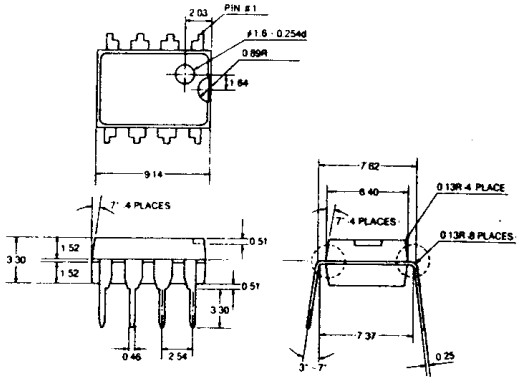
DBL 5010

TONE RINGER WITH BRIDGE DIODE

The DBL5010 is a bipolar IC designed to replace the mechanical bell in telephone sets. It generates two analong tones, and a warble frequency to drive either directly a piezo-ceramic transducer or a small loud-speaker in response to ringing signal on the telephone line.

8DIP Unit : mm



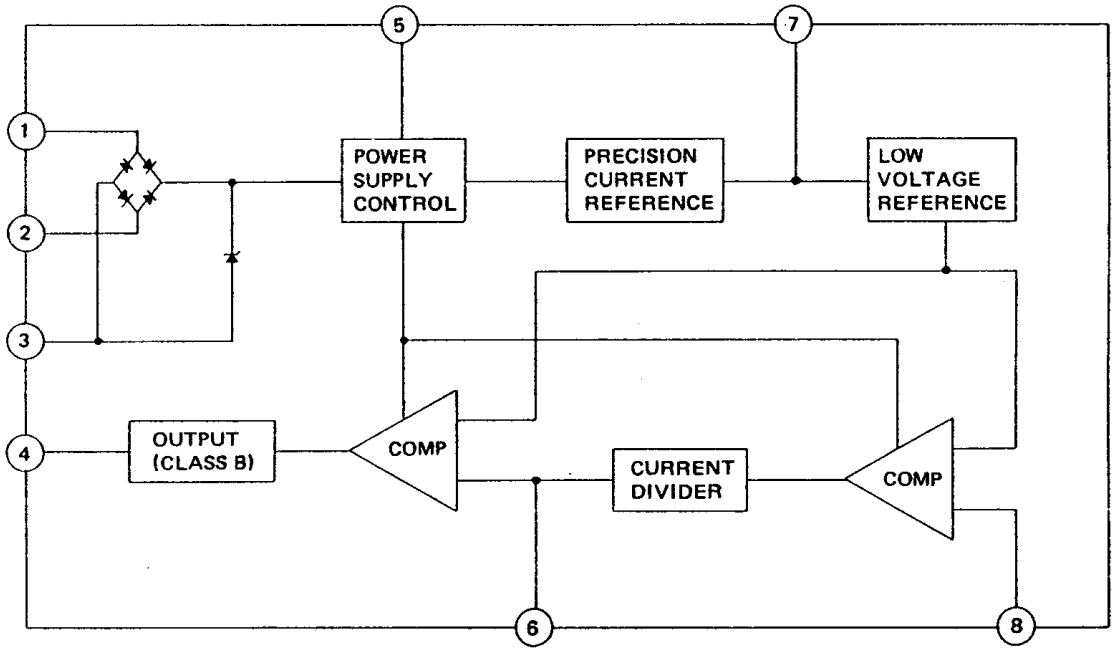
☐ FEATURES

- ○ Two tone output with warble
- ○ Fixed two tone frequency ratio
- ○ Powered by the normal telephone ringing signal
- ○ Internal supply regulation for low output tone variation
- ○ Built in surge protection
- ○ Bell tap suppression
- ○ High input impedance to low level voice band signals
- ○ Output rich in harmonics

☐ MAXIMUM RATINGS

Characteristic	Symbol	Rating	Unit
Power Dissipation(at 25℃)	P_D	1.0	W
Operating Temperature	T_{opr}	−40～+60	℃
Storage Temperature	T_{stg}	−50～+125	℃

☐ BLOCK DIAGRAM



☐ PIN DESCRIPTION

Pin No.	Symbol	Function
1	Tip	tip and ring connections to the telephone line
2	Ring	through a series capacitor and resistor
3	GND	common connection for the DBL5010 circuits
4	Vout	tone output to a piezo-ceramic transducer
5	Vdc	internal DC positive power supply rail
6	OFC	high frequency timing circuit which controls the output frequencys
7	WFC	time delay and low frequency timing circuit which controls the warble frequency
8	Iref	internal current control

☐ OPERATING CHARACTERISTICS

(Unless otherwise specified, 25℃, SW1 : 2, SW2 : 3)

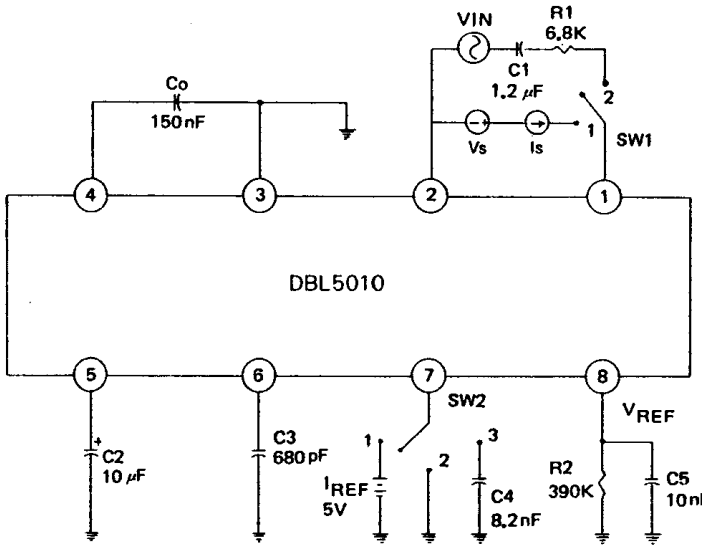
Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Sensitiviy	T_S	Acoustic output from the minimum input burst of 200mSec	—	20	—	m Sec
Delay	T_d	Initial charge time at C4	45	60	75	m Sec
Warble Rate	f_W	The rate is determined by C4 and the current used to charge and discharge it	7.5	10	12.5	Hz
Output Tones	f_{OL}	The frequencies determined by C3 and the current through it f_{OL}(SW2 : 1), f_{OH}(SW2 : 2)	410	512	614	Hz
	f_{OH}		512	640	768	Hz
Frequency Ratio	RF	f_{OL}/f_{OH}	—	0.8	—	

* Burst Wave of 40 to 130mVrms at 20Hz
* NOTE
  1. Initiation voltage(Vsi) is the supply voltage required to start the tone ringer oscillating.
  2. Sustaining voltage(Vsus) is the supply voltage required to maintain oscillation

☐ ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Standoff Voltage	V_{SO}	V_S adjusted until $0.2mA < I_S < 0.5mA$	7	8	9	V
Initiation Voltage	V_{si}	Vs adjusted until $0.9mA < I_S < 1.1mA$	17.9	19.4	20.8	V
Initiation Current	I_{si}	$V_S = V_{Si} + 100mV$	0.8	—	1.3	mA
Quiescant Current	I_q	$V_S = V_{Si} - 200mV$	0.4	—	0.7	mA
Discharge Current (anti bell Tap)	I_d	$I_d = I_{Si} - I_q$	0.4	—	—	mA
Max. Input Voltage	V_{max}	$I_S = 10mA$	20	22	24	V
Sustaining Voltage	V_{sus}	SW2 : 1	10.2	11.3	12.3	V
Sustaining Current	I_{sus}	SW2 : 1	0.35	0.45	0.55	mA
Input Leakage Current	I_L	$V_S < 7V$	—	—	100	μA

☐ TEST CIRCUIT

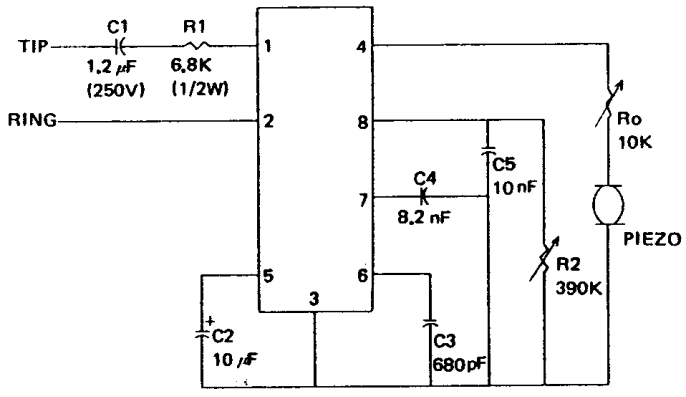


* NOTE

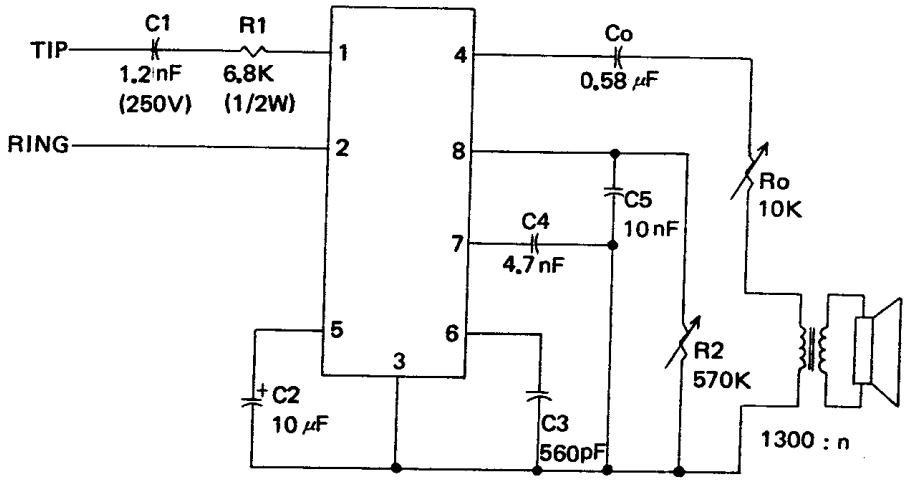
$$f_W = \frac{1}{160} \cdot \frac{I_{REF}}{C4} \qquad f_{OL} = \frac{1}{40} \cdot \frac{I_{REF}}{C3} \qquad f_{OH} = \frac{1}{32} \cdot \frac{I_{REF}}{C3}$$

☐ APPLICATION CIRCUIT

1. FOR USING A PIEZO CERAMIC TRANSDUCER



2. FOR USING A LOUD SPEAKER LOAD



☐ FUNCTIONAL DESCRIPTION

In response to a ringing signal on the connected telephone line, DBL5010 generates an output tone (square wave) which alternates between f_{OL} and f_{OH} at a f_W warble rate to drive either a small loud speaker or a piezo-ceramic transducer with electrical characteristics equivalent to a 150nF capacitor. In case of using a loud speaker a 1300Ω to N transformer is needed. The output coupling capacitor (Co) is required with transformer coupled loads. The output frequencies are determined by external component values as shown in application circuit.

DBL5010 includes a diode bridge and a zener regulator to derive power for the device from the normal telephone ringing signal. The DBL5010 operates from ringing signals of 40 to 130 Vrms at 20Hz.

The DBL5010 withstands normal voltage surges due to lightning strikes on the telephone network. Surge protection is partly provided by the external components.

C1 and R1 as shown in application circuit.

Bell tap immunity is provided by a turn-on hysteresis and delay circuit. When the applied external signal exceeds an internal threshold, the reservoir capacitor(C5 in application circuit) charges until the voltage across it exceeds the initiation voltage. Subsequently, a 0.5mA discharge current is applied across C5 for 60mSec.

If the reservoir voltage falls below the initiation voltage during this delay period. The 60mSec delay is reset. If the reservoir voltage exceeds the initiation voltage without interruption during the delay period, the hysteresis circuit latches and turns on the alerting tone output. Tone output is maintained until the reservoir voltage falls below the sustaining voltage.