

6MBI225V-120-50

IGBT Modules

IGBT MODULE (V series) 1200V / 225A / 6 in one package

■ Features

- Compact Package
- P.C.Board Mount
- Low $V_{CE(sat)}$

■ 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 (at $T_c=25^\circ\text{C}$ unless otherwise specified)

| Items | | Symbols | Conditions | | Maximum ratings | Units |
|-----------------------------|---|--------------|------------|------------------------|-----------------|------------------|
| Inverter | Collector-Emitter voltage | V_{CES} | | | 1200 | V |
| | Gate-Emitter voltage | V_{GES} | | | ± 20 | V |
| | Collector current | I_c | Continuous | $T_c=80^\circ\text{C}$ | 225 | A |
| | | I_{cp} | 1ms | $T_c=80^\circ\text{C}$ | 450 | |
| | | $-I_c$ | | | 225 | |
| | | $-I_c$ pulse | 1ms | | 450 | |
| Collector power dissipation | P_c | 1 device | | 1070 | W | |
| Junction temperature | | T_j | | | 175 | $^\circ\text{C}$ |
| Operation temperature | | T_{op} | | | 150 | |
| Storage temperature | | T_{stg} | | | -40 to +125 | |
| Isolation voltage | between terminal and copper base (*1) between thermistor and others (*2) | V_{iso} | AC : 1min. | | 2500 | VAC |
| Screw torque | Mounting (*3) | - | | | 3.5 | N m |
| | Terminals (*4) | - | | | 4.5 | |

Note *1: All terminals should be connected together during the test.

Note *2: Two thermistor terminals should be connected together, other terminals should be connected together and shorted to base plate during the test.

Note *3: Recommendable value : 2.5-3.5 Nm (M5)

Note *4: Recommendable value : 3.5-4.5 Nm (M6)

● Electrical characteristics (at Tj= 25°C unless otherwise specified)

| Items | Symbols | Conditions | Characteristics | | | Units | |
|--------------------------------------|------------------------------------|--|-----------------|------|------|-------|---|
| | | | min. | typ. | max. | | |
| Zero gate voltage collector current | ICES | V _{GE} = 0V, V _{CE} = 1200V | - | - | 3.0 | mA | |
| Gate-Emitter leakage current | IGES | V _{GE} = 0V, V _{CE} = ±20V | - | - | 600 | nA | |
| Gate-Emitter threshold voltage | V _{GE(th)} | V _{CE} = 20V, I _c = 225mA | 6.0 | 6.5 | 7.0 | V | |
| Collector-Emitter saturation voltage | V _{CE(sat)} (terminal) | V _{GE} = 15V I _c = 225A | Tj=25°C | - | 2.20 | 2.65 | V |
| | | | Tj=125°C | - | 2.55 | - | |
| | | | Tj=150°C | - | 2.60 | - | |
| | V _{CE(sat)} (chip) | V _{GE} = 15V I _c = 225A | Tj=25°C | - | 1.85 | 2.30 | |
| | | | Tj=125°C | - | 2.20 | - | |
| | | | Tj=150°C | - | 2.25 | - | |
| Input capacitance | Cies | V _{CE} = 10V, V _{GE} = 0V, f = 1MHz | - | 18 | - | nF | |
| Turn-on time | ton | V _{CC} = 600V I _c = 225A V _{GE} = +15V R _G = 1.6Ω | - | 550 | 1200 | μs | |
| | tr | | - | 180 | 600 | | |
| | tr(i) | | - | 120 | - | | |
| Turn-off time | toff | R _G = 1.6Ω | - | 1050 | 2000 | μs | |
| | tf | | - | 110 | 350 | | |
| Forward on voltage | V _F (terminal) | V _{GE} = 0V I _F = 225A | Tj=25°C | - | 2.05 | 2.50 | V |
| | | | Tj=125°C | - | 2.20 | - | |
| | | | Tj=150°C | - | 2.15 | - | |
| | V _F (chip) | V _{GE} = 0V I _F = 225A | Tj=25°C | - | 1.70 | 2.15 | |
| | | | Tj=125°C | - | 1.85 | - | |
| | | | Tj=150°C | - | 1.80 | - | |
| Reverse recovery time | trr | I _F = 225A | - | 200 | 600 | μs | |
| Resistance | R | T = 25°C | - | 5000 | - | Ω | |
| | | T = 100°C | 465 | 495 | 520 | | |
| B value | B | T = 25 / 50°C | 3305 | 3375 | 3450 | K | |

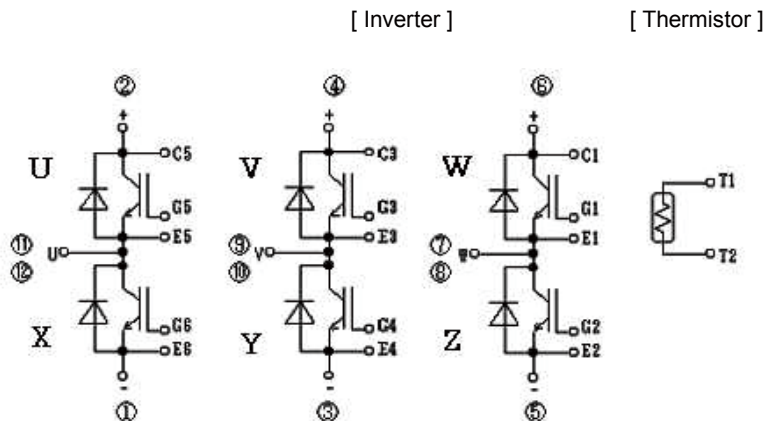
● Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics | | | Units |
|---|----------|-----------------------|-----------------|--------|------|-------|
| | | | min. | typ. | max. | |
| Thermal resistance (1device)(*5) | Rth(j-c) | Inverter IGBT | - | - | 0.14 | °C/W |
| | | Inverter FWD | - | - | 0.19 | |
| Contact thermal resistance (1device) (*6) | Rth(c-f) | with Thermal Compound | - | 0.0167 | - | |

Note *5: This value is including margins. This will be revised in future.

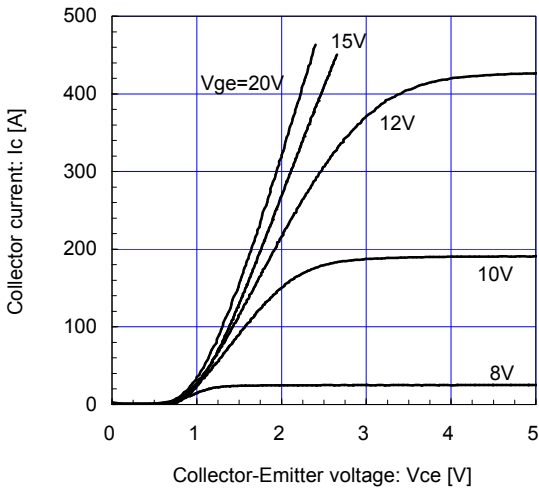
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Equivalent Circuit Schematic

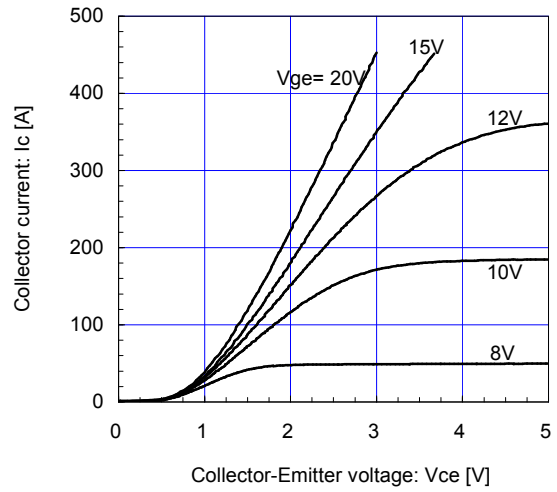


■ Characteristics (Representative)

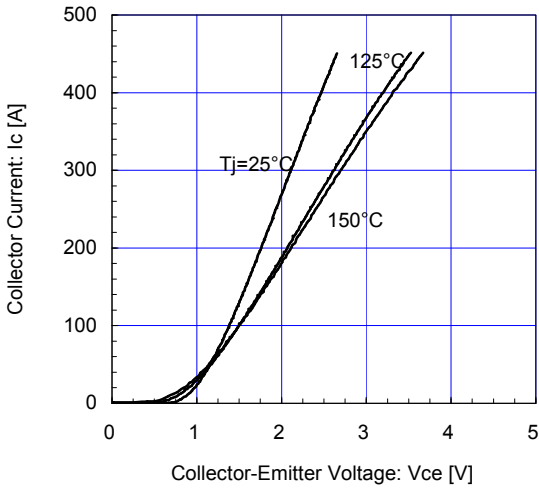
[INVERTER]
 Collector current vs. Collector-Emmitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



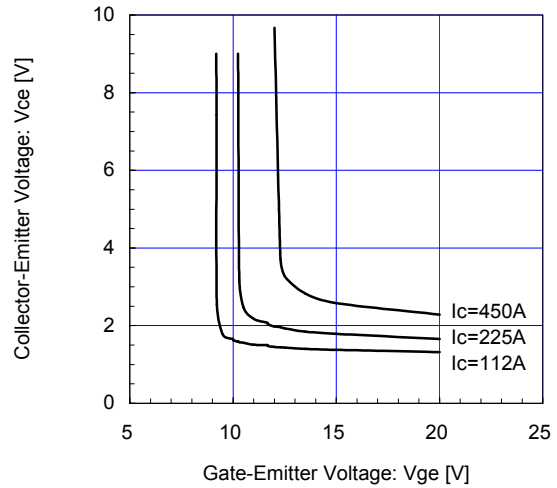
[INVERTER]
 Collector current vs. Collector-Emmitter voltage (typ.)
 $T_j = 150^\circ\text{C}$ / chip



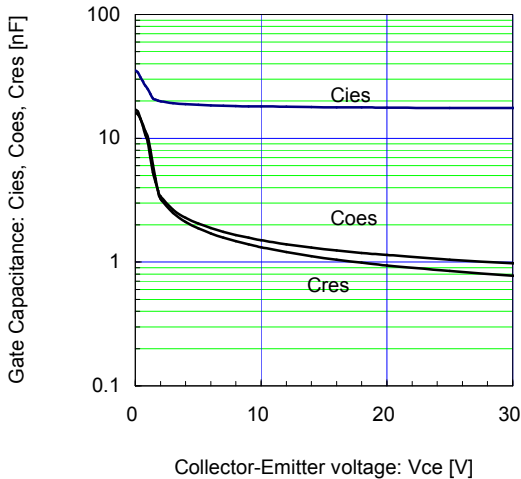
[INVERTER]
 Collector current vs. Collector-Emmitter voltage (typ.)
 $V_{ge} = 15\text{V}$ / chip



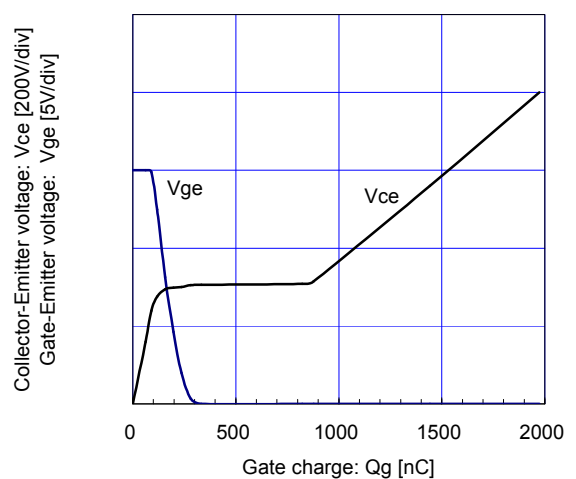
[INVERTER]
 Collector-Emmitter voltage vs. Gate-Emmitter voltage (typ.)
 $T_j = 25^\circ\text{C}$ / chip



[INVERTER]
 Gate Capacitance vs. Collector-Emmitter Voltage (typ.)
 $V_{ge} = 0\text{V}$, $f = 1\text{MHz}$, $T_j = 25^\circ\text{C}$

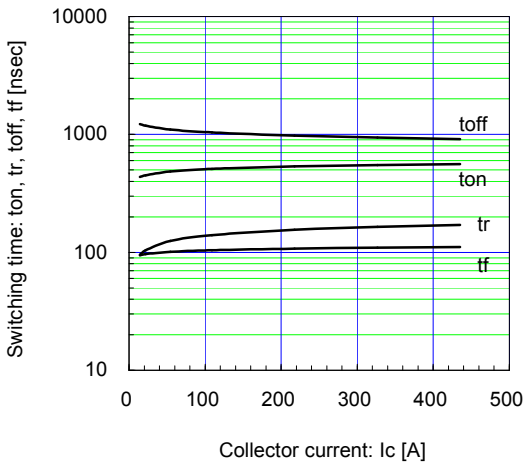


[INVERTER]
 Dynamic Gate Charge (typ.)
 $V_{cc} = 600\text{V}$, $I_c = 225\text{A}$, $T_j = 25^\circ\text{C}$



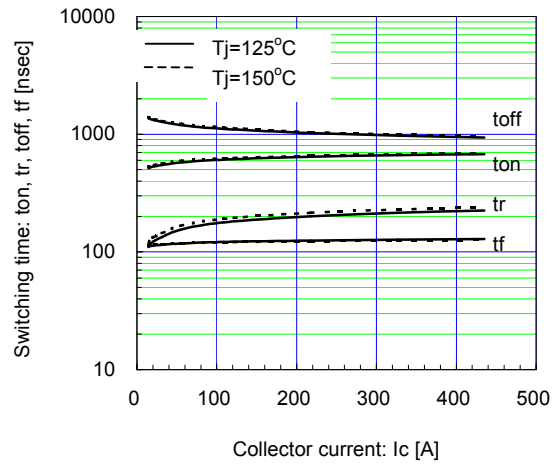
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{ge}=\pm 15V, R_g=1.6\Omega, T_j=25^\circ C$



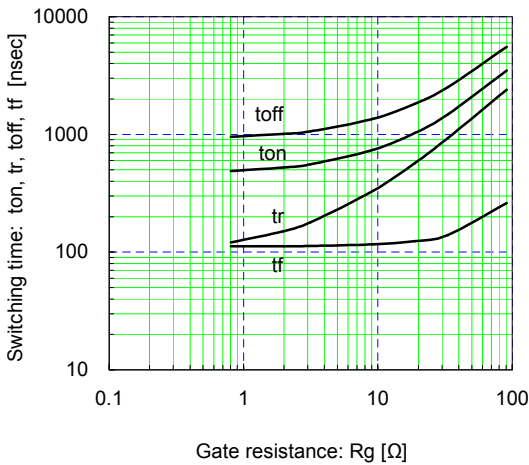
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{cc}=600V, V_{ge}=\pm 15V, R_g=1.6\Omega, T_j=125^\circ C, 150^\circ C$



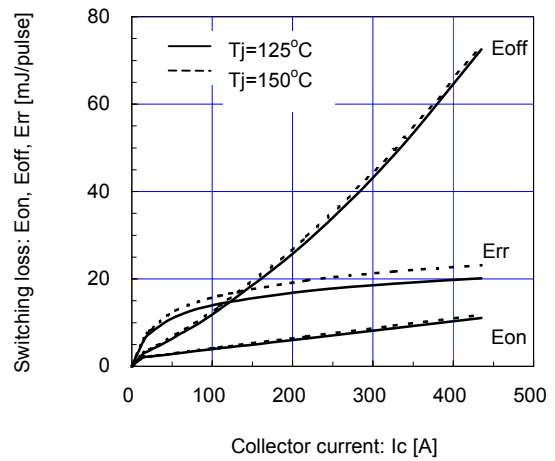
[INVERTER]

Switching time vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=225A, V_{ge}=\pm 15V, T_j=25^\circ C$



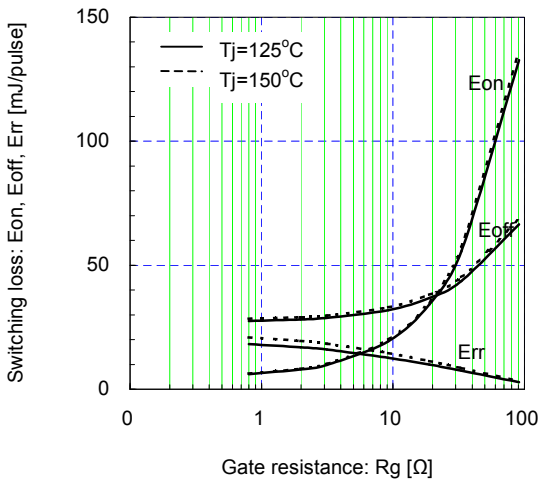
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{cc}=600, V_{ge}=\pm 15V, R_g=1.6\Omega, T_j=125^\circ C, 150^\circ C$



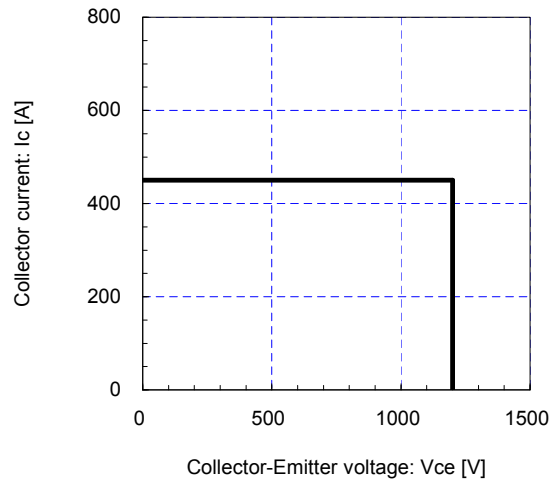
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{cc}=600V, I_c=225A, V_{ge}=\pm 15V, T_j=125^\circ C, 150^\circ C$



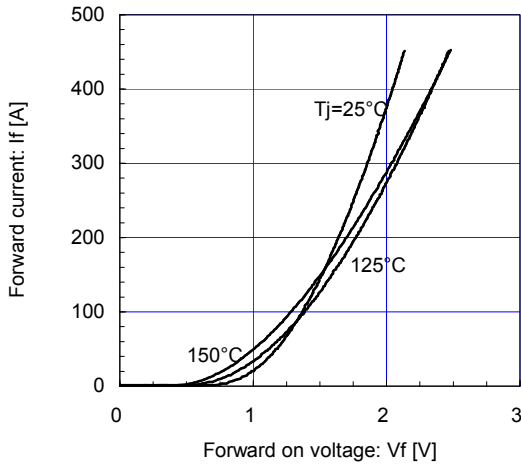
[INVERTER]

Reverse bias safe operating area (max.)
 $+V_{ge}=15V, -V_{ge}\leq 15V, R_g\geq 1.6\Omega, T_j=150^\circ C$



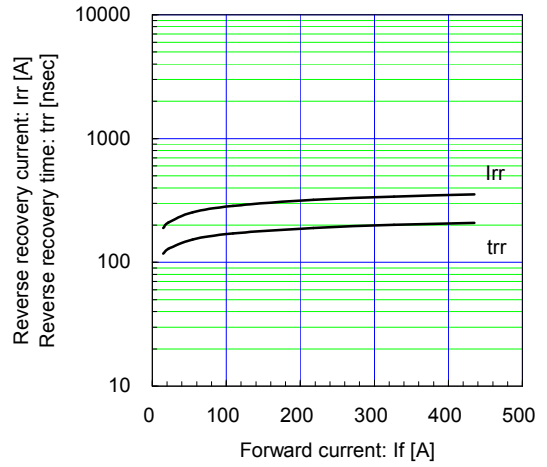
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
 chip



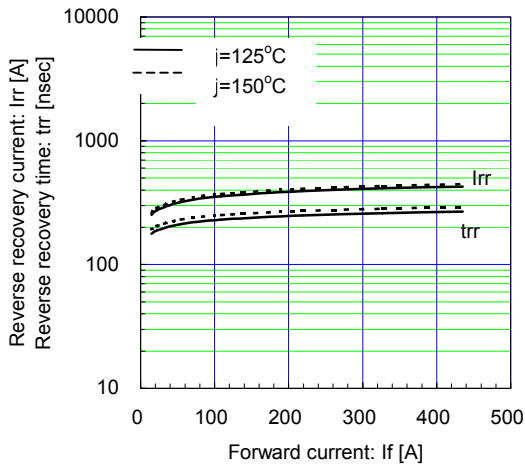
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{cc}=600V, V_{ge}=\pm 15V, R_g=1.6\Omega, T_j=25^\circ C$

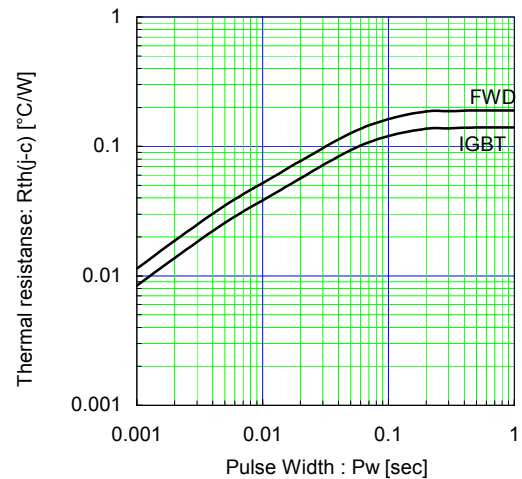


[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{cc}=600V, V_{ge}=\pm 15V, R_g=1.6\Omega, T_j=125^\circ C, 150^\circ C$

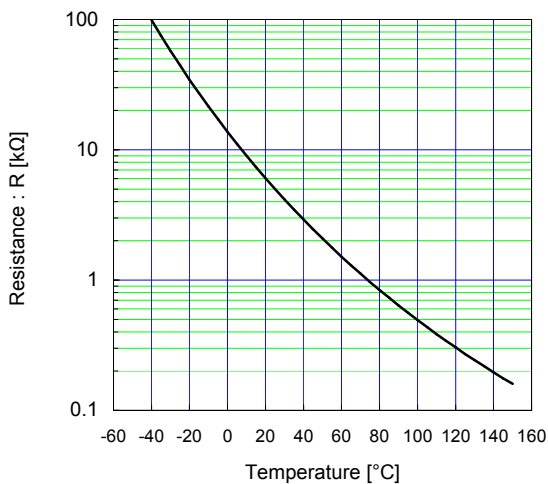


Transient Thermal Resistance (max.)

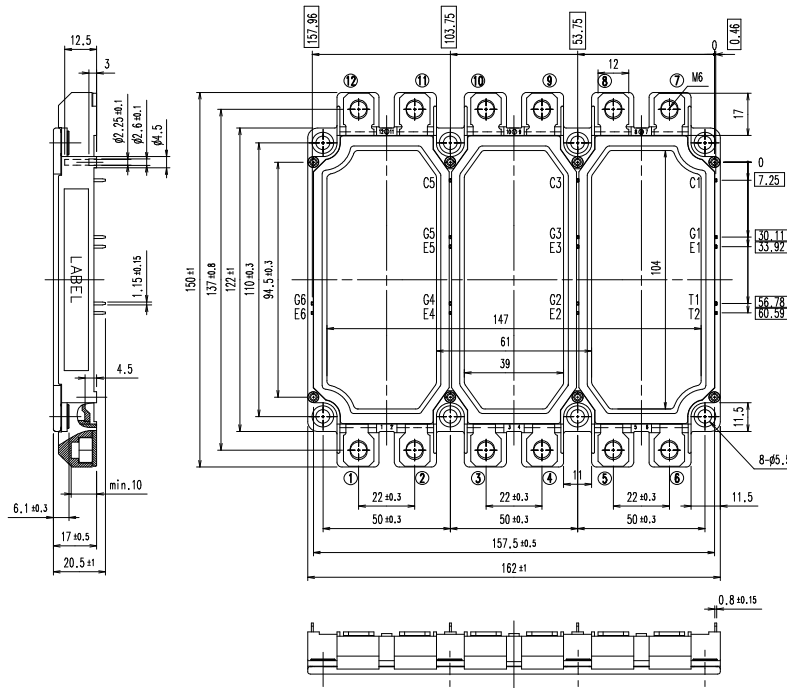


[THERMISTOR]

Temperature characteristic (typ.)



■ Outline Drawings, mm



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