



Quadruple Differential Comparators

GENERAL DESCRIPTION

The LND339 consists of four independent precision voltage comparators with an offset voltage as low as 2mV max for all four comparators, designed specifically to operate from a single power supply over a wide range of voltages. These comparators also have a unique characteristic in that the input common-mode voltage range includes ground, even though 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 LND339 was designed to directly interface with TTL and CMOS. When the LND339 series 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.

FEATURES

- Wide supply voltage range (5 to 30V_{DC} or ± 2.5 to ± 15 V_{DC})
- Very low supply current drain(0.8mA)-independent of supply voltage
- Low input biasing current: (25nA)
- Low input offset current(± 5 nA)
- Offset voltage(± 2 mV)
- Input common-mode voltage range includes GND
- 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
- Reduced V_{OS} drift over temperature
- Power drain suitable for battery operation
- Allows sensing near ground
- Compatible with all forms of logic
- 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 11.4 V, R _L ≥ 15kΩ	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	mV	
I _{OL} Low-level output current	V _{OL} = 1.5V, V _{ID} = -1V	25°C	6	16	mA	
I _{CC} Supply current	R _L = ∞	V _{CC} = 5V	25°C	0.8	2	mA
		V _{CC} = 30V	Full Range*		2.5	mA

*Full range (MIN to Max), for the LND339 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

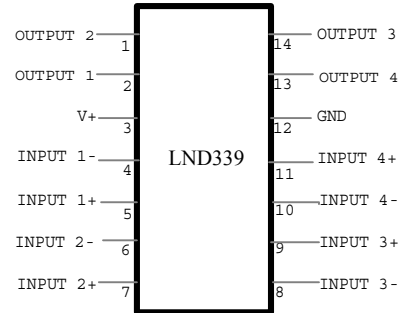
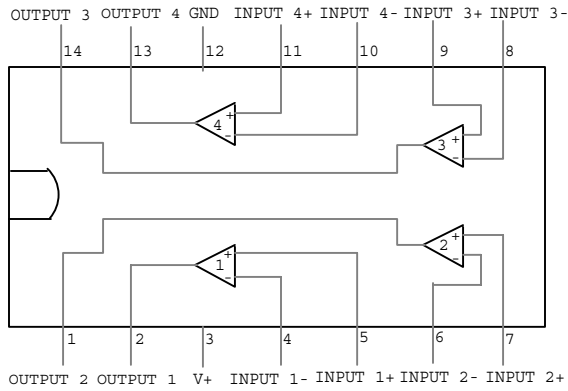
Parameter	Test Conditions	Min	Typ	Max	Unit
Response time	R _L connected to 5V through 5.1 kΩ, C _L = 15pF*(see Note 1)	100-mV input step with 5-mV overdrive		1.3	μs
		TTL-level input step		0.3	

*C_L includes probe and jig capacitance.

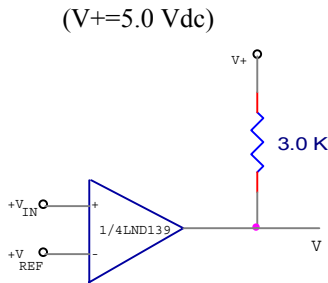
Note 1: The response time specified is the interval between the input step function and the instant when the output crosses 1.4V.



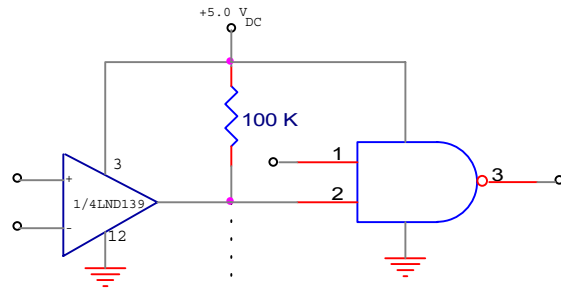
PIN CONFIGURATION



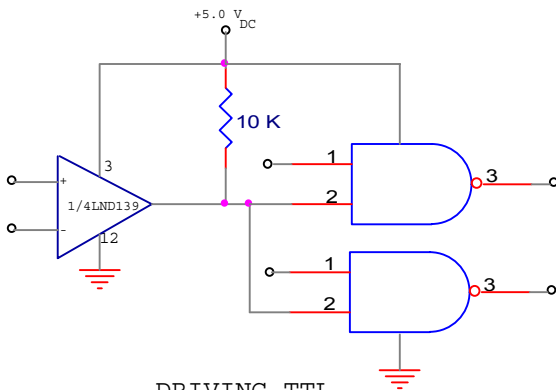
SOME TYPICAL APPLICATIONS



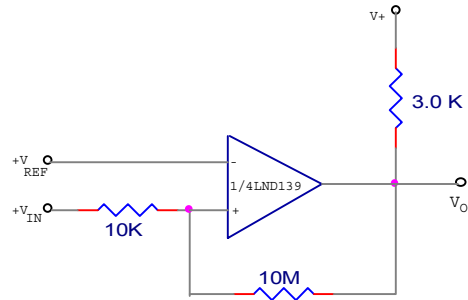
BASIC COMPARATOR



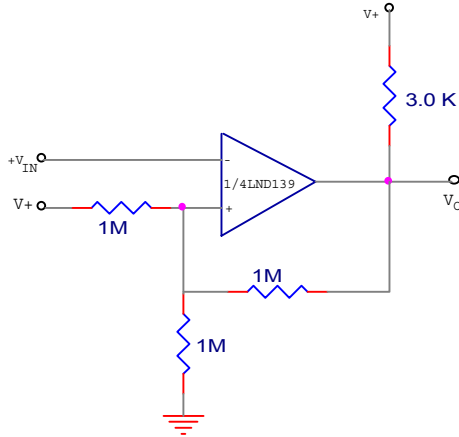
DRIVING CMOS



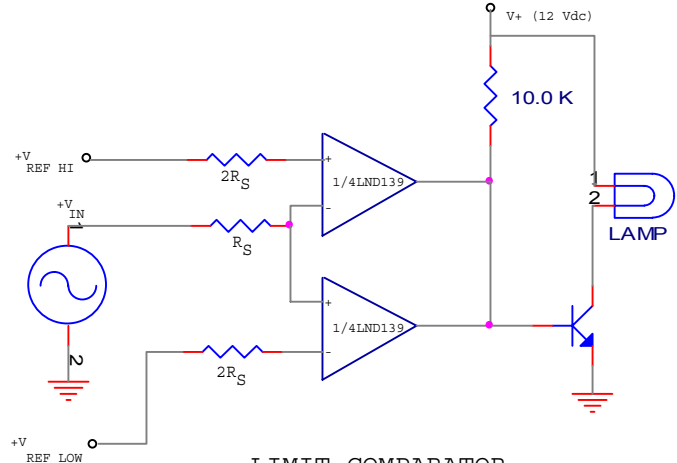
DRIVING TTL



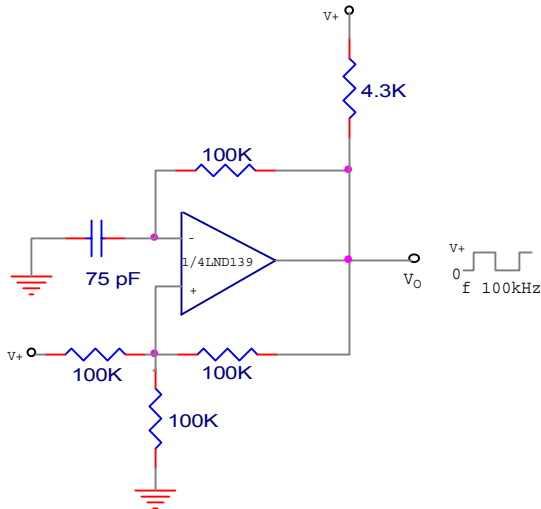
NON INVERTING COMPARATOR WITH HYSTERESIS



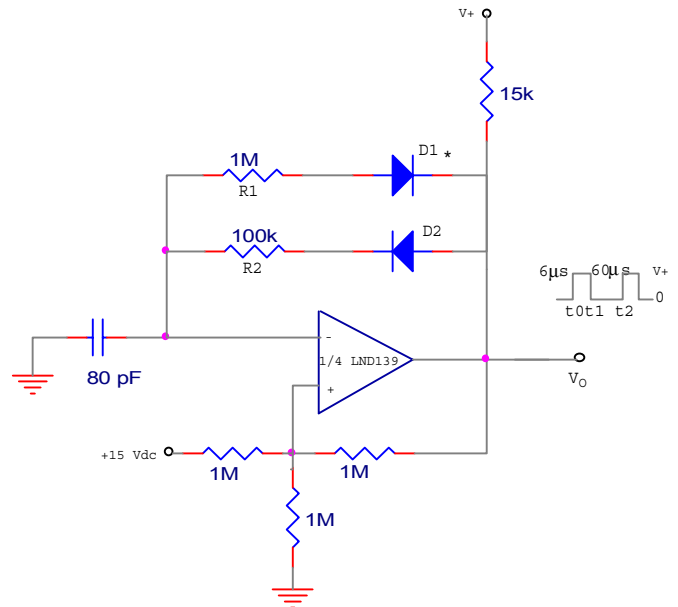
INVERTING COMPARATOR WITH HYSTERESIS



LIMIT COMPARATOR

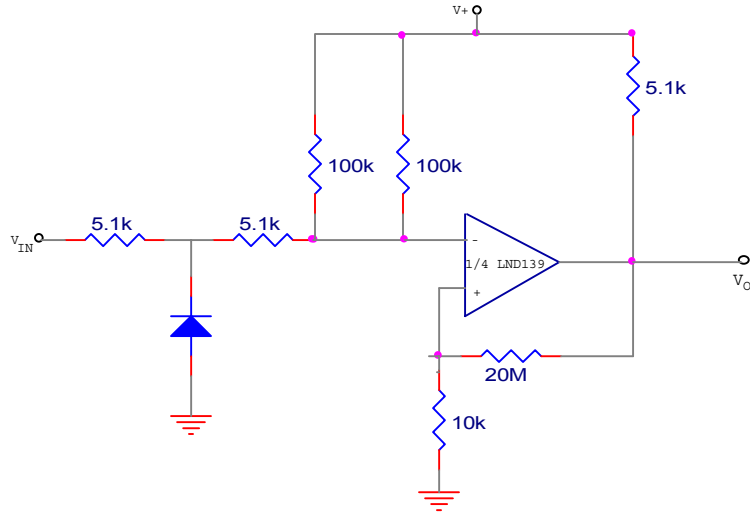


SQUAREWAVE OSCILLATOR



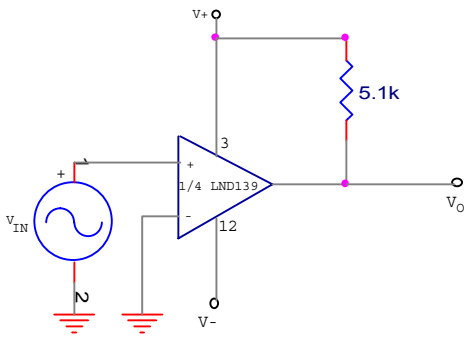
* For Large Raios of R1/R2, D1 can be omitted.

PULSE GENERATOR

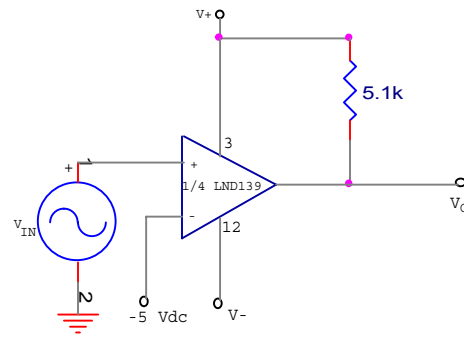


ZERO DETECTOR CROSSING
(SINGLE POWER SUPPLY)

SPLIT SUPPLY APPLICATIONS



ZERO CROSSING DETECTOR



COMPARATOR WITH A NEGATIVE REFERENCE