

International  
**IRF** Rectifier

## 80RIA SERIES

PHASE CONTROL THYRISTORS

Stud Version

### Features

- Hermetic glass-metal seal
- International standard case TO-209AC (TO-94)

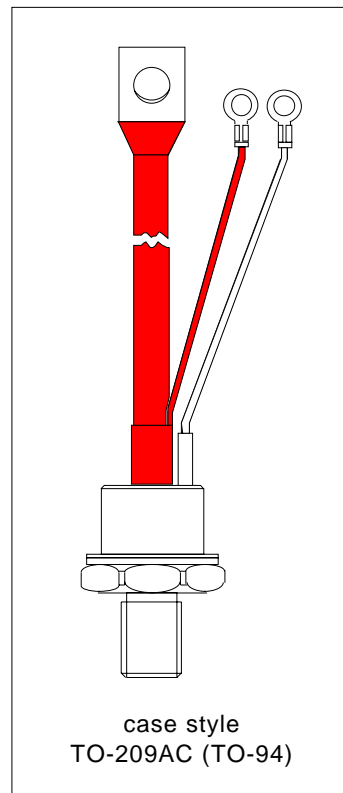
80A

### Typical Applications

- DC motor controls
- Controlled DC power supplies
- AC controllers

### Major Ratings and Characteristics

Parameters	80RIA	Unit
$I_{T(AV)}$	80	A
@ $T_C$	85	°C
$I_{T(RMS)}$	125	A
$I_{TSM}$ @ 50Hz	1900	A
@ 60Hz	1990	A
$I^2t$ @ 50Hz	18	KA <sup>2</sup> s
@ 60Hz	16	KA <sup>2</sup> s
$V_{DRM}/V_{RRM}$	400 to 1200	V
$t_q$ typical	110	μs
$T_J$	- 40 to 125	°C



**ELECTRICAL SPECIFICATIONS**

Voltage Ratings

Type number	Voltage Code	$V_{DRM}/V_{RRM}$ , max. repetitive peak and off-state voltage V	$V_{RSM}$ , maximum non-repetitive peak voltage V	$I_{DRM}/I_{RRM}$ max. @ $T_J = 125^\circ\text{C}$ mA
80RIA	40	400	500	15
	80	800	900	
	120	1200	1300	

On-state Conduction

Parameter	80RIA	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Case temperature	80	A	180° conduction, half sine wave
	85	°C	
$I_{T(RMS)}$ Max. RMS on-state current	125	A	DC @ 75°C case temperature
$I_{TSM}$ Max. peak, one-cycle non-repetitive surge current	1900	A	t = 10ms No voltage reappplied
	1990		t = 8.3ms reappplied
	1600		t = 10ms 100% $V_{RRM}$ reappplied
	1675		t = 8.3ms reappplied
$I^2t$ Maximum $I^2t$ for fusing	18	KA <sup>2</sup> s	t = 10ms No voltage reappplied
	16		t = 8.3ms reappplied
	12.7		t = 10ms 100% $V_{RRM}$ reappplied
	11.7		t = 8.3ms reappplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	180.5	KA <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied
$V_{T(TO)1}$ Low level value of threshold voltage	0.99	V	(16.7% x $\pi$ x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$V_{T(TO)2}$ High level value of threshold voltage	1.13		( $I > \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$r_{t1}$ Low level value of on-state slope resistance	2.29	mΩ	(16.7% x $\pi$ x $I_{T(AV)} < I < \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$r_{t2}$ High level value of on-state slope resistance	1.84		( $I > \pi$ x $I_{T(AV)}$ ), $T_J = T_J$ max.
$V_{TM}$ Max. on-state voltage	1.60	V	$I_{pk} = 250\text{A}$ , $T_J = 25^\circ\text{C}$ $t_p = 10\text{ms}$ sine pulse
$I_H$ Maximum holding current	200	mA	$T_J = 25^\circ\text{C}$ , anode supply 12V resistive load
$I_L$ Typical latching current	400		

Switching

Parameter	80RIA	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	300	A/ $\mu$ s	$T_J = 125^\circ\text{C}$ , $V_d = \text{rated } V_{\text{DRM}}$ , $I_{\text{TM}} = 2 \times \text{di/dt snubber } 0.2\mu\text{F}, 15\Omega$ , Gate pulse: 20V, 65 $\Omega$ , $t_p = 6\mu\text{s}$ , $t_r = 0.5\mu\text{s}$ Per JEDEC Standard RS-397, 5.2.2.6.
$t_d$ Typical delay time	1	$\mu$ s	Gate pulse: 10V, 15 $\Omega$ source, $t_p = 6\mu\text{s}$ , $t_r = 0.1\mu\text{s}$ , $V_d = \text{rated } V_{\text{DRM}}$ , $I_{\text{TM}} = 50\text{A}$ dc, $T_J = 25^\circ\text{C}$ .
$t_q$ Typical turn-off time	110		$I_{\text{TM}} = 50\text{A}$ , $T_J = T_J \text{ max}$ , di/dt = -5A/ $\mu$ s min., $V_R = 50\text{V}$ , dv/dt = 20V/ $\mu$ s, Gate bias: 0V 25 $\Omega$ , $t_p = 500\mu\text{s}$

Blocking

Parameter	80RIA	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/ $\mu$ s	$T_J = 125^\circ\text{C}$ exponential to 67% rated $V_{\text{DRM}}$
$I_{\text{RRM}}$ $I_{\text{DRM}}$ Max. peak reverse and off-state leakage current	15	mA	$T_J = 125^\circ\text{C}$ rated $V_{\text{DRM}}/V_{\text{RRM}}$ applied

Triggering

Parameter	80RIA	Units	Conditions
$P_{\text{GM}}$ Maximum peak gate power	12	W	$T_J = T_J \text{ max}$ , $t_p \leq 5\text{ms}$
$P_{\text{G(AV)}}$ Maximum average gate power	3		$T_J = T_J \text{ max}$ , $f = 50\text{Hz}$ , $d\% = 50$
$I_{\text{GM}}$ Max. peak positive gate current	3	A	$T_J = T_J \text{ max}$ , $t_p \leq 5\text{ms}$
$+V_{\text{GM}}$ Maximum peak positive gate voltage	20	V	$T_J = T_J \text{ max}$ , $t_p \leq 5\text{ms}$
$-V_{\text{GM}}$ Maximum peak negative gate voltage	10		
$I_{\text{GT}}$ Max. DC gate current required to trigger	270	mA	$T_J = -40^\circ\text{C}$
	120		$T_J = 25^\circ\text{C}$
	60		$T_J = 125^\circ\text{C}$
$V_{\text{GT}}$ Max. DC gate voltage required to trigger	3.5	V	$T_J = -40^\circ\text{C}$
	2.5		$T_J = 25^\circ\text{C}$
	1.5		$T_J = 125^\circ\text{C}$
$I_{\text{GD}}$ DC gate current not to trigger	6	mA	$T_J = T_J \text{ max}$
$V_{\text{GD}}$ DC gate voltage not to trigger	0.25		

Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 6V anode-to-cathode applied

Max. gate current/ voltage not to trigger is the max. value which will not trigger any unit with rated  $V_{\text{DRM}}$  anode-to-cathode applied

## 80RIA Series

Bulletin I25201 rev. B 03/03

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### Thermal and Mechanical Specification

Parameter	80RIA	Units	Conditions
T <sub>J</sub> Max. operating temperature range	-40 to 125	°C	
T <sub>stg</sub> Max. storage temperature range	-40 to 150		
R <sub>thJC</sub> Max. thermal resistance, junction to case	0.30	K/W	DC operation
R <sub>thCS</sub> Max. thermal resistance, case to heatsink	0.1		Mounting surface, smooth, flat and greased
T Mounting torque, ± 10%	15.5 (137)	Nm	Non lubricated threads
	14 (120)	(lbf-in)	Lubricated threads
wt Approximate weight	130	g	
Case style	TO-209AC(TO-94)		See Outline Table

### $\Delta R_{thJ-C}$ Conduction

(The following table shows the increment of thermal resistance  $R_{thJ-C}$  when devices operate at different conduction angles than DC)

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.042	0.030	K/W	T <sub>J</sub> = T <sub>J</sub> max.
120°	0.050	0.052		
90°	0.064	0.070		
60°	0.095	0.100		
30°	0.164	0.165		

### Ordering Information Table

Device Code	
<b>1</b>	- I <sub>TAV</sub> x 10A
<b>2</b>	- 0 = Eyelet terminals (Gate and Auxiliary Cathode Leads) 1 = Fast - on terminals (Gate and Auxiliary Cathode Leads)
<b>3</b>	- RIA = Essential part number
<b>4</b>	- Voltage code: Code x 10 = V <sub>RRM</sub> (See Voltage Rating Table)
<b>5</b>	- None = Stud base 1/2"-20UNF- 2A threads
NOTE: For Metric Device M12 x 1.75 E6 Contact factory	

Outline Table

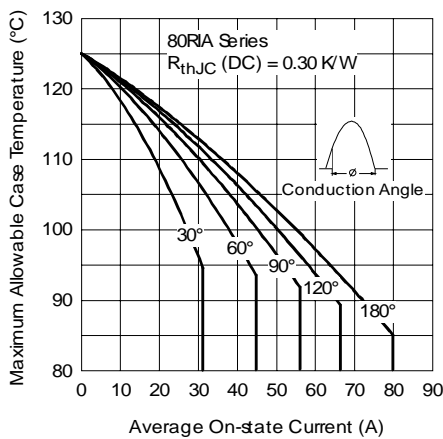
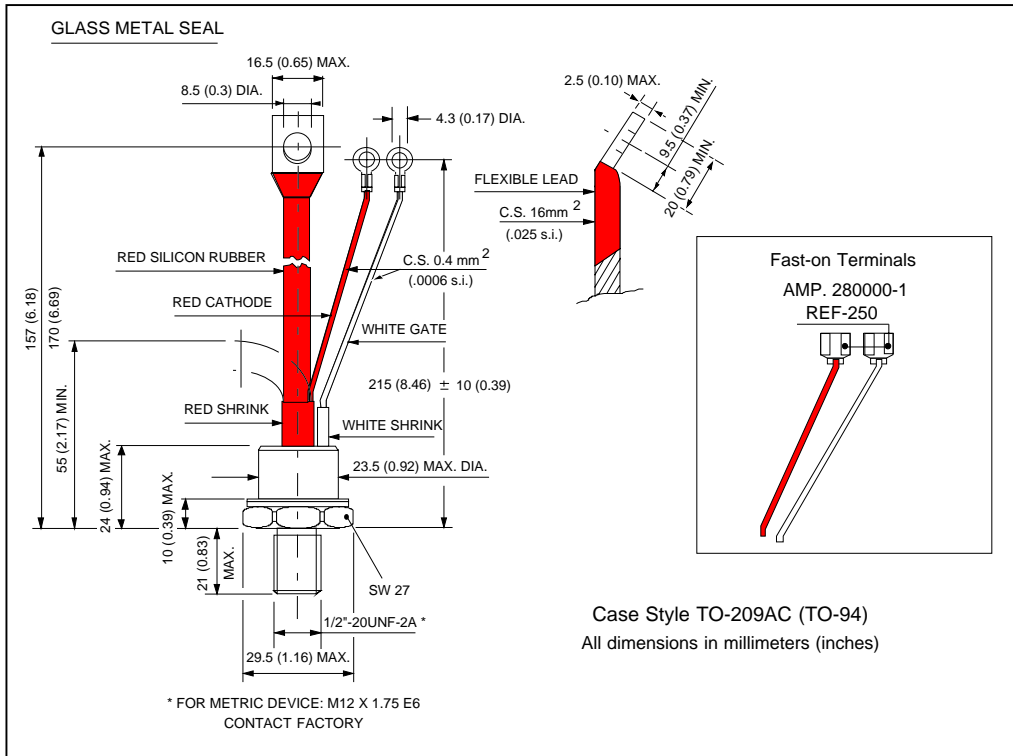


Fig. 1 - Current Ratings Characteristics

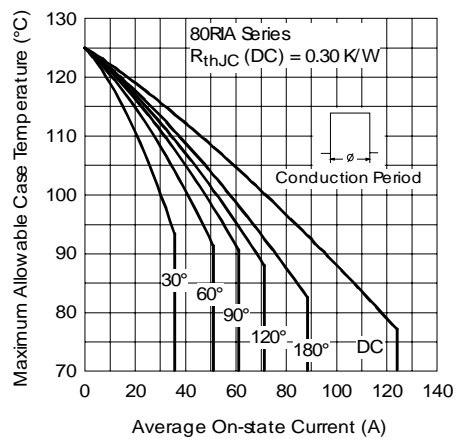


Fig. 2 - Current Ratings Characteristics

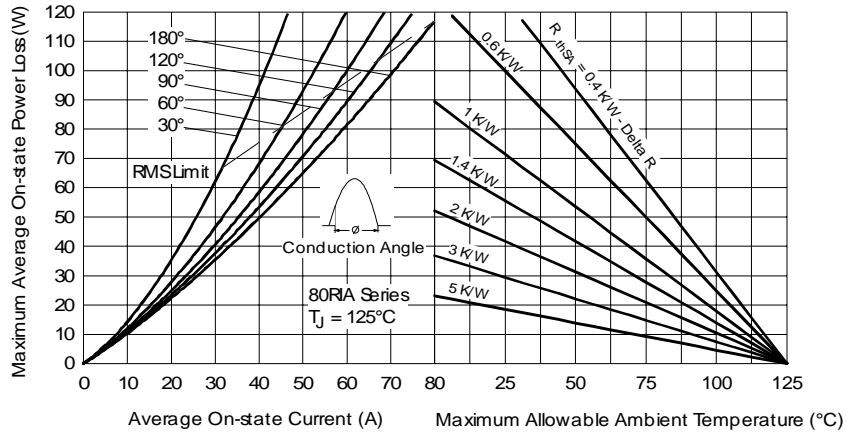


Fig. 3 - On-state Power Loss Characteristics

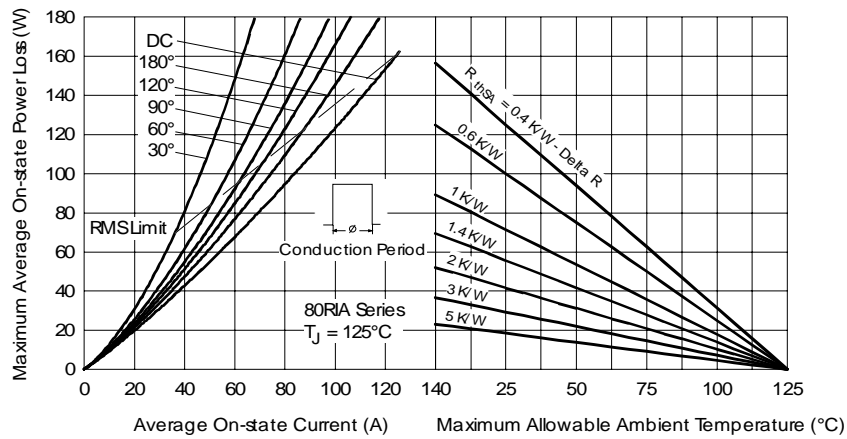


Fig. 4 - On-state Power Loss Characteristics

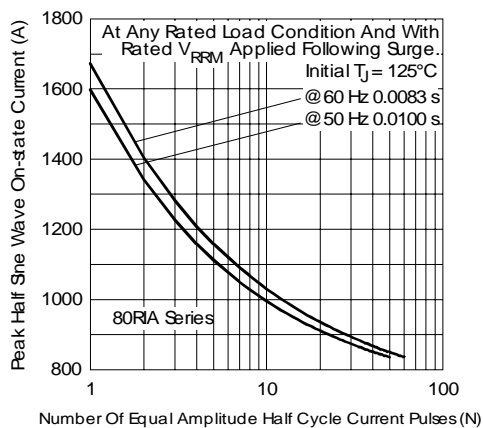


Fig. 5 - Maximum Non-Repetitive Surge Current

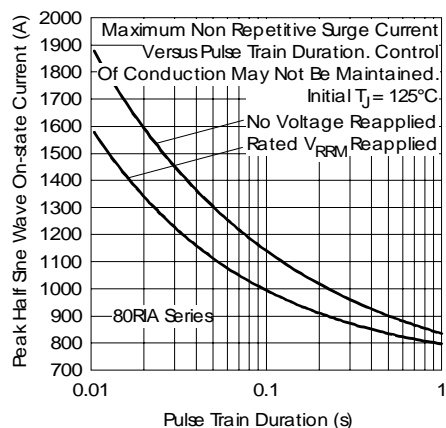


Fig. 6 - Maximum Non-Repetitive Surge Current

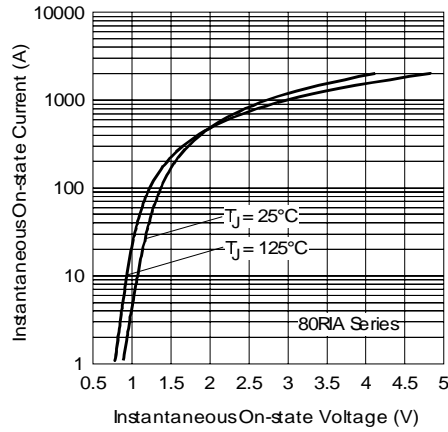


Fig. 7 - On-state Voltage Drop Characteristics

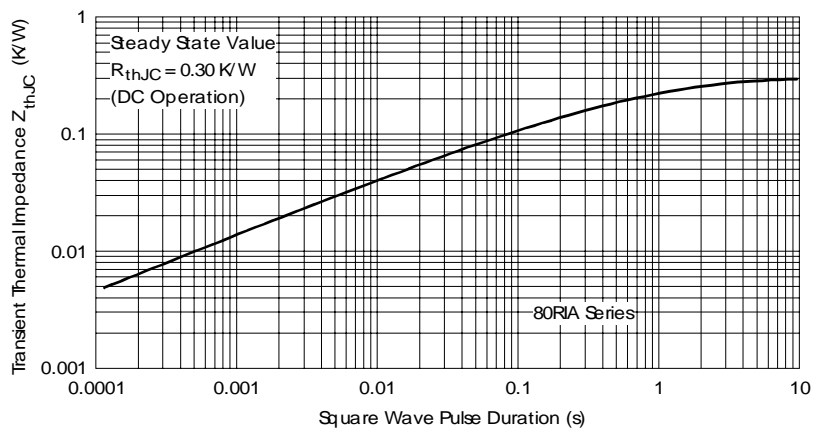


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

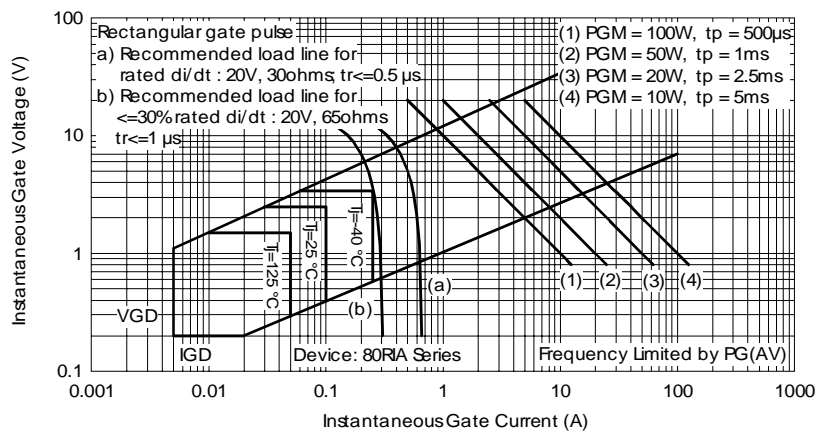


Fig. 9 - Gate Characteristics

## 80RIA Series

Bulletin I25201 rev. B 03/03

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

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