

## IGBT MODULE ( P-Series )

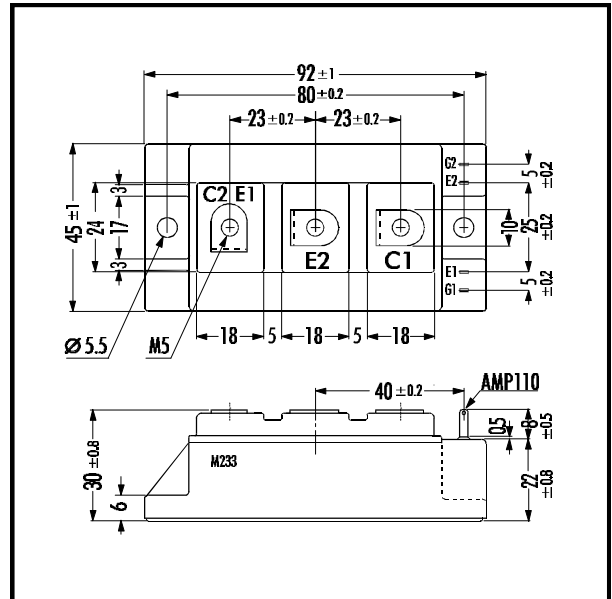
### ■ Features

- Square SC SOA at  $10 \times I_C$
- Simplified Parallel Connection
- Narrow Distribution of Characteristics
- High Short Circuit Withstand-Capability

### ■ Applications

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

### ■ Outline Drawing



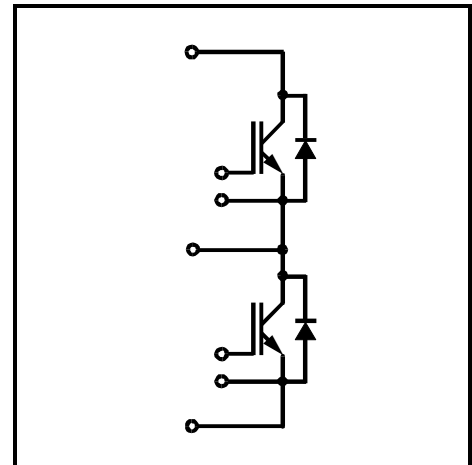
### ■ Maximum Ratings and Characteristics

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

| Items                     | Symbols                           | Ratings      | Units            |
|---------------------------|-----------------------------------|--------------|------------------|
| Collector-Emitter Voltage | $V_{CES}$                         | 1400         | V                |
| Gate -Emitter Voltage     | $V_{GES}$                         | $\pm 20$     | V                |
| Collector Current         | Continuous $T_c=25^\circ\text{C}$ | $I_C$        | 200              |
|                           |                                   | $I_C$        | 150              |
|                           | 1ms $T_c=80^\circ\text{C}$        | $I_C$ PULSE  | 400              |
|                           |                                   | $-I_C$       | 300              |
|                           |                                   | $-I_C$ PULSE | 150              |
| Max. Power Dissipation    | $P_C$                             | 1100         | W                |
| Operating Temperature     | $T_j$                             | +150         | $^\circ\text{C}$ |
| Storage Temperature       | $T_{stg}$                         | -40 ~ +125   | $^\circ\text{C}$ |
| Isolation Voltage         | A.C. 1min. $V_{is}$               | 2500         | V                |
| Screw Torque              | Mounting *1                       | 3.5          | Nm               |
|                           | Terminals *2                      | 3.5          |                  |

Note: \*1:Recommendable Value; 2.5 - 3.5 Nm (M5)

### ■ Equivalent Circuit

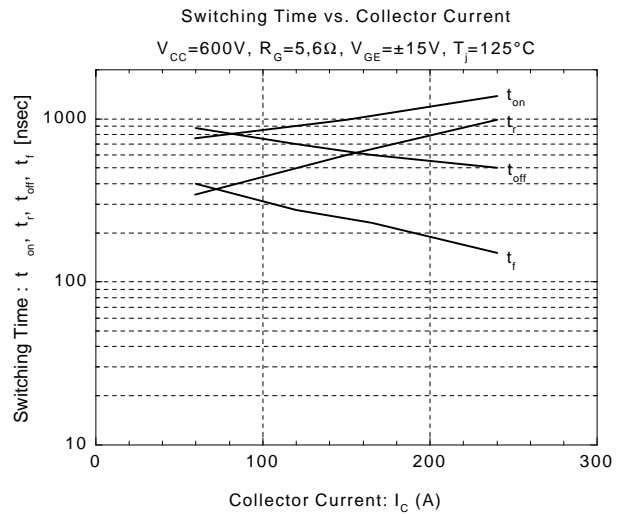
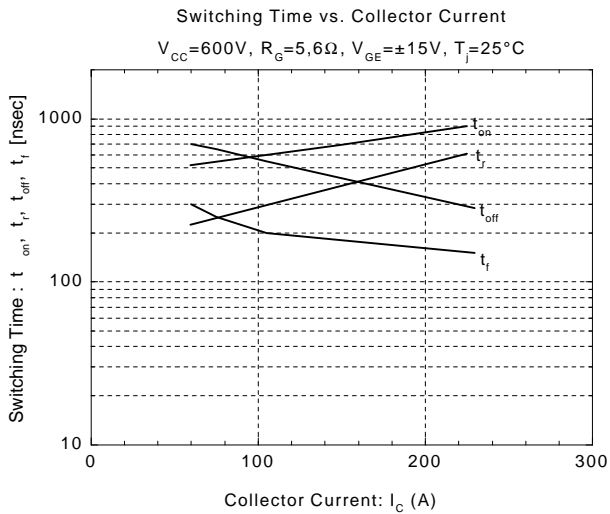
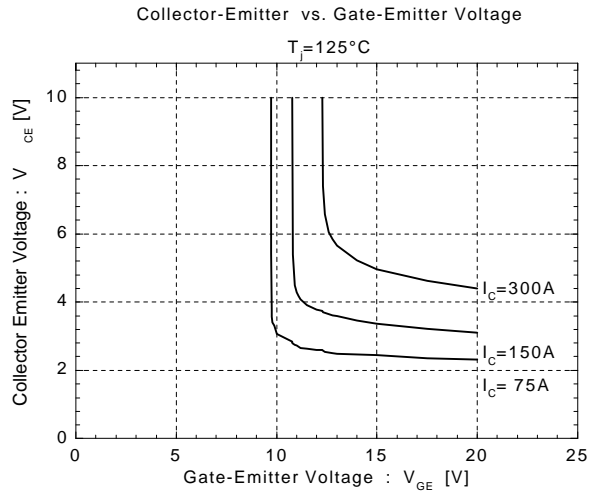
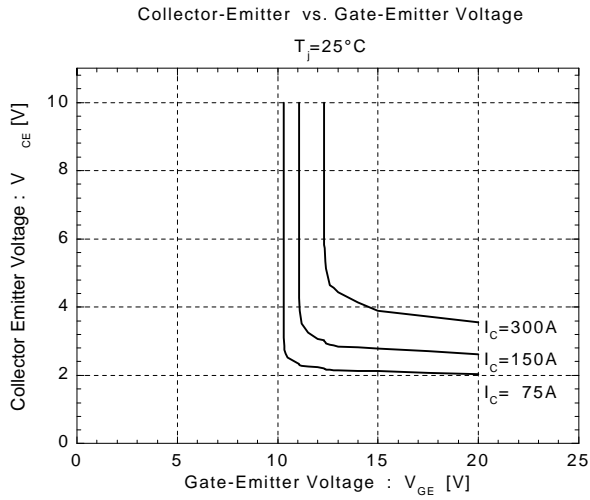
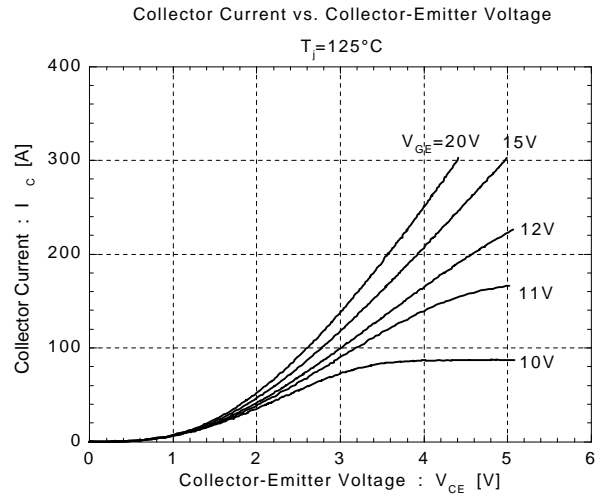
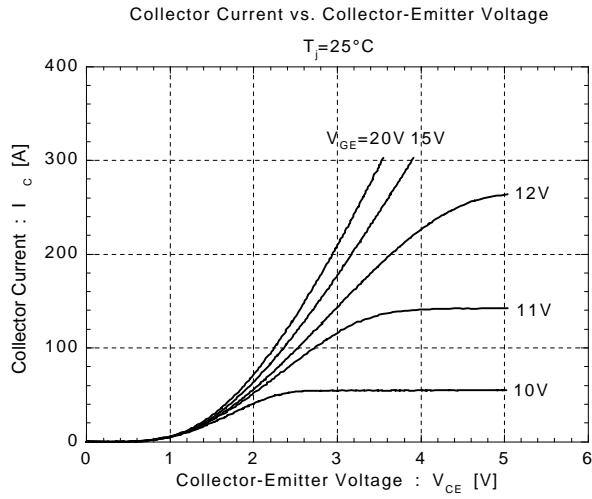


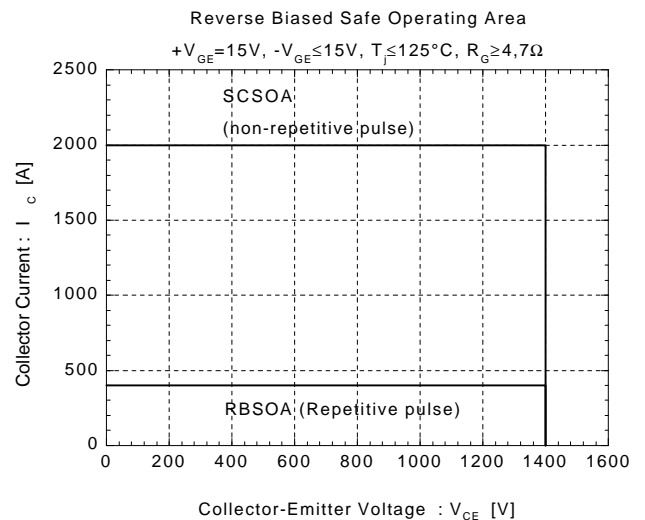
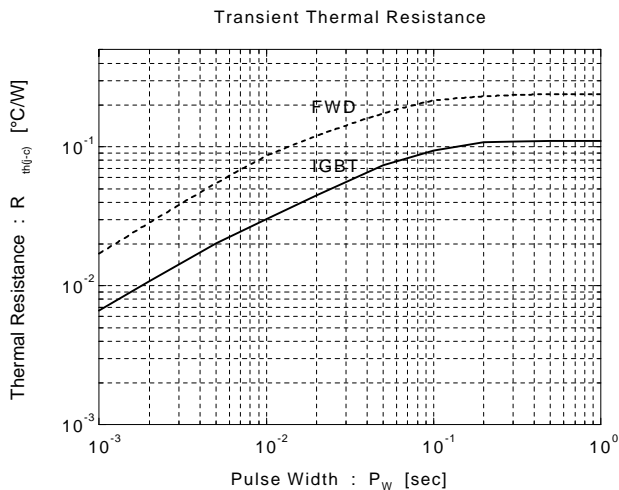
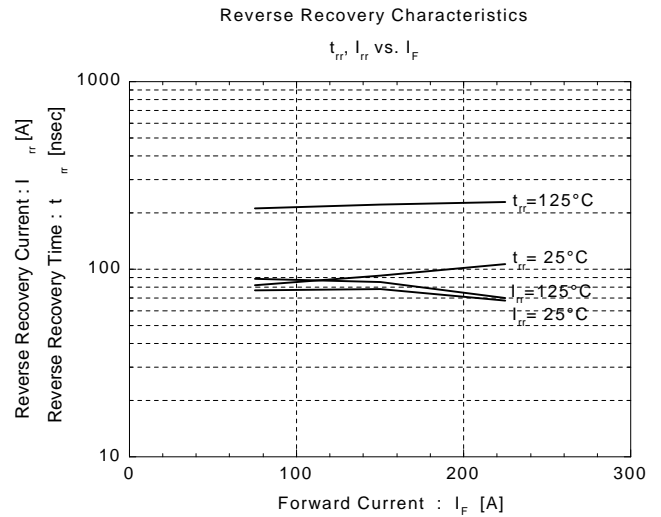
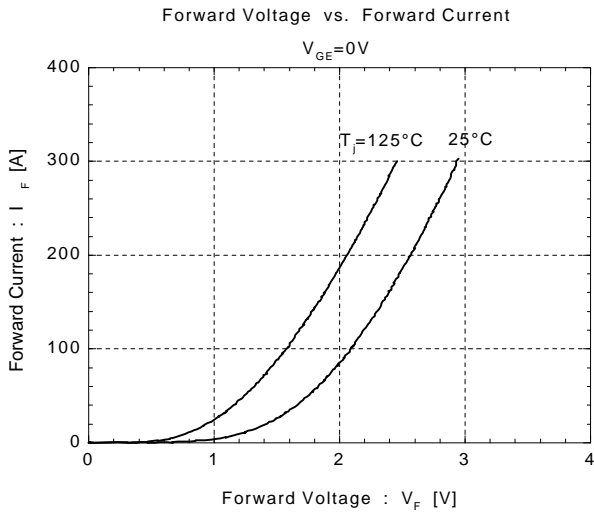
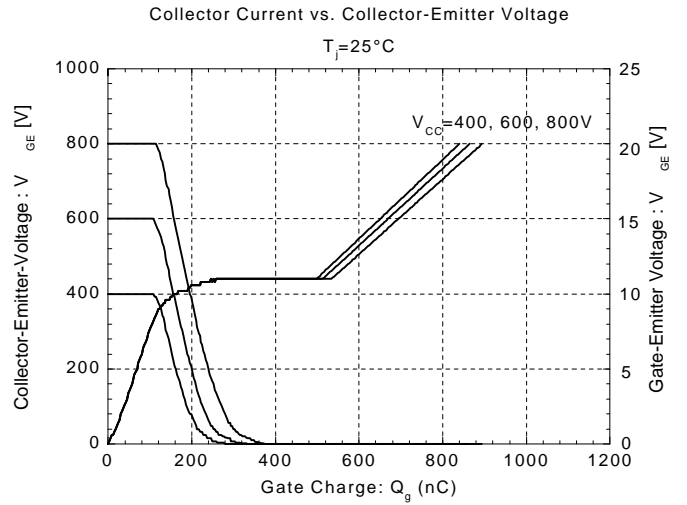
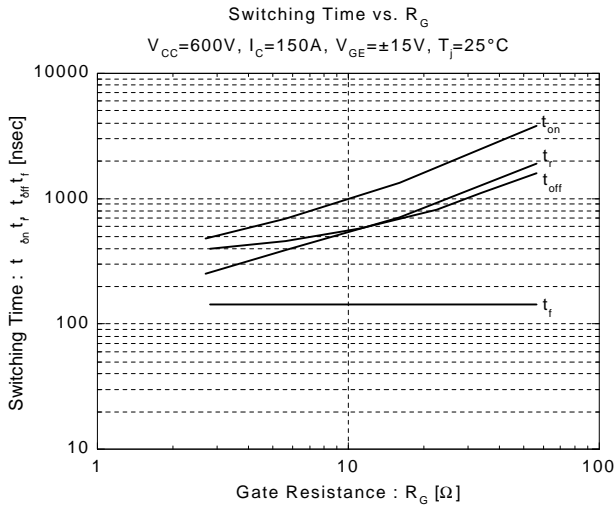
#### • Electrical Characteristics ( at $T_j=25^\circ\text{C}$ )

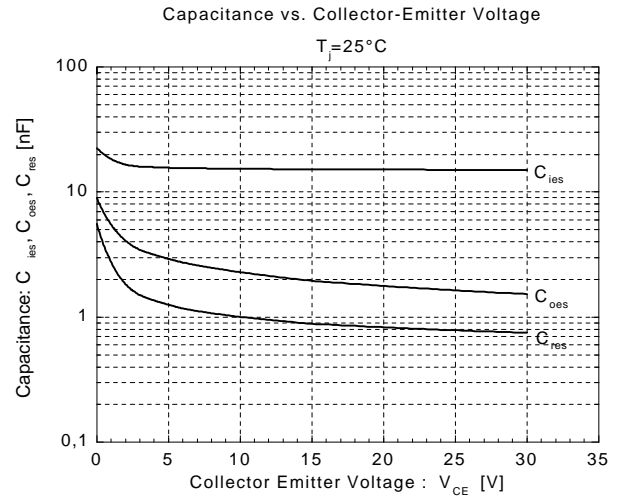
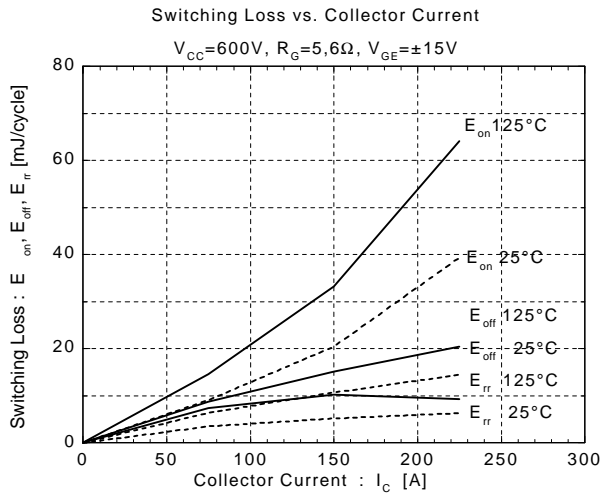
| Items                                | Symbols       | Test Conditions                                 | Min. | Typ.  | Max. | Units         |
|--------------------------------------|---------------|---|------|-------|------|---------------|
| Zero Gate Voltage Collector Current  | $I_{CES}$     | $V_{GE}=0V$ $V_{CE}=1400V$                      |      |       | 2.0  | mA            |
| Gate-Emitter Leakage Current         | $I_{GES}$     | $V_{CE}=0V$ $V_{GE}=\pm 20V$                    |      |       | 400  | $\mu\text{A}$ |
| Gate-Emitter Threshold Voltage       | $V_{GE(th)}$  | $V_{GE}=20V$ $I_C=150\text{mA}$                 | 6.0  | 8.0   | 9.0  | V             |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $T_j=25^\circ\text{C}$ $V_{GE}=15V$ $I_C=150A$  |      | 2.7   | 3.0  | V             |
|                                      |               | $T_j=125^\circ\text{C}$ $V_{GE}=15V$ $I_C=150A$ |      | 3.3   |      |               |
| Input capacitance                    | $C_{ies}$     | $V_{CE}=0V$                                     |      | 15000 |      | pF            |
| Output capacitance                   | $C_{oes}$     | $V_{CE}=10V$                                    |      | 2000  |      |               |
| Reverse Transfer capacitance         | $C_{res}$     | $f=1\text{MHz}$                                 |      | 1000  |      |               |
| Turn-on Time                         | $t_{ON}$      | $V_{CC}=600V$<br>$I_C=150A$                     |      |       | 1.2  | $\mu\text{s}$ |
|                                      | $t_r$         |   |      |       | 0.6  |               |
| Turn-off Time                        | $t_{OFF}$     | $V_{GE}=\pm 15V$<br>$R_G=5.6\Omega$             |      |       | 1.0  |               |
|                                      | $t_f$         |   |      |       | 0.3  |               |
| Diode Forward On-Voltage             | $V_F$         | $I_F=150A$ $V_{GE}=0V$                          |      | 2.4   | 3.3  | V             |
| Reverse Recovery Time                | $t_{rr}$      | $I_F=150A$                                      |      |       | 350  | ns            |

#### • Thermal Characteristics

| Items              | Symbols       | Test Conditions       | Min. | Typ.  | Max. | Units              |
|--------------------|---------------|-----------------------|------|-------|------|--------------------|
| Thermal Resistance | $R_{th(f-c)}$ | IGBT                  |      |       | 0.11 | $^\circ\text{C/W}$ |
|                    | $R_{th(f-c)}$ | Diode                 |      |       | 0.24 |                    |
|                    | $R_{th(c-f)}$ | With Thermal Compound |      | 0.025 |      |                    |







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