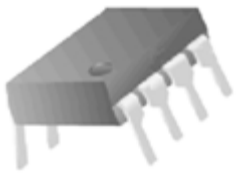
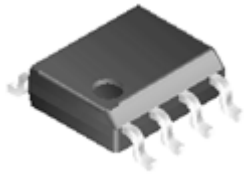
Dual Differential Comparators

LR393



DIP-8



SOP-8

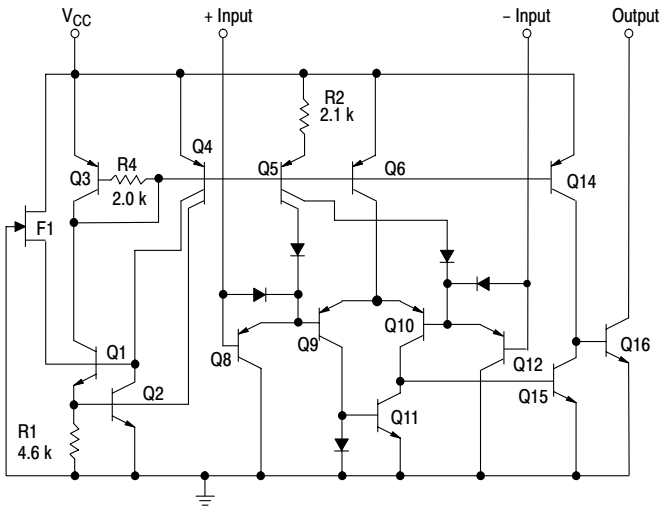
DESCRIPTION:

The LR393 consists of two independent voltage comparators with an offset voltage specification as low as 2.0mV max. for two comparators which were designed specifically to operation from a single power supply over a wide range of voltages. Operate 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.

FEATURE:

- Wide supply voltage range: single supply operation: 2V to 36V, dual supply operation: ±1V to ±18V
- Very low supply current drain (0.8mA) independent of supply voltage(2.0mW/comparator at 5.0 V_{DC})
- Low input biasing current: 25nA
- Low input offset current: 5.0nA; Low input offset voltage: 5.0mV
- Input common-mode voltage range includes ground
- Differential input voltage range equal to the power supply voltage
- Output voltage compatible with TTL,DTL,ECL,MOS and CMOS logic systems.

BLOCK DIAGRAM

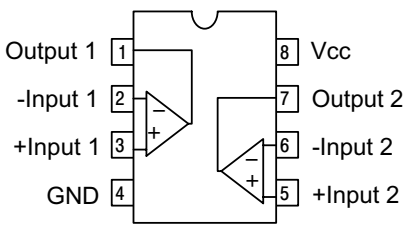


NOTE: Diagram shown is for 1 comparator

ORDERING INFORMATION

Device	Package
LR393	DIP-8
LR393D	SOP-8

PIN CONFIGURATION



(Top View)

PIN DESCRIPTIONS

No	Description	Symbol	No	Description	Symbol
1	Output 1	OUT1	5	+Input2	IN2（+）
2	-Input1	IN1（-）	6	-Input2	IN2（-）
3	+Input1	IN1（+）	7	Output 2	OUT2
4	Ground	GND	8	Supply Voltage	Vcc

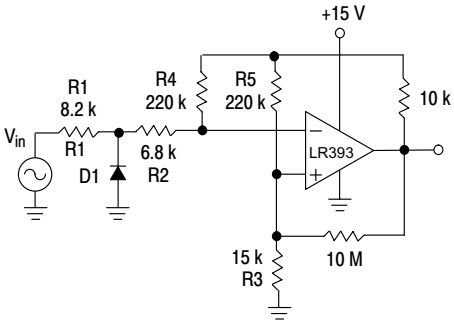
ABSOLUTE MAXIMUM RATINGS

Characteristics		Symbol	Value		Unit
			Min	Max	
Supply Voltage	Single supply voltage	Vcc		±18	V
	Dual supplies voltage			36	
Differential Input Voltage		V_{IDR}		36	V
Input common-mode voltage		V_{ICR}	-0.3	36	V
Output short-circuit to ground		I_{OG}		20	mA
Input Current		I_{IN}		50	mA
Maximum junction temperature		T_J		125	℃
Power Dissipation		P_D		570	mW
Operating Temperature Range		Tamb	0	70	℃
Storage Temperature Range		Tstg	-65	150	℃

ELECTRICAL CHARACTERISTICS（Un less otherwise specified :Vcc=5V，Tamb=25℃）

Characteristics	Test conditions	Symbo	Mi	Typ.	Max	Unit
Input Offset Voltage		V_{IO}		±1.0	±5.0	mV
	0℃ ≤Ta≤ 70℃				±9.0	
Input Offset Current		I_{IO}		±5.0	±50	nA
	0℃ ≤Ta≤ 70℃				±150	
Input Bias Current		I_{IB}		25	250	nA
	0℃ ≤Ta≤ 70℃				400	
Input Common-mode Voltage Range		V_{ICR}	0		Vcc-1.5	V
	0℃ ≤Ta≤ 70℃		0		Vcc-2.0	
Supply Current	R_L=∞ dual comparator	Icc		0.4	1.0	mA
	R_L=∞，dual comparator Vcc=30V				2.5	
Voltage Gain	R_L≥ 15KΩ，Vcc=15V	Gv	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		ns
Input Differential Voltage		V_{ID}			Vcc	V
Output Sink Current	$V_{IN(-)}$≥ 1.0V，$V_{IN(+)}$=0V，Vo≤ 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℃ ≤Ta≤ 70℃				700	
Output Leakage Current	$V_{IN(+)}$≥ 1.0V，$V_{IN(-)}$=0V，Vo=5.0V	I_{OL}		0.1		nA
	$V_{IN(+)}$≥ 1.0V，$V_{IN(-)}$=0V，Vo=30V 0℃ ≤Ta≤ 70℃				1000	

APPLICATION CIRCUIT

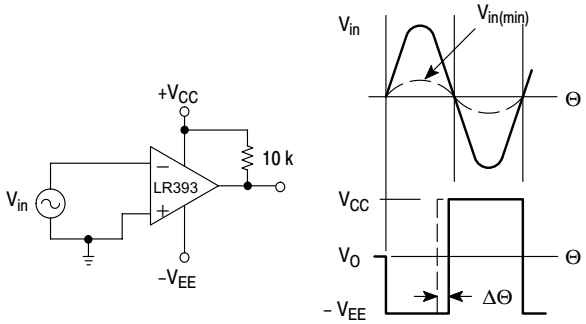


D1 prevents input from going negative by more than 0.6 V.

$R1 + R2 = R3$

$R3 \leq \frac{R5}{10}$ 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 ($\Delta\Theta$).

Figure 2. Zero Crossing Detector (Split Supply)

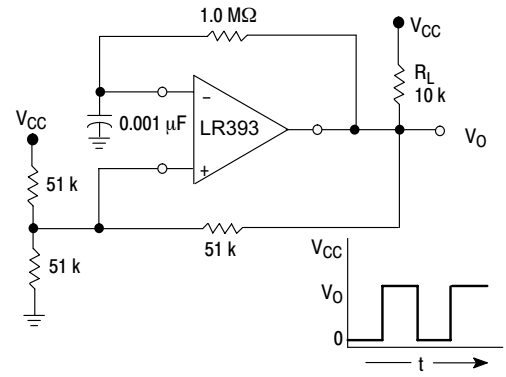
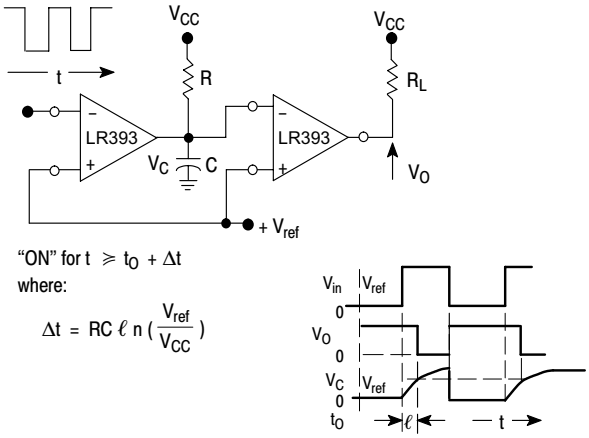


Figure 3. Free−Running Square−Wave Oscillator



"ON" for $t \geq t_O + \Delta t$

where:

$\Delta t = RC\,\ell n\left(\frac{V_{ref}}{V_{CC}}\right)$

Figure 4. Time Delay Generator

TYPICAL CHARACTERISTICS CURVES

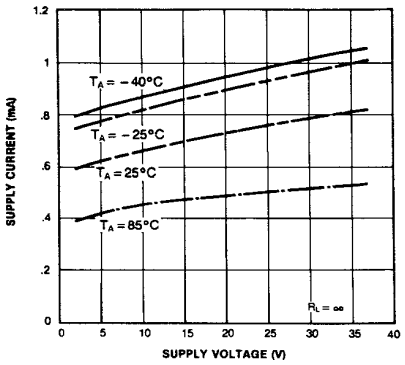


Figure 1. Supply Current vs Supply Voltage

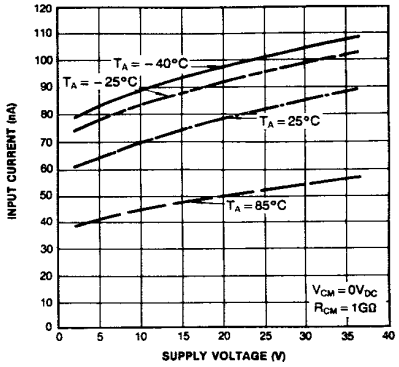


Figure 2. Input Current vs Supply Voltage

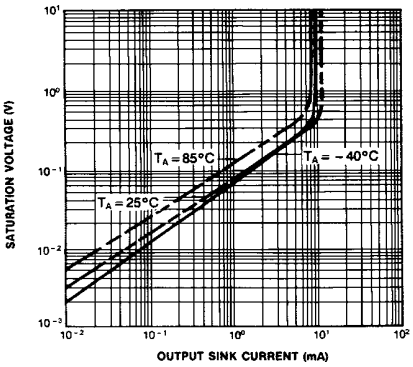


Figure 3. Output Saturation Voltage vs Sink Current

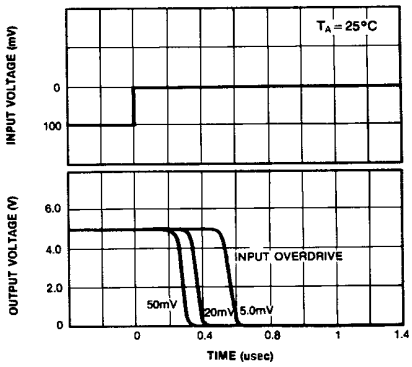


Figure 4. Response Time for Various Input Overdrive-Negative Transition

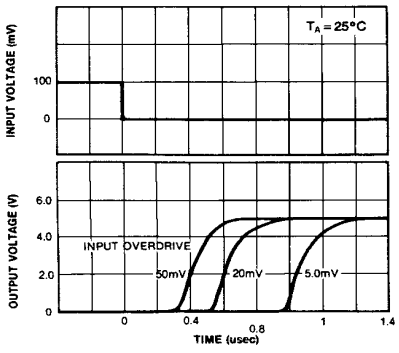
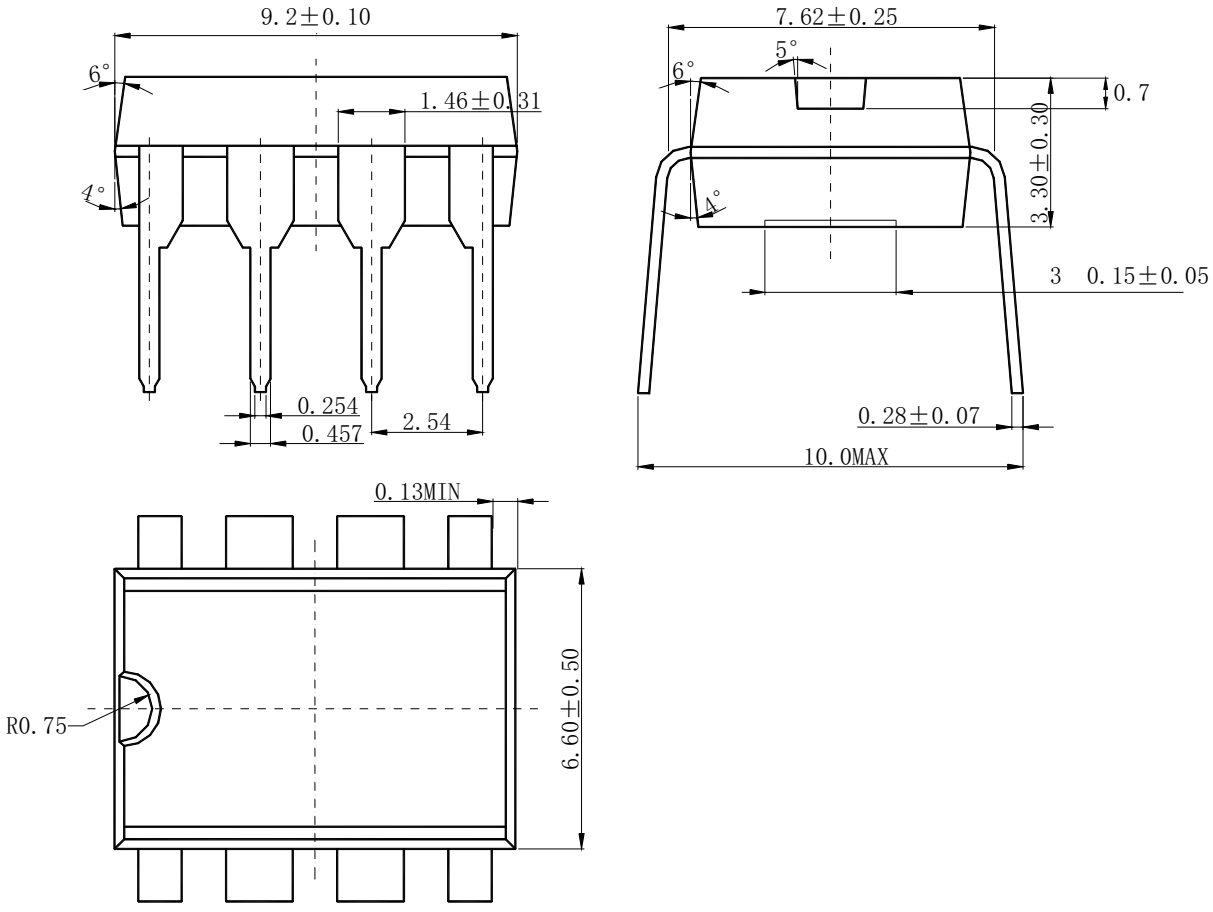


Figure 5. Response Time for Various Input Overdrive-Positive Transition

Mechanical Dimensions

DIP-8 **Unit: mm**



Mechanical Dimensions (Continued)

SOP-8 **Unit: mm**