

MITSUBISHI IGBT MODULES
CM50TL-24NF

HIGH POWER SWITCHING USE

CM50TL-24NF



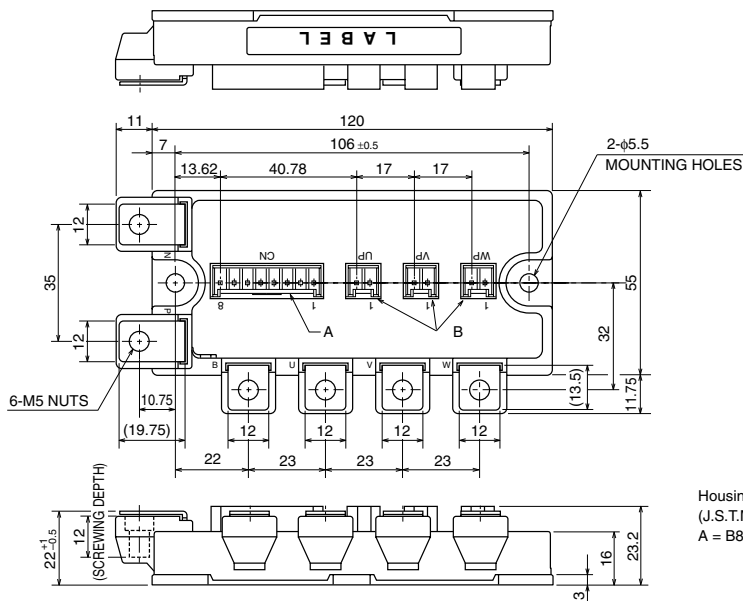
- IC 50A
- VCES 1200V
- Insulated Type
- 6-elements in a pack

APPLICATION

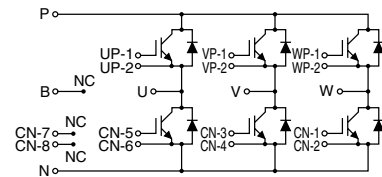
AC drive inverters & Servo controls, etc

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

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ABSOLUTE 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 | DC, T _c = 94°C ^{*1} | 50 | A |
| I _{CM} | | Pulse (Note 2) | 100 | A |
| I _E (Note 1) | Emitter current | | 50 | A |
| I _{EM} (Note 1) | | Pulse (Note 2) | 100 | A |
| P _C (Note 3) | Maximum collector dissipation | T _c = 25°C | 390 | 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 M5 screw | 2.5 ~ 3.5 | N • m |
| — | | Mounting M5 screw | 2.5 ~ 3.5 | N • m |
| — | Weight | Typical value | 350 | 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 _{CE} S, V _{GE} = 0V | — | — | 1 | mA |
| V _{GE(th)} | Gate-emitter threshold voltage | I _C = 5.0mA, 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 = 50A, V _{GE} = 15V | — | 2.1 | 3.0 | V |
| | | T _j = 25°C T _j = 125°C | — | 2.4 | — | |
| C _{ies} | Input capacitance | V _{CE} = 10V V _{GE} = 0V | — | — | 8.5 | nF |
| C _{oes} | Output capacitance | | — | — | 0.75 | nF |
| C _{res} | Reverse transfer capacitance | | — | — | 0.17 | nF |
| Q _G | Total gate charge | V _{CC} = 600V, I _C = 50A, V _{GE} = 15V | — | 250 | — | nC |
| t _{d(on)} | Turn-on delay time | V _{CC} = 600V, I _C = 50A V _{GE} = ±15V R _G = 6.3Ω, Inductive load I _E = 50A | — | — | 100 | ns |
| t _r | Turn-on rise time | | — | — | 50 | 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 | | — | — | 100 | ns |
| Q _{rr} (Note 1) | Reverse recovery charge | | — | 2 | — | µC |
| V _{EC} (Note 1) | Emitter-collector voltage | I _E = 50A, V _{GE} = 0V | — | — | 3.8 | V |
| R _{th(j-c)Q} | Thermal resistance | IGBT part (1/6 module) ^{*1} | — | — | 0.32 | K/W |
| R _{th(j-c)R} | | FWDi part (1/6 module) ^{*1} | — | — | 0.43 | K/W |
| R _{th(c-f)} | Contact thermal resistance | Case to heat sink, Thermal compound Applied (1/6 module) ^{*2} | — | 0.085 | — | K/W |
| R _G | External gate resistance | | 6.3 | — | 96 | Ω |

*1 : Case temperature (T_c) measured point is just under the chips.

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

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

Note 1. I_E, V_{EC}, t_{rr} & Q_{rr} 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.

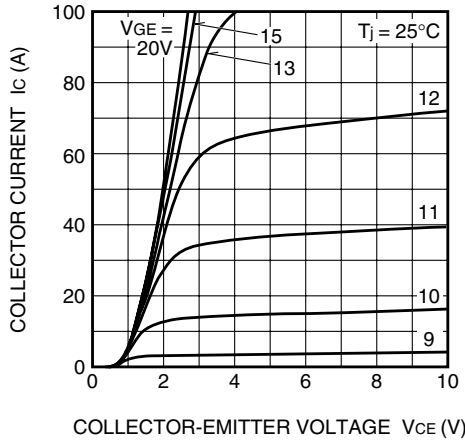
4. Pulse width and repetition rate should be such as to cause negligible temperature rise.

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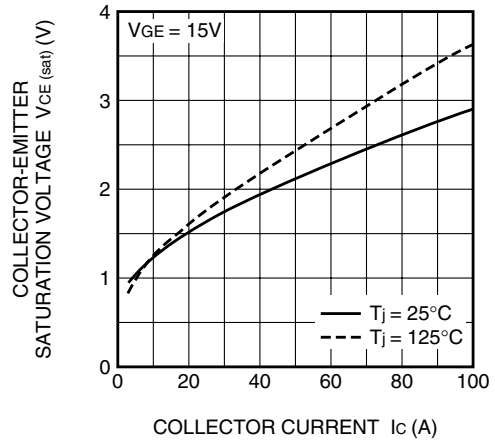
HIGH POWER SWITCHING USE

PERFORMANCE CURVES

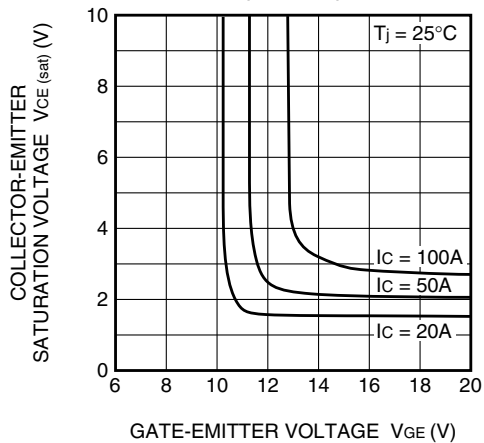
OUTPUT CHARACTERISTICS (TYPICAL)



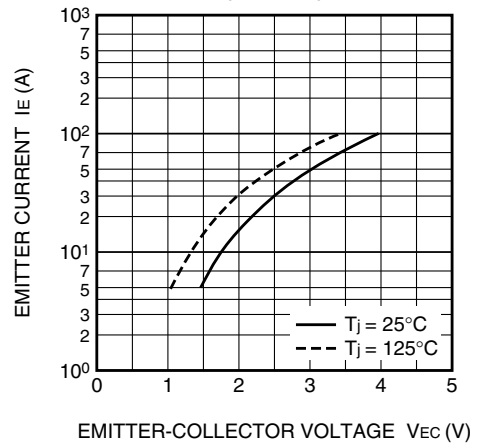
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



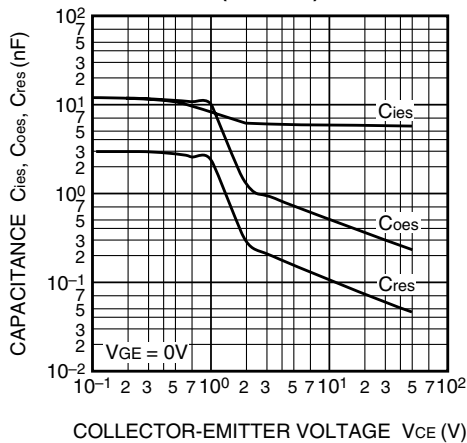
COLLECTOR-EMITTER SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



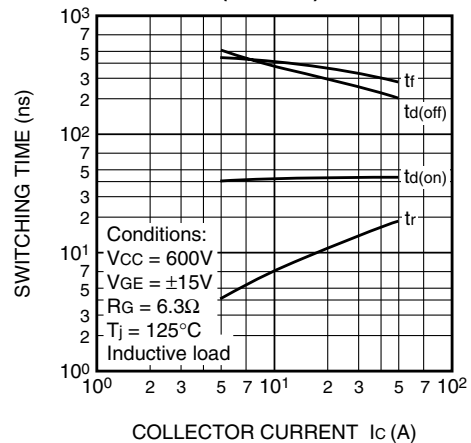
FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



CAPACITANCE-VCE CHARACTERISTICS (TYPICAL)



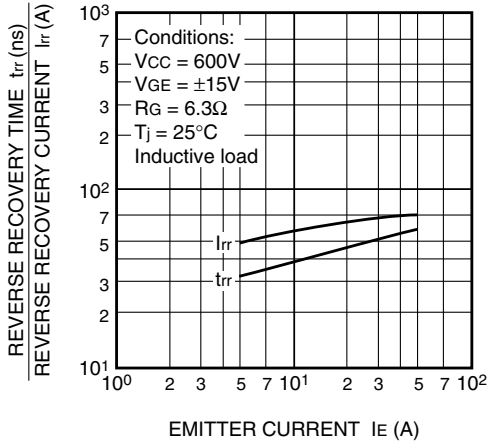
HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



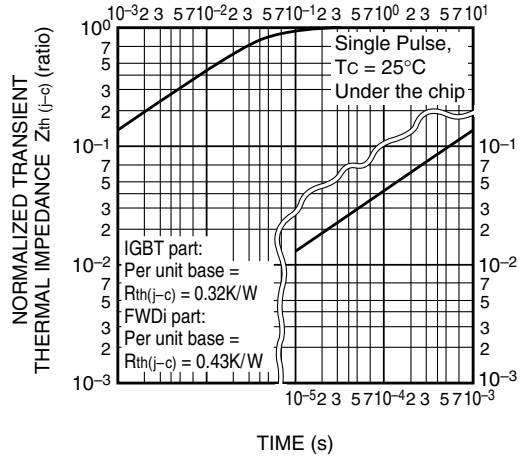
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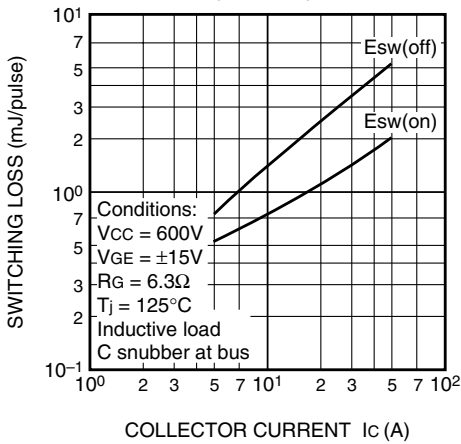
REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)



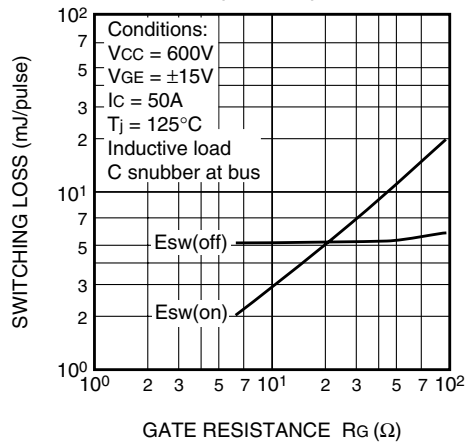
TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS (IGBT part & FWDi part)



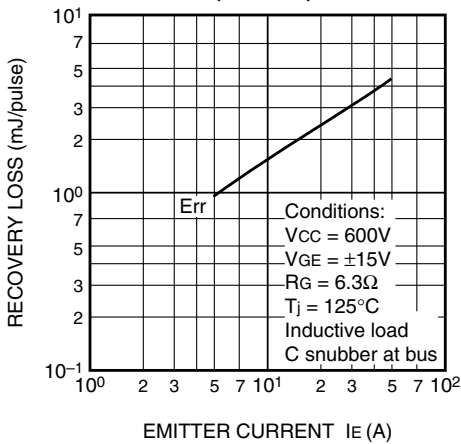
SWITCHING LOSS vs. COLLECTOR CURRENT (TYPICAL)



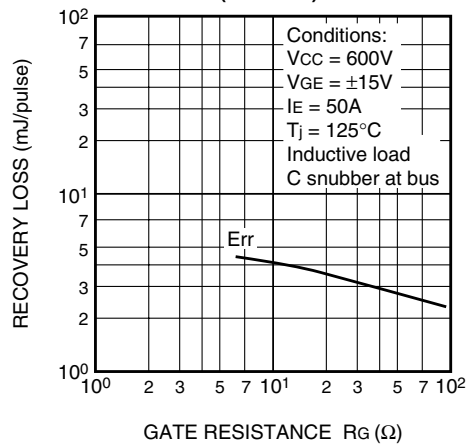
SWITCHING LOSS vs. GATE RESISTANCE (TYPICAL)



RECOVERY LOSS vs. IE (TYPICAL)



RECOVERY LOSS vs. GATE RESISTANCE (TYPICAL)



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