

MITSUBISHI IGBT MODULES
CM150TU-12F

HIGH POWER SWITCHING USE

CM150TU-12F



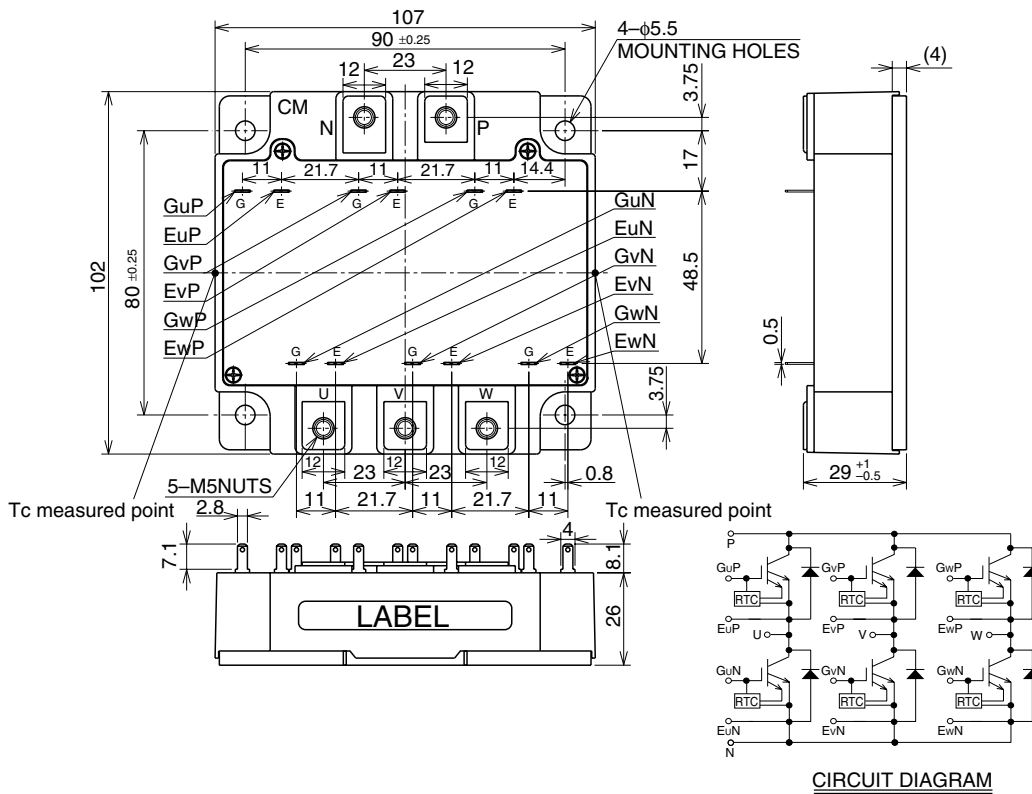
- IC 150A
- VCES 600V
- Insulated Type
- 6-elements in a pack

APPLICATION

General purpose inverters & Servo controls, etc

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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

| Symbol | Parameter | Conditions | Ratings | 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 | 150 | A |
| I _{CM} | | Pulse (Note 2) | 300 | |
| I _E (Note 1) | Emitter current | T _c = 25°C | 150 | A |
| I _{EM} (Note 1) | | Pulse (Note 2) | 300 | |
| P _C (Note 3) | Maximum collector dissipation | T _c = 25°C | 520 | 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 | V _{rms} |
| — | Torque strength | Main terminals M5 screw | 2.5 ~ 3.5 | N • m |
| | | Mounting M5 screw | 2.5 ~ 3.5 | N • m |
| — | Weight | Typical value | 680 | g |

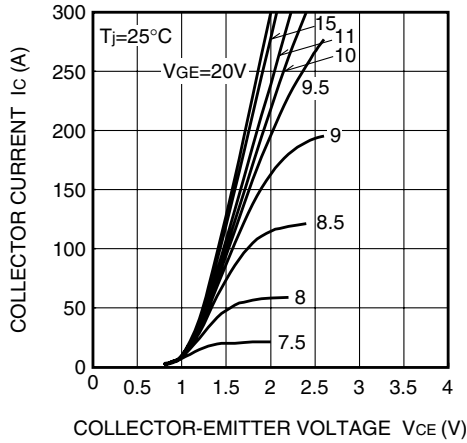
ELECTRICAL CHARACTERISTICS (T_j = 25°C, unless otherwise specified)

| Symbol | Parameter | Test conditions | Limits | | | Unit | | | | | | | | |
|--------------------------|--------------------------------------|---|--|------|--------|-----------------------|---|-----|-----|------------------------|---|-----|---|---|
| | | | Min. | Typ. | Max. | | | | | | | | | |
| I _{CES} | Collector cutoff current | V _{CE} = V _{CES} , V _{GE} = 0V | — | — | 1 | mA | | | | | | | | |
| V _{GE(th)} | Gate-emitter threshold voltage | I _C = 15mA, V _{CE} = 10V | 5 | 6 | 7 | V | | | | | | | | |
| I _{GES} | Gate leakage current | ±V _{GE} = V _{GES} , V _{CE} = 0V | — | — | 20 | μA | | | | | | | | |
| V _{CE(sat)} | Collector-emitter saturation voltage | I _C = 150A, V _{GE} = 15V | <table border="1"> <tr> <td>T_j = 25°C</td> <td>—</td> <td>1.6</td> <td>2.2</td> </tr> <tr> <td>T_j = 125°C</td> <td>—</td> <td>1.6</td> <td>—</td> </tr> </table> | | | T _j = 25°C | — | 1.6 | 2.2 | T _j = 125°C | — | 1.6 | — | V |
| T _j = 25°C | — | 1.6 | 2.2 | | | | | | | | | | | |
| T _j = 125°C | — | 1.6 | — | | | | | | | | | | | |
| C _{ies} | Input capacitance | V _{CE} = 10V V _{GE} = 0V | — | — | 41 | nF | | | | | | | | |
| C _{oes} | Output capacitance | | — | — | 2.7 | | | | | | | | | |
| C _{res} | Reverse transfer capacitance | | — | — | 1.5 | | | | | | | | | |
| Q _G | Total gate charge | V _{CC} = 300V, I _C = 150A, V _{GE} = 15V | — | 930 | — | nC | | | | | | | | |
| t _{d(on)} | Turn-on delay time | V _{CC} = 300V, I _C = 150A V _{GE} = ±15V R _G = 4.2Ω, Inductive load I _E = 150A | — | — | 120 | ns | | | | | | | | |
| t _r | Turn-on rise time | | — | — | 100 | | | | | | | | | |
| t _{d(off)} | Turn-off delay time | | — | — | 350 | | | | | | | | | |
| t _f | Turn-off fall time | | — | — | 250 | | | | | | | | | |
| t _{rr} (Note 1) | Reverse recovery time | | — | — | 150 | | | | | | | | | |
| Q _{rr} (Note 1) | Reverse recovery charge | — | 2.8 | — | μC | | | | | | | | | |
| V _{EC} (Note 1) | Emitter-collector voltage | I _E = 150A, V _{GE} = 0V | — | — | 2.6 | V | | | | | | | | |
| R _{th(j-c)Q} | Thermal resistance*1 | IGBT part (1/6 module) | — | — | 0.24 | K/W | | | | | | | | |
| R _{th(j-c)R} | | FWDi part (1/6 module) | — | — | 0.47 | | | | | | | | | |
| R _{th(c-f)} | Contact thermal resistance | Case to heat sink, Thermal compound applied*2 (1/6 module) | — | 0.09 | — | | | | | | | | | |
| R _{th(j-c)Q} | Thermal resistance | Case temperature measured point is just under the chips | — | — | 0.19*3 | | | | | | | | | |
| R _G | External gate resistance | | 4.2 | — | 42 | Ω | | | | | | | | |

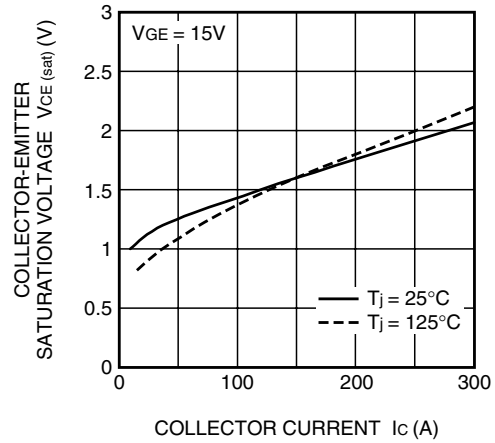
Note 1. I_E, V_{EC}, t_{rr}, Q_{rr} & die/dt represent characteristics of the anti-parallel, emitter-collector free-wheel diode (FWDi).
 2. Pulse width and repetition rate should be such that the device junction temperature (T_j) does not exceed T_{jmax} rating.
 3. Junction temperature (T_j) should 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.

PERFORMANCE CURVES

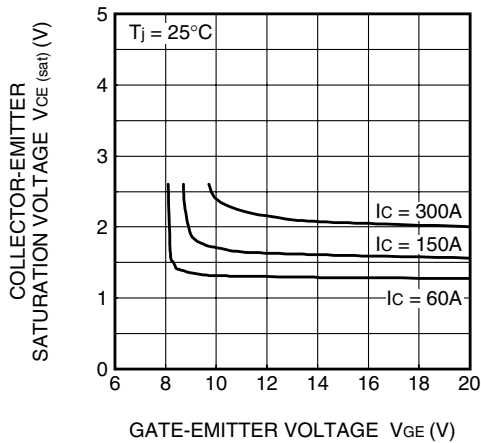
OUTPUT CHARACTERISTICS (TYPICAL)



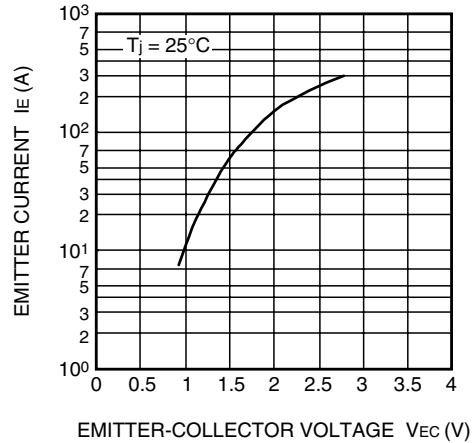
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



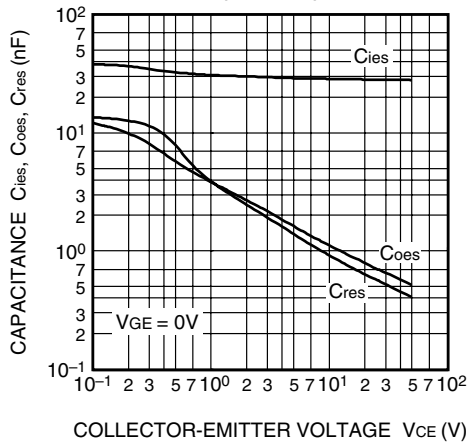
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



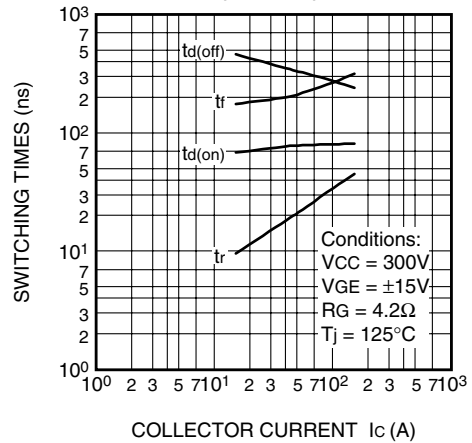
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE- V_{ce} CHARACTERISTICS (TYPICAL)



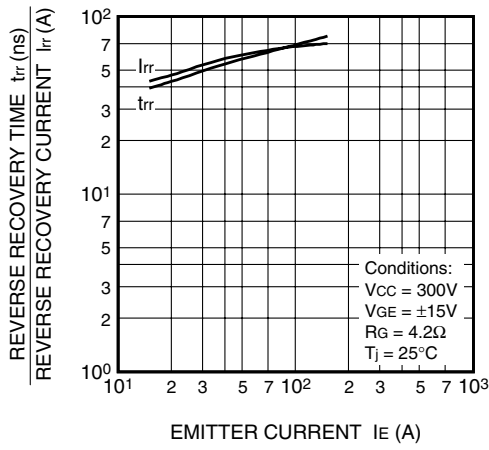
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



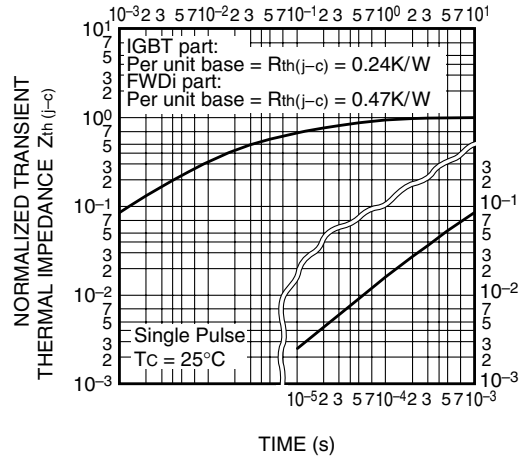
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HIGH POWER SWITCHING USE

REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

