

MITSUBISHI IGBT MODULES  
**CM600DY-12NF**

HIGH POWER SWITCHING USE

**CM600DY-12NF**



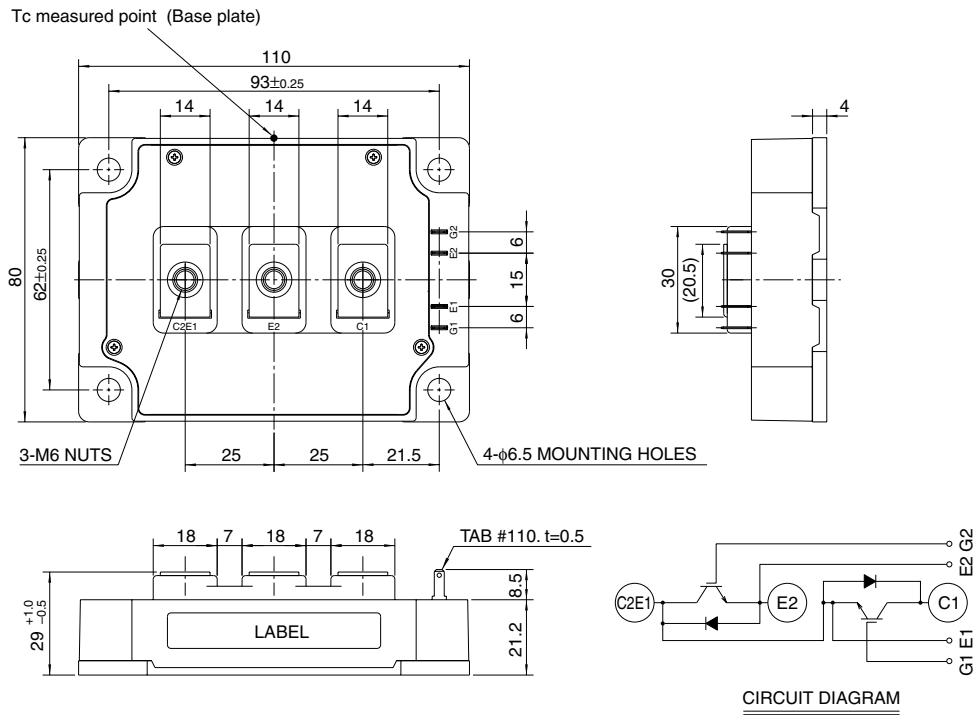
- IC ..... 600A
- VCES ..... 600V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

General purpose inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



MAXIMUM RATINGS (T<sub>J</sub> = 25°C)

| Symbol                   | Parameter                     | Conditions                                | Ratings    | Unit  |
|--------------------------|-------------------------------|---|------------|-------|
| V <sub>CES</sub>         | Collector-emitter voltage     | G-E Short                                 | 600        | V     |
| V <sub>GES</sub>         | Gate-emitter voltage          | C-E Short                                 | ±20        | V     |
| I <sub>C</sub>           | Collector current             | DC, T <sub>C</sub> ' = 89°C* <sup>3</sup> | 600        | A     |
| I <sub>CM</sub>          |                               | Pulse (Note 2)                            | 1200       | A     |
| I <sub>E</sub> (Note 1)  | Emitter current               |   | 600        | A     |
| I <sub>EM</sub> (Note 1) |                               | Pulse (Note 2)                            | 1200       | A     |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>C</sub> = 25°C                     | 1130       | W     |
| T <sub>J</sub>           | Junction temperature          |   | -40 ~ +150 | °C    |
| T <sub>stg</sub>         | Storage temperature           |   | -40 ~ +125 | °C    |
| V <sub>iso</sub>         | Isolation voltage             | Main Terminal to base plate, AC 1 min.    | 2500       | V     |
| —                        | Torque strength               | Main Terminal M6                          | 3.5 ~ 4.5  | N • m |
| —                        |                               | Mounting holes M6                         | 3.5 ~ 4.5  | N • m |
| —                        | Weight                        | Typical value                             | 580        | g     |

ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C)

| Symbol                   | Parameter                            | Test conditions  | Limits |      |                     | Unit |
|--------------------------|--------------------------------------|--|--------|------|---------------------|------|
|                          |                                      |  | Min.   | Typ. | Max.                |      |
| I <sub>CES</sub>         | Collector cutoff current             | V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0V  | —      | —    | 1                   | mA   |
| V <sub>GE(th)</sub>      | Gate-emitter threshold voltage       | I <sub>C</sub> = 60mA, V <sub>CE</sub> = 10V   | 5      | 6    | 7.5                 | V    |
| I <sub>GES</sub>         | Gate leakage current                 | V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V  | —      | —    | 0.5                 | μA   |
| V <sub>CE(sat)</sub>     | Collector-emitter saturation voltage | T <sub>J</sub> = 25°C  | —      | 1.7  | 2.2                 | V    |
|                          |                                      | T <sub>J</sub> = 125°C   | —      | 1.7  | —                   |      |
| C <sub>ies</sub>         | Input capacitance                    | V <sub>CE</sub> = 10V<br>V <sub>GE</sub> = 0V  | —      | —    | 90                  | nF   |
| C <sub>oes</sub>         | Output capacitance                   |  | —      | —    | 11                  | nF   |
| C <sub>res</sub>         | Reverse transfer capacitance         |  | —      | —    | 3.6                 | nF   |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 300V, I <sub>C</sub> = 600A, V <sub>GE</sub> = 15V   | —      | 2400 | —                   | nC   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 300V, I <sub>C</sub> = 600A<br>V <sub>GE1</sub> = V <sub>GE2</sub> = 15V<br>R <sub>G</sub> = 4.2Ω, Inductive load switching operation<br>I <sub>E</sub> = 600A | —      | —    | 500                 | ns   |
| t <sub>r</sub>           | Turn-on rise time                    |  | —      | —    | 300                 | ns   |
| t <sub>d(off)</sub>      | Turn-off delay time                  |  | —      | —    | 750                 | ns   |
| t <sub>f</sub>           | Turn-off fall time                   |  | —      | —    | 300                 | ns   |
| t <sub>rr</sub> (Note 1) | Reverse recovery time                |  | —      | —    | 250                 | ns   |
| Q <sub>rr</sub> (Note 1) | Reverse recovery charge              | —  | 8.7    | —    | μC                  |      |
| V <sub>EC</sub> (Note 1) | Emitter-collector voltage            | I <sub>E</sub> = 600A, V <sub>GE</sub> = 0V  | —      | —    | 2.6                 | V    |
| R <sub>th(j-c)Q</sub>    | Thermal resistance*1                 | IGBT part (1/2 module)   | —      | —    | 0.11                | °C/W |
| R <sub>th(j-c)R</sub>    |                                      | FWDi part (1/2 module)   | —      | —    | 0.18                | °C/W |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to fin, Thermal compound Applied*2 (1/2 module)   | —      | 0.02 | —                   | °C/W |
| R <sub>th(j-c')Q</sub>   | Thermal resistance                   | T <sub>c</sub> measured point is just under the chips  | —      | —    | 0.046* <sup>3</sup> | °C/W |
| R <sub>G</sub>           | External gate resistance             |  | 1.0    | —    | 10                  | Ω    |

\*1 : T<sub>c</sub> measured point is shown in page OUTLINE DRAWING.

\*2 : Typical value is measured by using Shin-etsu Silicone "G-746".

\*3 : T<sub>c</sub>' measured point is just under the chips.

If you use this value, R<sub>th(f-a)</sub> should be measured just under the chips.

Note 1. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub> & Q<sub>rr</sub> represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).

2. Pulse width and repetition rate should be such that the device junction temp. (T<sub>J</sub>) does not exceed T<sub>Jmax</sub> rating.

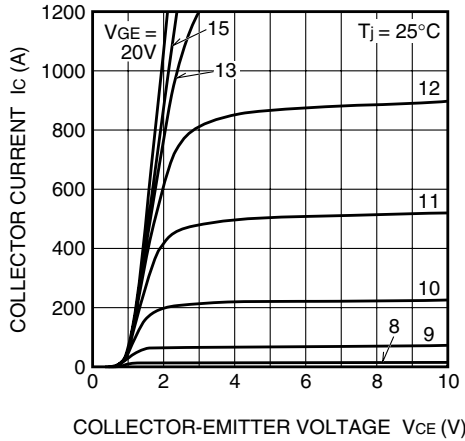
3. Junction temperature (T<sub>J</sub>) should not increase beyond 150°C.

# CM600DY-12NF

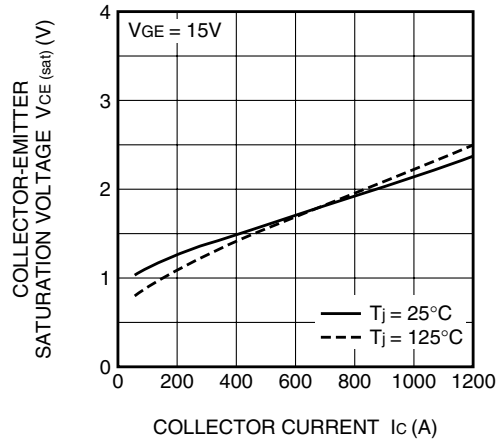
HIGH POWER SWITCHING USE

## PERFORMANCE CURVES

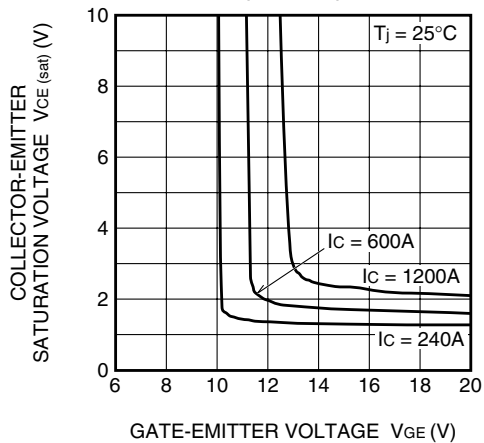
**OUTPUT CHARACTERISTICS (TYPICAL)**



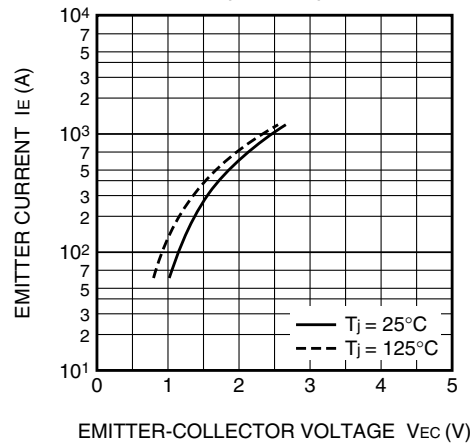
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



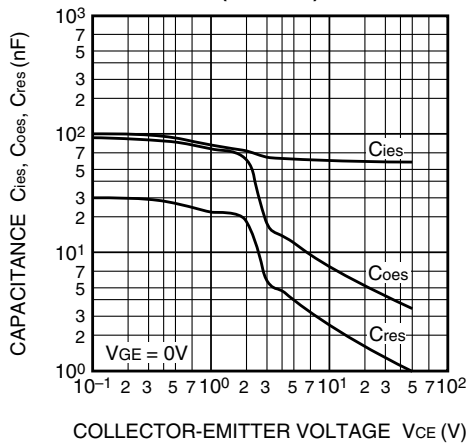
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



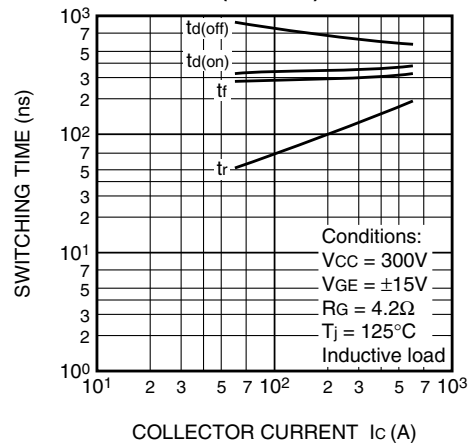
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



**CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)**



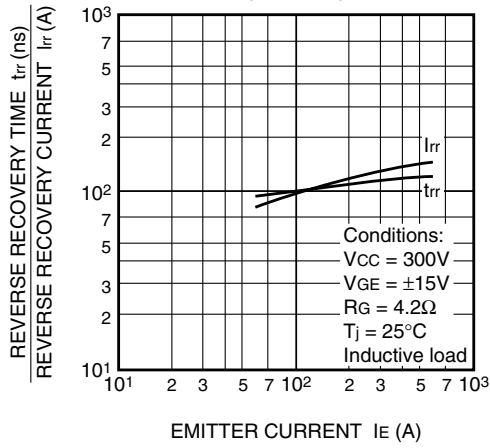
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**



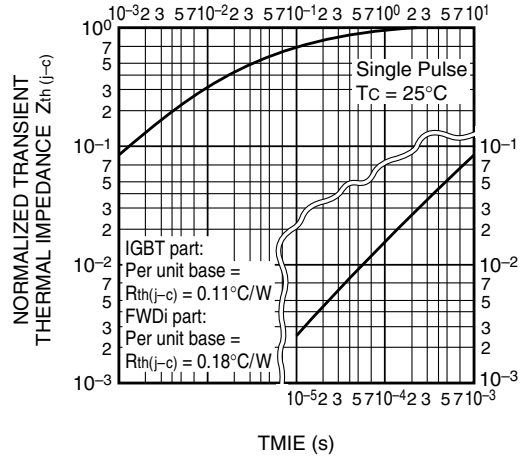
CM600DY-12NF

HIGH POWER SWITCHING USE

REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

