

### IGBT MODULE (U series) 1200V / 35A / PIM



#### ■ Features

- Low  $V_{CE(sat)}$
- Compact Package
- P.C. Board Mount Module
- Converter Diode Bridge Dynamic Brake Circuit

#### ■ Applications

- Inverter for Motoe Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

#### ■ Maximum ratings and characteristics

● Absolute maximum ratings ( $T_c=25^\circ\text{C}$  unless otherwise specified)

| Item                            |                                     | Symbol                       | Condition                    |                      | Rating  | Unit             |
|---------------------------------|-------------------------------------|------------------------------|------------------------------|----------------------|---------|------------------|
| Inverter                        | Collector-Emitter voltage           |                              | V <sub>CES</sub>             |                      | 1200    | V                |
|                                 | Gate-Emitter voltage                |                              | V <sub>GES</sub>             |                      | ±20     | V                |
|                                 | Collector current                   | I <sub>C</sub>               | Continuous                   | T <sub>C</sub> =25°C | 35      | A                |
|                                 |                                     |                              |                              | T <sub>C</sub> =80°C | 25      |                  |
|                                 |                                     | I <sub>CP</sub>              | 1ms                          | T <sub>C</sub> =25°C | 70      |                  |
|                                 |                                     |                              |                              | T <sub>C</sub> =80°C | 50      |                  |
|                                 |                                     | -I <sub>C</sub>              |                              |                      | 35      |                  |
| -I <sub>C</sub> pulse           | 1ms                                 |                              | 70                           |                      |         |                  |
| Collector power dissipation     |                                     | P <sub>C</sub>               | 1 device                     |                      | 160     | W                |
| Brake                           | Collector-Emitter voltage           |                              | V <sub>CES</sub>             |                      | 1200    | V                |
|                                 | Gate-Emitter voltage                |                              | V <sub>GES</sub>             |                      | ±20     | V                |
|                                 | Collector current                   | I <sub>C</sub>               | Continuous                   | T <sub>C</sub> =25°C | 25      | A                |
|                                 |                                     |                              |                              | T <sub>C</sub> =80°C | 15      |                  |
|                                 |                                     | I <sub>CP</sub>              | 1ms                          | T <sub>C</sub> =25°C | 50      |                  |
|                                 |                                     |                              |                              | T <sub>C</sub> =80°C | 30      |                  |
|                                 | Collector power dissipation         |                              | P <sub>C</sub>               | 1 device             |         | 115              |
| Repetitive peak reverse voltage |                                     | V <sub>R<sub>RRM</sub></sub> |                              | 1200                 | V       |                  |
| Converter                       | Repetitive peak reverse voltage     |                              | V <sub>R<sub>RRM</sub></sub> |                      | 1600    | V                |
|                                 | Average output current              |                              | I <sub>O</sub>               |                      | 35      | A                |
|                                 | Surge current (Non-Repetitive)      |                              | I <sub>FSM</sub>             |                      | 260     | A                |
|                                 | I <sup>2</sup> t (Non-Repetitive)   |                              | P <sub>t</sub>               |                      | 338     | A <sup>2</sup> s |
| Operating junction temperature  |                                     | T <sub>J</sub>               |                              | +150                 | °C      |                  |
| Storage temperature             |                                     | T <sub>slg</sub>             |                              | -40 to +125          | °C      |                  |
| Isolation voltage               | between terminal and copper base *2 | V <sub>iso</sub>             | AC : 1 minute                |                      | AC 2500 | V                |
|                                 | between thermistor and others *3    |                              |                              |                      | AC 2500 |                  |
| Mounting screw torque           |                                     |                              |                              |                      | 3.5 *1  | N·m              |

\*1 Recommendable value : 2.5 to 3.5 N·m (M5)

\*2 All terminals should be connected together when isolation test will be done.

\*3 Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

● Electrical characteristics (Tj=25°C unless otherwise specified)

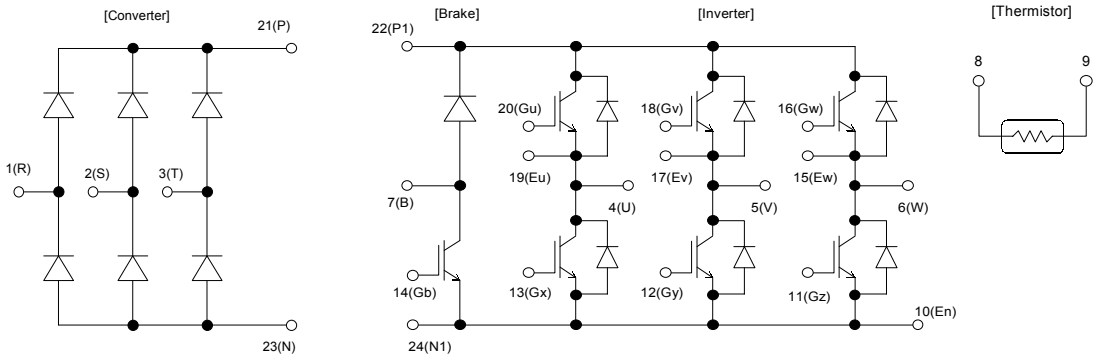
| Item                  |                                      | Symbol                 | Condition                      |          | Characteristics |      |      | Unit |
|-----------------------|--------------------------------------|------------------------|--------------------------------|----------|-----------------|------|------|------|
|                       |                                      |                        |                                |          | Min.            | Typ. | Max. |      |
| Inverter              | Zero gate voltage collector current  | ICES                   | VCE=1200V, VGE=0V              |          | -               | -    | 1.0  | mA   |
|                       | Gate-Emitter leakage current         | IGES                   | VCE=0V, VGE=±20V               |          | -               | -    | 200  | nA   |
|                       | Gate-Emitter threshold voltage       | VGE(th)                | VCE=20V, Ic=35mA               |          | 4.5             | 6.5  | 8.5  | V    |
|                       | Collector-Emitter saturation voltage | VCE(sat)<br>(terminal) | VGE=15V<br>Ic=35A              | Tj=25°C  | -               | 2.25 | 2.70 | V    |
|                       |                                      |                        |                                | Tj=125°C | -               | 2.60 | -    |      |
|                       |                                      | VCE(sat)<br>(chip)     |                                | Tj=25°C  | -               | 1.95 | 2.40 |      |
|                       |                                      |                        |                                | Tj=125°C | -               | 2.30 | -    |      |
|                       | Input capacitance                    | Cies                   | VGE=0V, VCE=10V, f=1MHz        |          | -               | 3    | -    | nF   |
|                       | Turn-on time                         | ton                    | VCC=600V<br>Ic=35A<br>VGE=±15V |          | -               | 0.53 | 1.20 | µs   |
|                       |                                      | tr                     |                                |          | -               | 0.43 | 0.60 |      |
|                       |                                      | tr(i)                  |                                |          | -               | 0.03 | -    |      |
|                       | Turn-off time                        | toff                   | RG= 43 Ω                       |          | -               | 0.37 | 1.00 |      |
|                       |                                      | tr                     |                                |          | -               | 0.07 | 0.30 |      |
|                       | Forward on voltage                   | VF<br>(terminal)       | VGE= 0 V<br>If=35A             | Tj=25°C  | -               | 2.05 | 2.40 | V    |
|                       |                                      |                        |                                | Tj=125°C | -               | 2.20 | -    |      |
| VF<br>(chip)          |                                      | Tj=25°C                |                                | -        | 1.75            | 2.10 |      |      |
|                       |                                      | Tj=125°C               |                                | -        | 1.90            | -    |      |      |
| Reverse recovery time | trr                                  | If=35A                 |                                | -        | -               | 0.35 | µs   |      |
| Brake                 | Zero gate voltage collector current  | ICES                   | VCE=1200V, VGE=0V              |          | -               | -    | 1.0  | mA   |
|                       | Gate-Emitter leakage current         | IGES                   | VCE=0V, VGE=±20V               |          | -               | -    | 200  | nA   |
|                       | Collector-Emitter saturation voltage | VCE(sat)<br>(terminal) | Ic=25A<br>VGE=15V              | Tj=25°C  | -               | 2.40 | 2.90 | V    |
|                       |                                      |                        |                                | Tj=125°C | -               | 2.85 | -    |      |
|                       |                                      | VCE(sat)<br>(chip)     |                                | Tj=25°C  | -               | 2.10 | 2.60 |      |
|                       |                                      |                        |                                | Tj=125°C | -               | 2.55 | -    |      |
|                       | Turn-on time                         | ton                    | VCC=600V<br>Ic=25A             |          | -               | 0.53 | 1.20 | µs   |
|                       |                                      | tr                     |                                |          | -               | 0.43 | 0.60 |      |
|                       | Turn-off time                        | toff                   | VGE=±15V<br>RG= 68 Ω           |          | -               | 0.37 | 1.00 |      |
|                       |                                      | tr                     |                                |          | -               | 0.07 | 0.30 |      |
|                       | Reverse current                      | IRRM                   | VR=1200V                       |          | -               | -    | 1.0  | mA   |
| Converter             | Forward on voltage                   | VFM                    | If=35 A                        | terminal | -               | 1.35 | 1.70 | V    |
|                       |                                      |                        | VGE=0V                         | chip     | -               | 1.25 | -    |      |
|                       | Reverse current                      | IRRM                   | VR=1600V                       |          | -               | -    | 1.0  | mA   |
| Thermistor            | Resistance                           | R                      | T=25°C                         |          | -               | 5000 | -    | Ω    |
|                       |                                      |                        | T=100°C                        |          | 465             | 495  | 520  |      |
|                       | B value                              | B                      | T=25/50°C                      |          | 3305            | 3375 | 3450 | K    |

● Thermal resistance Characteristics

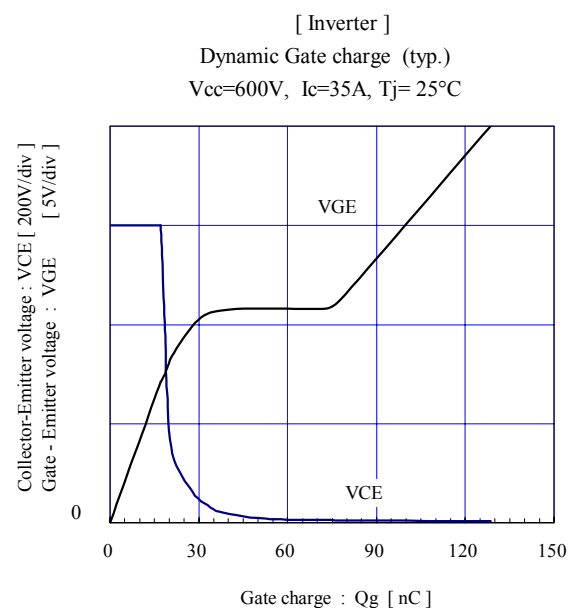
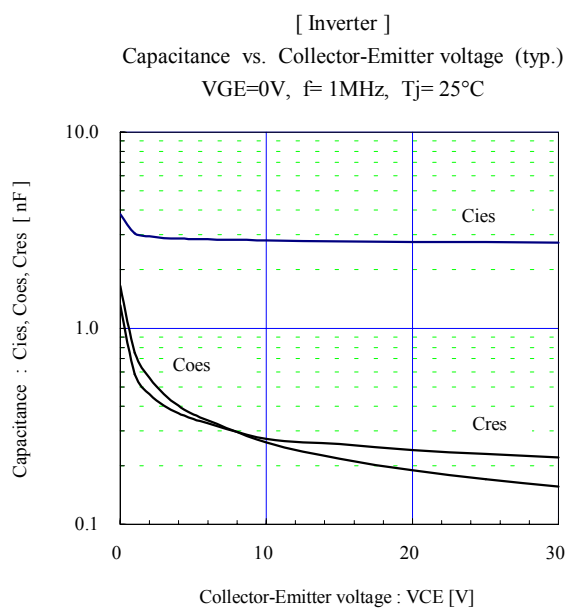
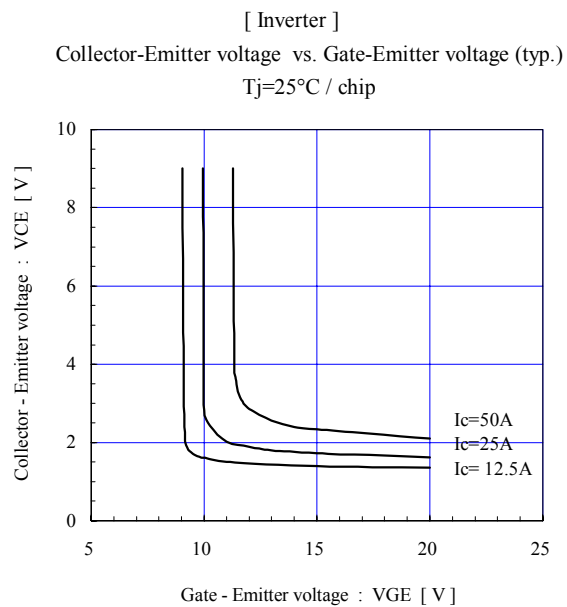
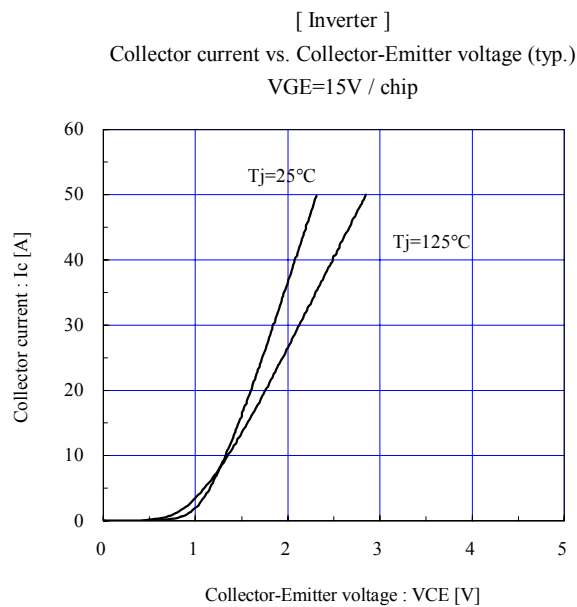
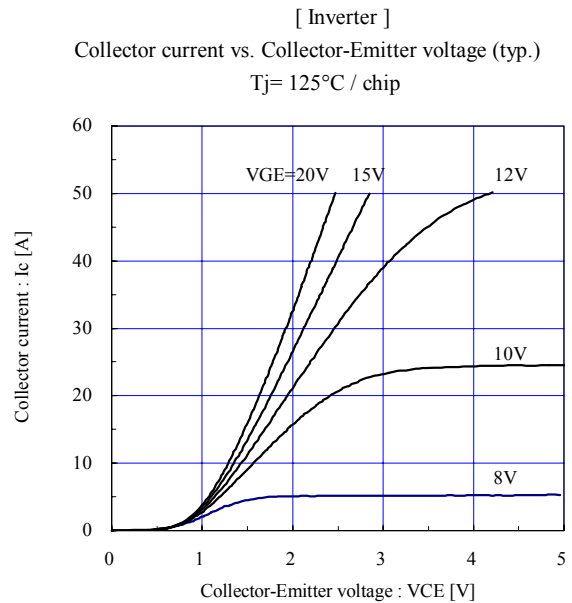
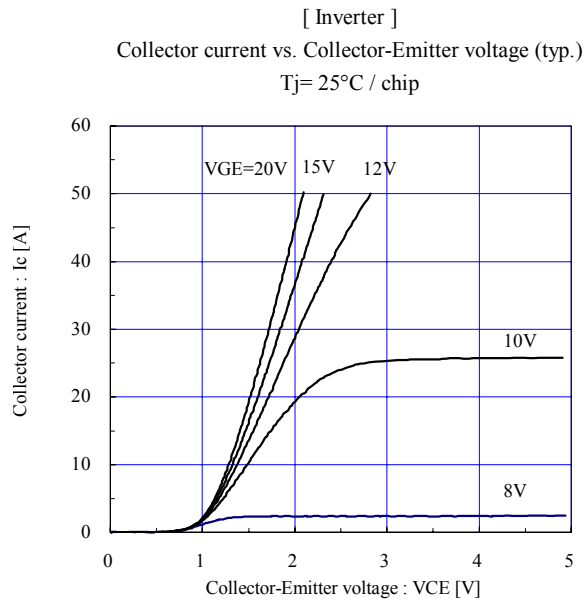
| Item                            |  | Symbol   | Condition             | Characteristics |      |      | Unit |
|---------------------------------|--|----------|-----------------------|-----------------|------|------|------|
|                                 |  |          |                       | Min.            | Typ. | Max. |      |
| Thermal resistance ( 1 device ) |  | Rth(j-c) | Inverter IGBT         | -               | -    | 0.76 | °C/W |
|                                 |  |          | Inverter FWD          | -               | -    | 1.19 |      |
|                                 |  |          | Brake IGBT            | -               | -    | 1.07 |      |
|                                 |  |          | Converter Diode       | -               | -    | 0.90 |      |
| Contact thermal resistance *    |  | Rth(c-f) | With thermal compound | -               | 0.05 | -    |      |

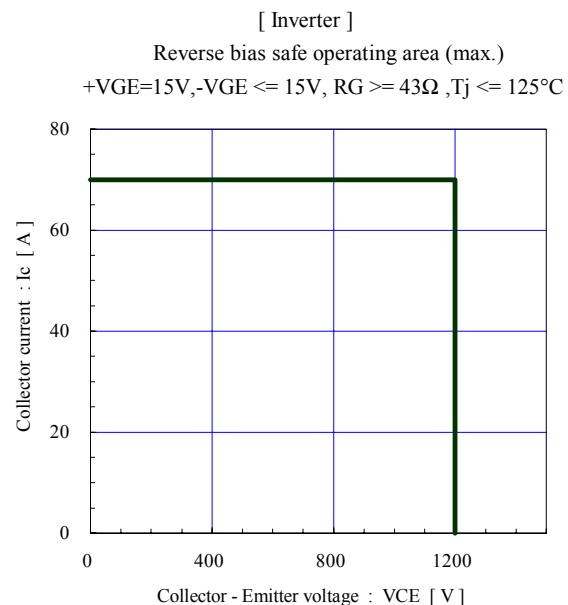
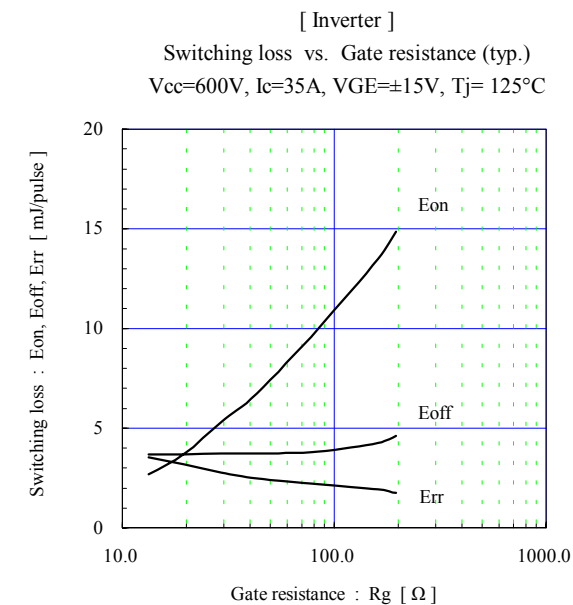
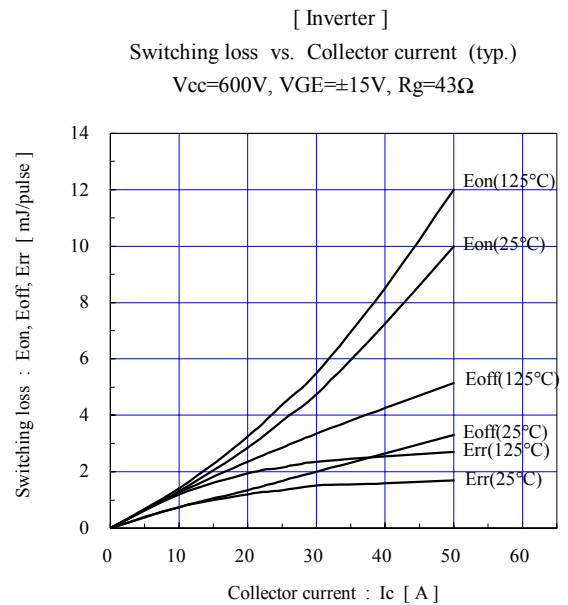
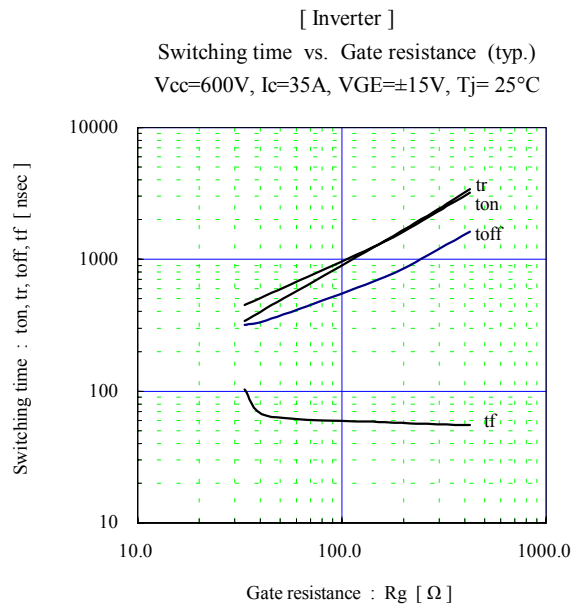
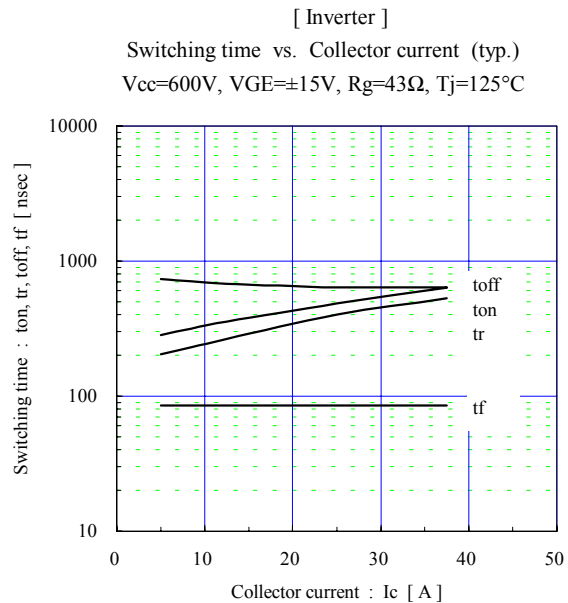
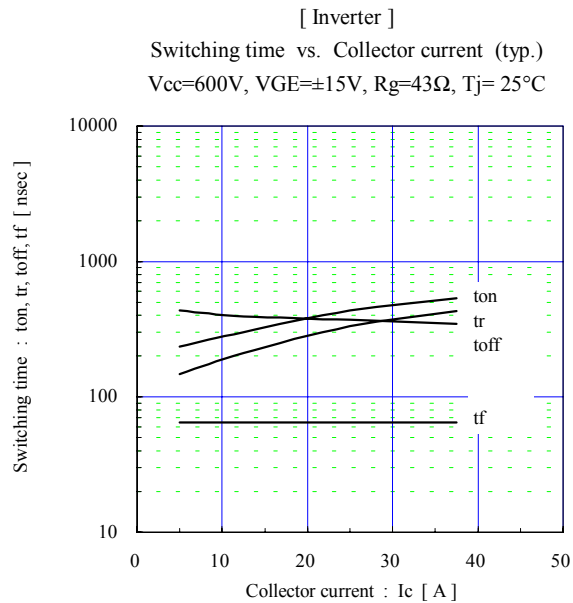
\* This is the value which is defined mounting on the additional cooling fin with thermal compound

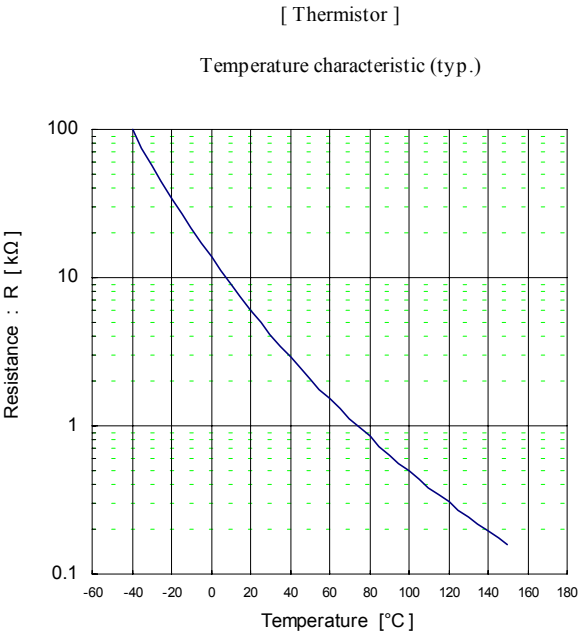
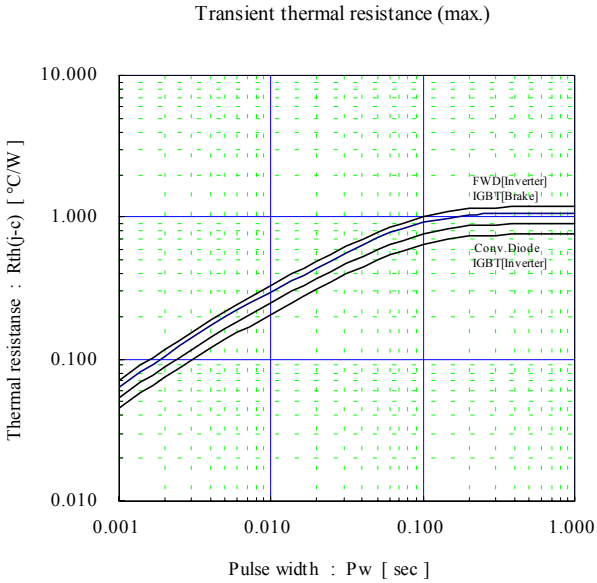
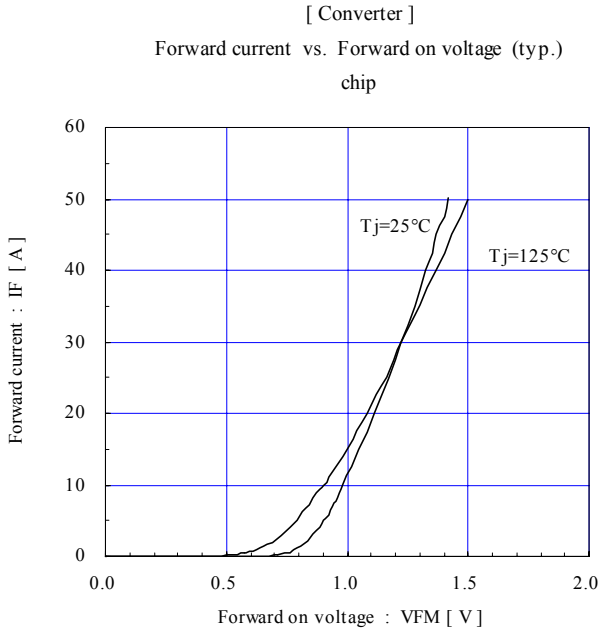
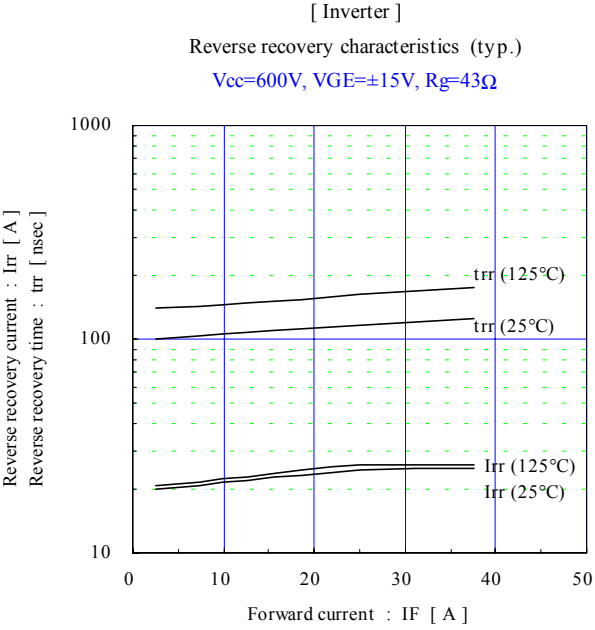
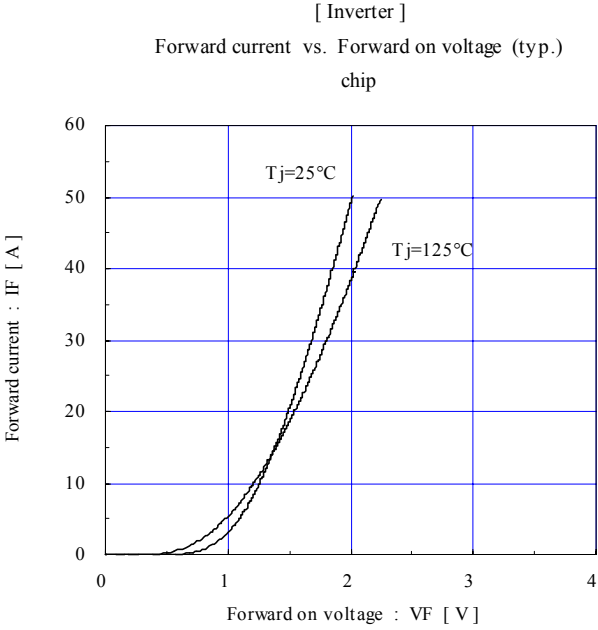
■ Equivalent Circuit Schematic

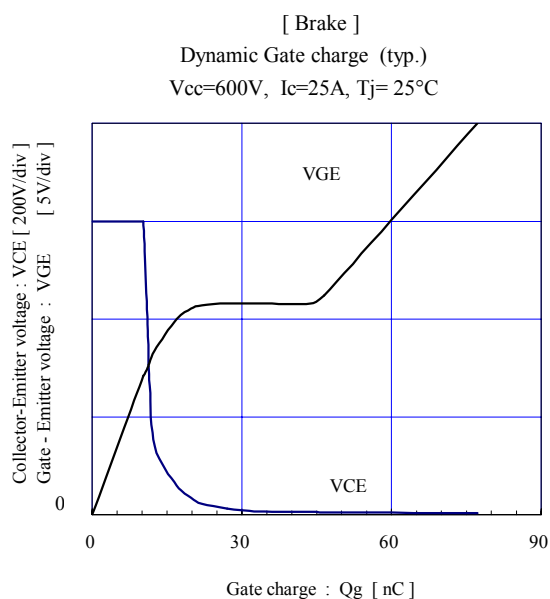
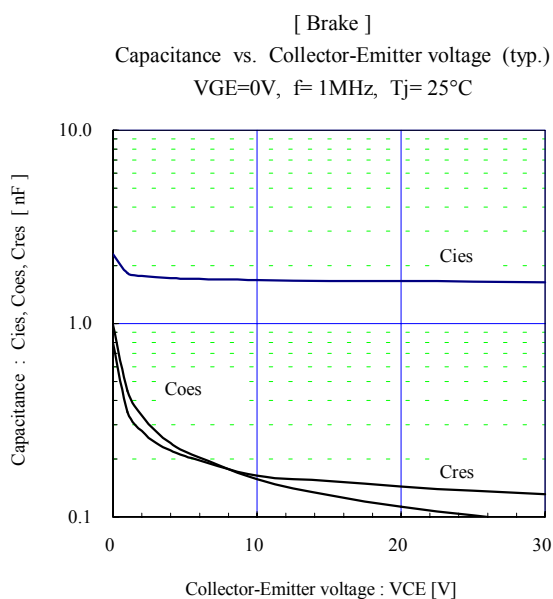
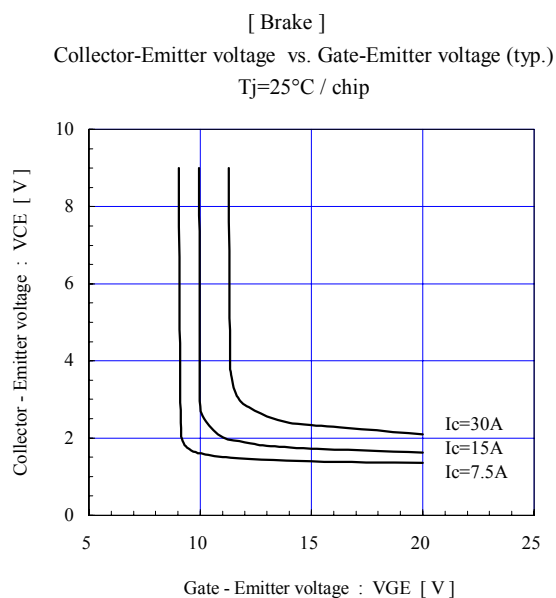
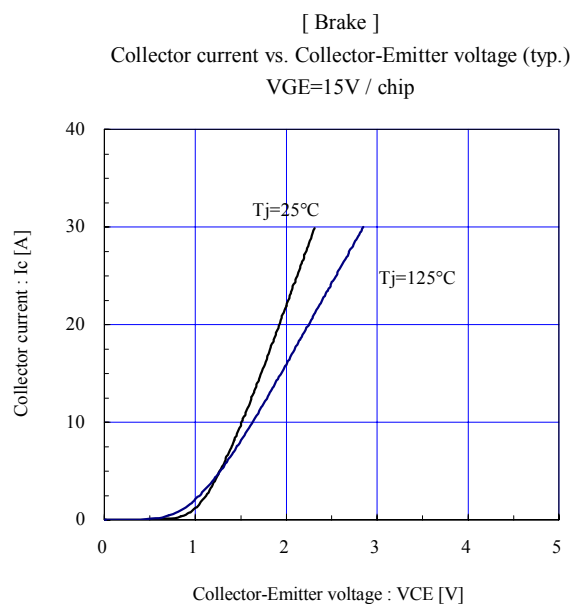
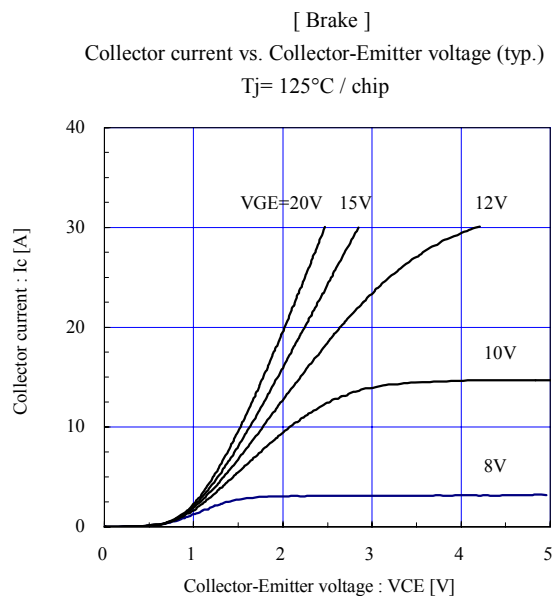
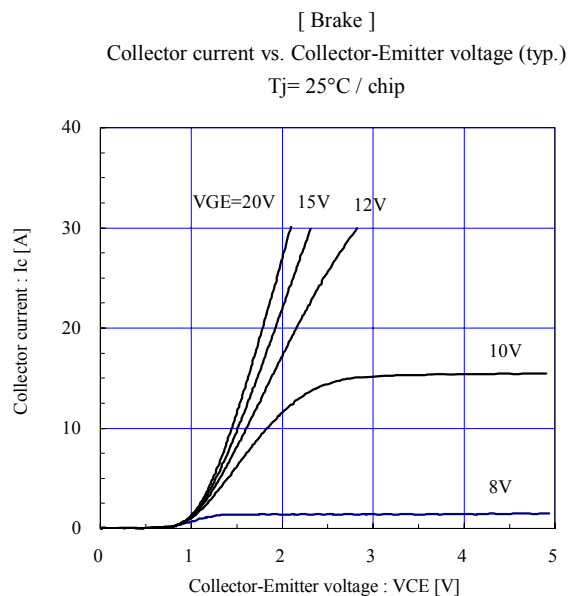


## ■ Characteristics (Representative)









## ■ Outline Drawings, mm

