Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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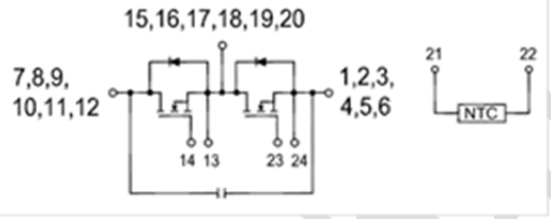
GCMS008A120B1B1

1200V 8.3mΩ SiC MOSFETs Half Bridge Module

Package: 31mm x 66mm x 12mm



Features

- Ultra Low Loss with SiC MOSFETs
- Zero Reverse Recovery Current with SiC SBDs
- Zero Turn-off Tail Current
- High-Frequency Operation
- Positive Temperature Coefficient on VDS(on)
- baseplate-less AlN DBC substrate

Applications

- UPS and SMPS
- Fast DC/DC Converter
- Motor Driver
- Induction Heating/Welding

Benefits

- Outstanding performance at high frequency operation
- Low switching losses
- Better EMI noise with low parasitic inductance
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Easy paralleling due to positive T_C of R_{DS_ON}
- RoHS Compliant

Absolute Maximum Ratings (T_j=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Specifications	Units
Drain - Source Voltage	V_{DS}		1200	V
Continuous Drain Current	I_D	V_{GS}=20V, T_C = 25 °C	300	A
		V_{GS}=20V, T_C = 90 °C	200	A
Gate - Source Voltage	V_{GS}	Absolute maximum	+25/-10	V
Pulsed Drain Current	I_{DS}	Limited by Tj_max	750	A
Maximum Power Dissipation	P_D	T_C = 25 °C	1000	W
		T_C = 100 °C	TBD	W
Solder Temperature	T_L	Max for 10 sec	260	°C

Electrical Characteristics of MOSFETs (T_j=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OFF						
Drain - Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V,I_D=150uA	1.2			kV
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1200V, V_{GS} = 0V	--	250	1000	μA
Gate-Source Leakage Current	I_{GSS}	V_{DS} = 0V, V_{GS} = 20V	--	--	±1.8	μA
ON						
Gate-Source Threshold Voltage	$V_{GS(TH)}$	V_{DS} = 10V, I_D = 15mA, T_j = 25 °C	2.0	2.6	4	V
		V_{DS} = 10V, I_D = 15mA, T_j = 150 °C		2.0		
On State Resistance	$R_{DS(ON)(chip)}$	V_{GS} = 20V, I_D = 150A, T_j = 25 °C	--	8	--	mΩ
		V_{GS} = 20V, I_D = 150A, T_j = 150 °C	--	14	--	mΩ
	$R_{DS(ON)(terminal)}$	V_{GS} = 20 V, I_{DS} = 150 A, T_J= 25˚C		9.5		mΩ
		V_{GS} = 20 V, I_{DS} = 150 A, T_J=125˚C		12.8		mΩ
		V_{GS} = 20 V, I_{DS} = 150 A, T_J=150˚C		14.3		mΩ
Transconductance	g_{fs}	V_{DS} = 20V, I_D = 150A, T_j = 25 °C		70.8		S
		V_{DS} = 20V, I_D = 150A, T_j = 150 °C		65.1		
DYNAMIC						
Input Capacitance	C_{ISS}	V_{DS} = 1000V, V_{GS} = 0V, f = 1 MHz, V_{AC} = 25mV	--	8.4	--	nF
Output Capacitance	C_{OSS}		--	660	--	pF
Reverse Transfer Capacitance	C_{RSS}		--	45	--	pF
Internal Gate Resistance	$R_{G(INT)}$	f = 1 MHz, V_{AC} = 25mV		0.37		Ω
Module Stray Inductance	L_σ	Between terminal DC+ and DC-	--	10	--	nH
Module Lead Resistance	R_{mod}		--	TBD	--	mΩ
SWITCHING						
Turn-On Delay Time	$t_{d(on)}$	V_{DD}= 650V, I_D =150A $R_{G(ext)}$= 2.5Ω, V_{GS}= -5/20V Inductive Load, T_J=25 °C	--	25	--	ns
Rise Time	t_r		--	40	--	ns
Turn-Off Delay Time	$t_{d(off)}$		--	36	--	ns
Fall Time	t_f		--	42	--	ns
Turn-On Switching Energy Loss	E_{ON}		--	TBD	--	mJ
Turn-Off Switching Energy Loss	E_{OFF}		--	TBD	--	mJ
Turn-On Delay Time	$t_{d(on)}$		--	TBD	--	ns
Rise Time	t_r		--	TBD	--	ns

Turn-Off Delay Time	$t_{d(off)}$	V_{DD}= 650V, I_D =150A R_G= 2.5Ω, V_{GS}=-5/20V Inductive Load, T_J=150 ^{0}C	--	TBD	--	ns
Fall Time	t_f		--	TBD	--	ns
Turn-On Switching Energy Loss	E_{ON}		--	TBD	--	mJ
Turn-Off Switching Energy Loss	E_{OFF}		--	TBD	--	mJ
Total Gate Charge	Q_G	V_{DD}= 650V, I_D =150A V_{GS}= -5/20V	--	483	--	nC
Gate-Source Charge	Q_{GS}		--	138	--	nC
Gate-Drain Charge	Q_{GD}		--	150	--	nC

Built-in SiC Body Diode Characteristics (T_C=25℃ unless otherwise specified)

Description	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	$V_{SD(chip)}$	I_{SD} = 75 A, V_{GS} = -5V , T_j=25℃		3.3		V
		I_{SD} = 75 A, V_{GS} = -5V, T_j=150℃		3.0		
Reverse Recovery Time	T_{rr}	I_{SD} = 150 A, V_{GS} = -5V , T_j=25℃,V_R=800V, diF/dt= 1000 A/μs		135		ns
Reverse Recovery Charge	Q_{rr}			1218		nC
Peak Reverse Recovery Current	I_{rrm}			40.5		A

Electrical Characteristics of Free-wheeling SiC SBD (T_C=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Maximum peak repetitive reverse voltage	V_{RRM}		1200	--	--	V
Maximum Reverse Leakage Current	I_{RM}	V_R = 1200V, T_j = 25 ^{0}C	--	4.1	100	μA
		V_R = 1200V, T_j = 150 ^{0}C	--	606	--	μA
Diode Forward Voltage	V_F	I_F = 30A, T_j = 25 ^{0}C	--	1.5	1.7	V
		I_F = 30A, T_j = 150 ^{0}C	--	2.3	--	V
Total Capacitive Charge	Q_C	V_R=1200 V, I_F<$I_{F,max}$	--	52	--	nC
Switching Time	t_C	dI_F/dt = 500 A/μs, T_j = 25 ^{0}C	--	--	10	ns
Total Capacitance	C	V_R = 1V, f = 1 MHz	--	895	--	pF
		V_R = 600V, f = 1 MHz	--	52	--	pF
		V_R = 1200V, f = 1 MHz	--	43	--	pF

Thermal Characteristics (T_C=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
MOSFET Thermal Resistance: Junction-To-Case	$R_{\theta JCM}$			0.085		℃/W
Diode Thermal Resistance: Junction-To-Case	$R_{\theta JCD}$			0.55		℃/W

Internal NTC-Thermistor Characteristics

Parameters	Symbol	Conditions	Min	Typ	Max	Units
Zero Power Resistance	R_{25}	T_c=25 ^{0}C	--	22.7	--	kΩ
	R_{100}	T_c=100 ^{0}C	--	1481	--	Ω
B Value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3950		K
	$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		4000		K
Power Dissipation	P_{25}	T_c=25 ^{0}C		200		mW

Module Characteristics (T_j=25°C unless otherwise specified)

Description	Symbol	Min	Typ	Max	Unit
Isolation Voltage(All Terminals Shorted), f = 50Hz, 1minute	V_{iso}	2500			V
Maximum Junction Temperature	T_J			150	℃
Maximum Operating Junction Temperature Range	T_{JOP}	-40		+150	℃
Storage Temperature	T_{stg}	-40		+125	℃
Case-To-Sink (Conductive Grease Applied)	$R_{\theta CS}$		0.1		℃/W
Mounting Screw:M6	T	1.0		1.5	N·m
Weight	G		25		g

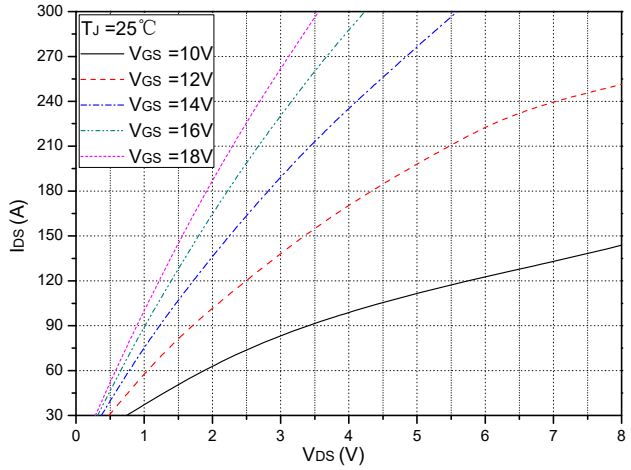


Fig. 1Typical Output Characteristics Tj=25℃ (terminal)

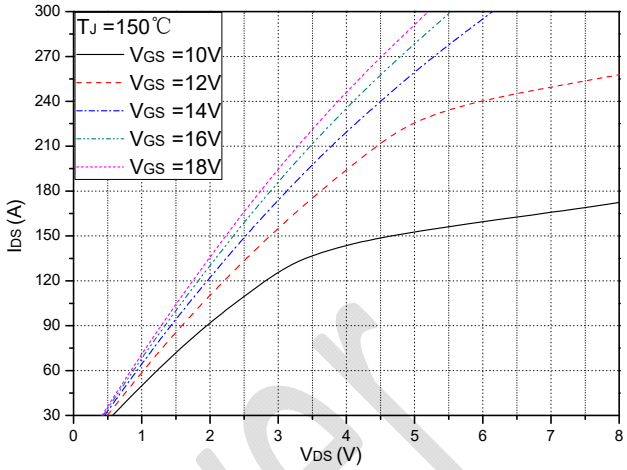


Fig. 2Typical Output Characteristics Tj=150℃ (terminal)

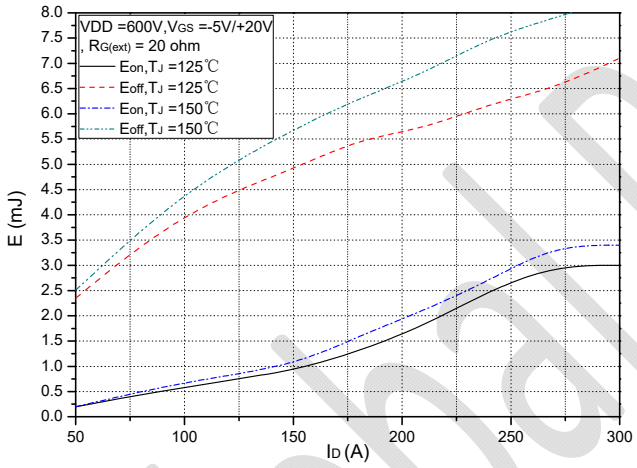


Fig. 3 Typical Switching Loss vs. Collector Current

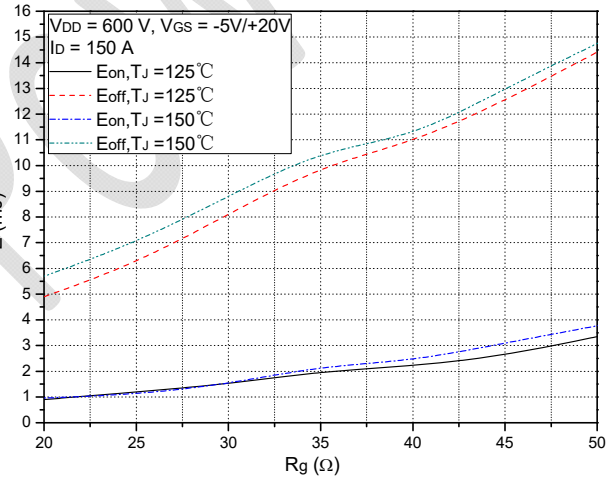


Fig. 4 Typical Switching Loss vs. Gate Resistance

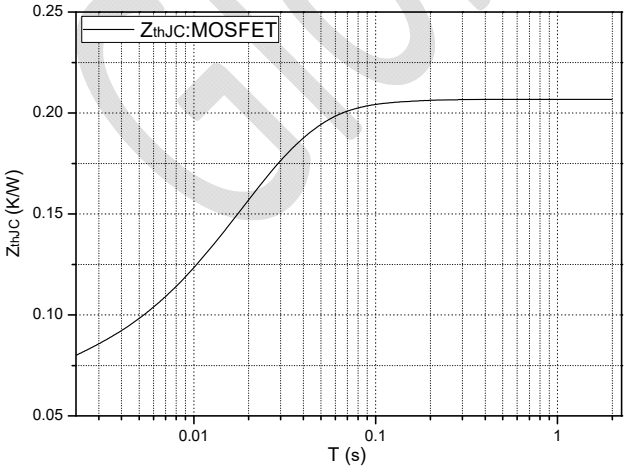


Fig. 5 Transient thermal impedance (MOSFET)

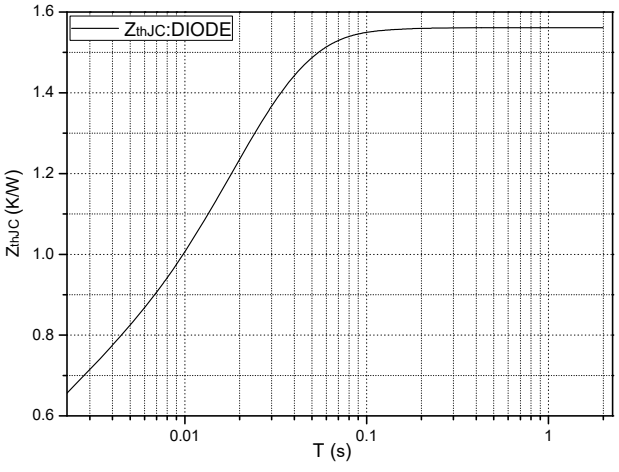


Fig. 6 Transient thermal impedance (SiC Diode)

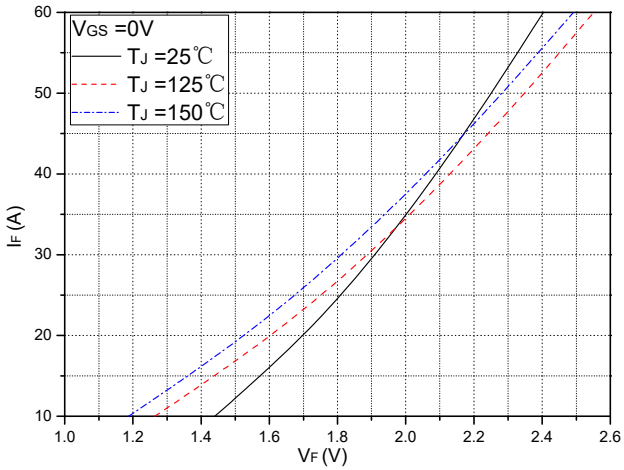


Fig. 7 Forward Characteristics of Diode

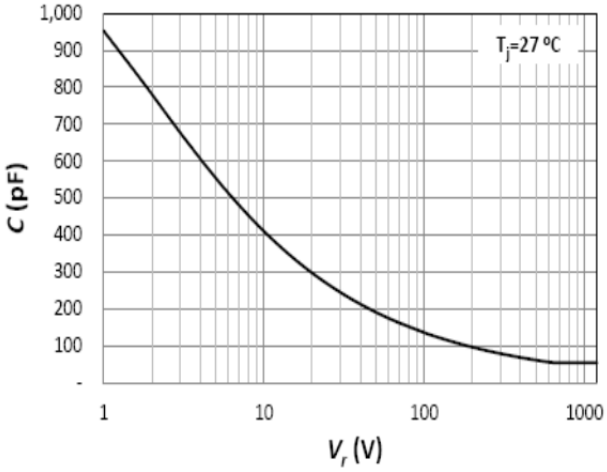


Fig. 8 Capacitance (Free-Wheeling SiC Diode)

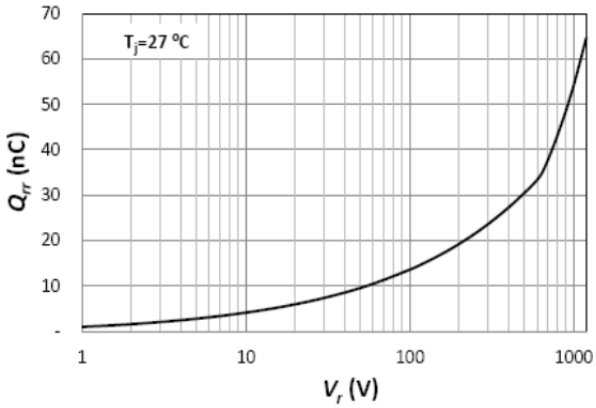


Fig. 9 Recovery Charge (Free-Wheeling SiC Diode)

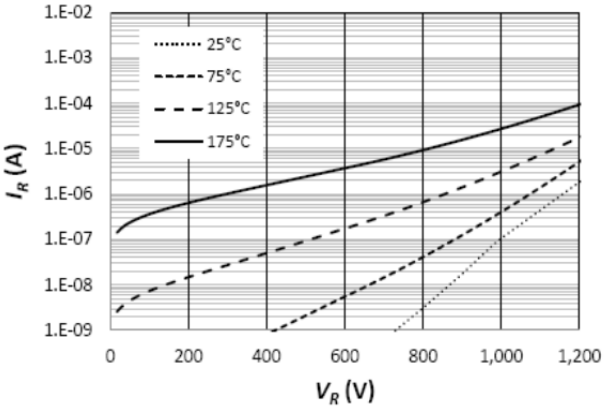


Fig. 10 Reverse Characteristics (Free-Wheeling SiC Diode)

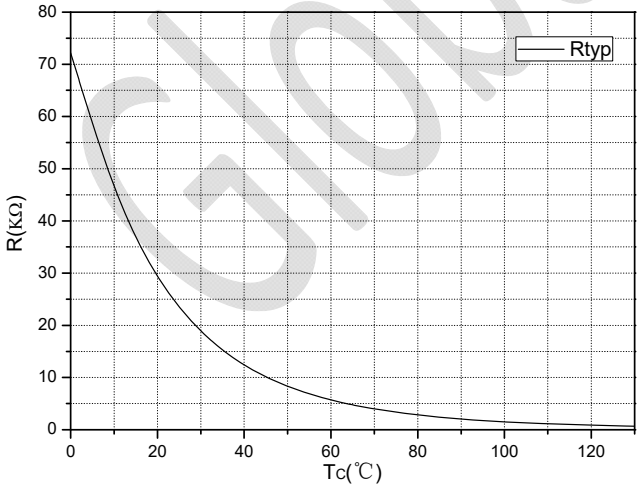
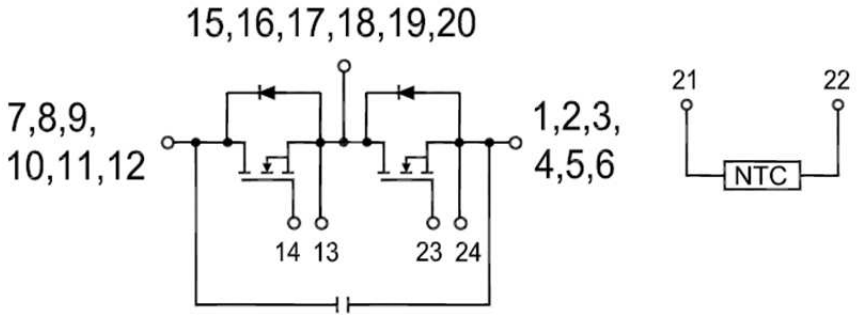
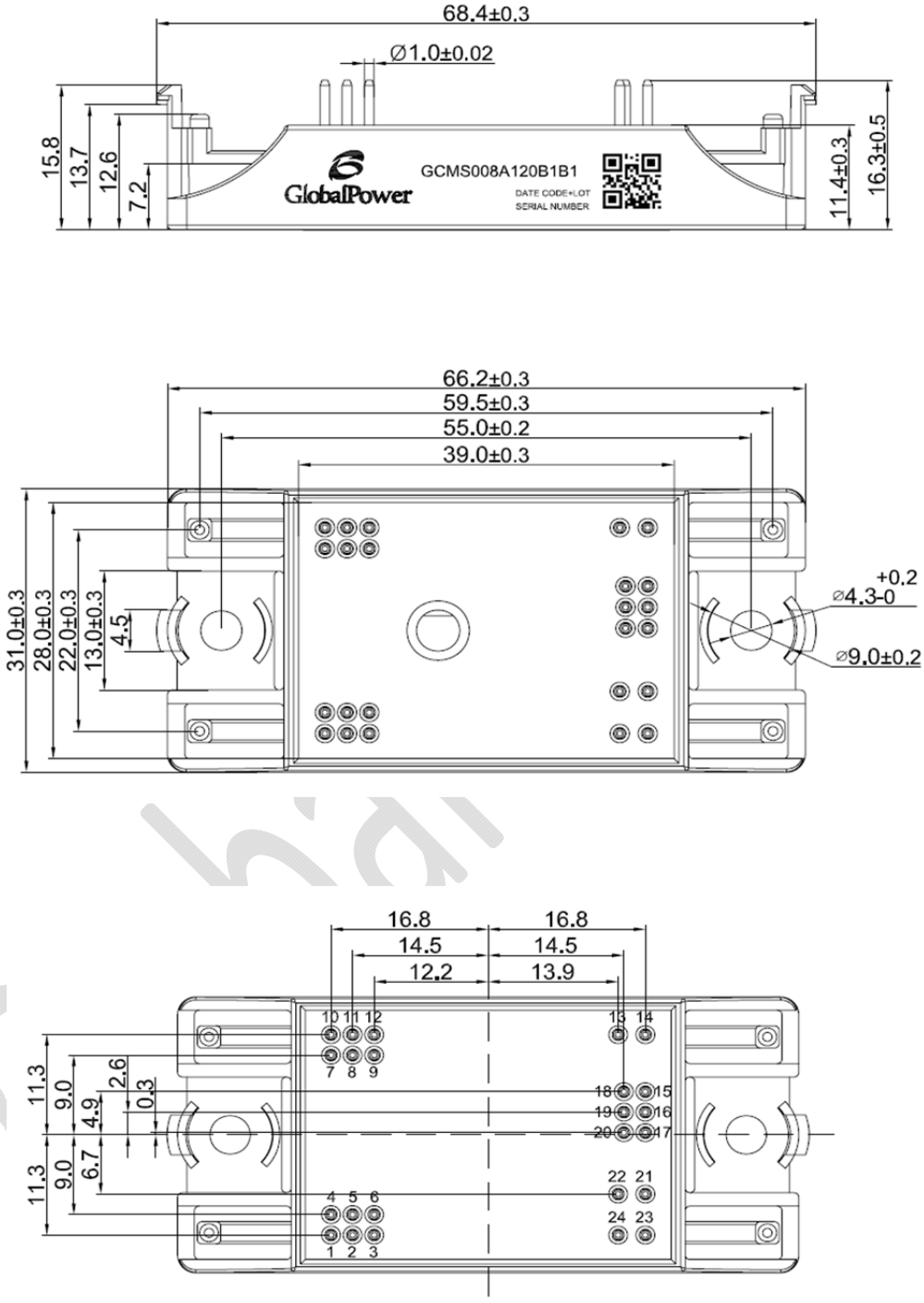


Fig.11 NTC Temperature characteristics

Internal Circuit:



Preliminary Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
04/20/2016	0.1	Initial release
06/01/2016	0.2	Revised the package outline and pin assignment
09/11/2016	0.3	Updated the test data of the modules

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Notes

- **RoHS Compliance**
  The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS2), as implemented March, 2013. RoHS Declarations for this product can be obtained from the Product Documentation sections of www.gptechgroup.com.

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  REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemi- cal Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact our office at GPTG Headquarters in Lake Forest, California to insure you get the most up-to-date REACh SVHC Declaration.
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