

2MBI450VN-170-50

IGBT Modules

IGBT MODULE (V series) 1700V / 450A / 2 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 T_c=25°C unless otherwise specified)

| Items | Symbols | Conditions | Maximum ratings | Units | |
|---|---------------------------------------|----------------------|-----------------|-----------------------|-----|
| Inverter | Collector-Emitter voltage | V _{CEs} | 1700 | V | |
| | Gate-Emitter voltage | V _{GES} | ±20 | V | |
| | Collector current | I _c | Continuous | T _c =25°C | 600 |
| | | | | T _c =100°C | 450 |
| | | I _{c pulse} | 1ms | 900 | A |
| | | -I _c | | 450 | |
| | -I _{c pulse} | 1ms | 900 | | |
| Collector power dissipation | P _c | 1 device | 2500 | W | |
| Junction temperature | T _j | | 175 | °C | |
| Operating junction temperature (under switching conditions) | T _{jop} | | 150 | | |
| Storage temperature | T _{stg} | | -40 ~ 125 | | |
| Isolation voltage | between terminal and copper base (*1) | V _{iso} | AC : 1min. | 3400 | VAC |
| | between thermistor and others (*2) | | | | |
| 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 T_j= 25°C unless otherwise specified)

| Items | Symbols | Conditions | Characteristics | | | Units | |
|--------------------------------------|------------------------------------|---|-----------------------|------|------|-------|---|
| | | | min. | typ. | max. | | |
| Zero gate voltage collector current | I _{CEs} | V _{GE} = 0V, V _{CE} = 1700V | - | - | 3.0 | mA | |
| Gate-Emitter leakage current | I _{GES} | V _{CE} = 0V, V _{GE} = ±20V | - | - | 600 | nA | |
| Gate-Emitter threshold voltage | V _{GE(th)} | V _{CE} = 20V, I _c = 450mA | 6.0 | 6.5 | 7.0 | V | |
| Collector-Emitter saturation voltage | V _{CE(sat)} (terminal) | V _{GE} = 15V I _c = 450A | T _j =25°C | - | 2.65 | 3.10 | V |
| | | | T _j =125°C | - | 3.10 | - | |
| | | | T _j =150°C | - | 3.15 | - | |
| | V _{CE(sat)} (chip) | | T _j =25°C | - | 2.00 | 2.45 | |
| | | | T _j =125°C | - | 2.45 | - | |
| | | | T _j =150°C | - | 2.50 | - | |
| Internal gate resistance | R _{G(int)} | - | - | 1.67 | - | Ω | |
| Input capacitance | C _{ies} | V _{CE} = 10V, V _{GE} = 0V, f = 1MHz | - | 40 | - | nF | |
| Turn-on time | t _{on} | V _{CC} = 900V | - | 900 | - | nsec | |
| | t _r | I _c = 450A | - | 400 | - | | |
| | t _{r(i)} | V _{GE} = ±15V | - | 100 | - | | |
| | Turn-off time | t _{off} | R _G = 3.3Ω | - | 1300 | | - |
| t _r | | L _s = 80nH | - | 100 | - | | |
| Forward on voltage | V _F (terminal) | V _{GE} = 0V I _F = 450A | T _j =25°C | - | 2.45 | 2.90 | V |
| | | | T _j =125°C | - | 2.75 | - | |
| | | | T _j =150°C | - | 2.70 | - | |
| | V _F (chip) | | T _j =25°C | - | 1.80 | 2.25 | |
| | | | T _j =125°C | - | 2.10 | - | |
| | | | T _j =150°C | - | 2.05 | - | |
| Reverse recovery time | t _r | I _F = 450A | - | 250 | - | nsec | |
| Thermistor | Resistance | R | T = 25°C | - | 5000 | - | Ω |
| | B value | B | T = 100°C | 465 | 495 | 520 | |
| | | | T = 25/50°C | 3305 | 3375 | 3450 | K |

● Thermal resistance characteristics

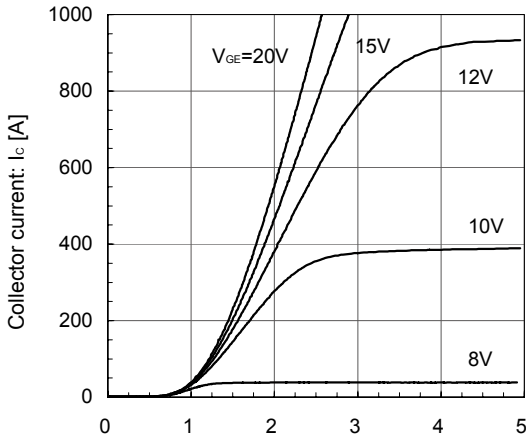
| Items | Symbols | Conditions | Characteristics | | | Units |
|---|----------------------|-------------------------------|-----------------|--------|------|-------|
| | | | min. | typ. | max. | |
| Thermal resistance(1device) | R _{th(j-c)} | Inverter IGBT Inverter FWD | - | - | 0.06 | °C/W |
| Contact thermal resistance (1device) (*5) | R _{th(c-f)} | with Thermal Compound | - | 0.0167 | - | |

Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

[INVERTER]

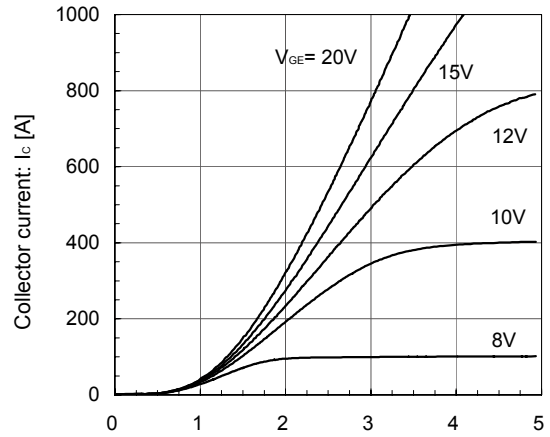
Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



Collector-Emittor voltage: V_{CE} [V]

[INVERTER]

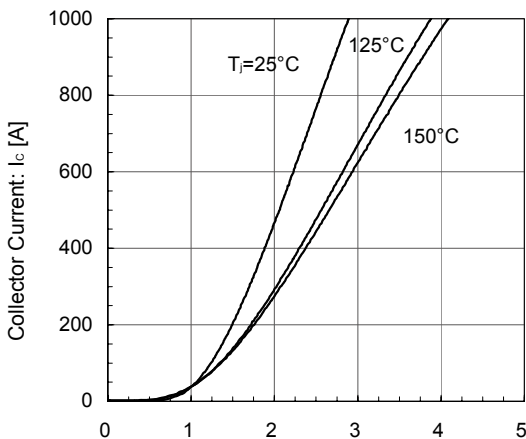
Collector current vs. Collector-Emittor voltage (typ.)
 $T_J = 150^\circ\text{C}$ / chip



Collector-Emittor voltage: V_{CE} [V]

[INVERTER]

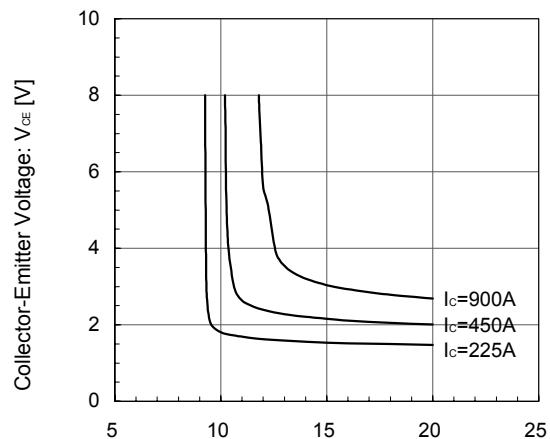
Collector current vs. Collector-Emittor voltage (typ.)
 $V_{GE} = 15\text{V}$ / chip



Collector-Emittor Voltage: V_{CE} [V]

[INVERTER]

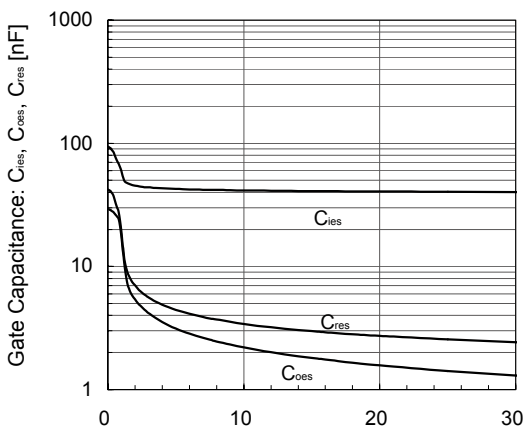
Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
 $T_J = 25^\circ\text{C}$ / chip



Gate-Emittor Voltage: V_{GE} [V]

[INVERTER]

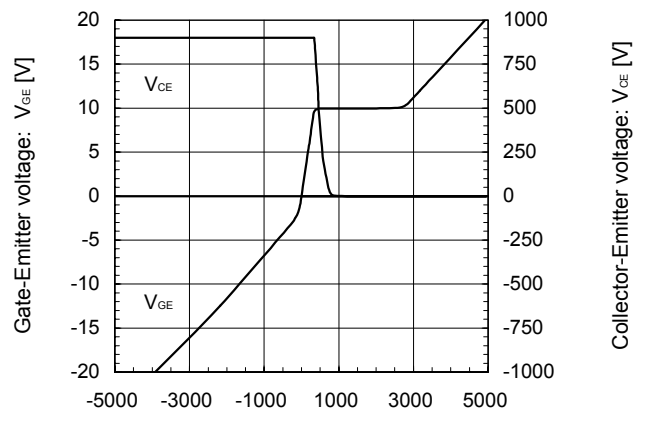
Gate Capacitance vs. Collector-Emittor Voltage (typ.)
 $V_{GE} = 0\text{V}$, $f = 1\text{MHz}$, $T_J = 25^\circ\text{C}$



Collector-Emittor voltage: V_{CE} [V]

[INVERTER]

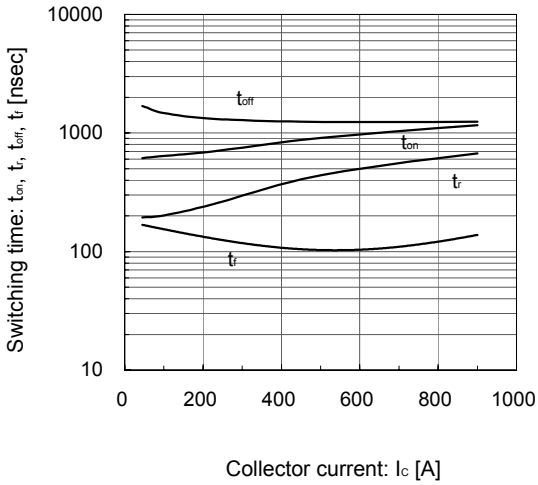
Dynamic Gate Charge (typ.)
 $V_{CC} = 900\text{V}$, $I_c = 450\text{A}$, $T_J = 25^\circ\text{C}$



Gate charge: Q_s [μC]

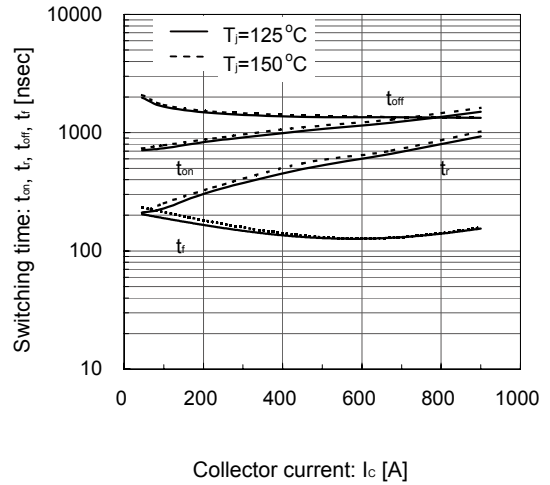
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=25^\circ C$



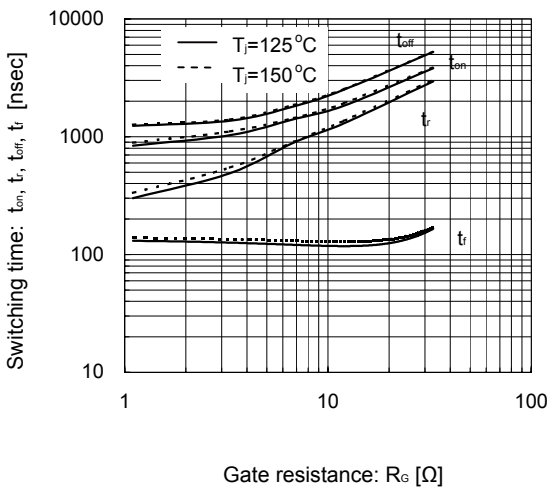
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$



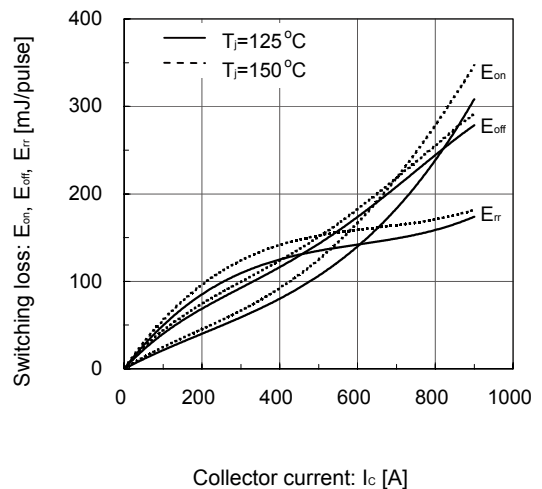
[INVERTER]

Switching time vs. Gate resistance (typ.)
 $V_{CC}=900V, I_c=450A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



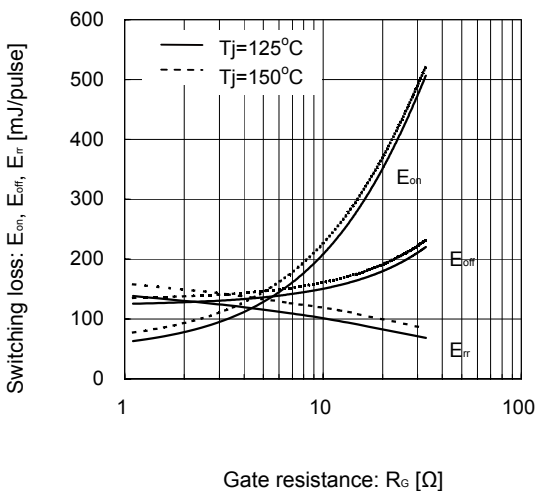
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$



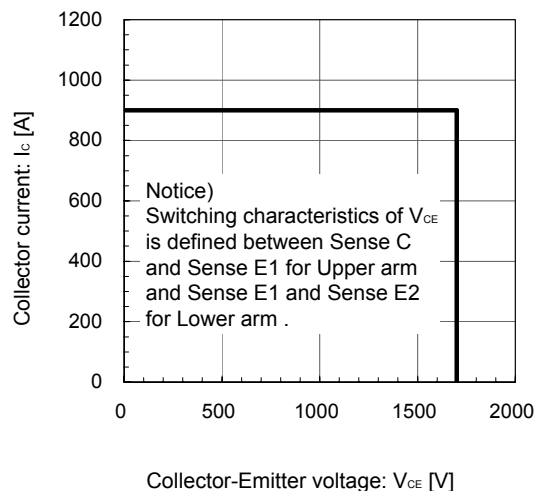
[INVERTER]

Switching loss vs. Gate resistance (typ.)
 $V_{CC}=900V, I_c=450A, V_{GE}=\pm 15V, T_J=125^\circ C, 150^\circ C$



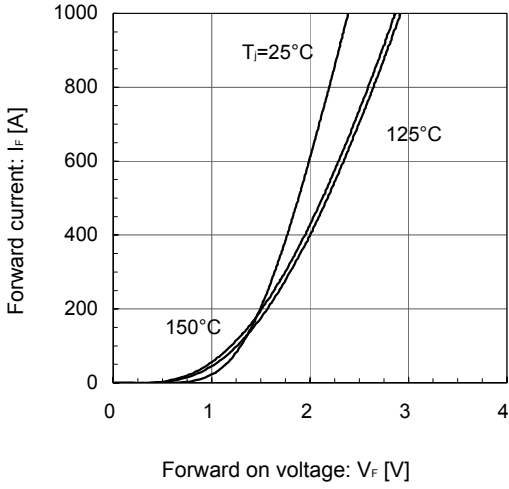
[INVERTER]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_G=3.3\Omega, T_J=150^\circ C$



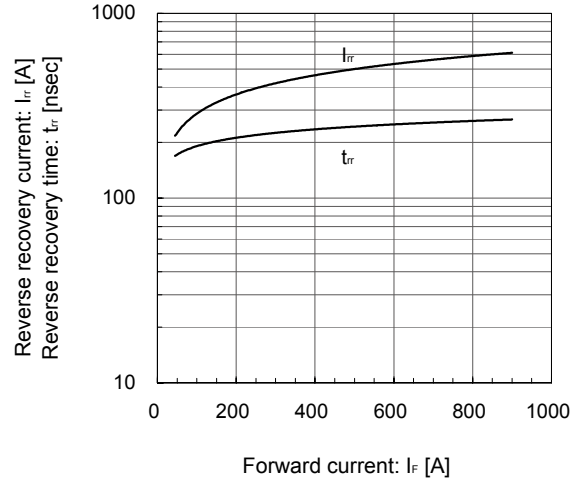
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



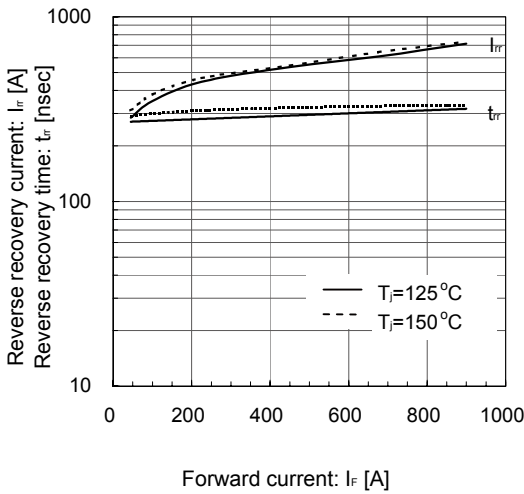
[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=25^\circ C$

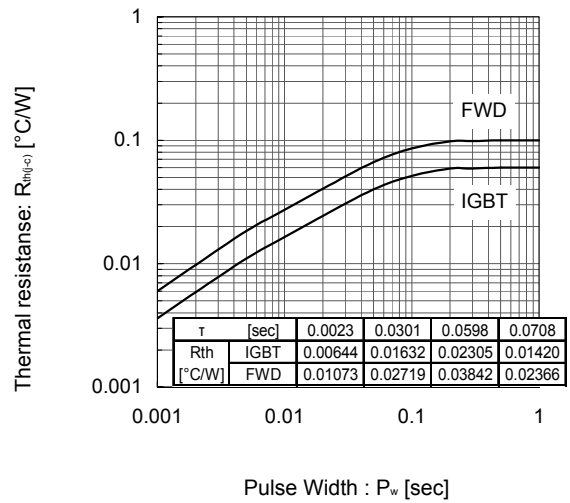


[INVERTER]

Reverse Recovery Characteristics (typ.)
 $V_{CC}=900V, V_{GE}=\pm 15V, R_G=3.3\Omega, T_J=125^\circ C, 150^\circ C$

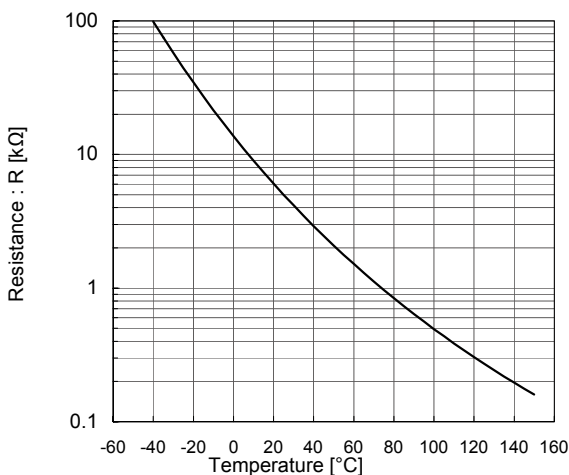


Transient Thermal Resistance (max.)

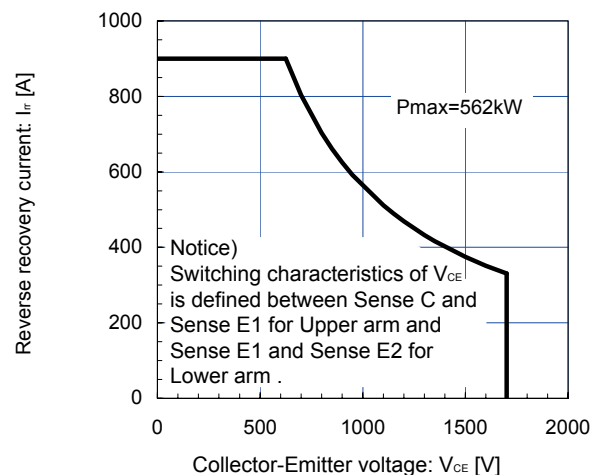


[THERMISTOR]

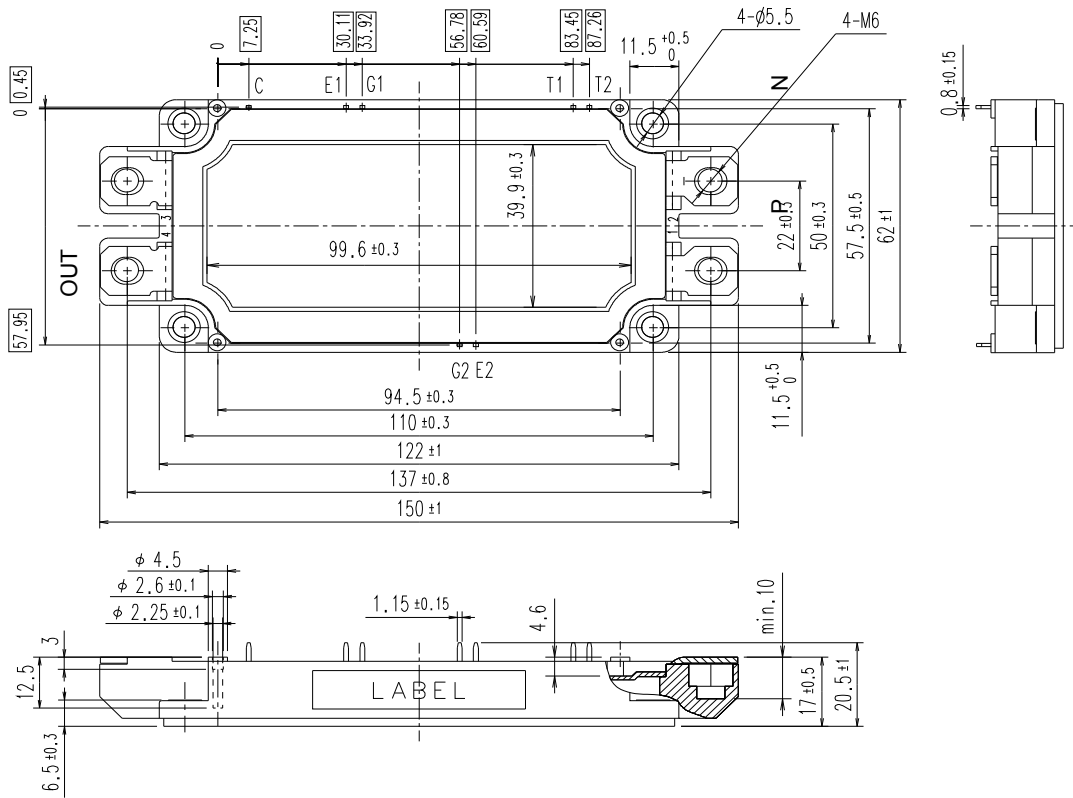
Temperature characteristic (typ.)



FWD safe operating area (max.)
 $T_J=150^\circ C$



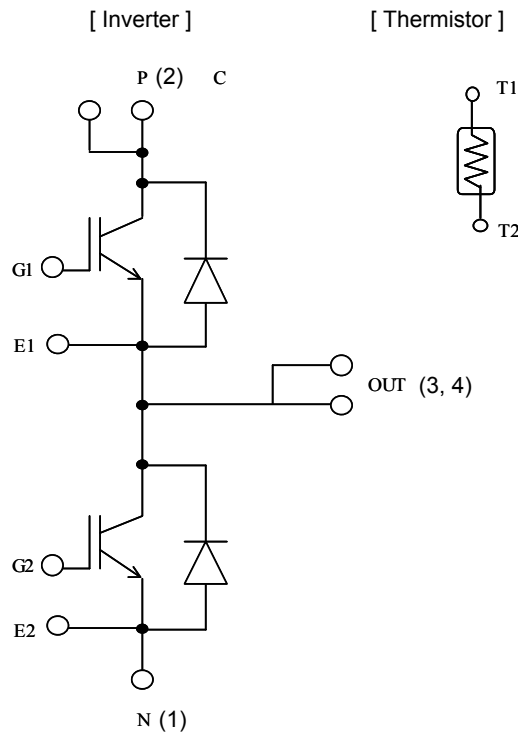
■ Outline Drawings, mm



NOTE) shows theoretical dimension and tolerance is $\pm \phi 0.5$

Weight: 300g (typ.)

■ Equivalent Circuit Schematic



WARNING

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