

# SC3D10065A Silicon Carbide Schottky Barrier Diode

$V_{RRM}=650V$   
 $I_F(T_C=135^\circ C)=15A$   
 $Q_C=23nC$

## 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
- Power Factor Correction
- Motor Drives

## Package



Part Number	Package	Marking
SC3D10065A	TO-220-2	C3D10065

## Maximum Ratings ( $T_C=25^\circ C$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	650	V		
$V_{RSM}$	Surge Peak Reverse Voltage	650	V		
$V_{DC}$	DC Blocking Voltage	650	V		
$I_F$	Continuous Forward Current	38	A	$T_C=25^\circ C$	Fig.3
		15		$T_C=135^\circ C$	
		11		$T_C=150^\circ C$	
$I_{FRM}$	Repetitive Peak Forward Surge Current	49	A	$T_C=25^\circ C, t_p=10ms, \text{Half Sine Wave}$	
		27		$T_C=110^\circ C, t_p=10ms, \text{Half Sine Wave}$	
$P_{tot}$	Power Dissipation	136	W	$T_C=25^\circ C$	Fig.4
		59		$T_C=110^\circ C$	
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-650V$	
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ C$		

## Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Condition	Note
$V_F$	Forward Voltage	1.5	1.8	V	$I_F=10A, T_J=25^\circ C$	Fig.1
		2.0	2.4		$I_F=10A, T_J=175^\circ C$	
$I_R$	Reverse Current	12	60	$\mu A$	$V_R=650V, T_J=25^\circ C$	Fig.2
		24	220		$V_R=650V, T_J=175^\circ C$	
$Q_C$	Total Capacitive Charge	23		nC	$V_R=400V, I_F=10A, di/dt=500A/\mu s, T_J=25^\circ C$	Fig.5
C	Total Capacitance	580		pF	$V_R=0V, T_J=25^\circ C, f=1MHz$	Fig.6
		43			$V_R=200V, T_J=25^\circ C, f=1MHz$	
		30			$V_R=400V, T_J=25^\circ C, f=1MHz$	

**Thermal Characteristics**

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.1	$^{\circ}C/W$	Fig.7

**Typical Performance**

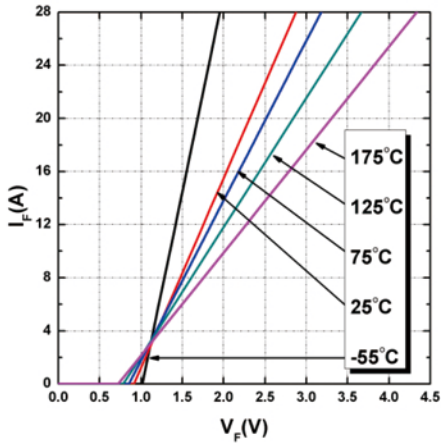


Figure 1. Forward Characteristics

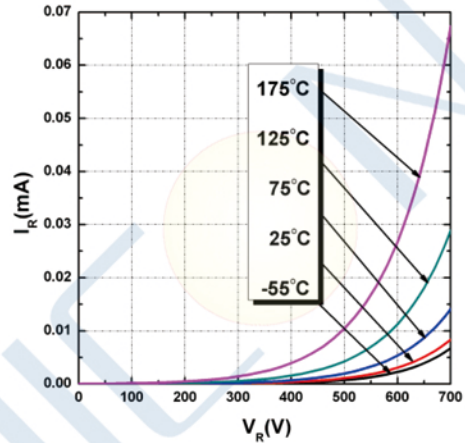


Figure 2. Reverse Characteristics

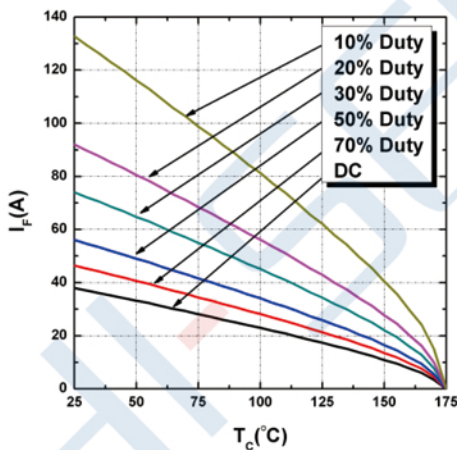


Figure 3. Current Derating

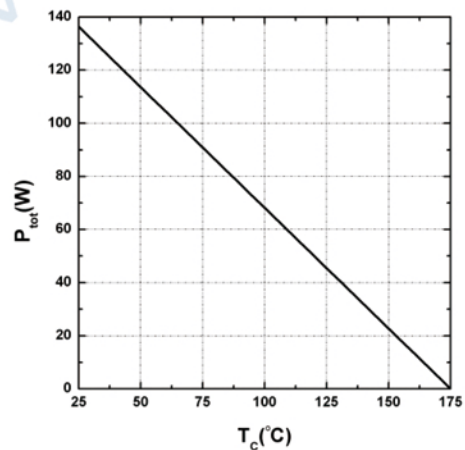


Figure 4. Power Derating

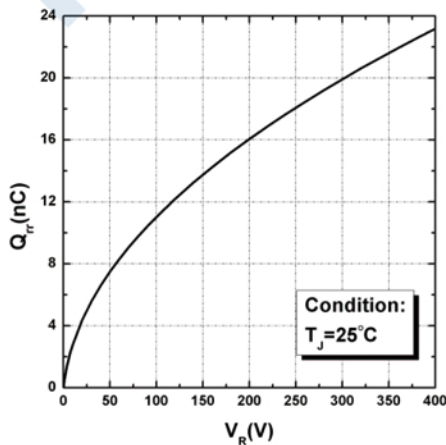


Figure 5. Total Capacitance Charge vs. Reverse Voltage

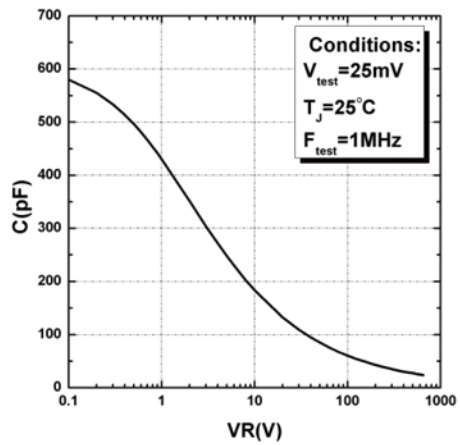


Figure 6. Capacitance vs. Reverse Voltage

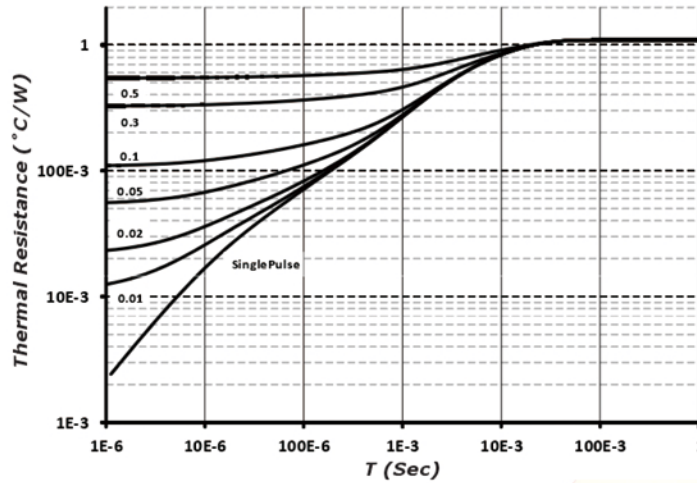
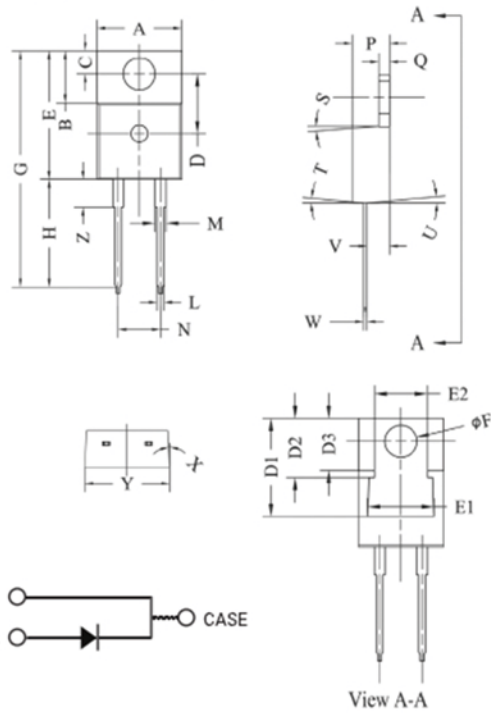


Figure 7. Transient Thermal Impedance

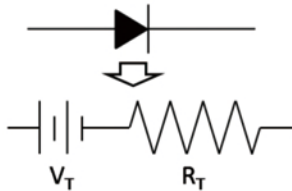
### Package Dimensions

POS	Inches		Millimeters	
	Min	Max	Min	Max
A	0.381	0.410	9.677	10.414
B	0.235	0.255	5.969	6.477
C	0.100	0.120	2.540	3.048
D	0.223	0.337	5.664	8.560
D1	0.457-0.490 typ.		11.60-12.45 typ.	
D2	0.277-0.303 typ.		7.04-7.70 typ.	
D3	0.244-0.252 typ.		6.22-6.4 typ.	
E	0.590	0.615	14.986	15.621
E1	0.302	0.326	7.68	8.28
E2	0.227	0.251	5.77	6.37
F	0.143	0.153	3.632	3.886
G	1.105	1.147	28.067	29.134
H	0.500	0.550	12.700	13.970
L	0.025	0.036	0.635	0.914
M	0.045	0.055	1.143	1.550
N	0.195	0.205	4.953	5.207
P	0.165	0.185	4.191	4.699
Q	0.048	0.054	1.219	1.372
S	3°	6°	3°	6°
T	3°	6°	3°	6°
U	3°	6°	3°	6°
V	0.094	0.110	2.388	2.794
W	0.014	0.025	0.356	0.635
X	3°	5.5°	3°	5.5°
Y	0.385	0.410	9.779	10.414
Z	0.130	0.150	3.302	3.810

Package TO-220-2



### Diode Model



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

$$V_T = 0.945 - 1.27 \times 10^{-3} \times T_J$$

$$R_T = 0.066 + 1.38 \times 10^{-4} \times T_J + 1.31 \times 10^{-6} \times T_J^2$$

Note:  $T_J$  = Diode Junction Temperature In DegreeCelsius, valid from -55°C to 175°C.

### Notes

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact hi-semicon electronics co., Ltd.