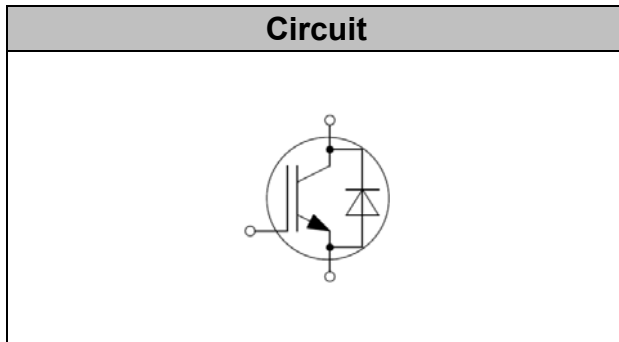




## IGBT Discrete

|                       |      |   |
|-----------------------|------|---|
| $V_{CE}$              | 1200 | V |
| $I_C$                 | 15   | A |
| $V_{CE(SAT)} I_C=15A$ | 1.85 | V |



## Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

## Features

- Low  $V_{CE(sat)}$  Trench-FS IGBT technology
- Maximum junction temperature 175°C
- Positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- High short circuit capability(10us)

## Maximum Ratings

| Parameter   | Symbol      | Value    | Unit    |
|---|-------------|----------|---------|
| Collector-Emitter Breakdown Voltage   | $V_{CE}$    | 1200     | V       |
| DC Collector Current, limited by $T_{jmax}$<br>$T_C=25^\circ C$<br>$T_C=100^\circ C$  | $I_C$       | 30<br>15 | A       |
| Diode Forward Current, limited by $T_{jmax}$<br>$T_C=25^\circ C$<br>$T_C=100^\circ C$ | $I_F$       | 30<br>15 | A       |
| Continuous Gate-Emitter Voltage   | $V_{GE}$    | $\pm 20$ | V       |
| Transient Gate-Emitter Voltage  | $V_{GE}$    | $\pm 30$ | V       |
| Turn off Safe Operating Area $V_{CE} \leq 1200V$ ,<br>$T_j \leq 150^\circ C$          |             | 60       | A       |
| Pulsed Collector Current, $V_{GE}=15V$ ,<br>$t_p$ limited by $T_{jmax}$               | $I_{CM}$    | 60       | A       |
| Diode Pulsed Current, $t_p$ limited by $T_{jmax}$                                     | $I_{Fpuls}$ | 60       | A       |
| Short Circuit Withstand Time,<br>$V_{GE}=15V$ , $V_{CC}=900V$ , $V_{CEM} \leq 1200V$  | $T_{sc}$    | 10       | $\mu s$ |
| Power Dissipation, $T_j=175^\circ C$ , $T_c=25^\circ C$                               | $P_{tot}$   | 200      | W       |



|  |       |            |    |
|--|-------|------------|----|
| Operating Junction Temperature   | $T_j$ | -40...+175 | °C |
| Storage Temperature  | $T_s$ | -55...+150 | °C |
| Soldering Temperature, wave soldering 1.6mm (0.063in.) from case for 10s |       | 260        | °C |

### Electrical Characteristics of the IGBT ( $T_j = 25^\circ\text{C}$ unless otherwise specified):

| Parameter                            | Symbol        | Conditions  | Min. | Typ.                 | Max.         | Unit |
|--------------------------------------|---------------|---|------|----------------------|--------------|------|
| <b>Static</b>                        |               |   |      |                      |              |      |
| Collector-Emitter Breakdown Voltage  | $BV_{CES}$    | $V_{GE}=0V, I_C=250\mu A$   | 1200 |                      | -            | V    |
| Gate Threshold Voltage               | $V_{GE(th)}$  | $V_{GE}=V_{CE}, I_C=0.5mA$  | 5.1  | 5.8                  | 6.4          | V    |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V, I_C=15A$<br>$T_j=25^\circ\text{C}$ ,<br>$T_j=125^\circ\text{C}$<br>$T_j=150^\circ\text{C}$ |      | 1.85<br>2.20<br>2.30 | 2.35         | V    |
| Zero Gate Voltage Collector Current  | $I_{CES}$     | $V_{CE}=1200V, V_{GE}=0V$<br>$T_j=25^\circ\text{C}$ ,<br>$T_j=150^\circ\text{C}$                        |      |                      | 0.25<br>5.00 | mA   |
| Gate-Emitter Leakage Current         | $I_{GES}$     | $V_{CE}=0V, V_{GE}=\pm 20V$   |      |                      | 100          | nA   |

| Parameter                       | Symbol    | Conditions  | Min. | Typ. | Max. | Unit |
|---------------------------------|-----------|---|------|------|------|------|
| <b>Dynamic</b>                  |           |   |      |      |      |      |
| Input Capacitance               | $C_{ies}$ | $V_{CE}=25V, V_{GE}=0V,$<br>$f=1MHz$  | -    | 1.2  | -    | nF   |
| Reverse Transfer Capacitance    | $C_{res}$ |   | -    | 0.04 | -    |      |
| Gate Charge                     | $Q_G$     | $V_{CC}=960V, I_C=15A,$<br>$V_{GE}=15V$                                       | -    | 0.14 | -    | uC   |
| Short Circuit Collector Current | $I_{SC}$  | $V_{GE}=15V, t_{sc}\leq 10\mu s,$<br>$V_{CC}=900V, T_j\leq 150^\circ\text{C}$ | -    | 60   | -    | A    |



## Electrical Characteristics of the Diode (T<sub>j</sub>= 25°C unless otherwise specified):

| Parameter             | Symbol         | Conditions   | Min. | Typ.                 | Max. | Unit |
|-----------------------|----------------|--|------|----------------------|------|------|
| <b>Static</b>         |                |  |      |                      |      |      |
| Diode Forward Voltage | V <sub>F</sub> | I <sub>F</sub> = 15A<br>T <sub>j</sub> = 25°C,<br>T <sub>j</sub> = 125°C<br>T <sub>j</sub> = 150°C |      | 2.00<br>1.80<br>1.70 | 2.40 | V    |

## Switching Characteristic, Inductive Load

| Parameter                                | Symbol              | Conditions  | Min. | Typ. | Max. | Unit |
|--|---------------------|---|------|------|------|------|
| <b>Dynamic , at T<sub>j</sub>= 25°C</b>  |                     |   |      |      |      |      |
| Turn-on Delay Time                       | t <sub>d(on)</sub>  | V <sub>CC</sub> = 600V, I <sub>C</sub> =15A,<br>V <sub>GE</sub> = -15v~15V,<br>R <sub>g</sub> =33 Ω | -    | 45   | -    | ns   |
| Rise Time                                | t <sub>r</sub>      |   | -    | 52   | -    | ns   |
| Turn-on Energy                           | E <sub>on</sub>     |   | -    | 1.5  | -    | mJ   |
| Turn-off Delay Time                      | t <sub>d(off)</sub> |   | -    | 128  | -    | ns   |
| Fall Time                                | t <sub>f</sub>      |   | -    | 186  | -    | ns   |
| Turn-off Energy                          | E <sub>off</sub>    |   | -    | 0.9  | -    | mJ   |
| <b>Dynamic , at T<sub>j</sub>= 125°C</b> |                     |   |      |      |      |      |
| Turn-on Delay Time                       | t <sub>d(on)</sub>  | V <sub>CC</sub> = 600V, I <sub>C</sub> =15A,<br>V <sub>GE</sub> = -15v~15V,<br>R <sub>g</sub> =33 Ω | -    | 50   | -    | ns   |
| Rise Time                                | t <sub>r</sub>      |   | -    | 55   | -    | ns   |
| Turn-on Energy                           | E <sub>on</sub>     |   | -    | 2.2  | -    | mJ   |
| Turn-off Delay Time                      | t <sub>d(off)</sub> |   | -    | 160  | -    | ns   |
| Fall Time                                | t <sub>f</sub>      |   | -    | 135  | -    | ns   |
| Turn-off Energy                          | E <sub>off</sub>    |   | -    | 1.3  | -    | mJ   |
| <b>Dynamic , at T<sub>j</sub>= 150°C</b> |                     |   |      |      |      |      |
| Turn-on Delay Time                       | t <sub>d(on)</sub>  | V <sub>CC</sub> = 600V, I <sub>C</sub> =15A,<br>V <sub>GE</sub> = -15v~15V,<br>R <sub>g</sub> =33 Ω | -    | 52   | -    | ns   |
| Rise Time                                | t <sub>r</sub>      |   | -    | 58   | -    | ns   |
| Turn-on Energy                           | E <sub>on</sub>     |   | -    | 2.4  | -    | mJ   |
| Turn-off Delay Time                      | t <sub>d(off)</sub> |   | -    | 170  | -    | ns   |
| Fall Time                                | t <sub>f</sub>      |   | -    | 138  | -    | ns   |
| Turn-off Energy                          | E <sub>off</sub>    |   | -    | 1.45 | -    | mJ   |

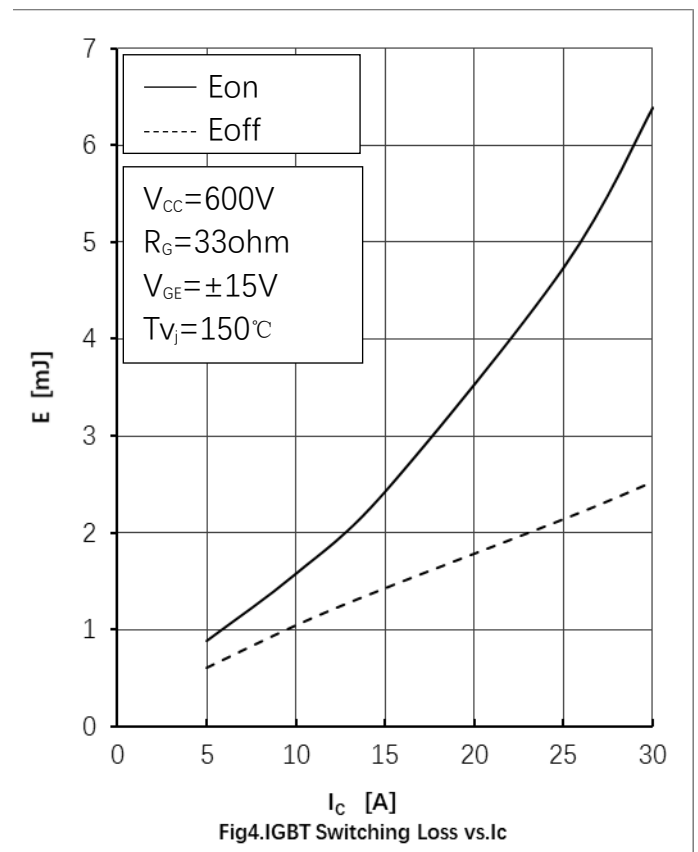
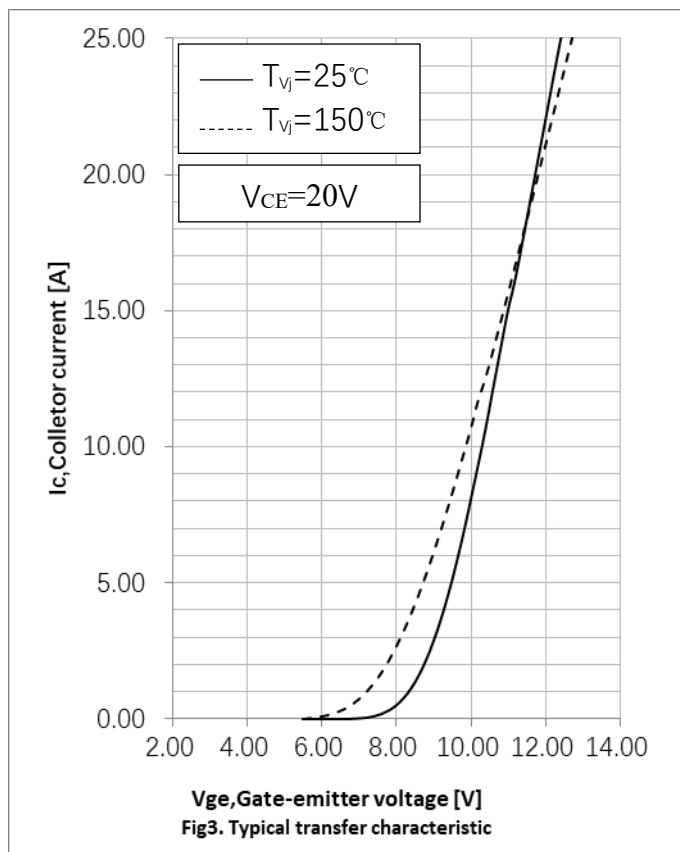
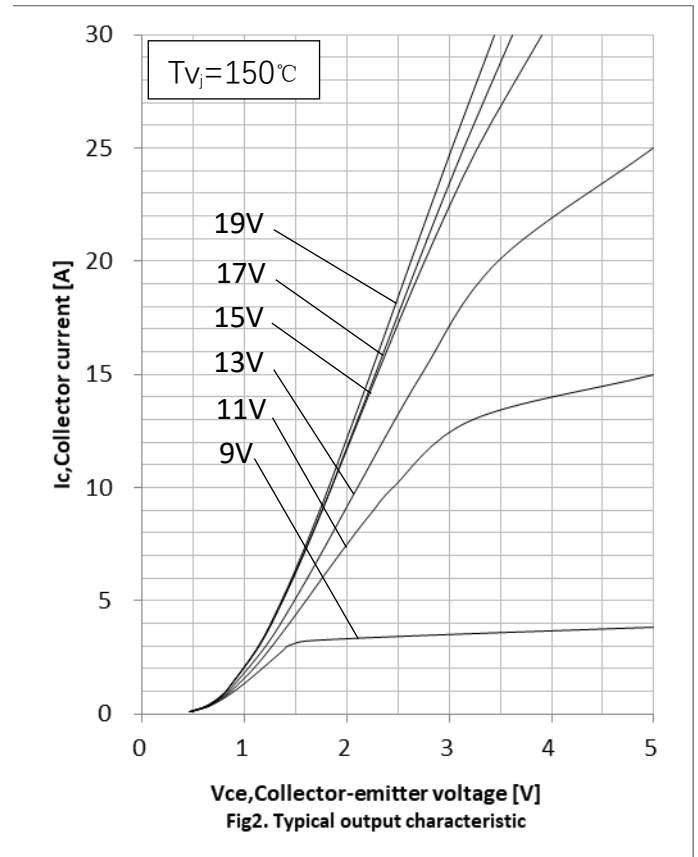
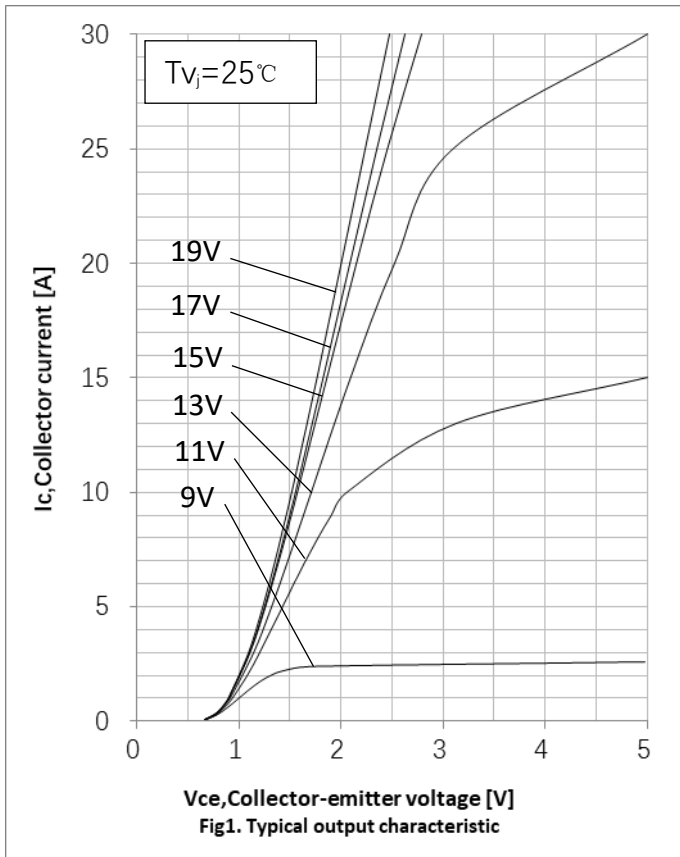


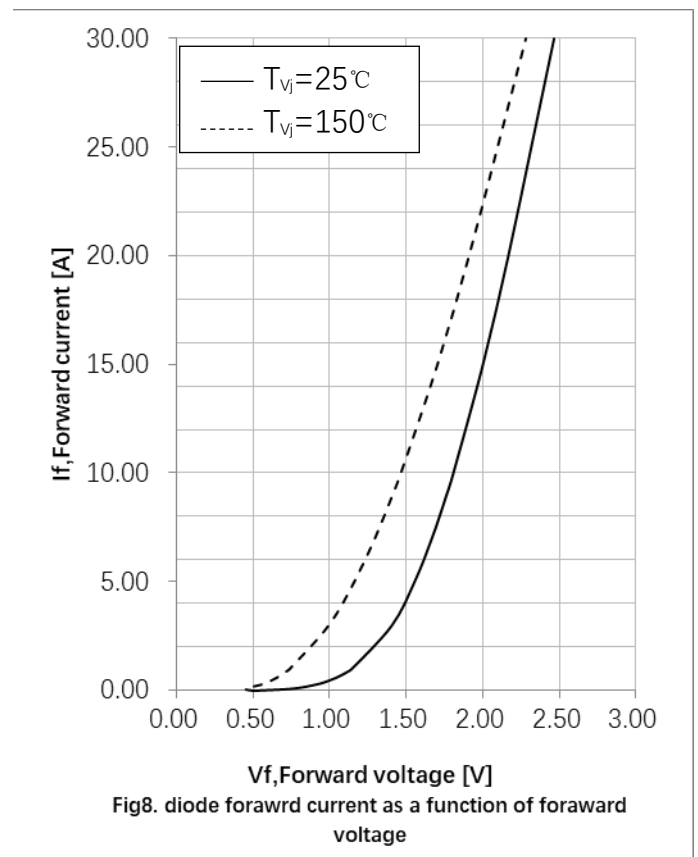
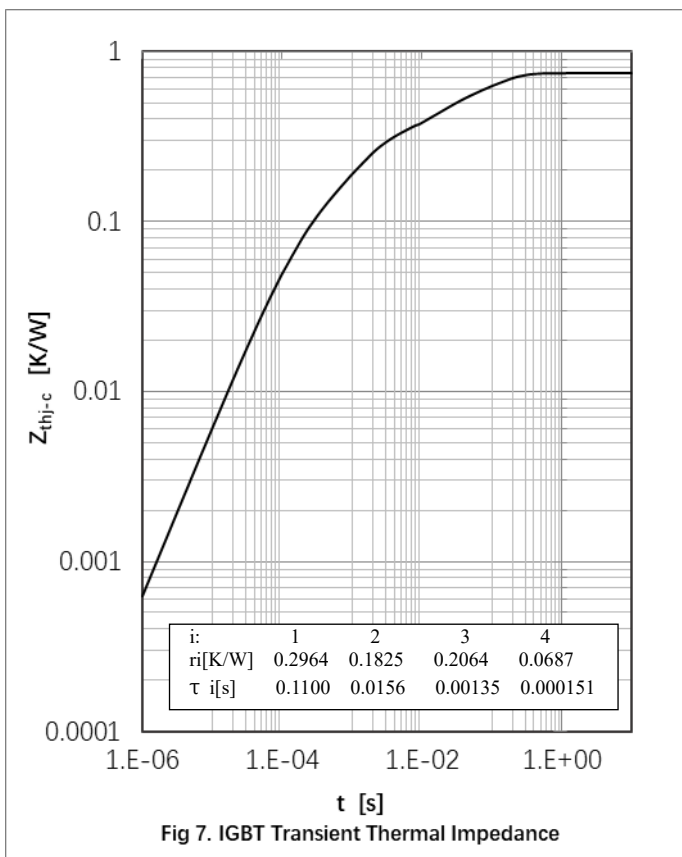
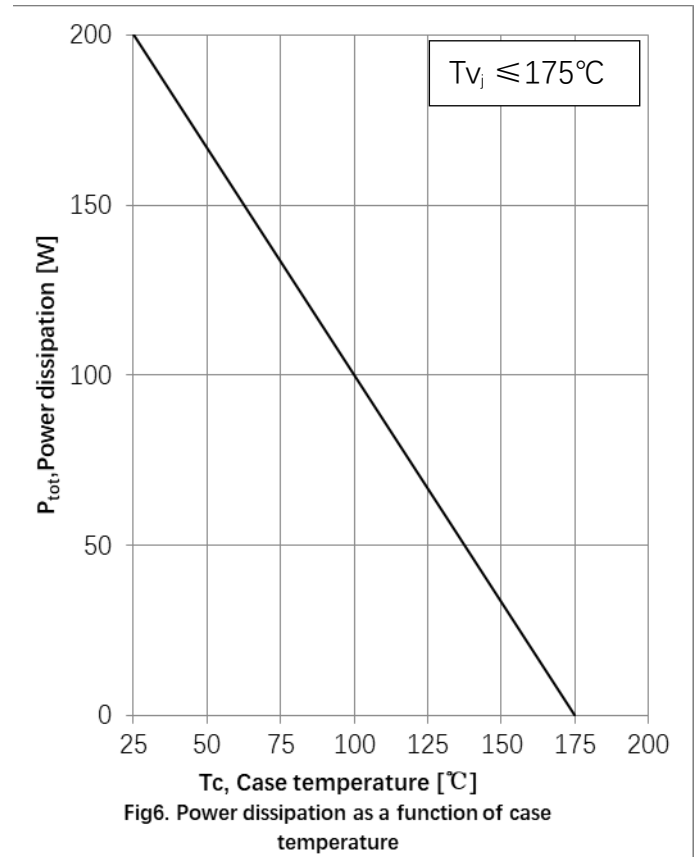
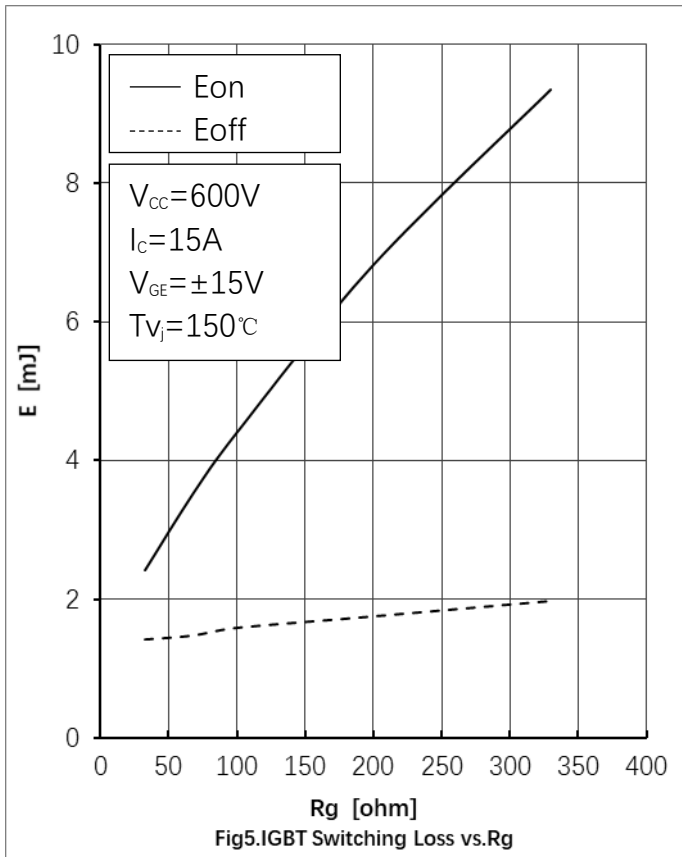
## Electrical Characteristics of the DIODE

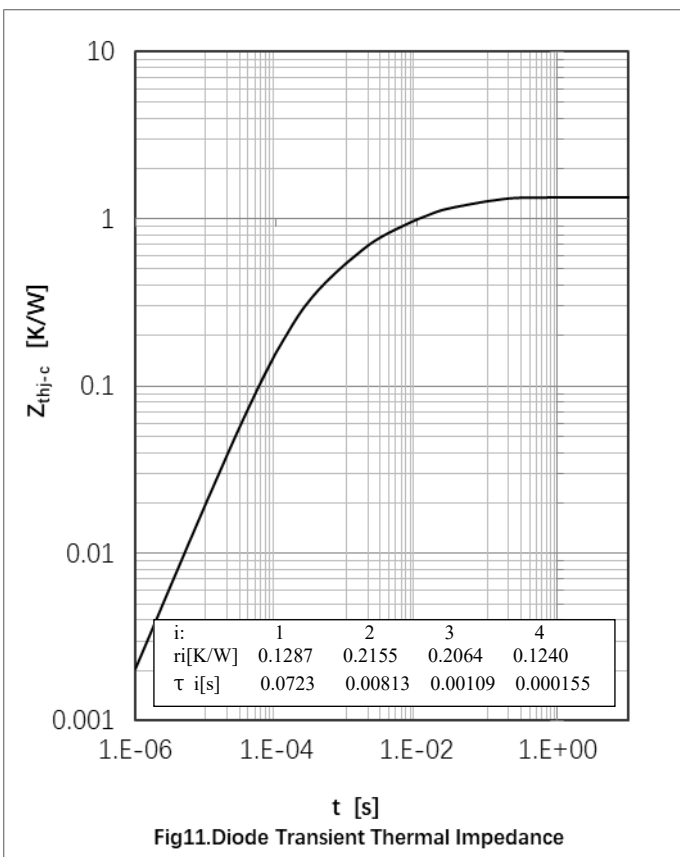
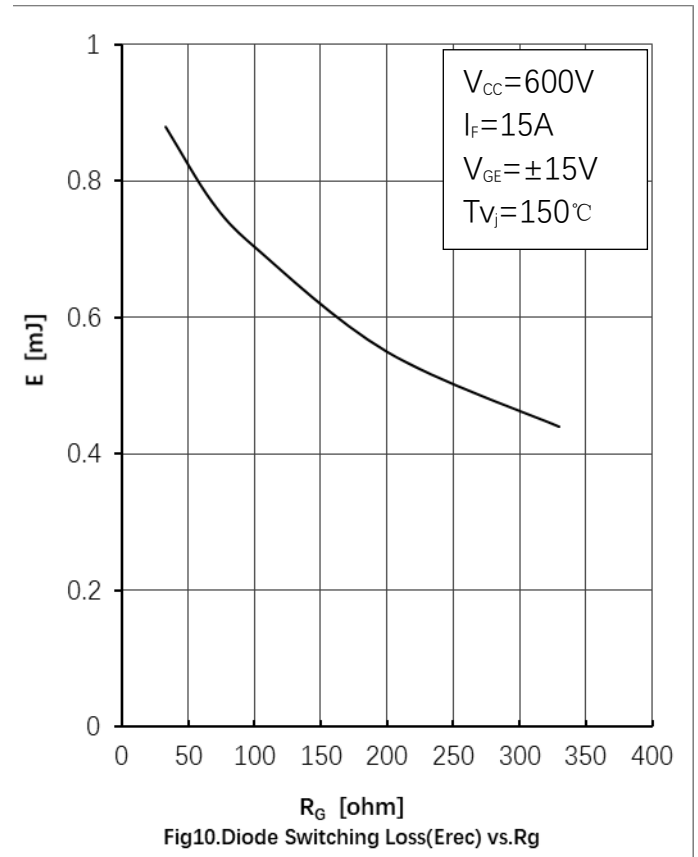
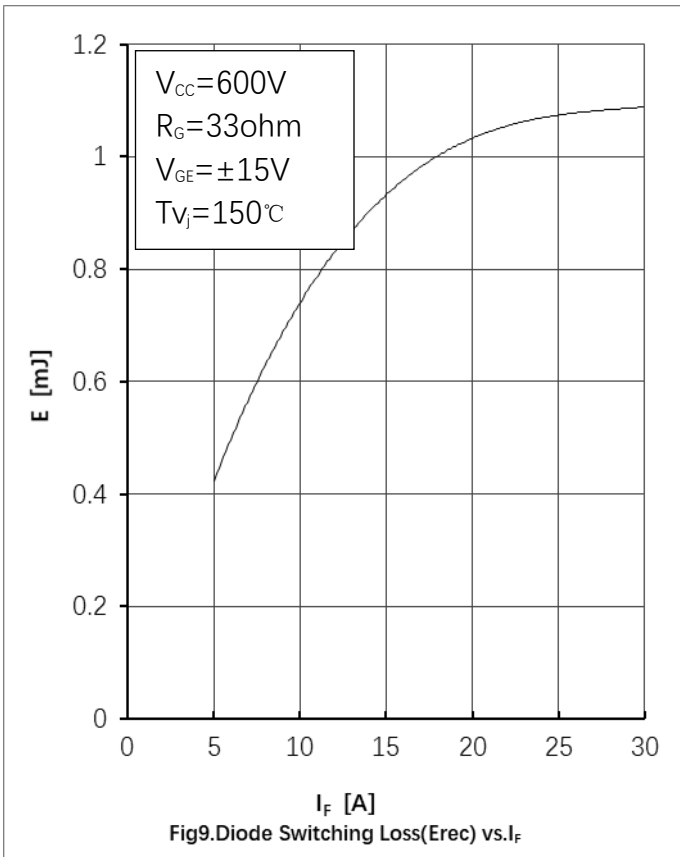
| Parameter                                | Symbol           | Conditions  | Min. | Typ. | Max. | Unit |
|--|------------------|---|------|------|------|------|
| <b>Dynamic , at T<sub>j</sub>= 25°C</b>  |                  |   |      |      |      |      |
| Diode Forward Voltage                    | V <sub>FM</sub>  | I <sub>F</sub> = 15A  | -    | 1.90 | -    | V    |
| Reverse Recovery Current                 | I <sub>rr</sub>  | I <sub>F</sub> =15A, V <sub>R</sub> =600V,<br>-di/dt=240A/μs, | -    | 7.5  | -    | A    |
| Reverse Recovery Charge                  | Q <sub>rr</sub>  |   | -    | 1.8  | -    | uC   |
| Reverse Recovery Energy                  | E <sub>rec</sub> |   | -    | 0.60 |      | mJ   |
| <b>Dynamic , at T<sub>j</sub>= 125°C</b> |                  |   |      |      |      |      |
| Reverse Recovery Current                 | I <sub>rr</sub>  | I <sub>F</sub> =15A, V <sub>R</sub> =600V,<br>-di/dt=240A/μs, | -    | 9    | -    | A    |
| Reverse Recovery Charge                  | Q <sub>rr</sub>  |   | -    | 2.4  | -    | uC   |
| Reverse Recovery Energy                  | E <sub>rec</sub> |   | -    | 0.9  |      | mJ   |
| <b>Dynamic , at T<sub>j</sub>= 150°C</b> |                  |   |      |      |      |      |
| Reverse Recovery Current                 | I <sub>rr</sub>  | I <sub>F</sub> =15A, V <sub>R</sub> =600V,<br>-di/dt=240A/μs, | -    | 9.5  | -    | A    |
| Reverse Recovery Charge                  | Q <sub>rr</sub>  |   | -    | 2.6  | -    | uC   |
| Reverse Recovery Energy                  | E <sub>rec</sub> |   | -    | 1.0  |      | mJ   |

## Thermal Resistance

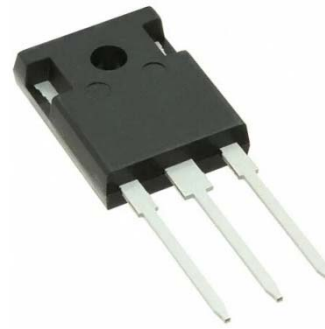
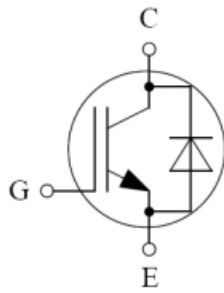
| Parameter                                 | Symbol               | Max. Value | Unit |
|---|----------------------|------------|------|
| IGBT Thermal Resistance, Junction - Case  | R <sub>th(j-c)</sub> | 0.75       | K/W  |
| Diode Thermal Resistance, Junction - Case | R <sub>th(j-c)</sub> | 1.35       | K/W  |
| Thermal Resistance, Junction - Ambient    | R <sub>th(j-a)</sub> | 40         | K/W  |







## ● Circuit Diagram



## ● Package Outline Information

CASE: TO 247

