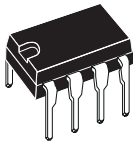
LS1240

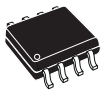
Electronic two-tone ringer

Features

- Low current consumption, in order to allow the parallel operation of 4 devices
- Integrated rectifier bridge with zener diodes to protect against over voltages little external circuitry
- Tone and switching frequencies adjustable by external components
- Integrated voltage and current hysteresis



Minidip



SO8

Description

LS1240 is a monolithic integrated circuit designed to replace the mechanical bell in telephone sets in connection with an electro-acoustical converter. It can drive directly a piezoceramic converter (buzzer) or a dynamic loudspeaker.

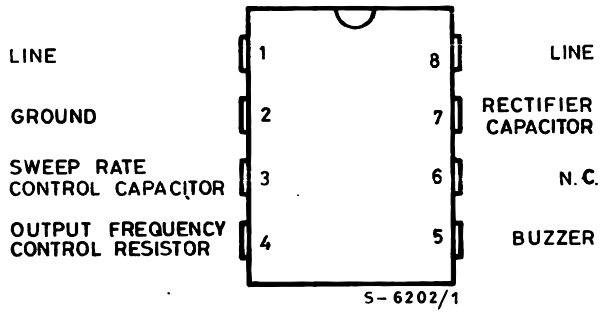
The output current capability of LS1240 is higher than the one of a standard ringer. To drive a dynamic loudspeaker LS1240 can simply use a decoupling capacitor, thus eliminating the usual transformer.

No current limitation is provided on the output stage of LS1240, so a minimum load DC of 50 Ω is advised, in series with a proper capacitor.

The two tone frequencies generated are switched by an internal oscillator in a fast sequence and are made audible across an output amplifier in the loudspeaker. Both tone frequencies and the switching frequency can be externally adjusted.

The supply voltage is obtained from the AC ring signal and the circuit is designed so that noise on the line or variations of the ringing signal cannot affect correct operation of the device.

Pin connection (top view)



1 Block diagram and test circuit

Figure 1. LS1240 block diagram

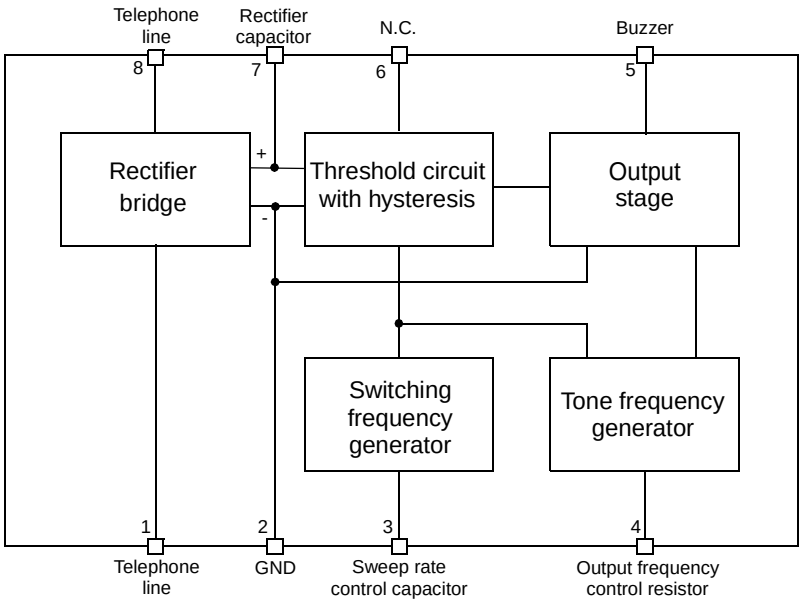
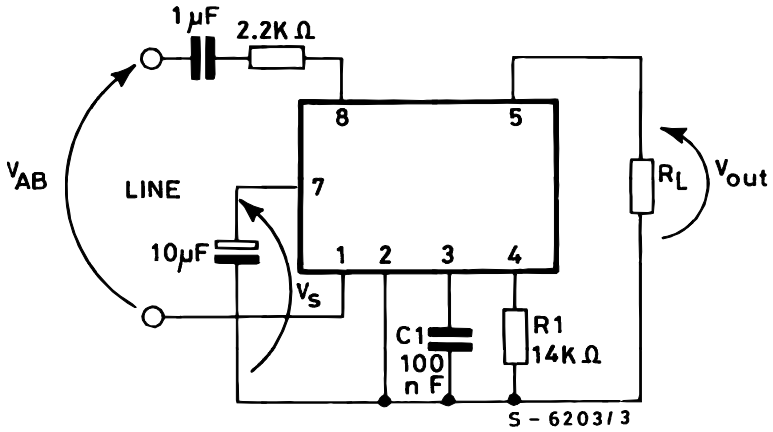


Figure 2. Test circuit



$$R1 = \frac{2.72 \cdot 10^4}{f1\ (Hz)} \cdot (1 - 0.04 \ln \frac{f1}{1943}) \qquad f2 = 0.725\ f1 \qquad f_{SWEEP} = \frac{750}{C1\ (nF)}$$

2 Electrical characteristics

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{AB}	Calling voltage (f = 50 Hz) continuous	120	Vms
V_{AB}	Calling voltage (f = 50 Hz) 5s ON/10s OFF	200	Vms
DC	Supply current	30	mA
T_{OP}	Operating temperature	-40 to 70	°C
Tstg	Storage and junction temperature	-65 to +150	°C

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj\text{-}amb}$	Maximum thermal resistance junction-ambient	100	°C/W

Tamb = 25°C, V_S = applied between pins 7-2 unless otherwise specified.

Table 3. Electrical characteristics

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	unit
V_S	Supply voltage				26	V
I_B	Current consumption without laod (pins 8-1)	V8-1 = 9.3 to 25 V		1.5	1.8	mA
V_{ON}	Activation voltage		12.2		13.2	V
V_{OFF}	Sustaining voltage		8		9	V
R_D	Differential resistance in OFF conditions (pins 8-1)		6.4			kΩ
V_{OUT}	Output voltage swing			V_S-5		V
I_{OUT}	Short circuit current (pins 5-2)	V_S = 20V R_L = 250Ω		70		mA
AC operation						
f_1 f_2	Output frequencies f_{OUT1} f_{OUT2}	V_S = 26V, R_1 = 14Ω V_S = 0V V_S = 6V	 1.74 1.22		 2.14 1.6	kHz
	$\frac{f_{OUT1}}{f_{OUT2}}$		1.33		1.43	
	Programming resistor range		8		56	kW
	Sweep frequency	R_1 = 14 kΩ C_1 = 100 nF	5.25	7.5	9.75	Hz

3 Application schematics

Figure 3. Typical application with buzzer

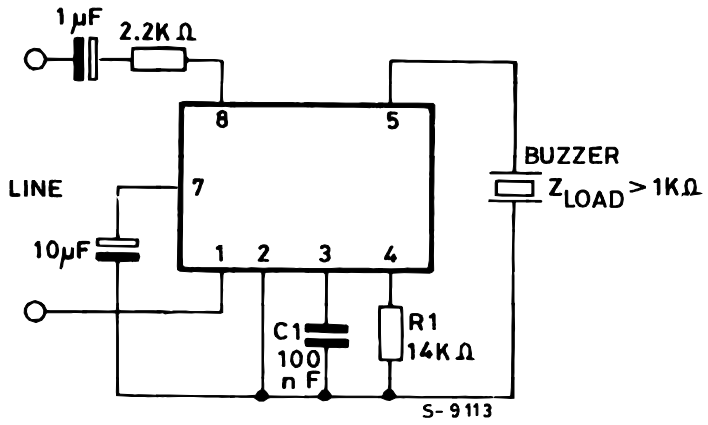
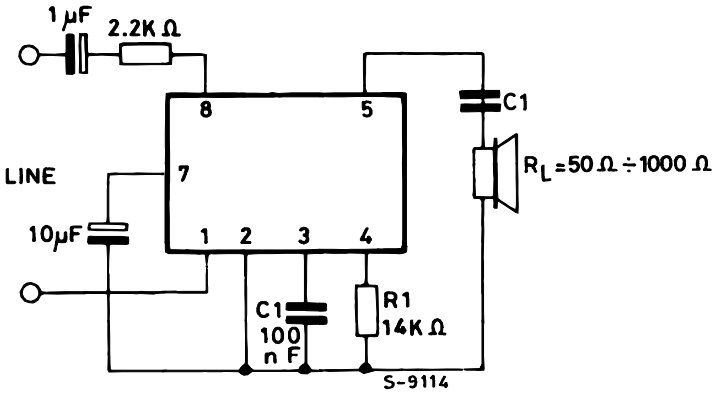


Figure 4. Typical application with loudspeaker (no transformer needed)



C_1 such that $|Z_{LOAD}| > 1\ K\Omega$

4 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect . The category of second Level Interconnect ismarked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Table 4. Minidip package dimensions

Dim.	mm			inch		
	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

Figure 5. Minidip package mechanicla drawing

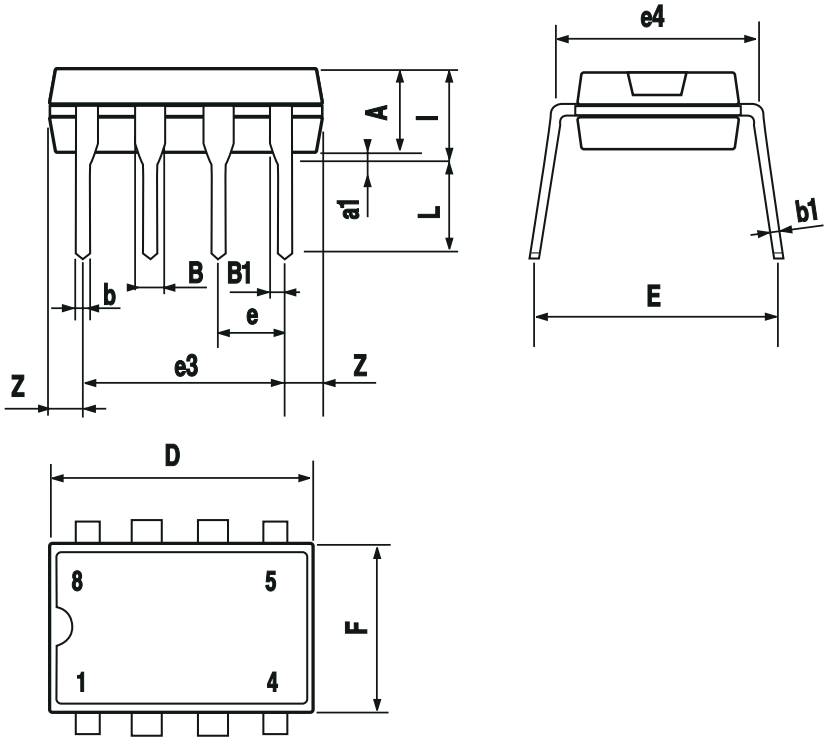
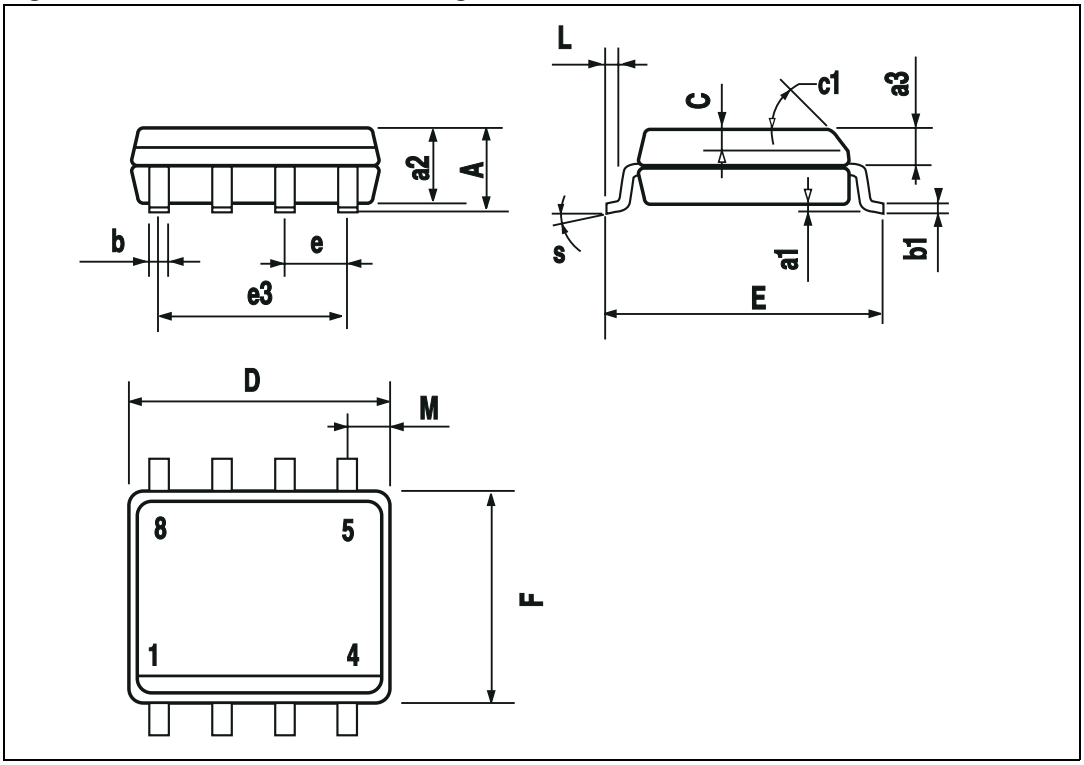


Table 5. SO8 package dimensions

Dim.	mm			inch		
	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		0.50	0.010		0.020
c1	45° (typ.)					
D(1)	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(1)	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

Figure 6. SO8 mechanical drawing



5 Ordering information

Table 6. Order codes

Part number	Package
LS1240A	Minidip
LS1240AD1	SO8
E-LS1240A(1)	Minidip
E-LS1240AD1(1)	SO8

1. ECOPACK® (see *Chapter 4*)

6 Revision history

Table 7. Document revision history

Date	Revision	Changes
15-Jul-1998	1	Initial release.
23-Aug-2006	2	Updated the document to reflect the fact that packages are leadfree and part numbers have changed.

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