

SC3D20120D**Silicon Carbide Schottky Barrier Diode****Features**

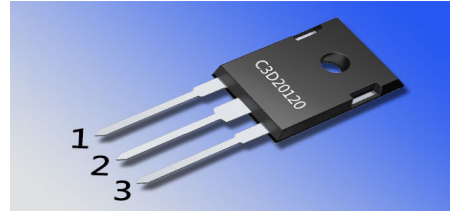
- 1200-Volt Schottky Rectifier
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on V_F

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(SMPS)
- Boost diodes in PFC or DC/DC stages
- Free wheeling diodes in inverter stages

Package

Part Number	Package	Marking
SC3D20120D	TO-247-3	C3D20120

Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V		
V_{RSM}	Surge Peak Reverse Voltage	1200	V		
V_{DC}	DC Blocking Voltage	1200	V		
I_F	Continuous Forward Current (Per Leg/Device)	53/106 17/34 10/20	A	$T_C=25^\circ\text{C}$ $T_C=135^\circ\text{C}$ $T_C=150^\circ\text{C}$	
I_{FRM}	Repetitive Peak Forward Surge Current	69 32	A	$T_C=25^\circ\text{C}, t_p=10\text{ms}, \text{Half Sine Wave}$ $T_C=110^\circ\text{C}, t_p=10\text{ms}, \text{Half Sine Wave}$	
P_{tot}	Power Dissipation (Per Leg/Device)	187.5/375 81/162	W	$T_C=25^\circ\text{C}$ $T_C=110^\circ\text{C}$	
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-950\text{V}$	
T_J, T_{stg}	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$		

Electrical Characteristics*

Symbol	Parameter	Typ.	Max.	Unit	Test Condition	Note
V_F	Forward Voltage	1.5 2.2	1.8 3.0	V	$I_F=10\text{A}, T_J=25^\circ\text{C}$ $I_F=10\text{A}, T_J=175^\circ\text{C}$	
I_R	Reverse Current	2 20	5 40	μA	$V_R=1200\text{V}, T_J=25^\circ\text{C}$ $V_R=1200\text{V}, T_J=175^\circ\text{C}$	
Q_C	Total Capacitive Charge	53.5		nC	$V_R=800\text{V}, I_F=10\text{A}, di/dt=500\text{A}/\mu\text{s}, T_J=25^\circ\text{C}$	
C	Total Capacitance	935 50 34.5		pF	$V_R=0\text{V}, T_J=25^\circ\text{C}, f=1\text{MHz}$ $V_R=400\text{V}, T_J=25^\circ\text{C}, f=1\text{MHz}$ $V_R=800\text{V}, T_J=25^\circ\text{C}, f=1\text{MHz}$	

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case (Per Leg/Device)	0.8/0.4	$^{\circ}\text{C}/\text{W}$	Fig.7

Typical Performance*

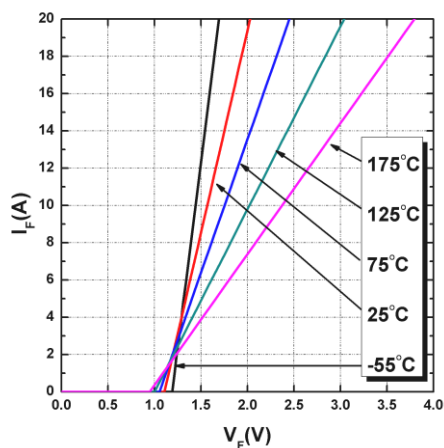


Figure 1. Forward Characteristics

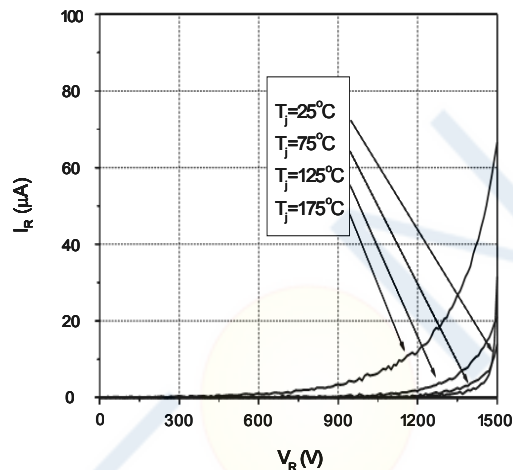


Figure 2. Reverse Characteristics

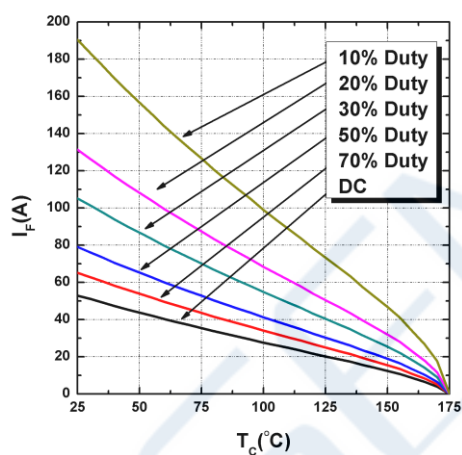


Figure 3. Current Derating

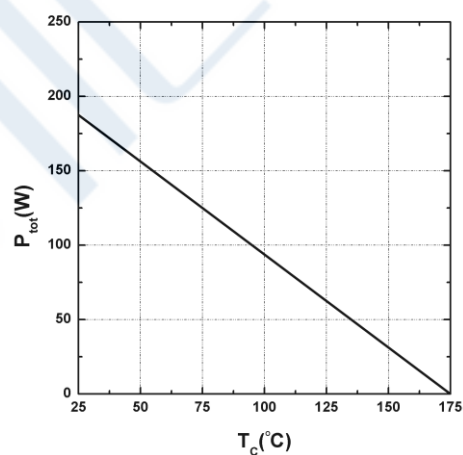


Figure 4. Power Derating

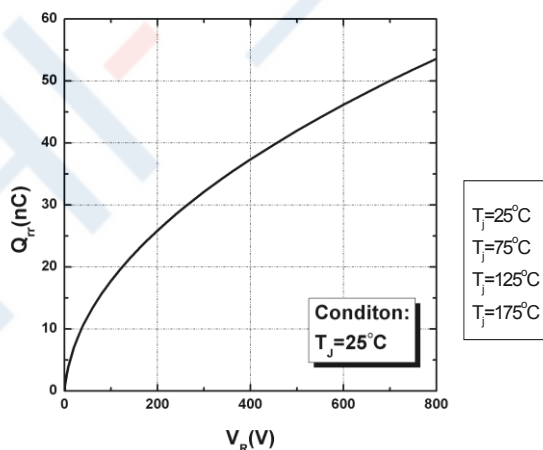


Figure 5. Total Capacitance Charge vs. Reverse Voltage

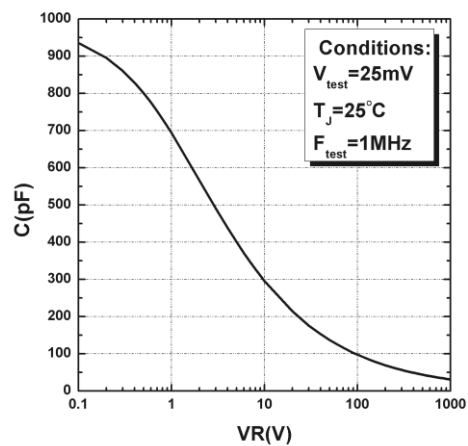


Figure 6. Capacitance vs. Reverse Voltage

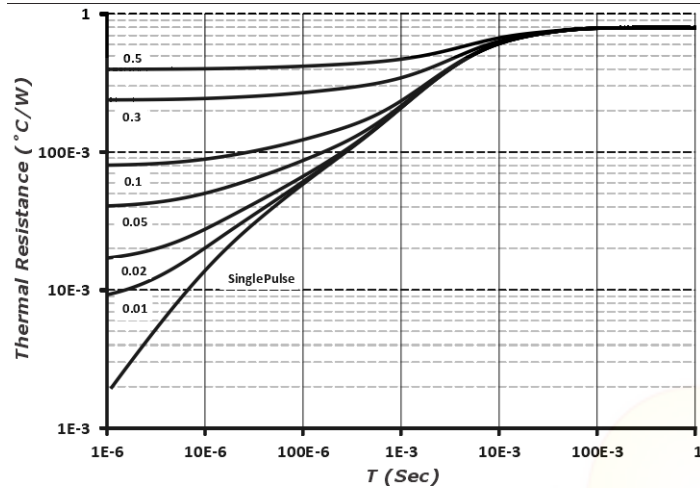
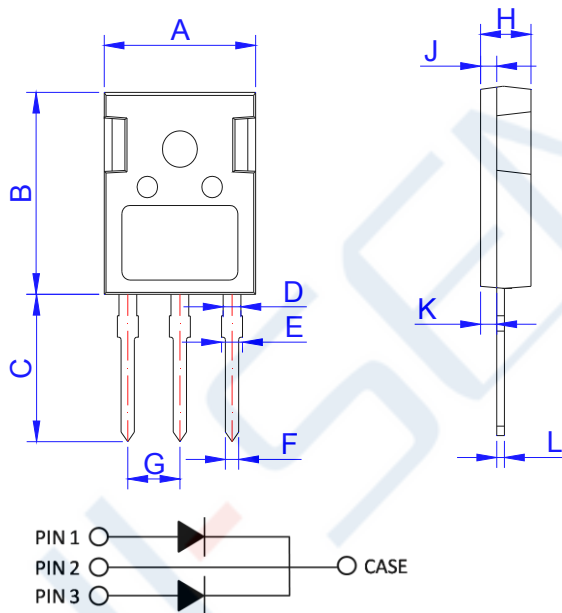


Figure 7. Transient Thermal Impedance

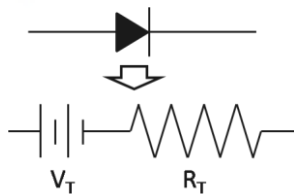
Package Dimensions

Package TO-247-3



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	0.190	0.205	4.83	5.21
A1	0.090	0.100	2.29	2.54
A2	0.075	0.085	1.91	2.16
b	0.042	0.052	1.07	1.33
b1	0.075	0.095	1.91	2.41
b3	0.113	0.133	2.87	3.38
c	0.022	0.027	0.55	0.68
D	0.819	0.831	20.80	21.10
D1	0.640	0.695	16.25	17.65
D2	0.037	0.049	0.95	1.25
E	0.620	0.635	15.75	16.13
E1	0.516	0.557	13.10	14.15
E2	0.145	0.201	3.68	5.10
E3	0.039	0.075	1.00	1.90
E4	0.487	0.529	12.38	13.43
e	0.214 BSC		5.44 BSC	
L	0.599	0.634	14.20	16.10
L1	0.161	0.173	4.10	4.40
N	3			
φP	0.138	0.144	3.51	3.65
Q	0.216	0.236	5.49	6.00
S	0.238	0.248	6.04	6.30
T	17.5° REF			
W	3.5° REF			
X	4.0° REF			

Diode Model*



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

$$V_T = 1.132 - 1.05 \times 10^{-3} \times T_J$$

$$R_T = 0.037 + 3.10 \times 10^{-4} \times T_J + 1.66 \times 10^{-6} \times T_J^2$$

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

Notes