K16RIA

Medium Power Thyristors

STUD VERSION

Liujing rectifier co., Ltd.

FEATURES

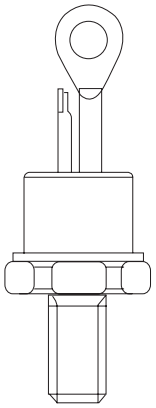
1). Improved glass passivation for high reliability and exceptional stability at high temperature
2). High di/dt and dv/dt capabilities
3). Standard package
4). Low thermal resistance
5). Metric threads version available
6). Types up to 1600V V_{DRM}/ V_{RRM}

TYPICAL APPLICATIONS

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

MAJOR RATINGS AND CHARACTERISTICS

Parameters		K16RIA		Unit
		10 to 120	140 to 160	
$I_{F(AV)}$		16	16	A
	@ T_C	85	85	℃
$I_{F(RMS)}$		35	35	A
I_{FSM}	@ 50Hz	340	225	A
	@ 60Hz	360	235	A
I^2t	@ 50Hz	574	255	A^2s
	@ 60Hz	524	235	A^2s
V_{DRM}/V_{RRM}		100 to 1200	1400 to 1600	V
T_q	typical	110		μs
T_J		- 65 to 125		℃



ELECTRICAL SPECIFICATIONS

1). Voltage Ratings

Type number	Voltage Code	V_{DRM}/V_{RRM}, maximum repetitive peak reverse voltage *(1)	V_{RSM}, maximum non-repetitive peak reverse voltage *(2)	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max
		V	V	mA
K16RIA	10	100	150	20
	20	200	300	10
	40	400	500	
	60	600	700	
	80	800	900	
	100	1000	1100	
	120	1200	1300	
	140	1400	1500	
	160	1600	1700	

*(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 tp ≤ 5ms

2). Forward Conduction

Parameters		K16RIA		Unit	Conditions		
		10 to 120	140 to 160				
$I_{T(AV)}$	Max. average forward current	16	16	A	180° conduction, half sine wave		
	@ Case temperature	85	85	℃			
$I_{T(RMS)}$	Max. RMS forward current	35	35	A			
I_{TSM}	Max. peak, one-cycle forward, non-repetitive surge current	340	225	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max.
		360	235		t = 8.3ms		
		285	190		t = 10ms	100% V_{RRM} reapplied	
		300	200		t = 8.3ms		
I^2t	Maximum I^2t for fusing	574	255	A^2s	t = 10ms	No voltage reapplied	
		524	235		t = 8.3ms		
		405	180		t = 10ms	100% V_{RRM} reapplied	
		375	165		t = 8.3ms		
$I^2\surd t$	Maximum $I^2\surd t$ for fusing	5740	2550	$A^2\surd s$	t = 0.1 to 10ms, no voltage reapplied		
$V_{T(TO)1}$	Low level value of threshold voltage	0.97	1.14	V	(16.7%x π x $I_{F(AV)}$<I< π x $I_{F(AV)}$), $T_J=T_J$ max.		
$V_{T(TO)2}$	High level value of threshold voltage	1.24	1.31		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
r_{t1}	Low level value of forward slope resistance	17.9	14.83	mΩ	(16.7% x π x $I_{F(AV)}$<I< π x$I_{F(AV)}$), $T_J=T_J$ max.		
r_{t2}	High level value of forward slope resistance	13.6	12.03		(I > π x $I_{F(AV)}$), $T_J = T_J$ max.		
V_{TM}	Max. forward voltage drop	1.75	-	V	I_{pk}= 50A, T_J = 25℃ t_p = 10ms sine pulse		
		-	1.80				
I_H	Maximum holding current	130		mA	T_J = 25° C, anode supply 12V resistive load		
I_L	Typical latching current	200					
di/dt	Max. rate of rise of turned-on current			A/μs			
	VDRM ≤ 600V	200			$T_J = T_J$ max., V_{DM} = rated V_{DRM} Gate pulse = 20V, 15Ω, t_p = 6 μs, tr = 0.1 μs max. I_{TM} = (2x rated di/dt) A		
	VDRM ≤ 800V	180					
	VDRM ≤ 1000V	160					
	VDRM ≤ 1600V	150					
t_{gt}	Typical turn-on time	0.9		μs	T_J=25℃, at = rated V_{DRM}/V_{RRM}, T_J=125℃		
t_{rr}	Typical reverse recovery time	4			$T_J=T_J$ max., $I_{TM}=I_{T(AV)}$, t_p>200 μs, di/dt = -10A/μs		
t_q	Typical turn-off time	110			$T_J = T_J$ max., $I_{TM} = I_{T(AV)}$, t_p > 200 μs, V_R = 100V, di/dt = -10A/μs, dv/dt = 20V/μs linear to 67% V_{DRM}, gate bias 0V-100W		
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}		

(*) t_q = 10 μ sup to 600V, t_q = 30 μ s up to 1600V available on special request.
(**) Available with: dv/dt = 1000V/μs, to complete code add S90 i.e. K16RIA120S90.

3). Triggering

Parameters		K16RIA	Unit	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 60 35	mA	T_J = - 65℃ T_J = 25℃ T_J = 125℃ Max. required gate trigger current/ voltage are the lowest value which will trigger all units 6V anode-to-cathode applied
V_{GT}	DC gate voltage required to trigger	3.0 2.0 1.0	 V V	T_J = - 65℃ T_J = 25℃ T_J = 125℃
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
T_J	Max. operating temperature range	- 65 to 125	℃	
T_{stg}	Max. storage temperature range	- 65 to 125	℃	
R_{thJC}	Max. thermal resistance, junction to case	0.86	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)	See Outline Table
	Case style	TO-48		

Δ R_{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°	0.21	0.15	K/W	$T_J = T_J$ max.
120°	0.25	0.25		
90°	0.31	0.34		
60°	0.45	0.47		
30°	0.76	0.76		

PERFORMANCE CURVES FIGURE

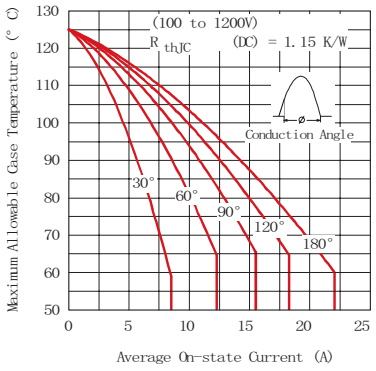


Fig.1 -Current Ratings Characteristic

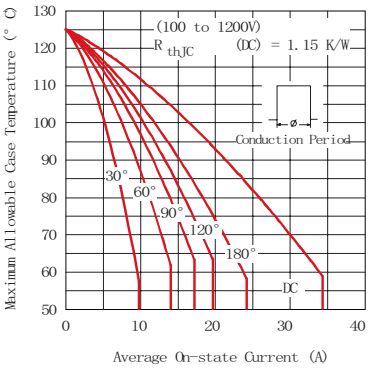


Fig.2 -Current Ratings Characteristic

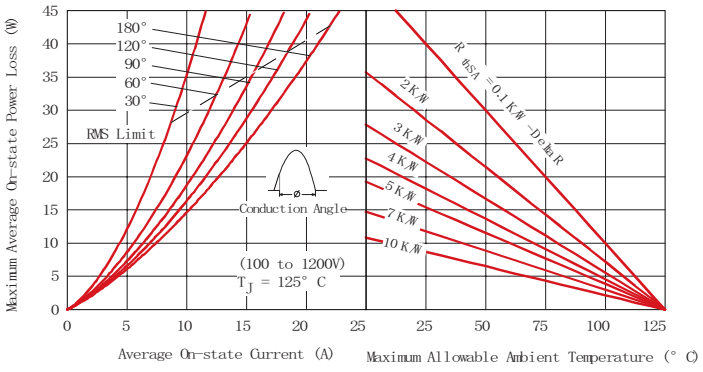


Fig. 3 - On-state Power Loss Characteristics

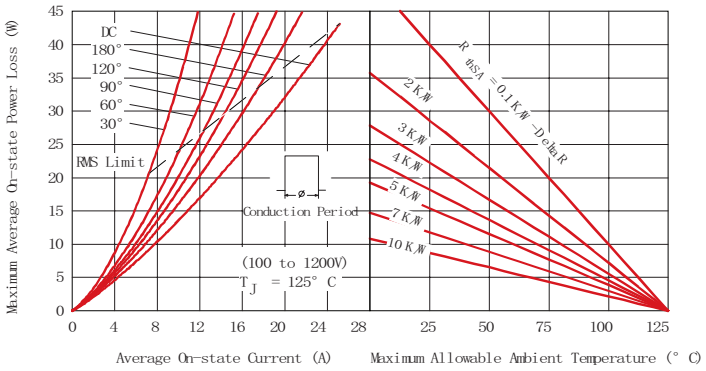
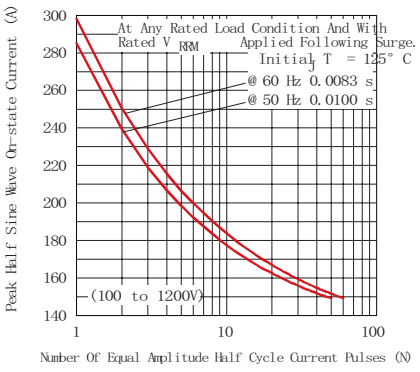
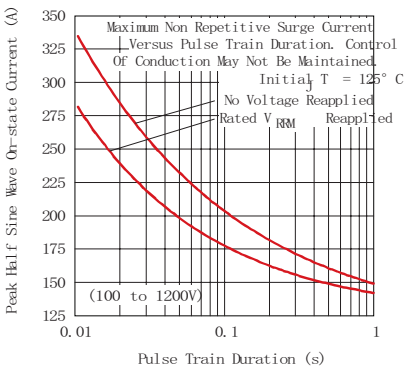


Fig. 4 - On-state Power Loss Characteristics





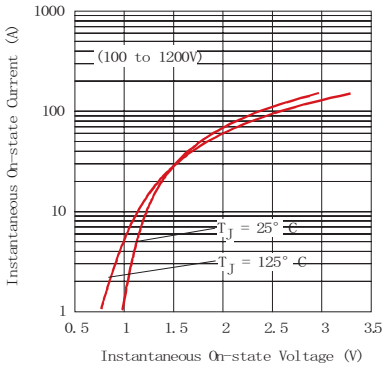


Fig. 7 - Forward Voltage Drop Characteristics

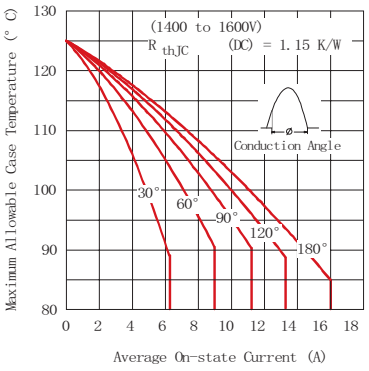


Fig. 8 - Current Ratings Characteristics

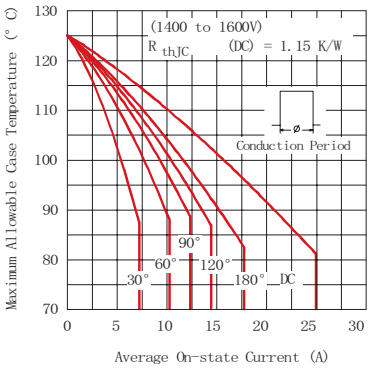


Fig. 9 - Current Ratings Characteristics

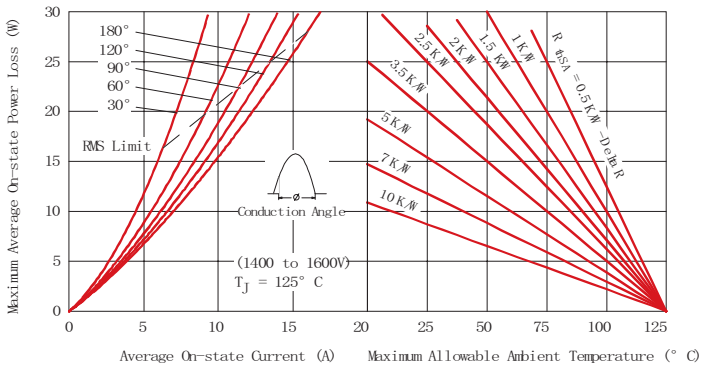


Fig. 10 - On-state Power Loss Characteristics

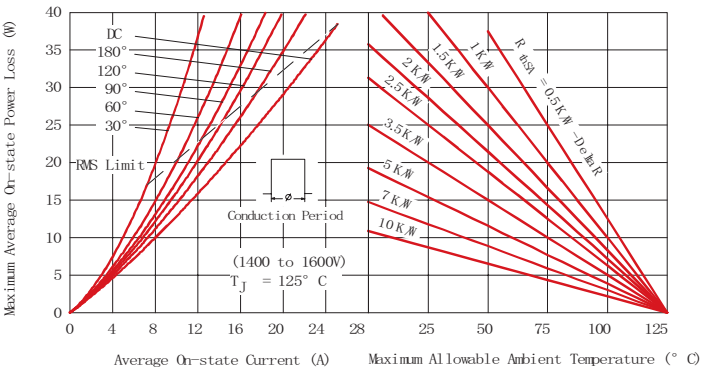


Fig. 11 - On-state Power Loss Characteristics

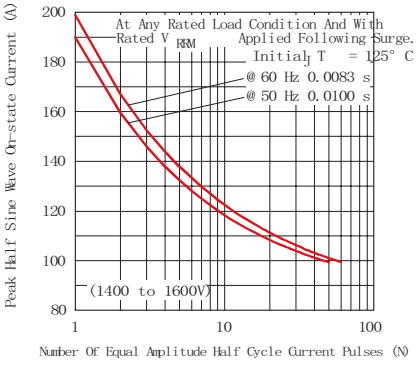


Fig. 12 - Maximum Non-Repetitive Surge Current

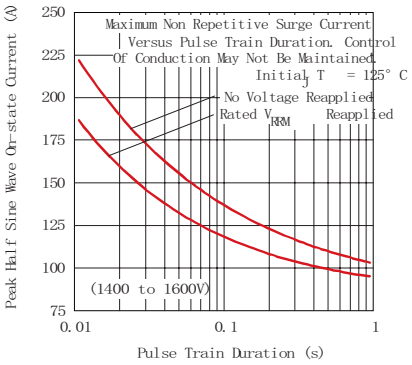


Fig. 13 - Maximum Non-Repetitive Surge Current

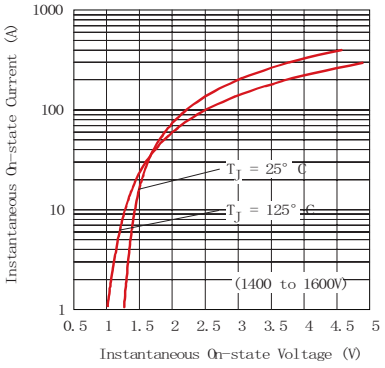


Fig. 14 - Forward Voltage Drop Characteristics

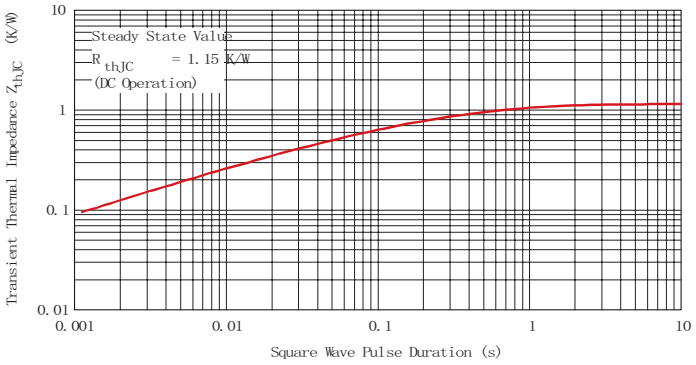


Fig. 15 - Thermal Impedance Z_{thJC} Characteristics

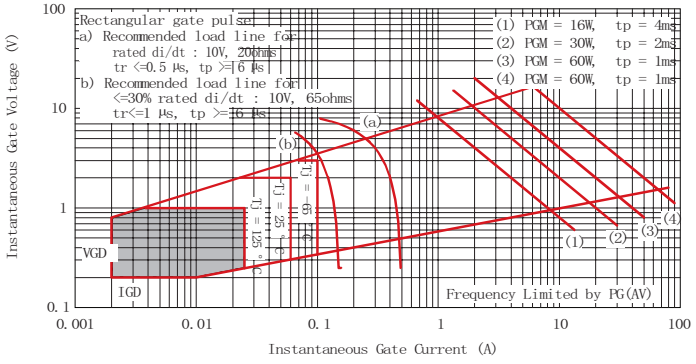
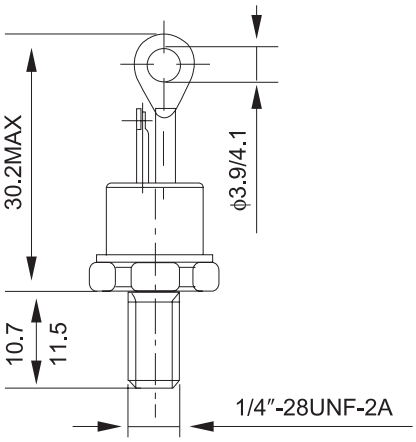
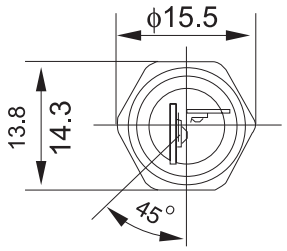


Fig. 16 - Gate Characteristics

OUTLINE





*FOR METRIC DEVICE:M6×1

Case Style TO-48

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