

# 2MBI100UA-120



## IGBT Module U-Series 1200V / 100A 2 in one-package

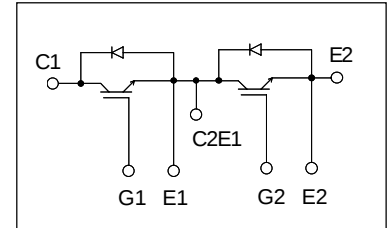
### ■ Features

- 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

### ■ Equivalent Circuit Schematic



### ■ Maximum ratings and characteristics

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

| Item                        |                                     | Symbol                | Conditions |                      | Rating      | Unit |
|-----------------------------|-------------------------------------|-----------------------|------------|----------------------|-------------|------|
| Collector-Emitter voltage   |                                     | V <sub>CES</sub>      |            |                      | 1200        | V    |
| Gate-Emitter voltage        |                                     | V <sub>GES</sub>      |            |                      | ±20         | V    |
| Collector current           |                                     | I <sub>c</sub>        | Continuous | T <sub>c</sub> =25°C | 150         | A    |
|                             |                                     |                       |            | T <sub>c</sub> =80°C | 100         |      |
|                             |                                     | I <sub>cp</sub>       | 1ms        | T <sub>c</sub> =25°C | 300         |      |
|                             |                                     |                       |            | T <sub>c</sub> =80°C | 200         |      |
|                             |                                     | -I <sub>c</sub>       |            |                      | 100         |      |
|                             |                                     | -I <sub>c</sub> pulse |            |                      | 200         |      |
| Collector Power Dissipation |                                     | P <sub>c</sub>        | 1 device   |                      | 540         | W    |
| Junction temperature        |                                     | T <sub>j</sub>        |            |                      | +150        | °C   |
| Storage temperature         |                                     | T <sub>stg</sub>      |            |                      | -40 to +125 |      |
| Isolation voltage           | between terminal and copper base *1 | V <sub>iso</sub>      | AC:1min.   |                      | 2500        | VAC  |
| Screw Torque                |                                     | Mounting *2           |            |                      | 3.5         | N·m  |
|                             |                                     | Terminals *2          |            |                      | 3.5         |      |

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

\*2 : Recommendable value : 2.5 to 3.5 N·m(M5)

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

| Item                                 | Symbols                | Conditions                      |          | Characteristics |      |      | Unit |
|--------------------------------------|------------------------|---------------------------------|----------|-----------------|------|------|------|
|                                      |                        |                                 |          | Min.            | Typ. | Max. |      |
| Zero gate voltage collector current  | ICES                   | VGE=0V, VCE=1200V               |          | —               | —    | 1.0  | mA   |
| Gate-Emitter leakage current         | IGES                   | VCE=0V, VGE=±20V                |          | —               | —    | 200  | nA   |
| Gate-Emitter threshold voltage       | VGE(th)                | VCE=20V, IC=100mA               |          | 4.5             | 6.5  | 8.5  | V    |
| Collector-Emitter saturation voltage | VCE(sat)<br>(terminal) | VGE=15V, IC=100A                | TJ=25°C  | —               | 1.9  | 2.25 | V    |
|                                      |                        |                                 | TJ=125°C | —               | 2.15 | —    |      |
|                                      | VCE(sat)<br>(chip)     |                                 | TJ=25°C  | —               | 1.75 | 2.10 |      |
|                                      |                        |                                 | TJ=125°C | —               | 2.00 | —    |      |
| Input capacitance                    | Cies                   | VCE=10V, VGE=0V, f=1MHz         |          | —               | 11   | —    | nF   |
| Turn-on time                         | ton                    | VCC=600V<br>IC=100A<br>VGE=±15V |          | —               | 0.36 | 1.20 | μs   |
|                                      | tr                     |                                 |          | —               | 0.21 | 0.60 |      |
|                                      | tr(i)                  |                                 |          | —               | 0.03 | —    |      |
| Turn-off time                        | toff                   | RG=5.6 Ω                        |          | —               | 0.37 | 1.00 |      |
|                                      | tr                     |                                 |          | —               | 0.07 | 0.30 |      |
| Forward on voltage                   | VF<br>(terminal)       | VGE=0V<br>IF=100A               | TJ=25°C  | —               | 1.75 | 2.05 | V    |
|                                      |                        |                                 | TJ=125°C | —               | 1.85 | —    |      |
|                                      | VF<br>(chip)           |                                 | TJ=25°C  | —               | 1.60 | 1.90 |      |
|                                      |                        |                                 | TJ=125°C | —               | 1.70 | —    |      |
| Reverse recovery time                | trr                    | IF=100A                         |          | —               | —    | 0.35 | μs   |
| Lead resistance, terminal-chip*3     | R lead                 |                                 |          | —               | 1.39 | —    | mΩ   |

\*3:Biggest internal terminal resistance among arm.

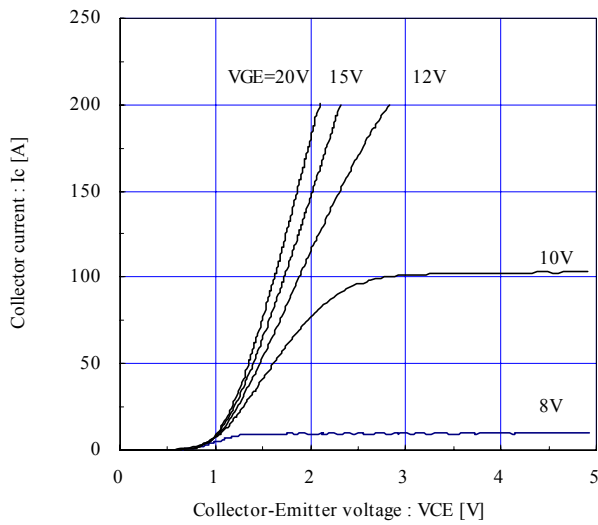
#### ● Thermal resistance characteristics

| Items                      | Symbols                 | Conditions            | Characteristics |      |       | Unit |
|----------------------------|-------------------------|-----------------------|-----------------|------|-------|------|
|                            |                         |                       | Min.            | Typ. | Max.  |      |
| Thermal resistance         | R <sub>th(j-c)</sub>    | IGBT                  | —               | —    | 0.230 | °C/W |
|                            | R <sub>th(j-c)</sub>    | FWD                   | —               | —    | 0.40  | °C/W |
| Contact Thermal resistance | R <sub>th(c-f)</sub> *4 | With thermal compound | —               | 0.05 | —     | °C/W |

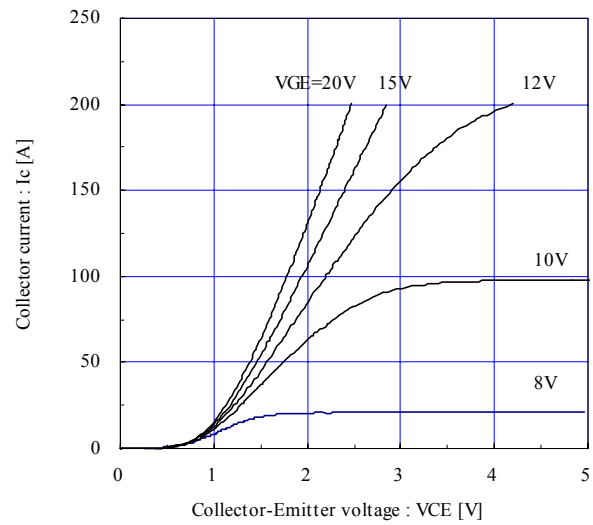
\*4 : This is the value which is defined mounting on the additional cooling fin with thermal compound.

## ■ Characteristics (Representative)

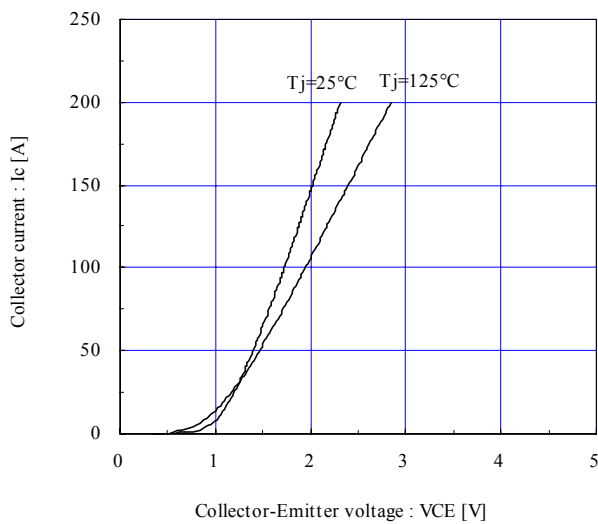
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$  / chip

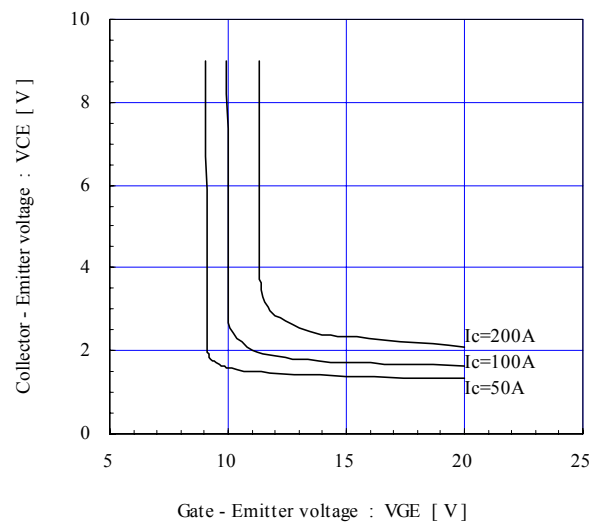
Collector current vs. Collector-Emitter voltage (typ.)

 $T_j = 125^\circ\text{C}$  / chip

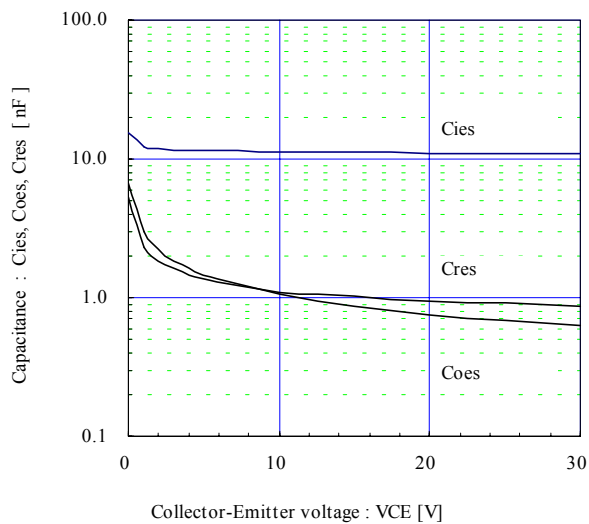
Collector current vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 15\text{V}$  / chip

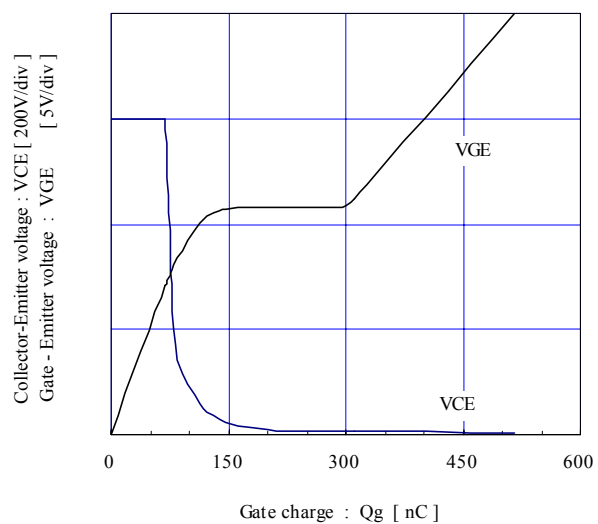
Collector-Emitter voltage vs. Gate-Emitter voltage (typ.)

 $T_j = 25^\circ\text{C}$  / chip

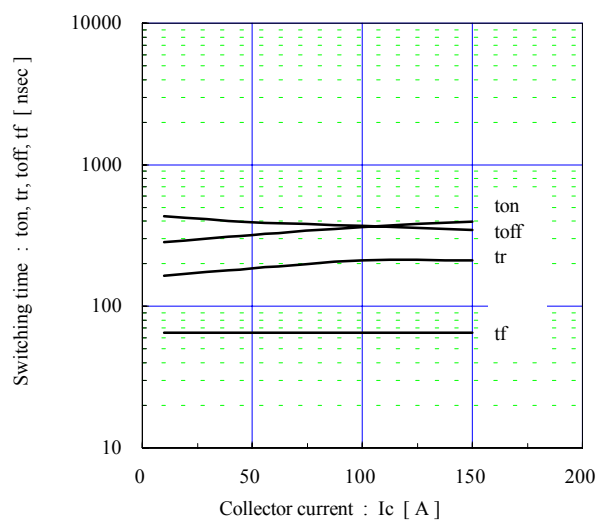
Capacitance vs. Collector-Emitter voltage (typ.)

 $V_{GE} = 0\text{V}$ ,  $f = 1\text{MHz}$ ,  $T_j = 25^\circ\text{C}$ 

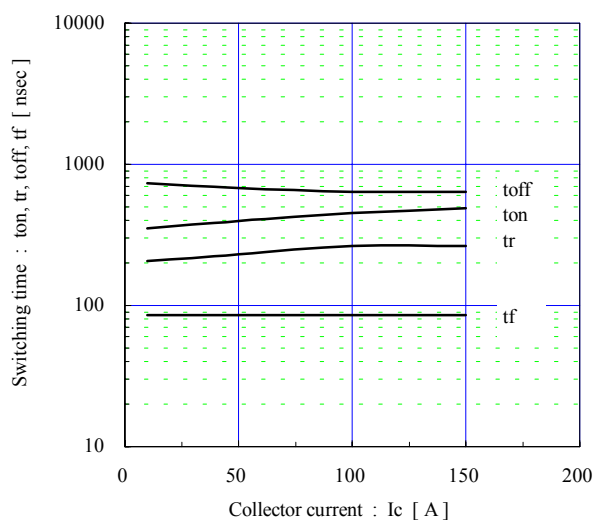
Dynamic Gate charge (typ.)

 $V_{cc} = 600\text{V}$ ,  $I_c = 100\text{A}$ ,  $T_j = 25^\circ\text{C}$ 

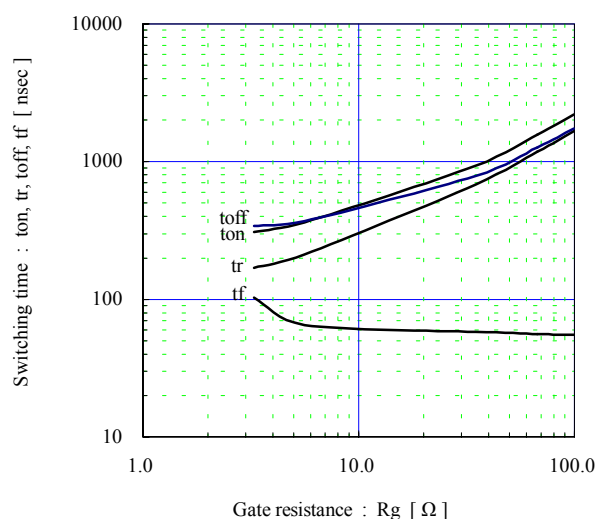
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V$ ,  $V_{GE}=\pm 15V$ ,  $R_g=5.6\Omega$ ,  $T_j=25^\circ C$



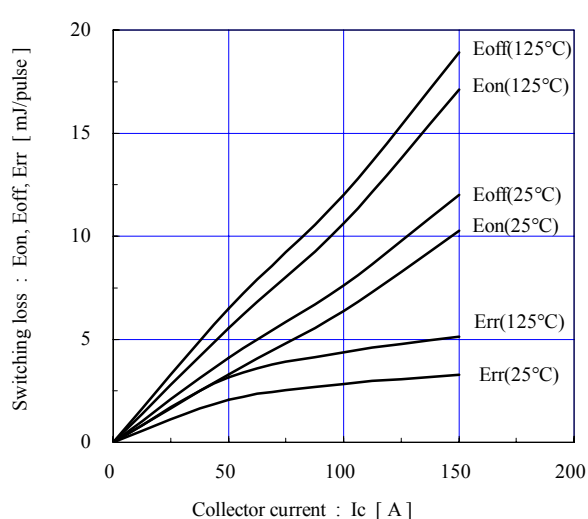
Switching time vs. Collector current (typ.)  
 $V_{cc}=600V$ ,  $V_{GE}=\pm 15V$ ,  $R_g=5.6\Omega$ ,  $T_j=125^\circ C$



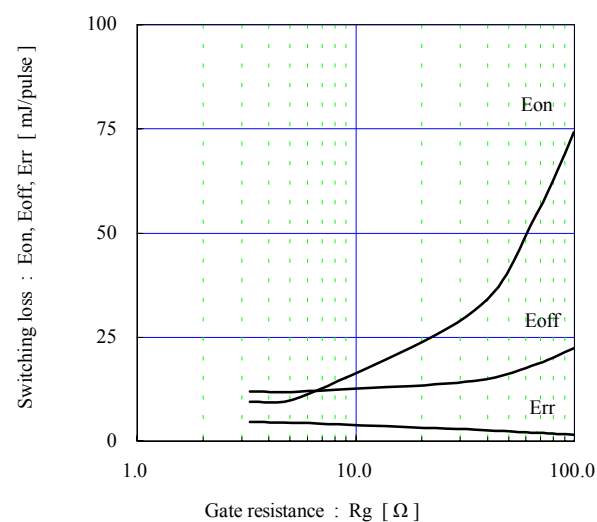
Switching time vs. Gate resistance (typ.)  
 $V_{cc}=600V$ ,  $I_c=100A$ ,  $V_{GE}=\pm 15V$ ,  $T_j=25^\circ C$



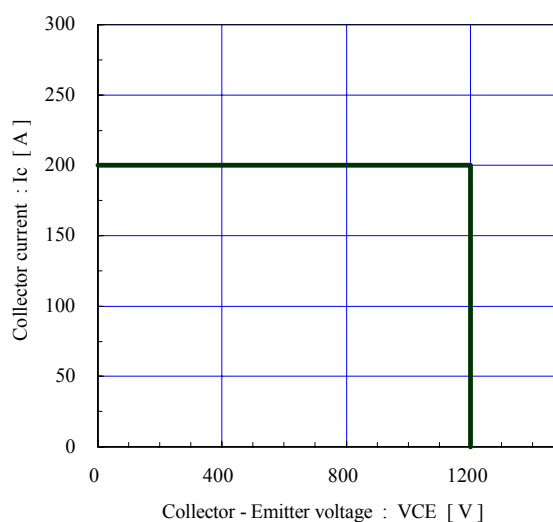
Switching loss vs. Collector current (typ.)  
 $V_{cc}=600V$ ,  $V_{GE}=\pm 15V$ ,  $R_g=5.6\Omega$

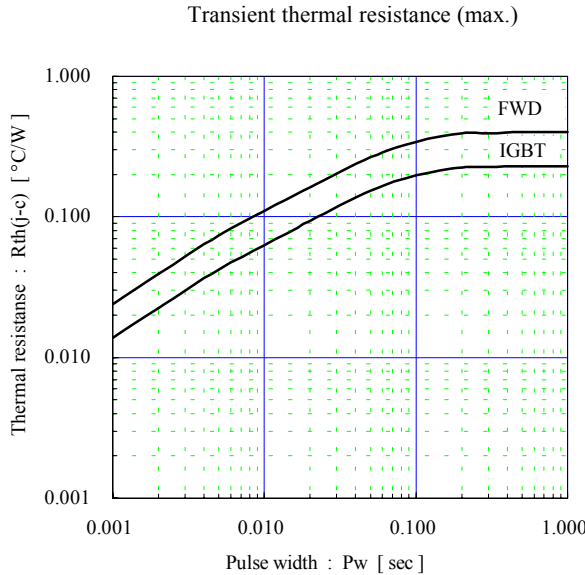
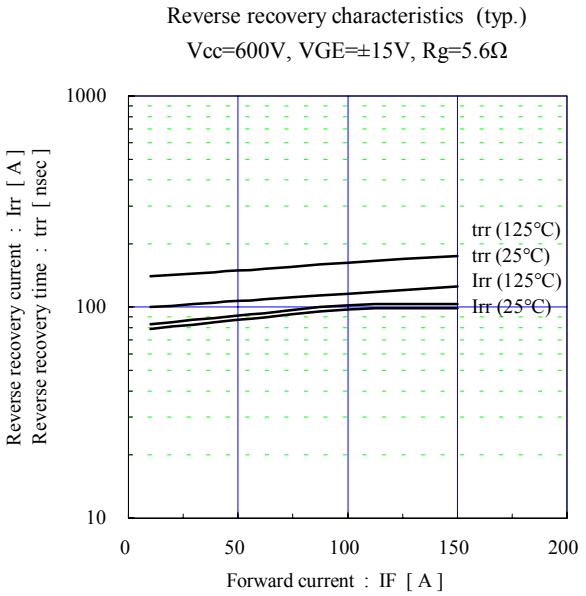
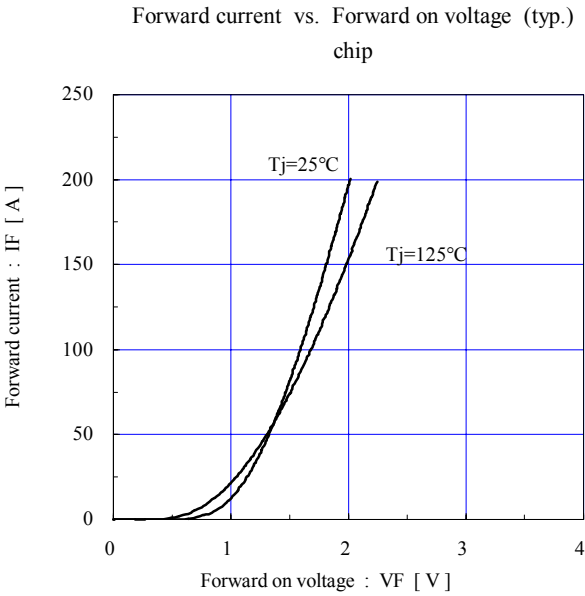


Switching loss vs. Gate resistance (typ.)  
 $V_{cc}=600V$ ,  $I_c=100A$ ,  $V_{GE}=\pm 15V$ ,  $T_j=125^\circ C$



Reverse bias safe operating area (max.)  
 $+V_{GE}=15V$ ,  $-V_{GE} \leq 15V$ ,  $R_g \geq 5.6\Omega$ ,  $T_j \leq 125^\circ C$





Outline Drawings, mm

M232

