

4855452 INTERNATIONAL RECTIFIER

55C 04835 D

Data Sheet No. PD-3.085

T-25-19

INTERNATIONAL RECTIFIER 

71RIA & 81RIA SERIES

110 and 125 Amp RMS SCRs

Major Ratings and Characteristics

	71RIA	81RIA	Units
$I_T(\text{RMS})$	110	125	A
$I_T(\text{AV})$	70	80	A
@ Max. T_C	80	91	$^{\circ}\text{C}$
I_{TSM}	@ 50 Hz	1200	A
	@ 60 Hz	1255	
I^2t	@ 50 Hz	7200	A^2s
	@ 60 Hz	6560	
I_{GT}	100	100	mA
dv/dt	200	200	$\text{V}/\mu\text{s}$
di/dt	150	300	$\text{A}/\mu\text{s}$
t_q (typ.)	110	350	μs
T_J	-40 to 125	-40 to 125	$^{\circ}\text{C}$
$V_{\text{RRM}}, V_{\text{DRM}}$ range	100 to 1200*	100 to 1200	V

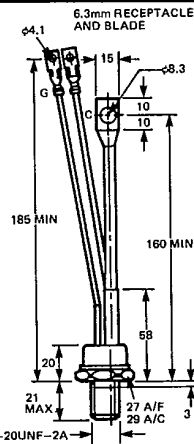
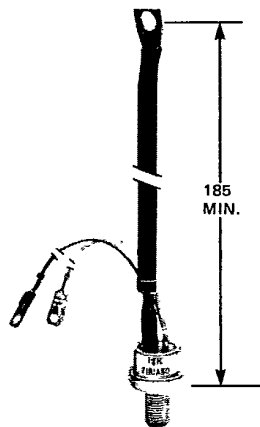
*100 to 1200V for 71RIA series.

Description/Features

- For general purpose phase control applications.
- High surge rating.
- Types up to 1200V $V_{\text{RRM}}, V_{\text{DRM}}$.
- Case style options.
- JAN and JANTX types available.

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CASE STYLE AND DIMENSIONS



IEC191: A12U1
BS3934: SO-30C
SO-30A

Similar to JEDEC: TO-209AC (TO-94) DIN 41892: 204 B 3
For 70RIA and Flag Terminal Outline Refer to Page A-48

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VOLTAGE RATINGS

Part Number†		VRRM, VDRM – Max. Repetitive Peak Reverse and Off-State Voltage (V) ①	VRSM – Max. Non-Repetitive Peak Reverse Voltage tp ≤ 5 ms (V)	IRM, IDM – Max. Peak Reverse and Off-State Current (mA)	
				71RIA	81RIA
		TJ = -40°C to 125°C	TJ = 25°C to 125°C	TJ = 125°C	
71RIA10	81RIA10	100	150	20	20
71RIA20	81RIA20	200	300	20	15
71RIA40	81RIA40	400	500	20	15
71RIA60	81RIA60	600	700	20	15
71RIA80	81RIA80	800	900	20	15
71RIA100	81RIA100	1000	1100	20	15
71RIA120	81RIA120	1200	1300	20	15

†Basic part number indicates case same as TO-209AC (TO-94) except control leads provided with FAST-ON receptacle and blade terminals. For outline TO-209AC (TO-94) with eyelet terminals on control leads change part number from 71___ to 70___, e.g., 70RIA60. (Not available for 81RIA ___). For outline TO-208AD (TO-83) change part number from 71___ or 81___ to 72___ or 82___, e.g., 72RIA60.

ELECTRICAL SPECIFICATIONS

	71RIA	81RIA	Units	Conditions	
ON-STATE					
IT(RMS) Max. RMS on-state current	110	125	A		
IT(AV) Max. average on-state current @ Max. TC	70	80	A	180° half sine wave conduction.	
	80	91	°C		
ITSM Max. peak one cycle, non-repetitive surge current	1200	1597	A	50 Hz half cycle sine wave or 6 ms rectangular pulse 60 Hz half cycle sine wave or 5 ms rectangular pulse Following any rated load condition, and with rated VRRM applied following surge. SCR turned fully on.	
	1255	1677			
	1430	1900	A	50 Hz half cycle sine wave or 6 ms rectangular pulse 60 Hz half cycle sine wave or 5 ms rectangular pulse Same condition as above except with VRRM applied following surge = 0.	
	1490	1989			
I²t Max. I²t capability, for fusing	7200	12,752	A²s	t = 10 ms t = 8.3 ms Rated VRRM applied following surge, initial TJ = 125°C.	
	6560	11,718			
	Max. I²t capability, for individual device fusing	10,180		18,050	t = 10 ms t = 8.3 ms VRRM = 0 following surge, initial TJ = 125°C.
		9300		16,484	
I²√t Max. I²√t capability, for individual device fusing ①	101,800	180,500	A²√s	t = 0.1 to 10 ms, VRRM following surge = 0, initial TJ = 125°C.	
VTM Max. peak on-state voltage	1.80	—	V	TJ = 25°C, IT(AV) = 70A (220A peak)	
	—	1.40	V	TJ = 25°C, IT(AV) = 80A (251A peak)	
iH Max. holding current	200	150	mA	TC = 25°C, anode supply = 22V, initial IT = 3A.	
BLOCKING					
dv/dt Min. critical rate-of-rise of off-state voltage	200	200	V/μs	TJ = 125°C Exponential to 100% rated VDRM TJ = 125°C Exponential to 67% rated VDRM Gate open circuited	
	500	500			

① Units may be broken over non-repetitively if di/dt does not exceed 20 A/μs.

② I²t for time tx = I²√t • √tx

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71RIA and 81RIA Series

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ELECTRICAL SPECIFICATIONS (Continued)

		71RIA	81RIA	Units	Conditions
SWITCHING					
t_d	Typical delay time	1	1	μ s	$T_C = 25^\circ\text{C}$, $V_{DM} = \text{rated } V_{DRM}$, $I_{TM} = 50\text{A}$ dc resistive circuit. Gate pulse: 10V, 25Ω source, $t_p = 6\ \mu\text{s}$, $t_r = 0.1\ \mu\text{s}$.
di/dt	Max. non-repetitive rate of rise of turned-on current	150	300	A/ μ s	$T_C = 125^\circ\text{C}$, $V_{DM} = \text{rated } V_{DRM}$, $I_{TM} = 2 \times di/dt$; snubber 0.2 μ F, 15Ω . Gate pulse: 20V, 65Ω , $t_p = 6\ \mu\text{s}$, $t_r = 0.5\ \mu\text{s}$. Per JEDEC Standard RS-397, 5.2.2.6.
t_q	Typical turn-off time	110	350	μ s	$T_C = 125^\circ\text{C}$, $I_{TM} = 60\text{A}$, commutating $di/dt = -5\ \text{A}/\mu\text{s}$, min. V_R during turn-off interval = 50V, $dv/dt = 20\ \text{V}/\mu\text{s}$ linear to rated V_{DRM} . Gate bias: 0V, 25Ω .
TRIGGERING					
PGM	Max. peak gate power	10	12	W	$t_p \leq 5\ \text{ms}$
PG(AV)	Max. average gate power	2.5	3.0	W	
+IGM	Max. peak positive gate current	2.5	3.0	A	
+VGM	Max. peak positive gate voltage	20	20	V	
-VGM	Max. peak negative gate voltage	10	10	V	
IGT	Max. required DC gate current to trigger	250	270	mA	$T_C = -40^\circ\text{C}$. Max. required gate trigger current is the lowest value which will trigger all units with $\pm 6\text{V}$ anode-to-cathode
		100	120	mA	$T_C = 25^\circ\text{C}$
		50	60	mA	$T_C = 125^\circ\text{C}$
VGT	Max. required DC gate voltage to trigger	3.5	3.5	V	$T_C = -40^\circ\text{C}$. Max. required gate trigger voltage is the lowest value which will trigger all units with 6V anode-to-cathode
		2.5	2.5	V	$T_C = 25^\circ\text{C}$
		1.5	1.5	V	$T_C = 125^\circ\text{C}$
VGD	Max. DC gate voltage not to trigger	0.2	0.25	V	$T_C = 125^\circ\text{C}$. Max. gate voltage/current not to trigger is the maximum value which will not trigger any unit with rated V_{DRM} anode-to-cathode.
IGD	Max. DC gate current not to trigger	5.0	6.0	mA	

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THERMAL-MECHANICAL SPECIFICATIONS

T_J	Operating junction temperature range	-40 to 125		$^\circ\text{C}$	
T_{stg}	Storage temperature range	-40 to 150		$^\circ\text{C}$	
R_{thJC}	Max. internal thermal resistance, junction to case	0.35	0.30	deg. C/W	DC operation
R_{thCS}	Thermal resistance, case to sink	0.1		deg. C/W	Mounting surface smooth, flat and greased.
T	Mounting torque, $\pm 10\%$	16 (13)		N • m (lbf • in.)	Non-lubricated threads (lubricated threads)
		140 (110)			
	Max. torque on screw in flag terminal	1.4 (12)		N • m (lbf • in.)	Non-lubricated threads TO-208AD (TO-83) (IR A-12) only
wt	Approximate weight	100 (3.5)		g (oz.)	
Case Style	leaded type	TO-209AC (TO-94) (IR A-11)			JEDEC
	terminal type	TO-208AD (TO-83) (IR A-12)			

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71RIA Series

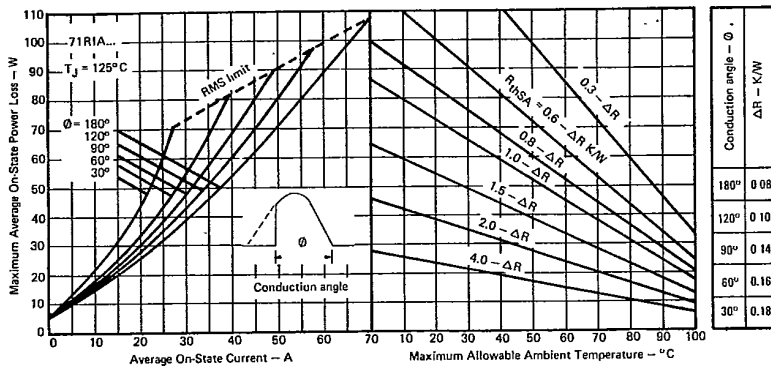


Fig. 1 - Current Rating Nomogram (Sinusoidal Waveforms, 40-400 Hz), 71RIA Series

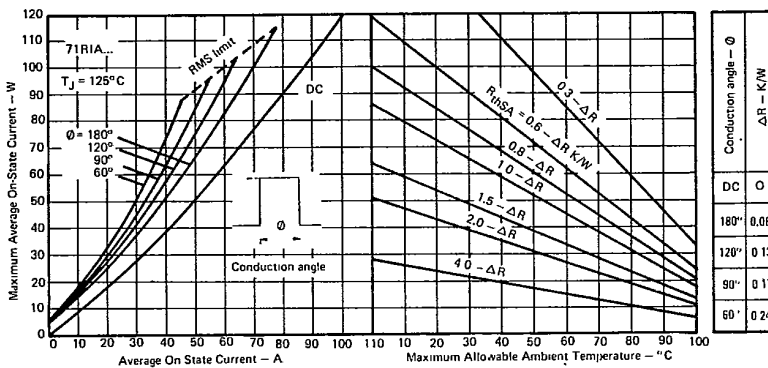


Fig. 2 - Current Rating Nomogram (Rectangular Waveforms, 40-400 Hz), 71RIA Series

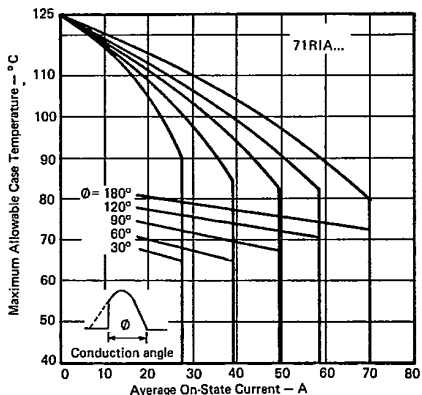


Fig. 3 - Average On-State Current Vs. Maximum Allowable Case Temperature (Sinusoidal Current Waveform), 71RIA Series

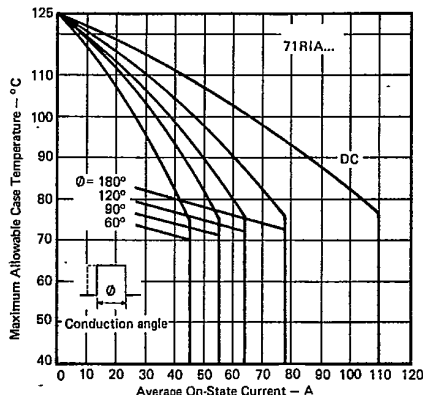


Fig. 4 - Average On-State Current Vs. Maximum Allowable Case Temperature (Rectangular Current Waveform), 71RIA Series

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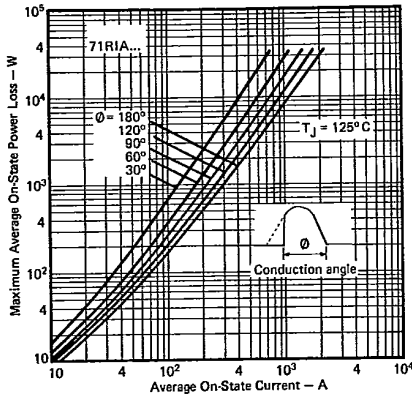


Fig. 5 - Maximum On-State Power Loss Vs. Average On-State Current (Sinusoidal Current Waveform), 71RIA Series

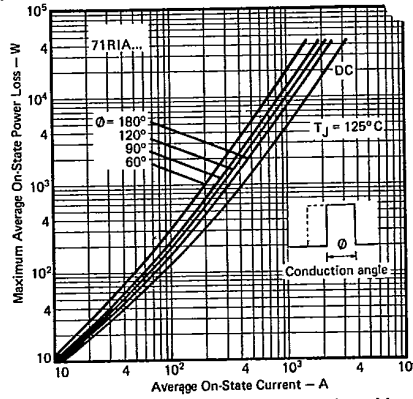


Fig. 6 - Maximum On-State Power Loss Vs. Average On-State Current (Rectangular Current Waveform), 71RIA Series

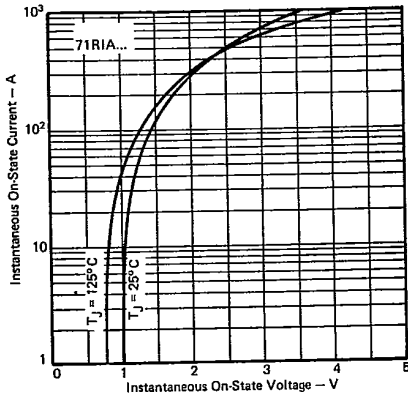


Fig. 7 - Maximum Instantaneous On-State Voltage Vs. Instantaneous On-State Current, 71RIA Series

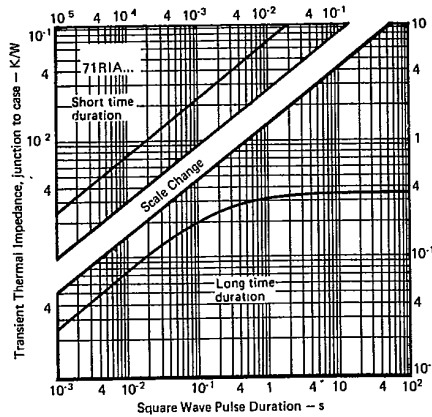


Fig. 8 - Maximum Transient Thermal Impedance Vs. Square Wave Pulse Duration, 71RIA Series

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See page A-48 for Fig. 9.

Fig. 9 - Gate Characteristics, 71RIA Series

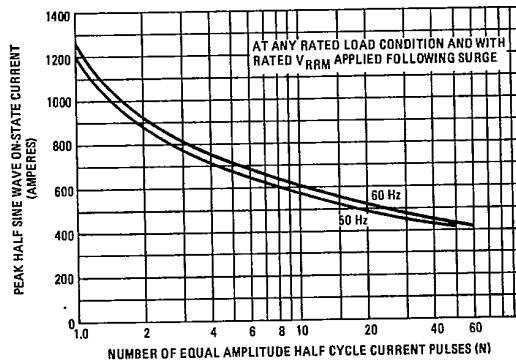


Fig. 10 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 71RIA Series

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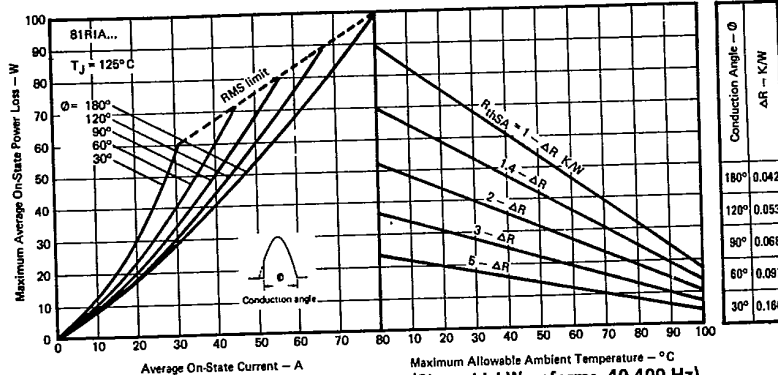


Fig. 11 - Current Rating Nomogram (Sinusoidal Waveforms, 40-400 Hz), 81RIA Series

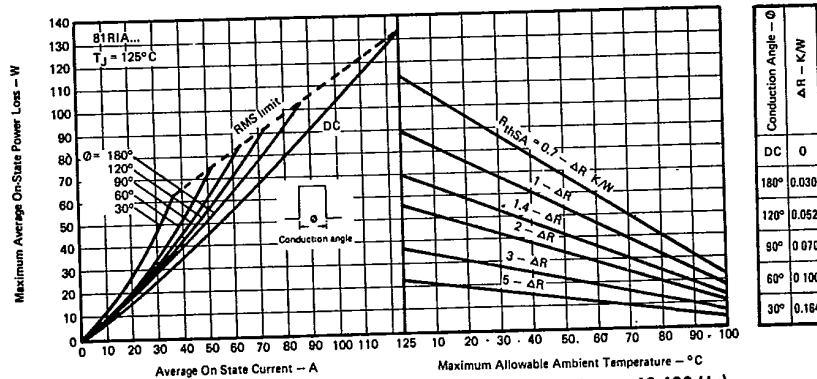


Fig. 12 - Current Rating Nomogram (Rectangular Waveforms, 40-400 Hz), 81RIA Series

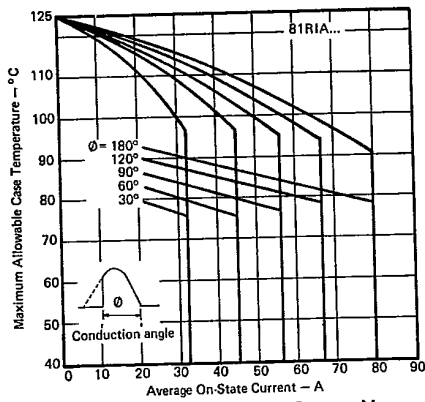


Fig. 13 - Average On-State Current Vs. Maximum Allowable Case Temperature (Sinusoidal Current Waveform), 81RIA Series

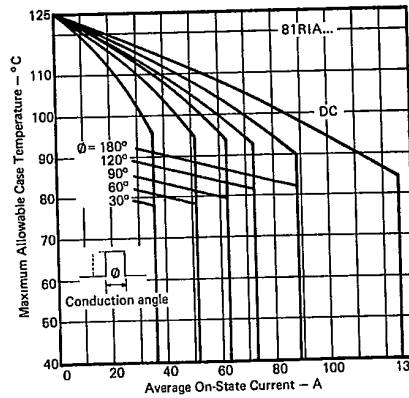


Fig. 14 - Average On-State Current Vs. Maximum Allowable Case Temperature (Rectangular Current Waveform), 81RIA Series

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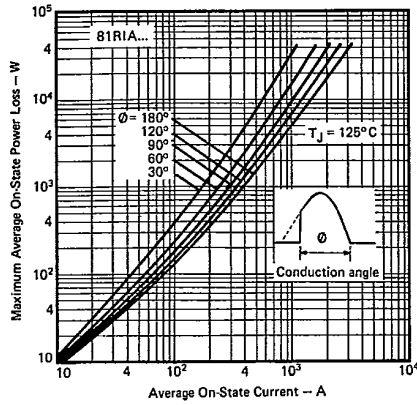


Fig. 15 - Maximum On-State Power Loss Vs. Average On-State Current (Sinusoidal Current Waveform), 81RIA Series

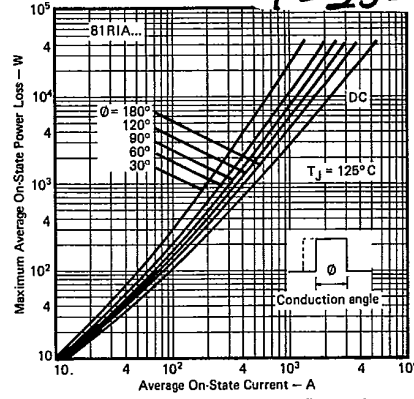


Fig. 16 - Maximum On-State Power Loss Vs. Average On-State Current (Rectangular Current Waveform), 81RIA Series

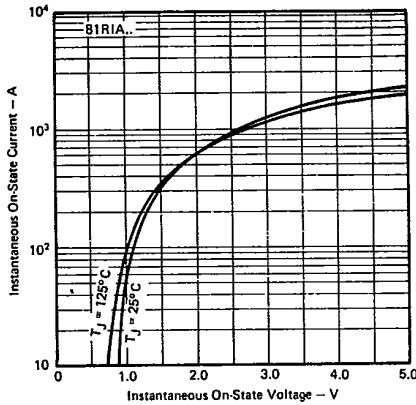


Fig. 17 - Maximum Instantaneous On-State Voltage Vs. Instantaneous On-State Current, 81RIA Series

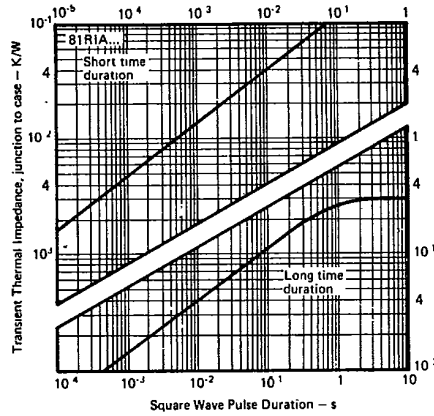


Fig. 18 - Maximum Transient Thermal Impedance Vs. Square Wave Pulse Duration, 81RIA Series

See page A-48 for Fig. 19.

Fig. 19 - Gate Characteristics, 81RIA Series

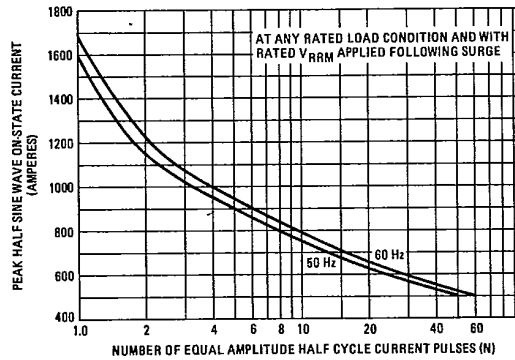


Fig. 20 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 81RIA Series

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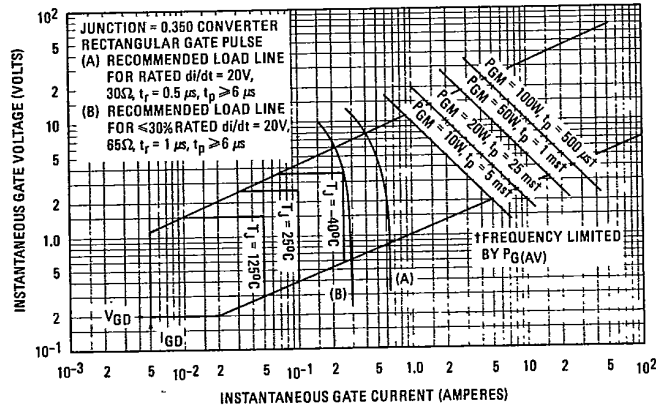
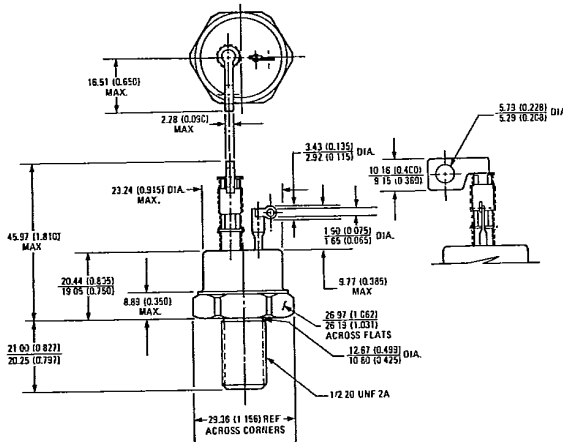


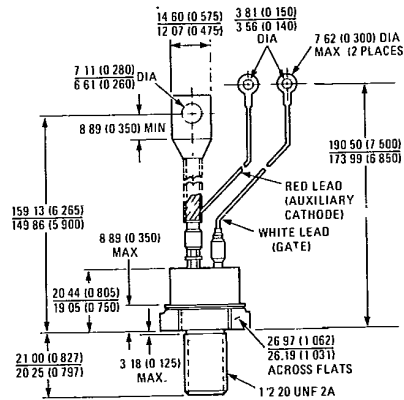
Fig. 9 - Gate Characteristics 71RIA Series
Fig. 19 - Gate Characteristics 81RIA Series

72RIA, 82RIA



IR Case Style A-14
Conforms to JEDEC Outline TO-208AD (TO-83)
All Dimensions in Millimeters and (Inches)

70RIA



IR case style A-13
Conforms to JEDEC Outline TO-209AC (TO-94)
Dimensions in Millimeters and (Inches)