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PCFFS05120AF

Silicon Carbide Schottky Diode

1200 V, 5 A

Features

- Max Junction Temperature 175 °C
- Avalanche Rated 55 mJ
- High Surge Current Capacity
- Positive Temperature Coefficient
- Ease of Paralleling
- No Reverse Recovery / No Forward Recovery

Applications

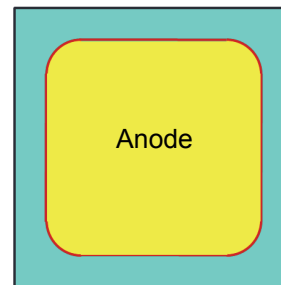
- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits

Description

Silicon Carbide (SiC) Schottky Diodes use a completely new technology that provides superior switching performance and higher reliability compared to Silicon. No reverse recovery current, temperature dependent switching characteristics, and excellent thermal performance sets Silicon Carbide as the next generation of power semiconductor. System benefits include highest efficiency, faster operation frequency, increased power density, reduced EMI, and reduced system size and cost.

Die Information

- Wafer Diameter 6 inch
- Die Size 1,690 x 1,690 μm (include Scribe Lane)
- Metallization
 - Top Ti / TiN / Al 4μm
 - Back Ti / NiV / Ag
- Die Thickness Typ. 200μm
- Bonding Pad Size
 - Anode 1,110 x 1,110 μm
 - Anode 12mil x 1



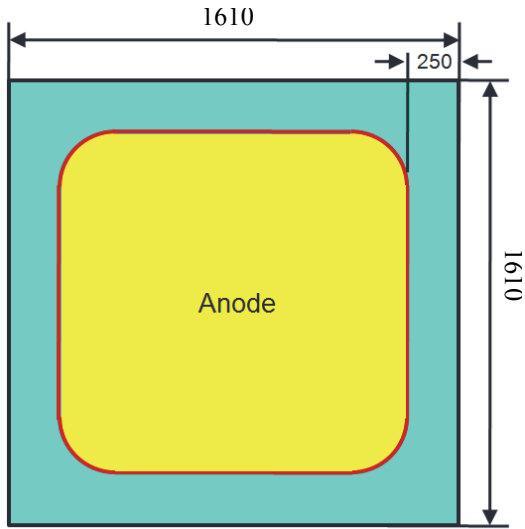
Electrical Characteristics on Wafer ^(Note 2) T_C = 25°C unless otherwise noted


Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _R	Reverse Blocking Voltage	I _R = 200 μA, T _C = 25 °C	1200	-	-	V
V _F	Forward Voltage	I _F = 5A, T _C = 25 °C	1.20	-	1.75	V
I _R	Reverse Current	V _R = 1200 V, T _C = 25 °C	-	-	200	μA

Notes:

1. Based on TO-247 package of ON Semiconductor
2. Tested 100% on wafer

Die Layout (Dimension: μm , except Scribe Lane)

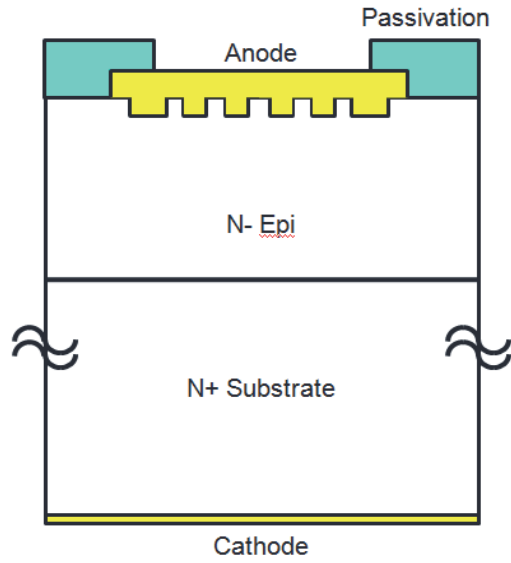


 Passivation Area

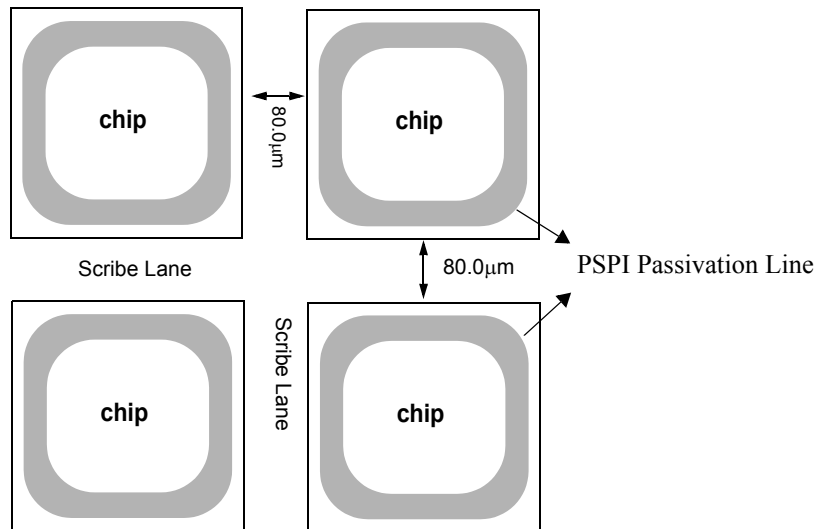
 **Passivation Information**

- Passivation Material: Polyimide (PSPI)
- Passivation Type: Local Passivation
- Passivation Thickness: 90KA

Cross Section



The Configuration of chips (Based on 6 inch wafer)



Sawn-on-film frame packing based on tested wafer

Absolute Maximum Ratings on TO-247 Package $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Ratings	Unit	
V_{RRM}	Peak Repetitive Reverse Voltage	1200	V	
E_{AS}	Single Pulse Avalanche Energy (Note 3)	55	mJ	
I_F	Continuous Rectified Forward Current @ $T_C < 148\text{ }^\circ\text{C}$	5	A	
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	$T_C = 25\text{ }^\circ\text{C}, 10\text{ }\mu\text{s}$	380	A
		$T_C = 150\text{ }^\circ\text{C}, 10\text{ }\mu\text{s}$	330	A
$I_{F, SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3\text{ ms}$	42	A
$I_{F, RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, $t_p = 8.3\text{ ms}$	21	A
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$	

Electrical Characteristics on TO-247 Package $T_C = 25\text{ }^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward Voltage	$I_F = 5\text{ A}, T_C = 25\text{ }^\circ\text{C}$	-	1.45	1.75	V
		$I_F = 5\text{ A}, T_C = 125\text{ }^\circ\text{C}$	-	1.7	2	
		$I_F = 5\text{ A}, T_C = 175\text{ }^\circ\text{C}$	-	2	2.4	
I_R	Reverse Current	$V_R = 1200\text{ V}, T_C = 25\text{ }^\circ\text{C}$	-	-	200	μA
		$V_R = 1200\text{ V}, T_C = 125\text{ }^\circ\text{C}$	-	-	300	
		$V_R = 1200\text{ V}, T_C = 175\text{ }^\circ\text{C}$	-	-	400	
Q_C	Total Capacitive Charge	$V = 800\text{ V}$	-	37	-	nC
C	Total Capacitance	$V_R = 1\text{ V}, f = 100\text{ kHz}$	-	337	-	pF
		$V_R = 400\text{ V}, f = 100\text{ kHz}$	-	33	-	
		$V_R = 800\text{ V}, f = 100\text{ kHz}$	-	26	-	

Note 3: EAS of 55 mJ is based on starting $T_J = 25\text{ }^\circ\text{C}$, $L = 0.5\text{ mH}$, $I_{AS} = 15\text{ A}$, $V = 150\text{ V}$.

Typical Characteristics $T_J = 25\text{ }^\circ\text{C}$ unless otherwise noted.

Figure 1. Forward Characteristics

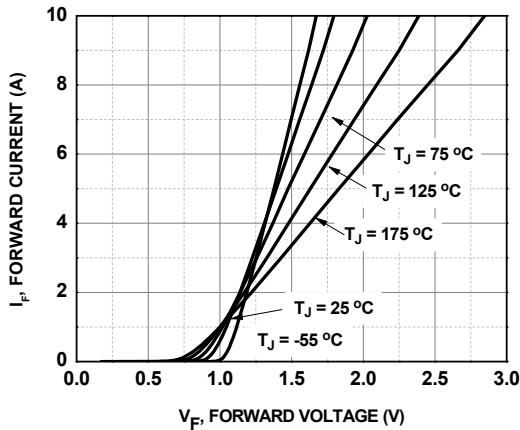


Figure 2. Reverse Characteristics

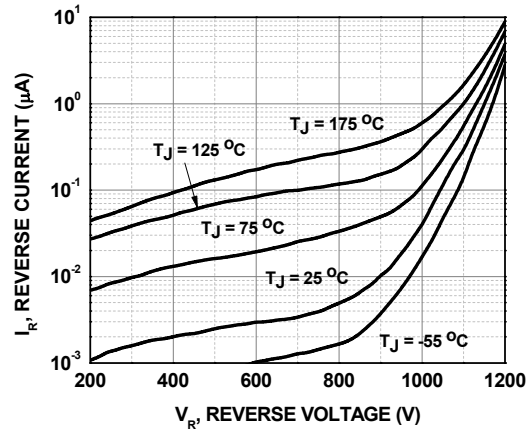


Figure 3. Reverse Characteristics

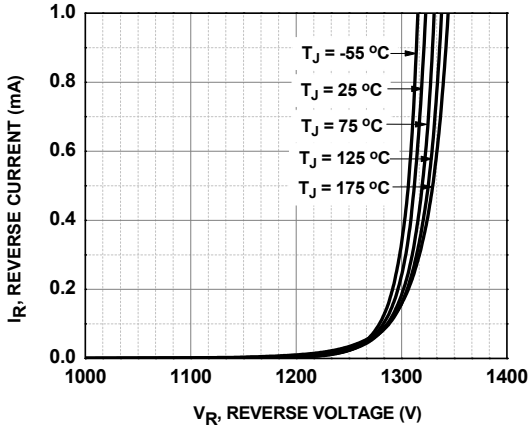


Figure 4. Current Derating

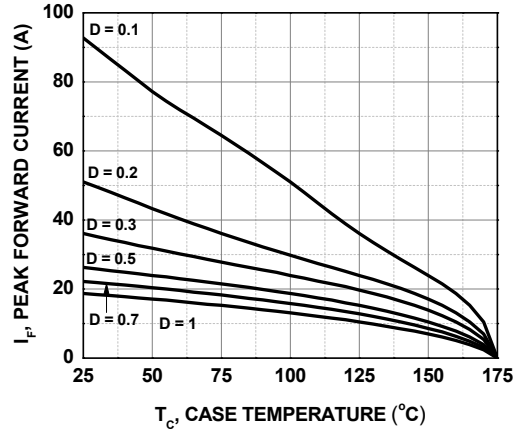


Figure 5. Power Derating

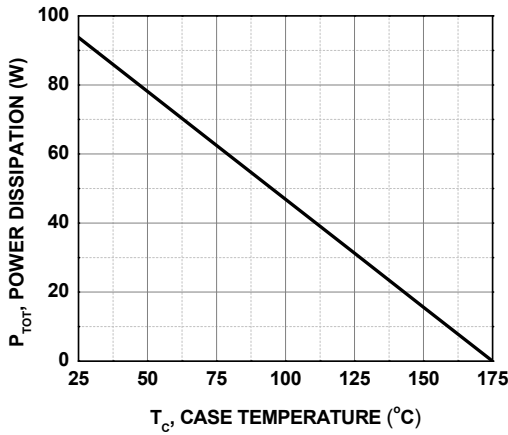


Figure 6. Capacitive Charge vs. Reverse Voltage

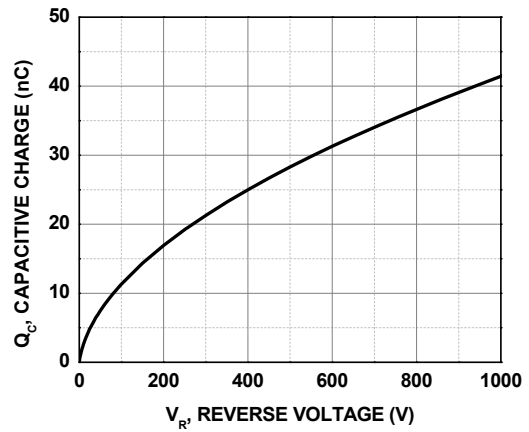


Figure 7. Capacitance vs. Reverse Voltage

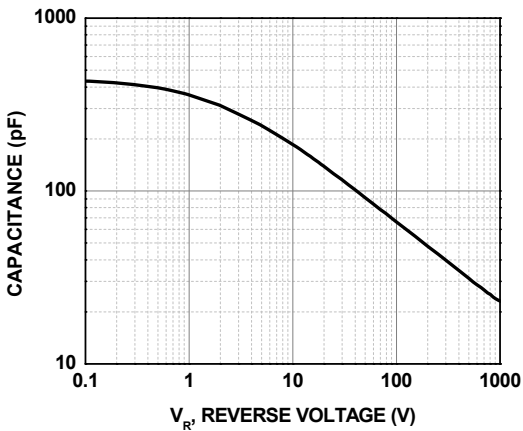
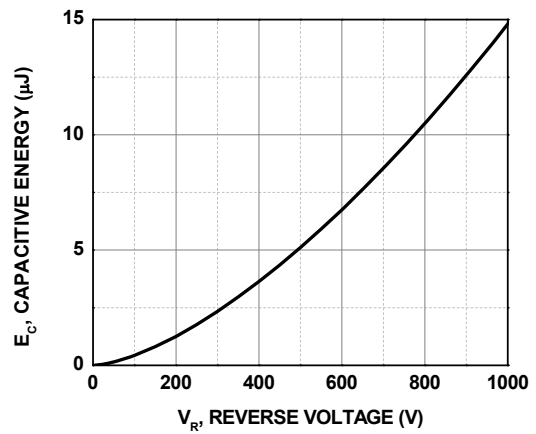
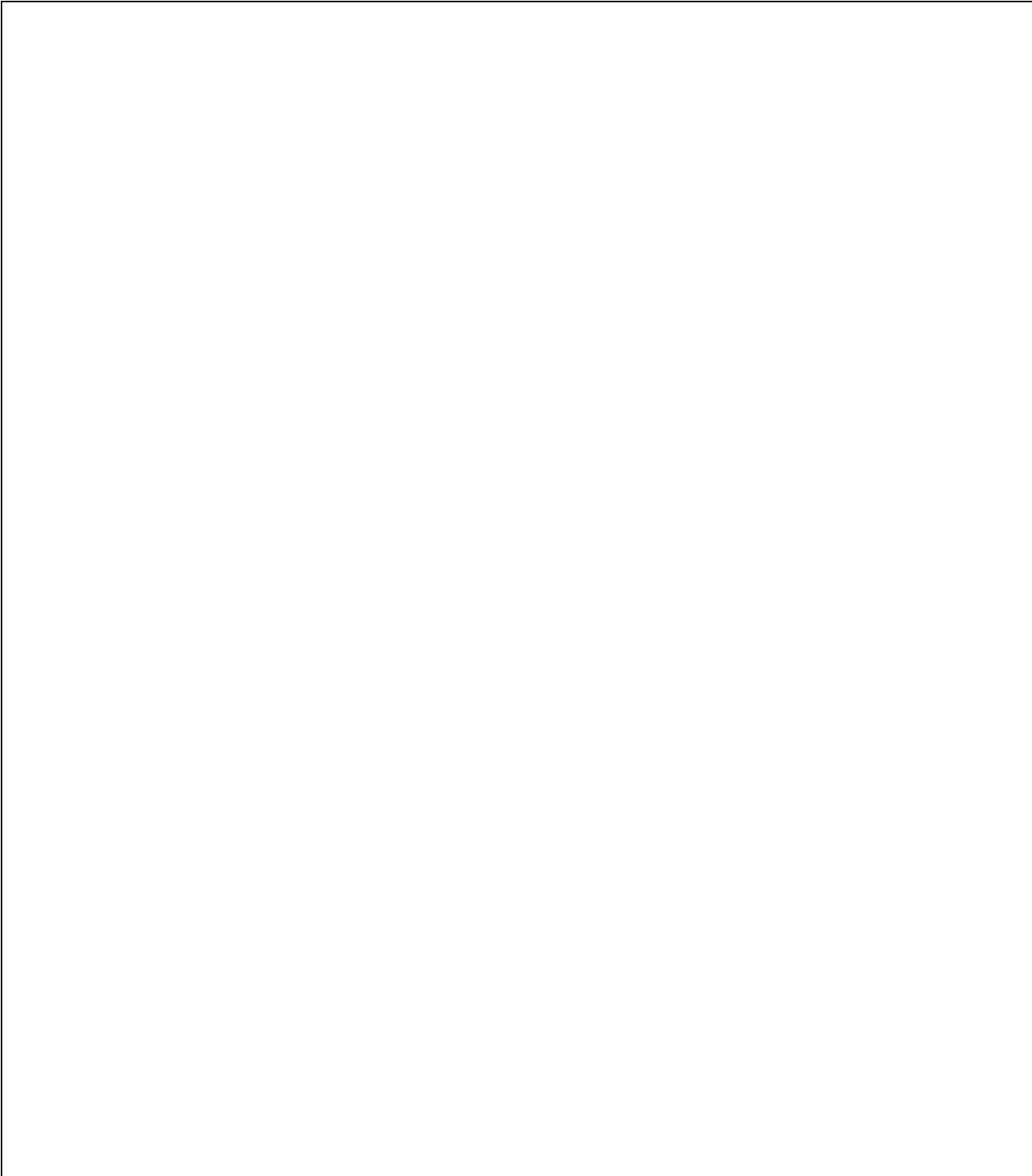


Figure 8. Capacitance Stored Energy





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