



## ELECTRONIC TWO - TONE RINGER

- LOW CURRENT CONSUMPTION, IN ORDER TO ALLOW THE PARALLEL OPERATION OF 4 DEVICES
- INTEGRATED RECTIFIER BRIDGE WITH ZENER DIODES TO PROTECT AGAINST OVERVOLTAGES
- LITTLE EXTERNAL CIRCUITRY
- TONE AND SWITCHING FREQUENCIES ADJUSTABLE BY EXTERNAL COMPONENTS
- INTEGRATED VOLTAGE AND CURRENT HYSTERESIS

### DESCRIPTION

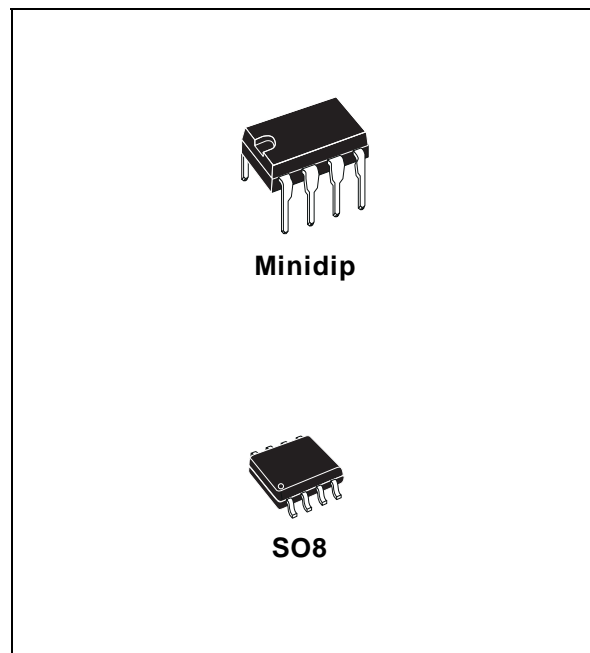
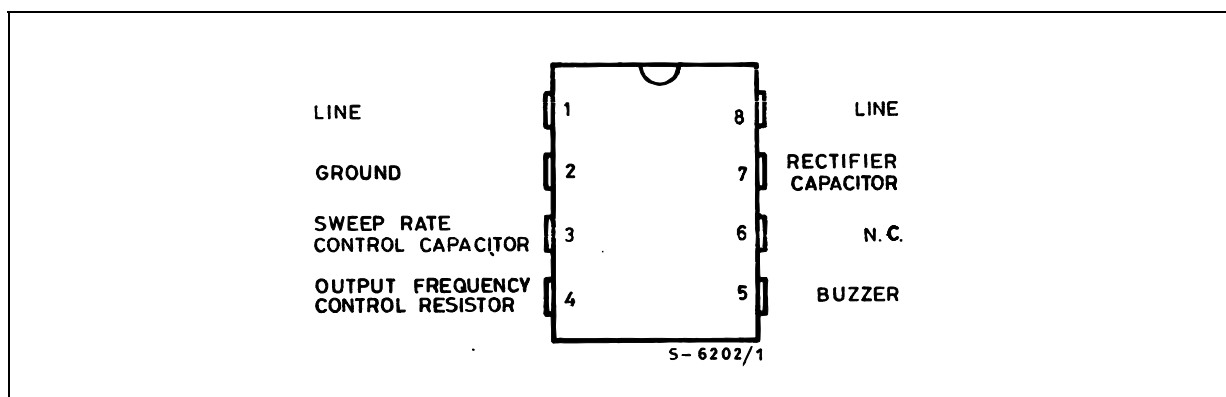
LS1240A is a monolithic integrated circuit designed to replace the mechanical bell in telephone sets in connection with an electro-acoustical converter. It can drive directly a piezoceramic converter (buzzer) or a dynamic loudspeaker.

The output current capability of LS1240A is higher than standard ringer. For driving a dynamic loudspeaker LS1240A can simply use a decoupling capacitor, thus eliminating the usual transformer.

No current limitation is provided on the output stage of LS1240A, so a minimum load DC of 50  $\Omega$  is advised, in series with a proper capacitor.

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

### PIN CONNECTION (top view)



### ORDERING NUMBERS

| Minidip | SO8       |
|---------|-----------|
| LS1240A | LS1240AD1 |

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.

BLOCK DIAGRAM

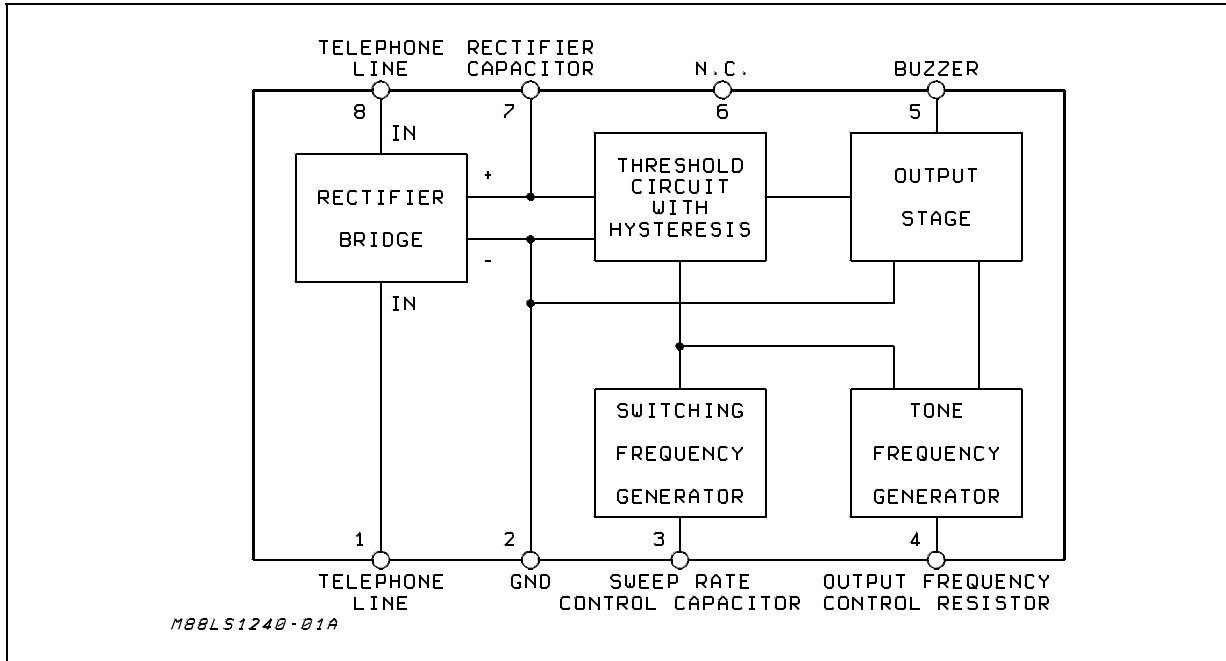
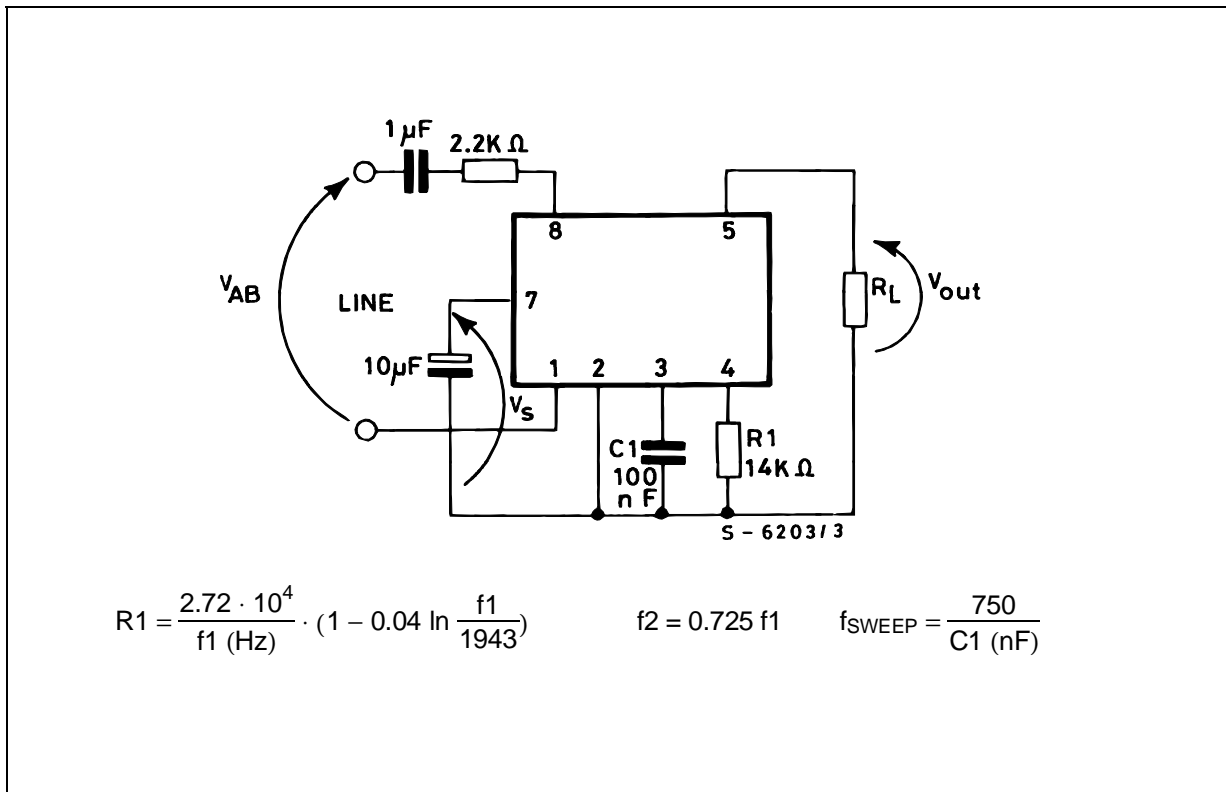


Figure 1 : Test Circuit.



**ABSOLUTE MAXIMUM RATINGS**

| Symbol    | Parameter                                 | Value         | Unit      |
|-----------|---|---------------|-----------|
| $V_{AB}$  | Calling Voltage (f = 50 Hz) Continuous    | 120           | $V_{rms}$ |
| $V_{AB}$  | Calling Voltage (f = 50 Hz) 5s ON/10s OFF | 200           | $V_{rms}$ |
| DC        | Supply Current                            | 30            | mA        |
| $T_{op}$  | Operating Temperature                     | - 40 to + 70  | °C        |
| $T_{stg}$ | Storage and Junction Temperature          | - 65 to + 150 | °C        |

**THERMAL DATA**

| Symbol          | Parameter                           | Value   | Unit |
|-----------------|-------------------------------------|---------|------|
| $R_{th\ j-amb}$ | Thermal Resistance Junction-ambient | Max 100 | °C/W |

**ELECTRICAL CHARACTERISTICS**

( $T_{amb} = 25\text{ °C}$ ;  $V_s$  = applied between pins 7-2 unless otherwise specified)

| Symbol    | Parameter   | Test Conditions               | Min. | Typ.      | Max. | Unit       |
|-----------|---|-------------------------------|------|-----------|------|------------|
| $V_s$     | Supply Voltage                                      |                               |      |           | 26   | V          |
| $I_B$     | Current Consumption without Load (pins 8-1)         | $V_{8-1} = 9.3$ 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 Condition (pins 8-1) |                               | 6.4  |           |      | k $\Omega$ |
| $V_{OUT}$ | Output Voltage Swing                                |                               |      | $V_s - 5$ |      | V          |
| $I_{OUT}$ | Short Circuit Current (pins 5-2)                    | $V_s = 20V$ $R_L = 250\Omega$ |      | 70        |      | mA         |

**AC OPERATION**

|                |  |   |              |     |             |            |
|----------------|--|---|--------------|-----|-------------|------------|
| $f_1$<br>$f_2$ | Output Frequencies<br>$f_{out1}$<br>$f_{out2}$ | $V_s = 26V$ , $R_1 = 14k\Omega$<br>$V_s = 0V$<br>$V_s = 6V$ | 1.74<br>1.22 |     | 2.14<br>1.6 | kHz        |
|                | $f_{OUT1}$<br>$f_{OUT2}$                       |   | 1.33         |     | 1.43        |            |
|                | Programming Resistor Range                     |   | 8            |     | 56          | k $\Omega$ |
| $f_{SWEEP}$    | Sweep Frequency                                | $R_1 = 14k\Omega$ , $C_1 = 100nF$                           | 5.25         | 7.5 | 9.75        | Hz         |

Figure 2 : Typical Application with BUZZER

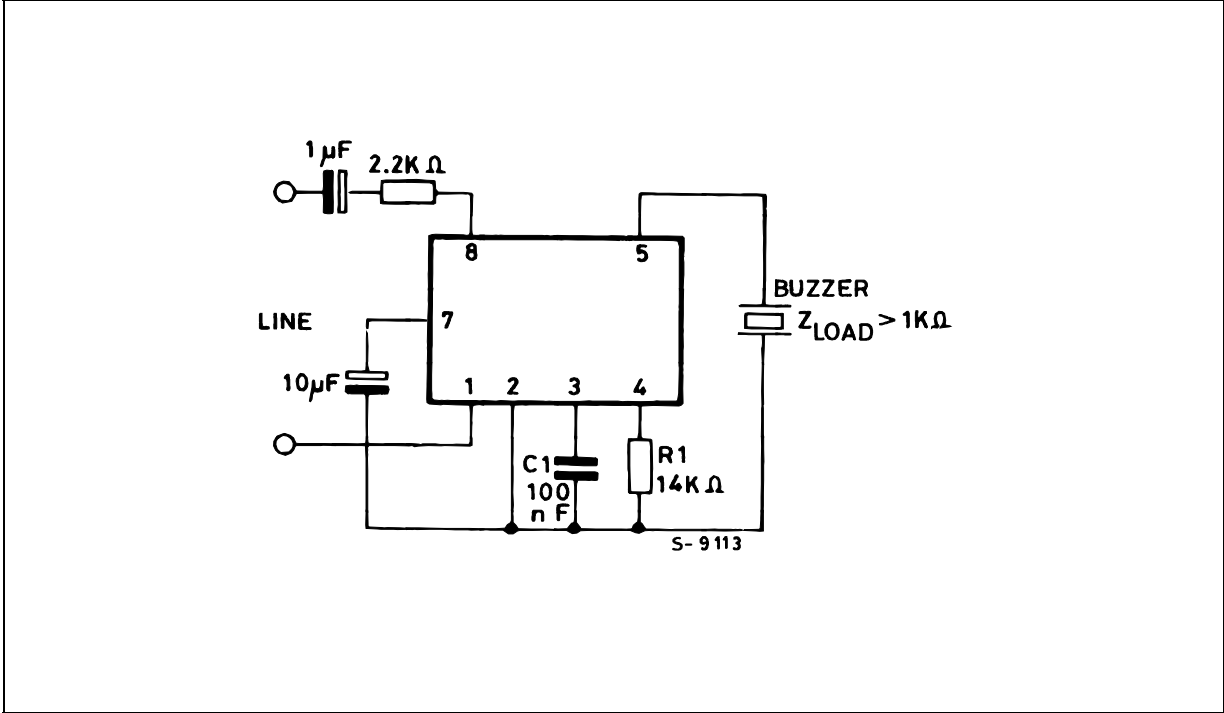
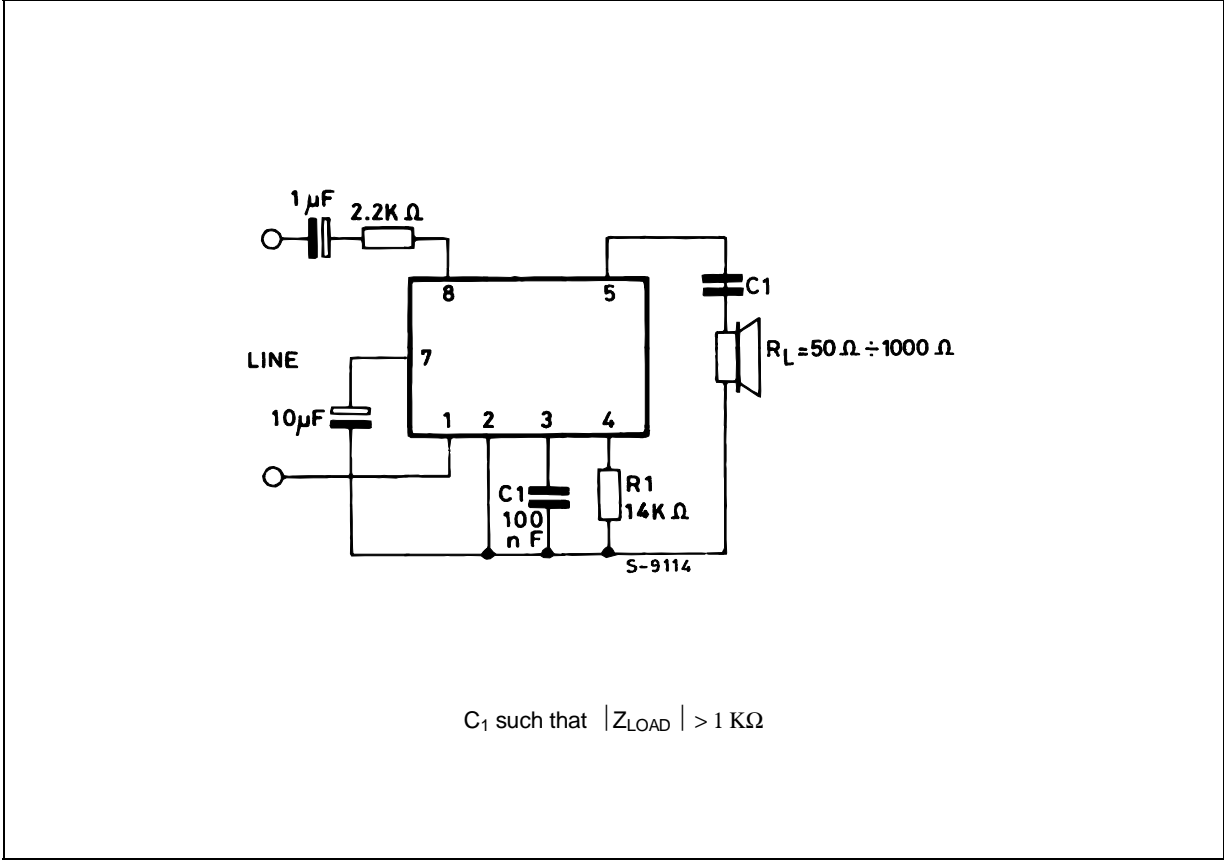
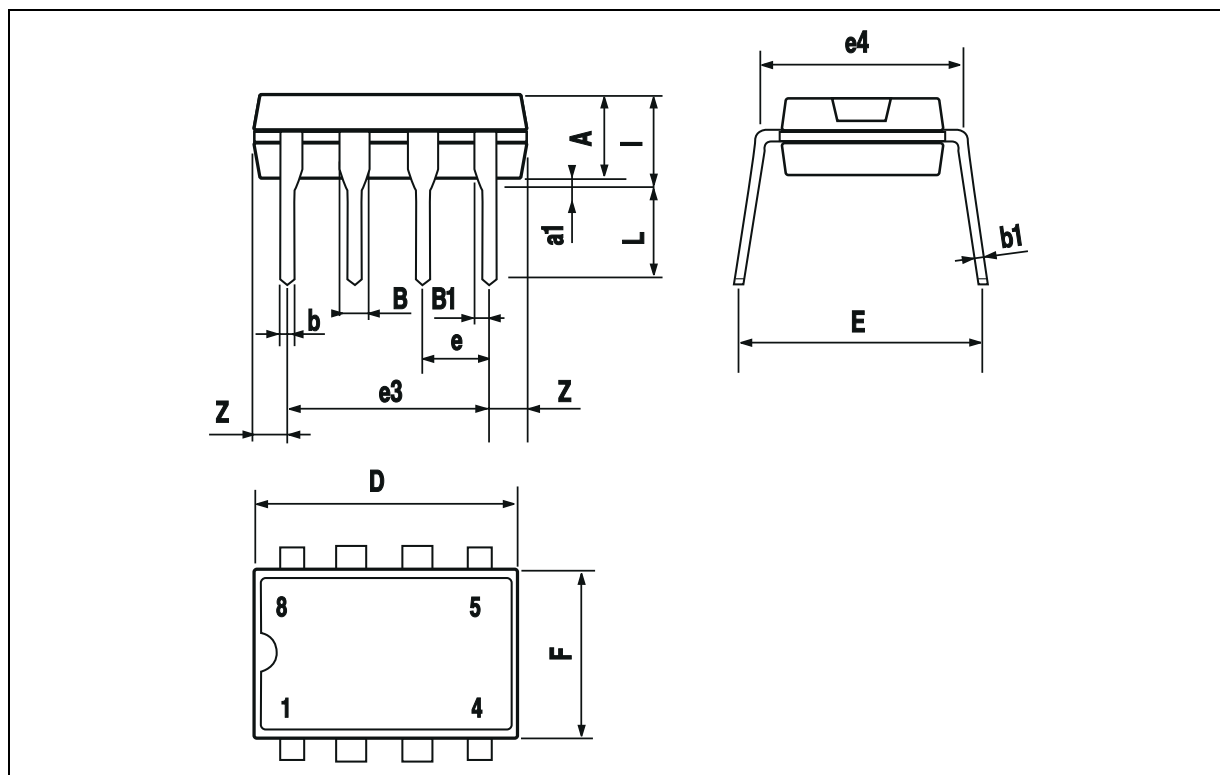


Figure 3 : Typical Application with Loudspeaker (no transformer needed)



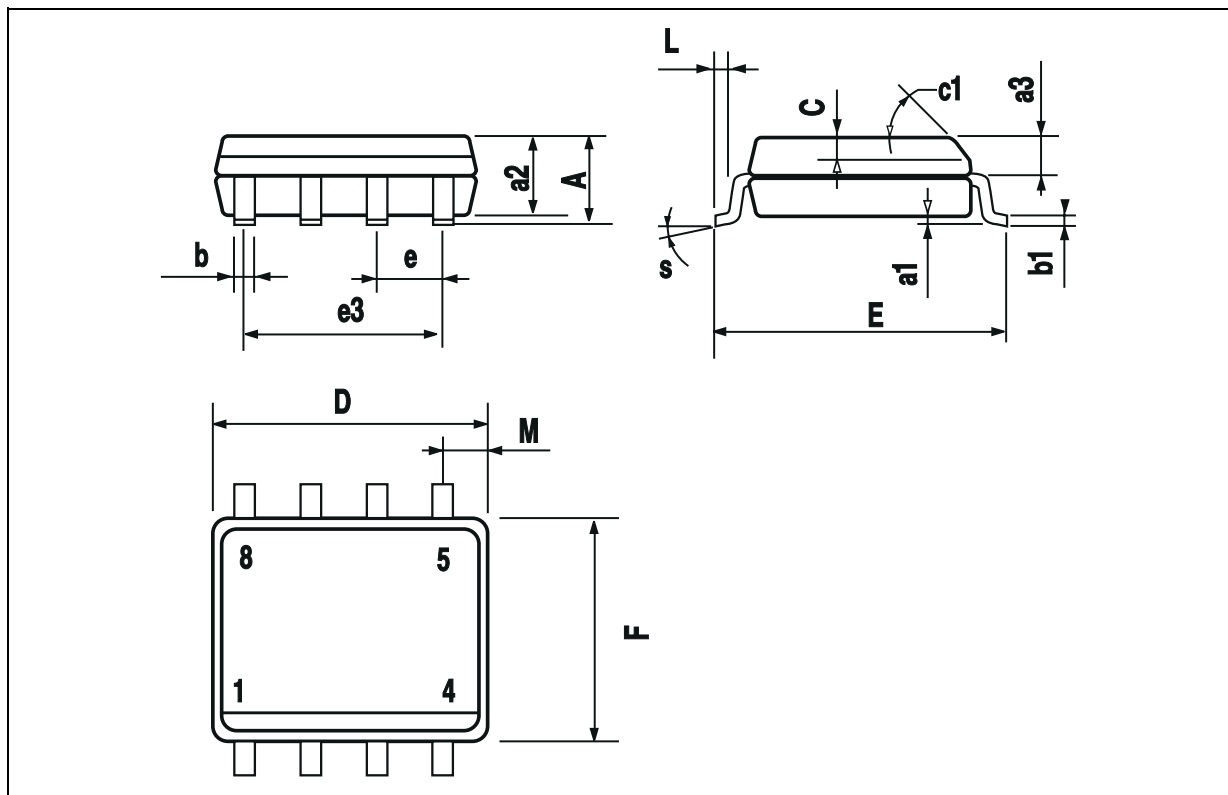
## MINIDIP PACKAGE MECHANICAL DATA

| 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 |
| l    |       |      | 5.08  |       |       | 0.200 |
| L    | 3.18  |      | 3.81  | 0.125 |       | 0.150 |
| Z    |       |      | 1.52  |       |       | 0.060 |



SO8 PACKAGE MECHANICAL DATA

| 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       |      | 0.5  | 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.)  |      |      |       |       |       |



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