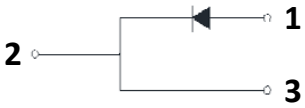
HC3D20065A

Silicon Carbide Schottky Diode

Features

- 650-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- 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
- Power Factor Correction
- Motor Drives

Part Number	Package	Marking
HC3D20065A	TO-220C-2L	HC3D20065A

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

Symbol	Parameter	Value	Unit	Test Conditions
V_{RRM}	Repetitive Peak Reverse Voltage	650	V	
V_{RSM}	Surge Peak Reverse Voltage	650	V	
V_{DC}	DC Blocking Voltage	650	V	
I_F	Continuous Forward Current	20	A	T_C=125˚C
I_{FRM}	Repetitive Peak Forward Surge Current	81	A	T_C=110˚C, t_P=10 ms, Half Sine Wave
I_{FSM}	Non-Repetitive Peak Forward Surge Current	123 104	A	T_C=25˚C, t_p = 10 ms, Half Sine Wave T_C=150˚C, t_p = 10 ms, Half Sine Wave
$I_{F,Max}$	Non-Repetitive Peak Forward Surge Current	450	A	T_C=25˚C, t_P = 10 µs, Pulse
P_{tot}	Power Dissipation	115	W	T_C=25˚C
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	˚C	

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions
V_F	Forward Voltage	1.35 1.5	1.5 -	V	I_F = 20 A ,T_J=25°C I_F = 20 A ,T_J=175°C
I_R	Reverse Current	0.06 12	100 -	μA	V_R = 650 V T_J=25°C V_R = 650 V T_J=175°C
Q_C	Total Capacitive Charge	24		nC	V_R = 400 V, I_F = 10 A di/dt = 500 A/μs T_J = 25°C
C	Total Capacitance	1000 91		pF	V_R = 0 V, T_J = 25°C, f = 1 MHz V_R = 400 V, T_J = 25°C, f = 1 MHz
E_{ava}	Non-repetetive Avaranche Energy	220		mJ	L=1mH

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

Thermal Characteristics

Symbol	Parameter	Typ.	Unit
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.87	°C/W

Typical Performance

Fig.1 V_F - I_F Characteristics

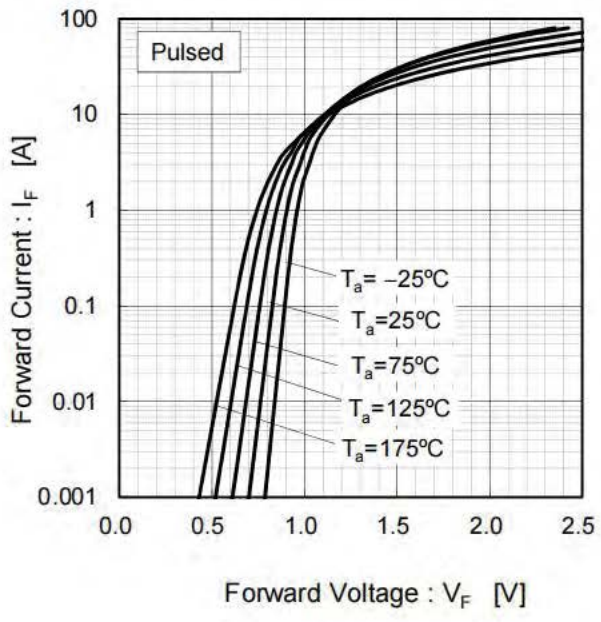
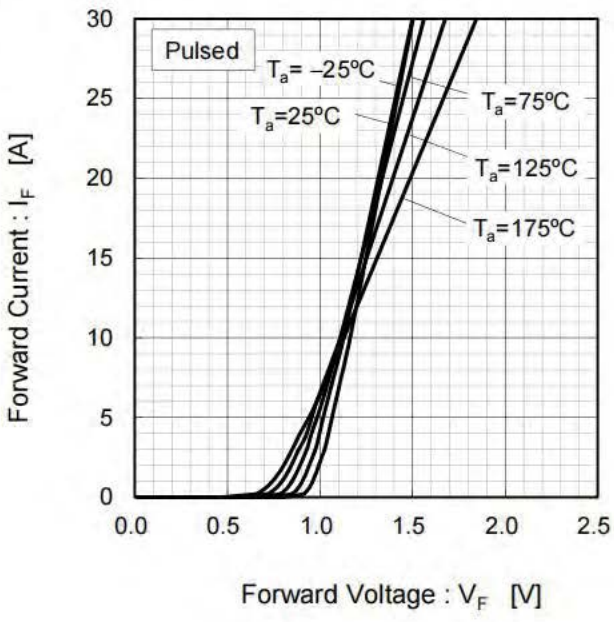


Fig.2 V_F - I_F Characteristics



Typical Performance

Fig.3 V_R - I_R Characteristics

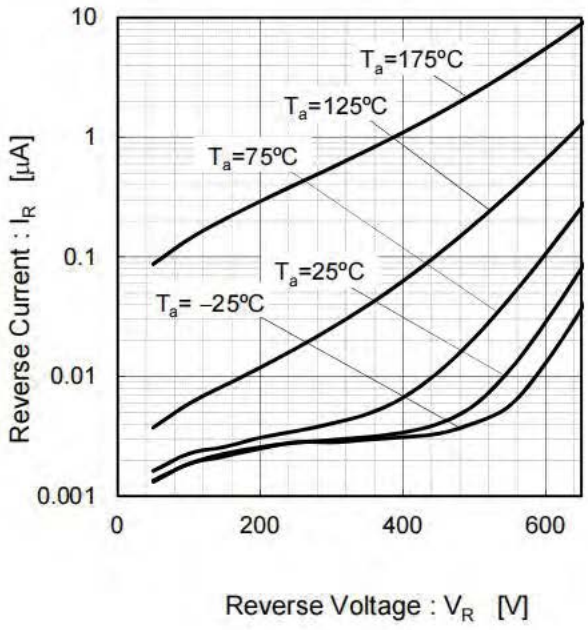


Fig.4 V_R-C_t Characteristics

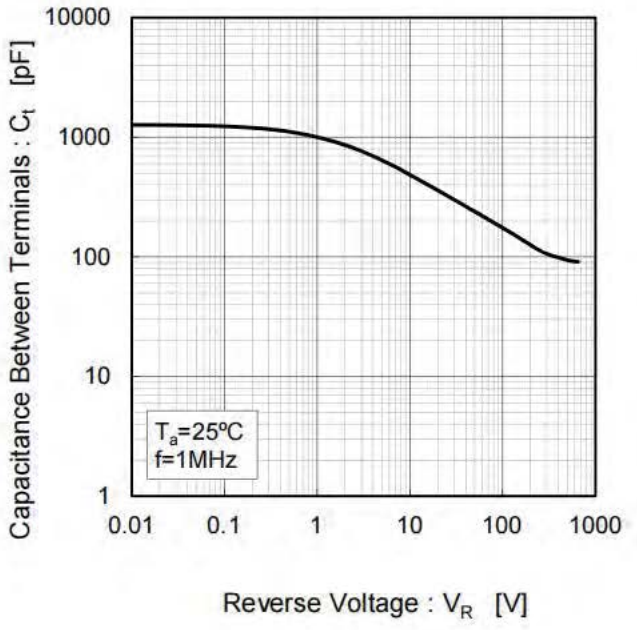


Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

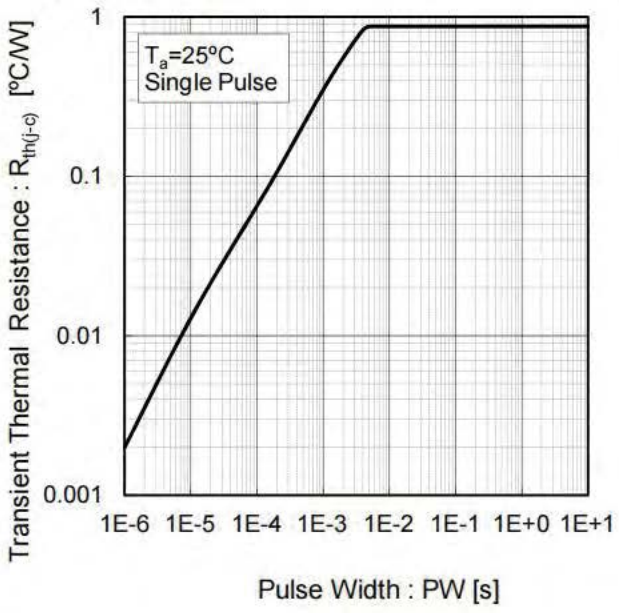
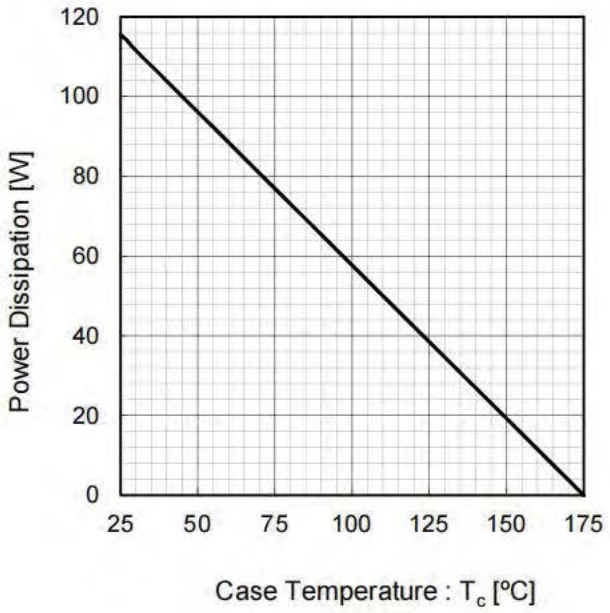
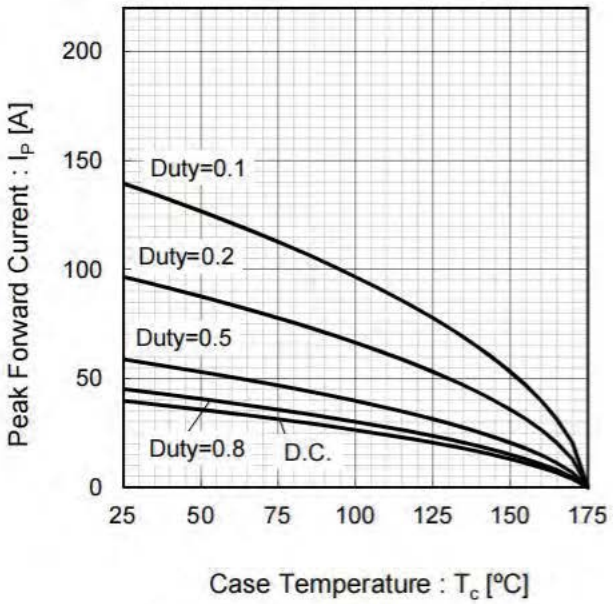


Fig.6 Power Dissipation



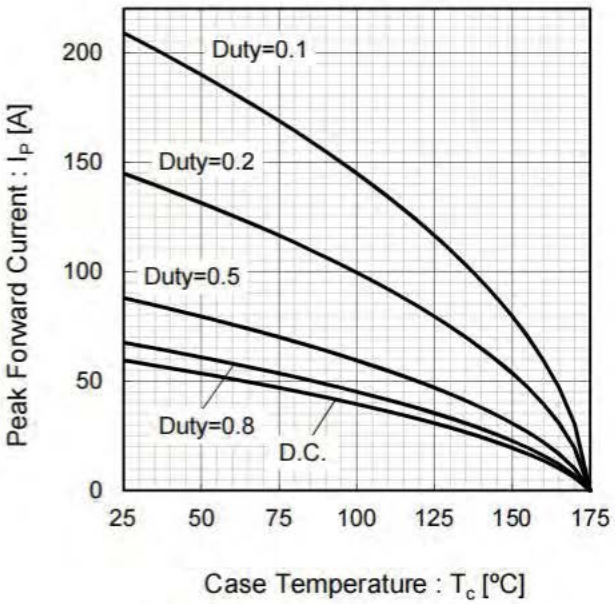
Typical Performance

Fig.7*3 Maximum peak forward current derating curve I_P - T_c



*3 Based on max Vf, max $R_{th(j-c)}$
Valid for switching of above 10kHz,
excluding D.C. curve.

Fig.8*4 Typical peak forward current derating curve I_P - T_c (Not guaranteed)



*4 Based on typ Vf, typ $R_{th(j-c)}$
Typical value, not guaranteed
Valid for switching of above 10kHz,
excluding D.C. curve

Fig.9 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)

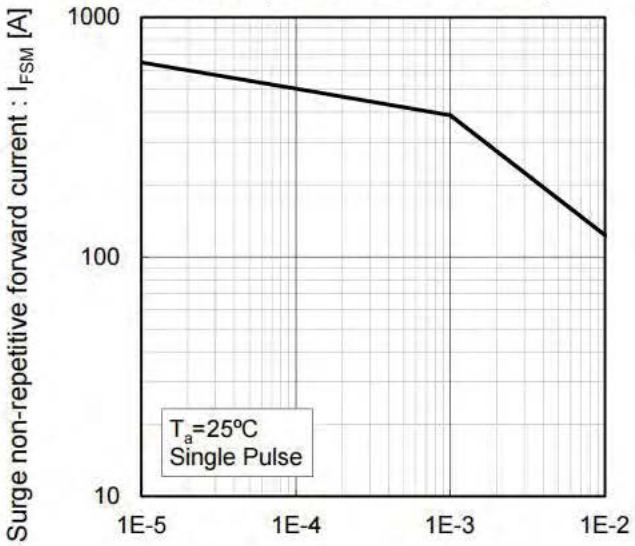
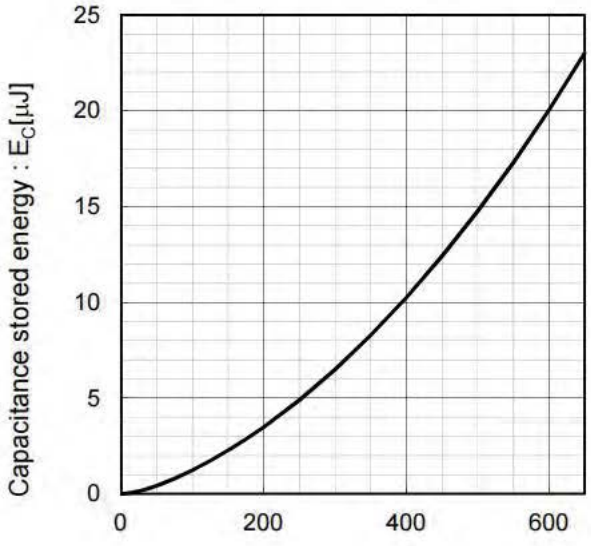
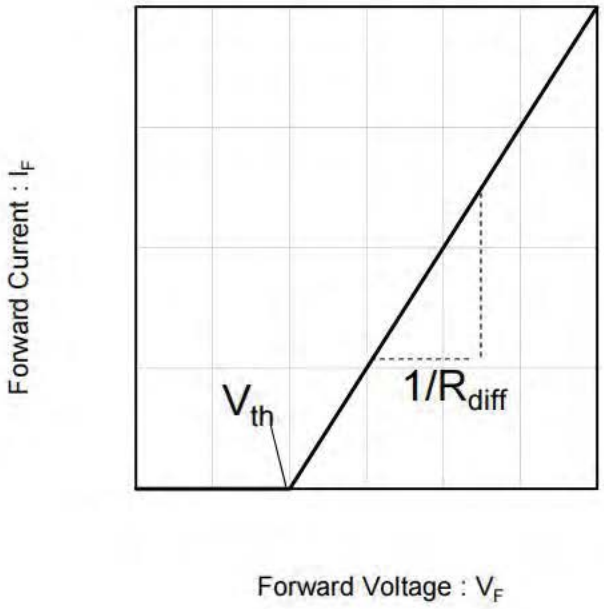


Fig.10 Typical capacitance store energy



Typical Performance

Fig.11 Equivalent forward current curve



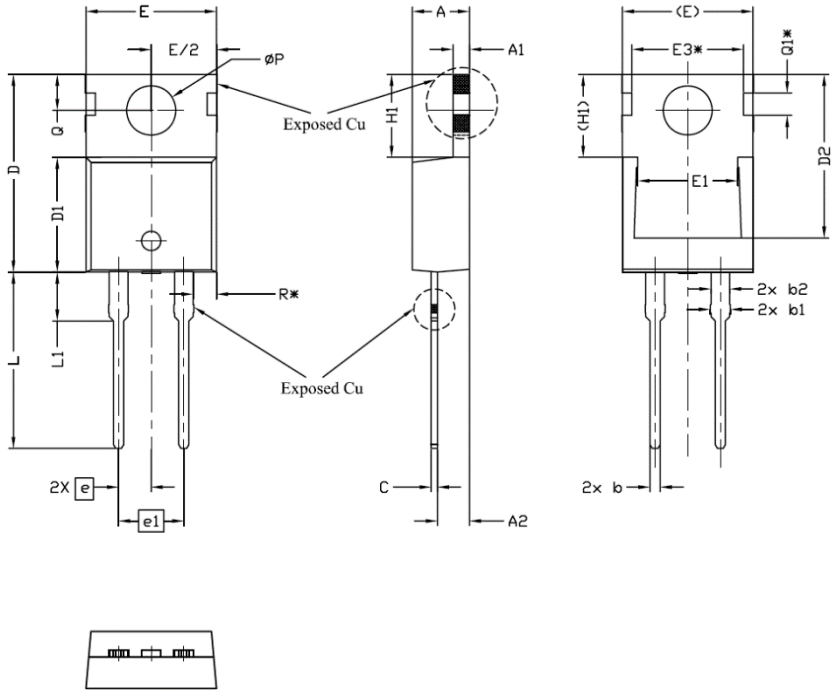
$$V_F = V_{th} + R_{diff} I_F$$

$$V_{th}(T_j) = a_0 + a_1 T_j$$
$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

Symbol	Typical Value	Unit
a_0	9.66E-01	V
a_1	– 1.10E-03	V/°C
b_0	1.76E-02	Ω
b_1	3.73E-05	Ω/°C
b_2	3.84E-07	$\Omega/°C^2$

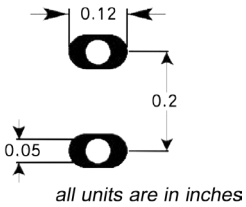
T_j in ºC; -55 ºC < T_j < 175ºC ; I_F < 40A

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

TO220-2L

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