# CM600HU-24F

**HIGH POWER SWITCHING USE**

**CM600HU-24F**

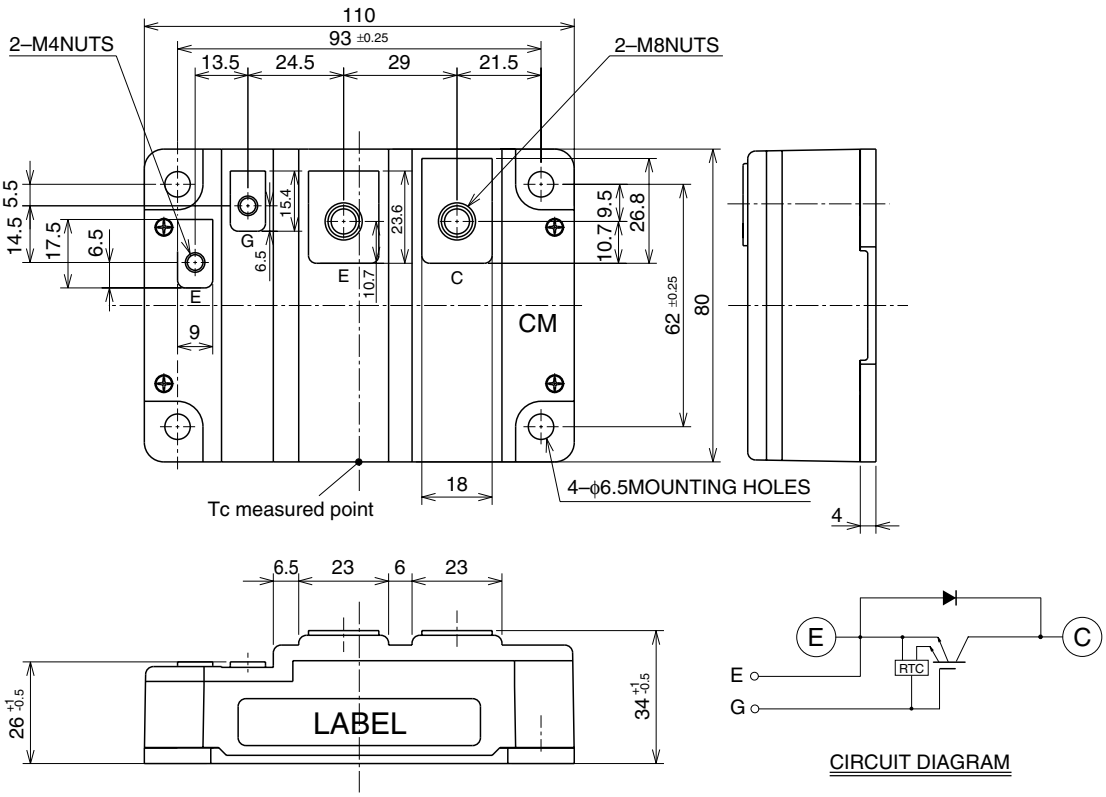
- $I_C$ ..... 600A
- $V_{CES}$ ..... 1200V
- Insulated Type
- 1-elements in a pack

## APPLICATION

General purpose inverters & Servo controls, etc

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm




CIRCUIT DIAGRAM



MITSUBISHI ELECTRIC

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

| 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 | $T_C$ = 25°C | 600 | A |
| $I_{CM}$ | | Pulse (Note 2) | 1200 | |
| $I_E$ (Note 1) | Emitter current | $T_C$ = 25°C | 600 | A |
| $I_{EM}$ (Note 1) | | Pulse (Note 2) | 1200 | |
| $P_C$ (Note 3) | Maximum collector dissipation | $T_C$ = 25°C | 1900 | 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 M8 screw | 8.8 ~ 10.8 | N • m |
| | | Mounting M6 screw | 3.5 ~ 4.5 | N • m |
| | | G(E) Terminal M4 screw | 1.3 ~ 1.7 | N • m |
| — | Weight | Typical value | 600 | g |

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

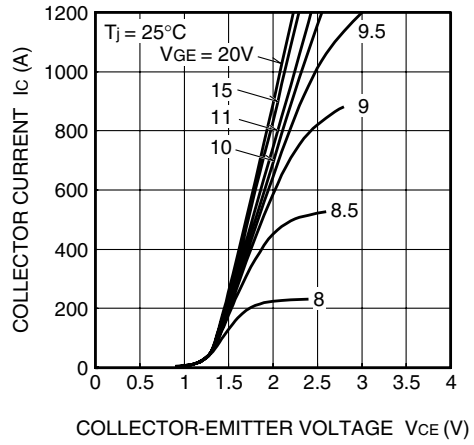
| Symbol | Parameter | Test conditions | | Limits | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| $I_{CES}$ | Collector cutoff current | $V_{CE}$ = $V_{CES}$, $V_{GE}$ = 0V | | — | — | 2 | mA |
| $V_{GE(th)}$ | Gate-emitter threshold voltage | $I_C$ = 60mA, $V_{CE}$ = 10V | | 5 | 6 | 7 | V |
| $I_{GES}$ | Gate leakage current | ±$V_{GE}$ = $V_{GES}$, $V_{CE}$ = 0V | | — | — | 80 | μA |
| $V_{CE(sat)}$ | Collector-emitter saturation voltage | $I_C$ = 600A, $V_{GE}$ = 15V | $T_j$ = 25°C | — | 1.8 | 2.4 | V |
| | | | $T_j$ = 125°C | — | 1.9 | — | |
| $C_{ies}$ | Input capacitance | $V_{CE}$ = 10V<br>$V_{GE}$ = 0V | | — | — | 230 | nF |
| $C_{oes}$ | Output capacitance | | | — | — | 10 | |
| $C_{res}$ | Reverse transfer capacitance | | | — | — | 6.0 | |
| $Q_G$ | Total gate charge | $V_{CC}$ = 600V, $I_C$ = 600A, $V_{GE}$ = 15V | | — | 6600 | — | nC |
| $t_{d(on)}$ | Turn-on delay time | $V_{CC}$ = 600V, $I_C$ = 600A<br>$V_{GE}$ = ±15V<br>$R_G$ = 1.0Ω, Inductive load<br>$I_E$ = 600A | | — | — | 300 | ns |
| $t_r$ | Turn-on rise time | | | — | — | 150 | |
| $t_{d(off)}$ | Turn-off delay time | | | — | — | 800 | |
| $t_f$ | Turn-off fall time | | | — | — | 300 | |
| $t_{rr}$ (Note 1) | Reverse recovery time | | | — | — | 500 | ns |
| $Q_{rr}$ (Note 1) | Reverse recovery charge | | | — | 43.2 | — | μC |
| $V_{EC}$(Note 1) | Emitter-collector voltage | $I_E$ = 600A, $V_{GE}$ = 0V | | — | — | 3.2 | V |
| $R_{th(j-c)Q}$ | Thermal resistance*1 | IGBT part | | — | — | 0.063 | K/W |
| $R_{th(j-c)R}$ | | FWDi part | | — | — | 0.075 | |
| $R_{th(c-f)}$ | Contact thermal resistance | Case to heat sink, Thermal compound applied*2 | | — | 0.015 | — | |
| $R_{th(j-c')Q}$ | Thermal resistance | Case temperature measured point is just under the chips | | — | — | 0.032*3 | |
| $R_G$ | External gate resistance | | | 1.0 | — | 10 | 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.

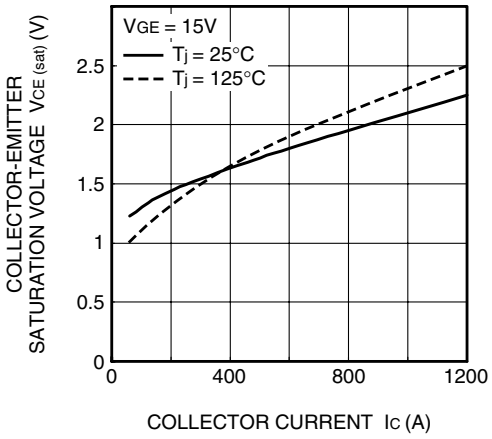
*1 : Case temperature (Tc) measured point is indicated in OUTLINE DRAWING.
*2 : Typical value is measured by using thermally conductive grease of $\lambda$ = 0.9[W/(m • K)].
*3 : If you use this value, $R_{th(f-a)}$ should be measured just under the chips.

## PERFORMANCE CURVES

### OUTPUT CHARACTERISTICS (TYPICAL)




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

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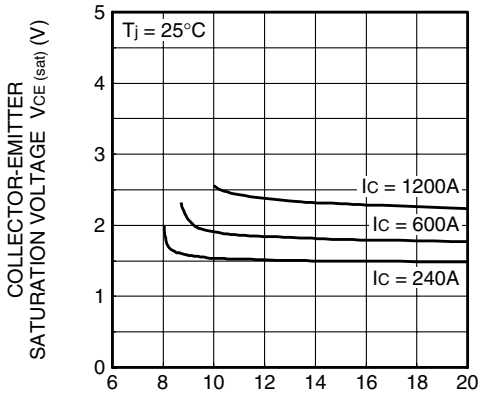
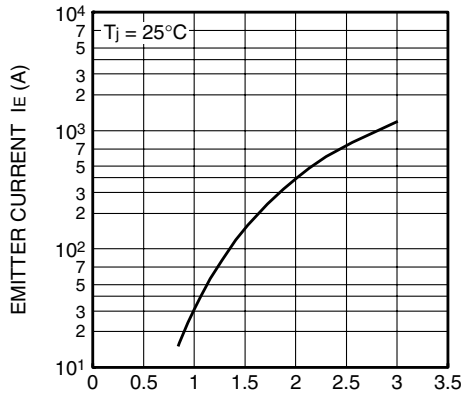
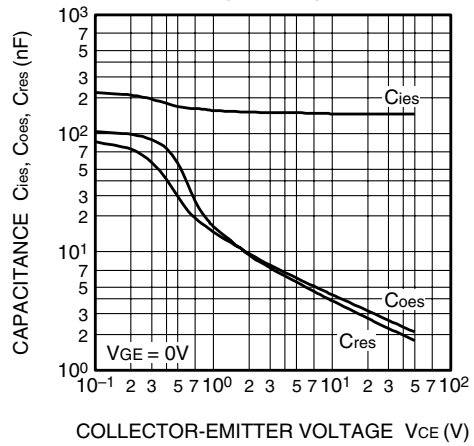


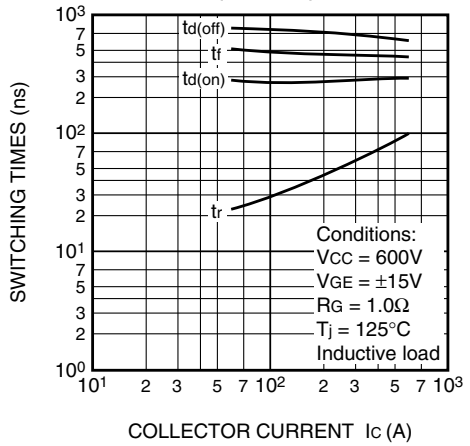

### FREE-WHEEL DIODE FORWARD CHARACTERISTICS (TYPICAL)



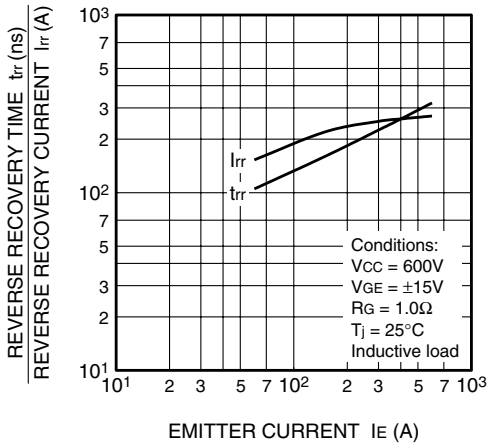

### CAPACITANCE–VCE CHARACTERISTICS (TYPICAL)



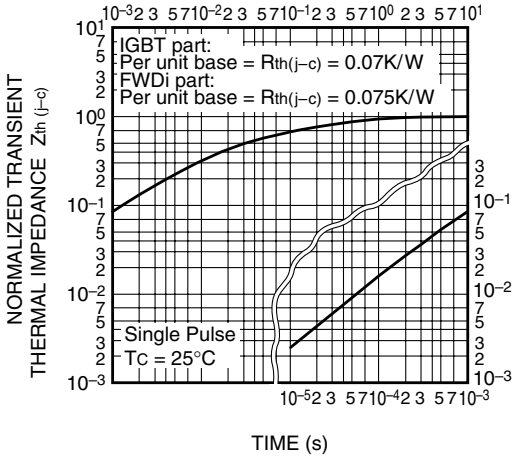

### HALF-BRIDGE SWITCHING CHARACTERISTICS (TYPICAL)



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




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




**GATE CHARGE CHARACTERISTICS (TYPICAL)**