HC4D20120D

Silicon Carbide Schottky Diode

Features

- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Positive Temperature Coefficient on V_F

Benefits

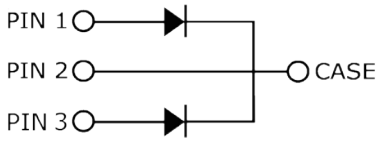
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

Applications

- Switch Mode Power Supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters

TO247-3L

Package



Part Number	Package	Marking
HC4D20120D	TO247-3L	HC4D20120D

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

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V		
V_{RSM}	Surge Peak Reverse Voltage	1300	V		
V_{DC}	DC Blocking Voltage	1200	V		
I_F	Continuous Forward Current (Per Leg/Device)	34/68 16.5/33 10/20	A	T_C=25°C T_C=135°C T_C=157°C	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	47* 31.5*	A	T_C=25°C, t_P=10 ms, Half Sine Pulse T_C-110°C, t_P=10 ms, Half Sine Pulse	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	71* 59.5*	A	T_C=25°C, t_P=10 ms, Half Sine Pulse T_C=110°C, t_P=10 ms, Half Sine Pulse	Fig. 8
$I_{F,Max}$	Non-Repetitive Peak Forward Current	750* 620*	A	T_C=25°C, t_P=10 μs, Pulse T_C=110°C, t_P=10 μs, Pulse	Fig. 8
P_{tot}	Power Dissipation(Per Leg/Device)	176/352 76/152	W	T_C=25°C T_C=110°C	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	V_R=0-960V	
$\int i^2dt$	i^2t value	25* 17.5*	A^2s	T_C=25°C, t_P=10 ms T_C=110°C, t_P=10 ms	
T_J	Operating Junction Range	-55 to +175	°C		
T_{stg}	Storage Temperature Range	-55 to +135	°C		
	TO-247 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

* Per Leg, ** Per Device

Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.5 2.2	1.8 3	V	I_F = 10 A T_J=25°C I_F = 10 A T_J=175°C	Fig. 1
I_R	Reverse Current	30 55	250 350	μA	V_R = 1200 V T_J=25°C V_R = 1200 V T_J=175°C	Fig. 2
Q_C	Total Capacitive Charge	52		nC	V_R = 800 V, I_F = 10A di/dt = 200 A/μs T_J = 25°C	Fig. 5
C	Total Capacitance	754 45 38		pF	V_R = 0 V, T_J = 25°C, f = 1 MHz V_R = 400 V, T_J = 25°C, f = 1 MHz V_R = 800 V, T_J = 25°C, f = 1 MHz	Fig. 6
E_C	Capacitance Stored Energy	14.5		μJ	V_R = 800 V	Fig. 7

Note: This is a majority carrier diode, so there is no reverse recovery charge.

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.85* 0.43**	°C/W	Fig. 9

* Per Leg, ** Per Device

Typical Performance (Per Leg)

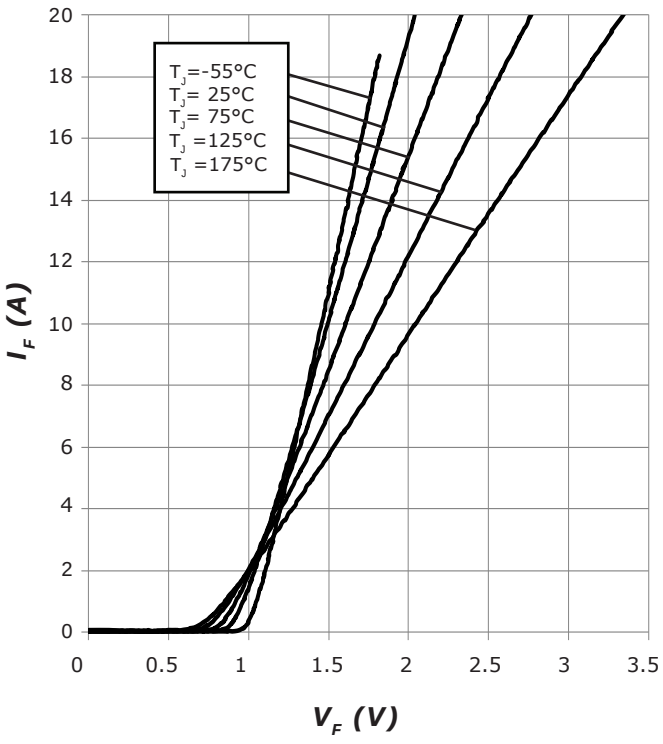


Figure 1. Forward Characteristics

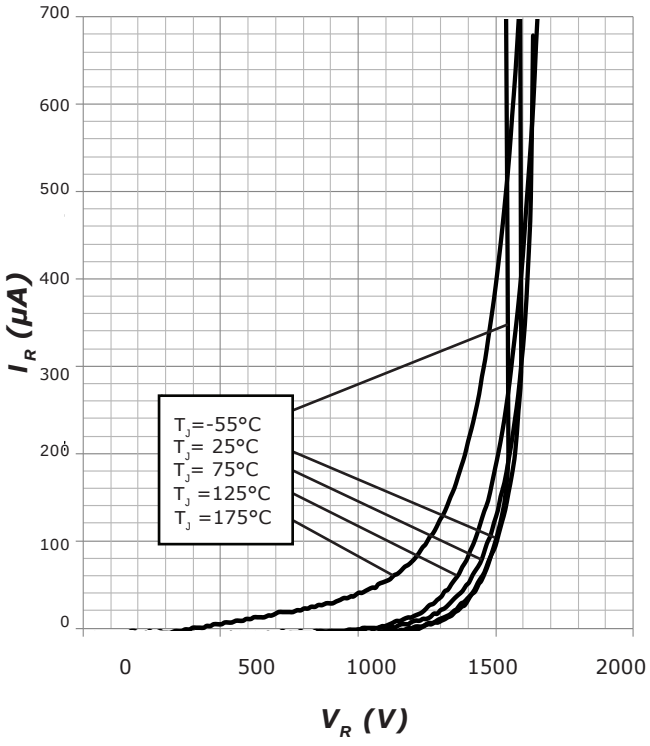


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

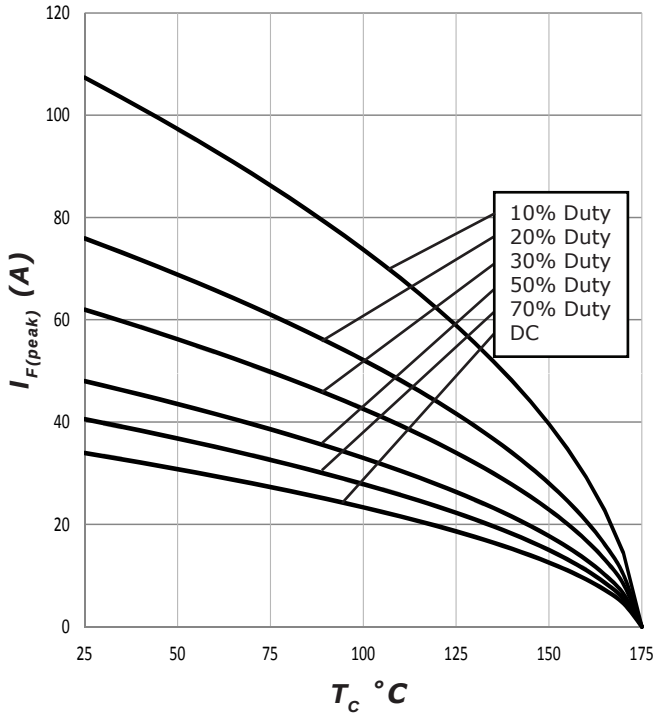


Figure 3. Current Derating

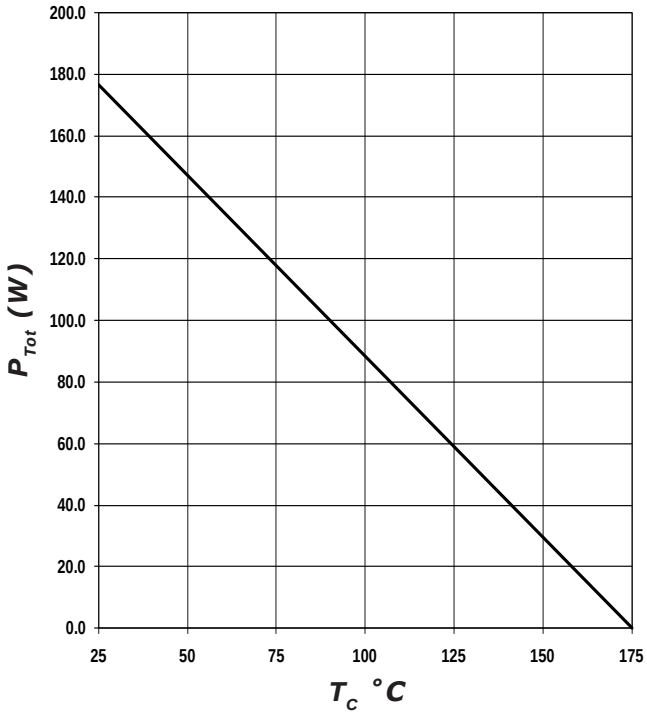


Figure 4. Power Derating

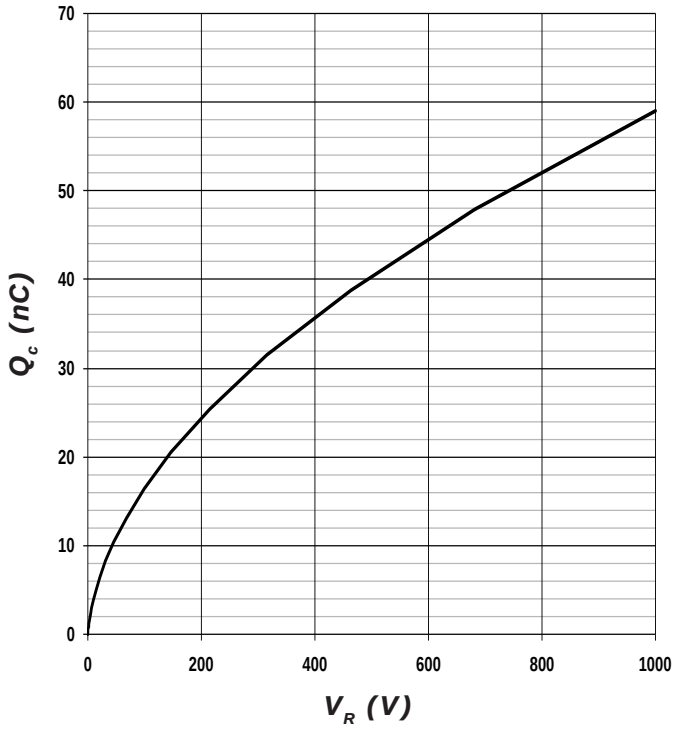


Figure 5. Recovery Charge vs. Reverse Voltage

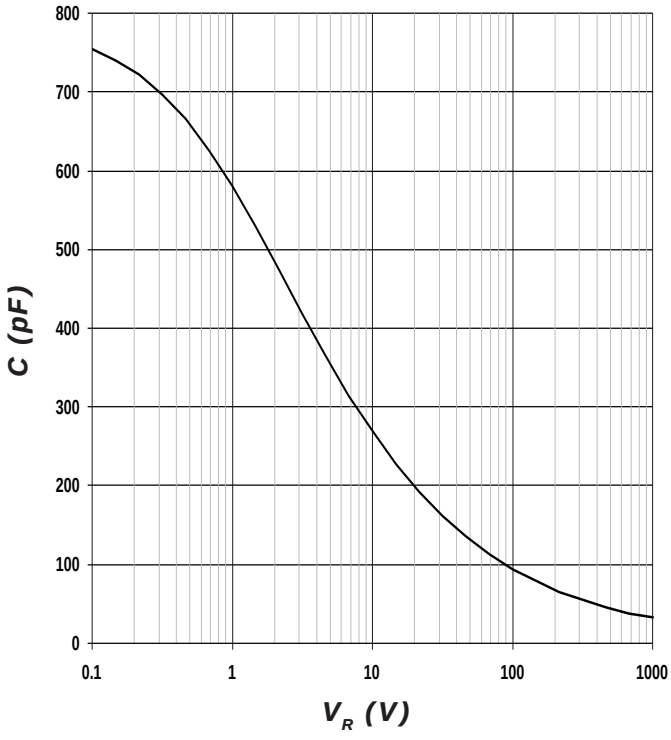


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

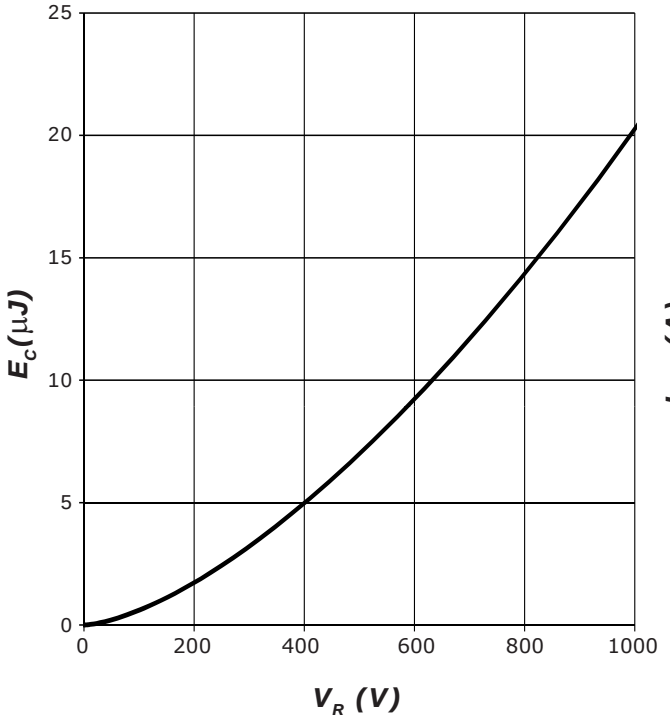


Figure 7. Typical Capacitance Stored Energy, per leg

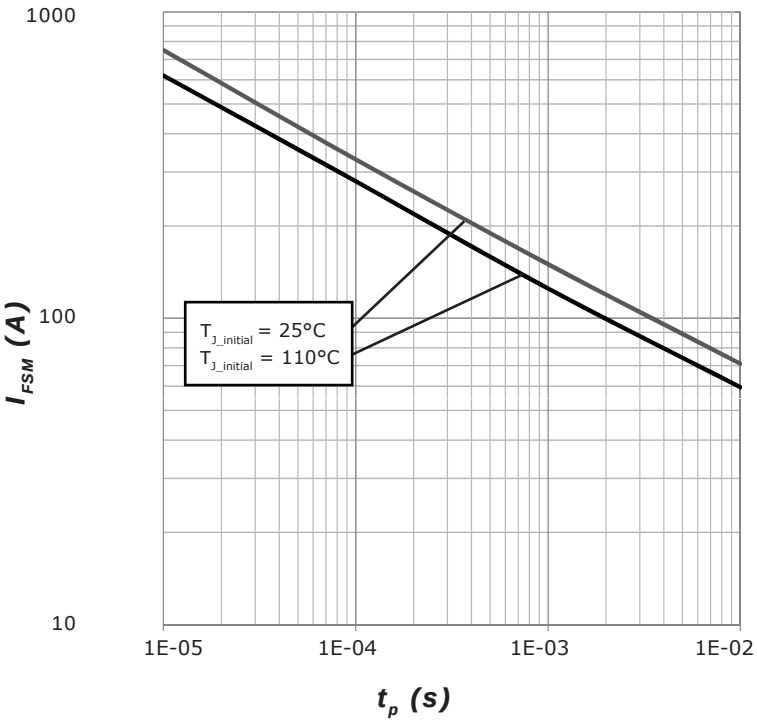


Figure 8. Non-Repetitive Peak Forward Surge Current versus Pulse Duration (sinusoidal waveform), per leg

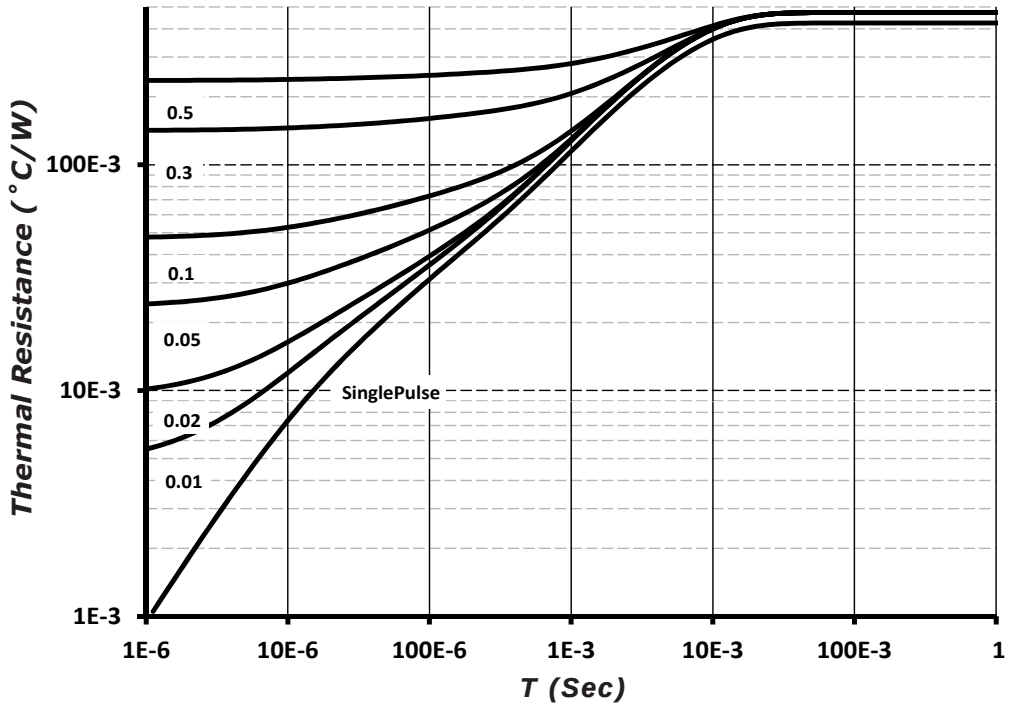
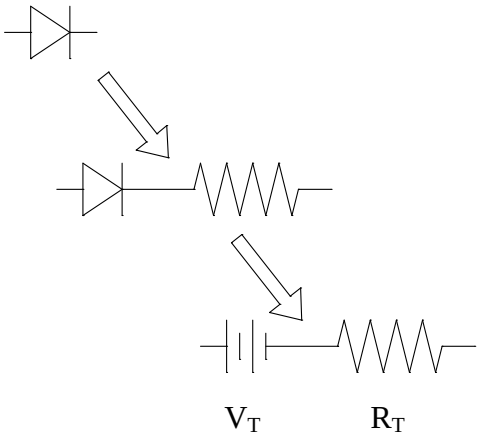


Figure 9. Device Transient Thermal Impedance

Diode Model



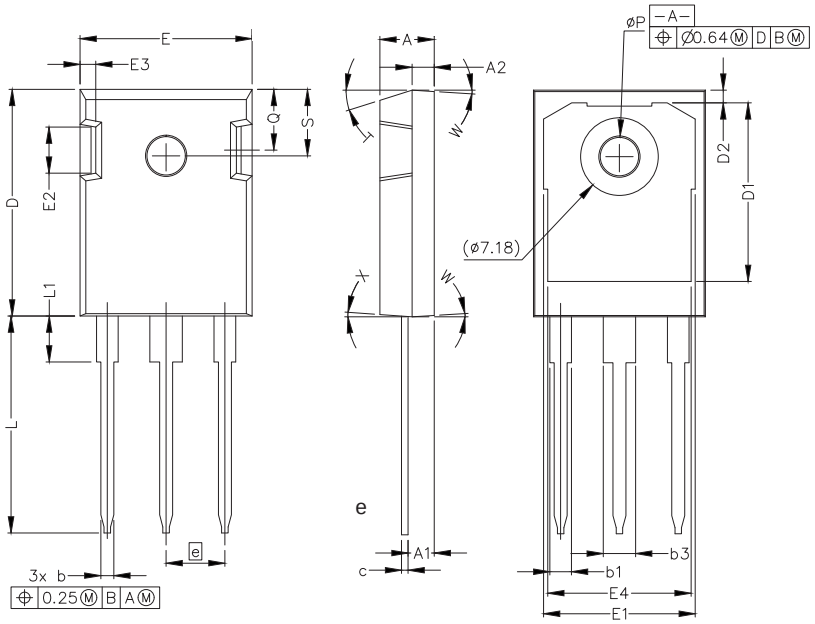
$$V_{fT} = V_T + If * R_T$$

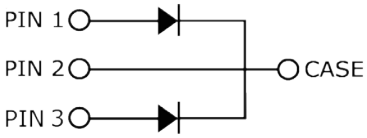
$$V_T = 0.98 + (T_J * -1.71 * 10^{-3})$$
$$R_T = 0.040 + (T_J * 5.32 * 10^{-4})$$

Note: T_j = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 175°C

Package Dimensions

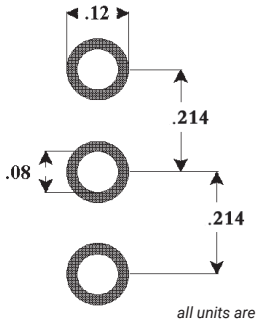
Package TO247-3L





POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b3	.113	.133	2.87	3.38
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
N	3			
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	17.5° REF			
W	3.5° REF			
X	4° REF			

Recommended Solder Pad Layout



all units are in inches

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