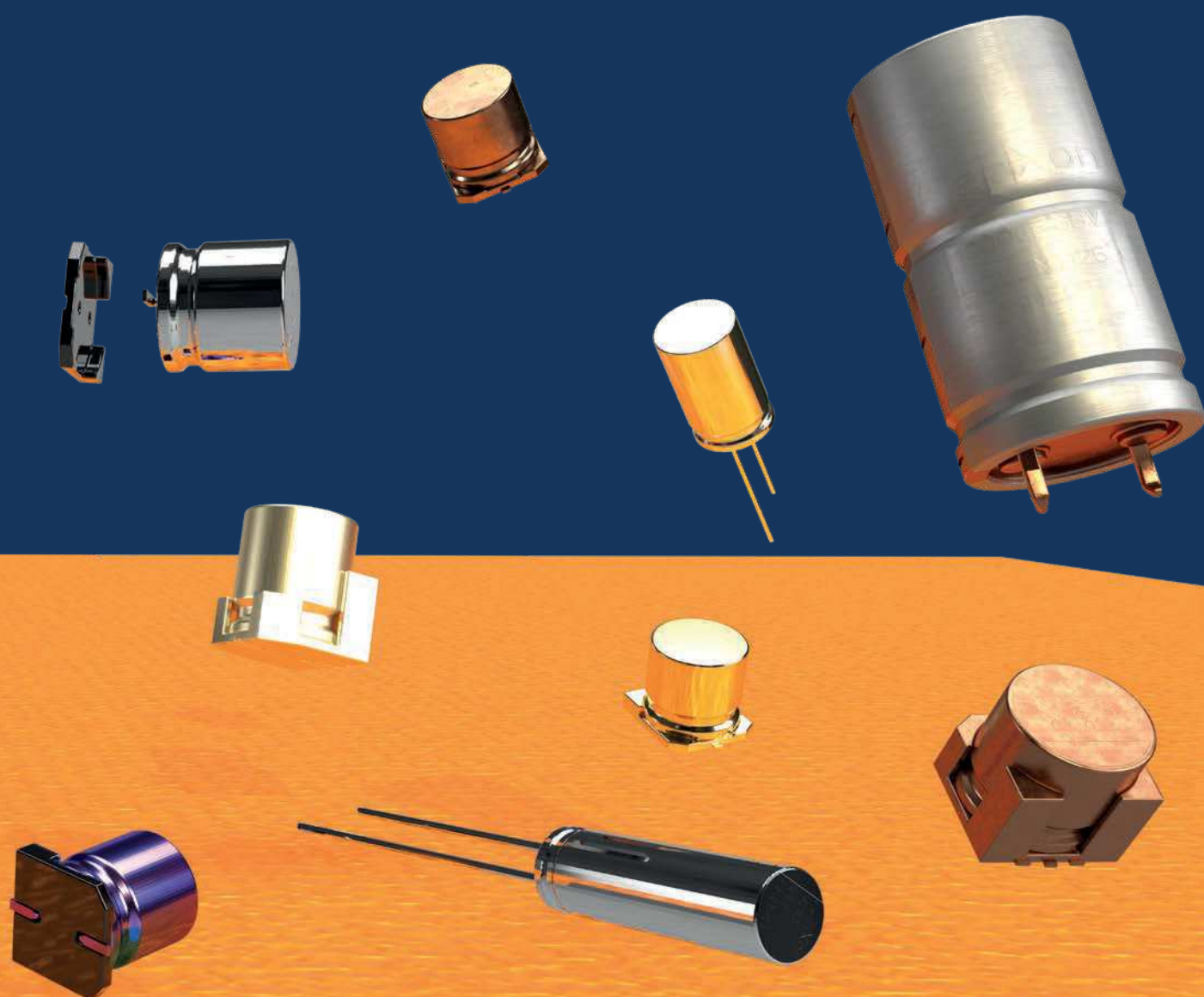


# CAPXON

## ELECTROLYTIC CAPACITORS




AUTOMOTIVE APPLICATIONS



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## 10 FACTS ABOUT CAPXON



## A WORLD OF ELECTROLYTIC CAPACITORS

CapXon's know-how in Electrolytic Capacitors covers technologies with aluminium foil. These are Aluminum Electrolytics, Solid Conductive Polymers and the combination known as Hybrid Conductive Polymers:

Aluminum Electrolytic	Description	Features
	<p>Rated Voltage • <math>V_R</math></p> <p>Cathode Material</p> <p>Self-healing of Dielectric</p> <p>Package</p> <p>Stability</p> <p>Lifetime</p> <p>Reliability</p>	<p>4 VDC to 650 VDC</p> <p>Liquid Electrolyte</p> <p>Yes</p> <p>Widest range in all sizes</p> <p>Reduced performance at low temperature</p> <p>Limited life at high temperature</p> <p>Automotive  AEC-Q200 qualified</p>
Solid Conductive Polymer	Description	Features
	<p>Rated Voltage • <math>V_R</math></p> <p>Cathode Material</p> <p>Self-Healing of Dielectric</p> <p>ESR</p> <p>Stability</p> <p>Lifetime</p> <p>Reliability</p>	<p>2.5 VDC to 100 VDC</p> <p>Solid Conductive Polymer</p> <p>No</p> <p>Ultra-low ESR at high frequency</p> <p>Stable for low and high temperature</p> <p>Very stable and long life - no dry out</p> <p>Only internal standard qualification</p>
Hybrid Conductive Polymer	Description	Features
	<p>Rated Voltage • <math>V_R</math></p> <p>Cathode Material</p> <p>Self-Healing of Dielectric</p> <p>ESR</p> <p>Stability</p> <p>Leakage Current • <math>I_{LEAK}</math></p> <p>Reliability</p>	<p>16 VDC to 400 VDC</p> <p>Solid Conductive Polymer &amp; Liquid Electrolyte</p> <p>Yes</p> <p>Very low ESR at high frequency</p> <p>Even more stable than liquid type</p> <p>Lower leakage current than Solid Conductive Polymer Type</p> <p>Automotive  AEC-Q200 qualified</p>

## COMPARISON OF ELECTROLYTIC CAPACITOR TECHNOLOGIES

Characteristics	Aluminum Electrolytic Capacitor	Solid Conductive Polymer Capacitor	Hybrid Conductive Polymer Capacitor
ESR at High Frequency	● (120 ~ 1 000 mΩ)	++ (7 ~ 15 mΩ)	+ (20 ~ 30 mΩ)
Leakage Current · I <sub>LEAK</sub>	++ (0.01·C <sub>R</sub> ·V <sub>R</sub> )	● (0.2·C <sub>R</sub> ·V <sub>R</sub> )	++ (0.01·C <sub>R</sub> ·V <sub>R</sub> )
Ripple Current · I <sub>R</sub>	● (~ 600 mA)	++ (2 000 ~ 7 000 mA)	+ (2 000 ~ 3 000 mA)
Rated Voltage · V <sub>R</sub>	++ (~ 700 V)	● (~ 100 V)	+ (~ 400 V)
Operating Temperature Characteristics	+ (-40 ~ + 125 °C)	+ (-55 ~ + 125 °C)	++ (-55 ~ + 150 °C)
Low Temperature Characteristics	● (-40 ~ + 125 °C)	++ (-55 ~ + 125 °C)	+ (-55 ~ + 150 °C)
Lifetime	● (105 °C / 3 000h)	++ (105 °C / 5 000h)	++ (105 °C / 10 000h)
Failure Mode	+ Open	● Short	+ Open

++ ... best performance

+ ... well performance

● ... basic performance

## IATF 16949 CERTIFICATION

As an international standard for quality management in the automotive industry, IATF 16949 forms the basis for delivering electronic components to automobile manufacturers or their producers.

CapXon's IATF 16949 certificate stands for:

- Improvement and idealization of all product and process flows in development and production
- Minimization of production fluctuations and error reduction
- Compliance and methodology according to a worldwide quality standard
- Meeting the demands of global quality systems for the automotive industry
- Increase product quality



### RELIABILITY TESTS ▪ AEC-Q200

As a prerequisite for being active in the supply chain of automobile manufacturers or their suppliers, compliance with the reliability standard AEC-Q200 (for passive components) and the quality standards according to IATF 16949 for zero defect quality are necessary. CapXon performs all reliability tests in its ISO/IEC 17025: 2005 accredited laboratory.

Endurance, useful life and temperature stress tests



Humidity bias, electrical characterization and temperature cycling tests



Board flex, terminal strength, solderability, solvents, surge voltage, vent, free fall, mechanical shock and vibration tests





**ISO/IEC 17025 ACCREDITED LABORATORY**

ISO/IEC 17025 specifies the requirements of laboratories in which reliability tests or calibrations are carried out. The focus is on the reliability and quality of test methods and the evidence that tests are consistently reliable and trustworthy.

CapXon qualifies the used measuring instruments, validates the test methods carried out for robustness, reproducibility and accuracy. The quality of the laboratory is periodically accredited by an external audit by CNAS (China National Accreditation Service of Conformity Assessment). **The results, certified according to ISO/IEC 17025, maximize the acceptance of the laboratory as an independent test center.**



## PPAP • PRODUCTION PART APPROVAL PROCESS

The **Production Part Approval Process (PPAP)** is a documented and standardized sampling procedure for series products in the automotive sector. The PPAP is part of the APQP requirements from the IATF 16949 and shows that CapXon can permanently produce, electrolytic capacitors under the requirements and specifications, specified by the customer.

- 1 Design Records
- 2 Engineering Change Document
- 3 Customer Engineering Approval
- 4 Design FMEA
- 5 Process Flow Diagrams
- 6 Process FMEA
- 7 Control Plan
- 8 Measurement System Analysis
- 9 Dimension Results
- 10 Material, Performance Report
- 11 Initial Process Studies
- 12 Qualified Laboratory Documentation
- 13 Appearance Approval Report
- 14 Samples Products
- 15 Master Samples
- 16 Checking Aids
- 17 Balance of Material
- 18 Part Submission Warrant (PSW)

The image displays a collection of 18 documents used in the PPAP process, arranged in a collage. The documents include:

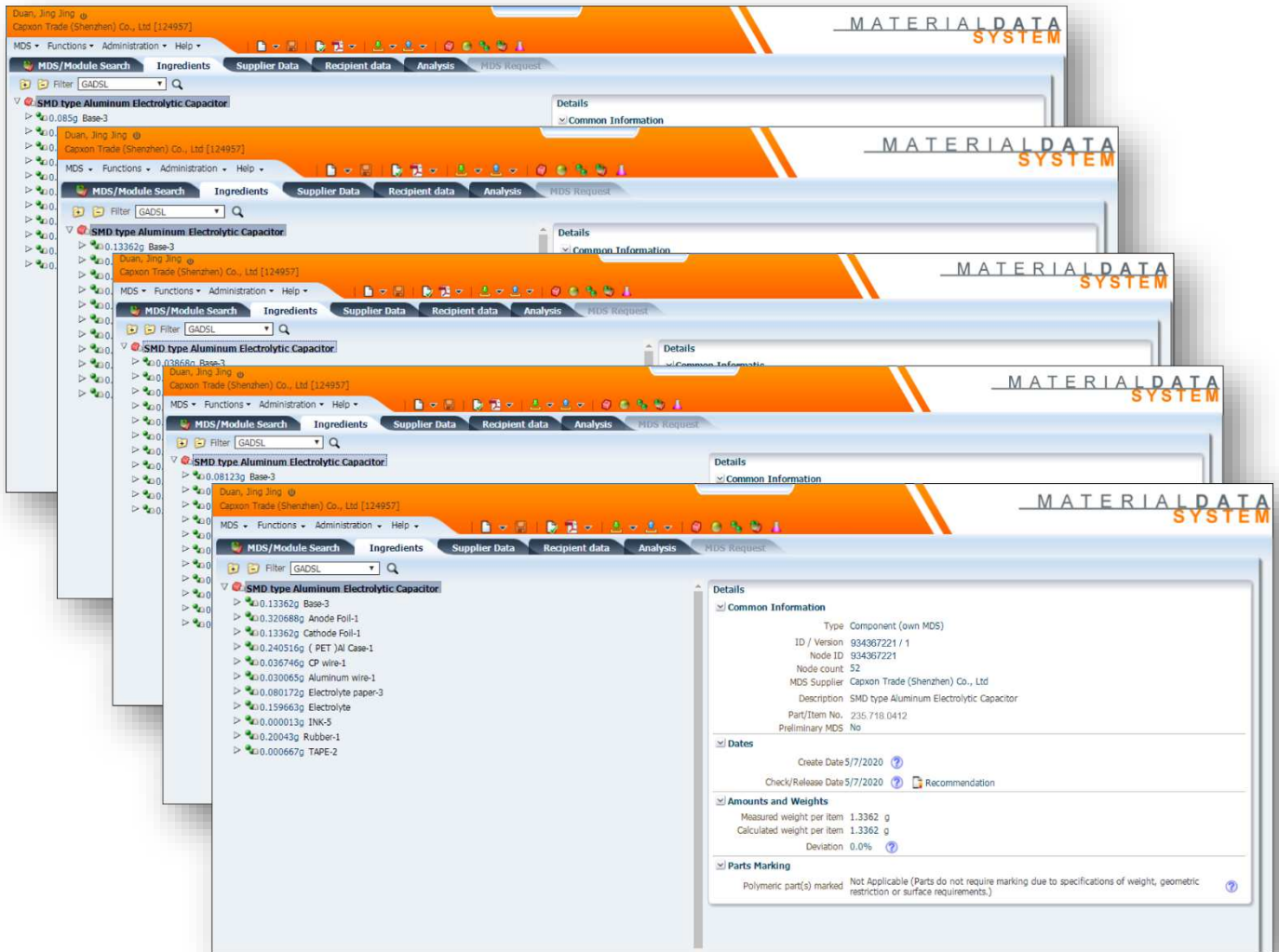
- Production Part Approval Process**: Main title page with part number DV221M035F105ETR and 235.718.0412.
- Table of Contents**: Lists sections like Design Records, Engineering Change Document, and Design Failure Mode and Effects Analysis (DFMEA).
- Initial Process Studies**: Includes measurement system analysis (MSA) charts and process parameters.
- Process Flow Diagrams**: Shows the manufacturing steps from processing to transportation.
- Gauge Repeatability and Reproducibility Data Collection Sheet**: Contains statistical data for LCR meter measurements.
- Biased Humidity Test Report**: A detailed table with columns for test parameters and results.
- Balance of Material**: A table listing various components and their weights.
- Part Submission Warrant (PSW)**: A comprehensive form for part approval, including customer information, material reporting, and submission results.

## IMDS ▪ INTERNATIONAL MATERIAL DATA SYSTEM

The IMDS – **International Material Database System** contains information about the used materials within the build-up of the component. IMDS has become a global standard used by almost all of the global OEMs.

With IMDS, it is possible to monitor and control hazardous substances and prohibited substances down to the single component. IMDS is mainly used to fulfil various reporting requirements of automotive manufacturers.

**For all our AEC-Q200 components and in case of an automotive use case, we provide IMDS entries on request.**



## COMPONENT RELIABILITY DATA

In this section, the main parameters for predictive reliability and availability calculations are explained and in which way CapXon can provide you with such data.

### FAILURE RATE $\lambda$

The failure rate  $\lambda$  describes the frequency which components possibly fail. The failure rate describes how many defects can be expected, if you run the application in operation for a certain time.

The failure rate can be calculated as following:

$$(1) \quad \lambda = \frac{n}{N \cdot t}$$

- n ... Number of defect components
- N ... Number of tested components
- t ... Amount of operating hours

### FAILURE CRITERIA

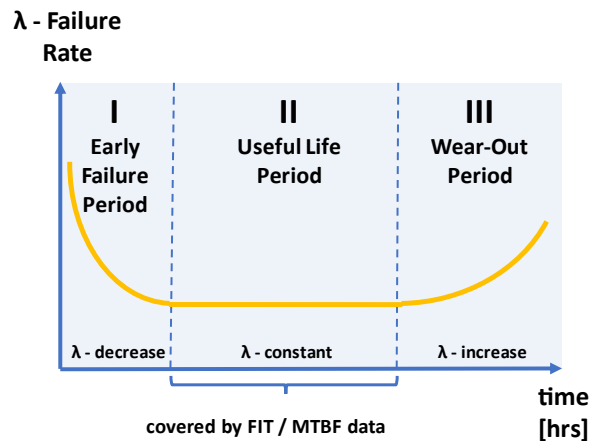
Capacitors will show certain wear-out phenomenon's by aging and so as times goes by the capacitors can possibly change their electrical performance.

**As soon as the component is no longer fulfilling their electrical spec, stated features or with customer agreed parameters, the status of capacitor is seen as in failure mode or defect. This does not necessarily mean that the application will fail. An essential influence are the design and dimensioning by customer, which lead to major impact on possible failure modes and fail criteria for the application itself.**

All given data by CapXon is just concerning the failure mode cases of the single component and is not representing the complexity of complete applications, assembled systems nor full electronic PCB boards.

### BATHTUB CURVE

It's a widely used model within the reliability engineering to describe the expected failure rates over the whole application lifetime / product life cycle.



#### Bathtub curve

**The Bathtub Curve states the failure rate behaviour within the three different product life cycle stages. These are the Early Failure Period, the Useful Life Period and the Wear Out Period.**

With production control, monitoring and quality assurance, it is possible to reduce the early failures to a best possible minimum.

Failures within the Useful Life Period, which are described as FIT or MTBF value, are defined as events of coincidence and are not representing any systematic or epidemic failures.

### FIT – FAILURES IN TIME

FIT - Failures In Time is the common way to describe the expected failure rate for electronics.

**The FIT values describe certain failure rate within the useful life period and provides the basis for calculations, assumptions and extrapolation of reliability and availability to gather the understanding for expected failures / defects. These calculated figures are used to decide whether the component is a proper choice for the desired use case. Additionally, it need to be clarified whether redundancies are necessary and which redundancies are needed to fulfil the desired mission profile of an application.**

The unit FIT defines the expected amount of failures per application hour.

$$(2) \quad 1 \text{ FIT} = \frac{10^{-9}}{h} = \frac{10^{-9} \text{ failures}}{\text{per operating hour}}$$

So as higher the stated FIT value is, as higher the statistical chance of defect is.

Please find the following example of a failure rate test determined by a useful life test:

- Number of failures  $n = 2$
- Number of tested components  $N = 10\ 000$
- Operating hours  $t = 20\ 000\ h$

$$(3) \quad \lambda = \frac{n}{N \cdot t} = \frac{2}{10\ 000 \cdot 20\ 000\ h} = 10\ FIT$$

$$(4) \quad 10\ FIT = \frac{10^{-8}}{h} = \frac{0.001\%}{1\ 000\ h}$$

## MTBF - MEANTIME BETWEEN FAILURES

It's the predicted elapsed time between inherent failures of an electronic system during normal operation. The MTBF can be calculated as arithmetic mean / average time between failures of a system.

Assuming a constant failure rate, the MTBF can be easily calculated by reciprocal value of the Failure Rate  $\lambda$ :

$$(5) \quad MTBF = \frac{1}{\lambda}$$

MTBF is just a different way to describe the failure rate and can be easily converted to FIT and vice versa:

$$(6) \quad MTBF = \frac{10^9\ h}{FIT} = \frac{114\ 000\ years}{FIT}$$

$$(7) \quad FIT = \frac{10^9\ h}{MTBF} = \frac{114\ 000\ years}{MTBF}$$

The **MTBF** values are just covering the useful life period (flat middle section) of the bathtub curve. Because of this, a FIT or MTBF value can't be extrapolated to estimate the service lifetime for a component. FIT or MTBF values doesn't cover the higher failure rates of the wear-out period, where the expected failure rate would be higher due to occurring wear-out phenomenon's.

## LIFETIME TESTS

Due to the fact that all electrolytic capacitors show aging behaviour and a possible drift of electrical parameters over usage time, lifetime tests are performed by manufacturers to describe the related reliability and performance of a certain capacitor. Different product series as well as the single product itself can provide very different lifetime performance. So, these test results are given to select the proper product in relation to the applied stress profile of application to gain the desired application performance within the whole product life cycle.

**There are various names (e.g. Endurance, Load Life, Useful Life, Operational Life, Life Expectancy, Shelf Life, ...) and different lifetime tests that are existing within the industry. Please kindly check the specific test specification and given data for the capacitor before design-in.**

Sadly, there is no standardized naming and test criteria existing, given by any international accepted standard committee for all the lifetime tests, which are applied to electrolytic capacitors. Customers need to compare competitor products carefully with each other to see if test specifications are similar or different.

Please see particular datasheets for the specific test results and criteria of an individual product of CapXon.

Again, please note that the criteria of failure are given by the test specification limits of the dedicated lifetime test and as soon as a component is not fulfilling these given limits, it is rated as a failure. So, failure does not necessarily mean defect or breakdown of application. It is just describing that the drift of electrical performance is bigger than the checked limits of the particular test. It doesn't matter whether the measured C value is lower as the allowed test limit or the component is in a failure mode of open circuit, both cases are treated the same as a failure. Design and dimensioning of application will arrange how much drift of electrical parameters can be accepted for the individual capacitor. For example, when the rate of capacitance change is becoming critical within the application is defined by customer design. The lifetime tests are in place to provide a common and industry-wide comparable performance index of the capacitors.

**As manufacturer, we can state and check how fast a drift of capacitance and further parameters will happen. Dimensioning within application design will set how long an error-free operation is possible. A proper dimensioning can enlarge the acceptable drift and so the lifetime performance. But be aware, if it is not done properly or component is overstressed, it also can shorten the expected lifetime performance. Please be aware to check dimensioning and drift estimation to assure your product performance for the desired lifetime.** For support with lifetime estimations and dimensioning, we are pleased to support you and feel free to get in touch with our technical support.

In the following section CapXon's lifetime tests, which are performed with our products, are described in detail.

## ENDURANCE

The Endurance test of the product checks the performance of its electrical parameters, such as capacitance change, leakage current and dissipation factor on their behaviour over time at a predetermined test setup of electrical stress and ambient condition.

Depending on the product series, the Endurance test is performed according to one of the settings below:

### Setting 1 - applying Endurance test:

- max. Temperature
- $V_R$  - Rated Voltage

### Setting 2 - applying Endurance test:

- max. Temperature
- $V_R$  - Rated Voltage
- $I_R$  - Rated Ripple

Setting 1 is in accordance to the IEC 60364-4 / JIS 51001-4 test criteria and Setting 2 is enlarging the electrical stress setup with additional appliance of  $I_R$ , to get a more representative result in comparison to possible real-life application stress.

The Endurance test is performed within product qualification at the stage of internal product validation and is repeated periodically for product requalification.

## USEFUL LIFE

To get more representative understanding of lifetime performance for typical capacitor use, the useful life test represents such criteria.

The applied electrical stress is like the Endurance test - Setting 2. The test specification limits are wider as the endurance test specification, but as described the applied electrical stress stays similar. So, a larger acceptable drift of electrical parameters results in a larger expected lifetime. This represents the operational frame which is set by customer at dimensioning the capacitor specification for their application and the possible borders of an error-free operation.

Also, we state a FIT value related to the useful life test. These failure rate describes the deviation / possibility of occurrence of failures within the useful life period when the settings of useful life test are applied. This is related to the middle section of the bathtub curve the so-called useful life period (see above page 12 - Bathtub Curve of Product Reliability).

In the datasheet you will find the following phrase:

Failure Rate (during useful Life): 1%/1 000h with a confidence level of 60%. As a result, this is like a 10 000 FIT:

$$\lambda = \frac{1\%}{h} = 10\,000 \text{ FIT} = 10\,000 \text{ failures} * 10^{-9h}$$

### Example:

If you have 8 000 components running in applications for 5 000 hours with the test conditions applied like the useful life test, you can estimate the number of components that show a higher drift as given by the useful life test spec borders as follows:

- Number of components  $N = 8\,000$
- Operating hours  $t = 5\,000 \text{ h}$

$$\lambda = \frac{n}{N * t}$$

$$n = \lambda * N * t = \frac{1\%}{1\,000h} * 8\,000 * 5\,000h = 400$$

This means that when there are 8 000 pcs in operation for 5 000 hours at the maximum possible operating conditions (max. temp.,  $V_R$  &  $I_R$  similar to useful life test criteria) an amount of 400 products (with a confidence level of 60%) can be expected to show a higher drift as given in the test spec.

## SHELF LIFE

The shelf life test simulates the aging of the capacitor, if it is just stressed with ambient temperature without any electrical load. The shelf life is not defining the possible storage time of the capacitor but just to describe the aging situation before mounting / PCB assembly.

The Shelf Life test criteria shall be satisfied, if the capacitor was restored to 20°C and following a conditioning by voltage treatment in accordance with 4.1 of JIS 5101-4 was applied, before measuring the capacitor.

**LIFETIME TEST EXAMPLES**

**Example 1** - Useful Life, Endurance (Setting 1) and Shelf life tests of SMD types – HV Series:

Lifetime Test		
Endurance 105°C (V <sub>a</sub> applied)	Test	2 000 hours
	ΔC/C	≤ ±30% of initial measured value
	tanδ	≤ 300% of initial specified value
	I <sub>leak</sub>	≤ the initial specified value
Shelf Life 105°C (None)	Test	1 000 hours
	ΔC/C	≤ ±30% of initial measured value
	tanδ	≤ 300% of initial specified value
	I <sub>leak</sub>	≤ the initial specified value
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below	
	ΔC/C	Within ±10% of initial value
	tanδ	Less than specified value
	I <sub>leak</sub>	Less than specified value

**Example 2** - of Useful Life, Endurance (Setting 2) and Shelf life tests of Radial types – GF Series

Lifetime Test			
Endurance 105°C (V <sub>a</sub> & I <sub>a</sub> applied)	Test	2 000 hours	ø D 5 ~ 6.3 mm
		3 000 hours	ø D 8 mm
		5 000 hours	ø D ≥ 10 mm
	ΔC/C	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
Shelf Life 105°C (None)	Test	1 000 hours	
		ΔC/C ≤ ±20% of initial measured value	
		tanδ ≤ 200% of initial specified value	
		I <sub>leak</sub> ≤ the initial specified value	

**Example 3** - of Useful Life, Endurance (Setting 2) and Shelf life tests of Snap In types – HU Series:

Lifetime Test		V <sub>a</sub> ≤ 100V	V <sub>a</sub> > 100V
Useful Life 105°C (V <sub>a</sub> & I <sub>a</sub> applied)	Test	5 000 hours	8 000 hours
	ΔC/C	≤ ±30% of initial measured value	≤ ±20% of initial measured value
	tanδ	≤ 300% of initial specified value	≤ 200% of initial specified value
	I <sub>leak</sub>	≤ the initial specified value	≤ the initial specified value
Endurance 105°C (V <sub>a</sub> applied)	Test	3 000 hours	
	ΔC/C	≤ ±15% of initial measured value	≤ ±10% of initial measured value
	tanδ	≤ 130% of initial specified value	≤ 130% of initial specified value
	I <sub>leak</sub>	≤ the initial specified value	≤ the initial specified value
Shelf Life 105°C (None)	Test	1 000 hours	
		ΔC/C ≤ ±15% of initial measured value	
		tanδ ≤ 130% of initial specified value	
		I <sub>leak</sub> ≤ the initial specified value	

**Example 4** - Useful Life, Endurance (Setting 2) and Shelf life tests of Screw types – RK Series:

Lifetime Test			
Useful Life 105°C (V <sub>a</sub> & I <sub>a</sub> applied)	Test	4 000 hours	
	ΔC/C	≤ ±45% of initial measured value	
	tanδ	≤ 300% of initial specified value	
	I <sub>leak</sub>	≤ the initial specified value	
Endurance 105°C (V <sub>a</sub> applied)	Test	2 000 hours	
	ΔC/C	≤ ±15% of initial measured value	
	tanδ	≤ 130% of initial specified value	
	I <sub>leak</sub>	≤ the initial specified value	
Shelf Life 105°C (None)	Test	1 000 hours	
		ΔC/C ≤ ±15% of initial measured value	
		tanδ ≤ 130% of initial specified value	
		I <sub>leak</sub> ≤ the initial specified value	

**TELCORDIA SR-332**

This industry-wide accepted standard provides data and tools for reliability predictions of components, devices or full hardware units of electronic equipment. Telcordia (for-

merly Bellcore). With the given figures and data, it is possible to assure system availability and to gather the desired system reliability.

**FIT & MTBF DATA OF CAPXON PRODUCTS**

CapXon provides FIT & MTBF values based on Telcordia SR332 standard for all components. From our perspective, it provides more reliable prediction because it is more specific and detailed than MIL-217 or Siemens SN 29500.

Please find the FIT values for CapXon components and application-based reliability prediction calculations on the following page.

The table of SMD / RADIAL / Snap-In is covering all Electrolytic Technologies – Liquid, Solid and Hybrid Electrolytic Capacitors in SMD & Radial.

The table of Screw capacitors is just concerning Liquid Aluminum Electrolytic Capacitors.

Mounting Type	SMD / Radial / Snap-In					
	100%		75%		50%	
Electrical Stress						
Operating Temp. [°C]	$\lambda$ [FIT]	$\sigma$ [FIT]	$\lambda$ [FIT]	$\sigma$ [FIT]	$\lambda$ [FIT]	$\sigma$ [FIT]
≤ 30	1,19	0,28	0,65	0,15	0,36	0,08
35	1,52	0,35	0,84	0,19	0,46	0,11
40	1,94	0,45	1,06	0,25	0,58	0,14
45	2,45	0,57	1,34	0,31	0,74	0,17
50	3,07	0,71	1,68	0,39	0,92	0,22
55	3,82	0,89	2,10	0,49	1,15	0,27
60	4,72	1,10	2,59	0,60	1,42	0,33
65	5,80	1,35	3,19	0,74	1,75	0,41
70	7,09	1,65	3,89	0,91	2,14	0,50
75	8,61	2,01	4,73	1,10	2,59	0,60
80	10,40	2,42	5,71	1,33	3,13	0,73
85	12,50	2,91	6,86	1,60	3,76	0,88
90	14,94	3,48	8,20	1,91	4,50	1,05
95	17,78	4,14	9,76	2,27	5,35	1,25
100	21,05	4,90	11,55	2,69	6,34	1,48
105	24,82	5,78	13,62	3,17	7,47	1,74
110	29,13	6,78	15,99	3,72	8,77	2,04
115	34,05	7,93	18,69	4,35	10,26	2,39
120	39,65	9,23	21,76	5,07	11,94	2,78
125	45,99	10,71	25,24	5,88	13,85	3,23
130	53,15	12,38	29,17	6,79	16,01	3,73
135	61,20	14,25	33,59	7,82	18,43	4,29
140	70,24	16,36	38,55	8,98	21,15	4,93
145	80,34	18,71	44,09	10,27	24,20	5,64
150	91,60	21,33	50,27	11,71	27,59	6,43

Table 1: FIT values for SMD, Radial, Snap-In

**Remark:** Above values are only valid within the max. specified temperature range of the particular component. All given FIT data is meant for lifetime predictions only and is not representing any warranty.

For particular products (e.g. screw capacitors) within the datasheet, further FIT or MTBF data is added and in such a case, this substitutes the general information stated above.

Mounting Type	Screw terminal					
	100%		75%		50%	
Electrical Stress						
Operating Temp. [°C]	$\lambda$ [FIT]	$\sigma$ [FIT]	$\lambda$ [FIT]	$\sigma$ [FIT]	$\lambda$ [FIT]	$\sigma$ [FIT]
≤ 30	34,20	24,43	18,77	13,40	10,30	7,36
35	43,85	31,32	24,06	17,19	13,21	9,43
40	55,78	39,84	30,61	21,87	16,80	12,00
45	70,42	50,30	38,65	27,61	21,21	15,15
50	88,27	63,05	48,44	34,60	26,59	18,99
55	109,88	78,48	60,30	43,07	33,09	23,64
60	135,88	97,06	74,57	53,27	40,93	29,23
65	166,99	119,28	91,65	65,46	50,30	35,93
70	203,99	145,71	111,95	79,97	61,44	43,89
75	247,76	176,97	135,97	97,12	74,62	53,30
80	299,26	213,76	164,24	117,31	90,14	64,38
85	359,57	256,84	197,34	140,96	108,30	77,36
90	429,86	307,04	235,91	168,51	129,47	92,48
95	511,39	365,28	280,66	200,47	154,03	110,02
100	605,57	432,55	332,34	237,39	182,39	130,28
105	713,89	509,92	391,79	279,85	215,02	153,59

Table 2: FIT values for Screw types

$\lambda$  - Mean Component Failure Rate

$\sigma$  - Standard Deviation of Component Failure Rate



## CALCULATION OF FIT VALUE FOR APPLICATION CASE

By using the given Telcordia SR-332 figures and by the assumption that the failure rate follows a gamma distribution, the FIT value can be calculated with given mean  $\lambda$  and standard deviation  $\sigma$  (see section tables in section 8.8) and desired UCL - Upper Confidence Level as follows:

$$\text{shape } \kappa = \left(\frac{\lambda}{\sigma}\right)^2$$

$$\text{scale } \theta = \frac{\sigma^2}{\lambda}$$

The desired FIT value for the application case is the P% quantile of the gamma distribution and it can be calculated by the inverse cumulative gamma distribution with the shape  $\kappa$  and scale  $\theta$  parameters as follows:

$$\lambda_{P\%UCL} = G^{-1}(P/100; \kappa; \theta)$$

If the shape  $\kappa$  parameter is >100 the FIT can also be calculated by using the P% quantile of the normal distribution, by inverse cumulative distribution of normal distribution with mean  $\lambda$  and standard deviation  $\sigma$ :

$$\lambda_{P\%UCL} = N^{-1}(P/100; \lambda; \sigma)$$

Customer need to define which UCL is desired for the reliability prediction for their application case (typical values for UCL are e.g. 60%,90%, 95%, 99%).

### CALCULATION EXAMPLE

#### Example 1:

GF Series – Radial type  
Aluminum Electrolytic Capacitor

@ 70°C and 75% electrical stress  
Upper Confidence Level (UCL) = 90%

Values according to table 1 at page 16:

$\lambda = 3.89$  FIT /  $\sigma = 0.91$  FIT

$$\text{shape } \kappa = \left(\frac{3.89}{0.91}\right)^2 = 18.27$$

$$\text{scale } \theta = \frac{0.91^2}{3.89} = 0.21$$

$$\lambda_{90\%UCL} = G^{-1}(90/100; 18.27; 0.21) = 5.02 \text{ FIT}$$

In Microsoft Excel you can solve this with the following formula:

International / American Excel Version:  
=GAMMAINV(0.9,18.27,0.21)

European Excel Version:  
=GAMMAINV(0,9;18,27;0,21)

#### Example 2:

RG Series - Screw type  
Aluminum Electrolytic Capacitor

@ 60°C and 75% electrical stress  
Upper Confidence Level (UCL) = 90%

Values according to table 2 at page 16:

$\lambda = 74.57$  FIT /  $\sigma = 53,27$  FIT

$$\text{shape } \kappa = \left(\frac{74.57}{53.27}\right)^2 = 2.01$$

$$\text{scale } \theta = \frac{0.91^2}{3.89} = 38.05 \text{ FIT}$$

$$\lambda_{90\%UCL} = G^{-1}(90/100; 2.01; 38.05) = 148.57 \text{ FIT}$$

In Microsoft Excel you can solve this with the following formula:

International / American Excel Version:  
=GAMMAINV(0.9,2.01,38.05)

European Excel Version:  
=GAMMAINV(0,9;2,01;38,05)

## QUALITY MANAGEMENT SYSTEM

We are committed and living the principle of **QUALITY FIRST - to offer highly satisfying products and service to the customer**. This global aim is shared by the CapXon quality and environmental management system and part of our business philosophy:

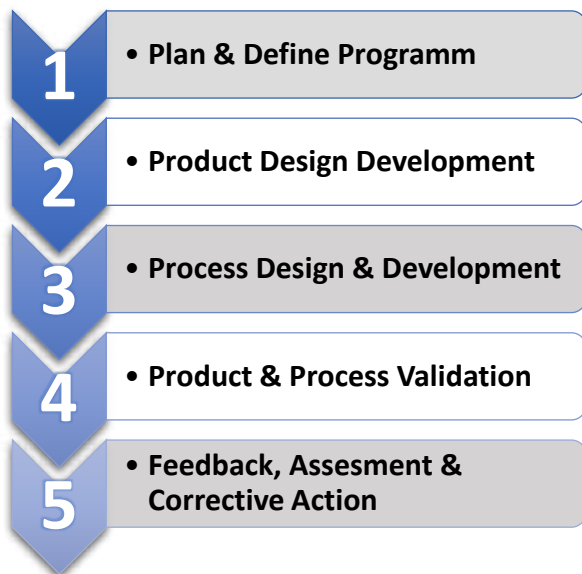
## QUALITY MANAGEMENT SYSTEM CERTIFICATION

In accordance with our quality commitment, CapXon quality management is certified by **ISO 9001** and **IATF 16949**. The certification covers our production plants as well as our sales organization. This standard is applied throughout the company and is used to implement, monitor and to proceed the CapXon quality policy in all process steps.

## PRODUCT AND PROCESS QUALITY

Our product and process development follows the sequence and phases of **APQP – Advance Product Quality Planning**:

### 5 Phases of APQP



Quality tools such quality tools, including **5S, PDCA, FMEA, (DFMEA & PFMEA), MSA, APQP, PPAP, SPC** and others, are in place to minimize risks, provide constant monitoring and ensure continuous improvements in conjunction with regular internal audits and QM reviews.

## QUALITY ASSURANCE

For our sample checks, we refer to **AQL - Acceptable Quality Level** figures, which are based on a random sampling

plan in accordance with **MIL-STD-1916**. Referring to instructions of this standard, a delivered lot will be accepted with a probability of 90%, if the percentage of non-conformance does not exceed the stated AQL figure. As a general internal target, the percentage of non-conformance in deliveries from CapXon is significantly below the AQL figure. The acceptance value we apply to non-conform components is  $c=0$ .

## INCOMING GOODS INSPECTION BY CUSTOMER

We recommend applying planned random sampling checks in accordance with MIL-STD-1916, is compliant with MIL STD 105 D and IEC 60410, for incoming goods inspection. The test methods, which shall be applied, are laid down in the relevant standards.

## ENVIRONMENTAL MANAGEMENT

### Environmental Policy

CapXon defines internally the following environmental protection principles:

- comply with the given law & regulations
- observe and act to reduce pollution
- produce cleanly
- reduce the consumption and save resources
- cut down usage of toxic substances
- make continuous improvements
- protect the environment

## ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATION

CapXon environmental management system is certified in accordance with ISO 14001 and is applied throughout the whole company as well as CapXon's environmental policy is implemented.

## ENVIRONMENTAL HAZARDOUS SUBSTANCES FREE MANAGEMENT SYSTEM

To show our commitment to protect the environment and people, CapXon drives a sustainable effort to produce environment-friendly products.

IECQ QC 080000 HSPM - Hazardous Substance Process Management, which is based on the quality management system of ISO 9001.

The CapXon QC080000 based HSF management system is company-wide applied for implementing the CapXon environmental Hazardous Substances management and that CapXon products effectively in the management of hazardous substances.

## ENERGY MANAGEMENT SYSTEM

CapXon establishes comprehensive energy use management in accordance with the requirements of ISO 50001 Energy Management System in order to meet the social responsibility of low carbon environmental protection and efficiency

## CERTIFICATION IN ACCORDANCE TO ISO 14001, ISO 50001, QC 080000

The CapXon Group operates an environmental management system that conforms to the requirements of **ISO 14001** and is mandatory for all plants. The CapXon Group operates an Energy management system that conforms to the requirements of **ISO 50001** and is mandatory for all plants. The CapXon Group operates an environmental **Hazardous Substances Free management system** that conforms to the requirements of QC 080000 and is mandatory for all plants. The company certificate is posted on the CapXon internet: ([www.capxongroup.com](http://www.capxongroup.com)).

## RoHS COMPLIANCE

The abbreviation **RoHS** is usually called **Restriction of Hazardous Substances**, the full term is the short term for the **Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment** and is referring to the EU directive 2011/65/EU. The RoHS 2 – 2011/65/Eu substituted the former RoHS 1- 2002/95/EC.

The aim of RoHS is to banish Hazardous Substances of electronic waste, which can harm the environment and others. Based on this regulation, we as component manufacturer, need to design, observe and control that such hazardous materials are fully avoided and reduced to the max. Moreover, it's possible to replace them by adequate non concerned materials within the given limitations .

For all by RoHS scoped materials (excluding exempt products) the maximum permitted concentrations are:

**all concerned materials** (except Cd)

- 0,1% / 1000ppm

**Cadmium -Cd:**

- 0,01% or 100ppm

These limitations for the restricted materials focus on each homogeneous material within the product. So, the limitations are concerning each individual / single substance or part, which can be separated mechanically (e.g. aluminum can, rubber sealant) and are not apply to the weight of the whole component itself.

Last update of RoHS was Directive (EU) 2015/863, which was published on 2015-03-31 and implemented by 2019-07-22. According to this directive, the following ten substances are restricted:

- **Pb** - Lead
- **Hg**- Mercury
- **Cd** - Cadmium
- **Cr<sup>+6</sup>** - Hexavalent chromium
- **PBB** - Polybrominated biphenyls
- **PBDE** - Polybrominated diphenyl ether
- **DEHP** - Bis (2-ethylhexyl) phthalate
- **BBP** - Butyl benzyl phthalate
- **DBP** - Dibutyl phthalate
- **DIBP** - Diisobutyl phthalate

By the update DEHP, BBP, DBP and DIBP were added to the list of hazardous substances.

Since 2011 RoHS compliance is mandatory to be able to get CE approval.

## C-RoHS / CHINA RoHS COMPLIANCE

The common speech so called China RoHS means the conformance to **SJ/T 11363-2006** for electrical components and assemblies and is fully called **Administrative Measure on the Control of Pollution Caused by Electronic Information Products**.

In China RoHS, the following substances are banned because they are considered as environmentally hazardous:

- **Pb** - Lead
- **Hg**- Mercury
- **Cd** - Cadmium
- **Cr<sup>+6</sup>** - Hexavalent chromium
- **PBB** - Polybrominated biphenyls
- **PBDE** - Polybrominated diphenyl ether

Since December 2012, CapXon has provided China RoHS certification for our products and certifications.

## SONY GP CERTIFICATION

Since Nov 2011, CapXon has been certified as Green Partner by SONY and we are running an environmental management system that continuously meet the requirements of the SONY Green Partner Program and we are working in

accordance with the Sony environmental quality assurance. The Certificate is listed by **SONY GP Certificate No.: FC012746**

## REACH CERTIFICATION

REACH is the abbreviation for Registration, Evaluation, Authorization of Chemicals and by Regulation (EC) No 1907 /2006 it is

So each manufacturer or importer, who is shipping goods to the European Union, need to declare and be compliant according to REACH, if within the shipped goods a substance, which is listed out SVHC-List (Substances of Very High Concern) is included and overall a total mass of bigger a ton per year is imported.

CapXon is working in accordance with REACH requirements and certification is available for our products.

## ROHS & REACH MARKING

Within our datasheets, we mark the RoHS and REACH compliance with our "RoHS & REACH compliant"- marking, please see marking below for reference:



## HALOGEN FREE (HF)

The Halogen Free requirements are based on customer and environmental regulations on management and control requirements of halogens, such as the **European Directive 2002/95/EC, IEC 61249-2-21, Montreal Protocol on Substances that Deplete the Ozone Layer and Controls the Stockholm joint pledge about durable organic pollutant.**

Concerned by the halogen-free initiative are elements like:

- **Fluorine**
- **Chlorine**
- **Bromine**
- **Iodine**
- **Astatine**

In case of fire, these elements can release toxic fumes, which could harm humans and can also cause corrosion of metals.

CapXon is using halogen-free materials for all our electrolytic capacitors. Since 31<sup>st</sup> of Oct 2009 all products meet the halogen-free requirements.

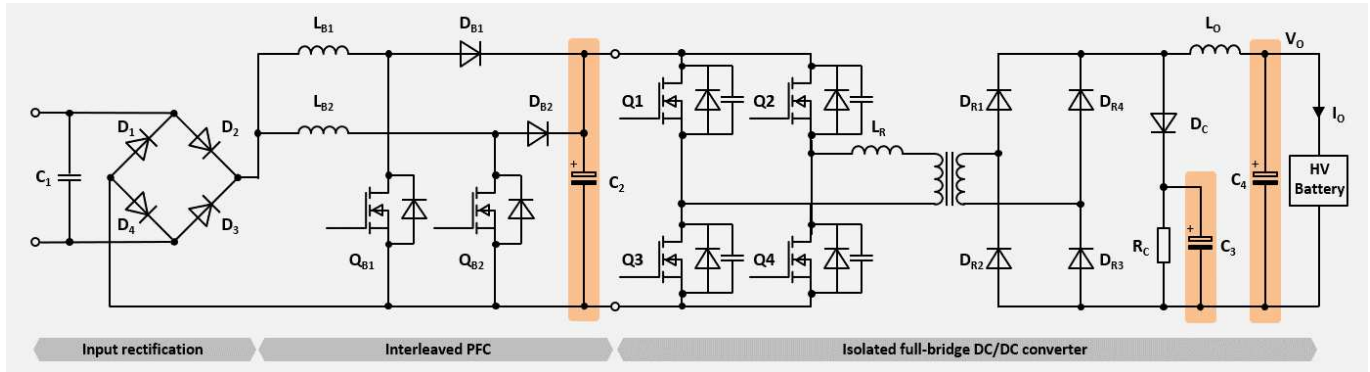
## BANNED AND ENVIRONMENTAL HAZARDOUS SUBSTANCES IN COMPONENTS

As a manufacturer of passive components, we develop our products focussing on sustainability. In order to guarantee a standardized procedure within CapXon, a mandatory avoidance list of Environmental Hazardous Substances with special interest is part of our environmental management system. The planning and development instructions include regulations and guidelines that aim to identify environmental aspects and to optimize products as well as processes with respect to material usage and environmental compliance to design them with sparing use of resources and to substitute hazardous substances as far as possible.

The environmental officer provides support in the assessment of the environmental impacts of our development projects and as part of our environmental management these aspects are checked and recorded in internal design reviews.

### EV ON BOARD CHARGER (OBC)

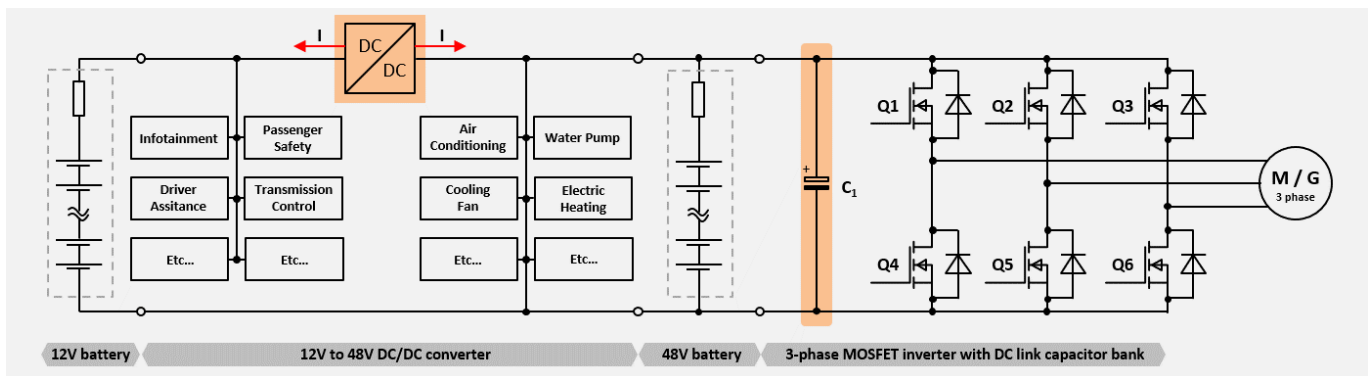
Example of an EV On Board Charger with 2 channel interleaved Power Factor Correction (PFC) and isolated full bridge DC/DC converter with recommended products.



Designation	Circuit	Purpose	Specification	Series	Part Number
C <sub>2</sub>	Interleaved PFC	Inductor ripple current filtering	150µF; 450V; 105°C; Radial; 12000h D18xL50mm; 1.07A@120Hz	FL	FL151M450K500AX
C <sub>2</sub>	Interleaved PFC	Inductor ripple current filtering	680µF; 450V; 105°C; Snap-In ; 10000h D35xL50mm; 2.5A@120Hz	UL	UL681M450P500AP6X
C <sub>3</sub>	Full-bridge DC/DC	Clamp voltage ringing filtering	3.3µF; 450V; 105°C; ±20%; 8000h D8xL16mm; 0.15A@100kHz	FL	FL3R3M450F160AX
C <sub>4</sub>	Full-bridge DC/DC	Low pass filtering	33µF; 450V; 105°C; Radial; 12000h D18xL25mm; 1.1A@100kHz	KH	KH330M450J250AX

### 12V TO 48V BOARD NET SYSTEM - 3-PHASE INVERTER CIRCUIT

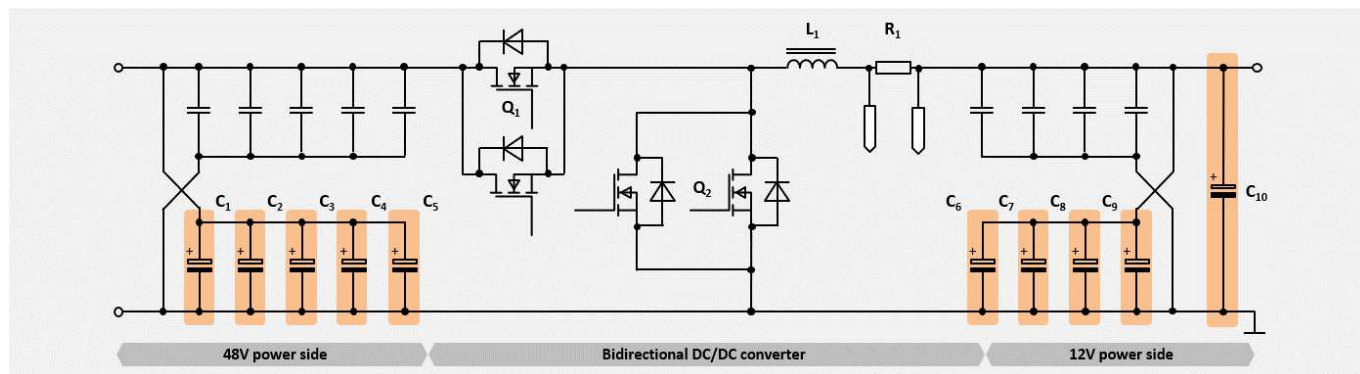
Example of a dual battery system 12V / 48V combined with 48V electric motors in mild hybrid cars with recommended products for the DC link capacitor bank.



Designation	Circuit	Purpose	Specification	Series	Part Number
C <sub>1</sub>	DC link bank	Energy coupling	150µF; 63V; 105°C; SMD; 10000h D10xL16.5mm; 4.35A@100kHz	AA	AA151M063G165PTRX
C <sub>1</sub>	DC link bank	Energy coupling	150µF; 63V; 125°C; SMD; 4000h D10xL16.5mm; 3.5A@100kHz	AC	AC151M063G165PTRX

### 12V TO 48V BOARD NET SYSTEM ▪ BIDIRECTONAL DC/DC CIRCUIT

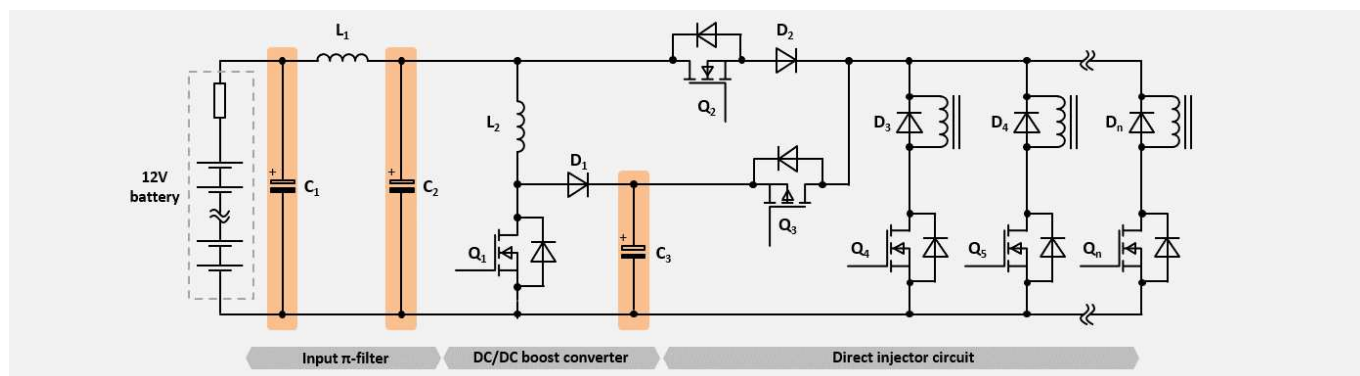
Example of a dual battery system 12V / 48V combined with 48V electric motors in mild hybrid cars with recommended products for the bidirectional DC/DC converter.



Designation	Circuit	Purpose	Specification	Series	Part Number
C <sub>1</sub> to C <sub>5</sub>	48V power side	Ripple filtering and ensure stability	33μF; 63V; 105°C; SMD; 10000h D10.5xL12.4mm; 1.7A@100kHz	AA	AA330M063F105PTRX
C <sub>6</sub> to C <sub>10</sub>	12V power side	Ripple filtering and ensure stability	33μF; 25V; 105°C; SMD; 10000h D5xL5.8mm; 0.9A@100kHz	AA	AA330M025C058PTRX

### DIRECT INJECTOR CIRCUIT

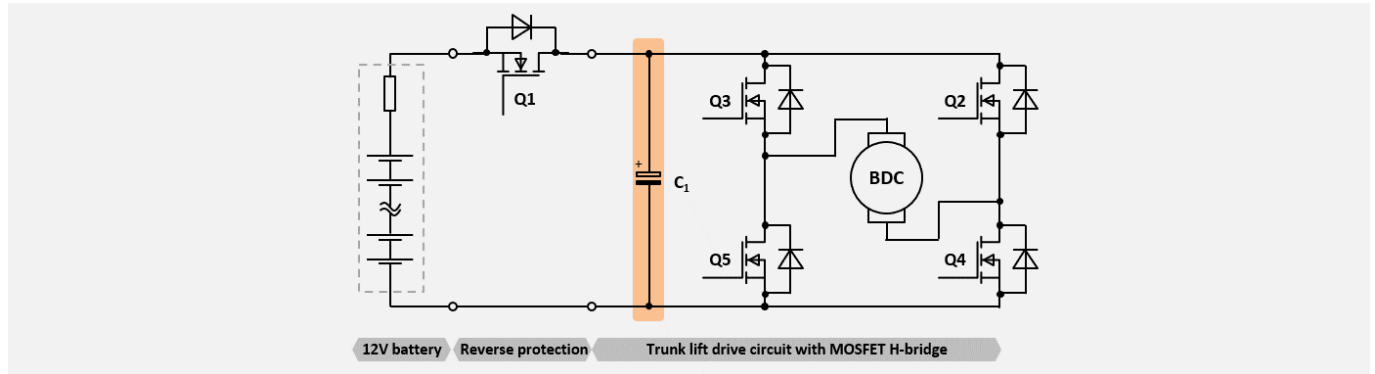
Example of a gasoline injection circuit for a n-cylinder engine with recommend products for the input noise filter (Pi- or π-filter) and the boost converter output.



Designation	Circuit	Purpose	Specification	Series	Part Number
C <sub>1</sub> , C <sub>2</sub>	Input π-filter	Noise ripple filter	220μF; 25V; 125°C; SMD; 2000h D10.5xL10.5mm; 0.14A@100kHz	TV	TV221M025G105ETRX
C <sub>1</sub> , C <sub>2</sub>	Input π-filter	Noise ripple filter	470μF; 25V; 125°C; SMD; 4000h D10.5xL12.4mm; 2.26A@100kHz	AC	AC471M025G124PTRX
C <sub>3</sub>	Boost converter	Output buffering and ensure stability	68μF; 80V; 125°C; SMD; 4000h D10xL12.4mm; 1.54A@100kHz	AC	AC680M080G124PTRX

### TRUNK LIFT MOTOR DRIVE

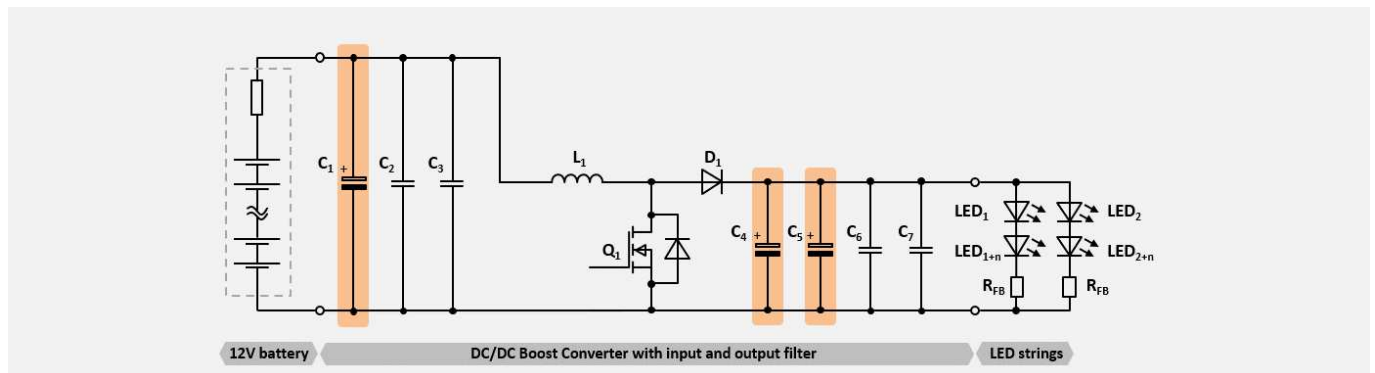
Example of a brushed DC motor (BDC) for a gear-driven lift with recommend products to hold the standby voltage on a constant level.



Designation	Circuit	Purpose	Specification	Series	Part Number
C <sub>1</sub>	Trunk lift drive	Bulk cap. to hold standby voltage	680μF; 25V; 105°C; SMD; 2000h D12.5xL14mm; 0.61A@120Hz	HV	HV681M025Z140ETRX
C <sub>1</sub>	Trunk lift drive	Bulk cap. to hold standby voltage	680μF; 25V; 105°C; Radial; 7000h D10xL20mm; 1.1A@120Hz	GH	GH681M025G200AX

### LED LIGHTING

Example of a boost automotive LED lighting system for multiple LED strings with recommend products for input and output smoothing.



Designation	Circuit	Purpose	Specification	Series	Part Number
C <sub>1</sub>	Boost converter	Input smoothing	330μF; 35V; 105°C; SMD; 5000h D10xL10.5mm; 0.85A@100kHz	RV	RV331M035G105ETRX
C <sub>4</sub> , C <sub>5</sub>	Boost converter	Output buffering and ensure stability	470μF; 35V; 105°C; SMD; 7000h D16xL17mm; 1.5A@100kHz	CV	CV471M035J170ETRX
C <sub>4</sub> , C <sub>5</sub>	Boost converter	Output buffering and ensure stability	68μF; 35V; 105°C; SMD; 10000h D6.3xL7.7mm; 2A@100kHz	AA	AA680M035E077PTRX

## TECHNICAL TERMS

Item	Description	SI units
$V_R$	Rated voltage	V
$V_S$	Surge voltage	V
$V_{Ripple\_AC}$	Ripple voltage	V
$V_{Reverse}$	Reverse voltage	V
$V_A$	Application voltage, operating voltage	A
$I_R$	Rated ripple current, rated alternating current	A
$I_A$	Application current, operating current	A
$I_{A\_Max}$	Maximum application current, maximum operating current	A
$I_{Leak}$	Leakage current	A
$T_{0\_Max}$	Upper category temperature	°C
$T_{0\_Min}$	Lower category temperature	°C
$T_A$	Application temperature, operating temperature	°C
$T_S$	Capacitor surface temperature	°C
$\Delta T_0$	Core temperature increase by internal heating due to rated ripple current	°C
$\Delta T_A$	Core temperature increase by internal heating due to application ripple current	°C
$C_R$	Rated capacitance	F
$\Delta C$	Capacitance tolerance	%
$C/C_R$	Capacitance drift	-
$\tan \delta$	Dissipation factor	-
$Z$	Impedance	$\Omega$
ESR	Equivalent series resistance	$\Omega$
ESL	Equivalent series inductance	H
$X_C$	Capacitive reactance	$\Omega$
$X_L$	Inductive reactance	$\Omega$
f	Frequency	Hz
$\omega$	Angular frequency	Hz
$\lambda$	FIT = failure in time	-
$K_f$	Multiplier for ripple current vs. frequency	-
$K_T$	Multiplier for ripple current vs. temperature	-
$K_0$	Dielectric constant derating coefficient at high temperature	-
$L_0$	Specified lifetime at max. capacitor temperature, rated voltage (and rated ripple current)	h
$L_A$	Expected lifetime at application conditions	h



OVERVIEW ▪ SMD ALUMINUM ELECTROLYTIC CAPACITORS



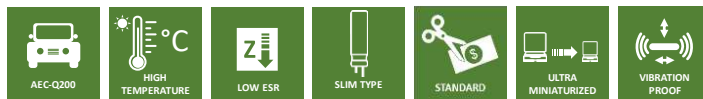
Features



Series	Page	AEC-Q200	High Temperature	Long Life	Low ESR	Standard	Ultra Long Life	Ultra Low ESR	Vibration Proof	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
										Min	Max	Min	Max	Min	Max	
LV	29	•				•			•	-40	+85	4	450	1	6800	2000
EV	39	•				•			•	-55	+105	6.3	50	1	150	1000
HV	45	•		•					•	-55	+105	6.3	100	1	6800	2000
										-40		160	450	2.2	68	
JV	54	•		•					•	-55	+105	6.3	50	1	1000	3000
DV	59	•			•				•	-55	+105	6.3	100	1	6800	2000 to 5000
RV	67	•						•	•	-55	+105	6.3	100	1	6800	2000 to 5000
										-40		160	450	2.2	68	
CV	75	•			•		•		•	-25	+105	6.3	50	22	1500	7000
TV	80	•	•						•	-40	+125	10	450	1	330	1000 to 2000

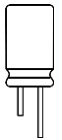
OVERVIEW ▪ SMD HYBRID CONDUCTIVE POLYMER CAPACITORS

Features



Series	Page	AEC-Q200	High Temperature	Low ESR	Slim Type	Standard	Ultra Miniaturized	Ultra Low ESR	Vibration Proof	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
										Min	Max	Min	Max	Min	Max	
AA	241	•		•	•	•			•	-55	+105	16	200	10	1500	5000 to 10000
AC	246	•	•	•	•				•	-55	+125	16	100	10	1500	4000
AB	251	•	•	•			•	•	•	-55	+125	25	35	33	680	4000
AN	255	•	•	•					•	-55	+135	16	100	10	820	4000
AU	260	•	•					•	•	-55	+135	25	100	22	680	4000
AR	264	•	•	•					•	-55	+145	16	80	22	560	2000
AP	268	•	•	•					•	-55	+150	16	80	22	560	1000

AU: New Product Series



### OVERVIEW - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

#### Features



Series	Page	AEC-Q200	High Temperature	Low ESR	Low Height	Ultra Long Life	Ultra High Ripple Current	Ultra Miniaturized	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
SG	96	•			•			•	-40	+105	6.3	50	1	470	4000
KL	100	•				•			-40	+105	160	400	3.3	330	5000
									-25		450	500	2.2	180	
GH	107	•		•					-55	+105	6.3	100	1	12000	5000 to 10000
FK	123	•				•			-40	+105	160	450	1	330	6000 to 8000
									-25		500		4.7	120	
FL	131	•				•			-40	+105	160	450	1	680	8000 to 12000
									-25		500		10	68	
GT	141	•				•			-40	+105	10	100	1	330	10000
TH	144	•	•						-40	+125	10	400	1	8200	1000 to 3000
									-25		450		1	47	
TE	155	•	•						-40	+130	10	400	2.2	4700	1000 to 3000
TU	163	•	•	•		•	•		-40	+135	25	100	160	12000	2000 to 3000

TU: New Product Series

### OVERVIEW - RADIAL HYBRID CONDUCTIVE POLYMER CAPACITORS

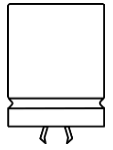
#### Features



Series	Page	AEC-Q200	High Temperature	High Voltage	Low ESR	Slim Type	Standard	Ultra Low ESR	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
AS	281	•		•	•	•	•		-55	+105	16	400	1.2	1500	2000 to 10000
AT	285	•	•		•	•			-55	+125	16	100	8.2	1500	2000 to 4000
AK	289	•	•		•				-55	+135	16	100	8.2	560	2000 to 3000
AE	292	•	•					•	-55	+135	25	100	22	680	4000
AL	295	•	•		•				-55	+145	16	80	8.2	560	2000
AM	298	•	•		•				-55	+150	16	80	8.2	560	1000

AE: New Product Series

### OVERVIEW - SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS



#### Features



Series	Page	AEC-Q200	High Reliability	High Temperature	Low ESR	Long Life	Multipin	Ultra Long Life	Vibration Proof	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)	Useful Life (hours)
										-40	+105	200	450	82	3300		
UJ	190	•	•				•		•	-40	+105	200	450	82	3300	2000	5000
										-25		500	550	47	1000		
UK	199	•	•			•	•		•	-40	+105	200	450	68	2200	3000	8000
										-25		500	550	47	680		
UL	209	•	•		•		•	•	•	-40	+105	200	450	82	2700	5000	10000
										-25		500	550	47	680		
HC	222	•	•	•	•		•	•	•	-55	+125	25	63	600	3300	3000	4000
HH	226	•	•	•			•	•	•	-40	+125	400	450	47	560	3000	4000

### LV SERIES ■ HIGH VOLTAGE, AUTOMOTIVE 85°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ SMD type
- Endurance: 85°C ■ 2 000 hours
- Low ESR and high ripple current
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics													
Operating Temperature Range		-40 ~ +85°C													
Rated Voltage Range	V <sub>R</sub>	4 ~ 100V DC						160 ~ 450V DC							
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V): V <sub>S</sub> = 1.15·V <sub>R</sub>						(V <sub>R</sub> > 315V): V <sub>S</sub> = 1.10·V <sub>R</sub>							
Capacitance Range	C <sub>R</sub>	1 ~ 6800μF						3.3 ~ 68μF							
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)													
Leakage Current (20°C ■ V <sub>R</sub> applied)	I <sub>LEAK</sub>	≤ 0.01·C <sub>R</sub> ·V <sub>R</sub> or 3μA						≤ 0.04·C <sub>R</sub> ·V <sub>R</sub> + 100μA							
		Whichever is greater ■ After 2 minutes						After 1 minute							
		[ I <sub>LEAK</sub> (μA) ; C <sub>R</sub> (μF) ; V <sub>R</sub> (V) ]													
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V <sub>R</sub> (V DC)	4	6.3	10	16	25	35	50	63	80	100	160 ~ 250	>250	
		∅ 4 ~ 6.3	42	30	22	18	16	14	14	12	12	10	-	-	
		∅ 8 ~ 10	45	34	26	20	16	14	14	12	12	10	15	20	
		≥ ∅ 12.5	45	40	36	24	18	15	14	12	12	10	15	20	
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	4	6.3	10	16	25	35	50	63	80	100	160 ~ 250	400	450
		Z-25°C/Z+20°C	7	4	3	2	2	2	2	3	3	3	3	6	6
		Z-40°C/Z+20°C	15	8	8	4	4	3	3	4	4	4	6	10	15

Lifetime Test			
Endurance 85°C (V <sub>R</sub> applied)	Test	<b>2 000 hours</b>	
	ΔC/C <sub>R</sub>	≤ ±25% of initial measured value	
	tanδ	≤ 200% of initial specified value	
	I <sub>Leak</sub>	≤ the initial specified value	
Shelf Life 85°C (V <sub>R</sub> = 0)	Test	<b>1 000 hours</b>	
	ΔC/C <sub>R</sub>	≤ ±25% of initial measured value	
	tanδ	≤ 200% of initial specified value	
	I <sub>Leak</sub>	≤ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4			
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below		
	ΔC/C <sub>R</sub>	Within ±10% of initial value	
	tanδ	Less than specified value	
	I <sub>Leak</sub>	Less than specified value	

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
4	•		47	4	5.5	28	LV470M004B055ETRX
	•		100	5	5.5	34	LV101M004C055ETRX
	•	• <sup>1</sup>	150	6.3	6.1	50	LV151M004E061ETRX □
	•	•	220	6.3	5.5	61	LV221M004E055ETRX
	•	•	330	6.3	7.7	135	LV331M004E077ETRX □
	•		330	8	6.5	145	LV331M004F065ETRX
	•		470	8	6.5	180	LV471M004F065ETRX
	•	•	470	8	10.5	220	LV471M004F105ETRX □
	•	•	560	8	10.5	242	LV561M004F105ETRX □
	•	•	680	8	10.5	285	LV681M004F105ETRX □
	•	•	1000	10	10.5	370	LV102M004G105ETRX □
	•	•	1200	10	10.5	410	LV122M004G105ETRX □
6.3	•		22	4	5.5	29	LV220M6R3B055ETRX
	•		33	4	5.5	33	LV330M6R3B055ETRX
	•		33	5	5.5	37	LV330M6R3C055ETRX
	•		47	4	5.5	40	LV470M6R3B055ETRX
	•		47	5	5.5	46	LV470M6R3C055ETRX
	•		100	5	5.5	70	LV101M6R3C055ETRX
	•	• <sup>1</sup>	100	6.3	6.1	85	LV101M6R3E061ETRX □
	•	• <sup>1</sup>	150	6.3	6.1	100	LV151M6R3E061ETRX □
	•	• <sup>1</sup>	220	6.3	6.1	130	LV221M6R3E061ETRX □
	•	•	220	6.3	7.7	141	LV221M6R3E077ETRX □
	•		220	8	6.5	150	LV221M6R3F065ETRX □
	•	•	330	6.3	7.7	197	LV331M6R3E077ETRX □
	•		330	8	6.5	210	LV331M6R3F065ETRX
	•	•	470	8	10.5	380	LV471M6R3F105ETRX
	•	•	560	8	10.5	410	LV561M6R3F105ETRX
	•	•	680	8	10.5	460	LV681M6R3F105ETRX □
	•	•	1000	8	10.5	480	LV102M6R3F105ETRX □
	•	•	1000	10	10.5	500	LV102M6R3G105ETRX □
	•	•	1200	10	10.5	510	LV122M6R3G105ETRX □
	•	•	1500	10	10.5	530	LV152M6R3G105ETRX □
•	•	3300	12.5	14	750	LV332M6R3Z140ETRX □	
•	•	6800	16	17	1330	LV682M6R3J170ETRX □	
10	•		10	4	5.5	21	LV100M010B055ETRX
	•		22	4	5.5	33	LV220M010B055ETRX
	•		22	5	5.5	37	LV220M010C055ETRX
	•		33	4	5.5	41	LV330M010B055ETRX
	•		33	5	5.5	43	LV330M010C055ETRX
	•		47	5	5.5	52	LV470M010C055ETRX
	•		100	6.3	5.5	76	LV101M010E055ETRX
	•	• <sup>1</sup>	150	6.3	6.1	88	LV151M010E061ETRX □
	•	•	220	6.3	7.7	170	LV221M010E077ETRX □

 □: Enter **W** for Vibration proof version

 •<sup>1</sup>: Consult CapXon for availability

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
10	•		220	8	6.5	190	LV221M010F065ETRX
	•	•	330	8	10.5	330	LV331M010F105ETRX ☐
	•	•	470	8	10.5	420	LV471M010F105ETRX ☐
	•	•	560	10	10.5	450	LV561M010G105ETRX ☐
	•	•	680	10	10.5	480	LV681M010G105ETRX ☐
	•	•	1000	10	10.5	510	LV102M010G105ETRX ☐
	•	•	2200	12.5	14	730	LV222M010Z140ETRX ☐
16	•		10	4	5.5	23	LV100M016B055ETRX
	•		22	4	5.5	37	LV220M016B055ETRX
	•		33	5	5.5	45	LV330M016C055ETRX
	•		47	5	5.5	50	LV470M016C055ETRX
	•		47	6.3	5.5	60	LV470M016E055ETRX
	•		100	6.3	5.5	100	LV101M016E055ETRX
	•	• <sup>1</sup>	100	6.3	6.1	108	LV101M016E061ETRX ☐
	•	•	150	6.3	7.7	135	LV151M016E077ETRX ☐
	•	•	220	6.3	7.7	185	LV221M016E077ETRX ☐
	•	•	220	8	10.5	290	LV221M016F105ETRX ☐
	•	•	330	8	10.5	330	LV331M016F105ETRX ☐
	•	•	470	8	10.5	430	LV471M016F105ETRX ☐
	•	•	470	10	10.5	460	LV471M016G105ETRX ☐
	•	•	560	10	10.5	500	LV561M016G105ETRX ☐
	•	•	680	10	10.5	550	LV681M016G105ETRX ☐
	•	•	1000	12.5	14	600	LV102M016Z140ETRX ☐
	•	•	1200	12.5	14	660	LV122M016Z140ETRX ☐
•	•	1500	12.5	14	710	LV152M016Z140ETRX ☐	
•	•	3300	16	17	1200	LV332M016J170ETRX ☐	
25	•		4.7	4	5.5	18	LV4R7M025B055ETRX
	•		10	4	5.5	27	LV100M025B055ETRX
	•		22	5	5.5	40	LV220M025C055ETRX
	•		22	6.3	5.5	46	LV220M025E055ETRX
	•		33	5	5.5	46	LV330M025C055ETRX
	•		33	6.3	5.5	54	LV330M025E055ETRX
	•		47	6.3	5.5	60	LV470M025E055ETRX
	•	• <sup>1</sup>	47	6.3	6.1	68	LV470M025E061ETRX ☐
	•	•	100	6.3	7.7	150	LV101M025E077ETRX ☐
	•		100	8	6.5	160	LV101M025F065ETRX
	•	•	150	8	10.5	200	LV151M025F105ETRX ☐
	•	•	220	8	10.5	300	LV221M025F105ETRX ☐
	•	•	330	8	10.5	390	LV331M025F105ETRX ☐
	•	•	330	10	10.5	450	LV331M025G105ETRX ☐
	•	•	470	10	10.5	480	LV471M025G105ETRX ☐
	•	•	560	12.5	14	520	LV561M025Z140ETRX ☐
	•	•	680	12.5	14	580	LV681M025Z140ETRX ☐

 ☐: Enter **W** for Vibration proof version

 •<sup>1</sup>: Consult CapXon for availability

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)			C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof					
25	●	●	1000	12.5	14	660	LV102M025Z140ETRX ☐
	●	●	2200	16	17	1150	LV222M025J170ETRX ☐
35	●		4.7	4	5.5	18	LV4R7M035B055ETRX
	●		10	4	5.5	29	LV100M035B055ETRX
	●		22	5	5.5	45	LV220M035C055ETRX
	●		22	6.3	5.5	48	LV220M035E055ETRX
	●		33	6.3	5.5	58	LV330M035E055ETRX
	●		47	6.3	5.5	65	LV470M035E055ETRX
	●	● <sup>1</sup>	47	6.3	6.1	70	LV470M035E061ETRX ☐
	●		47	8	6.5	115	LV470M035F065ETRX
	●	●	100	6.3	7.7	250	LV101M035E077ETRX ☐
	●	●	100	8	10.5	280	LV101M035F105ETRX ☐
	●	●	150	8	10.5	300	LV151M035F105ETRX ☐
	●	●	220	8	10.5	350	LV221M035F105ETRX ☐
	●	●	220	10	10.5	400	LV221M035G105ETRX ☐
	●	●	330	10	10.5	460	LV331M035G105ETRX ☐
	●	●	470	12.5	14	590	LV471M035Z140ETRX ☐
	●	●	560	12.5	14	600	LV561M035Z140ETRX ☐
	●	●	680	12.5	14	610	LV681M035Z140ETRX ☐
	●	●	1500	16	17	1060	LV152M035J170ETRX ☐
50	●		1	4	5.5	8.4	LV010M050B055ETRX
	●		2.2	4	5.5	14	LV2R2M050B055ETRX
	●		3.3	4	5.5	17	LV3R3M050B055ETRX
	●		4.7	4	5.5	22	LV4R7M050B055ETRX
	●		10	5	5.5	30	LV100M050C055ETRX
	●		10	6.3	5.5	35	LV100M050E055ETRX
	●	● <sup>1</sup>	22	6.3	6.1	60	LV220M050E061ETRX ☐
	●	●	22	6.3	7.7	75	LV220M050E077ETRX ☐
	●		22	8	6.5	80	LV220M050F065ETRX
	●	●	33	6.3	7.7	188	LV330M050E077ETRX ☐
	●		33	8	6.5	200	LV330M050F065ETRX
	●	●	47	6.3	7.7	225	LV470M050E077ETRX ☐
	●		47	8	6.5	240	LV470M050F065ETRX
	●	●	100	8	10.5	300	LV101M050F105ETRX ☐
	●	●	150	10	10.5	320	LV151M050G105ETRX ☐
	●	●	220	10	10.5	450	LV221M050G105ETRX ☐
	●	●	330	12.5	14	520	LV331M050Z140ETRX ☐
	●	●	470	16	17	925	LV471M050J170ETRX ☐
●	●	1000	16	17	940	LV102M050J170ETRX ☐	

 ☐: Enter **W** for Vibration proof version

 ●<sup>1</sup>: Consult CapXon for availability

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Vibration-proof		C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
	Standard						
63	•		1	4	5.5	8.4	LV010M063B055ETRX
	•		2.2	4	5.5	14	LV2R2M063B055ETRX
	•		3.3	5	5.5	18	LV3R3M063C055ETRX
	•		4.7	5	5.5	23	LV4R7M063C055ETRX
	•		4.7	6.3	5.5	27	LV4R7M063E055ETRX
	•		10	6.3	5.5	35	LV100M063E055ETRX
	•	•	22	6.3	7.7	75	LV220M063E077ETRX ☐
	•		22	8	6.5	75	LV220M063F065ETRX
	•	•	33	8	10.5	160	LV330M063F105ETRX ☐
	•	•	47	8	10.5	170	LV470M063F105ETRX ☐
	•	•	100	10	10.5	270	LV101M063G105ETRX ☐
	•	•	100	12.5	14	340	LV101M063Z140ETRX ☐
	•	•	150	12.5	14	380	LV151M063Z140ETRX ☐
	•	•	220	12.5	14	460	LV221M063Z140ETRX ☐
	•	•	330	16	17	560	LV331M063J170ETRX ☐
•	•	470	16	17	700	LV471M063J170ETRX ☐	
80	•		1	4	5.5	8	LV010M080B055ETRX
	•		2.2	5	5.5	16	LV2R2M080C055ETRX
	•		3.3	6.3	5.5	25	LV3R3M080E055ETRX
	•		4.7	6.3	5.5	30	LV4R7M080E055ETRX
	•	•	10	6.3	7.7	40	LV100M080E077ETRX ☐
	•	•	22	6.3	7.7	70	LV220M080E077ETRX ☐
	•	•	33	8	10.5	160	LV330M080F105ETRX ☐
	•	•	47	10	10.5	195	LV470M080G105ETRX ☐
	•	•	100	12.5	14	380	LV101M080Z140ETRX ☐
	•	•	150	12.5	14	450	LV151M080Z140ETRX ☐
	•	•	220	16	17	550	LV221M080J170ETRX ☐
100	•		1	4	5.5	8	LV010M100B055ETRX
	•		2.2	6.3	5.5	18	LV2R2M100E055ETRX
	•	• <sup>1</sup>	2.2	6.3	6.1	20	LV2R2M100E061ETRX ☐
	•		3.3	6.3	5.5	25	LV3R3M100E055ETRX
	•	• <sup>1</sup>	3.3	6.3	6.1	28	LV3R3M100E061ETRX ☐
	•	•	4.7	6.3	7.7	38	LV4R7M100E077ETRX ☐
	•		4.7	8	6.5	38	LV4R7M100F065ETRX
	•	•	10	6.3	7.7	50	LV100M100E077ETRX ☐
	•	•	22	8	10.5	120	LV220M100F105ETRX ☐
	•	•	33	10	10.5	190	LV330M100G105ETRX ☐
	•	•	47	12.5	14	330	LV470M100Z140ETRX ☐
	•	•	100	12.5	14	380	LV101M100Z140ETRX ☐
	•	•	150	16	17	560	LV151M100J170ETRX ☐

 ☐: Enter **W** for Vibration proof version

 •<sup>1</sup>: Consult CapXon for availability



## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Vibration-proof		C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
	Standard						
160	●	●	10	8	10.5	70	LV100M160F105ETRX ☐
	●	●	12	8	10.5	80	LV120M160F105ETRX ☐
	●	●	18	10	10.5	100	LV180M160G105ETRX ☐
	●	●	22	10	10.5	150	LV220M160G105ETRX ☐
	●	●	27	12.5	14	235	LV270M160Z140ETRX ☐
	●	●	33	12.5	14	250	LV330M160Z140ETRX ☐
	●	●	39	12.5	14	270	LV390M160Z140ETRX ☐
	●	●	47	16	17	400	LV470M160J170ETRX ☐
200	●	●	10	10	10.5	100	LV100M200G105ETRX ☐
	●	●	10	12.5	14	130	LV100M200Z140ETRX ☐
	●	●	22	12.5	14	235	LV220M200Z140ETRX ☐
	●	●	27	12.5	14	250	LV270M200Z140ETRX ☐
	●	●	33	12.5	14	270	LV330M200Z140ETRX ☐
	●	●	39	16	17	370	LV390M200J170ETRX ☐
	●	●	47	16	17	420	LV470M200J170ETRX ☐
	●	●	68	16	17	520	LV680M200J170ETRX ☐
250	●	●	4.7	8	10.5	70	LV4R7M250F105ETRX ☐
	●	●	6.8	10	10.5	95	LV6R8M250G105ETRX ☐
	●	●	10	10	10.5	115	LV100M250G105ETRX ☐
	●	●	15	12.5	14	180	LV150M250Z140ETRX ☐
	●	●	22	16	17	280	LV220M250J170ETRX ☐
	●	●	27	16	17	305	LV270M250J170ETRX ☐
	●	●	33	16	17	340	LV330M250J170ETRX ☐
	●	●	39	16	17	370	LV390M250J170ETRX ☐
400	●	●	47	16	17	430	LV470M250J170ETRX ☐
	●	●	3.3	10	10.5	50	LV3R3M400G105ETRX ☐
	●	●	4.7	10	10.5	90	LV4R7M400G105ETRX ☐
	●	●	4.7	12.5	14	115	LV4R7M400Z140ETRX ☐
	●	●	6.8	12.5	14	130	LV6R8M400Z140ETRX ☐
	●	●	8.2	12.5	14	140	LV8R2M400Z140ETRX ☐
	●	●	10	12.5	14	145	LV100M400Z140ETRX ☐
	●	●	10	16	17	160	LV100M400J170ETRX ☐
	●	●	12	16	17	175	LV120M400J170ETRX ☐
	●	●	15	16	17	170	LV150M400J170ETRX ☐
	●	●	18	16	17	195	LV180M400J170ETRX ☐
●	●	22	16	17	235	LV220M400J170ETRX ☐	

☐: Enter W for Vibration proof version

●<sup>1</sup>: Consult CapXon for availability

### STANDARD RATINGS

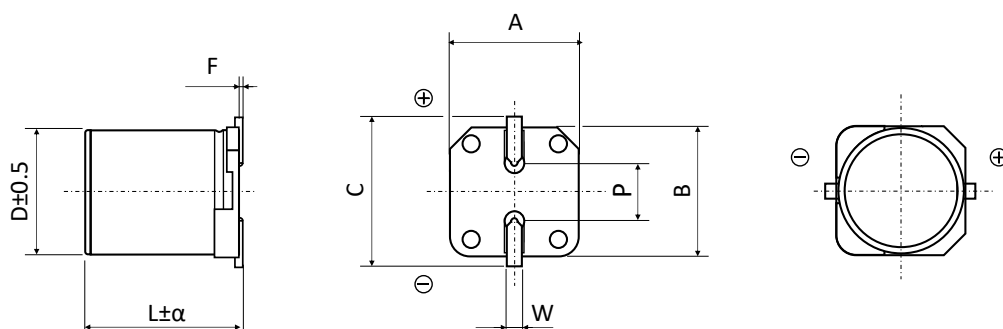
Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
	●	●					
450	●	●	4.7	12.5	14	115	LV4R7M450Z140ETRX □
	●	●	6.8	12.5	14	130	LV6R8M450Z140ETRX □
	●	●	8.2	12.5	14	140	LV8R2M450Z140ETRX □
	●	●	10	12.5	14	145	LV100M450Z140ETRX □
	●	●	10	16	17	160	LV100M450J170ETRX □
	●	●	12	16	17	175	LV120M450J170ETRX □
	●	●	15	16	17	170	LV150M450J170ETRX □
	●	●	18	16	17	195	LV180M450J170ETRX □
	●	●	22	16	17	235	LV220M450J170ETRX □

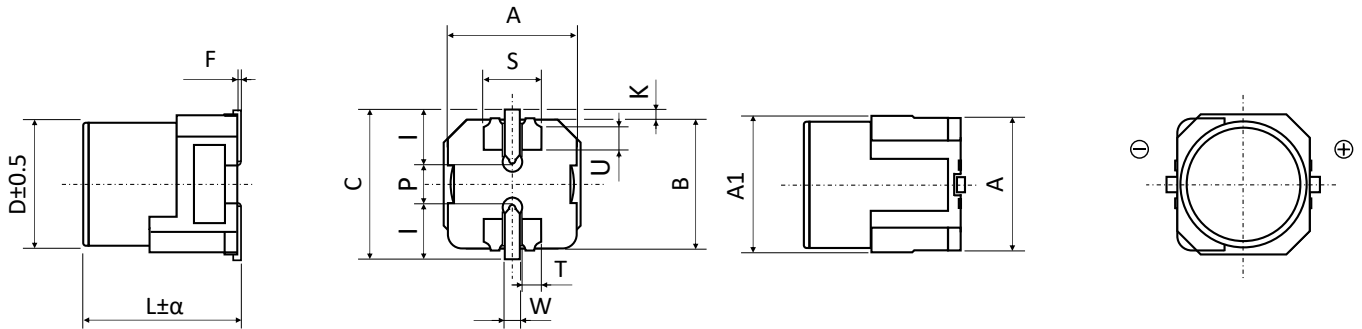
□: Enter **W** for Vibration proof version

●<sup>1</sup>: Consult CapXon for availability

### DIMENSIONS STANDARD PACKAGE - All dimensions in mm

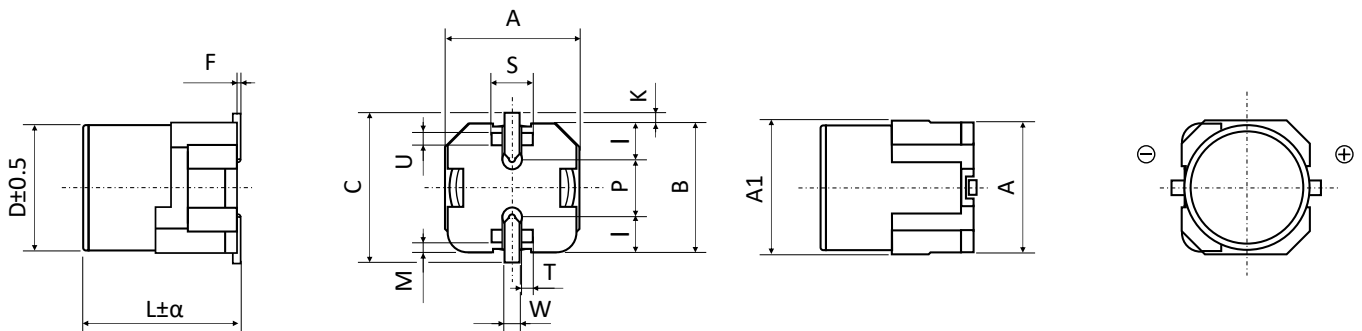


ø D	L	α	A ± 0.2	B ± 0.2	C ± 0.2	F	P ± 0.2	W
4.0	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5.0	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	6.1	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	6.5	Max	8.3	8.3	9.0	0.3 max.	2.3	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
12.5	14.0	Max	13.0	13.0	13.9	0.3 max.	4.5	1 to 1.4
16.0	17.0	0.5	17.0	17.0	18.0	0.3 max.	6.6	1 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm


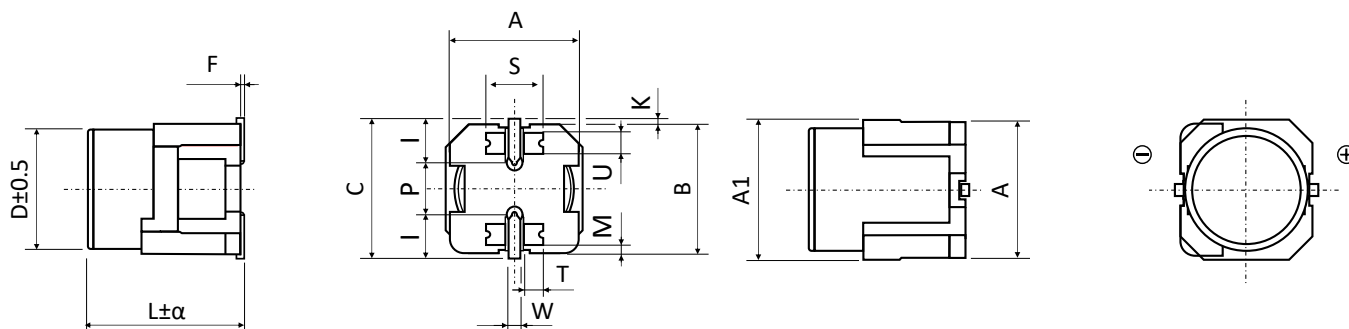
ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	6.1	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	6.1	2.2	2.9	2.4	1.1	1.55	0.65
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D12.5 and D16** ▪ All dimensions in mm


$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	$K \pm 0.3$
12.5	14.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
16.0	17.0	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$	$M \pm 0.1$
12.5	14.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
16.0	17.0	6.7	5.8	5.5	2.0	3.0	1.4	1.0

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	50/60	100/120	500	1k	$\geq 10k$
$1 \leq C_R \leq 100$	0.8	1	1.2	1.3	1.5
$100 < C_R \leq 6800$	0.8	1	1.1	1.15	1.2

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General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85



### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### EV SERIES ■ STANDARD, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ SMD type
- Endurance: 105°C ■ 1 000 hours
- Small dimensions
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-55 ~ +105°C						
Rated Voltage Range	$V_R$	6.3 ~ 50V DC						
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$						
Capacitance Range	$C_R$	1 ~ 1500 $\mu$ F						
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A, whichever is greater ■ After 2 minutes [ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]						
Dissipation Factor % (20°C ■ 120Hz)	tan $\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50
		$\phi 4$ to 6.3	30	24	20	18	16	14
		$\phi 8$ to 10	35	28	24	18	16	14
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	6	6	4	4	3	3
		Z-55°C/Z+20°C	8	8	6	4	3	3
Lifetime Test								
Endurance 105°C ( $V_R$ applied)	Test	1 000 hours						
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value						$\leq 16V$
		$\leq \pm 20\%$ of initial measured value						$\geq 25V$
	tan $\delta$	$\leq 200\%$ of initial specified value						
$I_{Leak}$	$\leq$ the initial specified value							
Shelf Life 105°C ( $V_R = 0$ )	Test	1 000 hours						
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value						$\leq 16V$
		$\leq \pm 20\%$ of initial measured value						$\geq 25V$
	tan $\delta$	$\leq 200\%$ of initial specified value						
$I_{Leak}$	$\leq$ the initial specified value							
		Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min acc. JIS-C-5101-4						
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below							
	$\Delta C/C_R$	Within $\pm 10\%$ of initial value						
	tan $\delta$	Less than specified value						
	$I_{Leak}$	Less than specified value						

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type	
	Vibration-proof						
6.3	•	22	4	5.5	22	EV220M6R3B055ETRX	
	•	33	4	5.5	30	EV330M6R3B055ETRX	
	•	47	4	5.5	36	EV470M6R3B055ETRX	
	•	100	5	5.5	60	EV101M6R3C055ETRX	
	•	150	6.3	5.5	86	EV151M6R3E055ETRX	
	•	220	6.3	5.5	89	EV221M6R3E055ETRX	
	•	•	220	6.3	7.7	102	EV221M6R3E077ETRX ☐
	•	•	220	8	6.5	102	EV221M6R3F065ETRX
	•	•	330	6.3	7.7	105	EV331M6R3E077ETRX ☐
	•	•	330	8	6.5	105	EV331M6R3F065ETRX
	•	•	470	8	10.5	210	EV471M6R3F105ETRX ☐
	•	•	1000	8	10.5	202	EV102M6R3F105ETRX ☐
	•	•	1000	10	10.5	230	EV102M6R3G105ETRX ☐
	•	•	1500	10	10.5	310	EV152M6R3G105ETRX ☐
10	•	22	4	5.5	27	EV220M010B055ETRX	
	•	33	4	5.5	25	EV330M010B055ETRX	
	•	33	5	5.5	40	EV330M010C055ETRX	
	•	47	5	5.5	46	EV470M010C055ETRX	
	•	100	5	5.5	52	EV101M010C055ETRX	
	•	100	6.3	5.5	60	EV101M010E055ETRX	
	•	150	6.3	5.5	86	EV151M010E055ETRX	
	•	•	220	6.3	7.7	105	EV221M010E077ETRX ☐
	•	•	220	8	6.5	105	EV221M010F065ETRX
	•	•	330	8	10.5	195	EV331M010F105ETRX ☐
	•	•	470	8	10.5	210	EV471M010F105ETRX ☐
	•	•	1000	10	10.5	310	EV102M010G105ETRX ☐
16	•	10	4	5.5	18	EV100M016B055ETRX	
	•	22	4	5.5	30	EV220M016B055ETRX	
	•	33	5	5.5	40	EV330M016C055ETRX	
	•	47	5	5.5	51	EV470M016C055ETRX	
	•	100	6.3	5.5	60	EV101M016E055ETRX	
	•	•	150	6.3	7.7	95	EV151M016E077ETRX ☐
	•	•	150	8	6.5	95	EV151M016F065ETRX
	•	•	220	6.3	7.7	105	EV221M016E077ETRX ☐
	•	•	330	8	10.5	195	EV331M016F105ETRX ☐
	•	•	470	8	10.5	210	EV471M016F105ETRX ☐
25	•	4.7	4	5.5	16	EV4R7M025B055ETRX	
	•	10	4	5.5	26	EV100M025B055ETRX	
	•	22	5	5.5	38	EV220M025C055ETRX	
	•	33	5	5.5	48	EV330M025C055ETRX	
	•	47	6.3	5.5	63	EV470M025E055ETRX	
	•	•	100	6.3	7.7	91	EV101M025E077ETRX ☐
	•	•	100	8	6.5	91	EV101M025F065ETRX
	•	•	150	8	10.5	140	EV151M025F105ETRX ☐

 ☐: Enter **W** for Vibration proof version

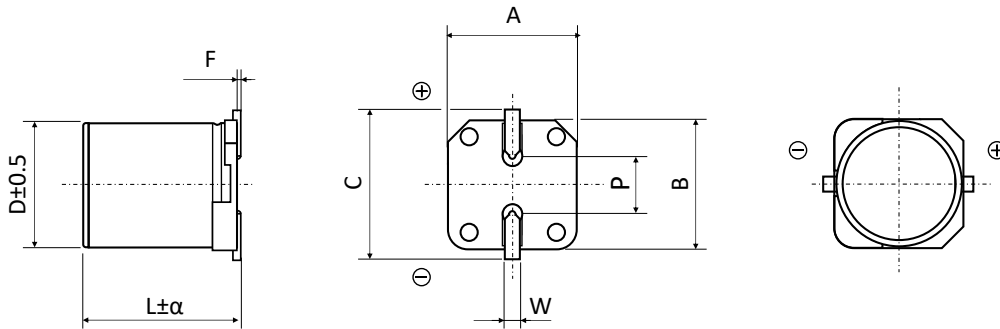
**STANDARD RATINGS**

Part number shows blister tape on paper reel

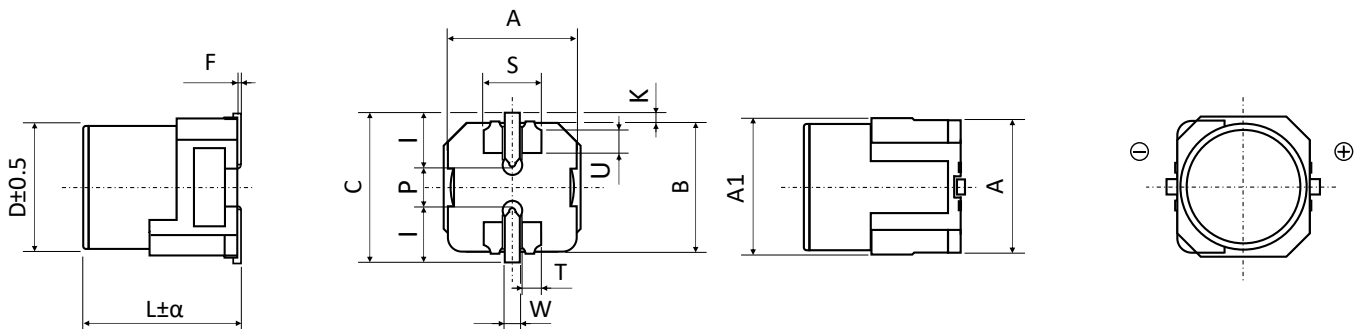
V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
	•	•					
25	•	•	220	8	10.5	155	EV221M025F105ETRX
	•	•	330	8	10.5	175	EV331M025F105ETRX
	•	•	330	10	10.5	198	EV331M025G105ETRX
	•	•	470	10	10.5	300	EV471M025G105ETRX
35	•		4.7	4	5.5	16	EV4R7M035B055ETRX
	•		10	4	5.5	27	EV100M035B055ETRX
	•		22	5	5.5	37	EV220M035C055ETRX
	•		22	6.3	5.5	42	EV220M035E055ETRX
	•		33	6.3	5.5	50	EV330M035E055ETRX
	•	•	33	6.3	7.7	58	EV330M035E077ETRX
	•		47	6.3	5.5	58	EV470M035E055ETRX
	•	•	47	6.3	7.7	66	EV470M035E077ETRX
	•	•	100	6.3	7.7	84	EV101M035E077ETRX
	•		100	8	6.5	84	EV101M035F065ETRX
	•	•	150	8	10.5	155	EV151M035F105ETRX
	•	•	220	8	10.5	167	EV221M035F105ETRX
	•	•	220	10	10.5	190	EV221M035G105ETRX
	•	•	330	10	10.5	300	EV331M035G105ETRX
	50	•		1	4	5.5	6.3
•			2.2	4	5.5	11	EV2R2M050B055ETRX
•			3.3	4	5.5	14	EV3R3M050B055ETRX
•			4.7	4	5.5	19	EV4R7M050B055ETRX
•			4.7	5	5.5	22	EV4R7M050C055ETRX
•			10	5	5.5	29	EV100M050C055ETRX
•			10	6.3	5.5	33	EV100M050E055ETRX
•			22	6.3	5.5	51	EV220M050E055ETRX
•		•	33	6.3	7.7	60	EV330M050E077ETRX
•			33	8	6.5	60	EV330M050F065ETRX
•		•	47	6.3	7.7	66	EV470M050E077ETRX
•			47	8	6.5	66	EV470M050F065ETRX
•		•	100	8	10.5	140	EV101M050F105ETRX
•		•	150	10	10.5	180	EV151M050G105ETRX
•		•	220	10	10.5	220	EV221M050G105ETRX

: Enter **W** for Vibration proof version



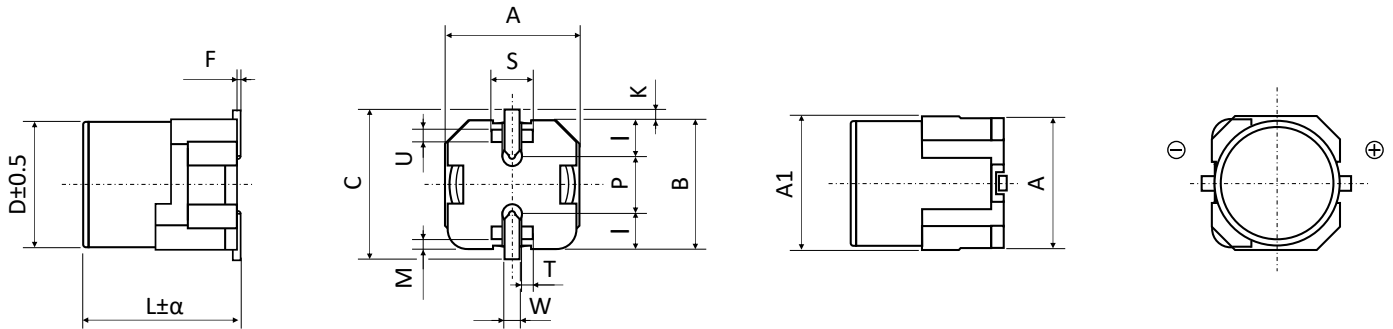
**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm


∅ D	L	α	A ± 0.2	B ± 0.2	C ± 0.2	F	P ± 0.2	W
4	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8	6.5	Max	8.3	8.3	9.0	0.3 max.	2.3	0.5 to 0.8
8	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm


∅ D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

∅ D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**


$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	$K \pm 0.2$
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$	$M \pm 0.1$
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	50/60	100/120	500	1k	$\geq 10k$
$1 \leq C_R \leq 100$	0.8	1	1.2	1.3	1.5
$100 < C_R \leq 1500$	0.8	1	1.1	1.15	1.2

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General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85

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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### HV SERIES ▪ HIGH VOLTAGE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ SMD type
- Endurance: 105°C ▪ 2 000 hours
- Low ESR and high ripple current
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics												
Operating Temperature Range		-55 ~ +105°C						-40 ~ +105°C						
Rated Voltage Range	V <sub>R</sub>	6.3 ~ 100V DC						160 ~ 450V DC						
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V): V <sub>S</sub> = 1.15·V <sub>R</sub>						(V <sub>R</sub> > 315V): V <sub>S</sub> = 1.10·V <sub>R</sub>						
Capacitance Range	C <sub>R</sub>	1 ~ 6800μF						2.2 ~ 68μF						
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)												
Leakage Current (20°C ▪ V <sub>R</sub> applied)	I <sub>LEAK</sub>	≤ 0.01·C <sub>R</sub> ·V <sub>R</sub> or 3μA						≤ 0.04·C <sub>R</sub> ·V <sub>R</sub> + 100μA						
		Whichever is greater ▪ After 2 minutes						After 1 minute						
		[ I <sub>LEAK</sub> (μA) ; C <sub>R</sub> (μF) ; V <sub>R</sub> (V) ]												
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V <sub>R</sub> (V DC)	6.3	10	16	25	35	50	63	80	100	160 ~ 250	>250	
		∅ 4 ~ 6.3	30	24	20	16	14	14	12	10	10	-	-	
		∅ 8 ~ 10	35	26	24	18	14	14	12	10	10	15	20	
		≥ ∅ 12.5	37	34	24	18	14	14	12	10	10	15	20	
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	6.3	10	16	25	35	50	63	80	100	160 ~ 250	400	450
		Z-25°C/Z+20°C	6	4	4	3	2	2	2	3	3	3	6	6
		Z-40°C/Z+20°C	12	10	8	6	4	4	4	4	4	6	10	15
		Z-55°C/Z+20°C	14	12	10	6	4	4	4	4	4	6	10	15
Lifetime Test														
Endurance 105°C (V <sub>R</sub> applied)	Test	2 000 hours												
	ΔC/C <sub>R</sub>	≤ ±30% of initial measured value												
	tanδ	≤ 300% of initial specified value												
	I <sub>Leak</sub>	≤ the initial specified value												
Shelf Life 105°C (V <sub>R</sub> = 0)	Test	1 000 hours												
	ΔC/C <sub>R</sub>	≤ ±30% of initial measured value												
	tanδ	≤ 300% of initial specified value												
	I <sub>Leak</sub>	≤ the initial specified value												
		Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4												
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below													
	ΔC/C <sub>R</sub>	Within ±10% of initial value												
	tanδ	Less than specified value												
	I <sub>Leak</sub>	Less than specified value												

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Vibration-proof		C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type	
	Standard							
6.3	•		22	4	5.5	23	HV220M6R3B055ETRX	
	•		33	4	5.5	28	HV330M6R3B055ETRX	
	•		47	4	5.5	37	HV470M6R3B055ETRX	
	•		47	5	5.5	40	HV470M6R3C055ETRX	
	•		100	5	5.5	46	HV101M6R3C055ETRX	
	•		100	6.3	5.5	57	HV101M6R3E055ETRX	
	•		150	6.3	5.5	70	HV151M6R3E055ETRX	
	•		150	8	6.5	90	HV151M6R3F065ETRX	
	•	•	220	6.3	7.7	90	HV221M6R3E077ETRX ☐	
	•		220	8	6.5	130	HV221M6R3F065ETRX	
	•	•	330	6.3	7.7	140	HV331M6R3E077ETRX ☐	
	•	•	330	8	10.5	170	HV331M6R3F105ETRX ☐	
	•	•	470	8	10.5	210	HV471M6R3F105ETRX ☐	
	•	•	560	8	10.5	310	HV561M6R3F105ETRX ☐	
	•	•	680	8	10.5	330	HV681M6R3F105ETRX ☐	
	•	•	680	10	10.5	370	HV681M6R3G105ETRX ☐	
	•	•	1000	8	10.5	420	HV102M6R3F105ETRX ☐	
	•	•	1000	10	10.5	480	HV102M6R3G105ETRX ☐	
	10	•		22	4	5.5	25	HV220M010B055ETRX
		•		33	4	5.5	34	HV330M010B055ETRX
•			47	5	5.5	42	HV470M010C055ETRX	
•			100	6.3	5.5	55	HV101M010E055ETRX	
•			100	8	6.5	60	HV101M010F065ETRX	
•			150	6.3	5.5	90	HV151M010E055ETRX	
•			150	8	6.5	110	HV151M010F065ETRX	
•		•	220	6.3	7.7	140	HV221M010E077ETRX ☐	
•			220	8	6.5	160	HV221M010F065ETRX	
•		•	330	8	10.5	195	HV331M010F105ETRX ☐	
•		•	470	8	10.5	350	HV471M010F105ETRX ☐	
•		•	470	10	10.5	420	HV471M010G105ETRX ☐	
•		•	560	10	10.5	450	HV561M010G105ETRX ☐	
•		•	680	10	10.5	480	HV681M010G105ETRX ☐	
•		•	1000	10	10.5	530	HV102M010G105ETRX ☐	
•		•	1200	12.5	14	570	HV122M010Z140ETRX ☐	
•		•	1500	12.5	14	750	HV152M010Z140ETRX ☐	
•		•	4700	16	17	880	HV472M010J170ETRX ☐	

☐: Enter W for Vibration proof version

 •<sup>1</sup>: Consult CapXon for availability

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type	
	Vibration-proof						
16	•	10	4	5.5	20	HV100M016B055ETRX	
	•	22	4	5.5	31	HV220M016B055ETRX	
	•	22	5	5.5	35	HV220M016C055ETRX	
	•	33	5	5.5	36	HV330M016C055ETRX	
	•	33	6.3	5.5	40	HV330M016E055ETRX	
	•	47	5	5.5	45	HV470M016C055ETRX	
	•	47	6.3	5.5	56	HV470M016E055ETRX	
	•	•	100	6.3	7.7	58	HV101M016E077ETRX <input type="checkbox"/>
	•	•	100	8	6.5	62	HV101M016F065ETRX
	•	•	150	6.3	7.7	125	HV151M016E077ETRX <input type="checkbox"/>
	•	•	150	8	6.5	140	HV151M016F065ETRX
	•	•	220	6.3	7.7	170	HV221M016E077ETRX <input type="checkbox"/>
	•	•	220	8	10.5	185	HV221M016F105ETRX <input type="checkbox"/>
	•	•	330	8	10.5	250	HV331M016F105ETRX <input type="checkbox"/>
	•	•	470	8	10.5	370	HV471M016F105ETRX <input type="checkbox"/>
	•	•	470	10	10.5	420	HV471M016G105ETRX <input type="checkbox"/>
	•	•	560	10	10.5	480	HV561M016G105ETRX <input type="checkbox"/>
	•	•	680	10	10.5	540	HV681M016G105ETRX <input type="checkbox"/>
	•	•	1000	12.5	14	580	HV102M016Z140ETRX <input type="checkbox"/>
	•	•	1200	12.5	14	590	HV122M016Z140ETRX <input type="checkbox"/>
•	•	1500	12.5	14	620	HV152M016Z140ETRX <input type="checkbox"/>	
•	•	3300	16	17	850	HV332M016J170ETRX <input type="checkbox"/>	
25	•	4.7	4	5.5	12	HV4R7M025B055ETRX	
	•	10	4	5.5	22	HV100M025B055ETRX	
	•	22	5	5.5	38	HV220M025C055ETRX	
	•	33	6.3	5.5	48	HV330M025E055ETRX	
	•	•	47	6.3	7.7	56	HV470M025E077ETRX <input type="checkbox"/>
	•	•	47	8	6.5	60	HV470M025F065ETRX
	•	•	100	6.3	7.7	110	HV101M025E077ETRX <input type="checkbox"/>
	•	•	100	8	10.5	160	HV101M025F105ETRX <input type="checkbox"/>
	•	•	150	8	10.5	175	HV151M025F105ETRX <input type="checkbox"/>
	•	•	220	8	10.5	180	HV221M025F105ETRX <input type="checkbox"/>
	•	•	220	10	10.5	190	HV221M025G105ETRX <input type="checkbox"/>
	•	•	330	8	10.5	290	HV331M025F105ETRX <input type="checkbox"/>
	•	•	470	10	10.5	440	HV471M025G105ETRX <input type="checkbox"/>
	•	•	560	12.5	14	490	HV561M025Z140ETRX <input type="checkbox"/>
	•	•	680	12.5	14	510	HV681M025Z140ETRX <input type="checkbox"/>
	•	•	1000	12.5	14	600	HV102M025Z140ETRX <input type="checkbox"/>
	•	•	2200	16	17	805	HV222M025J170ETRX <input type="checkbox"/>
	35	•	4.7	4	5.5	14	HV4R7M035B055ETRX
•		10	4	5.5	24	HV100M035B055ETRX	
•		22	5	5.5	40	HV220M035C055ETRX	
•		22	6.3	5.5	46	HV220M035E055ETRX	
•		•	33	6.3	7.7	47	HV330M035E077ETRX <input type="checkbox"/>

: Enter **W** for Vibration proof version

 •<sup>1</sup>: Consult CapXon for availability

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
35	●		33	8	6.5	50	HV330M035F065ETRX
	●	●	47	6.3	7.7	60	HV470M035E077ETRX ☐
	●		47	8	6.5	65	HV470M035F065ETRX
	●	●	100	6.3	7.7	130	HV101M035E077ETRX ☐
	●	●	100	8	10.5	180	HV101M035F105ETRX ☐
	●	●	150	8	10.5	190	HV151M035F105ETRX ☐
	●	●	220	8	10.5	250	HV221M035F105ETRX ☐
	●	●	220	10	10.5	280	HV221M035G105ETRX ☐
	●	●	330	10	10.5	360	HV331M035G105ETRX ☐
	●	●	470	12.5	14	460	HV471M035Z140ETRX ☐
	●	●	560	12.5	14	500	HV561M035Z140ETRX ☐
	●	●	1500	16	17	740	HV152M035J170ETRX ☐
50	●		1	4	5.5	8.4	HV010M050B055ETRX
	●		2.2	4	5.5	11	HV2R2M050B055ETRX
	●		3.3	4	5.5	13	HV3R3M050B055ETRX
	●		4.7	4	5.5	18	HV4R7M050B055ETRX
	●		10	6.3	5.5	28	HV100M050E055ETRX
	●	●	22	6.3	7.7	50	HV220M050E077ETRX ☐
	●		22	8	6.5	55	HV220M050F065ETRX
	●	●	33	6.3	7.7	95	HV330M050E077ETRX ☐
	●	●	33	8	10.5	135	HV330M050F105ETRX ☐
	●	●	47	6.3	7.7	115	HV470M050E077ETRX ☐
	●	●	47	8	10.5	155	HV470M050F105ETRX ☐
	●	●	100	10	10.5	315	HV101M050G105ETRX ☐
	●	●	150	10	10.5	330	HV151M050G105ETRX ☐
	●	●	220	10	10.5	350	HV221M050G105ETRX ☐
	●	●	330	12.5	14	400	HV331M050Z140ETRX ☐
	●	●	470	16	17	570	HV471M050J170ETRX ☐
●	●	1000	16	17	655	HV102M050J170ETRX ☐	
63	●		1	4	5.5	7	HV010M063B055ETRX
	●		2.2	4	5.5	11	HV2R2M063B055ETRX
	●		3.3	5	5.5	14	HV3R3M063C055ETRX
	●		4.7	5	5.5	22	HV4R7M063C055ETRX
	●		10	6.3	5.5	40	HV100M063E055ETRX
	●	●	22	6.3	7.7	58	HV220M063E077ETRX ☐
	●	●	33	8	10.5	112	HV330M063F105ETRX ☐
	●	●	47	8	10.5	119	HV470M063F105ETRX ☐
	●	●	100	10	10.5	280	HV101M063G105ETRX ☐
	●	●	220	12.5	14	300	HV221M063Z140ETRX ☐
	●	●	470	16	17	630	HV471M063J170ETRX ☐

 ☐: Enter **W** for Vibration proof version

 ●<sup>1</sup>: Consult CapXon for availability

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Vibration-proof		C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
	Standard						
80	•		1	4	5.5	7	HV010M080B055ETRX
	•		2.2	5	5.5	12	HV2R2M080C055ETRX
	•		3.3	6.3	5.5	17	HV3R3M080E055ETRX
	•		4.7	6.3	5.5	25	HV4R7M080E055ETRX
	•	•	10	6.3	7.7	35	HV100M080E077ETRX ☐
	•	•	22	6.3	7.7	58	HV220M080E077ETRX ☐
	•	•	33	8	10.5	112	HV330M080F105ETRX ☐
	•	•	47	10	10.5	160	HV470M080G105ETRX ☐
	•	•	100	12.5	14	380	HV101M080Z140ETRX ☐
	•	•	150	16	17	500	HV151M080J170ETRX ☐
	•	•	220	16	17	600	HV221M080J170ETRX ☐
100	•		1	4	5.5	7	HV010M100B055ETRX
	•	• <sup>1</sup>	2.2	6.3	6.1	15	HV2R2M100E061ETRX ☐
	•		2.2	6.3	5.5	13	HV2R2M100E055ETRX ☐
	•	• <sup>1</sup>	3.3	6.3	6.1	20	HV3R3M100E061ETRX ☐
	•	•	4.7	6.3	7.7	28	HV4R7M100E077ETRX ☐
	•	•	10	6.3	7.7	35	HV100M100E077ETRX ☐
	•	•	22	8	10.5	85	HV220M100F105ETRX ☐
	•	•	33	10	10.5	135	HV330M100G105ETRX ☐
	•	•	47	12.5	14	240	HV470M100Z140ETRX ☐
	•	•	150	16	17	500	HV151M100J170ETRX ☐
	160	•	•	10	8	10.5	57
•		•	12	8	10.5	60	HV120M160F105ETRX ☐
•		•	18	10	10.5	65	HV180M160G105ETRX ☐
•		•	22	10	10.5	70	HV220M160G105ETRX ☐
•		•	27	12.5	14	85	HV270M160Z140ETRX ☐
•		•	33	12.5	14	95	HV330M160Z140ETRX ☐
•		•	39	12.5	14	105	HV390M160Z140ETRX ☐
•		•	47	16	17	260	HV470M160J170ETRX ☐
•		•	68	16	17	300	HV680M160J170ETRX ☐
200	•	•	10	10	10.5	64	HV100M200G105ETRX ☐
	•	•	10	12.5	14	80	HV100M200Z140ETRX ☐
	•	•	22	12.5	14	105	HV220M200Z140ETRX ☐
	•	•	27	12.5	14	115	HV270M200Z140ETRX ☐
	•	•	33	12.5	14	170	HV330M200Z140ETRX ☐
	•	•	33	16	17	220	HV330M200J170ETRX ☐
	•	•	47	16	17	260	HV470M200J170ETRX ☐

☐: Enter W for Vibration proof version

 •<sup>1</sup>: Consult CapXon for availability



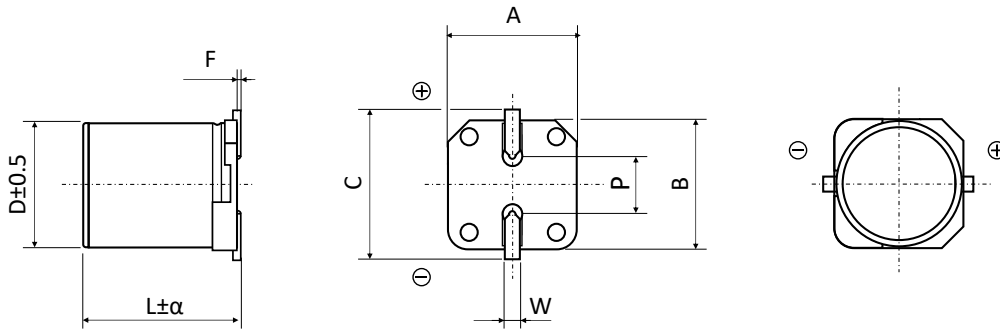
**STANDARD RATINGS**

Part number shows blister tape on paper reel

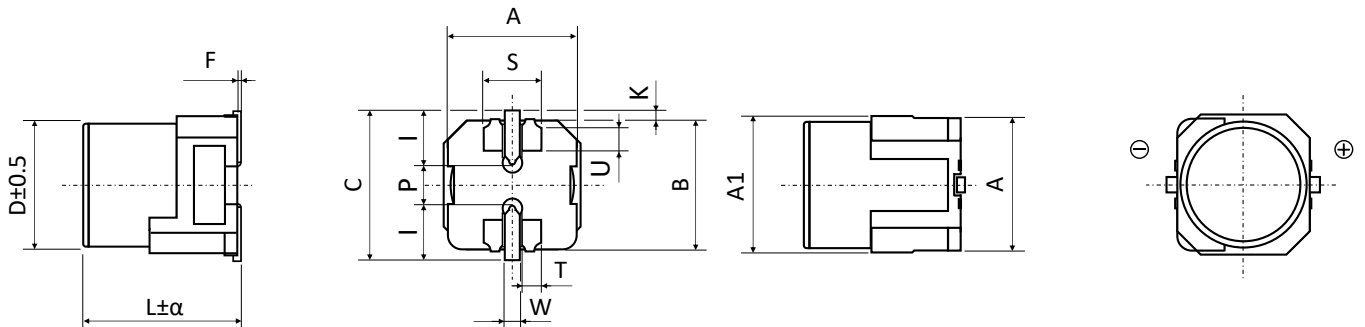
V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
	●	●					
250	●	●	4.7	8	10.5	50	HV4R7M250F105ETRX
	●	●	6.8	10	10.5	60	HV6R8M250G105ETRX
	●	●	10	10	10.5	75	HV100M250G105ETRX
	●	●	15	12.5	14	120	HV150M250Z140ETRX
	●	●	22	16	17	180	HV220M250J170ETRX
	●	●	27	16	17	200	HV270M250J170ETRX
	●	●	33	16	17	230	HV330M250J170ETRX
	●	●	39	16	17	260	HV390M250J170ETRX
400	●	●	47	16	17	285	HV470M250J170ETRX
	●	●	2.2	8	10.5	27	HV2R2M400F105ETRX
	●	●	3.3	8	10.5	34	HV3R3M400F105ETRX
	●	●	3.9	10	10.5	40	HV3R9M400G105ETRX
	●	●	4.7	10	10.5	40	HV4R7M400G105ETRX
	●	●	4.7	12.5	14	50	HV4R7M400Z140ETRX
	●	●	6.8	12.5	14	60	HV6R8M400Z140ETRX
	●	●	8.2	12.5	14	65	HV8R2M400Z140ETRX
	●	●	10	12.5	14	70	HV100M400Z140ETRX
	●	●	10	16	17	85	HV100M400J170ETRX
	●	●	12	16	17	95	HV120M400J170ETRX
	●	●	22	16	17	120	HV220M400J170ETRX
450	●	●	3.3	10	10.5	40	HV3R3M450G105ETRX
	●	●	3.9	10	10.5	40	HV3R9M450G105ETRX
	●	●	4.7	12.5	14	50	HV4R7M450Z140ETRX
	●	●	6.8	12.5	14	60	HV6R8M450Z140ETRX
	●	●	8.2	12.5	14	65	HV8R2M450Z140ETRX
	●	●	10	12.5	14	70	HV100M450Z140ETRX
	●	●	10	16	17	85	HV100M450J170ETRX
	●	●	12	16	17	95	HV120M450J170ETRX
	●	●	15	16	17	100	HV150M450J170ETRX
	●	●	22	16	17	120	HV220M450J170ETRX

: Enter **W** for Vibration proof version

 ●<sup>1</sup>: Consult CapXon for availability

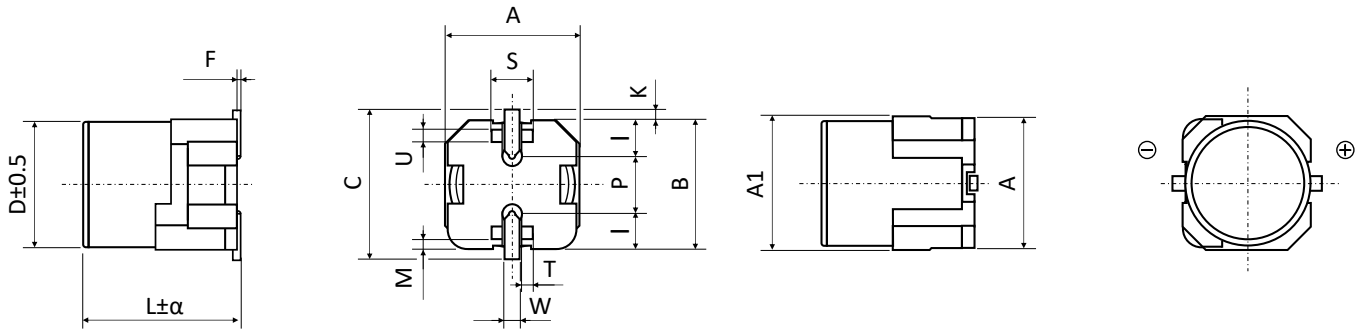
**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm


∅ D	L	α	A ± 0.2	B ± 0.2	C ± 0.2	F	P ± 0.2	W
4.0	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5.0	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	6.1	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	6.5	Max	8.3	8.3	9.0	0.3 max.	2.3	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
12.5	14.0	Max	13.0	13.0	13.9	0.3 max.	4.5	1 to 1.4
16.0	17.0	0.5	17.0	17.0	18.0	0.3 max.	6.6	1 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm


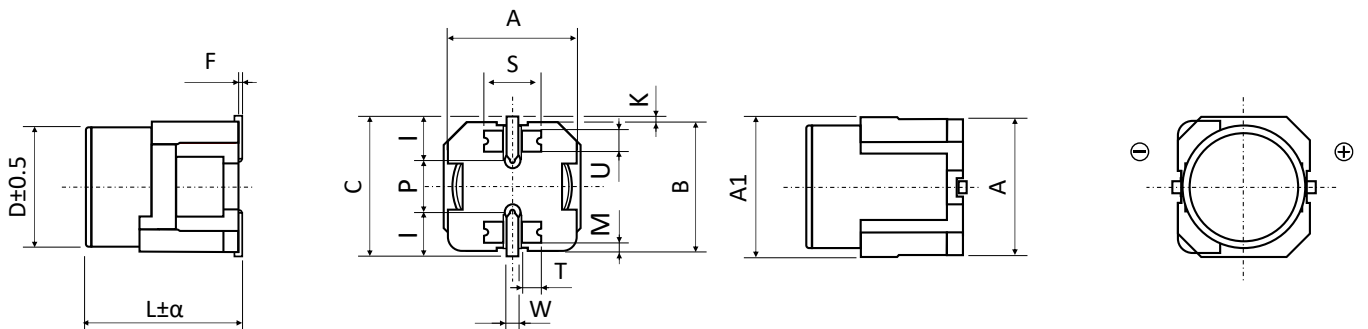
∅ D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	6.1	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

∅ D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	6.1	2.2	2.9	2.4	1.1	1.55	0.65
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D12.5 and D16** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.3
12.5	14.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
16.0	17.0	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
12.5	14.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
16.0	17.0	6.7	5.8	5.5	2.0	3.0	1.4	1.0

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu$ F) / Frequency (Hz)	50/60	100/120	500	1k	$\geq 10k$
$1 \leq C_R \leq 100$	0.8	1	1.2	1.3	1.5
$100 < C_R \leq 6800$	0.8	1	1.1	1.15	1.2

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### JV SERIES ■ LONG LIFE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ SMD type
- Endurance: 105°C ■ 3 000 hours
- Small dimensions
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-55 ~ +105°C						
Rated Voltage Range	$V_R$	6.3 ~ 50V DC						
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$						
Capacitance Range	$C_R$	1 ~ 1000 $\mu$ F						
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A, whichever is greater ■ After 2 minutes [ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]						
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50
		$\tan\delta$	28	24	20	16	13	12
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	10	7	5	3	3	3
		Z-55°C/Z+20°C	12	10	6	5	4	4
Lifetime Test								
Endurance 105°C ( $V_R$ applied)	Test	<b>3 000 hours</b>						
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value						
	$\tan\delta$	$\leq 300\%$ of initial specified value						
	$I_{Leak}$	$\leq$ the initial specified value						
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1 000 hours</b>						
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value						
	$\tan\delta$	$\leq 300\%$ of initial specified value						
	$I_{Leak}$	$\leq$ the initial specified value						
		Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4						
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below							
	$\Delta C/C_R$	Within $\pm 10\%$ of initial value						
	$\tan\delta$	Less than specified value						
	$I_{Leak}$	Less than specified value						

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
6.3	•		22	4	5.5	22	JV220M6R3B055ETRX
	•		33	5	5.5	33	JV330M6R3C055ETRX
	•		47	5	5.5	36	JV470M6R3C055ETRX
	•		100	6.3	5.5	68	JV101M6R3E055ETRX
	•	•	220	6.3	7.7	120	JV221M6R3E077ETRX ☐
	•	•	330	8	10.5	230	JV331M6R3F105ETRX ☐
	•	•	470	10	10.5	290	JV471M6R3G105ETRX ☐
	•	•	1000	10	10.5	360	JV102M6R3G105ETRX ☐
10	•		22	5	5.5	30	JV220M010C055ETRX
	•		33	5	5.5	35	JV330M010C055ETRX
	•		47	6.3	5.5	52	JV470M010E055ETRX
	•	•	100	6.3	7.7	81	JV101M010E077ETRX ☐
	•	•	220	8	10.5	142	JV221M010F105ETRX ☐
	•	•	330	10	10.5	280	JV331M010G105ETRX ☐
	•	•	470	10	10.5	305	JV471M010G105ETRX ☐
	16	•		10	4	5.5	18
•			22	5	5.5	31	JV220M016C055ETRX
•			33	6.3	5.5	48	JV330M016E055ETRX
•			47	6.3	5.5	51	JV470M016E055ETRX
•		•	100	6.3	7.7	83	JV101M016E077ETRX ☐
•		•	220	10	10.5	222	JV221M016G105ETRX ☐
•		•	330	10	10.5	305	JV331M016G105ETRX ☐
•		•	470	10	10.5	330	JV471M016G105ETRX ☐
25	•		4.7	4	5.5	16	JV4R7M025B055ETRX
	•		10	4	5.5	26	JV100M025B055ETRX
	•		22	6.3	5.5	44	JV220M025E055ETRX
	•		33	6.3	5.5	50	JV330M025E055ETRX
	•	•	47	6.3	7.7	66	JV470M025E077ETRX ☐
	•	•	100	8	10.5	118	JV101M025F105ETRX ☐
	•	•	220	10	10.5	300	JV221M025G105ETRX ☐
	•	•	330	10	10.5	395	JV331M025G105ETRX ☐
35	•		4.7	4	5.5	16	JV4R7M035B055ETRX
	•		10	5	5.5	27	JV100M035C055ETRX
	•		22	6.3	5.5	45	JV220M035E055ETRX
	•	•	33	6.3	7.7	58	JV330M035E077ETRX ☐
	•	•	47	8	10.5	93	JV470M035F105ETRX ☐
	•	•	100	10	10.5	155	JV101M035G105ETRX ☐
	•	•	220	10	10.5	340	JV221M035G105ETRX ☐
	•	•	330	10	10.5	420	JV331M035G105ETRX ☐

 ☐: Enter **W** for Vibration proof version

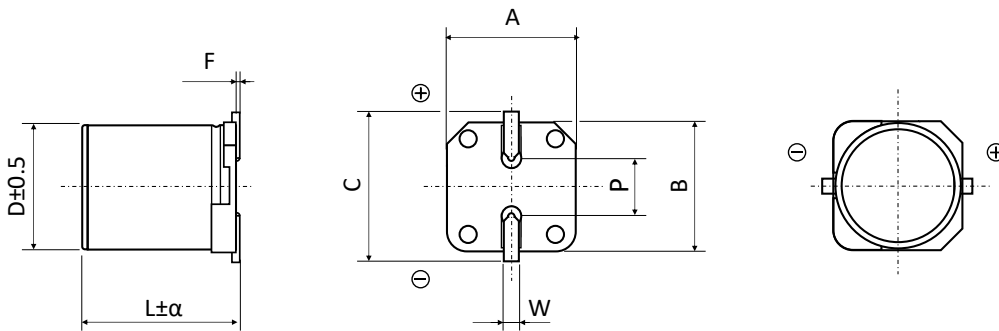
## STANDARD RATINGS

Part number shows blister tape on paper reel

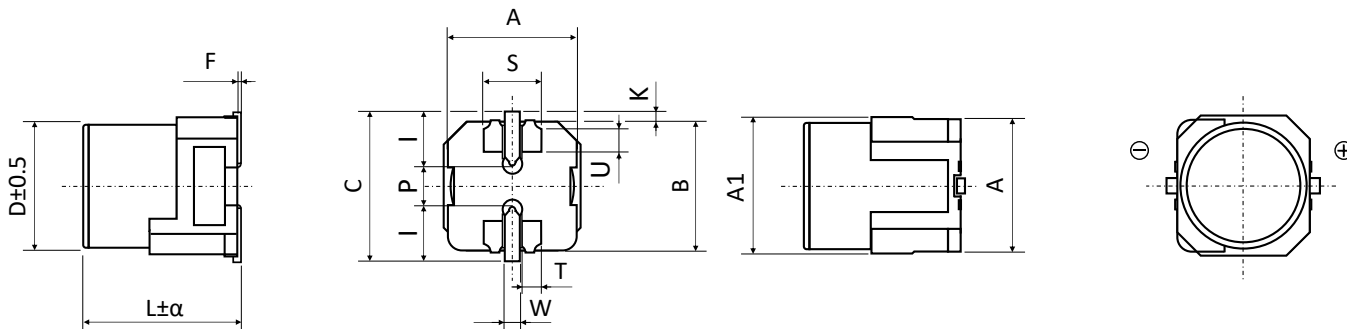
$V_R$ (V)	Standard	Vibration-proof	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
	•	•					
50	•		1	4	5.5	8	JV010M050B055ETRX
	•		2.2	4	5.5	12	JV2R2M050B055ETRX
	•		3.3	4	5.5	17	JV3R3M050B055ETRX
	•		4.7	5	5.5	22	JV4R7M050C055ETRX
	•		10	6.3	5.5	33	JV100M050E055ETRX
	•	•	22	6.3	7.7	58	JV220M050E077ETRX □
	•	•	33	8	10.5	140	JV330M050F105ETRX □
	•	•	47	8	10.5	170	JV470M050F105ETRX □
	•	•	100	10	10.5	300	JV101M050G105ETRX □

□: Enter **W** for Vibration proof version

## DIMENSIONS STANDARD PACKAGE - All dimensions in mm

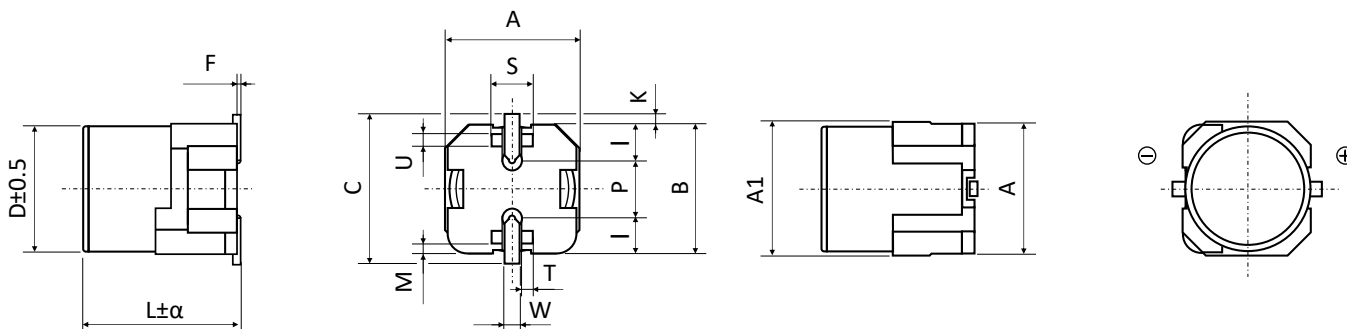


$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
4	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3 ▪ All dimensions in mm**


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9



**MULTIPLIER K<sub>f</sub> for RIPPLE CURRENT vs. FREQUENCY**

C <sub>R</sub> (µF) / Frequency (Hz)	50/60	100/120	500	1k	≥ 10k
1 ≤ C <sub>R</sub> ≤ 100	0.8	1	1.2	1.3	1.5
100 < C <sub>R</sub> ≤ 1000	0.8	1	1.1	1.15	1.2



**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

	
<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid SMD</p>
<p>Page 310</p>	<p>Page 85</p>

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### DV SERIES - LOW IMPEDANCE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR - SMD type
- Endurance: 105°C - 2 000 hours up to 5 000 hours
- Low impedance type
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-55 ~ +105°C									
Rated Voltage Range	$V_R$	6.3 ~ 100V DC									
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$									
Capacitance Range	$C_R$	1 ~ 6800 $\mu$ F									
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz - 20°C)									
Leakage Current (20°C - $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A, whichever is greater - After 2 minutes [ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]									
Dissipation Factor % (20°C - 120Hz)	$\tan\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50	63	80	100
		$\tan\delta$	24	19	16	14	14	12	10	9	8
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50	63	80	100
		Z-25°C/Z+20°C	2	2	2	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	4	3	3	3	3	3
		Z-55°C/Z+20°C	12	10	6	6	4	4	4	4	4
Lifetime Test											
Endurance 105°C ( $V_R$ applied)	Test	5 000 hours									$\geq \varnothing 12.5\text{mm}$
		2 000 hours									$< \varnothing 12.5\text{mm}$
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value									
	$\tan\delta$	$\leq 300\%$ of initial specified value									
Shelf Life 105°C ( $V_R = 0$ )	Test	1 000 hours									
		$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value								
	$\tan\delta$	$\leq 300\%$ of initial specified value									
	$I_{Leak}$	$\leq$ the initial specified value									
Resistance to Soldering Heat	Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4										
	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below										
	$\Delta C/C_R$	Within $\pm 10\%$ of initial value									
	$\tan\delta$	Less than specified value									
	$I_{Leak}$	Less than specified value									

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	C <sub>R</sub> (µF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type	
	Vibration-proof							
6.3	•	22	4	5.5	2200	75	DV220M6R3B055ETRX	
	•	27	4	5.5	1980	79	DV270M6R3B055ETRX	
	•	33	4	5.5	1900	82	DV330M6R3B055ETRX	
	•	33	5	5.5	1300	130	DV330M6R3C055ETRX	
	•	47	4	5.5	1880	86	DV470M6R3B055ETRX	
	•	47	5	5.5	1100	150	DV470M6R3C055ETRX	
	•	56	5	5.5	1100	150	DV560M6R3C055ETRX	
	•	68	5	5.5	900	160	DV680M6R3C055ETRX	
	•	68	6.3	5.5	550	220	DV680M6R3E055ETRX	
	•	100	5	5.5	800	170	DV101M6R3C055ETRX	
	•	100	6.3	5.5	530	230	DV101M6R3E055ETRX	
	•	150	6.3	5.5	510	235	DV151M6R3E055ETRX	
	•	150	8	6.5	480	250	DV151M6R3F065ETRX	
	•	•	220	6.3	7.7	450	260	DV221M6R3E077ETRX ☐
	•	•	220	6.3	5.5	480	240	DV221M6R3E055ETRX
	•	•	330	6.3	7.7	360	275	DV331M6R3E077ETRX ☐
	•	•	330	8	6.5	340	290	DV331M6R3F065ETRX
	•	•	470	8	10.5	280	450	DV471M6R3F105ETRX ☐
	•	•	680	8	10.5	250	500	DV681M6R3F105ETRX ☐
	•	•	1000	8	10.5	200	530	DV102M6R3F105ETRX ☐
	•	•	1000	10	10.5	170	570	DV102M6R3G105ETRX ☐
	•	•	1200	10	10.5	160	600	DV122M6R3G105ETRX ☐
•	•	1500	10	10.5	130	650	DV152M6R3G105ETRX ☐	
•	•	1800	10	10.5	80	860	DV182M6R3G105ETRX ☐	
•	•	3300	12.5	14	80	1100	DV332M6R3Z140ETRX ☐	
•	•	6800	16	17	52	1250	DV682M6R3J170ETRX ☐	
10	•	22	4	5.5	2200	80	DV220M010B055ETRX	
	•	27	5	5.5	1900	125	DV270M010C055ETRX	
	•	33	4	5.5	1850	90	DV330M010B055ETRX	
	•	33	5	5.5	1200	150	DV330M010C055ETRX	
	•	47	5	5.5	1100	165	DV470M010C055ETRX	
	•	47	6.3	5.5	590	180	DV470M010E055ETRX	
	•	56	6.3	5.5	570	210	DV560M010E055ETRX	
	•	68	6.3	5.5	550	220	DV680M010E055ETRX	
	•	100	5	5.5	800	210	DV101M010C055ETRX	
	•	100	6.3	5.5	530	240	DV101M010E055ETRX	
	•	150	6.3	5.5	490	250	DV151M010E055ETRX	
	•	150	8	6.5	470	260	DV151M010F065ETRX	
	•	•	220	6.3	7.7	440	270	DV221M010E077ETRX ☐
	•	•	220	8	6.5	400	285	DV221M010F065ETRX
	•	•	330	8	10.5	250	500	DV331M010F105ETRX ☐
	•	•	470	8	10.5	250	550	DV471M010F105ETRX ☐
	•	•	680	10	10.5	200	680	DV681M010G105ETRX ☐

 ☐: Enter **W** for Vibration proof version

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
10	•	•	1000	10	10.5	150	740	DV102M010G105ETRX
	•	•	2200	12.5	14	80	1100	DV222M010Z140ETRX
	•	•	4700	16	17	52	1250	DV472M010J170ETRX
16	•		10	4	5.5	2200	80	DV100M016B055ETRX
	•		15	4	5.5	2000	85	DV150M016B055ETRX
	•		22	4	5.5	1980	90	DV220M016B055ETRX
	•		22	5	5.5	1600	140	DV220M016C055ETRX
	•		27	5	5.5	740	170	DV270M016C055ETRX
	•		33	6.3	5.5	600	185	DV330M016E055ETRX
	•		47	5	5.5	1050	195	DV470M016C055ETRX
	•		47	6.3	5.5	580	210	DV470M016E055ETRX
	•		56	6.3	5.5	560	220	DV560M016E055ETRX
	•		68	6.3	5.5	540	230	DV680M016E055ETRX
	•		68	8	6.5	500	240	DV680M016F065ETRX
	•		100	6.3	5.5	520	255	DV101M016E055ETRX
	•	•	150	6.3	7.7	450	265	DV151M016E077ETRX
	•		150	8	6.5	440	270	DV151M016F065ETRX
	•	•	220	6.3	7.7	430	275	DV221M016E077ETRX
	•		220	8	6.5	410	285	DV221M016F065ETRX
	•	•	330	8	10.5	250	550	DV331M016F105ETRX
	•	•	470	8	10.5	220	590	DV471M016F105ETRX
	•	•	680	10	10.5	160	720	DV681M016G105ETRX
	•	•	1500	12.5	14	80	1100	DV152M016Z140ETRX
•	•	3300	16	17	52	1250	DV332M016J170ETRX	
25	•		6.8	4	5.5	2800	70	DV6R8M025B055ETRX
	•		10	4	5.5	2100	85	DV100M025B055ETRX
	•		15	5	5.5	1900	125	DV150M025C055ETRX
	•		22	5	5.5	1200	145	DV220M025C055ETRX
	•		22	6.3	5.5	1150	160	DV220M025E055ETRX
	•		27	6.3	5.5	620	200	DV270M025E055ETRX
	•		33	5	5.5	1050	160	DV330M025C055ETRX
	•		33	6.3	5.5	580	220	DV330M025E055ETRX
	•	•	47	6.3	7.7	540	230	DV470M025E077ETRX
	•		47	6.3	5.5	560	220	DV470M025E055ETRX
	•		56	6.3	5.5	540	230	DV560M025E055ETRX
	•		68	6.3	5.5	480	240	DV680M025E055ETRX
	•		68	8	6.5	450	260	DV680M025F065ETRX
	•	•	100	6.3	7.7	380	290	DV101M025E077ETRX
	•		100	8	6.5	360	300	DV101M025F065ETRX
	•	•	150	8	10.5	250	480	DV151M025F105ETRX
	•	•	220	8	10.5	220	530	DV221M025F105ETRX
	•	•	330	8	10.5	200	570	DV331M025F105ETRX
	•	•	470	10	10.5	150	650	DV471M025G105ETRX

: Enter **W** for Vibration proof version

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)			C <sub>R</sub> (μF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof						
25	•	•	1000	12.5	14	80	1100	DV102M025Z140ETRX
	•	•	2200	16	17	52	1250	DV222M025J170ETRX
35	•		3.3	4	5.5	2800	80	DV3R3M035B055ETRX
	•		4.7	4	5.5	2500	85	DV4R7M035B055ETRX
	•		6.8	4	5.5	2200	88	DV6R8M035B055ETRX
	•		10	4	5.5	2000	90	DV100M035B055ETRX
	•		10	5	5.5	1400	125	DV100M035C055ETRX
	•		15	5	5.5	1200	140	DV150M035C055ETRX
	•		22	5	5.5	1100	155	DV220M035C055ETRX
	•		22	6.3	5.5	1050	170	DV220M035E055ETRX
	•		27	6.3	5.5	600	210	DV270M035E055ETRX
	•		33	6.3	5.5	540	230	DV330M035E055ETRX
	•		33	8	6.5	510	260	DV330M035F065ETRX
	•		47	6.3	5.5	530	240	DV470M035E055ETRX
	•		47	8	6.5	490	250	DV470M035F065ETRX
	•	•	56	6.3	7.7	490	250	DV560M035E077ETRX
	•	•	68	6.3	7.7	400	265	DV680M035E077ETRX
	•	•	100	6.3	7.7	380	300	DV101M035E077ETRX
	•	•	100	8	10.5	280	420	DV101M035F105ETRX
	•	•	150	8	10.5	240	510	DV151M035F105ETRX
	•	•	220	8	10.5	210	570	DV221M035F105ETRX
	•	•	330	10	10.5	150	650	DV331M035G105ETRX
50	•		1	4	5.5	4500	55	DV010M050B055ETRX
	•		2.2	4	5.5	4500	55	DV2R2M050B055ETRX
	•		3.3	4	5.5	4500	55	DV3R3M050B055ETRX
	•		4.7	4	5.5	4500	55	DV4R7M050B055ETRX
	•		6.8	5	5.5	3800	75	DV6R8M050C055ETRX
	•		10	5	5.5	2800	95	DV100M050C055ETRX
	•		10	6.3	5.5	2200	130	DV100M050E055ETRX
	•		15	6.3	5.5	1600	140	DV150M050E055ETRX
	•		22	6.3	5.5	1300	150	DV220M050E055ETRX
	•	•	27	6.3	7.7	1200	180	DV270M050E077ETRX
	•	•	33	6.3	7.7	710	190	DV330M050E077ETRX
	•		33	8	6.5	700	200	DV330M050F065ETRX
	•	•	47	6.3	7.7	700	230	DV470M050E077ETRX
	•		47	8	6.5	690	240	DV470M050F065ETRX
	•	•	56	8	10.5	520	300	DV560M050F105ETRX
	•	•	68	8	10.5	500	320	DV680M050F105ETRX
	•	•	100	8	10.5	460	350	DV101M050F105ETRX
	•	•	150	10	10.5	250	600	DV151M050G105ETRX

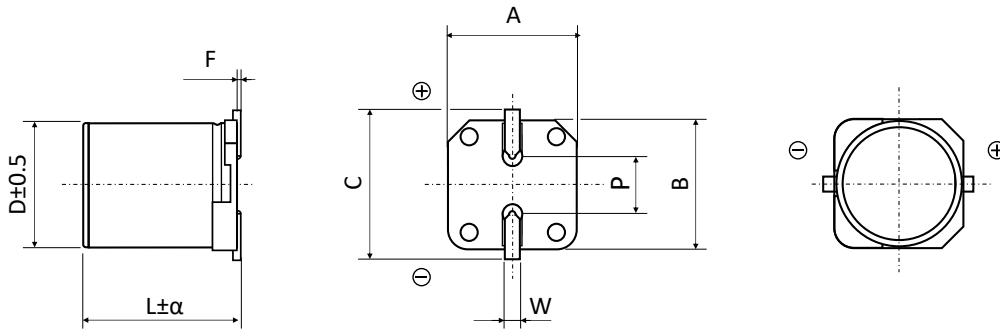
: Enter **W** for Vibration proof version

**STANDARD RATINGS**

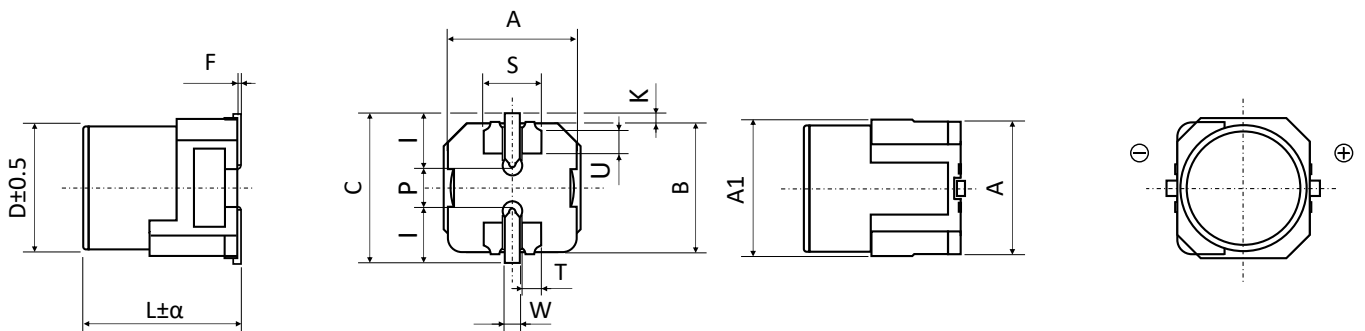
Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard		C <sub>R</sub> (μF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof						
50	•	•	220	10	10.5	230	650	DV221M050G105ETRX
	•	•	330	12.5	14	210	800	DV331M050Z140ETRX
	•	•	1000	16	17	78	1000	DV102M050J170ETRX
63	•		4.7	5	5.5	2800	45	DV4R7M063C055ETRX
	•		10	6.3	5.5	1600	80	DV100M063E055ETRX
	•	•	22	6.3	7.7	1100	150	DV220M063E077ETRX
	•	•	33	8	10.5	800	230	DV330M063F105ETRX
	•	•	47	8	10.5	550	260	DV470M063F105ETRX
	•	•	68	10	10.5	400	380	DV680M063G105ETRX
	•	•	100	10	10.5	280	400	DV101M063G105ETRX
	•	•	100	12.5	14	260	520	DV101M063Z140ETRX
	•	•	150	12.5	14	200	780	DV151M063Z140ETRX
	•	•	220	12.5	14	180	810	DV221M063Z140ETRX
	•	•	470	16	17	85	1390	DV471M063J170ETRX
80	•		4.7	6.3	5.5	3800	50	DV4R7M080E055ETRX
	•	•	10	6.3	7.7	3000	70	DV100M080E077ETRX
	•	•	22	6.3	7.7	1700	110	DV220M080E077ETRX
	•	•	33	8	10.5	1100	200	DV330M080F105ETRX
	•	•	47	10	10.5	900	320	DV470M080G105ETRX
	•	•	68	10	10.5	650	490	DV680M080G105ETRX
	•	•	100	12.5	14	420	580	DV101M080Z140ETRX
	•	•	220	16	17	260	930	DV221M080J170ETRX
100	•	•	10	6.3	7.7	4000	65	DV100M100E077ETRX
	•	•	22	8	10.5	2000	110	DV220M100F105ETRX
	•	•	33	10	10.5	1300	180	DV330M100G105ETRX
	•	•	47	10	10.5	1000	370	DV470M100G105ETRX
	•	•	47	12.5	14	950	480	DV470M100Z140ETRX
	•	•	68	12.5	14	600	580	DV680M100Z140ETRX
	•	•	100	12.5	14	500	620	DV101M100Z140ETRX
	•	•	220	16	17	280	1050	DV221M100J170ETRX

: Enter **W** for Vibration proof version

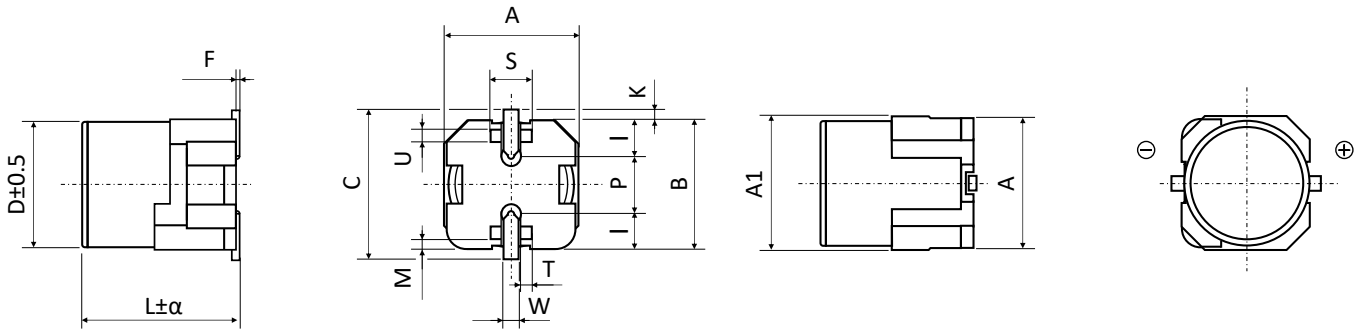
**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm


$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
4.0	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5.0	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	6.5	Max	8.3	8.3	9.0	0.3 max.	2.3	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
12.5	14.0	Max	13.0	13.0	13.9	0.3 max.	4.5	1 to 1.4
16.0	17.0	0.5	17.0	17.0	18.0	0.3 max.	6.6	1 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm


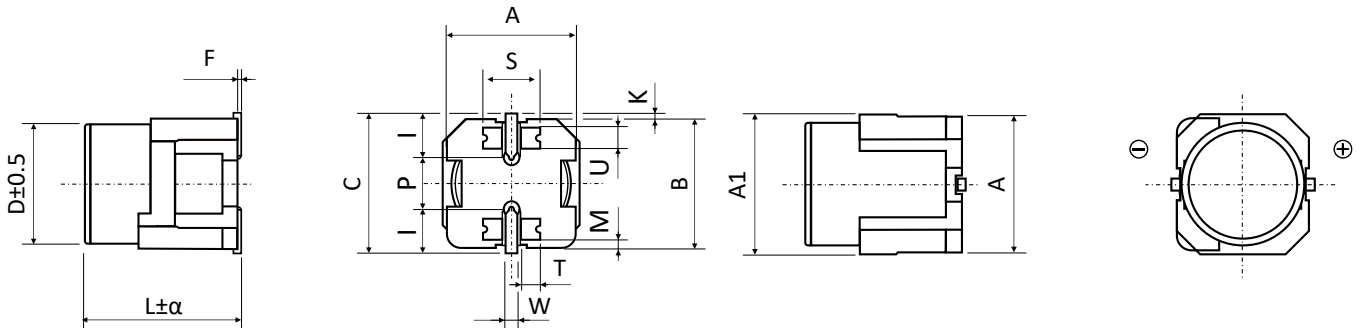
$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	K
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D12.5 and D16** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.3
12.5	14.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
16.0	17.0	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
12.5	14.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
16.0	17.0	6.7	5.8	5.5	2.0	3.0	1.4	1.0



**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu\text{F}$ ) / Frequency (Hz)	50/60	100/120	500	1k	10k	50k ~ 100k
$1 \leq C_R \leq 10$	0.47	0.59	0.76	0.85	0.97	1
$10 < C_R \leq 6800$	0.52	0.65	0.8	0.89	0.97	1

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### RV SERIES ■ HIGH VOLTAGE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ SMD type
- Endurance: 105°C ■ 2 000 hours up to 5 000 hours
- High voltage and low impedance
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics												
Operating Temperature Range		-55 ~ +105°C						-40 ~ +105°C						
Rated Voltage Range	$V_R$	6.3 ~ 100V DC						160 ~ 450V DC						
Surge Voltage	$V_S$	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$						$(V_R > 315V): V_S = 1.10 \cdot V_R$						
Capacitance Range	$C_R$	1 ~ 6800 $\mu$ F						2.2 ~ 68 $\mu$ F						
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)												
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A						$\leq 0.04 \cdot C_R \cdot V_R + 100\mu$ A						
		Whichever is greater ■ After 2 minutes						After 1 minute						
		[ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]												
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50	63	80	100	160 ~ 250	>250	
		$\tan\delta$ (%)	22	19	16	14	14	12	10	9	8	15	20	
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50	63	80	100	160 ~ 250	400	450
		Z-25°C/Z+20°C	4	3	2	2	2	2	2	2	2	3	6	6
		Z-40°C/Z+20°C	8	6	4	4	3	3	3	3	3	6	10	15
		Z-55°C/Z+20°C	12	10	6	6	4	4	4	4	4	-	-	-

Lifetime Test			
Endurance 105°C ( $V_R$ applied)	Test	<b>5 000 hours</b>	> $\phi$ 6.3mm
		<b>2 000 hours</b>	$\leq \phi$ 6.3mm
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value	
	$\tan\delta$	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value	
	$\tan\delta$	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4			
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below		
	$\Delta C/C_R$	Within $\pm 10\%$ of initial value	
	$\tan\delta$	Less than specified value	
	$I_{Leak}$	Less than specified value	

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	C <sub>R</sub> (µF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type	
	Vibration-proof							
6.3	•	22	4	5.5	1350	80	RV220M6R3B055ETRX	
	•	33	4	5.5	1350	85	RV330M6R3B055ETRX	
	•	47	5	5.5	800	160	RV470M6R3C055ETRX	
	•	100	6.3	5.5	440	240	RV101M6R3E055ETRX	
	•	150	6.3	5.5	440	240	RV151M6R3E055ETRX	
	•	•	220	6.3	7.7	360	280	RV221M6R3E077ETRX ☐
	•	•	330	6.3	7.7	320	350	RV331M6R3E077ETRX ☐
	•	•	330	8	10.5	170	450	RV331M6R3F105ETRX ☐
	•	•	470	8	10.5	170	500	RV471M6R3F105ETRX ☐
	•	•	680	8	10.5	170	550	RV681M6R3F105ETRX ☐
	•	•	1000	8	10.5	170	550	RV102M6R3F105ETRX ☐
	•	•	1500	10	10.5	90	690	RV152M6R3G105ETRX ☐
	•	•	3300	12.5	14	66	1150	RV332M6R3Z140ETRX ☐
	•	•	6800	16	17	35	1800	RV682M6R3J170ETRX ☐
10	•	22	4	5.5	1350	90	RV220M010B055ETRX	
	•	33	5	5.5	800	160	RV330M010C055ETRX	
	•	47	6.3	5.5	440	230	RV470M010E055ETRX	
	•	100	6.3	5.5	440	240	RV101M010E055ETRX	
	•	150	6.3	5.5	440	250	RV151M010E055ETRX	
	•	•	220	6.3	7.7	360	280	RV221M010E077ETRX ☐
	•	•	330	8	10.5	170	500	RV331M010F105ETRX ☐
	•	•	470	8	10.5	170	550	RV471M010F105ETRX ☐
	•	•	680	10	10.5	90	690	RV681M010G105ETRX ☐
	•	•	1000	10	10.5	90	690	RV102M010G105ETRX ☐
	•	•	2200	12.5	14	66	1150	RV222M010Z140ETRX ☐
	•	•	4700	16	17	35	1800	RV472M010J170ETRX ☐
16	•	10	4	5.5	2100	90	RV100M016B055ETRX	
	•	22	5	5.5	800	150	RV220M016C055ETRX	
	•	33	6.3	5.5	440	230	RV330M016E055ETRX	
	•	47	6.3	5.5	440	230	RV470M016E055ETRX	
	•	100	6.3	5.5	440	255	RV101M016E055ETRX	
	•	•	150	6.3	7.7	360	280	RV151M016E077ETRX ☐
	•	•	220	6.3	7.7	360	280	RV221M016E077ETRX ☐
	•	•	330	8	10.5	170	550	RV331M016F105ETRX ☐
	•	•	470	8	10.5	170	600	RV471M016F105ETRX ☐
	•	•	470	10	10.5	90	670	RV471M016G105ETRX ☐
	•	•	680	10	10.5	90	750	RV681M016G105ETRX ☐
	•	•	1500	12.5	14	66	1150	RV152M016Z140ETRX ☐
•	•	3300	16	17	35	1800	RV332M016J170ETRX ☐	
25	•	10	4	5.5	2100	90	RV100M025B055ETRX	
	•	22	5	5.5	800	150	RV220M025C055ETRX	
	•	33	6.3	5.5	440	230	RV330M025E055ETRX	
	•	47	6.3	5.5	440	230	RV470M025E055ETRX	
	•	•	100	6.3	7.7	360	300	RV101M025E077ETRX ☐

 ☐: Enter **W** for Vibration proof version

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
25	•	•	150	8	10.5	170	500	RV151M025F105ETRX
	•	•	220	8	10.5	170	550	RV221M025F105ETRX
	•	•	330	8	10.5	170	600	RV331M025F105ETRX
	•	•	470	10	10.5	90	670	RV471M025G105ETRX
	•	•	1000	12.5	14	66	1150	RV102M025Z140ETRX
	•	•	2200	16	17	35	1800	RV222M025J170ETRX
35	•		4.7	4	5.5	1900	90	RV4R7M035B055ETRX
	•		10	5	5.5	800	150	RV100M035C055ETRX
	•		22	6.3	5.5	440	230	RV220M035E055ETRX
	•		33	6.3	5.5	440	230	RV330M035E055ETRX
	•		47	6.3	5.5	440	240	RV470M035E055ETRX
	•	•	100	8	10.5	170	450	RV101M035F105ETRX
	•	•	150	8	10.5	170	550	RV151M035F105ETRX
	•	•	220	8	10.5	160	600	RV221M035F105ETRX
	•	•	220	10	10.5	90	670	RV221M035G105ETRX
	•	•	330	10	10.5	80	850	RV331M035G105ETRX
	•	•	470	12.5	14	66	1150	RV471M035Z140ETRX
	•	•	680	12.5	14	66	1150	RV681M035Z140ETRX
	•	•	1000	16	17	48	1800	RV102M035J170ETRX
•	•	1500	16	17	48	1800	RV152M035J170ETRX	
50	•		1	4	5.5	4400	60	RV010M050B055ETRX
	•		2.2	4	5.5	3900	60	RV2R2M050B055ETRX
	•		3.3	4	5.5	3900	60	RV3R3M050B055ETRX
	•		4.7	4	5.5	3900	75	RV4R7M050B055ETRX
	•		4.7	5	5.5	1520	85	RV4R7M050C055ETRX
	•		10	6.3	5.5	1400	165	RV100M050E055ETRX
	•		22	6.3	5.5	1200	165	RV220M050E055ETRX
	•	•	33	6.3	7.7	680	185	RV330M050E077ETRX
	•	•	47	6.3	7.7	680	185	RV470M050E077ETRX
	•	•	68	8	10.5	340	300	RV680M050F105ETRX
	•	•	100	8	10.5	340	350	RV101M050F105ETRX
	•	•	100	10	10.5	250	555	RV101M050G105ETRX
	•	•	150	10	10.5	250	555	RV151M050G105ETRX
	•	•	220	10	10.5	230	600	RV221M050G105ETRX
	•	•	470	16	17	73	1610	RV471M050J170ETRX
	•	•	680	16	17	73	1610	RV681M050J170ETRX
	•	•	1000	16	17	73	1610	RV102M050J170ETRX
63	•		4.7	5	5.5	2600	50	RV4R7M063C055ETRX
	•		10	6.3	5.5	1500	80	RV100M063E055ETRX
	•	•	22	6.3	7.7	1000	120	RV220M063E077ETRX
	•	•	33	8	10.5	700	250	RV330M063F105ETRX
	•	•	47	8	10.5	650	280	RV470M063F105ETRX
	•	•	68	10	10.5	380	400	RV680M063G105ETRX
	•	•	100	10	10.5	240	420	RV101M063G105ETRX

: Enter **W** for Vibration proof version

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (µF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
63	•	•	100	12.5	14	220	540	RV101M063Z140ETRX
	•	•	150	12.5	14	180	800	RV151M063Z140ETRX
	•	•	220	12.5	14	160	830	RV221M063Z140ETRX
	•	•	470	16	17	82	1410	RV471M063J170ETRX
80	•	•	10	6.3	7.7	2600	60	RV100M080E077ETRX
	•	•	22	8	10.5	1700	130	RV220M080F105ETRX
	•	•	33	8	10.5	1600	140	RV330M080F105ETRX
	•	•	47	10	10.5	700	210	RV470M080G105ETRX
	•	•	68	12.5	14	500	500	RV680M080Z140ETRX
	•	•	100	12.5	14	450	550	RV101M080Z140ETRX
	•	•	150	12.5	14	420	600	RV151M080Z140ETRX
	•	•	220	16	17	380	700	RV221M080J170ETRX
	•	•	330	16	17	320	800	RV331M080J170ETRX
	100	•	•	10	6.3	7.7	3900	65
•		•	22	8	10.5	1900	130	RV220M100F105ETRX
•		•	33	10	10.5	1250	200	RV330M100G105ETRX
•		•	47	10	10.5	950	390	RV470M100G105ETRX
•		•	47	12.5	14	900	500	RV470M100Z140ETRX
•		•	68	12.5	14	570	600	RV680M100Z140ETRX
•		•	100	12.5	14	480	640	RV101M100Z140ETRX
•		•	100	16	17	450	800	RV101M100J170ETRX
160	•	•	10	8	10.5	-	88	RV100M160F105ETRX
	•	•	18	10	10.5	-	104	RV180M160G105ETRX
	•	•	22	10	10.5	-	112	RV220M160G105ETRX
	•	•	27	12.5	14	-	136	RV270M160Z140ETRX
	•	•	33	12.5	14	-	152	RV330M160Z140ETRX
	•	•	47	16	17	-	416	RV470M160J170ETRX
	•	•	68	16	17	-	480	RV680M160J170ETRX
200	•	•	10	12.5	14	-	128	RV100M200Z140ETRX
	•	•	22	12.5	14	-	168	RV220M200Z140ETRX
	•	•	27	12.5	14	-	184	RV270M200Z140ETRX
	•	•	33	16	17	-	352	RV330M200J170ETRX
	•	•	47	16	17	-	416	RV470M200J170ETRX
250	•	•	4.7	8	10.5	-	80	RV4R7M250F105ETRX
	•	•	4.7	12.5	14	-	104	RV4R7M250Z140ETRX
	•	•	6.8	10	10.5	-	96	RV6R8M250G105ETRX
	•	•	6.8	12.5	14	-	125	RV6R8M250Z140ETRX
	•	•	10	10	10.5	-	120	RV100M250G105ETRX
	•	•	15	12.5	14	-	192	RV150M250Z140ETRX
	•	•	22	16	17	-	288	RV220M250J170ETRX
400	•	•	2.2	8	10.5	-	40	RV2R2M400F105ETRX
	•	•	3.3	8	10.5	-	48	RV3R3M400F105ETRX
	•	•	3.9	10	10.5	-	56	RV3R9M400G105ETRX
	•	•	4.7	10	10.5	-	64	RV4R7M400G105ETRX

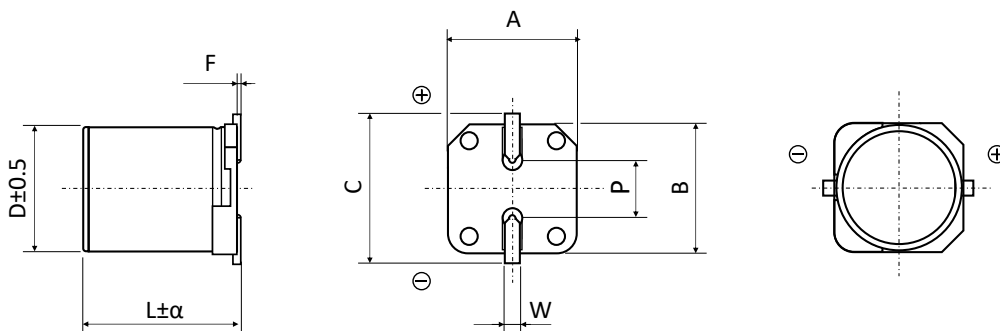
: Enter **W** for Vibration proof version

**STANDARD RATINGS**

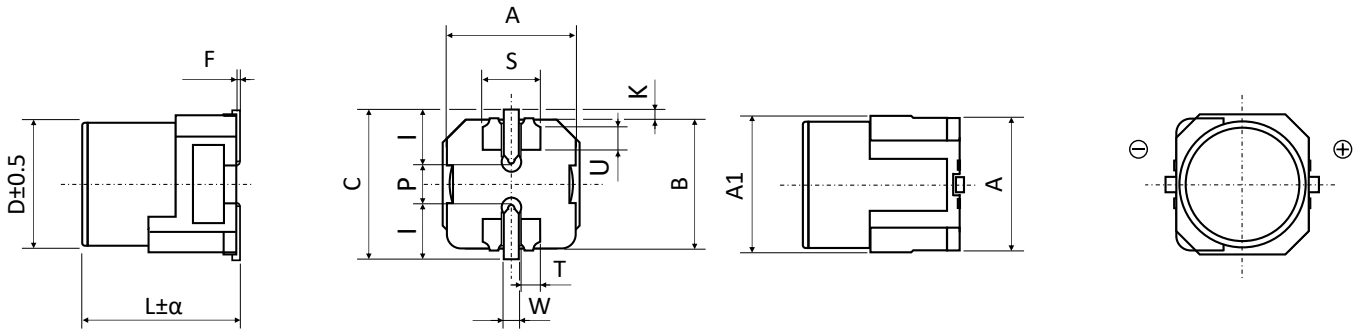
Part number shows blister tape on paper reel

$V_R$ (V)	Standard	Vibration-proof	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
	●	●						
400	●	●	6.8	12.5	14	-	96	RV6R8M400Z140ETRX <input type="checkbox"/>
	●	●	8.2	12.5	14	-	104	RV8R2M400Z140ETRX <input type="checkbox"/>
	●	●	10	12.5	14	-	112	RV100M400Z140ETRX <input type="checkbox"/>
	●	●	12	16	17	-	152	RV120M400J170ETRX <input type="checkbox"/>
	●	●	22	16	17	-	192	RV220M400J170ETRX <input type="checkbox"/>
450	●	●	3.3	10	10.5	-	64	RV3R3M450G105ETRX <input type="checkbox"/>
	●	●	3.9	10	10.5	-	64	RV3R9M450G105ETRX <input type="checkbox"/>
	●	●	4.7	12.5	14	-	80	RV4R7M450Z140ETRX <input type="checkbox"/>
	●	●	6.8	12.5	14	-	96	RV6R8M450Z140ETRX <input type="checkbox"/>
	●	●	8.2	12.5	14	-	104	RV8R2M450Z140ETRX <input type="checkbox"/>
	●	●	10	12.5	14	-	112	RV100M450Z140ETRX <input type="checkbox"/>
	●	●	12	16	17	-	144	RV120M450J170ETRX <input type="checkbox"/>
	●	●	15	16	17	-	160	RV150M450J170ETRX <input type="checkbox"/>

: Enter **W** for Vibration proof version

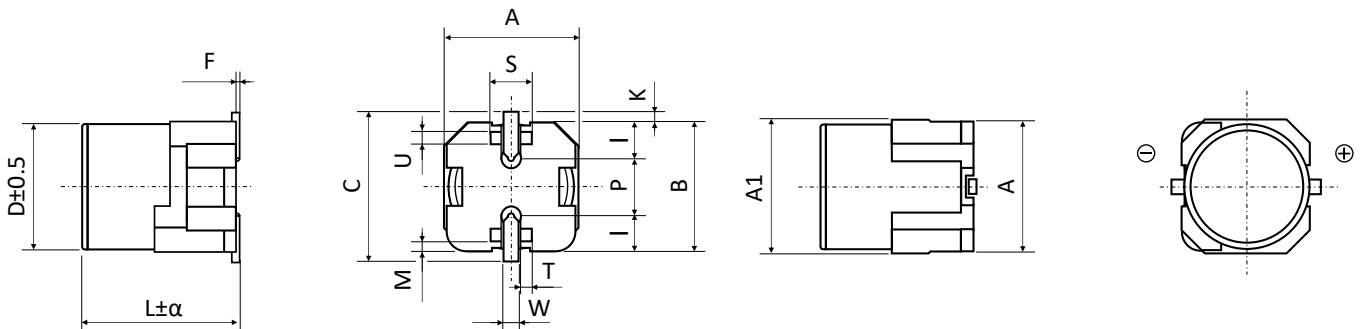
**DIMENSIONS STANDARD PACKAGE - All dimensions in mm**


$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
4.0	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5.0	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
12.5	14.0	Max	13.0	13.0	13.9	0.3 max.	4.5	1 to 1.4
16.0	17.0	0.5	17.0	17.0	18.0	0.3 max.	6.6	1 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3 ▪ All dimensions in mm**


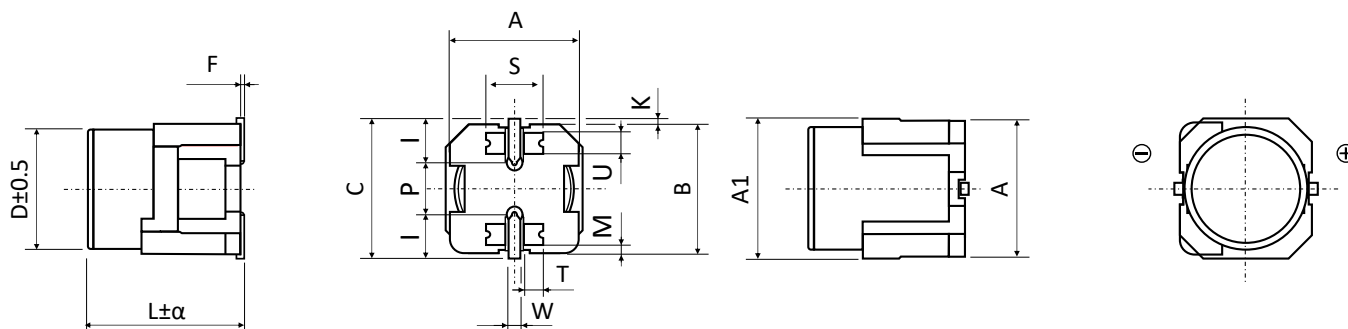
ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D12.5 and D16** ▪ All dimensions in mm


$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	$K \pm 0.3$
12.5	14.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
16.0	17.0	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$	$M \pm 0.1$
12.5	14.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
16.0	17.0	6.7	5.8	5.5	2.0	3.0	1.4	1.0

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**
**< 160V**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	50/60	100/120	500	1k	10k	50k ~ 100k
$1 \leq C_R \leq 10$	0.47	0.59	0.76	0.85	0.97	1
$10 < C_R \leq 6800$	0.52	0.65	0.8	0.89	0.97	1

 **$\geq 160V$** 

$C_R$ ( $\mu F$ ) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k ~ 100k
$2.2 \leq C_R \leq 68$	0.5	0.63	0.78	0.88	0.97	1

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85



### DISCLAIMER

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CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### CV SERIES ■ LONG LIFE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ SMD type
- Endurance: 105°C ■ 7000 hours
- Low impedance and high ripple current
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +105°C						
Rated Voltage Range	$V_R$	6.3 ~ 50V DC						
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$						
Capacitance Range	$C_R$	22 ~ 1500 $\mu$ F						
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A, whichever is greater ■ After 2 minutes [ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]						
Dissipation Factor % (20°C ■ 120Hz)	tan $\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50
		tan $\delta$	32	28	26	16	14	14
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	4	3	3
Lifetime Test								
Endurance 105°C ( $V_R$ applied)	Test	<b>7 000 hours</b>						
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value						
	tan $\delta$	$\leq 300\%$ of initial specified value						
	$I_{Leak}$	$\leq$ the initial specified value						
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1 000 hours</b>						
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value						
	tan $\delta$	$\leq 300\%$ of initial specified value						
	$I_{Leak}$	$\leq$ the initial specified value						
Resistance to Soldering Heat	Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4							
	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below							
	$\Delta C/C_R$	Within $\pm 10\%$ of initial value						
	tan $\delta$	Less than specified value						
	$I_{Leak}$	Less than specified value						

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (µF)	ø D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
6.3	•	•	100	6.3	7.7	1100	140	CV101M6R3E077ETRX
	•	•	150	6.3	7.7	900	180	CV151M6R3E077ETRX
	•	•	220	6.3	7.7	750	230	CV221M6R3E077ETRX
	•	•	330	8	10.5	500	400	CV331M6R3F105ETRX
	•	•	470	8	10.5	220	600	CV471M6R3F105ETRX
	•	•	680	10	10.5	200	700	CV681M6R3G105ETRX
	•	•	1000	12.5	14	100	1100	CV102M6R3Z140ETRX
10	•	•	100	6.3	7.7	1100	140	CV101M010E077ETRX
	•	•	150	6.3	7.7	900	180	CV151M010E077ETRX
	•	•	220	6.3	7.7	750	230	CV221M010E077ETRX
	•	•	330	8	10.5	500	400	CV331M010F105ETRX
	•	•	470	8	10.5	220	600	CV471M010F105ETRX
	•	•	680	10	10.5	200	700	CV681M010G105ETRX
	•	•	1000	12.5	14	100	1100	CV102M010Z140ETRX
16	•	•	100	6.3	7.7	1100	140	CV101M016E077ETRX
	•	•	150	8	10.5	600	250	CV151M016F105ETRX
	•	•	220	8	10.5	400	280	CV221M016F105ETRX
	•	•	330	8	10.5	220	600	CV331M016F105ETRX
	•	•	470	8	10.5	220	600	CV471M016F105ETRX
	•	•	470	10	10.5	160	850	CV471M016G105ETRX
	•	•	680	12.5	14	100	1100	CV681M016Z140ETRX
25	•	•	1000	16	17	80	1500	CV102M016J170ETRX
	•	•	22	6.3	7.7	1500	95	CV220M025E077ETRX
	•	•	33	6.3	7.7	1300	120	CV330M025E077ETRX
	•	•	47	6.3	7.7	1100	140	CV470M025E077ETRX
	•	•	100	8	10.5	700	280	CV101M025F105ETRX
	•	•	150	8	10.5	600	380	CV151M025F105ETRX
	•	•	220	8	10.5	220	600	CV221M025F105ETRX
	•	•	330	8	10.5	200	650	CV331M025F105ETRX
	•	•	390	10	10.5	190	750	CV391M025G105ETRX
	•	•	470	10	10.5	160	850	CV471M025G105ETRX
35	•	•	680	12.5	14	100	1100	CV681M025Z140ETRX
	•	•	1000	16	17	80	1500	CV102M025J170ETRX
	•	•	47	6.3	7.7	1000	230	CV470M035E077ETRX
	•	•	100	8	10.5	220	600	CV101M035F105ETRX
	•	•	220	10	10.5	160	850	CV221M035G105ETRX
	•	•	330	12.5	14	100	1100	CV331M035Z140ETRX
	•	•	470	16	17	80	1500	CV471M035J170ETRX

: Enter **W** for Vibration proof version

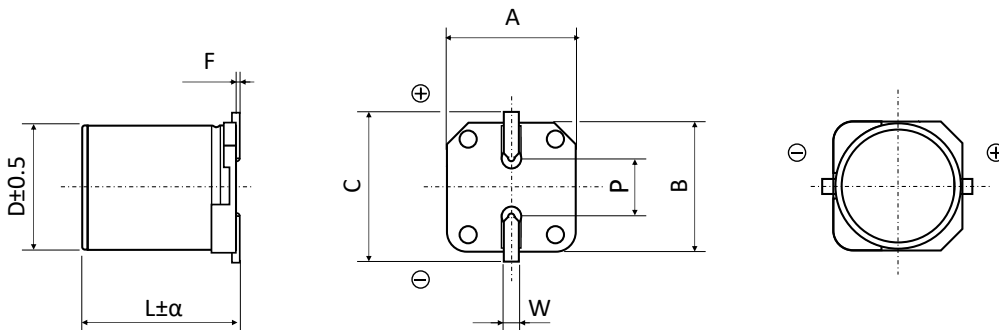
## STANDARD RATINGS

Part number shows blister tape on paper reel

$V_R$ (V)	Standard	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
	Vibration-proof						
50	•	47	8	10.5	530	350	CV470M050F105ETRX
	•	100	8	10.5	530	350	CV101M050F105ETRX
	•	100	10	10.5	510	400	CV101M050G105ETRX
	•	150	10	10.5	480	450	CV151M050G105ETRX
	•	220	12.5	14	400	850	CV221M050Z140ETRX
	•	330	16	17	300	1100	CV331M050J170ETRX

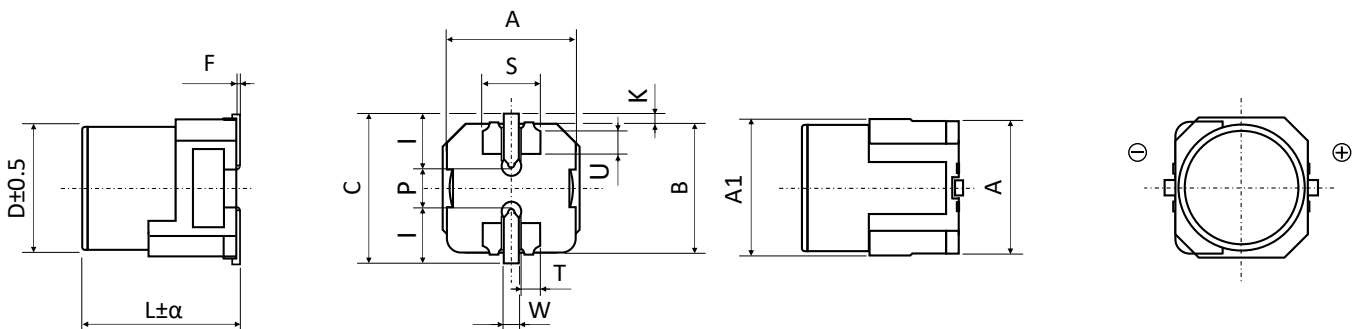
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## DIMENSIONS STANDARD PACKAGE - All dimensions in mm



$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
12.5	14.0	Max	13.0	13.0	13.9	0.3 max.	4.5	1 to 1.4
16.0	17.0	0.5	17.0	17.0	18.0	0.3 max.	6.6	1 to 1.4

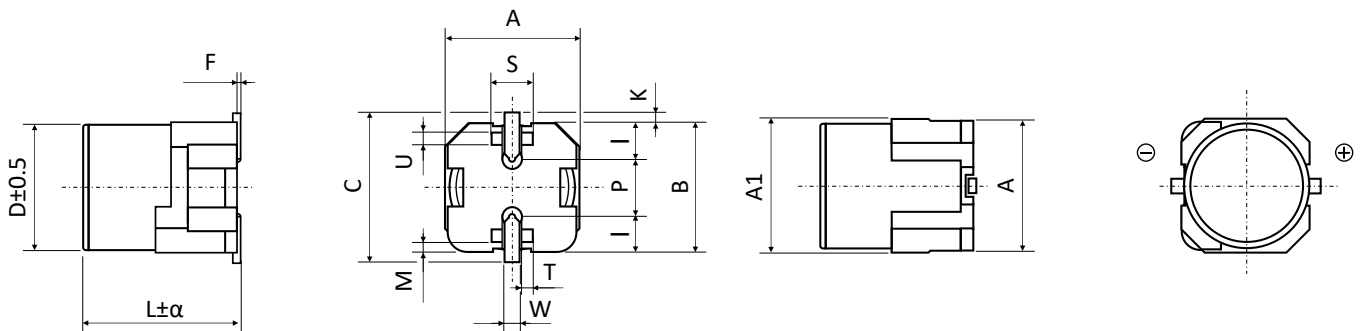
## DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3 - All dimensions in mm



**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm

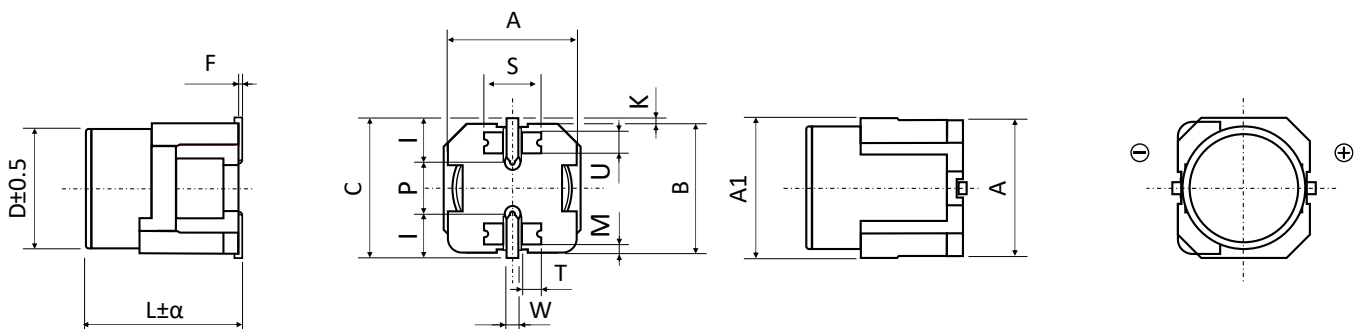
ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D12.5 and D16** ▪ All dimensions in mm


ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.3
12.5	14.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
16.0	17.0	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
12.5	14.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
16.0	17.0	6.7	5.8	5.5	2.0	3.0	1.4	1.0

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu$ F) / Frequency (Hz)	50/60	100/120	500	1k	10k ~ 100k
$22 \leq C_R \leq 100$	0.53	0.67	0.8	0.87	1
$100 < C_R \leq 1500$	0.67	0.83	0.92	0.96	1

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General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85

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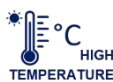
For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

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### TV SERIES ■ HIGH TEMP., AUTOMOTIVE 125°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ SMD type
- Endurance: 125°C ■ 1 000 hours up to 2 000 hours
- Especially for applications with high ambient temperatures
- Vibration-proof (VP) version (up to 30g) available upon request
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics										
Operating Temperature Range		-40 ~ +125°C										
Rated Voltage Range	V <sub>R</sub>	10 ~ 50V DC					160 ~ 450V DC					
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V): V <sub>S</sub> = 1.15·V <sub>R</sub>					(V <sub>R</sub> > 315V): V <sub>S</sub> = 1.10·V <sub>R</sub>					
Capacitance Range	C <sub>R</sub>	10 ~ 330μF					1 ~ 18μF					
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)										
Leakage Current (20°C ■ V <sub>R</sub> applied)	I <sub>LEAK</sub>	≤ 0.03·C <sub>R</sub> ·V <sub>R</sub> or 3μA					≤ 0.04·C <sub>R</sub> ·V <sub>R</sub> + 100μA					
		Whichever is greater ■ After 1 minute					After 1 minute					
		[ I <sub>LEAK</sub> (μA) ; C <sub>R</sub> (μF) ; V <sub>R</sub> (V) ]										
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V <sub>R</sub> (V DC)	10	16	25	35	50	160	200	250	400	450
		tanδ (%)	32	24	21	18	18	20	20	25	25	30
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	10	16	25	35	50	160	200	250	400	450
		Z-25°C/Z+20°C	12	8	6	4	4	8	8	8	12	15
		Z-40°C/Z+20°C	14	8	6	4	4	-	-	-	-	-
Lifetime Test												
Endurance 125°C (V <sub>R</sub> applied)	Test	2 000 hours					∅ 8 x 10.5mm & ∅ 10 x 10.5mm					
		1 000 hours					∅ 6.3 x 7.7mm & ∅ 8 x 6.5mm					
	ΔC/C <sub>R</sub>	≤ ±30% of initial measured value										
	tanδ	≤ 300% of initial specified value										
Shelf Life 125°C (V <sub>R</sub> = 0)	Test	1 000 hours										
		ΔC/C <sub>R</sub>	≤ ±30% of initial measured value									
	tanδ	≤ 300% of initial specified value										
	I <sub>Leak</sub>	≤ the initial specified value										
		Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4										
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below											
	ΔC/C <sub>R</sub>	Within ±10% of initial value										
	tanδ	Less than specified value										
	I <sub>Leak</sub>	Less than specified value										

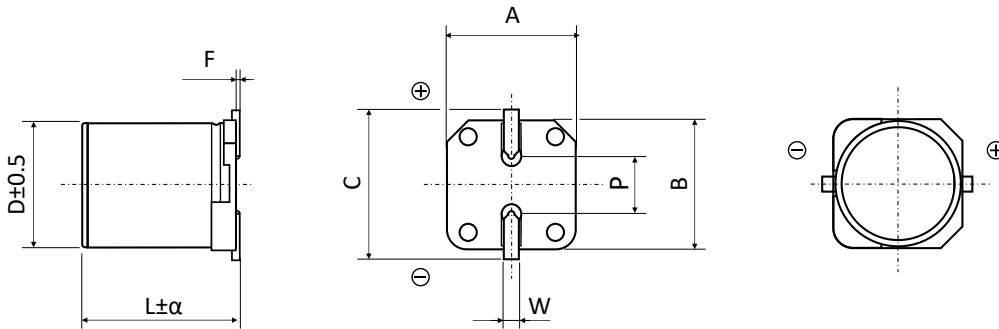
**STANDARD RATINGS**

Part number shows blister tape on paper reel

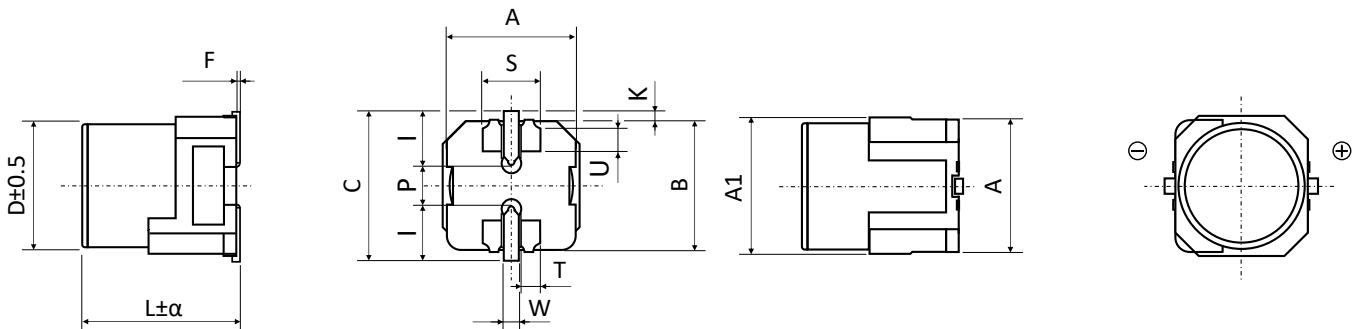
V <sub>R</sub> (V)	Standard		C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +125°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof					
10	•	•	100	6.3	7.7	53	TV101M010E077ETRX ☐
	•		100	8	6.5	58	TV101M010F065ETRX
	•	•	220	8	10.5	90	TV221M010F105ETRX ☐
	•	•	330	10	10.5	112	TV331M010G105ETRX ☐
16	•	•	100	8	10.5	66	TV101M016F105ETRX ☐
	•	•	220	10	10.5	102	TV221M016G105ETRX ☐
25	•	•	47	6.3	7.7	45	TV470M025E077ETRX ☐
	•		47	8	6.5	48	TV470M025F065ETRX
	•	•	100	8	10.5	74	TV101M025F105ETRX ☐
	•	•	220	10	10.5	116	TV221M025G105ETRX ☐
35	•	•	33	6.3	7.7	40	TV330M035E077ETRX ☐
	•		33	8	6.5	44	TV330M035F065ETRX
	•	•	47	8	10.5	52	TV470M035F105ETRX ☐
	•	•	100	10	10.5	80	TV101M035G105ETRX ☐
50	•	•	10	6.3	7.7	22	TV100M050E077ETRX ☐
	•		10	8	6.5	24	TV100M050F065ETRX
	•	•	22	6.3	7.7	35	TV220M050E077ETRX ☐
	•		22	8	6.5	38	TV220M050F065ETRX
	•	•	33	8	10.5	46	TV330M050F105ETRX ☐
	•	•	47	10	10.5	58	TV470M050G105ETRX ☐
160	•	•	6.8	8	10.5	42	TV6R8M160F105ETRX ☐
	•	•	10	10	10.5	59	TV100M160G105ETRX ☐
	•	•	18	10	10.5	65	TV180M160G105ETRX ☐
200	•	•	4.7	8	10.5	36	TV4R7M200F105ETRX ☐
	•	•	6.8	10	10.5	59	TV6R8M200G105ETRX ☐
	•	•	10	10	10.5	59	TV100M200G105ETRX ☐
250	•	•	3.3	8	10.5	28	TV3R3M250F105ETRX ☐
	•	•	4.7	10	10.5	59	TV4R7M250G105ETRX ☐
400	•	•	1	8	10.5	27	TV010M400F105ETRX ☐
	•	•	1.8	8	10.5	30	TV1R8M400F105ETRX ☐
	•	•	2.2	8	10.5	33	TV2R2M400F105ETRX ☐
	•	•	2.2	10	10.5	37	TV2R2M400G105ETRX ☐
	•	•	3.3	8	10.5	36	TV3R3M400F105ETRX ☐
	•	•	3.3	10	10.5	39	TV3R3M400G105ETRX ☐
	•	•	4.7	10	10.5	46	TV4R7M400G105ETRX ☐
	•	•	5.6	10	10.5	50	TV5R6M400G105ETRX ☐
450	•	•	2.2	8	10.5	28	TV2R2M450F105ETRX ☐
	•	•	3.3	10	10.5	32	TV3R3M450G105ETRX ☐
	•	•	3.9	10	10.5	38	TV3R9M450G105ETRX ☐

☐: Enter W for Vibration proof version



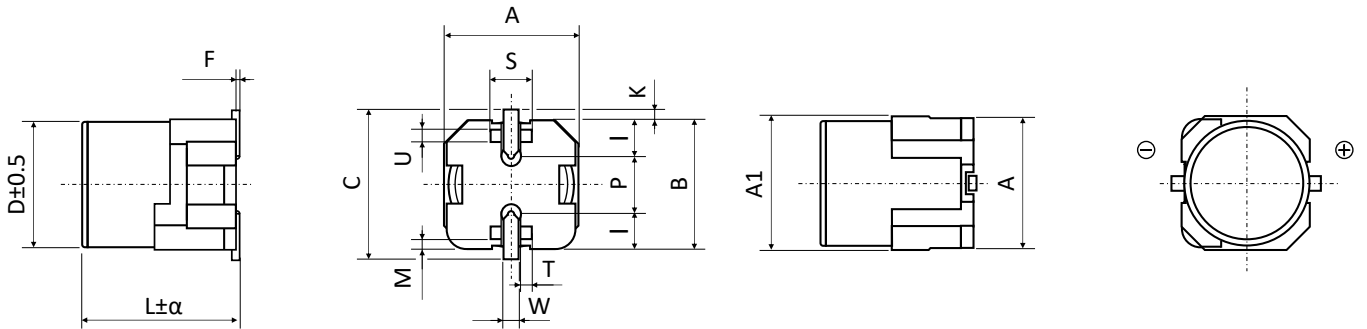
**DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm**


$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	6.5	Max	8.3	8.3	9.0	0.3 max.	2.3	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D6.3$  ▀ All dimensions in mm**


$\phi D$	L	$\alpha$	$A \pm 0.2$	$A1$ (max.)	$B \pm 0.2$	$C$ (max.)	F	K
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**


$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	$K \pm 0.2$
8	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$	$M \pm 0.1$
8	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	50/60	100/120	500	1k	10k ~ 100k
$1 \leq C_R \leq 47$	0.8	1	1.2	1.3	1.5
$100 < C_R \leq 330$	0.8	1	1.1	1.15	1.2

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

General Precautions and Guidelines	Packaging Information Liquid SMD
Page 310	Page 85



### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### PRODUCT CODE - SMD ALUMINUM ELECTROLYTIC CAPACITORS



SMD type example:

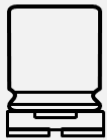
DV series ▪ 220µF ▪ 50V ▪ ±20% ▪ Ø 10mm ▪ L 10.5mm ▪ Tape & Reel ▪ AEC-Q200

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<b>D V</b>		<b>2 2 1</b>			<b>M</b>	<b>0 5 0</b>			<b>G</b>	<b>1 0 5</b>			<b>E</b>	<b>T R</b>		<b>X - - -</b>			
Series		Capacitance			Capacitance tolerance	Voltage			Case Ø (mm)	Height (mm)			Type code	Taping		Special requirement			
Code	µF	Code	%	Code	Volt	Code	ØD	Code	H	Code	Type	Code	TR	Tape on reel		Code	Special		
OR1	0.1	H	±5	004	4	B	4	055	5.5	E	Standard	TR			U	Plastic reel			
R47	0.47	K	±10	6R3	6.3	C	5	061	6.1						W	Vibration proof			
010	1	S	±15	010	10	E	6.3	065	6.5						X	AEC-Q200			
4R7	4.7	M	±20	016	16	F	8	077	7.7										
100	10	N	±30	025	25	G	10	105	10.5										
101	100	D	±40	035	35	H	12	140	14										
102	1000	I	+5 to +20	050	50	Z	12.5	170	17										
682	6800	B	0 to -20	063	63	I	13	215	21.5										
		G	0 to +10	080	80	J	16												
		Z	0 to +20	100	100	K	18												
		Y	0 to +30	160	160	L	20												
		X	0 to +40	200	200	M	22												
		A	0 to +50	250	250														
		J	-5 to +20	400	400														
		C	-5 to +30	450	450														
		E	-8 to +5																
		V	-10 to +20																
		Q	-10 to +30																
		T	-10 to +50																
		W	-20 to +10																
		P	-15 to +20																
		L	-25 to +20																
		U	-30 to 0																
		F	-35 to 0																
		O	-50 to 0																

Please consult CapXon for further assistance

### MARKING - SMD ALUMINUM ELECTROLYTIC CAPACITORS

#### Aluminum Electrolytic Capacitor - SMD type



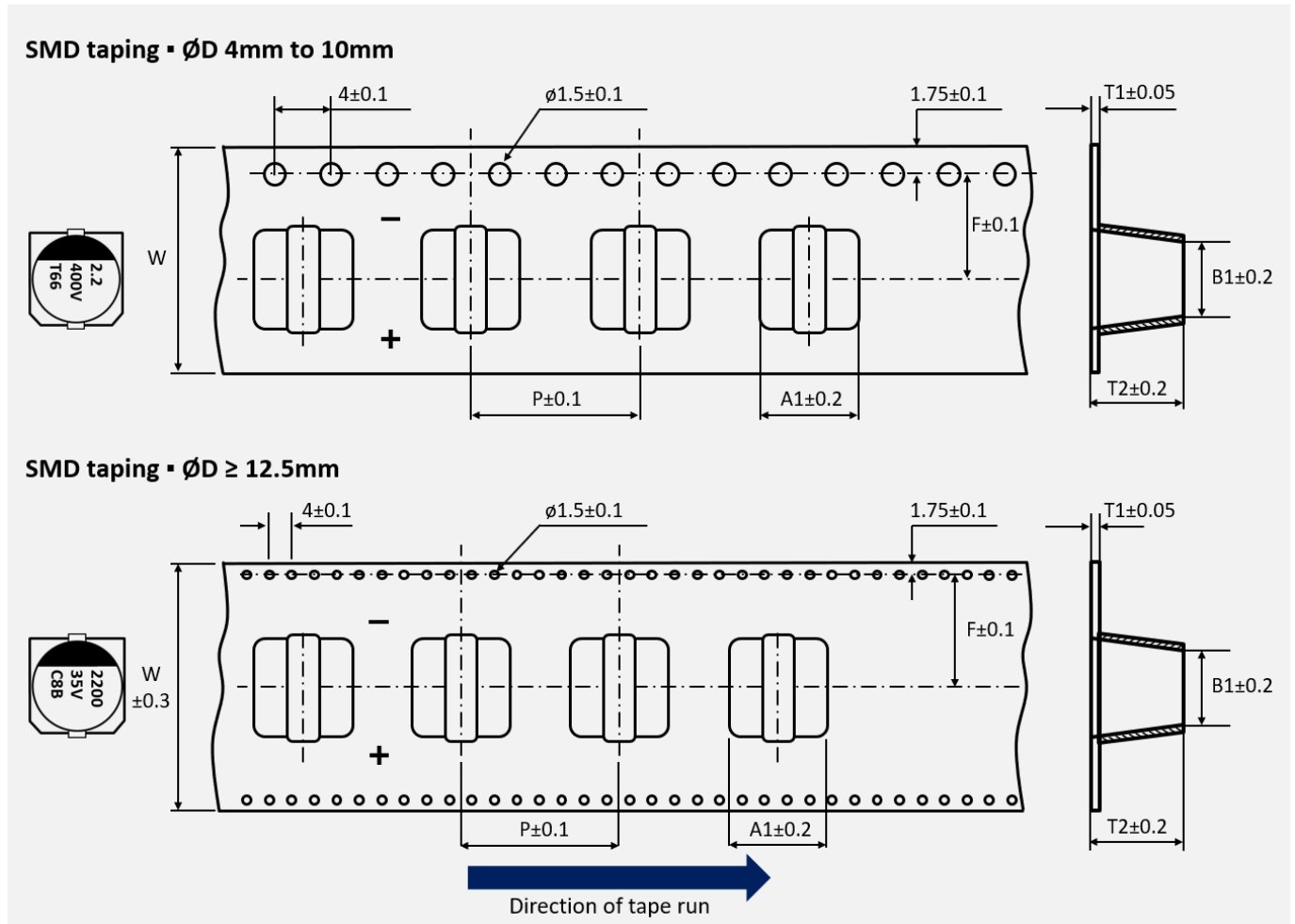
220: Nominal capacitance (µF)  
 50X: Rated voltage (V) ▪ AEC-Q200 type  
 (-) polarity (Cathode indicate)  
 D: DV Series  
 96: Production datacode year/month  
 (ex. 2019/June)

Top view  
 AEC-Q200 type



Digits	Description
1 <sup>st</sup>	Last digit of the year
2 <sup>nd</sup>	Month 1, 2, 3...9, A (10), B (11), C (12)

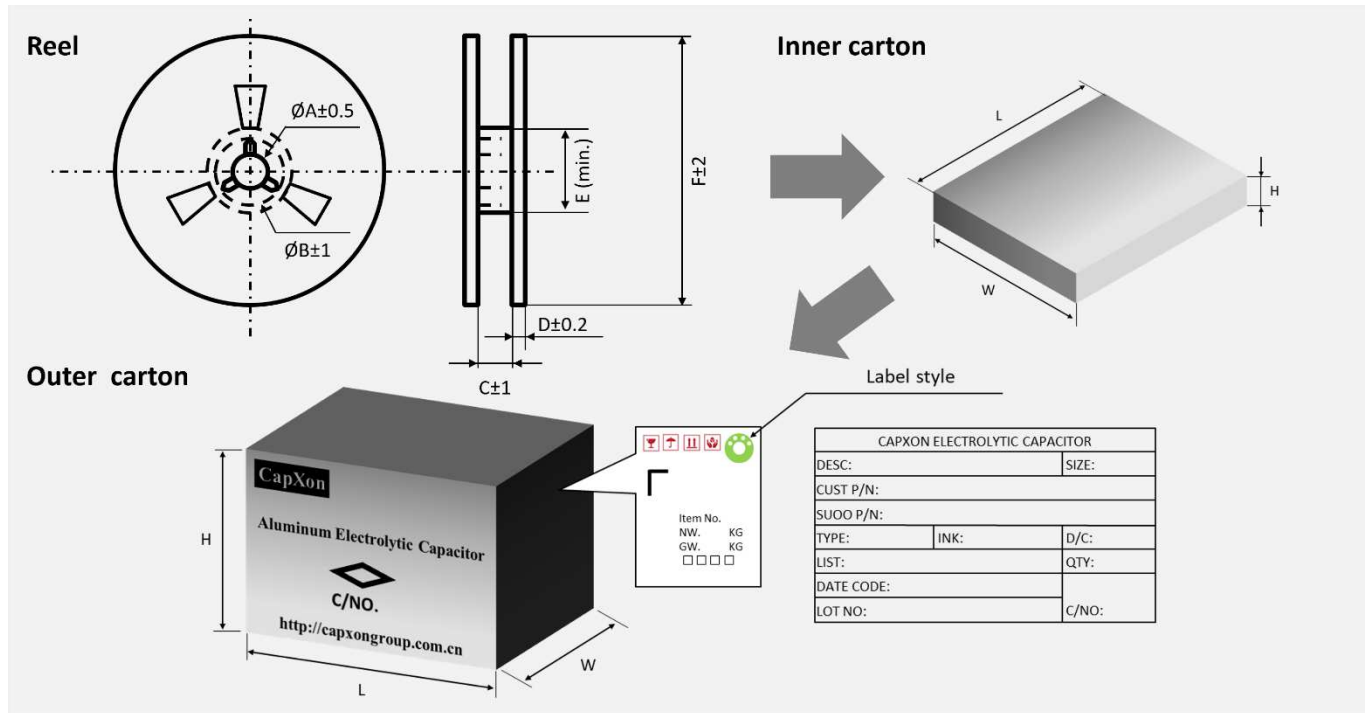
### TAPING - SMD ALUMINUM ELECTROLYTIC CAPACITORS - REEL PACK



All dimensions in mm

$\phi D \times L$	4 x 5.5	5 x 5.5	6.3 x 5.5	6.3 x 6.1	6.3 x 7.7	8 x 6.5	8 x 10.5	10 x 10.5	12.5 x 14	16 x 17	16 x 21.5	18 x 16.5	18 x 21.5
W	12	12	16	16	16	16	24	24	32	44	44	44	44
P	8	12	12	12	12	12	16	16	24	28	32	32	32
F	5.5	5.5	7.5	7.5	7.5	7.5	11.5	11.5	14.2	20.2	20.2	20.2	20.2
A1	4.7	5.7	7	7	7	8.7	8.7	10.7	13.9	17.5	17.5	19.5	19.5
B1	4.7	5.7	7	7	7	8.7	8.7	10.7	13.9	17.5	17.5	19.5	19.5
T1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5
T2	5.7	5.7	5.7	6.2	8.1	7	11	11	14.5	17.5	23	17.5	23

### TAPING • SMD ALUMINUM ELECTROLYTIC CAPACITORS • REEL PACK • PAPER REEL



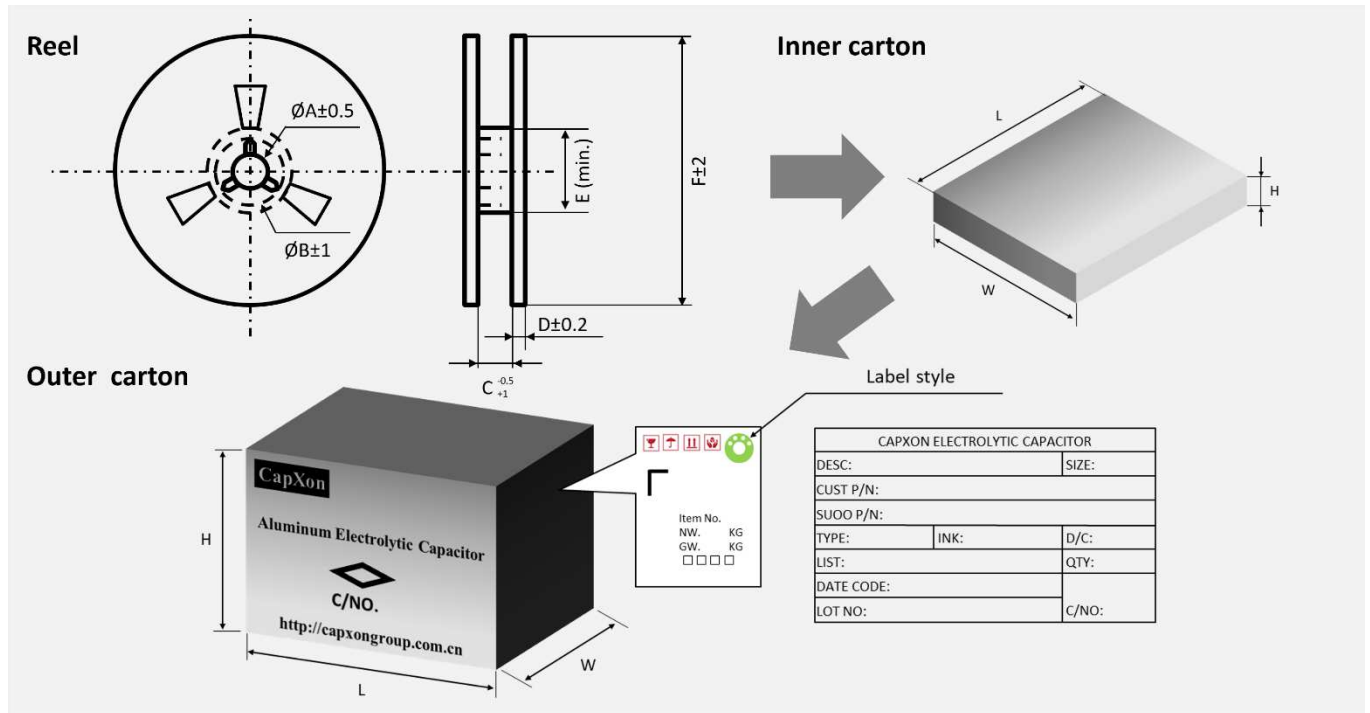
Ø D (mm)	L (mm)	Reel quantity (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	5.5	2000	10000	400 x 390 x 106	30000	425 x 412 x 340	China	85322200
5	5.5	1000	5000	400 x 390 x 106	15000	425 x 412 x 340	China	85322200
6.3	5.5	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	6.1	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	7.7	900	3600	400 x 390 x 106	10800	425 x 412 x 340	China	85322200
8	6.5	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	10.5	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
10	10.5	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
12.5	14	200	600	400 x 390 x 130	1800	430 x 420 x 422	China	85322200
16	17	125	250	400 x 390 x 106	750	425 x 412 x 340	China	85322200
	21.5	100	200	400 x 390 x 106	600	425 x 412 x 340	China	85322200
18	16.5	125	250	400 x 390 x 106	750	425 x 412 x 340	China	85322200
	21.5	100	200	400 x 390 x 106	600	425 x 412 x 340	China	85322200

#### All reel dimensions in mm

Ø D	4	5	5	6.3	6.3	6.3	6.3	8	8	8	8	10	10	10	10	12.5	16	16	18	18
L	5.5	5.5	5.8	5.5	5.8	6.1	7.7	6.5	7.7	10.5	11.7	8.7	10.5	12.4	16.5	14	17	21.5	16.5	21.5
A	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
B	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
C	14	14	14	18	18	18	18	18	18	26	26	26	26	26	26	34	46	46	46	46
D	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
E	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
F	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380

Remark: Standard = Paper reel

### TAPING - SMD ALUMINUM ELECTROLYTIC CAPACITORS - REEL PACK - PLASTIC REEL



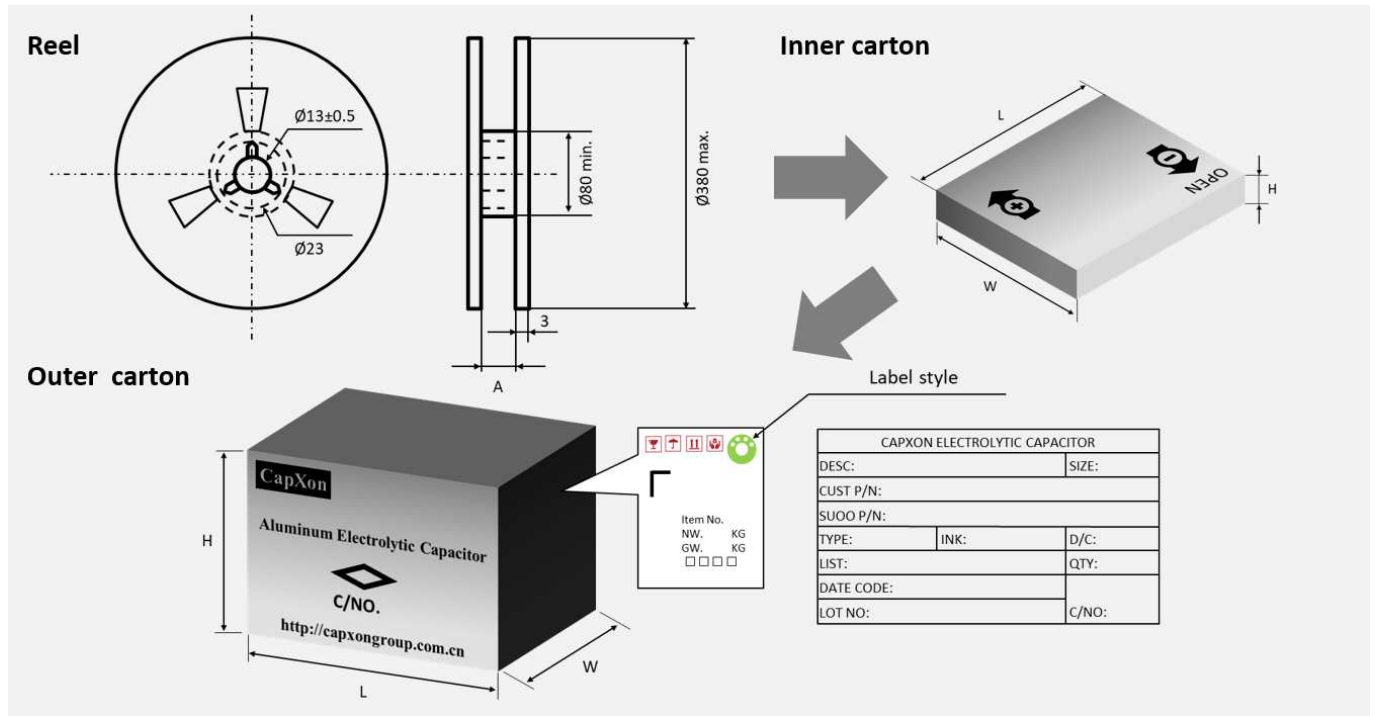
Ø D (mm)	L (mm)	Reel quantity (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	5.5	2000	10000	400 x 390 x 106	30000	425 x 412 x 340	China	85322200
5	5.5	1000	5000	400 x 390 x 106	15000	425 x 412 x 340	China	85322200
6.3	5.5	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	6.1	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
8	7.7	900	3600	400 x 390 x 106	10800	425 x 412 x 340	China	85322200
	6.5	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
10	10.5	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
	10.5	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
12.5	14	200	600	400 x 390 x 130	1800	430 x 420 x 422	China	85322200
16	17	125	250	400 x 390 x 106	750	425 x 412 x 340	China	85322200
	21.5	100	200	400 x 390 x 106	600	425 x 412 x 340	China	85322200
18	16.5	125	250	400 x 390 x 106	750	425 x 412 x 340	China	85322200
	21.5	100	200	400 x 390 x 106	600	425 x 412 x 340	China	85322200

#### All reel dimensions in mm

Ø D	4	5	5	6.3	6.3	6.3	6.3	8	8	8	8	10	10	10	10	12.5	16	16	18	18
L	5.5	5.5	5.8	5.5	5.8	6.1	7.7	6.5	7.7	10.5	11.7	8.7	10.5	12.4	16.5	14	17	21.5	16.5	21.5
A	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
B	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
C	14	14	14	18	18	18	18	18	18	26	26	26	26	26	26	34	46	46	46	46
D	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
F	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380	380

Remark: Plastic reel = Add code "U" at the end of the part number

### TAPING • SMD ALUMINUM ELECTROLYTIC CAPACITORS • REEL PACK

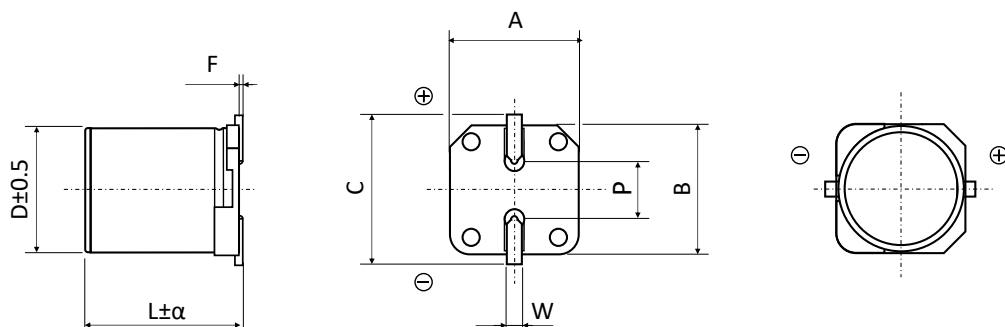


Ø D (mm)	L (mm)	A (mm)	Reel quantity (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	5.5	14	2000	10000	400 x 390 x 106	30000	425 x 412 x 340	China	85322200
5	5.5	14	1000	5000	400 x 390 x 106	15000	425 x 412 x 340	China	85322200
6.3	5.5	18	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	6.1	18	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
8	7.7	18	900	3600	400 x 390 x 106	10800	425 x 412 x 340	China	85322200
	6.5	18	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
10	10.5	26	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
	10.5	26	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
12.5	14	34	200	600	400 x 390 x 130	1800	425 x 412 x 340	China	85322200
16	17	46	125	250	400 x 390 x 106	750	425 x 412 x 340	China	85322200
	21.5	46	100	200	400 x 390 x 106	600	425 x 412 x 340	China	85322200
18	16.5	46	125	250	400 x 390 x 106	750	425 x 412 x 340	China	85322200
	21.5	46	100	200	400 x 390 x 106	600	425 x 412 x 340	China	85322200

Remark: Standard = Paper reel  
 Plastic reel = Add code "U" at the end of the part number

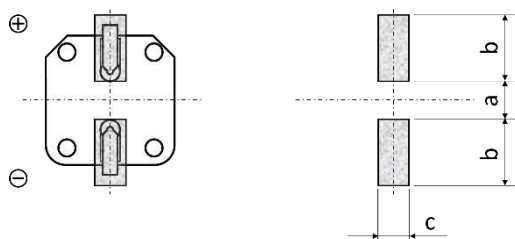


### DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm



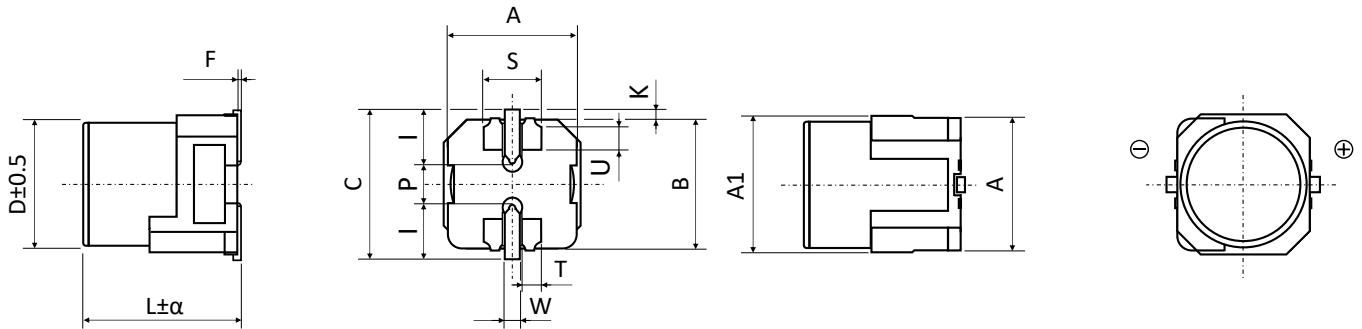
$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
4.0	5.5	Max	4.3	4.3	4.9	0.3 max.	1.0	0.5 to 0.8
5.0	5.5	Max	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.5	0.2	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	6.1	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	Max	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	6.5	Max	8.3	8.3	9.0	0.3 max.	2.3	0.5 to 0.8
8.0	10.5	Max	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	Max	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
12.5	14.0	Max	13.0	13.0	13.9	0.3 max.	4.5	1.0 to 1.4
16.0	17.0	0.5	17.0	17.0	18.0	0.3 max.	6.6	1.0 to 1.4
16.0	21.5	0.5	17.0	17.0	18.0	0.3 max.	6.6	1.0 to 1.4
18.0	16.5	0.5	19.0	19.0	20.0	0.3 max.	6.6	1.0 to 1.4
18.0	21.5	0.5	19.0	19.0	20.0	0.3 max.	6.6	1.0 to 1.4

### PAD LAYOUT STANDARD PACKAGE ▀ All dimensions in mm



$\phi D$	L	a	b	c
4.0	5.5	1.0	2.6	1.6
5.0	5.5	1.4	3.0	1.6
6.3	5.5	2.1	3.5	1.6
6.3	6.1	2.1	3.5	1.6
6.3	7.7	2.1	3.5	1.6
8.0	6.5	2.1	4.5	1.6
8.0	10.5	2.8	4.2	1.9
10.0	10.5	4.3	4.4	1.9
12.5	14.0	4.3	5.8	2.5
16.0	17.0	6.0	6.5	3.5
16.0	21.5	6.0	6.5	3.5
18.0	16.5	6.0	7.5	3.5
18.0	21.5	6.0	7.5	3.5

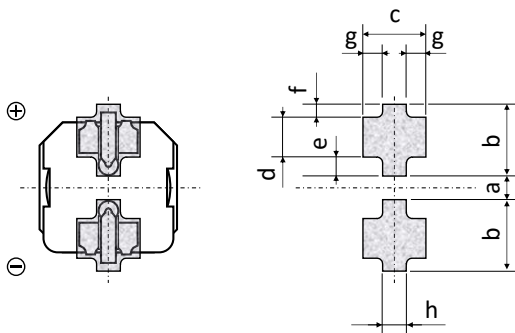
### DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3 ▪ All dimensions in mm



Ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	6.1	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	8.0	0.3	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

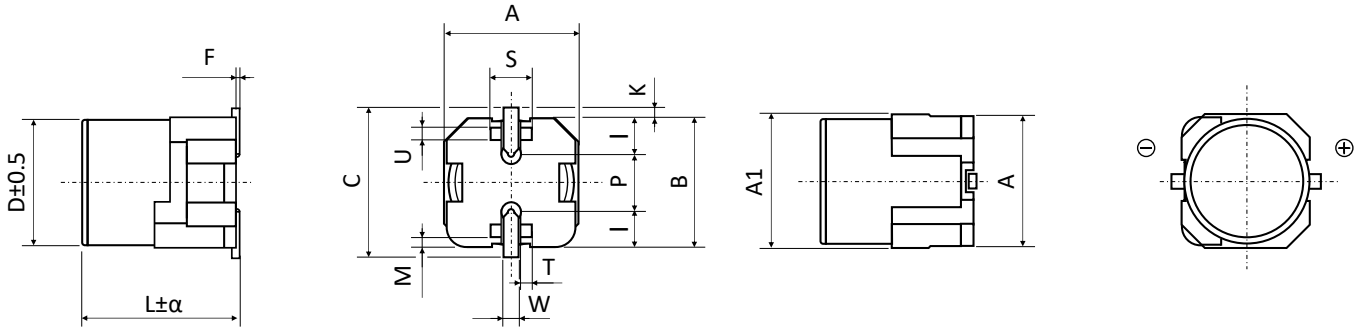
Ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	6.1	2.2	2.9	2.4	1.1	1.55	0.65
6.3	8.0	2.2	2.9	2.4	1.1	1.55	0.65

### PAD LAYOUT VP PACKAGE (VIBRATION-PROOF) Ø D6.3 ▪ All dimensions in mm



Ø D	L	a	b	c	d	e	f	g	h
6.3	6.1	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2
6.3	8.0	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2

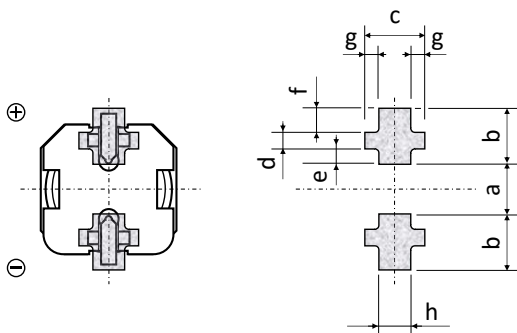
**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**



Ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8.0	10.5	0.5	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	13.5	0.5	10.3	10.8	10.3	12.0	0 to 0.15	0.7

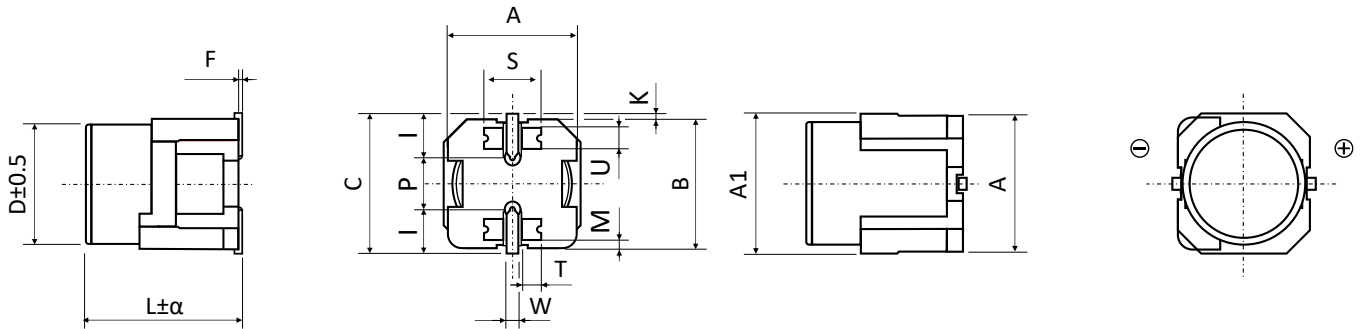
Ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	13.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**PAD LAYOUT VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**



Ø D	L	a	b	c	d	e	f	g	h
8.0	10.5	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
10.0	10.5	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
10.0	12.5	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
10.0	13.5	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5

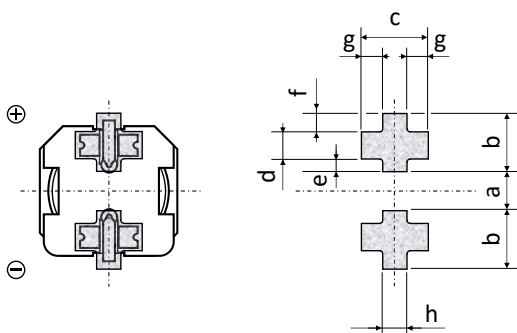
**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D12.5, D16 and D18 ▪ All dimensions in mm**



Ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.3
12.5	14.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
12.5	16.0	1.0	13.5	13.5	13.5	15.0	0 to 0.15	0.7
16.0	17.0	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7
16.0	21.5	1.0	17.0	17.0	17.0	19.0	0 to 0.15	0.7
18.0	16.5	1.0	19.0	19.0	19.0	21.0	0 to 0.15	0.7
18.0	21.5	1.0	19.0	19.0	19.0	21.0	0 to 0.15	0.7

Ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
12.5	14.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
12.5	16.0	4.4	6.0	4.7	2.0	2.2	1.2	0.95
16.0	17.0	6.7	5.8	5.5	2.0	3.0	1.4	1.0
16.0	21.5	6.7	5.8	5.5	2.0	3.0	1.4	1.0
18.0	16.5	6.7	5.8	6.7	2.1	3.0	1.4	1.5
18.0	21.5	6.7	5.8	6.7	2.1	3.0	1.4	1.5

**PAD LAYOUT VP PACKAGE (VIBRATION-PROOF) Ø D12.5, D16 and D18 ▪ All dimensions in mm**

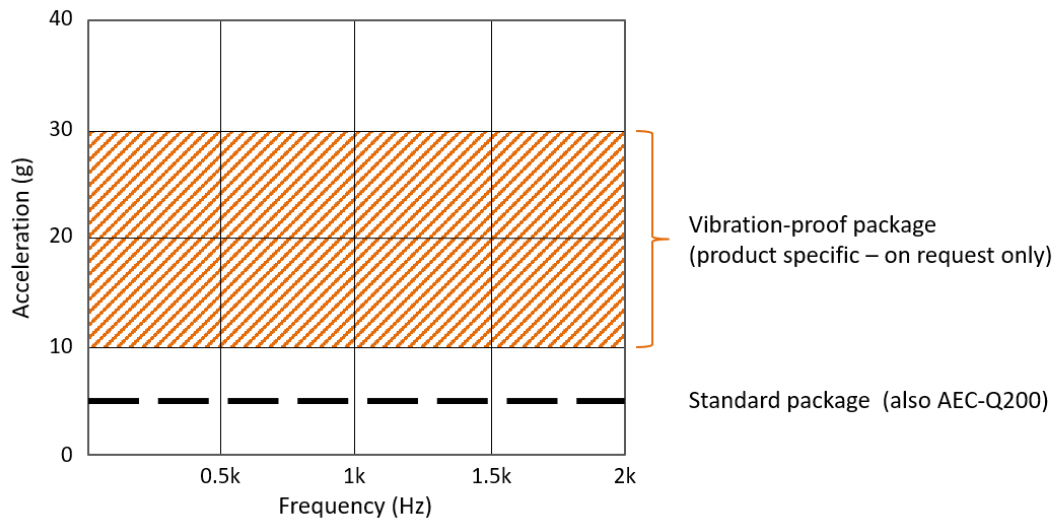


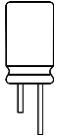
Ø D	L	a	b	c	d	e	f	g	h
12.5	14.0	3.9	6.0	6.9	2.8	1.3	1.9	2.2	2.5
12.5	16.0	3.9	6.0	6.9	2.8	1.3	1.9	2.2	2.5
16.0	17.0	5.8	6.8	6.2	3.6	1.3	1.9	1.7	2.8
16.0	21.5	5.8	6.8	6.2	3.6	1.3	1.9	1.7	2.8
18.0	16.5	5.8	7.3	6.2	3.6	1.8	1.9	1.7	2.8
18.0	21.5	5.8	7.3	6.2	3.6	1.8	1.9	1.7	2.8

## VIBRATION SPECIFICATION - STANDARD AND VIBRATION PROOF PACKAGE



Package	Test Standard	Condition	Determinant Standard
Standard package	IEC 60384-1 IEC 60384-18 IEC 60068-2-6 MIL-STD 202 Method 204	<ol style="list-style-type: none"> <li>10Hz ~ 2kHz ~ 10Hz (20 minutes)</li> <li>Amplitude (single peak): 0.35 mm (at 10 ~ 55Hz)</li> <li>Acceleration: 49m/s<sup>2</sup> (5g at 55 ~ 2kHz)</li> <li>X, Y, Z directions, 4 hours per direction, total 12 hours</li> </ol>	<ol style="list-style-type: none"> <li><math>\Delta C/C \leq \pm 5\%</math> of initial value</li> <li>DF <math>\leq</math> stated limit</li> <li>LC <math>\leq</math> stated limit</li> <li>No visible damage</li> <li>No leakage of electrolyte</li> </ol>
Vibration-proof package		<ol style="list-style-type: none"> <li>Consult CapXon for test details</li> </ol>	<ol style="list-style-type: none"> <li>Consult CapXon for test details</li> </ol>





### OVERVIEW - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

#### Features



Series	Page	AEC-Q200	High Temperature	Low ESR	Low Height	Ultra Long Life	Ultra High Ripple Current	Ultra Miniaturized	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
SG	96	•			•			•	-40	+105	6.3	50	1	470	4000
KL	100	•				•			-40	+105	160	400	3.3	330	5000
									-25		450	500	2.2	180	
GH	107	•		•					-55	+105	6.3	100	1	12000	5000 to 10000
FK	123	•				•			-40	+105	160	450	1	330	6000 to 8000
									-25		500		4.7	120	
FL	131	•				•			-40	+105	160	450	1	680	8000 to 12000
									-25		500		10	68	
GT	141	•				•			-40	+105	10	100	1	330	10000
TH	144	•	•						-40	+125	10	400	1	8200	1000 to 3000
									-25		450		1	47	
TE	155	•	•						-40	+130	10	400	2.2	4700	1000 to 3000
TU	163	•	•	•		•	•		-40	+130	25	100	160	12000	2000 to 3000

TU: New Product Series

### OVERVIEW - RADIAL HYBRID CONDUCTIVE POLYMER CAPACITORS

#### Features



Series	Page	AEC-Q200	High Temperature	High Voltage	Low ESR	Slim Type	Standard	Ultra Low ESR	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
AS	281	•		•	•	•	•		-55	+105	16	400	1.2	1500	2000 to 10000
AT	285	•	•		•	•			-55	+125	16	100	8.2	1500	2000 to 4000
AK	289	•	•		•				-55	+135	16	100	8.2	560	2000 to 3000
AE	292	•	•					•	-55	+135	25	100	22	680	4000
AL	295	•	•		•				-55	+145	16	80	8.2	560	2000
AM	298	•	•		•				-55	+150	16	80	8.2	560	1000

AU: New Product Series

### SG SERIES ■ 7/9 MM HEIGHT, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 4 000 hours
- Miniaturized for space critical applications
- Low height ■ 7mm and 9mm
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +105°C						
Rated Voltage Range	$V_R$	6.3 ~ 50V DC						
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$						
Capacitance Range	$C_R$	1 ~ 470 $\mu$ F						
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A, whichever is greater After 2 minutes						
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50
		$\tan\delta$ (%)	24	20	17	15	13	12
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3

Lifetime Test			
Endurance 105°C ( $V_R$ applied)	Test	<b>4 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value	
	$\tan\delta$	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value	
	$\tan\delta$	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
		Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4	

#### MULTIPLIER $K_f$ for RIPPLE CURRENT vs. FREQUENCY

$C_R$ ( $\mu$ F) / Frequency (Hz)	50/60	100/120	1k	50k ~ 100k
$1 < C_R \leq 470$	0.65	1	1.35	1.5

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
6.3	22	4	7	35	SG220M6R3B070A00X
	33	5	7	43	SG330M6R3C070A00X
	47	5	7	50	SG470M6R3C070A00X
	100	6.3	7	76	SG101M6R3E070A00X
	220	8	7	131	SG221M6R3F070A00X
	330	8	9	145	SG331M6R3F090A00X
	470	8	9	145	SG471M6R3F090A00X
10	22	5	7	42	SG220M010C070A00X
	33	5	7	50	SG330M010C070A00X
	47	6.3	7	60	SG470M010E070A00X
	100	8	7	96	SG101M010F070A00X
	220	8	9	145	SG221M010F090A00X
	330	8	9	145	SG331M010F090A00X
	470	8	9	145	SG471M010F090A00X
	470	10	9	165	SG471M010G090A00X
16	10	4	7	29	SG100M016B070A00X
	10	5	7	29	SG100M016C070A00X
	22	5	7	46	SG220M016C070A00X
	33	6.3	7	58	SG330M016E070A00X
	47	6.3	7	70	SG470M016E070A00X
	100	6.3	7	95	SG101M016E070A00X
	100	8	7	110	SG101M016F070A00X
	220	8	9	145	SG221M016F090A00X
	330	8	9	145	SG331M016F090A00X
	330	10	9	165	SG331M016G090A00X
	470	10	9	165	SG471M016G090A00X
25	10	5	7	36	SG100M025C070A00X
	22	6.3	7	52	SG220M025E070A00X
	33	6.3	7	65	SG330M025E070A00X
	47	6.3	7	70	SG470M025E070A00X
	47	8	7	80	SG470M025F070A00X
	100	8	7	100	SG101M025F070A00X
	100	8	9	145	SG101M025F090A00X
	150	8	9	145	SG151M025F090A00X
	220	10	9	165	SG221M025G090A00X
35	10	4	7	26	SG100M035B070A00X
	22	6.3	7	60	SG220M035E070A00X
	33	8	7	75	SG330M035F070A00X
	47	8	9	89	SG470M035F090A00X
	100	10	9	165	SG101M035G090A00X

See "PACKAGING INFORMATION" to taped or formed products.

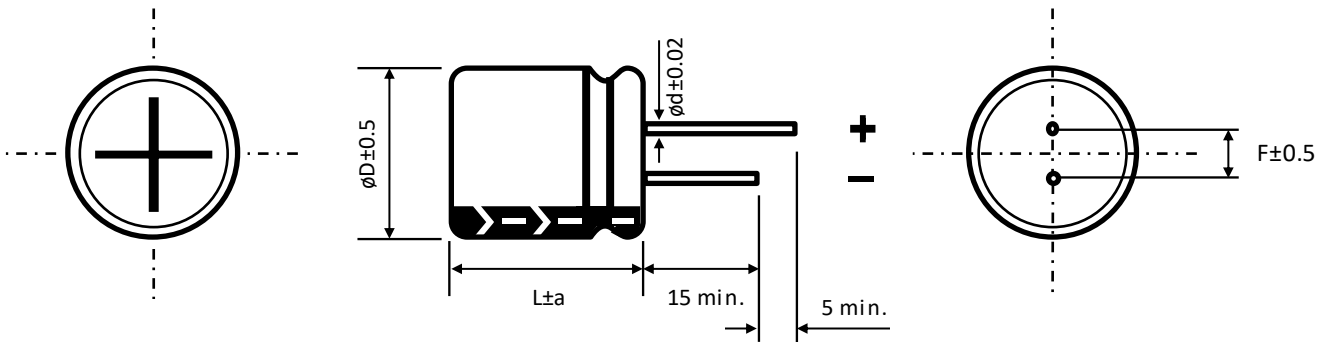


**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
50	1	4	7	12	SG010M050B070A00X
	2.2	4	7	21	SG2R2M050B070A00X
	3.3	4	7	26	SG3R3M050B070A00X
	4.7	5	7	31	SG4R7M050C070A00X
	10	6.3	7	46	SG100M050E070A00X
	22	8	7	67	SG220M050F070A00X
	33	8	9	89	SG330M050F090A00X
	47	8	9	89	SG470M050F090A00X
	100	10	9	165	SG101M050G090A00X



See "PACKAGING INFORMATION" to taped or formed products.

**DIMENSIONS** - All dimensions in mm


$\phi D$	4	5	6.3	8	10
F	1.5	2	2.5	3.5	5
$\phi d$	0.45	0.45	0.5	0.5	0.6
a	1	1	1	L = 7	L = 9
				1	1.5

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

	
<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
<p>Page 310</p>	<p>Page 168</p>

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### KL SERIES ▪ HIGH VOLTAGE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 5 000 hours
- High voltage version up to 500V
- High reliability
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C				-25 ~ +105°C			
Rated Voltage Range	$V_R$	160 ~ 400V DC				450V ~ 500V DC			
Surge Voltage	$V_S$	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$				$(V_R > 315V): V_S = 1.10 \cdot V_R$			
Capacitance Range	$C_R$	3.3 ~ 330 $\mu$ F				2.2 ~ 180 $\mu$ F			
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ▪ 20°C)							
Leakage Current (20°C ▪ $V_R$ applied)	$I_{LEAK}$	$C_R \cdot V_R \leq 1000$				$\leq 0.1 \cdot C_R \cdot V_R + 40\mu A$ (After 1 minute)			
		$C_R \cdot V_R > 1000$				$\leq 0.04 \cdot C_R \cdot V_R + 100\mu A$ (After 1 minute)			
		[ $I_{LEAK}$ ( $\mu A$ ) ; $C_R$ ( $\mu F$ ) ; $V_R$ (V) ]							
Dissipation Factor % (20°C ▪ 120Hz)	$\tan \delta$	$V_R$ (V DC)	160	200	250	350	400	450	500
		$\tan \delta$ (%)	12	12	12	15	15	17	20
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	160	200	250	350	400	450	500
		Z-25°C/Z+20°C	3	3	3	6	6	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	-	-

Lifetime Test			
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	<b>5 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4			

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
160	3.3	10	12.5	52	KL3R3M160G125A00X
	4.7	10	12.5	60	KL4R7M160G125A00X
	10	10	12.5	104	KL100M160G125A00X
	10	10	16	115	KL100M160G160A00X
	15	10	16	150	KL150M160G160A00X
	22	10	16	190	KL220M160G160A00X
	22	10	20	210	KL220M160G200A00X
	33	10	16	235	KL330M160G160A00X
	33	10	20	258	KL330M160G200A00X
	33	13	20	300	KL330M160I200A00X
	47	10	20	270	KL470M160G200A00X
	47	13	20	310	KL470M160I200A00X
	68	13	20	430	KL680M160I200A00X
	68	13	25	470	KL680M160I250A00X
	100	13	25	540	KL101M160I250A00X
	100	16	20	540	KL101M160J200A00X
	100	16	25	590	KL101M160J250A00X
	120	16	20	560	KL121M160J200A00X
	150	16	25	650	KL151M160J250A00X
	180	16	31.5	750	KL181M160J315A00X
220	16	31.5	820	KL221M160J315A00X	
220	18	25	710	KL221M160K250A00X	
270	18	31.5	880	KL271M160K315A00X	
330	18	31.5	930	KL331M160K315A00X	
330	18	40	1000	KL331M160K400A00X	
200	3.3	10	12.5	52	KL3R3M200G125A00X
	4.7	10	12.5	60	KL4R7M200G125A00X
	6.8	10	12.5	70	KL6R8M200G125A00X
	10	10	12.5	104	KL100M200G125A00X
	10	10	16	115	KL100M200G160A00X
	10	10	20	125	KL100M200G200A00X
	15	10	16	150	KL150M200G160A00X
	22	10	16	210	KL220M200G160A00X
	22	10	20	230	KL220M200G200A00X
	33	10	20	290	KL330M200G200A00X
	33	13	20	350	KL330M200I200A00X
	47	13	20	380	KL470M200I200A00X
	68	13	25	530	KL680M200I250A00X
	68	16	20	530	KL680M200J200A00X
	100	16	20	570	KL101M200J200A00X
	100	16	25	610	KL101M200J250A00X
120	16	25	700	KL121M200J250A00X	
150	16	25	700	KL151M200J250A00X	

See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
200	150	16	31.5	750	KL151M200J315A00X
	180	18	31.5	830	KL181M200K315A00X
	220	18	31.5	970	KL221M200K315A00X
	270	18	40	1100	KL271M200K400A00X
	330	18	45	1250	KL331M200K450A00X
250	4.7	10	12.5	60	KL4R7M250G125A00X
	6.8	10	12.5	75	KL6R8M250G125A00X
	10	10	16	160	KL100M250G160A00X
	10	10	20	170	KL100M250G200A00X
	15	10	16	180	KL150M250G160A00X
	22	10	20	250	KL220M250G200A00X
	22	13	20	290	KL220M250I200A00X
	33	13	20	360	KL330M250I200A00X
	33	13	25	380	KL330M250I250A00X
	47	13	25	430	KL470M250I250A00X
	68	16	20	530	KL680M250J200A00X
	68	16	25	550	KL680M250J250A00X
	68	18	20	550	KL680M250K200A00X
	100	16	25	630	KL101M250J250A00X
	100	16	31.5	700	KL101M250J315A00X
	100	18	25	680	KL101M250K250A00X
	100	18	31.5	750	KL101M250K315A00X
	120	18	31.5	790	KL121M250K315A00X
	150	18	31.5	840	KL151M250K315A00X
	150	18	35.5	880	KL151M250K355A00X
	180	18	40	980	KL181M250K400A00X
	220	18	35.5	960	KL221M250K355A00X
220	18	40	1020	KL221M250K400A00X	
350	4.7	10	12.5	65	KL4R7M350G125A00X
	6.8	10	16	100	KL6R8M350G160A00X
	10	10	20	170	KL100M350G200A00X
	10	13	20	180	KL100M350I200A00X
	15	13	20	200	KL150M350I200A00X
	22	13	20	290	KL220M350I200A00X
	33	13	25	320	KL330M350I250A00X
	33	16	20	320	KL330M350J200A00X
	47	16	25	430	KL470M350J250A00X
	47	16	31.5	440	KL470M350J315A00X
	68	16	35.5	550	KL680M350J355A00X
	100	18	31.5	750	KL101M350K315A00X
	100	18	35.5	780	KL101M350K355A00X
	400	3.3	10	12.5	55
4.7		10	16	100	KL4R7M400G160A00X

See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
400	6.8	10	16	120	KL6R8M400G160A00X
	6.8	10	20	125	KL6R8M400G200A00X
	10	10	16	156	KL100M400G160A00X
	10	10	20	170	KL100M400G200A00X
	10	13	20	200	KL100M400I200A00X
	15	10	16	156	KL150M400G160A00X
	15	13	20	200	KL150M400I200A00X
	22	13	25	320	KL220M400I250A00X
	22	16	20	320	KL220M400J200A00X
	33	16	20	400	KL330M400J200A00X
	33	16	25	430	KL330M400J250A00X
	47	16	20	420	KL470M400J200A00X
	47	16	25	450	KL470M400J250A00X
	47	16	31.5	530	KL470M400J315A00X
	68	16	25	480	KL680M400J250A00X
	68	16	31.5	530	KL680M400J315A00X
	82	16	31.5	580	KL820M400J315A00X
	100	16	31.5	710	KL101M400J315A00X
	100	18	35.5	750	KL101M400K355A00X
	120	16	35.5	800	KL121M400J355A00X
120	18	31.5	800	KL121M400K315A00X	
150	16	40	920	KL151M400J400A00X	
150	18	31.5	890	KL151M400K315A00X	
180	18	40	1060	KL181M400K400A00X	
220	18	45	1200	KL221M400K450A00X	
450	2.2	10	12.5	45	KL2R2M450G125A00X
	3.3	10	16	65	KL3R3M450G160A00X
	4.7	10	12.5	95	KL4R7M450G125A00X
	4.7	10	16	105	KL4R7M450G160A00X
	6.8	10	16	125	KL6R8M450G160A00X
	6.8	10	20	140	KL6R8M450G200A00X
	10	10	20	170	KL100M450G200A00X
	10	13	20	190	KL100M450I200A00X
	10	13	25	220	KL100M450I250A00X
	15	16	20	270	KL150M450J200A00X
	22	13	20	280	KL220M450I200A00X
	22	16	20	320	KL220M450J200A00X
	22	16	25	360	KL220M450J250A00X
	33	16	25	440	KL330M450J250A00X
	33	18	25	460	KL330M450K250A00X
	47	16	31.5	480	KL470M450J315A00X
47	18	25	450	KL470M450K250A00X	
56	16	31.5	530	KL560M450J315A00X	

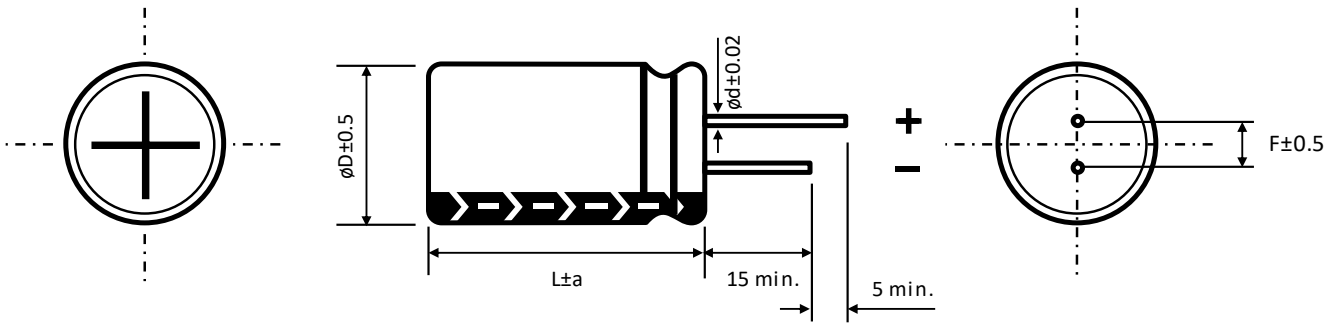
See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
450	68	16	35.5	600	KL680M450J355A00X
	68	18	25	580	KL680M450K250A00X
	68	18	31.5	620	KL680M450K315A00X
	82	16	35.5	680	KL820M450J355A00X
	100	16	35.5	750	KL101M450J355A00X
	120	18	35.5	840	KL121M450K355A00X
	150	18	40	970	KL151M450K400A00X
	180	18	45	1090	KL181M450K450A00X
500	4.7	13	20	82	KL4R7M500I200A00X
	6.8	13	20	96	KL6R8M500I200A00X
	10	13	25	130	KL100M500I250A00X
	22	16	25	210	KL220M500J250A00X
	33	16	31.5	280	KL330M500J315A00X
	47	16	35.5	360	KL470M500J355A00X
	47	18	31.5	360	KL470M500K315A00X
	56	16	40	420	KL560M500J400A00X
	56	18	31.5	400	KL560M500K315A00X
	68	16	45	480	KL680M500J450A00X
	68	18	35.5	460	KL680M500K355A00X
	68	18	40	490	KL680M500K400A00X
	82	18	40	540	KL820M500K400A00X
	100	18	45	630	KL101M500K450A00X
	100	20	40	660	KL101M500L400A00X
120	22	45	800	KL121M500M450A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**DIMENSIONS** ▪ All dimensions in mm


$\phi D$	10	13	16	18	22
F	5	5	7.5	7.5	10
$\phi d$	0.6		0.8		

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$		$\phi D > 18$
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5	2
		1.5	2	1.5	2	

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	100/120	1k	10k	≥ 50k
$3.3 < C_R \leq 330$	1	1.5	1.7	1.9

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 310	Page 168





### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### GH SERIES ■ LOW IMPEDANCE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 3 000 hours up to 10 000 hours
- Low impedance and high ripple current
- Wide capacitance range
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics										
Operating Temperature Range		-55 ~ +105°C										
Rated Voltage Range	$V_R$	6.3 ~ 100V DC										
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$										
Capacitance Range	$C_R$	1 ~ 12000 $\mu$ F										
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)										
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 $\mu$ A, whichever is greater ■ After 2 minutes [ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]										
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	$V_R$ (V DC)	6.3	10	16	25	35	50	63	80	100	
		$\tan\delta$ (%)	22	19	16	14	12	10	9	9	10	
		For $C_R \geq 1000\mu$ F, add 2% per every multiple 1000 $\mu$ F of rated capacitance value										
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	6.3	10	16	25	35	50	63	80	100	
		Z-25°C/Z+20°C	4	3	2	2	1.5	1.5	1.5	1.5	1.5	
		Z-40°C/Z+20°C	6	4	3	3	2	2	2	2	2	
		Z-55°C/Z+20°C	8	6	5	5	4	4	4	4	4	
		For capacitance > 1000 $\mu$ F										
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 $\mu$ F of rated capacitance value									
		Z-40°C/Z+20°C	Add 1 for every multiple 1000 $\mu$ F of rated capacitance value									
Z-55°C/Z+20°C	Add 1.5 for every multiple 1000 $\mu$ F of rated capacitance value											
Lifetime Test												
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	5 000 hours					$\phi$ D 5 ~ 6.3 mm					
		7 000 hours					$\phi$ D 8 ~ 12 mm					
		10 000 hours					$\phi$ D $\geq$ 13 mm					
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value										
	$\tan\delta$	$\leq 200\%$ of initial specified value										
$I_{Leak}$	$\leq$ the initial specified value											
Shelf Life 105°C ( $V_R = 0$ )	Test	1 000 hours										
		$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value									
		$\tan\delta$	$\leq 200\%$ of initial specified value									
	$I_{Leak}$	$\leq$ the initial specified value										
		Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4										

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
6.3	82	5	11	1630	198	GH820M6R3C110A00X
	100	5	11	1450	210	GH101M6R3C110A00X
	120	5	11	1280	222	GH121M6R3C110A00X
	150	6.3	11	1160	240	GH151M6R3E110A00X
	180	6.3	11	1040	282	GH181M6R3E110A00X
	220	6.3	11	890	378	GH221M6R3E110A00X
	270	6.3	11	770	396	GH271M6R3E110A00X
	330	6.3	11	770	396	GH331M6R3E110A00X
	330	6.3	15	680	426	GH331M6R3E150A00X
	330	8	11.5	680	444	GH331M6R3F115A00X
	390	6.3	15	580	462	GH391M6R3E150A00X
	390	8	11.5	520	480	GH391M6R3F115A00X
	470	6.3	15	410	504	GH471M6R3E150A00X
	470	8	11.5	380	534	GH471M6R3F115A00X
	470	10	12.5	380	564	GH471M6R3G125A00X
	560	8	11.5	360	570	GH561M6R3F115A00X
	560	8	16	360	600	GH561M6R3F160A00X
	560	10	12.5	360	612	GH561M6R3G125A00X
	680	8	11.5	330	582	GH681M6R3F115A00X
	680	8	16	330	618	GH681M6R3F160A00X
	680	10	12.5	330	642	GH681M6R3G125A00X
	820	8	11.5	250	666	GH821M6R3F115A00X
	820	10	12.5	250	720	GH821M6R3G125A00X
	1000	8	16	220	690	GH102M6R3F160A00X
	1000	8	20	220	756	GH102M6R3F200A00X
	1000	10	12.5	220	708	GH102M6R3G125A00X
	1200	8	20	180	840	GH122M6R3F200A00X
	1200	10	16	180	888	GH122M6R3G160A00X
	1500	8	20	150	1056	GH152M6R3F200A00X
	1500	10	16	120	1128	GH152M6R3G160A00X
	1500	10	20	120	1176	GH152M6R3G200A00X
	1800	8	25	110	1230	GH182M6R3F250A00X
	1800	10	20	110	1308	GH182M6R3G200A00X
	2200	10	20	100	1350	GH222M6R3G200A00X
	2200	10	25	100	1362	GH222M6R3G250A00X
	2700	10	25	90	1488	GH272M6R3G250A00X
	2700	10	30	90	1560	GH272M6R3G300A00X
	2700	13	20	90	1512	GH272M6R3I200A00X
	3300	10	30	85	1620	GH332M6R3G300A00X
	3300	13	20	85	1584	GH332M6R3I200A00X
3900	13	25	80	1860	GH392M6R3I250A00X	
4700	13	25	75	1938	GH472M6R3I250A00X	
4700	13	30	70	1992	GH472M6R3I300A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
6.3	5600	13	30	68	1992	GH562M6R3I300A00X
	5600	16	25	68	2196	GH562M6R3J250A00X
	6800	13	30	63	2520	GH682M6R3I300A00X
	6800	16	25	63	2718	GH682M6R3J250A00X
10	22	5	11	3080	66	GH220M010C110A00X
	27	5	11	2670	72	GH270M010C110A00X
	33	5	11	2330	72	GH330M010C110A00X
	39	5	11	2020	120	GH390M010C110A00X
	47	5	11	1710	132	GH470M010C110A00X
	56	5	11	1470	144	GH560M010C110A00X
	68	5	11	1300	162	GH680M010C110A00X
	82	5	11	1150	192	GH820M010C110A00X
	100	5	11	1020	222	GH101M010C110A00X
	100	6.3	11	1020	240	GH101M010E110A00X
	120	5	11	1020	246	GH121M010C110A00X
	120	6.3	11	1020	258	GH121M010E110A00X
	150	6.3	11	950	282	GH151M010E110A00X
	180	6.3	11	680	318	GH181M010E110A00X
	220	6.3	11	600	366	GH221M010E110A00X
	220	6.3	15	580	390	GH221M010E150A00X
	270	6.3	15	560	414	GH271M010E150A00X
	270	8	11.5	530	420	GH271M010F115A00X
	330	6.3	11	500	402	GH331M010E110A00X
	330	6.3	15	470	462	GH331M010E150A00X
	330	8	11.5	450	492	GH331M010F115A00X
	390	6.3	15	420	456	GH391M010E150A00X
	390	8	11.5	420	516	GH391M010F115A00X
	470	6.3	15	370	480	GH471M010E150A00X
	470	8	11.5	300	552	GH471M010F115A00X
	560	8	11.5	280	588	GH561M010F115A00X
	560	8	16	250	636	GH561M010F160A00X
	560	10	12.5	250	636	GH561M010G125A00X
	680	8	16	210	660	GH681M010F160A00X
	680	8	20	200	684	GH681M010F200A00X
	680	10	12.5	200	684	GH681M010G125A00X
	820	8	16	200	732	GH821M010F160A00X
	820	8	20	180	828	GH821M010F200A00X
	820	10	12.5	160	876	GH821M010G125A00X
820	10	16	160	936	GH821M010G160A00X	
1000	8	16	160	1020	GH102M010F160A00X	
1000	8	20	140	1122	GH102M010F200A00X	
1000	10	12.5	140	1032	GH102M010G125A00X	
1000	10	16	130	1140	GH102M010G160A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
10	1200	8	20	130	1248	GH122M010F200A00X
	1200	10	16	130	1272	GH122M010G160A00X
	1200	10	20	120	1368	GH122M010G200A00X
	1500	10	20	106	1536	GH152M010G200A00X
	1500	13	16	110	1619	GH152M010I160A00X
	1800	10	25	102	1650	GH182M010G250A00X
	1800	13	20	98	1704	GH182M010I200A00X
	2200	10	25	95	1776	GH222M010G250A00X
	2200	10	30	93	1860	GH222M010G300A00X
	2200	13	20	93	1872	GH222M010I200A00X
	2200	16	16	93	1926	GH222M010J160A00X
	2700	10	30	84	2076	GH272M010G300A00X
	2700	13	20	84	2028	GH272M010I200A00X
	2700	13	25	84	2124	GH272M010I250A00X
	2700	18	16	84	2240	GH272M010K160A00X
	3300	10	30	70	2232	GH332M010G300A00X
	3300	13	25	70	2268	GH332M010I250A00X
	3300	16	25	70	2316	GH332M010J250A00X
	3900	13	25	65	2304	GH392M010I250A00X
	3900	13	30	65	2376	GH392M010I300A00X
	3900	16	20	70	2362	GH392M010J200A00X
	3900	16	25	65	2544	GH392M010J250A00X
	4700	13	30	65	2484	GH472M010I300A00X
	4700	13	35	60	2568	GH472M010I350A00X
	4700	16	25	57	2634	GH472M010J250A00X
	5600	13	35	54	2640	GH562M010I350A00X
	5600	16	25	54	2472	GH562M010J250A00X
	5600	16	31.5	50	2736	GH562M010J315A00X
	5600	18	20	57	2459	GH562M010K200A00X
	6800	16	31.5	46	2964	GH682M010J315A00X
	6800	18	25	52	2865	GH682M010K250A00X
	8200	16	35.5	43	3350	GH822M010J355A00X
8200	18	31.5	44	3392	GH822M010K315A00X	
10000	16	40	40	3850	GH103M010J400A00X	
10000	18	35.5	41	3850	GH103M010K355A00X	
12000	18	40	37	4150	GH123M010K400A00X	
16	10	5	11	3900	36	GH100M016C110A00X
	15	5	11	3320	72	GH150M016C110A00X
	22	5	11	2640	72	GH220M016C110A00X
	27	5	11	2370	132	GH270M016C110A00X
	33	5	11	2000	144	GH330M016C110A00X
	39	5	11	1610	168	GH390M016C110A00X
47	5	11	1350	186	GH470M016C110A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
16	56	5	11	1240	210	GH560M016C110A00X
	68	5	11	1180	228	GH680M016C110A00X
	82	6.3	11	1030	264	GH820M016E110A00X
	100	5	11	1100	228	GH101M016C110A00X
	100	6.3	11	860	264	GH101M016E110A00X
	120	6.3	11	660	312	GH121M016E110A00X
	150	6.3	11	580	336	GH151M016E110A00X
	150	6.3	15	580	396	GH151M016E150A00X
	180	6.3	15	560	420	GH181M016E150A00X
	180	8	11.5	540	426	GH181M016F115A00X
	220	6.3	15	520	504	GH221M016E150A00X
	220	8	11.5	460	540	GH221M016F115A00X
	270	6.3	15	420	540	GH271M016E150A00X
	270	8	11.5	380	582	GH271M016F115A00X
	330	6.3	15	340	588	GH331M016E150A00X
	330	8	11.5	370	588	GH331M016F115A00X
	330	8	16	350	618	GH331M016F160A00X
	390	8	11.5	330	612	GH391M016F115A00X
	390	8	16	330	654	GH391M016F160A00X
	390	10	12.5	330	648	GH391M016G125A00X
	470	8	16	290	846	GH471M016F160A00X
	470	8	20	280	900	GH471M016F200A00X
	470	10	12.5	280	882	GH471M016G125A00X
	560	8	16	260	864	GH561M016F160A00X
	560	8	20	240	936	GH561M016F200A00X
	560	10	12.5	240	882	GH561M016G125A00X
	560	10	16	200	960	GH561M016G160A00X
	680	8	20	200	960	GH681M016F200A00X
	680	10	16	180	1044	GH681M016G160A00X
	820	8	20	170	1104	GH821M016F200A00X
	820	10	16	150	1254	GH821M016G160A00X
	820	10	20	150	1320	GH821M016G200A00X
	1000	10	16	140	1404	GH102M016G160A00X
	1000	10	20	120	1476	GH102M016G200A00X
	1200	10	20	130	1500	GH122M016G200A00X
	1200	10	25	110	1578	GH122M016G250A00X
	1500	10	25	96	1620	GH152M016G250A00X
	1500	13	20	95	1728	GH152M016I200A00X
	1500	16	16	95	1778	GH152M016I160A00X
	1800	10	30	97	1776	GH182M016G300A00X
1800	13	20	94	1854	GH182M016I200A00X	
1800	13	25	90	1956	GH182M016I250A00X	
2200	13	20	90	2082	GH222M016I200A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
16	2200	13	25	85	2340	GH222M016I250A00X
	2200	18	16	90	2300	GH222M016K160A00X
	2700	13	25	76	2436	GH272M016I250A00X
	2700	13	30	72	2496	GH272M016I300A00X
	2700	16	20	74	2362	GH272M016J200A00X
	2700	16	25	72	2544	GH272M016J250A00X
	3300	13	30	68	2562	GH332M016I300A00X
	3300	13	35	66	2628	GH332M016I350A00X
	3300	16	25	64	2700	GH332M016J250A00X
	3900	13	35	50	2664	GH392M016I350A00X
	3900	16	25	60	2736	GH392M016J250A00X
	3900	16	31.5	58	2856	GH392M016J315A00X
	3900	18	20	60	2721	GH392M016K200A00X
	4700	16	31.5	50	2886	GH472M016J315A00X
	4700	18	25	55	2844	GH472M016K250A00X
	5600	16	35.5	46	2968	GH562M016J355A00X
	5600	18	31.5	48	3084	GH562M016K315A00X
	5600	18	35.5	45	3168	GH562M016K355A00X
	6800	16	40	40	3252	GH682M016J400A00X
	6800	18	35.5	40	3252	GH682M016K355A00X
8200	18	35.5	38	3750	GH822M016K355A00X	
10000	18	40	36	4150	GH103M016K400A00X	
25	10	5	11	3010	66	GH100M025C110A00X
	15	5	11	2640	120	GH150M025C110A00X
	22	5	11	2300	144	GH220M025C110A00X
	27	5	11	2030	156	GH270M025C110A00X
	33	5	11	1720	174	GH330M025C110A00X
	39	5	11	1500	174	GH390M025C110A00X
	47	5	11	1370	222	GH470M025C110A00X
	47	6.3	11	1280	240	GH470M025E110A00X
	56	5	11	1250	264	GH560M025C110A00X
	68	6.3	11	970	300	GH680M025E110A00X
	82	6.3	11	790	312	GH820M025E110A00X
	100	6.3	11	680	360	GH101M025E110A00X
	100	8	11.5	540	516	GH101M025F115A00X
	120	6.3	11	580	402	GH121M025E110A00X
	120	6.3	15	560	462	GH121M025E150A00X
	150	6.3	15	540	510	GH151M025E150A00X
	150	8	11.5	520	528	GH151M025F115A00X
	180	6.3	15	510	546	GH181M025E150A00X
	180	8	11.5	460	552	GH181M025F115A00X
	220	8	11.5	420	618	GH221M025F115A00X
220	8	16	400	642	GH221M025F160A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
25	270	8	11.5	340	750	GH271M025F115A00X
	270	8	16	320	756	GH271M025F160A00X
	270	10	12.5	320	816	GH271M025G125A00X
	330	8	16	250	960	GH331M025F160A00X
	330	10	12.5	240	924	GH331M025G125A00X
	470	8	20	230	1056	GH471M025F200A00X
	470	10	12.5	210	1020	GH471M025G125A00X
	470	10	16	210	1080	GH471M025G160A00X
	560	8	20	170	1224	GH561M025F200A00X
	560	10	16	150	1260	GH561M025G160A00X
	680	10	20	110	1470	GH681M025G200A00X
	680	13	16	100	1550	GH681M025I160A00X
	820	10	20	110	1668	GH821M025G200A00X
	820	10	25	100	1704	GH821M025G250A00X
	1000	10	25	93	1812	GH102M025G250A00X
	1000	13	20	90	1872	GH102M025I200A00X
	1000	16	16	88	1926	GH102M025J160A00X
	1200	13	20	82	2028	GH122M025I200A00X
	1200	18	16	80	2240	GH122M025K160A00X
	1500	13	20	67	2124	GH152M025I200A00X
	1500	13	25	65	2190	GH152M025I250A00X
	1800	13	30	58	2310	GH182M025I300A00X
	1800	16	20	56	2172	GH182M025J200A00X
	1800	16	25	58	2340	GH182M025J250A00X
	2200	13	30	52	2592	GH222M025I300A00X
	2200	16	25	50	2712	GH222M025J250A00X
	2200	18	20	52	2697	GH222M025K200A00X
	2700	13	35	50	2850	GH272M025I350A00X
	2700	16	25	48	2673	GH272M025J250A00X
	2700	16	31.5	46	2958	GH272M025J315A00X
	3300	16	31.5	38	3204	GH332M025J315A00X
	3300	16	35.5	36	3288	GH332M025J355A00X
	3300	18	25	41	3156	GH332M025K250A00X
3900	16	35.5	36	3500	GH392M025J355A00X	
3900	18	31.5	36	3544	GH392M025K315A00X	
4700	16	40	34	3800	GH472M025J400A00X	
4700	18	35.5	34	3800	GH472M025K355A00X	
5600	18	40	30	4100	GH562M025K400A00X	
35	10	5	11	2650	84	GH100M035C110A00X
	15	5	11	2290	144	GH150M035C110A00X
	22	5	11	1900	162	GH220M035C110A00X
	27	5	11	1580	174	GH270M035C110A00X
	27	6.3	11	1420	198	GH270M035E110A00X

See "PACKAGING INFORMATION" to taped or formed products.



**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
35	33	5	11	1250	222	GH330M035C110A00X
	33	6.3	11	1250	240	GH330M035E110A00X
	39	6.3	11	1100	252	GH390M035E110A00X
	47	5	11	96	232	GH470M035C110A00X
	47	6.3	11	920	264	GH470M035E110A00X
	56	6.3	11	750	282	GH560M035E110A00X
	56	6.3	15	680	306	GH560M035E150A00X
	68	6.3	11	620	312	GH680M035E110A00X
	68	6.3	15	550	348	GH680M035E150A00X
	82	6.3	15	510	354	GH820M035E150A00X
	82	8	11.5	470	384	GH820M035F115A00X
	100	6.3	11	490	329	GH101M035E110A00X
	100	6.3	15	470	378	GH101M035E150A00X
	100	8	11.5	450	414	GH101M035F115A00X
	120	8	11.5	420	546	GH121M035F115A00X
	120	8	16	380	612	GH121M035F160A00X
	150	8	11.5	380	618	GH151M035F115A00X
	150	8	16	350	714	GH151M035F160A00X
	150	10	12.5	350	720	GH151M035G125A00X
	180	8	16	320	792	GH181M035F160A00X
	180	10	12.5	320	804	GH181M035G125A00X
	220	8	16	260	864	GH221M035F160A00X
	220	8	20	240	936	GH221M035F200A00X
	220	10	12.5	240	888	GH221M035G125A00X
	270	8	20	220	1056	GH271M035F200A00X
	270	10	12.5	240	984	GH271M035G125A00X
	270	10	16	210	1068	GH271M035G160A00X
	330	8	20	160	1140	GH331M035F200A00X
	330	10	16	150	1176	GH331M035G160A00X
	470	10	20	110	1302	GH471M035G200A00X
	470	10	25	100	1398	GH471M035G250A00X
	470	13	16	110	1272	GH471M035I160A00X
	470	13	20	100	1398	GH471M035I200A00X
	560	10	25	96	1572	GH561M035G250A00X
	560	13	20	96	1584	GH561M035I200A00X
	680	10	25	84	1680	GH681M035G250A00X
	680	13	20	82	1692	GH681M035I200A00X
	680	16	16	80	1740	GH681M035J160A00X
	820	13	20	68	1818	GH821M035I200A00X
	820	13	25	62	1944	GH821M035I250A00X
1000	10	30	60	2136	GH102M035G300A00X	
1000	13	25	60	2184	GH102M035I250A00X	
1000	13	30	58	2280	GH102M035I300A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
35	1000	18	16	56	2189	GH102M035K160A00X
	1200	13	25	52	2292	GH122M035I250A00X
	1200	16	20	52	2384	GH122M035J200A00X
	1200	16	25	50	2568	GH122M035J250A00X
	1500	13	35	48	2820	GH152M035I350A00X
	1500	16	31.5	48	2928	GH152M035J315A00X
	1800	13	35	45	2976	GH182M035I350A00X
	1800	16	25	48	2722	GH182M035J250A00X
	1800	16	31.5	45	3012	GH182M035J315A00X
	1800	18	20	48	2707	GH182M035K200A00X
	2200	16	31.5	36	3228	GH222M035J315A00X
	2200	18	25	36	3132	GH222M035K250A00X
	2700	16	35.5	32	3294	GH272M035J355A00X
	2700	18	31.5	32	3336	GH272M035K315A00X
	3300	16	40	29	3800	GH332M035J400A00X
	3300	18	35.5	29	3800	GH332M035K355A00X
3900	18	40	26	4100	GH392M035K400A00X	
50	1	5	11	4310	24	GH010M050C110A00X
	2.2	5	11	3600	36	GH2R2M050C110A00X
	3.3	5	11	3500	48	GH3R3M050C110A00X
	4.7	5	11	3300	66	GH4R7M050C110A00X
	5.6	5	11	3200	96	GH5R6M050C110A00X
	6.8	5	11	3000	96	GH6R8M050C110A00X
	8.2	5	11	2800	108	GH8R2M050C110A00X
	10	5	11	2600	120	GH100M050C110A00X
	15	5	11	1870	150	GH150M050C110A00X
	22	5	11	1600	162	GH220M050C110A00X
	22	6.3	11	1270	168	GH220M050E110A00X
	27	6.3	11	1020	192	GH270M050E110A00X
	33	6.3	11	870	282	GH330M050E110A00X
	33	6.3	15	850	296	GH330M050E150A00X
	39	6.3	11	720	306	GH390M050E110A00X
	39	6.3	15	700	330	GH390M050E150A00X
	47	6.3	11	580	303	GH470M050E110A00X
	47	6.3	15	550	348	GH470M050E150A00X
	47	8	11.5	550	366	GH470M050F115A00X
	56	6.3	11	490	323	GH560M050E110A00X
	56	8	11.5	470	378	GH560M050F115A00X
	68	8	11.5	470	420	GH680M050F115A00X
82	6.3	15	460	462	GH820M050E150A00X	
82	8	11.5	460	492	GH820M050F115A00X	
82	8	16	450	528	GH820M050F160A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
50	100	8	11.5	450	540	GH101M050F115A00X
	100	8	16	250	576	GH101M050F160A00X
	120	8	16	250	630	GH121M050F160A00X
	150	8	16	240	696	GH151M050F160A00X
	150	8	20	240	756	GH151M050F200A00X
	150	10	12.5	250	702	GH151M050G125A00X
	150	10	16	240	780	GH151M050G160A00X
	180	8	20	240	864	GH181M050F200A00X
	180	10	16	240	912	GH181M050G160A00X
	220	10	16	240	1056	GH221M050G160A00X
	220	10	20	200	1122	GH221M050G200A00X
	270	10	20	100	1212	GH271M050G200A00X
	270	10	25	100	1284	GH271M050G250A00X
	270	13	16	100	1278	GH271M050I160A00X
	330	10	25	95	1404	GH331M050G250A00X
	330	13	20	82	1500	GH331M050I200A00X
	470	10	30	78	1749	GH471M050G300A00X
	470	13	20	78	1776	GH471M050I200A00X
	470	13	25	78	1860	GH471M050I250A00X
	470	16	16	78	1827	GH471M050J160A00X
	560	13	20	75	2094	GH561M050I200A00X
	560	13	25	70	2172	GH561M050I250A00X
	560	18	16	73	2313	GH561M050K160A00X
	680	13	25	57	2304	GH681M050I250A00X
	680	16	25	57	2376	GH681M050J250A00X
	820	13	30	52	2412	GH821M050I300A00X
	820	16	20	54	2084	GH821M050J200A00X
	820	16	31.5	52	2484	GH821M050J315A00X
	1000	13	40	48	2750	GH102M050I400A00X
	1000	16	25	50	2676	GH102M050J250A00X
	1000	16	31.5	48	2736	GH102M050J315A00X
	1000	18	20	50	2661	GH102M050K200A00X
	1200	16	31.5	45	2952	GH122M050J315A00X
1200	16	35.5	42	3048	GH122M050J355A00X	
1200	18	25	47	2854	GH122M050K250A00X	
1500	16	35.5	38	3216	GH152M050J355A00X	
1800	16	40	35	3550	GH182M050J400A00X	
1800	18	31.5	35	3367	GH182M050K315A00X	
2200	18	35.5	32	3550	GH222M050K355A00X	
2700	18	40	30	3790	GH272M050K400A00X	
3300	18	40	28	3810	GH332M050K400A00X	
63	10	5	11	3015	116	GH100M063C110A00X
	15	5	11	2370	130	GH150M063C110A00X

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
63	22	5	11	1770	151	GH220M063C110A00X
	22	6.3	11	1391	194	GH220M063E110A00X
	27	6.3	11	1290	201	GH270M063E110A00X
	33	6.3	11	1013	227	GH330M063E110A00X
	39	6.3	11	890	242	GH390M063E110A00X
	47	6.3	11	755	263	GH470M063E110A00X
	47	8	11.5	730	313	GH470M063F115A00X
	56	8	11.5	700	319	GH560M063F115A00X
	68	8	11.5	500	378	GH680M063F115A00X
	68	8	16	420	476	GH680M063F160A00X
	82	8	11.5	470	390	GH820M063F115A00X
	82	8	16	420	476	GH820M063F160A00X
	82	10	12.5	430	480	GH820M063G125A00X
	100	8	16	360	514	GH101M063F160A00X
	100	10	12.5	375	514	GH101M063G125A00X
	120	8	16	365	511	GH121M063F160A00X
	120	8	20	320	603	GH121M063F200A00X
	120	10	12.5	357	527	GH121M063G125A00X
	120	10	16	300	639	GH121M063G160A00X
	150	8	20	320	603	GH151M063F200A00X
	150	10	16	276	666	GH151M063G160A00X
	180	8	25	260	741	GH181M063F250A00X
	180	10	16	280	662	GH181M063G160A00X
	180	10	20	260	757	GH181M063G200A00X
	220	8	25	230	788	GH221M063F250A00X
	220	10	16	230	730	GH221M063G160A00X
	220	10	20	200	891	GH221M063G200A00X
	220	13	16	200	910	GH221M063I160A00X
	270	10	20	164	986	GH271M063G200A00X
	270	13	20	130	1241	GH271M063I200A00X
	330	10	25	126	1242	GH331M063G250A00X
	330	13	16	150	1086	GH331M063I160A00X
	330	13	20	130	1281	GH331M063I200A00X
	330	13	25	100	1611	GH331M063I250A00X
	390	13	25	93	1618	GH391M063I250A00X
	470	13	20	93	1516	GH471M063I200A00X
	470	13	25	90	1698	GH471M063I250A00X
	470	13	30	88	1863	GH471M063I300A00X
	470	16	20	82	1856	GH471M063J200A00X
	560	13	25	87	1727	GH561M063I250A00X
560	13	30	81	1942	GH561M063I300A00X	
560	16	20	82	1857	GH561M063J200A00X	
680	13	30	71	2081	GH681M063I300A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
63	680	13	35	68	2273	GH681M063I350A00X
	680	16	20	84	1834	GH681M063J200A00X
	820	13	40	66	2453	GH821M063I400A00X
	820	16	25	66	2229	GH821M063J250A00X
	820	18	20	73	2108	GH821M063K200A00X
	1000	13	45	63	2652	GH102M063I450A00X
	1000	16	31.5	56	2689	GH102M063J315A00X
	1000	18	25	71	2307	GH102M063K250A00X
	1200	16	31.5	54	2726	GH122M063J315A00X
	1200	18	25	62	2470	GH122M063K250A00X
	1500	18	31.5	51	2996	GH152M063K315A00X
	1500	18	35.5	48	3256	GH152M063K355A00X
	1800	16	40	36	3759	GH182M063J400A00X
	1800	18	35.5	42	3480	GH182M063K355A00X
	2200	18	40	35	3937	GH222M063K400A00X
80	10	5	11	4070	99	GH100M080C110A00X
	15	5	11	3200	112	GH150M080C110A00X
	22	6.3	11	1878	167	GH220M080E110A00X
	27	6.3	11	1742	173	GH270M080E110A00X
	33	6.3	11	1367	195	GH330M080E110A00X
	39	8	11.5	1202	244	GH390M080F115A00X
	47	8	11.5	1019	265	GH470M080F115A00X
	56	8	11.5	945	275	GH560M080F115A00X
	56	8	16	900	325	GH560M080F160A00X
	68	8	16	660	380	GH680M080F160A00X
	68	10	12.5	660	388	GH680M080G125A00X
	82	8	16	630	389	GH820M080F160A00X
	82	10	12.5	660	389	GH820M080G125A00X
	100	8	20	450	509	GH101M080F200A00X
	100	10	16	450	521	GH101M080G160A00X
	100	13	16	440	634	GH101M080I160A00X
	120	10	16	430	533	GH121M080G160A00X
	150	10	20	345	657	GH151M080G200A00X
	150	13	16	400	664	GH151M080I160A00X
	180	10	20	330	677	GH181M080G200A00X
	180	10	25	320	755	GH181M080G250A00X
	180	13	16	340	721	GH181M080I160A00X
	220	10	25	310	766	GH221M080G250A00X
	220	13	20	310	830	GH221M080I200A00X
	270	13	20	270	889	GH271M080I200A00X
	270	13	25	250	1018	GH271M080I250A00X
	330	13	20	190	1060	GH331M080I200A00X
330	16	20	180	1253	GH331M080J200A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
80	390	13	30	150	1427	GH391M080I300A00X
	470	13	30	130	1533	GH471M080I300A00X
	470	13	35	120	1711	GH471M080I350A00X
	470	16	25	160	1431	GH471M080J250A00X
	470	18	20	150	1470	GH471M080K200A00X
	560	13	40	140	1684	GH561M080I400A00X
	560	16	25	150	1478	GH561M080J250A00X
	560	18	20	150	1470	GH561M080K200A00X
	680	16	31.5	130	1757	GH681M080J315A00X
	680	18	25	150	1581	GH681M080K250A00X
	820	16	35.5	120	1929	GH821M080J355A00X
	820	18	25	130	1699	GH821M080K250A00X
	1000	16	35.5	120	1929	GH102M080J355A00X
	1000	16	40	110	2150	GH102M080J400A00X
	1000	18	31.5	110	2040	GH102M080K315A00X
	1200	16	40	90	2377	GH122M080J400A00X
	1200	18	35.5	95	2314	GH122M080K355A00X
	1500	16	40	84	2461	GH152M080J400A00X
	1500	18	40	83	2641	GH152M080K400A00X
	1800	18	40	82	2657	GH182M080K400A00X
100	4.7	5	11	5750	54	GH4R7M100C110A00X
	5.6	5	11	5000	90	GH5R6M100C110A00X
	6.8	5	11	4360	96	GH6R8M100C110A00X
	8.2	5	11	3675	105	GH8R2M100C110A00X
	10	6.3	11	2625	141	GH100M100E110A00X
	10	8	11.5	2200	180	GH100M100F115A00X
	15	6.3	11	2313	150	GH150M100E110A00X
	22	6.3	11	1850	168	GH220M100E110A00X
	22	8	11.5	1375	228	GH220M100F115A00X
	27	8	11.5	1310	233	GH270M100F115A00X
	33	8	11.5	1238	240	GH330M100F115A00X
	39	8	16	1200	281	GH390M100F160A00X
	47	8	16	850	335	GH470M100F160A00X
	47	10	12.5	810	350	GH470M100G125A00X
	47	10	16	780	357	GH470M100G160A00X
	56	8	16	760	354	GH560M100F160A00X
	56	8	20	680	414	GH560M100F200A00X
	56	10	12.5	750	364	GH560M100G125A00X
	68	8	20	650	423	GH680M100F200A00X
	68	10	16	680	424	GH680M100G160A00X
82	8	20	520	473	GH820M100F200A00X	
82	10	16	520	485	GH820M100G160A00X	
100	8	30	420	635	GH101M100F300A00X	

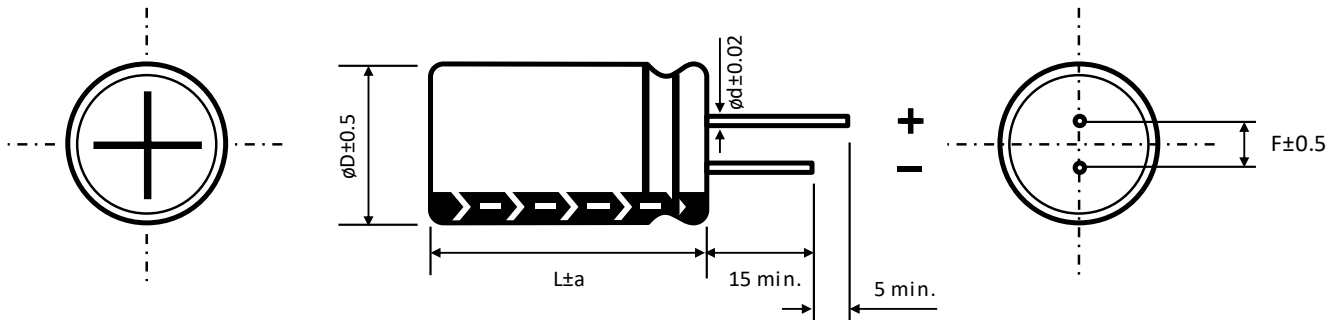
See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
100	100	10	16	450	521	GH101M100G160A00X
	100	10	20	420	595	GH101M100G200A00X
	100	13	16	430	641	GH101M100I160A00X
	100	13	20	380	749	GH101M100I200A00X
	120	8	35	360	738	GH121M100F350A00X
	120	10	20	400	610	GH121M100G200A00X
	120	10	25	370	701	GH121M100G250A00X
	120	13	16	400	664	GH121M100I160A00X
	150	10	25	330	743	GH151M100G250A00X
	150	10	30	310	833	GH151M100G300A00X
	150	13	20	330	804	GH151M100I200A00X
	180	13	20	290	858	GH181M100I200A00X
	180	13	25	280	962	GH181M100I250A00X
	220	13	20	270	889	GH221M100I200A00X
	220	13	25	250	108	GH221M100I250A00X
	220	16	16	270	915	GH221M100J160A00X
	220	16	20	250	1063	GH221M100J200A00X
	270	10	40	230	1106	GH271M100G400A00X
	270	13	30	200	1235	GH271M100I300A00X
	270	16	25	200	1280	GH271M100J250A00X
	330	13	30	160	1381	GH331M100I300A00X
	330	13	35	140	1584	GH331M100I350A00X
	330	16	25	140	1530	GH331M100J250A00X
	390	13	40	130	1748	GH391M100I400A00X
	390	18	25	150	1581	GH391M100K250A00X
	470	16	25	150	1478	GH471M100J250A00X
	470	16	31.5	110	1910	GH471M100J315A00X
	470	18	25	140	1637	GH471M100K250A00X
	560	16	35.5	130	1853	GH561M100J355A00X
	560	18	31.5	130	1877	GH561M100K315A00X
	680	16	35.5	120	1929	GH681M100J355A00X
	680	18	35.5	110	2150	GH681M100K355A00X
820	18	35.5	105	2201	GH821M100K355A00X	
820	18	40	100	2406	GH821M100K400A00X	
1000	18	40	95	2468	GH102M100K400A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**DIMENSIONS** ▪ All dimensions in mm


$\phi D$	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
$\phi d$	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5		L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5
		1.5	2	1.5	2

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	100/120	400	1k	10k	100k
$C_R \leq 10$	0.4	0.52	0.6	0.92	1
$10 < C_R \leq 100$	0.67	0.8	0.83	0.94	1
$100 < C_R \leq 1000$	0.75	0.84	0.88	0.95	1
$1000 \leq C_R$	0.82	0.87	0.92	0.95	1

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 310	Page 168





### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### FK SERIES ■ HIGH VOLTAGE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 6000 hours up to 8000 hours
- High voltage up to 500V
- High reliability
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C				-25 ~ +105°C			
Rated Voltage Range	V <sub>R</sub>	160 ~ 450V DC				500V DC			
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V): V <sub>S</sub> = 1.15·V <sub>R</sub>				(V <sub>R</sub> > 315V): V <sub>S</sub> = 1.10·V <sub>R</sub>			
Capacitance Range	C <sub>R</sub>	1 ~ 330μF				4.7 ~ 120μF			
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)							
Leakage Current (20°C - V <sub>R</sub> applied)	I <sub>LEAK</sub>	C <sub>R</sub> ·V <sub>R</sub> ≤ 1000				≤ 0.1·C <sub>R</sub> ·V <sub>R</sub> + 40μA (After 1 minute)			
		C <sub>R</sub> ·V <sub>R</sub> > 1000				≤ 0.04·C <sub>R</sub> ·V <sub>R</sub> + 100μA (After 1 minute)			
		[ I <sub>LEAK</sub> (μA) ; C <sub>R</sub> (μF) ; V <sub>R</sub> (V) ]							
Dissipation Factor % (20°C - 120Hz)	tanδ	V <sub>R</sub> (V DC)	160	200	250	350	400	450	500
		tanδ (%)	15	15	15	20	20	20	24
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	160	200	250	350	400	450	500
		Z-25°C/Z+20°C	3	3	3	5	5	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	-	-

Lifetime Test				
Endurance 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	6 000 hours	∅ D 6.3 ~ 8 mm	
		6 000 hours	∅ D 10 x L 9 mm	
		8 000 hours	∅ D 10 x L 12.5 mm	
		8 000 hours	∅ D > 10 mm	
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value		
	tanδ	≤ 200% of initial specified value		
	I <sub>Leak</sub>	≤ the initial specified value		
Shelf Life 105°C (V <sub>R</sub> = 0)	Test	1 000 hours		
		ΔC/C <sub>R</sub>	≤ ±20% of initial measured value	
		tanδ	≤ 200% of initial specified value	
		I <sub>Leak</sub>	≤ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4				

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
160	1	6.3	11	20.4	51	FK010M160E110A00X
	1	6.3	9	18.4	46	FK010M160E090A00X
	1.5	6.3	11	22.4	56	FK1R5M160E110A00X
	1.5	6.3	9	20.4	51	FK1R5M160E090A00X
	2.2	6.3	11	28.4	71	FK2R2M160E110A00X
	2.2	6.3	9	26	65	FK2R2M160E090A00X
	3.3	6.3	11	32.4	81	FK3R3M160E110A00X
	3.3	6.3	9	29.2	73	FK3R3M160E090A00X
	4.7	6.3	11	36.4	91	FK4R7M160E110A00X
	4.7	6.3	9	34.4	86	FK4R7M160E090A00X
	5.6	6.3	11	38.4	96	FK5R6M160E110A00X
	5.6	6.3	9	36.4	91	FK5R6M160E090A00X
	5.6	8	11.5	44	110	FK5R6M160F115A00X
	6.8	6.3	11	44	110	FK6R8M160E110A00X
	6.8	8	11.5	52	130	FK6R8M160F115A00X
	6.8	8	9	44	110	FK6R8M160F090A00X
	8.2	8	11.5	60	150	FK8R2M160F115A00X
	8.2	8	9	56	140	FK8R2M160F090A00X
	10	8	11.5	96	240	FK100M160F115A00X
	10	8	16	110	275	FK100M160F160A00X
	10	8	9	88	220	FK100M160F090A00X
	10	10	12.5	120	300	FK100M160G125A00X
	15	8	16	110	275	FK150M160F160A00X
	15	10	9	100	250	FK150M160G090A00X
	22	8	20	180	450	FK220M160F200A00X
	22	10	12.5	160	400	FK220M160G125A00X
	22	10	16	180	450	FK220M160G160A00X
	33	10	16	230	575	FK330M160G160A00X
	33	10	20	250	625	FK330M160G200A00X
	47	10	16	300	750	FK470M160G160A00X
	47	10	20	300	750	FK470M160G200A00X
	68	13	20	470	1175	FK680M160I200A00X
	82	13	20	520	1300	FK820M160I200A00X
100	13	25	620	1395	FK101M160I250A00X	
100	16	20	630	1418	FK101M160J200A00X	
150	16	25	840	1890	FK151M160J250A00X	
220	18	25	1090	2453	FK221M160K250A00X	
270	16	31.5	1260	2835	FK271M160J315A00X	
330	18	31.5	1400	3150	FK331M160K315A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
200	1	6.3	11	22.8	57	FK010M200E110A00X
	1	6.3	9	21.2	53	FK010M200E090A00X
	1.5	6.3	11	24.4	61	FK1R5M200E110A00X
	1.5	6.3	9	22.8	57	FK1R5M200E090A00X
	2.2	6.3	11	30	75	FK2R2M200E110A00X
	2.2	6.3	9	27.6	69	FK2R2M200E090A00X
	3.3	6.3	11	38.8	97	FK3R3M200E110A00X
	3.3	6.3	9	34.8	87	FK3R3M200E090A00X
	4.7	6.3	11	52	130	FK4R7M200E110A00X
	4.7	8	9	52	130	FK4R7M200F090A00X
	5.6	6.3	11	56	140	FK5R6M200E110A00X
	5.6	8	11.5	64	160	FK5R6M200F115A00X
	5.6	8	9	56	140	FK5R6M200F090A00X
	6.8	8	11.5	76	190	FK6R8M200F115A00X
	6.8	8	9	64	160	FK6R8M200F090A00X
	8.2	8	11.5	84	210	FK8R2M200F115A00X
	10	8	11.5	110	275	FK100M200F115A00X
	10	8	16	120	300	FK100M200F160A00X
	10	10	12.5	130	325	FK100M200G125A00X
	10	10	9	110	275	FK100M200G090A00X
	22	8	20	220	550	FK220M200F200A00X
	22	10	16	220	550	FK220M200G160A00X
	22	10	20	250	625	FK220M200G200A00X
	33	10	16	260	650	FK330M200G160A00X
	33	10	20	280	700	FK330M200G200A00X
	47	13	16	360	900	FK470M200I160A00X
47	13	20	390	975	FK470M200I200A00X	
68	13	20	470	1175	FK680M200I200A00X	
68	13	25	520	1300	FK680M200I250A00X	
100	13	25	630	1418	FK101M200I250A00X	
100	16	25	680	1530	FK101M200J250A00X	
150	18	25	900	2025	FK151M200K250A00X	
220	16	31.5	1090	2453	FK221M200J315A00X	
250	1	6.3	11	23.6	59	FK010M250E110A00X
	1	6.3	9	21.2	53	FK010M250E090A00X
	1.5	6.3	11	24.4	61	FK1R5M250E110A00X
	1.5	6.3	9	22.8	57	FK1R5M250E090A00X
	2.2	6.3	11	30.4	76	FK2R2M250E110A00X
	2.2	6.3	9	27.6	69	FK2R2M250E090A00X
	2.2	8	11.5	38	95	FK2R2M250F115A00X
	3.3	6.3	11	40	100	FK3R3M250E110A00X
	3.3	6.3	9	34.8	87	FK3R3M250E090A00X

See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	I <sub>R</sub> • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
250	3.3	8	11.5	56	140	FK3R3M250F115A00X
	4.7	8	11.5	64	160	FK4R7M250F115A00X
	4.7	8	16	72	180	FK4R7M250F160A00X
	4.7	8	9	52	130	FK4R7M250F090A00X
	4.7	10	12.5	76	190	FK4R7M250G125A00X
	5.6	8	11.5	72	180	FK5R6M250F115A00X
	5.6	8	9	64	160	FK5R6M250F090A00X
	6.8	8	11.5	80	200	FK6R8M250F115A00X
	6.8	8	16	92	230	FK6R8M250F160A00X
	6.8	10	12.5	100	250	FK6R8M250G125A00X
	8.2	8	16	88	220	FK8R2M250F160A00X
	8.2	10	9	80	200	FK8R2M250G090A00X
	10	8	16	120	300	FK100M250F160A00X
	10	10	12.5	120	300	FK100M250G125A00X
	15	10	16	130	325	FK150M250G160A00X
	22	10	16	180	450	FK220M250G160A00X
	22	10	20	200	500	FK220M250G200A00X
	33	10	20	270	675	FK330M250G200A00X
	33	13	16	270	675	FK330M250I160A00X
	33	13	20	320	800	FK330M250I200A00X
	47	13	20	400	1000	FK470M250I200A00X
	47	13	25	430	1075	FK470M250I250A00X
56	13	25	500	1250	FK560M250I250A00X	
68	16	25	560	1400	FK680M250J250A00X	
100	16	25	680	1530	FK101M250J250A00X	
150	16	31.5	900	2025	FK151M250J315A00X	
220	18	31.5	1130	2543	FK221M250K315A00X	
350	1	6.3	11	26.4	66	FK010M350E110A00X
	1	6.3	9	21.2	53	FK010M350E090A00X
	1	8	11.5	30.8	77	FK010M350F115A00X
	1.5	6.3	11	30	75	FK1R5M350E110A00X
	1.5	6.3	9	26.4	66	FK1R5M350E090A00X
	2.2	6.3	11	38	95	FK2R2M350E110A00X
	2.2	8	11.5	48	120	FK2R2M350F115A00X
	2.2	8	9	35.2	88	FK2R2M350F090A00X
	3.3	8	11.5	56	140	FK3R3M350F115A00X
	3.3	8	9	48	120	FK3R3M350F090A00X
	3.3	10	12.5	64	160	FK3R3M350G125A00X
	4.7	8	16	72	180	FK4R7M350F160A00X
	4.7	10	12.5	76	190	FK4R7M350G125A00X
	4.7	10	9	64	160	FK4R7M350G090A00X
	5.6	8	16	84	210	FK5R6M350F160A00X

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
350	5.6	10	12.5	88	220	FK5R6M350G125A00X
	6.8	8	20	110	275	FK6R8M350F200A00X
	6.8	10	16	110	275	FK6R8M350G160A00X
	8.2	8	20	130	325	FK8R2M350F200A00X
	10	8	20	130	325	FK100M350F200A00X
	10	10	16	130	325	FK100M350G160A00X
	15	10	20	150	375	FK150M350G200A00X
	22	13	20	260	650	FK220M350I200A00X
	33	13	25	380	950	FK330M350I250A00X
	47	16	20	430	1075	FK470M350J200A00X
	47	16	25	460	1150	FK470M350J250A00X
	68	18	20	560	1400	FK680M350K200A00X
	68	18	25	600	1500	FK680M350K250A00X
	82	18	25	610	1525	FK820M350K250A00X
	100	16	31.5	720	1620	FK101M350J315A00X
150	18	35.5	960	2160	FK151M350K355A00X	
400	1	6.3	11	30.4	76	FK010M400E110A00X
	1	6.3	9	25.2	63	FK010M400E090A00X
	1.5	6.3	9	30.4	76	FK1R5M400E090A00X
	1.5	8	11.5	36.4	91	FK1R5M400F115A00X
	2.2	6.3	11	44	110	FK2R2M400E110A00X
	2.2	8	11.5	48	120	FK2R2M400F115A00X
	2.2	8	9	40	100	FK2R2M400F090A00X
	3.3	8	11.5	60	150	FK3R3M400F115A00X
	3.3	8	9	52	130	FK3R3M400F090A00X
	4.7	8	11.5	80	200	FK4R7M400F115A00X
	4.7	8	16	88	220	FK4R7M400F160A00X
	4.7	10	12.5	92	230	FK4R7M400G125A00X
	4.7	10	9	72	180	FK4R7M400G090A00X
	5.6	8	16	88	220	FK5R6M400F160A00X
	5.6	10	12.5	100	250	FK5R6M400G125A00X
	6.8	8	16	110	275	FK6R8M400F160A00X
	6.8	10	12.5	110	275	FK6R8M400G125A00X
	8.2	8	16	110	275	FK8R2M400F160A00X
	8.2	10	12.5	120	300	FK8R2M400G125A00X
	8.2	10	16	130	325	FK8R2M400G160A00X
	10	8	20	140	350	FK100M400F200A00X
	10	10	16	140	350	FK100M400G160A00X
10	10	20	160	400	FK100M400G200A00X	
15	10	20	190	475	FK150M400G200A00X	
15	13	16	200	500	FK150M400I160A00X	
22	13	20	260	650	FK220M400I200A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
400	33	13	25	360	900	FK330M400I250A00X
	33	16	20	360	900	FK330M400J200A00X
	47	16	25	470	1175	FK470M400J250A00X
	56	18	25	560	1400	FK560M400K250A00X
	68	18	25	590	1475	FK680M400K250A00X
	82	16	31.5	630	1575	FK820M400J315A00X
	100	18	31.5	770	1733	FK101M400K315A00X
	120	18	31.5	830	1868	FK121M400K315A00X
450	150	18	35.5	930	2093	FK151M400K355A00X
	1	6.3	11	30.4	76	FK010M450E110A00X
	1	6.3	9	25.2	63	FK010M450E090A00X
	1.5	8	11.5	36.4	91	FK1R5M450F115A00X
	2.2	8	11.5	48	120	FK2R2M450F115A00X
	2.2	8	16	56	140	FK2R2M450F160A00X
	2.2	8	9	40	100	FK2R2M450F090A00X
	2.2	10	12.5	60	150	FK2R2M450G125A00X
	3.3	8	11.5	64	160	FK3R3M450F115A00X
	3.3	10	12.5	80	200	FK3R3M450G125A00X
	3.3	10	9	68	170	FK3R3M450G090A00X
	4.7	8	16	100	250	FK4R7M450F160A00X
	4.7	10	12.5	100	250	FK4R7M450G125A00X
	4.7	10	16	110	275	FK4R7M450G160A00X
	5.6	10	16	110	275	FK5R6M450G160A00X
	6.8	8	20	120	300	FK6R8M450F200A00X
	6.8	10	16	130	325	FK6R8M450G160A00X
	6.8	10	20	140	350	FK6R8M450G200A00X
	8.2	10	20	140	350	FK8R2M450G200A00X
	10	10	20	160	400	FK100M450G200A00X
	15	13	20	220	550	FK150M450I200A00X
	22	13	25	290	725	FK220M450I250A00X
	22	16	20	290	725	FK220M450J200A00X
	33	13	25	360	900	FK330M450I250A00X
	33	16	25	390	975	FK330M450J250A00X
	47	16	25	470	1175	FK470M450J250A00X
	47	18	25	500	1250	FK470M450K250A00X
	68	16	31.5	630	1575	FK680M450J315A00X
	68	18	25	590	1475	FK680M450K250A00X
	82	18	31.5	680	1700	FK820M450K315A00X
	100	18	35.5	800	1800	FK101M450K355A00X

See "PACKAGING INFORMATION" to taped or formed products.

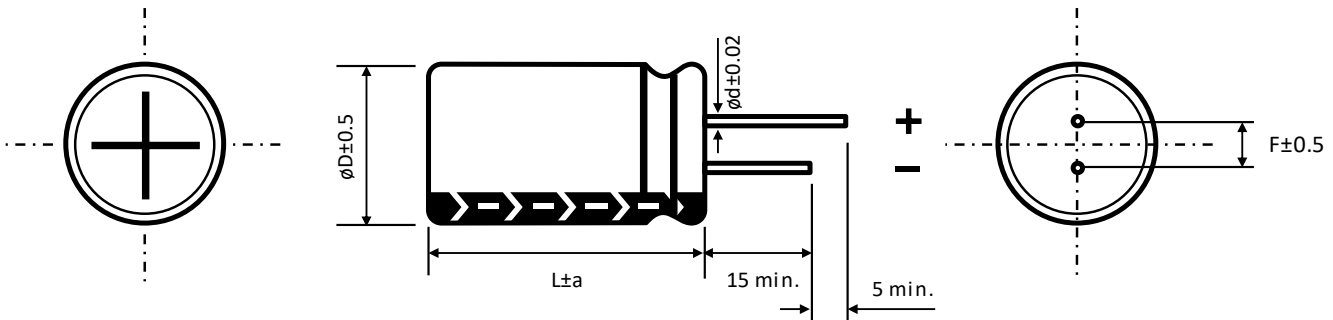
## STANDARD RATINGS

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
500	4.7	10	20	88	220	FK4R7M500G200A00X
	5.6	10	20	92	230	FK5R6M500G200A00X
	6.8	10	20	130	325	FK6R8M500G200A00X
	8.2	10	20	130	325	FK8R2M500G200A00X
	10	13	20	140	350	FK100M500I200A00X
	15	13	25	180	450	FK150M500I250A00X
	22	16	25	230	575	FK220M500J250A00X
	33	18	25	390	975	FK330M500K250A00X
	47	16	31.5	500	1250	FK470M500J315A00X
	56	18	31.5	570	1425	FK560M500K315A00X
	68	18	35.5	630	1575	FK680M500K355A00X
	82	18	40	680	1700	FK820M500K400A00X
	100	18	45	800	1800	FK101M500K450A00X
120	22	45	840	1890	FK121M500M450A00X	

See "PACKAGING INFORMATION" to taped or formed products.

## DIMENSIONS • All dimensions in mm



$\phi D$	6.3	8	10	13	16	18	22
F	2.5	3.5	5	5	7.5	7.5	10
$\phi d$	0.5	L < 20	L $\geq$ 20	0.6		0.8	
		0.5	0.6				

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$		$\phi D > 18$
	1.5	L = 25 to 35.5	L < 25 and L $\geq$ 40	L = 25 to 31.5	L < 25 and L $\geq$ 35.5	2
		1.5	2	1.5	2	



**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 82	1	1.75	2.25	2.5
$\geq 100$	1	1.67	2.05	2.25

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 310	Page 168

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### FL SERIES ■ LONG LIFE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C • 8000 hours up to 12000 hours
- High voltage up to 500V
- High reliability
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +105°C					-25 ~ +105°C				
Rated Voltage Range	$V_R$	160 ~ 450V DC					500V DC				
Surge Voltage	$V_S$	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$					$(V_R > 315V): V_S = 1.10 \cdot V_R$				
Capacitance Range	$C_R$	1 ~ 680 $\mu$ F					10 ~ 68 $\mu$ F				
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)									
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	$C_R \cdot V_R \leq 1000$					$\leq 0.1 \cdot C_R \cdot V_R + 40\mu A$ (After 1 minute)				
		$C_R \cdot V_R > 1000$					$\leq 0.04 \cdot C_R \cdot V_R + 100\mu A$ (After 1 minute)				
		[ $I_{LEAK}$ ( $\mu A$ ) ; $C_R$ ( $\mu F$ ) ; $V_R$ (V) ]									
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	$V_R$ (V DC)	160	200	220	250	350	400	420	450	500
		$\tan \delta$ (%)	15	15	15	15	20	20	20	20	24
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	160	200	220	250	350	400	420	450	500
		Z-25°C/Z+20°C	3	3	3	3	5	5	6	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	6	-	-	-

Lifetime Test			
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	8 000 hours	$\phi D = 6.3 \sim 8$ mm
		10 000 hours	$\phi D = 10$ mm
		12 000 hours	$\phi D \geq 13$ mm • $\leq 450V$
		10 000 hours	$\phi D \geq 13$ mm • 500V
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
$I_{Leak}$	$\leq$ the initial specified value		
Shelf Life 105°C ( $V_R = 0$ )	Test	1 000 hours	
		$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value
		$\tan \delta$	$\leq 200\%$ of initial specified value
		$I_{Leak}$	$\leq$ the initial specified value
Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4			

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
160	1	6.3	11	18.4	46	FL010M160E110A00X
	1.5	6.3	11	20.4	51	FL1R5M160E110A00X
	2.2	6.3	11	24.8	62	FL2R2M160E110A00X
	3.3	6.3	11	37.2	93	FL3R3M160E110A00X
	4.7	8	11.5	38	95	FL4R7M160F115A00X
	5.6	8	11.5	40	100	FL5R6M160F115A00X
	6.8	8	11.5	50	125	FL6R8M160F115A00X
	6.8	8	16	59.2	148	FL6R8M160F160A00X
	10	8	11.5	72	180	FL100M160F115A00X
	15	8	16	100	250	FL150M160F160A00X
	15	10	12.5	100	250	FL150M160G125A00X
	22	10	16	140	350	FL220M160G160A00X
	22	10	20	150	375	FL220M160G200A00X
	33	10	16	190	475	FL330M160G160A00X
	33	10	20	210	525	FL330M160G200A00X
	39	10	16	240	600	FL390M160G160A00X
	47	10	20	300	750	FL470M160G200A00X
	56	10	20	310	775	FL560M160G200A00X
	68	13	20	480	1200	FL680M160I200A00X
	68	13	25	520	1300	FL680M160I250A00X
	82	10	25	440	1100	FL820M160G250A00X
	82	13	20	510	1275	FL820M160I200A00X
	100	13	20	590	1328	FL101M160I200A00X
	100	13	25	630	1418	FL101M160I250A00X
	100	16	20	630	1418	FL101M160J200A00X
	150	13	25	730	1643	FL151M160I250A00X
	150	16	20	770	1733	FL151M160J200A00X
	150	16	25	820	1845	FL151M160J250A00X
	180	16	20	870	1958	FL181M160J200A00X
	220	16	25	1020	2295	FL221M160J250A00X
	220	18	20	1000	2250	FL221M160K200A00X
	220	18	25	1040	2340	FL221M160K250A00X
330	16	31.5	1350	3038	FL331M160J315A00X	
330	18	31.5	1380	3105	FL331M160K315A00X	
390	16	35.5	1510	3398	FL391M160J355A00X	
470	16	40	1710	3848	FL471M160J400A00X	
470	18	35.5	1720	3870	FL471M160K355A00X	
560	18	40	1910	4298	FL561M160K400A00X	
680	18	45	2130	4793	FL681M160K450A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	$I_R$ - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
200	1	6.3	11	26	65	FL010M200E110A00X
	1.5	6.3	11	28	70	FL1R5M200E110A00X
	2.2	6.3	11	34	85	FL2R2M200E110A00X
	3.3	6.3	11	46	115	FL3R3M200E110A00X
	4.7	8	11.5	64	160	FL4R7M200F115A00X
	5.6	8	11.5	66.4	166	FL5R6M200F115A00X
	6.8	8	11.5	70	175	FL6R8M200F115A00X
	6.8	10	12.5	76	190	FL6R8M200G125A00X
	10	8	16	92	230	FL100M200F160A00X
	10	10	16	100	250	FL100M200G160A00X
	12	10	12.5	100	250	FL120M200G125A00X
	15	8	20	140	350	FL150M200F200A00X
	22	10	16	180	450	FL220M200G160A00X
	22	10	20	200	500	FL220M200G200A00X
	27	10	16	200	500	FL270M200G160A00X
	33	10	20	260	650	FL330M200G200A00X
	33	13	20	300	750	FL330M200I200A00X
	47	10	20	310	775	FL470M200G200A00X
	47	13	20	400	1000	FL470M200I200A00X
	56	10	25	380	950	FL560M200G250A00X
	68	13	20	470	1175	FL680M200I200A00X
	68	13	25	520	1300	FL680M200I250A00X
	68	16	20	520	1300	FL680M200J200A00X
	82	16	20	560	1400	FL820M200J200A00X
	100	13	25	640	1440	FL101M200I250A00X
	100	16	20	670	1508	FL101M200J200A00X
	100	16	25	690	1553	FL101M200J250A00X
	100	18	20	710	1598	FL101M200K200A00X
	120	16	20	720	1620	FL121M200J200A00X
	150	16	20	790	1778	FL151M200J200A00X
	150	16	25	840	1890	FL151M200J250A00X
	150	18	25	890	2003	FL151M200K250A00X
	180	16	25	910	2048	FL181M200J250A00X
	180	18	20	910	2048	FL181M200K200A00X
	220	18	25	1050	2363	FL221M200K250A00X
	220	18	31.5	1160	2610	FL221M200K315A00X
270	16	35.5	1250	2813	FL271M200J355A00X	
330	16	40	1430	3218	FL331M200J400A00X	
330	18	31.5	1400	3150	FL331M200K315A00X	
330	18	35.5	1440	3240	FL331M200K355A00X	
390	18	35.5	1520	3420	FL391M200K355A00X	
470	18	40	1750	3938	FL471M200K400A00X	
470	18	45	1820	4095	FL471M200K450A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
220	27	10	16	200	500	FL270M220G160A00X
	39	10	20	270	675	FL390M220G200A00X
	68	13	20	480	1200	FL680M220I200A00X
	150	16	25	850	1913	FL151M220J250A00X
	220	16	31.5	1110	2498	FL221M220J315A00X
	270	18	31.5	1260	2835	FL271M220K315A00X
	330	16	45	1450	3263	FL331M220J450A00X
	390	18	45	1620	3645	FL391M220K450A00X
250	470	18	50	1840	4140	FL471M220K500A00X
	1	6.3	11	26	65	FL010M250E110A00X
	1.5	6.3	11	28	70	FL1R5M250E110A00X
	2.2	6.3	11	34	85	FL2R2M250E110A00X
	3.3	6.3	11	46	115	FL3R3M250E110A00X
	3.3	8	11.5	60	150	FL3R3M250F115A00X
	4.7	8	11.5	68	170	FL4R7M250F115A00X
	5.6	8	11.5	76	190	FL5R6M250F115A00X
	6.8	8	16	96	240	FL6R8M250F160A00X
	6.8	10	12.5	96	240	FL6R8M250G125A00X
	8.2	8	20	120	300	FL8R2M250F200A00X
	10	8	16	120	300	FL100M250F160A00X
	10	10	16	130	325	FL100M250G160A00X
	15	8	20	150	375	FL150M250F200A00X
	22	10	16	200	500	FL220M250G160A00X
	22	10	20	220	550	FL220M250G200A00X
	22	13	20	250	625	FL220M250I200A00X
	33	10	20	270	675	FL330M250G200A00X
	33	13	16	270	675	FL330M250I160A00X
	33	13	20	320	800	FL330M250I200A00X
	47	13	20	400	1000	FL470M250I200A00X
	47	13	25	410	1025	FL470M250I250A00X
	47	16	20	450	1125	FL470M250J200A00X
	56	13	20	430	1075	FL560M250I200A00X
	68	13	25	500	1250	FL680M250I250A00X
	68	16	20	530	1325	FL680M250J200A00X
	68	16	25	570	1425	FL680M250J250A00X
	68	18	20	570	1425	FL680M250K200A00X
	82	13	25	570	1425	FL820M250I250A00X
	82	16	20	580	1450	FL820M250J200A00X
	100	16	25	760	1710	FL101M250J250A00X
	100	16	31.5	800	1800	FL101M250J315A00X
100	18	20	720	1620	FL101M250K200A00X	
100	18	25	780	1755	FL101M250K250A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
250	120	16	25	780	1755	FL121M250J250A00X
	120	18	20	780	1755	FL121M250K200A00X
	150	18	25	890	2003	FL151M250K250A00X
	150	18	31.5	980	2205	FL151M250K315A00X
	180	16	31.5	1020	2295	FL181M250J315A00X
	180	18	25	980	2205	FL181M250K250A00X
	220	16	35.5	1130	2543	FL221M250J355A00X
	220	18	31.5	1130	2543	FL221M250K315A00X
	270	16	40	1290	2903	FL271M250J400A00X
	270	18	35.5	1310	2948	FL271M250K355A00X
330	18	40	1460	3285	FL331M250K400A00X	
350	1	8	11.5	30	75	FL010M350F115A00X
	1.5	8	11.5	32	80	FL1R5M350F115A00X
	2.2	10	12.5	44	110	FL2R2M350G125A00X
	3.3	10	12.5	60	150	FL3R3M350G125A00X
	4.7	10	16	80	200	FL4R7M350G160A00X
	6.8	10	16	100	250	FL6R8M350G160A00X
	10	10	20	130	325	FL100M350G200A00X
	15	10	20	160	400	FL150M350G200A00X
	18	10	20	180	450	FL180M350G200A00X
	22	10	20	200	500	FL220M350G200A00X
	22	13	20	260	650	FL220M350I200A00X
	27	10	25	260	650	FL270M350G250A00X
	33	13	20	330	825	FL330M350I200A00X
	33	13	25	360	900	FL330M350I250A00X
	33	16	20	380	950	FL330M350J200A00X
	47	13	25	430	1075	FL470M350I250A00X
	47	16	20	440	1100	FL470M350J200A00X
	47	18	20	470	1175	FL470M350K200A00X
	56	16	20	480	1200	FL560M350J200A00X
	68	16	25	570	1425	FL680M350J250A00X
	68	16	31.5	620	1550	FL680M350J315A00X
	68	18	20	570	1425	FL680M350K200A00X
	68	18	25	620	1550	FL680M350K250A00X
	82	16	25	620	1550	FL820M350J250A00X
	82	18	25	640	1600	FL820M350K250A00X
	100	16	31.5	800	1800	FL101M350J315A00X
	100	18	25	780	1755	FL101M350K250A00X
	120	16	35.5	860	1935	FL121M350J355A00X
120	18	31.5	870	1958	FL121M350K315A00X	
150	16	40	1020	2295	FL151M350J400A00X	
150	18	35.5	1020	2295	FL151M350K355A00X	
180	18	40	1080	2430	FL181M350K400A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
400	1	8	9	26	65	FL010M400F090A00X
	1	8	11.5	30	75	FL010M400F115A00X
	1.5	8	9	30.4	76	FL1R5M400F090A00X
	1.5	8	11.5	36.4	91	FL1R5M400F115A00X
	1.5	8	16	40.4	101	FL1R5M400F160A00X
	2.2	8	11.5	40	100	FL2R2M400F115A00X
	2.2	8	16	56	140	FL2R2M400F160A00X
	3.3	8	11.5	52	130	FL3R3M400F115A00X
	3.3	8	16	60	150	FL3R3M400F160A00X
	3.3	8	20	61.2	153	FL3R3M400F200A00X
	3.3	10	12.5	60.4	151	FL3R3M400G125A00X
	3.3	10	16	72.8	182	FL3R3M400G160A00X
	3.9	8	16	66	165	FL3R9M400F160A00X
	4.7	8	11.5	72	180	FL4R7M400F115A00X
	4.7	8	20	92	230	FL4R7M400F200A00X
	4.7	10	16	96	240	FL4R7M400G160A00X
	5.6	8	20	100	250	FL5R6M400F200A00X
	5.6	10	16	100	250	FL5R6M400G160A00X
	5.6	10	20	110	275	FL5R6M400G200A00X
	6.8	8	20	120	300	FL6R8M400F200A00X
	6.8	10	16	120	300	FL6R8M400G160A00X
	8.2	10	16	120	300	FL8R2M400G160A00X
	8.2	10	20	130	325	FL8R2M400G200A00X
	10	10	16	130	325	FL100M400G160A00X
	10	10	20	140	350	FL100M400G200A00X
	15	10	20	180	450	FL150M400G200A00X
	15	13	20	200	500	FL150M400I200A00X
	22	13	20	280	700	FL220M400I200A00X
	22	13	25	310	775	FL220M400I250A00X
	22	16	20	320	800	FL220M400J200A00X
	27	13	20	300	750	FL270M400I200A00X
	33	13	25	330	825	FL330M400I250A00X
	33	16	20	340	850	FL330M400J200A00X
	39	13	25	390	975	FL390M400I250A00X
	47	16	25	480	1200	FL470M400J250A00X
	47	16	31.5	530	1325	FL470M400J315A00X
	47	18	20	470	1175	FL470M400K200A00X
	47	18	25	510	1275	FL470M400K250A00X
	56	16	25	500	1250	FL560M400J250A00X
	56	18	20	500	1250	FL560M400K200A00X
68	16	25	580	1450	FL680M400J250A00X	
68	18	25	630	1575	FL680M400K250A00X	
68	18	31.5	700	1750	FL680M400K315A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
400	82	16	31.5	660	1650	FL820M400J315A00X
	82	18	25	650	1625	FL820M400K250A00X
	82	18	31.5	710	1775	FL820M400K315A00X
	100	16	35.5	760	1710	FL101M400J355A00X
	100	18	31.5	770	1733	FL101M400K315A00X
	120	16	40	870	1958	FL121M400J400A00X
	120	18	35.5	870	1958	FL121M400K355A00X
	150	18	40	1020	2295	FL151M400K400A00X
420	180	18	45	1100	2475	FL181M400K450A00X
	6.8	10	16	120	300	FL6R8M420G160A00X
	12	10	20	150	375	FL120M420G200A00X
	15	10	25	190	475	FL150M420G250A00X
	22	13	20	290	725	FL220M420I200A00X
	27	13	25	340	850	FL270M420I250A00X
	33	16	20	390	975	FL330M420J200A00X
	47	16	25	500	1250	FL470M420J250A00X
	47	18	20	500	1250	FL470M420K200A00X
	68	16	31.5	650	1625	FL680M420J315A00X
	68	18	25	620	1550	FL680M420K250A00X
	82	16	35.5	730	1825	FL820M420J355A00X
	82	18	31.5	730	1825	FL820M420K315A00X
	100	16	40	830	1868	FL101M420J400A00X
	100	18	35.5	840	1890	FL101M420K355A00X
	120	18	40	930	2093	FL121M420K400A00X
	120	18	45	950	2138	FL121M420K450A00X
	150	18	50	1060	2385	FL151M420K500A00X
450	1	8	9	26	65	FL010M450F090A00X
	1	8	11.5	33.2	83	FL010M450F115A00X
	1.5	8	11.5	36.8	92	FL1R5M450F115A00X
	1.5	10	9	37.2	93	FL1R5M450G090A00X
	1.8	8	11.5	38.8	97	FL1R8M450F115A00X
	1.8	10	9	39.2	98	FL1R8M450G090A00X
	2.2	8	16	56.4	141	FL2R2M450F160A00X
	3.3	8	16	61.2	153	FL3R3M450F160A00X
	4.7	10	16	92	230	FL4R7M450G160A00X
	5.6	10	16	100	250	FL5R6M450G160A00X
	6.8	10	16	130	325	FL6R8M450G160A00X
	6.8	10	20	140	350	FL6R8M450G200A00X
	8.2	10	20	140	350	FL8R2M450G200A00X
	10	10	20	140	350	FL100M450G200A00X
	10	10	25	160	400	FL100M450G250A00X
10	13	16	150	375	FL100M450I160A00X	

See "PACKAGING INFORMATION" to taped or formed products.

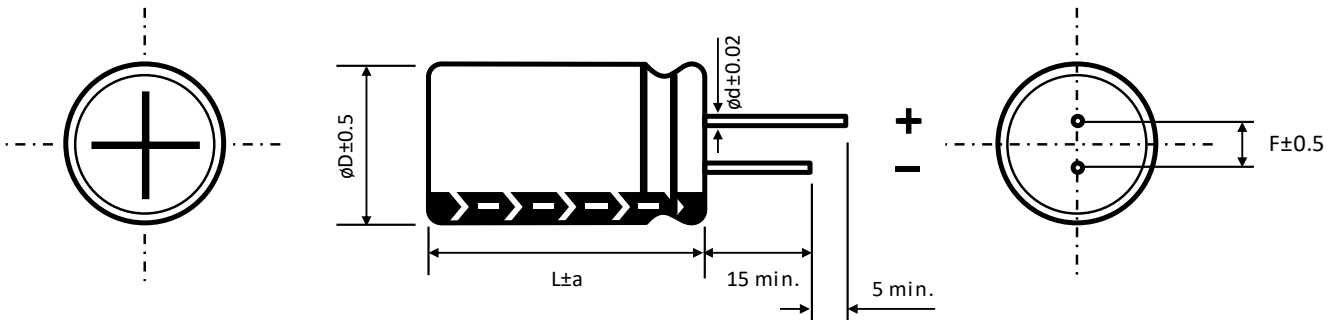


**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	$I_R$ • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
450	15	10	25	190	475	FL150M450G250A00X
	15	13	20	200	500	FL150M450I200A00X
	18	13	20	260	650	FL180M450I200A00X
	22	13	25	290	725	FL220M450I250A00X
	22	16	20	300	750	FL220M450J200A00X
	22	18	20	320	800	FL220M450K200A00X
	27	13	25	340	850	FL270M450I250A00X
	33	16	20	390	975	FL330M450J200A00X
	33	16	25	420	1050	FL330M450J250A00X
	33	16	31.5	460	1150	FL330M450J315A00X
	33	18	20	420	1050	FL330M450K200A00X
	33	18	25	450	1125	FL330M450K250A00X
	39	18	20	440	1100	FL390M450K200A00X
	47	16	25	500	1250	FL470M450J250A00X
	47	16	31.5	560	1400	FL470M450J315A00X
	47	18	25	540	1350	FL470M450K250A00X
	47	18	31.5	590	1475	FL470M450K315A00X
	56	16	31.5	590	1475	FL560M450J315A00X
	56	18	25	560	1400	FL560M450K250A00X
	56	18	31.5	630	1575	FL560M450K315A00X
	68	16	35.5	660	1650	FL680M450J355A00X
	68	18	31.5	660	1650	FL680M450K315A00X
	82	16	40	750	1875	FL820M450J400A00X
	82	18	31.5	720	1800	FL820M450K315A00X
	82	18	35.5	750	1875	FL820M450K355A00X
	100	18	35.5	840	1890	FL101M450K355A00X
100	18	40	900	2025	FL101M450K400A00X	
120	18	45	950	2138	FL121M450K450A00X	
150	18	50	1070	2408	FL151M450K500A00X	
500	10	13	20	130	325	FL100M500I200A00X
	12	13	20	140	350	FL120M500I200A00X
	15	13	25	180	450	FL150M500I250A00X
	15	16	20	180	450	FL150M500J200A00X
	22	16	25	230	575	FL220M500J250A00X
	22	18	20	220	550	FL220M500K200A00X
	33	16	31.5	290	725	FL330M500J315A00X
	33	18	25	280	700	FL330M500K250A00X
	47	18	31.5	360	900	FL470M500K315A00X
	56	18	35.5	390	975	FL560M500K355A00X
	68	18	40	420	1050	FL680M500K400A00X

See "PACKAGING INFORMATION" to taped or formed products.

**DIMENSIONS** ▪ All dimensions in mm


ø D	6.3	8		10	13	16	18
F	2.5	3.5		5	5	7.5	7.5
ø d	0.5	L < 20	L ≥ 20	0.6		0.8	
		0.5	0.6				

a	ø D < 16		ø D = 16		ø D = 18		
	1.5	L = 25 to 35.5		L < 25 and L ≥ 40		L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5		2		1.5	2

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

CAP (µF) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 82	1	1.75	2.25	2.5
≥ 100	1	1.67	2.05	2.25

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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General Precautions and Guidelines Page 310	Packaging Information Liquid Radial Page 168



### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### GT SERIES ■ MINIATURIZED, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 10000 hours
- Miniaturized for space critical applications
- High reliability
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C							
Rated Voltage Range	$V_R$	10 ~ 100V DC							
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$							
Capacitance Range	$C_R$	1 ~ 330μF							
Cap. Tolerance	$\Delta C$	±20% (120Hz ■ 20°C)							
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	$\leq 0.01 \cdot C_R \cdot V_R$ or 3μA, whichever is greater ■ After 2 minutes [ $I_{LEAK}$ (μA) ; $C_R$ (μF) ; $V_R$ (V) ]							
Dissipation Factor % (20°C ■ 120Hz)	tanδ	$V_R$ (V DC)	10	16	25	35	50	63	100
		tanδ (%)	45	35	30	22	19	17	15
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	10	8	6	6	5	5	5
		Z-40°C/Z+20°C	14	10	8	8	8	8	6

Lifetime Test			
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	<b>10 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value	
	tanδ	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 105°C ( $V_R = 0$ )	Test	<b>1 000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value	
	tanδ	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4			

**STANDARD RATINGS**

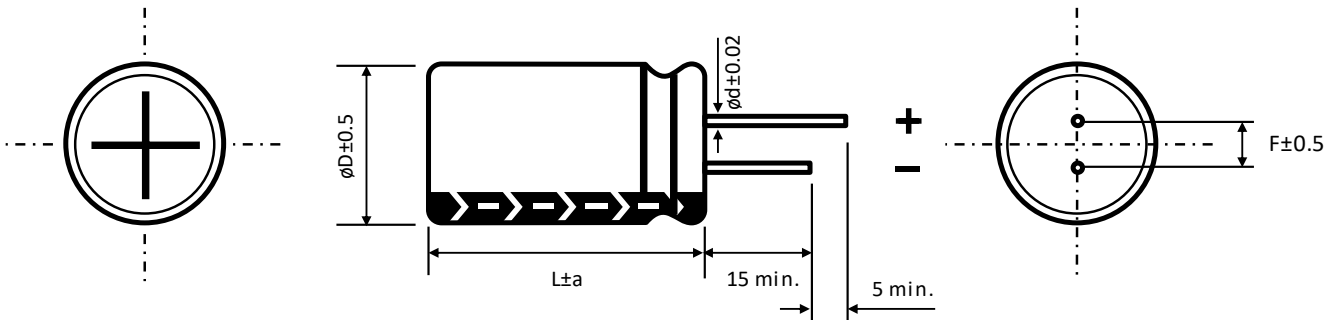
Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ = Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
10	100	5	11	140	GT101M010C110A00X
	220	6.3	11	220	GT221M010E110A00X
	330	8	11.5	340	GT331M010F115A00X
16	47	5	11	140	GT470M016C110A00X
	100	6.3	11	220	GT101M016E110A00X
	220	8	11.5	340	GT221M016F115A00X
25	33	5	11	140	GT330M025C110A00X
	47	5	11	140	GT470M025C110A00X
	100	6.3	11	220	GT101M025E110A00X
35	33	5	11	90	GT330M035C110A00X
	47	6.3	11	220	GT470M035E110A00X
	100	8	11.5	340	GT101M035F115A00X
50	1	5	11	26	GT010M050C110A00X
	2.2	5	11	36	GT2R2M050C110A00X
	3.3	5	11	75	GT3R3M050C110A00X
	4.7	5	11	85	GT4R7M050C110A00X
	10	5	11	95	GT100M050C110A00X
	22	5	11	140	GT220M050C110A00X
	33	6.3	11	200	GT330M050E110A00X
	47	6.3	11	200	GT470M050E110A00X
63	100	8	11.5	280	GT101M050F115A00X
	10	5	11	85	GT100M063C110A00X
	22	6.3	11	180	GT220M063E110A00X
	33	6.3	11	180	GT330M063E110A00X
100	47	8	11.5	250	GT470M063F115A00X
	1	5	11	40	GT010M100C110A00X
	2.2	5	11	50	GT2R2M100C110A00X
	3.3	5	11	60	GT3R3M100C110A00X
	4.7	5	11	70	GT4R7M100C110A00X
	10	6.3	11	150	GT100M100E110A00X
22	8	11.5	230	GT220M100F115A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 10	0.42	0.6	0.8	1
22 ~ 33	0.55	0.75	0.9	1
47 ~ 330	0.7	0.85	0.95	1

**DIMENSIONS** ▪ All dimensions in mm


$\phi D$	5	6.3	8
F	2	2.5	3.5
$\phi d$	0.5	0.5	0.5
a	1.5	1.5	1.5

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**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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### TH SERIES ■ HIGH TEMP., AUTOMOTIVE 125°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 125°C ■ 1 000 hours up to 3 000 hours
- Especially for applications with high ambient temperatures
- High reliability
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +125°C				-25 ~ +125°C					
Rated Voltage Range	V <sub>R</sub>	10 ~ 400V DC				450V DC					
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V): V <sub>S</sub> = 1.15·V <sub>R</sub>				(V <sub>R</sub> > 315V): V <sub>S</sub> = 1.10·V <sub>R</sub>					
Capacitance Range	C <sub>R</sub>	1 ~ 8200μF				1 ~ 47μF					
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)									
Leakage Current (20°C ■ V <sub>R</sub> applied)	I <sub>LEAK</sub>	10 ~ 100V				≤ 0.01C <sub>R</sub> ·V <sub>R</sub> or 3μA (After 2 minutes)					
		160 ~ 450V	C <sub>R</sub> ·V <sub>R</sub> ≤ 1000		≤ 0.1C <sub>R</sub> ·V <sub>R</sub> + 40μA (After 1 minute)						
			C <sub>R</sub> ·V <sub>R</sub> > 1000		≤ 0.04C <sub>R</sub> ·V <sub>R</sub> + 100μA (After 1 minute)						
[ I <sub>LEAK</sub> (μA) ; C <sub>R</sub> (μF) ; V <sub>R</sub> (V) ]											
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V <sub>R</sub> (V DC)	10	16	25	35	50	63	80		
		tanδ (%)	18	15	13	12	10	8	8		
		V <sub>R</sub> (V DC)	100	160	200	250	350	400	450		
		tanδ (%)	7	12	12	12	15	15	20		
For C <sub>R</sub> ≥ 1000μF, add 2% per every multiple 1000μF of rated capacitance value											
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	10	16 ~ 100	160 ~ 250	350 ~ 400	450				
		Z-25°C/Z+20°C	3	2	3	6	6				
		Z-40°C/Z+20°C	4	4	6	12	-				
		For capacitance > 1000μF									
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value								
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value										
Lifetime Test											
Endurance 125°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	1 000 hours				∅ D < 8 mm					
		2 000 hours				∅ D = 8 ~ 10 mm					
		3 000 hours				∅ D ≥ 13 mm					
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value									
	tanδ	≤ 300% of initial specified value									
I <sub>Leak</sub>	≤ the initial specified value										
Shelf Life 125°C (V <sub>R</sub> = 0)	Test	1 000 hours									
		ΔC/C <sub>R</sub>	≤ ±20% of initial measured value								
		tanδ	≤ 300% of initial specified value								
	I <sub>Leak</sub>	≤ the initial specified value									
Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4											

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ - Max. Ripple Current +125°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
10	47	5	11	92	TH470M010C110A00X
	56	5	11	100	TH560M010C110A00X
	100	5	11	130	TH101M010C110A00X
	100	6.3	11	145	TH101M010E110A00X
	120	6.3	11	160	TH121M010E110A00X
	330	8	11.5	350	TH331M010F115A00X
	330	10	12.5	410	TH331M010G125A00X
	470	8	11.5	430	TH471M010F115A00X
	470	8	16	500	TH471M010F160A00X
	470	10	12.5	505	TH471M010G125A00X
	470	10	16	525	TH471M010G160A00X
	560	10	12.5	530	TH561M010G125A00X
	680	8	20	640	TH681M010F200A00X
	680	10	16	660	TH681M010G160A00X
	1000	10	16	870	TH102M010G160A00X
	1000	10	20	960	TH102M010G200A00X
	1200	10	20	1000	TH122M010G200A00X
1500	10	20	1120	TH152M010G200A00X	
16	22	5	11	66	TH220M016C110A00X
	33	6.3	11	91	TH330M016E110A00X
	47	5	11	97	TH470M016C110A00X
	47	6.3	11	110	TH470M016E110A00X
	100	6.3	11	175	TH101M016E110A00X
	100	8	11.5	206	TH101M016F115A00X
	220	8	11.5	340	TH221M016F115A00X
	220	10	12.5	400	TH221M016G125A00X
	330	8	11.5	400	TH331M016F115A00X
	330	8	16	460	TH331M016F160A00X
	330	10	12.5	470	TH331M016G125A00X
	330	10	16	525	TH331M016G160A00X
	470	8	11.5	500	TH471M016F115A00X
	470	8	20	640	TH471M016F200A00X
	470	10	12.5	590	TH471M016G125A00X
	470	10	16	650	TH471M016G160A00X
	470	10	20	720	TH471M016G200A00X
	680	10	20	760	TH681M016G200A00X
	820	10	16	740	TH821M016G160A00X
	820	10	25	900	TH821M016G250A00X
1000	10	20	860	TH102M016G200A00X	
1000	10	25	950	TH102M016G250A00X	
1000	13	20	1000	TH102M016I200A00X	

See "PACKAGING INFORMATION" to taped or formed products.



**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
25	22	6.3	11	70	TH220M025E110A00X
	33	5	11	88	TH330M025C110A00X
	33	6.3	11	100	TH330M025E110A00X
	47	5	11	97	TH470M025C110A00X
	47	6.3	11	110	TH470M025E110A00X
	47	8	11.5	130	TH470M025F115A00X
	56	6.3	11	120	TH560M025E110A00X
	100	8	11.5	210	TH101M025F115A00X
	100	10	12.5	250	TH101M025G125A00X
	120	8	11.5	220	TH121M025F115A00X
	150	8	11.5	260	TH151M025F115A00X
	180	8	11.5	290	TH181M025F115A00X
	220	8	11.5	360	TH221M025F115A00X
	220	8	16	415	TH221M025F160A00X
	220	10	12.5	420	TH221M025G125A00X
	220	10	16	470	TH221M025G160A00X
	270	8	20	470	TH271M025F200A00X
	270	10	12.5	435	TH271M025G125A00X
	330	8	16	510	TH331M025F160A00X
	330	10	12.5	520	TH331M025G125A00X
	330	10	16	570	TH331M025G160A00X
	330	10	20	631	TH331M025G200A00X
	390	10	16	650	TH391M025G160A00X
	470	8	20	620	TH471M025F200A00X
	470	10	16	640	TH471M025G160A00X
	470	10	20	700	TH471M025G200A00X
	470	10	25	770	TH471M025G250A00X
	470	13	20	810	TH471M025I200A00X
	560	10	20	680	TH561M025G200A00X
	560	10	25	750	TH561M025G250A00X
	680	10	20	740	TH681M025G200A00X
	1000	13	20	880	TH102M025I200A00X
	1000	13	25	970	TH102M025I250A00X
	1000	16	25	1100	TH102M025J250A00X
	1200	10	20	1010	TH122M025G200A00X
	1500	10	25	1220	TH152M025G250A00X
	1800	13	20	1350	TH182M025I200A00X
	2700	13	25	1710	TH272M025I250A00X
	3300	13	30	2070	TH332M025I300A00X
	5600	18	25	2730	TH562M025K250A00X
6800	16	35.5	3300	TH682M025J355A00X	
8200	16	40	3750	TH822M025J400A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
35	22	5	11	72	TH220M035C110A00X
	22	6.3	11	82	TH220M035E110A00X
	33	8	11.5	108	TH330M035F115A00X
	47	6.3	11	110	TH470M035E110A00X
	47	8	11.5	130	TH470M035F115A00X
	47	10	12.5	158	TH470M035G125A00X
	56	6.3	11	130	TH560M035E110A00X
	100	8	11.5	200	TH101M035F115A00X
	100	10	12.5	230	TH101M035G125A00X
	100	10	16	262	TH101M035G160A00X
	120	8	11.5	300	TH121M035F115A00X
	120	8	16	350	TH121M035F160A00X
	150	10	12.5	360	TH151M035G125A00X
	180	8	20	410	TH181M035F200A00X
	180	10	12.5	380	TH181M035G125A00X
	220	10	12.5	440	TH221M035G125A00X
	220	10	16	490	TH221M035G160A00X
	220	10	20	540	TH221M035G200A00X
	270	10	16	500	TH271M035G160A00X
	270	10	20	550	TH271M035G200A00X
	330	10	16	560	TH331M035G160A00X
	330	10	25	680	TH331M035G250A00X
	330	13	20	718	TH331M035I200A00X
	390	10	20	590	TH391M035G200A00X
	470	10	20	700	TH471M035G200A00X
	470	13	20	810	TH471M035I200A00X
	470	13	25	900	TH471M035I250A00X
	560	10	20	580	TH561M035G200A00X
	560	13	16	610	TH561M035I160A00X
	680	10	20	800	TH681M035G200A00X
	820	10	25	980	TH821M035G250A00X
	1000	13	25	1140	TH102M035I250A00X
	1000	16	25	1280	TH102M035J250A00X
	1200	10	30	1290	TH122M035G300A00X
	1500	13	25	1368	TH152M035I250A00X
2200	13	30	1660	TH222M035I300A00X	
2700	13	40	2350	TH272M035I400A00X	
3300	16	31.5	2480	TH332M035J315A00X	
3300	18	25	2400	TH332M035K250A00X	
4700	16	40	3000	TH472M035J400A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
50	2.2	8	11.5	25	TH2R2M050F115A00X
	3.3	8	11.5	30	TH3R3M050F115A00X
	4.7	5	11	32	TH4R7M050C110A00X
	4.7	8	11.5	42.5	TH4R7M050F115A00X
	10	5	11	42	TH100M050C110A00X
	10	6.3	11	48	TH100M050E110A00X
	10	8	11.5	56	TH100M050F115A00X
	22	5	11	66	TH220M050C110A00X
	22	6.3	11	75	TH220M050E110A00X
	22	8	11.5	86	TH220M050F115A00X
	33	8	11.5	118	TH330M050F115A00X
	47	6.3	11	120	TH470M050E110A00X
	47	8	11.5	140	TH470M050F115A00X
	47	10	12.5	164	TH470M050G125A00X
	56	8	11.5	150	TH560M050F115A00X
	68	8	11.5	160	TH680M050F115A00X
	82	8	11.5	170	TH820M050F115A00X
	100	10	12.5	230	TH101M050G125A00X
	100	10	16	250	TH101M050G160A00X
	100	10	20	277	TH101M050G200A00X
	120	10	16	290	TH121M050G160A00X
	180	10	20	400	TH181M050G200A00X
	220	10	20	510	TH221M050G200A00X
	220	10	25	560	TH221M050G250A00X
	220	13	20	587	TH221M050I200A00X
	270	10	20	610	TH271M050G200A00X
	330	10	20	700	TH331M050G200A00X
	330	13	20	810	TH331M050I200A00X
	330	13	25	900	TH331M050I250A00X
	470	13	25	900	TH471M050I250A00X
	470	16	25	1000	TH471M050J250A00X
	560	10	30	950	TH561M050G300A00X
	680	13	25	1050	TH681M050I250A00X
1000	13	30	1390	TH102M050I300A00X	
1200	13	35	1510	TH122M050I350A00X	
1200	18	20	1450	TH122M050K200A00X	
1500	13	40	1960	TH152M050I400A00X	
1800	18	25	1960	TH182M050K250A00X	
2200	18	31.5	2500	TH222M050K315A00X	
2700	18	35.5	2750	TH272M050K355A00X	
3300	18	40	2950	TH332M050K400A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
63	4.7	6.3	11	38	TH4R7M063E110A00X
	10	8	11.5	58	TH100M063F115A00X
	22	8	11.5	93	TH220M063F115A00X
	33	8	11.5	115	TH330M063F115A00X
	33	10	12.5	132	TH330M063G125A00X
	47	10	12.5	155	TH470M063G125A00X
	47	10	16	172	TH470M063G160A00X
	100	10	16	260	TH101M063G160A00X
	180	10	20	400	TH181M063G200A00X
	220	10	25	520	TH221M063G250A00X
	220	13	25	595	TH221M063I250A00X
	330	13	25	880	TH331M063I250A00X
	330	16	25	1000	TH331M063J250A00X
	390	13	20	800	TH391M063I200A00X
	680	13	30	1290	TH681M063I300A00X
	820	13	35	1420	TH821M063I350A00X
	820	18	20	1360	TH821M063K200A00X
	1200	18	25	1620	TH122M063K250A00X
	1500	18	31.5	1980	TH152M063K315A00X
1800	16	40	2260	TH182M063J400A00X	
2200	18	40	2680	TH222M063K400A00X	
80	22	8	11.5	120	TH220M080F115A00X
	33	10	12.5	170	TH330M080G125A00X
	47	10	12.5	200	TH470M080G125A00X
	100	10	20	370	TH101M080G200A00X
	330	13	25	870	TH331M080I250A00X
	390	16	20	900	TH391M080J200A00X
	470	16	25	1010	TH471M080J250A00X
	560	13	35	1100	TH561M080I350A00X
	560	16	25	1060	TH561M080J250A00X
	560	18	20	1050	TH561M080K200A00X
680	16	31.5	1300	TH681M080J315A00X	
100	1	6.3	11	24	TH010M100E110A00X
	2.2	6.3	11	31	TH2R2M100E110A00X
	3.3	6.3	11	36	TH3R3M100E110A00X
	4.7	6.3	11	38	TH4R7M100E110A00X
	4.7	8	11.5	48	TH4R7M100F115A00X
	10	8	11.5	60	TH100M100F115A00X
	10	10	12.5	70	TH100M100G125A00X
	22	8	11.5	76	TH220M100F115A00X
	22	10	12.5	90	TH220M100G125A00X
	22	10	16	100	TH220M100G160A00X

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
100	33	10	12.5	130	TH330M100G125A00X
	33	10	16	140	TH330M100G160A00X
	33	10	20	158	TH330M100G200A00X
	47	10	16	150	TH470M100G160A00X
	47	10	25	175	TH470M100G250A00X
	47	13	20	185	TH470M100I200A00X
	100	13	25	320	TH101M100I250A00X
	100	16	25	350	TH101M100J250A00X
	330	13	35	890	TH331M100I350A00X
	330	16	25	860	TH331M100J250A00X
	330	18	20	850	TH331M100K200A00X
	390	13	40	1050	TH391M100I400A00X
	390	16	31.5	1050	TH391M100J315A00X
	560	18	31.5	1290	TH561M100K315A00X
	680	18	35.5	1480	TH681M100K355A00X
820	18	40	1850	TH821M100K400A00X	
160	1	6.3	11	23	TH010M160E110A00X
	2.2	6.3	11	35	TH2R2M160E110A00X
	3.3	6.3	11	37	TH3R3M160E110A00X
	3.3	8	11.5	41	TH3R3M160F115A00X
	4.7	8	11.5	52	TH4R7M160F115A00X
	6.8	10	12.5	70	TH6R8M160G125A00X
	10	8	11.5	70	TH100M160F115A00X
	10	10	12.5	82	TH100M160G125A00X
	22	10	16	115	TH220M160G160A00X
	22	10	20	128	TH220M160G200A00X
	33	13	20	200	TH330M160I200A00X
	47	13	20	240	TH470M160I200A00X
	47	13	25	260	TH470M160I250A00X
	82	10	30	340	TH820M160G300A00X
	100	10	35	380	TH101M160G350A00X
	100	13	25	390	TH101M160I250A00X
	100	16	25	430	TH101M160J250A00X
	120	10	40	450	TH121M160G400A00X
	150	13	30	500	TH151M160I300A00X
	180	13	35	600	TH181M160I350A00X
180	18	20	550	TH181M160K200A00X	
220	16	31.5	690	TH221M160J315A00X	
330	18	35.5	900	TH331M160K355A00X	
200	1	6.3	11	23	TH010M200E110A00X
	2.2	6.3	11	35	TH2R2M200E110A00X
	3.3	8	11.5	48	TH3R3M200F115A00X
	4.7	8	11.5	50	TH4R7M200F115A00X

See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
200	4.7	10	12.5	60	TH4R7M200G125A00X
	6.8	10	12.5	70	TH6R8M200G125A00X
	10	10	12.5	80	TH100M200G125A00X
	22	10	20	140	TH220M200G200A00X
	22	10	25	150	TH220M200G250A00X
	22	13	20	160	TH220M200I200A00X
	33	13	20	200	TH330M200I200A00X
	33	13	25	220	TH330M200I250A00X
	47	13	20	245	TH470M200I200A00X
	47	13	25	270	TH470M200I250A00X
	47	16	25	300	TH470M200J250A00X
	56	13	20	260	TH560M200I200A00X
	82	13	25	360	TH820M200I250A00X
	100	13	30	430	TH101M200I300A00X
	100	16	20	400	TH101M200J200A00X
	100	16	25	440	TH101M200J250A00X
	100	16	31.5	490	TH101M200J315A00X
	150	13	40	600	TH151M200I400A00X
	150	16	25	530	TH151M200J250A00X
	250	1	6.3	11	23
2.2		6.3	11	35	TH2R2M250E110A00X
2.2		8	11.5	40	TH2R2M250F115A00X
3.3		8	11.5	50	TH3R3M250F115A00X
3.3		10	12.5	53	TH3R3M250G125A00X
4.7		10	12.5	60	TH4R7M250G125A00X
4.7		10	16	68	TH4R7M250G160A00X
6.8		10	16	75	TH6R8M250G160A00X
10		10	16	83	TH100M250G160A00X
22		13	20	160	TH220M250I200A00X
22		13	25	170	TH220M250I250A00X
33		13	25	220	TH330M250I250A00X
33		16	25	240	TH330M250J250A00X
39		10	30	230	TH390M250G300A00X
47		10	35	280	TH470M250G350A00X
47		16	25	300	TH470M250J250A00X
47		16	31.5	330	TH470M250J315A00X
56		10	40	300	TH560M250G400A00X
68		13	30	330	TH680M250I300A00X
82		13	35	380	TH820M250I350A00X
82	18	20	350	TH820M250K200A00X	

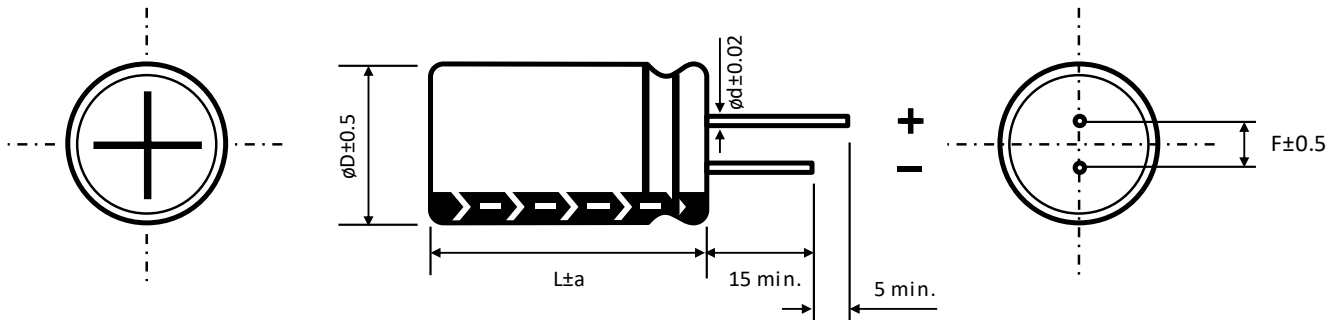
See "PACKAGING INFORMATION" to taped or formed products.

**STANDARD RATINGS**

Part number shows bulk version with straight leads

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_R$ • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
250	100	13	40	490	TH101M250I400A00X
	120	18	25	460	TH121M250K250A00X
	220	18	35.5	850	TH221M250K355A00X
350	1	8	11.5	26	TH010M350F115A00X
	2.2	8	11.5	40	TH2R2M350F115A00X
	2.2	10	12.5	47	TH2R2M350G125A00X
	3.3	10	12.5	55	TH3R3M350G125A00X
	3.3	10	16	60	TH3R3M350G160A00X
	4.7	10	16	68	TH4R7M350G160A00X
	4.7	10	20	75	TH4R7M350G200A00X
	5.6	10	20	78	TH5R6M350G200A00X
	6.8	13	20	85	TH6R8M350I200A00X
	10	10	25	105	TH100M350G250A00X
	10	13	20	110	TH100M350I200A00X
	22	13	25	180	TH220M350I250A00X
	22	16	25	200	TH220M350J250A00X
	27	10	30	180	TH270M350G300A00X
	33	10	35	220	TH330M350G350A00X
	33	16	25	230	TH330M350J250A00X
	33	16	31.5	260	TH330M350J315A00X
	47	13	30	280	TH470M350I300A00X
	47	16	31.5	320	TH470M350J315A00X
	47	16	35.5	340	TH470M350J355A00X
	56	13	35	330	TH560M350I350A00X
	56	16	25	320	TH560M350J250A00X
	56	18	20	310	TH560M350K200A00X
	68	13	40	390	TH680M350I400A00X
400	1	10	12.5	30	TH010M400G125A00X
	2.2	10	16	50	TH2R2M400G160A00X
	3.3	10	16	60	TH3R3M400G160A00X
	4.7	10	16	70	TH4R7M400G160A00X
	4.7	10	20	80	TH4R7M400G200A00X
	5.6	10	20	85	TH5R6M400G200A00X
	6.8	13	20	90	TH6R8M400I200A00X
	10	13	20	110	TH100M400I200A00X
	22	13	25	180	TH220M400I250A00X
	27	13	25	190	TH270M400I250A00X
	33	16	20	220	TH330M400J200A00X
	33	16	25	240	TH330M400J250A00X
	47	16	25	290	TH470M400J250A00X
	47	16	31.5	320	TH470M400J315A00X

See "PACKAGING INFORMATION" to taped or formed products.

**DIMENSIONS** ▪ All dimensions in mm


ø D	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ø d	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				

a	ø D < 16	ø D = 16		ø D = 18	
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2	1.5	2

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ (µF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k ~ 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38
$1000 \leq C_R$	0.8	1	1.11	1.17	1.25	1.28

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 310	Page 168





### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### TE SERIES ■ HIGH TEMP., AUTOMOTIVE 130°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 130°C ■ 1 000 hours up to 3 000 hours
- Especially for applications with high ambient temperatures
- High reliability
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +130°C			-25 ~ +130°C				
Rated Voltage Range	V <sub>R</sub>	10 ~ 400V DC			450V DC				
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V): V <sub>S</sub> = 1.15·V <sub>R</sub>			(V <sub>R</sub> > 315V): V <sub>S</sub> = 1.10·V <sub>R</sub>				
Capacitance Range	C <sub>R</sub>	2.2 ~ 4700μF			1 ~ 100μF				
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)							
Leakage Current (20°C • V <sub>R</sub> applied)	I <sub>LEAK</sub>	10 ~ 100V			≤ 0.01C <sub>R</sub> ·V <sub>R</sub> or 3μA (After 2 minutes)				
		160 ~ 450V	C <sub>R</sub> ·V <sub>R</sub> ≤ 1000		≤ 0.1C <sub>R</sub> ·V <sub>R</sub> + 40μA (After 1 minute)				
			C <sub>R</sub> ·V <sub>R</sub> > 1000		≤ 0.04C <sub>R</sub> ·V <sub>R</sub> + 100μA (After 1 minute)				
Dissipation Factor % (20°C • 120Hz)	tanδ	V <sub>R</sub> (V DC)	10	16	25	35	50	63	
		tanδ (%)	20	16	14	12	10	9	
		V <sub>R</sub> (V DC)	100	160	200	250	350	400	450
		tanδ (%)	8	15	15	15	20	20	25
		For C <sub>R</sub> ≥ 1000μF, add 2% per every multiple 1000μF of rated capacitance value							
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	10	16 ~ 100	160 ~ 250	350 ~ 400	450		
		Z-25°C/Z+20°C	3	2	3	5	6		
		Z-40°C/Z+20°C	4	4	6	-	-		
		For capacitance > 1000μF							
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value						
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value								
Lifetime Test									
Endurance 130°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	1 000 hours			ø D 6.3 mm				
		2 000 hours			ø D 8 mm				
		3 000 hours			ø D ≥ 10 mm ■ 10 ~ 100V				
		2 000 hours			ø D ≥ 10 mm ■ 160 ~ 450V				
	ΔC/C <sub>R</sub>	≤ ±30% of initial measured value							
tanδ	≤ 300% of initial specified value								
I <sub>Leak</sub>	≤ the initial specified value								
Shelf Life 130°C (V <sub>R</sub> = 0)	Test	1 000 hours							
		ΔC/C <sub>R</sub>	≤ ±30% of initial measured value						
		tanδ	≤ 300% of initial specified value						
		I <sub>Leak</sub>	≤ the initial specified value						
	Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4								

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> • Max. Ripple Current +130°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
10	220	8	11.5	360	TE221M010F115A00X
	330	8	11.5	475	TE331M010F115A00X
	330	10	12.5	500	TE331M010G125A00X
	470	10	12.5	670	TE471M010G125A00X
	470	10	16	720	TE471M010G160A00X
	1000	10	20	1175	TE102M010G200A00X
	1500	13	20	1495	TE152M010I200A00X
	2200	13	25	1690	TE222M010I250A00X
	3300	16	25	2275	TE332M010J250A00X
	4700	16	31.5	2765	TE472M010J315A00X
16	220	8	11.5	360	TE221M016F115A00X
	220	10	12.5	375	TE221M016G125A00X
	330	8	11.5	395	TE331M016F115A00X
	330	10	16	515	TE331M016G160A00X
	470	10	12.5	655	TE471M016G125A00X
	470	10	20	800	TE471M016G200A00X
	1000	10	20	1175	TE102M016G200A00X
	1000	13	20	1240	TE102M016I200A00X
	1500	13	20	1515	TE152M016I200A00X
	1500	13	25	1665	TE152M016I250A00X
	2200	13	25	1690	TE222M016I250A00X
	2200	16	25	1875	TE222M016J250A00X
	3300	16	31.5	2690	TE332M016J315A00X
	4700	16	35.5	2940	TE472M016J355A00X
	25	220	8	11.5	360
220		10	16	475	TE221M025G160A00X
330		10	12.5	630	TE331M025G125A00X
330		10	20	775	TE331M025G200A00X
470		10	16	755	TE471M025G160A00X
470		13	20	960	TE471M025I200A00X
1000		13	20	1240	TE102M025I200A00X
1000		16	25	1465	TE102M025J250A00X
1500		16	25	1865	TE152M025J250A00X
1500		16	31.5	2065	TE152M025J315A00X
2200		16	31.5	2380	TE222M025J315A00X
2200		16	35.5	2515	TE222M025J355A00X
3300		16	35.5	2695	TE332M025J355A00X
3300		18	35.5	2875	TE332M025K355A00X

See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +130°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
35	100	8	11.5	460	TE101M035F115A00X
	100	10	16	600	TE101M035G160A00X
	220	10	12.5	610	TE221M035G125A00X
	220	10	20	745	TE221M035G200A00X
	330	10	16	790	TE331M035G160A00X
	330	13	20	1000	TE331M035I200A00X
	470	10	20	920	TE471M035G200A00X
	470	13	25	1175	TE471M035I250A00X
	1000	13	25	1235	TE102M035I250A00X
	1000	16	31.5	1535	TE102M035J315A00X
	1500	16	31.5	2340	TE152M035J315A00X
	1500	16	35.5	2465	TE152M035J355A00X
	2200	16	35.5	2695	TE222M035J355A00X
2200	18	35.5	2875	TE222M035K355A00X	
50	10	6.3	11	140	TE100M050E110A00X
	22	6.3	11	200	TE220M050E110A00X
	22	8	11.5	240	TE220M050F115A00X
	33	8	11.5	285	TE330M050F115A00X
	47	8	11.5	275	TE470M050F115A00X
	47	10	12.5	315	TE470M050G125A00X
	100	10	12.5	465	TE101M050G125A00X
	100	10	16	515	TE101M050G160A00X
	220	10	20	865	TE221M050G200A00X
	220	13	20	1000	TE221M050I200A00X
	330	13	20	1065	TE331M050I200A00X
	330	13	25	1175	TE331M050I250A00X
	470	16	20	1240	TE471M050J200A00X
	470	16	25	1335	TE471M050J250A00X
	1000	16	31.5	2465	TE102M050J315A00X
2200	18	40	3065	TE222M050K400A00X	
63	33	8	11.5	255	TE330M063F115A00X
	47	10	12.5	285	TE470M063G125A00X
	100	10	16	415	TE101M063G160A00X
	220	13	20	845	TE221M063I200A00X
	330	13	25	1145	TE331M063I250A00X
	470	16	25	1455	TE471M063J250A00X
	1000	16	31.5	1865	TE102M063J315A00X
	1500	18	40	2735	TE152M063K400A00X

See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> = Max. Ripple Current +130°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
100	4.7	8	11.5	115	TE4R7M100F115A00X
	10	8	11.5	130	TE100M100F115A00X
	22	8	11.5	190	TE220M100F115A00X
	33	10	12.5	275	TE330M100G125A00X
	47	10	16	285	TE470M100G160A00X
	100	13	20	545	TE101M100I200A00X
	220	16	25	1000	TE221M100J250A00X
	330	16	31.5	1345	TE331M100J315A00X
160	470	18	31.5	1600	TE471M100K315A00X
	3.3	6.3	11	65	TE3R3M160E110A00X
	4.7	6.3	11	70	TE4R7M160E110A00X
	4.7	8	11.5	85	TE4R7M160F115A00X
	5.6	8	11.5	100	TE5R6M160F115A00X
	6.8	8	11.5	110	TE6R8M160F115A00X
	6.8	8	16	130	TE6R8M160F160A00X
	10	8	16	145	TE100M160F160A00X
	15	8	16	190	TE150M160F160A00X
	22	10	16	310	TE220M160G160A00X
	33	10	20	360	TE330M160G200A00X
	47	13	20	460	TE470M160I200A00X
	68	13	25	585	TE680M160I250A00X
	100	16	25	820	TE101M160J250A00X
	150	16	31.5	940	TE151M160J315A00X
	200	3.3	6.3	11	70
4.7		6.3	11	75	TE4R7M200E110A00X
4.7		8	11.5	85	TE4R7M200F115A00X
5.6		8	11.5	100	TE5R6M200F115A00X
5.6		8	16	120	TE5R6M200F160A00X
6.8		8	11.5	115	TE6R8M200F115A00X
6.8		8	16	135	TE6R8M200F160A00X
10		8	16	160	TE100M200F160A00X
10		8	20	180	TE100M200F200A00X
15		8	16	190	TE150M200F160A00X
15		8	20	210	TE150M200F200A00X
22		8	20	310	TE220M200F200A00X
22		10	16	310	TE220M200G160A00X
22		10	20	320	TE220M200G200A00X
33		10	20	360	TE330M200G200A00X
33		13	20	410	TE330M200I200A00X
47		13	20	460	TE470M200I200A00X
47		13	25	515	TE470M200I250A00X
68	16	20	585	TE680M200J200A00X	
68	16	25	630	TE680M200J250A00X	

See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +130°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
200	100	13	30	675	TE101M200I300A00X
	100	16	25	820	TE101M200J250A00X
	150	13	40	880	TE151M200I400A00X
	150	16	35.5	945	TE151M200J355A00X
250	3.3	6.3	11	75	TE3R3M250E110A00X
	4.7	8	11.5	110	TE4R7M250F115A00X
	5.6	8	11.5	110	TE5R6M250F115A00X
	6.8	8	16	135	TE6R8M250F160A00X
	8.2	8	16	165	TE8R2M250F160A00X
	10	8	16	180	TE100M250F160A00X
	15	8	20	220	TE150M250F200A00X
	22	10	16	300	TE220M250G160A00X
	33	13	20	450	TE330M250I200A00X
	47	13	20	475	TE470M250I200A00X
	68	13	30	640	TE680M250I300A00X
	68	16	25	640	TE680M250J250A00X
	100	13	35	710	TE101M250I350A00X
	100	16	31.5	835	TE101M250J315A00X
	150	13	50	980	TE151M250I500A00X
	150	16	35.5	1025	TE151M250J355A00X
350	2.2	6.3	11	60	TE2R2M350E110A00X
	3.3	8	11.5	85	TE3R3M350F115A00X
	4.7	8	11.5	110	TE4R7M350F115A00X
	5.6	8	16	125	TE5R6M350F160A00X
	6.8	8	20	150	TE6R8M350F200A00X
	8.2	8	20	170	TE8R2M350F200A00X
	10	10	20	195	TE100M350G200A00X
	15	10	20	250	TE150M350G200A00X
	22	13	20	310	TE220M350I200A00X
	33	16	20	450	TE330M350J200A00X
	47	16	20	540	TE470M350J200A00X
	68	18	25	645	TE680M350K250A00X
100	18	31.5	850	TE101M350K315A00X	
400	2.2	6.3	11	75	TE2R2M400E110A00X
	2.2	8	11.5	85	TE2R2M400F115A00X
	2.2	8	16	95	TE2R2M400F160A00X
	2.7	8	16	100	TE2R7M400F160A00X
	3.3	8	11.5	95	TE3R3M400F115A00X
	3.3	8	16	115	TE3R3M400F160A00X
	3.3	8	20	125	TE3R3M400F200A00X
	4.7	8	11.5	110	TE4R7M400F115A00X
	4.7	8	20	125	TE4R7M400F200A00X
	4.7	10	16	125	TE4R7M400G160A00X

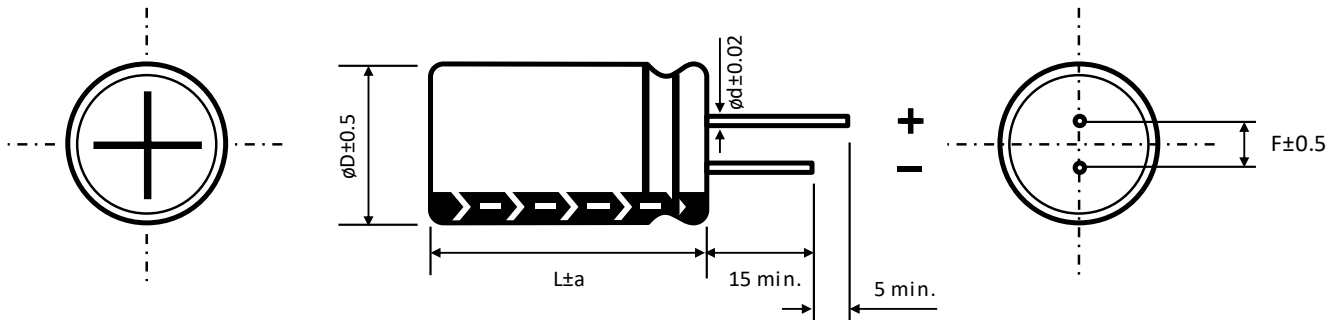
See "PACKAGING INFORMATION" to taped or formed products.

## STANDARD RATINGS

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>R</sub> - Max. Ripple Current +130°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
400	5.6	8	20	135	TE5R6M400F200A00X
	5.6	10	16	135	TE5R6M400G160A00X
	5.6	10	20	150	TE5R6M400G200A00X
	6.8	8	20	150	TE6R8M400F200A00X
	6.8	10	16	150	TE6R8M400G160A00X
	6.8	10	20	165	TE6R8M400G200A00X
	8.2	10	16	170	TE8R2M400G160A00X
	8.2	10	20	190	TE8R2M400G200A00X
	10	10	16	190	TE100M400G160A00X
	10	10	20	200	TE100M400G200A00X
	10	10	25	215	TE100M400G250A00X
	15	13	20	260	TE150M400I200A00X
	22	13	25	345	TE220M400I250A00X
	33	16	25	460	TE330M400J250A00X
	47	13	40	520	TE470M400I400A00X
	47	16	31.5	610	TE470M400J315A00X
	47	18	25	579	TE470M400K250A00X
	68	13	55	745	TE680M400I550A00X
68	18	31.5	660	TE680M400K315A00X	
100	18	40	880	TE101M400K400A00X	
450	1	8	11.5	65	TE010M450F115A00X
	2.2	8	16	95	TE2R2M450F160A00X
	3.3	8	16	100	TE3R3M450F160A00X
	4.7	8	20	125	TE4R7M450F200A00X
	5.6	10	16	135	TE5R6M450G160A00X
	6.8	10	20	165	TE6R8M450G200A00X
	8.2	10	20	190	TE8R2M450G200A00X
	10	10	25	215	TE100M450G250A00X
	10	13	20	215	TE100M450I200A00X
	15	13	20	260	TE150M450I200A00X
	22	10	40	350	TE220M450G400A00X
	22	16	20	345	TE220M450J200A00X
	22	16	25	385	TE220M450J250A00X
	33	10	50	450	TE330M450G500A00X
	33	16	25	485	TE330M450J250A00X
	33	16	31.5	545	TE330M450J315A00X
	47	13	45	565	TE470M450I450A00X
	47	16	35.5	600	TE470M450J355A00X
68	18	31.5	660	TE680M450K315A00X	
100	18	40	880	TE101M450K400A00X	

See "PACKAGING INFORMATION" to taped or formed products.

**DIMENSIONS** ▪ All dimensions in mm


ø D	6.3	8	10	13	16	18
F	2.5	3.5	5	5	7.5	7.5
ø d	0.5	L < 20	L ≥ 20	0.6		0.8
		0.5	0.6			

a	ø D < 16	ø D = 16		ø D = 18	
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2	1.5	2

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**
**10 ~ 100V**

$C_R$ (µF) / Frequency (Hz)	50/60	100/120	1k	10k	50k ~ 100k
$C_R < 10$	0.35	0.42	0.6	0.8	1
10 ~ 33	0.45	0.55	0.75	0.9	1
47 ~ 330	0.6	0.7	0.85	0.95	1
470 ~ 1500	0.65	0.75	0.9	0.98	1
$1500 \leq C_R$	0.75	0.8	0.95	1	1

**160 ~ 450V**

$C_R$ (µF) / Frequency (Hz)	100/120	400	1k	10k	50k ~ 100k
$C_R < 33$	0.4	0.6	0.75	0.9	1
$C_R \geq 33$	0.45	0.65	0.8	0.95	1

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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General Precautions and Guidelines	Packaging Information Liquid Radial
Page 310	Page 168





### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

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**TU SERIES ■ HIGH TEMP., HIGH RIPPLE, AUTOMOTIVE 135°C TYPE**

**KEY FEATURES**



AEC-Q200



HIGH RIPPLE



HIGH TEMPERATURE

- **ALUMINUM ELECTROLYTIC CAPACITOR • THT type**
- Endurance: 135°C ■ 2 000 hours up to 3 000 hours
- Especially for applications with high ambient temperatures
- 150°C short-term load for 100 hours guaranteed
- AEC-Q200 version available



**SPECIFICATIONS**

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +135°C							
Rated Voltage Range	$V_R$	25 ~ 100V DC							
Surge Voltage	$V_S$	$V_S = 1.15 \cdot V_R$							
Capacitance Range	$C_R$	160 ~ 12000 $\mu$ F							
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)							
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	$\leq 0.03 \cdot C_R \cdot V_R$ or 4 $\mu$ A, whichever is greater • After 2 minutes [ $I_{LEAK}$ ( $\mu$ A) ; $C_R$ ( $\mu$ F) ; $V_R$ (V) ]							
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	$V_R$ (V DC)	25	35	50	63	80	100	
		$\tan \delta$ (%)	14	12	10	10	8	8	
For $C_R \geq 1000\mu$ F, add 2% per every multiple 1000 $\mu$ F of rated capacitance value									
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	25	35	50	63	80	100	
		Z-25°C/Z+20°C	3	2	2	2	2	2	
		Z-40°C/Z+20°C	4	4	4	4	4	4	
		For capacitance > 1000 $\mu$ F							
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 $\mu$ F of rated capacitance value						
Z-40°C/Z+20°C	Add 1 for every multiple 1000 $\mu$ F of rated capacitance value								
<b>Lifetime Test</b>									
Endurance 135°C & 125°C ( $V_R$ & $I_R$ applied)	Test	135°C	3000 hours	25 ~ 50V DC					
			2000 hours	63 ~ 100V DC					
		125°C	3000 hours	25 ~ 63V DC					
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value							
	$\tan \delta$	$\leq 300\%$ of initial specified value							
$I_{Leak}$	$\leq$ initial specified value								
High Temperature Endurance 135°C & 125°C ( $V_R$ & $I_R$ applied)	Test	135°C	2500 hours	25 ~ 50V DC					
			1500 hours	63 ~ 100V DC					
		125°C	2500 hours	25 ~ 100V DC					
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value							
	$\tan \delta$	$\leq 300\%$ of initial specified value							
$I_{Leak}$	$\leq$ initial specified value								
Shelf Life 135°C ( $V_R = 0$ )	Test	1000 hours							
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value							
	$\tan \delta$	$\leq 300\%$ of initial specified value							
	$I_{Leak}$	$\leq$ initial specified value							
Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4									

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (Ω)	I <sub>R</sub> • Max. Ripple Current +125°C • 100kHz (mA rms)	I <sub>R</sub> • Max. Ripple Current +135°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
25	2000	12.5	20	0.042	2760	1690	TU202M025Z200A00X
	3000	12.5	25	0.034	3480	2010	TU302M025Z250A00X
	3300	16	20	0.035	3040	1860	TU332M025J200A00X
	3600	12.5	30	0.028	4490	2900	TU362M025Z300A00X
	4300	18	20	0.034	3250	1870	TU432M025K200A00X
	4700	12.5	35	0.026	5140	3190	TU472M025Z350A00X
	4700	16	25	0.028	4260	2870	TU472M025J250A00X
	5100	12.5	40	0.025	5810	3470	TU512M025Z400A00X
	5600	16	30	0.024	5480	3400	TU562M025J300A00X
	6200	18	25	0.027	4500	2900	TU622M025K250A00X
	7500	16	35	0.020	6070	3630	TU752M025J350A00X
	7500	18	30	0.022	5600	3470	TU752M025K300A00X
	9100	16	40	0.019	6810	3930	TU912M025J400A00X
	10000	18	35	0.019	6280	3750	TU103M025K350A00X
12000	18	40	0.018	7070	4080	TU123M025K400A00X	
35	1300	12.5	20	0.042	2760	1690	TU132M035Z200A00X
	1800	12.5	25	0.033	3480	2010	TU182M035Z250A00X
	2000	16	20	0.035	3040	1860	TU202M035J200A00X
	2200	12.5	30	0.028	4490	2900	TU222M035Z300A00X
	2400	18	20	0.034	3250	1870	TU242M035K200A00X
	2700	12.5	35	0.030	5140	3190	TU272M035Z350A00X
	3000	16	25	0.028	4260	2870	TU302M035J250A00X
	3300	12.5	40	0.024	5810	3470	TU332M035Z400A00X
	3600	16	30	0.023	5480	3400	TU362M035J300A00X
	3900	18	25	0.027	4500	2900	TU392M035K250A00X
	4300	16	35	0.020	6070	3630	TU432M035J350A00X
	4700	18	30	0.022	5600	3470	TU472M035K300A00X
	5600	16	40	0.021	6810	3930	TU562M035J400A00X
	6200	18	35	0.021	6280	3750	TU622M035K350A00X
7500	18	40	0.020	7070	4080	TU752M035K400A00X	
50	620	12.5	20	0.073	2400	1470	TU621M050Z200A00X
	820	12.5	25	0.058	3350	2260	TU821M050Z250A00X
	1000	16	20	0.050	2960	1870	TU102M050J200A00X
	1100	12.5	30	0.048	4220	2520	TU112M050Z300A00X
	1300	12.5	35	0.042	4810	2780	TU132M050Z350A00X
	1300	16	25	0.042	4040	2500	TU132M050J250A00X
	1300	18	20	0.049	3130	2110	TU132M050K200A00X
	1600	12.5	40	0.041	5240	3020	TU162M050Z400A00X
1600	16	30	0.038	5130	2960	TU162M050J300A00X	

See "PACKAGING INFORMATION" to taped or formed product

**STANDARD RATINGS**

Part number shows bulk version with straight leads

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (Ω)	I <sub>R</sub> • Max. Ripple Current +125°C • 100kHz (mA rms)	I <sub>R</sub> • Max. Ripple Current +135°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
50	1800	18	25	0.038	4230	2530	TU182M050K250A00X
	2200	16	35	0.029	5480	3160	TU222M050J350A00X
	2400	18	30	0.028	5240	3020	TU242M050K300A00X
	2700	16	40	0.025	5930	3420	TU272M050J400A00X
	3000	18	35	0.024	5870	3390	TU302M050K350A00X
	3600	18	40	0.023	6420	3700	TU362M050K400A00X
63	390	12.5	20	0.074	1640	1420	TU391M063Z200A00X
	560	12.5	25	0.054	2520	2050	TU561M063Z250A00X
	680	16	20	0.053	2140	1910	TU681M063J200A00X
	750	12.5	30	0.053	3110	2630	TU751M063Z300A00X
	910	12.5	35	0.038	3760	2970	TU911M063Z350A00X
	910	18	20	0.048	2350	2100	TU911M063K200A00X
	1000	16	25	0.038	2940	2680	TU102M063J250A00X
	1100	12.5	40	0.031	4610	3260	TU112M063Z400A00X
	1200	16	30	0.034	3860	3050	TU122M063J300A00X
	1300	18	25	0.035	3080	2810	TU132M063K250A00X
	1600	16	35	0.027	4590	3420	TU162M063J350A00X
	1600	18	30	0.028	4080	3220	TU162M063K300A00X
	1800	16	40	0.025	5190	3670	TU182M063J400A00X
	2200	18	35	0.023	5220	3690	TU222M063K350A00X
2400	18	40	0.021	5660	3820	TU242M063K400A00X	
80	270	12.5	20	0.074	1610	1400	TU271M080Z200A00X
	390	12.5	25	0.052	2520	2050	TU391M080Z250A00X
	470	16	20	0.053	2140	1910	TU471M080J200A00X
	510	12.5	30	0.042	3110	2630	TU511M080Z300A00X
	620	12.5	35	0.038	3745	2960	TU621M080Z350A00X
	620	18	20	0.044	2350	2100	TU621M080K200A00X
	680	16	25	0.046	2900	2650	TU681M080J250A00X
	750	12.5	40	0.035	4610	3260	TU751M080Z400A00X
	750	16	30	0.038	3860	3050	TU751M080J300A00X
	820	18	25	0.033	3080	2810	TU821M080K250A00X
	1000	16	35	0.032	4570	3410	TU102M080J350A00X
	1100	18	30	0.034	4080	3220	TU112M080K300A00X
	1300	16	40	0.033	5190	3670	TU132M080J400A00X
	1300	18	35	0.028	5190	3670	TU132M080K350A00X
1600	18	40	0.026	5640	3810	TU162M080K400A00X	

See "PACKAGING INFORMATION" to taped or formed product



**STANDARD RATINGS**

Part number shows bulk version with straight leads

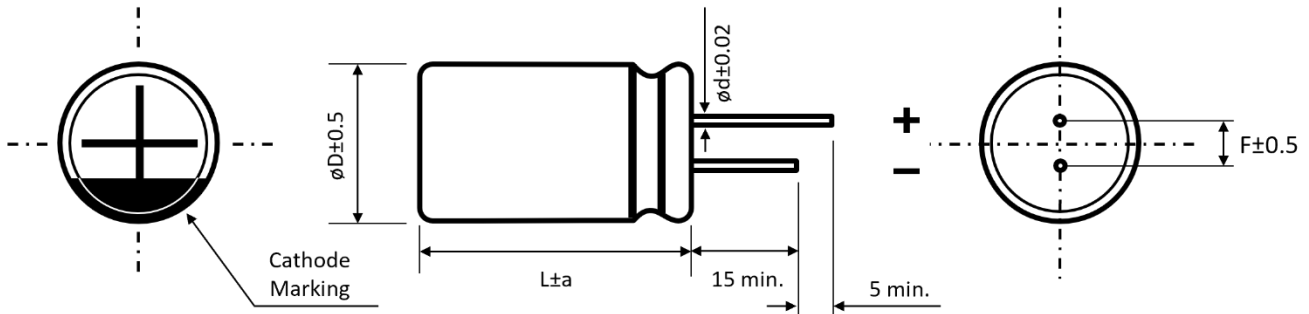
$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz ( $\Omega$ )	$I_R$ - Max. Ripple Current +125°C - 100kHz (mA rms)	$I_R$ - Max. Ripple Current +135°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
<b>100</b>	160	12.5	20	0.090	1580	1410	TU161M100Z200A00X
	220	12.5	25	0.068	2120	1950	TU221M100Z250A00X
	270	16	20	0.067	2050	1670	TU271M100J200A00X
	300	12.5	30	0.052	2950	2330	TU301M100Z300A00X
	360	12.5	35	0.045	3530	2630	TU361M100Z350A00X
	360	18	20	0.061	2270	1860	TU361M100K200A00X
	390	16	25	0.048	2790	2340	TU391M100J250A00X
	430	12.5	40	0.038	4140	2920	TU431M100Z400A00X
	470	16	30	0.041	3440	2720	TU471M100J300A00X
	510	18	25	0.045	2920	2470	TU511M100K250A00X
	560	16	35	0.036	4150	2930	TU561M100J350A00X
	620	18	30	0.037	3920	2920	TU621M100K300A00X
	750	16	40	0.029	5020	3380	TU751M100J400A00X
	820	18	35	0.030	4710	3330	TU821M100K350A00X
	910	18	40	0.028	5260	3550	TU911M100K400A00X

See "PACKAGING INFORMATION" to taped or formed product

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$C_R$ ( $\mu F$ ) / Frequency (Hz)	100/120	1k	10k	50k ~ 100k
$C_R \leq 160$	0.4	0.75	0.90	1
$160 < C_R \leq 680$	0.5	0.85	0.94	1
$680 < C_R \leq 2000$	0.6	0.87	0.95	1
$2200 < C_R \leq 4300$	0.75	0.9	0.95	1
$4300 < C_R$	0.85	0.95	0.98	1

**DIMENSIONS** ▪ All dimensions in mm



<b>ø D</b>	<b>12.5</b>	<b>16</b>		<b>18</b>	
<b>F</b>	5.0	7.5		7.5	
<b>ø d</b>	0.6	0.8			
<b>a</b>	1.5	L = 25 to 35	L < 25 and L ≥ 40	L = 25 to 30	L < 25 and L ≥ 35
		1.5	2	1.5	2

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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General Precautions and Guidelines	Packaging Information Liquid Radial
Page 310	Page 168

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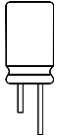
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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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### PRODUCT CODE - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

THT type example:

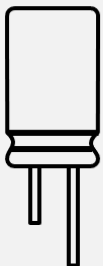
GH series ▪ 330µF ▪ 80V ▪ ±20% ▪ Ø 13mm ▪ H 20mm ▪ P 5mm ▪ Tape Ammo ▪ AEC-Q200


1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
G	H	3	3	1	M	0	8	0	I	2	0	0	E	T	A	X	-	-	-	
Series		Capacitance			Capacitance tolerance	Voltage			Case Ø (mm)	Height (mm)			Type code	Taping / lead treatment *		Special requirement				
Code		µF	Code		%	Code		Volt	Code		ØD	Code		H	Code		Type	Code		Special
OR1		0.1			H	±5	004	4	B	4	050	5	A	Without lead treatment						
R47		0.47			K	±10	6R3	6.3	C	5	070	7	E	With lead treatment						
010		1			S	±15	010	10	E	6.3	090	9								
4R7		4.7			N	±30	025	25	G	10	115	11.5								
100		10			D	±40	035	35	H	12	125	12.5								
220		22			I	+5 to +20	050	50	Z	12.5	130	13								
101		100			X	0 to +40	200	200	A	0 to +50	300	30								
561		560			J	-5 to +20	250	250	J	-5 to +20	315	31.5								
102		1000			C	-5 to +30	350	350	C	-5 to +30	350	35								
472		4700			E	-8 to +5	400	400	E	-8 to +5	355	35.5								
103		10000			V	-10 to +20	420	420	V	-10 to +20	400	40								
333		33000			Q	-10 to +30	450	450	Q	-10 to +30	450	45								
					T	-10 to +50	500	500	T	-10 to +50	500	50								
					W	-20 to +10			W	-20 to +10	550	55								
					P	-15 to +20			P	-15 to +20	600	60								
					L	-25 to +20			L	-25 to +20										
					U	-30 to 0			U	-30 to 0										
					F	-35 to 0			F	-35 to 0										
					O	-50 to 0			O	-50 to 0										

\* See chapter taping or lead treatment for further information  
Please consult CapXon for further assistance

### MARKING - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

#### Aluminum Electrolytic Capacitor - Radial type



CapXon: Manufacturer trademark  
 330µF: Nominal capacitance  
 80V: Rated voltage (V) ▪ Standard type  
 (-) polarity (Cathode indicate)  
 GH: Series  
 105°C: Maximum operating temperature  
 P1944: Production datacode year/week (ex. 2019/CW44)  
 X: AEC-Q200 type  
 VENT: Safety vent

#### Standard type



#### AEC-Q200 type



Front side

Back side

**TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS**

Possible tape versions in AMMO packaging with lead space F and taping ordering code.  
All dimensions in mm.

D	Diameter	4	5	6.3	8	10	12.5	13	14.5	16	18	20	22	25	Code
F	Lead space Straight leads	1.5	2	2.5	3.5	5	5	5	7.5	7.5	7.5	10	10	10	
F	Ammo Tape	2	2	-	-	-	-	-	-	-	-	-	-	-	TB
	Ammo Tape	2.5	2.5	2.5	-	-	-	-	-	-	-	-	-	-	TC
	Ammo Tape	-	-	-	3.5	-	-	-	-	-	-	-	-	-	TD
	Ammo Tape	5	5	5	5	5	5	5	-	-	-	-	-	-	TA
	Ammo Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	TE
	Ammo Tape	-	-	-	-	-	-	5	-	-	-	-	-	-	PA
	Ammo Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	PE

Possible tape versions in REEL packaging with lead space F and taping ordering code.  
All dimensions in mm.

D	Diameter	4	5	6.3	8	10	12.5	13	14.5	16	18	20	22	25	Code
F	Lead space Straight leads	1.5	2	2.5	3.5	5	5	5	7.5	7.5	7.5	10	10	10	
F	Reel Tape	2	2	-	-	-	-	-	-	-	-	-	-	-	RB
	Reel Tape	2.5	2.5	2.5	-	-	-	-	-	-	-	-	-	-	RC
	Reel Tape	-	-	-	3.5	-	-	-	-	-	-	-	-	-	RD
	Reel Tape	5	5	5	5	5	5	5	-	-	-	-	-	-	RA
	Reel Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	RE
	Reel Tape	-	-	-	-	-	-	5	-	-	-	-	-	-	QA
	Reel Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	QE

Details to the exact tape dimensions can be found in the following drawings on the next pages:

**T1 taping** ▪ ØD 5mm ▪ standard lead space

**T2 taping** ▪ ØD 4 and 5mm ▪ wide lead space

**T3 taping** ▪ ØD 6.3 to 13mm ▪ standard lead space

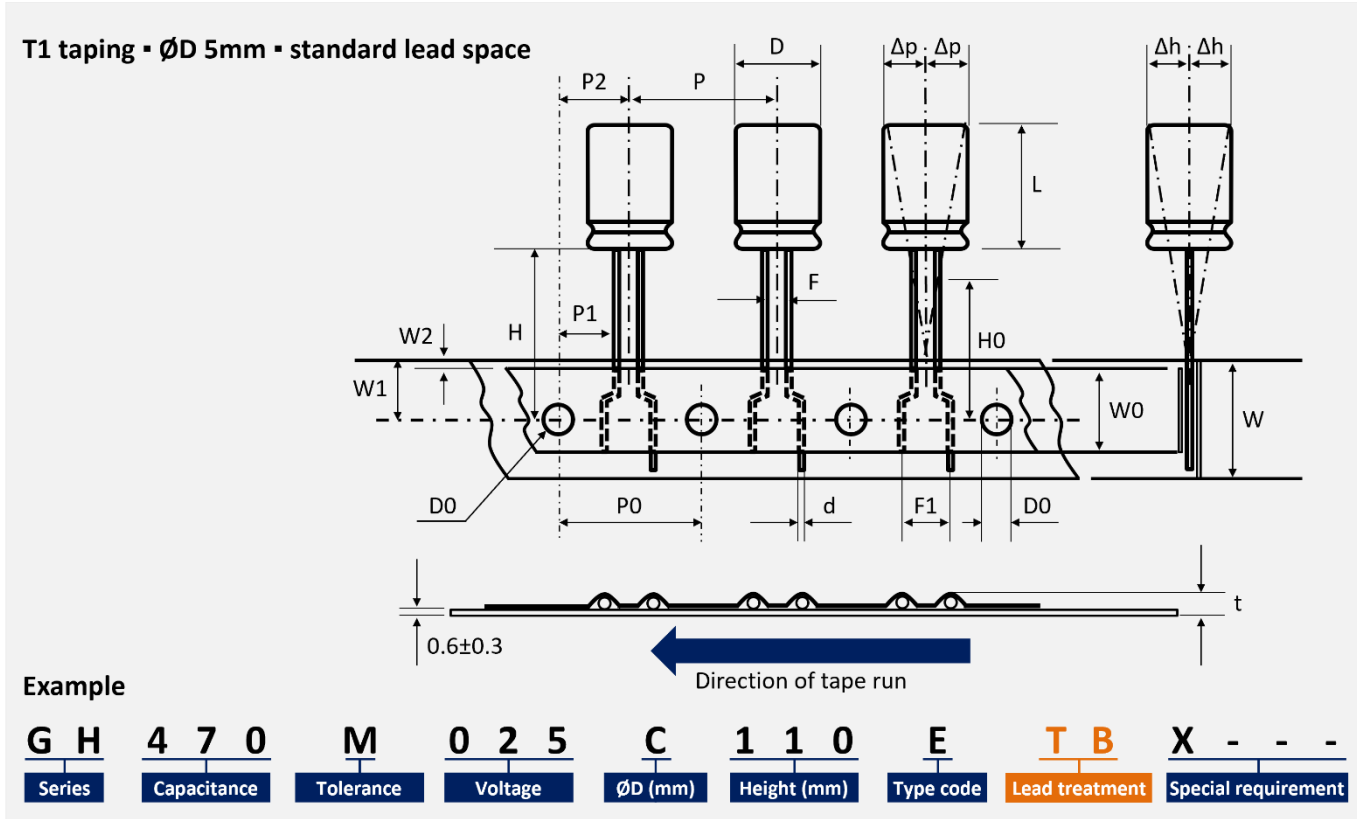
**T4 taping** ▪ ØD 4 to 8mm ▪ lead space F = 5mm

**T5 taping** ▪ ØD ≥ 12.5mm ▪ wide component space

**T6 taping** ▪ ØD ≥ 14.5mm ▪ standard component space



**TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS**



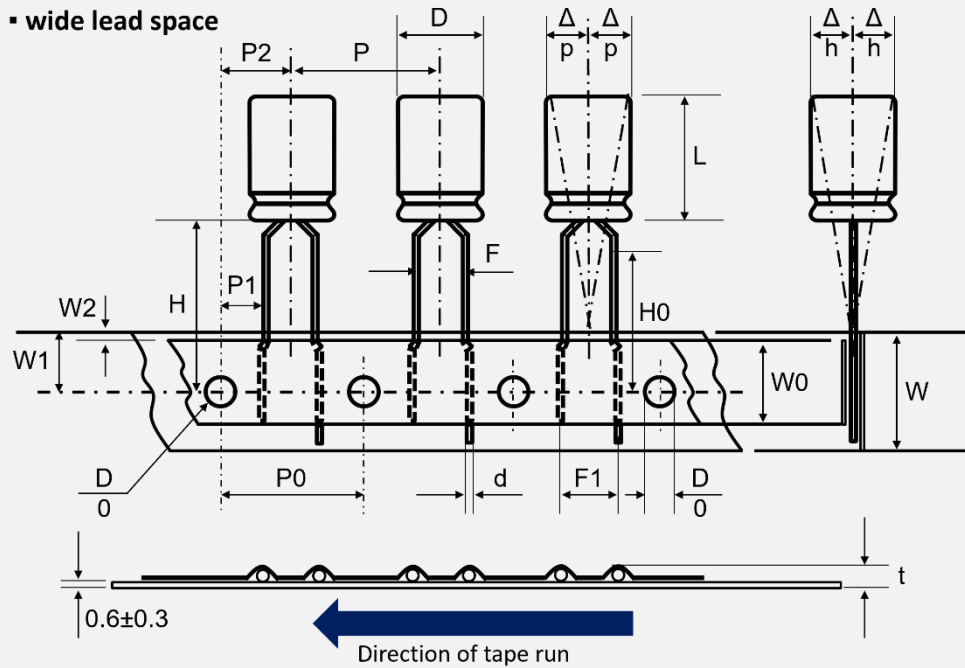
All dimensions in mm

	D	L	d	P	P0	P1	P2	F	F1	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
<b>Tol</b>	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	±0.5	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	
<b>Item</b>	5	5-7 (+1) 9 (±2) 11-15 (±1.5)	0.45 0.5 0.5	12.7	12.7	5.35	6.35	2	5	18	11	9	2	18.5	4	1	1	1.5	TB

Table and example show the ammo package version. Coding RB instead of TB means the reel package version. In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

**TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS**

T2 taping • ØD 4 and 5mm • wide lead space



Example

<b>S</b>	<b>G</b>	<b>4</b>	<b>R</b>	<b>7</b>	<b>M</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>C</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>E</b>	<b>T</b>	<b>C</b>	<b>X</b>	-	-	-
Series	Capacitance	Tolerance		Voltage	ØD (mm)	Height (mm)		Type code	Lead treatment	Special requirement									

All dimensions in mm

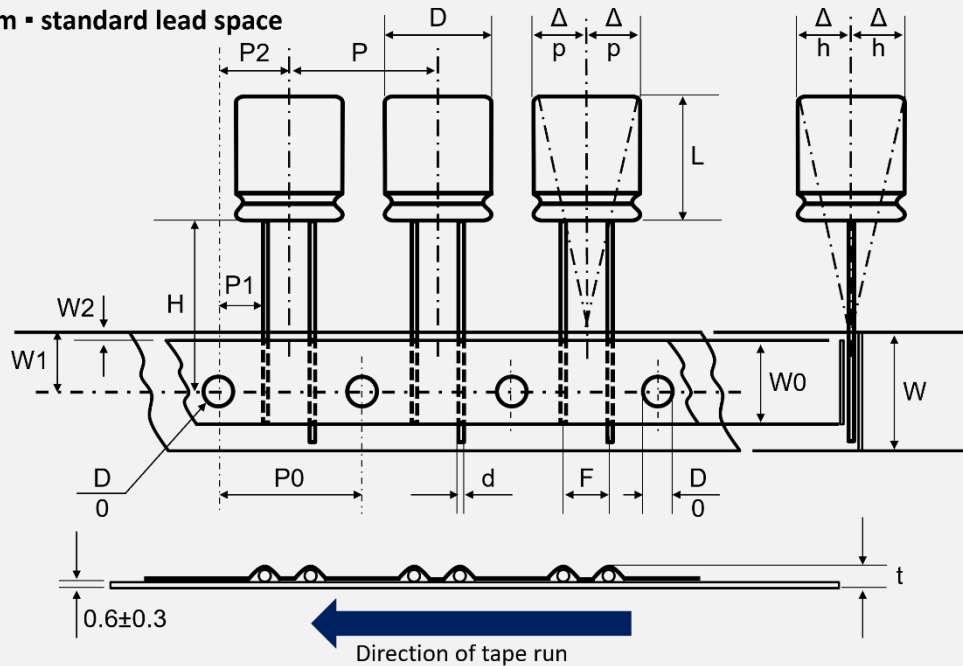
	D	L	d	P	P0	P1	P2	F	F1	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
<b>Tol</b>	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	±0.5	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	Code
<b>Item</b>	4	5-7 (+1)	0.45	12.7	12.7	5.35	6.35	2	5	18	11	9	2	18.5	4	1	1	1.5	TB
		5.1				2.5		TC											
	5	9 (+2)	0.5	12.7	12.7	5.1	6.35	2.5	5	18	11	9	2	18.5	4	1	1	1.5	TC
		11-15 (±1.5)	0.5																

Table and example show the ammo package version. Coding RB or RC instead of TB or TC means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

**TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS**

T3 taping • ØD 6.3 to 13mm • standard lead space



Example

<b>T</b>	<b>E</b>	<b>3 3 1</b>	<b>M</b>	<b>0 1 0</b>	<b>G</b>	<b>1 2 5</b>	<b>E</b>	<b>TA</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

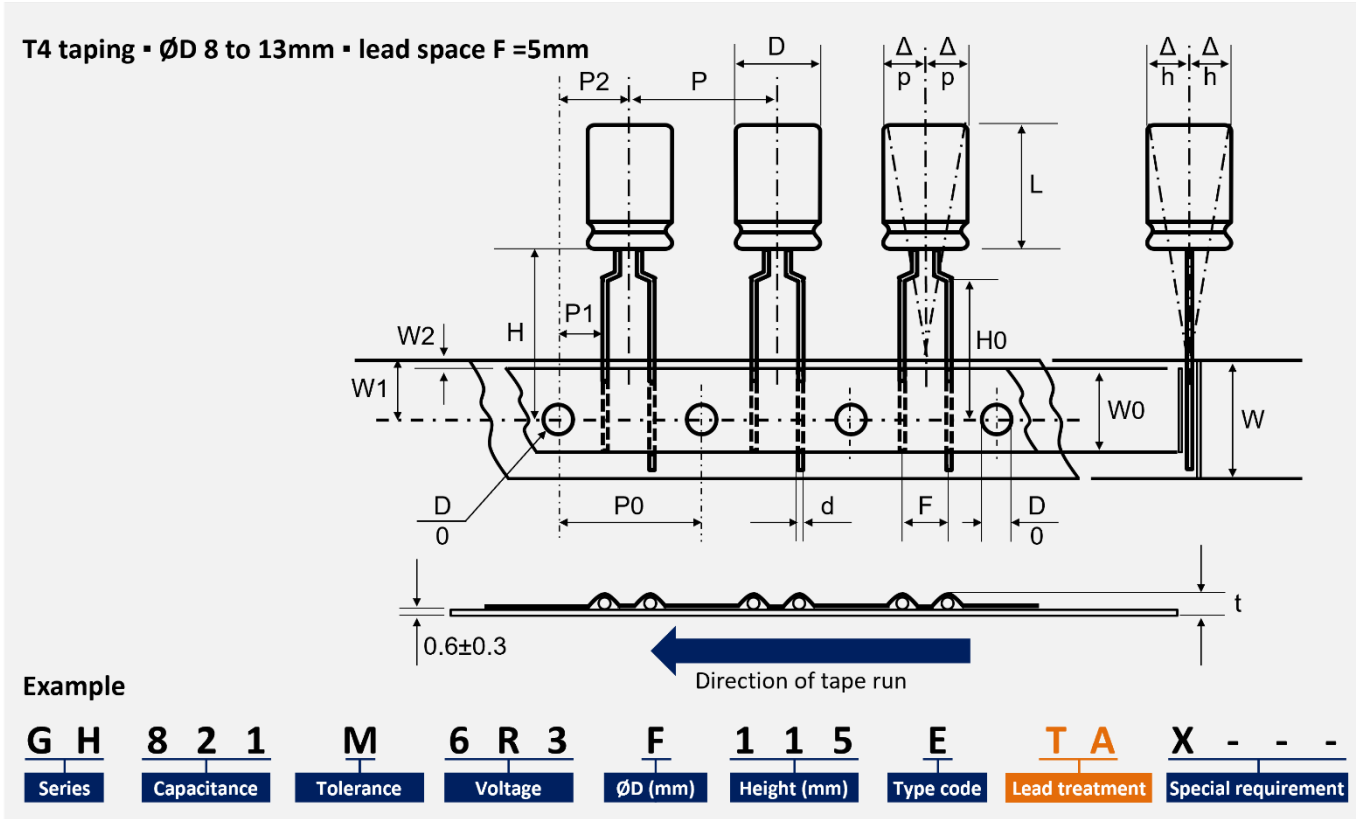
All dimensions in mm

	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
<b>Tol</b>	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	Code
<b>Item</b>	6.3	5 (+1)	0.45	12.7	12.7	5.1	6.35	2.5	18	11	9	2	18.5	4	1	1	1.5	TC
		7 (+1)	0.5															TC
		9 (±2)	0.5															TC
		11-25 (±1.5)	0.5															TC
	8	5 (+1)	0.45	12.7	12.7	4.6	6.35	3.5	18	11	9	2	18.5	4	1	1	1.5	TD
		7 (+1)	0.5															TD
		9 (±2)	0.5															TD
		11.5-16 (±1.5)	0.5															TD
	10	7-9 (±2)	0.6	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	4	1	1	1.5	TA
		12.3-35 (±1.5)	0.6															TA
(12.5)	13-16 (+2)	0.6	15	15	5	7.5	5	18	15	9	2	18.5	4	2	2	1.5	TA	
13	20-35 (±1.5)	0.6															TA	

Table and example show the ammo package version. Coding RA, RC or RD instead of TA, TC or TD means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

**TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS**



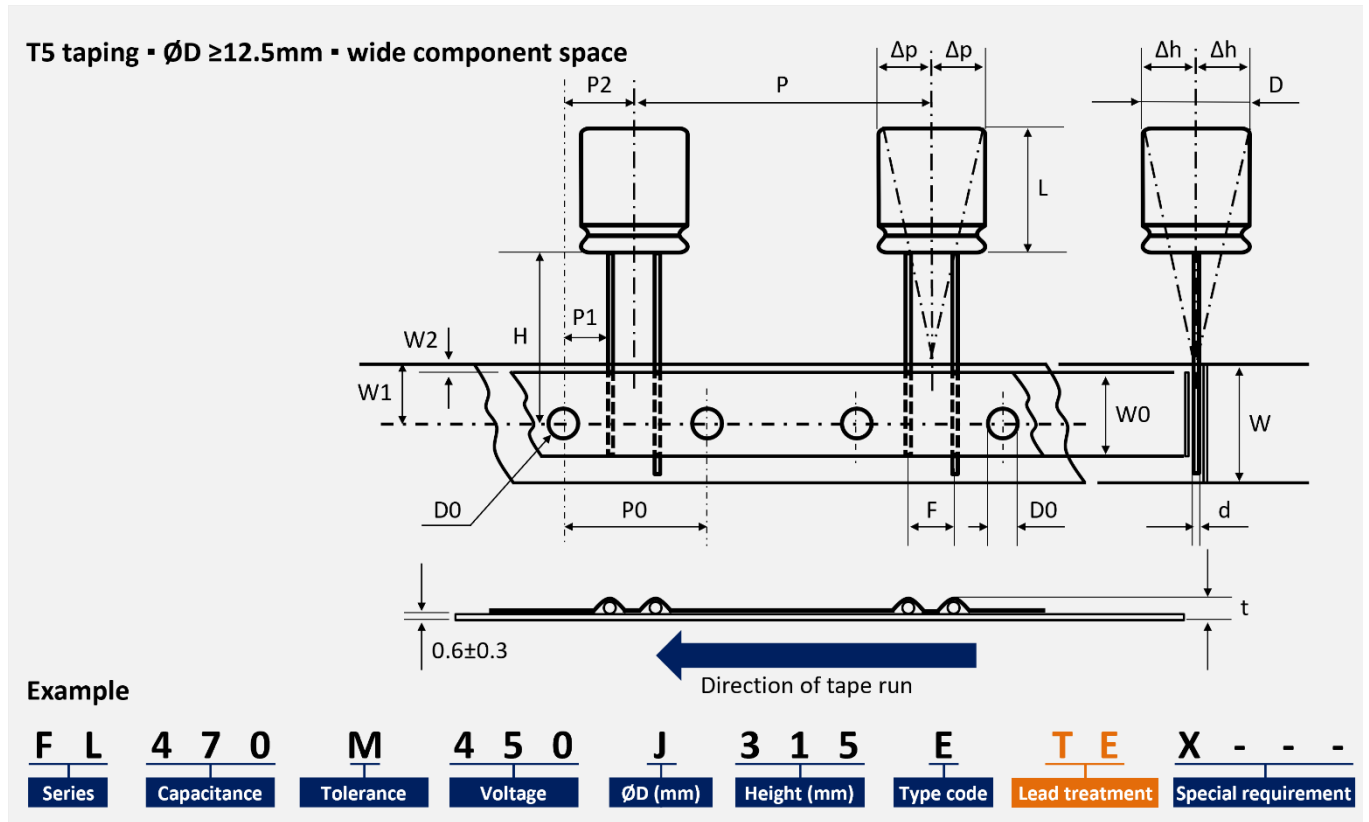
All dimensions in mm

	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	H0	D0	Δh	Δp	t	Code
<b>Tol</b>	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.5	±0.2	Max	Max	Max	Code
<b>Item</b>	4	5-7 (+1)	0.45	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	16	4	1	1	1.5	TA
		5-7 (+1)	0.45																
	5	9 (±2)	0.5																
		11-15 (±1.5)	0.5																
	6.3	5 (+1)	0.45																
		7 (+1)	0.5																
		9 (±2)	0.5																
	8	11-25 (±1.5)	0.5																
		5 (+1)	0.45																
		7 (+1)	0.5																
		9 (±2)	0.5																
		11.5-16 (±1.5)	0.5																
20-30 (±1.5)	0.6																		

Table and example show the ammo package version. Coding RA instead of TA means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

### TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS



All dimensions in mm

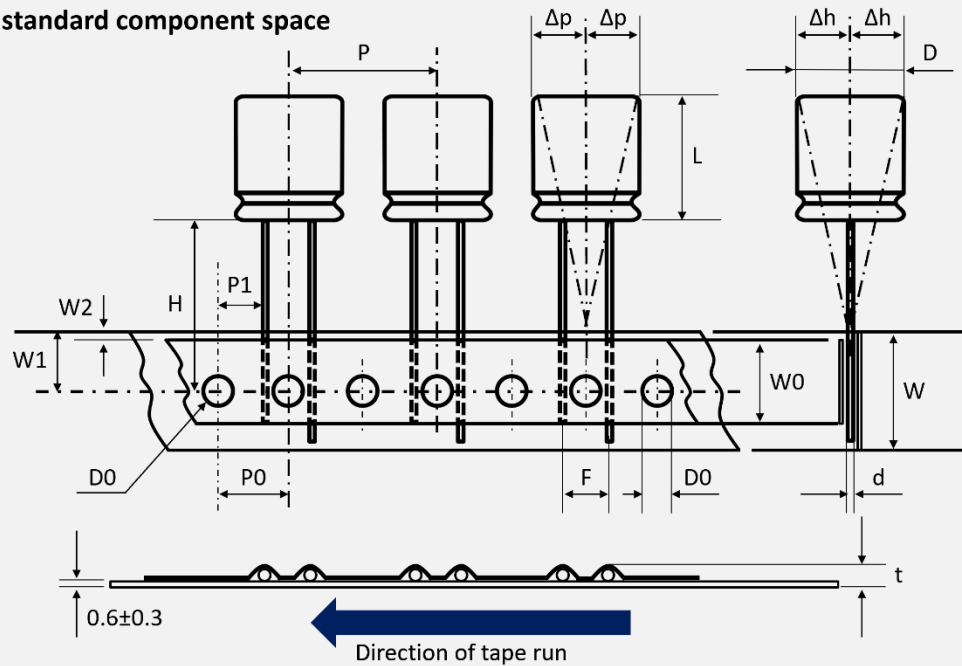
	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	D0	$\Delta h$	$\Delta p$	t	Code
<b>Tol</b>	$\pm 0.5$	-	$\pm 0.02$	$\pm 1.0$	$\pm 0.2$	$\pm 0.7$	$\pm 1.3$	$\pm 0.5$	$\pm 0.5$	$\pm 0.5$	$\pm 0.5$	Max	+0.75 -0.5	$\pm 0.2$	Max	Max	Max	Code
<b>Item</b>	13 (12.5)	13-16 (+2) 20-35 ( $\pm 1.5$ )	0.6	25.4	12.7	3.85	6.35	5	18	15	9	2	18.5	4	2	2	1.5	PA
	14.5	18-35 ( $\pm 2$ )	0.8	30	15	3.75	7.5	7.5	18	15	9	2	18.5	4	2	2	1.5	TE
	16	16-21 ( $\pm 2$ ) 25-35.5 ( $\pm 1.5$ )	0.8	30	15	3.75	7.5	7.5	18	15	9	2	18.5	4	2	2	1.5	
	18	16-21 ( $\pm 2$ ) 25-31.5 ( $\pm 1.5$ ) 35.5 ( $\pm 2$ )	0.8	30	15	3.75	7.5	7.5	18	15	9	2	18.5	4	2	2	1.5	

Table and example show the ammo package version. Coding RE or QA instead of TE or PA means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

**TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS**

T6 taping •  $\varnothing D \geq 14.5\text{mm}$  • standard component space



Example

<b>K</b>	<b>L</b>	<b>2 7 1</b>	<b>M</b>	<b>1 6 0</b>	<b>K</b>	<b>3 1 5</b>	<b>E</b>	<b>P E</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

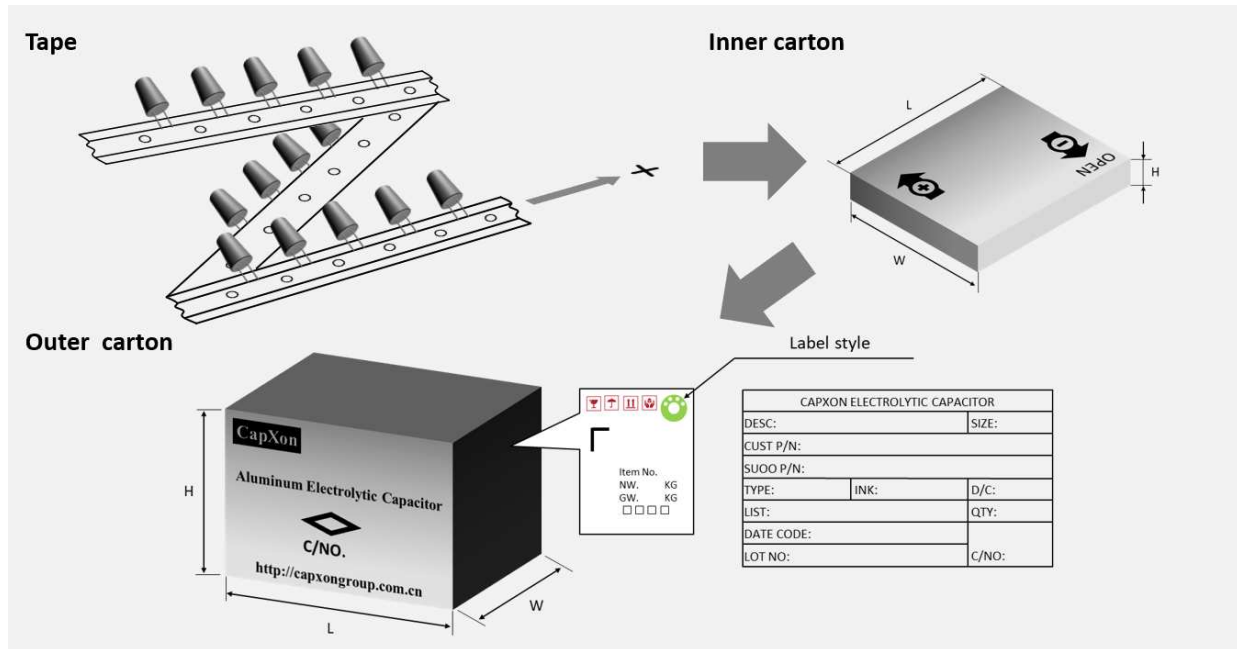
All dimensions in mm

	D	L	d	P	P0	P1	F	W	W0	W1	W2	H	D0	$\Delta h$	$\Delta p$	t	Code
<b>Tol</b>	±0.5	-	±0.02	±1.0	±0.2	±0.7	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	Code
<b>Item</b>	14.5	18-35 (±2)	0.8	25.4	12.7	8.95	<b>7.5</b>	18	15	9	2	18.5	4	2	2	1.5	PE
	16	16-21 (±2)	0.8	25.4	12.7	8.95	<b>7.5</b>	18	15	9	2	18.5	4	2	2	1.5	
		25-35.5 (±1.5)															
	18	16-21 (±2)	0.8	25.4	12.7	8.95	<b>7.5</b>	18	15	9	2	18.5	4	2	2	1.5	
25-31.5 (±1.5) 35.5 (±2)																	

Table and example show the ammo package version. Coding QE instead of PE means the reel package version.

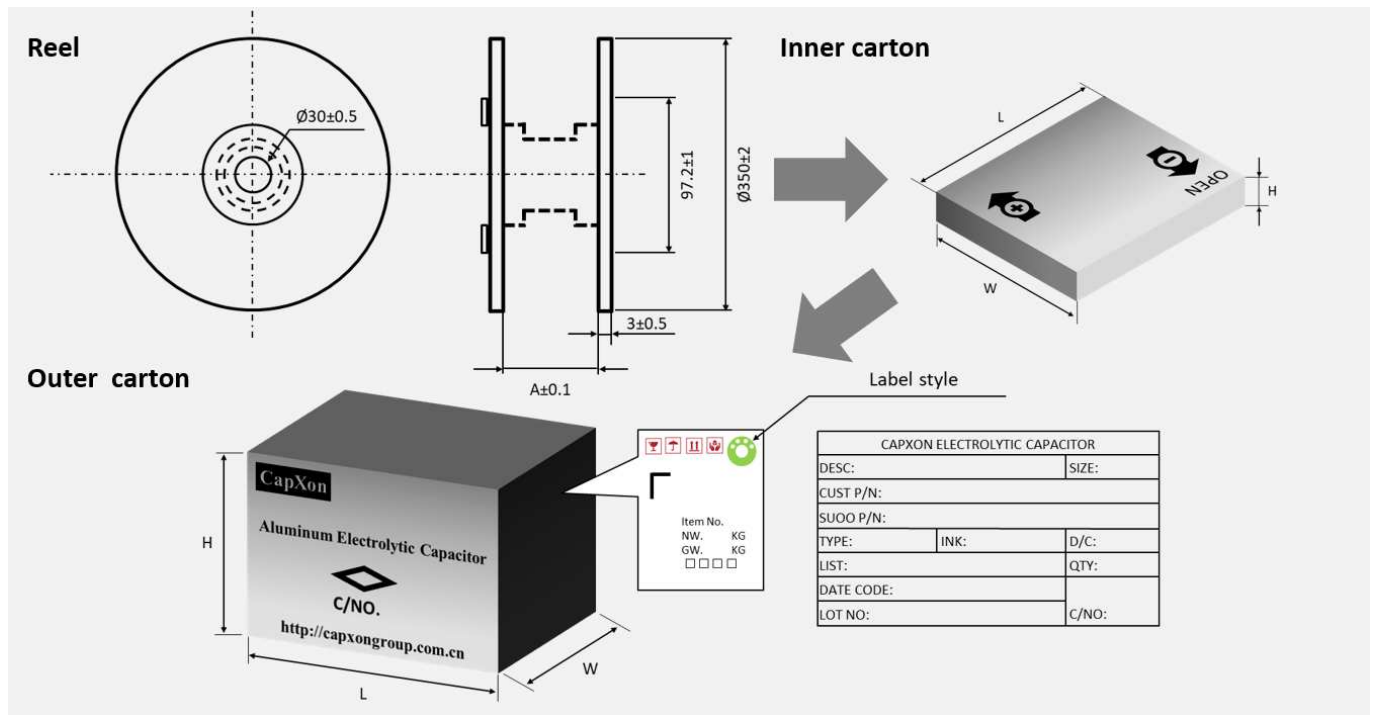
In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

### TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS • AMMO PACK



∅ D (mm)	Length L (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	All	2500	331 x 227 x 51	25000	474 x 343 x 285	China	85322200
5	All	2000	331 x 227 x 51	20000	474 x 343 x 285	China	85322200
6.3	5 to 15	1500	331 x 227 x 51	15000	474 x 343 x 285	China	85322200
	17 to 20	1300	327 x 191 x 57	13000	403 x 343 x 312	China	85322200
8	5 to 20	800	327 x 191 x 57	8000	403 x 343 x 312	China	85322200
	25 to 30	800	332 x 216 x 64	6400	474 x 343 x 285	China	85322200
10	7 to 15	600	331 x 227 x 51	6000	474 x 343 x 285	China	85322200
	16 to 20	500	327 x 191 x 57	5000	403 x 343 x 312	China	85322200
	21 to 25	500	332 x 190 x 60	2500	351 x 208 x 334	China	85322200
	26 to 30	500	332 x 216 x 64	4000	474 x 343 x 285	China	85322200
12.5 (P0=15)	35	500	310 x 260 x 71	2500	330 x 278 x 380	China	85322200
	13 to 25	300	327 x 191 x 57	3000	403 x 343 x 312	China	85322200
	26 to 30	300	332 x 216 x 64	2400	474 x 343 x 285	China	85322200
12.5 (P0=12.7)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	13 to 25	300	327 x 191 x 57	3000	403 x 343 x 312	China	85322200
	26 to 30	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
13 (P0=15)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	13 to 25	300	327 x 191 x 57	3000	403 x 343 x 312	China	85322200
	26 to 30	300	332 x 216 x 64	2400	474 x 343 x 285	China	85322200
13 (P0=12.7)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	13 to 25	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	26 to 30	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
16 (P0=15)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	16 to 20	200	327 x 191 x 57	2000	403 x 343 x 312	China	85322200
	21 to 25	250	318 x 254 x 67	2000	528 x 331 x 281	China	85322200
16 (P0=12.7)	> 25	250	310 x 260 x 71	1250	330 x 278 x 380	China	85322200
	16 to 20	200	327 x 191 x 57	2000	403 x 343 x 312	China	85322200
	21 to 25	200	332 x 216 x 64	1600	474 x 343 x 285	China	85322200
18	> 25	250	310 x 260 x 71	1250	330 x 278 x 380	China	85322200
	16 to 25	200	310 x 260 x 61	1000	330 x 278 x 333	China	85322200
	> 25	200	310 x 260 x 71	1000	330 x 278 x 380	China	85322200

### TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS • REEL PACK



Ø D (mm)	Length L (mm)	A (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	All	45	1800	350 x 350 x 105	10800	375 x 375 x 343	China	85322200
5	All	45	1300	350 x 350 x 105	7800	375 x 375 x 343	China	85322200
6.3	All	45	1000	350 x 350 x 105	6000	375 x 375 x 343	China	85322200
8	5 to 17	45	800	350 x 350 x 105	4800	375 x 375 x 343	China	85322200
	18 to 28	55	800	349 x 349 x 121	4800	375 x 375 x 385	China	85322200
10	7 to 17	45	600	350 x 350 x 105	3600	375 x 375 x 343	China	85322200
	18 to 28	55	600	349 x 349 x 121	3600	375 x 375 x 385	China	85322200
12.5	13 to 17	45	400	350 x 350 x 105	1800	375 x 375 x 343	China	85322200
	18 to 28	55	400	349 x 349 x 121	1800	375 x 375 x 385	China	85322200
13	13 to 17	45	300	350 x 350 x 105	1800	375 x 375 x 343	China	85322200
	18 to 28	55	300	349 x 349 x 121	1800	375 x 375 x 385	China	85322200
16	13 to 17	45	200	350 x 350 x 105	1200	375 x 375 x 343	China	85322200
	18 to 28	55	200	349 x 349 x 121	1200	375 x 375 x 385	China	85322200





**PACKAGING ▪ RADIAL ALUMINUM ELECTROLYTIC CAPACITORS  
STRAIGHT LEADS ▪ BULK PACK**


∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
22	21 to 26	25 in all/2 lines	100	304 x 196 x 68	800	415 x 320 x 295	China	85322200
	30 to 41	25 in all/2 lines	100	305 x 197 x 79.5	600	415 x 320 x 260	China	85322200
	45 to 70	25 in all/2 lines	100	304 x 196 x 92	600	415 x 320 x 295	China	85322200
25	21 to 26	25 in all/2 lines	100	334 x 217 x 68	800	448 x 354 x 295	China	85322200
	30 to 41	25 in all/2 lines	100	334 x 217 x 79.5	600	448 x 354 x 260	China	85322200
	≥ 45	25 in all/2 lines	100	334 x 217 x 92	600	448 x 354 x 295	China	85322200
	21 to 26	25 in all/2 lines	100	304 x 196 x 68	800	415 x 320 x 295	China	85322200



### PACKAGING - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS CUTTED LEADS - BULK PACK

∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Cutting height (mm)	Outer box quantity (pcs)	Outer carton quantity (pcs)	Country of origin	Tariff number
3	All L	2500/bag	10000	N/A	6	60000	China	85322200
4	5 to 7	2000/bag	8000	N/A	5	40000	China	85322200
5	5 to 9	2000/bag	8000	N/A	5	40000	China	85322200
	11 to 12	1000/bag	6000	C < 7	5	30000	China	85322200
	11 to 12	1000/bag	4000	C ≥ 7	5	20000	China	85322200
6.3	5 to 7	1000/bag	6000	N/A	5	30000	China	85322200
	9 to 12	1000/bag	4000	N/A	5	20000	China	85322200
	15 to 20	1000/bag	4000	N/A	6	24000	China	85322200
8	≤ 9	500/bag	4000	N/A	6	24000	China	85322200
	11 to 13	500/bag	3000	C < 7	6	18000	China	85322200
	14	500/bag	2500	C < 7	6	15000	China	85322200
	15 to 16	500/bag	2000	C < 7	6	12000	China	85322200
	20	500/bag	1000	C < 7	12	12000	China	85322200
	30 to 35.5	500/bag	1000	C < 7	8	8000	China	85322200
	36 to 41	40/line	840	C < 7	10	8400	China	85322200
	42 to 51	40/line	840	C < 7	6	5040	China	85322200
10	52 to 60	40/line	840	C < 7	6	5040	China	85322200
	7 to 10	500/bag	1000	C < 7	12	12000	China	85322200
	12 to 17	500/bag	1000	C < 7	10	10000	China	85322200
	20	500/bag	1000	C < 7	8	8000	China	85322200
	24 to 25	500/bag	1000	C < 7	6	6000	China	85322200
	30 to 35.5	32/line	540	C < 7	12	6480	China	85322200
	36 to 41	32/line	540	C < 7	10	5400	China	85322200
	42 to 51	32/line	540	C < 7	8	4320	China	85322200
13	52 to 60	32/line	540	C < 7	6	3240	China	85322200
	31	25/line	350	C < 7	6	2100	China	85322200
	35 to 41	25/line	350	C < 7	5	1750	China	85322200
	42 to 51	25/line	350	C < 7	4	1400	China	85322200
	52 to 60	25/line	350	C < 7	4	1400	China	85322200
16	35 to 40	25/line	350	C ≥ 12	4	1400	China	85322200
	16 to 21	18/line	180	N/A	6	1080	China	85322200
	25 to 31.5	18/line	180	C < 7	6	1080	China	85322200
	25 to 31.5	18/line	180	C ≥ 7	5	900	China	85322200
	35.5 to 41	18/line	180	C < 7	5	900	China	85322200
18	35.5 to 41	18/line	180	C ≥ 7	4	720	China	85322200
	15 to 21	32 in all/2 lines	160	N/A	6	960	China	85322200
	25 to 31.5	32 in all/2 lines	160	C < 7	6	960	China	85322200
	25 to 31.5	32 in all/2 lines	160	C ≥ 7	5	800	China	85322200
	35.5 to 41	32 in all/2 lines	160	C < 7	5	800	China	85322200
	35.5 to 41	32 in all/2 lines	160	C ≥ 7	4	640	China	85322200
20	≥ 45	32 in all/2 lines	160	N/A	4	640	China	85322200
	25 to 40	30 in all/2 lines	120	C < 7	6	720	China	85322200
	25 to 40	30 in all/2 lines	150	C ≥ 7	4	600	China	85322200
	≥ 41	30 in all/2 lines	150	C < 7	4	600	China	85322200
20	≥ 41	30 in all/2 lines	120	C ≥ 7	4	480	China	85322200

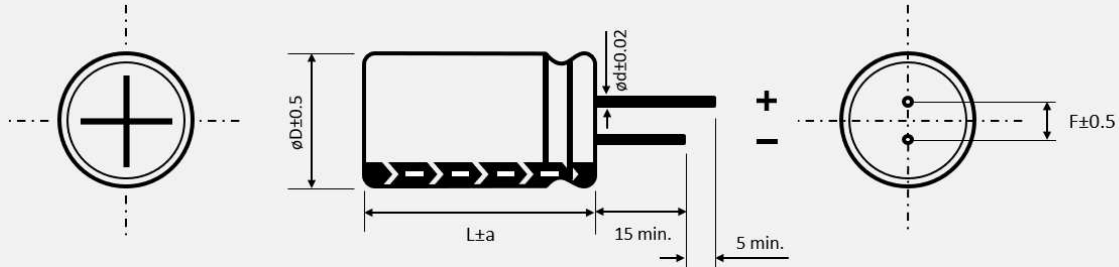
### PACKAGING ▪ RADIAL ALUMINUM ELECTROLYTIC CAPACITORS CUTTED LEADS ▪ BULK PACK



∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Cutting height (mm)	Outer box quantity (pcs)	Outer carton quantity (pcs)	Country of origin	Tariff number
22	21 to 31	25 in all/2 lines	100	C < 7	6	600	China	85322200
	21 to 31	25 in all/2 lines	100	C ≥ 7	5	500	China	85322200
	36 to 41	25 in all/2 lines	100	C < 7	5	500	China	85322200
	36 to 41	25 in all/2 lines	100	C ≥ 7	6	600	China	85322200
	46 to 51	25 in all/2 lines	100	C < 7	4	400	China	85322200
	46 to 51	25 in all/2 lines	100	C ≥ 7	3	300	China	85322200
	≥ 56	25 in all/2 lines	100	C < 7	3	300	China	85322200
25	21 to 26	25 in all/2 lines	100	N/A	6	600	China	85322200
	30 to 37	25 in all/2 lines	100	N/A	5	500	China	85322200
	40 to 51	25 in all/2 lines	100	N/A	4	400	China	85322200
	≥ 52	25 in all/2 lines	100	N/A	3	300	China	85322200

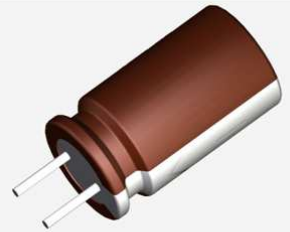
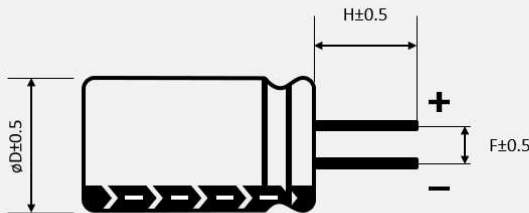
### AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • standard version • standard lead spacing (all dimension in mm)



ø D (mm)	4	5	6.3	8			10	13	16		18		22	25		
F (mm)	1.5	2	2.5	3.5			5	7.5	7.5		10	12.5				
L (mm)	All	≤ 7	> 7	≤ 5	> 5	≤ 5	7	9 to < 20	≥ 20	All	25 to 35.5	< 25 & ≥ 40	25 to 31.5	< 25 & ≥ 35	All	All
ø d (mm)	0.45	0.45	0.5	0.45	0.5	0.45	0.5	0.6	0.6	0.6	0.8	0.8	0.8	1		
a (mm)	1	1	1	1	1	1	1.5	1.5	1.5	1.5	2	1.5	2	2		

Radial type • CA version • cutted leads • standard lead spacing



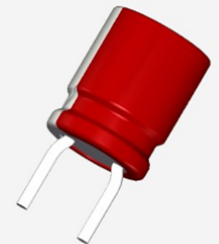
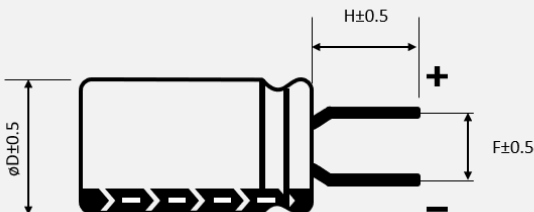
Length „H“ customized. See product code table customized lead length for further reference.

ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5

Example

<b>G</b>	<b>H</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>M</b>	<b>6</b>	<b>R</b>	<b>3</b>	<b>E</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>E</b>	<b>C</b>	<b>A</b>	<b>X</b>	-	-	-	
Series	Capacitance	Tolerance	Voltage	øD (mm)	Height (mm)	Type code	Lead treatment	Special requirement												

Radial type • CE version • cutted leads • wide lead spacing ≤ 2.5mm



Length „H“ customized. See product code table customized lead length for further reference.

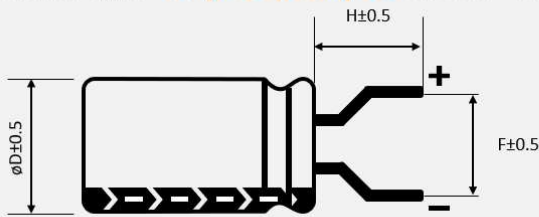
ø D (mm)	4	5
F (mm)	2	2.5

Example

<b>S</b>	<b>G</b>	<b>2</b>	<b>R</b>	<b>2</b>	<b>M</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>B</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>E</b>	<b>C</b>	<b>E</b>	<b>X</b>	-	-	-
Series	Capacitance	Tolerance	Voltage	øD (mm)	Height (mm)	Type code	Lead treatment	Special requirement											

### AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **CF / CG / CH / CI** version • cutted leads • wide lead spacing  $\geq 2.5\text{mm}$



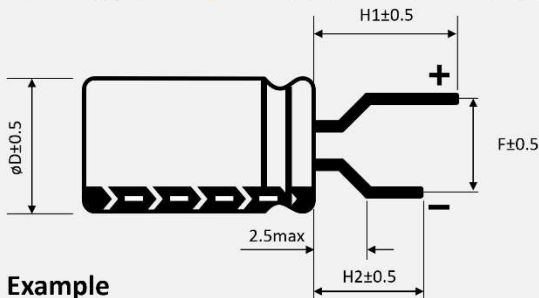
$\varnothing D$ (mm)	4	4	4	5	5	6.3	6.3	8	10	13
F (mm)	2.5	3.5	5	3.5	5	3.5	5	5	7.5	7.5
Code	CF	CG	CH	CG	CH	CG	CH	CH	CI	CI

Example

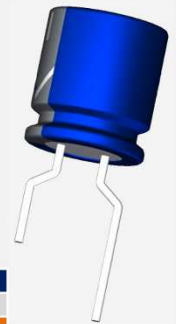
Length „H“ customized. See product code table customized lead length for further reference.

<b>G</b>	<b>H</b>	<b>1 2 1</b>	<b>M</b>	<b>0 1 6</b>	<b>E</b>	<b>1 1 0</b>	<b>E</b>	<b>CH</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **FA / FE** version • wide lead spacing  $\geq 5\text{mm}$  • long anode



Length „H1“ and „H2“ customized. Consult CapXon to specify the details.

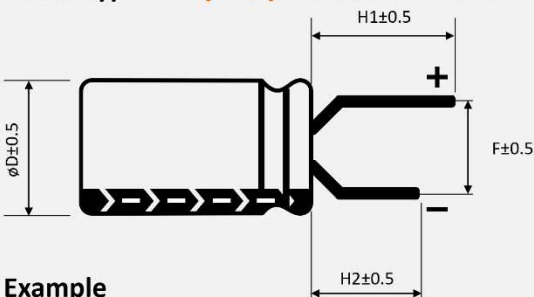


$\varnothing D$ (mm)	4	5	6.3	8	10	13
F (mm)	5	5	5	5	7.5	7.5
Code	FA	FA	FA	FA	FE	FE

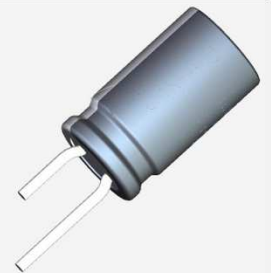
Example

<b>G</b>	<b>T</b>	<b>2 2 1</b>	<b>M</b>	<b>0 1 0</b>	<b>E</b>	<b>1 1 0</b>	<b>E</b>	<b>FA</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **FB / FC / FD** version • wide lead spacing  $\leq 3.5\text{mm}$  • long anode



Length „H1“ and „H2“ customized. Consult CapXon to specify the deta



$\varnothing D$ (mm)	4	5	6.3
F (mm)	2	2.5	3.5
Code	FB	FC	FD

Example

<b>S</b>	<b>G</b>	<b>R 4 7</b>	<b>M</b>	<b>0 5 0</b>	<b>B</b>	<b>0 7 0</b>	<b>E</b>	<b>FB</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

### AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **KA** version • kinked anode and cathode • standard lead spacing

$\varnothing D$ (mm)	5	6.3	8	10	13	16	18	22
F (mm)	2	2.5	3.5	5	5	7.5	7.5	10
$H_1$ (mm)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
$H_2$ (mm)	4	4	4	4.5	4.5	4.5	4.5	4.5
E (mm)	1.12	1.12	1.32	1.32	1.32	1.32	1.32	1.82

**Example**

Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement
T E	2 2 2	M	0 2 5	J	3 5 5	E	<b>KA</b>	X - - -

Radial type • **KE** version • kinked anode and cathode • wide lead spacing  $\leq 2.5$ mm

$\varnothing D$ (mm)	4	5
F (mm)	2	2.5
$H_1$ (mm)	1.8	1.8
$H_2$ (mm)	4	4
E (mm)	1.12	1.12

**Example**

Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement
S G	3 3 0	M	0 1 0	C	0 7 0	E	<b>KE</b>	X - - -

Radial type • **KF** version • kinked anode and cathode • wide lead spacing 5mm

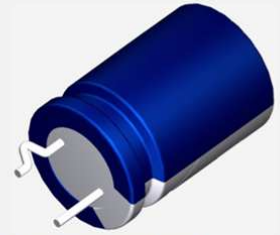
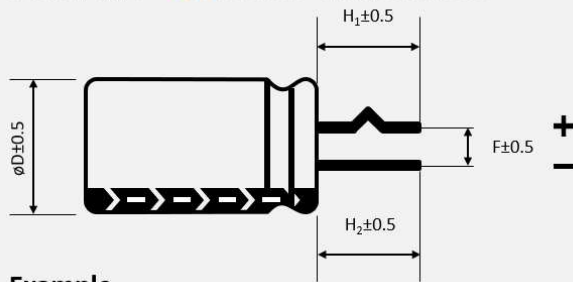
$\varnothing D$ (mm)	5	6.3	8
F (mm)	5	5	5
$H_1$ (mm)	4	4	4
E (mm)	1.12	1.12	1.32

**Example**

Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement
T H	2 2 1	M	0 2 5	F	1 1 5	E	<b>KF</b>	X - - -

### AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

#### Radial type • CK version • kinked anode

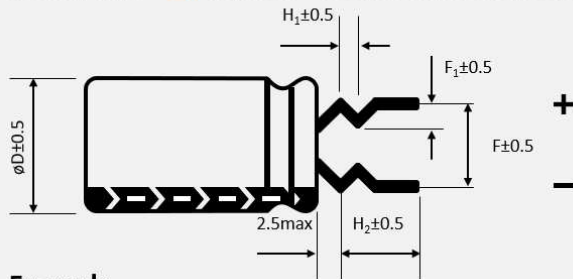


$\varnothing D$ (mm)	4	5	6.3	8	10	13	16	18
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5
$H_1$ (mm)	4	4	4	4	4.5	4.5	4.5	4.5
$H_2$ (mm)	4	4	4	4	4.5	4.5	4.5	4.5

#### Example

<b>F</b>	<b>K</b>	<b>1 0 0</b>	<b>M</b>	<b>4 0 0</b>	<b>G</b>	<b>2 0 0</b>	<b>E</b>	<b>CK</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

#### Radial type • EF version • double kinked anode and cathode • lead spacing 5mm

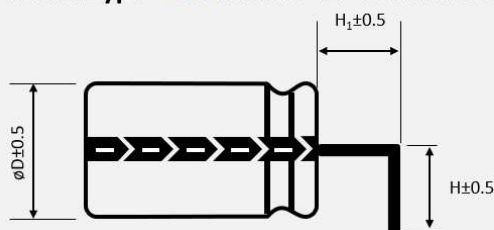


$\varnothing D$ (mm)	4	5	6.3	8
F (mm)	5	5	5	5
$H_1$ (mm)	1.8	1.8	1.8	1.8
$H_2$ (mm)	4	4	4	4
$F_1$ (mm)	1.2	1.2	1.2	1.2

#### Example

<b>T</b>	<b>E</b>	<b>3 3 0</b>	<b>M</b>	<b>0 6 3</b>	<b>F</b>	<b>1 1 5</b>	<b>E</b>	<b>EF</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

#### Radial type • CR version • L-bended leads • cathode right



$\varnothing D$ (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5
$H_1$ (mm)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

#### Example

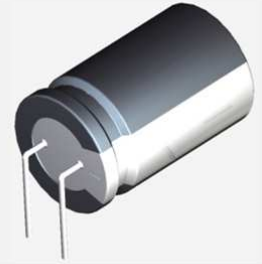
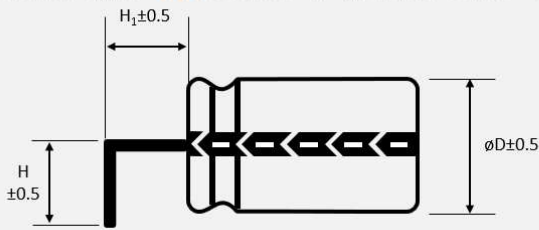
Length „H“ customized. See product code table customized lead length for further reference.

<b>F</b>	<b>K</b>	<b>1 0 1</b>	<b>M</b>	<b>4 5 0</b>	<b>K</b>	<b>3 5 5</b>	<b>E</b>	<b>CR</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement



### AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **CL** version • L - bended leads • cathode left



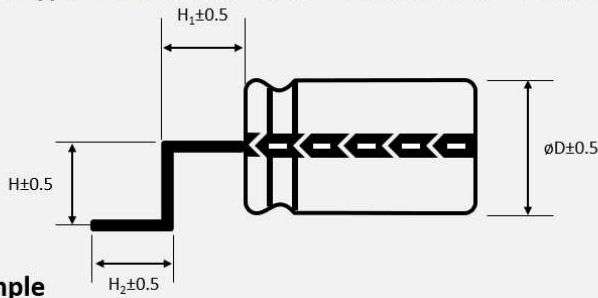
Ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5
H <sub>1</sub> (mm)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Example

Length „H“ customized. See product code table customized lead length for further reference.

<b>G</b>	<b>H</b>	<b>5 6 0</b>	<b>M</b>	<b>0 8 0</b>	<b>F</b>	<b>1 1 5</b>	<b>E</b>	<b>C L</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **CS** version • SMD - bended leads • cathode left



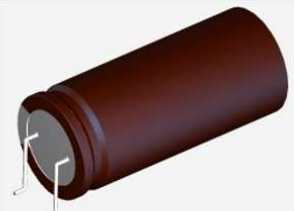
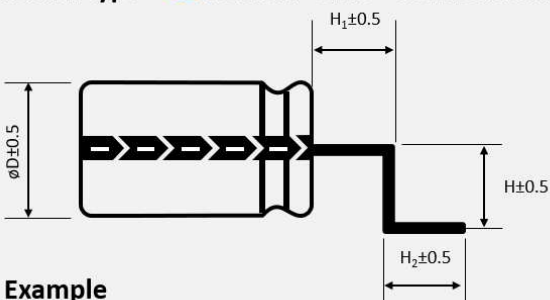
Length „H“, „H<sub>1</sub>“ and H<sub>2</sub>“ customized. Ask CapXon for further assistance

Ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5

Example

<b>F</b>	<b>K</b>	<b>3 R 3</b>	<b>M</b>	<b>4 5 0</b>	<b>G</b>	<b>0 9 0</b>	<b>E</b>	<b>C S</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **CZ** version • SMD - bended leads • cathode right



Length „H“, „H<sub>1</sub>“ and H<sub>2</sub>“ customized. Ask CapXon for further assistance

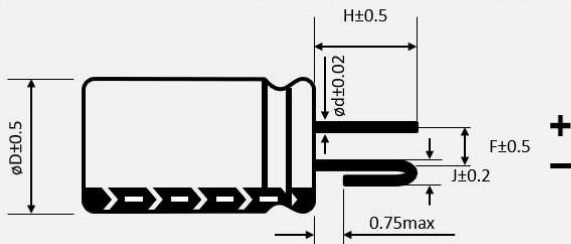
Ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5

Example

<b>T</b>	<b>H</b>	<b>4 7 2</b>	<b>M</b>	<b>0 3 5</b>	<b>J</b>	<b>4 0 0</b>	<b>E</b>	<b>C Z</b>	<b>X - - -</b>
Series		Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

### AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **J I** version • polarity protected footprint • cathode bended



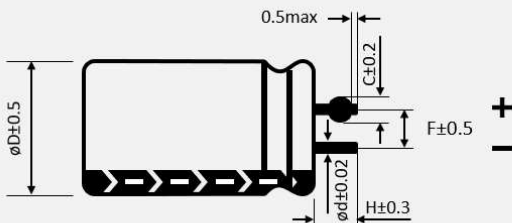
ø D (mm)	10	12.5	13	16	18	22
F (mm)	5	5	5	7.5	7.5	10
J (mm)	1.5	1.5	1.5	1.9	1.9	1.9
ø d (mm)	0.6	0.6	0.6	0.8	0.8	0.8

Example

Length „H“ customized. See product code table customized lead length for further reference.

<b>G H</b>	<b>1 5 2</b>	<b>M</b>	<b>0 6 3</b>	<b>K</b>	<b>3 1 5</b>	<b>E</b>	<b>J I</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	øD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **CD** version • polarity protected footprint • anode pressed

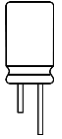


ø D (mm)	10	12.5	13	16	18	22
F (mm)	5	5	5	7.5	7.5	10
C (mm)	1.1	1.1	1.1	1.4	1.4	1.4
ø d (mm)	0.6	0.6	0.6	0.8	0.8	0.8

Example

Length „H“ customized. See product code table customized lead length for further reference.

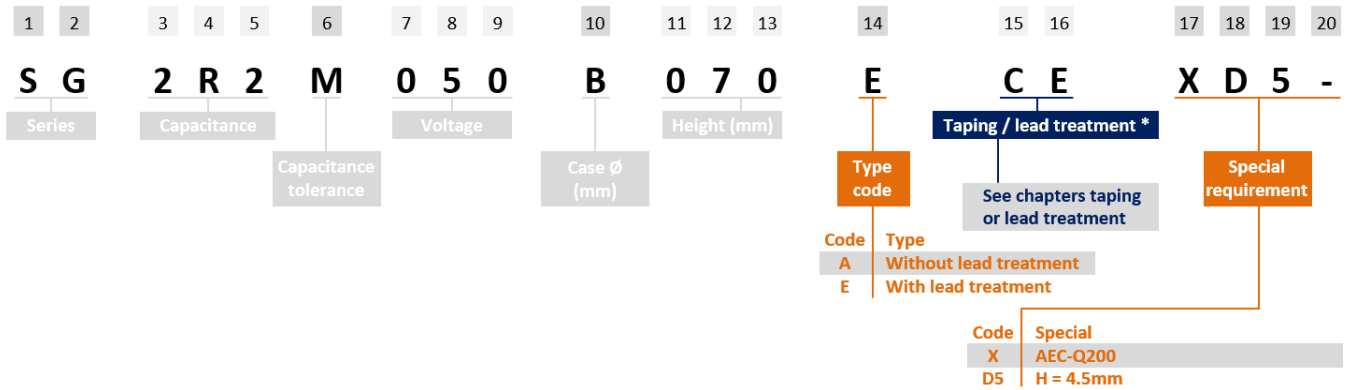
<b>T E</b>	<b>3 3 1</b>	<b>M</b>	<b>0 5 0</b>	<b>I</b>	<b>2 0 0</b>	<b>E</b>	<b>C D</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	øD (mm)	Height (mm)	Type code	Lead treatment	Special requirement



### PRODUCT CODE TABLE • CUSTOMIZED LEAD LENGTH

THT type example:

SG series ▪ 2.2µF ▪ 50V ▪ ±20% ▪ Ø 4mm ▪ L 5mm ▪ CE version, wide lead spacing ▪ P 2.5mm ▪ H 4.5mm  
▪ AEC-Q200



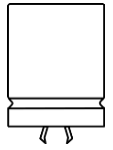
Product code 17 <sup>th</sup> digit	H (mm)
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26

Product code 18 <sup>th</sup> digit	H (mm)
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9

Example H (mm)	Product code Automotive
4.5	XD5
6.0	XF0
10.7	XX7
16.5	XP5

The 18<sup>th</sup> digit is according basic ordering of the Latin alphabet and shows the measure "H" in front of the decimal separator. The 19<sup>th</sup> digit follows the numbering from 0 to 9 and shows the measure "H" after the decimal separator.

### OVERVIEW - SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS



#### Features



Series	Page	AEC-Q200	High Reliability	High Temperature	Low ESR	Long Life	Multipin	Ultra Long Life	Vibration Proof	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)	Useful Life (hours)
										-40	+105	200	450	82	3300		
UJ	190	•	•				•		•	-40	+105	200	450	82	3300	2000	5000
										-25		500	550	47	1000		
UK	199	•	•			•	•		•	-40	+105	200	450	68	2200	3000	8000
										-25		500	550	47	680		
UL	209	•	•		•		•	•	•	-40	+105	200	450	82	2700	5000	10000
										-25		500	550	47	680		
HC	222	•	•	•	•		•	•	•	-55	+125	25	63	600	3300	3000	4000
HH	226	•	•	•			•	•	•	-40	+125	400	450	47	560	3000	4000

### UJ SERIES ▪ LONG LIFE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ Snap-In type
- Useful life: 105°C ▪ 5 000 hours
- Extremely stable dissipation factor and leakage current
- Especially for applications with demanding operating environment
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics			
Operating Temperature Range		-40 ~ +105°C		-25 ~ +105°C	
Rated Voltage Range	V <sub>R</sub>	200 ~ 450V DC		500 ~ 550V DC	
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V) ▪ V <sub>S</sub> = 1.15·V <sub>R</sub>		(V <sub>R</sub> > 315V) ▪ V <sub>S</sub> = 1.10·V <sub>R</sub>	
Capacitance Range	C <sub>R</sub>	82 ~ 3300µF		47 ~ 1000µF	
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)			
Leakage Current (20°C ▪ V <sub>R</sub> applied)	I <sub>LEAK</sub>	≤ 3 · √C <sub>R</sub> · V <sub>R</sub> ▪ After 5 minutes [ I <sub>LEAK</sub> (µA) ; C <sub>R</sub> (µF) ; V <sub>R</sub> (V) ]			
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V <sub>R</sub> (V DC)	200 ~ 400	450 ~ 550	
		tanδ	15	20	
Self-Resistance (20°C ▪ 120Hz)	ESR	Not to exceed the values shown in standard ratings			
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	200 ~ 250	315 ~ 450	500 ~ 550
		Z-25°C/Z+20°C	4	5	6
		Z-40°C/Z+20°C	7	10	-

Lifetime Test					
Useful Life 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>5 000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value			
	tanδ	≤ 200% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
	Deviation Rate at Useful Life: 100 FIT = 0.01%/1000h with 60% confidence level ▪ parts show higher drift as test criteria				
Endurance 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>2 000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±15% of initial measured value			
	tanδ	≤ 175% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
Shelf Life 105°C (V <sub>R</sub> = 0)	Test	<b>1 000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±15% of initial measured value			
	tanδ	≤ 175% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
	Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4				
Vibration Resistance Test		Max. 10g force, f <sub>RANGE</sub> 10Hz ... 55Hz, amplitude 0.75mm; X/Y/Z-axis each 2h; capacitor rigidly clamped by body to surface ▪ IEC 60068-2-6			

**STANDARD RATINGS**

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (mΩ)	Max. ESR +20°C - 120Hz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
200	330	22	25	330	600	1130	UJ331M200M250A□□X
	390	22	25	280	510	1210	UJ391M200M250A□□X
	390	22	30	280	510	1250	UJ391M200M300A□□X
	390	25	25	280	510	1310	UJ391M200N250A□□X
	470	22	30	230	420	1400	UJ471M200M300A□□X
	470	25	25	230	420	1400	UJ471M200N250A□□X
	470	25	30	230	420	1520	UJ471M200N300A□□X
	560	22	35	200	360	1610	UJ561M200M350A□□X
	560	25	30	200	360	1610	UJ561M200N300A□□X
	560	30	25	200	360	1620	UJ561M200O250A□□X
	680	22	40	160	290	1860	UJ681M200M400A□□X
	680	25	30	160	290	1690	UJ681M200N300A□□X
	680	30	25	160	290	1980	UJ681M200O250A□□X
	820	22	45	130	240	2140	UJ821M200M450A□□X
	820	25	35	130	240	2140	UJ821M200N350A□□X
	820	30	30	130	240	2290	UJ821M200O300A□□X
	1000	22	50	110	200	2480	UJ102M200M500A□□X
	1000	25	40	110	200	2480	UJ102M200N400A□□X
	1000	30	30	110	200	2520	UJ102M200O300A□□X
	1000	35	25	110	200	2440	UJ102M200P250A□□X
	1200	25	45	94	170	2890	UJ122M200N450A□□X
	1200	30	35	94	170	2890	UJ122M200O350A□□X
	1200	35	30	94	170	3030	UJ122M200P300A□□X
	1500	25	55	72	130	3520	UJ152M200N550A□□X
	1500	30	40	72	130	3590	UJ152M200O400A□□X
	1500	35	35	72	130	3520	UJ152M200P350A□□X
	1800	30	45	61	110	4090	UJ182M200O450A□□X
	1800	35	35	61	110	3770	UJ182M200P350A□□X
2200	30	55	50	90	4820	UJ222M200O550A□□X	
2200	35	45	50	90	4820	UJ222M200P450A□□X	
2700	35	50	41	74	5160	UJ272M200P500A□□X	
3300	35	55	33	60	5850	UJ332M200P550A□□X	
250	220	22	25	500	900	910	UJ221M250M250A□□X
	270	22	25	410	740	1030	UJ271M250M250A□□X
	330	22	30	330	600	1200	UJ331M250M300A□□X
	390	22	35	280	510	1370	UJ391M250M350A□□X
	390	25	25	280	510	1260	UJ391M250N250A□□X
	470	22	35	230	420	1530	UJ471M250M350A□□X
	470	25	30	230	420	1530	UJ471M250N300A□□X
	470	30	25	230	420	1690	UJ471M250O250A□□X
	560	22	40	200	360	1760	UJ561M250M400A□□X
	560	25	35	200	360	1680	UJ561M250N350A□□X
	680	22	45	160	290	2040	UJ681M250M450A□□X
	680	25	40	160	290	2130	UJ681M250N400A□□X

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ = Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
250	680	30	30	160	290	2130	UJ681M250O300A□□X
	680	35	25	160	290	2120	UJ681M250P250A□□X
	820	25	45	130	240	2230	UJ821M250N450A□□X
	820	30	35	130	240	2450	UJ821M250O350A□□X
	820	35	30	130	240	2620	UJ821M250P300A□□X
	1000	25	50	110	200	2570	UJ102M250N500A□□X
	1000	30	40	110	200	2850	UJ102M250O400A□□X
	1000	35	30	110	200	2770	UJ102M250P300A□□X
	1200	30	45	94	170	3420	UJ122M250O450A□□X
	1200	35	35	94	170	3260	UJ122M250P350A□□X
	1500	30	50	72	130	3720	UJ152M250O500A□□X
	1500	35	40	72	130	3780	UJ152M250P400A□□X
	1800	35	45	61	110	4090	UJ182M250P450A□□X
2200	35	55	50	90	5040	UJ222M250P550A□□X	
350	100	22	25	1110	1990	590	UJ101M350M250A□□X
	120	22	30	920	1660	690	UJ121M350M300A□□X
	120	25	25	920	1660	690	UJ121M350N250A□□X
	150	22	35	740	1330	800	UJ151M350M350A□□X
	180	25	30	620	1110	850	UJ181M350N300A□□X
	180	30	25	620	1110	890	UJ181M350O250A□□X
	220	22	40	500	900	990	UJ221M350M400A□□X
	220	25	40	500	900	1100	UJ221M350N400A□□X
	220	30	30	500	900	1080	UJ221M350O300A□□X
	220	35	25	500	900	1080	UJ221M350P250A□□X
	270	25	45	410	740	1280	UJ271M350N450A□□X
	270	30	35	410	740	1250	UJ271M350O350A□□X
	270	35	25	410	740	1250	UJ271M350P250A□□X
	330	25	50	330	600	1550	UJ331M350N500A□□X
	330	30	35	330	600	1460	UJ331M350O350A□□X
	330	35	30	330	600	1460	UJ331M350P300A□□X
	390	35	40	280	510	1920	UJ391M350P400A□□X
	470	35	45	230	420	2170	UJ471M350P450A□□X
	560	35	45	200	360	2410	UJ561M350P450A□□X
	560	40	40	200	360	2460	UJ561M350Q400A□□X
	680	35	55	160	290	2790	UJ681M350P550A□□X
	680	40	45	160	290	2790	UJ681M350Q450A□□X
	820	35	60	130	240	3210	UJ821M350P600A□□X
	820	40	50	130	240	3150	UJ821M350Q500A□□X
	820	45	40	130	240	3110	UJ821M350V400A□□X
	1000	35	60	110	200	3230	UJ102M350P600A□□X
	1000	40	50	110	200	3260	UJ102M350Q500A□□X
1200	40	55	94	170	3680	UJ122M350Q550A□□X	
1500	40	65	72	130	4560	UJ152M350Q650A□□X	
1800	40	75	61	110	5670	UJ182M350Q750A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (m $\Omega$ )	Max. ESR +20°C - 120Hz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
400	100	22	25	1110	1990	650	UJ101M400M250A□□X
	120	22	25	920	1660	920	UJ121M400M250A□□X
	150	22	30	740	1330	1080	UJ151M400M300A□□X
	180	22	30	620	1110	1150	UJ181M400M300A□□X
	180	25	25	620	1110	1120	UJ181M400N250A□□X
	220	22	35	500	900	1320	UJ221M400M350A□□X
	220	25	30	500	900	1300	UJ221M400N300A□□X
	270	22	40	410	740	1500	UJ271M400M400A□□X
	270	25	35	410	740	1490	UJ271M400N350A□□X
	270	30	25	410	740	1330	UJ271M400O250A□□X
	330	22	50	330	600	1760	UJ331M400M500A□□X
	330	25	40	330	600	1680	UJ331M400N400A□□X
	330	30	30	330	600	1550	UJ331M400O300A□□X
	330	35	25	330	600	1440	UJ331M400P250A□□X
	390	22	55	280	510	1940	UJ391M400M550A□□X
	390	25	45	280	510	1860	UJ391M400N450A□□X
	390	30	35	280	510	1750	UJ391M400O350A□□X
	390	35	30	280	510	1750	UJ391M400P300A□□X
	470	25	50	230	420	2070	UJ471M400N500A□□X
	470	30	40	230	420	1970	UJ471M400O400A□□X
	470	35	30	230	420	1910	UJ471M400P300A□□X
	560	25	60	200	360	2370	UJ561M400N600A□□X
	560	30	45	200	360	2180	UJ561M400O450A□□X
	560	35	35	200	360	1920	UJ561M400P350A□□X
	680	30	50	160	290	2410	UJ681M400O500A□□X
	680	35	40	160	290	2350	UJ681M400P400A□□X
	820	30	60	130	240	2760	UJ821M400O600A□□X
	820	35	45	130	240	2670	UJ821M400P450A□□X
	1000	35	55	110	200	3160	UJ102M400P550A□□X
	1000	40	50	110	200	3240	UJ102M400Q500A□□X
1200	35	60	94	170	3560	UJ122M400P600A□□X	
1200	40	55	94	170	3640	UJ122M400Q550A□□X	
1500	45	70	72	130	4680	UJ152M400V700A□□X	
1800	45	80	61	110	5290	UJ182M400V800A□□X	
450	82	22	25	1790	3230	590	UJ820M450M250A□□X
	100	22	30	1470	2650	690	UJ101M450M300A□□X
	100	25	25	1470	2650	690	UJ101M450N250A□□X
	120	22	35	1230	2210	720	UJ121M450M350A□□X
	150	22	35	980	1770	920	UJ151M450M350A□□X
	150	25	30	980	1770	910	UJ151M450N300A□□X
	150	30	25	980	1770	970	UJ151M450O250A□□X
	180	22	40	820	1470	1280	UJ181M450M400A□□X
	180	25	30	820	1470	1200	UJ181M450N300A□□X
	180	30	25	820	1470	1180	UJ181M450O250A□□X

□□ see description at end of standard ratings



**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (m $\Omega$ )	Max. ESR +20°C - 120Hz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
450	220	22	45	670	1210	1440	UJ221M450M450A□□X
	220	25	35	670	1210	1370	UJ221M450N350A□□X
	220	30	30	670	1210	1360	UJ221M450O300A□□X
	330	22	60	440	800	1860	UJ331M450M600A□□X
	330	25	50	440	800	1820	UJ331M450N500A□□X
	330	30	35	440	800	1640	UJ331M450O350A□□X
	330	35	30	440	800	1640	UJ331M450P300A□□X
	390	25	55	380	680	2010	UJ391M450N550A□□X
	390	30	40	380	680	1830	UJ391M450O400A□□X
	390	35	35	380	680	1830	UJ391M450P350A□□X
	470	25	60	310	560	2210	UJ471M450N600A□□X
	470	30	45	310	560	2050	UJ471M450O450A□□X
	470	35	40	310	560	2050	UJ471M450P400A□□X
	560	30	50	260	470	2260	UJ561M450O500A□□X
	560	35	45	260	470	2180	UJ561M450P450A□□X
	680	30	60	220	390	2590	UJ681M450O600A□□X
	680	35	50	220	390	2580	UJ681M450P500A□□X
	820	35	60	180	320	2800	UJ821M450P600A□□X
	820	40	50	180	320	2800	UJ821M450Q500A□□X
	1000	35	65	150	270	3210	UJ102M450P650A□□X
1000	40	55	150	270	3210	UJ102M450Q550A□□X	
1200	40	70	120	220	3540	UJ122M450Q700A□□X	
500	56	22	25	2630	4740	630	UJ560M500M250A□□X
	82	22	35	1790	3230	820	UJ820M500M350A□□X
	82	25	25	1790	3230	780	UJ820M500N250A□□X
	120	22	45	1230	2210	1050	UJ121M500M450A□□X
	120	25	35	1230	2210	1020	UJ121M500N350A□□X
	120	30	25	1230	2210	970	UJ121M500O250A□□X
	150	22	50	980	1770	1200	UJ151M500M500A□□X
	150	25	40	980	1770	1170	UJ151M500N400A□□X
	150	30	30	980	1770	1130	UJ151M500O300A□□X
	150	35	25	980	1770	1090	UJ151M500P250A□□X
	180	22	60	820	1470	1370	UJ181M500M600A□□X
	180	25	45	820	1470	1310	UJ181M500N450A□□X
	180	30	35	820	1470	1280	UJ181M500O350A□□X
	180	35	30	820	1470	1260	UJ181M500P300A□□X
	220	25	50	670	1210	1460	UJ221M500N500A□□X
	220	30	40	670	1210	1450	UJ221M500O400A□□X
	220	35	35	670	1210	1440	UJ221M500P350A□□X
	270	25	60	540	980	1700	UJ271M500N600A□□X
	270	30	45	540	980	1630	UJ271M500O450A□□X
	270	35	35	540	980	1630	UJ271M500P350A□□X
330	30	50	440	800	1810	UJ331M500O500A□□X	
330	35	40	440	800	1710	UJ331M500P400A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

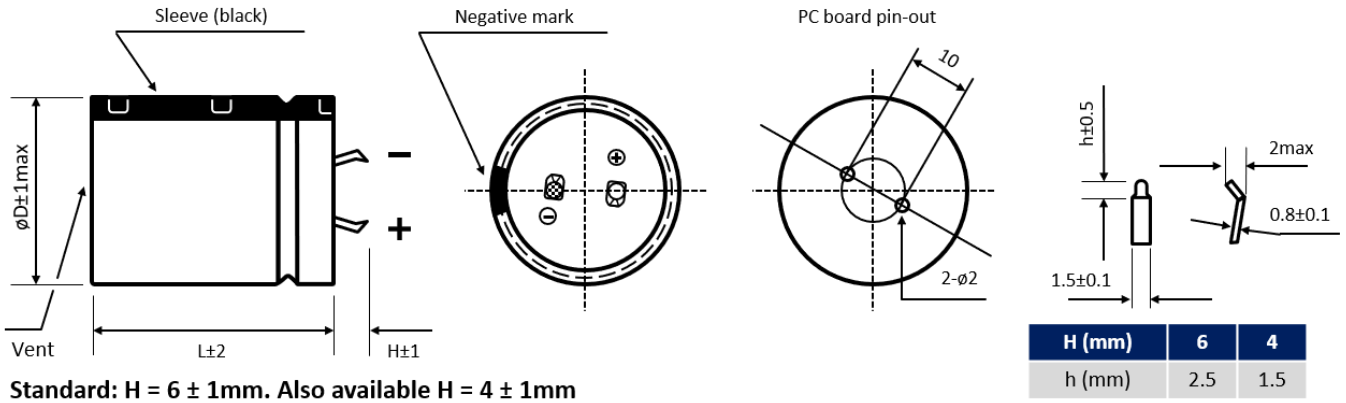
V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (mΩ)	Max. ESR +20°C • 120Hz (mΩ)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
500	390	30	60	380	680	2060	UJ391M500O600A□□X
	390	35	50	380	680	2060	UJ391M500P500A□□X
	470	35	55	310	560	2190	UJ471M500P550A□□X
	560	35	60	260	470	2650	UJ561M500P600A□□X
	680	40	60	220	390	3000	UJ681M500Q600A□□X
	820	40	70	180	320	4000	UJ821M500Q700A□□X
	1000	40	80	150	270	4680	UJ102M500Q800A□□X
550	47	25	25	3130	5640	470	UJ470M550N250A□□X
	56	25	30	2630	4740	540	UJ560M550N300A□□X
	68	25	35	2170	3900	620	UJ680M550N350A□□X
	68	30	25	2170	3900	650	UJ680M550O250A□□X
	82	25	35	1790	3230	690	UJ820M550N350A□□X
	82	30	30	1790	3230	730	UJ820M550O300A□□X
	100	25	40	1470	2650	800	UJ101M550N400A□□X
	100	30	35	1470	2650	840	UJ101M550O350A□□X
	100	35	25	1470	2650	870	UJ101M550P250A□□X
	120	25	50	1230	2210	920	UJ121M550N500A□□X
	120	30	35	1230	2210	940	UJ121M550O350A□□X
	120	35	30	1230	2210	1040	UJ121M550P300A□□X
	150	25	55	980	1770	1090	UJ151M550N550A□□X
	150	30	45	980	1770	1170	UJ151M550O450A□□X
	150	35	35	980	1770	1210	UJ151M550P350A□□X
	180	30	50	820	1470	1330	UJ181M550O500A□□X
	180	35	40	820	1470	1360	UJ181M550P400A□□X
	180	35	35	820	1470	1290	UJ181M550P350A□□X
	220	30	55	670	1210	1540	UJ221M550O550A□□X
	220	35	45	670	1210	1560	UJ221M550P450A□□X
	220	35	35	670	1210	1400	UJ221M550P350A□□X
270	35	50	540	980	1790	UJ271M550P500A□□X	
270	35	40	540	980	1630	UJ271M550P400A□□X	
330	35	50	440	800	1660	UJ331M550P500A□□X	
390	35	55	380	680	1850	UJ391M550P550A□□X	
470	35	60	310	560	2100	UJ471M550P600A□□X	

□□: Enter **P6** for standard type • 6mm pin length  
 □□: Enter **Z6** for 3-pin type • 6mm pin length  
 □□: Enter **Y6** for multi-pin type • 6mm pin length

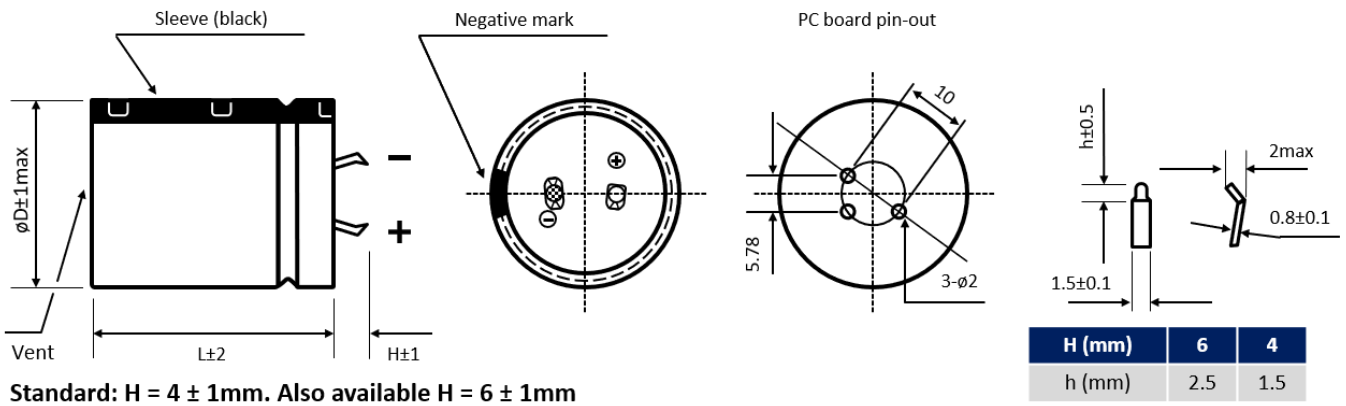
□□: Enter **P4** for standard type • 4mm pin length  
 □□: Enter **Z4** for 3-pin type • 4mm pin length  
 □□: Enter **Y4** for multi-pin type • 4mm pin length

## DIMENSIONS - All dimensions in mm

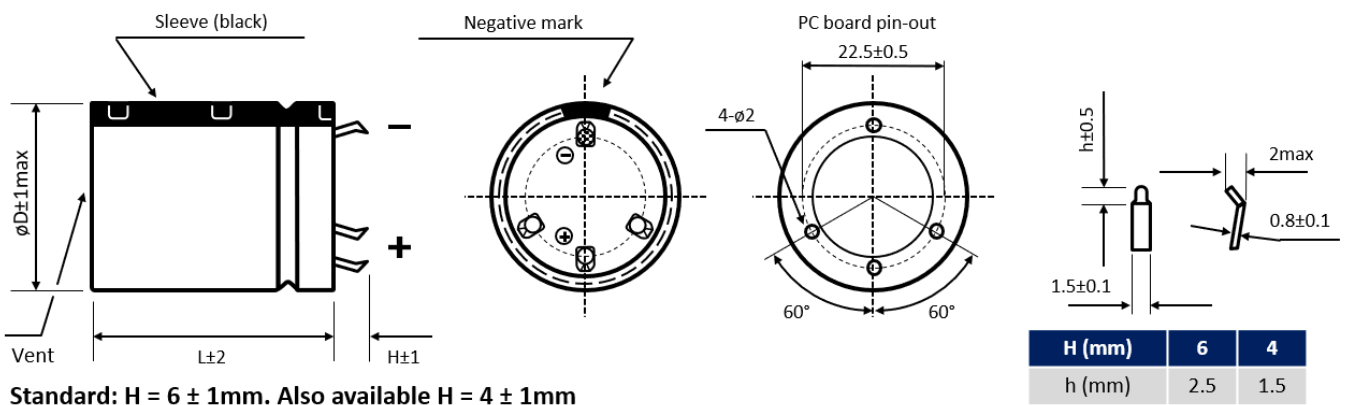
### 2-pin version - Standard type



### 3-pin version - Polarity protection



### Multipin version - Diameter $\phi D \geq 30$ mm





Further possible terminal styles can be found in our packaging information liquid snap-in.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

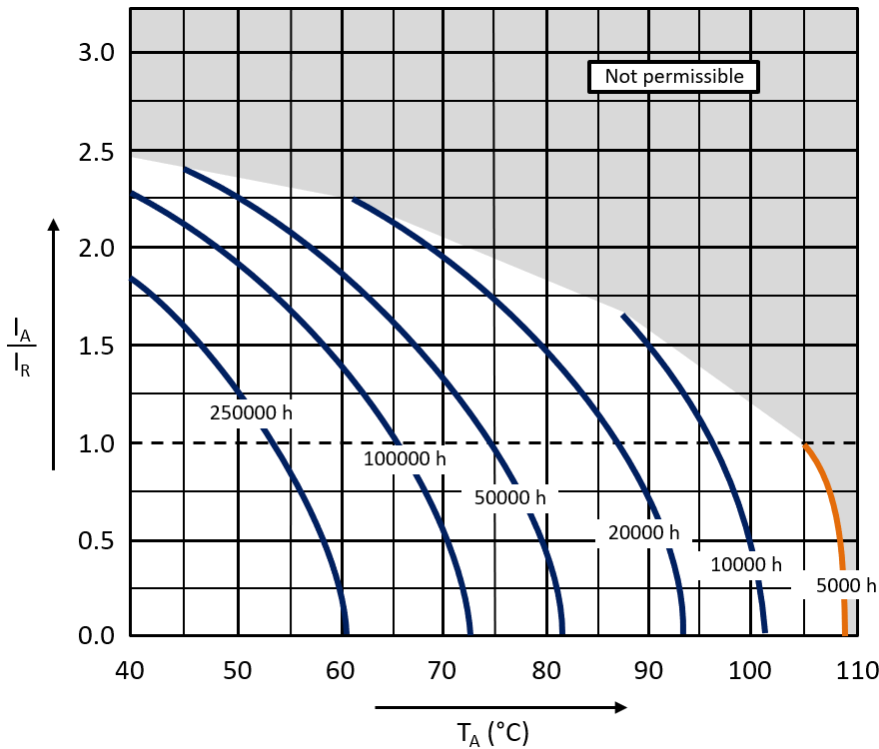
$V_R$ (V) / Frequency (Hz)	50/60	100/120	300	1k	10k	50k - 100k
$200 \leq V_R \leq 250$	0.81	1	1.17	1.32	1.45	1.5
$350 \leq V_R \leq 550$	0.77	1	1.16	1.3	1.41	1.43

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

	
General Precautions and Guidelines	Packaging Information Liquid Snap-In
Page 310	Page 230

USEFUL LIFE



With:  $I_A$ : Application current  
 $I_R$ : Rated ripple current (A RMS)  
 $T_A$ : Application temperature of the capacitor

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### UK SERIES ▪ ULTRA LONG LIFE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ Snap-In type
- Useful life: 105°C ▪ 8000 hours
- Extremely stable dissipation factor and leakage current
- Especially for applications with demanding operating environment
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics			
Operating Temperature Range		-40 ~ +105°C		-25 ~ +105°C	
Rated Voltage Range	V <sub>R</sub>	200 ~ 450V DC		500 ~ 550V DC	
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V) ▪ V <sub>S</sub> = 1.15·V <sub>R</sub>		(V <sub>R</sub> > 315V) ▪ V <sub>S</sub> = 1.10·V <sub>R</sub>	
Capacitance Range	C <sub>R</sub>	68 ~ 2200µF		47 ~ 680µF	
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)			
Leakage Current (20°C ▪ V <sub>R</sub> applied)	I <sub>LEAK</sub>	≤ 3 · √C <sub>R</sub> · V <sub>R</sub> ▪ After 5 minutes [ I <sub>LEAK</sub> (µA) ; C <sub>R</sub> (µF) ; V <sub>R</sub> (V) ]			
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V <sub>R</sub> (V DC)	200 ~ 400	450 ~ 550	
		tanδ	15	20	
Self-Resistance (20°C ▪ 120Hz)	ESR	Not to exceed the values shown in standard ratings			
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	200 ~ 250	315 ~ 450	500 ~ 550
		Z-25°C/Z+20°C	4	5	6
		Z-40°C/Z+20°C	7	10	-

Lifetime Test					
Useful Life 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>8000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value			
	tanδ	≤ 200% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
	Deviation Rate at Useful Life: 100 FIT = 0.01%/1000h with 60% confidence level ▪ parts show higher drift as test criteria				
Endurance 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>3000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±15% of initial measured value			
	tanδ	≤ 175% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
Shelf Life 105°C (V <sub>R</sub> = 0)	Test	<b>1000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±15% of initial measured value			
	tanδ	≤ 175% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4					
Vibration Resistance Test	Max. 10g force, f <sub>RANGE</sub> 10Hz ... 55Hz, amplitude 0.75mm; X/Y/Z-axis each 2h; capacitor rigidly clamped by body to surface ▪ IEC 60068-2-6				

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
200	330	22	25	320	600	1380	UK331M200M250A□□X
	390	22	25	280	510	1450	UK391M200M250A□□X
	470	22	30	230	420	1680	UK471M200M300A□□X
	470	25	25	230	420	1680	UK471M200N250A□□X
	560	22	35	190	360	1810	UK561M200M350A□□X
	560	25	30	190	360	1780	UK561M200N300A□□X
	560	30	25	190	360	1960	UK561M200O250A□□X
	680	22	40	160	290	2150	UK681M200M400A□□X
	680	25	35	160	290	2060	UK681M200N350A□□X
	680	30	25	160	290	2170	UK681M200O250A□□X
	820	22	45	130	240	2420	UK821M200M450A□□X
	820	25	35	130	240	2220	UK821M200N350A□□X
	820	30	25	130	240	2340	UK821M200O250A□□X
	1000	25	45	110	200	2720	UK102M200N450A□□X
	1000	30	30	110	200	2910	UK102M200O300A□□X
	1000	35	25	110	200	3140	UK102M200P250A□□X
	1200	25	50	92	170	2870	UK122M200N500A□□X
	1200	30	35	92	170	3420	UK122M200O350A□□X
	1200	35	30	92	170	3380	UK122M200P300A□□X
	1500	25	60	70	130	3290	UK152M200N600A□□X
1500	30	45	70	130	4120	UK152M200O450A□□X	
1500	35	35	70	130	3910	UK152M200P350A□□X	
1800	30	50	59	110	4330	UK182M200O500A□□X	
1800	35	40	59	110	4460	UK182M200P400A□□X	
2200	30	60	49	90	4750	UK222M200O600A□□X	
2200	35	45	49	90	5110	UK222M200P450A□□X	
250	220	22	25	490	900	1150	UK221M250M250A□□X
	270	22	25	400	740	1210	UK271M250M250A□□X
	330	22	30	320	600	1520	UK331M250M300A□□X
	330	25	25	320	600	1450	UK331M250N250A□□X
	390	22	35	280	510	1720	UK391M250M350A□□X
	390	22	40	280	510	1820	UK391M250M400A□□X
	390	25	30	280	510	1580	UK391M250N300A□□X
	390	30	25	280	510	1620	UK391M250O250A□□X
	470	22	40	230	420	1960	UK471M250M400A□□X
	470	25	30	230	420	1720	UK471M250N300A□□X
	470	30	25	230	420	1880	UK471M250O250A□□X
	560	22	45	190	360	2160	UK561M250M450A□□X
	560	25	35	190	360	1960	UK561M250N350A□□X
	560	30	30	190	360	2220	UK561M250O300A□□X
	560	35	25	190	360	2080	UK561M250P250A□□X
	680	22	50	160	290	2410	UK681M250M500A□□X
680	25	40	160	290	2210	UK681M250N400A□□X	
680	30	30	160	290	2350	UK681M250O300A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (mΩ)	Max. ESR +20°C • 120Hz (mΩ)	I <sub>R</sub> - Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
250	680	35	25	160	290	2500	UK681M250P250A□□X
	820	30	35	130	240	2780	UK821M250O350A□□X
	820	35	30	130	240	2900	UK821M250P300A□□X
	1000	30	40	110	200	3300	UK102M250O400A□□X
	1000	35	35	110	200	3360	UK102M250P350A□□X
	1200	30	50	92	170	3850	UK122M250O500A□□X
	1200	35	40	92	170	3820	UK122M250P400A□□X
	1500	30	55	70	130	4330	UK152M250O550A□□X
	1500	35	45	70	130	4340	UK152M250P450A□□X
	1800	35	50	59	110	4700	UK182M250P500A□□X
	2200	35	60	49	90	5580	UK222M250P600A□□X
315	150	22	25	720	1330	1000	UK151M315M250A□□X
	180	22	30	600	1110	1150	UK181M315M300A□□X
	220	22	30	490	900	1300	UK221M315M300A□□X
	220	25	25	490	900	1300	UK221M315N250A□□X
	270	22	35	400	740	1410	UK271M315M350A□□X
	270	25	30	400	740	1420	UK271M315N300A□□X
	330	22	40	320	600	1740	UK331M315M400A□□X
	330	25	35	320	600	1580	UK331M315N350A□□X
	330	30	25	320	600	1620	UK331M315O250A□□X
	390	22	50	280	510	1940	UK391M315M500A□□X
	390	25	35	280	510	1700	UK391M315N350A□□X
	390	30	30	280	510	1780	UK391M315O300A□□X
	390	35	25	280	510	1800	UK391M315P250A□□X
	470	22	55	230	420	2050	UK471M315M550A□□X
	470	25	45	230	420	2040	UK471M315N450A□□X
	470	30	35	230	420	2030	UK471M315O350A□□X
	470	35	30	230	420	2070	UK471M315P300A□□X
	560	25	50	190	360	2280	UK561M315N500A□□X
	560	30	35	190	360	2230	UK561M315O350A□□X
	560	35	30	190	360	2250	UK561M315P300A□□X
	680	25	55	160	290	2700	UK681M315N550A□□X
	680	30	40	160	290	2660	UK681M315O400A□□X
	680	35	35	160	290	2700	UK681M315P350A□□X
	820	30	50	130	240	3120	UK821M315O500A□□X
	820	35	40	130	240	3100	UK821M315P400A□□X
	1000	30	55	110	200	3640	UK102M315O550A□□X
1000	35	45	110	200	3560	UK102M315P450A□□X	
1200	35	50	92	170	4050	UK122M315P500A□□X	
1500	35	60	70	130	4350	UK152M315P600A□□X	
350	100	22	25	1080	1990	740	UK101M350M250A□□X
	100	25	20	1080	1990	520	UK101M350N200A□□X
	120	22	25	900	1660	920	UK121M350M250A□□X
	150	22	30	720	1330	1060	UK151M350M300A□□X

□□ see description at end of standard ratings



**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
350	180	22	30	600	1110	1170	UK181M350M300A□□X
	180	25	25	600	1110	1170	UK181M350N250A□□X
	220	22	35	490	900	1320	UK221M350M350A□□X
	220	22	40	490	900	1400	UK221M350M400A□□X
	220	25	30	490	900	1330	UK221M350N300A□□X
	220	30	25	490	900	1350	UK221M350O250A□□X
	270	22	45	400	740	1550	UK271M350M450A□□X
	270	25	35	400	740	1470	UK271M350N350A□□X
	270	30	25	400	740	1370	UK271M350O250A□□X
	330	22	50	320	600	1760	UK331M350M500A□□X
	330	25	40	320	600	1680	UK331M350N400A□□X
	330	30	30	320	600	1640	UK331M350O300A□□X
	330	35	25	320	600	1690	UK331M350P250A□□X
	390	25	45	280	510	1860	UK391M350N450A□□X
	390	30	35	280	510	1840	UK391M350O350A□□X
	390	35	30	280	510	1870	UK391M350P300A□□X
	470	25	50	230	420	2090	UK471M350N500A□□X
	470	30	40	230	420	2090	UK471M350O400A□□X
	470	35	30	230	420	2080	UK471M350P300A□□X
	560	30	45	190	360	2240	UK561M350O450A□□X
560	35	35	190	360	2260	UK561M350P350A□□X	
680	30	50	160	290	2670	UK681M350O500A□□X	
680	35	40	160	290	2710	UK681M350P400A□□X	
820	35	45	130	240	3110	UK821M350P450A□□X	
820	35	50	130	240	3250	UK821M350P500A□□X	
1000	35	55	110	200	3580	UK102M350P550A□□X	
1200	35	60	92	170	4100	UK122M350P600A□□X	
400	82	22	25	1310	2430	610	UK820M400M250A□□X
	100	22	25	1080	1990	670	UK101M400M250A□□X
	120	22	30	900	1660	790	UK121M400M300A□□X
	120	25	25	900	1660	790	UK121M400N250A□□X
	120	25	30	900	1660	850	UK121M400N300A□□X
	150	22	35	720	1330	950	UK151M400M350A□□X
	150	22	40	720	1330	1000	UK151M400M400A□□X
	150	25	25	720	1330	890	UK151M400N250A□□X
	150	25	30	720	1330	960	UK151M400N300A□□X
	150	30	25	720	1330	990	UK151M400O250A□□X
	180	22	35	600	1110	1040	UK181M400M350A□□X
	180	22	40	600	1110	1100	UK181M400M400A□□X
	180	25	30	600	1110	1050	UK181M400N300A□□X
	180	25	35	600	1110	1120	UK181M400N350A□□X
	180	30	25	600	1110	1090	UK181M400O250A□□X
	180	30	30	600	1110	1170	UK181M400O300A□□X
220	22	45	490	900	1200	UK221M400M450A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (m $\Omega$ )	Max. ESR +20°C - 120Hz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
400	220	25	35	490	900	1200	UK221M400N350A□□X
	220	25	45	490	900	1240	UK221M400N450A□□X
	220	30	25	490	900	1150	UK221M400O250A□□X
	220	30	30	490	900	1240	UK221M400O300A□□X
	220	35	25	490	900	1240	UK221M400P250A□□X
	270	22	50	400	740	1320	UK271M400M500A□□X
	270	25	40	400	740	1290	UK271M400N400A□□X
	270	25	50	400	740	1420	UK271M400N500A□□X
	270	30	30	400	740	1270	UK271M400O300A□□X
	270	30	35	400	740	1350	UK271M400O350A□□X
	270	35	25	400	740	1300	UK271M400P250A□□X
	270	35	30	400	740	1390	UK271M400P300A□□X
	330	25	45	320	600	1500	UK331M400N450A□□X
	330	25	50	320	600	1570	UK331M400N500A□□X
	330	30	35	320	600	1500	UK331M400O350A□□X
	330	30	40	320	600	1580	UK331M400O400A□□X
	330	35	30	320	600	1540	UK331M400P300A□□X
	330	35	35	320	600	1640	UK331M400P350A□□X
	390	25	50	280	510	1700	UK391M400N500A□□X
	390	30	40	280	510	1720	UK391M400O400A□□X
	390	30	45	280	510	1800	UK391M400O450A□□X
	390	35	30	280	510	1700	UK391M400P300A□□X
	390	35	35	280	510	1780	UK391M400P350A□□X
	470	30	45	230	420	1980	UK471M400O450A□□X
	470	30	50	230	420	2070	UK471M400O500A□□X
	470	35	35	230	420	1980	UK471M400P350A□□X
	470	35	40	230	420	2070	UK471M400P400A□□X
	470	35	45	230	420	2160	UK471M400P450A□□X
	560	30	50	190	360	2260	UK561M400O500A□□X
	560	35	40	190	360	2260	UK561M400P400A□□X
	560	35	45	190	360	2360	UK561M400P450A□□X
	680	30	50	160	290	2490	UK681M400O500A□□X
680	35	45	160	290	2600	UK681M400P450A□□X	
680	35	50	160	290	2720	UK681M400P500A□□X	
820	35	55	130	240	3110	UK821M400P550A□□X	
820	35	60	130	240	3230	UK821M400P600A□□X	
1000	35	55	110	200	3440	UK102M400P550A□□X	
1000	35	60	110	200	3570	UK102M400P600A□□X	
1200	35	60	92	170	3910	UK122M400P600A□□X	
450	68	22	25	2110	3900	550	UK680M450M250A□□X
	82	22	25	1750	3230	610	UK820M450M250A□□X
	100	22	30	1430	2650	720	UK101M450M300A□□X
	100	25	25	1430	2650	720	UK101M450N250A□□X
	120	22	35	1190	2210	850	UK121M450M350A□□X

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
450	120	22	40	1190	2210	900	UK121M450M400A□□X
	120	25	30	1190	2210	850	UK121M450N300A□□X
	120	25	35	1190	2210	910	UK121M450N350A□□X
	120	30	25	1190	2210	850	UK121M450O250A□□X
	150	22	40	960	1770	1000	UK151M450M400A□□X
	150	25	30	960	1770	960	UK151M450N300A□□X
	150	25	35	960	1770	1020	UK151M450N350A□□X
	150	30	25	960	1770	1000	UK151M450O250A□□X
	150	30	30	960	1770	1060	UK151M450O300A□□X
	150	35	25	960	1770	1090	UK151M450P250A□□X
	180	22	45	790	1470	1160	UK181M450M450A□□X
	180	22	50	790	1470	1210	UK181M450M500A□□X
	180	25	35	790	1470	1120	UK181M450N350A□□X
	180	25	40	790	1470	1210	UK181M450N400A□□X
	180	30	30	790	1470	1210	UK181M450O300A□□X
	180	30	35	790	1470	1240	UK181M450O350A□□X
	180	35	25	790	1470	1210	UK181M450P250A□□X
	180	35	30	790	1470	1280	UK181M450P300A□□X
	220	25	40	650	1210	1240	UK221M450N400A□□X
	220	25	45	650	1210	1280	UK221M450N450A□□X
	220	30	30	650	1210	1240	UK221M450O300A□□X
	220	30	35	650	1210	1280	UK221M450O350A□□X
	220	35	25	650	1210	1240	UK221M450P250A□□X
	220	35	30	650	1210	1280	UK221M450P300A□□X
	270	25	50	530	980	1420	UK271M450N500A□□X
	270	30	30	530	980	1280	UK271M450O300A□□X
	270	30	35	530	980	1350	UK271M450O350A□□X
	270	35	30	530	980	1390	UK271M450P300A□□X
	270	35	35	530	980	1480	UK271M450P350A□□X
	330	30	40	430	800	1580	UK331M450O400A□□X
	330	30	45	430	800	1660	UK331M450O450A□□X
	330	35	30	430	800	1580	UK331M450P300A□□X
	330	35	35	430	800	1660	UK331M450P350A□□X
	390	30	45	370	680	1800	UK391M450O450A□□X
	390	30	50	370	680	1890	UK391M450O500A□□X
	390	35	40	370	680	1890	UK391M450P400A□□X
	390	35	45	370	680	1970	UK391M450P450A□□X
	470	30	50	300	560	2080	UK471M450O500A□□X
	470	35	35	300	560	1970	UK471M450P350A□□X
	470	35	40	300	560	2080	UK471M450P400A□□X
470	35	45	300	560	2160	UK471M450P450A□□X	
560	35	50	250	470	2470	UK561M450P500A□□X	
560	35	55	250	470	2570	UK561M450P550A□□X	
680	35	50	210	390	2720	UK681M450P500A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

V <sub>R</sub> (V)	C <sub>R</sub> (µF)	ø D (mm)	L (mm)	Typ. ESR +20°C - 120Hz (mΩ)	Max. ESR +20°C - 120Hz (mΩ)	I <sub>r</sub> - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
450	680	35	60	210	390	2940	UK681M450P600A□□X
	820	35	60	170	320	3230	UK821M450P600A□□X
	820	35	65	170	320	3350	UK821M450P650A□□X
500	47	22	25	3050	5640	450	UK470M500M250A□□X
	56	22	30	2560	4740	520	UK560M500M300A□□X
	68	22	30	2110	3900	520	UK680M500M300A□□X
	68	22	35	2110	3900	560	UK680M500M350A□□X
	68	25	25	2110	3900	540	UK680M500N250A□□X
	68	25	30	2110	3900	580	UK680M500N300A□□X
	82	22	35	1750	3230	700	UK820M500M350A□□X
	82	25	30	1750	3230	710	UK820M500N300A□□X
	100	22	40	1430	2650	810	UK101M500M400A□□X
	100	25	35	1430	2650	860	UK101M500N350A□□X
	100	30	30	1430	2650	850	UK101M500O300A□□X
	120	22	50	1190	2210	980	UK121M500M500A□□X
	120	25	40	1190	2210	950	UK121M500N400A□□X
	120	30	35	1190	2210	1000	UK121M500O350A□□X
	120	35	30	1190	2210	1030	UK121M500P300A□□X
	150	22	50	960	1770	1100	UK151M500M500A□□X
	150	25	45	960	1770	1130	UK151M500N450A□□X
	150	30	40	960	1770	1190	UK151M500O400A□□X
	150	35	35	960	1770	1230	UK151M500P350A□□X
	180	25	50	790	1470	1240	UK181M500N500A□□X
	180	30	45	790	1470	1310	UK181M500O450A□□X
	220	25	55	650	1210	1450	UK221M500N550A□□X
	220	30	45	650	1210	1470	UK221M500O450A□□X
	220	35	40	650	1210	1530	UK221M500P400A□□X
	220	35	35	650	1210	1450	UK221M500P350A□□X
	270	30	50	530	980	1550	UK271M500O500A□□X
	270	35	40	530	980	1620	UK271M500P400A□□X
	330	30	55	430	800	1890	UK331M500O550A□□X
	390	35	45	370	680	1850	UK391M500P450A□□X
	390	35	55	370	680	2020	UK391M500P550A□□X
	470	35	60	300	560	2280	UK471M500P600A□□X
	560	35	65	250	470	2320	UK561M500P650A□□X
	680	40	60	210	390	2450	UK681M500Q600A□□X
550	220	35	35	650	1210	1300	UK221M550P350A□□X
	270	35	45	530	980	1600	UK271M550P450A□□X
	330	35	50	430	800	1630	UK331M550P500A□□X
	390	35	55	370	680	1800	UK391M550P550A□□X
	470	35	65	300	560	2100	UK471M550P650A□□X

□□: Enter **P6** for standard type ▪ 6mm pin length

□□: Enter **Z6** for 3-pin type ▪ 6mm pin length

□□: Enter **Y6** for multi-pin type ▪ 6mm pin length

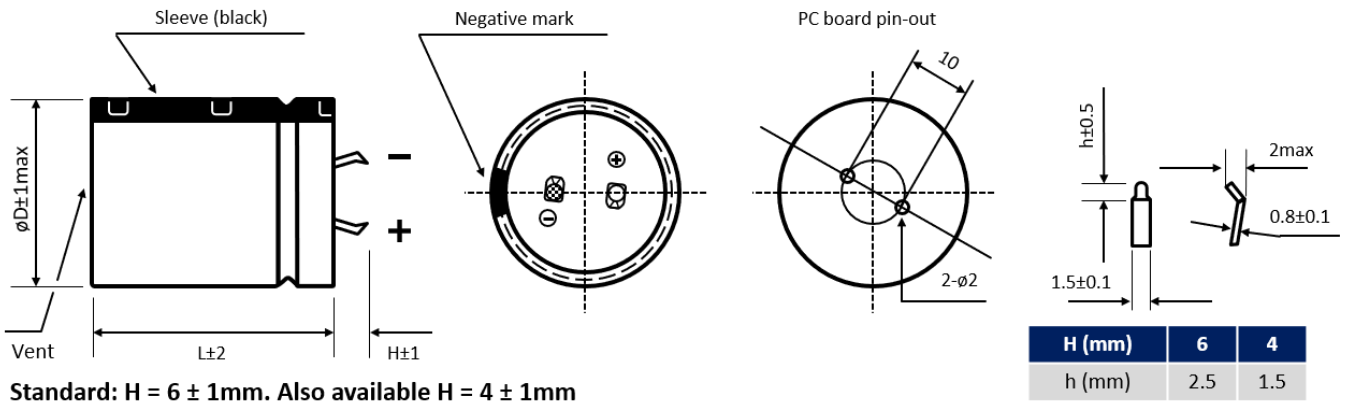
□□: Enter **P4** for standard type ▪ 4mm pin length

□□: Enter **Z4** for 3-pin type ▪ 4mm pin length

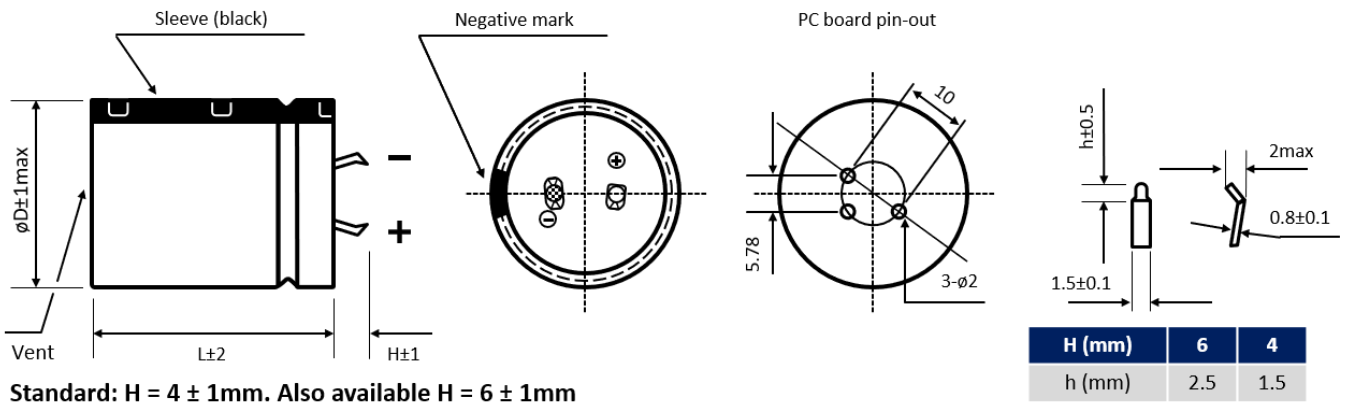
□□: Enter **Y4** for multi-pin type ▪ 4mm pin length

**DIMENSIONS** ▪ All dimensions in mm

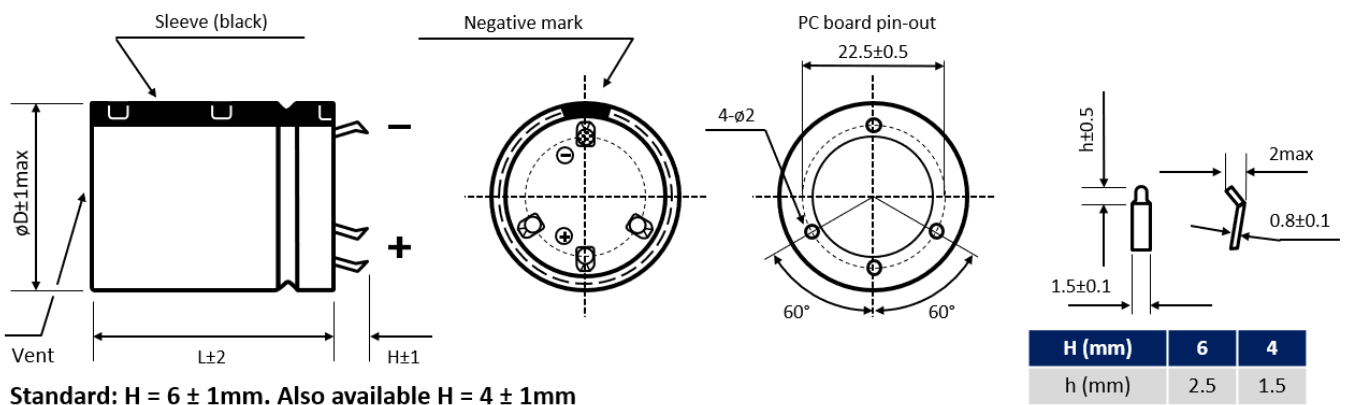
2-pin version ▪ Standard type



3-pin version ▪ Polarity protection



Multipin version ▪ Diameter  $\phi D \geq 30$  mm



Further possible terminal styles can be found in our packaging information liquid snap-in.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

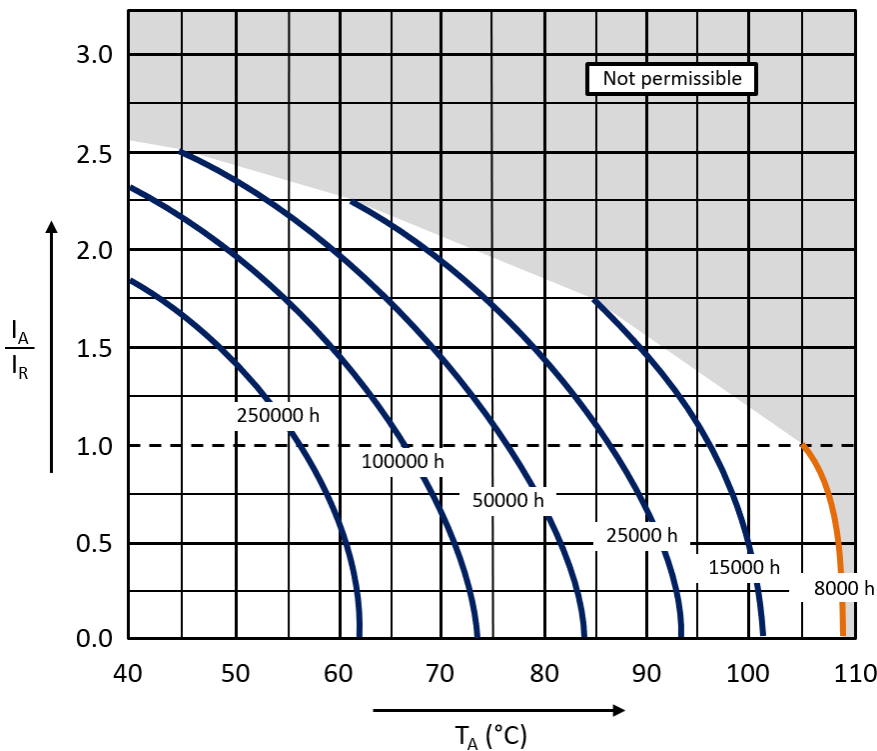
$V_R$ (V) / Frequency (Hz)	50/60	100/120	300	1k	10k	50k - 100k
$200 \leq V_R \leq 250$	0.81	1	1.17	1.32	1.45	1.5
$315 \leq V_R \leq 550$	0.77	1	1.16	1.3	1.41	1.43

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

General Precautions and Guidelines	Packaging Information Liquid Snap-In
Page 310	Page 230

**USEFUL LIFE**



With:  $I_A$ : Application current  
 $I_R$ : Rated ripple current (A RMS)  
 $T_A$ : Application temperature of the capacitor

### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### UL SERIES ▀ ULTRA LONG LIFE, AUTOMOTIVE 105°C TYPE

#### KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • Snap-In type
- Useful life: 105°C • 10000 hours
- Extremely stable dissipation factor and leakage current
- Especially for applications with demanding operating environment
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics			
Operating Temperature Range		-40 ~ +105°C		-25 ~ +105°C	
Rated Voltage Range	V <sub>R</sub>	200 ~ 450V DC		500 ~ 550V DC	
Surge Voltage	V <sub>S</sub>	(V <sub>R</sub> ≤ 315V) • V <sub>S</sub> = 1.15·V <sub>R</sub>		(V <sub>R</sub> > 315V) • V <sub>S</sub> = 1.10·V <sub>R</sub>	
Capacitance Range	C <sub>R</sub>	82 ~ 2700µF		47 ~ 680µF	
Cap. Tolerance	ΔC	±20% (120Hz • 20°C)			
Leakage Current (20°C • V <sub>R</sub> applied)	I <sub>LEAK</sub>	$\leq 3 \cdot \sqrt{C_R \cdot V_R}$ • After 5 minutes [ I <sub>LEAK</sub> (µA) ; C <sub>R</sub> (µF) ; V <sub>R</sub> (V) ]			
Dissipation Factor % (20°C • 120Hz)	tanδ	V <sub>R</sub> (V DC)	200 ~ 400	450 ~ 550	
		tanδ	15	20	
Self-Resistance (20°C • 120Hz)	ESR	Not to exceed the values shown in standard ratings			
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	200 ~ 250	315 ~ 450	500 ~ 550
		Z-25°C/Z+20°C	4	5	6
		Z-40°C/Z+20°C	7	10	-

Lifetime Test					
Useful Life 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>10 000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value			
	tanδ	≤ 200% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
	Deviation Rate at Useful Life: 100 FIT = 0.01%/1000h with 60% confidence level • parts show higher drift as test criteria				
Endurance 105°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>5 000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±15% of initial measured value			
	tanδ	≤ 175% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
Shelf Life 105°C (V <sub>R</sub> = 0)	Test	<b>1 000 hours</b>			
	ΔC/C <sub>R</sub>	≤ ±15% of initial measured value			
	tanδ	≤ 175% of initial specified value			
	I <sub>Leak</sub>	≤ the initial specified value			
Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4					
Vibration Resistance Test	Max. 10g force, f <sub>RANGE</sub> 10Hz ... 55Hz, amplitude 0.75mm; X/Y/Z-axis each 2h; capacitor rigidly clamped by body to surface • IEC 60068-2-6				



**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
200	180	22	20	580	1110	750	UL181M200M200A□□X
	220	22	25	470	900	800	UL221M200M250A□□X
	270	22	25	390	740	1310	UL271M200M250A□□X
	270	22	30	390	740	1350	UL271M200M300A□□X
	270	25	25	390	740	1350	UL271M200N250A□□X
	330	22	25	320	600	1410	UL331M200M250A□□X
	330	22	30	320	600	1530	UL331M200M300A□□X
	330	25	25	320	600	1480	UL331M200N250A□□X
	390	22	30	270	510	1630	UL391M200M300A□□X
	390	22	35	270	510	1680	UL391M200M350A□□X
	390	25	25	270	510	1630	UL391M200N250A□□X
	390	25	30	270	510	1680	UL391M200N300A□□X
	390	30	25	270	510	1680	UL391M200O250A□□X
	470	22	30	220	420	1720	UL471M200M300A□□X
	470	22	35	220	420	1840	UL471M200M350A□□X
	470	25	25	220	420	1630	UL471M200N250A□□X
	470	25	30	220	420	1750	UL471M200N300A□□X
	470	35	25	220	420	1750	UL471M200P250A□□X
	560	22	35	190	360	1950	UL561M200M350A□□X
	560	22	40	190	360	2070	UL561M200M400A□□X
	560	25	30	190	360	1840	UL561M200N300A□□X
	560	25	35	190	360	1920	UL561M200N350A□□X
	560	30	30	190	360	1840	UL561M200O300A□□X
	560	35	25	190	360	1840	UL561M200P250A□□X
	680	22	40	150	290	2220	UL681M200M400A□□X
	680	22	45	150	290	2320	UL681M200M450A□□X
	680	25	35	150	290	2110	UL681M200N350A□□X
	680	25	40	150	290	2320	UL681M200N400A□□X
	680	30	30	150	290	2110	UL681M200O300A□□X
	680	30	35	150	290	2320	UL681M200O350A□□X
	680	35	30	150	290	2320	UL681M200P300A□□X
	820	22	50	130	240	2600	UL821M200M500A□□X
	820	25	40	130	240	2370	UL821M200N400A□□X
	820	30	30	130	240	2110	UL821M200O300A□□X
	820	30	35	130	240	2370	UL821M200O350A□□X
	820	35	30	130	240	2370	UL821M200P300A□□X
	1000	22	60	110	200	3000	UL102M200M600A□□X
	1000	25	45	110	200	2630	UL102M200N450A□□X
	1000	30	35	110	200	2370	UL102M200O350A□□X
	1000	30	40	110	200	2420	UL102M200O400A□□X
1000	35	30	110	200	2370	UL102M200P300A□□X	
1000	35	35	110	200	2420	UL102M200P350A□□X	
1200	25	50	89	170	2880	UL122M200N500A□□X	
1200	30	40	89	170	2550	UL122M200O400A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
200	1200	35	30	89	170	2440	UL122M200P300A□□X
	1200	35	35	89	170	2880	UL122M200P350A□□X
	1500	30	45	68	130	2820	UL152M200O450A□□X
	1500	30	50	68	130	3000	UL152M200O500A□□X
	1500	35	35	68	130	2980	UL152M200P350A□□X
	1500	35	40	68	130	3080	UL152M200P400A□□X
	1800	30	50	58	110	3080	UL182M200O500A□□X
	1800	35	40	58	110	3180	UL182M200P400A□□X
	1800	35	45	58	110	3280	UL182M200P450A□□X
	2200	35	50	48	90	3450	UL222M200P500A□□X
2700	35	60	39	74	4000	UL272M200P600A□□X	
250	220	22	25	470	900	850	UL221M250M250A□□X
	270	22	25	390	740	1320	UL271M250M250A□□X
	270	22	30	390	740	1360	UL271M250M300A□□X
	270	25	25	390	740	1360	UL271M250N250A□□X
	330	22	30	320	600	1550	UL331M250M300A□□X
	330	22	35	320	600	1600	UL331M250M350A□□X
	330	25	25	320	600	1450	UL331M250N250A□□X
	330	25	30	320	600	1600	UL331M250N300A□□X
	390	22	35	270	510	1750	UL391M250M350A□□X
	390	22	40	270	510	1800	UL391M250M400A□□X
	390	25	30	270	510	1680	UL391M250N300A□□X
	390	25	35	270	510	1730	UL391M250N350A□□X
	390	30	30	270	510	1730	UL391M250O300A□□X
	470	22	40	220	420	1970	UL471M250M400A□□X
	470	22	45	220	420	2020	UL471M250M450A□□X
	470	25	30	220	420	1750	UL471M250N300A□□X
	470	25	35	220	420	1800	UL471M250N350A□□X
	470	30	25	220	420	1750	UL471M250O250A□□X
	470	30	30	220	420	1800	UL471M250O300A□□X
	560	22	45	190	360	2200	UL561M250M450A□□X
	560	25	40	190	360	2200	UL561M250N400A□□X
	560	30	30	190	360	1970	UL561M250O300A□□X
	560	30	35	190	360	2050	UL561M250O350A□□X
	560	35	30	190	360	2050	UL561M250P300A□□X
	680	22	50	150	290	2450	UL681M250M500A□□X
	680	25	45	150	290	2250	UL681M250N450A□□X
	680	30	35	150	290	2180	UL681M250O350A□□X
	680	30	40	150	290	2250	UL681M250O400A□□X
	680	35	30	150	290	2180	UL681M250P300A□□X
	820	25	50	130	240	2490	UL821M250N500A□□X
820	30	45	130	240	2190	UL821M250O450A□□X	
820	35	35	130	240	2150	UL821M250P350A□□X	
1000	25	55	110	200	2910	UL102M250N550A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
250	1000	30	40	110	200	2440	UL102M250O400A□□X
	1000	30	45	110	200	2540	UL102M250O450A□□X
	1000	35	35	110	200	2380	UL102M250P350A□□X
	1000	35	40	110	200	2540	UL102M250P400A□□X
	1200	30	45	89	170	2680	UL122M250O450A□□X
	1200	30	50	89	170	2730	UL122M250O500A□□X
	1200	35	40	89	170	2720	UL122M250P400A□□X
	1500	30	55	68	130	3150	UL152M250O550A□□X
	1500	35	45	68	130	3150	UL152M250P450A□□X
	1500	35	50	68	130	3200	UL152M250P500A□□X
	1800	35	50	58	110	3420	UL182M250P500A□□X
	1800	35	55	58	110	3600	UL182M250P550A□□X
2200	35	60	48	90	3750	UL222M250P600A□□X	
315	120	22	25	870	1660	720	UL121M315M250A□□X
	150	22	25	700	1330	1000	UL151M315M250A□□X
	150	22	30	700	1330	1030	UL151M315M300A□□X
	150	30	25	700	1330	1000	UL151M315O250A□□X
	180	22	30	580	1110	1140	UL181M315M300A□□X
	180	22	35	580	1110	1180	UL181M315M350A□□X
	180	25	30	580	1110	1180	UL181M315N300A□□X
	220	22	35	470	900	1310	UL221M315M350A□□X
	220	22	40	470	900	1350	UL221M315M400A□□X
	220	25	30	470	900	1310	UL221M315N300A□□X
	220	25	35	470	900	1350	UL221M315N350A□□X
	220	30	25	470	900	1310	UL221M315O250A□□X
	270	22	40	390	740	1490	UL271M315M400A□□X
	270	22	45	390	740	1540	UL271M315M450A□□X
	270	25	35	390	740	1390	UL271M315N350A□□X
	270	25	40	390	740	1540	UL271M315N400A□□X
	270	30	30	390	740	1390	UL271M315O300A□□X
	330	22	45	320	600	1690	UL331M315M450A□□X
	330	22	50	320	600	1760	UL331M315M500A□□X
	330	25	35	320	600	1590	UL331M315N350A□□X
	330	25	40	320	600	1630	UL331M315N400A□□X
	330	30	25	320	600	1410	UL331M315O250A□□X
	330	30	30	320	600	1460	UL331M315O300A□□X
	330	35	25	320	600	1460	UL331M315P250A□□X
	390	22	50	270	510	1870	UL391M315M500A□□X
	390	25	40	270	510	1780	UL391M315N400A□□X
	390	25	45	270	510	1830	UL391M315N450A□□X
	390	30	30	270	510	1630	UL391M315O300A□□X
390	30	35	270	510	1680	UL391M315O350A□□X	
390	35	25	270	510	1480	UL391M315P250A□□X	
390	35	30	270	510	1550	UL391M315P300A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
315	470	22	55	220	420	2090	UL471M315M550A□□X
	470	25	45	220	420	1990	UL471M315N450A□□X
	470	30	35	220	420	1860	UL471M315O350A□□X
	470	30	40	220	420	1990	UL471M315O400A□□X
	470	35	30	220	420	1740	UL471M315P300A□□X
	470	35	35	220	420	1990	UL471M315P350A□□X
	560	22	60	190	360	2290	UL561M315M600A□□X
	560	25	50	190	360	2210	UL561M315N500A□□X
	560	30	40	190	360	2080	UL561M315O400A□□X
	560	30	45	190	360	2160	UL561M315O450A□□X
	560	35	30	190	360	2080	UL561M315P300A□□X
	560	35	35	190	360	2160	UL561M315P350A□□X
	680	25	55	150	290	2440	UL681M315N550A□□X
	680	25	60	150	290	2500	UL681M315N600A□□X
	680	30	45	150	290	2320	UL681M315O450A□□X
	680	30	50	150	290	2400	UL681M315O500A□□X
	680	35	35	150	290	2160	UL681M315P350A□□X
	680	35	40	150	290	2130	UL681M315P400A□□X
	820	30	50	130	240	2550	UL821M315O500A□□X
	820	30	55	130	240	2590	UL821M315O550A□□X
	820	35	40	130	240	2260	UL821M315P400A□□X
	820	35	45	130	240	2350	UL821M315P450A□□X
	1000	30	55	110	200	2780	UL102M315O550A□□X
	1000	30	60	110	200	2820	UL102M315O600A□□X
	1000	35	50	110	200	2700	UL102M315P500A□□X
	1200	30	60	89	170	3010	UL122M315O600A□□X
	1200	35	55	89	170	2920	UL122M315P550A□□X
	1200	35	60	89	170	2960	UL122M315P600A□□X
1500	35	60	68	130	3420	UL152M315P600A□□X	
1500	35	65	68	130	3620	UL152M315P650A□□X	
350	100	22	25	1050	1990	500	UL101M350M250A□□X
	120	22	25	870	1660	920	UL121M350M250A□□X
	120	22	30	870	1660	940	UL121M350M300A□□X
	150	22	30	700	1330	1080	UL151M350M300A□□X
	150	25	25	700	1330	1050	UL151M350N250A□□X
	180	22	35	580	1110	1220	UL181M350M350A□□X
	180	22	40	580	1110	1270	UL181M350M400A□□X
	180	25	30	580	1110	1200	UL181M350N300A□□X
	220	22	40	470	900	1390	UL221M350M400A□□X
	220	22	45	470	900	1430	UL221M350M450A□□X
	220	25	30	470	900	1300	UL221M350N300A□□X
	220	25	35	470	900	1350	UL221M350N350A□□X
	220	30	25	470	900	1300	UL221M350O250A□□X
	270	22	45	390	740	1570	UL271M350M450A□□X

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
350	270	22	50	390	740	1620	UL271M350M500A□□X
	270	25	35	390	740	1490	UL271M350N350A□□X
	270	25	40	390	740	1530	UL271M350N400A□□X
	270	30	25	390	740	1340	UL271M350O250A□□X
	270	30	30	390	740	1490	UL271M350O300A□□X
	270	35	25	390	740	1420	UL271M350P250A□□X
	330	22	50	320	600	1770	UL331M350M500A□□X
	330	25	40	320	600	1690	UL331M350N400A□□X
	330	25	45	320	600	1770	UL331M350N450A□□X
	330	30	30	320	600	1560	UL331M350O300A□□X
	330	30	35	320	600	1690	UL331M350O350A□□X
	330	35	25	320	600	1560	UL331M350P250A□□X
	390	22	55	270	510	1960	UL391M350M550A□□X
	390	25	45	270	510	1880	UL391M350N450A□□X
	390	25	50	270	510	1970	UL391M350N500A□□X
	390	30	35	270	510	1770	UL391M350O350A□□X
	390	30	40	270	510	1830	UL391M350O400A□□X
	390	30	45	270	510	1920	UL391M350O450A□□X
	390	35	30	270	510	1660	UL391M350P300A□□X
	390	35	35	270	510	1730	UL391M350P350A□□X
	470	25	50	220	420	2090	UL471M350N500A□□X
	470	25	55	220	420	2140	UL471M350N550A□□X
	470	30	40	220	420	1990	UL471M350O400A□□X
	470	30	45	220	420	2090	UL471M350O450A□□X
	470	35	35	220	420	1900	UL471M350P350A□□X
	560	25	55	190	360	2300	UL561M350N550A□□X
	560	25	60	190	360	2380	UL561M350N600A□□X
	560	30	45	190	360	2200	UL561M350O450A□□X
	560	30	50	190	360	2300	UL561M350O500A□□X
	560	35	40	190	360	2130	UL561M350P400A□□X
	560	35	45	190	360	2350	UL561M350P450A□□X
	680	30	50	150	290	2430	UL681M350O500A□□X
	680	30	55	150	290	2480	UL681M350O550A□□X
	680	35	40	150	290	2170	UL681M350P400A□□X
	680	35	45	150	290	2400	UL681M350P450A□□X
	820	30	55	130	240	2500	UL821M350O550A□□X
	820	30	60	130	240	2650	UL821M350O600A□□X
	820	35	45	130	240	2450	UL821M350P450A□□X
	820	35	50	130	240	2500	UL821M350P500A□□X
	1000	35	50	110	200	2800	UL102M350P500A□□X
1000	35	60	110	200	3000	UL102M350P600A□□X	
1000	40	50	110	200	3000	UL102M350Q500A□□X	
1200	35	60	89	170	3010	UL122M350P600A□□X	
1200	35	70	89	170	3230	UL122M350P700A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi D$ (mm)	L (mm)	Typ. ESR +20°C - 120Hz (m $\Omega$ )	Max. ESR +20°C - 120Hz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
350	1200	40	60	89	170	3250	UL122M350Q600A□□X
	1500	40	80	68	130	4210	UL152M350Q800A□□X
	1500	45	60	68	130	4060	UL152M350V600A□□X
	1800	40	90	58	110	4900	UL182M350Q900A□□X
	1800	45	70	58	110	4750	UL182M350V700A□□X
	2200	45	85	48	90	5400	UL222M350V850A□□X
	2700	45	100	39	74	6430	UL272M350VA00A□□X
400	82	22	25	1280	2430	550	UL820M400M250A□□X
	100	22	25	1050	1990	660	UL101M400M250A□□X
	100	22	30	1050	1990	680	UL101M400M300A□□X
	100	25	25	1050	1990	680	UL101M400N250A□□X
	120	22	25	870	1660	700	UL121M400M250A□□X
	120	22	30	870	1660	760	UL121M400M300A□□X
	120	25	25	870	1660	760	UL121M400N250A□□X
	150	22	30	700	1330	850	UL151M400M300A□□X
	150	22	35	700	1330	900	UL151M400M350A□□X
	150	25	25	700	1330	850	UL151M400N250A□□X
	150	25	30	700	1330	900	UL151M400N300A□□X
	180	22	35	580	1110	990	UL181M400M350A□□X
	180	22	40	580	1110	1050	UL181M400M400A□□X
	180	25	30	580	1110	1050	UL181M400N300A□□X
	180	25	35	580	1110	1100	UL181M400N350A□□X
	180	30	25	580	1110	1050	UL181M400O250A□□X
	220	22	45	470	900	1120	UL221M400M450A□□X
	220	22	50	470	900	1160	UL221M400M500A□□X
	220	25	30	470	900	1070	UL221M400N300A□□X
	220	25	35	470	900	1120	UL221M400N350A□□X
	220	30	25	470	900	1100	UL221M400O250A□□X
	220	30	30	470	900	1160	UL221M400O300A□□X
	270	22	50	390	740	1260	UL271M400M500A□□X
	270	25	40	390	740	1260	UL271M400N400A□□X
	270	25	45	390	740	1290	UL271M400N450A□□X
	270	30	30	390	740	1260	UL271M400O300A□□X
	270	30	35	390	740	1290	UL271M400O350A□□X
	270	35	25	390	740	1260	UL271M400P250A□□X
	330	22	55	320	600	1450	UL331M400M550A□□X
	330	25	40	320	600	1350	UL331M400N400A□□X
	330	25	45	320	600	1420	UL331M400N450A□□X
	330	30	30	320	600	1350	UL331M400O300A□□X
	330	30	35	320	600	1420	UL331M400O350A□□X
330	35	30	320	600	1460	UL331M400P300A□□X	
390	25	50	270	510	1620	UL391M400N500A□□X	
390	25	55	270	510	1690	UL391M400N550A□□X	
390	30	40	270	510	1620	UL391M400O400A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
400	390	30	45	270	510	1690	UL391M400O450A□□X
	390	35	30	270	510	1590	UL391M400P300A□□X
	390	35	35	270	510	1690	UL391M400P350A□□X
	470	30	45	220	420	1880	UL471M400O450A□□X
	470	30	50	220	420	1970	UL471M400O500A□□X
	470	35	35	220	420	1860	UL471M400P350A□□X
	470	35	40	220	420	1960	UL471M400P400A□□X
	560	35	40	190	360	2130	UL561M400P400A□□X
	560	35	45	190	360	2250	UL561M400P450A□□X
	680	35	45	150	290	2480	UL681M400P450A□□X
	680	35	50	150	290	2600	UL681M400P500A□□X
	820	35	55	130	240	2670	UL821M400P550A□□X
	820	35	60	130	240	2780	UL821M400P600A□□X
	820	40	50	130	240	2780	UL821M400Q500A□□X
	1000	35	65	110	200	3250	UL102M400P650A□□X
	1000	40	55	110	200	3250	UL102M400Q550A□□X
	1200	35	75	89	170	3720	UL122M400P750A□□X
	1200	40	65	89	170	3720	UL122M400Q650A□□X
	1200	45	55	89	170	3720	UL122M400V550A□□X
	1500	40	80	68	130	4560	UL152M400Q800A□□X
1500	45	65	68	130	4560	UL152M400V650A□□X	
1800	45	80	58	110	5360	UL182M400V800A□□X	
450	82	22	25	1700	3230	600	UL820M450M250A□□X
	100	22	25	1390	2650	640	UL101M450M250A□□X
	100	22	30	1390	2650	690	UL101M450M300A□□X
	100	25	25	1390	2650	690	UL101M450N250A□□X
	120	22	30	1160	2210	760	UL121M450M300A□□X
	120	22	35	1160	2210	810	UL121M450M350A□□X
	120	25	25	1160	2210	760	UL121M450N250A□□X
	120	25	30	1160	2210	810	UL121M450N300A□□X
	150	22	35	930	1770	900	UL151M450M350A□□X
	150	22	40	930	1770	960	UL151M450M400A□□X
	150	25	30	930	1770	900	UL151M450N300A□□X
	150	25	35	930	1770	960	UL151M450N350A□□X
	150	30	25	930	1770	900	UL151M450O250A□□X
	150	30	30	930	1770	960	UL151M450O300A□□X
	180	22	40	770	1470	1050	UL181M450M400A□□X
	180	22	45	770	1470	1100	UL181M450M450A□□X
	180	25	30	770	1470	1050	UL181M450N300A□□X
	180	25	35	770	1470	1100	UL181M450N350A□□X
	180	30	25	770	1470	1030	UL181M450O250A□□X
	180	30	30	770	1470	1110	UL181M450O300A□□X
180	35	25	770	1470	1110	UL181M450P250A□□X	
220	22	45	640	1210	1160	UL221M450M450A□□X	

□□ see description at end of standard ratings

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (m $\Omega$ )	Max. ESR +20°C • 120Hz (m $\Omega$ )	$I_R$ • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
450	220	25	35	640	1210	1150	UL221M450N350A□□X
	220	25	40	640	1210	1180	UL221M450N400A□□X
	220	30	30	640	1210	1150	UL221M450O300A□□X
	220	30	35	640	1210	1200	UL221M450O350A□□X
	220	35	25	640	1210	1150	UL221M450P250A□□X
	270	22	55	520	980	1310	UL271M450M550A□□X
	270	25	45	520	980	1290	UL271M450N450A□□X
	270	25	50	520	980	1310	UL271M450N500A□□X
	270	30	30	520	980	1230	UL271M450O300A□□X
	270	30	40	520	980	1350	UL271M450O400A□□X
	270	35	30	520	980	1350	UL271M450P300A□□X
	330	25	50	420	800	1500	UL331M450N500A□□X
	330	30	40	420	800	1500	UL331M450O400A□□X
	330	30	45	420	800	1580	UL331M450O450A□□X
	330	35	30	420	800	1500	UL331M450P300A□□X
	330	35	35	420	800	1580	UL331M450P350A□□X
	390	25	55	360	680	1690	UL391M450N550A□□X
	390	30	45	360	680	1720	UL391M450O450A□□X
	390	30	50	360	680	1800	UL391M450O500A□□X
	390	35	35	360	680	1720	UL391M450P350A□□X
	390	35	40	360	680	1790	UL391M450P400A□□X
	470	30	50	290	560	1970	UL471M450O500A□□X
	470	30	55	290	560	2060	UL471M450O550A□□X
	470	35	40	290	560	1950	UL471M450P400A□□X
	470	35	45	290	560	2060	UL471M450P450A□□X
	560	30	55	250	470	2240	UL561M450O550A□□X
	560	35	45	250	470	2160	UL561M450P450A□□X
	560	35	50	250	470	2360	UL561M450P500A□□X
	680	35	50	210	390	2500	UL681M450P500A□□X
	680	35	55	210	390	2620	UL681M450P550A□□X
	820	35	65	170	320	3000	UL821M450P650A□□X
	820	40	55	170	320	3000	UL821M450Q550A□□X
1000	35	70	140	270	3100	UL102M450P700A□□X	
1000	35	80	140	270	3560	UL102M450P800A□□X	
1000	40	70	140	270	3600	UL102M450Q700A□□X	
1000	45	60	140	270	3600	UL102M450V600A□□X	
1200	40	80	120	220	3950	UL122M450Q800A□□X	
1500	45	80	95	180	4800	UL152M450V800A□□X	
1800	45	90	79	150	5670	UL182M450V900A□□X	
500	47	22	25	2970	5640	400	UL470M500M250A□□X
	56	22	25	2490	4740	430	UL560M500M250A□□X
	56	22	30	2490	4740	470	UL560M500M300A□□X
	56	25	25	2490	4740	470	UL560M500N250A□□X
	68	22	30	2050	3900	520	UL680M500M300A□□X

□□ see description at end of standard ratings



**STANDARD RATINGS**

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	Typ. ESR +20°C • 120Hz (mΩ)	Max. ESR +20°C • 120Hz (mΩ)	I <sub>R</sub> • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number Automotive Type
500	68	22	35	2050	3900	550	UL680M500M350A□□X
	68	25	25	2050	3900	520	UL680M500N250A□□X
	68	25	30	2050	3900	550	UL680M500N300A□□X
	82	22	35	1700	3230	610	UL820M500M350A□□X
	82	25	30	1700	3230	610	UL820M500N300A□□X
	100	22	40	1390	2650	720	UL101M500M400A□□X
	100	25	35	1390	2650	720	UL101M500N350A□□X
	100	30	30	1390	2650	720	UL101M500O300A□□X
	120	22	45	1160	2210	740	UL121M500M450A□□X
	120	25	40	1160	2210	740	UL121M500N400A□□X
	120	30	35	1160	2210	770	UL121M500O350A□□X
	120	35	30	1160	2210	800	UL121M500P300A□□X
	150	22	50	930	1770	960	UL151M500M500A□□X
	150	25	45	930	1770	980	UL151M500N450A□□X
	150	30	35	930	1770	920	UL151M500O350A□□X
	150	35	30	930	1770	920	UL151M500P300A□□X
	180	25	50	770	1470	1130	UL181M500N500A□□X
	180	30	35	770	1470	1050	UL181M500O350A□□X
	180	35	30	770	1470	1100	UL181M500P300A□□X
	220	25	50	640	1210	1220	UL221M500N500A□□X
	220	30	45	640	1210	1250	UL221M500O450A□□X
	220	35	30	640	1210	1100	UL221M500P300A□□X
	220	35	35	640	1210	1230	UL221M500P350A□□X
	270	30	50	520	980	1510	UL271M500O500A□□X
	270	35	35	520	980	1310	UL271M500P350A□□X
	270	35	40	520	980	1420	UL271M500P400A□□X
	330	35	40	420	800	1480	UL331M500P400A□□X
	330	35	45	420	800	1560	UL331M500P450A□□X
	390	35	50	360	680	1780	UL391M500P500A□□X
	470	35	55	290	560	2140	UL471M500P550A□□X
470	35	60	290	560	2260	UL471M500P600A□□X	
560	35	65	250	470	2380	UL561M500P650A□□X	
680	40	65	210	390	2520	UL681M500Q650A□□X	
550	220	35	40	640	1210	1300	UL221M550P400A□□X
	270	35	50	520	980	1600	UL271M550P500A□□X
	330	35	55	420	800	1630	UL331M550P550A□□X
	390	35	60	360	680	1800	UL391M550P600A□□X
	470	35	70	290	560	2100	UL471M550P700A□□X

□□: Enter **P6** for standard type • 6mm pin length

□□: Enter **Z6** for 3-pin type • 6mm pin length

□□: Enter **Y6** for multi-pin type • 6mm pin length

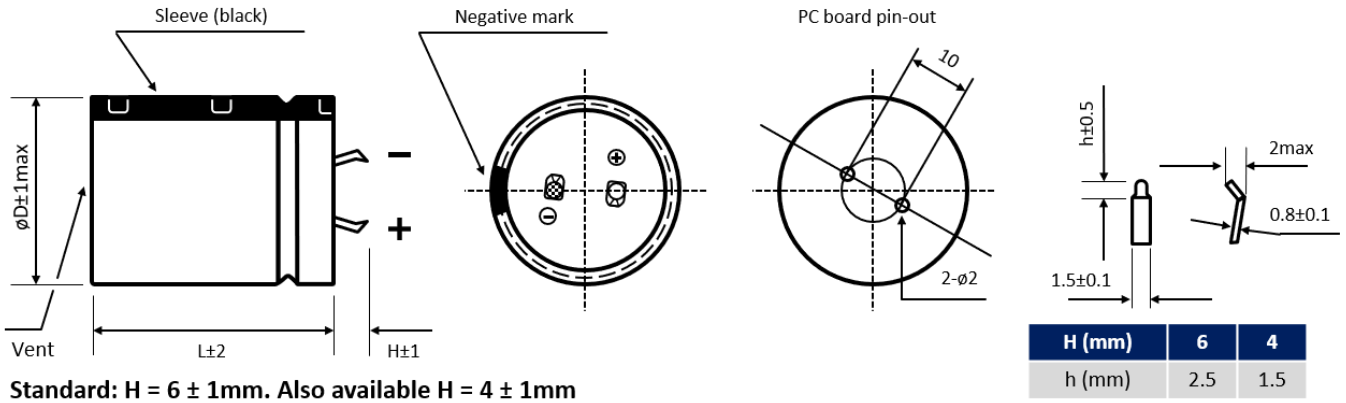
□□: Enter **P4** for standard type • 4mm pin length

□□: Enter **Z4** for 3-pin type • 4mm pin length

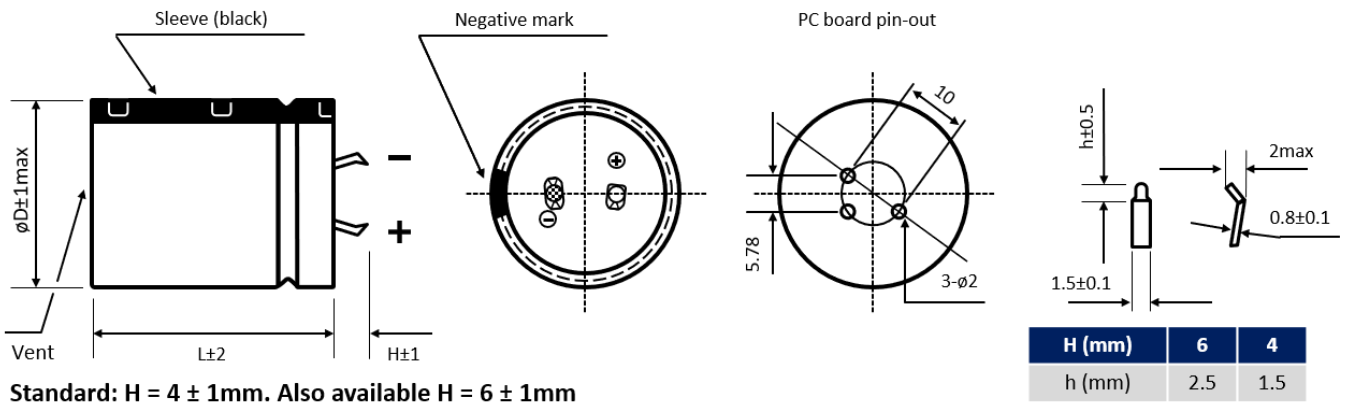
□□: Enter **Y4** for multi-pin type • 4mm pin length

## DIMENSIONS ▪ All dimensions in mm

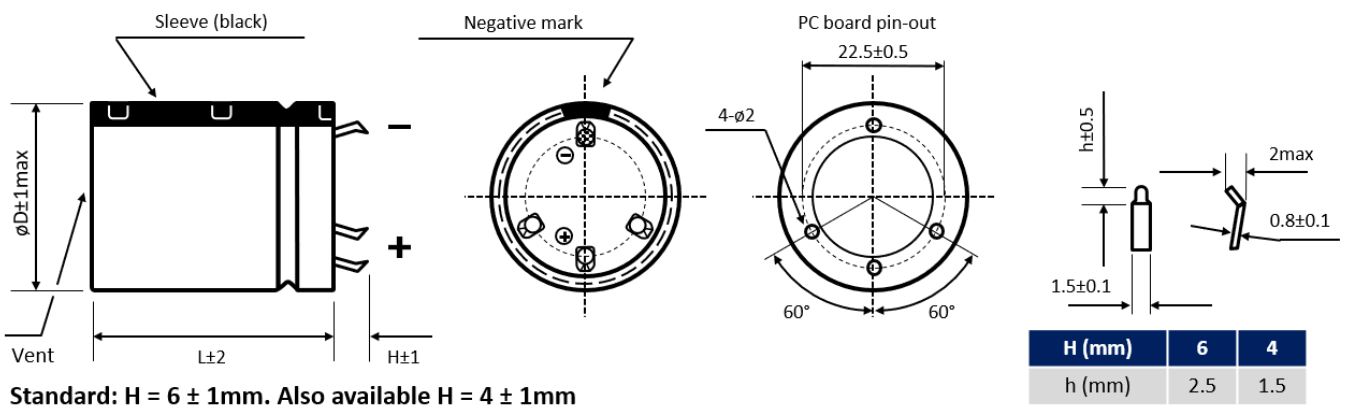
### 2-pin version ▪ Standard type



### 3-pin version ▪ Polarity protection



### Multipin version ▪ Diameter $\phi D \geq 30$ mm



Further possible terminal styles can be found in our packaging information liquid snap-in.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

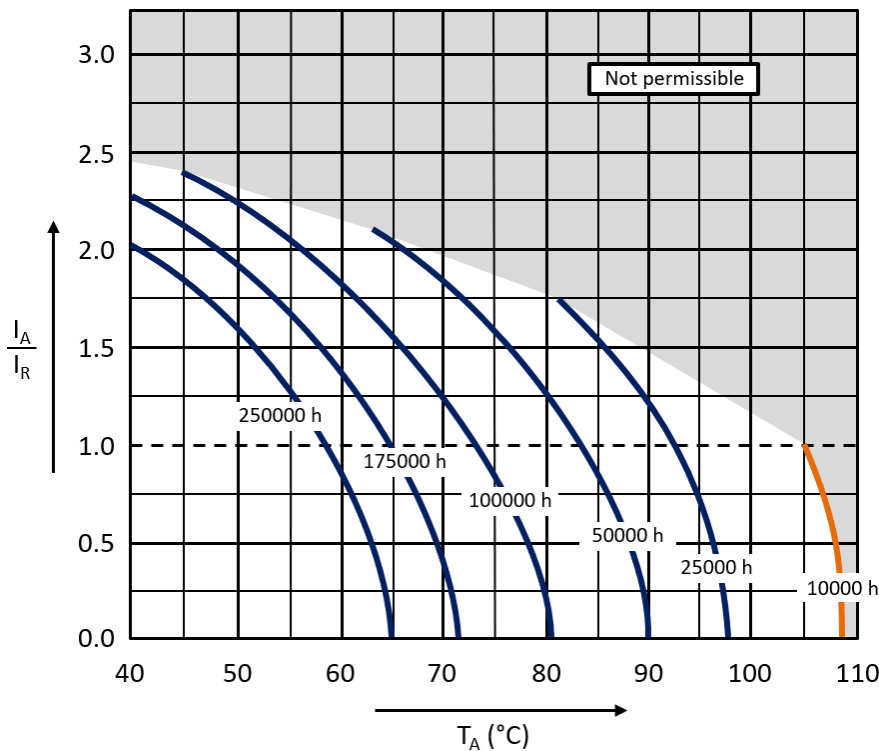
$V_R$ (V) / Frequency (Hz)	50/60	100/120	300	1k	10k	50k - 100k
$200 \leq V_R \leq 250$	0.81	1	1.17	1.32	1.45	1.5
$315 \leq V_R \leq 550$	0.77	1	1.16	1.3	1.41	1.43

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

General Precautions and Guidelines	Packaging Information Liquid Snap-In
Page 310	Page 230

**USEFUL LIFE**



With:  $I_A$ : Application current  
 $I_R$ : Rated ripple current (A RMS)  
 $T_A$ : Application temperature of the capacitor



### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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### HC SERIES ▪ HIGH RELIABILITY, AUTOMOTIVE 125°C TYPE

#### KEY FEATURES



- **DOUBLE-CRAMPING** ▪ Snap-In type
- Useful life: 125°C ▪ 4000 hours
- Low ESR and high ripple current
- High vibration (up to 30g) stability. Consult CapXon for test details
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics				
Operating Temperature Range		-55 ~ +125°C				
Rated Voltage Range	V <sub>R</sub>	25 ~ 63V DC				
Surge Voltage	V <sub>S</sub>	V <sub>S</sub> = 1.15·V <sub>R</sub>				
Capacitance Range	C <sub>R</sub>	600 ~ 3300µF				
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)				
Leakage Current (20°C ▪ V <sub>R</sub> applied)	I <sub>LEAK</sub>	$\leq 3 \cdot \sqrt{C_R \cdot V_R}$ ▪ After 5 minutes [ I <sub>LEAK</sub> (µA) ; C <sub>R</sub> (µF) ; V <sub>R</sub> (V) ]				
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	Not to exceed the values shown in standard ratings				
Self-Resistance (20°C ▪ 100kHz)	ESR	Not to exceed the values shown in standard ratings				
Low Temperature Characteristics at 120Hz	Z ratio max.	V <sub>R</sub> (V DC)	25	35	50	63
		Z-25°C/Z+20°C	4	4	4	4
		Z-55°C/Z+20°C	10	8	6	6

Lifetime Test						
Useful Life 125°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>4 000 hours</b>				
	ΔC/C <sub>R</sub>	≤ ±30% of initial measured value				
	tanδ	≤ 300% of initial specified value				
	I <sub>Leak</sub>	≤ the initial specified value				
	Deviation Rate at Useful Life: 100 FIT = 0.01%/1000h with 60% confidence level ▪ parts show higher drift as test criteria					
Endurance 125°C (V <sub>R</sub> & I <sub>R</sub> applied)	Test	<b>3 000 hours</b>				
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value				
	tanδ	≤ 200% of initial specified value				
	I <sub>Leak</sub>	≤ the initial specified value				
Shelf Life 125°C (V <sub>R</sub> = 0)	Test	<b>1 000 hours</b>				
	ΔC/C <sub>R</sub>	≤ ±20% of initial measured value				
	tanδ	≤ 200% of initial specified value				
	I <sub>Leak</sub>	≤ the initial specified value				
Before measurement: Restore capacitor to 20°C, apply V <sub>R</sub> for 30 min according JIS-C-5101-4						
Vibration Resistance Test	Max. 30g force, f <sub>RANGE</sub> 10Hz ... 2kHz, amplitude max. 2mm; X/Y/Z-axis each 2h; capacitor rigidly clamped by body to surface ▪ JIS-C-5101-1 (2010)					

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_{LEAK}$ ( $\mu$ A, 5min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +125°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
25	1800	20	30	637	20	28	4100	HC182M025L300A□□X
	2200	20	35	704	20	22	4870	HC222M025L350A□□X
	3300	20	40	862	20	16	5500	HC332M025L400A□□X
35	1200	20	30	615	15	31	3900	HC122M035L300A□□X
	1500	20	35	687	15	26	5000	HC152M035L350A□□X
	2200	20	40	832	15	19	5900	HC222M035L400A□□X
50	1200	20	35	735	10	36	4200	HC122M050L350A□□X
	1500	20	40	822	10	33	4900	HC152M050L400A□□X
63	600	20	30	583	10	50	3740	HC601M063L300A□□X
	820	20	35	682	10	39	4300	HC821M063L350A□□X
	1000	20	40	753	10	31	5250	HC102M063L400A□□X

**POSSIBLE CAN SIZES** ▪ Please consult us to individual requirements

Size with $\phi$ D 20		Size with $\phi$ D 22		Size with $\phi$ D 25		Size with $\phi$ D 30		Size with $\phi$ D 35	
$\phi$ D (mm)	L (mm)	$\phi$ D (mm)	L (mm)	$\phi$ D (mm)	L (mm)	$\phi$ D (mm)	L (mm)	$\phi$ D (mm)	L (mm)
20	30	22	30	25	30	30	30	35	30
20	35	22	35	25	35	30	35	35	35
20	40	22	40	25	40	30	40	35	40
		22	45	25	45	30	45	35	45

 □□: Enter **P6** for standard type ▪ 6mm pin length

 □□: Enter **Z6** for 3-pin type ▪ 6mm pin length

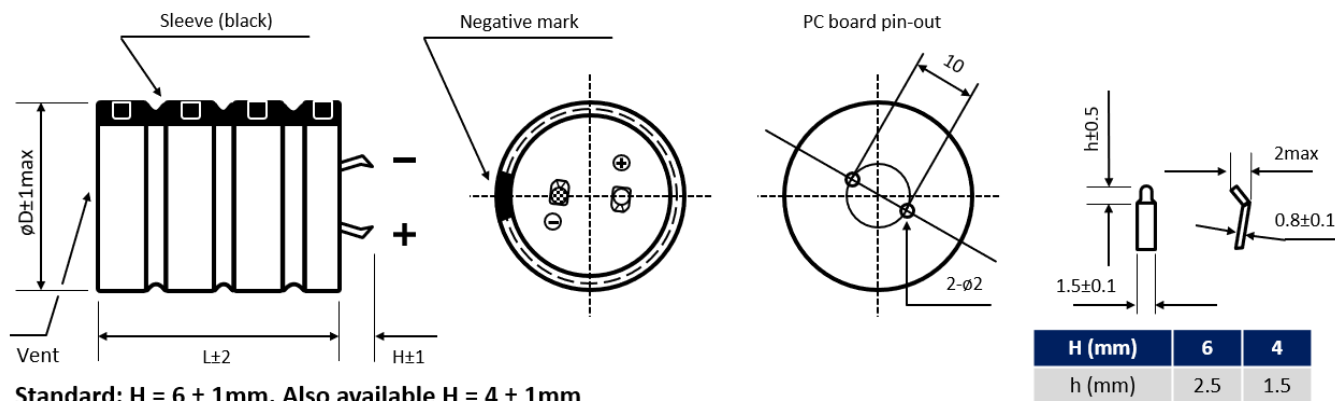
 □□: Enter **Y6** for multi-pin type ▪ 6mm pin length

 □□: Enter **P4** for standard type ▪ 4mm pin length

 □□: Enter **Z4** for 3-pin type ▪ 4mm pin length

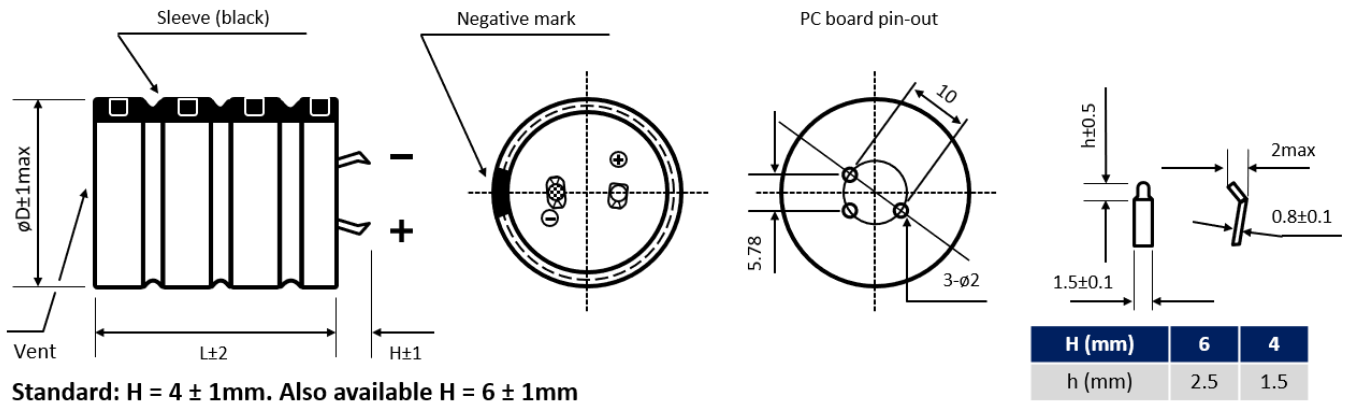
 □□: Enter **Y4** for multi-pin type ▪ 4mm pin length

**DIMENSIONS** ▪ All dimensions in mm

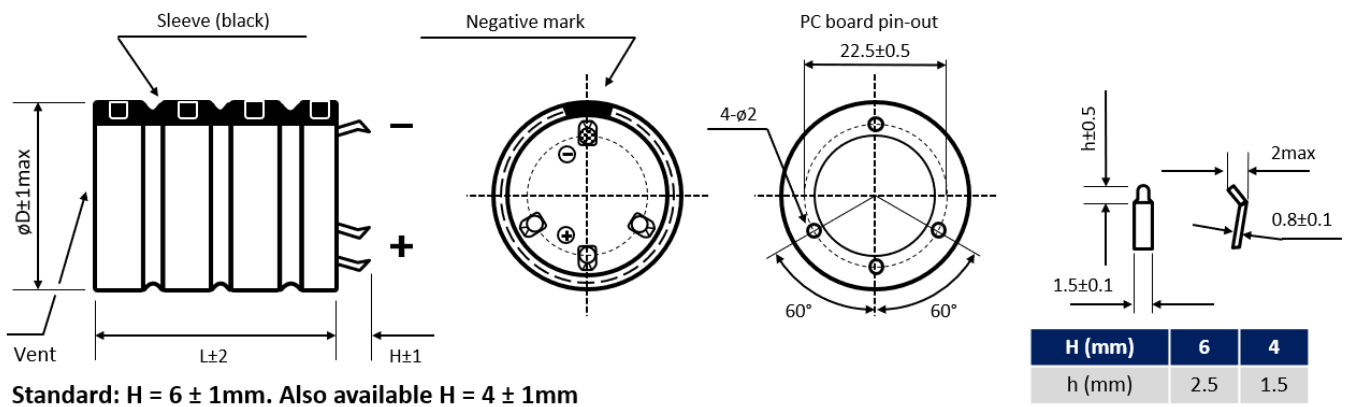
 2-pin version ▪ Diameter  $\phi$  D 20 mm to 25 mm ▪ Standard type


## DIMENSIONS ▪ All dimensions in mm

3-pin version ▪ Polarity protection ▪ Diameter  $\phi$  D 20 mm to 25 mm



Multipin version ▪ Diameter  $\phi$  D ≥ 30 mm



Further possible terminal styles can be found in our packaging information liquid snap-in.

## MULTIPLIER $K_f$ for RIPPLE CURRENT vs. FREQUENCY

$V_R$ (V) / Frequency (Hz)	50/60	100/120	300	1k	10k
$25 \leq V_R \leq 63$	0.56	0.7	0.83	0.92	1

## PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following pages in the table.

General Precautions and Guidelines	Packaging Information Liquid Snap-In
Page 310	Page 230



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### HH SERIES ▪ HIGH VOLTAGE, AUTOMOTIVE 125°C TYPE

#### KEY FEATURES



- **HIGH TEMPERATURE** ▪ Snap-In type
- Useful life: 125°C ▪ 4000 hours
- High reliability and high voltage applications
- Extremely stable dissipation factor and leakage current
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics		
Operating Temperature Range		-40 ~ +125°C		
Rated Voltage Range	$V_R$	400 ~ 450V DC		
Surge Voltage	$V_S$	$V_S = 1.10 \cdot V_R$		
Capacitance Range	$C_R$	47 ~ 560µF		
Cap. Tolerance	$\Delta C$	±20% (120Hz ▪ 20°C)		
Leakage Current (20°C ▪ $V_R$ applied)	$I_{LEAK}$	$\leq 0.02 \cdot C_R \cdot V_R$ ▪ After 5 minutes [ $I_{LEAK}$ (µA) ; $C_R$ (µF) ; $V_R$ (V) ]		
Dissipation Factor % (20°C ▪ 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings		
Self-Resistance (20°C ▪ 120Hz)	ESR	Not to exceed the values shown in standard ratings		
Low Temperature Characteristics at 120Hz	Z ratio max.	$V_R$ (V DC)	400	450
		Z-25°C/Z+20°C	6	6
		Z-40°C/Z+20°C	10	10

Lifetime Test			
Useful Life 125°C ( $V_R$ & $I_R$ applied)	Test	<b>4000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value	
	$\tan\delta$	$\leq 300\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
	Deviation Rate at Useful Life: 100 FIT = 0.01%/1000h with 60% confidence level ▪ parts show higher drift as test criteria		
Endurance 125°C ( $V_R$ & $I_R$ applied)	Test	<b>3000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan\delta$	$\leq 200\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
Shelf Life 125°C ( $V_R = 0$ )	Test	<b>1000 hours</b>	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan\delta$	$\leq 200\%$ of initial specified value	
	$I_{Leak}$	$\leq$ the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply $V_R$ for 30 min according JIS-C-5101-4		
Vibration Resistance Test	Max. 10g force, $f_{RANGE}$ 10Hz ... 55Hz, amplitude 0.75mm; X/Y/Z-axis each 2h; capacitor rigidly clamped by body to surface ▪ IEC 60068-2-6		

### STANDARD RATINGS

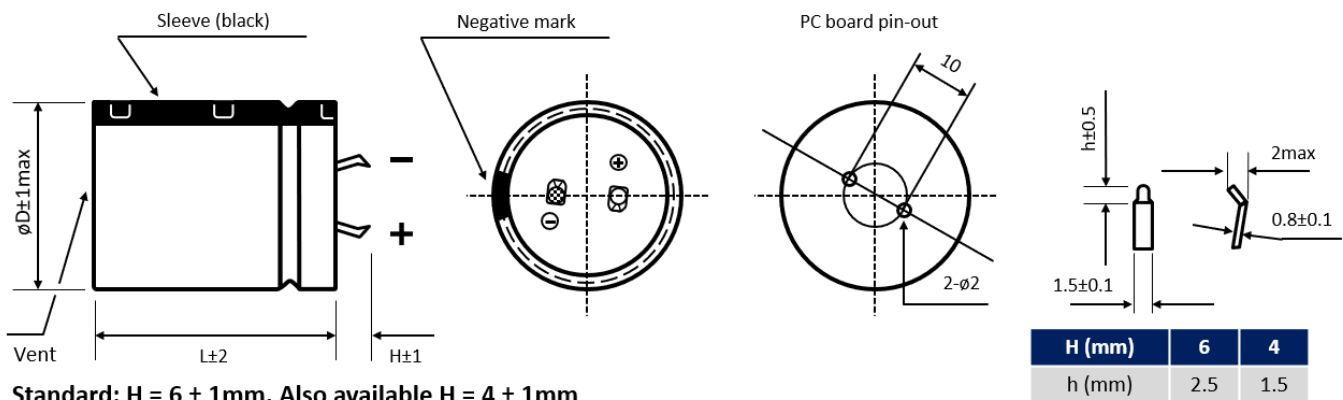
V <sub>R</sub> (V)	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 5min)	tanδ +20°C - 120Hz (%)	Max. ESR +20°C - 120Hz (mΩ)	I <sub>r</sub> - Max. Ripple Current +125°C - 120Hz (mA rms)	CapXon Part Number Automotive Type
400	47	22	25	376	20	4230	260	HH470M400M250A□□X
	68	22	30	544	20	2930	340	HH680M400M300A□□X
	82	22	30	656	20	2430	380	HH820M400M300A□□X
	100	22	35	800	20	1990	430	HH101M400M350A□□X
	120	22	35	960	20	1660	500	HH121M400M350A□□X
	150	22	40	1200	20	1330	550	HH151M400M400A□□X
	180	22	45	1440	20	1110	640	HH181M400M450A□□X
	220	25	45	1760	20	900	780	HH221M400N450A□□X
	270	25	50	2160	20	740	920	HH271M400N500A□□X
	330	30	45	2640	20	600	1020	HH331M400O450A□□X
	390	30	50	3120	20	510	1160	HH391M400O500A□□X
	470	35	45	3760	20	420	1340	HH471M400P450A□□X
450	68	22	30	612	20	2930	380	HH680M450M300A□□X
	82	22	35	738	20	2430	440	HH820M450M350A□□X
	100	22	40	900	20	1990	460	HH101M450M400A□□X
	120	22	45	1080	20	1660	540	HH121M450M450A□□X
	150	22	50	1350	20	1330	620	HH151M450M500A□□X
	180	22	55	1620	20	1110	730	HH181M450M550A□□X
	220	25	50	1980	20	900	870	HH221M450N500A□□X
	270	30	45	2430	20	740	1120	HH271M450O450A□□X
	330	30	50	2970	20	600	1300	HH331M450O500A□□X
	390	35	45	3510	20	510	1480	HH391M450P450A□□X
	470	35	50	4230	20	420	1670	HH471M450P500A□□X

□□: Enter **P6** for standard type ▪ 6mm pin length  
 □□: Enter **Z6** for 3-pin type ▪ 6mm pin length  
 □□: Enter **Y6** for multi-pin type ▪ 6mm pin length

□□: Enter **P4** for standard type ▪ 4mm pin length  
 □□: Enter **Z4** for 3-pin type ▪ 4mm pin length  
 □□: Enter **Y4** for multi-pin type ▪ 4mm pin length

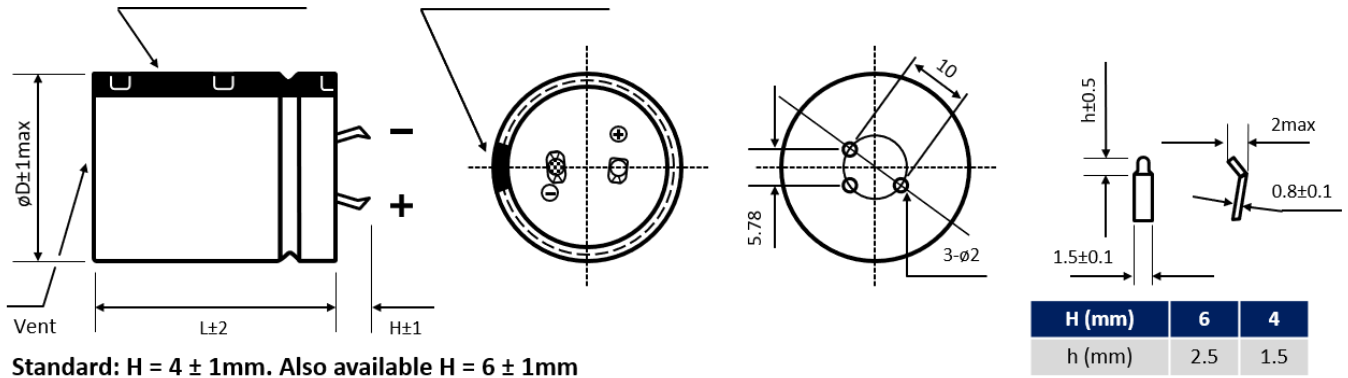
### DIMENSIONS ▪ All dimensions in mm

2-pin version ▪ Diameter ∅ D 20 mm to 25 mm ▪ Standard type

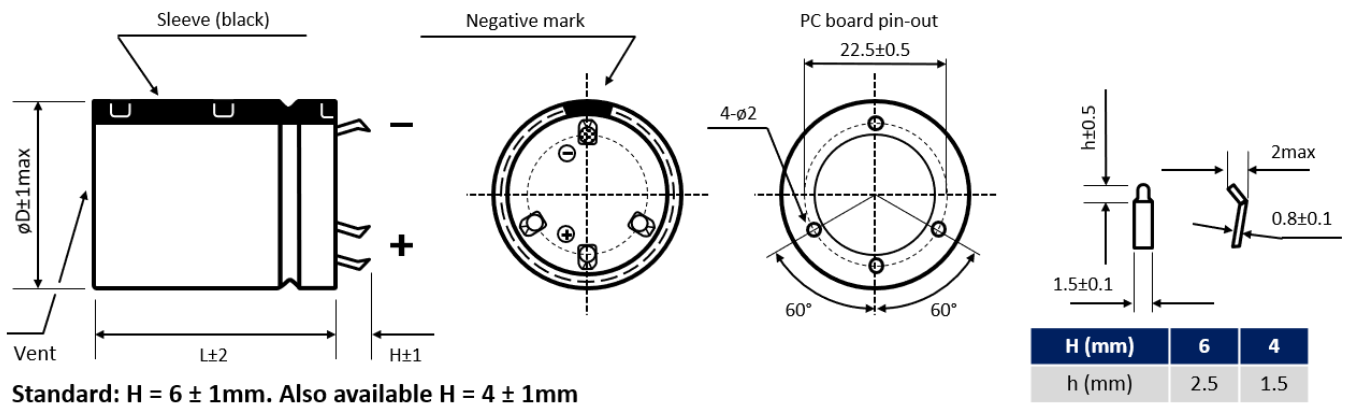


**DIMENSIONS** ▪ All dimensions in mm

3-pin version ▪ Polarity protection ▪ Diameter  $\phi$  D 20 mm to 25 mm



Multipin version ▪ Diameter  $\phi$  D ≥ 30 mm



Further possible terminal styles can be found in our packaging information liquid snap-in.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

$V_R$ (V) / Frequency (Hz)	50/60	100/120	300	1k	10k	50k
$400 \leq V_R \leq 450$	0.77	1	1.16	1.3	1.41	1.43

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General Precautions and Guidelines	Packaging Information Liquid Snap-In
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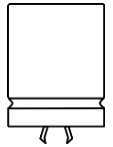
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### PRODUCT CODE - SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS



Snap-in type example:

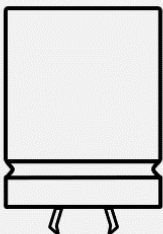
UJ series ▪ 470µF ▪ 450V ▪ ±20% ▪ Ø 30mm ▪ L 45mm ▪ 2-pin ▪ 6mm pin length ▪ AEC-Q200

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
U	J	4	7	1	M	4	5	0	O	4	5	0	A	P	6	X	-	-	-
Series		Capacitance			Capacitance tolerance	Voltage			Case Ø (mm)	Height (mm)			Type code	Terminals		Special requirement			
Code		µF	Code	%	Code	Volt	Code	ØD	Code	H	Code	Type	See chapter terminals or lead treatment		See datasheet for reference				
100	10		H	±5	6R3	6.3	L	20	A	Without lead treatment					U PE mat packaging Ø20 to ≤ 35mm				
220	22		K	±10	010	10	M	22	E	With lead treatment					X AEC-Q200				
101	100		S	±15	016	16	N	25											
561	560		M	±20	025	25	O	30											
102	1000		N	±30	035	35	P	35											
472	4700		D	±40	050	50	Q	40											
103	10000		I	+5 to +20	063	63	U	42											
683	68000		B	0 to -20	080	80	V	45											
104	100000		G	0 to +10	100	100													
										150	15								
										200	20								
										250	25								
										300	30								
										350	35								
										400	40								
										450	45								
										500	50								
										550	55								
										600	60								
										650	65								
										700	70								
										750	75								
										800	80								
										850	85								
										900	90								
										950	95								
										A00	100								
										A05	105								

Please consult CapXon for further assistance

### MARKING - SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

#### Aluminum Electrolytic Capacitor - Snap-In type

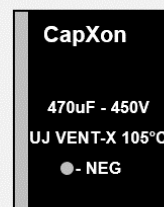


CapXon: Manufacturer trademark  
 470µF: Nominal capacitance  
 450V: Rated voltage  
 (-) polarity (Cathode indicate)  
 UJ: Series  
 VENT: Safety vent  
 105°C: Maximum operating temperature  
 X: AEC-Q200  
 191213: Production datecode  
 year/month/day  
 (ex. 2019/December/13<sup>th</sup>)

Side view

Top view

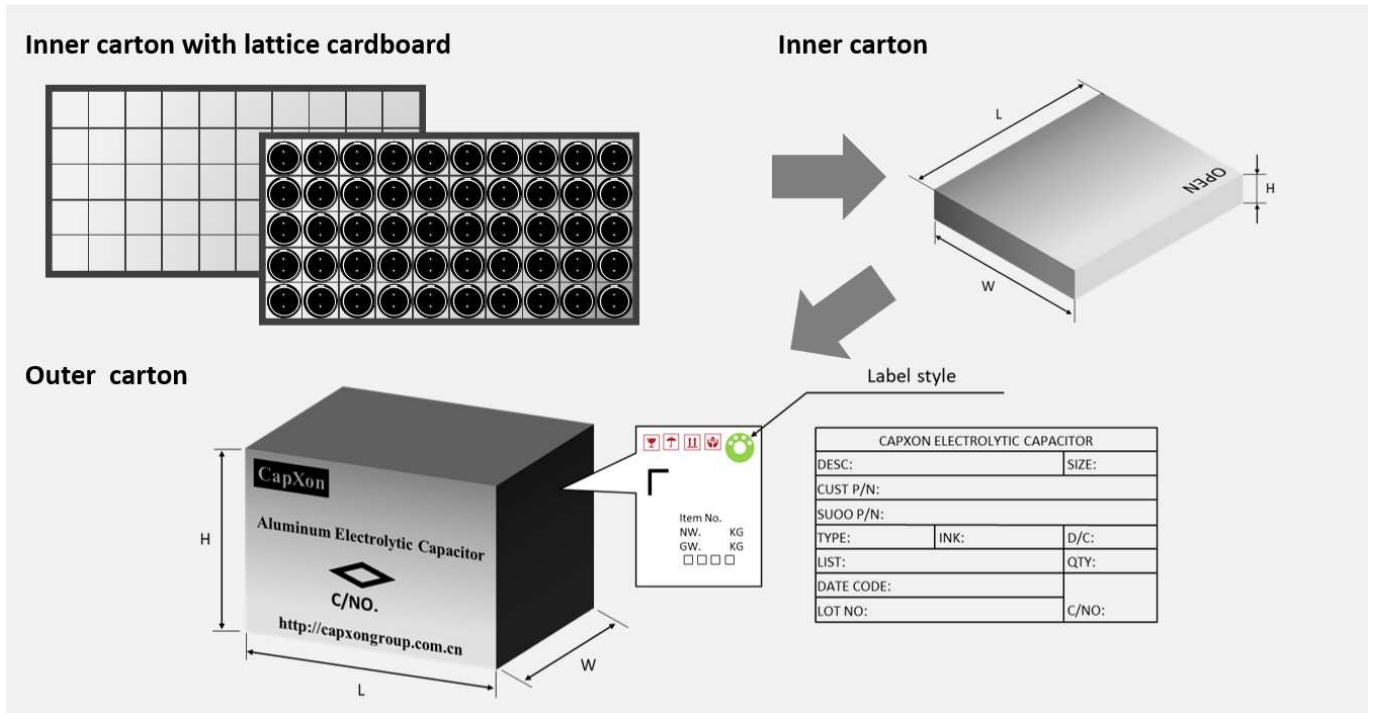
#### AEC-Q200 type



### PACKAGING • SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

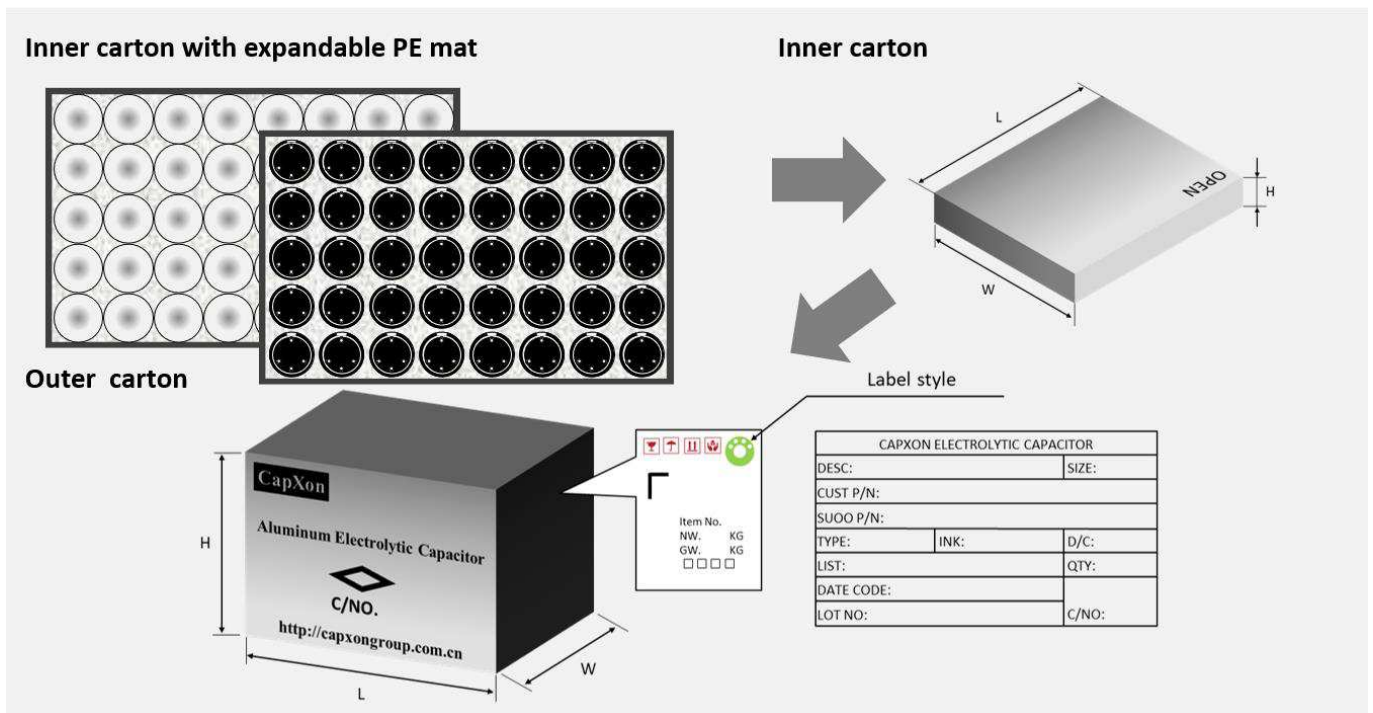
**Inner carton with lattice cardboard. Standard for diameter 20mm, 22mm, 25mm, 30mm and 35mm.**

Packaging method: Lattice cardboard in the inner carton, covered with an aluminum foil layer on the products to discharge the electrolytic capacitors. Cardboard box cover on top.



**Inner carton with expandable PE mat. Standard for diameter 40mm, 45mm and 50mm\*.**

Packing method: Expandable PE mat in the inner carton, covered with an aluminum foil layer on the products to discharge the electrolytic capacitors. Expandable PE layer on top to avoid product shaking.



\* For smaller diameters, see ordering information "special requirement" in the product code.

### PACKAGING • SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS



Inner carton with lattice cardboard.

∅ D (mm)	Length L (mm)	Terminal length H (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
20	≤ 25		120	268 x 265 x 38	720	560 x 280 x 135	China	85322200
	27 to 35	< 6 (L=35)	120	268 x 265 x 48	720	560 x 275 x 167	China	85322200
	35	≥ 6	120	268 x 265 x 64	720	560 x 275 x 208	China	85322200
	40 to 51		120	268 x 265 x 64	720	560 x 275 x 208	China	85322200
22	≤ 25		100	268 x 265 x 38	600	560 x 280 x 135	China	85322200
	27 to 35	< 6 (L=35)	100	268 x 265 x 48	600	560 x 275 x 167	China	85322200
	35	≥ 6	100	268 x 265 x 64	600	560 x 275 x 208	China	85322200
	40 to 51		100	268 x 265 x 64	600	560 x 275 x 208	China	85322200
	52 to 61		100	268 x 265 x 90	400	560 x 275 x 208	China	85322200
	62 to 75		100	268 x 265 x 90	400	560 x 275 x 208	China	85322200
25	≤ 25		100	295 x 293 x 38	500	310 x 308 x 211	China	85322200
	26 to 35	< 6 (L=35)	100	295 x 293 x 48	500	315 x 313 x 258	China	85322200
	35	≥ 6	100	295 x 293 x 64	500	310 x 308 x 340	China	85322200
	40 to 51		100	295 x 293 x 64	500	310 x 308 x 340	China	85322200
	52 to 60		100	295 x 293 x 72	500	310 x 308 x 383	China	85322200
	61 to 75		100	295 x 293 x 90	400	310 x 308 x 383	China	85322200
30	≤ 25		50	344 x 173 x 38	400	375 x 361 x 175	China	85322200
	26 to 35	< 6 (L=35)	50	344 x 173 x 48	400	375 x 361 x 220	China	85322200
	35	≥ 6	50	344 x 173 x 64	300	375 x 361 x 200	China	85322200
	40 to 51		50	344 x 173 x 64	300	375 x 361 x 220	China	85322200
	52 to 65		50	344 x 173 x 80	300	375 x 361 x 260	China	85322200
	70 to 85		50	344 x 173 x 100	200	375 x 361 x 220	China	85322200
35	≤ 25		50	392 x 195 x 48	300	405 x 407 x 164	China	85322200
	26 to 35	< 6 (L=35)	50	392 x 195 x 48	300	405 x 407 x 164	China	85322200
	35	≥ 6	50	392 x 195 x 64	300	405 x 407 x 212	China	85322200
	36 to 44		50	392 x 195 x 64	300	405 x 407 x 212	China	85322200
	45 to 52		50	392 x 195 x 64	200	410 x 210 x 280	China	85322200
	56 to 65		50	392 x 195 x 80	200	405 x 407 x 175	China	85322200
	66 to 75		50	392 x 195 x 90	200	405 x 407 x 212	China	85322200
	80 to 85		50	392 x 195 x 100	200	405 x 407 x 220	China	85322200
	90 to 100		50	392 x 195 x 115	100	405 x 407 x 130	China	85322200

### PACKAGING - SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS



Inner carton with expandable PE mat.

∅ D (mm)	Length L (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
20	≤ 30	120	295 x 295 x 48	720	615 x 310 x 167	China	85322200
	35 to 47	120	295 x 295 x 64	720	615 x 310 x 210	China	85322200
	50 to 65	120	295 x 295 x 80	480	615 x 310 x 180	China	85322200
22	≤ 30	100	295 x 295 x 48	600	615 x 310 x 167	China	85322200
	35 to 47	100	295 x 295 x 64	600	615 x 310 x 210	China	85322200
	50 to 65	100	295 x 295 x 80	400	615 x 310 x 180	China	85322200
	70 to 80	100	295 x 295 x 95	400	615 x 310 x 210	China	85322200
25	≤ 30	100	325 x 325 x 48	500	345 x 345 x 260	China	85322200
	35 to 47	100	325 x 325 x 64	500	345 x 345 x 340	China	85322200
	50 to 65	100	325 x 325 x 80	400	345 x 345 x 340	China	85322200
	70 to 80	100	325 x 325 x 95	400	345 x 345 x 400	China	85322200
30	≤ 30	50	410 x 215 x 48	300	450 x 430 x 164	China	85322200
	35 to 47	50	410 x 215 x 64	300	450 x 430 x 210	China	85322200
	50 to 65	50	410 x 215 x 80	200	450 x 430 x 180	China	85322200
	70 to 80	50	410 x 215 x 95	200	450 x 430 x 210	China	85322200
	85 to 95	50	410 x 215 x 110	200	450 x 430 x 240	China	85322200
35	≤ 30	50	447 x 230 x 48	300	480 x 470 x 164	China	85322200
	35 to 47	50	447 x 230 x 64	300	480 x 470 x 212	China	85322200
	50 to 65	50	447 x 230 x 80	200	480 x 470 x 180	China	85322200
	70 to 80	50	447 x 230 x 96	150	467 x 250 x 308	China	85322200
	85 to 95	50	447 x 230 x 110	100	467 x 250 x 240	China	85322200
40	26 to 55	40	383 x 245 x 80	120	400 x 265 x 265	China	85322200
	60 to 75	40	383 x 245 x 90	120	400 x 265 x 295	China	85322200
	80 to 105	40	383 x 245 x 120	80	400 x 265 x 265	China	85322200
45	35 to 65	35	390 x 285 x 80	70	590 x 410 x 100	China	85322200
	70 to 80	35	390 x 285 x 95	70	590 x 410 x 115	China	85322200
	85 to 105	35	390 x 285 x 115	70	590 x 410 x 130	China	85322200
50	50 to 59	NA	NA	70	510 x 340 x 180	China	85322200
	60 to 65	NA	NA	70	510 x 340 x 200	China	85322200
	70 to 100	NA	NA	35	510 x 340 x 120	China	85322200



### AVAILABLE TERMINALS ▪ SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

Snap-In type ▪ **PP** version ▪ 2-pin ▪ standard type ▪  $\varnothing D = 20$  to 45mm

H (mm)	6	4
h (mm)	2.5	1.5
Type / Terminal code	A P6	A P4

Standard: H = 6 mm. Also available H = 4 mm

Example

<b>U</b>	<b>J</b>	<b>4 7 1</b>	<b>M</b>	<b>4 5 0</b>	<b>O</b>	<b>4 5 0</b>	<b>A</b>	<b>P 6</b>	<b>X -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement	

Snap-In type ▪ **ZP** version ▪ 3-pin ▪ polarity protection ▪  $\varnothing D = 20$  to 45mm

H (mm)	6	4
h (mm)	2.5	1.5
Type / Terminal code	A Z6	A Z4

Standard: H = 4 mm. Also available H = 6 mm

Example

<b>U</b>	<b>J</b>	<b>4 7 1</b>	<b>M</b>	<b>4 5 0</b>	<b>O</b>	<b>4 5 0</b>	<b>A</b>	<b>Z 4</b>	<b>X -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement	

### AVAILABLE TERMINALS • SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

**Snap-In type • YP version • Multi-pin • polarity protection •  $\varnothing D = 30$  to 45mm**

Side view labels: Sleeve (black),  $\varnothing D \pm 1 \text{ max}$ , Vent,  $L \pm 2$ ,  $H \pm 1$ ,  $-$ ,  $+$

Top view labels: Negative mark,  $4 \cdot \varnothing 2$ ,  $22.5 \pm 0.5$ ,  $60^\circ$ ,  $60^\circ$

PC board pin-out labels:  $h \pm 0.5$ ,  $2 \text{ max}$ ,  $0.8 \pm 0.1$ ,  $1.5 \pm 0.2$

H (mm)	6	4
h (mm)	2.5	1.5
Type / Terminal code	A Y6	A Y4

Standard: H = 6 mm. Also available H = 4 mm

**Example**

Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement
U J	4 7 1	M	4 5 0	O	4 5 0	A	Y 6	X -

**Snap-In type • LP version • slim terminal •  $\varnothing D = 20$  to 45mm**

Side view labels: Sleeve (black),  $\varnothing D \pm 1 \text{ max}$ , Vent,  $L \pm 2$ ,  $H \pm 1$ ,  $0.9$ ,  $-$ ,  $+$

Top view labels: Negative mark,  $2 \cdot \varnothing 2$ ,  $3.2 \pm 0.2$

PC board pin-out labels:  $h \pm 0.5$ ,  $2 \text{ max}$ ,  $0.8 \pm 0.1$ ,  $1.5 \pm 0.2$

H (mm)	9.5	4
Type / Terminal code	A L9	A L4

Standard: H = 9.5 mm. Also available H = 4 mm

**Example**

Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement
U J	4 7 1	M	4 5 0	O	4 5 0	A	L 9	X -

### AVAILABLE TERMINALS • SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

**Snap-In type • CP version • lug type • T type •  $\varnothing D = 30$  to 45mm**

Standard: H = 4.5 mm. Also available H = 5.5 mm

H (mm)	5.5	4.5
Type / Terminal code	A C5	A C4

**Example**

<b>U J</b>	<b>4 7 1</b>	<b>M</b>	<b>4 5 0</b>	<b>O</b>	<b>4 5 0</b>	<b>A</b>	<b>C 4</b>	<b>X -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement

**Snap-In type • HP version • lug type • U type •  $\varnothing D = 30$  to 45mm**

Standard: H = 6 mm

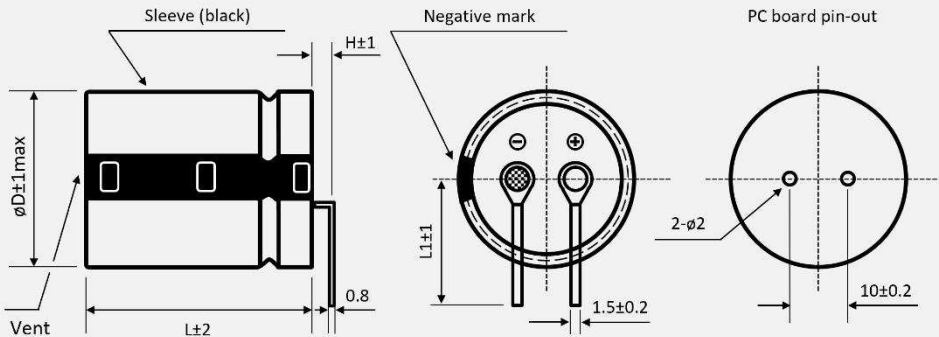
H (mm)	6
Type / Terminal code	A H6

**Example**

<b>U J</b>	<b>4 7 1</b>	<b>M</b>	<b>4 5 0</b>	<b>O</b>	<b>4 5 0</b>	<b>A</b>	<b>H 6</b>	<b>X -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement

### AVAILABLE TERMINALS • SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

Snap-In type • **TP** version • long terminal • cathode right side •  $\varnothing D = 20$  to  $45$ mm



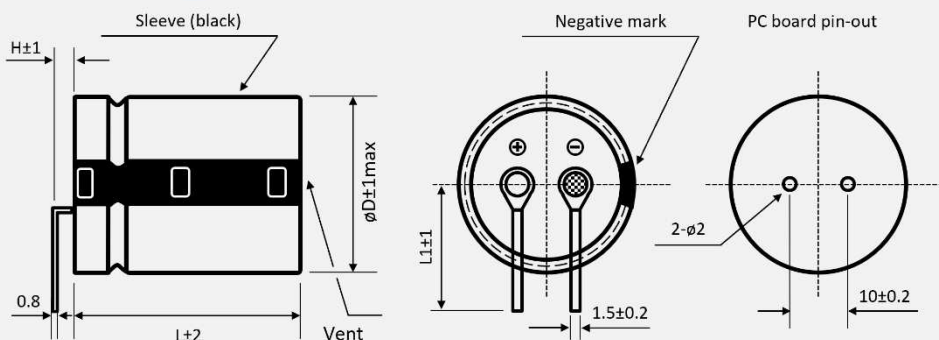
Standard:  $H = 2.5$  mm

H (mm)	2.5
Type / Terminal code	E CR

Example

<b>U J</b>	<b>4 7 1</b>	<b>M</b>	<b>4 5 0</b>	<b>O</b>	<b>4 5 0</b>	<b>E</b>	<b>C R</b>	<b>X -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement

Snap-In type • **TP** version • long terminal • cathode left side •  $\varnothing D = 20$  to  $45$ mm



Standard:  $H = 2.5$  mm

H (mm)	2.5
Type / Terminal code	E CL

Example

<b>U J</b>	<b>4 7 1</b>	<b>M</b>	<b>4 5 0</b>	<b>O</b>	<b>4 5 0</b>	<b>E</b>	<b>C L</b>	<b>- -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement

### AVAILABLE TERMINALS ▪ SNAP-IN ALUMINUM ELECTROLYTIC CAPACITORS

**Snap-In type ▪ VP version ▪ lug type ▪  $\varnothing D = 20$  to 45mm**

Standard: H = 8 mm.

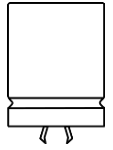
Consult CapXon for further lug heights

Example

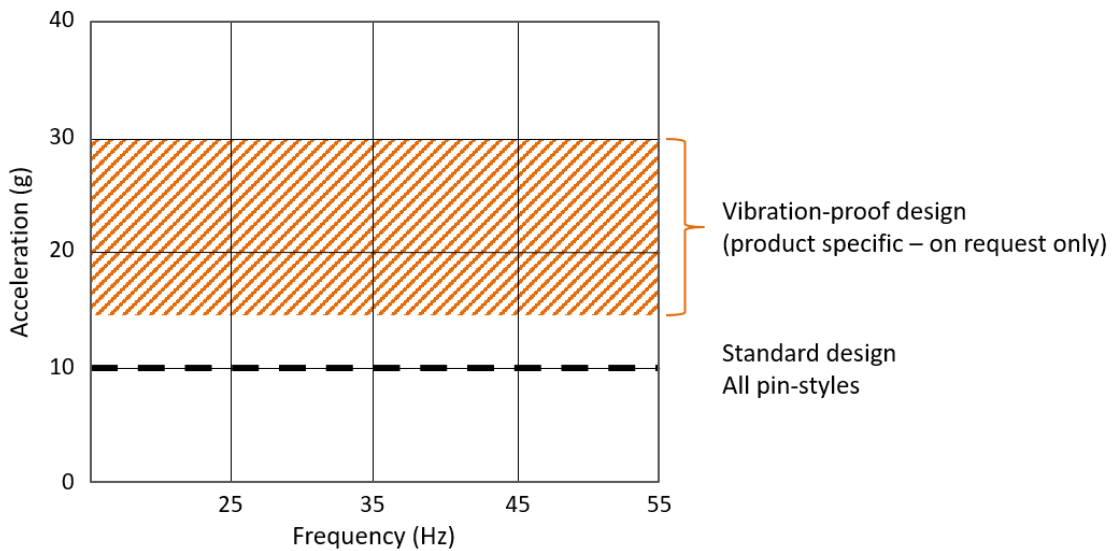
U J	4 7 1	M	4 5 0	0	4 5 0	A	V 8	X -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Terminals	Special requirement

H ± 0.5	$\varnothing D$	L1 ± 0.1	L2 ± 0.2	W ± 0.2	W1 ± 0.2	W2 ± 0.2	d ± 0.1
12	25	3.3	1.3	4	3.2	1.8	0.6
	30	3.3	1	4.6	3.7	2	0.8
	35	3.3	1	4.6	3.7	2	0.8
	40	3.3	1	4.6	3.7	2	0.8
	45	3.3	1	4.6	3.7	2	0.8
6	25	3.3	1.3	4	3.2	1.8	0.6
	30	3.3	1	4.6	3.7	2	0.8
	35	3.3	1	4.6	3.7	2	0.8
	40	3.3	1	4.6	3.7	2	0.8
	45	3.3	1	4.6	3.7	2	0.8
5	25	3.3	1.3	4	3.2	1.8	0.6
	30	3.3	1	4.6	3.7	2	0.8
	35	3.3	1	4.6	3.7	2	0.8
	40	3.3	1	4.6	3.7	2	0.8
	45	3.3	1	4.6	3.7	2	0.8

### VIBRATION SPECIFICATION - STANDARD AND VIBRATION PROOF DESIGN



Package	Test Standard	Condition	Determinant Standard
Standard design all pin-styles	IEC 60384-1 IEC 60384-4 IEC 60068-2-6 MIL-STD 202 Method 204	<ol style="list-style-type: none"> <li>1. Frequency range: 10Hz ~ 55Hz</li> <li>2. Amplitude (single peak): 0.75 mm</li> <li>3. Acceleration: 100m/s<sup>2</sup> (10g at 10 ~ 55Hz)</li> <li>4. X, Y, Z directions, 2 hours per direction, total 6 hours</li> </ol>	<ol style="list-style-type: none"> <li>6. <math>\Delta C/C \leq \pm 5\%</math> of initial value</li> <li>7. <math>DF \leq</math> stated limit</li> <li>8. <math>LC \leq</math> stated limit</li> <li>9. No visible damage</li> <li>10. No leakage of electrolyte</li> </ol>
Vibration-proof design		<ol style="list-style-type: none"> <li>1. Consult CapXon for test details</li> </ol>	<ol style="list-style-type: none"> <li>2. Consult CapXon for test details</li> </ol>



### OVERVIEW - SMD ALUMINUM ELECTROLYTIC CAPACITORS



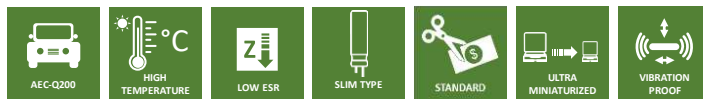
#### Features



Series	Page	AEC-Q200	High Temperature	Long Life	Low ESR	Standard	Ultra Long Life	Ultra Low ESR	Vibration Proof	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
										-	+	-	+	-	+	
LV	29	•				•			•	-40	+85	4	450	1	6800	2000
EV	39	•				•			•	-55	+105	6.3	50	1	150	1000
HV	45	•		•					•	-55	+105	6.3	100	1	6800	2000
										-40		160	450	2.2	68	
JV	54	•		•					•	-55	+105	6.3	50	1	1000	3000
DV	59	•			•				•	-55	+105	6.3	100	1	6800	2000 to 5000
RV	67	•						•	•	-55	+105	6.3	100	1	6800	2000 to 5000
										-40		160	450	2.2	68	
CV	75	•			•		•		•	-25	+105	6.3	50	22	1500	7000
TV	80	•	•						•	-40	+125	10	450	1	330	1000 to 2000

### OVERVIEW - SMD HYBRID CONDUCTIVE POLYMER CAPACITORS

#### Features



Series	Page	AEC-Q200	High Temperature	Low ESR	Slim Type	Standard	Ultra Miniaturized	Ultra Low ESR	Vibration Proof	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
										-	+	-	+	-	+	
AA	241	•		•	•	•			•	-55	+105	16	200	10	1500	5000 to 10000
AC	246	•	•	•	•				•	-55	+125	16	100	10	1500	4000
AB	251	•	•	•			•	•	•	-55	+125	25	35	33	470	4000
AN	255	•	•	•					•	-55	+135	16	100	10	820	4000
AU	260	•	•					•	•	-55	+135	25	100	22	680	4000
AR	264	•	•	•					•	-55	+145	16	80	22	560	2000
AP	268	•	•	•					•	-55	+150	16	80	22	560	1000

AU: New Product Series

### AA SERIES ▀ LONG LIFE UP TO 10000 HOURS

#### KEY FEATURES



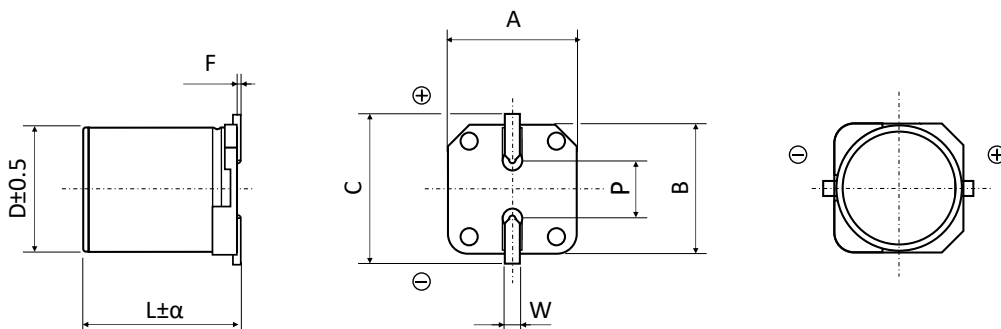
- HYBRID CONDUCTIVE POLYMER • SMD type
- Endurance: 105°C • 5000 up to 10000 hours
- Low ESR and high ripple current
- Vibration Proof (VP) version (up to 30g) available
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +105°C
Rated Voltage Range	$V_R$	16 ~ 200V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$ ( $V_R \geq 200V$ ): $V_S = 1.15 \cdot V_R$
Capacitance Range	$C_R$	10 ~ 1500µF
Cap. Tolerance	$\Delta C$	±20% (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings
<b>Lifetime Test</b>		
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	<b>10000 hours</b> ≤ 100V <b>5000 hours</b> > 100V
	$\Delta C/C_R$	Within ±30% of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

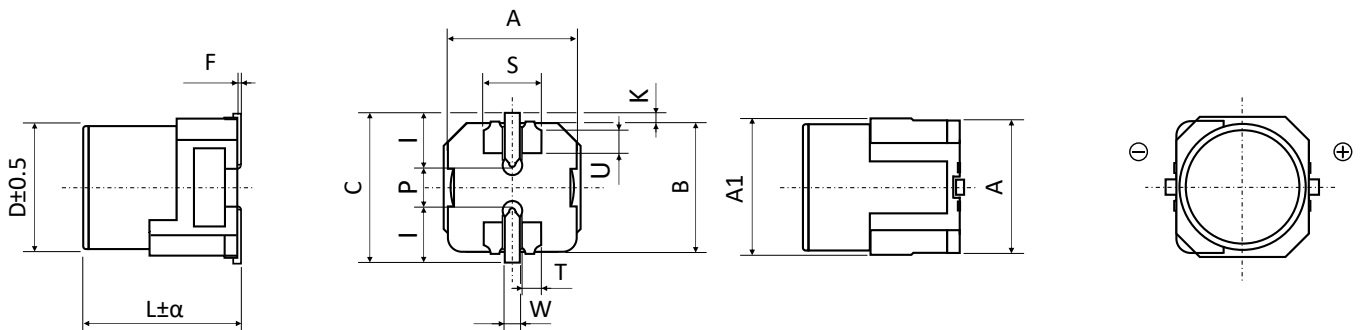
#### DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm





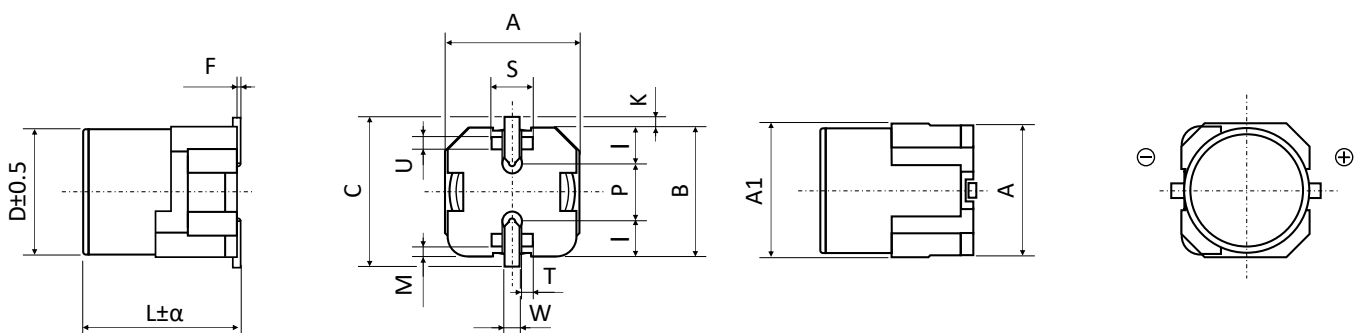
**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
5.0	5.8	0.3	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.8	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
8.0	11.7	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4
10.0	16.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm


$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	K
6.3	5.8	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	7.7	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$
6.3	5.8	2.2	2.9	2.4	1.1	1.55	0.65
6.3	7.7	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10** ▪ All dimensions in mm


## DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm

ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
8.0	11.7	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	16.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
8.0	11.7	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	16.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)			C <sub>R</sub> (µF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (µA, 2min)	tanδ +20°C ▪ 120Hz (%)	Max. ESR +20°C ▪ 100kHz (mΩ)	I <sub>R</sub> ▪ Max. Ripple Cur- rent +105°C ▪ 100kHz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof								
16	•	•	100	6.3	5.8	16.0	16	50	1300	AA101M016E058PTRX <input type="checkbox"/>
	•	•	120	6.3	5.8	19.2	16	50	1300	AA121M016E058PTRX <input type="checkbox"/>
	•	•	150	6.3	5.8	24.0	16	50	1300	AA151M016E058PTRX <input type="checkbox"/>
	•	•	220	6.3	7.7	35.2	16	30	2000	AA221M016E077PTRX <input type="checkbox"/>
	•	•	270	6.3	7.7	43.2	16	30	2000	AA271M016E077PTRX <input type="checkbox"/>
	•	•	330	10	10.5	52.8	16	20	2500	AA331M016G105PTRX <input type="checkbox"/>
	•	•	470	8	10.5	75.2	16	27	2300	AA471M016F105PTRX <input type="checkbox"/>
	•	•	470	10	10.5	75.2	16	20	2500	AA471M016G105PTRX <input type="checkbox"/>
	•	•	560	8	11.7	89.6	16	23	2400	AA561M016F117PTRX <input type="checkbox"/>
	•	•	560	10	10.5	89.6	16	20	2500	AA561M016G105PTRX <input type="checkbox"/>
	•	•	820	10	12.4	131.2	16	16	2800	AA821M016G124PTRX <input type="checkbox"/>
•	•	1500	10	16.5	240.0	16	11	5000	AA152M016G165PTRX <input type="checkbox"/>	
25	•		33	5	5.8	8.3	14	80	900	AA330M025C058PTRX <input type="checkbox"/>
	•	•	56	6.3	5.8	14.0	14	50	1300	AA560M025E058PTRX <input type="checkbox"/>
	•	•	100	6.3	7.7	25.0	14	30	2000	AA101M025E077PTRX <input type="checkbox"/>
	•	•	220	8	10.5	55.0	14	27	2300	AA221M025F105PTRX <input type="checkbox"/>
	•	•	270	8	11.7	67.5	14	25	2400	AA271M025F117PTRX <input type="checkbox"/>
	•	•	330	10	10.5	82.5	14	20	2500	AA331M025G105PTRX <input type="checkbox"/>
	•	•	470	10	12.4	117.5	14	16	2800	AA471M025G124PTRX <input type="checkbox"/>
	•	•	560	10	16.5	140.0	14	11	5000	AA561M025G165PTRX <input type="checkbox"/>

: Enter **W** for Vibration proof version

## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C · 120Hz (%)	Max. ESR +20°C · 100kHz (mΩ)	I <sub>R</sub> · Max. Ripple Current +105°C · 100kHz (mA rms)	CapXon Part Number Automotive Type
35	•		22	5	5.8	7.7	12	100	900	AA220M035C058PTRX <input type="checkbox"/>
	•	•	27	6.3	5.8	9.5	12	60	1300	AA270M035E058PTRX <input type="checkbox"/>
	•	•	47	6.3	5.8	16.5	12	60	1300	AA470M035E058PTRX <input type="checkbox"/>
	•	•	68	6.3	7.7	23.8	12	35	2000	AA680M035E077PTRX <input type="checkbox"/>
	•	•	100	8	10.5	35.0	12	27	2300	AA101M035F105PTRX <input type="checkbox"/>
	•	•	150	8	10.5	52.5	12	27	2300	AA151M035F105PTRX <input type="checkbox"/>
	•	•	180	8	11.7	63.0	12	25	2400	AA181M035F117PTRX <input type="checkbox"/>
	•	•	270	10	10.5	94.5	12	20	2500	AA271M035G105PTRX <input type="checkbox"/>
	•	•	330	10	12.4	115.5	12	17	2800	AA331M035G124PTRX <input type="checkbox"/>
	•	•	470	10	16.5	164.5	12	11	5000	AA471M035G165PTRX <input type="checkbox"/>
50	•		10	5	5.8	5.0	10	120	750	AA100M050C058PTRX <input type="checkbox"/>
	•	•	22	6.3	5.8	11.0	10	80	1100	AA220M050E058PTRX <input type="checkbox"/>
	•	•	33	6.3	7.7	16.5	10	40	1600	AA330M050E077PTRX <input type="checkbox"/>
	•	•	56	10	10.5	28.0	10	28	2000	AA680M050F105PTRX <input type="checkbox"/>
	•	•	68	8	10.5	34.0	10	30	1800	AA820M050F117PTRX <input type="checkbox"/>
	•	•	82	8	11.7	41.0	10	28	1880	AA680M050G105PTRX <input type="checkbox"/>
	•	•	100	10	10.5	50.0	10	28	2000	AA101M050G105PTRX <input type="checkbox"/>
	•	•	120	10	12.4	60.0	10	25	2200	AA121M050G124PTRX <input type="checkbox"/>
	•	•	220	10	16.5	110.0	10	13	4600	AA221M050G165PTRX <input type="checkbox"/>
63	•	•	10	6.3	5.8	6.3	8	120	1000	AA100M063E058PTRX <input type="checkbox"/>
	•	•	22	6.3	7.7	13.9	8	80	1500	AA220M063E077PTRX <input type="checkbox"/>
	•	•	33	8	10.5	20.8	8	40	1700	AA330M063F105PTRX <input type="checkbox"/>
	•	•	47	8	10.5	29.6	8	40	1700	AA470M063F105PTRX <input type="checkbox"/>
	•	•	47	8	11.7	29.6	8	38	1750	AA470M063F117PTRX <input type="checkbox"/>
	•	•	56	10	10.5	35.3	8	30	1800	AA560M063G105PTRX <input type="checkbox"/>
	•	•	68	10	10.5	42.8	8	30	1800	AA680M063G105PTRX <input type="checkbox"/>
	•	•	82	10	12.4	51.7	8	22	2100	AA820M063G124PTRX <input type="checkbox"/>
	•	•	150	10	16.5	94.5	8	15	4350	AA151M063G165PTRX <input type="checkbox"/>
80	•	•	22	8	10.5	17.6	8	45	1550	AA220M080F105PTRX <input type="checkbox"/>
	•	•	27	8	11.7	21.6	8	43	1600	AA270M080F117PTRX <input type="checkbox"/>
	•	•	33	10	10.5	26.4	8	36	1700	AA330M080G105PTRX <input type="checkbox"/>
	•	•	47	10	10.5	37.6	8	36	1700	AA470M080G105PTRX <input type="checkbox"/>
	•	•	56	10	12.4	44.8	8	32	1800	AA560M080G124PTRX <input type="checkbox"/>
100	•	•	22	8	10.5	22.0	8	55	1400	AA220M100F105PTRX <input type="checkbox"/>
	•	•	22	8	11.7	22.0	8	52	1450	AA220M100F117PTRX <input type="checkbox"/>
	•	•	22	10	10.5	22.0	8	45	1500	AA220M100G105PTRX <input type="checkbox"/>
	•	•	27	10	12.4	27.0	8	40	1600	AA270M100G124PTRX <input type="checkbox"/>
	•	•	33	10	12.4	33.0	8	40	1600	AA330M100G124PTRX <input type="checkbox"/>
200	•	•	10	10	12.4	20.0	12	100	800	AA100M200G124PTRX <input type="checkbox"/>

: Enter **W** for Vibration proof version

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.10	0.10	0.10	0.15
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.20	0.30	0.40	0.45
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.50	0.60	0.65	0.75
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

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General Precautions and Guidelines	Packaging Information Hybrid SMD
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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AC SERIES ▀ LONG LIFE AT 125°C

#### KEY FEATURES



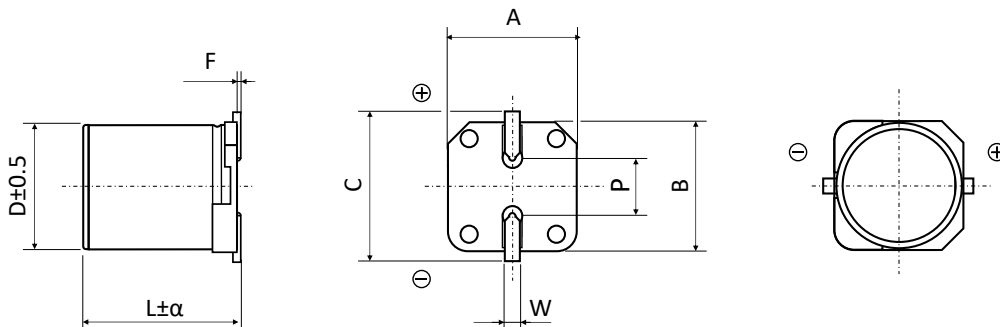
- HYBRID CONDUCTIVE POLYMER • SMD type
- Endurance: 125°C • 4 000 hours
- Low ESR and high ripple current
- Vibration Proof (VP) version (up to 30g) available
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +125°C
Rated Voltage Range	$V_R$	16 ~ 100V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	10 ~ 1500 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings
<b>Lifetime Test</b>		
Endurance 125°C ( $V_R$ & $I_R$ applied)	Test	<b>4 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan \delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

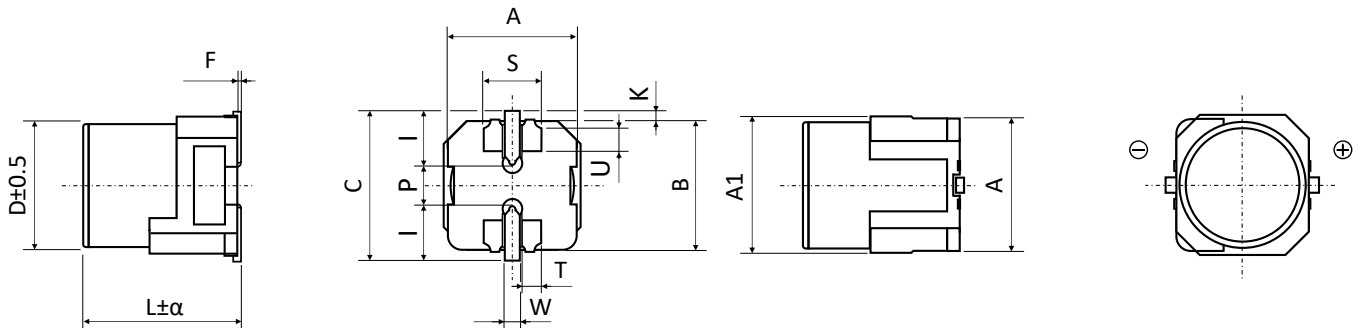
#### DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm



**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
5.0	5.8	0.3	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.8	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
8.0	11.7	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4
10.0	16.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

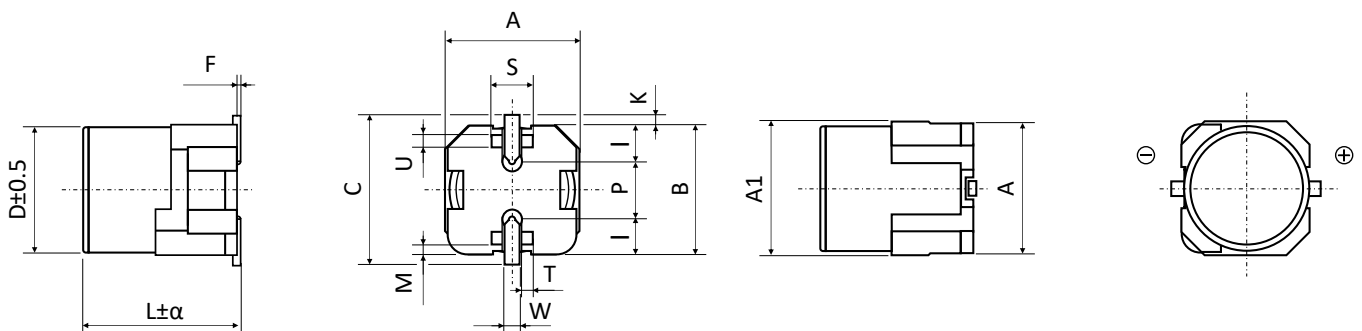
**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3** ▪ All dimensions in mm



$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	K
6.3	5.8	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	7.7	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$
6.3	5.8	2.2	2.9	2.4	1.1	1.55	0.65
6.3	7.7	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10** ▪ All dimensions in mm























### DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm

ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
8.0	11.7	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	16.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
8.0	11.7	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	16.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

### STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)			C <sub>R</sub> (µF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (µA, 2min)	tanδ +20°C ▪ 120Hz (%)	Max. ESR +20°C ▪ 100kHz (mΩ)	I <sub>R</sub> ▪ Max. Ripple Cur- rent +125°C ▪ 100kHz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof								
16	•	•	100	6.3	5.8	16.0	16	50	900	AC101M016E058PTRX 
	•	•	120	6.3	5.8	19.2	16	50	900	AC121M016E058PTRX 
	•	•	150	6.3	5.8	24.0	16	50	900	AC151M016E058PTRX 
	•	•	220	6.3	7.7	35.2	16	30	1400	AC221M016E077PTRX 
	•	•	270	6.3	7.7	43.2	16	30	1700	AC271M016E077PTRX 
	•	•	330	10	10.5	52.8	16	20	2000	AC331M016G105PTRX 
	•	•	470	8	10.5	75.2	16	27	1600	AC471M016F105PTRX 
	•	•	470	10	10.5	75.2	16	20	2000	AC471M016G105PTRX 
	•	•	560	8	11.7	89.6	16	23	1650	AC561M016F117PTRX 
	•	•	560	10	10.5	89.6	16	20	2000	AC561M016G105PTRX 
	•	•	820	10	12.4	131.2	16	16	2260	AC821M016G124PTRX 
•	•	1500	10	16.5	240.0	16	11	4000	AC152M016G165PTRX 	
25	•		33	5	5.8	8.3	14	80	550	AC330M025C058PTRX 
	•	•	56	6.3	5.8	14.0	14	50	900	AC560M025E058PTRX 
	•	•	100	6.3	7.7	25.0	14	30	1400	AC101M025E077PTRX 
	•	•	220	8	10.5	55.0	14	27	1600	AC221M025F105PTRX 
	•	•	270	8	11.7	67.5	14	25	1650	AC271M025F117PTRX 
	•	•	330	10	10.5	82.5	14	20	2000	AC331M025G105PTRX 
	•	•	470	10	12.4	117.5	14	16	2260	AC471M025G124PTRX 
	•	•	560	10	16.5	140.0	14	11	4000	AC561M025G165PTRX 

: Enter **W** for Vibration proof version

### STANDARD RATINGS

Part number shows blister tape on reel version

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C - 120Hz (%)	Max. ESR +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +125°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
35	•		22	5	5.8	7.7	12	100	550	AC220M035C058PTRX <input type="checkbox"/>
	•	•	47	6.3	5.8	16.5	12	60	900	AC470M035E058PTRX <input type="checkbox"/>
	•	•	68	6.3	7.7	23.8	12	35	1400	AC680M035E077PTRX <input type="checkbox"/>
	•	•	100	8	10.5	35.0	12	27	1600	AC101M035F105PTRX <input type="checkbox"/>
	•	•	150	8	10.5	52.5	12	27	1600	AC151M035F105PTRX <input type="checkbox"/>
	•	•	180	8	11.7	63.0	12	25	1650	AC181M035F117PTRX <input type="checkbox"/>
	•	•	270	10	10.5	94.5	12	20	2000	AC271M035G105PTRX <input type="checkbox"/>
	•	•	330	10	12.4	115.5	12	17	2260	AC331M035G124PTRX <input type="checkbox"/>
50	•		10	5	5.8	5.0	10	120	500	AC100M050C058PTRX <input type="checkbox"/>
	•	•	22	6.3	5.8	11.0	10	80	750	AC220M050E058PTRX <input type="checkbox"/>
	•	•	33	6.3	7.7	16.5	10	40	1100	AC330M050E077PTRX <input type="checkbox"/>
	•	•	56	10	10.5	28.0	10	28	1600	AC560M050G105PTRX <input type="checkbox"/>
	•	•	68	8	10.5	34.0	10	30	1250	AC680M050F105PTRX <input type="checkbox"/>
	•	•	82	8	11.7	41.0	10	28	1300	AC820M050F117PTRX <input type="checkbox"/>
	•	•	100	10	10.5	50.0	10	28	1600	AC101M050G105PTRX <input type="checkbox"/>
	•	•	120	10	10.5	60.0	10	28	1600	AC121M050G105PTRX <input type="checkbox"/>
	•	•	120	10	12.4	60.0	10	25	1750	AC121M050G124PTRX <input type="checkbox"/>
	•	•	220	10	16.5	110.0	10	13	3700	AC221M050G165PTRX <input type="checkbox"/>
63	•	•	10	6.3	5.8	6.3	8	120	700	AC100M063E058PTRX <input type="checkbox"/>
	•	•	22	6.3	7.7	13.9	8	80	900	AC220M063E077PTRX <input type="checkbox"/>
	•	•	33	8	10.5	20.8	8	40	1100	AC330M063F105PTRX <input type="checkbox"/>
	•	•	47	8	10.5	29.6	8	40	1100	AC470M063F105PTRX <input type="checkbox"/>
	•	•	47	8	11.7	29.6	8	38	1130	AC470M063F117PTRX <input type="checkbox"/>
	•	•	56	10	10.5	35.3	8	30	1400	AC560M063G105PTRX <input type="checkbox"/>
	•	•	68	10	10.5	42.8	8	30	1400	AC680M063G105PTRX <input type="checkbox"/>
	•	•	82	10	12.4	51.7	8	22	1650	AC820M063G124PTRX <input type="checkbox"/>
	•	•	150	10	16.5	94.5	8	15	3500	AC151M063G165PTRX <input type="checkbox"/>
80	•	•	22	8	10.5	17.6	8	45	1050	AC220M080F105PTRX <input type="checkbox"/>
	•	•	27	8	11.7	21.6	8	43	1080	AC270M080F117PTRX <input type="checkbox"/>
	•	•	33	10	10.5	26.4	8	36	1360	AC330M080G105PTRX <input type="checkbox"/>
	•	•	47	10	10.5	37.6	8	36	1360	AC470M080G105PTRX <input type="checkbox"/>
	•	•	56	10	12.4	44.8	8	35	1440	AC560M080G124PTRX <input type="checkbox"/>
	•	•	68	10	12.4	54.4	8	32	1540	AC680M080G124PTRX <input type="checkbox"/>
100	•	•	22	8	10.5	22.0	8	55	950	AC220M100F105PTRX <input type="checkbox"/>
	•	•	22	8	11.7	22.0	8	52	980	AC220M100F117PTRX <input type="checkbox"/>
	•	•	22	10	10.5	22.0	8	45	1200	AC220M100G105PTRX <input type="checkbox"/>
	•	•	27	10	12.4	27.0	8	40	1360	AC270M100G124PTRX <input type="checkbox"/>
	•	•	33	10	12.4	33.0	8	40	1360	AC330M100G124PTRX <input type="checkbox"/>

: Enter **W** for Vibration proof version



**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.10	0.10	0.10	0.15
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.20	0.30	0.40	0.45
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.50	0.60	0.65	0.75
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

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All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AB SERIES ■ MINIATURIZED HIGH RIPPLE CURRENT TYPE

#### KEY FEATURES



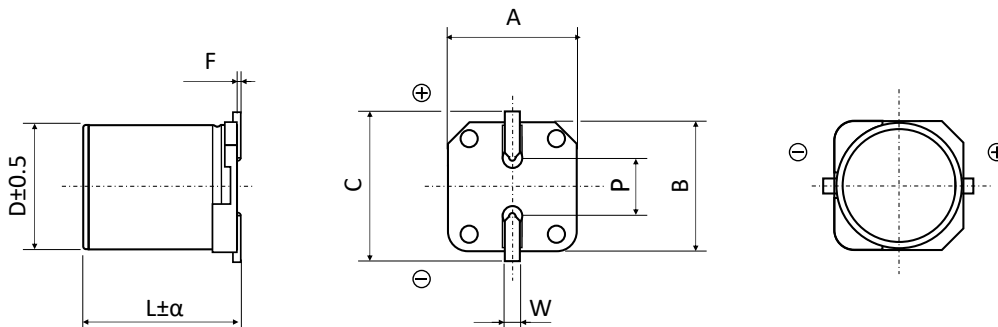
- HYBRID CONDUCTIVE POLYMER • SMD type
- Endurance: 125°C • 4 000 hours
- Low ESR and **extremely** high ripple current in small dimensions
- Vibration Proof (VP) version (up to 30g) available
- AEC-Q200 qualified



#### SPECIFICATIONS

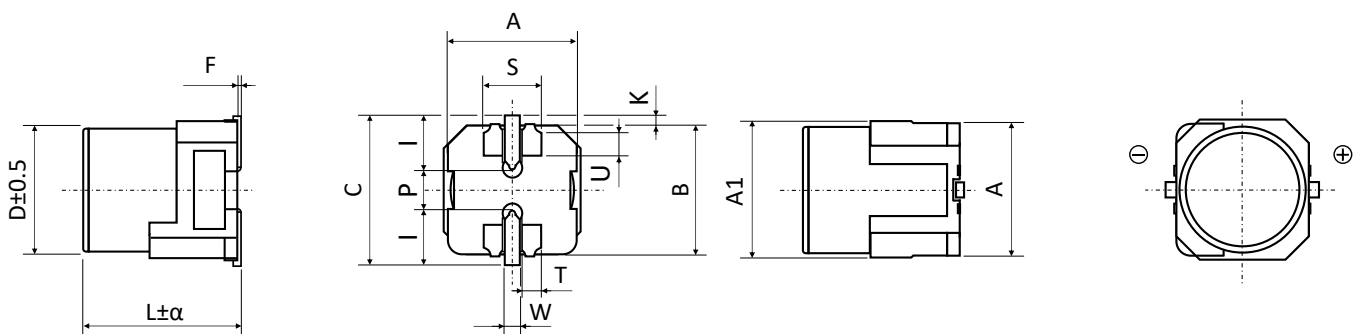
Items		Performance Characteristics
Operating Temperature Range		-55 ~ +125°C
Rated Voltage Range	$V_R$	25 ~ 35V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	33 ~ 680 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings
<b>Lifetime Test</b>		
Endurance 125°C ( $V_R$ & $I_R$ applied)	Test	<b>4 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan \delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

#### DIMENSIONS STANDARD PACKAGE ■ All dimensions in mm



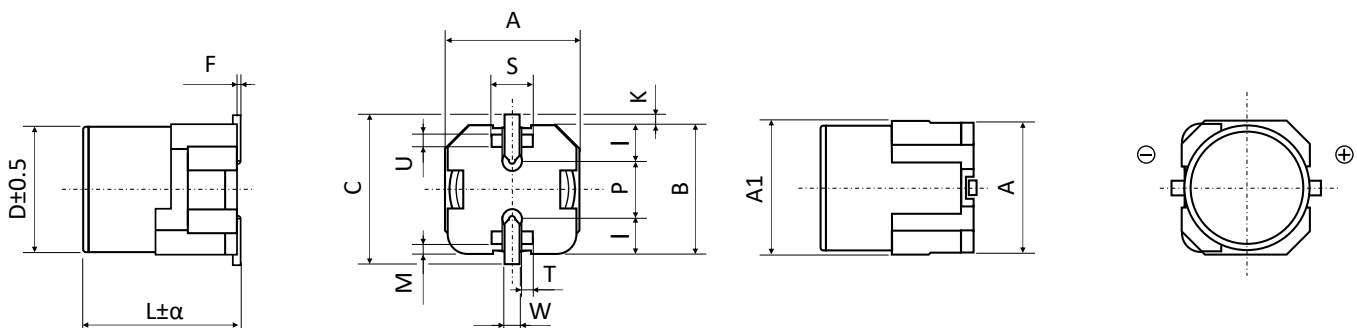
**DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm**

$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
5.0	5.8	0.3	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.8	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D6.3$  ▀ All dimensions in mm**


$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	K
6.3	5.8	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	7.7	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$
6.3	5.8	2.2	2.9	2.4	1.1	1.55	0.65
6.3	7.7	2.2	2.9	2.4	1.1	1.55	0.65

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D8$  and  $D10$  ▀ All dimensions in mm**


## DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm

ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9

## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)			C <sub>R</sub> (µF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (µA, 2min)	tanδ +20°C ▪ 120Hz (%)	Max. ESR +20°C ▪ 100kHz (mΩ)	I <sub>R</sub> ▪ Max. Ripple Cur- rent +125°C ▪ 100kHz (mA rms)	CapXon Part Number
	Standard	Vibration-proof								
25	•		47	5	5.8	11.8	14	80	850	AB470M025C058PTRX
	•		56	5	5.8	14.0	14	80	850	AB560M025C058PTRX
	•	•	68	6.3	5.8	17.0	14	50	1300	AB680M025E058PTRX
	•	•	82	6.3	5.8	20.5	14	50	1300	AB820M025E058PTRX
	•	•	100	6.3	5.8	25.0	14	50	1300	AB101M025E058PTRX
	•	•	150	6.3	7.7	37.5	14	30	1800	AB151M025E077PTRX
	•	•	180	6.3	7.7	45.0	14	30	1800	AB181M025E077PTRX
	•	•	270	8	10.5	67.5	14	27	2000	AB271M025F105PTRX
	•	•	330	8	10.5	82.5	14	27	2000	AB331M025F105PTRX
	•	•	470	10	10.5	117.5	14	20	2800	AB471M025G105PTRX
	•	•	560	10	10.5	140.0	14	20	2800	AB561M025G105PTRX
35	•	•	680	10	12.4	170.0	14	16	3160	AB681M025G124PTRX
	•		33	5	5.8	11.5	12	100	750	AB330M035C058PTRX
	•		39	5	5.8	13.7	12	100	750	AB390M035C058PTRX
	•	•	56	6.3	5.8	19.6	12	60	1200	AB560M035E058PTRX
	•	•	68	6.3	5.8	23.8	12	60	1200	AB680M035E058PTRX
	•	•	100	6.3	7.7	35.0	12	35	1700	AB101M035E077PTRX
	•	•	120	6.3	7.7	42.0	12	35	1700	AB121M035E077PTRX
	•	•	180	8	10.5	63.0	12	27	2000	AB181M035F105PTRX
	•	•	220	8	10.5	77.0	12	27	2000	AB221M035F105PTRX
	•	•	330	10	10.5	115.5	12	20	2800	AB331M035G105PTRX
	•	•	390	10	10.5	136.5	12	20	2800	AB391M035G105PTRX

: Enter **W** for Vibration proof version

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.15	0.15	0.20	0.25
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.35	0.45	0.55	0.60
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.65	0.70	0.75	0.75
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Hybrid SMD
Page 310	Page 272

**DISCLAIMER**

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AN SERIES ▀ LONG LIFE AT 135°C

#### KEY FEATURES



AEC-Q 200



SHOCK VIBRATION



TEMPERATURE HIGH

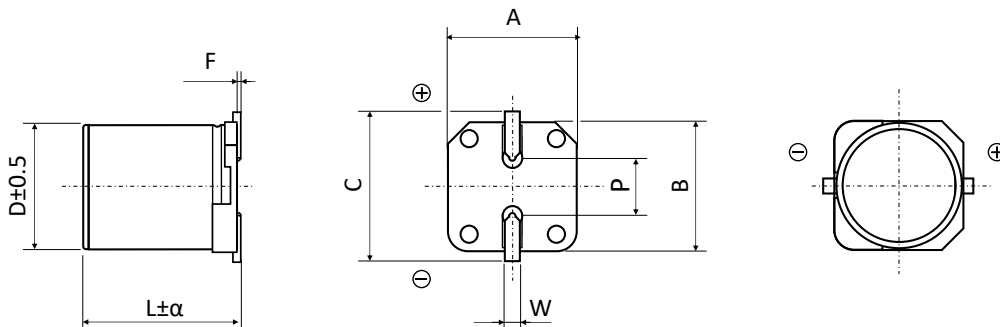
- HYBRID CONDUCTIVE POLYMER • SMD type
- Endurance: 135°C • 4 000 hours
- Low ESR and high ripple current
- Vibration Proof (VP) version (up to 30g) available
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +135°C
Rated Voltage Range	$V_R$	16 ~ 100V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	10 ~ 820 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings
<b>Lifetime Test</b>		
Endurance 135°C ( $V_R$ & $I_R$ applied)	Test	<b>4 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

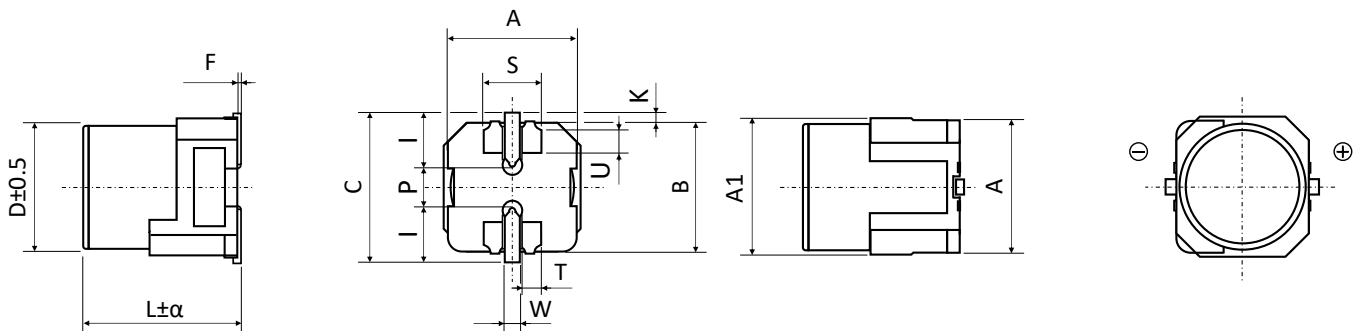
#### DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm



## DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
5.0	5.8	0.3	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.8	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
8.0	11.7	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

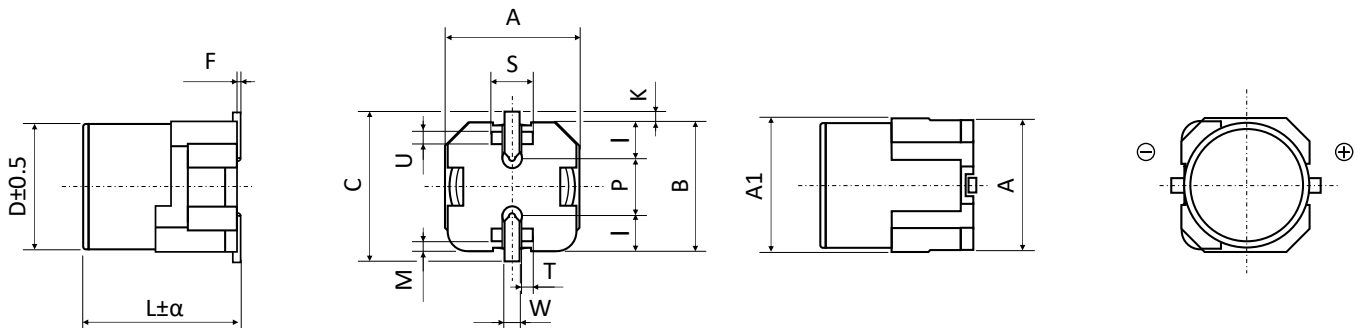
## DIMENSIONS VP PACKAGE (VIBRATION-PROOF) $\phi D6.3$ ▀ All dimensions in mm



$\phi D$	L	$\alpha$	$A \pm 0.2$	A1 (max.)	$B \pm 0.2$	C (max.)	F	K
6.3	5.8	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	7.7	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$
6.3	5.8	2.2	2.9	2.4	1.1	1.55	0.65
6.3	7.7	2.2	2.9	2.4	1.1	1.55	0.65

## DIMENSIONS VP PACKAGE (VIBRATION-PROOF) $\phi D8$ and $D10$ ▀ All dimensions in mm



## DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm

ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
8.0	11.7	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
8.0	11.7	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9

## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)			C <sub>R</sub> (µF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (µA, 2min)	tanδ +20°C ▪ 120Hz (%)	Max. ESR +20°C ▪ 100kHz (mΩ)	I <sub>R</sub> ▪ Max. Ripple Cur- rent +135°C ▪ 100kHz (mA rms)	CapXon Part Number Automotive Type
	Standard	Vibration-proof								
16	•	•	100	6.3	5.8	16.0	16	50	900	AN101M016E058PTRX <input type="checkbox"/>
	•	•	120	6.3	5.8	19.2	16	50	900	AN121M016E058PTRX <input type="checkbox"/>
	•	•	150	6.3	5.8	24.0	16	50	900	AN151M016E058PTRX <input type="checkbox"/>
	•	•	220	6.3	7.7	35.2	16	30	1400	AN221M016E077PTRX <input type="checkbox"/>
	•	•	270	6.3	7.7	43.2	16	30	1700	AN271M016E077PTRX <input type="checkbox"/>
	•	•	330	10	10.5	52.8	16	20	2000	AN331M016G105PTRX <input type="checkbox"/>
	•	•	470	8	10.5	75.2	16	27	1600	AN471M016F105PTRX <input type="checkbox"/>
	•	•	470	10	10.5	75.2	16	20	2000	AN471M016G105PTRX <input type="checkbox"/>
	•	•	560	8	11.7	89.6	16	23	1650	AN561M016F117PTRX <input type="checkbox"/>
	•	•	560	10	10.5	89.6	16	20	2000	AN561M016G105PTRX <input type="checkbox"/>
25	•	•	820	10	12.4	131.2	16	16	2260	AN821M016G124PTRX <input type="checkbox"/>
	•	•	33	5	5.8	8.3	14	80	550	AN330M025C058PTRX <input type="checkbox"/>
	•	•	56	6.3	5.8	14.0	14	50	900	AN560M025E058PTRX <input type="checkbox"/>
	•	•	100	6.3	7.7	25.0	14	30	1400	AN101M025E077PTRX <input type="checkbox"/>
	•	•	220	8	10.5	55.0	14	27	1600	AN221M025F105PTRX <input type="checkbox"/>
	•	•	270	8	11.7	67.5	14	25	1650	AN271M025F117PTRX <input type="checkbox"/>
	•	•	330	10	10.5	82.5	14	20	2000	AN331M025G105PTRX <input type="checkbox"/>
35	•	•	470	10	12.4	117.5	14	16	2260	AN471M025G124PTRX <input type="checkbox"/>
	•	•	22	5	5.8	7.7	12	100	550	AN220M035C058PTRX <input type="checkbox"/>
	•	•	47	6.3	5.8	16.5	12	60	900	AN470M035E058PTRX <input type="checkbox"/>
	•	•	68	6.3	7.7	23.8	12	35	1400	AN680M035E077PTRX <input type="checkbox"/>
	•	•	100	8	10.5	35.0	12	27	1600	AN101M035F105PTRX <input type="checkbox"/>
	•	•	150	8	10.5	52.5	12	27	1600	AN151M035F105PTRX <input type="checkbox"/>
	•	•	180	8	11.7	63.0	12	25	1650	AN181M035F117PTRX <input type="checkbox"/>
	•	•	270	10	10.5	94.5	12	20	2000	AN271M035G105PTRX <input type="checkbox"/>
•	•	330	10	12.4	115.5	12	17	2260	AN331M035G124PTRX <input type="checkbox"/>	

: Enter **W** for Vibration proof version



## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	∅ D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C - 120Hz (%)	Max. ESR +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +135°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
50	•		10	5	5.8	5.0	10	120	500	AN100M050C058PTRX <input type="checkbox"/>
	•	•	22	6.3	5.8	11.0	10	80	750	AN220M050E058PTRX <input type="checkbox"/>
	•	•	33	6.3	7.7	16.5	10	40	1100	AN330M050E077PTRX <input type="checkbox"/>
	•	•	56	10	10.5	28.0	10	28	1600	AN560M050G105PTRX <input type="checkbox"/>
	•	•	68	8	10.5	34.0	10	30	1250	AN680M050F105PTRX <input type="checkbox"/>
	•	•	82	8	11.7	41.0	10	28	1300	AN820M050F117PTRX <input type="checkbox"/>
	•	•	100	10	10.5	50.0	10	28	1600	AN101M050G105PTRX <input type="checkbox"/>
	•	•	120	10	10.5	60.0	10	28	1600	AN121M050G105PTRX <input type="checkbox"/>
63	•	•	10	6.3	5.8	6.3	8	120	700	AN100M063E058PTRX <input type="checkbox"/>
	•	•	22	6.3	7.7	13.9	8	80	900	AN220M063E077PTRX <input type="checkbox"/>
	•	•	33	8	10.5	20.8	8	40	1100	AN330M063F105PTRX <input type="checkbox"/>
	•	•	47	8	10.5	29.6	8	40	1100	AN470M063F105PTRX <input type="checkbox"/>
	•	•	47	8	11.7	29.6	8	38	1130	AN470M063F117PTRX <input type="checkbox"/>
	•	•	56	10	10.5	35.3	8	30	1400	AN560M063G105PTRX <input type="checkbox"/>
	•	•	68	10	10.5	42.8	8	30	1400	AN680M063G105PTRX <input type="checkbox"/>
	•	•	82	10	12.4	51.7	8	22	1650	AN820M063G124PTRX <input type="checkbox"/>
80	•	•	22	8	10.5	17.6	8	45	1050	AN220M080F105PTRX <input type="checkbox"/>
	•	•	27	8	11.7	21.6	8	43	1080	AN270M080F117PTRX <input type="checkbox"/>
	•	•	33	10	10.5	26.4	8	36	1360	AN330M080G105PTRX <input type="checkbox"/>
	•	•	47	10	10.5	37.6	8	36	1360	AN470M080G105PTRX <input type="checkbox"/>
	•	•	56	10	12.4	44.8	8	35	1440	AN560M080G124PTRX <input type="checkbox"/>
	•	•	68	10	12.4	54.4	8	32	1540	AN680M080G124PTRX <input type="checkbox"/>
100	•	•	22	8	10.5	22.0	8	55	950	AN220M100F105PTRX <input type="checkbox"/>
	•	•	22	8	11.7	22.0	8	52	980	AN220M100F117PTRX <input type="checkbox"/>
	•	•	22	10	10.5	22.0	8	45	1200	AN220M100G105PTRX <input type="checkbox"/>
	•	•	27	10	12.4	27.0	8	40	1360	AN270M100G124PTRX <input type="checkbox"/>
	•	•	33	10	12.4	33.0	8	40	1360	AN330M100G124PTRX <input type="checkbox"/>

: Enter W for Vibration proof version

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.15	0.15	0.20	0.25
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.30	0.40	0.45	0.55
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.60	0.70	0.75	0.80
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.85	0.90	1.00	1.00

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

**AU SERIES ▀ HIGH RIPPLE CURRENT TYPE**

**KEY FEATURES**



- **HYBRID CONDUCTIVE POLYMER • SMD type**
- Endurance: 135°C • 4 000 hours
- Ultra-low ESR and highest ripple current
- Vibration Proof (VP) version (up to 30g) available
- AEC-Q200 version available

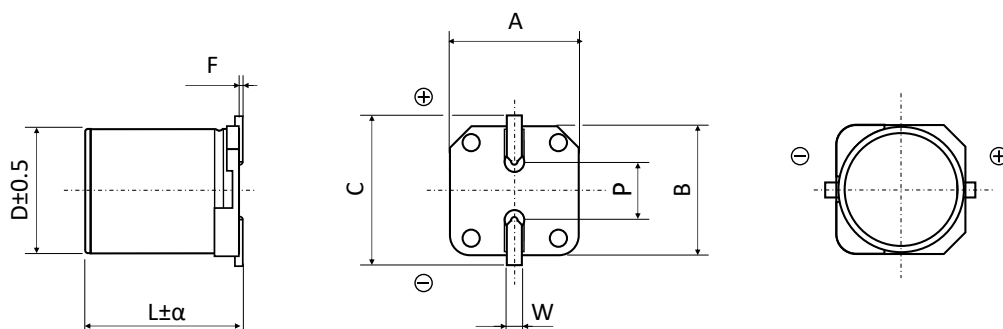


**SPECIFICATIONS**

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +135°C
Rated Voltage Range	$V_R$	25 ~ 100V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	22 ~ 680 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings

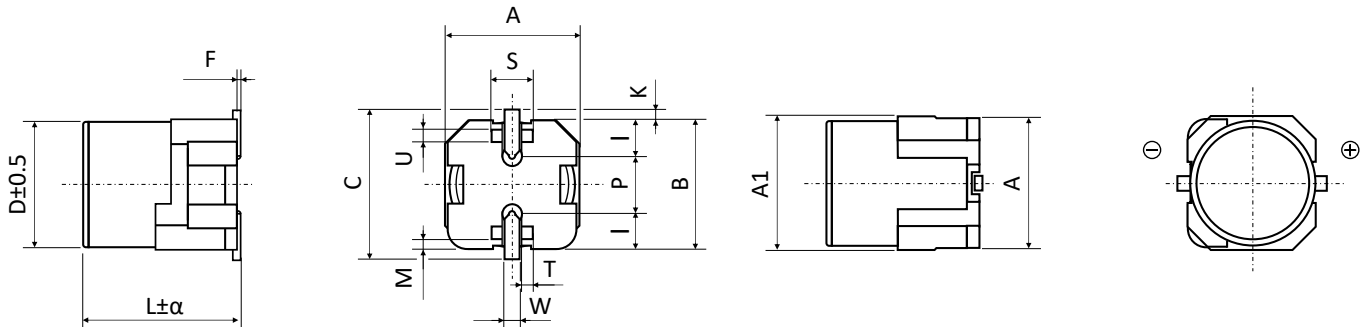
Lifetime Test		
Endurance 135°C ( $V_R$ & $I_R$ applied)	Test	<b>4 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

**DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm**



$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
10	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4
10	16.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION PROOF) Ø D10 • All dimensions in mm**



ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
10	12.4	<sup>-0.3</sup> / <sub>+0.7</sub>	10.3	10.8	10.3	12.0	0 to 0.15	0.7 ± 0.2
10	16.5	<sup>-0.3</sup> / <sub>+0.7</sub>	10.3	10.8	10.3	12.0	0 to 0.15	0.7 ± 0.2

ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
10	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10	16.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (µF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (µA, 2min)	tanδ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (mΩ)	I <sub>R</sub> • Max. Ripple Current • 100kHz (mA rms)		CapXon Part Number Automotive Type
									+125°C	+135°C	
25	•	•	470	10	12.4	117.5	14	10	5000	3500	AU471M025G124PTRX <input type="checkbox"/>
	•	•	560	10	16.5	140	14	8	5800	4000	AU561M025G165PTRX <input type="checkbox"/>
	•	•	680	10	16.5	170	14	8	5800	4000	AU681M025G165PTRX <input type="checkbox"/>
35	•	•	330	10	12.4	115.5	12	11	4800	3300	AU331M035G124PTR <input type="checkbox"/>
	•	•	470	10	16.5	164.5	12	9	5500	3800	AU471M035G165PTR <input type="checkbox"/>
50	•	•	68	10	12.4	34	10	15	4000	2800	AU680M050G124PTR <input type="checkbox"/>
	•	•	100	10	12.4	50	10	15	4000	2800	AU101M050G124PTR <input type="checkbox"/>
	•	•	120	10	12.4	60	10	12	4600	3200	AU121M050G124PTR <input type="checkbox"/>
	•	•	150	10	12.4	75	10	12	4600	3200	AU151M050G124PTR <input type="checkbox"/>
	•	•	180	10	16.5	90	10	10	5200	3600	AU181M050G165PTR <input type="checkbox"/>
	•	•	220	10	16.5	110	10	10	5200	3600	AU221M050G165PTR <input type="checkbox"/>
63	•	•	47	10	12.4	29.6	8	15	4000	2800	AU470M063G124PTR <input type="checkbox"/>
	•	•	56	10	12.4	35.3	8	15	4000	2800	AU560M063G124PTR <input type="checkbox"/>
	•	•	68	10	12.4	42.8	8	15	4000	2800	AU680M063G124PTR <input type="checkbox"/>
	•	•	100	10	12.4	63.0	8	12	4600	3200	AU101M063G124PTR <input type="checkbox"/>
	•	•	120	10	12.4	75.6	8	12	4600	3200	AU121M063G124PTR <input type="checkbox"/>
	•	•	150	10	16.5	94.5	8	10	5200	3600	AU151M063G165PTR <input type="checkbox"/>

: Enter **W** for Vibration proof version

**STANDARD RATINGS**

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (mΩ)	I <sub>r</sub> - Max. Ripple Current • 100kHz (mA rms)		CapXon Part Number Automotive Type
									+125°C	+135°C	
80	•	•	47	10	12.4	37.6	8	18	3600	2500	AU470M080G124PTRX
	•	•	56	10	12.4	44.8	8	15	3600	2500	AU560M080G124PTRX
	•	•	68	10	12.4	54.5	8	15	4000	2800	AU680M080G124PTRX
	•	•	100	10	16.5	80	8	12	4700	3300	AU101M080G165PTRX
100	•	•	22	10	12.4	22	8	25	3000	2100	AU220M100G124PTRX
	•	•	33	10	12.4	33	8	20	3400	2400	AU330M100G124PTRX
	•	•	47	10	16.5	47	8	15	4100	2900	AU470M100G165PTRX

: Enter **W** for Vibration proof version

**MULTIPLIER K<sub>f</sub> for RIPPLE CURRENT vs. FREQUENCY**

Frequency (Hz)	100 ≤ Freq. < 120	120 ≤ Freq. < 200	200 ≤ Freq. < 300	300 ≤ Freq. < 500
Coefficient K <sub>f</sub>	0.15	0.15	0.20	0.25
Frequency (Hz)	500 ≤ Freq. < 1k	1k ≤ Freq. < 2k	2k ≤ Freq. < 3k	3k ≤ Freq. < 5k
Coefficient K <sub>f</sub>	0.30	0.40	0.45	0.55
Frequency (Hz)	5k ≤ Freq. < 10k	10k ≤ Freq. < 15k	15k ≤ Freq. < 20k	20k ≤ Freq. < 40k
Coefficient K <sub>f</sub>	0.60	0.70	0.75	0.80
Frequency (Hz)	40k ≤ Freq. < 50k	50k ≤ Freq. < 100k	100k ≤ Freq. < 500k	500k ≤ Freq. < 1M
Coefficient K <sub>f</sub>	0.85	0.90	1.00	1.00

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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General Precautions and Guidelines	Packaging Information Hybrid SMD
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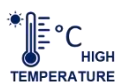
For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AR SERIES ▀ HIGH TEMPERATURE TYPE 145°C

#### KEY FEATURES



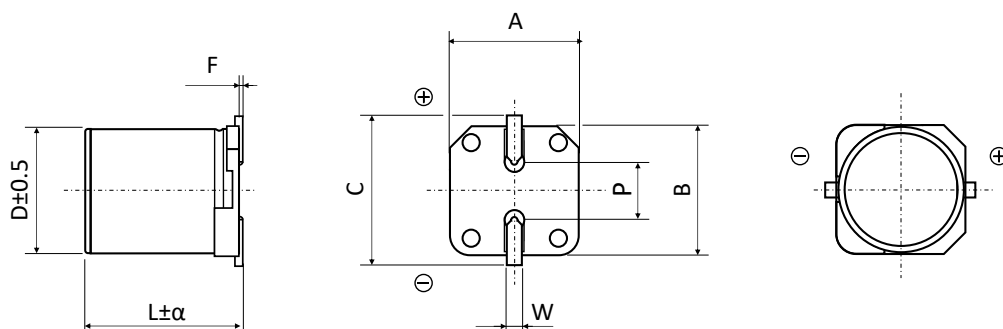
- HYBRID CONDUCTIVE POLYMER • SMD type
- Endurance: 145°C • 2 000 hours
- Low ESR and high ripple current
- Vibration-proof (VP) version (up to 30g) available
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +145°C
Rated Voltage Range	$V_R$	16 ~ 80V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	22 ~ 560 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings
<b>Lifetime Test</b>		
Endurance 145°C ( $V_R$ & $I_R$ applied)	Test	<b>2 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

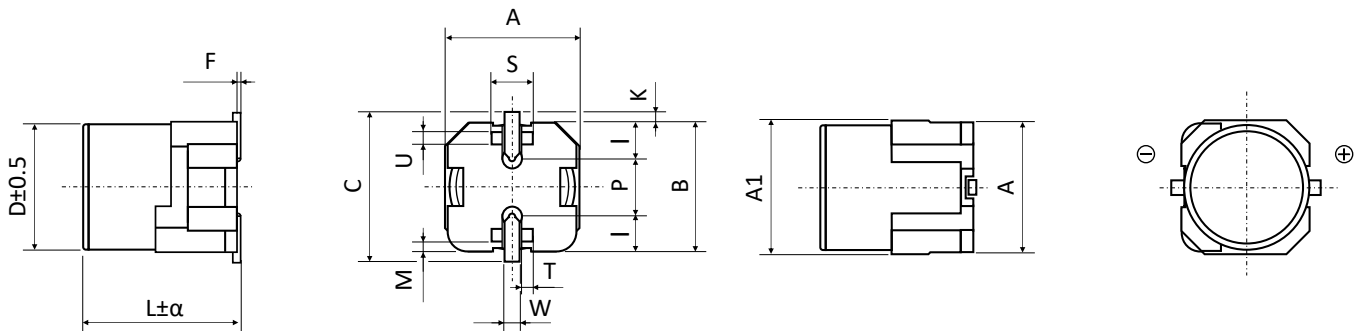
#### DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm



**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
8.0	11.7	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D8$  and  $D10$**  ▪ All dimensions in mm



**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D8$  and  $D10$**  ▪ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$A1$ (max.)	$B \pm 0.2$	$C$ (max.)	F	$K \pm 0.2$
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
8.0	11.7	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$	$M \pm 0.1$
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
8.0	11.7	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9



## STANDARD RATINGS

Part number shows blister tape on paper reel

$V_R$ (V)	Standard	Vibration-proof	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_{LEAK}$ ( $\mu A$ , 2min)	$\tan\delta$ +20°C - 120Hz (%)	Max. ESR +20°C - 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +145°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
16	•	•	270	8	10.5	43.2	16	27	700	AR271M016F105PTRX
	•	•	330	8	10.5	52.8	16	25	770	AR331M016F105PTRX
	•	•	470	10	10.5	75.2	16	20	900	AR471M016G105PTRX
	•	•	560	10	12.4	89.6	16	16	1050	AR561M016G124PTRX
25	•	•	220	8	10.5	55.0	14	27	700	AR221M025F105PTRX
	•	•	270	8	11.7	67.5	14	25	770	AR271M025F117PTRX
	•	•	330	10	10.5	82.5	14	20	900	AR331M025G105PTRX
	•	•	470	10	12.4	117.5	14	16	1050	AR471M025G124PTRX
35	•	•	100	8	10.5	35.0	12	27	700	AR101M035F105PTRX
	•	•	150	8	10.5	52.5	12	27	700	AR151M035F105PTRX
	•	•	180	8	11.7	63.0	12	25	770	AR181M035F117PTRX
	•	•	270	10	10.5	94.5	12	20	900	AR271M035G105PTRX
	•	•	330	10	12.4	115.5	12	17	1020	AR331M035G124PTRX
50	•	•	68	8	10.5	34.0	10	30	600	AR680M050F105PTRX
	•	•	82	8	11.7	41.0	10	28	660	AR820M050F117PTRX
	•	•	56	10	10.5	28.0	10	28	800	AR560M050G105PTRX
	•	•	100	10	10.5	50.0	10	28	800	AR101M050G105PTRX
	•	•	120	10	10.5	60.0	10	28	800	AR121M050G105PTRX
	•	•	120	10	12.4	60.0	10	25	900	AR121M050G124PTRX
63	•	•	33	8	10.5	20.8	8	40	600	AR330M063F105PTRX
	•	•	47	8	10.5	29.6	8	40	600	AR470M063F105PTRX
	•	•	47	8	11.7	29.6	8	38	650	AR470M063F117PTRX
	•	•	56	10	10.5	35.3	8	30	800	AR560M063G105PTRX
	•	•	68	10	10.5	42.8	8	30	800	AR680M063G105PTRX
	•	•	82	10	12.4	51.7	8	27	900	AR820M063G124PTRX
80	•	•	22	8	10.5	17.6	8	45	560	AR220M080F105PTRX
	•	•	27	8	11.7	21.6	8	43	580	AR270M080F117PTRX
	•	•	33	8	10.5	26.4	8	36	730	AR330M080G105PTRX
	•	•	47	10	10.5	37.6	8	36	730	AR470M080G105PTRX
	•	•	56	10	12.4	44.8	8	34	800	AR560M080G124PTRX
	•	•	68	10	12.4	54.4	8	34	800	AR680M080G124PTRX

: Enter **W** for Vibration proof version

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.10	0.10	0.10	0.15
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.20	0.30	0.40	0.45
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.50	0.60	0.65	0.75
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AP SERIES ▀ HIGH TEMPERATURE TYPE 150°C

#### KEY FEATURES



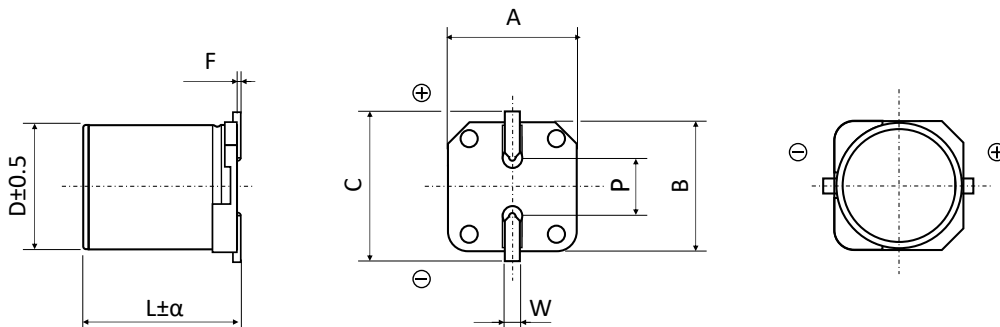
- HYBRID CONDUCTIVE POLYMER • SMD type
- Endurance: 150°C • 1 000 hours
- Low ESR and high ripple current
- Vibration Proof (VP) version (up to 30g) available
- AEC-Q200 qualified



#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +150°C
Rated Voltage Range	$V_R$	16 ~ 80V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	22 ~ 560 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings
<b>Lifetime Test</b>		
Endurance 150°C ( $V_R$ & $I_R$ applied)	Test	<b>1 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan \delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

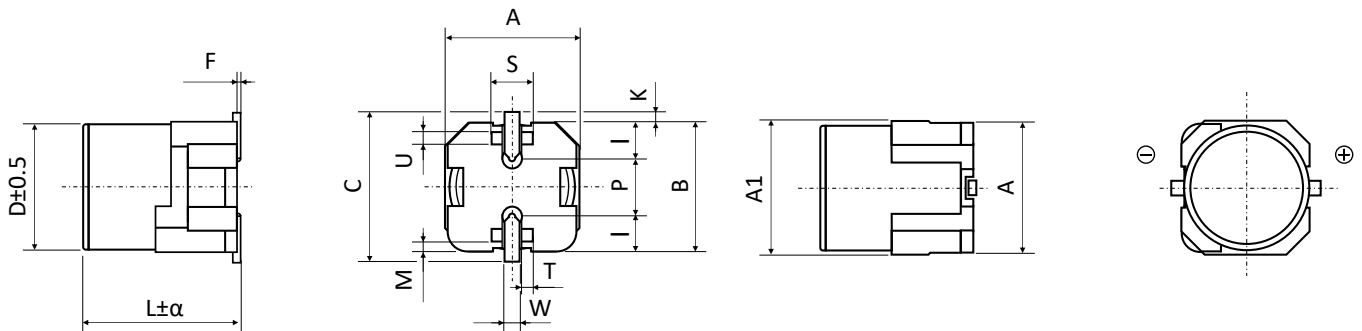
#### DIMENSIONS STANDARD PACKAGE ▀ All dimensions in mm



**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
8.0	11.7	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D8$  and  $D10$**  ▪ All dimensions in mm



**DIMENSIONS VP PACKAGE (VIBRATION-PROOF)  $\phi D8$  and  $D10$**  ▪ All dimensions in mm

$\phi D$	L	$\alpha$	$A \pm 0.2$	$A1$ (max.)	$B \pm 0.2$	$C$ (max.)	F	$K \pm 0.2$
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
8.0	11.7	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

$\phi D$	L	$P \pm 0.2$	$S \pm 0.1$	$I \pm 0.1$	$T \pm 0.1$	$U \pm 0.1$	$W \pm 0.1$	$M \pm 0.1$
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
8.0	11.7	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9

## STANDARD RATINGS

Part number shows blister tape on paper reel

V <sub>R</sub> (V)	Standard	Vibration-proof	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C - 120Hz (%)	Max. ESR +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +150°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
16	•	•	270	8	10.5	43.2	16	27	700	AP271M016F105PTRX
	•	•	330	8	10.5	52.8	16	25	770	AP331M016F105PTRX
	•	•	470	10	10.5	75.2	16	20	900	AP471M016G105PTRX
	•	•	560	10	12.4	89.6	16	16	1050	AP561M016G124PTRX
25	•	•	220	8	10.5	55.0	14	27	700	AP221M025F105PTRX
	•	•	270	8	11.7	67.5	14	25	770	AP271M025F117PTRX
	•	•	330	10	10.5	82.5	14	20	900	AP331M025G105PTRX
	•	•	470	10	12.4	117.5	14	16	1050	AP471M025G124PTRX
35	•	•	100	8	10.5	35.0	12	27	700	AP101M035F105PTRX
	•	•	150	8	10.5	52.5	12	27	700	AP151M035F105PTRX
	•	•	180	8	11.7	63.0	12	25	770	AP181M035F117PTRX
	•	•	270	10	10.5	94.5	12	20	900	AP271M035G105PTRX
	•	•	330	10	12.4	115.5	12	17	1020	AP331M035G124PTRX
50	•	•	56	10	10.5	28.0	10	28	800	AP560M050G105PTRX
	•	•	68	8	10.5	34.0	10	30	600	AP680M050F105PTRX
	•	•	82	8	11.7	41.0	10	28	660	AP820M050F117PTRX
	•	•	100	10	10.5	50.0	10	28	800	AP101M050G105PTRX
	•	•	120	10	10.5	60.0	10	28	800	AP121M050G105PTRX
	•	•	120	10	12.4	60.0	10	25	900	AP121M050G124PTRX
63	•	•	33	8	10.5	20.8	8	40	600	AP330M063F105PTRX
	•	•	47	8	10.5	29.6	8	40	600	AP470M063F105PTRX
	•	•	47	8	11.7	29.6	8	38	650	AP470M063F117PTRX
	•	•	56	10	10.5	35.3	8	30	800	AP560M063G105PTRX
	•	•	68	10	10.5	42.8	8	30	800	AP680M063G105PTRX
	•	•	82	10	12.4	51.7	8	27	900	AP820M063G124PTRX
80	•	•	22	8	10.5	17.6	8	45	560	AP220M080F105PTRX
	•	•	27	8	11.7	21.6	8	43	580	AP270M080F117PTRX
	•	•	33	8	10.5	26.4	8	36	730	AP330M080G105PTRX
	•	•	47	10	10.5	37.6	8	36	730	AP470M080G105PTRX
	•	•	56	10	12.4	44.8	8	34	800	AP560M080G124PTRX
	•	•	68	10	12.4	54.4	8	34	800	AP680M080G124PTRX

: Enter **W** for Vibration proof version

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.10	0.10	0.10	0.15
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.20	0.30	0.40	0.45
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.50	0.60	0.65	0.75
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Hybrid SMD
Page 310	Page 272

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

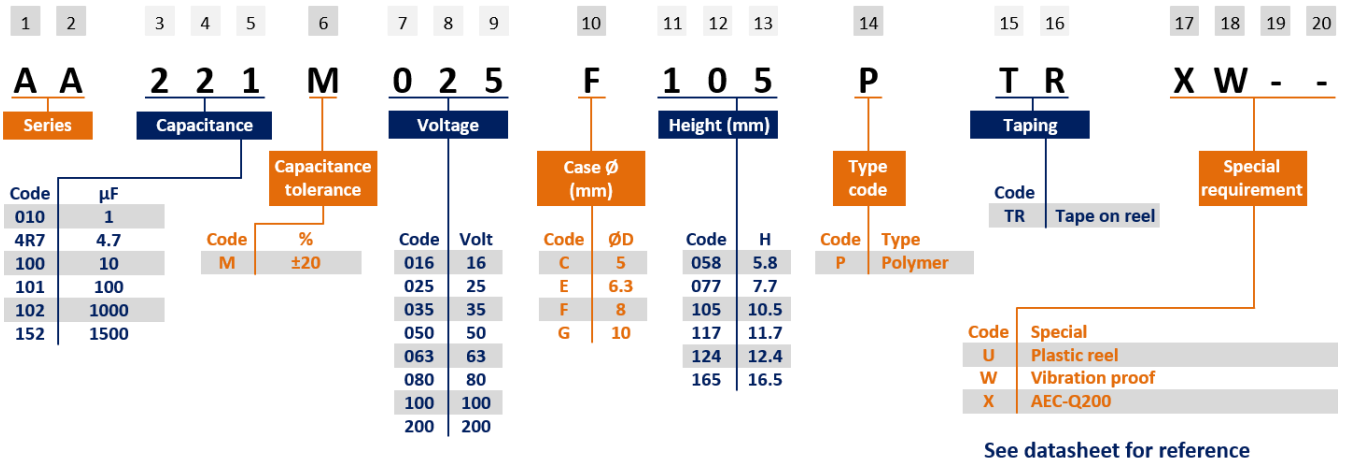
For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### PRODUCT CODE - SMD HYBRID CONDUCTIVE POLYMER CAPACITORS



SMD type example:

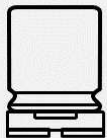
AA series ▪ 220µF ▪ 25V ▪ ±20% ▪ Ø 8mm ▪ L 10.5mm ▪ Tape & Reel ▪ AEC-Q200 ▪ Vibration proof package



Please consult CapXon for further assistance

### MARKING - SMD HYBRID CONDUCTIVE POLYMER CAPACITORS

#### Hybrid Polymer Capacitor - SMD type



CapXon: Manufacturer trademark  
 220: Nominal capacitance (µF)  
 25X: Rated voltage (V) ▪ AEC-Q200 type  
 (-) polarity (Cathode indicate)

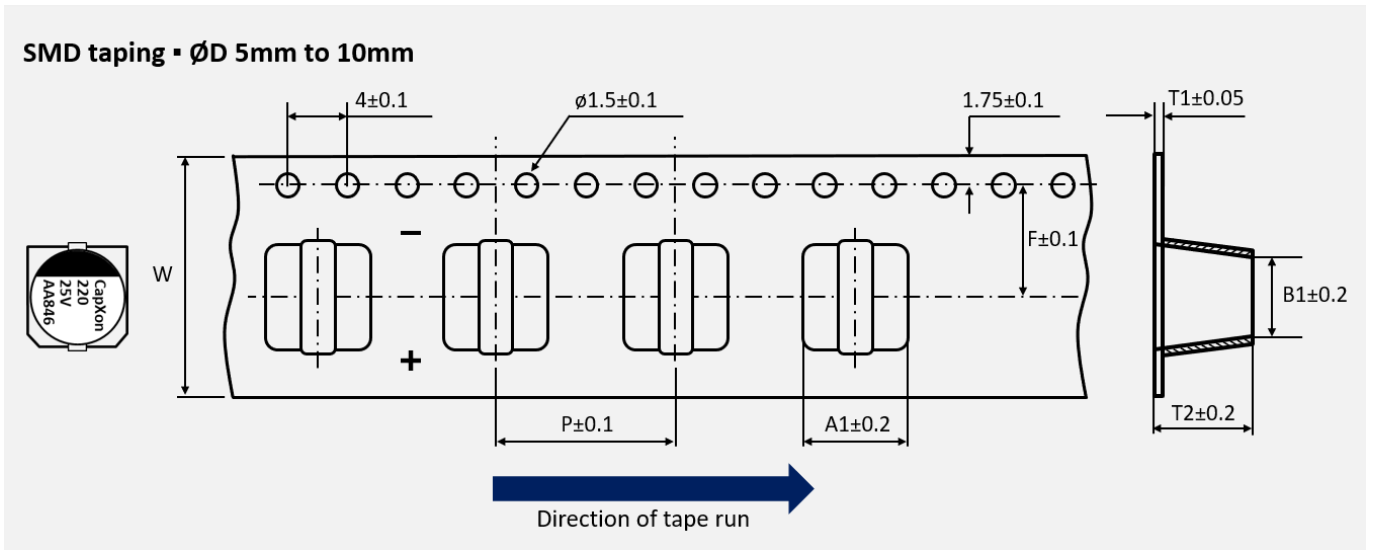
AA: AA Series  
 003: Production datacode year/week  
 (ex. 2020/3<sup>rd</sup> week)

Top view  
 AEC-Q200 type



0 03  
 → Production week  
 → Last digit of the year

**TAPING - SMD HYBRID CONDUCTIVE POLYMER CAPACITORS - REEL PACK**

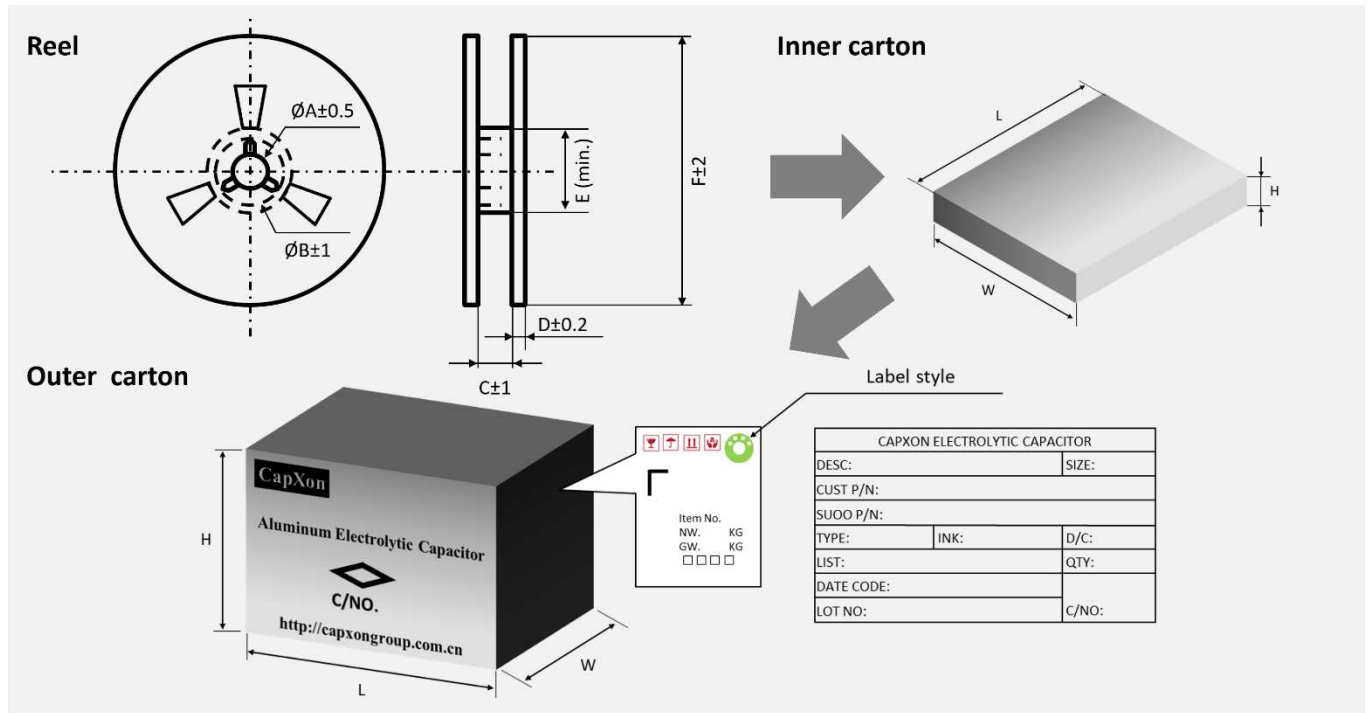


All dimensions in mm

$\phi D$	5 x 5.8	6.3 x 5.8	6.3 x 7.7	8 x 10.5	8 x 11.7	10 x 10.5	10 x 12.4	10 x 16.5
W	12	16	16	24	24	24	24	24
P	12	12	12	16	16	16	16	16
F	5.5	7.5	7.5	11.5	11.5	11.5	11.5	11.5
A1	5.7	7	7	8.7	8.7	10.7	10.7	10.7
B1	5.7	7	7	8.7	8.7	10.7	10.7	10.7
T1	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.5
T2	6.1	6.2	8	11	13	11	12.9	17.5



### TAPING • SMD HYBRID CONDUCTIVE POLYMER CAPACITORS • REEL PACK • PAPER REEL



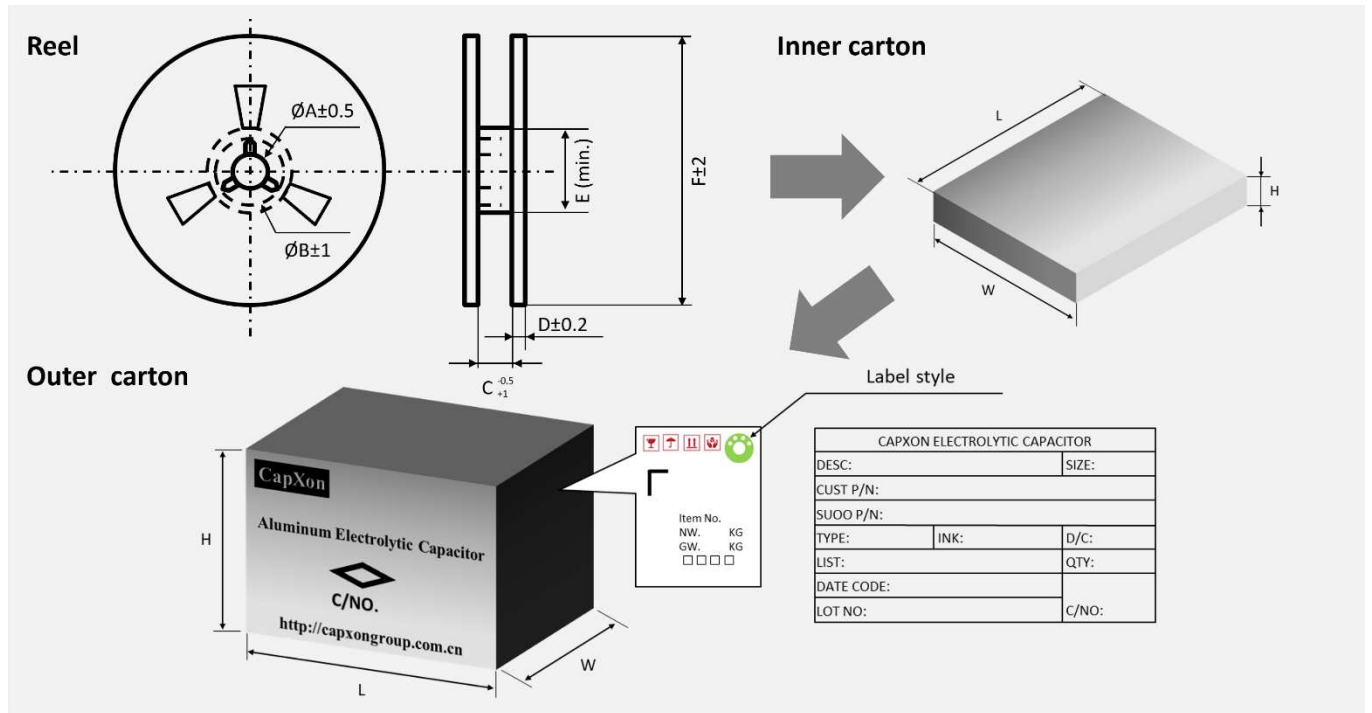
$\phi D$ (mm)	L (mm)	A (mm)	Reel quantity (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
5	5.8	14	1000	5000	400 x 390 x 106	15000	425 x 412 x 340	China	85322200
6.3	5.8	18	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	7.7	18	900	3600	400 x 390 x 106	10800	425 x 412 x 340	China	85322200
8	10.5	26	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
	11.7	26	400	1200	400 x 390 x 106	3600	425 x 412 x 340	China	85322200
10	10.5	26	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
	12.4	26	400	1200	400 x 390 x 106	3600	425 x 412 x 340	China	85322200
	16.5	26	250	750	400 x 390 x 106	2250	425 x 412 x 340	China	85322200

#### All reel dimensions in mm

$\phi D$	5	6.3	6.3	6.3	6.3	8	8	8	8	10	10	10	10
L	5.8	5.5	5.8	6.1	7.7	6.5	7.7	10.5	11.7	8.7	10.5	12.4	16.5
A	15	15	15	15	15	15	15	15	15	15	15	15	15
B	21	21	21	21	21	21	21	21	21	21	21	21	21
C	14	18	18	18	18	18	18	26	26	26	26	26	26
D	3	3	3	3	3	3	3	3	3	3	3	3	3
E	80	80	80	80	80	80	80	80	80	80	80	80	80
F	380	380	380	380	380	380	380	380	380	380	380	380	380

Remark: Standard = Paper reel

### TAPING • SMD HYBRID CONDUCTIVE POLYMER CAPACITORS • REEL PACK • PLASTIC REEL

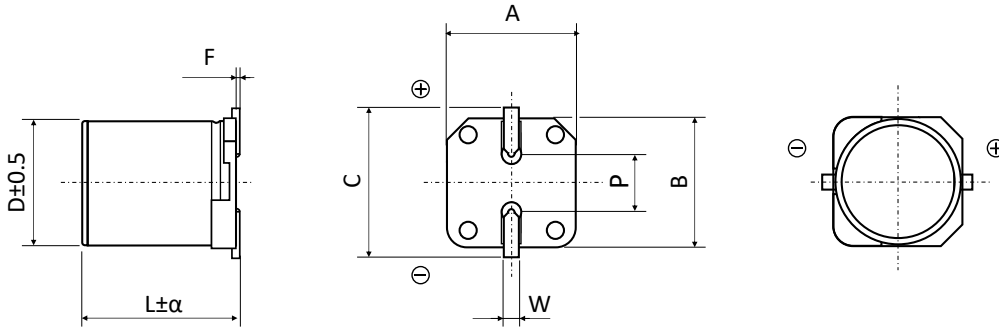


Ø D (mm)	L (mm)	A (mm)	Reel quantity (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
5	5.8	14	1000	5000	400 x 390 x 106	15000	425 x 412 x 340	China	85322200
6.3	5.8	18	1000	4000	400 x 390 x 106	12000	425 x 412 x 340	China	85322200
	7.7	18	900	3600	400 x 390 x 106	10800	425 x 412 x 340	China	85322200
8	10.5	26	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
	11.7	26	400	1200	400 x 390 x 106	3600	425 x 412 x 340	China	85322200
10	10.5	26	500	1500	400 x 390 x 106	4500	425 x 412 x 340	China	85322200
	12.4	26	400	1200	400 x 390 x 106	3600	425 x 412 x 340	China	85322200
	16.5	26	250	750	400 x 390 x 106	2250	425 x 412 x 340	China	85322200

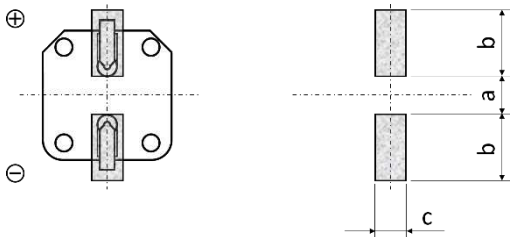
#### All reel dimensions in mm

Ø D	5	6.3	6.3	6.3	6.3	8	8	8	8	10	10	10	10
L	5.8	5.5	5.8	6.1	7.7	6.5	7.7	10.5	11.7	8.7	10.5	12.4	16.5
A	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2
B	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5
C	14	18	18	18	18	18	18	26	26	26	26	26	26
D	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
E	100	100	100	100	100	100	100	100	100	100	100	100	100
F	380	380	380	380	380	380	380	380	380	380	380	380	380

Remark: Plastic reel = Add code "U" at the end of the part number

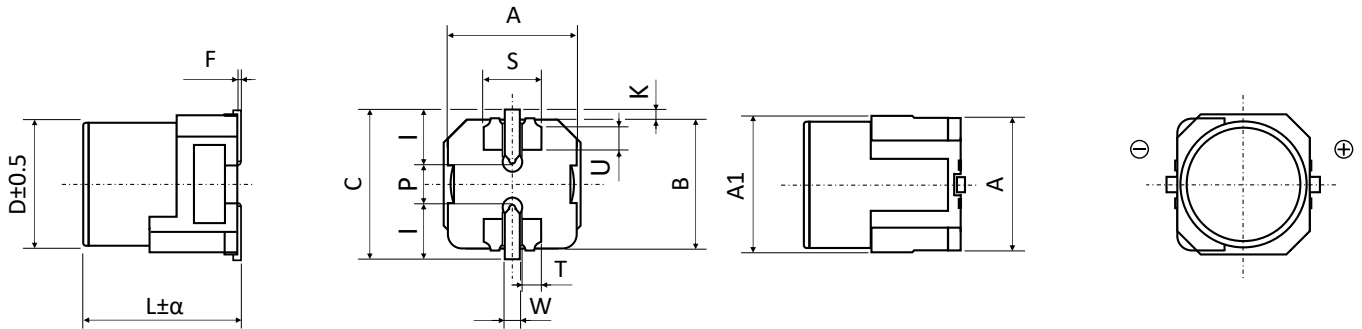
**DIMENSIONS STANDARD PACKAGE** ▪ All dimensions in mm


$\phi D$	L	$\alpha$	$A \pm 0.2$	$B \pm 0.2$	$C \pm 0.2$	F	$P \pm 0.2$	W
5.0	5.8	0.3	5.3	5.3	5.9	0.3 max.	1.4	0.5 to 0.8
6.3	5.8	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
6.3	7.7	0.3	6.6	6.6	7.2	0.3 max.	2.2	0.5 to 0.8
8.0	10.5	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
8.0	11.7	0.3	8.3	8.3	9.0	0.3 max.	3.1	0.7 to 1.1
10.0	10.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	0.7 to 1.1
10.0	12.4	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4
10.0	16.5	0.3	10.3	10.3	11.0	0.3 max.	4.5	1.0 to 1.4

**PAD LAYOUT STANDARD PACKAGE** ▪ All dimensions in mm


$\phi D$	L	a	b	c
5.0	5.8	1.4	3.0	1.6
6.3	5.8	2.1	3.5	1.6
6.3	7.7	2.1	3.5	1.6
8.0	10.5	2.8	4.2	1.9
8.0	11.7	2.8	4.2	1.9
10.0	10.5	4.3	4.4	1.9
10.0	12.4	4.3	4.4	2.2
10.0	16.5	4.3	4.4	2.2

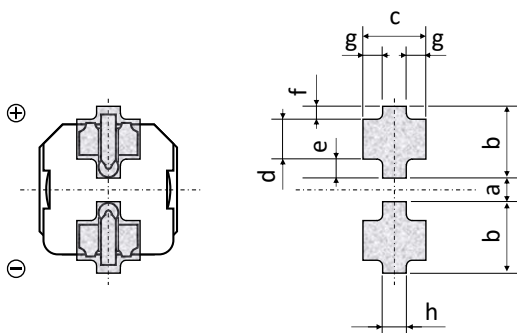
### DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D6.3 ▪ All dimensions in mm



ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K
6.3	5.8	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	7.7	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2
6.3	10.5	-0.3/+0.7	6.6	7.1	6.6	7.8	0 to 0.15	0.35 +0.15/-0.2

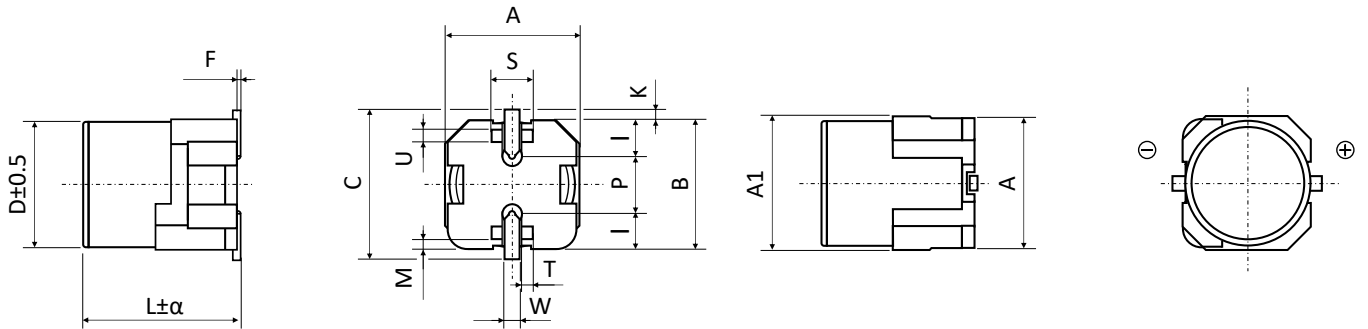
ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1
6.3	5.8	2.2	2.9	2.4	1.1	1.55	0.65
6.3	7.7	2.2	2.9	2.4	1.1	1.55	0.65
6.3	10.5	2.2	2.9	2.4	1.1	1.55	0.65

### PAD LAYOUT VP PACKAGE (VIBRATION-PROOF) Ø D6.3 ▪ All dimensions in mm



ø D	L	a	b	c	d	e	f	g	h
6.3	5.8	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2
6.3	7.7	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2
6.3	10.5	1.2	3.6	3.2	2.0	0.95	0.65	1.0	1.2

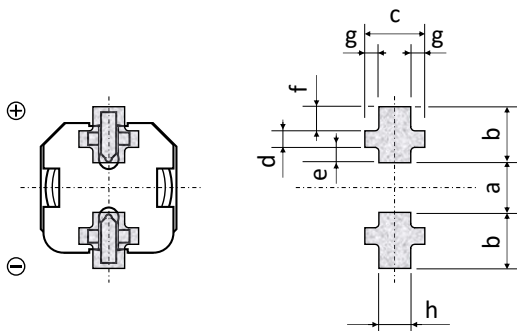
**DIMENSIONS VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**



Ø D	L	α	A ± 0.2	A1 (max.)	B ± 0.2	C (max.)	F	K ± 0.2
8.0	10.5	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
8.0	11.7	-0.3/+0.7	8.3	8.8	8.3	10.0	0 to 0.15	0.7
10.0	10.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	12.4	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7
10.0	16.5	-0.3/+0.7	10.3	10.8	10.3	12.0	0 to 0.15	0.7

Ø D	L	P ± 0.2	S ± 0.1	I ± 0.1	T ± 0.1	U ± 0.1	W ± 0.1	M ± 0.1
8.0	10.5	3.1	3	3.4	1.4	0.7	1.2	0.7
8.0	11.7	3.1	3	3.4	1.4	0.7	1.2	0.7
10.0	10.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	12.4	4.6	3.3	3.5	1.5	0.8	1.2	0.9
10.0	16.5	4.6	3.3	3.5	1.5	0.8	1.2	0.9

**PAD LAYOUT VP PACKAGE (VIBRATION-PROOF) Ø D8 and D10 ▪ All dimensions in mm**



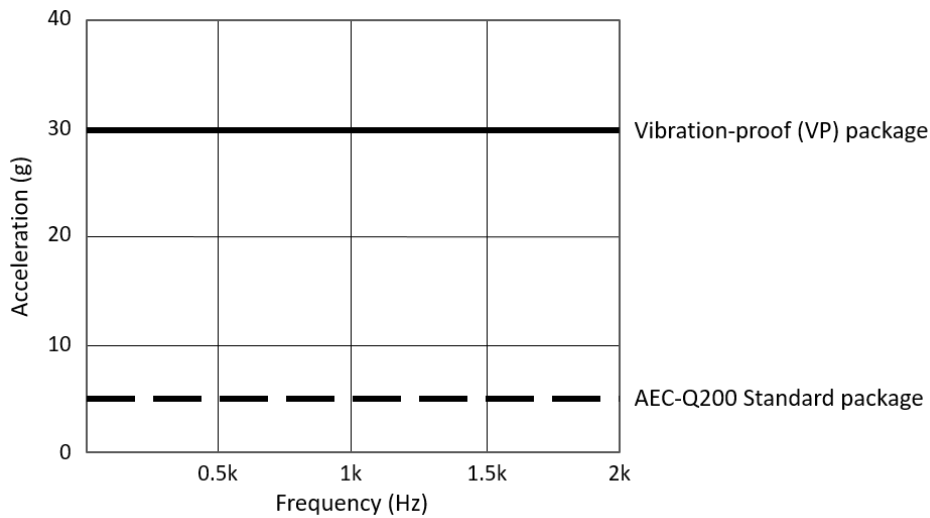
Ø D	L	a	b	c	d	e	f	g	h
8.0	10.5	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
8.0	11.7	2.7	4.0	4.7	1.3	1.0	1.7	1.1	2.5
10.0	10.5	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
10.0	12.4	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5
10.0	16.5	3.9	4.4	4.7	1.3	1.2	1.9	1.1	2.5

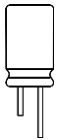
### VIBRATION SPECIFICATION - STANDARD AND VIBRATION PROOF PACKAGE



Reference JIS C 60068-2 / IEC 60068-2-6

Package	Condition	Determinant Standard
Standard	5. 10Hz ~ 2kHz ~ 10Hz (20 minutes) 6. Amplitude (single peak): 0.35 mm (at 10 ~ 55Hz) 7. Acceleration: 49m/s <sup>2</sup> (5g at 55 ~ 2kHz) 8. X, Y, Z directions, 4 hours per direction, total 12 hours	11. $\Delta C/C \leq \pm 5\%$ of initial value 12. $DF \leq$ stated limit 13. $LC \leq$ stated limit 14. No visible damage 15. No leakage of electrolyte
Vibration-proof	2. 10Hz ~ 2kHz ~ 10Hz (10 minutes) 3. Amplitude (single peak): 2 mm (at 10 ~ 55Hz) 4. Acceleration: 294m/s <sup>2</sup> (30g at 55 ~ 2kHz) 5. X, Y, Z directions, 4 hours per direction, total 12 hours	3. $\Delta C/C \leq \pm 5\%$ of initial value 4. $DF \leq$ stated limit 5. $LC \leq$ stated limit 6. No visible damage 7. No leakage of electrolyte





### OVERVIEW - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

#### Features



Series	Page	AEC-Q200	High Temperature	Low ESR	Low Height	Ultra Long Life	Ultra High Ripple Current	Ultra Miniaturized	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
SG	96	•			•			•	-40	+105	6.3	50	1	470	4000
KL	100	•				•			-40	+105	160	400	3.3	330	5000
									-25		450	500	2.2	180	
GH	107	•		•					-55	+105	6.3	100	1	12000	5000 to 10000
FK	123	•				•			-40	+105	160	450	1	330	6000 to 8000
									-25		500		4.7	120	
FL	131	•				•			-40	+105	160	450	1	680	8000 to 12000
									-25		500		10	68	
GT	141	•				•			-40	+105	10	100	1	330	10000
TH	144	•	•						-40	+125	10	400	1	8200	1000 to 3000
									-25		450		1	47	
TE	155	•	•						-40	+130	10	400	2.2	4700	1000 to 3000
TU	163	•	•	•		•	•		-40	+130	25	63	390	12000	2000 to 3000

TU: New Product Series

### OVERVIEW - RADIAL HYBRID CONDUCTIVE POLYMER CAPACITORS

#### Features



Series	Page	AEC-Q200	High Temperature	High Voltage	Low ESR	Slim Type	Standard	Ultra Low ESR	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
AS	281	•		•	•	•	•		-55	+105	16	400	1.2	1500	2000 to 10000
AT	285	•	•		•	•			-55	+125	16	100	8.2	1500	2000 to 4000
AK	289	•	•		•				-55	+135	16	100	8.2	560	2000 to 3000
AE	292	•	•					•	-55	+135	25	100	22	680	4000
AL	295	•	•		•				-55	+145	16	80	8.2	560	2000
AM	298	•	•		•				-55	+150	16	80	8.2	560	1000

AE: New Product Series

### AS SERIES ■ LONG LIFE UP TO 10000 HOURS

#### KEY FEATURES



- HYBRID CONDUCTIVE POLYMER • THT type
- Endurance: 105°C ■ 2 000 up to 10 000 hours
- Low ESR and high ripple current
- Superior electrical stability over application lifetime
- AEC-Q200 qualified

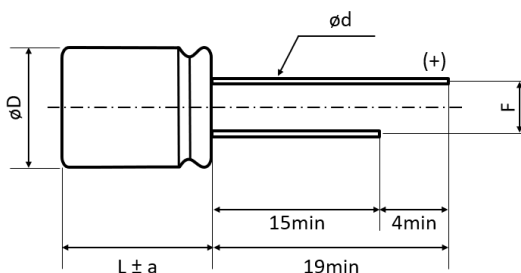


#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +105°C
Rated Voltage Range	$V_R$	16 ~ 400V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$ ( $V_R \geq 200V$ ): $V_S = 1.15 \cdot V_R$
Capacitance Range	$C_R$	1.2 ~ 1500 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan \delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings

Lifetime Test			
Endurance 105°C ( $V_R$ & $I_R$ applied)	Test	10 000 hours	$\geq \phi D 8 \cdot < 250V$
		5 000 hours	$\leq \phi D 6.3 \cdot < 250V DC$
		5 000 hours	250V
		2 000 hours	400V
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value	
	$\tan \delta$	Less than 200% of the specified value	
	ESR	Less than 200% of the specified value	
$I_{Leak}$	Less than the specified value		

#### DIMENSIONS ■ All dimensions in mm



$\phi D$	L	$\phi D0.5$	a	F $\pm 0.5$	$\phi d \pm 0.05$
6.3	8	6.3	1	2.5	0.6
8	9	8	1.5	3.5	0.6
8	11.5	8	1.5	3.5	0.6
10	10	10	1.5	5	0.6
10	12.5	10	1.5	5	0.8
10	18	10	2	5	0.8



**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_{LEAK}$ ( $\mu$ A, 2min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
16	120	6.3	8	19.2	16	40	1500	AS121M016E080PTCX
	270	8	9	43.2	16	26	2000	AS271M016F090PTDX
	330	8	11.5	52.8	16	23	2350	AS331M016F115PTDX
	470	10	10	75.2	16	21	2600	AS471M016G100PTAX
	560	10	12.5	89.6	16	15	3000	AS561M016G125PTAX
	1500	10	18	240.0	16	12	5000	AS152M016G180PTAX
25	68	6.3	8	17.0	16	45	1400	AS680M025E080PTCX
	150	8	9	37.5	16	27	1900	AS151M025F090PTDX
	220	8	11.5	55.0	16	24	2250	AS221M025F115PTDX
	270	10	10	67.5	16	22	2530	AS271M025G100PTAX
	330	10	12.5	82.5	16	16	2900	AS331M025G125PTAX
	1000	10	18	250.0	16	12	5000	AS102M025G180PTAX
35	47	6.3	8	16.5	16	60	1300	AS470M035E080PTCX
	100	8	9	35.0	16	30	1800	AS101M035F090PTDX
	150	8	11.5	52.5	16	25	2100	AS151M035F115PTDX
	150	10	10	52.5	16	23	2470	AS151M035G100PTAX
	220	10	12.5	77.0	16	17	2830	AS221M035G125PTAX
	680	10	18	238.0	16	14	4600	AS681M035G180PTAX
40	27	6.3	8	10.8	16	70	1250	AS270M040E080PTCX
	56	8	9	22.4	16	32	1750	AS560M040F090PTDX
	82	8	11.5	32.8	16	27	2000	AS820M040F115PTDX
	100	10	10	40.0	16	24	2400	AS101M040G100PTAX
	120	10	10	48.0	16	18	2750	AS121M040G100PTAX
	180	10	12.5	72.0	16	18	3000	AS181M040G125PTAX
50	15	6.3	8	7.5	16	80	1200	AS150M050E080PTCX
	33	8	9	16.5	16	35	1670	AS330M050F090PTDX
	47	8	11.5	23.5	16	30	1900	AS470M050F115PTDX
	56	10	10	28.0	16	25	2320	AS560M050G100PTAX
	82	10	12.5	41.0	16	19	2650	AS820M050G125PTAX
	220	10	18	110.0	16	15	4350	AS221M050G180PTAX
63	10	6.3	8	6.3	16	100	1060	AS100M063E080PTCX
	22	8	9	13.9	16	40	1560	AS220M063F090PTDX
	27	8	11.5	17.0	16	35	1750	AS270M063F115PTDX
	33	10	10	20.8	16	30	2100	AS330M063G100PTAX
	47	10	10	29.6	16	30	2100	AS470M063G100PTAX
	56	10	12.5	35.3	16	22	2400	AS560M063G125PTAX
	150	10	18	94.5	16	18	4000	AS151M063G180PTAX
80	8.2	8	9	6.6	16	90	1050	AS8R2M080F115PTDX
	15	8	11.5	12.0	16	70	1400	AS150M080F115PTDX
	12	10	10	9.6	16	70	1600	AS120M080G100PTAX
	15	10	10	12.0	16	70	1600	AS150M080G100PTAX
	18	10	12.5	14.4	16	50	1830	AS180M080G125PTAX

Part number shows taped version with straight leads and Ammo Pack packaging.  
See "ADDITIONAL INFORMATION" for further lead treatment options.

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_{LEAK}$ ( $\mu A$ , 2min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
100	8.2	8	9	8.2	16	100	1000	AS8R2M100F090PTDX
	10	8	11.5	10.0	16	80	1300	AS100M100F115PTDX
	10	10	10	10.0	16	80	1450	AS100M100G100PTAX
	12	10	10	12.0	16	80	1450	AS120M100G100PTAX
	15	10	12.5	15.0	16	60	1660	AS150M100G125PTAX
	47	10	12.5	47.0	16	60	1660	AS470M100G125PTAX
250	8.2	10	12.5	20.5	16	120	740	AS8R2M250G125PTAX
400	1.2	8	9	4.8	16	200	430	AS1R2M400F090PTDX
	2.2	8	11.5	8.8	16	170	510	AS2R2M400F115PTDX
	4.7	10	12.5	18.8	16	150	650	AS4R7M400G125PTAX

Part number shows taped version with straight leads and Ammo Pack packaging.  
See "PACKAGING INFORMATION" for further lead treatment options.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

Frequency (Hz)	100 ≤ Freq. < 120	120 ≤ Freq. < 200	200 ≤ Freq. < 300	300 ≤ Freq. < 500
Coefficient $K_f$	0.10	0.10	0.10	0.15

Frequency (Hz)	500 ≤ Freq. < 1k	1k ≤ Freq. < 2k	2k ≤ Freq. < 3k	3k ≤ Freq. < 5k
Coefficient $K_f$	0.20	0.30	0.40	0.45

Frequency (Hz)	5k ≤ Freq. < 10k	10k ≤ Freq. < 15k	15k ≤ Freq. < 20k	20k ≤ Freq. < 40k
Coefficient $K_f$	0.50	0.60	0.65	0.70

Frequency (Hz)	40k ≤ Freq. < 50k	50k ≤ Freq. < 100k	100k ≤ Freq. < 500k	500k ≤ Freq. < 1M
Coefficient $K_f$	0.80	0.85	1.00	1.05

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our "General Precautions and Guidelines" as well as our "Packaging Information". Please refer to the following links in the table.

General Precautions and Guidelines Page 310	Packaging Information Hybrid Radial Page 306

### DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

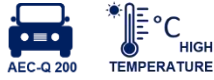
For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AT SERIES ■ LONG LIFE AT 125°C UP TO 4 000 hours

#### KEY FEATURES



- HYBRID CONDUCTIVE POLYMER ■ THT type
- Endurance: 125°C ■ 2 000 up to 4 000 hours
- Low ESR and high ripple current
- Superior electrical stability over application lifetime
- AEC-Q200 qualified

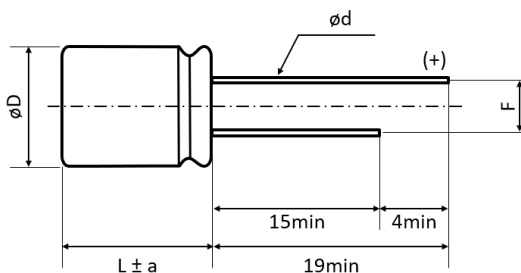


#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +125°C
Rated Voltage Range	$V_R$	16 ~ 100V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	8.2 ~ 1500 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C ■ 100kHz)	ESR	Not to exceed the values shown in standard ratings

Lifetime Test			
Endurance 125°C ( $V_R$ & $I_R$ applied)	Test	4 000 hours	$\geq \phi D 8$
		2 000 hours	$\leq \phi D 6.3$
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value	
	$\tan\delta$	Less than 200% of the specified value	
	ESR	Less than 200% of the specified value	
	$I_{Leak}$	Less than the specified value	

#### DIMENSIONS ■ All dimensions in mm



$\phi D$	L	$\phi D \pm 0.5$	a	F $\pm 0.5$	$\phi d \pm 0.05$
6.3	8	6.3	1	2.5	0.6
8	9	8	1.5	3.5	0.6
8	11.5	8	1.5	3.5	0.6
10	10	10	1.5	5	0.6
10	12.5	10	1.5	5	0.8
10	18	10	2	5	0.8

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu$ F)	$\phi$ D (mm)	L (mm)	$I_{LEAK}$ ( $\mu$ A, 2min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +125°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
16	120	6.3	8	19.2	16	32	1440	AT121M016E080PTCX
	270	8	9	43.2	16	23	1970	AT271M016F090PTDX
	330	8	11.5	52.8	16	20	2340	AT331M016F115PTDX
	470	10	10	75.2	16	18	2620	AT471M016G100PTAX
	560	10	12.5	89.6	16	14	3030	AT561M016G125PTAX
	1500	10	18	240.0	16	12	4000	AT152M016G180PTAX
25	68	6.3	8	17.0	16	35	1380	AT680M025E080PTCX
	150	8	9	37.5	16	25	1880	AT151M025F090PTDX
	220	8	11.5	55.0	16	22	2230	AT221M025F115PTDX
	270	10	10	67.5	16	19	2500	AT271M025G100PTAX
	330	10	12.5	82.5	16	14	2890	AT331M025G125PTAX
	1000	10	18	250.0	16	12	4000	AT102M025G180PTAX
35	47	6.3	8	16.5	16	45	1280	AT470M035E080PTCX
	100	8	9	35.0	16	28	1780	AT101M035F090PTDX
	150	8	11.5	52.5	16	25	2100	AT151M035F115PTDX
	150	10	10	52.5	16	20	2440	AT151M035G100PTAX
	220	10	12.5	77.0	16	15	2800	AT221M035G125PTAX
	680	10	18	238.0	16	14	3700	AT681M035G180PTAX
40	27	6.3	8	10.8	16	48	1230	AT270M040E080PTCX
	56	8	9	22.4	16	30	1710	AT560M040F090PTDX
	82	8	11.5	32.8	16	27	2000	AT820M040F115PTDX
	100	10	10	40.0	16	21	2360	AT101M040G100PTAX
	120	10	10	48.0	16	20	2400	AT121M040G100PTAX
	180	10	12.5	72.0	16	18	2550	AT181M040G125PTAX
50	15	6.3	8	7.5	16	80	960	AT150M050E080PTCX
	33	8	9	16.5	16	35	1330	AT330M050F090PTDX
	47	8	11.5	23.5	16	30	1520	AT470M050F115PTDX
	56	10	10	28.0	16	30	1850	AT560M050G100PTAX
	82	10	12.5	41.0	16	25	2120	AT820M050G125PTAX
	220	10	18	110.0	16	15	3500	AT221M050G180PTAX
63	10	6.3	8	6.3	16	100	840	AT100M063E080PTCX
	22	8	9	13.9	16	40	1240	AT220M063F090PTDX
	27	8	11.5	17	16	35	1400	AT270M063F115PTDX
	33	10	10	20.8	16	35	1680	AT330M063G100PTAX
	47	10	10	29.6	16	35	1680	AT470M063G100PTAX
	56	10	12.5	35.3	16	30	1920	AT560M063G125PTAX
	150	10	18	94.5	16	18	3200	AT151M063G180PTAX
80	8.2	8	9	6.6	16	90	840	AT8R2M080F090PTDX
	15	8	11.5	12	16	70	1120	AT150M080F115PTDX
	12	10	10	9.6	16	70	1280	AT120M080G100PTAX
	15	10	10	12	16	70	1280	AT150M080G100PTAX
	18	10	12.5	14.4	16	60	1460	AT180M080G125PTAX

Part number shows taped version with straight leads and Ammo Pack packaging.  
See "PACKAGING INFORMATION" for further lead treatment options.

**STANDARD RATINGS**

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C - 120Hz (%)	Max. ESR +20°C - 100kHz (mΩ)	I <sub>R</sub> - Max. Ripple Current +125°C - 100kHz (mA rms)	CapXon Part Number Automotive Type
100	8.2	8	9	8.2	16	100	800	AT8R2M100F090PTDX
	10	8	11.5	10	16	80	1040	AT100M100F115PTDX
	10	10	10	10	16	80	1160	AT100M100G100PTAX
	12	10	10	12	16	80	1160	AT120M100G100PTAX
	15	10	12.5	15	16	70	1320	AT150M100G125PTAX
	47	10	12.5	15	16	70	1320	AT470M100G125PTAX

☐: Leave blank for Standard type      ☐: Enter X for AEC-Q200 type  
 Part number shows taped version with straight leads and Ammo Pack packaging.  
 See "PACKAGING INFORMATION" for further lead treatment options.

**MULTIPLIER K<sub>f</sub> for RIPPLE CURRENT vs. FREQUENCY**

Frequency (Hz)	100 ≤ Freq. < 120	120 ≤ Freq. < 200	200 ≤ Freq. < 300	300 ≤ Freq. < 500
Coefficient K <sub>f</sub>	0.10	0.10	0.10	0.15
Frequency (Hz)	500 ≤ Freq. < 1k	1k ≤ Freq. < 2k	2k ≤ Freq. < 3k	3k ≤ Freq. < 5k
Coefficient K <sub>f</sub>	0.20	0.30	0.40	0.45
Frequency (Hz)	5k ≤ Freq. < 10k	10k ≤ Freq. < 15k	15k ≤ Freq. < 20k	20k ≤ Freq. < 40k
Coefficient K <sub>f</sub>	0.50	0.60	0.65	0.70
Frequency (Hz)	40k ≤ Freq. < 50k	50k ≤ Freq. < 100k	100k ≤ Freq. < 500k	500k ≤ Freq. < 1M
Coefficient K <sub>f</sub>	0.80	0.85	1.00	1.05

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General Precautions and Guidelines	Packaging Information Hybrid Radial
Page 310	Page 306

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

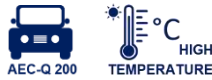
For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### AK SERIES ▀ LONG LIFE AT 135°C UP TO 3 000 hours

#### KEY FEATURES



- HYBRID CONDUCTIVE POLYMER • THT type
- Endurance: 135°C • 2 000 up to 3 000 hours
- Low ESR and high ripple current
- Superior electrical stability over application lifetime
- AEC-Q200 qualified

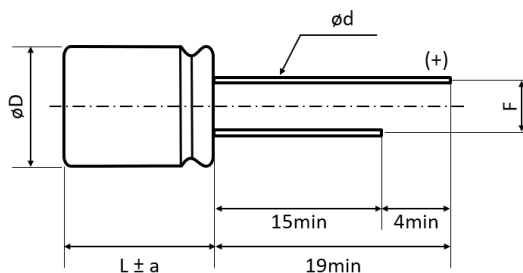


#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +135°C
Rated Voltage Range	$V_R$	16 ~ 100V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	8.2 ~ 560 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings

Lifetime Test			
Endurance 135°C ( $V_R$ & $I_R$ applied)	Test	<b>3 000 hours</b>	$\geq \varnothing 8$
		<b>2 000 hours</b>	$\leq \varnothing 6.3$
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value	
	$\tan\delta$	Less than 200% of the specified value	
	ESR	Less than 200% of the specified value	
	$I_{Leak}$	Less than the specified value	

#### DIMENSIONS ▀ All dimensions in mm



$\varnothing D$	L	$\varnothing D \pm 0.5$	a	F $\pm 0.5$	$\varnothing d \pm 0.05$
6.3	8	6.3	1	2.5	0.6
8	9	8	1.5	3.5	0.6
8	11.5	8	1.5	3.5	0.6
10	10	10	1.5	5	0.6
10	12.5	10	1.5	5	0.8



**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_{LEAK}$ ( $\mu A$ , 2min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +135°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
16	120	6.3	8	19.2	16	32	1440	AK121M016E080PTCX
	270	8	9	43.2	16	23	1970	AK271M016F090PTDX
	330	8	11.5	52.8	16	20	2340	AK331M016F115PTDX
	470	10	10	75.2	16	18	2620	AK471M016G100PTAX
	560	10	12.5	89.6	16	14	3030	AK561M016G125PTAX
25	68	6.3	8	17.0	16	35	1380	AK680M025E080PTCX
	150	8	9	37.5	16	25	1880	AK151M025F090PTDX
	220	8	11.5	55.0	16	22	2230	AK221M025F115PTDX
	270	10	10	67.5	16	19	2500	AK271M025G100PTAX
	330	10	12.5	82.5	16	14	2890	AK331M025G125PTAX
35	47	6.3	8	16.5	16	45	1280	AK470M035E080PTCX
	100	8	9	35.0	16	28	1780	AK101M035F090PTDX
	150	8	11.5	52.5	16	25	2100	AK151M035F115PTDX
	150	10	10	52.5	16	20	2440	AK151M035G100PTAX
	220	10	12.5	77.0	16	15	2800	AK221M035G125PTAX
40	27	6.3	8	10.8	16	48	1230	AK270M040E080PTCX
	56	8	9	22.4	16	30	1710	AK560M040F090PTDX
	82	8	11.5	32.8	16	27	2000	AK820M040F115PTDX
	100	10	10	40.0	16	21	2360	AK101M040G100PTAX
	120	10	10	48.0	16	20	2400	AK121M040G100PTAX
	180	10	12.5	72.0	16	18	2550	AK181M040G125PTAX
50	15	6.3	8	7.5	16	80	960	AK150M050E080PTCX
	33	8	9	16.5	16	35	1330	AK330M050F090PTDX
	47	8	11.5	23.5	16	30	1520	AK470M050F115PTDX
	56	10	10	28.0	16	30	1850	AK560M050G100PTAX
	82	10	12.5	41.0	16	25	2120	AK820M050G125PTAX
63	10	6.3	8	6.3	16	100	840	AK100M063E080PTCX
	22	8	9	13.9	16	40	1240	AK220M063F090PTDX
	27	8	11.5	17.0	16	35	1400	AK270M063F115PTDX
	33	10	10	20.8	16	35	1680	AK330M063G100PTAX
	47	10	10	29.6	16	35	1680	AK470M063G100PTAX
	56	10	12.5	35.3	16	30	1920	AK560M063G125PTAX
80	8.2	8	9	6.6	16	90	840	AK8R2M080F090PTDX
	15	8	11.5	12.0	16	70	1120	AK150M080F115PTDX
	12	10	10	9.6	16	70	1280	AK120M080G100PTAX
	15	10	10	12.0	16	70	1280	AK150M080G100PTAX
	18	10	12.5	14.4	16	60	1460	AK180M080G125PTAX
100	8.2	8	9	8.2	16	100	800	AK8R2M100F090PTDX
	10	8	11.5	10.0	16	80	1040	AK100M100F115PTDX
	10	10	10	10.0	16	80	1160	AK100M100G100PTAX
	12	10	10	12.0	16	80	1160	AK120M100G100PTAX
	15	10	12.5	15.0	16	70	1320	AK150M100G125PTAX

Part number shows taped version with straight leads and Ammo Pack packaging.  
See "PACKAGING INFORMATION" for further lead treatment options.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.15	0.15	0.20	0.25
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.30	0.40	0.45	0.55
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.60	0.70	0.75	0.80
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.85	0.90	1.00	1.00

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

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General Precautions and Guidelines	Packaging Information Hybrid Radial
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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

**AE SERIES** ■ HIGH RIPPLE CURRENT TYPE

**KEY FEATURES**



- **HYBRID CONDUCTIVE POLYMER** • THT type
- Endurance: 135°C • 4 000 hours
- Ultra-low ESR and highest ripple current
- Superior electrical stability over application lifetime
- AEC-Q200 version available

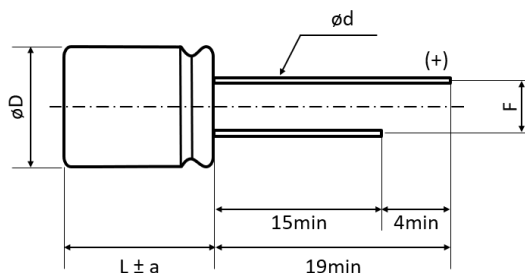


**SPECIFICATIONS**

Items		Performance Characteristics
<b>Operating Temperature Range</b>		-55 ~ +135°C
<b>Rated Voltage Range</b>	$V_R$	25 ~ 100V DC
<b>Surge Voltage</b>	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
<b>Capacitance Range</b>	$C_R$	22 ~ 680 $\mu$ F
<b>Cap. Tolerance</b>	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
<b>Leakage Current (20°C • <math>V_R</math> applied)</b>	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
<b>Dissipation Factor % (20°C • 120Hz)</b>	$\tan\delta$	Not to exceed the values shown in standard ratings
<b>Equivalent Series Resistance (20°C • 100kHz)</b>	ESR	Not to exceed the values shown in standard ratings

Lifetime Test		
<b>Endurance</b> 135°C ( $V_R$ & $I_R$ applied)	Test	<b>4 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

**DIMENSIONS** • All dimensions in mm



$\phi D$	L	$\phi D \pm 0.5$	a	F $\pm 0.5$	$\phi d \pm 0.05$
10.0	12.5	10	1.5	5	0.8
10.0	16.0	10	2.0	5	0.8

**STANDARD RATINGS**

V <sub>R</sub> (V)	C <sub>R</sub> (μF)	ø D (mm)	L (mm)	I <sub>LEAK</sub> (μA, 2min)	tanδ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (mΩ)	I <sub>r</sub> • Max. Ripple Current • 100kHz (mA rms)		CapXon Part Number
							+125°C	+135°C	
25	470	10	12.5	117.5	16	10	5000	3500	AE471M025G125PTAX
	560	10	16	140	16	8	5800	4000	AE561M025G160PTAX
	680	10	16	170	16	8	5800	4000	AE681M025G160PTAX
35	330	10	12.5	115.5	16	11	4800	3300	AE331M035G125PTAX
	470	10	16	164.5	16	9	5500	3800	AE471M035G160PTAX
50	68	10	12.5	34	16	15	4000	2800	AE680M050G125PTAX
	100	10	12.5	50	16	15	4000	2800	AE101M050G125PTAX
	120	10	12.5	60	16	12	4600	3200	AE121M050G125PTAX
	150	10	12.5	75	16	12	4600	3200	AE151M050G125PTAX
	180	10	16	90	16	10	5200	3600	AE181M050G160PTAX
	220	10	16	110	16	10	5200	3600	AE221M050G160PTAX
63	47	10	12.5	29.6	16	15	4000	2800	AE470M063G125PTAX
	56	10	12.5	35.3	16	15	4000	2800	AE560M063G125PTAX
	68	10	12.5	42.8	16	15	4000	2800	AE680M063G125PTAX
	100	10	12.5	63.0	16	12	4600	3200	AE101M063G125PTAX
	120	10	12.5	75.6	16	12	4600	3200	AE121M063G125PTAX
	150	10	16	94.5	16	10	5200	3600	AE151M063G160PTAX
80	47	10	12.5	37.6	16	18	3600	2500	AE470M080G125PTAX
	56	10	12.5	44.8	16	18	3600	2500	AE560M080G125PTAX
	68	10	12.5	54.4	16	15	4000	2800	AE680M080G125PTAX
	100	10	16	80	16	12	4700	3300	AE101M080G160PTAX
100	22	10	12.5	22	16	25	3000	2100	AE220M100G125PTAX
	33	10	12.5	33	16	20	3400	2400	AE330M100G125PTAX
	47	10	16	47	16	15	4100	2900	AE470M100G160PTAX



Part number shows taped version with straight leads and Ammo Pack packaging.  
See "PACKAGING INFORMATION" for further lead treatment options.

**MULTIPLIER K<sub>f</sub> for RIPPLE CURRENT vs. FREQUENCY**

Frequency (Hz)	100 ≤ Freq. < 120	120 ≤ Freq. < 200	200 ≤ Freq. < 300	300 ≤ Freq. < 500
Coefficient K <sub>f</sub>	0.15	0.15	0.20	0.25
Frequency (Hz)	500 ≤ Freq. < 1k	1k ≤ Freq. < 2k	2k ≤ Freq. < 3k	3k ≤ Freq. < 5k
Coefficient K <sub>f</sub>	0.30	0.40	0.45	0.55
Frequency (Hz)	5k ≤ Freq. < 10k	10k ≤ Freq. < 15k	15k ≤ Freq. < 20k	20k ≤ Freq. < 40k
Coefficient K <sub>f</sub>	0.60	0.70	0.75	0.80
Frequency (Hz)	40k ≤ Freq. < 50k	50k ≤ Freq. < 100k	100k ≤ Freq. < 500k	500k ≤ Freq. < 1M
Coefficient K <sub>f</sub>	0.85	0.90	1.00	1.00

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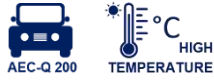
For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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### AL SERIES ■ HIGH TEMPERATURE TYPE 145°C

#### KEY FEATURES



- HYBRID CONDUCTIVE POLYMER ■ THT type
- Endurance: 145°C ■ 2 000 hours
- Low ESR and high ripple current  
Superior electrical stability over application lifetime
- AEC-Q200 qualified

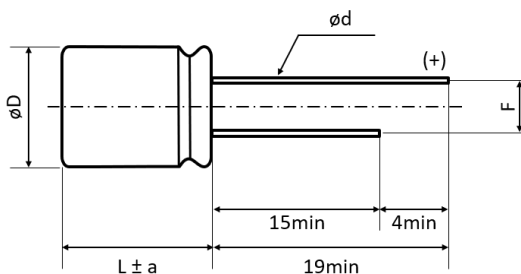


#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +145°C
Rated Voltage Range	$V_R$	16 ~ 80V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	8.2 ~ 560 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz ■ 20°C)
Leakage Current (20°C ■ $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C ■ 100kHz)	ESR	Not to exceed the values shown in standard ratings

Lifetime Test		
Endurance 145°C ( $V_R$ & $I_R$ applied)	Test	<b>2 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

#### DIMENSIONS ■ All dimensions in mm



$\phi D$	L	$\phi D \pm 0.5$	a	F $\pm 0.5$	$\phi d \pm 0.05$
8	9	8	1.5	3.5	0.6
8	11.5	8	1.5	3.5	0.6
10	10	10	1.5	5	0.6
10	12.5	10	1.5	5	0.8

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_{LEAK}$ ( $\mu A$ , 2min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +145°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
16	270	8	9	43.2	16	25	780	AL271M016F090PTDX
	330	8	11.5	52.8	16	23	950	AL331M016F115PTDX
	470	10	10	75.2	16	20	1050	AL471M016G100PTAX
	560	10	12.5	89.6	16	16	1220	AL561M016G125PTAX
25	150	8	9	37.5	16	27	750	AL151M025F090PTDX
	220	8	11.5	55	16	25	900	AL221M025F115PTDX
	270	10	10	67.5	16	22	1000	AL271M025G100PTAX
	330	10	12.5	82.5	16	16	1150	AL331M025G125PTAX
35	100	8	9	16.5	16	30	700	AL101M035F090PTDX
	150	8	11.5	35	16	27	850	AL151M035F115PTDX
	150	10	10	52.5	16	23	950	AL151M035G100PTAX
	220	10	12.5	77	16	18	1100	AL221M035G125PTAX
40	56	8	9	22.4	16	30	660	AL560M040F090PTDX
	82	8	11.5	32.8	16	27	800	AL820M040F115PTDX
	100	10	10	40	16	25	920	AL101M040G100PTAX
	120	10	10	48	16	23	920	AL121M040G100PTAX
	180	10	12.5	48	16	20	1040	AL181M040G125PTAX
50	33	8	9	16.5	16	35	620	AL330M050F090PTDX
	47	8	11.5	23.5	16	28	730	AL570M050F115PTDX
	56	10	10	28	16	28	880	AL560M050G100PTAX
	82	10	12.5	41	16	25	1040	AL820M050G125PTAX
63	22	8	9	13.9	16	40	600	AL220M063F090PTDX
	27	8	11.5	17	16	35	700	AL270M063F115PTDX
	33	10	10	20.8	16	30	850	AL330M063G100PTAX
	47	10	10	29.6	16	30	850	AL470M063G100PTAX
	56	10	12.5	35.3	16	25	950	AL560M063G125PTAX
80	8.2	8	9	6.6	16	90	450	AL8R2M080F090PTDX
	12	10	10	9.6	16	70	650	AL120M080G100PTAX
	15	8	11.5	12	16	70	550	AL150M080F115PTDX
	15	10	10	12	16	70	650	AL150M080G100PTAX
	18	10	12.5	14.4	16	50	750	AL180M080G125PTAX

Part number shows taped version with straight leads and Ammo Pack packaging.  
See "PACKAGING INFORMATION" for further lead treatment options.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.10	0.10	0.10	0.15
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.20	0.30	0.40	0.45
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.50	0.60	0.65	0.70
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

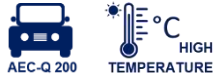
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### AM SERIES • HIGH TEMPERATURE TYPE 150°C

#### KEY FEATURES



- HYBRID CONDUCTIVE POLYMER • THT type
- Endurance: 150°C • 1 000 hours
- Low ESR and high ripple current
- Superior electrical stability over application lifetime
- AEC-Q200 qualified

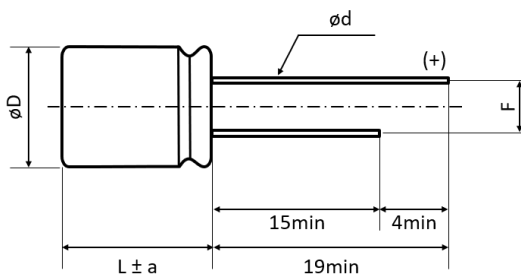


#### SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-55 ~ +150°C
Rated Voltage Range	$V_R$	16 ~ 80V DC
Surge Voltage	$V_S$	( $V_R \leq 100V$ ): $V_S = 1.25 \cdot V_R$
Capacitance Range	$C_R$	8.2 ~ 560 $\mu$ F
Cap. Tolerance	$\Delta C$	$\pm 20\%$ (120Hz • 20°C)
Leakage Current (20°C • $V_R$ applied)	$I_{LEAK}$	Not to exceed the values shown in standard ratings After 2 minutes
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	Not to exceed the values shown in standard ratings
Equivalent Series Resistance (20°C • 100kHz)	ESR	Not to exceed the values shown in standard ratings

Lifetime Test		
Endurance 150°C ( $V_R$ & $I_R$ applied)	Test	<b>1 000 hours</b>
	$\Delta C/C_R$	Within $\pm 30\%$ of the initial value
	$\tan\delta$	Less than 200% of the specified value
	ESR	Less than 200% of the specified value
	$I_{Leak}$	Less than the specified value

#### DIMENSIONS • All dimensions in mm



$\phi D$	L	$\phi D \pm 0.5$	a	F $\pm 0.5$	$\phi d \pm 0.05$
8	9	8	1.5	3.5	0.6
8	11.5	8	1.5	3.5	0.6
10	10	10	1.5	5	0.6
10	12.5	10	1.5	5	0.8

**STANDARD RATINGS**

$V_R$ (V)	$C_R$ ( $\mu F$ )	$\phi D$ (mm)	L (mm)	$I_{LEAK}$ ( $\mu A$ , 2min)	$\tan\delta$ +20°C • 120Hz (%)	Max. ESR +20°C • 100kHz (m $\Omega$ )	$I_R$ - Max. Ripple Current +150°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
16	270	8	9	43.2	16	25	770	AM271M016F090PTDX
	330	8	11.5	52.8	16	23	800	AM331M016F115PTDX
	470	10	10	75.2	16	20	880	AM471M016G100PTAX
	560	10	12.5	89.6	16	16	1010	AM561M016G125PTAX
25	150	8	9	37.5	16	27	750	AM151M025F090PTDX
	220	8	11.5	55.0	16	25	770	AM221M025F115PTDX
	270	10	10	67.5	16	22	850	AM271M025G100PTAX
	330	10	12.5	82.5	16	16	970	AM331M025G125PTAX
35	100	8	9	16.5	16	30	710	AM101M035F090PTDX
	150	8	11.5	35.0	16	27	730	AM151M035F115PTDX
	150	10	10	52.5	16	23	830	AM151M035G100PTAX
	220	10	12.5	77.0	16	18	950	AM221M035G125PTAX
40	56	8	9	22.4	16	30	650	AM560M040F090PTDX
	82	8	11.5	32.8	16	27	660	AM820M040F115PTDX
	100	10	10	40.0	16	25	720	AM101M040G100PTAX
	120	10	10	48.0	16	23	740	AM121M040G100PTAX
	180	10	12.5	48.0	16	20	850	AM181M040G125PTAX
50	33	8	9	16.5	16	35	550	AM330M050F090PTDX
	47	8	11.5	23.5	16	28	620	AM470M050F115PTDX
	56	10	10	28.0	16	28	660	AM560M050G100PTAX
	82	10	12.5	41.0	16	25	720	AM820M050G125PTAX
63	22	8	9	13.9	16	40	520	AM220M063F090PTDX
	27	8	11.5	17.0	16	35	540	AM270M063F115PTDX
	33	10	10	20.8	16	30	570	AM330M063G100PTAX
	47	10	10	29.6	16	30	570	AM470M063G100PTAX
	56	10	12.5	35.3	16	25	620	AM560M063G125PTAX
80	8.2	8	9	6.6	16	90	320	AM8R2M080F090PTDX
	12	10	10	9.6	16	70	440	AM120M080G100PTAX
	15	8	11.5	12.0	16	70	410	AM150M080F115PTDX
	15	10	10	12.0	16	70	440	AM150M080G100PTAX
	18	10	12.5	14.4	16	50	480	AM180M080G125PTAX

Part number shows taped version with straight leads and Ammo Pack packaging.  
See "PACKAGING INFORMATION" for further lead treatment options.

**MULTIPLIER  $K_f$  for RIPPLE CURRENT vs. FREQUENCY**

<b>Frequency (Hz)</b>	<b>100 ≤ Freq. &lt; 120</b>	<b>120 ≤ Freq. &lt; 200</b>	<b>200 ≤ Freq. &lt; 300</b>	<b>300 ≤ Freq. &lt; 500</b>
Coefficient $K_f$	0.10	0.10	0.10	0.15
<b>Frequency (Hz)</b>	<b>500 ≤ Freq. &lt; 1k</b>	<b>1k ≤ Freq. &lt; 2k</b>	<b>2k ≤ Freq. &lt; 3k</b>	<b>3k ≤ Freq. &lt; 5k</b>
Coefficient $K_f$	0.20	0.30	0.40	0.45
<b>Frequency (Hz)</b>	<b>5k ≤ Freq. &lt; 10k</b>	<b>10k ≤ Freq. &lt; 15k</b>	<b>15k ≤ Freq. &lt; 20k</b>	<b>20k ≤ Freq. &lt; 40k</b>
Coefficient $K_f$	0.50	0.60	0.65	0.70
<b>Frequency (Hz)</b>	<b>40k ≤ Freq. &lt; 50k</b>	<b>50k ≤ Freq. &lt; 100k</b>	<b>100k ≤ Freq. &lt; 500k</b>	<b>500k ≤ Freq. &lt; 1M</b>
Coefficient $K_f$	0.80	0.85	1.00	1.05

**PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION**

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Hybrid Radial
Page 310	Page 306

**DISCLAIMER**

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

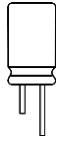
Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

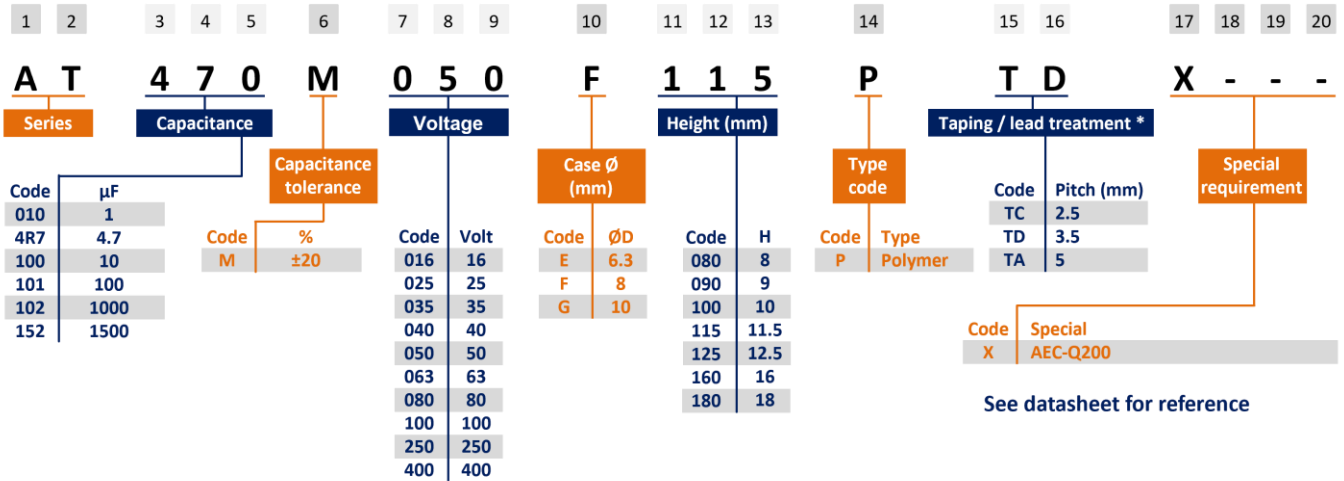
For further information, please visit our website [www.capxongroup.com](http://www.capxongroup.com) or contact CapXon directly.

### PRODUCT CODE - RADIAL HYBRID CONDUCTIVE POLYMER CAPACITORS



THT type example:

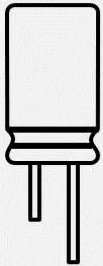
AT series ▪ 47µF ▪ 50V ▪ ±20% ▪ Ø 8mm ▪ L 11.5mm ▪ P 3.5mm ▪ Tape Ammo ▪ AEC-Q200



\* See chapter taping or lead treatment for further information  
Please consult CapXon for further assistance

### MARKING - RADIAL HYBRID POLYMER CAPACITORS

#### Hybrid Polymer Capacitor - Radial type



CapXon: Manufacturer trademark  
 47: Nominal capacitance (µF)  
 50X: Rated voltage (V) ▪ AEC-Q200 type  
 (-) polarity (Cathode indicate)

AT: AT Series  
 003: Production datacode year/week  
 (ex. 2020/3<sup>rd</sup> week)

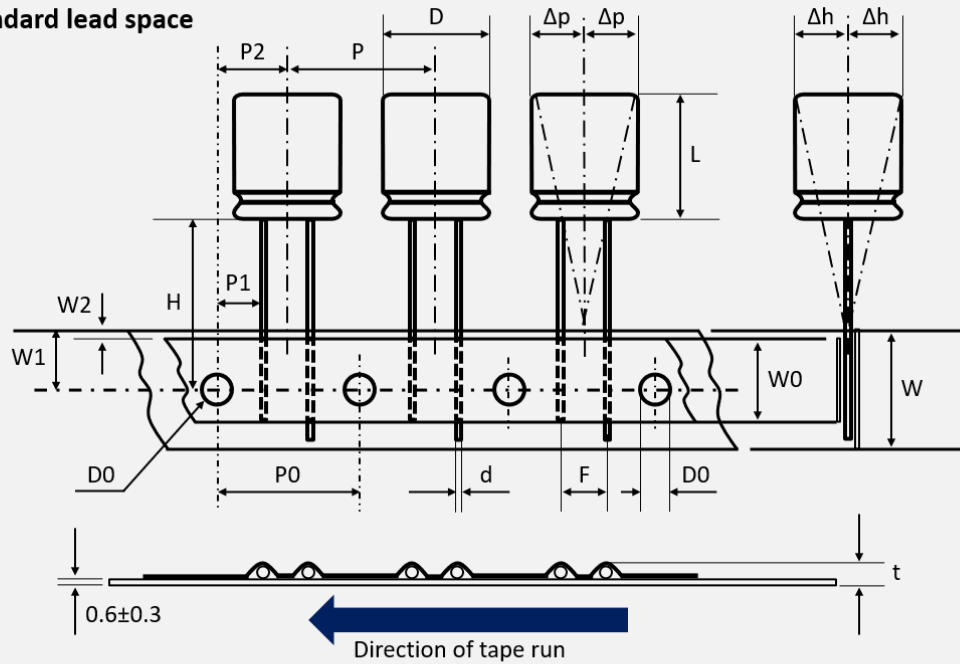
#### Top view AEC-Q200 type



0 03  
 → Production week  
 → Last digit of the year

**TAPING • RADIAL HYBRID POLYMER CAPACITORS • AMMO PACK**

Taping •  $\varnothing D \geq 6.3\text{mm}$  • standard lead space



Example

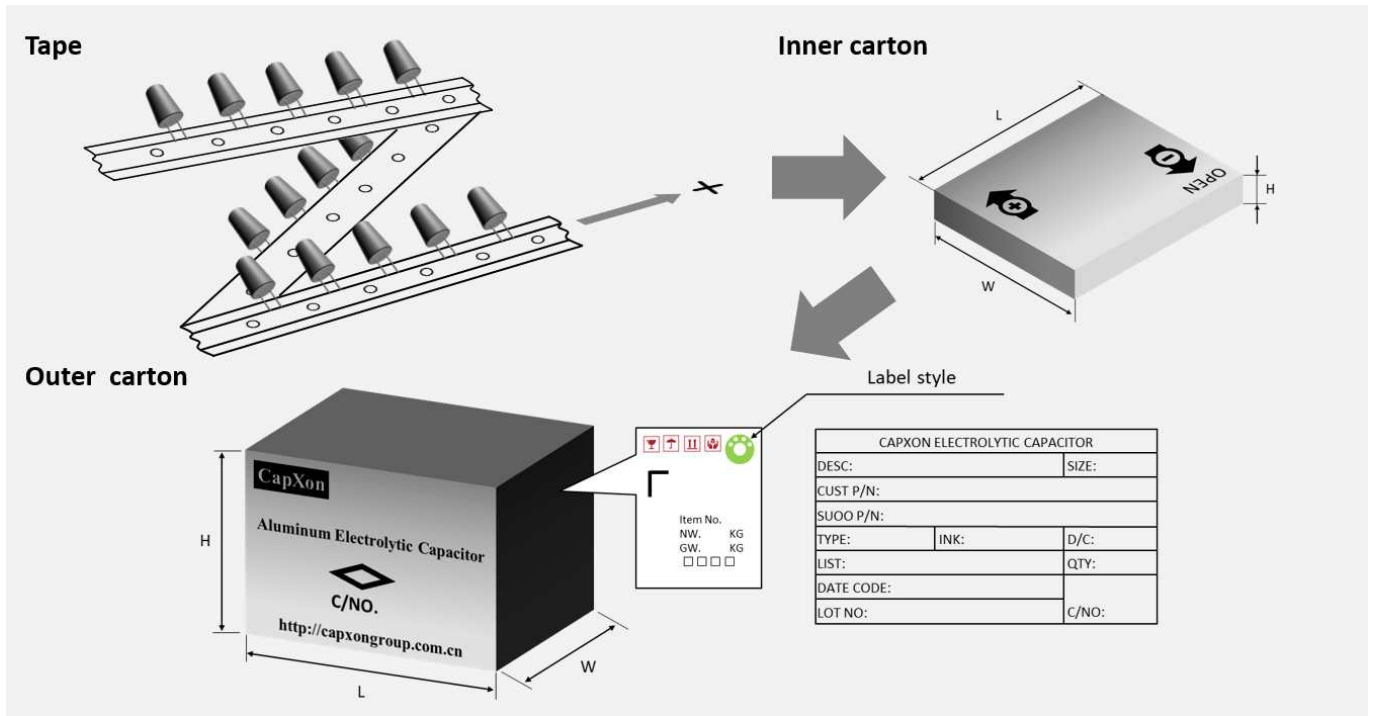
<b>A</b>	<b>S</b>	<b>2 2 1</b>	<b>M</b>	<b>0 2 5</b>	<b>F</b>	<b>1 1 5</b>	<b>P</b>	<b>T D</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

All dimensions in mm

	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	D0	$\Delta h$	$\Delta p$	T	Code
<b>Tol</b>	$\pm 0.5$	-	$\pm 0.02$	$\pm 1.0$	$\pm 0.2$	$\pm 0.7$	$\pm 1.3$	$\pm 0.5$	$\pm 0.5$	$\pm 0.5$	$\pm 0.5$	Max	$+0.75$ $-0.5$	$\pm 0.2$	Max	Max	Max	Code
<b>Item</b>	6.3	8 ( $\pm 1.5$ )	0.6	12.7	12.7	5.1	6.35	<b>2.5</b>	18	11	9	2	18.5	4	1	1	1.5	<b>TC</b>
	8	9 ( $\pm 1.5$ )	0.6	12.7	12.7	4.6	6.35	<b>3.5</b>	18	11	9	2	18.5	4	1	1	1.5	<b>TD</b>
		11.5 ( $\pm 1.5$ )																
	10	10 ( $\pm 1.5$ )	0.6	12.7	12.7	3.85	6.35	<b>5</b>	18	11	9	2	18.5	4	1	1	1.5	<b>TA</b>
		12.5 ( $\pm 1.5$ )																
16 ( $\pm 2$ )																		
	18 ( $\pm 2$ )	0.8																

The negative lead (cathode) is in the front, i.e. in the direction of tape run.

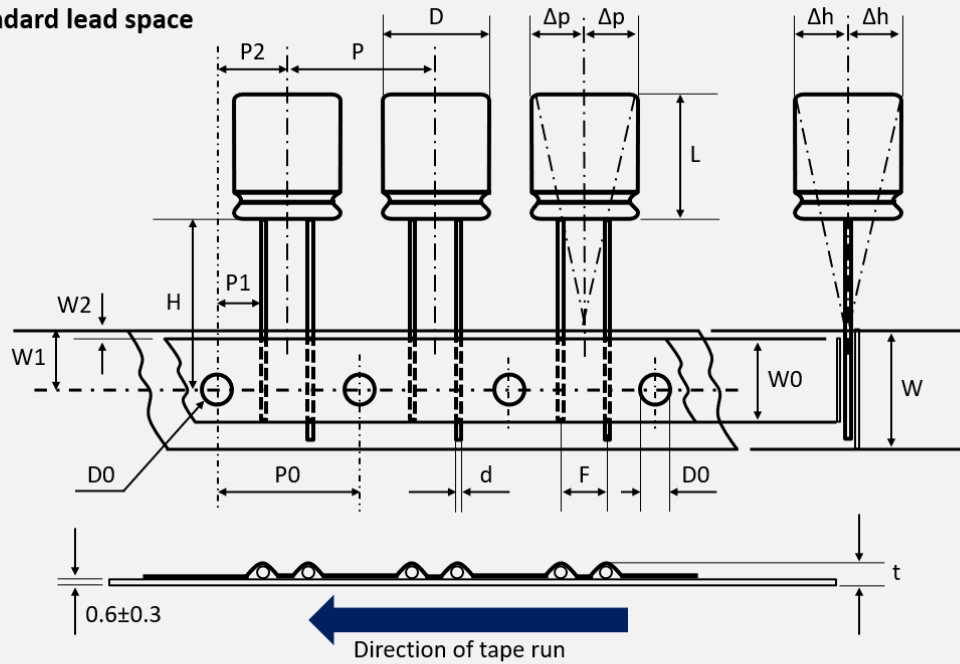
### TAPING • RADIAL HYBRID POLYMER CAPACITORS • AMMO PACK



∅ D (mm)	Length L (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
6.3	8	1500	331 x 227 x 51	15000	474 x 343 x 285	China	85322200
8	9 to 11.5	800	331 x 227 x 51	8000	474 x 343 x 285	China	85322200
10	10 to 12.5	600	331 x 227 x 51	6000	474 x 343 x 285	China	85322200
	16	500	331 x 227 x 51	5000	474 x 343 x 285	China	85322200
	18	500	331 x 227 x 51	5000	474 x 343 x 285	China	85322200

### TAPING • RADIAL HYBRID POLYMER CAPACITORS • REEL PACK

Taping •  $\varnothing D \geq 6.3\text{mm}$  • standard lead space



Example

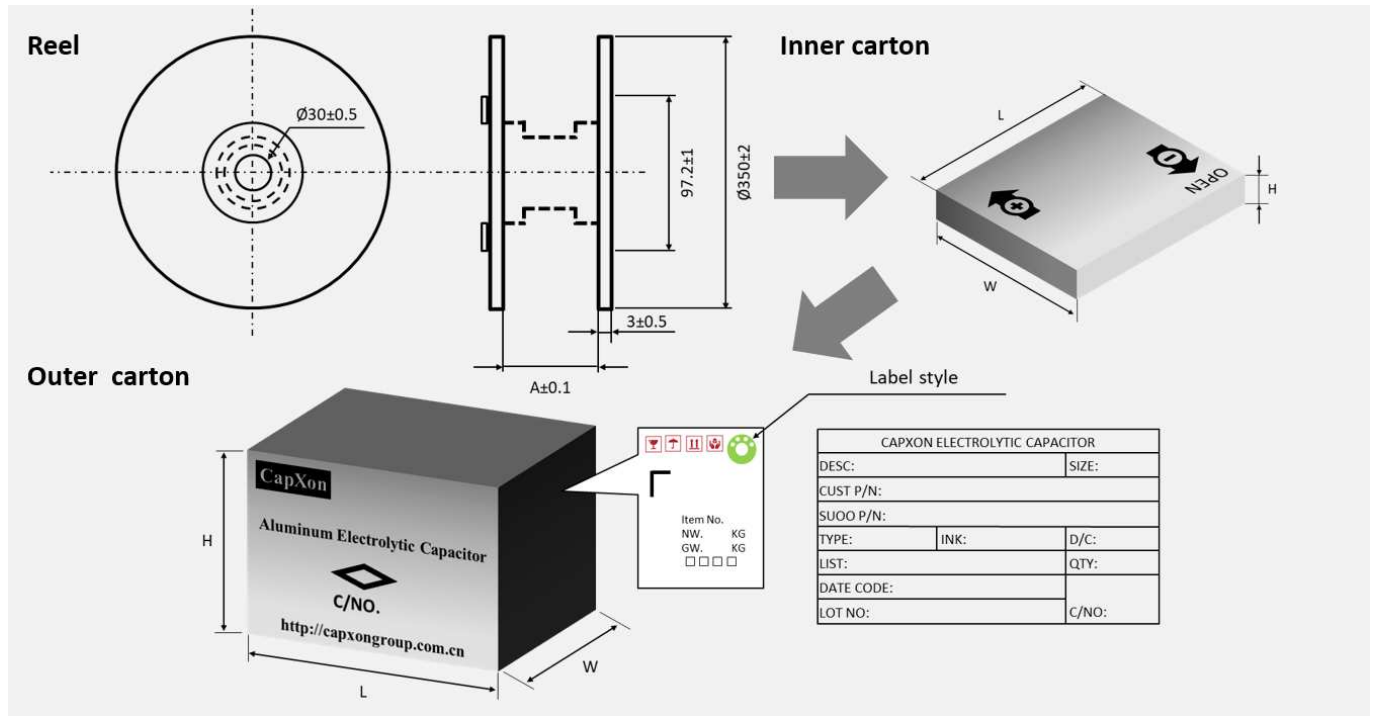
<b>A</b>	<b>S</b>	<b>2 2 1</b>	<b>M</b>	<b>0 2 5</b>	<b>F</b>	<b>1 1 5</b>	<b>P</b>	<b>R D</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

All dimensions in mm

	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	D0	$\Delta h$	$\Delta p$	T	Code	
<b>Tol</b>	$\pm 0.5$	-	$\pm 0.02$	$\pm 1.0$	$\pm 0.2$	$\pm 0.7$	$\pm 1.3$	$\pm 0.5$	$\pm 0.5$	$\pm 0.5$	$\pm 0.5$	Max	$+0.75$ $-0.5$	$\pm 0.2$	Max	Max	Max	Code	
<b>Item</b>	6.3	8 ( $\pm 1.5$ )	0.6	12.7	12.7	5.1	6.35	2.5	18	11	9	2	18.5	4	1	1	1.5	RC	
	8	9 ( $\pm 1.5$ )	0.6	12.7	12.7	4.6	6.35	3.5	18	11	9	2	18.5	4	1	1	1	1	RD
		11.5 ( $\pm 1.5$ )																	
	10	10 ( $\pm 1.5$ )	0.6	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	4	1	1	1.5	1.5	RA
		12.5 ( $\pm 1.5$ )																	
16 ( $\pm 2$ )																			
	18 ( $\pm 2$ )	0.8																	

The negative lead (cathode) is in the front, i.e. in the direction of tape run.

### TAPING • RADIAL HYBRID POLYMER CAPACITORS • REEL PACK

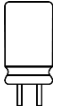


$\varnothing D$ (mm)	Length L (mm)	A (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
6.3	8	45	1000	350 x 350 x 105	6000	375 x 375 x 343	China	85322200
8	9 to 11.5	45	800	350 x 350 x 105	4800	375 x 375 x 343	China	85322200
10	10 to 12.5	45	600	350 x 350 x 105	3600	375 x 375 x 343	China	85322200
	16	55	600	349 x 349 x 121	3600	375 x 375 x 385	China	85322200
	18	55	600	349 x 349 x 121	3600	375 x 375 x 385	China	85322200



**PACKAGING ▪ RADIAL HYBRID POLYMER CAPACITORS  
STRAIGHT LEADS ▪ BULK PACK**

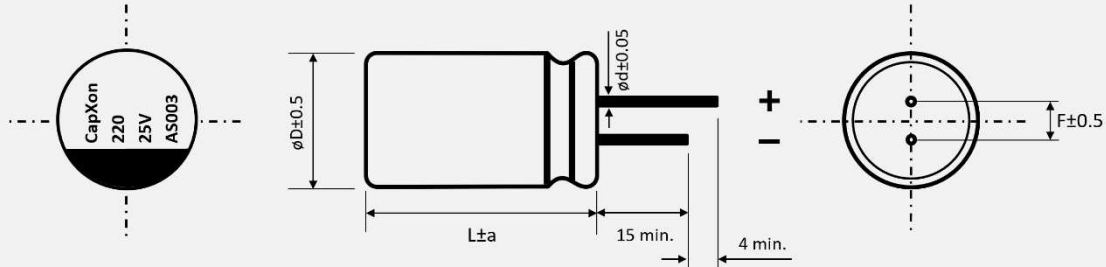

∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
6.3	8	600/bag	7200	295 x 181 x 222	7200	295 x 181 x 222	China	85322200
8	9	450/bag	5400	295 x 181 x 222	5400	295 x 181 x 222	China	85322200
	11.5	300/bag	3600	295 x 181 x 222	3600	295 x 181 x 222	China	85322200
10	10	300/bag	3600	295 x 181 x 222	3600	295 x 181 x 222	China	85322200
	12.5	200/bag	2400	295 x 181 x 222	2400	295 x 181 x 222	China	85322200
	16	200/bag	2400	295 x 181 x 222	2400	295 x 181 x 222	China	85322200
	18	200/bag	2400	295 x 181 x 222	2400	295 x 181 x 222	China	85322200


**PACKAGING ▪ RADIAL HYBRID POLYMER CAPACITORS  
CUTTED LEADS ▪ BULK PACK**

∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Cutting height (mm)	Outer box quantity (pcs)	Outer carton quantity (pcs)	Country of origin	Tariff number
6.3	8	800/bag	800/box	≤ 7	9600	9600	China	85322200
8	9	600/bag	600/box	≤ 7	7200	7200	China	85322200
	11.5	500/bag	500/box	≤ 7	6000	6000	China	85322200
10	10	400/bag	400/box	≤ 7	4800	4800	China	85322200
	12.5	300/bag	300/box	≤ 7	3600	3600	China	85322200
	16	200/bag	200/box	≤ 7	2400	2400	China	85322200
	18	200/bag	200/box	≤ 7	2400	2400	China	85322200

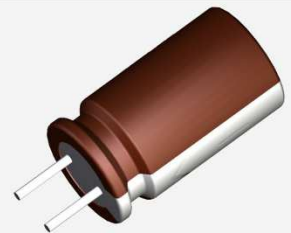
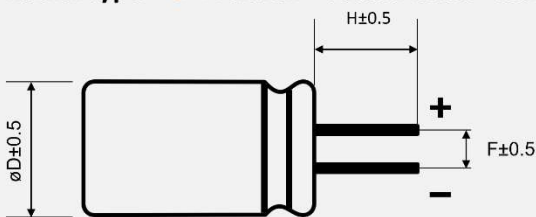
### AVAILABLE LEAD TREATMENTS • RADIAL HYBRID POLYMER CAPACITORS

Radial type • standard lead spacing (all dimensions in mm)



Ø D (mm)	L (mm)	a (mm)	F (mm)	Ø d (mm)
6.3	8	1	2.5	0.6
8	9	1.5	3.5	0.6
8	11.5	1.5	3.5	0.6
10	10	1.5	5	0.6
10	12.5	1.5	5	0.8
10	16	2	5	0.8
10	18	2	5	0.8

Radial type • **CA** version • cutted leads • standard lead spacing

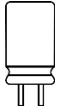


Length „H“ customized. See product code table  
customized lead length for further reference.

Ø D (mm)	6.3	8	10
F (mm)	2.5	3.5	5

Example

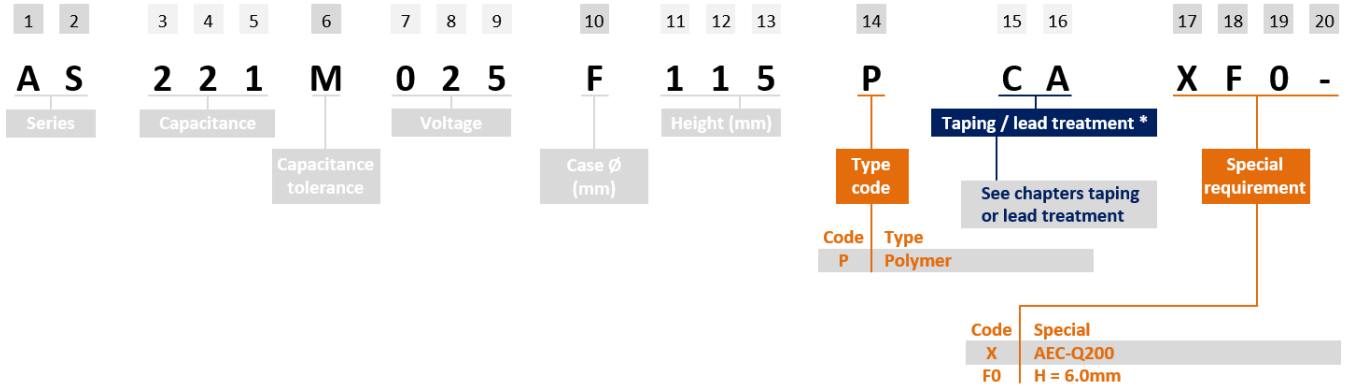
<b>A</b>	<b>S</b>	<b>2 2 1</b>	<b>M</b>	<b>0 2 5</b>	<b>F</b>	<b>1 1 5</b>	<b>P</b>	<b>CA</b>	<b>X - - -</b>
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement	



### PRODUCT CODE TABLE • CUSTOMIZED LEAD LENGTH

THT type example:

AS series ▪ 220µF ▪ 25V ▪ ±20% ▪ Ø 8mm ▪ L 11.5mm ▪ CA version, cutted leads ▪ P 3.5mm ▪ H 6.0mm  
▪ AEC-Q200



Product code 17 <sup>th</sup> digit	H (mm)
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9

Product code 18 <sup>st</sup> digit	H (mm)
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9

Example H (mm)	Product code Automotive
4.0	XD0
4.5	XD5
5.2	XE2
6.0	XF0

The 18<sup>th</sup> digit is according basic ordering of the Latin alphabet and shows the measure "H" in front of the decimal separator. The 19<sup>th</sup> digit follows the numbering from 0 to 9 and shows the measure "H" after the decimal separator.

## PRECAUTIONS & GUIDELINES

### ▪ AUTOMOTIVE PRODUCTS ▪

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## **1. PRECAUTIONS & GUIDELINES**

### **▪ AUTOMOTIVE PRODUCTS ▪**

In the following Precautions and Guidelines, CapXon provides instructions and requirements to assure a proper handling and desired performance of capacitors. This version is an abbreviation of the full General Precautions and Guidelines, which is available on our webpage.

#### **1.1. GENERAL - ALL TYPES -**

##### **1.1.1. POLARITY**

All conventional Electrolytic Capacitors have a polarity due to the internal construction. This polarity is marked on the component by printing on the top of component or on the sleeve of Aluminum Electrolytic Capacitors, including Radial, Snap-In and Screw types.

Any reverse voltage can cause short circuit breakdown of capacitor or leakage of electrolyte. Electrolytic Capacitors isn't designed for AC-voltage supply and only meant for DC-voltage applications.

For an application where polarity in circuit can be reversed or unknown, specific bi-polar aluminium electrolytic capacitors shall be used. We offer such components within our product range.

##### **1.1.2. OVERVOLTAGE**

Overvoltage can damage the capacitor and can cause a drastic increase in leakage current, which possibly shortens the lifetime of the capacitor. In a worst case, short circuit failure mode can happen. As a result, do not apply any continuous or temporary overvoltage.

The applied operating voltage, which is applied to the capacitor, should not exceed the rated voltage of the capacitor.

##### **1.1.3. OPERATING TEMPERATURE**

Only operate the capacitor within the limits of allowed temperature range, which is specified by datasheet. Be aware that the sum of thermal stress by ambient condition plus electrical stress is the main driving factor for aging. As the thermal stress level gets higher, the expected capacitor lifetime would be lower.

A drop in applied temperature, ambient condition or cooling within application can enlarge the expected lifetime of the capacitor. For details, please see further documentation of lifetime estimation.

##### **1.1.4. RIPPLE CURRENT**

The applied ripple current shall not exceed the stated max. ripple current  $I_R$  on the datasheet at the specific frequency.

When capacitors are overstressed by ripple, it can generate massive heat inside the capacitor, which can result in deterioration, vent operation or capacitor breakage.

##### **1.1.5. CHARGE AND DISCHARGING**

Frequent and quick charge / discharge generates heat inside the capacitor and can cause possible increase of leakage current, reduction of the expected lifetime, decrease of capacitance, vent operation or breakage.

For such applications please see design rules or consult our technical support for assistance.

##### **1.1.6. SOLDERING CONDITIONS**

For recommended reflow solder profile, please see additional information at Section 2. Soldering Instructions.

Soldering by vapor phase for SMD types or any hand soldering are not recommended. No permission is released by CapXon side either. In case of such a usage, customer need to validate solder result and applied component stress within their own manufacturing process.

##### **1.1.7. MSL – MOISTURE SENSITIVE LEVEL (ONLY FOR SMD TYPES)**

Our Automotive SMD components are rated according to JEDEC J-STD020 with MSL1. Construction of this part does not include hygroscopic critical materials and are not prone to delamination or popcorn effects.

##### **1.1.8. RESISTANCE TO CHEMICALS AND SOLVENTS FOR WASHING, GLUING, FILLING AND COATING**

Due to the wide variety of suppliers and different chemical formulas of washing, gluing, filling and coating materials, the individually used material and appliance process need to be validated by customer itself. It is not possible to provide any global material usage approval from our side. CapXon can provide additional information, including combination of chemicals which could be critical to the component behavior and can support measurements of component performance after appliance of washing, gluing, filling or coating materials. For specific support, please kindly contact our technical support for further advices.

##### **1.1.9. CLEANING AND WASHING**

Do not wash the assembled capacitors with the following cleaning agents:

- **Xylene**  
- can cause deterioration of the rubber seal material
- **Halogenated solvents**  
- can cause corrosion and electrical failure modes
- **Petroleum based solvents**  
- can cause degeneration of the rubber seal material
- **Alkali based solvents**  
- can cause corrosion and dissolving of aluminum can
- **Acetone**  
- component marking possibly dissolve

After finishing cleaning and washing, the below points need to be verified by customer:

Dry all solvents properly from PCB as well as capacitor surface sufficiently and apply air blower or air knife, with temperatures within the temperature range of the product specification, if needed.

Monitor pH value, conductivity, specific gravity and water content of cleaning solvents to be sure of possible contaminations and pollution. Contaminations can negatively affect the performance of the capacitor.

### 1.1.10. GLUING, FILLING OR COATING

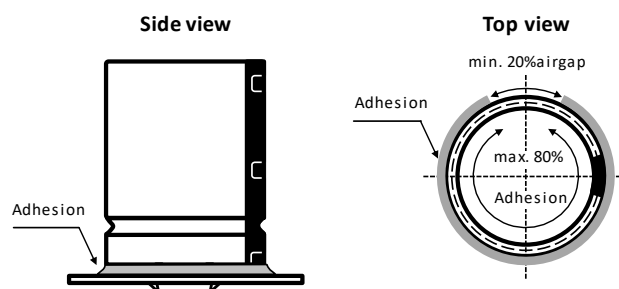
It is not allowed to use any gluing (adhesives), filling or coating materials, which contains halogenated solvents. Halogen ions are critical, because they can diffuse or creep in the capacitor through rubber sealing and can possibly damage the internal capacitor element /structure result in serious failure modes for the capacitor.

Additionally, please pay attention to the following points:

- Make sure that the surface of capacitor and the area between component bottom / rubber sealant is dry and clean before appliance of gluing, filling or coating material. It is important to avoid any contamination with chemical residues (e.g. flux residues, cleaning).
- Please follow and meet the stated gluing, coating, filling, heating and curing instructions from manufacturer or supplier of such materials. Be aware of possible shrinkage of such materials. Verify that the hardening was properly done and that no solvents / agents do remain.
- There should be no excessive heat nor mechanical pressure /stress at any stages from the production on customer side. Be aware of the possible material shrinkage of used material. High material shrinkage which leads to damage on capacitor is not CapXon's responsibility.
- The used materials of gluing, coating or filling can possibly react with the marking of component and this can change optical appearance such as the appearance and legibility.

- If the rubber seal surface is fully covered by gluing, filling or coating material, it is no longer possible to have a natural diffusion of gas between the inside of the capacitor and the ambient. So, to avoid such situation, it's strongly recommended to block maximum 80% of the sealed section on the bottom side of the capacitor.

Please find the example below of how gluing could be applied on Radial and Snap-In types.



*Gluing reference example of a Snap-In capacitor*

### 1.1.11. OPERATION AND ENVIRONMENT

As long as the application is powered, in operation and cap is not discharged, the user is never permitted to touch the electric terminals of the capacitor directly or to bridge the terminals by hand or any other conductive liquid or solid material. Otherwise, a short circuit of terminals can happen and a hard discharge can damage capacitor / application as well as it can harm the operator.

Within operation, please avoid the following environmental conditions to assure proper capacitor operation:

- high vibration, shocks or mechanical stress. For tested and allowed conditions, please see available references or contact us for details
- avoid direct sunlight, ozone and any kind of radiation or ultraviolet rays
- corrosive or toxic gases (e.g. ammonium, chlorine and compounds, bromine and compounds, hydrogen sulfide, sulfuric acid)
- ambient with high amount of damp condensation, water or types of oil

### 1.1.12. MECHANICAL STRESS

Best possible, avoid mechanical stress for the capacitor and do not apply any excessive mechanical stress to the lead wire pins or terminal.

After mounting, do not lift nor carry the PCB assembly by just grabbing the capacitor to pick up the board.

**1.1.13. STORAGE**

In case of long-term storage without applying voltage to the capacitor, leakage current tends to increase.

By applying the rated voltage before usage, the dielectric layer of aluminium oxide and leakage current can be stabilized.

If the capacitor is for more than 12 months, it is recommended to apply the DC rated voltage  $V_R$  for 30 minutes through 1kΩ protective series resistor.

The storage conditions for storage on customer side should be monitored and controlled to a temperature of 5°C up to 35°C and less than 75% rel. humidity.

**1.1.14. DISPOSAL**

Please follow your local governmental and organizational restrictions for disposal and if needed, contact your local responsible for correct handling.

In case of incineration, punch holes in the aluminum can in advanced to avoid explosion of capacitor and then burn with at least 800°C, otherwise it can result toxic gas.

**1.2. ALUMINUM ELECTROLYTIC & HYBRID CONDUCTIVE POLYMER CAPACITORS**

**- ALL MOUNTING STYLES -**

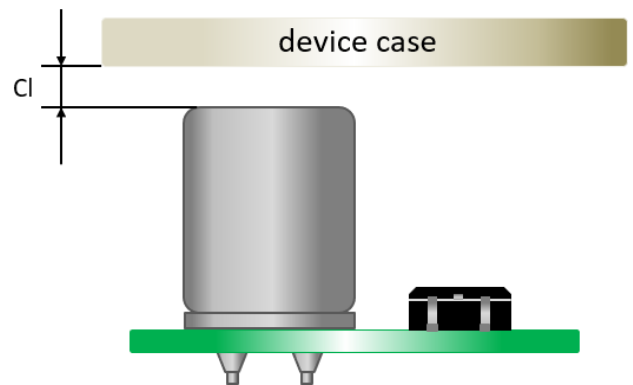
**1.2.1. VENT & VENT OPERATION AT EMERGENCY**

As a safety feature, most our regular electrolytic capacitors have a so-called vent, which is a pre-determined breaking point. In case of overstressed component, it can lead to internal gassing and due to this an internal overpressure will result in vent operation. So, the vent will open to release such pressure and gas can become visible. If user detects vent operation or gassing out of the capacitor when operating, disconnect the application immediately from power supply to turn it off directly. If it can't be turned off, the capacitor or the conductive liquid / gas of electrolyte can result in short-circuits, which can dramatically damage the application.

Please notice to avoid being near with body or face above or in direction of capacitors vent when powered. When the running application is overstressed, gas leakage by vent is possible. By this gas with temperatures higher than 100°C can occur and can hurt human body and face. In such an event, if contact with skin, wash it immediately with plenty of water and soap. If contact with eyes, rinse immediately

(e.g. eye shower) with plenty of water. If gas is inhaled, gargle right away with plenty of water. For all three cases, please consult a doctor for medical advices.

For proper operation of vent, consider space between the vent and covering surfaces (e.g. housing) as stated at the table below, it is strongly recommended for your mechanical construction / build-up of your product:



*Minimum distance to be observed for the safe operation of the capacitor*

Case diameter $\phi$	Clearance distance Cl
6.3mm to 16mm	Min. 2mm
18mm to 35mm	Min. 3mm
$\geq 40$ mm	Min. 5mm

*Recommended minimum clearance distance between topside capacitor and device case*

If such a space is not provided, the vent will not operate completely or even cannot open in case of overpressure.

Case sizes which are smaller than 6.3mm in diameter have no vent on top, for these no space need to be considered.

**1.2.2. SLEEVE MATERIAL (NOT FOR SMD)**

The standard sleeve material for the majority of our Radial, Snap-In and Screw mounting capacitors is PET and for some series PVC is used as sleeve material. When sleeve is exposed to xylene, toluene or similar and afterwards exposed to high heat, the sleeve may be cracked or damaged.

The sleeve is not used as insulating material or layer and does not insulate capacitor to surroundings. For needed insulation, further actions need to be considered by customer and please follow our recommended design rules.

Sleeves are applied for all Aluminum Electrolytic Capacitors with Radial, Snap-In or Screw mounting and if desired for further customized solutions.



### **1.3. ALUMINUM ELECTROLYTIC - RADIAL TYPE -**

It may not damage capacitors directly, but an electrolyte leakage may happen, if installed by other mounting method in horizontal direction.

#### **1.3.1. PIN CUTTING & BENDING**

Please take absolute care when cutting or bending pins, that the pin is fixed mechanically in direction of rubber sealant. It is necessary that the mechanical force while cutting and bending, which results in pulling or pressing force on pin, does not stress the inner construction of capacitor element or to damage the rubber sealant. Excessive pulling or pressing force on the pin with missing fixation can result in damage of internal pin to capacitor element connection and also the sealing can be weakened. So, please take care to assure appropriate cutting and bending. Do not pre-damage the capacitors and shorten their lifetime performance by incorrect handling.

#### **1.3.2. SOLDERING**

For recommended wave solder profile, please see additional solder instruction at section 2.3.

Improper soldering conditions may shrink or break the sleeve. Additionally, excessive heat can damage the internal capacitor element as terminals and lead wires conduct heat into the capacitor.

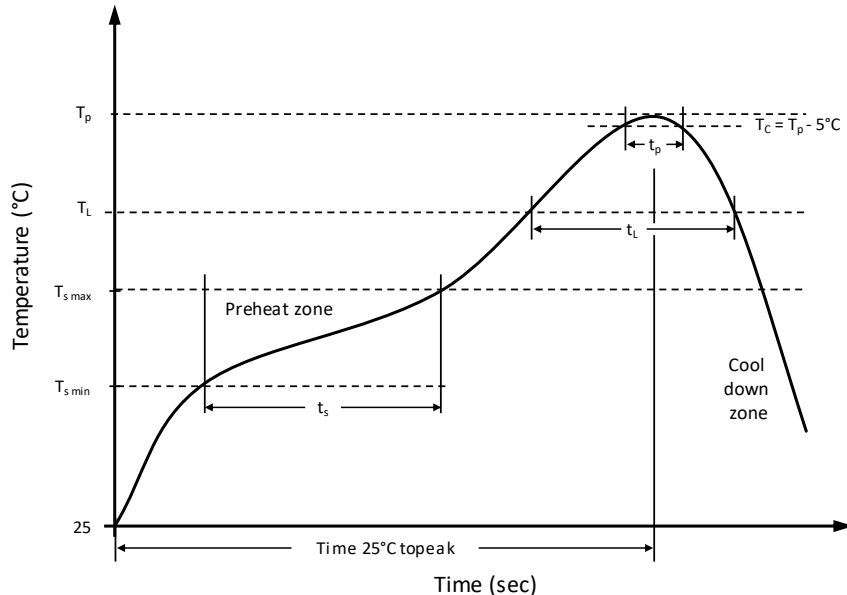
## 2. SOLDERING INSTRUCTIONS

In the following sections CapXon’s leadfree solder profiles are stated in detail.

### 2.1. REFLOW SOLDERING • SMD – ALUMINUM ELECTROLYTIC CAPACITORS



#### Recommended reflow soldering conditions



#### Classification of reflow soldering profile

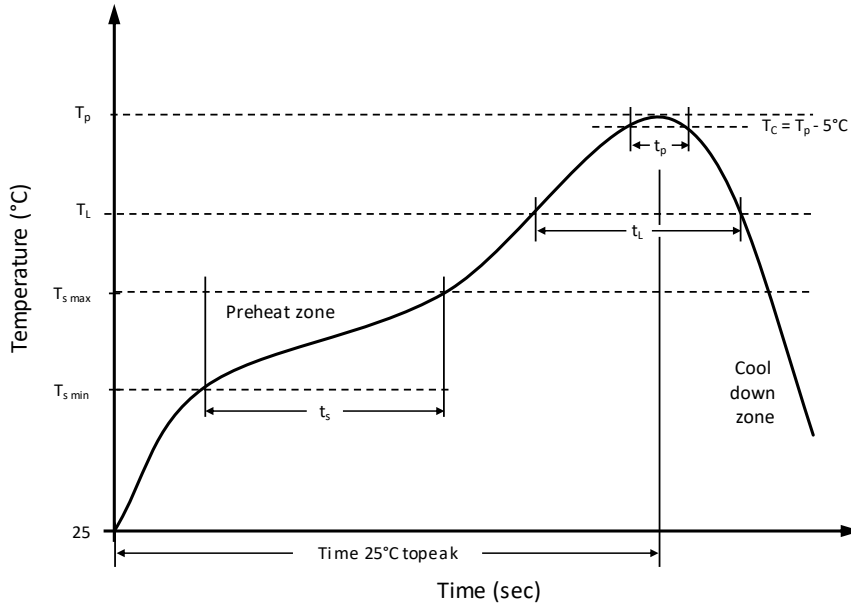
Profile Features		Value
Preheat temperature min.	$T_{s\ min}$	150 °C
Preheat temperature max.	$T_{s\ max}$	180 °C
Preheat time $t_s$ from $T_{s\ min}$ to $T_{s\ max}$	$t_s$	120 seconds
Ramp-up rate ( $T_L$ to $T_p$ )		max. 3 °C/second
Liquidous temperature	$T_L$	217 °C
Time $t_L$ maintained above $T_L$	$t_L$	See reference table below for $\varnothing$ Diameter / Rated Voltage $V_R$ combination
Peak package body temperature	$T_p$	See reference table below for $\varnothing$ Diameter / Rated Voltage $V_R$ combination
Timeframe of within 5°C below and up to max actual peak body temperature	$t_p$	See reference table below for $\varnothing$ Diameter / Rated Voltage $V_R$ combination
Ramp-down rate ( $T_L$ to $T_p$ )		max. 6 °C/second
Time 25°C to peak temperature		max. 8 minutes

\* Limitations of ramp rates to JEDEC-J-STD020E

#### Package classification reflow temperature for SMD – Aluminum Electrolytic Capacitors

$\varnothing$ Diameter (mm)	$V_R$ • Rated Voltage (V)	$t_L$ • Time above 217°C	Time above 230°C	$T_p$ Peak Temperature	$t_p$ Timing (seconds)	Allowed Reflow Runs
4 up to 6.3	4 to 50	90 sec. max.	30 sec. max.	260 °C	10	max. twice
	63 to 100	60 sec. max.	30 sec. max.	255 °C	5	max. twice
8 up to 10	4 to 50	60 sec. max.	30 sec. max.	250 °C	5	max. twice
	63 to 450	40 sec. max.	30 sec. max.	240 °C	5	max. twice
12.5 up to 18	4 to 50	30 sec. max.	20 sec. max.	245 °C	5	max. twice
	63 to 450	20 sec. max.	5 sec. max.	235 °C	5	max. twice

**2.2. REFLOW SOLDERING - SMD – HYBRID CONDUCTIVE POLYMER CAPACITORS**

**Recommended reflow soldering conditions**

**Classification of reflow soldering profile**

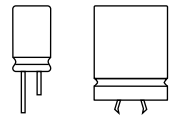
Profile Features		Value
Preheat temperature min.	$T_{s\ min}$	160 °C
Preheat temperature max.	$T_{s\ max}$	200 °C
Preheat time $t_s$ from $T_{s\ min}$ to $T_{s\ max}$	$t_s$	120 seconds
Ramp-up rate ( $T_L$ to $T_p$ )		max. 3 °C/second
Liquidous temperature	$T_L$	217 °C
Time $t_L$ maintained above $T_L$	$t_L$	See reference table below for proper $\varnothing$ Diameter
Peak package body temperature	$T_p$	See reference table below for proper $\varnothing$ Diameter
Timeframe of within 5°C below and up to max actual peak body temperature	$t_p$	See reference table below for proper $\varnothing$ Diameter
Ramp-down rate ( $T_L$ to $T_p$ )		max. 6 °C/second
Time 25°C to peak temperature		max. 8 minutes

\* Limitations of ramp rates to JEDEC-J-STD020E

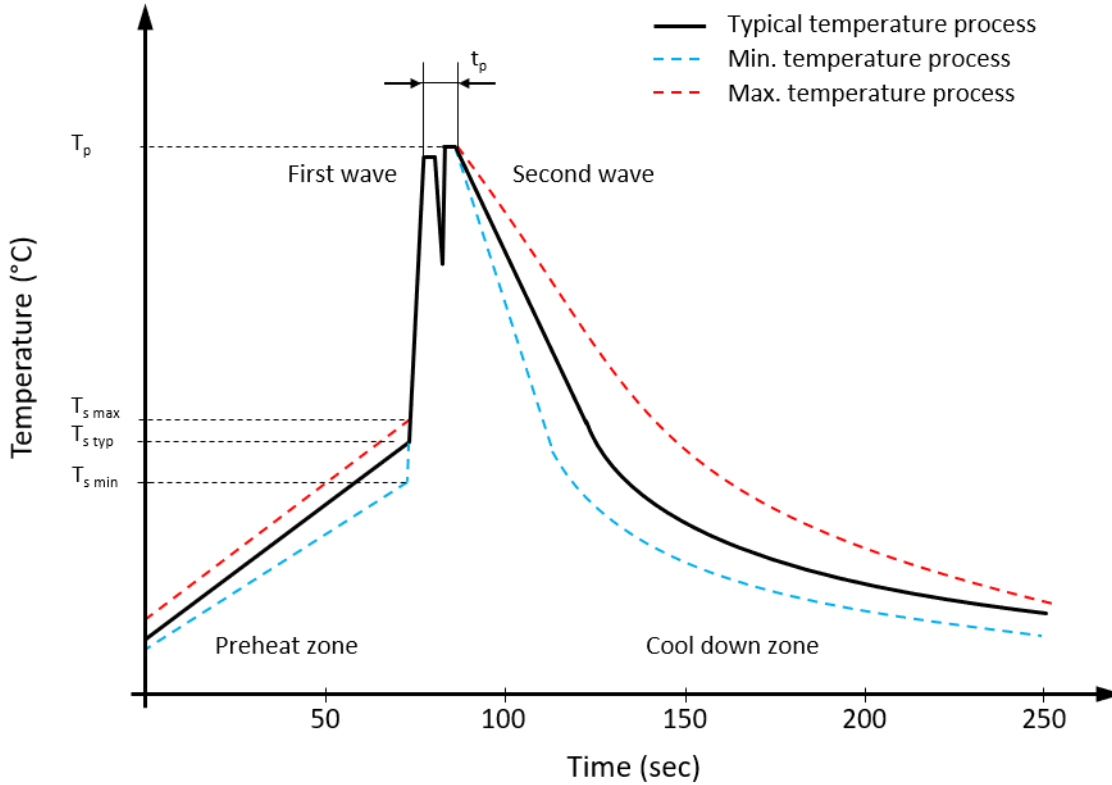
**Package classification reflow temperature for SMD – Hybrid Conductive Polymer Capacitors**

$\varnothing$ Diameter (mm)	Time above 200°C	$t_L$ Time above 217°C	Time above 230°C	$T_p$ Peak Temperature (°C)	$t_p$ Timing (seconds)	Allowed Reflow Runs
≤ 6.3	70 sec. max	40 sec. max.	30 sec. max.	260	5	max. twice
≥ 8	70 sec. max	40 sec. max.	30 sec. max.	245	10	max. twice
	70 sec. max	40 sec. max.	30 sec. max.	260	5	only once

**2.3. WAVE SOLDERING - ALL RADIAL & SNAP-IN CAPACITORS**



**Recommended wave soldering conditions**



**Classification wave soldering profile - Refer to EN 61760-1: 2006**

Profile Features		Value - Pb-free Assembly	Value - Sn-Pb Assembly
Preheat temperature min.	$T_{s\ min}$	100 °C	100 °C
Preheat temperature typical	$T_{s\ typ}$	120 °C	120 °C
Preheat temperature max.	$T_{s\ max}$	130 °C	130 °C
Preheat time $t_s$ from $T_{s\ min}$ to $T_{s\ max}$	$t_s$	70 seconds	70 seconds
Peak temperature	$T_p$	245 °C ~ 260 °C	235 °C ~ 260 °C
Time of actual peak temperature	$t_p$	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down rate min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second
Time 25°C to 25°C		4 minutes	4 minutes



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