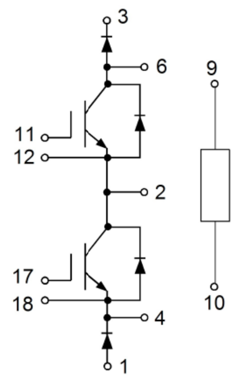
# GTR300TAR65T2SH

## IGBT Module

**Features:**

- Short Circuit Rated ＞10μs
- Low Saturation Voltage: $V_{CE\ (sat)}$ = 1.40V @ $I_C$ = 300A , $T_C$=25℃
- Low Switching Loss
- 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℃ 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℃ | 300 | A |
| | | $T_C$ = 25℃ | 357 | A |
| $I_{CM}$ | Peak Collector Current Repetitive | $T_J$ = 175℃ | 600 | A |
| $t_{SC}$ | Short Circuit Withstand Time | | >10 | μs |
| $P_D$ | Maximum Power Dissipation (IGBT) | $T_C$ = 25℃ $T_{Jmax}$=175℃ | 1000 | W |

## **Electrical Characteristics of IGBT** ($T_C$=25℃ unless otherwise specified)

Static Characteristics

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $V_{GE(th)}$ | Gate-Emitter Threshold Voltage | $I_C$ =1mA, $V_{CE}$ = $V_{GE}$ | | 4.0 | 4.5 | 5.5 | V |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ = 300A, $V_{GE}$ = 15V | $T_J$ = 25℃ | | 1.40 | | V |
| | | | $T_J$ = 125℃ | | 1.60 | | V |
| $I_{CES}$ | Collector-Emitter Leakage Current | $V_{GE}$ = 0V, $V_{CE}$ = $V_{CES}$, $T_J$ = 25℃ | | | | 1 | mA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$ = ±20V, $V_{CE}$ = 0V, $T_J$ = 25℃ | | | | 300 | nA |
| $C_{ies}$ | Input Capacitance | $V_{CE}$ = 25V, $V_{GE}$ = 0V , f ＝1MHz | | | 25.0 | | nF |
| $C_{oes}$ | Output Capacitance | | | | 1.0 | | nF |
| $C_{res}$ | Reveres Transfer Capacitance | | | | 0.8 | | nF |

Switching Characteristics

| Symbol | Description | Conditions | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|---|
| $t_{d(on)}$ | Turn-on Delay Time | $V_{CC}$ = 300V,$I_C$ = 300A, $R_G$ =10 Ω,$V_{GE}$ = ±15V Inductive Load | $T_J$ = 25℃ | | 400 | | ns |
| | | | $T_J$ = 125℃ | | 410 | | |
| $t_r$ | Rise Time | | $T_J$ = 25℃ | | 395 | | ns |
| | | | $T_J$ = 125℃ | | 410 | | |
| $t_{d(off)}$ | Turn-off Delay Time | | $T_J$ = 25℃ | | 430 | | ns |
| | | | $T_J$ = 125℃ | | 420 | | |
| $t_f$ | Fall Time | | $T_J$ = 25℃ | | 180 | | ns |
| | | | $T_J$ = 125℃ | | 165 | | |
| $E_{on}$ | Turn-on Switching Loss | | $T_J$ = 25℃ | | 6.7 | | mJ |
| | | | $T_J$ = 125℃ | | 10.5 | | |
| $E_{off}$ | Turn-off Switching Loss | | $T_J$ = 25℃ | | 16.0 | | mJ |
| | | | $T_J$ = 125℃ | | 20 | | |
| $Q_g$ | Total Gate Charge | | $T_J$ = 25℃ | | 2450 | | nC |
| SCSOA | SCSOA | $V_{CC}$ = 300V, $V_{GE}$ = 15V, $T_J$ = 150℃ | | 10 | | | μs |
| $R_{θJC}$ | IGBT Thermal Resistance: Junction-To-Case(per leg) | | | | 0.15 | | ℃/W |

## Diode, Inverse

**Maximum Rated Values** ($T_C$=25℃ unless otherwise specified)

| | | | |
|---|---|---|---|
| $V_{RRM}$ | Repetitive Peak Reverse Voltage | 650 | V |
| $I_F$ | Diode Continuous Forward Current | 30 | A |
| $I_{FM}$ | Peak FWD Current Repetitive | 60 | A |

**Electrical Characteristics of FWD** ($T_C$=25℃ unless otherwise specified)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Forward Voltage | $I_F$ = 30A | $T_J$ = 25℃ | | 1.20 | | V |
| | | | $T_J$ = 125℃ | | 1.20 | | |
| $I_{rr}$ | Peak Reverse Recovery Current | $I_F$=30A, di/dt =650A/μs, $V_{rr}$ = 300V, $V_{GE}$ = -15V | $T_J$ = 25℃ | | 20 | | A |
| | | | $T_J$ = 125℃ | | 32 | | |
| $Q_{rr}$ | Reverse Recovery Charge | | $T_J$ = 25℃ | | 1.3 | | μC |
| | | | $T_J$ = 125℃ | | 2.5 | | |
| $R_{θJC}$ | Diode Thermal Resistance: Junction-To-Case(per leg) | | | | 0.35 | | ℃/W |

## Diode, Freewheeling

**Maximum Rated Values** ($T_C$=25℃ 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℃ unless otherwise specified)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $V_{FM}$ | Forward Voltage | $I_F$ = 300A | $T_J$ = 25℃ | | 1.60 | | V |
| | | | $T_J$ = 125℃ | | 1.70 | | |
| $I_{rr}$ | Peak Reverse Recovery Current | $I_F$=300A, di/dt =1755A/μs, $V_{rr}$ = 300V, $V_{GE}$ = -15V | $T_J$ = 25℃ | | 125 | | A |
| | | | $T_J$ = 125℃ | | 210 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| $Q_{rr}$ | Reverse Recovery Charge | $I_F$＝300A, di/dt =1755A/μs, $V_{rr}$ = 300V, $V_{GE}$ = -15V | $T_J$ = 25℃ | | 10.5 | | μC |
| | | | $T_J$ = 125℃ | | 24.0 | | |
| $R_{\theta JC}$ | Diode Thermal Resistance: Junction-To-Case(per leg) | | | | 0.24 | | ℃/W |

## Internal NTC- Thermistor Characteristic

| | | | | |
|---|---|---|---|---|
| $R_{25}$ | $T_C$ =25℃ | 5 | | kΩ |
| △R/R | $T_C$ =100℃，$R_{100}$ =481Ω | | ±5 | % |
| $P_{25}$ | $T_C$ =25℃ | 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

| Symbol | Description | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $V_{iso}$ | Isolation Voltage (All Terminals Shorted) | f = 50Hz, 1minute | 2500 | | | V |
| $T_J$ | Maximum Junction Temperature | | | | 175 | ℃ |
| $T_{JOP}$ | Maximum Operating Junction Temperature Range | | -40 | | +150 | ℃ |
| $T_{stg}$ | Storage Temperature | | -40 | | +125 | ℃ |
| CTI | Comparative Tracking Index | | 200 | | | V |
| $R_{\theta CS}$ | Case-To-Sink Thermally (Conductive Grease Applied) | | | 0.10 | | ℃/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 |

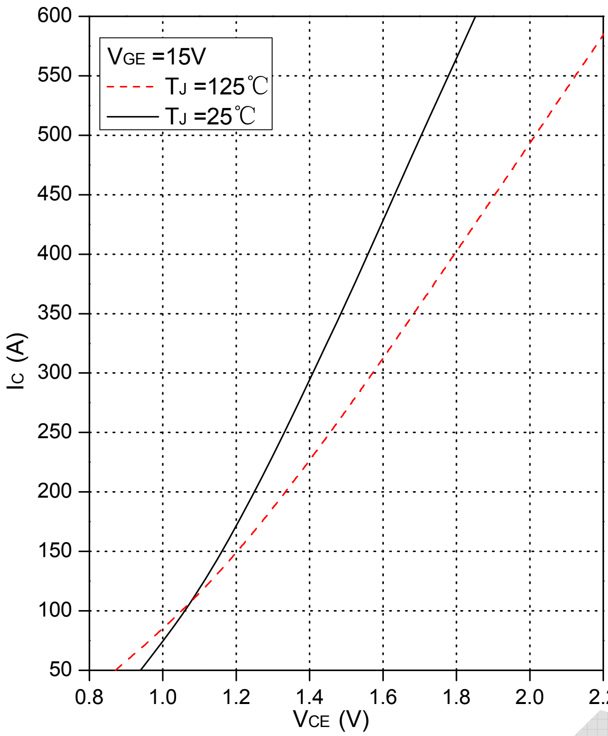



Fig.1 Typical Saturation Voltage Characteristics

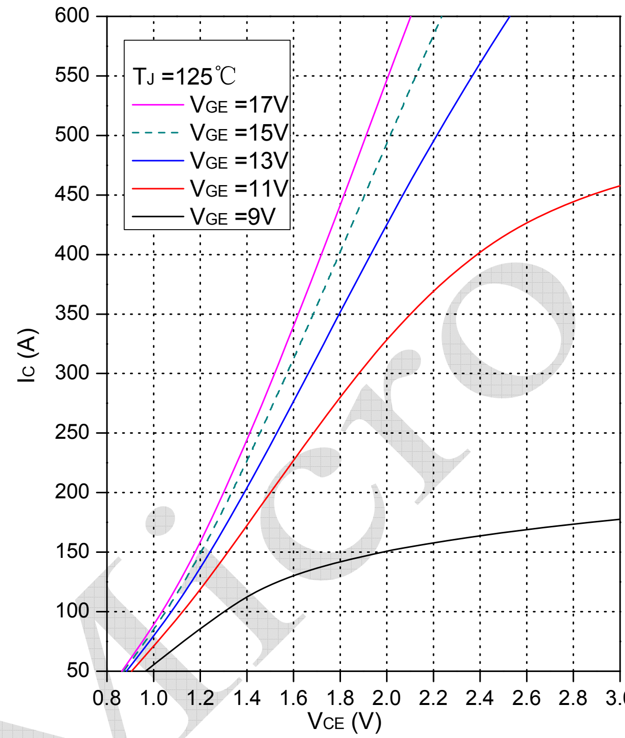



Fig.2 Typical Output Characteristics

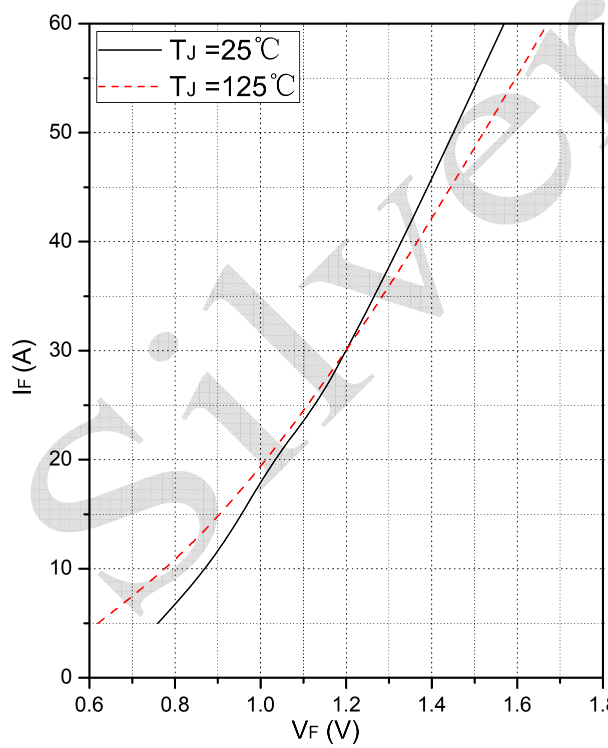



Fig.3 Forward Characteristics of FWD (Inverse)

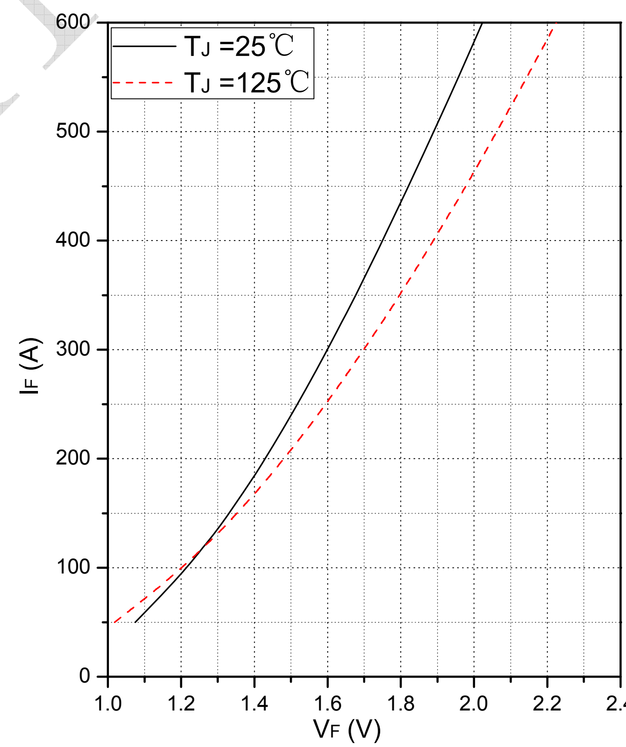



Fig.4 Forward Characteristics of FWD (Freewheeling)

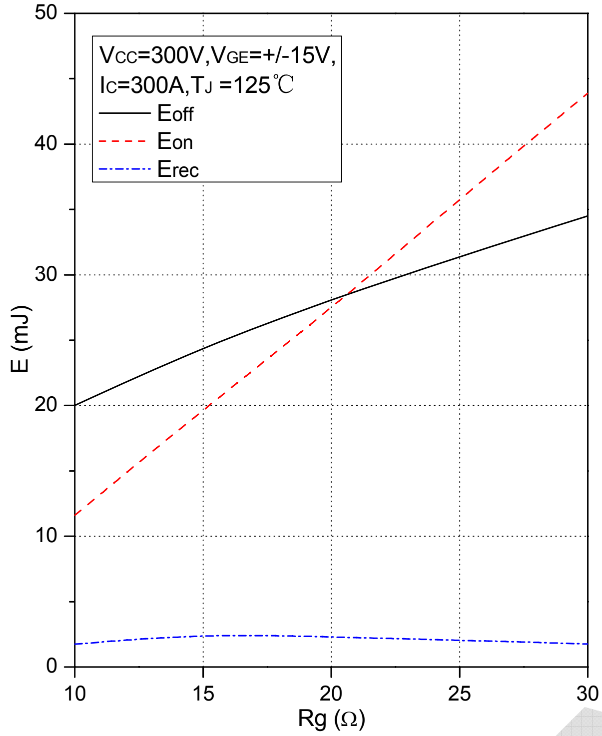



Fig.5 Typical Switching Loss vs. Gate Resistance

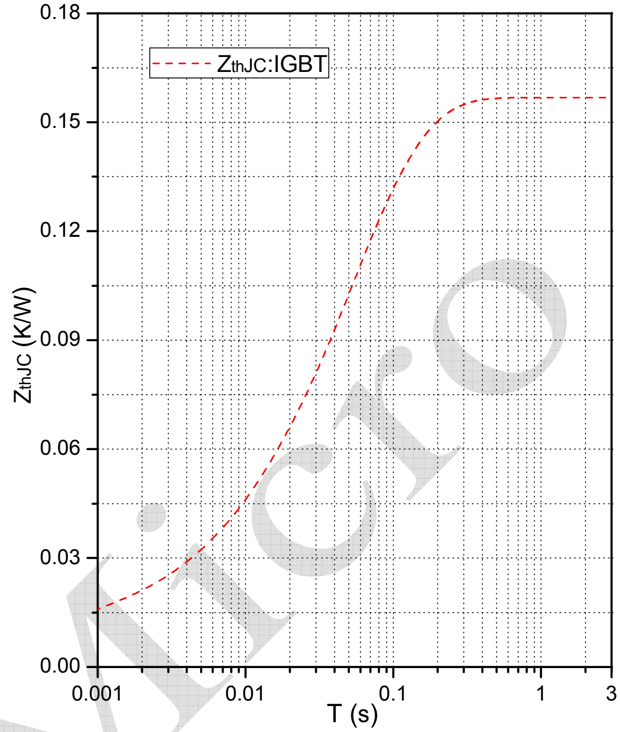



Fig.6 Transient Thermal Impedance (IGBT)

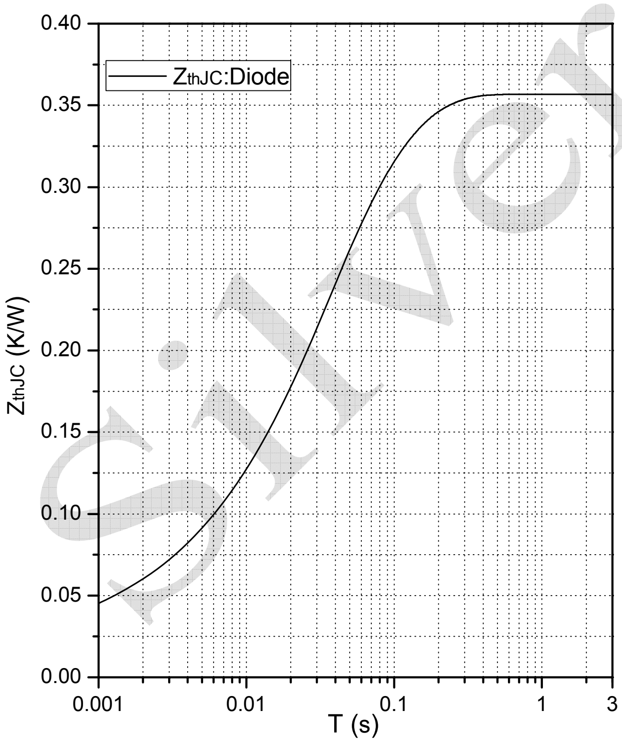



Fig.7 Transient Thermal Impedance (Inverse Diode)

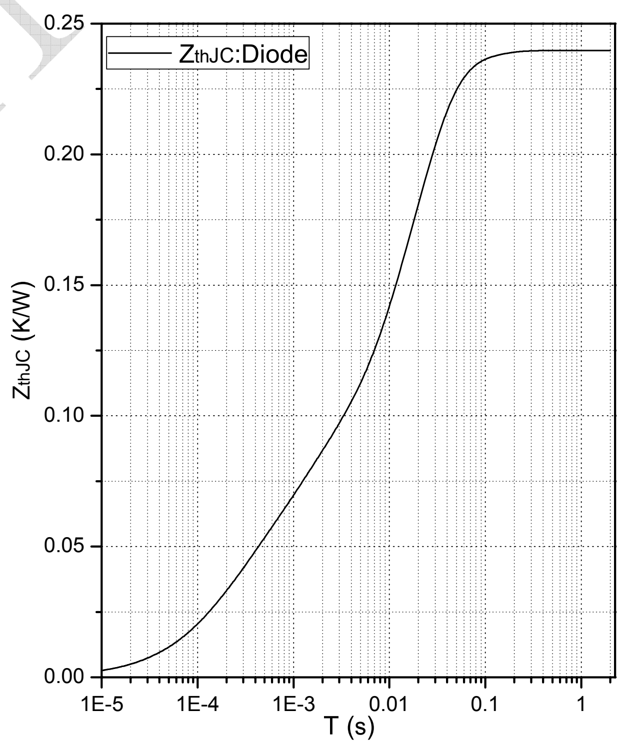



Fig.8 Transient Thermal Impedance (Freewheeling Diode)

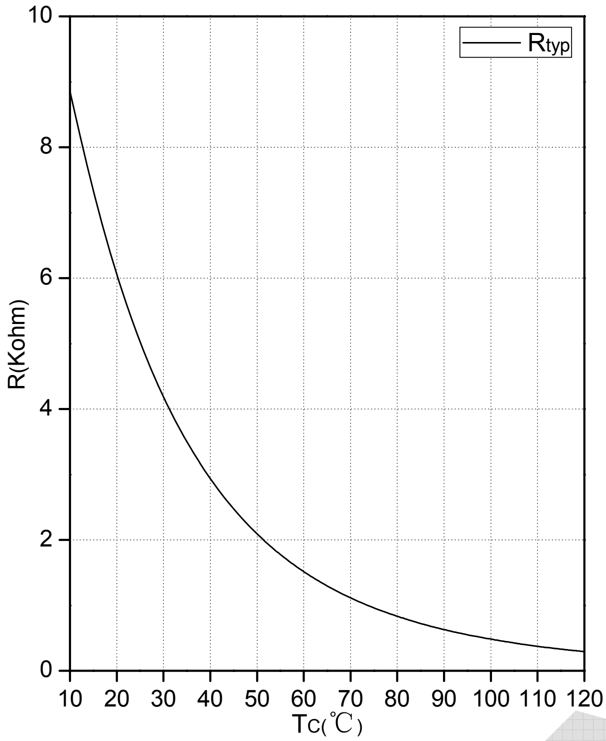


Fig.9 NTC Temperature Characteristics

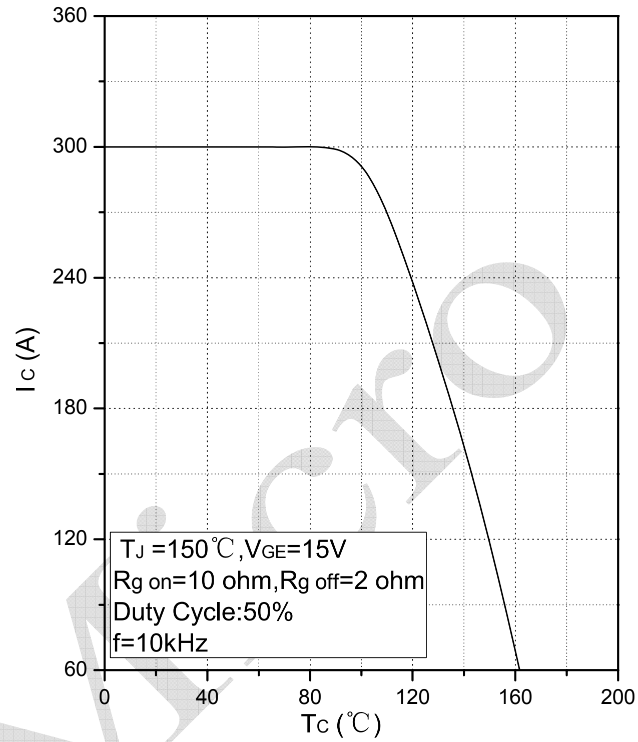
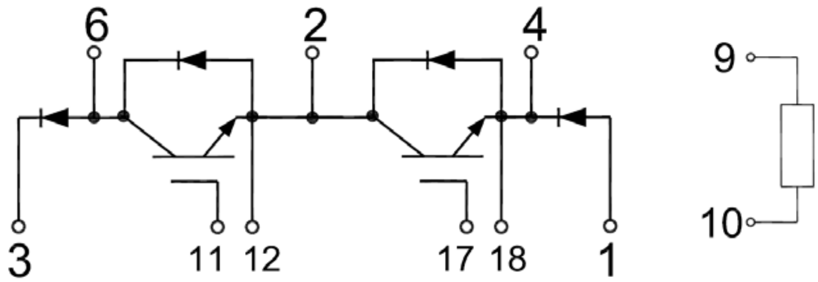
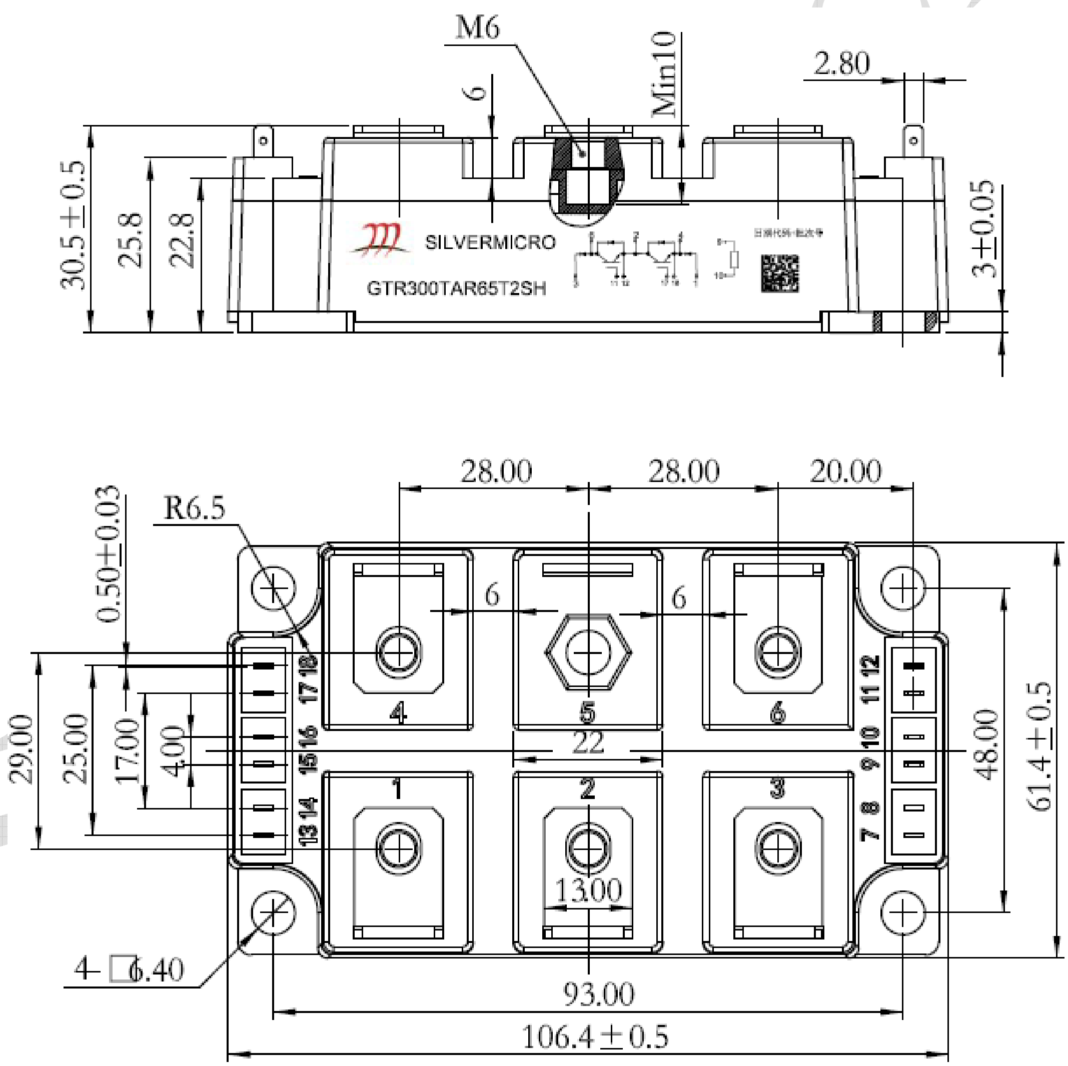


Fig.10 Rated Current vs. Temperature

## Internal Circuit




## Package Outline (Unit: mm):



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