

# M348x Series

## UM348x Multi-Instrument Melody Generator

### Features

- Powered by a 1.5V battery
- Low standby current
- 512-note memory, up to 16 songs
- 8 playing modes by user setting
- One built-in RC oscillator
- 8 beats selectable
- 3 timbres - piano, organ, and mandolin
- 5 tempos available through mask setting
- 14 tones selectable
- On-chip envelope modulator and pre-amplifier

### General Description

The M3481 series is a mask-ROM-programmed multi-instrument melody generator, implemented by CMOS technology. It is designed to play the melody according to the previously programmed information

and is capable of generating 16 songs with 3 instrument effects : piano, organ and mandolin. The device

also includes a pre-amplifier which provides a simple interface to the driver circuit. The M3481 series is intended for applications such as toys, door bells, music box, melody clock/timers and telephones.

### Absolute Maximum Ratings

DC Supply Voltage ..... -0.3V to +5.0V  
 Input Voltage Range ..... Vss-0.3V to Vdd+0.3V  
 Operating Ambient Temperature ..... 0°C to +70°C  
 Storage Temperature ..... -10°C to +125°C

### Electrical Characteristics

(Vss=0V, Vdd=1.5V, Ta=25°C, unless otherwise specified.)

| Parameter             | Symbol           | Min.     | Typ. | Max.     | Conditions             |
|-----------------------|------------------|----------|------|----------|------------------------|
| Operating Voltage     | Vdd              | 1.3V     | 1.5V | 5V       |                        |
| Stand-by Current      | I <sub>sb</sub>  | -        | -    | 12µA     | No load                |
| Input Voltage High    | V <sub>ih</sub>  | Vdd-0.3V | -    | Vdd      |                        |
| Input Voltage Low     | V <sub>il</sub>  | Vss      | -    | Vss+0.3V |                        |
| Input Current High    | I <sub>ih</sub>  | 1.5µA    | 3µA  | 6µA      | V <sub>ih</sub> =Vdd   |
| Input Current Low     | I <sub>il</sub>  | -        | -    | 0.1µA    | V <sub>il</sub> =Vss   |
| ENV Pin Drive Current | I <sub>env</sub> | 500µA    | -    | -        | V <sub>env</sub> =0.8V |
| Output Current (OP1)  | I <sub>ol</sub>  | 200µA    | -    | 1200µA   | V <sub>ol</sub> =0.8V  |
| Output Current (OP2)  | I <sub>oh</sub>  | 200µA    | -    | 1200µA   | V <sub>oh</sub> =0.7V  |

### Playing modes

| Mode | CE | SL | LP | AS | Program   |
|------|----|----|----|----|---|
| 0    | 0  | X  | X  | X  | Standby   |
| 1    | 1  | 0  | 0  | 0  | First melody→...→Last melody→Stop                     |
| 2    | ↑  | 0  | 0  | 1  | First melody→...→Last melody→Repeat from first melody |
| 3    | ↑  | 0  | 1  | 0  | Start from the present melody→Stop                    |
| 4    | 1  | 0  | 1  | 1  | Repeat the present melody                             |
| 5    | 1  | ↑  | 0  | 0  | Change to the next melody→...→Last melody→Stop        |
| 6    | 1  | ↑  | 0  | 1  | Next melody→...→Last melody→Repeat from first melody  |
| 7    | 1  | ↑  | 1  | 0  | Change to the next melody→Stop                        |
| 8    | 1  | ↑  | 1  | 1  | Change to the next melody→Repeat the same melody      |

(↑ means a low to high voltage level transaction)

**Song Series List** (Fewer songs version provides longer duration for each song)

**M3481** (8 songs)

Jingle Bells  
 Santa Claus Is Coming To Town  
 Silent Night, Holy Night  
 Joy To The World  
 Rudolph, The Red-nosed Reindeer  
 We Wish You A Merry Christmas  
 O Come, All Ye Faithful  
 Hark, The Herald Angels Sing

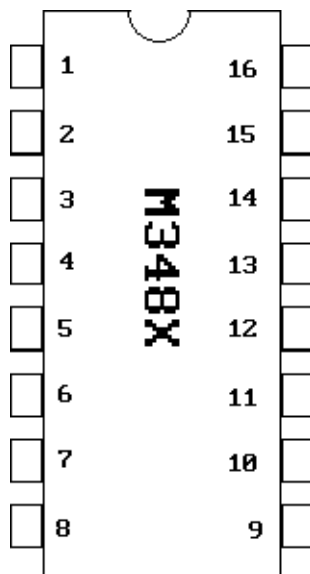
**M3482** (12 songs)

American Patrol  
 Rabbits  
 Oh My Darling, Clementine  
 Butterfly  
 London Bridge Is Falling Down  
 Row, Row, Row Your Boat  
 Are You Sleeping  
 Happy Birthday  
 Joy Symphony  
 Home Sweet Home  
 Weigenlied  
 Melody On Purple Bamboo

**M3485** (5 songs)

The Hawaiian Wedding Song  
 Try To Remember  
 Aloha OE  
 Love Story  
 Yesterday

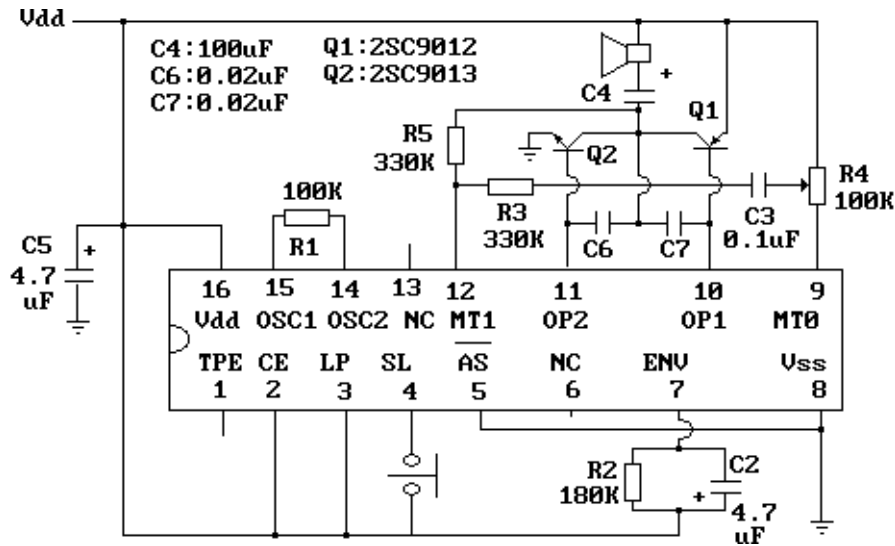
**Pin Configuration**



| Pin no. | Symbol | Description  |
|---------|--------|--|
| 1       | TSP    | Output flag signal of melody auto stop : In normal operation, this should be open. |
| 2       | CE     | Chip is enabled if connected to Vdd. Chip is disabled if connected to Vss.         |
| 3       | LP     | Only one song plays if connected to Vdd. All songs play if connected to Vss.       |
| 4       | SL     | A positive going edge will change to play the next song.                           |
| 5       | AS     | The melody will repeat if connected to Vdd and will stop automatically if to Vss.  |
| 6       | NC     | No connection  |
| 7       | ENV    | Envelope circuit terminal  |
| 8       | Vss    | Negative power supply  |
| 9       | MTO    | Modulated tone signal output   |
| 10      | OP1    | Pre-amplifier output 1   |
| 11      | OP2    | Pre-amplifier output 2   |
| 12      | MT1    | Modulated tone signal input to the pre-amplifier.                                  |
| 13      | NC     | No connection  |
| 14      | OSC2   | External oscillator terminal 1   |
| 15      | OSC1   | External oscillator terminal 2   |
| 16      | Vdd    | Positive power supply  |

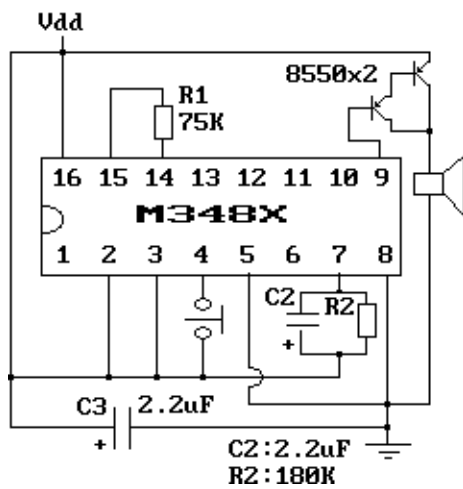
## Typical Application Circuit

### A. MELODY DOOR BELL

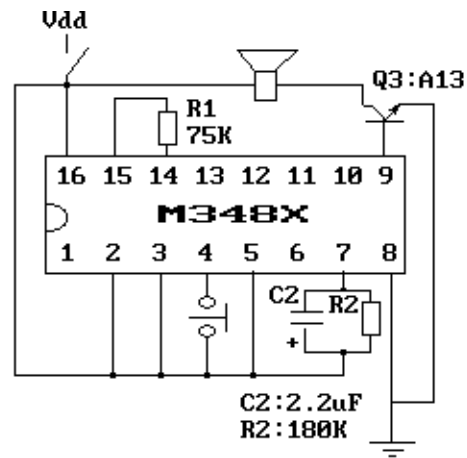


### B. LOW COST APPLICATIONS USING SPEAKER

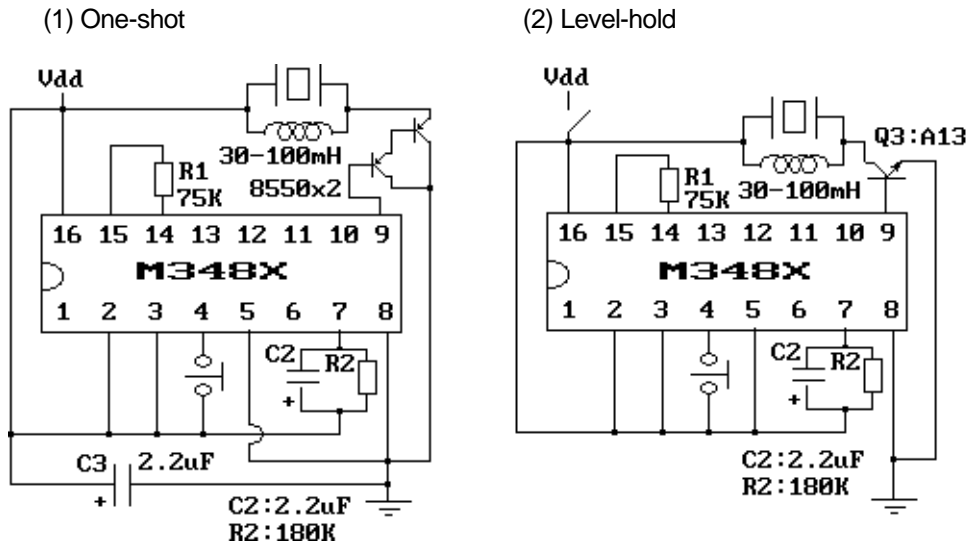
(1) One-shot



(2) Level-hold



### C. LOW COST APPLICATIONS USING PIEZO BUZZER



The inductor in parallel can be replaced by a 100kΩ resistor but the sound level will be lower.

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