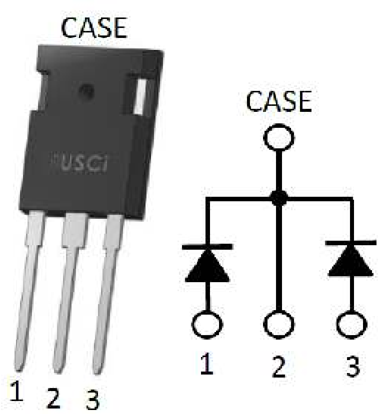
DATASHEET

UJ3D06560KSD



Part Number	Package	Marking
UJ3D06560KSD	TO-247-3L	UJ3D06560KSD

650V 60A SiC Merged PiN-Schottky Diode

Revision C, January 2019

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.

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

Paramater	Symbol	Test Conditions	Value (Leg/ Device)	Units
DC blocking voltage	V_R		650	V
Repetitive peak reverse voltage, T_j=25°C	V_{RRM}		650	V
Surge peak reverse voltage	V_{RSM}		650	V
Maximum DC forward current	I_F	T_C = 140°C	30/60	A
Non-repetitive forward surge current sine halfwave	I_{FSM}	T_C = 25°C, t_p = 10ms	165/330	A
		T_C = 110°C, t_p = 10ms	150/300	
Repetitive forward surge current sine halfwave, D=0.1	I_{FRM}	T_C = 25°C, t_p = 10ms	107.2/214.4	A
		T_C = 110°C, t_p = 10ms	66.1/132.2	
Non-repetitive peak forward current	$I_{F, max}$	T_C = 25°C, t_p = 10µs	1250/2500	A
		T_C = 110°C, t_p = 10µs	1250/2500	
i^2t value	$\int i^2dt$	T_C = 25°C, t_p = 10ms	136/544	A^2s
		T_C = 110°C, t_p = 10ms	112/448	
Diode dV/dt ruggedness	dV/dt	V_R = 0 - 650V	200	V/ns
Power dissipation	P_{tot}	T_C = 25°C	288.5/577	W
		T_C = 140°C	67.3/134.6	
Maximum junction temperature	$T_{J, max}$		175	°C
Operating and storage temperature	T_J, T_{STG}		-55 to 175	°C
Soldering temperatures, wavesoldering only allowed at leads	T_{sold}	1.6mm from case for 10s	260	°C

Electrical Characteristics

Parameter	Symbol	Test Conditions	Value (Leg/Device)			Units
			Min	Typ	Max	
Forward voltage	V_F	I_F = 30A/60A, T_J = 25°C	-	1.5	1.7	V
		I_F = 30A/60A, T_J = 150°C	-	1.77	2.10	
		I_F = 30A/60A, T_J = 175°C	-	1.85	2.25	
Reverse current	I_R	V_R = 650V, T_J = 25°C	-	30/60	370/740	µA
		V_R = 650V, T_J = 175°C	-	390/780	-	
Total capacitive charge (3)	Q_C	V_R = 400V	-	72/144	-	nC
Total capacitance	C	V_R = 1V, f = 1MHz	-	990/ 1980	-	PF
		V_R = 300V, f = 1MHz	-	117/234	-	
		V_R = 600V, f = 1MHz	-	101/202	-	
Capacitance stored energy	E_C	V_R = 400V	-	10.5/21	-	µJ

(1) QC is independent on TJ, di_F/dt, and IF 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	$R_{\theta JC}$		-	0.4/0.2	0.52/0.26	°C/W

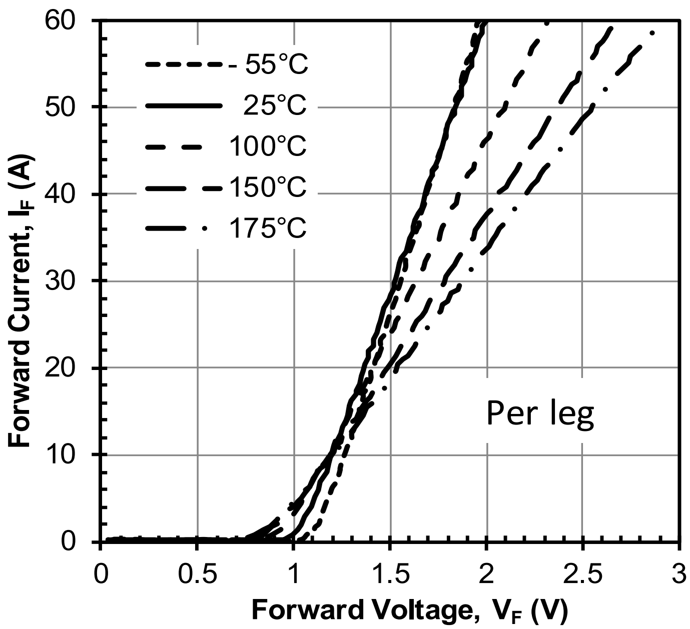


Figure 1. Typical forward characteristics

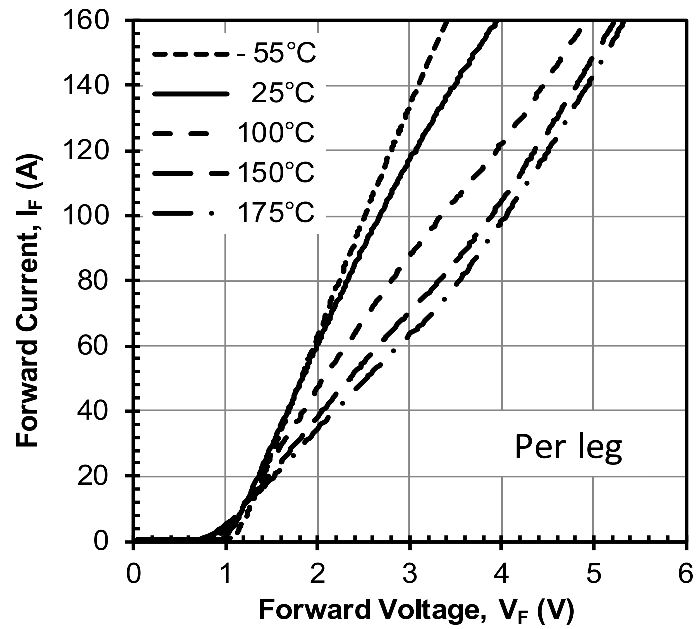


Figure 2. Typical forward characteristics in surge current

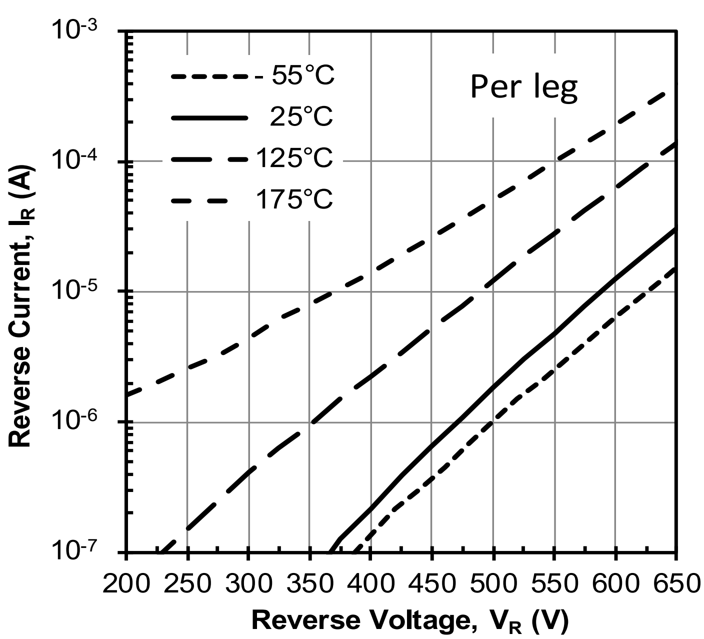


Figure 3. Typical reverse characteristics

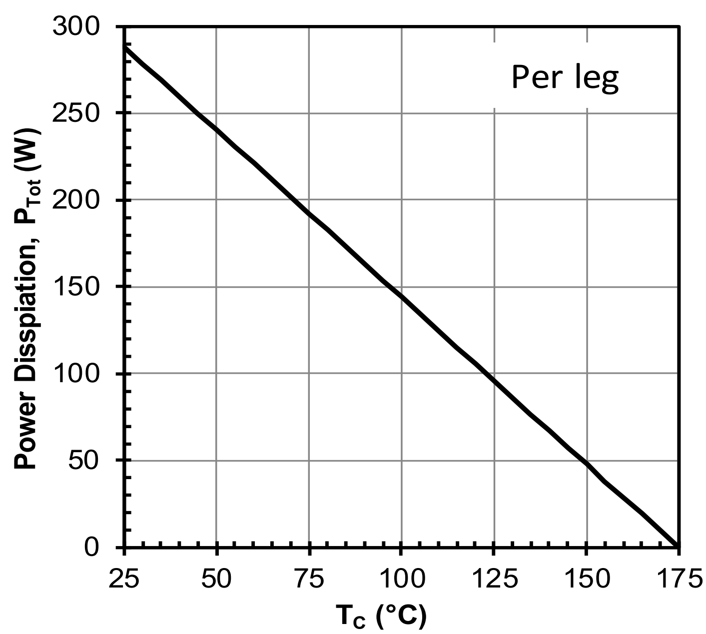


Figure 4. Power dissipation

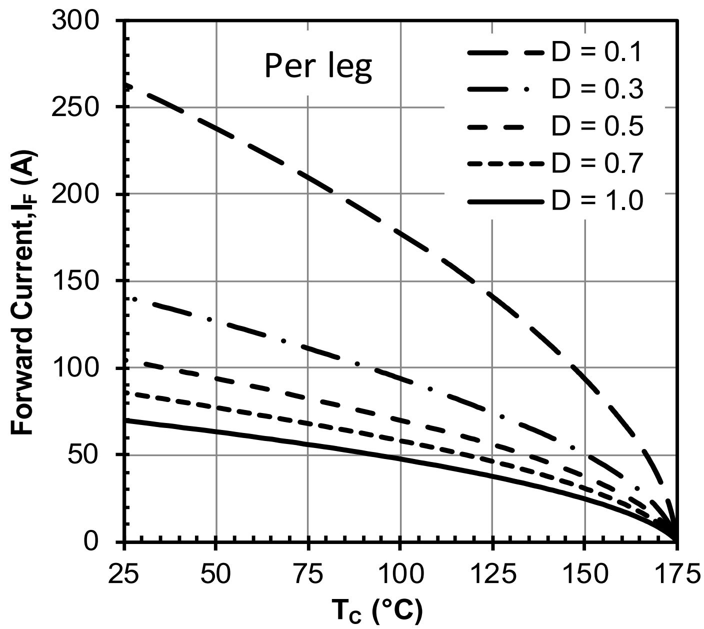


Figure 5. Diode forward current

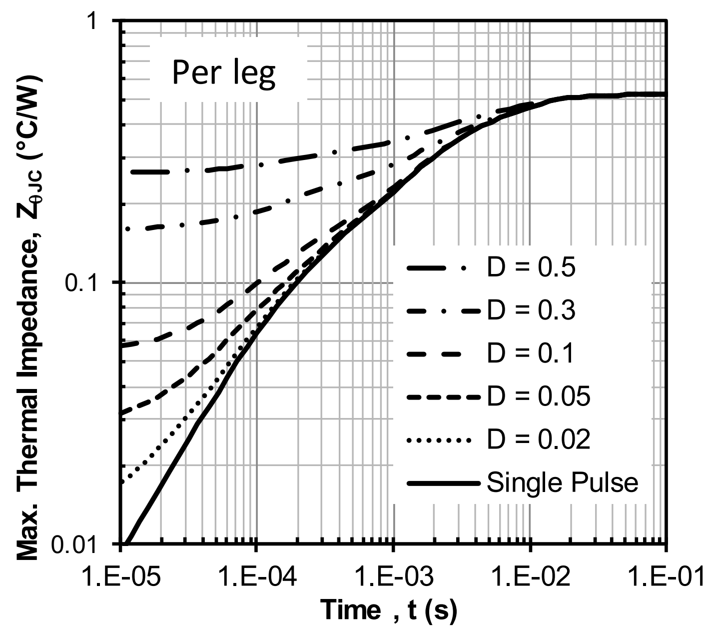


Figure 6. Maximum transient thermal impedance

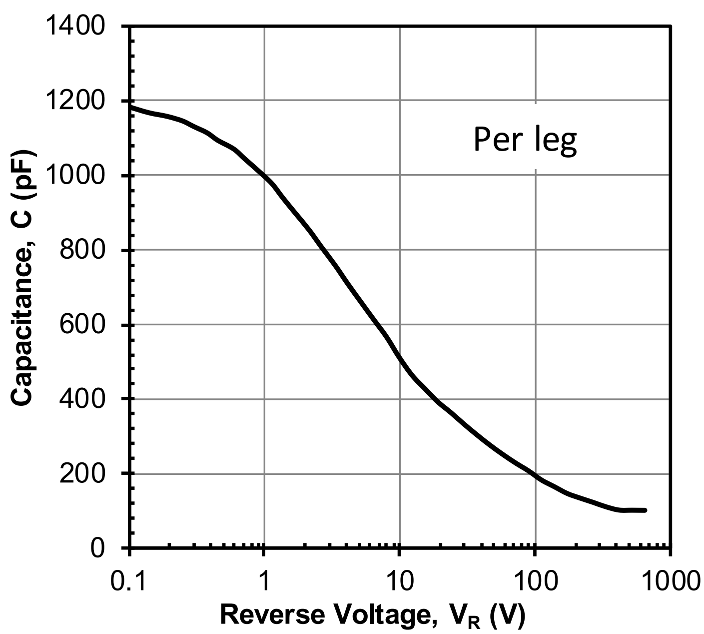


Figure 7. Capacitance vs. reverse voltage at 1MHz

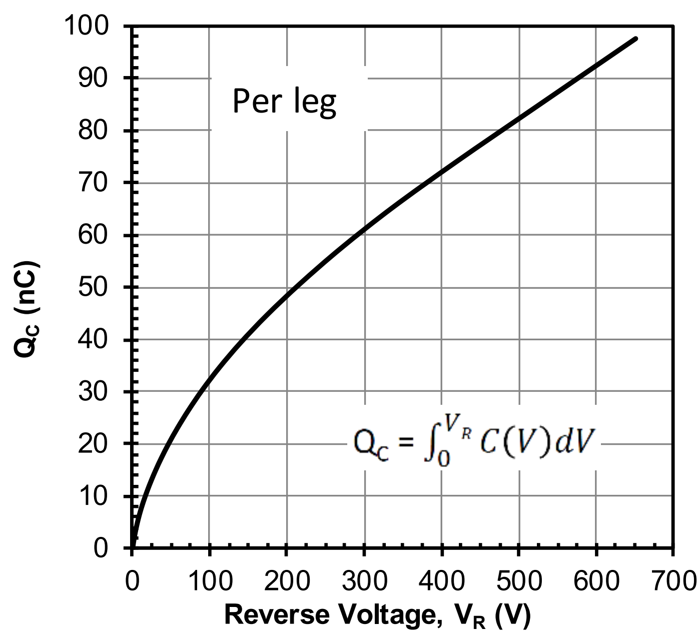


Figure 8. Typical capacitive charge vs. reverse voltage

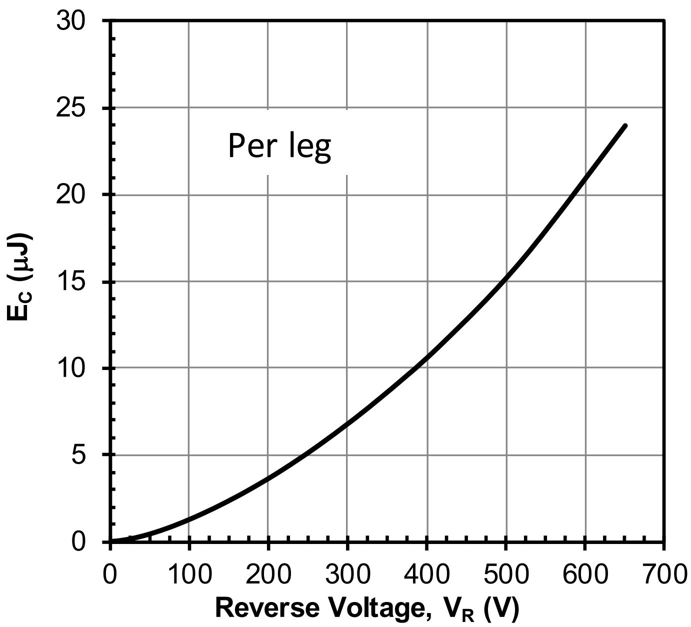


Figure 9. Typical capacitance stored energy vs. reverse voltage

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