# 2MBI1400VXB-170P-54

IGBT Modules

## IGBT MODULE (V series)
## 1700V / 1400A / 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 | $V_{CES}$ | | | 1700 | V |
| | Gate-Emitter voltage | $V_{GES}$ | | | ±20 | V |
| | Collector current | $I_c$ | Continuous | $T_C$=25°C | 1800 | A |
| | | | | $T_C$=100°C | 1400 | |
| | | $I_{c\ pulse}$ | 1ms | | 2800 | |
| | | $-I_c$ | | | 1400 | |
| | | $-I_{c\ pulse}$ | 1ms | | 2800 | |
| | Collector power dissipation | $P_C$ | 1 device | | 8820 | W |
| Junction temperature | | $T_j$ | | | 175 | °C |
| Operating junction temperature (under switching conditions) | | $T_{jop}$ | | | 150 | |
| Case temperature | | $T_C$ | | | 150 | |
| Storage temperature | | $T_{stg}$ | | | -40 ~ +150 | |
| Isolation voltage | between terminal and copper base (*1) | $V_{iso}$ | AC : 1min. | | 4000 | VAC |
| | between thermistor and others (*2) | | | | | |
| Screw torque (*3) | Mounting | - | M5 | | 6.0 | N m |
| | Main Terminals | | M8 | | 10.0 | |
| | Sense Terminals | | M4 | | 2.1 | |

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 3.0 ~ 6.0 Nm (M5) Recommendable Value : Main Terminals 8.0 ~ 10.0 Nm (M8)
Recommendable Value : Sense Terminals 1.8 ~ 2.1 Nm (M4)

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

| | Items | Symbols | Conditions | | Characteristics min. | typ. | max. | Units |
|---|---|---|---|---|---|---|---|---|
| Inverter | Zero gate voltage collector current | $I_{CES}$ | $V_{GE}$ = 0V, $V_{CE}$ = 1700V | | - | - | 12.0 | mA |
| | Gate-Emitter leakage current | $I_{GES}$ | $V_{CE}$ = 0V, $V_{GE}$ = ±20V | | - | - | 2400 | nA |
| | Gate-Emitter threshold voltage | $V_{GE (th)}$ | $V_{CE}$ = 20V, $I_C$ = 1400mA | | 6.0 | 6.5 | 7.0 | V |
| | Collector-Emitter saturation voltage | $V_{CE (sat)}$ (terminal) (*4) | $V_{GE}$ = 15V, $I_C$ = 1400A | $T_j$=25°C | - | 2.10 | 2.55 | V |
| | | | | $T_j$=125°C | - | 2.45 | - | |
| | | | | $T_j$=150°C | - | 2.55 | - | |
| | | $V_{CE (sat)}$ (chip) | | $T_j$=25°C | - | 1.90 | 2.35 | |
| | | | | $T_j$=125°C | - | 2.25 | - | |
| | | | | $T_j$=150°C | - | 2.35 | - | |
| | Internal gate resistance | $Rg_{(int)}$ | - | | - | 2.25 | - | Ω |
| | Input capacitance | $C_{ies}$ | $V_{CE}$ = 10V, $V_{GE}$ = 0V, f = 1MHz | | - | 113 | - | nF |
| | Turn-on time | $t_{on}$ | $V_{CC}$ = 900V, $I_C$ = 1400A, $V_{GE}$ = ±15V, $R_G$ = +0.47/-0.68Ω, $L_S$ = 40nH | | - | 1350 | - | nsec |
| | | $t_r$ | | | - | 300 | - | |
| | | $t_{r (i)}$ | | | - | 150 | - | |
| | Turn-off time | $t_{off}$ | | | - | 1800 | - | |
| | | $t_f$ | | | - | 200 | - | |
| | Forward on voltage | $V_F$ (terminal) (*4) | $V_{GE}$ = 0V, $I_F$ = 1400A | $T_j$=25°C | - | 2.00 | 2.45 | V |
| | | | | $T_j$=125°C | - | 2.25 | - | |
| | | | | $T_j$=150°C | - | 2.20 | - | |
| | | $V_F$ (chip) | | $T_j$=25°C | - | 1.80 | 2.25 | |
| | | | | $T_j$=125°C | - | 2.05 | - | |
| | | | | $T_j$=150°C | - | 2.00 | - | |
| | Reverse recovery time | $t_{rr}$ | $I_F$ = 1400A | | - | 250 | - | nsec |
| 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 |

Note *4: Please refer to page 7 , there is definition of on-state voltage at terminal.

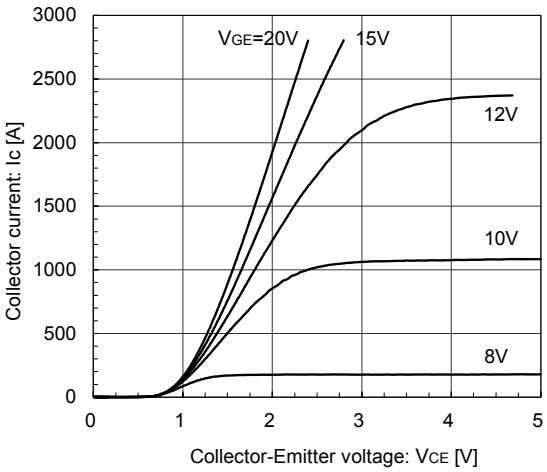
## ● Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics min. | typ. | max. | Units |
|---|---|---|---|---|---|---|
| Thermal resistance (1device) | Rth(j-c) | Inverter IGBT | - | - | 0.017 | °C/W |
| | | Inverter FWD | - | - | 0.032 | |
| Contact thermal resistance (1device) (*5) | Rth(c-f) | with Thermal Compound | - | 0.0042 | - | |

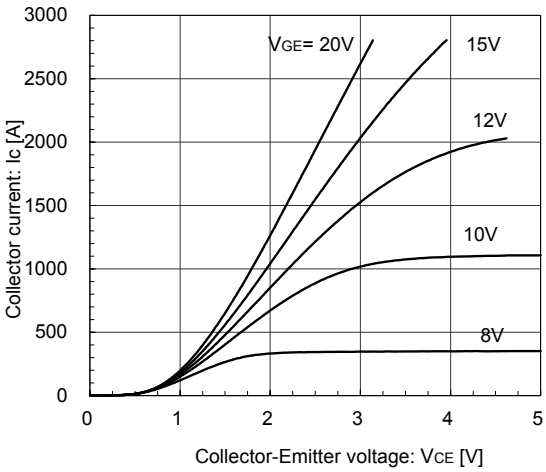
Note *5: This is the value which is defined mounting on the additional cooling fin with thermal compound.

## ■ Characteristics (Representative)

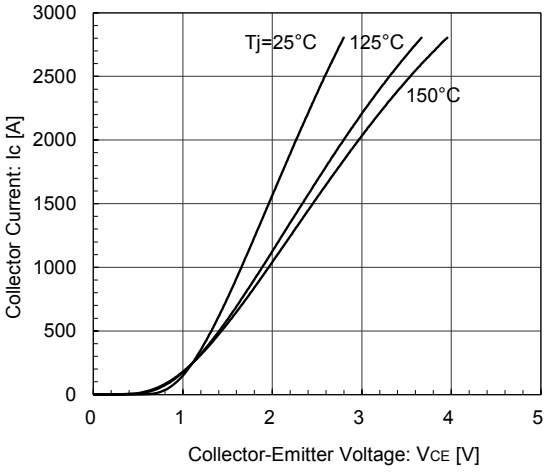
[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



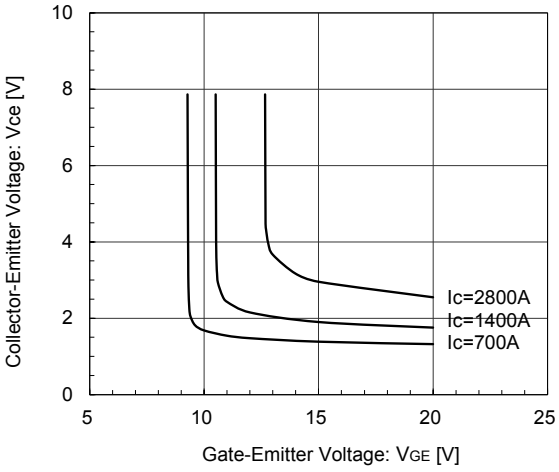

[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 150°C / chip



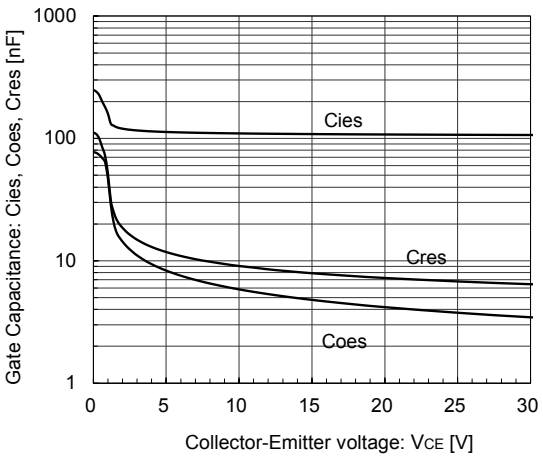

[INVERTER]
Collector current vs. Collector-Emitter voltage (typ.)
VGE= 15V / chip



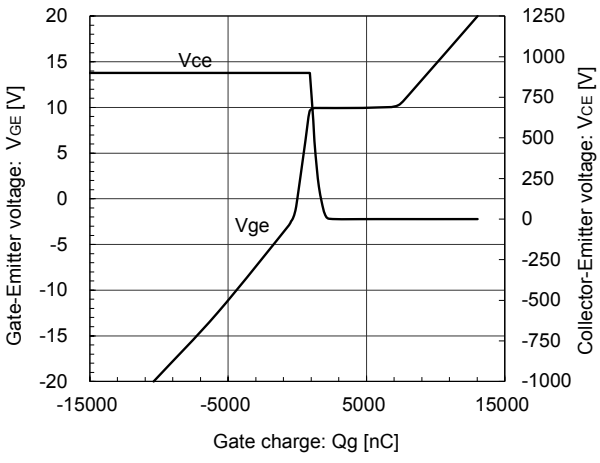

[INVERTER]
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj= 25°C / chip



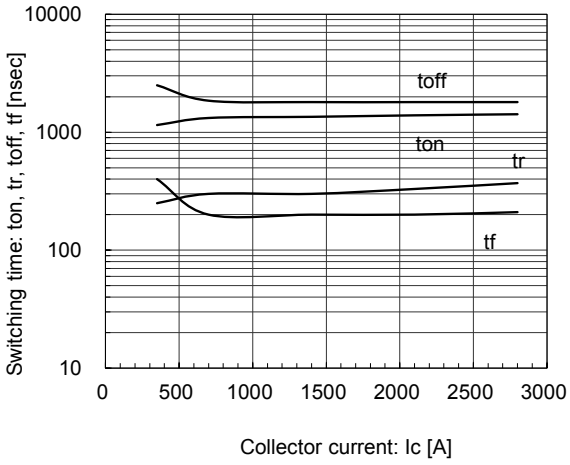

[INVERTER]
Gate Capacitance vs. Collector-Emitter Voltage (typ.)
VGE= 0V, *f*= 1MHz, Tj= 25°C



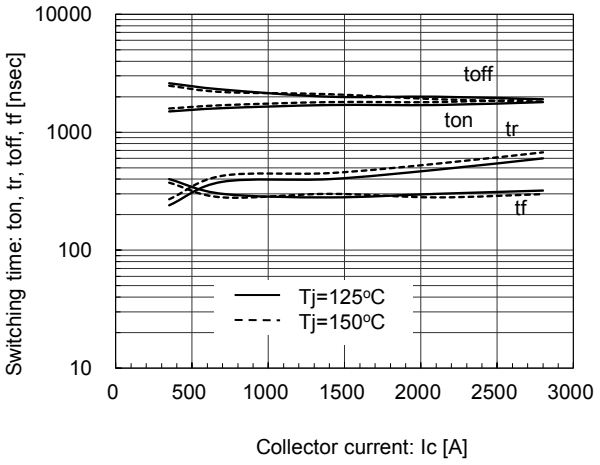

[INVERTER]
Dynamic Gate Charge (typ.)
Vcc=900V, Ic=1400A, Tj= 25°C



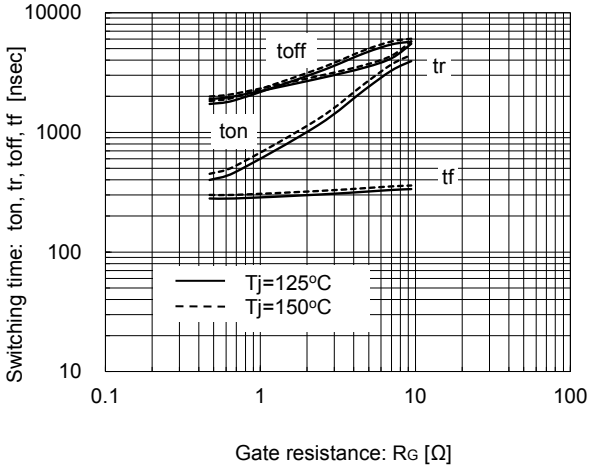
[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=900V, $V_{GE}$=±15V, $R_G$=+0.47/-0.68Ω, Tj=25°C



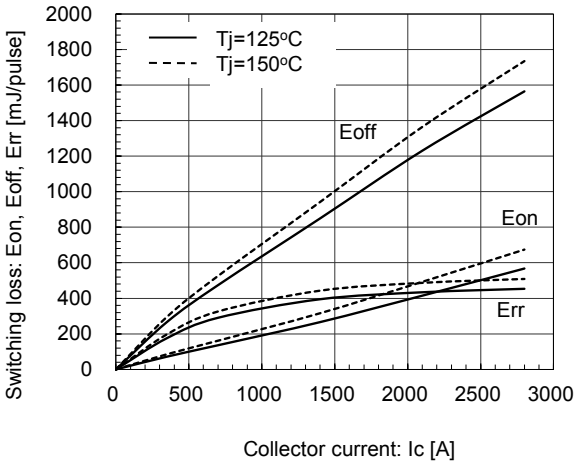

[INVERTER]
Switching time vs. Collector current (typ.)
Vcc=900V, $V_{GE}$=±15V, $R_G$=+0.47/-0.68Ω, Tj=125°C, 150°C



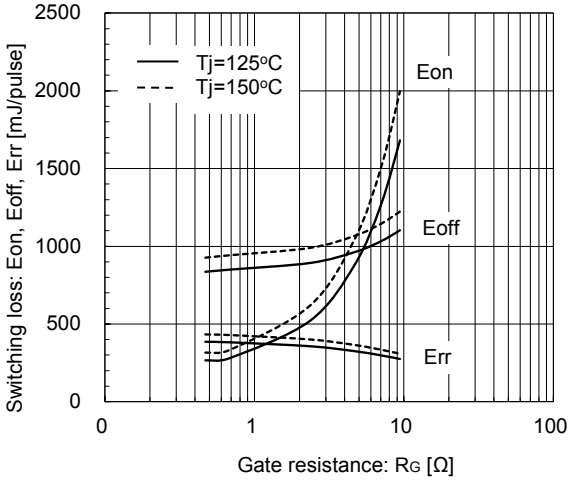

[INVERTER]
Switching time vs. Gate resistance (typ.)
Vcc=900V, Ic=1400A, $V_{GE}$=±15V, Tj=125°C, 150°C



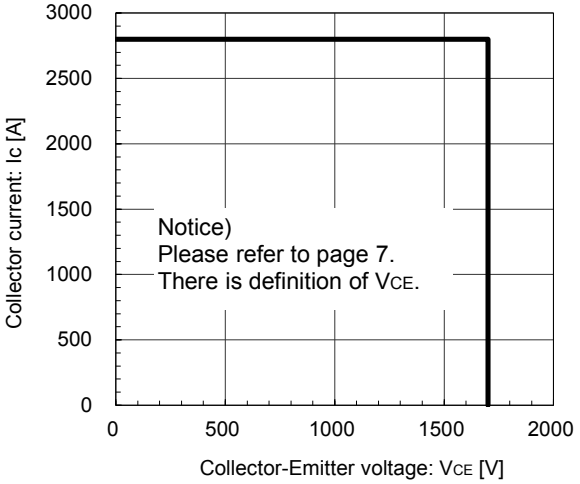

[INVERTER]
Switching loss vs. Collector current (typ.)
Vcc=900V, $V_{GE}$=±15V, $R_G$=+0.47/-0.68Ω, Tj=125°C, 150°C




[INVERTER]
Switching loss vs. Gate resistance (typ.)
Vcc=900V, Ic=1400A, $V_{GE}$=±15V, Tj=125°C, 150°C

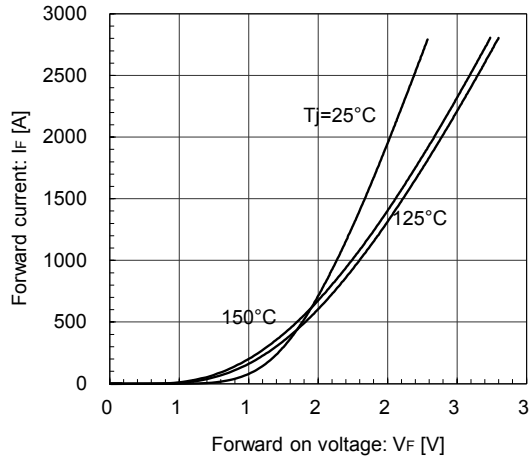



[INVERTER]
Reverse bias safe operating area (max.)
+$V_{GE}$=15V, -$V_{GE}$=15V, $R_G$=+0.47/-0.68Ω, Tj=150°C



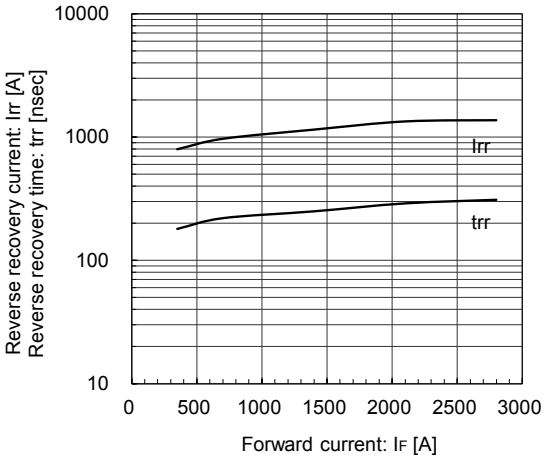
[INVERTER]

Forward Current vs. Forward Voltage (typ.)
chip



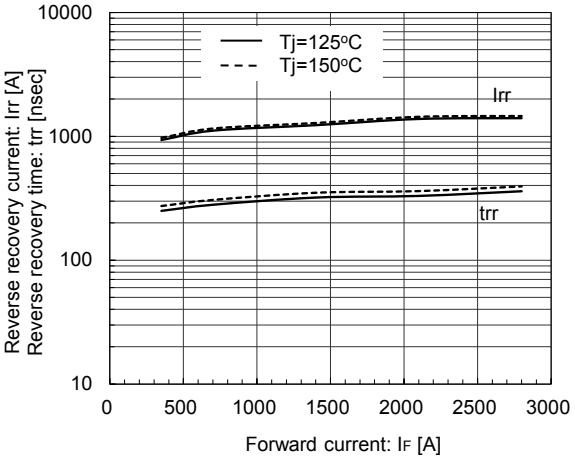

[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=900V, VGE=±15V, RG=+0.47/-0.68Ω, Tj=25°C

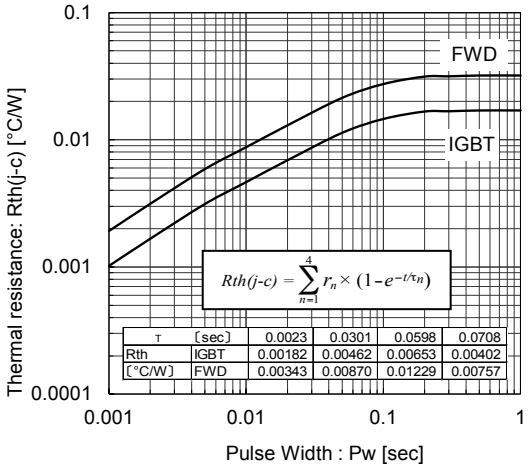



[INVERTER]

Reverse Recovery Characteristics (typ.)
Vcc=900V, VGE=±15V, RG=+0.47/-0.68Ω, Tj=125°C, 150°C



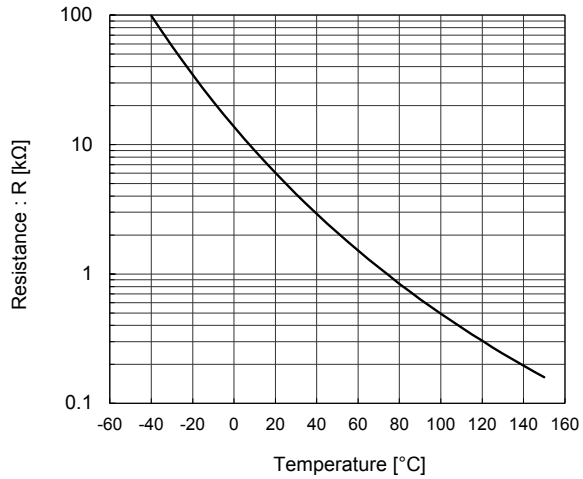

Transient Thermal Resistance (max.)




| τ | [sec] | 0.0023 | 0.0301 | 0.0598 | 0.0708 |
|---|---|---|---|---|---|
| Rth | IGBT | 0.00182 | 0.00462 | 0.00653 | 0.00402 |
| [°C/W] | FWD | 0.00343 | 0.00870 | 0.01229 | 0.00757 |

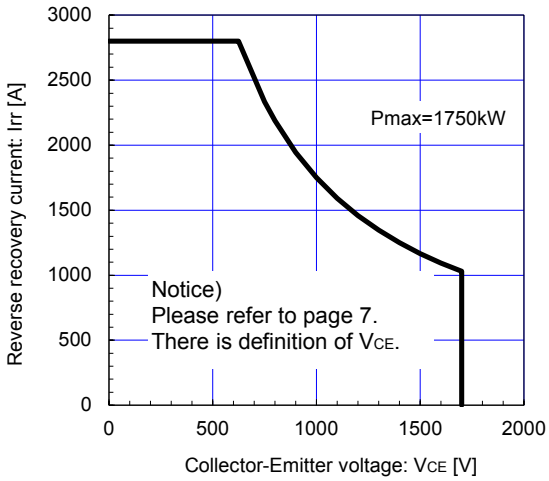
[THERMISTOR]

Temperature characteristic (typ.)

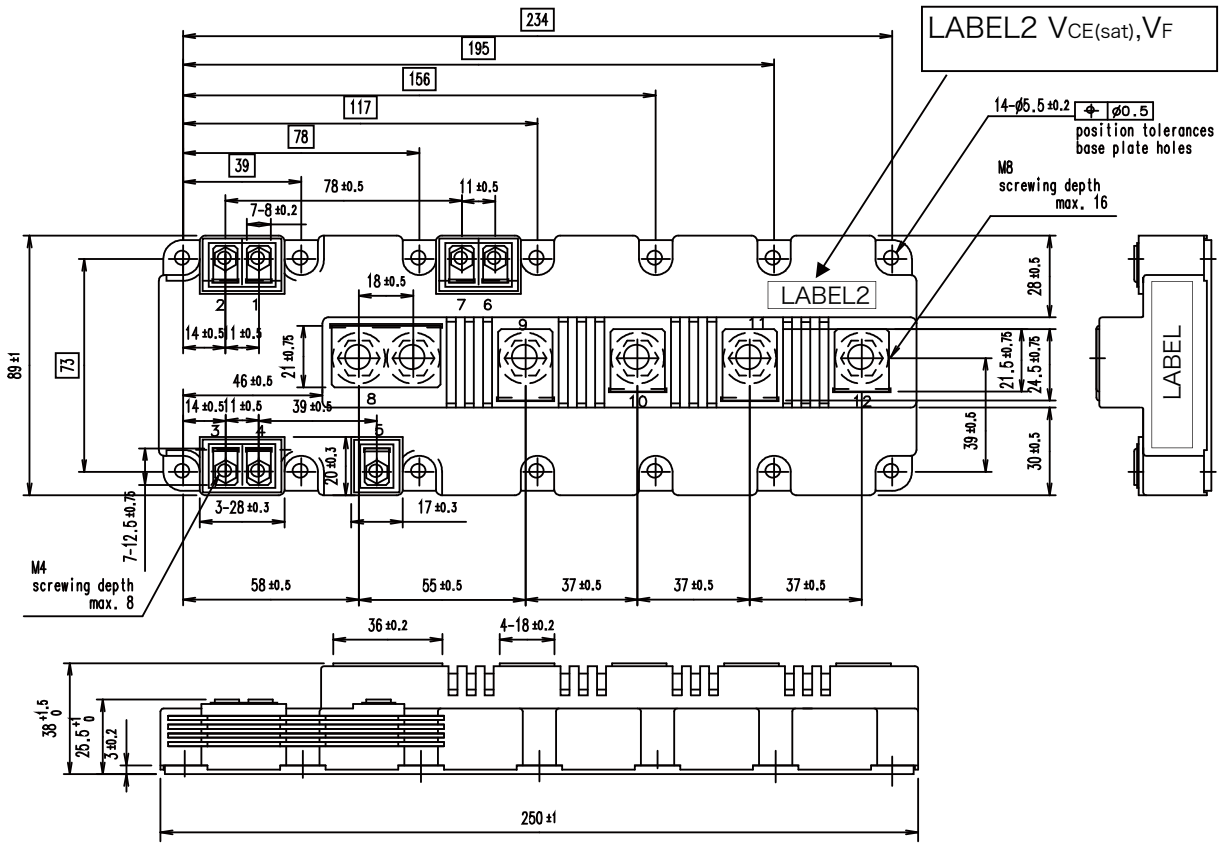



FWD safe operating area (max.)

Tj=150°C

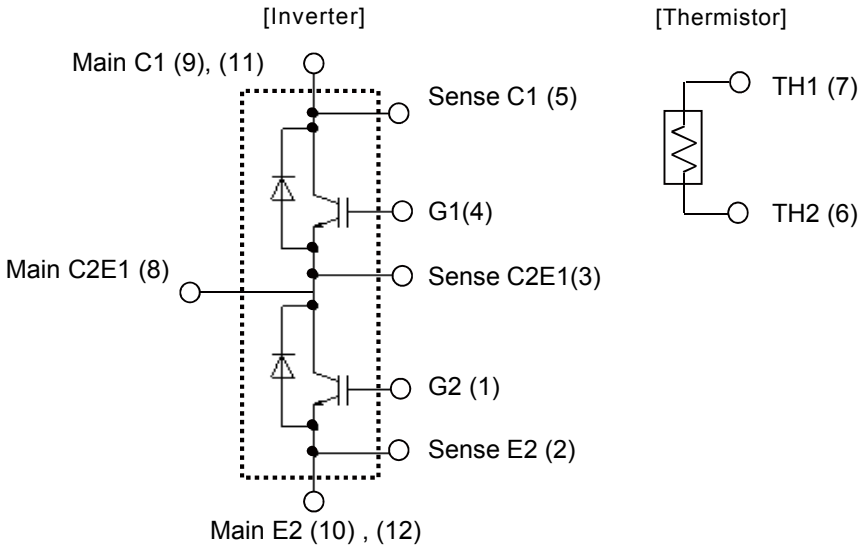


## ■ Outline Drawings, mm

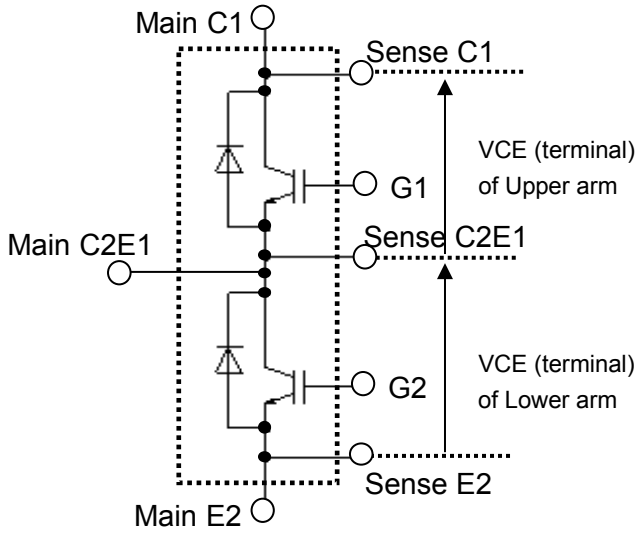



Weight:1250g(typ.)

## ■ Equivalent Circuit Schematic



## ■ Definition of on-state voltage at terminal and switching characteristics




Fuji defined VCE value of terminal by using Sense C1 and Sense C2E1 for Upper arm and Sense C2E1 and Sense E2 for Lower arm .

Switching characteristics of VCE also is defined between Sense C1 and Sense C2E1 for Upper arm and Sense C2E1 and Sense E2 for Lower arm .

Please use these terminals whenever measure spike voltage and on-state voltage .

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• Medical equipment

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IGBT Modules

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- 关于本规格书中没有记载的产品信息，应用手册，技术信息等，请参考以下链接。
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| 5 Mounting Instructions | www.fujielectric.com/products/semiconductor/model/igbt/mounting/ |
| 6 IGBT Loss Simulation Software | www.fujielectric.com/products/semiconductor/model/igbt/simulation/ |
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