

2MBI1200U4G-170

IGBT MODULE (U series) 1700V / 1200A / 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 | I _c | Continuous | Tc=25°C Tc=80°C | 1600 1200 | A |
| | I _{cp} | 1ms | Tc=25°C Tc=80°C | 3200 2400 | |
| | -I _c | | | 1200 | |
| | -I _c pulse | 1ms | | 2400 | |
| | Collector power dissipation | P _c | 1 device | 6250 | |
| 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. | 3400 | VAC | |
| Screw torque (*2) | Mounting | | 5.75 | N m | |
| | Main Terminals | | 10 | | |
| | Sense Terminals | | 2.5 | | |

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

Note *2: Recommendable value : Mounting : 4.25-5.75 Nm (M6), Main Terminals : 8-10 Nm (M8), Sense Terminals : 1.7-2.5 Nm (M4)

● 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} = 1700V | - | - | 1.0 | mA | |
| Gate-Emitter leakage current | I _{GES} | V _{CE} = 0V, V _{GE} = ±20V | - | - | 1600 | nA | |
| Gate-Emitter threshold voltage | V _{GE(th)} | V _{CE} = 20V, I _c = 1200mA | 5.5 | 6.5 | 7.5 | V | |
| Collector-Emitter saturation voltage | V _{CE(sat)} (main terminal) | V _{GE} = 15V I _c = 1200A | Tj=25°C | - | 2.57 | 2.76 | V |
| | | | Tj=125°C | - | 2.97 | - | |
| | V _{CE(sat)} (chip) | | Tj=25°C | - | 2.25 | 2.40 | |
| | | | Tj=125°C | - | 2.65 | - | |
| Input capacitance | C _{ies} | V _{CE} = 10V, V _{GE} = 0V, f = 1MHz | - | 112 | - | nF | |
| Turn-on time | ton | V _{CC} = 900V, I _c = 1200A, V _{GE} = ±15V, Tj = 125°C, R _{gon} = 4.7Ω, R _{goff} = 1.2Ω | - | 3.10 | - | μs | |
| | tr | | - | 1.25 | - | | |
| Turn-off time | toff | | - | 1.45 | - | | |
| | tf | | - | 0.25 | - | | |
| Forward on voltage | V _F (main terminal) | V _{GE} = 0V I _F = 1200A | Tj=25°C | - | 2.12 | 2.51 | V |
| | | | Tj=125°C | - | 2.32 | - | |
| | V _F (chip) | | Tj=25°C | - | 1.80 | 2.15 | |
| | | | Tj=125°C | - | 2.00 | - | |
| Reverse recovery time | trr | I _F = 1200A | - | 0.45 | - | μs | |
| Lead resistance, terminal-chip (*3) | R lead | | - | 0.27 | - | mΩ | |

Note *3: Biggest internal terminal resistance among arm.

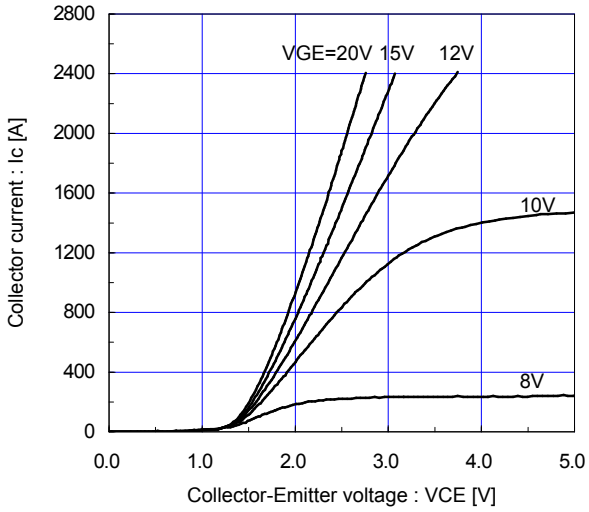
● Thermal resistance characteristics

| Items | Symbols | Conditions | Characteristics | | | Units |
|--------------------------------------|----------------------|----------------------------|-----------------|-------|-------|-------|
| | | | min. | typ. | max. | |
| Thermal resistance (1device) | R _{th(j-c)} | IGBT | - | - | 0.020 | °C/W |
| | | FWD | - | - | 0.033 | |
| Contact thermal resistance (1device) | R _{th(c-f)} | with Thermal Compound (*4) | - | 0.006 | - | |

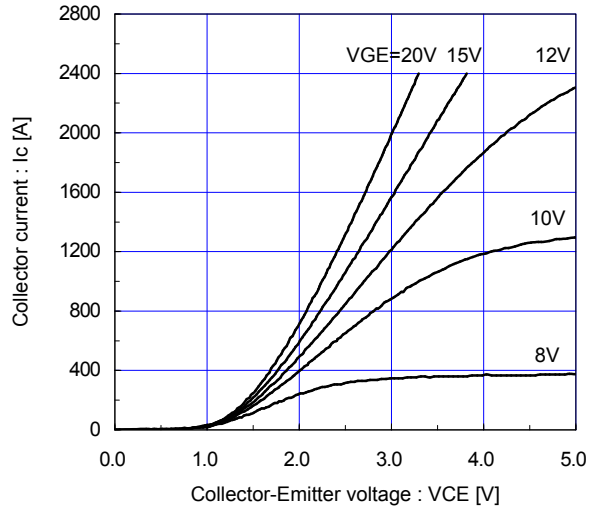
Note *4: This is the value which is defined mounting on the additional cooling fin with thermal compound.

■ Characteristics (Representative)

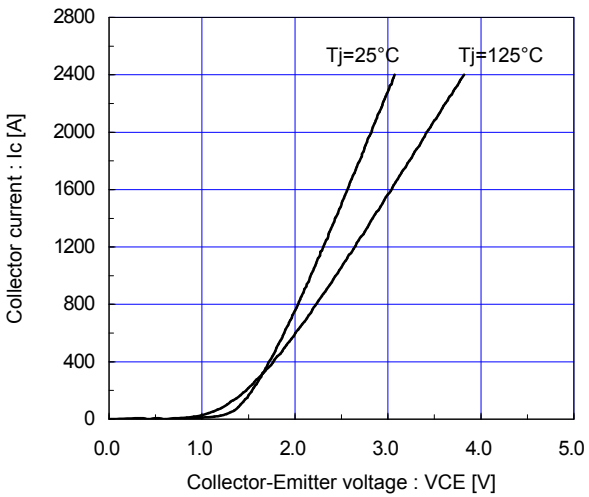
Collector current vs. Collector-Emitter voltage (typ.)
Tj=25°C, chip



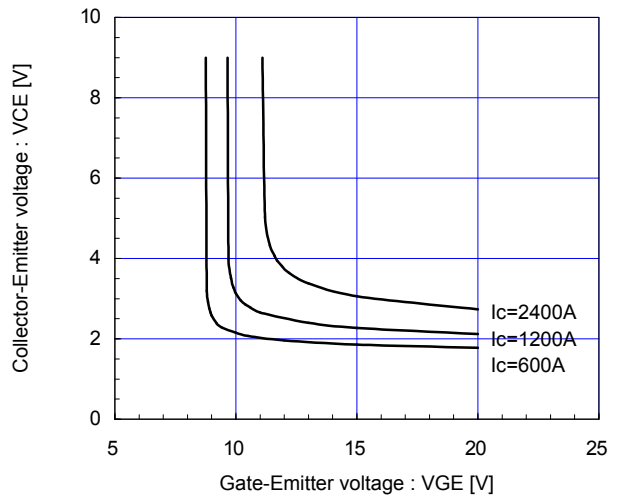
Collector current vs. Collector-Emitter voltage (typ.)
Tj=125°C, chip



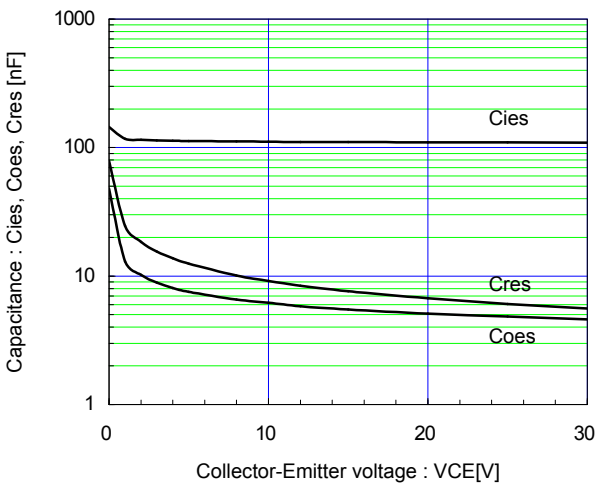
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
VGE=+15V, chip



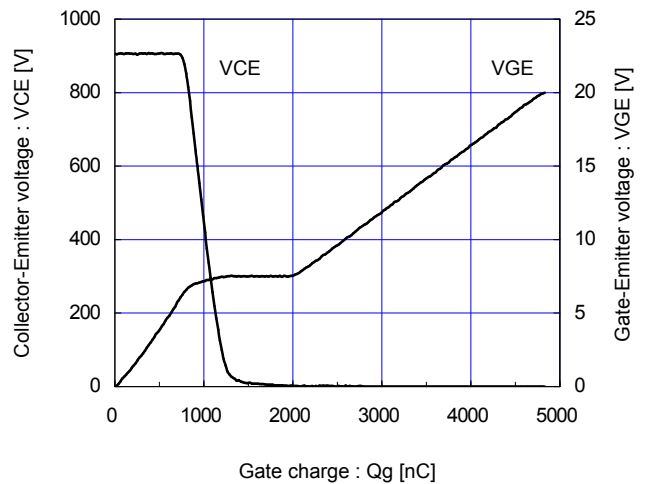
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)
Tj=25°C, chip



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

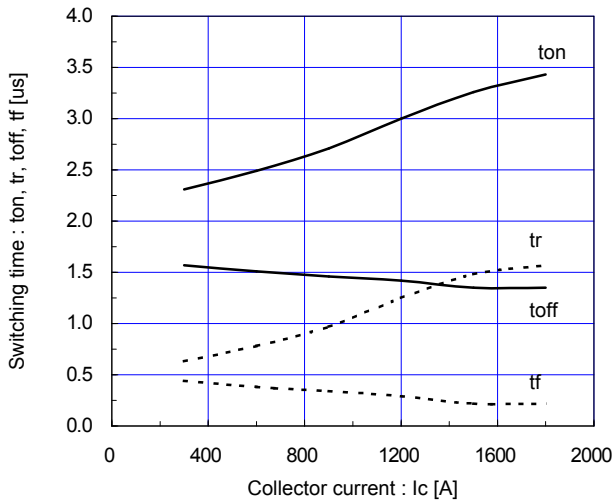


Dynamic Gate charge (typ.)
Tj=25°C



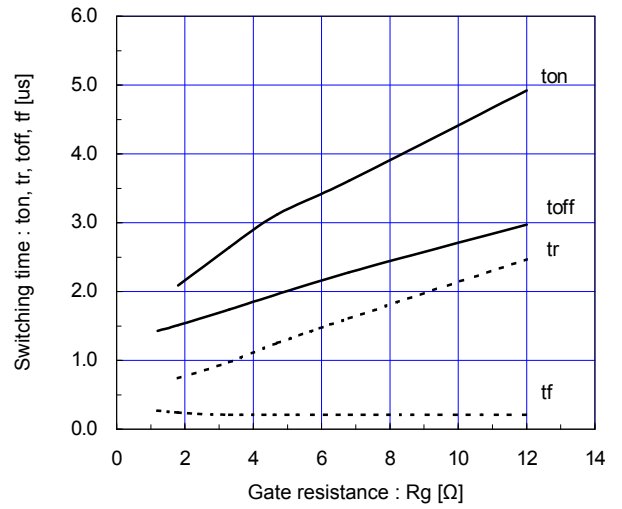
Switching time vs. Collector current (typ.)

V_{cc}=900V, V_{GE}=±15V, R_{gon}=4.7Ω, R_{goff}=1.2Ω, T_j=125°C



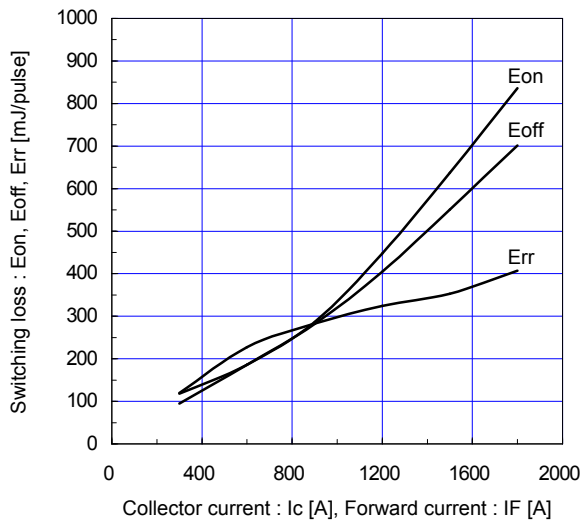
Switching time vs. Gate resistance (typ.)

V_{cc}=900V, I_c=1200A, V_{GE}=±15V, T_j=125°C



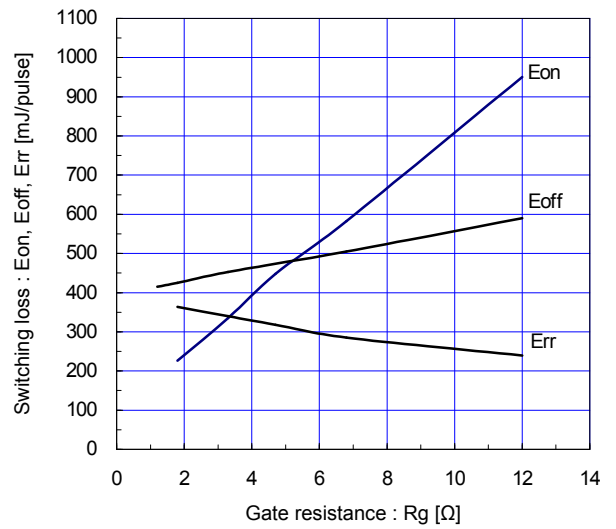
Switching loss vs. Collector current (typ.)

V_{cc}=900V, V_{GE}=±15V, R_{gon}=4.7Ω, R_{goff}=1.2Ω, T_j=125°C



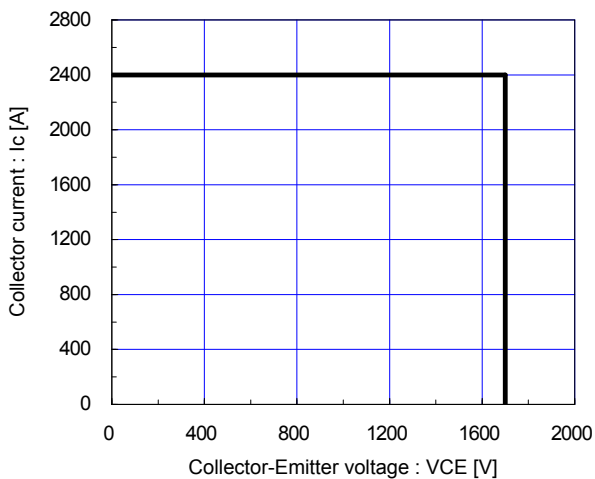
Switching loss vs. Gate resistance (typ.)

V_{cc}=900V, I_c=1200A, V_{GE}=±15V, T_j=125°C

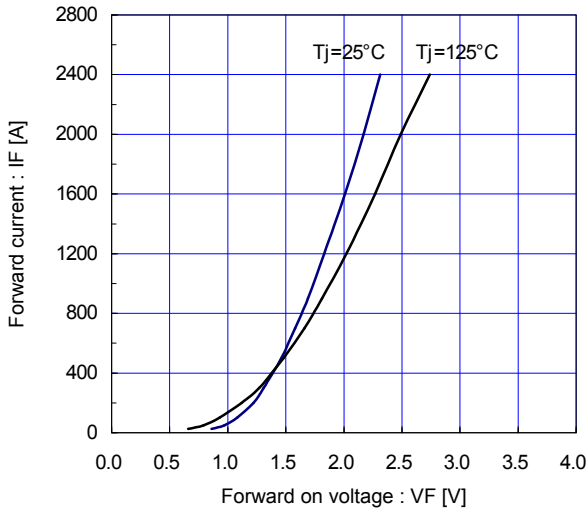


Reverse bias safe operating area (max.)

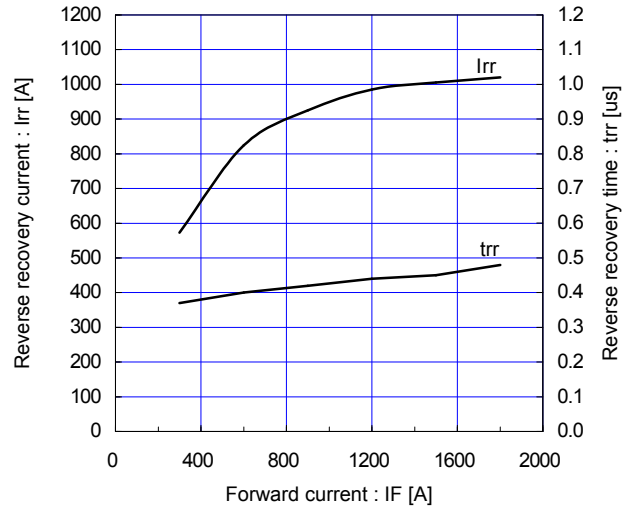
±V_{GE}=15V, T_j=125°C/chip



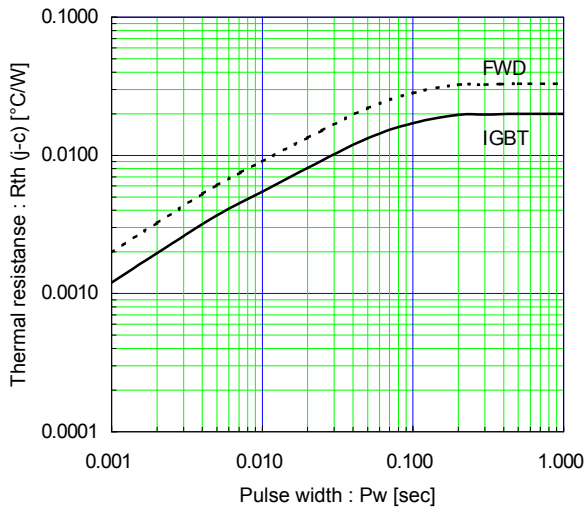
Forward current vs. Forward on voltage (typ.)
chip



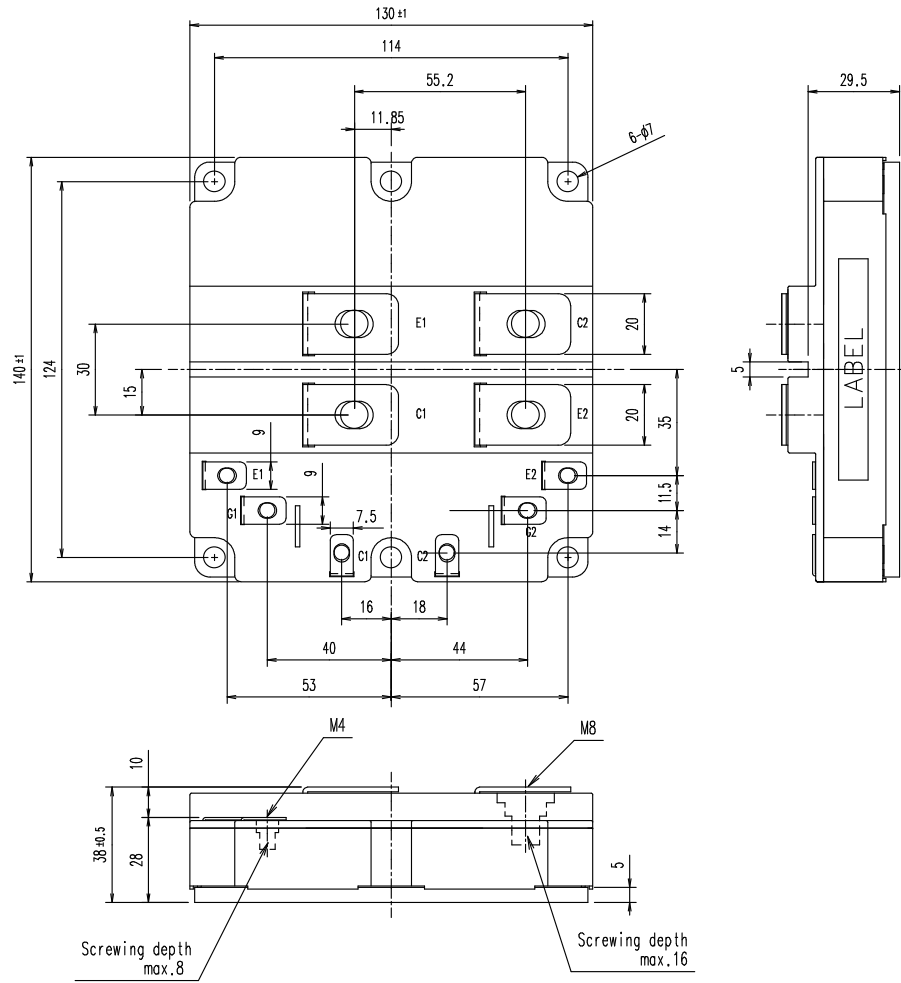
Reverse recovery characteristics (typ.)
Vcc=900V, VGE=±15V, Rgon=4.7Ω, Tj=125°C



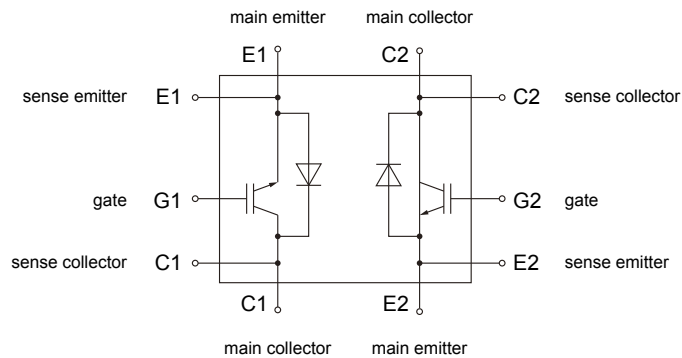
Transient thermal resistance (max.)



■ Outline Drawings, mm



■ Equivalent Circuit Schematic



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