

1200 V, 30 A mSiC™ Schottky Diode

MSC030SDA120K, AEC-Q101



Product Overview

1200 V, 30 A Silicon Carbide (SiC) Schottky Diode, 2-lead TO-220



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 °C	70	A
		T _C = 135 °C	32	
		T _C = 145 °C	27	
I _{FRM}	Repetitive peak forward surge current (T _C = 25 °C, t _p = 8.3 ms, half sine wave)		92	
I _{FSM}	Non-repetitive forward surge current (T _C = 25 °C, t _p = 8.3 ms, half sine wave)		165	
P _{TOT}	Total power dissipation	T _C = 25 °C	300	W
		T _C = 110 °C	130	
E _{AS}	Single-pulse avalanche energy (starting T _J = 25 °C, L = 0.22 mH, peak I _L = 30A)		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		0.35	0.5	$^{\circ}\text{C/W}$
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		0.07		oz
			1.9		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

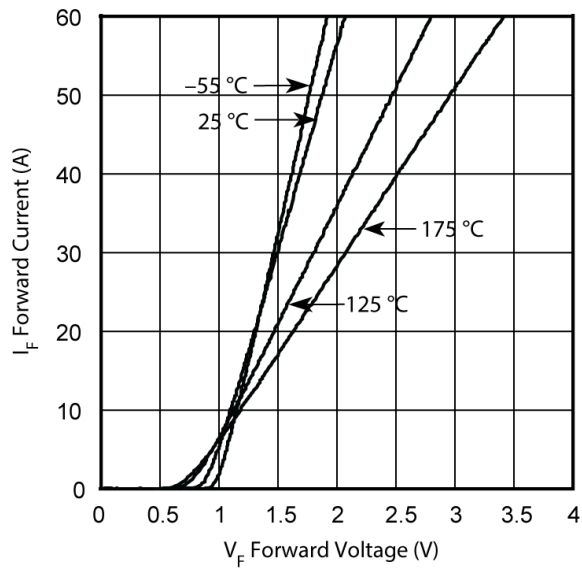


Figure 1-2. Reverse Current vs. Reverse Voltage

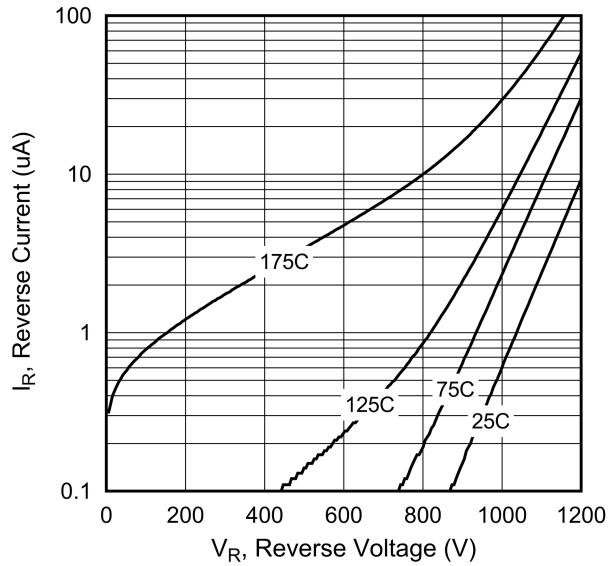


Figure 1-3. Total Charge vs. Reverse Voltage

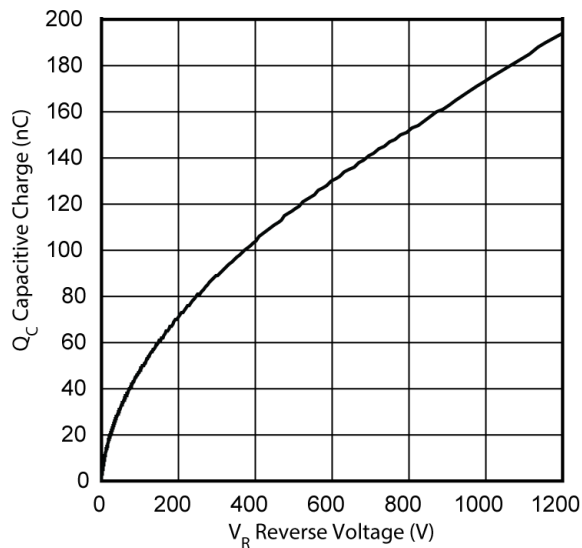


Figure 1-4. Capacitance vs. Reverse Voltage

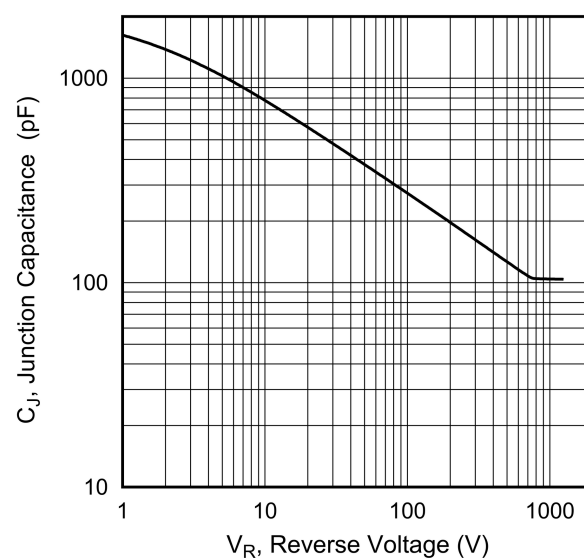


Figure 1-5. Max. Power Dissipation vs. Case Temp.

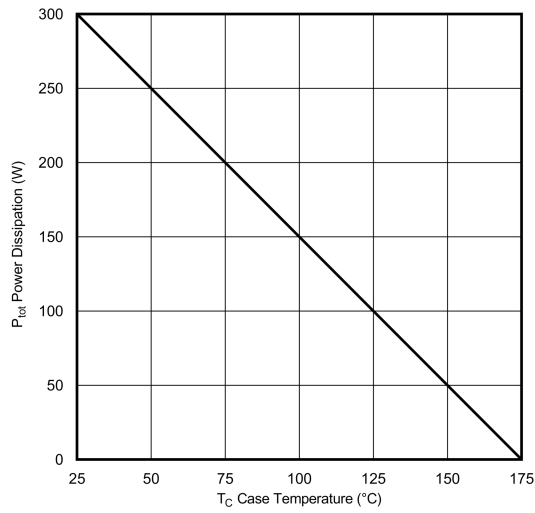


Figure 1-6. Max. Forward Current vs. Case Temp.

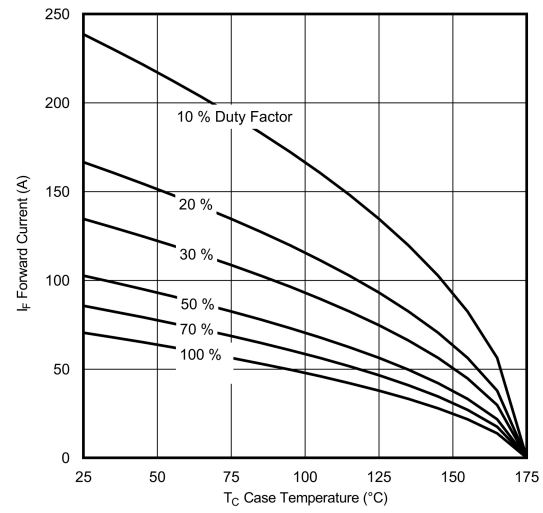
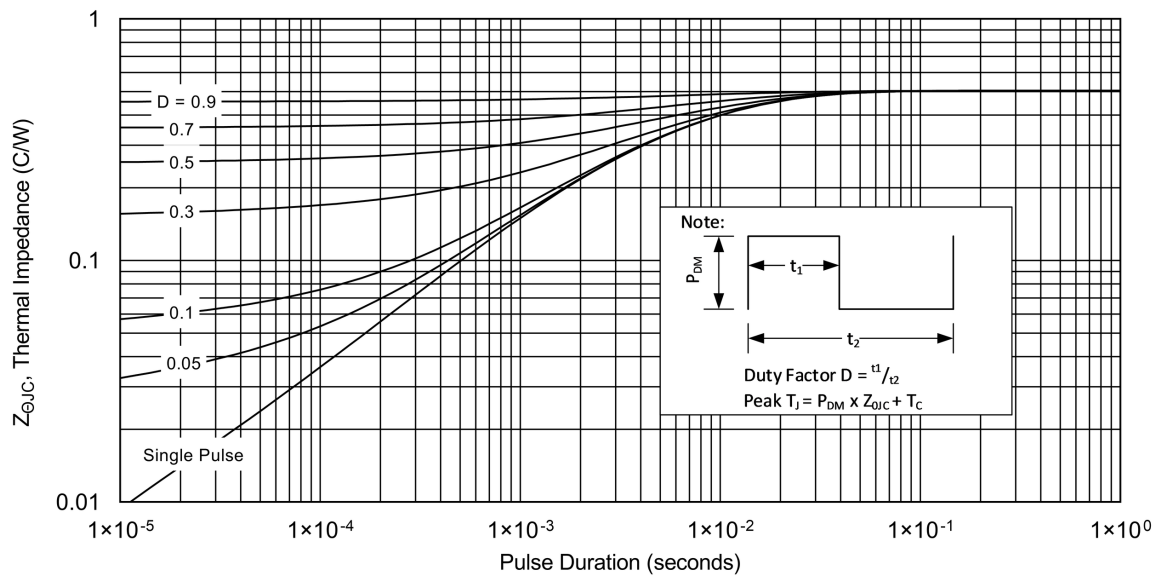


Figure 1-7. Maximum Transient Thermal Impedance



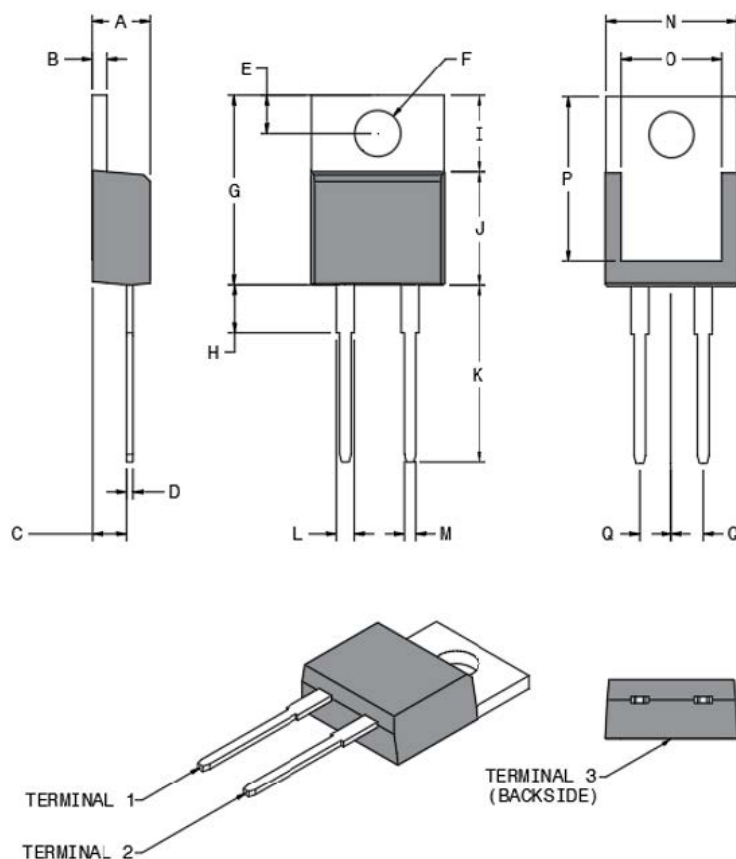
2. Package Specification

This section shows the package specification of this device.

2.1 Package Outline Drawing

The following figure illustrates the TO-220 package drawing of this device.

Figure 2-1. Package Outline Drawing



The following table lists the TO-220 dimensions and should be used in conjunction with the package outline drawing.

Table 2-1. TO-220 Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
A	4.32	4.57	0.170	0.180
B	1.14	1.40	0.045	0.055
C	2.50	2.74	0.098	0.106
D	0.36	0.53	0.014	0.021
E	2.65	3.05	0.104	0.120
F	3.60	3.96	0.142	0.156
G	14.50	15.60	0.571	0.614
H	2.39	3.65	0.094	0.144
I	6.00	6.80	0.236	0.268
J	8.40	9.00	0.331	0.354

.....continued

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
K	13.00	14.00	0.512	0.551
L	1.23	1.39	0.048	0.055
M	0.69	0.88	0.027	0.035
N	10.00	10.36	0.394	0.408
O	7.57	7.90	0.298	0.311
P	12.20	13.10	0.480	0.516
Q	2.54 BSC		0.100 BSC	
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-00005051A, which replaces the previous Microsemi literature number 053-4100.
Initial release (Microsemi Revision A)	06/2019	Initial release.

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