



UM348X Series

Multi-Instrument Melody Generator

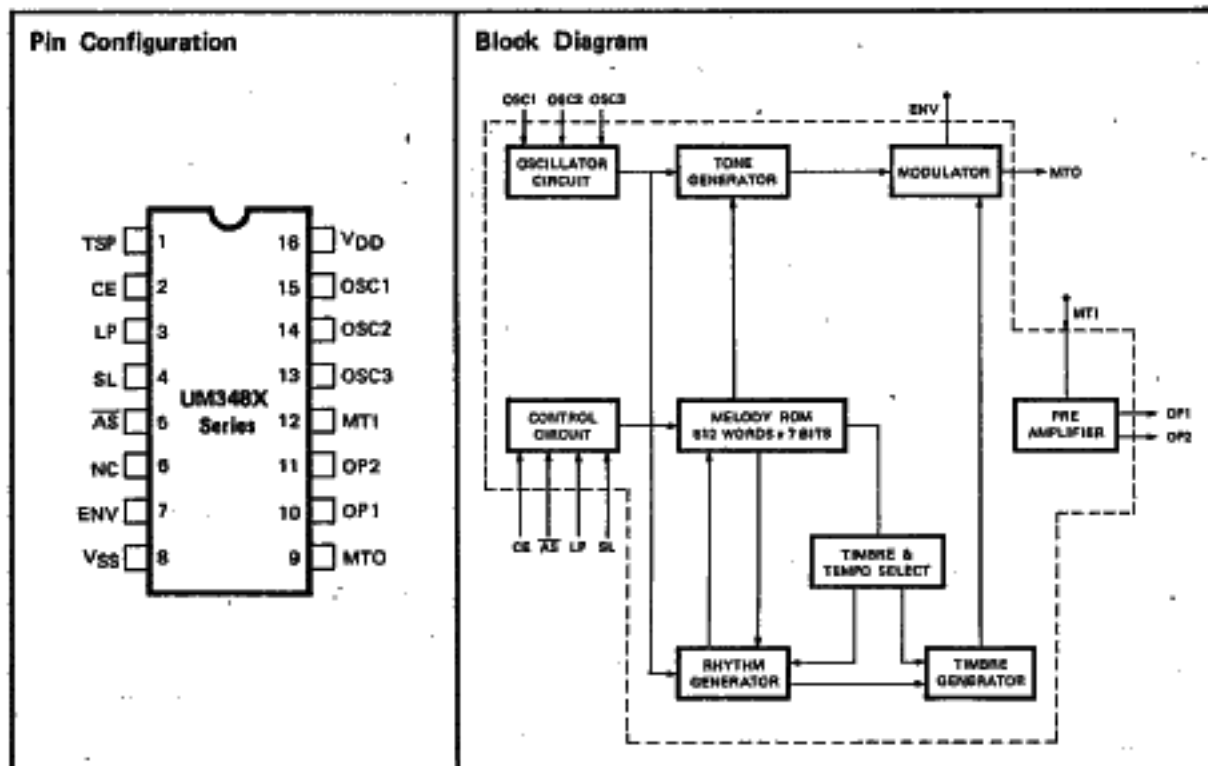
Features

- Powered by a 1.5V battery
- Low stand-by current
- 512-note memory, up to 16 songs
- Play all the songs repeatedly or auto stop
- Play one song only, repeatedly or auto stop
- Every song starts from the first note
- Any song can be present
- 3 timbres — piano, organ and mandolin
- 5 tempos available through mask setting
- On-chip envelope modulator and pre-amplifier

General Description

The UM348X series is a mask-ROM-programmed multi-instrument melody generator, implemented in the CMOS technology. They are designed to play the melody according to the previously programmed information and capable of generating 16 songs with 3 instrument sounds, the piano, the organ and the mandolin.

The devices also include a pre-amplifier which provide simple interface to the driver circuit. The UM348X series is intended for applications such as toys, door bells, music boxes, melody clock/timers and telephones.





Absolute Maximum Ratings*

DC Supply Voltage	-0.3V to 5.0V
Input/Output Voltage	$V_{SS} - 0.3$ to $V_{DD} + 0.3V$
Operating Ambient Temperature	-10°C to 60°C
Storage Temperature	-55°C to 125°C

***Comments**

Stress above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Electrical Characteristics

($V_{DD} = 1.5V$, $V_{SS} = 0V$, $T_A = 25^\circ C$, unless otherwise specified.)

Parameter	Symbol	Min.	Typ.	Max.	Conditions
Operating Voltage	V_{DD}	1.35V	1.5V	3V	
Stand-By Current	I_{STB}	0.1 μA	-	12 μA	OSC halting
Input Voltage-High	V_{IH}	$V_{DD} - 0.3V$	-	V_{DD}	
Input Voltage-Low	V_{IL}	V_{SS}	-	$V_{SS} + 0.3V$	
Input Current High	I_{IH}	1.5 μA	3 μA	6 μA	$V_{IH} = V_{DD}$
Input Current Low	I_{IL}	-	-	0.1 μA	$V_{IL} = V_{SS}$
ENV Pin Drive Current	I_{ENV}	500 μA	-	-	$V_{ENV} = 0.8V$
Output Current (OP1)	I_{OL}	200 μA	-	1200 μA	$V_{OL} = 0.8V$
Output Current (OP2)	I_{OH}	200 μA	-	1200 μA	$V_{OH} = 0.7V$

Pin Description

Pin No.	Designation	Description
1	TSP	Output flag of melody auto stop In normal operation, this pin should be open
2	CE	Chip enabled if connected to V_{DD} Chip disabled if connected to V_{SS}
3	LP	The melody plays only one song if this pin is connected to V_{DD} The melody plays all songs if this pin is connected to V_{SS}
4	SL	A positive going edge applied to this pin will make the melody change to the next song
5	\overline{AS}	The melody will be repeated if this pin is connected to V_{DD} The melody will stop automatically if this pin is connected to V_{SS}
6	NC	No connection
7	ENV	Envelope circuit terminal
8	V_{SS}	Negative supply power
9	MTO	Modulated tone signal output
10	OP1	Pre-amplifier output 1
11	OP2	Pre-amplifier output 2
12	MTI	Modulated tone signal input to the pre-amplifier
13	OSC3	Pin 13-15 can be connected as an RC oscillator External oscillating signal can be input to Pin 15
14	OSC2	
15	OSC1	
16	V_{DD}	Positive power supply

Functional Description
Oscillator & Control Circuit

The resistor R_1 & capacitor C_1 are connected externally to set the frequency at 100 KHz. Addition of R_2 (shown is application CKT) in series with input inverter is to make the circuit insensitive to the variation of supply voltage. Under the stand-by condition (CE is Low) the operation of the OSC is inhibited. As soon as a high level signal is applied to the CE terminal, the circuit starts oscillating. Since the OSC frequency is used as a time base of the tone, rhythm and tempo generators, its accuracy will affect the quality of the melody.

Modulator Circuit

The tone signal and the timbre signal are put through

the modulator circuit. The output waveform is shown in Fig. 1 and the modulator circuit shown in Fig. 2. Proper selection of C_2 , R_2 can produce envelopes of desired charging and discharging time.

Pre-amplifier

The pre-amplifier circuit is shown in Fig. 3. Feedback resistor R_4 must be connected to obtain proper bias of pre-amp stage. In the stand-by state the pre-amp is disabled, and OP1 is pulled up to V_{DD} . OP2 is pulled down to V_{SS} .

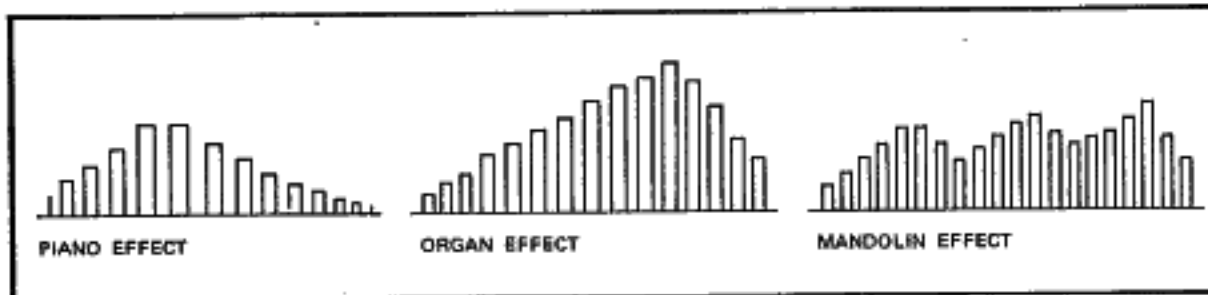


Figure 1. Waveform at MTO

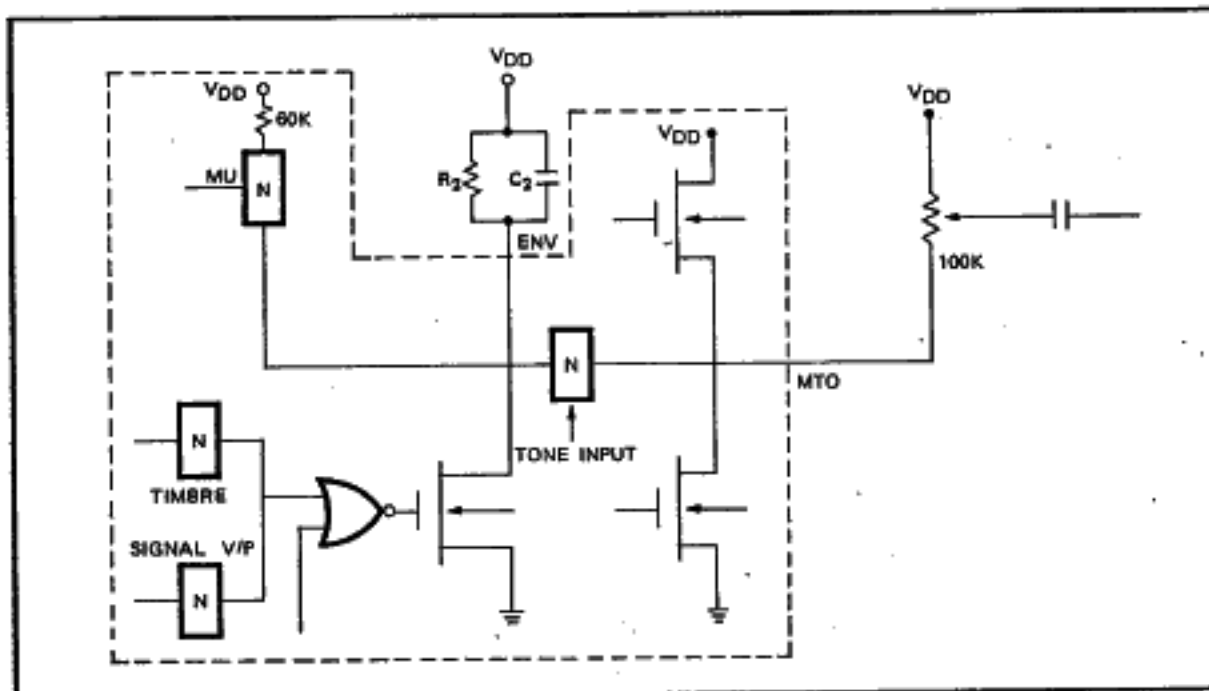
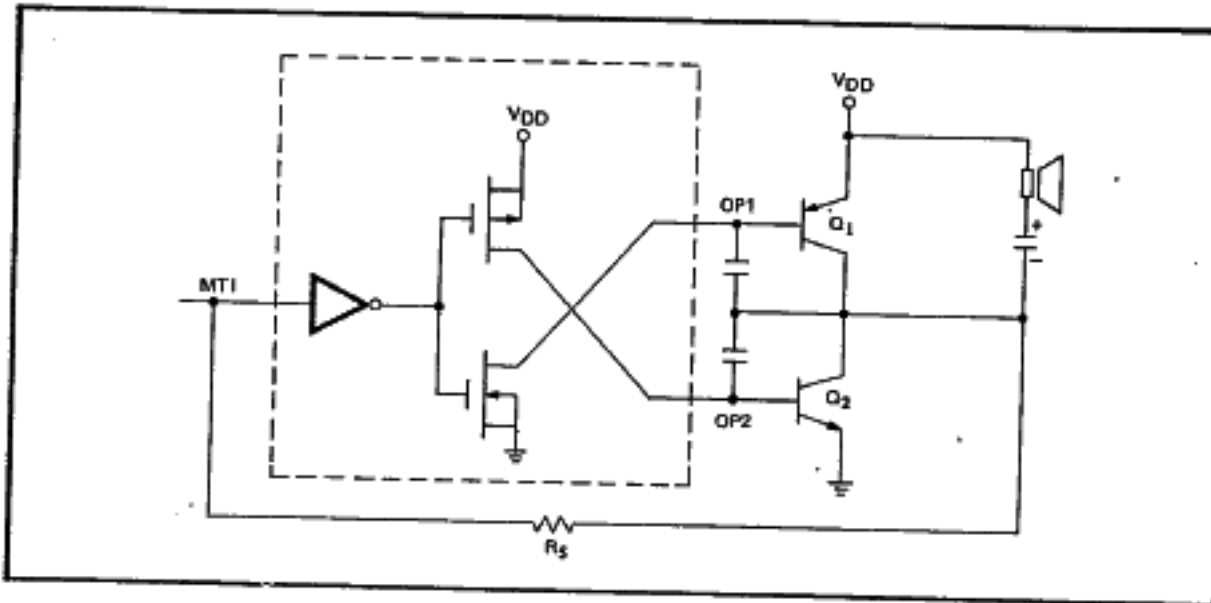






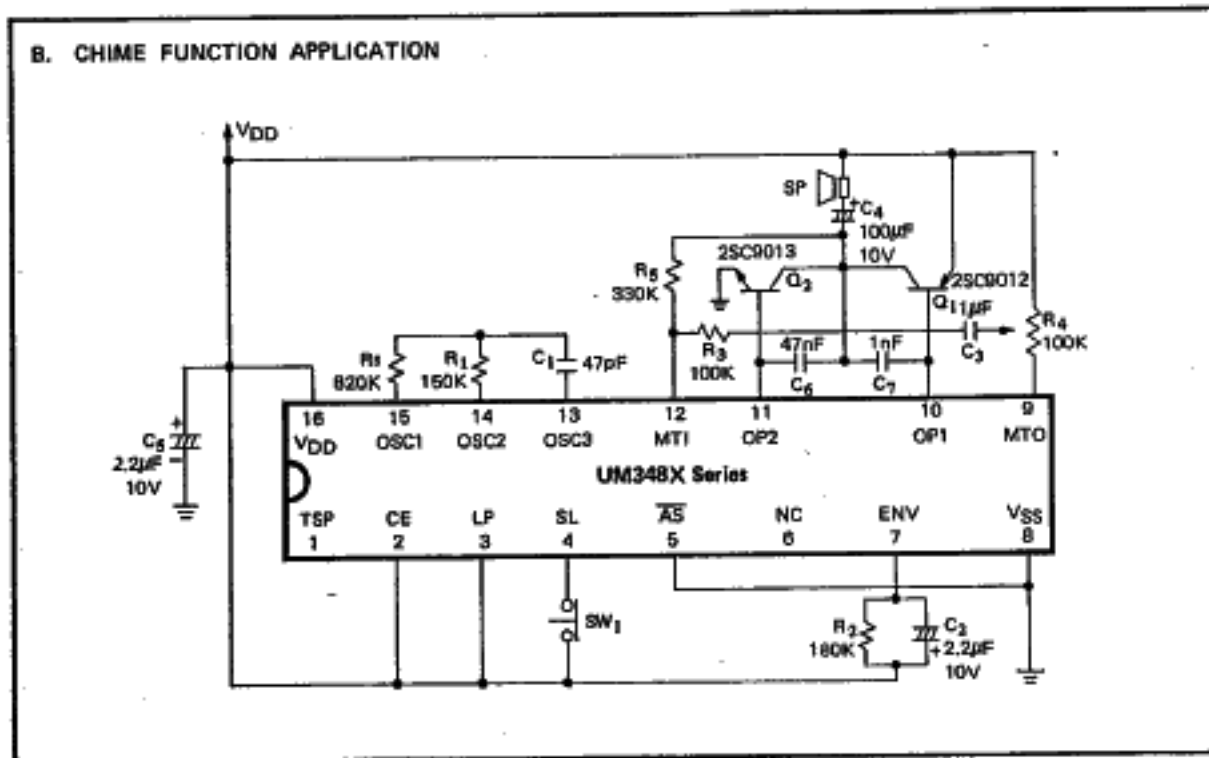
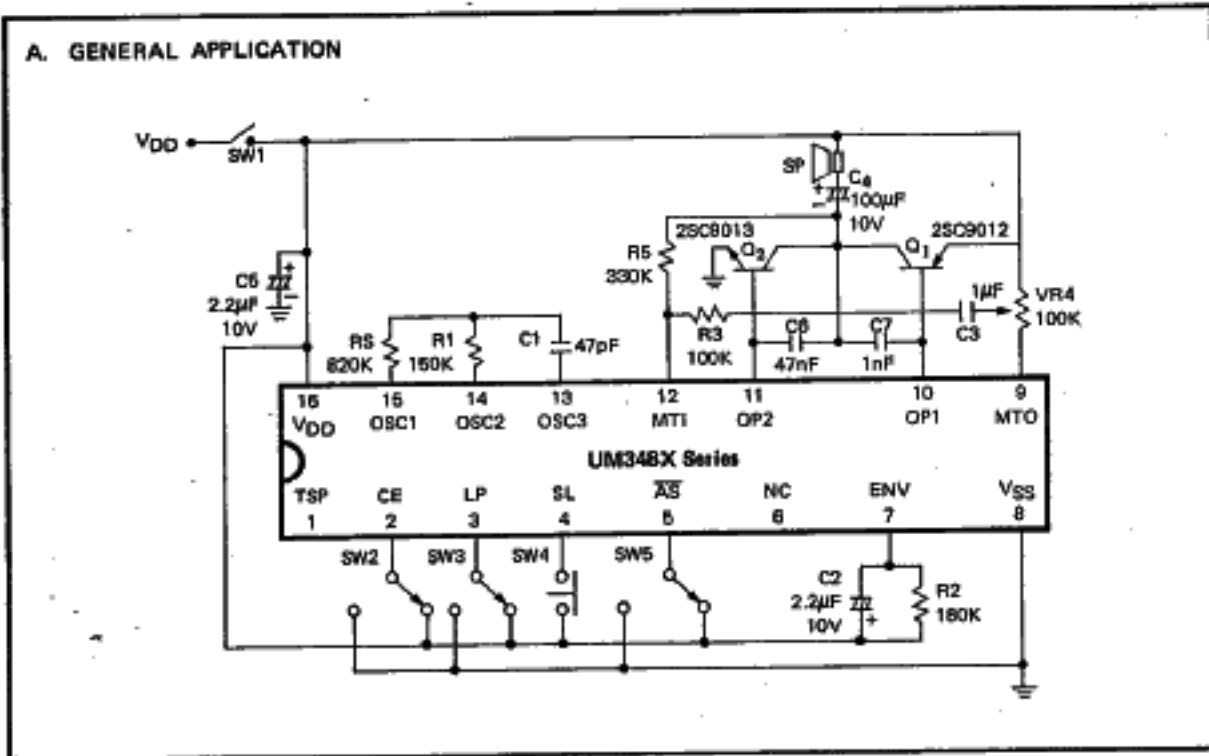
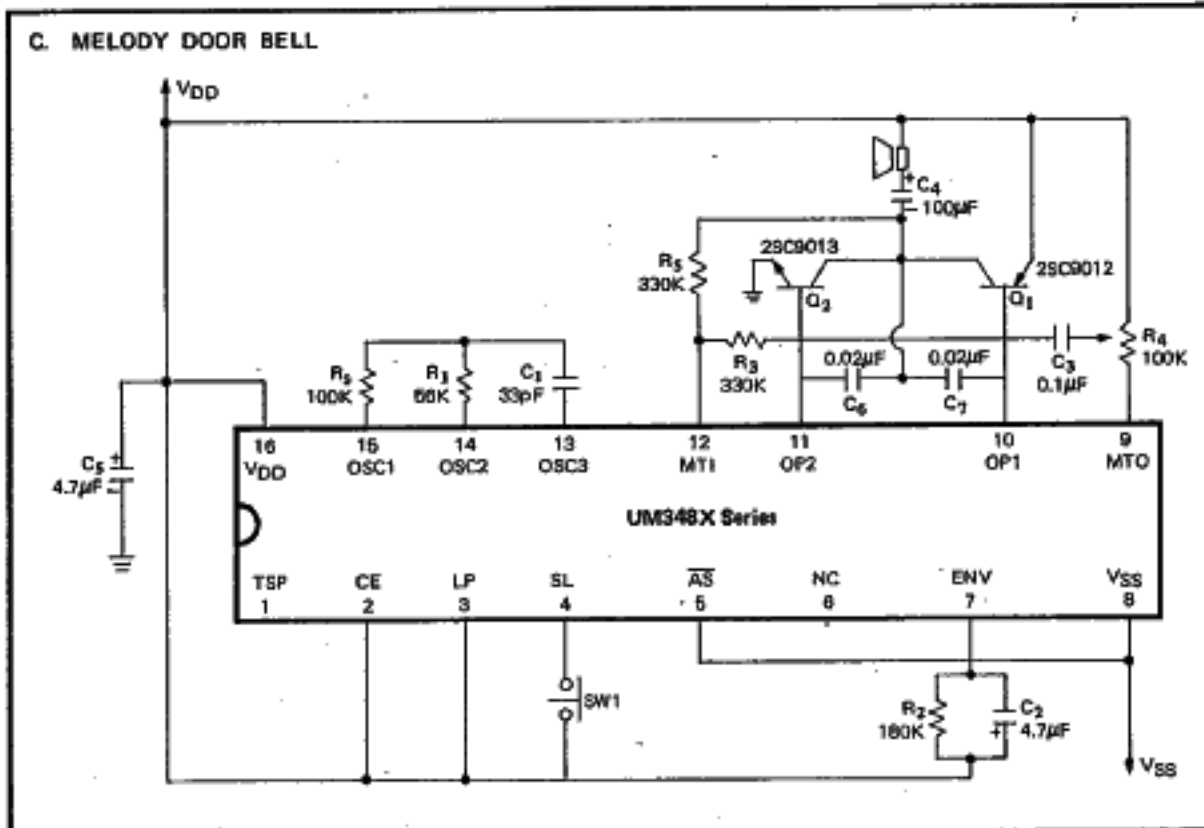
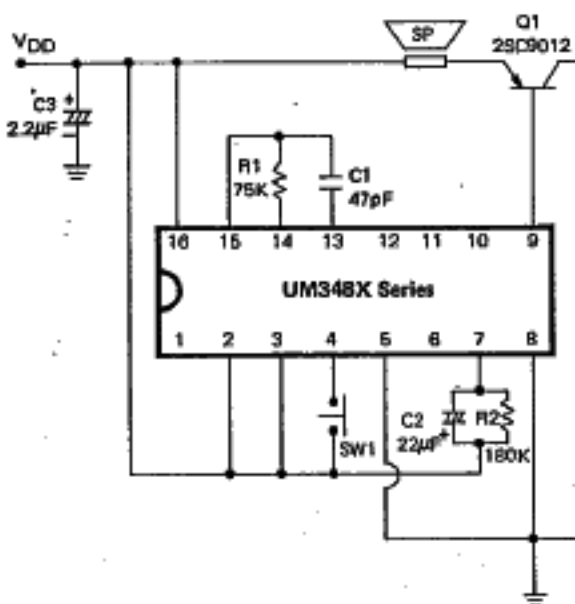
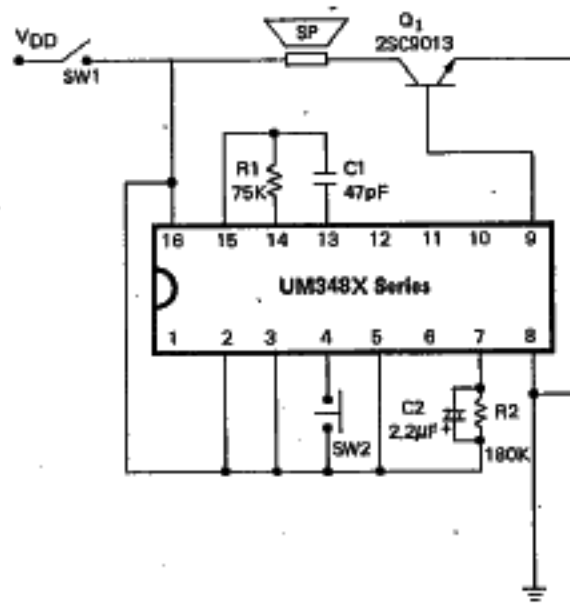


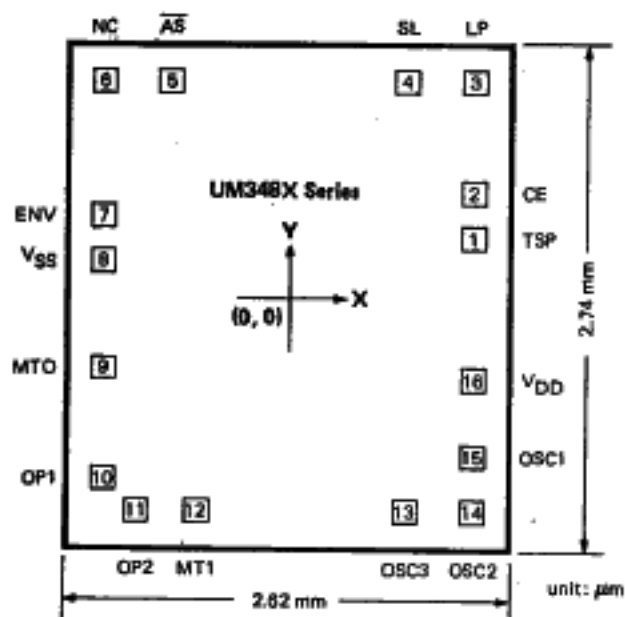
Figure 2. Modulator Circuit


Figure 3. Pre-amplifier Circuit
Program Truth Table

Items	CE	SL	LP	AS	Program
1	0	X	X	X	Stand-by
2	1	0	0	0	Start from first melody → last melody → stop
3		0	0	1	Start from first melody → last melody → repeat from first melody
4		0	1	0	Start from the present melody → stop
5	1	0	1	1	Repeat the present melody
6	1		0	0	Change to the next melody → last melody → stop
7	1		0	1	Change to the next melody → last melody → repeat from first melody
8	1		1	0	Change to the next melody → stop
9	1		1	1	Change to the next melody → repeat the same melody

Typical Application


C. MELODY DOOR BELL

D. LOW COST APPLICATION
(1) One-shot

(2) Level-hold


Bonding Diagram


Pad No.	Designation	X	Y
1	TSP	1163.57	640.08
2	CE	1163.57	836.68
3	LP	1163.57	1220.72
4	SL	662.94	1209.29
5	$\overline{\text{AS}}$	-913.38	1220.72
6	NC	-1097.28	1220.72
7	ENV	-1159.00	496.08
8	V_{SS}	-1159.00	299.47
9	MTO	-1149.86	-491.49
10	OP1	-1149.85	-1028.70
11	OP2	-1044.70	-1216.15
12	MT1	-861.82	-1216.15
13	OSC3	745.24	-1216.15
14	OSC2	1163.57	-1217.42
15	OSC1	1154.43	-1032.26
16	V_{DD}	1154.43	-619.51

Ordering Information
UM3481A

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

Wedding March
 Happy Birthday
 Humoresque
 Lorelei
 The Last Rose of Summer
 Love Song from Sikang

UM3484

Westminster
 Chime Function

UM3482A

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
 Wiegenlied
 Melody on Purple Bamboo

UM34811A

Twinkle Twinkle Little Star
 Coo Coo Waltz (1)
 Eency Weency Spider
 Lullaby
 Santa Lucia
 Oh My Darling, Clementine
 Are You Sleeping
 Rock-a-bye Baby
 London Bridge is Falling Down
 Little Brown Jug
 Butterfly
 Long Long Ago
 Coo Coo Waltz (2)
 Mary Had a Little Lamb
 The Train is Running Fast
 Dream of Home and Mother

UM3483

L'eau Vive (Living Water)
 Home on the Range
 Romance de Amor
 Comin' Thro' the Ryel