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Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

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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

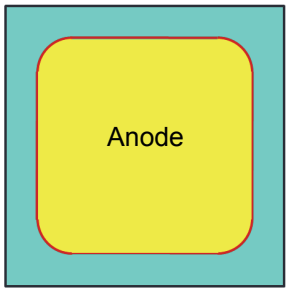
- General Purpose
- SMPS, Solar Inverter, UPS
- Power Switching Circuits

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 × 1,110 μm
- Recommended Wire Bond (Note 1)
  - Anode 12mil × 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

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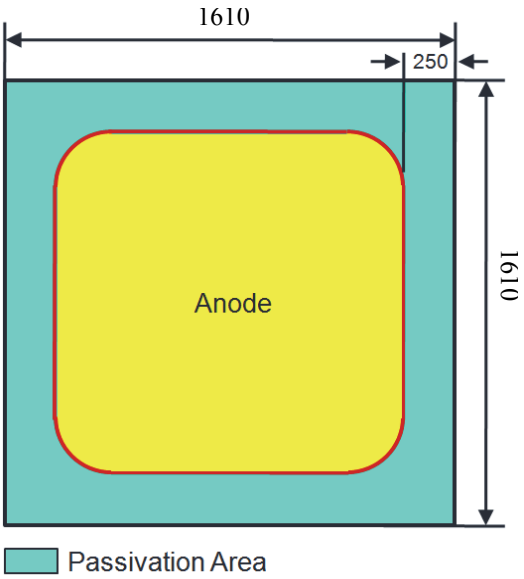
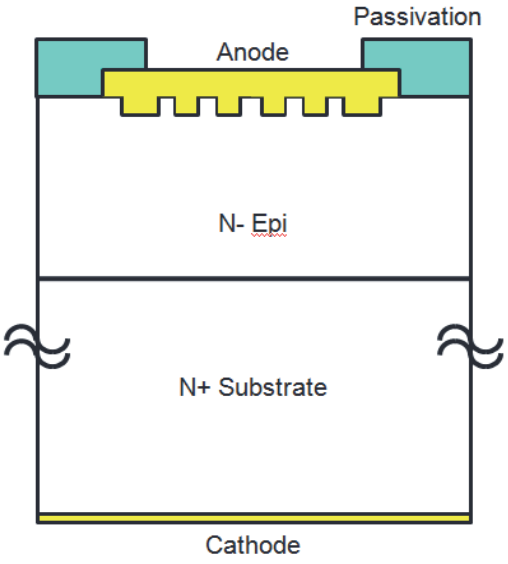
Die Layout (Dimension: μm, except Scribe Lane)



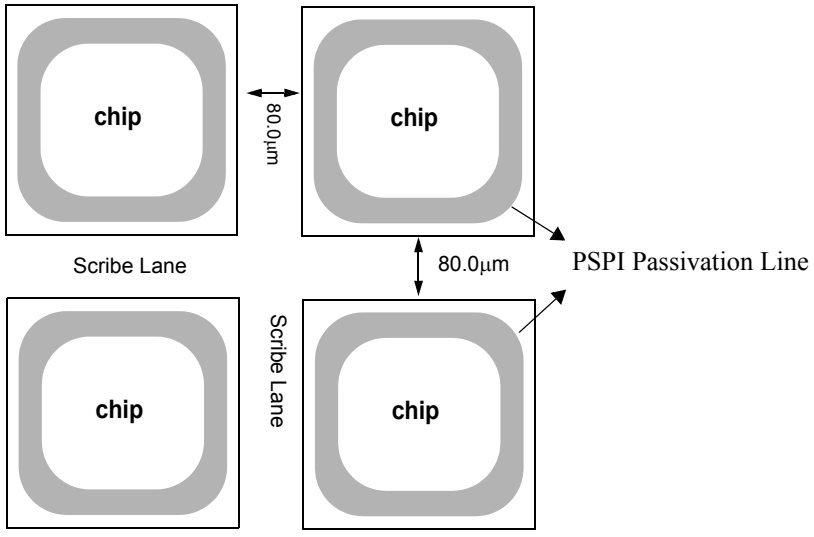
Cross Section



Passivation Information

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

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 °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 °C		5	A
$I_{F, Max}$	Non-Repetitive Peak Forward Surge Current	T_C = 25 °C, 10 μs	380	A
		T_C = 150 °C, 10 μs	330	A
$I_{F,SM}$	Non-Repetitive Forward Surge Current	Half-Sine Pulse, t_p = 8.3 ms	42	A
$I_{F,RM}$	Repetitive Forward Surge Current	Half-Sine Pulse, t_p = 8.3 ms	21	A
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +175	°C

Electrical Characteristics on TO-247 Package T_C = 25 °C unless otherwise noted.

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

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

Typical Characteristics T_J = 25 °C unless otherwise noted.

Figure 1. Forward Characteristics

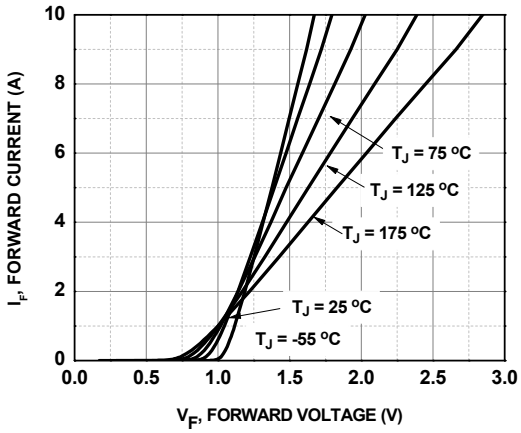


Figure 2. Reverse Characteristics

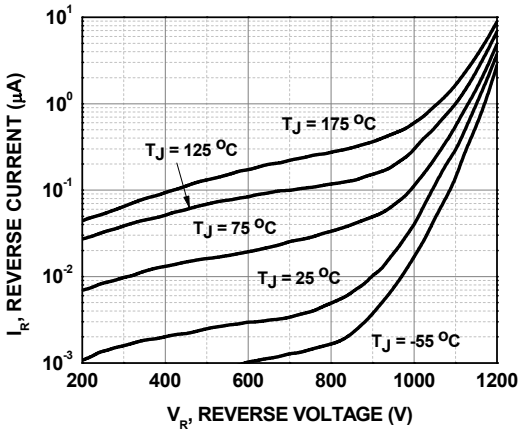


Figure 3. Reverse Characteristics

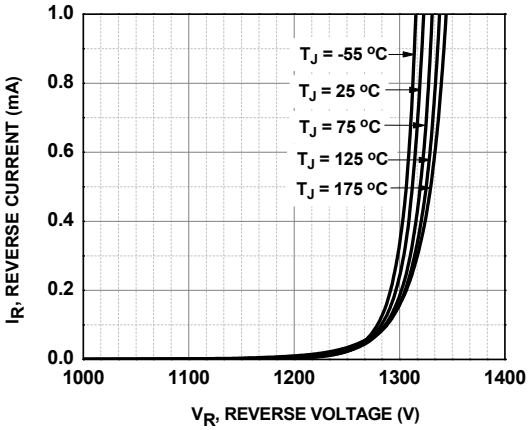


Figure 4. Current Derating

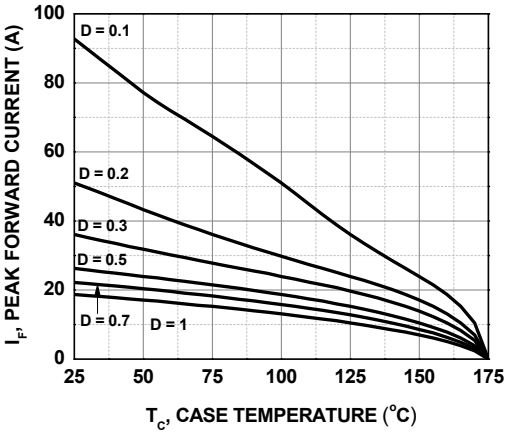


Figure 5. Power Derating

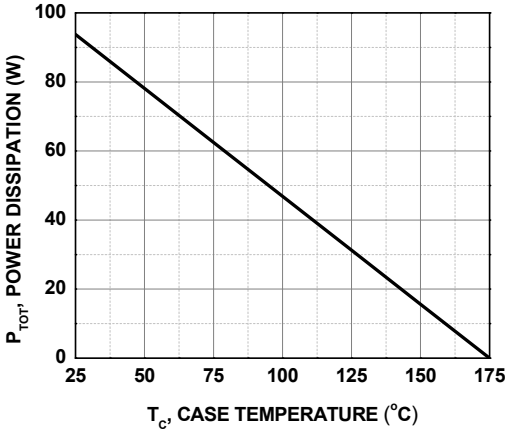


Figure 6. Capacitive Charge vs. Reverse Voltage

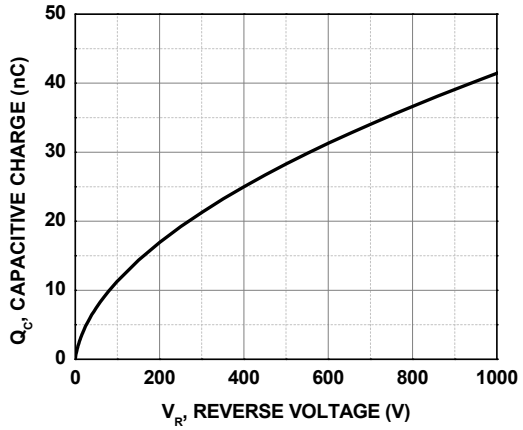


Figure 7. Capacitance vs. Reverse Voltage

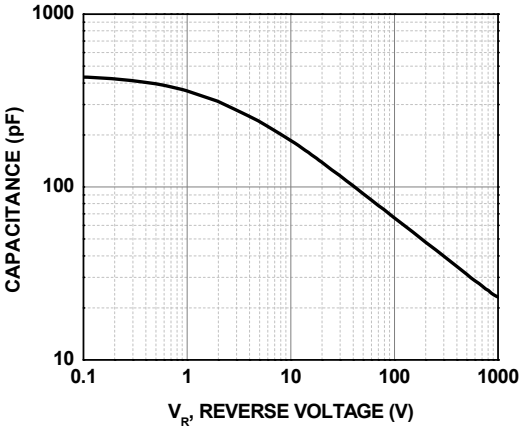
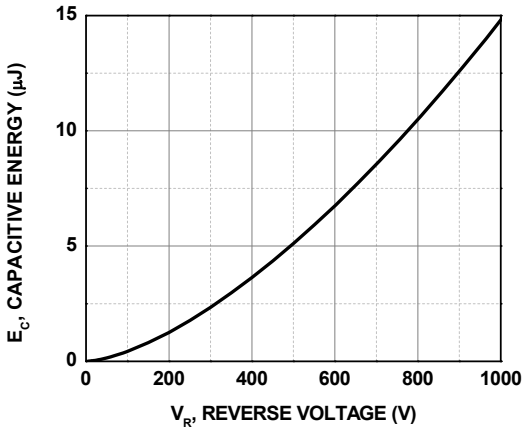


Figure 8. Capacitance Stored Energy



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