MITSUBISHI TRANSISTOR MODULES

QM15KD-HB

MEDIUM POWER SWITCHING USE
INSULATED TYPE

QM15KD-HB

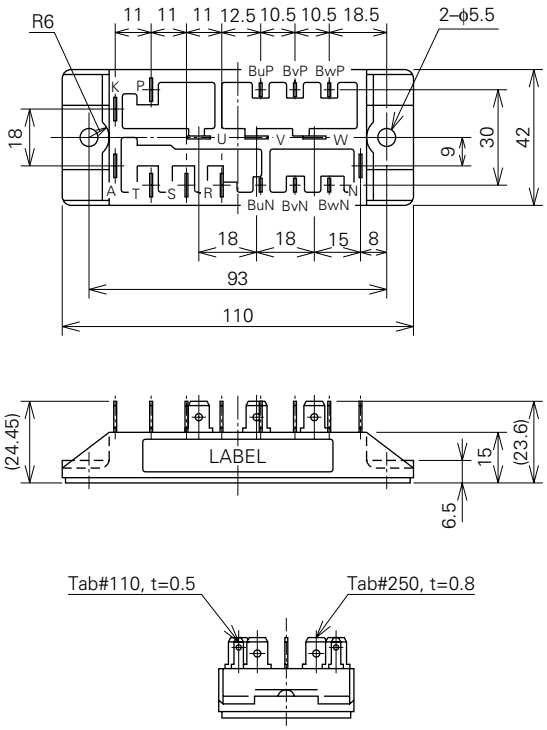
- **I_C** Collector current **15A**
- **V_{CEX}** Collector-emitter voltage **600V**
- **h_{FE}** DC current gain..... **250**
- **Insulated Type**
- **UL Recognized**
  Yellow Card No. E80276 (N)
  File No. E80271

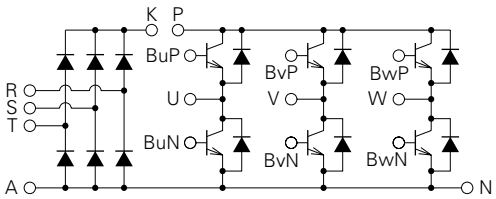
APPLICATION

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

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm





Feb.1999

MITSUBISHI ELECTRIC

QM15KD-HB

MEDIUM POWER SWITCHING USE
INSULATED TYPE

ABSOLUTE MAXIMUM RATINGS (Inverter part, T_j=25°C)

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	15	A
$-I_C$	Collector reverse current	DC (forward diode current)	15	A
P_C	Collector dissipation	T_C=25°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°C)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Repetitive peak reverse voltage		800	V
V_{RSM}	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°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	A^2s

ABSOLUTE MAXIMUM RATINGS (Common)

Symbol	Parameter	Conditions	Ratings	Unit
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	Mounting screw M5	1.47~1.96	N·m
			15~20	kg·cm
—	Weight	Typical value	125	g

ELECTRICAL CHARACTERISTICS (Inverter part, T_j=25°C)

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	—	—	40	mA
$V_{CE\ (sat)}$	Collector-emitter saturation voltage	I_C=15A, I_B=60mA	—	—	2.0	V
$V_{BE\ (sat)}$	Base-emitter saturation voltage		—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C$=15A (diode forward voltage)	—	—	1.5	V
h_{FE}	DC current gain	I_C=15A, V_{CE}=2V	250	—	—	—
t_{on}	Switching time	V_{CC}=300V, I_C=15A, I_{B1}=90mA,$-I_{B2}$=0.3A	—	—	1.5	µs
t_s			—	—	10	µs
t_f			—	—	2.0	µs
$R_{th\ (j-c)\ Q}$	Thermal resistance (junction to case)	Transistor part (per 1/6 module)	—	—	1.65	°C/W
$R_{th\ (j-c)\ R}$		Diode part (per 1/6 module)	—	—	2.8	°C/W
$R_{th\ (c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied	—	—	0.35	°C/W

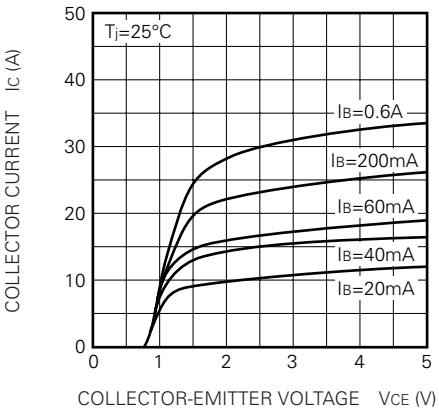
ELECTRICAL CHARACTERISTICS (Converter part, T_j=25°C)

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

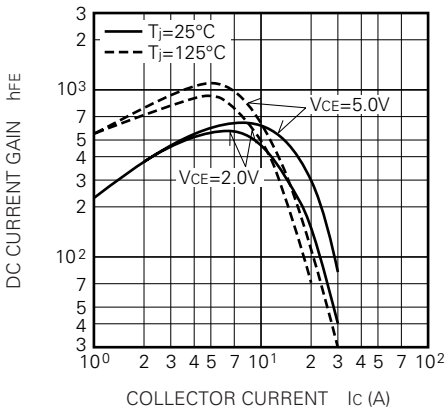
MITSUBISHI ELECTRIC

PERFORMANCE CURVES

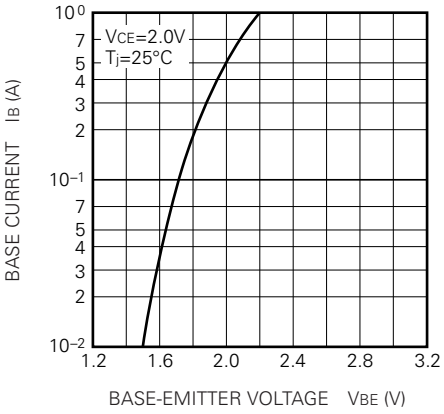
COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)



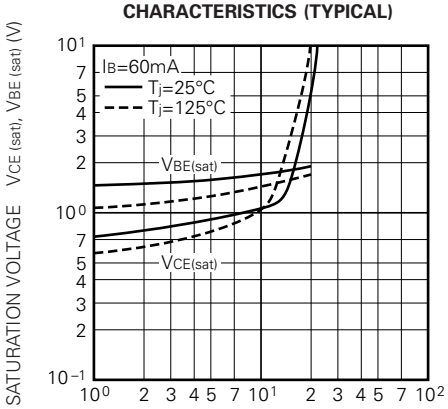
DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)



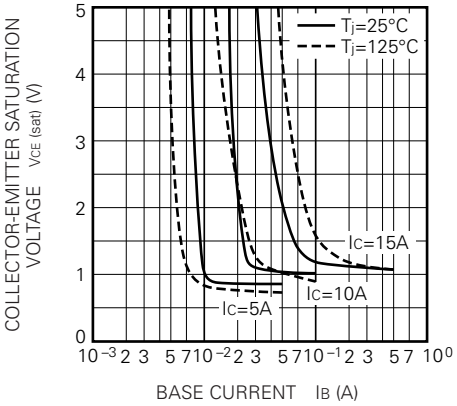
COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)



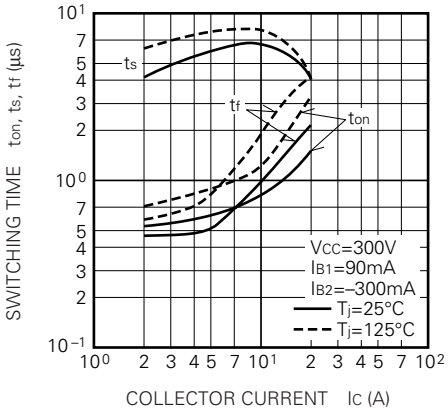
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



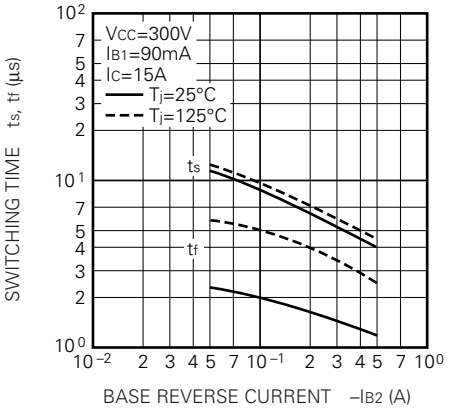
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



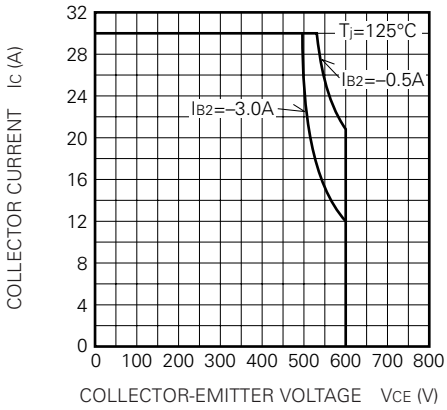
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



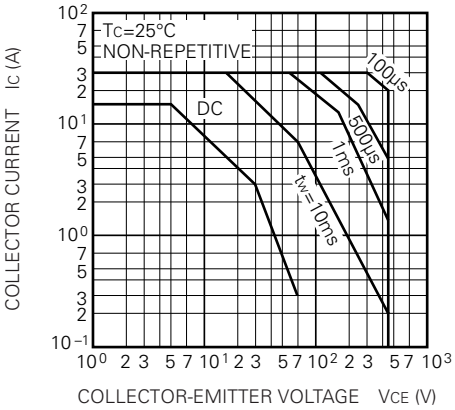
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



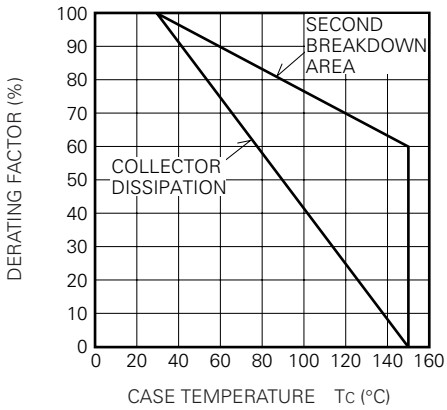
REVERSE BIAS SAFE OPERATING AREA



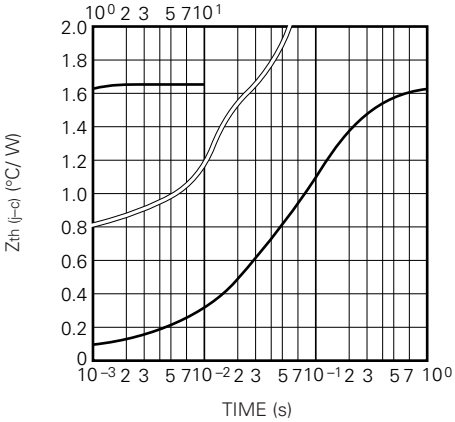
FORWARD BIAS SAFE OPERATING AREA



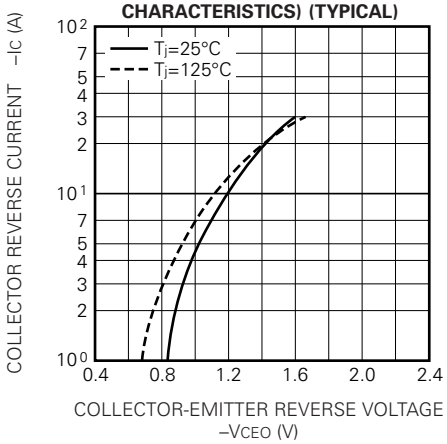
DERATING FACTOR OF F. B. S. O. A.



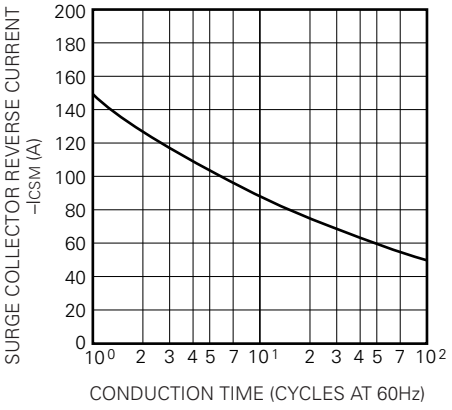
TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)



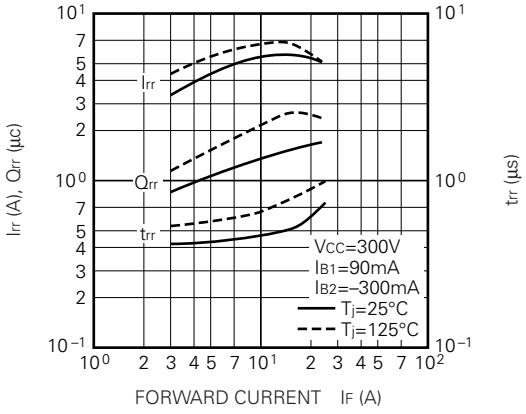
REVERSE COLLECTOR CURRENT VS. COLLECTOR-EMITTER REVERSE VOLTAGE (DIODE FORWARD CHARACTERISTICS) (TYPICAL)



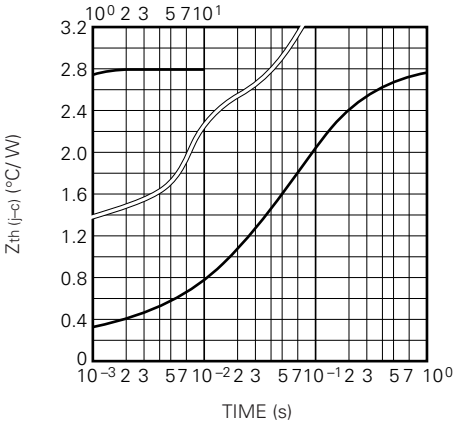
RATED SURGE COLLECTOR REVERSE CURRENT (DIODE FORWARD SURGE CURRENT)



REVERSE RECOVERY CHARACTERISTICS OF FREE-WHEEL DIODE (TYPICAL)

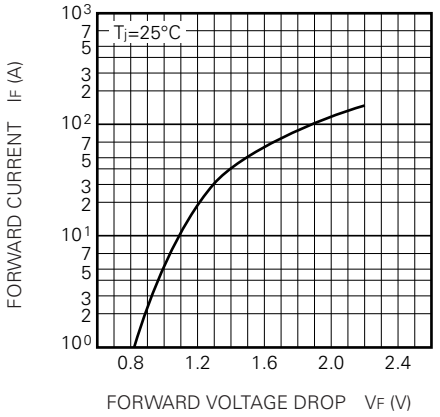


TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (DIODE)

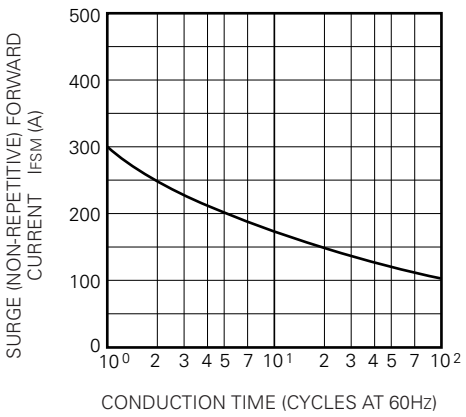


PERFORMANCE CURVES (Diode parts)

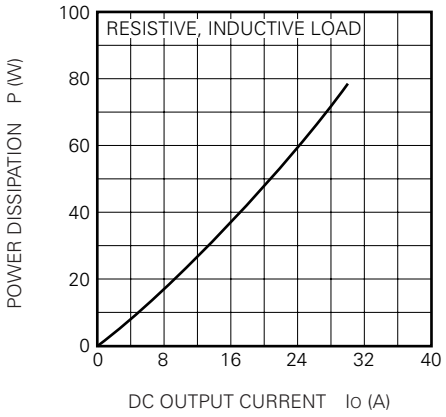
MAXIMUM FORWARD CHARACTERISTIC



ALLOWABLE SURGE (NON-REPETITIVE) FORWARD CURRENT



MAXIMUM POWER DISSIPATION



ALLOWABLE CASE TEMPERATURE VS. DC OUTPUT CURRENT