UM3491 Series

Melody Generator with Accompaniment

Features

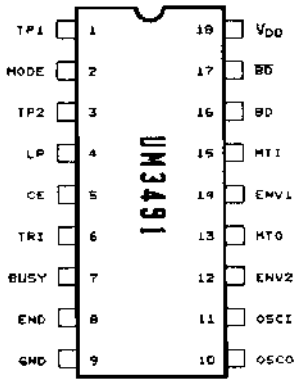
- Typical 3V operating voltage
- 1024-note memory; up to 16 songs can be selected
- Dual tone mixed output; 2 individual external envelope circuits
- RC oscillator with one external resistor
- 31 programmable tones (including rest) from C4 - C7
- 15 programmable tempos
- Pulse signal output when melody ends
- Low standby current
- Single song played repeatedly or auto stop
- All songs played repeated or auto stop
- Any song can be selected sequentially

General Description

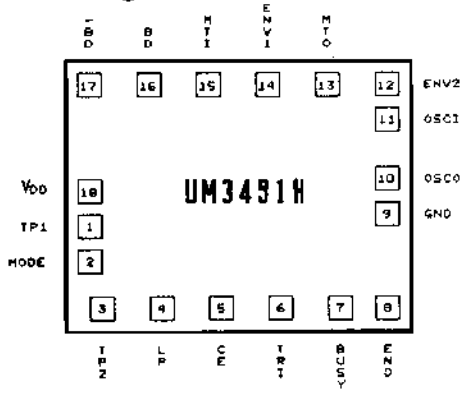
The UM3491 Series comprises mask-ROM-programmed melody generators with accompaniments implemented through CMOS technology. They are designed to play melodies according to previously programmed information. The devices also include melody and accompaniment which are mixed to generate simultaneous outputs.

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

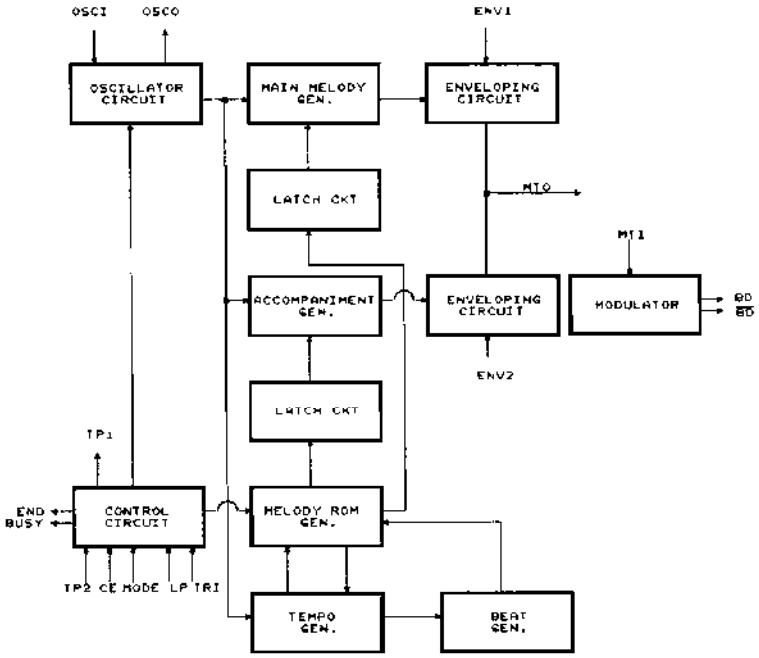
Pin Configuration



Pad Configuration



Block Diagram



Absolute Maximum Ratings*

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

Applied Voltage at any Pin . . GND - 0.3V to V_{DD} + 0

Ambient Temperature under Bias. . . . . -10°C +80°C

Storage Temperature . . . . . -55°C to 125°C

*Comments

Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the 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.

DC Electrical Characteristics (GND = 0V, T_A = 25°C, F_{OSC} = 64 KHz, unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Operating Voltage	V_{DD}	2.6	3	3.3	V	
Standby Current	I_{STB}	–	–	2	μA	V_{DD} = 3V osc halting
Operating Current	I_{DD}	–	2	5	mA	V_{DD} = 3V, No load
BD Drive Current	I_{BD}	1	–	–	mA	V_{DD} = 3V, V_{OH} = 1.5V MTI = 0V
BD Sink Current	I_{BS}	1	–	–	mA	V_{DD} = 3V, V_{OL} = 15V MTI = 3V
$\overline{BD}$ Drive Current	I_{BD}	1	–	–	mA	V_{DD} = 3V, V_{OH} = 1.5V MTI = 0V
$\overline{BD}$ Sink Current	I_{BS}	1	–	–	mA	V_{DD} = 3V, V_{OL} = 1.5V MTI = 3V
Frequency Deviation Per Lot	$\triangle F/F$	– 10	–	10	%	V_{DD} = 3V
Frequency Stability	$\triangle F/F$	–	–	20	%	$\frac{F_{OSC}(3.3V) - F_{OSC}(2.7V)}{F_{OSC}(2.7V)}$
END Drive Current	I_{END}	100	–	–	μA	V_{DD} = 3V, V_{END} = 1.1V
BUSY Drive Current	I_{BUSY}	100	–	–	μA	V_{DD} = 3V, V_{BUSY} = 1.1V

Pin and Pad Descriptions

Pin and Pad No.	Designation	Description
1	TP1	Test. Not connected in normal operation
2	MODE	The melody will repeat if connected to V_{DD} The melody will stop automatically if connected to GND
3	TP2	Test. Not connected in normal operation
4	LP	Only one song is played if connected to V_{DD} All songs are played if connected to GND
5	CE	Chip enabled if connected to V_{DD} Chip disable if connected to GND
6	TRI	A positive going edge will change the melody to the next song
7	BUSY	This output is high during stand-by and low during melody output
8	END	Provides a positive pulse output after the melody stops. The output is low otherwise
9	GND	Ground
10	OSCO	RC oscillator or inverted clock output
11	OSCI	RC oscillator
12	ENV2	Enveloping circuit terminal
13	MTO	Modulated tone signal output
14	ENV1	Enveloping circuit terminal
15	MTI	Modulated tone signal output
16	BD	Tone signal output 1
17	$\overline{BD}$	Tone signal output 2
18	V_{DD}	Positive power supply

Functional Description

Oscillator & Control Circuit

One resistor is connected externally to set the frequency at 64 KHz. In the standby condition (CE is low) the operation of the oscillation circuit is inhibited. As soon as a high level signal is applied to the CE terminal the circuit starts oscillating. Since the oscillating frequency is used as a time base of the tone, beat 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".

Beat Generator

The beat generator is also a programmed divider. It contains 16 available beats as follows: 0, 1/4, 1/2, 3/4, 1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2, 2-3/4, 3, 3-1/4, 3-1/2, 3-3/4 beats.

Tempo Generator

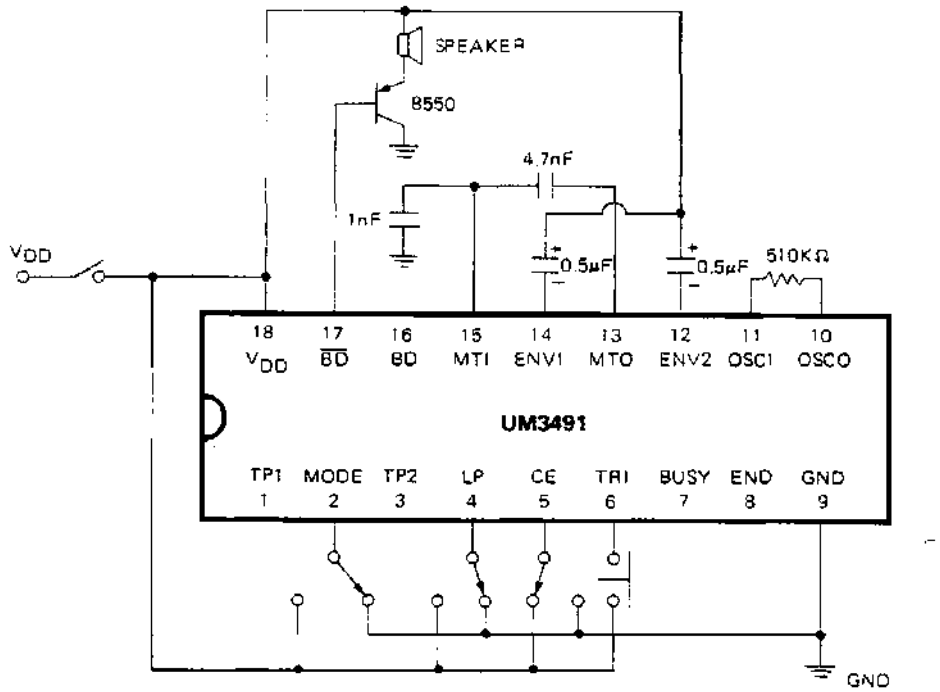
There are 14 available tempos in the UM3491. The 14 tempos are: 63, 67, 72, 78, 85, 94, 104, 117, 134, 156, 188, 234, 313, 469 beats/minute.

Melody ROM

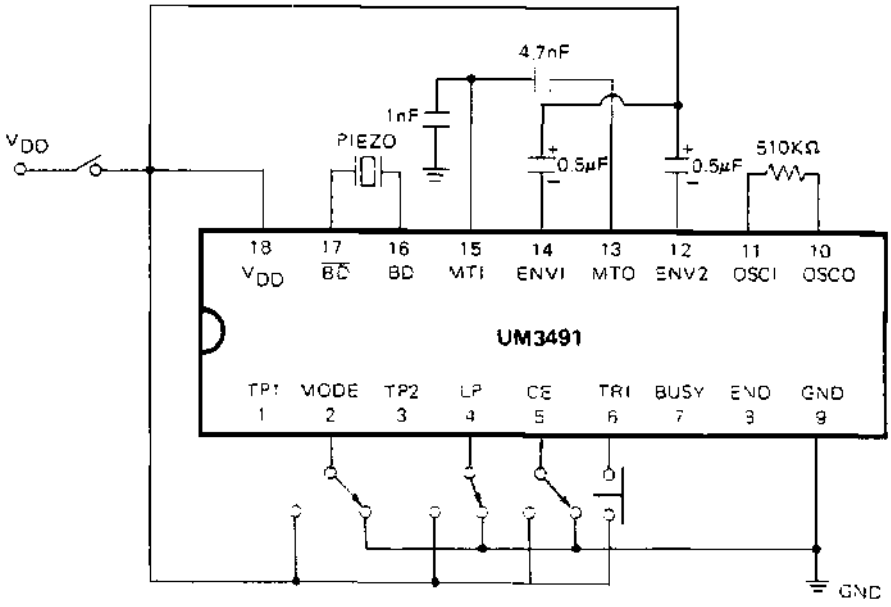
The mask ROM can memorize 1024 notes with 10 bits. 1 bit is used for controlling melody code (main or accompaniment), 5 bits are used for controlling the tone code and 4 bits are used for controlling the beat.

Application Circuits (for reference only)

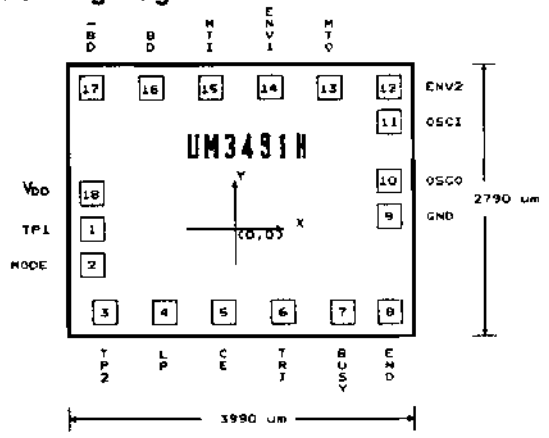
A. General Application for Speaker



B. General Application for Piezo



Bonding Diagram



* Substrate connect to V_{DD}.

unit: μm

Pad No.	Designation	X	Y
1	TP1	-1811	- 702
2	MODE	-1813	- 965
3	TP2	-1615	-1164
4	LP	-1219	-1220
5	CE	- 507	-1220
6	TRI	39	-1248
7	BUSY	1395	-1240
8	END	1785	-1222
9	GND	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

Ordering Information

Part No.	Package
UM3491H - X	CHIP FORM
UM3491 - X	18L DIP