

# GSID150A120T2C1

## 6-Pack IGBT Module



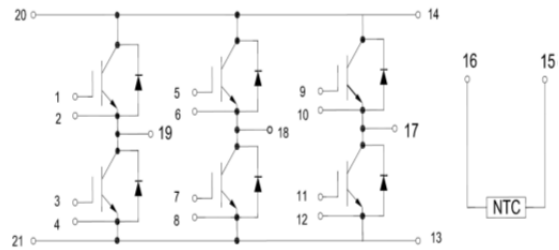
### Features:

- Short Circuit Rated 10 $\mu$ 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:

- Industrial Inverters
- Servo Applications



### 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		$\pm 20$	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	$\mu s$
$P_D$	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
			$T_J = 125^\circ\text{C}$	2.20		
			$T_J = 150^\circ\text{C}$	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
$C_{res}$	Output capacitance			1.09		nF

#### Switching Characteristics

Symbol	Description	Conditions	Switching Characteristics			Unit
			$T_J$	Min	Max	
$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 10\text{A}, R_G = 15\Omega, V_{GE} = \pm 15\text{V}, \text{Inductive Load}$	$25^\circ\text{C}$		735	ns
			$125^\circ\text{C}$		720	
			$150^\circ\text{C}$		720	
$t_r$	Rise Time		$25^\circ\text{C}$		180	ns
			$125^\circ\text{C}$		190	
			$150^\circ\text{C}$		195	
$t_{d(off)}$	Turn-off Delay Time		$25^\circ\text{C}$		630	ns
			$125^\circ\text{C}$		655	
			$150^\circ\text{C}$		675	
$t_f$	Fall Time	$25^\circ\text{C}$		170	ns	
		$125^\circ\text{C}$		200		
		$150^\circ\text{C}$		210		
$E_{on}$	Turn-on Switching Loss	$25^\circ\text{C}$		19.7	mJ	
		$125^\circ\text{C}$		23.3		
		$150^\circ\text{C}$		24.8		
$E_{off}$	Turn-off Switching Loss	$25^\circ\text{C}$		9.3	mJ	

Q <sub>g</sub>	Total Gate Charge		T <sub>J</sub> = 125°C		12.7		
			T <sub>J</sub> = 150°C		14.7		
			T <sub>J</sub> = 25°C		1650		nC
			T <sub>J</sub> = 125°C		1665		
			T <sub>J</sub> = 150°C		1672		
RBSOA	Reverse Bias Safe Operation Area	I <sub>C</sub> =300A, 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				
SCSOA	Short Circuit Safe Operation Area	V <sub>CC</sub> = 600V, V <sub>GE</sub> = 15V, T <sub>J</sub> = 150°C	10			μs	
R <sub>θJC</sub>	IGBT Thermal Resistance: Junction-To-Case			0.138		°C/W	

### Diode, Inverter

#### Maximum Rated Values (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	150	A
I <sub>FM</sub>	Repetitive Peak Forward Current	300	A

#### Electrical Characteristics of FWD (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> = 150A , V <sub>GE</sub> = 0V	T <sub>J</sub> = 25°C	2.30		V
			T <sub>J</sub> = 125°C	2.40		
			T <sub>J</sub> = 150°C	2.40		
I <sub>rr</sub>	Peak Reverse Recovery Current		T <sub>J</sub> = 25°C	50		A
			T <sub>J</sub> = 125°C	65		
			T <sub>J</sub> = 150°C	75		
Q <sub>rr</sub>	Reverse Recovery Charge	I <sub>F</sub> = 150A, di/dt = 900A/μs, V <sub>rr</sub> = 600V, V <sub>GE</sub> = -15V	T <sub>J</sub> = 25°C	7.3		μC
			T <sub>J</sub> = 125°C	14.3		
			T <sub>J</sub> = 150°C	18.3		
E <sub>rec</sub>	Reverse Recovery Energy		T <sub>J</sub> = 25°C	2.0		mJ
			T <sub>J</sub> = 125°C	4.3		

		$T_J = 150^\circ\text{C}$	5.8	
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case		0.258	$^\circ\text{C}/\text{W}$

### Internal NTC-Thermistor Characteristics

Symbol	Description	Min	Typ	Max	Unit
$R_{25}$	$T_C = 25^\circ\text{C}$		5		$\text{k}\Omega$
$\Delta R/R$	$T_C = 100^\circ\text{C}$ , $R_{100} = 481\Omega$			$\pm 5$	%
$P_{25}$	$T_C = 25^\circ\text{C}$		50		$\text{mW}$
$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298.15\text{K}))]$		3380		K
$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298.15\text{K}))]$		3440		K

### Module

Symbol	Description	Min	Typ	Max	Unit
$V_{iso}$	Isolation Voltage(All Terminals Shorted) <span style="float: right;"><math>f = 50\text{Hz}</math>, 1minute</span>	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)		0.02		$^\circ\text{C}/\text{W}$
M	Mounting Screw:M5	4.0		6.0	N·m
G	Weight		300		g

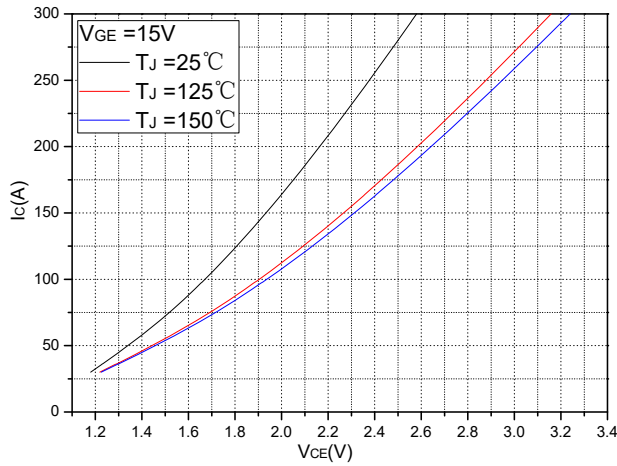


Fig.1 Typical Saturation Voltage Characteristics

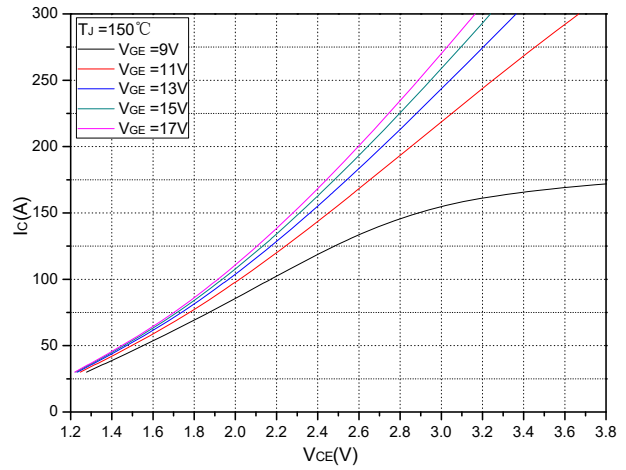


Fig.2 Typical Output Characteristics

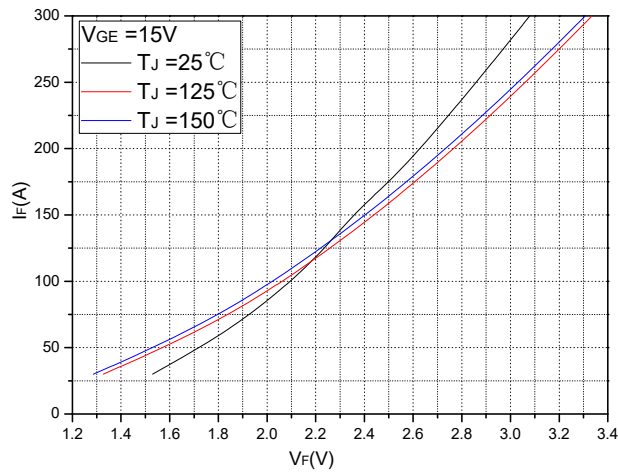


Fig.3 Forward Characteristics of FWD

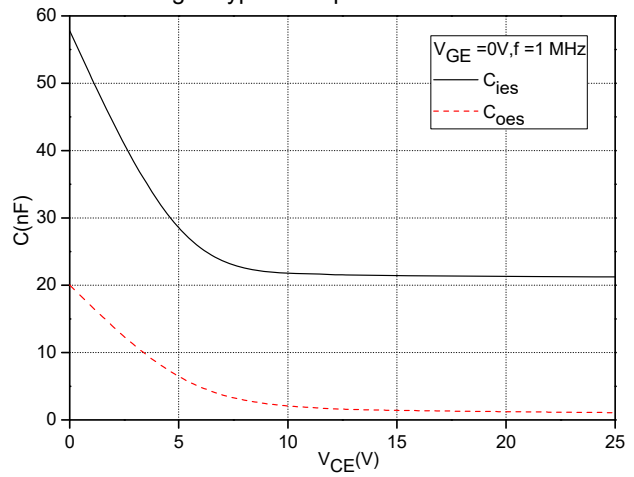


Fig.4 Capacitance Characteristics

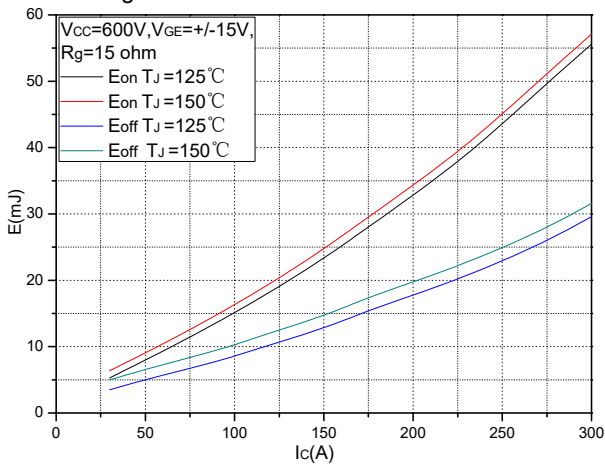


Fig.5 Typical Switching Loss vs. Collector Current

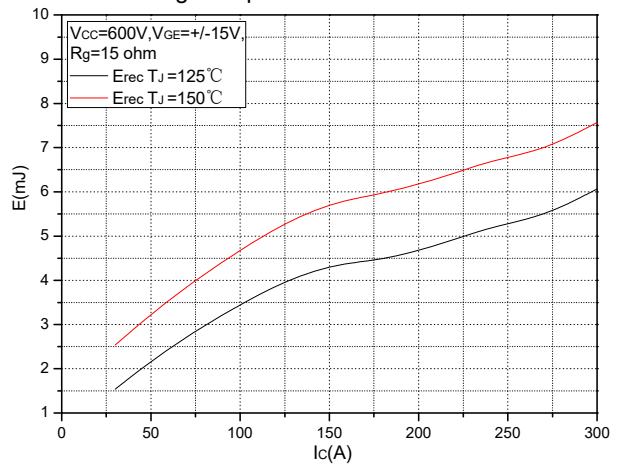


Fig.6 Typical Switching Loss vs. Collector Current

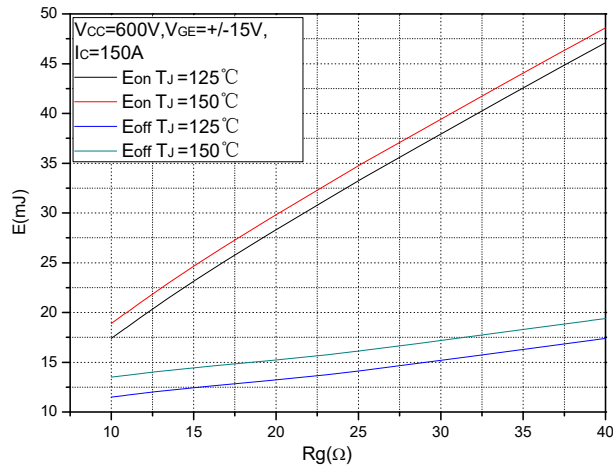


Fig.7 Typical Switching Losses vs. Gate Resistance

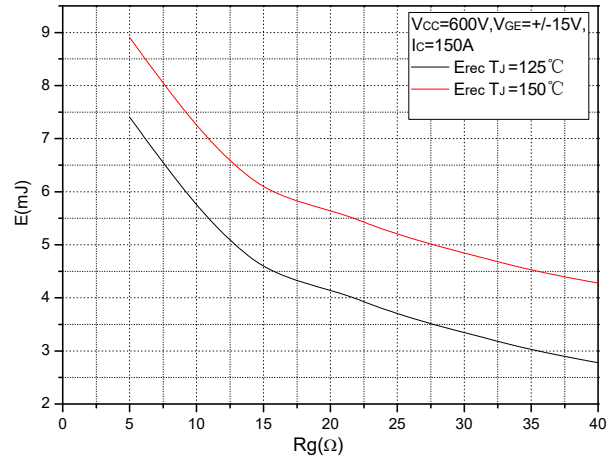


Fig.8 Typical Switching Losses vs. Gate Resistance

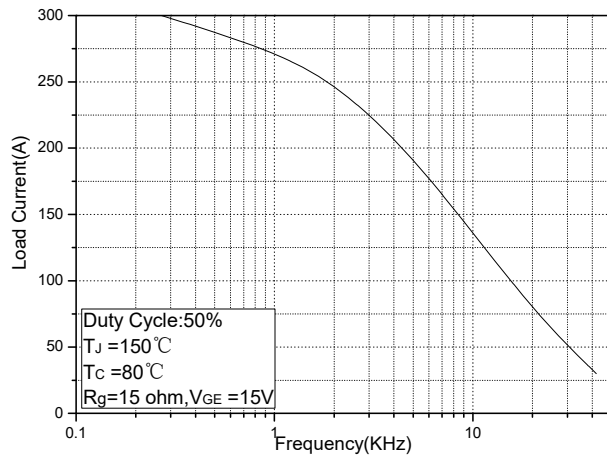


Fig.9 Typical Load Current vs. Frequency

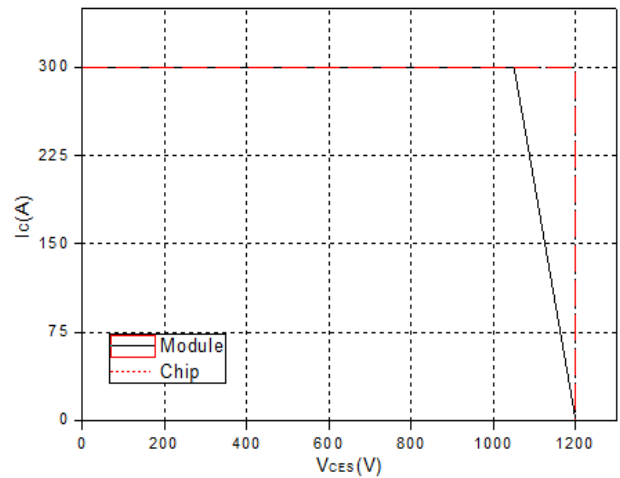


Fig.10 Reverse Bias Safe Operation Area (RBSOA)

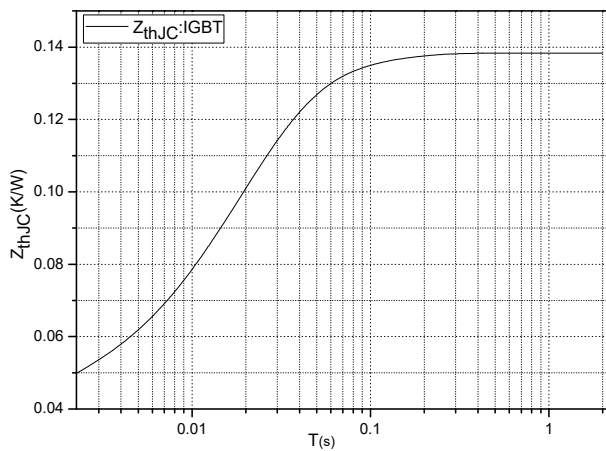


Fig.11 Transient thermal impedance (IGBT)

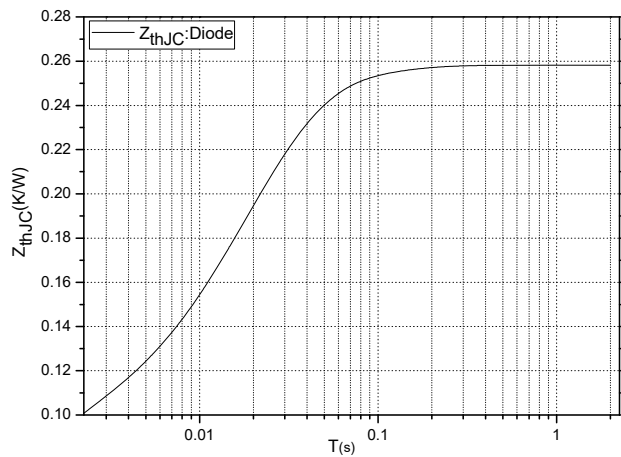


Fig.12 Transient thermal impedance (Diode)

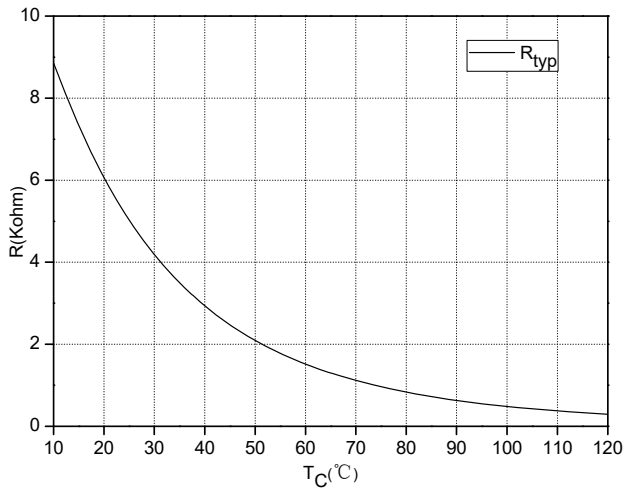
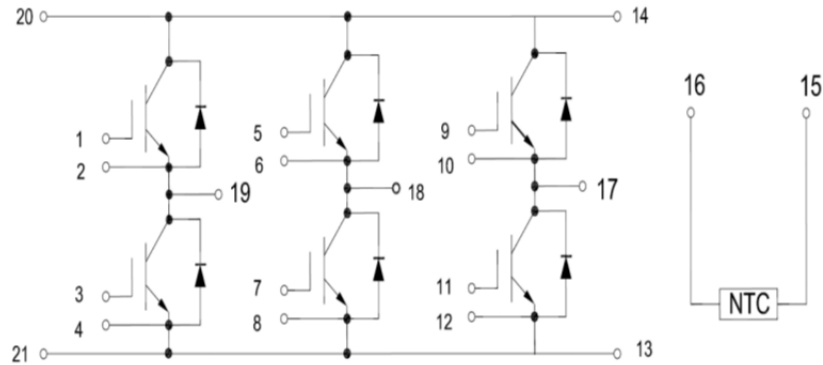
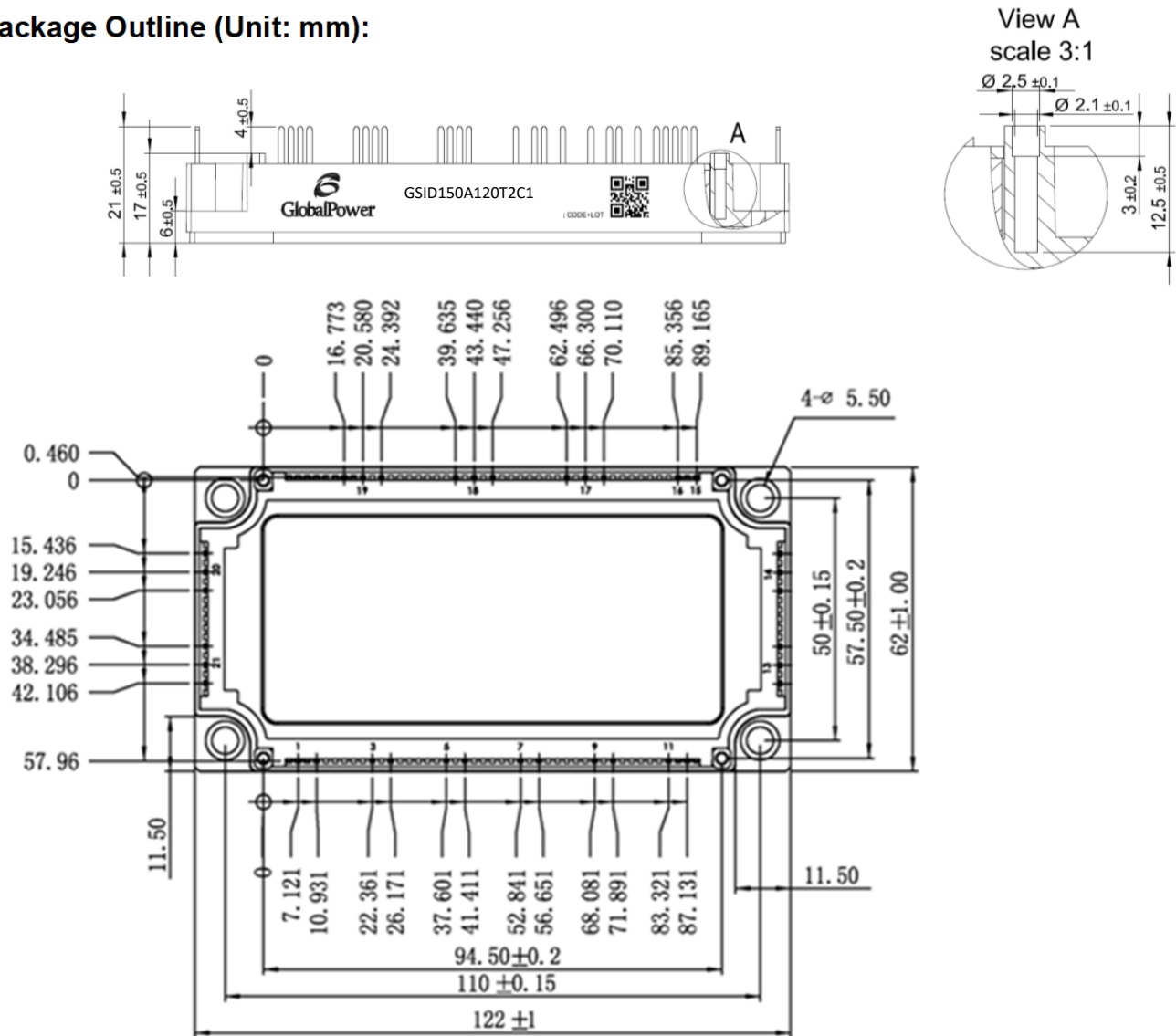


Fig.13 NTC Temperature characteristics

### Internal Circuit:



### Package Outline (Unit: mm):





### Revision History

Date	Revision	Notes
06/15/2015	1.0	Initial release
11/17/2015	2.0	Add test data at junction temperature of 150 °C.
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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