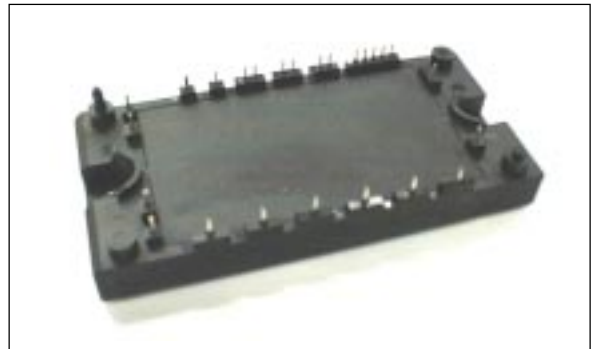


PIM/Built-in converter with thyristor and brake (S series) 600V / 50A / PIM



■ Features

- Low $V_{CE(sat)}$
- Compact Package
- P.C. Board Mount Module
- 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} | 600 | V | |
| | Gate-Emitter voltage | V_{GES} | ± 20 | V | |
| | Collector current | I_C | Continuous | 50 | A |
| | | I_{CP} | 1ms | 100 | A |
| | | $-I_C$ | | 50 | A |
| Collector power dissipation | P_C | 1 device | 200 | W | |
| Brake | Collector-Emitter voltage | V_{CES} | 600 | V | |
| | Gate-Emitter voltage | V_{GES} | ± 20 | V | |
| | Collector current | I_C | Continuous | 30 | A |
| | | I_{CP} | 1ms | 60 | A |
| | Collector power dissipation | P_C | 1 device | 120 | W |
| Thyristor | Repetitive peak reverse voltage(Diode) | V_{RRM} | 600 | V | |
| | Repetitive peak off-state voltage | V_{DRM} | 800 | V | |
| | Repetitive peak reverse voltage | V_{RRM} | 800 | V | |
| | Average on-state current | $I_{T(AV)}$ | 50Hz/60Hz sine wave | 50 | A |
| | Surge On-state current (Non-Repetitive) | I_{TSM} | $T_j=125^\circ\text{C}$, 10ms half sine wave | 563 | A |
| Junction temperature | T_{jw} | | 125 | $^\circ\text{C}$ | |
| Converter | Repetitive peak reverse voltage | V_{RRM} | 800 | V | |
| | Average output current | I_o | 50Hz/60Hz sine wave | 50 | A |
| | Surge current (Non-Repetitive) | I_{FSM} | $T_j=150^\circ\text{C}$, 10ms | 525 | A |
| | I^2t (Non-Repetitive) | I^2t | half sine wave | 1378 | A^2s |
| Junction temperature (except Thyristor) | T_j | | +150 | $^\circ\text{C}$ | |
| Storage temperature | T_{stg} | | -40 to +125 | $^\circ\text{C}$ | |
| Isolation between terminal and copper base *2 voltage between thermistor and others *3 | V_{iso} | AC : 1 minute | AC 2500 | V | |
| | | | AC 2500 | V | |
| Mounting screw torque | | | 1.7 *1 | Nm | |

*1 Recommendable value : 1.3 to 1.7 N·m (M4)

*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 26 should be connected together and shorted to copper base.

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

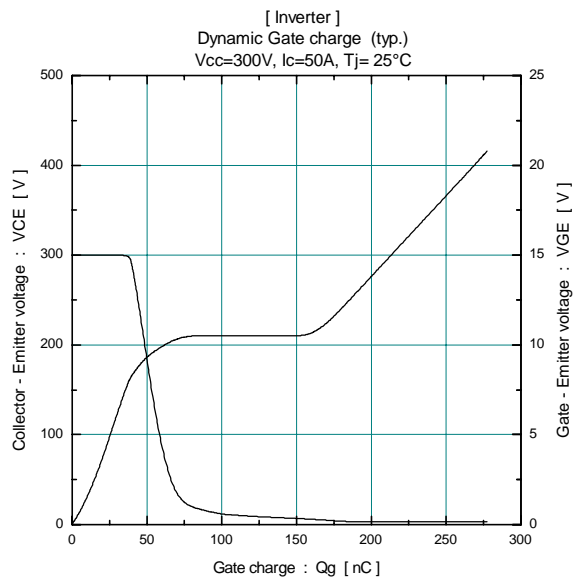
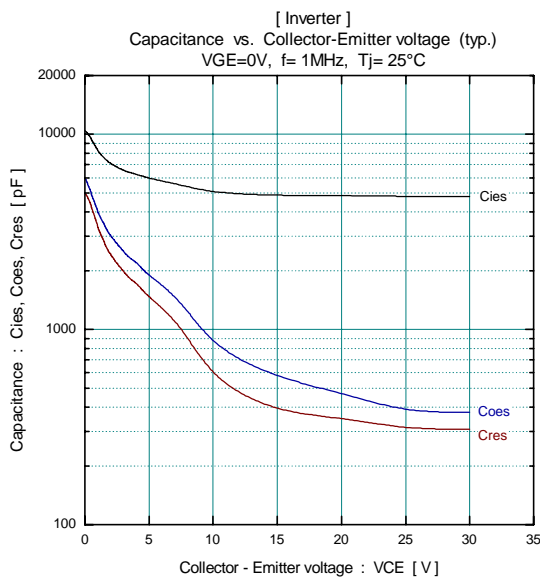
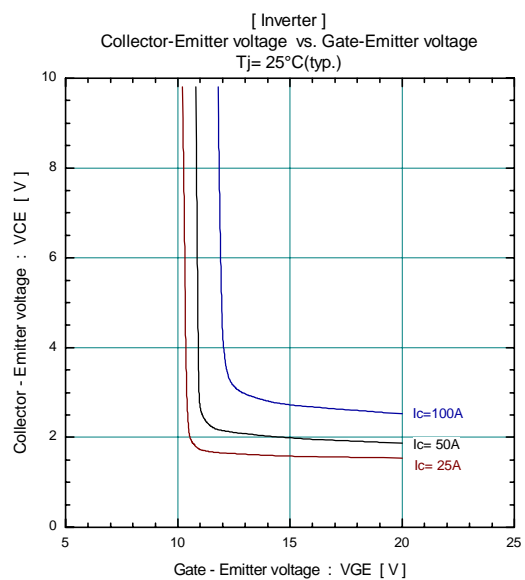
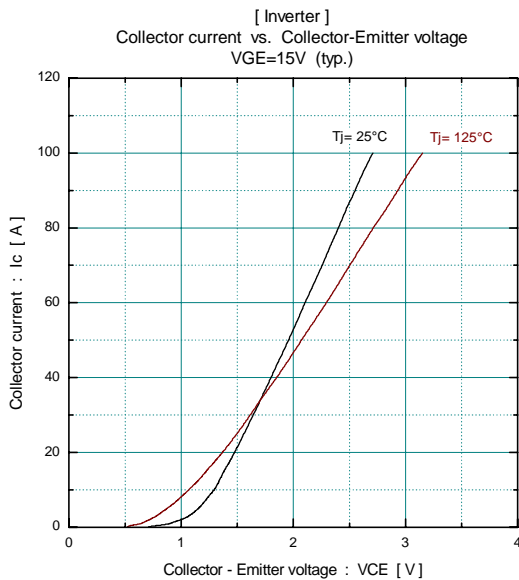
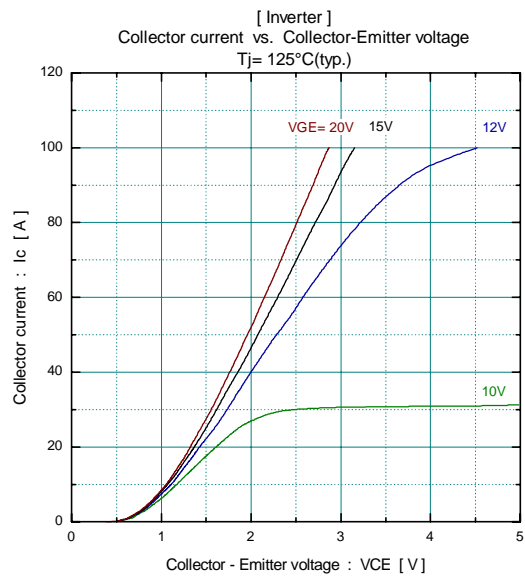
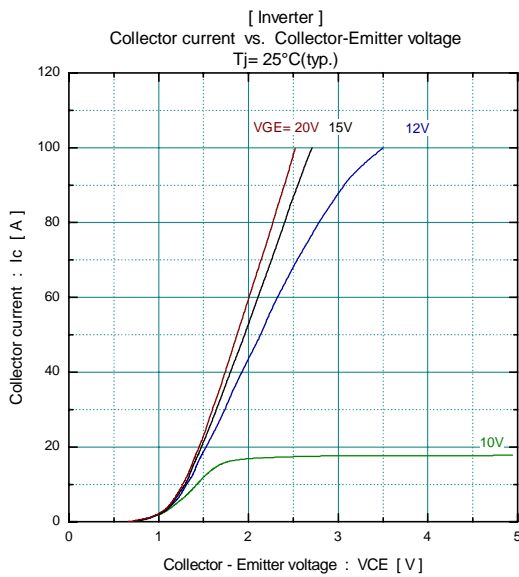
| Item | Symbol | Condition | Characteristics | | | Unit | | |
|------------------------------|--------------------------------------|----------------------|---|----------|------|------|-----|---|
| | | | Min. | Typ. | Max. | | | |
| Inverter | Zero gate voltage collector current | ICES | V _{CE} =600V, V _{GE} =0V | | 150 | μA | | |
| | Gate-Emitter leakage current | IGES | V _{CE} =0V, V _{GE} =±20V | | 200 | nA | | |
| | Gate-Emitter threshold voltage | V _{GE(th)} | V _{CE} =20V, I _c =50mA | | 5.5 | 7.8 | 8.5 | V |
| | Collector-Emitter saturation voltage | V _{CE(sat)} | V _{GE} =15V, I _c =50A | chip | 1.8 | | V | |
| | | | | terminal | 1.95 | 2.4 | | |
| | Input capacitance | C _{ies} | V _{GE} =0V, V _{CE} =10V, f=1MHz | | 5000 | | pF | |
| | Turn-on time | ton | V _{CC} =300V | | 0.45 | 1.2 | μs | |
| | | tr | I _c =50A | | 0.25 | 0.6 | | |
| | Turn-off | toff | V _{GE} =±15V | | 0.40 | 1.0 | | |
| | | tf | R _G =51Ω | | 0.05 | 0.35 | | |
| Forward on voltage | V _F | I _F =50A | chip | 1.75 | | V | | |
| | | | terminal | 1.9 | 2.6 | | | |
| Reverse recovery time of FRD | t _{rr} | I _F =50A | | | 300 | ns | | |
| Brake | Zero gate voltage collector current | ICES | V _{CE(s)} =600V, V _{GE} =0V | | 150 | μA | | |
| | Gate-Emitter leakage current | IGES | V _{CE} =0V, V _{GE} =±20V | | 200 | nA | | |
| | Collector-Emitter saturation voltage | V _{CE(sat)} | I _c =30A, V _{GE} =15V | chip | 1.8 | | V | |
| | | | | terminal | 1.95 | 2.4 | | |
| | Turn-on time | ton | V _{CC} =300V | | 0.45 | 1.2 | μs | |
| | | tr | I _c =30A | | 0.25 | 0.6 | | |
| | Turn-off time | toff | V _{GE} =±15V | | 0.40 | 1.0 | | |
| | | tf | R _G =82Ω | | 0.05 | 0.35 | | |
| | Reverse current | I _{RRM} | V _R =600V | | | 150 | μA | |
| | off-state current | I _{DM} | V _{DM} =800V | | | 1.0 | mA | |
| Thyristor | Reverse current | I _{RRM} | V _{RM} =800V | | | 1.0 | mA | |
| | Gate trigger current | I _{GT} | V _D =6V, I _T =1A | | | 100 | mA | |
| | Gate trigger voltage | V _{GT} | V _D =6V, I _T =1A | | | 2.5 | V | |
| | On-state voltage | V _{TM} | I _{TM} =50A | chip | 1.1 | 1.3 | V | |
| | | | | terminal | 1.2 | | | |
| Converter | Forward on voltage | V _{FM} | I _F =50A | chip | 1.1 | V | | |
| | | | | terminal | 1.2 | | 1.5 | |
| | Reverse current | I _{RRM} | V _R =800V | | | 150 | μA | |
| 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 | |

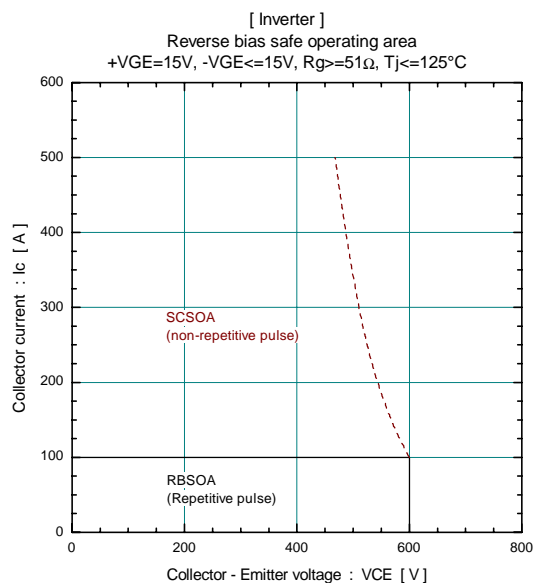
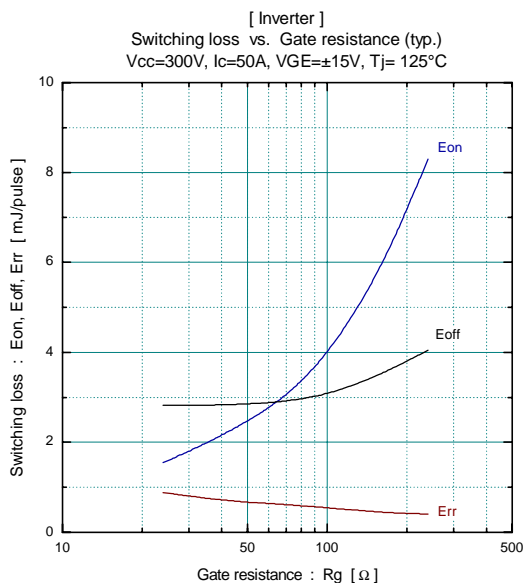
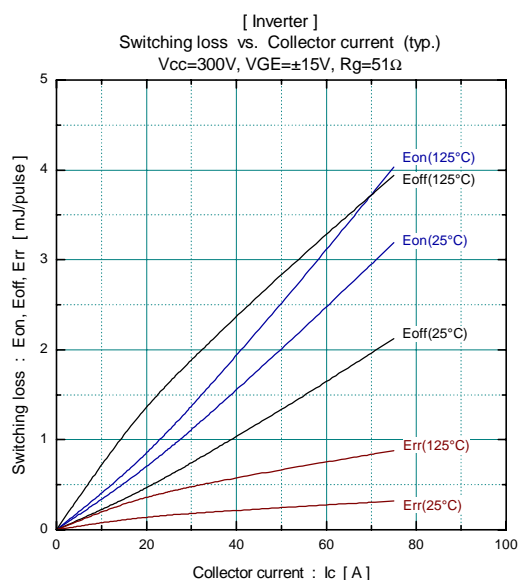
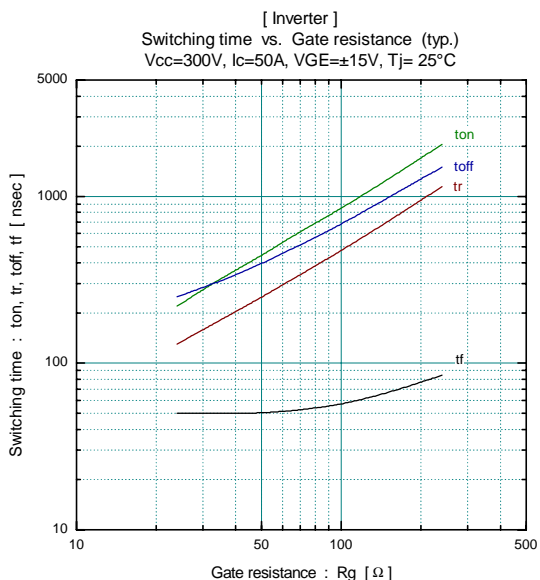
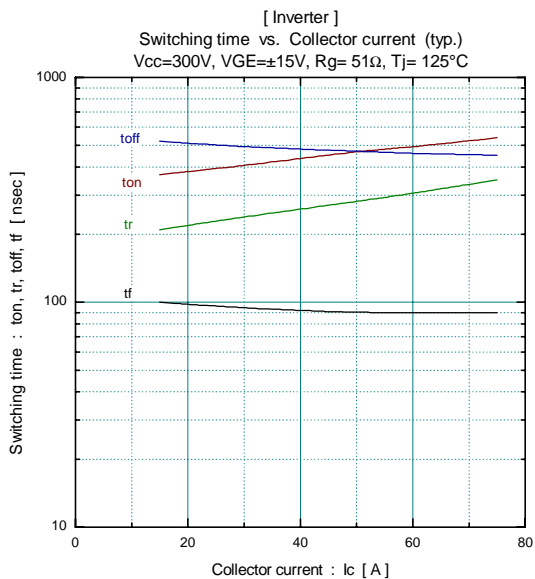
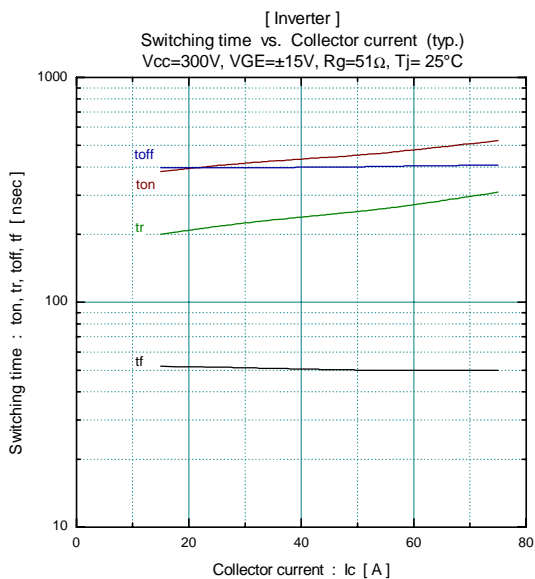
● Thermal resistance Characteristics

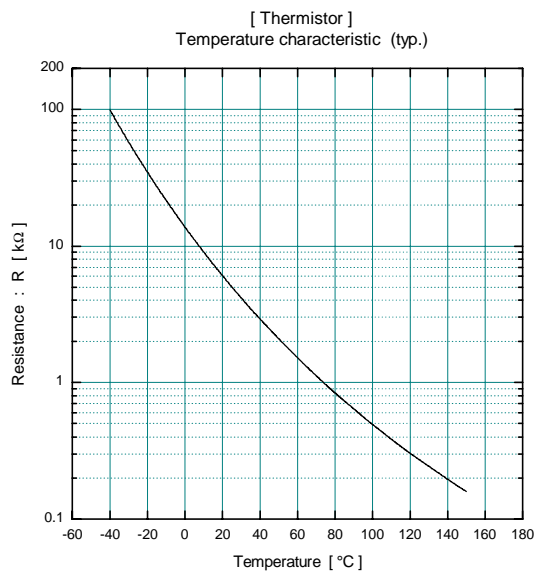
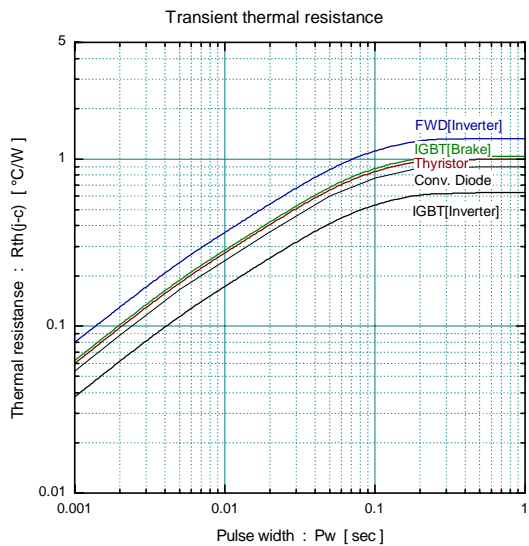
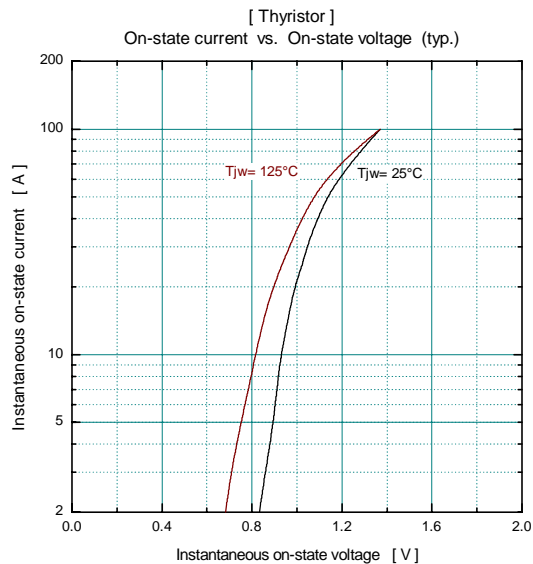
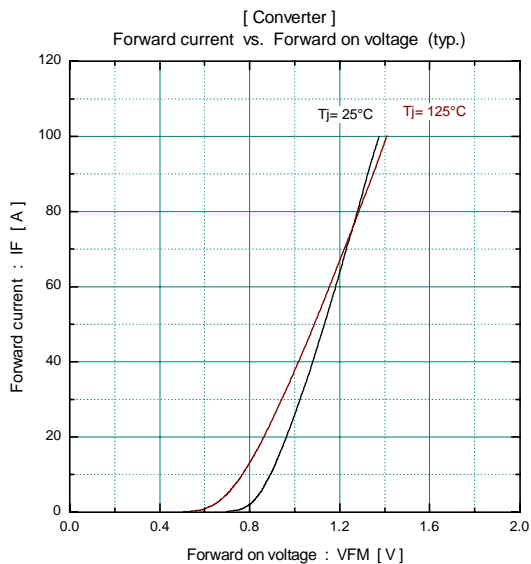
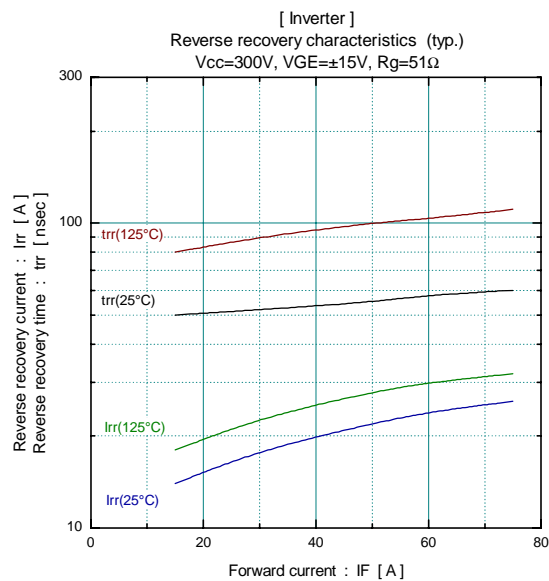
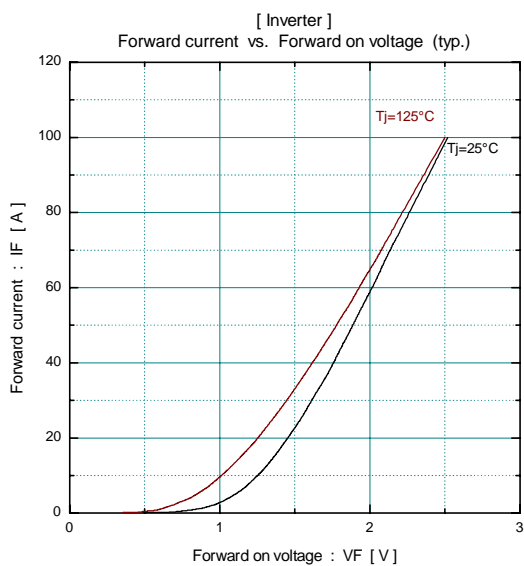
| Item | Symbol | Condition | Characteristics | | | Unit |
|---------------------------------|----------------------|-----------------------|-----------------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Thermal resistance (1 device) | R _{th(j-c)} | Inverter IGBT | | | 0.63 | °C/W |
| | | Inverter FWD | | | 1.33 | |
| | | Brake IGBT | | | 1.04 | |
| | | Thyristor | | | 1.00 | |
| | | Converter Diode | | | 0.90 | |
| Contact thermal resistance * | R _{th(c-f)} | With thermal compound | | 0.05 | | |

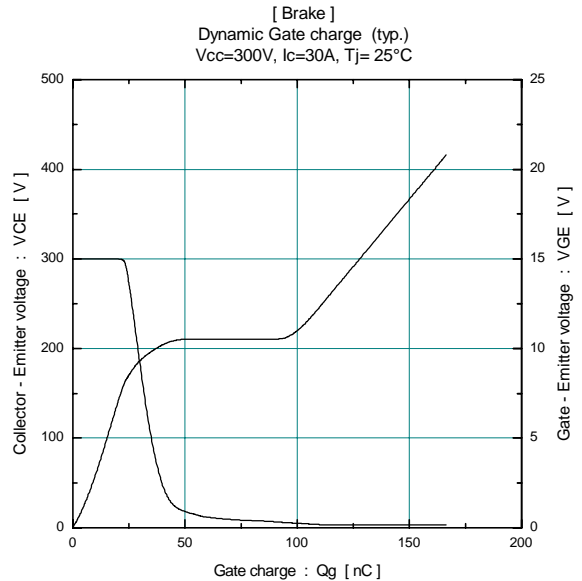
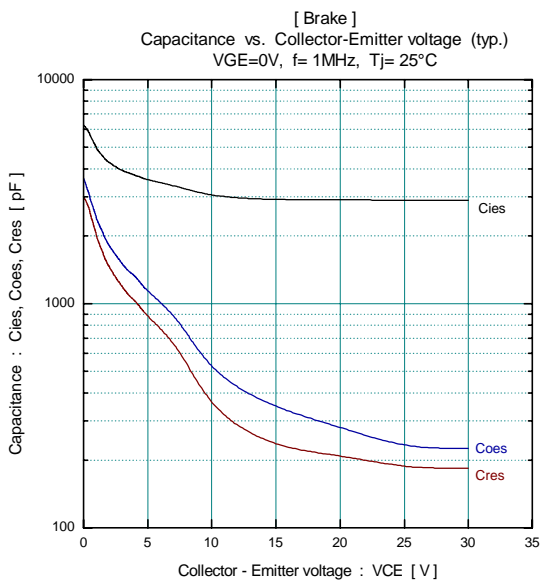
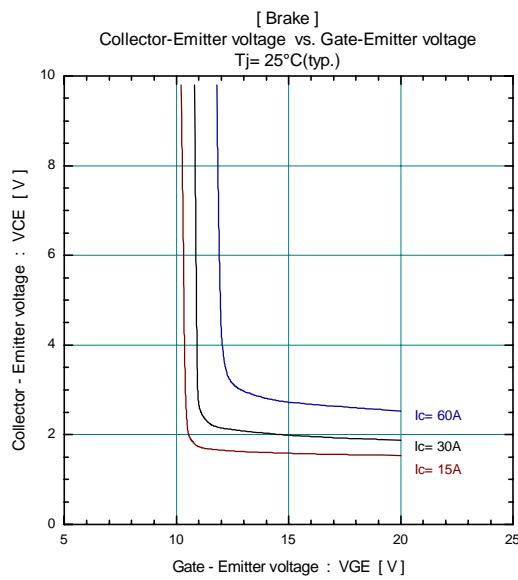
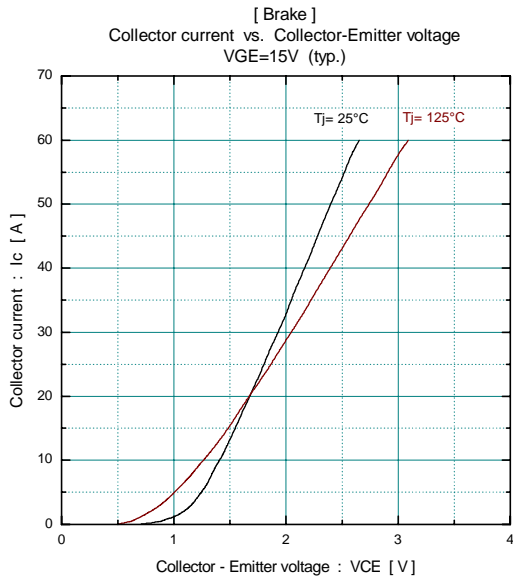
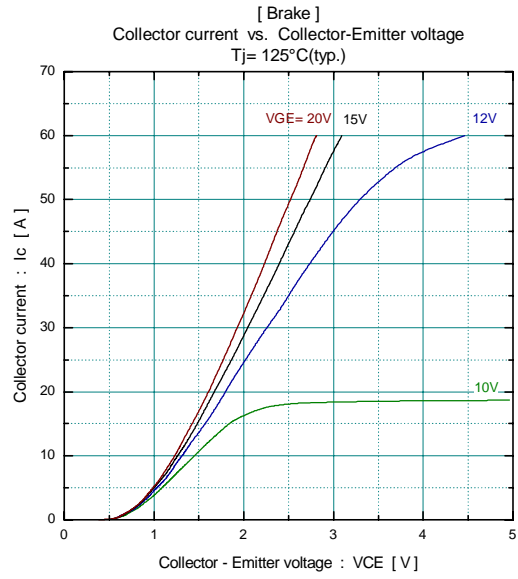
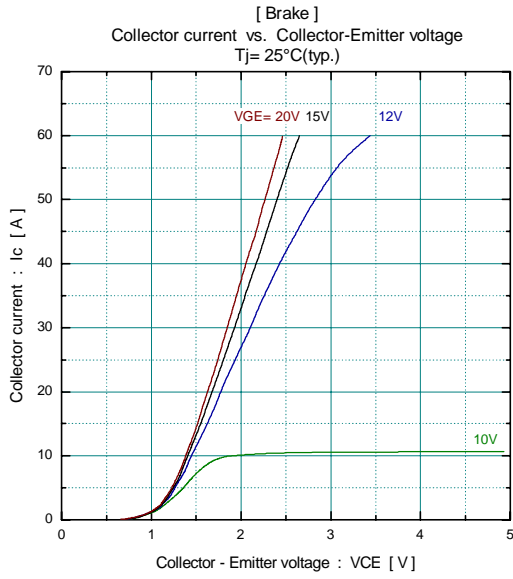
* This is the value which is defined mounting on the additional cooling fin with thermal compound

■ Characteristics (Representative)

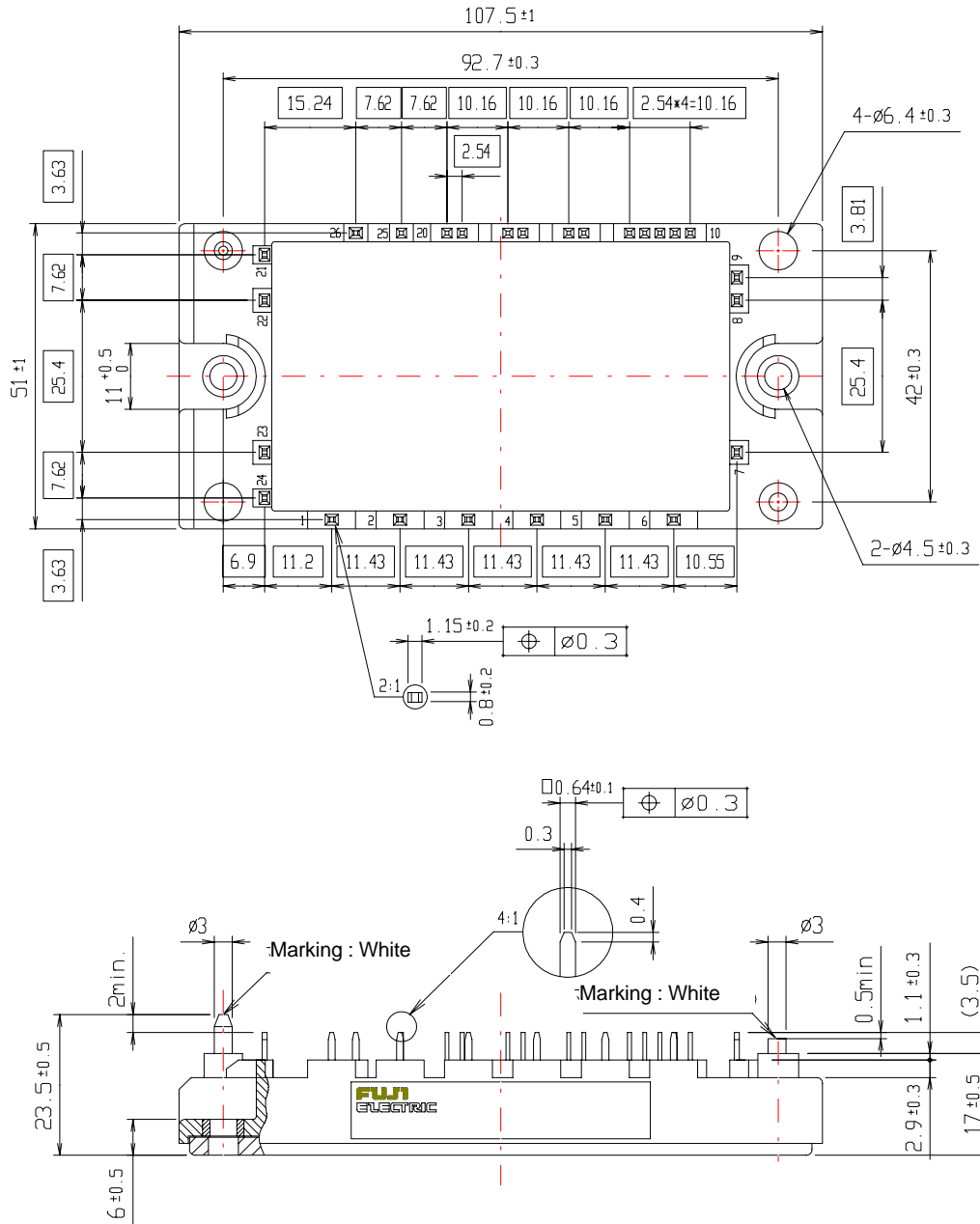








■ Outline Drawings, mm



■ Equivalent Circuit Schematic

