

## IGBT MODULE ( S-Series )

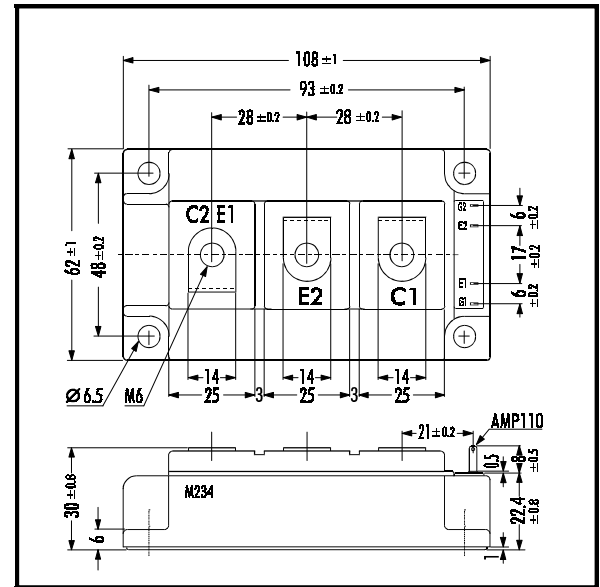
### ■ Features

- NPT-Technology
- Square SC SOA at  $10 \times I_C$
- High Short Circuit Withstand-Capability
- Small Temperature Dependence of the Turn-Off Switching Loss
- Low Losses And Soft Switching

### ■ Applications

- High Power Switching
- A.C. Motor Controls
- D.C. Motor Controls
- Uninterruptible Power Supply

## ■ Outline Drawing



## ■ Maximum Ratings and Characteristics

### • Absolute Maximum Ratings ( $T_c=25^\circ\text{C}$ )

| Items                     | Symbols      | Ratings      | Units            |
|---------------------------|--------------|--------------|------------------|
| Collector-Emitter Voltage | $V_{CES}$    | 1200         | V                |
| Gate -Emitter Voltage     | $V_{GES}$    | $\pm 20$     | V                |
| Collector Current         | Continuous   | $I_C$        | 200 / 150        |
|                           | 1ms          | $I_C$ PULSE  | 400 / 300        |
|                           | Continuous   | $-I_C$       | 150              |
|                           | 1ms          | $-I_C$ PULSE | 300              |
| Max. Power Dissipation    | $P_C$        | 1000         | W                |
| Operating Temperature     | $T_J$        | +150         | $^\circ\text{C}$ |
| Storage Temperature       | $T_{stg}$    | -40 ~ +125   | $^\circ\text{C}$ |
| Isolation Voltage<br>*1   | A.C. 1min.   | $V_{is}$     | 2500             |
| Screw Torque              | Mounting *2  | 3.5          | Nm               |
|                           | Terminals *2 | 4.5          | Nm               |

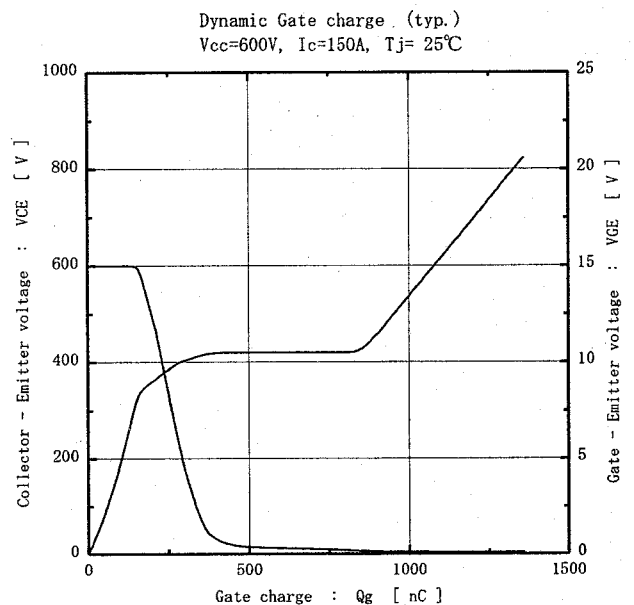
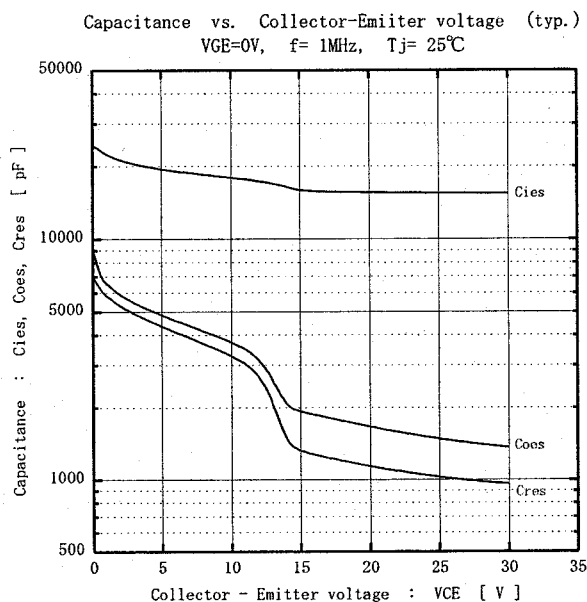
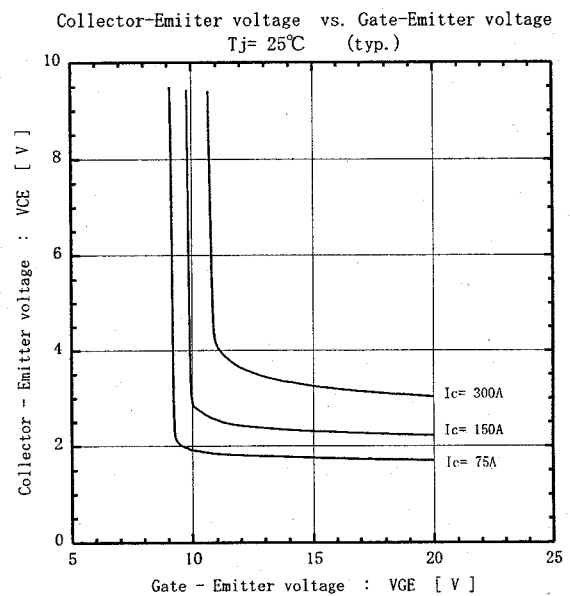
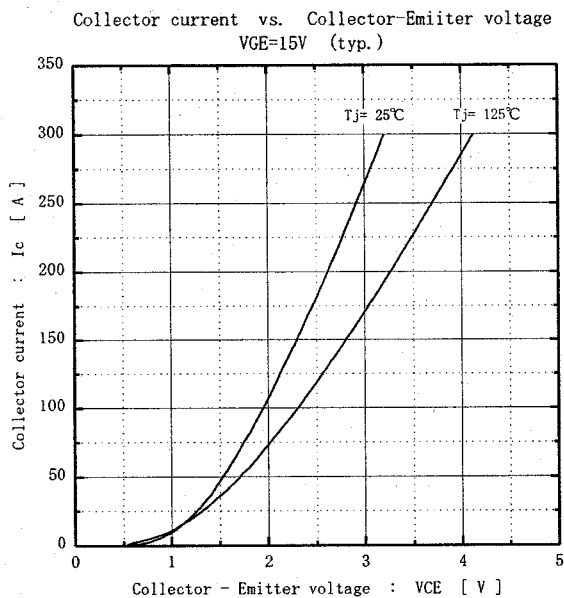
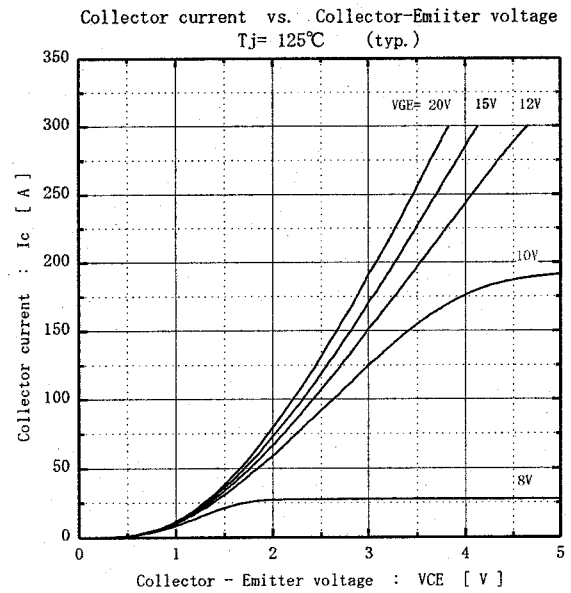
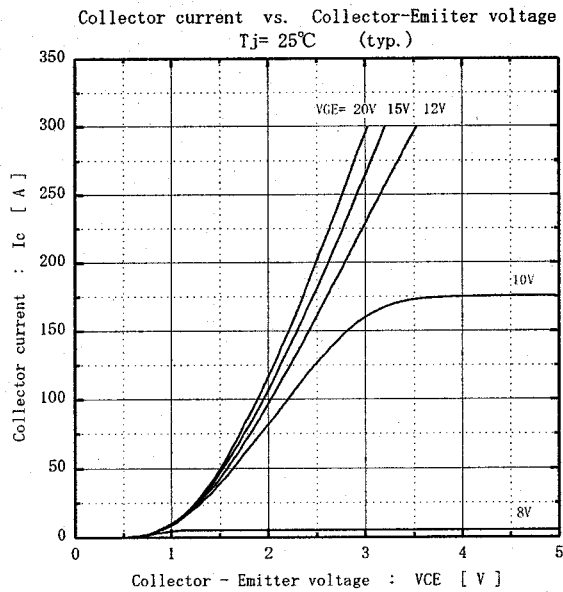
Note: 1\*: All Terminals should be connected together when isolation test will be done.  
2\*: Recommendable Value; Mounting 2.5 ~ 3.5 Nm (M5 or M6), Terminal 3.5~4.5 (M6)

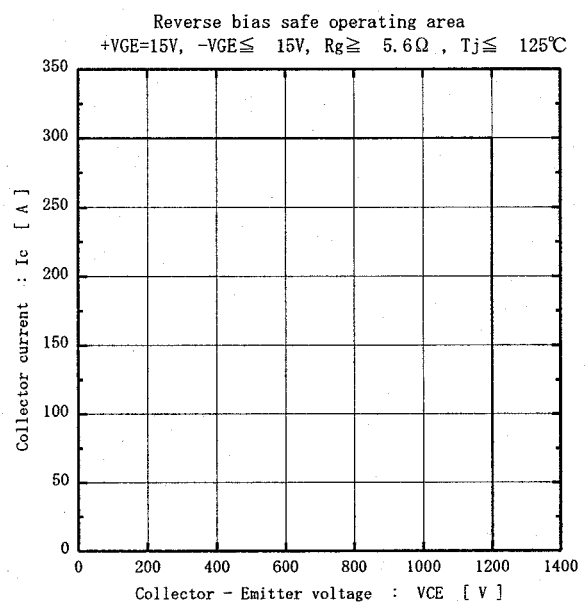
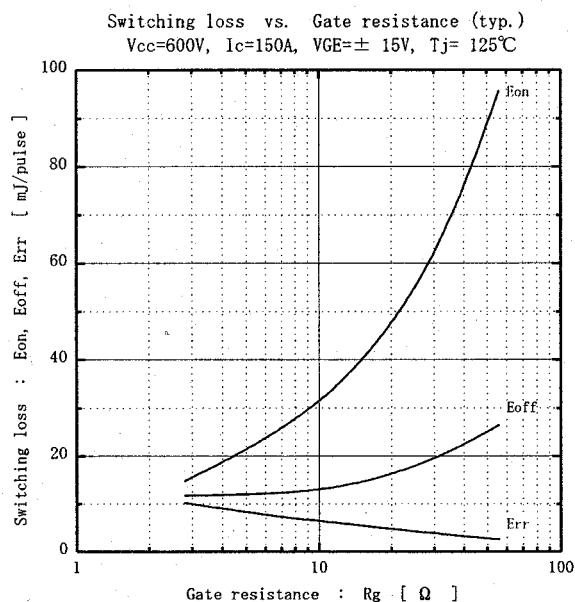
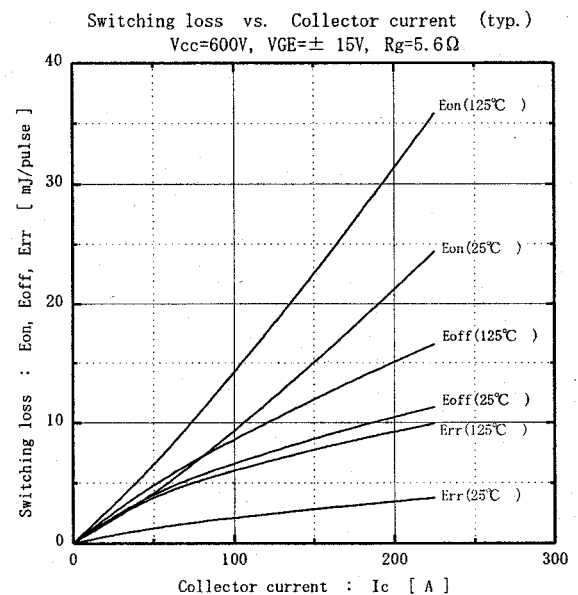
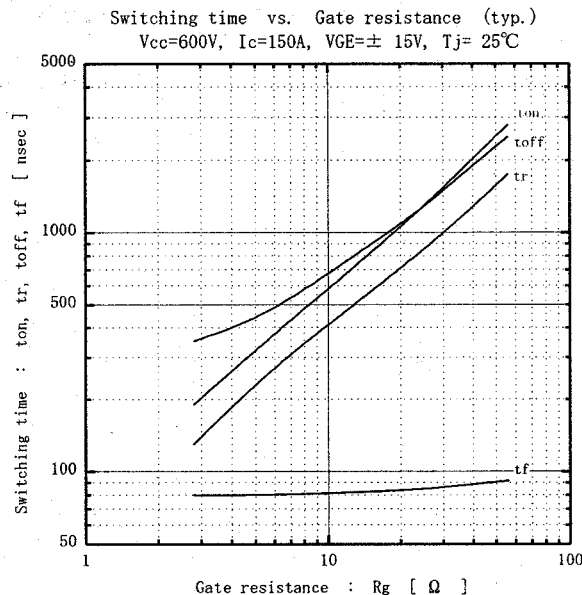
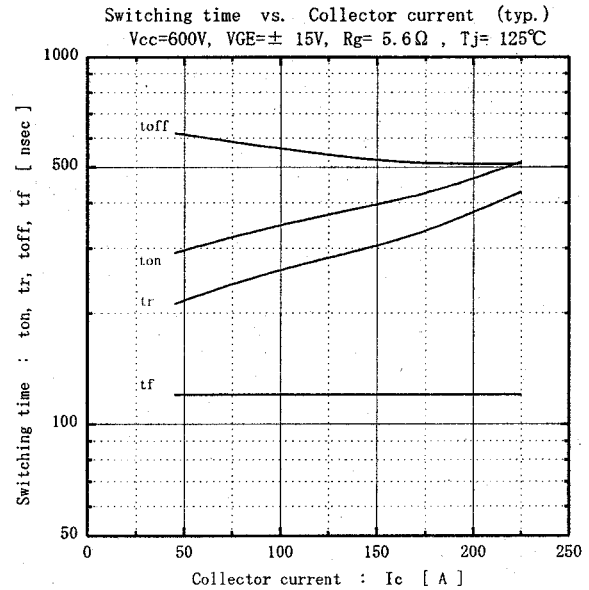
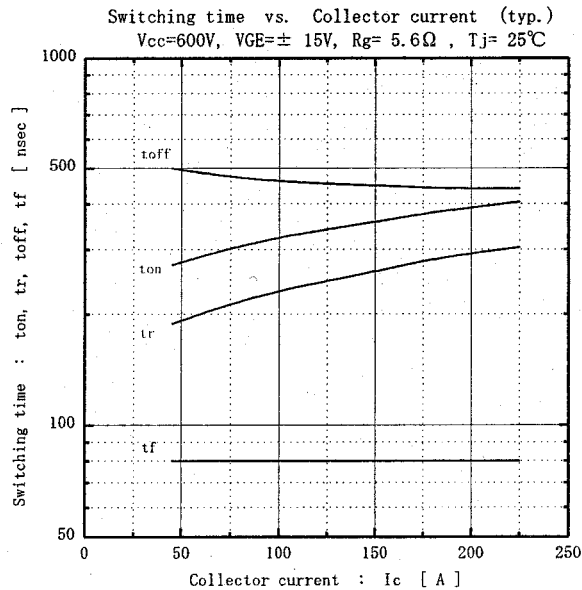
### • Electrical Characteristics ( at $T_J=25^\circ\text{C}$ )

| Items                                | Symbols       | Test Conditions              | Min.                    | Typ.   | Max. | Units         |
|--------------------------------------|---------------|------------------------------|-------------------------|--------|------|---------------|
| Zero Gate Voltage Collector Current  | $I_{CES}$     | $V_{GE}=0V$ $V_{CE}=1200V$   |                         |        | 2.0  | mA            |
| Gate-Emitter Leakage Current         | $I_{GES}$     | $V_{CE}=0V$ $V_{GE}=\pm 20V$ |                         |        | 400  | nA            |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$  | $V_{GE}=20V$ $I_C=150mA$     | 5.5                     | 7.2    | 8.5  | V             |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V$ $I_C=150A$      |                         | 2.3    | 2.6  | V             |
| Input Capacitance                    | $C_{ies}$     | $V_{GE}=0V$                  |                         | 18'000 |      | pF            |
| Output Capacitance                   | $C_{oes}$     | $V_{CE}=10V$                 |                         | 3'750  |      | pF            |
| Reverse Transfer Capacitance         | $C_{res}$     | $f=1MHz$                     |                         | 3'300  |      | pF            |
| Turn-on Time                         | $t_{ON}$      | $V_{CC}=600V$                |                         | 0.35   | 1.2  | $\mu\text{s}$ |
|                                      | $t_{r,x}$     | $I_C=150A$                   |                         | 0.25   | 0.6  | $\mu\text{s}$ |
|                                      | $t_{r,i}$     | $V_{GE}=\pm 15V$             |                         | 0.10   |      | $\mu\text{s}$ |
| Turn-off Time                        | $t_{OFF}$     | $R_G=5.6\Omega$              |                         | 0.45   | 1.0  | $\mu\text{s}$ |
|                                      | $t_f$         | Inductive Load               |                         | 0.08   | 0.3  | $\mu\text{s}$ |
|                                      |               |                              |                         |        |      | $\mu\text{s}$ |
| Diode Forward On-Voltage             | $V_F$         | $I_F=150A$ ; $V_{GE}=0V$     | $T_J=25^\circ\text{C}$  | 2.3    | 3.0  | V             |
|                                      |               |                              | $T_J=125^\circ\text{C}$ | 2.0    |      | V             |
| Reverse Recovery Time                | $t_{rr}$      | $I_F=150A$                   |                         |        | 350  | ns            |

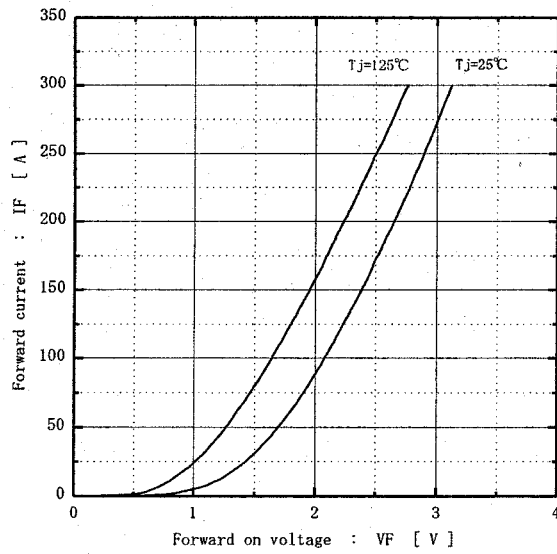
### • Thermal Characteristics

| Items              | Symbols       | Test Conditions       | Min. | Typ.  | Max.  | Units              |
|--------------------|---------------|-----------------------|------|-------|-------|--------------------|
| Thermal Resistance | $R_{th(j-c)}$ | IGBT                  |      |       | 0.125 | $^\circ\text{C/W}$ |
|                    | $R_{th(j-c)}$ | Diode                 |      |       | 0.260 | $^\circ\text{C/W}$ |
|                    | $R_{th(c-f)}$ | With Thermal Compound |      | 0.025 |       | $^\circ\text{C/W}$ |



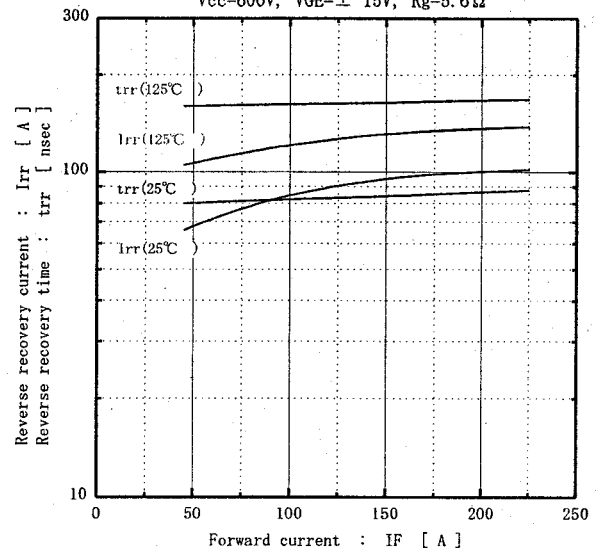


Forward current vs. Forward on voltage (typ.)



Reverse recovery characteristics (typ.)

Vcc=600V, VGE=± 15V, Rg=5.6Ω



Transient thermal resistance

