

Dual Differential Comparators

LR393D

DESCRIPTION

The LR393D consists of two voltage comparators with an offset voltage specification as low as 2.0mV max. 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. 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.



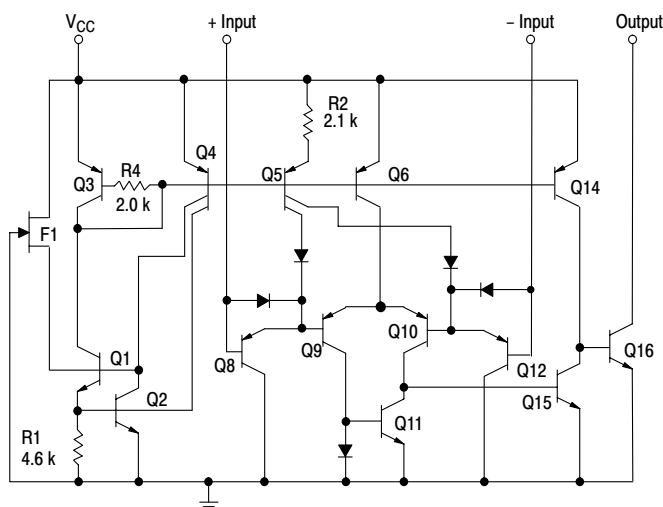
FEATURES

- Single or dual supply operation
- Wide operating supply range ($V_{CC}=2V\sim 36V$ or ± 1 to $\pm 18V$)
- Input common-mode voltage includes ground
- Low supply current drain: $I_{CC}=0.8mA$ (Typical)
- Low input bias current $I_{bias}=65nA$ (Typical)
- Output compatible with TTL, DTL, and CMOS logic system
- We declare that the material of product complies with RoHS requirements and Halogen Free.
- MSL: 3

ORDERING INFORMATION

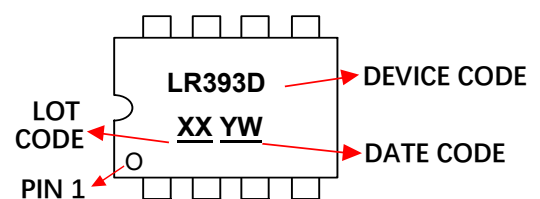
Device	LR393D
Package	SOP-8
Shipping	4000/Tape&Reel
MOQ	4000

BLOCK DIAGRAM

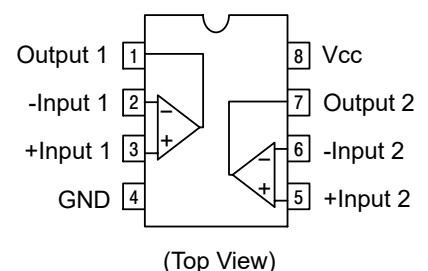


NOTE: Diagram shown is for 1 comparator

MARKING INFORMATION



PIN CONFIGURATION



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 (Ta=25°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Supply Voltage	Vcc	±18 or 36	V
Differential input voltage	Vi(diff)	36	V
Input Voltage	VI	-0.3~36V	V
Operating Temperature	Topr	-40 to +125	°C
Junction Operating Temperature	Tj	-40 to +150	°C
Storage Temperature	Tstg	-65 to +150	°C

ELECTRICAL CHARACTERISTICS

(Vcc=5.0V, Ta=25°C, All voltage referenced to GND unless otherwise specified)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Input offset voltage	VIO	VCM=0 to Vcc-1.5	25°C	±1.0	±5.0	mV
			Full range		±7.0	mV
Input offset current	IIO	Vo(p)=1.4V, Rs=0	25°C	±5	±50	nA
			Full range		±500	nA
Input Bias current	Ib		25°C	65	250	nA
			Full range		400	nA
Input Common-mode voltage range	VI(R)		25°C	0	Vcc-1.5	V
			Full range		Vcc-2	V
Supply Current	Icc	RL=∞, Vcc=5V	25°C	0.6	1.0	mA
		RL=∞, Vcc=30V	25°C	0.8	2.5	mA
			Full range		2.5	mA
Large signal Voltage Gain	GV	Vcc=15V, RL>15kΩ	25°C	70	85	dB
Large signal response time	tres	Vi=TTL logic wing Vref=1.4V, VRL=5V, RL=5.1kΩ	25°C	350		ns
Response time	tres	VRL=5V, RL=5.1kΩ	25°C	1400		ns
Output sink current	Isink	Vi(-)>1V, Vi(+)=0V, Vo(p)<1.5V	25°C	6	18	mA
Output saturation voltage	Vsat	Vi(-)>1V, Vi(+)=0V, Isink=4mA	25°C	160	400	mV
			Full range		400	mV
output leakage current	Ileakage	VI(+)=1V, VI(-)=0, Vo(p)=5V	25°C	0.1		nA
		VI(+)=1V, VI(-)=0, Vo(p)=30V	Full range		3	uA

TYPICAL PERFORMANCE CHARACTERISTICS

Fig.1 Supply Current

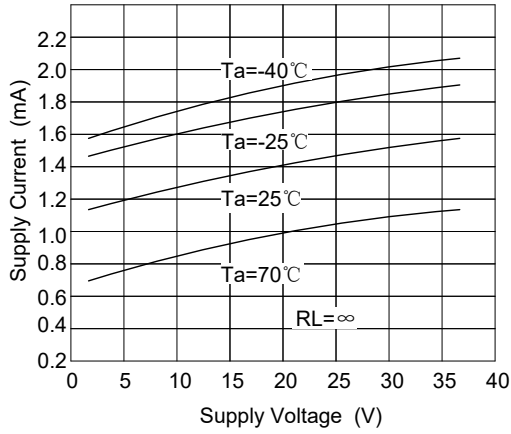


Fig.2 Input Current

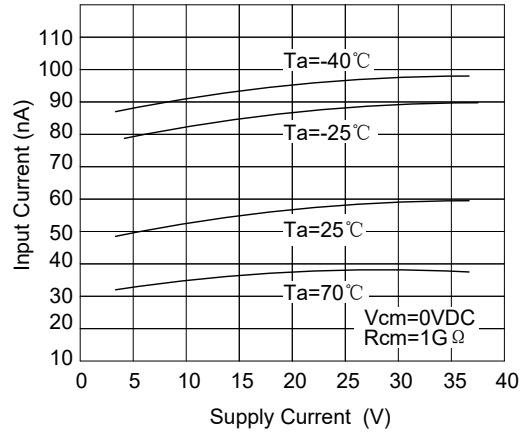


Fig.3 Output Saturation Voltage

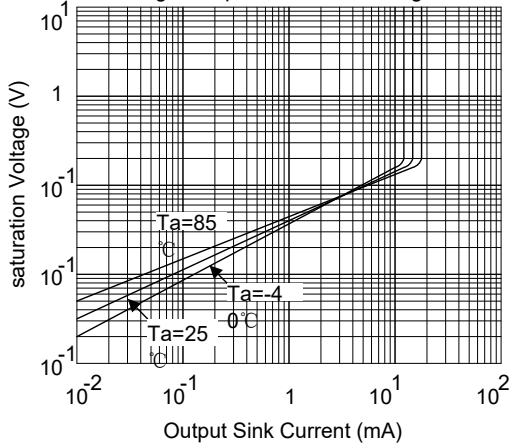


Fig.4 Reponse time for various input overdrive negative transition

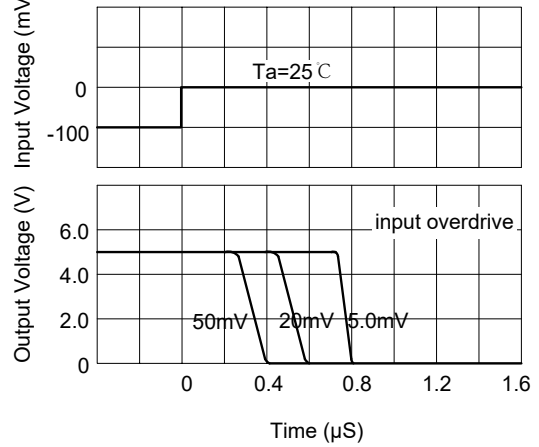
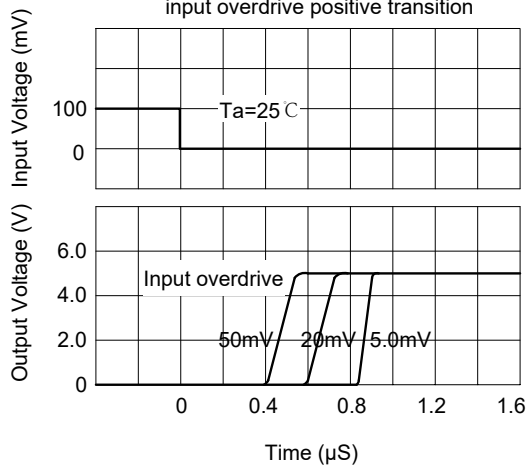
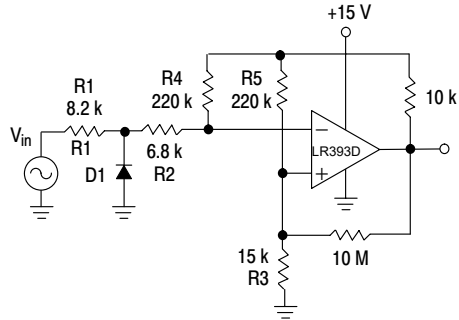


Fig.5 Reponse time for various input overdrive positive transition

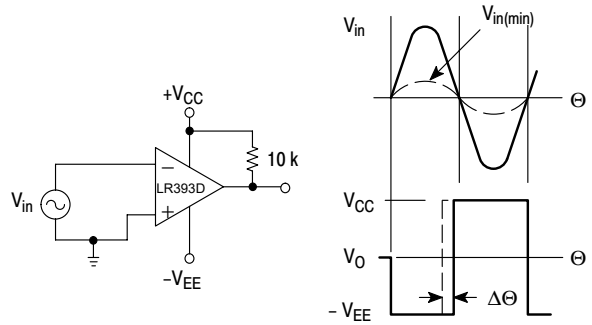


TYPICAL APPLICATION CIRCUITS



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 4. Zero Crossing Detector (Single Supply)



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

Figure 5. Zero Crossing Detector (Split Supply)

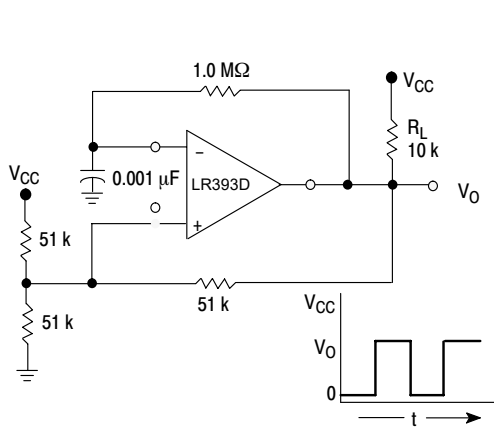


Figure 6. Free-Running Square-Wave Oscillator

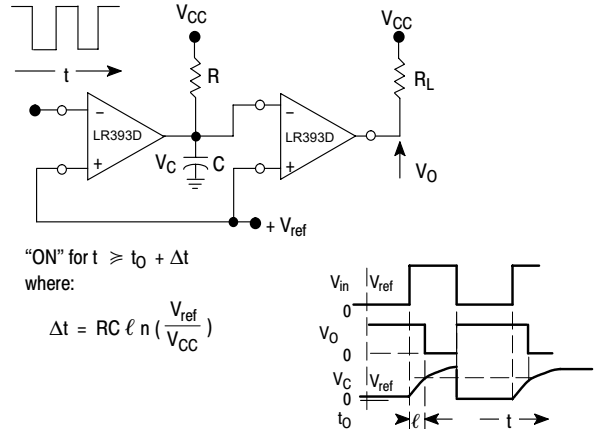
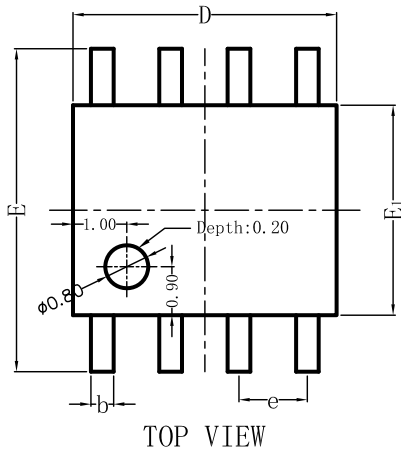
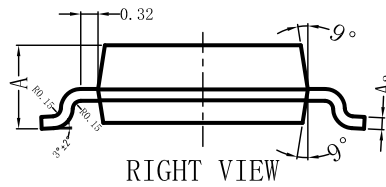
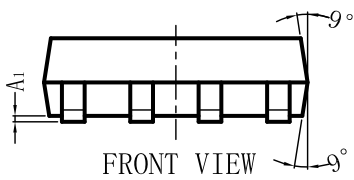


Figure 7. Time Delay Generator

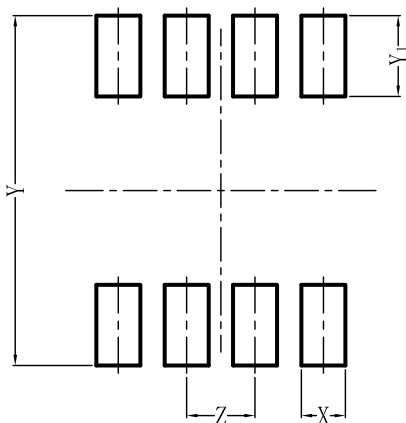
PACKAGE DIMENSIONS



SOP8 (Unit:mm)			
Dim	Min	Typ	Max
A	1.35	1.55	1.75
A1	0.06	--	0.16
A2	0.19	0.22	0.25
b	0.33	0.42	0.51
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		



RECOMENDED PAD LAYOUT



Dimensions	(mm)
X	0.820
Y	6.500
Y1	1.500
Z	1.270

REVISION HISTORY

Version	Description	Update by	Update Date
2.1	Add marking diagram. Add product packing specification. Update SOP-8 package outline dimensions.	Chen S	2023-02-21
2.2	Update SOP-8 package outline dimensions. Update electrical characteristics and maximum ratings. Update electrical characteristic curves.	Chen S	2024-01-03

DISCLAIMER

- Curve guarantee in the specification. The curve of test items with electric parameter is used as quality guarantee. The curve of test items without electric parameter is used as reference only.
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