

110/111RKI SERIES

PHASE CONTROL THYRISTORS

Stud Version

Features

- High current and high surge ratings
- Hermetic ceramic housing

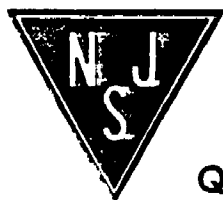
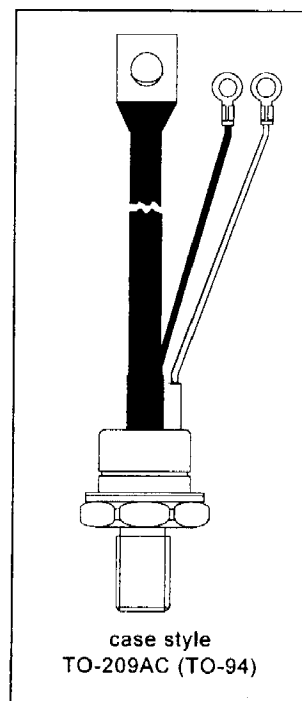
110A

Typical Applications

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

Major Ratings and Characteristics

Parameters	110/111RKI	Units
$I_{T(AV)}$	110	A
$@ T_C$	90	$^{\circ}\text{C}$
$I_{T(RMS)}$	172	A
I_{TSM}		
$@ 50\text{Hz}$	2080	A
$@ 60\text{Hz}$	2180	A
I^2t		
$@ 50\text{Hz}$	21.7	KA^2s
$@ 60\text{Hz}$	19.8	KA^2s
V_{DRM}/V_{RRM}	400 to 1200	V
t_q	typical 110	μs
T_J	- 40 to 140	$^{\circ}\text{C}$



Quality Semi-Conductors

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Blocking

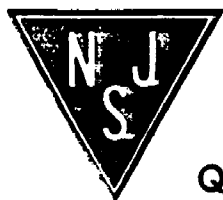
Parameter	110/111RKJ	Units	Conditions
dv/dt Maximum critical rate of rise of off-state voltage	500	V/ μ s	$T_J = T_J \text{ max.}$ linear to 80% rated V_{DRM}
$I_{RRM/DRM}$ Max. peak reverse and off-state leakage current	20	mA	$T_J = T_J \text{ max.}$ rated V_{DRM}/V_{RRM} applied

Triggering

Parameter	110/111RKJ	Units	Conditions
P_{GM} Maximum peak gate power	12	W	$T_J = T_J \text{ max.}$ $t_p \leq 5\text{ms}$
$P_{G(AV)}$ Maximum average gate power	3.0		$T_J = T_J \text{ max.}$ $f = 50\text{Hz}$, $d\% = 50$
I_{GM} Max. peak positive gate current	3.0	A	$T_J = T_J \text{ max.}$ $t_p \leq 5\text{ms}$
$+V_{GM}$ Maximum peak positive gate voltage	20	V	$T_J = T_J \text{ max.}$ $t_p \leq 5\text{ms}$
$-V_{GM}$ Maximum peak negative gate voltage	10		
I_{GT} DC gate current required to trigger	TYP.	MAX.	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 140^\circ\text{C}$ Max. required gate trigger/ current/ voltage are the lowest value which will trigger all units 12V anode-to-cathode applied
	180	-	
	80	120	
V_{GT} DC gate voltage required to trigger	2.5	-	$T_J = -40^\circ\text{C}$ $T_J = 25^\circ\text{C}$ $T_J = 140^\circ\text{C}$
	1.6	2	
	1	-	
I_{GD} DC gate current not to trigger	6.0	mA	$T_J = T_J \text{ max}$
V_{GD} DC gate voltage not to trigger	0.25	V	

Thermal and Mechanical Specification

Parameter	110/111RKJ	Units	Conditions
T_J Max. operating temperature range	-40 to 140	$^\circ\text{C}$	
T_{stg} Max. storage temperature range	-40 to 150		
R_{thJC} Max. thermal resistance, junction to case	0.27	K/W	DC operation
R_{thCS} Max. thermal resistance, case to heatsink	0.1		Mounting surface, smooth, flat and greased
T Mounting torque, $\pm 10\%$	15.5	Nm (lbf-in)	Non lubricated threads
	(137)		
	14 (120)		Lubricated threads
wl Approximate weight	130	g	
Case style	TO-209AC (TO-94)		See Outline Table



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ELECTRICAL SPECIFICATIONS

Voltage Ratings

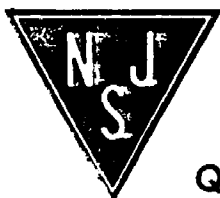
Type number	Voltage Code	V_{DRM}/V_{RRM} max. repetitive peak and off-state voltage V	V_{RSM} maximum non-repetitive peak voltage V	I_{DRM}/I_{RRM} max. @ $T_J = T_J$ max. mA
110/111RKI	40	400	500	20
	80	800	900	
	120	1200	1300	

On-state Conduction

Parameter	110/111RKI	Units	Conditions
$I_{T(AV)}$ Max. average on-state current @ Case temperature	110 90	A °C	180° conduction, half sine wave
$I_{T(RMS)}$ Max. RMS on-state current	172	A	DC @ 83°C case temperature
I_{TSM} Max. peak, one-cycle non-repetitive surge current	2080		t = 10ms No voltage
	2180		t = 8.3ms reapplied
	1750		t = 10ms 100% V_{RRM}
	1830		t = 8.3ms reapplied
I^2t Maximum I^2t for fusing	21.7	KA ² s	t = 10ms No voltage
	19.8		t = 8.3ms reapplied
	15.3		t = 10ms 100% V_{RRM}
	14.0		t = 8.3ms reapplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	217	KA ² √s	t = 0.1 to 10ms, no voltage reapplied
$V_{T(TO1)}$ Low level value of threshold voltage	0.82	V	$(16.7\% \times \pi \times I_{T(AV)}) < I < \pi \times I_{T(AV)}$, $T_J = T_J$ max.
$V_{T(TO2)}$ High level value of threshold voltage	1.02		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.
r_{11} Low level value of on-state slope resistance	2.16	mΩ	$(16.7\% \times \pi \times I_{T(AV)}) < I < \pi \times I_{T(AV)}$, $T_J = T_J$ max.
r_{12} High level value of on-state slope resistance	1.70		$(I > \pi \times I_{T(AV)})$, $T_J = T_J$ max.
V_{TM} Max. on-state voltage	1.57	V	$I_{pk} = 350A$, $T_J = T_J$ max., $t_p = 10ms$ sine pulse
I_H Maximum holding current	200	mA	$T_J = 25^\circ C$, anode supply 6V resistive load
I_L Typical latching current	400		

Switching

Parameter	110/111RKI	Units	Conditions
di/dt Max. non-repetitive rate of rise of turned-on current	300	A/μs	Gate drive 20V, 20Ω, $t_i \leq 1\mu s$ $T_J = T_J$ max, anode voltage $\leq 80\% V_{DRM}$
t_d Typical delay time	1	μs	Gate current 1A, $di_g/dt = 1A/\mu s$ $V_d = 0.67\% V_{DRM}$, $T_J = 25^\circ C$
t_q Typical turn-off time	110		$I_{TM} = 50A$, $T_J = T_J$ max., $di/dt = -5A/\mu s$, $V_R = 50V$ $dv/dt = 20V/\mu s$, Gate 0V 25Ω



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