**Tentative**

**CM400HA-24A**

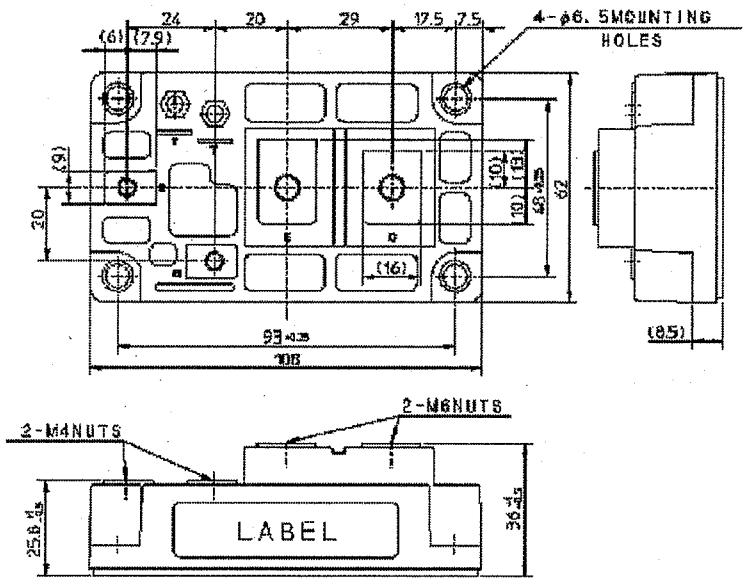
| | | | | |
|---|---|---|---|---|
| Pre. | H.Hanada | Rev | | |
| Apr. | T. Fumis 07-Oct-'03 | | | |

HIGH POWER SWITCHING USE

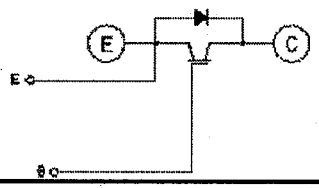
CM400HA-24A

- Ic ····· 400A
- $V_{CES}$ ····· 1200V
- Insulated Type
- 1-elements in a pack

OUTLINE DRAWING Dimensions in mm




CIRCUIT DIAGRAM




APPLICATION

AC drive inverters & Servo controls,etc

ABSOLUTE MAXIMUM RATINGS ($T_j$ = 25 °C)

| Symbol | Item | Conditions | Ratings | Units |
|---|---|---|---|---|
| $V_{CES}$ | Collector-emitter voltage | G-E Short | 1200 | V |
| $V_{GES}$ | Gate-emitter voltage | C-E Short | ±20 | V |
| $I_C$ | Collector current | DC, Tc=87 °C *1 | 400 | A |
| $I_{CM}$ | | Pulse ② | 800 | |
| $I_E$ ① | Emitter current | | 400 | A |
| $I_{EM}$ ① | | Pulse ② | 800 | |
| Pc ③ | Maximum collector dissipation | Tc= 25 °C *1 | 2710 | W |
| Tj | Junction temperature | | −40~+150 | °C |
| Tstg | Storage temperature | | −40~+125 | °C |
| Viso | Isolation voltage | Main terminal to base plate,AC 1 min. | 2500 | V |
| — | Torque strength | Main terminal M6 | 1.96 ~ 2.94 | N·m |
| — | Torque strength | Mounting holes M6 | 1.96 ~ 2.94 | N·m |
| — | Torque strength | G(E) terminal M4 | 0.98 ~ 1.47 | N·m |
| — | Weight | Typical value | 400 | g |

ELECTRICAL CHARACTERISTICS ($T_j$ = 25 °C)

| Symbol | Item | Conditions | | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| $I_{CES}$ | Collector cutoff current | $V_{CE}=V_{CES}, V_{GE}$= 0V | | — | — | 1 | mA |
| $V_{GE(th)}$ | Gate-emitter threshold voltage | $I_C$=40mA, $V_{CE}$= 10V | | 6 | 7 | 8 | V |
| $I_{GES}$ | Gate leakage current | $V_{GE}=V_{GES}$, $V_{CE}$= 0V | | — | — | 0.5 | μA |
| $V_{CE(sat)}$ | Collector to emitter saturation voltage | $T_j$= 25 °C | $I_C$ = 400A | — | 2.1 | 3.0 | V |
| | | $T_j$= 125 °C | $V_{GE}$= 15V | — | 2.4 | — | |
| Cies | Input capacitance | $V_{CE}$= 10V | | — | — | 70 | nF |
| Coes | Output capacitance | $V_{GE}$= 0V | | — | — | 6 | |
| Cres | Reverse transfer capacitance | | | — | — | 1.4 | |
| $Q_G$ | Total gate charge | $V_{CC}$=600V, Ic=400A, $V_{GE}$=15V | | — | 2000 | — | nC |
| td(on) | Turn-on delay time | $V_{CC}$=600V, Ic=400A | | — | — | 550 | ns |
| tr | Turn-on rise time | $V_{GE1}=V_{GE2}$=15V | | — | — | 180 | |
| td(off) | Turn-off delay time | $R_G$=0.78Ω, Inductive load | | — | — | 600 | |
| tf | Turn-off fall time | switching operation | | — | — | 350 | |
| trr ① | Reverse recovery time | $I_E$=400A | | — | — | 250 | ns |
| Qrr ① | Reverse recovery charge | | | — | 16 | — | μC |
| $V_{EC}$ ① | Emitter-collector voltage | $I_E$=400A, $V_{GE}$= 0V | | — | — | 3.8 | V |
| Rth(j-c)Q | Thermal resistance | IGBT part *1 | | — | — | 0.046 | °C/W |
| Rth(j-c)R | | FWDi part *1 | | — | — | 0.085 | |
| Rth(c-f) | Contact thermal resistance | Case to fin, Thermal compound Applied *2 | | — | 0.02 | — | |
| RG | External gate resistance | | | 0.78 | — | 10 | Ω |

*1: Tc,Tf measured point is just under the chips.
*2: Typical value is measured by using Shin-etsu Silicone "G-746".

① $I_E$,$V_{EC}$,trr & Qrr 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.($T_j$) dose not exceed Tjmax 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.