

# GT150TL120T2SH

## IGBT Module

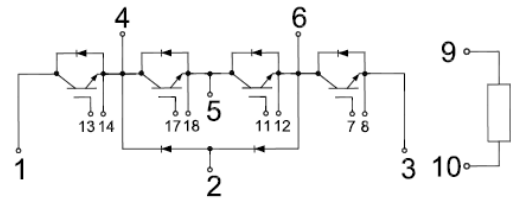
### Features:

- 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



### Application:

- 3-Level-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
		$T_C = 25^\circ C$	275	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	$T_C = 25^\circ C$ $T_{Jmax}=175^\circ C$	1035	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	$I_C = 3 \text{ mA}, V_{CE} = V_{GE}$	4.5	5.5	6.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 150\text{A}, V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$	1.90	2.10	V
			$T_J = 125^\circ\text{C}$	2.20		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	$V_{GE} = 0\text{V}, V_{CE} = V_{CES}, T_J = 25^\circ\text{C}$			200	nA
$C_{ies}$	Input Capacitance	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$		20.2		nF
$C_{oes}$	Output capacitance			1.15		nF

### Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 600\text{V}, I_C = 150\text{A}, R_G = 6.2\Omega, V_{GE} = \pm 15\text{V}, \text{Inductive Load}$	$T_J = 25^\circ\text{C}$		235		ns
			$T_J = 125^\circ\text{C}$		220		
$t_r$	Rise Time		$T_J = 25^\circ\text{C}$		115		ns
			$T_J = 125^\circ\text{C}$		120		
$t_{d(off)}$	Turn-off Delay Time		$T_J = 25^\circ\text{C}$		360		ns
			$T_J = 125^\circ\text{C}$		380		
$t_f$	Fall Time		$T_J = 25^\circ\text{C}$		160		ns
			$T_J = 125^\circ\text{C}$		230		
$E_{on}$	Turn-on Switching Loss		$T_J = 25^\circ\text{C}$		9.1		mJ
			$T_J = 125^\circ\text{C}$		12.2		
$E_{off}$	Turn-off Switching Loss		$T_J = 25^\circ\text{C}$		7.5		mJ
			$T_J = 125^\circ\text{C}$		11.5		
$Q_g$	Total Gate Charge		$T_J = 25^\circ\text{C}$		1230		nC
$R_g$	Internal Gate Resistance		$T_J = 25^\circ\text{C}$		4.7		$\Omega$
RBSOA	Reverse Bias Safe Operation Area	$I_C=300\text{A}, V_{CC}=1050\text{V}, V_p=1200\text{V}, R_g = 6.2\Omega, V_{GE}=\pm 15\text{V to } 0\text{V}, T_J = 150^\circ\text{C}$	Trapezoid				
SCSOA	Short Circuit Safe Operation Area	$V_{CC} = 600\text{V}, V_{GE} = 15\text{V}, T_J = 150^\circ\text{C}$	10			$\mu\text{s}$	
$R_{\theta JC}$	Junction-To-Case			0.145		$^\circ\text{C/W}$	

### Diode, Inverter

#### Maximum Rated Values ( $T_C=25^{\circ}\text{C}$ 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 FWD ( $T_C=25^{\circ}\text{C}$ Unless otherwise specified)

Symbol	Description	Conditions	Min	Typ	Max	Unit
$V_{FM}$	Forward Voltage	$I_C = 150\text{A}$ , $V_{GE} = 15\text{V}$	$T_J = 25^{\circ}\text{C}$	2.00		V
			$T_J = 125^{\circ}\text{C}$	2.20		
$I_{rr}$	Peak Reverse Recovery Current	$I_F = 150\text{A}$ , $di/dt = 1500\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^{\circ}\text{C}$	65		A
			$T_J = 125^{\circ}\text{C}$	90		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 150\text{A}$ , $di/dt = 1500\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^{\circ}\text{C}$	6.5		$\mu\text{C}$
			$T_J = 125^{\circ}\text{C}$	13.8		
$E_{rec}$	Reverse Recovery Energy	$I_F = 150\text{A}$ , $di/dt = 1500\text{A}/\mu\text{s}$ , $V_{rr} = 600\text{V}$ , $V_{GE} = -15\text{V}$	$T_J = 25^{\circ}\text{C}$	2.6		mJ
			$T_J = 125^{\circ}\text{C}$	4.8		
$R_{\theta JC}$	Junction-To-Case			0.286		$^{\circ}\text{C}/\text{W}$

### Diode, 3-Level

#### Maximum Rated Values ( $T_C=25^{\circ}\text{C}$ 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 FWD ( $T_C=25^\circ\text{C}$ Unless otherwise specified)

Symbol	Description	Conditions		Min	Typ	Max	Unit
$V_{FM}$	Forward Voltage	$I_C = 150A$ , $V_{GE} = 15V$	$T_J = 25^\circ\text{C}$		2.00		V
			$T_J = 125^\circ\text{C}$		2.20		
$I_{rr}$	Peak Reverse Recovery Current		$T_J = 25^\circ\text{C}$		65		A
			$T_J = 125^\circ\text{C}$		90		
$Q_{rr}$	Reverse Recovery Charge	$I_F = 150A$ , $di/dt = 1500A/\mu s$ , $V_{rr} = 600V$ , $V_{GE} = -15V$	$T_J = 25^\circ\text{C}$		6.5		$\mu\text{C}$
			$T_J = 125^\circ\text{C}$		13.8		
$E_{rec}$	Reverse Recovery Energy		$T_J = 25^\circ\text{C}$		2.6		mJ
			$T_J = 125^\circ\text{C}$		4.8		
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case				0.286		$^\circ\text{C}/\text{W}$

### Internal NTC- Thermistor Characteristic

Symbol	Condition	Typ.	Max.	Units
$R_{25}$	$T_C = 25^\circ\text{C}$	5		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		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

	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	3.0		5.0	N·m
	Mounting Screw:M6	4.0		6.0	
G	Weight		345		g

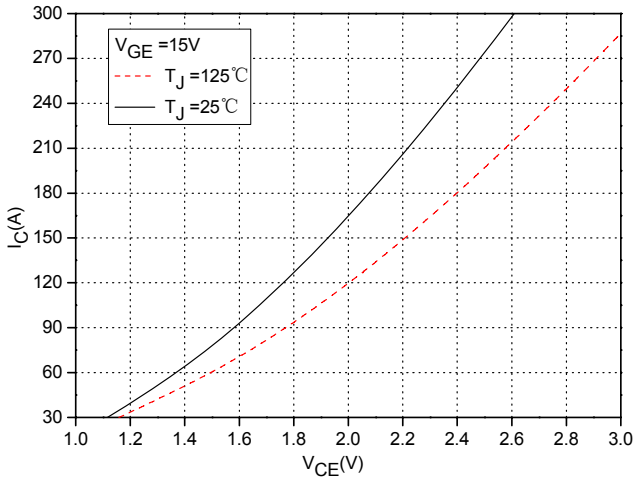


Fig.1 Typical Saturation Voltage Characteristics

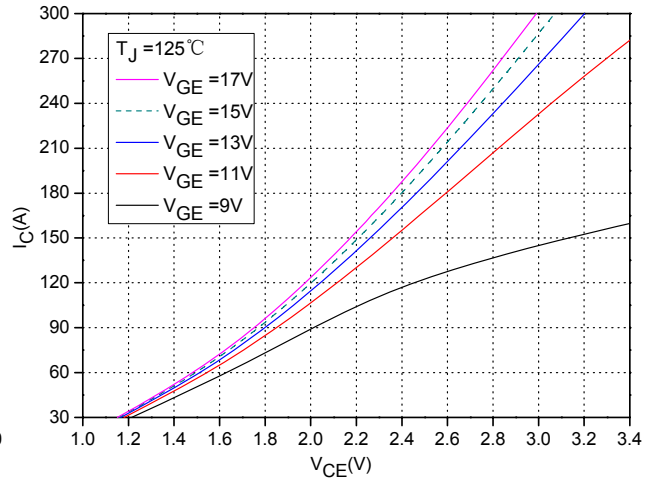


Fig.2 Typical Output Characteristics

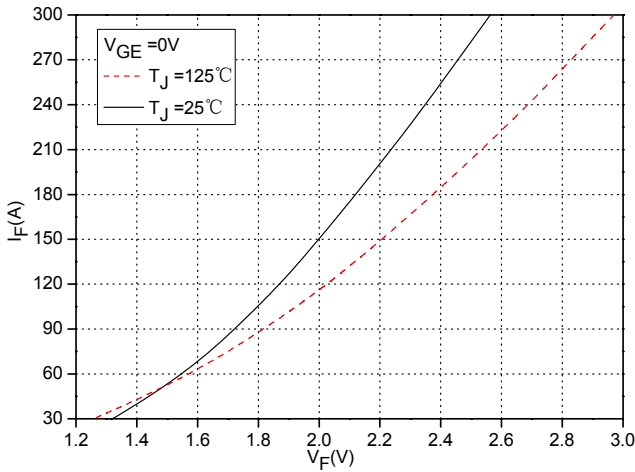


Fig.3 Forward Characteristics of Diode (Reverse)

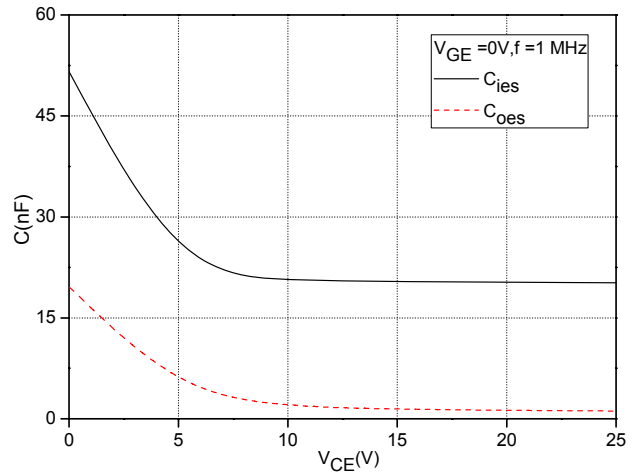


Fig.4 Capacitance Characteristics

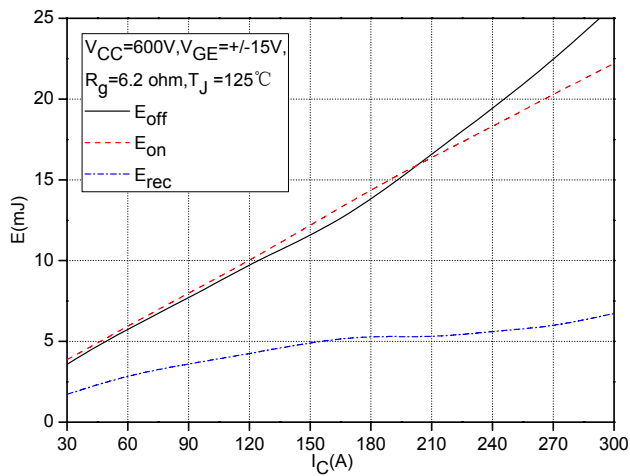


Fig.5 Typical Switching Loss vs. Collector Current

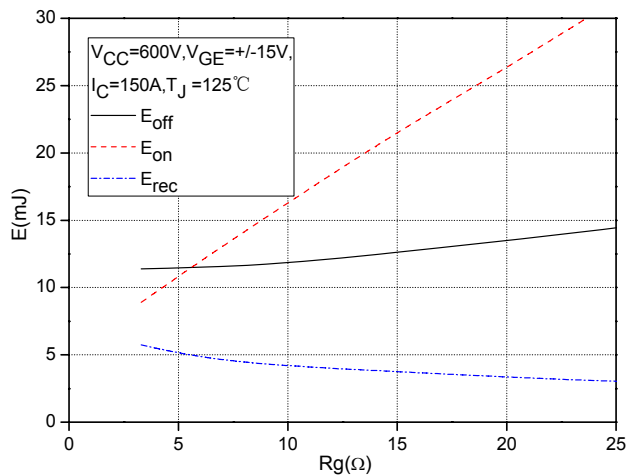


Fig.6 Typical Switching Loss vs. Gate Resistance

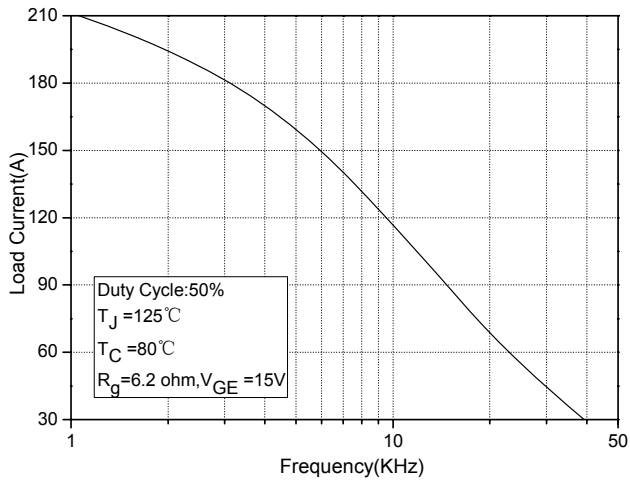


Fig.7 Typical Load Current vs. Frequency

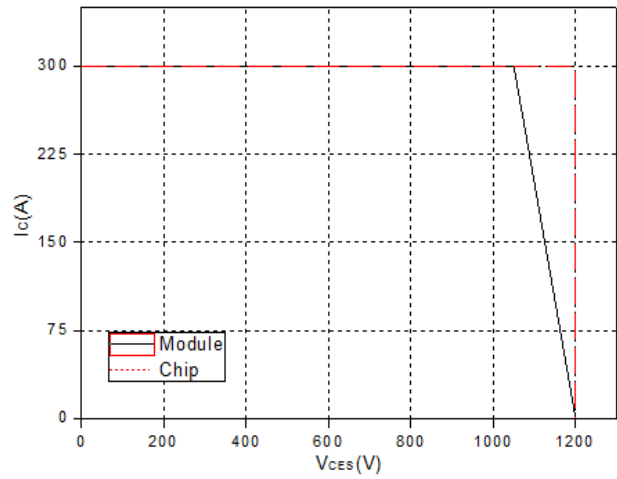


Fig.8 Reverse Bias Safe Operation Area (RBSOA)

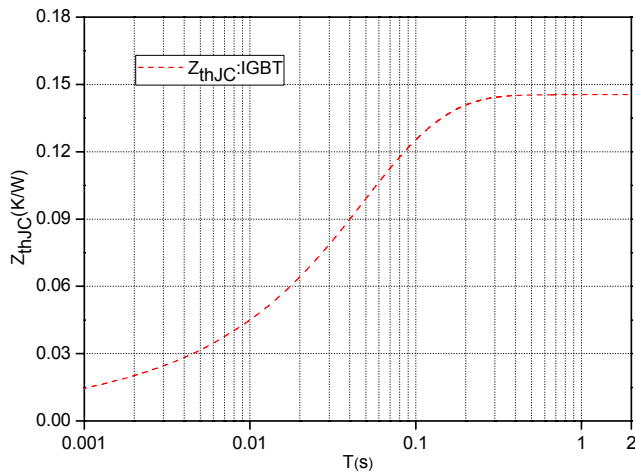


Fig.9 Transient thermal impedance (IGBT)

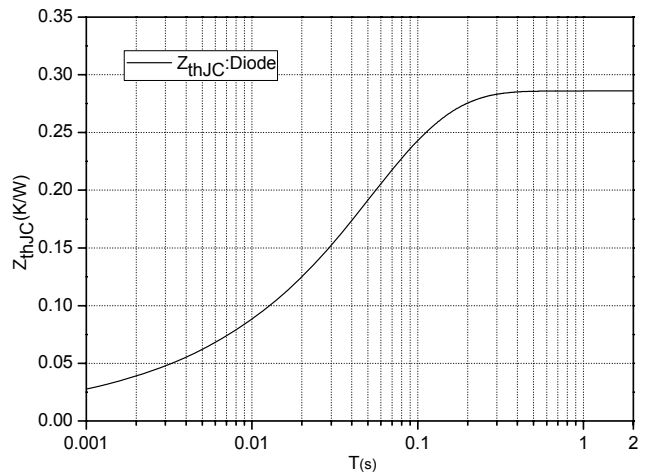


Fig.10 Transient thermal impedance (Diode)

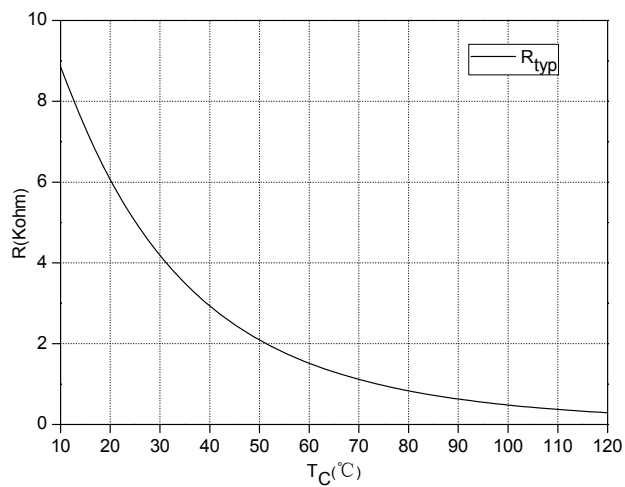


Fig.11 NTC Temperature characteristics

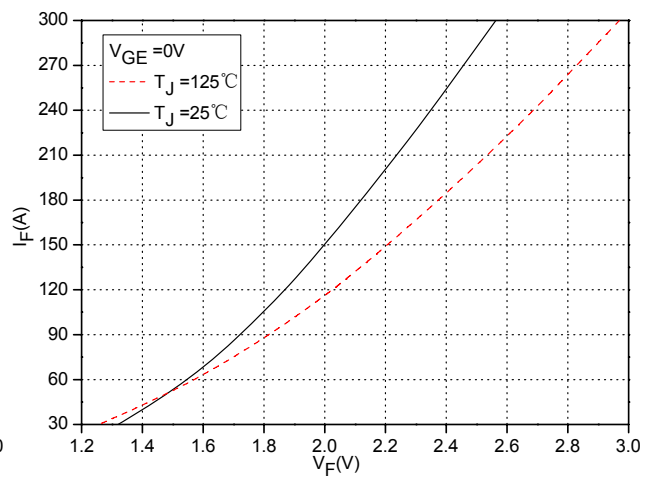
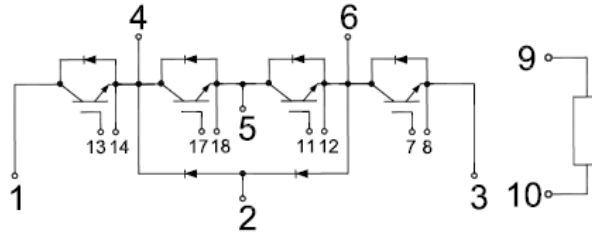
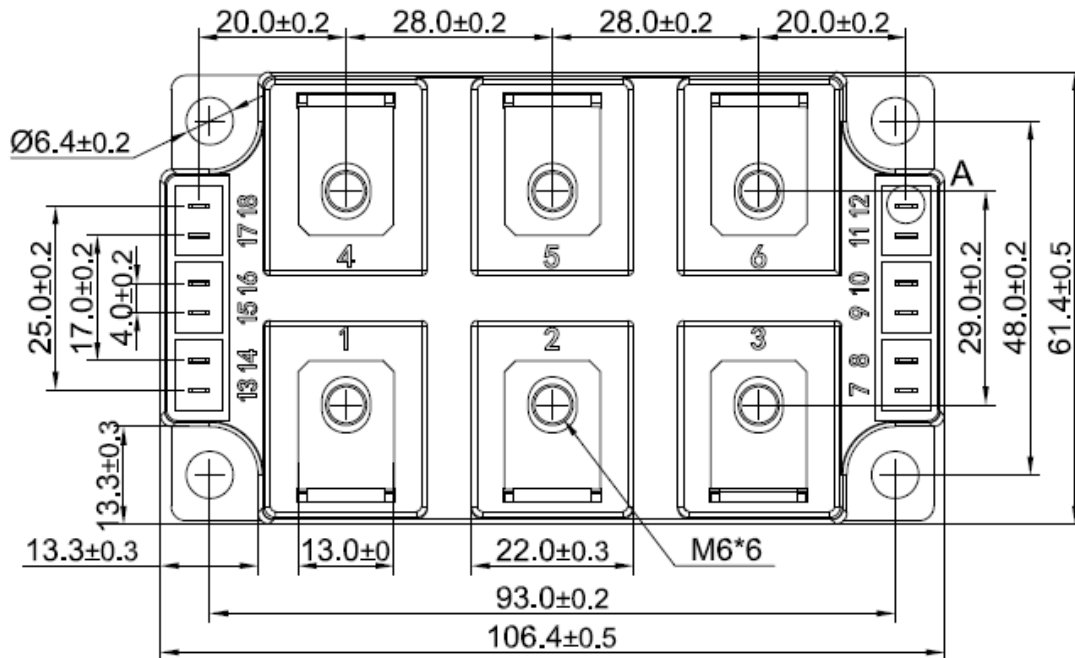
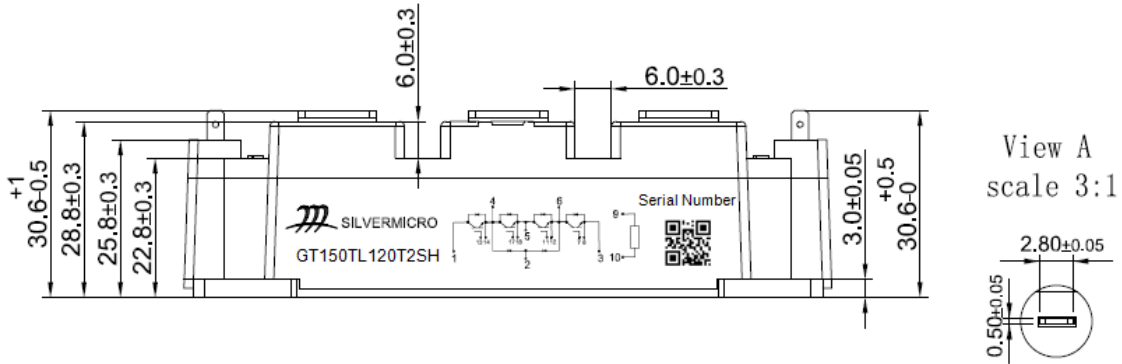


Fig.12 Forward Characteristics (Diode, 3-Level)

### Internal Circuit



### Package Outline (Unit: mm):







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