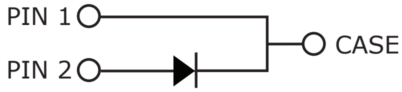
C4D40120H

4th Generation 1200 V, 40 A Silicon Carbide Schottky Diode

Description

With the performance advantages of a Silicon Carbide (SiC) Schottky Barrier diode, power electronics systems can expect to meet higher efficiency standards than Si-based solutions, while also reaching higher frequencies and power densities. SiC diodes can be easily paralleled to meet various application demands, without concern of thermal runaway. In combination with the reduced cooling requirements and improved thermal performance of SiC products, SiC diodes are able to provide lower overall system costs in a variety of diverse applications.



Package Type: TO-247-2
Marking: C4D40120

Features

- Low Forward Voltage (V_F) Drop with Positive Temperature Coefficient
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Increased Creepage / Clearance + HV-H3TRB Rugged

Applications

- Battery Chargers
- Solar & Renewable Energy Power Conversion
- Industrial Power Supplies
- Boost Diodes in PFC & DC-DC

Maximum Ratings (T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit	Test Conditions	Note
Repetitive Peak Reverse Voltage	V_{RRM}	1200	V		
DC Blocking Voltage	V_{DC}	1200			
Continuous Forward Current	I_F	128	A	T_J = 25 °C	Fig. 3
		88		T_J = 100 °C	
		41		T_J = 155 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	161		T_c = 25 °C, t_p = 10 ms, Half Sine Pulse	
		91		T_c = 110 °C, t_p = 10 ms, Half Sine Pulse	
Non-Repetitive Forward Surge Current	I_{FSM}	247		T_c = 25 °C, t_p = 10 ms, Half Sine Pulse	
		245		T_c = 110 °C, t_p = 10 ms, Half Sine Pulse	
Power Dissipation	P_{tot}	667	W	T_J = 25 °C	Fig. 4
		289		T_J = 110 °C	
i^2t Value	$\int i^2t$	305	A^2s	T_c = 25 °C, t_p = 10 ms	
		300		T_c = 110 °C, t_p = 10 ms	

Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Units	Test Conditions	Note
Forward Voltage	V_F	1.5	1.8	V	I_F = 40 A, T_J = 25 °C	Fig. 1
		2.2	3		I_F = 40 A, T_J = 175 °C	
Reverse Current	I_R	45	300	µA	V_R = 1200 V, T_J = 25 °C	Fig. 2
		75	500		V_R = 1200 V, T_J = 175 °C	
Total Capacitive Charge	Q_C	167		nC	V_R = 800 V, T_J = 25 °C	Fig. 5
Total Capacitance	C	2,809		pF	V_R = 0 V, T_J = 25 °C, f = 1 MHz	Fig. 6
		174			V_R = 400 V, T_J = 25 °C, f = 1 MHz	
		145			V_R = 800 V, T_J = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_C	36		µJ	V_R = 800 V	Fig. 7

Note:
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

Thermal & Mechanical Characteristics

Parameter	Symbol	Value	Units	Note
Thermal Resistance, Junction to Case (Typ.)	$R_{\theta, JC}$	0.225	°C / W	
Operating Junction & Storage Temperature	T_J, T_{stg}	-55 to +175	°C	Fig. 8
Maximum Processing Temperature	T_{PROC}	325		10 min. Maximum

Electrostatic Discharge (ESD) Classifications

Parameter	Symbol	Value
Human Body Model	HBM	Class 3B (≥ 8000 V)
Charge Device Model	CDM	Class C3 (≥ 1000 V)

Typical Performance

Figure 1. Forward Characteristics

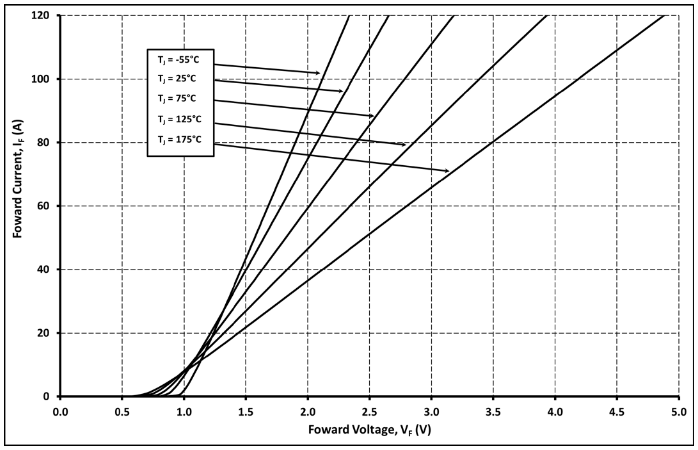


Figure 2. Reverse Characteristics

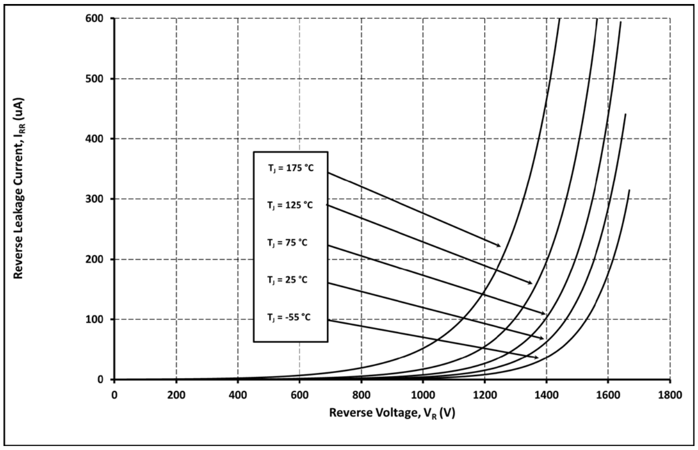


Figure 3. Current Derating

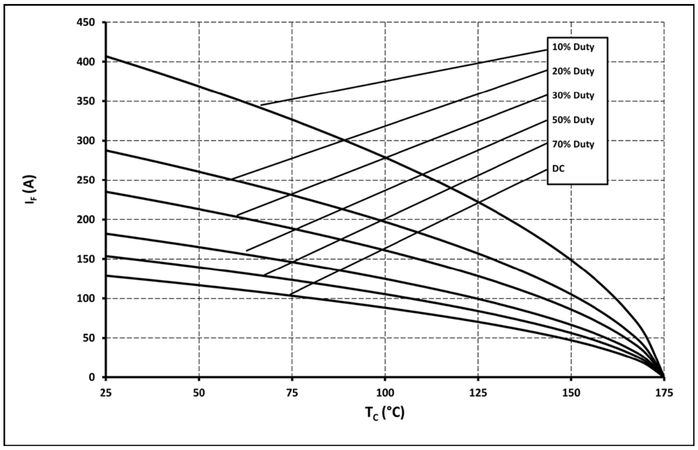


Figure 4. Power Derating

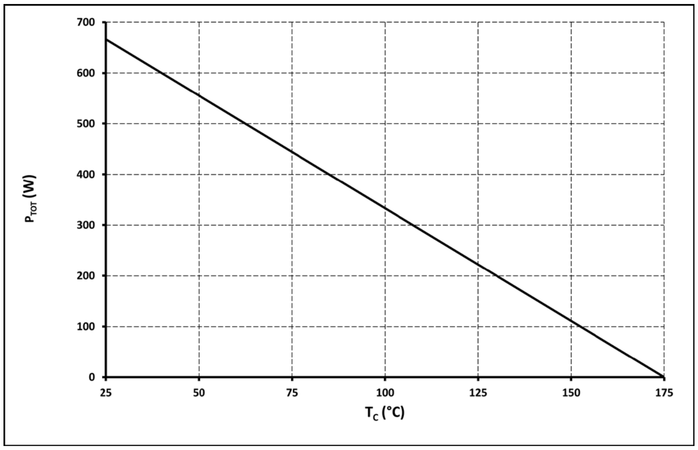


Figure 5. Total Capacitance Charge vs. Reverse Voltage

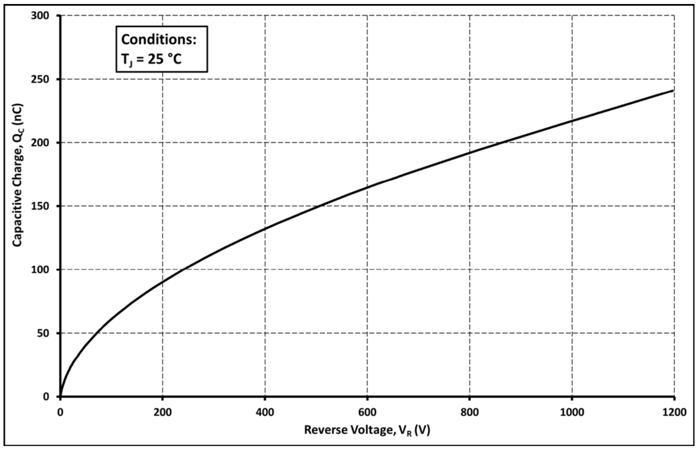
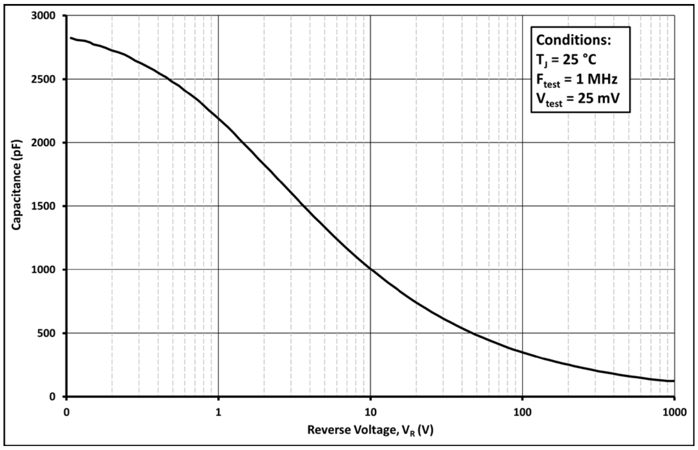


Figure 6. Capacitance vs. Reverse Voltage



Typical Performance

Figure 7. Capacitance Stored Energy

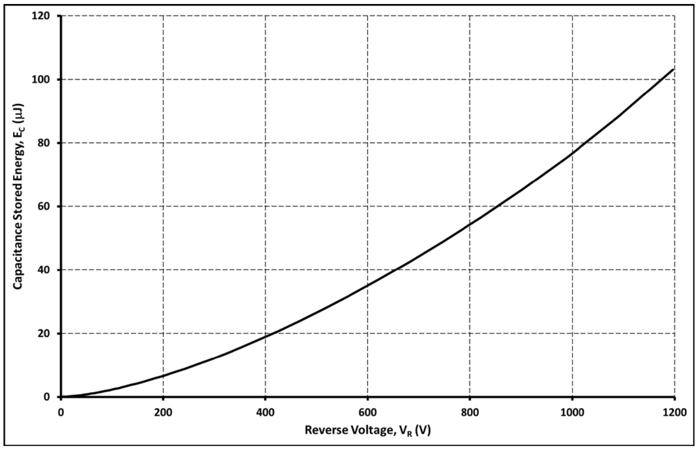
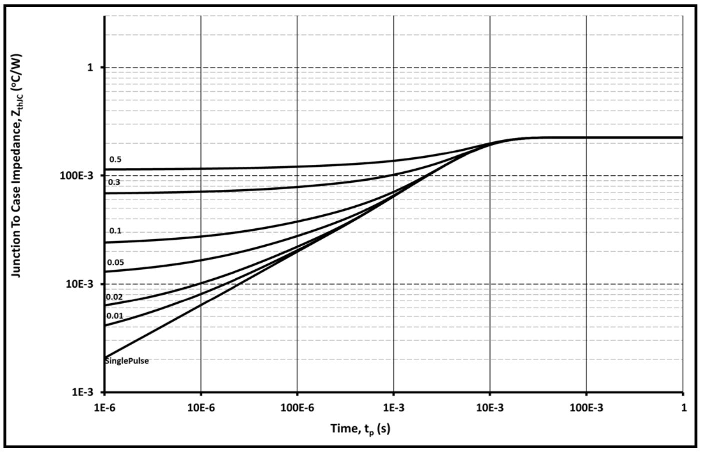


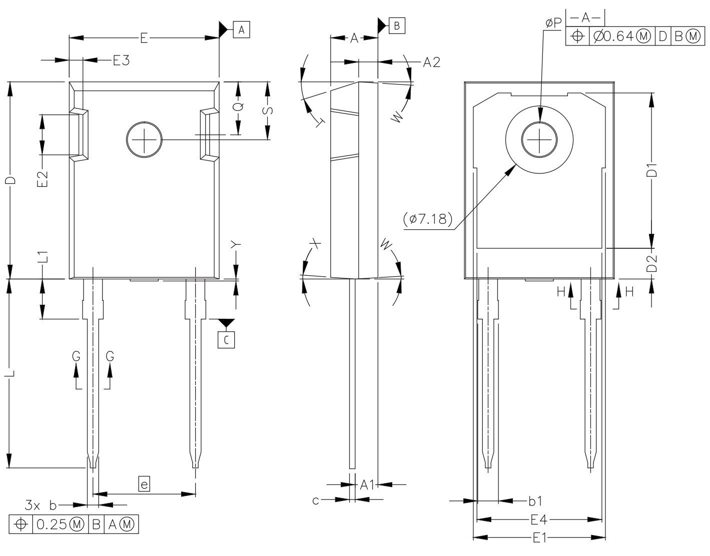
Figure 8. Transient Thermal Impedance



Package Dimensions

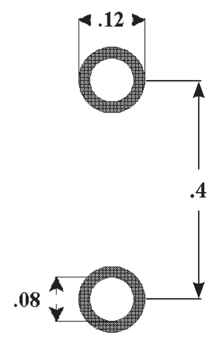
Package: TO-247-2

All dimensions in mm.



SYM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	.190	.205
A1	2.29	2.54	.090	.100
A2	1.91	2.16	.075	.085
b'	1.07	1.28	.042	.050
b	1.07	1.33	.042	.052
b1	1.91	2.41	.075	.095
b2	1.91	2.16	.075	.085
c'	0.55	0.65	.022	.026
c	0.55	0.68	.022	.027
D	20.80	21.10	.819	.831
D1	16.25	17.35	.640	.683
D2	2.86	3.16	.112	.124
E	15.75	16.13	.620	.635
E1	13.10	14.15	.516	.557
E2	3.68	5.10	.145	.201
E3	1.00	1.90	.039	.075
E4	12.38	13.43	.487	.529
e	10.88 BSC		.428 BSC	
L	19.81	20.32	.780	.800
L1	4.10	4.40	.161	.173
øP	3.51	3.65	.138	.144
Q	5.49	6.00	.216	.236
S	6.04	6.30	.238	.248
T	17.5° REF.			
W	3.5° REF.			
X	4° REF.			
Y	0	0.50	0	0.020

Recommended Solder Pad Layout



TO-247-2

all units are in inches

Learn more about recommended soldering profiles in this application note.

Notes

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