

IGBT MODULE (P-Series)

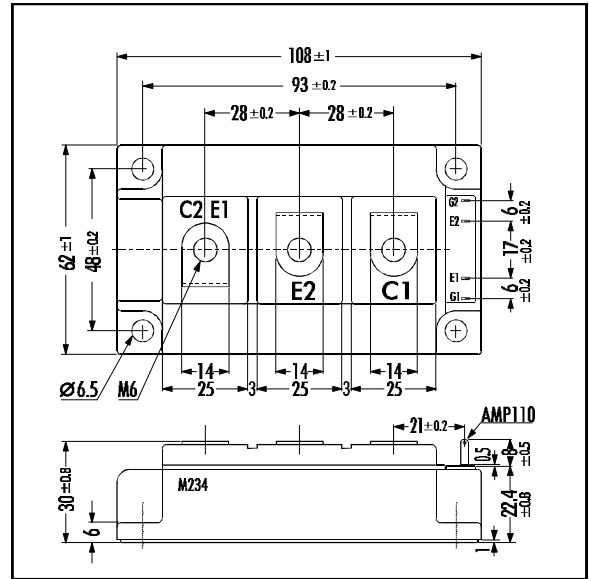
■ Features

- 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



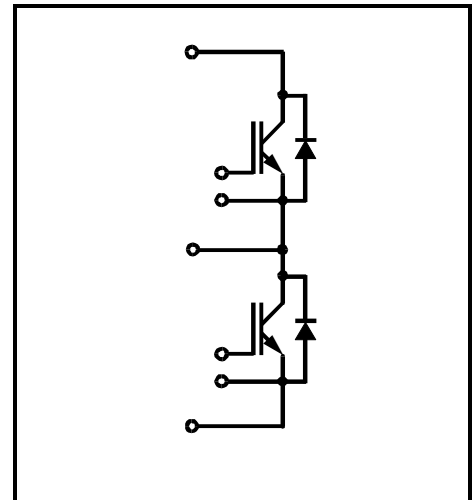
■ Maximum Ratings and Characteristics

• 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 $T_c=25^\circ\text{C}$ | 200 | A |
| | | 150 | |
| | 1ms $T_c=25^\circ\text{C}$ | 400 | |
| | | 1ms $T_c=80^\circ\text{C}$ | |
| | 1ms | $-I_C$ | |
| 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



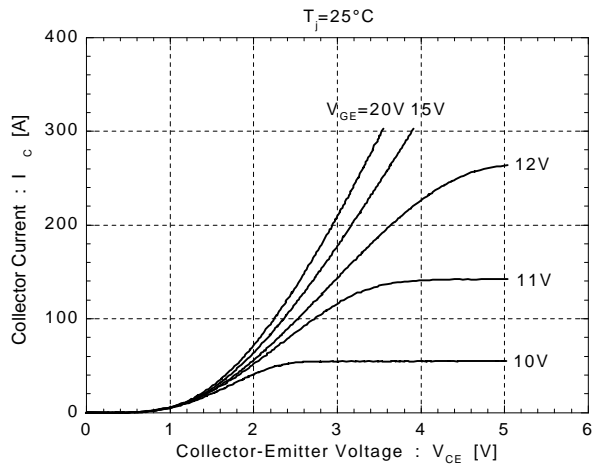
• Electrical Characteristics (at $T_f=25^\circ\text{C}$)

| 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 | $V_{GE(th)}$ | $V_{GE}=20V$ $I_C=150\text{mA}$ | 6.0 | 8.0 | 9.0 | V |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ | $T_f=25^\circ\text{C}$ $V_{GE}=15V$ $I_C=150A$ | | 2.7 | 3.0 | V |
| | | $T_f=125^\circ\text{C}$ $V_{GE}=15V$ $I_C=150A$ | | 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} | $V_{CC}=600V$ $I_C=150A$ | | | 1.2 | μs |
| | t_r | | | | 0.6 | |
| Turn-off Time | t_{OFF} | $V_{GE}=\pm 15V$ $R_G=5.6\Omega$ | | | 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 |

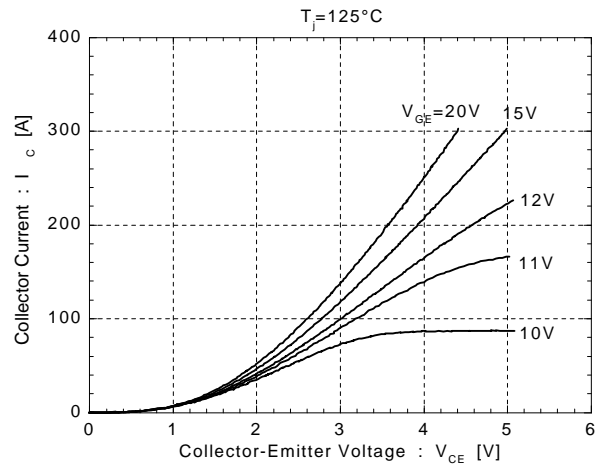
• Thermal Characteristics

| 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 | | |

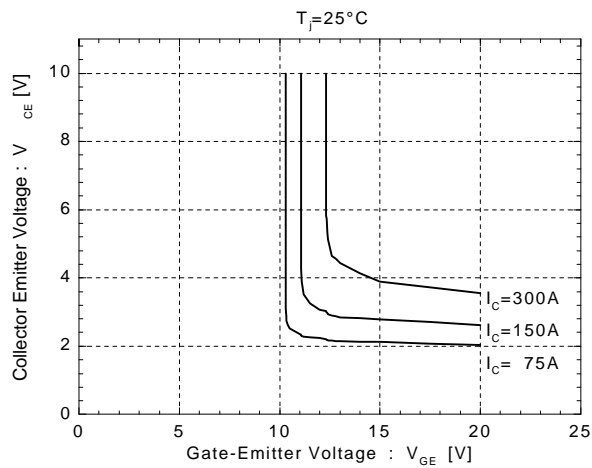
Collector Current vs. Collector-Emmitter Voltage



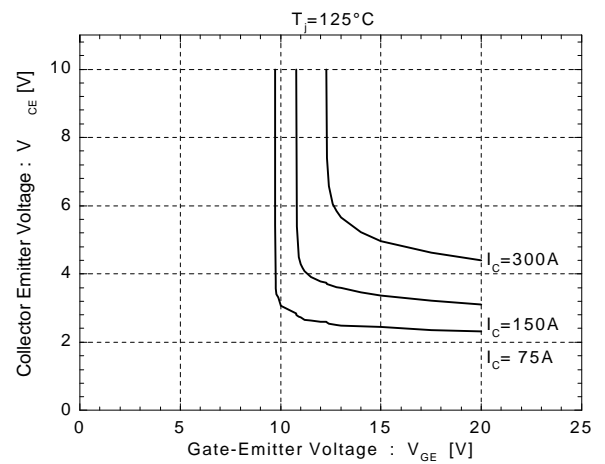
Collector Current vs. Collector-Emmitter Voltage



Collector-Emmitter vs. Gate-Emmitter Voltage

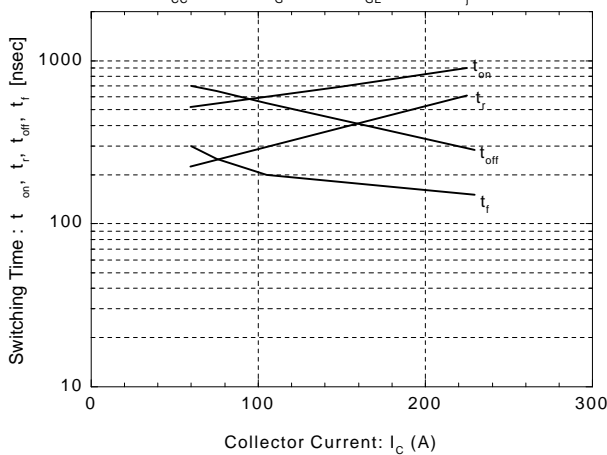


Collector-Emmitter vs. Gate-Emmitter Voltage



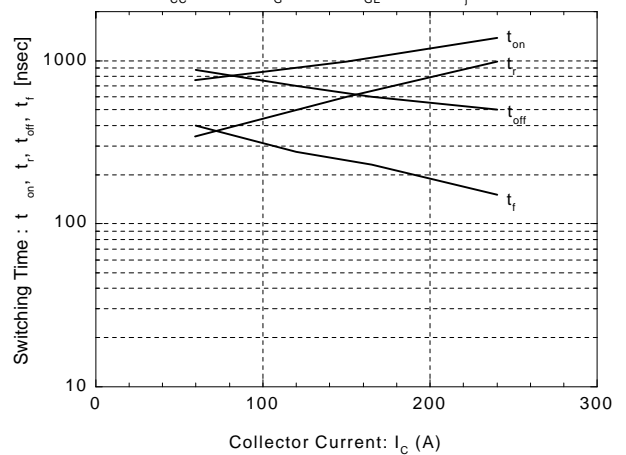
Switching Time vs. Collector Current

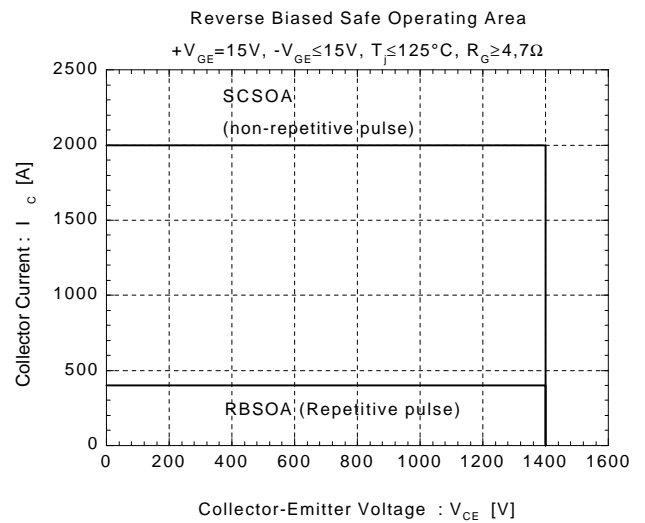
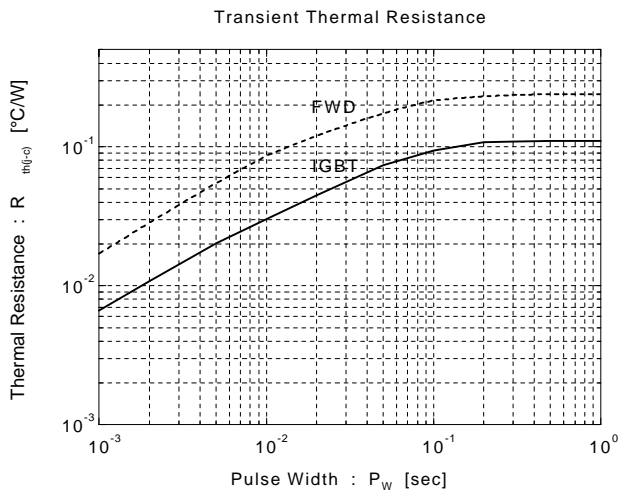
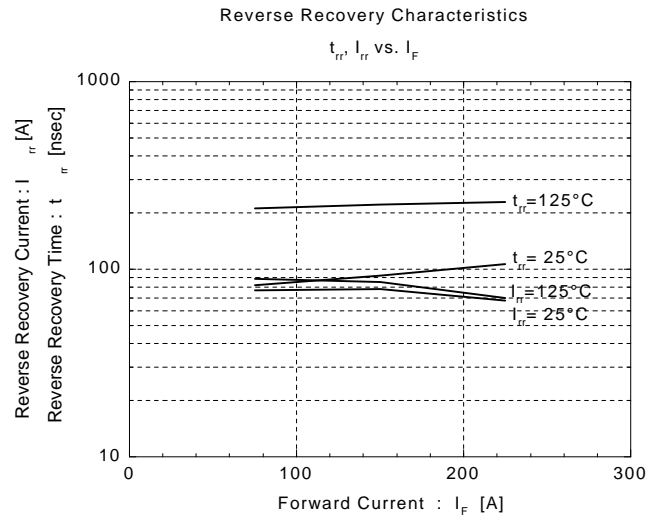
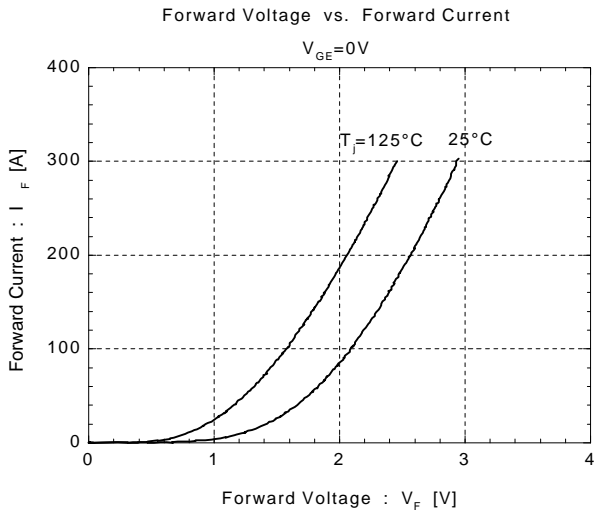
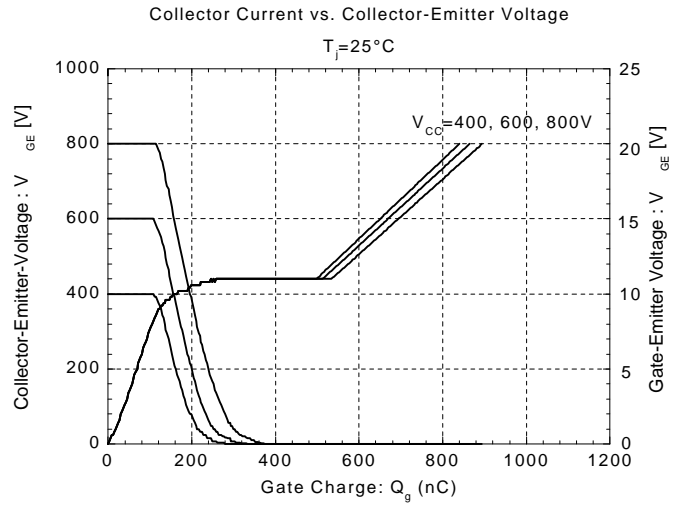
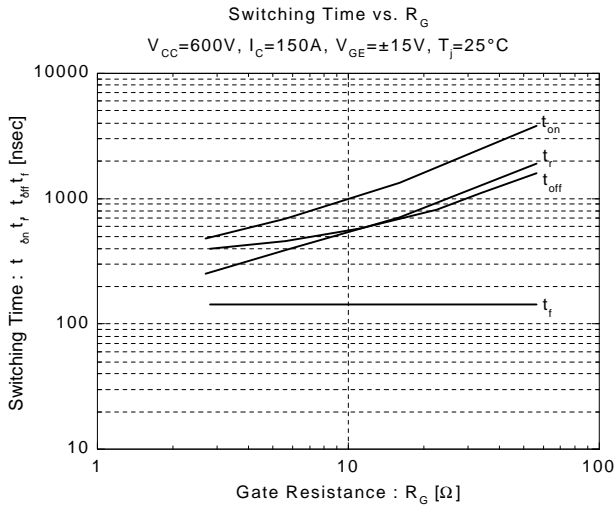
$V_{CC}=600V, R_G=5,6\Omega, V_{GE}=\pm 15V, T_j=25^\circ\text{C}$

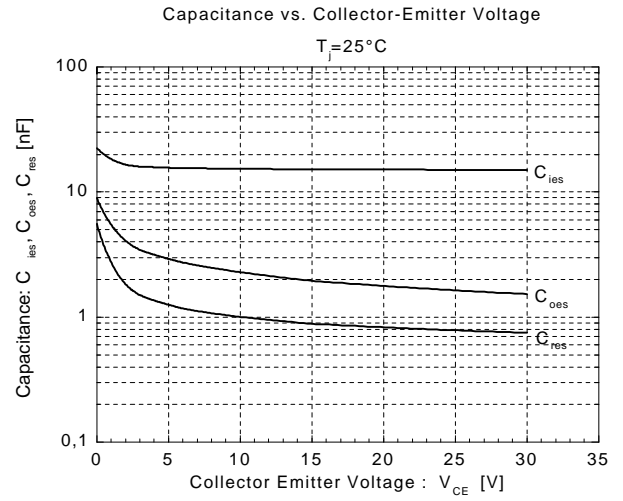
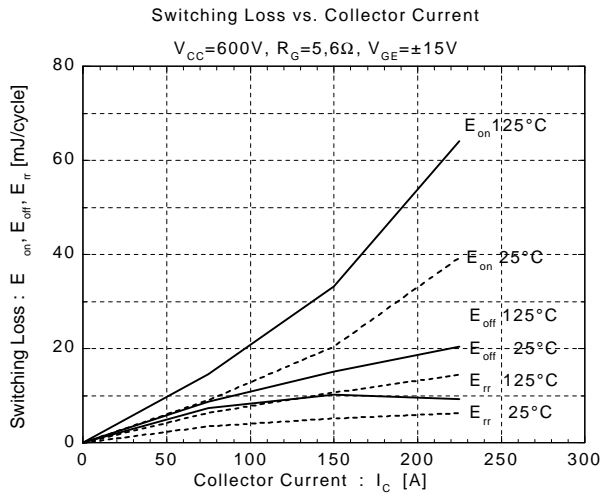


Switching Time vs. Collector Current

$V_{CC}=600V, R_G=5,6\Omega, V_{GE}=\pm 15V, T_j=125^\circ\text{C}$







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