

# 1MBI200N-120

IGBT Module

1200V / 200A 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 <sub>CES</sub>      | 1200            | V    |
| Gate-Emitter voltage      |            | V <sub>GES</sub>      | ±20             | V    |
| Collector<br>current      | Continuous | I <sub>C</sub>        | 200             | A    |
|                           | 1ms        | I <sub>C</sub> pulse  | 400             | A    |
|                           | Continuous | -I <sub>C</sub>       | 200             | A    |
|                           | 1ms        | -I <sub>C</sub> pulse | 400             | A    |
| Max. power dissipation    |            | P <sub>C</sub>        | 1500            | W    |
| Operating temperature     |            | T <sub>J</sub>        | +150            | °C   |
| Storage temperature       |            | T <sub>stg</sub>      | -40 to +125     | °C   |
| Isolation voltage         |            | V <sub>is</sub>       | AC 2500 (1min.) | V    |
| Screw torque              |            | Mounting *1           | 3.5             | N·m  |
|                           |            | Terminals *2          | 4.5             | N·m  |
|                           |            | Terminals *3          | 1.7             | N·m  |

\*1 : Recommendable value : 2.5 to 3.5 N·m(M5) or (M6)

\*2 : Recommendable value : 3.5 to 4.5 N·m(M6)

\*3 : Recommendable value : 1.3 to 1.7 N·m(M4)

### ● Electrical characteristics (at T<sub>J</sub>=25°C unless otherwise specified)

| Item                                 | Symbol               | Characteristics |       |      | Conditions                                  | Unit |
|--------------------------------------|----------------------|-----------------|-------|------|---------------------------------------------|------|
|                                      |                      | Min.            | Typ.  | Max. |                                             |      |
| Zero gate voltage collector current  | I <sub>CES</sub>     | —               | —     | 4.0  | V <sub>GE</sub> =0V, V <sub>CE</sub> =1200V | mA   |
| Gate-Emitter leakage current         | I <sub>GES</sub>     | —               | —     | 60   | V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V  | μA   |
| Gate-Emitter threshold voltage       | V <sub>GE(th)</sub>  | 4.5             | —     | 7.5  | V <sub>CE</sub> =20V, I <sub>C</sub> =200mA | V    |
| Collector-Emitter saturation voltage | V <sub>CE(sat)</sub> | —               | —     | 3.3  | V <sub>GE</sub> =15V, I <sub>C</sub> =200A  | V    |
| Input capacitance                    | C <sub>ies</sub>     | —               | 32000 | —    | V <sub>GE</sub> =0V                         | pF   |
| Output capacitance                   | C <sub>oes</sub>     | —               | 11600 | —    | V <sub>CE</sub> =10V                        |      |
| Reverse transfer capacitance         | C <sub>res</sub>     | —               | 10320 | —    | f=1MHz                                      |      |
| Turn-on time                         | t <sub>on</sub>      | —               | 0.65  | 1.2  | V <sub>CC</sub> =600V                       | μs   |
|                                      | t <sub>r</sub>       | —               | 0.25  | 0.6  | I <sub>C</sub> =200A                        |      |
| Turn-off time                        | t <sub>off</sub>     | —               | 0.85  | 1.5  | V <sub>GE</sub> =±15V                       |      |
|                                      | t <sub>f</sub>       | —               | 0.35  | 0.5  | R <sub>G</sub> =4.7 ohm                     |      |
| Diode forward on voltage             | V <sub>F</sub>       | —               | —     | 3.0  | I <sub>F</sub> =200A, V <sub>GE</sub> =0V   | V    |
| Reverse recovery time                | t <sub>rr</sub>      | —               | —     | 0.35 | I <sub>F</sub> =200A                        | μs   |

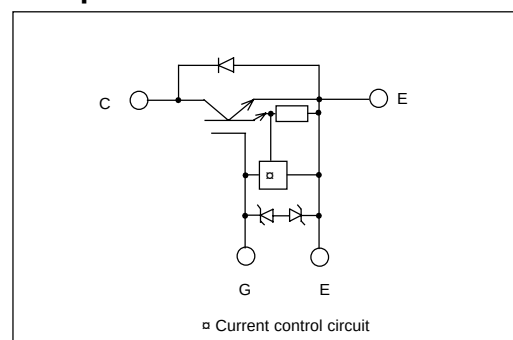
### ● Thermal resistance characteristics

| Item               | Symbol                 | Characteristics |        |       | Conditions              | Unit |
|--------------------|------------------------|-----------------|--------|-------|-------------------------|------|
|                    |                        | Min.            | Typ.   | Max.  |                         |      |
| Thermal resistance | R <sub>th(j-c)</sub>   | —               | —      | 0.085 | IGBT                    | °C/W |
|                    | R <sub>th(j-c)</sub>   | —               | —      | 0.22  | Diode                   | °C/W |
|                    | R <sub>th(c-f)*4</sub> | —               | 0.0125 | —     | the base to cooling fin | °C/W |

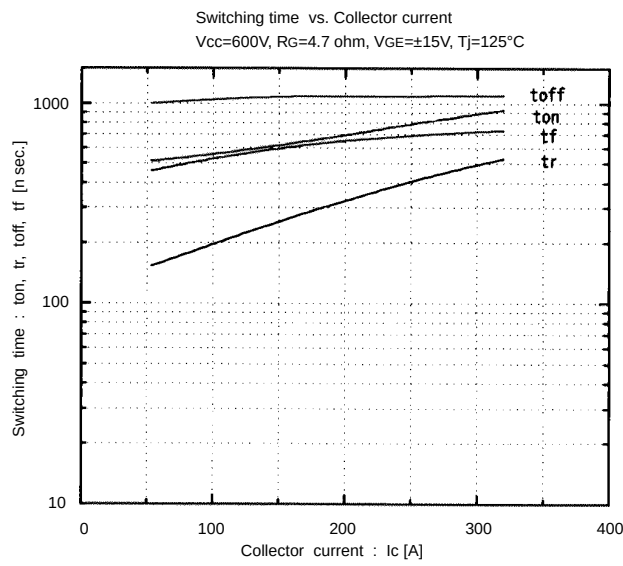
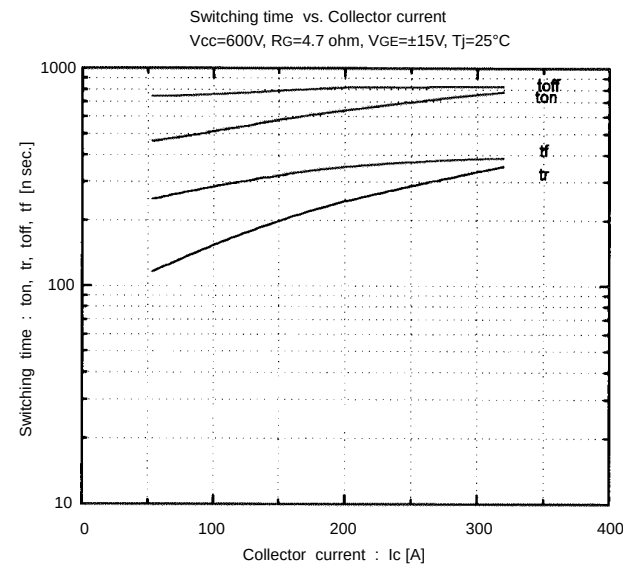
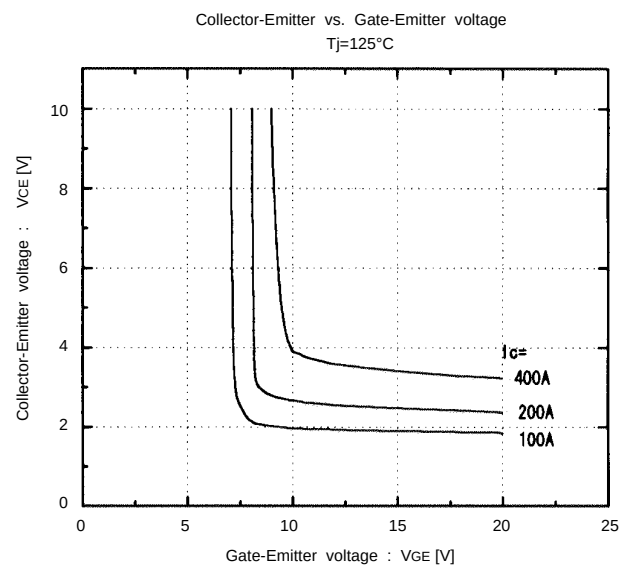
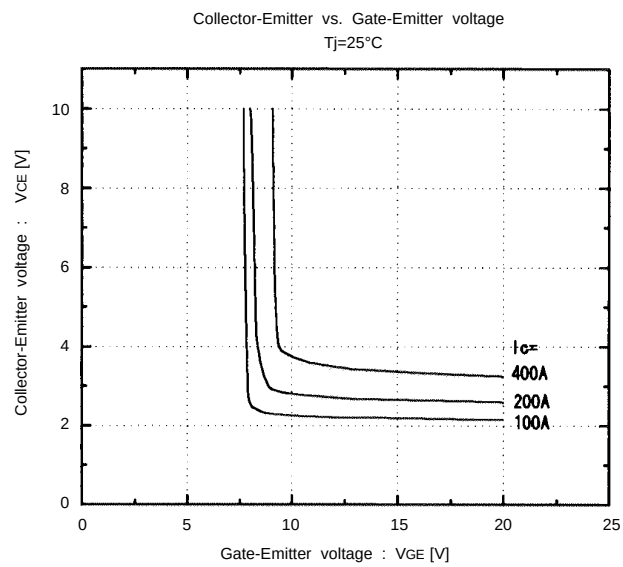
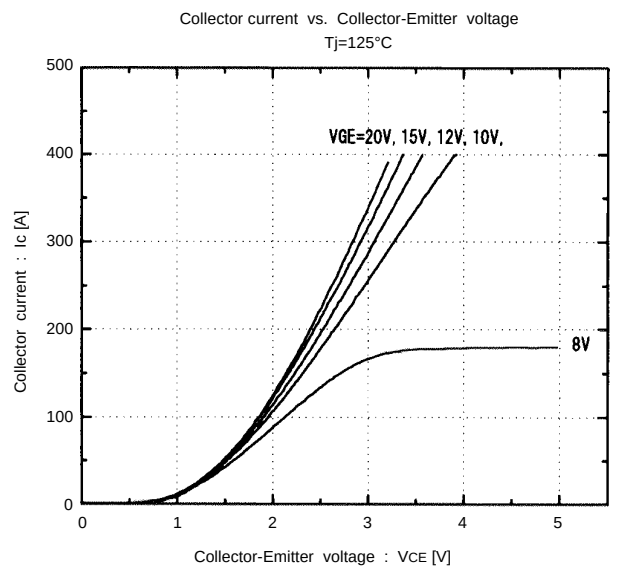
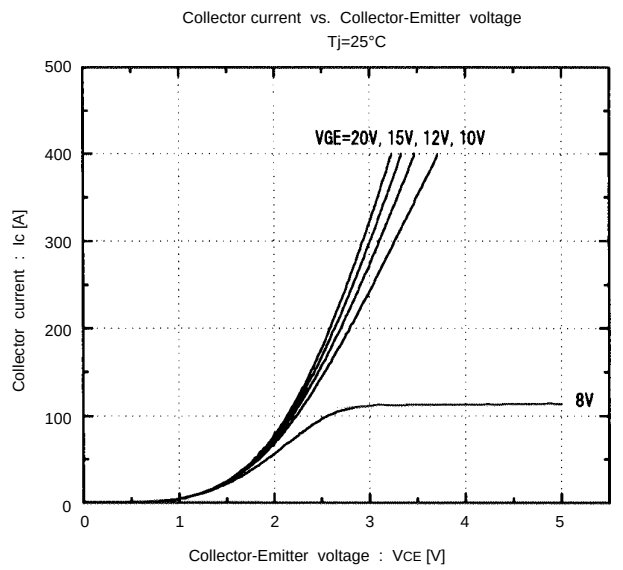
\*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound



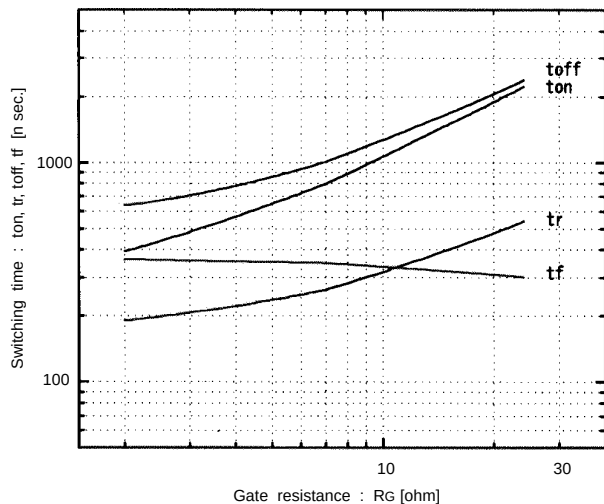
## ■ Equivalent Circuit Schematic



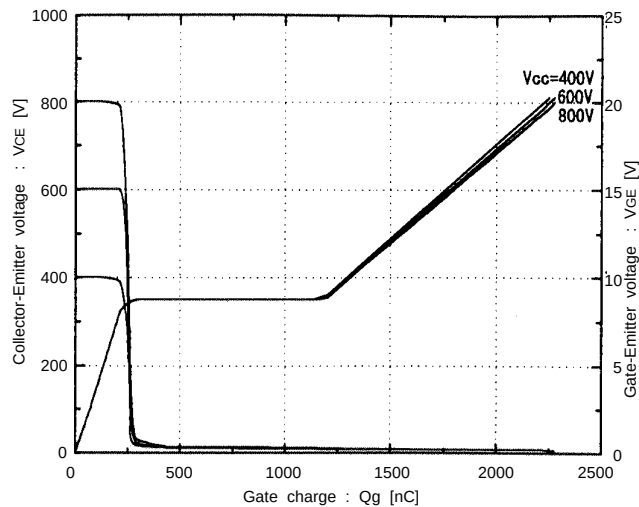
■ Characteristics (Representative)



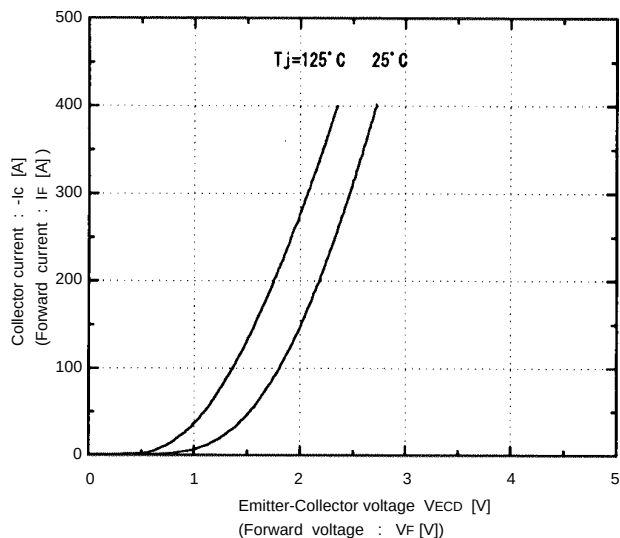
Switching time vs.  $R_G$   
 $V_{CC}=600V$ ,  $I_C=200A$ ,  $V_{GE}=\pm 15V$ ,  $T_J=25^\circ C$



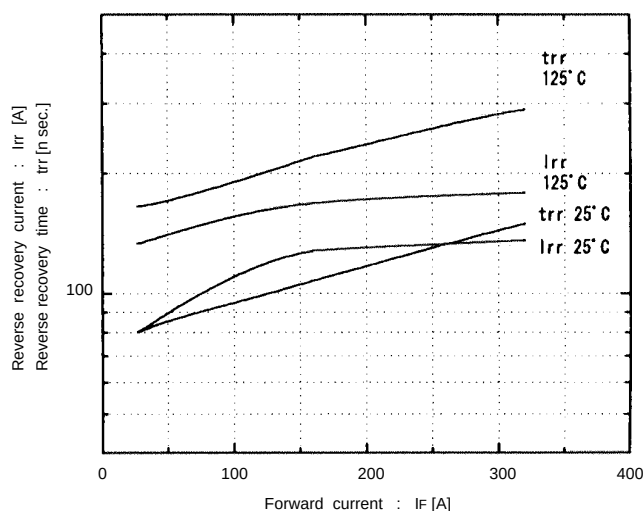
Dynamic input characteristics  
 $T_J=25^\circ C$



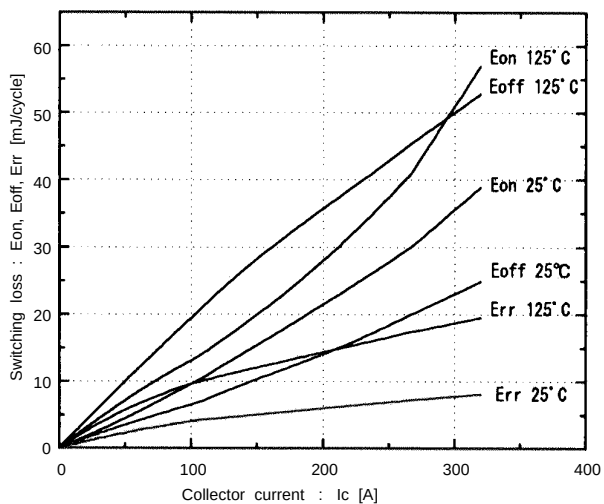
Forward current vs. Forward voltage  
 $V_{GE}=0V$



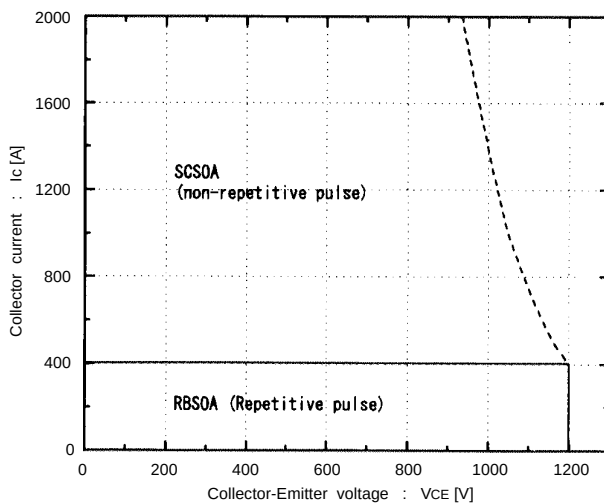
Reverse recovery characteristics  
 $t_{rr}$ ,  $I_{rr}$ , vs.  $I_F$

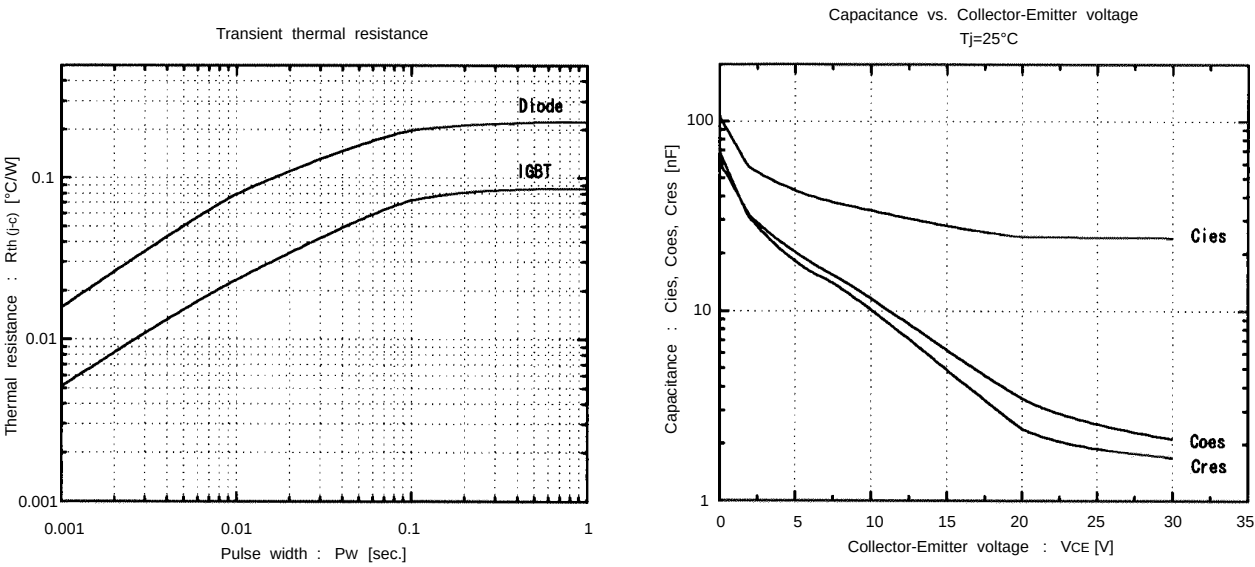


Switching loss vs. Collector current  
 $V_{CC}=600V$ ,  $R_G=4.7\text{ ohm}$ ,  $V_{GE}=\pm 15V$



Reversed biased safe operating area  
 $+V_{GE}=15V$ ,  $-V_{GE} \leq 15V$ ,  $T_J \leq 125^\circ C$ ,  $R_G \geq 4.7\text{ ohm}$





■ Outline Drawings, mm

