



LM2903

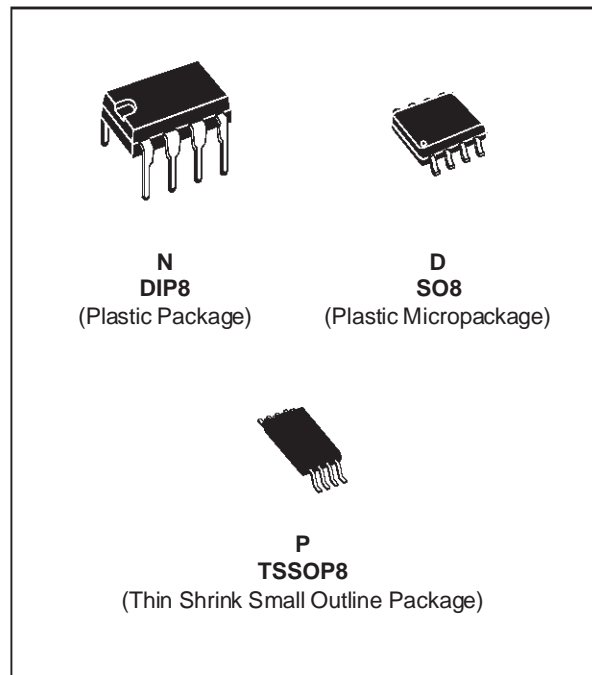
LOW POWER DUAL VOLTAGE COMPARATORS

- WIDE SINGLE SUPPLY VOLTAGE RANGE OR DUAL SUPPLIES +2V TO +36V OR $\pm 1V$ TO $\pm 18V$
- VERY LOW SUPPLY CURRENT (0.4mA) INDEPENDENT OF SUPPLY VOLTAGE (1 mW/comparator at +5V)
- LOW INPUT BIAS CURRENT : 25nA TYP
- LOW INPUT OFFSET CURRENT : $\pm 5nA$ TYP
- INPUT COMMON-MODE VOLTAGE RANGE INCLUDES GROUND
- LOW OUTPUT SATURATION VOLTAGE : 250mV TYP. ($I_o = 4mA$)
- DIFFERENTIAL INPUT VOLTAGE RANGE EQUAL TO THE SUPPLY VOLTAGE
- TTL, DTL, ECL, MOS, CMOS COMPATIBLE OUTPUTS

DESCRIPTION

This device consists of two independent low power voltage comparators designed specifically to operate from a single supply over a wide range of voltages. Operation from split power supplies is also possible.

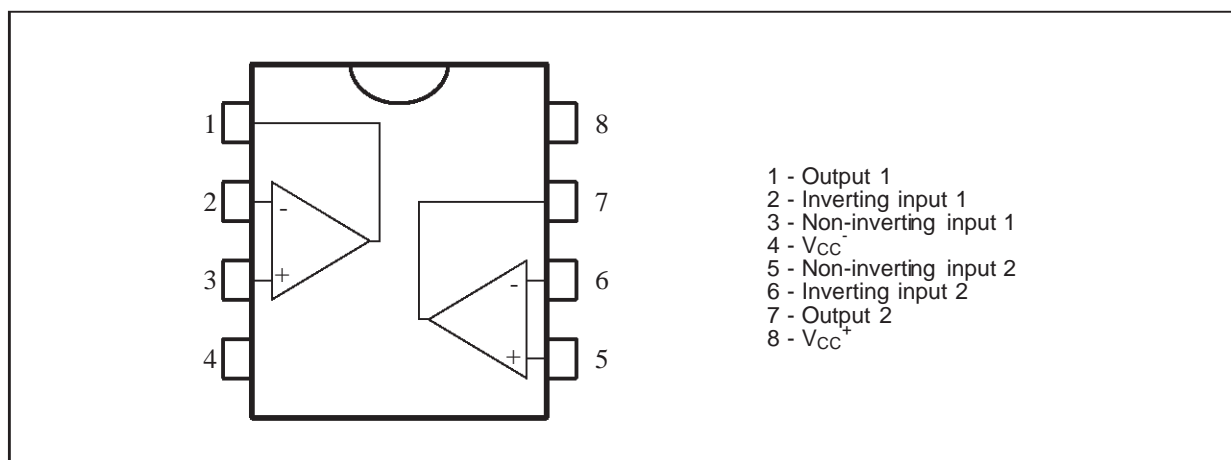
These comparators also have a unique characteristic in the fact that the input common-mode voltage range includes ground even though operated from a single power supply voltage.



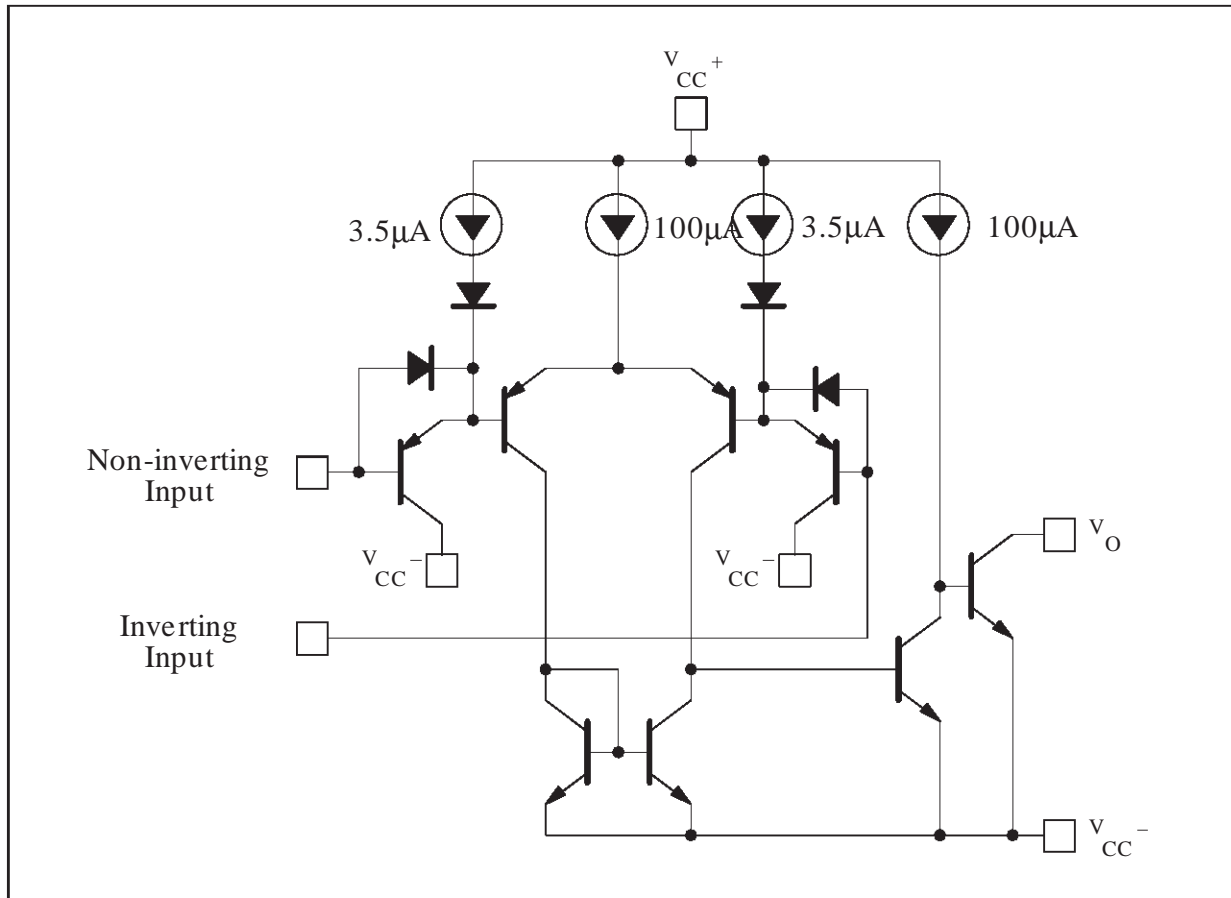
ORDER CODES

Part Number	Temperature Range	Package		
		N	D	P
LM2903	-40, +125°C	•	•	•
Example : LM2903N				

PIN CONNECTIONS (top view)



SCHMATIC DIAGRAM (1/2 LM2903)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CC}	Supply Voltage	± 18 or 36	V
V_{id}	Differential Input Voltage	± 36	V
V_i	Input Voltage	-0.3 to $+36$	V
	Output Short-circuit to Ground – (note 1)	Infinite	
P_{tot}	Power Dissipation	830	mW
T_{oper}	Operating Free-air Temperature Range	-40 to $+125$	$^{\circ}C$
T_{stg}	Storage Temperature Range	-65 to $+150$	$^{\circ}C$

Notes :

ELECTRICAL CHARACTERISTICS

$V_{CC}^+ = +5V$, $V_{CC}^- = 0V$, $T_{amb} = 25^{\circ}C$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V_{io}	Input Offset Voltage – (note 2) $T_{amb} = +25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		1	7 15	mV
I_{ib}	Input Bias Current – (note 3) $T_{amb} = +25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		25	250 400	nA
I_{io}	Input Offset Current $T_{amb} = +25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		5	50 150	nA
A_{vd}	Large Signal Voltage Gain $V_{CC} = 15V$, $R_L = 15k\Omega$, $V_o = 1$ to $11V$	25	200		V/mV
I_{CC}	Supply Current (all comparators) $V_{CC} = 5V$, no load $V_{CC} = 30V$, no load		0.4 1	1 2.5	mA
V_{icm}	Input Common Mode Voltage Range - (note 4) $T_{amb} = +25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$	0 0		$V_{CC}^+ - 1.5$ $V_{CC}^+ - 2$	V
V_{id}	Differential Input Voltage - (note 6)			V_{CC}^+	V
I_{sink}	Output Sink Current ($V_{id} = -1V$, $V_o = 1.5V$)	6	16		mA
V_{OL}	Low Level Output Voltage ($V_{id} = -1V$, $I_{sink} = 4mA$) $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		250	400 700	mV
I_{OH}	High Level Output Current ($V_{id} = 1V$, $V_{CC} = V_o = 30V$) $T_{amb} = 25^{\circ}C$ $T_{min.} \leq T_{amb} \leq T_{max.}$		0.1	1	nA μA
t_{re}	Response Time ($R_L = 5.1k\Omega$ to V_{CC}^+) – (note 5)		1.3		μs
t_{rel}	Large Signal Response Time ($V_i = TTL$, $V_{ref} = +1.4V$, $R_L = 5.1k\Omega$ to V_{CC}^+)		300		ns

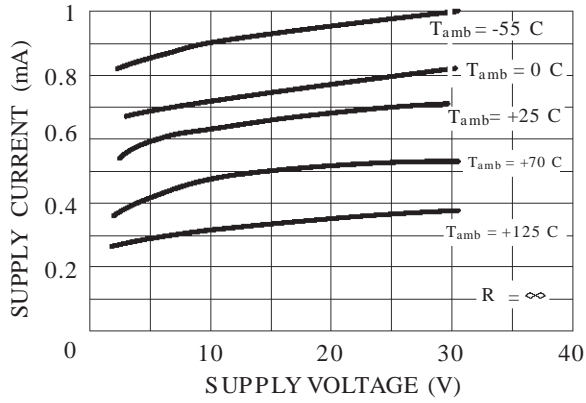
Notes :

2.

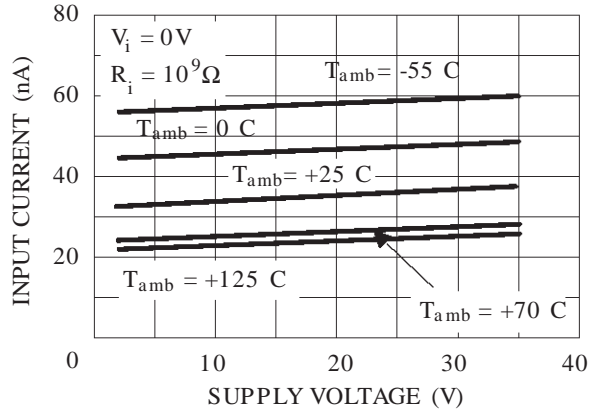
At output switch point, $V_o \approx 1.4V$, $R_s = 0\Omega$ with V_{CC}^+ from 5V to 30V and over the full input common-mode range (0V to $V_{CC}^+ 1.5V$).

3.

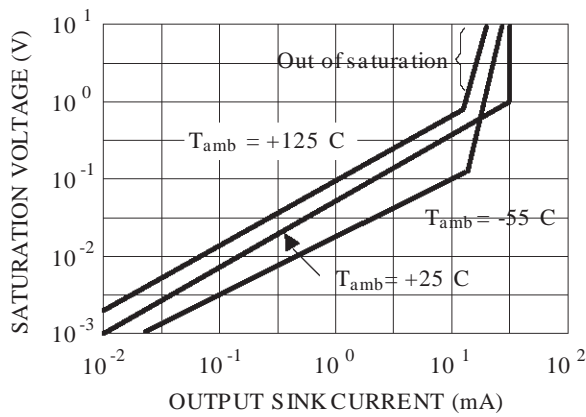
SUPPLY CURRENT versus



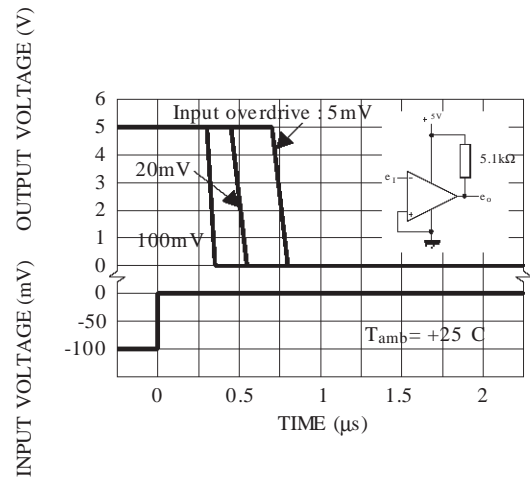
INPUT CURRENT versus



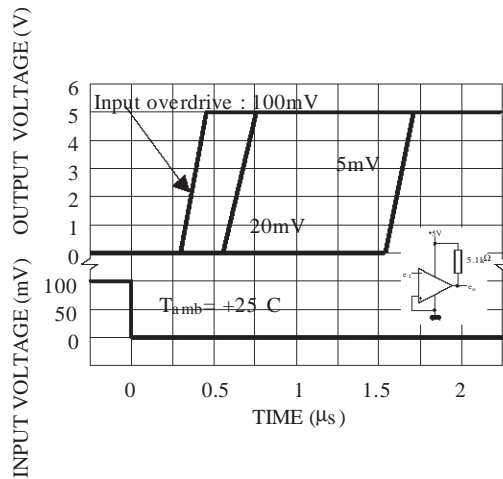
OUTPUT SATURATION VOLTAGE



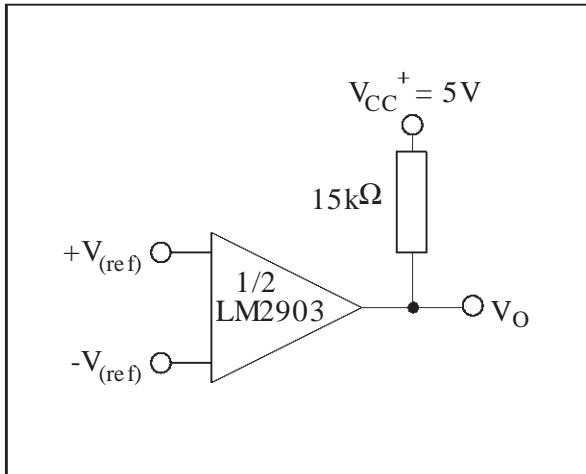
RESPONSE TIME FOR VARIOUS IN-



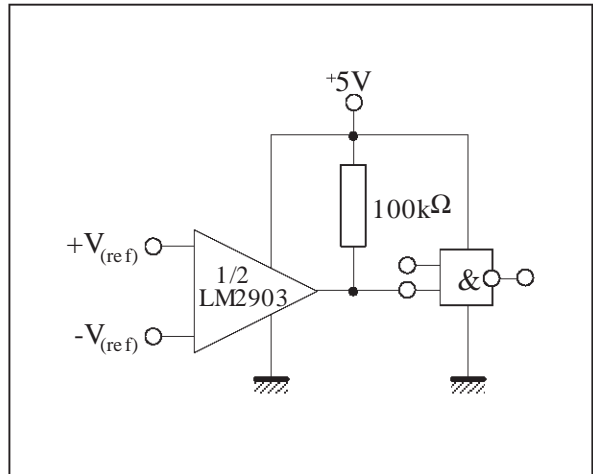
RESPONSE TIME FOR VARIOUS IN-



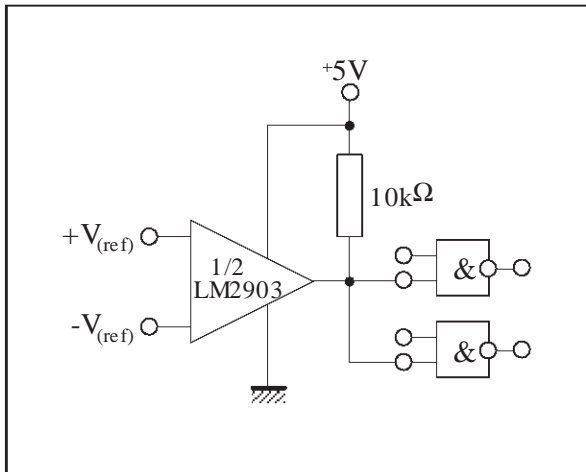
TYPICAL APPLICATIONS
BASIC COMPARATOR



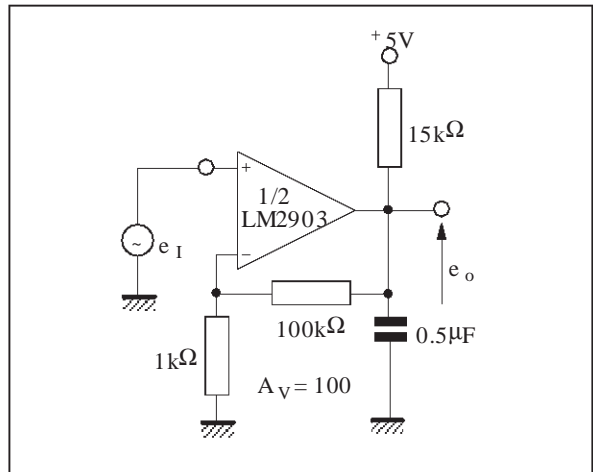
DRIVING CMOS



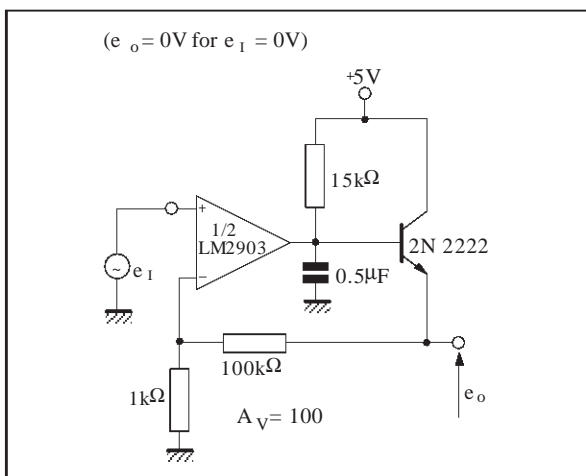
DRIVING TTL



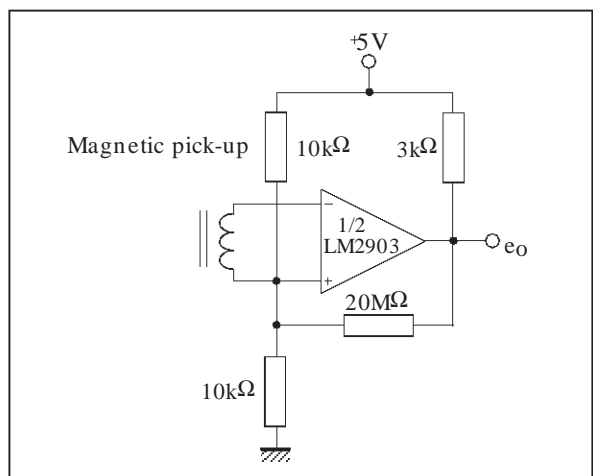
LOW FREQUENCY OP AMP



LOW FREQUENCY OP AMP

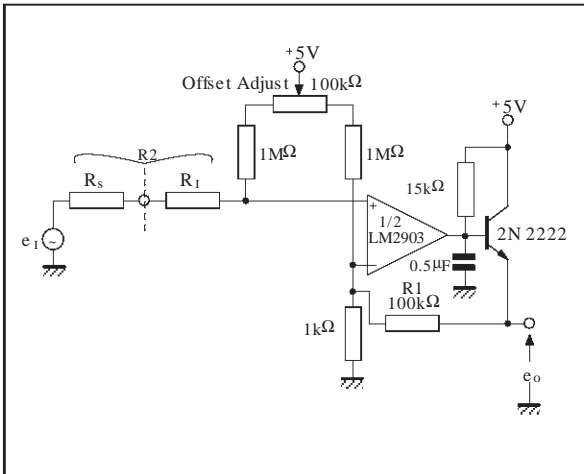


TRANSDUCER AMPLIFIER

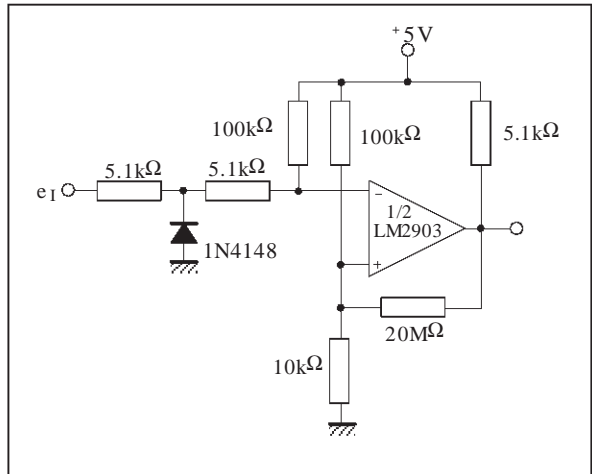


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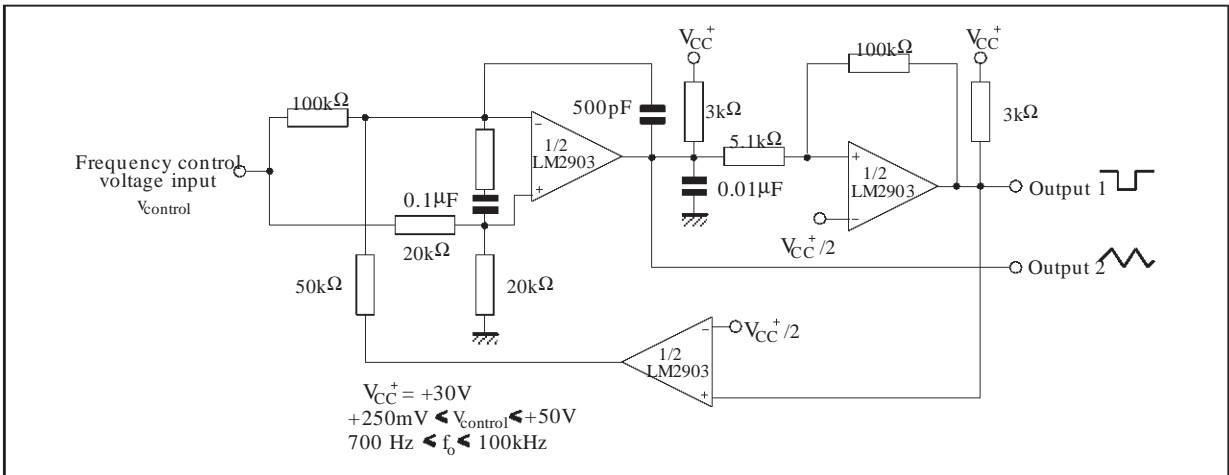
LOW FREQUENCY OP AMP WITH OFFSET ADJUST



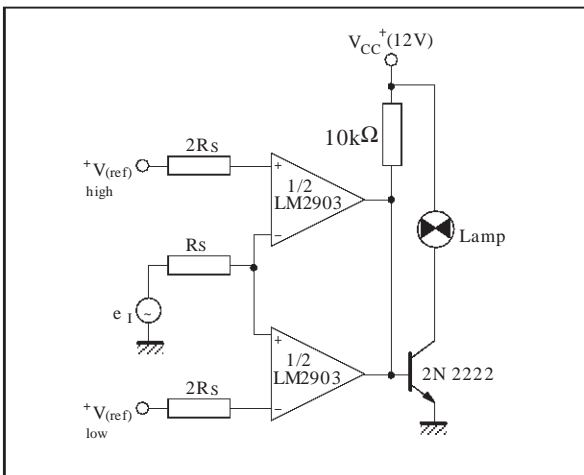
ZERO CROSSING DETECTOR (SINGLE POWER SUPPLY)



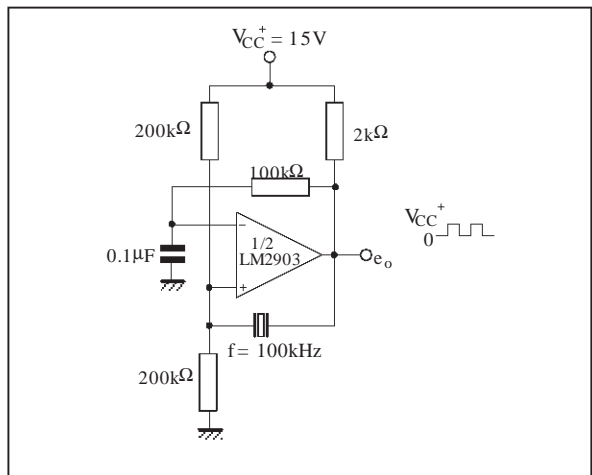
TWO DECADES HIGH FREQUENCY VCO

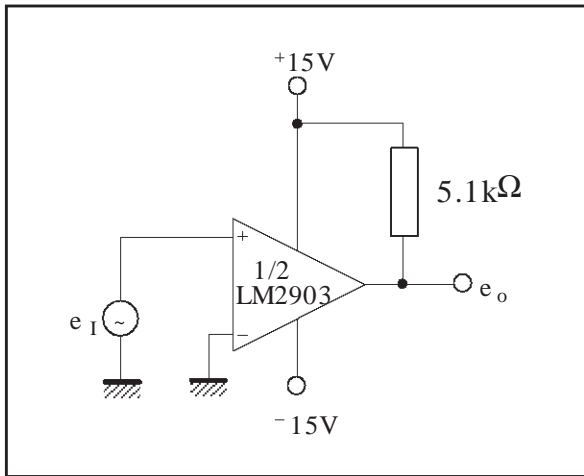
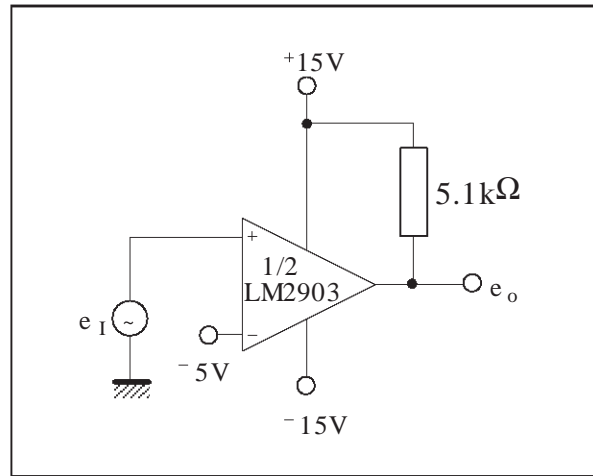


LIMIT COMPARATOR



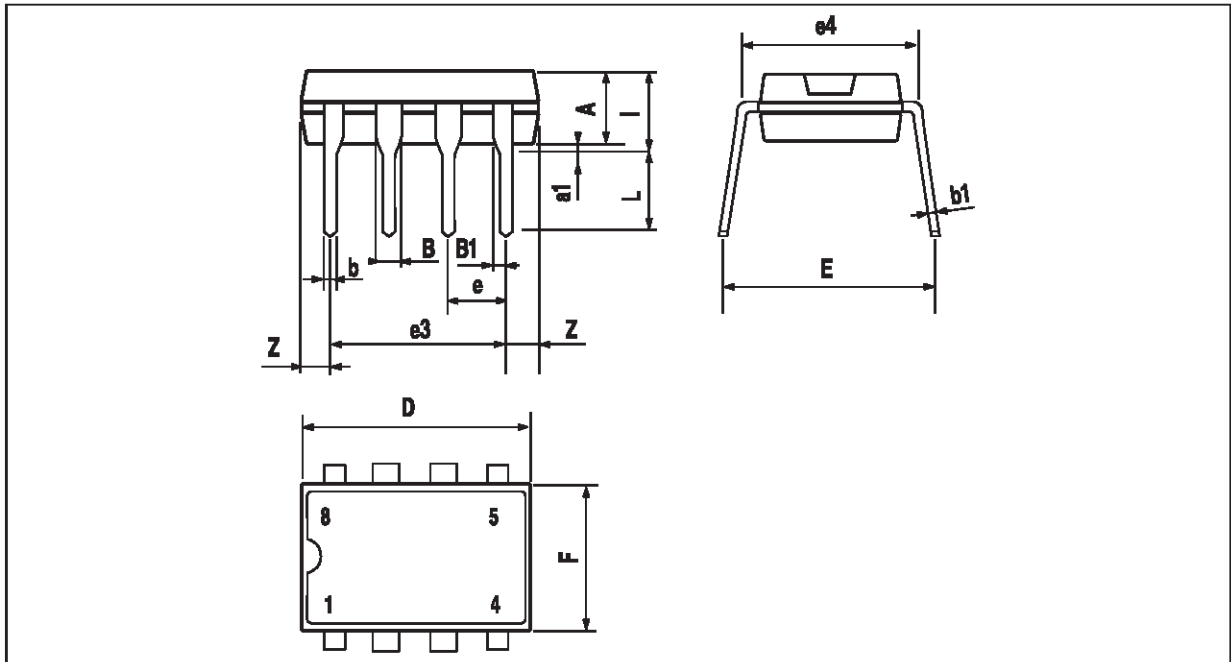
CRYSTAL CONTROLLED OSCILLATOR



SPLIT-SUPPLY APPLICATIONS
ZERO CROSSING DETECTOR**COMPARATOR WITH A NEGATIVE REFERENCE**

LM2903

PACKAGE MECHANICAL DATA 8 PINS -PLASTIC DIP

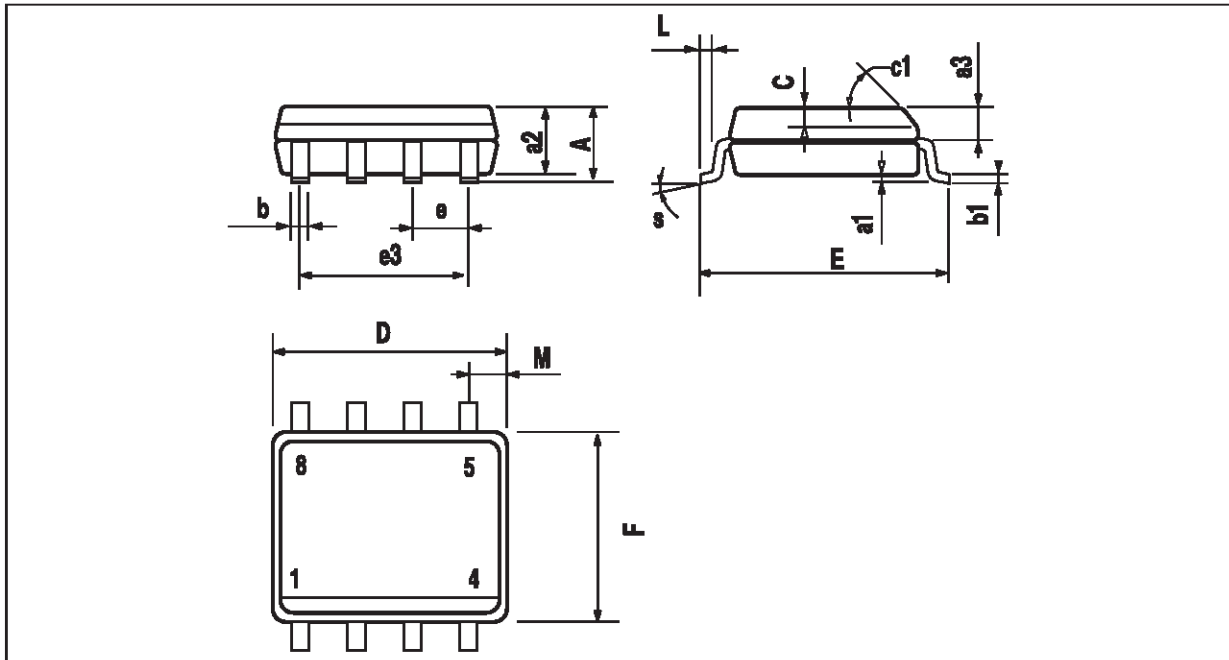


PM-DIP8.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
i			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

DIP8.TBL

PACKAGE MECHANICAL DATA
8 PINS -PLASTIC MICROPACKAGE (SO)

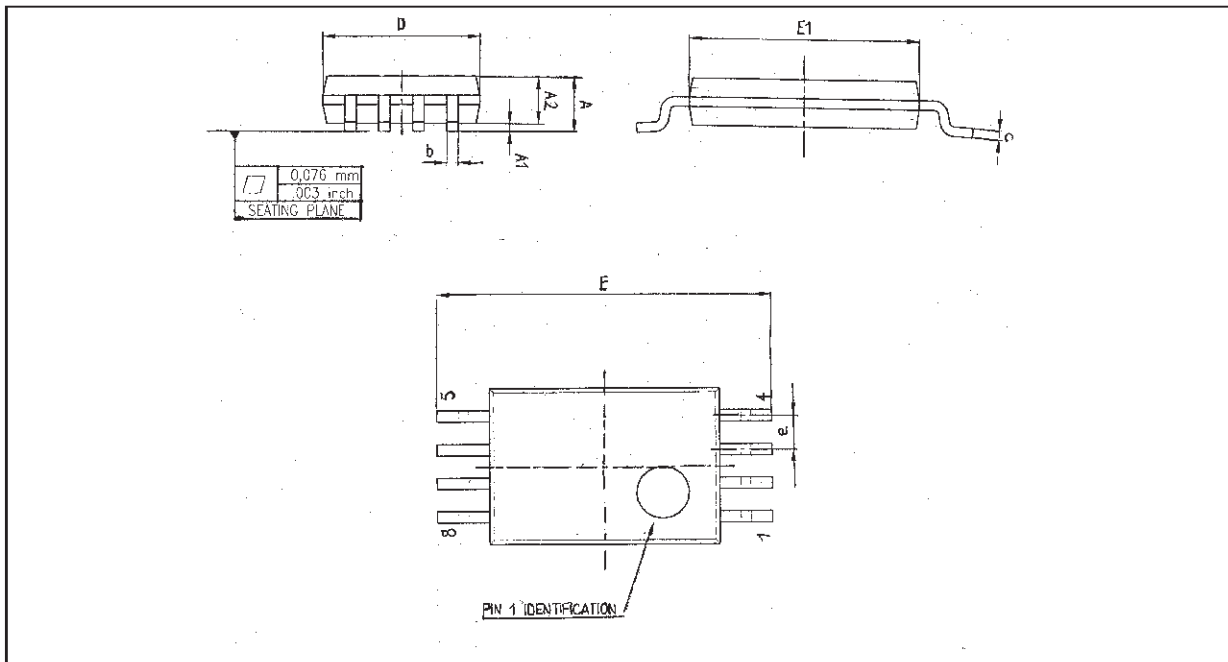


Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F	3.8		4.0	0.150		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

PM-SO8-EPS

SO8-TBL

PACKAGE MECHANICAL DATA
8 PINS -THIN SHRINK SMALL OUTLINE PACKAGE



Dim.	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.20			0.05
A1	0.05		0.15	0.01		0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
b	0.19		0.30	0.007		0.15
c	0.09		0.20	0.003		0.012
D	2.90	3.00	3.10	0.114	0.118	0.122
E		6.40			0.252	
E1	4.30	4.40	4.50	0.169	0.173	0.177
e		0.65			0.025	
k	0°		8°	0°		8°
l	0.50	0.60	0.75	0.09	0.0236	0.030

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