DESCRIPTION

The LM393DR-CN is dual independent precision voltage comparators capable of single or split supply operation.The LM393DR-CN is designed to permit a common mode range−to−ground level with single supply operation. Input offset voltage specifications as low as 3.0 mV make this device an excellent selection for many applications in consumer, automotive, and industrial electronics.The LM393DR-CN is available in a SOP8 package .

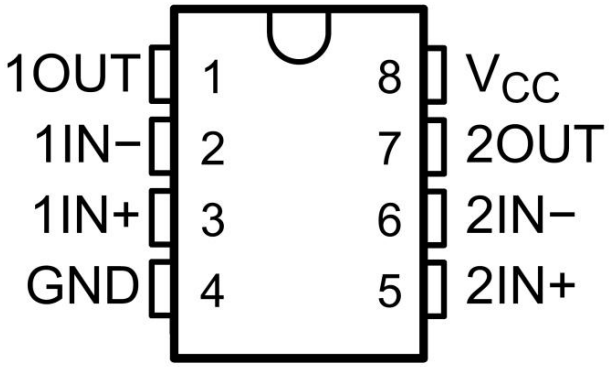
APPLICATIONS

- Industrial Equipment
- Automotive
- Power Monitoring
- Peak Detectors
- Logic Voltage Conversion
- Electrical Appliances

FEATURES

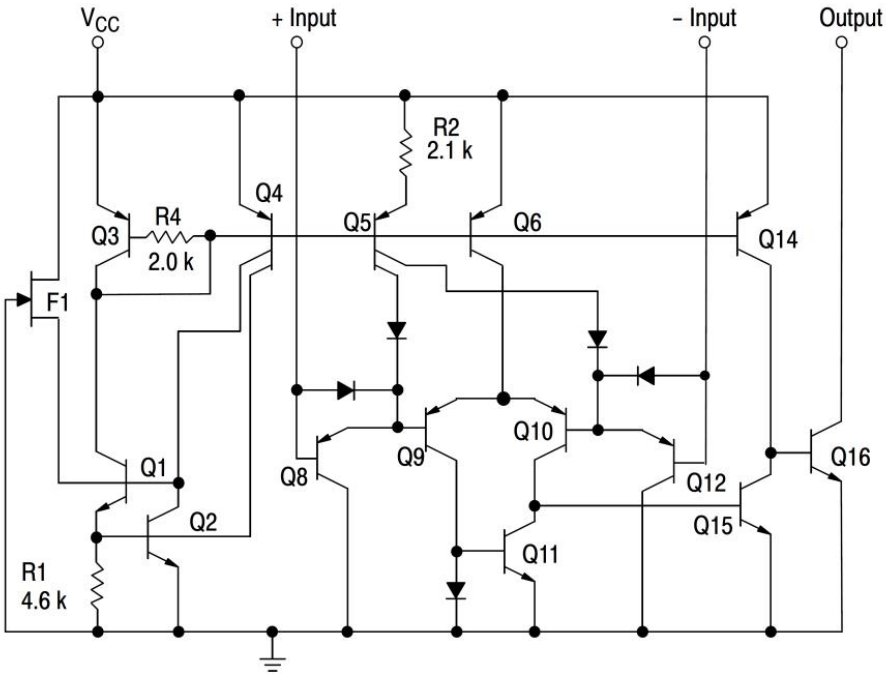
- Wide Supply Range:
  – Single Supply: 3.0V to 36V
  – Split Supply: ±1.5V to ±18V
- Low Input Bias Current: 25nA Typ
- Low Input Offset Current: ±5.0nA Typ

Pin Configuration



SOP8

Simplified Schematic(Each Comparator)



Absolute Maximum Ratings

Over operating free-air temperature range (unless otherwise noted)

PARAMETER		MIN	MAX	UNIT
Supply Voltage	Signal-supply		36	V
	Dual-supply		±18	V
Differential input voltage			±36	V
Input voltage range		-0.3	36	V
Output voltage			36	V
Input common mode voltage			V_{CC} - 1.5	V
Output Current			20	mA
Maximum Junction Temperature			+150	℃
Storage Temperature Range		-65	+150	℃
Lead Temperature(soldering, 10sec)			+260	℃

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

PARAMETER		MIN	TYP	MAX	UNIT
Supply Voltage, Vs=(V+) - (V-)	Signal-supply	3		32	V
	Dual-supply	±1.5		±16	V
Operating Temperature Range		-20	+25	+85	℃

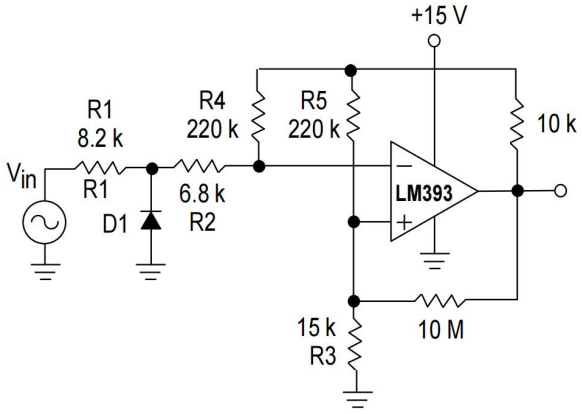
Electrical Characteristics

(At T_A=+25℃, V_{CC}=5V, unless otherwise noted.)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
Input Offset Voltage	V_{IO}	T_A=25℃		-	±1	±5	mV
		-20℃≤ T_A ≤+85℃		-	-	±7	
Input Offset Current	I_{IO}	T_A=25℃		-	±5	±50	nA
		-20℃≤ T_A ≤+85℃		-	-	±150	
Input Bias Current	I_{IB}	T_A=25℃		-	25	250	nA
		-20℃≤ T_A ≤+85℃		-	-	400	
Input common mode voltage range	V_{ICR}	T_A=25℃		0	-	V_{CC} - 1.5	V
		-20℃≤ T_A ≤+85℃		0	-	V_{CC} - 2.0	
Supply Current	I_{CC}	R_L=∞, V_{CC}=5V		-	0.4	1.0	mA
		R_L=∞, V_{CC}=30V		-	0.45	2.5	
Voltage Gain	G_V	RL ≥ 15KΩ, V_{CC}=15V		50	200	-	V/mV
Response time	t_{RES}	V_{RL}=5V, R_L=5.1KΩ	TTL input with V_{REF}=1.4V	-	0.3	-	us
			Input overdrive=5mV, Input step=100mV	-	1.3	-	
Input differential voltage	V_{ID}	-		-0.3	-	V_{CC}	V

Low-level output current	I_{SINK}	IN- ≥ 1.0V, IN+ = 0V, V_O ≤ 1.5V	6	16	-	mA
Output saturation voltage	V_{SAT}	IN- ≥ 1.0V, IN+ = 0V, I_{SINK}≤4.0mA,	-	150	400	mV
		IN- ≥ 1.0V, IN+ = 0V, I_{SINK}≤4.0mA, -20℃≤ T_A ≤ +85℃	-	-	700	
Output Leakage Current	I_{OL}	IN+ ≥ 1.0V, IN- = 0V, V_O = 5V	-	0.1	-	uA
		IN+ ≥ 1.0V, IN- = 0V, V_O = 30V -20℃≤ T_A ≤ +85℃	-	-	1	

Typical Applications

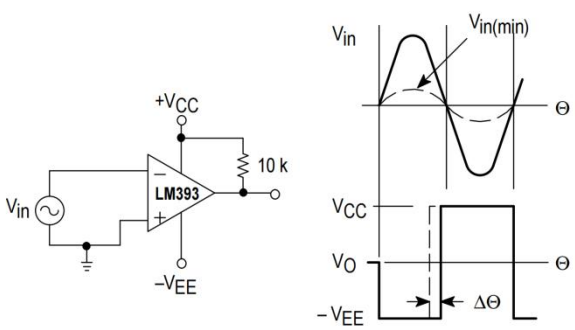


D1 prevents input from going negative by more than 0.6 V.

$R1 + R2 = R3$

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

Figure 1. Zero Crossing Detector(Single Supply)



$V_{in(min)} \approx$ 0.4 V peak for 1% phase distortion (ΔΘ).

Figure 2. Zero Crossing Detector(Split Supply)

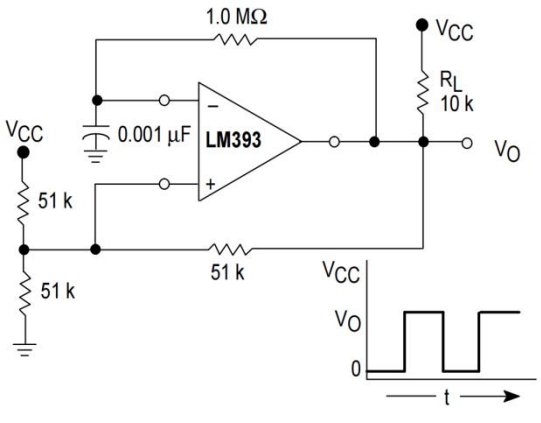


Figure 3. Free–Running Square–Wave Oscillator

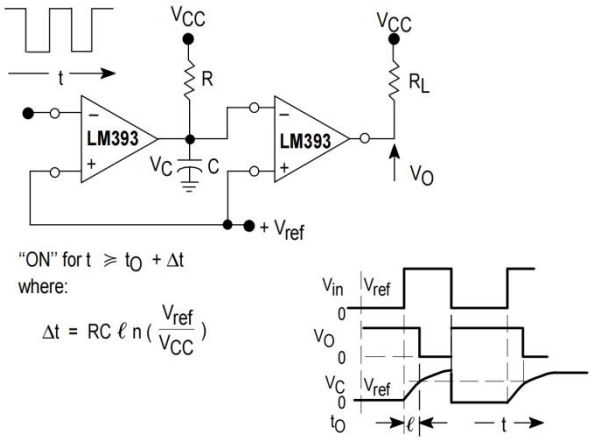
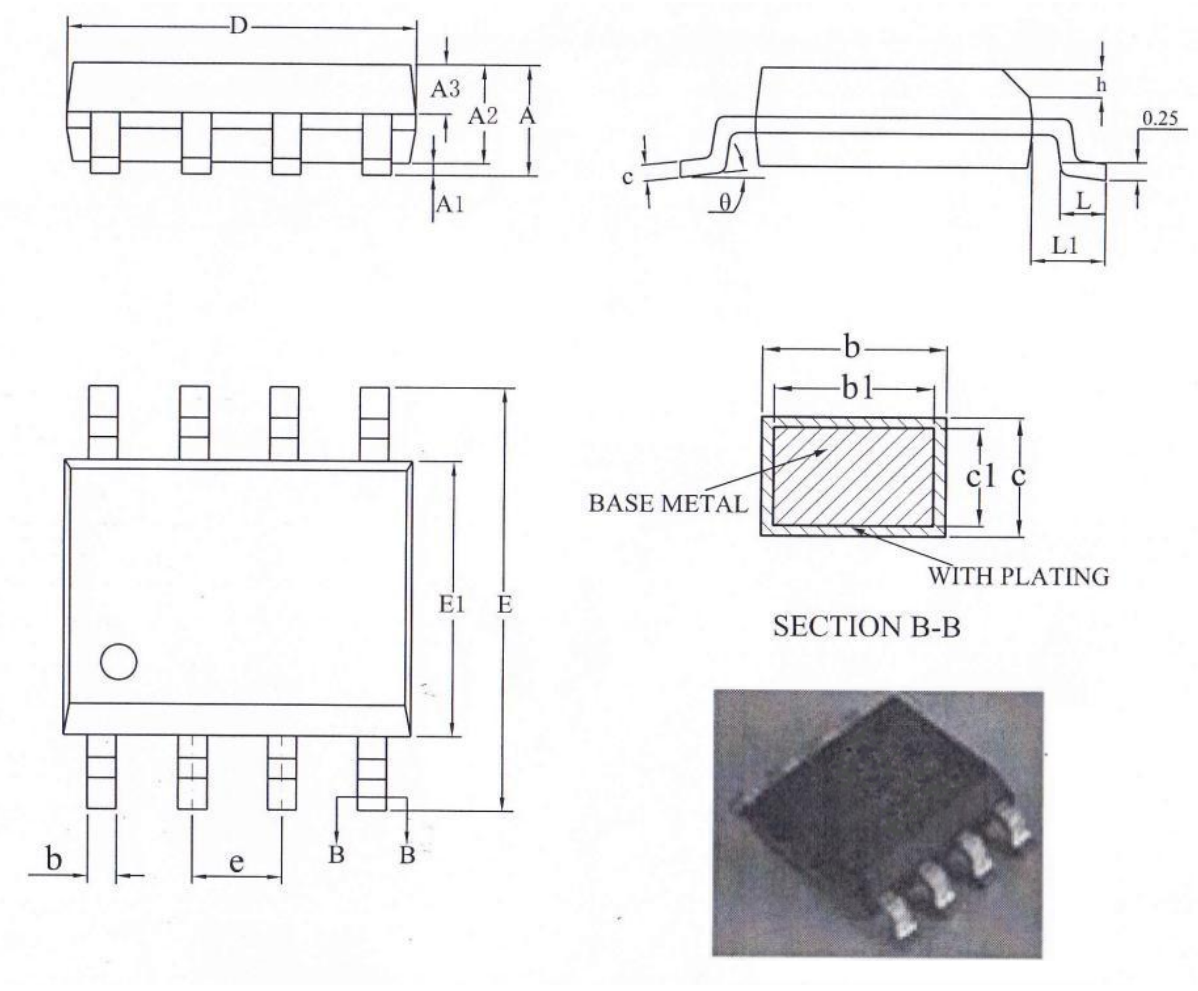


Figure 4. Time Delay Generator

PACKAGE OUTLINE DIMENSIONS

SOP8



SYMBOL	MILLIMETER			SYMBOL	MILLIMETER		
	MIN	NOM	MAX		MIN	NOM	MAX
A	-	-	1.75	D	4.80	4.90	5.00
A1	0.10	-	0.225	E	5.80	6.00	6.20
A2	1.30	1.40	1.50	E1	3.80	3.90	4.00
A3	0.60	0.65	0.70	e	1.27 BSC		
b	0.39	-	0.47	h	0.25	-	0.50
b1	0.38	0.41	0.44	L	0.50	-	0.80
c	0.20	-	0.24	L1	1.05REF		
c1	0.19	0.20	0.21	θ	0°	-	8°

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