MITSUBISHI TRANSISTOR MODULES

# QM50HA-H

**MEDIUM POWER SWITCHING USE**
**INSULATED TYPE**

**QM50HA-H**



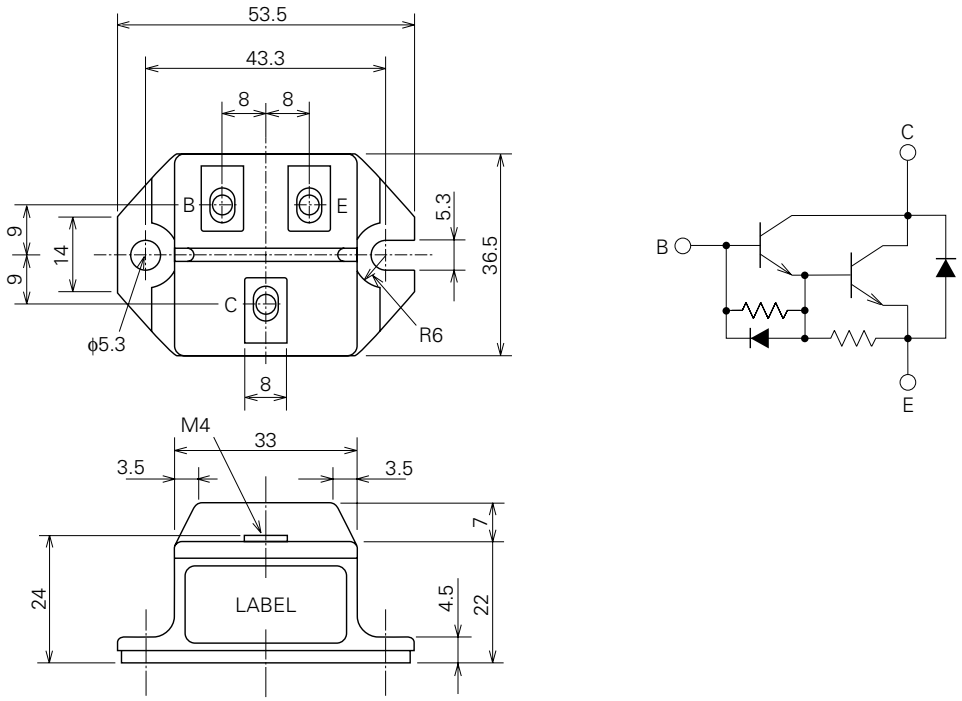
- **$I_C$** Collector current ..... **50A**
- **$V_{CEX}$** Collector-emitter voltage ..... **600V**
- **$h_{FE}$** DC current gain ..... **75**
- **Insulated Type**
- **UL Recognized**
  Yellow Card No. E80276 (N)
  File No. E80271

## APPLICATION

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

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm






MITSUBISHI ELECTRIC

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

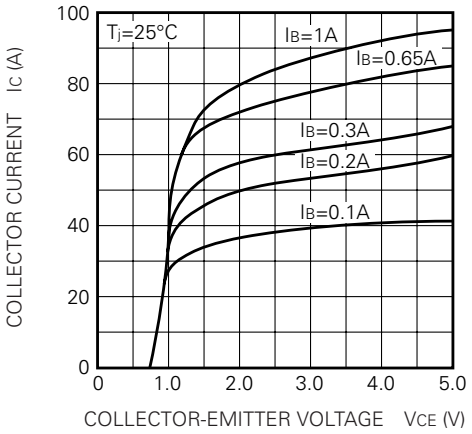
| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| $V_{CEX\ (SUS)}$ | Collector-emitter voltage | $I_C$=1A, $V_{EB}$=2V | 600 | V |
| $V_{CEX}$ | Collector-emitter voltage | $V_{EB}$=2V | 600 | V |
| $V_{CBO}$ | Collector-base voltage | Emitter open | 600 | V |
| $V_{EBO}$ | Emitter-base voltage | Collector open | 7 | V |
| $I_C$ | Collector current | DC | 50 | A |
| $-I_C$ | Collector reverse current | DC (forward diode current) | 50 | A |
| $P_C$ | Collector dissipation | $T_C$=25°C | 310 | W |
| $I_B$ | Base current | DC | 3 | A |
| $-I_{CSM}$ | Surge collector reverse current (forward diode current) | Peak value of one cycle of 60Hz (half wave) | 500 | A |
| $T_j$ | Junction temperature | | –40~+150 | °C |
| $T_{stg}$ | Storage temperature | | –40~+125 | °C |
| $V_{iso}$ | 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 | 90 | g |

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

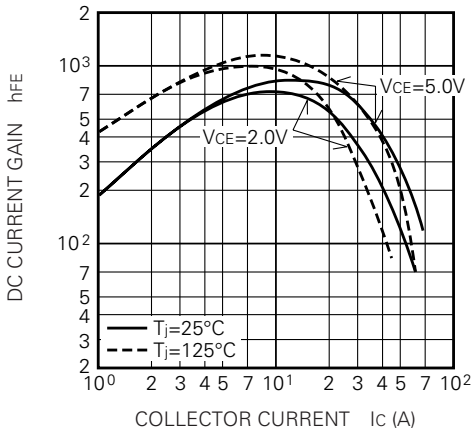
| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $I_{CEX}$ | Collector cutoff current | $V_{CE}$=600V, $V_{EB}$=2V | — | — | 1.0 | mA |
| $I_{CBO}$ | Collector cutoff current | $V_{CB}$=600V, Emitter open | — | — | 1.0 | mA |
| $I_{EBO}$ | Emitter cutoff current | $V_{EB}$=7V | — | — | 200 | mA |
| $V_{CE\ (sat)}$ | Collector-emitter saturation voltage | $I_C$=50A, $I_B$=0.65A | — | — | 2.0 | V |
| $V_{BE\ (sat)}$ | Base-emitter saturation voltage | | — | — | 2.5 | V |
| $-V_{CEO}$ | Collector-emitter reverse voltage | $-I_C$=50A (diode forward voltage) | — | — | 1.75 | V |
| $h_{FE}$ | DC current gain | $I_C$=50A, $V_{CE}$=2V/5V | 75/100 | — | — | — |
| $t_{on}$ | Switching time | $V_{CC}$=300V, $I_C$=50A, $I_{B1}$=$-I_{B2}$=1A | — | — | 1.5 | µs |
| $t_s$ | | | — | — | 12 | µs |
| $t_f$ | | | — | — | 3.0 | µs |
| $R_{th\ (j-c)\ Q}$ | Thermal resistance (junction to case) | Transistor part | — | — | 0.4 | °C/W |
| $R_{th\ (j-c)\ R}$ | | Diode part | — | — | 1.3 | °C/W |
| $R_{th\ (c-f)}$ | Contact thermal resistance (case to fin) | Conductive grease applied | — | — | 0.15 | °C/W |

## PERFORMANCE CURVES

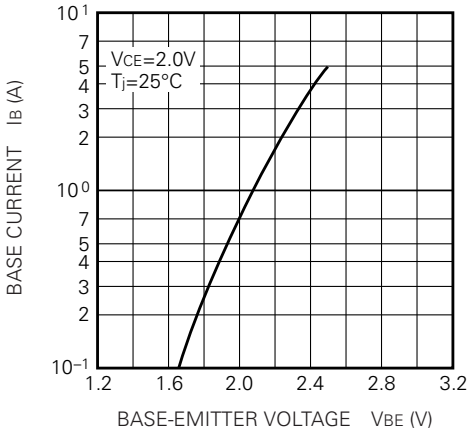
**COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)**



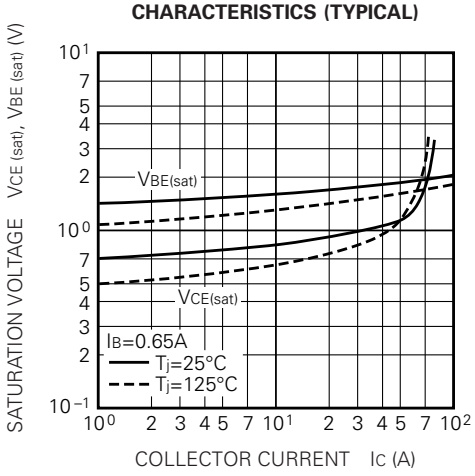

**DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)**



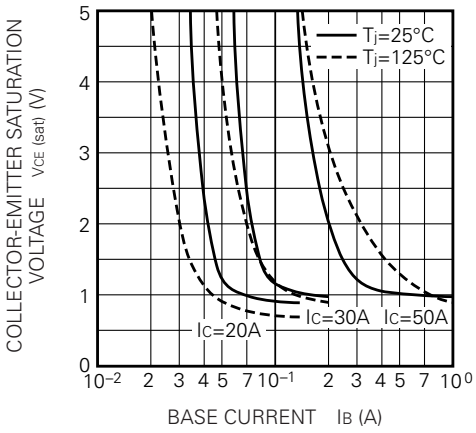

**COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)**



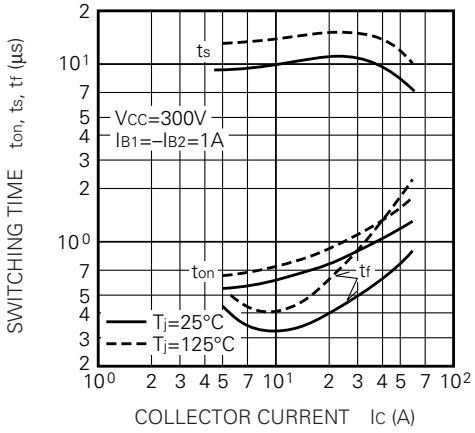

**SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



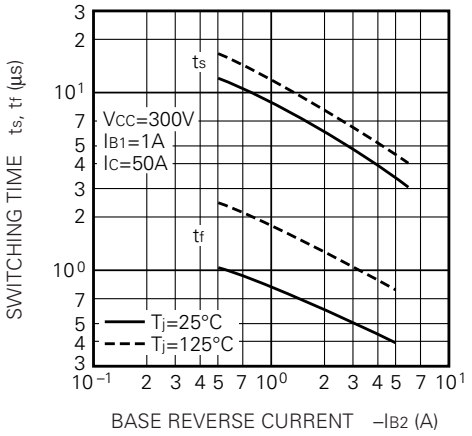

**COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)**



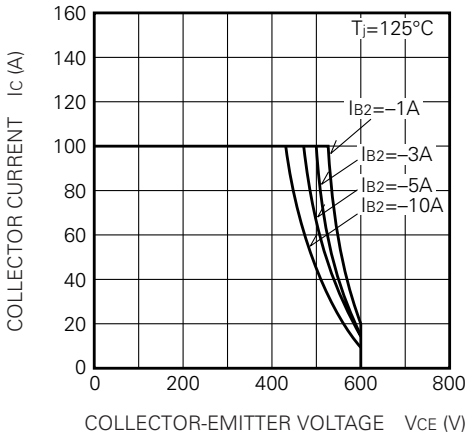

**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



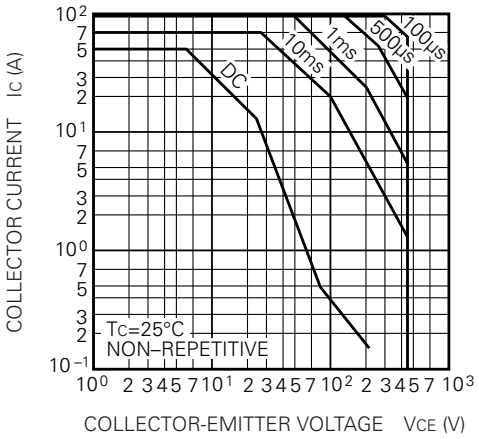
**SWITCHING TIME VS. BASE CURRENT (TYPICAL)**



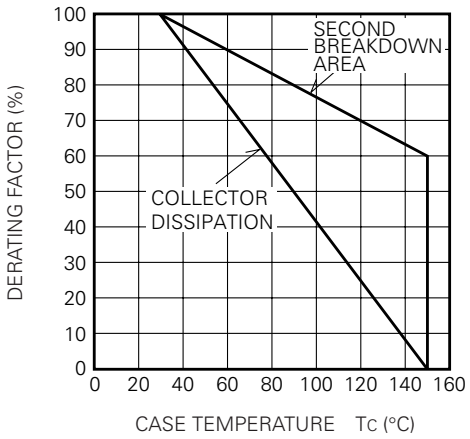

**REVERSE BIAS SAFE OPERATING AREA**



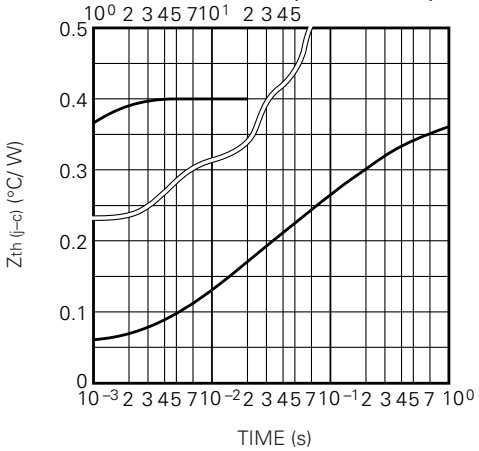

**FORWARD BIAS SAFE OPERATING AREA**



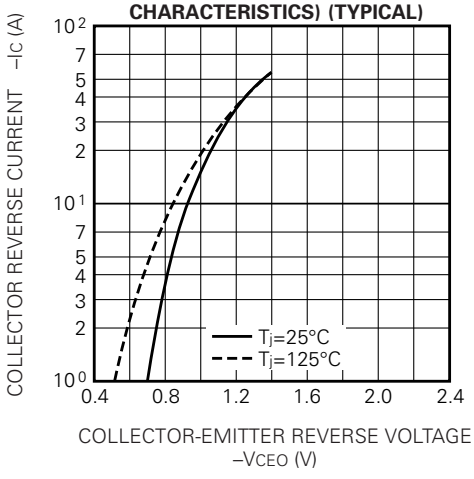

**DERATING FACTOR OF F. B. S. O. A.**



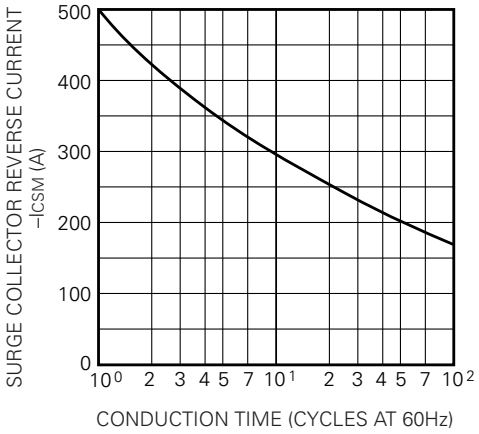

**TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)**



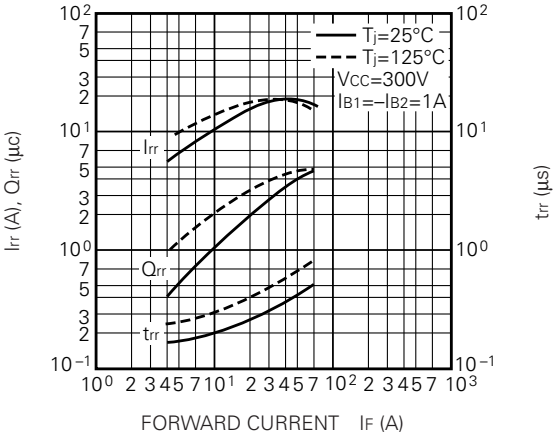

**REVERSE COLLECTOR CURRENT VS. COLLECTOR-EMITTER REVERSE VOLTAGE (DIODE FORWARD CHARACTERISTICS) (TYPICAL)**



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




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




**TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (DIODE)**

