

MITSUBISHI IGBT MODULES  
**CM150TL-24NF**

HIGH POWER SWITCHING USE

**CM150TL-24NF**



- IC ..... 150A
- VCES ..... 1200V
- Insulated Type
- 6-elements in a pack

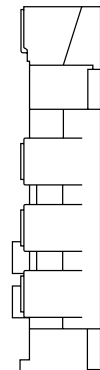
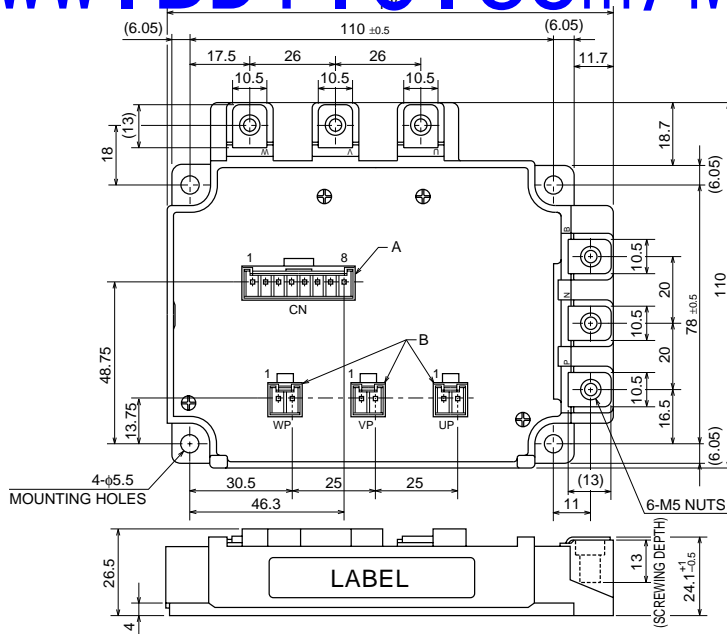
**APPLICATION**

AC drive inverters & Servo controls, etc

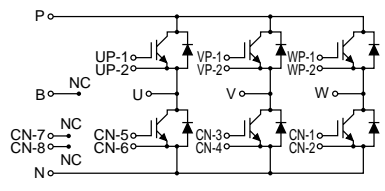
**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm

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Housing Type of A and B  
 (J.S.T.Mfg.Co.Ltd)  
 A = B8P-VH-FB-B, B = B2P-VH-FB-B



**CIRCUIT DIAGRAM**

## CM150TL-24NF

HIGH POWER SWITCHING USE

ABSOLUTE MAXIMUM RATINGS (T<sub>j</sub> = 25°C)

| Symbol                   | Parameter                     | Conditions                              | Ratings    | Unit |
|--------------------------|-------------------------------|---|------------|------|
| V <sub>CE</sub> S        | Collector-emitter voltage     | G-E Short                               | 1200       | V    |
| V <sub>GE</sub> S        | Gate-emitter voltage          | C-E Short                               | ±20        | V    |
| I <sub>C</sub>           | Collector current             | DC, T <sub>c</sub> = 76°C <sup>*1</sup> | 150        | A    |
| I <sub>CM</sub>          |                               | Pulse (Note 2)                          | 300        | A    |
| I <sub>E</sub> (Note 1)  | Emitter current               |   | 150        | A    |
| I <sub>EM</sub> (Note 1) |                               | Pulse (Note 2)                          | 300        | A    |
| P <sub>C</sub> (Note 3)  | Maximum collector dissipation | T <sub>c</sub> = 25°C                   | 890        | 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             | Main Terminal to base plate, AC 1 min.  | 2500       | V    |
| —                        | Torque strength               | Main Terminal M5                        | 2.5 ~ 3.5  | N•m  |
| —                        |                               | Mounting holes M5                       | 2.5 ~ 3.5  | N•m  |
| —                        | Weight                        | Typical value                           | 750        | g    |

ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25°C)

| Symbol                   | Parameter                            | Test conditions  | Limits |       |      | Unit |
|--------------------------|--------------------------------------|--|--------|-------|------|------|
|                          |                                      |  | Min.   | Typ.  | Max. |      |
| I <sub>CE</sub> S        | Collector cutoff current             | V <sub>CE</sub> = V <sub>CE</sub> S, V <sub>GE</sub> = 0V  | —      | —     | 1    | mA   |
| V <sub>GE(th)</sub>      | Gate-emitter threshold voltage       | I <sub>C</sub> = 15mA, V <sub>CE</sub> = 10V   | 6      | 7     | 8    | V    |
| I <sub>GE</sub> S        | Gate leakage current                 | V <sub>GE</sub> = V <sub>GE</sub> S, V <sub>CE</sub> = 0V  | —      | —     | 0.5  | μA   |
| V <sub>CE(sat)</sub>     | Collector-emitter saturation voltage | I <sub>C</sub> = 150A, V <sub>GE</sub> = 15V   | —      | 2.1   | 3.0  | V    |
| C <sub>ies</sub>         | Input capacitance                    | V <sub>CE</sub> = 10V  | —      | 8.4   | —    | nF   |
| C <sub>oes</sub>         | Output capacitance                   | V <sub>CE</sub> = 10V  | —      | —     | 2    | nF   |
| C <sub>res</sub>         | Reverse transfer capacitance         | V <sub>GE</sub> = 0V   | —      | —     | 0.45 | nF   |
| Q <sub>G</sub>           | Total gate charge                    | V <sub>CC</sub> = 600V, I <sub>C</sub> = 150A, V <sub>GE</sub> = 15V   | —      | 675   | —    | nC   |
| t <sub>d(on)</sub>       | Turn-on delay time                   | V <sub>CC</sub> = 600V, I <sub>C</sub> = 150A<br>V <sub>GE1</sub> = V <sub>GE2</sub> = 15V<br>R <sub>G</sub> = 2.1Ω, Inductive load switching operation<br>I <sub>E</sub> = 150A | —      | —     | 130  | ns   |
| t <sub>r</sub>           | Turn-on rise time                    |  | —      | —     | 70   | ns   |
| t <sub>d(off)</sub>      | Turn-off delay time                  |  | —      | —     | 400  | ns   |
| t <sub>f</sub>           | Turn-off fall time                   |  | —      | —     | 350  | ns   |
| t <sub>rr</sub> (Note 1) | Reverse recovery time                |  | —      | —     | 150  | ns   |
| Q <sub>rr</sub> (Note 1) | Reverse recovery charge              | —  | 5.8    | —     | μC   |      |
| V <sub>EC</sub> (Note 1) | Emitter-collector voltage            | I <sub>E</sub> = 150A, V <sub>GE</sub> = 0V  | —      | —     | 3.8  | V    |
| R <sub>th(j-c)Q</sub>    | Thermal resistance                   | IGBT part (1/6 module) <sup>*1</sup>   | —      | —     | 0.14 | °C/W |
| R <sub>th(j-c)R</sub>    |                                      | FWDi part (1/6 module) <sup>*1</sup>   | —      | —     | 0.23 | °C/W |
| R <sub>th(c-f)</sub>     | Contact thermal resistance           | Case to fin, Thermal compound Applied (1/6 module) <sup>*2</sup>   | —      | 0.051 | —    | °C/W |
| R <sub>G</sub>           | External gate resistance             |  | 2.1    | —     | 31   | Ω    |

\*1 : T<sub>c</sub> measured point is just under the chips.If you use this value, R<sub>th(f-a)</sub> should be measured just under the chips.

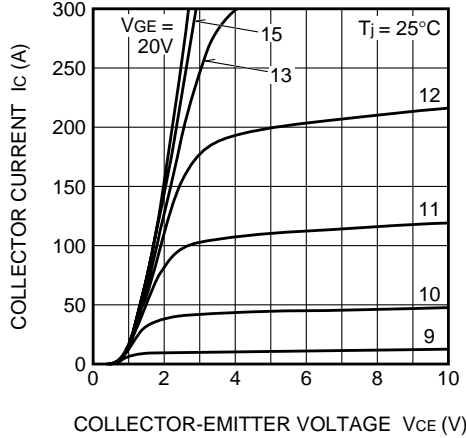
\*2 : Typical value is measured by using Shin-etsu Silicone "G-746".

Note 1. I<sub>E</sub>, V<sub>EC</sub>, t<sub>rr</sub> & Q<sub>rr</sub> represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).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.

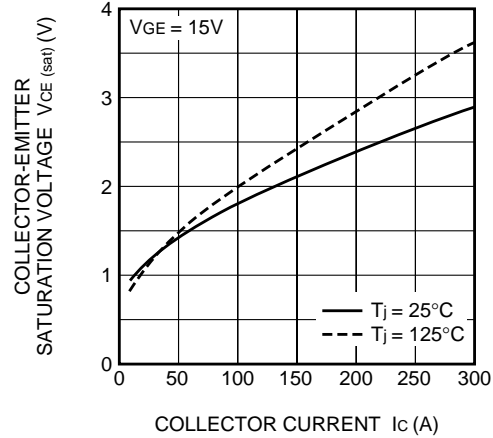
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

PERFORMANCE CURVES

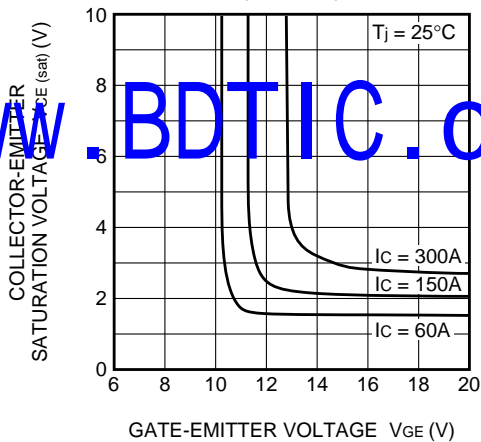
OUTPUT CHARACTERISTICS (TYPICAL)



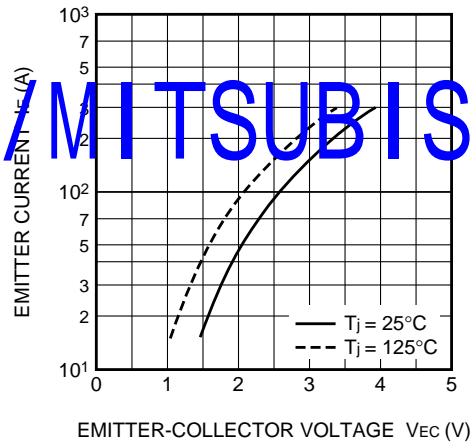
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)

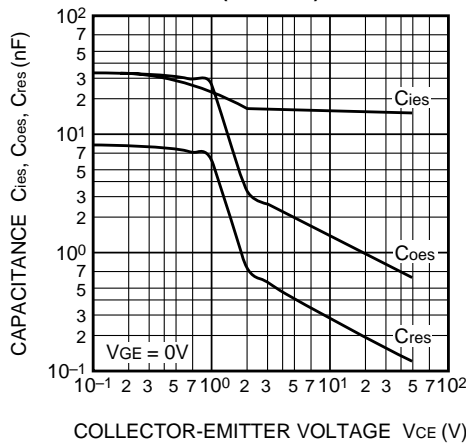


FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)

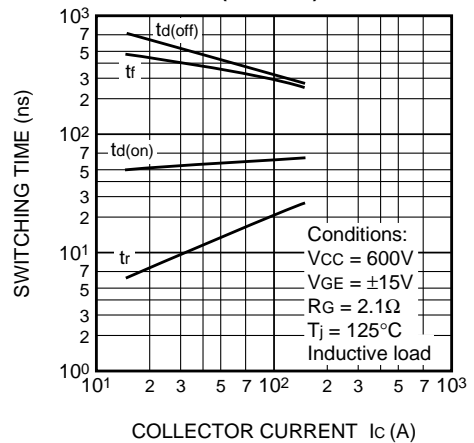


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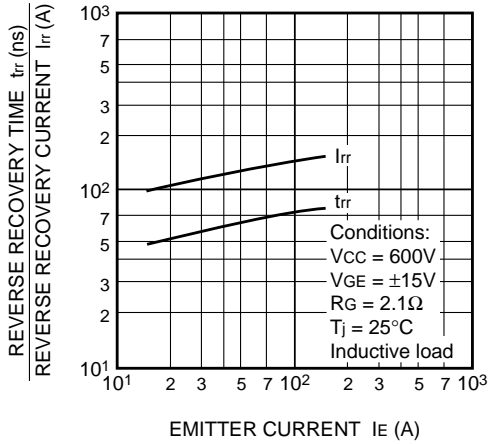
CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)



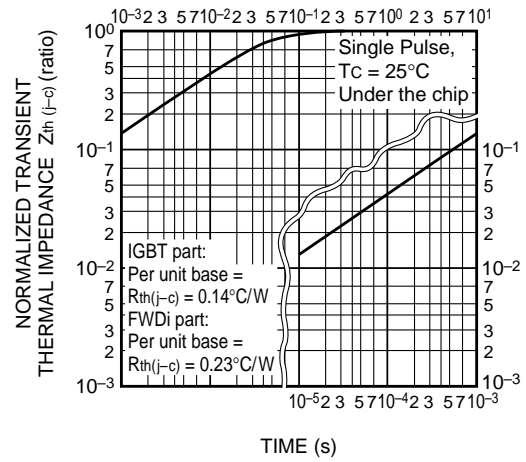
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



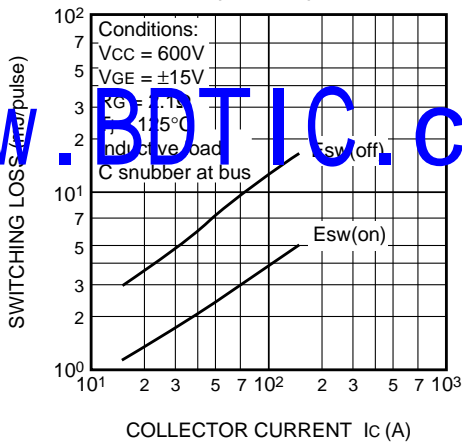
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



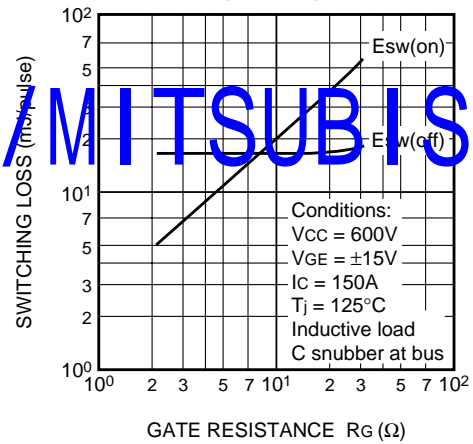
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



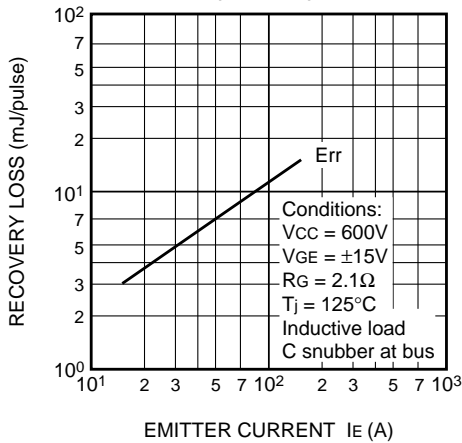
SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)



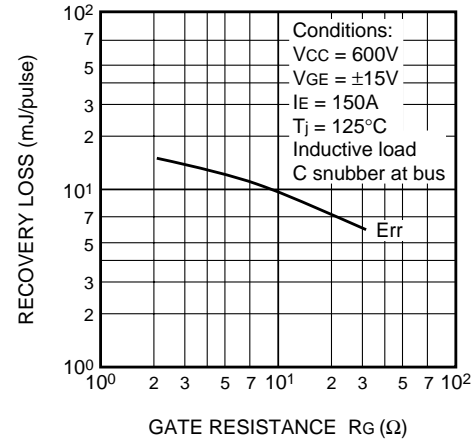
SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)



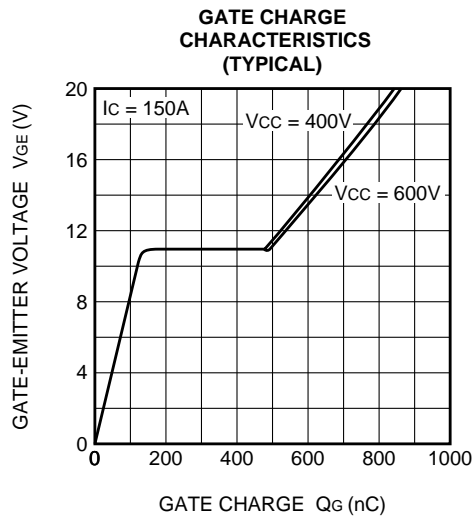
RECOVERY LOSS vs. IE (TYPICAL)



RECOVERY LOSS vs. GATE RESISTANCE (TYPICAL)



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