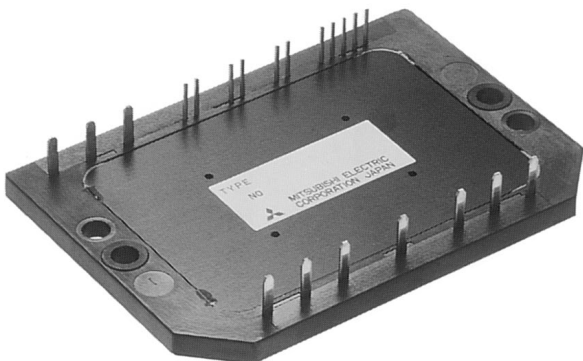


CM15MD-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

CM15MD-12H



- IC 15A
- VCES 600V
- Insulated Type
- CIB Module
- 3φ Inverter+3φ Converter+Brake
- UL Recognized

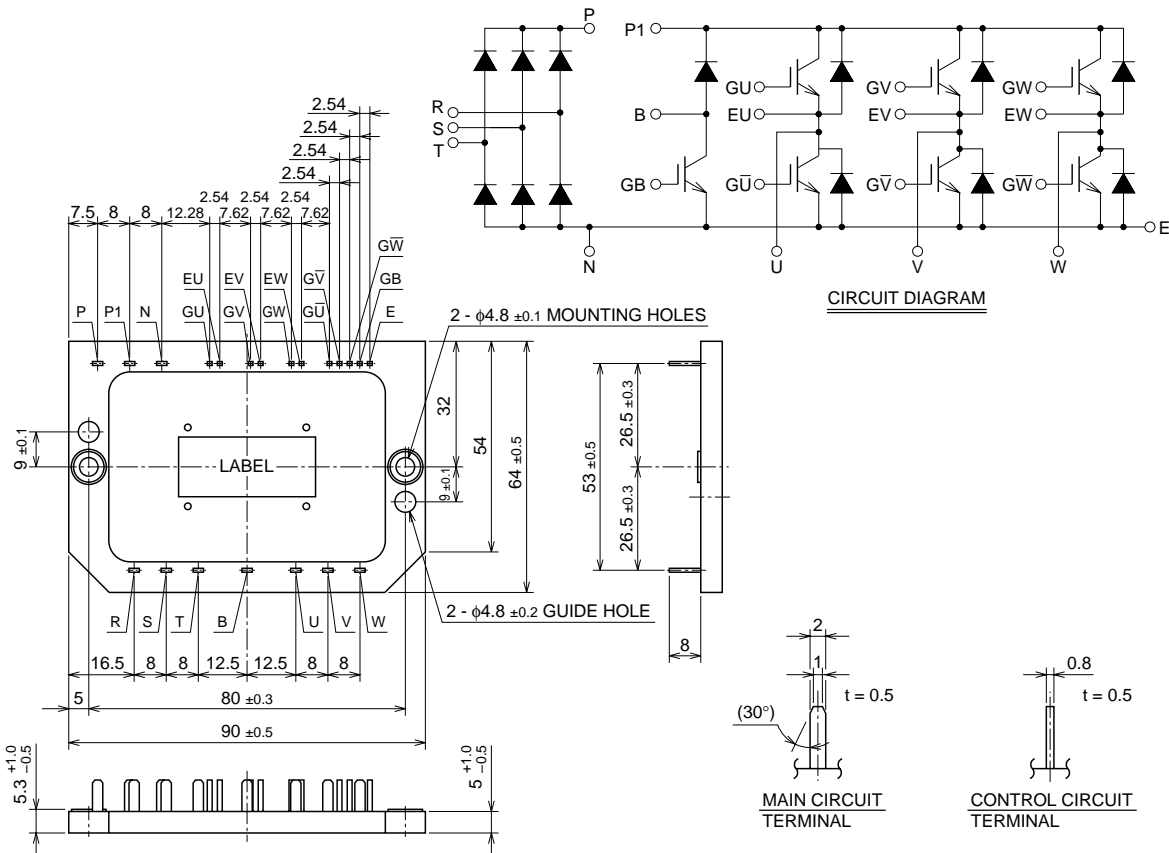
Yellow Card No. E80276 (N)
File No. E80271

APPLICATION

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

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



Note. Not use the guiding holes to mount on the cooling fin.

CM15MD-12H

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

| Symbol | Parameter | Condition | Rating | Unit |
|---------------------------|-------------------------------|-----------------------|--------|------|
| V _{CES} | Collector-emitter voltage | G – E Short | 600 | V |
| V _{GES} | Gate-emitter voltage | C – E Short | ±20 | V |
| I _C | Collector Current | T _C = 25°C | 15 | A |
| I _{CM} | | PULSE (Note. 2) | 30 | A |
| I _E (Note. 1) | Emitter Current | T _C = 25°C | 15 | A |
| I _{EM} (Note. 1) | | PULSE (Note. 2) | 30 | A |
| P _C (Note. 3) | Maximum collector dissipation | T _f = 25°C | 45 | W |

BRAKE PART

| Symbol | Parameter | Condition | Rating | Unit |
|---------------------------|---------------------------------|-----------------------|--------|------|
| V _{CES} | Collector-emitter voltage | G – E Short | 600 | V |
| V _{GES} | Gate-emitter voltage | C – E Short | ±20 | V |
| I _C | Collector Current | T _C = 25°C | 15 | A |
| I _{CM} | | PULSE (Note. 2) | 30 | A |
| P _C (Note. 3) | Maximum Collector dissipation | T _f = 25°C | 45 | W |
| V _{RRM} | Repetitive peak reverse voltage | Clamp diode part | 600 | V |
| I _{FM} (Note. 3) | Forward current | Clamp diode part | 15 | A |

CONVERTER PART

| Symbol | Parameter | Condition | Rating | Unit |
|------------------|--|--|--------|------------------|
| V _{RRM} | Repetitive peak reverse voltage | | 800 | V |
| E _a | Recommended AC input voltage | | 220 | V |
| I _O | DC output current | 3φ rectifying circuit | 15 | A |
| I _{FSM} | Surge (non-repetitive) forward current | 1 cycle at 60Hz, peak value Non-repetitive | 150 | A |
| I ² t | I ² t for fusing | Value for one cycle of surge current | 93 | A ² s |

COMMON RATING

| Symbol | Parameter | Condition | Rating | Unit |
|------------------|----------------------|-------------------|-------------|-------|
| T _j | Junction temperature | | -40 ~ +150 | °C |
| T _{stg} | Storage temperature | | -40 ~ +125 | °C |
| V _{iso} | Isolation voltage | AC 1 min. | 2500 | V |
| — | Mounting torque | Mounting M4 screw | 1.47 ~ 1.96 | N · m |
| — | Weight | Typical value | 60 | g |

CM15MD-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPEELECTRICAL CHARACTERISTICS (T_j = 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 = 1.5mA, 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 | IC = 15A, VGE = 15V (Note. 4) | T _j = 25°C | — | 2.1 | 2.8 | V |
| | | | T _j = 150°C | — | 2.15 | — | |
| Cies | Input capacitance | VCE = 10V VGE = 0V | — | — | 1.5 | nF | |
| Co _{es} | Output capacitance | | — | — | 1.2 | nF | |
| Cres | Reverse transfer capacitance | | — | — | 0.3 | nF | |
| QG | Total gate charge | VCC = 300V, IC = 15A, VGE = 15V | — | 45 | — | nC | |
| td (on) | Turn-on delay time | VCC = 300V, IC = 15A | — | — | 120 | ns | |
| tr | Turn-on rise time | VGE1 = VGE2 = 15V | — | — | 300 | ns | |
| td (off) | Turn-off delay time | RG = 42Ω | — | — | 200 | ns | |
| tf | Turn-off fall time | Resistive load | — | — | 300 | ns | |
| VEC (Note. 1) | Emitter-collector voltage | IE = 15A, VGE = 0V | — | — | 2.8 | V | |
| trr (Note. 1) | Reverse recovery time | IE = 15A, VGE = 0V | — | — | 110 | ns | |
| Qrr (Note. 1) | Reverse recovery charge | die / dt = -30A / μs | — | 0.04 | — | μC | |
| R _{th(j-f)Q} (Note. 5) | Thermal resistance | IGBT part, Per 1/6 module | — | — | 2.8 | °C/W | |
| R _{th(j-f)R} (Note. 5) | | FWDi part, Per 1/6 module | — | — | 3.5 | °C/W | |

BRAKE PART

| Symbol | Parameter | Condition | Limits | | | Unit | |
|---------------------------------|---|---------------------------------|------------------------|------|------|------|---|
| | | | Min. | Typ. | Max. | | |
| ICES | Collector cutoff current | VCE = VCES, VGE = 0V | — | — | 1 | mA | |
| VGE(th) | Gate-emitter threshold voltage | IC = 1.5mA, VCE = 10V | 4.5 | 6 | 7.5 | V | |
| IGES | Gate-emitter cutoff current | VGE = VGES, VCE = 0V | — | — | 0.5 | μA | |
| VCE(sat) | Collector-to-emitter saturation voltage | IC = 15A, VGE = 15V (Note. 4) | T _j = 25°C | — | 2.1 | 2.8 | V |
| | | | T _j = 150°C | — | 2.15 | — | |
| Cies | Input capacitance | VCE = 10V VGE = 0V | — | — | 1.5 | nF | |
| Co _{es} | Output capacitance | | — | — | 1.2 | nF | |
| Cres | Reverse transfer capacitance | | — | — | 0.3 | nF | |
| QG | Total gate charge | VCC = 300V, IC = 15A, VGE = 15V | — | 45 | — | nC | |
| VFM | Forward voltage drop | IF = 15A, Clamp diode part | — | — | 1.5 | V | |
| R _{th(j-f)Q} (Note. 5) | Thermal resistance | IGBT part | — | — | 2.8 | °C/W | |
| R _{th(j-f)R} (Note. 5) | | Clamp diode part | — | — | 3.6 | °C/W | |

CONVERTER PART

| Symbol | Parameter | Condition | Limits | | | Unit |
|--------------------------------|----------------------------|-----------------------------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| IRRM | Repetitive reverse current | VR = VRRM, T _j = 150°C | — | — | 8 | mA |
| VFM | Forward voltage drop | IF = 15A | — | — | 1.5 | V |
| R _{th(j-f)} (Note. 5) | Thermal resistance | Per 1/6 module | — | — | 3.6 | °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_j) does not exceed T_{jmax} rating.

3. Junction temperature (T_j) 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.

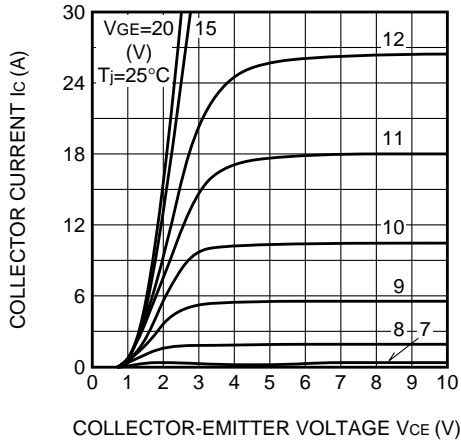
- The conductive grease applied, between module and fin.
- Al plate is used as fin.

CM15MD-12H

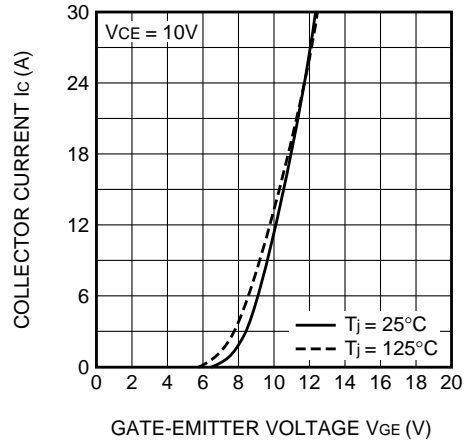
MEDIUM POWER SWITCHING USE
INSULATED TYPE

PERFORMANCE CURVES

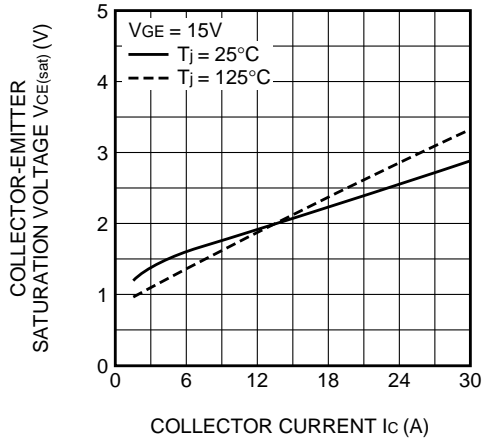
OUTPUT CHARACTERISTICS (TYPICAL)



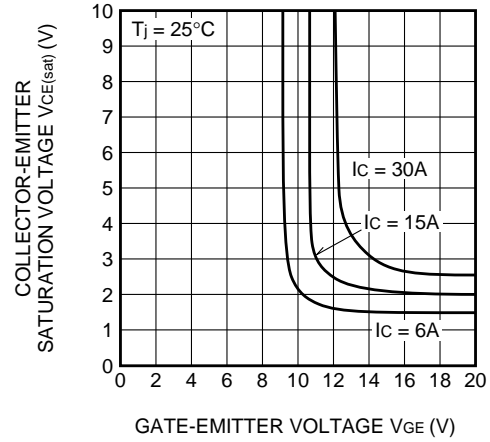
TRANSFER CHARACTERISTICS (TYPICAL)



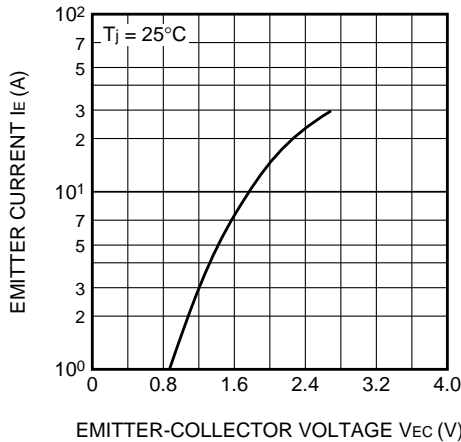
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



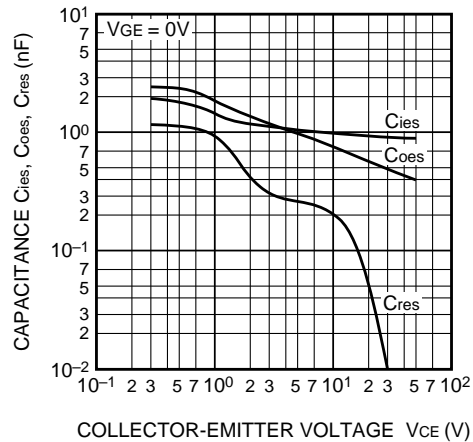
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



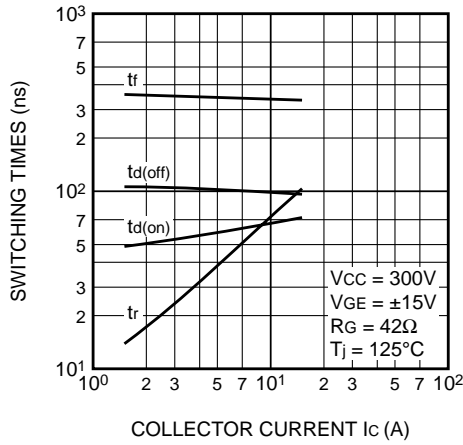
CAPACITANCE VS. Vce (TYPICAL)



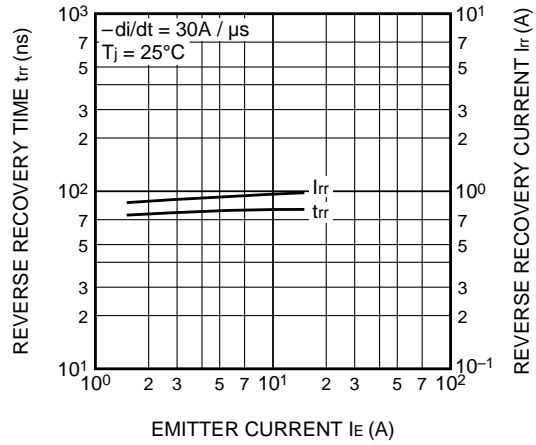
CM15MD-12H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

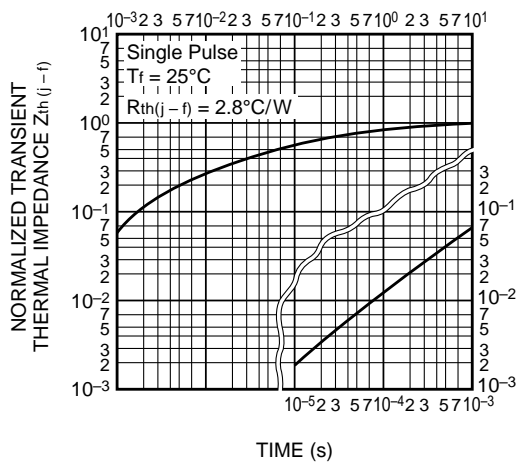
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



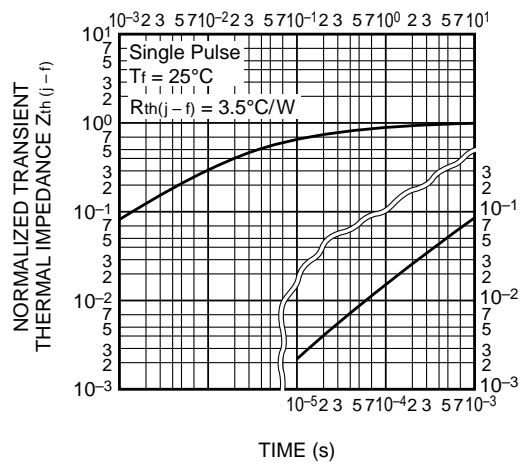
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (FWDi part)



V_{GE} - GATE CHARGE (TYPICAL)

