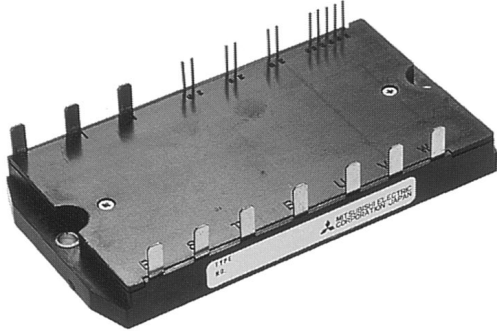


MITSUBISHI IGBT MODULES  
**CM30MD3-12H**  
 MEDIUM POWER SWITCHING USE  
 FLAT-BASE TYPE, INSULATED TYPE

**CM30MD3-12H**



- IC ..... 30A
- VCES ..... 600V
- Insulated Type
- CIB Module
- 3φ Inverter+1φ Converter
- UL Recognized

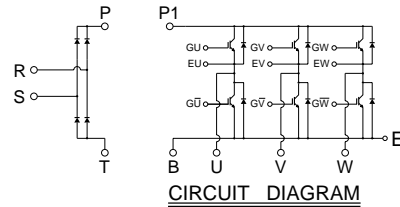
Yellow Card No. E80276 (N)  
 File No. E80271

**APPLICATION**

AC & DC motor controls, General purpose inverters, Servo controls, NC, Robotics, UPS

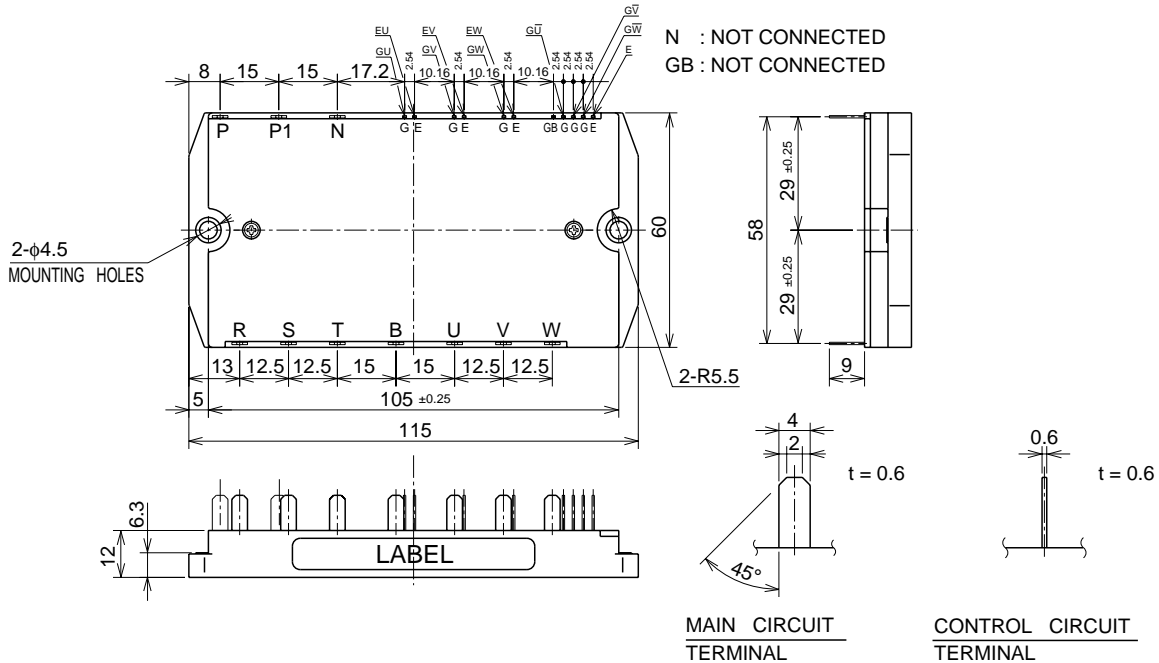
**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



**CIRCUIT DIAGRAM**

N : NOT CONNECTED  
 GB : NOT CONNECTED



**MAIN CIRCUIT  
 TERMINAL**

**CONTROL CIRCUIT  
 TERMINAL**

## CM30MD3-12H

MEDIUM POWER SWITCHING USE  
FLAT-BASE TYPE, INSULATED TYPE**MAXIMUM RATINGS** ( $T_j = 25^\circ\text{C}$ )  
**INVERTER PART**

| Symbol                    | Parameter                     | Condition             | Rating | 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             | T <sub>C</sub> = 25°C | 30     | A    |
| I <sub>CM</sub>           |                               | PULSE (Note. 2)       | 60     | A    |
| I <sub>E</sub> (Note. 1)  | Emitter Current               | T <sub>C</sub> = 25°C | 30     | A    |
| I <sub>EM</sub> (Note. 1) |                               | PULSE (Note. 2)       | 60     | A    |
| P <sub>C</sub> (Note. 3)  | Maximum collector dissipation | T <sub>f</sub> = 25°C | 66     | W    |

**CONVERTER PART**

| Symbol           | Parameter                              | Condition                                    | Rating              | Unit             |
|------------------|--|--|---------------------|------------------|
| V <sub>RRM</sub> | Repetitive peak reverse voltage        |  | 800                 | V                |
| E <sub>a</sub>   | Recommended AC input voltage           |  | 220                 | V                |
| I <sub>O</sub>   | DC output current                      | 1φ rectifying circuit T <sub>f</sub> = 111°C | 25                  | A                |
| I <sub>FSM</sub> | Surge (non-repetitive) forward current | 1 cycle at 60Hz, peak value Non-repetitive   | 550                 | A                |
| I <sup>2</sup> t | I <sup>2</sup> t for fusing            | Value for one cycle of surge current         | 1.2X10 <sup>3</sup> | A <sup>2</sup> s |

**COMMON RATING**

| Symbol           | Parameter            | Condition         | Rating      | Unit  |
|------------------|----------------------|-------------------|-------------|-------|
| T <sub>j</sub>   | Junction temperature |                   | -40 ~ +150  | °C    |
| T <sub>stg</sub> | Storage temperature  |                   | -40 ~ +125  | °C    |
| V <sub>iso</sub> | Isolation voltage    | AC 1 min.         | 2500        | V     |
| —                | Mounting torque      | Mounting M4 screw | 0.98 ~ 1.47 | N · m |
| —                | Weight               | Typical value     | 100         | g     |

## CM30MD3-12H

MEDIUM POWER SWITCHING USE  
FLAT-BASE TYPE, INSULATED TYPEELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C)  
INVERTER PART

| Symbol                         | Parameter                            | Test conditions                 | Limits |      |      | Unit |
|--------------------------------|--------------------------------------|---------------------------------|--------|------|------|------|
|                                |                                      |                                 | Min.   | Typ. | Max. |      |
| ICES                           | Collector cutoff current             | VCE = VCES, VGE = 0V            | —      | —    | 1    | mA   |
| VGE(th)                        | Gate-emitter threshold voltage       | IC = 3mA, VCE = 10V             | 4.5    | 6    | 7.5  | V    |
| IGES                           | Gate-emitter cutoff current          | VGE = VGES, VCE = 0V            | —      | —    | 0.5  | μA   |
| VCE(sat)                       | Collector-emitter saturation voltage | T <sub>j</sub> = 25°C           | —      | 2.1  | 2.8  | V    |
|                                |                                      | T <sub>j</sub> = 150°C          | —      | 2.15 | —    |      |
| Cies                           | Input capacitance                    | VCE = 10V<br>VGE = 0V           | —      | —    | 3.0  | nF   |
| Coes                           | Output capacitance                   |                                 | —      | —    | 2.4  | nF   |
| Cres                           | Reverse transfer capacitance         |                                 | —      | —    | 0.6  | nF   |
| QG                             | Total gate charge                    | VCC = 300V, IC = 30A, VGE = 15V | —      | 90   | —    | nC   |
| td (on)                        | Turn-on delay time                   | VCC = 300V, IC = 30A            | —      | —    | 120  | ns   |
| tr                             | Turn-on rise time                    | VGE1 = VGE2 = 15V               | —      | —    | 300  | ns   |
| td (off)                       | Turn-off delay time                  | RG = 21Ω                        | —      | —    | 200  | ns   |
| tf                             | Turn-off fall time                   | Resistive load                  | —      | —    | 300  | ns   |
| VEC (Note. 1)                  | Emitter-collector voltage            | IE = 30A, VGE = 0V              | —      | —    | 2.8  | V    |
| trr (Note. 1)                  | Reverse recovery time                | IE = 30A, VGE = 0V              | —      | —    | 110  | ns   |
| Qrr (Note. 1)                  | Reverse recovery charge              | die / dt = -60A / μs            | —      | 0.08 | —    | μC   |
| R <sub>th(j-Q)</sub> (Note. 5) | Thermal resistance                   | IGBT part, Per 1/6 module       | —      | —    | 1.9  | °C/W |
| R <sub>th(j-R)</sub> (Note. 5) |                                      | FWDi part, Per 1/6 module       | —      | —    | 2.4  | °C/W |

## CONVERTER PART

| Symbol                         | Parameter                  | Condition                         | Limits |      |      | Unit |
|--------------------------------|----------------------------|-----------------------------------|--------|------|------|------|
|                                |                            |                                   | Min.   | Typ. | Max. |      |
| IRRM                           | Repetitive reverse current | VR = VRRM, T <sub>j</sub> = 150°C | —      | —    | 8    | mA   |
| VFM                            | Forward voltage drop       | IF = 40A                          | —      | —    | 1.6  | V    |
| R <sub>th(j-I)</sub> (Note. 5) | Thermal resistance         | Per 1/4 module                    | —      | —    | 1.7  | °C/W |

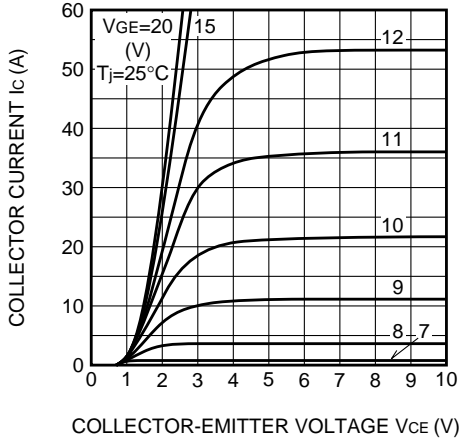
- Note 1. IE, VEC, trr, Qrr & die/dt represent characteristics of the anti-parallel, emitter to collector free-wheel diode.  
 2. Pulse width and repetition rate should be such that the device junction temp. (T<sub>j</sub>) does not exceed T<sub>jmax</sub> rating.  
 3. Junction temperature (T<sub>j</sub>) should not increase beyond 150°C.  
 4. Pulse width and repetition rate should be such as to cause negligible temperature rise.  
 5. Thermal resistance is specified under following conditions.  
 • The conductive grease applied, between module and fin.  
 • Al plate is used as fin.

# CM30MD3-12H

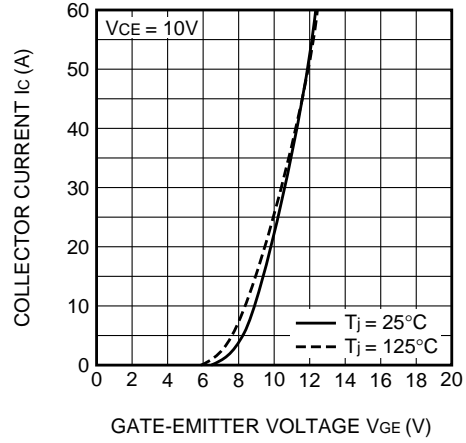
MEDIUM POWER SWITCHING USE  
FLAT-BASE TYPE, INSULATED TYPE

## PERFORMANCE CURVES

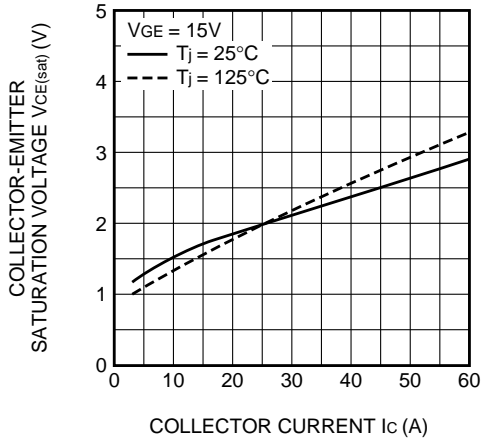
**OUTPUT CHARACTERISTICS (TYPICAL)**



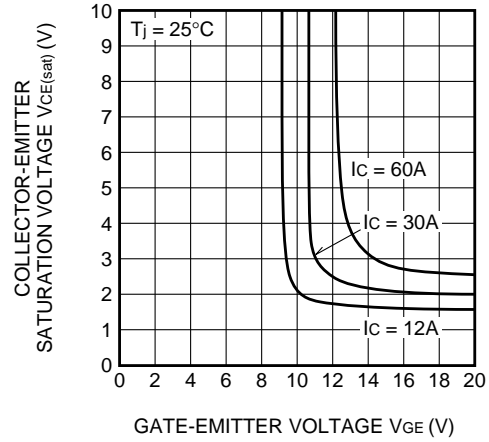
**TRANSFER CHARACTERISTICS (TYPICAL)**



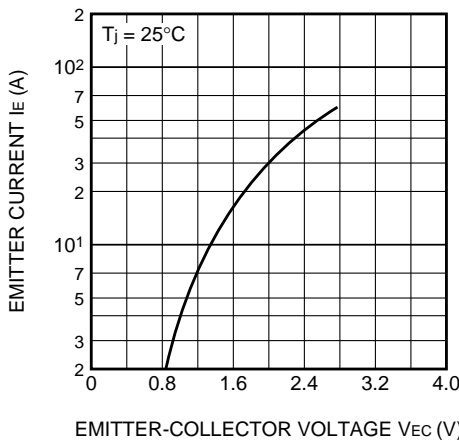
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



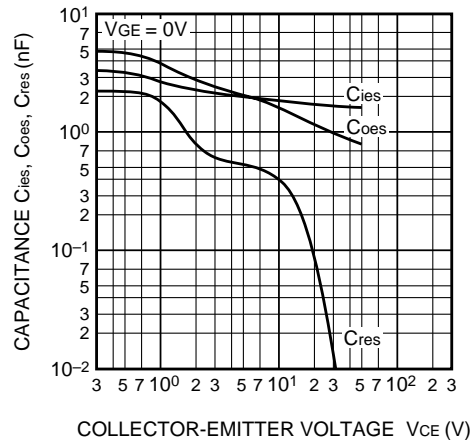
**COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



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



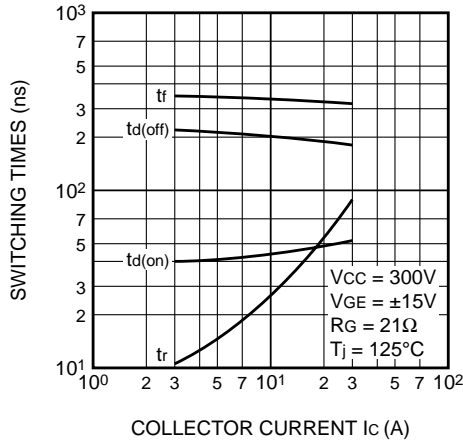
**CAPACITANCE VS. Vce (TYPICAL)**



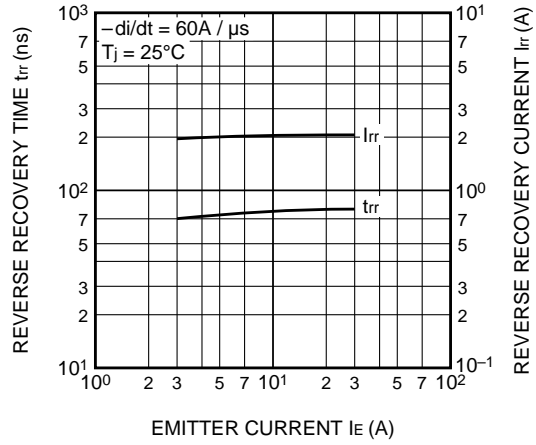
# CM30MD3-12H

MEDIUM POWER SWITCHING USE  
FLAT-BASE TYPE, INSULATED TYPE

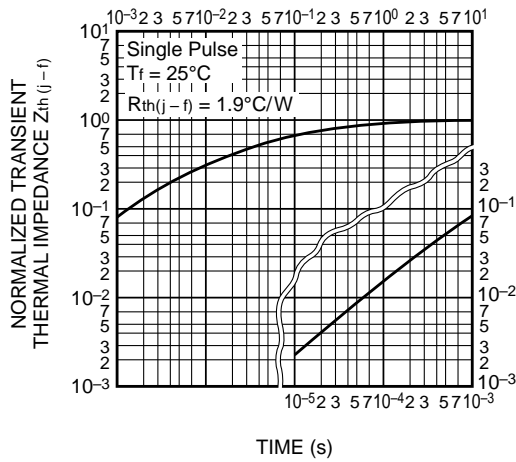
**HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)**



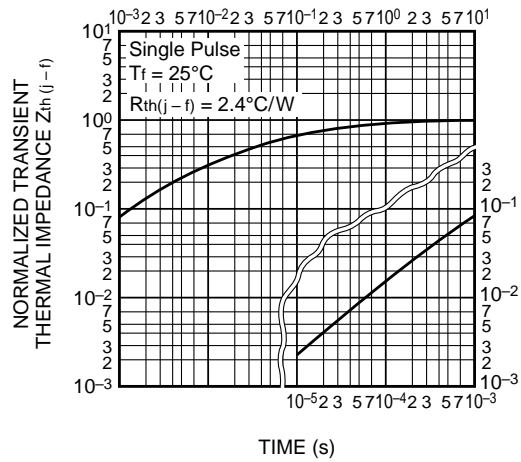
**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)**



**VGE - GATE CHARGE (TYPICAL)**

