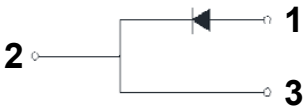
HSCS310AHGC9

Silicon Carbide Schottky Diode

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

TO-220C-2L



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

AEC-Q101 Qualified

Part Number	Package	Qty(PCS)
HSCS310AHGC9	TO-220C-2L	50

Maximum Ratings (T_C = 25 ˚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	30 14.5 10	A	T_C=25˚C T_C=135˚C T_C=153˚C	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	46 31	A	T_C=25˚C, t_P = 10 ms, Half Sine Wave T_C=110˚C, t_P=10 ms, Half Sine Wave	
I_{FSM}	Non-Repetitive Peak Forward Surge Current	90 71	A	T_C=25˚C, t_p = 10 ms, Half Sine Wave T_C=110˚C, t_p = 10 ms, Half Sine Wave	Fig. 8
$I_{F,Max}$	Non-Repetitive Peak Forward Surge Current	860 680	A	T_C=25˚C, t_p = 10 µs, Pulse T_C=110˚C, t_P = 10 µs, Pulse	Fig. 8
P_{tot}	Power Dissipation	136.5 59	W	T_C=25˚C T_C=110˚C	Fig. 4
T_J , T_{stg}	Operating Junction and Storage Temperature	-55 to +175	˚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 = 10 A T_J=25°C I_F = 10 A T_J=175°C	Fig. 1
I_R	Reverse Current	12 24	60 220	μA	V_R = 650 V T_J=25°C V_R = 650 V T_J=175°C	Fig. 2
Q_C	Total Capacitive Charge	24		nC	V_R = 400 V, I_F = 10 A di/dt = 500 A/μs T_J = 25°C	Fig. 5
C	Total Capacitance	460.5 44 40		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	Fig. 6
E_C	Capacitance Stored Energy	3.6		μJ	V_R = 400 V	Fig. 7

Note: This is a majority carrier diode, so there is no reverse recovery charge.

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1.1	°C/W	Fig. 9

Typical Performance

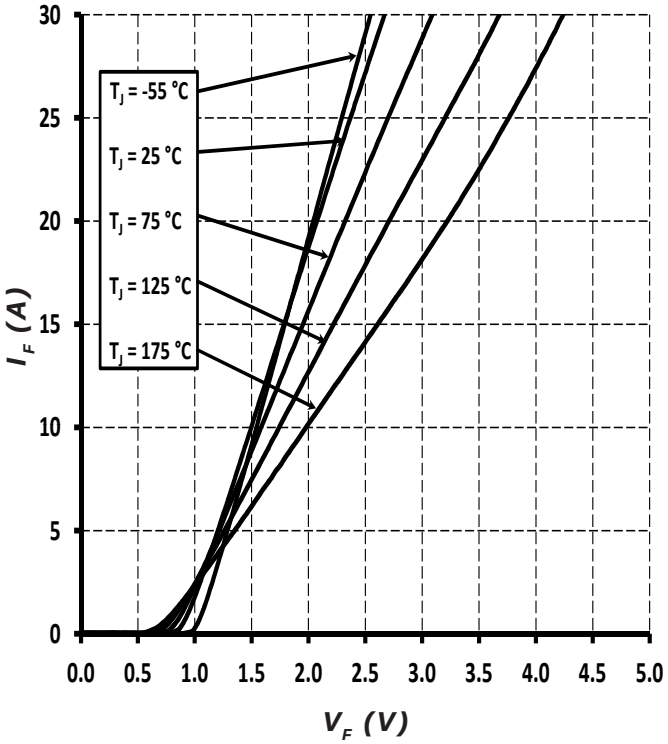


Figure 1. Forward Characteristics

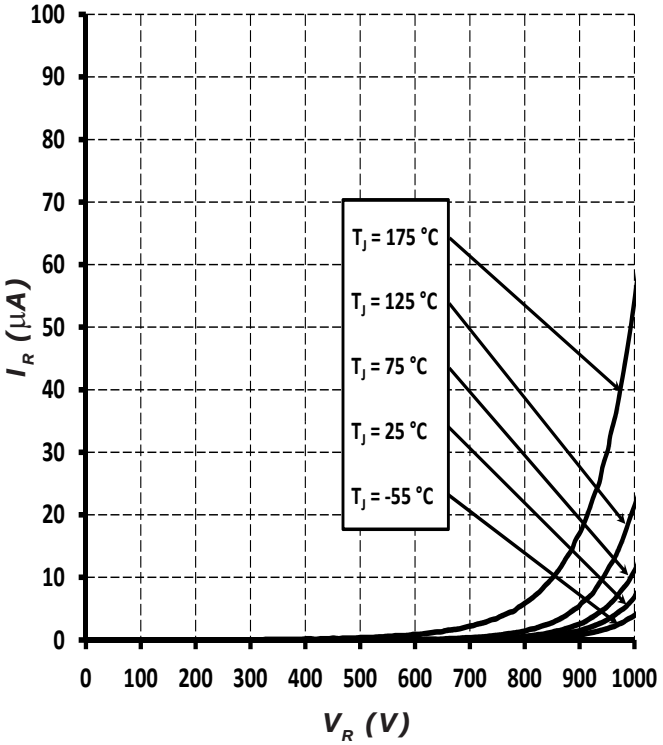


Figure 2. Reverse Characteristics

Typical Performance

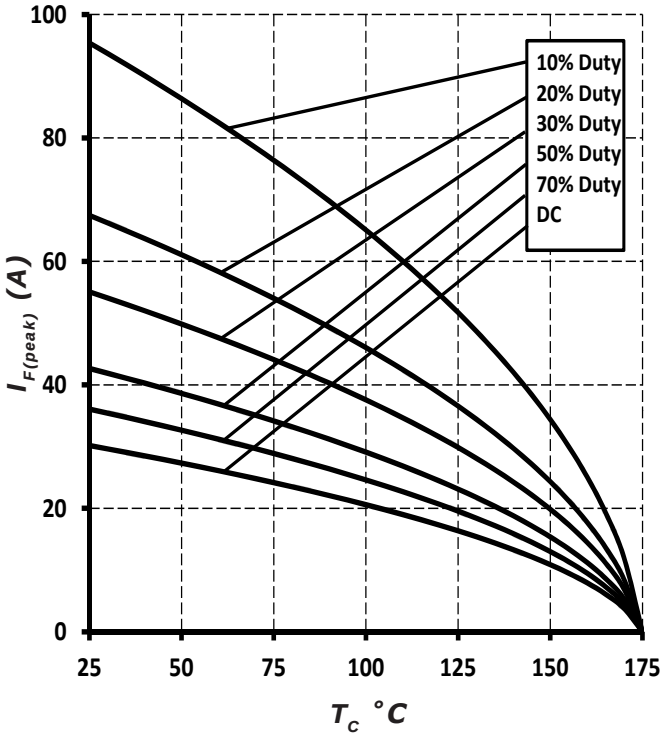


Figure 3. Current Derating

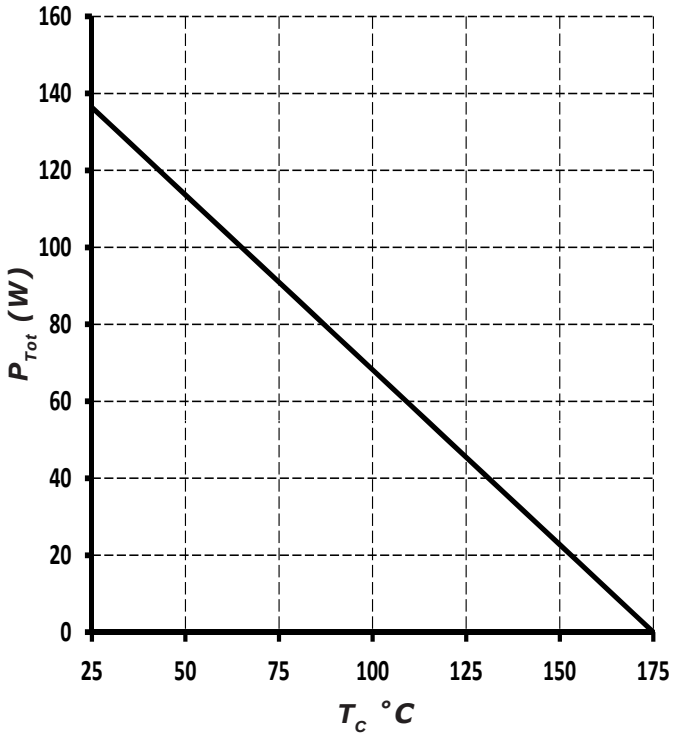


Figure 4. Power Derating

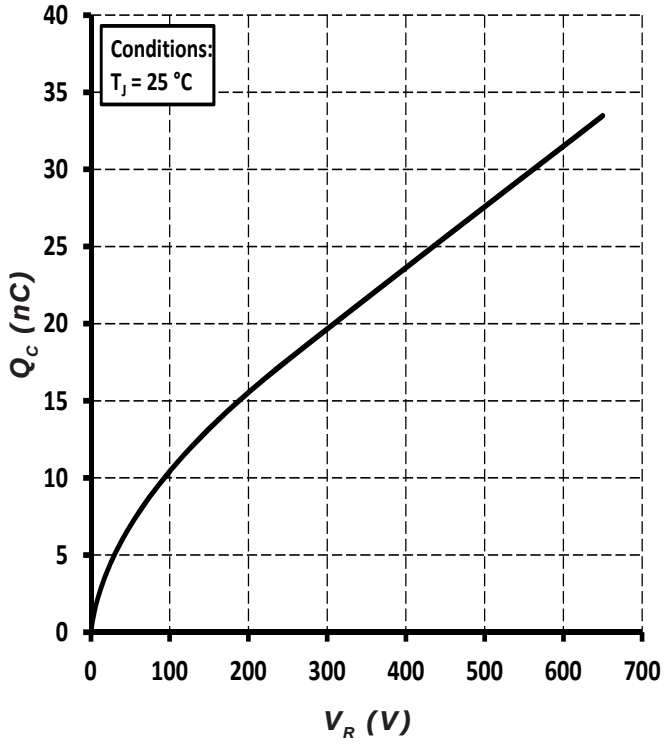


Figure 5. Total Capacitance Charge vs. Reverse Voltage

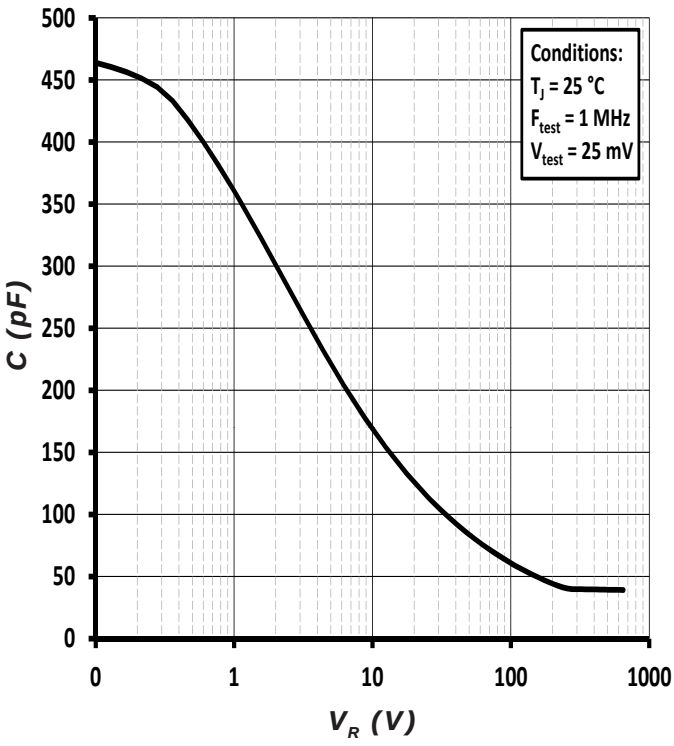


Figure 6. Capacitance vs. Reverse Voltage

Typical Performance

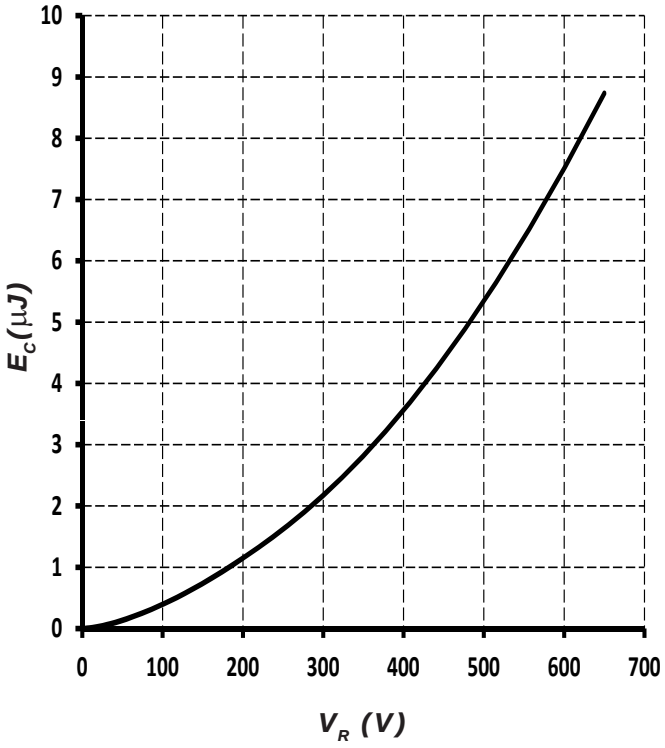


Figure 7. Capacitance Stored Energy

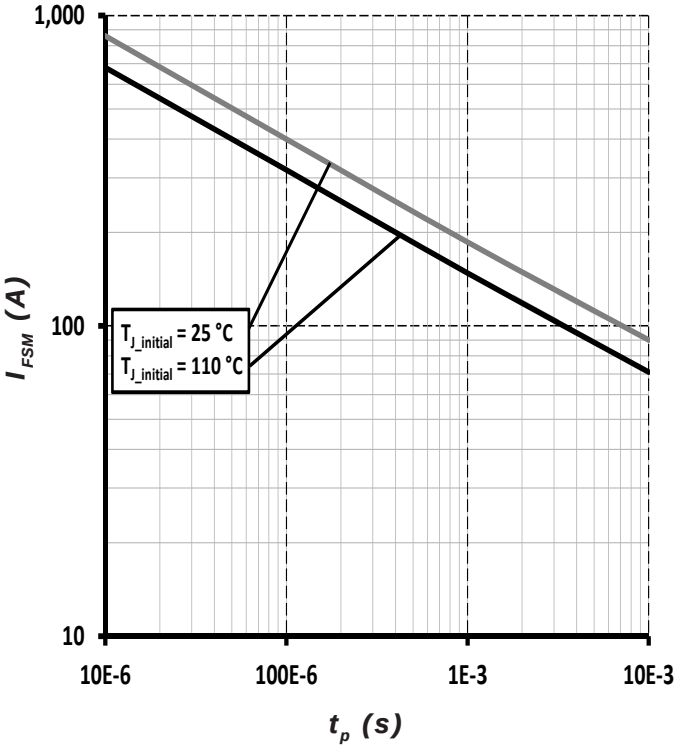


Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

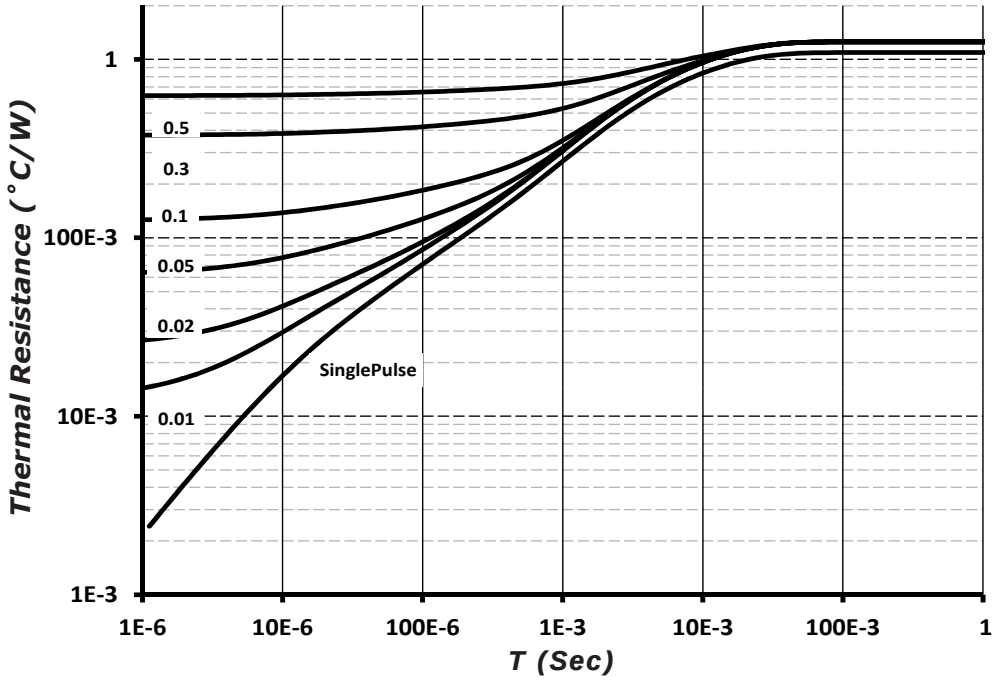
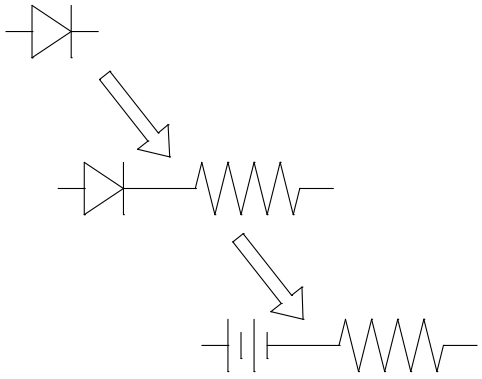


Figure 9. Transient Thermal Impedance

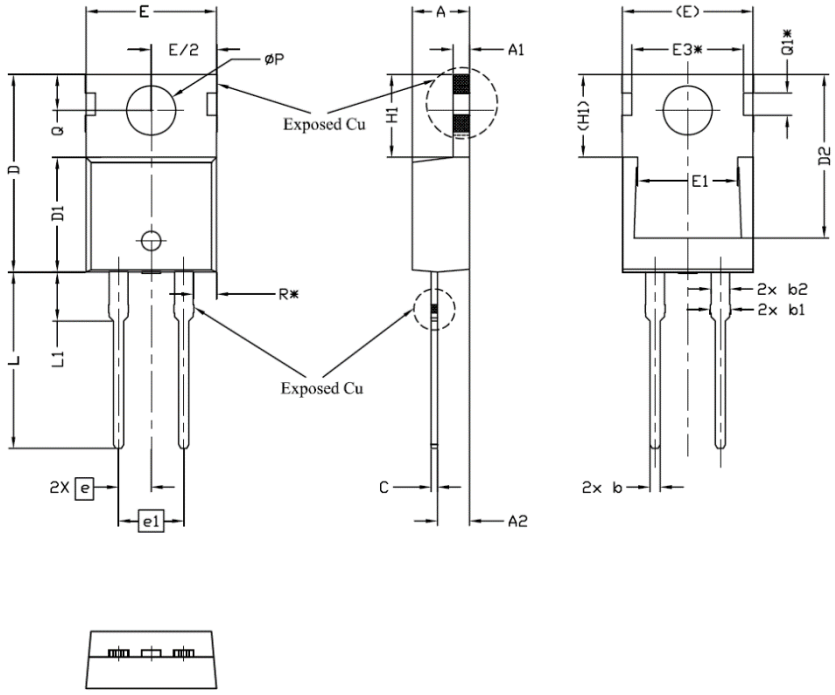
Diode Model



$$Vf_T = V_T + If * R_T$$
$$V_T = 0.94 + (T_J * -1.3*10^{-3})$$
$$R_T = 0.044 + (T_J * 4.4*10^{-4})$$

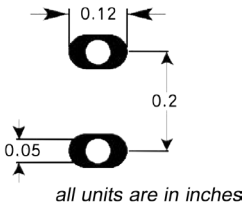
Note: T_J = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 175°C

Package Information
TO-220C-2L



SYMBOL	DIMENSIONS			NOTES
	MIN.	NOM.	MAX.	
A	4.24	4.44	4.64	
A1	1.15	1.27	1.40	
A2	2.30	2.48	2.70	
b	0.70	0.80	0.90	
b1	1.20	1.55	1.75	
b2	1.20	1.45	1.70	
c	0.40	0.50	0.60	
D	14.70	15.37	16.00	4
D1	8.82	8.92	9.02	
D2	12.43	12.73	12.83	5
E	9.96	10.16	10.36	4,5
E1	6.86	7.77	8.89	5
E3*	8.70REF.			
e	2.54BSC			
e1	5.08BSC			
H1	6.30	6.45	6.60	5,6
L	13.47	13.72	13.97	
L1	3.60	3.80	4.00	
ØP	3.75	3.84	3.93	
Q	2.60	2.80	3.00	
Q1*	1.73REF.			
R*	1.82REF.			

Recommended Solder Pad Layout



all units are in inches

TO220-2L

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