

## IGBT MODULE ( N series )

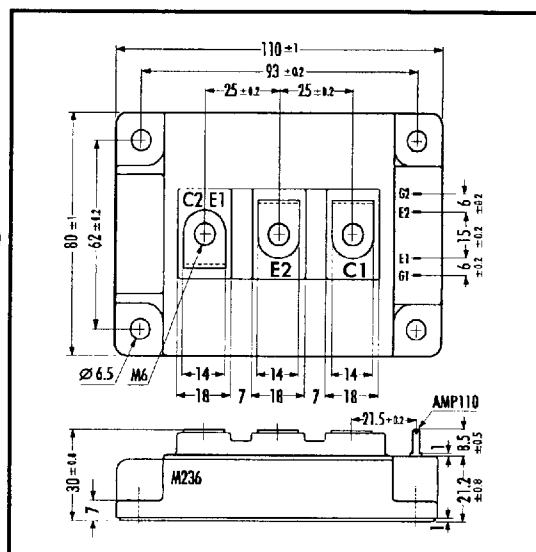
### n Features

- Square RBSOA
- Low Saturation Voltage
- Less Total Power Dissipation
- Improved FWD Characteristic
- Minimized Internal Stray Inductance
- Overcurrent Limiting Function (~3 Times Rated Current)

### n Applications

- High Power Switching
- A.C. Motor Controls
- D.C. Motor Controls
- Uninterruptible Power Supply

### n Outline Drawing



### n Maximum Ratings and Characteristics

#### •Absolute Maximum Ratings ( T<sub>c</sub>=25°C )

| Items                     | Symbols          | Ratings               | Units |
|---------------------------|------------------|-----------------------|-------|
| Collector-Emitter Voltage | V <sub>CE</sub>  | 600                   | V     |
| Gate-Emitter Voltage      | V <sub>GE</sub>  | ± 20                  | V     |
| Collector Current         | Continuous       | I <sub>C</sub>        | 600   |
|                           | 1ms              | I <sub>C PULSE</sub>  | 1200  |
|                           | Continuous       | -I <sub>C</sub>       | 600   |
|                           | 1ms              | -I <sub>C PULSE</sub> | 1200  |
| Max. Power Dissipation    | P <sub>C</sub>   | 2100                  | W     |
| Operating Temperature     | T <sub>J</sub>   | +150                  | °C    |
| Storage Temperature       | T <sub>stg</sub> | -40 ~ +125            | °C    |
| Isolation Voltage         | A.C. 1min.       | V <sub>is</sub>       | 2500  |
| Screw Torque              | Mounting *1      | 3.5                   | Nm    |
|                           | Terminals *2     | 4.5                   |       |

Note: \*1 Recommendable Value; 2.5 ~ 3.5 Nm (M6) or (M6)  
\*2 Recommendable Value; 3.5 ~ 4.5 Nm (M6)

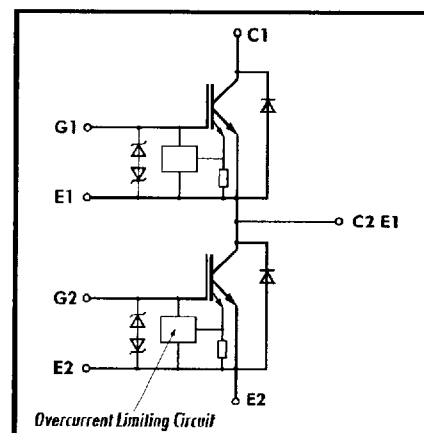
#### •Electrical Characteristics ( at T<sub>J</sub>=25°C )

| Items                                | Symbols              | Test Conditions                            | Min. | Typ.  | Max. | Units |
|--------------------------------------|----------------------|--------------------------------------------|------|-------|------|-------|
| Zero Gate Voltage Collector Current  | I <sub>CE0</sub>     | V <sub>GE</sub> =0V V <sub>CE</sub> =600V  |      |       | 4.0  | mA    |
| Gate-Emitter Leakage Current         | I <sub>GES</sub>     | V <sub>CE</sub> =0V V <sub>GE</sub> =± 20V |      |       | 60   | μA    |
| Gate-Emitter Threshold Voltage       | V <sub>GE(th)</sub>  | V <sub>GE</sub> =20V I <sub>C</sub> =600mA | 4.5  |       | 7.5  | V     |
| Collector-Emitter Saturation Voltage | V <sub>CE(sat)</sub> | V <sub>GE</sub> =15V I <sub>C</sub> =600A  |      |       | 2.9  | V     |
| Input capacitance                    | C <sub>ies</sub>     | V <sub>CE</sub> =0V                        |      | 39600 |      | pF    |
| Output capacitance                   | C <sub>oes</sub>     | V <sub>CE</sub> =10V                       |      | 8800  |      |       |
| Reverse Transfer capacitance         | C <sub>res</sub>     | f=1MHz                                     |      | 2670  |      |       |
| Turn-on Time                         | t <sub>ON</sub>      | V <sub>CE</sub> =300V                      |      | 0.6   | 1.2  | μs    |
|                                      | t <sub>r</sub>       | I <sub>C</sub> =600A                       |      | 0.2   | 0.6  |       |
| Turn-off Time                        | t <sub>OFF</sub>     | V <sub>GE</sub> =± 15V                     |      | 0.6   | 1.0  |       |
|                                      | t <sub>f</sub>       | R <sub>GE</sub> =2.7Ω                      |      | 0.2   | 0.35 |       |
| Diode Forward On-Voltage             | V <sub>F</sub>       | I <sub>F</sub> =600A V <sub>GE</sub> =0V   |      |       | 3.1  | V     |
| Reverse Recovery Time                | t <sub>rr</sub>      | I <sub>F</sub> =600A                       |      |       | 300  | ns    |

#### •Thermal Characteristics

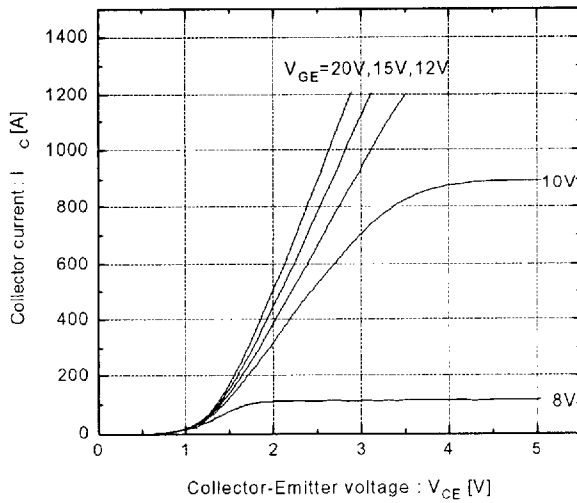
| Items              | Symbols              | Test Conditions       | Min. | Typ.   | Max. | Units |
|--------------------|----------------------|-----------------------|------|--------|------|-------|
| Thermal Resistance | R <sub>th(j-c)</sub> | IGBT                  |      |        | 0.06 | °C/W  |
|                    | R <sub>th(j-g)</sub> | Diode                 |      |        | 0.15 |       |
|                    | R <sub>th(c-h)</sub> | With Thermal Compound |      | 0.0167 |      |       |

### n Equivalent Circuit



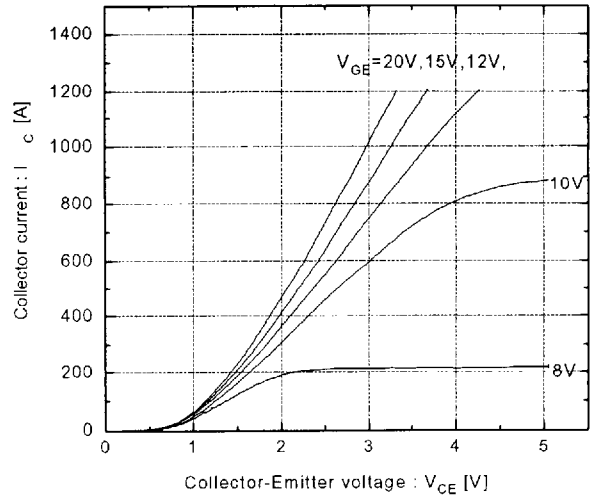
Collector current vs. Collector-Emittor voltage

$T_J = 25^\circ\text{C}$



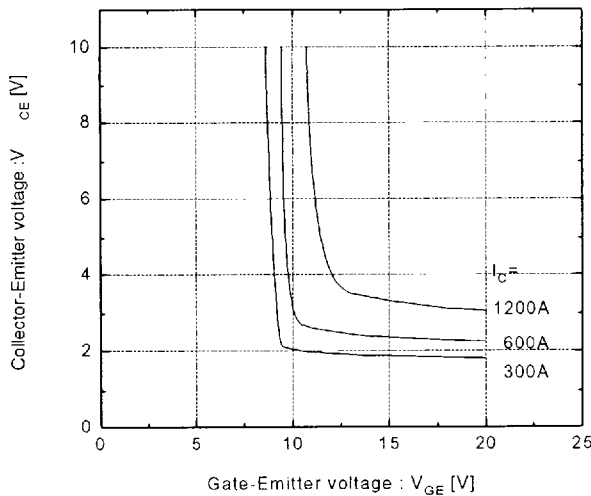
Collector current vs. Collector-Emittor voltage

$T_J = 125^\circ\text{C}$



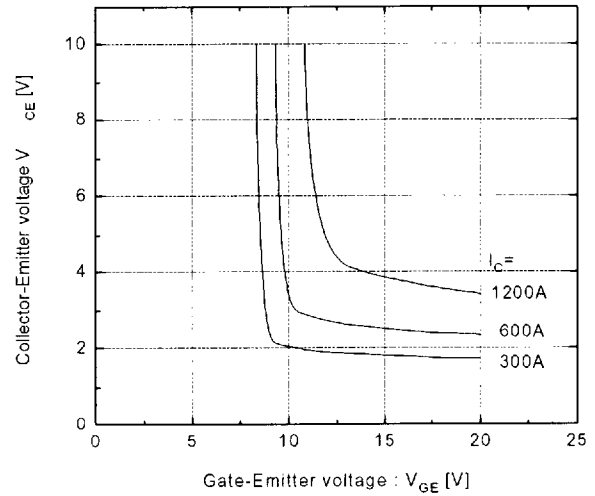
Collector-Emittor vs. Gate-Emittor voltage

$T_J = 25^\circ\text{C}$



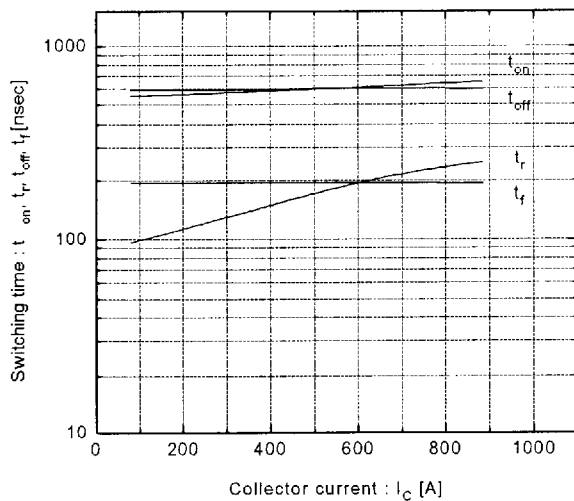
Collector-Emittor vs. Gate-Emittor voltage

$T_J = 125^\circ\text{C}$



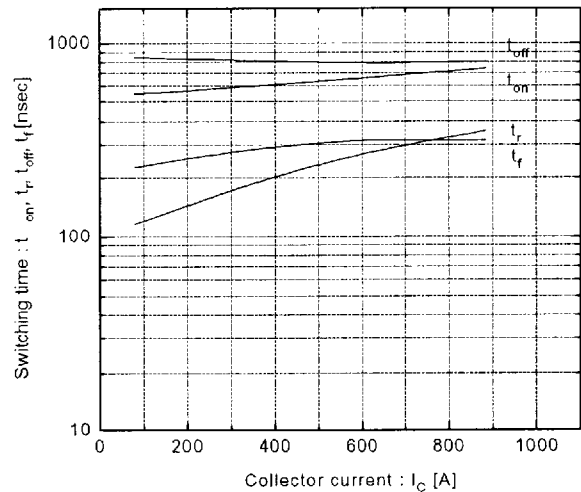
Switching time vs. Collector current

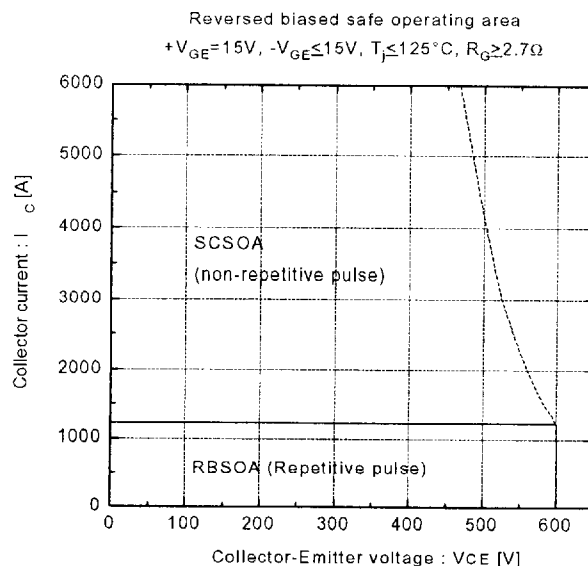
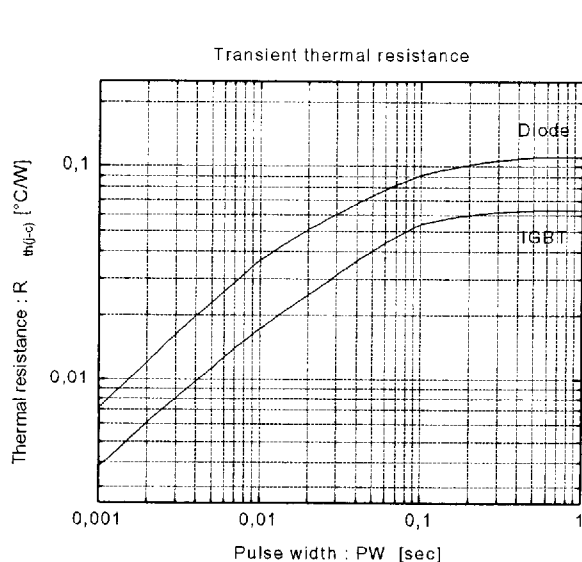
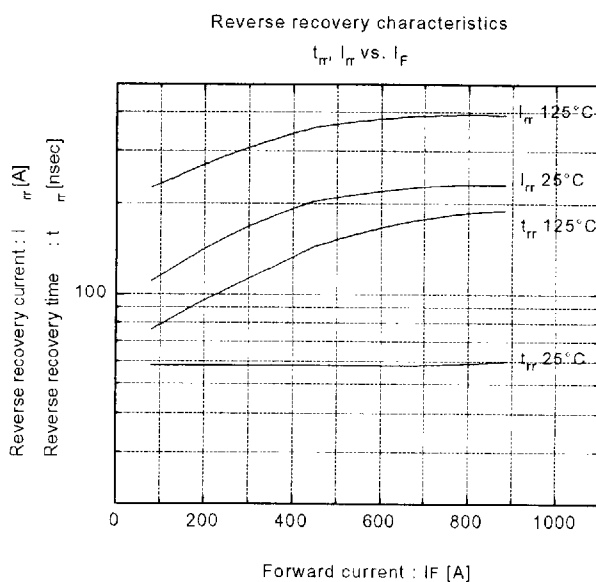
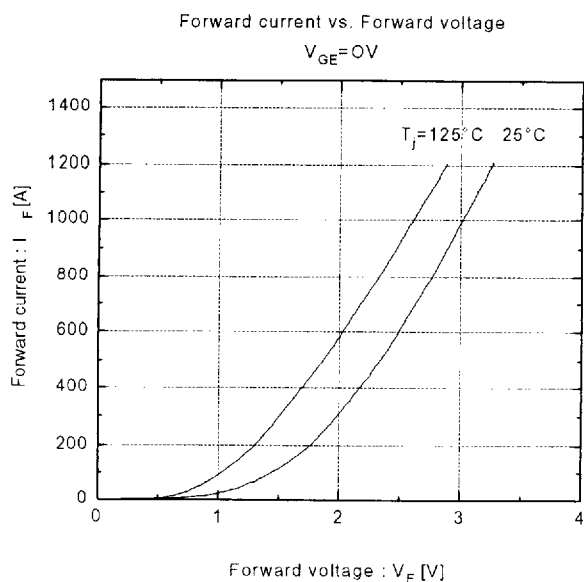
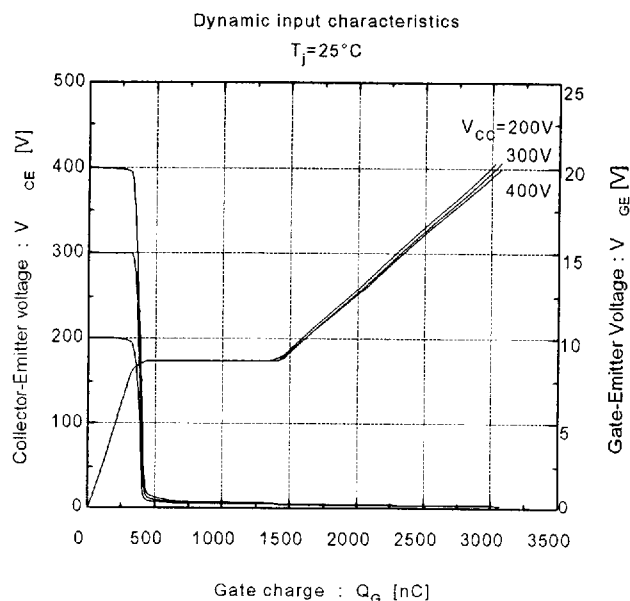
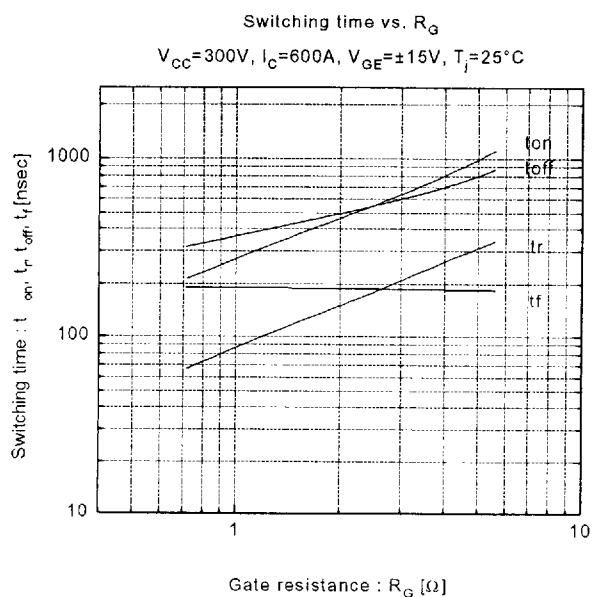
$V_{CC} = 300\text{V}$ ,  $R_G = 2.7\Omega$ ,  $V_{GE} = \pm 15\text{V}$ ,  $T_J = 25^\circ\text{C}$

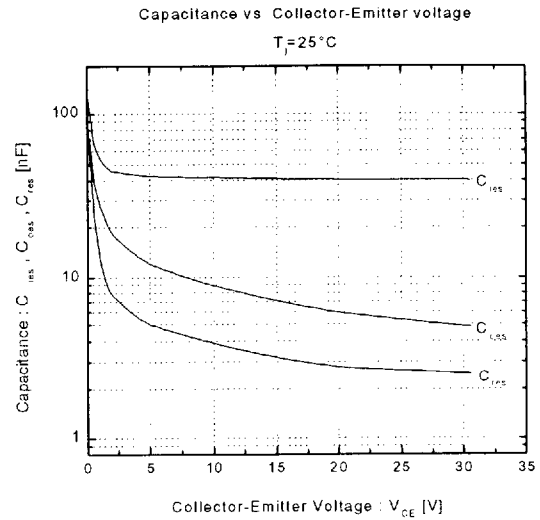
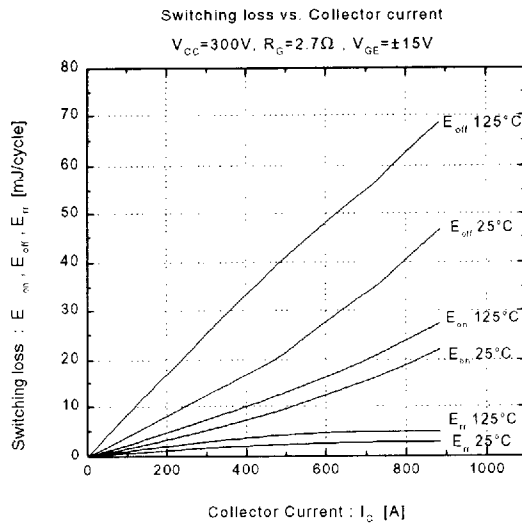


Switching time vs. Collector current

$V_{CC} = 300\text{V}$ ,  $R_G = 2.7\Omega$ ,  $V_{GE} = \pm 15\text{V}$ ,  $T_J = 125^\circ\text{C}$






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