CSD20060D–Silicon Carbide Schottky Diode

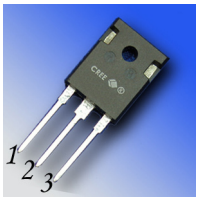
Zero Recovery® Rectifier

V_{RRM}	= 600 V
$I_{F(AVG)}$	= 20 A
Q_c	= 56 nC

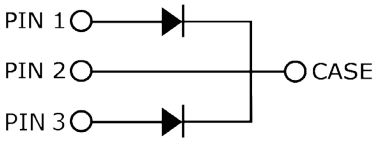
Features

- 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

Package



TO-247-3



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} : 2000W-4000W
- Motor Drives
  - Typical Power : 5HP-10HP

Part Number	Package	Marking
CSD20060D	TO-247-3	CSD20060

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 (Per Leg/Device)	10/20 16.5/33	A	T_C=150˚C T_C=125˚C	
$I_{F(Peak)}$	Peak Forward Current	25/50	A	T_C=125˚, T_{REP}<1 mS, Duty=0.5	
I_{FRM}	Repetitive Peak Forward Surge Current (Per Leg/Device)	43/86 29/58	A	T_C=25˚C, t_P=10 ms, Half Sine Wave T_C=125˚C, t_P=10 ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current (Per Leg)	77	A	T_C=25˚C, t_P=1.5 ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current (Per Leg/Device)	250/500	A	T_C=25˚C, t_P=10 µs, Pulse	
P_{tot}	Power Dissipation (Per Leg)	138 46	W	T_C=25˚C T_C=125˚C	
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	˚C		
	TO-247 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.5 2.0	1.8 2.4	V	I_F = 10 A T_J=25°C I_F = 10 A T_J=175°C	
I_R	Reverse Current	50 100	200 1000	µA	V_R = 600 V T_J=25°C V_R = 600 V T_J=175°C	
Q_C	Total Capacitive Charge	28		nC	V_R = 600 V, I_F = 10 A di/dt = 500 A/µs T_J = 25°C	
C	Total Capacitance	550 65 50		pF	V_R = 0 V, T_J = 25°C, f = 1 MHz V_R = 200 V, T_J = 25°C, f = 1 MHz V_R = 400 V, T_J = 25°C, f = 1 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	1.08** 0.54*	°C/W

** Per Leg, * Both Legs

Typical Performance (Per Leg)

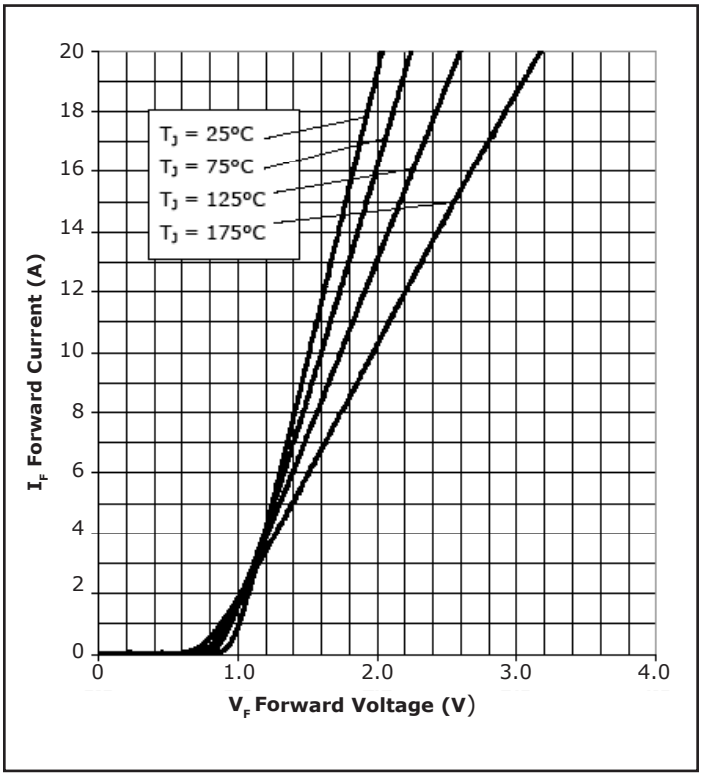


Figure 1. Forward Characteristics

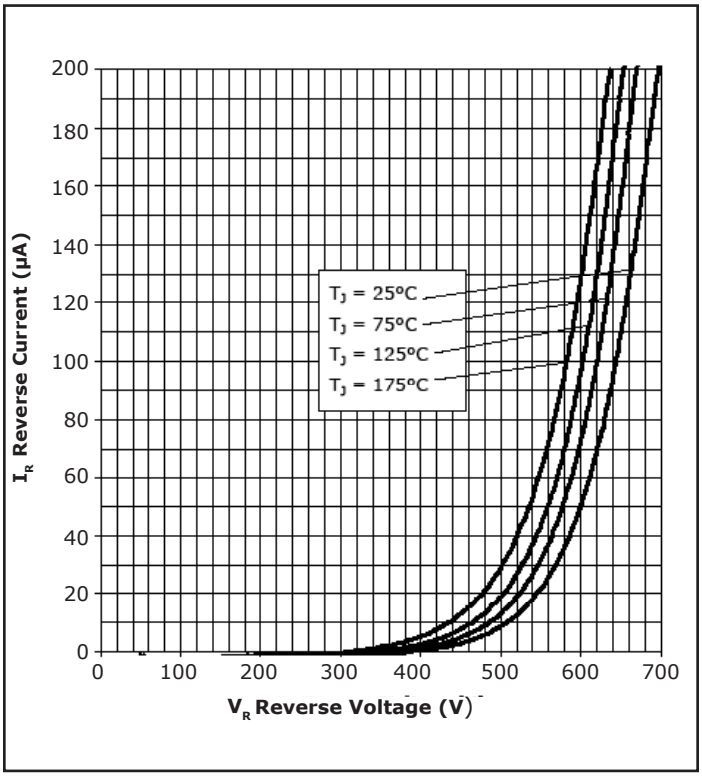


Figure 2. Reverse Characteristics

Typical Performance (Per Leg)

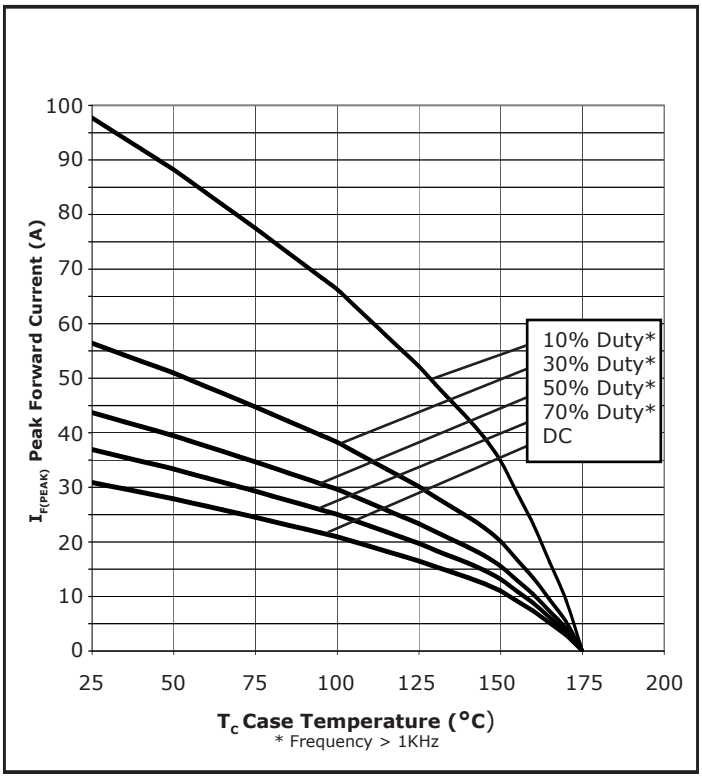


Figure 3. Current Derating

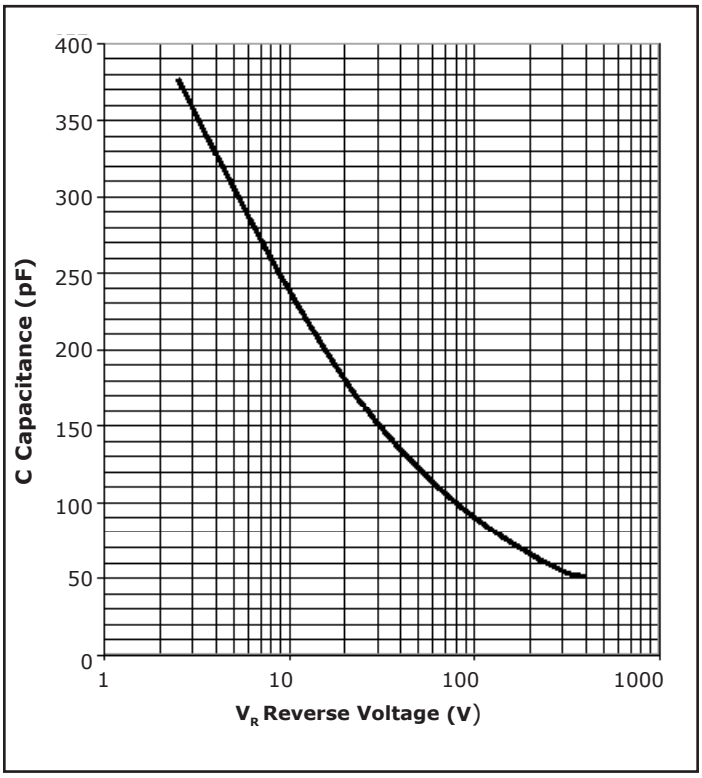


Figure 4. Capacitance vs. Reverse Voltage

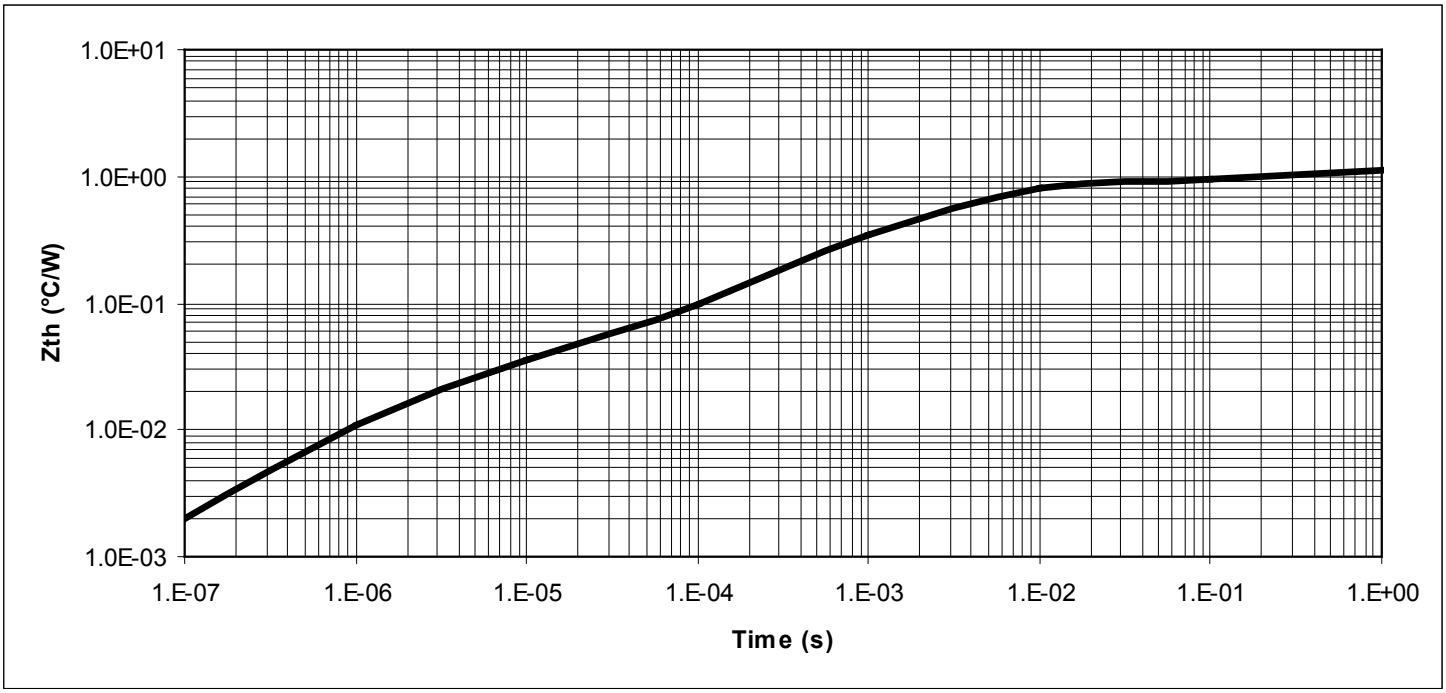


Figure 5. Transient Thermal Impedance

Typical Performance (Per Leg)

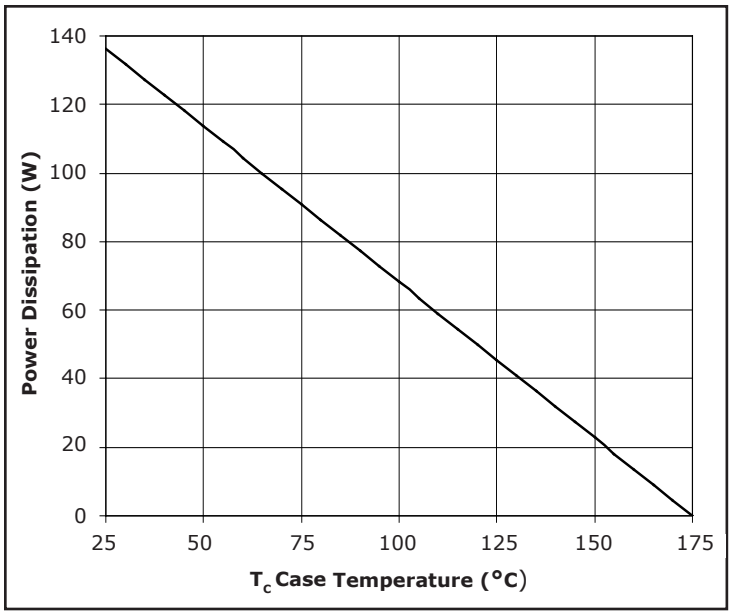
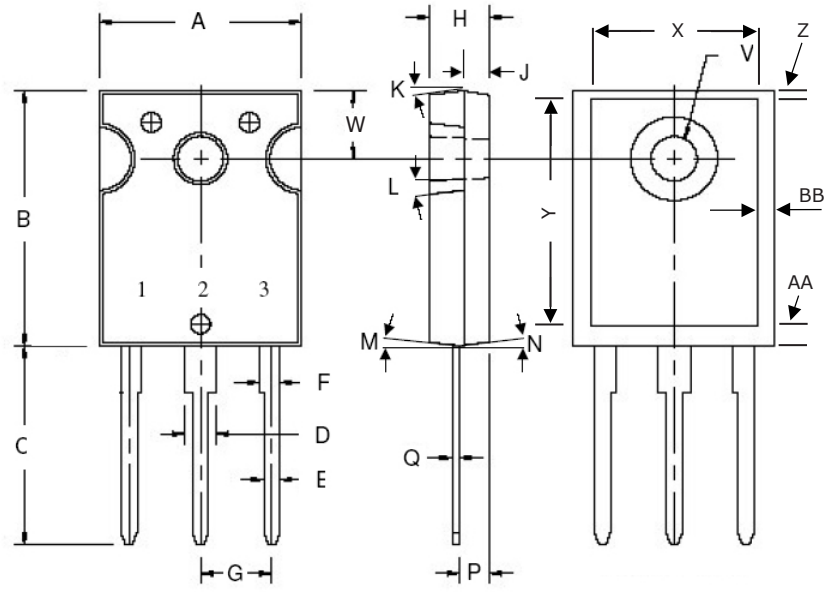
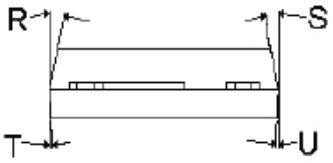


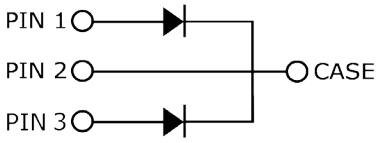
Figure 6. Power Derating

Package Dimensions

Package TO-247-3

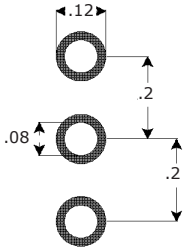






POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.605	.631	15.367	16.027
B	.800	.830	20.320	21.082
C	.789	.800	20.05	20.31
D	.095	.126	2.413	3.200
E	.046	.052	1.168	1.321
F	.060	.084	1.524	2.134
G	.215 TYP		.215 TYP	
H	.180	.203	4.572	5.156
J	.078	.081	1.982	2.057
K	6°	21°	6°	21°
L	4°	6°	4°	6°
M	2°	4°	2°	4°
N	2°	4°	2°	4°
P	.090	.097	2.286	2.464
Q	.020	.030	.508	.762
R	9°	11°	9°	11°
S	9°	11°	9°	11°
T	2°	8°	2°	8°
U	2°	8°	2°	8°
V	.138	.144	3.505	3.658
W	.210	.220	5.334	5.588
X	.502	.557	12.751	14.148
Y	.637	.695	16.180	17.653
Z	.040	.052	1.016	1.321
AA	.032	.046	.813	1.168
BB	.110	.140	2.794	3.556

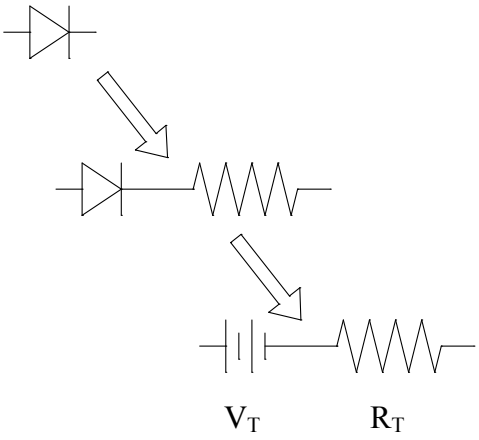
Recommended Solder Pad Layout



TO-247-3

Part Number	Package	Marking
CSD20060D	TO-247-3	CSD20060

Diode Model



$$Vf_T = V_T + If * R_T$$

$$V_{T=} 0.92 + (T_j * -1.35*10^{-3})$$
$$R_{T=} 0.052 + (T_j * 0.29*10^{-3})$$

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 "

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