



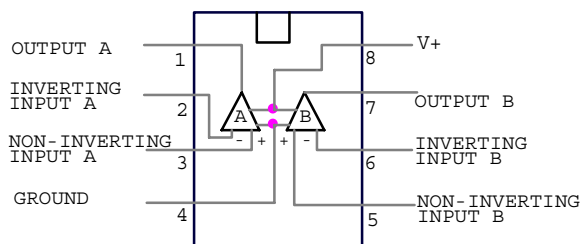
Dual Differential Comparators

GENERAL DESCRIPTION

The LND393 consists of two independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max for two comparators. They are specifically designed to operate from a single power supply over a wide range of voltages. In addition, the comparators have the unique ability in that the input common-mode voltage range includes ground, while operated from a single power supply voltage. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Application areas include limit comparators, simple analog to digital converters, pulse, squarewave and time delay generators: wide range VCO, MOS clock timers, multi-vibrators and high voltage digital logic gates. The LND393 was designed to directly interface with TTL and CMOS. When the LND393 is operated from both plus and minus power supplies, it will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators.

PIN CONFIGURATION



FEATURES

- Wide supply (Voltage range single and dual supplies 5V to 30V, $\pm 2.5V$ to $\pm 15V$)
- Very Low supply current drain(0.8mA)
- Low input biasing current(25nA)
- Low input offset voltage($\pm 5nA$)
- Maximum offset voltage($\pm 5mV$)
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Output voltage compatible with TTL, DTL,ECL ,MOS and CMOS logic systems

ADVANTAGES

- High precision comparators
- Reduce V_{OS} drift over temperature
- Power drain suitable for battery operation
- Compatible with all forms of logic
- Allows sensing near ground
- Eliminates need for dual supplies



ELECTRICAL CHARACTERISTICS

Parameter	Test Conditions *		Min	Typ	Max	Unit	
V_{IO} Input offset voltage	$V_{CC}=5V$ to $30V$ $V_{IC}=V_{ICR}$ min, $V_O=1.4V$	25°C		2	5	mV	
		Full range			9		
I_{IO} Input offset current	$V_O=1.4V$	25°C		5	50	nA	
		Full range			150		
I_{IB} Input bias current	$V_O=1.4V$	25°C		-25	-250	nA	
		Full range			-400		
V_{ICR} Common-mode input voltage range**		25°C	0		$V_{CC}-1.5$	V	
		Full Range	0		$V_{CC}-2$		
A_{VD} Large-signal differential voltage amplification	$V_{CC}=15V$ $V_O=1.4V$ to $11.4V$, $R_L \geq 15k\Omega$	25°C	50	200		V/mV	
I_{OH} High-level output current	$V_{OH}=5V$, $V_{ID}=1V$	25°C		0.1	50	nA	
	$V_{OH}=30V$, $V_{ID}=1V$	Full Range			1	μA	
V_{OL} Low-Level output voltage	$I_{OL}=4mA$, $V_{ID}=-1V$	25°C		150	400	mV	
		Full Range			700	mA	
I_{OL} Low-level output current	$V_{OL}=1.5V$, $V_{ID}=-1V$	25°C	6			mA	
I_{CC} Supply current	$R_L=\infty$	$V_{CC}=5V$	25°C		0.8	1	mA
		$V_{CC}=30V$	Full Range			2.5	mA

*Full range (MIN to Max), for the LND393 is 0°C to 70°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

**The voltage at either input or common-mode should not be allowed to go negative by more than 0.3V. The upper end of the common-mode voltage range is $V_{CC}-1.5V$, but either or both inputs can go to 30V without damage.

SWITCHING CHARACTERISTICS

Parameter	Test Conditions		Min	Typ	Max	Unit
Response time	R_L connected to 5V through 5.1 k Ω , $C_L=15pF$ *(see Note 1)	100-mV input step with 5-mV overdrive		1.3		μs
		TTL-level input step		0.3		

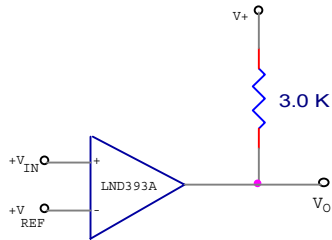
* C_L includes probe and jig capacitance.

Note 1: The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.

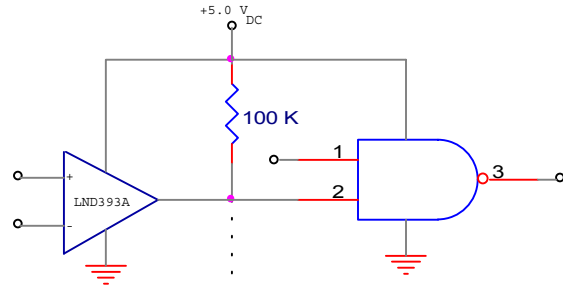


TYPICAL APPLICATIONS

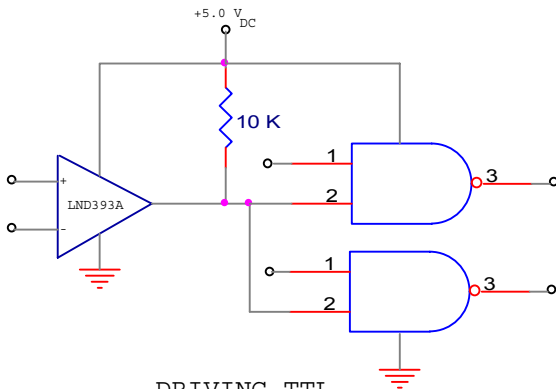
(V+ = 5.0Vdc)



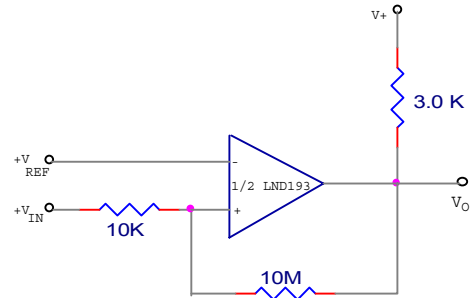
BASIC COMPARATOR



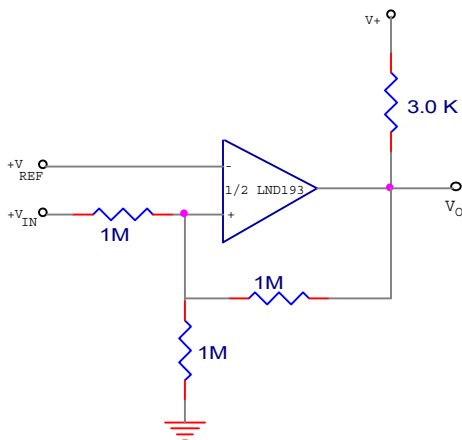
DRIVING CMOS



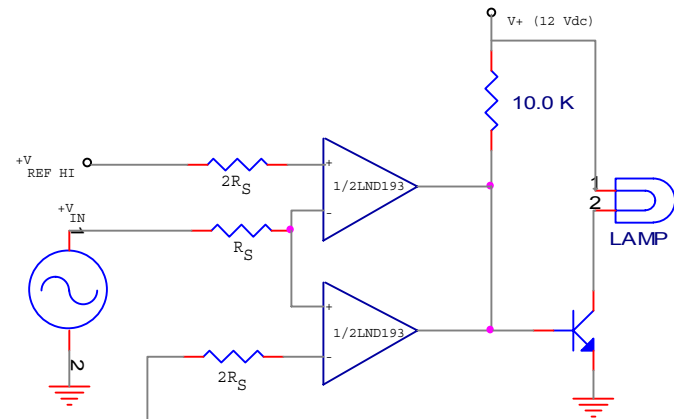
DRIVING TTL



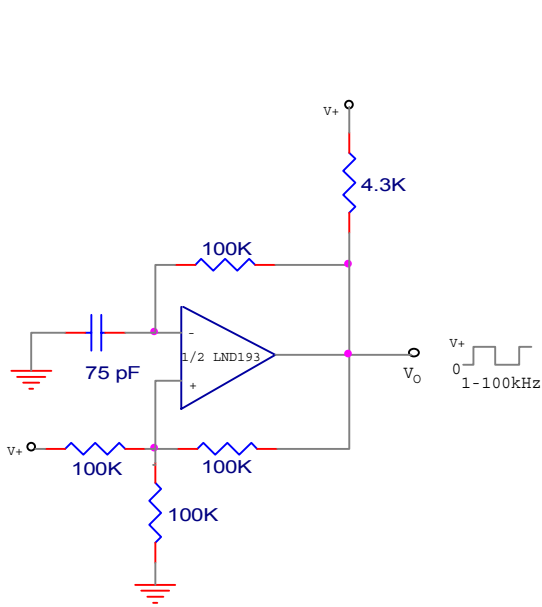
NON INVERTING COMPARATOR WITH HYSTERESIS



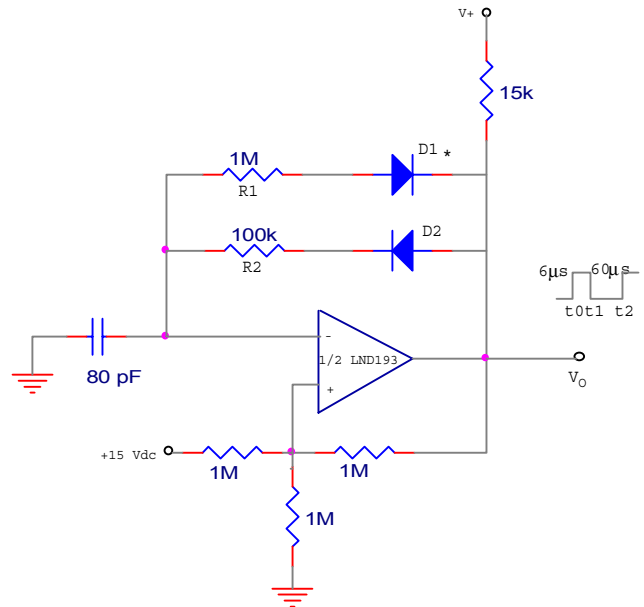
INVERTING COMPARATOR WITH HYSTERESIS



LIMIT COMPARATOR

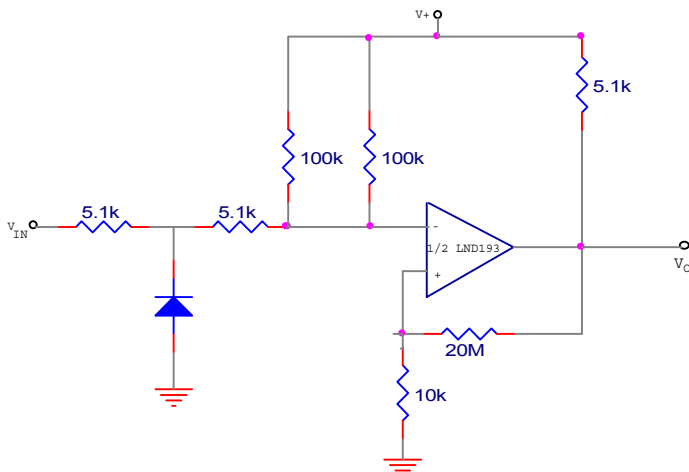


SQUAREWAVE OSCILLATOR



* For Large Raiois of R1/R2, D1 can be omitted.

PULSE GENERATOR



ZERO DETECTOR CROSSING
(SINGLE POWER SUPPLY)