

## IGBT MODULE ( L series)

### ■ Features

- High Speed Switching
- Low Saturation Voltage
- Voltage Drive

### ■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply
- Industrial Machines, such as Welding Machines

### ■ Maximum Ratings and Characteristics

#### ● Absolute Maximum Ratings

| Items                     | Symbols      | Ratings         | Units |
|---------------------------|--------------|-----------------|-------|
| Collector-Emitter Voltage | $V_{CES}$    | 1200            | V     |
| Gate-Emitter Voltage      | $V_{GES}$    | $\pm 20$        | V     |
| Collector Current         | Continuous   | $I_C$           | 300   |
|                           | 1ms          | $I_{C\ pulse}$  | 600   |
|                           | Continuous   | $-I_C$          | 300   |
|                           | 1ms          | $-I_{C\ pulse}$ | 600   |
| Max. Power Dissipation    | $P_C$        | 2000            | W     |
| Operating Temperature     | $T_j$        | +150            | °C    |
| Storage Temperature       | $T_{stg}$    | -40 to +125     | °C    |
| Net. Weight               |              | 415             | g     |
| Isolation Voltage         | AC. 1min.    | $V_{isol}$      | 2500  |
| Screw Torque              | Mounting *1  | 35              | kg•cm |
|                           | Terminals *2 | 45              |       |
|                           | Terminals *3 | 17              |       |

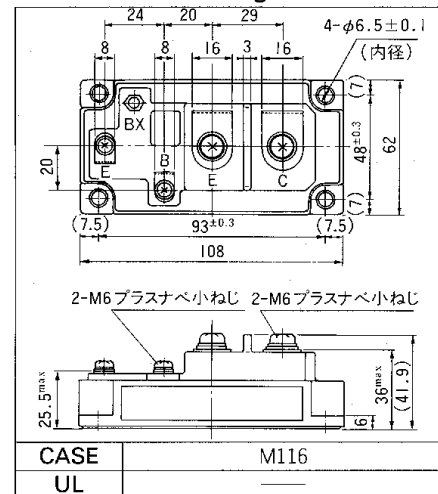
#### ● Electrical Characteristics ( $T_c=25^\circ\text{C}$ )

| Items                                | Symbols       | Test Conditions                                  | Min. | Typ.  | Max. | Units   |
|--------------------------------------|---------------|--------------------------------------------------|------|-------|------|---------|
| Zero Gate Voltage Collector Current  | $I_{CES}$     | $V_{GE}=0V\ V_{CE}=1200V\ T_c=25^\circ\text{C}$  |      |       | 4.0  | mA      |
|                                      |               | $V_{GE}=0V\ V_{CE}=1200V\ T_c=125^\circ\text{C}$ |      |       | —    | mA      |
| Gate-Emitter Leakage Current         | $I_{GES}$     | $V_{CE}=0V\ V_{GE}=\pm 20V$                      |      |       | 400  | nA      |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$  | $V_{CE}=20V\ I_C=300mA$                          | 3.0  |       | 6.0  | V       |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $V_{GE}=15V\ I_C=300A$                           |      |       | 3.5  | V       |
| Input Capacitance                    | $C_{ies}$     | $V_{GE}=0V$                                      |      | 54000 |      | pF      |
| Output Capacitance                   | $C_{oes}$     | $V_{CE}=10V$                                     |      | —     |      |         |
| Reverse Transfer Capacitance         | $C_{res}$     | $f=1MHz$                                         |      | —     |      |         |
| Turn-on Time                         | $t_{on}$      | $V_{CC}=600V$                                    |      | 0.6   | 0.8  | $\mu s$ |
|                                      | $t_r$         | $I_C=300A$                                       |      | 0.4   | 0.6  |         |
| Turn-off Time                        | $t_{off}$     | $V_{GE}=\pm 15V$                                 |      | 0.8   | 1.5  |         |
|                                      | $t_f$         | $R_G=2.7\Omega$                                  |      | 0.3   | 0.5  |         |
| Diode Forward On-Voltage             | $V_F$         | $I_F=300A\ V_{GE}=0V$                            |      |       | 2.5  | V       |
| Reverse Recovery Time                | $t_{rr}$      | $I_F=300A\ -di/dt=900A/\mu s\ V_{GE}=-10V$       |      | 200   | 350  | ns      |

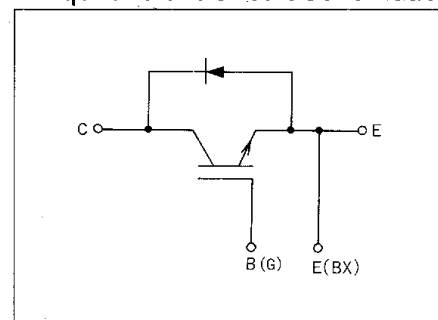
#### ● Thermal Characteristics

| Items              | Symbols       | Test Conditions       | Min. | Typ.   | Max.  | Units |
|--------------------|---------------|-----------------------|------|--------|-------|-------|
| Thermal Resistance | $R_{th(j-c)}$ | IGBT                  |      |        | 0.063 | °C/W  |
|                    | $R_{th(j-c)}$ | Diode                 |      |        | 0.10  |       |
|                    | $R_{th(c-f)}$ | With Thermal compound |      | 0.0125 |       |       |

### ■ Outline Drawings



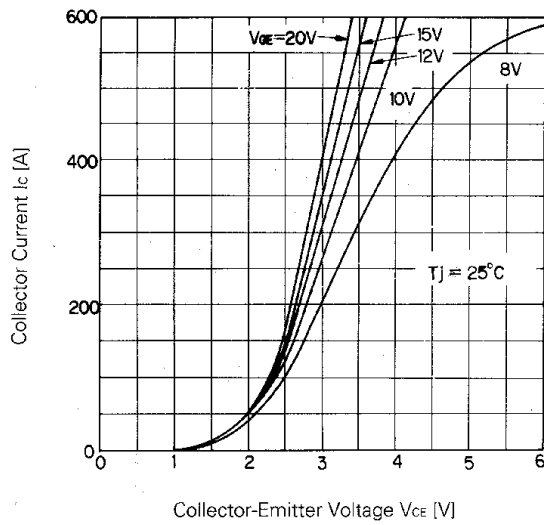
### ■ Equivalalent Circuit Schematic



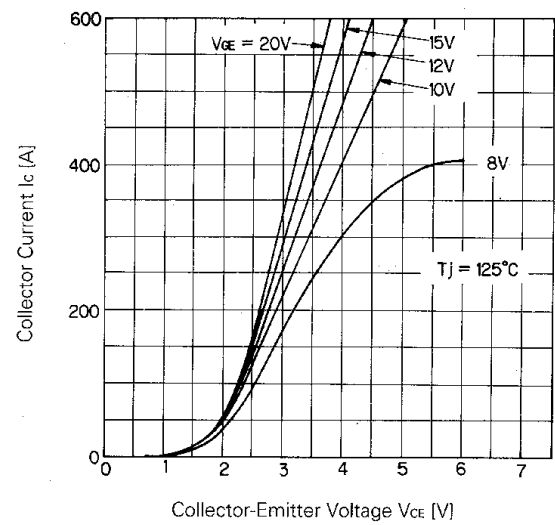
\*1 Recommendable Value 25 to 35kg•cm (M5)

\*2 Recommendable Value 35 to 45kg•cm (M6)

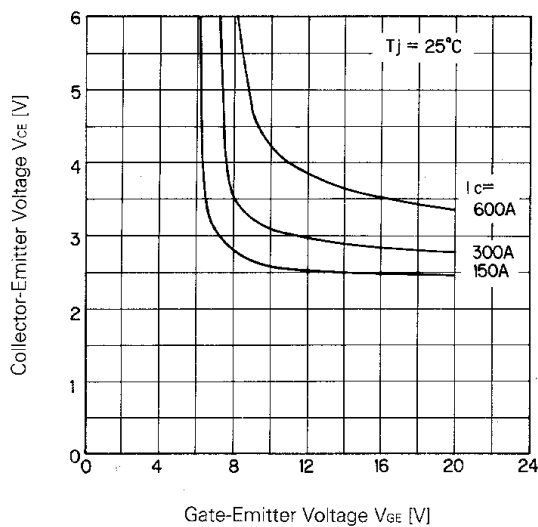
\*3 Recommendable Value 13 to 17kg•cm (M4)



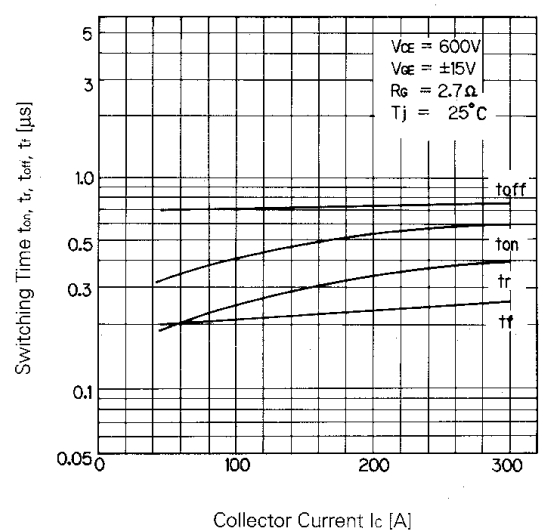
Collector Current vs. Collector-Emitter Voltage



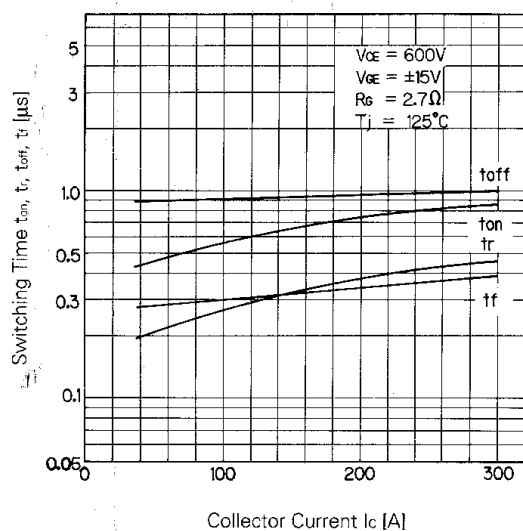
Collector Current vs. Collector-Emitter Voltage



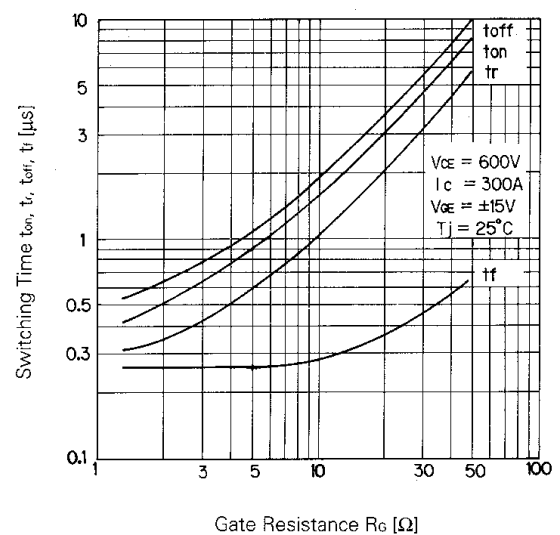
Collector-Emitter Voltage vs. Gate-Emitter Voltage



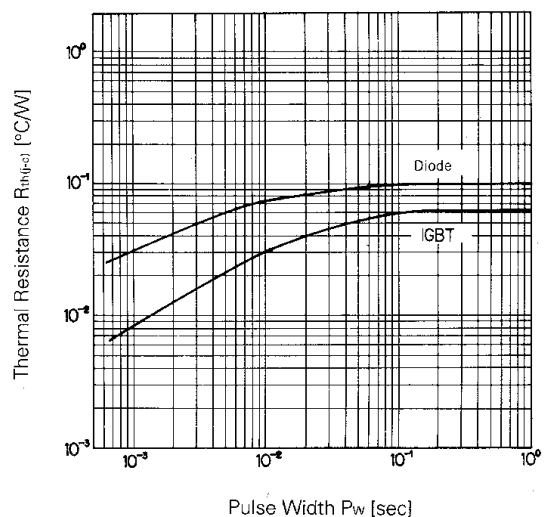
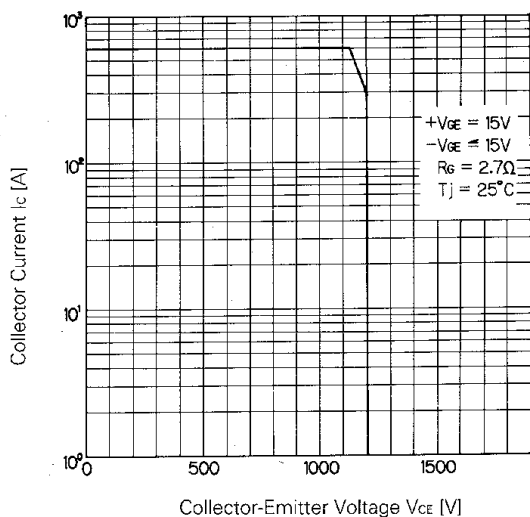
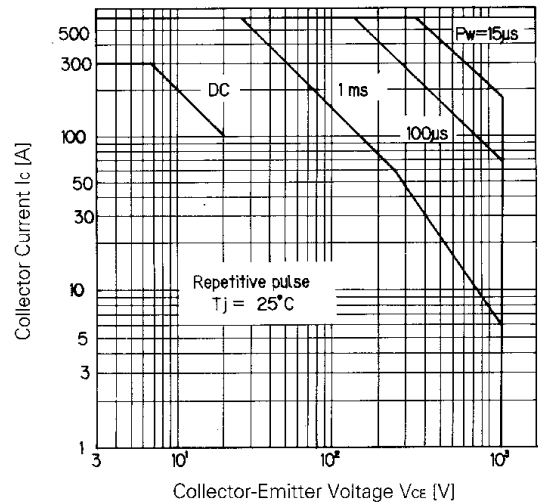
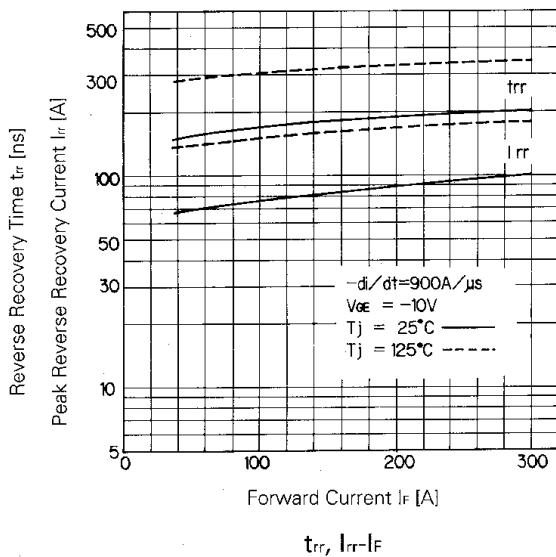
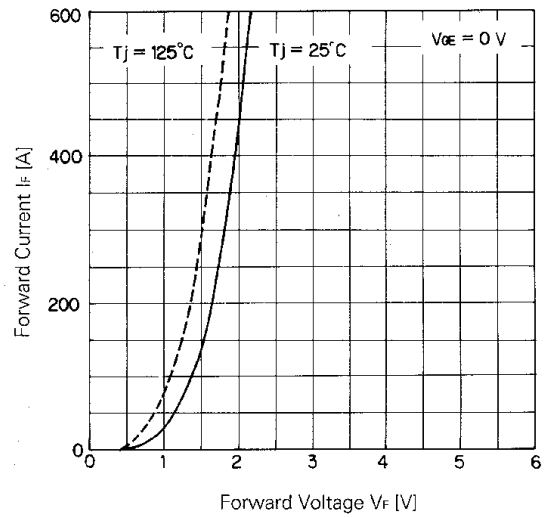
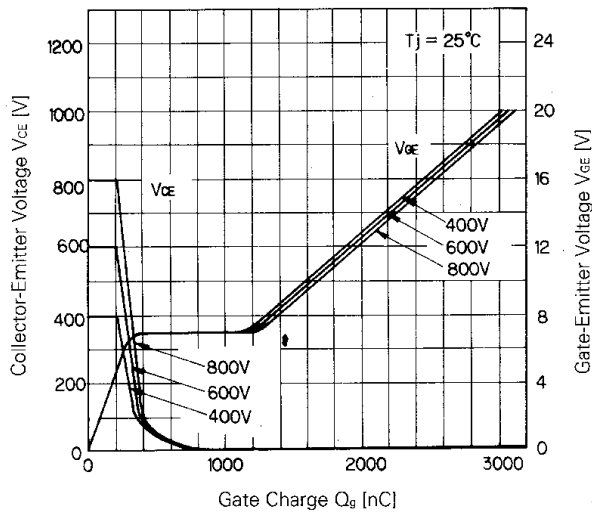
Switching Time



Switching Time



Switching Time-Gate Resistance



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