

MITSUBISHI IGBT MODULES
CM400DU-24F

HIGH POWER SWITCHING USE

CM400DU-24F



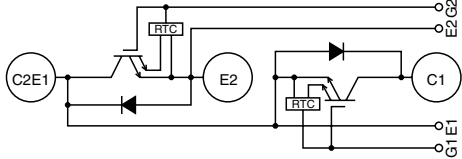
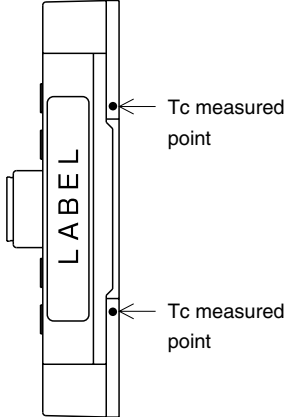
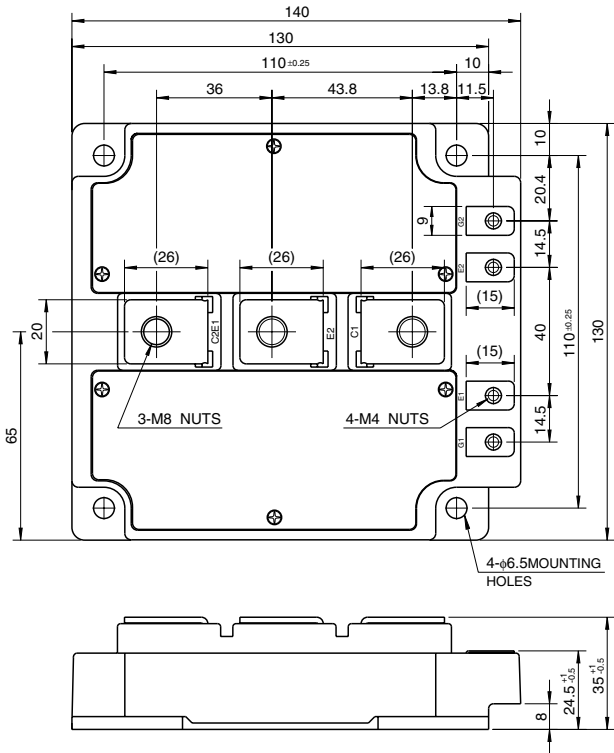
- IC 400A
- VCES 1200V
- Insulated Type
- 2-elements in a pack

APPLICATION

General purpose inverters & Servo controllers, etc

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



CIRCUIT DIAGRAM

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MAXIMUM RATINGS (T_j = 25°C, unless otherwise specified)

| Symbol | Parameter | Conditions | Ratings | Unit |
|--------------------------|-------------------------------|--|------------|-------|
| V _{CE} S | Collector-emitter voltage | G-E Short | 1200 | V |
| V _{GE} S | Gate-emitter voltage | C-E Short | ±20 | V |
| I _C | Collector current | T _C = 25°C | 400 | A |
| I _{CM} | | Pulse (Note 2) | 800 | A |
| I _E (Note 1) | Emitter current | T _C = 25°C | 400 | A |
| I _{EM} (Note 1) | | Pulse (Note 2) | 800 | A |
| P _C (Note 3) | Maximum collector dissipation | T _C = 25°C | 1100 | W |
| T _j | Junction temperature | | -40 ~ +150 | °C |
| T _{stg} | Storage temperature | | -40 ~ +125 | °C |
| V _{iso} | Isolation voltage | Terminals to base plate, f = 60Hz, AC 1 minute | 2500 | Vrms |
| — | Torque strength | Main terminals M8 screw | 8.8 ~ 10.8 | N • m |
| | | Mounting M6 screw | 3.5 ~ 4.5 | |
| | | G(E) Terminal M4 screw | 1.3 ~ 1.7 | |
| — | Weight | Typical value | 1200 | g |

ELECTRICAL CHARACTERISTICS (T_j = 25°C, unless otherwise specified)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|--------------------------|--------------------------------------|---|------------------------|-------|---------|------|
| | | | Min. | Typ. | Max. | |
| I _{CE} S | Collector cutoff current | V _{CE} = V _{CE} S, V _{GE} = 0V | — | — | 2 | mA |
| V _{GE(th)} | Gate-emitter threshold voltage | I _C = 40mA, V _{CE} = 10V | 5 | 6 | 7 | V |
| I _{GE} S | Gate leakage current | ±V _{GE} = V _{GE} S, V _{CE} = 0V | — | — | 80 | μA |
| V _{CE(sat)} | Collector-emitter saturation voltage | I _C = 400A, V _{GE} = 15V | T _j = 25°C | | 2.4 | V |
| | | | T _j = 125°C | | — | |
| C _{ies} | Input capacitance | V _{CE} = 10V V _{GE} = 0V | — | — | 160 | nF |
| C _{oes} | Output capacitance | | — | — | 6.8 | nF |
| C _{res} | Reverse transfer capacitance | | — | — | 4.0 | nF |
| Q _G | Total gate charge | V _{CC} = 600V, I _C = 400A, V _{GE} = 15V | — | 4400 | — | nC |
| t _{d(on)} | Turn-on delay time | V _{CC} = 600V, I _C = 400A V _{GE} = ±15V R _G = 3.1Ω, Inductive load I _E = 400A | — | — | 450 | ns |
| t _r | Turn-on rise time | | — | — | 200 | ns |
| t _{d(off)} | Turn-off delay time | | — | — | 1000 | ns |
| t _f | Turn-off fall time | | — | — | 300 | ns |
| t _{rr} (Note 1) | Reverse recovery time | | — | — | 550 | ns |
| Q _{rr} (Note 1) | Reverse recovery charge | | — | 23.6 | — | μC |
| V _{EC} (Note 1) | Emitter-collector voltage | I _E = 400A, V _{GE} = 0V | — | — | 3.2 | V |
| R _{th(j-c)Q} | Thermal resistance*1 | IGBT part (1/2 module) | — | — | 0.11 | K/W |
| R _{th(j-c)R} | | FWDi part (1/2 module) | — | — | 0.13 | K/W |
| R _{th(c-f)} | Contact thermal resistance | Case to heat sink, Thermal compound applied*2 (1/2 module) | — | 0.010 | — | K/W |
| R _{th(j-c')Q} | Thermal resistance | Case temperature measured point is just under the chips | — | — | 0.045*3 | K/W |
| R _G | External gate resistance | | 3.1 | — | 15 | Ω |

Note 1. I_E, V_{EC}, t_{rr}, Q_{rr} & die/dt 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_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.

*1 : Case temperature (T_c) measured point is indicated in OUTLINE DRAWING.

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

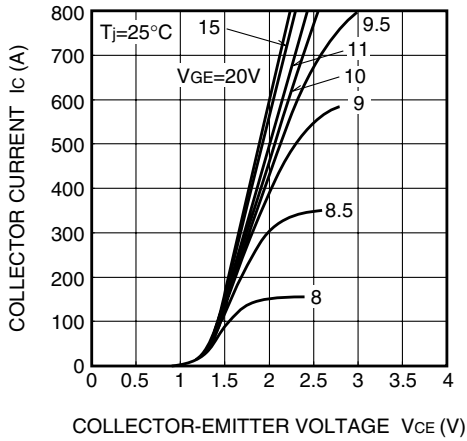
*3 : If you use this value, R_{th(f-a)} should be measured just under the chips.

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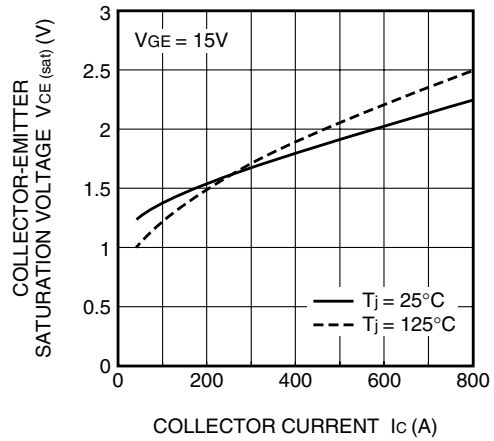
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

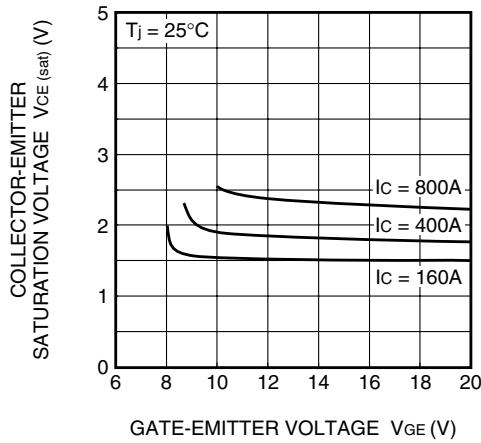
OUTPUT CHARACTERISTICS (TYPICAL)



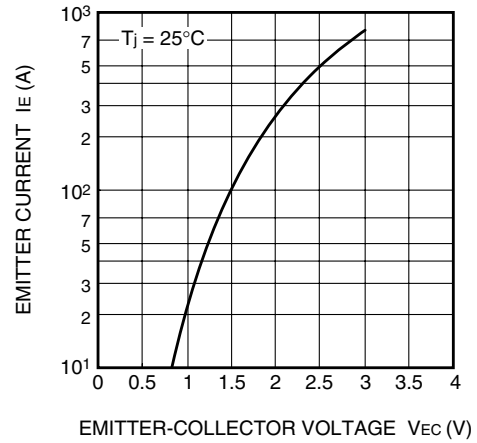
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



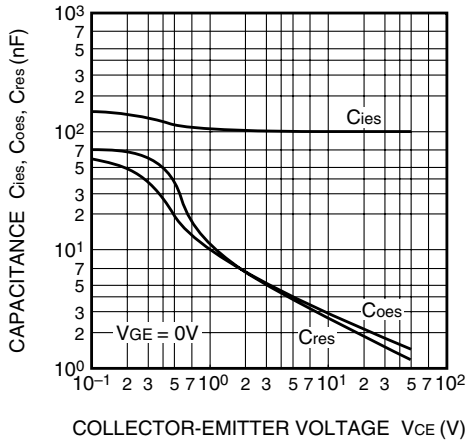
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



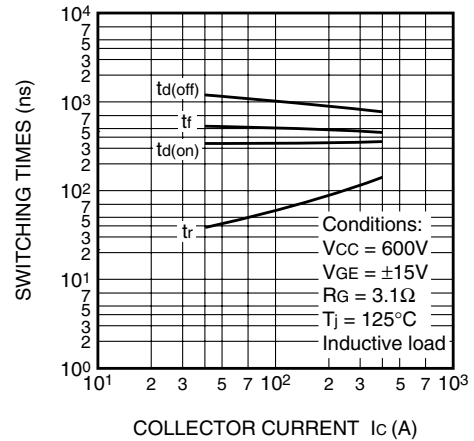
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



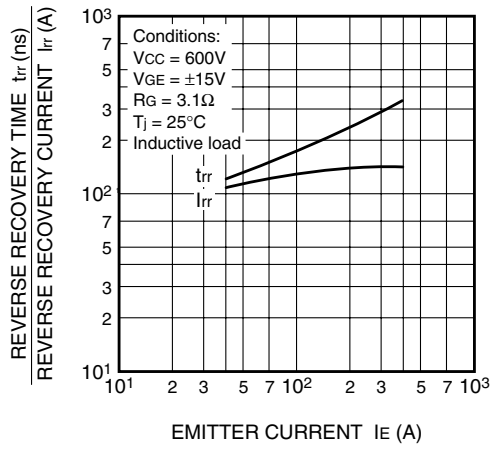
CAPACITANCE-Vce CHARACTERISTICS (TYPICAL)



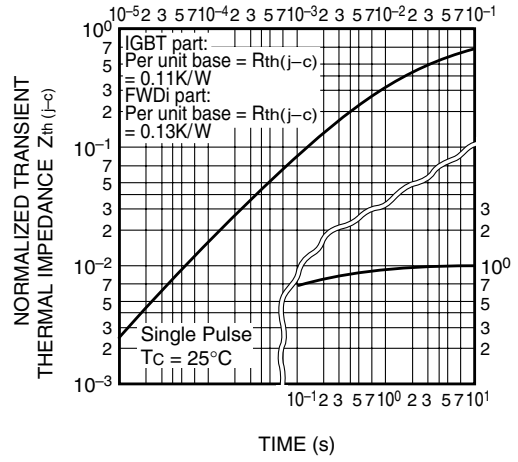
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

