

Dual Differential Comparators

LR2903D

DESCRIPTION

The LR2903D 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.



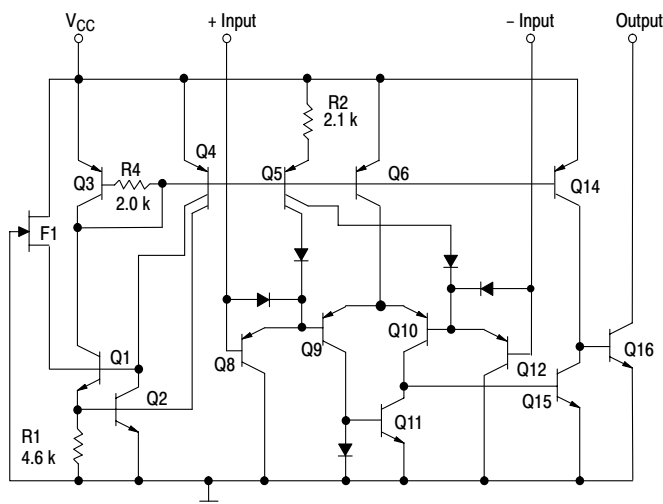
FEATURES

- Wide supply voltage range
- Low supply current drain independent of the 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

ORDERING INFORMATION

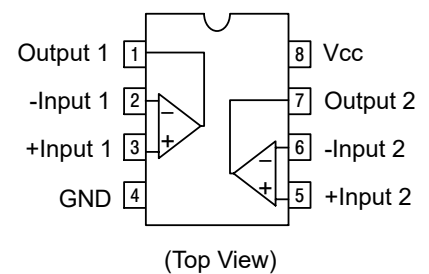
Device	Package
LR2903D	SOP-8

BLOCK DIAGRAM



NOTE: Diagram shown is for 1 comparator

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

ELECTRICAL CHARACTERISTICS

at specified free-air temperature, VCC=5V (unless otherwise noted)

PARAMETER	TEST CONDITIONS ¹		MIN	TYP	MAX	UNIT
V _{io} Input offset voltage	V _{CC} =5V to 30V, V _{IC} =V _{ICR} min, V _O =1.4V	25°C		2	5	mV
		Full range			9	
I _{io} Input offset current	V _O =1.4V	25°C		5	50	nA
		Full range			150	
I _{IB} Input bias current	V _O =1.4V	25°C		-25	-250	nA
		Full range			-400	
V _{ICR} Common-mode input voltage range ²		25°C	0 to V _{CC} -1.5			V
		Full range	0 to V _{CC} -2			
A _{VD} Large-signal differential voltage amplification	V _{CC} =15V, V _O =1.4V to 11.4V, R _L ≥ 15kΩ to V _{CC}	25°C	50	200		V/mV
I _{OH} High-level output current	V _{OH} =5V, V _{ID} =1V V _{OH} =30V, V _{ID} =1V	25°C		0.1	50	nA
		Full range			1	
V _{OL} Low-level output voltage	I _{OL} =4mA, 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			mA
I _{CC} Supply current	R _L =∞	V _{CC} =5V	25°C	0.8	1	mA
		V _{CC} =30V	Full range		2.5	
Response time	R _L connected to 5V through 5.1kΩ, C _L =15pF ³	100mV input step with 5mV overdrive		1.3		μs
		TTL-level input step		0.3		

NOTE 1. Full range (MIN to MAX) for the LR2903D is -40°C to 125°C. All characteristics are measured with zero common-mode input voltage unless otherwise specified.

2. 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.

3. C_L includes probe and jig capacitance. The response time specified is the interval between the input step function and the instant, when the output crosses 1.4V.

TYPICAL PERFORMANCE CHARACTERISTICS

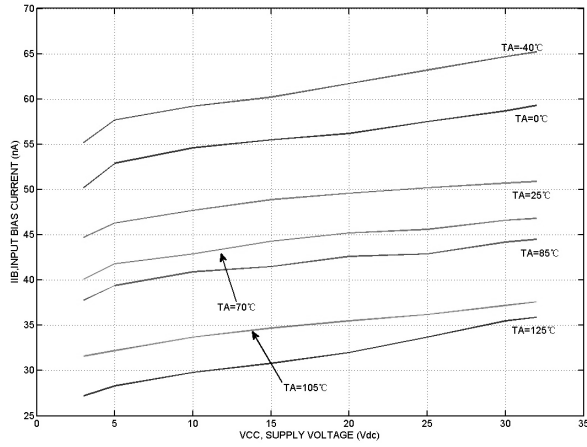


Figure 1. Input Bias Current vs Power Supply Voltage

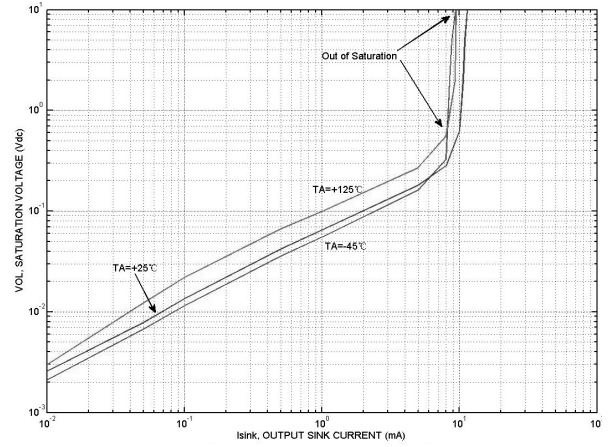


Figure 2. Output Saturation Voltage vs Output Sink Current

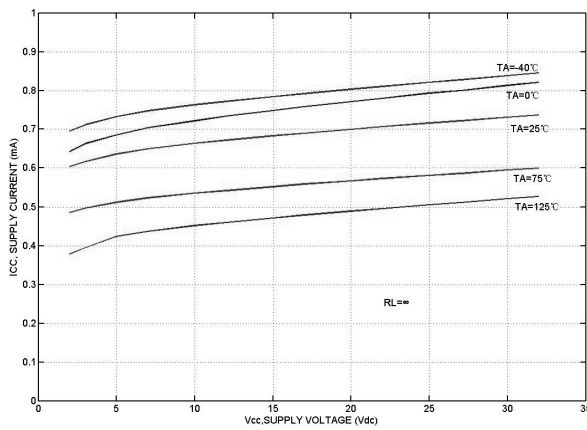
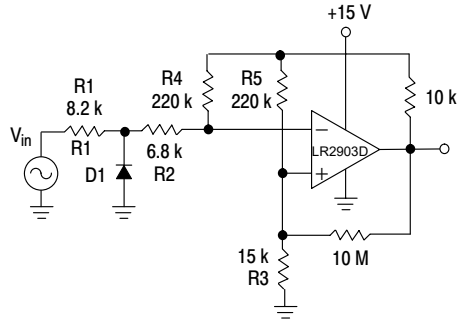


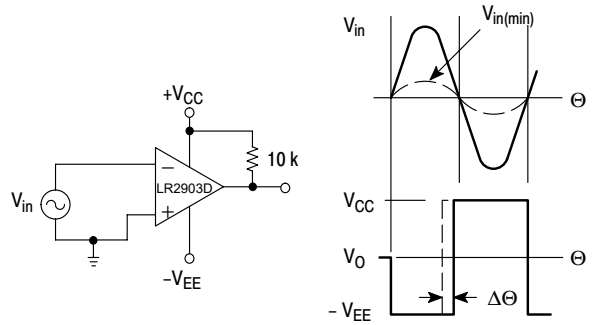
Figure 3. Power Supply Current vs Power Supply Voltage

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)



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

Figure 5. Zero Crossing Detector (Split Supply)

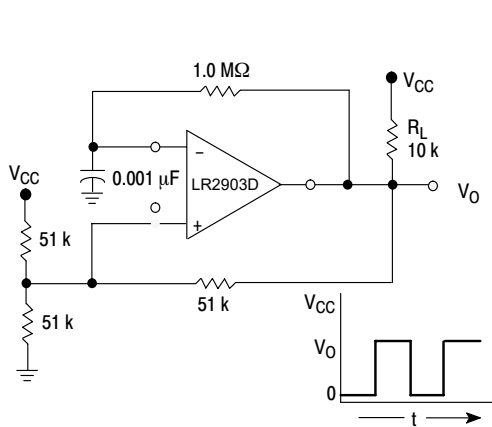


Figure 6. Free-Running Square-Wave Oscillator

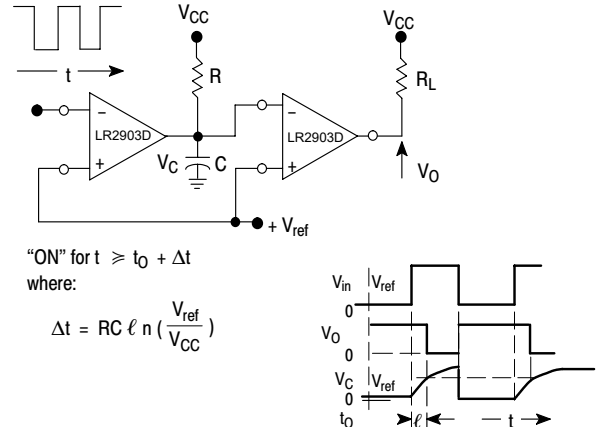


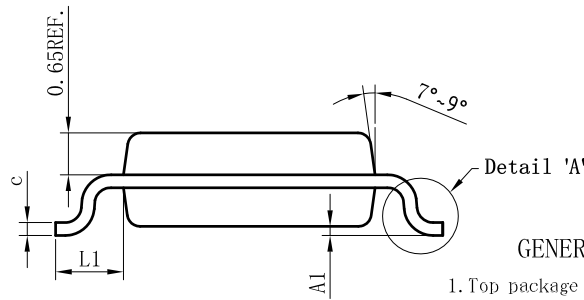
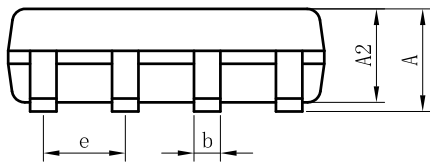
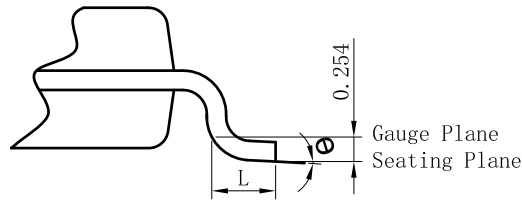
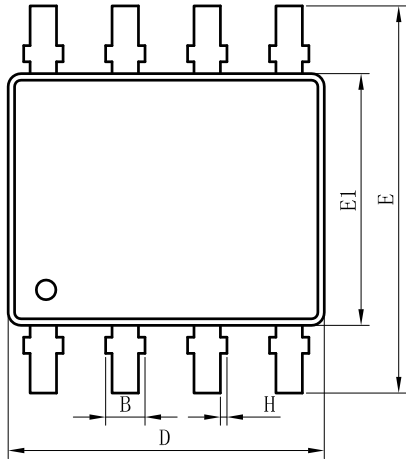
Figure 7. Time Delay Generator

MECHANICAL DIMENSIONS

SOP-8

Unit: mm

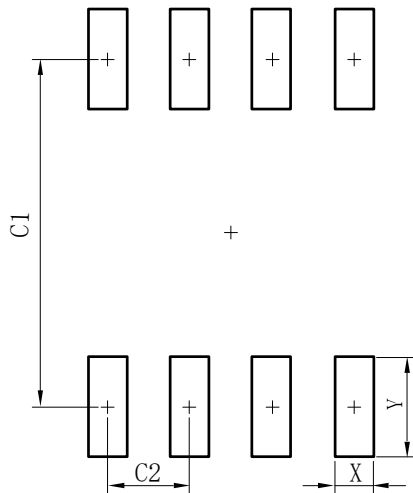
SOP-8			
DIM	MIN	NOR	MAX
A	-	-	1.75
A1	0.10	0.15	0.20
A2	1.35	1.45	1.55
b	0.33	0.42	0.51
c	0.15	0.22	0.29
D	4.77	4.90	5.03
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.46	0.66	0.86
L1	0.85	1.05	1.25
θ	0°	5°	8°
B	-	-	0.55
H	0	0.05	0.10
All Dimensions in mm			



GENERAL NOTES

1. Top package surface finish Ra0.4±0.2um
2. Bottom package surface finish Ra0.7±0.2um
3. Side package surface finish Ra0.4±0.2um
4. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs. Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
5. Dimension "b" Does Not Include Dambar Protrusion.

SUGGESTED PAD LAYOUT



SOP-8	
DIM	(mm)
X	0.60
Y	1.55
C1	5.40
C2	1.27

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