


## DESCRIPTION

The RH111 is a general purpose voltage comparator. The RH111 offers maximum input offset voltage of 3mV and input offset current of 10nA with a typical response time of 200ns. The RH111 can operate from a single 5V supply to  $\pm 15V$  supplies and can drive up to 50mA loads referred to ground or either supply. A separate output Ground pin allows output signals to be isolated from analog ground.

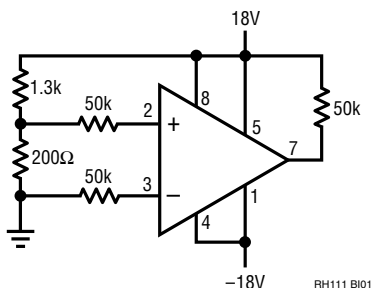
The wafer lots are processed to the requirements of Linear Technology's in-house Class S flow to yield circuits usable in precision space applications.

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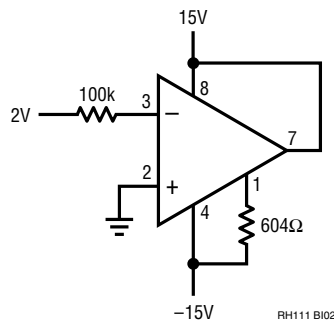
## ABSOLUTE MAXIMUM RATINGS

Supply Voltage (Pin 8 to Pin 4) .....	36V
Output to Negative Supply (Pin 7 to Pin 4) .....	35V
Ground to Negative Supply (Pin 1 to Pin 4) .....	30V
Differential Input Voltage .....	35V
Voltage at Strobe Pin (Pin 6 to Pin 8) .....	5V
Input Voltage (Note 1) .....	$\pm 15V$
Output Short-Circuit Duration .....	10 sec
Operating Temperature	
Range (Note 2) .....	$-55^{\circ}C$ to $125^{\circ}C$
Storage Temperature Range .....	$-65^{\circ}C$ to $150^{\circ}C$
Lead Temperature (Soldering, 10 sec) .....	$300^{\circ}C$

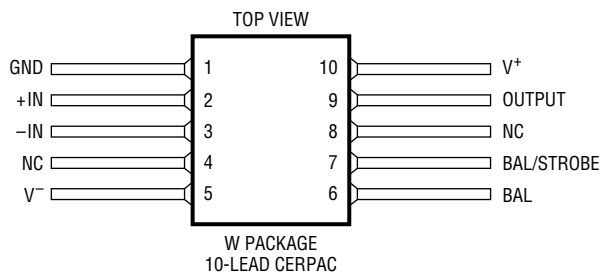
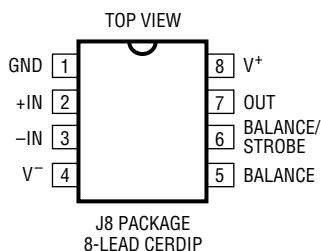
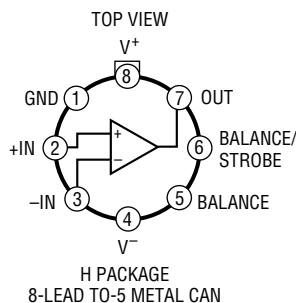
## BURN-IN CIRCUIT



OR



## PACKAGE/ORDER INFORMATION



**TABLE 1: ELECTRICAL CHARACTERISTICS** (Preirradiation) (Note 9)

SYMBOL	PARAMETER	CONDITIONS	NOTES	$T_A = 25^\circ\text{C}$			SUB-GROUP	$-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$			SUB-GROUP	UNITS	
				MIN	TYP	MAX		MIN	TYP	MAX			
$V_{OS}$	Input Offset Voltage	$R_S \leq 50k$	3,4			3.0	1			4.0	2,3	mV	
$I_{OS}$	Input Offset Current		3,4			10	1			20	2,3	nA	
$I_B$	Input Bias Current		3			100	1			150	2,3	nA	
$A_{VOL}$	Large-Signal Voltage Gain		7		40		4					V/mV	
	Input Voltage Range	$V_S = \pm 15V, V_{PIN7} \leq 5V$			-14.5	13.0	1		-14.5	13.0	2,3	V	
$t_D$	Response Time		5		200							ns	
$V_{OL}$	Output Saturation Voltage	$V_{IN}^- = 5mV, I_{OUT} = 50mA, V^+ \geq 4.5V, V^- = 0V$	8			1.5	1						V
				$V_{IN}^- = 6mV, I_{OUT} = 8mA$	8		0.4	1		0.4	2,3	V	
	Output Leakage Current	$V_{IN}^+ = 5mV, I_{STROBE} = 3mA, V_{OUT} = 20V, V_{GND} = -15V$				10	1			500	2,3	nA	
	Positive Supply Current		8			6.0	1					mA	
	Negative Supply Current		8			5.0	1					mA	
	Strobe Current	Minimum to Ensure Output Transistor Is Turned Off	6		3							mA	
	Input Capacitance				6							pF	

**TABLE 1A: ELECTRICAL CHARACTERISTICS** (Postirradiation) (Note 9)

SYMBOL	PARAMETER	CONDITIONS	NOTES	10KRAD(Si)		20KRAD(Si)		50KRAD(Si)		100KRAD(Si)		200KRAD(Si)		UNITS	
				MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
$V_{OS}$	Input Offset Voltage	$R_S \leq 50k$				3.0	3.0	3.0	3.0	3.0	3.0	4.0		mV	
$I_{OS}$	Input Offset Current					10	10	10	10	25	25	50		nA	
$I_B$	Input Bias Current					100	150	200	200	300	300	400		nA	
$A_{VOL}$	Large-Signal Voltage Gain		7		40	40	40	40	40	40	40	25		V/mV	
	Input Voltage Range	$V_S = \pm 15V, V_{PIN7} \leq 5V$			-14.5	13.0	-14.5	13.0	-14.5	13.0	-14.5	13.0	-14.5	13.0	V
$V_{OL}$	Output Saturation Voltage	$V_{IN}^- = 5mV, I_{OUT} = 50mA, V^+ \geq 4.5V, V^- = 0V$	8			1.5	1.5	1.5	1.5	1.5	1.5	1.5		V	
				$V_{IN}^- = 6mV, I_{OUT} = 8mA$	8		0.4	0.4	0.4	0.4	0.4	0.4	0.4		V
	Output Leakage Current	$V_{IN}^+ = 5mV, I_{STROBE} = 3mA, V_{OUT} = 20V, V_{GND} = -15V$			10	10	10	10	100	100	100	100		nA	
	Positive Supply Current		8		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		mA	
	Negative Supply Current		8		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		mA	
	Strobe Current	Minimum to Ensure Output Transistor Is Turned Off	6		3 (Typ)	3(Typ)	3(Typ)	3(Typ)	3(Typ)	3(Typ)	3(Typ)	3(Typ)		mA	
	Input Capacitance				6 (Typ)	6(Typ)	6(Typ)	6(Typ)	6(Typ)	6(Typ)	6(Typ)	6(Typ)		pF	

**Note 1:** Applicable for  $\pm 15\text{V}$  supplies. The positive input voltage limit is 30V above the negative supply. The negative input voltage limit is the negative supply.

**Note 2:**  $T_{J\text{MAX}} = 150^\circ\text{C}$

**Note 3:** Offset voltage, offset current and bias current specifications apply for any supply voltage from a single 5V up to  $\pm 15\text{V}$  supplies.

**Note 4:** Offset voltage and offset currents shown are the maximum values required to drive the output within a volt of either supply with a 1mA load. These parameters define an error band and take into account the worst-case effects of voltage gain and input impedance.

**Note 5:** Response time is specified for a 100mV input step with 5mV overdrive with the collector output terminated with a 500 $\Omega$  pull-up resistor tied to 5V.

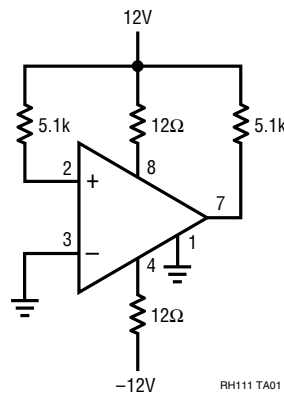
**Note 6:** Do not short the Strobe pin to ground. It should be current driven at 3mA to 5mA for the shortest strobe time. Currents as low as 500 $\mu\text{A}$  will strobe the RH111 if speed is not important. External leakage on the Strobe pin in excess of 0.2 $\mu\text{A}$  when the strobe is "off" can cause offset voltage shifts.

**Note 7:**  $R_L = 1\text{k}\Omega, -10\text{V} \leq V_{\text{OUT}} \leq 14.5\text{V}$

**Note 8:**  $V_{\text{GND}} = 0\text{V}$ .

**Note 9:**  $V_S = \pm 15\text{V}, V_{\text{CM}} = 0\text{V}, V_{\text{GND}} = V^-, T_A = 25^\circ\text{C}$ , unless otherwise noted.

## TOTAL DOSE BIAS CIRCUIT



## TABLE 2: ELECTRICAL TEST REQUIREMENTS

MIL-STD-883 TEST REQUIREMENTS	SUBGROUP
Final Electrical Test Requirements (Method 5004)	1*, 2, 3, 4
Group A Test Requirements (Method 5005)	1, 2, 3, 4
Group B and D End Point Electrical Parameters (Method 5005)	1, 2, 3

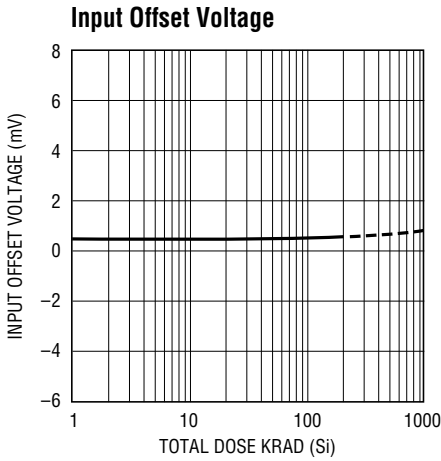
\* PDA Applies to subgroup 1. See PDA Test Notes.

### PDA Test Notes

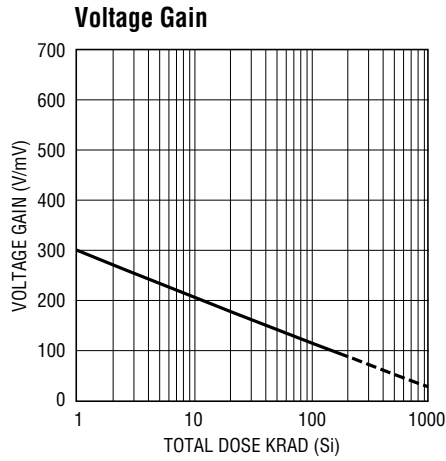
The PDA is specified as 5% based on failures from group A, subgroup 1, tests after cooldown as the final electrical test in accordance with method 5004 of MIL-STD-883 Class B. The verified failures of group A, subgroup 1, after burn-in divided by the total number of devices submitted for burn-in in that lot shall be used to determine the percent for the lot.

Linear Technology Corporation reserves the right to test to tighter limits than those given.

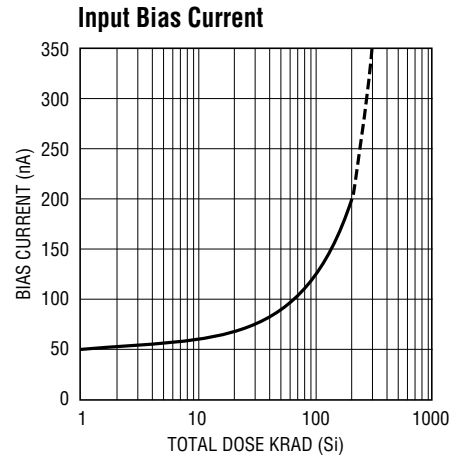
# TYPICAL PERFORMANCE CHARACTERISTICS



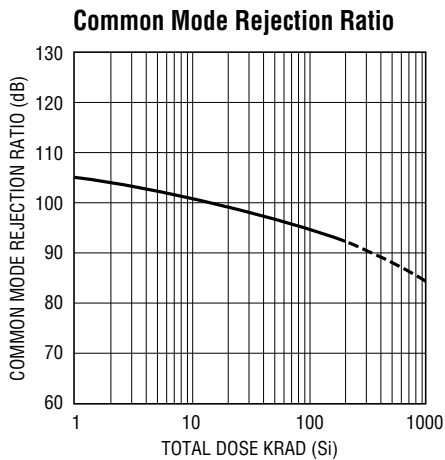
RH111 G01



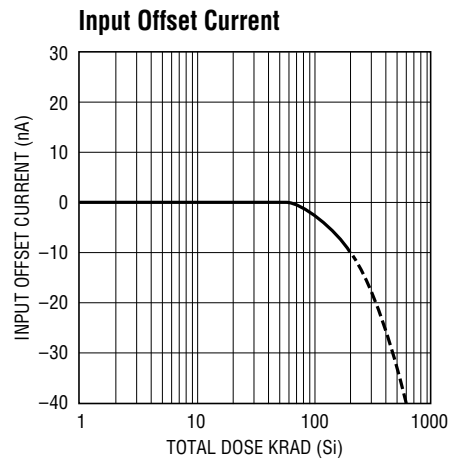
RH111 G02



RH111 G03



RH111 G04



RH111 G05