

CSD04060–silicon Carbide Schottky Diode

ZERO RECOVERY® RECTIFIER

$$V_{RRM} = 600 \text{ V}$$

$$I_{F(AVG)} = 4 \text{ A}$$

$$Q_c = 9 \text{ nC}$$

Features

- 600-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

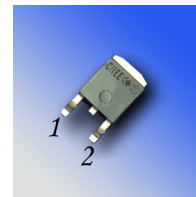
Benefits

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

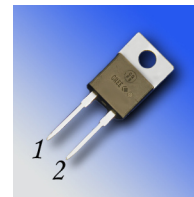
Applications

- Switch Mode Power Supplies
- Power Factor Correction
 - Typical PFC P_{out} : 400W-800W
- Motor Drives
 - Typical Power : 0.5HP-2HP

Package



TO-252-2



TO-220-2



Part Number	Package	Marking
CSD04060A	TO-220-2	CSD04060
CSD04060E	TO-252-2	CSD04060

Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	600	V		
V_{RSM}	Surge Peak Reverse Voltage	600	V		
V_{DC}	DC Blocking Voltage	600	V		
$I_{F(AVG)}$	Average Forward Current	4 7	A	$T_C=150^\circ\text{C}$ $T_C=125^\circ\text{C}$	
$I_{F(PEAK)}$	Peak Forward Current	10	A	$T_C=125^\circ\text{C}$, $T_{REF}<1 \text{ mS}$, Duty=0.5	
I_{FRM}	Repetitive Peak Forward Surge Current	20	A	$T_C=25^\circ\text{C}$, $t_p=10 \text{ ms}$, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	50 27	A	$T_C=25^\circ\text{C}$, $t_p=10 \text{ ms}$, Half Sine Wave $T_C=125^\circ\text{C}$, $t_p=10 \text{ ms}$, Half Sine Wave	
i^2t	i^2t Value	12.5	A ² s	$T_C=25^\circ\text{C}$, $t_p=10 \text{ ms}$, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	110	A	$T_C=25^\circ\text{C}$, $t_p=10 \mu\text{s}$, Pulse	
P_{tot}	Power Dissipation	62.5 20.8	W	$T_C=25^\circ\text{C}$ $T_C=125^\circ\text{C}$	
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	$I_F = 4\text{ A}$ $T_J = 25^\circ\text{C}$ $I_F = 4\text{ A}$ $T_J = 175^\circ\text{C}$	
I_R	Reverse Current	25 50	200 1000	μA	$V_R = 600\text{ V}$ $T_J = 25^\circ\text{C}$ $V_R = 600\text{ V}$ $T_J = 175^\circ\text{C}$	
Q_C	Total Capacitive Charge	9		nC	$V_R = 600\text{ V}$, $I_F = 1\text{ A}$ $di/dt = 500\text{ A}/\mu\text{s}$ $T_J = 25^\circ\text{C}$	
C	Total Capacitance	220 26 20		pF	$V_R = 0\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 200\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$ $V_R = 400\text{ V}$, $T_J = 25^\circ\text{C}$, $f = 1\text{ MHz}$	

Note:

1. 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	2.4	$^\circ\text{C}/\text{W}$

Typical Performance

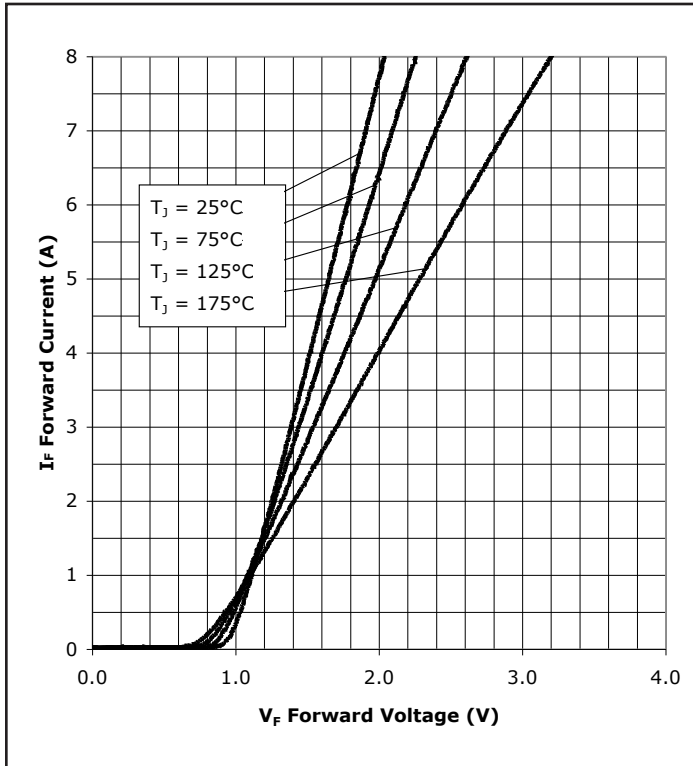


Figure 1. Forward Characteristics

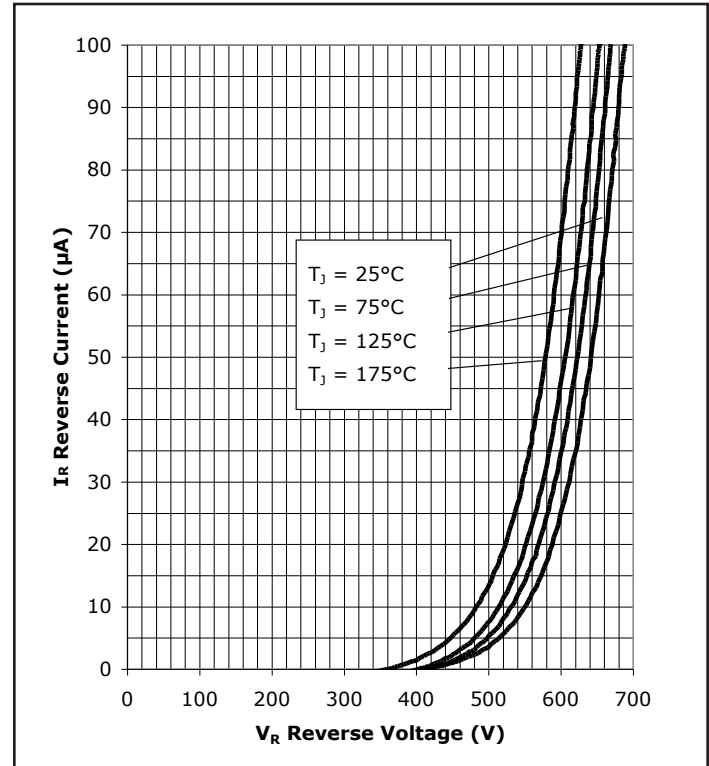


Figure 2. Reverse Characteristics



Typical Performance

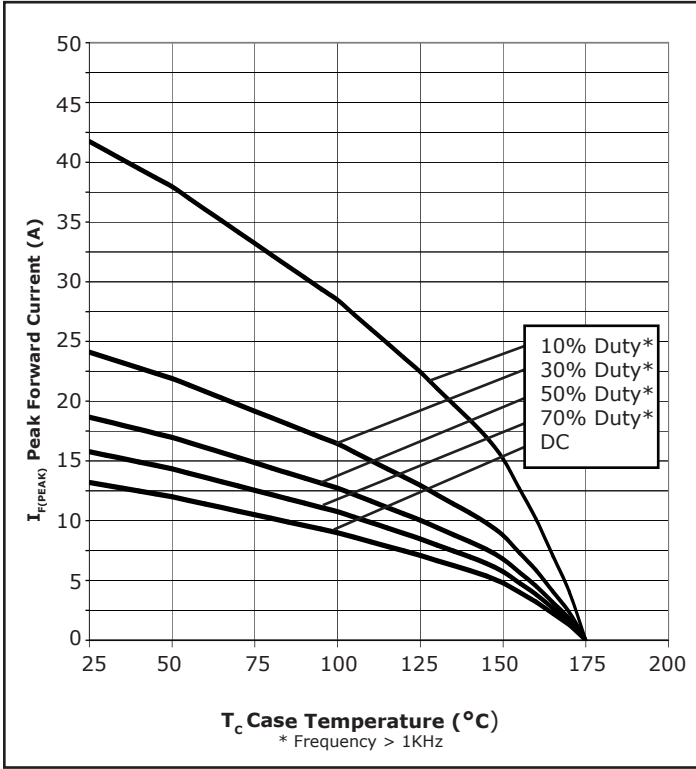


Figure 3. Current Derating

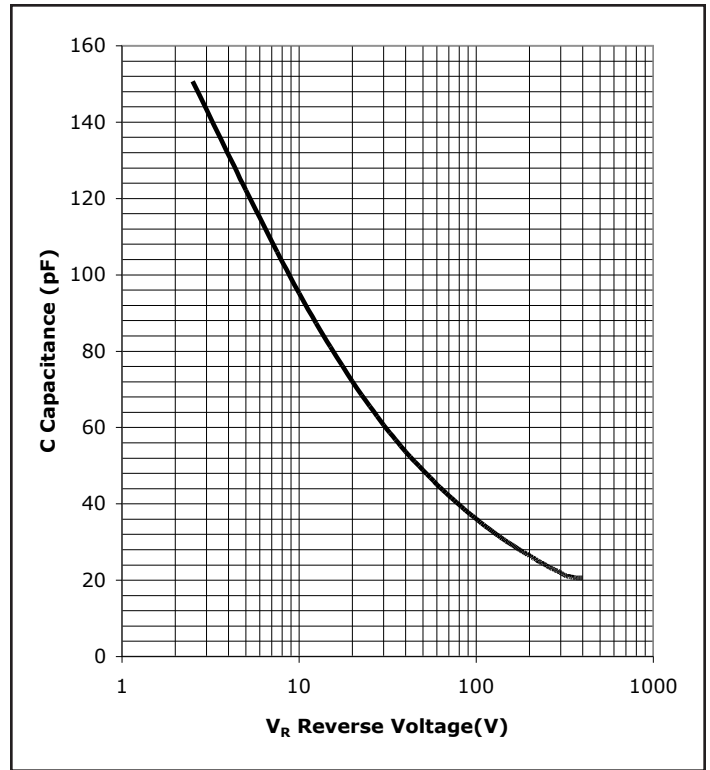


Figure 4. Capacitance vs. Reverse Voltage

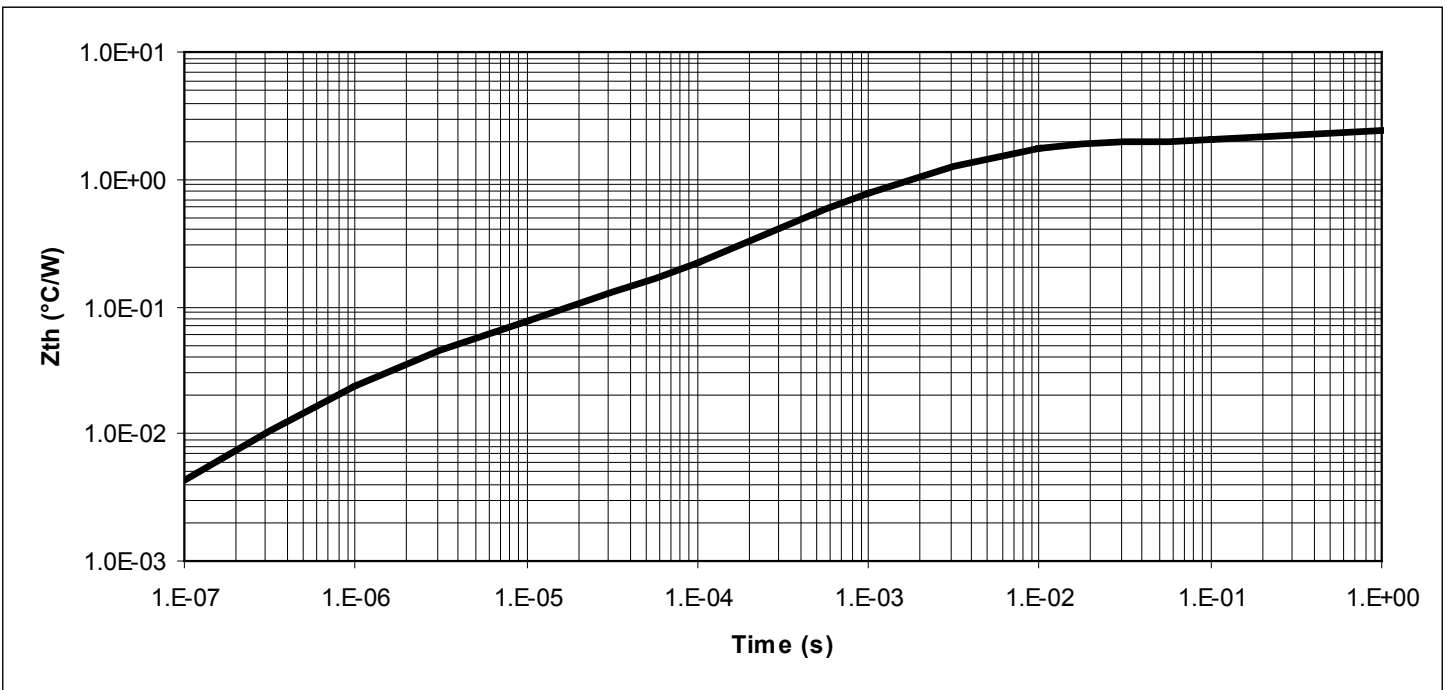


Figure 5. Transient Thermal Impedance



Typical Performance

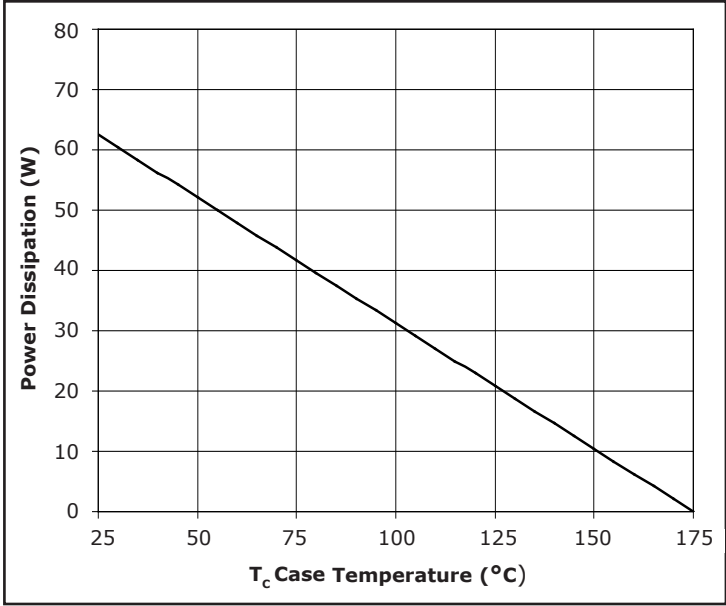


Figure 6. Power Derating

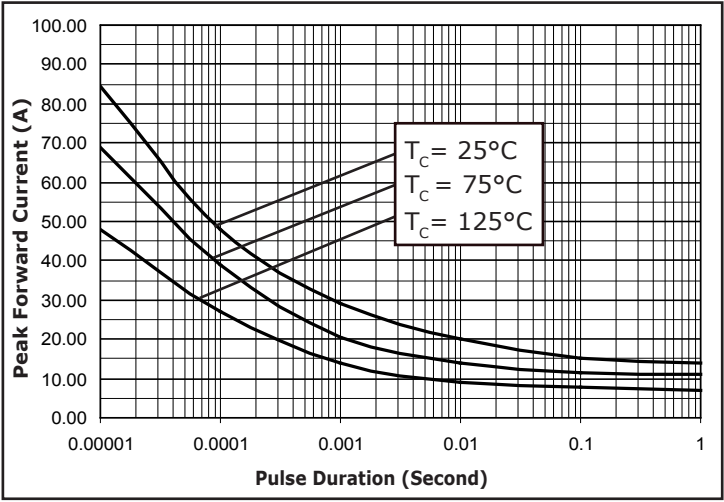


Figure 7. Repetitive Peak Surge Current (Square Pulse)

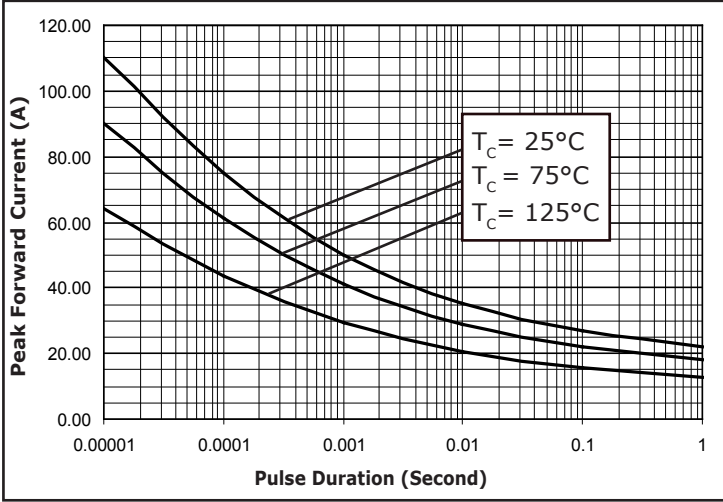
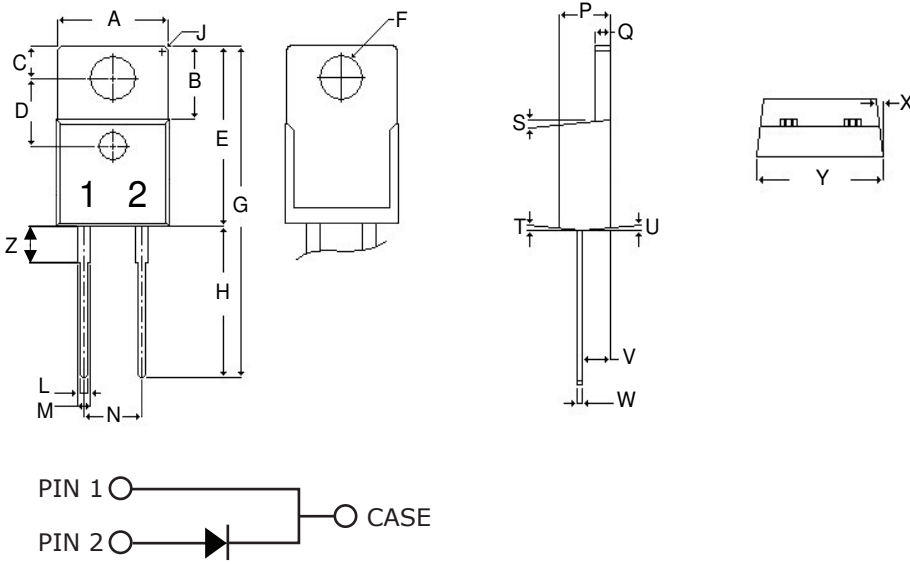


Figure 8. Non-Repetitive Peak Surge Current (Square Pulse)

Package Dimensions

Package TO-220-2



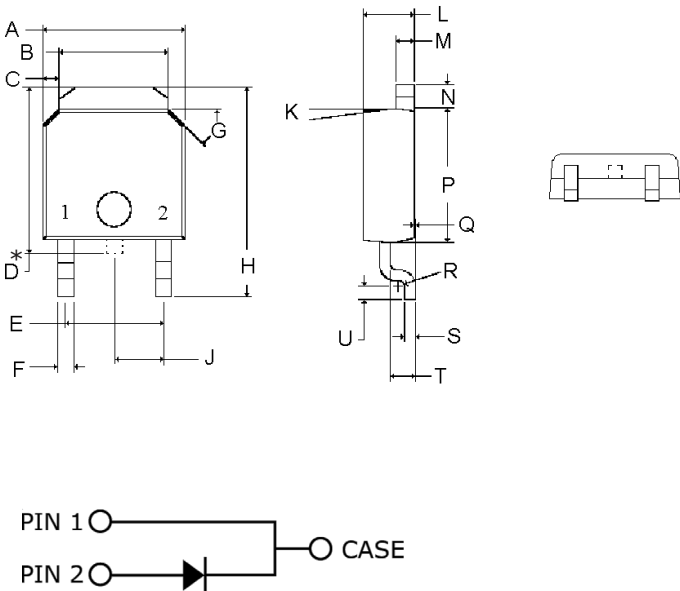
POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.235	.255	5.969	6.477
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
E	.590	.615	14.986	15.621
F	.143	.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	.500	.550	12.700	13.970
J	R 0.197		R 0.197	
L	.025	.036	.635	.914
M	.045	.055	1.143	1.397
N	.195	.205	4.953	5.207
P	.165	.185	4.191	4.699
Q	.048	.054	1.219	1.372
S	3°	6°	3°	6°
T	3°	6°	3°	6°
U	3°	6°	3°	6°
V	.094	.110	2.388	2.794
W	.014	.025	.356	.635
X	3°	5.5°	3°	5.5°
Y	.385	.410	9.779	10.414
Z	.130	.150	3.302	3.810

NOTE:

1. Dimension L, M, W apply for Solder Dip Finish

Package Dimensions

Package TO-252-2

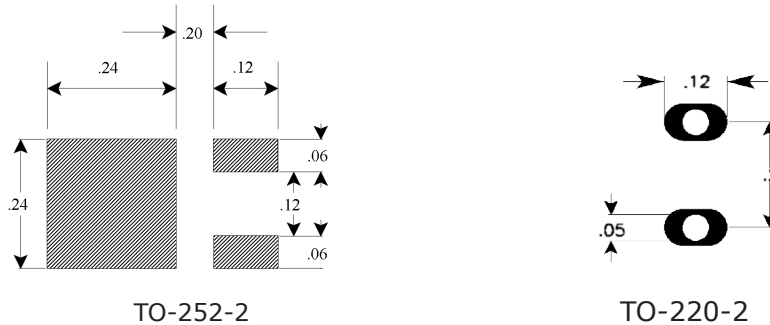


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.255	.265	6.477	6.731
B	.197	.205	5.004	5.207
C	.027	.033	.686	.838
D*	.270	.322	6.858	8.179
E	.178	.182	4.521	4.623
F	.025	.035	.635	.889
G	44°	46°	44°	46°
H	.382	.397	9.703	10.084
J	.090 TYP		2.286 TYP	
K	6°	8°	6°	8°
L	.086	.094	2.184	2.388
M	.030	.034	.762	.864
N	.040	.044	1.016	1.118
P	.235	.245	5.969	6.223
Q	0.00	.004	0.00	.102
R	R0.01 TYP		R0.31 TYP	
S	.017	.023	.428	.588
T	.040	.044	1.016	1.118
U	.021	.027	.534	1.118

Note:

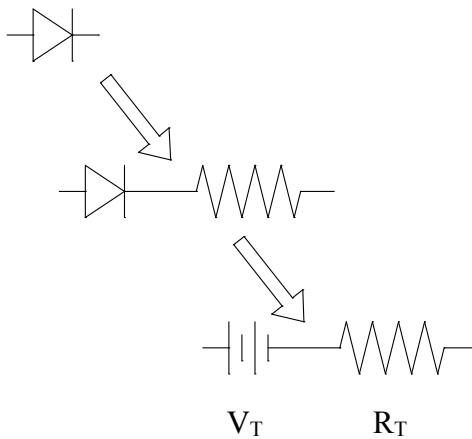
- * Tab "D" may not be present

Recommended Solder Pad Layout



Part Number	Package	Marking
CSD04060A	TO-220-2	CSD04060
CSD04060E	TO-252-2	CSD04060

Diode Model



$$V_f = V_T + I_f \cdot R_T$$

$$V_T = 0.965 + (T_j * -1.3 * 10^{-3})$$

$$R_T = 0.096 + (T_j * 1.06 * 10^{-3})$$

Note: T_j = Diode Junction Temperature In Degrees Celcius

"The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006. This part number was released previously with Sn/Pb solder plating as a standard industry finish. For more information please contact power_sales@cree.com"

This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, air traffic control systems, or weapons systems.

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