

## Two-Tone Ringer for Telephone Sets

### Description

The two-tone ringing circuit in conjunction with a piezo transducer replaces the normal electromechanical telephone bell. It is operated with the ringing current from the exchange. However, there is a possibility of operating

the IC with a dc supply voltage being developed for large operating range. The integrated circuit is overload protected.

### Features

- Push-Pull output stage
- RC oscillator operation
- Adjustable volume
- Input protective diode
- On-chip rectifier bridge

- High voltage I<sup>2</sup>L technology
- Internal control resolution with hysteresis

### Benefit

- Sequence frequency adjustable between 2.5 and 25 Hz

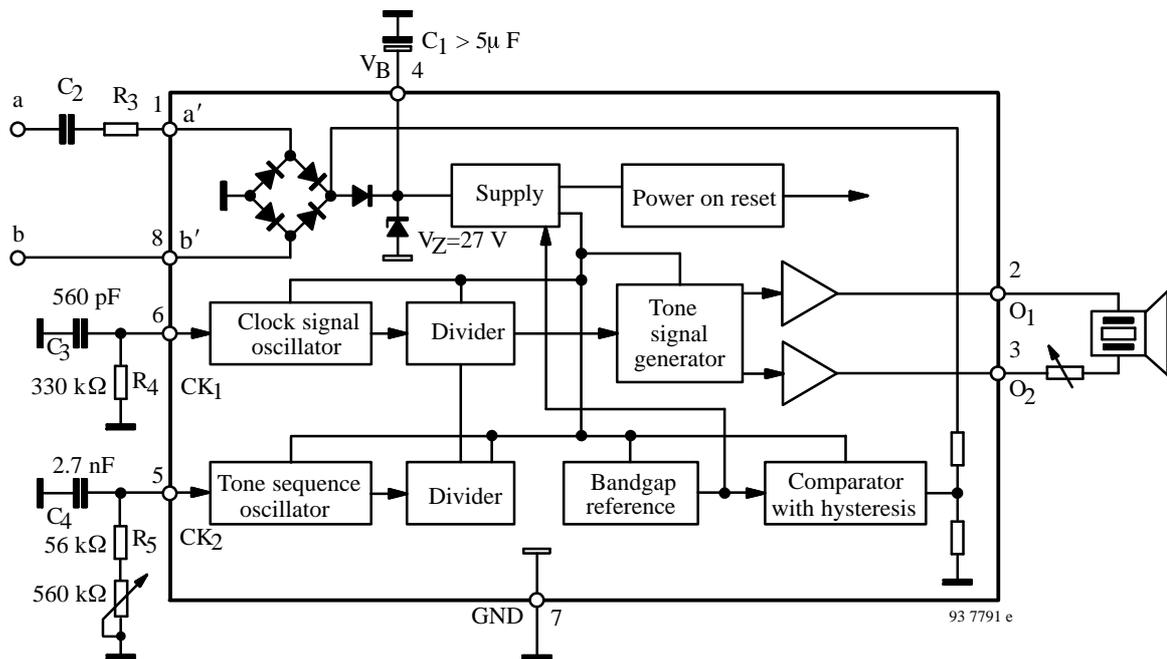
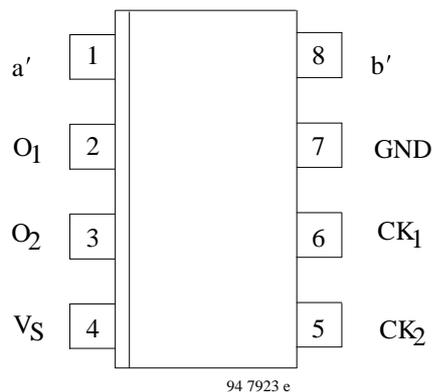


Figure 1. Block diagram of U4072B and application circuit

## Pin Description

Pin	Symbol	Function
1, 8	a', b'	AC ringing signal input
6	CK <sub>1</sub>	Oscillator input for clock frequency
2, 3	O <sub>1</sub> , O <sub>2</sub>	Output signals
4	V <sub>B</sub>	Output to charging capacitor
5	CK <sub>2</sub>	Oscillator input for sequence frequency
7	GND	Ground



### Pins 1 and 8 - Power Supply

Pin 1 and Pin 8 connect the circuit with the ac ringing signal supplied by the exchange via lines a and b. A decoupling capacitor of 1  $\mu\text{F}$  in series with a 2.2 k $\Omega$  resistor is required against overvoltage and insertion loss specifications. Following these specifications overload protections are fulfilled by the IC.

### Pins 2 and 3 - Output Signal

Push-pull outputs are used to drive a piezo-ceramic transducer. It can process an average current of up to 20 mA in both direction. The output signal without load is 2. to 2.5 V<sub>B</sub> (V<sub>pp</sub>). Volume can be controlled by an external potentiometer.

1. The integrated circuit can withstand an ac voltage of 110 V/50 Hz for 15 seconds between terminals a and b (figure 1).
2. The circuit will not be damaged by a surge voltage test with the following conditions (figure 2):

Charging voltage of surge capacitance V<sub>CS</sub> = 2 kV

Pulse shape 10/700  $\mu\text{s}$

Pulse sequence 30 s

No. of surges 10

Polarity change after 5 surges

### Pin 4 - Power Supply Filtering V<sub>B</sub>

After the rectification of the ringing signal across the diode bridge in the IC, filtering of the power supply is provided with C<sub>1</sub> (1 to 22  $\mu\text{F}$ ) connected at Pin 4. An integrated Z-diode limits the maximum supply voltage up to 30 V.

### Pins 5 and 6 - Inputs for Oscillators

With external RC circuitry at Pins 5 and 6, both oscillators supply audio sequence and ringing (clock) frequencies. Sequence frequency adjustment is determined with a resistor range between 43 and 600 k $\Omega$  where pulse duration is about  $1.45 \times RC + 10 \mu\text{s}$ .

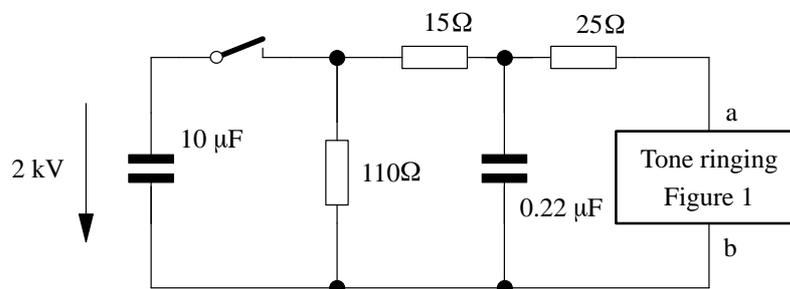


Figure 2.

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## Absolute Maximum Ratings

Reference point Pin 7, unless otherwise specified

Parameters	Symbol	Value	Unit
Supply Current Pin 1, 8	$I_S$	50	mA
Output current Pin 2, 3	$\pm I_O$	50	mA
Ambient temperature range	$T_{amb}$	-25 to +60	°C
Storage temperature range	$T_{stg}$	-40 to +125	°C
Power dissipation, $T_{amb} = 60^\circ\text{C}$	$P_{tot}$	590	mW
Junction temperature	$T_j$	125	°C

## Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient	$R_{thJA}$	110	K/W

## Electrical Characteristics

$V_B = 10\text{ V}$ ,  $f = 4\text{ kHz}$ ,  $T_{amb} = 25^\circ\text{C}$ , reference point Pin 7, unless otherwise specified

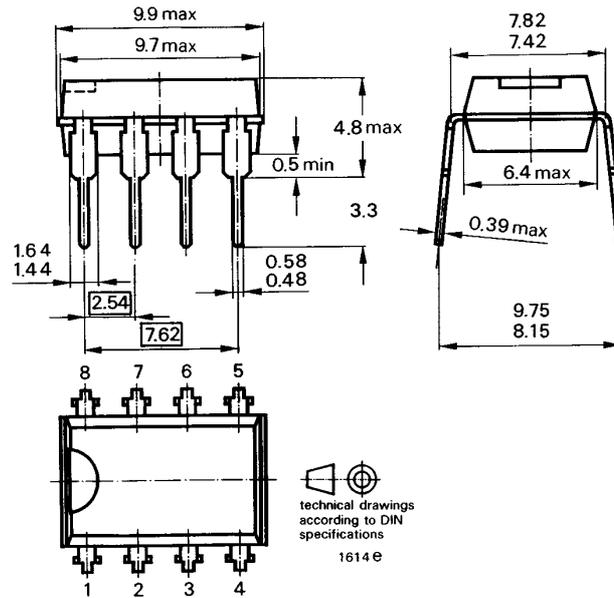
Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply current, outputs open	$V_B = 10\text{ V}$ Pin 4	$I_S$	1.5	2.0	2.5	mA
Switch-on threshold	Pin 4		5.7	7.7	9.5	V
Switch-off threshold	Pin 4		2.8	4.1	5.3	V
Ringing frequency	$R_4 = 160\text{ k}\Omega$ , $C_3 = 1\text{ nF}$ Pin 2, 3	$f_{1H}$	937	1010	1083	Hz
		$f_{1L}$	752	808	868	
Audio sequence frequency	$R_5 = 160\text{ k}\Omega$ , $C_4 = 1\text{ nF}$ Pin 2, 3	$f_2$	11.5	12.5	14.0	HZ
Internal voltage limitation	$I_Z = 1\text{ mA}$ Pin 2, 3	$V_Z$	25	27	30	V
Range of $R_4$ and $R_5$ resistance values	Pin 5, 6	$R$	43		600	$\text{k}\Omega$

## Order Information

Extended Type Number	Package	Remarks
U4072B	DIP8	

## Dimensions in mm

Package: DIP8



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2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

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1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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