

# GSID150A120S3B1

## IGBT Module



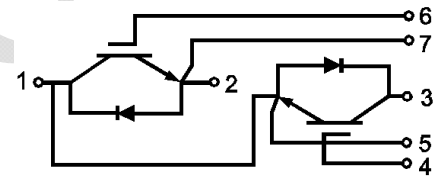
### Features:

- Low Saturation Voltage:  $V_{CE(sat)} = 1.80V @ I_C = 150A, T_C=25^\circ C$
- Low Switching Loss
- 100% RBSOA Tested ( $2 \times I_C$ )
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



### Applications:

- Welding Machine/ Cutting Machine
- Induction Heating
- Ultrasonic Device
- PV System
- SMPS



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

$V_{CES}$	Collector-Emitter Blocking Voltage		1200	V
$V_{GES}$	Gate-Emitter Voltage		$\pm 20$	V
$I_C$	Continuous Collector Current	$T_C = 80^\circ C$	150	A
		$T_C = 25^\circ C$	300	A
$I_{CM}$	Repetitive Peak Collector Current	$T_J = 175^\circ C$	300	A
$t_{SC}$	Short Circuit Withstand Time		>10	$\mu s$
$P_D$	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$ $T_{Jmax}=175^\circ C$	940	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	$I_C = 1\text{mA}, V_{CE} = V_{GE}$	3.5	4.5	5.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150\text{A}, V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$	1.80	2.00	V
			$T_J = 125^\circ\text{C}$	1.90	2.10	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	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		14.0		nF
$C_{oes}$	Output Capacitance			1.0		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	$T_J = 25^\circ\text{C}$		850		ns
			$T_J = 125^\circ\text{C}$		850		
$t_r$	Rise Time		$T_J = 25^\circ\text{C}$		170		ns
			$T_J = 125^\circ\text{C}$		170		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$		825		ns
			$T_J = 125^\circ\text{C}$		890		
$t_f$	Fall Time		$T_J = 25^\circ\text{C}$		165		ns
			$T_J = 125^\circ\text{C}$		195		
$E_{on}$	Turn-on Switching Loss		$T_J = 25^\circ\text{C}$		13.7		mJ
			$T_J = 125^\circ\text{C}$		15.7		
$E_{off}$	Turn-off Switching Loss	$T_J = 25^\circ\text{C}$		8.7		mJ	
		$T_J = 125^\circ\text{C}$		12.0			
$Q_g$	Total Gate Charge	$T_J = 25^\circ\text{C}$		1650		nC	
RBSOA	Reverse Bias Safe Operation Area	$I_C=300\text{A}, V_{CC}=960\text{V}, V_p=1200\text{V}, R_g = 15\ \Omega, V_{GE}=\pm 15\text{V to } 0\text{V}, T_J = 150^\circ\text{C}$	Trapezoid				
SCSOA	Short Circuit Safe Operation Area	$V_{CC} = 300\text{V}, V_{GE} = 15\text{V}, T_J = 150^\circ\text{C}$	10			$\mu\text{s}$	
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case			0.16		$^\circ\text{C/W}$	

### Maximum Rated Values of Diode ( $T_C=25^\circ\text{C}$ unless otherwise specified)

$V_{RRM}$	Repetitive Peak Reverse Voltage	1200	V
$I_F$	Diode Continuous Forward Current	150	A
$I_{FM}$	Diode Maximum Forward Current	300	A

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{FM}$	Forward Voltage	$I_F = 150\text{A}$ , $V_{GE} = 0\text{V}$	$T_J = 25^\circ\text{C}$	2.2	2.4	V
			$T_J = 125^\circ\text{C}$	2.4		
$I_{rr}$	Peak Reverse Recovery Current		$T_J = 25^\circ\text{C}$	60		A
			$T_J = 125^\circ\text{C}$	90		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 150\text{A}$ , $di/dt = 970\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^\circ\text{C}$	7.2		$\mu\text{C}$
			$T_J = 125^\circ\text{C}$	15.0		
$E_{rec}$	Reverse Recovery Energy		$T_J = 25^\circ\text{C}$	2.9		mJ
			$T_J = 125^\circ\text{C}$	6.0		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case			0.28		$^\circ\text{C}/\text{W}$

### Module

Symbol	Description	Min	Typ	Max	Unit
$V_{iso}$	Isolation Voltage(All Terminals Shorted)			2500	V
$T_J$	Maximum Junction Temperature			175	$^\circ\text{C}$
$T_{JOP}$	Maximum Operating Junction Temperature Range	-40		+150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature	-40		+125	$^\circ\text{C}$
$R_{\theta CS}$	Case-To-Sink (Conductive Grease Applied)		0.1		$^\circ\text{C}/\text{W}$
T	Power Terminals Screw:M6	4.0		6.0	N·m
T	Mounting Screw:M6	4.0		6.0	N·m
G	Weight		230		g

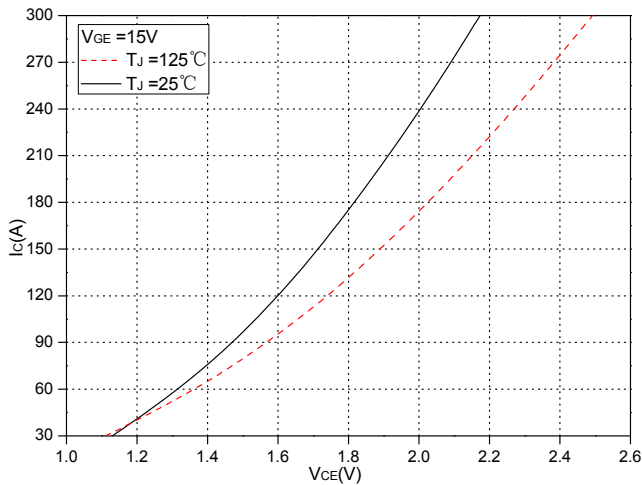


Fig.1 Typical Saturation Voltage Characteristics

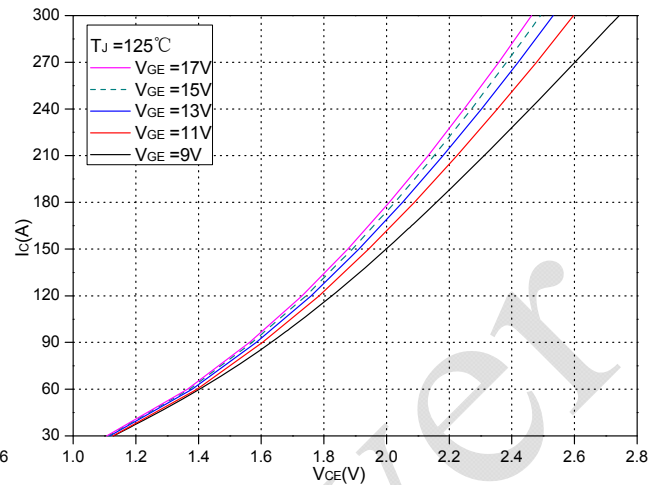


Fig.2 Typical Output Characteristics

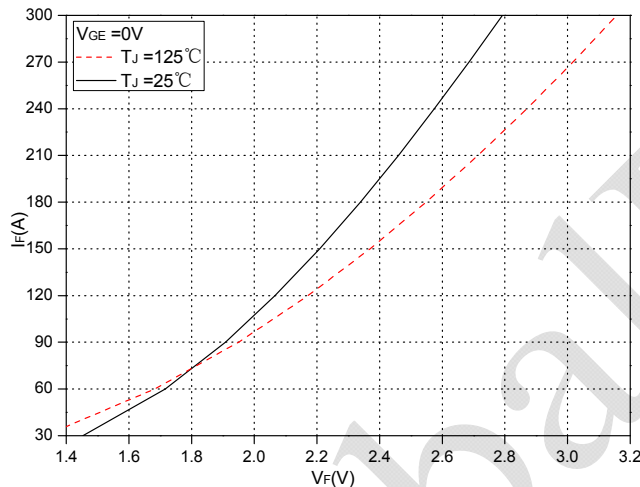


Fig.3 Forward Characteristics of Diode

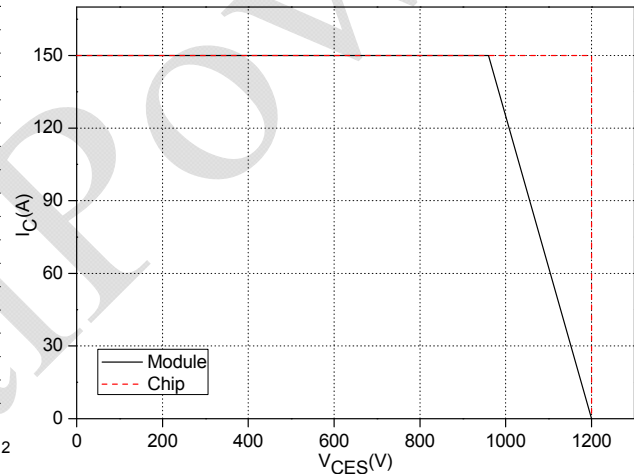


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

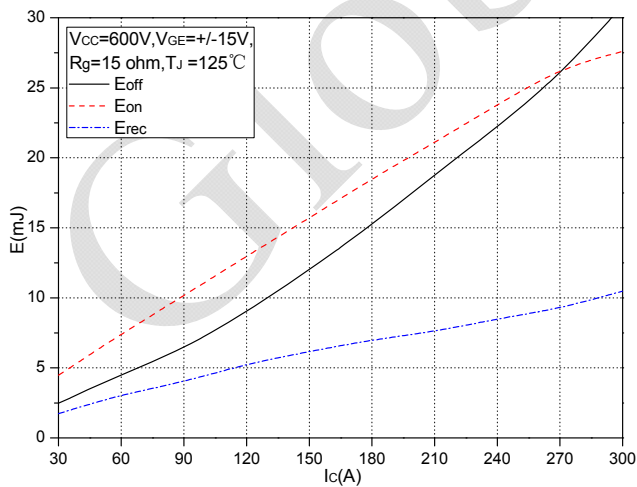


Fig.5 Typical Switching Loss vs. Collector Current

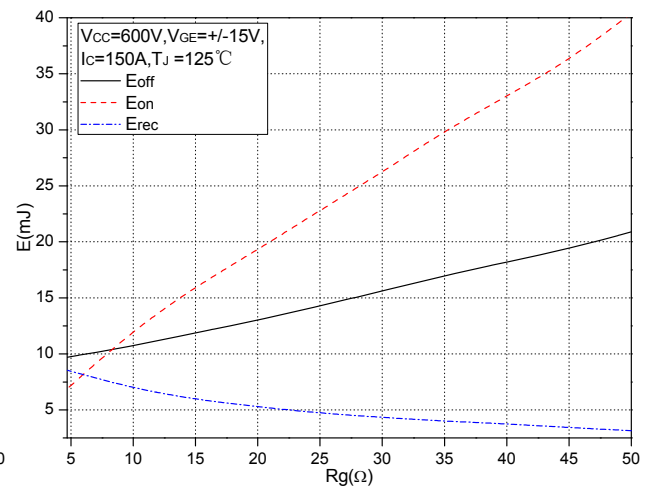


Fig.6 Typical Switching Loss vs. Gate Resistance

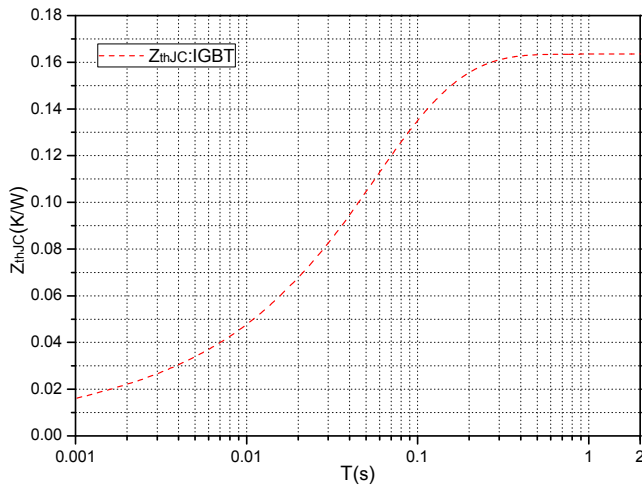


Fig.7 Transient thermal impedance (IGBT)

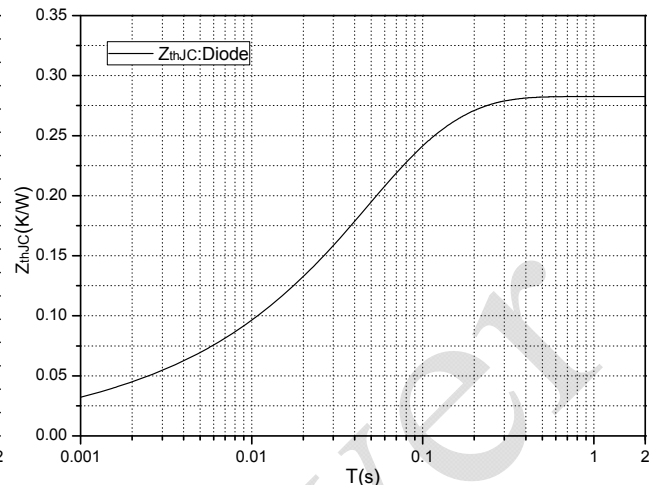


Fig.8 Transient thermal impedance (Diode)

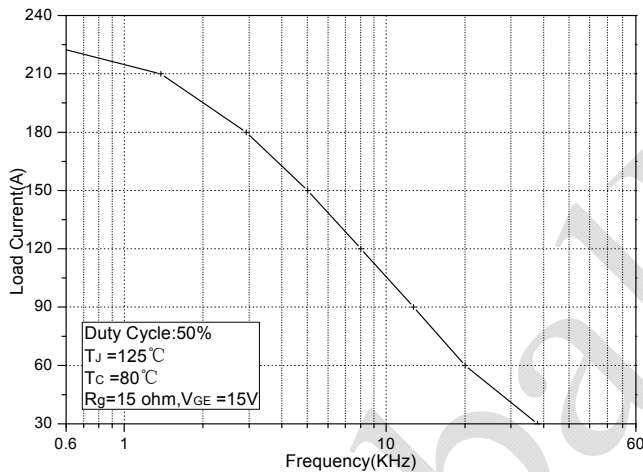


Fig.9 Typical Load Current vs. Frequency

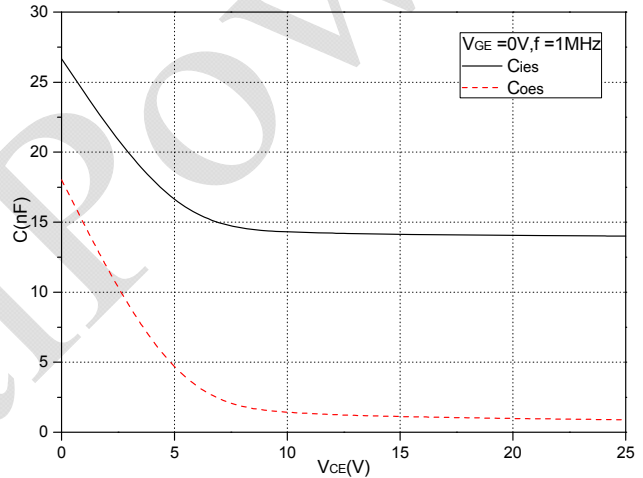
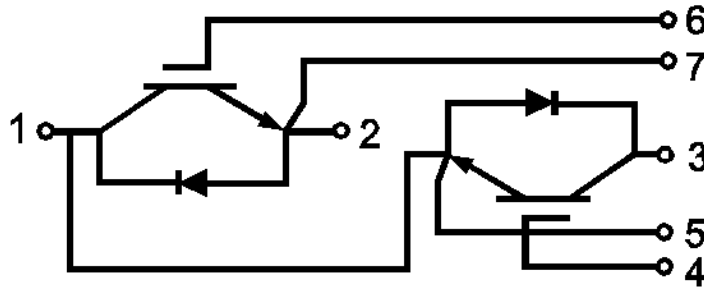
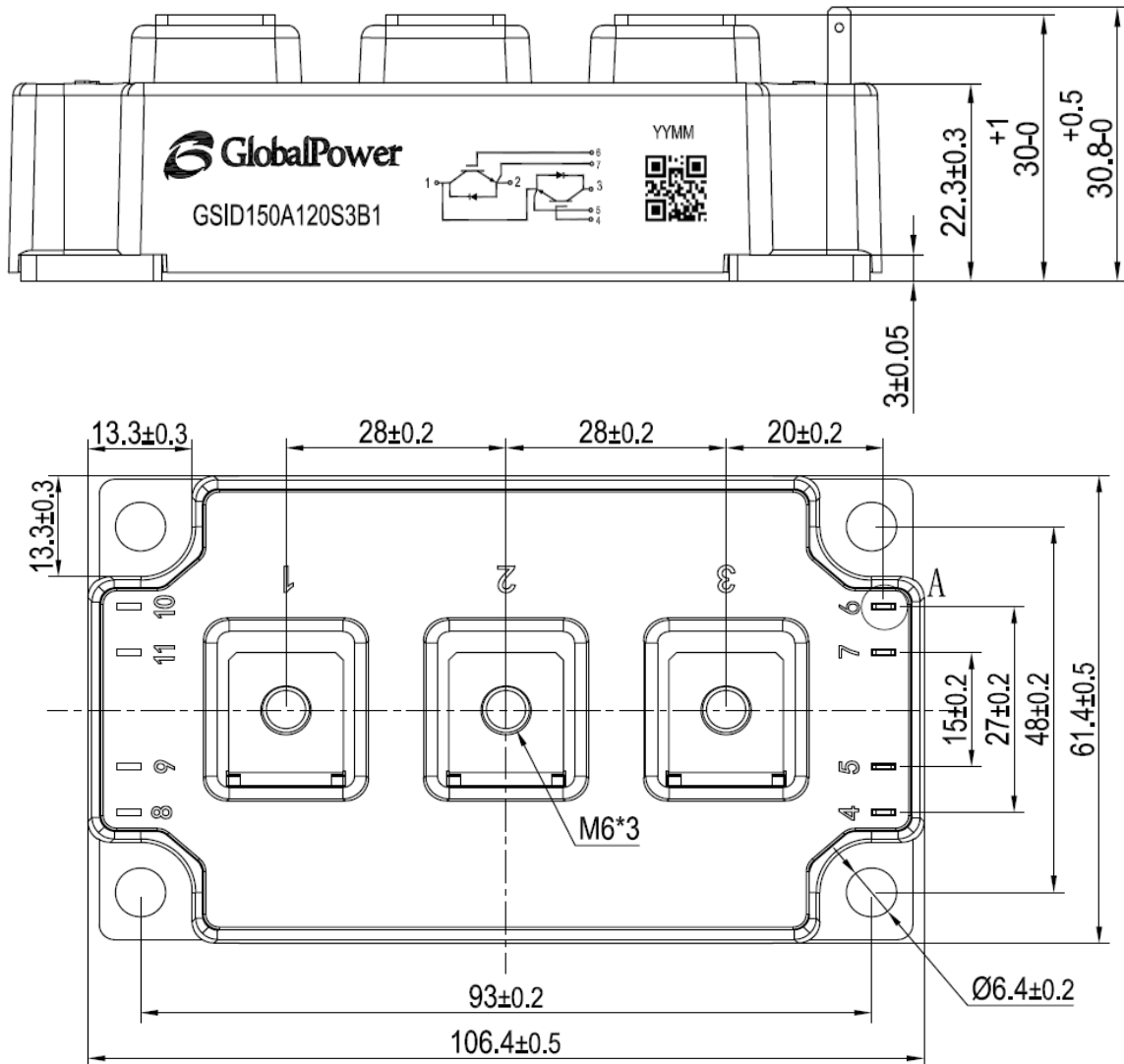


Fig.10 Capacitance Characteristics

**Internal Circuit**



**Package Outline (Unit: mm):**



### Revision History

Date	Revision	Notes
4/13/2015	1.0	Initial release

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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](http://www.gptechgroup.com).

- **REACH Compliance**

REACH substances of high concern (SVHCs) information is available for this product. Since the European Chemical 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.

REACH banned substance information (REACH Article 67) is also available upon request.

- This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control.

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