MITSUBISHI IGBT MODULES

# CM100TL-24NF

HIGH POWER SWITCHING USE

**CM100TL-24NF**

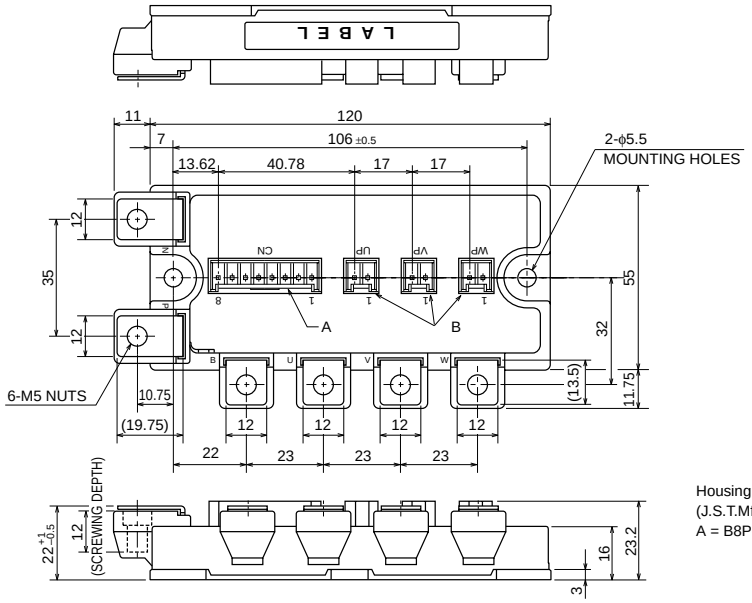
- $I_C$ ..... 100A
- $V_{CES}$ ..... 1200V
- Insulated Type
- 6-elements in a pack

## APPLICATION

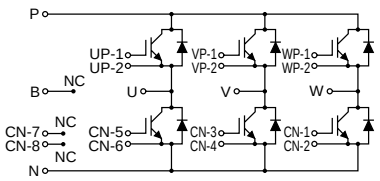
AC drive inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm




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




CIRCUIT DIAGRAM



MITSUBISHI ELECTRIC

## ABSOLUTE MAXIMUM RATINGS (Tj = 25°C)

| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage | G-E Short | 1200 | V |
| $V_{GES}$ | Gate-emitter voltage | C-E Short | ±20 | V |
| $I_C$ | Collector current | DC, $T_C$ = 80°C*1 | 100 | A |
| $I_{CM}$ | | Pulse (Note 2) | 200 | A |
| $I_E$ (Note 1) | Emitter current | | 100 | A |
| $I_{EM}$ (Note 1) | | Pulse (Note 2) | 200 | A |
| $P_C$ (Note 3) | Maximum collector dissipation | $T_C$ = 25°C | 620 | W |
| $T_j$ | Junction temperature | | –40 ~ +150 | °C |
| $T_{stg}$ | Storage temperature | | –40 ~ +125 | °C |
| $V_{iso}$ | 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 | 350 | g |

## ELECTRICAL CHARACTERISTICS (Tj = 25°C)

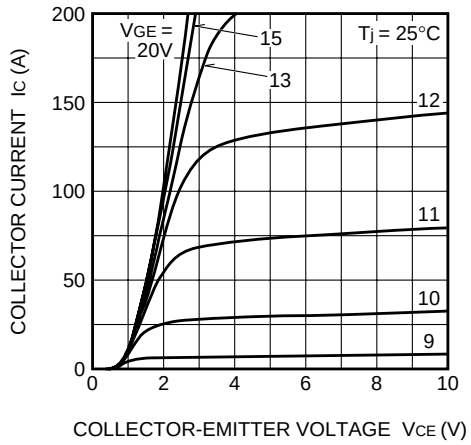
| Symbol | Parameter | Test conditions | | Limits | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| $I_{CES}$ | Collector cutoff current | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | — | — | 1 | mA |
| $V_{GE(th)}$ | Gate-emitter threshold voltage | $I_C$ = 10mA, $V_{CE}$ = 10V | | 6 | 7 | 8 | V |
| $I_{GES}$ | Gate leakage current | $V_{GE}$ = $V_{GES}$, $V_{CE}$ = 0V | | — | — | 0.5 | µA |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $I_C$ = 100A, $V_{GE}$ = 15V | $T_j$ = 25°C | — | 2.1 | 3.0 | V |
| | | | $T_j$ = 125°C | — | 2.4 | — | |
| $C_{ies}$ | Input capacitance | $V_{CE}$ = 10V, $V_{GE}$ = 0V | | — | — | 17.5 | nF |
| $C_{oes}$ | Output capacitance | | | — | — | 1.5 | nF |
| $C_{res}$ | Reverse transfer capacitance | | | — | — | 0.34 | nF |
| $Q_G$ | Total gate charge | $V_{CC}$ = 600V, $I_C$ = 100A, $V_{GE}$ = 15V | | — | 500 | — | nC |
| $t_{d(on)}$ | Turn-on delay time | $V_{CC}$ = 600V, $I_C$ = 100A, $V_{GE1}$ = $V_{GE2}$ = 15V, $R_G$ = 3.1Ω, Inductive load switching operation, $I_E$ = 100A | | — | — | 100 | ns |
| $t_r$ | Turn-on rise time | | | — | — | 70 | ns |
| $t_{d(off)}$ | Turn-off delay time | | | — | — | 300 | ns |
| $t_f$ | Turn-off fall time | | | — | — | 350 | ns |
| $t_{rr}$ (Note 1) | Reverse recovery time | | | — | — | 150 | ns |
| $Q_{rr}$ (Note 1) | Reverse recovery charge | | | — | 4.8 | — | µC |
| $V_{EC}$(Note 1) | Emitter-collector voltage | $I_E$ = 100A, $V_{GE}$ = 0V | | — | — | 3.8 | V |
| $R_{th(j-c)Q}$ | Thermal resistance | IGBT part (1/6 module)*1 | | — | — | 0.20 | °C/W |
| $R_{th(j-c)R}$ | | FWDi part (1/6 module)*1 | | — | — | 0.28 | °C/W |
| $R_{th(c-f)}$ | Contact thermal resistance | Case to fin, Thermal compound Applied (1/6 module)*2 | | — | 0.085 | — | °C/W |
| $R_G$ | External gate resistance | | | 3.1 | — | 42 | Ω |

*1 : $T_C$ measured point is just under the chips.
If you use this value, $R_{th(f-a)}$ should be measured just under the chips.
*2 : Typical value is measured by using Shin-etsu Silicone “G-746”.

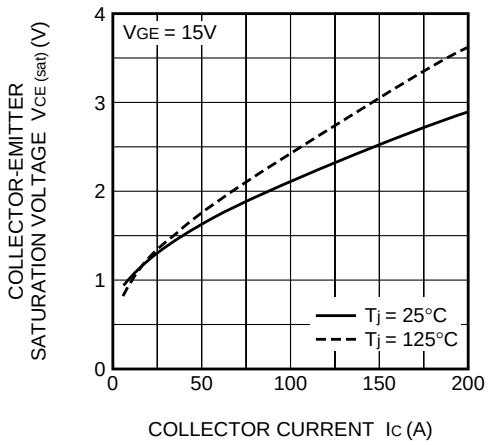
Note 1. $I_E$, $V_{EC}$, $t_{rr}$ & $Q_{rr}$ represent characteristics of the anti-parallel, emitter to collector free-wheel diode (FWDi).
2. Pulse width and repetition rate should be such that the device junction temp. ($T_j$) does not exceed $T_{jmax}$ rating.
3. Junction temperature ($T_j$) should not increase beyond 150°C.
4. Pulse width and repetition rate should be such as to cause neglible temperature rise.

## PERFORMANCE CURVES

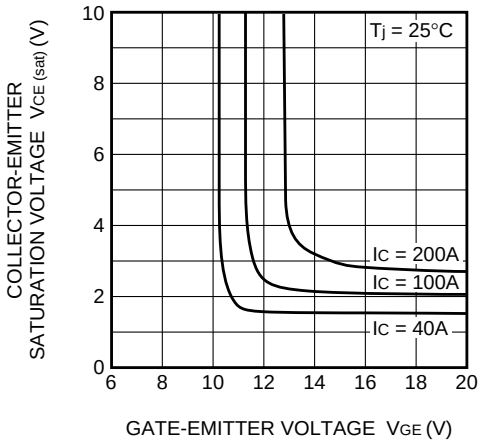
### OUTPUT CHARACTERISTICS (TYPICAL)



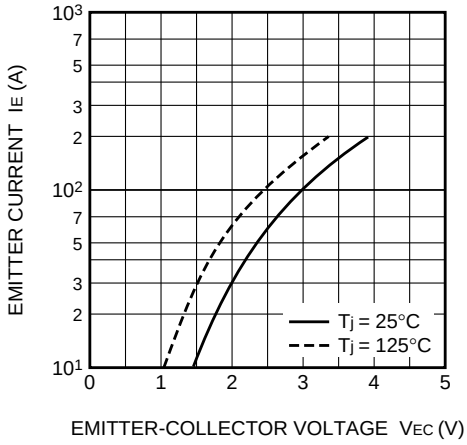

### COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



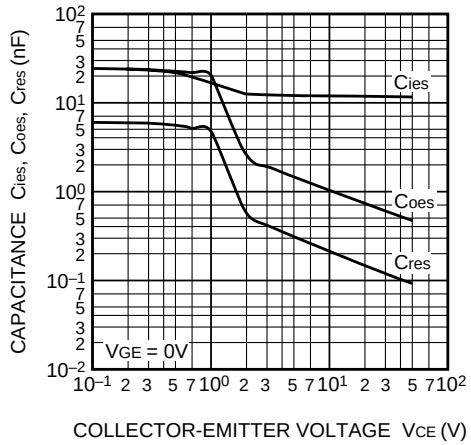

### COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



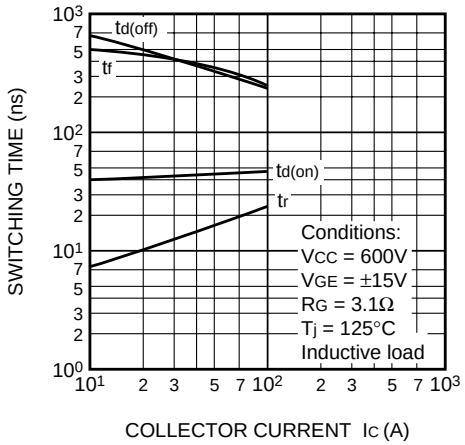

### FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



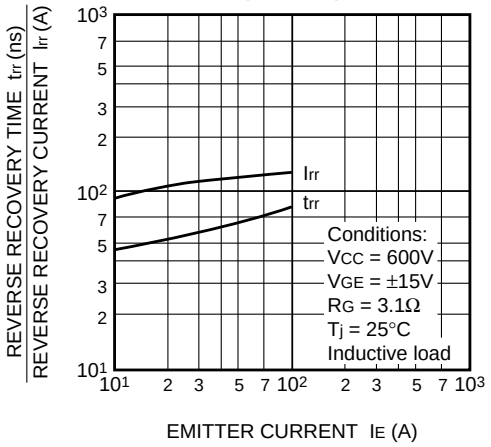

### CAPACITANCE–VCE CHARACTERISTICS (TYPICAL)



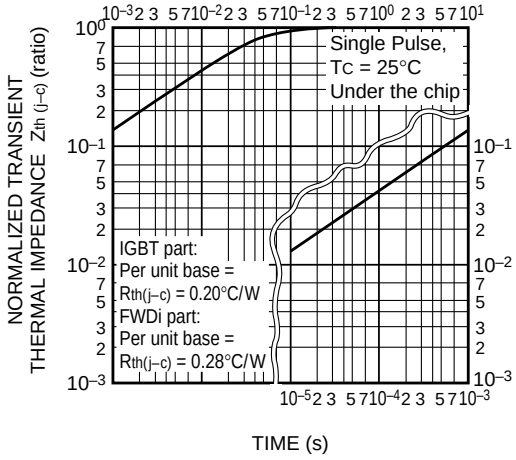

### HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



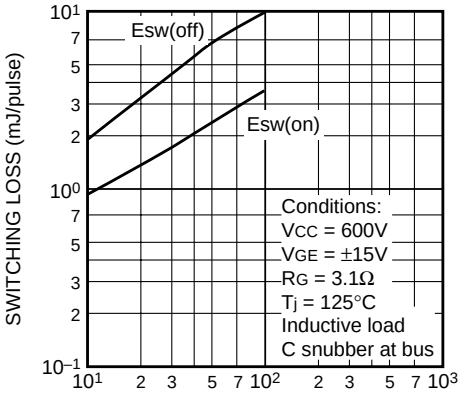
**REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)**



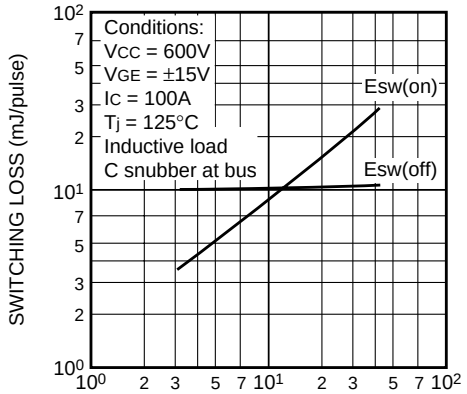

**TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)**



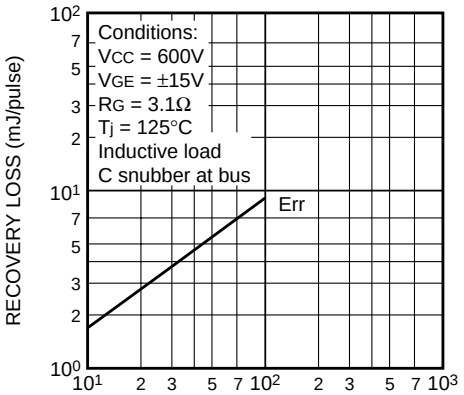

**SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)**



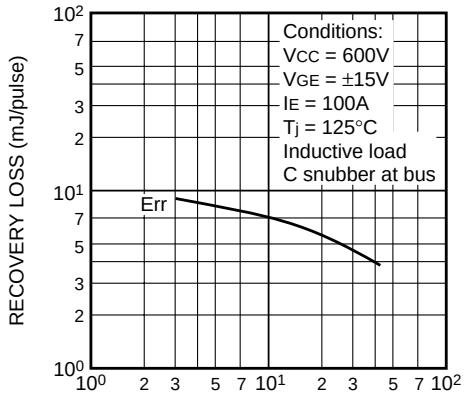

**SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)**




**RECOVERY LOSS vs. IE (TYPICAL)**




**RECOVERY LOSS vs. GATE RESISTANCE (TYPICAL)**



**GATE CHARGE CHARACTERISTICS (TYPICAL)**