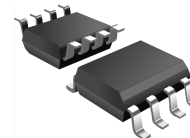


Description

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 current 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.

Features

Wide supply voltage range
 Low supply current drain independent of supply voltage. 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

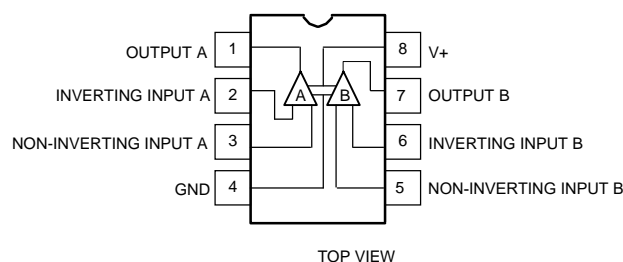


SOP - 8



DIP - 8

Internal Block Diagram



Package

Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNITS
Supply Voltage	V_{CC}	± 18 or 36	V
Differential Input Voltage	$V_{I(DIFF)}$	36	V
Common-mode Input Voltage	V_{ICR}	-0.3 ~ +36	V
Power Dissipation	P_D	570	mW
Operating Temperature Range	T_{OPR}	-20 ~ +70	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

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	V _{CC} = 5 V to 30V, V _{IC} = V _{ICR} min, V _O =1.4 V	25 °C		1	5	mV
			Full range			9	
I _{IO}	Input offset current	V _O =1.4 V	25 °C		5	50	nA
			Full range			150	
I _{IB}	Input bias current	V _O =1.4 V	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} = 15 V, V _O =1.4V to 11.4 V, R _L ≥ 15 kΩ to V _{CC}	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	16		mA
I _{CC}	Supply current	R _L = ∞	V _{CC} = 5V	25 °C	0.4	1	mA
			V _{CC} = 30V	Full range		2.5	

* Full range (MIN to MAX), for the LM393 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

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 Applications Circuit

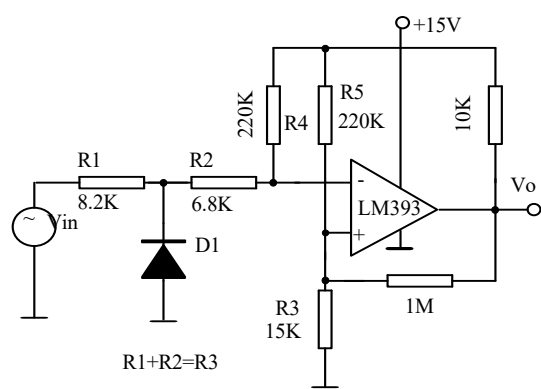


Figure1.Zero Crossing Detector (Single Supply)

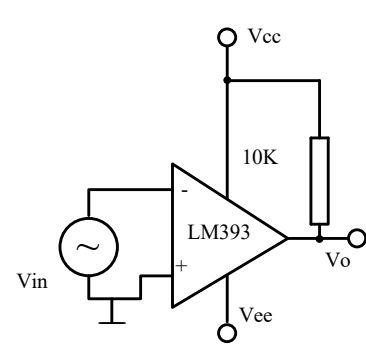


Figure2.Zero Crossing Detector (Split Supply)

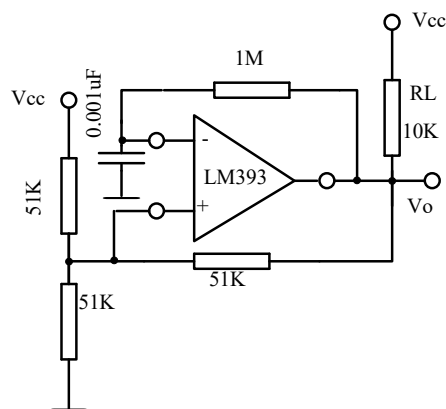


Figure3.Free-running Square- wave Oscillator

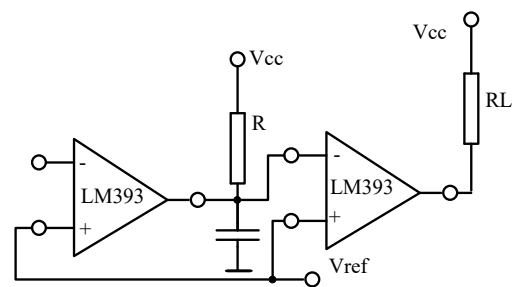
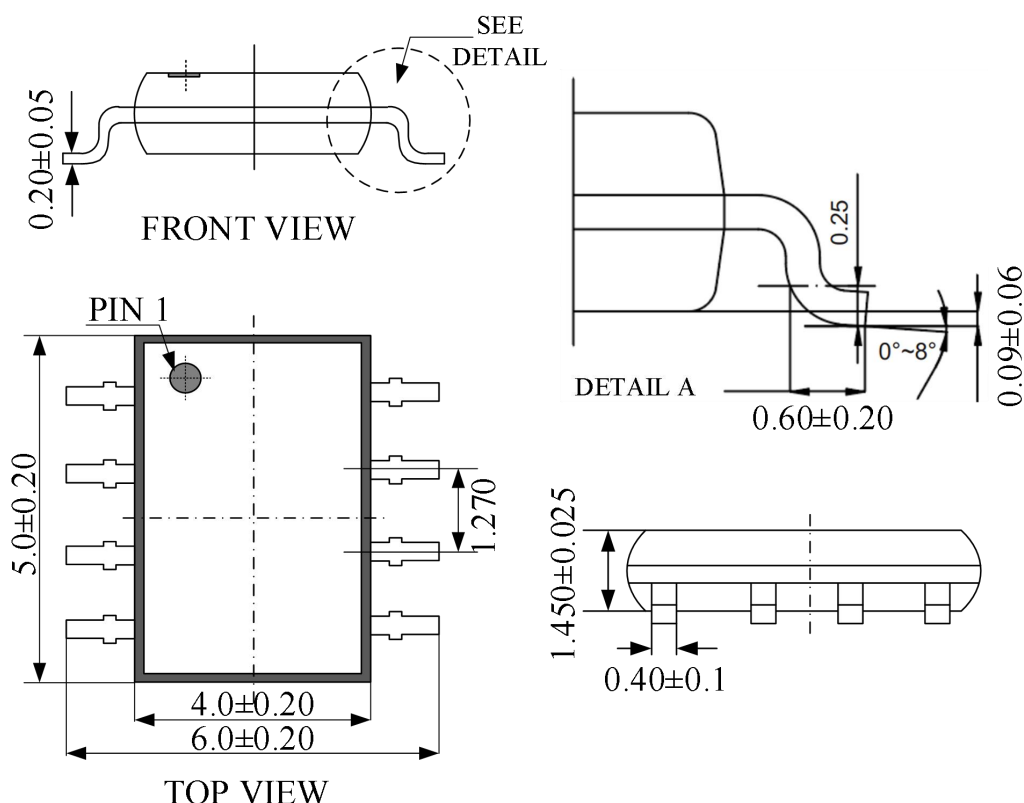


Figure4.Time Delay Generator

Outline Drawing – SOP-8(Dimensions in mm)




Package Information

Package Type	Description	Quantity (pcs)	Standard
SOP-8	Reel -13" tape	4000	EIA-481

Contact Information

TANI website: <http://www.tanisemi.com> Email: tani@tanisemi.com

For additional information, please contact your local Sales Representative.

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