

MITSUBISHI THYRISTOR MODULES

TM20RA-M,-H

MEDIUM POWER GENERAL USE
INSULATED TYPE

TM20RA-M,-H



- **IT (AV)** Average on-state current **20A**
- **IF (AV)** Average forward current **20A**
- **VRRM** Repetitive peak reverse voltage
..... **400/800V**
- **VDRM** Repetitive peak off-state voltage
..... **400/800V**
- **MIX DOUBLE ARMS**
- **Insulated Type**
- **UL Recognized**

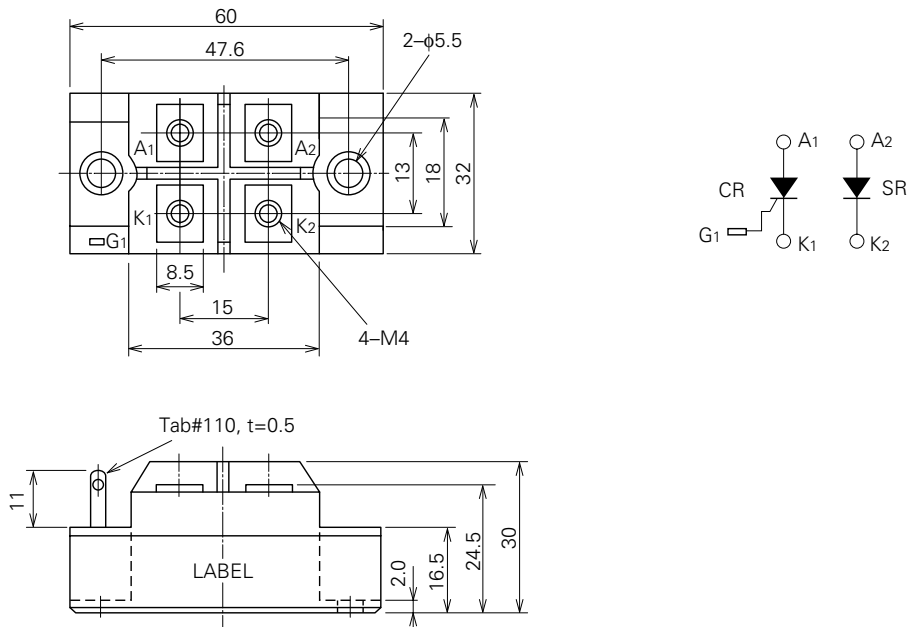
Yellow Card No. E80276 (N)
File No. E80271

APPLICATION

DC motor control, NC equipment, Inverters, Servo drives, contactless switches,
electric furnace temperature control, light dimmers

OUTLINE DRAWING & CIRCUIT DIAGRAM

Dimensions in mm



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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Voltage class		Unit
		M	H	
VRRM	Repetitive peak reverse voltage	400	800	V
VRSM	Non-repetitive peak reverse voltage	480	960	V
VR (DC)	DC reverse voltage	320	640	V
VDRM	Repetitive peak off-state voltage	400	800	V
VDSM	Non-repetitive peak off-state voltage	480	960	V
VD (DC)	DC off-state voltage	320	640	V

Symbol	Parameter	Conditions	Ratings	Unit
I_T (RMS), I_F (RMS)	RMS current		30	A
I_T (AV), I_F (AV)	Average current	Single-phase, half-wave 180° conduction, $T_C=87^\circ\text{C}$	20	A
I_{TSM} , I_{FSM}	Surge (non-repetitive) current	One half cycle at 60Hz, peak value	400	A
I^2t	I^2t for fusing	Value for one cycle of surge current	6.7×10^2	A^2s
di/dt	Critical rate of rise of on-state current	$V_D=1/2V_{DRM}$, $I_G=0.5\text{A}$, $T_j=125^\circ\text{C}$	100	$\text{A}/\mu\text{s}$
PGM	Peak gate power dissipation		5.0	W
PG (AV)	Average gate power dissipation		0.5	W
VFGM	Peak gate forward voltage		10	V
VRGM	Peak gate reverse voltage		5.0	V
IFGM	Peak gate forward current		2.0	A
T_j	Junction temperature		-40~125	$^\circ\text{C}$
T_{stg}	Storage temperature		-40~125	$^\circ\text{C}$
V_{iso}	Isolation voltage	Charged part to case	2500	V
—	Mounting torque	Main terminal screw M4	0.98~1.47	N·m
			10~15	kg·cm
		Mounting screw M5	1.47~2.45	N·m
			15~25	kg·cm
—	Weight	Typical value	80	g

ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Test conditions	Limits			Unit
			Min.	Typ.	Max.	
IRRM	Repetitive peak reverse current	$T_j=125^\circ\text{C}$, V_{RRM} applied	—	—	4.0	mA
IDRM	Repetitive peak off-state current	$T_j=125^\circ\text{C}$, V_{DRM} applied	—	—	4.0	mA
V_{TM} , V_{FM}	Forward voltage	$T_j=125^\circ\text{C}$, $I_{TM}=I_{FM}=60\text{A}$, instantaneous meas.	—	—	1.8	V
dv/dt	Critical rate of rise of off-state voltage	$T_j=125^\circ\text{C}$, $V_D=2/3V_{DRM}$	500	—	—	$\text{V}/\mu\text{s}$
VGT	Gate trigger voltage	$T_j=25^\circ\text{C}$, $V_D=6\text{V}$, $R_L=2\Omega$	—	—	3.0	V
VGD	Gate non-trigger voltage	$T_j=125^\circ\text{C}$, $V_D=1/2V_{DRM}$	0.25	—	—	V
IGT	Gate trigger current	$T_j=25^\circ\text{C}$, $V_D=6\text{V}$, $R_L=2\Omega$	10	—	50	mA
$R_{th(j-c)}$	Thermal resistance	Junction to case (per 1/2 module)	—	—	1.0	$^\circ\text{C}/\text{W}$
$R_{th(c-f)}$	Contact thermal resistance	Case to fin, conductive grease applied (per 1/2 module)	—	—	0.25	$^\circ\text{C}/\text{W}$
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	$\text{M}\Omega$

Note: Items of the above table applies to the Thyristor part and the Diode part as circled in the following tables.

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MAXIMUM RATINGS

Item	VRRM	VRSM	VR (DC)	VDRM	VD SM	VD (DC)	IT (RMS)	IT (AV)	ITSM	i^2t	di/dt
							IF (RMS)	IF (AV)	IFSM		
Thyristor	○	○	○	○	○	○	○	○	○	○	○
Diode	○	○	○	—	—	—	○	○	○	○	—

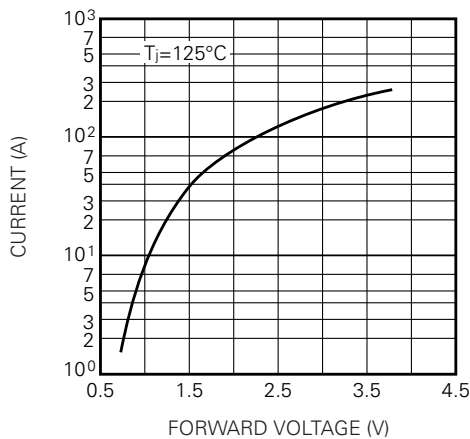
Item	PGM	PG (AV)	VFGM	IFGM	T _j	T _{stg}
Thyristor	○	○	○	○	○	○
Diode	—	—	—	—	○	○

ELECTRICAL CHARACTERISTICS

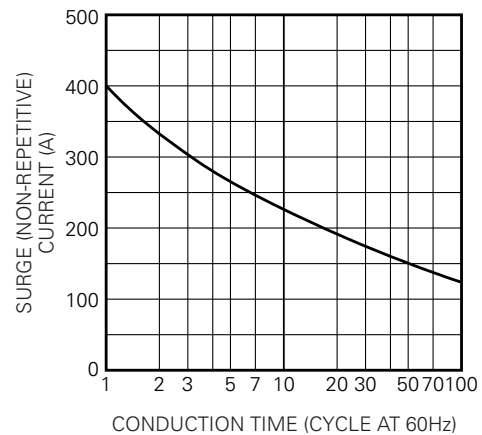
Item	IRRM	IDRM	VTM	dv/dt	VGT	VGD	IGT	R _{th (j-c)}	R _{th (c-f)}
			VFM						
Thyristor	○	○	○	○	○	○	○	○	○
Diode	○	—	○	—	—	—	—	○	○

PERFORMANCE CURVES

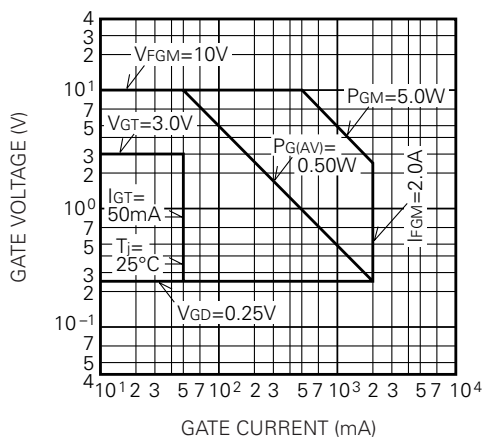
MAXIMUM FORWARD CHARACTERISTIC



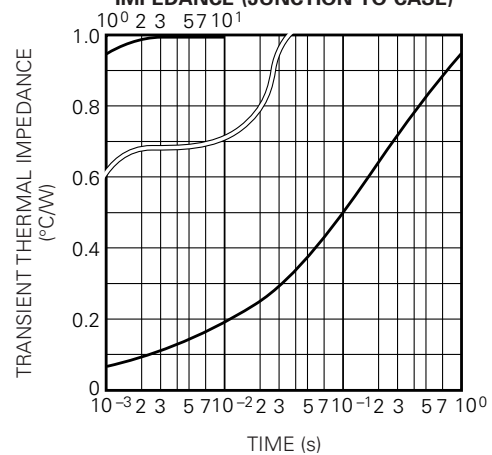
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

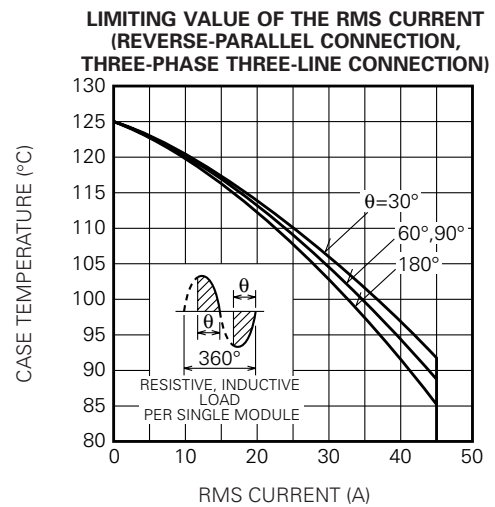
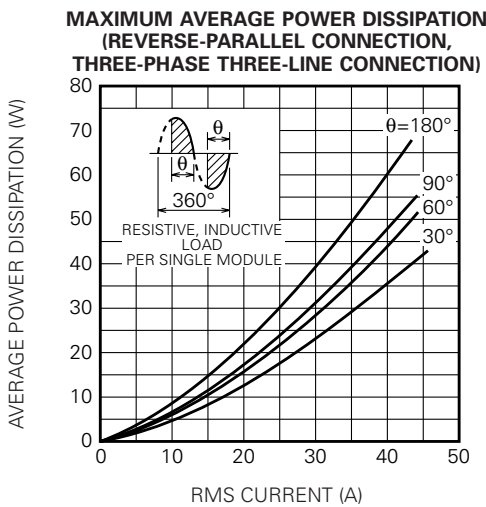
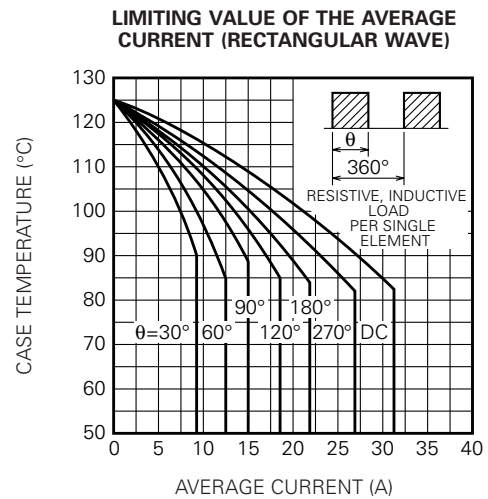
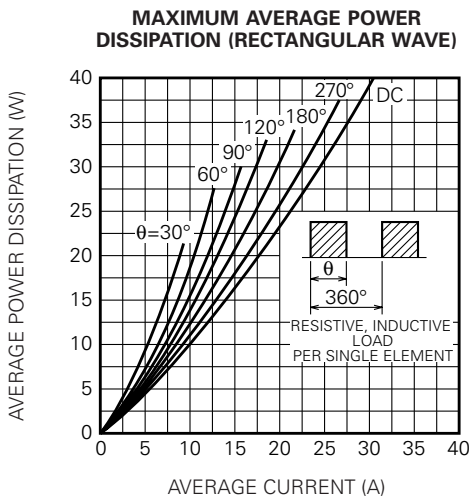
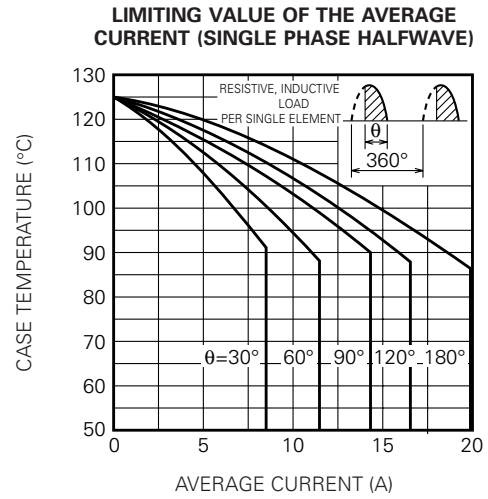
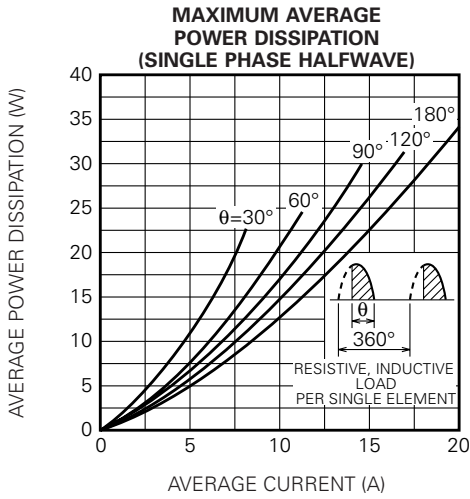


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



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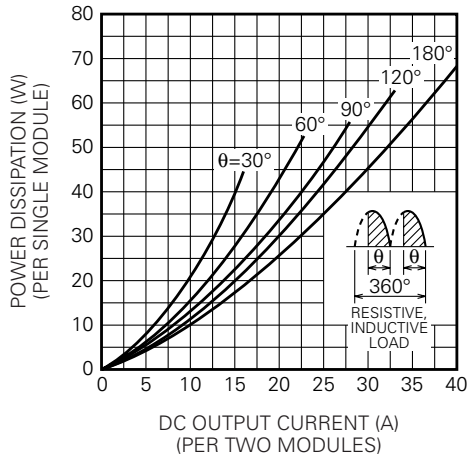
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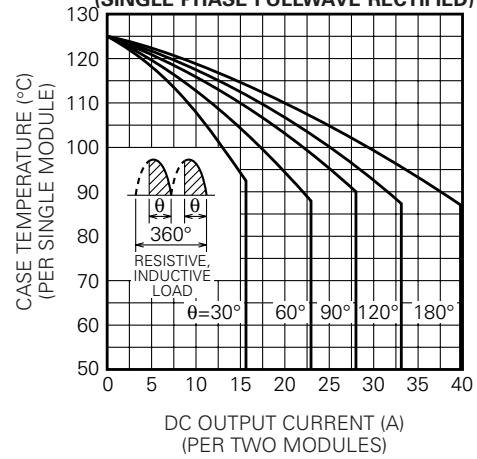
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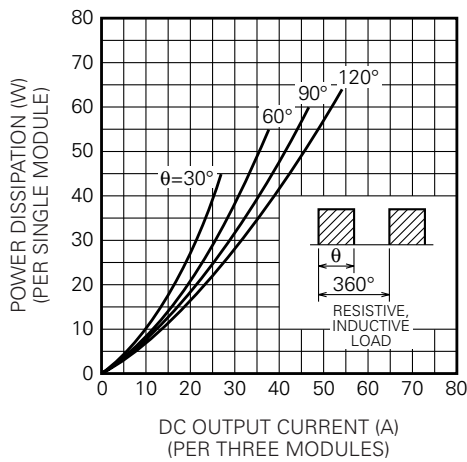
**MAXIMUM POWER DISSIPATION
(SINGLE PHASE FULLWAVE RECTIFIED)**



**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)**

