



LM2903

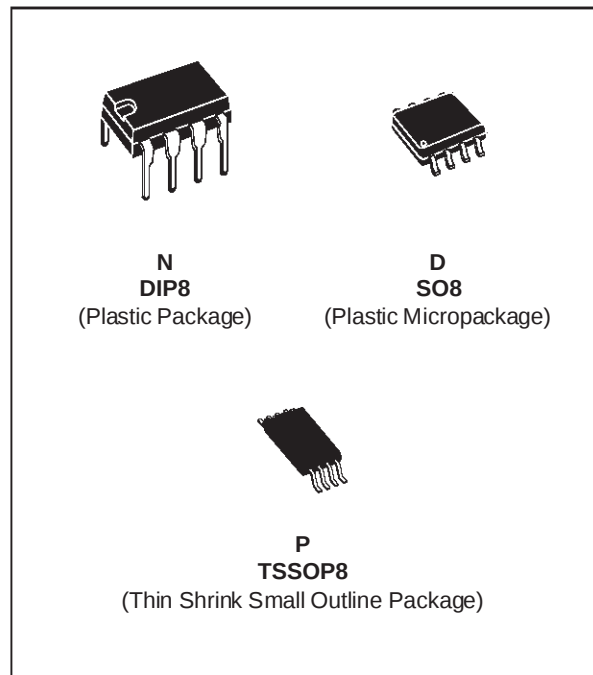
LOW POWER DUAL VOLTAGE COMPARATORS

- WIDE SINGLE SUPPLY VOLTAGE RANGE OR DUAL SUPPLIES +2V TO +36V OR $\pm 1\text{V}$ TO $\pm 18\text{V}$
- 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 : $\pm 5\text{nA}$ TYP
- INPUT COMMON-MODE VOLTAGE RANGE INCLUDES GROUND
- LOW OUTPUT SATURATION VOLTAGE : 250mV TYP. ($I_o = 4\text{mA}$)
- 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.

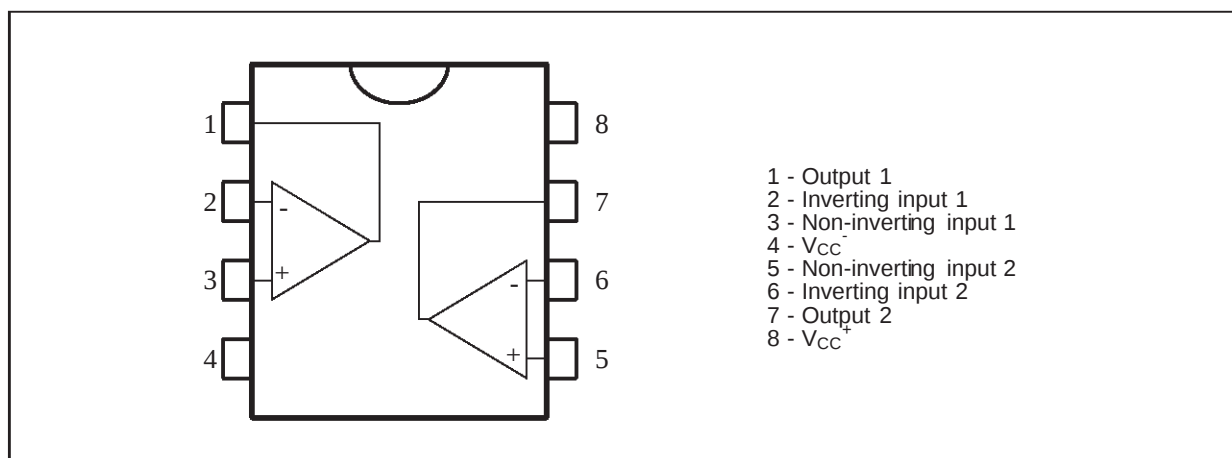
These comparators also have a unique characteristic in the fact that the input common-mode voltage range includes ground even though operated from a single power supply voltage.



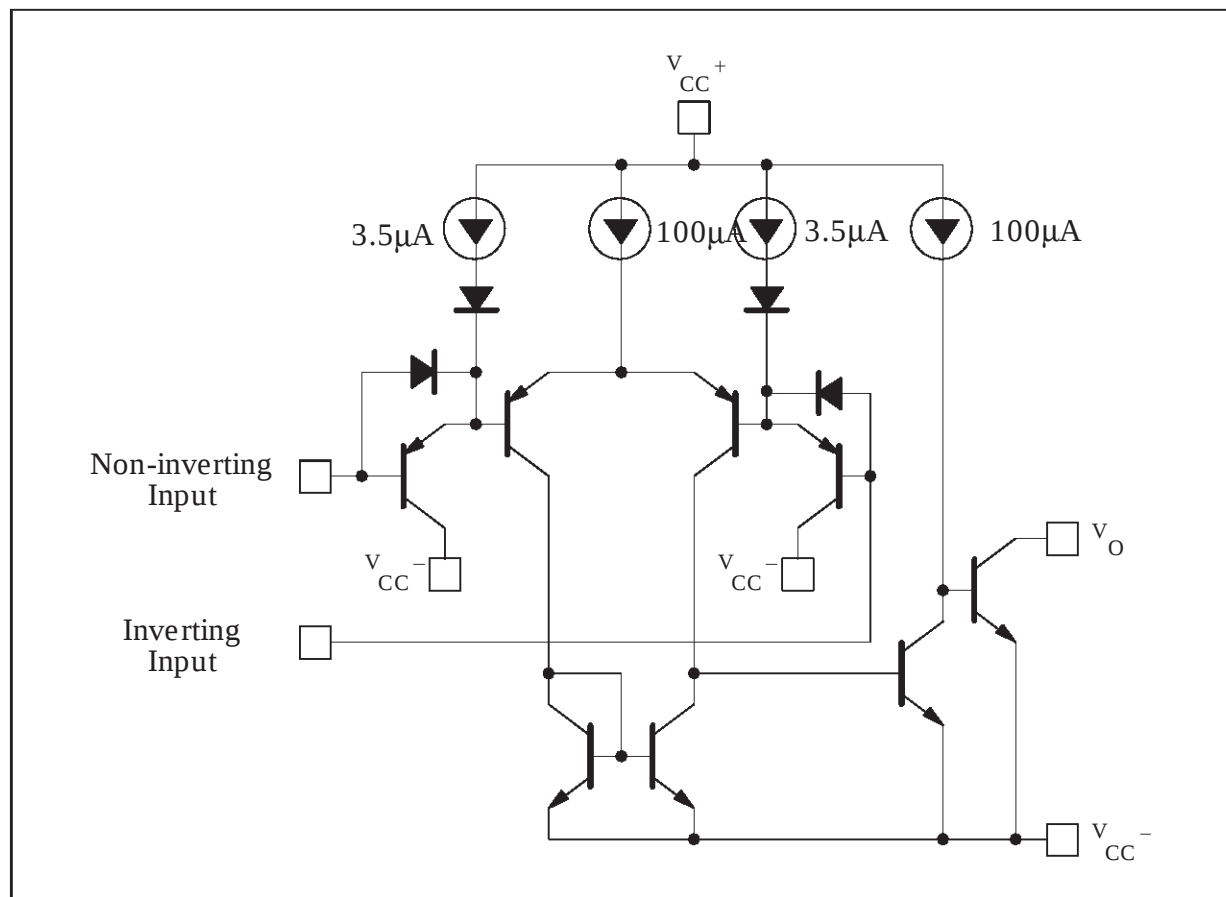
ORDER CODES

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

PIN CONNECTIONS (top view)



SCHEMATIC 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	°C
T_{stg}	Storage Temperature Range	-65 to +150	°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

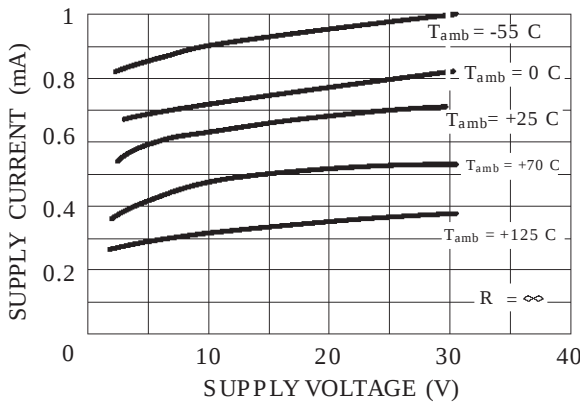
Notes :

2.

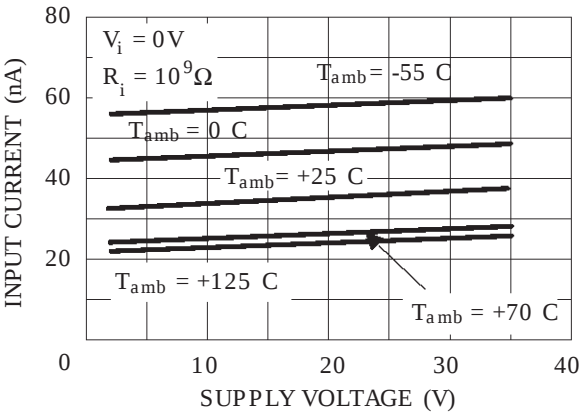
At output switch point, $V_O \approx 1.4V$, $R_S = 0\Omega$ with V_{CC}^+ from 5V to 30V and over the full input common-mode range (0V to $V_{CC}^+ 1.5V$).

3.

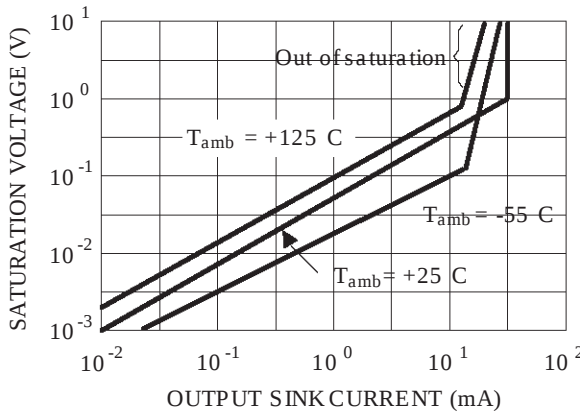
SUPPLY CURRENT versus



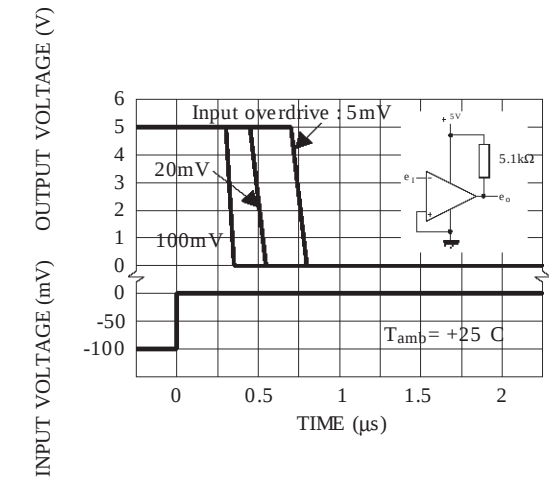
INPUT CURRENT versus



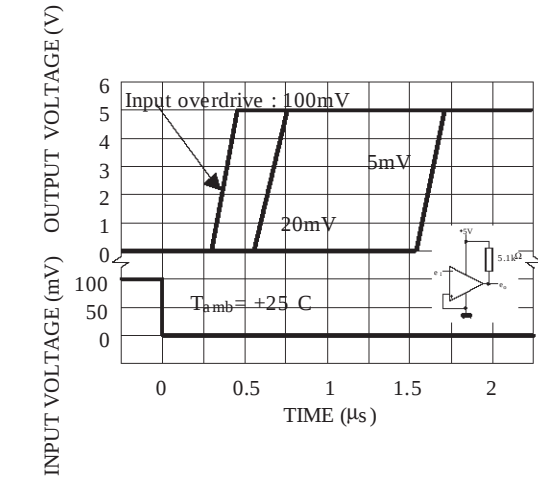
OUTPUT SATURATION VOLTAGE



RESPONSE TIME FOR VARIOUS IN-

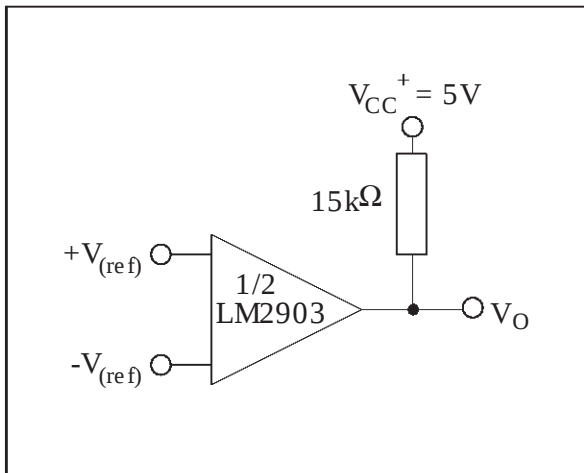


RESPONSE TIME FOR VARIOUS IN-

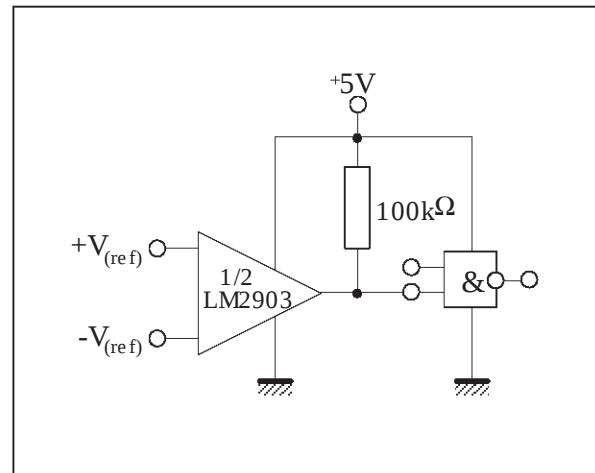


TYPICAL APPLICATIONS

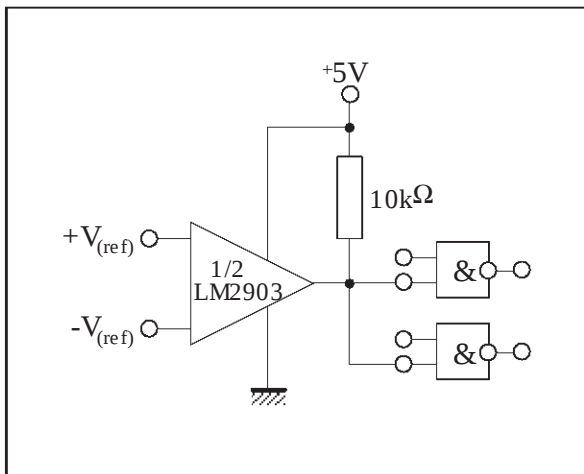
BASIC COMPARATOR



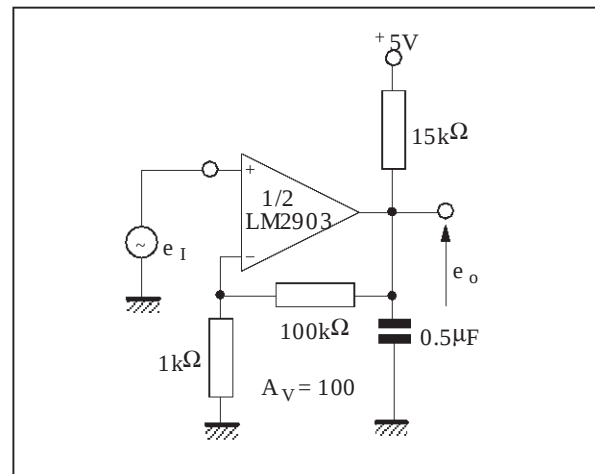
DRIVING CMOS



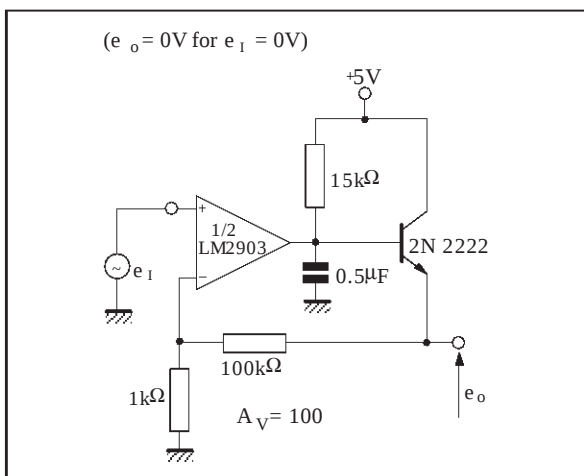
DRIVING TTL



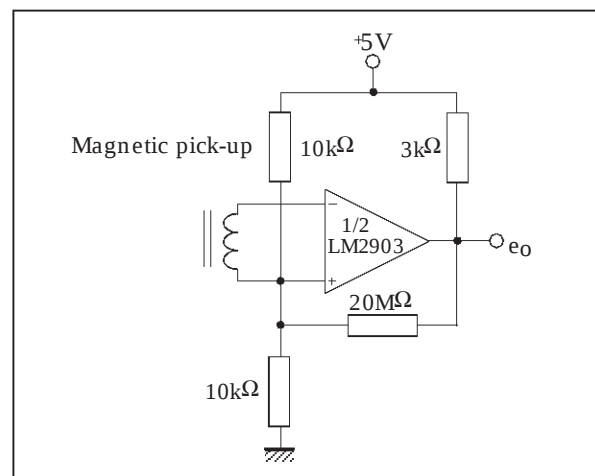
LOW FREQUENCY OP AMP



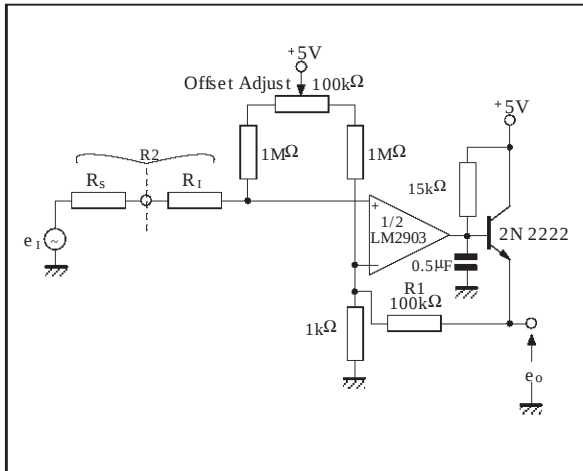
LOW FREQUENCY OP AMP



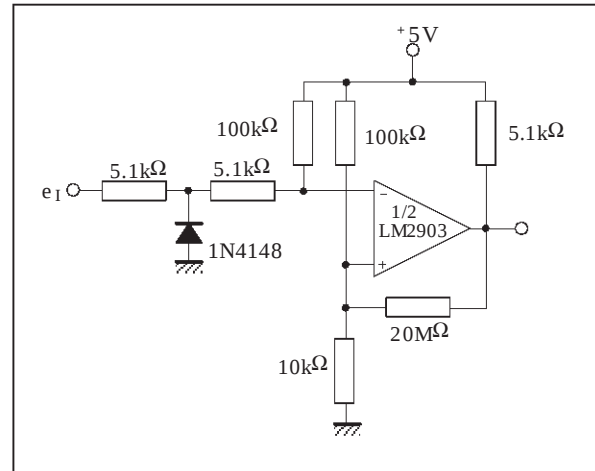
TRANSDUCER AMPLIFIER



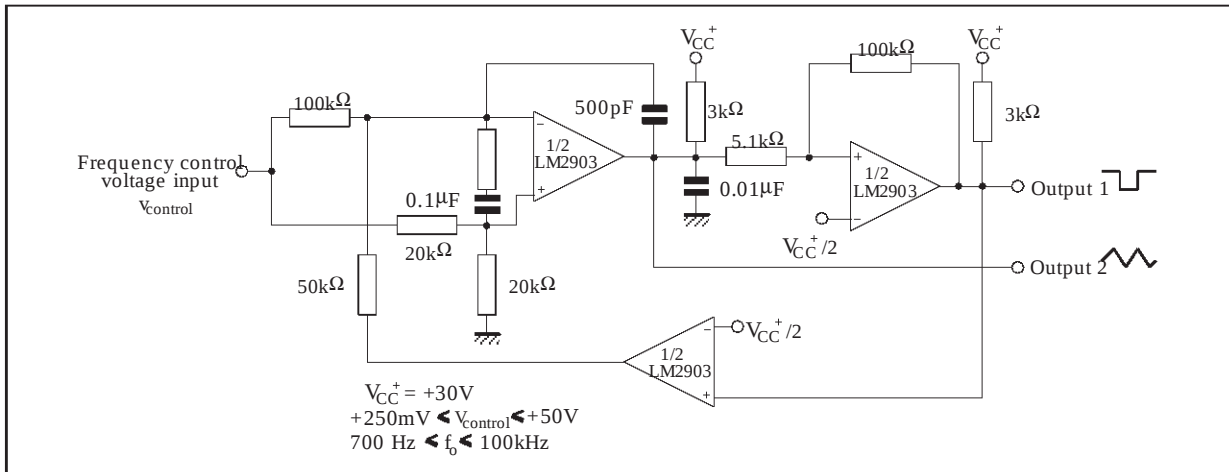
LOW FREQUENCY OP AMP WITH OFFSET ADJUST



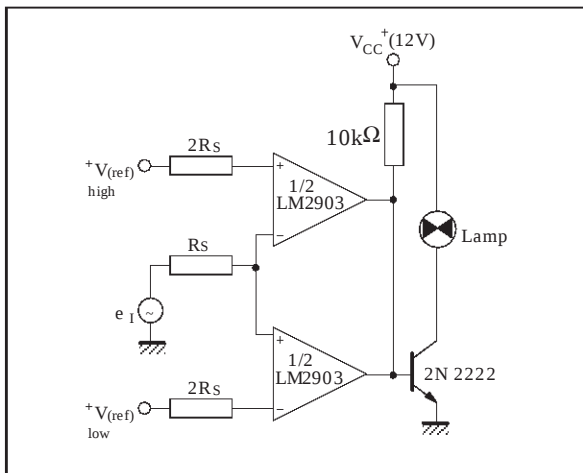
ZERO CROSSING DETECTOR (SINGLE POWER SUPPLY)



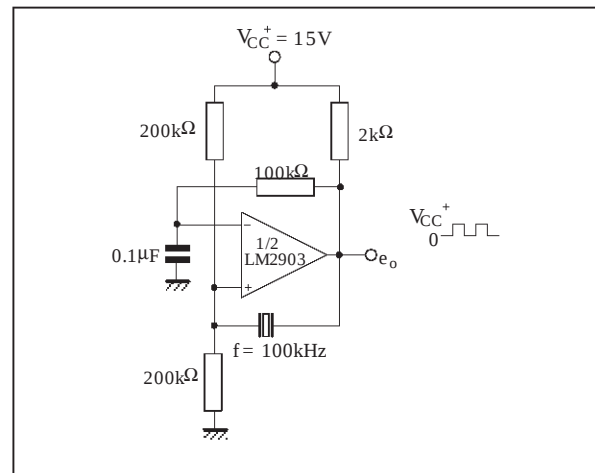
TWO DECADES HIGH FREQUENCY VCO

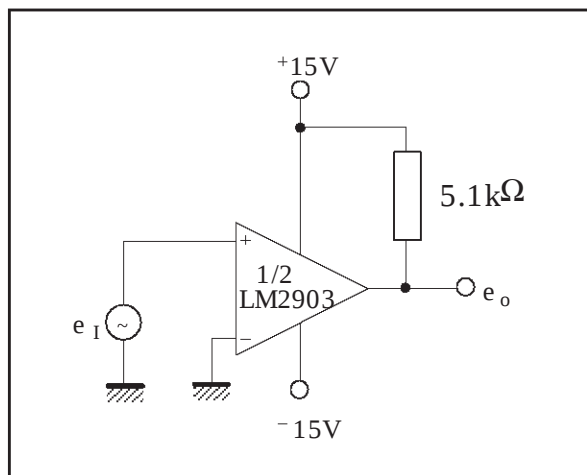
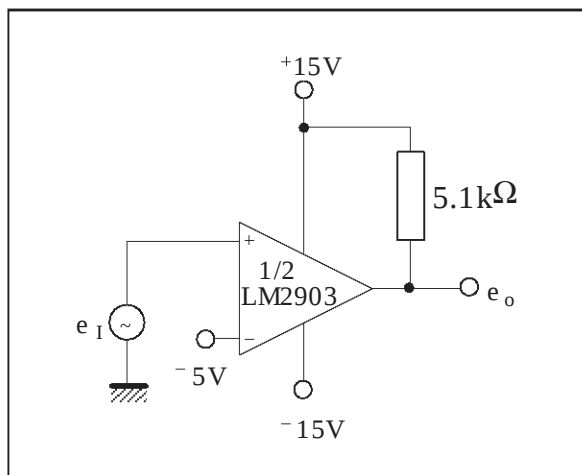


LIMIT COMPARATOR

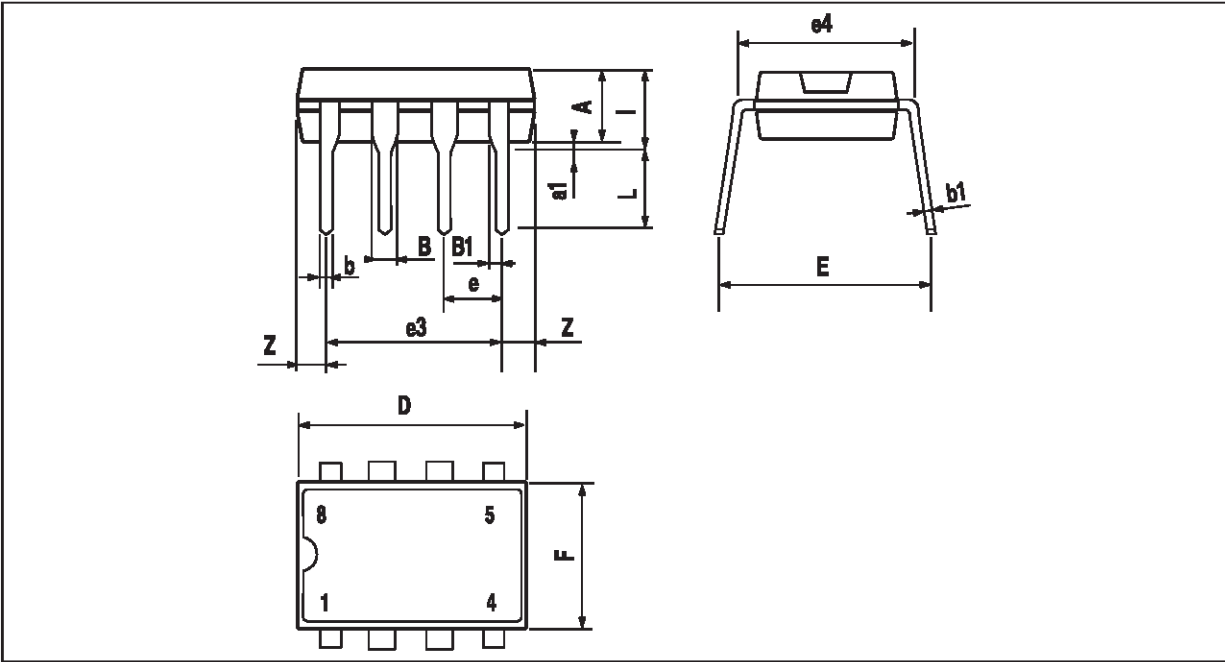


CRYSTAL CONTROLLED OSCILLATOR



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

PACKAGE MECHANICAL DATA
8 PINS -PLASTIC DIP

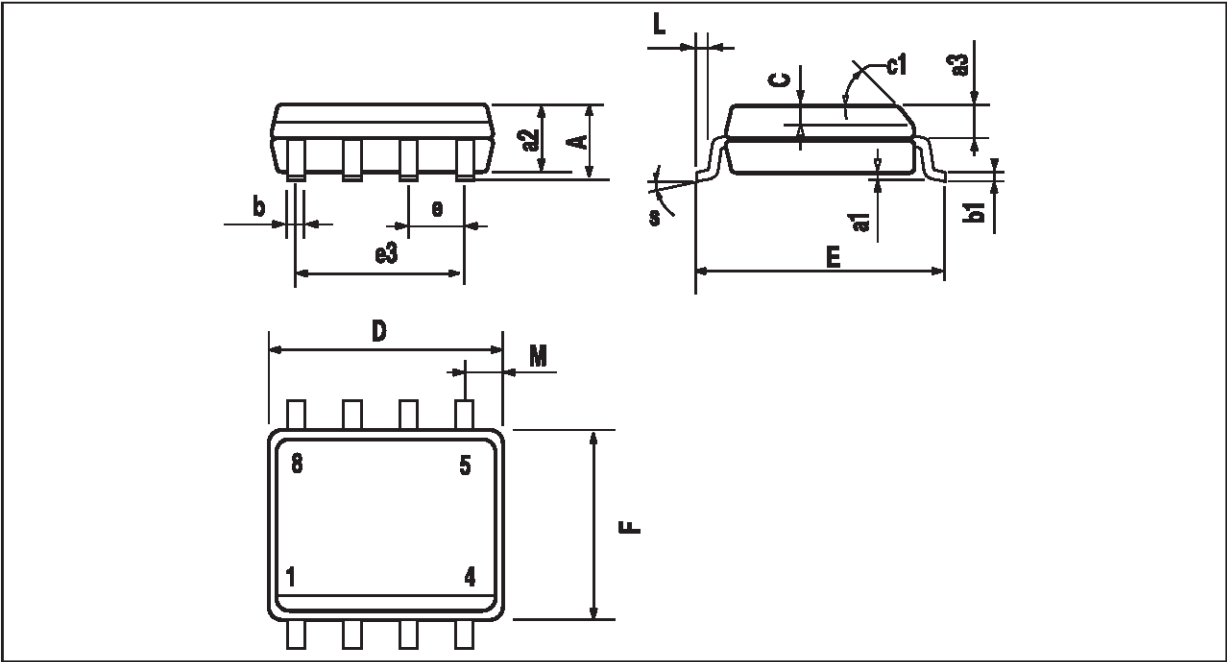


PM-DIP8.EPS

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)



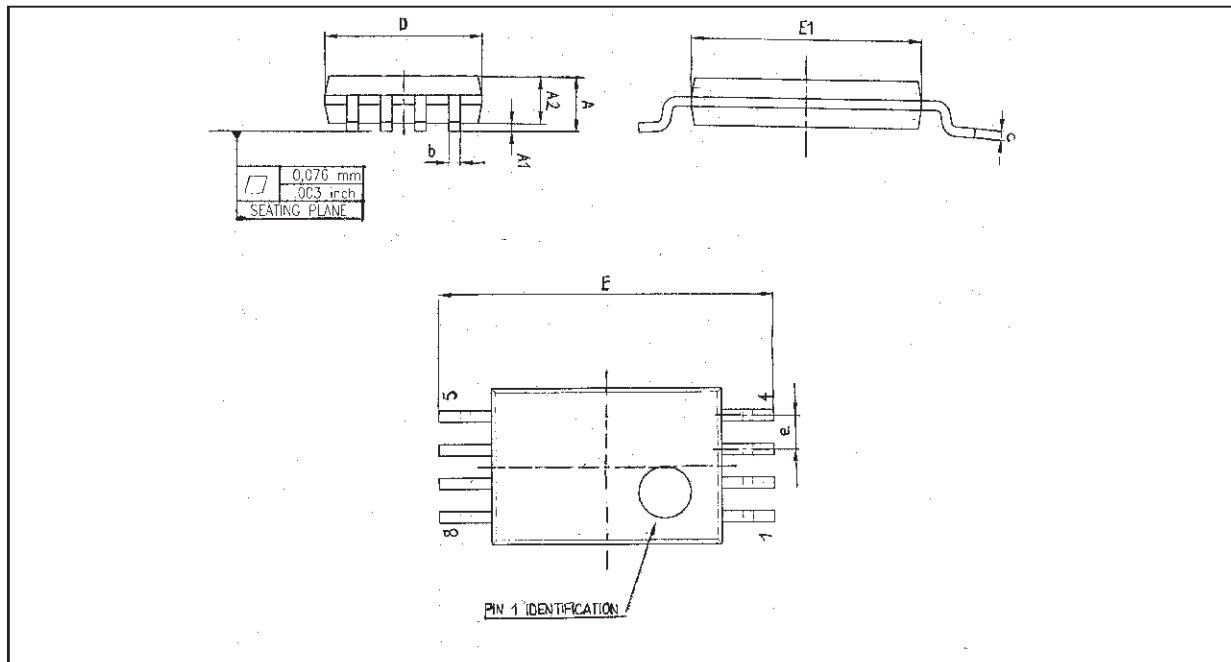
PM-S08.EPS

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.)					

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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