

# CSD01060 –silicon Carbide Schottky Diode

## ZERO RECOVERY<sup>®</sup> RECTIFIER

$V_{RRM}$	= 600 V
$I_{F(AVG)}$	= 1 A
$Q_c$	= 3.3 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  $V_F$

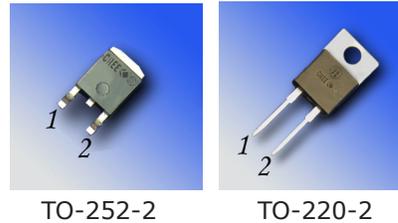
### Benefits

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

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
  - Typical PFC  $P_{out}$  : 100W-200W
- Motor Drives
  - Typical Power : 0.25HP-0.5HP

### Package



Part Number	Package	Marking
CSD01060A	TO-220-2	CSD01060
CSD01060E	TO-252-2	CSD01060

### 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	1.4 2.2	A	$T_C=150^{\circ}C$ $T_C=125^{\circ}C$	
$I_{F(PEAK)}$	Peak Forward Current	2.5	A	$T_C=125^{\circ}C$ , $T_{REP}<1$ mS, Duty=0.5	
$I_{FRM}$	Repetitive Peak Forward Surge Current	7 5.5	A	$T_C=25^{\circ}C$ , $t_p=10$ ms, Half Sine Wave $T_C=125^{\circ}C$ , $t_p=10$ ms, Half Sine Wave	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	9	A	$T_C=25^{\circ}C$ , $t_p=1.5$ ms, Half Sine Wave	
$I_{FSM}$	Non-Repetitive Peak Forward Surge Current	32	A	$T_C=25^{\circ}C$ , $t_p=10$ $\mu$ s, Pulse	
$P_{tot}$	Power Dissipation	21.4 7.1	W	$T_C=25^{\circ}C$ $T_C=125^{\circ}C$	
$T_j, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^{\circ}C$		
	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	1.6 2.0	1.8 2.4	V	$I_F = 1\text{ A}$ , $T_J = 25^\circ\text{C}$ $I_F = 1\text{ A}$ , $T_J = 175^\circ\text{C}$	
$I_R$	Reverse Current	20 40	100 500	$\mu\text{A}$	$V_R = 600\text{ V}$ , $T_J = 25^\circ\text{C}$ $V_R = 600\text{ V}$ , $T_J = 150^\circ\text{C}$	
$Q_C$	Total Capacitive Charge	3.3		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	80 11 8.5		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	7	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	60	$^\circ\text{C}/\text{W}$

## Typical Performance

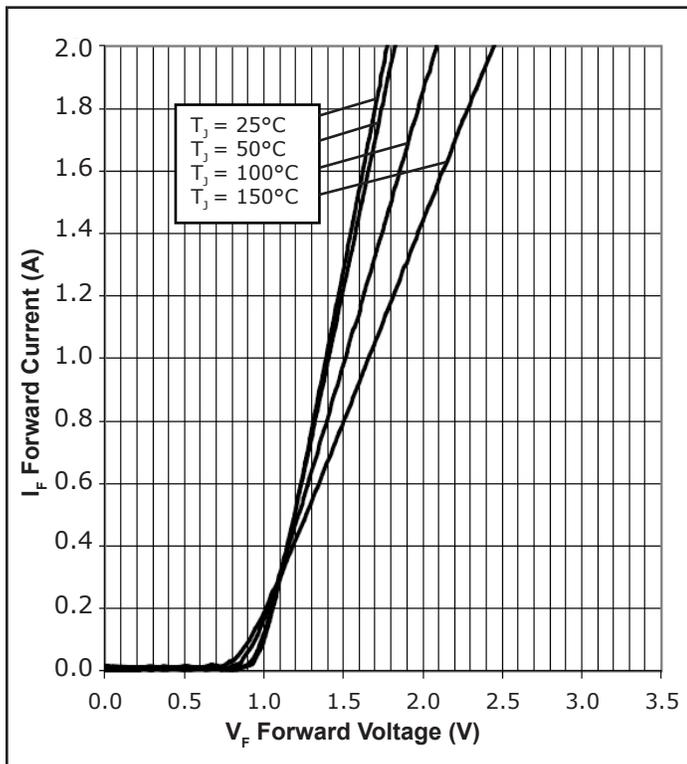


Figure 1. Forward Characteristics

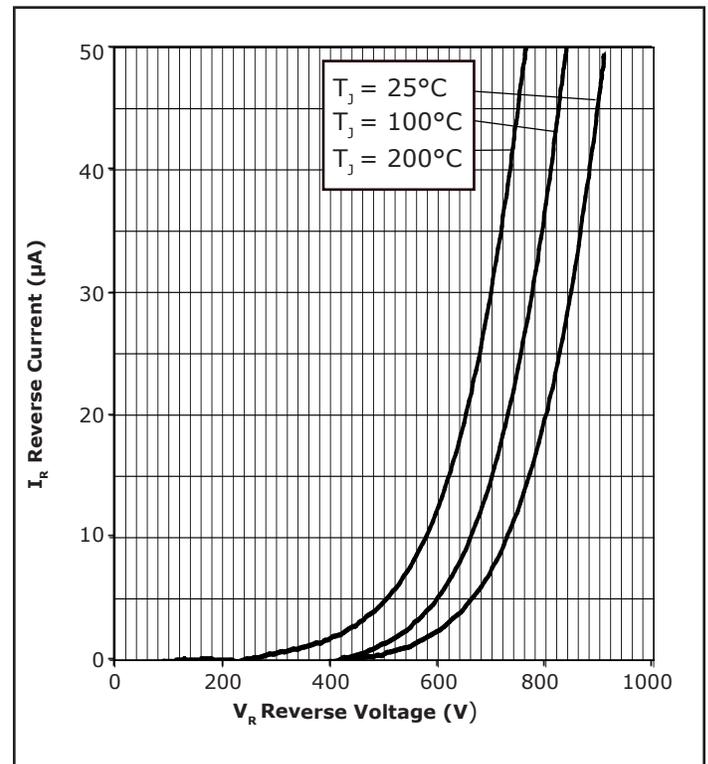


Figure 2. Reverse Characteristics

### Typical Performance

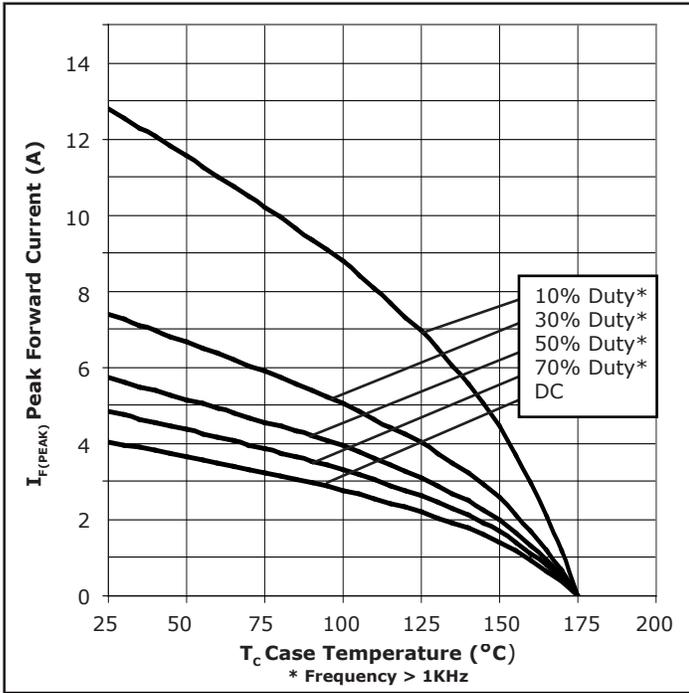


Figure 3. Current Derating

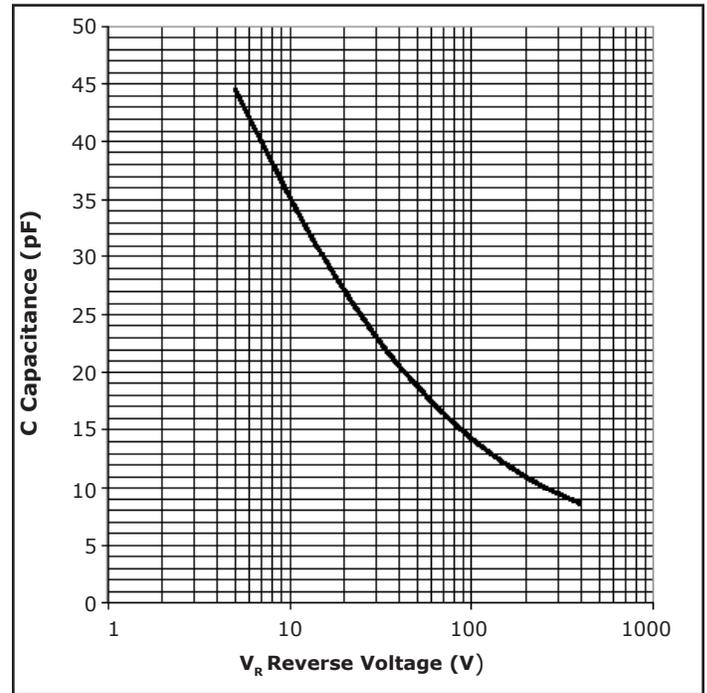


Figure 4. Capacitance vs. Reverse Voltage

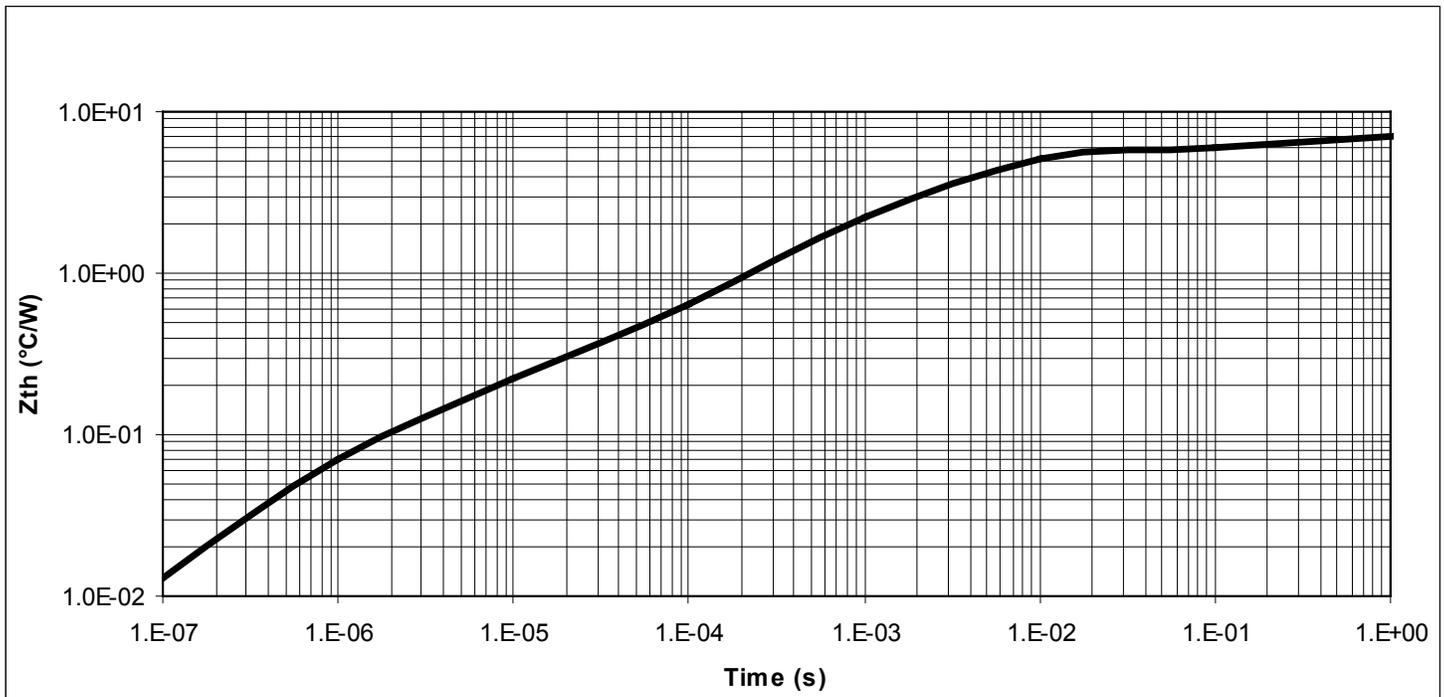


Figure 5. Transient Thermal Impedance

## Typical Performance

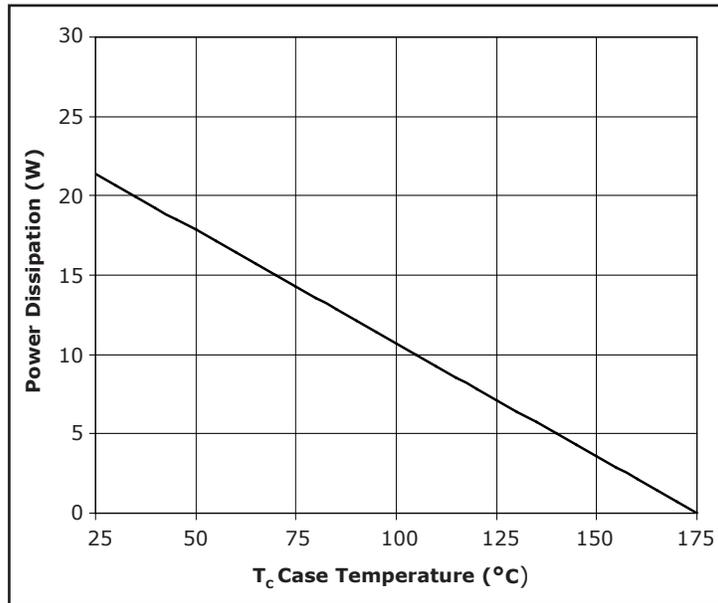
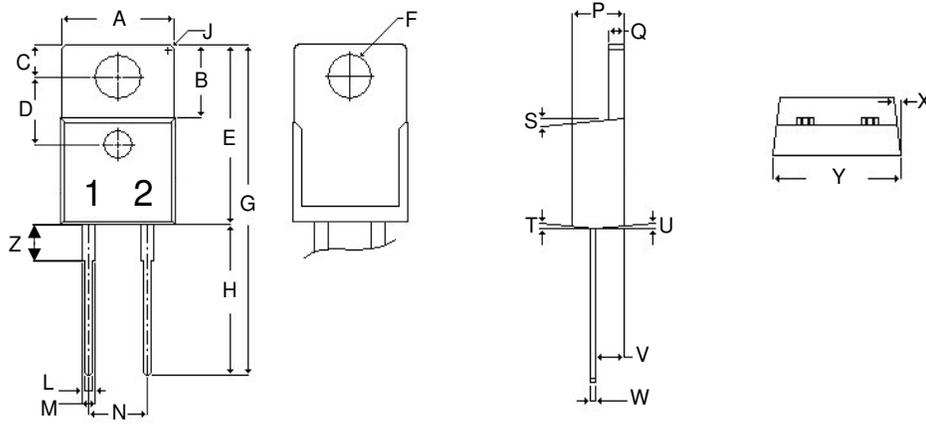


Figure 6. Power Derating

## Package Dimensions

Package TO-220-2



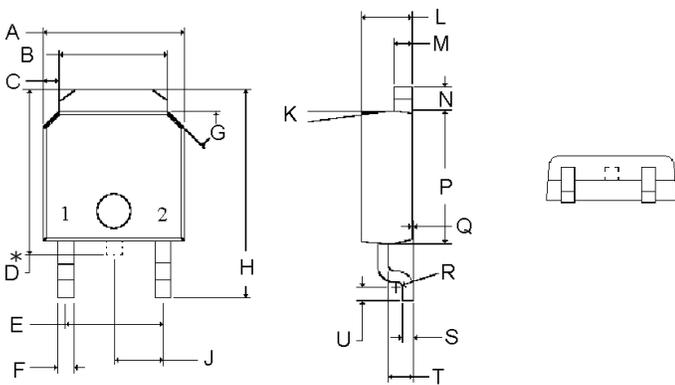
POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.381	.410	9.677	10.414
B	.235	.255	5.969	6.477
C	.100	.120	2.540	3.048
D	.223	.337	5.664	8.560
E	.590	.615	14.986	15.621
F	.143	.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	.500	.550	12.700	13.970
J	R 0.197		R 0.197	
L	.025	.036	.635	.914
M	.045	.055	1.143	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

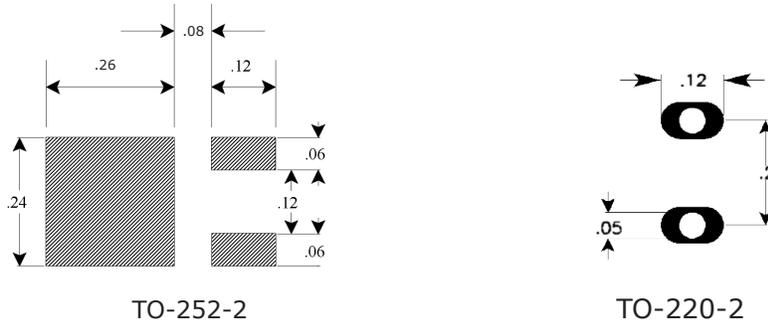


POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.255	.265	6.477	6.731
B	.197	.205	5.004	5.207
C	.027	.033	.686	.838
D*	.270	.322	6.858	8.179
E	.178	.182	4.521	4.623
F	.025	.035	.635	.889
G	44°	46°	44°	46°
H	.382	.397	9.703	10.084
J	.090 TYP		2.286 TYP	
K	6°	8°	6°	8°
L	.086	.094	2.184	2.388
M	.030	.034	.762	.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:

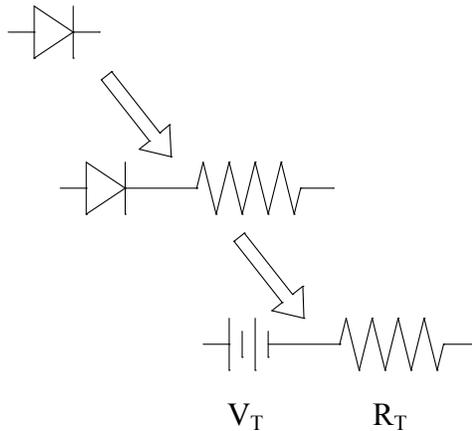
- \* Tab "D" may not be present

## Recommended Solder Pad Layout



Part Number	Package	Marking
CSD01060A	TO-220-2	CSD01060
CSD01060E	TO-252-2	CSD01060

## Diode Model



$$V_{fT} = V_T + I_f \cdot R_T$$

$$V_T = 0.94 + (T_j * -1.2 * 10^{-3})$$

$$R_T = 0.015 + (T_j * 6.4 * 10^{-3})$$

**Note:**  $T_j$  = Diode Junction Temperature In Degrees Celcius

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