

芯伯乐®
X I N B O L E

Product Specification

XBLW LM393

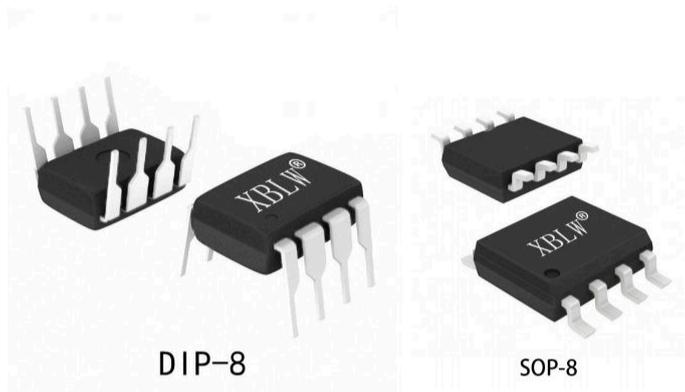
Dual Comparators

WEB | www.xinboleic.com



Descriptions

The LM393 series consists of two independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max for two comparators which 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. 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. It is mainly used in consumer and industrial electronic products. It is available in DIP-8 or SOP-8 package form.



Feature

- Wide Supply Voltage Range
Single Supplies: 2.0V to 36V
Dual Supplies: $\pm 1.0V$ to $\pm 18V$
- Very Low Supply Current Drain (0.8mA)—Independent Of Supply Voltage
- Low Input Biasing Current: 25 nA
- Low Input Offset Current: 5.0 nA
- Maximum Offset Voltage: 5.0mV
- Input Differential Voltage Range Is Same With Supply Voltage Range
- Compatible With TTL, DTL, ECL, MOS and CMOS

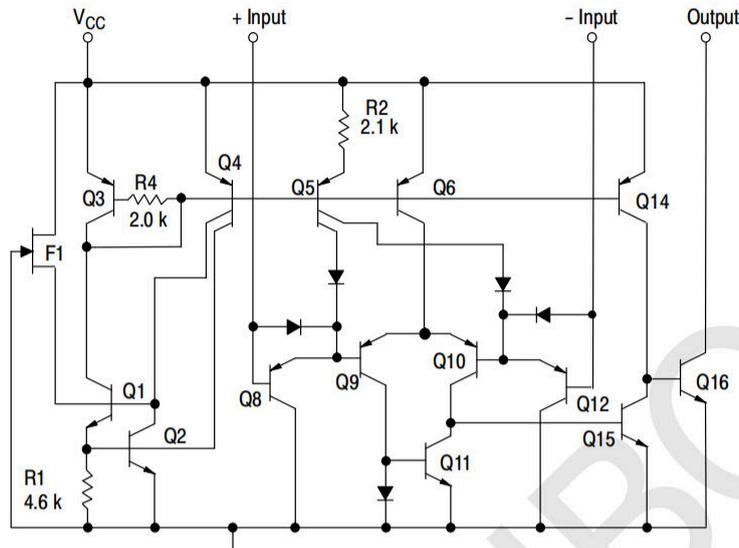
Applications

- Vacuum robot
- Single phase UPS
- Server PSU
- Cordless power tool
- Wireless infrastructure
- Appliances
- Building automation
- Factory automation & control
- Motor drives
- Infotainment & cluster

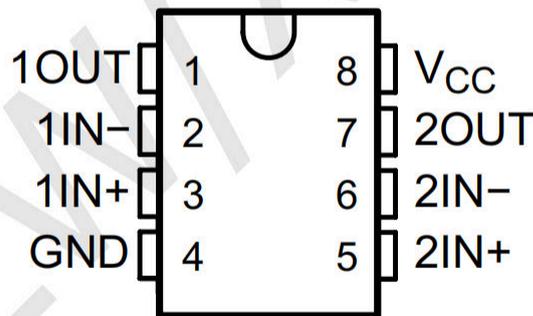
Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW LM393N	DIP-8	LM393N	Tube	2000pcs/Box
XBLW LM393DTR	SOP-8	LM393	Tape	2500pcs/Reel

Scematic Diagram



Pin Diagram



(Top View)

Pins Configurations

No.	Description	Symbol	No.	Description	Symbol
1	OUTPUT 1	OUT1	5	NONINVERTING INPUT 2	IN2+
2	INVERTING INPUT 1	IN1-	6	INVERTING INPUT 2	IN2-
3	NONINVERTING INPUT 1	IN1+	7	OUTPUT 2	OUT2
4	GROUND	GND	8	POWER SUPPLY	Vcc

Absolute Maximum Ratings

TA=25°C, unless otherwise noted

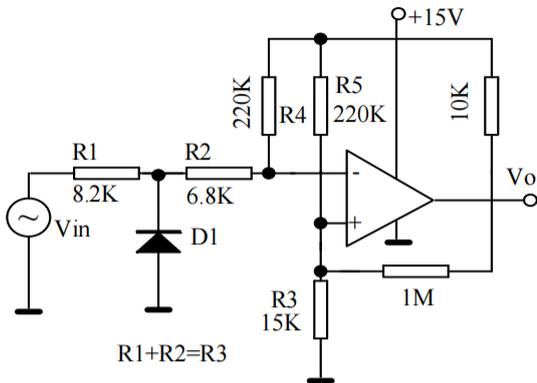
Parameter	Symbol	Value		Unit
		Min.	Max.	
Supply Voltage	V _{CC}		± 18	V
		Dual Single	36	
Differential Input Voltage	V _{IDR}		36	V
Input Common Mode Voltage Range	V _{ICR}	-0.3	36	V
Output Leakage Current	I _{OG}		20	mA
Maximum Operation Junction Temperature	T _{J(MAX)}		125	°C
Power Dissipation	P _D		570	mW
Operation Temperature	T _{amb}	0	70	°C
Storage Temperature	T _{stg}	-65	150	°C

Electrical Characteristics

 TA=25°C, V_{CC}=5V, unless otherwise noted

Charateristics	Test Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Input Offset Voltage	Ta=25°C	V _{IO}		2	5	mV
	0°C = Ta ≤ 70°C				9	
Input Offset Current	Ta=25°C	I _{IO}		5	50	nA
	0°C ≤ Ta ≤ 70°C				150	
Input Bias Current	Ta=25°C	I _{IB}		25	250	nA
	0°C ≤ Ta ≤ 70°C				400	
Input Common Mode Voltage Range	Ta=25°C	V _{ICR}	0		V _{CC} -1.5	V
	0°C ≤ Ta ≤ 70°C		0		V _{CC} -2.0	
Supply Current	R _L =∞ Dual Comparator	I _{CC}		0.4	1.0	mA
	R _L =∞ Dual Comparator, V _{CC} =30V				2.5	
Voltage Gain	R _L > 15KΩ, V _{CC} =15V	G _V	50	200		V/ mV
Large Signal Response Time	V _{IN} =TTL Logic Swing, V _{REF} =1.4V, V _{RL} =5.0V, R _L =5.1KΩ	t _{RES}		300		ns
Response Time	V _{RL} =5.0V, R _L =5.1KΩ	t _{RES}		1.3		us
Input Differential Voltage		V _{ID}			V _{CC}	V
Output Sink Current	V _{IN(-)} ≥ 1.0V, V _{IN(+)} = 0V, V _O ≤ 1.5V	I _{SINK}	6.0	16		mA
Output Saturation Voltage	V _{IN(-)} ≥ 1.0V, V _{IN(+)} = 0V, I _{SINK} ≤ 4.0mA	V _{SAT}		150	400	mV
	V _{IN(-)} ≥ 1.0V, V _{IN(+)} = 0V, I _{SINK} ≤ 4.0mA 0°C = Ta ≤ 70°C				700	
Output Leakage Current	V _{IN(+)} ≥ 1.0V, V _{IN(-)} = 0V, V _O = 5.0V	I _{OL}		0.1		nA
	V _{IN(+)} ≥ 1.0V, V _{IN(-)} = 0V, V _O = 30V 0°C ≤ Ta ≤ 70°C				1000	

Applications

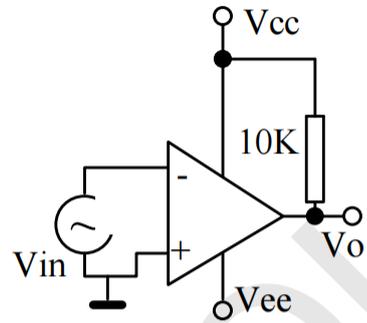


D1 prevents input from going negative by more than 0.6 V.

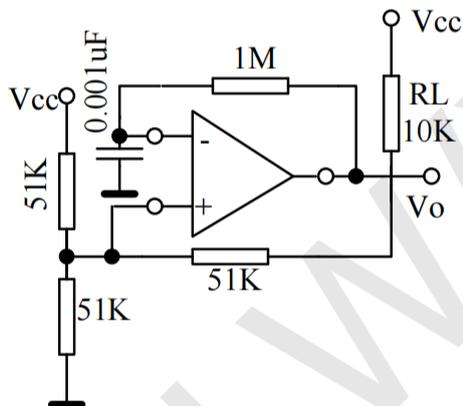
$$R1 + R2 = R3$$

$$R3 \leq \frac{R5}{10} \text{ for small error in zero crossing.}$$

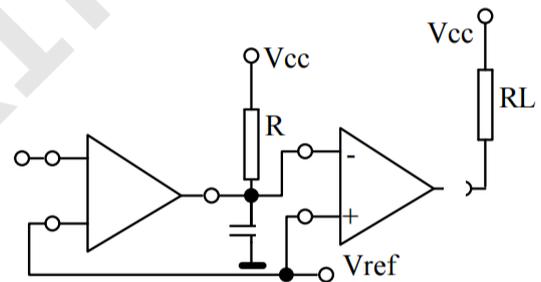
**Zero Crossing Detector
(Single Supply)**



**Zero Crossing Detector
(Split Supply)**



Square wave oscillator

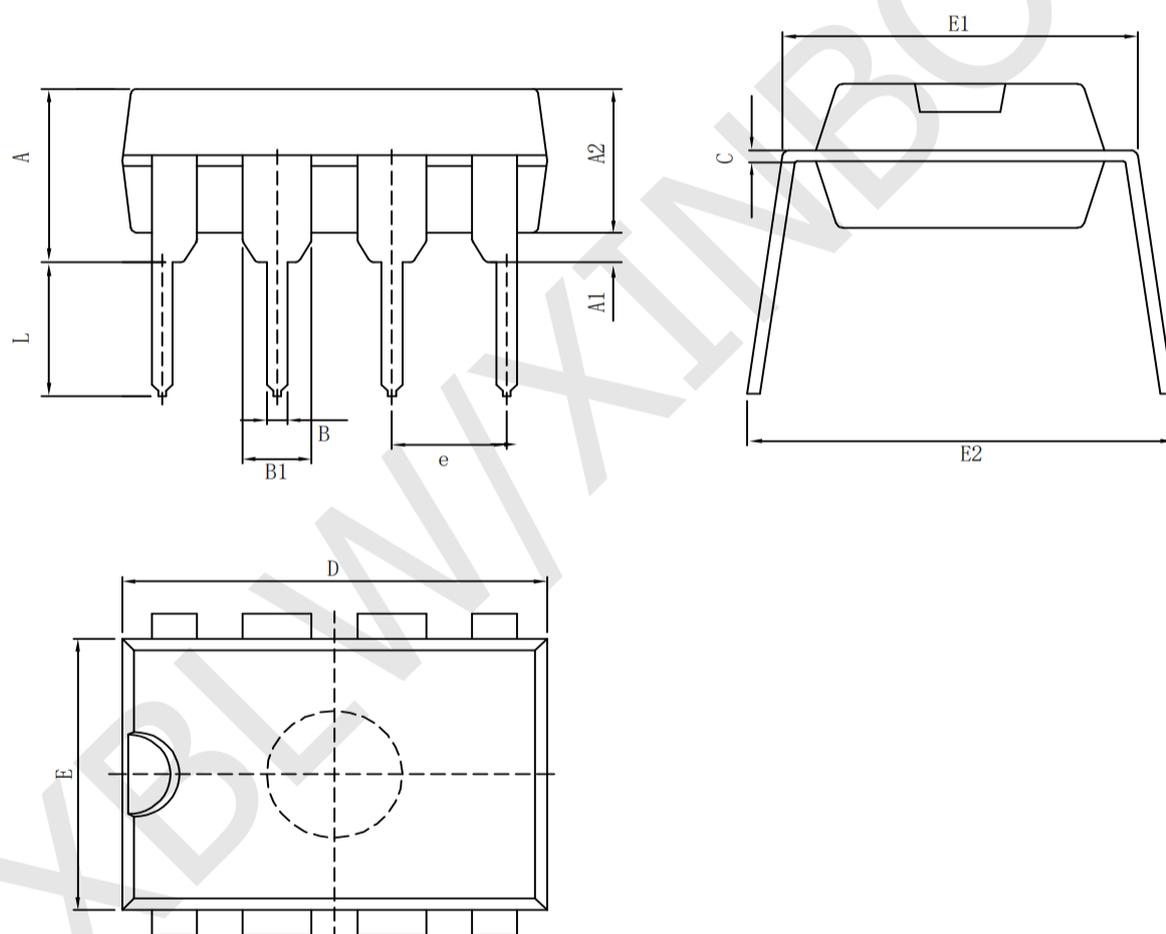


Time Delay Generator

Package Information

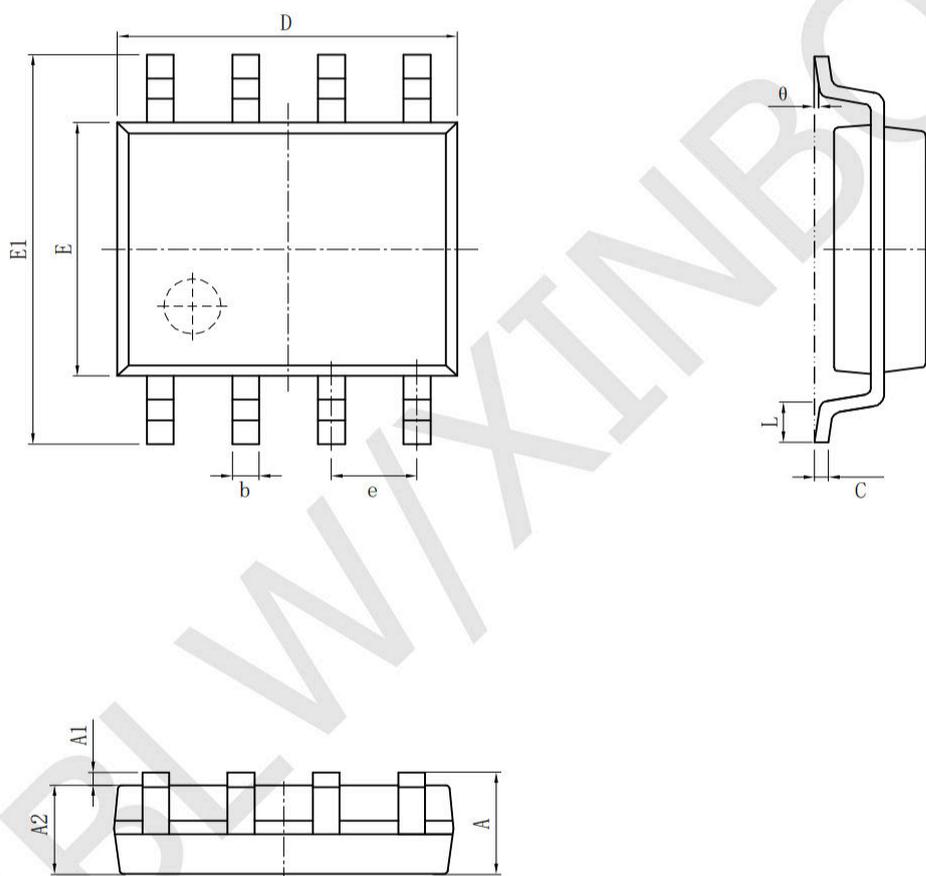
- DIP-8

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A	3.710	4.310	A	0.146	0.170
A1	0.510		A1	0.020	
A2	3.200	3.600	A2	0.126	0.142
B	0.380	0.570	B	0.015	0.022
B1	1.524 (BSC)		B1	0.060 (BSC)	
C	0.204	0.360	C	0.008	0.014
D	9.000	9.400	D	0.354	0.370
E	6.200	6.600	E	0.244	0.260
E1	7.320	7.920	E1	0.288	0.312
e	2.540 (BSC)		e	0.100 (BSC)	
L	3.000	3.600	L	0.118	0.142
E2	8.400	9.000	E2	0.331	0.354



• SOP-8

Size Symbol	Dimensions In Millimeters		Size Symbol	Dimensions In Inches	
	Min (mm)	Max (mm)		Min (in)	Max (in)
A	1.350	1.750	A	0.053	0.069
A1	0.100	0.250	A1	0.004	0.010
A2	1.350	1.550	A2	0.053	0.061
b	0.330	0.510	b	0.013	0.020
c	0.170	0.250	c	0.006	0.010
D	4.700	5.100	D	0.185	0.200
E	3.800	4.000	E	0.150	0.157
E1	5.800	6.200	E1	0.228	0.224
e	1.270 (BSC)		e	0.050 (BSC)	
L	0.400	1.270	L	0.016	0.050
θ	0°	8°	θ	0°	8°



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