

MITSUBISHI IGBT MODULES  
**CM300DY-24A**

HIGH POWER SWITCHING USE

**CM300DY-24A**



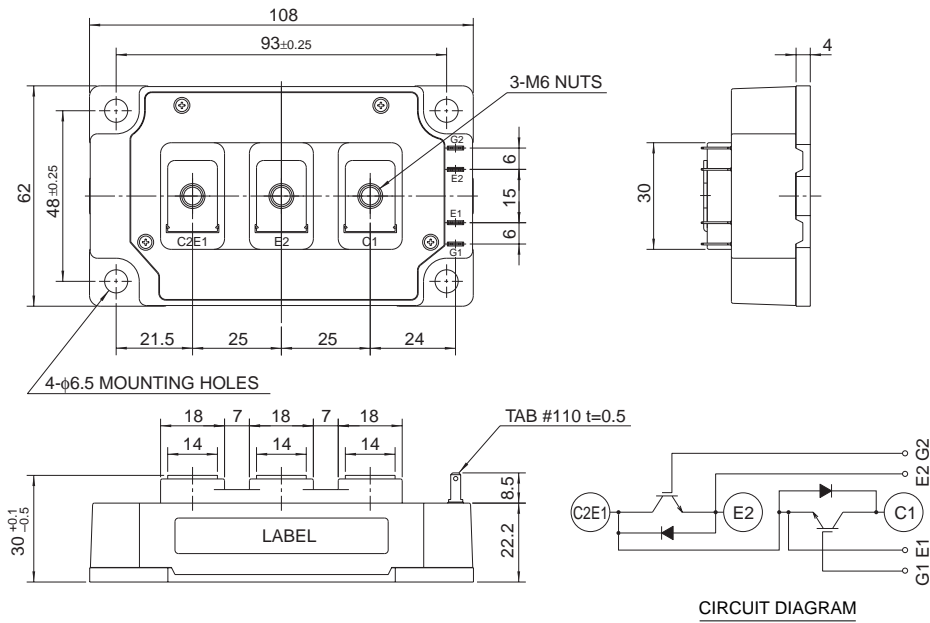
- IC .....300A
- VCES ..... 1200V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

AC drive inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



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

| Symbol                   | Parameter                     | Conditions                              | Ratings    | Unit  |
|--------------------------|-------------------------------|---|------------|-------|
| V <sub>CE</sub>          | Collector-emitter voltage     | G-E Short                               | 1200       | V     |
| V <sub>GE</sub>          | Gate-emitter voltage          | C-E Short                               | ±20        | V     |
| I <sub>C</sub>           | Collector current             | DC, T <sub>c</sub> = 80°C <sup>*1</sup> | 300        | A     |
| I <sub>CM</sub>          |                               | Pulse (Note 2)                          | 600        |       |
| I <sub>E</sub> (Note 1)  | Emitter current               |   | 300        | A     |
| I <sub>EM</sub> (Note 1) |                               | Pulse (Note 2)                          | 600        |       |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>c</sub> = 25°C <sup>*1</sup>     | 1890       | 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  |       |
| —                        | Weight                        | Typical value                           | 400        | g     |

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

| Symbol                   | Parameter                            | Test conditions  | Limits |      |       | Unit |
|--------------------------|--------------------------------------|--|--------|------|-------|------|
|                          |                                      |  | Min.   | Typ. | Max.  |      |
| I <sub>CE</sub>          | Collector cutoff current             | V <sub>CE</sub> = V <sub>CE</sub> , V <sub>GE</sub> = 0V   | —      | —    | 1     | mA   |
| V <sub>GE(th)</sub>      | Gate-emitter threshold voltage       | I <sub>C</sub> = 30mA, V <sub>CE</sub> = 10V   | 6      | 7    | 8     | V    |
| I <sub>GE</sub>          | Gate leakage current                 | V <sub>GE</sub> = V <sub>GE</sub> , V <sub>CE</sub> = 0V   | —      | —    | 0.5   | μA   |
| V <sub>CE(sat)</sub>     | Collector-emitter saturation voltage | T <sub>j</sub> = 25°C<br>T <sub>j</sub> = 125°C  | —      | 2.1  | 3.0   | V    |
|                          |                                      | I <sub>C</sub> = 300A, V <sub>GE</sub> = 15V   |        | 2.4  | —     |      |
| C <sub>ies</sub>         | Input capacitance                    | V <sub>CE</sub> = 10V<br>V <sub>GE</sub> = 0V  | —      | —    | 47    | nF   |
| C <sub>oes</sub>         | Output capacitance                   |  | —      | —    | 4     |      |
| C <sub>res</sub>         | Reverse transfer capacitance         |  | —      | —    | 0.9   |      |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 600V, I <sub>C</sub> = 300A, V <sub>GE</sub> = 15V   | —      | 1350 | —     | nC   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 600V, I <sub>C</sub> = 300A<br>V <sub>GE1</sub> = V <sub>GE2</sub> = 15V<br>R <sub>G</sub> = 1.0Ω, Inductive load switching operation<br>I <sub>E</sub> = 300A | —      | —    | 550   | ns   |
| t <sub>r</sub>           | Turn-on rise time                    |  | —      | —    | 180   |      |
| t <sub>d(off)</sub>      | Turn-off delay time                  |  | —      | —    | 600   |      |
| t <sub>f</sub>           | Turn-off fall time                   |  | —      | —    | 350   |      |
| t <sub>rr</sub> (Note 1) | Reverse recovery time                |  | —      | —    | 250   |      |
| Q <sub>rr</sub> (Note 1) | Reverse recovery charge              | —  | 9.0    | —    | μC    |      |
| V <sub>EC</sub> (Note 1) | Emitter-collector voltage            | I <sub>E</sub> = 300A, V <sub>GE</sub> = 0V  | —      | —    | 3.8   | V    |
| R <sub>th(j-c)Q</sub>    | Thermal resistance                   | IGBT part (1/2 module) <sup>*1</sup>   | —      | —    | 0.066 | °C/W |
| R <sub>th(j-c)R</sub>    |                                      | FWDi part (1/2 module) <sup>*1</sup>   | —      | —    | 0.12  |      |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to fin, Thermal compound Applied (1/2 module) <sup>*1,*2</sup>  | —      | 0.02 | —     |      |
| R <sub>G</sub>           | External gate resistance             |  | 1.0    | —    | 16    | Ω    |

\*1 : T<sub>c</sub>, T<sub>f</sub> measured point is just under the chips.

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

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.

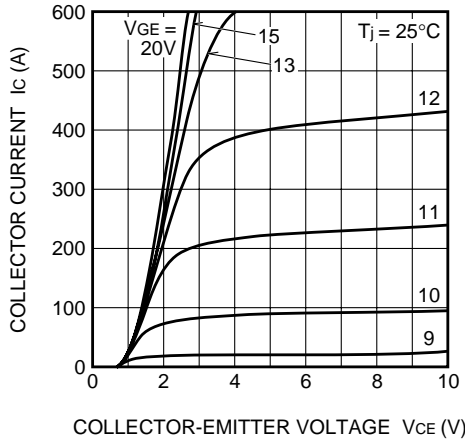
3. Junction temperature (T<sub>j</sub>) should not increase beyond 150°C.

# CM300DY-24A

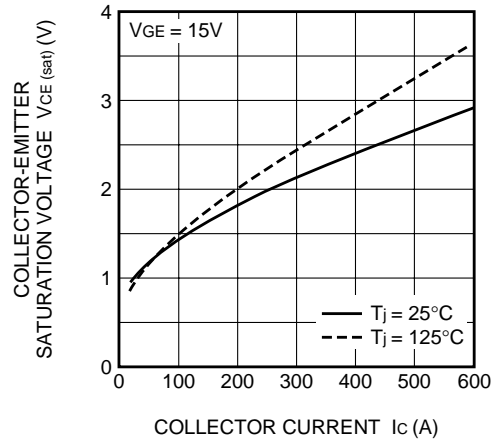
HIGH POWER SWITCHING USE

## PERFORMANCE CURVES

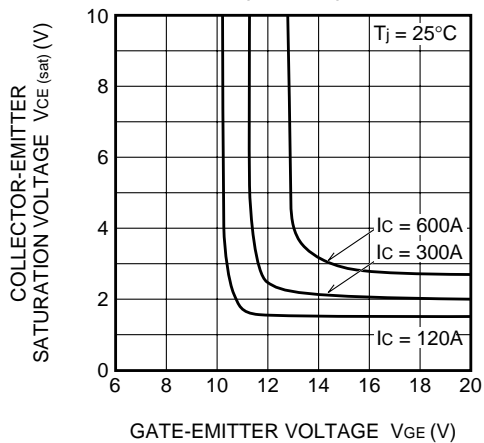
**OUTPUT CHARACTERISTICS (TYPICAL)**



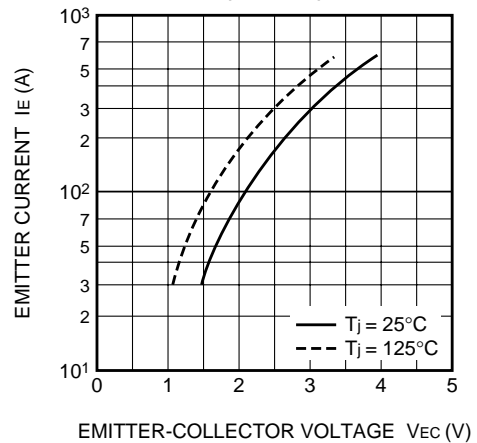
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



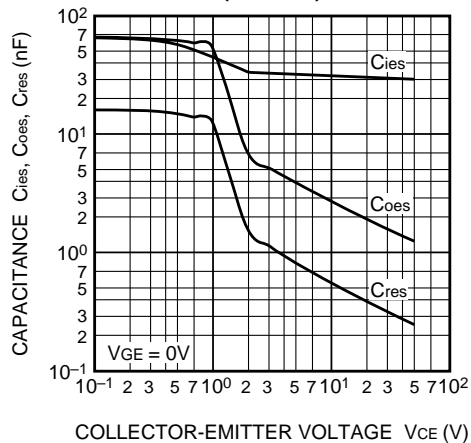
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



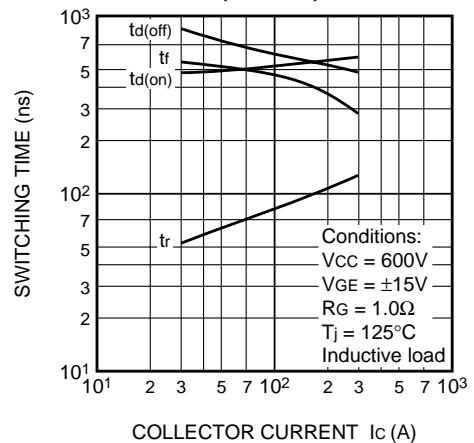
**FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)**



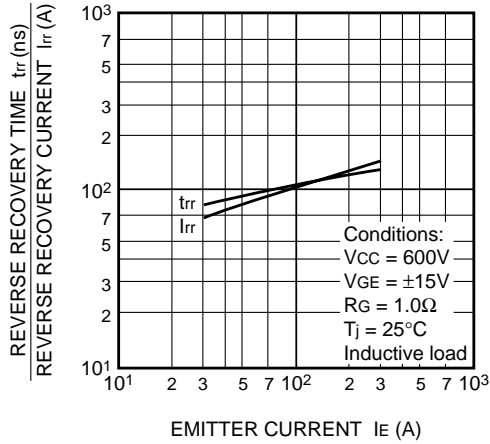
**CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)**



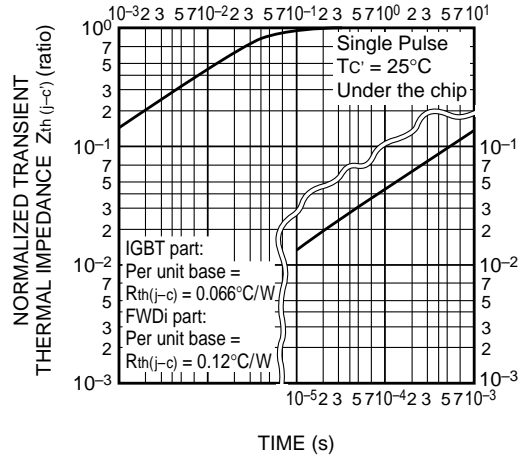
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**



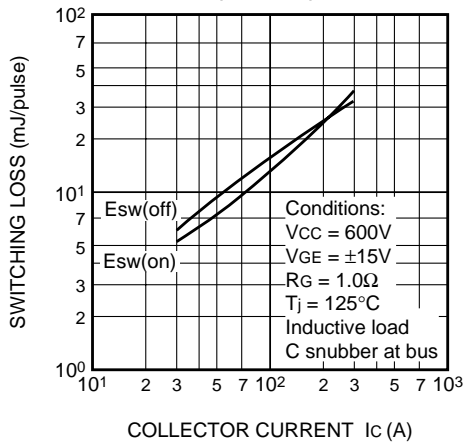
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



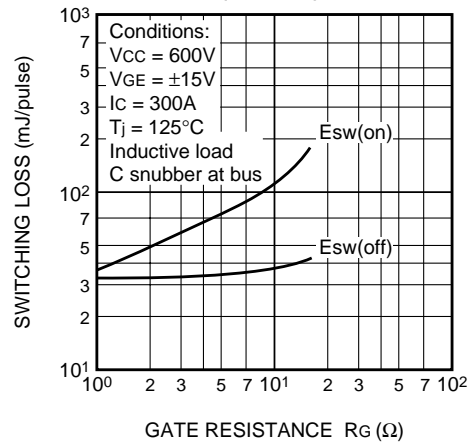
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



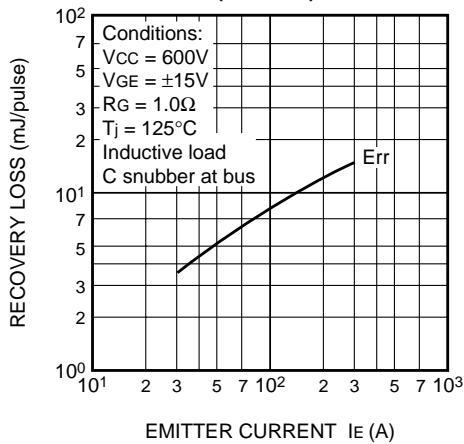
SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)



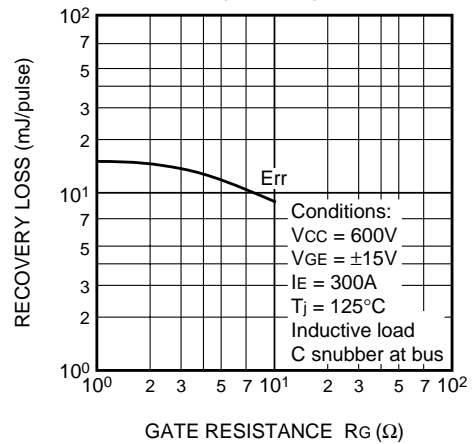
SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)



RECOVERY LOSS vs. IE (TYPICAL)



RECOVERY LOSS vs. GATE RESISTANCE (TYPICAL)



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