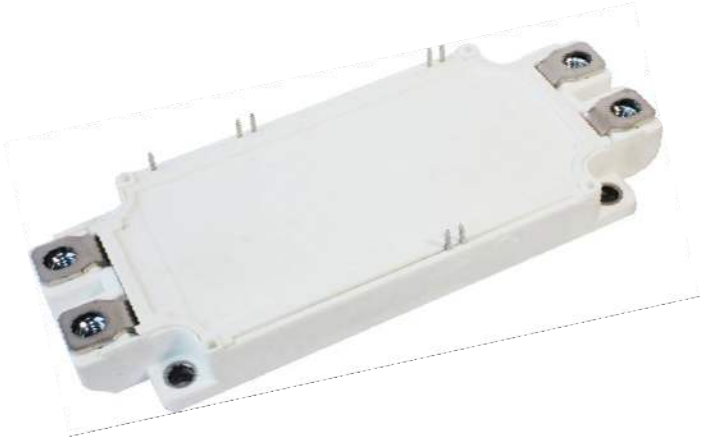
GSID600A120S4B1

Half-Bridge IGBT Module

RoHS

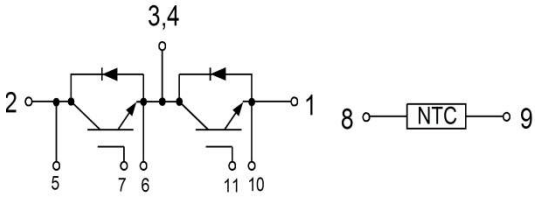


Features：

- Trench & Field Stop IGBT
- Short Circuit Rated > 10μs
- Low Switching Loss
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement

Applications：

- Hybrid Electrical Vehicles
- Automotive Applications
- Commercial Agriculture Vehicles
- Motor Drives



IGBT, Inverter

Maximum Rated Values (T_C=25℃ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		±20	V
I_C	Continuous Collector Current	T_C = 80℃	600	A
		T_C = 25℃	980	A
$I_{CM(1)}$	Peak Collector Current Repetitive	T_J = 150℃	1200	A
P_D	Maximum Power Dissipation per IGBT	T_C = 25℃ T_{Jmax}=175℃	3330	W

Electrical Characteristics of IGBT (T_C=25℃ unless otherwise specified)

Static characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	I_C = 12 mA, V_{CE} = V_{GE}		4.5	5.5	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =600A, V_{GE} = 15V	T_J = 25℃		1.70	2.00	V
			T_J = 125℃		2.10		V
I_{CES}	Collector-Emitter Leakage Current	V_{GE} = 0V, V_{CE} = V_{CES}, T_J = 25℃				1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = ±20V, V_{CE} = 0V, T_J = 25℃				400	nA
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f =1MHz			49.4		nF
C_{oes}	Output capacitance				3.63		nF
C_{res}	Reverse capacitance				1.93		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V,I_C = 600A, R_g = 1 Ω, V_{GE} = ±15V, Inductive Load	T_J = 25℃		213		ns
			T_J = 125℃		265		
t_r	Rise Time		T_J = 25℃		143		ns
			T_J = 125℃		150		
$t_{d(off)}$	Turn-off Delay Time		T_J = 25℃		530		ns
			T_J = 125℃		551		
t_f	Fall Time		T_J = 25℃		120		ns
			T_J = 125℃		168		
E_{on}	Turn-on Switching Loss		T_J = 25℃		38.6		mJ
			T_J = 125℃		50		
E_{off}	Turn-off Switching Loss		T_J = 25℃		53.8		mJ
			T_J = 125℃		76		
Q_g	Total Gate Charge		T_J = 25℃		4.95		uC
RBSOA	RBSOA	I_C=1200A,V_{CC}=1050V,Vp=1200V, Rg = 1Ω, V_{GE}=+15V to 0V, T_J =150°C		Trapezoid			
SCSOA	SCSOA	V_{CC} =600V, V_{GE} = 15V, T_J = 150°C		10			μs

$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case (per Leg)		0.045		°C/W

Maximum Rated Values of Diode (T_C=25℃ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	600	A
I_{FM}	Repetitive Peak Forward Current	1200	A

Electrical Characteristics of FWD (T_C=25℃ unless otherwise specified)

V_{FM}	Forward Voltage	I_F = 600A , V_{GE} = 0V	T_J = 25℃		1.70		V
			T_J = 125℃		1.80		
trr	Reverse Recovery Time	I_F=600A, di/dt =2678A/μs, V_{rr} = 600V, V_{GE} = -15V	T_J = 25℃		309		
			T_J = 125℃		394		
I_{rr}	Peak Reverse Recovery Current		T_J = 25℃		59.8		A
			T_J = 125℃		99.1		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		27.6		μC
			T_J = 125℃		47.1		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		394		mJ
			T_J = 125℃		59.8		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case (per Leg)				0.064		℃/W

Internal NTC-Thermistor Characteristics

Symbol	Description	Min	Typ	Max	Unit
R_{25}	T_C =25℃		5		kΩ
△R/R	T_C =100℃，R_{100} =481Ω			±5	%
P_{25}	T_C =25℃		50		mW
$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$		3380		K
$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15K))]$		3440		K

Module

Symbol	Description		Min	Typ	Max	Unit
V_{iso}	Isolation Voltage(All Terminals Shorted)	f = 50Hz, 1minute	2500			V
T_J	Maximum Junction Temperature				175	℃
T_{JOP}	Maximum Operating Junction Temperature Range		-40		+150	℃
T_{stg}	Storage Temperature		-40		+125	℃
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)			0.02		℃/W
M	Mounting Screw:M5		3.0		5.0	N·m
M	Power Terminals Screw: M6		4.0		6.0	N·m
G	Weight			330		g

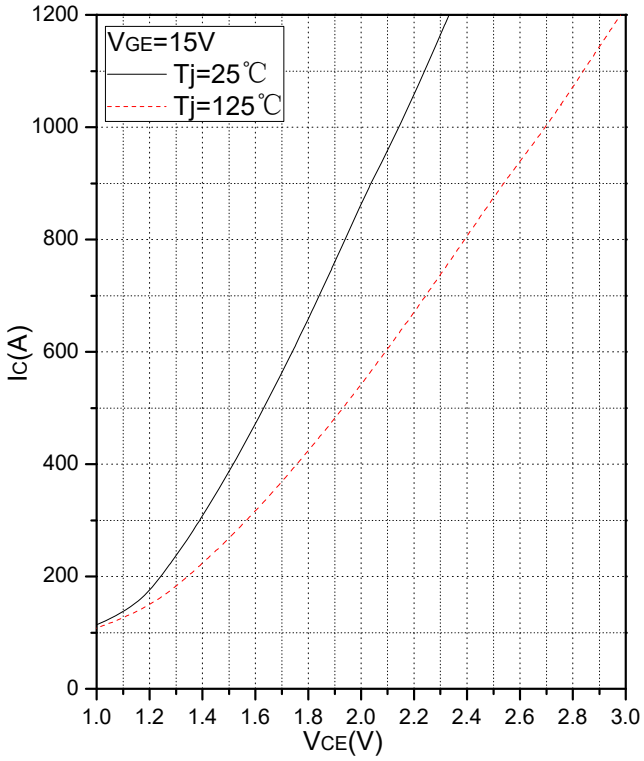


Fig.1 Typical Saturation Voltage Characteristics

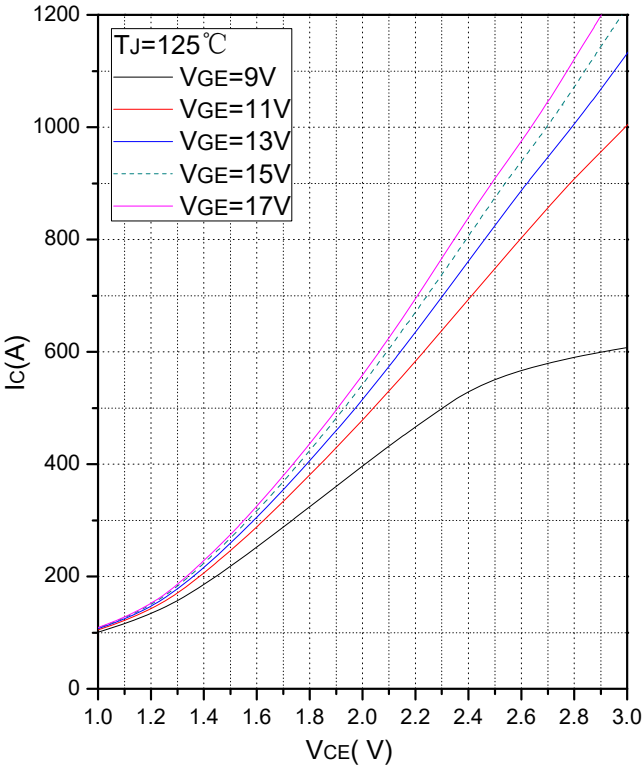


Fig.2 Typical Output Characteristics

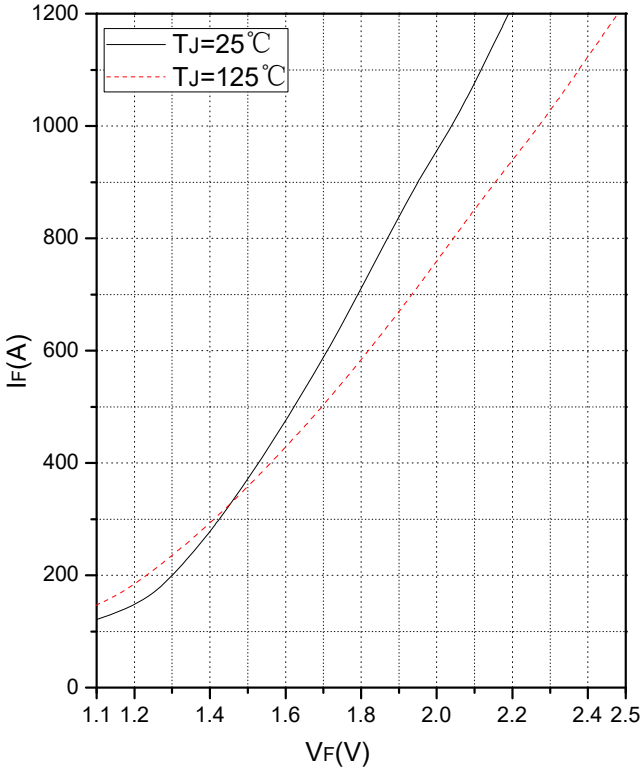


Fig.3 Forward Characteristics of FWD

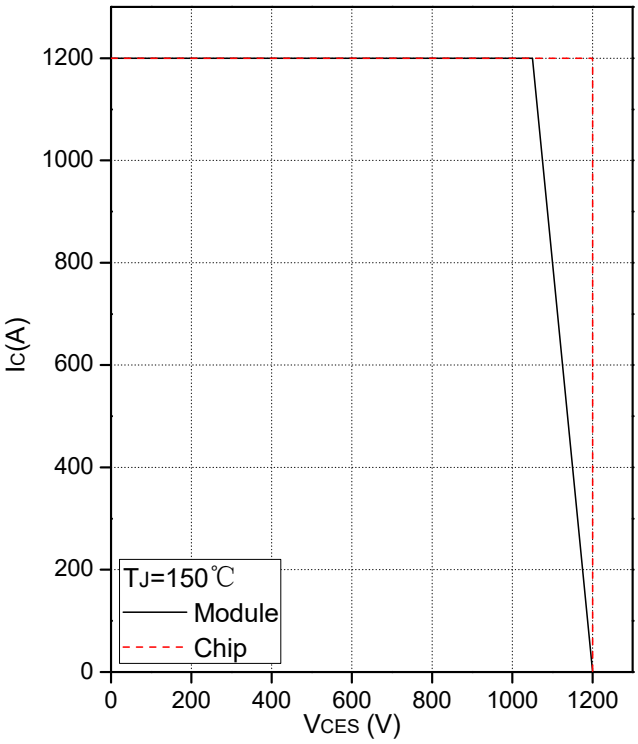


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

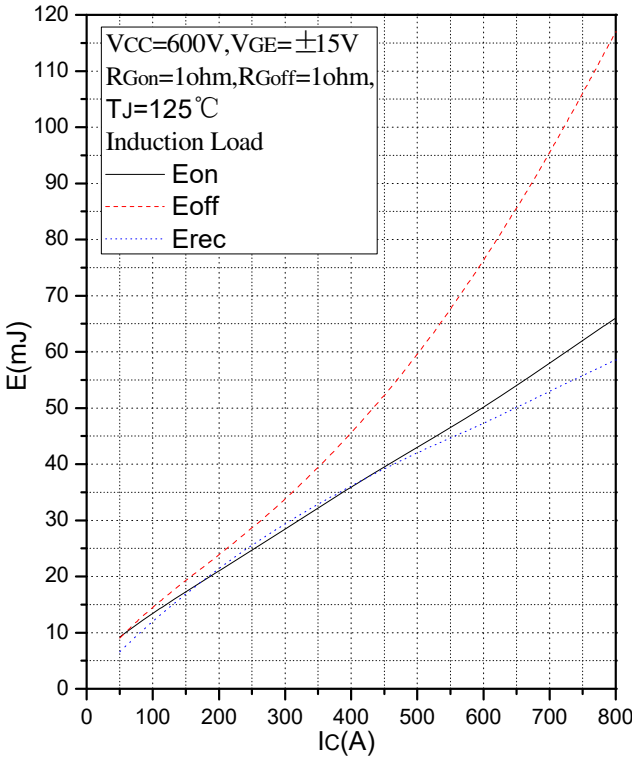


Fig.5 Typical Switching Loss vs. Collector Current

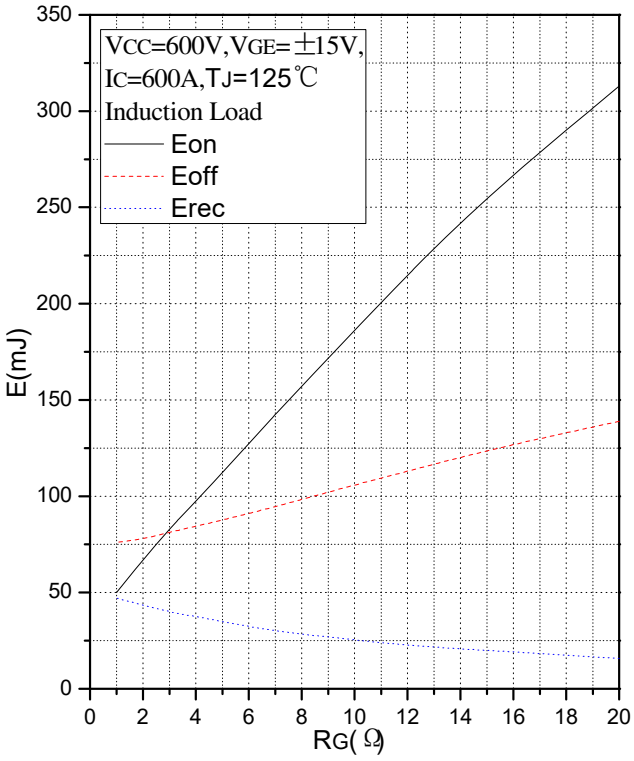


Fig.6 Typical Switching Loss vs. Gate Resistance

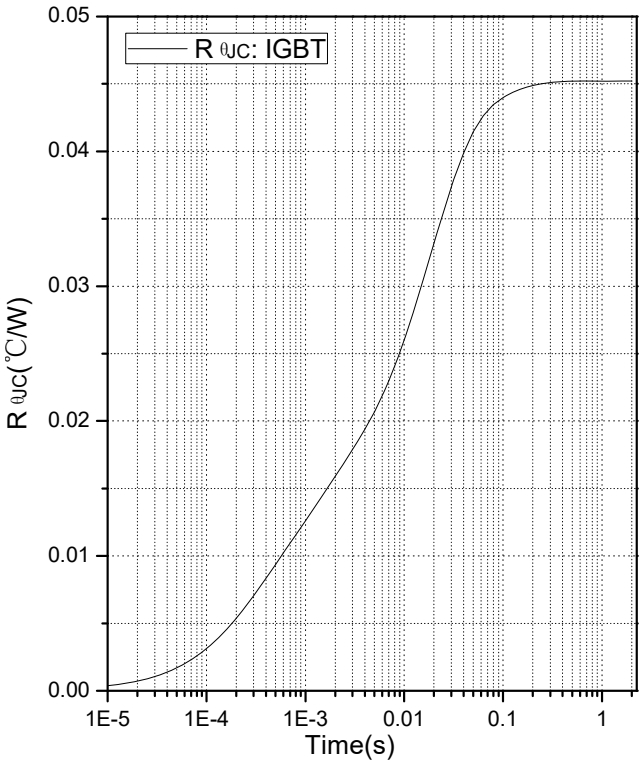


Fig.7 Transient Thermal Impedance (IGBT)

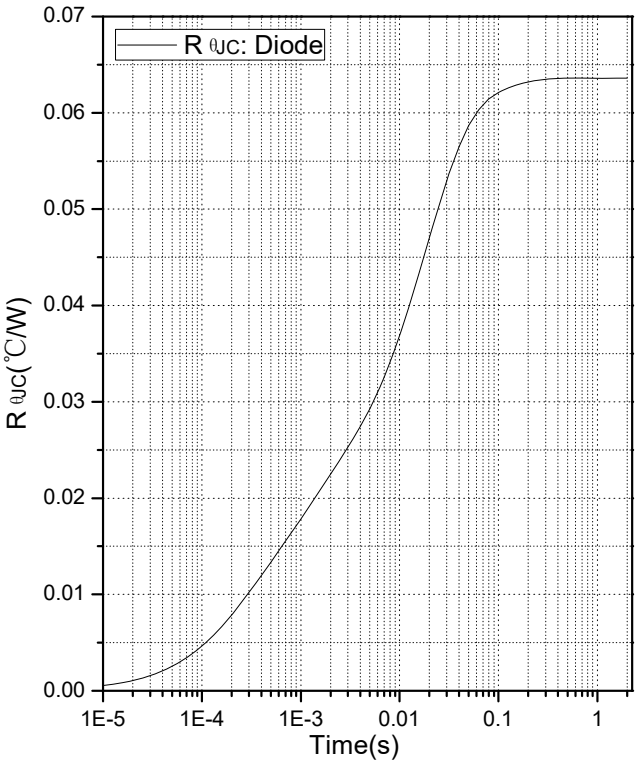


Fig.8 Transient Thermal Impedance (Diode)

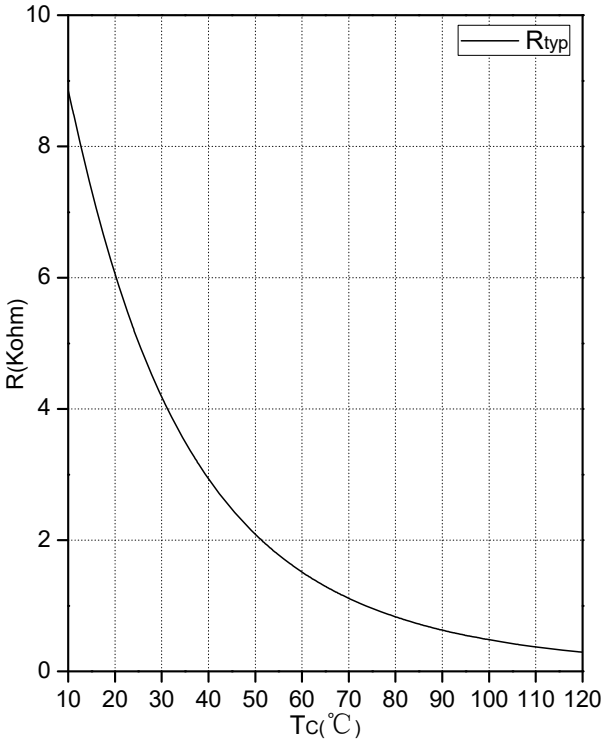
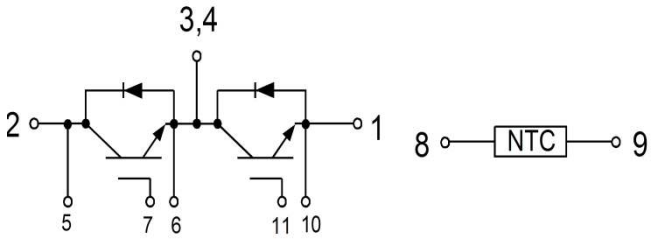
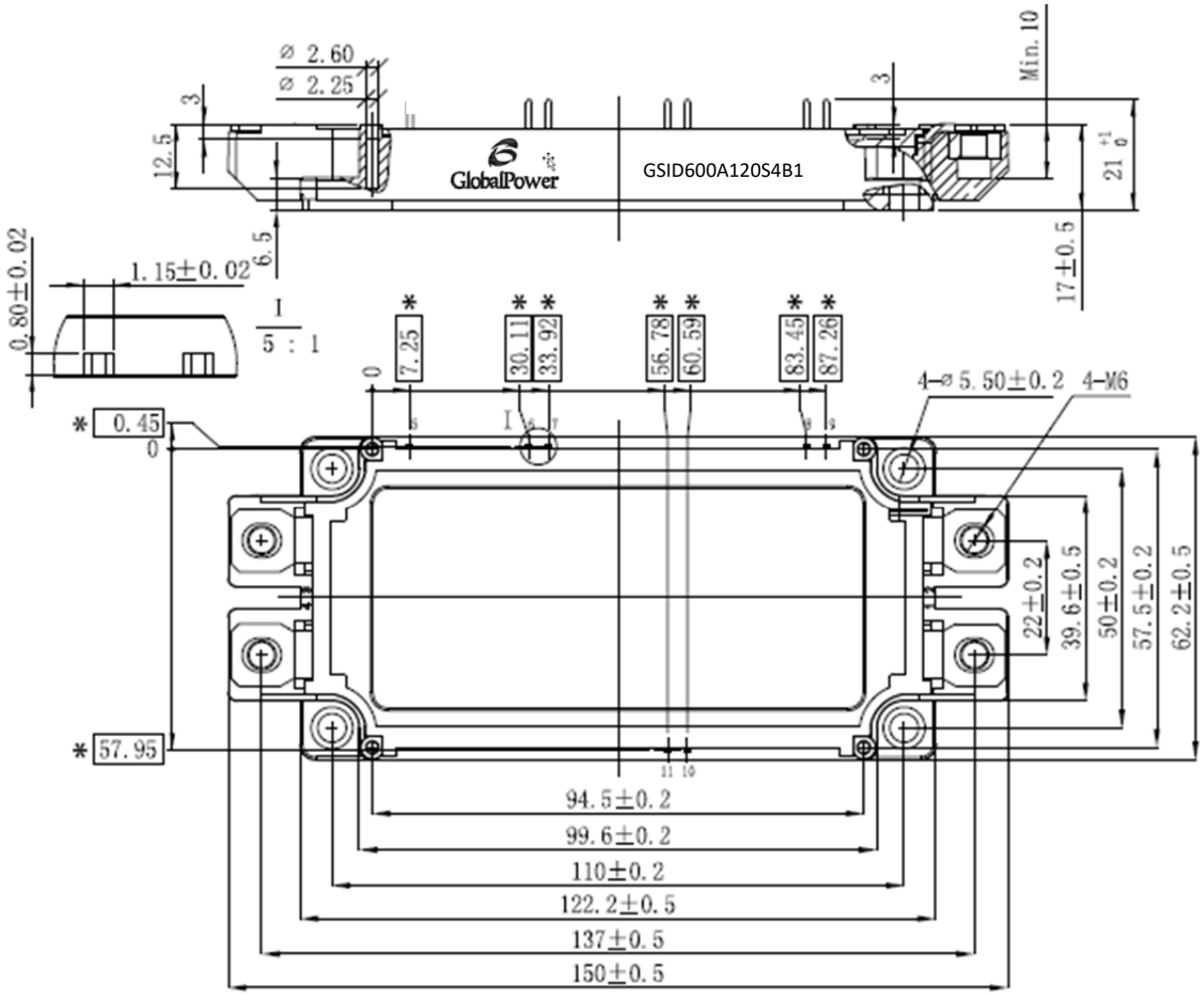


Fig.9 NTC Temperature Characteristics

Internal Circuit



Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
05/11/2015	0.1	Initial release of preliminary datasheet.
12/21/2015	0.2	Add SCSOA specification
05/20/2016	0.3	Revise the measured data
10/20/2019	0.4	Improved IGBT and FWD for automotive applications
01/03/2020	0.5	Applied company name change

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.SemiQ.com.

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