



Features

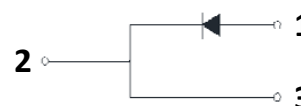
- 650-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on V_F

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 ($T_c = 25^\circ\text{C}$ 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	$T_c = 125^\circ\text{C}$
I_{FRM}	Repetitive Peak Forward Surge Current	81	A	$T_c = 110^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave
I_{FSM}	Non-Repetitive Peak Forward Surge Current	123 104	A	$T_c = 25^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave $T_c = 150^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave
I_{FMax}	Non-Repetitive Peak Forward Surge Current	450	A	$T_c = 25^\circ\text{C}$, $t_p = 10$ μs , Pulse
P_{tot}	Power Dissipation	115	W	$T_c = 25^\circ\text{C}$
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$	



Electrical Characteristics

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

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	$^\circ\text{C}/\text{W}$

Typical Performance

Fig.1 $V_F - I_F$ Characteristics

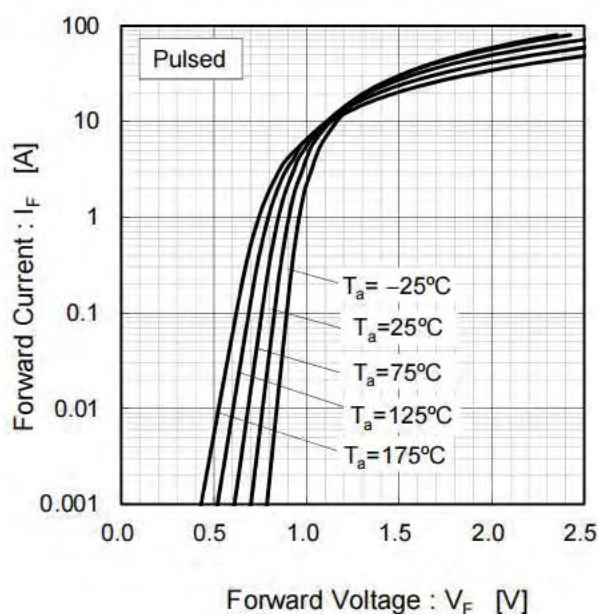
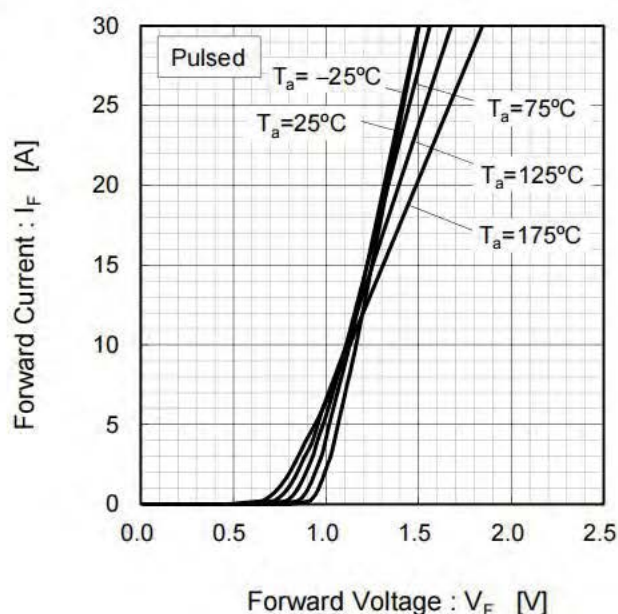


Fig.2 $V_F - I_F$ Characteristics





Typical Performance

Fig.3 $V_R - I_R$ Characteristics

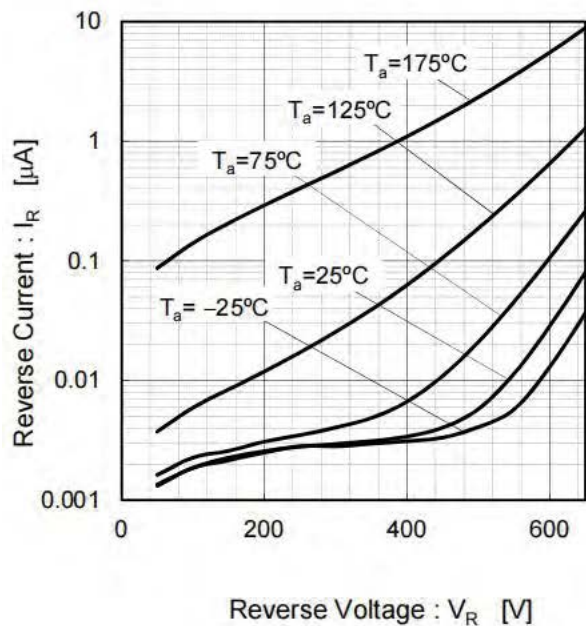


Fig.4 $V_R - C_t$ Characteristics

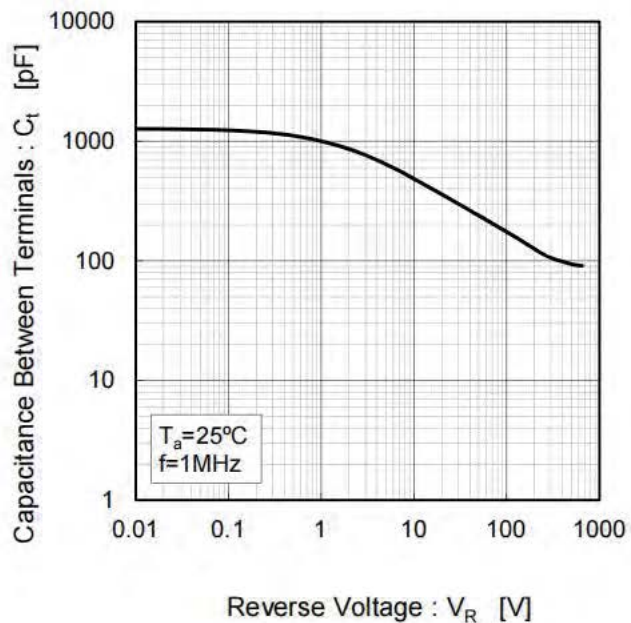


Fig.5 Typical Transient Thermal Resistance vs. Pulse Width

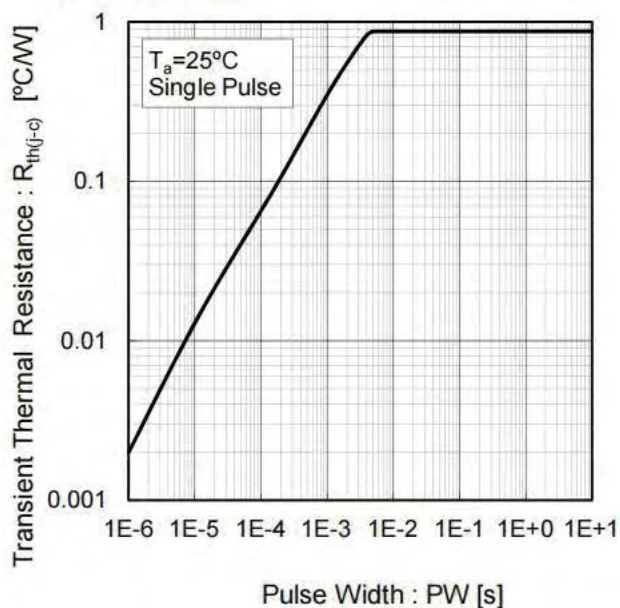
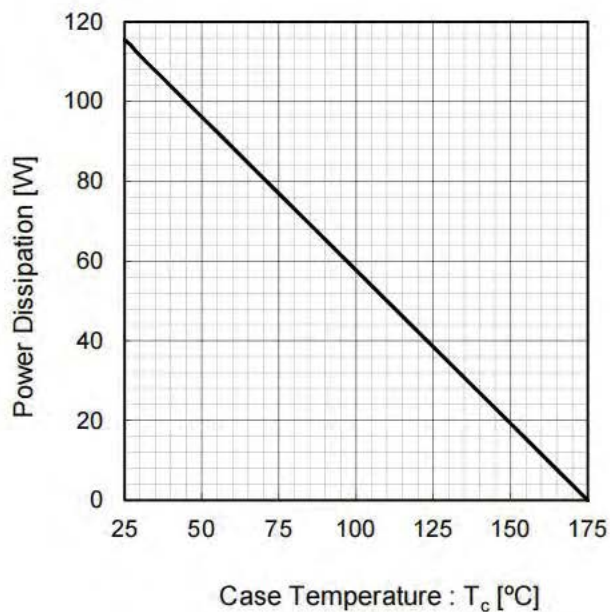


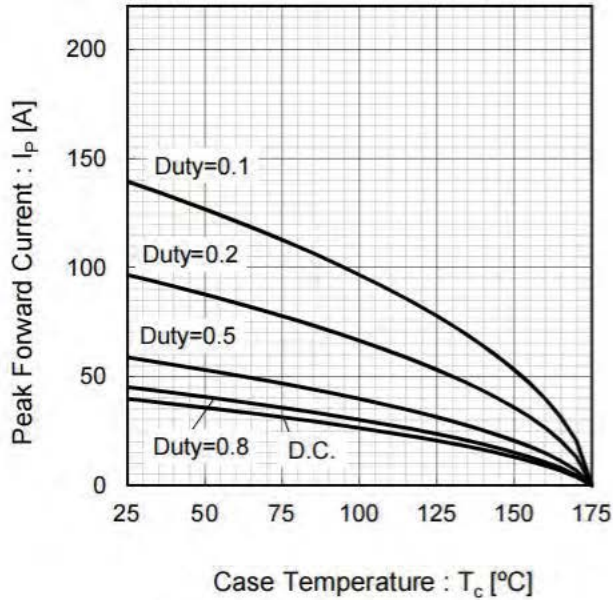
Fig.6 Power Dissipation





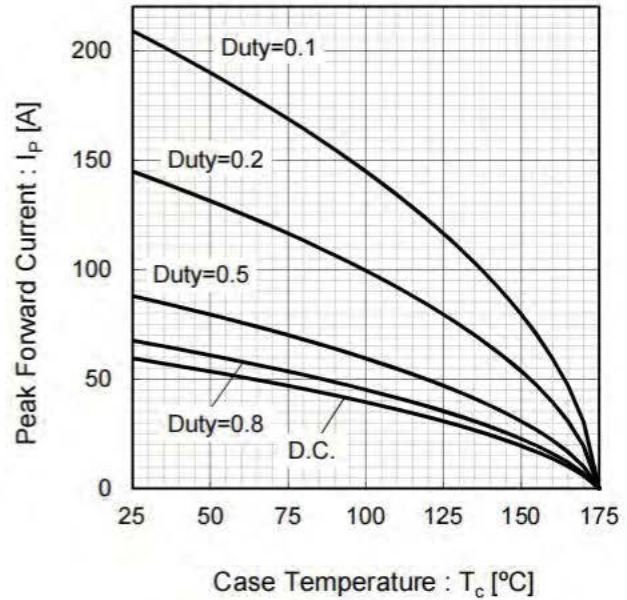
Typical Performance

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



*³ Based on max V_f , 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 V_f , 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)

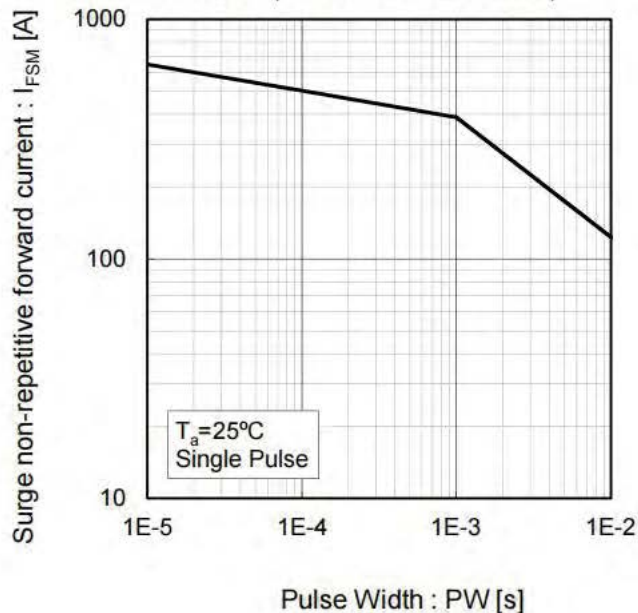
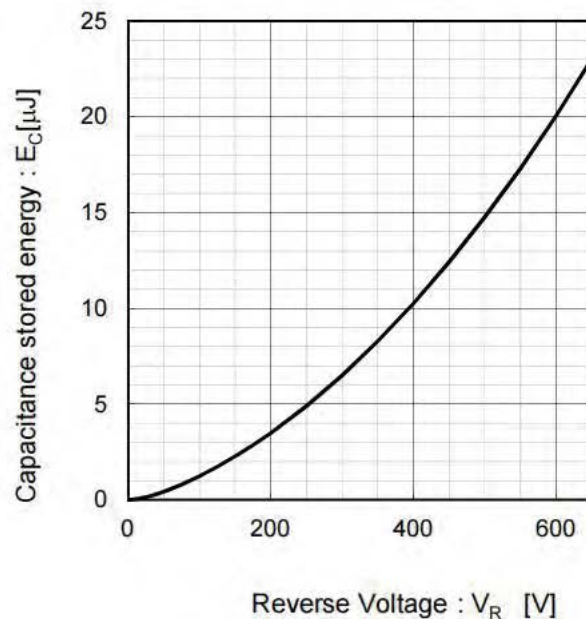


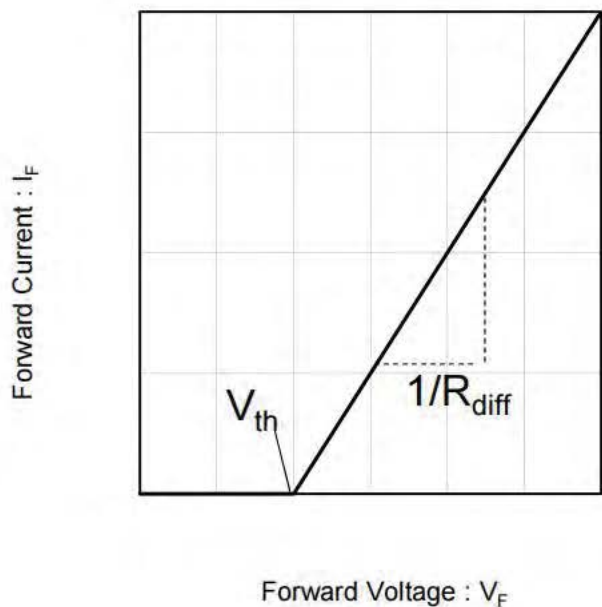
Fig.10 Typical capacitance store energy





Typical Performance

Fig.11 Equivalent forward current curve



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

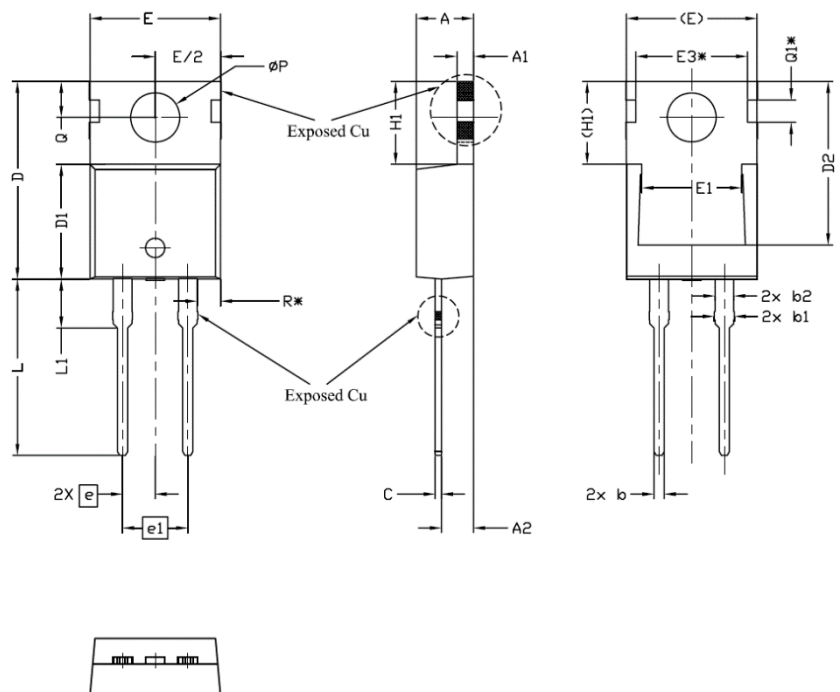
$$V_{th}(T_j) = a_0 + a_1 T_j$$
$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

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	$\Omega/^\circ\text{C}$
b_2	3.84E-07	$\Omega/^\circ\text{C}^2$

T_j in °C; -55 °C < T_j < 175°C ; I_F < 40A

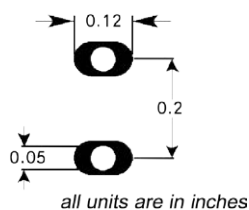


Package Information TO-220C-2L



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



TO220-2L



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