

MEDIUM POWER THYRISTORS

Stud Version

Features

- High current rating
- Excellent dynamic characteristics
dv/dt = 1000V/μs option
- Superior surge capabilities
- Standard package
- Metric threads version available
- Types up to 1600V V

50A

Typical Applications

- Phase control applications in converters
- Lighting circuits
- Battery charges
- Regulated power supplies and temperature and speed control circuit
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements

Major Ratings and Characteristics

Parameters	50RIA		Units
	10 to 120	140 to 160	
$I_{T(AV)}$	50	50	A
@ T_C	94	90	°C
$I_{T(RMS)}$	80	80	A
I_{TSM} @ 50Hz	1430	1200	A
@ 60Hz	1490	1257	A
I^2t @ 50Hz	10.18	7.21	KA ² s
@ 60Hz	9.30	6.58	KA ² s
V_{DRM}/V_{RRM}	100 to 1200	1400 to 1600	V
t_q typical	110		μs
T_J	- 40 to 125		°C

Case Style
TO-208AC (TO-65)

50RIA Series

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
50RIA	10	100	150	15
	20	200	300	
	40	400	500	
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	
	140	1400	1500	
	160	1600	1700	

On-state Conduction

Parameter	50RIA		Units	Conditions		
	10 to 120	140 to 160				
$I_{T(AV)}$ Max. average on-state current @ Case temperature	50	50	A	180° sinusoidal conduction		
	94	90	°C			
$I_{T(RMS)}$ Max. RMS on-state current	80	80	A			
I_{TSM} Max. peak, one-cycle non-repetitive surge current	1430	1200	A	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J$ max.
	1490	1257		t = 8.3ms	reapplied	
	1200	1010		t = 10ms	100% V_{RRM}	
	1255	1057		t = 8.3ms	reapplied	
I^2t Maximum I^2t for fusing	10.18	7.21	KA ² s	t = 10ms	No voltage	
	9.30	6.58		t = 8.3ms	reapplied	
	7.20	5.10		t = 10ms	100% V_{RRM}	
	6.56	4.65		t = 8.3ms	reapplied	
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	101.8	72.1	KA ² √s	t = 0.1 to 10ms, no voltage reapplied, $T_J = T_J$ max.		
$V_{T(TO)1}$ Low level value of threshold voltage	0.94	1.02	V	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
$V_{T(TO)2}$ High level value of threshold voltage	1.08	1.17		$(\pi \times I_{T(AV)} < I < 20 \times \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
r_{t1} Low level value of on-state slope resistance	4.08	4.78	mΩ	$(16.7\% \times \pi \times I_{T(AV)} < I < \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
r_{t2} High level value of on-state slope resistance	3.34	3.97		$(\pi \times I_{T(AV)} < I < 20 \times \pi \times I_{T(AV)})$, $T_J = T_J$ max.		
V_{TM} Max. on-state voltage	1.60	1.78	V	$I_{pk} = 157$ A, $T_J = 25^\circ\text{C}$		
I_H Maximum holding current	200		mA	$T_J = 25^\circ\text{C}$. Anode supply 22V, resistive load, Initial $I_T = 2$ A		
I_L Latching current	400			Anode supply 6V, resistive load		

Blocking

Parameter	50RIA	Units	Conditions
dv/dt Max. critical rate of rise of off-state voltage	200	V/ μ s	$T_J = T_J$ max. linear to 100% rated V_{DRM}
	500 (*)		$T_J = T_J$ max. linear to 67% rated V_{DRM}

Parameter	50RIA	Units	Conditions
P_{GM} Maximum peak gate power	10	W	$T_J = T_J$ max, $t_p \leq 5$ ms
$P_{G(AV)}$ Maximum average gate power	2.5		
I_{GM} Max. peak positive gate current	2.5	A	
$+V_{GM}$ Maximum peak positive gate voltage	20	V	
$-V_{GM}$ Maximum peak negative gate voltage	10		
I_{GT} DC gate current required to trigger	250	mA	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$
	100		
	50		
V_{GT} DC gate voltage required to trigger	3.5	V	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$
	2.5		
I_{GD} DC gate current not to trigger	5.0	mA	$T_J = T_J$ max $V_{DRM} =$ rated voltage
V_{GD} DC gate voltage not to trigger	0.2	V	$T_J = T_J$ max V_{DRM} anode-to-cathode applied

50RIA Series

Parameter		50RIA	Units	Conditions	
T_J	Max. operating temperature range	- 40 to 125	°C		
T_{stg}	Max. storage temperature range	- 40 to 125	°C		
R_{thJC}	Max. thermal resistance, junction to case	0.35	K/W	DC operation	
R_{thCS}	Max. thermal resistance, case to heatsink	0.25	K/W	Mounting surface, smooth, flat and greased	
T	Mounting torque	Min.	2.8 (25)	Nm (lbf-in)	Non-lubricated threads
		Max.	3.4 (30)		
wt	Approximate weight	28 (1.0)	g (oz)		
Case style		TO-208AC (TO-65)		See Outline Table	



Outline Table

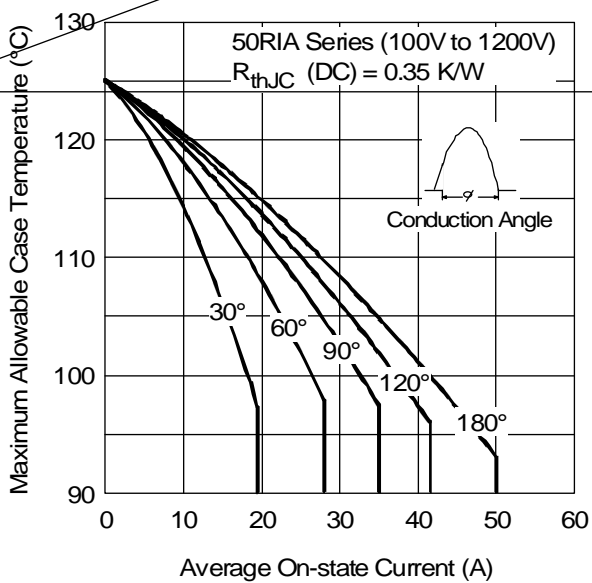
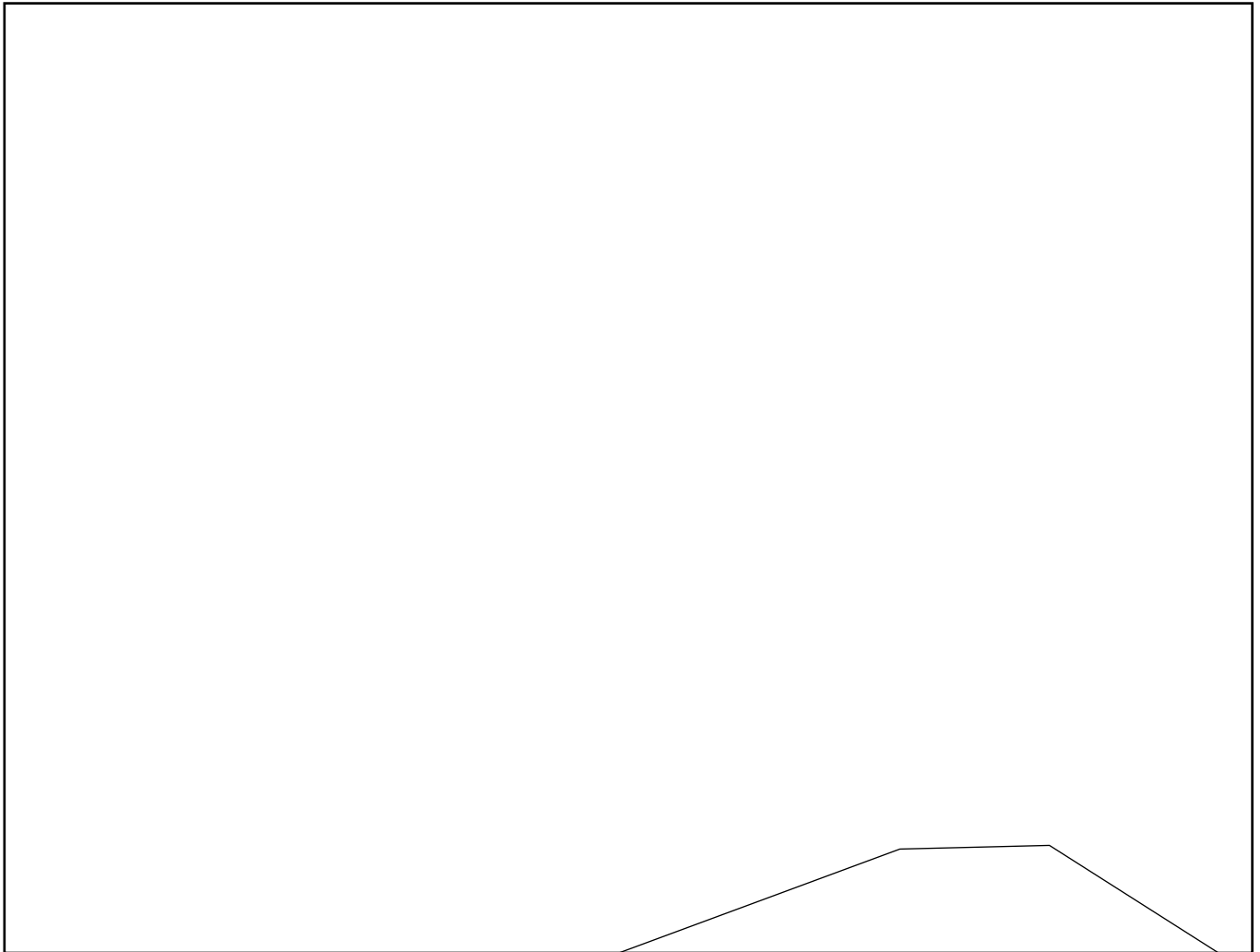
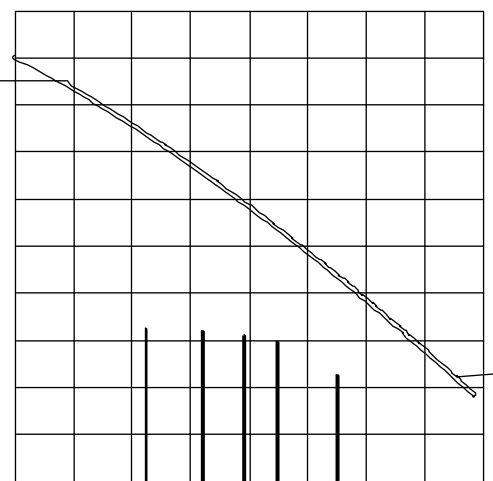


Fig. 1 - Current Ratings Characteristic



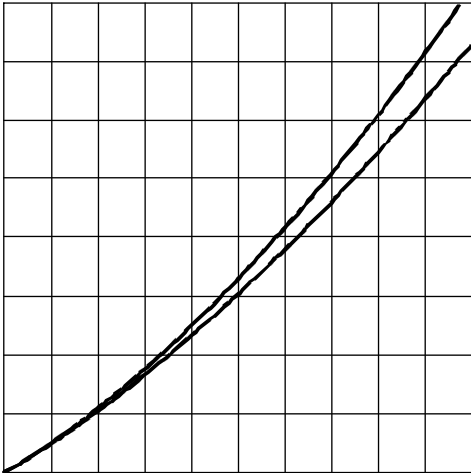


Fig. 3 - On-state Power Loss Characteristics

Fig. 4 - On-state Power Loss Characteristics

Fig. 5 - Maximum Non-Repetitive Surge Current

Fig. 6 - Maximum Non-Repetitive Surge Current

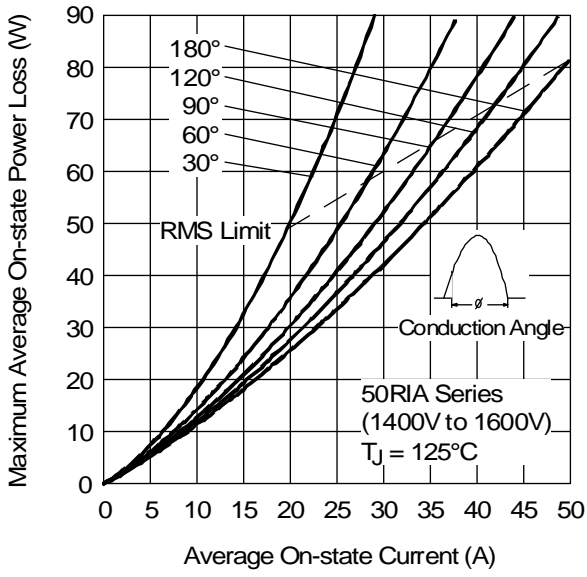


Fig. 9 - On-state Power Loss Characteristics

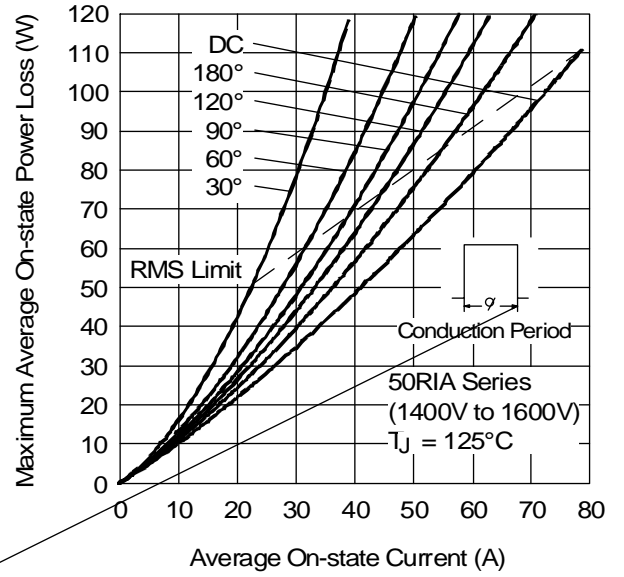


Fig. 10 - On-state Power Loss Characteristics

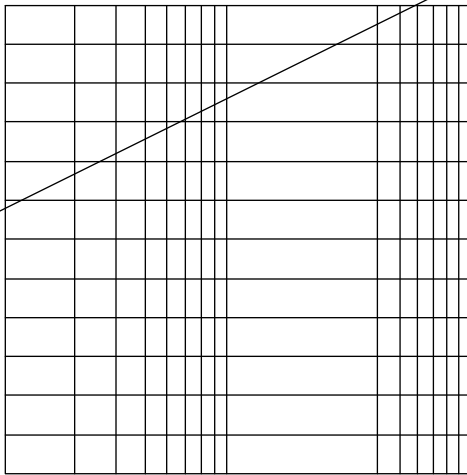


Fig. 11 - Maximum Non-Repetitive Surge Current

Fig. 12 - Maximum Non-Repetitive Surge Current

Fig. 14 - Forward Voltage Drop Characteristics

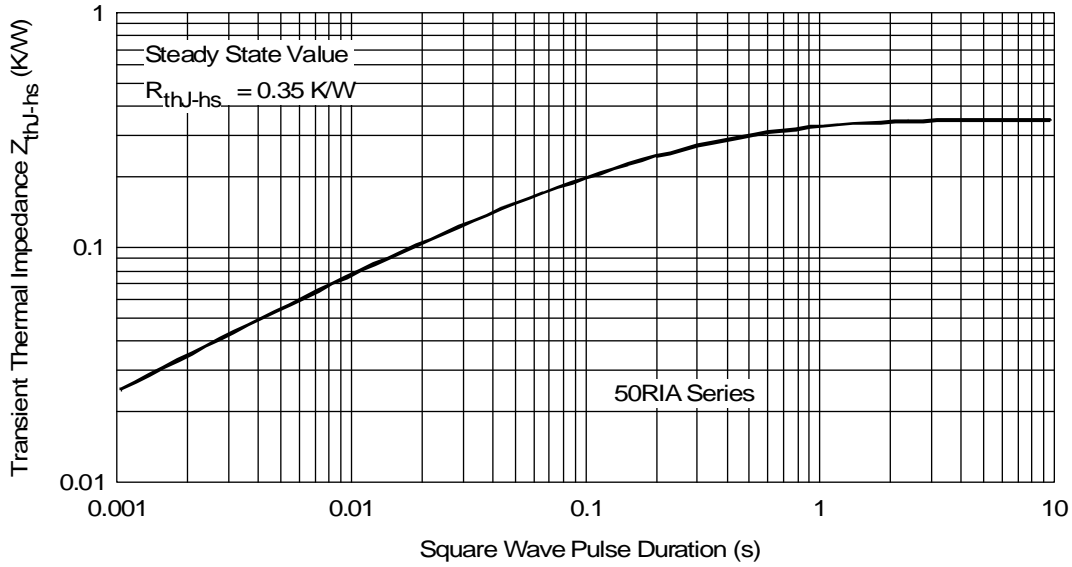


Fig. 15 - Thermal Impedance Z_{thJC} Characteristics

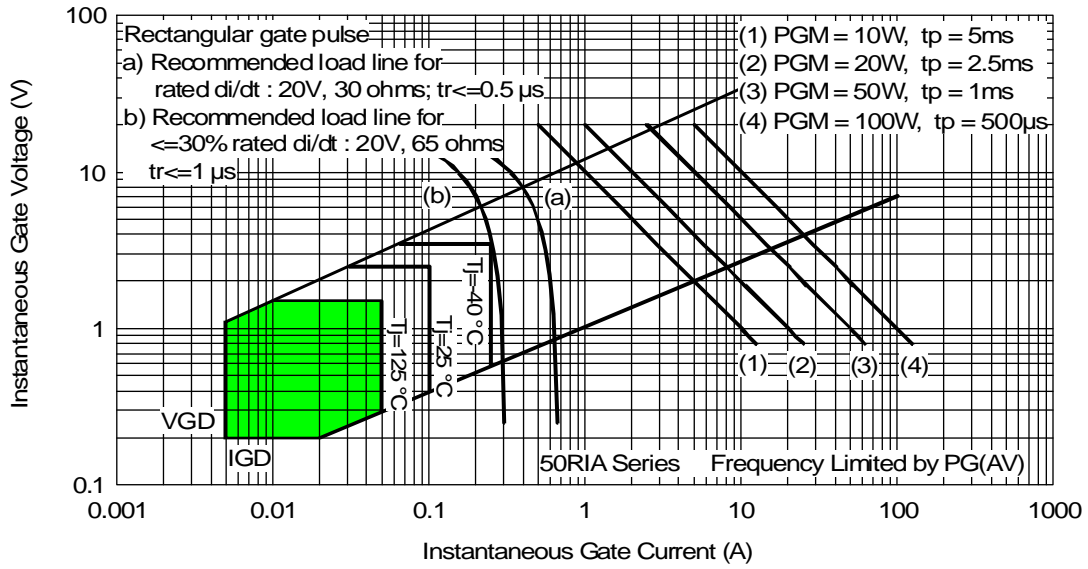


Fig. 16 - Gate Characteristics