

TOSHIBA INTEGRATED IGBT MODULE SILICON N CHANNEL IGBT

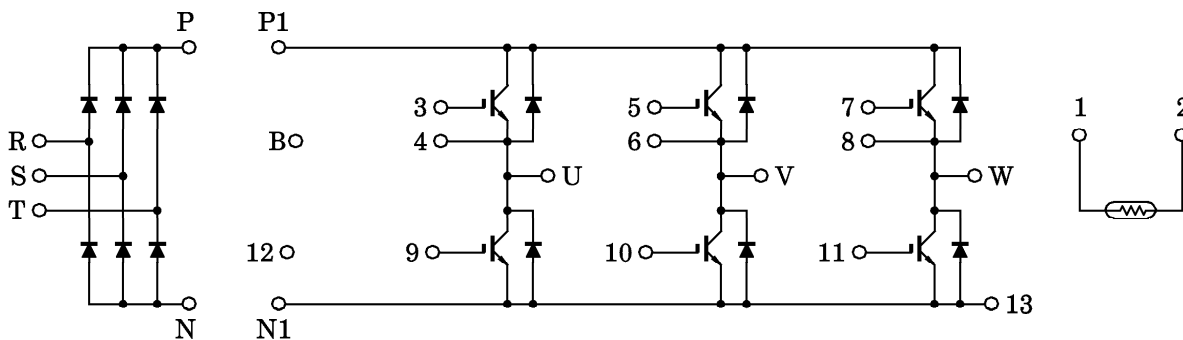
# MIG15Q806H, MIG15Q806HA

HIGH POWER SWITCHING APPLICATIONS

MOTOR CONTROL APPLICATIONS

- Integrates Inverter, Converter Power Circuits and Thermistor in One Package.
- Output (Inverter Stage) : 3 $\phi$  15 A / 1200 V IGBT
- Input (Converter Stage) : 3 $\phi$  15 A / 1600 V Silicon Rectifier
- The Electrodes are Isolated from Case.
- Weight : 190 g
- Outline
  - MIG15Q806H : 2-108E5A
  - MIG15Q806HA : 2-108E6A

EQUIVALENT CIRCUIT



961001EAA2

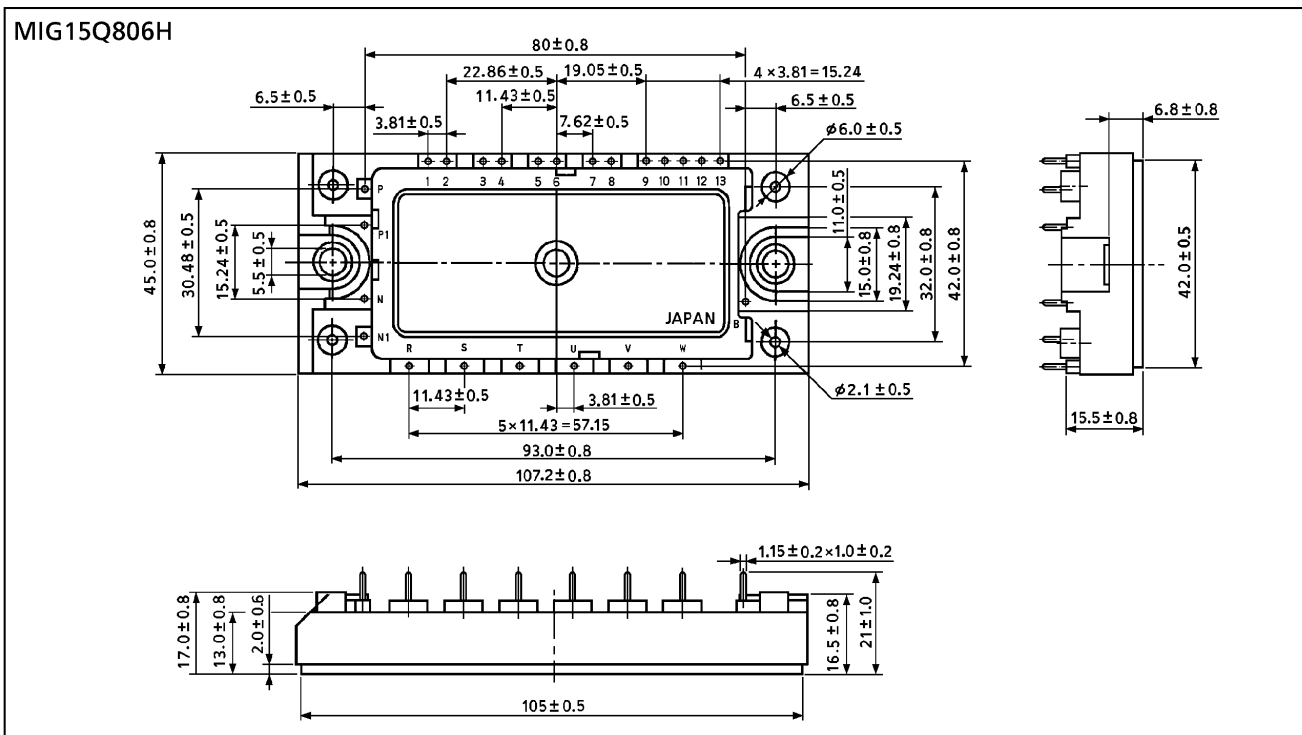
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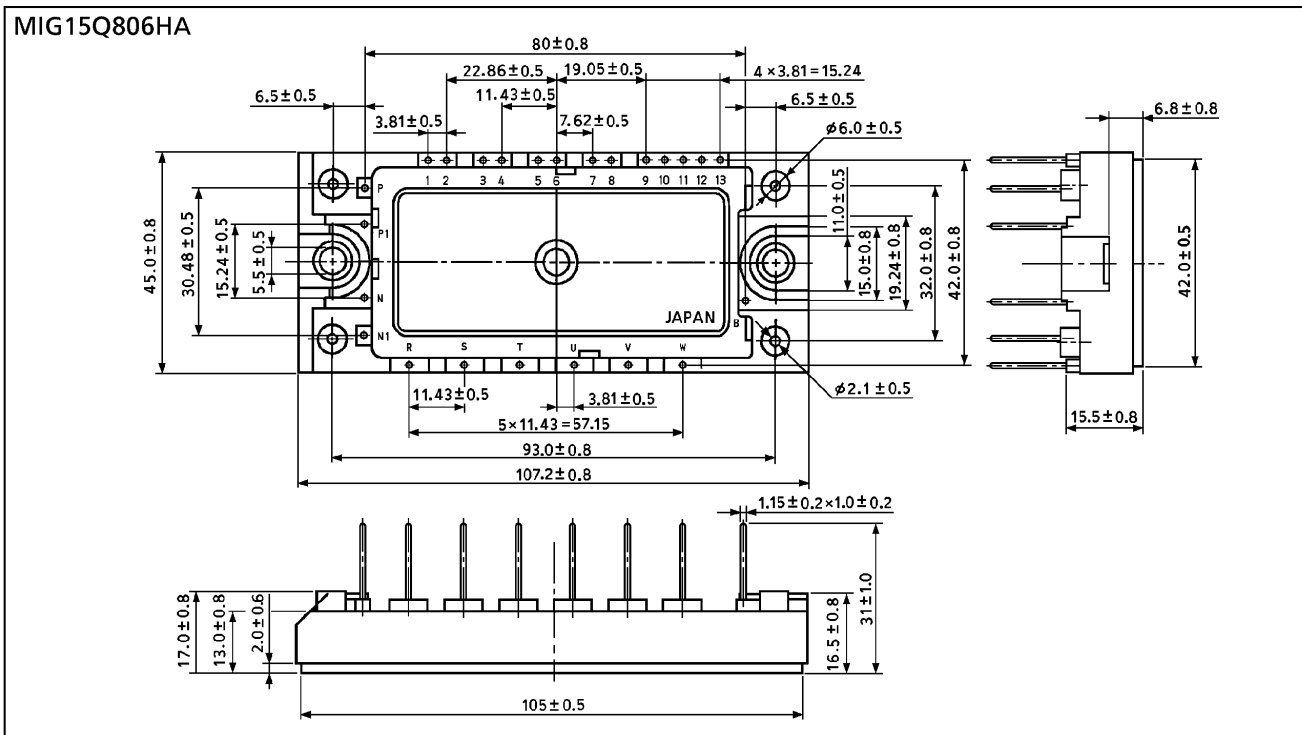
**Package Dimension**

Unit : mm



2-108E5A

Unit : mm



2-108E6A

MAXIMUM RATINGS (Ta = 25°C)

| STAGE   | CHARACTERISTIC   | SYMBOL            | RATING                | UNIT    |   |
|---|--|-------------------|-----------------------|---------|---|
| Inverter  | Collector-Emitter Voltage                                    | V <sub>CES</sub>  | 1200                  | V       |   |
|   | Gate-Emitter Voltage   | V <sub>GES</sub>  | ±20                   | V       |   |
|   | Collector Current  | DC                | I <sub>C</sub>        | 25 / 15 | A |
|   |  | 1 ms              | I <sub>CP</sub>       | 50 / 30 | A |
|   | Forward Current  | DC                | I <sub>F</sub>        | 15      | A |
|   |  | 1 ms              | I <sub>FM</sub>       | 30      | A |
| Collector Power Dissipation (T <sub>c</sub> = 25°C) |  | P <sub>C</sub>    | 145                   | W       |   |
| Converter   | Repetitive Peak Reverse Voltage                              | V <sub>RRM</sub>  | 1600                  | V       |   |
|   | Average Output Rectified Current                             | I <sub>O</sub>    | 15                    | A       |   |
|   | Peak One Cycle Surge Forward Current (50 Hz, Non-Repetitive) | I <sub>FSM</sub>  | 250                   | A       |   |
| Module  | 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 minute) | V       |   |
|   | Screw Torque   | —                 | 6                     | N·m     |   |

(25°C / 80°C)  
(25°C / 80°C)

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

a. Inverter stage

| 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                     | —   | —    | ±500 | nA   |    |
| Collector Cut-Off Current            | I <sub>CES</sub>      | V <sub>CE</sub> = 1200 V, V <sub>GE</sub> = 0                    | —   | —    | 0.5  | mA   |    |
| Gate-Emitter Cut-Off Voltage         | V <sub>GE (off)</sub> | I <sub>C</sub> = 15 mA, V <sub>CE</sub> = 5 V                    | —   | 6.0  | —    | V    |    |
| Collector-Emitter Saturation Voltage | V <sub>CE (sat)</sub> | I <sub>C</sub> = 15 A, T <sub>j</sub> = 25°C                     | —   | 2.8  | 3.2  | V    |    |
|                                      |                       | V <sub>GE</sub> = 15 V, T <sub>j</sub> = 125°C                   | —   | 3.1  | 3.7  |      |    |
| Input Capacitance                    | C <sub>ies</sub>      | V <sub>CE</sub> = 10 V, V <sub>GE</sub> = 0, f = 1 MHz           | —   | 1850 | —    | pF   |    |
| Switching Time                       | Rise Time             | t <sub>r</sub>   | V <sub>CC</sub> = 600 V<br>I <sub>C</sub> = 15 A<br>V <sub>GE</sub> = ±15 V<br>R <sub>G</sub> = 82 Ω<br>T <sub>j</sub> = 125°C (Note 1) | —    | 0.07 | 0.15 | μs |
|                                      | Turn-On Time          | t <sub>on</sub>  |   | —    | 0.15 | 0.30 |    |
|                                      | Fall Time             | t <sub>f</sub>   |   | —    | 0.07 | 0.10 |    |
|                                      | Turn-Off Time         | t <sub>off</sub>   |   | —    | 0.60 | 0.90 |    |
| Forward Voltage                      | V <sub>F</sub>        | I <sub>F</sub> = 15 A, V <sub>GE</sub> = 0                       | —   | 2.0  | 2.8  | V    |    |
| Reverse Recovery Time                | t <sub>rr</sub>       | I <sub>F</sub> = 15 A, V <sub>GE</sub> = -10 V, di/dt = 200 A/μs | —   | 0.10 | 0.25 | μs   |    |
| Thermal Resistance                   | R <sub>th (j-e)</sub> | Transistor   | —   | —    | 0.86 | °C/W |    |
|                                      |                       | Diode  | —   | —    | 1.5  |      |    |

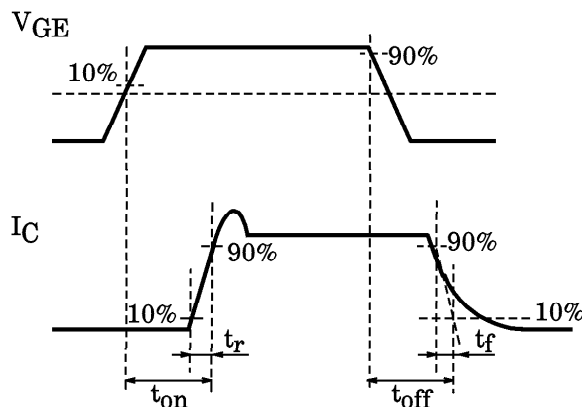
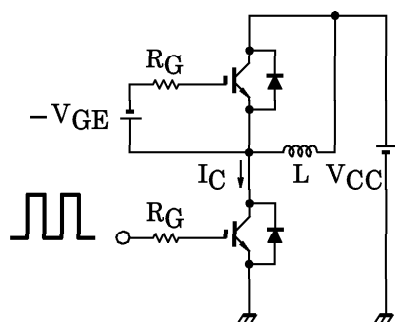
b. Converter stage

| CHARACTERISTIC                       | SYMBOL        | TEST CONDITION            | MIN. | TYP. | MAX. | UNIT                 |
|--------------------------------------|---------------|---------------------------|------|------|------|----------------------|
| Repetitive Peak Reverse Current      | $I_{RRM}$     | $V_{RRM} = 1600\text{ V}$ | —    | —    | 50   | $\mu\text{A}$        |
| Peak Forward Voltage                 | $V_{FM}$      | $I_{FM} = 15\text{ A}$    | —    | 1.05 | 1.20 | V                    |
| Peak One Cycle Surge Forward Current | $I_{FSM}$     | 50 Hz sine-half-wave      | 250  | —    | —    | A                    |
| Thermal Resistance                   | $R_{th(j-c)}$ | —                         | —    | —    | 1.90 | $^{\circ}\text{C/W}$ |

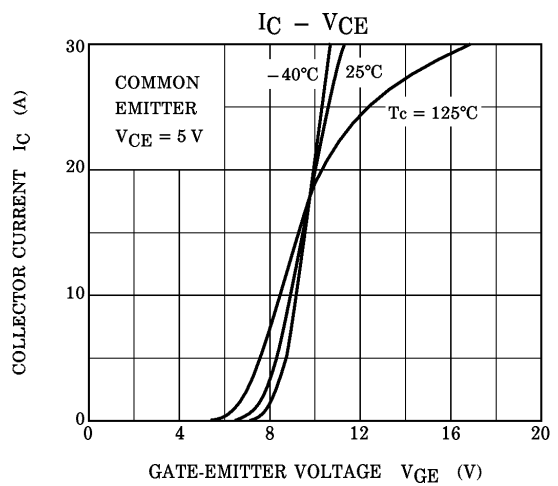
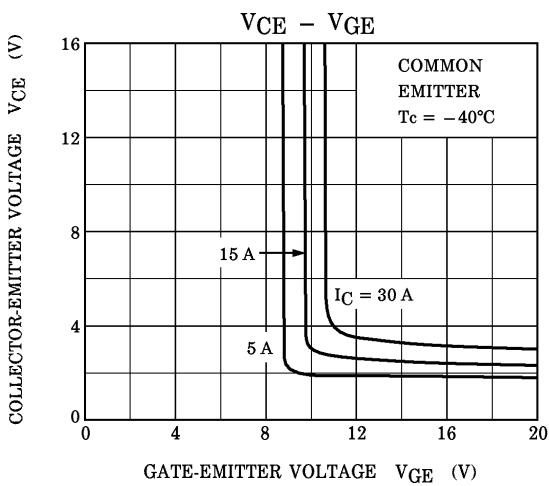
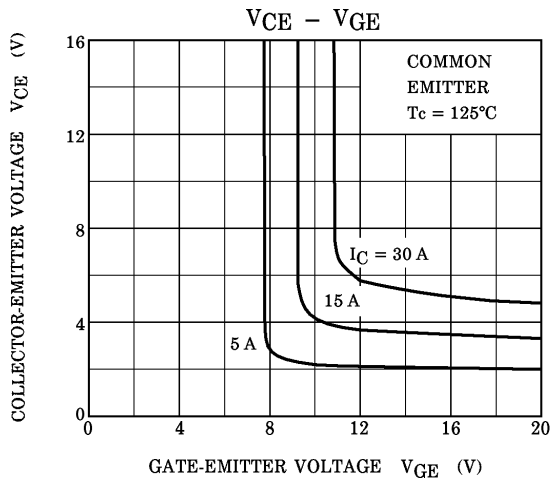
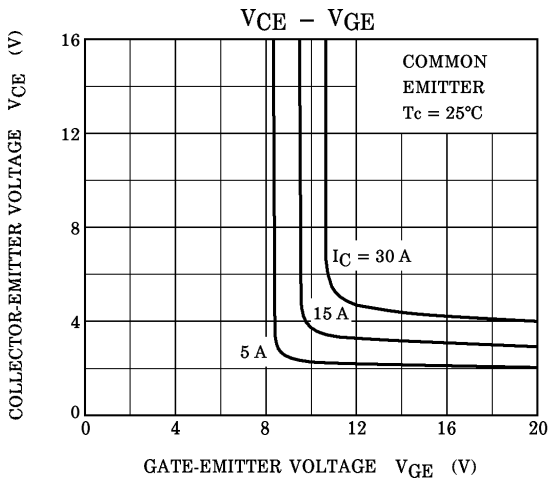
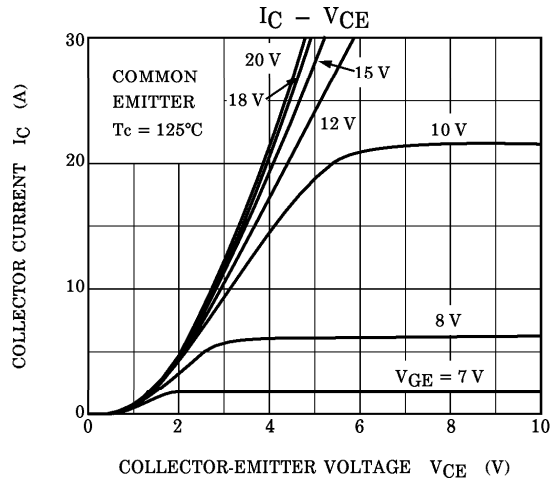
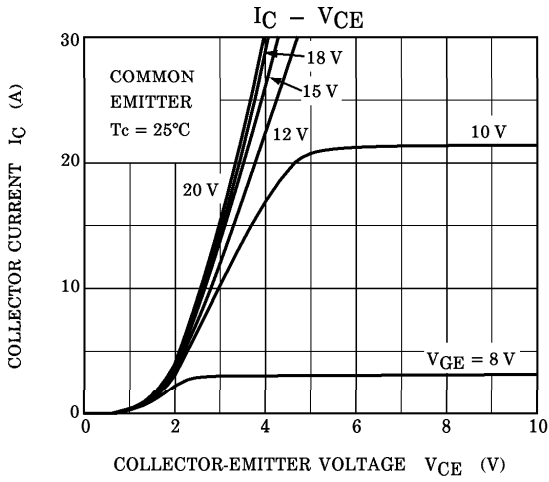
c. Thermistor

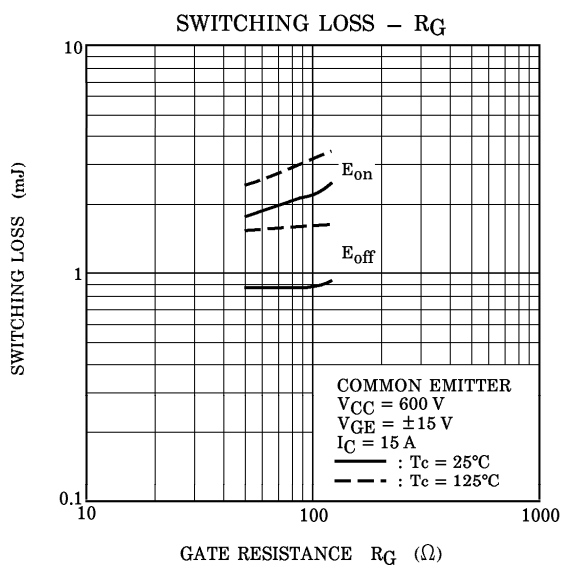
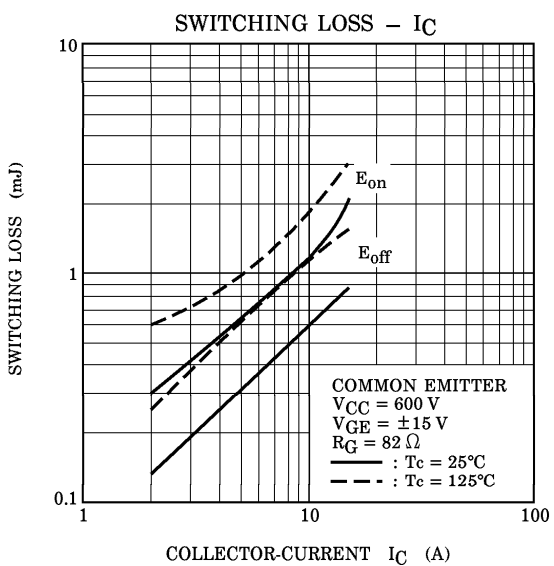
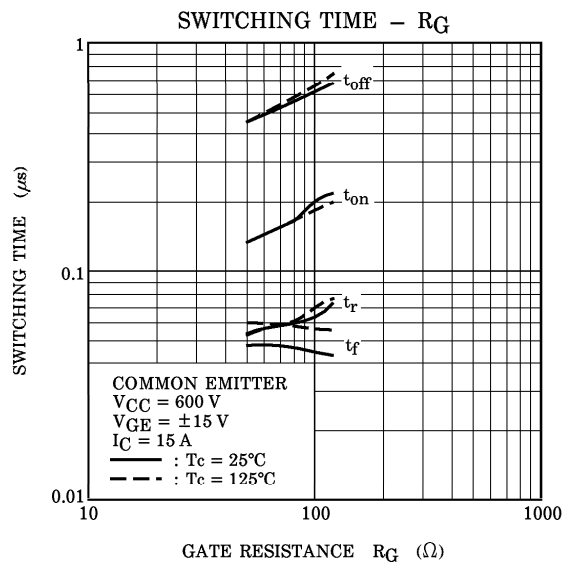
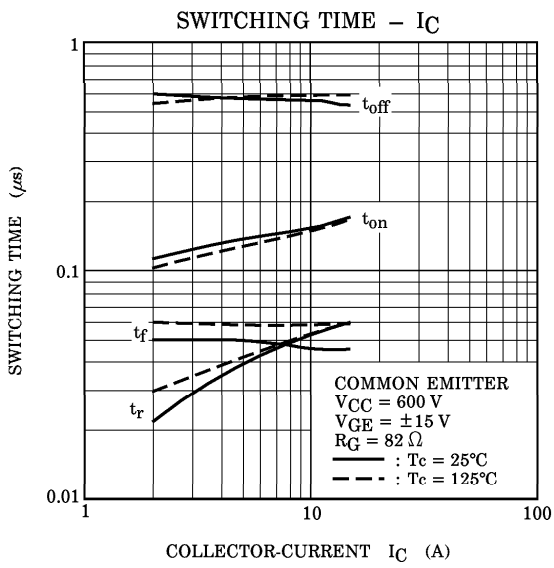
| CHARACTERISTIC        | SYMBOL      | TEST CONDITION  | MIN.  | TYP. | MAX.  | UNIT             |
|-----------------------|-------------|---|-------|------|-------|------------------|
| Zero-Power Resistance | $R_{25}$    | $I_{TM} = 0.2\text{ mA}$ , $T_c = 25^{\circ}\text{C}$ | 17.31 | 20   | 23.14 | $\text{k}\Omega$ |
| B Value               | $B_{25/85}$ | $T_c = 25^{\circ}\text{C} / T_c = 85^{\circ}\text{C}$ | —     | 3760 | —     | K                |

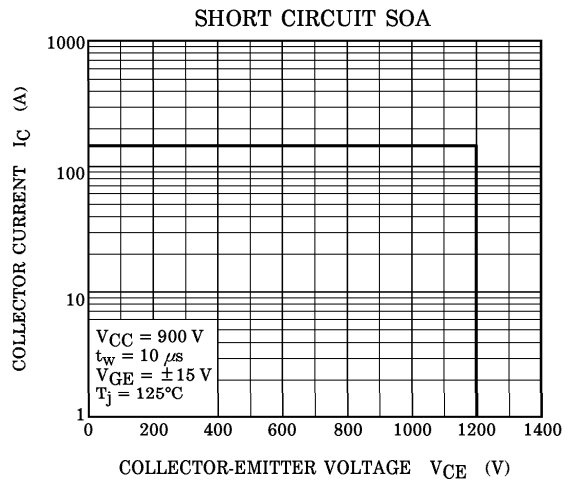
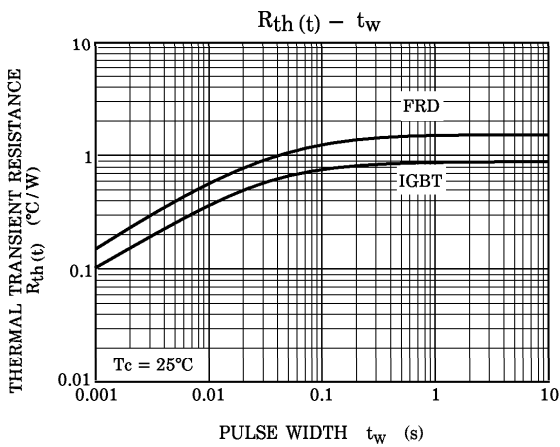
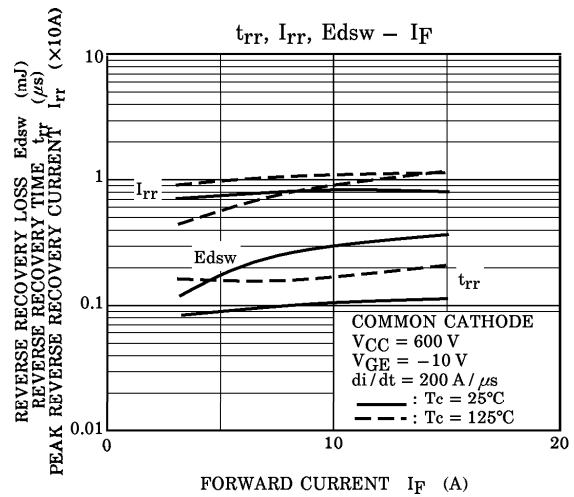
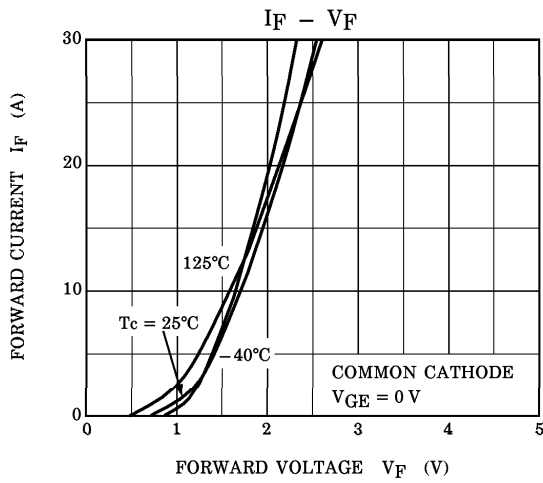
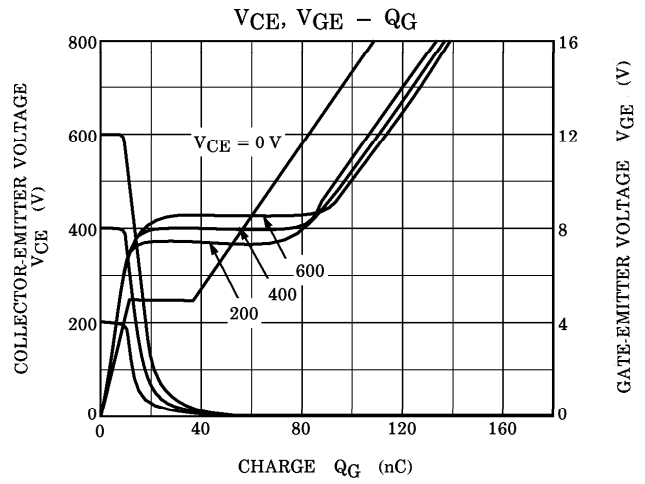
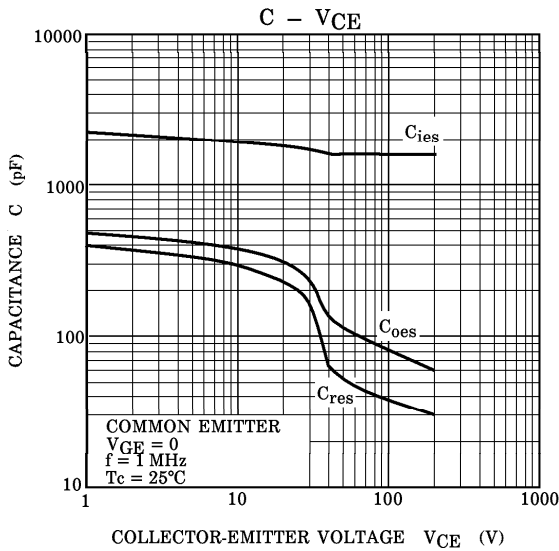
(Note 1) : Switching Time Test Circuit & Timing Chart

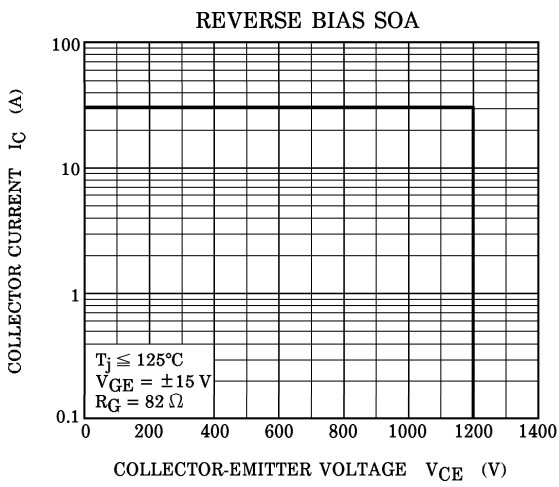


a. Inverter stage









**b. Converter stage**

