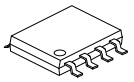
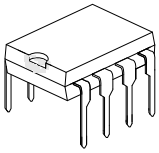
TELEPHONE TONE RINGER



SOP-8



DIP-8

■ DESCRIPTION

The UTC **31002A** is a bipolar integrated circuit designed for telephone bell replacement. It can also be used as alarms or other alerting devices.

■ FEATURES

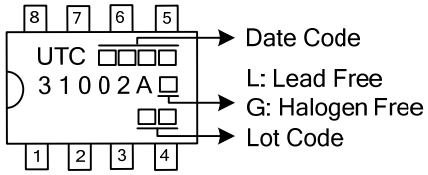
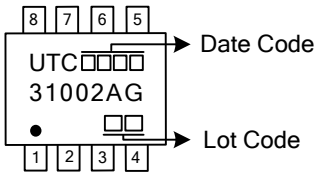
*Designed for telephone bell replacement.
*Low current drain for multiple extension of lines.
*Adjustable 2-frequency tone.
*Adjustable warbling rate.
*Built-in hysteresis prevents false triggering and rotary dial 'CHIRPS'.
*Programmable for initiation current by simple external resistor

■ ORDERING INFORMATION

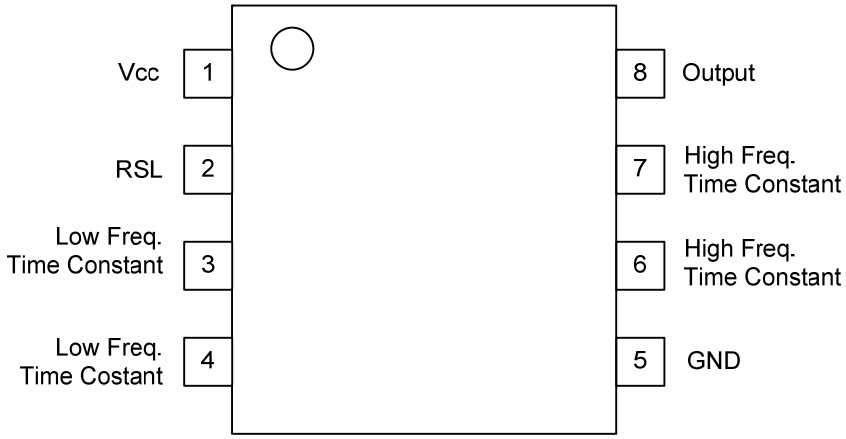
Ordering Number		Package	Packing
Lead Free	Halogen Free		
31002AL-D08-T	31002AG-D08-T	DIP-8	Tube
-	31002AG-S08-R	SOP-8	Tape Reel
-	31002AG-S08-T	SOP-8	Tube

31002AL-D08-T (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel, T: Tube (2) D08: DIP-8, S08: SOP-8 (3) L: Lead Free, G: Halogen Free and Lead Free

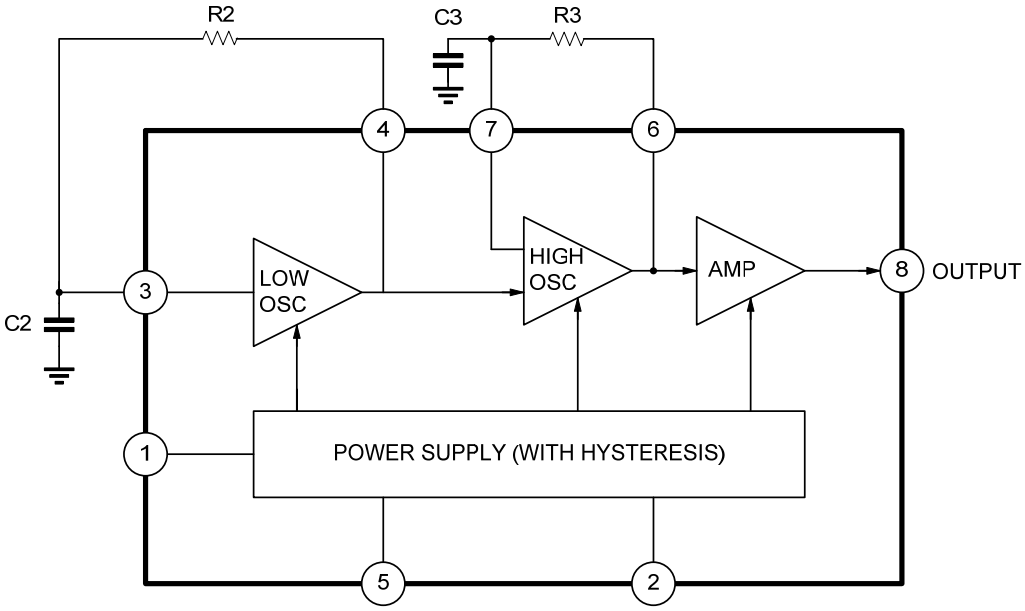
■ MARKING

DIP-8	SOP-8
	

■ PIN CONFIGURATIONS



■ BLOCK DIAGRAM



Note:R2,R3,C2 and C3 are parts externally mounted

■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	30	V
Power Dissipation	DIP-8	P_D	800	mW
	SOP-8	P_D	400	mW
Operating Temperature		T_{OPR}	-45 ~ +85	°C
Storage Temperature		T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS

(T_A=25°C, all voltage referenced to GND unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Supply Voltage	Vcc				29.0	V
Initiation Supply Voltage (Note 1)	Vsi	See Fig.2	17	19	21	V
Initiation Supply Current (Note 1)		6.8K-Pin 2 to GND	1.3	2.8	4.2	mA
Sustaining Voltage (Note 2)	Vsus	See Fig.2	9.7	11.0	12.0	V
Sustaining Current (Note 2)	Isus	No Load Vcc=Vsus, See Fig.2	0.7	1.4	2.5	mA
Output Voltage High	V_{OH}	Vcc=21V, I8=-15mA Pin6=6V, Pin7=GND	17.0	19.0	21.0	V
Output Voltage Low	V_{OL}	Vcc=21V, I8=15mA Pin6=GND, Pin7=6V			1.6	V
IIN(Pin 3) IIN(Pin 7)		Pin3=6V, Pin4=GND Pin7=6V, Pin6=GND			500 500	nA nA
High Frequency 1	FH1	R3=191K, C3=6800pF	461	512	563	Hz
High Frequency 2	FH2	R3=191K, C3=6800pF	576	640	704	Hz
Low Frequency	FL	R2=165K, C2=0.47μF	9.0	10	11.0	Hz

Notes: (See electrical characteristics sheet)

1. Initiation supply 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.

■ APPLICATION NOTE

The application circuit illustrates the use of the UTC **31002A** device in typical telephone tone ringer application.

The AC ringer signal voltage appears across the TIP and RING inputs of the circuit and is attenua-ted by capacitor C1 and resistor R1.

C1 also provides isolation from DC voltage (48V) on the exchanged line.

After full wave rectification by the bridge diode, the wave form is filtered by capacitor C4 to provide a DC supply for the tone ringer chip.

As this voltage exceeds the initiation voltage (Vsi), oscillation starts.

With the components shown, the output frequency chops between 512Hz (F_{H1}) and 640 Hz (F_{H2}) at a 10 Hz (F_L) rate.

The loudspeaker load is coupled through a 1300Ω to 8Ω transformer.

The output coupling capacitor C5 is required with transformer coupled loads.

When driving a pizeo-ceramic transducer type load, the coupling C5 and transformer (1300Ω:8Ω) are not required.

However, a current limiting resistor is required.

The low frequency oscillator oscillates at a rate (F_L) controlled by an external resistor (R2) and capacitor (C2).

The frequency can be determined using the relation F_L=1/1.289 R2* C2. The high frequency oscillates at a F_{H1}, F_{H2} controlled by an external resistor (R3) and capacitor (C3). The frequency can be determined using the relation F_{H1}=1/1.504 R3*C3 and F_{H2}=1/1.203 R3*C3

Pin 2 of the UTC **31002A** allows connection of external resistor RSL, which is used to program the slope of the supply current vs. supply voltage characteristics (see Fig.3), and hence the supply current up to the initiation voltage (Vsi). This initiation voltage remains constant independent of RSL.

The supply current drawn prior to triggering varies inversely with RSL, decreasing for increasing value of resistance. Thus, increasing the value of RSL, will decrease the amount of AC ringing current required to trigger the device. As such, longer sucribser loops are possible since less voltage is dropped per unit length of loop wire due to the lower current level. RSL can also be used to compensated for smaller AC coupling capacitors (C5 on Fig.4) (higher impedance) to the line which can be used to alter the ringer equivalence number of a tone ringer circuit.

The graph in Fig.3 illustrates the variation of supply current with supply voltage of the UTC **31002A**.

Three curves are drawn to show the variation of initiation current with RSL. Curve B (RSL=6.8K) shows the I-V characteristic for UTC **31002A** tone ringer. Curve A is a plot with RSL<6.8KΩ and shows an increase in the current drawn up to the initiation voltage Vsi. The I-V characteristic after initiation remains unchanged. Curve C illustrates the effect of increasing RSL above 6.8K initiation current decreases but again current alter triggering is unchanged.

Fig.2 Circuit Current-Supply Voltage
(No Load)

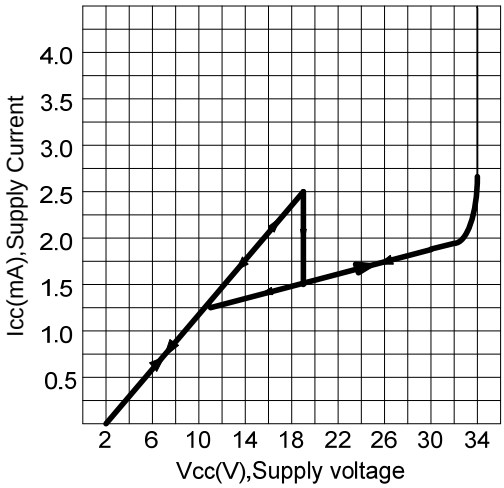
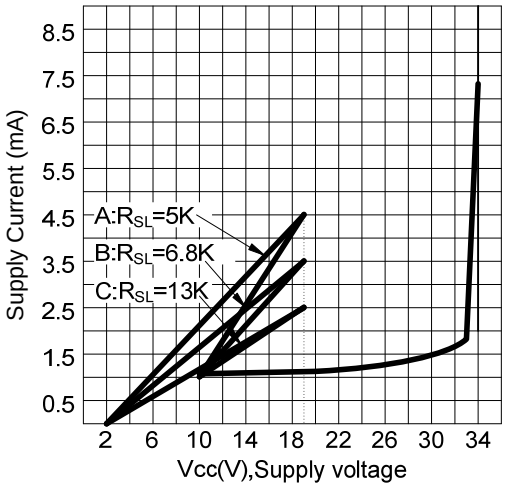


Fig.3 Supply Current Vs. Supply Voltage
(No Load)



■ APPLICATION CIRCUIT

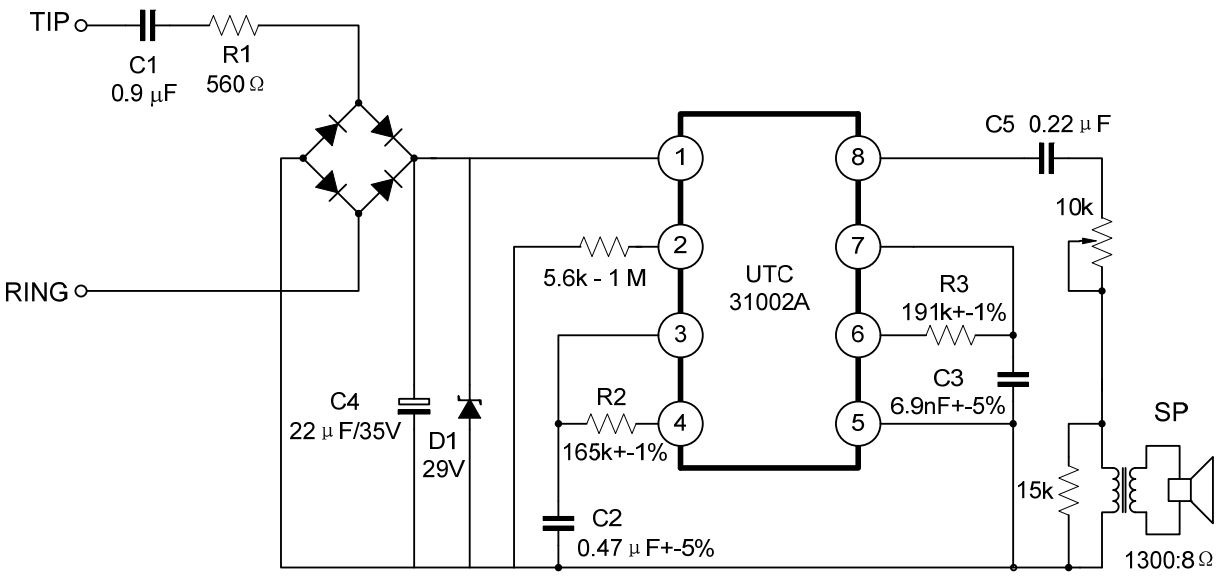


Fig.4