

MITSUBISHI IGBT MODULES  
**CM1000DU-34NF**

HIGH POWER SWITCHING USE

**CM1000DU-34NF**



- IC ..... 1000A
- VCES ..... 1700V
- Insulated Type
- 2-elements in a pack

**APPLICATION**

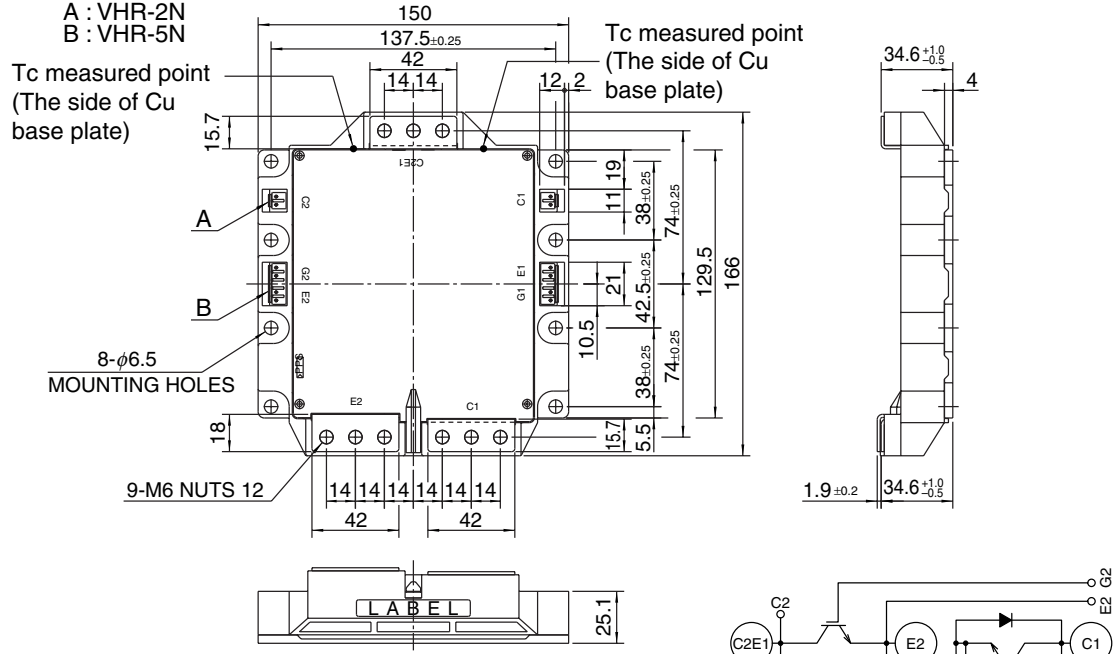
General purpose inverters Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm

A,B HOUSING Type  
 (J. S. T. Mfg. Co. Ltd)

A : VHR-2N  
 B : VHR-5N



CIRCUIT DIAGRAM

**CM1000DU-34NF**

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**MAXIMUM RATINGS (T<sub>J</sub> = 25°C, unless otherwise specified)**

| Symbol                   | Parameter                         | Conditions                                     | Ratings    | Unit             |
|--------------------------|-----------------------------------|--|------------|------------------|
| V <sub>CE</sub> S        | Collector-emitter voltage         | G-E Short                                      | 1700       | V                |
| V <sub>GE</sub> S        | Gate-emitter voltage              | C-E Short                                      | ±20        | V                |
| I <sub>C</sub>           | Collector current                 | T <sub>C</sub> = 104°C                         | 1000       | A                |
| I <sub>CM</sub>          |                                   | Pulse (Note 2)                                 | 2000       |                  |
| I <sub>E</sub> (Note 1)  | Emitter current                   | T <sub>C</sub> = 25°C                          | 1000       | A                |
| I <sub>EM</sub> (Note 1) |                                   | Pulse (Note 2)                                 | 2000       |                  |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation     | T <sub>C</sub> = 25°C                          | 8900       | W                |
| T <sub>J</sub>           | Junction temperature              |  | -40 ~ +150 | °C               |
| T <sub>stg</sub>         | Storage temperature <sup>*3</sup> |  | -40 ~ +125 | °C               |
| V <sub>iso</sub>         | Isolation voltage                 | Terminals to base plate, f = 60Hz, AC 1 minute | 3500       | V <sub>rms</sub> |
| —                        | Torque strength                   | Main terminals M6 screw                        | 3.5 ~ 4.5  | N • m            |
|                          |                                   | Mounting M6 screw                              | 3.5 ~ 4.5  | N • m            |
| —                        | Weight                            | Typical value                                  | 1400       | g                |

**ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C, unless otherwise specified)**

| Symbol                             | Parameter   | Test conditions   | Limits                 |       |       | Unit |
|------------------------------------|---|---|------------------------|-------|-------|------|
|                                    |   |   | Min.                   | Typ.  | Max.  |      |
| I <sub>CE</sub> S                  | Collector cutoff current  | V <sub>CE</sub> = V <sub>CE</sub> S, V <sub>GE</sub> = 0V   | —                      | —     | 1     | mA   |
| V <sub>GE(th)</sub>                | Gate-emitter threshold voltage                                    | I <sub>C</sub> = 100mA, V <sub>CE</sub> = 10V   | 5.5                    | 7     | 8.5   | V    |
| I <sub>GES</sub>                   | Gate leakage current  | ±V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V  | —                      | —     | 5     | µA   |
| V <sub>CE(sat)</sub><br>(chip)     | Collector-emitter saturation voltage<br>(without lead resistance) | I <sub>C</sub> = 1000A, V <sub>GE</sub> = 15V (Note 4)  | —                      | 2.2   | 2.8   | V    |
|                                    |   | T <sub>J</sub> = 125°C  | —                      | 2.45  | —     |      |
| R <sub>(lead)</sub>                | Module lead resistance  | I <sub>C</sub> = 1000A, terminal-chip   | —                      | 0.286 | —     | mΩ   |
| C <sub>ies</sub>                   | Input capacitance   | V <sub>CE</sub> = 10V<br>V <sub>GE</sub> = 0V   | —                      | —     | 220   | nF   |
| C <sub>oes</sub>                   | Output capacitance  |   | —                      | —     | 25    |      |
| C <sub>res</sub>                   | Reverse transfer capacitance                                      |   | —                      | —     | 4.7   |      |
| Q <sub>G</sub>                     | Total gate charge   | V <sub>CC</sub> = 1000V, I <sub>C</sub> = 1000A, V <sub>GE</sub> = 15V  | —                      | 6000  | —     | nC   |
| t <sub>d(on)</sub>                 | Turn-on delay time  | V <sub>CC</sub> = 1000V, I <sub>C</sub> = 1000A<br>V <sub>GE</sub> = ±15V<br>R <sub>G</sub> = 0.47Ω, Inductive load | —                      | —     | 600   | ns   |
| t <sub>r</sub>                     | Turn-on rise time   |   | —                      | —     | 150   |      |
| t <sub>d(off)</sub>                | Turn-off delay time   |   | —                      | —     | 900   |      |
| t <sub>f</sub>                     | Turn-off fall time  |   | —                      | —     | 200   |      |
| t <sub>rr</sub> (Note 1)           | Reverse recovery time   |   | I <sub>E</sub> = 1000A | —     | —     |      |
| Q <sub>rr</sub> (Note 1)           | Reverse recovery charge   |   | —                      | 90    | —     | µC   |
| V <sub>EC</sub> (Note 1)<br>(chip) | Emitter-collector voltage<br>(without lead resistance)            | I <sub>E</sub> = 1000A, V <sub>GE</sub> = 0V  | —                      | 2.3   | 3     | V    |
| R <sub>th(j-c)Q</sub>              | Thermal resistance <sup>*1</sup>                                  | IGBT part (1/2 module)  | —                      | —     | 0.014 | K/W  |
| R <sub>th(j-c)R</sub>              |   | FWDi part (1/2 module)  | —                      | —     | 0.023 |      |
| R <sub>th(c-f)</sub>               | Contact thermal resistance <sup>*2</sup>                          | Case to heat sink, Thermal compound applied (1/2 module)  | —                      | 0.016 | —     |      |
| R <sub>G</sub>                     | External gate resistance  |   | 0.47                   | —     | 4.7   | Ω    |

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-collector free-wheel diode (FWDi).

2. Pulse width and repetition rate should be such that the device junction temperature (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.

4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

\*1 : Case temperature (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.

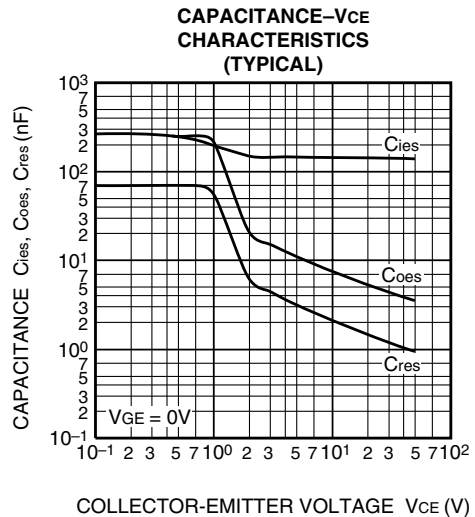
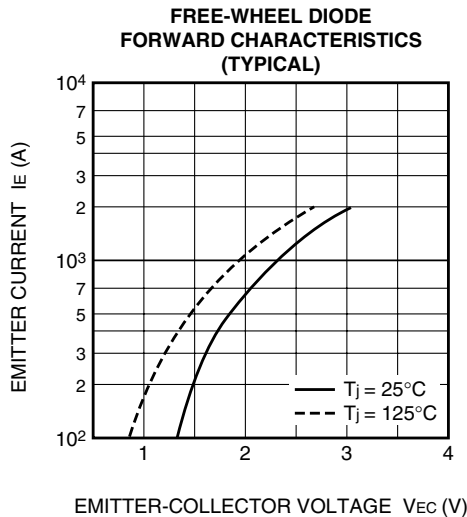
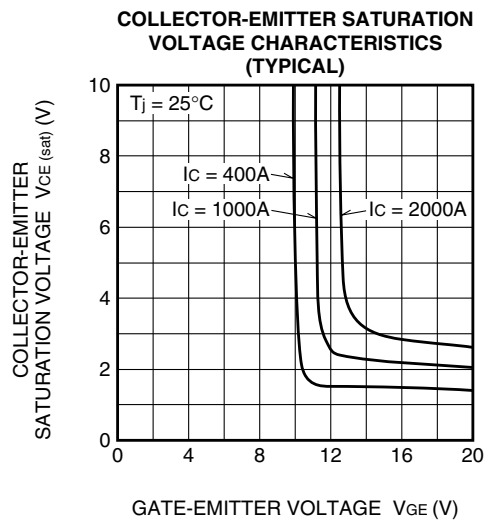
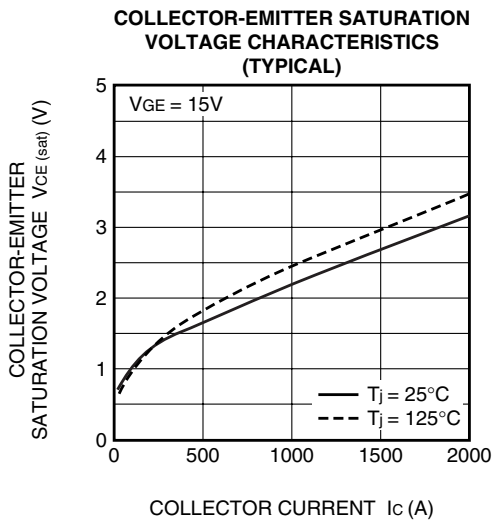
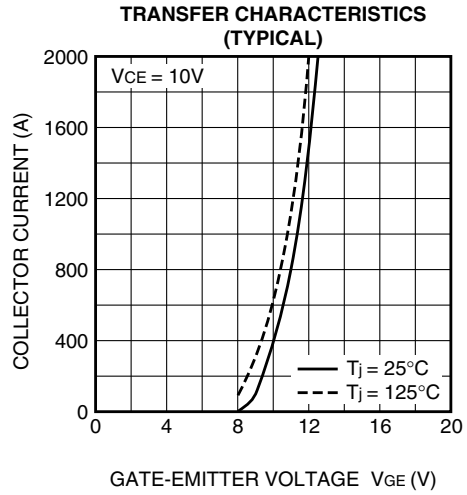
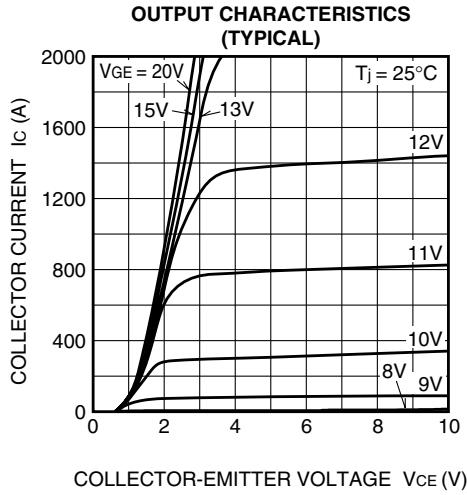
\*2 : Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m • K)].

\*3 : The operation temperature is restrained by the permission temperature of female connector.

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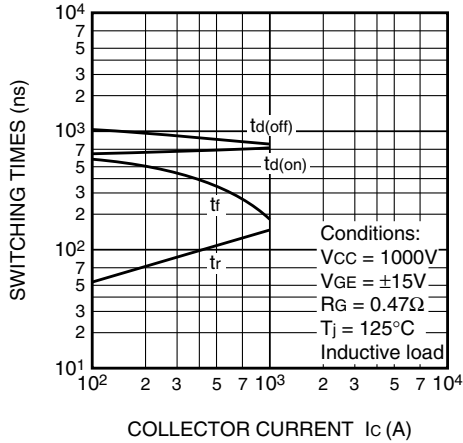
## PERFORMANCE CURVES



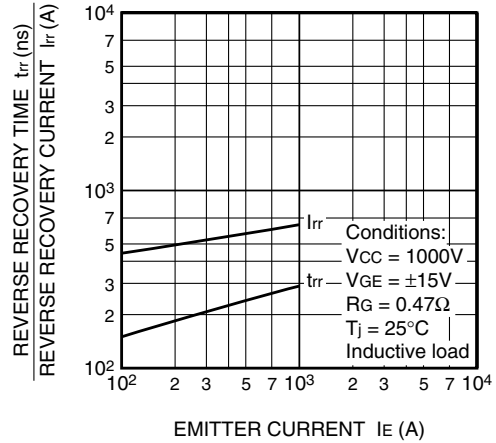
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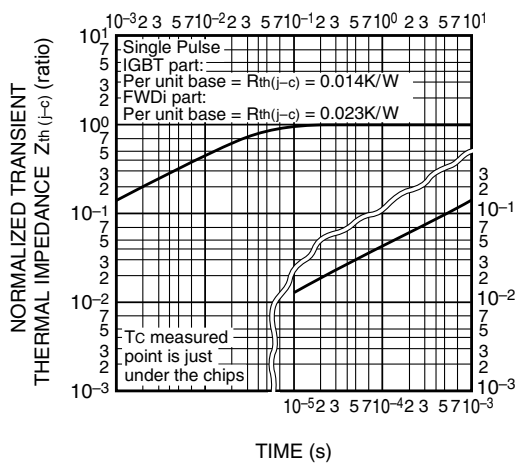
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



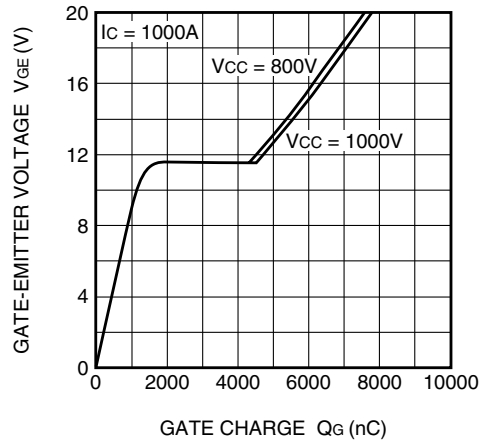
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



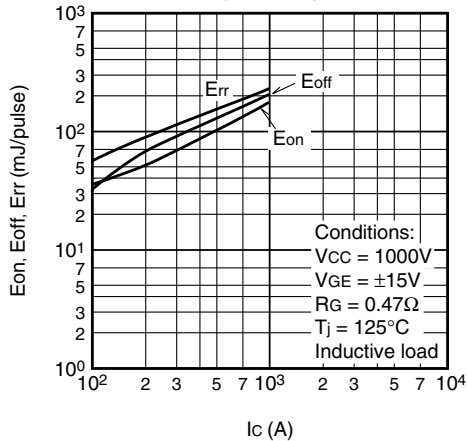
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)



Ic-Esw (TYPICAL)



Rg-Esw (TYPICAL)

