

# 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)

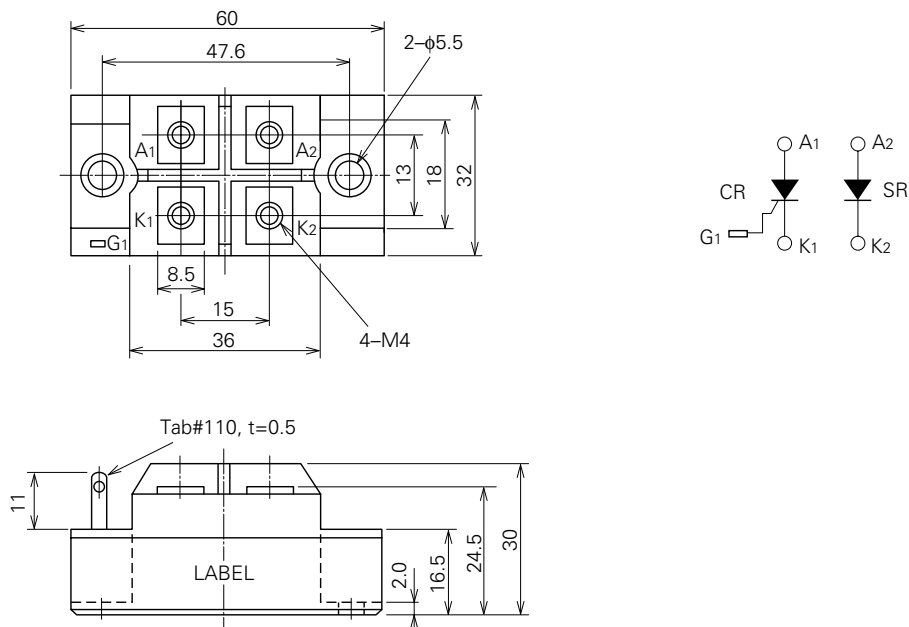
File No. E80271

## 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
IT (RMS), IF (RMS)	RMS current		30	A
IT (AV), IF (AV)	Average current	Single-phase, half-wave 180° conduction, Tc=87°C	20	A
ITSM, IFSM	Surge (non-repetitive) current	One half cycle at 60Hz, peak value	400	A
I <sup>2</sup> t	I <sup>2</sup> t for fusing	Value for one cycle of surge current	6.7 × 10 <sup>2</sup>	A <sup>2</sup> s
di/dt	Critical rate of rise of on-state current	V <sub>D</sub> =1/2V <sub>DRM</sub> , I <sub>G</sub> =0.5A, T <sub>j</sub> =125°C	100	A/μs
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 <sub>j</sub>	Junction temperature		−40~125	°C
T <sub>stg</sub>	Storage temperature		−40~125	°C
V <sub>iso</sub>	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 <sub>j</sub> =125°C, VRRM applied	—	—	4.0	mA
IDRM	Repetitive peak off-state current	T <sub>j</sub> =125°C, VDRM applied	—	—	4.0	mA
VTM, VFM	Forward voltage	T <sub>j</sub> =125°C, I <sub>TM</sub> =I <sub>FM</sub> =60A, instantaneous meas.	—	—	1.8	V
dv/dt	Critical rate of rise of off-state voltage	T <sub>j</sub> =125°C, V <sub>D</sub> =2/3V <sub>DRM</sub>	500	—	—	V/μs
VGT	Gate trigger voltage	T <sub>j</sub> =25°C, V <sub>D</sub> =6V, R <sub>L</sub> =2Ω	—	—	3.0	V
VGD	Gate non-trigger voltage	T <sub>j</sub> =125°C, V <sub>D</sub> =1/2V <sub>DRM</sub>	0.25	—	—	V
IGT	Gate trigger current	T <sub>j</sub> =25°C, V <sub>D</sub> =6V, R <sub>L</sub> =2Ω	10	—	50	mA
R <sub>th</sub> (j-c)	Thermal resistance	Junction to case (per 1/2 module)	—	—	1.0	°C/W
R <sub>th</sub> (c-f)	Contact thermal resistance	Case to fin, conductive grease applied (per 1/2 module)	—	—	0.25	°C/W
—	Insulation resistance	Measured with a 500V megohmmeter between main terminal and case	10	—	—	MΩ

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	VDSM	VD (DC)	IT (RMS)	IT (AV)	ITSM	$i^2t$	di/dt
							IF (RMS)	IF (AV)	IFSM		
Thyristor	○	○	○	○	○	○	○	○	○	○	○
Diode	○	○	○	—	—	—	○	○	○	○	—

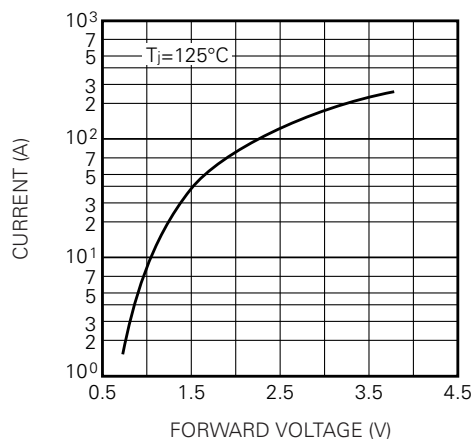
Item	PGM	PG (AV)	VFGM	IFGM	T <sub>j</sub>	T <sub>stg</sub>
Thyristor	○	○	○	○	○	○
Diode	—	—	—	—	○	○

## ELECTRICAL CHARACTERISTICS

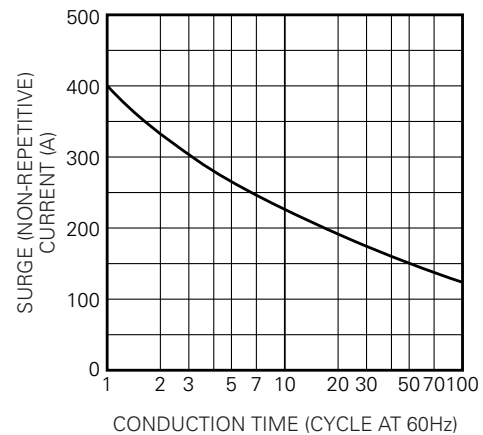
Item	IRRM	IDRM	VTM	dv/dt	VGT	VGD	IGT	R <sub>th</sub> (j-c)	R <sub>th</sub> (c-f)
			VFM						
Thyristor	○	○	○	○	○	○	○	○	○
Diode	○	—	○	—	—	—	—	○	○

## PERFORMANCE CURVES

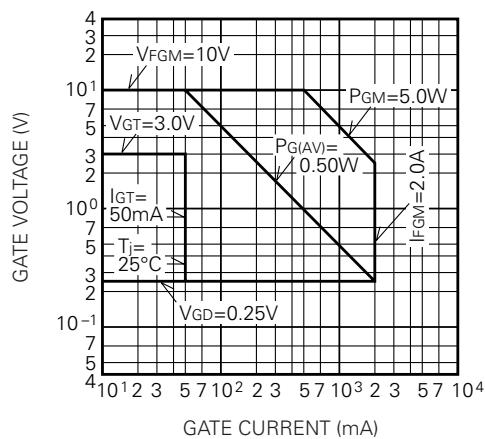
MAXIMUM FORWARD CHARACTERISTIC



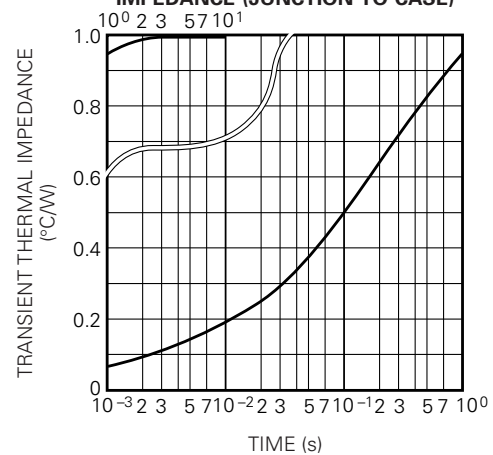
RATED SURGE (NON-REPETITIVE) CURRENT



GATE CHARACTERISTICS

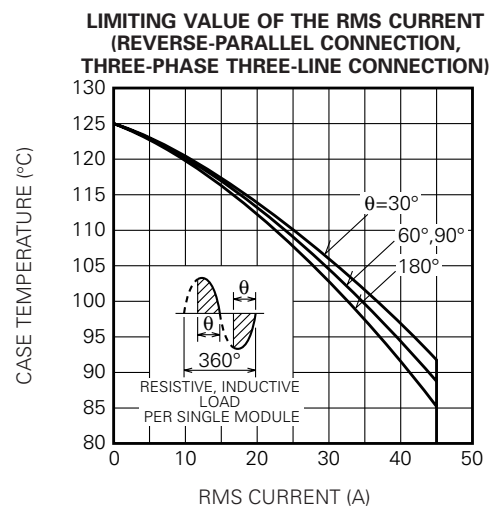
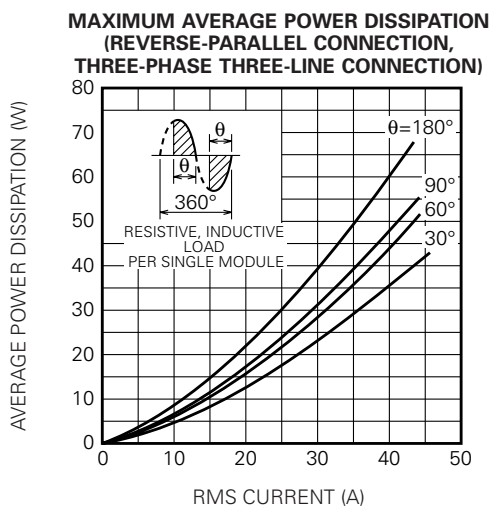
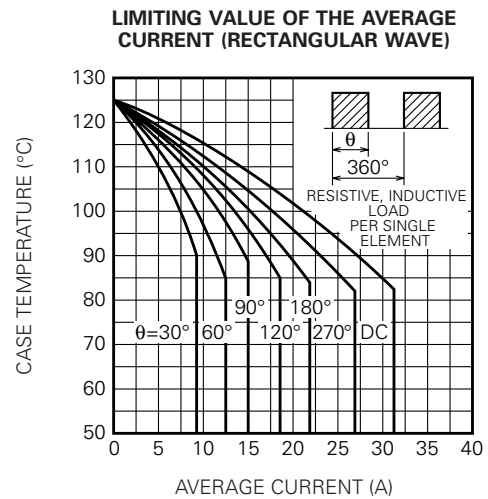
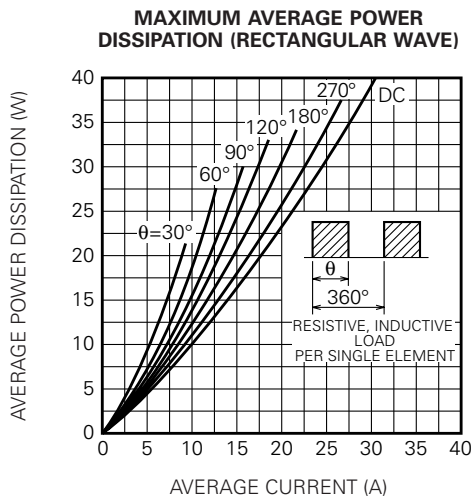
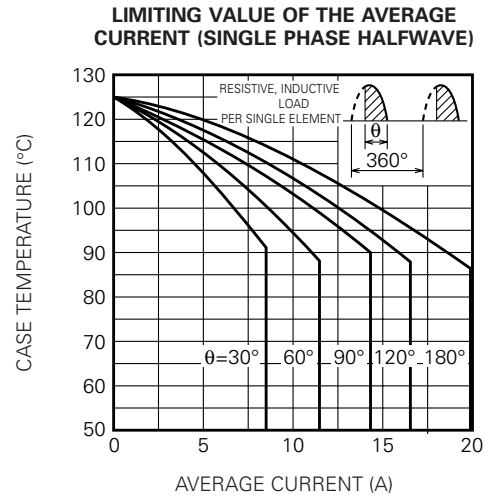
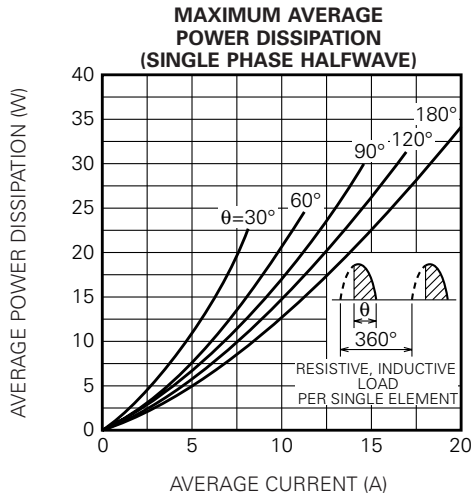


MAXIMUM TRANSIENT THERMAL IMPEDANCE (JUNCTION TO CASE)



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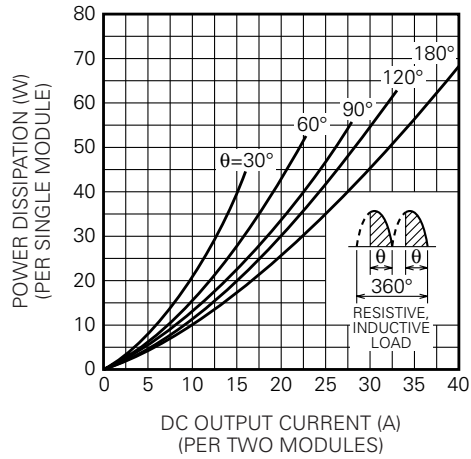
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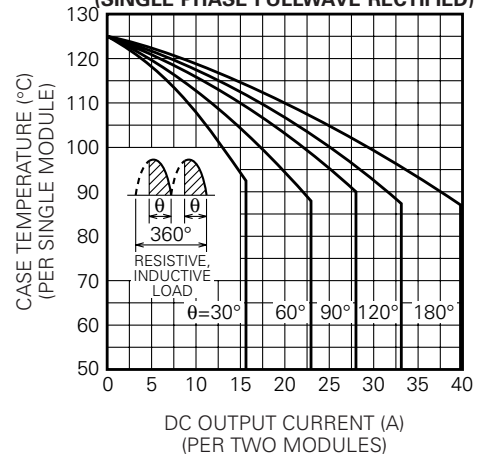
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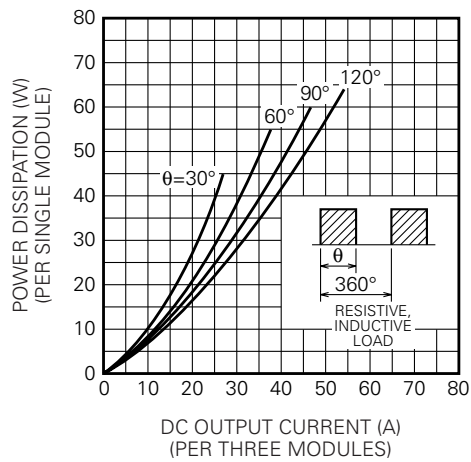
**MAXIMUM POWER DISSIPATION  
(SINGLE PHASE FULLWAVE RECTIFIED)**



**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)**

