

GSID300A125S5C1

6-Pack IGBT Module



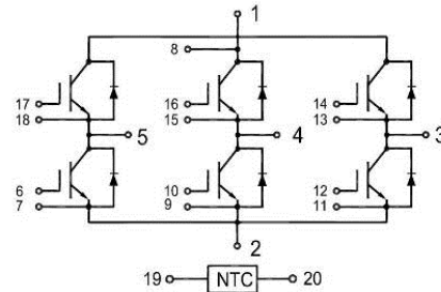
Features:

- Trench & Field Stop IGBT
- Short Circuit Rated >10 μ s
- Low Saturation Voltage: $V_{CE(sat)} = 2.15V @ I_C = 300A, T_J = 25^\circ C$
- Low Switching Loss
- 100% RBSOA Tested (2 \times I_C)
- Low Stray Inductance
- AlN DBC substrate for better thermal conductivity
- 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		1250	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C = 100^\circ C$	300	A
		$T_C = 25^\circ C$	585	A
$I_{CM(1)}$	Peak Collector Current Repetitive	$T_J = 175^\circ C$	600	A
t_{SC}	Short Circuit Withstand Time		>10	μ s
P_D	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	2515	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	$I_C = 2\text{ mA}, V_{CE} = V_{GE}$	4.5	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 300\text{A}, V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$	2.15	2.40	V
			$T_J = 125^\circ\text{C}$	2.45		V
			$T_J = 150^\circ\text{C}$	2.55		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	$V_{GE} = \pm 20\text{V}, V_{CE} = 0\text{V}, T_J = 25^\circ\text{C}$			400	nA
R_{G_INT}	Internal Gate Resistance			0		Ω
C_{ies}	Input Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		30.8		nF
C_{oes}	Output Capacitance			2.06		nF
C_{res}	Reverse Transfer Capacitance			1.43		nF

Switching Characteristics

Symbol	Description	Conditions	Switching Characteristics			Unit	
			T_J	Min	Typ		Max
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 750\text{V}, I_C = 300\text{A}, R_G = 1\Omega, V_{GE} = \pm 15\text{V}, \text{Inductive Load}$	25°C		310		ns
			125°C		330		
			150°C		344		
t_r	Rise Time		25°C		128		ns
			125°C		133		
			150°C		138		
$t_{d(off)}$	Turn-off Delay Time		25°C		364		ns
			125°C		397		
			150°C		412		
t_f	Fall Time	25°C		200		ns	
		125°C		226			
		150°C		238			
E_{on}	Turn-on Switching Loss	25°C		17.0		mJ	
		125°C		23.0			

			$T_J = 150^\circ\text{C}$		24.0		
E_{off}	Turn-off Switching Loss	$V_{\text{CC}} = 750\text{V}, I_{\text{C}} = 300\text{A}, R_{\text{G}} = 1\Omega, V_{\text{GE}} = \pm 15\text{V},$ Inductive Load	$T_J = 25^\circ\text{C}$		31.5		mJ
			$T_J = 125^\circ\text{C}$		38.3		
			$T_J = 150^\circ\text{C}$		39.0		
Q_{g}	Total Gate Charge		$T_J = 25^\circ\text{C}$		2280		nC
			$T_J = 125^\circ\text{C}$		2360		
			$T_J = 150^\circ\text{C}$		2350		
RBSOA	Reverse Bias Safe Operation Area	$I_{\text{C}}=600\text{A}, V_{\text{CC}}=1050\text{V}, V_{\text{p}}=1200\text{V},$ $R_{\text{g}} = 10\Omega, V_{\text{GE}}=+15\text{V to } 0\text{V}, T_J=150^\circ\text{C}$	Trapezoid				
SCSOA	Short Circuit Safe Operation Area	$V_{\text{CC}} < 750\text{V}, V_{\text{GE}} = 15\text{V},$ $T_J = 150^\circ\text{C}$	10				μs
$R_{\theta\text{JC}}$	IGBT Thermal Resistance: Junction-To-Case				0.06		$^\circ\text{C/W}$

Diode, Inverter

Maximum Rated Values ($T_{\text{C}}=25^\circ\text{C}$ 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 ($T_{\text{C}}=25^\circ\text{C}$ unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V_{FM}	Forward Voltage	$I_{\text{F}} = 300\text{A},$ $V_{\text{GE}} = 0\text{V}$	$T_J = 25^\circ\text{C}$		1.90	V
			$T_J = 125^\circ\text{C}$		2.00	
			$T_J = 150^\circ\text{C}$		2.00	
t_{rr}	Reverse Recovery Time	$I_{\text{F}}=300\text{A},$ $di/dt = 1175\text{A}/\mu\text{s},$ $V_{\text{rr}} = 750\text{V},$ $V_{\text{GE}} = -15\text{V}$	$T_J = 25^\circ\text{C}$		327	ns
			$T_J = 125^\circ\text{C}$		468	
			$T_J = 150^\circ\text{C}$		520	
I_{rr}	Peak Reverse Recovery Current		$T_J = 25^\circ\text{C}$		169	A
			$T_J = 125^\circ\text{C}$		222	
			$T_J = 150^\circ\text{C}$		238	

Q _{rr}	Reverse Recovery Charge		T _J = 25°C		33.4		μC
			T _J = 125°C		58.2		
			T _J = 150°C		67.3		
E _{rec}	Reverse Recovery Energy	I _F = 300A, di/dt = 1175A/μs, V _{rr} = 750V, V _{GE} = -15	T _J = 25°C		17.7		mJ
			T _J = 125°C		33.1		
			T _J = 150°C		37.8		
R _{θJC}	Diode Thermal Resistance: Junction-To-Case				0.066		°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
CTI	Comparative Tracking Index	200			V
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
	Base plate material: Copper, Isolation substrate: AlN				

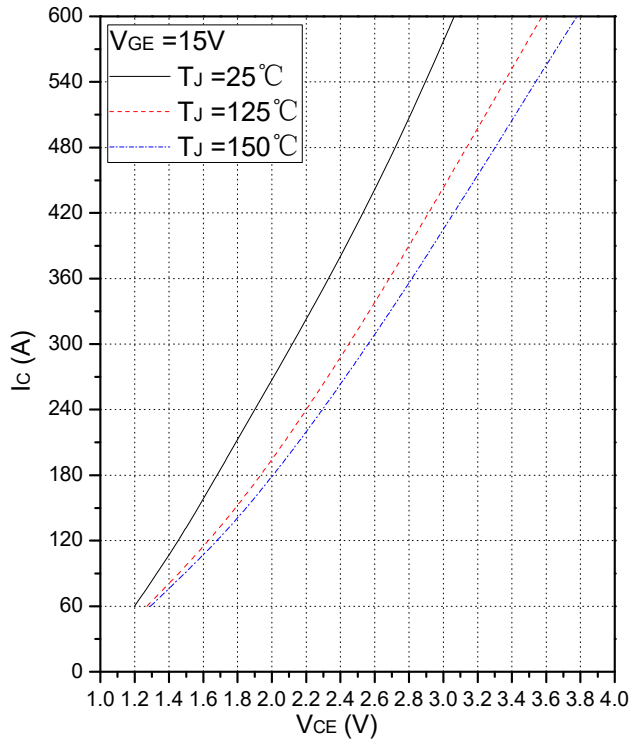


Fig.1 Typical Saturation Voltage Characteristics

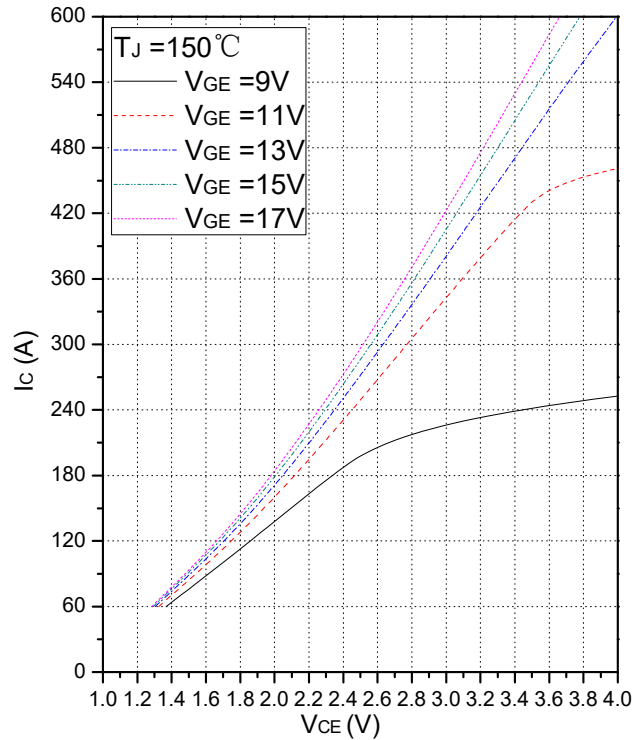


Fig.2 Typical Output Characteristics

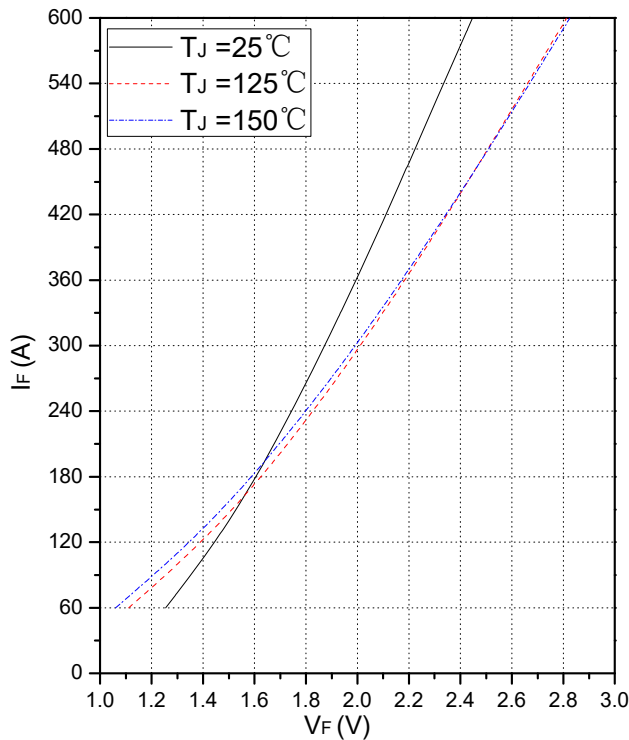


Fig.3 Forward Characteristics of FWD

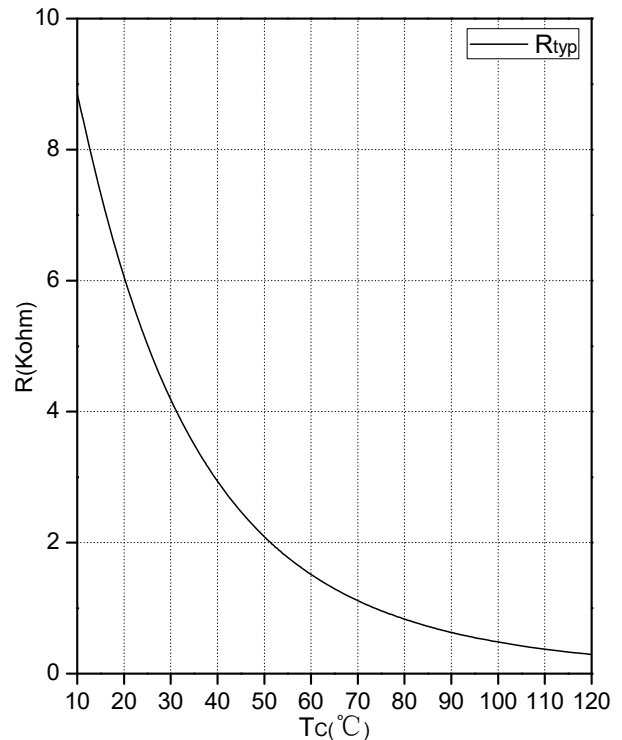


Fig.4 NTC Temperature Characteristics

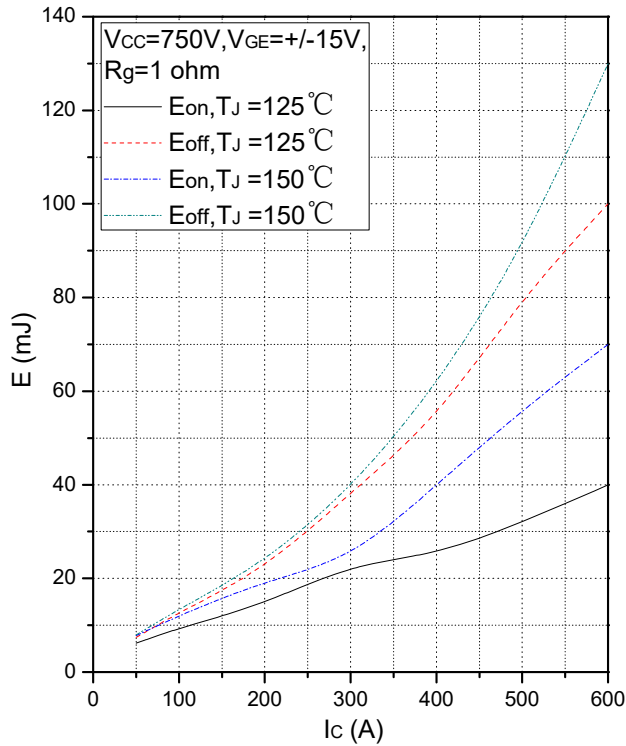


Fig.5 Typical Switching Loss ($E_{on/off}$) vs. Collector Current

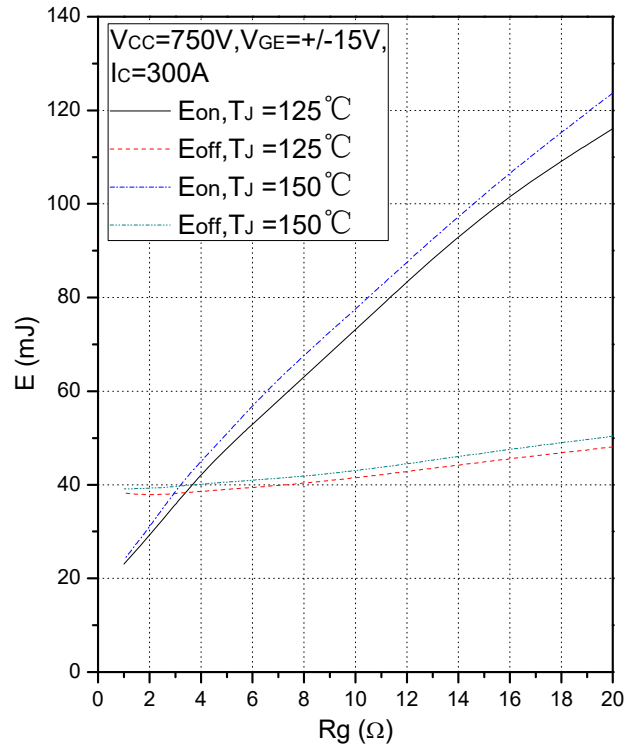


Fig.6 Typical Switching Loss ($E_{on/off}$) vs. Gate Resistance

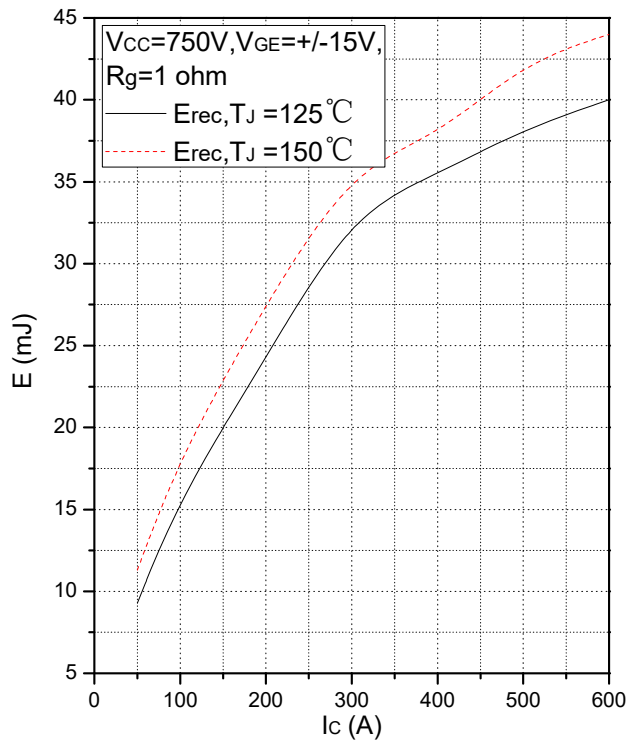


Fig.7 Typical Switching Loss (E_{rec}) vs. Collector Current

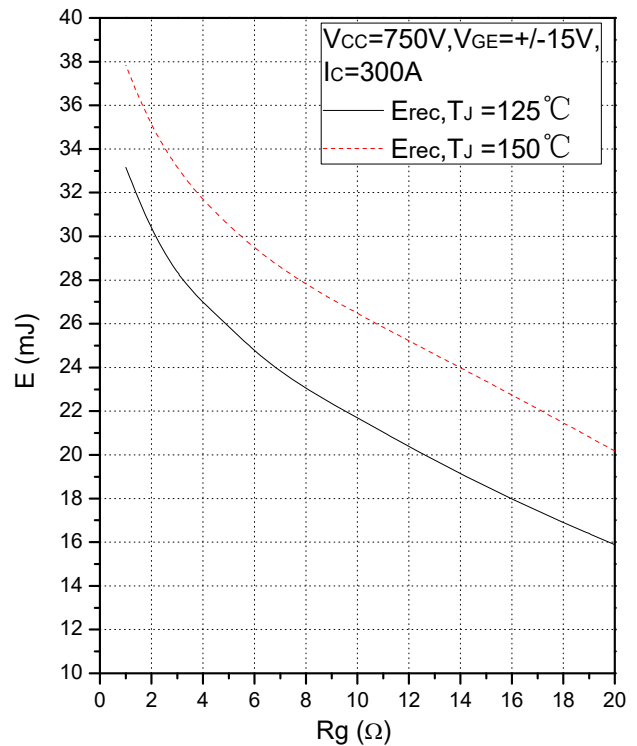


Fig.8 Typical Switching Loss (E_{rec}) vs. Gate Resistance

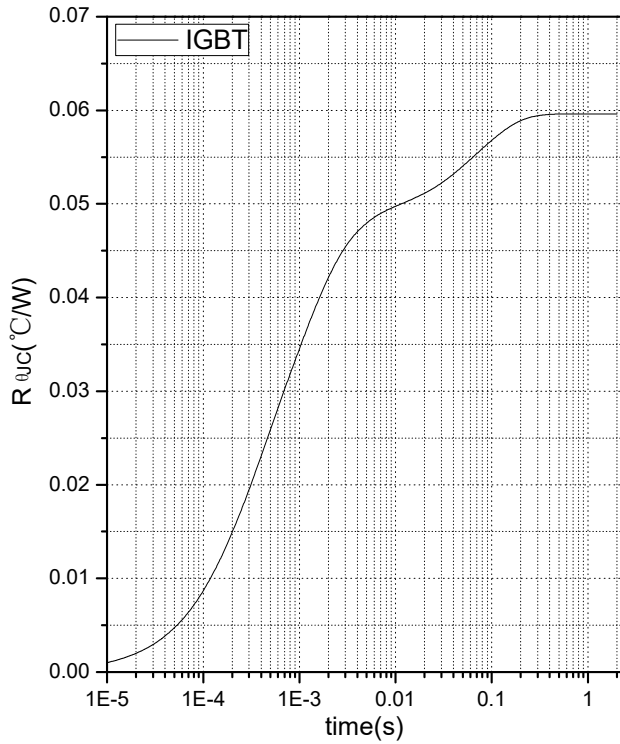


Fig.9 Transient Thermal Impedance (IGBT)

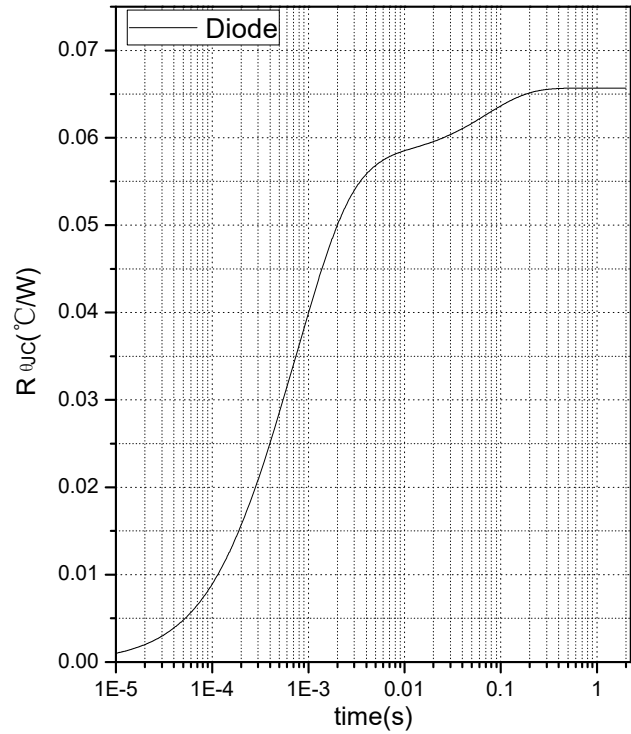


Fig.10 Transient Thermal Impedance (Diode)

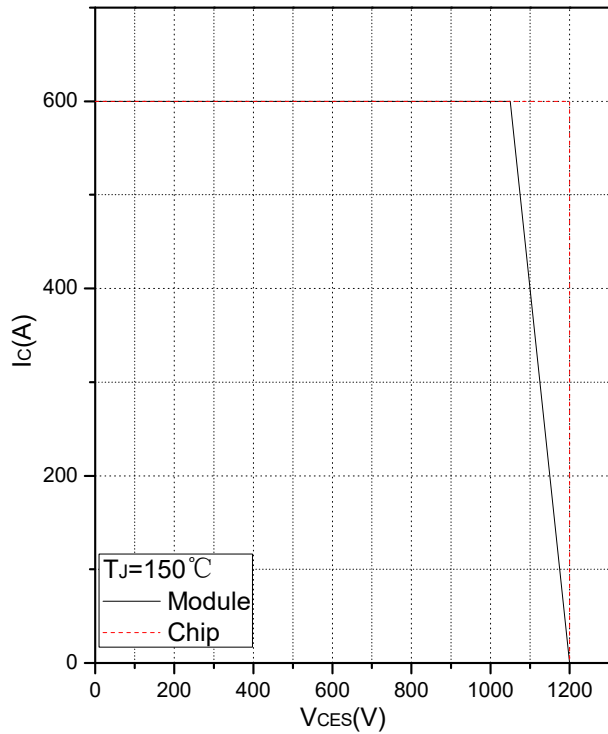
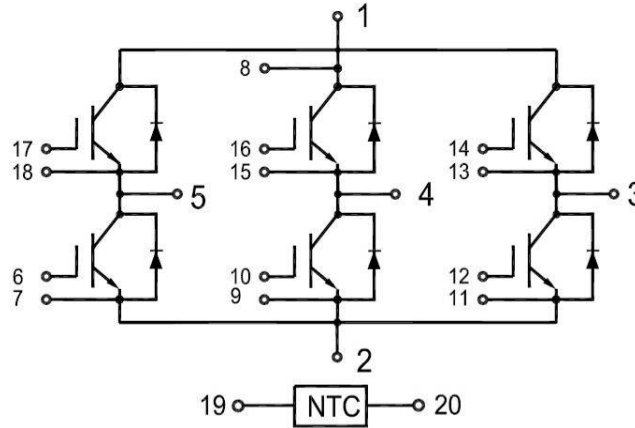
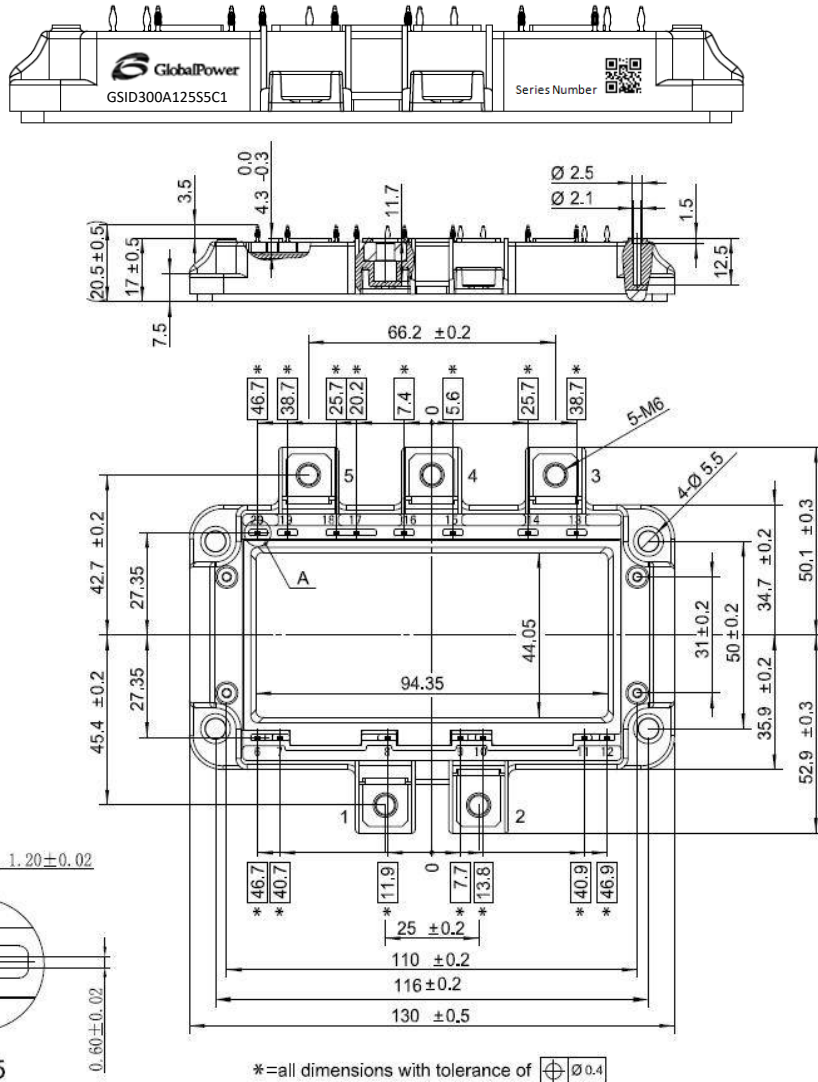


Fig.11 Reverse Bias Safe Operation Area (RBSOA)

Internal Circuit



Package Outline (Unit: mm):



Revision History

Date	Revision	Notes
3/30/2017	0.1	Initial release of preliminary datasheet.
10/12/2017	0.2	Updated the electrical specification and the measurement data.
01/03/2020	0.3	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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