

Intelligent Power Module (R-Series)

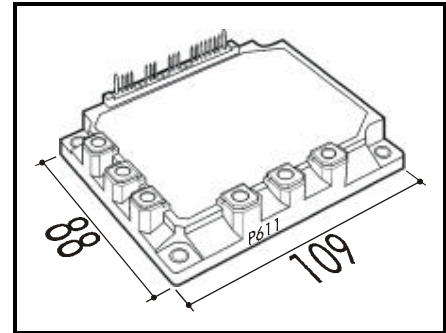
■ Maximum Ratings and Characteristics

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

| Items | Symbols | Ratings | | Units |
|--|-----------------------------------|---------|-----------|-------|
| | | Min. | Max. | |
| DC Bus Voltage | V_{DC} | 0 | 900 | V |
| DC Bus Voltage (surge) | $V_{DC(Surge)}$ | 0 | 1000 | |
| DC Bus Voltage (short operating) | V_{SC} | 200 | 800 | |
| Collector-Emitter Voltage | V_{CES} | 0 | 1200 | A |
| Inverter Collector | Continuous I_C | | 50 | |
| Current | 1ms I_{CP} Duty=62.6% $-I_C$ | | 100 50 | |
| Collector Power Dissipation One Transistor | P_C | | 400 | W |
| Voltage of Power Supply for Driver | V_{CC} | 0 | 20 | V |
| Input Signal Voltage | V_{IN} | 0 | V_Z | |
| Input Signal Current | I_{IN} | | 1 | mA |
| Alarm Signal Voltage | V_{ALM} | 0 | V_{CC} | V |
| Alarm Signal Current | I_{ALM} | | 15 | mA |
| Junction Temperature | T_j | | 150 | °C |
| Operating Temperature | T_{OP} | -20 | 100 | |
| Storage Temperature | T_{stg} | -40 | 125 | |
| Isolation Voltage | A.C. 1min. V_{iso} | | 2500 | V |
| Screw Torque | Mounting *1 | | 3.5 | Nm |
| | Terminals *1 | | 3.5 | |

Note: *1: Recommendable Value; 2.5 – 3.0 Nm (M5)

■ Outline Drawing



• Electrical Characteristics of Power Circuit (at $T_j=25^\circ\text{C}$, $V_{CC}=15\text{V}$)

| Items | | Symbols | Conditions | Min. | Typ. | Max. | Units |
|-------|---------------------------------------|---------------|---|------|------|------|-------|
| INV | Collector Current At Off Signal Input | I_{CES} | $V_{CE}=1200\text{V}$, Input Terminal Open | | | 1.0 | mA |
| | Collector-Emitter Saturation Voltage | $V_{CE(Sat)}$ | $I_C=50\text{A}$ | | | 2.6 | V |
| | Forward Voltage of FWD | V_F | $-I_C=50\text{A}$ | | | 3.0 | V |

• Electrical Characteristics of Control Circuit (at $T_j=25^\circ\text{C}$, $V_{CC}=15\text{V}$)

| Items | | Symbols | Conditions | Min. | Typ. | Max. | Units |
|---|--|--------------|---|------|------|------|---------------|
| Current of P-Line Side Driver (One Unit) | | I_{CCP} | $f_{SW}=0\sim 15\text{kHz}$, $T_c=-20\sim 100^\circ\text{C}$ | 3 | | 18 | mA |
| Current of N-Line Side Driver (Three Units) | | I_{CCN} | $f_{SW}=0\sim 15\text{kHz}$, $T_c=-20\sim 100^\circ\text{C}$ | 10 | | 65 | |
| Input Signal Threshold Voltage | | $V_{IN(th)}$ | On | 1.00 | 1.35 | 1.70 | V |
| | | | Off | 1.25 | 1.60 | 1.95 | |
| Input Zener Voltage | | V_Z | $R_{IN}=20\text{k}\Omega$ | | 8.0 | | °C |
| Over Heating Protection Temperature Level | | T_{COH} | $V_{DC}=0\text{V}$, $I_C=0\text{A}$, Case Temp. | 110 | | 125 | |
| Hysteresis | | T_{CH} | | | 20 | | |
| IGBT Chips Over Heating Protec. Temp. Level | | T_{IOH} | Surface Of IGBT Chip | 150 | | | |
| Hysteresis | | T_{IH} | | | 20 | | A |
| Inverter Collector Current Protection Level | | I_{OC} | $T_j=125^\circ\text{C}$ | 75 | | | |
| Over Current Detecting Time | | t_{DOC} | $T_j=25^\circ\text{C}$ | | 10 | | μs |
| Alarm Signal Hold Time | | t_{ALM} | | 1.5 | 2 | | ms |
| Limiting Resistor for Alarm | | R_{ALM} | | 1425 | 1500 | 1575 | Ω |
| Under Voltage Protection Level | | V_{UV} | | 11.0 | | 12.5 | V |
| Hysteresis | | V_H | | 0.2 | | | |

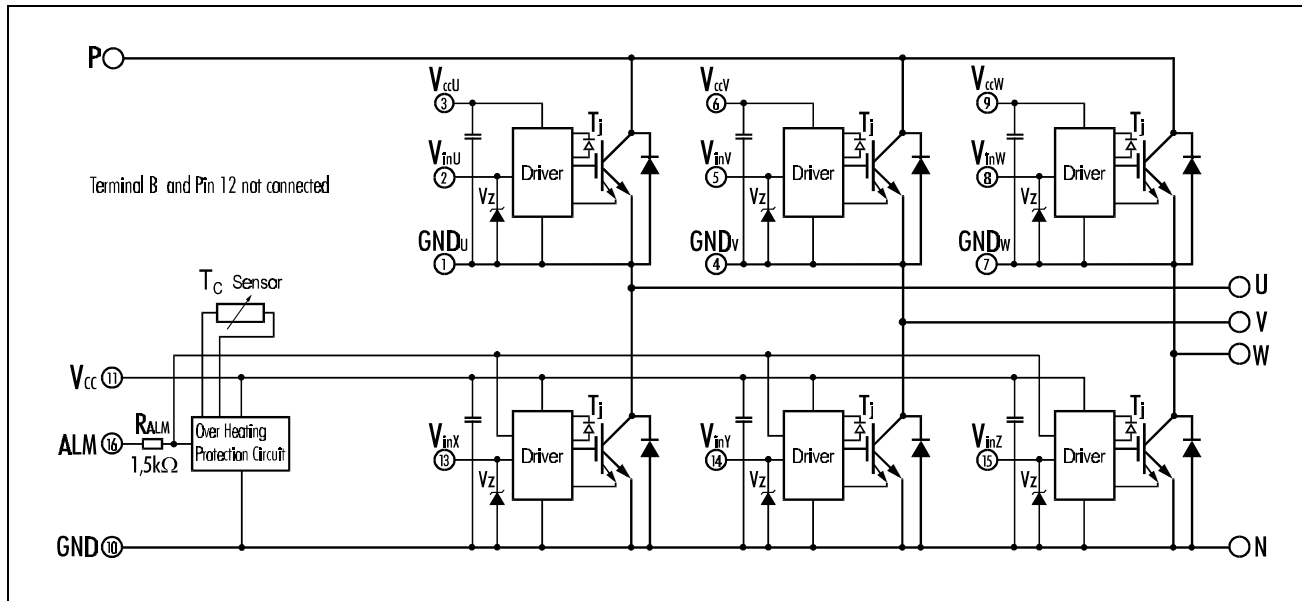
• Dynamic Characteristics (at $T_c=T_j=125^\circ\text{C}$, $V_{CC}=15\text{V}$)

| Items | | Symbols | Conditions | Min. | Typ. | Max. | Units |
|----------------|----------|---|---|------|------|------|---------------|
| Switching Time | t_{ON} | t_{OFF} | $I_C=50\text{A}$, $V_{DC}=600\text{V}$ | 0.3 | | | μs |
| | | | | | | 3.6 | |
| | t_{RR} | $I_F=50\text{A}$, $V_{DC}=600\text{V}$ | | | 0.4 | | |

• Thermal Characteristics

| Items | | Symbols | Conditions | Min. | Typ. | Max. | Units |
|--------------------|--|---------------|-----------------------|------|------|------|-------|
| Thermal Resistance | | $R_{th(f-c)}$ | Inverter IGBT | | | 0.31 | °C/W |
| | | $R_{th(f-e)}$ | Diode | | | 0.70 | |
| | | $R_{th(c-f)}$ | With Thermal Compound | | 0.05 | | |

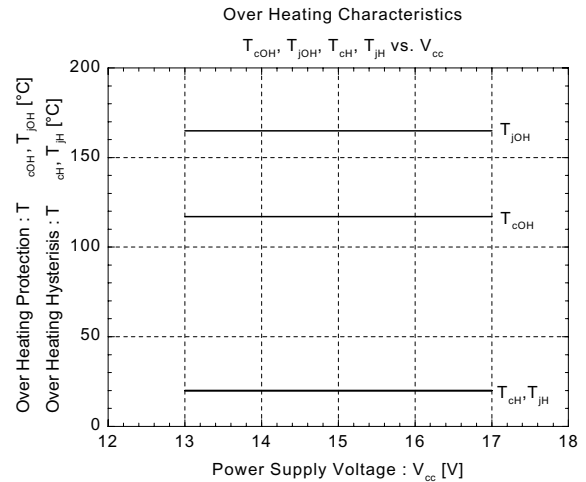
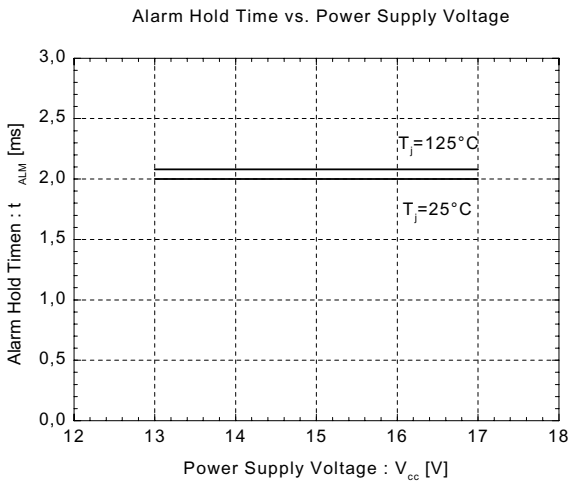
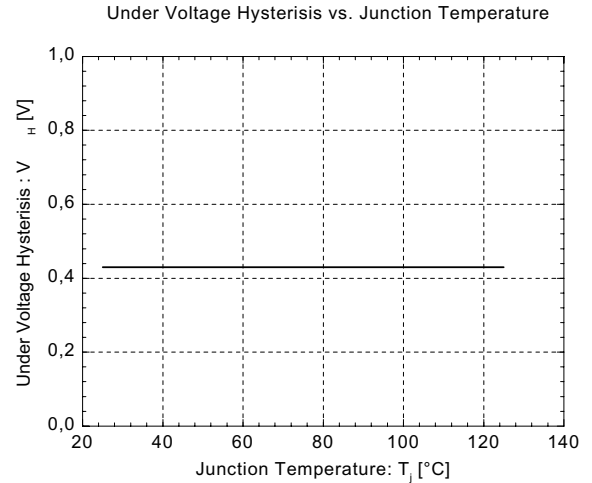
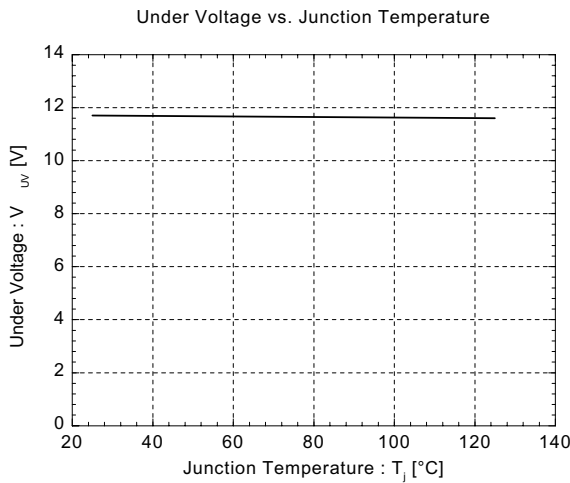
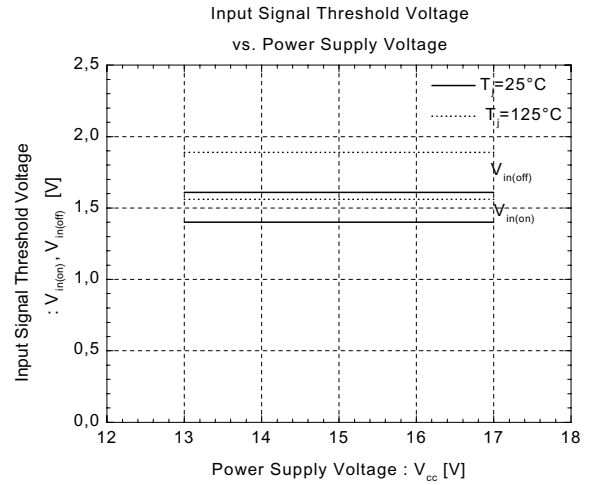
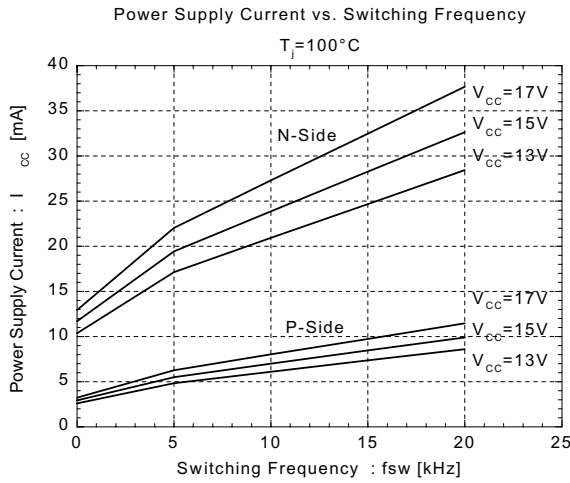
■ Equivalent Circuit



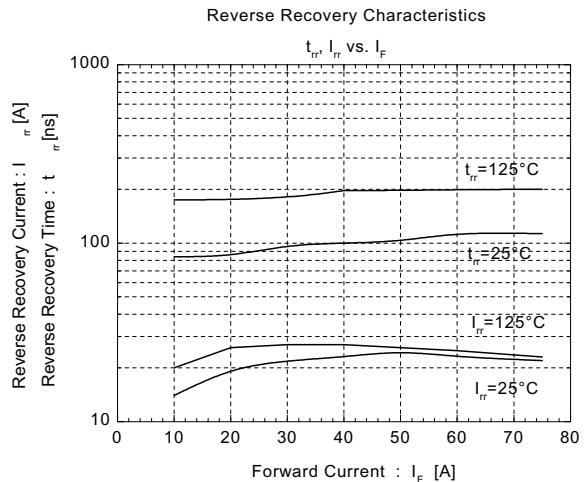
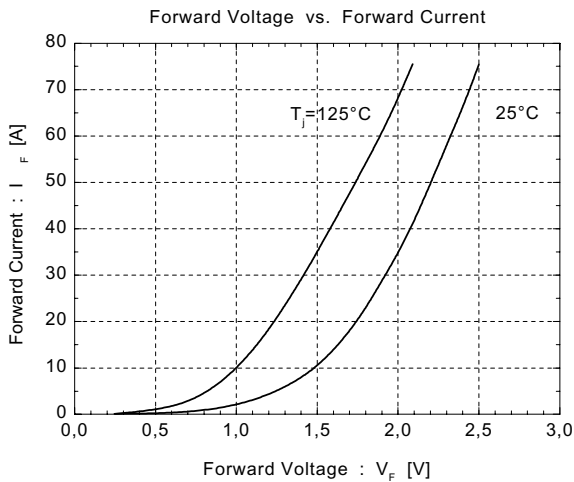
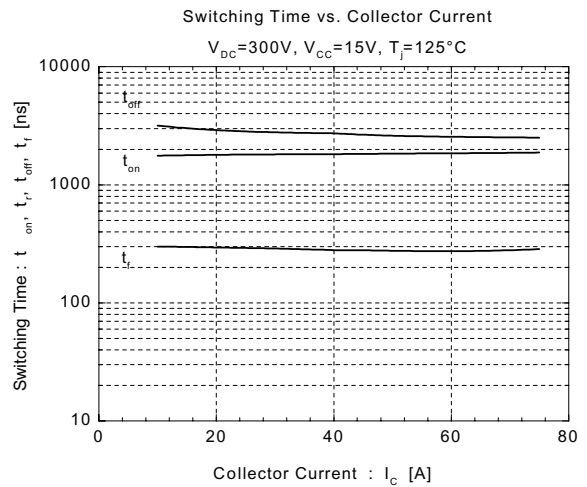
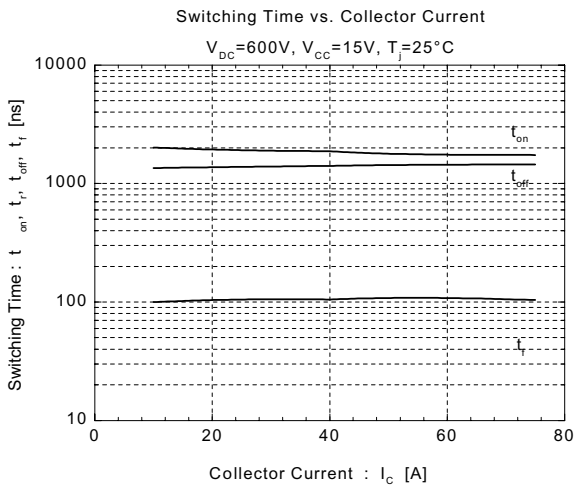
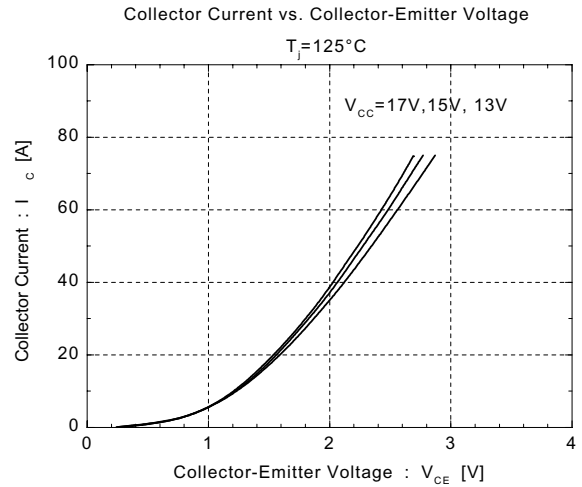
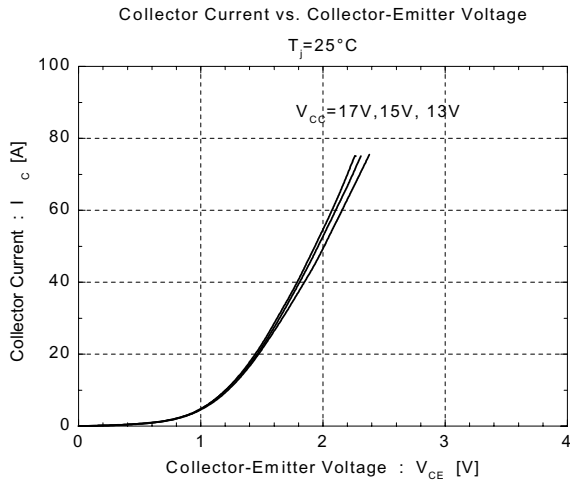
Drivers include following functions

- Short circuit protection circuit
- Amplifier for driver
- Undervoltage protection circuit
- Overcurrent protection circuit
- IGBT Chip overheating protection

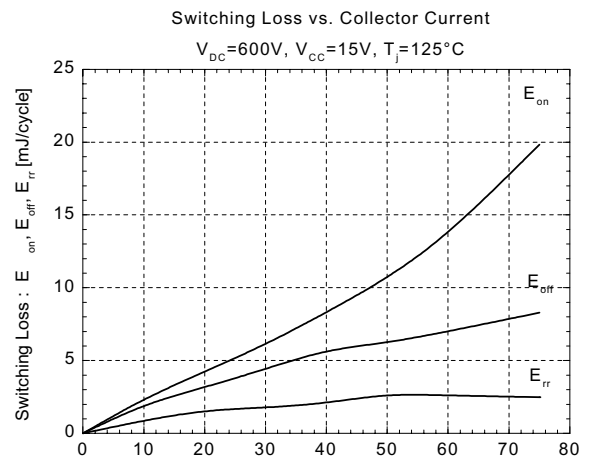
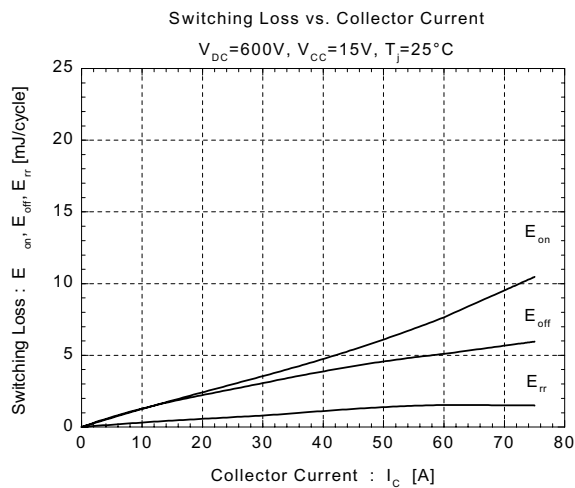
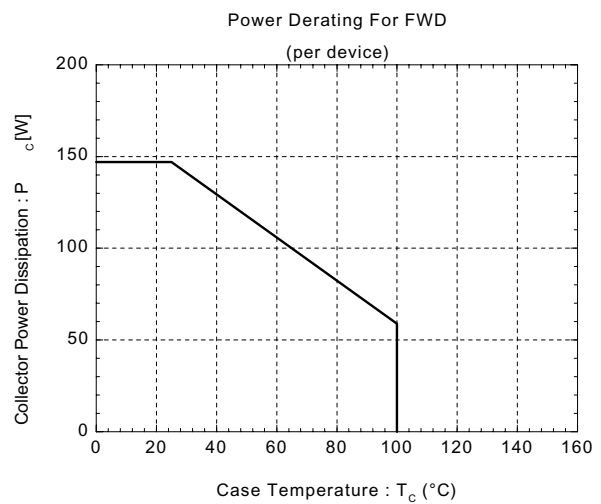
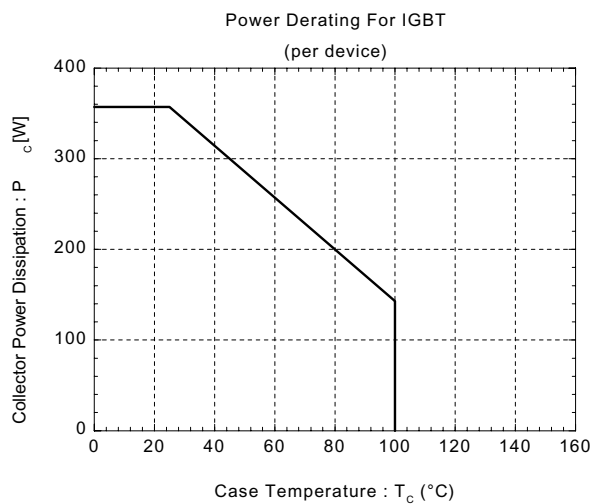
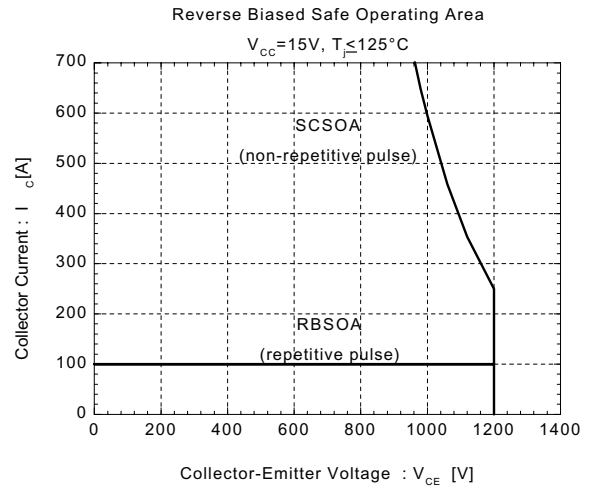
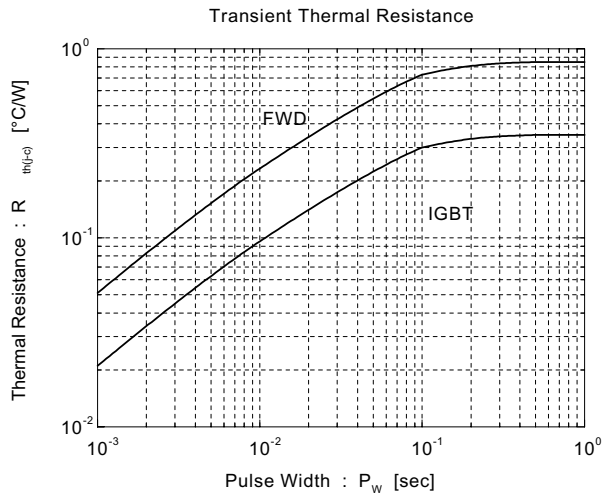
■ Control Circuit



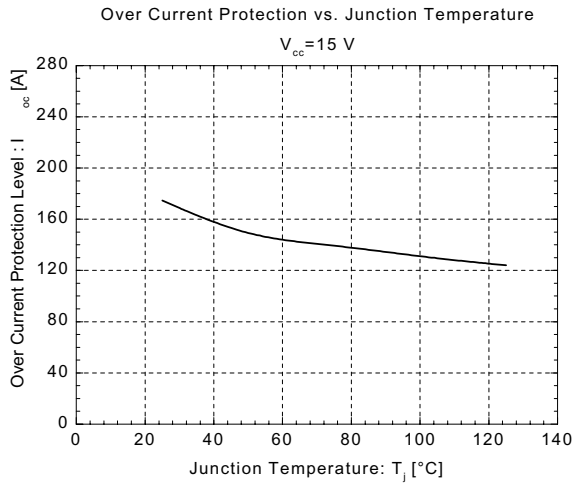
■ Inverter



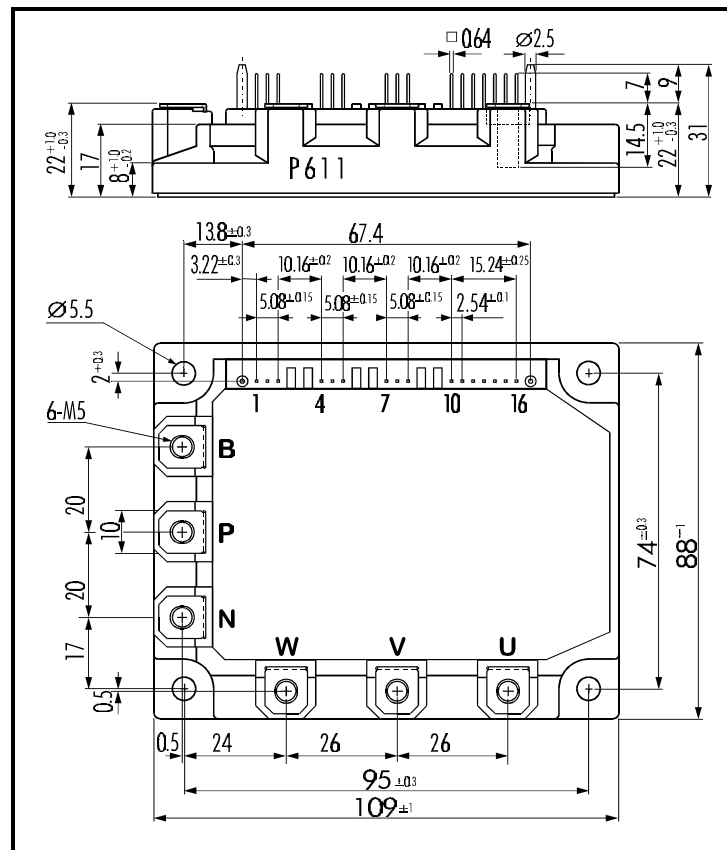
■ Inverter



■ Inverter



■ Outline Drawing



Weight: 440g