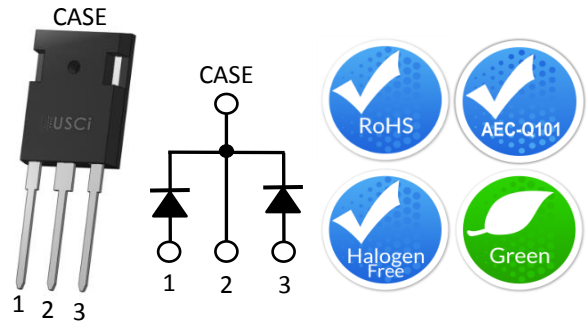


Description

United Silicon Carbide, Inc. offers the 3rd 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
UJ3D1220KSD	TO-247-3L	UJ3D1220KSD

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
- ◆ Excellent thermal performance, Ag sintered
- ◆ 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 (Leg/Device)	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	$T_C = 158^\circ\text{C}$	10/20	A
Non-repetitive forward surge current sine halfwave	I_{FSM}	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	120/240	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	110/220	
Repetitive forward surge current sine halfwave, $D=0.1$	I_{FRM}	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	56.7/113.4	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	33.6/67.2	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\mu\text{s}$	720/1440	A
		$T_C = 110^\circ\text{C}, t_p = 10\mu\text{s}$	720/1440	
i^2t value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	72/288	A^2s
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	60/240	
Power dissipation	P_{Tot}	$T_C = 25^\circ\text{C}$	234.4/468.8	W
		$T_C = 158^\circ\text{C}$	26.6/53.2	
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 (Leg/Device)			Units
			Min	Typ	Max	
Forward voltage	V_F	$I_F=10\text{A}/20\text{A}, T_J = 25^\circ\text{C}$	-	1.4	1.6	V
		$I_F=10\text{A}/20\text{A}, T_J = 150^\circ\text{C}$	-	1.85	2.3	
		$I_F=10\text{A}/20\text{A}, T_J = 175^\circ\text{C}$	-	2	2.6	
Reverse current	I_R	$V_R=1200\text{V}, T_J=25^\circ\text{C}$	-	100/200	640/1280	μA
		$V_R=1200\text{V}, T_J=175^\circ\text{C}$	-	1000/2000		
Total capacitive charge ⁽¹⁾	Q_C	$V_R=800\text{V}$		51/102		nC
Total capacitance	C	$V_R=1\text{V}, f=1\text{MHz}$		510/1020		pF
		$V_R=400\text{V}, f=1\text{MHz}$		48/96		
		$V_R=800\text{V}, f=1\text{MHz}$		41/82		
Capacitance stored energy	E_C	$V_R=800\text{V}$		15/30		μJ

(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 (Leg/Device)			Units
			Min	Typ	Max	
Thermal resistance, junction - case	$R_{\theta JC}$			0.49/0.245	0.64/0.32	$^\circ\text{C}/\text{W}$

Typical Performance (Per Leg)

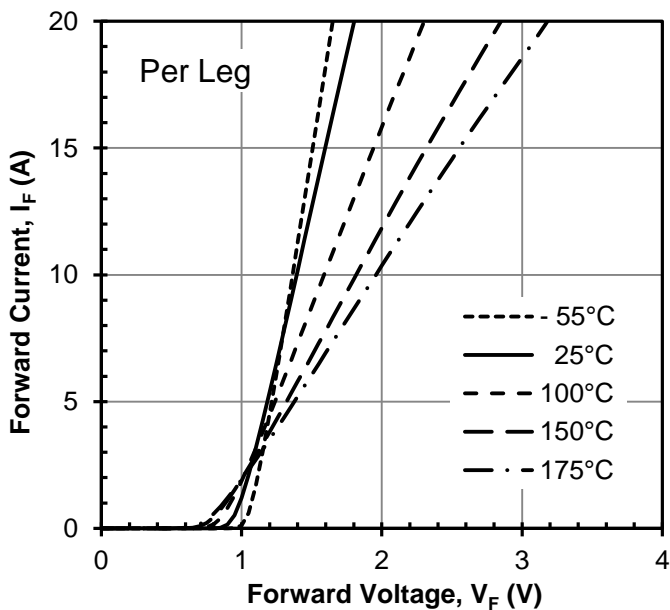


Figure 1 Typical forward characteristics

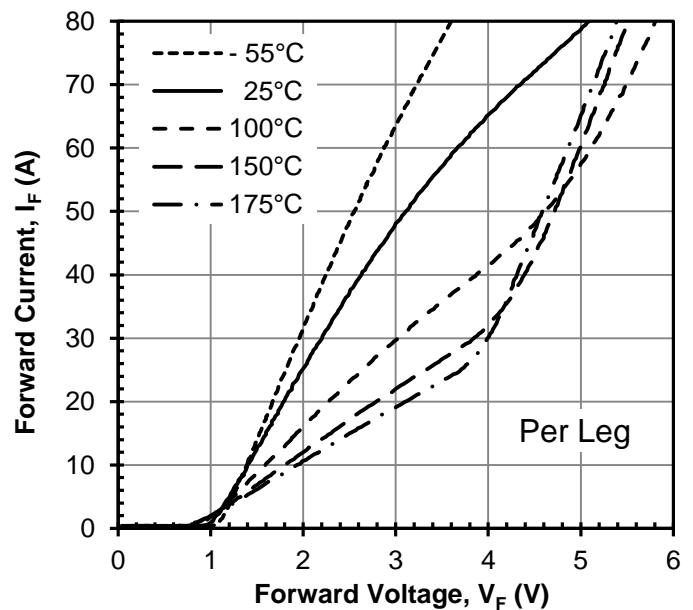


Figure 2 Typical forward characteristics in surge current

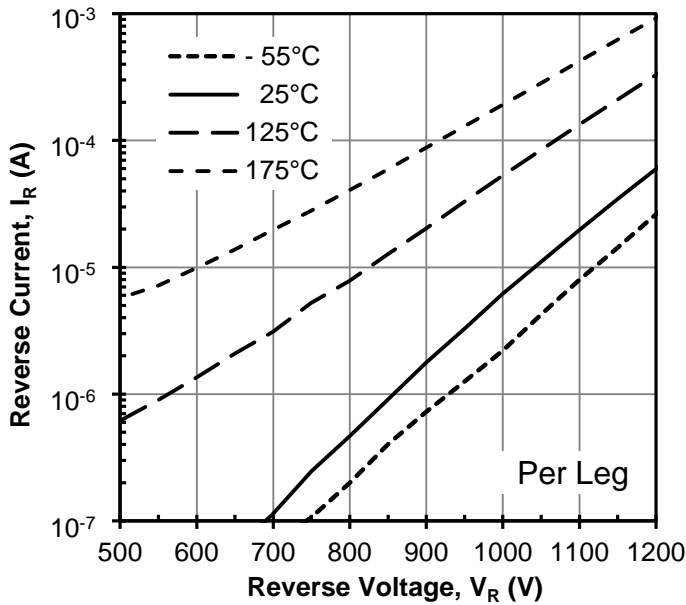


Figure 3 Typical reverse characteristics

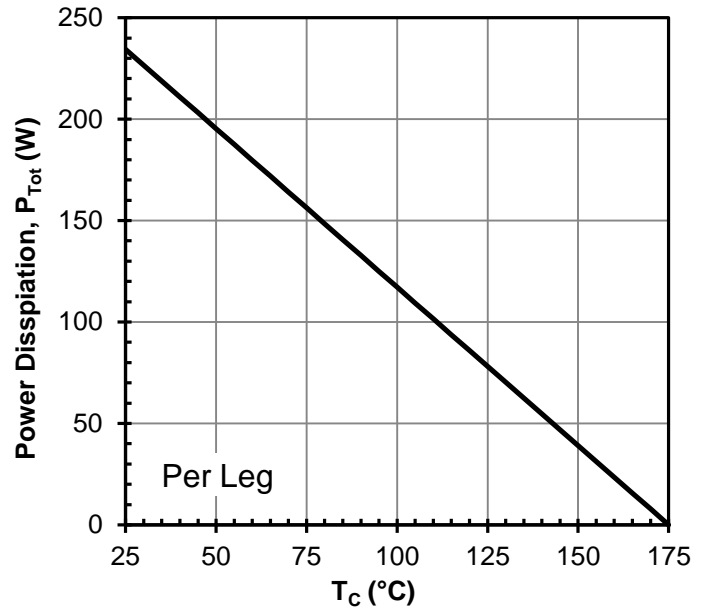


Figure 4 Power dissipation

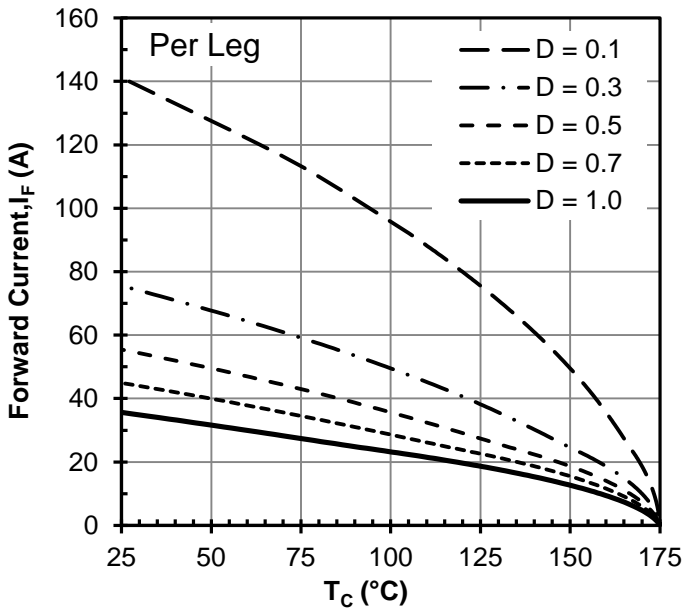


Figure 5 Diode forward current

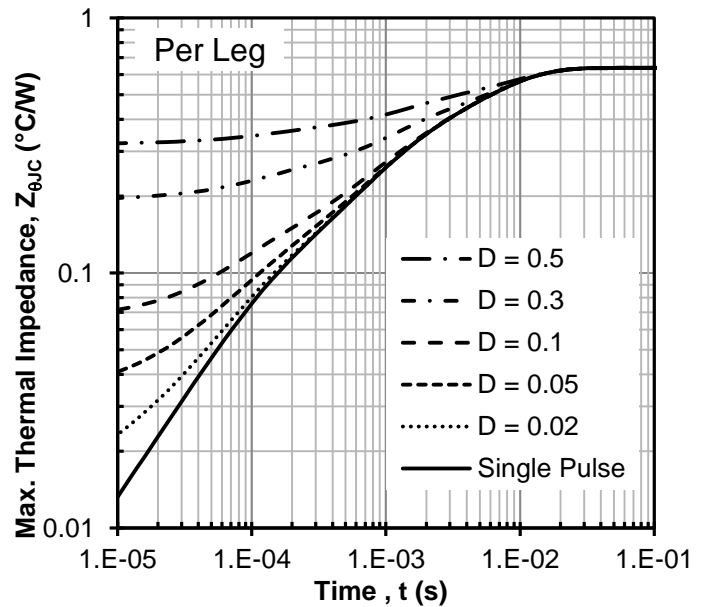


Figure 6 Maximum transient thermal impedance

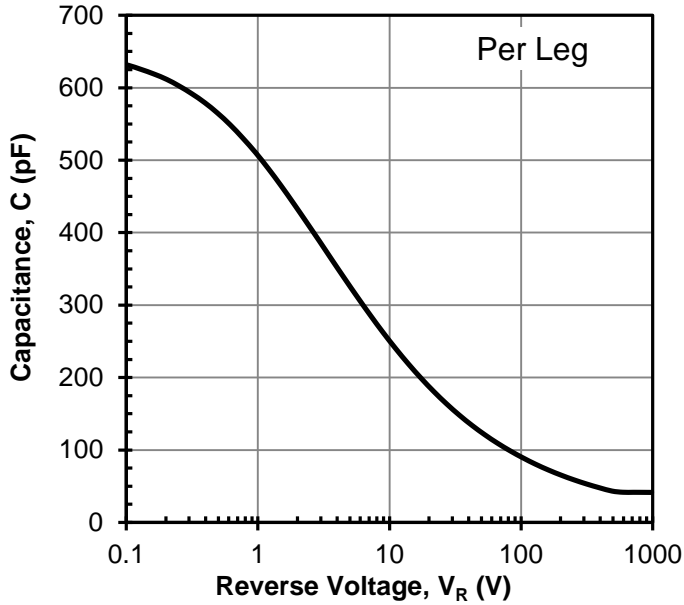


Figure 7 Capacitance vs. reverse voltage at 1MHz

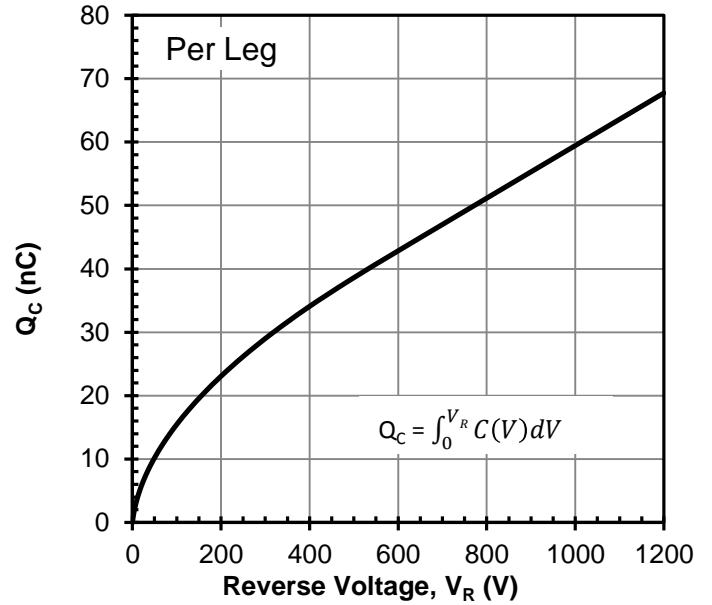


Figure 8 Typical capacitive charge vs. reverse voltage

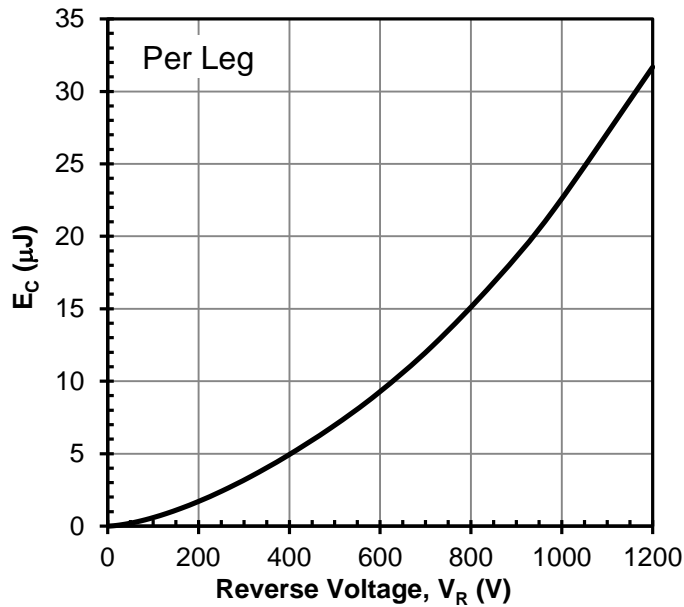


Figure 9 Typical capacitance stored energy vs. reverse voltage

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