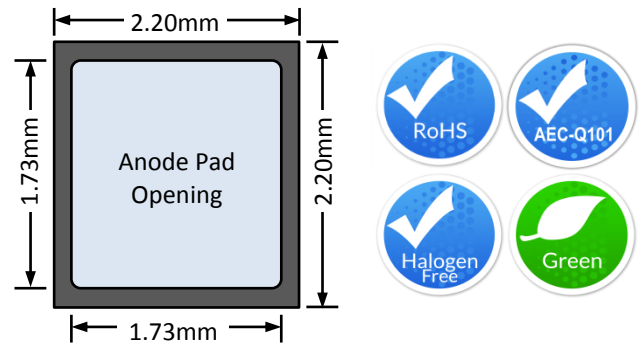


## Description

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
UJ3D1210	Undiced wafer
UJ3D1210Z	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
- ◆ 100% UIS tested
- ◆ 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	$V_R$		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 <sup>(1)</sup>	$I_F$	$T_C = 157^\circ\text{C}$	10	A
Non-repetitive forward surge current <sup>(1)</sup> sine halfwave	$I_{FSM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	120	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	110	
Repetitive forward surge current <sup>(1)</sup> sine halfwave, $D=0.1$	$I_{FRM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	54.2	A
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	32.3	
Non-repetitive peak forward current <sup>(1)</sup>	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\mu\text{s}$	720	A
		$T_C = 110^\circ\text{C}, t_p = 10\mu\text{s}$	720	
$i^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ms}$	72	$\text{A}^2\text{s}$
		$T_C = 110^\circ\text{C}, t_p = 10\text{ms}$	60	
Maximum junction temperature <sup>(2)</sup>	$T_{J,max}$		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 0.68°C/W.

(2) Package limited

**Electrical Characteristics**

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

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward voltage	$V_F$	$I_F = 10\text{A}, T_J = 25^\circ\text{C}$	-	1.4	1.6	V
		$I_F = 10\text{A}, T_J = 150^\circ\text{C}$	-	1.85	2.3	
		$I_F = 10\text{A}, T_J = 175^\circ\text{C}$	-	2	2.6	
Reverse current	$I_R$	$V_R = 1200\text{V}, T_J = 25^\circ\text{C}$	-	100	640	$\mu\text{A}$
		$V_R = 1200\text{V}, T_J = 175^\circ\text{C}$	-	1000		
Total capacitive charge <sup>(3)</sup>	$Q_C$	$V_R = 800\text{V}$		51		nC
Total capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$		510		pF
		$V_R = 400\text{V}, f = 1\text{MHz}$		48		
		$V_R = 800\text{V}, f = 1\text{MHz}$		41		
Capacitance stored energy	$E_C$	$V_R = 800\text{V}$		15		$\mu\text{J}$

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

**Typical Performance**

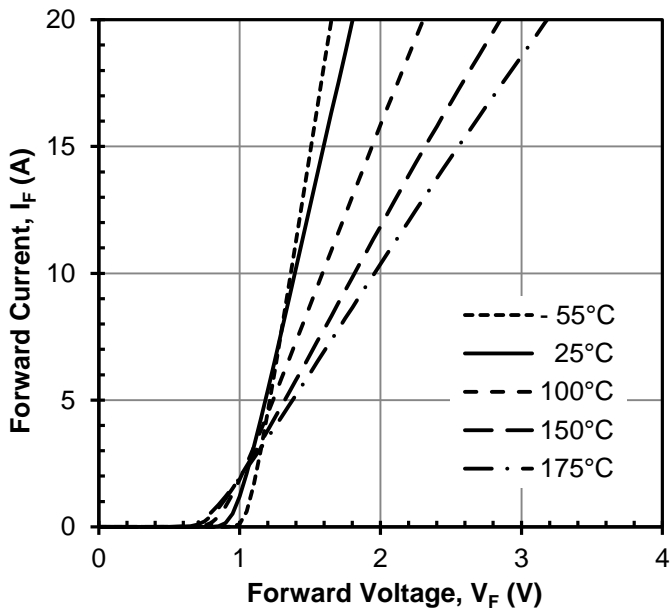


Figure 1 Typical forward characteristics

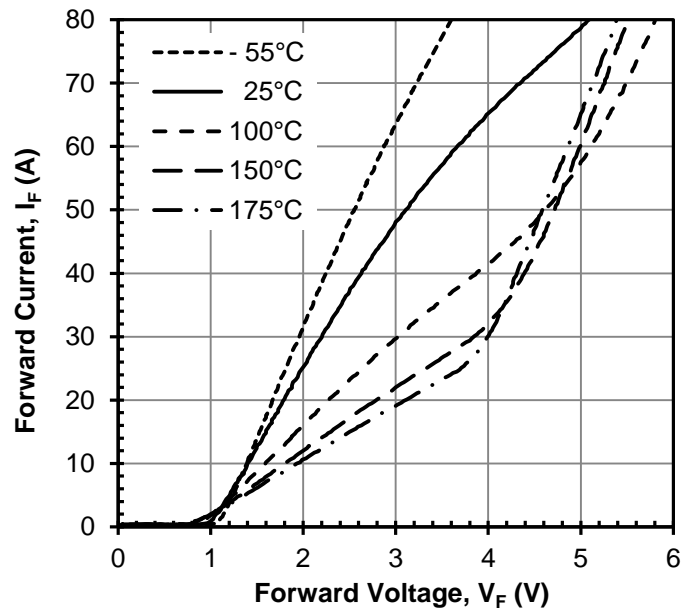


Figure 2 Typical forward characteristics in surge current

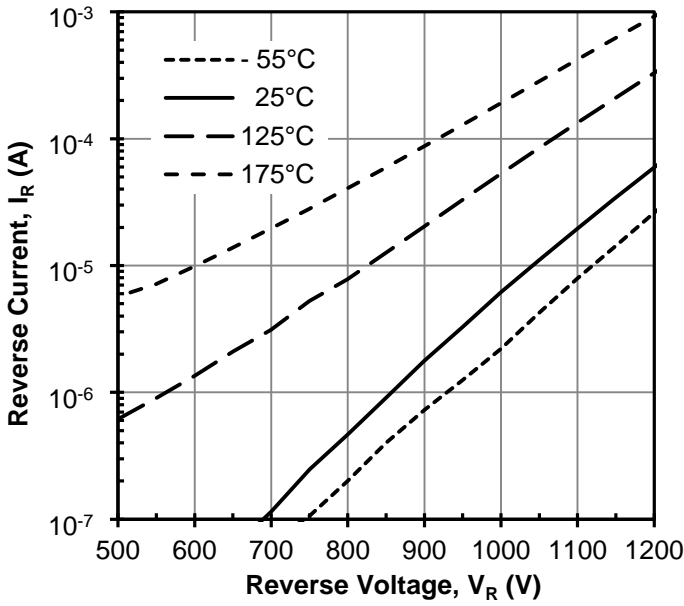


Figure 3 Typical reverse characteristics

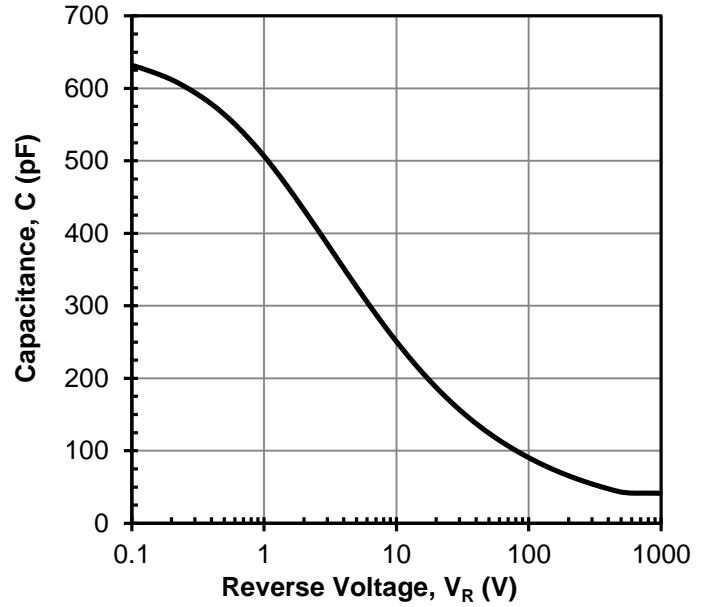


Figure 4 Capacitance vs. reverse voltage at 1MHz

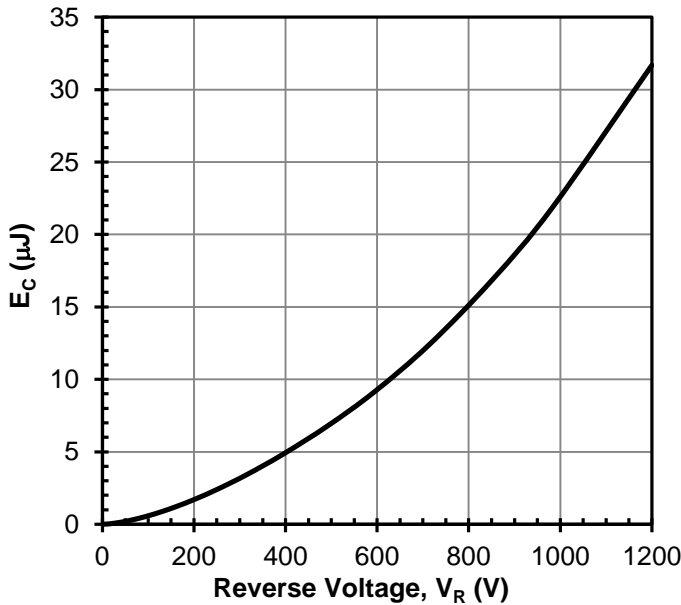


Figure 5 Typical capacitance stored energy vs. reverse voltage

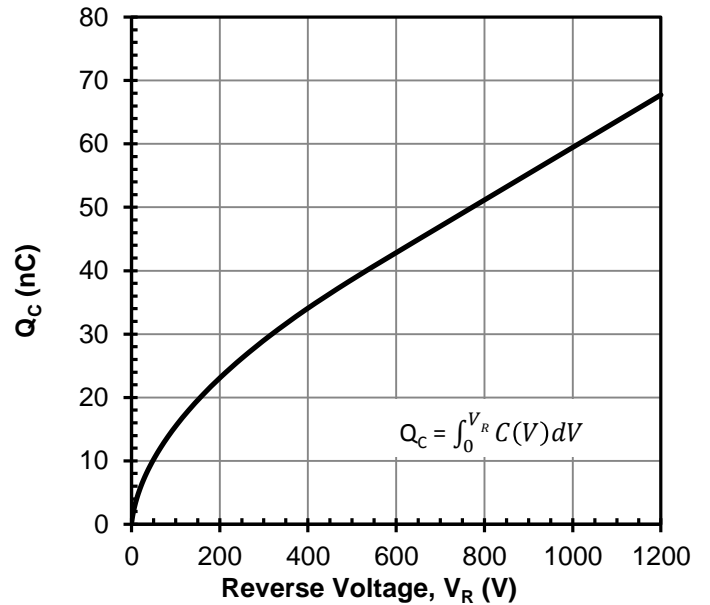


Figure 6 Typical capacitive charge vs. reverse voltage

## Mechanical Characteristics

Parameter	Typical Value	Units
Die Dimensions with Scribe Line (L x W)	2.20 x 2.20	mm
Scribe Line Width	80	μm
Top Anode Pad Opening (L x W)	1.73 x 1.73	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	2,939	

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