UMC

UM3491

PRELIMINARY

Melody Generator With Accompaniment

Features

- 3V operating voltage for speaker application.
- 1024-note memory; up to 16 tunes.
- Dual tone mixed output, 2 individual external envelope circuits
- RC oscillator with one external resistor
- 31 programmable tones (include rest) from $C_4 \sim C_7$
- 15 programmable tempos
- 16 programmable time segments for note arrangement
- N^+ programming
- Pulse signal output when melody ends
- Low stand-by current
- Single song played repeatedly or auto stop
- All songs played repeatedly or auto stop

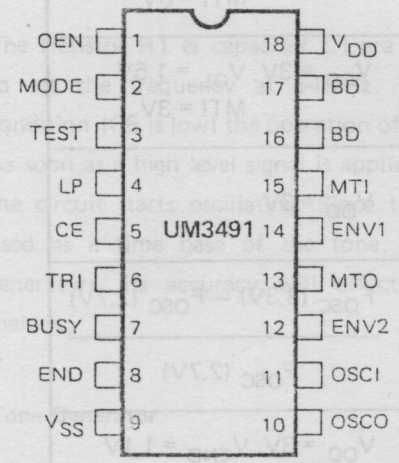
General Description

The UM3491 series comprises mask-ROM-programmed melody generators with accompaniment implemented through CMOS technology. They are designed to play melodies according to previously programmed information.

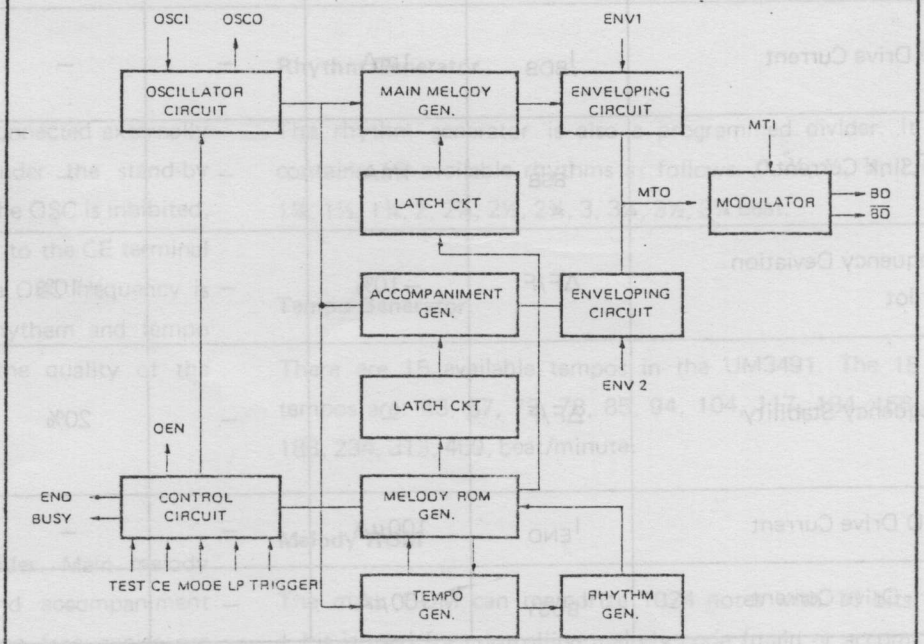
The devices also include melody and accompaniment which are mixed together to generate simultaneous output.

The UM3491 series is intended for applications such as toys, doorbells, melody clock/timers, etc.

Pin Configuration



Block Diagram



PC87001

Absolute Maximum Ratings*

Supply Voltage . . . . . −0.3V to +5.0V

Applied Voltage at any Pin . . . . . V_{SS} −0.3V to V_{DD} +0

Ambient Temperature under Bias . . . . . −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_{SS}= 0V, T_A = 25°C, F_{OSC} = 64KHz, unless otherwise specified.)

Parameter	Symbol	Min.	Typ.	Max.	Condition
Operating Voltage	V_{DD}	2.6V	3V	5V	
Stand-by Current	I_{STB}	–	–	1μA	V_{DD} = 3V osc halting
Operating Current	I_{DD}	–	2mA	5mA	V_{DD} = 3V, No load
BD Drive Current	I_{BD}	1mA	–	–	V_{DD} = 3V, V_{OH} = 1.5V MTI = 0V
BD Sink Current	I_{BS}	1mA	–	–	V_{DD} = 3V, V_{OL} = 1.5V MTI = 3V
$\overline{BD}$ Drive Current	I_{BDB}	1mA	–	–	V_{DD} = 3V, V_{OH} = 1.5V MTI = 0V
$\overline{BD}$ Sink Current	I_{BSB}	1mA	–	–	V_{DD} = 3V, V_{OL} = 1.5V MTI = 3V
Frequency Deviation per lot	ΔF/F	−10%	–	+10%	V_{DD} = 3V
Frequency Stability	ΔF/F	–	–	20%	$\frac{F_{OSC}(3.3V) - F_{OSC}(2.7V)}{F_{OSC}(2.7V)}$
END Drive Current	I_{END}	100μA	–	–	V_{DD} = 3V, V_{END} = 1.1V
Busy Drive Current	I_{BUSY}	100μA	–	–	V_{DD} = 3V, V_{BUSY} = 1.1V

Pin Description

Pin No.	Designation	Description
1	OEN	No connection
2	MODE	The melody will be repeated if this pin connected to V_{DD}. The melody will be stopped automatically if this pin connected to V_{SS}. (OR floating)
3	TEST	This pin is used for testing; in normal operation it should be open
4	LP	Only one song is played if this pin connected to V_{DD}. (OR floating) All songs are played if this pin connected to V_{SS}.
5	CE	Chip enable if connected to V_{DD} Chip disable if connected to V_{SS}
6	TRI	A positive going edge applied to this pin will change the melody to the next song
7	BUSY	This output is high during stand-by and low during melody output
8	END	This pin provides a positive pulse output after the melody stops. The output is low otherwise
9	V_{SS}	Negative supply power
10	OSCO	RC oscillator pin or inverted clock output
11	OSCI	RC oscillator pin
12	ENV2	Enveloping circuit terminal
13	MTO	Modulated tone signal output
14	ENV1	Enveloping circuit terminal
15	MTI	Modulated tone signal input
16	BD	Tone signal output 1
17	$\overline{BD}$	Tone signal output 2
18	V_{DD}	Positive power supply

Functional Description

Oscillator & Control Circuit

The Resistor R1 & capacitor C1 are connected externally to set the frequency at 64KHz. 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, rhythem and tempo generators, its accuracy will affect the quality of the melody.

Tone Generator

The generator is a programmed divider. Main melody generator can produce 31 tones, and accompaniment generator can produce 31 tones, tone frequencies are oscillator frequencies % M, where M is any number from 12 to 255. The range of scales is from "C4" to "F7".

Rhythm Generator

The rhythm generator is also a programmed divider. It contains 16 available rhythms as follows: 0, ¼, ½, ¾, 1, 1¼, 1½, 1¾, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾ beat.

Tempo Generator

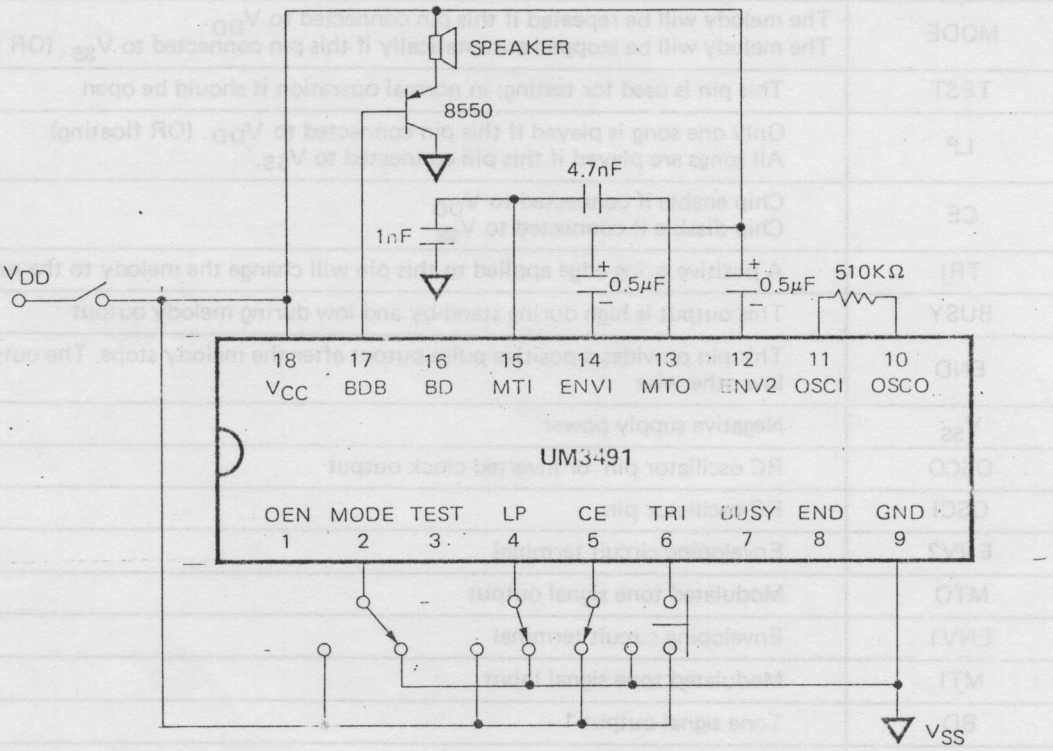
There are 15 available tempos in the UM3491. The 15 tempos are: 63, 67, 72, 78, 85, 94, 104, 117, 134, 156, 188, 234, 313, 469, beat/minute.

Melody ROM

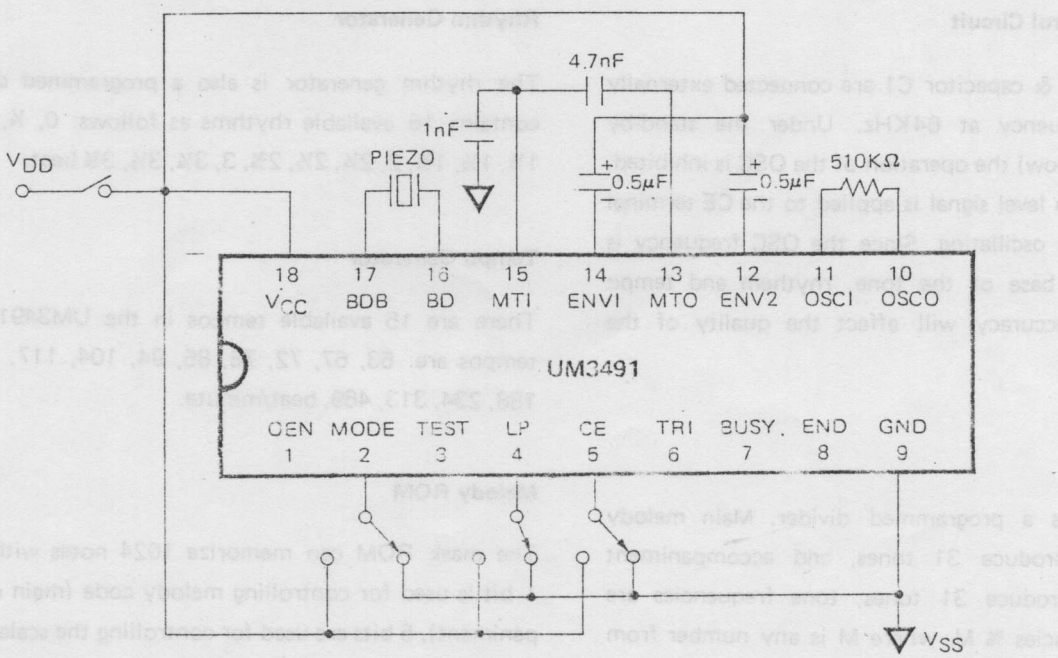
The mask ROM can memorize 1024 notes with 10 bits, 1 bit is used for controlling melody code (main or accompaniment), 5 bits are used for controlling the scale code and 4 bits are used for controlling the scale code.

Application Circuit

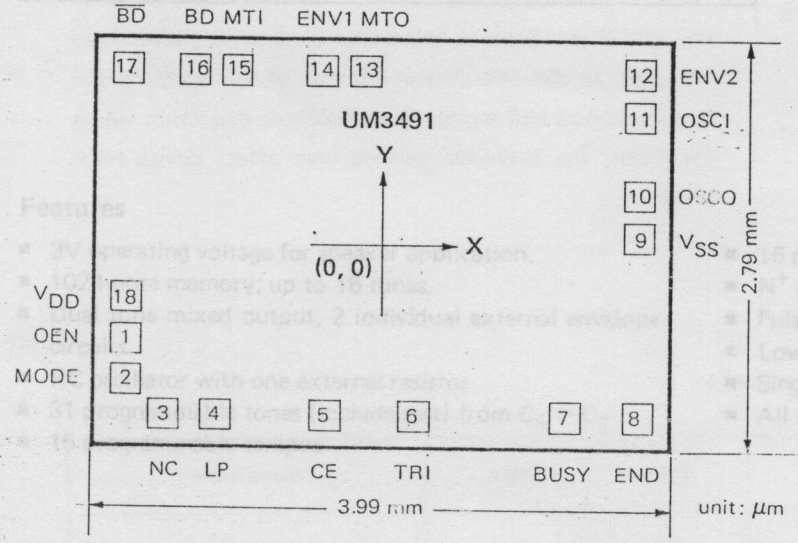
A. GENERAL APPLICATION FOR SPEAKER.



B. GENERAL APPLICATION FOR PIEZO.



Bonding Diagram



Pad No.	Designation	X	Y
1	OEN	−1811	−702
2	MODE	−1813	− 965
3	NC	−1615	−1164
4	LP	−1219	−1220
5	CE	− 507	−1220
6	TRI	39	−1248
7	BUSY	1395	−1240
8	END	1785	−1222
9	V_{SS}	1801	− 10
10	OSCO	1801	198
11	OSCI	1801	990
12	ENV2	1801	1190
13	MTO	− 331	1208
14	ENV1	− 531	1208
15	MTI	−1071	1208
16	BD	−1349	1184
17	$\overline{BD}$	−1720	1184
18	V_{DD}	−1811	− 496

Song Series List

1. Version 1 Melody

1. Jingle Bells + Santa Claus is coming to town
2. We wish you a merry X'mas + it came upon a MID-night clear
3. Silver Bells + Silent Night, Holy Night
4. The First RSEL + Frosty The Snow Man
5. O Little Town of Bethlehem + O Come All YE Faithful
6. O Tannenbaum + Rudolph the Red-Nose Reirdear
7. Joy to The World + Deck The Hall
8. Hark; The Herald Angels Sign + O Christmas Tree
9. Feliz Navid + Luis Villia Lobos

2. Version 2 Melody

1. For Elice .
2. London Bridge Is Falling Down
3. Old Macdonald Had A Farm
4. Coo Coo Waltz
5. Yankee Doodle
6. Music Box Dancer
7. American Patrol
8. Butterfly
9. Mary Had A Little Lamp
10. Sympherny
11. Are You Sleeping
12. It's A Small World

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