GC3D50170H

Silicon Carbide Schottky Diode

Features

- 1.8kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- Extremely Fast Switching
- Positive Temperature Coefficient on V_F

V_{RRM}	=	1800 V
I_F (T_c=135°C)	=	50 A
Q_c	=	158 nC

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
- AC/DC converters

Part Number	Package
GC3D50170H	TO-247-2

TO-247-2

Package

●Absolute Maximum Ratings (T_j = 25°C)

Parameter		Symbol	Value	Unit
Reverse voltage (repetitive peak)		V_{RM}	1800	V
Reverse voltage (DC)		V_R	1800	V
Continuous forward current (T_c=145°C)		I_F	50 *1	A
Surge non-repetitive forward current	PW=10ms sinusoidal, T_j=25°C	I_{FSM} *2	150	A
	PW=10ms sinusoidal, T_j=150°C		110	A
	PW=10µs square, T_j=25°C		630	A
i^2t value	1≦PW≦10ms, T_j=25°C	$\int i^2dt$ *2	120	A^2s
	1≦PW≦10ms, T_j=150°C		60	A^2s
Junction temperature		T_j	175	°C
Range of storage temperature		T_{stg}	−55 to +175	°C

*1 Limited by T_j *2 Assumes $Z_{th(j-a)}$ of 0.16 °C/W or less. (Pulse Width = 8.3ms)

●Electrical characteristics (T_j = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
DC blocking voltage	V_{DC}	I_R =0.3mA	1700	-	-	V
Forward voltage	V_F	I_F=50A,T_j=25°C	-	1.65	1.95	V
		I_F=50A,T_j=150°C	-	2.5	-	V
		I_F=50A,T_j=175°C	-	2.8	-	V
Reverse current	I_R	V_R=1800V,T_j=25°C	-	5	300	μA
		V_R=1800V,T_j=150°C	-	110	-	μA
		V_R=1800V,T_j=175°C	-	250	-	μA
Total capacitance	C	V_R=1V,f=1MHz	-	3100	-	pF
		V_R=1800V,f=1MHz	-	170	-	pF
Total capacitive charge	Q_C	V_R=800V,di/dt=500A/μs	-	158	-	nC
Switching time	t_C	V_R=800V,di/dt=500A/μs	-	39	-	ns

●Electrical characteristic curves

Fig.1 V_F - I_F Characteristics

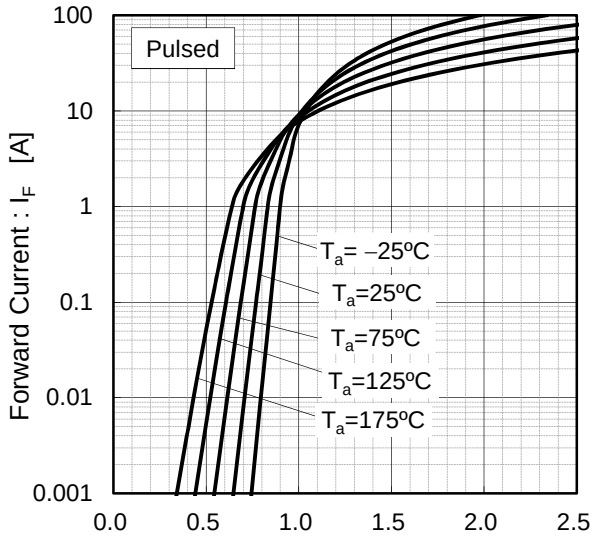


Fig.2 V_F - I_F Characteristics

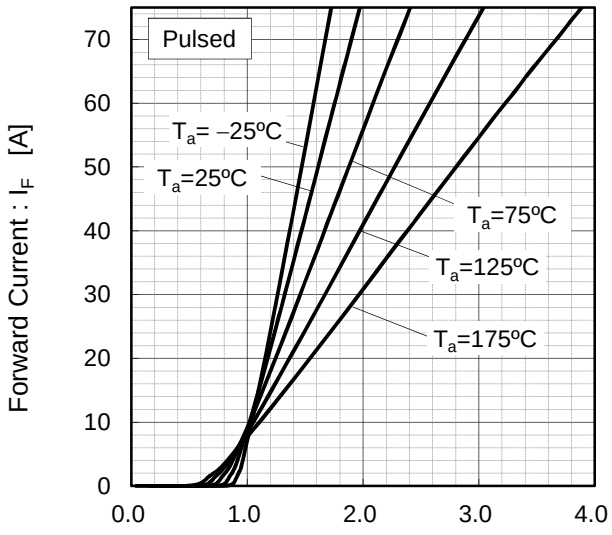


Fig.3 V_R - I_R Characteristics

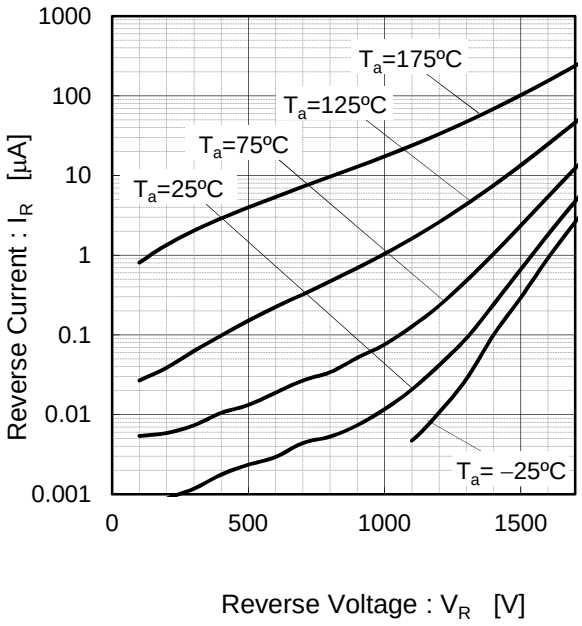


Fig.4 V_R-C_t Characteristics

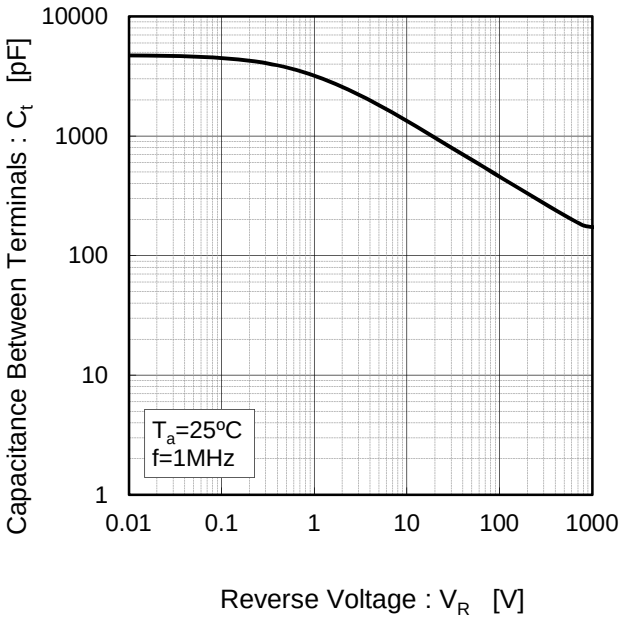
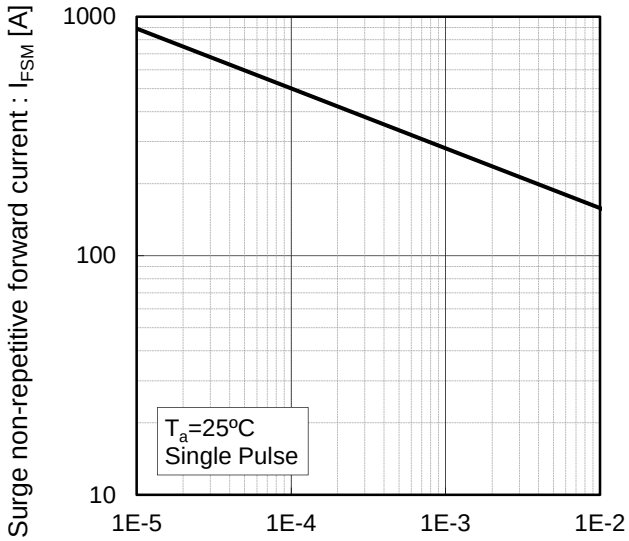


Fig.5 Surge non-repetitive forward current vs. Pulse width (Sinusoidal waveform)*



* Assumes $Z_{th(j-a)}$ of 0.38 °C/W or less.
(Pulse Width = 8.3ms)

Fig.6 Typical capacitance store energy

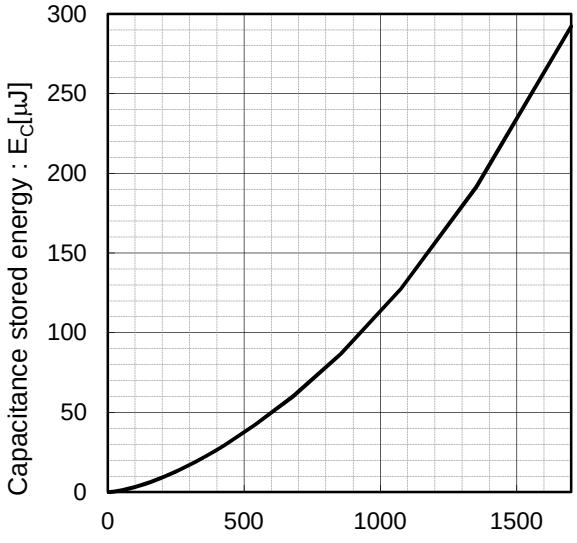
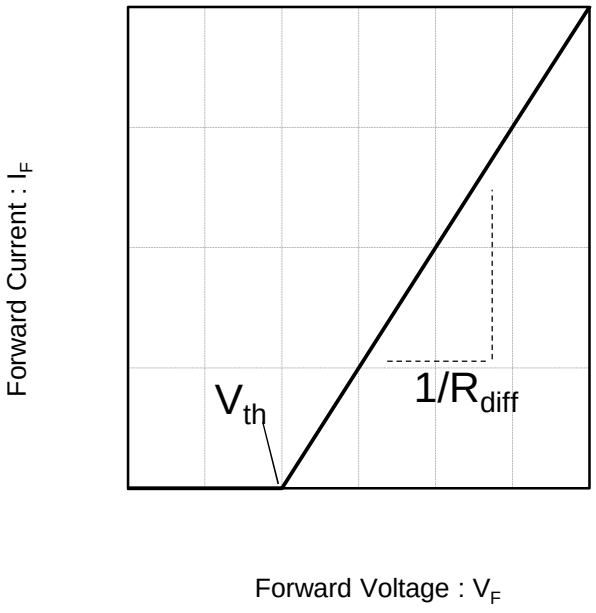


Fig.7 Equivalent forward current curve



$$V_F = V_{th} + R_{diff} I_F$$

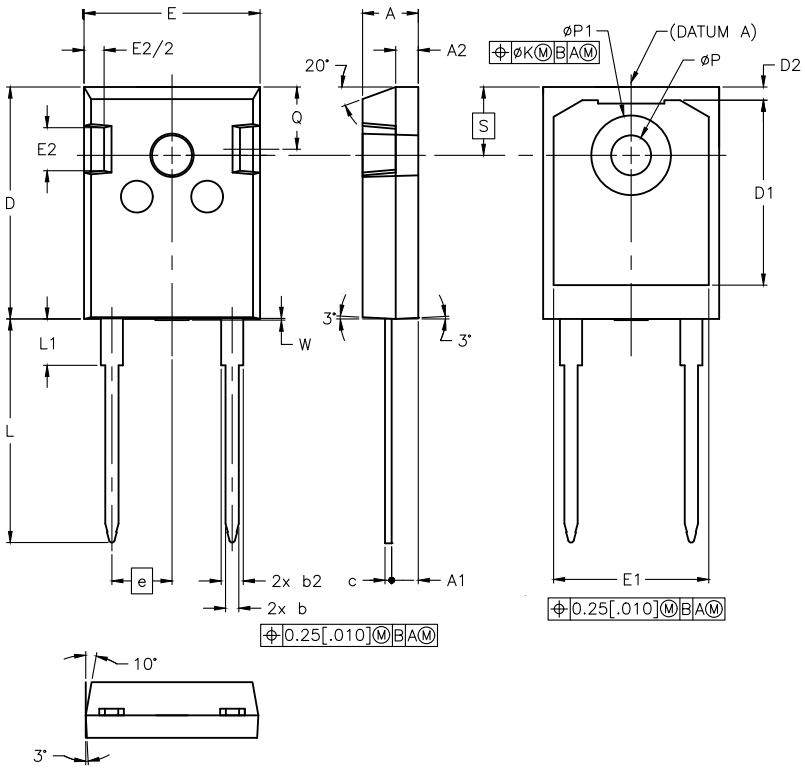
$$V_{th}(T_j) = a_0 + a_1 T_j$$
$$R_{diff}(T_j) = b_0 + b_1 T_j + b_2 T_j^2$$

Symbol	Typical Value	Unit
a_0	9.21E-01	V
a_1	– 1.52E-03	V/°C
b_0	1.20E-02	Ω
b_1	8.13E-05	Ω/°C
b_2	5.64E-07	Ω/°C^2

T_j in ºC; -55 ºC < T_j < ºC ; I_F < 100A

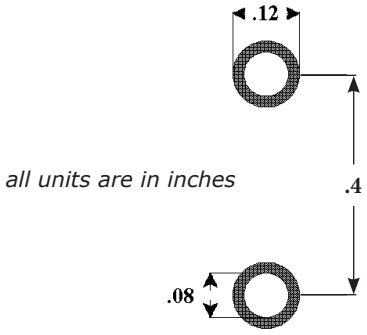
Package Dimensions

Package TO-247-2



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.70	5.31
A1	.087	.102	2.21	2.59
A2	.059	.098	1.50	2.49
b	.039	.055	0.99	1.40
b2	.065	.094	1.65	2.39
c	.015	.035	0.38	0.89
D	.819	.845	20.80	21.46
D1	.515	-	13.08	-
D2	.020	.053	0.51	1.35
E	.620	.640	15.49	16.26
E1	.530	-	13.46	-
E2	.135	.157	3.43	3.99
e	.214		5.44	
ØK	.010		0.25	
L	.780	.800	19.81	20.32
L1	-	.177	-	4.50
ØP	.140	.144	3.56	3.66
ØP1	.278	.291	7.06	7.39
Q	.212	.244	5.38	6.20
S	.243		6.17	
W	-	.006	-	0.15

Recommended Solder Pad Layout



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