

MITSUBISHI IGBT MODULES  
**CM150DY-12NF**

HIGH POWER SWITCHING USE

**CM150DY-12NF**



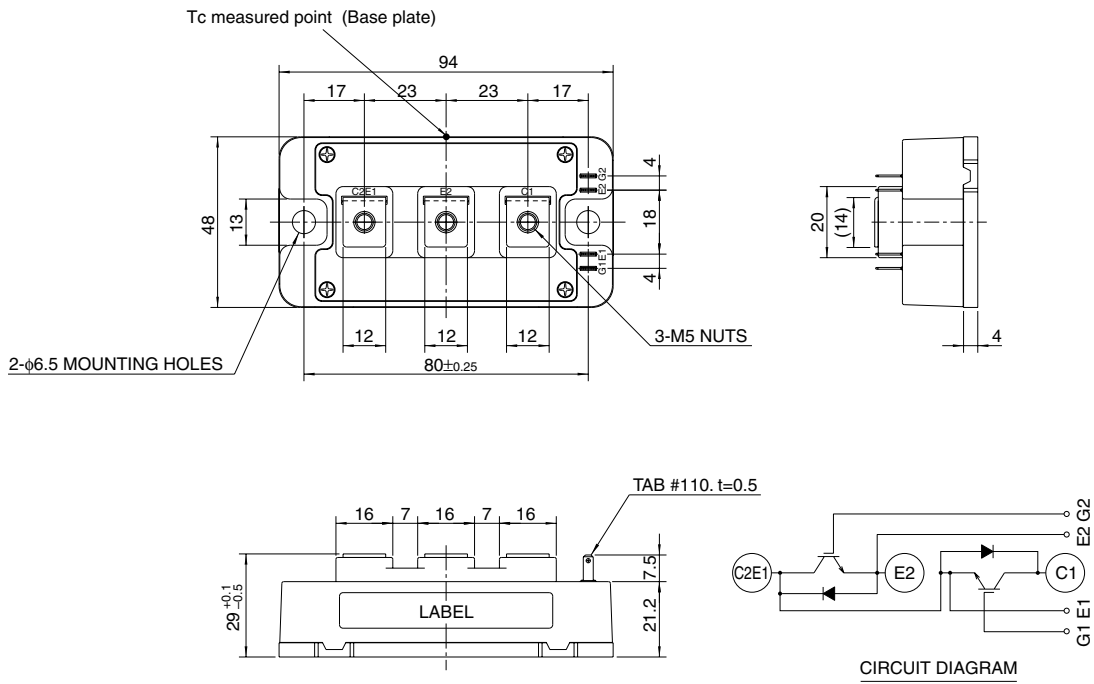
- IC ..... 150A
- VCES ..... 600V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

General purpose inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



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MAXIMUM RATINGS (Tj = 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> ' = 97°C <sup>*3</sup> | 150        | A     |
| I <sub>CM</sub>          |                               | Pulse (Note 2)                            | 300        | A     |
| I <sub>E</sub> (Note 1)  | Emitter current               |   | 150        | A     |
| I <sub>EM</sub> (Note 1) |                               | Pulse (Note 2)                            | 300        | A     |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>c</sub> = 25°C                     | 590        | 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 M5                          | 2.5 ~ 3.5  | N • m |
| —                        |                               | Mounting holes M6                         | 3.5 ~ 4.5  | N • m |
| —                        | Weight                        | Typical value                             | 310        | g     |

ELECTRICAL CHARACTERISTICS (Tj = 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> = 15mA, 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  | —      | —    | 23                 | nF   |
| C <sub>oes</sub>         | Output capacitance                   |  | —      | —    | 2.8                | nF   |
| C <sub>res</sub>         | Reverse transfer capacitance         |  | —      | —    | 0.9                | nF   |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 300V, I <sub>C</sub> = 150A, V <sub>GE</sub> = 15V   | —      | 600  | —                  | nC   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 300V, I <sub>C</sub> = 150A<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> = 150A | —      | —    | 120                | ns   |
| t <sub>r</sub>           | Turn-on rise time                    |  | —      | —    | 100                | ns   |
| t <sub>d(off)</sub>      | Turn-off delay time                  |  | —      | —    | 300                | ns   |
| t <sub>f</sub>           | Turn-off fall time                   |  | —      | —    | 300                | ns   |
| t <sub>rr</sub> (Note 1) | Reverse recovery time                |  | —      | —    | 150                | ns   |
| Q <sub>rr</sub> (Note 1) | Reverse recovery charge              | —  | 2.5    | —    | µC                 |      |
| V <sub>EC</sub> (Note 1) | Emitter-collector voltage            | I <sub>E</sub> = 150A, V <sub>GE</sub> = 0V  | —      | —    | 2.6                | V    |
| R <sub>th(j-c)Q</sub>    | Thermal resistance <sup>*1</sup>     | IGBT part (1/2 module)   | —      | —    | 0.21               | °C/W |
| R <sub>th(j-c)R</sub>    |                                      | FWDi part (1/2 module)   | —      | —    | 0.47               | °C/W |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to fin, Thermal compound Applied <sup>*2</sup> (1/2 module)   | —      | 0.07 | —                  | °C/W |
| R <sub>th(j-c')Q</sub>   | Thermal resistance                   | T <sub>c</sub> measured point is just under the chips  | —      | —    | 0.16 <sup>*3</sup> | °C/W |
| R <sub>G</sub>           | External gate resistance             |  | 4.2    | —    | 42                 | 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.

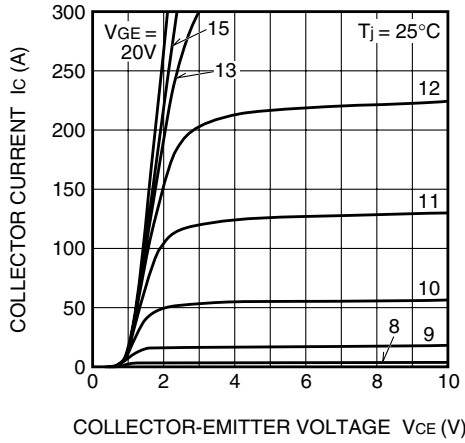
3. Junction temperature (T<sub>j</sub>) should not increase beyond 150°C.

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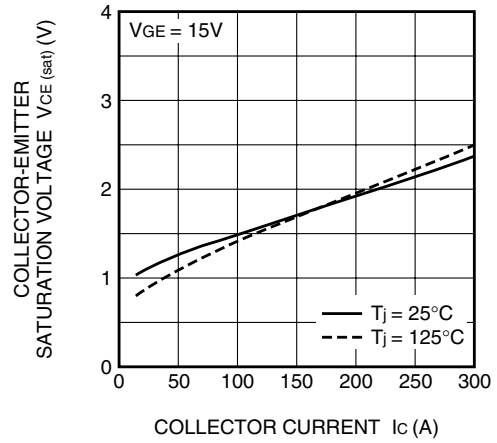
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

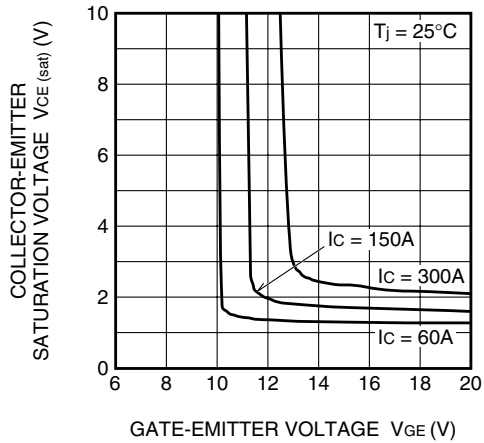
OUTPUT CHARACTERISTICS (TYPICAL)



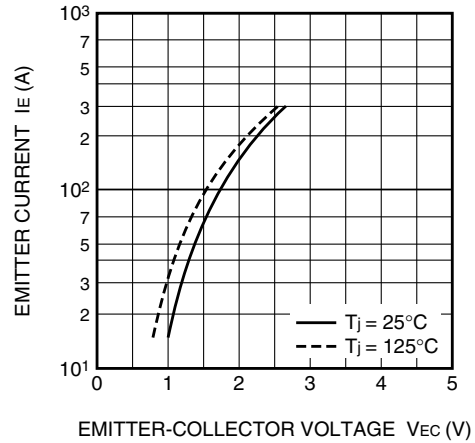
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



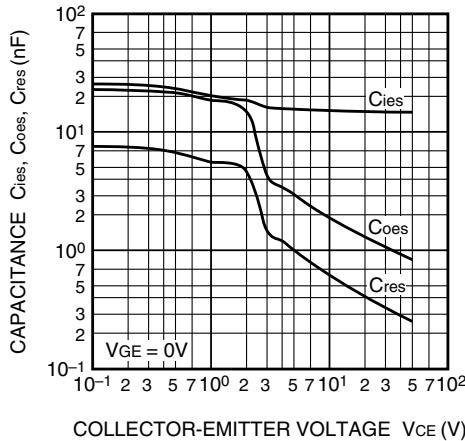
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



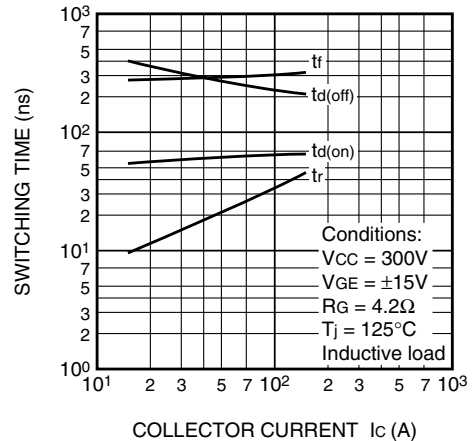
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)



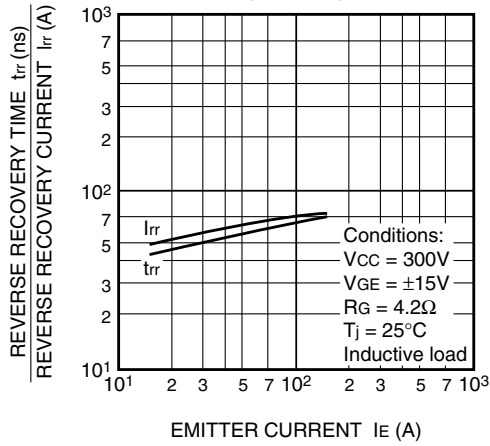
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



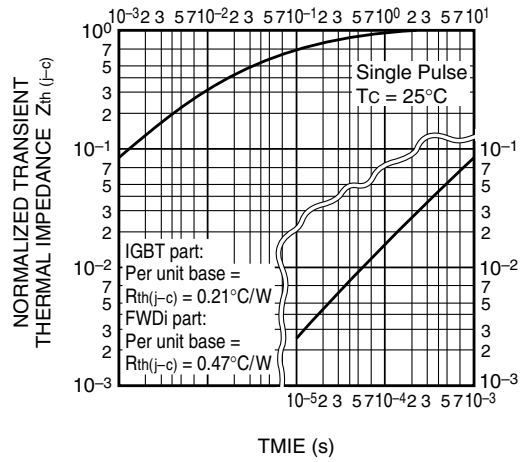
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HIGH POWER SWITCHING USE

REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

