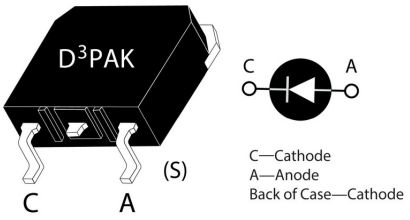
1200 V, 30 A mSiC™ Schottky Diode

MSC030SDA120S, AEC-Q101

Product Overview

1200 V, 30 A Silicon Carbide (SiC) Schottky Diode, D3PAK

The industrial-grade product is MSC030SDA120S. The automotive-grade product is MSC030SDA120SVAO.



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	65	A
		T_C = 135 °C	29	
		T_C = 145 °C	24	
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	259	W
		T_C = 110 °C	112	
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		0.4	0.58	°C/W
T_J, T_{STG}	Operating junction and storage temperature range	–55		175	°C
	Reflow temperature			260	°C
Wt	Package weight		0.14		oz
			4.0		g

1.2 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	I_F = 30A, T_J = 25 °C		1.5	1.8	V
		I_F = 30A, T_J = 175 °C		2.1		
I_{RM}	Reverse leakage current	V_R = 1200V, T_J = 25 °C		9	200	µA
		V_R = 1200V, T_J = 175 °C		150		
Q_C	Total capacitive charge	V_R = 600V		130		nC
C_J	Junction capacitance	V_R = 400V, f = 1 MHz		141		pF
		V_R = 800V, f = 1 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

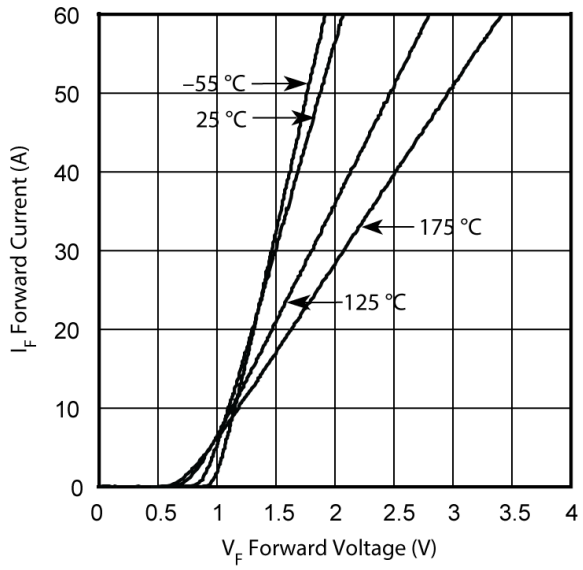


Figure 1-2. Reverse Current vs. Reverse Voltage

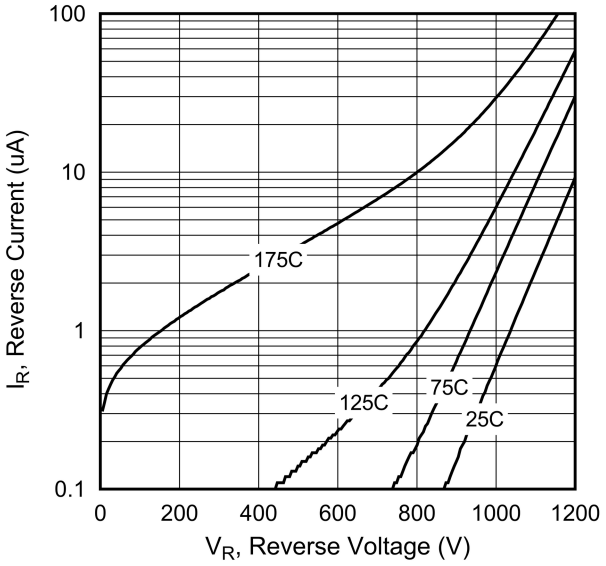


Figure 1-3. Total Charge vs. Reverse Voltage

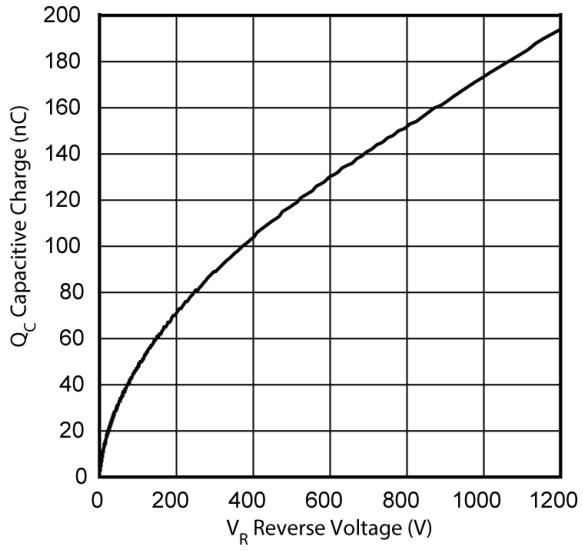


Figure 1-4. Capacitance vs. Reverse Voltage

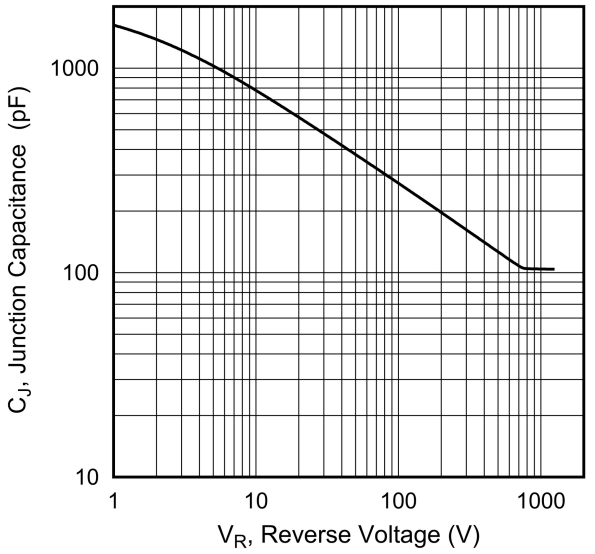


Figure 1-5. Max. Power Dissipation vs. Case Temp.

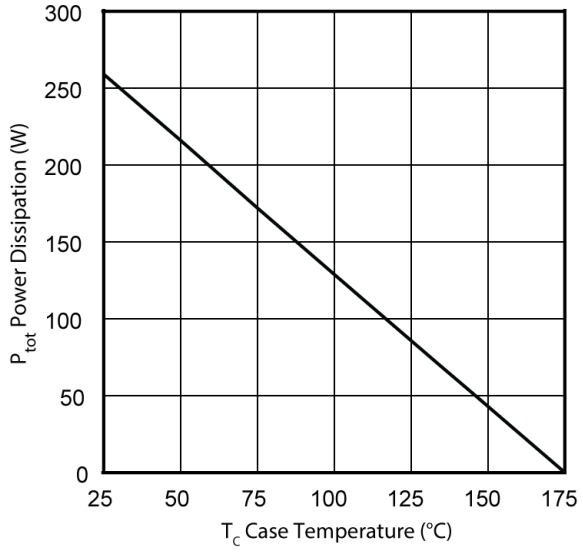


Figure 1-6. Max. Forward Current vs. Case Temp.

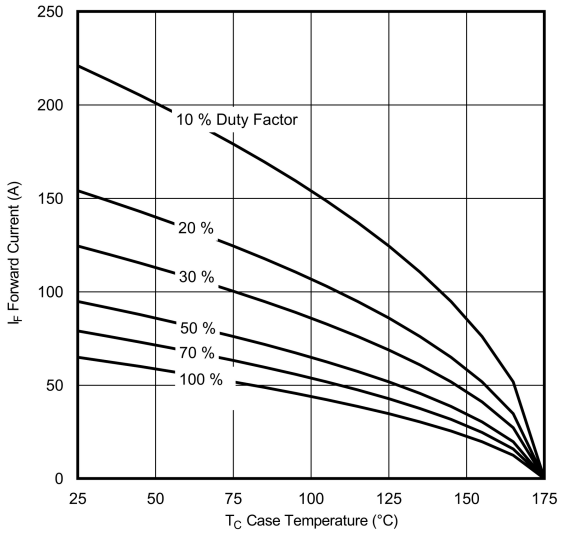
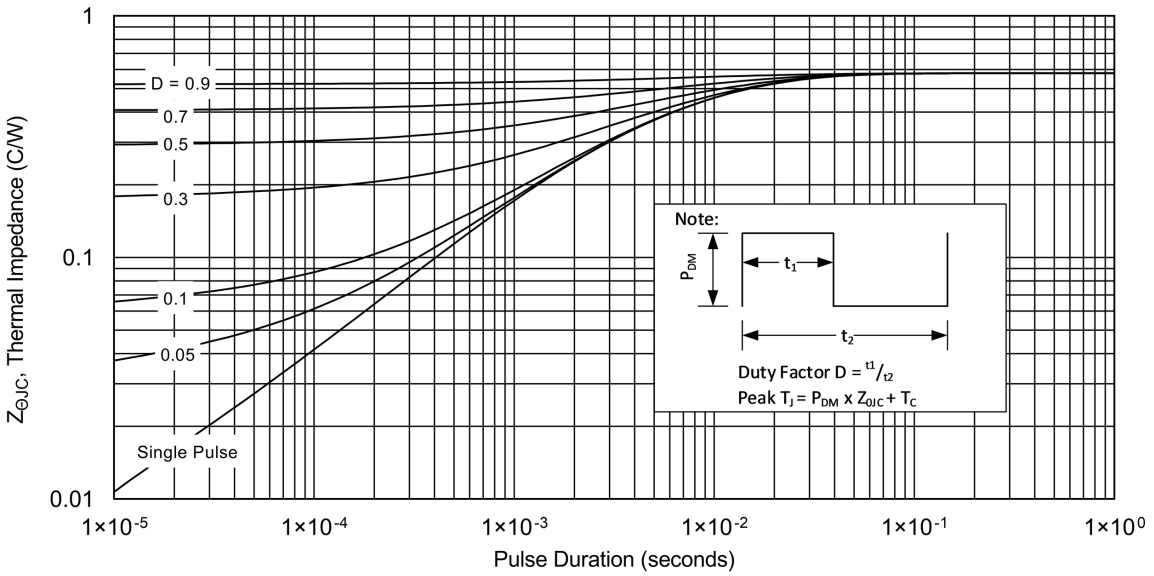


Figure 1-7. Maximum Transient Thermal Impedance



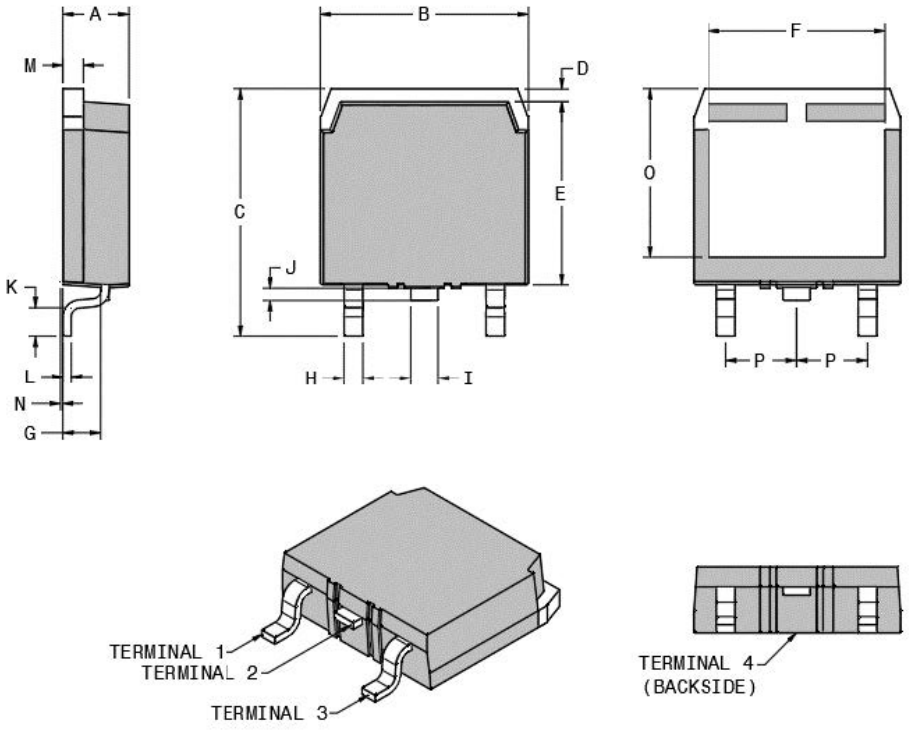
2. Package Specification

This section shows the package specification of this device.

2.1 Package Outline Drawing

The following figure illustrates the D3PAK package outline of this device.

Figure 2-1. Package Outline Drawing



The following table shows the D3PAK dimensions and should be used in conjunction with the package outline drawing.

Table 2-1. D3PAK Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
A	4.90	5.10	0.193	0.201
B	15.85	16.20	0.624	0.638
C	18.70	19.10	0.736	0.752
D	1.00	1.025	0.039	0.049
E	13.80	14.00	0.543	0.551
F	13.30	13.60	0.524	0.535
G	2.70	2.90	0.106	0.114
H	1.15	1.45	0.045	0.057
I	1.95	2.21	0.077	0.087
J	0.94	1.40	0.037	0.055
K	2.40	2.70	0.094	0.106
L	0.40	0.60	0.016	0.024

.....continued				
Symbol	**Min (mm)**	**Max (mm)**	**Min (in.)**	**Max (in.)**
M	1.45	1.60	0.057	0.063
N	0.00	0.018	0.00	0.007
O	12.40	12.70	0.488	0.500
P	5.45 BSC (nom.)		0.215 BSC (nom.)	
Terminal 1	Cathode			
Terminal 2	Cathode			
Terminal 3	Anode			
Terminal 4	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-00005050A, which replaces the previous Microsemi literature number 053-4092.
Initial release (Microsemi Revision A)	01/2019	Initial release.

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