MITSUBISHI TRANSISTOR MODULES

QM30E2Y/E3Y-H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

QM30E2Y/E3Y-H

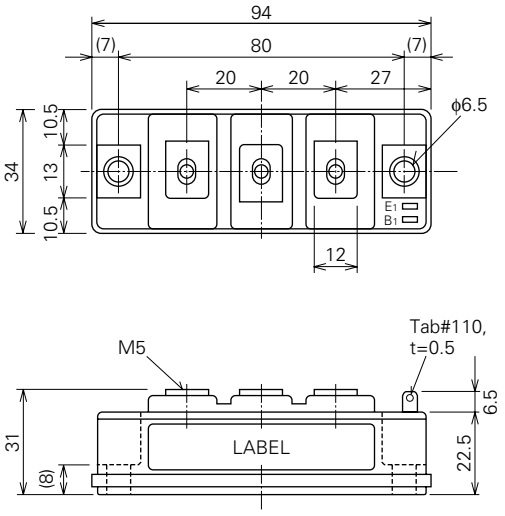
- **I_C** Collector current **30A**
- **V_{CEX}** Collector-emitter voltage **600V**
- **h_{FE}** DC current gain..... **75**
- **Insulated Type**
- **UL Recognized**
  Yellow Card No. E80276 (N)
  File No. E80271

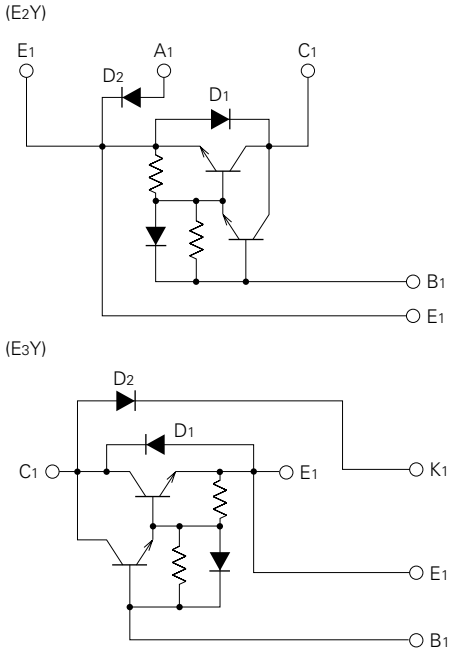
APPLICATION

DC chopper, DC motor controllers, Inverters

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm





Feb.1999

MITSUBISHI ELECTRIC

QM30E2Y/E3Y-H

MEDIUM POWER SWITCHING USE
INSULATED TYPE

ABSOLUTE MAXIMUM RATINGS (Transistor part including D1, 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	30	A
$-I_C$	Collector reverse current	DC (forward diode current)	30	A
P_C	Collector dissipation	T_C=25°C	250	W
I_B	Base current	DC	1.8	A
$-I_{CSM}$	Surge collector reverse current (forward diode current)	Peak value of one cycle of 60Hz (half wave)	300	A

ABSOLUTE MAXIMUM RATINGS (Diode part (D2), T_j=25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Repetitive peak reverse voltage		600	V
V_{RSM}	Non-repetitive peak reverse voltage		720	V
$V_{R\ (DC)}$	DC reverse voltage		480	V
I_{DC}	DC current	DC circuit, resistive, inductive load	30	A
I_{FSM}	Surge (non-repetitive) forward current	Peak value of one cycle of 60Hz (half wave)	600	A
I^2t	I^2t for fusing	Value for one cycle of surge current	1.5×10^3	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	Main terminal screw M5	1.47~1.96	N·m
			15~20	kg·cm
		Mounting screw M6	1.96~2.94	N·m
			20~30	kg·cm
—	Weight	Typical value	210	g

ELECTRICAL CHARACTERISTICS (Transistor part including D1, 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	—	—	200	mA
$V_{CE\ (sat)}$	Collector-emitter saturation voltage	I_C=30A, I_B=0.4A	—	—	2.0	V
$V_{BE\ (sat)}$	Base-emitter saturation voltage		—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C$=30A (diode forward voltage)	—	—	1.85	V
h_{FE}	DC current gain	I_C=30A, V_{CE}=2V/5V	75/100	—	—	—
t_{on}	Switching time	V_{CC}=300V, I_C=30A, I_{B1}=$-I_{B2}$=0.6A	—	—	1.5	µs
t_s			—	—	12	µs
t_f			—	—	3.0	µs
$R_{th\ (j-c)\ Q}$	Thermal resistance (junction to case)	Transistor part	—	—	0.5	°C/W
$R_{th\ (j-c)\ R}$		Diode part	—	—	2.0	°C/W
$R_{th\ (c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied	—	—	0.15	°C/W

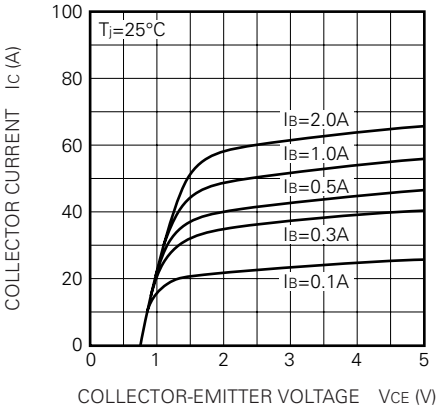
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS (Diode part (D2), T_j=25°C)

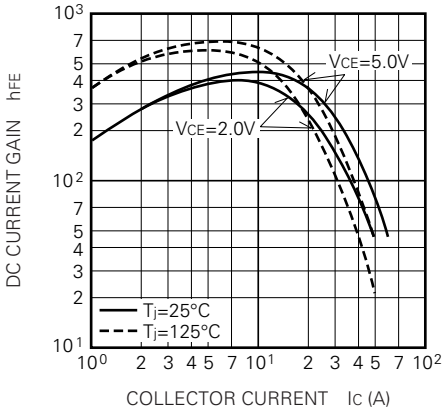
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I_{RRM}	Repetitive peak reverse current	V_R=V_{RRM}, T_j=150°C	—	—	5.0	mA
V_{FM}	Forward voltage	I_F=30A	—	—	1.5	V
t_{rr}	Reverse recovery time	I_F=30A, di/dt=−60A/µs, V_R=600V, T_j=150°C	—	—	0.9	µs
Q_{rr}	Reverse recovery charge		—	—	15	µC
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	1.3	°C/W
$R_{th(c-f)}$	Contact thermal resistance	Conductive grease applied (case to fin)	—	—	0.15	°C/W

PERFORMANCE CURVES

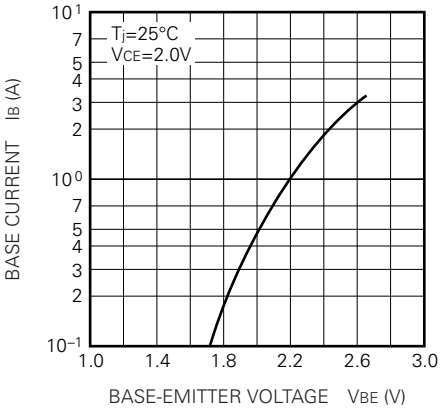
COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)



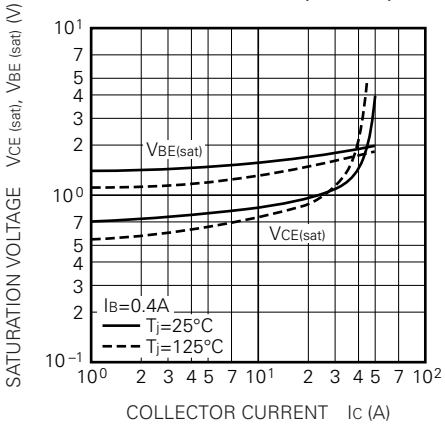
DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)



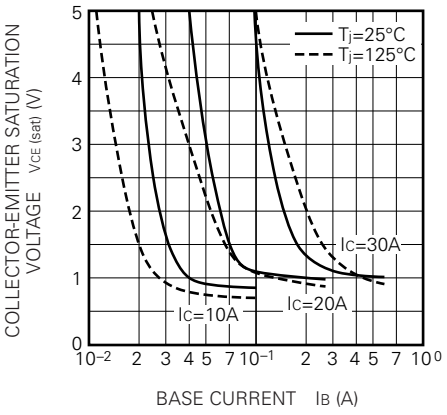
COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)



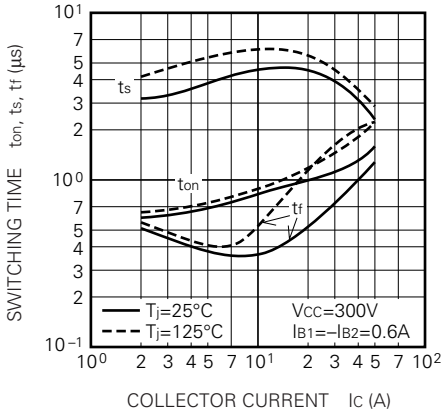
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



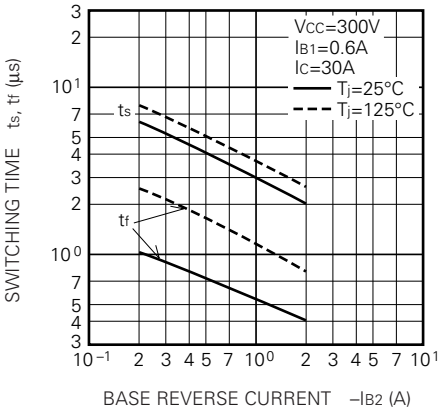
COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)



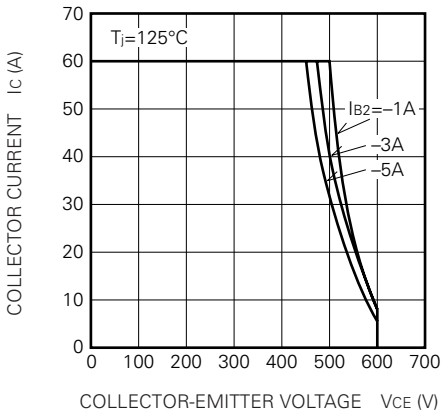
SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)



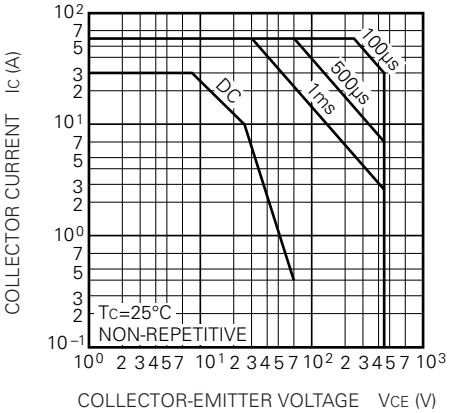
SWITCHING TIME VS. BASE CURRENT (TYPICAL)



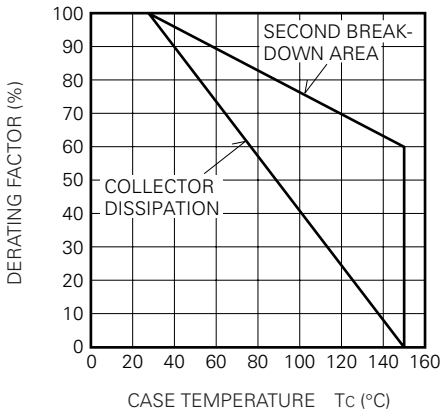
REVERSE BIAS SAFE OPERATING AREA



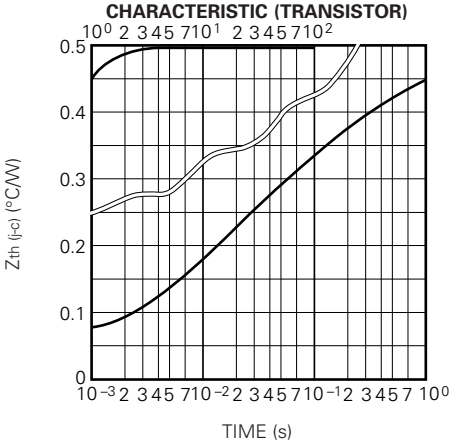
FORWARD BIAS SAFE OPERATING AREA



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

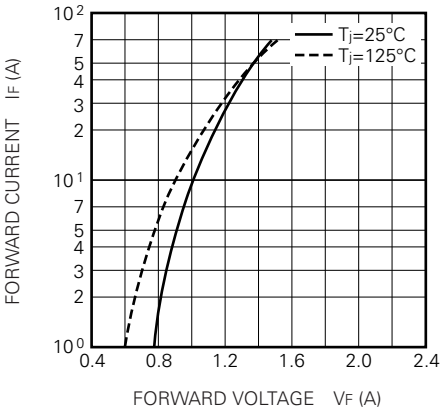


TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)

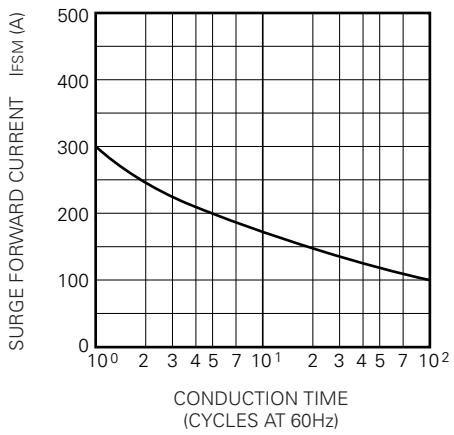


PERFORMANCE CURVES (Diode part (D1))

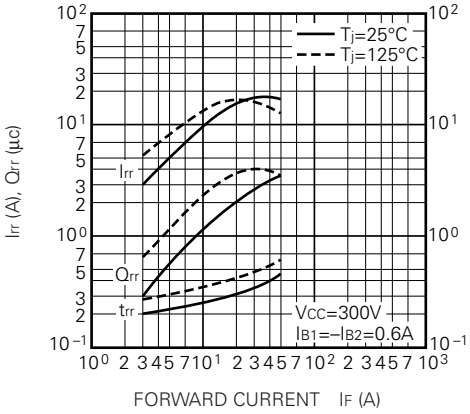
FORWARD CHARACTERISTICS (TYPICAL)



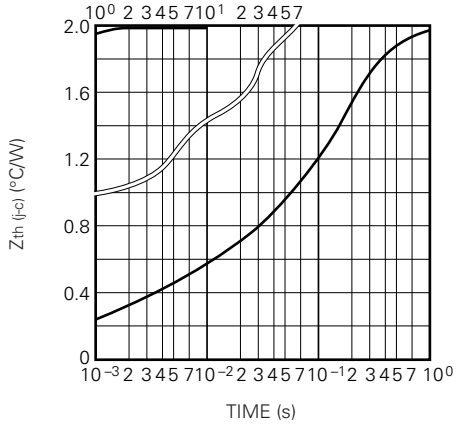
MAXIMUM SURGE CURRENT



REVERSE RECOVERY CHARACTERISTICS (TYPICAL)

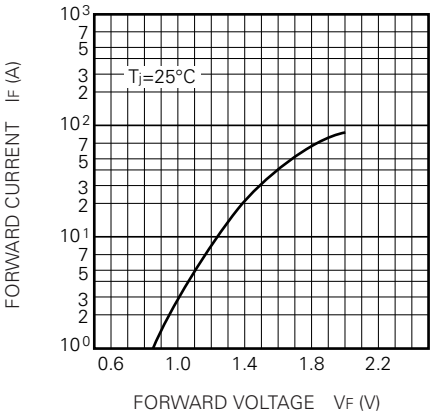


TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC

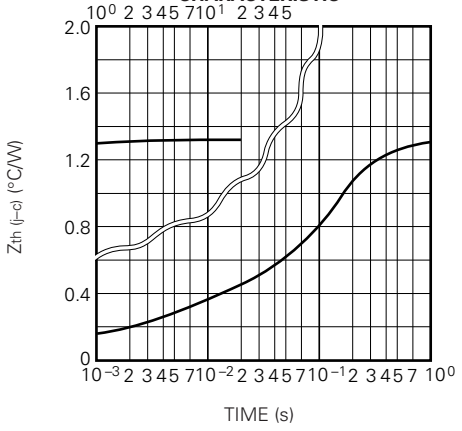


PERFORMANCE CURVES (Diode part (D2))

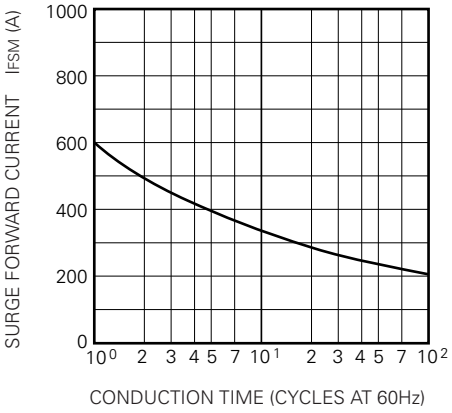
MAXIMUM FORWARD CHARACTERISTIC



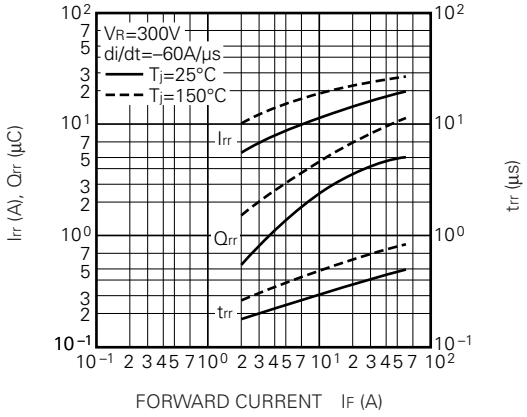
TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC



MAXIMUM SURGE CURRENT



REVERSE RECOVERY CHARACTERISTICS (VS. IF) (TYPICAL)



REVERSE RECOVERY CHARACTERISTICS (VS. di/dt) (TYPICAL)