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# 1MBI400S-120

**IGBT Module**

## 1200V / 400A 1 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

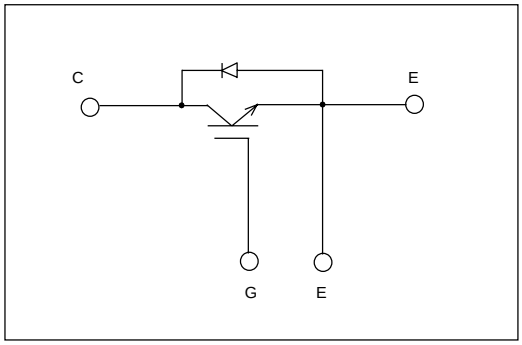
### ■ Maximum ratings and characteristics

**● Absolute maximum ratings (at Tc=25°C unless otherwise specified)**

| Item | | | Symbol | Rating | Unit |
|---|---|---|---|---|---|
| Collector-Emitter voltage | | | $V_{CES}$ | 1200 | V |
| Gate-Emitter voltaga | | | $V_{GES}$ | ±20 | V |
| Collector current | Continuous | Tc=25°C | IC | 600 | A |
| | | Tc=80°C | | 400 | A |
| | 1ms | Tc=25°C | IC pulse | 1200 | A |
| | | Tc=80°C | | 800 | A |
| | | | -IC | 400 | A |
| | 1ms | | -IC pulse | 800 | A |
| Max. power dissipation | | | PC | 3100 | W |
| Operating temperature | | | $T_j$ | +150 | ℃ |
| Storage temperature | | | $T_{stg}$ | -40 to +125 | ℃ |
| Isolation voltage *1 | | | $V_{is}$ | AC 2500 (1min.) | V |
| Screw torque | | | Mounting *2 | 3.5 | N·m |
| | | | Terminals *2 | 4.5 | N·m |
| | | | Terminals *2 | 1.7 | N·m |

*1 : Aii terminals should be connected together when isolation test will be done
*2 : Recommendable value : Mounting 2.5 to 3.5 N·m(M5 or M6)
Terminal 3.5 to 4.5 N·m(M6), 1.3 to 1.7N·m(M4)

### ■ Equivalent Circuit Schematic




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

| Item | Symbol | Characteristics | | | Conditions | | Unit |
|---|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | | |
| Zero gate voltage collector current | ICES | – | – | 4.0 | VGE=0V, VCE=1200V | | mA |
| Gate-Emitter leakage current | IGES | – | – | 0.8 | VCE=0V, VGE=±20V | | µA |
| Gate-Emitter threshold voltage | VGE(th) | 5.5 | 7.2 | 8.5 | VCE=20V, IC=400mA | | V |
| Collector-Emitter saturation voltage | VCE(sat) | – | 2.3 | 2.6 | Tc=25° C | VGE=15V, IC=400A | V |
| | | – | 2.8 | – | Tc=125°C | | |
| Input capacitance | Cies | – | 48000 | – | VGE=0V | | pF |
| Output capacitance | Coes | – | 10000 | – | VCE=10V | | |
| Reverse transfer capacitance | Cres | – | 8800 | – | f=1MHz | | |
| Turn-on time | ton | – | 0.35 | 1.2 | VCC=600V | | µs |
| | tr | – | 0.25 | 0.6 | IC=400A | | |
| | tr(i) | – | 0.1 | – | VGE=±15V | | |
| Turn-off time | toff | – | 0.45 | 1.0 | RG=1.8 ohm | | |
| | tf | – | 0.08 | 0.3 | | | |
| Forward on voltage | VF | – | 2.7 | 3.5 | Tj=25°C | IF=400A, VGE=0V | V |
| | | – | 2.4 | – | Tj=125°C | | |
| Reverse recovery time | trr | – | – | 0.35 | IF=400A | | µs |

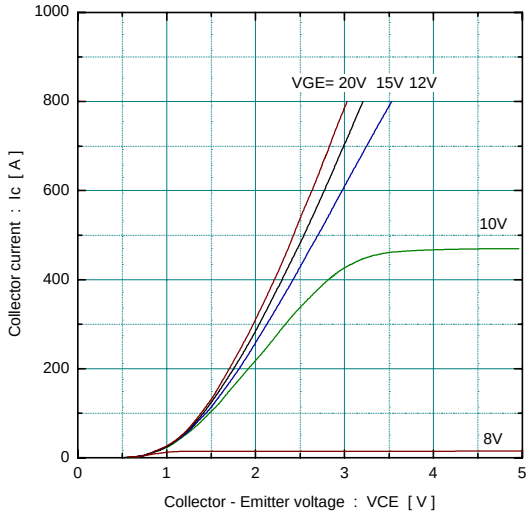
**● Thermal resistance characteristics**

| Item | Symbol | Characteristics | | | Conditions | Unit |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Thermal resistance | Rth(j-c) | – | – | 0.04 | IGBT | °C/W |
| | Rth(j-c) | – | – | 0.12 | FWD | °C/W |
| | Rth(c-f)*4 | – | 0.0125 | – | the base to cooling fin | °C/W |

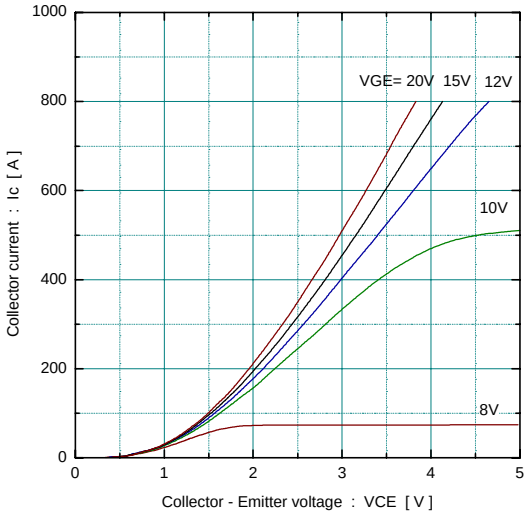
*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound

## Characteristics

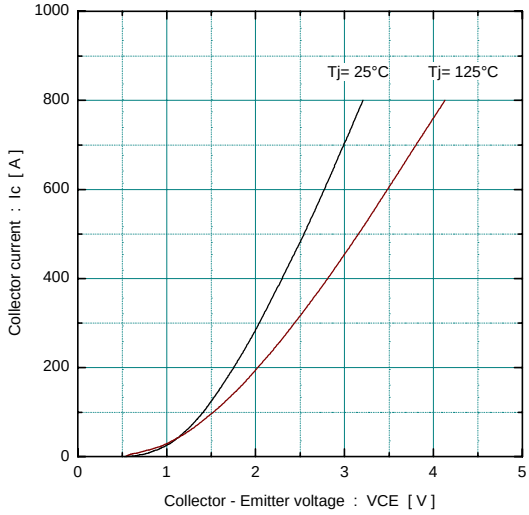
Collector current vs. Collector-Emiiter voltage
Tj= 25°C (typ.)



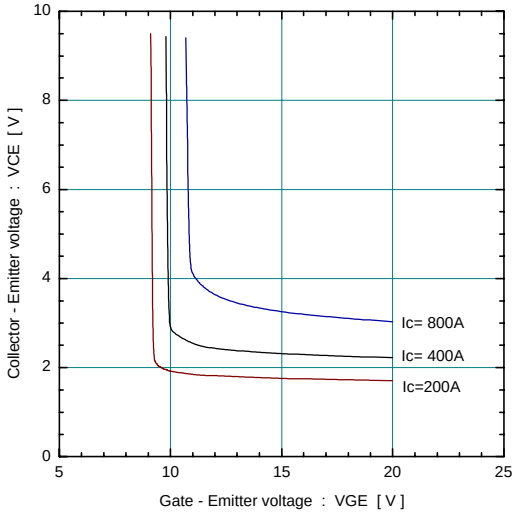

Collector current vs. Collector-Emiiter voltage
Tj= 125°C (typ.)



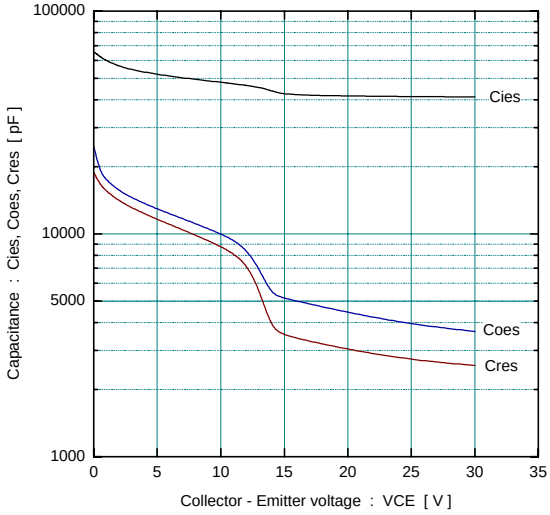

Collector current vs. Collector-Emiiter voltage
VGE=15V (typ.)



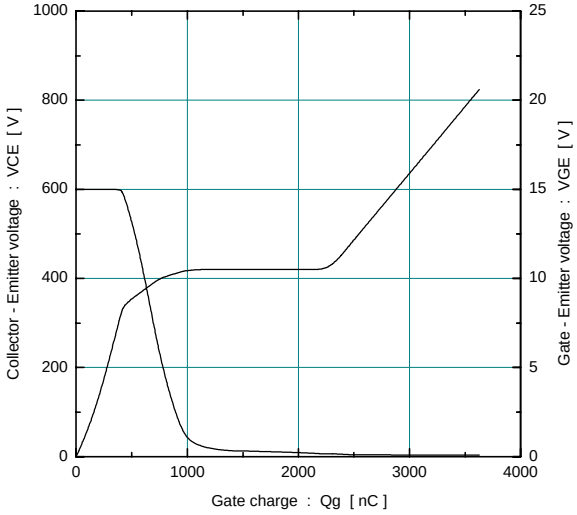

Collector-Emiiter voltage vs. Gate-Emitter voltage
Tj= 25°C (typ.)



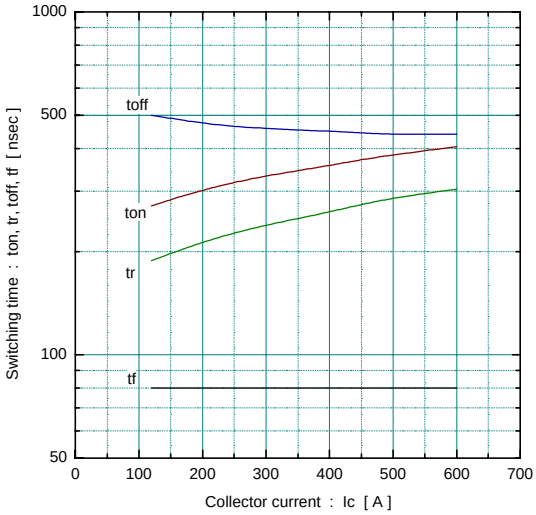

Capacitance vs. Collector-Emiiter voltage (typ.)
VGE=0V, f= 1MHz, Tj= 25°C



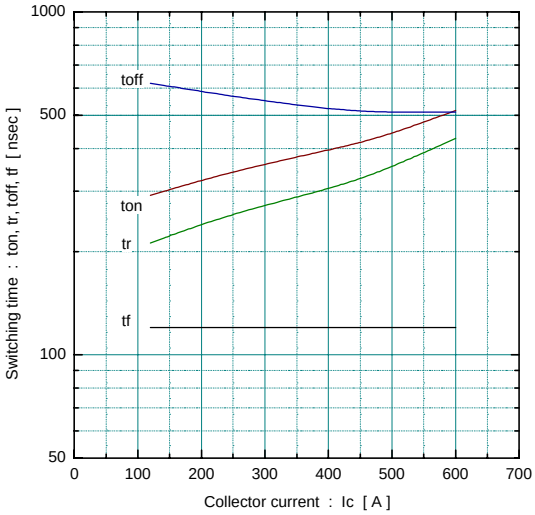

Dynamic Gate charge (typ.)
Vcc=600V, Ic=400A, Tj= 25°C



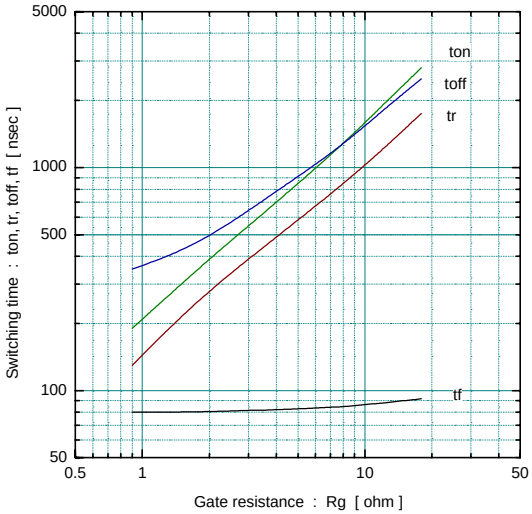
Switching time vs. Collector current (typ.)
Vcc=600V, VGE=+-15V, Rg= 1.8ohm, Tj= 25°C



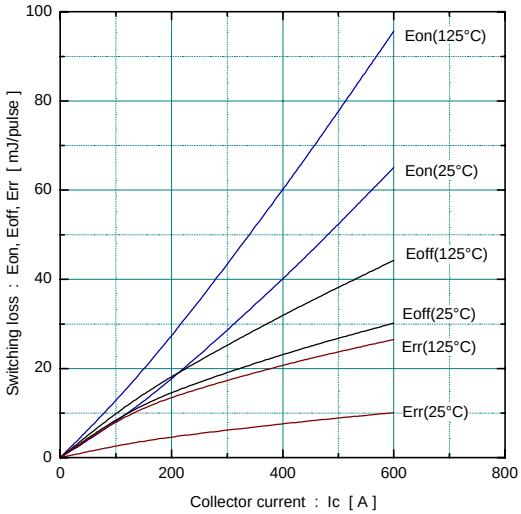

Switching time vs. Collector current (typ.)
Vcc=600V, VGE=+-15V, Rg= 1.8ohm, Tj= 125°C



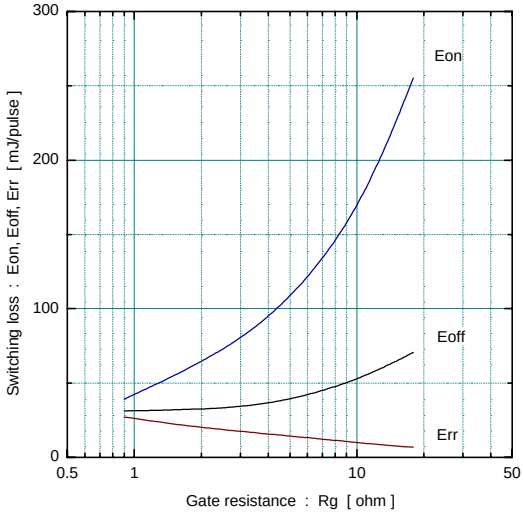

Switching time vs. Gate resistance (typ.)
Vcc=600V, Ic=400A, VGE=+-15V, Tj= 25°C



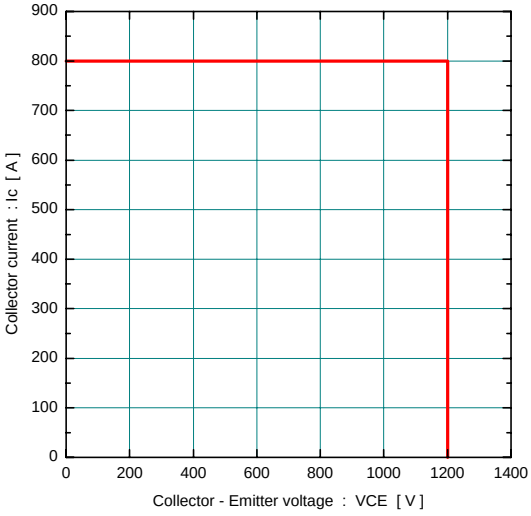

Switching loss vs. Collector current (typ.)
Vcc=600V, VGE=+-15V, Rg=1.8ohm



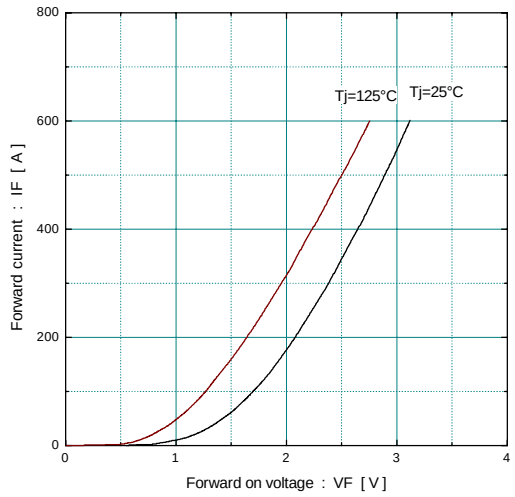

Switching loss vs. Gate resistance (typ.)
Vcc=600V, Ic=400A, VGE=+-15V, Tj= 125°C



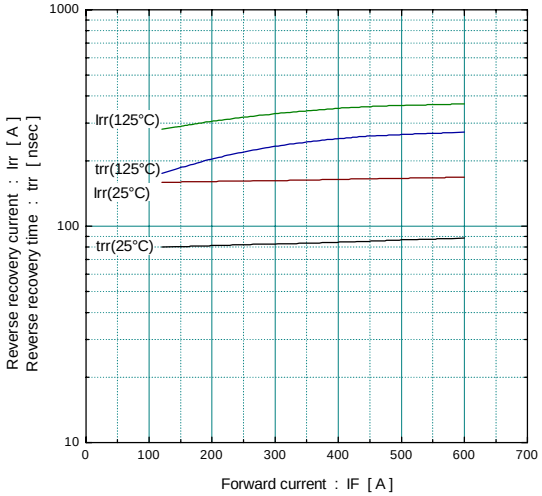

Reverse bias safe operating area
+VGE=15V, -VGE<=15V, Rg>=1.8ohm, Tj<=125°C



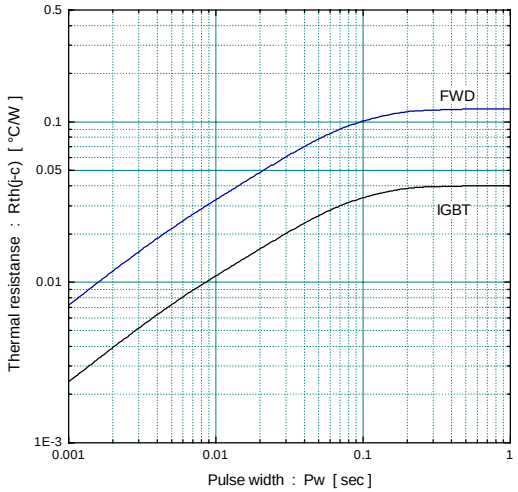
Forward current vs. Forward on voltage (typ.)



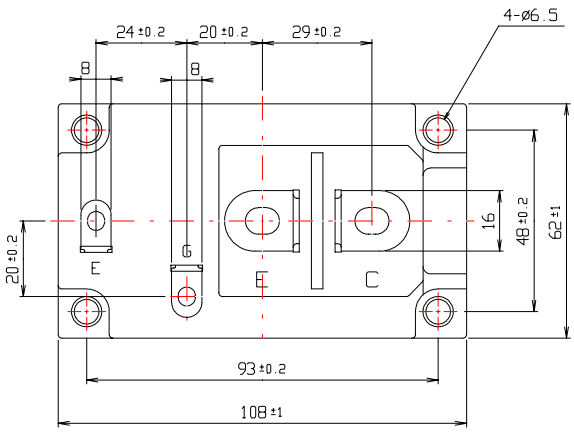

Reverse recovery characteristics (typ.)
Vcc=600V, VGE=+-15V, Rg=1.8ohm

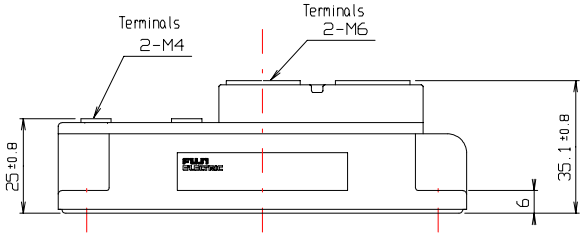



Transient thermal resistance




## ■ Outline Drawings, mm




mass : 380g