

6MBI450U-120



IGBT Module U-Series 1200V / 450A 6 in one-package

■ Features

- High speed switching
- Voltage drive
- Low inductance module structure

■ 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 Tc=25°C unless otherwise specified)

| Item | Symbol | Conditions | Rating | Unit | |
|-----------------------------|-------------------------------------|------------------|----------------------|------|-----|
| Collector-Emitter voltage | V _{CES} | | 1200 | V | |
| Gate-Emitter voltage | V _{GES} | | ±20 | V | |
| Collector current | I _c | Continuous | T _c =25°C | 600 | A |
| | | | T _c =80°C | 450 | |
| | I _{cp} | 1ms | T _c =25°C | 1200 | |
| | | | T _c =80°C | 900 | |
| | -I _c | | | 450 | |
| | -I _c pulse | | | 900 | |
| Collector Power Dissipation | P _c | 1 device | 2080 | W | |
| Junction temperature | T _j | | +150 | °C | |
| Storage temperature | T _{stg} | | -40 to +125 | | |
| Isolation voltage | between terminal and copper base *1 | V _{iso} | AC:1min. | 2500 | VAC |
| | between thermistor and others *2 | | | | |
| Screw Torque | Mounting *3 | - | | 3.5 | N·m |
| | Terminals *4 | | | | |

*1 : All terminals should be connected together when isolation test will be done.

*2 : Two thermistor terminals should be connected together, each other terminals should be connected together and shorted to base plate when isolation test will be done.

*3 : Recommendable value : 2.5 to 3.5 N·m(M5) *4 : Recommendable value : 3.5 to 4.5 N·m(M6)

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

| Item | Symbols | Conditions | Characteristics | | | Unit | |
|--------------------------------------|------------------------------------|---|-----------------------|------|------|------|---|
| | | | Min. | Typ. | Max. | | |
| Zero gate voltage collector current | ICES | V _{GE} =0V, V _{CES} =1200V | - | - | 3.0 | mA | |
| Gate-Emitter leakage current | IGES | V _{CE} =0V, V _{GE} =±20V | - | - | 600 | nA | |
| Gate-Emitter threshold voltage | V _{GE(th)} | V _{CE} =20V, I _c =450mA | 4.5 | 6.5 | 8.5 | V | |
| Collector-Emitter saturation voltage | V _{CE(sat)} (terminal) | V _{GE} =15V, I _c =450A | T _j =25°C | - | 2.20 | 2.55 | V |
| | | | T _j =125°C | - | 2.45 | - | |
| | V _{CE(sat)} (chip) | | T _j =25°C | - | 1.75 | 2.10 | |
| | | | T _j =125°C | - | 2.00 | - | |
| Input capacitance | C _{ies} | V _{CE} =10V, V _{GE} =0V, f=1MHz | - | 50 | - | nF | |
| Turn-on time | t _{on} | V _{CC} =600V | - | 0.36 | 1.20 | μs | |
| | t _r | I _c =450A | - | 0.21 | 0.60 | | |
| | t _{r(i)} | V _{GE} =±15V | - | 0.03 | - | | |
| Turn-off time | t _{off} | R _G =1.1 Ω | - | 0.37 | 1.00 | μs | |
| | t _f | | - | 0.07 | 0.30 | | |
| Forward on voltage | V _F (terminal) | V _{GE} =0V I _F =450A | T _j =25°C | - | 2.05 | 2.35 | V |
| | | | T _j =125°C | - | 2.15 | - | |
| | V _F (chip) | | T _j =25°C | - | 1.60 | 1.90 | |
| | | | T _j =125°C | - | 1.70 | - | |
| Reverse recovery time | t _{rr} | I _F =450A | - | - | 0.35 | μs | |
| Lead resistance, terminal-chip*5 | R lead | | - | 1.0 | - | mΩ | |
| Thermistor | Resistance | R | T=25°C | - | 5000 | - | Ω |
| | | | T=100°C | 465 | 495 | 520 | |
| | B value | B | T=25/50°C | 3305 | 3375 | 3450 | K |

*5:Biggest internal terminal resistance among arm.

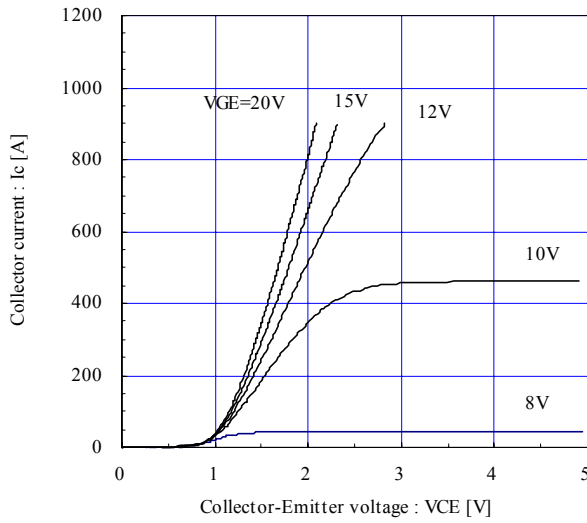
● Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics | | | Unit |
|----------------------------|-------------------------|-----------------------|-----------------|--------|------|------|
| | | | Min. | Typ. | Max. | |
| Thermal resistance | R _{th(j-c)} | IGBT | - | - | 0.06 | °C/W |
| | R _{th(j-c)} | FWD | - | - | 0.10 | °C/W |
| Contact Thermal resistance | R _{th(c-f)} *6 | With thermal compound | - | 0.0167 | - | °C/W |

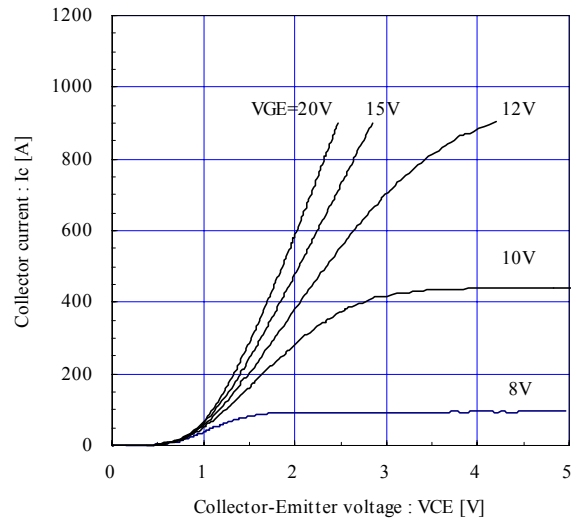
*6 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

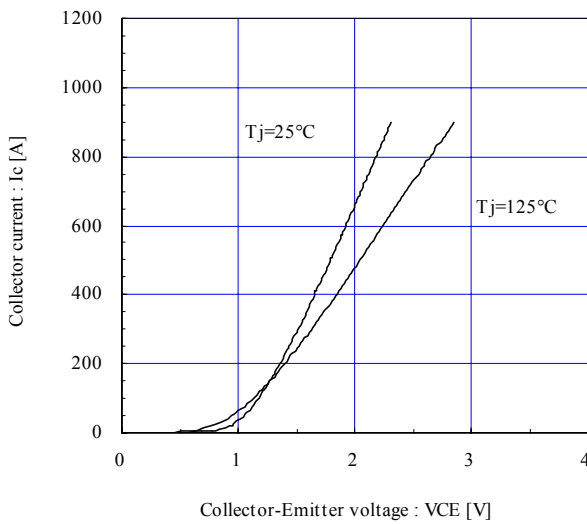
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



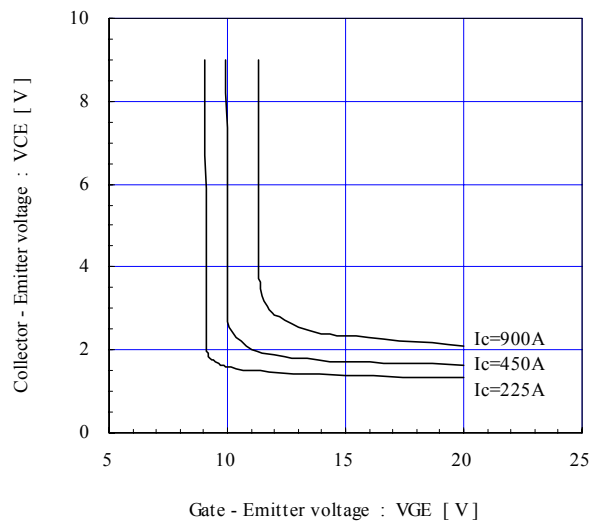
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 125°C / chip



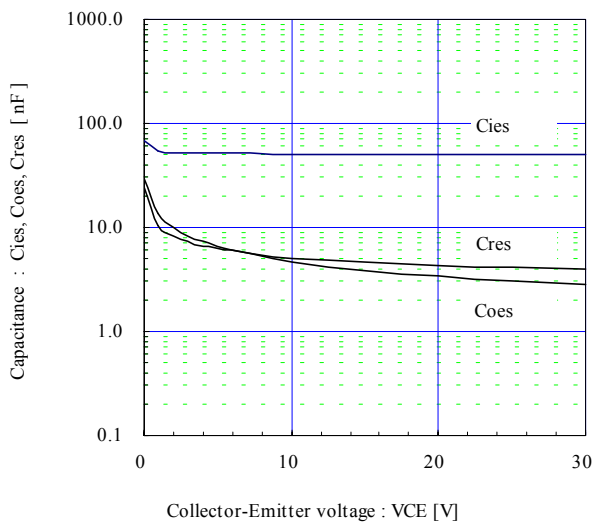
Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



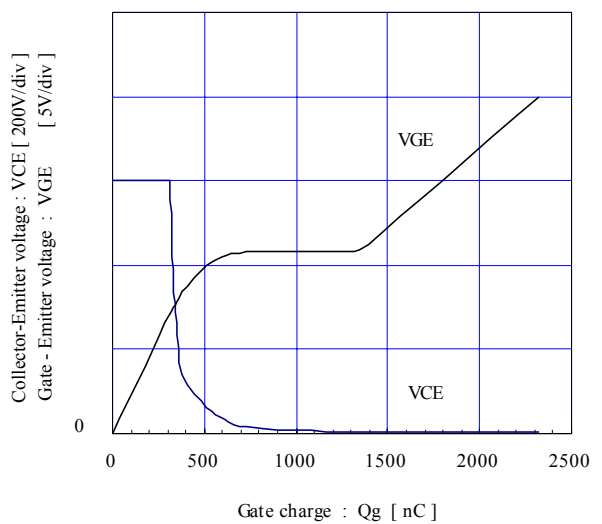
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C

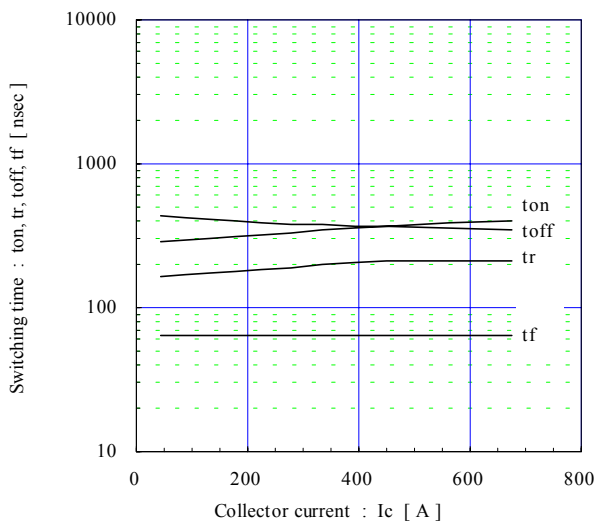


Dynamic Gate charge (typ.)
Vce=600V, Ic=450A, Tj= 25°C



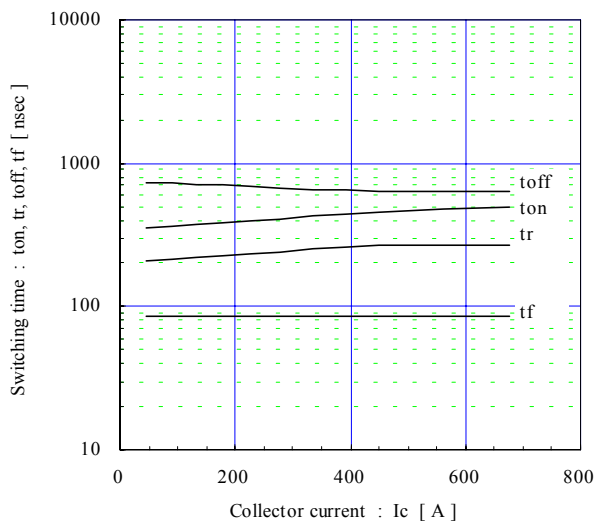
Switching time vs. Collector current (typ.)

V_{cc}=600V, V_{GE}=±15V, R_g=1.1Ω, T_j= 25°C



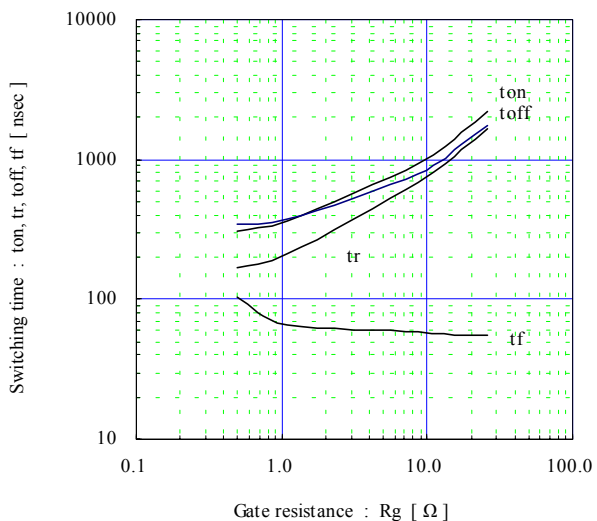
Switching time vs. Collector current (typ.)

V_{cc}=600V, V_{GE}=±15V, R_g=1.1Ω, T_j=125°C



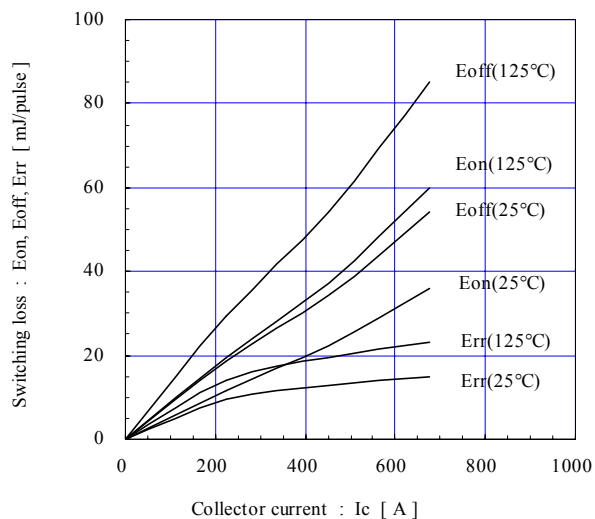
Switching time vs. Gate resistance (typ.)

V_{cc}=600V, I_c=450A, V_{GE}=±15V, T_j= 25°C



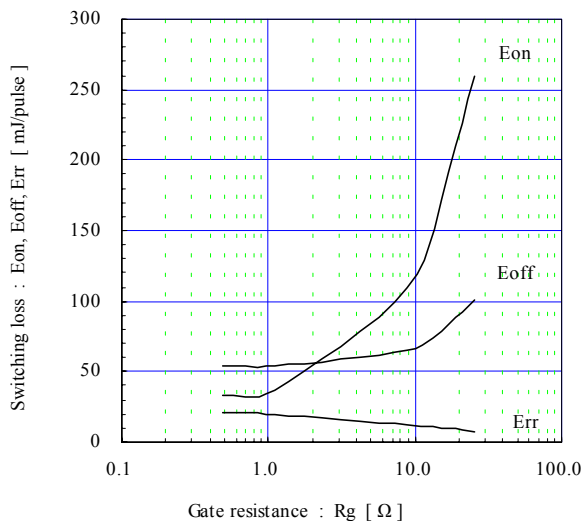
Switching loss vs. Collector current (typ.)

V_{cc}=600V, V_{GE}=±15V, R_g=1.1Ω



Switching loss vs. Gate resistance (typ.)

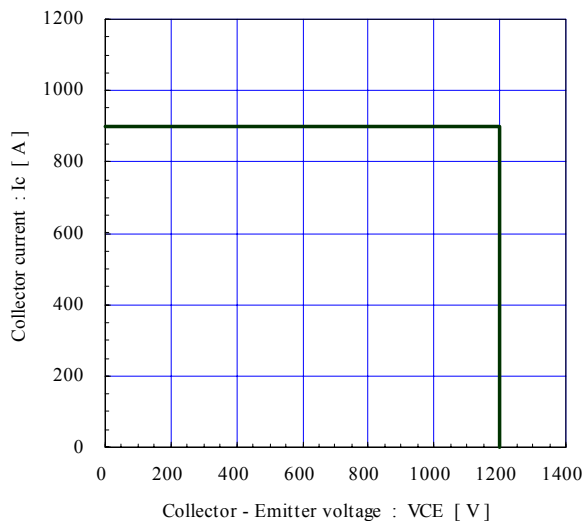
V_{cc}=600V, I_c=450A, V_{GE}=±15V, T_j= 125°C



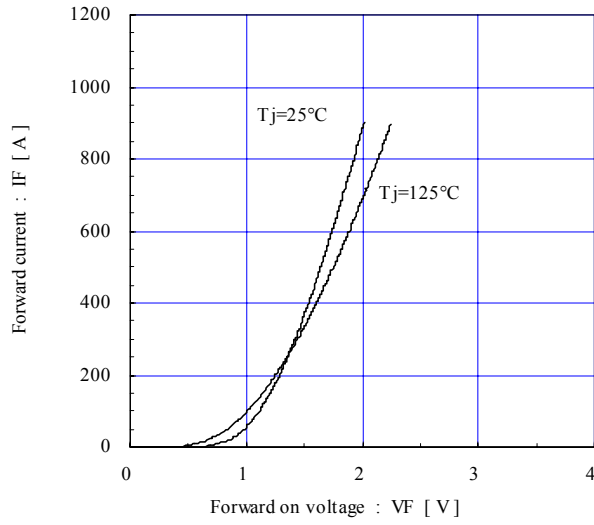
Reverse bias safe operating area (max.)

+V_{GE}=15V, -V_{GE} ≤ 15V, R_g ≥ 1.1Ω, T_j ≤ 125°C

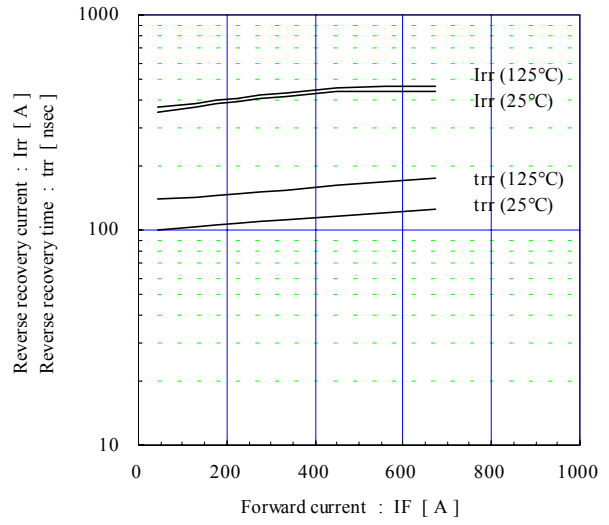
Stray inductance ≤ 100nH



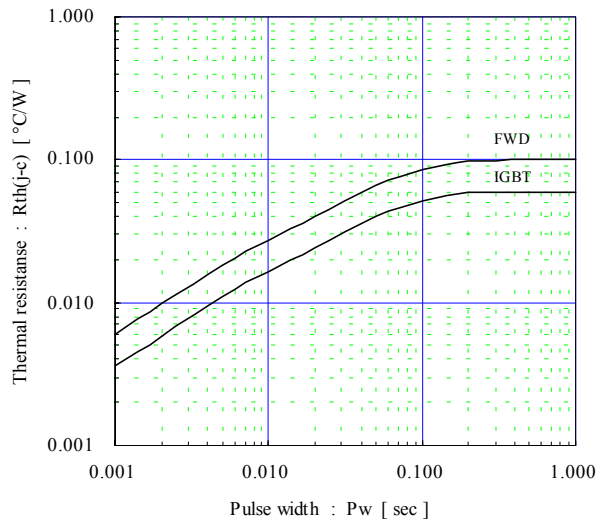
Forward current vs. Forward on voltage (typ.)
chip



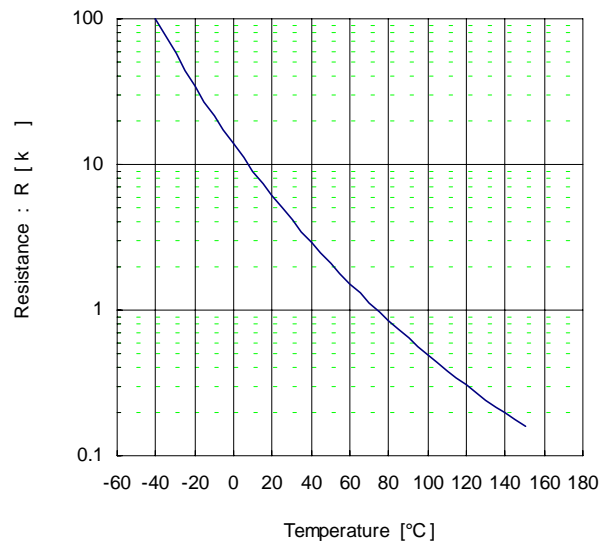
Reverse recovery characteristics (typ.)
 $V_{cc}=600\text{V}$, $V_{GE}=\pm 15\text{V}$, $R_g=1.1\Omega$



Transient thermal resistance (max.)

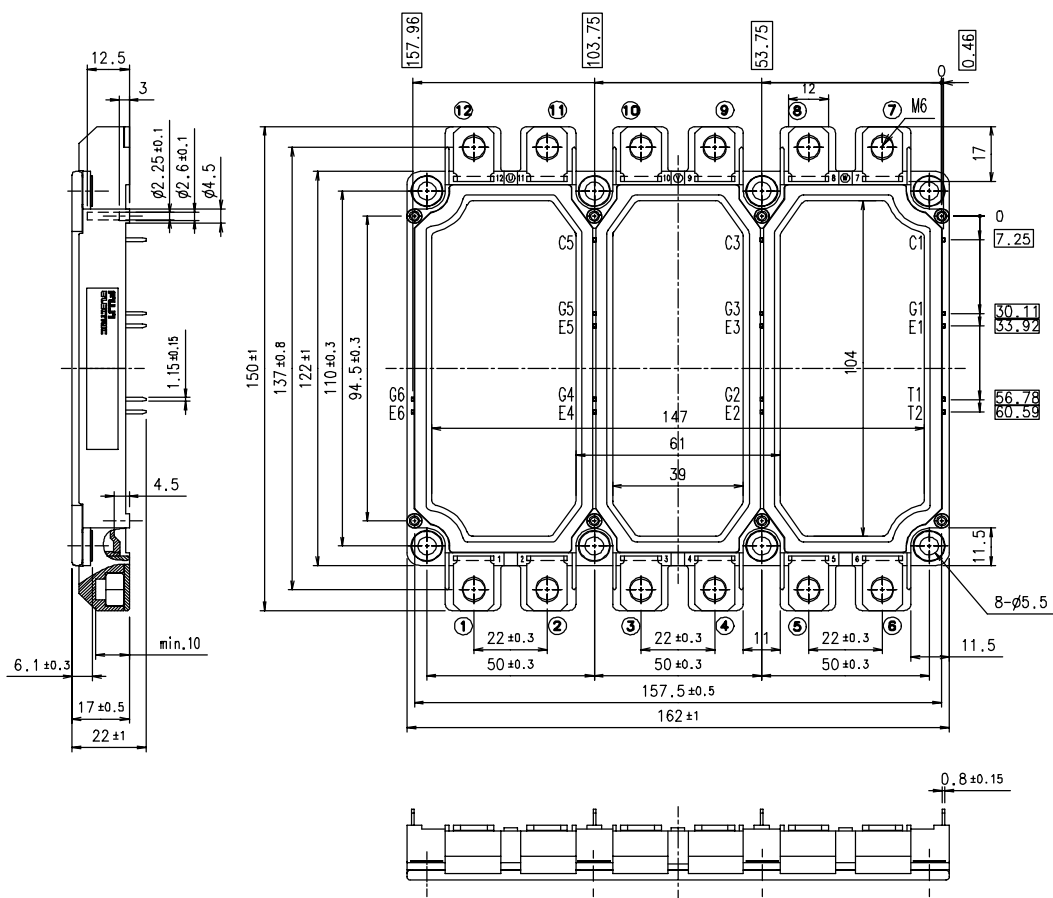


Temperature characteristic (typ.)



Outline Drawings, mm

M629



NOTE) shows theoretical dimension and tolerance is ± 0.5 .

Equivalent Circuit Schematic

