

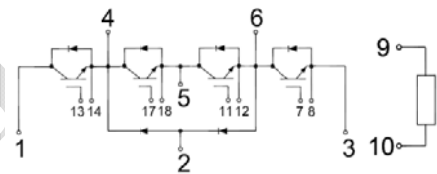
GTR300TL65T2SH

IGBT Module

Preliminary Data

Features:

- Field Stop Trench Gate IGBT
- Short Circuit Rated $> 10\mu\text{s}$
- Low Saturation Voltage
- Low Switching Loss
- 100% RBSOA Tested ($2 \times I_c$)
- Low Stray Inductance
- Lead Free, Compliant with RoHS Requirement



Applications:

- UPS and SMPS
- Industrial Inverters
- Servo Applications
- 3 Level Inverter

IGBT, Inverter

Maximum Rated Values ($T_c=25^\circ\text{C}$ unless otherwise specified)

V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_c	Continuous Collector Current	$T_c = 100^\circ\text{C}$	300	A
		$T_c = 25^\circ\text{C}$	435	A
I_{CM}	Peak Collector Current Repetitive	$T_J = 175^\circ\text{C}$	600	A
t_{SC}	Short Circuit Withstand Time		> 10	μs
P_D	Maximum Power Dissipation (IGBT)	$T_c = 25^\circ\text{C}$ $T_{Jmax} = 175^\circ\text{C}$	1300	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	$I_C = 8\text{mA}$, $V_{CE} = V_{GE}$	5.0	5.9	6.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 300\text{A}$, $V_{GE} = 15\text{V}$	$T_J = 25^\circ\text{C}$	1.50	1.80	V
			$T_J = 125^\circ\text{C}$	1.80		V
			$T_J = 150^\circ\text{C}$	1.80		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	$V_{GE} = \pm 20\text{V}$, $V_{CE} = 0\text{V}$, $T_J = 25^\circ\text{C}$			300	nA
C_{ies}	Input Capacitance	$V_{CE} = 25\text{V}$, $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$		25		nF
C_{oes}	Output Capacitance			1.0		nF
C_{res}	Reveres Transfer Capacitance			0.8		nF

Switching Characteristics

$t_{d(on)}$	Turn-on Delay Time	$V_{CC} = 300\text{V}$, $I_C = 300\text{A}$, $R_{Gon} = 4.7\ \Omega$, $V_{GE} = \pm 15\text{V}$ Inductive Load	$T_J = 25^\circ\text{C}$	408		ns
			$T_J = 125^\circ\text{C}$	404		
t_r	Rise Time	$V_{CC} = 300\text{V}$, $I_C = 300\text{A}$, $R_{Gon} = 4.7\ \Omega$, $V_{GE} = \pm 15\text{V}$ Inductive Load	$T_J = 25^\circ\text{C}$	203		ns
			$T_J = 125^\circ\text{C}$	205		
$t_{d(off)}$	Turn-off Delay Time	$V_{CC} = 300\text{V}$, $I_C = 300\text{A}$, $R_{Goff} = 4.7\ \Omega$, $V_{GE} = \pm 15\text{V}$ Inductive Load	$T_J = 25^\circ\text{C}$	359		ns
			$T_J = 125^\circ\text{C}$	365		
t_f	Fall Time	$V_{CC} = 300\text{V}$, $I_C = 300\text{A}$, $R_{Goff} = 4.7\ \Omega$, $V_{GE} = \pm 15\text{V}$ Inductive Load	$T_J = 25^\circ\text{C}$	98		ns
			$T_J = 125^\circ\text{C}$	121		
E_{on}	Turn-on Switching Loss	$V_{CC} = 300\text{V}$, $I_C = 300\text{A}$, $R_{Gon} = 4.7\ \Omega$, $V_{GE} = \pm 15\text{V}$ $di/dt = 1250\text{A}/\mu\text{s}$ ($T_J = 125^\circ\text{C}$), Inductive Load	$T_J = 25^\circ\text{C}$	5.3		mJ
			$T_J = 125^\circ\text{C}$	5.7		
E_{off}	Turn-off Switching Loss	$V_{CC} = 300\text{V}$, $I_C = 300\text{A}$, $R_{Goff} = 4.7\ \Omega$, $V_{GE} = \pm 15\text{V}$ $du/dt = 2570\text{V}/\mu\text{s}$ ($T_J = 125^\circ\text{C}$), Inductive Load	$T_J = 25^\circ\text{C}$	12.9		mJ
			$T_J = 125^\circ\text{C}$	15.5		
Q_g	Total Gate Charge	$V_{GE} = +15\text{V} \dots -15\text{V}$	$T_J = 25^\circ\text{C}$	1.82		nC
RBSOA	$I_C = 600\text{A}$, $V_{CC} = 600\text{V}$, $V_p = 650\text{V}$, $R_{Goff} = 4.7\ \Omega$, $V_{GE} = +15\text{V}$ to 0V , $T_J = 150^\circ\text{C}$		Trapezoid			
SCSOA	$V_{CC} = 300\text{V}$, $V_{GE} = 15\text{V}$, $T_J = 150^\circ\text{C}$		10			μs
$R_{\theta JC}$	IGBT Thermal Resistance: Junction-To-Case(per leg)			0.115		$^\circ\text{C}/\text{W}$

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

V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	200	A
I_{FM}	Peak FWD Current Repetitive	400	A

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

V_{FM}	Forward Voltage	$I_F=200A$	$T_J=25^\circ\text{C}$	1.60	V
			$T_J=125^\circ\text{C}$	1.70	
			$T_J=150^\circ\text{C}$	1.70	
t_{rr}	Reverse Recovery Time		$T_J=25^\circ\text{C}$	118	ns
			$T_J=125^\circ\text{C}$	158	
			$T_J=150^\circ\text{C}$	171	
I_{rr}	Peak Reverse Recovery Current	$I_F=200A,$ $-di_F/dt = 1445A/\mu s(T_J=150^\circ\text{C}),$ $V_R=300V,$ $V_{GE}=-15V$	$T_J=25^\circ\text{C}$	69	A
			$T_J=125^\circ\text{C}$	91	
			$T_J=150^\circ\text{C}$	97	
Q_{rr}	Reverse Recovery Charge		$T_J=25^\circ\text{C}$	5.15	μC
			$T_J=125^\circ\text{C}$	9.6	
			$T_J=150^\circ\text{C}$	11.1	
E_{rec}	Reverse Recovery Energy		$T_J=25^\circ\text{C}$	0.41	mJ
			$T_J=125^\circ\text{C}$	1.53	
			$T_J=150^\circ\text{C}$	1.88	
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case(per leg)			0.295	$^\circ\text{C/W}$

Diode, Freewheeling (Neutral Clamp Diode)
Maximum Rated Values ($T_C=25^\circ\text{C}$ unless otherwise specified)

V_{RRM}	Repetitive Peak Reverse Voltage	650	V
I_F	Diode Continuous Forward Current	300	A
I_{FM}	Peak FWD Current Repetitive	600	A

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

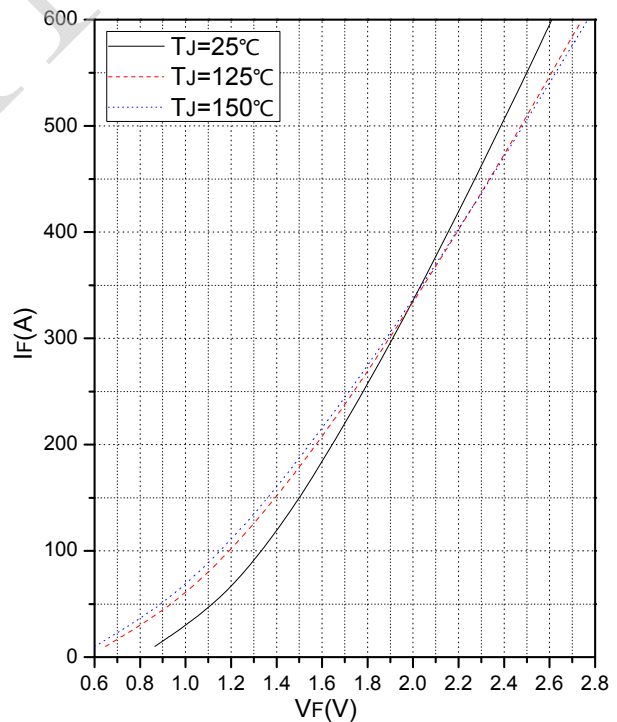
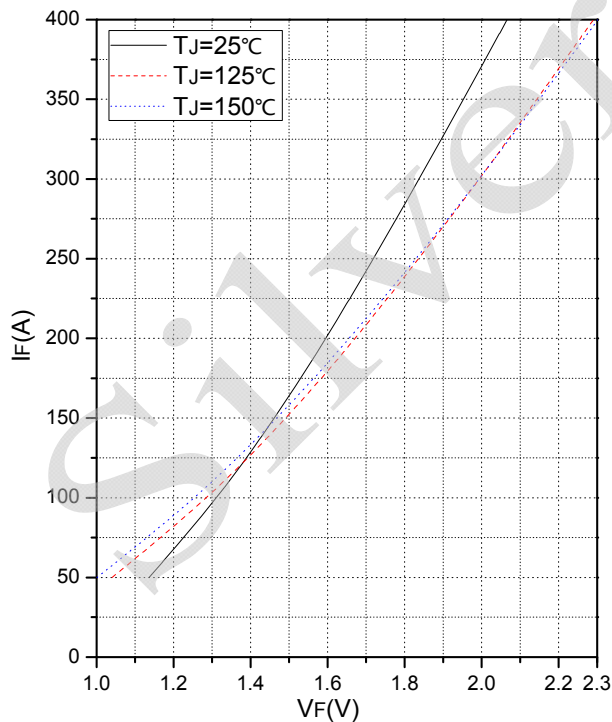
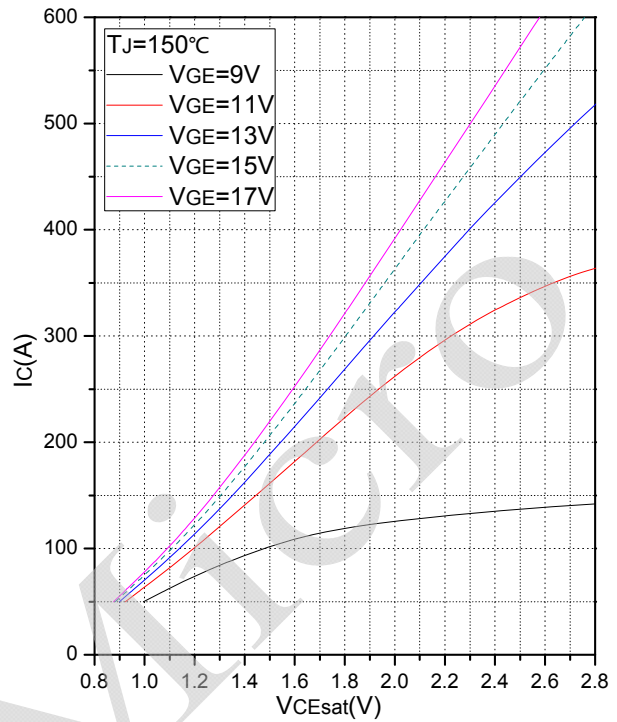
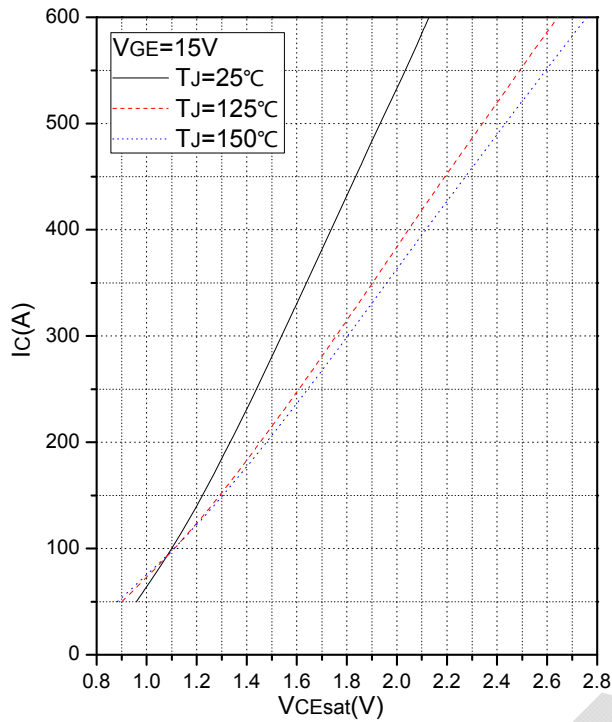
V_{FM}	Forward Voltage	$I_F = 300\text{A}$	$T_J=25^\circ\text{C}$	1.90	V
			$T_J=125^\circ\text{C}$	1.90	
			$T_J=150^\circ\text{C}$	1.90	
t_{rr}	Reverse Recovery Time		$T_J=25^\circ\text{C}$	139	ns
			$T_J=125^\circ\text{C}$	194	
I_{rr}	Peak Reverse Recovery Current	$I_F=300\text{A}$, $-di_F/dt=1440\text{A}/\mu\text{s}(T_J=150^\circ\text{C})$, $V_R = 300\text{V}$, $V_{GE} = -15\text{V}$	$T_J=25^\circ\text{C}$	103	A
			$T_J=125^\circ\text{C}$	138	
Q_{rr}	Reverse Recovery Charge		$T_J=25^\circ\text{C}$	8.6	μC
			$T_J=125^\circ\text{C}$	16.3	
E_{rec}	Reverse Recovery Energy		$T_J=25^\circ\text{C}$	0.25	mJ
			$T_J=125^\circ\text{C}$	2.19	
$R_{\theta JC}$	Diode Thermal Resistance: Junction-To-Case(per leg)			0.224	$^\circ\text{C}/\text{W}$

Internal NTC- Thermistor Characteristic

R_{25}	$T_C = 25^\circ\text{C}$	5		k Ω
$\Delta R/R$	$T_C = 100^\circ\text{C}$, $R_{100} = 481\Omega$		± 5	%
P_{25}	$T_C = 25^\circ\text{C}$	50		mW
$B_{25/50}$	$R_2=R_{25} \exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$	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)	f = 50Hz, 1minute	2500			V
T _J	Maximum Junction Temperature				175	°C
T _{JOP}	Maximum Operating Junction Temperature Range		-40		+150	°C
T _{stg}	Storage Temperature		-40		+125	°C
CTI	Comparative Tracking Index		200			V
R _{θCS}	Case-To-Sink Thermally (Conductive Grease Applied)			0.10		°C/W
M	Power Terminals Screw:M6		3.0		5.0	N·m
M	Mounting Screw:M6		4.0		6.0	N·m
G	Weight			230		g



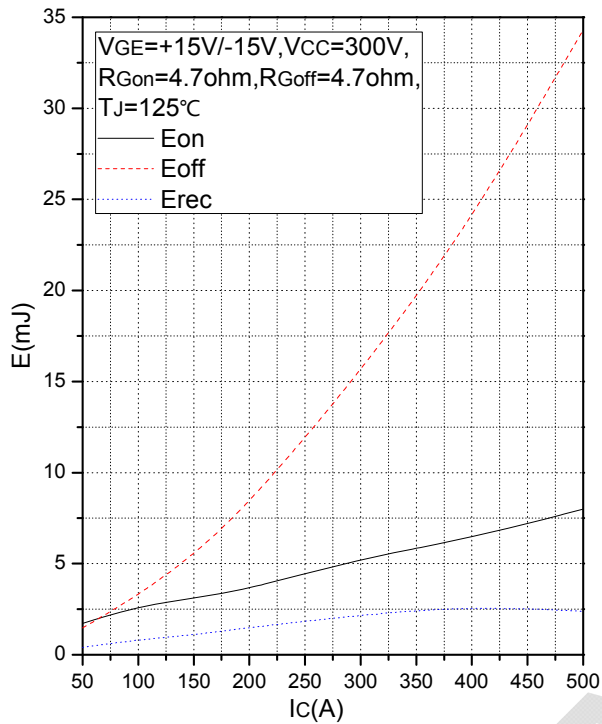


Fig.5 Typical Switching Loss vs. Collector Current

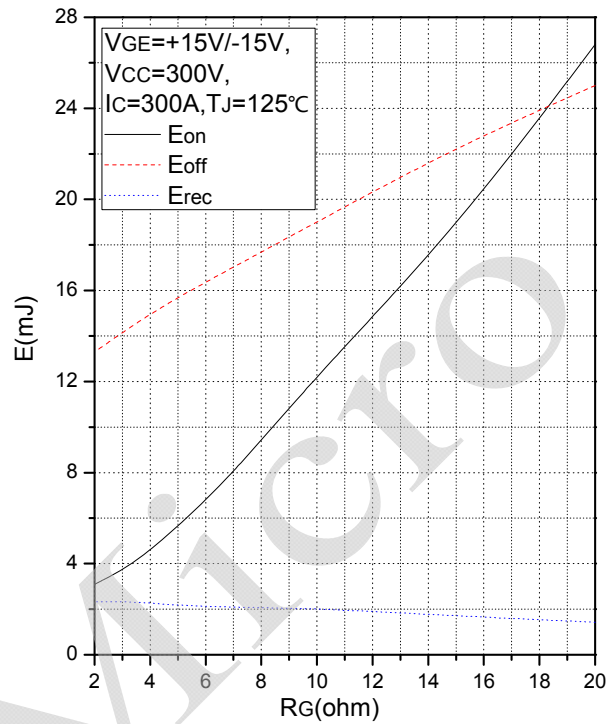


Fig.6 Typical Switching Loss vs. Gate Resistance

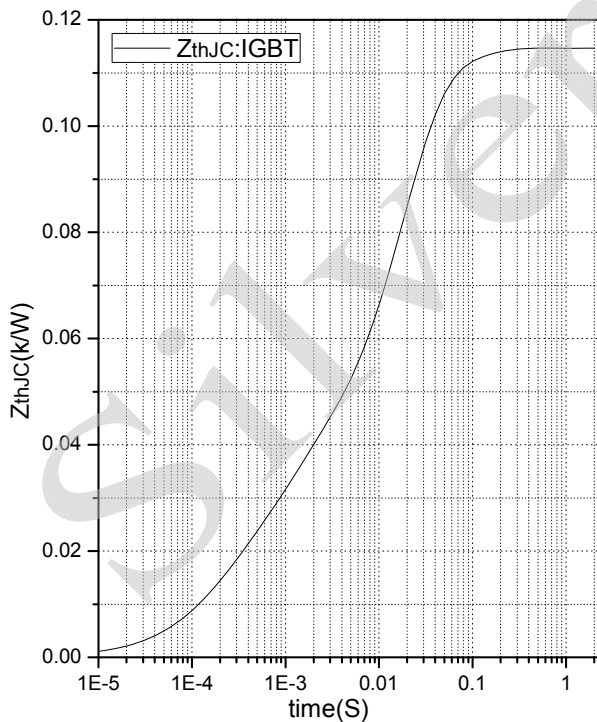


Fig.7 Transient Thermal Impedance (IGBT)

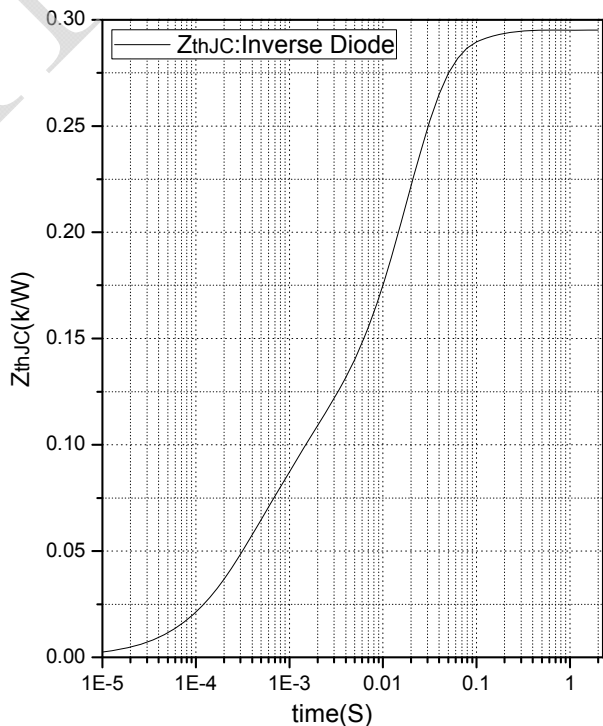


Fig.8 Transient Thermal Impedance (Inverse Diode)

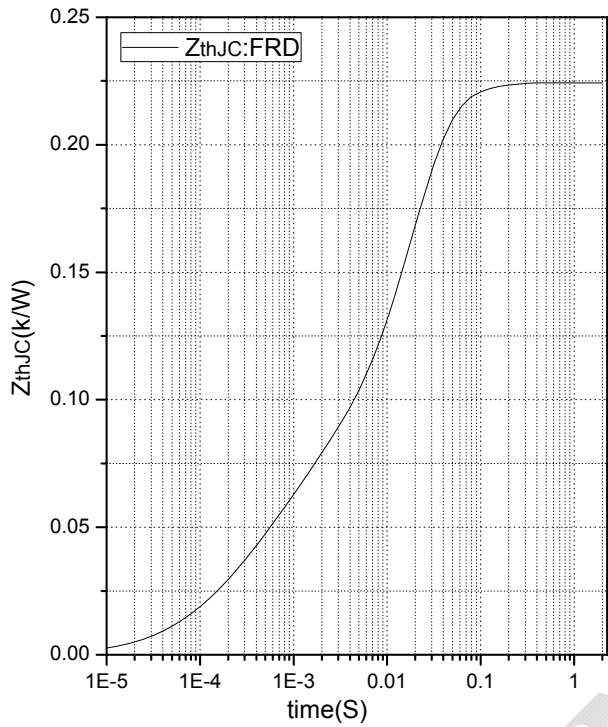


Fig.9 Transient Thermal Impedance (Freewheeling Diode)

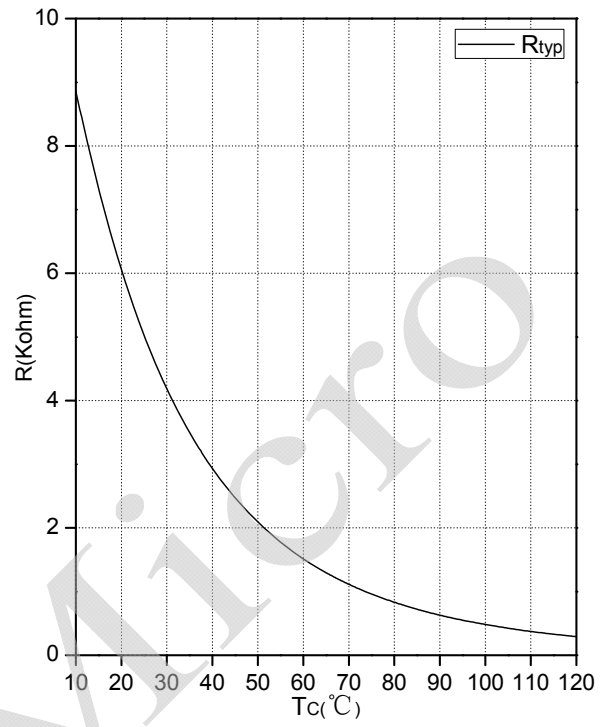


Fig.10 NTC Temperature Characteristics

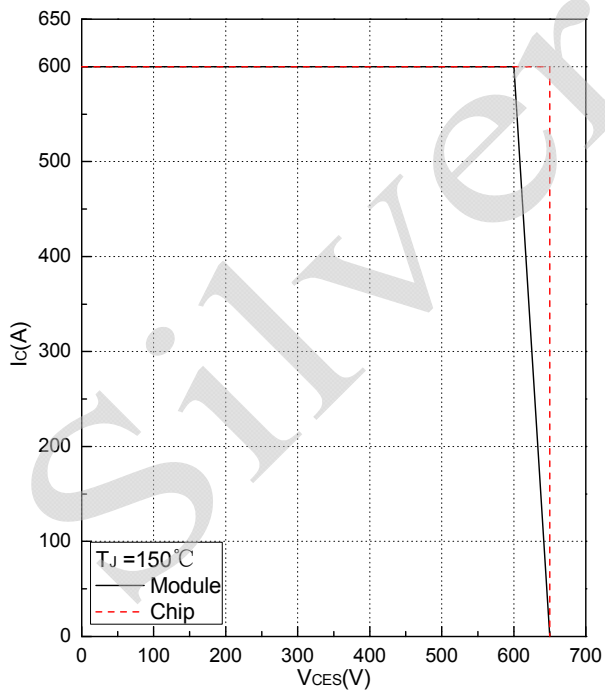
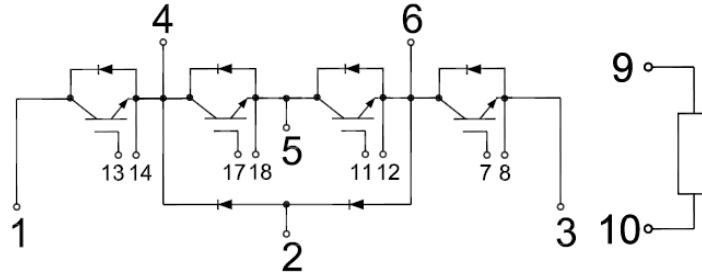
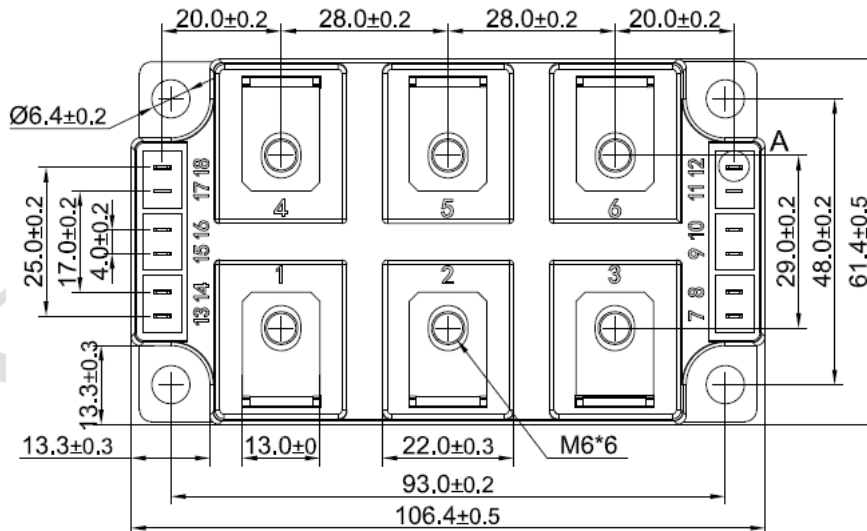
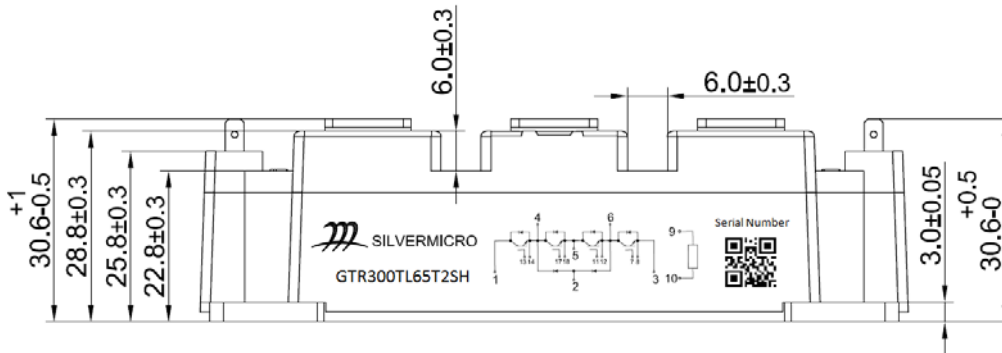


Fig.11 Reverse Bias Safe Operation Area (RBSOA)

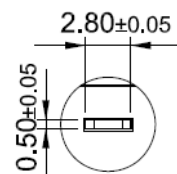
Internal Circuit



Package Outline (Unit: mm):



View A
scale 3:1





Date	Revision	Notes
06/13/2018	01	Initial release
09/29/2018	A	Final Version

Announcement

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