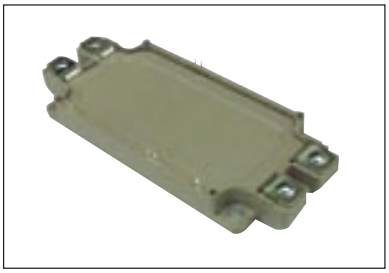
# 2MBI225U4N-170-50

IGBT Modules

## IGBT MODULE (U series)
## 1700V / 225A / 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 |
|---|---|---|---|---|---|---|
| Collector-Emitter voltage | | $V_{CES}$ | | | 1700 | V |
| Gate-Emitter voltage | | $V_{GES}$ | | | ±20 | V |
| Collector current | | Ic | Continuous | Tc=25°C | 300 | A |
| | | | | Tc=80°C | 225 | |
| | | Icp | 1ms | Tc=25°C | 600 | |
| | | | | Tc=80°C | 450 | |
| | | -Ic | | | 225 | |
| | | -Ic pulse | 1ms | | 450 | |
| Collector power dissipation | | Pc | 1 device | | 1040 | W |
| Junction temperature | | Tj | | | 150 | °C |
| Storage temperature | | Tstg | | | -40 to +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 when isolation test will be done.
Note *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.
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 min. | typ. | max. | Units |
|---|---|---|---|---|---|---|---|---|
| Inverter | 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, $I_C$ = 225mA | | 4.5 | 6.5 | 8.5 | V |
| | Collector-Emitter saturation voltage | $V_{CE\ (sat)}$ (terminal) | $V_{GE}$ = 15V, $I_C$ = 225A | Tj=25°C | - | 2.60 | 2.85 | V |
| | | | | Tj=125°C | - | 3.00 | - | |
| | | $V_{CE\ (sat)}$ (chip) | | Tj=25°C | - | 2.30 | 2.45 | |
| | | | | Tj=125°C | - | 2.65 | - | |
| | Input capacitance | Cies | $V_{CE}$ = 10V, $V_{GE}$ = 0V, f = 1MHz | | - | 21 | - | nF |
| | Turn-on time | ton | $V_{CC}$ = 900V, $I_C$ = 225A, $V_{GE}$ = ±15V, $R_G$ = 2.2Ω | | - | 0.62 | 1.20 | µs |
| | | tr | | | - | 0.39 | 0.60 | |
| | | tr (i) | | | - | 0.05 | - | |
| | Turn-off time | toff | | | - | 0.55 | 1.50 | |
| | | tf | | | - | 0.09 | 0.30 | |
| | Forward on voltage | $V_F$ (terminal) | $V_{GE}$ = 0V, $I_F$ = 225A | Tj=25°C | - | 2.05 | 2.35 | V |
| | | | | Tj=125°C | - | 2.25 | - | |
| | | $V_F$ (chip) | | Tj=25°C | - | 1.80 | 1.95 | |
| | | | | Tj=125°C | - | 2.00 | - | |
| | Reverse recovery time | trr | $I_F$ = 225A | | - | 0.18 | 0.6 | µs |
| | Lead resistance, terminal-chip (*5) | R lead | | | - | 1.30 | - | 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 |

Note *5: Biggest internal terminal resistance among arm.

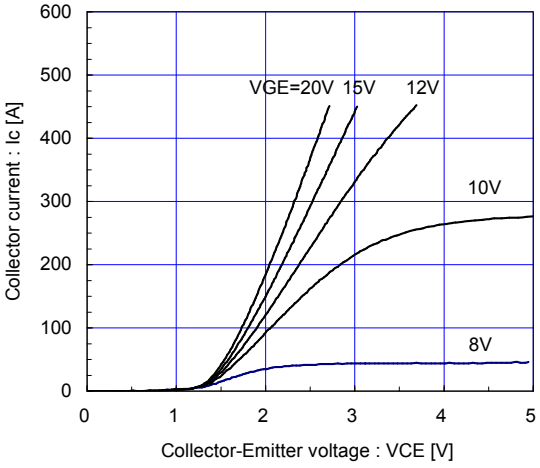
● **Thermal resistance characteristics**

| Items | Symbols | Conditions | Characteristics min. | typ. | max. | Units |
|---|---|---|---|---|---|---|
| Thermal resistance (1device) | Rth(j-c) | IGBT | - | - | 0.12 | °C/W |
| | | FWD | - | - | 0.20 | |
| Contact thermal resistance (1device) (*6) | Rth(c-f) | with Thermal Compound | - | 0.0167 | - | |

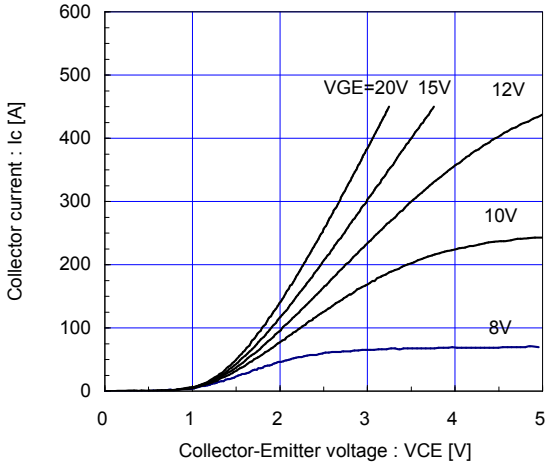
Note *6: This is the value which is defined mounting on the additional cooling fin with thermal compound.

## Characteristics (Representative)

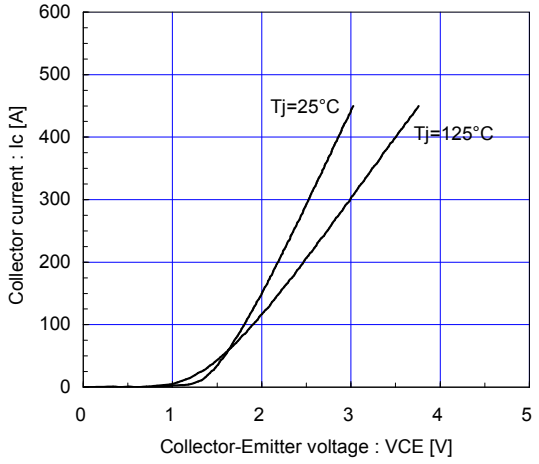
Collector current vs. Collector-Emitter voltage (typ.)
Tj= 25°C / chip



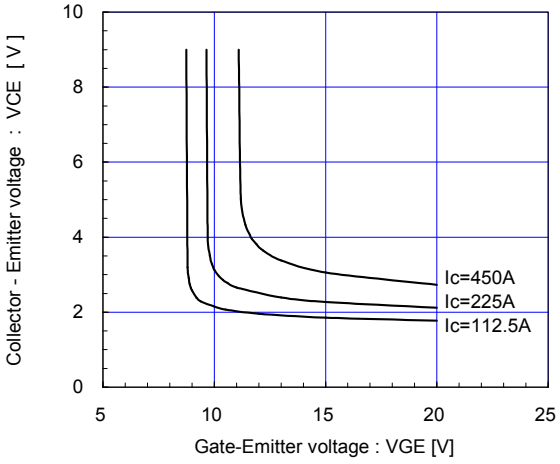

Collector current vs. Collector-Emitter voltage (typ.)
Tj= 125°C/ chip



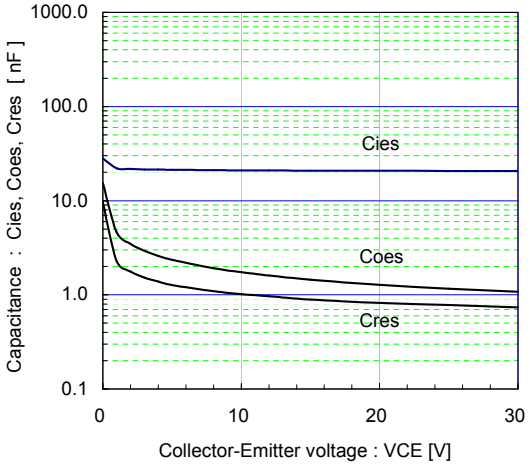

Collector current vs. Collector-Emitter voltage (typ.)
VGE=15V / chip



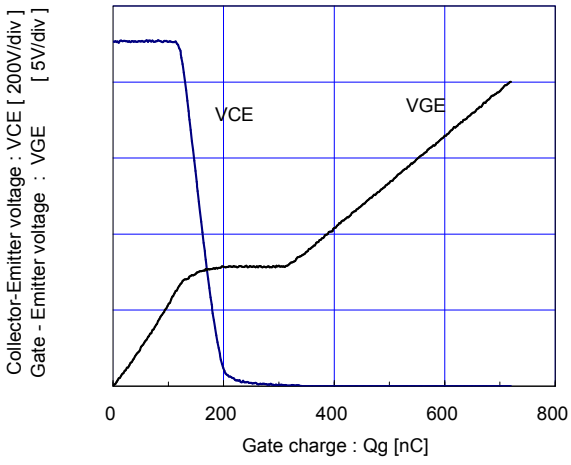

Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C / chip



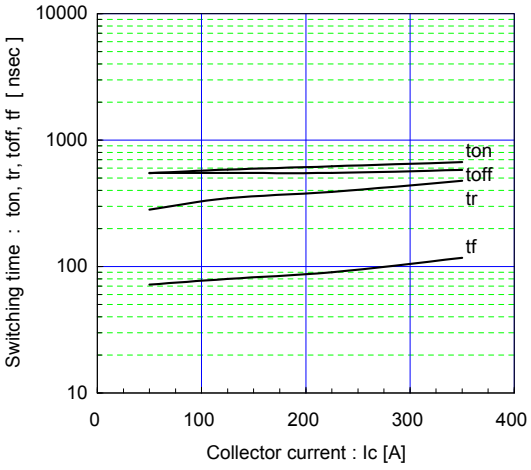

Capacitance vs. Collector-Emitter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



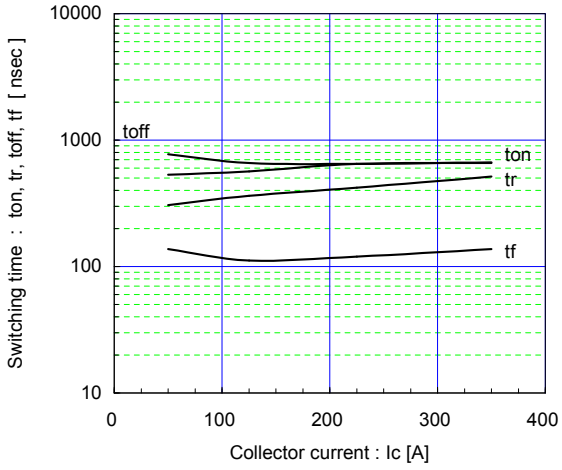

Dynamic Gate charge (typ.)
Vcc=900V, Ic=225A, Tj= 25°C



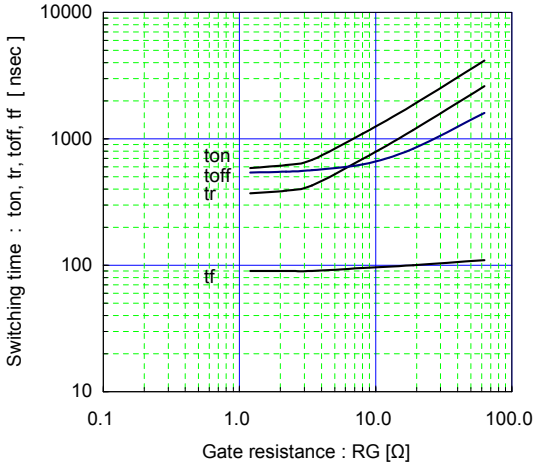
Switching time vs. Collector current (typ.)
Vcc=900V, VGE=±15V, Rg=2.2Ω, Tj= 25°C



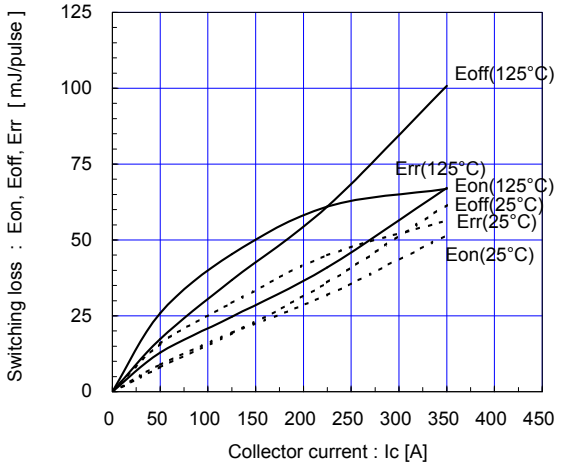

Switching time vs. Collector current (typ.)
Vcc=900V, VGE=±15V, Rg=2.2Ω, Tj=125°C



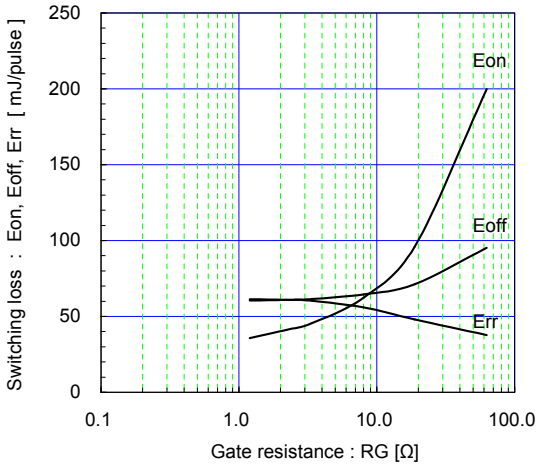

Switching time vs. Gate resistance (typ.)
Vcc=900V, Ic=225A, VGE=±15V, Tj= 25°C



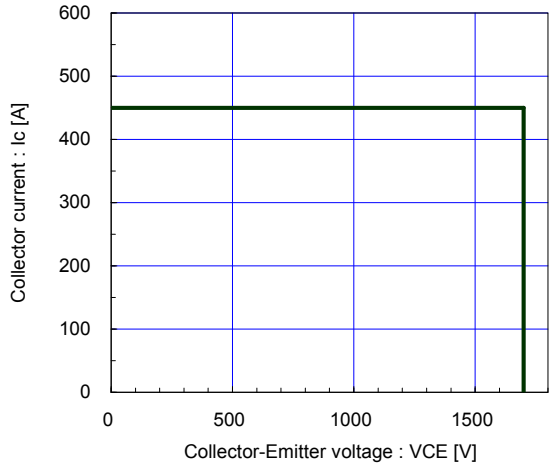

Switching loss vs. Collector current (typ.)
Vcc=900V, VGE=±15V, Rg=2.2Ω



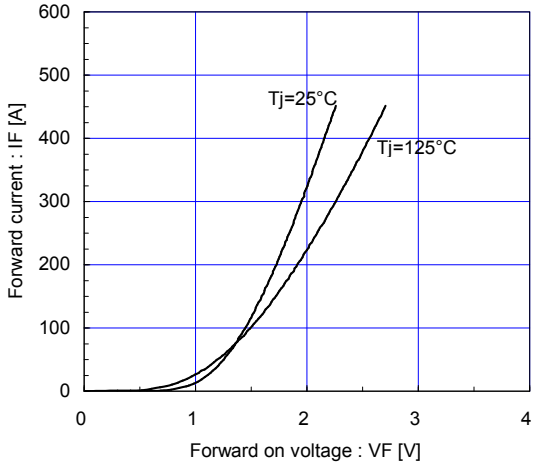

Switching loss vs. Gate resistance (typ.)
Vcc=900V, Ic=225A, VGE=±15V, Tj= 125°C



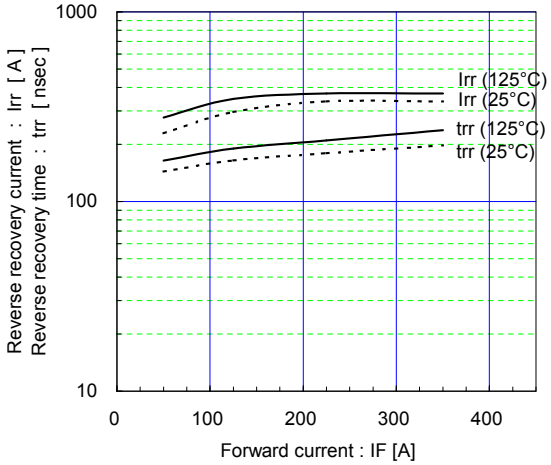

Reverse bias safe operating area (max.)
+VGE=15V,-VGE <= 15V, RG >= 2.2Ω ,Tj <= 125°C
Stray inductance <= 100nH



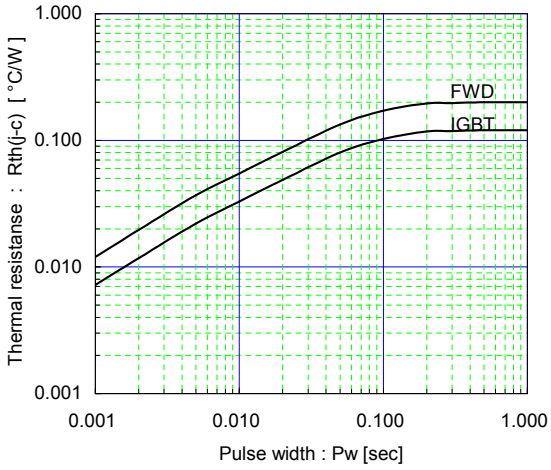
Forward current vs. Forward on voltage (typ.)
chip



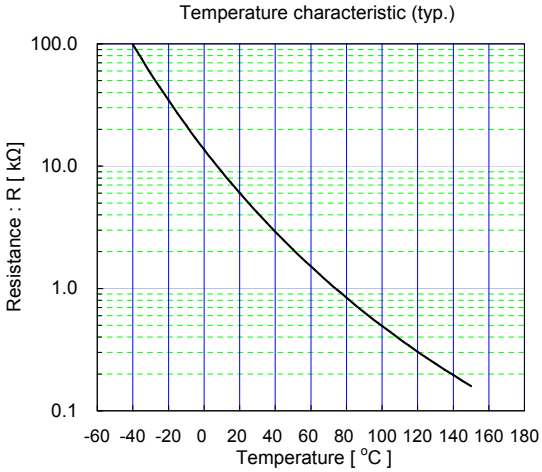

Reverse recovery characteristics (typ.)
Vcc=900V, VGE=±15V, Rg=2.2Ω



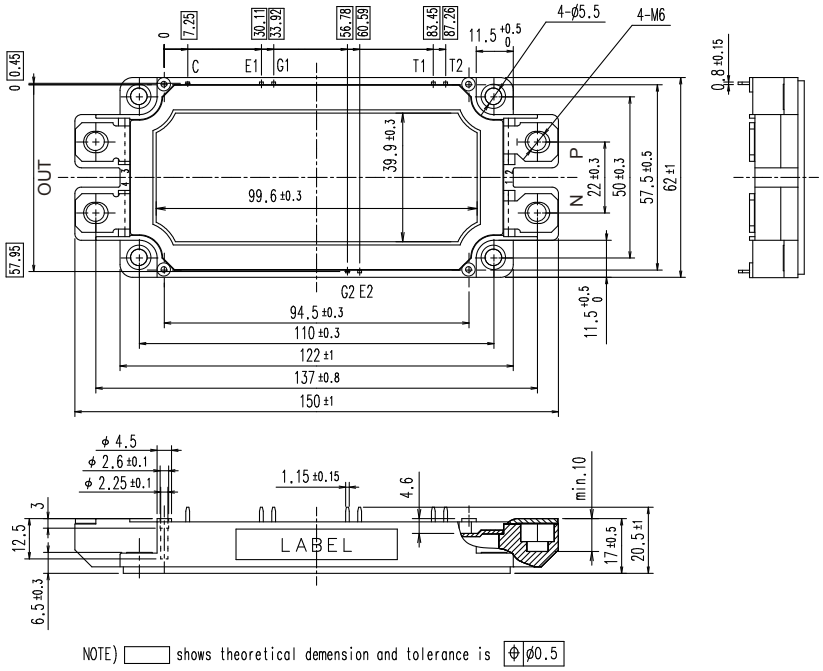

Transient thermal resistance (max.)



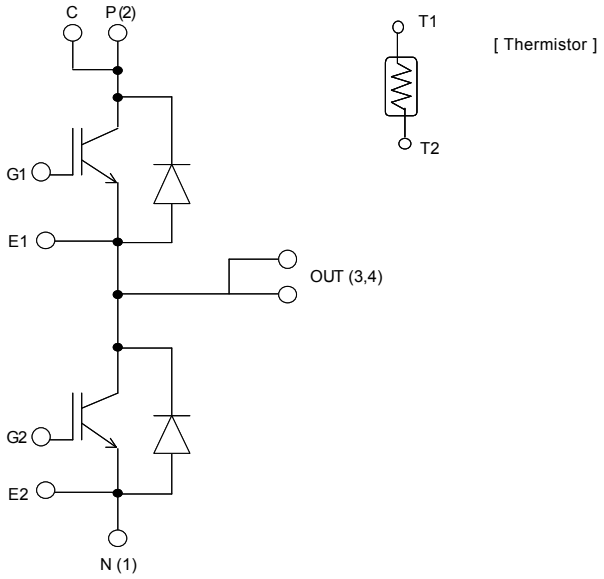

[ Thermistor ]
Temperature characteristic (typ.)



## ■ Outline Drawings, mm




## ■ Equivalent Circuit Schematic



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