Low Power Offset Voltage Dual Comparators

General Description

The LM393 consists of two independent voltage comparators. These were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply curr ent drain is independent of the magnitude of the power supply voltage. The outputs can be connected to other open -collector outputs to achieve wired-AND relationships

The LM393 series are available in 2 Packages:
DIP-8 and SOP-8.

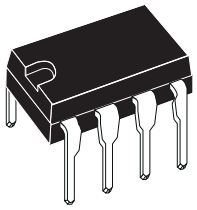
Features

- Wide supply voltage range
- Low supply current drain independent of supply woltage
- Low input biasing current
- Low input offset current
- Low input offset voltage
- Input common-mode voltage range includes GND
- Differential input voltage range equal to the power supply voltage
- Low output saturation voltage
- Output voltage compatible with TTL, MOS and CMOS logic

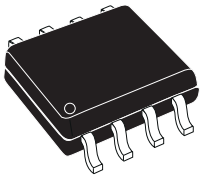
Applications

- Battery Charger
- Cordless Telephone
- Switching Power Supply
- DC-DC Module
- PC Motherboard
- Communication Equipment

Package outline



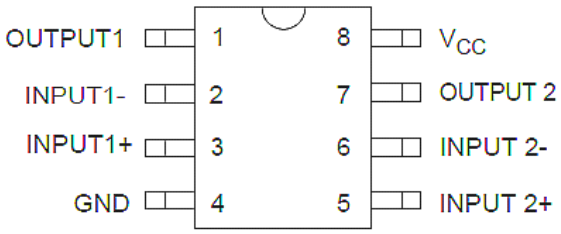
DIP-8



SOP-8

Pin Configurations

DIP-8/SOP-8



Top View

Electrical Characteristics

at specified free-air temperature, Vcc = 5 V (unless otherwise noted)

Symbol	Parameter	Test conditions*			LM393			Units
					Min	Typ	Max	
V_{IO}	Input offset voltage	Vcc = 5 V to 30V, $V_{IC} = V_{ICR}$ min, Vo=1.4 V		25 °C		2	5	mV
				Full range			9	
I_{IO}	Input offset current	Vo=1.4 V		25 °C		5	50	nA
				Full range			150	
I_{IB}	Input bias current	Vo=1.4 V		25 °C		-25	-250	nA
				Full range			-400	
V_{ICR}	Common-mode input voltage range**			25° C	0 to Vcc-1.5			V
				Full range	0 to Vcc - 2			
A_{VD}	Large-signal differential voltage amplification	Vcc = 15 V, Vo=1.4V to 11.4 V, R_L ≥ 15 kΩ to		25 °C	50	200		V/mV
I_{OH}	High-level output current	V_{OH}=5 V, 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} = 4 mA, V_{ID}=-1V		25 °C		150	400	mV
				Full range			700	
I_{OL}	Low-level output current	V_{OL}= 1.5V, V_{ID}=-1V		25 °C	6			mA
Icc	Supply current	R_L = ∞	V_{CC} = 5V	25 °C		0.8	1	mA
			V_{CC} = 30V	Full range			2.5	

* Full range (MIN to MAX), for the LM393 is O °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 Charactristics

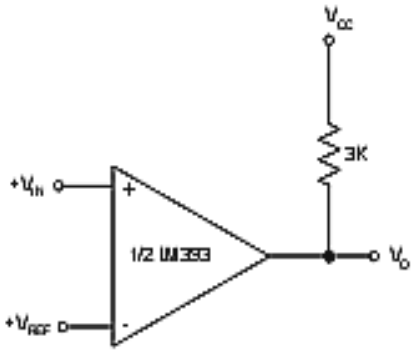
Vcc=5V, T_A=25 °C

Parameter	Test conditions		Min	Typ	Max	Units
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		

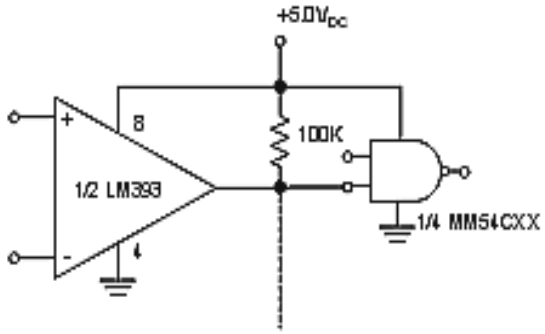
* C_L includes probe and jig capacitance.

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

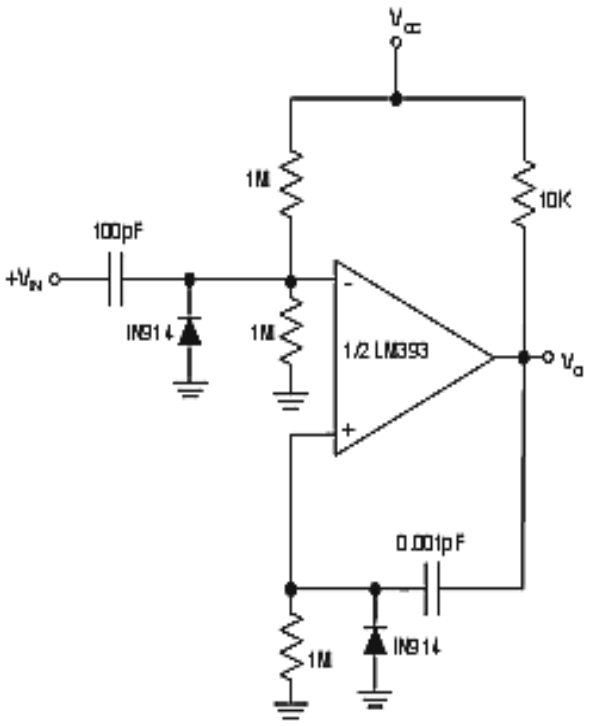
Typical Characteristics



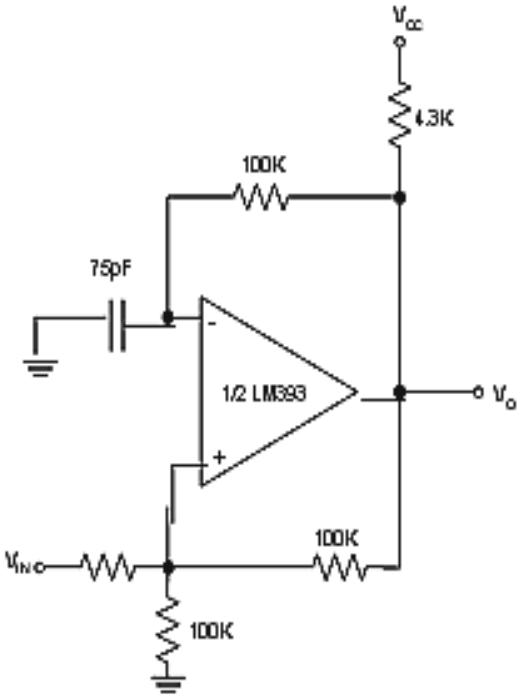
Basic comparator



Driving CMOS/TTL

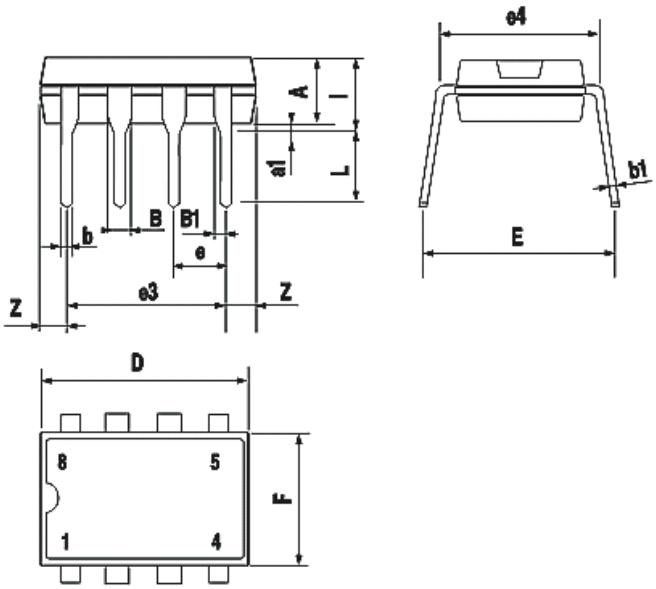


One Shot Multivibrator



Squarewave Oscillator

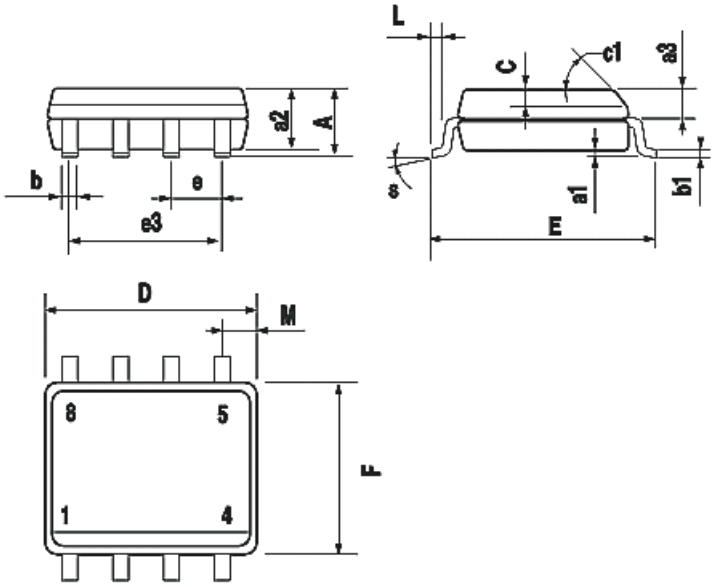
Mechanical Dimensions



Plastic DIP-8 Mechanical DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063

Mechanical Dimensions



SOP-8 Mechanical DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.068
a1	0.1		0.25	0.003		0.009
a2			1.65			0.064
a3	0.65		0.85	0.025		0.033
b	0.35		0.48	0.013		0.018
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.019
c1	45 (typ.)					
D	4.8		5.0	0.188		0.196
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.14		0.157
L	0.4		1.27	0.015		0.050
M			0.6			0.023
S	8 (max.)					