

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

Part Number	Package	Marking
C3D16065D1	TO-247-3	C3D16065D1



TO-247-3

V_{RRM}	=	650 V
$I_F (T_c=147^\circ\text{C})$	=	16 A
Q_c	=	40 nC

Package



Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value		Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	650	V		
V_{DC}	DC Blocking Voltage	650	V		
I_F	Continuous Forward Current	43 20 16	A	$T_c=25^\circ\text{C}$ $T_c=135^\circ\text{C}$ $T_c=147^\circ\text{C}$	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	57 33	A	$T_c=25^\circ\text{C}, t_p=10\text{ ms}$, Half Sine Pulse $T_c=110^\circ\text{C}, t_p=10\text{ ms}$, Half Sine Pulse	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	160 148	A	$T_c=25^\circ\text{C}, t_p=10\text{ ms}$, Half Sine Pulse $T_c=110^\circ\text{C}, t_p=10\text{ ms}$, Half Sine Pulse	Fig. 8
P_{tot}	Power Dissipation	173 75	W	$T_c=25^\circ\text{C}$ $T_c=110^\circ\text{C}$	Fig. 4
$\int i^2 dt$	$i^2 t$ value	128 110	A^2s	$T_c=25^\circ\text{C}, t_p=10\text{ ms}$ $T_c=110^\circ\text{C}, t_p=10\text{ ms}$	
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	$I_F = 16\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 16\text{ A}$ $T_J = 175^\circ\text{C}$	Fig. 1
I_R	Reverse Current	18 38	95 378	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	40		nC	$V_R = 400\text{ V}$, $I_F = 16\text{ A}$ $T_J = 25^\circ\text{C}$	Fig. 5
C	Total Capacitance	740 74 68		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	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	0.86	$^\circ\text{C/W}$	Fig. 9

Typical Performance

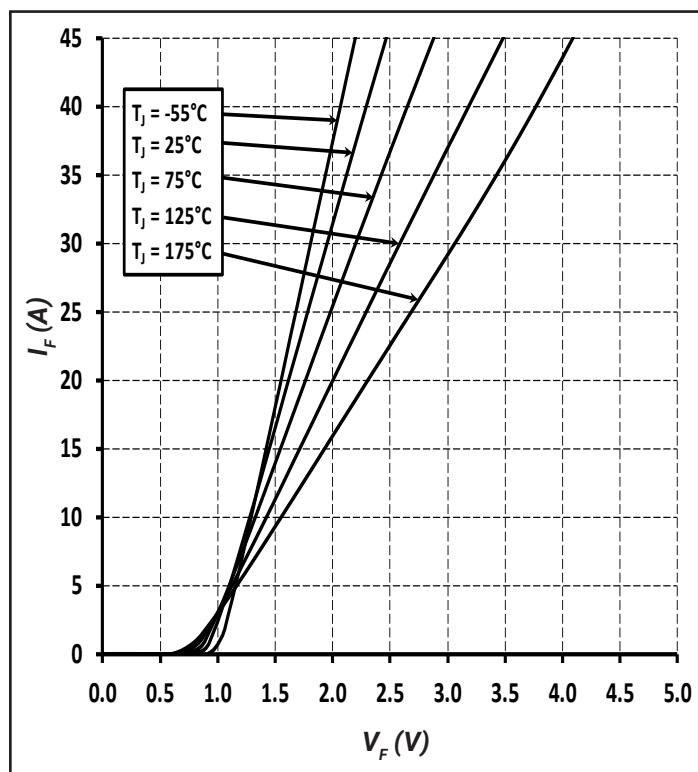


Figure 1. Forward Characteristics

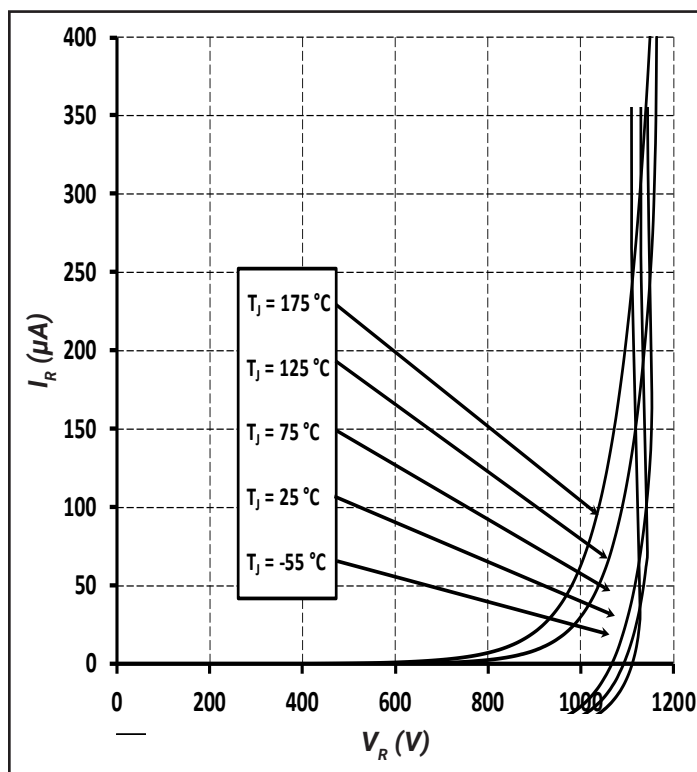


Figure 2. Reverse Characteristics

Typical Performance

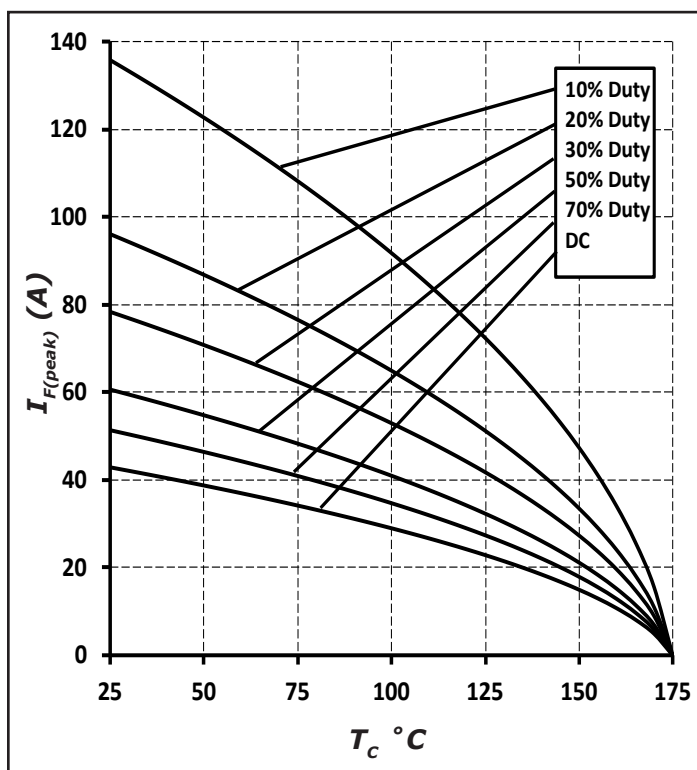


Figure 3. Current Derating

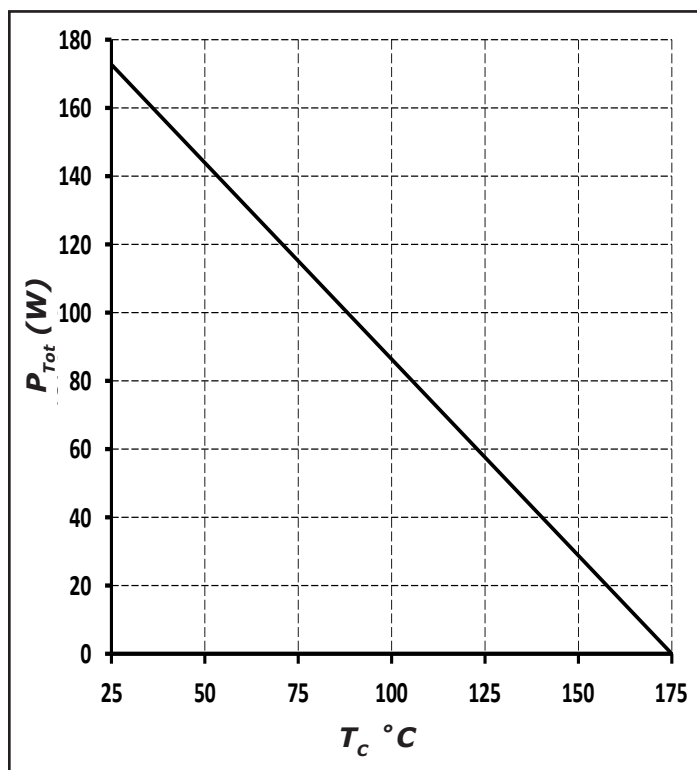


Figure 4. Power Derating

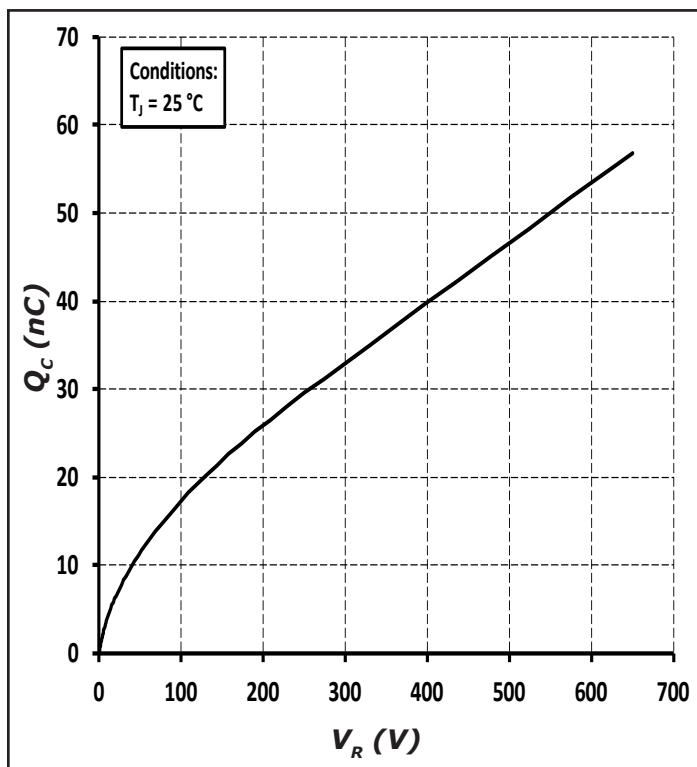


Figure 5. Total Capacitance Charge vs. Reverse Voltage

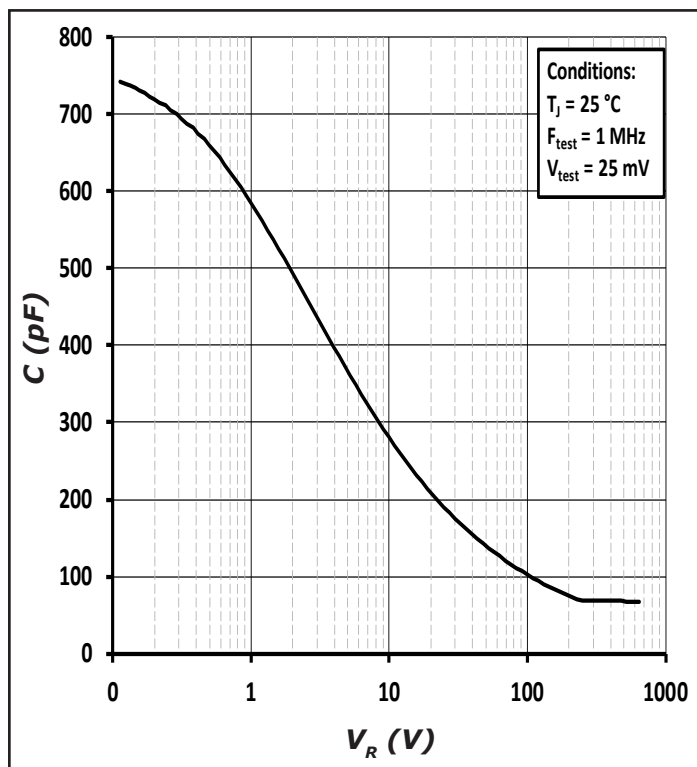


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

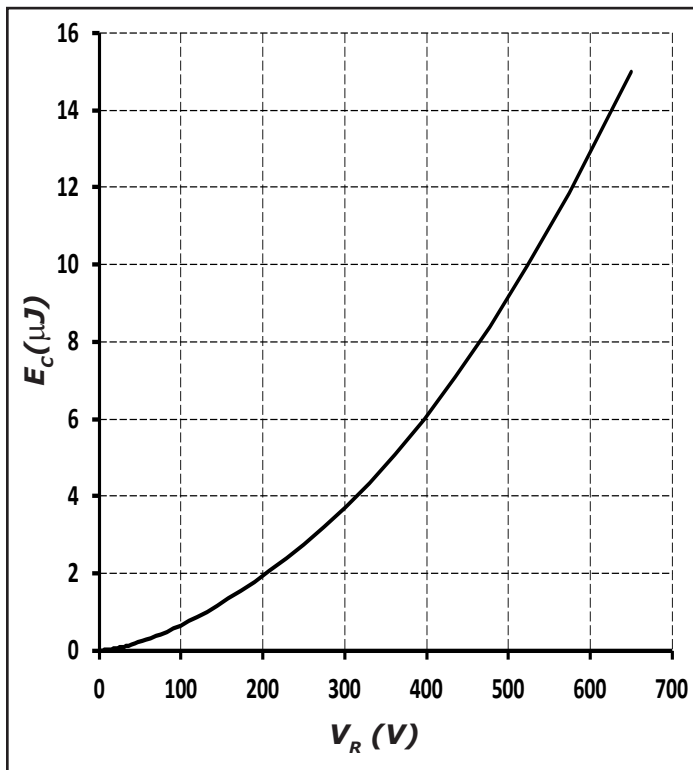


Figure 7. Capacitance Stored Energy

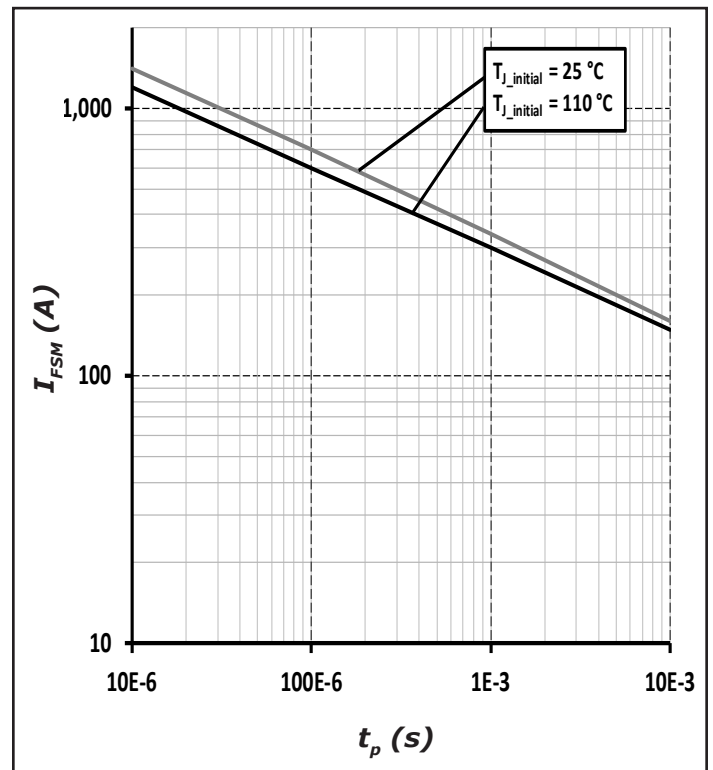


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

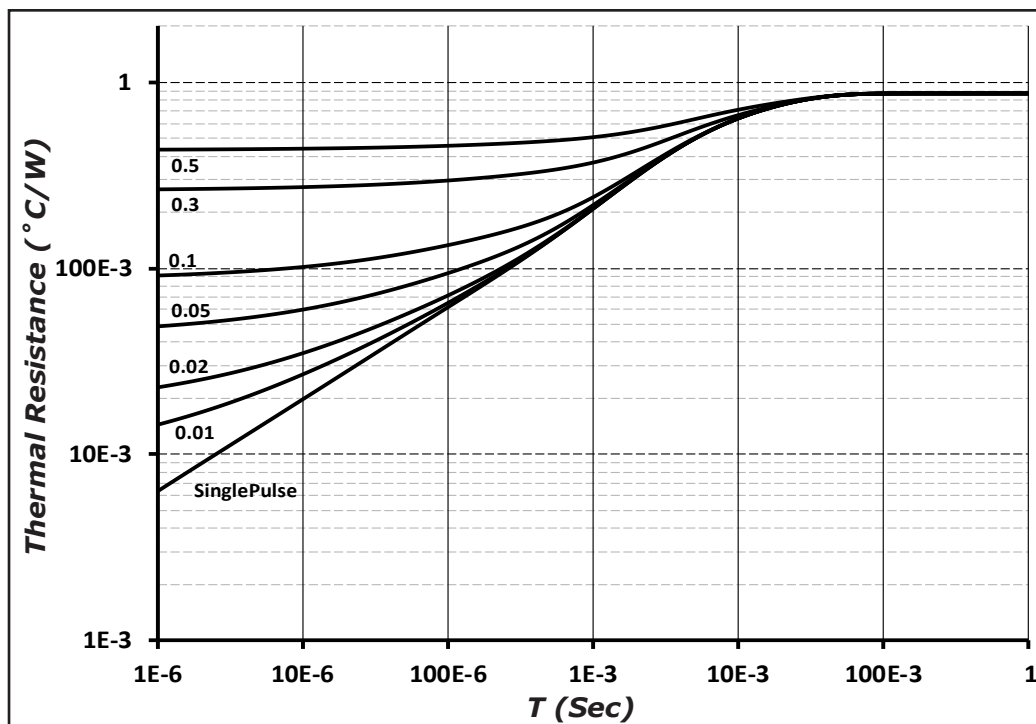
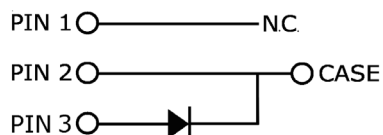
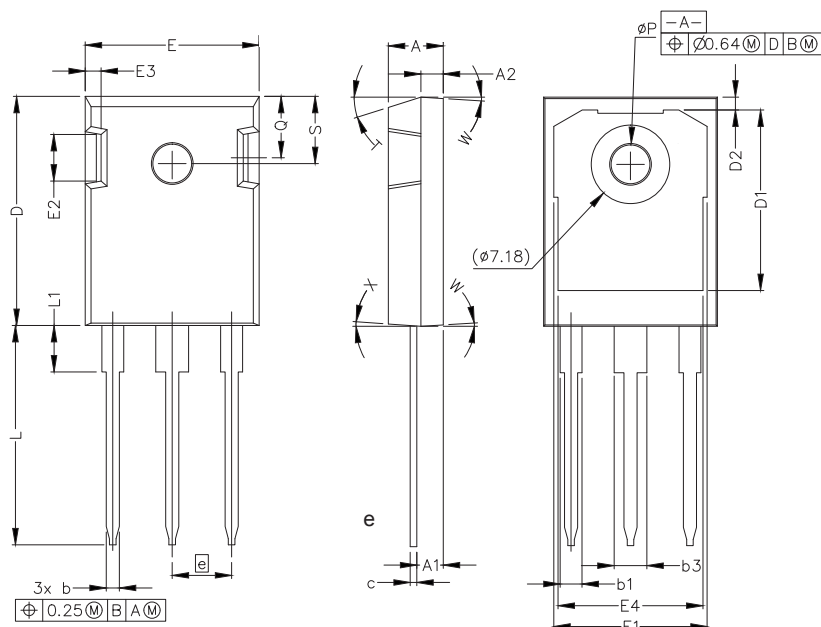


Figure 9. Transient Thermal Impedance

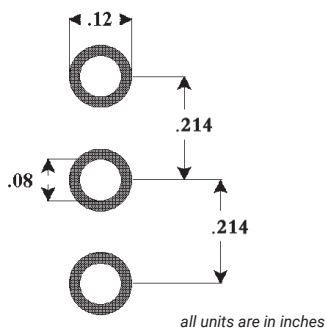
Package Dimensions

Package TO-247-3



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.83	5.21
A1	.090	.100	2.29	2.54
A2	.075	.085	1.91	2.16
b	.042	.052	1.07	1.33
b1	.075	.095	1.91	2.41
b3	.113	.133	2.87	3.38
c	.022	.027	0.55	0.68
D	.819	.831	20.80	21.10
D1	.640	.695	16.25	17.65
D2	.037	.049	0.95	1.25
E	.620	.635	15.75	16.13
E1	.516	.557	13.10	14.15
E2	.145	.201	3.68	5.10
E3	.039	.075	1.00	1.90
E4	.487	.529	12.38	13.43
e	.214 BSC		5.44 BSC	
L	.780	.800	19.81	20.32
L1	.161	.173	4.10	4.40
N	3			
ØP	.138	.144	3.51	3.65
Q	.216	.236	5.49	6.00
S	.238	.248	6.04	6.30
T	17.5° REF			
W	3.5° REF			
X	4° REF			

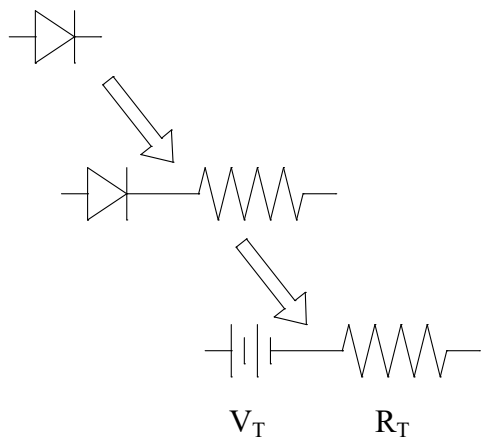
Recommended Solder Pad Layout



TO-247-3

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Diode Model



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

$$V_T = 0.97 + (T_J * -1.0 * 10^{-3})$$

$$R_T = 0.024 + (T_J * 3.0 * 10^{-4})$$

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