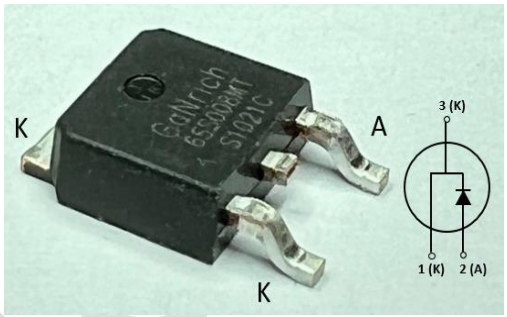
GR-65S008MT – SiC 650V 8A Schottky Barrier Diode

Features

- 650-Volt Schottky Rectifier
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching
- Positive Temperature Coefficient on VF
- Low capacitive charge
- Product Summary

VR	650	V
IF(T_j=175℃)	8	A
Q_c	18	nC



GR-65S008MT, DPAK TO252

Potential Applications

- Boost Diodes in PFC or DC/DC stages
- Switch Mode Power Supplies (SMPS)
- AC/DC Converters
- Motor Drives

Product Validation

• Qualified for industrial applications according to the relevant tests of JEDEC22

Production Name	Package
GR-65S008MT	DPAK- TO252

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1- Electrical Characteristics and Parameters

◆ **Table 1 Absolute Maximum Ratings** (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Value	Unit
VRRM	Repetitive Peak Reverse Voltage	650	V
VRSM	Surge Peak Reverse Voltage	650	V
I_F	Continuous Forward Current@ T_C < 150°C	8	A
I_{FM}	Non−Repetitive Peak Forward Surge Current T_C=25 °C, t_p=10ms, Half Sine Wave,D=0.3	40	A
I_{FSM}	Non−Repetitive Forward Surge Current (Half−Sine Pulse) T_C= 25°C, t_P =10 ms, D=0.3	56	A
T_j	Operating Junction and Storage Temperature Range	-55~175	°C
P_{tot}	Total dissipation at T_C = 25°C Operation	107	W

◆ **Table 2 Thermal Characteristics**

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	(*)Thermal resistance junction-ambient	1.32	°C/W

(*) When Mounted on 1 inch^2 FR-4 board, 2 oz of Cu and t = 10 sec.

◆ **Table 3 Electrical Characteristics** (T_j = 25°C unless otherwise noted)

Static Characteristics

Symbol	Parameter	Test Conditions	Values			Unit
			Min.	Typ.	Max.	
VR	DC Blocking Voltage	IR=100uA	650	-	-	V
VF	Forward Voltage	IF=8A, T_j =25°C		1.4	1.8	V
		IF=8A, T_j =175°C		1.8	2.4	V
IR	Reverse Current	VR=650V, T_j =25°C		0.9	50	uA
		VR=650V, T_j =175°C		15	150	uA

AC Characteristics

Symbol	Parameter	Test Conditions	Values			Unit
			Min.	Typ.	Max.	
C_j	Total Capacitance	VR=0.1V, f=1MHz		320		pF
		VR=100V, f=1MHz		45		pF
		VR=400V, f=1MHz		30		pF
Q_c	Total Capacitive Charge	VR=400V, T_j =25°C, di/dt = 200 A/µs, IF ≤IF_{MAX}		18		nC
E_c	Capacitance Stored Energy	VR=400V, T_j =25°C		3.6		uJ

2- Typical Characteristic Curves

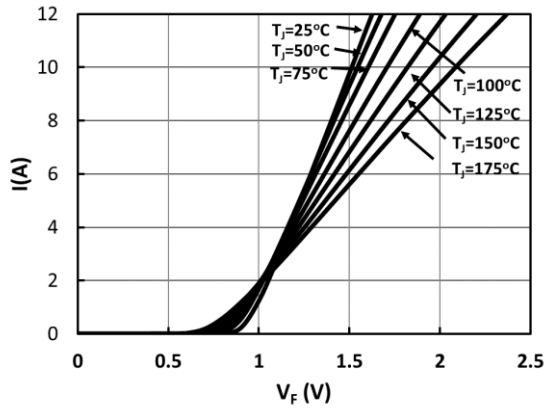

Figure 1: Typical Forward Characteristics

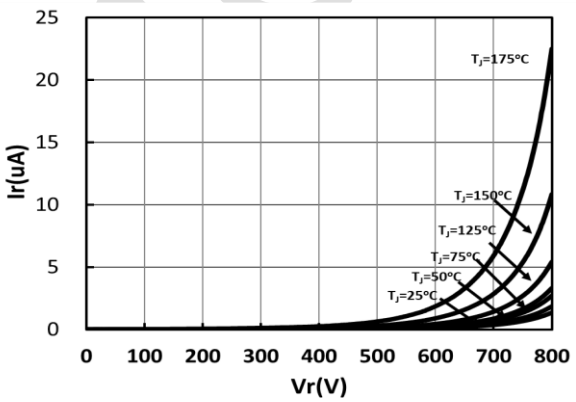

Figure 2: Typical reverse current versus reverse voltage

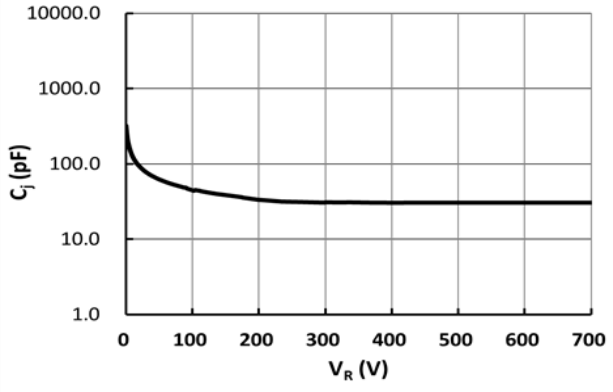

Figure 3: Junction capacitance versus reverse voltage applied (typical values)

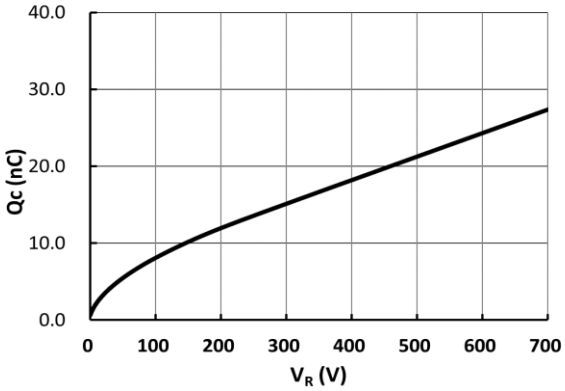

Figure 4: Total capacitive charges versus reverse voltage applied (typical values)

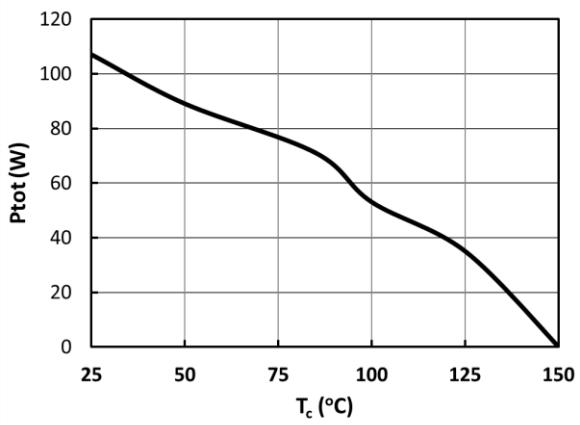

Figure 5: Power dissipation versus case temperature

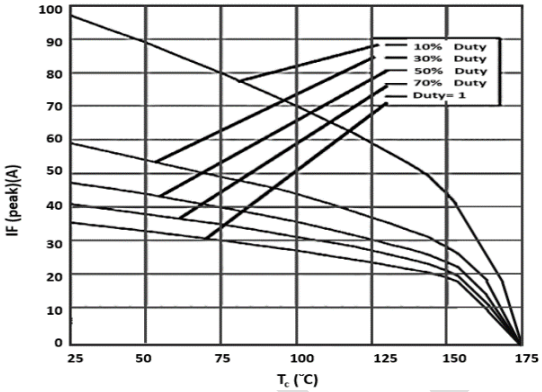

Figure 6: Peak forward current versus case temperature

3- Package Outline

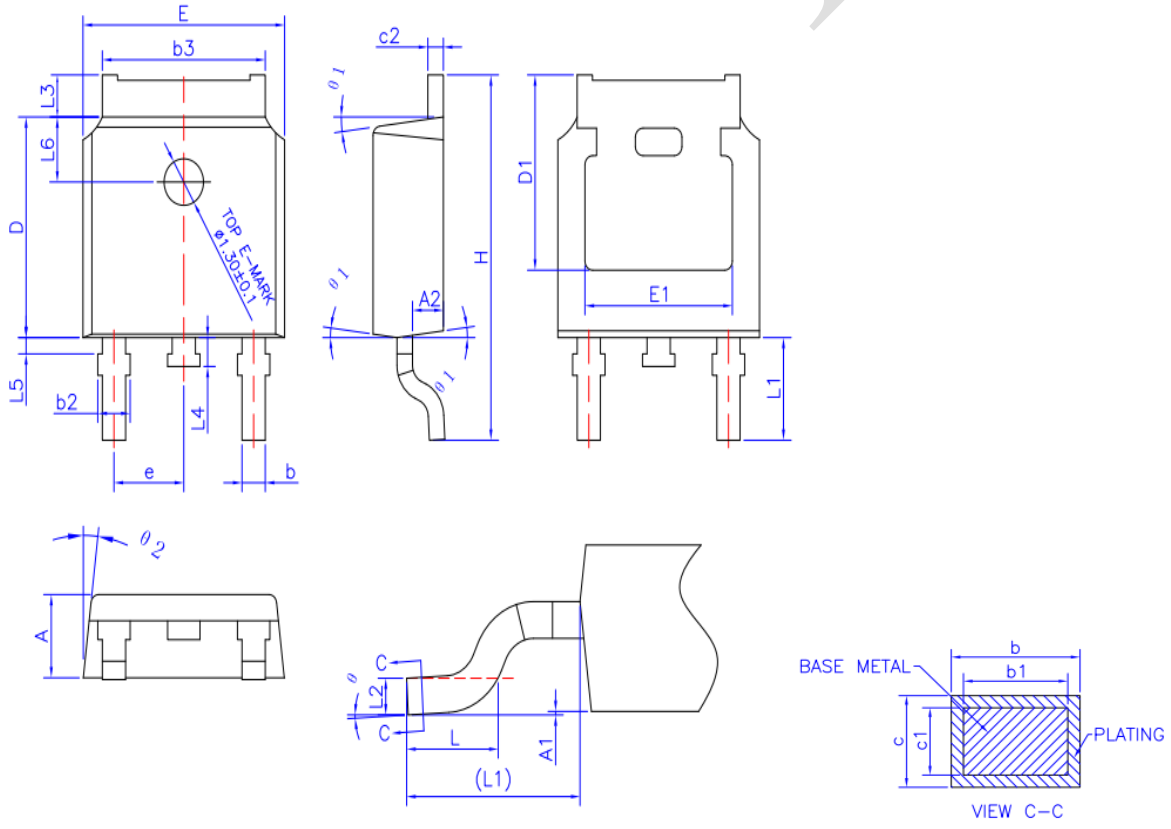

Figure 7 Package Outline of GR-65S008MT

COMMON DIMENSIONS (UNITS OF MEASURE =MILLIMETER)			
SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0	---	0.10
A2	0.90	1.01	1.10
b	0.72	---	0.85
b1	0.71	0.76	0.81
b2	0.72	---	0.90
b3	5.13	5.33	5.46
c	0.47	---	0.60
c1	0.46	0.51	0.56
c2	0.47	---	0.60
D	6.00	6.10	6.20
D1	5.25	---	---
E	6.50	6.60	6.70
E1	4.70	---	---
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.508 BSC		
L3	0.90	---	1.25
L4	0.60	0.80	1.00
L5	0.15	---	0.75
L6	1.80 REF		
θ	0°	---	8°
θ1	5°	7°	9°
θ2	5°	7°	9°

Table 4 Dimension of GR-65S008MT

GR DAPK-TO252 Footprint:

All units are in millimeters

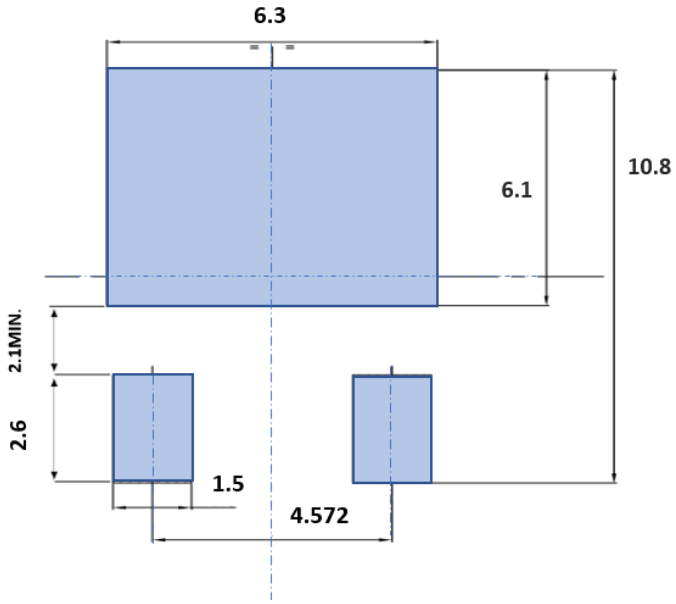

Figure 8 Recommended PCB Solder Pad

4- Reflow Soldering Profile

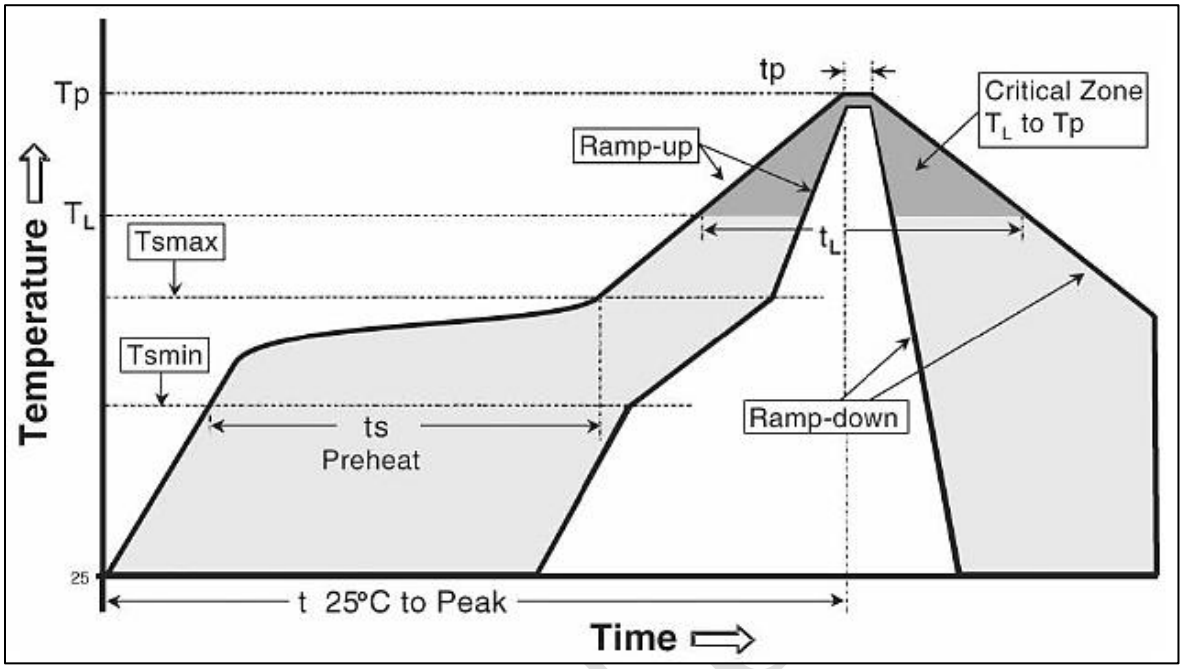

Figure 9 Recommended Reflow Soldering Condition (IPC/JEDEC J-STD-020 Revision C)

Profile Feature		Pb-Free Assembly
Average Ramp-Up Rate (T_{smax} to T_p)		3 °C/second max.
Preheat	Temperature Min (T_{smin})	150 °C
	Preheat: Temperature Max (T_{smax})	200 °C
	Time (t_{smin} to t_{smax})	60-180 seconds
Time Maintained Above	Temperature (T_L)	217 °C
	Time (t_L)	60-150 seconds
Peak Temperature (T_p)		260 °C
Time Within 5 °C of Actual Peak Temperature (t_p)		20-40 seconds
Ramp-Down Rate		6 °C/second max.
Time 25 °C to Peak Temperature		8 minutes max.

Note: All temperatures refer to the topside of the package, measured on the package body surface.

5- Application Circuit

-PFC Boost

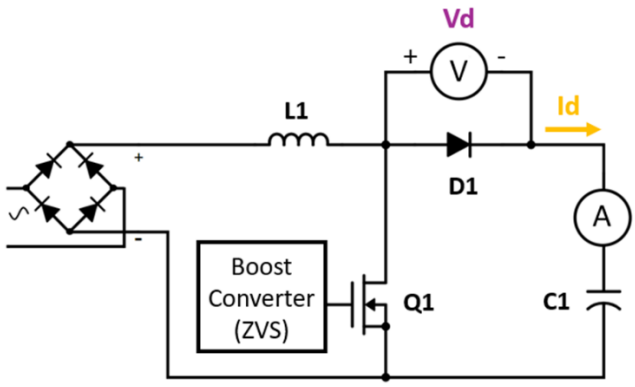

Figure 10: Diode Characteristics -Test Circuit for PFC Boost

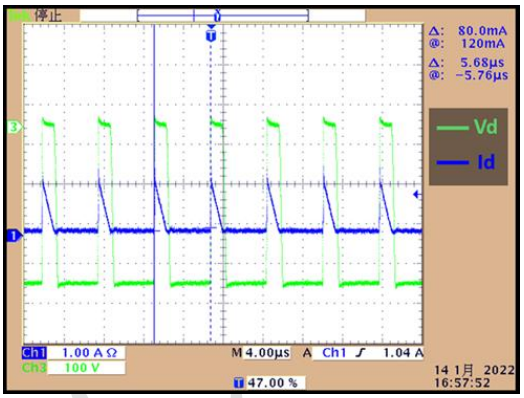

Figure 11: Test Waveform of diode for PFC Boost 150W 400V/0.375A @230Vac

- Reverse Recovery Characteristics of Diodes

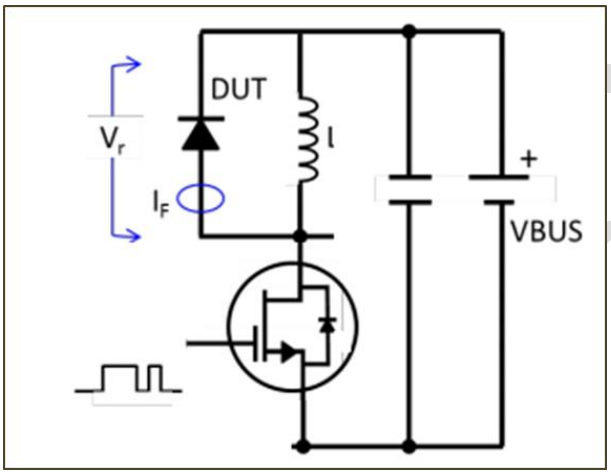

Figure 12: Test circuit for measuring reverse recovery characteristics of diodes.

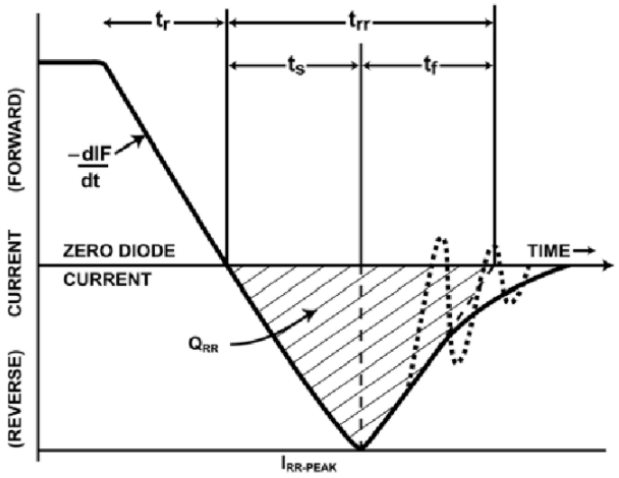

Figure 13: Definitions of the different portions of a high-voltage, power rectifier's reverse recovery current waveform

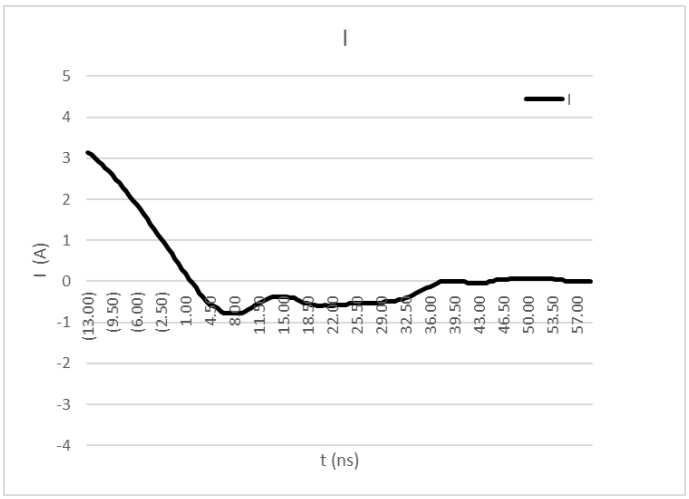

Figure 13: Test Waveform of SiC Diode Q_c, T_j = 25°C

■ Total capacitive charge
VR = 400 V, di/dt = 200 A/μs,
IF ≤IF, MAX, T_j =25 °C

$$Qc = \int_{t(I=>0\rightarrow 0)}^{t(I=<0\rightarrow 0)} I\, d(t)$$

=17.36 nC ≤18nC

6- Revision History

Date	Revision	Changes
15-Dec-21	1	First issue
07-Feb-22	2	Application Circuit