MSC015SDA120B

Datasheet

Zero Recovery Silicon Carbide Schottky Diode

Final

May 2018

Microsemi

Power Matters.™

Contents

1 Revision History

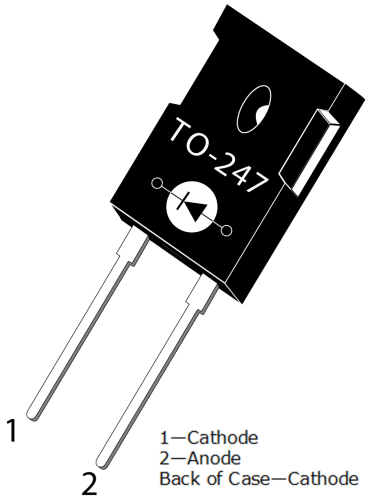
The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1 Revision A

Revision A was published in May 2018. It is the first publication of this document.

2 Product Overview

This section shows the product overview for the MSC015SDA120B device.



2.1 Features

The following are key features of the MSC015SDA120B device:

- Ultra-fast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche energy rated
- RoHS compliant

2.2 Benefits

The following are benefits of the MSC015SDA120B device:

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

2.3 Applications

The MSC015SDA120B device is designed for the following 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

3 Electrical Specifications

This section shows the electrical specifications for the MSC015SDA120B device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the MSC015SDA120B device. All ratings at T_C = 25 °C unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_R	Maximum DC reverse voltage	1200	V
V_{RRM}	Maximum peak repetitive reverse voltage	1200	
V_{RWM}	Maximum working peak reverse voltage	1200	
I_F	Maximum DC forward current (T_C = 25 °C)	39	A
	Maximum DC forward current (T_C = 135 °C)	17	
	Maximum DC forward current (T_C = 145 °C)	14	
I_{FRM}	Repetitive peak forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)	55	
I_{FSM}	Non-repetitive forward surge current (T_C = 25 °C, t_p = 8.3 ms, half sine wave)	109	
P_{tot}	Power dissipation (T_C = 25 °C)	167	W
	Power dissipation (T_C = 110 °C)	72	
T_J , T_{STG}	Operating junction and storage temperature range	–55 to 175	°C
T_L	Lead temperature for 10 seconds	300	
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, L = 0.89 mH, peak I_L = 15 A)	100	mJ

The following table shows the thermal and mechanical characteristics of the MSC015SDA120B.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance		0.62	0.90	°C/W
W_T	Package weight		0.22		oz
			5.9		g
	Mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

3.2 Electrical Performance

The following table shows the static characteristics of the MSC015SDA120B.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Type	Max	Unit
V_F	Forward voltage	I_F = 15 A, T_J = 25 °C	1.5	1.8	V
		I_F = 15 A, T_J = 175 °C	2.0		
I_{RM}	Maximum reverse leakage count	V_R = 1200 V, T_J = 25 °C	10	200	µA
		V_R = 1200 V, T_J = 175 °C	50		
Q_C	Total capacitive charge	V_R = 600 V, T_J = 25 °C	73		nC
C_J	Junction capacitance	V_R = 1 V, T_J = 25 °C, f = 1 MHz	906		pF
	Junction capacitance	V_R = 400 V, T_J = 25 °C, f = 1 MHz	80		
	Junction capacitance	V_R = 800 V, T_J = 25 °C, f = 1 MHz	59		

3.3 Performance Curves

This section shows the typical performance curves for the MSC015SDA120B device.

Figure 1 • Maximum Transient Thermal Impedance

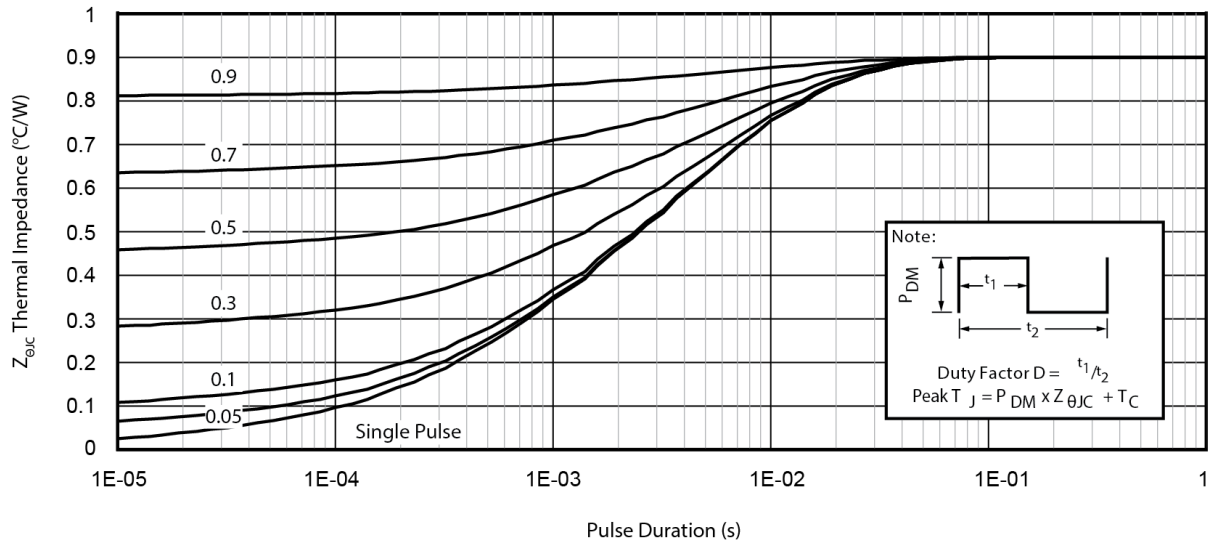


Figure 2 • Forward Current vs Forward Voltage

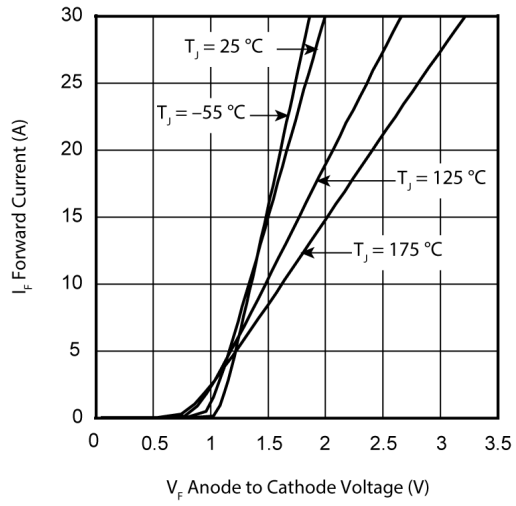


Figure 3 • Max Forward Current vs Case Temperature

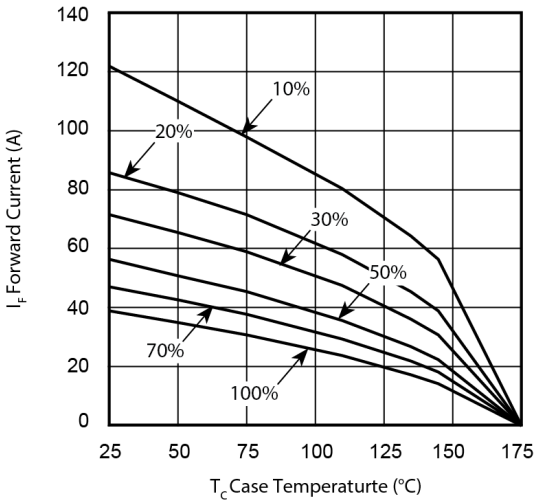


Figure 4 • Max Power Dissipation vs Case Temperature

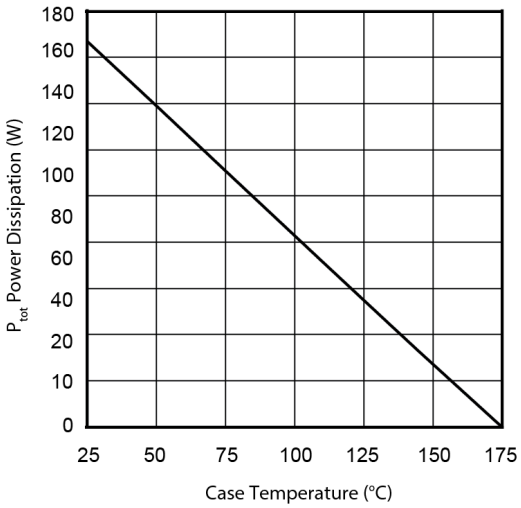


Figure 5 • Reverse Current vs Reverse Voltage

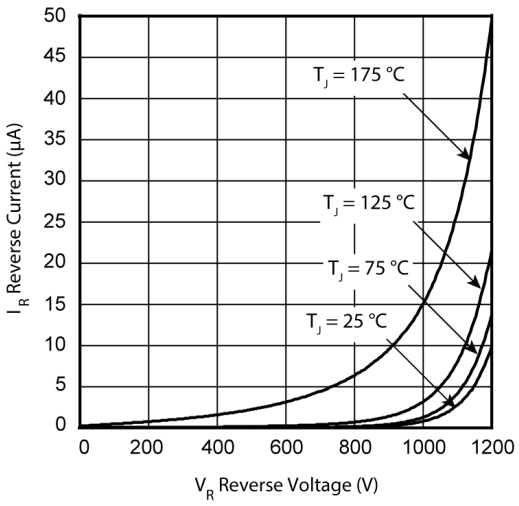


Figure 6 • Total Capacitive Charge vs. Reverse Voltage

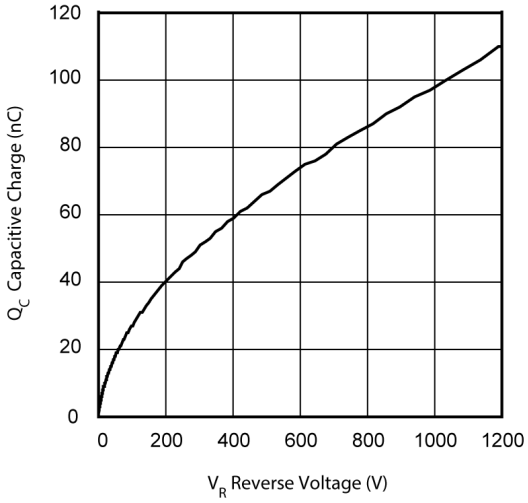
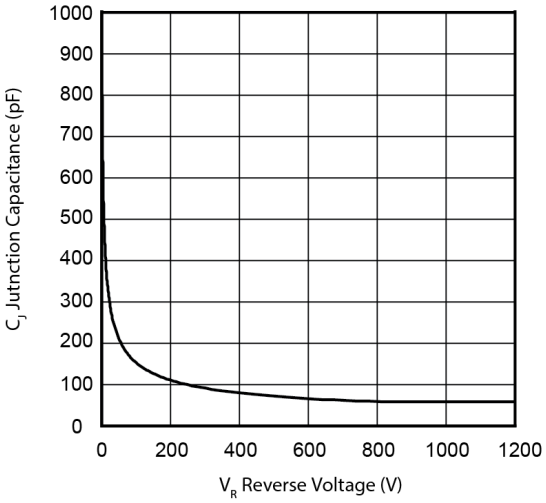


Figure 7 • Junction Capacitance vs Reverse Voltage



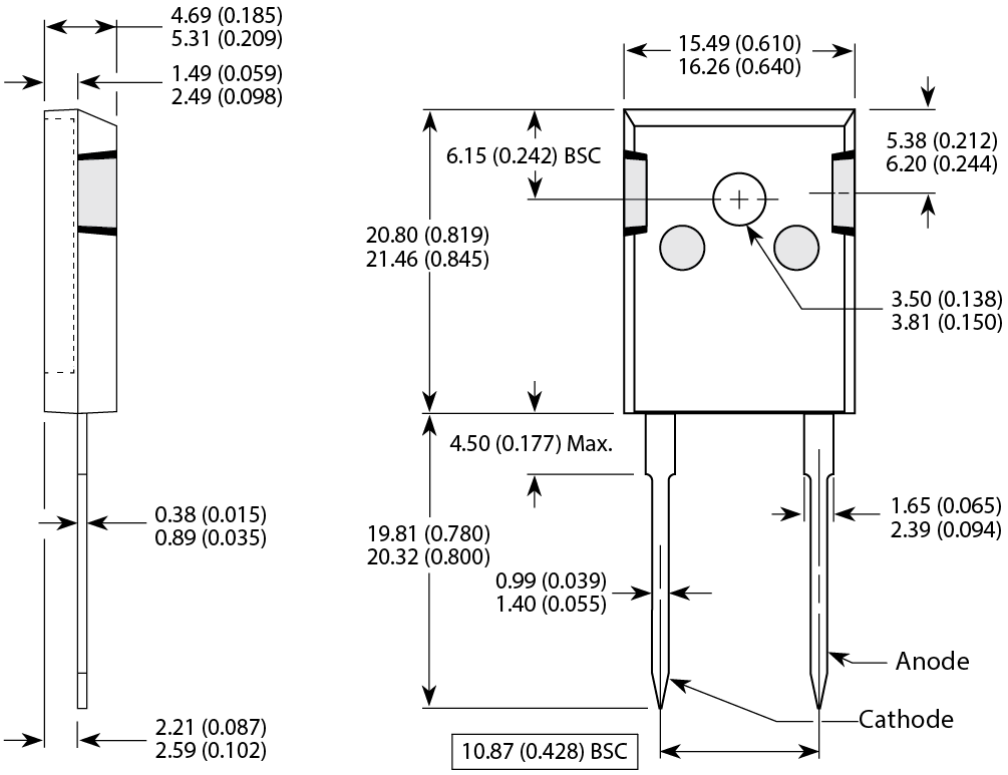
4 Package Specification

This section shows the package specification for the MSC015SDA120B device.

4.1 Package Outline Drawing

This section shows the TO-247 package outline drawing of the MSC015SDA120B device. The dimensions in the figure below are in millimeters and (inches).

Figure 8 • Package Outline Drawing



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