



## Features

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

## Benefits

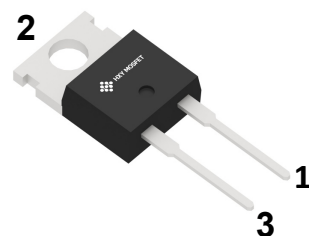
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

## Applications

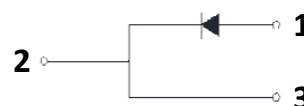
- Switch Mode Power Supplies (SMPS)
- Boost diodes in PFC or DC/DC stages
- Free Wheeling Diodes in Inverter stages
- AC/DC converters



Part Number	Package	Marking
HC4D10120A	TO-220C-2L	HC4D10120A



TO-220C-2L



## Maximum Ratings ( $T_C=25^{\circ}\text{C}$ 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	33 16 10	A	$T_C=25^{\circ}\text{C}$ $T_C=135^{\circ}\text{C}$ $T_C=156^{\circ}\text{C}$	Fig. 3
$I_{FRM}$	Repetitive Peak Forward Surge Current	47 31.5	A	$T_C=25^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse $T_C=110^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse	
$I_{FSM}$	Non-Repetitive Forward Surge Current	71 59.5	A	$T_C=25^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse $T_C=110^{\circ}\text{C}$ , $t_p=10$ ms, Half Sine Pulse	Fig. 8
$I_{FMax}$	Non-Repetitive Peak Forward Current	750 620	A	$T_C=25^{\circ}\text{C}$ , $t_p=10$ $\mu\text{s}$ , Pulse $T_C=110^{\circ}\text{C}$ , $t_p=10$ $\mu\text{s}$ , Pulse	Fig. 8
$P_{tot}$	Power Dissipation	166.5 72	W	$T_C=25^{\circ}\text{C}$ $T_C=110^{\circ}\text{C}$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-960\text{V}$	
$\int i^2 dt$	$i^2t$ value	25 17.5	$\text{A}^2\text{s}$	$T_C=25^{\circ}\text{C}$ , $t_p=10$ ms $T_C=110^{\circ}\text{C}$ , $t_p=10$ ms	
$T_J$	Operating Junction Range	-55 to +175	$^{\circ}\text{C}$		
$T_{stg}$	Storage Temperature Range	-55 to +135	$^{\circ}\text{C}$		
	TO-220 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	1.5 2.2	1.8 3	V	$I_F = 10\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 10\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
$I_R$	Reverse Current	30 55	250 350	$\mu\text{A}$	$V_R = 1200\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V}$ $T_J = 175^\circ\text{C}$	Fig. 2
$Q_C$	Total Capacitive Charge	52		nC	$V_R = 800\text{ V}$ , $I_F = 10\text{ A}$ $di/dt = 200\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	754 45 38		pF	$V_R = 0\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 400\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$ $V_R = 800\text{ V}$ , $T_J = 25^\circ\text{C}$ , $f = 1\text{ MHz}$	Fig. 6
$E_C$	Capacitance Stored Energy	14.5		$\mu\text{J}$	$V_R = 800\text{ V}$	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	0.9	$^\circ\text{C}/\text{W}$	Fig. 9

## Typical Performance

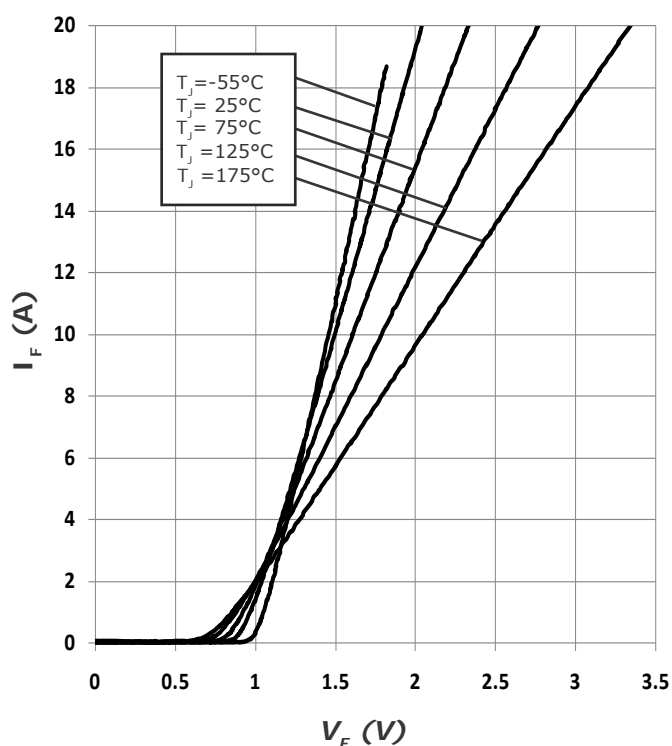


Figure 1. Forward Characteristics

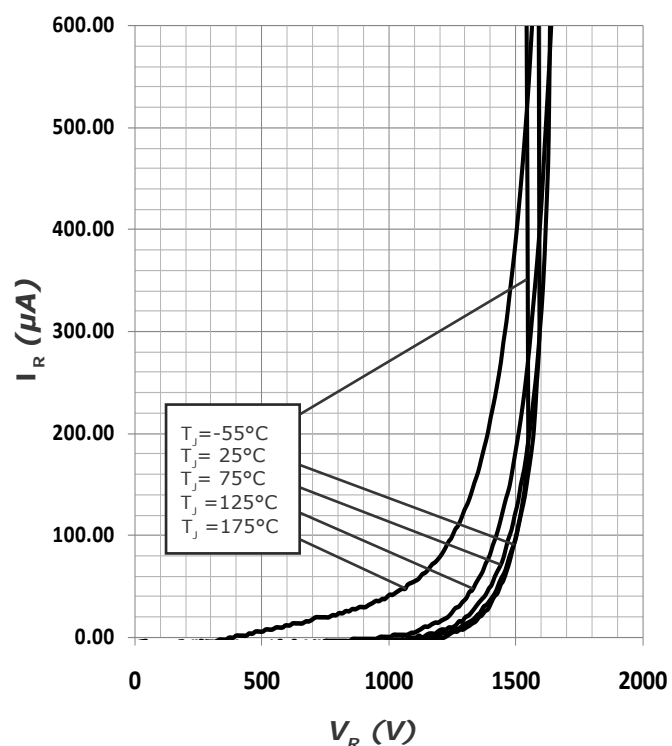


Figure 2. Reverse Characteristics



## Typical Performance

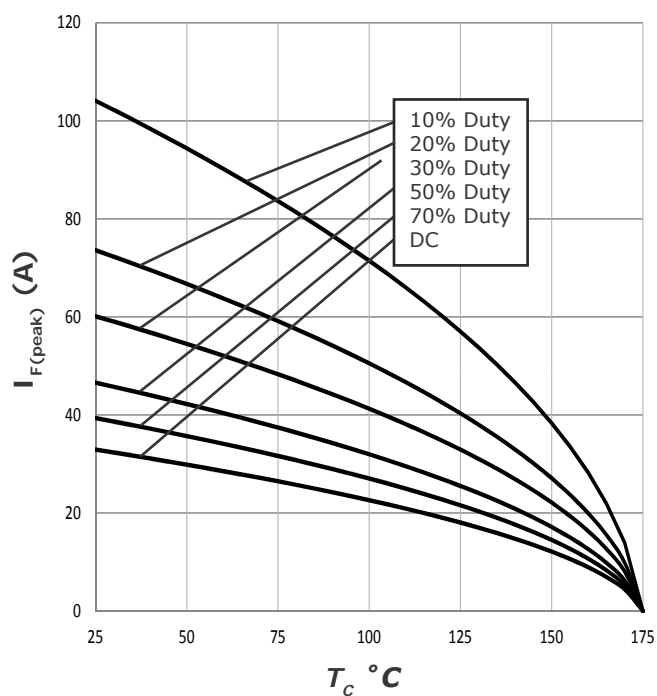


Figure 3. Current Derating

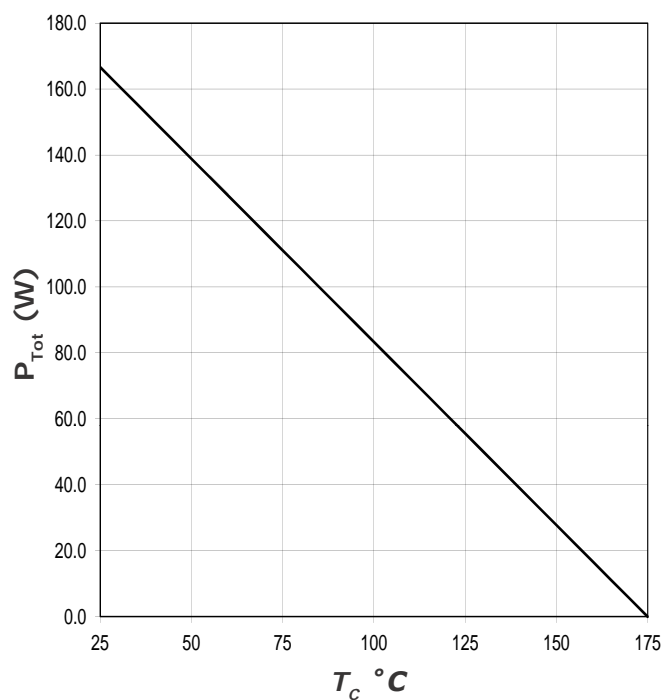


Figure 4. Power Derating

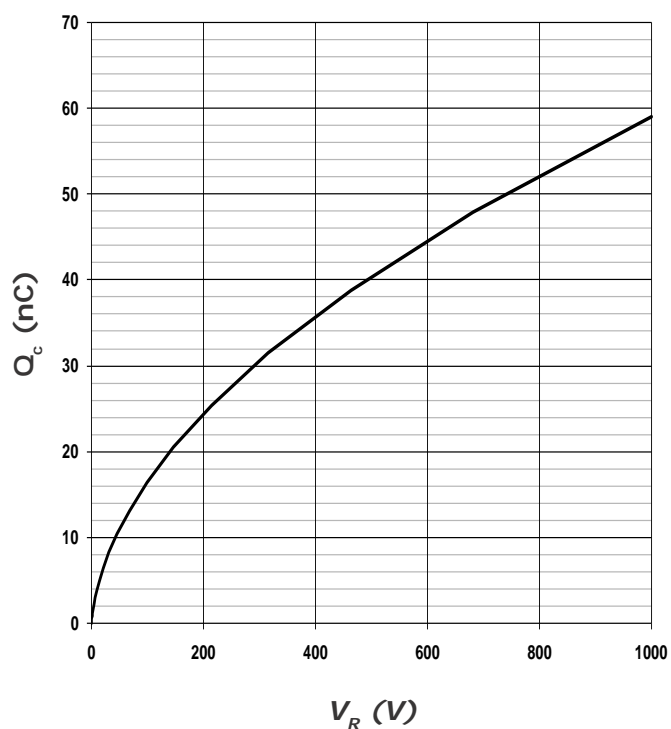


Figure 5. Recovery Charge vs. Reverse Voltage

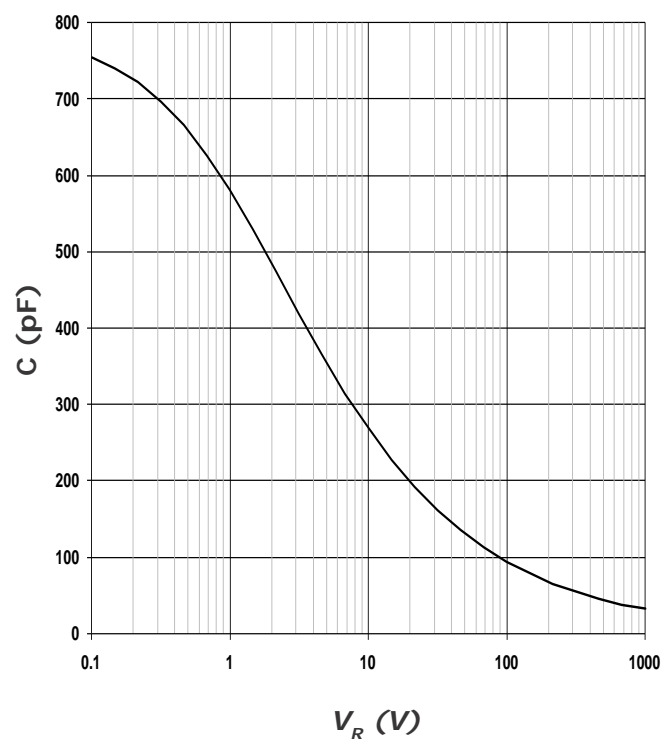


Figure 6. Capacitance vs. Reverse Voltage



## Typical Performance

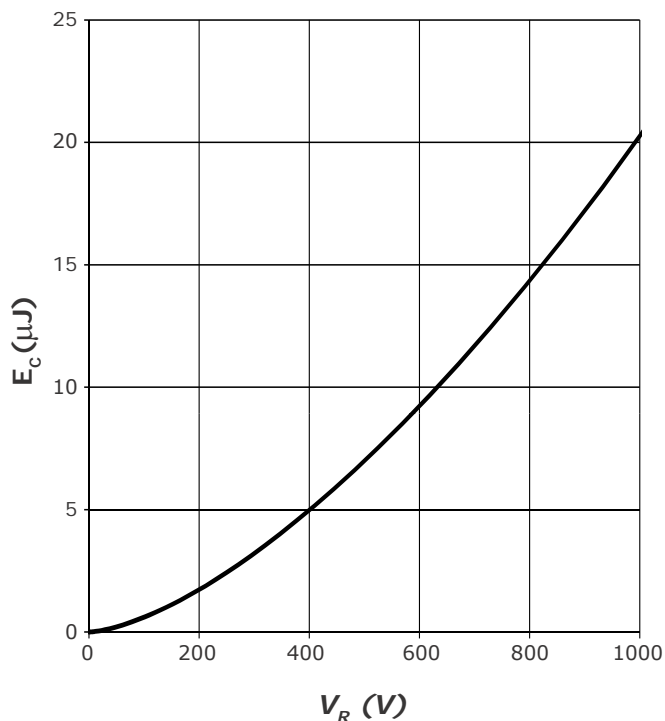


Figure 7. Typical Capacitance Stored Energy

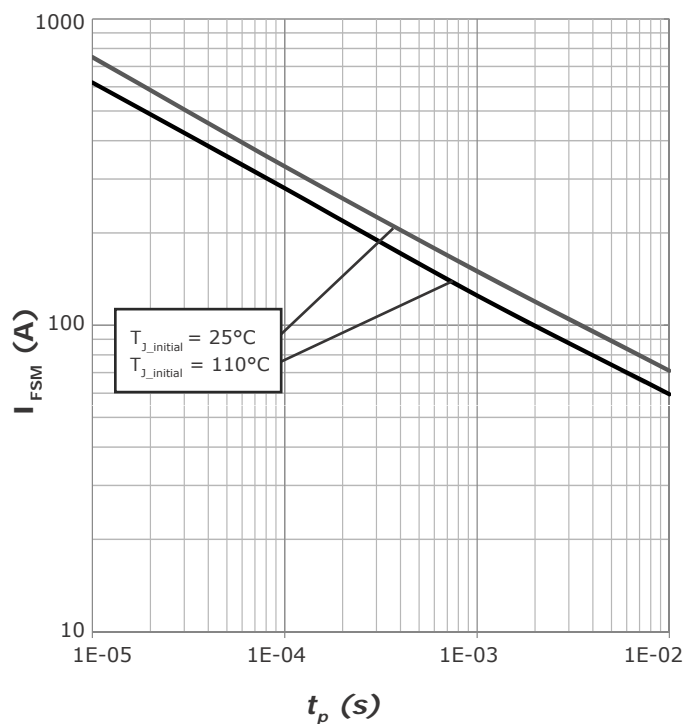


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

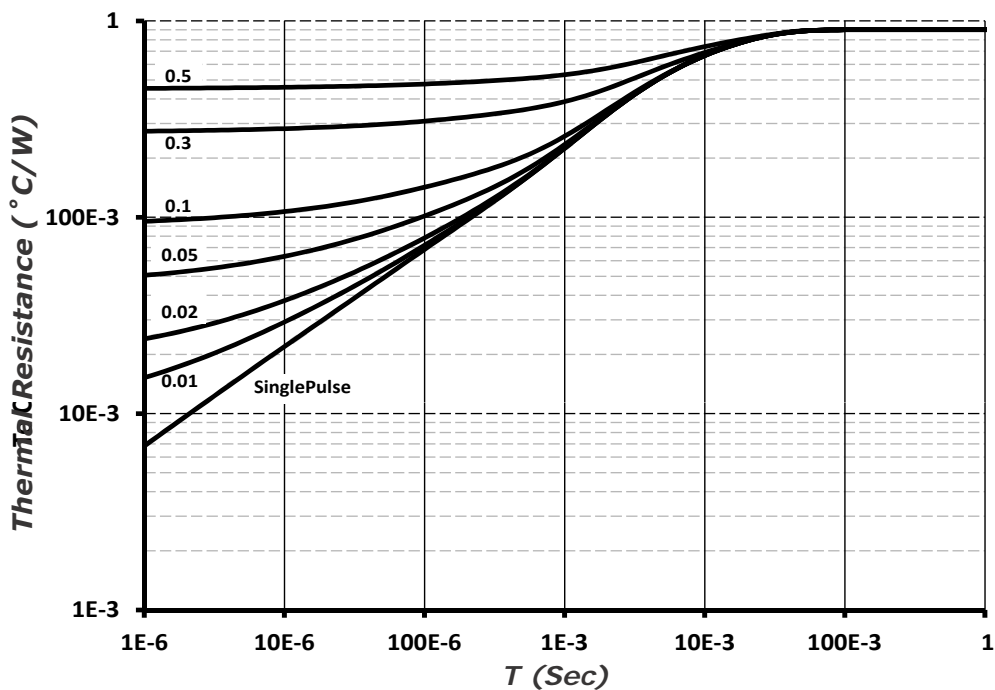
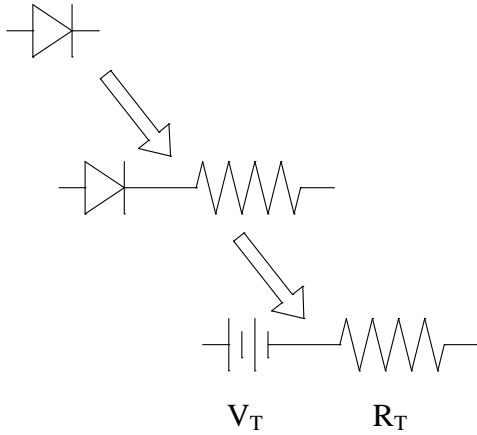


Figure 9. Transient Thermal Impedance



## Diode Model



$$V_{fT} = V_T + I_f \cdot R_T$$

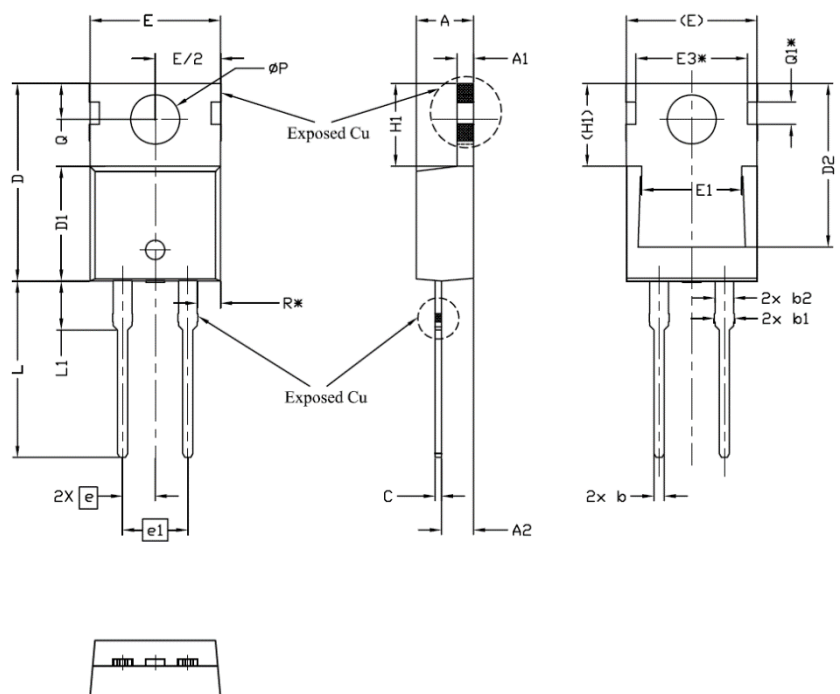
$$V_T = 0.98 + (T_J \cdot -1.71 \cdot 10^{-3})$$

$$R_T = 0.040 + (T_J \cdot 5.32 \cdot 10^{-4})$$

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

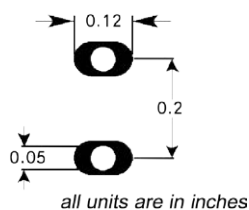


## Package Information TO-220C-2L



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



TO-220C-2L



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