



MITSUBISHI TRANSISTOR MODULES

**QM15KD-HB**

**MEDIUM POWER SWITCHING USE  
INSULATED TYPE**

**ABSOLUTE MAXIMUM RATINGS** (Inverter part,  $T_j=25^\circ\text{C}$ )

| Symbol     | Parameter   | Conditions                                  | Ratings | Unit |
|------------|---|---|---------|------|
| VCEX (SUS) | Collector-emitter voltage                               | $I_C=1\text{A}$ , $V_{EB}=2\text{V}$        | 600     | V    |
| VCEX       | Collector-emitter voltage                               | $V_{EB}=2\text{V}$                          | 600     | V    |
| VCBO       | Collector-base voltage                                  | Emitter open                                | 600     | V    |
| VEBO       | Emitter-base voltage                                    | Collector open                              | 7       | V    |
| $I_C$      | Collector current                                       | DC  | 15      | A    |
| $-I_C$     | Collector reverse current                               | DC (forward diode current)                  | 15      | A    |
| $P_C$      | Collector dissipation                                   | $T_c=25^\circ\text{C}$                      | 76      | W    |
| $I_B$      | Base current  | DC  | 1       | A    |
| $-I_{CSM}$ | Surge collector reverse current (forward diode current) | Peak value of one cycle of 60Hz (half wave) | 150     | A    |

**ABSOLUTE MAXIMUM RATINGS** (Converter part,  $T_j=25^\circ\text{C}$ )

| Symbol    | Parameter                              | Conditions   | Ratings | Unit                 |
|-----------|--|--|---------|----------------------|
| VRRM      | Repetitive peak reverse voltage        |  | 800     | V                    |
| VRSM      | Non-repetitive peak reverse voltage    |  | 900     | V                    |
| $E_a$     | Recommended AC input voltage           |  | 220     | V                    |
| $I_O$     | DC output current                      | Three phase full wave rectifying circuit, $T_c=79^\circ\text{C}$ | 30      | A                    |
| $I_{FSM}$ | Surge (non-repetitive) forward current | One half cycle at 60 Hz, peak value                              | 300     | A                    |
| $I^2t$    | $I^2t$ for fusing                      | Value for one cycle of surge current                             | 375     | $\text{A}^2\text{s}$ |

**ABSOLUTE MAXIMUM RATINGS** (Common)

| Symbol    | Parameter            | Conditions                            | Ratings       | Unit             |
|-----------|----------------------|---------------------------------------|---------------|------------------|
| $T_j$     | Junction temperature |                                       | $-40\sim 150$ | $^\circ\text{C}$ |
| $T_{stg}$ | Storage temperature  |                                       | $-40\sim 125$ | $^\circ\text{C}$ |
| $V_{iso}$ | Isolation voltage    | Charged part to case, AC for 1 minute | 2500          | V                |
| —         | Mounting torque      | Mounting screw M5                     | 1.47~1.96     | N·m              |
| —         | Weight               | Typical value                         | 15~20         | kg·cm            |
| —         | Weight               | Typical value                         | 125           | g                |

**ELECTRICAL CHARACTERISTICS** (Inverter part,  $T_j=25^\circ\text{C}$ )

| Symbol         | Parameter                                | Test conditions  | Limits |      |      | Unit                      |
|----------------|--|--|--------|------|------|---------------------------|
|                |  |  | Min.   | Typ. | Max. |                           |
| $I_{CEX}$      | Collector cutoff current                 | $V_{CE}=600\text{V}$ , $V_{EB}=2\text{V}$  | —      | —    | 1.0  | mA                        |
| $I_{CBO}$      | Collector cutoff current                 | $V_{CB}=600\text{V}$ , Emitter open  | —      | —    | 1.0  | mA                        |
| $I_{EBO}$      | Emitter cutoff current                   | $V_{EB}=7\text{V}$   | —      | —    | 40   | mA                        |
| $V_{CE(sat)}$  | Collector-emitter saturation voltage     | $I_C=15\text{A}$ , $I_B=60\text{mA}$   | —      | —    | 2.0  | V                         |
| $V_{BE(sat)}$  | Base-emitter saturation voltage          |  | —      | —    | 2.5  | V                         |
| $-V_{CEO}$     | Collector-emitter reverse voltage        | $-I_C=15\text{A}$ (diode forward voltage)  | —      | —    | 1.5  | V                         |
| $h_{FE}$       | DC current gain                          | $I_C=15\text{A}$ , $V_{CE}=2\text{V}$  | 250    | —    | —    | —                         |
| $t_{on}$       | Switching time                           | $V_{CC}=300\text{V}$ , $I_C=15\text{A}$ , $I_{B1}=90\text{mA}$ , $-I_{B2}=0.3\text{A}$ | —      | —    | 1.5  | $\mu\text{s}$             |
| $t_s$          |  |  | —      | —    | 10   | $\mu\text{s}$             |
| $t_f$          |  |  | —      | —    | 2.0  | $\mu\text{s}$             |
| $R_{th(j-c)Q}$ | Thermal resistance (junction to case)    | Transistor part (per 1/6 module)   | —      | —    | 1.65 | $^\circ\text{C}/\text{W}$ |
| $R_{th(j-c)R}$ |  | Diode part (per 1/6 module)  | —      | —    | 2.8  | $^\circ\text{C}/\text{W}$ |
| $R_{th(c-f)}$  | Contact thermal resistance (case to fin) | Conductive grease applied  | —      | —    | 0.35 | $^\circ\text{C}/\text{W}$ |

**ELECTRICAL CHARACTERISTICS** (Converter part,  $T_j=25^\circ\text{C}$ )

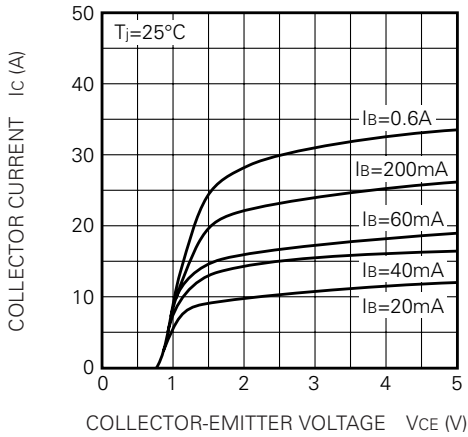
| Symbol        | Parameter                       | Test conditions                         | Limits |      |      | Unit                      |
|---------------|---------------------------------|---|--------|------|------|---------------------------|
|               |                                 |   | Min.   | Typ. | Max. |                           |
| $I_{RRM}$     | Repetitive peak reverse current | $V_R=V_{RRM}$ , $T_j=150^\circ\text{C}$ | —      | —    | 5.0  | mA                        |
| $V_{FM}$      | Forward voltage drop            | $I_F=30\text{A}$                        | —      | —    | 1.3  | V                         |
| $R_{th(j-c)}$ | Thermal resistance              | Junction to case                        | —      | —    | 0.9  | $^\circ\text{C}/\text{W}$ |
| $R_{th(c-f)}$ | Contact thermal resistance      | Case to fin, conductive grease applied  | —      | —    | 0.35 | $^\circ\text{C}/\text{W}$ |

**QM15KD-HB**

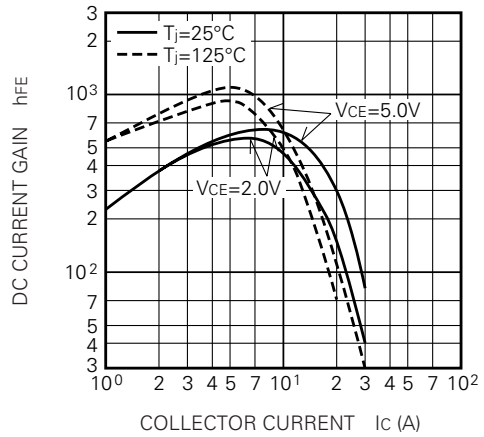
MEDIUM POWER SWITCHING USE  
INSULATED TYPE

**PERFORMANCE CURVES**

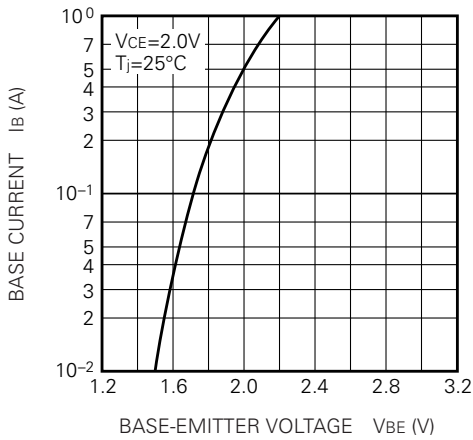
**COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)**



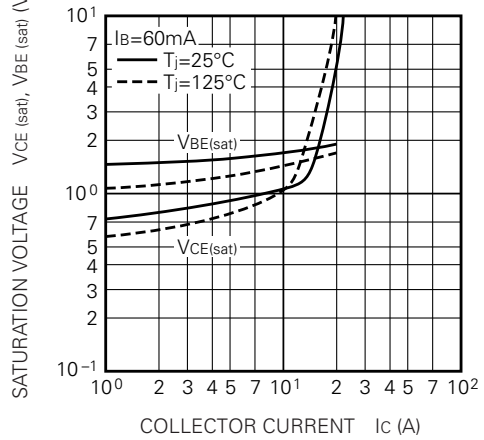
**DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)**



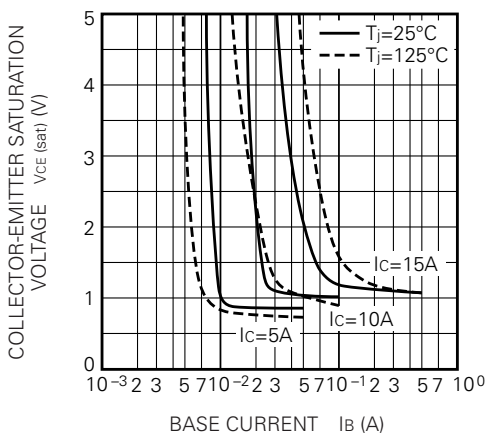
**COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)**



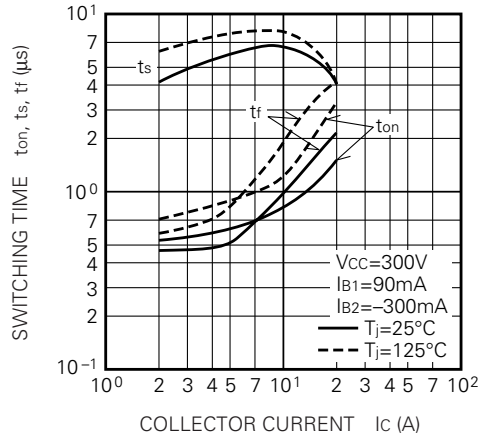
**SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)**



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



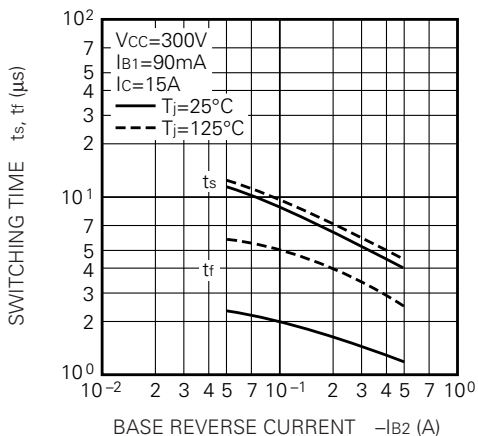
**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



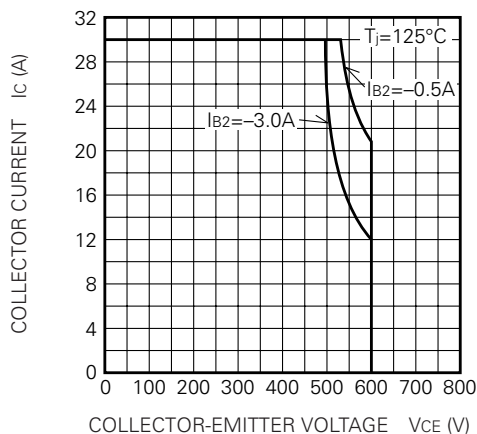
# QM15KD-HB

MEDIUM POWER SWITCHING USE  
INSULATED TYPE

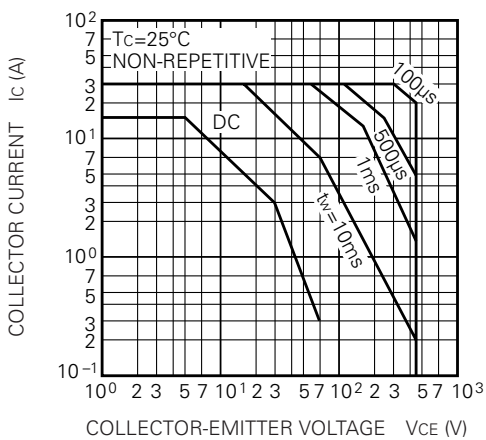
**SWITCHING TIME VS. BASE CURRENT (TYPICAL)**



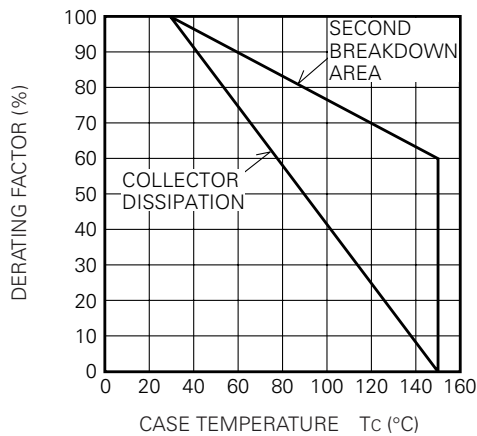
**REVERSE BIAS SAFE OPERATING AREA**



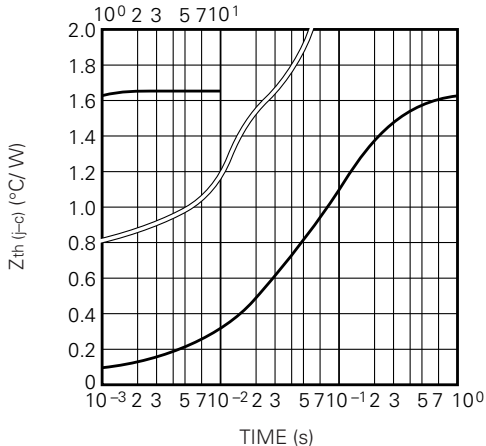
**FORWARD BIAS SAFE OPERATING AREA**



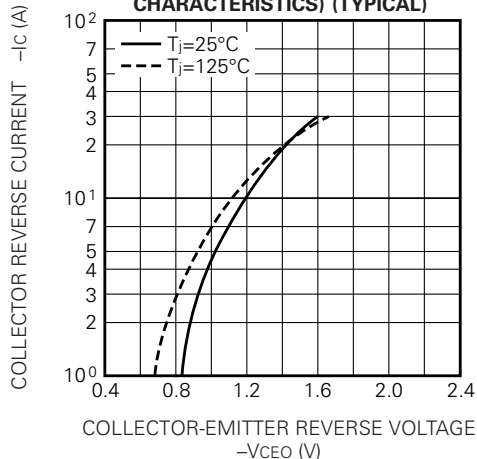
**DERATING FACTOR OF F. B. S. O. A.**



**TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)**



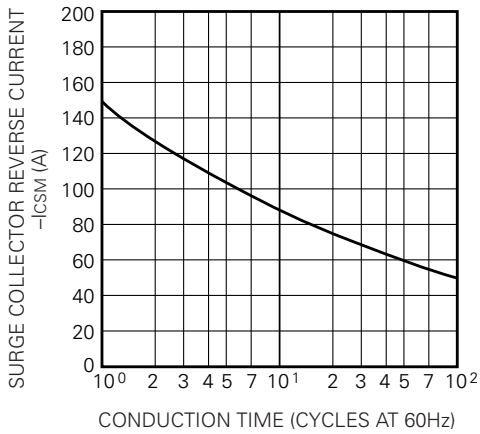
**REVERSE COLLECTOR CURRENT VS. COLLECTOR-EMITTER REVERSE VOLTAGE (DIODE FORWARD CHARACTERISTICS) (TYPICAL)**



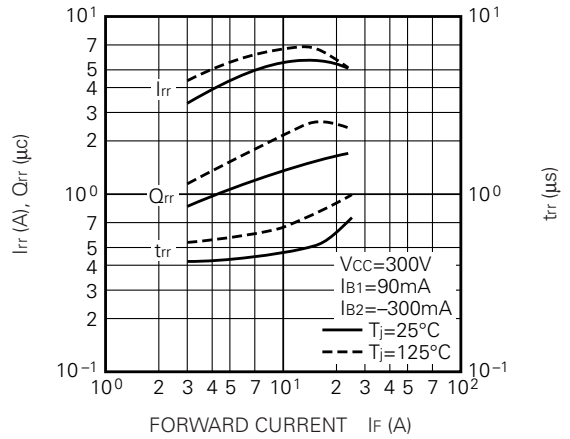
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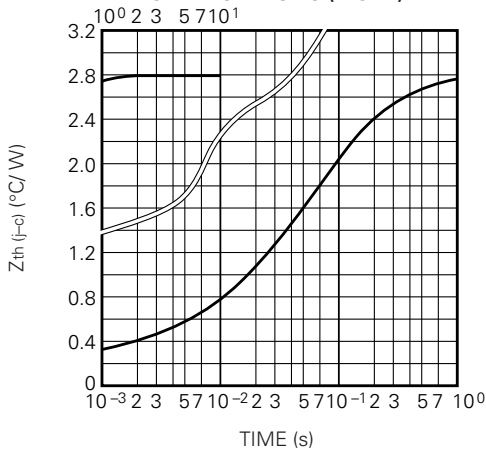
**RATED SURGE COLLECTOR REVERSE CURRENT  
(DIODE FORWARD SURGE CURRENT)**



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



**TRANSIENT THERMAL IMPEDANCE  
CHARACTERISTIC (DIODE)**

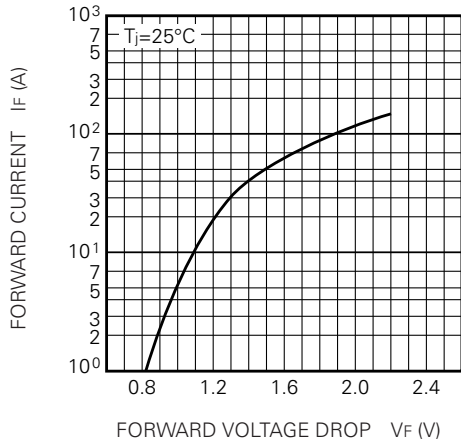


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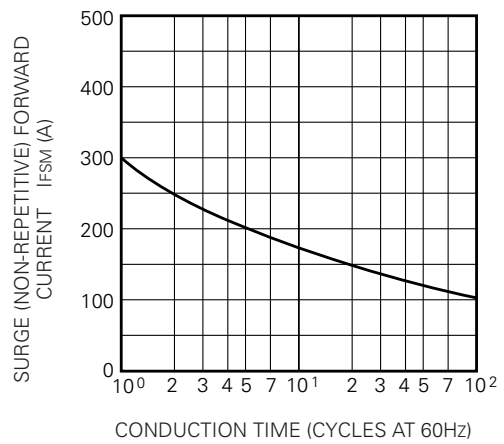
MEDIUM POWER SWITCHING USE  
INSULATED TYPE

## PERFORMANCE CURVES (Diode parts)

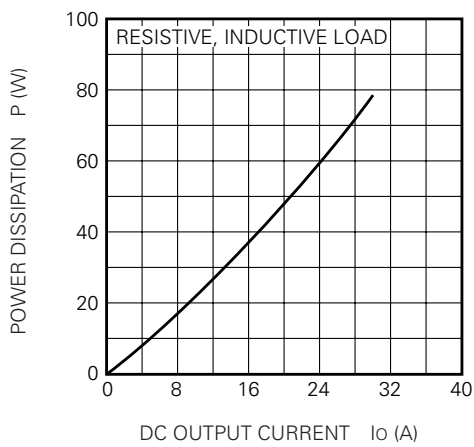
**MAXIMUM FORWARD CHARACTERISTIC**



**ALLOWABLE SURGE (NON-REPETITIVE) FORWARD CURRENT**



**MAXIMUM POWER DISSIPATION**



**ALLOWABLE CASE TEMPERATURE VS. DC OUTPUT CURRENT**

