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MITSUBISHI TRANSISTOR MODULES

# QM50TB-2HB

MEDIUM POWER SWITCHING USE  
INSULATED TYPE

QM50TB-2HB



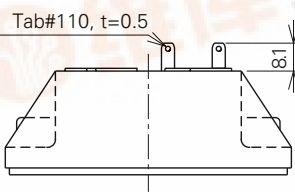
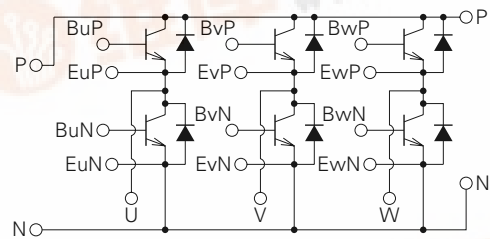
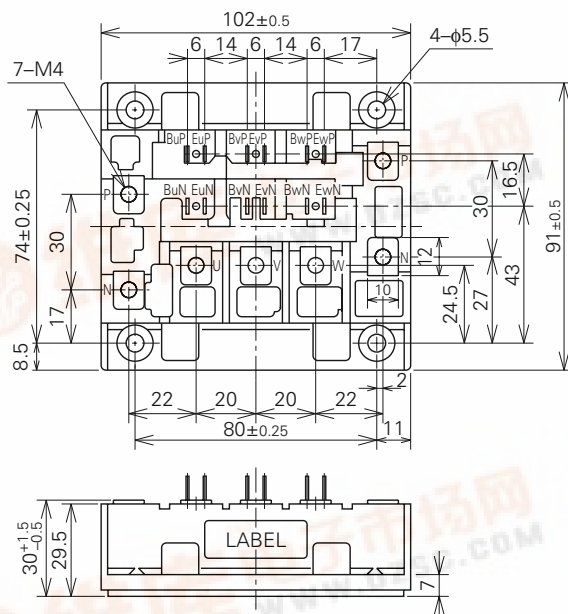
- **I<sub>c</sub>** Collector current ..... **50A**
- **V<sub>CEX</sub>** Collector-emitter voltage ..... **1000V**
- **h<sub>FE</sub>** DC current gain ..... **750**
- **Insulated Type**
- **UL Recognized**  
Yellow Card No. E80276 (N)  
File No. E80271

## APPLICATION

Inverters, Servo drives, DC motor controllers, NC equipment, Welders

## OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



Note: All Transistor Units are 4-Stage Darlingtons.



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**ABSOLUTE MAXIMUM RATINGS** (T<sub>j</sub>=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     | 1000      | V     |
| V <sub>CEX</sub>       | Collector-emitter voltage                               | V <sub>EB</sub> =2V                         | 1000      | V     |
| V <sub>CBO</sub>       | Collector-base voltage                                  | Emitter open                                | 1000      | V     |
| V <sub>EBO</sub>       | Emitter-base voltage                                    | Collector open                              | 7         | V     |
| I <sub>C</sub>         | Collector current                                       | DC  | 50        | A     |
| -I <sub>C</sub>        | Collector reverse current                               | DC (forward diode current)                  | 50        | A     |
| P <sub>C</sub>         | Collector dissipation                                   | T <sub>C</sub> =25°C                        | 400       | W     |
| I <sub>B</sub>         | Base current  | DC  | 3         | A     |
| -I <sub>CSM</sub>      | Surge collector reverse current (forward diode current) | Peak value of one cycle of 60Hz (half wave) | 500       | 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       | 2500      | V     |
| —                      | Mounting torque   | Main terminal screw M4                      | 0.98~1.47 | N·m   |
|                        |   |   | 10~15     | kg·cm |
|                        |   | Mounting screw M5                           | 1.47~1.96 | N·m   |
|                        |   |   | 15~20     | kg·cm |
| —                      | Weight  | Typical value                               | 660       | g     |

**ELECTRICAL CHARACTERISTICS** (T<sub>j</sub>=25°C, unless otherwise noted)

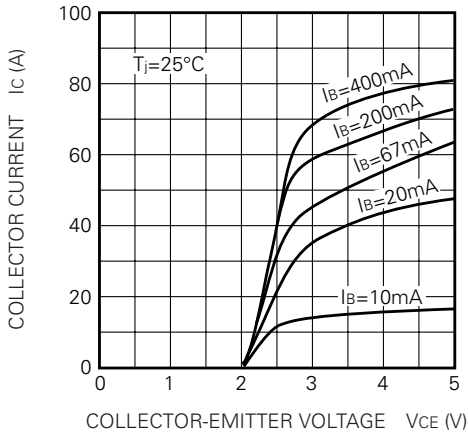
| Symbol                  | Parameter                                | Test conditions  | Limits |      |      | Unit |
|-------------------------|--|--|--------|------|------|------|
|                         |  |  | Min.   | Typ. | Max. |      |
| I <sub>CEX</sub>        | Collector cutoff current                 | V <sub>CE</sub> =1000V, V <sub>EB</sub> =2V  | —      | —    | 2.0  | mA   |
| I <sub>CBO</sub>        | Collector cutoff current                 | V <sub>CB</sub> =1000V, Emitter open   | —      | —    | 2.0  | mA   |
| I <sub>EBO</sub>        | Emitter cutoff current                   | V <sub>EB</sub> =7V  | —      | —    | 50   | mA   |
| V <sub>CE (sat)</sub>   | Collector-emitter saturation voltage     | I <sub>C</sub> =50A, I <sub>B</sub> =67mA  | —      | —    | 4.0  | V    |
| V <sub>BE (sat)</sub>   | Base-emitter saturation voltage          |  | —      | —    | 4.0  | V    |
| -V <sub>CEO</sub>       | Collector-emitter reverse voltage        | -I <sub>C</sub> =50A (diode forward voltage)   | —      | —    | 1.8  | V    |
| h <sub>FE</sub>         | DC current gain                          | I <sub>C</sub> =50A, V <sub>CE</sub> =4.0V   | 750    | —    | —    | —    |
| t <sub>on</sub>         | Switching time                           | V <sub>CC</sub> =600V, I <sub>C</sub> =50A, I <sub>B1</sub> =0.1mA, I <sub>B2</sub> =-1.0A | —      | —    | 2.5  | 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 (per 1/6 module)   | —      | —    | 0.31 | °C/W |
| R <sub>th (j-c) R</sub> |  | Diode part (per 1/6 module)  | —      | —    | 1.2  | °C/W |
| R <sub>th (c-f)</sub>   | Contact thermal resistance (case to fin) | Conductive grease applied (per 1/6 module)   | —      | —    | 0.2  | °C/W |

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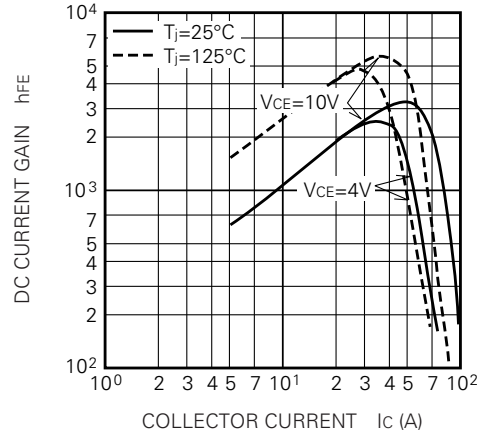
MEDIUM POWER SWITCHING USE  
INSULATED TYPE

## PERFORMANCE CURVES

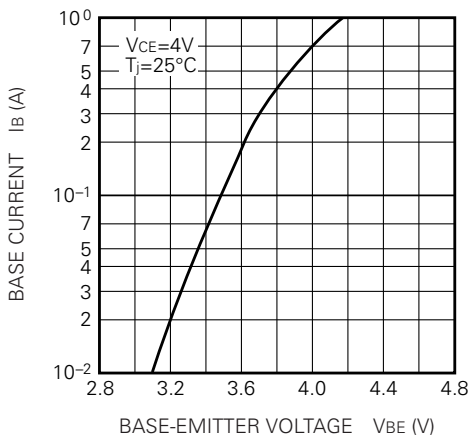
**COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)**



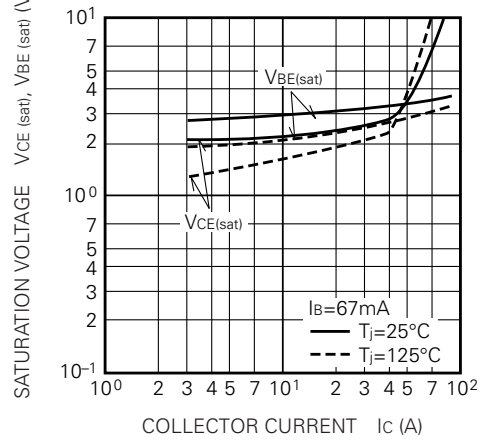
**DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)**



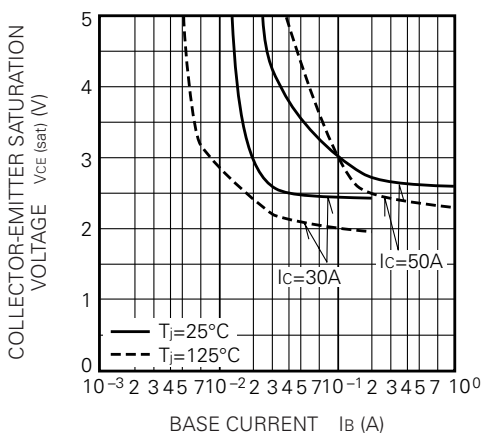
**COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)**



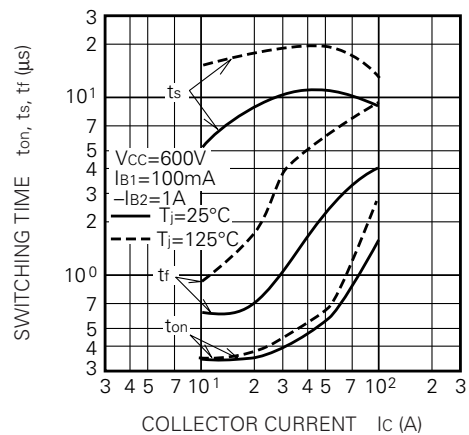
**SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



**COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)**



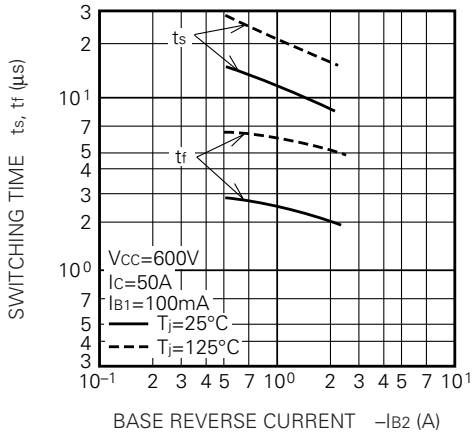
**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



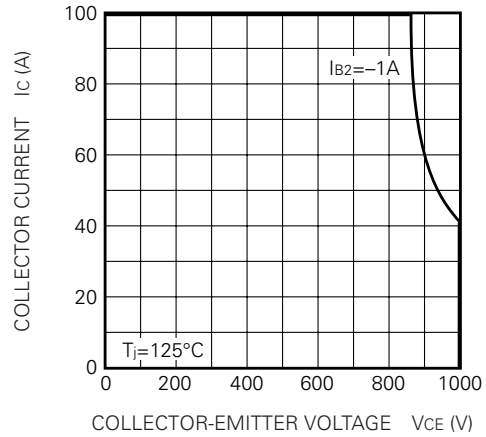
# QM50TB-2HB

MEDIUM POWER SWITCHING USE  
INSULATED TYPE

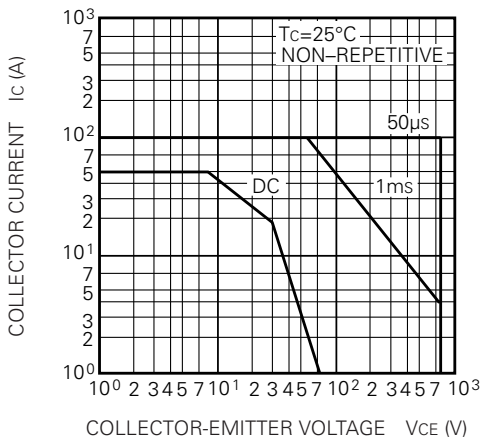
**SWITCHING TIME VS. BASE CURRENT (TYPICAL)**



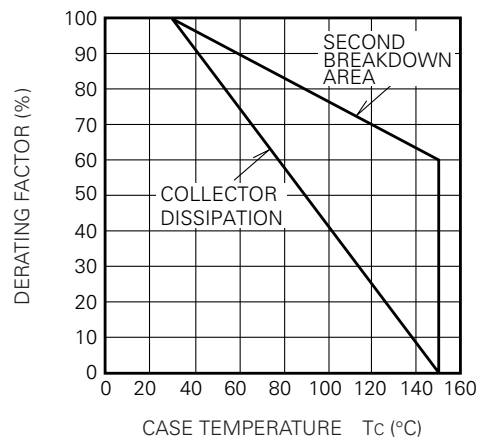
**REVERSE BIAS SAFE OPERATING AREA**



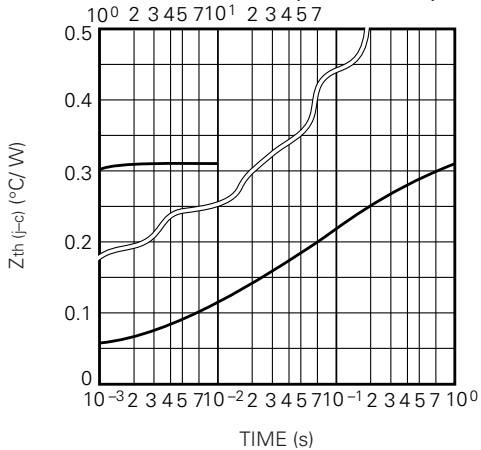
**FORWARD BIAS SAFE OPERATING AREA**



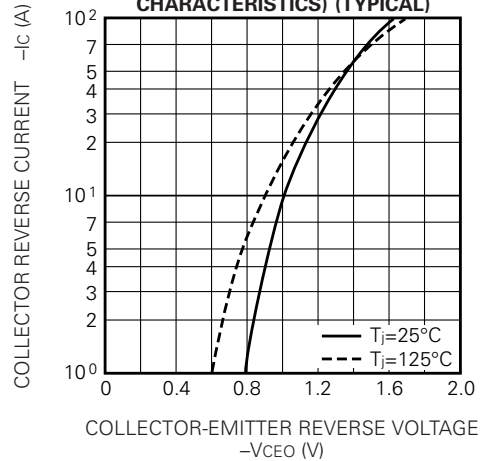
**DERATING FACTOR OF F. B. S. O. A.**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)**



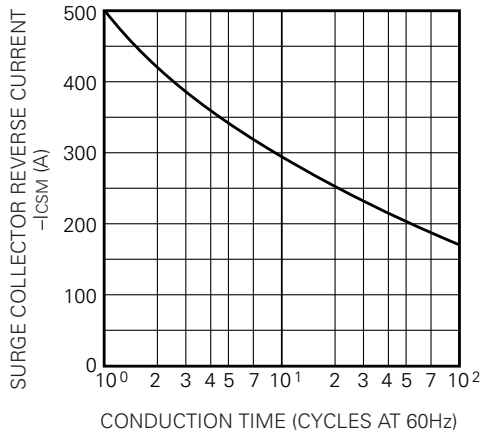
**REVERSE COLLECTOR CURRENT VS. COLLECTOR-EMITTER REVERSE VOLTAGE (DIODE FORWARD CHARACTERISTICS) (TYPICAL)**



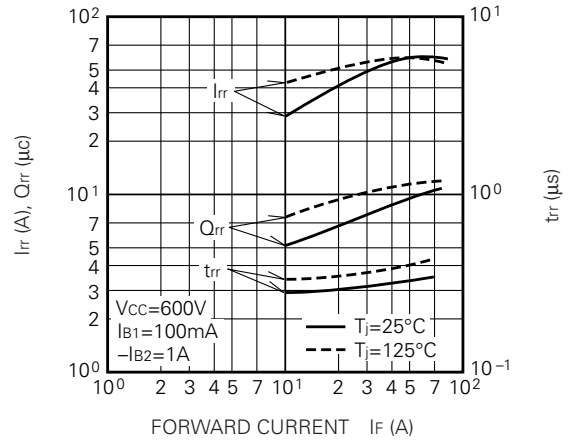
**QM50TB-2HB**

MEDIUM POWER SWITCHING USE  
INSULATED TYPE

**RATED SURGE COLLECTOR REVERSE CURRENT  
(DIODE FORWARD SURGE CURRENT)**



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



**TRANSIENT THERMAL IMPEDANCE  
CHARACTERISTIC (DIODE)**

