

2MBI300VN-120-50

IGBT Modules

IGBT MODULE (V series) 1200V / 300A / 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 Tc=25°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 | Tc=25°C | 450 |
| | | | | Tc=100°C | 300 |
| | | I_c pulse | 1ms | 600 | A |
| | | -Ic | 300 | | |
| -Ic pulse | 1ms | 600 | | | |
| Collector power dissipation | P_c | 1 device | 1595 | W | |
| Junction temperature | T_j | | 175 | °C | |
| Operating junction temperature (under switching conditions) | T_{jop} | | 150 | | |
| Case temperature | T_c | | 125 | | |
| 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) | - | 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 : Mounting : 2.5-3.5 Nm (M5) Note *4: Recommendable value : Terminals : 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 | I_{CES} | $V_{GE} = 0V, V_{CE} = 1200V$ | - | - | 3.0 | mA | |
| Gate-Emitter leakage current | I_{GES} | $V_{CE} = 0V, V_{GE} = \pm 20V$ | - | - | 600 | nA | |
| Gate-Emitter threshold voltage | $V_{GE(th)}$ | $V_{CE} = 20V, I_c = 300mA$ | 6.0 | 6.5 | 7.0 | V | |
| Collector-Emitter saturation voltage | $V_{CE(sat)}$ (terminal) | $V_{GE} = 15V$ $I_c = 300A$ | Tj=25°C | - | 2.20 | 2.65 | V |
| | | | Tj=125°C | - | 2.50 | - | |
| | | | Tj=150°C | - | 2.55 | - | |
| | $V_{CE(sat)}$ (chip) | | Tj=25°C | - | 1.75 | 2.20 | |
| | | | Tj=125°C | - | 2.05 | - | |
| | | | Tj=150°C | - | 2.10 | - | |
| Internal gate resistance | $R_g(int)$ | - | - | 2.5 | - | Ω | |
| Input capacitance | C_{ies} | $V_{CE} = 10V, V_{GE} = 0V, f = 1MHz$ | - | 27 | - | nF | |
| Turn-on time | t_{on} | $V_{CC} = 600V$ | - | 550 | - | nsec | |
| | t_r | $I_c = 300A$ | - | 180 | - | | |
| | $t_r(i)$ | $V_{GE} = \pm 15V$ | - | 120 | - | | |
| | t_{off} | $R_g = 0.93\Omega$ | - | 1050 | - | | |
| Turn-off time | t_{off} | $L_s = 80nH$ | - | 110 | - | nsec | |
| | t_f | | - | 110 | - | | |
| Forward on voltage | V_F (terminal) | $V_{GE} = 0V$ $I_F = 300A$ | Tj=25°C | - | 2.15 | 2.60 | V |
| | | | Tj=125°C | - | 2.30 | - | |
| | | | Tj=150°C | - | 2.25 | - | |
| | V_F (chip) | | Tj=25°C | - | 1.70 | 2.15 | |
| | | | Tj=125°C | - | 1.85 | - | |
| | | | Tj=150°C | - | 1.80 | - | |
| Reverse recovery time | t_{rr} | $I_F = 300A$ | - | 200 | - | nsec | |
| Thermistor | Resistance | R | T=25°C | - | 5000 | - | Ω |
| | | T=100°C | 465 | 495 | 520 | | |
| | | T=25/50°C | 3305 | 3375 | 3450 | | |
| B value | B | T=25/50°C | 3305 | 3375 | 3450 | K | |

● Thermal resistance characteristics

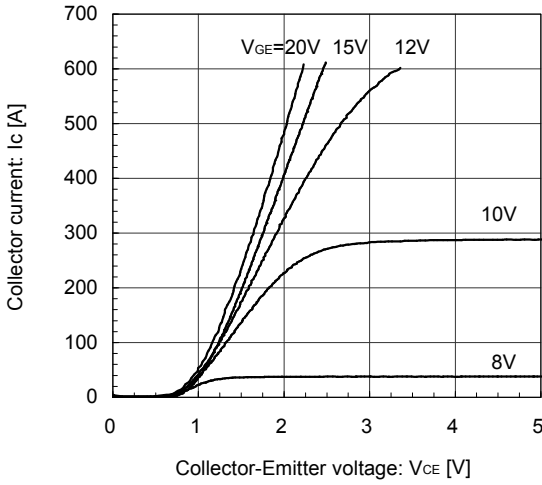
| Items | Symbols | Conditions | Characteristics | | | Units |
|---|----------|-----------------------|-----------------|--------|-------|-------|
| | | | min. | typ. | max. | |
| Thermal resistance (1device) | Rth(j-c) | Inverter IGBT | - | - | 0.094 | °C/W |
| | | Inverter FWD | - | - | 0.150 | |
| Contact thermal resistance (1device) (*5) | Rth(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)

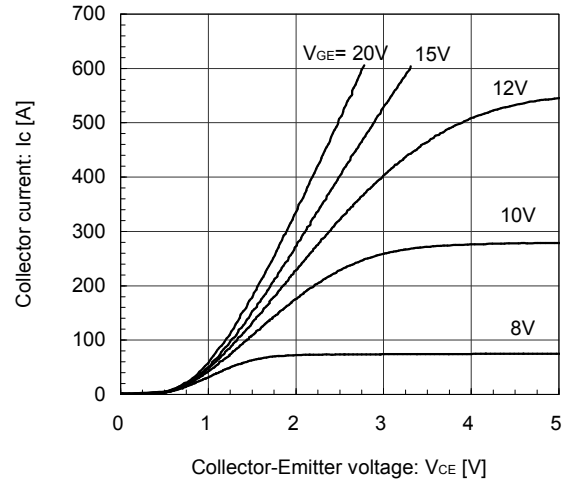
[INVERTER]

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



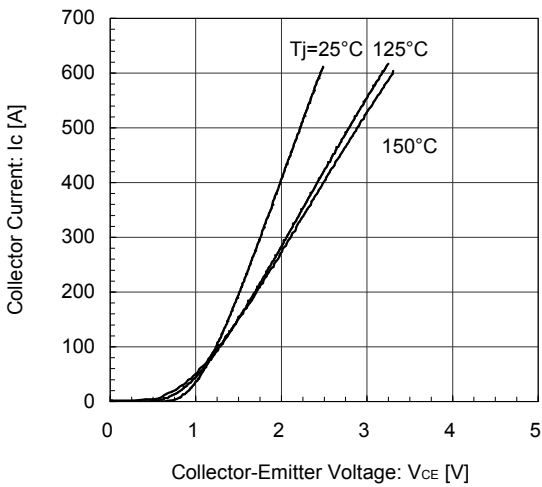
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Collector current vs. Collector-Emittor voltage (typ.)
Tj= 150°C / chip



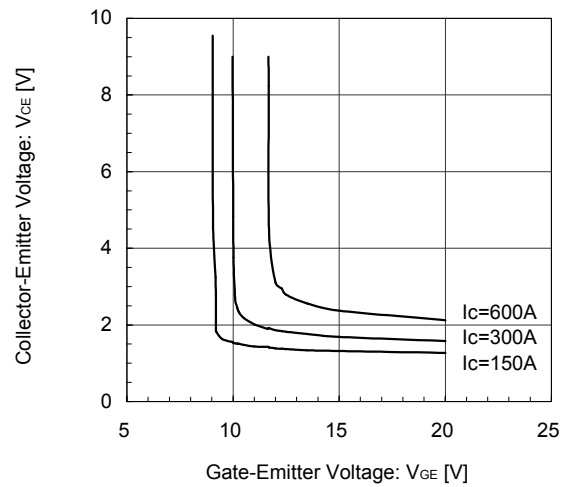
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Collector current vs. Collector-Emittor voltage (typ.)
VGE= 15V / chip



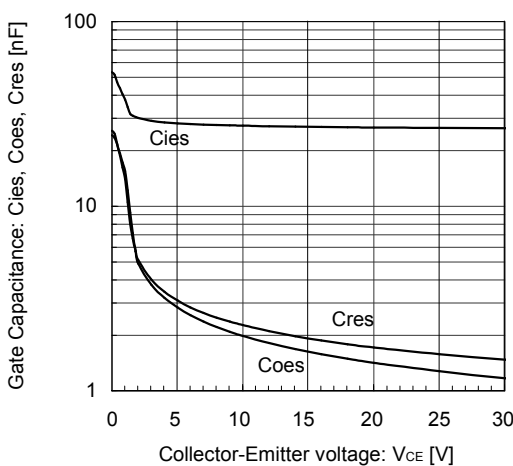
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Collector-Emittor voltage vs. Gate-Emittor voltage (typ.)
Tj= 25°C / chip



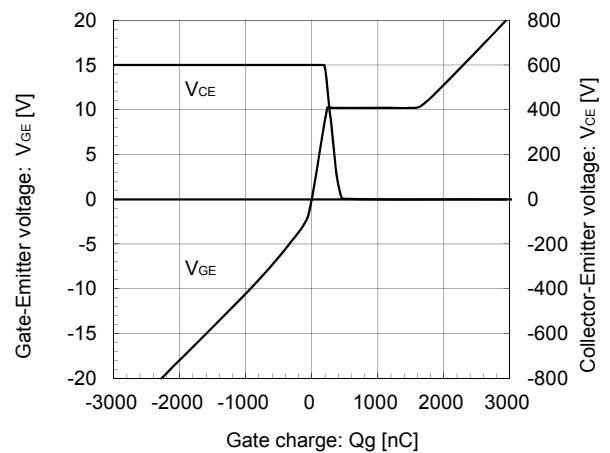
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Gate Capacitance vs. Collector-Emittor Voltage (typ.)
VGE= 0V, f= 1MHz, Tj= 25°C



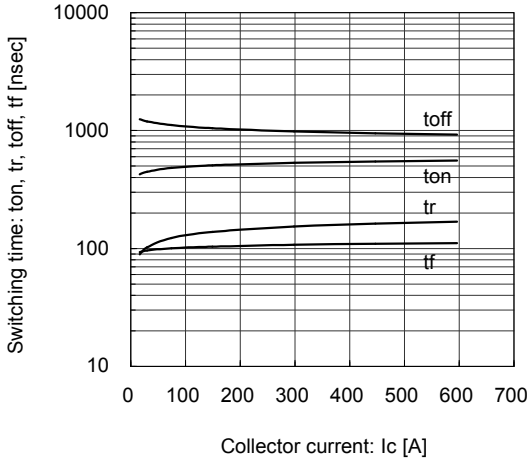
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Dynamic Gate Charge (typ.)
Vcc=600V, Ic=300A, Tj= 25°C



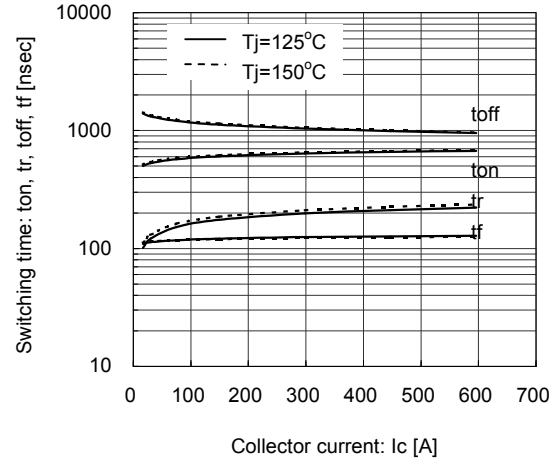
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=25^\circ C$



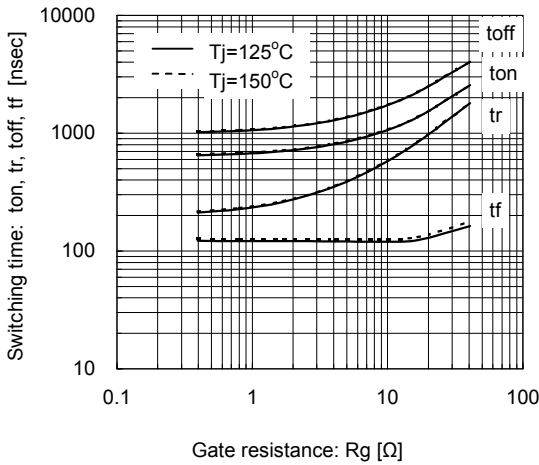
[INVERTER]

Switching time vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



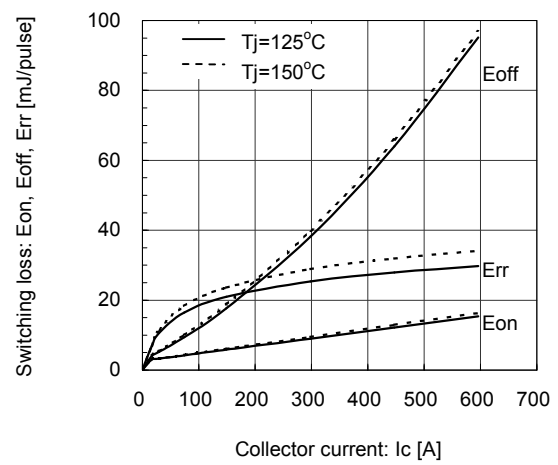
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Switching time vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



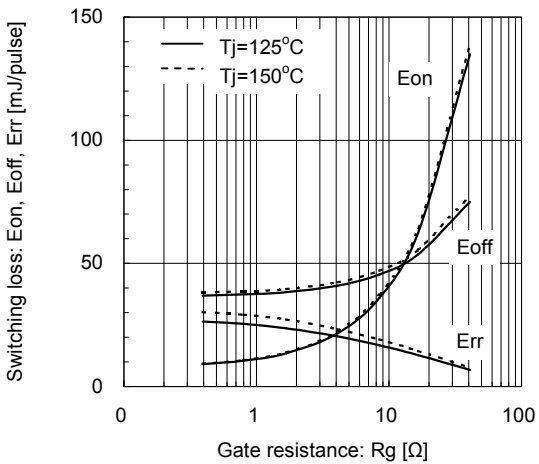
[INVERTER]

Switching loss vs. Collector current (typ.)
 $V_{CC}=600V, V_{GE}=\pm 15V, R_g=0.93\Omega, T_j=125^\circ C, 150^\circ C$



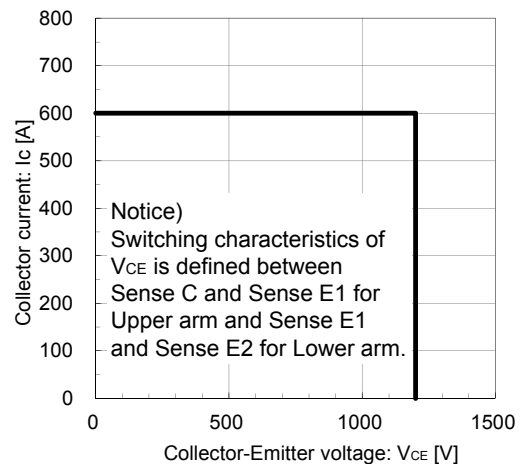
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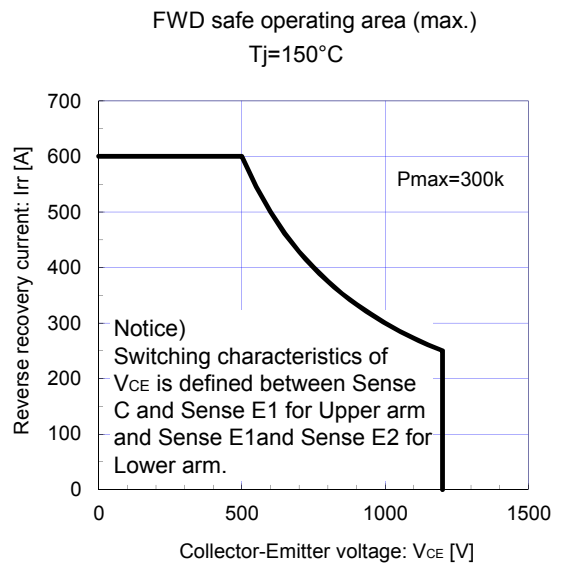
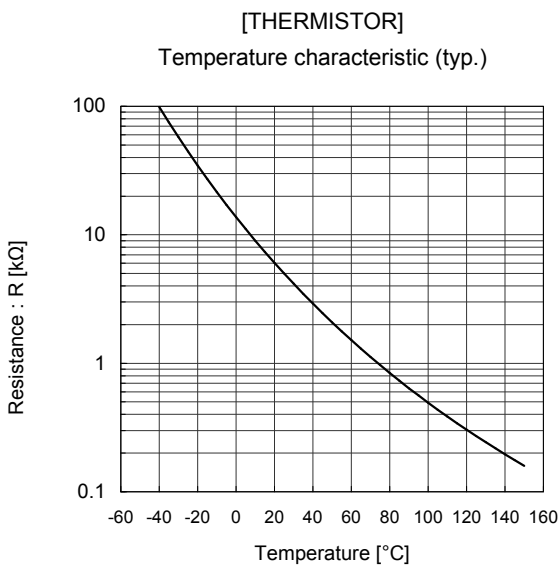
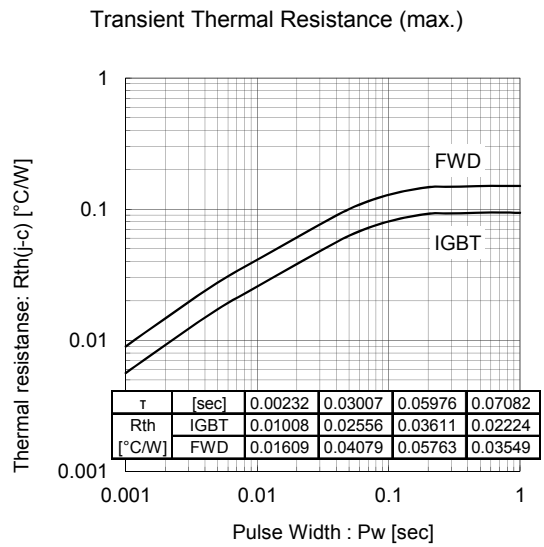
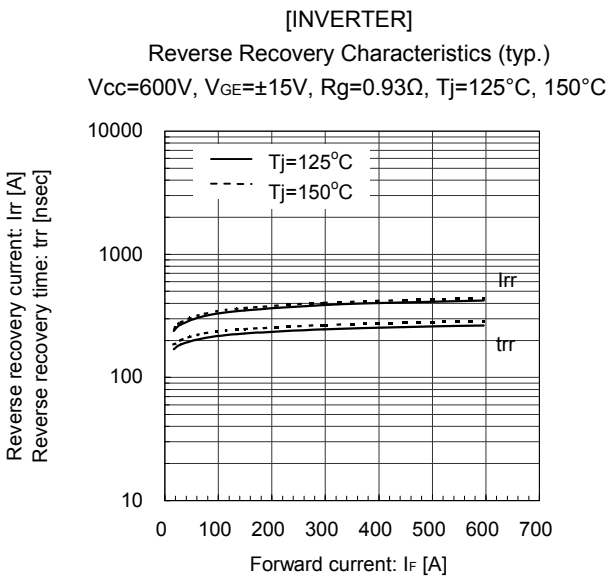
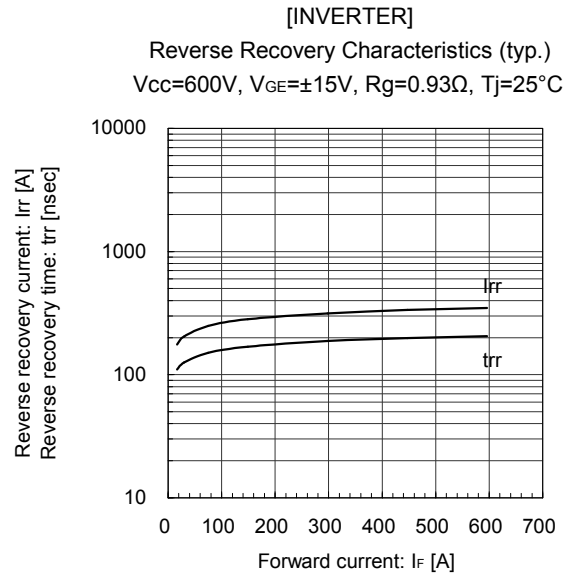
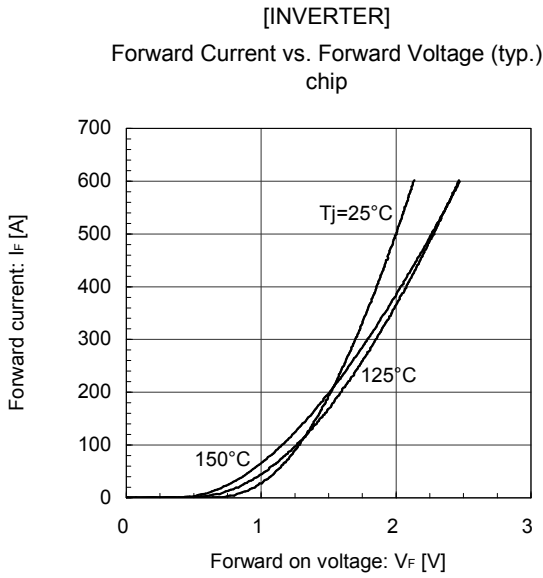
Switching loss vs. Gate resistance (typ.)
 $V_{CC}=600V, I_c=300A, V_{GE}=\pm 15V, T_j=125^\circ C, 150^\circ C$



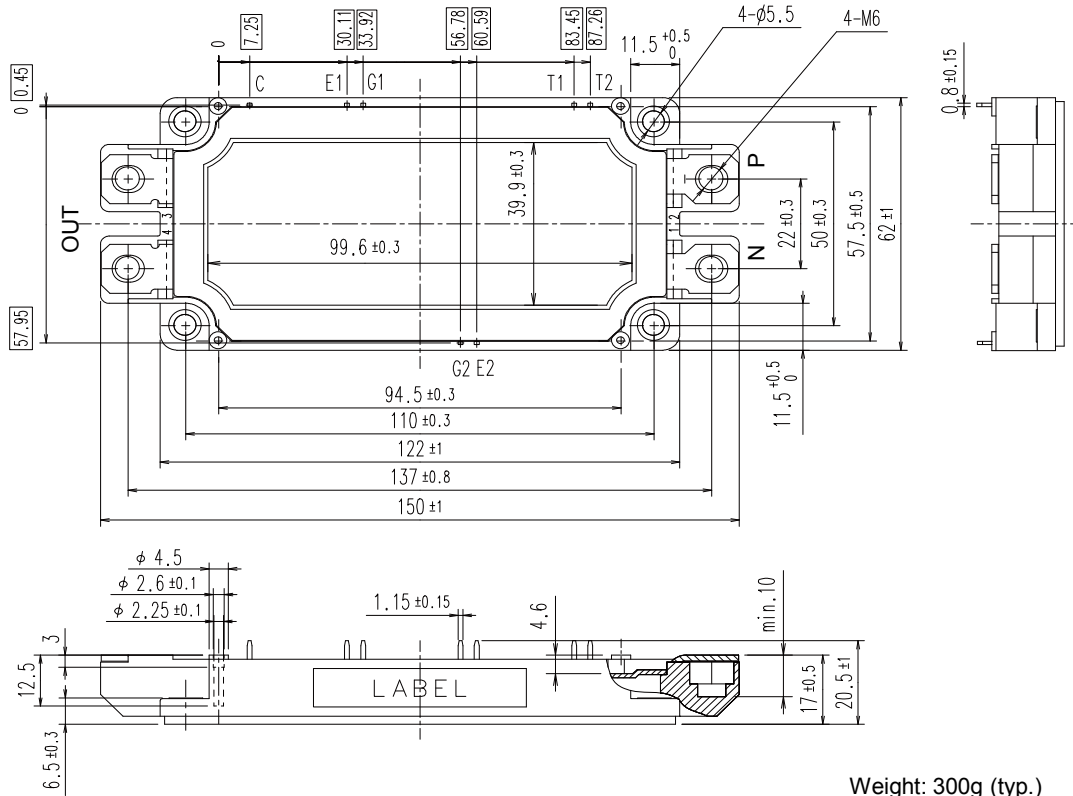
[INVERTER]

Reverse bias safe operating area (max.)
 $+V_{GE}=15V, -V_{GE}=15V, R_g=0.93\Omega, T_j=150^\circ C$



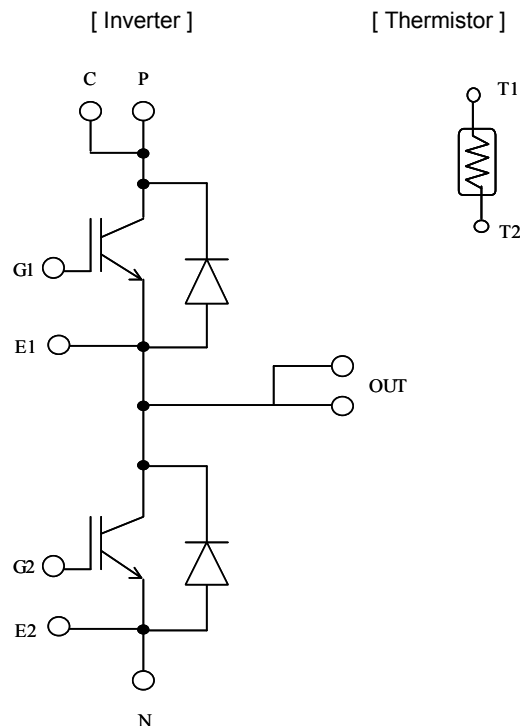


■ Outline Drawings (Unit : mm)



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

■ Equivalent Circuit



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