Dual voltage comparator

LM119

FEATURES

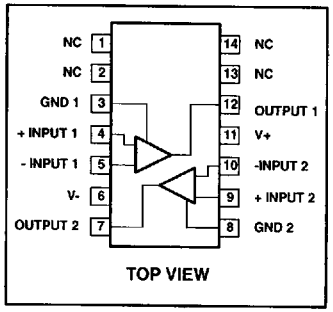
- Two independent comparators
- Operates from a single 5V supply
- Typically 80ns response time at ±15V
- Minimum fanout of 3 (each side)
- Maximum input current of 1μA over temperature
- Inputs and outputs can be isolated from system ground

DESCRIPTION

The LM119 is a precision high-speed dual comparator fabricated on a single monolithic chip. It is designed to operate over a wide range of supply voltages down to a single 5V logic supply and ground. Further, it has higher gain and lower input currents than devices like the μA710. The uncommitted collector of the output stage makes the LM119 compatible with RTL, DTL, and TTL as well as capable of driving lamps and relays at currents up to 25mA.

Although designed primarily for applications requiring operation from digital logic supplies, the LM119 is fully specified for power supplies up to ±15V. It features faster response than the LM111 at the expense of higher power dissipation. However, the high-speed, wide operating voltage range and low package count make the LM119 much more versatile than older devices like the μA711.

PIN CONFIGURATION

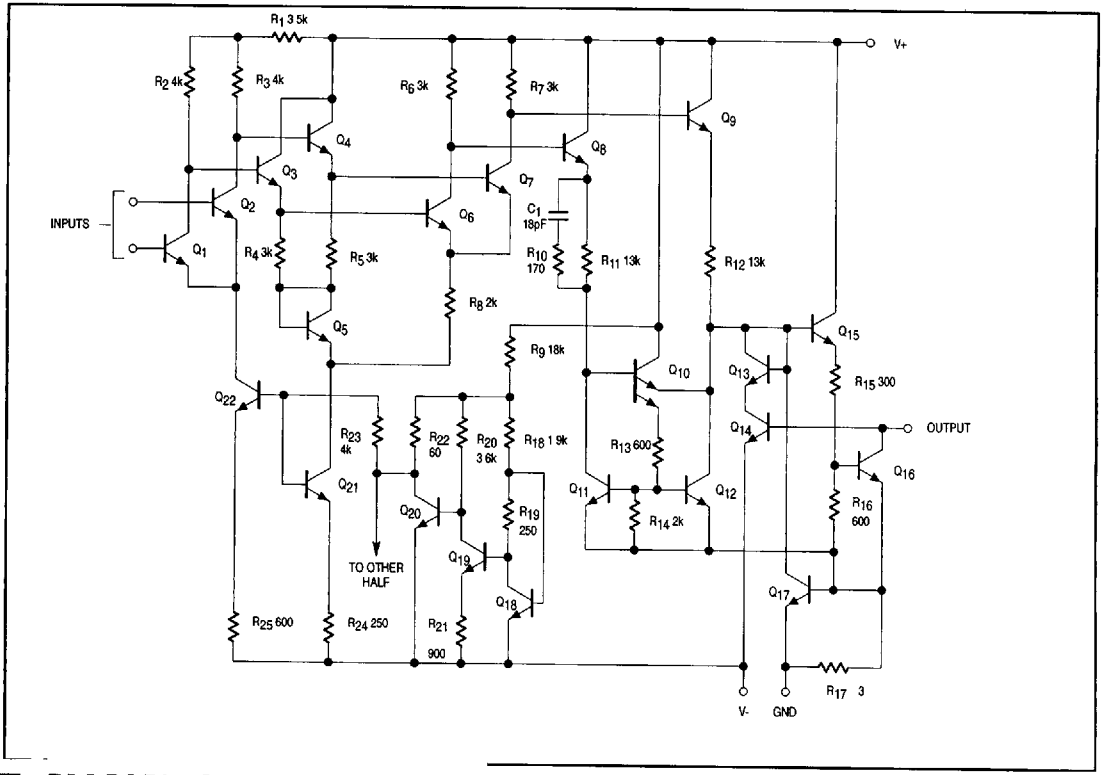


ORDERING INFORMATION

DESCRIPTION	ORDER CODE	PACKAGE DESIGNATOR*
14-Pin Ceramic DIP	LM119/BCA	GDIP1-T14

* MIL-STD 1835 or Appendix A of 1995 Military Data Handbook

EQUIVALENT SCHEMATIC



ABSOLUTE MAXIMUM RATINGS[1]

SYMBOL	PARAMETER	RATING	UNIT
V_S	Total supply voltage	36	V
	Output to negative supply voltage	36	V
	Ground to negative supply voltage	25	V
	Ground to positive supply voltage	18	V
	Differential input voltage	±5	V
V_{IN}	Input voltage[2]	±15	V
	Maximum power dissipation[3]	500	mW
	Output short-circuit duration	10	s
T_{amb}	Operating temperature range	-55 to +125	°C
T_{STG}	Storage temperature range	-65 to +150	°C
T_{SOLD}	Lead soldering temperature (10sec max)	300	°C

DC ELECTRICAL CHARACTERISTICS

$V_S = \pm 15V$, $-55°C \leq T_A \leq 125°C$, unless otherwise specified.

SYMBOL	PARAMETER	TEST CONDITIONS	$T_{amb} = +25°C$			$T_{amb} = -55°C$–$+125°C$		UNIT
			MIN	TYP	MAX	MIN	MAX	
V_{OS}	Input offset voltage[4, 5]	$R_S \leq 5k\Omega$		0.7	4.0		7.0	mV
I_{OS}	Input offset current[4, 5]			30	75		100	nA
I_B	Input bias current[5]			150	500		1000	nA
A_V	Voltage gain[6]		10	40				V/mV
V_{OL}	Saturation voltage	V+ ≥ 4.5V, V- = 0 V_{IN}[7] ≤ -5mV, I_{OUT} = 25mA		0.75	1.5			V
		V+ ≥ 4.5V, V- = 0 V_{IN}[7] ≤ -6mV, I_{OUT} = 3.2mA		0.23	0.4			V
		$T_A = 125°C$					0.4	V
		$T_A = -55°C$					0.6	V
I_{OH}	Output leakage current	V- = 0V, $V_{IN} \geq 5mV$, $V_{OUT} = 35V$		0.2	2		10	µA
V_{IN}	Input voltage range	$V_S = \pm 15V$	±12	±13		±12		V
		V+ = 5V, V- = 0V	1		3	1	3	V
V_{ID}	Differential input voltage				±5		±5	V
I+	Positive supply current	V+ = 5V, V- = 0V		4.3				mA
I+	Positive supply current	$V_S = \pm 15V$		8.0	11.5			mA
I-	Negative supply current	$V_S = \pm 15V$		3.0	–4.5			mA

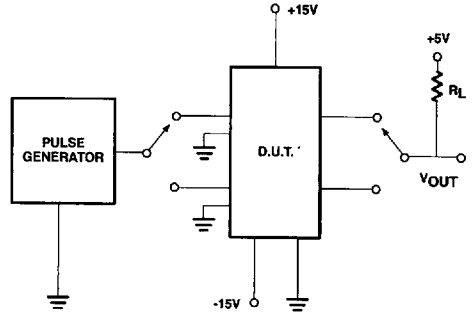
AC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
t_R	Response time[8]	$V_S = \pm 15V$, $T_A = 25°C$ $R_L = 500\Omega$ (see test figure)		80		ns

NOTES:

1. Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. Functional operation at these or any other conditions above those indicated in the operational specifications is not implied.
2. For supply voltages less than ±15V, the absolute maximum rating is equal to the supply voltage.
3. The absolute maximum junction temperature is 150°C. Device dissipation must be derated as 9.5mW/°C.
4. V_{OS}, I_{OS} and I_B specifications apply for a supply voltage range of $V_S = \pm 15V$ down to a single 5V supply.
5. The offset voltages and offset currents given are the maximum values required to drive the output to within 1V of either supply with a 1mA load. Thus these parameters define an error band and take into account the worst case effects of voltage gain and input impedance.
6. This parameter is guaranteed, but not tested.
7. V_{IN} value specified is the overdrive applied in addition to the specified V_{OS} value.
8. The response time specified is for a 100mV step with 5mV overdrive.

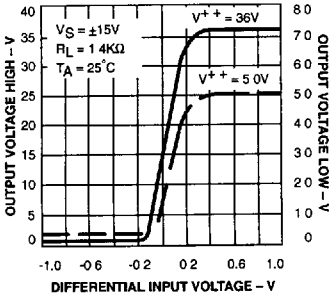
TEST CIRCUIT



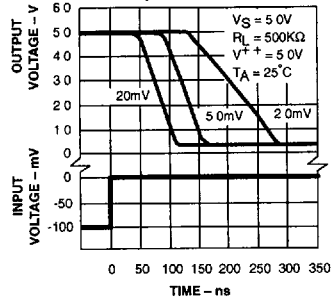
Response Time Measurement

TYPICAL PERFORMANCE CHARACTERISTICS

Transfer Function



Response Time for Various Input Overdrives



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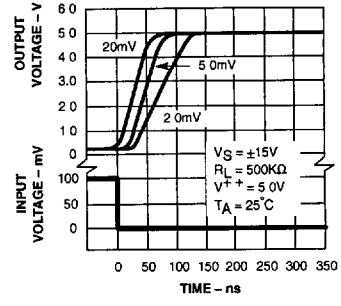
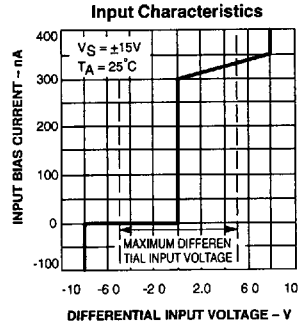
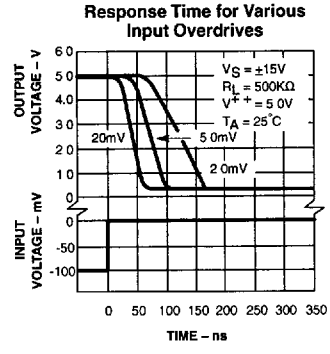


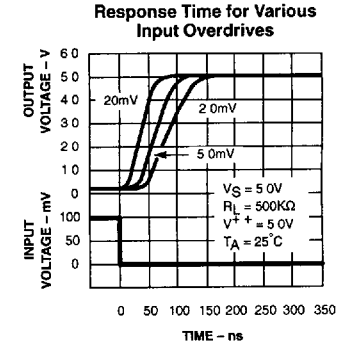
Input Characteristics



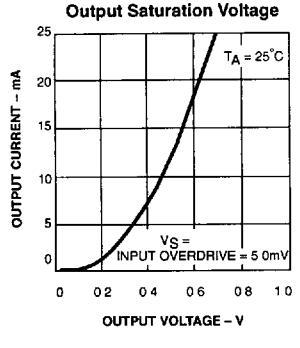
Response Time for Various Input Overdrives



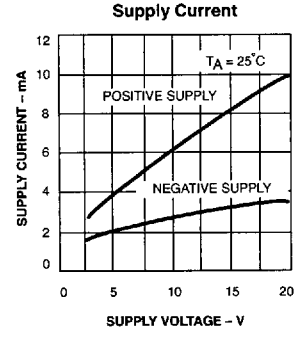
Response Time for Various Input Overdrives



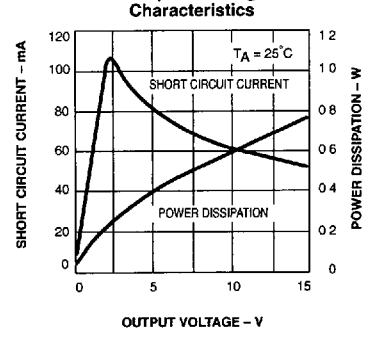
Output Saturation Voltage



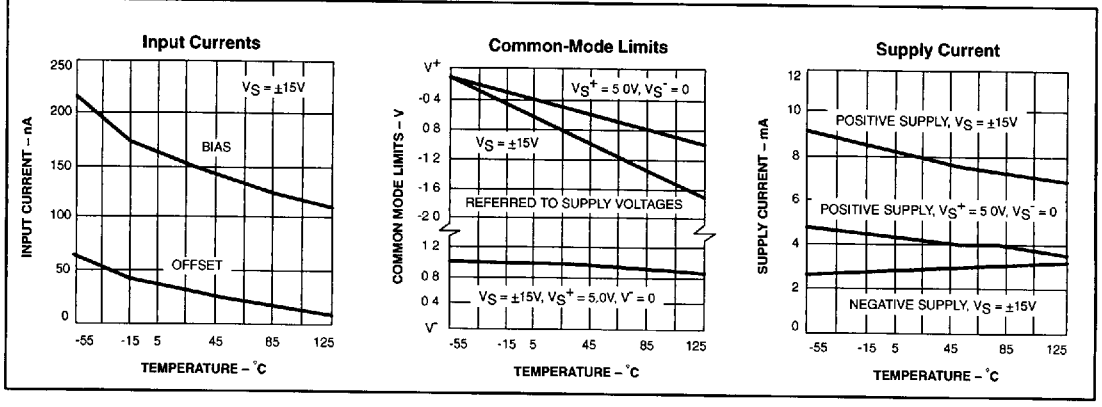
Supply Current



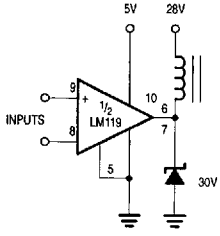
Output Limiting Characteristics



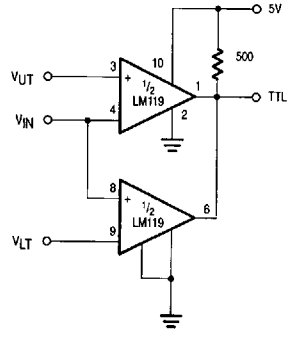
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)



TYPICAL APPLICATIONS

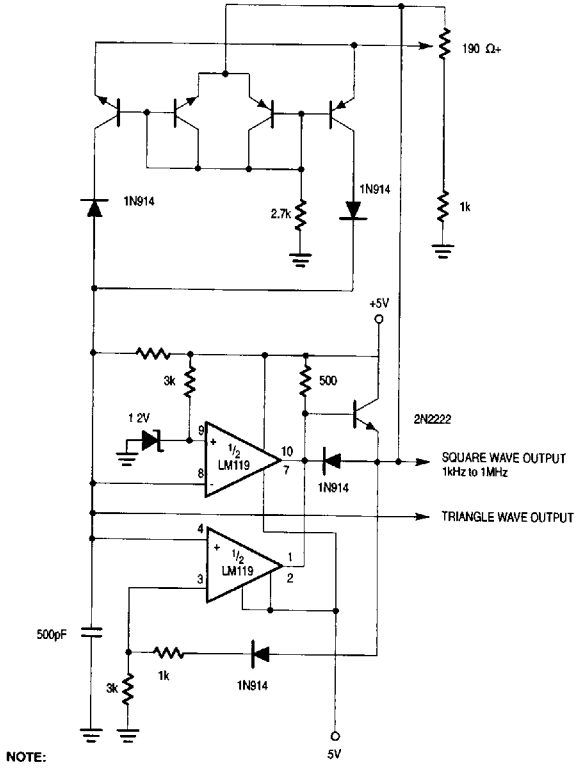


Relay Driver



Window Detector

NOTES:
V_{OUT} = 5V for $V_{LT} < V_{IN} < V_{UT}$
V_{OUT} = 0V for $V_{IN} < V_{LT}$ or $V_{IN} > V_{UT}$



NOTE:
Frequency adjust must be buffered for $R_L \leq 10\Omega$

Wide Range Variable Oscillator