

IGBT MODULE (P-Series)

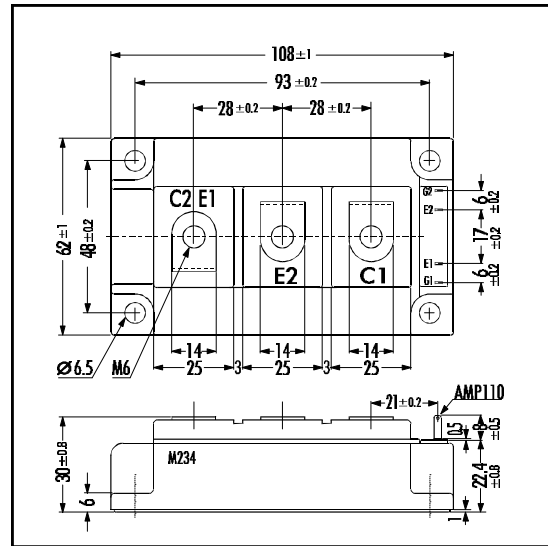
■ Features

- 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



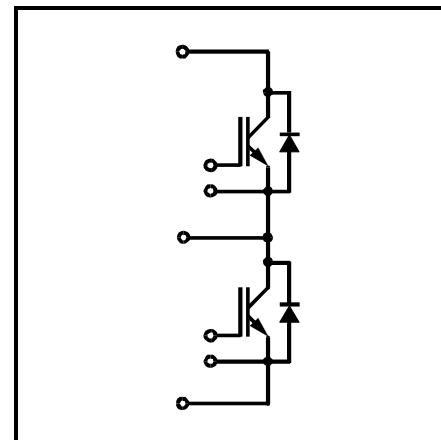
■ Maximum Ratings and Characteristics

• 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} | ± 20 | V |
| Collector Current | Continuous $T_C=25^\circ\text{C}$ | I_C | 150 |
| | | I_C | 100 |
| | 1ms $T_C=25^\circ\text{C}$ | $I_{C\text{ PULSE}}$ | 300 |
| | | $I_{C\text{ PULSE}}$ | 200 |
| | 1ms $T_C=80^\circ\text{C}$ | $-I_C$ | 100 |
| | $-I_{C\text{ PULSE}}$ | 200 | |
| Max. Power Dissipation | P_C | 780 | 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



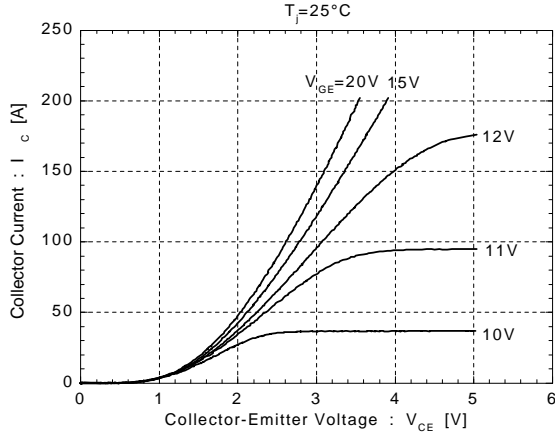
• Electrical Characteristics (at $T_j=25^\circ\text{C}$)

| 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 | μA |
| Gate-Emitter Threshold Voltage | $V_{GE(th)}$ | $V_{GE}=20V$ $I_C=100\text{mA}$ | 6.0 | 8.0 | 9.0 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $T_j=25^\circ\text{C}$ $V_{GE}=15V$ $I_C=100\text{A}$ | | 2.7 | 3.0 | V |
| | | $T_j=125^\circ\text{C}$ $V_{GE}=15V$ $I_C=100\text{A}$ | | 3.3 | | |
| Input capacitance | C_{ies} | $V_{CE}=0V$ | | 10000 | | pF |
| Output capacitance | C_{oes} | $V_{CE}=10V$ | | 1500 | | |
| Reverse Transfer capacitance | C_{res} | $f=1\text{MHz}$ | | 650 | | |
| Turn-on Time | t_{ON} | $V_{CC}=600V$ | | | 1.2 | μs |
| | t_r | $I_C=100\text{A}$ | | | 0.6 | |
| Turn-off Time | t_{OFF} | $V_{GE}=\pm 15V$ | | | 1.0 | |
| | t_f | $R_G=9.1\Omega$ | | | 0.3 | |
| Diode Forward On-Voltage | V_F | $I_F=100\text{A}$ $V_{GE}=0V$ | | 2.4 | 3.3 | V |
| Reverse Recovery Time | t_{rr} | $I_F=100\text{A}$ | | | 350 | ns |

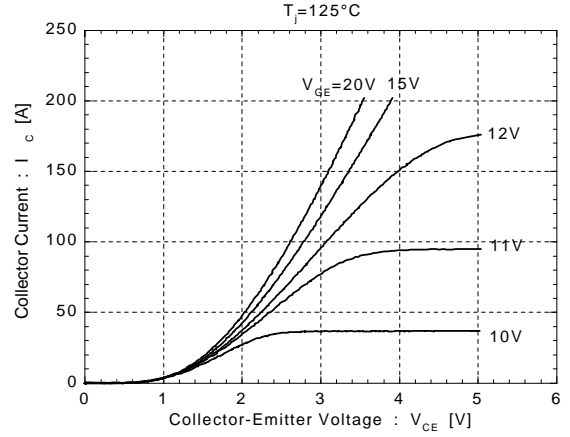
• Thermal Characteristics

| Items | Symbols | Test Conditions | Min. | Typ. | Max. | Units |
|--------------------|---------------|-----------------------|------|-------|------|--------------------|
| Thermal Resistance | $R_{th(j-c)}$ | IGBT | | | 0.16 | $^\circ\text{C/W}$ |
| | $R_{th(j-e)}$ | Diode | | | 0.33 | |
| | $R_{th(c-l)}$ | With Thermal Compound | | 0.025 | | |

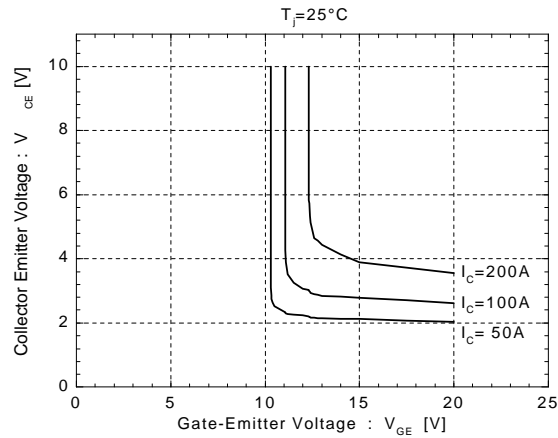
Collector Current vs. Collector-Emitter Voltage



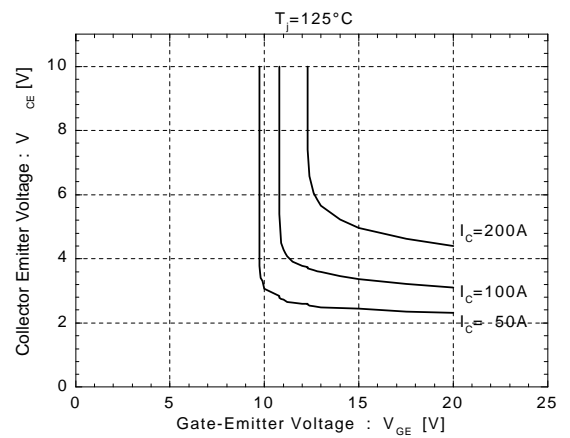
Collector Current vs. Collector-Emitter Voltage



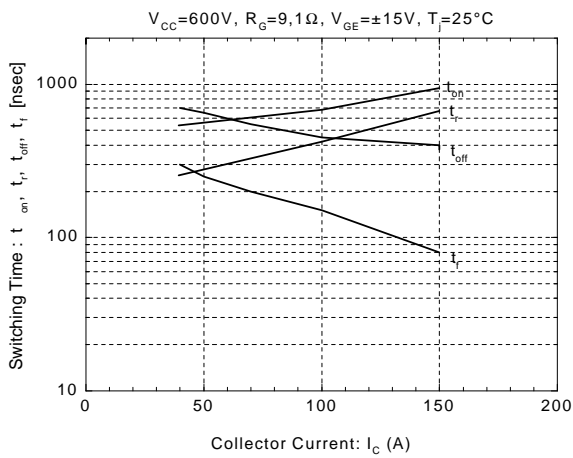
Collector-Emitter vs. Gate-Emitter Voltage



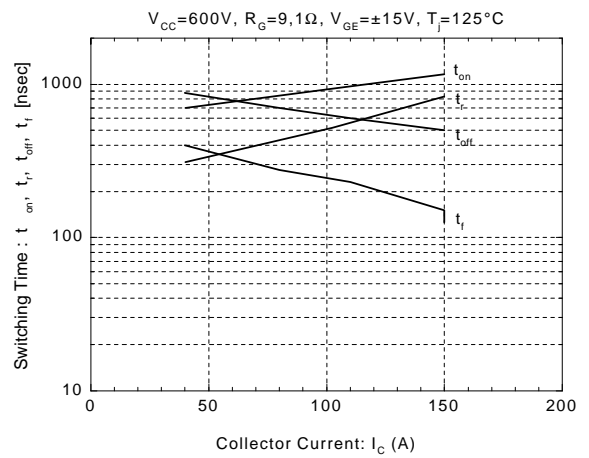
Collector-Emitter vs. Gate-Emitter Voltage

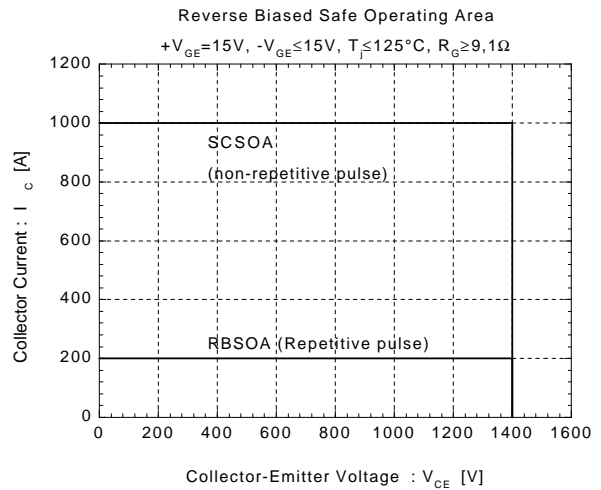
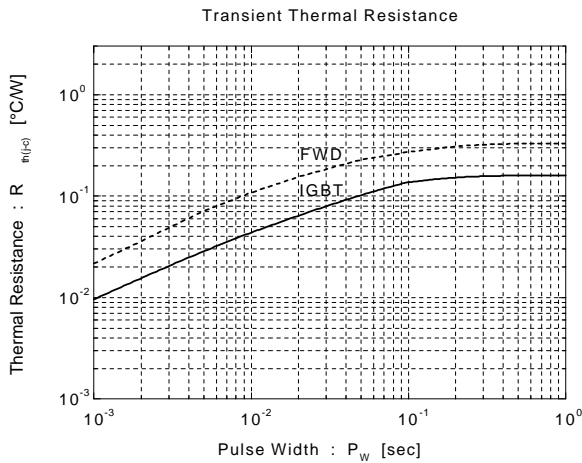
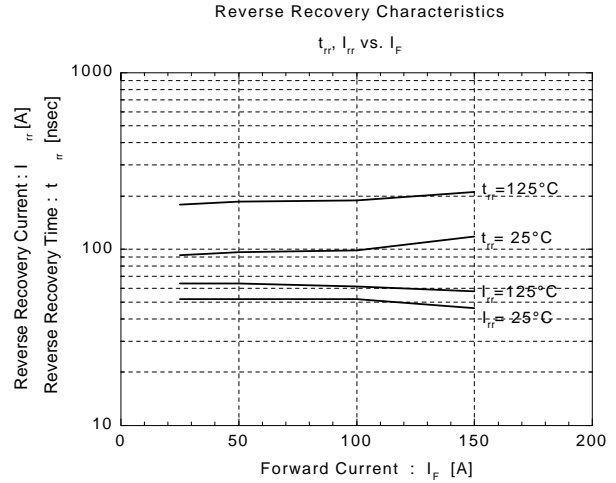
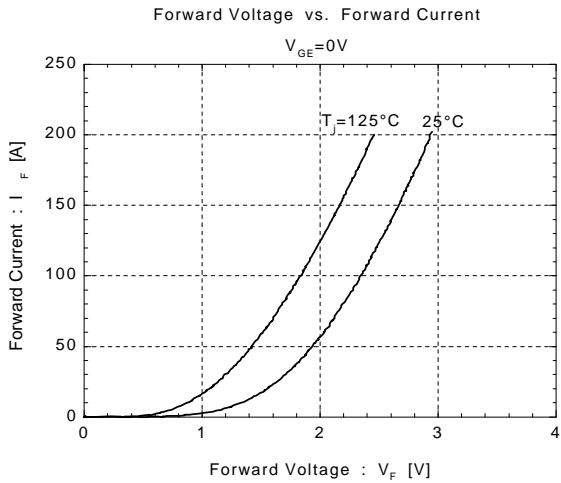
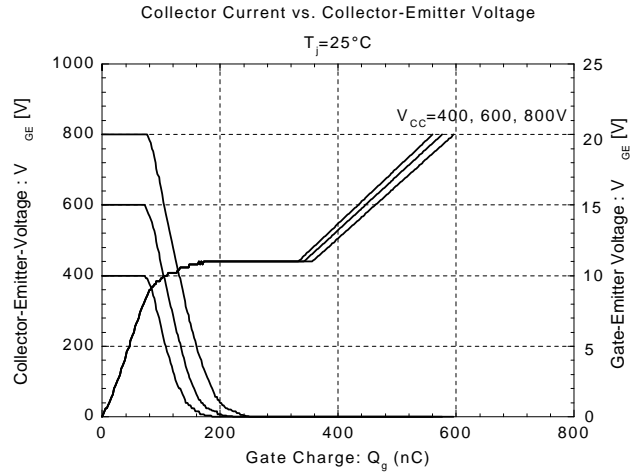
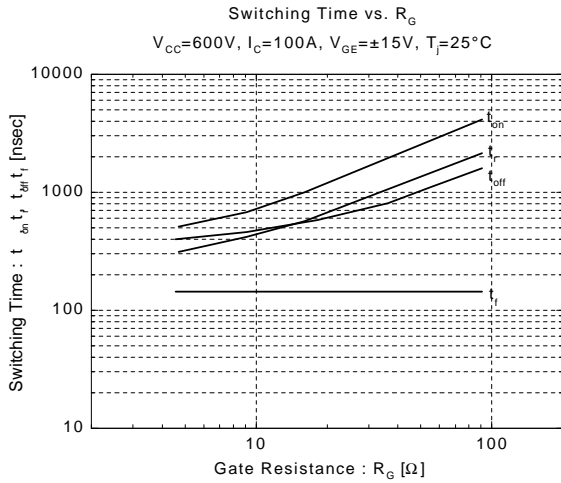


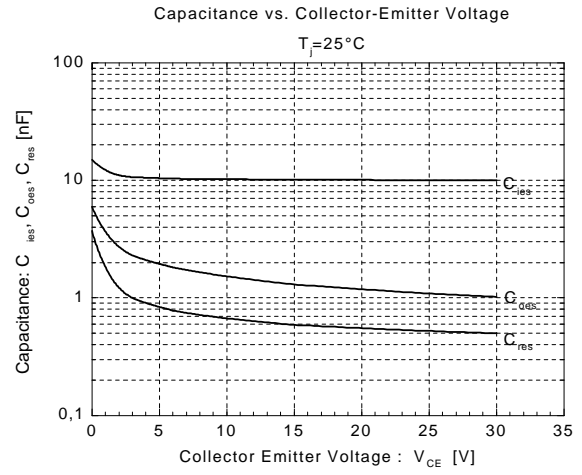
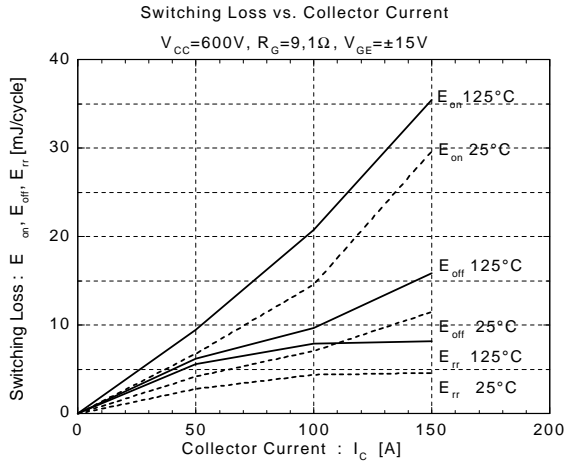
Switching Time vs. Collector Current



Switching Time vs. Collector Current







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