

MITSUBISHI TRANSISTOR MODULES

# QM600HD-M

HIGH POWER SWITCHING USE  
NON-INSULATED TYPE

QM600HD-M



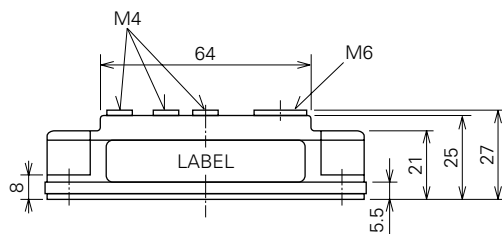
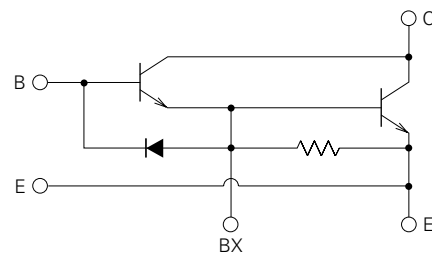
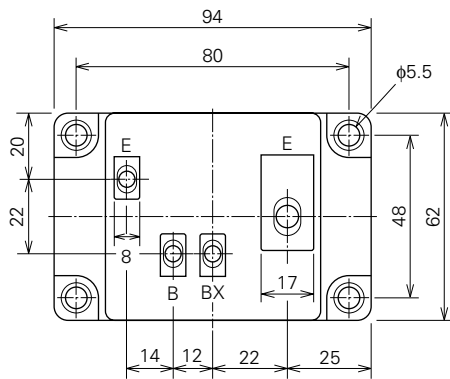
- **I<sub>C</sub>** Collector current ..... **600A**
- **V<sub>CEX</sub>** Collector-emitter voltage ..... **350V**
- **h<sub>FE</sub>** DC current gain ..... **500**
- **Non-Insulated Type**

## APPLICATION

Robotics, Forklifts, Welders

## OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



Feb.1999



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

| Symbol                 | Parameter   | Conditions                                  | Ratings   | Unit  |
|------------------------|---|---|-----------|-------|
| V <sub>CEX (SUS)</sub> | Collector-emitter voltage                               | I <sub>c</sub> =1A, V <sub>EB</sub> =2V     | 350       | V     |
| V <sub>CEX</sub>       | Collector-emitter voltage                               | V <sub>EB</sub> =2V                         | 350       | V     |
| V <sub>CBO</sub>       | Collector-base voltage                                  | Emitter open                                | 400       | V     |
| V <sub>EBO</sub>       | Emitter-base voltage                                    | Collector open                              | 10        | V     |
| I <sub>c</sub>         | Collector current                                       | DC  | 600       | A     |
| -I <sub>c</sub>        | Collector reverse current                               | DC (forward diode current)                  | —         | A     |
| P <sub>c</sub>         | Collector dissipation                                   | T <sub>c</sub> =25°C                        | 2080      | W     |
| I <sub>B</sub>         | Base current  | DC  | 15        | A     |
| -I <sub>CSM</sub>      | Surge collector reverse current (forward diode current) | Peak value of one cycle of 60Hz (half wave) | —         | A     |
| T <sub>J</sub>         | Junction temperature                                    |   | -40~+150  | °C    |
| T <sub>stg</sub>       | Storage temperature                                     |   | -40~+125  | °C    |
| V <sub>iso</sub>       | Isolation voltage                                       | Charged part to case, AC for 1 minute       | —         | V     |
| —                      | Mounting torque   | Main terminal screw M6                      | 1.96~2.94 | N·m   |
|                        |   |   | 20~30     | kg·cm |
|                        |   | Mounting screw M5                           | 1.47~1.96 | N·m   |
|                        |   |   | 15~20     | kg·cm |
|                        |   | B(E) terminal screw M4                      | 0.98~1.47 | N·m   |
|                        |   |   | 10~15     | kg·cm |
| BX terminal screw M4   | 0.98~1.47   | N·m   |           |       |
|                        | 10~15   | kg·cm                                       |           |       |
| —                      | Weight  | Typical value                               | 420       | g     |

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

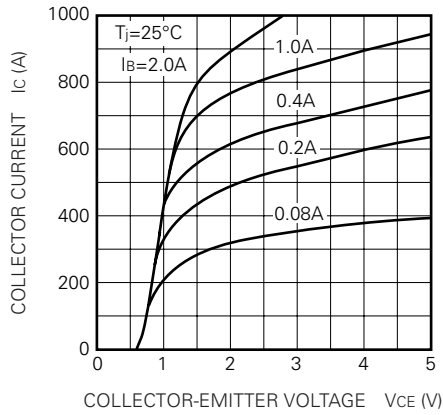
| Symbol                  | Parameter                                | Test conditions  | Limits |      |      | Unit |
|-------------------------|--|--|--------|------|------|------|
|                         |  |  | Min.   | Typ. | Max. |      |
| I <sub>CEX</sub>        | Collector cutoff current                 | V <sub>CE</sub> =350V, V <sub>EB</sub> =2V   | —      | —    | 2.0  | mA   |
| I <sub>CBO</sub>        | Collector cutoff current                 | V <sub>CB</sub> =400V, Emitter open  | —      | —    | 2.0  | mA   |
| I <sub>EBO</sub>        | Emitter cutoff current                   | V <sub>EB</sub> =10V   | —      | —    | 800  | mA   |
| V <sub>CE (sat)</sub>   | Collector-emitter saturation voltage     | I <sub>c</sub> =600A, I <sub>B</sub> =1.2A   | —      | —    | 2.0  | V    |
| V <sub>BE (sat)</sub>   | Base-emitter saturation voltage          |  | —      | —    | 2.5  | V    |
| -V <sub>CEO</sub>       | Collector-emitter reverse voltage        | -I <sub>c</sub> =600A (diode forward voltage)  | —      | —    | —    | V    |
| h <sub>FE</sub>         | DC current gain                          | I <sub>c</sub> =600A, V <sub>CE</sub> =2V  | 500    | —    | —    | —    |
| t <sub>on</sub>         | Switching time                           | V <sub>CC</sub> =200V, I <sub>c</sub> =600A, I <sub>B1</sub> =2A, -I <sub>B2</sub> =4A | —      | —    | 3.0  | μs   |
| t <sub>s</sub>          |  |  | —      | —    | 15   | μs   |
| t <sub>f</sub>          |  |  | —      | —    | 3.0  | μs   |
| R <sub>th (j-c) Q</sub> | Thermal resistance (junction to case)    | Transistor part  | —      | —    | 0.06 | °C/W |
| R <sub>th (j-c) R</sub> |  | Diode part   | —      | —    | —    | °C/W |
| R <sub>th (c-f)</sub>   | Contact thermal resistance (case to fin) | Conductive grease applied  | —      | —    | 0.05 | °C/W |

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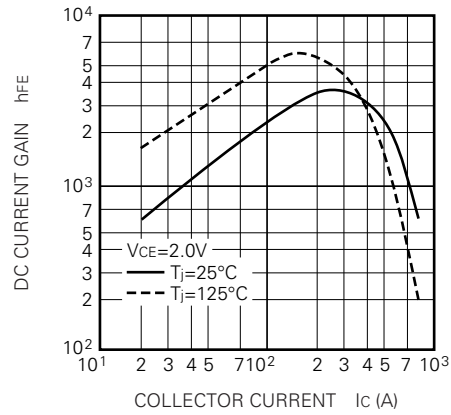
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## PERFORMANCE CURVES

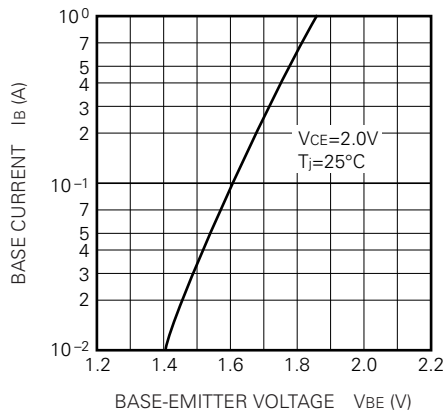
COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)



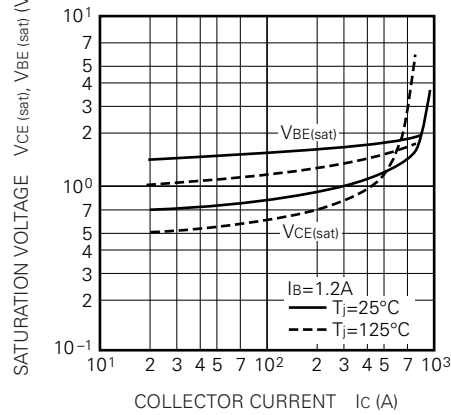
DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)



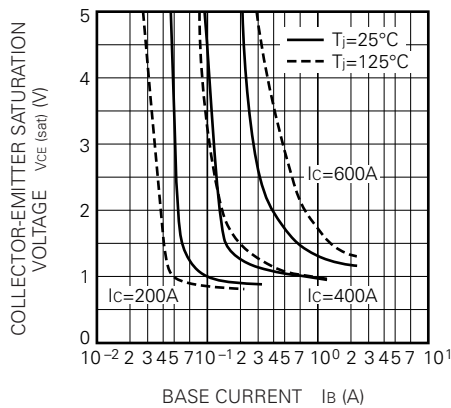
COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)



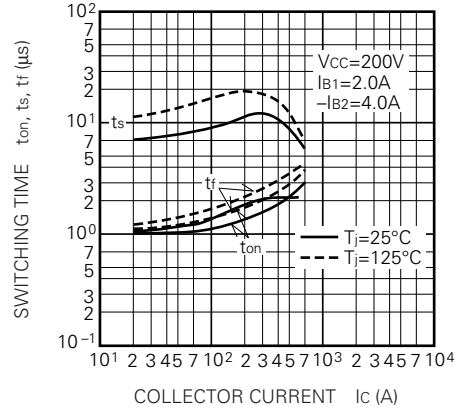
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



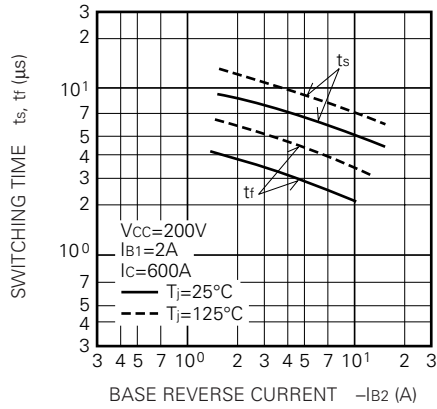
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



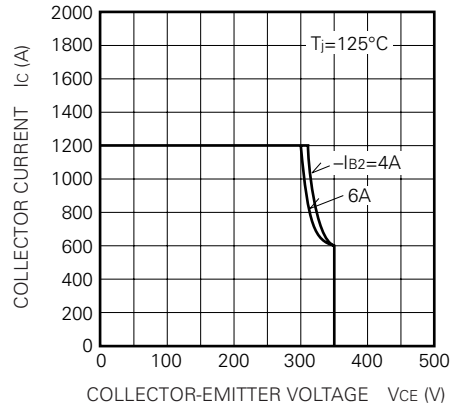
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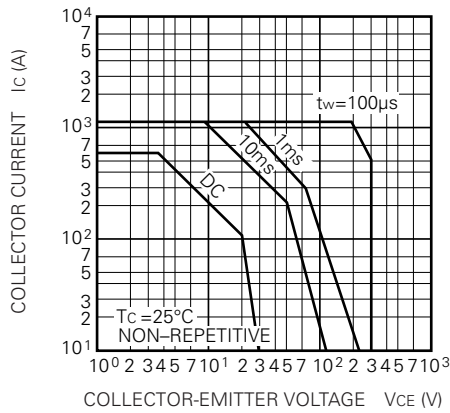
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



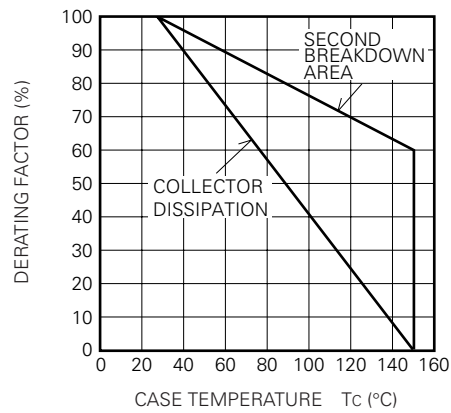
REVERSE BIAS SAFE OPERATING AREA



FORWARD BIAS SAFE OPERATING AREA



DERATING FACTOR OF F. B. S. O. A.



TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)

