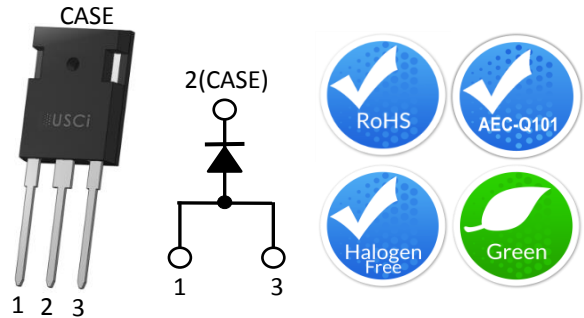


## Description

United Silicon Carbide, Inc. offers the 3<sup>rd</sup> generation of high performance SiC Merged-PiN-Schottky (MPS) diodes. With zero reverse recovery charge and 175°C maximum junction temperature, these diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.



Part Number	Package	Marking
UJ3D1250K	TO-247-3L	UJ3D1250K

## Features

- ◆ 175°C maximum operating junction temperature
- ◆ Easy paralleling
- ◆ Extremely fast switching not dependent on temperature
- ◆ No reverse or forward recovery
- ◆ Enhanced surge current capability, MPS structure
- ◆ 100% UIS tested
- ◆ AEC-Q101 qualified

## Typical Applications

- ◆ Power converters
- ◆ Industrial motor drives
- ◆ Switching-mode power supplies
- ◆ Power factor correction modules

## Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Units
DC blocking voltage	$V_R$		1200	V
Repetitive peak reverse voltage, $T_j=25^\circ\text{C}$	$V_{RRM}$		1200	V
Surge peak reverse voltage	$V_{RSM}$		1200	V
Maximum DC forward current	$I_F$	$T_C = 112^\circ\text{C}$	50	A
Non-repetitive forward surge current sine halfwave	$I_{FSM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	275	A
Repetitive forward surge current sine halfwave, $D=0.1$	$I_{FRM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	163.5	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	99.6	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\mu\text{s}$	2400	A
		$T_C = 110^\circ\text{C}, t_p = 10\mu\text{s}$	2400	
$i^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	378	$\text{A}^2\text{s}$
Power dissipation	$P_{Tot}$	$T_C = 25^\circ\text{C}$	319	W
		$T_C = 112^\circ\text{C}$	134	
Maximum junction temperature	$T_{J,max}$		175	$^\circ\text{C}$
Operating and storage temperature	$T_J, T_{STG}$		-55 to 175	$^\circ\text{C}$
Soldering temperatures, wavesoldering only allowed at leads	$T_{sold}$	1.6mm from case for 10s	260	$^\circ\text{C}$

### Electrical Characteristics

$T_J = +25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward voltage	$V_F$	$I_F = 50\text{A}, T_J = 25^\circ\text{C}$	-	1.5	1.7	V
		$I_F = 50\text{A}, T_J = 150^\circ\text{C}$	-	1.95	2.4	
		$I_F = 50\text{A}, T_J = 175^\circ\text{C}$	-	2.2	2.7	
Reverse current	$I_R$	$V_R = 1200\text{V}, T_J = 25^\circ\text{C}$	-	500	1250	$\mu\text{A}$
		$V_R = 1200\text{V}, T_J = 175^\circ\text{C}$	-	3500		
Total capacitive charge <sup>(1)</sup>	$Q_C$	$V_R = 800\text{V}$		240		nC
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$		2340		pF
		$V_R = 400\text{V}, f = 1\text{MHz}$		224		
		$V_R = 800\text{V}, f = 1\text{MHz}$		198		
Capacitance stored energy	$E_C$	$V_R = 800\text{V}$		72		$\mu\text{J}$

(1)  $Q_C$  is independent on  $T_J$ ,  $di_F/dt$ , and  $I_F$  as shown in the application note USCi\_AN0011.

### Thermal characteristics

Parameter	symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction - case	$R_{\theta JC}$			0.36	0.47	$^\circ\text{C}/\text{W}$

### Typical Performance

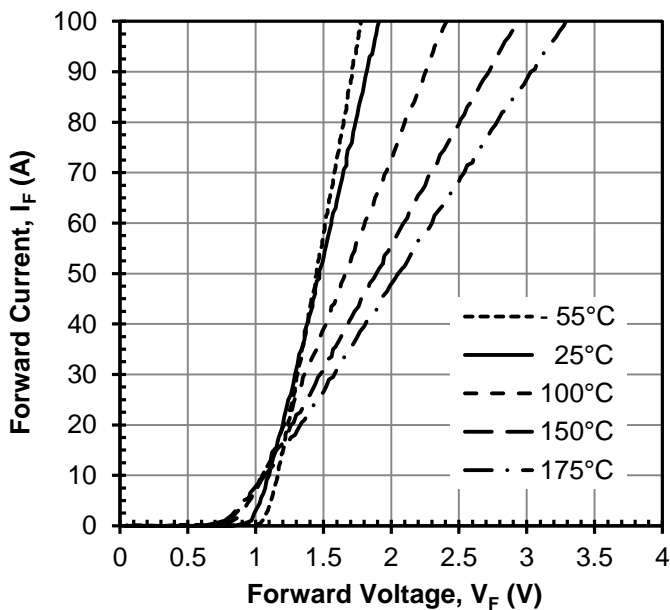


Figure 1 Typical forward characteristics

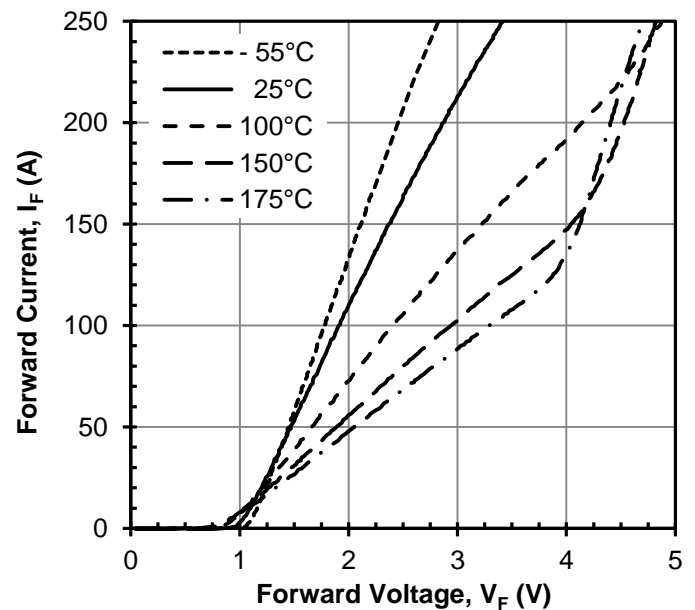


Figure 2 Typical forward characteristics in surge current

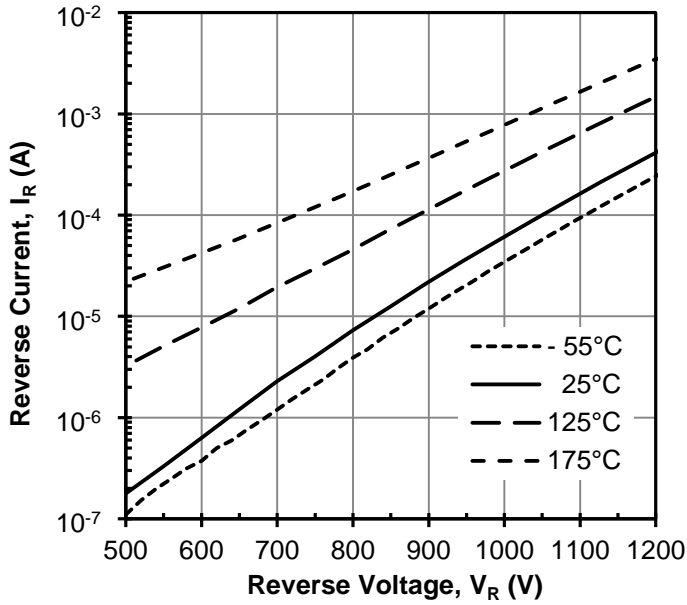


Figure 3 Typical reverse characteristics

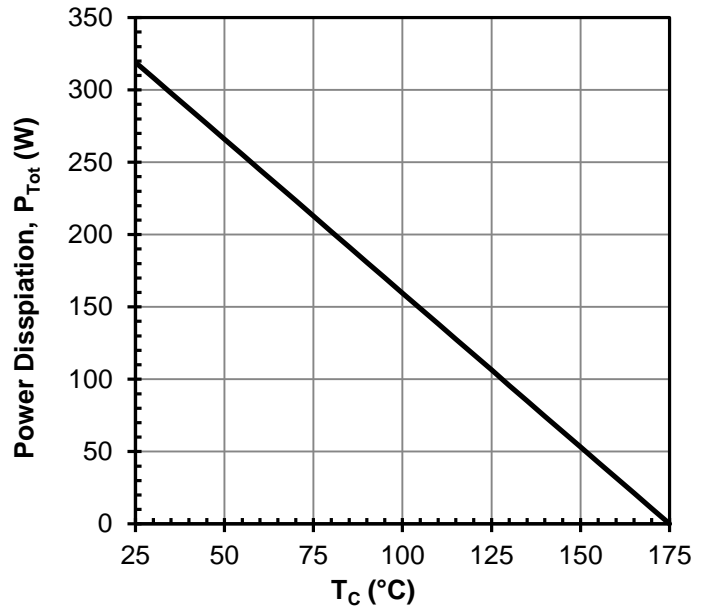


Figure 4 Power dissipation

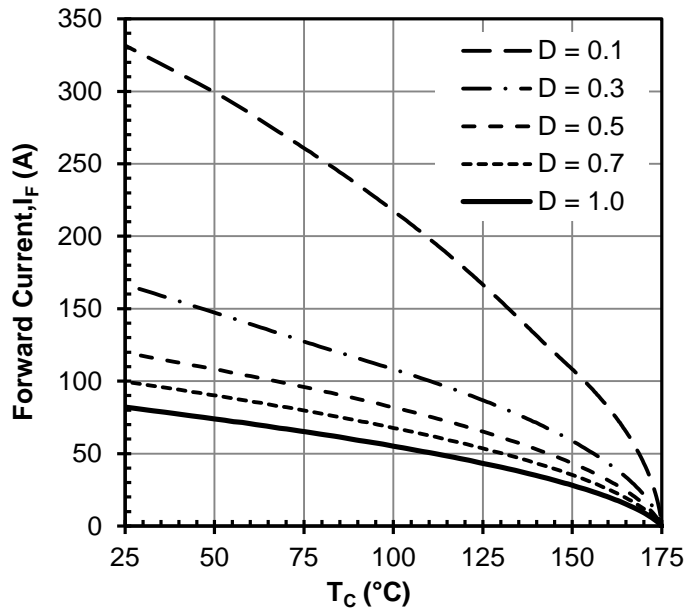


Figure 5 Diode forward current

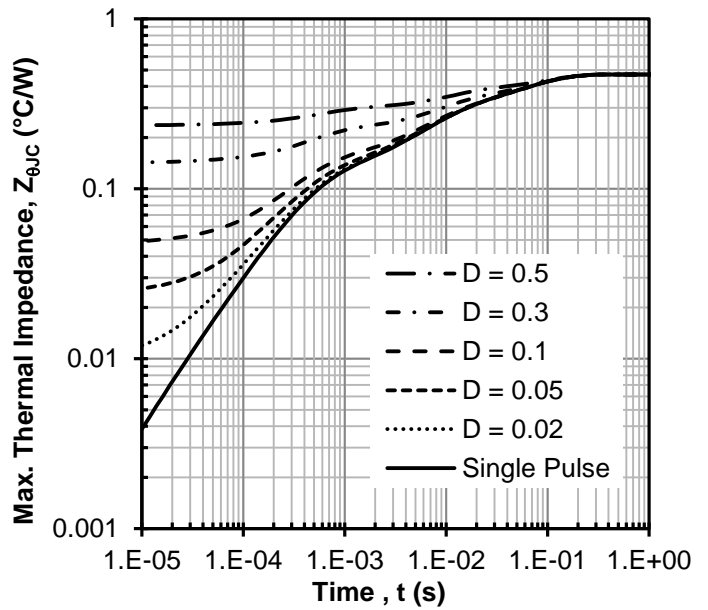
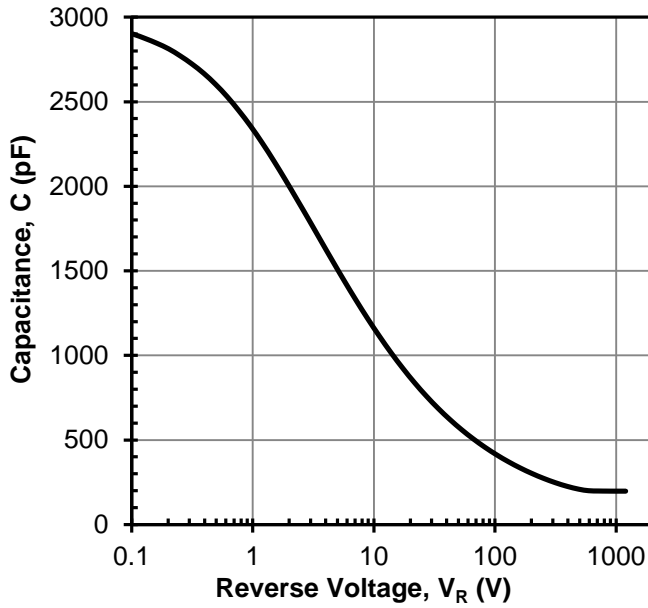
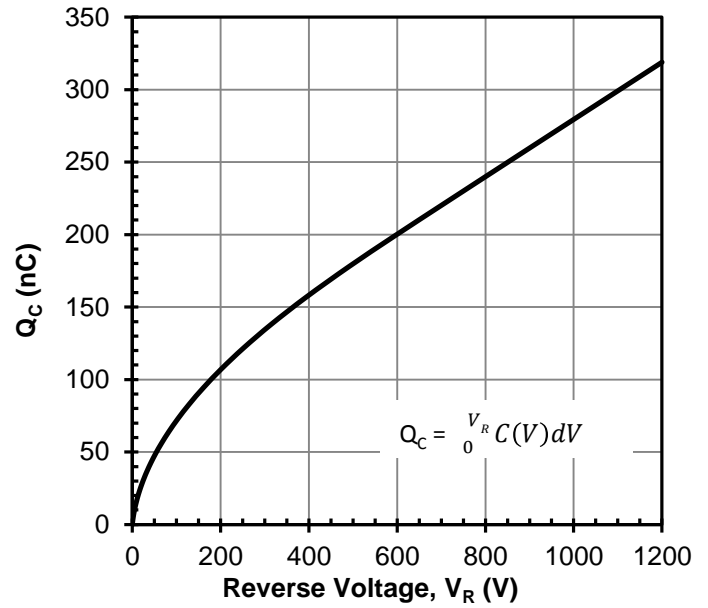


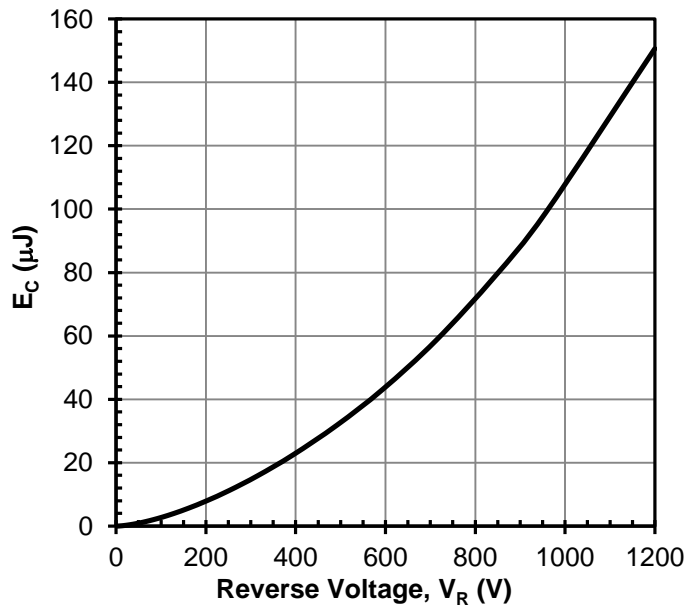
Figure 6 Maximum transient thermal impedance



**Figure 7** Capacitance vs. reverse voltage at 1MHz



**Figure 8** Typical capacitive charge vs. reverse voltage



**Figure 9** Typical capacitance stored energy vs. reverse voltage

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