SUPSiC®

Wuxi Gwok Semiconductor Co.,Ltd

GC4D12120A
Silicon Carbide Schnottky Diode

V_{RRM}	=	1200 V
$I_F(T_c=135°C)$ =		16 A
Q_c	=	52 nC

atures

Features

- 1.2kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching
- 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
- AC/DC converters

Part Number	Package	Marking
GC4D12120A	TO-220-2	GC4D12120

TO-220-2

PIN 1 ○———————○ CASE
PIN 2 ○————▷|————

Maximum Ratings (T_C=25°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	1300	V		
V_R	DC Peak Reverse Voltage	1200	V		
I_F	Continuous Forward Current	33 16 12	A	$T_C=25°C$ $T_C=135°C$ $T_C=156°C$	Fig. 3
I_{FRM}	Repetitive Peak Forward Surge Current	47 31.5	A	$T_C=25°C$, $t_P=10$ ms, Half Sine Pulse $T_C=110°C$, $t_P=10$ ms, Half Sine Pulse	
I_{FSM}	Non-Repetitive Forward Surge Current	71 59.5	A	$T_C=25°C$, $t_P=10$ ms, Half Sine Pulse $T_C=110°C$, $t_P=10$ ms, Half Sine Pulse	Fig. 8
$I_{F,Max}$	Non-Repetitive Peak Forward Current	750 620	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	166.5 72	W	$T_C=25°C$ $T_C=110°C$	Fig. 4
dV/dt	Diode dV/dt ruggedness	200	V/ns	$V_R=0-960V$	
$\int i^2 dt$	i²t value	25 17.5	A²s	$T_C=25°C$, $t_P=10$ ms $T_C=110°C$, $t_P=10$ ms	
T_J	Operating Junction Range	-55 to +175	°C		
T_{stg}	Storage Temperature Range	-55 to +135	°C		
	TO-220 Mounting Torque	1 8.8	Nm Ibf-in	M3 Screw 6-32 Screw	

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.35 2.2	1.8 3	V	I_F = 10 A T_J=25°C I_F = 10 A T_J=175°C	Fig. 1
I_R	Reverse Current	30 55	250 350	μA	V_R = 1200 V T_J=25°C V_R = 1200 V T_J=175°C	Fig. 2
Q_C	Total Capacitive Charge	52		nC	V_R = 800 V, I_F = 10A di/dt = 200 A/μs T_J = 25°C	Fig. 5
C	Total Capacitance	754 45 38		pF	V_R = 0 V, T_J = 25°C, f = 1 MHz V_R = 400 V, T_J = 25°C, f = 1 MHz V_R = 800 V, T_J = 25°C, f = 1 MHz	Fig. 6
E_C	Capacitance Stored Energy	14.5		μJ	V_R = 800 V	Fig. 7

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

Thermal Characteristics

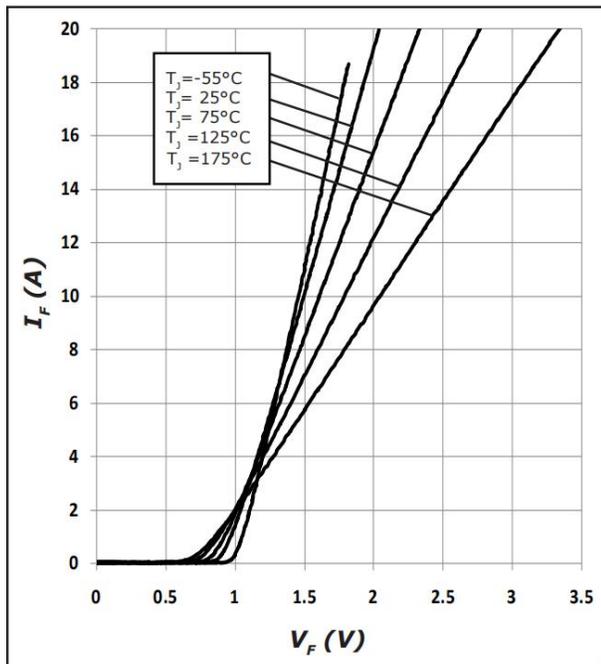| Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.9	°C/W	Fig. 9

Typical Performance
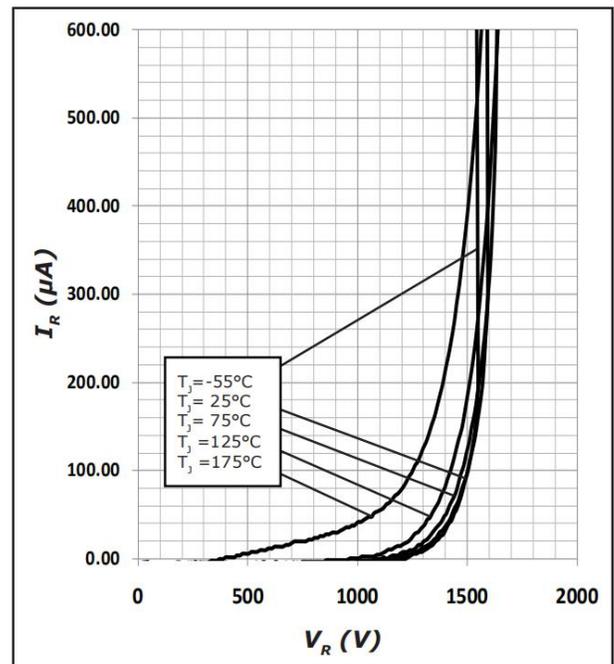

Figure 1. Forward Characteristics

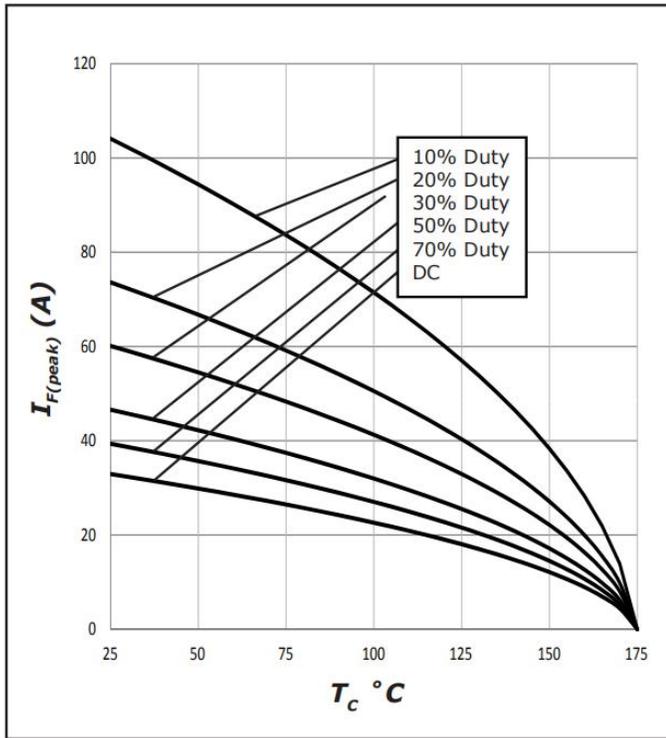Figure 2. Reverse Characteristics

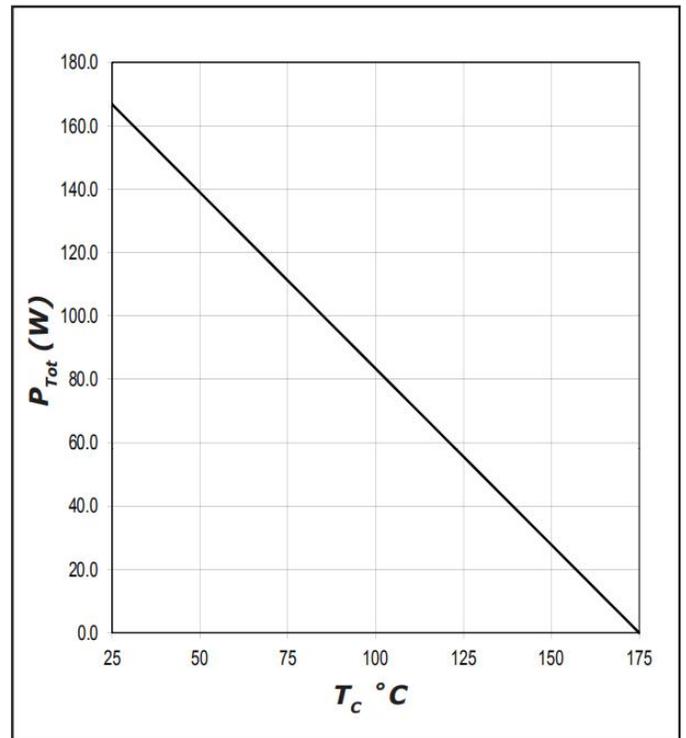**Typical Performance**

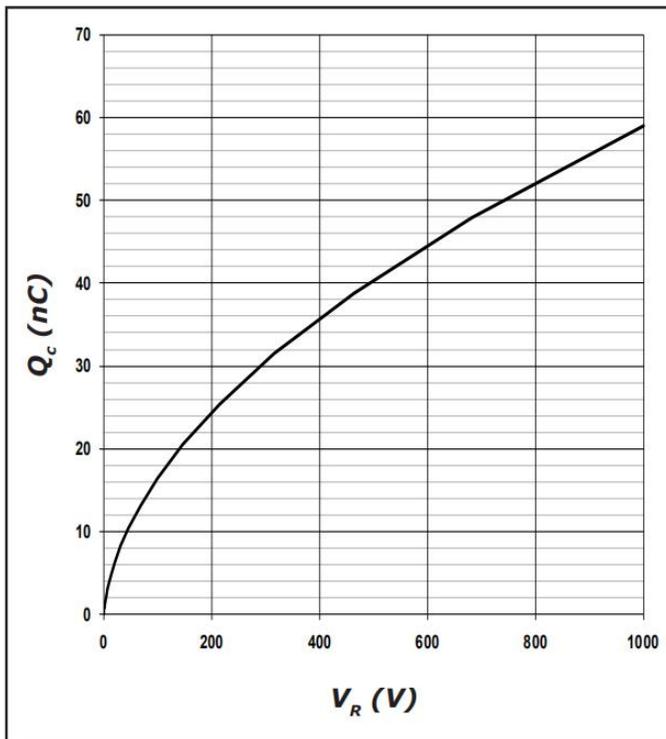Figure 3. Current Derating

Figure 4. Power Derating

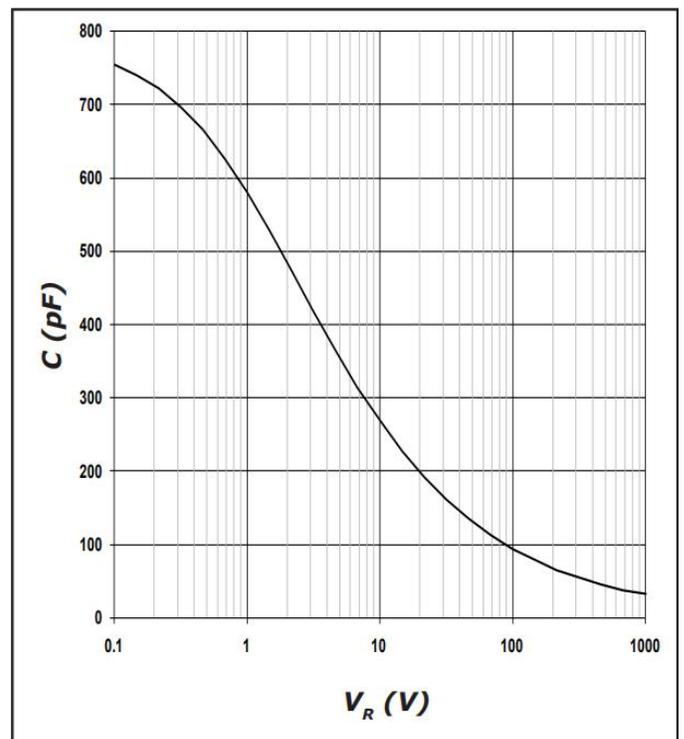Figure 5. Recovery Charge vs. Reverse Voltage
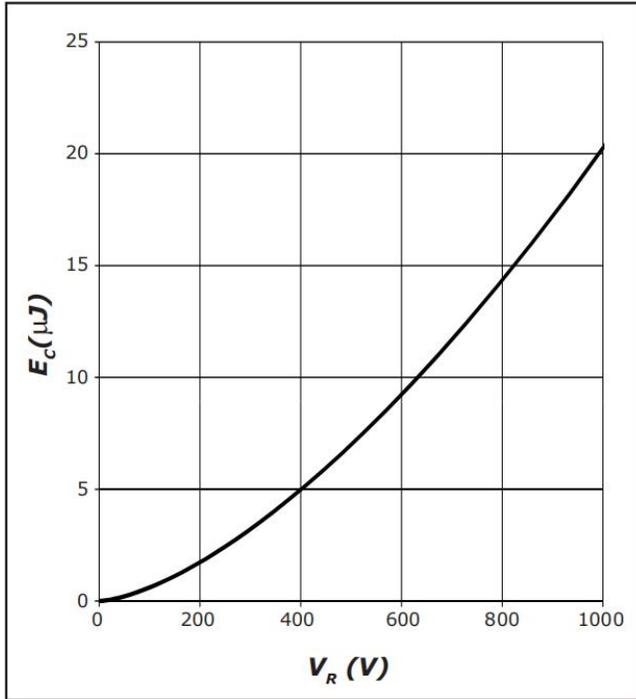

Figure 6. Capacitance vs. Reverse Voltage
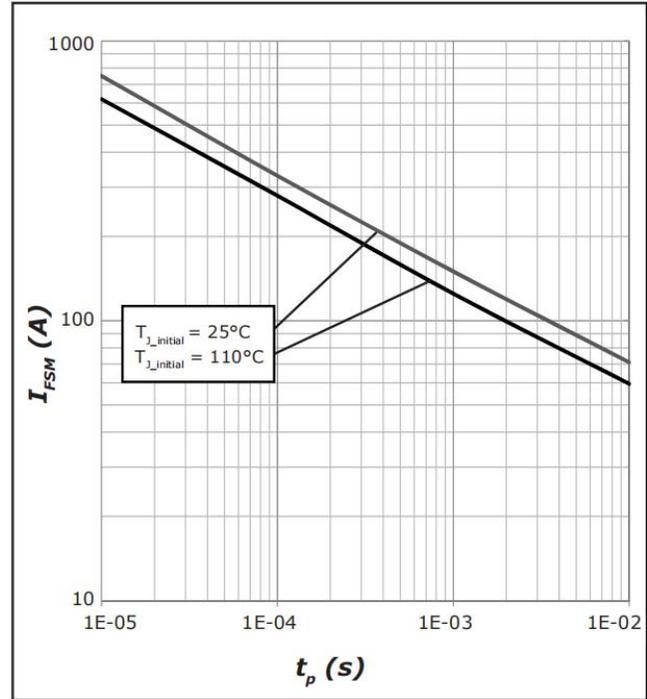
Figure 7. Typical Capacitance Stored Energy

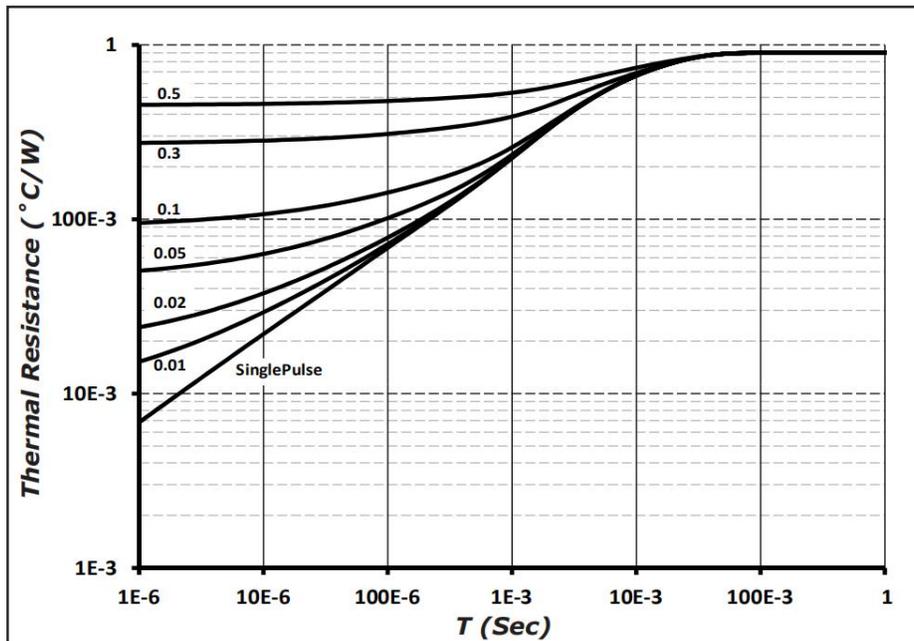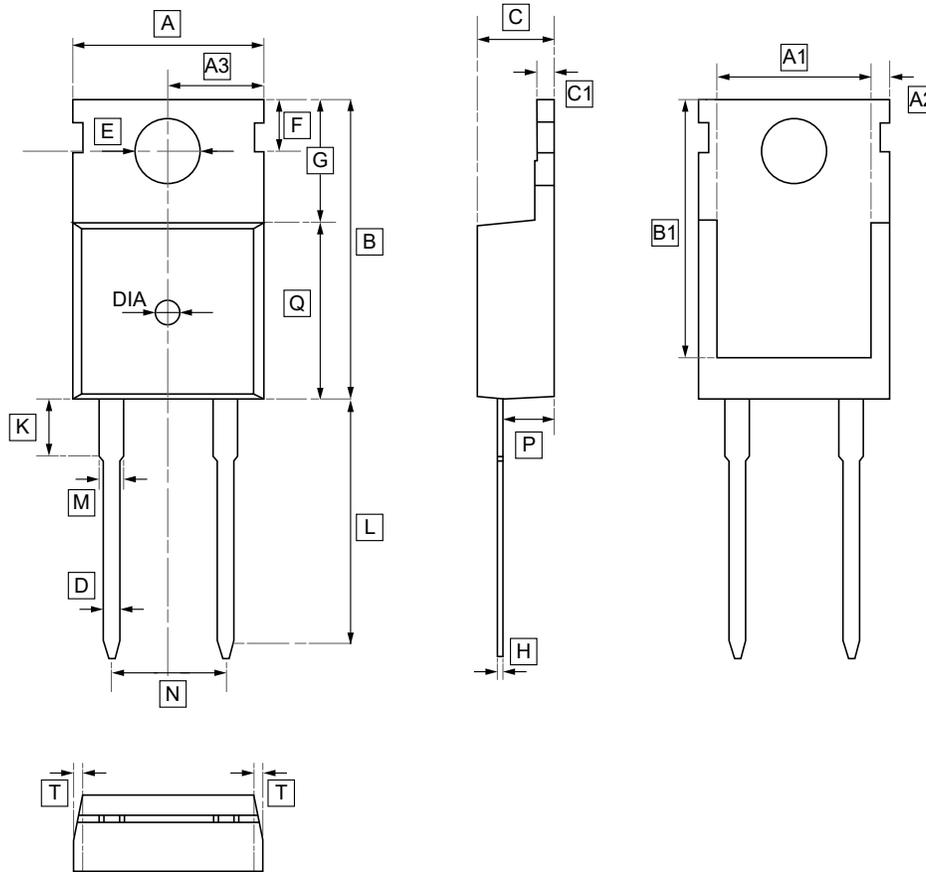Figure 8. Non-repetitive peak forward surge current versus pulse duration (sinusoidal waveform)

Figure 9. Transient Thermal Impedance
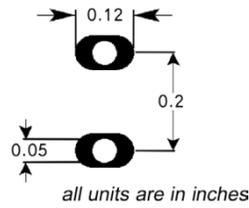
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Package Dimensions

Package TO-220-2

DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	D	E	F	G
Min	9.7	8.44	1.05	4.8	15.4	12.9	4.28	1.1	0.6	3.4	2.65	5.2
Max	10.3	8.84	1.25	5.2	16.2	13.5	4.68	1.5	1.0	3.8	3.25	5.8

Symbol	H	K	L	L1	M	N	P	Q	T	DIA
Min	0.4	2.9	12.8	2.7	1.15	4.98	2.1	8.7	W:0.35	⊙1.5
Max	0.6	3.3	13.6	3.3	1.35	5.18	2.7	9.3		(deep 0.2)

Diode Model

all units are in inches

TO-220-2

Part Number	Package
GC4D12120A	TO-220-2

PIN 1 ○
PIN 2 ○ — CASE

Diode Model
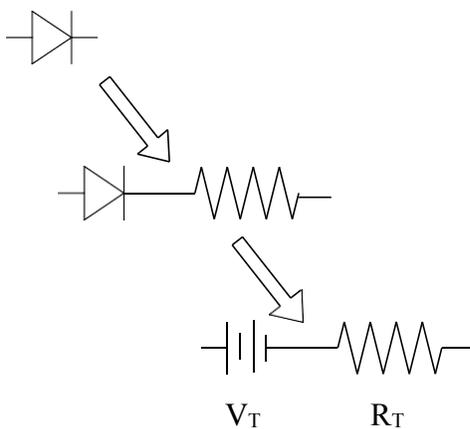
$$V_{fT} = V_T + If * R_T$$

$$V_T = 0.98 + (T_J * -1.71 * 10^{-3})$$
$$R_T = 0.040 + (T_J * 5.32 * 10^{-4})$$

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

V_T R_T

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