

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



#### ■ Features

- Low  $V_{CE(sat)}$
- Compact package
- P.C. board mount
- Converter diode bridge, Dynamic brake circuit

#### ■ Applications

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

#### ■ Maximum ratings and characteristics

● Absolute maximum ratings ( $T_c=25^\circ\text{C}$  unless without specified)

| Item                            | Symbol  | Condition | Rating                         | Unit                   |                      |   |
|---------------------------------|---|-----------|--------------------------------|------------------------|----------------------|---|
| Inverter                        | Collector-Emitter voltage   | $V_{CES}$ | 1200                           | V                      |                      |   |
|                                 | Gate-Emitter voltage  | $V_{GES}$ | $\pm 20$                       | V                      |                      |   |
|                                 | Collector current   | $I_C$     | Continuous                     | $T_c=25^\circ\text{C}$ | 50                   | A |
|                                 |   |           |                                | $T_c=80^\circ\text{C}$ | 35                   |   |
|                                 |   | $I_{CP}$  | 1ms                            | $T_c=25^\circ\text{C}$ | 100                  | A |
|                                 |   |           |                                | $T_c=80^\circ\text{C}$ | 70                   |   |
| $-I_C$                          |   |           | 35                             | A                      |                      |   |
| Collector power dissipation     | $P_C$   | 1 device  | 240                            | W                      |                      |   |
| Brake                           | Collector-Emitter voltage   | $V_{CES}$ | 1200                           | V                      |                      |   |
|                                 | Gate-Emitter voltage  | $V_{GES}$ | $\pm 20$                       | V                      |                      |   |
|                                 | Collector current   | $I_C$     | Continuous                     | $T_c=25^\circ\text{C}$ | 35                   | A |
|                                 |   |           |                                | $T_c=80^\circ\text{C}$ | 25                   |   |
|                                 |   | $I_{CP}$  | 1ms                            | $T_c=25^\circ\text{C}$ | 70                   | A |
|                                 |   |           |                                | $T_c=80^\circ\text{C}$ | 50                   |   |
| Collector power dissipation     | $P_C$   | 1 device  | 180                            | W                      |                      |   |
| Repetitive peak reverse voltage | $V_{RRM}$   |           | 1200                           | V                      |                      |   |
| Converter                       | Repetitive peak reverse voltage   | $V_{RRM}$ | 1600                           | V                      |                      |   |
|                                 | Average output current  | $I_O$     | 50Hz/60Hz sine wave            | 35                     | A                    |   |
|                                 | Surge current (Non-Repetitive)  | $I_{FSM}$ | $T_j=150^\circ\text{C}$ , 10ms | 360                    | A                    |   |
|                                 | $I^2t$ (Non-Repetitive)   | $I^2t$    | half sine wave                 | 648                    | $\text{A}^2\text{s}$ |   |
| Operating junction temperature  | $T_j$   |           | +150                           | $^\circ\text{C}$       |                      |   |
| Storage temperature             | $T_{stg}$   |           | -40 to +125                    | $^\circ\text{C}$       |                      |   |
| Isolation voltage               | between terminal and copper base *2<br>between thermistor and others *3 | $V_{iso}$ | AC : 1 minute                  | AC 2500                | V                    |   |
|                                 |   |           |                                | 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 Terminal 8 and 9 should be connected together. Terminal 1 to 7 and 10 to 24 should be connected together and shorted to copper base.

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

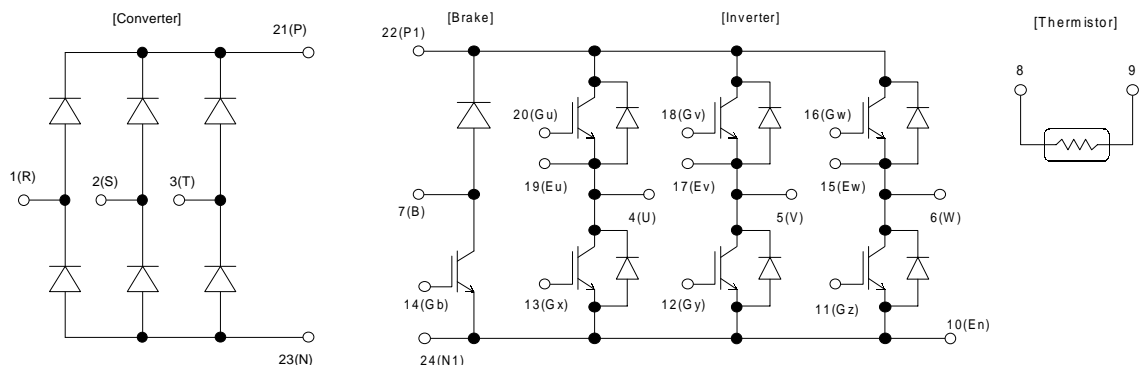
| Item                         | Symbol                               | Condition        | Characteristics         |          |      | Unit |      |      |
|------------------------------|--------------------------------------|------------------|-------------------------|----------|------|------|------|------|
|                              |                                      |                  | 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        |          | 0.2  | µA   |      |      |
|                              | Gate-Emitter threshold voltage       | VGE(th)          | VCE=20V, Ic=35mA        |          | 5.5  | 7.2  | 8.5  | V    |
|                              | Collector-Emitter saturation voltage | VCE(sat)         | VGE=15V, Ic=35A         | chip     | 2.1  |      | V    |      |
|                              |                                      |                  |                         | terminal | 2.25 | 2.7  |      |      |
|                              | Input capacitance                    | Cies             | VGE=0V, VCE=10V, f=1MHz |          | 4200 |      | pF   |      |
|                              | Turn-on time                         | ton              | VCC=600V<br>Ic=35A      | VGE=±15V |      | 0.35 | 1.2  | µs   |
|                              |                                      |                  |                         |          |      | 0.25 | 0.6  |      |
|                              |                                      |                  |                         |          |      | 0.1  |      |      |
|                              | Turn-off                             | toff             | RG=33Ω                  |          | 0.45 | 1.0  |      |      |
|                              |                                      |                  |                         | 0.08     | 0.3  |      |      |      |
| Forward on voltage           | VF                                   | IF=35A           | chip                    | 2.3      |      | V    |      |      |
|                              |                                      |                  | terminal                | 2.45     | 3.3  |      |      |      |
| Reverse recovery time of FRD | 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        |          | 0.2  | µA   |      |      |
|                              | Collector-Emitter saturation voltage | VCE(sat)         | Ic=25A, VGE=15V         | chip     | 2.1  |      | V    |      |
|                              |                                      |                  |                         | terminal | 2.25 | 2.7  |      |      |
|                              | Turn-on time                         | ton              | VCC=600V<br>Ic=25A      | VGE=±15V |      | 0.35 | 1.2  | µs   |
|                              |                                      |                  |                         |          |      | 0.25 | 0.6  |      |
|                              | Turn-off time                        | toff             | RG=51Ω                  |          | 0.45 | 1.0  |      |      |
|                              |                                      |                  |                         |          | 0.08 | 0.3  |      |      |
|                              | Reverse current                      | I <sub>RRM</sub> | VR=1200V                |          |      | 1.0  | mA   |      |
|                              | Forward on voltage                   | VFM              | IF=35A                  | chip     | 1.1  |      | V    |      |
| terminal                     |                                      |                  |                         | 1.2      | 1.5  |      |      |      |
| Reverse current              | I <sub>RRM</sub>                     | VR=1600V         |                         |          | 1.0  | mA   |      |      |
| Thermistor                   | Resistance                           | R                | T=25°C                  |          | 5000 | Ω    |      |      |
|                              |                                      |                  | T=100°C                 |          | 465  |      | 495  | 520  |
|                              |                                      |                  | T=25/50°C               |          | 3305 |      | 3375 | 3450 |

● Thermal resistance Characteristics

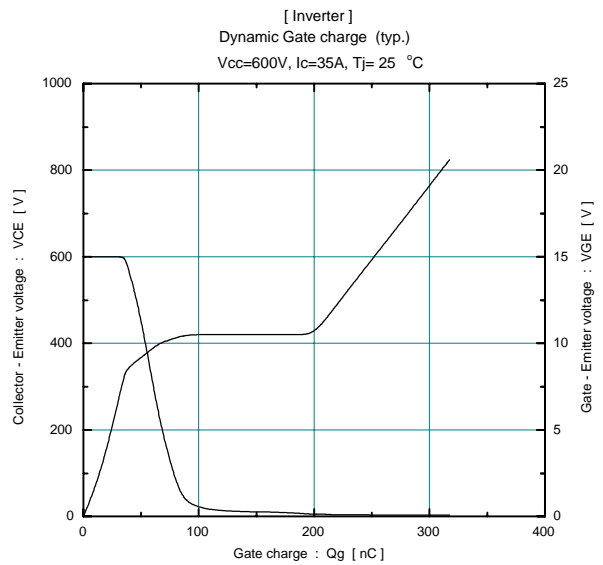
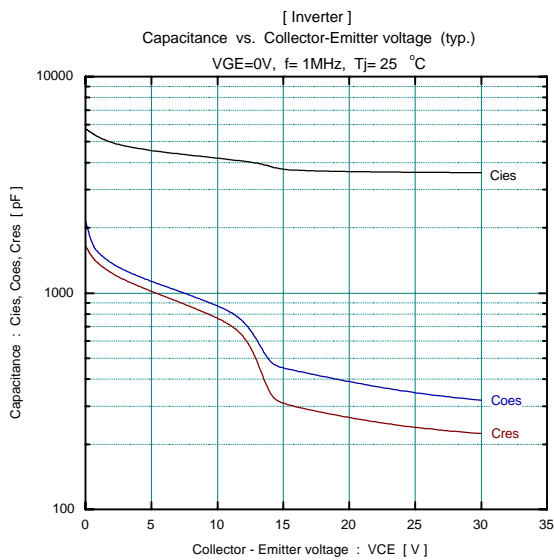
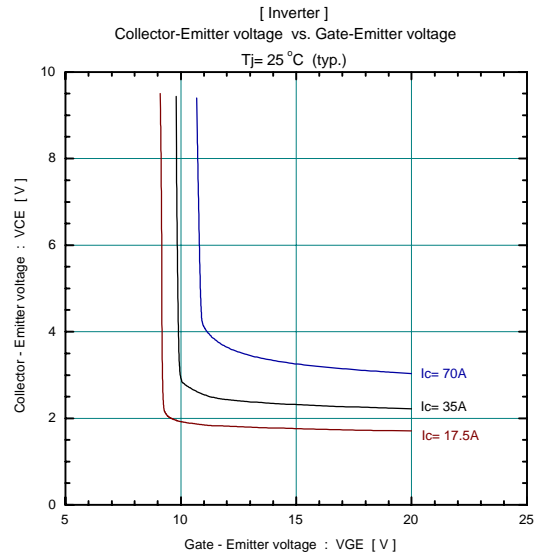
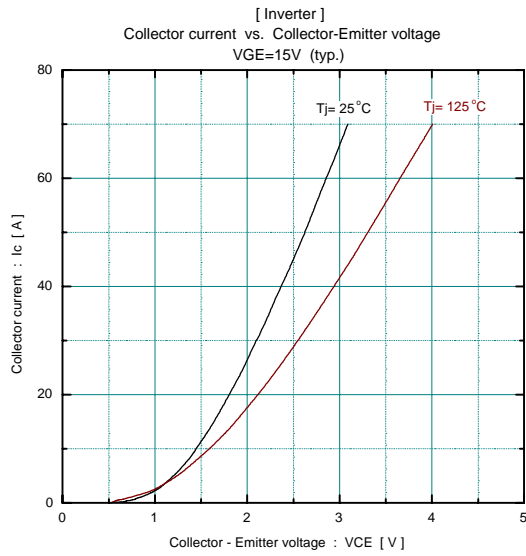
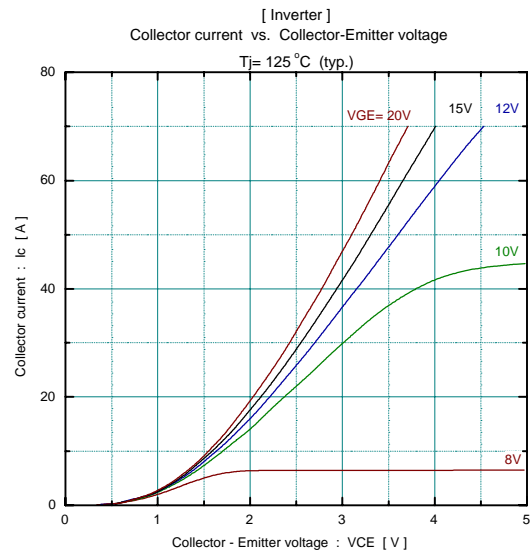
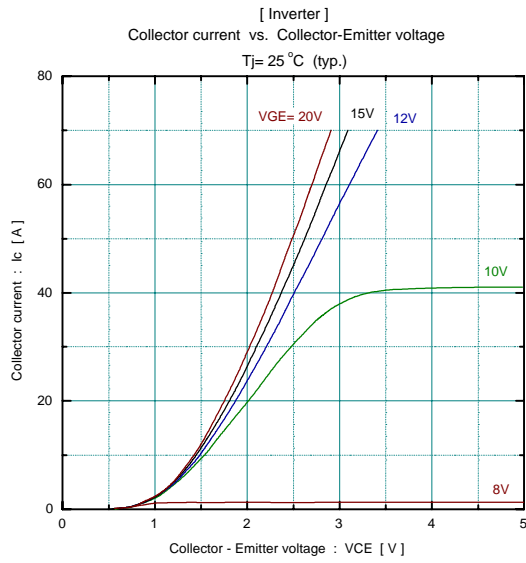
| Item                            | Symbol   | Condition             | Characteristics |      |      | Unit |
|---------------------------------|----------|-----------------------|-----------------|------|------|------|
|                                 |          |                       | Min.            | Typ. | Max. |      |
| Thermal resistance ( 1 device ) | Rth(j-c) | Inverter IGBT         |                 |      | 0.52 | °C/W |
|                                 |          | Inverter FWD          |                 |      | 0.90 |      |
|                                 |          | Brake IGBT            |                 |      | 0.69 |      |
|                                 |          | Converter Diode       |                 |      | 0.75 |      |
| Contact thermal resistance *    | Rth(c-f) | With thermal compound |                 | 0.05 |      |      |

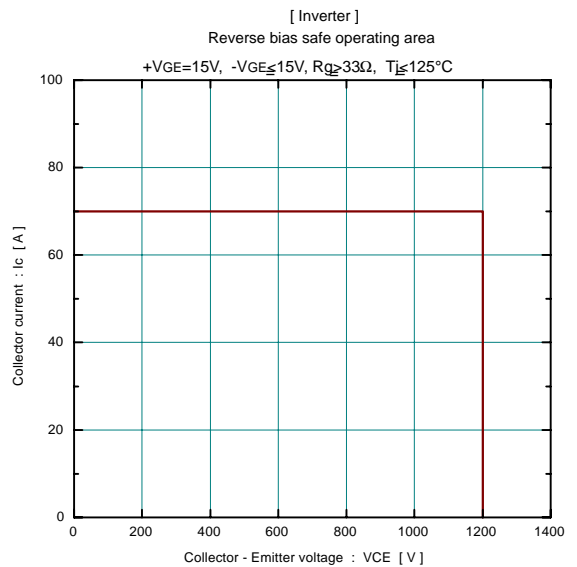
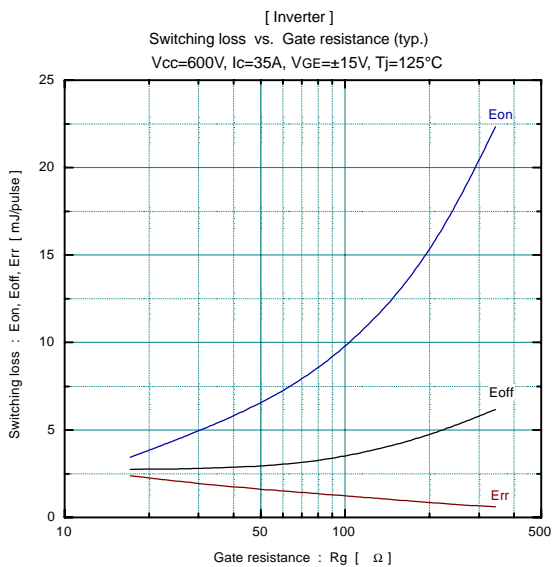
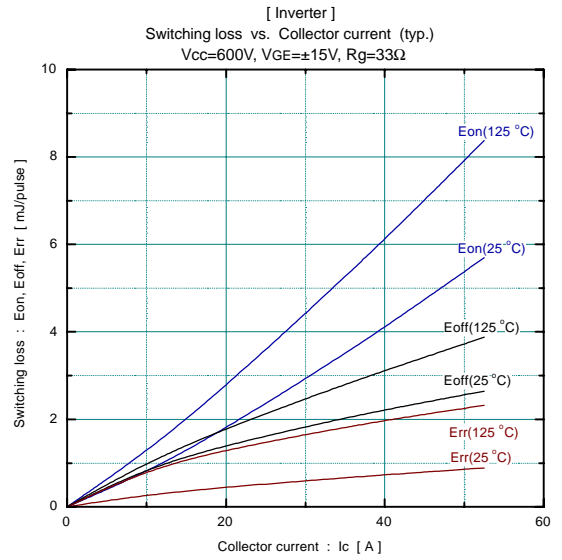
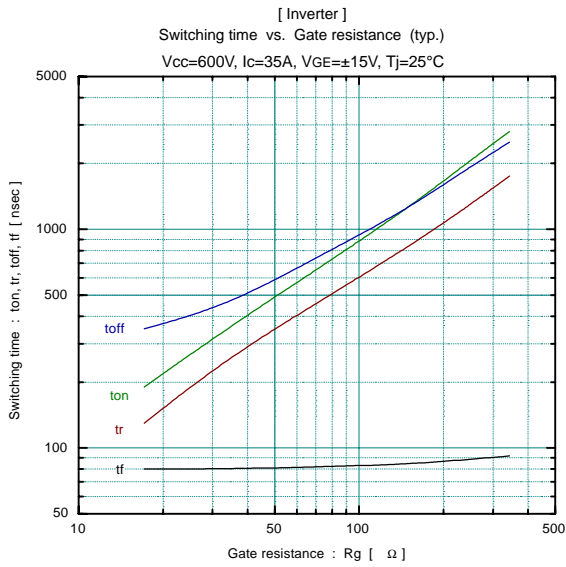
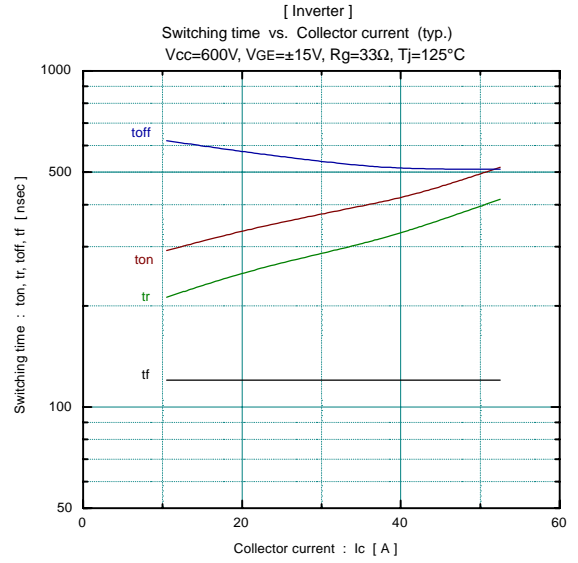
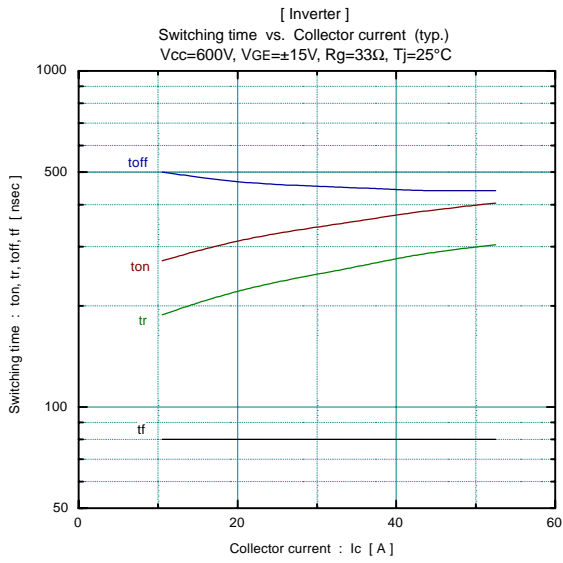
\* This is the value which is defined mounting on the additional cooling fin with thermal compound

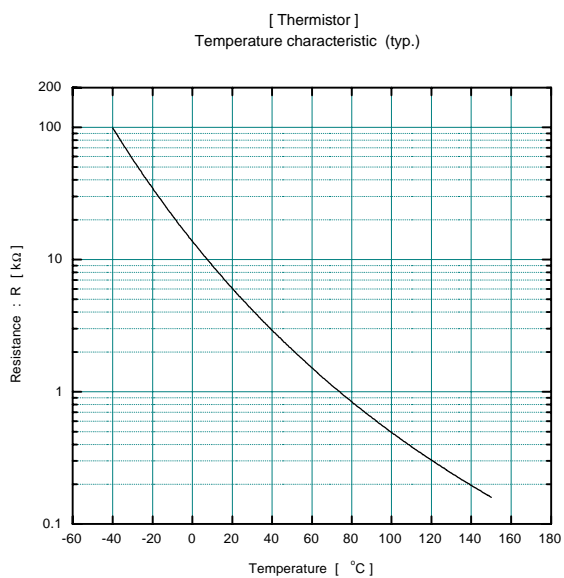
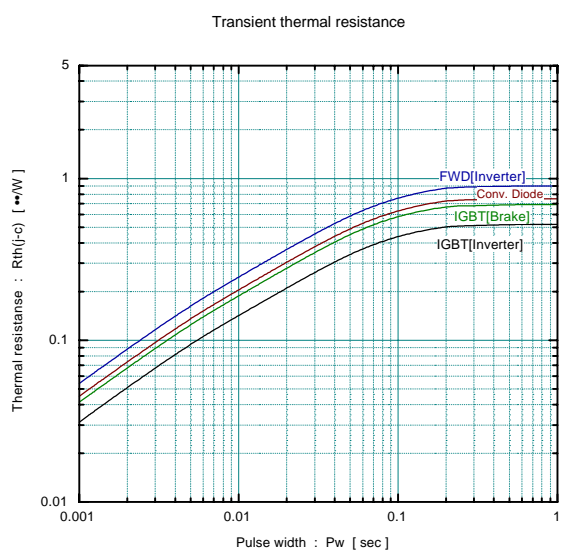
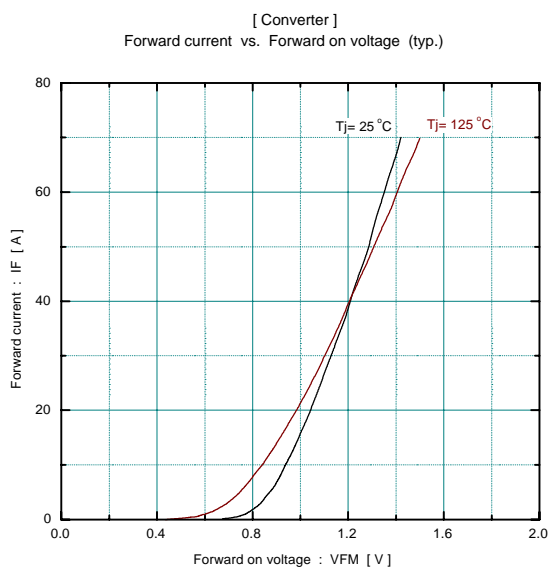
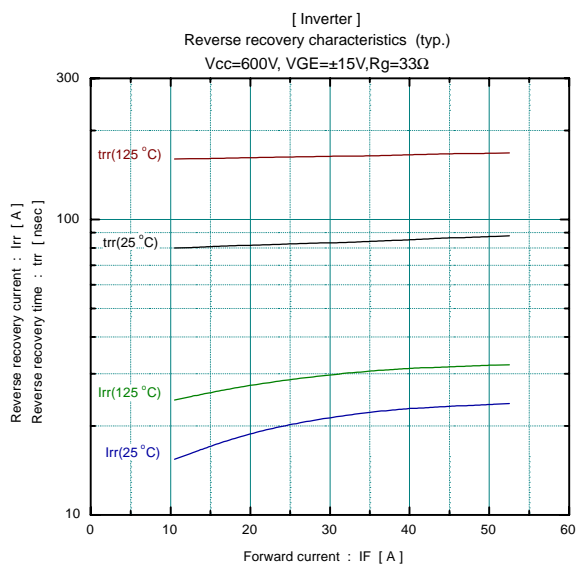
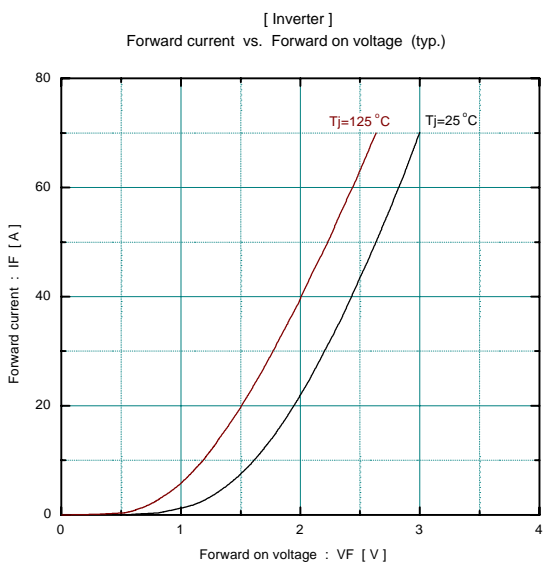
■ Equivalent Circuit Schematic

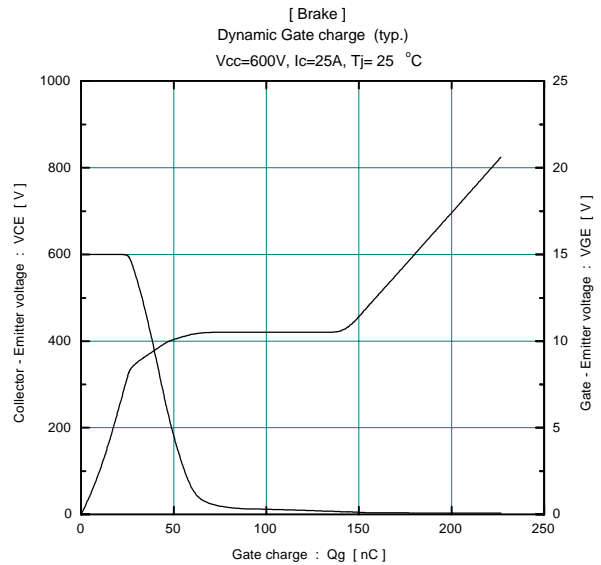
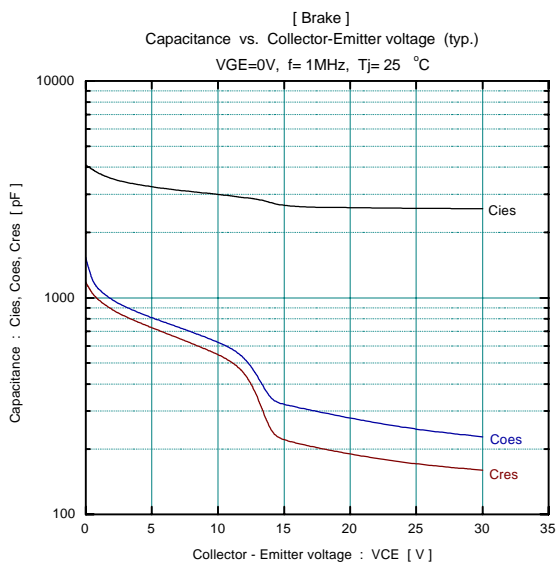
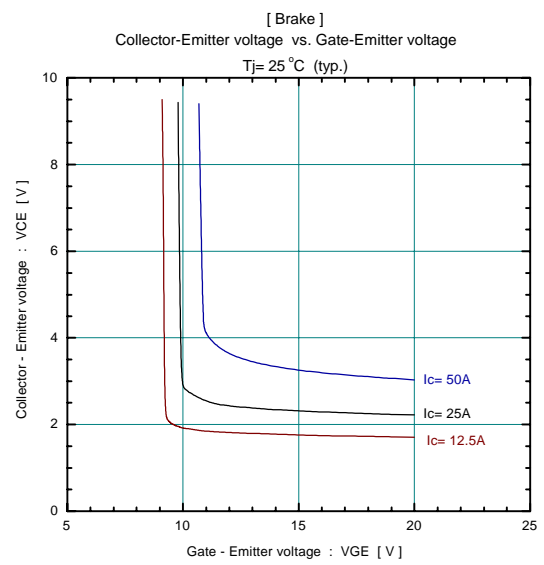
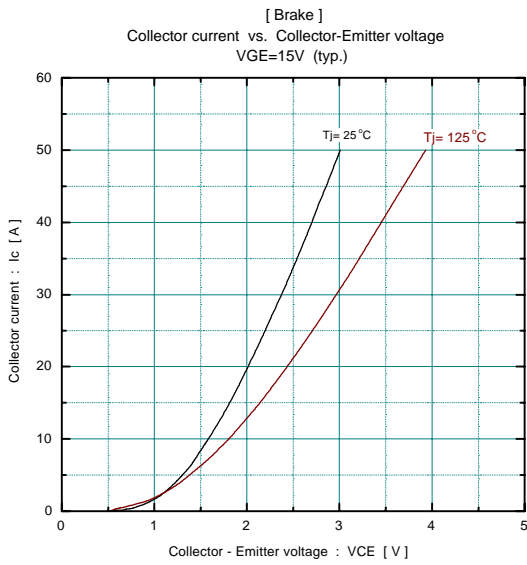
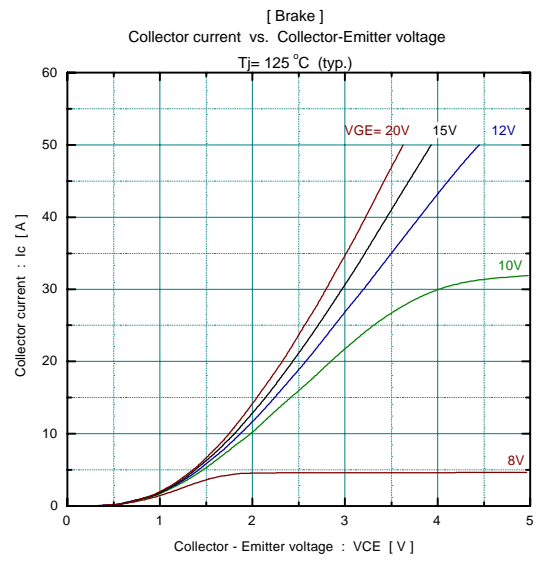
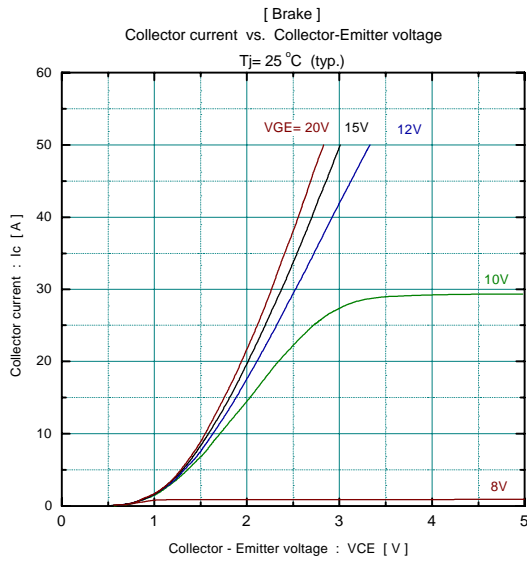


■ Characteristics (Representative)

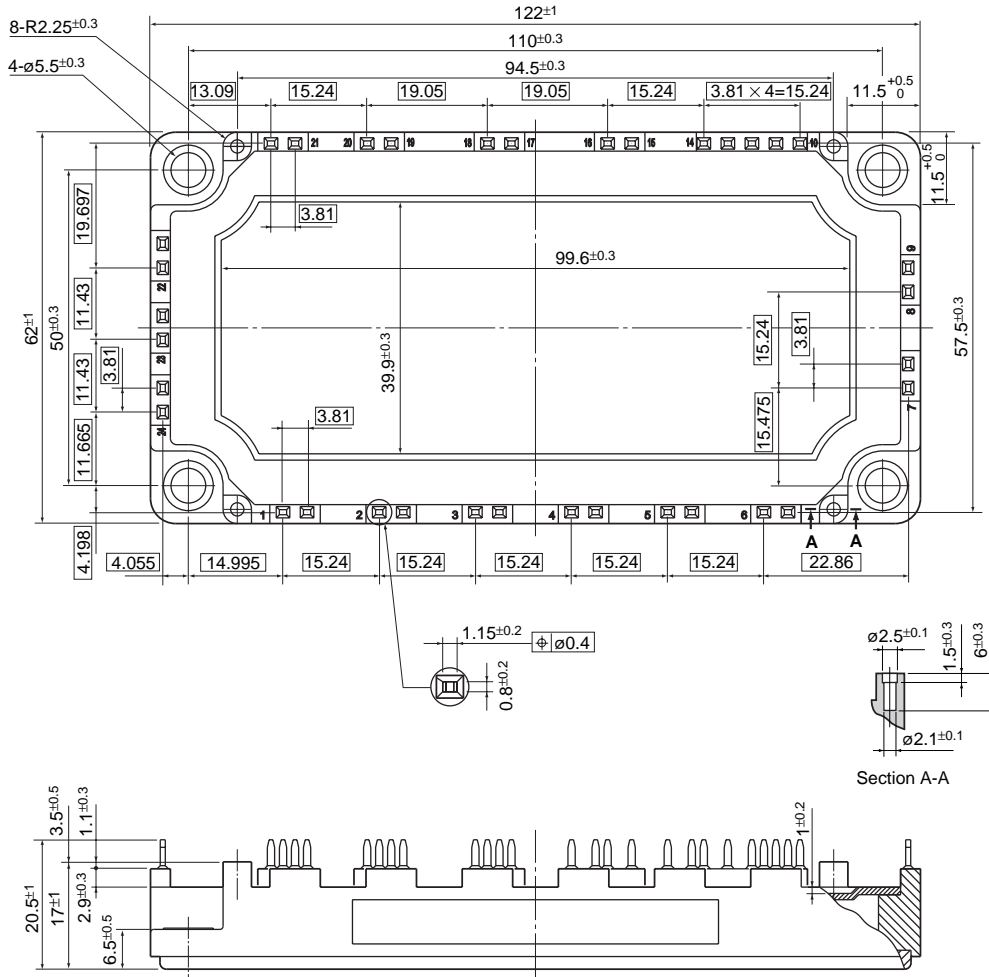








■ Outline Drawings, mm



□ Shows theory dimensions

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