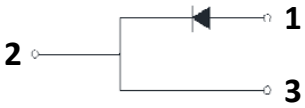
HC4D05120A

Silicon Carbide Schottky Diode

Features

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

TO-220C-2L



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

Part Number	Package	Marking
HC4D05120A	TO-220C-2L	HC4D05120A

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_R	DC Peak Reverse Voltage	1200	V		
I_F	Continuous Forward Current	19 9.5 5	A	T_C=25°C T_C=135°C T_C=161°C	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	26 18	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 Forward Surge Current	46 36	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	400 320	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	100 43	W	T_C=25°C T_C=110°C	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	V_R=0-650V	
$\int i^2dt$	i^2t value	10.6 6.5	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		
	TO220-2L Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.4 1.9	1.8 3	V	I_F = 5 A T_J=25°C I_F = 5 A T_J=175°C	Fig. 1
I_R	Reverse Current	20 40	150 300	μA	V_R = 1200 V T_J=25°C V_R = 1200 V T_J=175°C	Fig. 2
Q_C	Total Capacitive Charge	27		nC	V_R = 800 V, I_F = 5A di/dt = 200 A/μs T_J = 25°C	Fig. 5
C	Total Capacitance	390 27 20		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	8.0		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	1.5	°C/W	Fig. 9

Typical Performance

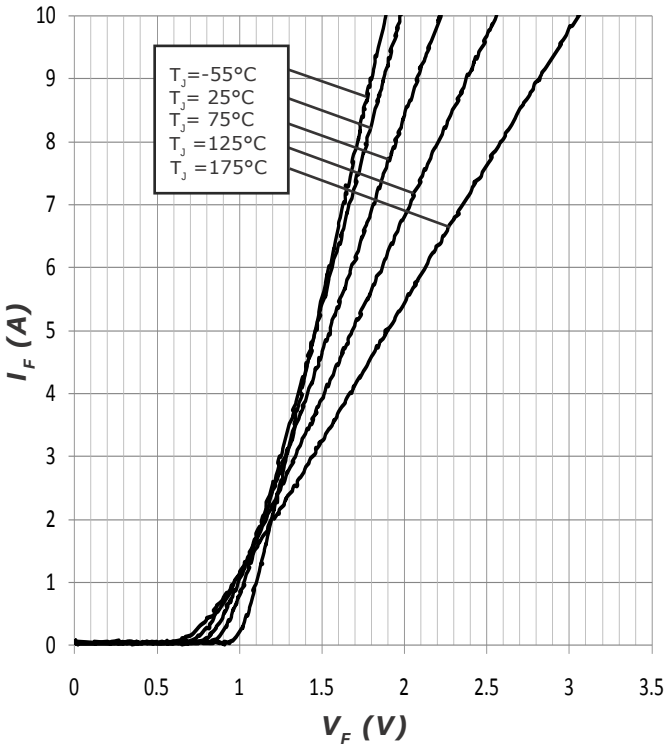


Figure 1. Forward Characteristics

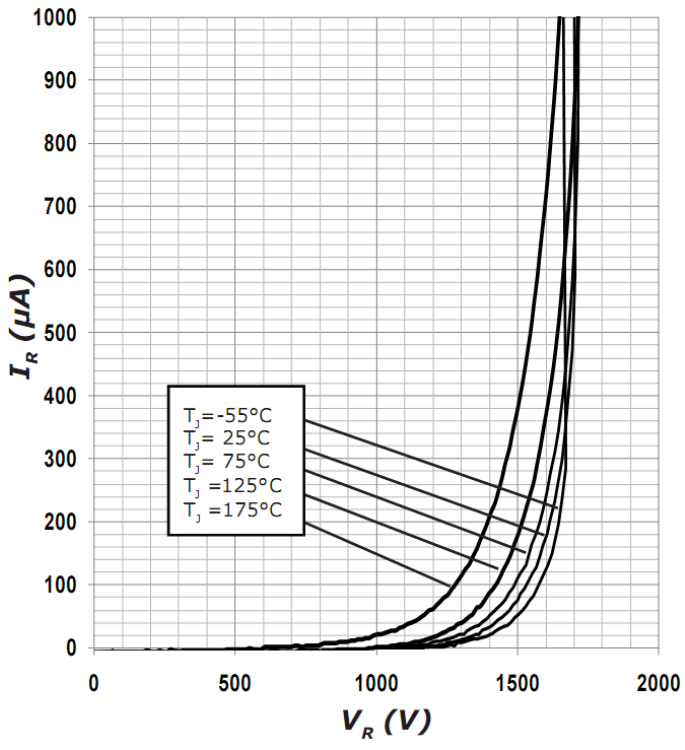


Figure 2. Reverse Characteristics

Typical Performance

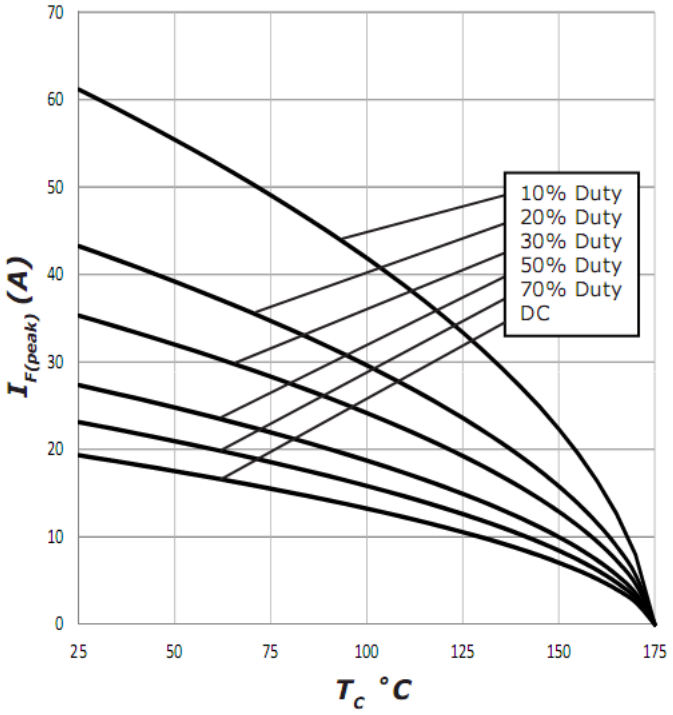


Figure 3. Current Derating

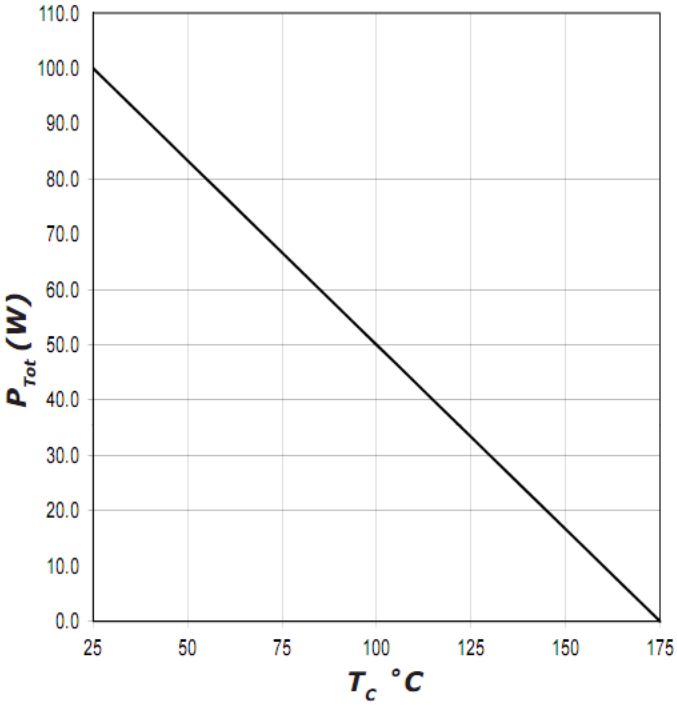


Figure 4. Power Derating

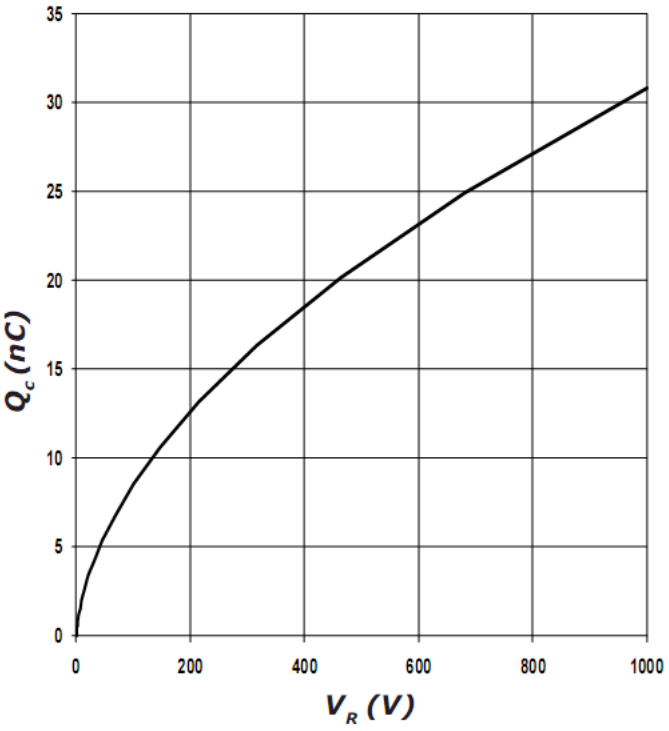


Figure 5. Recovery Charge vs. Reverse Voltage

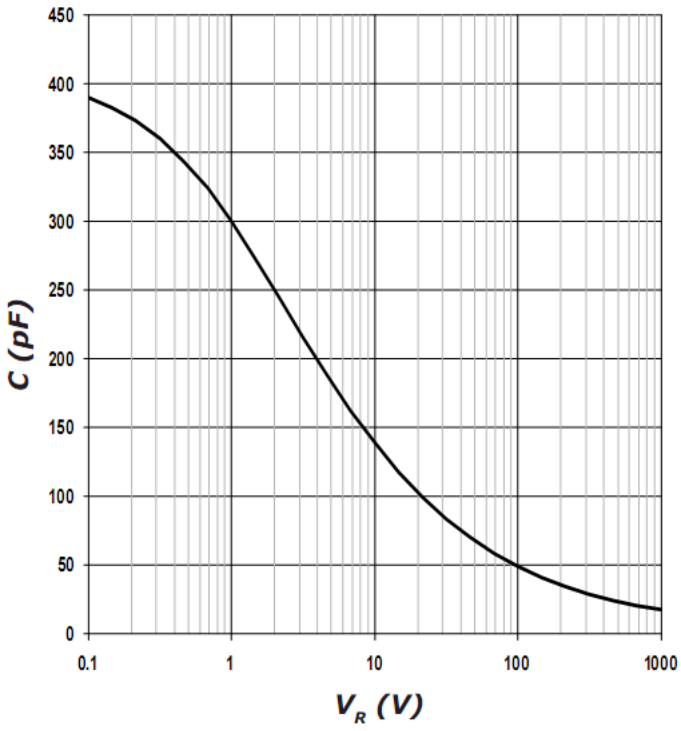
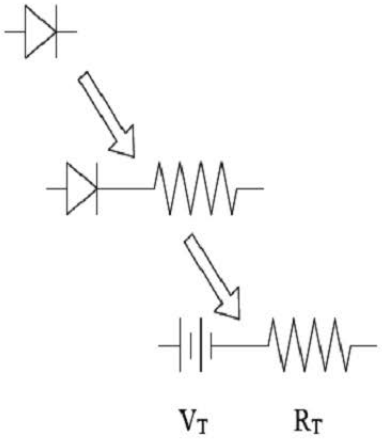


Figure 6. Capacitance vs. Reverse Voltage

Diode Model



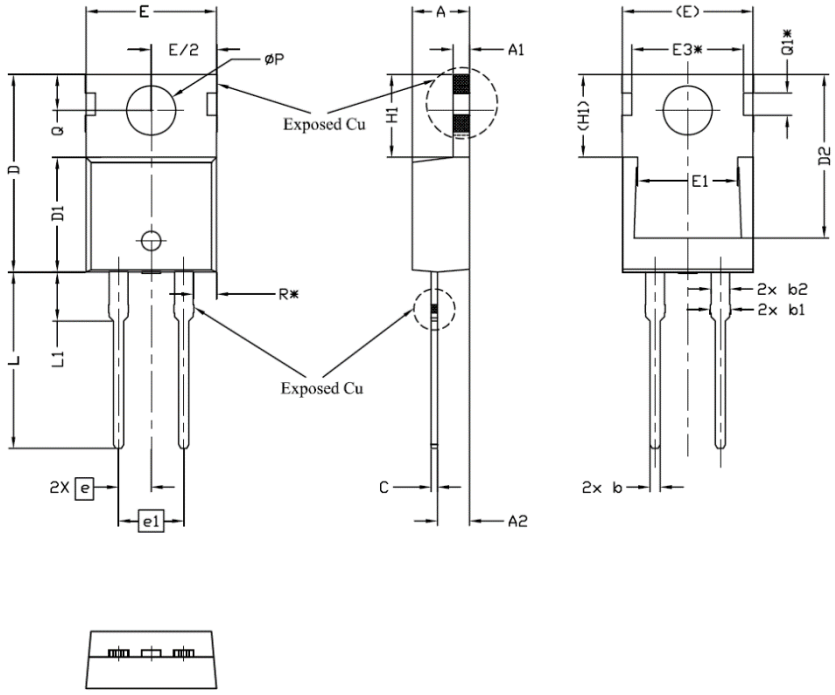
$$Vf_T = V_T + If * R_T$$

$$\mathbf{V_T = 0.96 + (T_j * -1.22*10^{-3})}$$

$$\mathbf{R_T = 0.08 + (T_j * 8.5*10^{-4})}$$

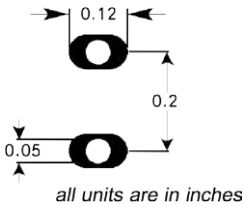
Note: T_j is diode junction temperature in degrees Celsius

Package Information
TO-220C-2L



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4.24	4.44	4.64	
A1	1.15	1.27	1.40	
A2	2.30	2.48	2.70	
b	0.70	0.80	0.90	
b1	1.20	1.55	1.75	
b2	1.20	1.45	1.70	
c	0.40	0.50	0.60	
D	14.70	15.37	16.00	4
D1	8.82	8.92	9.02	
D2	12.43	12.73	12.83	5
E	9.96	10.16	10.36	4,5
E1	6.86	7.77	8.89	5
E3*	8.70REF.			
e	2.54BSC			
e1	5.08BSC			
H1	6.30	6.45	6.60	5,6
L	13.47	13.72	13.97	
L1	3.60	3.80	4.00	
ØP	3.75	3.84	3.93	
Q	2.60	2.80	3.00	
Q1*	1.73REF.			
R*	1.82REF.			

Recommended Solder Pad Layout



all units are in inches

TO-220C-2L

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