

TOSHIBA IGBT MODULE SILICON N CHANNEL IGBT

# MG600Q2YS60A

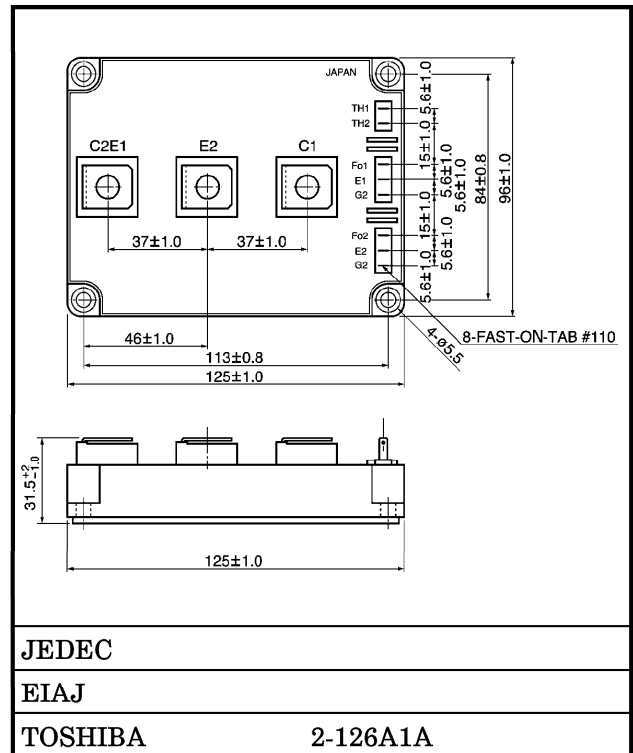
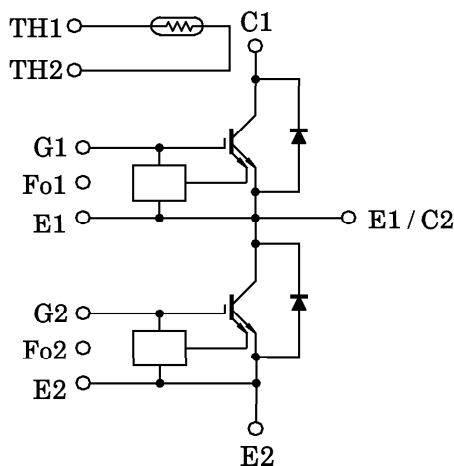
HIGH POWER SWITCHING APPLICATIONS

Unit in mm

MOTOR CONTROL APPLICATIONS

- The Electrodes are Isolated from Case.
- Enhancement-Mode
- Thermal Output Terminal (TH)

EQUIVALENT CIRCUIT



Weight : 680 g

000707EAA1

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## MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC   |               | SYMBOL            | RATING             | UNIT |
|--|---------------|-------------------|--------------------|------|
| Collector-Emitter Voltage                              |               | V <sub>CE</sub>   | 1200               | V    |
| Gate-Emitter Voltage                                   |               | V <sub>GE</sub>   | ±20                | V    |
| Collector Current                                      | DC            | I <sub>C</sub>    | 600                | A    |
| Forward Current  | DC            | I <sub>F</sub>    | 600                | A    |
| Collector Power Dissipation<br>(T <sub>c</sub> = 25°C) |               | P <sub>C</sub>    | 4300               | W    |
| Junction Temperature                                   |               | T <sub>j</sub>    | 150                | °C   |
| Storage Temperature Range                              |               | T <sub>stg</sub>  | -40~125            | °C   |
| Isolation Voltage                                      |               | V <sub>Isol</sub> | 2500<br>(AC 1 min) | V    |
| Screw Torque   | Terminal : M8 | —                 | 10                 | N·m  |
|  | Mounting : M5 | —                 | 3                  | N·m  |

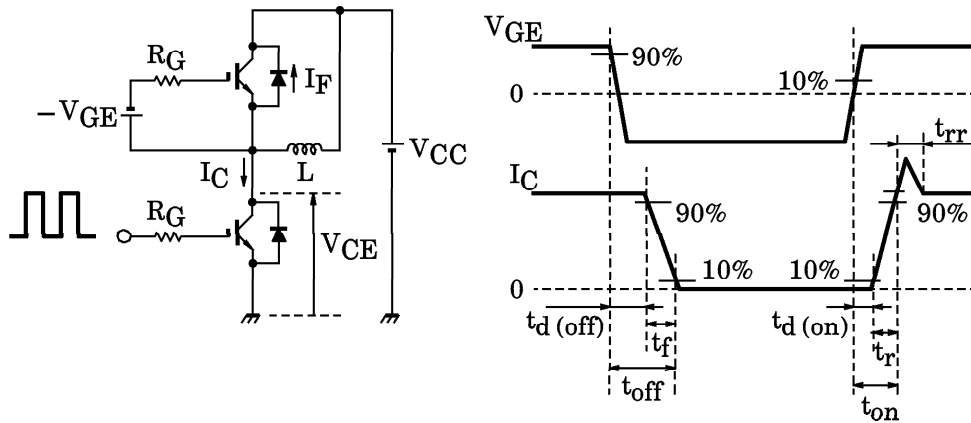
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

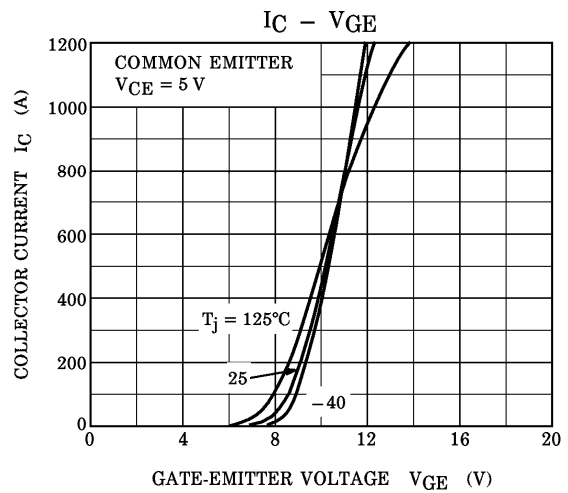
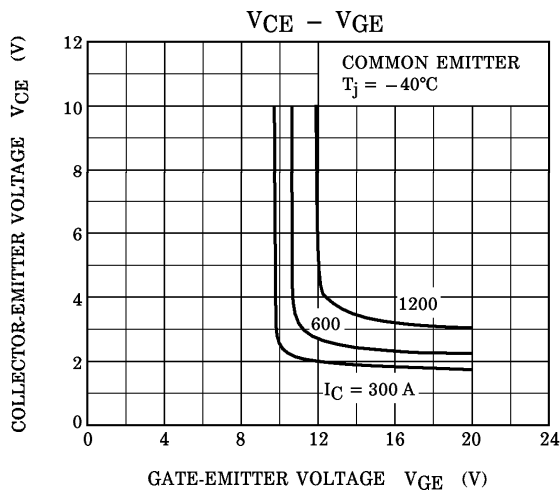
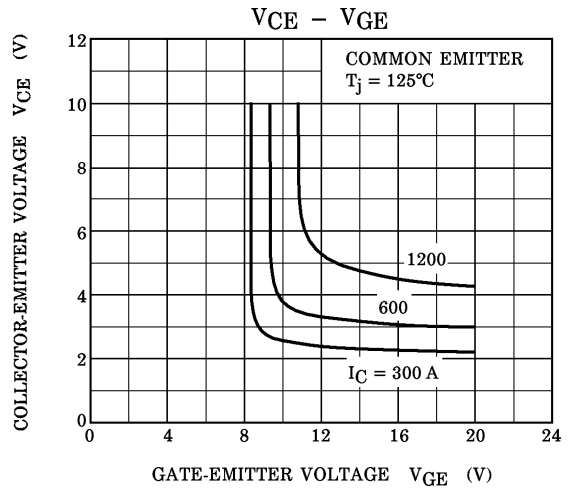
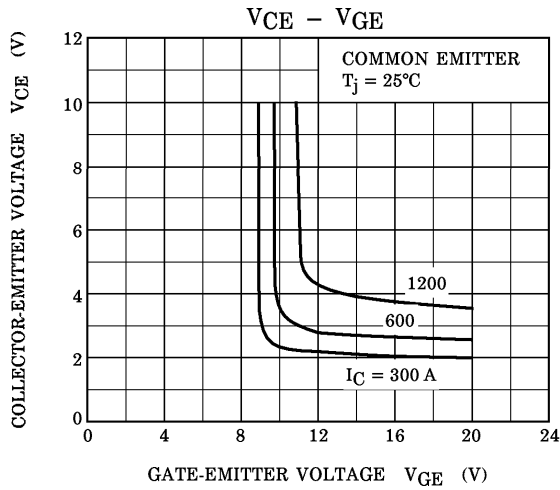
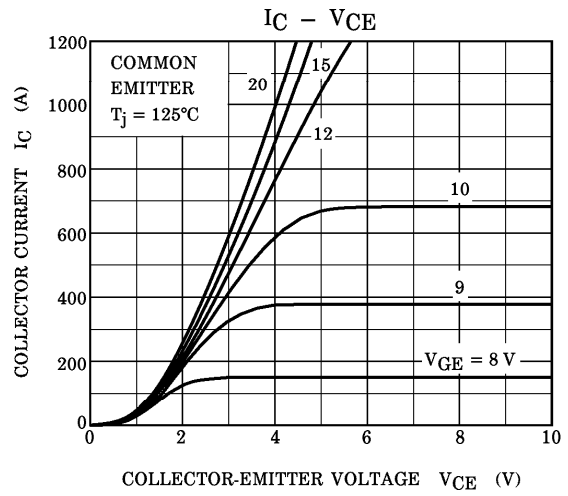
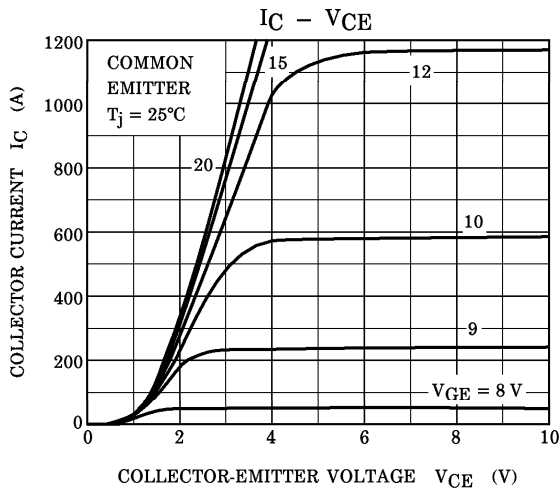
| CHARACTERISTIC                       |                       | SYMBOL  | TEST CONDITION   | MIN.                   | TYP.  | MAX.  | UNIT   |   |
|--------------------------------------|-----------------------|---|--|------------------------|-------|-------|--------|---|
| Gate Leakage Current                 |                       | I <sub>GES</sub>                                  | V <sub>GE</sub> = ±20 V, V <sub>CE</sub> = 0 V   | —                      | —     | ±10   | μA     |   |
| Collector Cut-Off Current            |                       | I <sub>CE</sub>                                   | V <sub>CE</sub> = 1200 V, V <sub>GE</sub> = 0  | —                      | —     | 1     | mA     |   |
| Gate-Emitter Cut-Off Voltage         |                       | V <sub>GE</sub> (off)                             | I <sub>C</sub> = 600 mA, V <sub>CE</sub> = 5 V   | —                      | 6.7   | —     | V      |   |
| Collector-Emitter Saturation Voltage | V <sub>CE</sub> (sat) | I <sub>C</sub> = 600 A,<br>V <sub>GE</sub> = 15 V | T <sub>j</sub> = 25°C  | —                      | 2.7   | 3.1   | V      |   |
|                                      |                       |   | T <sub>j</sub> = 125°C   | —                      | 3.2   | 3.5   |        |   |
| Input Capacitance                    |                       | C <sub>ies</sub>                                  | V <sub>CE</sub> = 10 V, V <sub>GE</sub> = 0 V,<br>f = 1 MHz  | —                      | 41000 | —     | pF     |   |
| Gate-Emitter Voltage                 |                       | V <sub>GE</sub>                                   | —  | 13                     | 15    | 17    | V      |   |
| Gate Resistance                      |                       | R <sub>G</sub>                                    | —  | 7.5                    | —     | 15    | Ω      |   |
| Switching Time                       | Turn-On Delay Time    | t <sub>d</sub> (on)                               | Inductive Load<br>V <sub>CC</sub> = 600 V<br>I <sub>C</sub> = 600 A<br>V <sub>GE</sub> = ±15 V<br>R <sub>G</sub> = 7.5 Ω<br><br>(Note) | —                      | 0.3   | —     | μs     |   |
|                                      | Rise Time             | t <sub>r</sub>                                    |  | —                      | 0.2   | —     |        |   |
|                                      | Turn-On Time          | t <sub>on</sub>                                   |  | —                      | 0.5   | —     |        |   |
|                                      | Turn-Off Delay Time   | t <sub>d</sub> (off)                              |  | —                      | 1.3   | —     |        |   |
|                                      | Fall Time             | t <sub>f</sub>                                    |  | —                      | 0.1   | 0.3   |        |   |
|                                      | Turn-Off Time         | t <sub>off</sub>                                  |  | —                      | 1.4   | —     |        |   |
| Forward Voltage                      |                       | V <sub>F</sub>                                    | I <sub>F</sub> = 600 A,<br>V <sub>GE</sub> = 0 V   | T <sub>j</sub> = 25°C  | —     | 2.2   | 3.2    | V |
|                                      |                       |   |  | T <sub>j</sub> = 125°C | —     | 2.0   | —      |   |
| Reverse Recovery Time                |                       | t <sub>rr</sub>                                   | I <sub>F</sub> = 600 A, V <sub>GE</sub> = -15 V<br>di / dt = 2000 A / μs   | —                      | 0.3   | 0.5   | μs     |   |
| Thermal Resistance                   |                       | R <sub>th</sub> (j-c)                             | Transistor Stage   | —                      | —     | 0.029 | °C / W |   |
|                                      |                       |   | Diode Stage  | —                      | —     | 0.056 |        |   |
| RTC Operating Current                |                       | I <sub>rte</sub>                                  | T <sub>j</sub> = 25°C  | 1200                   | —     | —     | A      |   |

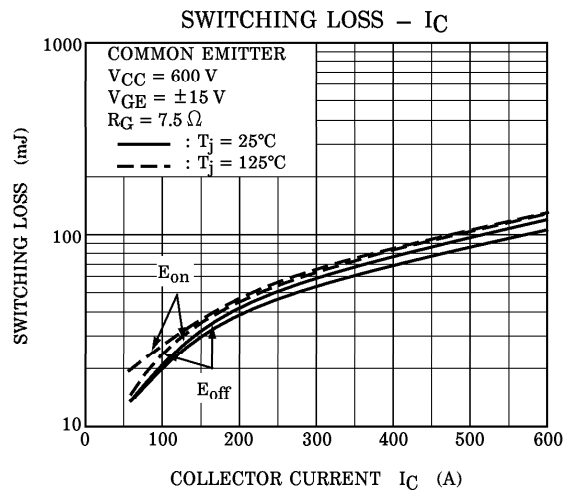
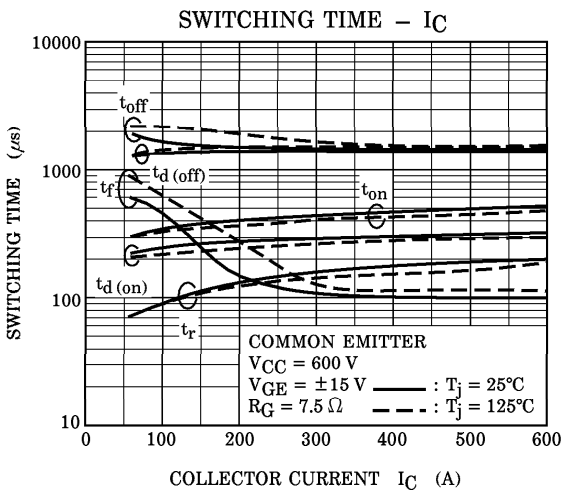
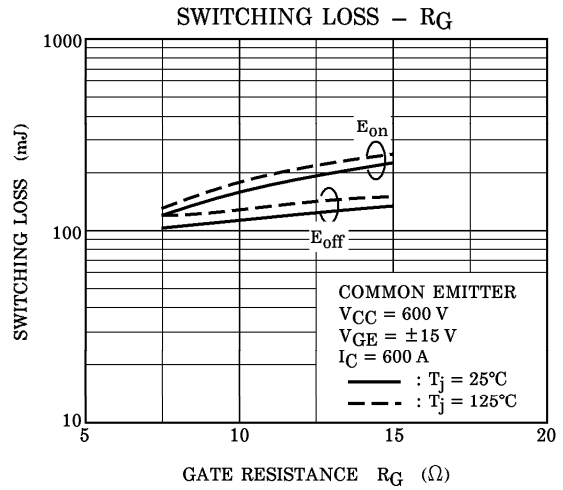
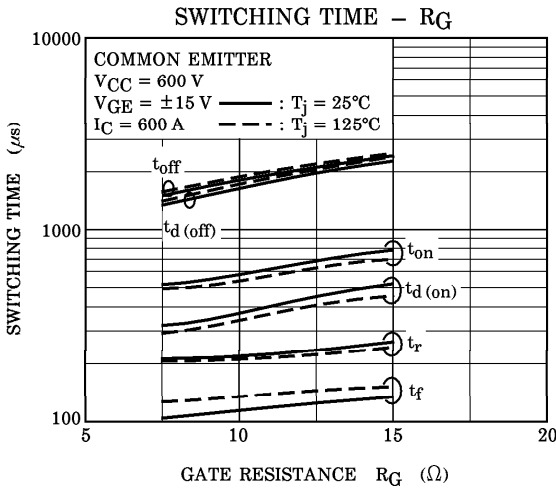
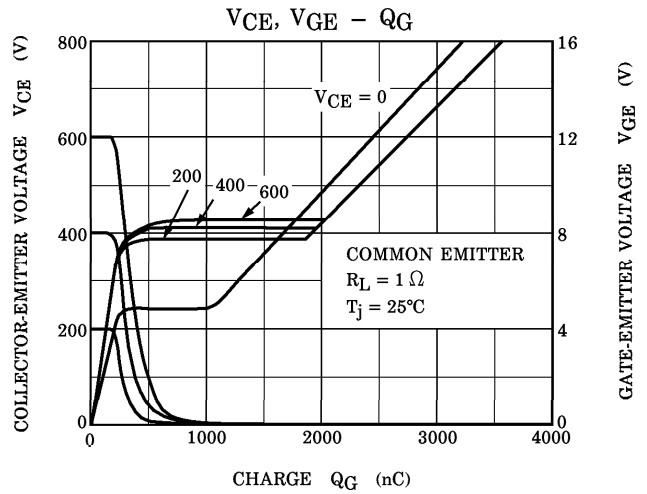
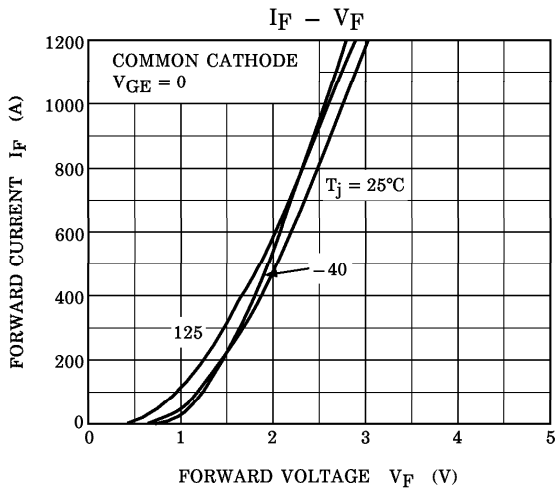
THERMISTOR

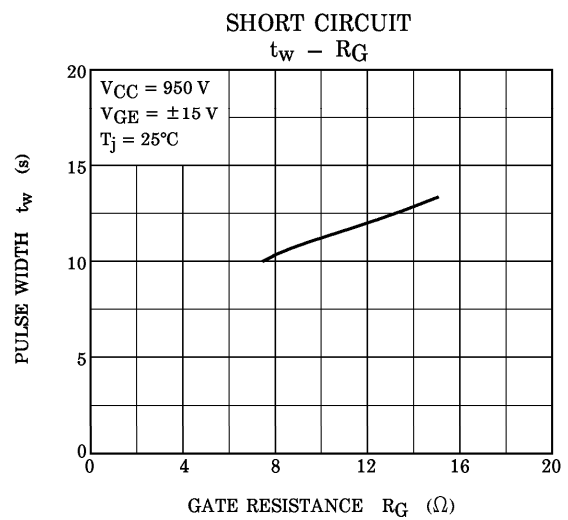
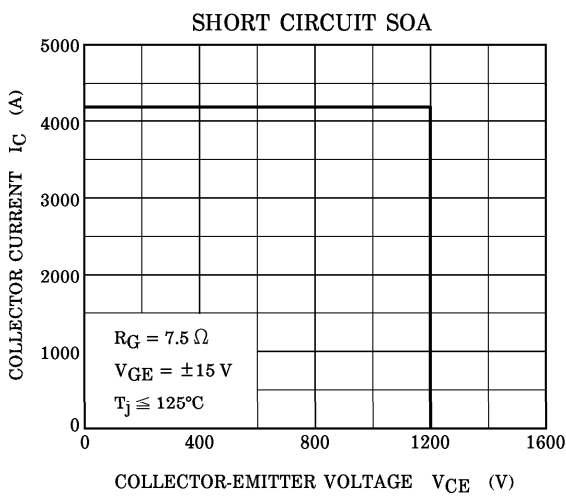
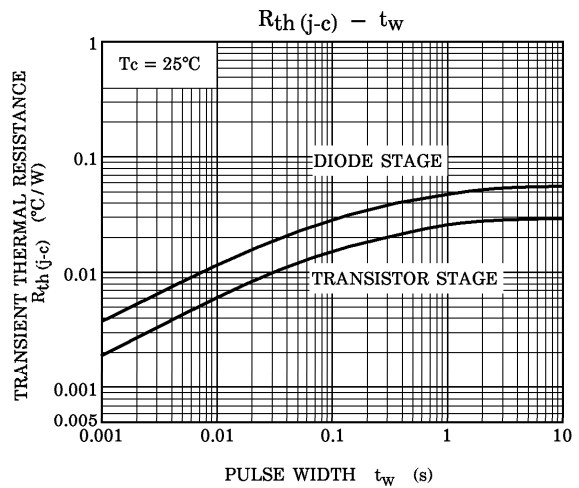
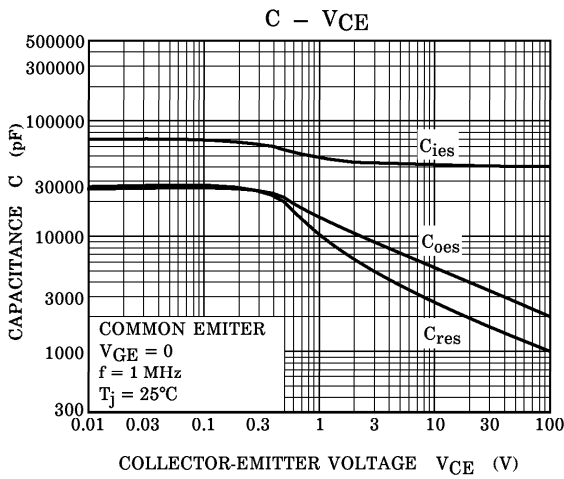
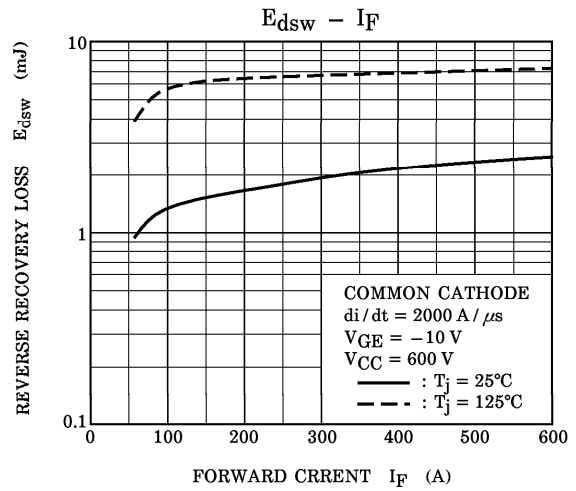
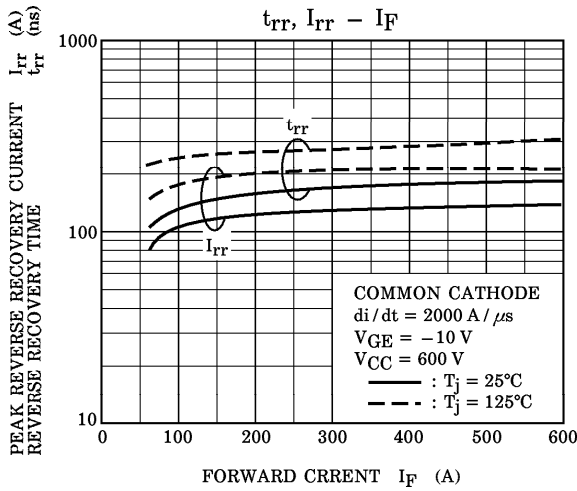
| CHARACTERISTIC        | SYMBOL   | TEST CONDITION        | MIN. | TYP. | MAX. | UNIT |
|-----------------------|----------|-----------------------|------|------|------|------|
| Zero Power Resistance | R25      | Tc = 25°C             | —    | 100  | —    | kΩ   |
| B Value               | B25 / 85 | Tc = 25°C / Tc = 85°C | —    | 4390 | —    | K    |
| Isolation Voltage     |          | Tc = 25°C             | 2500 | —    | —    | Vrms |

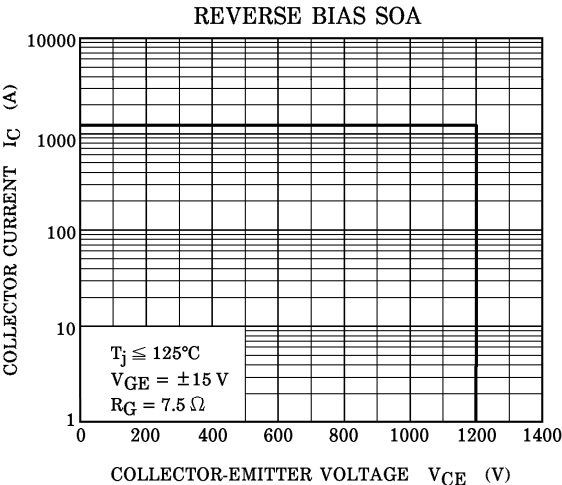
(Note) : Switching time measurement circuit and input/output waveforms











<V<sub>CE</sub> (sat) RANK>  
V<sub>CE</sub> (sat)

| RANK SYMBOL | MIN. | MAX. |
|-------------|------|------|
| 21          | 1.8  | 2.1  |
| 22          | 1.9  | 2.2  |
| 23          | 2.0  | 2.3  |
| 24          | 2.1  | 2.4  |
| 25          | 2.2  | 2.5  |
| 26          | 2.3  | 2.6  |
| 27          | 2.4  | 2.7  |
| 28          | 2.5  | 2.8  |
| 29          | 2.6  | 2.9  |
| 30          | 2.7  | 3.0  |
| 31          | 2.8  | 3.1  |
| 32          | 2.9  | 3.2  |
| 33          | 3.0  | 3.3  |

<V<sub>F</sub> RANK>  
V<sub>F</sub>

| RANK SYMBOL | MIN. | MAX. |
|-------------|------|------|
| B           | 1.5  | 1.8  |
| C           | 1.7  | 2.0  |
| D           | 1.9  | 2.2  |
| E           | 2.1  | 2.4  |
| F           | 2.3  | 2.6  |
| G           | 2.5  | 2.8  |
| H           | 2.7  | 3.0  |
| I           | 2.9  | 3.2  |
| J           | 3.1  | 3.4  |
| K           | 3.3  | 3.6  |

<MARK POSITION>

