

**Tone Ringer For Telephone Set**

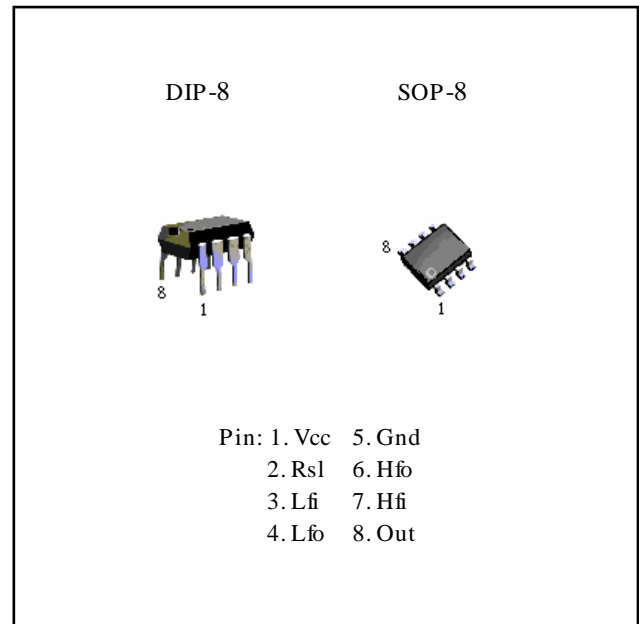
The PJ31002 is a bipolar integrated circuit designed for telephone bell replacement.

**FEATURES**

- Oscillation frequency is variable
- Few external components
- Sustaining power is low
- Package is compact (DIP-8)
- Current consumption is small

**ORDERING INFORMATION**

Device	Operating Temperature	Package
PJ31002CD	-20°C ~ +85°C	DIP-8
PJ31002CS		SOP-8

**ELECTRICAL CHARACTERISTICS** ( Unless otherwise specified, Ta=25°C, Vcc=24V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	Test Circuit
Operating Voltage	Vopr	--	--	38	V		FIG.4
Supply Initiation Voltage	Vsi	15	17	19.5	V	(NOTE 1)	FIG.4
Sustaining Voltage	Vsus	10.5	12.0	13.0	V	(NOTE 2)	FIG.4
Supply Initiation Current	Isi	1.4	3.3	4.2	mA	Vcc=Vsi, No LOAD	FIG.4
Sustaining Current	Isus	0.35	0.9	1.5	mA	Vcc=Vsus, No LOAD	FIG.4
Oscillator Frequency (NOTE3)	fL	9	10	11	Hz		FIG.5
Oscillator Frequency (NOTE3)	fH1	461	512	563	Hz		FIG.5
Oscillator Frequency (NOTE3)	fH2	576	640	703	Hz		FIG.5
Output Voltage *Hi*	Voh	19.7	22.0	23.5	V	Ioh=10mA 7 Pin=GND	FIG.4
Output Voltage *Lo*	Vol	0.5	0.9	1.4	V	Iol=10mA 7 Pin=5.5V	FIG.4
Ringing Start Voltage	Vtr	--	--	36.0	V	(NOTE 4)	FIG.3

**ABSOLUTE MAXIMUM RATING** (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply Voltage	Vcc	38	V
Power Dissipation	Pd	500	mW
Operating Temperature Range	Topr	-20 ~ +85	°C
Storage Temperature Range	Tstg	-55 ~ +125	°C

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( NOTE 1 ) Supply initiation voltage is the value of DC supply voltage required to start the tone ringer oscillation.

( NOTE 2 ) Sustaining voltage is the value of DC supply voltage required to maintain oscillation.

( NOTE 3 ) Oscillator frequency is determined by the following equations :

$$fL = 1 / ( 1.234 * R1 * C1 ) \quad \text{Hz}$$

$$fH1 = 1 / ( 1.515 * R2 * C2 ) \quad \text{Hz}$$

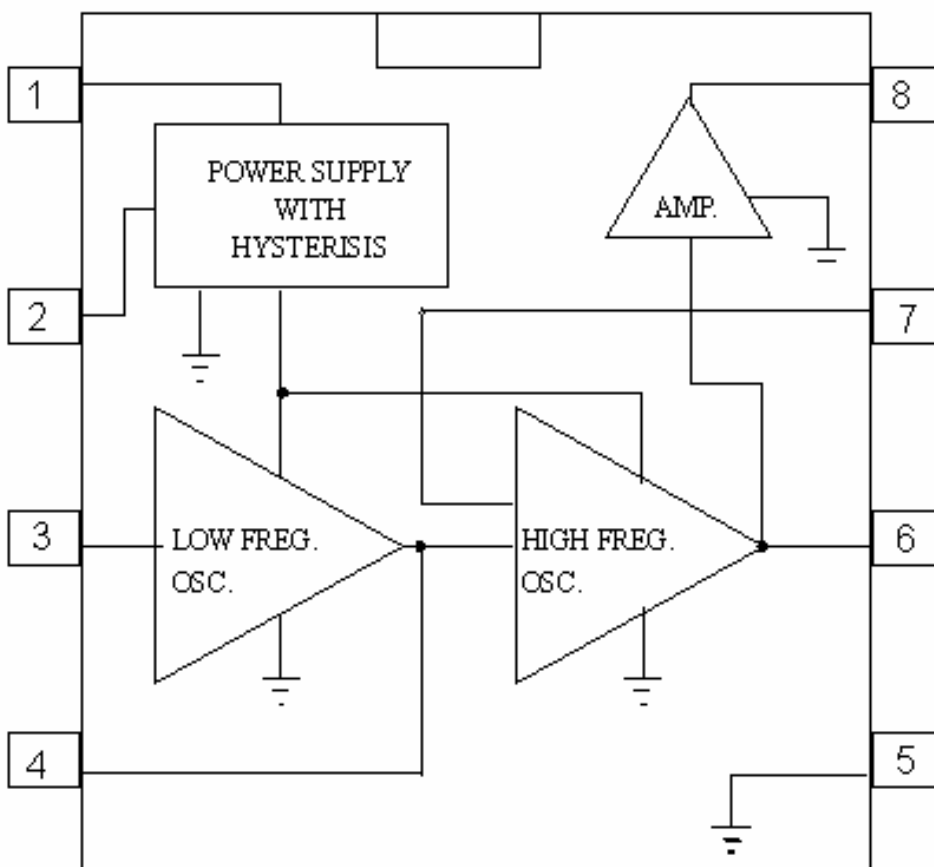
$$fH2 = 1.24 * fH1 \quad \text{Hz}$$

( NOTE 4 ) Ringing start voltage is the value of AC supply voltage required to start the tone ringer ringing in FIG.3

( NOTE 5 ) This product is not designed for protection against radioactive rays.

( NOTE 6 ) All data and specifications are subject to change without notice.

**Figure 2. Block Diagram**



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HOW TO USE THE RSL PIN

In the IC, the supply initiation current (I<sub>si</sub>) can be changed using the RSL Pin . As show is the diagram, the RSL (Pin 2) is grounded through resistor R<sub>s</sub>. By changing the R<sub>s</sub> value, supply initiation current can be changed.

Supply voltage (V<sub>cc</sub>) vs. supply current (I<sub>cc</sub>) characteristics resulting from changes in the value of R<sub>s</sub> are shown in the following diagram.

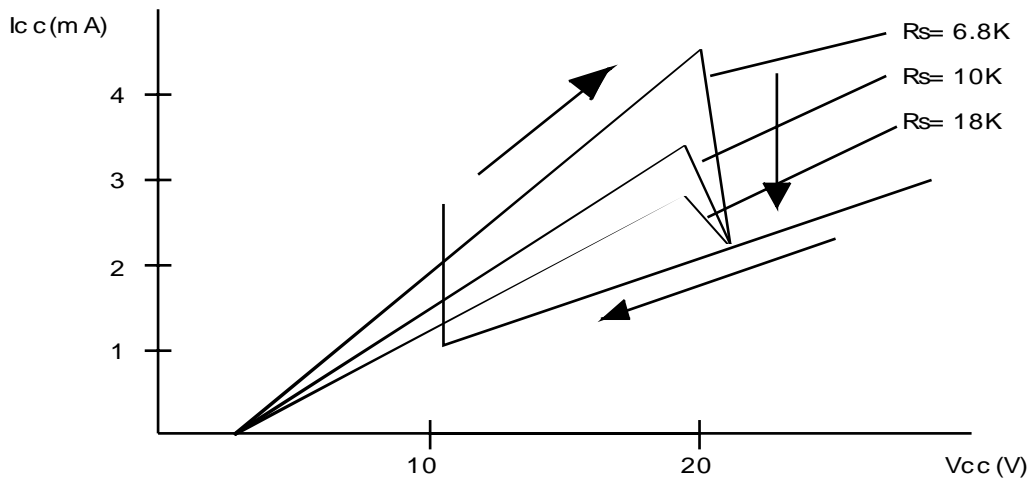
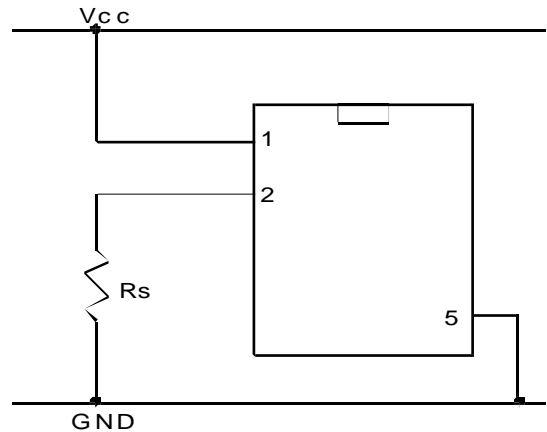


Figure 3.Ringing Start Voltage Test Circuit

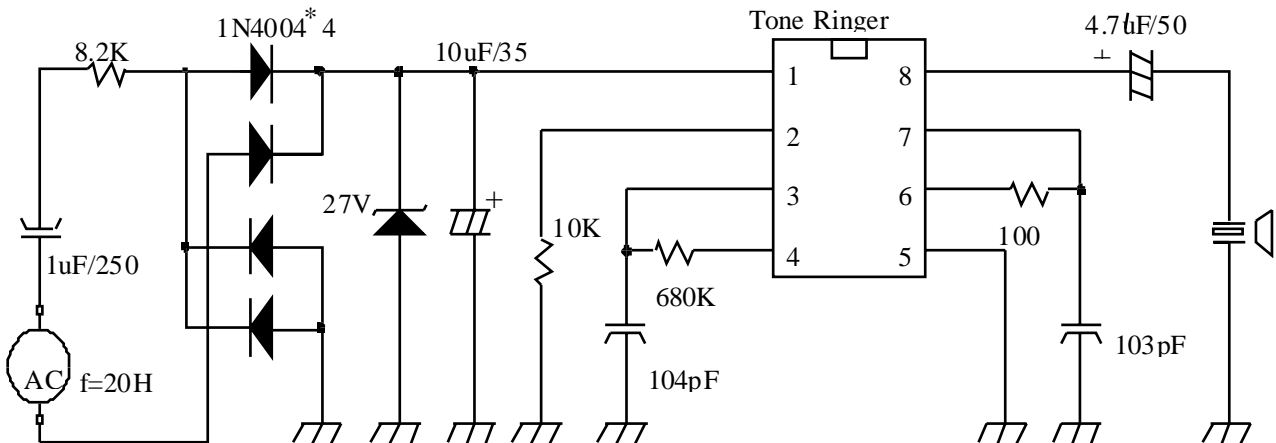
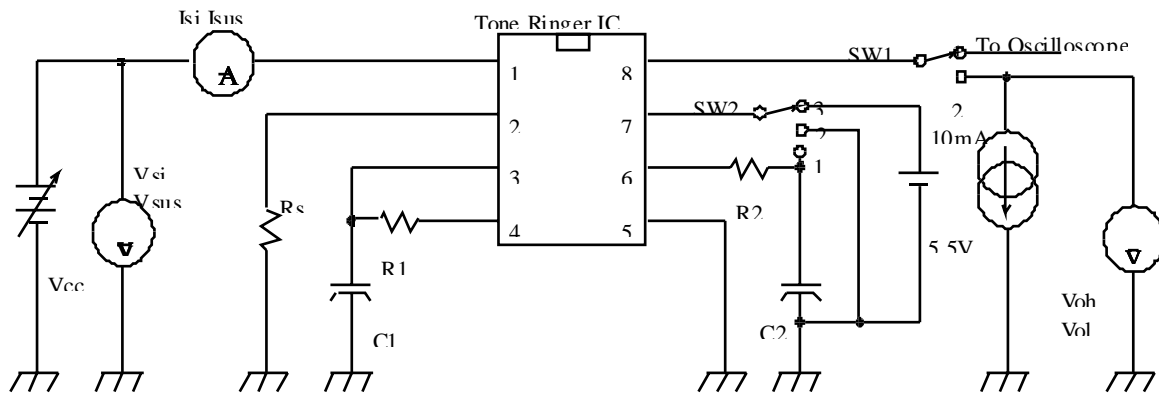


FIG. 4 Test Circuit (1)

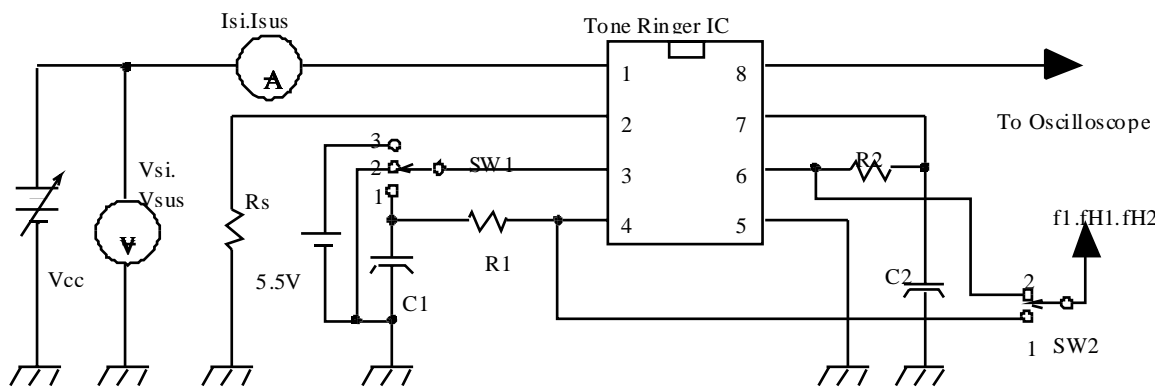


• SWITCH POSITION IS THE FOLLOWING TABLE :

PARAMETER	SW1	SW2
Vsi , Isi	1	1
Vsus , Isus	1	1
Voh	2	2
Vol	2	3

R1 = 165 K (+/-) 1%  
 R2 = 191 K (+/-) 1%  
 C1 = 0.47  $\mu$ F (+/-) 5%  
 C2 = 0.0068  $\mu$ F (+/-) 5%

FIG. 4 Test Circuit (2)



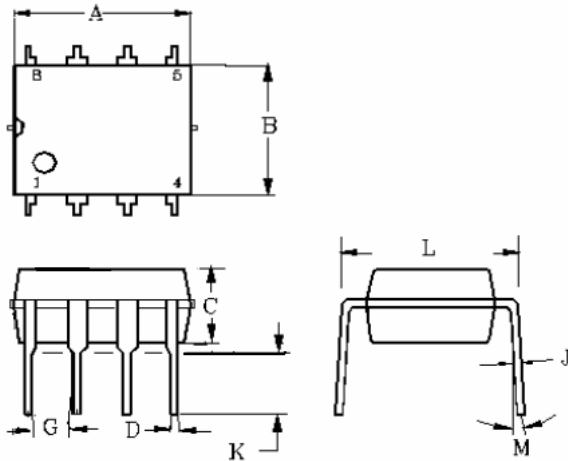
• SWITCH POSITION IS THE FOLLOWING TABLE :

PARAMETER	SW1	SW2
FL	1	1
fH1	1	1
fH2	2	2

R1 = 165 K (+/-) 1%  
 R2 = 191 K (+/-) 1%  
 C1 = 0.47  $\mu$ F (+/-) 5%  
 C2 = 0.0068  $\mu$ F (+/-) 5%

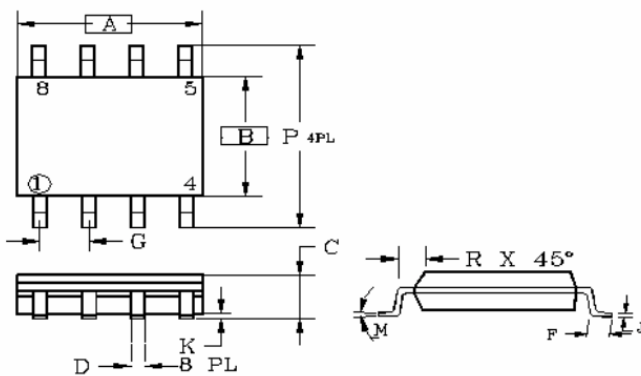
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DIP-8



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.07	9.32	0.357	0.367
B	6.22	6.48	0.245	0.255
C	3.18	4.43	0.125	0.135
D	0.35	0.55	0.019	0.020
G	2.54BSC		0.10BSC	
J	0.29	0.31	0.011	0.012
K	3.25	3.35	0.128	0.132
L	7.75	8.00	0.305	0.315
M	-	10°	-	10°

SOP-8



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.196
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019