

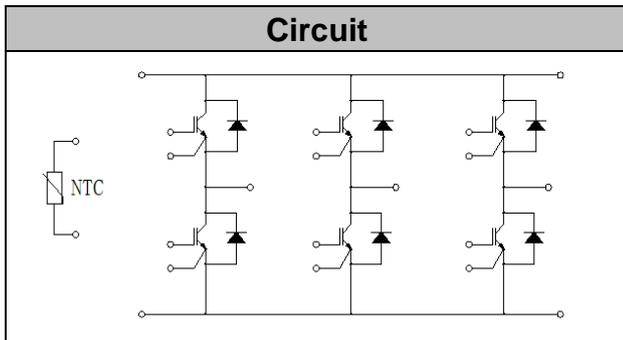
## IGBT Modules



V<sub>CEs</sub>            1200V  
I<sub>C</sub>                 75A

## Applications

- Motor Drivers
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)



## Features

- Low switching losses
- Low V<sub>ce(sat)</sub> with positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- Low inductance case
- High short circuit capability(10us)
- Maximum junction temperature 175°C

### ● IGBT- inverter

#### Absolute Maximum Ratings

| Parameter                         | Symbol           | Conditions  | Value | Unit |
|-----------------------------------|------------------|---|-------|------|
| Collector-Emitter Voltage         | V <sub>CEs</sub> | V <sub>GE</sub> =0V, I <sub>C</sub> =1mA, T <sub>vj</sub> =25°C | 1200  | V    |
| Continuous Collector Current      | I <sub>C</sub>   | T <sub>c</sub> =100°C, T <sub>vjmax</sub> =175°C                | 75    | A    |
| Repetitive Peak Collector Current | I <sub>CRM</sub> | tp=1ms  | 150   | A    |
| Gate-Emitter Voltage              | V <sub>GES</sub> | T <sub>vj</sub> =25°C   | ±20   | V    |
| Total Power Dissipation           | P <sub>tot</sub> | T <sub>c</sub> =25°C<br>T <sub>vjmax</sub> =175°C               | 440   | W    |

**IGBT****Characteristic values**

| Parameter                               | Symbol        | Conditions  | Value  |      |      | Unit     |    |
|---|---------------|---|--|------|------|----------|----|
|   |               |   | Min.   | Typ. | Max. |          |    |
| Gate-emitter Threshold Voltage          | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=3mA, T_{vj}=25^{\circ}C$  | 5.0  | 5.8  | 6.5  | V        |    |
| Collector-Emitter Cut-off Current       | $I_{CES}$     | $V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$   |  |      | 1.0  | mA       |    |
| Collector-Emitter Saturation Voltage    | $V_{CE(sat)}$ | $I_C=100A, V_{GE}=15V, T_{vj}=25^{\circ}C$  |  | 1.85 | 2.25 | V        |    |
|   |               | $I_C=100A, V_{GE}=15V, T_{vj}=125^{\circ}C$   |  | 2.15 |      |          |    |
| Gate Charge                             | $Q_G$         |   |  | 0.85 |      | $\mu C$  |    |
| Internal Gate Resistance                | $R_{gint}$    |   |  | 10   |      | $\Omega$ |    |
| Input Capacitance                       | $C_{ies}$     | $V_{CE}=25V, V_{GE}=0V,$<br>$f=1MHz, T_{vj}=25^{\circ}C$                                  |  | 4.20 |      | nF       |    |
| Reverse Transfer Capacitance            | $C_{res}$     |   |  |      | 0.32 |          | nF |
| Gate-Emitter leakage current            | $I_{GES}$     | $V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$   |  |      | 400  | nA       |    |
| Turn-on Delay Time                      | $t_{d(on)}$   | $I_C=75A$<br>$V_{CE}=600V$<br>$V_{GE}=\pm 15V$<br>$R_G=5.1\Omega$<br>$T_{vj}=25^{\circ}C$ |  | 230  |      | ns       |    |
| Rise Time                               | $t_r$         |   |  |      | 78   |          | ns |
| Turn-off Delay Time                     | $t_{d(off)}$  |   |  |      | 380  |          | ns |
| Fall Time                               | $t_f$         |   |  |      | 42   |          | ns |
| Energy Dissipation During Turn-on Time  | $E_{on}$      |   |  |      | 5.60 |          | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$     |   |  |      | 4.3  |          | mJ |
| Turn-on Delay Time                      | $t_{d(on)}$   |   | $I_C=75A$<br>$V_{CE}=600V$<br>$V_{GE}=\pm 15V$<br>$R_G=5.1\Omega$<br>$T_{vj}=125^{\circ}C$ |      | 280  |          | ns |
| Rise Time                               | $t_r$         |   |  |      |      | 85       |    |
| Turn-off Delay Time                     | $t_{d(off)}$  |   |  |      | 450  |          | ns |
| Fall Time                               | $t_f$         |   |  |      | 68   |          | ns |
| Energy Dissipation During Turn-on Time  | $E_{on}$      |   |  |      | 7.42 |          | mJ |
| Energy Dissipation During Turn-off Time | $E_{off}$     |   |  |      | 6.5  |          | mJ |
| SC Data                                 | $I_{sc}$      | $T_p \leq 10\mu s, V_{GE}=15V, T_{vj}=150^{\circ}C,$<br>$V_{cc}=900V, V_{CEM} \leq 1200V$ |  |      | 300  |          | A  |



## ● Diode

### Absolute Maximum Ratings

| Parameter                       | Symbol    | Conditions                             | Value | Unit             |
|---------------------------------|-----------|--|-------|------------------|
| Repetitive Peak Reverse Voltage | $V_{RRM}$ | $T_{vj}=25^{\circ}C$                   | 1200  | V                |
| Continuous DC Forward Current   | $I_F$     |  | 75    | A                |
| Repetitive Peak Forward Current | $I_{FRM}$ | $t_p=1ms$                              | 150   | A                |
| $I^2t$ -value                   | $I^2t$    | $V_R=0, t_p=10ms, T_{vj}=125^{\circ}C$ | 1140  | A <sup>2</sup> s |
|                                 |           | $V_R=0, t_p=10ms, T_{vj}=150^{\circ}C$ | 1050  |                  |

### Characteristic values

| Parameter                     | Symbol    | Conditions                          | Value |      |      | Unit    |
|-------------------------------|-----------|-------------------------------------|-------|------|------|---------|
|                               |           |                                     | Min.  | Typ. | Max. |         |
| Forward Voltage               | $V_F$     | $I_F=75A, T_{vj}=25^{\circ}C$       |       | 1.95 |      | V       |
|                               |           | $I_F=75A, T_{vj}=125^{\circ}C$      |       | 2.05 |      |         |
| Recovered Charge              | $Q_{rr}$  | $I_F=75A$                           |       | 4.2  |      | $\mu C$ |
| Peak Reverse Recovery Current | $I_{rr}$  | $V_R=600V$<br>$-di_F/dt=900A/\mu s$ |       | 75   |      | A       |
| Reverse Recovery Energy       | $E_{rec}$ | $T_{vj}=25^{\circ}C$                |       | 2.06 |      | mJ      |
| Recovered Charge              | $Q_{rr}$  | $I_F=75A$                           |       | 9.6  |      | $\mu C$ |
| Peak Reverse Recovery Current | $I_{rr}$  | $V_R=600V$<br>$-di_F/dt=900A/\mu s$ |       | 92   |      | A       |
| Reverse Recovery Energy       | $E_{rec}$ | $T_{vj}=125^{\circ}C$               |       | 4.34 |      | mJ      |

## NTC-Thermistor

### Characteristic values

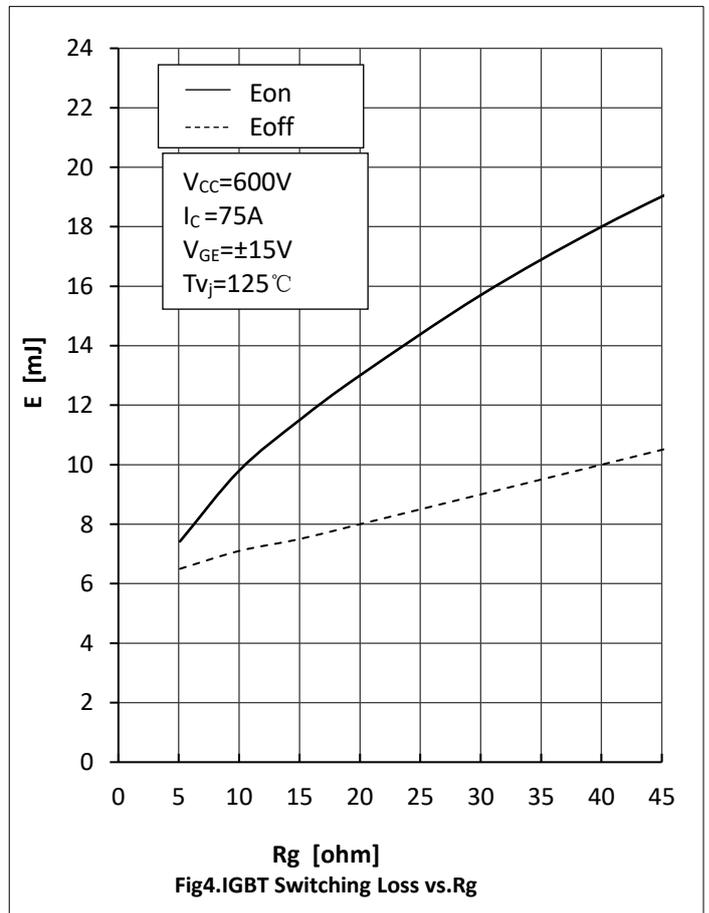
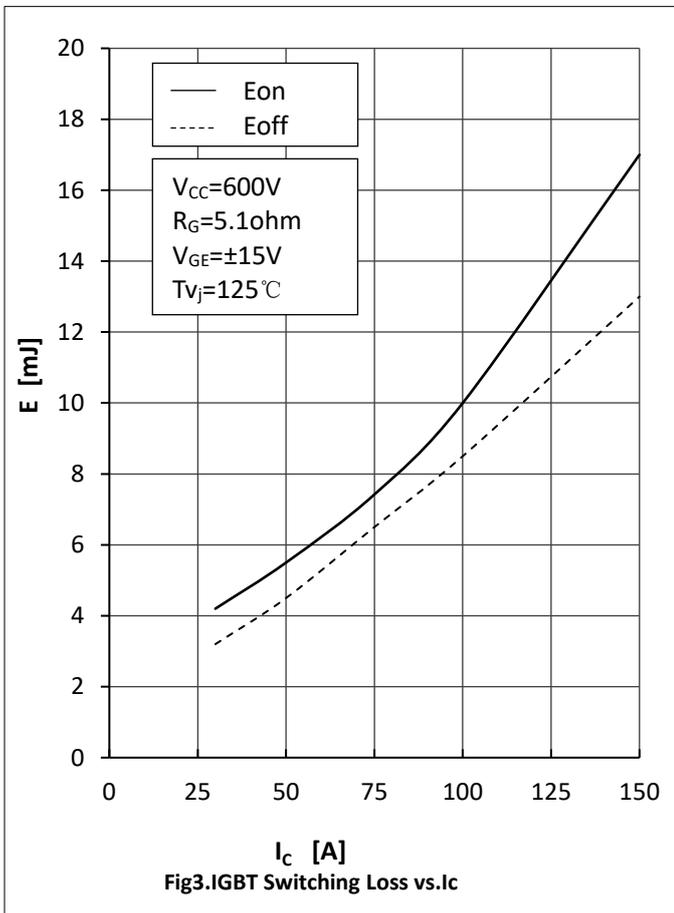
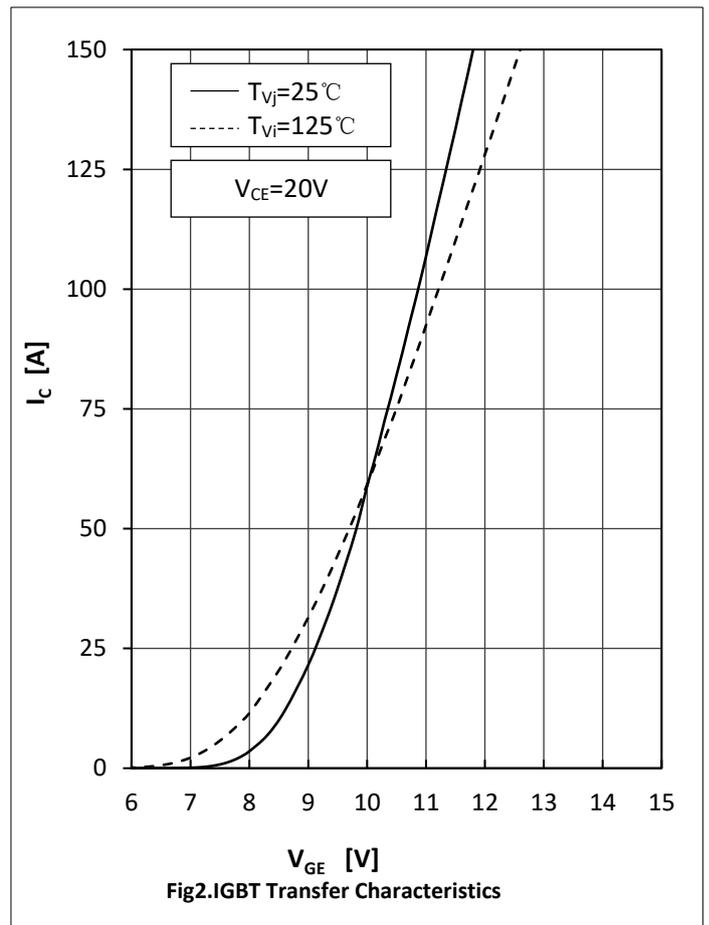
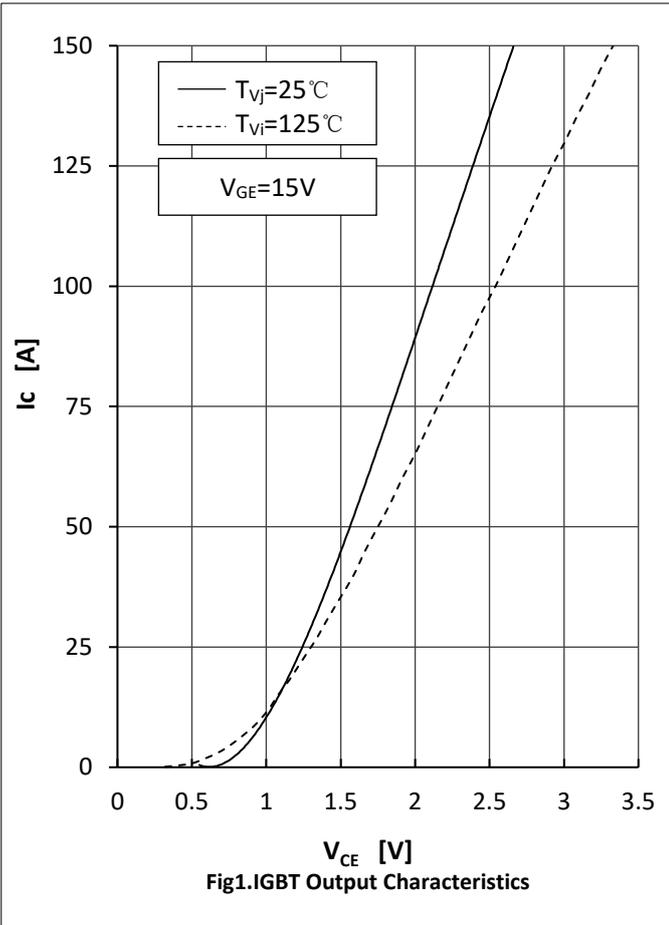
| Parameter              | Symbol       | Conditions                                     | Value |      |      | Unit      |
|------------------------|--------------|--|-------|------|------|-----------|
|                        |              |  | Min.  | Typ. | Max. |           |
| Rated Resistance       | $R_{25}$     |  |       | 5.0  |      | $k\Omega$ |
| Deviation of $R_{100}$ | $\Delta R/R$ | $T_C=100, R_{100}=493.3\Omega$                 | -5    |      | 5    | %         |
| Power Dissipation      | $P_{25}$     |  |       |      | 20.0 | mW        |
| B-value                | $B_{25/50}$  | $R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15K))]$ |       | 3375 |      | K         |

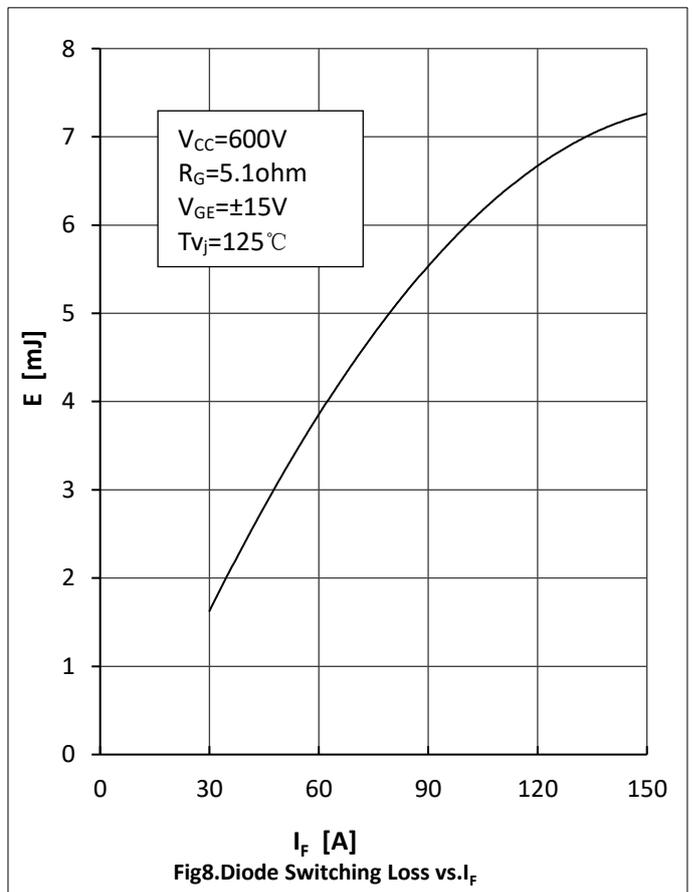
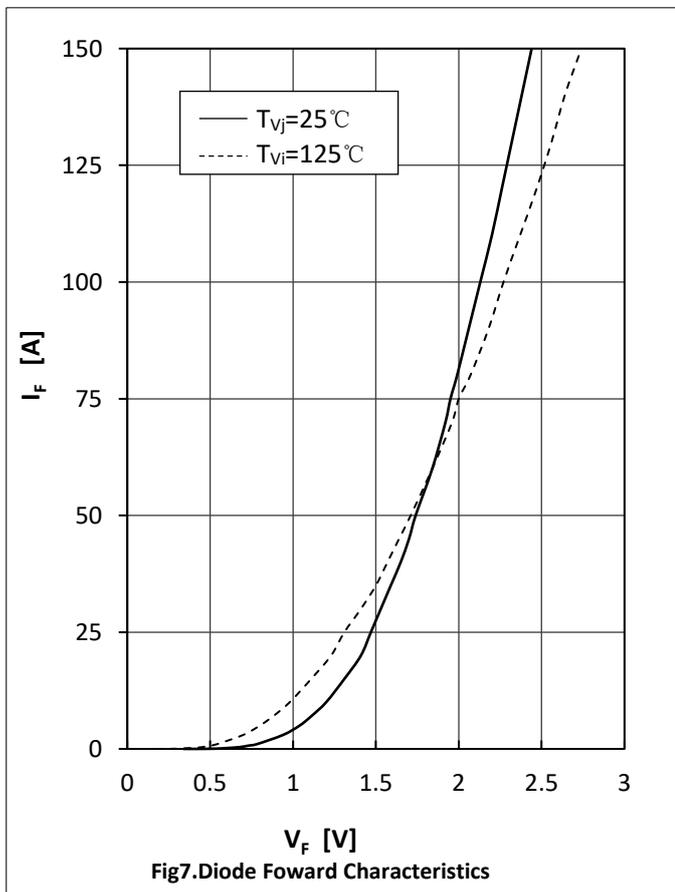
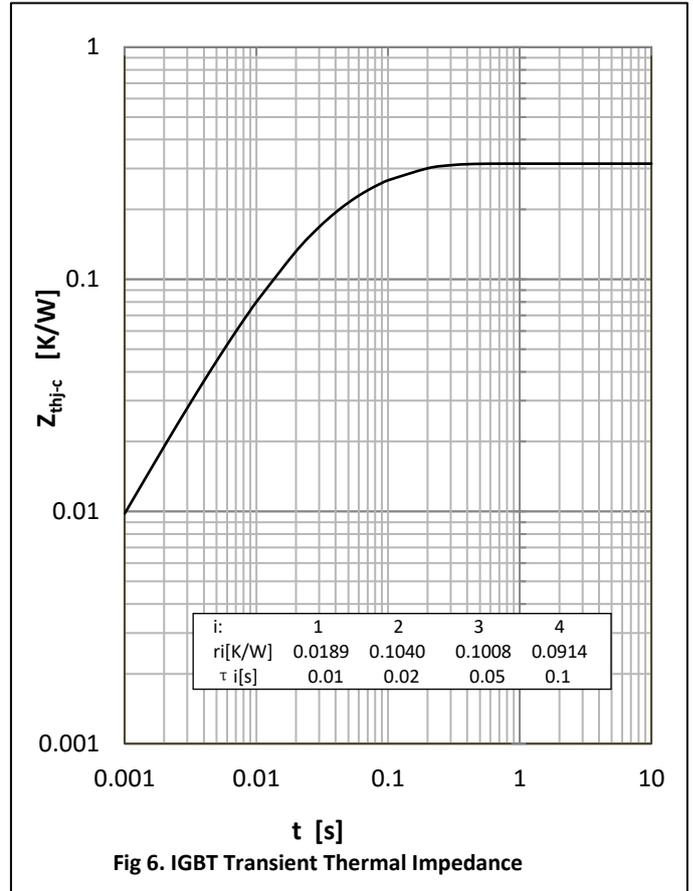
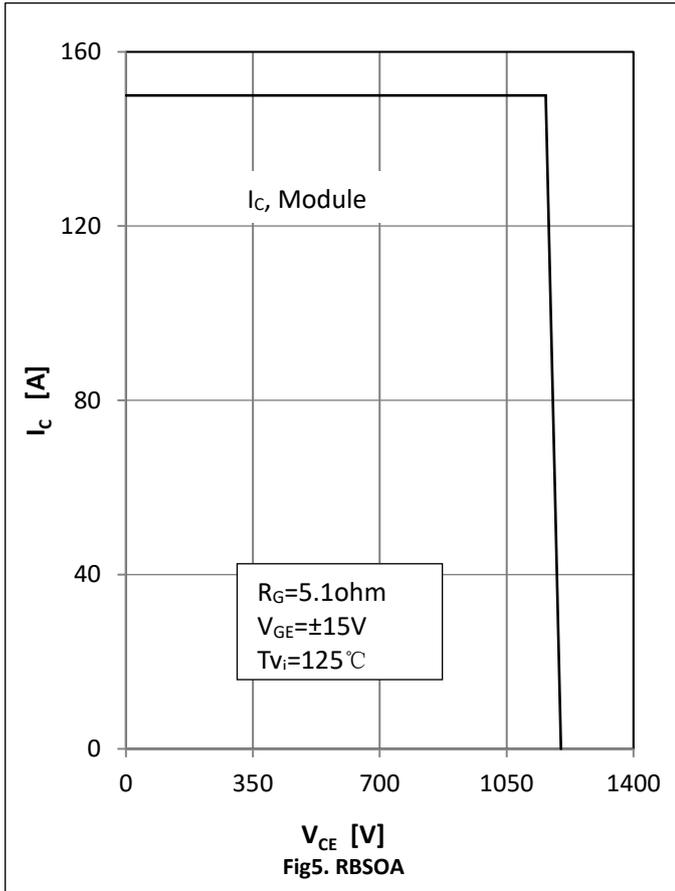


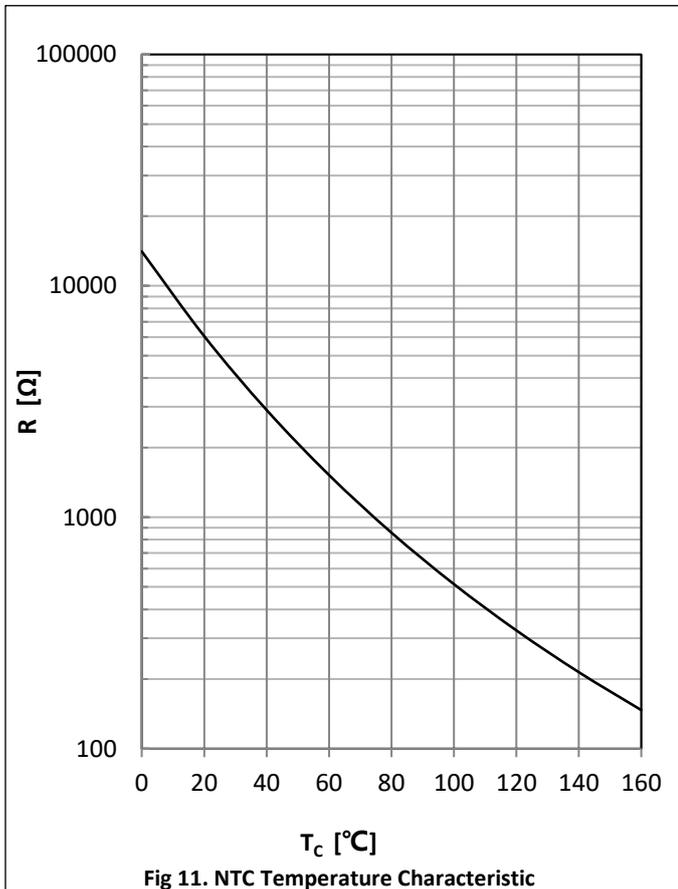
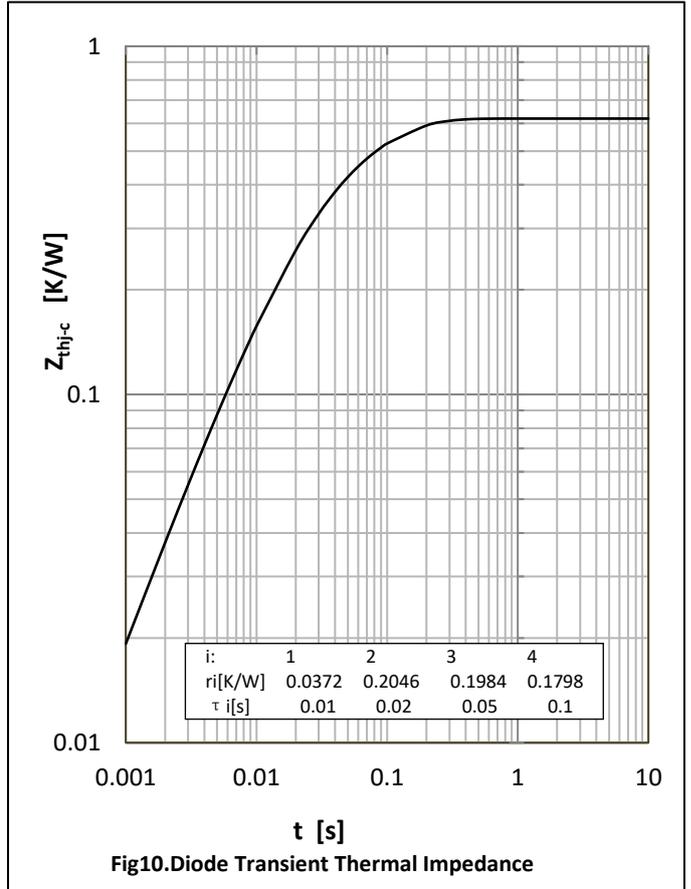
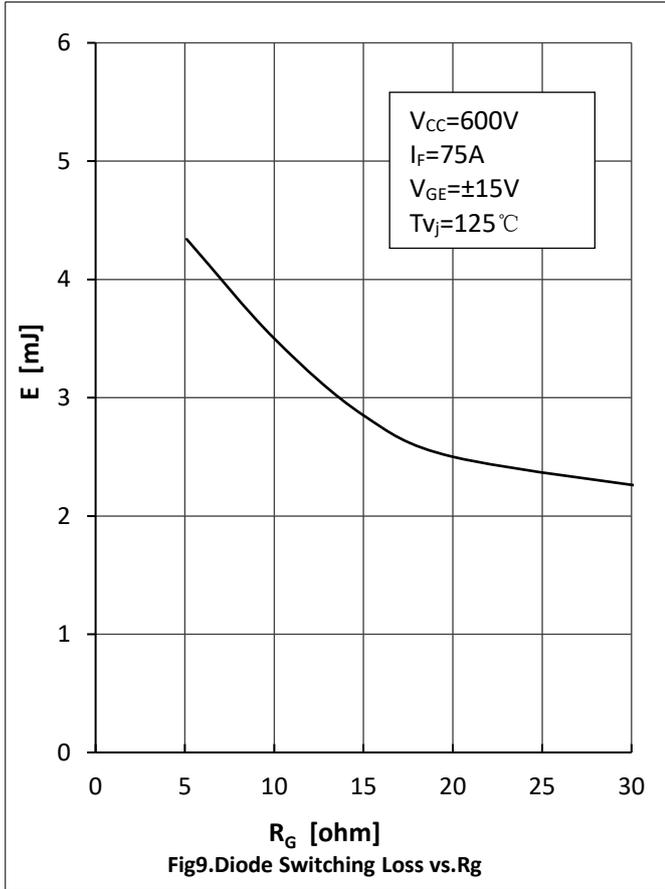
## ● Module Characteristics

$T_c=25^{\circ}\text{C}$  unless otherwise specified

| Parameter                              | Symbol                      | Conditions                            | Value |      |      | Unit               |
|--|-----------------------------|---------------------------------------|-------|------|------|--------------------|
|  |                             |                                       | Min.  | Typ. | Max. |                    |
| Isolation voltage                      | $V_{\text{isol}}$           | $t=1\text{min}, f=50\text{Hz}$        | 2500  |      |      | V                  |
| Maximum Junction Temperature           | $T_{\text{jmax}}$           |                                       |       |      | 175  | $^{\circ}\text{C}$ |
| Operating Junction Temperature         | $T_{\text{vj op}}$          |                                       | -40   |      | 150  | $^{\circ}\text{C}$ |
| Storage Temperature                    | $T_{\text{stg}}$            |                                       | -40   |      | 125  | $^{\circ}\text{C}$ |
| Stray-inductance-module                | $L_{\text{SCE}}$            |                                       |       | 21   |      | nH                 |
| Comparative Tracking Index             | CTI                         |                                       |       | >200 |      |                    |
| Module lead resistance, terminals-chip | $R_{\text{CC}'+\text{EE}'}$ | $T_c=25^{\circ}\text{C}$ , per switch |       | 1.9  |      | m $\Omega$         |
|  | $R_{\text{AA}'+\text{CC}'}$ |                                       |       | 1.5  |      |                    |
| Thermal Resistance Junction-to Case    | $R_{\theta\text{JC}}$       | per IGBT-inverter                     |       |      | 0.34 | K/W                |
|  |                             | per Diode-inverter                    |       |      | 0.62 |                    |
| Thermal Resistance Case-to Sink        | $R_{\theta\text{CS}}$       | per IGBT-inverter                     |       | 0.21 |      | K/W                |
|  |                             | per Diode-inverter                    |       | 0.33 |      |                    |
| Mounting Force Per Clamp               | F                           |                                       | 3.0   |      | 6.0  | N                  |
| Weight of Module                       | G                           |                                       |       | 300  |      | g                  |

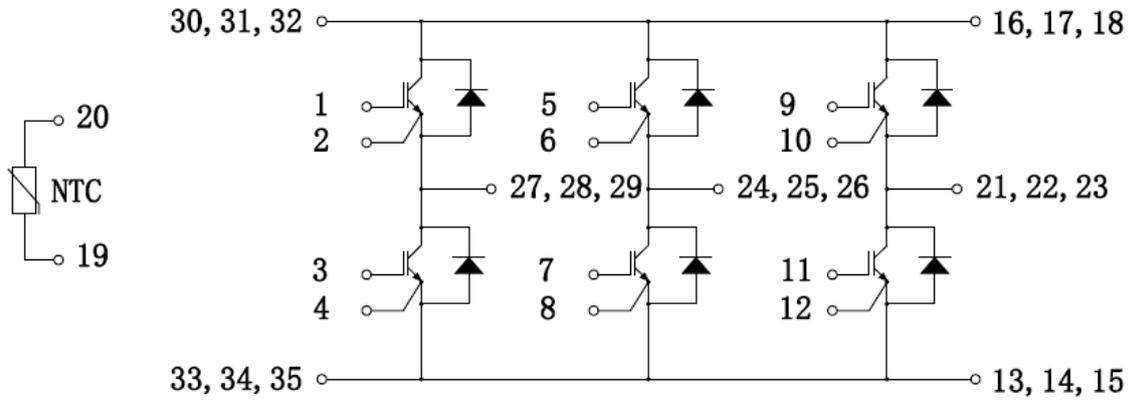








## ● Circuit Diagram



## ● Package Outline Information

