

MITSUBISHI IGBT MODULES  
**CM600HU-24H**  
 HIGH POWER SWITCHING USE  
 INSULATED TYPE

**CM600HU-24H**



- Ic ..... 600A
- VCES ..... 1200V
- Insulated Type
- 1-element in a pack
- UL Recognized

Yellow Card No. E80276

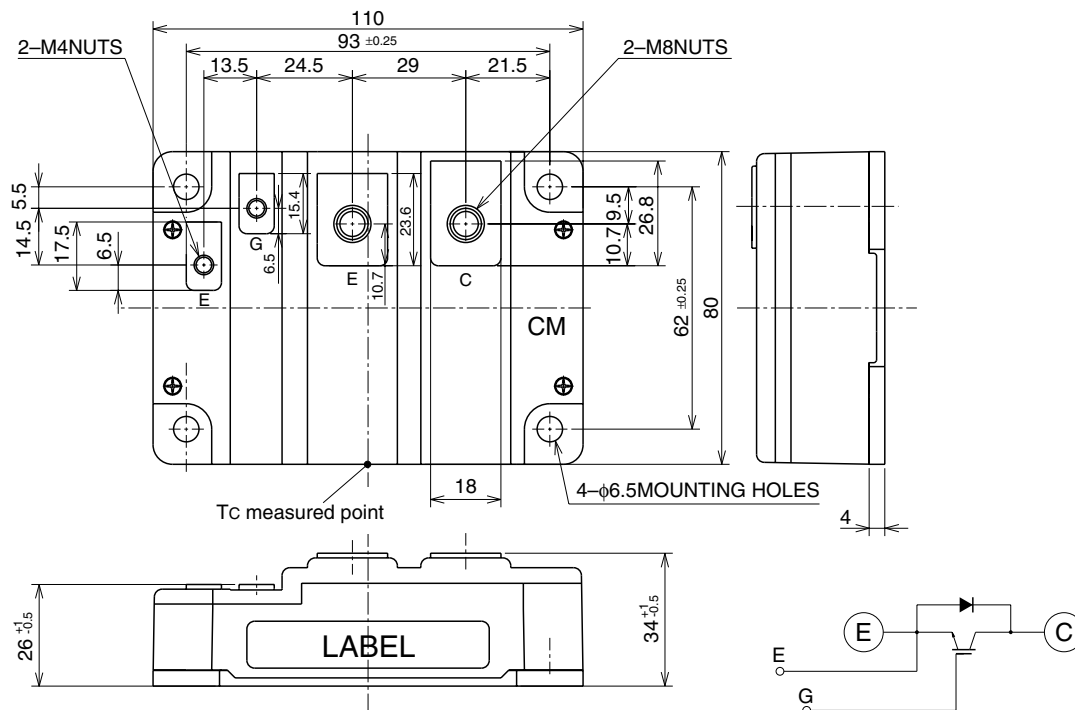
File No. E80271

**APPLICATION**

UPS, NC machine, AC-Drive control, Servo, Welders

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



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

| Symbol                   | Item                          | Conditions                                        | Ratings    | Unit |
|--------------------------|-------------------------------|---------------------------------------------------|------------|------|
| V <sub>CES</sub>         | Collector-emitter voltage     | V <sub>GE</sub> = 0V                              | 1200       | V    |
| V <sub>GES</sub>         | Gate-emitter voltage          | V <sub>CE</sub> = 0V                              | ±20        | V    |
| I <sub>C</sub>           | Collector current             | T <sub>C</sub> = 25°C                             | 600        | A    |
| I <sub>CM</sub>          |                               | Pulse (Note 1)                                    | 1200       | A    |
| I <sub>E</sub> (Note 2)  | Emitter current               | T <sub>C</sub> = 25°C                             | 600        | A    |
| I <sub>EM</sub> (Note 2) |                               | Pulse (Note 1)                                    | 1200       | A    |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>C</sub> = 25°C                             | 3100       | 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             | Charged part to base plate, f = 60Hz, AC 1 minute | 2500       | Vrms |
| —                        | Mounting torque               | Main terminals M8 screw                           | 9.8 ~ 10.8 | N·m  |
|                          |                               | Mounting M6 screw                                 | 3.5 ~ 4.5  | N·m  |
|                          |                               | Auxiliary terminals M4 screw                      | 1.3 ~ 1.7  | N·m  |
| —                        | Weight                        | Typical value                                     | 600        | g    |

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

| Symbol                   | Item                                 | 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            | —                      | —     | 2    | mA   |
| V <sub>GE(th)</sub>      | Gate-emitter threshold voltage       | I <sub>C</sub> = 60mA, V <sub>CE</sub> = 10V                         | 4.5                    | 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 | I <sub>C</sub> = 600A, V <sub>GE</sub> = 15V (Note 4)                | T <sub>j</sub> = 25°C  | —     | 2.9  | V    |
|                          |                                      |                                                                      | T <sub>j</sub> = 125°C | —     | 2.85 |      |
| C <sub>ies</sub>         | Input capacitance                    | V <sub>CE</sub> = 10V                                                | —                      | —     | 90   | nF   |
| C <sub>oes</sub>         | Output capacitance                   | V <sub>GE</sub> = 0V                                                 | —                      | —     | 31.5 | nF   |
| C <sub>res</sub>         | Reverse transfer capacitance         |                                                                      | —                      | —     | 18   | nF   |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 600V, I <sub>C</sub> = 600A, V <sub>GE</sub> = 15V | —                      | 2250  | —    | nC   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 600V, I <sub>C</sub> = 600A                        | —                      | —     | 300  | ns   |
| t <sub>r</sub>           | Turn-on rise time                    | V <sub>GE</sub> = ±15V                                               | —                      | —     | 700  | ns   |
| t <sub>d(off)</sub>      | Turn-off delay time                  | R <sub>G</sub> = 2.1Ω                                                | —                      | —     | 450  | ns   |
| t <sub>f</sub>           | Turn-off fall time                   | Resistive load                                                       | —                      | —     | 350  | ns   |
| V <sub>EC</sub> (Note 2) | Emitter-collector voltage            | I <sub>E</sub> = 600A, V <sub>GE</sub> = 0V                          | —                      | —     | 3.2  | V    |
| t <sub>rr</sub> (Note 2) | Reverse recovery time                | I <sub>E</sub> = 600A,                                               | —                      | —     | 300  | ns   |
| Q <sub>rr</sub> (Note 2) | Reverse recovery charge              | die / dt = −1200A / μs                                               | —                      | 3.3   | —    | μC   |
| R <sub>th(j-c)Q</sub>    | Thermal resistance (Note 5)          | Junction to case, IGBT part                                          | —                      | —     | 0.04 | K/W  |
| R <sub>th(j-c)R</sub>    |                                      | Junction to case, FWDi part                                          | —                      | —     | 0.06 | K/W  |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to heat sink, conductive grease applied (Note 6)                | —                      | 0.015 | —    | K/W  |

Note 1. 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.

2. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub>, Q<sub>rr</sub> & die/dt represent characteristics of the anti-parallel, emitter-collector free-wheel diode.

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.

5. Case temperature (T<sub>C</sub>) measured point is shown in page OUTLINE DRAWING.

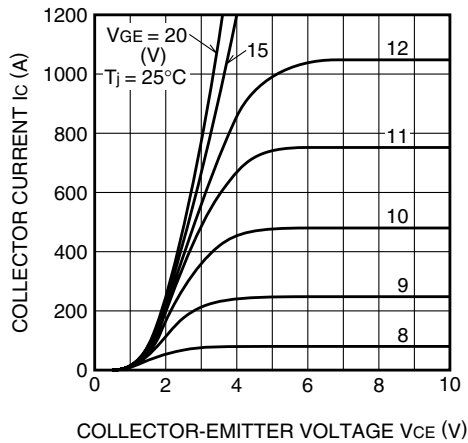
6. Typical value is measured by using thermally conductive grease of λ = 0.9[W/(m · K)].

# CM600HU-24H

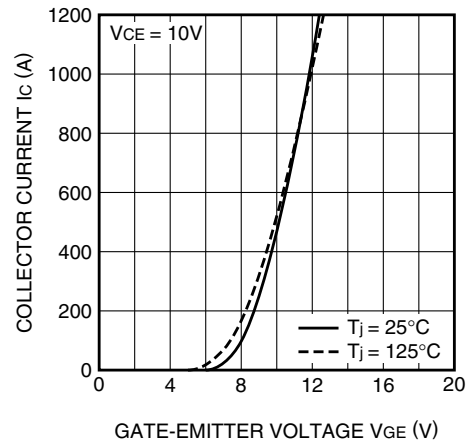
HIGH POWER SWITCHING USE  
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## PERFORMANCE CURVES

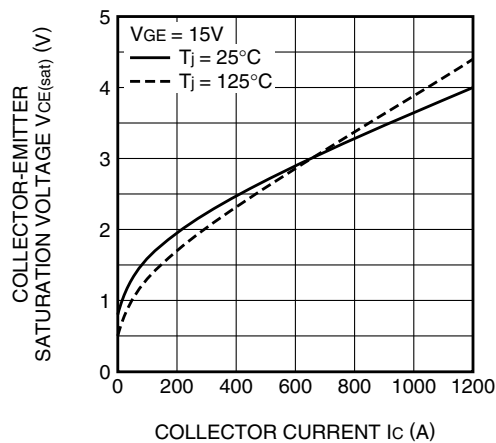
OUTPUT CHARACTERISTICS  
(TYPICAL)



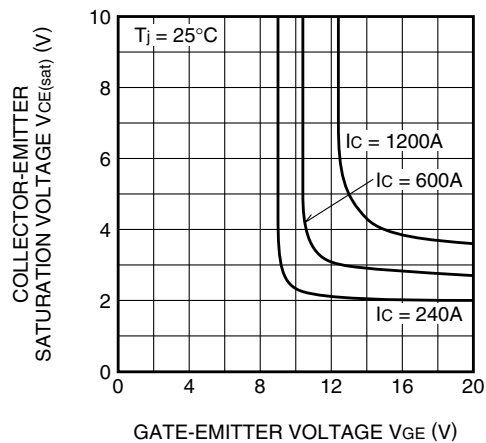
TRANSFER CHARACTERISTICS  
(TYPICAL)



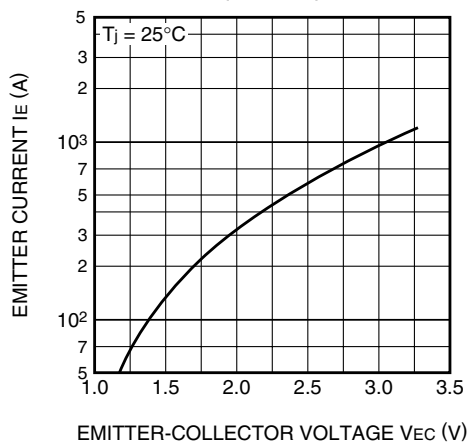
COLLECTOR-EMITTER SATURATION  
VOLTAGE CHARACTERISTICS  
(TYPICAL)



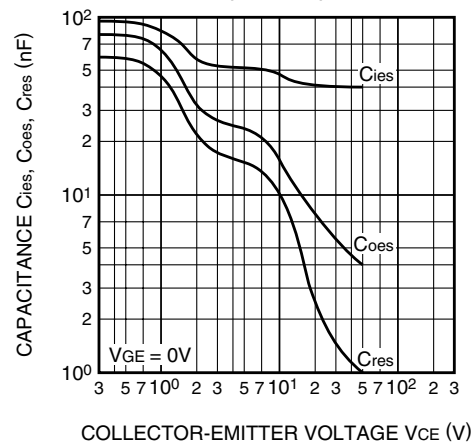
COLLECTOR-EMITTER SATURATION  
VOLTAGE CHARACTERISTICS  
(TYPICAL)



FREE-WHEEL DIODE  
FORWARD CHARACTERISTICS  
(TYPICAL)



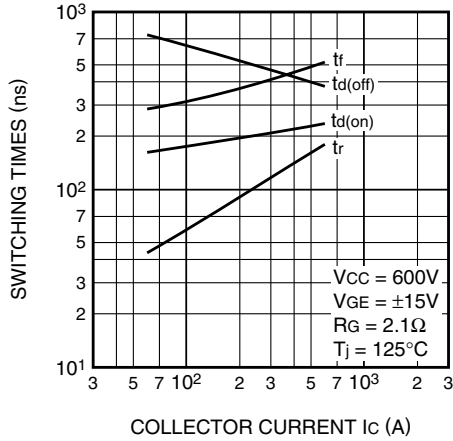
CAPACITANCE CHARACTERISTICS  
(TYPICAL)



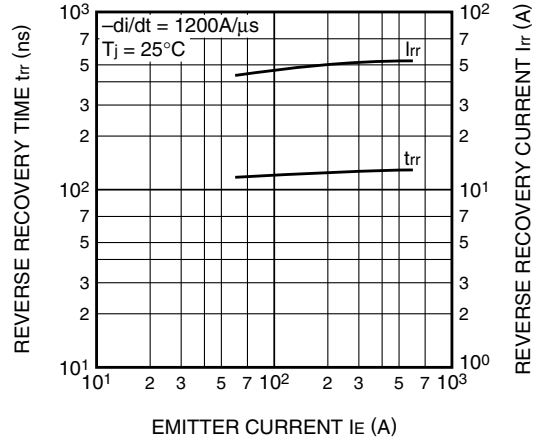
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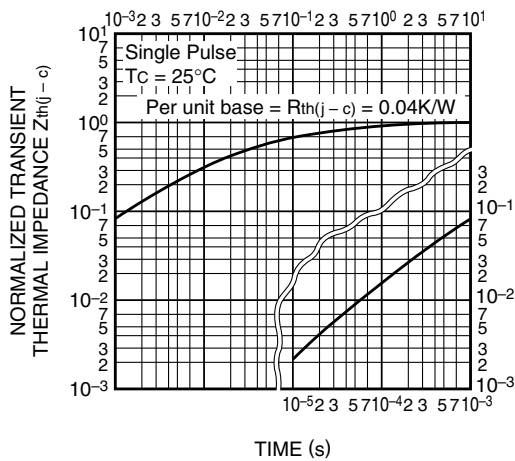
HALF-BRIDGE  
SWITCHING TIME CHARACTERISTICS  
(TYPICAL)



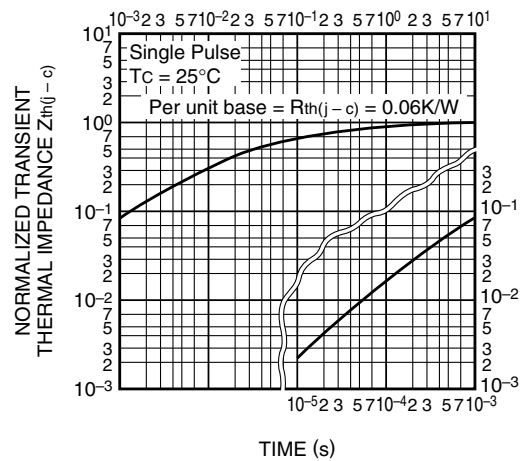
REVERSE RECOVERY CHARACTERISTICS  
OF FREE-WHEEL DIODE  
(TYPICAL)



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(IGBT part)



TRANSIENT THERMAL  
IMPEDANCE CHARACTERISTICS  
(FWDi part)



GATE CHARGE CHARACTERISTICS  
(TYPICAL)

