



CM75TU-12F

HIGH POWER SWITCHING USE

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

| Symbol                   | Parameter                     | Conditions                                     | Ratings    | 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                          | 75         | A                |
| I <sub>CM</sub>          |                               | Pulse (Note 2)                                 | 150        |                  |
| I <sub>E</sub> (Note 1)  | Emitter current               | T <sub>c</sub> = 25°C                          | 75         | A                |
| I <sub>EM</sub> (Note 1) |                               | Pulse (Note 2)                                 | 150        |                  |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>c</sub> = 25°C                          | 290        | 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             | Terminals to base plate, f = 60Hz, AC 1 minute | 2500       | V <sub>rms</sub> |
| —                        | Torque strength               | Main terminals M4 screw                        | 1.3 ~ 1.7  | N • m            |
|                          |                               | Mounting M5 screw                              | 2.5 ~ 3.5  | N • m            |
| —                        | Weight                        | Typical value                                  | 570        | g                |

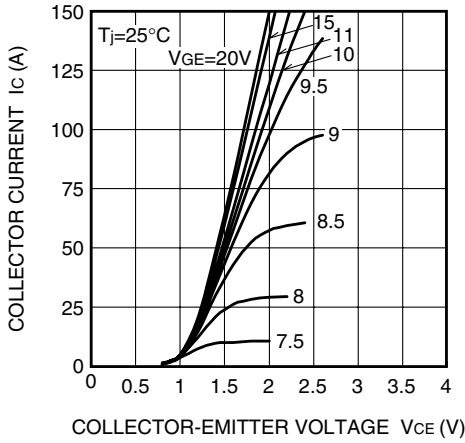
ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C, unless otherwise specified)

| Symbol                   | Parameter                            | 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   | —  | —    | 1      | mA                    |   |     |     |                        |   |     |   |   |
| V <sub>GE(th)</sub>      | Gate-emitter threshold voltage       | I <sub>C</sub> = 7.5mA, V <sub>CE</sub> = 10V   | 5  | 6    | 7      | V                     |   |     |     |                        |   |     |   |   |
| I <sub>GES</sub>         | Gate leakage current                 | ±V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0V  | —  | —    | 20     | μA                    |   |     |     |                        |   |     |   |   |
| V <sub>CE(sat)</sub>     | Collector-emitter saturation voltage | I <sub>C</sub> = 75A, V <sub>GE</sub> = 15V   | <table border="0"> <tr> <td>T<sub>j</sub> = 25°C</td> <td>—</td> <td>1.6</td> <td>2.2</td> </tr> <tr> <td>T<sub>j</sub> = 125°C</td> <td>—</td> <td>1.6</td> <td>—</td> </tr> </table> |      |        | T <sub>j</sub> = 25°C | — | 1.6 | 2.2 | T <sub>j</sub> = 125°C | — | 1.6 | — | V |
| T <sub>j</sub> = 25°C    | —                                    | 1.6   | 2.2  |      |        |                       |   |     |     |                        |   |     |   |   |
| T <sub>j</sub> = 125°C   | —                                    | 1.6   | —  |      |        |                       |   |     |     |                        |   |     |   |   |
| C <sub>ies</sub>         | Input capacitance                    | V <sub>CE</sub> = 10V<br>V <sub>GE</sub> = 0V   | —  | —    | 20     | nF                    |   |     |     |                        |   |     |   |   |
| C <sub>oes</sub>         | Output capacitance                   |   | —  | —    | 1.4    |                       |   |     |     |                        |   |     |   |   |
| C <sub>res</sub>         | Reverse transfer capacitance         |   | —  | —    | 0.75   |                       |   |     |     |                        |   |     |   |   |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 300V, I <sub>C</sub> = 75A, V <sub>GE</sub> = 15V   | —  | 465  | —      | nC                    |   |     |     |                        |   |     |   |   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 300V, I <sub>C</sub> = 75A<br>V <sub>GE</sub> = ±15V<br>R <sub>G</sub> = 8.3Ω, Inductive load<br>I <sub>E</sub> = 75A | —  | —    | 100    | ns                    |   |     |     |                        |   |     |   |   |
| t <sub>r</sub>           | Turn-on rise time                    |   | —  | —    | 80     |                       |   |     |     |                        |   |     |   |   |
| t <sub>d(off)</sub>      | Turn-off delay time                  |   | —  | —    | 300    |                       |   |     |     |                        |   |     |   |   |
| t <sub>f</sub>           | Turn-off fall time                   |   | —  | —    | 250    |                       |   |     |     |                        |   |     |   |   |
| t <sub>rr</sub> (Note 1) | Reverse recovery time                |   | —  | —    | 150    |                       |   |     |     |                        |   |     |   |   |
| Q <sub>rr</sub> (Note 1) | Reverse recovery charge              | —   | 1.4  | —    | μC     |                       |   |     |     |                        |   |     |   |   |
| V <sub>EC</sub> (Note 1) | Emitter-collector voltage            | I <sub>E</sub> = 75A, V <sub>GE</sub> = 0V  | —  | —    | 2.6    | V                     |   |     |     |                        |   |     |   |   |
| R <sub>th(j-c)Q</sub>    | Thermal resistance*1                 | IGBT part (1/6 module)  | —  | —    | 0.43   | K/W                   |   |     |     |                        |   |     |   |   |
| R <sub>th(j-c)R</sub>    |                                      | FWDi part (1/6 module)  | —  | —    | 0.9    |                       |   |     |     |                        |   |     |   |   |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to heat sink, Thermal compound applied*2 (1/6 module)  | —  | 0.11 | —      |                       |   |     |     |                        |   |     |   |   |
| R <sub>th(j-c')Q</sub>   | Thermal resistance                   | Case temperature measured point is just under the chips   | —  | —    | 0.34*3 |                       |   |     |     |                        |   |     |   |   |
| R <sub>G</sub>           | External gate resistance             |   | 8.3  | —    | 83     | Ω                     |   |     |     |                        |   |     |   |   |

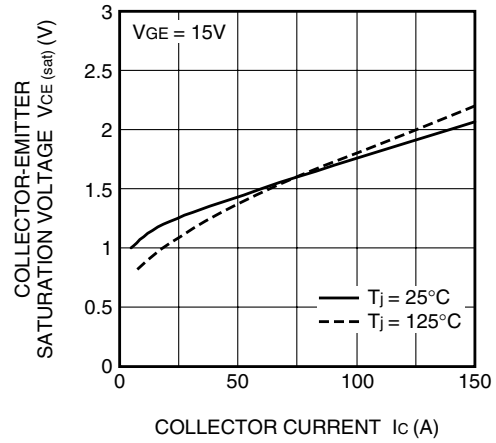
Note 1. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub>, Q<sub>rr</sub> & die/dt represent characteristics of the anti-parallel, emitter-collector free-wheel diode (FWDi).  
 2. Pulse width and repetition rate should be such that the device junction temperature (T<sub>j</sub>) does not exceed T<sub>jmax</sub> rating.  
 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.  
 \*1 : Case temperature (T<sub>c</sub>) 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<sub>th(f-a)</sub> should be measured just under the chips.

PERFORMANCE CURVES

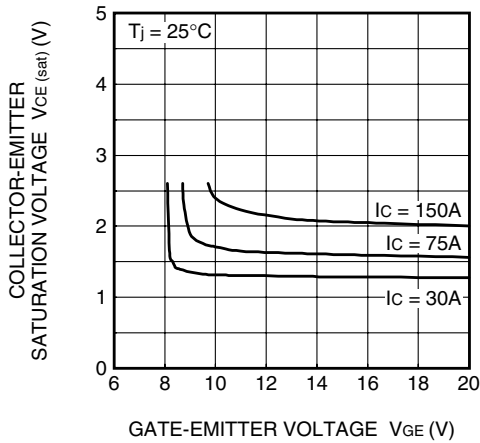
OUTPUT CHARACTERISTICS (TYPICAL)



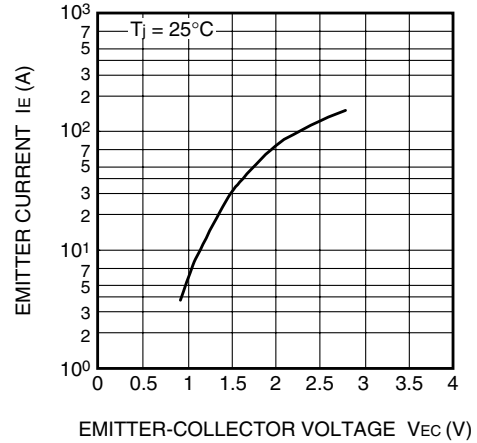
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



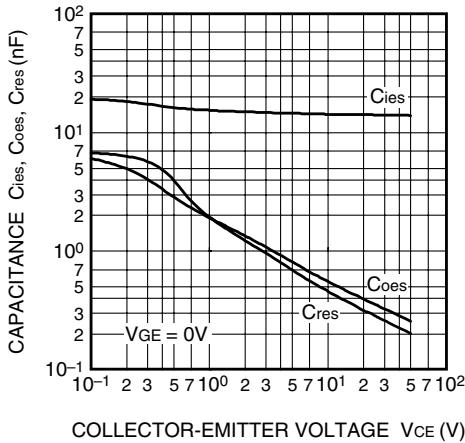
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



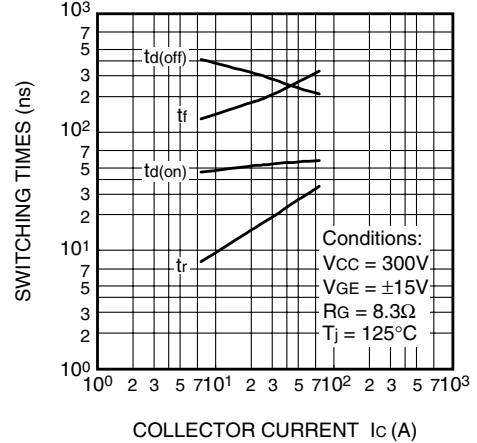
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



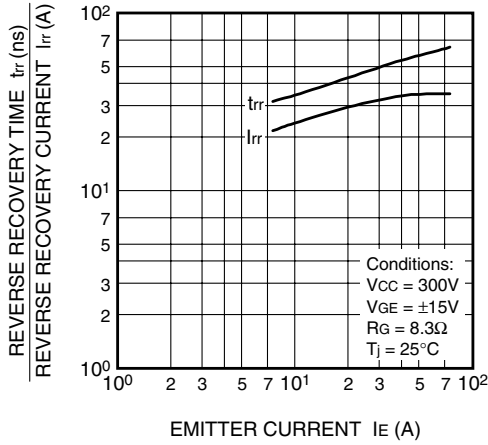
CAPACITANCE-Vce CHARACTERISTICS (TYPICAL)



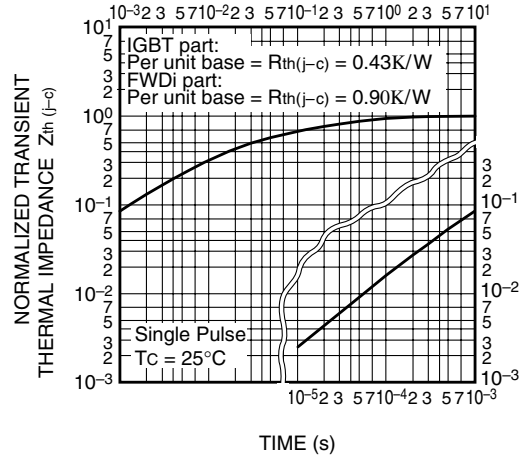
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



GATE CHARGE CHARACTERISTICS (TYPICAL)

