UM9392

PRELIMINARY

Melody Generator with Accompaniment

Features

- 3V operating voltage for speaker application
- 256-note memory; up to 4 tunes
- Dual-tone mixed output; 2 individual external envelope circuits
- RC oscillator with one external resistor
- 31 programmable tones (include rest) from $C_4 \sim F_7$
- 15 programmable tempos
- 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

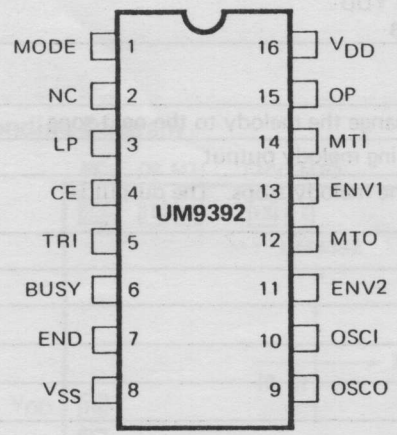
General Description

The UM9392 series comprises masked ROM-programmed melody generators with accompaniment implemented through CMOS technology. They are designed to play melodies according to previously programmed information.

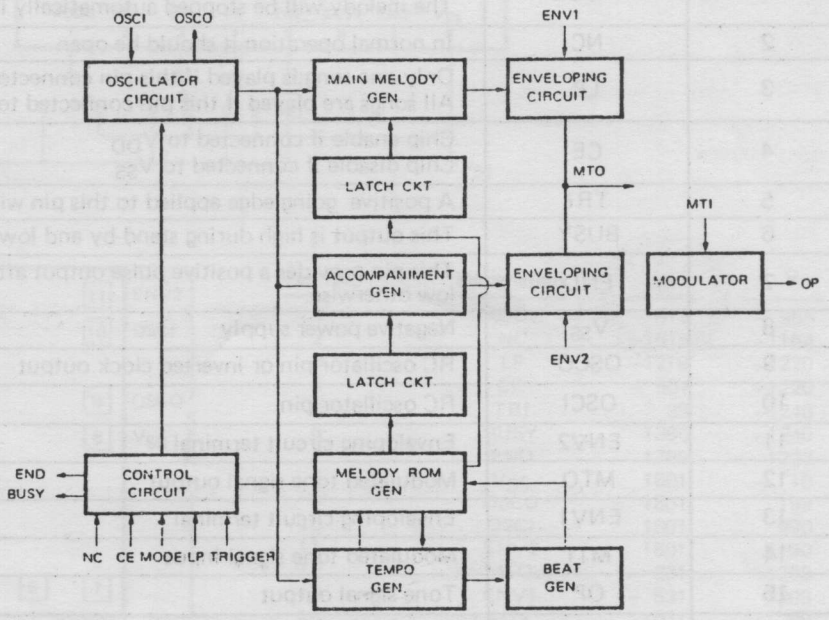
The devices include melody and accompaniment, which are mixed together to generate simultaneous output.

The UM9392 series is intended for applications such as toys, doorbells, telephones, etc.

Pin Configuration



Block Diagram



PC8711E.REV.1.1

–bsolute 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

Stresses 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} = 64 KHz, 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
OP Drive Current	I_{BD}	1mA	–	–	V_{DD} = 3V, V_{OH} = 1.5V MTI = 0V
OP Sink Current	I_{BS}	1mA	–	–	V_{DD} = 3V, V_{OL} = 1.5 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	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}.
2	NC	In normal operation it should be open
3	LP	Only one song is played if this pin connected to V_{DD}. All songs are played if this pin connected to V_{SS}.
4	CE	Chip enable if connected to V_{DD} Chip disable if connected to V_{SS}
5	TRI	A positive going edge applied to this pin will change the melody to the next song
6	BUSY	This output is high during stand-by and low during melody output
7	END	This pin provides a positive pulse output after the melody stops. The output is low otherwise.
8	V_{SS}	Negative power supply
9	OSCO	RC oscillator pin or inverted clock output
10	OSCI	RC oscillator pin
11	ENV2	Enveloping circuit terminal
12	MTO	Modulated tone signal output
13	ENV1	Enveloping circuit terminal
14	MTI	Modulated tone signal input
15	OP	Tone signal output
16	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, beat and tempo generators, its accuracy will affect the quality of the melody.

Tone Generator

The generator is a programmed divider. The main melody generator can produce 31 tones, and the 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 follows: 0, ¼, ½, ¾, 1, 1¼, 1½, 1¾, 2, 2¼, 2½, 2¾, 3, 3¼, 3½, 3¾ beat.

Tempo Generator

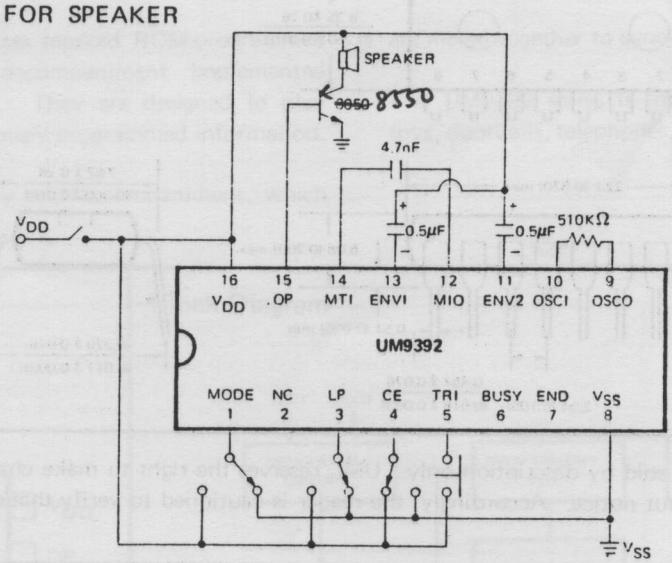
There are 15 available tempos in the UM9392. The 15 tempos are: 63, 67, 72, 78, 85, 94, 104, 117, 134, 156, 188, 234, 313, 469, 938 beats/minute.

Melody ROM

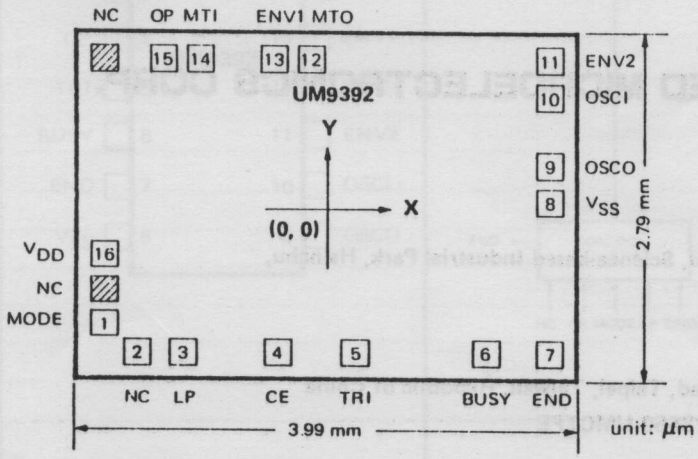
The masked ROM can memorize 256 notes with 10 bits, 1 bit is used for controlling the melody code (main or accompaniment), 5 bits are used for controlling the scale code and 4 bits are used for controlling the scale code.

Application Circuit

GENERAL APPLICATION FOR SPEAKER



Bonding Diagram



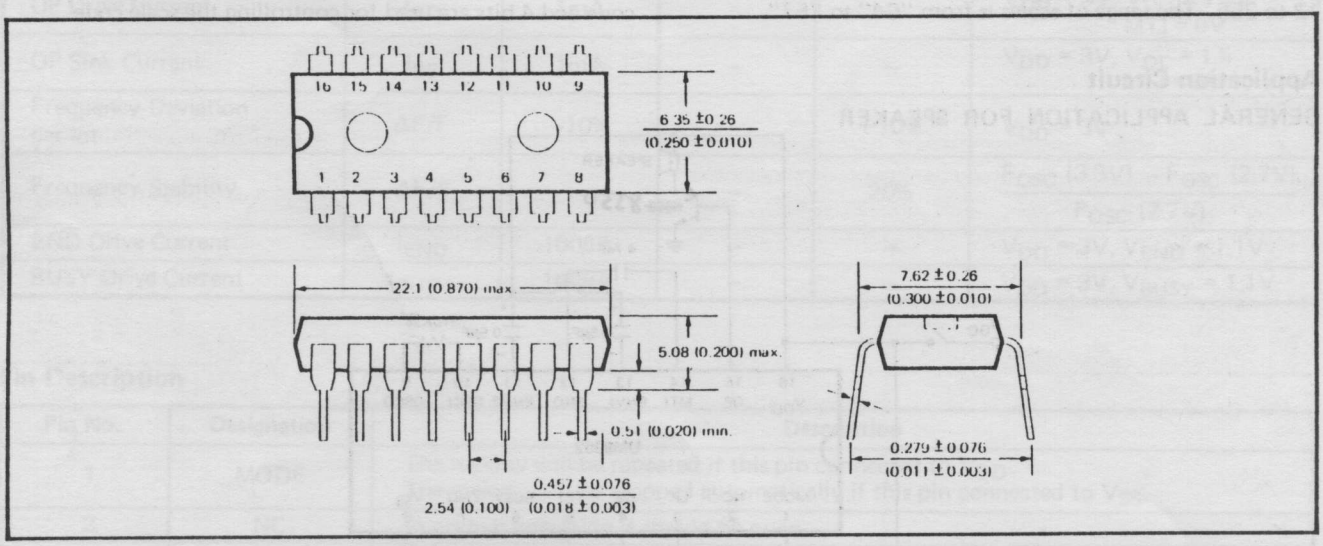
Pad No.	Designation	X	Y
1	MODE	−1813	− 965
2	NC	−1615	−1164
3	LP	−1219	−1220
4	CE	− 507	−1220
5	TRI	39	−1248
6	BUSY	1395	−1240
7	END	1785	−1222
8	V_{SS}	1801	− 10
9	OSCO	1801	198
10	OSCI	1801	990
11	ENV2	1801	1190
12	MTO	− 331	1208
13	ENV1	− 531	1208
14	MTI	−1071	1208
15	OP	−1349	1184
16	V_{DD}	−1811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

UM9392 Song List

UM9392-1	1. Jingle Bells
	2. Santa Claus is Coming to Town
	3. We Wish You a Merry Christmas
UM9392-2	1. Jingle Bells
	2. Rudolph The Red-Nosed Reindeer
	3. Joy to the World
UM9392-3	1. It's a Small World
	2. London Bridge is Falling Down
	3. Yankee Doodle
UM9392-4	1. Music Box Dancer
	2. Mary had a Little Lamb
	3. Butterfly
UM9392-5	1. You are my Sunshine
	2. Love me Tender Love me True
	3. Oh! My Darling
UM9392-6	1. Green Sleeves
	2. Die Lorelei
	3. Annie Laurie
UM9392-7	1. Peter Cottontail
	2. Easter Parade
	3. Watch with Me

Package Information – mm (inch)

16 – LEAD DUAL IN-LINE; PLASTIC



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