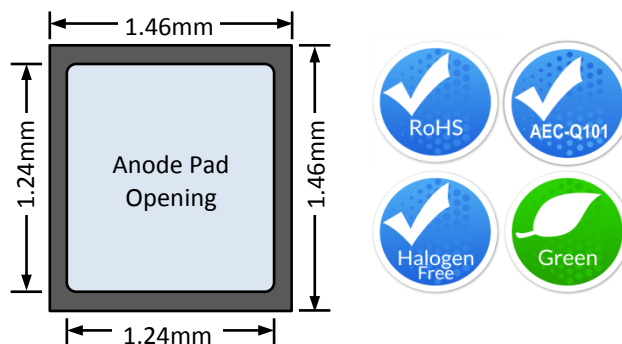


Description

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
UJ3D06510	Undiced wafer
UJ3D06510Z	Die on tape

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
- ◆ AEC-Q101 qualified in TO-220/TO-247 packaged devices

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		650	V
Repetitive peak reverse voltage, $T_j=25^\circ\text{C}$	V_{RRM}		650	V
Surge peak reverse voltage	V_{RSM}		650	V
Maximum DC forward current ⁽¹⁾	I_F	$T_C = 152^\circ\text{C}$	10	A
Non-repetitive forward surge current ⁽¹⁾ sine halfwave	I_{FSM}	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	70	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	60	
Repetitive forward surge current ⁽¹⁾ sine halfwave, $D=0.1$	I_{FRM}	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	45.9	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	28.7	
Non-repetitive peak forward current ⁽¹⁾	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\mu\text{s}$	455	A
		$T_C = 110^\circ\text{C}, t_p = 10\mu\text{s}$	455	
Non-repetitive avalanche energy ⁽¹⁾	E_{AS}	$T_j = 25^\circ\text{C}, L = 5\text{mH}, I_{pk}=5.5\text{A}, V_{DD}=100\text{V}$	84	mJ
Maximum junction temperature	$T_{J,max}$		175	$^\circ\text{C}$
Operating and storage temperature	T_J, T_{STG}		-55 to 175	$^\circ\text{C}$

(1) Assumes a maximum junction-to-case thermal resistance of 1.1°C/W.

Electrical Characteristics

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

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward voltage	V_F	$I_F = 10\text{A}, T_J = 25^\circ\text{C}$	-	1.5	1.7	V
		$I_F = 10\text{A}, T_J = 150^\circ\text{C}$	-	1.68	2.0	
		$I_F = 10\text{A}, T_J = 175^\circ\text{C}$	-	1.75	2.1	
Reverse current	I_R	$V_R = 650\text{V}, T_J = 25^\circ\text{C}$	-	10	60	μA
		$V_R = 650\text{V}, T_J = 175^\circ\text{C}$	-	150		
Total capacitive charge ⁽²⁾	Q_C	$V_R = 400\text{V}$		23		nC
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$		327		pF
		$V_R = 300\text{V}, f = 1\text{MHz}$		38		
		$V_R = 600\text{V}, f = 1\text{MHz}$		34		
Capacitance stored energy	E_C	$V_R = 400\text{V}$		3.4		μJ

(2) Q_C is independent on T_J , di_F/dt , and I_F as shown in the application note USCi_AN0011.

Typical Performance

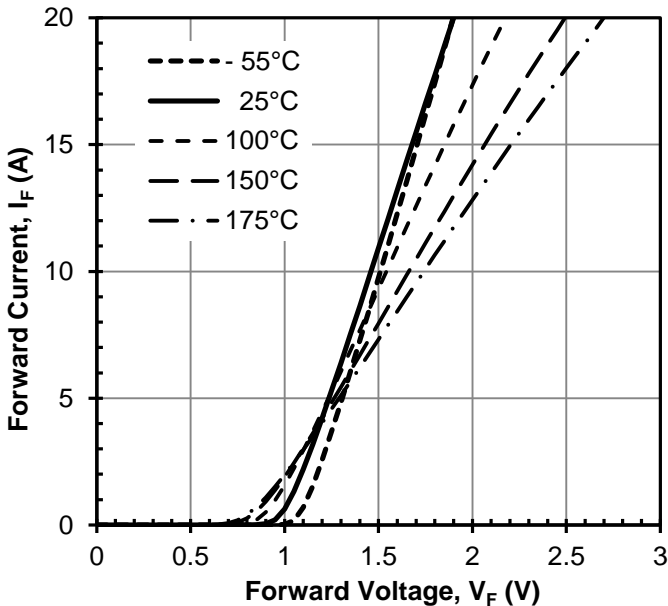


Figure 1 Typical forward characteristics

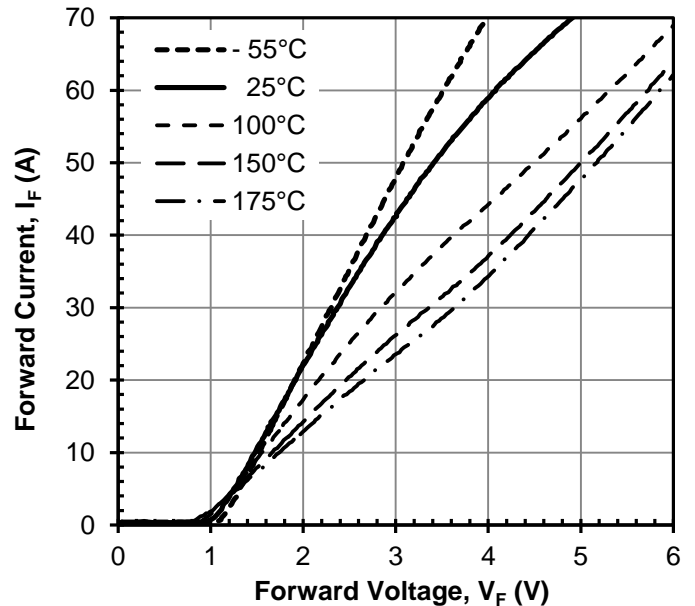


Figure 2 Typical forward characteristics in surge current

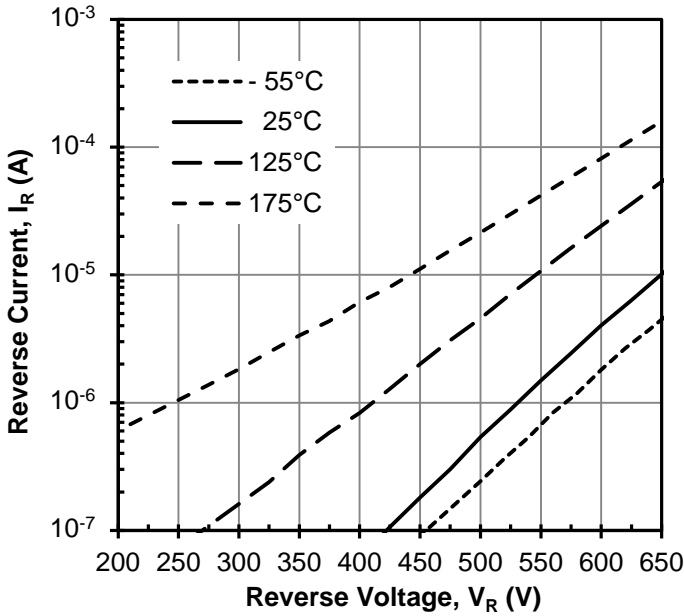


Figure 3 Typical reverse characteristics

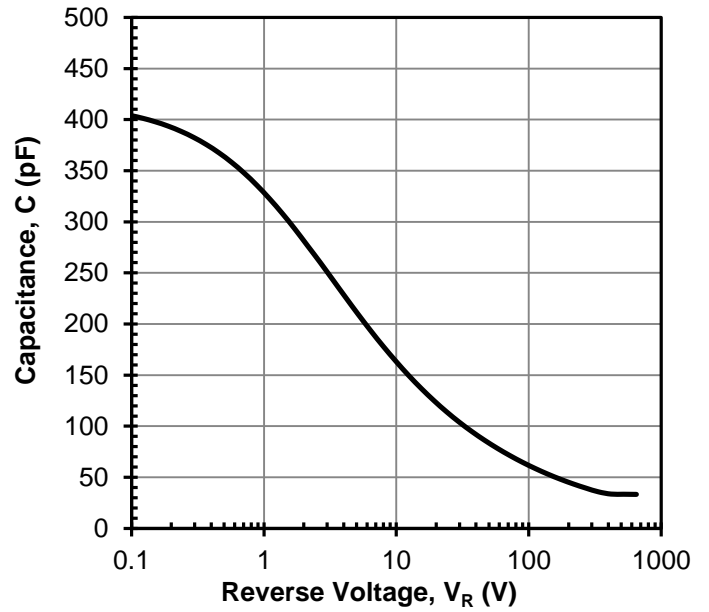


Figure 4 Capacitance vs. reverse voltage at 1MHz

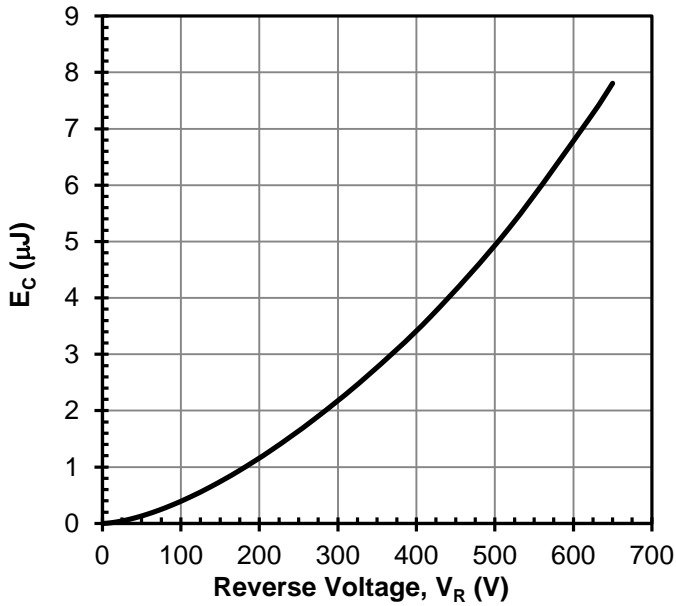


Figure 5 Typical capacitance stored energy vs. reverse voltage

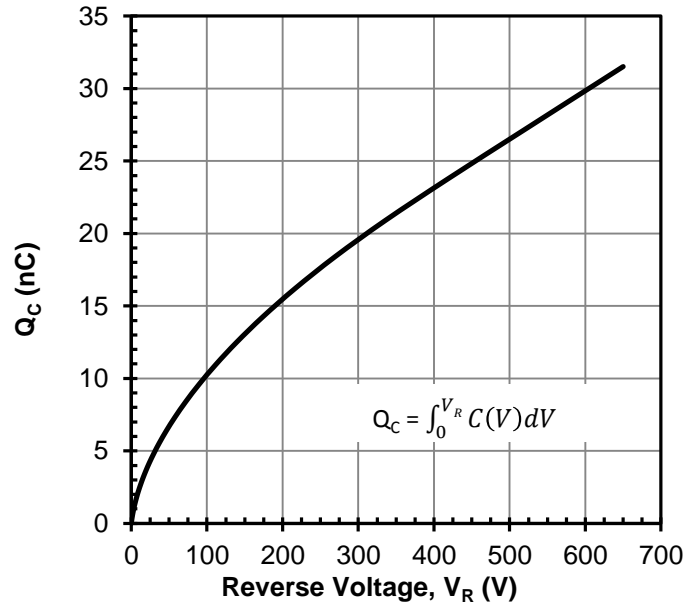


Figure 6 Typical capacitive charge vs. reverse voltage

Mechanical Characteristics

Parameter	Typical Value	Units
Die Dimensions with Scribe Line (L x W)	1.46 x 1.46	mm
Scribe Line Width	80	μm
Top Anode Pad Opening (L x W)	1.24 x 1.24	mm
Anode Metallization (AlCu)	5	μm
Cathode Metallization (Ti/Ni/Ag)	0.1/0.2/1	μm
Frontside Passivation	Polyimide	
Wafer Size	150	mm
Die Thickness	150	μm
Gross Die Per Wafer	6,784	

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