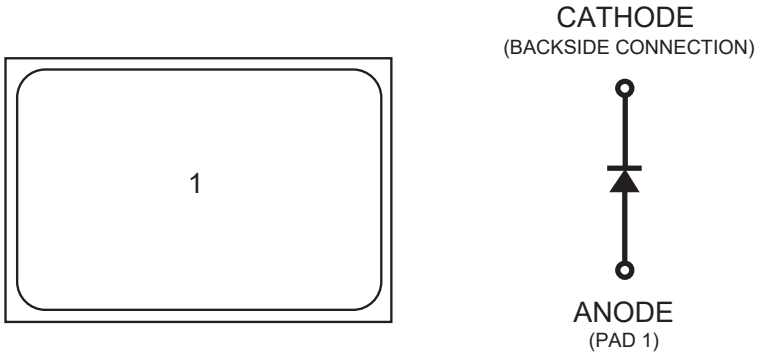
3300V, 90A mSiC™ Diode Bare Die

MSC090SDA330D/S

Product Overview

3300V, 90A, Silicon Carbide (SiC) Schottky Diode bare die.



Features

- No reverse recovery
- Low forward voltage
- Low leakage current
- RoHS compliant

Benefits

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density

Applications

- Power Factor Correction (PFC)
- Anti-parallel diode
  - Switch-mode power supply
  - Inverters/converters
  - Motor controllers
- Freewheeling diode
  - Switch-mode power supply
  - Inverters/converters
- Snubber/clamp diode

1. Device Specifications

This section shows the specifications of this device.

1.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings of this device.

Table 1-1. Absolute Maximum Ratings

Symbol	Parameter		Ratings	Unit
V_R	Maximum DC reverse voltage		3300	V
V_{RRM}	Maximum peak repetitive reverse voltage			
V_{RWM}	Maximum working peak reverse voltage			
I_F	Maximum DC forward current[1]	T_C = 25 °C	187	A
		T_C = 135 °C	92	
		T_C = 145 °C	78	
I_{FRM}	Repetitive peak forward surge current (tp = 8.3 ms, half sine wave)[1]		258	
I_{FSM}	Non-repetitive forward surge current (tp = 8.3 ms, half sine wave)[1]		615	
P_{TOT}	Total power dissipation[1]	T_C = 25 °C	1500	W
		T_C = 135 °C	400	
		T_C = 145 °C	300	

Note:

1. I_F values for < 0.10 °C/W die to heatsink thermal resistance based on TO-247 package. Current capability may be bond wire limited.

1.2 Thermal and Mechanical Characteristics

The following table shows the thermal and mechanical characteristics of this device.

Table 1-2. Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min.	Typ.	Max.	Unit
T_J, T_{STG}	Operating junction and storage temperature range	–55	—	175	°C
T_{proc}	Assembly soldering temperature (10 minutes maximum)	—	—	375	

Recommended storage: The die should be stored (as shipped) in dry nitrogen with an ambient temperature of 25 °C.

ESD practices should comply with JESD-625.

1.3 Electrical Performance

The following table shows the static characteristics of this device. T_J = 25 °C unless otherwise specified.

Table 1-3. Static Characteristics

Symbol	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
V_F	Forward voltage[1]	I_F = 90A, T_J = 25 °C	—	2.1	2.5	V
		I_F = 90A, T_J = 175 °C	—	4.3	—	
I_{RM}	Reverse leakage current[1]	V_R = 3300V, T_J = 25 °C	—	15	90	µA
		V_R = 3300V, T_J = 175 °C	—	150	—	
Q_C	Total capacitive charge[1]	V_R = 1650V	—	927	—	nC
C_J	Junction capacitance[1]	V_R = 1V, f = 1 MHz	—	6326	—	pF
		V_R = 1100V, f = 1 MHz	—	361	—	
		V_R = 2200V, f = 1 MHz	—	256	—	

2. Typical Performance Curves

This section shows the typical performance curves of this device.

Figure 2-1. Forward Current vs. Forward Voltage

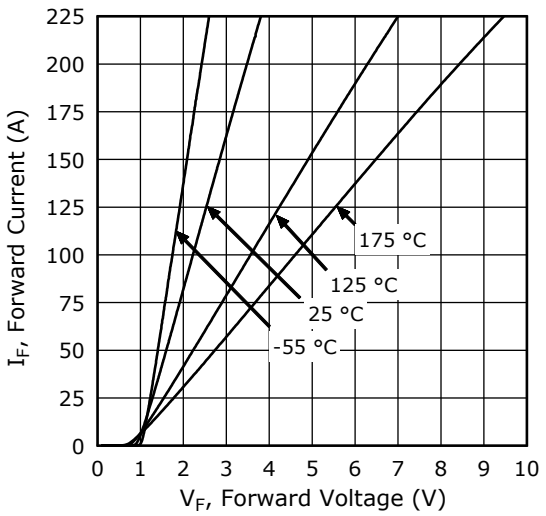


Figure 2-2. Reverse Current vs. Reverse Voltage

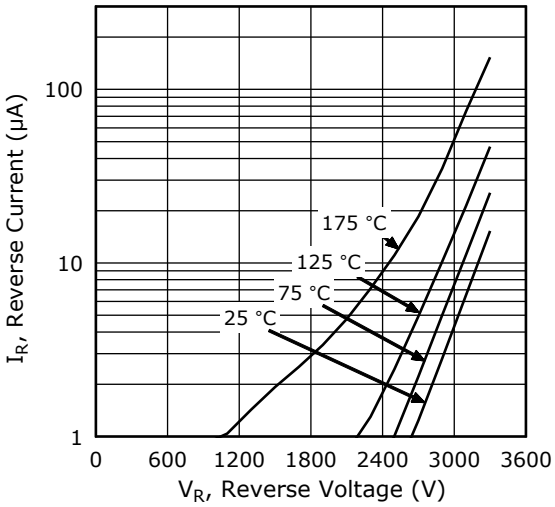


Figure 2-3. Total Charge vs. Reverse Voltage

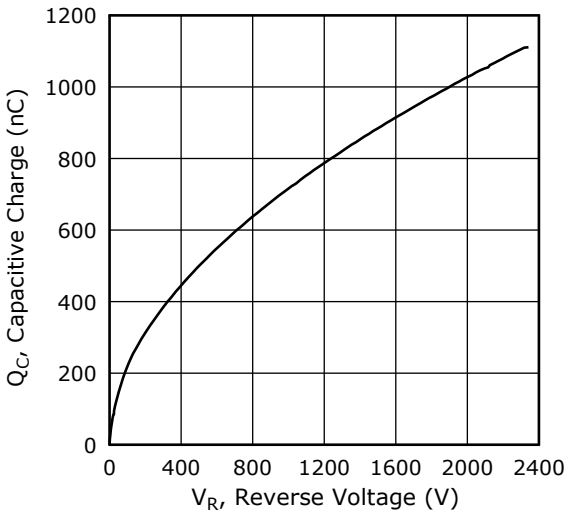
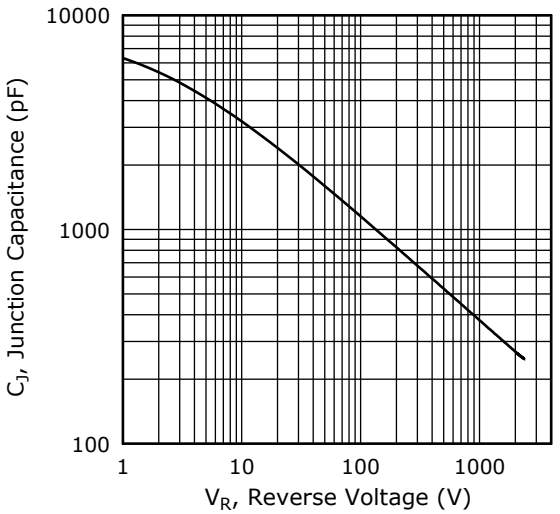


Figure 2-4. Capacitance vs. Reverse Voltage



3. Die Specification

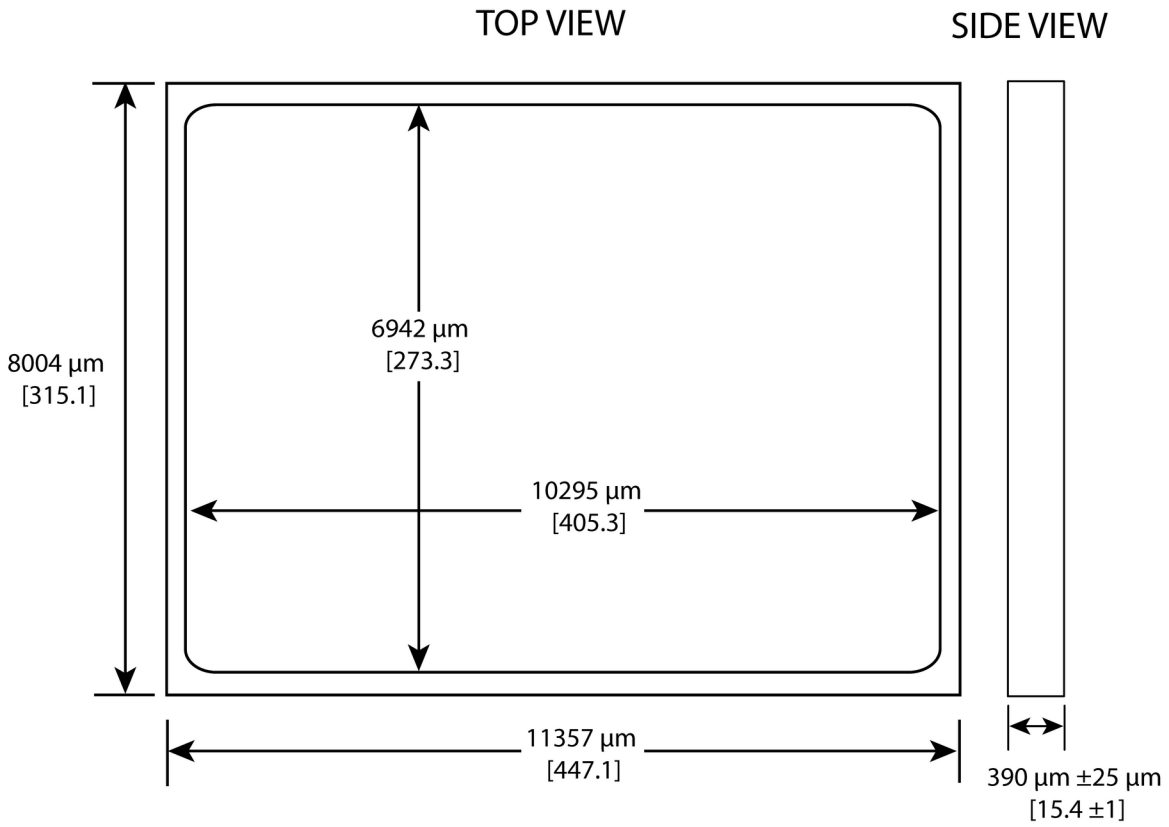
This section shows the die specification of this device.

3.1 Die Layout

The dimensions in this drawing are the nominal dimensions including the scribe street. The final die dimensions are determined by the scribe frame at each fabrication location and the dicing process at each assembly location.

The dimensions in the figure below are in µm and [mils].

Figure 3-1. Die Outline Drawing



Die Layout

Description	Thickness	Component
Top metal - Anode	5.0 µm	Al/Cu
Backside metal - Cathode	1.0 µm	Ag

4. Revision History

Table 4-1. Revision History

Revision	Date	Description
B	07/2024	The following changes are made in this revision of the document: • Updated Product Overview. • Updated Table 1-1 and Table 1-3. • Updated 2. Typical Performance Curves.
A	03/2022	Document created.

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