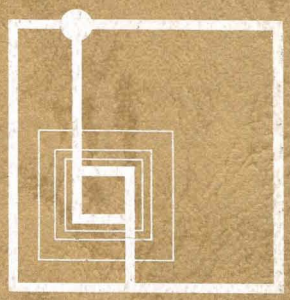
MITSUBISHI DATA BOOK 1984

POWER MODULE



MITSUBISHI ELECTRIC

All values shown in this catalogue are subject to change for product improvement.

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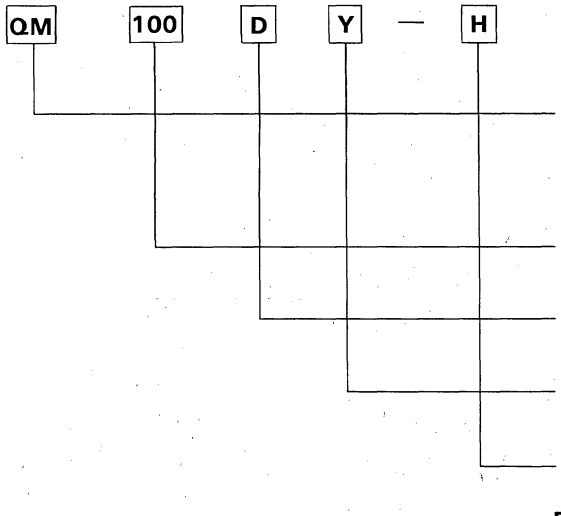
1 GUIDANCE

2 TRANSISTOR MODULES

TYPE DESIGNATION OF MITSUBISHI POWER MODULES



The kind of power module
RM: Diode modules
TM: Thyristor module
QM: Transistor modules
GM: GTO modules

Current rating
Ex. 100 : 100A

The kind of connection
H, D, C, R, E, S, B, T (See the next page)

Minor change

Voltage class

Voltage class	Diode, thyristor modules V_{RRM} (V)	Transistor module V_{CBO} (V)	Recommended AC voltage V_{AC} (V)
M	400	400	110
H	800	600	220
24	1200	—	330
2H	1600	1000	440

TABLE OF MITSUBISHI TRANSISTOR MODULES

TRANSISTOR MODULES

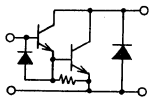
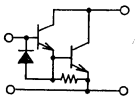
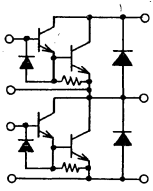
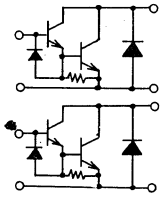
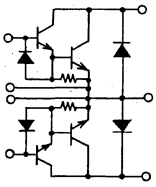
Connection	Type	Current rating I_C (A) 15 20 30 50 75 100 150 200 300	Voltage rating V_{CBO} (V) M 200 400 H 600 2H*1 800 1000	Note	Page
	QM15HA	●	●	Insulated type	2—5
	QM30HA	●	●		2—8
	QM50HA	●	●		2—10
	QM100HY	●	●		2—14
	QM100HC	●	●	Non-insulated type	2—12
	QM200HA	●	● ●	Insulated type	2—16
	QM300HA	●	● ●		2—22
	QM10HB*2	●	●	Insulated type	2—3
	QM100HD	●	●	Non-insulated type	2—12
	QM15DX	●	●	Insulated type	2—28
	QM20DX	●	●		2—31
	QM30DY	●	● ●		2—34
	QM50DY	●	● ●		2—40
	QM75DY	●	● ●		2—47
	QM100DY	●	● ●		2—54
	QM150DY	●	● ●		2—61
	QM30DZ	●	●	Insulated type	2—67
	QM50DZ	●	●		2—69
	QM50CY	●	●	Insulated type	2—71
	QM100CY	●	●		2—73

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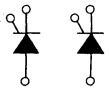
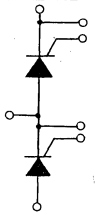
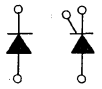
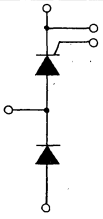
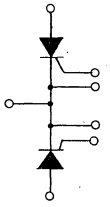
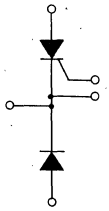
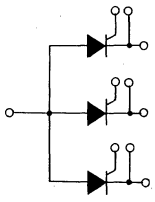
TABLE OF MITSUBISHI THYRISTOR MODULES

THYRISTOR MODULES

Connection	Type	Current rating $I_{T(AV)}$ (A) 20	40	60	80	100	120	Voltage rating V_{RRM} (V) M 400	H 800	24 1200	2H 1600	Note	Page
	TM20DA	●						●	●			Insulated type	3−3
	TM25DZ		●					●	●			Insulated type	3−7
	TM55DZ			●				●	●	●	●		3−11
	TM90DZ				●			●	●	●	●		3−19
	TM130DZ						●	●	●				3−27
	TM20RA	●						●	●			Insulated type	3−31
	TM25RZ		●					●	●			Insulated type	3−35
	TM55RZ			●				●	●	●	●		3−39
	TM90RZ				●			●	●	●	●		3−47
	TM130RZ						●	●	●				3−55
	TM25CZ*		●					●	●			Insulated type	—
	TM55CZ*			●				●	●	●	●		
	TM90CZ*				●			●	●	●	●		
	TM130CZ*						●	●	●				
	TM25EZ*		●					●	●			Insulated type	—
	TM55EZ*			●				●	●	●	●		
	TM90EZ*				●			●	●	●	●		
	TM130EZ*						●	●	●				
	TM25SZ*		●					●	●			Non-insulated type	—
	TM55SZ*			●				●	●	●	●		
	TM90SZ*				●			●	●	●	●		
	TM130SZ*						●	●	●				

* : Product based on customer request

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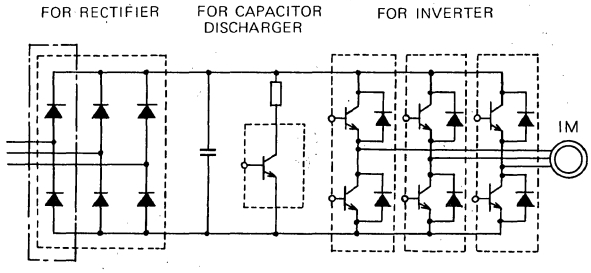
APPLICATION OF TRANSISTOR MODULES TO AC MOTOR CONTROLLERS

Application of transistor modules to AC motor controllers (VVVF Inverters)



APPLIED POWER MODULES

(1) AC 220V line

Motor rating (kW)	Inverter rating (kVA)	For rectifier Diode Modules	For capacitor discharger Transistor Modules	For inverter Transistor Modules
1.1	1.5	RM10TA-H	QM15HB-H	QM15DX-H×3 or QM15TB-H
1.5	2.0	RM10TA-H	QM15HB-H	QM20DX-H×3 or QM20TB-H
2.2	3.0	RM15TA-H	QM15HB-H	QM30DY-H×3
3.7	5.0	RM30TA-H	QM30HB-H	QM50DY-H×3
5.5	7.5	RM30TA-H	QM50HB-H	QM75DY-H×3
7.5	10	RM30TA-H	QM50HB-H	QM100DY-H×3
11	15	RM60DZ-H×3	QM100HA-H	QM150DY-H×3
15	20	RM60DZ-H×3	QM100HA-H	QM200HA-H×6
18.5	25	RM100DZ-H×3	—	QM300HA-H×6
22	30	RM100DZ-H×3	—	QM300HA-H×6
30	40	RM100DZ-H×2P×3	—	QM200HA-H×2P×6
37	50	RM100DZ-H×2P×3	—	QM300HA-H×2P×6

■ AC 440V line

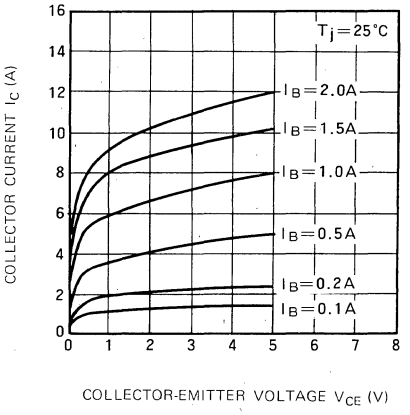
Motor rating (kW)	Inverter rating (kVA)	For rectifier Diode Modules	For capacitor discharger Transistor Modules	For inverter Transistor Modules
3.7	5.0	RM60DZ-2H×3	—	QM30DY-2H×3
5.5	7.5	RM60DZ-2H×3	—	QM50DY-2H×3
7.5	10	RM60DZ-2H×3	—	QM50DY-2H×3
11	15	RM60DZ-2H×3	—	QM75DY-2H×3
15	20	RM60DZ-2H×3	—	QM100DY-2H×3
18.5	25	RM60DZ-2H×3	—	QM150DY-2H×3
22	30	RM60DZ-2H×3	—	QM150DY-2H×3
30	40	RM100DZ-2H×3	—	QM200HA-2H×6
37	50	RM100DZ-2H×3	—	QM300HA-2H×6
45	60	RM100DZ-2H×3	—	QM300HA-2H×6
55	75	RM100DZ-2H×2P×3	—	QM200HA-2H×2P×6
75	100	RM100DZ-2H×2P×3	—	QM300HA-2H×6

ELECTRICAL CHARACTERISTICS (T_j = 25°C)

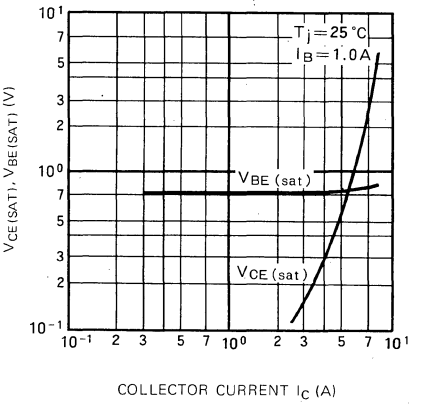
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	V_{CE}=1000V, V_{BE}=−2V	—	—	1	mA
I_{EBO}	Emitter cutoff current	V_{EB}=7V	—	—	150	mA
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C$= A (diode forward voltage drop)	—	—	—	V
$V_{CE(sat)}$	Collector-emitter saturation voltae	I_C=5A, I_B=1A	—	—	1.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	I_C=5A, I_B=1A	—	—	1.5	V
h_{FE}	DC current gain	I_C=5A, V_{CE}=1.0V	5	—	—	—
t_{on}	Switching time	V_{CC}=600V, I_C=5A, I_{B1}=−I_{B2}=1A	—	—	1.5	μs
t_s			—	—	7	μs
t_f			—	—	2	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	1.2	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	—	
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, conductive grease applied	—	—	—	°C/W

PERFORMANCE CURVES

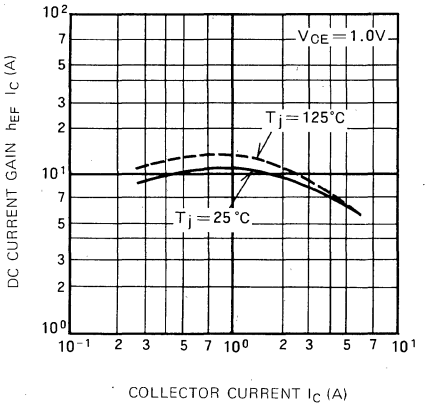
COMMON EMITTER OUTPUT CHARACTERISTICS



SATURATION VOLTAGE CHARACTORISTICS $V_{CE(sat)}$, $V_{BE(sat)}$ VS. I_C



DC CURRENT GAIN VS. COLLECTOR CURRENT

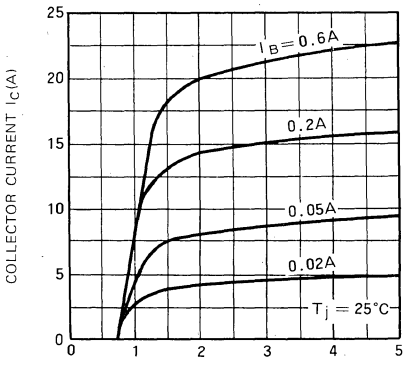


ELECTRICAL CHARACTERISTICS (T_j = 25°C)

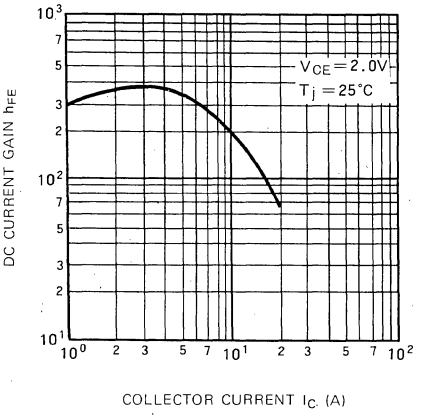
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{CBO}	Collector cut off current	$V_{CB}=V_{CBO}$, emitter open	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$, collector open	—	—	50	mA
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C=15A$, $I_B=0.3A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=15A$, $I_B=0.3A$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage (diode forward voltage drop)	$I_C=-15A$	—	—	1.5	V
h_{FE}	DC current gain	$I_C=15A$, $V_{CE}=2V/5V$	50/100	—	—	—
t_{on}	Turn-on time	$I_{B1}=0.3A$, $V_{CC}=300V$, $I_C=15A$	—	—	1.5	μs
t_s	Storage time	$I_{B1}=0.3A$, $I_{B2}=-0.3A$ $V_{CC}=300V$, $I_C=15A$	—	—	8	μs
t_f	Fall time	$I_{B1}=0.3A$, $I_{B2}=-0.3A$ $V_{CC}=300V$, $I_C=15A$	—	—	3	μs
$R_{th(j-c)}$	Thermal resistance (Transistor part)	junction to case	—	—	1.2	°C/W
$R_{th(j-c)}$	Thermal resistance (Diode part)	junction to case	—	—	2.5	°C/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, conductive grease applied	—	—	0.4	°C/W

PERFORMANCE CURVES

COMMON EMITTER OUTPUT CHARACTERISTICS



DC CURRENT GAIN VS. COLLECTOR CURRENT



QM30HA-H

MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM30HA-H is a medium-power transistor module which is designed for use in switching applications. It is an insulated device consisting of one Darlington transistor with a high-speed feed back diode. The rated collector current is 30A and the rated collector-emitter voltage is 450V.

FEATURES

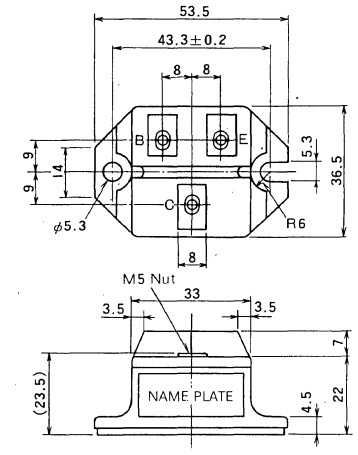
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- The high-speed feedback diode is included.
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

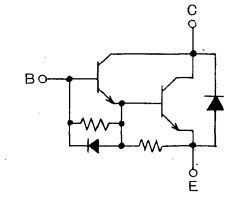
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



Accessory: 3 pieces of M4 x 10 screws.

MAXIMUM RATINGS (T_j=25°C)

Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=30A, I_{B2}=−5A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−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
$I_{C(pulse)}$	Collector current	t_w=1ms	60	A
P_C	Collector dissipation	T_C=25℃	250	W
I_B	Base current	DC	1.8	A
$-I_{C(DC)}$	Reverse collector current (forward diode current)	DC	30	A
$-I_{CSM}$	Reverse surge current (forward diode current)	Peak value of one cycle of 60Hz (half wave)	300	A
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
T_j	Junction temperature		−40～+150	℃
T_{stg}	Storage temperature		−40～+125	℃
—	Mounting torque	Recommended value (12kg·cm) Main terminal screw M4	10～15	kg·cm
		Recommended value (17kg·cm) Mounting screw M5	15～20	
—	Weight	Typical value	90	g

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QM50HA-H

MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM50HA-H is a medium-power transistor module which is designed for use in switching applications. It is an insulated device consisting of one Darlington transistor with a high-speed feed back diode. The rated collector current is 50A and the rated collector-emitter voltage is 450V.

FEATURES

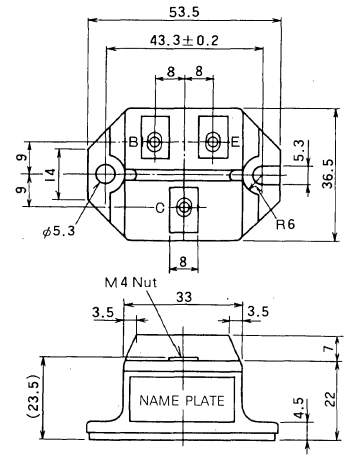
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- The high-speed feedback diode is included.
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

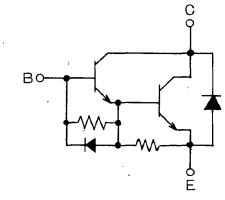
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



Accessory: 3 pieces of M4 x 10 screws.

MAXIMUM RATINGS (T_j=25°C)

Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=50A, I_{B2}=−7A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage E	Collector open	7	V
I_C	Collector current	DC	50	A
$I_{C(pulse)}$	Collector current	tw=1ms	100	A
P_C	Collector dissipation	T_C=25°C	310	W
I_B	Base current	DC	3	A
$-I_{C(DC)}$	Reverse collector current (forward diode surge current)		50	A
$-I_{CSM}$	Reverse surge current (forward diode current)	Peak value of one cycle of 60Hz (half wave)	500	A
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
T_j	Junction temperature		−40～+150	°C
Tstg	Storage temperature		−40～+125	°C
—	Mounting torque	Recommended value (12kg-cm) Main terminal screw M4	10～15	kg·cm
		Recommended value (17kg-cm) Mounting screw M5	15～20	
—	Weight	Typical value	90	g

MITSUBISHI ELECTRIC

QM100HC-M

HIGH POWER SWITCHING USE NON-INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM100HC-M is a high-power transistor module which is designed for use in switching applications. It is a non-insulated device consisting of one Darlington transistor with a high-speed feedback diode. The rated collector current for each element is 100A and the rated collector-emitter voltage is 300V.

FEATURES

- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- The high-speed feedback diode is included.

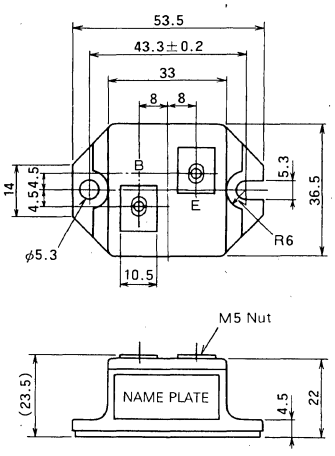
APPLICATIONS

Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies, welders.

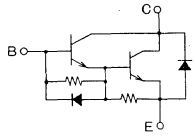
Note: Type QM100HD-M without feedback diode is available

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



Accessory : 2 pieces of M5×12 hexagon head bolts.

MAXIMUM RATINGS (T_j=25°C)

Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	300	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=100A, I_{B2}=−5A	350	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	350	V
V_{CBO}	Collector-base voltage	Emitter open	400	V
V_{EBO}	Emitter-base voltage	Collector open	10	V
I_C	Collector current	DC	100	A
$I_{C(pulse)}$	Collector current	t_W=1ms	200	A
P_C	Collector dissipation	T_C=25℃	420	W
I_B	Base current	DC	3	A
$-I_{C(DC)}$	Reverse collector current	DC (forward diode current)	100	A
$-I_{CSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	1000	A
T_j	Junction temperature		−40～+150	℃
Tstg	Storage temperature		−40～+125	℃
—	Mounting torque	Main terminals M5 screw / M5 mounting screw	15～20	kg·cm
—	Weight	Typical value	87	g

MITSUBISHI ELECTRIC

QM100HY-H

HIGH POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM100HY-H is a high-power transistor module which is designed for use in switching applications. It is an insulated device consisting of one Darlington transistor with a high-speed feed back diode. The rated collector current is 100A and the rated collector-emitter voltage is 450V.

FEATURES

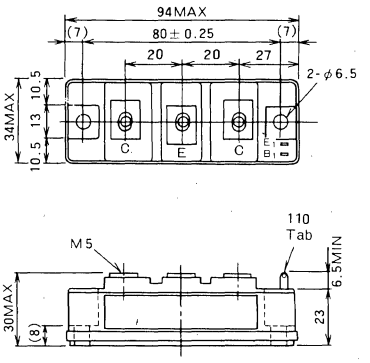
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- The high-speed feedback diode is included.
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink without the need to insulate them individually.

APPLICATIONS

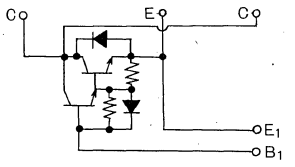
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



Accessory : 3 pieces of hexagon head bolts (M5×12)

MAXIMUM RATINGS (T_j=25°C)

Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=100A, I_B=−5A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	100	A
$I_{C(pulse)}$	Collector current	tw=1ms	200	A
$-I_{C(DC)}$	Reverse collector current	DC (forward diode current)	100	A
P_C	Collector dissipation	T_C=25°C, per one transistor	620	W
I_B	Base current		6	A
$-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	500	A
T_j	Junction temperature		−40～+150	℃
Tstg	Storage temperature		−40～+125	℃
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
—	Mounting torque	Main terminals M5 screw / M6 mounting screw	15～20/20～30	kg·cm
—	Weight	Typical value	210	g

MITSUBISHI ELECTRIC

QM200HA-H

HIGH POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM200HA-H is a high-power transistor module which is designed for use in switching applicaiton. It is an insulated device consisting of one Darlington transistor with a high-speed feed back diode. The rated collector current is 200A and the rated collector-emitter voltage is 450V.

FEATURES

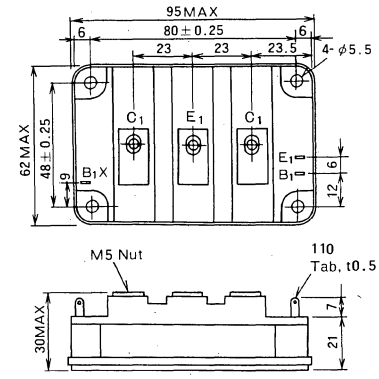
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- The high-speed feed back diode is included.
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

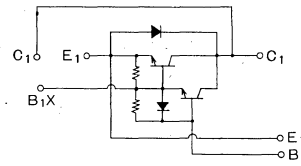
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



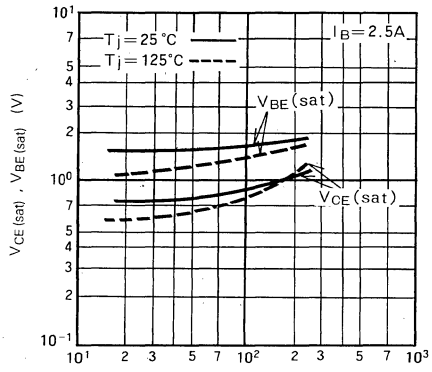
Accessory : 3 pieces of hexagon head bolts (M5×12)

MAXIMUM RATINGS (T_j=25°C)

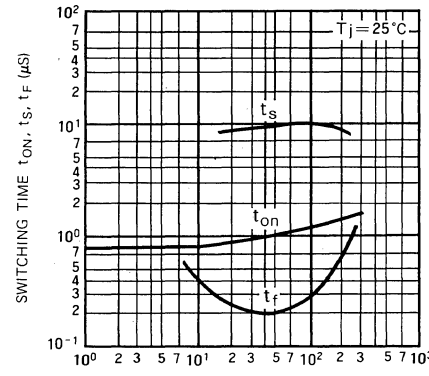
Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=200A, I_B=−7A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage	Collector open	7	V
I_C	Collector current	DC	200	A
$I_{C(pulse)}$	Collector current	Pulse width 1ms	400	A
$-I_{C(DC)}$	Reverse collector current	DC (forward diode current)	200	A
P_C	Collector dissipation	T_C=25°C	1240	W
I_B	Base current	DC	10	A
$-I_{CSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	2000	A
T_j	Junction temperature		−40～+150	°C
T_{stg}	Storage temperature		−40～+125	°C
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
—	Mounting torque	(Recommended value 17kg·cm) Terminal screw and mounting screw M5	15～20	kg·cm
—	Weight	Typical value	400	g

MITSUBISHI ELECTRIC

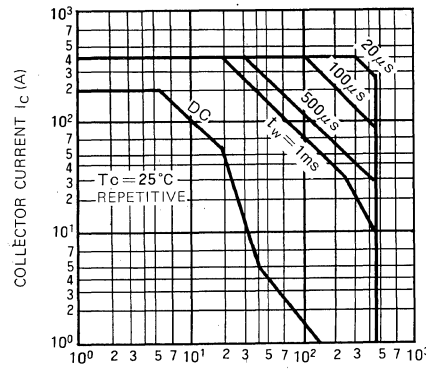
SATURATION CHARACTERISTICS



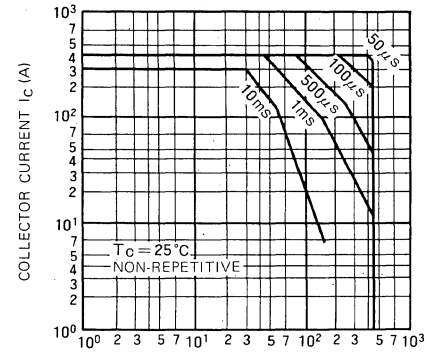
SWITCH TIME VS. COLLECTOR CURRENT



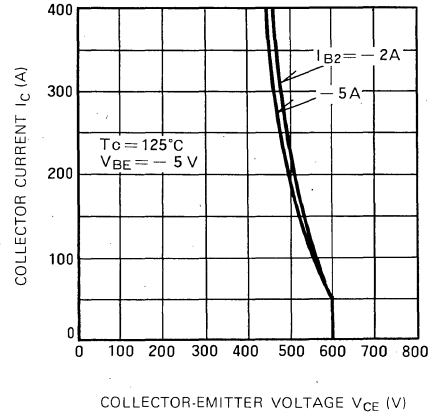
SAFE OPERATING AREA



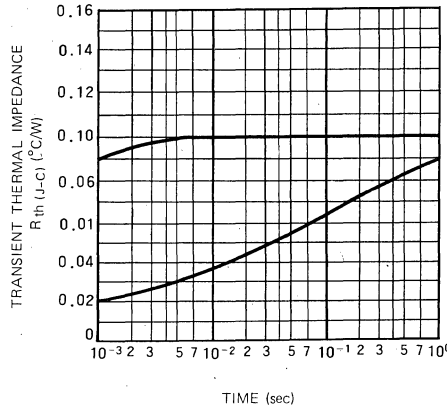
SAFE OPERATING AREA



REVERSE SAFE OPERATING AREA



TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)

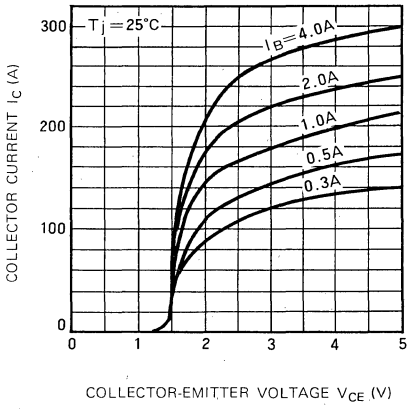


ELECTRICAL CHARACTERISTICS (T_j=25°C)

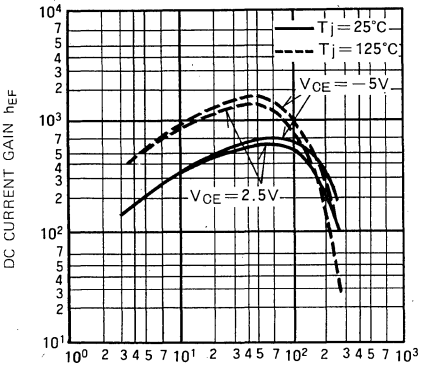
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	V_{CE}=1000V, V_{BE}=−2V	—	—	4	mA
I_{EBO}	Emitter cutoff current	V_{EB}=7V	—	—	800	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	I_C=200A, I_B=4A	—	—	2.5	V
$V_{BE(sat)}$	Base-emitter saturation voltage	I_C=200A, I_B=4A	—	—	3.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C$=200A (diode forward voltage drop)	—	—	1.8	V
h_{FE}	DC current gain	I_C=200A, V_{CE}=2.8V/5V	75/100	—	—	—
t_{on}	Switching time	V_{CC}=600V, I_C=200A, I_{B1}=−I_{B2}=4A	—	—	3.0	μs
t_s			—	—	15	μs
t_f			—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.08	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	0.35	°C/W
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.04	°C/W

PERFORMANCE CURVES

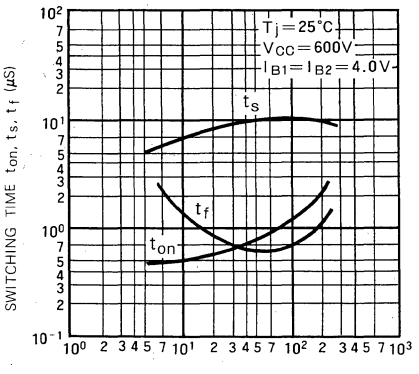
COMMON EMITTER OUTPUT CHARACTERISTICS



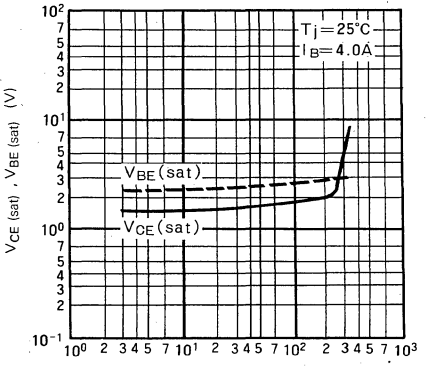
DC CURRENT GAIN VS. COLLECTOR CURRENT



SWITCHING TIME VS. COLLECTOR CURRENT



SATURATION CHARACTERISTICS



QM300HA-H

HIGH POWER SWITCHING USE NON-INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM300HA-H is a high-power transistor module which is designed for use in switching application. It is an insulated device consisting of a Darlington transistor with a reverse parallel connected high-speed diode. The rated collector current for each element is 300A and the rated collector-emitter voltage is 450V.

FEATURES

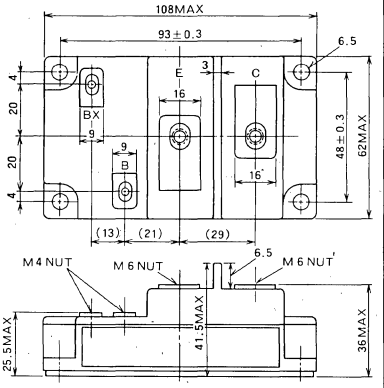
- A high h_{FE} allows compacts base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- The transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

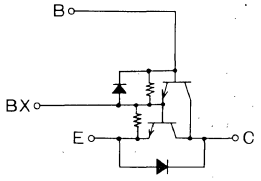
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



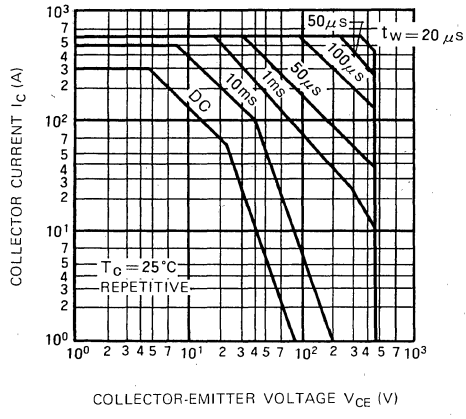
Accessory: 2 pieces of M4 x 10 bolts and 2 pieces of M6 x 12 bolts

MAXIMUM RATINGS (T_j=25°C)

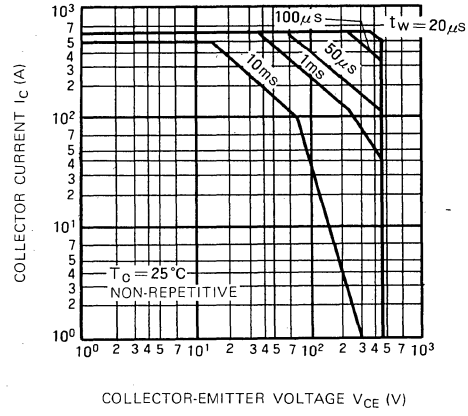
Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, Base open	450	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage	Collector open	7	V
I_C	Collector current	DC	300	A
$-I_C$	Reverse collector current	DC (forward diode current)	300	A
P_C	Collector dissipation	T_C=25°C	1380	W
I_B	Base current		18	A
$-I_{CSM1}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	3000	A
T_j	Junction temperature		−40～+150	°C
Tstg	Storage temperature		−40～+125	°C
V_{ISOL}	Insulation withstand voltage		2000	V
—	Mounting torque	B and BX terminals (M4)	10～15	kg-cm
		Main terminals and mounting screw (M6)	20～30	
—	Weight	Typical value	460	g

MITSUBISHI ELECTRIC

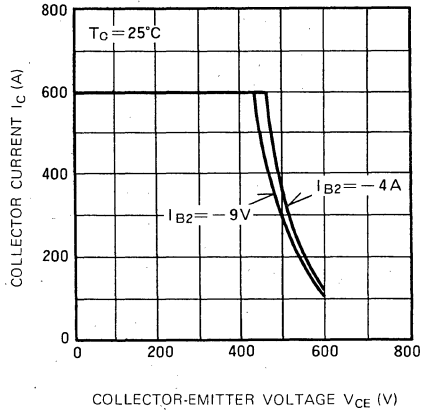
SAFE OPERATING AREA



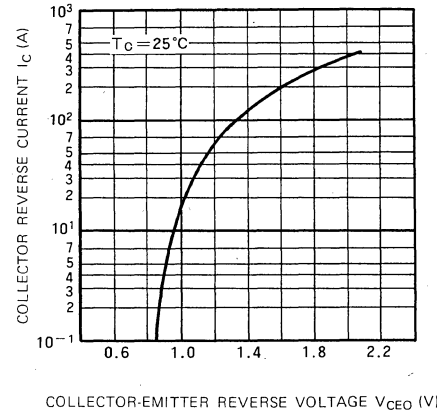
SAFE OPERATING AREA



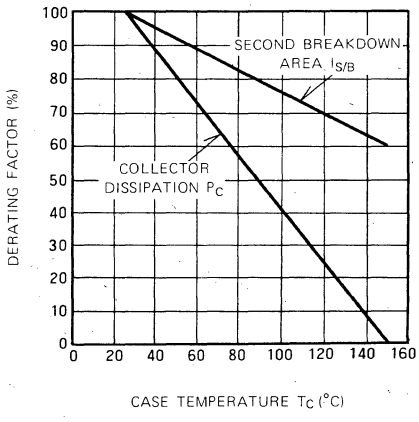
REVERSE SAFE OPERATING AREA



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



DERATING FACTOR OF S.O.A.

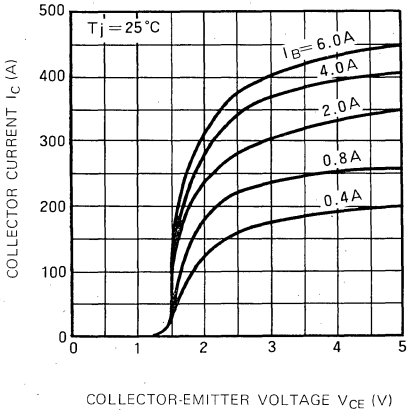


ELECTRICAL CHARACTERISTICS (T_j=25°C)

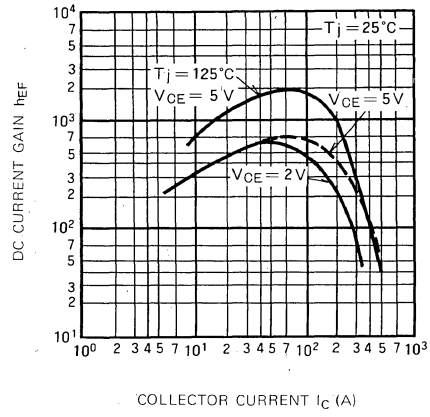
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	V_{CE}=1000V, V_{BE}=−2V	—	—	20	mA
I_{EBO}	Emitter cutoff current	V_{EB}=7V	—	—	800	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	I_C=300A, I_B=4A	—	—	2.5	V
$V_{BE(sat)}$	Base-emitter saturation voltage	I_C=300A, I_B=4A	—	—	3.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C$=300A (diode reverse voltage drop)	—	—	1.8	V
h_{FE}	DC current gain	I_C=300A, V_{CE}=5V	100	—	—	—
ton	Switching time	V_{CC}=600V, I_C=300A, I_{B1}=6A, I_{B2}=−6A	—	—	3.0	μs
ts			—	—	15	μs
tf			—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.063	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	0.30	
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, conductive grease applied	—	—	0.04	°C/W

PERFORMANCE CURVES

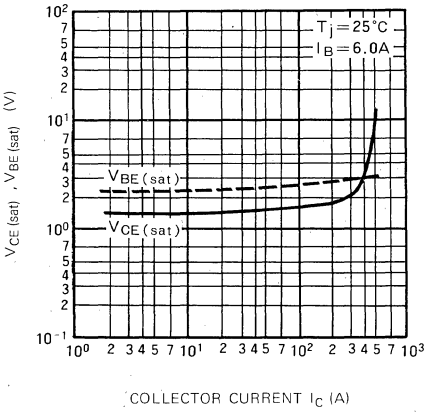
COMMON EMITTER OUTPUT CHARACTERISTICS



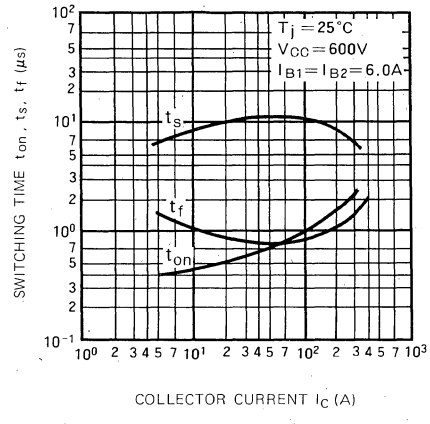
DC CURRENT GAIN VS. COLLECTOR CURRENT



SATURATION CHARACTERISTICS



SWITCHING TIME VS. COLLECTOR CURRENT



QM15DX-H

MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM15DX-H is a medium-power transistor module which is designed for use in switching application. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 15A and the rated collector-emitter voltage is 450V.

FEATURES

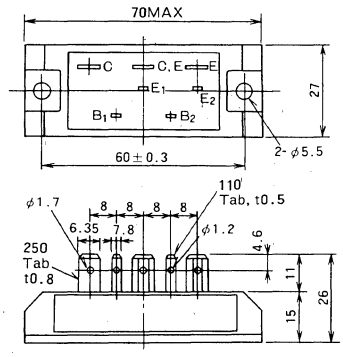
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

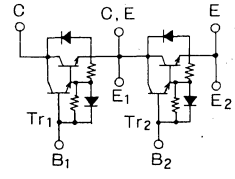
Inverters for AC motor controllers, DC motor control power supplies, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM

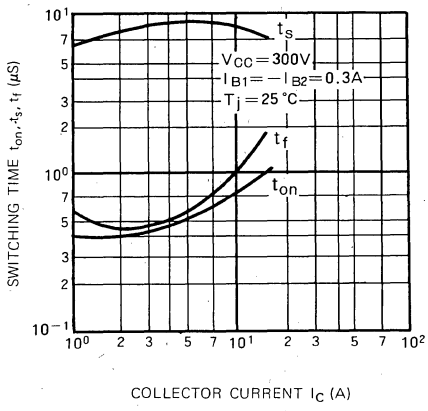


MAXIMUM RATINGS (T_j=25°C)

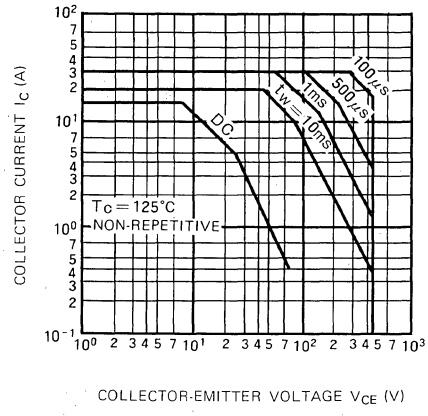
Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=15A, I_{B2}=−1A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage	Collector open	7	V
I_C	Collector current	DC	15	A
$I_{C(pulse)}$	Collector current	t_W=1ms	30	A
P_C	Collector dissipation	T_C=25°C (per one transistor)	100	W
I_B	Base current	DC	0.9	A
$-I_{C(DC)}$	Reverse collector current (forward diode current)	DC	15	A
$-I_{CSM}$	Reverse surge current (forward diode current)	Peak value of one cycle of 60Hz (half wave)	150	A
Visol	Isolation voltage	AC for 1 minute	2000	V
T_j	Junction temperature		−40~+150	°C
Tstg	Storage temperature		−40~+125	°C
—	Mounting torque	Recommended value 12kg·cm	10~15	kg·cm
—	Weight	Typical value	75	g

MITSUBISHI ELECTRIC

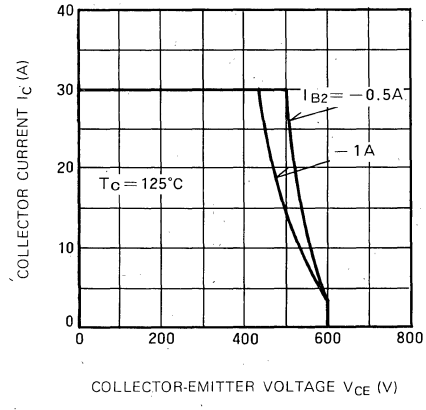
SWITCHING TIME VS. COLLECTOR CURRENT



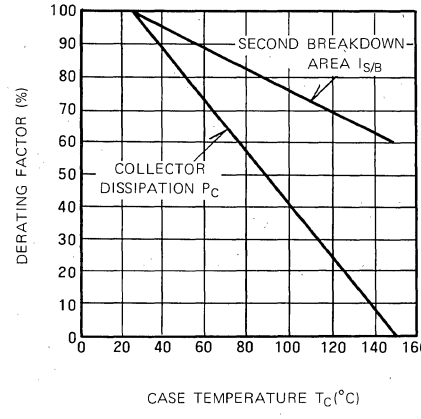
SAFE OPERATING AREA



REVERSE BIAS S.O.A.



DERATING FACTOR OF S.O.A.



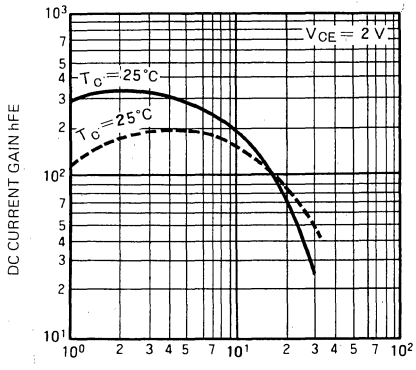
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS (T_j=25°C)

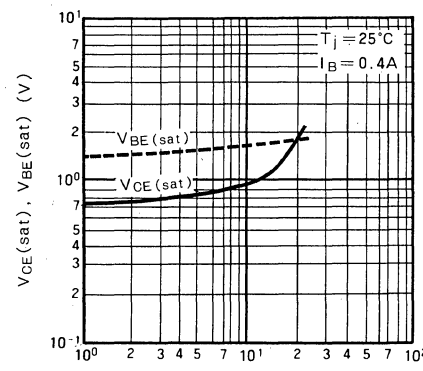
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, $V_{EB}=-2V$	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=5V$	—	—	150	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=20A$, $I_B=0.28A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=20A$, $I_B=0.28A$, $V_{CE}=2V$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$I_C=-20A$	—	—	1.5	V
h_{FE}	DC current gain	$I_C=20A$, $V_{CE}=2V/5V$	70/100	—	—	—
ton	Switching time	$I_{B1}=0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	1.5	μs
ts		$I_{B1}=0.4A$, $I_{B2}=-0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	12	μs
tf		$I_{B1}=0.4A$, $I_{B2}=-0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	2.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.8	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	2.2	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.25	°C/W

PERFORMANCE CURVES

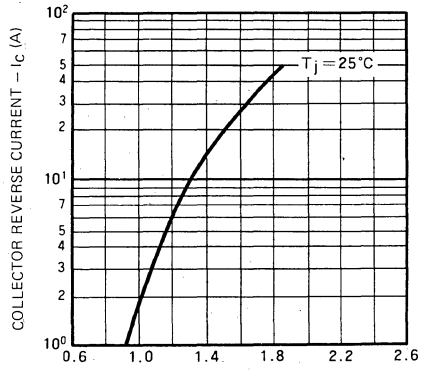
DC CURRENT GAIN VS. COLLECTOR CURRENT



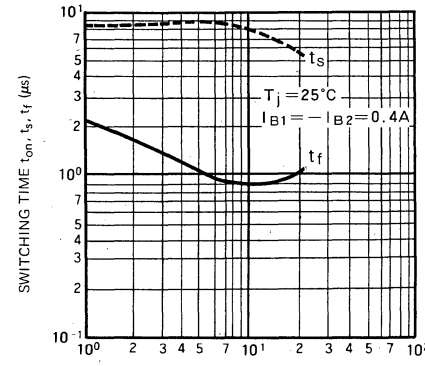
SATURATION CHARACTERISTICS



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



SWITCHING TIME VS. COLLECTOR CURRENT



QM30DY-H

MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM30DY-H is a medium-power transistor module which is designed for use in switching application. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 30A and the rated collector-emitter voltage is 450V.

FEATURES

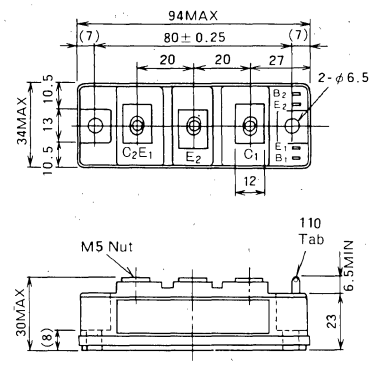
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

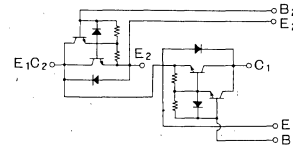
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



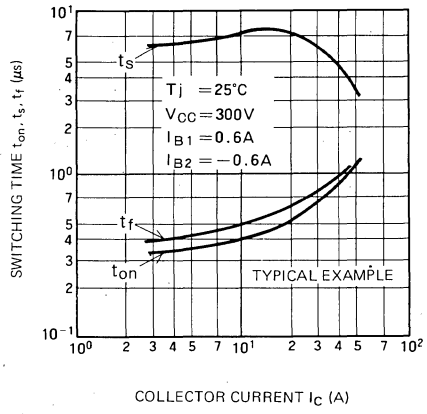
Accessory : 3 pieces of hexagon head bolts (M5×12)

MAXIMUM RATINGS (T_j=25°C)

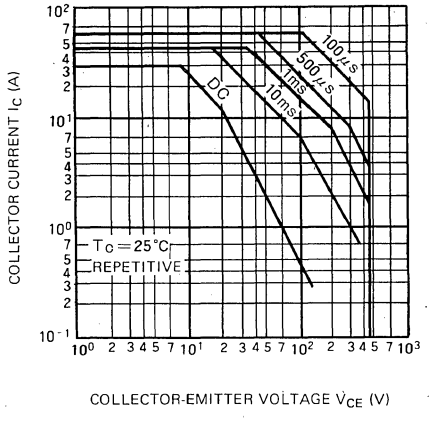
Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=30A, I_{B2}=−5A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	30	A
$I_{C(pulse)}$	Collector current	t_W=1ms	60	A
$-I_C$	Reverse collector current	DC (forward diode current)	30	A
P_C	Collector dissipation	T_C=25°C, per one transistor	250	W
I_B	Base current		1.8	A
$-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	300	A
T_j	Junction temperature		−40～+150	°C
T_{stg}	Storage temperature		−40～+125	°C
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
—	Mounting torque	Main terminals M5 screw / M6 mounting screw	15～20／20～30	kg·cm
—	Weight	Typical value	210	g

MITSUBISHI ELECTRIC

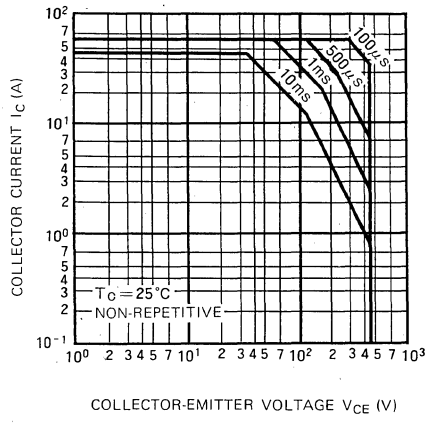
SWITCHING TIME VS. COLLECTOR CURRENT



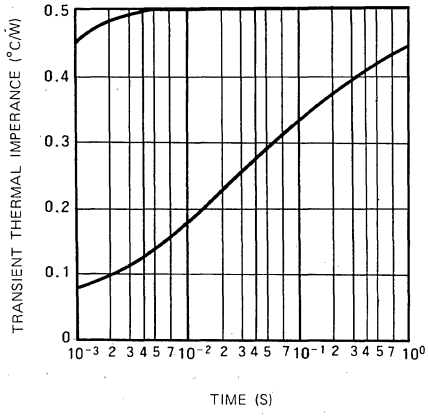
SAFE OPERATING AREA



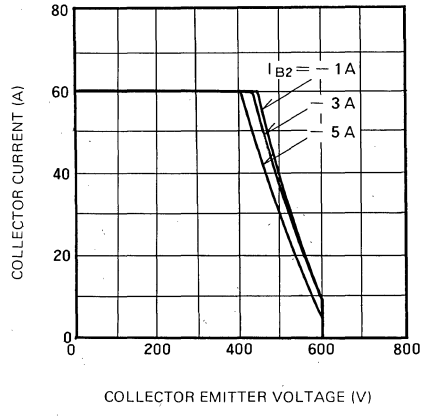
SAFE OPERATING AREA



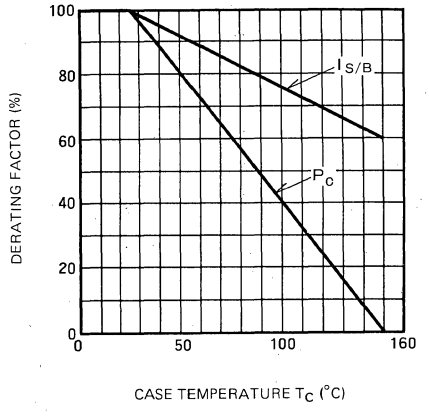
MAXIMUM TRANSIENT THERMAL IMPEDANCE CHARACTERISTICS



REVERSE BIAS S.O.A.



POWER DERATING



QM30DY-2H

TENTATIVE

HIGH VOLTAGE MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM30DY-2H is a high voltage medium-power transistor module which is designed for use in switching applications. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 30A and the rated collector-emitter voltage is 1000V.

FEATURES

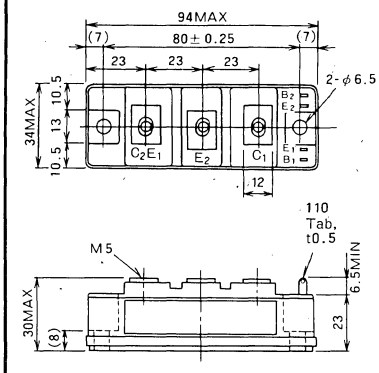
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feedback diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.
- It is possible to use it on the 440V power line.

APPLICATIONS

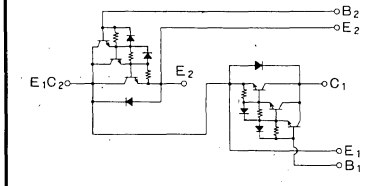
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



Accessory : 3 pieces of M5×12 hexagon head bolts.

MAXIMUM RATINGS (T_j=25°C)

Symbol	Item	Conditions	Ratings	Unit
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=24A, I_{B2}=−2A	1000	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	1000	V
V_{CBO}	Collector-base voltage	Emitter open	1000	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	30	A
$-I_C$	Reverse collector current	DC (forward diode current)	30	A
P_C	Collector dissipation	T_C=25°C	300	W
I_B	Base current		2	A
$-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	—	A
T_j	Junction temperature		−40～+150	°C
Tstg	Storage temperature		−40～+125	°C
Visol	Insulation withstand voltage	AC for 1 minute	2500	V
—	Mounting torque	Main terminals M5 screw and M6mounting screw	15～20／20～30	kg-cm
—	Weight	Typical value	210	g

MITSUBISHI ELECTRIC

QM50DY-H

MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM50DY-H is a medium-power transistor module which is designed for use in switching application. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 50A and the rated collector-emitter voltage is 450V.

FEATURES

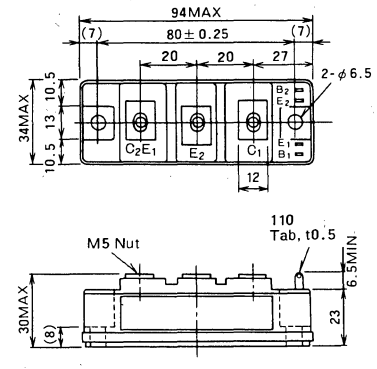
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

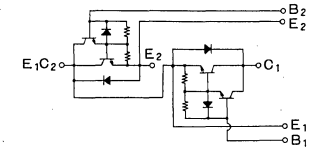
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



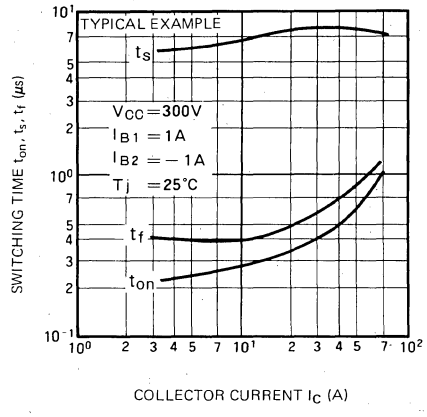
Accessory : 3 pieces of hexagon head bolts (M5×12)

MAXIMUM RATINGS (T_j=25°C)

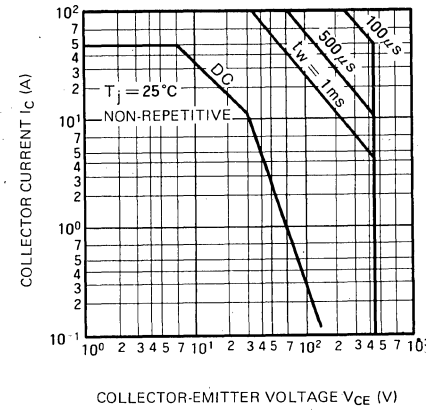
Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C=1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=50A, I_B=−7A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	50	A
$I_{C(pulse)}$	Collector current	tw=1ms	100	A
$-I_C$	Reverse collector current	DC (forward diode current)	50	A
P_C	Collector dissipation	T_C=25°C, per one transistor	310	W
I_B	Base current		3	A
$-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 50Hz (half wave) (forward diode surge current)	500	A
T_j	Junction temperature		−40～+150	℃
T_{stg}	Storage temperature		−40～+125	℃
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
—	Mounting torque	Main terminals M5 screw／M6mounting screw	15～20／20～30	kg·cm
—	Weight	Typical value	210	g

MITSUBISHI ELECTRIC

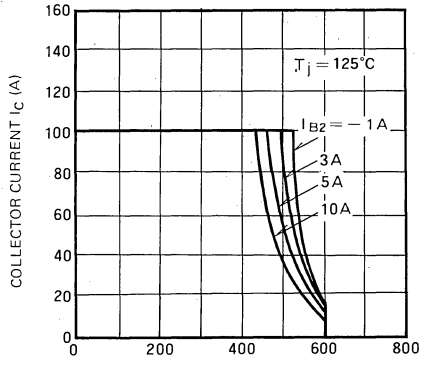
SWITCHING TIME VS. COLLECTOR CURRENT



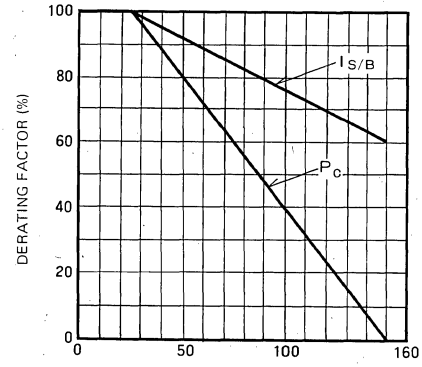
SAFE OPERATING AREA



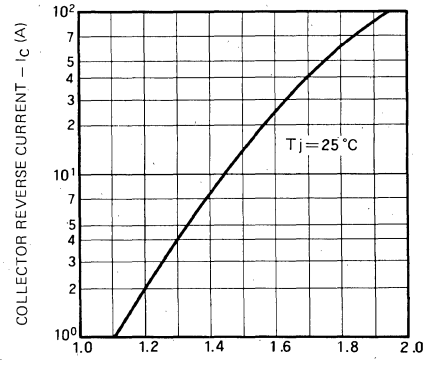
REVERSE BIAS S.O.A.



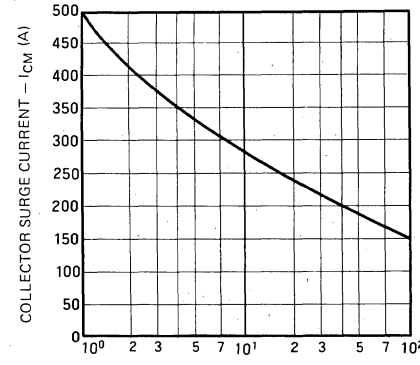
POWER DERATING



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



RATED COLLECTOR SURGE CURRENT (DIODE FORWARD SURGE CURRENT)



QM50DY-2H

HIGH VOLTAGE MEDIUM POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM50DY-2H is a high voltage medium-power transistor module which is designed for use in switching applications. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 50A and the rated collector-emitter voltage is 1000V.

FEATURES

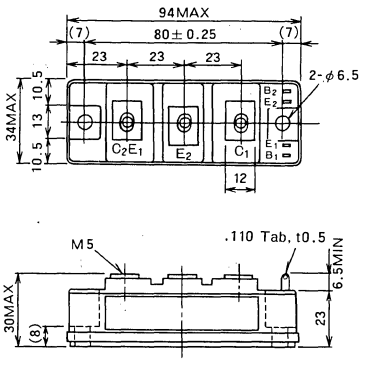
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feedback diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.
- It is possible to use it on the 440V power line.

APPLICATIONS

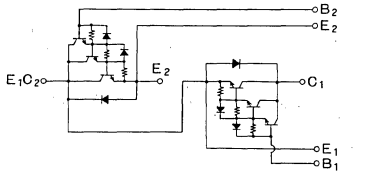
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



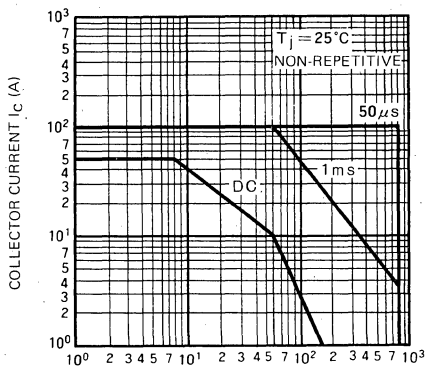
Accessory: 3 pieces of M5 x 12 bolts

MAXIMUM RATINGS (T_j = 25°C)

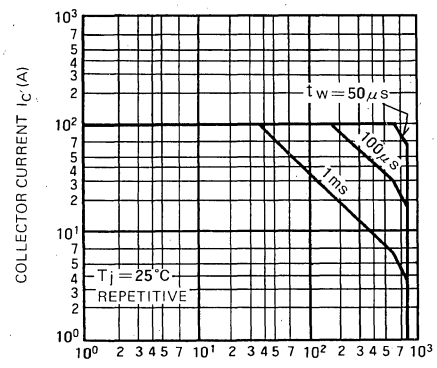
Symbol	Item	Conditions	Ratings	Unit
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=50A, I_{B2}=−3A	1000	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	1000	V
V_{CBO}	Collector-base voltage	Emitter open	1000	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	50	A
$I_{C(pulse)}$	Collector current	tw=1ms	100	A
$-I_C$	Reverse collector current	DC (forward diode current)	50	A
P_C	Collector dissipation	T_C=25°C, per one transistor	400	W
I_B	Base current		3	A
$-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	500	A
T_j	Junction temperature		−40～+150	℃
T_{stg}	Storage temperature		−40～+125	℃
V_{ISOL}	Isolation voltage	AC for 1 minute	2500	V
—	Mounting torque	Main terminals M5 screw / M6 mounting screw	15～20／20～30	kg·cm
—	Weight	Typical value	210	g

MITSUBISHI ELECTRIC

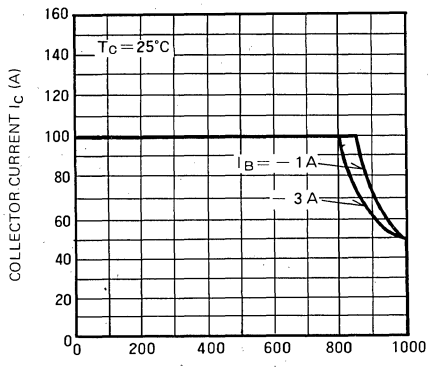
SAFE OPERATING AREA



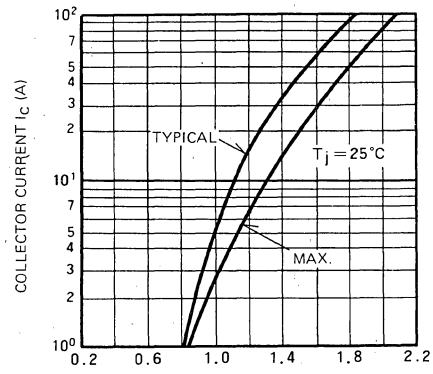
SAFE OPERATING AREA



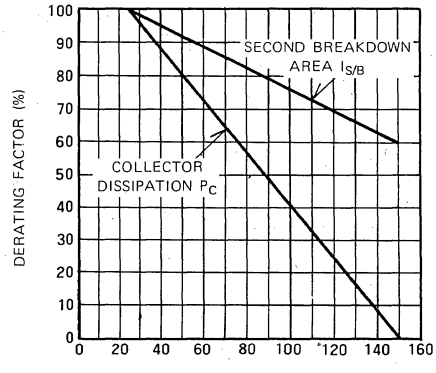
REVERSE BIAS S.O.A.



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



DERATING FACTOR OF S.O.A.

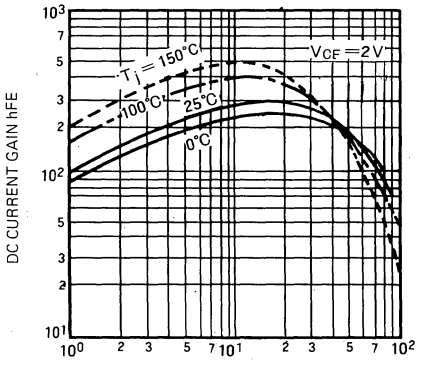


ELECTRICAL CHARACTERISTICS (T_j = 25°C)

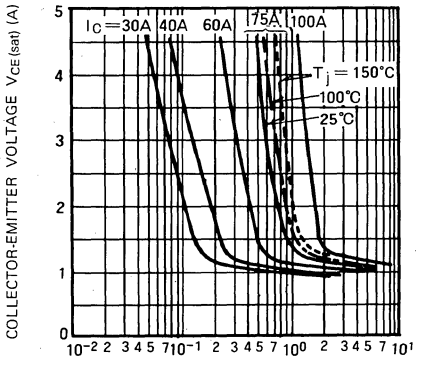
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, emitter open	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$, collector open	—	—	200	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=75A$, $I_B=1A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=75A$, $I_B=1A$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$I_C=-75A$	—	—	1.85	V
h_{FE}	DC current gain	$I_C=75A$, $V_{CE}=2V/5V$	75/100	—	—	—
ton	Turn-on time	$I_{B_1}=1.5A$, $V_{CC}=300V$, $I_C=75A$	—	—	2.5	μs
ts	Storage time	$I_{B_1}=1.5A$, $I_{B_2}=-1.5A$, $V_{CC}=300V$, $I_C=75A$	—	—	12	μs
tf	Fall time	$I_{B_1}=1.5A$, $I_{B_2}=-1.5A$, $V_{CC}=300V$, $I_C=75A$	—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.35	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	0.85	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.15	°C/W

PERFORMANCE CURVES

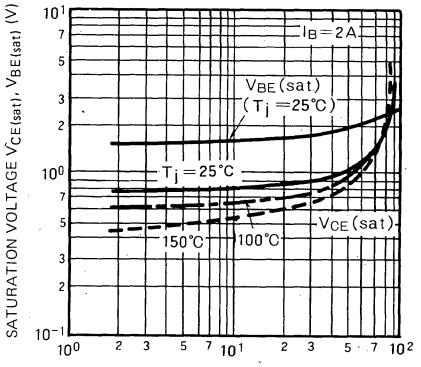
DC CURRENT GAIN VS. COLLECTOR CURRENT



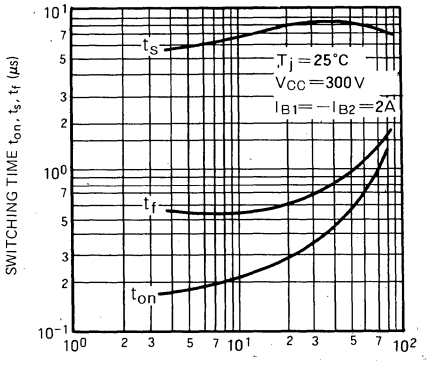
COLLECTOR-EMITTER SATURATION VOLTAGE



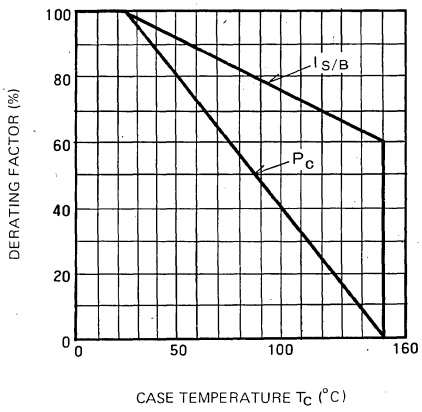
SATURATION VOLTAGE CHARACTERISTICS



SWITCHING TIME VS. COLLECTOR CURRENT



POWER DERATING

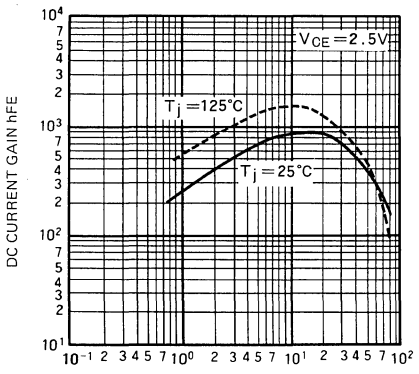


ELECTRICAL CHARACTERISTICS (T_j=25°C)

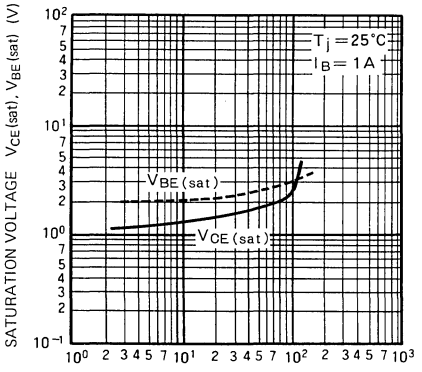
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	V_{CE}=1000V, V_{BE}=−2V	—	—	1	mA
I_{EBO}	Emitter cutoff current	V_{EB}=7V	—	—	200	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	I_C=75A, I_B=1.5A	—	—	2.5	V
$V_{BE(sat)}$	Base-emitter saturation voltage	I_C=75A, I_B=1.5A	—	—	3.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C$=75A (diode forward voltage drop)	—	—	1.8	V
h_{FE}	DC current gain	I_C=75A, V_{CE}=2.8V/5V	75/100	—	—	—
ton	Switching time	V_{CC}=600V, I_C=75A, I_{B1}=1.5A, I_{B2}=−1.5A	—	—	2.5	μs
ts			—	—	15	μs
tf			—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.25	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	1.2	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.13	°C/W

PERFORMANCE CURVES

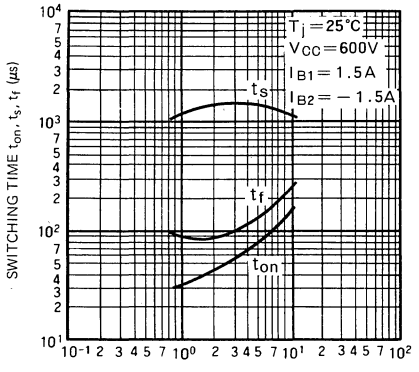
DC CORRECT GAIN CHARACTERISTICS h_{FE} VS. I_C (TYPICAL)



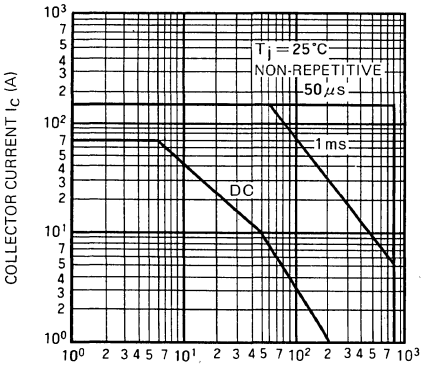
SATURATION VOLTAGE CHARACTERISTICS $V_{CE(sat)}$, $V_{BE(sat)}$ VS. I_C (TYPICAL)



SWITCHING TIME VS COLLECTOR CURRENT t_{on}, t_s, t_f VS. I_C (TYPICAL)



SAFE OPERATING AREA



MITSUBISHI ELECTRIC

QM100DY-H

HIGH POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM100DY-H is a high-power transistor module which is designed for use in switching application. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 100A and the rated collector-emitter voltage is 450V.

FEATURES

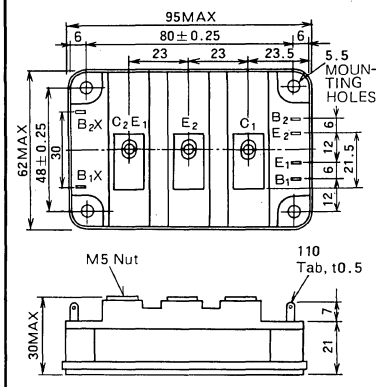
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.

APPLICATIONS

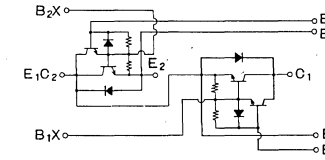
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



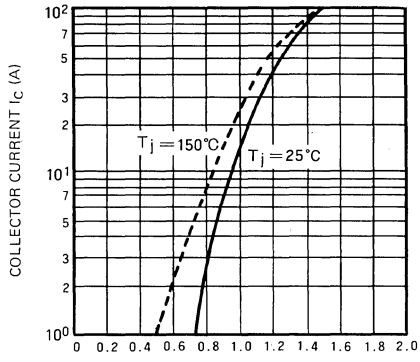
Accessory : 3 pieces of hexagon head bolts (M5×12)

MAXIMUM RATINGS (T_j = 25°C)

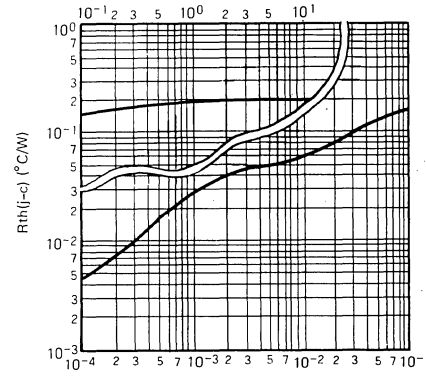
Symbol	Item	Conditions	Ratings	Unit
$V_{CEO(SUS)}$	Collector-emitter voltage	I_C = 1A, base open	450	V
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C = 100A, I_{B2} = −5A	500	V
V_{CEX}	Collector-emitter voltage	V_{BE} = −2V	600	V
V_{CBO}	Collector-base voltage	Emitter open	600	V
V_{EBO}	Emitter-base voltage	Collector open	7	V
I_C	Collector current	DC	100	A
$I_{C(pulse)}$	Collector current	tw = 1ms	200	A
$-I_{C(DC)}$	Reverse collector current	DC (forward diode current)	100	A
P_C	Collector dissipation	T_C = 25°C (per one transistor)	620	W
I_B	Base current	DC	6	A
$-I_{CSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	1000	A
T_j	Junction temperature		−40 ~ +150	°C
T_{stg}	Storage temperature		−40 ~ +125	°C
V_{ISOL}	Isolation voltage	AC for 1 minute	2000	V
—	Mounting torque	(Recommended value 17kg•cm) Terminal and mounting screw M5	15 ~ 20	kg•cm
—	Weight	Typical value	400	g

MITSUBISHI ELECTRIC

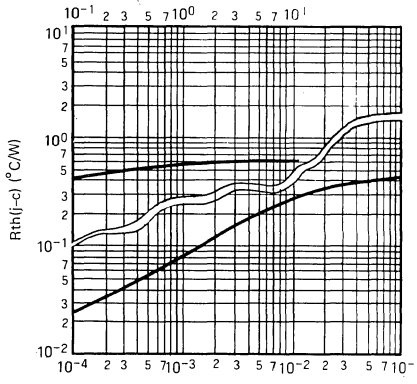
REVERSE COLLECTOR CURRENT VS. COLLECTOR-EMITTER REVERSE VOLTAGE (DIODE FORWARD CHARACTERISTIC)



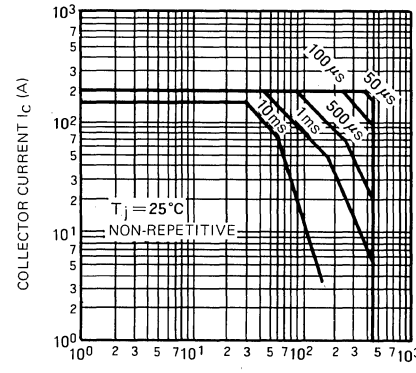
TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)



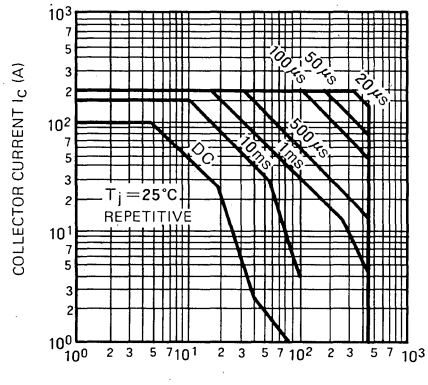
TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (DIODE)



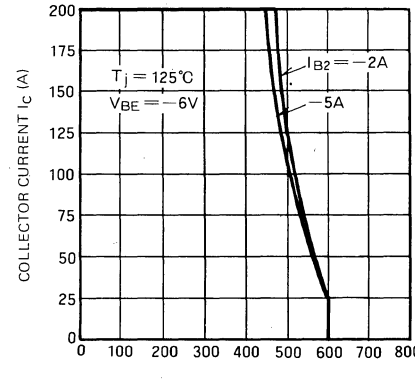
SAFE OPERATING AREA



SAFE OPERATING AREA



REVERSE BIAS SAFE OPERATING AREA



QM100DY-2H

HIGH VOLTAGE HIGH POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM100DY-2H is a high voltage high-power transistor module which is designed for use in switching applications. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 100A and the rated collector-emitter voltage is 1000V.

FEATURES

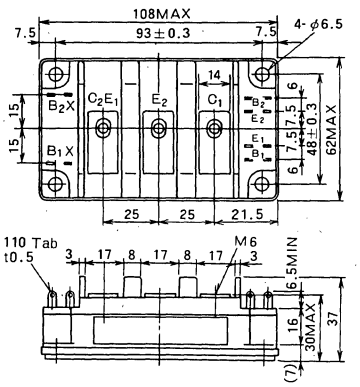
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.
- It is possible to use it on the 440V power line.

APPLICATIONS

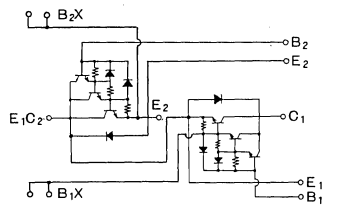
Inverters for AC motor controllers, power supplies for DC motor control, regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



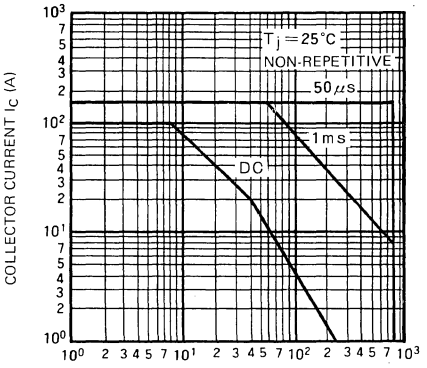
Accessory : 2 pieces of M6×12 hexagon head bolts.

MAXIMUM RATINGS (T_j=25°C)

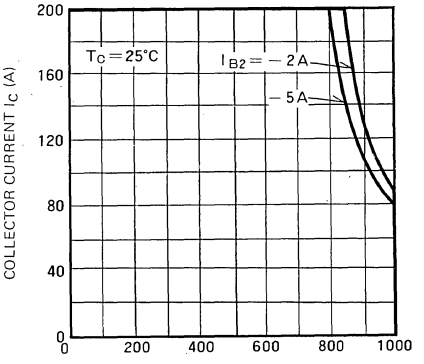
Symbol	Item	Conditions	Ratings	Unit
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=80A, I_{B2}=−5A	1000	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	1000	V
V_{CBO}	Collector-base voltage	Emitter open	1000	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	100	A
$I_{C(pulse)}$	Collector current	tw=1ms	200	A
$-I_C$	Reverse collector current	DC (forward diode current)	100	A
P_C	Collector dissipation	T_C=25°C, per one transistor	800	W
I_B	Base current		5	A
$*-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 50Hz (half wave) (forward diode surge current)	1000	A
T_j	Junction temperature		−40～+150	℃
T_{stg}	Storage temperature		−40～+125	℃
V_{ISOL}	Isolation voltage	AC for 1 minute	2500	V
—	Mounting torque	Main terminals M5 screw / M6 mounting screw	20～30	kg·cm
—	Weight	Typical value	470	g

MITSUBISHI ELECTRIC

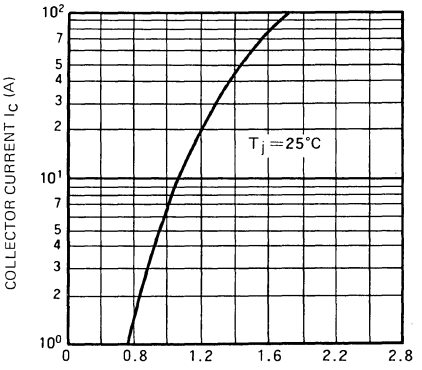
SAFE OPERATING AREA



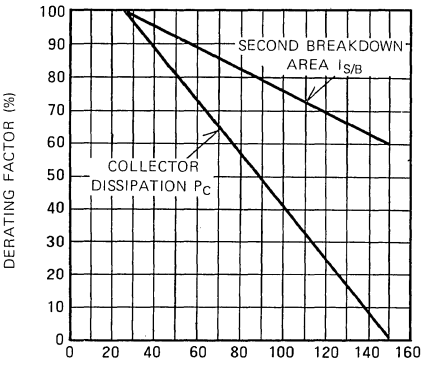
REVERSE BIAS S.O.A.



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



DERATING FACTOR OF S.O.A.



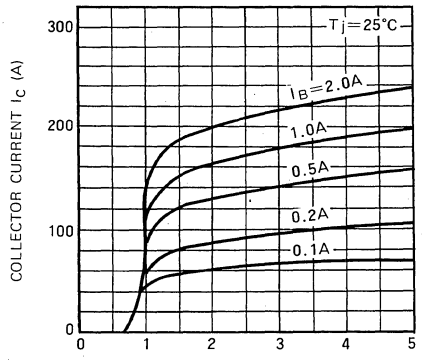
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS (T_j=25°C)

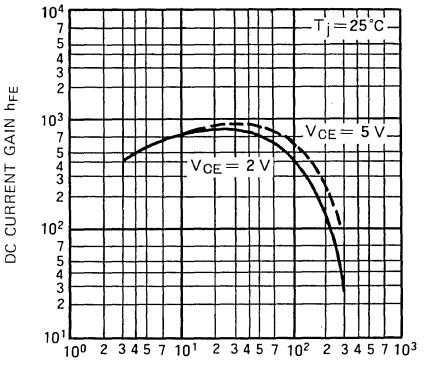
Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	2	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, emitter open	—	—	2	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$, collector open	—	—	350	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=150A$, $I_B=2A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=150A$, $I_B=2A$, $V_{CE}=2.0V$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C=150A$	—	—	1.85	V
h_{FE}	DC current gain	$I_C=150A$, $V_{CE}=2V/5V$	75/100	—	—	—
ton	Turn-on time	$I_{B1}=3A$, $V_{CC}=300V$, $I_C=150A$	—	—	2.5	μs
ts	Storage time	$I_{B1}=3A$, $I_{B2}=-3A$, $V_{CC}=300V$, $I_C=150A$	—	—	12	μs
tf	Fall time	$I_{B1}=3A$, $I_{B2}=-3A$, $V_{CC}=300V$, $I_C=150A$	—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.18	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	0.6	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.1	°C/W

PERFORMANCE CURVES

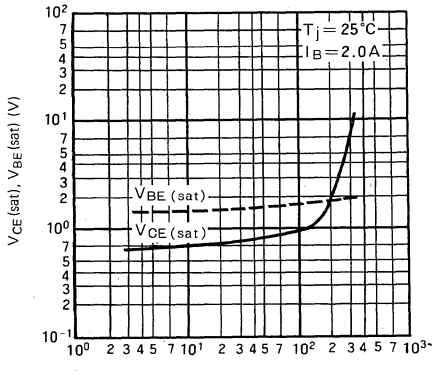
COMMON EMITTER OUTPUT CHARACTERISTICS



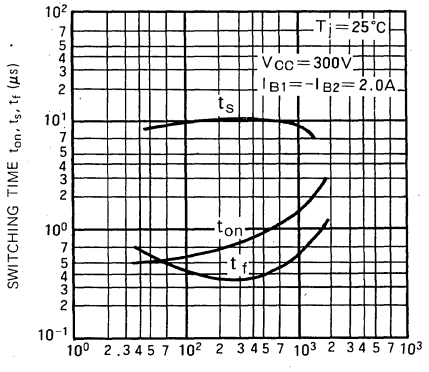
DC CURRENT GAIN VS. COLLECTOR CURRENT



SATURATION CHARACTERISTICS



SWITCHING TIME VS. COLLECTOR CURRENT



MITSUBISHI ELECTRIC

QM150DY-2H

HIGH VOLTAGE HIGH POWER SWITCHING USE INSULATED TYPE

DESCRIPTION

Mitsubishi Type QM150DY-2H is a high voltage high-power transistor module which is designed for use in switching applications. It is an insulated device consisting of two Darlington transistors with each transistor having a reverse parallel connected high-speed diode. The rated collector current for each element is 150A and the rated collector-emitter voltage is 1000V.

FEATURES

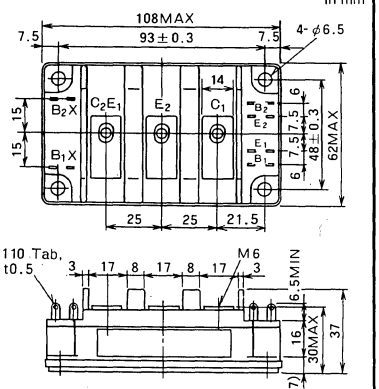
- A high h_{FE} allows compact base driving circuits.
- A low saturation voltage makes the device ideal for switching applications.
- Each transistor has a reverse parallel connected high-speed diode (feed back diode).
- The main electrodes and metallic case are insulated to allow several transistor modules to be mounted on the same heat-sink.
- It is possible to use it on the 440V power line.

APPLICATIONS

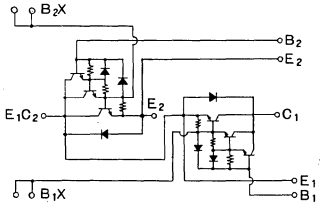
Inverters for AC motor controllers, power supplies for DC motor control regulated AC and DC power supplies.

OUTLINE DRAWING

Dimensions in mm



CIRCUIT DIAGRAM



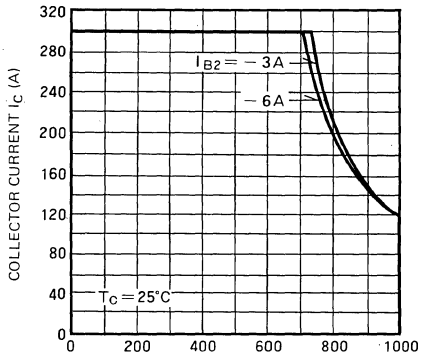
Accessory : 2 pieces of M6×12 hexagon head bolts.

MAXIMUM RATINGS (T_j = 25°C)

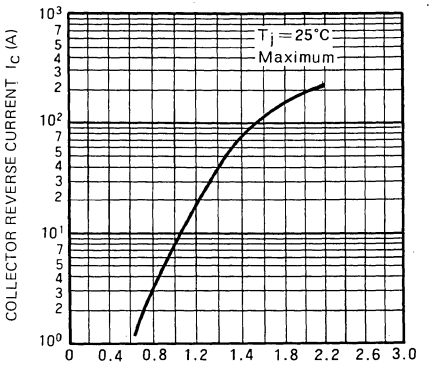
Symbol	Item	Conditions	Ratings	Unit
$V_{CEX(SUS)}$	Collector-emitter voltage	I_C=120A, I_{B2}=−6A	1000	V
V_{CEX}	Collector-emitter voltage	V_{BE}=−2V	1000	V
V_{CBO}	Collector-base voltage	Emitter open	1000	V
V_{EBO}	Emitter-base voltage		7	V
I_C	Collector current	DC	150	A
$I_{C(pulse)}$	Collector current	tw=1ms	300	A
$-I_C$	Reverse collector current	DC (forward diode current)	150	A
P_C	Collector dissipation	T_C=25°C, per one transistor	1000	W
I_B	Base current		8	A
$-I_{CRSM}$	Reverse surge collector current	Peak value of one cycle of 60Hz (half wave) (forward diode surge current)	1500	A
T_j	Junction temperature		−40～+150	°C
T_{stg}	Storage temperature		−40～+125	°C
V_{ISOL}	Isolation voltage	AC for 1 minute	2500	V
—	Mounting torque	Main terminals M6 screw / M6 mounting screw	20～30	kg·cm
—	Weight	Typical value	470	g

MITSUBISHI ELECTRIC

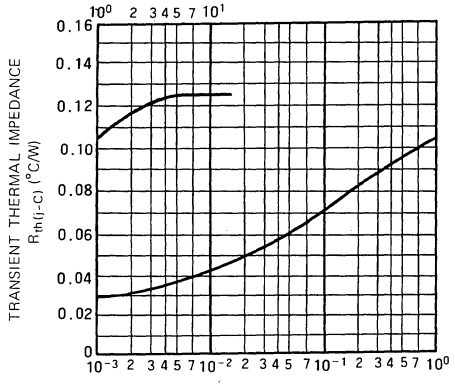
REVERSE BIAS S.O.A.



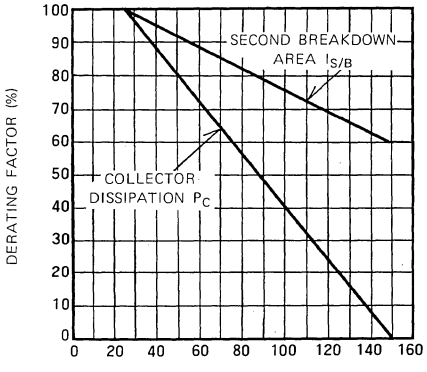
REVERSE COLLECTOR CURRENT VS. COLLECTOR-EMITTER REVERSE VOLTAGE (DIODE FORWARD CHARACTERISTICS)



TRANSIENT THERMAL IMPEDANCE CHARACTERISTIC (TRANSISTOR)



DERATING FACTOR OF S.O.A.



ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$	—	—	200	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=30A$, $I_B=0.4A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=30A$, $I_B=0.4A$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C=40A$ (diode forward voltage drop)	—	—	1.2	V
h_{FE}	DC current gain	$I_C=30A$, $V_{CE}=2V/5V$	75/100	—	—	—
ton	Switching time	$V_{CC}=300V$, $I_C=30A$, $I_{B1}=-I_{B2}=0.5A$	—	—	1.5	μs
ts			—	—	12	μs
tf			—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.5	℃/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	2.0	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.15	℃/W

Performance curves of QM30DZ-H are the same as those of QM30DY-H.

ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$	—	—	200	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=50A$, $I_B=0.65A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=50A$, $I_B=0.65A$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C=80A$ (diode forward voltage drop)	—	—	1.2	V
h_{FE}	DC current gain	$I_C=50A$, $V_{CE}=2V/5V$	75/100	—	—	—
ton	Switching time	$V_{CC}=300V$, $I_C=50A$, $I_{B1}=-I_{B2}=1A$	—	—	1.5	μs
ts			—	—	12	μs
tf			—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.35	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	1.3	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.15	°C/W

Performance curves of QM50DZ-H are the same as those of QM50DY-H.

ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$	—	—	200	mA
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=50A$, $I_B=0.65A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=50A$, $I_B=0.65A$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C=50A$ (diode forward voltage drop)	—	—	1.75	V
h_{FE}	DC current gain	$I_C=50A$, $V_{CE}=2V/5V$	75/100	—	—	—
ton	Switching time	$V_{CC}=300V$, $I_C=50A$, $I_{B1}=-I_{B2}=1A$	—	—	1.5	μs
ts			—	—	12	μs
tf			—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.4	°C/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	1.3	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.15	°C/W

Performance curves of QM50CY-H are the same as those of QM50DY-H.

ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	2	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, emitter open	—	—	2	mA
I_{EBO}	Emitter cutoff current	$V_{BE}=-7V$	—	—	300	mA
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C=100A$, $I_B=1.3A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=100A$, $I_B=1.3A$, $V_{CE}=2.0V$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage	$-I_C=100A$	—	—	1.75	V
h_{FE}	DC current gain	$I_C=100A$, $V_{CE}=2V/5V$	75/100	—	—	—
ton	Turn-on time	$I_{B1}=2A$, $V_{CC}=300V$, $I_C=100A$	—	—	2.0	μs
ts	Storage time	$I_{B1}=2A$, $I_{B2}=-2A$, $V_{CC}=300V$, $I_C=100A$	—	—	12	μs
t_f	Fall time	$I_{B1}=2A$, $I_{B2}=-2A$, $V_{CC}=300V$, $I_C=100A$	—	—	3.0	μs
$R_{th(j-c)}$	Thermal resistance	Junction to case, transistor part	—	—	0.2	°C/W
$R_{th(j-c)}$		Junction to case, diode part	—	—	0.6	°C/W
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per a half module	—	—	0.1	°C/W

Performance curves of QM100CY-H are the same as those of QM100DY-H.

ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, $V_{EB}=-2V$	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$	—	—	150	mA
$-V_{CEO}$	Collector-emitter reverse voltage	$I_C=-20A$, $T_C=25℃$	—	—	1.5	V
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=20A$, $I_B=0.28A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=20A$, $I_B=0.28A$, $V_{CE}=2V$	—	—	2.5	V
h_{FE}	DC current gain	$I_C=20A$, $V_{CE}=2V/5V$	70/100	—	—	—
t_{on}	Switching time	$I_{B1}=0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	1.5	μs
t_s		$I_{B1}=0.4A$, $I_{B2}=-0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	12	μs
t_f		$I_{B1}=0.4A$, $I_{B2}=-0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	2.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.8	℃/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	2.2	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per one module	—	—	0.08	℃/W

Performance curves of QM20BA-H are the same as those of QM20DX-H.

ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, Emitter open	—	—	1	mA
I_{EBO}	Emitter cutoff current	$V_{EB}=7V$, Collector open	—	—	50	mA
$V_{CE(sat)}$	Collector-emitter saturation voltage	$I_C=15A$, $I_B=0.3A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=15A$, $I_B=0.3A$	—	—	2.5	V
$-V_{CEO}$	Collector-emitter reverse voltage (diode forward voltage drop)	$I_C=-15A$, T_j=25°C	—	—	1.5	V
h_{EF}	DC current gain	$I_C=15A$, $V_{CE}=2V/5V$	50/100	—	—	—
t_{on}	Turn-on time	$I_{B1}=0.3A$, $V_{CC}=300V$, $I_C=15A$	—	—	1.5	μs
t_f	Storage time	$I_{B1}=0.3A$, $I_{B2}=-0.3A$, $V_{CC}=300V$, $I_C=15A$	—	—	8	μs
t_s	Fall time	$I_{B1}=0.3A$, $I_{B2}=-0.3A$, $V_{CC}=300V$, $I_C=15A$	—	—	3	μs
$R_{th(j-c)}$	Thermal resistance (Transistor part)	Junction to case	—	—	1.2	°C/W
$R_{th(j-c)}$	Thermal resistance (Diode part)	Junction to case	—	—	2.5	°C/W
$R_{th(c-f)}$	Control thermal resistance (case to fin)	Conductive grease applied, per one module	—	—	0.07	°C/W

Performance curves of QM15TB-H are the same as those of QM15HA-H.

ELECTRICAL CHARACTERISTICS (T_j=25°C)

Symbol	Item	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{CEX}	Collector cutoff current	$V_{CE}=V_{CEX}$, $V_{BE}=-2V$	—	—	1	mA
I_{CBO}	Collector cutoff current	$V_{CB}=V_{CBO}$, $V_{EB}=-2V$	—	—	1	
I_{EBO}	Emitter cutoff current	$V_{EB}=V_{EBO}$	—	—	150	mA
$-V_{CEO}$	Collector-emitter reverse voltage	$I_C=-20A$, $T_C=25℃$	—	—	1.5	V
$V_{CE(sat)}$	Collector-emitter saturation voltae	$I_C=20A$, $I_B=0.28A$	—	—	2.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	$I_C=20A$, $I_B=0.28A$, $V_{CE}=2V$	—	—	2.5	V
h_{FE}	DC current gain	$I_C=20A$, $V_{CE}=2V/5V$	70/100	—	—	—
t_{on}	Switching time	$I_{B1}=0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	1.5	μs
t_s		$I_{B1}=0.4A$, $I_{B2}=-0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	12	μs
t_f		$I_{B1}=0.4A$, $I_{B2}=-0.4A$, $V_{CC}=300V$, $I_C=20A$	—	—	2.0	μs
$R_{th(j-c)}$	Thermal resistance	Transistor part, junction to case	—	—	0.8	℃/W
$R_{th(j-c)}$		Diode part, junction to case	—	—	2.2	
$R_{th(c-f)}$	Contact thermal resistance (case to fin)	Conductive grease applied, per one module	—	—	0.06	℃/W

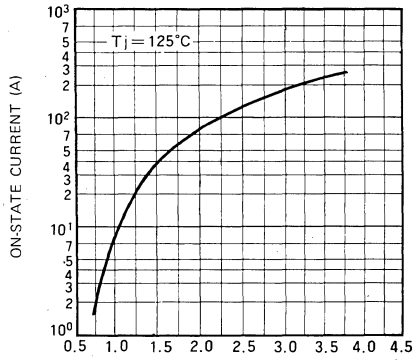
* Performance curves of QM20TB-H are the same as those of QM20DX-H.

ELECTRICAL CHARACTERISTICS

Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	4.0	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	4.0	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=60A, instantaneous value	—	—	1.80	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2 Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2 Ω	—	—	50	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	1.0	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.25	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

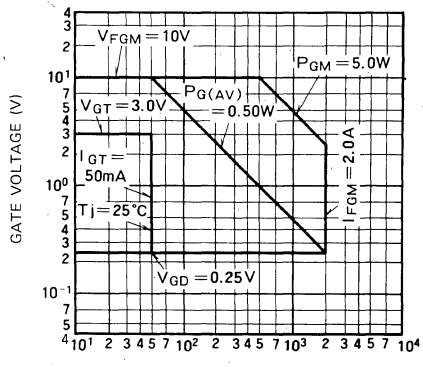
PERFORMANCE CURVES

MAXIMUM ON-STATE CHARACTERISTICS

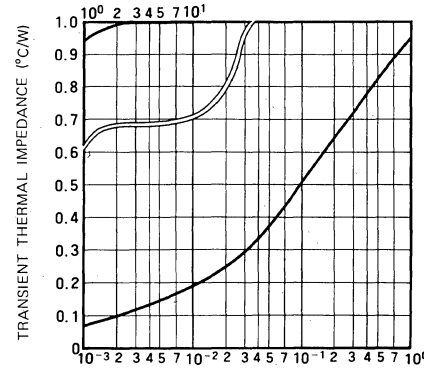


RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT

GATE CHARACTERISTICS

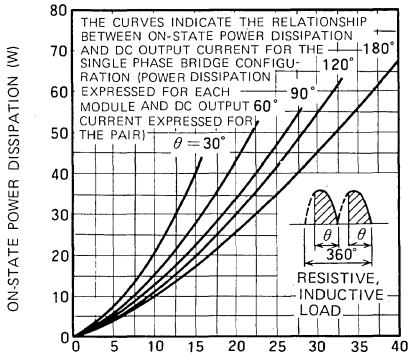


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

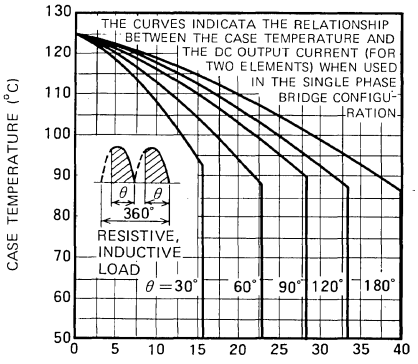


MITSUBISHI ELECTRIC

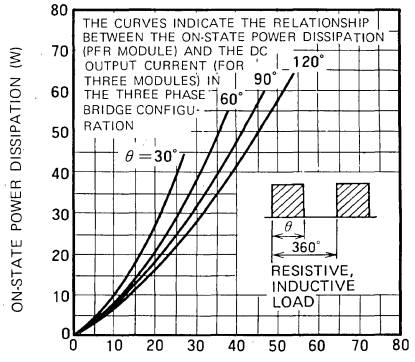
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



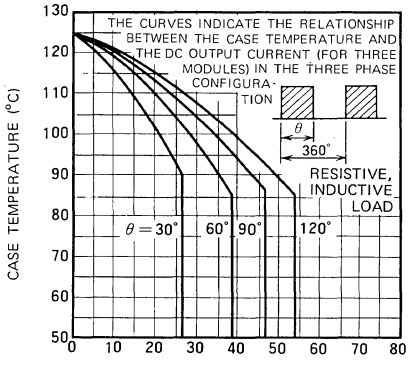
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)



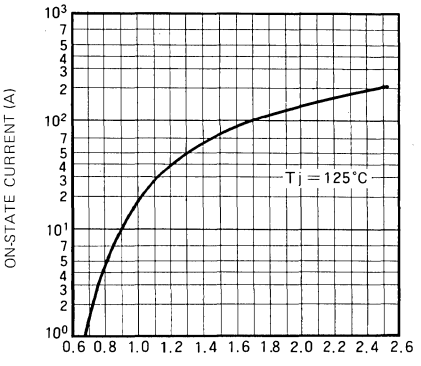
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS

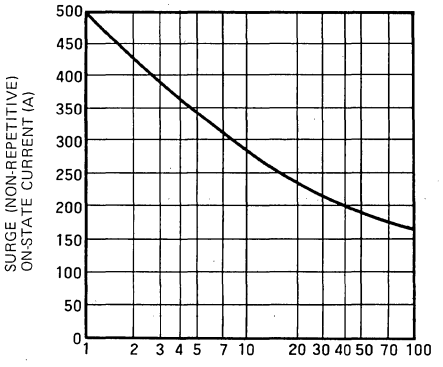
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	4.0	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	4.0	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=75A, instantaneous value	—	—	1.50	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	50	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.80	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

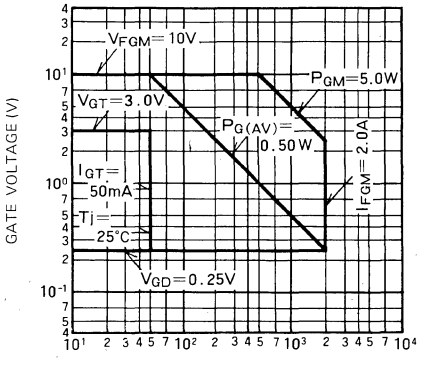
MAXIMUM ON-STATE CHARACTERISTICS



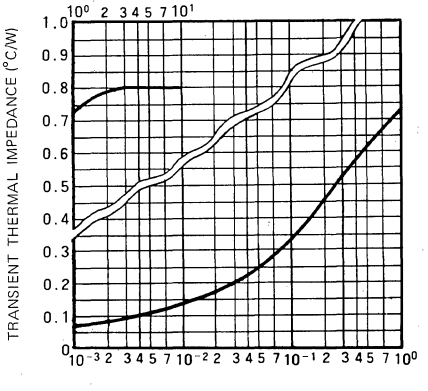
RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT



GATE CHARACTERISTICS

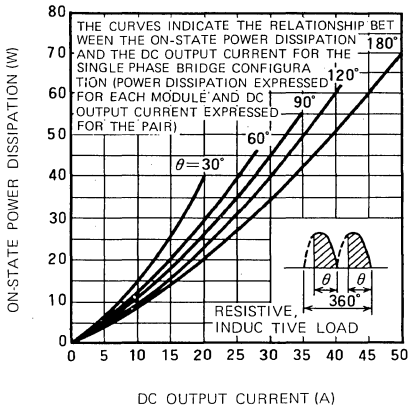


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

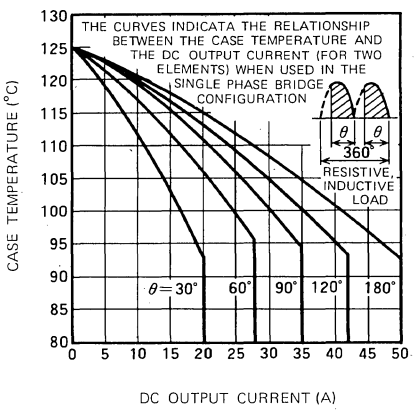


MITSUBISHI ELECTRIC

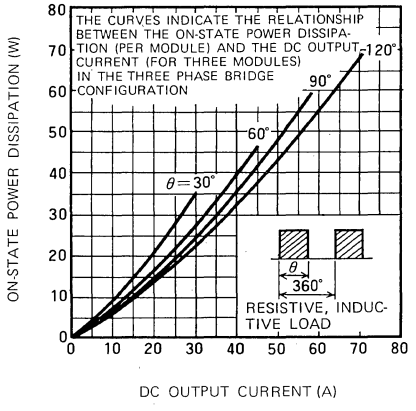
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



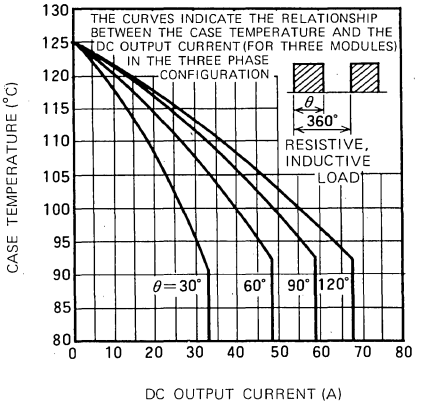
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)



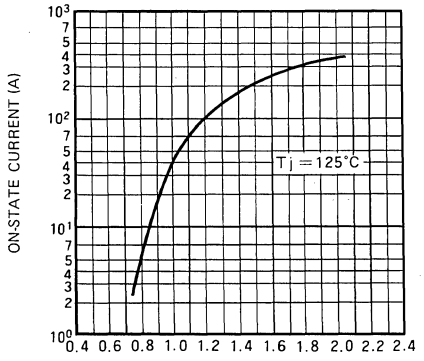
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS

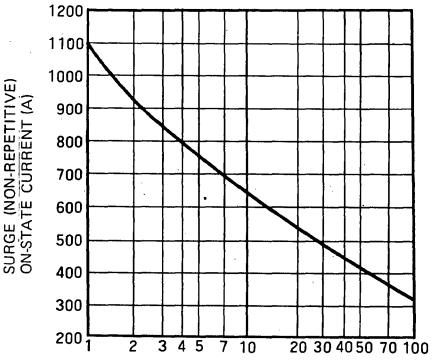
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	10	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	10	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=165A, instantaneous value	—	—	1.35	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.50	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

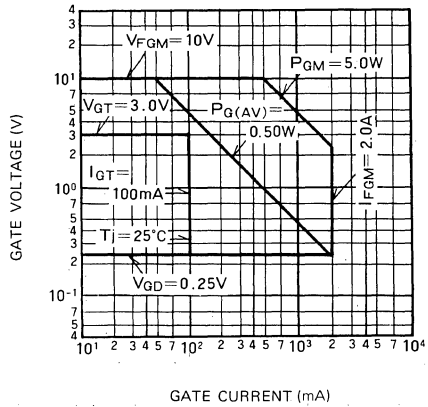
MAXIMUM ON-STATE CHARACTERISTICS



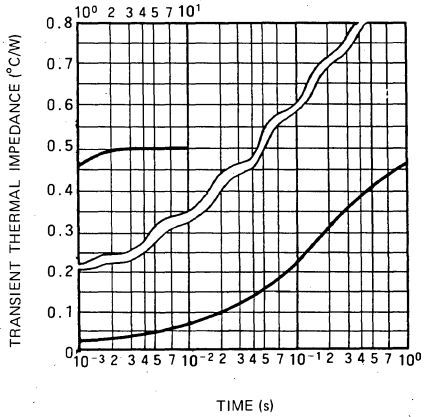
RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT



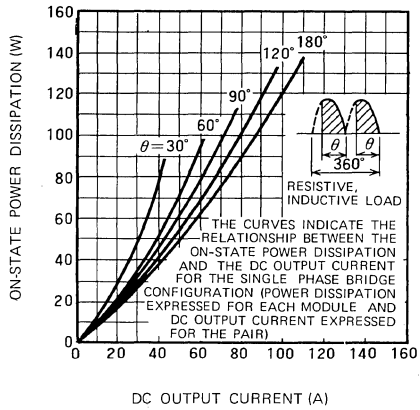
GATE CHARACTERISTICS



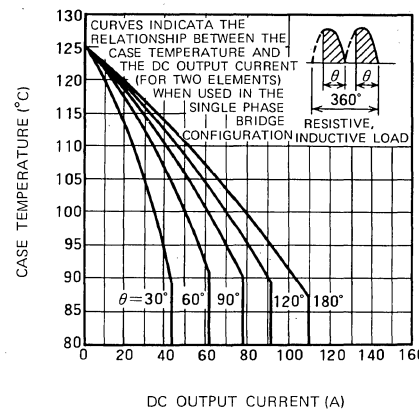
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



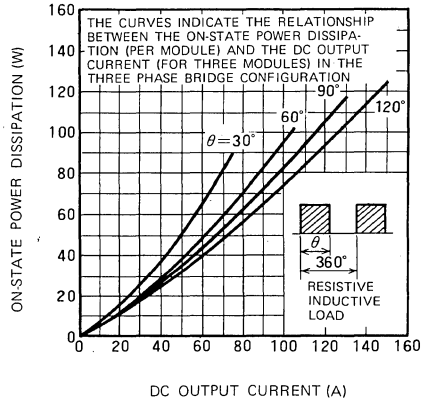
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



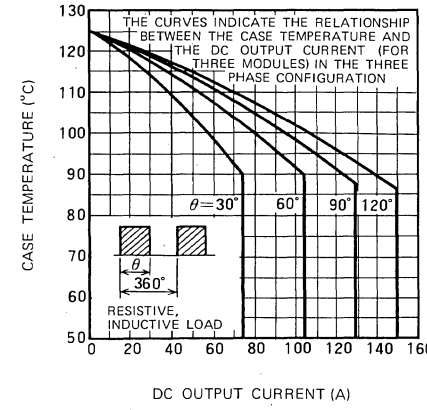
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

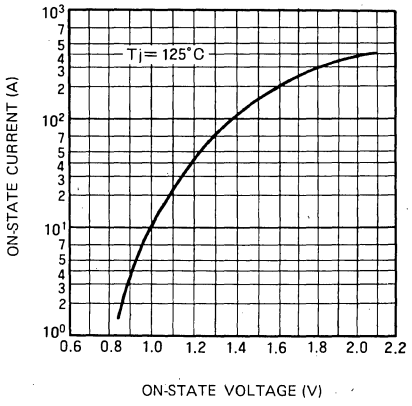


ELECTRICAL CHARACTERISTICS

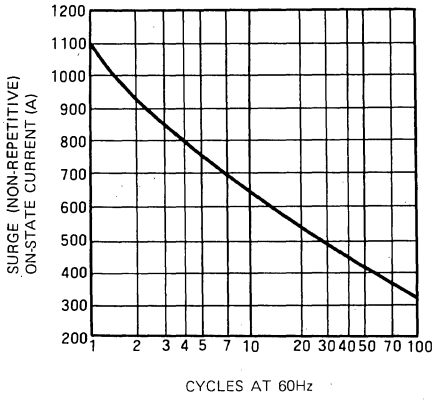
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	10	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	10	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=165A, instantaneous value	—	—	1.50	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	2.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.50	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

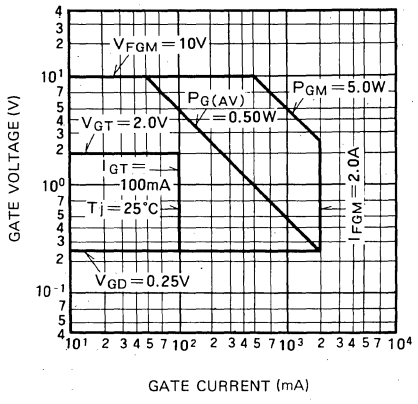
MAXIMUM ON-STATE CHARACTERISTICS



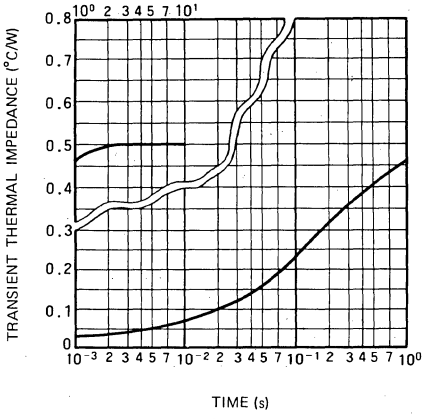
RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT



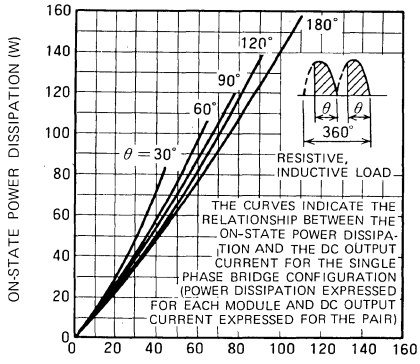
GATE CHARACTERISTICS



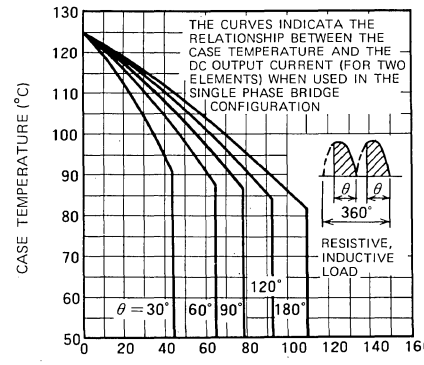
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



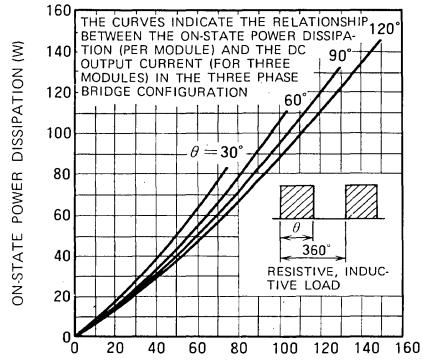
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



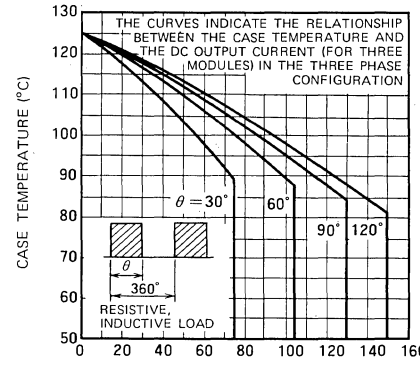
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

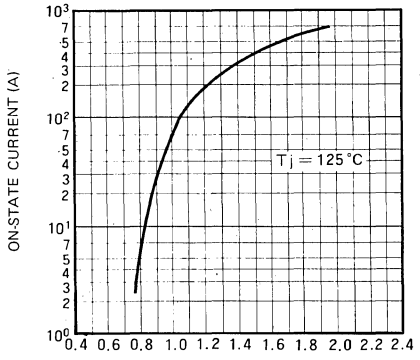


ELECTRICAL CHARACTERISTICS

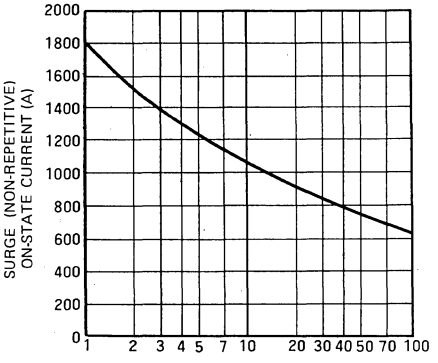
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	15	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	15	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=270A, instantaneous value	—	—	1.30	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.30	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

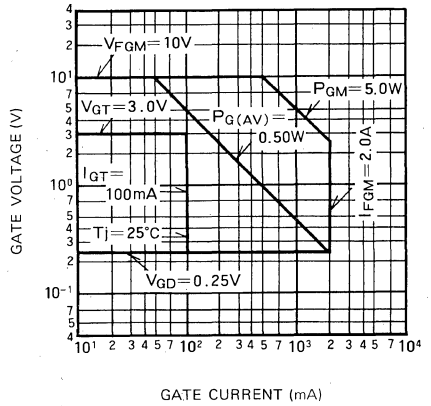
MAXIMUM ON-STATE CHARACTERISTICS



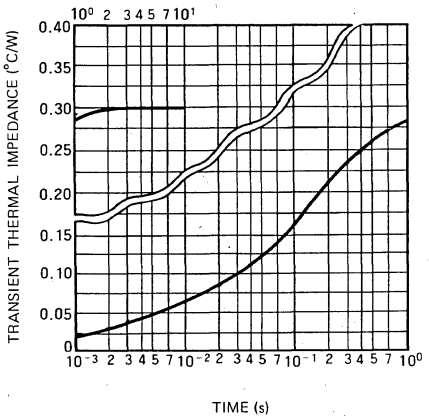
RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT



GATE CHARACTERISTICS

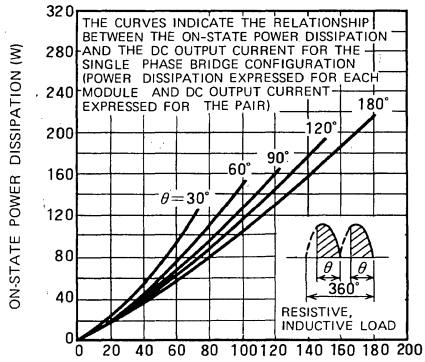


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

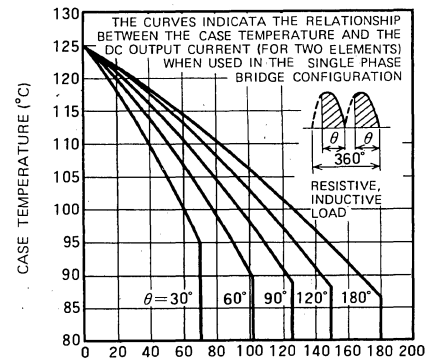


MITSUBISHI ELECTRIC

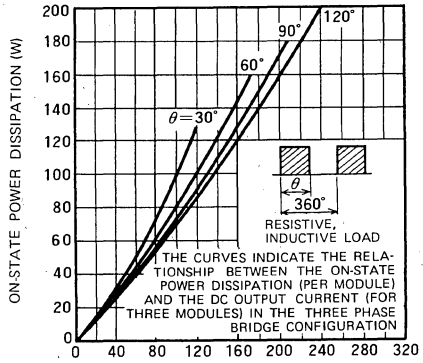
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



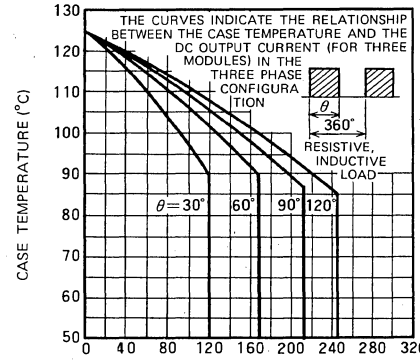
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)



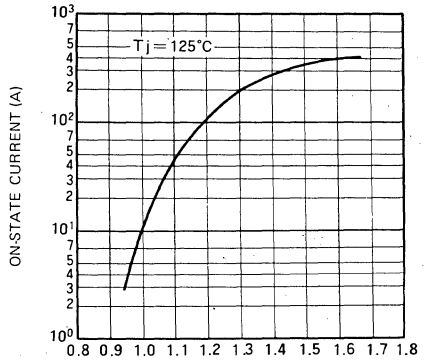
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS

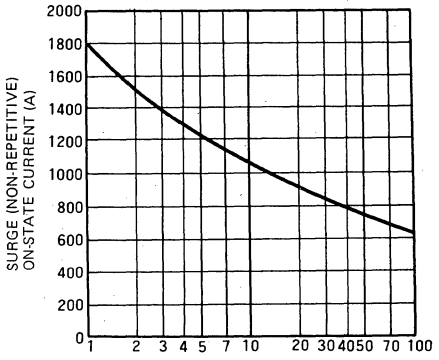
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	15	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	15	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=270A, instantaneous value	—	—	1.40	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	2.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.30	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

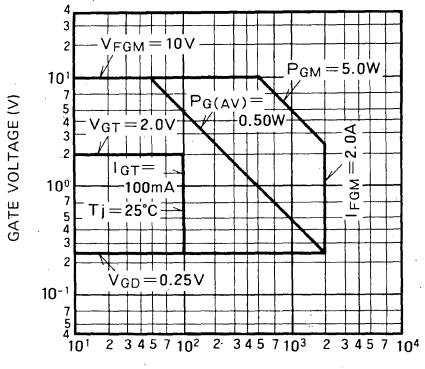
MAXIMUM ON-STATE CHARACTERISTICS



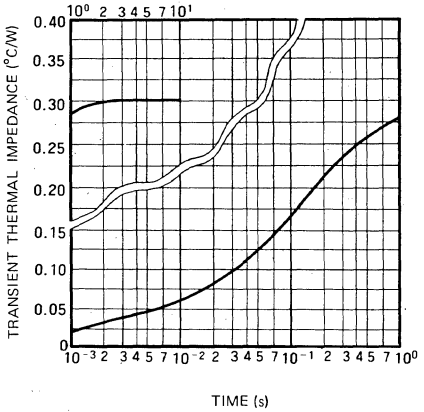
RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT



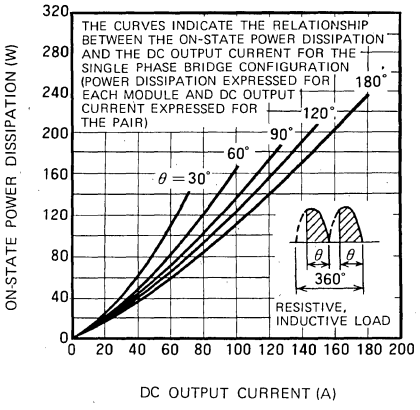
GATE CHARACTERISTICS



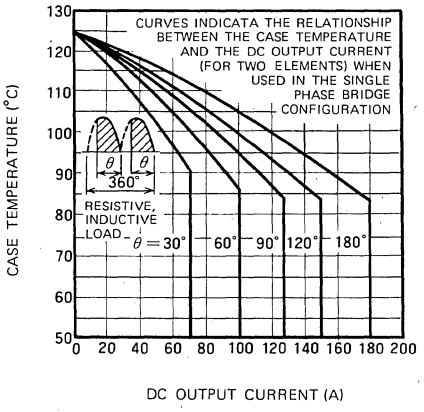
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



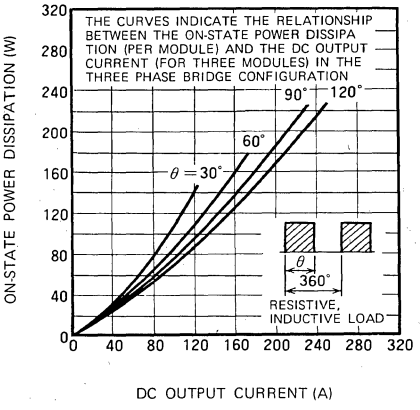
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



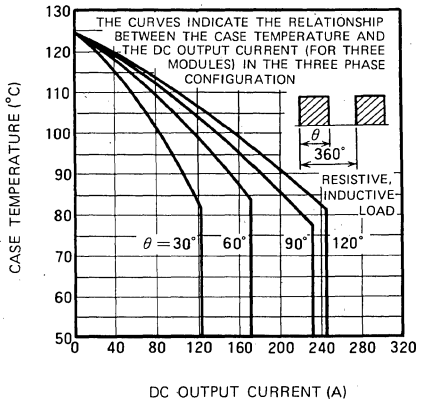
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

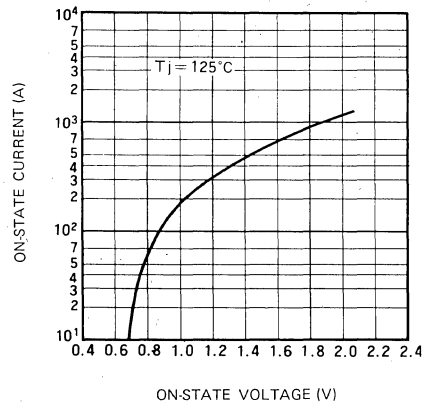


ELECTRICAL CHARACTERISTICS

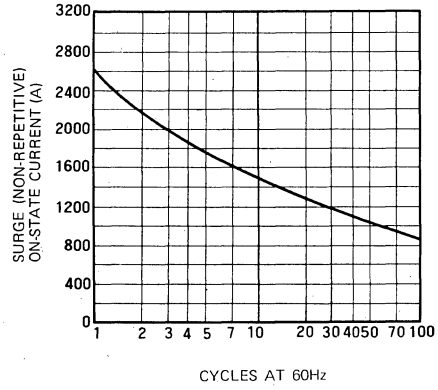
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	30	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	30	mA
V_{TM}	On-state voltage	T_j=125℃, I_{TM}=390, instantaneous value	—	—	1.30	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.22	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.05	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

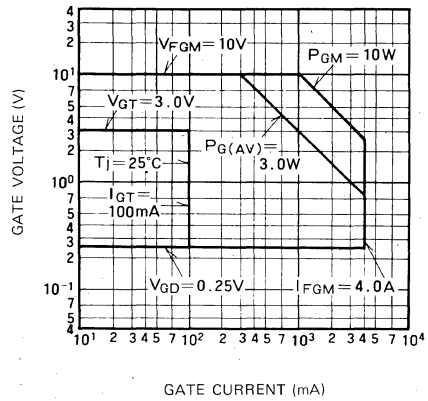
MAXIMUM ON-STATE CHARACTERISTICS



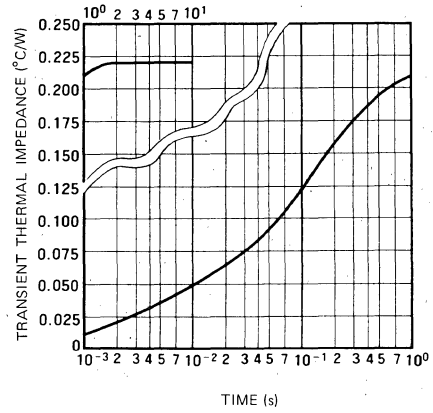
RATED SURGE (NON-REPETITIVE) ON-STATE CURRENT



GATE CHARACTERISTICS

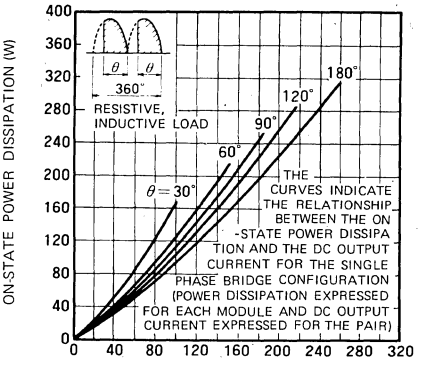


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

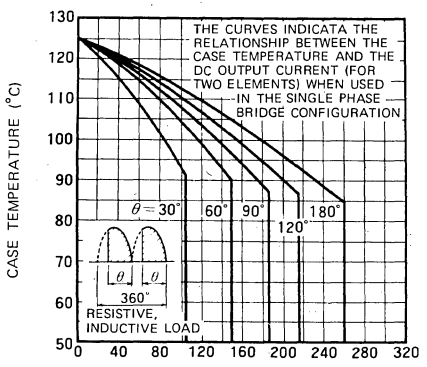


MITSUBISHI ELECTRIC

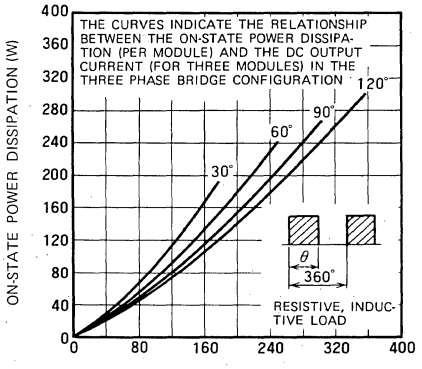
MAXIMUM ON-STATE POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



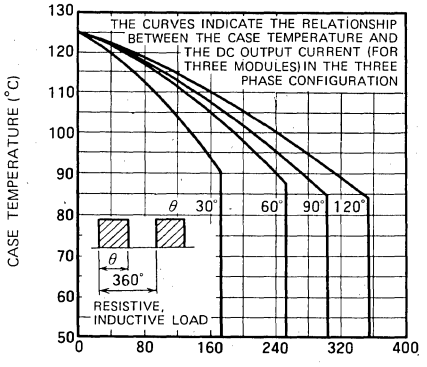
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM ON-STATE POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

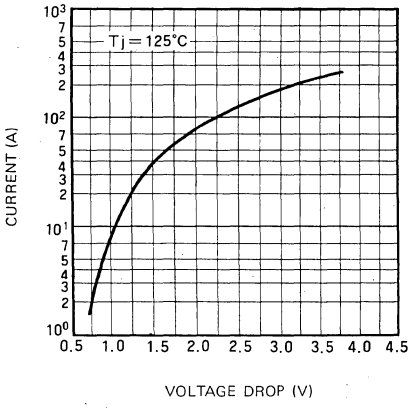


ELECTRICAL CHARACTERISTICS

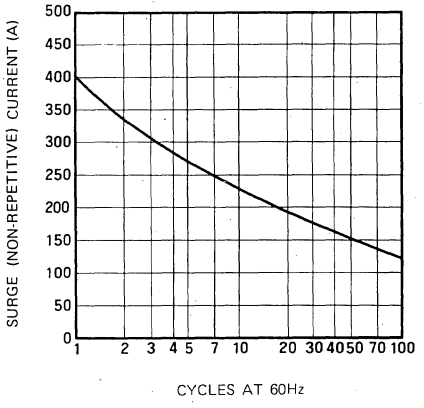
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	4.0	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	4.0	mA
V_{TM}, V_{FM}	Voltage drop	T_j=125℃, I_{TM}=I_{FM}=60A, instantaneous value	—	—	1.80	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	50	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	1.0	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.25	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

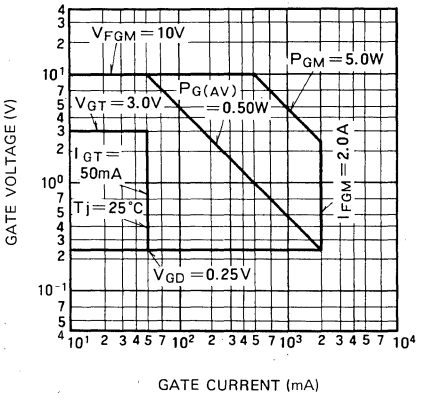
MAXIMUM FORWARD CHARACTERISTICS



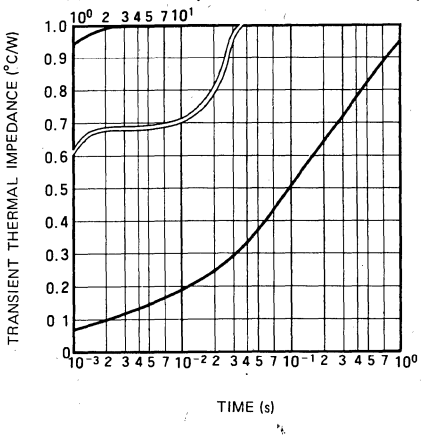
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

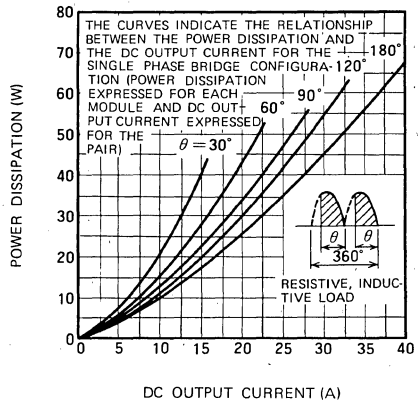


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

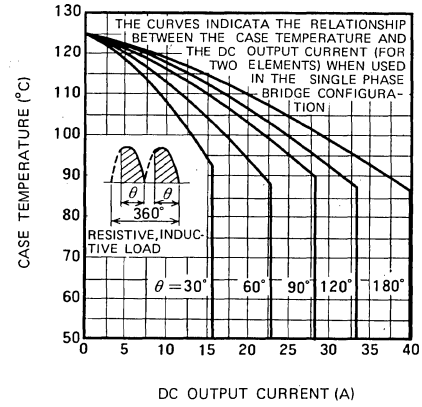


MITSUBISHI ELECTRIC

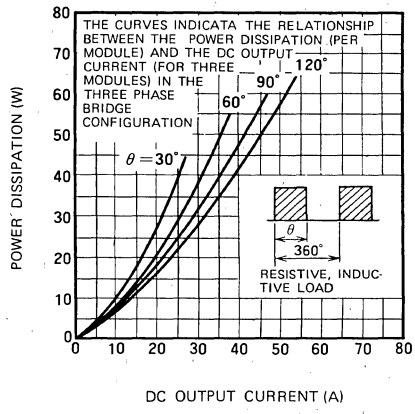
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



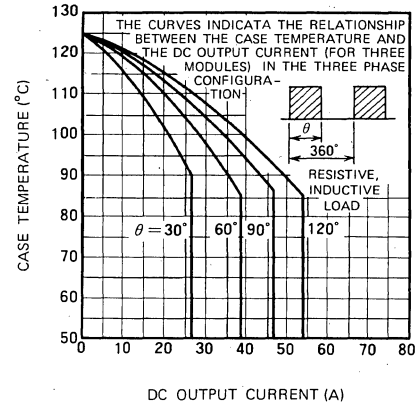
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

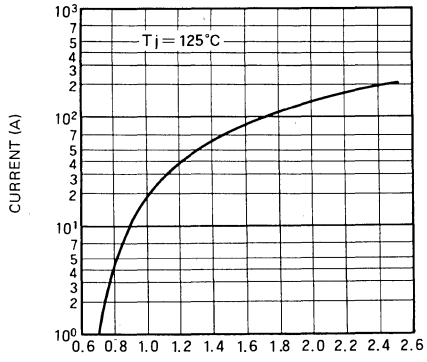


ELECTRICAL CHARACTERISTICS

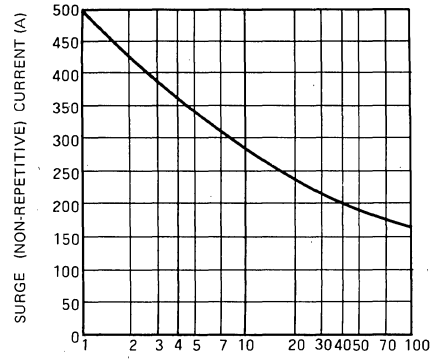
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	4.0	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	4.0	mA
V_{TM}, V_{FM}	Voltage drop	T_j=125℃, I_{TM}=I_{FM}=75A, instantaneous value	—	—	1.50	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=$^2/_3V_{DRM}$	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=$^1/_2V_{DRM}$	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	50	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.80	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

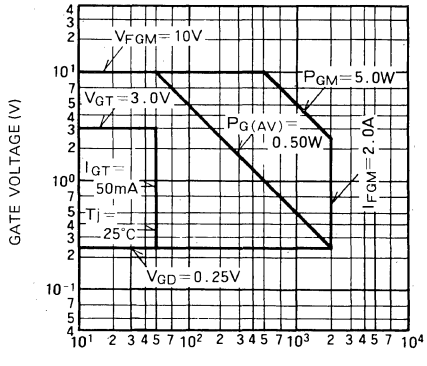
MAXIMUM FORWARD CHARACTERISTICS



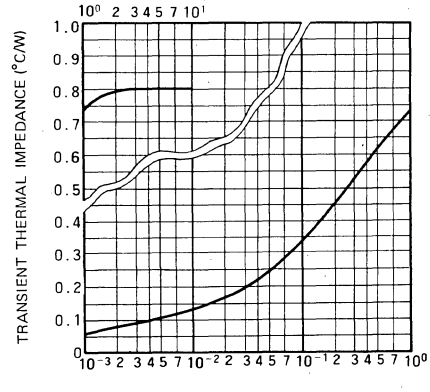
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

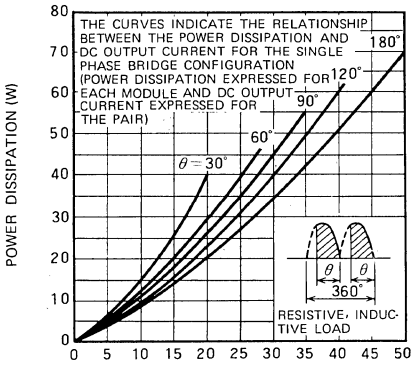


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

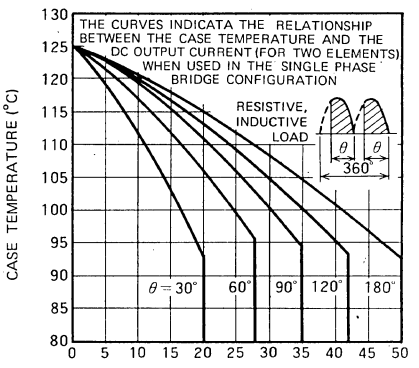


MITSUBISHI ELECTRIC

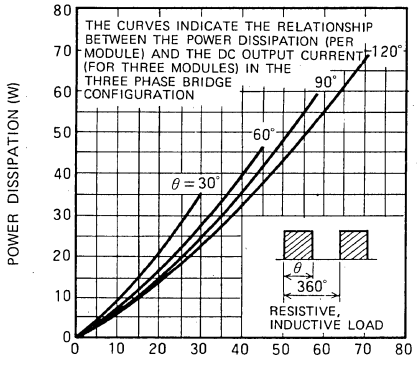
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



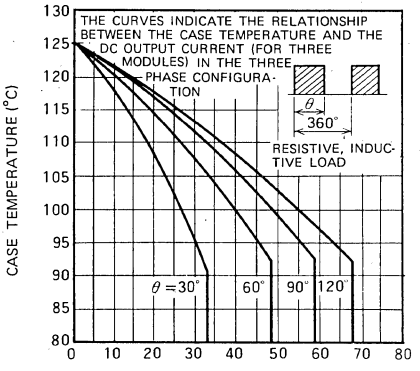
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

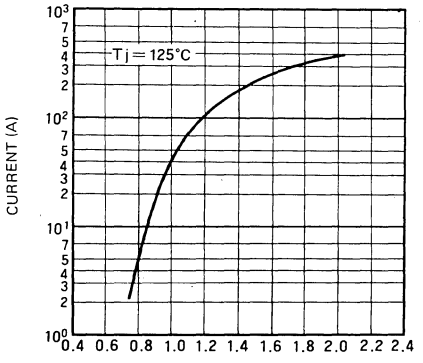


ELECTRICAL CHARACTERISTICS

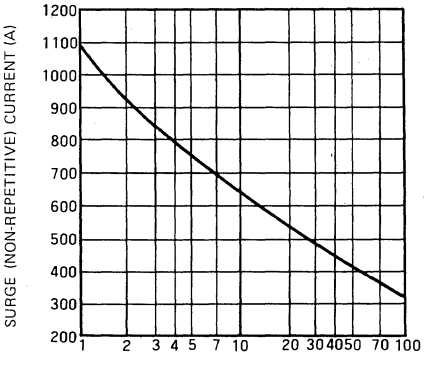
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	10	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	10	mA
V_{TM}, V_{FM}	Voltage drop	T_j=125℃, I_{TM}=I_{FM}=165A, instantaneous value	—	—	1.35	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.50	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

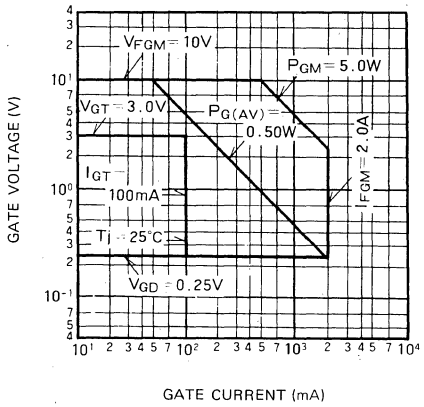
MAXIMUM FORWARD CHARACTERISTICS



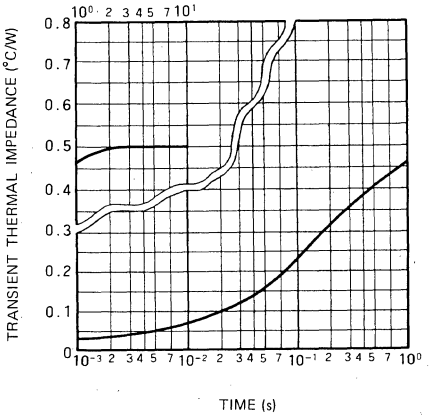
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

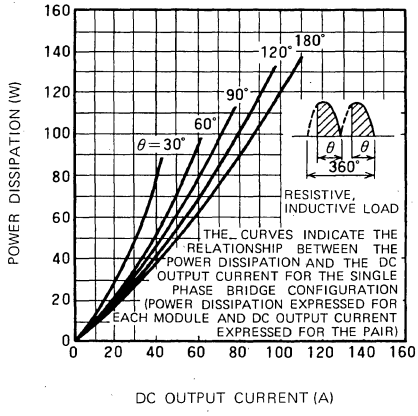


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

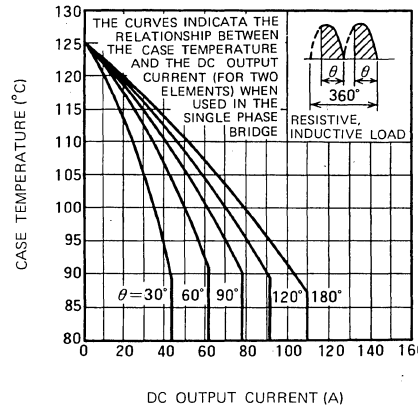


MITSUBISHI ELECTRIC

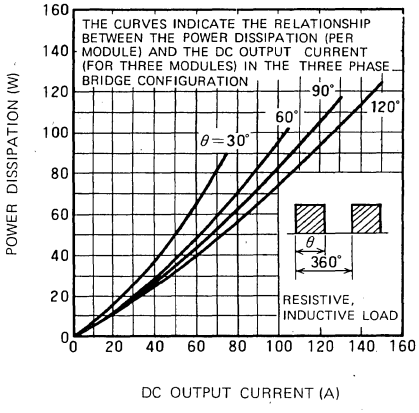
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



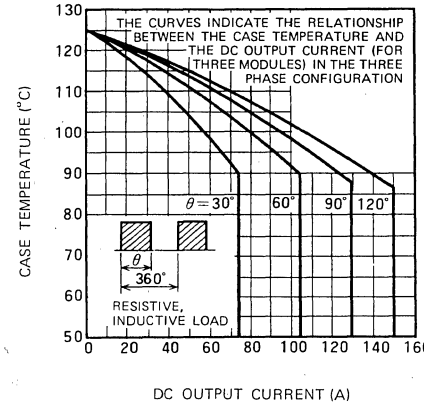
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

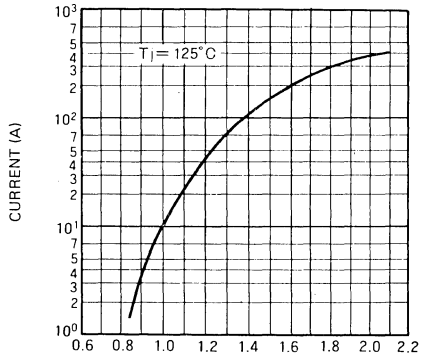


ELECTRICAL CHARACTERISTICS

Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	10	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	10	mA
V_{TM}, V_{FM}	Voltage drop	T_j=125℃, I_{TM}, I_{FM}=165A, instantaneous value	—	—	1.50	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	2.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.50	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

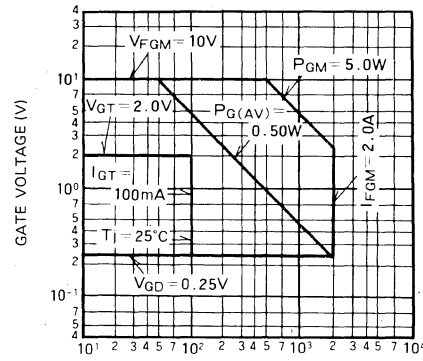
PERFORMANCE CURVES

MAXIMUM FORWARD CHARACTERISTICS

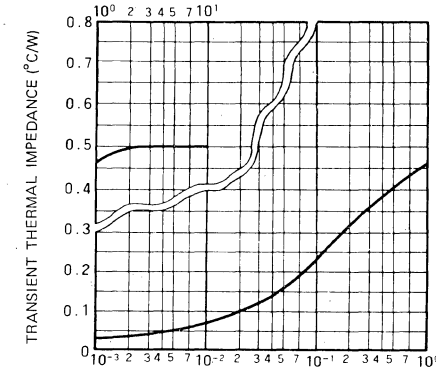


RATED SURGE (NON-REPETITIVE) CURRENT

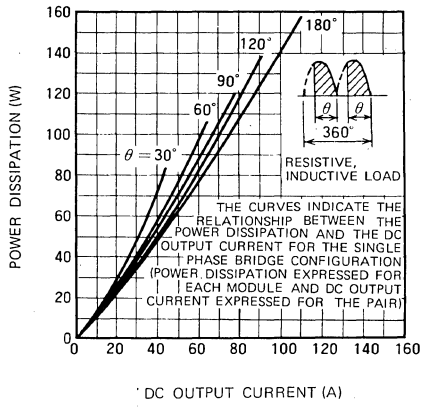
GATE CHARACTERISTICS



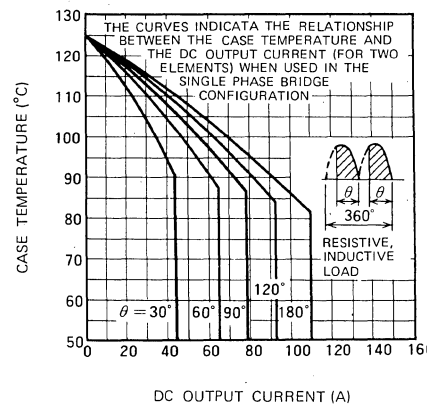
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



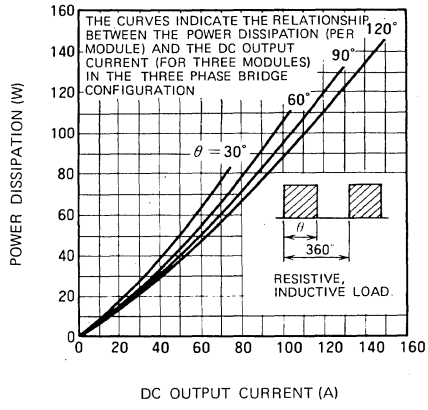
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



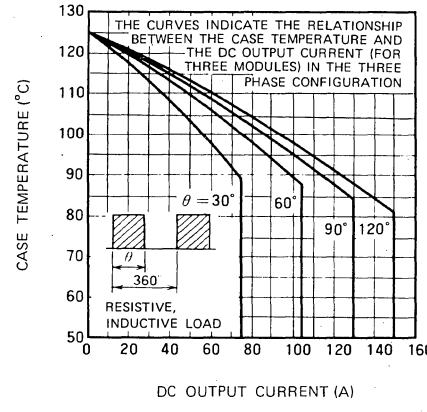
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

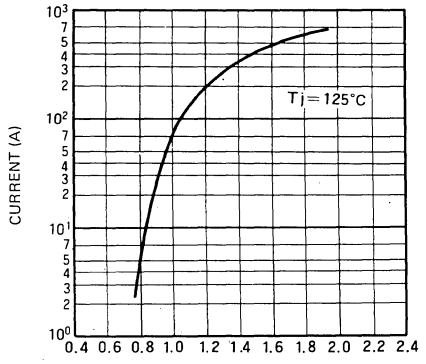


ELECTRICAL CHARACTERISTICS

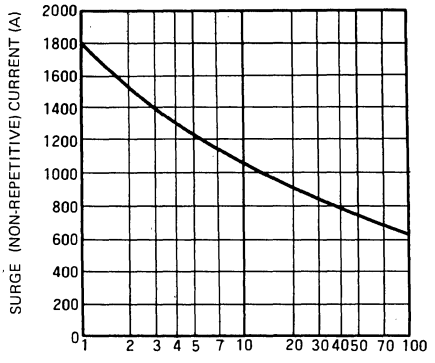
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	15	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	15	mA
V_{TM}, V_{FM}	Voltage drop	T_j=125℃, I_{TM}, I_{FM}=270V, instantaneous value	—	—	1.27	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.30	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

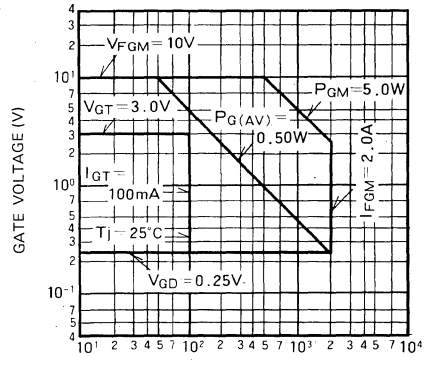
MAXIMUM FORWARD CHARACTERISTICS



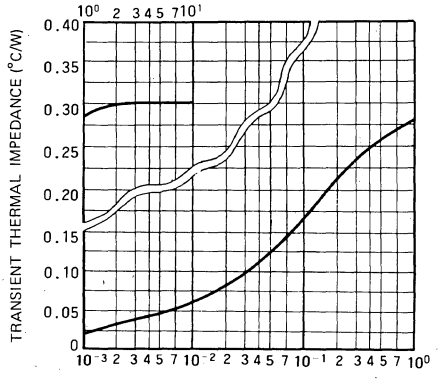
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

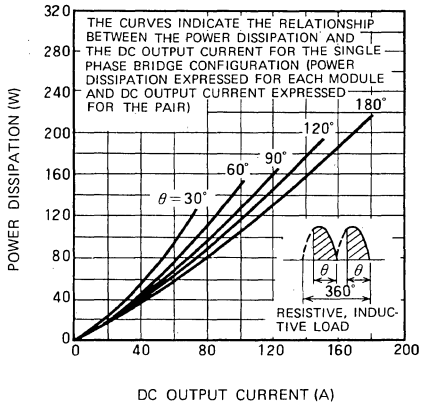


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

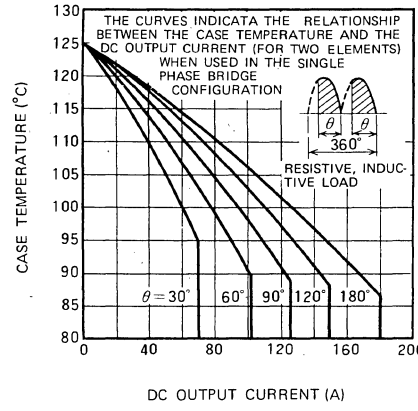


MITSUBISHI ELECTRIC

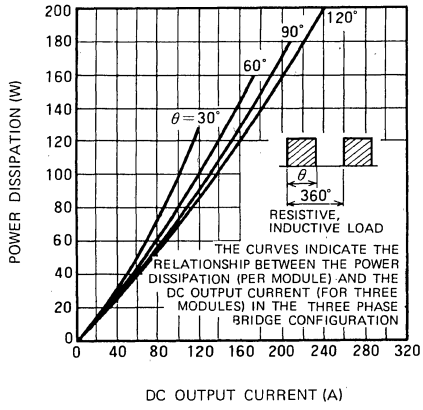
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



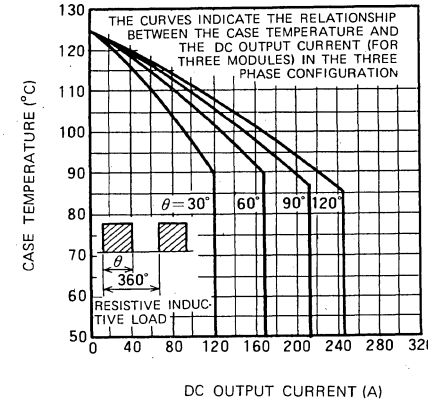
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)



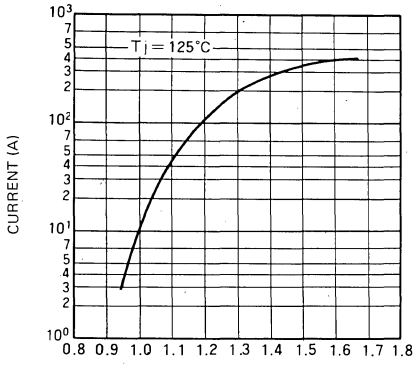
MITSUBISHI ELECTRIC

ELECTRICAL CHARACTERISTICS

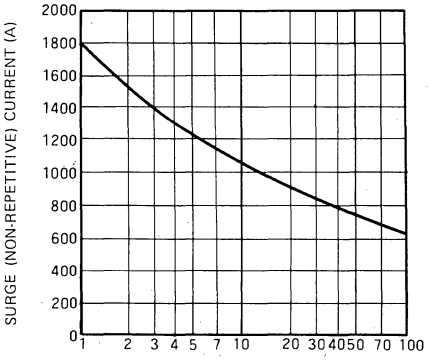
Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	$T_j=125℃$, V_{RRM} applied	—	—	15	mA
I_{DRM}	Repetitive peak off-state current	$T_j=125℃$, V_{DRM} applied	—	—	15	mA
V_{TM}, V_{FM}	Voltage drop	$T_j=125℃$, I_{TM}, $I_{FM}=270A$, instantaneous value	—	—	1.40	V
dv/dt	Critical rate of rise of off-state voltage	$T_j=125℃$, $V_D=2/3V_{DRM}$	500	—	—	V/μs
V_{GT}	Gate trigger voltage	$T_j=25℃$, $V_D=6V$, $R_L=2Ω$	—	—	2.0	V
V_{GD}	Gate non-trigger voltage	$T_j=125℃$, $V_D=1/2V_{DRM}$	0.25	—	—	V
I_{GT}	Gate trigger current	$T_j=25℃$, $V_D=6V$, $R_L=2Ω$	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.30	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.20	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

PERFORMANCE CURVES

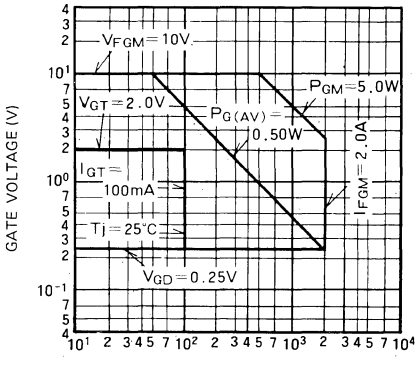
MAXIMUM FORWARD CHARACTERISTICS



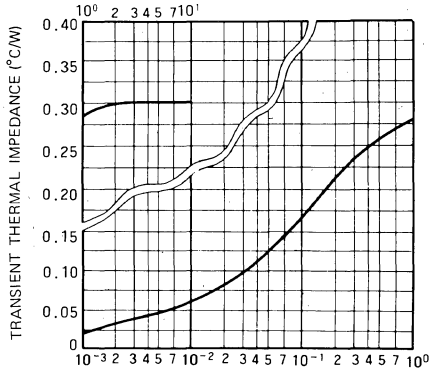
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

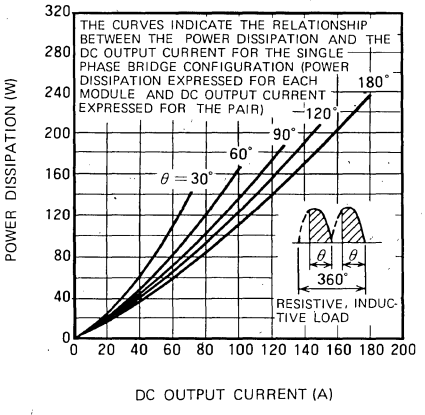


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

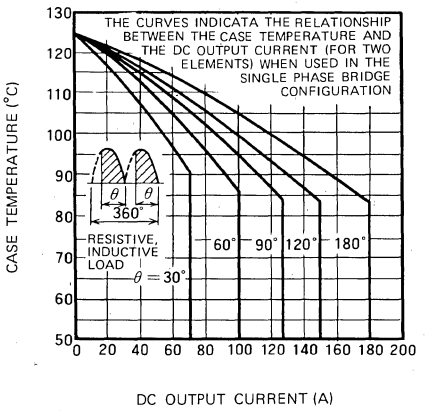


MITSUBISHI ELECTRIC

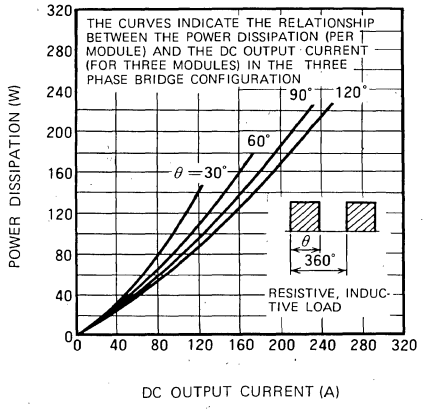
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



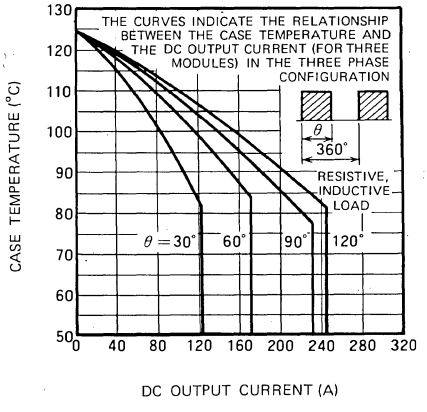
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)



LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

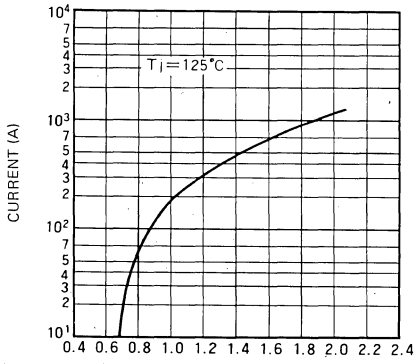


ELECTRICAL CHARACTERISTICS

Symbol	Item	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{RRM}	Repetitive peak reverse current	T_j=125℃, V_{RRM} applied	—	—	30	mA
I_{DRM}	Repetitive peak off-state current	T_j=125℃, V_{DRM} applied	—	—	30	mA
V_{TM}, V_{FM}	Voltage drop	T_j=125℃, I_{FM}=I_{FM}=390A, instantaneous value	—	—	1.30	V
dv/dt	Critical rate of rise of off-state voltage	T_j=125℃, V_D=2/3V_{DRM}	500	—	—	V/μs
V_{GT}	Gate trigger voltage	T_j=25℃, V_D=6V, R_L=2Ω	—	—	3.0	V
V_{GD}	Gate non-trigger voltage	T_j=125℃, V_D=1/2V_{DRM}	0.25	—	—	V
I_{GT}	Gate trigger current	T_j=25℃, V_D=6V, R_L=2Ω	—	—	100	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case	—	—	0.22	℃/W
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, with thermal compound	—	—	0.05	℃/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

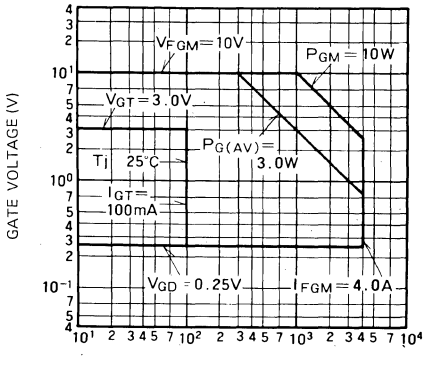
PERFORMANCE CURVES

MAXIMUM FORWARD CHARACTERISTICS

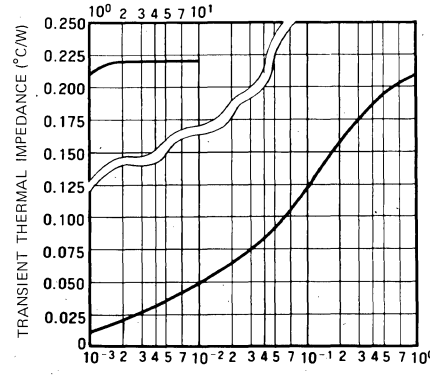


RATED SURGE (NON-REPETITIVE) CURRENT

GATE CHARACTERISTICS

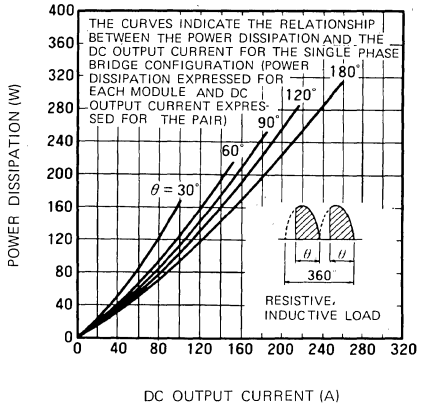


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)

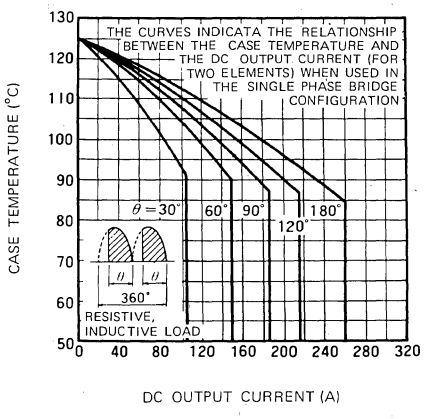


MITSUBISHI ELECTRIC

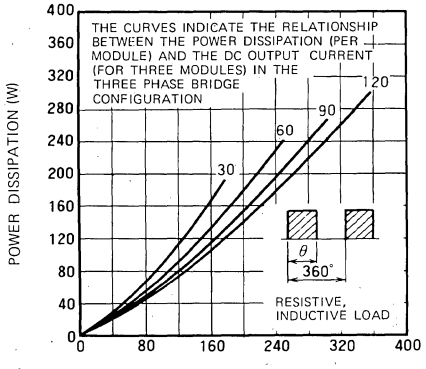
MAXIMUM POWER DISSIPATION (SINGLE PHASE FULLWAVE RECTIFIED)



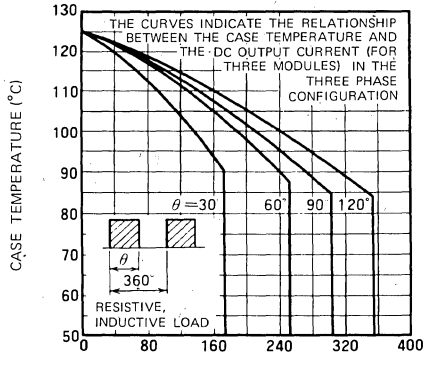
LIMITING VALUE OF THE DC OUTPUT CURRENT (SINGLE PHASE FULLWAVE RECTIFIED)



MAXIMUM POWER DISSIPATION (THREE PHASE FULLWAVE RECTIFIED)

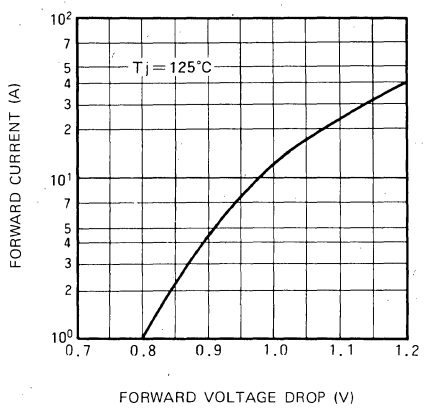


LIMITING VALUE OF THE DC OUTPUT CURRENT (THREE PHASE FULLWAVE RECTIFIED)

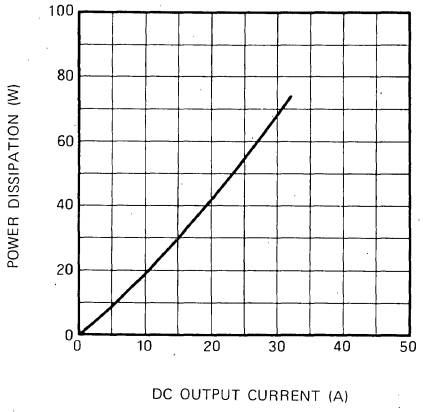


PERFORMANCE CURVES

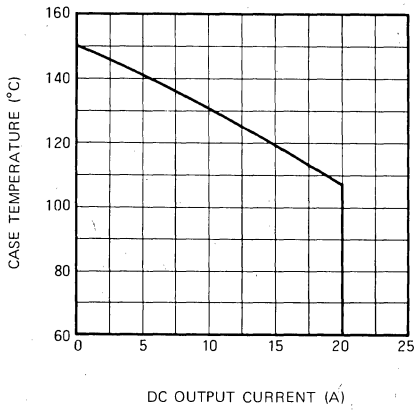
MAXIMUM FORWARD CHARACTERISTICS



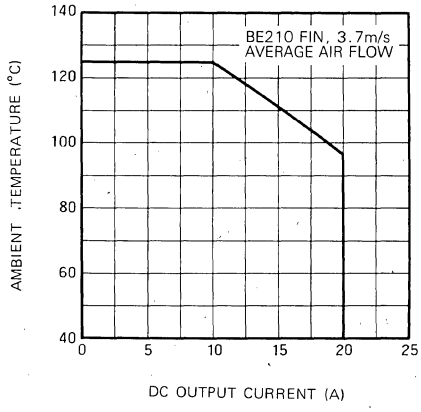
MAXIMUM POWER DISSIPATION



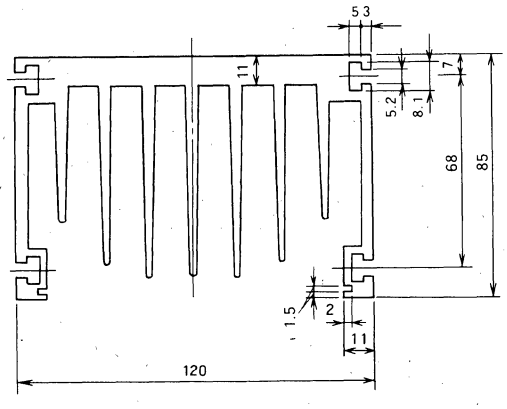
ALLOWABLE CASE TEMPERATURE VS. DC OUTPUT CURRENT



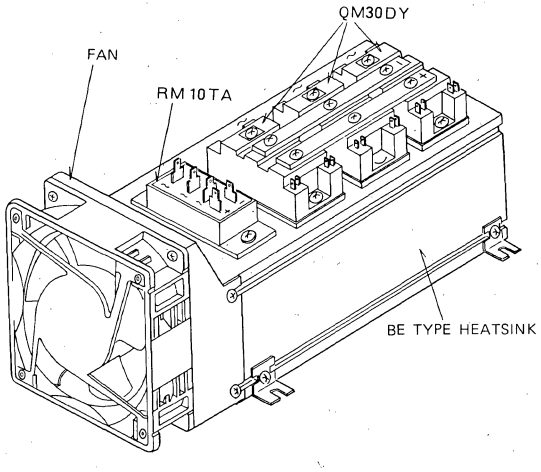
ALLOWABLE AMBIENT TEMPERATURE VS. DC OUTPUT CURRENT



BE TYPE HEATSINK (dimensions in mm)



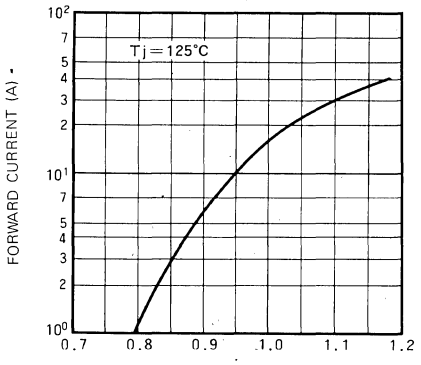
POWER MODULE MOUNTING EXAMPLE



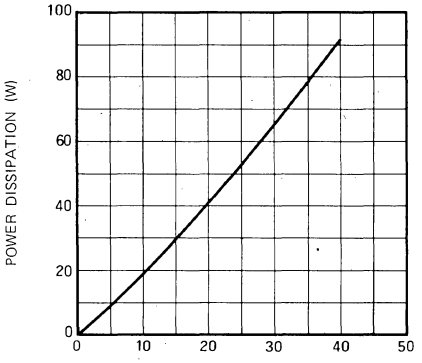
MITSUBISHI ELECTRIC

PERFORMANCE CURVES

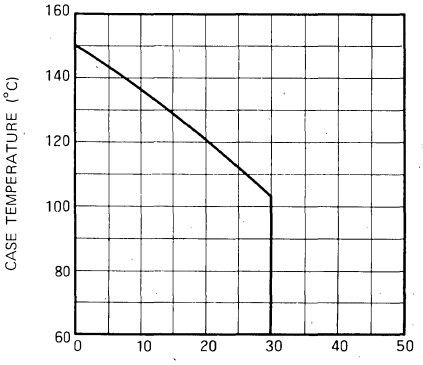
MAXIMUM FORWARD CHARACTERISTICS



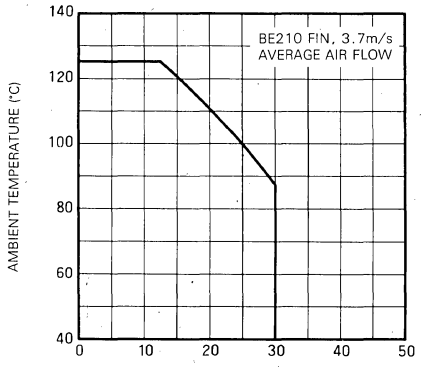
MAXIMUM POWER DISSIPATION



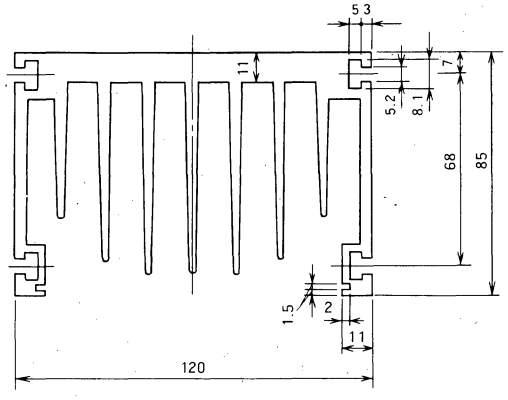
ALLOWABLE CASE TEMPERATURE VS. DC OUTPUT CURRENT



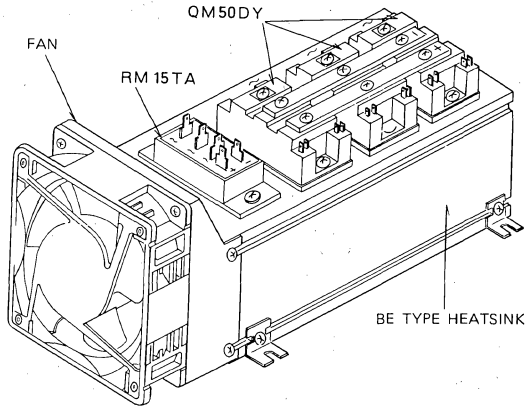
ALLOWABLE AMBIENT TEMPERATURE VS. DC OUTPUT CURRENT



BE TYPE HEATSINK (dimensions in mm)



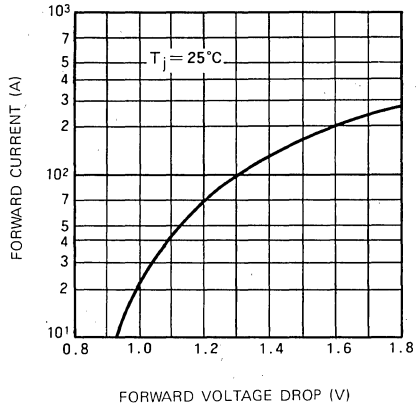
POWER MODULE MOUNTING EXAMPLE



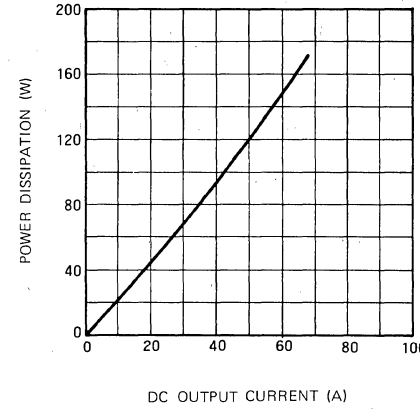
MITSUBISHI ELECTRIC

PERFORMANCE CURVES

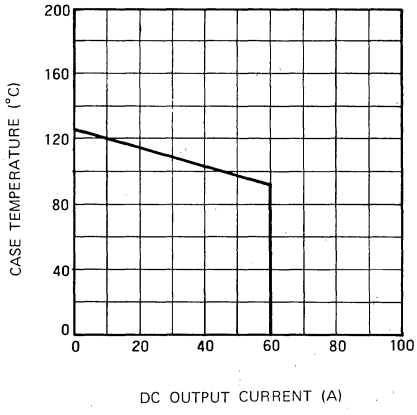
MAXIMUM FORWARD CHARACTERISTICS



MAXIMUM POWER DISSIPATION



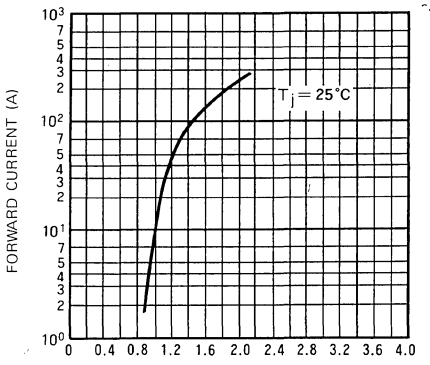
ALLOWABLE CASE TEMPERATURE VS. DC OUTPUT CURRENT



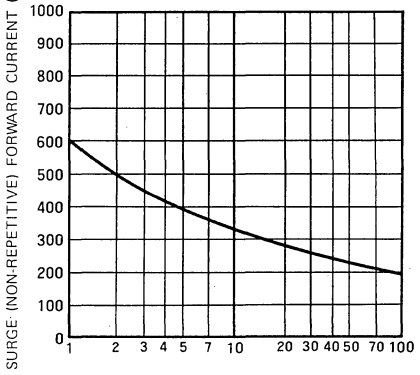
MITSUBISHI ELECTRIC

PERFORMANCE CURVES

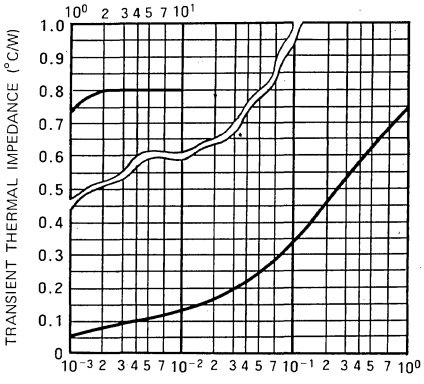
MAXIMUM FORWARD CHARACTERISTICS



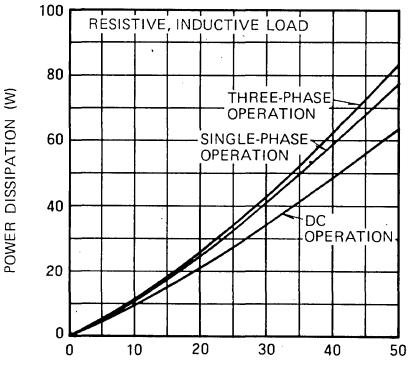
MAXIMUM ALLOWABLE PEAK SURGE (NON-REPETITIVE) CURRENT



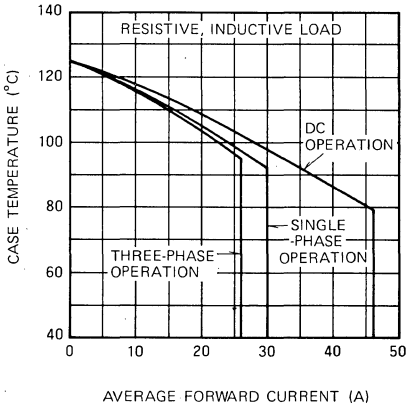
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



MAXIMUM POWER DISSIPATION



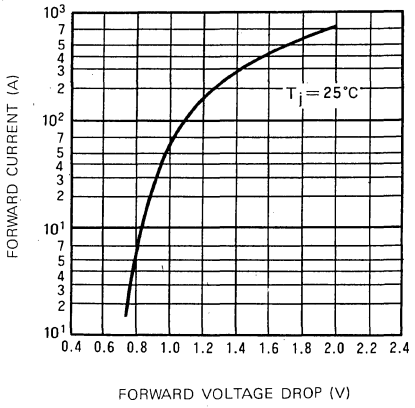
ALLOWABLE CASE TEMPERATURE VS. AVERAGE FORWARD CURRENT



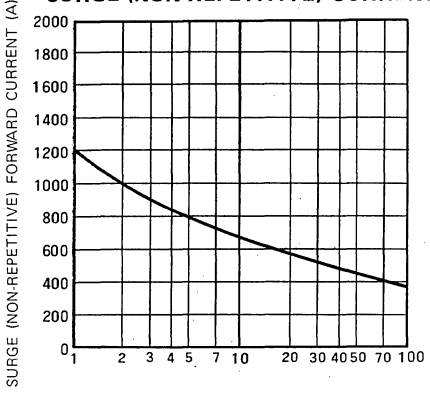
MITSUBISHI ELECTRIC

PERFORMANCE CURVES

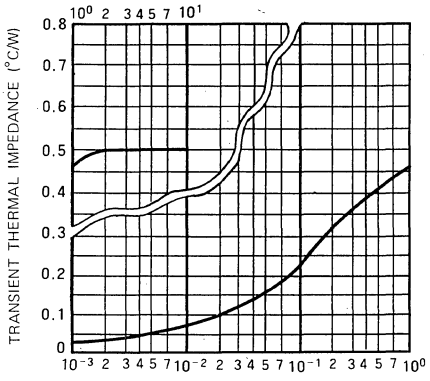
MAXIMUM FORWARD CHARACTERISTICS



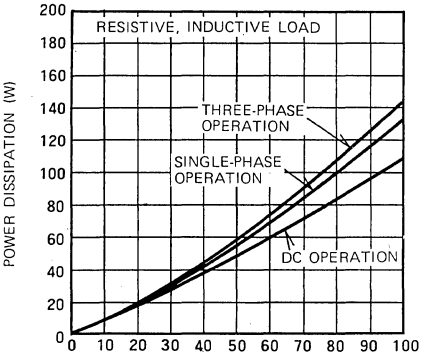
MAXIMUM ALLOWABLE PEAK SURGE (NON-REPETITIVE) CURRENT



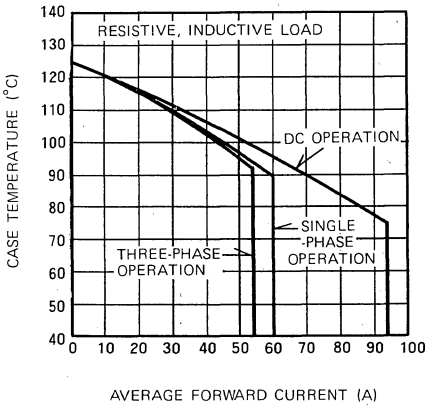
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



MAXIMUM POWER DISSIPATION



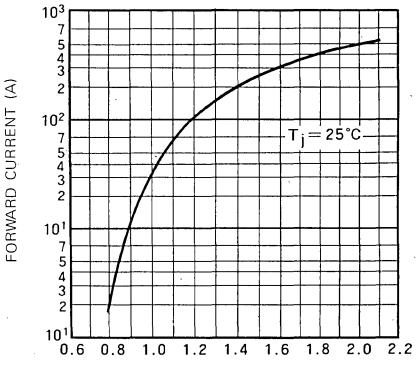
ALLOWABLE CASE TEMPERATURE VS. AVERAGE FORWARD CURRENT



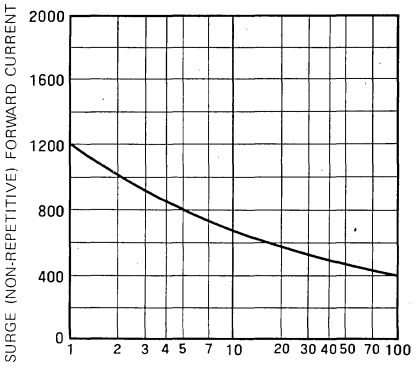
MITSUBISHI ELECTRIC

PERFORMANCE CURVES

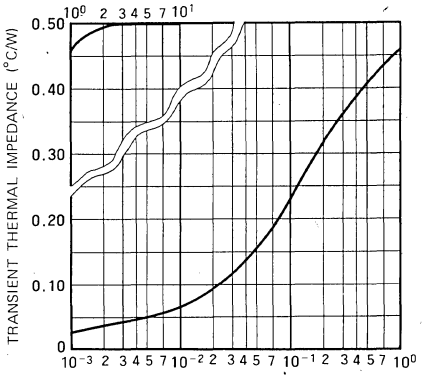
MAXIMUM FORWARD CHARACTERISTICS



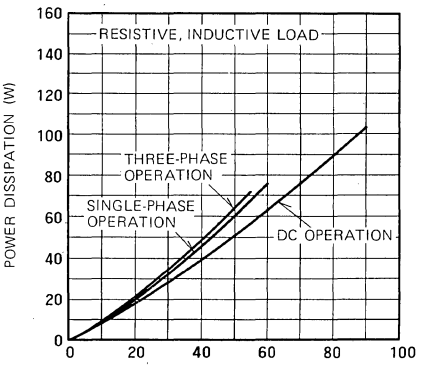
MAXIMUM ALLOWABLE PEAK SURGE (NON-REPETITIVE) CURRENT



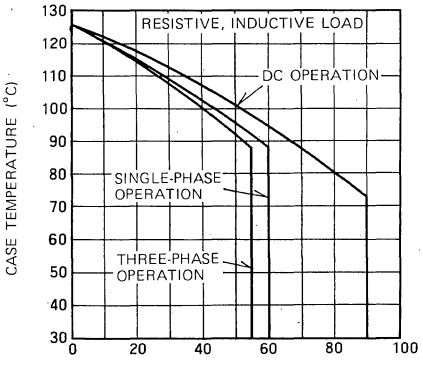
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



MAXIMUM POWER DISSIPATION

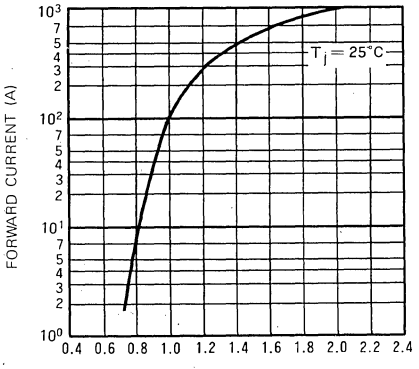


ALLOWABLE CASE TEMPERATURE VS. AVERAGE FORWARD CURRENT

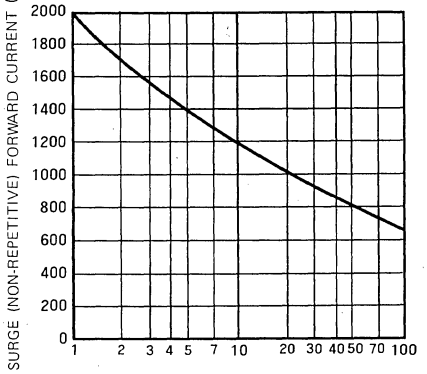


PERFORMANCE CURVES

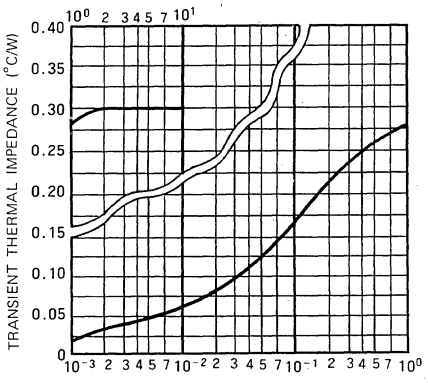
MAXIMUM FORWARD CHARACTERISTICS



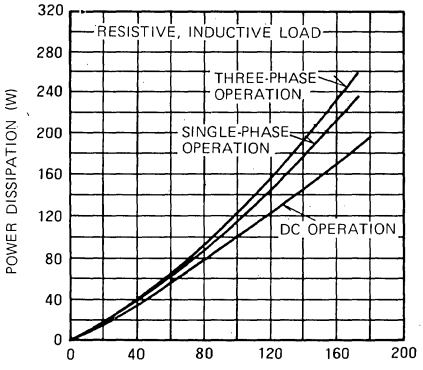
MAXIMUM ALLOWABLE PEAK SURGE (NON-REPETITIVE) CURRENT



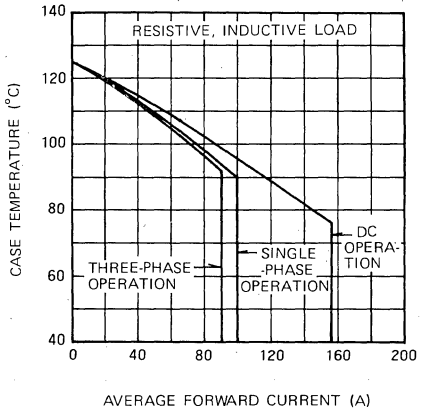
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



MAXIMUM POWER DISSIPATION

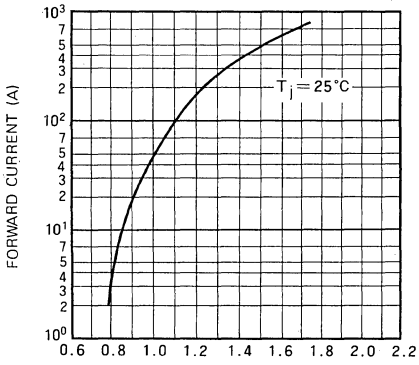


ALLOWABLE CASE TEMPERATURE VS. AVERAGE FORWARD CURRENT

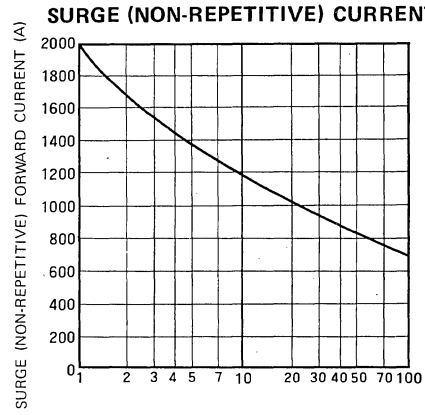


PERFORMANCE CURVES

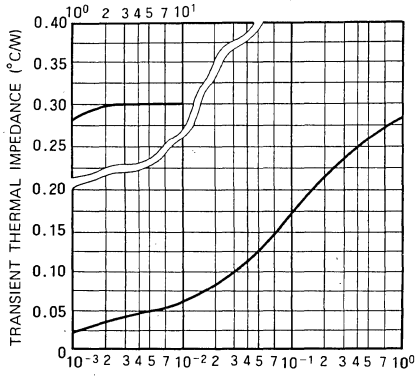
MAXIMUM FORWARD CHARACTERISTICS



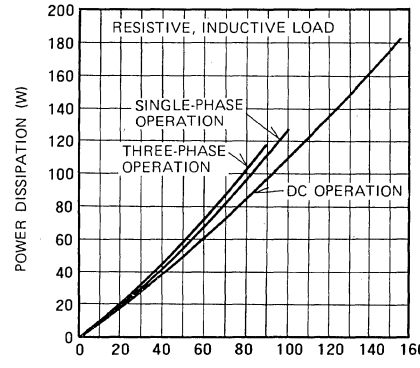
MAXIMUM ALLOWABLE PEAK SURGE (NON-REPETITIVE) CURRENT



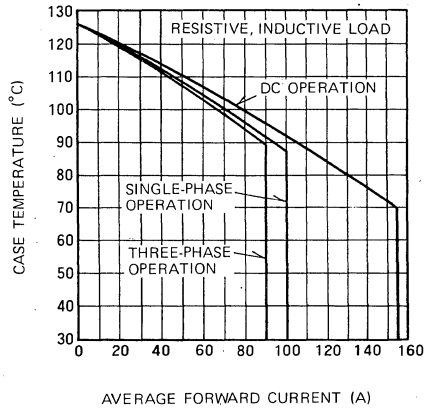
MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



MAXIMUM POWER DISSIPATION



ALLOWABLE CASE TEMPERATURE VS. AVERAGE FORWARD CURRENT



MITSUBISHI ELECTRIC

HYBRID IC FOR DRIVING TRANSISTOR MODULES

MAXIMUM RATINGS (T_a = −20 ~ +70°C, unless otherwise specified)

Symbol	Items	Conditions	Ratings	Unit
V_{CC}	Supply voltage		14	V
V_{EE}			−5	V
V_I	INPUT voltage		−1 ~ +5	V
I_{OH}	OUTPUT current	t_W=10μs, f=2kHz	−1	A
I_{OLP}		10μs, 2kHz	3 *	A
V_{ISO}	Isolation voltage	60Hz, Ta=25℃	1500 **	Vrms
T_S	Operating Temperature	Substrate	−20 ~ +100	℃
T_a		Ambient	−20 ~ +70	℃

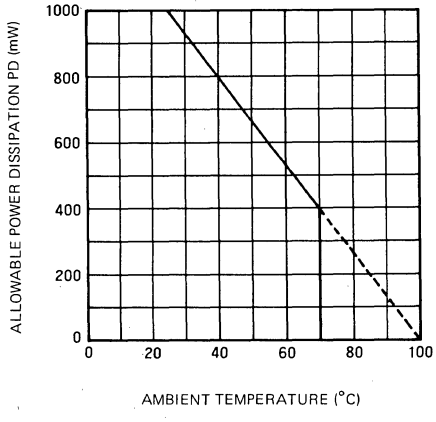
* : Pulse width 10μs, f=2kHz.
** : Sinusoidal wave form 60Hz, 1 minute, T_a=25°C

ELECTRICAL CHARACTERISTICS (T_a = 25°C, V_{CC} = 10V, V_{EE} = 3V, unless otherwise specified)

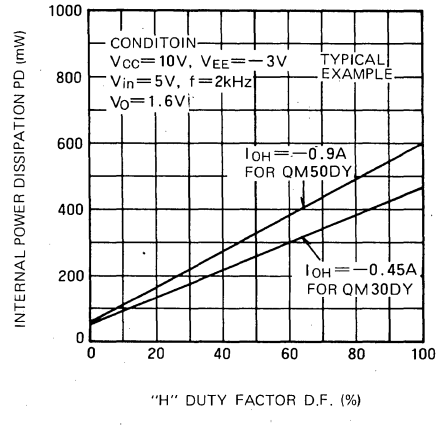
Symbol	Items	Test conditions	Characteristics			Unit
			Min	Typ	Max	
I_{IH}	"H" input current	V_I=5V	—	10	—	mA
I_{OH}	"H" output current	V_O=1.6V, Rext=9Ω	—	−0.9	—	A
I_{OLP}	"L" output peak current	R_2=1Ω, Cext=10μF	—	2	—	A
P_d	Internal power dissipation	I_{OH}=−0.9A, I_{OLP}=2A, f=2kHz, D.F.=50%	—	0.33	—	W
t_{PLH}	"L-H" propagation delay time	V_I=0→4V, T_S=100℃	—	—	10	μs
t_r	"L-H" rise time	V_I=0→4V, T_S=100℃	—	—	1	μs
t_{PHL}	"H-L" propagation delay time	V_I=5→0V, T_S=100℃	—	—	15	μs
t_f	"H-L" fall time	V_I=5→0V, T_S=100℃	—	—	3	μs

PERFORMANCE CURVES

ALLOWABLE POWER DISSIPATION VS. TA MAXIMUM RATING

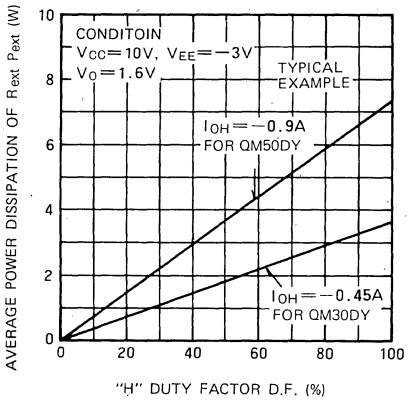


INTERNAL POWER DISSIPATION VS. DUTY FACTOR

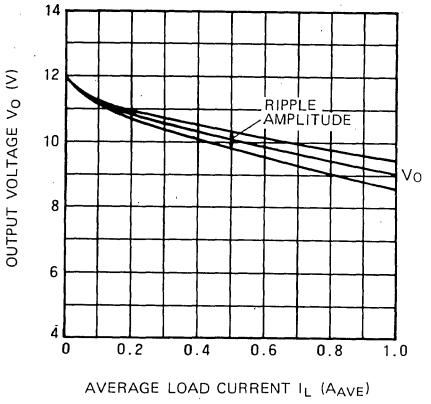


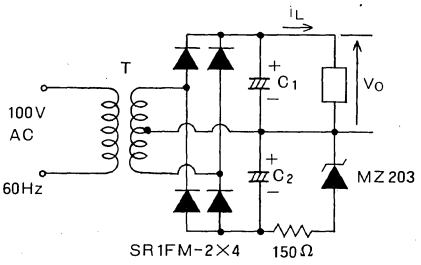
HYBRID IC FOR DRIVING TRANSISTOR MODULES

POWER DISSIPATION OF R_{ext} VS. DUTY FACTOR



OUTPUT CHARACTERISTIC OF FULL WAVE RECTIFYING CIRCUIT WITH CENTER-TAPPED TRANSFORMER (FOR REFERENCE)





T : 8V, 1A×2 CENTER-TAPPED TRANSFORMER

C_1 : 4700μF, C_2 : 470μF

RECOMMENDED OPERATING CONDITION

When driving QM50DY-H or QM30DY-H,

Symbol	Items	Min	Nom	Max	Unit
V_{CC}	Supply voltage	9	10	11	V
V_{EE}	Supply voltage	−2.5	−3	−4	V
V_{IH}	"H" Input voltage	4	—	5	V
V_{OH}	"H" Output voltage	1.4	1.6	2.1	V
V_{OL}	"L" Input voltage	−2	—	—	V
Rext		—	9Ω, 10W (18Ω 5W)	—	Ω
R_2		—	1(3.3)	—	Ω
R_1		—	150	—	Ω
D_2		—	MZ303	—	—
Cext		10 *	—	—	μF
C_1		—	4700 (3300)	—	μF
C_2		—	470	—	μF
f		—	—	2	kHz

Note : Data shown in ( ) are available for QM30DY-H.

* : The equivalent series resistor ESR of this capacitor decreases the sink current I_{OLP} especially at low temperature.
We found the following capacitors are usable.
for { $T_a \geqslant -20°C$ ..... RU50WV 10 μf min. ELNA CO. LTD.
{ $T_a \geqslant 0°C$ ..... RB-LL50WV 22 μF min.

ADVICE ON PCB PATTERN LAYOUT

(1) The auxiliary resistor Rext and R_1 dissipate large power, so you should be careful not to heat M57215L by radidant heat from these hot devices.

(2) The capacitor Cext should be arranged close by pin 3 and pin 4 to avoid false operation, which may be induced by abrupt change of the load impedance.

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POWER MODULE

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