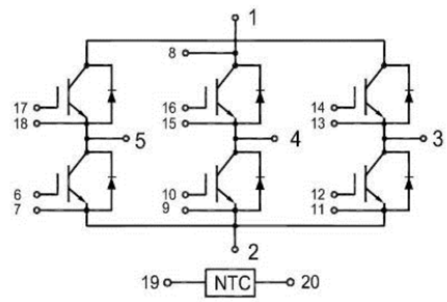
GSID300A120S5C1

6-Pack IGBT Module

Features：

- Short Circuit Rated 10μs
- Low Saturation Voltage: $V_{CE\ (sat)}$ = 1.90V @ I_C = 300A , T_C=25℃
- Low Switching Loss
- 100% RBSOA Tested（2×Ic）
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications：

- High Power Converters
- Motor Drivers
- UPS Systems

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℃	300	A
		T_C = 25℃	430	A
$I_{CM(1)}$	Peak Collector Current Repetitive	T_J = 175℃	600	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	T_C = 25℃ T_{Jmax}=175℃	1630	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 = 10 mA, V_{CE} = V_{GE}		5.0	5.5	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C =300A, V_{GE} = 15V	T_J = 25℃		1.9	2.25	V
			T_J = 125℃		2.30		V
			T_J = 150℃		2.30		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
R_{G_INT}	Internal Gate Resistance				1.0		Ω
C_{ies}	Input Capacitance	V_{CE} = 25V, V_{GE} = 0V , f ＝1MHz			30.0		nF
C_{oes}	Output Capacitance				0.86		nF
C_{res}	Reverse Transfer Capacitance				0.70		nF

Switching Characteristics

Symbol	Description	Conditions		Min	Typ	Max	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{CC} = 600V, I_C = 300A, R_G = 2Ω, V_{GE} = ±15V, Inductive Load	T_J = 25℃		465		ns
			T_J = 125℃		479		
			T_J = 150℃		483		
t_r	Rise Time		T_J = 25℃		143		ns
			T_J = 125℃		149		
			T_J = 150℃		152		
$t_{d(off)}$	Turn-off Delay Time		T_J = 25℃		582		ns
			T_J = 125℃		609		
			T_J = 150℃		614		
t_f	Fall Time		T_J = 25℃		243		ns
			T_J = 125℃		329		
			T_J = 150℃		338		
E_{on}	Turn-on Switching Loss		T_J = 25℃		6.15		mJ
			T_J = 125℃		9.00		

			T_J = 150℃		9.75		
E_{off}	Turn-off Switching Loss	V_{CC} = 600V, I_C = 300A, R_G = 2Ω, V_{GE} = ±15V, Inductive Load	T_J = 25℃		17.55		mJ
			T_J = 125℃		24.15		
			T_J = 150℃		27.15		
Q_g	Total Gate Charge		T_J = 25℃		2876		nC
			T_J = 125℃		2911		
			T_J = 150℃		2921		
RBSOA	Reverse Bias Safe Operation Area	I_C=600A, V_{CC}=1050V, Vp=1200V, Rg = 5Ω, V_{GE}=+15V to 0V, T_J =150°C		Trapezoid			
SCSOA	Short Circuit Safe Operation Area	V_{CC} < 720V, V_{GE} = 15V, T_J = 150℃		10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case				0.092		℃/W

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

V_{RRM}	Repetitive Peak Reverse Voltage	1200	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Repetitive Peak Forward Current	600	A

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

Symbol	Description	Conditions		Min	Typ	Max	Unit
V_{FM}	Forward Voltage	I_F = 300A, V_{GE} = 0V	T_J = 25℃		1.70		V
			T_J = 125℃		1.80		
			T_J = 150℃		1.75		
I_{rr}	Peak Reverse Recovery Current	I_F＝300A, di/dt =1028A/μs, V_{rr} = 600V, V_{GE} = -15V	T_J = 25℃		147.6		A
			T_J = 125℃		193.7		
			T_J = 150℃		210.0		
Q_{rr}	Reverse Recovery Charge		T_J = 25℃		13.14		μC
			T_J = 125℃		25.47		

			T_J = 150℃		30.45		
E_{rec}	Reverse Recovery Energy		T_J = 25℃		7.23		mJ
			T_J = 125℃		13.04		
			T_J = 150℃		15.79		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.118		℃/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		6.0	N·m
M	Power Terminals Screw: M6		3.0		6.0	N·m
G	Weight			390		g

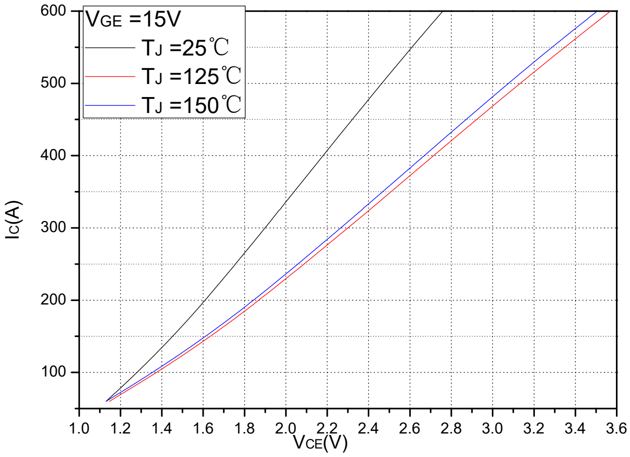


Fig.1 Typical Saturation Voltage Characteristics

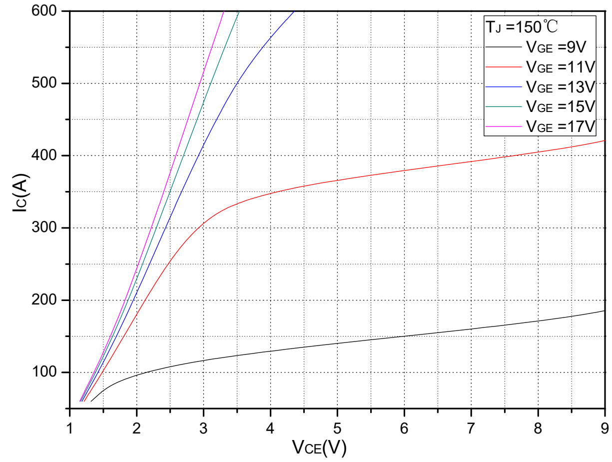


Fig.2 Typical Output Characteristics

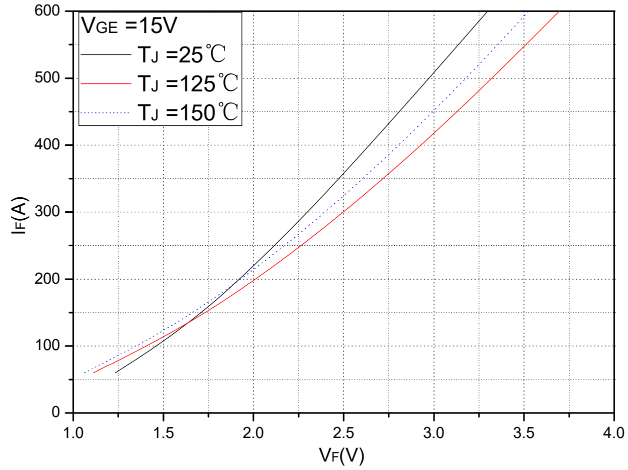


Fig.3 Forward Characteristics of FWD

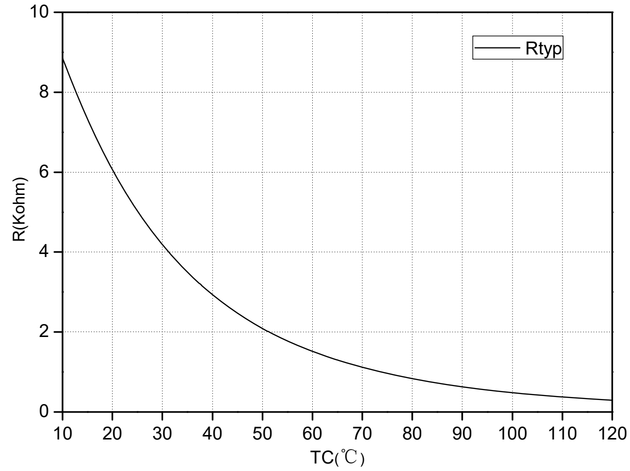


Fig.4 NTC Temperature characteristics

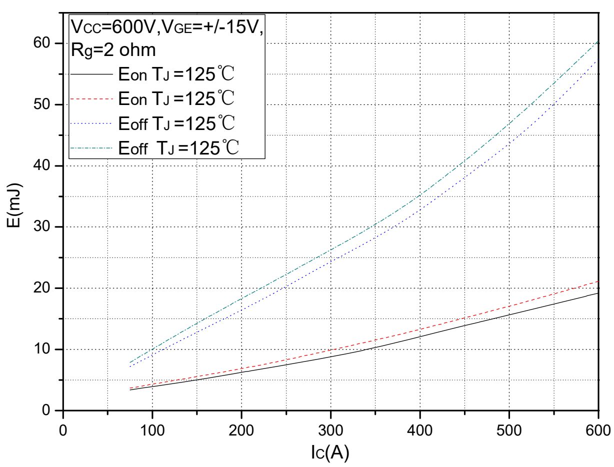


Fig.5 Typical Switching Loss vs. Collector Current

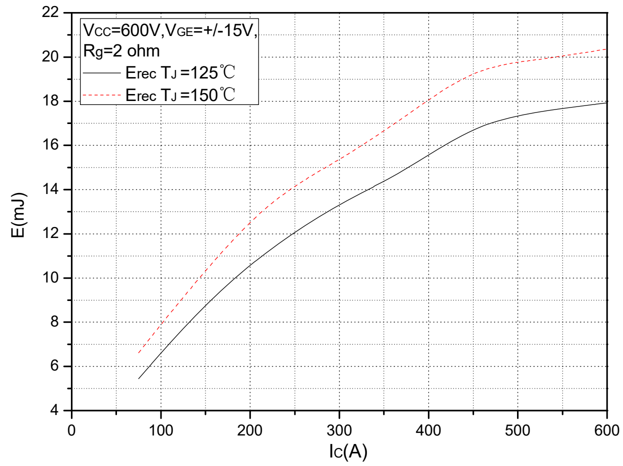


Fig.6 Typical Switching Loss vs. Collector Current

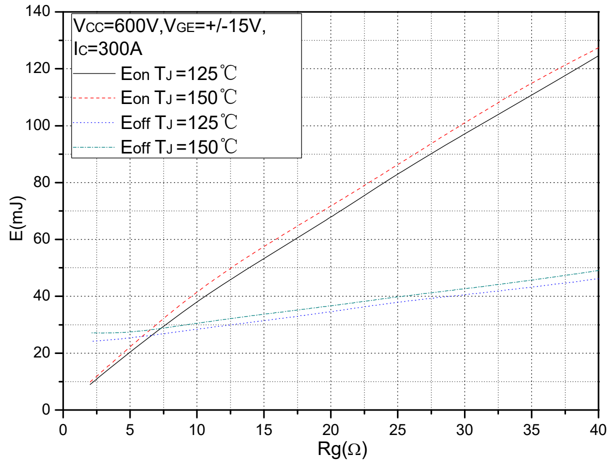


Fig.7 Typical Switching Loss vs. Gate Resistance

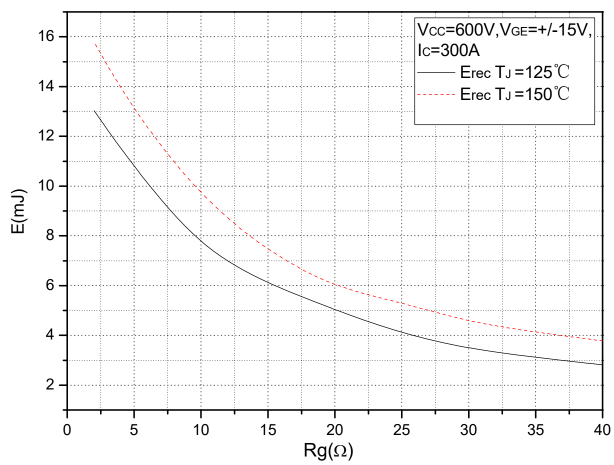


Fig.8 Typical Switching Loss vs. Gate Resistance

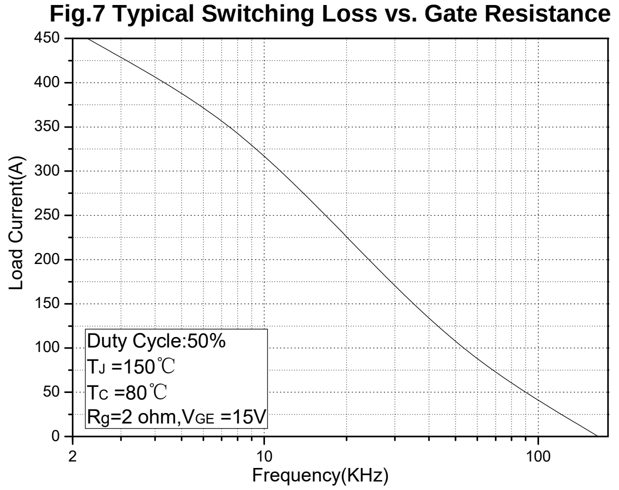


Fig.9 Typical Load Current vs. Frequency

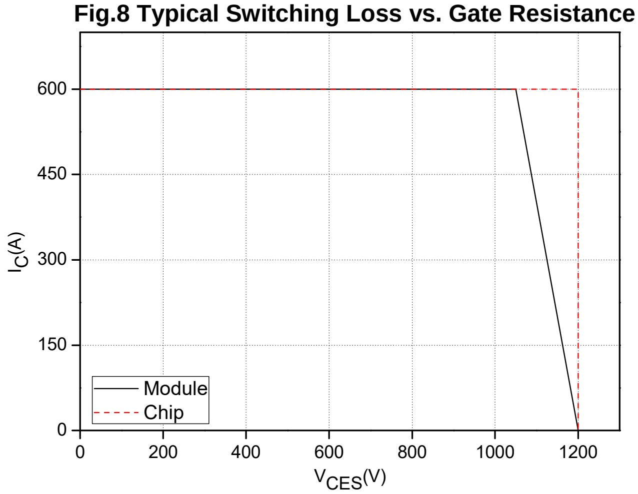


Fig.10 Reverse Bias Safe Operation Area (RBSOA)

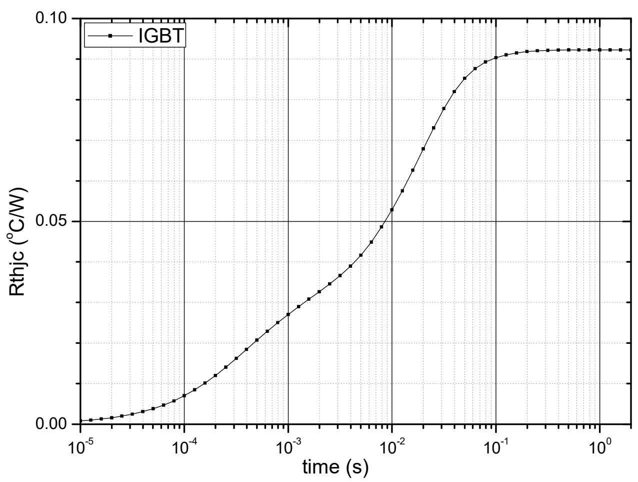


Fig.11 Transient thermal impedance (IGBT)

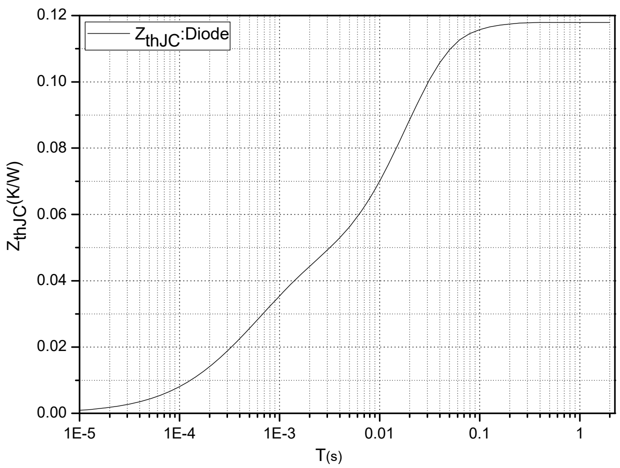
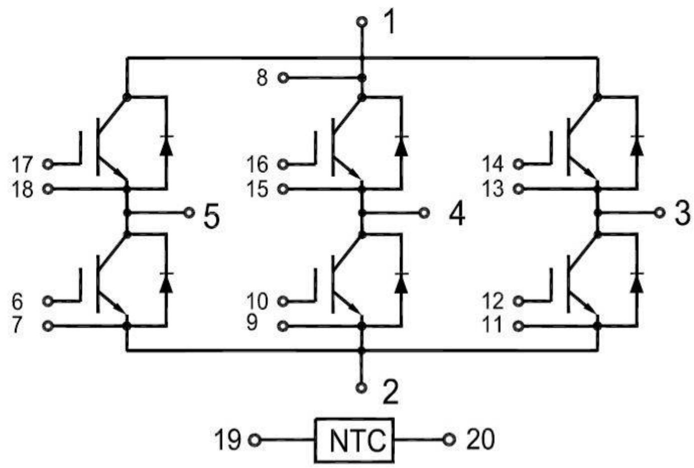
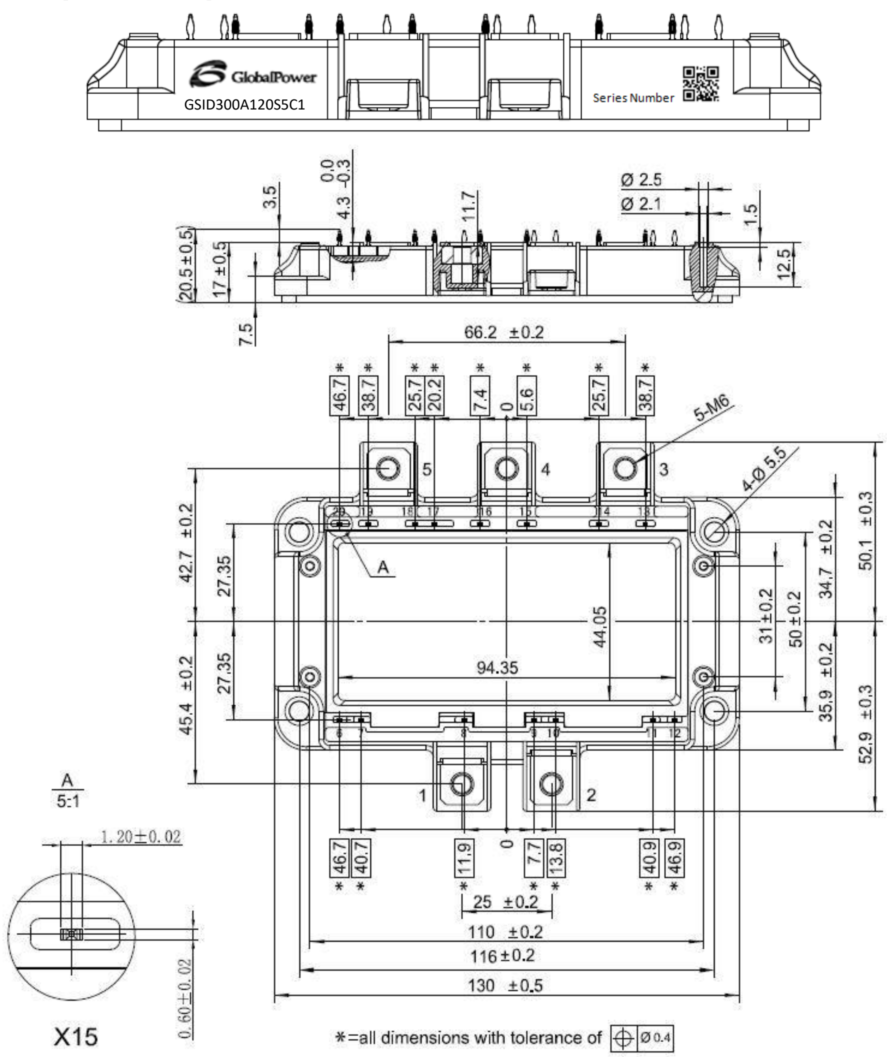


Fig.12 Transient thermal impedance (Diode)

Internal Circuit



Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
10/15/2015	0.1	Initial release of preliminary datasheet.
11/02/2015	0.2	Modified the test data at junction temperature of 150^{o}C.
12/16/2015	0.3	Modified Freewheeling diode and dynamic performances data
01/31/2016	0.4	Add the internal gate resistor parameter
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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