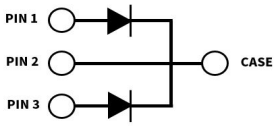
C3D20060D

3rd Generation 600 V, 20 A Silicon Carbide Schottky Diode

Description

With the performance advantages of a Silicon Carbide (SiC) Schottky Barrier diode, power electronics systems can expect to meet higher efficiency standards than Si-based solutions, while also reaching higher frequencies and power densities. SiC diodes can be easily paralleled to meet various application demands, without concern of thermal runaway. In combination with the reduced cooling requirements and improved thermal performance of SiC products, SiC diodes are able to provide lower overall system costs in a variety of diverse applications.



Package Types: TO-247-3
Marking: C3D20060

Features

- High-Frequency Operation
- Zero Reverse Recovery Current / Forward Recovery Voltage
- Temperature-Independent Switching Behavior
- Parallel Devices Without Thermal Runaway

Typical Applications

- Boost Diodes in PFC or DC/DC Stages
- Free Wheeling Diodes in Inverter Stages
- Switch Mode Power Supplies
- Solar Inverters
- AC/DC Converters

Maximum Ratings (T_C = 25°C Unless Otherwise Specified)

* Per Leg, ** Per Device

Parameter	Symbol	Value	Unit	Test Conditions	Notes
Repetitive Peak Reverse Voltage	V_{RRM}	600	V		
Surge Peak Reverse Voltage	V_{RSM}	600			
DC Blocking Voltage	V_{DC}	600			
Continuous Forward Current (Per Leg/Per Device)	I_F	27.5/55	A	T_C = 25 °C	Fig. 3
		13/26		T_C = 135 °C	
		10/20		T_C = 149 °C	
Repetitive Peak Forward Surge Current	I_{FRM}	46*		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	
		31*		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Non-Repetitive Forward Surge Current	I_{FSM}	90*		T_C = 25 °C, t_p = 10 ms, Half Sine Wave	Fig. 8
		71*		T_C = 110 °C, t_p = 10 ms, Half Sine Wave	
Non-Repetitive Peak Forward Surge Current	$I_{F,Max}$	860*		T_C = 25 °C, t_p = 10 µs, Pulse	
		680*		T_C = 110 °C, t_p = 10 µs, Pulse	
Power Dissipation	P_{tot}	136.5*	W	T_C = 25 °C	Fig. 4
		59*		T_C = 110 °C	
Diode dV/dt Ruggedness	dV/dt	200	V/ns	V_R = 0-650V	

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Electrical Characteristics

Parameter	Symbol	Typ.	Max.	Unit	Test Conditions	Notes
Forward Voltage	V_F	1.5	1.8	V	I_F = 10 A, T_j = 25 °C	Fig. 1
		2.0	2.4		I_F = 10 A, T_j = 175 °C	
Reverse Current	I_R	10	50	µA	V_R = 600 V, T_j = 25 °C	Fig. 2
		20	200		V_R = 600 V, T_j = 175 °C	
Total Capacitive Charge	Q_C	24		nC	V_R = 400 V, T_j = 25 °C I_F = 10A, di/dt = 500A/µs	Fig. 5
Total Capacitance	C	460.5		pF	V_R = 0 V, T_j = 25 °C, f = 1 MHz	Fig. 6
		44			V_R = 200 V, T_j = 25 °C, f = 1 MHz	
		40			V_R = 400 V, T_j = 25 °C, f = 1 MHz	
Capacitance Stored Energy	E_c	3.6		µJ	V_R = 400 V	Fig. 7

Notes:
SiC Schottky Diodes are majority carrier devices, so there is no reverse recovery charge.

Thermal & Mechanical Characteristics

Parameter	Symbol	Value	Unit	Notes
Thermal Resistance, Junction to Case (Typical)	$R_{\theta, JC (TYP)}$	1.3** 0.65*	°C / W	
Junction Temperature	T_j	-55 to +175	°C	
Case & Storage Temperature	T_c	-55 to +175		
TO-247 Mounting Torque	-	1	Nm	M3 Screw
		8.8	lbf-in	6-32 Screw

* Per Leg, ** Per Device

Typical Performance

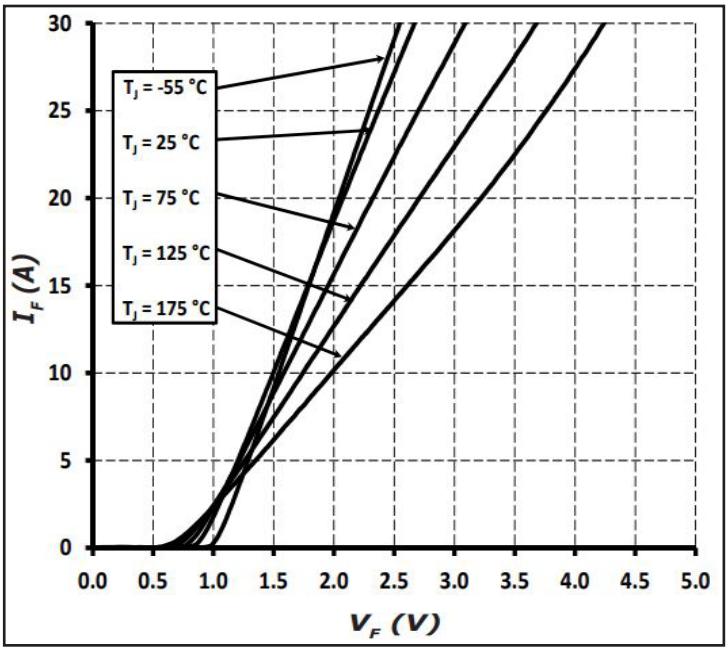


Figure 1
Forward Characteristics

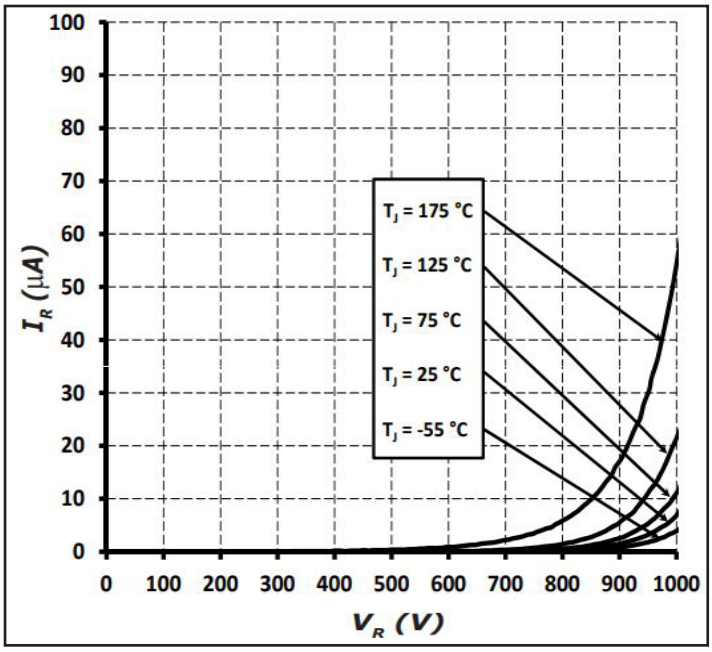


Figure 2
Reverse Characteristics

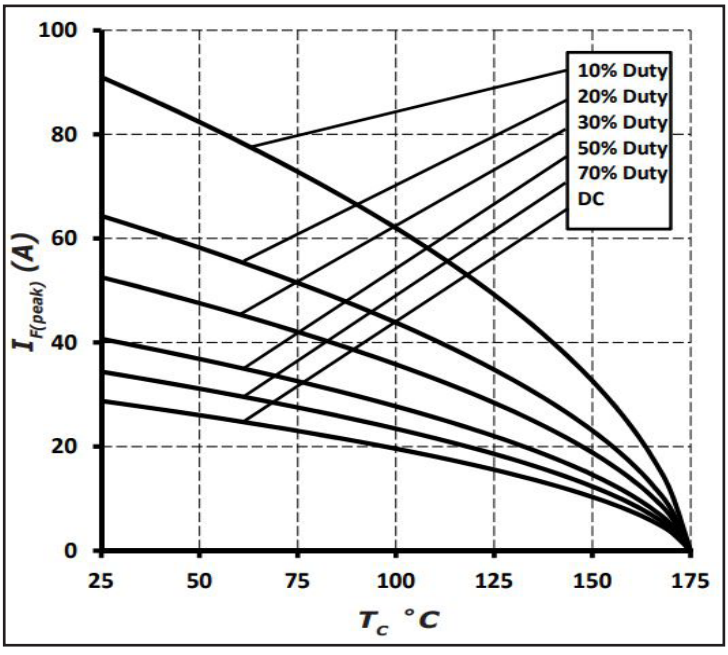


Figure 3
Current Derating

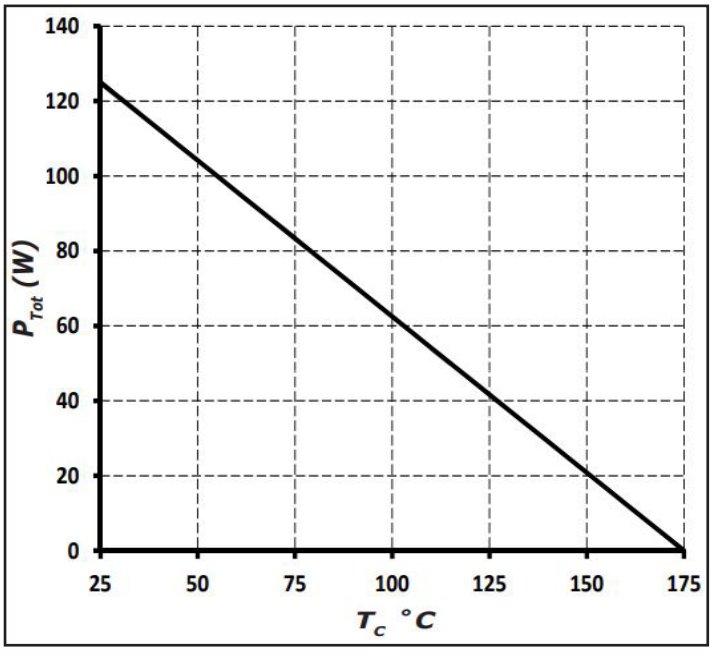


Figure 4
Power Derating

Typical Performance

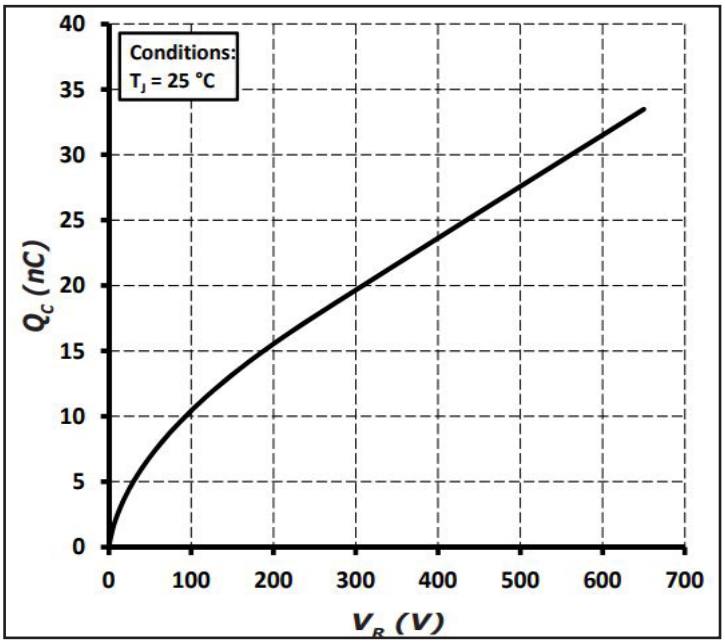


Figure 5
Total Capacitance Charge vs. Reverse Voltage

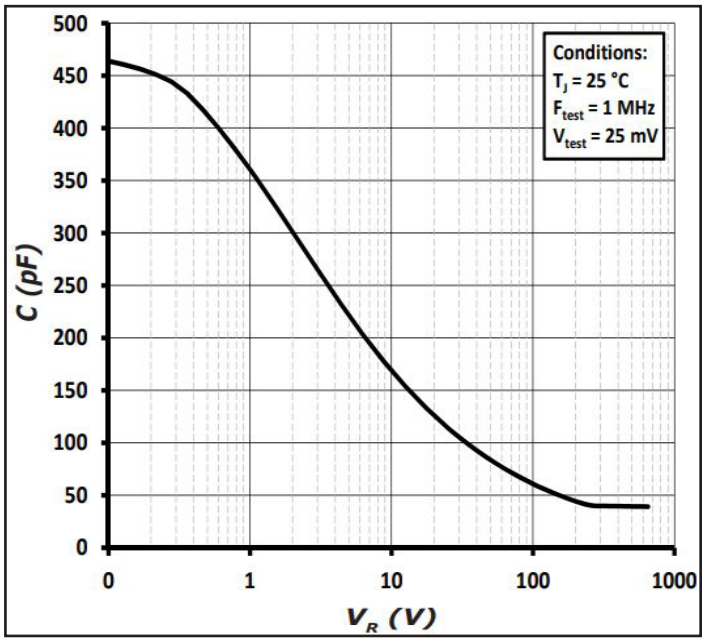


Figure 6
Capacitance vs. Reverse Voltage

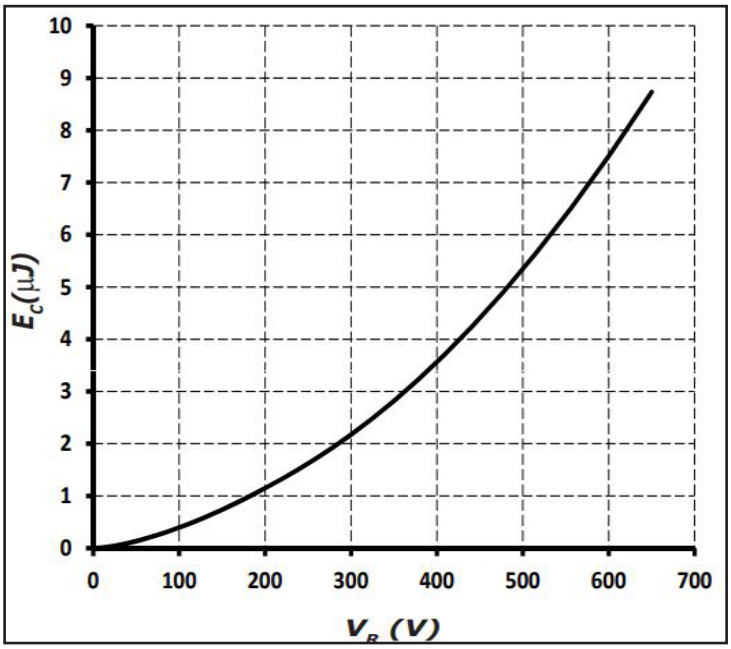


Figure 7
Capacitance Stored Energy

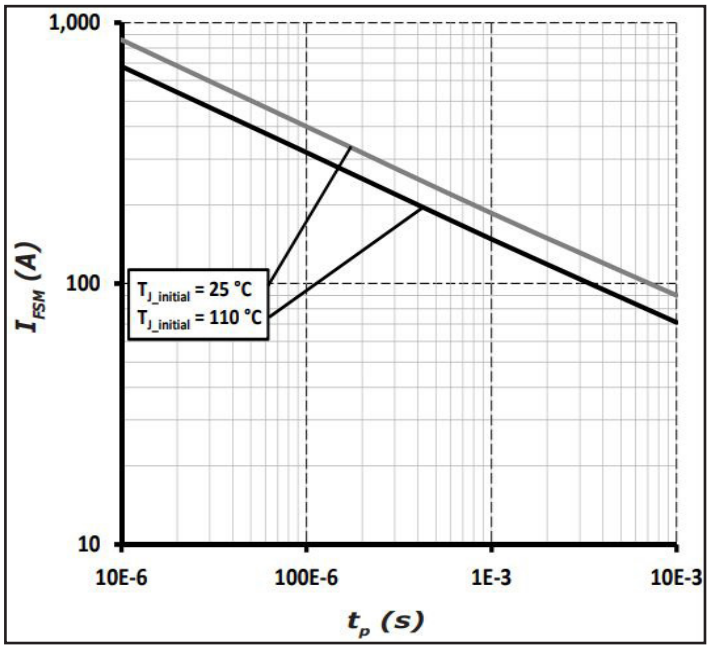


Figure 8
Non-Repetitive Peak Forward Surge Current vs. Pulse Duration

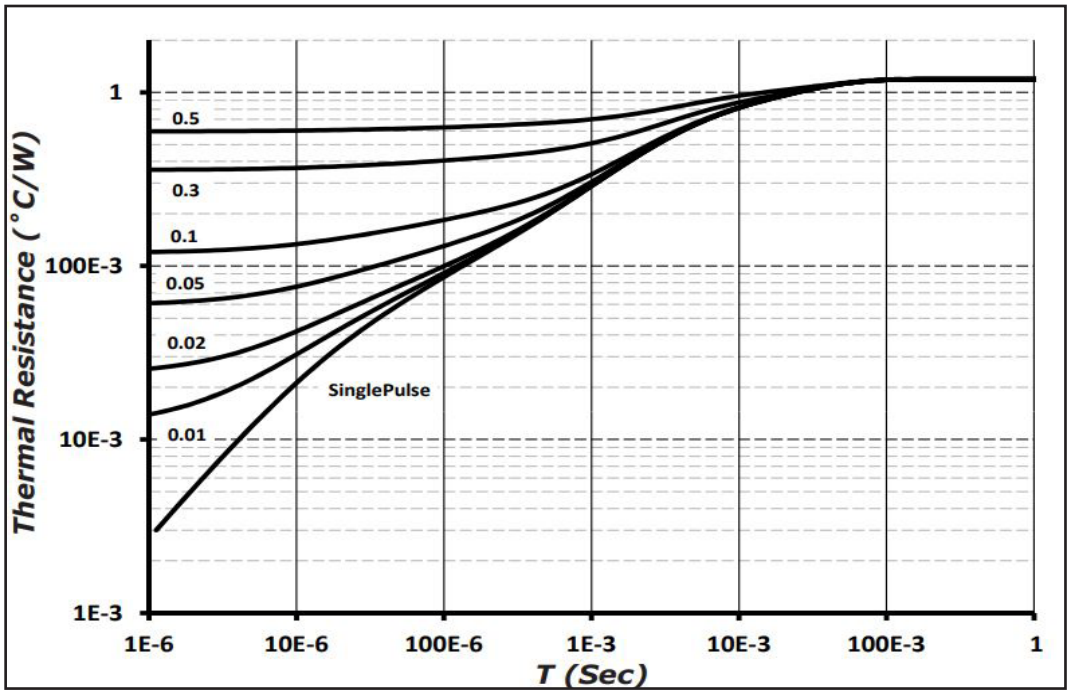
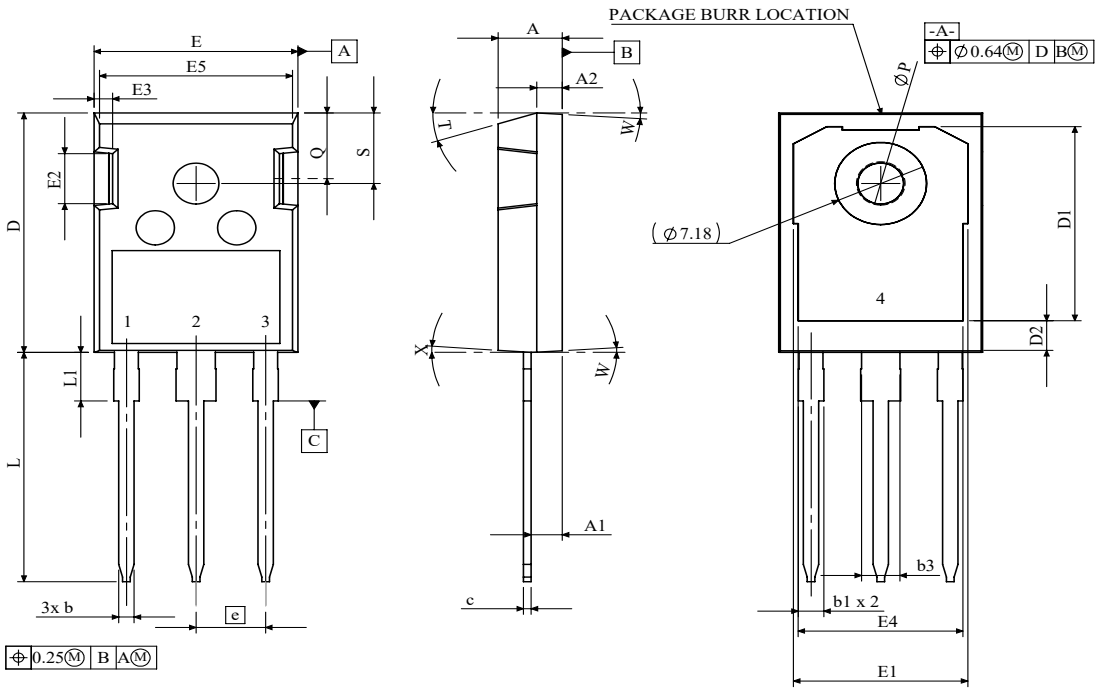


Figure 9
Transient Thermal Impedance

Package Dimensions & Pin-Out

Package: TO-247-3



SYMBOL	MIN (mm)	MAX (mm)
A	4.83	5.21
A1	2.27	2.52
A2	1.91	2.16
b	1.07	1.33
b1	1.91	2.41
b3	2.87	3.38
c	0.55	0.74
D	20.75	21.05
D1	16	17.4
D2	2.86	3.26
E	15.75	16.13
E1	13.5	14.55
E2	3.68	5.1
E3	1	1.9
E4	12.38	13.43
E5	14.65	15.05
e	5.44 BSC	
L	19.73	20.48
L1	3.97	4.69
ØP	3.18	4.06
Q	5.42	5.96
S	5.85	6.49
T	17.5° REF.	
W	3.5° REF.	
X	4° REF.	

1	ANODE
2	CATHODE
3	ANODE
4	CATHODE

NOTES:
1. ALL METAL SURFACES ARE TIN PLATED (MATTE), EXCEPT AREA OF CUT.
2. DIMENSIONING & TOLERANCING CONFORM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE LISTED IN MILLIMETERS. ANGLES ARE IN DEGREES.
4. BURR OR MOLD FLASH SIZE (0.5 mm) IS NOT INCLUDED IN THE DIMENSIONS

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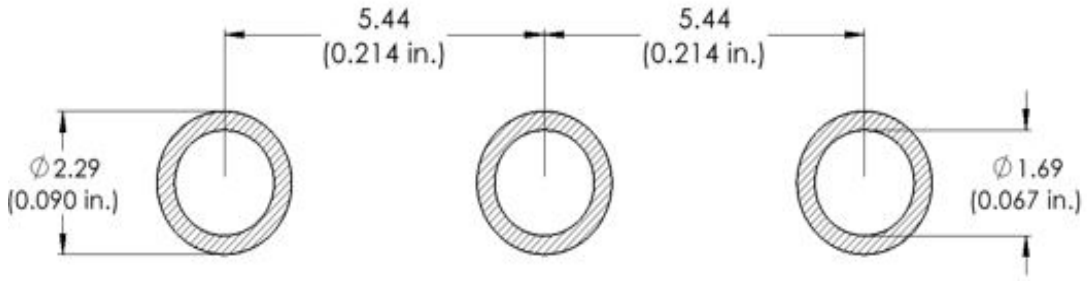
TITLE: PACKAGE OUTLINE DRAWING: TO-247-3L(SCHOTTKY 2 die)

Date: 02/15/24 | REVISION NO. 02 | A4

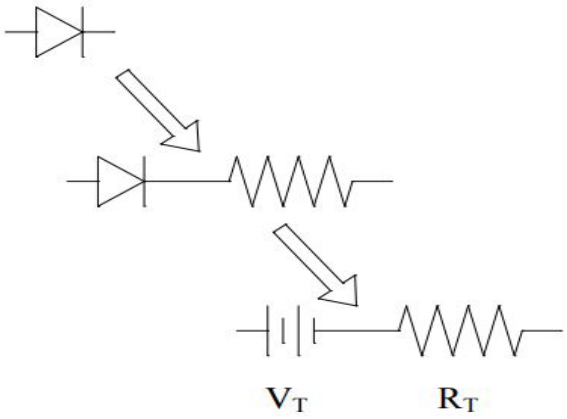
PRD 05963 | SCALE:1:1 | SHEET 1 OF 1

Recommended Solder Pad Layout

Primary dimensions shown in mm.



Diode Model



$$Vf_T = V_T + If * R_T$$

$$V_T = 0.94 + (T_J * -1.3*10^{-3})$$
$$R_T = 0.044 + (T_J * 4.4*10^{-4})$$

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

Product Ordering Information

Order Number	Packing Type
C3D20060D	Tube

REACh, RoHS, and Halogen-Free compliance documentation available for this product.

Revision History

Document Version	Date of Release	Description of Changes
E	March- 2016	Initial Release
8	November-2023	Update Branding, POD, Package Image, Solder pad layout
9	September - 2024	Legal Disclaimer and POD Updated

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