



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

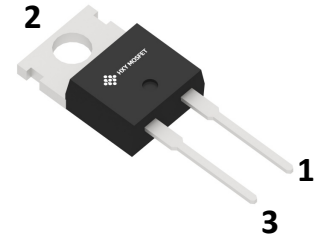
- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

Applications

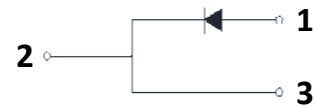
- Switch Mode Power Supplies
- Power Factor Correction
- Motor Drives



Part Number	Package	Brand
NXPSC10650Q	TO-220C-2L	HXY MOSFET



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	650	V		
V_{RSM}	Surge Peak Reverse Voltage	650	V		
V_{DC}	DC Blocking Voltage	650	V		
I_F	Continuous Forward Current	30 14.5 10	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=153^\circ\text{C}$	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	46 31	A	$T_C=25^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave $T_C=110^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	90 71	A	$T_C=25^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave $T_C=110^\circ\text{C}$, $t_p = 10$ ms, Half Sine Wave	Fig. 8
I_{FMax}	Non-Repetitive Peak Forward Surge Current	860 680	A	$T_C=25^\circ\text{C}$, $t_p = 10$ μs , Pulse $T_C=110^\circ\text{C}$, $t_p = 10$ μs , Pulse	Fig. 8
P_{tot}	Power Dissipation	136.5 59	W	$T_C=25^\circ\text{C}$ $T_C=110^\circ\text{C}$	Fig. 4
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		
	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 2.0	1.8 2.4	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	12 24	60 220	μA	$V_R = 650\text{ V}$, $T_J = 25^\circ\text{C}$ $V_R = 650\text{ V}$, $T_J = 175^\circ\text{C}$	Fig. 2
Q_C	Total Capacitive Charge	24		nC	$V_R = 400\text{ V}$, $I_F = 10\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	460.5 44 40		pF	$V_R = 0\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 200\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 400\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$	Fig. 6
E_C	Capacitance Stored Energy	3.6		μJ	$V_R = 400\text{ V}$	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	1.1	$^\circ\text{C}/\text{W}$	Fig. 9

Typical Performance

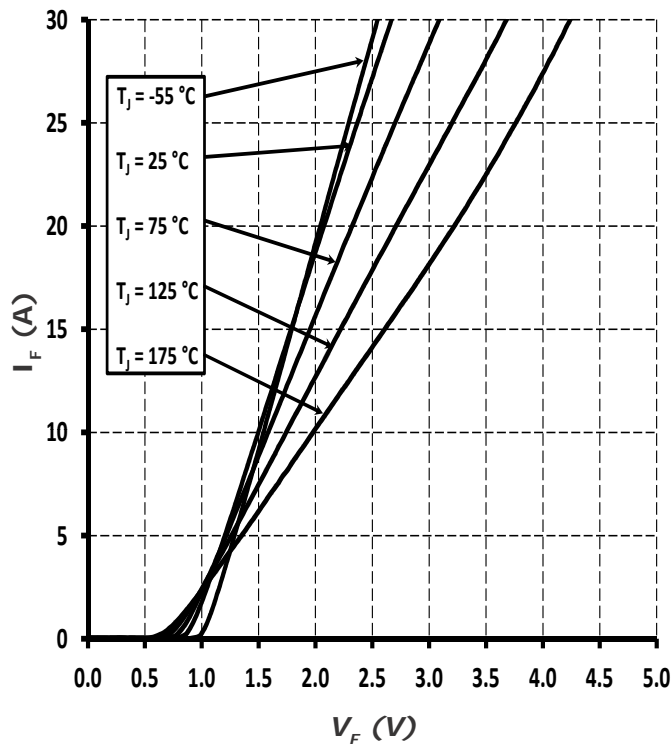


Figure 1. Forward Characteristics

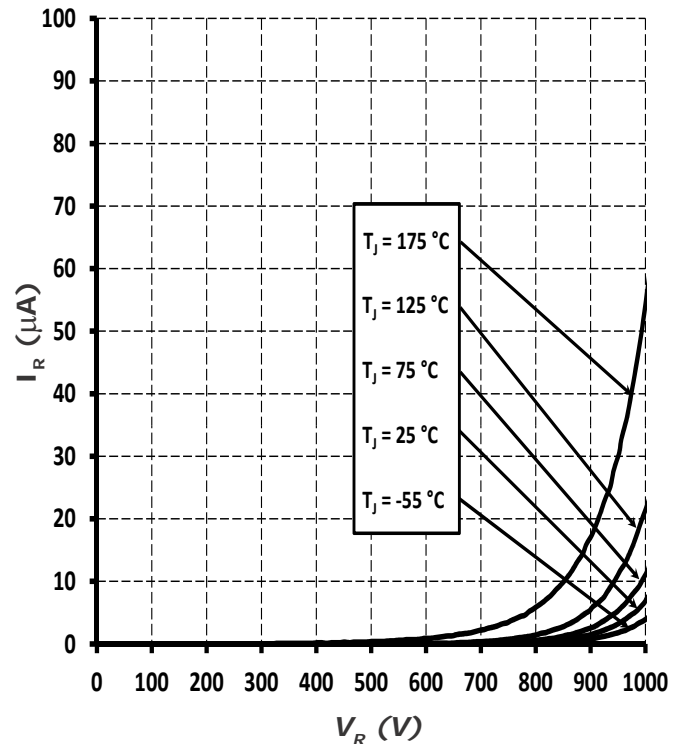


Figure 2. Reverse Characteristics



Typical Performance

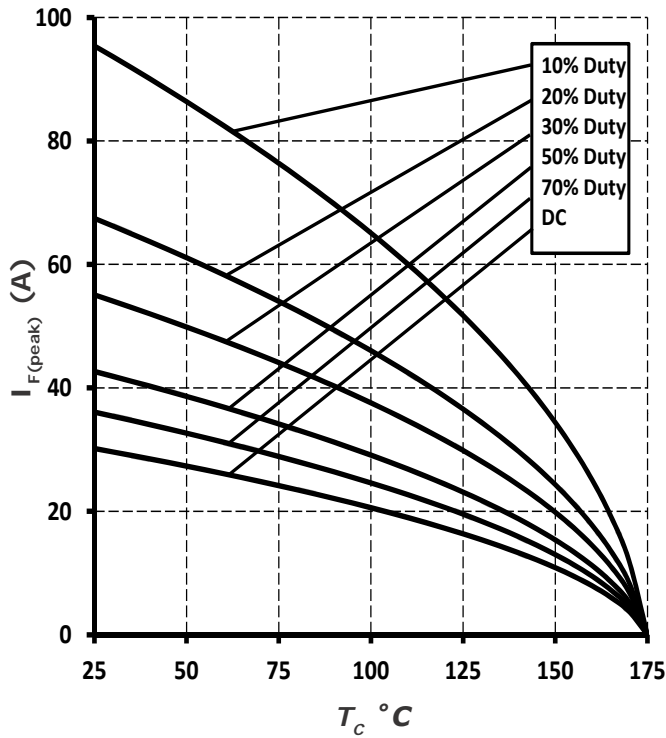


Figure 3. Current Derating

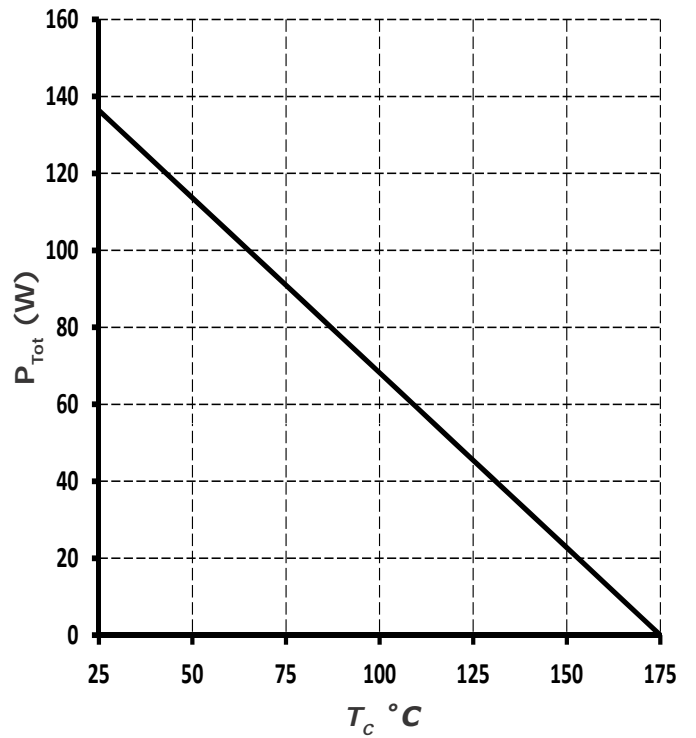


Figure 4. Power Derating

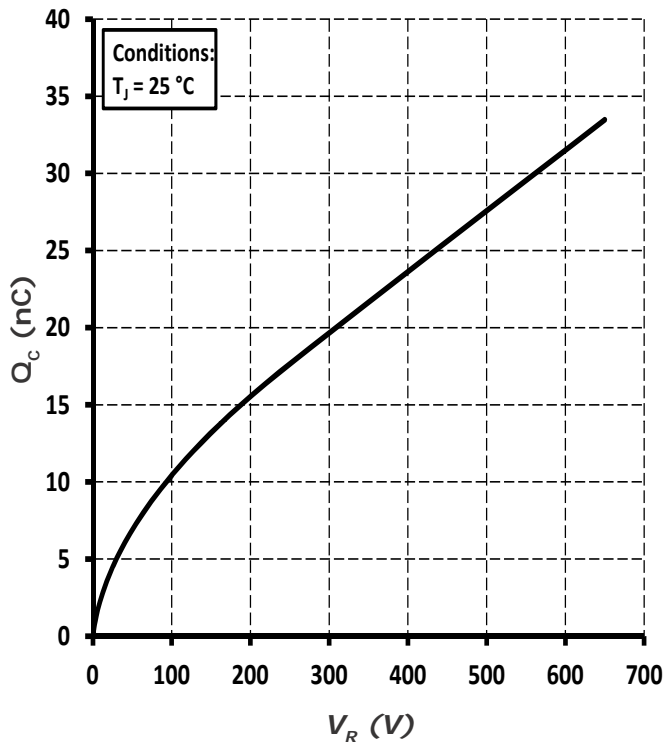


Figure 5. Total Capacitance Charge vs. Reverse Voltage

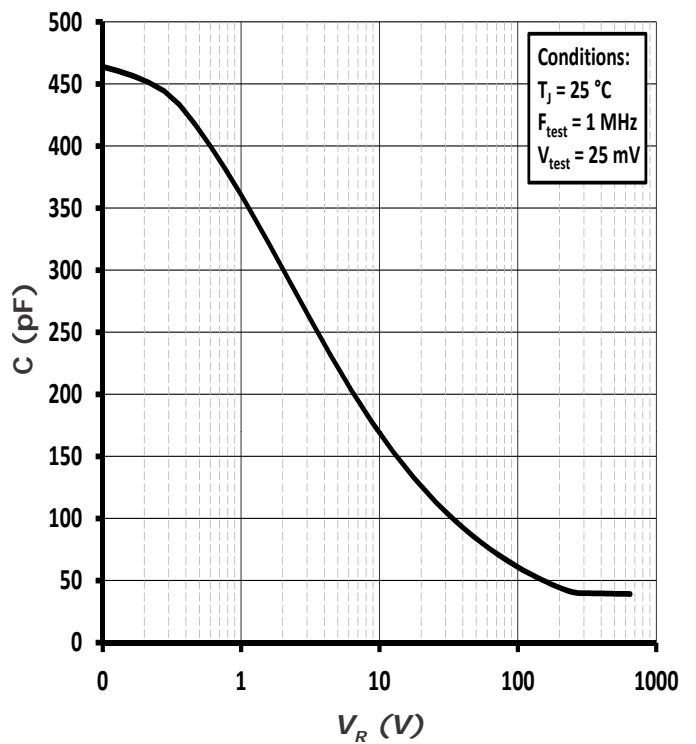


Figure 6. Capacitance vs. Reverse Voltage



Typical Performance

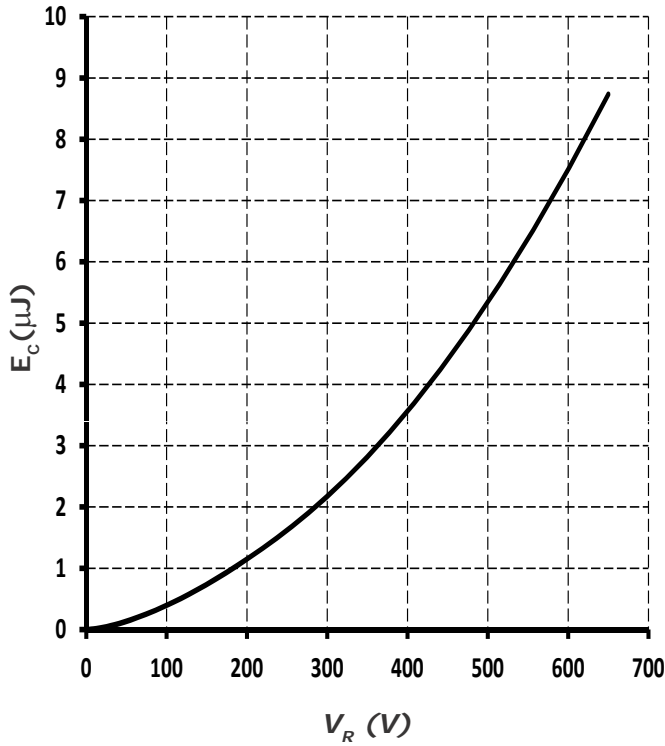


Figure 7. Capacitance Stored Energy

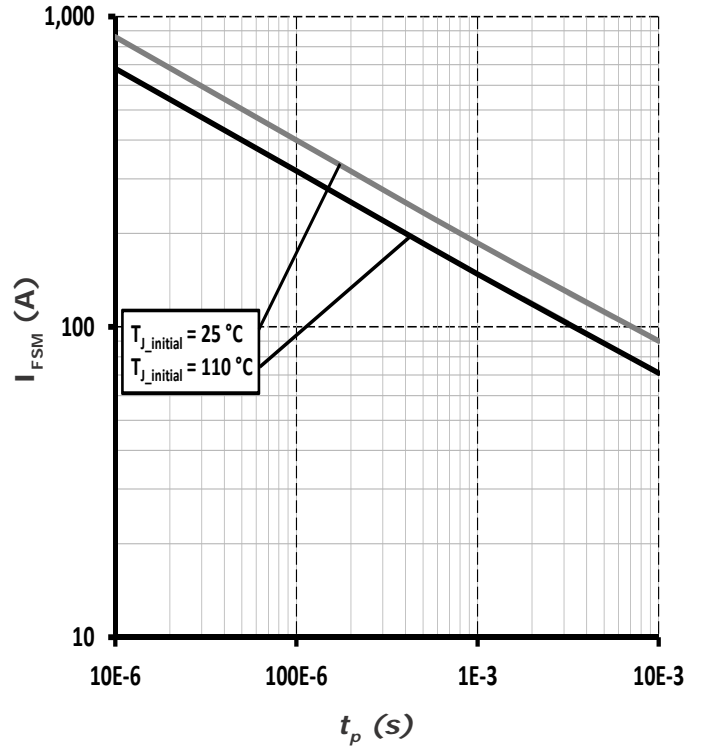


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

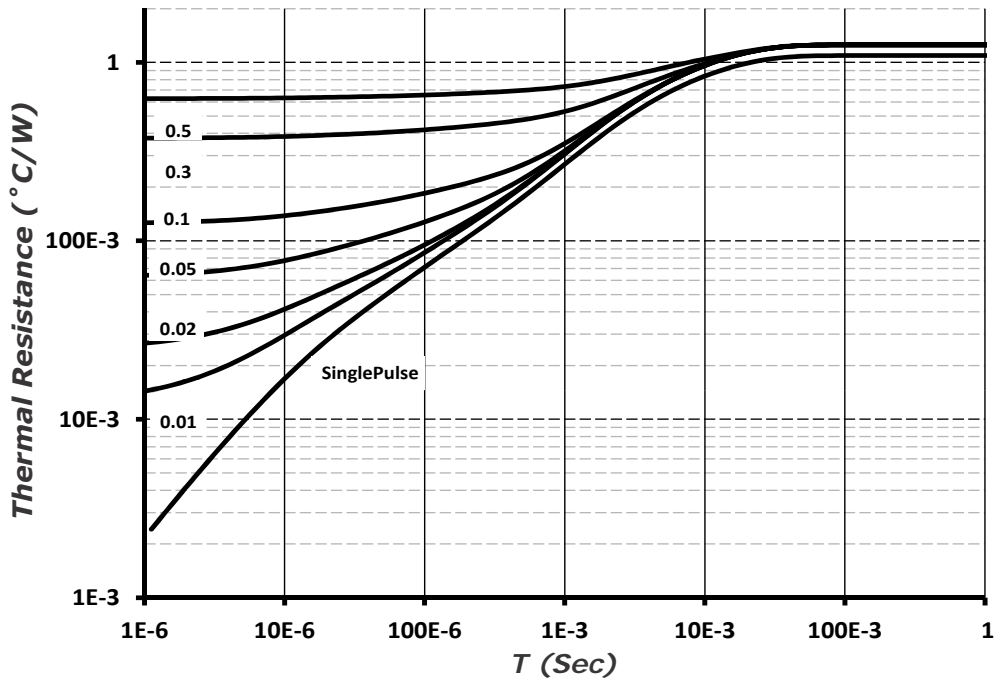
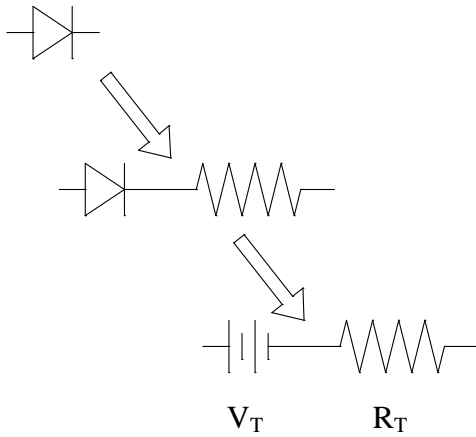


Figure 9. Transient Thermal Impedance



Diode Model



$$V_{f_T} = V_T + I_f * R_T$$

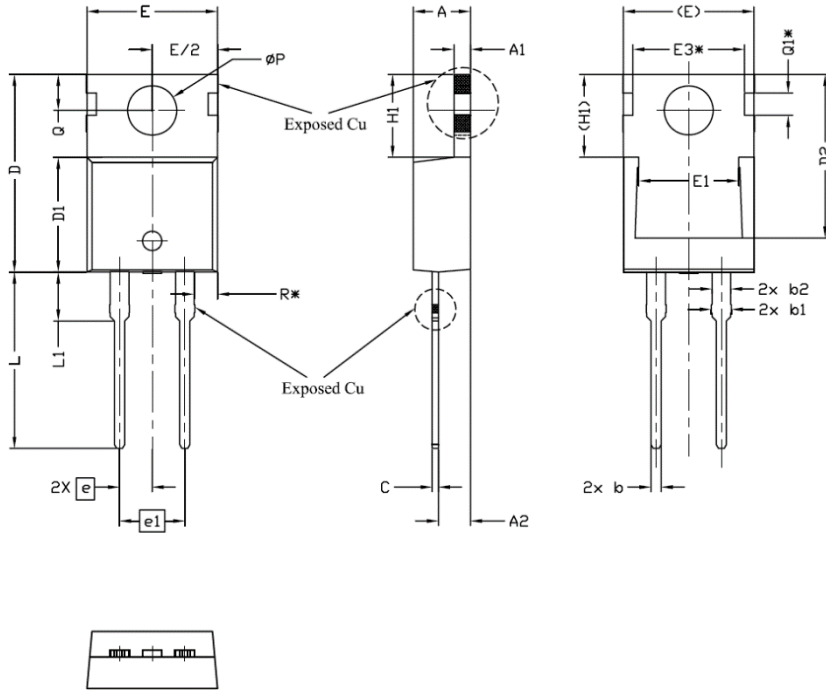
$$V_T = 0.94 + (T_J * -1.3 * 10^{-3})$$

$$R_T = 0.044 + (T_J * 4.4 * 10^{-4})$$

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

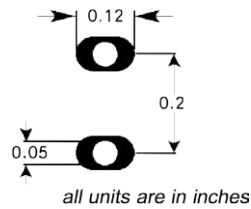


Package Information
TO-220C-2L



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	
$\varnothing P$	3,75	3,84	3,93	
Q	2,60	2,80	3,00	
Q1*	1,73REF.			
R*	1,82REF.			

Recommended Solder Pad Layout





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