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Bulletin I2405 rev. B 04/06

International
IOR Rectifier

10RIA SERIES

MEDIUM POWER THYRISTORS **Stud Version**

10A

Features

- Improved glass passivation for high reliability and exceptional stability at high temperature
- High di/dt and dv/dt capabilities
- Standard package
- Low thermal resistance
- Metric threads version available
- Types up to 1200V V_{DRM}/ V_{RRM}
- RoHS Compliant

Typical Applications

- Medium power switching
- Phase control applications
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements

Major Ratings and Characteristics

Parameters		10RIA	Unit
$I_{T(AV)}$		10	A
	@ T_C	85	°C
$I_{T(RMS)}$		25	A
I_{TSM}	@50Hz	225	A
	@60Hz	240	A
I^2t	@50Hz	255	A^2s
	@60Hz	233	A^2s
V_{DRM}/V_{RRM}		100 to 1200	V
t_q	typical	110	µs
T_J		- 65 to 125	°C

Case Style
TO-208AA (TO-48)

ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM}, max. repetitive peak and off-state voltage (1) V	V_{RSM}, maximum non-repetitive peak voltage (2) V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max. mA
10RIA	10	100	150	20
	20	200	300	10
	40	400	500	
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	

(1) Units may be broken over non-repetitively in the off-state direction without damage, if dI/dt does not exceed 20A/µs
(2) For voltage pulses with $t_p \leq 5$ms

On-state Conduction

Parameter		10RIA	Units	Conditions		
$I_{T(AV)}$	Max. average on-state current	10	A	180° conduction, half sine wave		
	@ Case temperature	85	°C			
$I_{T(RMS)}$	Max. RMS on-state current	25	A			
I_{TSM}	Max. peak, one-cycle non-repetitive surge current	225	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		240		t = 8.3ms		
		190		t = 10ms	100% V_{RRM} reapplied	
		200		t = 8.3ms		
I^2t	Maximum I^2t for fusing	255	A^2s	t = 10ms	No voltage reapplied	
		233		t = 8.3ms		
		180		t = 10ms	100% V_{RRM} reapplied	
		165		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	2550	$A^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$	Low level value of threshold voltage	1.10	V	(16.7% x π x $I_{T(AV)}$ < I < π x $I_{T(AV)}$), $T_J = T_J$ max.		
$V_{T(TO)2}$	High level value of threshold voltage	1.39		(I > π x $I_{T(AV)}$), $T_J = T_J$ max.		
r_{t1}	Low level value of on-state slope resistance	24.3	mΩ	(16.7% x π x $I_{T(AV)}$ < I < π x $I_{T(AV)}$), $T_J = T_J$ max.		
r_{t2}	High level value of on-state slope resistance	16.7		(I > π x $I_{T(AV)}$), $T_J = T_J$ max.		
V_{TM}	Max. on-state voltage	1.75	V	I_{pk}= 32A, T_J = 25°C t_p = 10ms sine pulse		
I_H	Maximum holding current	130	mA	T_J = 25°C, anode supply 12V resistive load		
I_L	Typical latching current	200				

Switching

	Parameter		10RIA	Units	Conditions
di/dt	Max. rate of rise of turned-on current	$V_{DRM} \leq 600V$	200	A/µs	$T_J = T_J$ max., V_{DM} = rated V_{DRM} Gate pulse = 20V, 15Ω, t_p = 6µs, t_r = 0.1µs max. I_{TM} = (2x rated di/dt) A
		$V_{DRM} \leq 800V$	180		
		$V_{DRM} \leq 1000V$	160		
		$V_{DRM} \leq 1600V$	150		
t_{gt}	Typical turn-on time		0.9	µs	T_J = 25°C, at = rated V_{DRM}/V_{RRM}, T_J = 125°C
t_{rr}	Typical reverse recovery time		4		$T_J = T_J$ max., $I_{TM} = I_{T(AV)}$, t_p > 200µs, di/dt = -10A/µs
t_q	Typical turn-off time		110		$T_J = T_J$ max., $I_{TM} = I_{T(AV)}$, t_p > 200µs, V_R = 100V, di/dt = -10A/µs, dv/dt = 20V/µs linear to 67% V_{DRM}, gate bias 0V-100W

(*) t_q = 10µsup to 600V, t_q = 30µs up to 1600V available on special request.

Blocking

	Parameter	10RIA	Units	Conditions
dv/dt	Max. critical rate of rise of off-state voltage	100	V/µs	$T_J = T_J$ max. linear to 100% rated V_{DRM}
		300 (*)		$T_J = T_J$ max. linear to 67% rated V_{DRM}

(**) Available with: dv/dt = 1000V/µs, to complete code add S90 i.e. 10RIA120S90.

Triggering

	Parameter	10RIA	Units	Conditions	
P_{GM}	Maximum peak gate power	8.0	W	$T_J = T_J$ max.	
$P_{G(AV)}$	Maximum average gate power	2.0			
I_{GM}	Max. peak positive gate current	1.5	A	$T_J = T_J$ max.	
$-V_{GM}$	Maximum peak negative gate voltage	10	V	$T_J = T_J$ max.	
I_{GT}	DC gate current required to trigger	90	mA	T_J = - 65°C	Max. required gate trigger current/ voltage are the lowest value which will trigger all units 6V anode-to-cathode applied
		60		T_J = 25°C	
		35		T_J = 125°C	
V_{GT}	DC gate voltage required to trigger	3.0	V	T_J = - 65°C	
		2.0	V	T_J = 25°C	
		1.0	V	T_J = 125°C	
I_{GD}	DC gate current not to trigger	2.0	mA	$T_J = T_J$ max., V_{DRM} = rated value	
V_{GD}	DC gate voltage not to trigger	0.2	V	$T_J = T_J$ max. V_{DRM} = rated value	Max. gate current/ voltage not to trigger is the max. value which will not trigger any unit with rated V_{DRM} anode-to-cathode applied

Thermal and Mechanical Specification

	Parameter	10RIA		Units	Conditions
T_J	Max. operating temperature range	- 65 to 125		°C	
T_{stg}	Max. storage temperature range	- 65 to 125		°C	
R_{thJC}	Max. thermal resistance, junction to case	1.85		K/W	DC operation
R_{thCS}	Max. thermal resistance, case to heatsink	0.35		K/W	Mounting surface, smooth, flat and greased
T	Mounting torque	to nut	to device		
		20(27.5)	25	lbf-in	Lubricated threads
		0.23(0.32)	0.29	kgf.m	(Non-lubricated threads)
		2.3(3.1)	2.8	Nm	
wt	Approximate weight	14 (0.49)		g (oz)	
	Case style	TO-208AA (TO-48)			See Outline Table

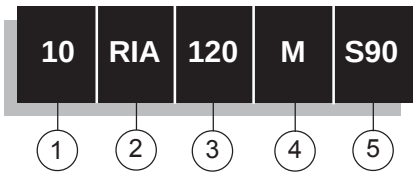
ΔR_{thJC} Conduction

(The following table shows the increment of thermal resistence R_{thJC} when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.44	0.32	K/W	$T_J = T_J$ max.
120°	0.53	0.56		
90°	0.68	0.75		
60°	1.01	1.05		
30°	1.71	1.73		

Ordering Information Table

Device Code



1 - Current code

2 - Essential part number

3 - Voltage code: Code x 10 = V_{RRM} (See Voltage Rating Table)

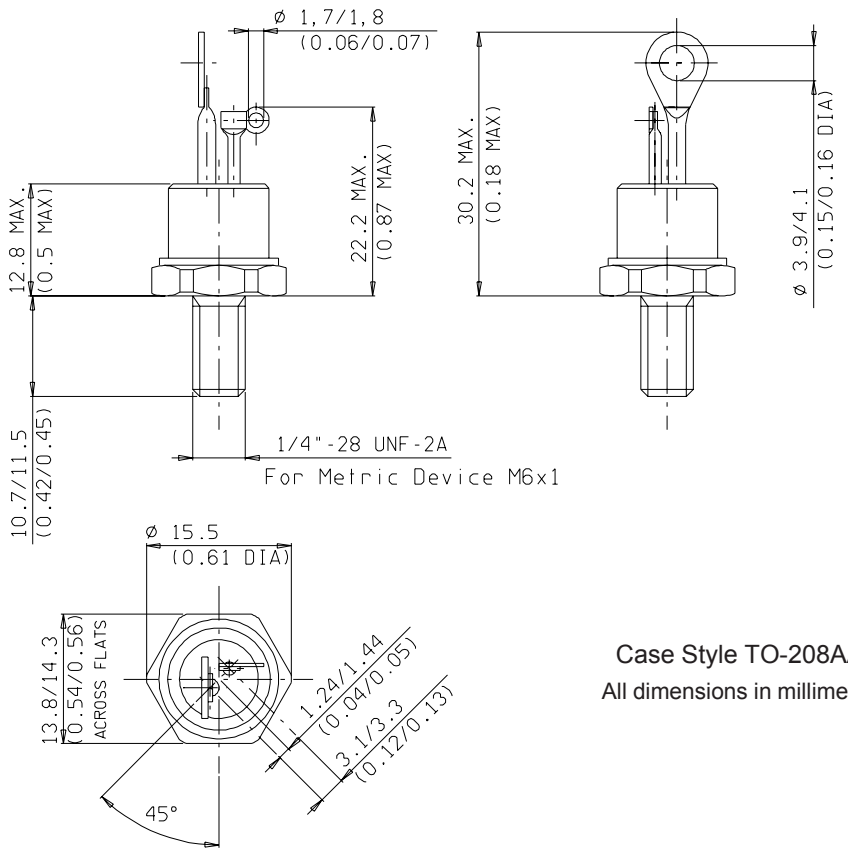
4 - None = Stud base TO-208AA (TO-48) 1/4" 28UNF-2A

M = Stud base TO-208AA (TO-48) M6 X 1

5 - Critical dv/dt: None = 300V/µs (Standard value)

S90 = 1000V/µs (Special selection)

Outline Table



Case Style TO-208AA (TO-48)
All dimensions in millimeters (inches)

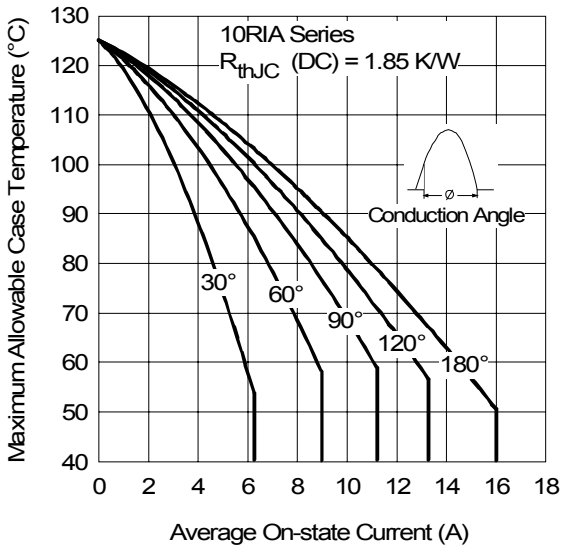


Fig. 1 - Current Ratings Characteristic

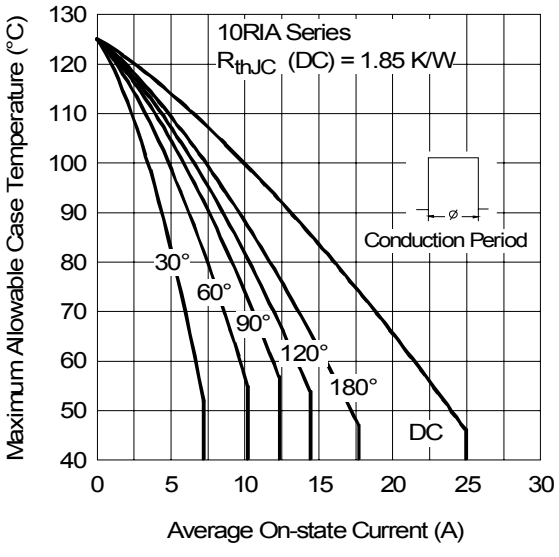


Fig. 2 - Current Ratings Characteristic

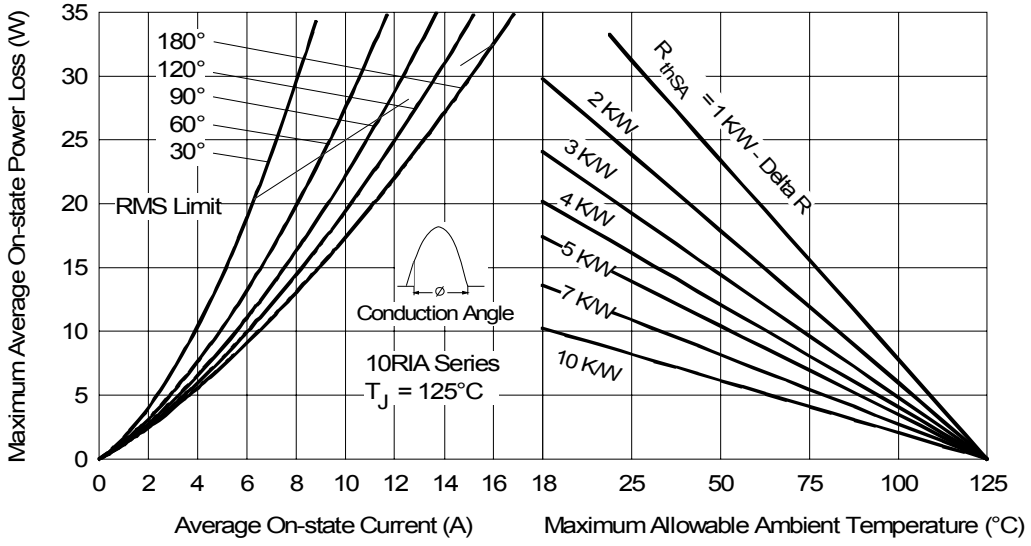


Fig. 3 - On-state Power Loss Characteristics

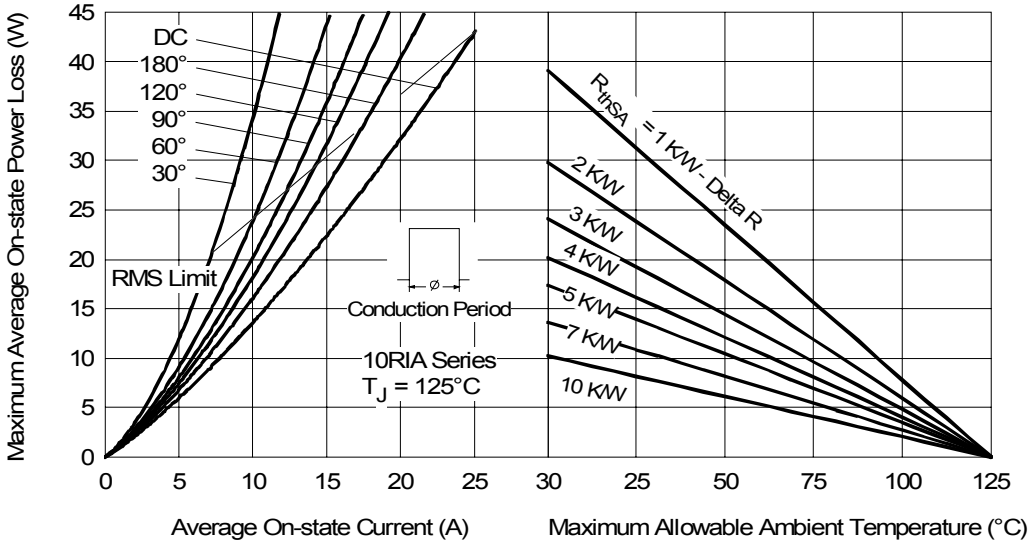


Fig. 4 - On-state Power Loss Characteristics

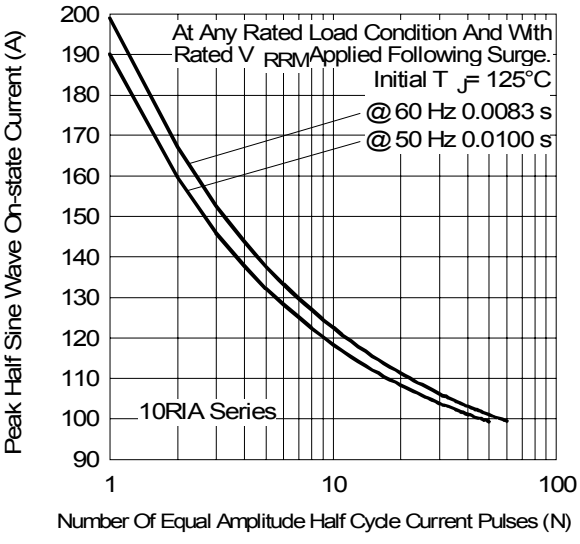


Fig. 5 - Maximum Non-Repetitive Surge Current

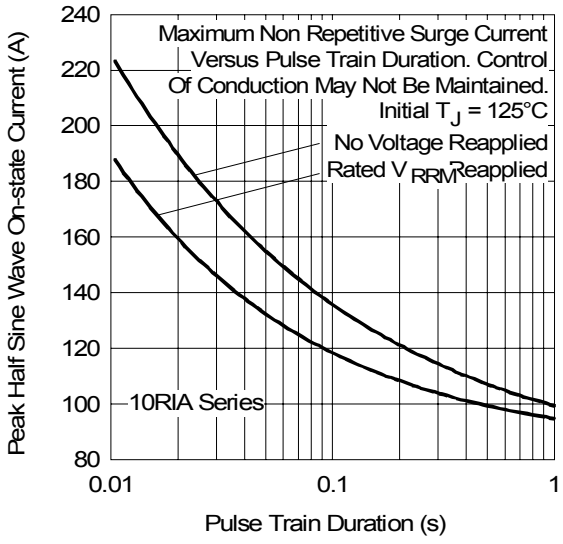


Fig. 6 - Maximum Non-Repetitive Surge Current

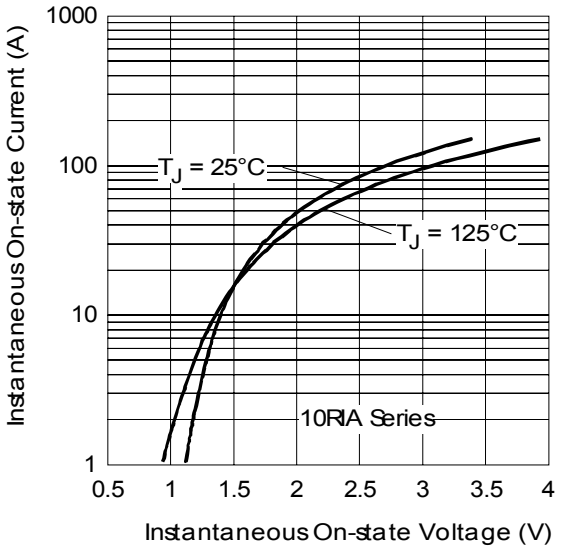


Fig. 7 - Forward Voltage Drop Characteristics

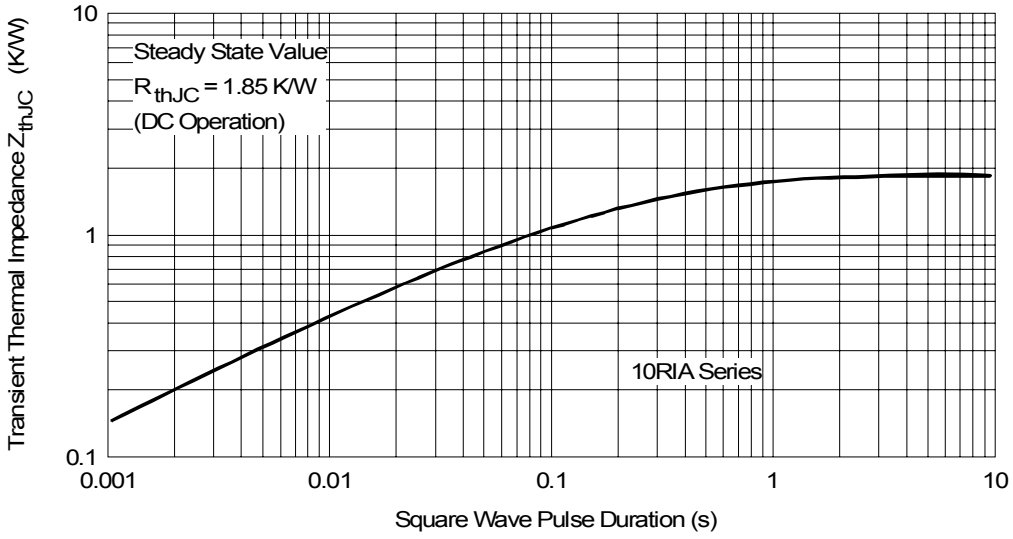


Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

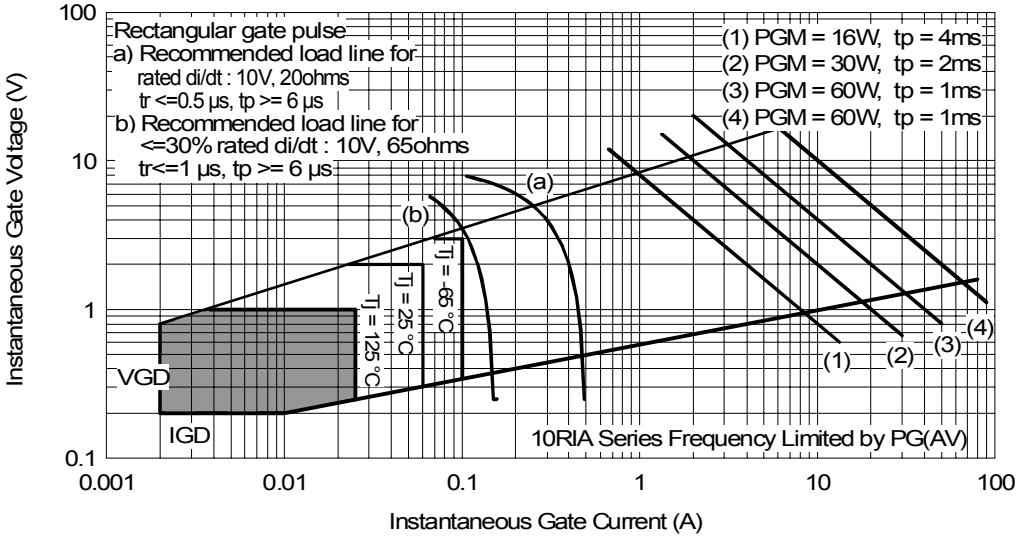


Fig. 9 - Gate Characteristics

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial and Consumer Level and Lead-Free.
Qualification Standards can be found on IR's Web site.

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