

**TOSHIBA**

**MG400V2YS60A**

TOSHIBA IGBT MODULE SILICON N CHANNEL IGBT

# MG400V2YS60A

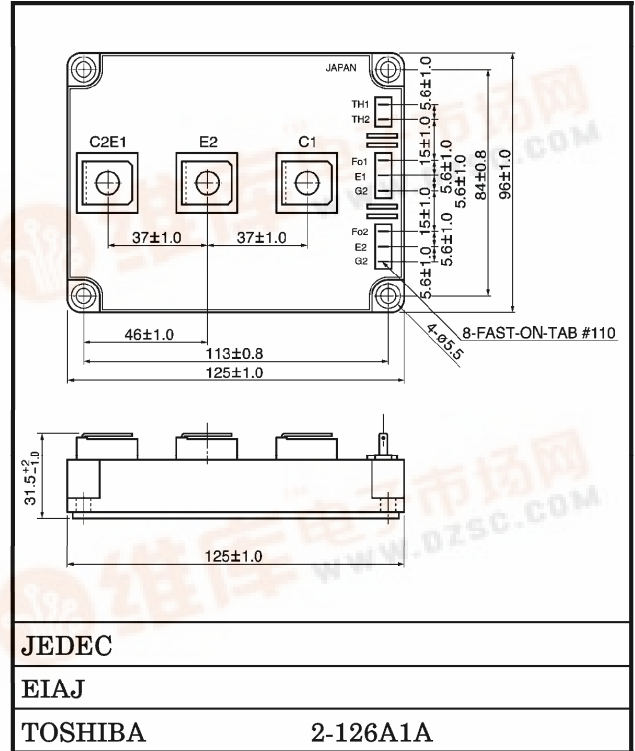
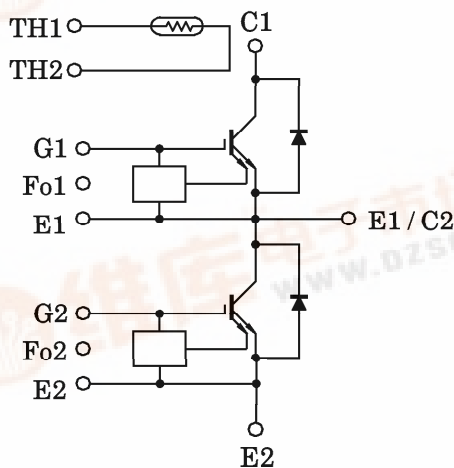
HIGH POWER SWITCHING APPLICATIONS

Unit in mm

MOTOR CONTROL APPLICATIONS

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

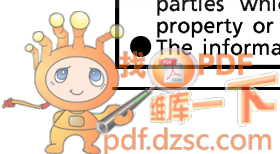
EQUIVALENT CIRCUIT



Weight : 680 g

000707EAA1

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MAXIMUM RATINGS (Ta = 25°C)

| CHARACTERISTIC                                         |               | SYMBOL            | RATING             | UNIT |
|--------------------------------------------------------|---------------|-------------------|--------------------|------|
| Collector-Emitter Voltage                              |               | V <sub>CES</sub>  | 1700               | V    |
| Gate-Emitter Voltage                                   |               | V <sub>GES</sub>  | ±20                | V    |
| Collector Current                                      | DC            | I <sub>C</sub>    | 400                | A    |
| Forward Current                                        | DC            | I <sub>F</sub>    | 400                | 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> | 4000<br>(AC 1 min) | V    |
| Screw Torque                                           | Terminal : M8 | —                 | 10                 | N·m  |
|                                                        | Mounting : M5 | —                 | 3                  | N·m  |

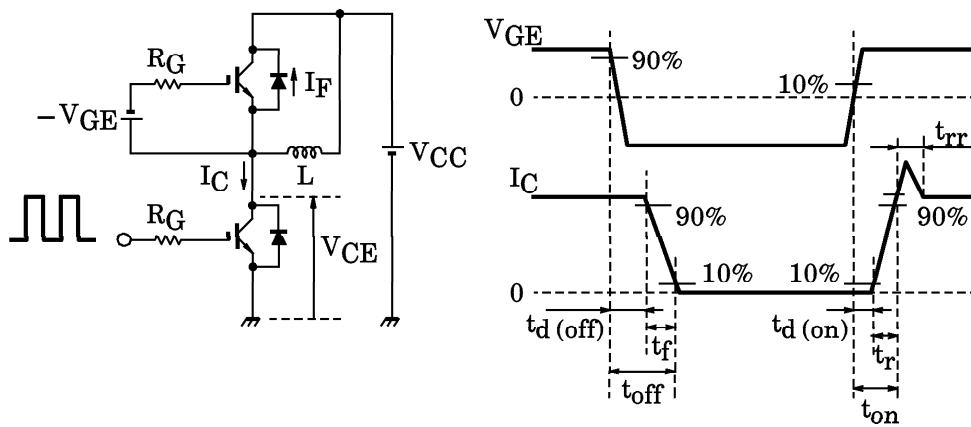
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

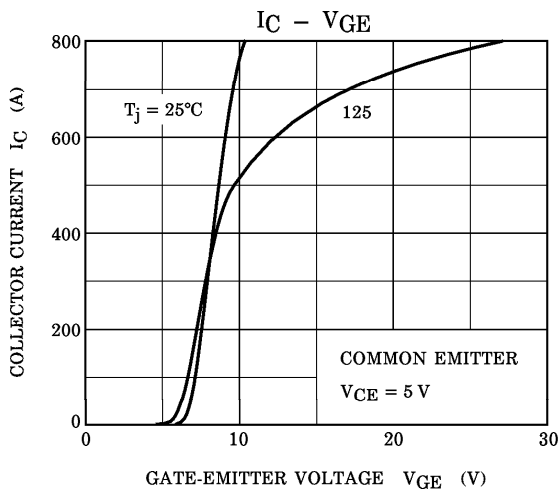
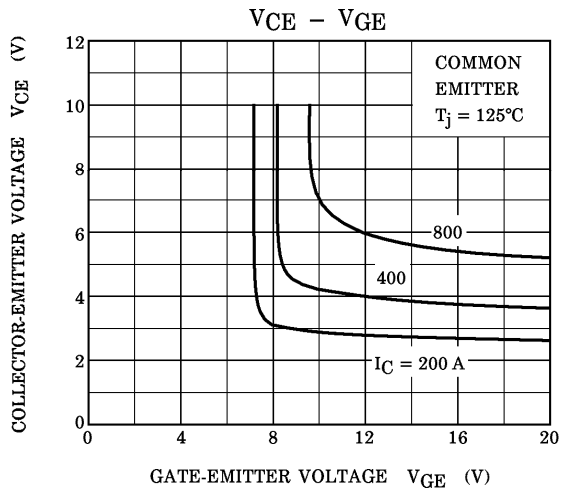
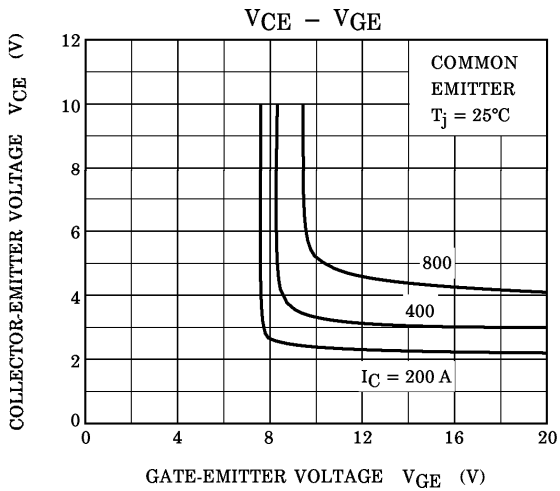
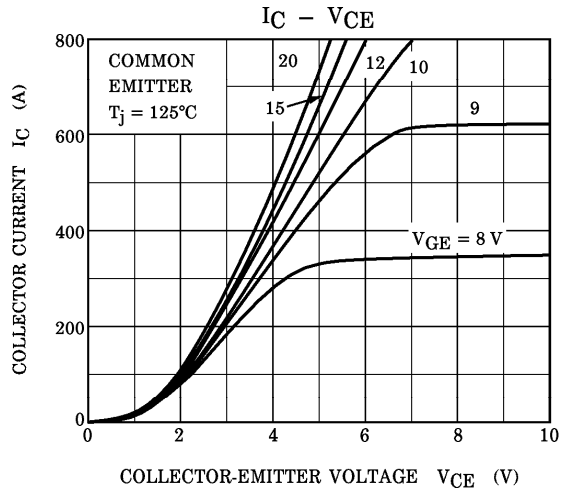
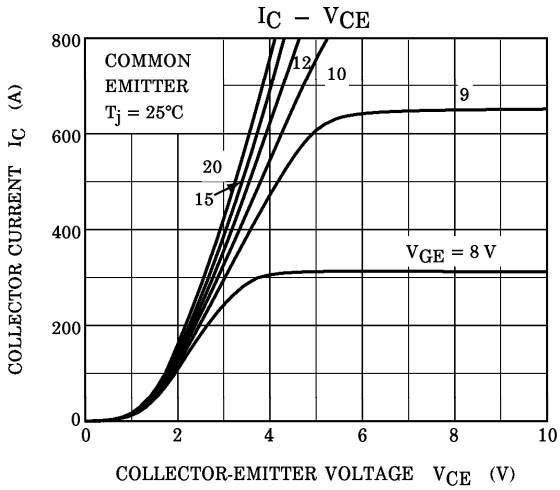
| CHARACTERISTIC                       |                     | SYMBOL                | TEST CONDITION                                                                                                                         | MIN.                   | TYP.  | MAX.  | UNIT   |   |
|--------------------------------------|---------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------|-------|--------|---|
| 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>CES</sub>      | V <sub>CE</sub> = 1700 V, V <sub>GE</sub> = 0 V                                                                                        | —                      | —     | 1     | mA     |   |
| Gate-Emitter Cut-Off Voltage         |                     | V <sub>GE (off)</sub> | I <sub>C</sub> = 400 mA, V <sub>CE</sub> = 5 V                                                                                         | —                      | 5.5   | —     | V      |   |
| Collector-Emitter Saturation Voltage |                     | V <sub>CE (sat)</sub> | I <sub>C</sub> = 400 A,<br>V <sub>GE</sub> = 15 V                                                                                      | T <sub>j</sub> = 25°C  | —     | 3.0   | 3.4    | V |
|                                      |                     |                       |                                                                                                                                        | T <sub>j</sub> = 125°C | —     | 3.8   | 4.2    |   |
| Input Capacitance                    |                     | C <sub>ies</sub>      | V <sub>CE</sub> = 10 V, V <sub>GE</sub> = 0 V,<br>f = 1 MHz                                                                            | —                      | 45000 | —     | pF     |   |
| Gate-Emitter Voltage                 |                     | V <sub>GE</sub>       | —                                                                                                                                      | 13                     | 15    | 17    | V      |   |
| Gate Resistance                      |                     | R <sub>G</sub>        | —                                                                                                                                      | 8.2                    | —     | 15    | Ω      |   |
| Switching Time                       | Turn-On Delay Time  | t <sub>d (on)</sub>   | Inductive Load<br>V <sub>CC</sub> = 900 V<br>I <sub>C</sub> = 400 A<br>V <sub>GE</sub> = ±15 V<br>R <sub>G</sub> = 8.2 Ω<br><br>(Note) | —                      | 0.35  | —     | μs     |   |
|                                      | Rise Time           | t <sub>r</sub>        |                                                                                                                                        | —                      | 0.2   | —     |        |   |
|                                      | Turn-On Time        | t <sub>on</sub>       |                                                                                                                                        | —                      | 0.55  | —     |        |   |
|                                      | Turn-Off Delay Time | t <sub>d (off)</sub>  |                                                                                                                                        | —                      | 0.9   | —     |        |   |
|                                      | Fall Time           | t <sub>f</sub>        |                                                                                                                                        | —                      | 0.4   | 0.6   |        |   |
|                                      | Turn-Off Time       | t <sub>off</sub>      |                                                                                                                                        | —                      | 1.3   | —     |        |   |
| Forward Voltage                      |                     | V <sub>F</sub>        | I <sub>F</sub> = 400 A,<br>V <sub>GE</sub> = 0 V                                                                                       | T <sub>j</sub> = 25°C  | —     | 3.2   | 4.2    | V |
|                                      |                     |                       |                                                                                                                                        | T <sub>j</sub> = 125°C | —     | 2.4   | —      |   |
| Reverse Recovery Time                |                     | t <sub>rr</sub>       | I <sub>F</sub> = 400 A, V <sub>GE</sub> = -15 V<br>di / dt = 2000 A / μs                                                               | —                      | 0.20  | 0.40  | μs     |   |
| Thermal Resistance                   |                     | R <sub>th (j-c)</sub> | Transistor Stage                                                                                                                       | —                      | —     | 0.029 | °C / W |   |
|                                      |                     |                       | Diode Stage                                                                                                                            | —                      | —     | 0.056 |        |   |
| RTC Operating Current                |                     | I <sub>rtc</sub>      | T <sub>j</sub> = 25°C                                                                                                                  | 800                    | —     | —     | A      |   |

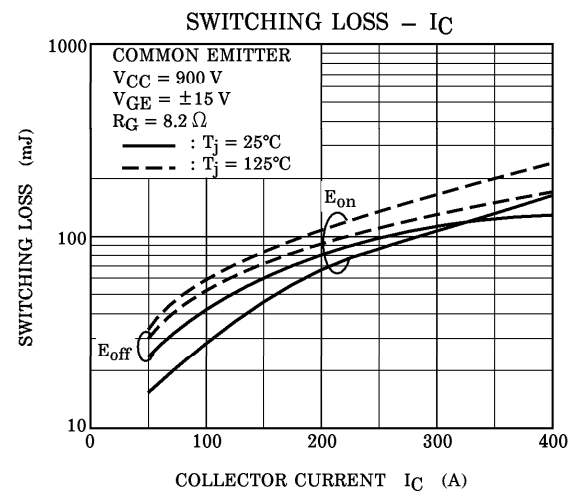
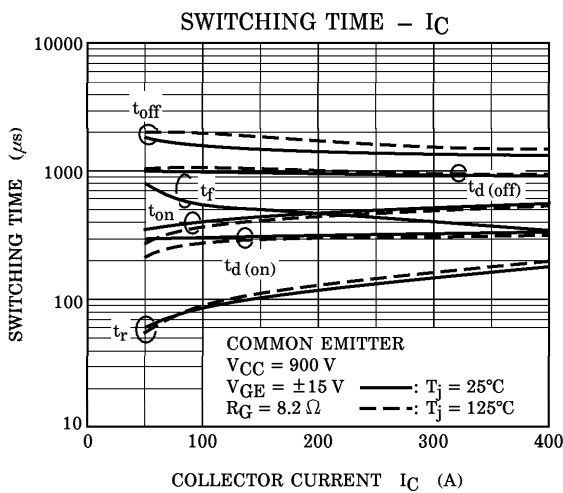
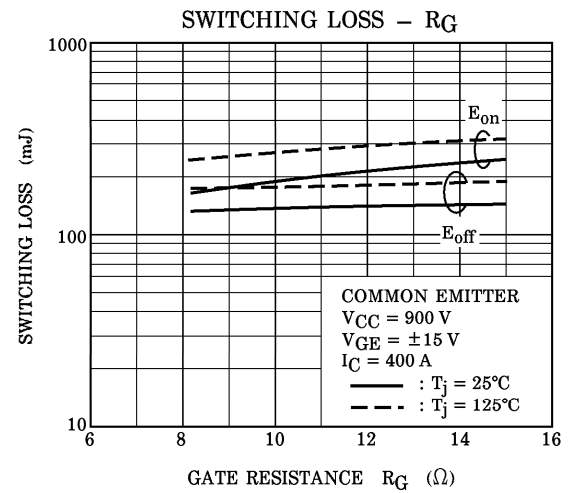
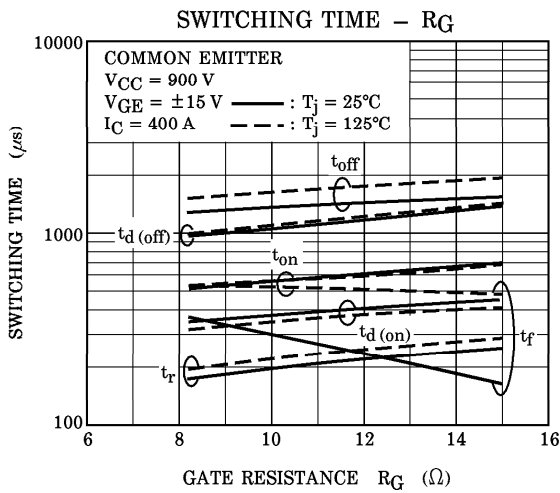
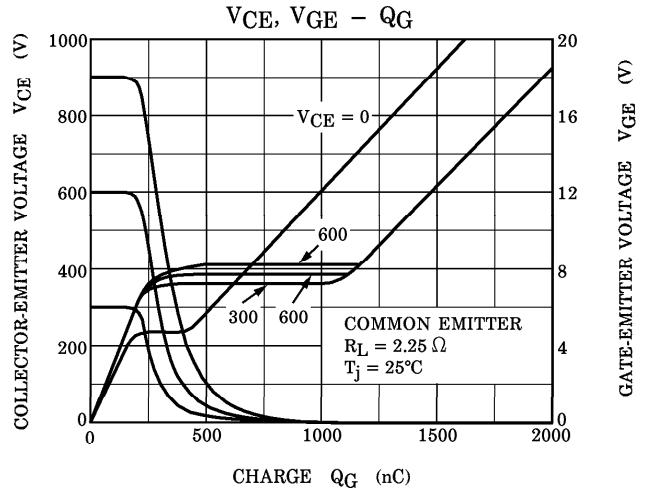
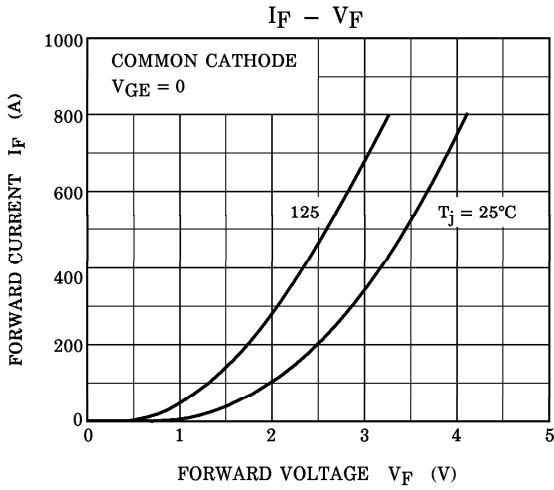
**THERMISTOR**

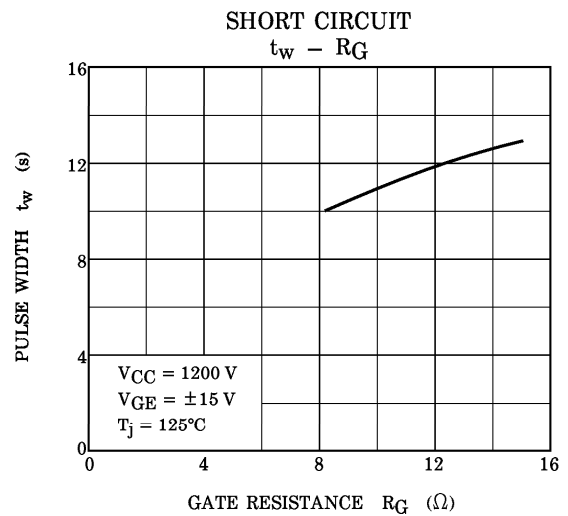
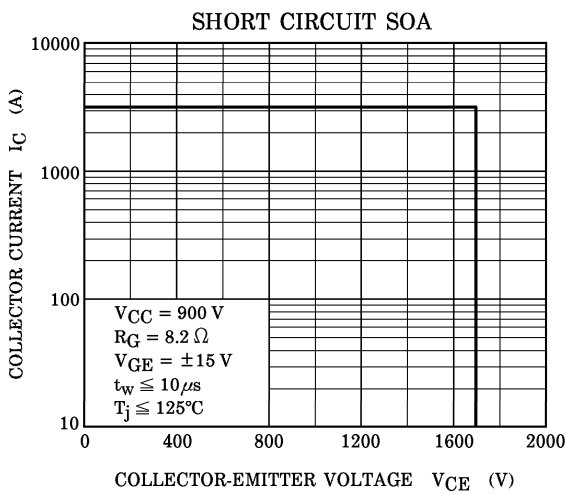
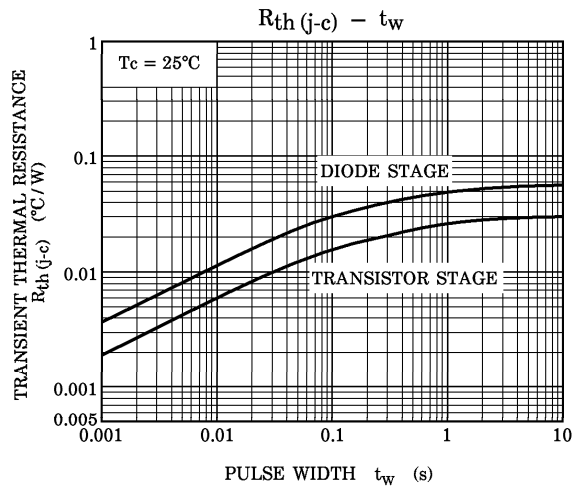
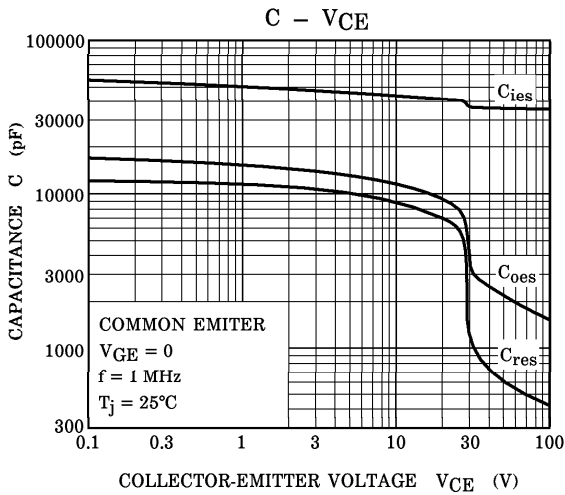
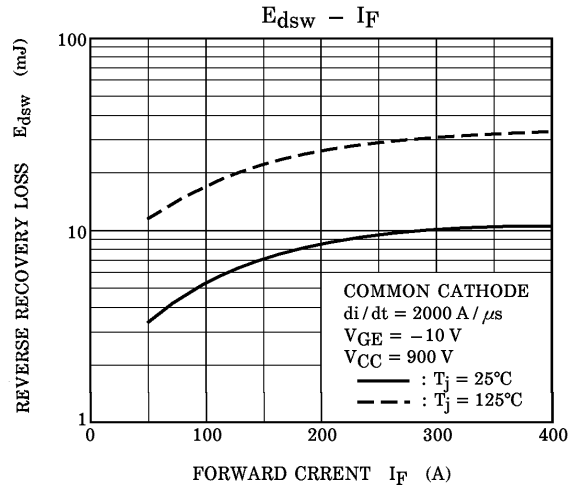
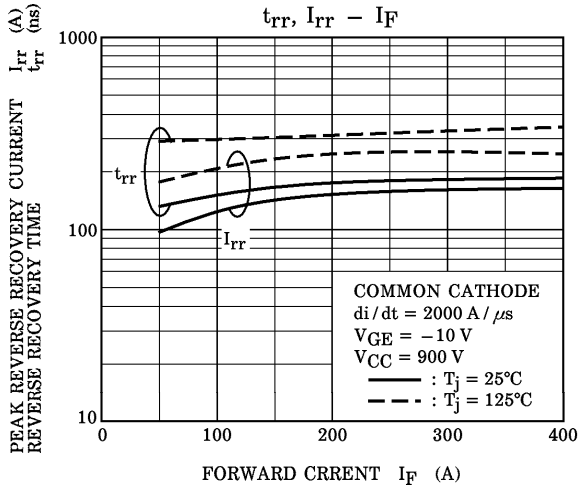
| CHARACTERISTIC        | SYMBOL   | TEST CONDITION                                | MIN. | TYP. | MAX. | UNIT             |
|-----------------------|----------|-----------------------------------------------|------|------|------|------------------|
| Zero Power Resistance | R25      | T <sub>c</sub> = 25°C                         | —    | 100  | —    | kΩ               |
| B Value               | B25 / 85 | T <sub>c</sub> = 25°C / T <sub>c</sub> = 85°C | —    | 4390 | —    | K                |
| Isolation Voltage     |          | T <sub>c</sub> = 25°C                         | 2500 | —    | —    | V <sub>rms</sub> |

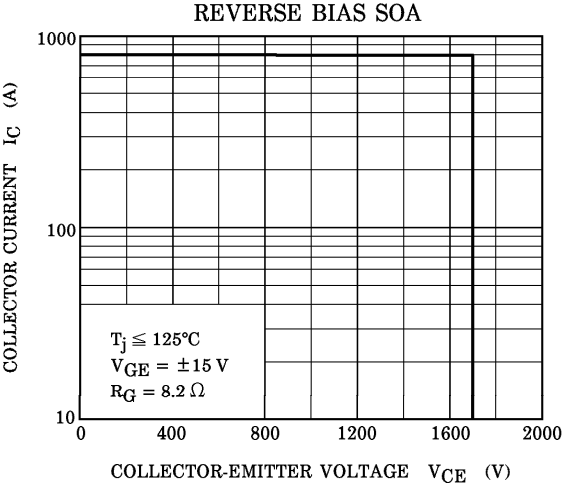
(Note) : Switching time measurement circuit and input/output waveforms











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

| RANK SYMBOL | MIN. | MAX. |
|-------------|------|------|
| 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  |
| 34          | 3.1  | 3.4  |

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

| RANK SYMBOL | MIN. | MAX. |
|-------------|------|------|
| 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  |
| L           | 3.5  | 3.8  |
| M           | 3.7  | 4.0  |
| N           | 3.9  | 4.2  |

<MARK POSITION>

