



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: [info@chipsmall.com](mailto:info@chipsmall.com) Web: [www.chipsmall.com](http://www.chipsmall.com)

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



# GHS200A120S3B1

## Si IGBT hybrid module with SiC SBDs



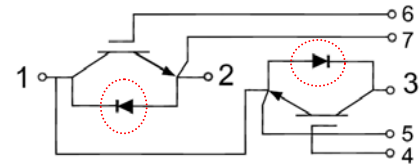
### Features:

- Low Saturation Voltage:  $V_{CE(sat)} = 1.80V @ I_C = 200A, T_C=25^\circ C$
- Low Switching Loss
- SiC SBD for Freewheeling diode:  $V_F = 1.60V @ I_F = 200A, T_J=25^\circ C$
- 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
- UPS and 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	$T_C = 80^\circ C$	200	A
		$T_C = 25^\circ C$	400	A
$I_{CM}$	Repetitive Peak Collector Current	$T_J = 175^\circ C$	400	A
$t_{SC}$	Short Circuit Withstand Time		>10	$\mu s$
$P_D$	Maximum Power Dissipation per IGBT	$T_C = 25^\circ C$ $T_{Jmax} = 175^\circ C$	1070	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	$I_C = 1\text{mA}, V_{CE} = V_{GE}$	4.0	4.5	5.0	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
			$T_J = 125^\circ\text{C}$	2.10		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		
$t_r$	Rise Time		$T_J = 25^\circ\text{C}$		200		ns
			$T_J = 125^\circ\text{C}$		205		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$		900		ns
			$T_J = 125^\circ\text{C}$		950		
$t_f$	Fall Time		$T_J = 25^\circ\text{C}$		110		ns
			$T_J = 125^\circ\text{C}$		140		
$E_{on}$	Turn-on Switching Loss		$T_J = 25^\circ\text{C}$		TBD	19.0	mJ
			$T_J = 125^\circ\text{C}$		TBD	22.9	
$E_{off}$	Turn-off Switching Loss	$T_J = 25^\circ\text{C}$		TBD	15.2	mJ	
		$T_J = 125^\circ\text{C}$		TBD	19.6		
$Q_g$	Total Gate Charge	$T_J = 25^\circ\text{C}$		2100		nC	
RBSOA	Reverse Bias Safe Operation Area	$I_C=400\text{A}, V_{CC}=960\text{V}, V_p=1200\text{V}, R_g = 15\ \Omega, V_{GE}=\pm 15\text{V to } 0\text{V}, T_J = 150^\circ\text{C}$	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			0.14		$^\circ\text{C/W}$	

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

Symbol	Description	Conditions	Value	Unit
$V_{RRM}$	Repetitive Peak Reverse Voltage	$T_J=25^\circ\text{C}$	1200	V
$I_F$	Diode Continuous Forward Current	$T_C=125^\circ\text{C}$ , $T_J=175^\circ\text{C}$	279	A
$I_{F,SM}$	Surge Non-repetitive Forward Current	$T_C=125^\circ\text{C}$ , $t_p=8.3$ ms sine half wave	900	A
dv/dt	Diode dv/dt Ruggedness	Turn-on slew rate, repetitive	50	V/ns

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

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_R$	DC Blocking Voltage	$I_R=100$ uA	1200			V
$V_F$	Forward Voltage	$I_F = 200\text{A}$ , $V_{GE} = 0\text{V}$	$T_J = 25^\circ\text{C}$	1.7	1.8	V
			$T_J = 175^\circ\text{C}$	2.3	2.8	
$I_R$	Reverse leakage Current	$V_R=1200\text{V}$	$T_J = 25^\circ\text{C}$	28	500	$\mu\text{A}$
		$V_R=1200\text{V}$	$T_J = 175^\circ\text{C}$	1050		
$Q_C$	Total Capacitive Charge	$V_R=1200\text{V}$	$T_J = 25^\circ\text{C}$	776		nC
C	Total Capacitance	$V_R=1\text{V}$ , $f=1$ MHz		11428		pF
		$V_R=600\text{V}$ , $f=1$ MHz		667		
		$V_R=1200\text{V}$ , $f=1$ MHz		647		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case			<b>TBD</b>	0.21	$^\circ\text{C/W}$

### Module

Symbol	Description	Min	Typ	Max	Unit
$V_{iso}$	Isolation Voltage(All Terminals Shorted)			2500	V
		f = 50Hz, 1minute			
$T_J$	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		$^\circ\text{C/W}$
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

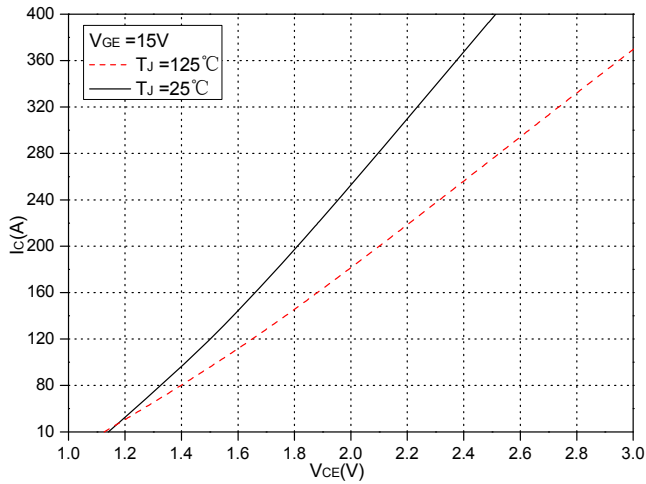


Fig.1 Typical Saturation Voltage Characteristics

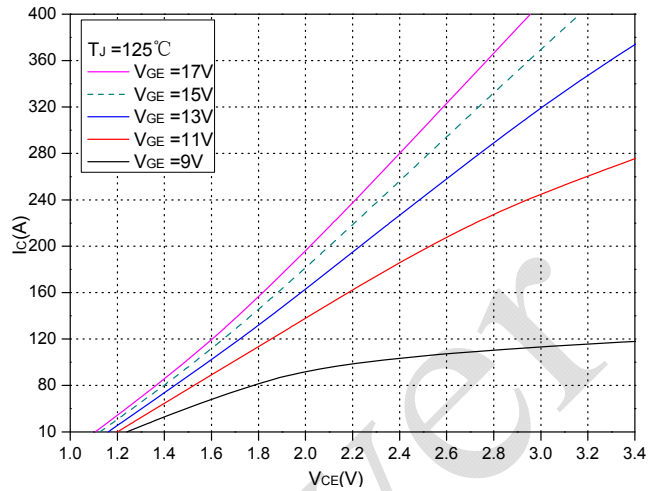


Fig.2 Typical Output Characteristics

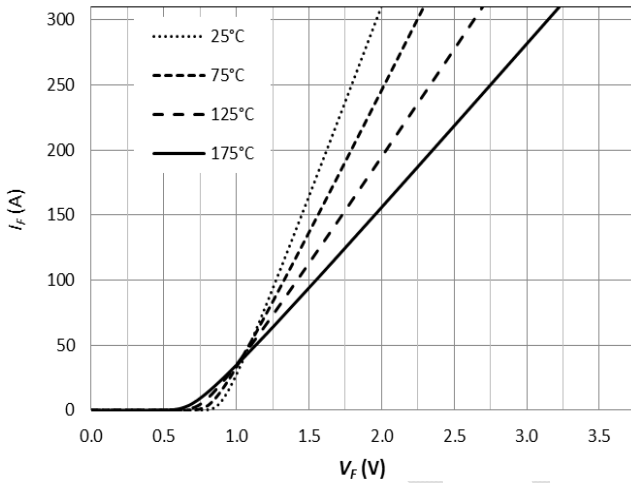


Fig.3 Forward Characteristics of Diode

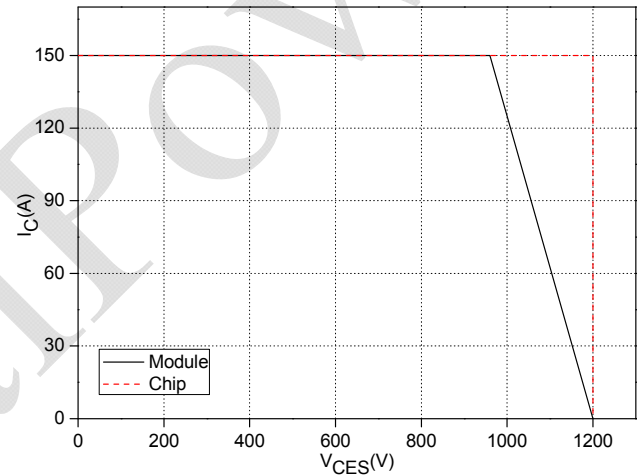


Fig.4 Reverse Bias Safe Operation Area (RBSOA)

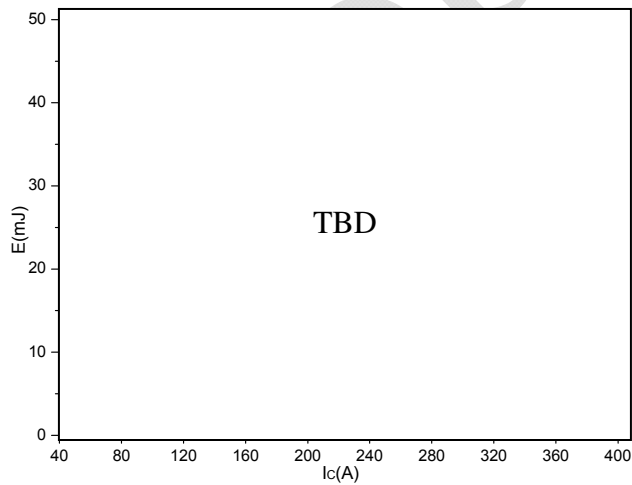


Fig.5 Typical Switching Loss vs. Collector Current

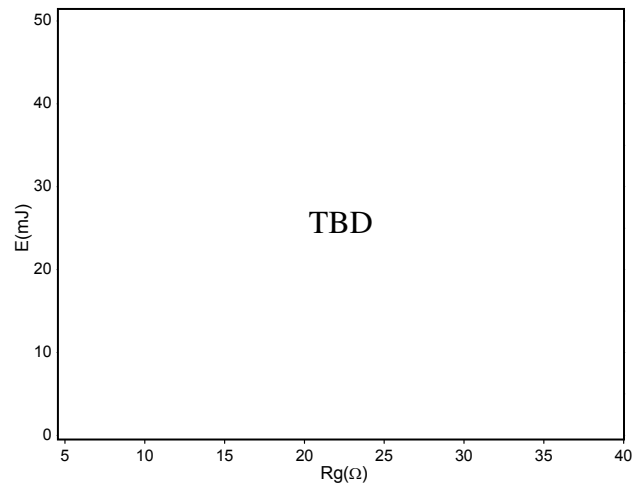


Fig.6 Typical Switching Loss vs. Gate Resistance

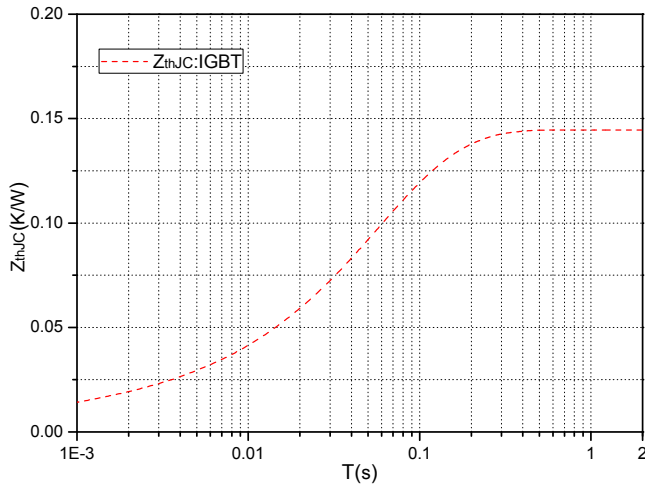


Fig.7 Transient thermal impedance (IGBT)

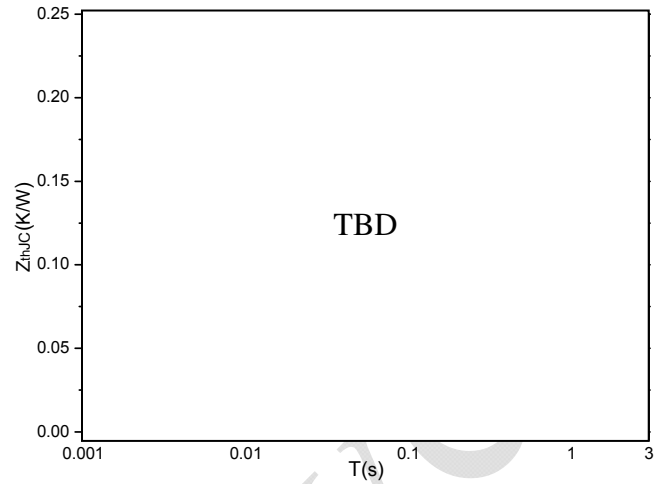


Fig.8 Transient thermal impedance (Diode)

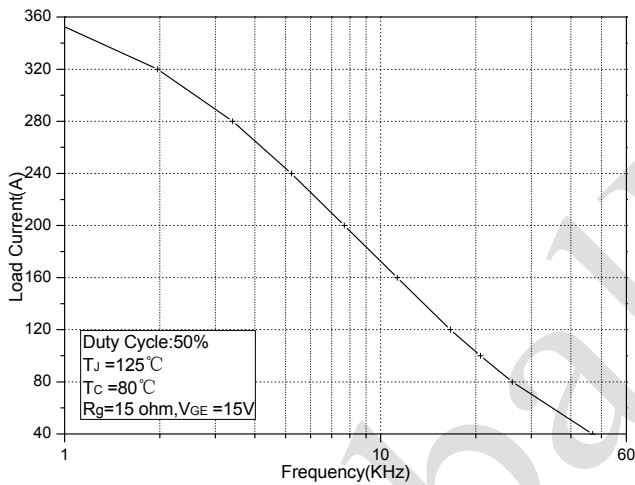


Fig.9 Typical Load Current vs. Frequency

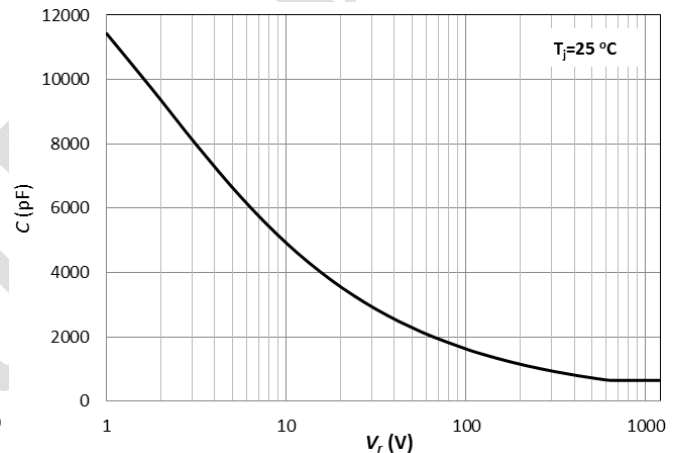


Fig.10 Capacitance Characteristics of Diode

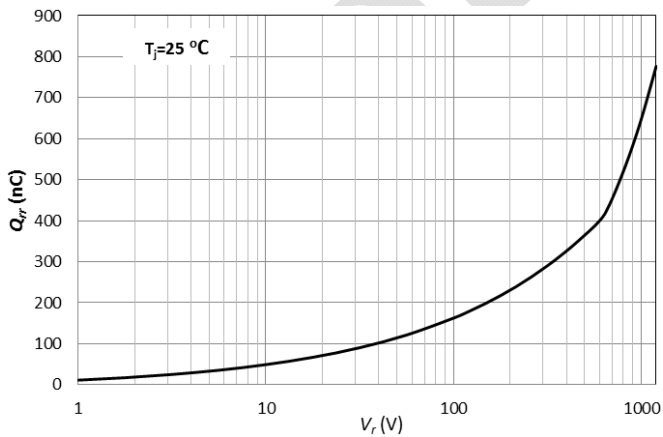


Fig. 11 Diode Recovery Charge

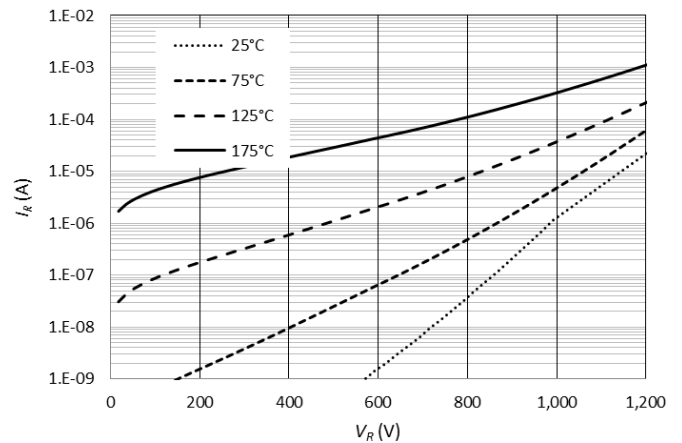
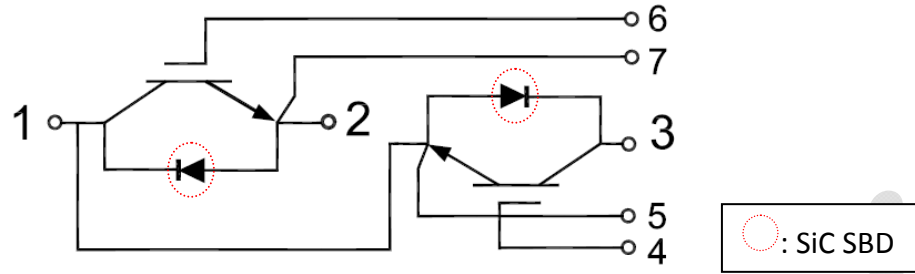
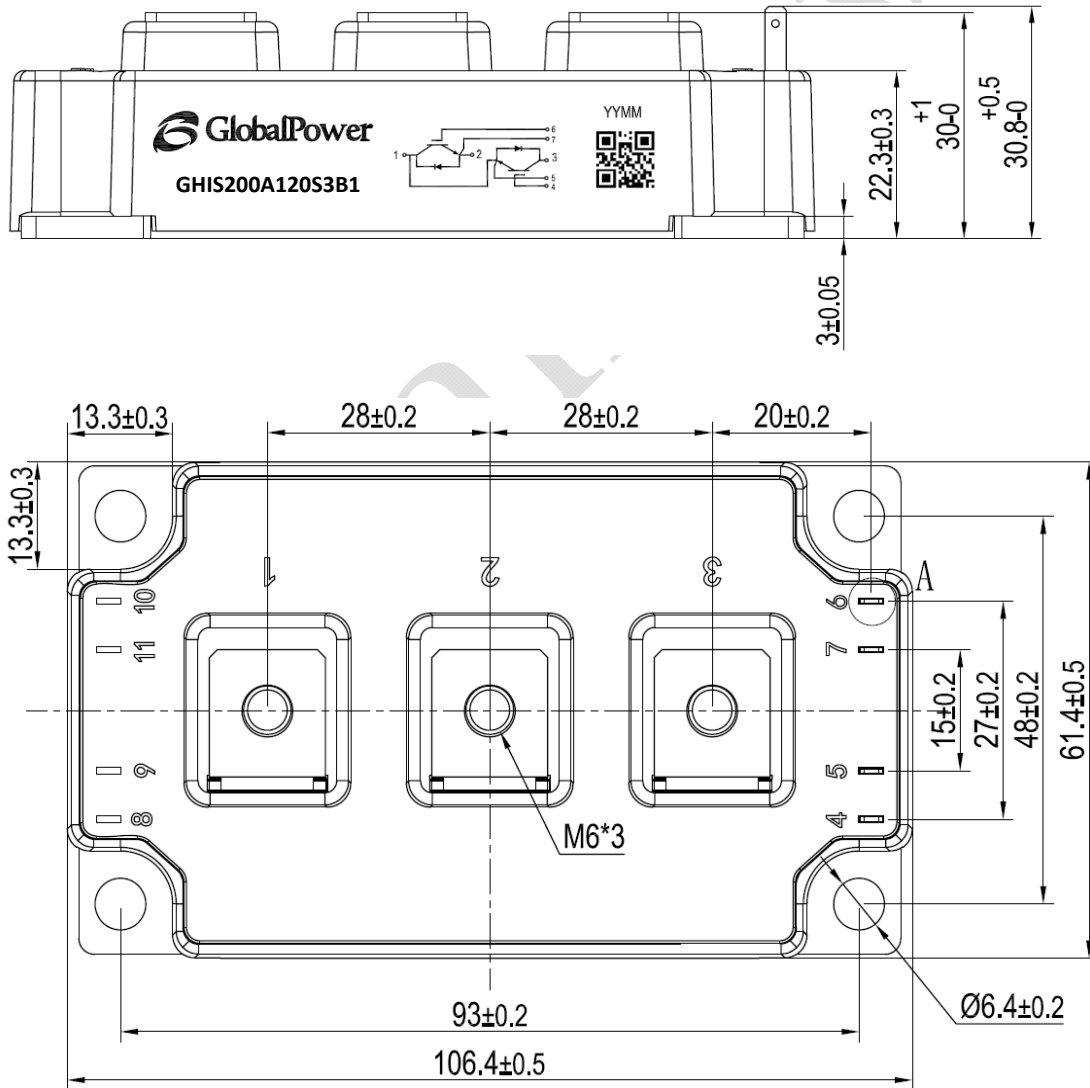


Fig. 12 Diode Leakage Current (Parameterized on T<sub>j</sub>)

**Internal Circuit**



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



### Revision History

Date	Revision	Notes
4/22/2015	0.1	Initial release of preliminary datasheet

### Global Power Technologies Group

20692 Prism Place  
 Lake Forest, CA 92630  
 TEL (949) 207-7500  
 FAX (949) 613-7600  
 E-mail: [info@gptechgroup.com](mailto:info@gptechgroup.com)  
 Web site: [www.gptechgroup.com](http://www.gptechgroup.com)



### 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.
- To obtain additional technical information or to place an order for this product, please contact us. The information in this datasheet is provided by Global Power Technologies Group. GPTG reserves the right to make changes, corrections, modifications, and improvements of datasheet without notice.