

MITSUBISHI TRANSISTOR MODULES  
**QM30E2Y/E3Y-H**

MEDIUM POWER SWITCHING USE  
 INSULATED TYPE

QM30E2Y/E3Y-H



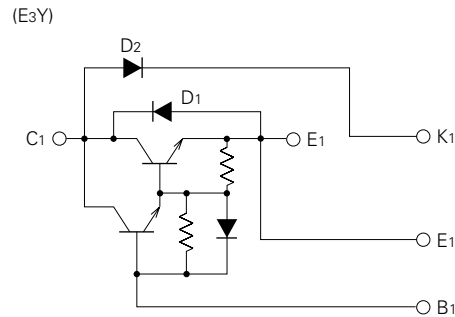
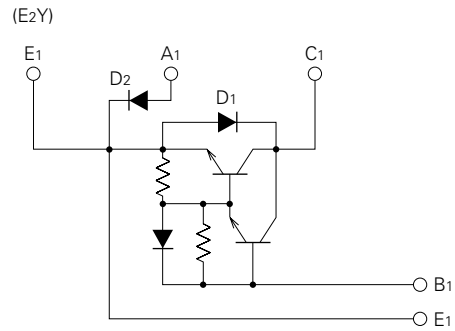
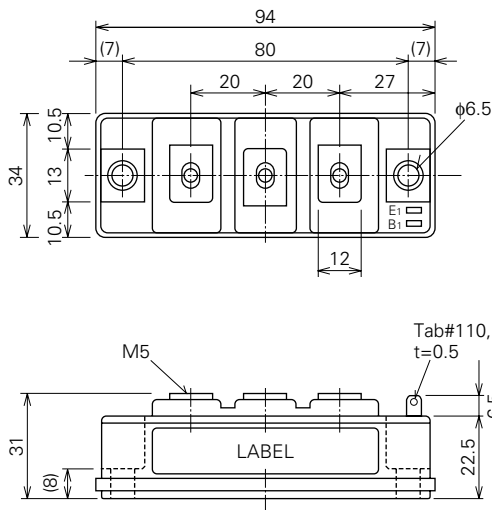
- **I<sub>c</sub>** Collector current ..... **30A**
- **V<sub>CEX</sub>** Collector-emitter voltage ..... **600V**
- **h<sub>FE</sub>** DC current gain ..... **75**
- **Insulated Type**
- **UL Recognized**  
 Yellow Card No. E80276 (N)  
 File No. E80271

**APPLICATION**

DC chopper, DC motor controllers, Inverters

**OUTLINE DRAWING & CIRCUIT DIAGRAM**

Dimensions in mm



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## ABSOLUTE MAXIMUM RATINGS (Transistor part including D1, T<sub>j</sub>=25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CEX</sub> (SUS)	Collector-emitter voltage	I <sub>c</sub> =1A, V <sub>EB</sub> =2V	600	V
V <sub>CEX</sub>	Collector-emitter voltage	V <sub>EB</sub> =2V	600	V
V <sub>CBO</sub>	Collector-base voltage	Emitter open	600	V
V <sub>EBO</sub>	Emitter-base voltage	Collector open	7	V
I <sub>c</sub>	Collector current	DC	30	A
-I <sub>c</sub>	Collector reverse current	DC (forward diode current)	30	A
P <sub>c</sub>	Collector dissipation	T <sub>c</sub> =25°C	250	W
I <sub>B</sub>	Base current	DC	1.8	A
-I <sub>CSM</sub>	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<sub>j</sub>=25°C)

Symbol	Parameter	Conditions	Ratings	Unit
V <sub>RRM</sub>	Repetitive peak reverse voltage		600	V
V <sub>RSM</sub>	Non-repetitive peak reverse voltage		720	V
V <sub>R</sub> (DC)	DC reverse voltage		480	V
I <sub>DC</sub>	DC current	DC circuit, resistive, inductive load	30	A
I <sub>FSM</sub>	Surge (non-repetitive) forward current	Peak value of one cycle of 60Hz (half wave)	600	A
I <sup>2</sup> <sub>t</sub>	I <sup>2</sup> <sub>t</sub> for fusing	Value for one cycle of surge current	1.5 × 10 <sup>3</sup>	A <sup>2</sup> s

## ABSOLUTE MAXIMUM RATINGS (Common)

Symbol	Parameter	Conditions	Ratings	Unit
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 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<sub>j</sub>=25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
I <sub>CEX</sub>	Collector cutoff current	V <sub>CE</sub> =600V, V <sub>EB</sub> =2V	—	—	1.0	mA
I <sub>CBO</sub>	Collector cutoff current	V <sub>CB</sub> =600V, Emitter open	—	—	1.0	mA
I <sub>EBO</sub>	Emitter cutoff current	V <sub>EB</sub> =7V	—	—	200	mA
V <sub>CE</sub> (sat)	Collector-emitter saturation voltage	I <sub>c</sub> =30A, I <sub>B</sub> =0.4A	—	—	2.0	V
V <sub>BE</sub> (sat)	Base-emitter saturation voltage		—	—	2.5	V
-V <sub>CEO</sub>	Collector-emitter reverse voltage	-I <sub>c</sub> =30A (diode forward voltage)	—	—	1.85	V
h <sub>FE</sub>	DC current gain	I <sub>c</sub> =30A, V <sub>CE</sub> =2V/5V	75/100	—	—	—
t <sub>on</sub>	Switching time	V <sub>CC</sub> =300V, I <sub>c</sub> =30A, I <sub>B1</sub> =-I <sub>B2</sub> =0.6A	—	—	1.5	μs
t <sub>s</sub>			—	—	12	μs
t <sub>f</sub>			—	—	3.0	μs
R <sub>th</sub> (j-c) Q	Thermal resistance (junction to case)	Transistor part	—	—	0.5	°C/W
R <sub>th</sub> (j-c) R		Diode part	—	—	2.0	°C/W
R <sub>th</sub> (c-f)	Contact thermal resistance (case to fin)	Conductive grease applied	—	—	0.15	°C/W

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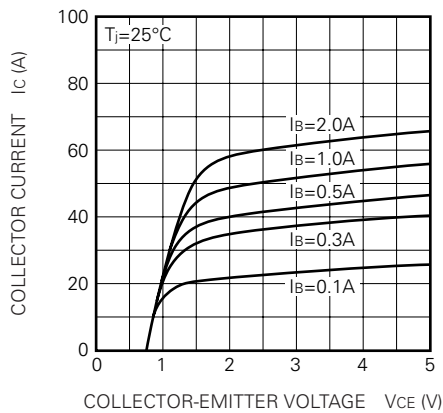
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## ELECTRICAL CHARACTERISTICS (Diode part (D2), $T_j=25^\circ\text{C}$ )

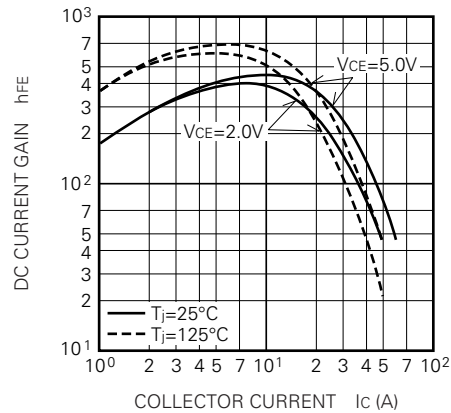
Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
$I_{RRM}$	Repetitive peak reverse current	$V_R=V_{RRM}, T_j=150^\circ\text{C}$	—	—	5.0	mA
$V_{FM}$	Forward voltage	$I_F=30\text{A}$	—	—	1.5	V
$t_{rr}$	Reverse recovery time	$I_F=30\text{A}, di/dt=-60\text{A}/\mu\text{s}, V_R=600\text{V},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

## PERFORMANCE CURVES

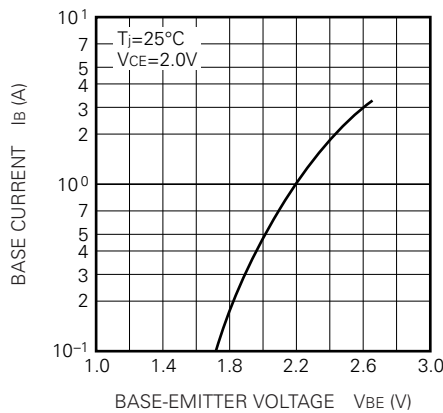
COMMON EMITTER OUTPUT CHARACTERISTICS (TYPICAL)



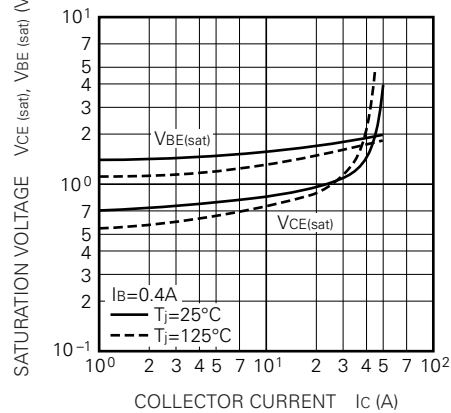
DC CURRENT GAIN VS. COLLECTOR CURRENT (TYPICAL)



COMMON EMITTER INPUT CHARACTERISTIC (TYPICAL)



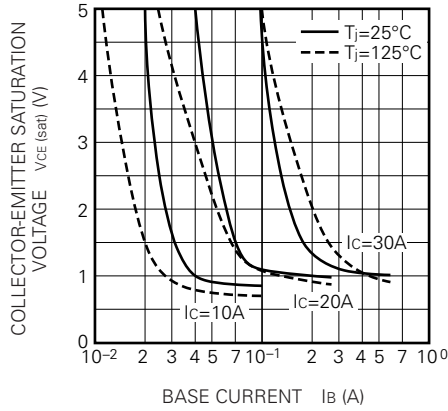
SATURATION VOLTAGE CHARACTERISTICS (TYPICAL)



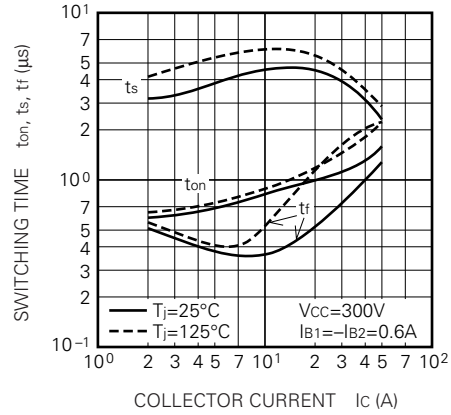
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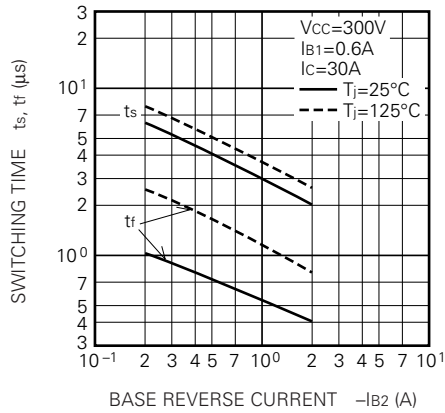
**COLLECTOR-EMITTER SATURATION VOLTAGE (TYPICAL)**



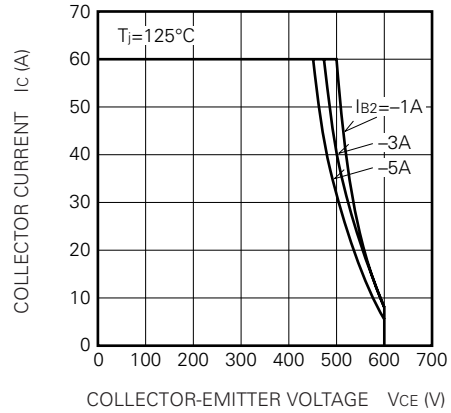
**SWITCHING TIME VS. COLLECTOR CURRENT (TYPICAL)**



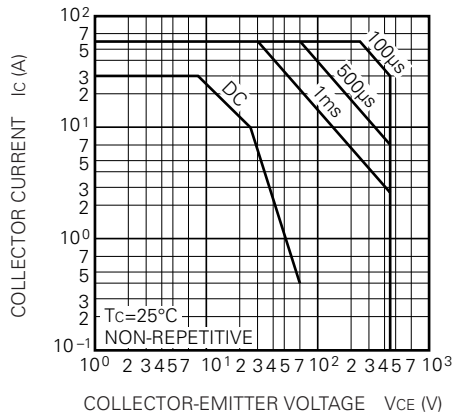
**SWITCHING TIME VS. BASE CURRENT (TYPICAL)**



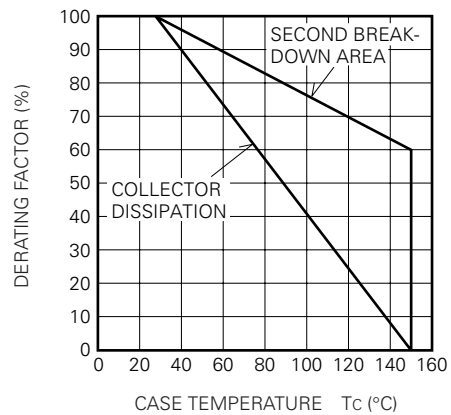
**REVERSE BIAS SAFE OPERATING AREA**



**FORWARD BIAS SAFE OPERATING AREA**

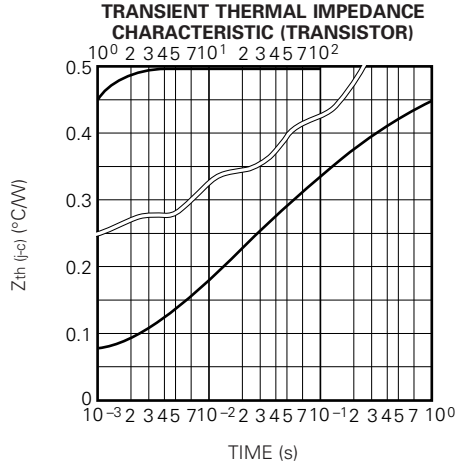


**DERATING FACTOR OF F. B. S. O. A.**

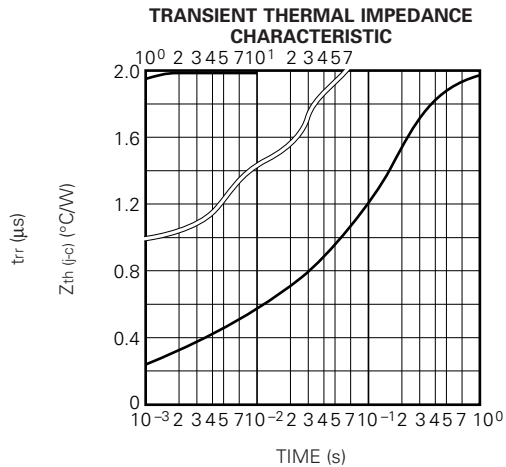
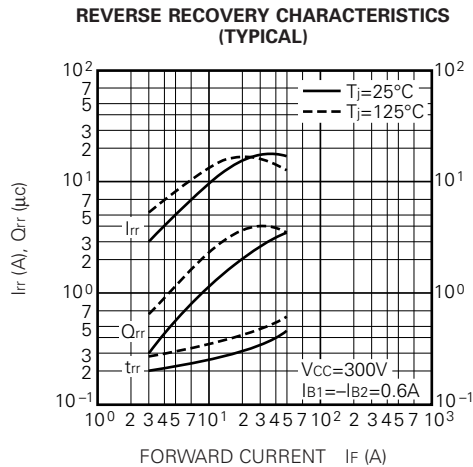
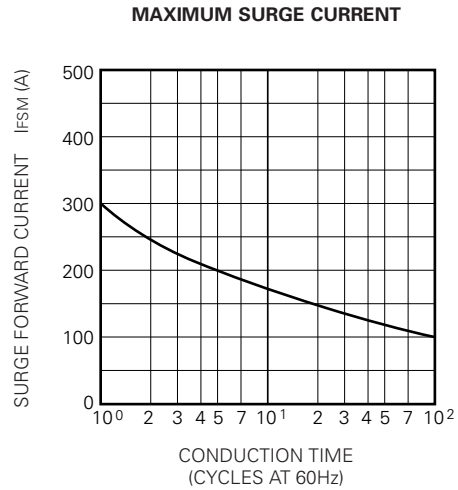
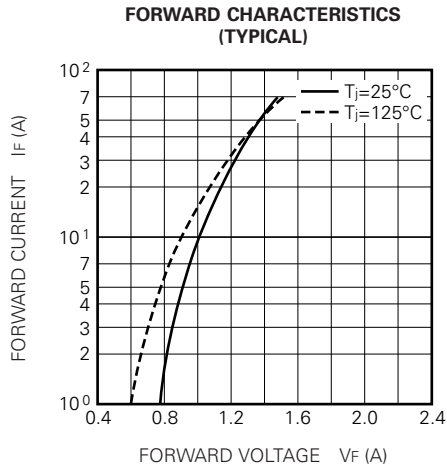


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## PERFORMANCE CURVES (Diode part (D1))

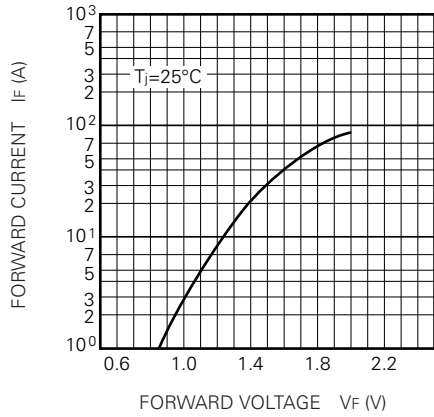


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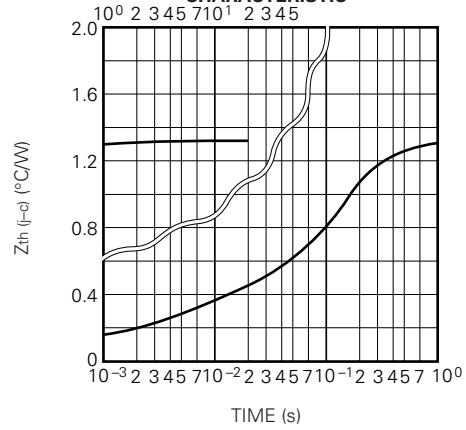
MEDIUM POWER SWITCHING USE  
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## PERFORMANCE CURVES (Diode part (D2))

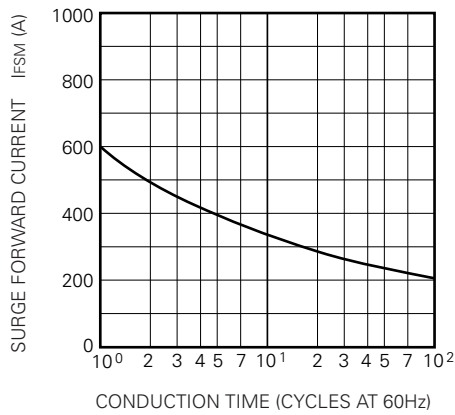
MAXIMUM FORWARD CHARACTERISTIC



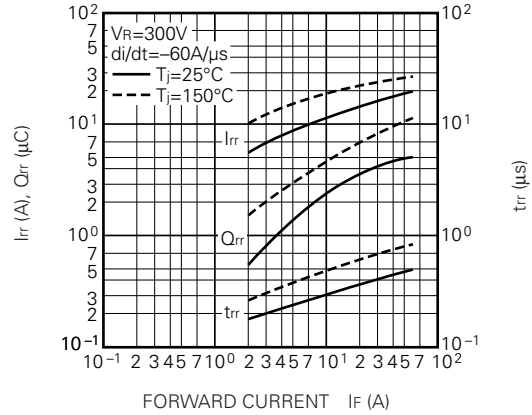
TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC



MAXIMUM SURGE CURRENT



REVERSE RECOVERY CHARACTERISTICS (VS.  $I_F$ ) (TYPICAL)



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

