

1200 V, 30 A mSiC™ Schottky Diode

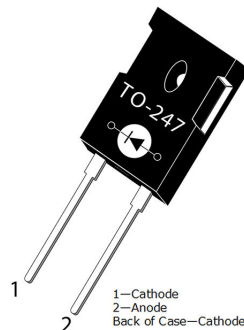
MSC030SDA120B, AEC-Q101



Product Overview

1200 V, 30 A Silicon Carbide (SiC) Schottky Diode, TO-247

The industrial-grade product is MSC030SDA120B. The automotive-grade product is MSC030SDA120BVAO.



Features

- No reverse recovery
- Low forward voltage
- Low leakage current
- Avalanche-energy rated
- 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	1200	V	
V_{RRM}	Maximum peak repetitive reverse voltage			
V_{RWM}	Maximum working peak reverse voltage			
I_F	Maximum DC forward current	$T_C = 25\text{ }^\circ\text{C}$	65	A
		$T_C = 135\text{ }^\circ\text{C}$	29	
		$T_C = 145\text{ }^\circ\text{C}$	24	
I_{FRM}	Repetitive peak forward surge current ($T_C = 25\text{ }^\circ\text{C}$, $t_p = 8.3\text{ ms}$, half sine wave)	92		
I_{FSM}	Non-repetitive forward surge current ($T_C = 25\text{ }^\circ\text{C}$, $t_p = 8.3\text{ ms}$, half sine wave)	165		
P_{TOT}	Total power dissipation	$T_C = 25\text{ }^\circ\text{C}$	259	W
		$T_C = 110\text{ }^\circ\text{C}$	112	
E_{AS}	Single-pulse avalanche energy (starting $T_J = 25\text{ }^\circ\text{C}$, $L = 0.22\text{ mH}$, peak $I_L = 30\text{ A}$)	100	mJ	

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
$R_{\theta JC}$	Junction-to-case thermal resistance		0.4	0.58	$^\circ\text{C/W}$
T_J, T_{STG}	Operating junction and storage temperature range	-55		175	$^\circ\text{C}$
T_L	Lead temperature for 10 seconds			300	$^\circ\text{C}$
W_t	Package weight		0.22		oz
			6.2		g
	Mounting torque, 6-32 or M3 screw			10	lbf-in.
				1.1	N-m

1.2 Electrical Performance

The following table shows the static characteristics of this device. $T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Table 1-3. Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	$I_F = 30\text{ A}$, $T_J = 25\text{ }^\circ\text{C}$		1.5	1.8	V
		$I_F = 30\text{ A}$, $T_J = 175\text{ }^\circ\text{C}$		2.1		
I_{RM}	Reverse leakage current	$V_R = 1200\text{ V}$, $T_J = 25\text{ }^\circ\text{C}$		9	200	μA
		$V_R = 1200\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$		150		
Q_C	Total capacitive charge	$V_R = 600\text{ V}$		130		nC
C_J	Junction capacitance	$V_R = 400\text{ V}$, $f = 1\text{ MHz}$		141		pF
		$V_R = 800\text{ V}$, $f = 1\text{ MHz}$		105		

1.3 Typical Performance Curves

This section shows the typical performance curves of this device.

Figure 1-1. Forward Current vs. Forward Voltage

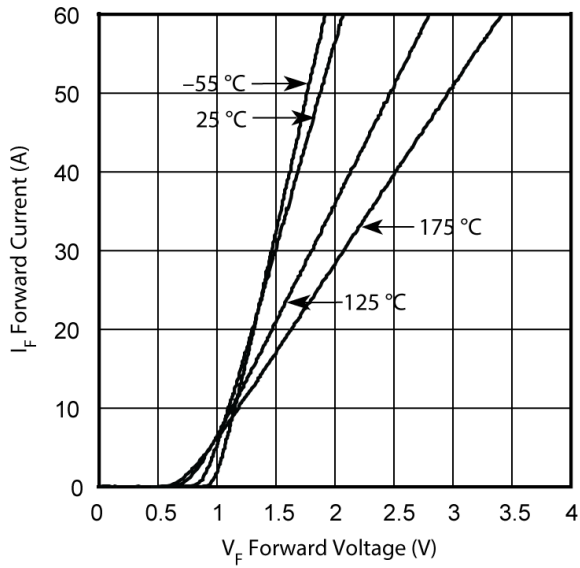


Figure 1-2. Reverse Current vs. Reverse Voltage

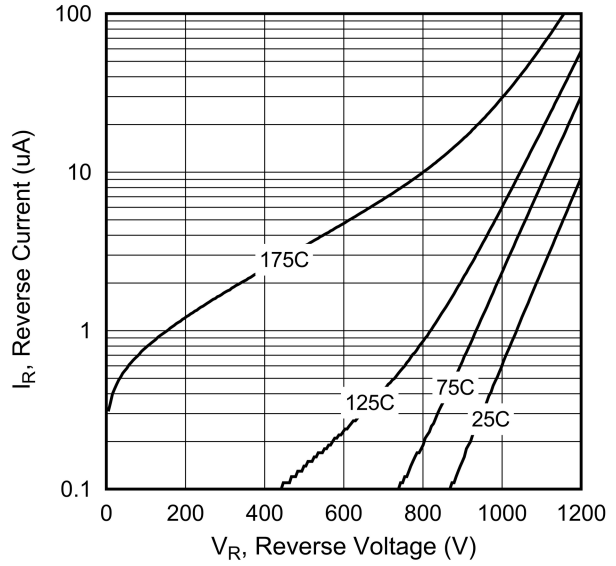


Figure 1-3. Total Charge vs. Reverse Voltage

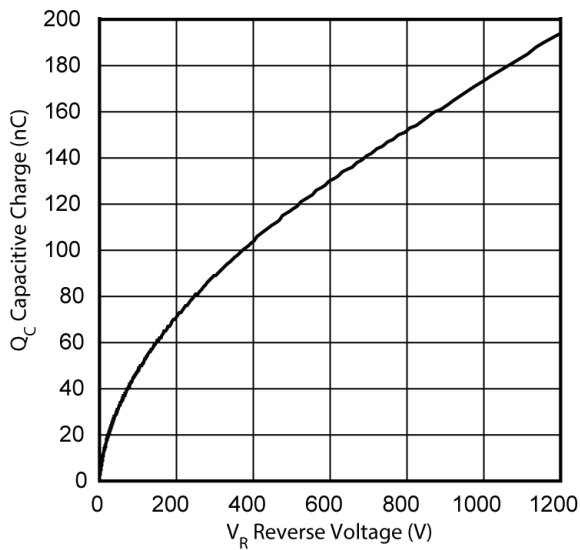


Figure 1-4. Capacitance vs. Reverse Voltage

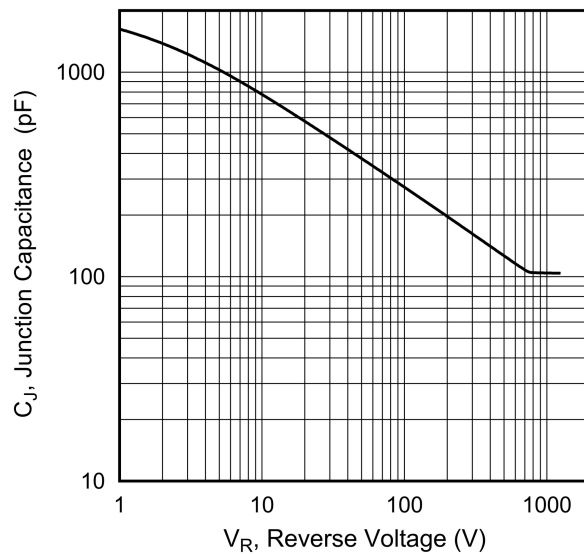


Figure 1-5. Max. Power Dissipation vs. Case Temp.

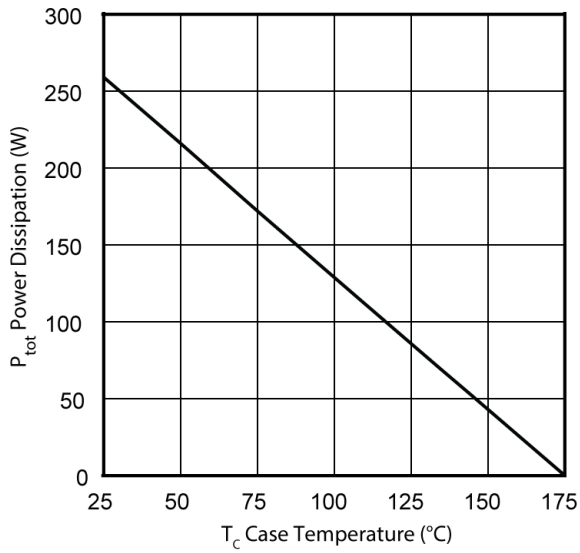


Figure 1-6. Max. Forward Current vs. Case Temp.

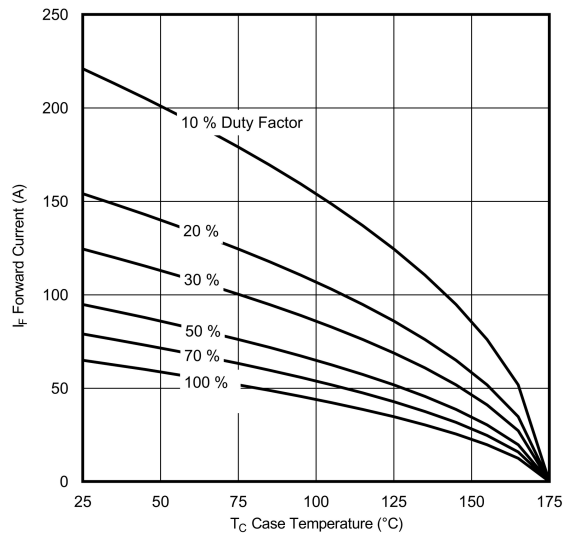
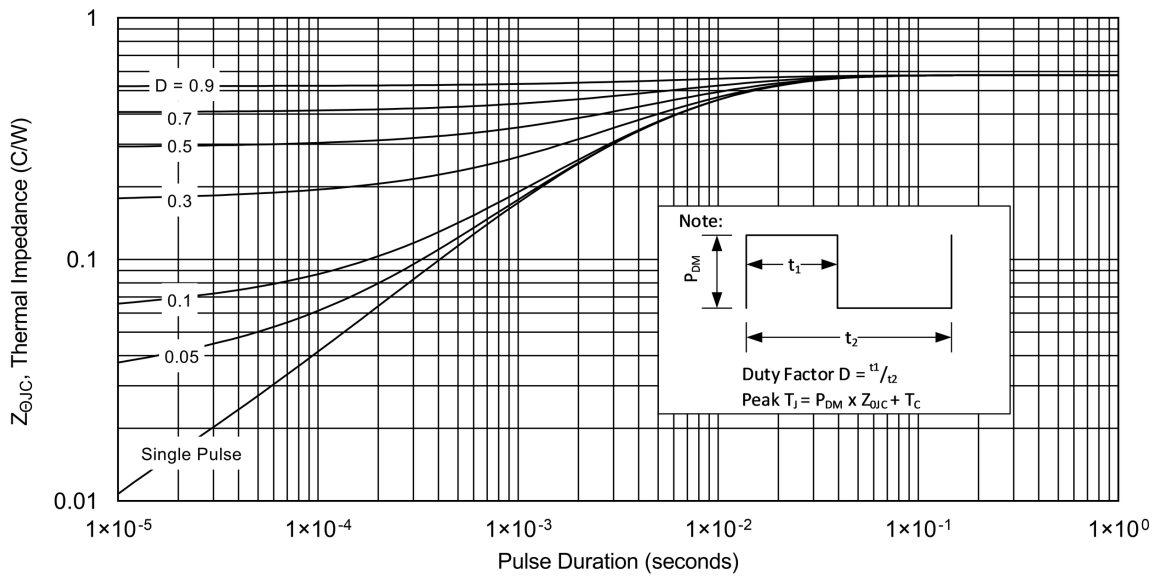


Figure 1-7. Maximum Transient Thermal Impedance



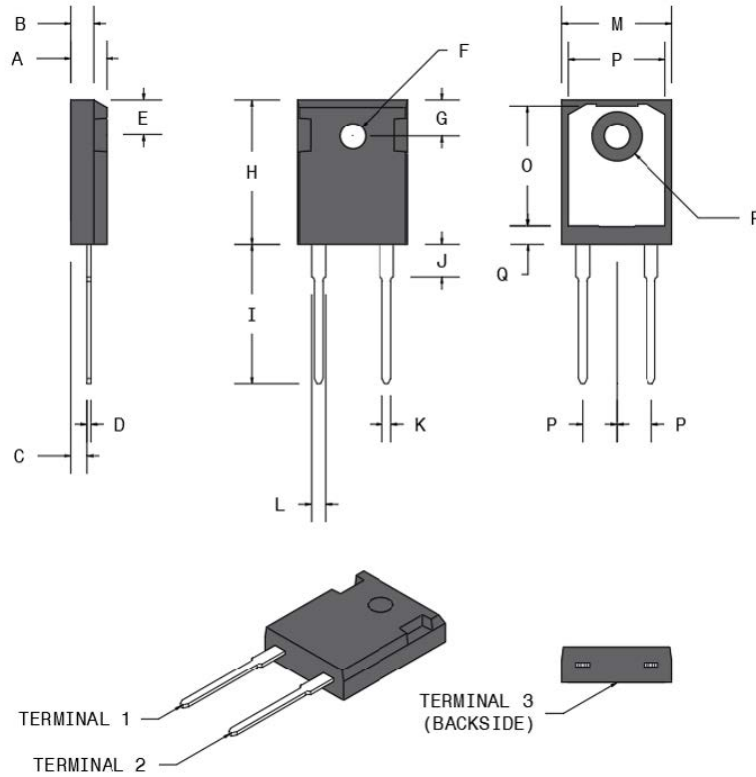
2. Package Specification

This section shows the package specification of this device.

2.1 Package Outline Drawing

The following figure illustrates the TO-247 drawing of this device.

Figure 2-1. Package Outline Drawing



The following table lists the TO-247 dimensions and should be used in conjunction with the package outline drawing.

Table 2-1. TO-247 Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
A	4.69	5.31	0.185	0.209
B	1.49	2.49	0.059	0.098
C	2.21	2.59	0.087	0.102
D	0.40	0.79	0.016	0.031
E	5.38	6.20	0.212	0.244
F	3.50	3.81	0.138	0.150
G	6.15 BSC		0.242 BSC	
H	20.80	21.46	0.819	0.845
I	19.81	20.32	0.780	0.800
J	4.00	4.50	0.157	0.177
K	1.01	1.40	0.040	0.055
L	1.65	2.13	0.065	0.084

.....continued

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
M	15.49	16.26	0.610	0.640
N	13.50	14.50	0.531	0.571
O	16.50	17.50	0.650	0.689
P	5.45 BSC		0.215 BSC	
Q	2.00	2.75	0.079	0.108
R	7.10	7.50	0.280	0.295
Terminal 1	Cathode			
Terminal 2	Anode			
Terminal 3	Cathode			

3. 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.

Table 3-1. Revision History

Revision	Date	Description
A	06/2023	Document migrated from Microsemi template to Microchip template; Assigned Microchip literature number DS-00005049A, which replaces the previous Microsemi literature number 053-4082.
Initial release (Microsemi Revision A)	01/2018	Initial release.

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