

GSID150A120S5C1 6-Pack IGBT Module



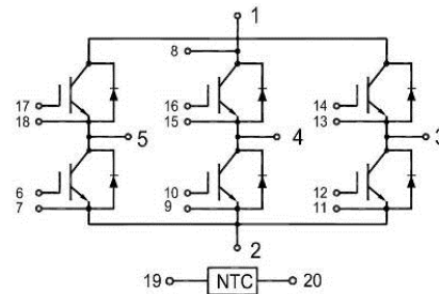
Features:

- Short Circuit Rated 10 μ s
- Low Saturation Voltage: $V_{CE(sat)} = 1.90V @ I_C = 150A, T_C=25^\circ C$
- Low Switching Loss
- 100% RBSOA Tested ($2 \times I_C$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- High Power Converters
- Motor Drivers
- UPS Systems



IGBT, Inverter

Maximum Rated Values ($T_C=25^\circ C$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C = 80^\circ C$	150	A
		$T_C = 25^\circ C$	285	A
$I_{CM(1)}$	Peak Collector Current Repetitive	$T_J = 175^\circ C$	300	A
t_{SC}	Short Circuit Withstand Time		>10	μs
P_D	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	1087	W

Electrical Characteristics of IGBT ($T_C=25^\circ\text{C}$ unless otherwise specified)

Static characteristics

Symbol	Description	Conditions	Min	Typ	Max	Unit	
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C = 1\text{ mA}, V_{CE} = V_{GE}$	5.0	5.5	6.0	V	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150\text{A}, V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$		1.9	2.10	V
			$T_J = 125^\circ\text{C}$		2.30		V
			$T_J = 150^\circ\text{C}$		2.30		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$			1	mA	
I_{GES}	Gate-Emitter Leakage Current	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}, T_J = 25^\circ\text{C}$			200	nA	
C_{ies}	Input Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		21.2		nF	
C_{oes}	Output capacitance			1.09		nF	

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 150\text{A}, R_G = 15\Omega, V_{GE} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		735		ns
			$T_J = 125^\circ\text{C}$		720		
			$T_J = 150^\circ\text{C}$		720		
t_r	Rise Time		$T_J = 25^\circ\text{C}$		180		ns
			$T_J = 125^\circ\text{C}$		190		
			$T_J = 150^\circ\text{C}$		195		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$		630		ns
			$T_J = 125^\circ\text{C}$		655		
			$T_J = 125^\circ\text{C}$		675		
t_f	Fall Time		$T_J = 25^\circ\text{C}$		170		ns
			$T_J = 125^\circ\text{C}$		200		
			$T_J = 150^\circ\text{C}$		210		
E_{on}	Turn-on Switching Loss	$T_J = 25^\circ\text{C}$		19.7		mJ	
		$T_J = 125^\circ\text{C}$		23.3			
		$T_J = 150^\circ\text{C}$		24.8			

E _{off}	Turn-off Switching Loss		T _J = 25°C		9.3		mJ
			T _J = 125°C		12.7		
			T _J = 150°C		14.7		
Q _g	Total Gate Charge		T _J = 25°C		1650		nC
			T _J = 125°C		1665		
			T _J = 150°C		1672		
RBSOA	Reverse Bias Safe Operation Area	I _C =600A, V _{CC} =1050V, V _p =1200V, R _g = 15Ω, 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°C	10				μs
R _{θJC}	IGBT Thermal Resistance: Junction-To-Case				0.138		°C/W

Diode, Inverter

Maximum Rated Values (T_C=25°C unless otherwise specified)

V _{RRM}	Repetitive Peak Reverse Voltage	1200	V
I _F	Diode Continuous Forward Current	150	A
I _{FM}	Repetitive Peak Forward Current	300	A

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
V _{FM}	Forward Voltage	I _F = 150A , V _{GE} = 0V	T _J = 25°C		1.70	V
			T _J = 125°C		1.75	
			T _J = 150°C		1.70	
I _{rr}	Peak Reverse Recovery Current	I _F = 150A, di/dt = 627A/μs, V _{rr} = 600V, V _{GE} = -15V	T _J = 25°C		32.8	A
			T _J = 125°C		57.8	
			T _J = 150°C		65.3	
Q _{rr}	Reverse Recovery Charge	I _F = 150A, di/dt = 627A/μs, V _{rr} = 600V, V _{GE} = -15V	T _J = 25°C		5.72	μC
			T _J = 125°C		12.94	
			T _J = 150°C		14.56	

E _{rec}	Reverse Recovery Energy	T _J = 25°C	2.02	mJ
		T _J = 125°C	4.04	
		T _J = 150°C	4.72	
R _{θJC}	Diode Thermal Resistance: Junction-To-Case		0.253	°C/W

Internal NTC-Thermistor Characteristics

Symbol	Description	Min	Typ	Max	Unit
R ₂₅	T _C =25°C		5		kΩ
ΔR/R	T _C =100°C, R ₁₀₀ =481Ω			±5	%
P ₂₅	T _C =25°C		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	°C
T _{JOP}	Maximum Operating Junction Temperature Range	-40		+150	°C
T _{stg}	Storage Temperature	-40		+125	°C
R _{θCS}	Case-To-Sink (Conductive Grease Applied)		0.02		°C/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

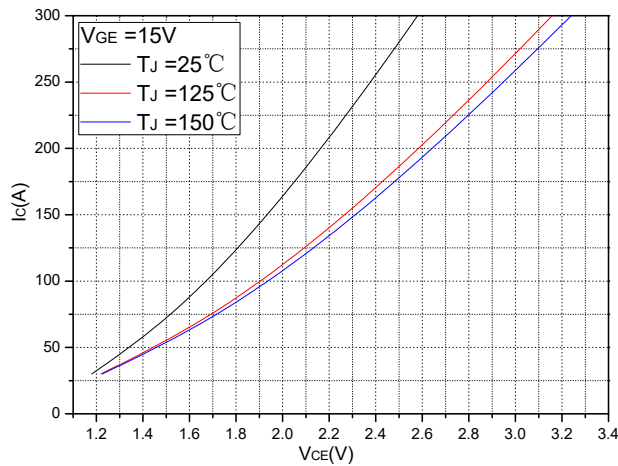


Fig.1 Typical Saturation Voltage Characteristics

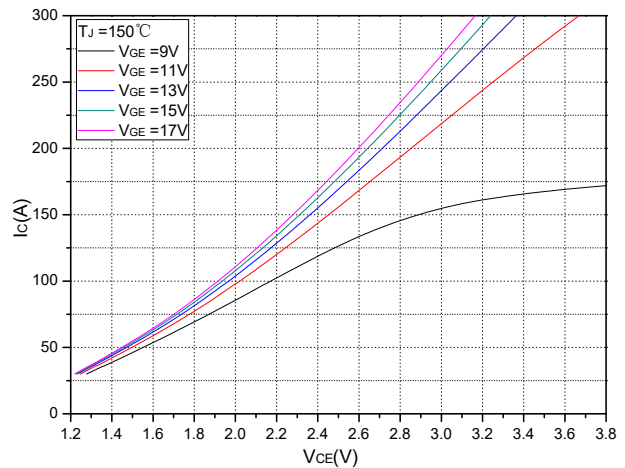


Fig.2 Typical Output Characteristics

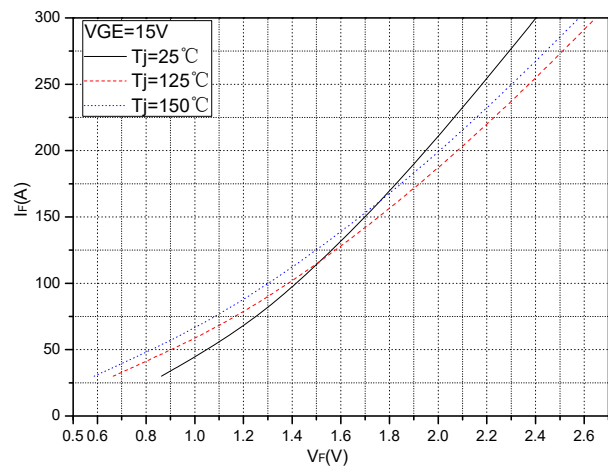


Fig.3 Forward Characteristics of FWD

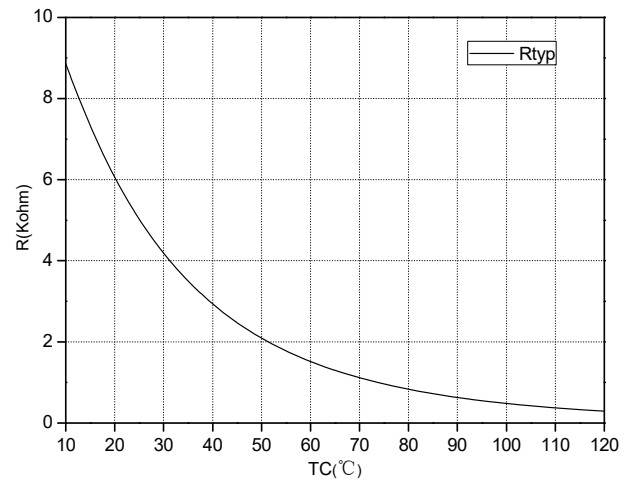


Fig.4 NTC Temperature characteristics

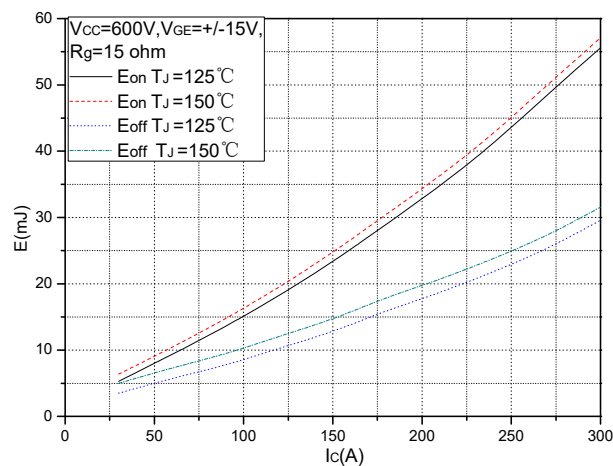


Fig.5 Typical Switching Loss vs. Collector Current

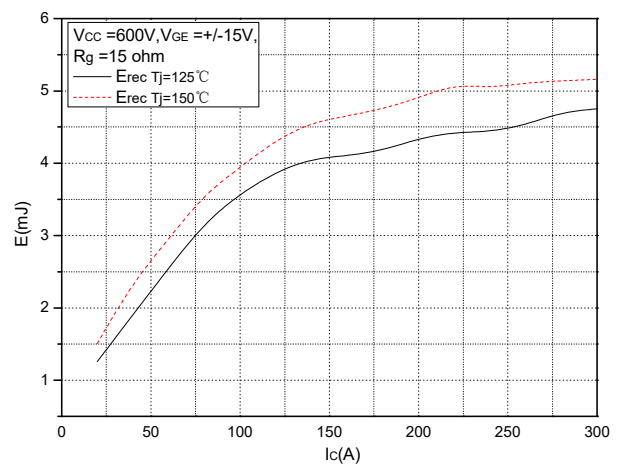


Fig.6 Typical Switching Loss vs. Collector Current

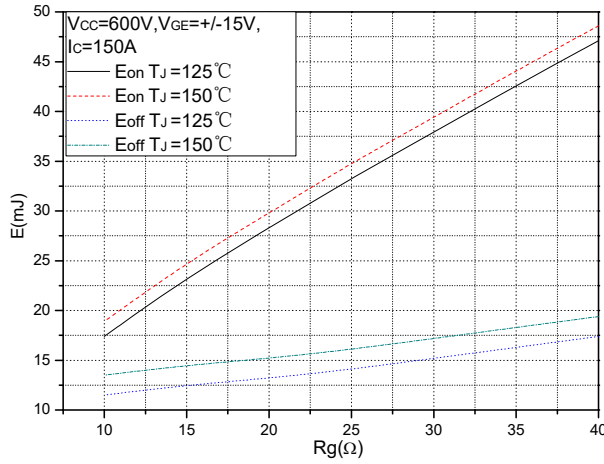


Fig.7 Typical Switching Loss vs. Gate Resistance

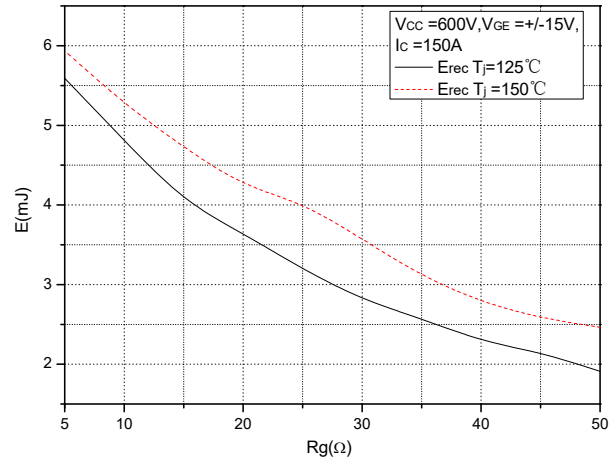


Fig.8 Typical Switching Loss vs. Gate Resistance

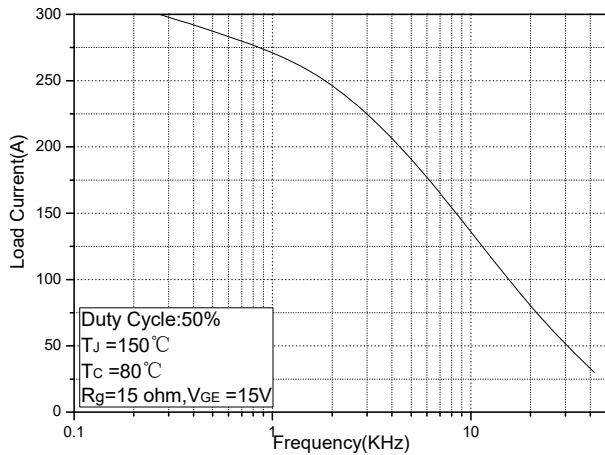


Fig.9 Typical Load Current vs. Frequency

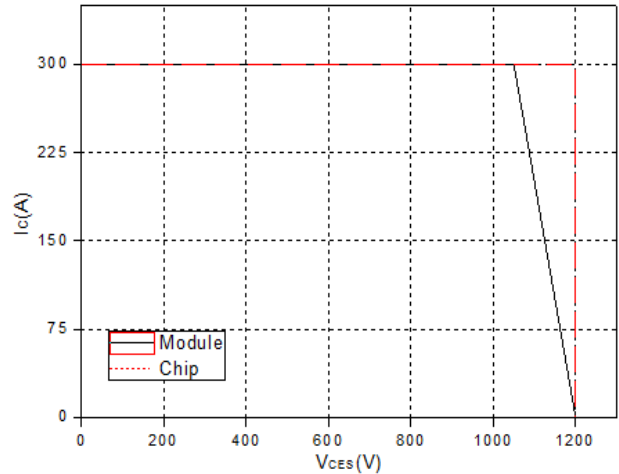


Fig.10 Reverse Bias Safe Operation Area (RBSOA)

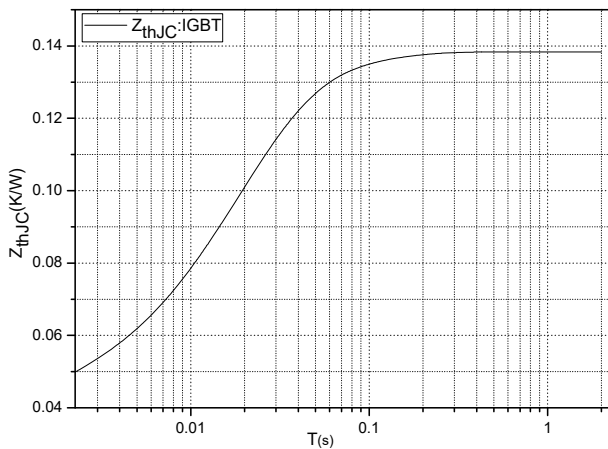


Fig.11 Transient thermal impedance (IGBT)

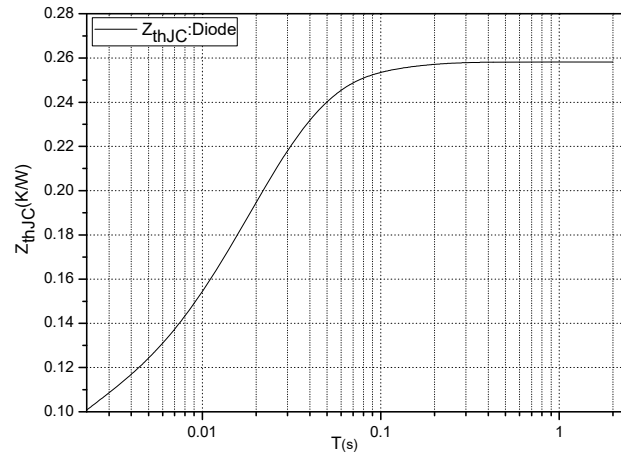


Fig.12 Transient thermal impedance (Diode)

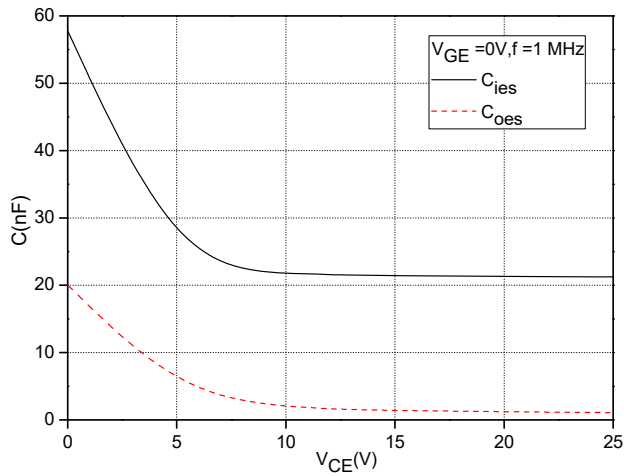
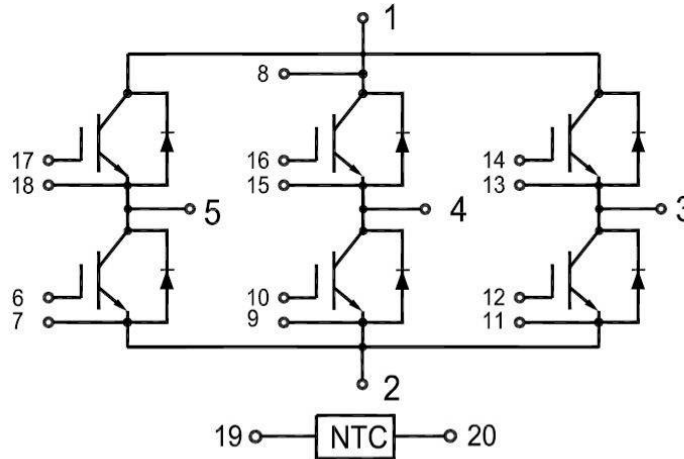
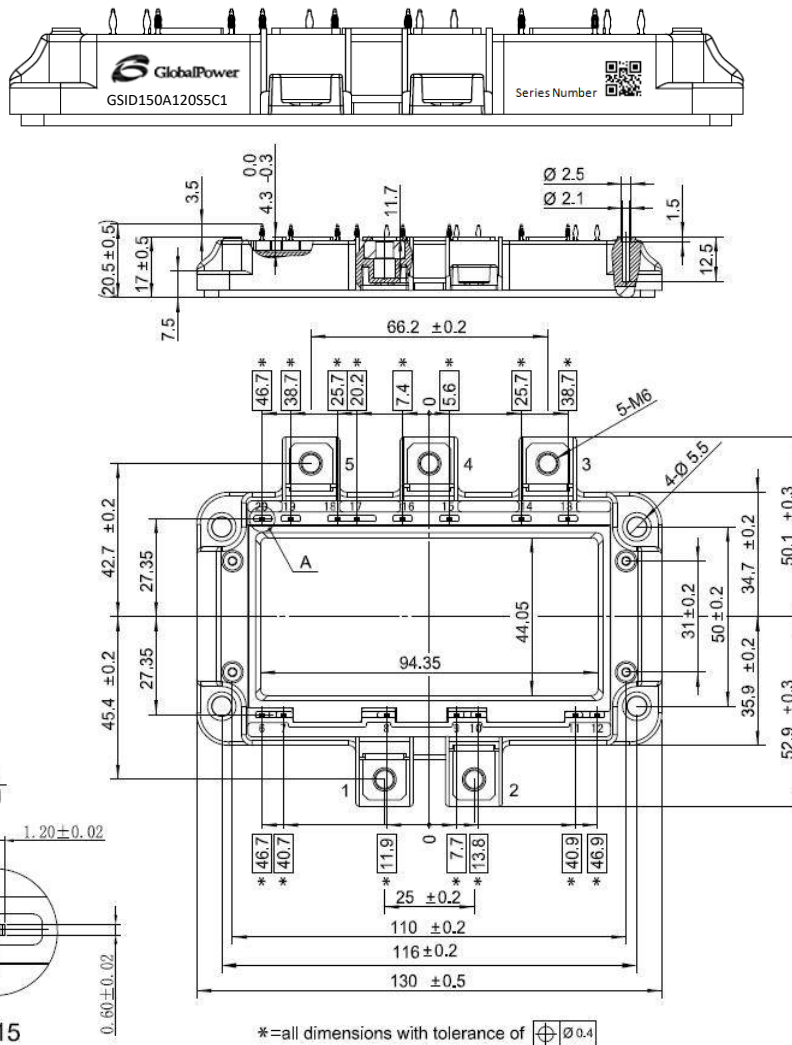


Fig.13 Capacitance Characteristics

Internal Circuit



Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
10/23/2015	0.1	Initial release of preliminary datasheet
11/15/2015	0.2	Add the test data at junction temperature of 150°C.
12/28/2015	0.3	Update the freewheeling diode specifications
01/03/2020	0.4	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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