

# GSID200A120S3B1

## IGBT Module



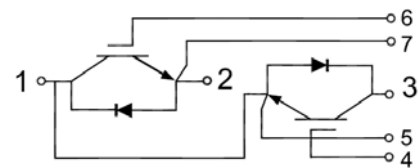
### Features:

- Low Saturation Voltage:  $V_{CE(sat)} = 1.80V @ I_C = 200A, T_C = 25^\circ C$
- 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
- UPS



### 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	$T_C = 80^\circ C$	200	A
		$T_C = 25^\circ C$	400	A
$I_{CM}$	Repetitive Peak Collector Current	$T_J = 175^\circ C$	400	A
$P_D$	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	1595	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	$I_C = 10\text{mA}$ , $V_{CE} = V_{GE}$	3.0	4.0	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 200\text{A}$ , $V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$	1.80	2.00	V
			$T_J = 125^\circ\text{C}$	1.90		V
			$T_J = 150^\circ\text{C}$	2.00		V
$I_{CES}$	Collector-Emitter Leakage Current	$V_{GE} = 0\text{V}$ , $V_{CE} = V_{CES}$ , $T_J = 2^\circ\text{C}$			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	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$		20.0		nF
$C_{oes}$	Output Capacitance			1.08		nF

#### Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}$ , $I_C = 200\text{A}$ , $R_G = 15\ \Omega$ , $V_{GE} = \pm 15\text{V}$ , Inductive Load	$T_J = 25^\circ\text{C}$	1100		ns
			$T_J = 125^\circ\text{C}$	1080		
			$T_J = 150^\circ\text{C}$	1095		
$t_r$	Rise Time		$T_J = 25^\circ\text{C}$	200		ns
			$T_J = 125^\circ\text{C}$	205		
			$T_J = 150^\circ\text{C}$	219		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$	900		ns
			$T_J = 125^\circ\text{C}$	950		
			$T_J = 150^\circ\text{C}$	963		
$t_f$	Fall Time		$T_J = 25^\circ\text{C}$	110		ns
			$T_J = 125^\circ\text{C}$	140		
			$T_J = 150^\circ\text{C}$	150		
$E_{on}$	Turn-on Switching Loss	$T_J = 25^\circ\text{C}$	19.00		mJ	
		$T_J = 125^\circ\text{C}$	22.90			
		$T_J = 150^\circ\text{C}$	24.11			

E <sub>off</sub>	Turn-off Switching Loss	V <sub>CC</sub> = 600V, I <sub>C</sub> = 200A, R <sub>G</sub> = 15 Ω, V <sub>GE</sub> = ±15V, Inductive Load	T <sub>J</sub> = 25°C		15.20		mJ
			T <sub>J</sub> = 125°C		19.60		
			T <sub>J</sub> = 150°C		20.43		
Q <sub>g</sub>	Total Gate Charge		T <sub>J</sub> = 25°C		2100		nC
			T <sub>J</sub> = 125°C		2130		
			T <sub>J</sub> = 150°C		2145		
R <sub>gint</sub>	Internal Gate Resistance		T <sub>J</sub> = 25°C	1.9	2.5	3.1	Ω
RBSOA	Reverse Bias Safe Operation Area	I <sub>C</sub> =400A, V <sub>CC</sub> =1050V, V <sub>p</sub> =1200V, R <sub>g</sub> = 15Ω, V <sub>GE</sub> =+15V to 0V, T <sub>J</sub> =150°C	Trapezoid				
R <sub>θJC</sub>	IGBT Thermal Resistance: Junction-To-Case				0.094		°C/W

### Maximum Rated Values of Diode (T<sub>C</sub>=25°C unless otherwise specified)

V <sub>RRM</sub>	Repetitive Peak Reverse Voltage	1200	V
I <sub>F</sub>	Diode Continuous Forward Current	200	A
I <sub>FM</sub>	Diode Maximum Forward Current	400	A

### Electrical Characteristics of Diode (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
V <sub>FM</sub>	Forward Voltage	I <sub>F</sub> = 200A , V <sub>GE</sub> = 0V	T <sub>J</sub> = 25°C		2.10	V
			T <sub>J</sub> = 125°C		2.15	
			T <sub>J</sub> = 150°C		2.10	
I <sub>rr</sub>	Peak Reverse Recovery Current	I <sub>F</sub> = 200A, di/dt = 960A/μs, V <sub>rr</sub> = 600V, V <sub>GE</sub> = -15V	T <sub>J</sub> = 25°C		65	A
			T <sub>J</sub> = 125°C		105	
			T <sub>J</sub> = 150°C		118	
Q <sub>rr</sub>	Reverse Recovery Charge		T <sub>J</sub> = 25°C		9.65	μC
			T <sub>J</sub> = 125°C		21.80	
			T <sub>J</sub> = 150°C		23.10	

E <sub>rec</sub>	Reverse Recovery Energy	I <sub>F</sub> = 200A, di/dt = 960A/μs, V <sub>rr</sub> = 600V, V <sub>GE</sub> = -15V	T <sub>J</sub> = 25°C	3.20	mJ
			T <sub>J</sub> = 125°C	8.20	
			T <sub>J</sub> = 150°C	8.74	
R <sub>θJC</sub>	Diode Thermal Resistance: Junction-To-Case			0.165	°C/W

### Module

Symbol	Description	Min	Typ	Max	Unit
V <sub>iso</sub>	Isolation Voltage(All Terminals Shorted)	f = 50Hz, 1minute	2500		V
T <sub>J</sub>	Maximum Junction Temperature			175	°C
T <sub>JOP</sub>	Maximum Operating Junction Temperature Range		-40	+150	°C
T <sub>stg</sub>	Storage Temperature		-40	+125	°C
R <sub>θCS</sub>	Case-To-Sink (Conductive Grease Applied)			0.03	°C/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

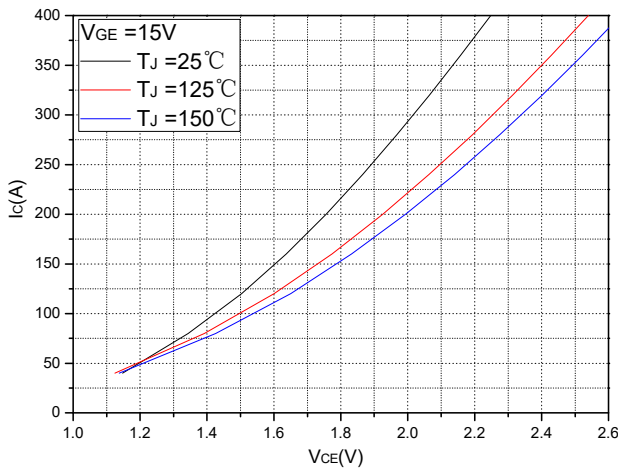


Fig.1 Typical Saturation Voltage Characteristics

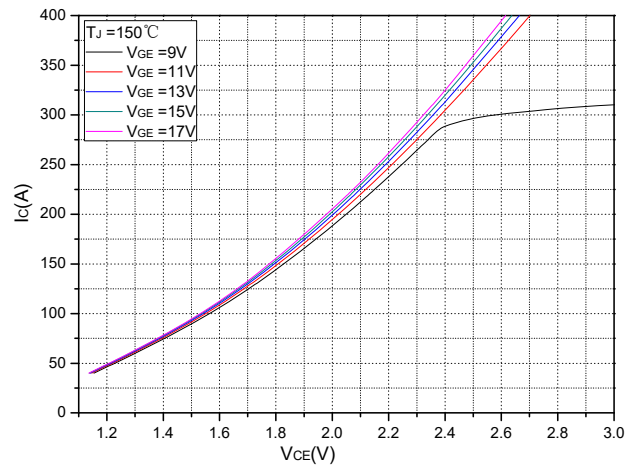


Fig.2 Typical Output Characteristics

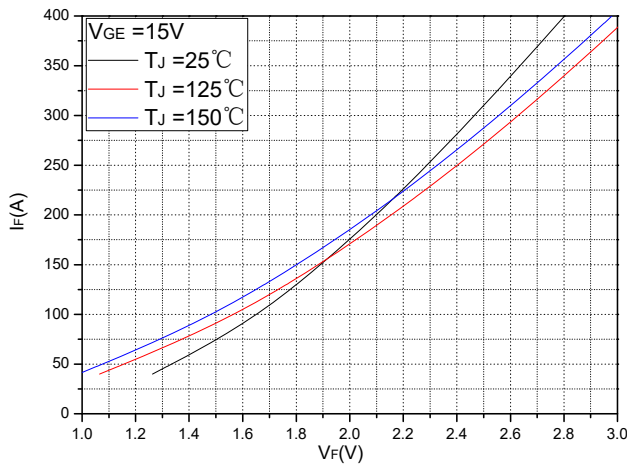


Fig.3 Forward Characteristics of Diode

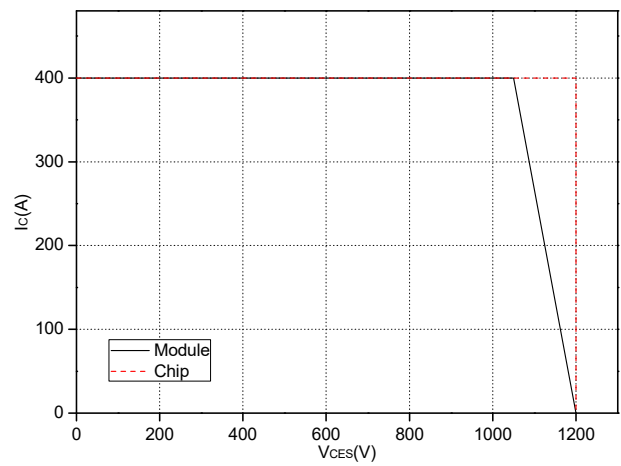


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

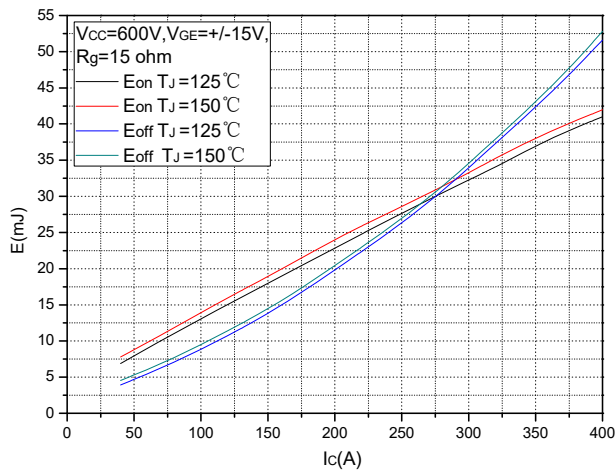


Fig.5 Typical Switching Loss vs. Collector Current

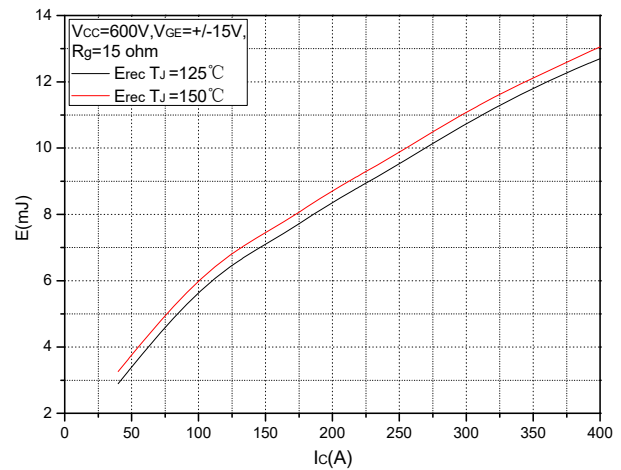


Fig.6 Typical Switching Loss vs. Collector Current

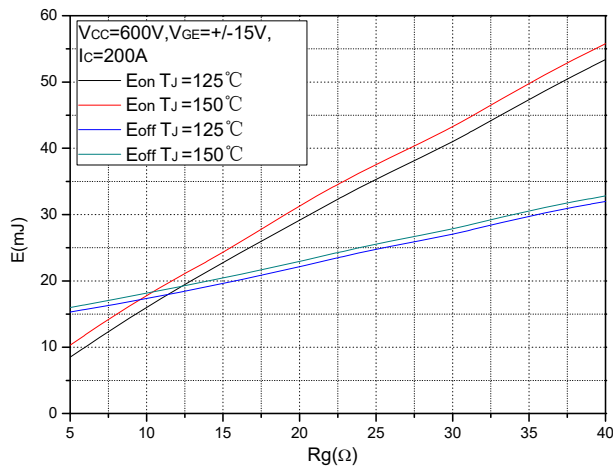


Fig.7 Typical Switching Loss vs. Gate Resistance

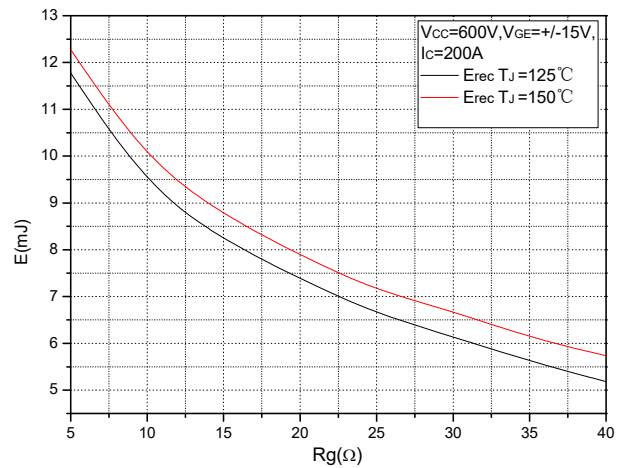


Fig.8 Typical Switching Loss vs. Gate Resistance

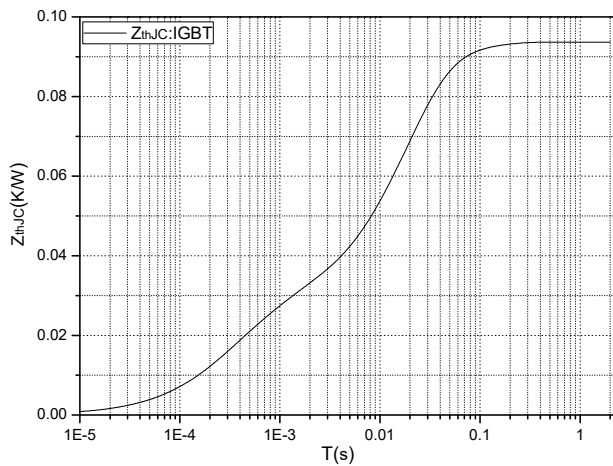


Fig.9 Transient thermal impedance (IGBT)

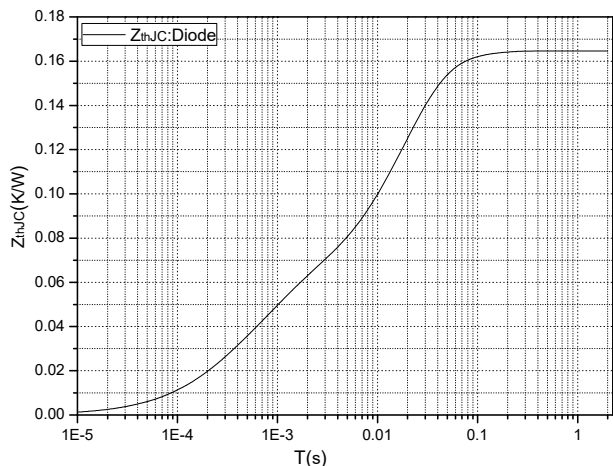


Fig.10 Transient thermal impedance (Diode)

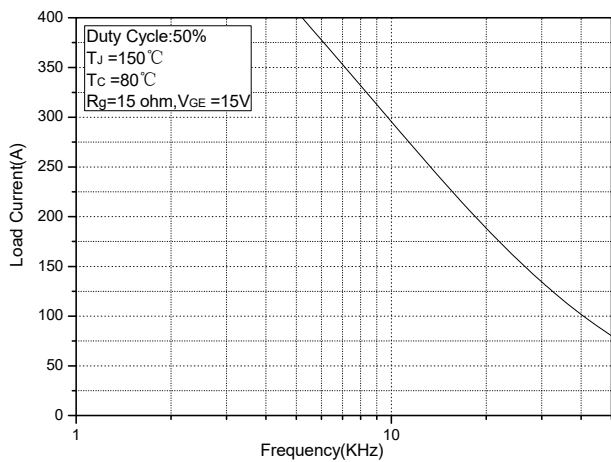


Fig.11 Typical Load Current vs. Frequency

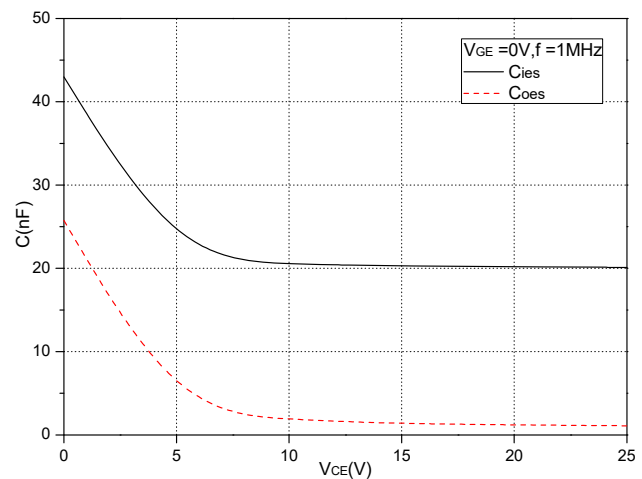
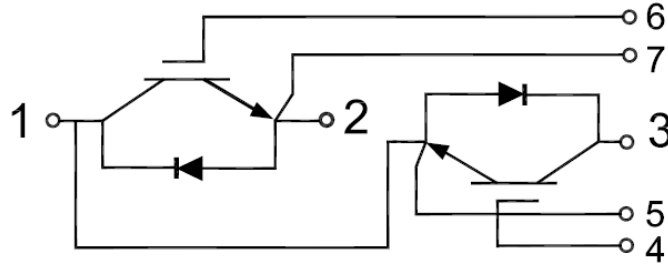
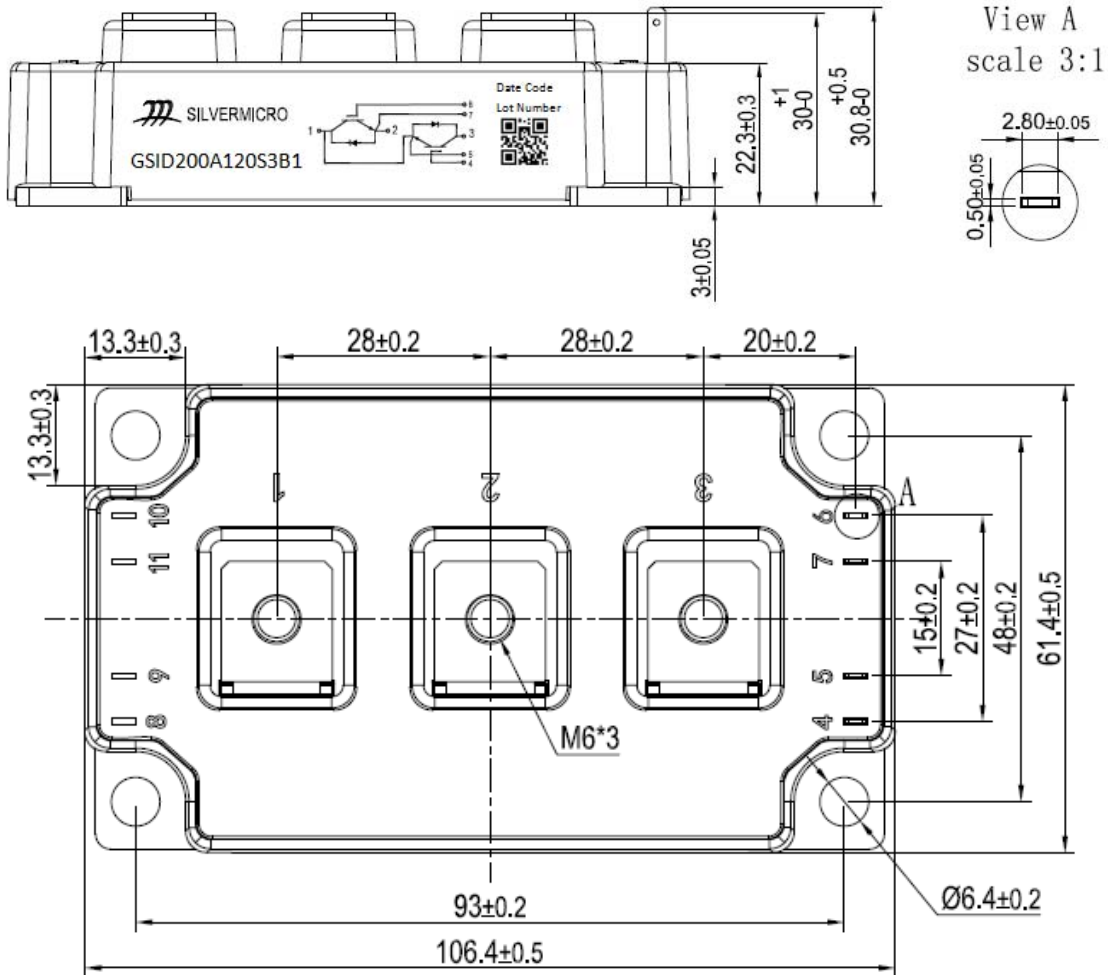


Fig.12 Capacitance Characteristics

**Internal Circuit**



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



### Revision History

Date	Revision	Notes
04/13/2015	1.0	Initial release
11/17/2015	2.0	Add Tj=150°C test data, etc.
01/03/2020	2.1	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](http://www.SemiQ.com).

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