



Simple Melody Generator

- 62-note ROM memory
- 1.3V to 3.3V operating voltage and low power consumption
- Dynamic speaker can be driven with an external NPN transistor.

- OSC. resistor is built-in
- One-shot mode or level-hold mode can be selected
- Power on reset; melody begins from the first note
- Direct piezo drive.

The UM66T series is a CMOS LSI designed for use in door bells, telephones and toy applications. It is an on-chip ROM programmed for musical performance. Produced by CMOS technology, the device results in very low

power consumption. Since the UM66T series includes oscillator and mode selector circuits, a compact melody module can be constructed with only a few additional components.

UM66	1	O/P
Txxx	2	V _{DD}
85xx	3	V _{SS}

The block diagram illustrates the architecture of a 64 KHz digital synthesizer. The system is composed of several interconnected modules:

- OSCILLATOR**: Provides a 64 KHz signal to the **TONE GENERATOR** and the **BEAT GENERATOR**.
- TONE GENERATOR**: Receives the 64 KHz signal and outputs to the **OUTPUT CONTROL** block. It is also controlled by the **SCALE ROM** (via $S_6 S_5 S_4 S_3 S_2 S_1 S_0$) and the **MELODY ROM** (via $b_5 b_4 b_3 b_2$).
- OUTPUT CONTROL**: Receives a **PAUSE** signal and outputs to the **OUTPUT BUFFER**, which produces the final output O_p .
- SCALE ROM**: Provides data to the **TONE GENERATOR**.
- MELODY ROM**: Receives data from the **PROGRAM COUNTER** (via $a_5 a_4 a_3 a_2 a_1 a_0$) and outputs to the **TONE GENERATOR** (via $b_5 b_4 b_3 b_2$) and the **BEAT ROM** (via $b_1 b_0$).
- PROGRAM COUNTER**: Receives data from the **MELODY ROM** and outputs to the **MELODY ROM** and the **TIMING AND CONTROL** block (via $a_5 a_4 a_3 a_2 a_1 a_0$).
- BEAT ROM**: Receives data from the **MELODY ROM** (via $b_1 b_0$) and outputs to the **BEAT GENERATOR** (via $P_3 P_2 P_1 P_0$).
- BEAT GENERATOR**: Outputs to the **TEMPO GENERATOR**.
- TEMPO OPTION**: Provides input to the **TEMPO GENERATOR** (via $T_3 T_2 T_1 T_0$).
- TEMPO GENERATOR**: Outputs to the **TIMING AND CONTROL** block (via $T_3 T_2 T_1 T_0$).
- TIMING AND CONTROL**: Receives **END** and **MODE** signals and outputs to the **PROGRAM COUNTER** (via $M_3 M_2 M_1 M_0$) and the **MELODY ROM** (via $a_5 a_4 a_3 a_2 a_1 a_0$). It also controls the **STACCATO** output.
- OPTIONS**: Provides input to the **TIMING AND CONTROL** block (via $M_3 M_2 M_1 M_0$).

Pin No.	Designation	Description
1	O/P	Melody output
2	V _{DD}	Positive power supply
3	V _{SS}	Negative power supply

Absolute Maximum Ratings*

DC Supply Voltage	−0.3V to +5.0V
Operating Ambient Temperature	−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.

DC Electrical Characteristics

($V_{SS} = 0V$, $T_A = 25^\circ C$, $F_{OSC} = 65536$ Hz, unless otherwise specified.)

Parameter		Symbol	Min.	TYP.	Max.	Conditions
Operating Voltage		V_{DD}	1.3V	—	3.3V	
Supply Current	Stand-by	I_S	—	—	1 μA	$V_{DD} = 1.5V$ O/P open
	Operating	I_D	—	—	60 μA	$V_{DD} = 1.5V$ O/P open
O/p Drive Current		$I_{O/P}$	600 μA	1.5 mA	—	$V_{DD} = 1.3V$ $V_{O/p} = 0.8V$
O/p Sink Current		$I_{\overline{O/p}}$	600 μA	1.5 mA	—	$V_{DD} = 1.3V$ $V_{O/p} = 0.5V$
Frequency Deviation Per Lot		$\Delta F/F$	-12%	—	33%	$V_{DD} = 1.5V$
Frequency Stability		$\Delta F/F$	—	—	12%	$\frac{F_{OSC}(1.6V) - F_{OSC}(1.3V)}{F_{OSC}(1.3V)}$

Functional Description
Oscillator Circuit

The oscillator frequency is used as a time base for tone and beat generators. Its accuracy affects the quality of the music.

Tone Generator

Tone frequencies are oscillator frequencies $\div M$, where M is any even number from 64 to 254. Within a melody, 14 scales can be selected including PAUSE code and END code. The tone generator is a programmed divider. The range of scales is from “C4” to “C6” and range of frequency varies from 258 Hz to 32768 Hz.

Beat Generator

The beat generator is also a programmed divider. It

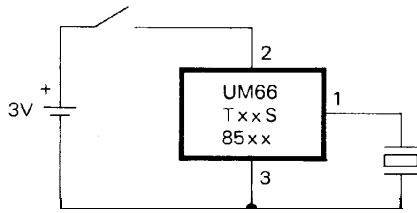
contains 15 available beats as follows: 1/4, 1/2, 3/4, 1, 1-1/4, 1-1/2, 1-3/4, 2, 2-1/4, 2-1/2, 2-3/4, 3, 3-1/4, 3-1/2, 3-3/4 J. Four beats can be selected from these.

Melody ROM

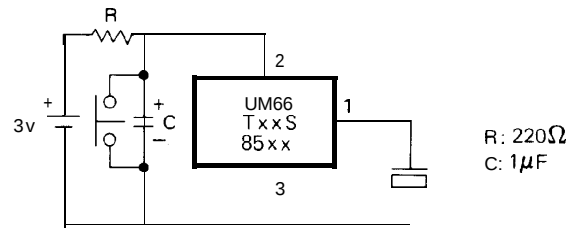
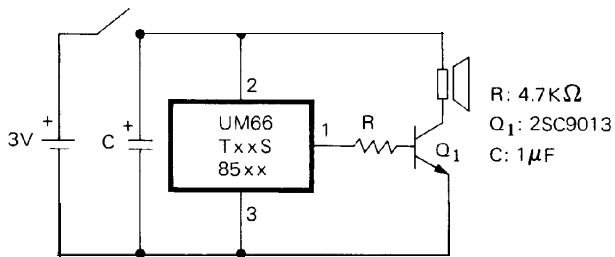
The mask ROM can memorize 64 notes with 6 bits; 4 bits are used for controlling the scale code and 2 bits are used for controlling the rhythm code.

Tempo Generator

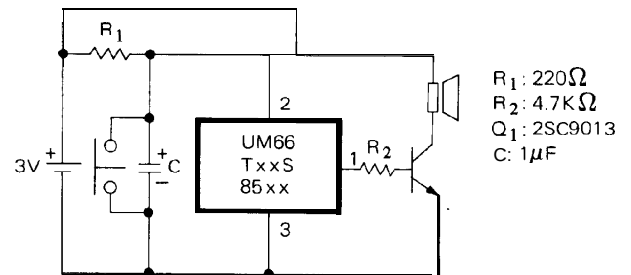
There are 15 available tempos in the UM66T. The 15 tempos are: 128, 137, 148, 160, 175, 192, 213, 240, 274, 320, 384, 480, 640, 960, 1920 J/minute.

Typical Application Circuits
ONE SHOT MODE FOR PIEZO

ONE SHOT MODE FOR PIEZO

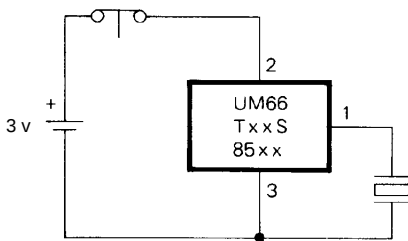
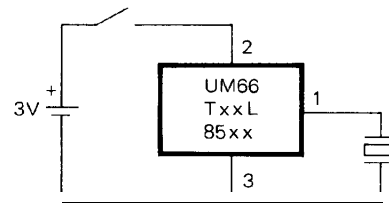
(Normal open switch)


ONE SHOT MODE FOR SPEAKER

ONE SHOT MODE FOR SPEAKER

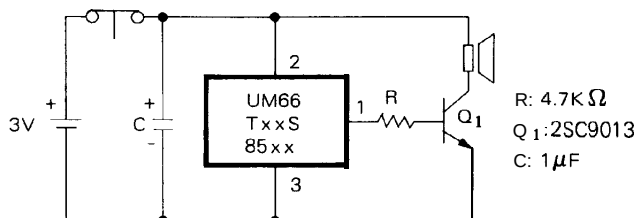
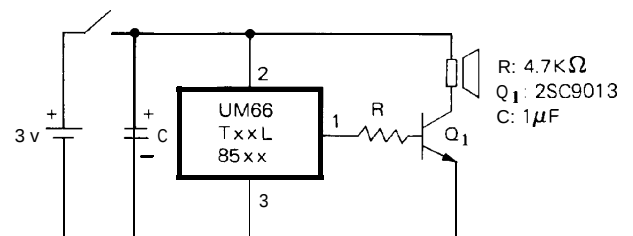
(Normal open switch)

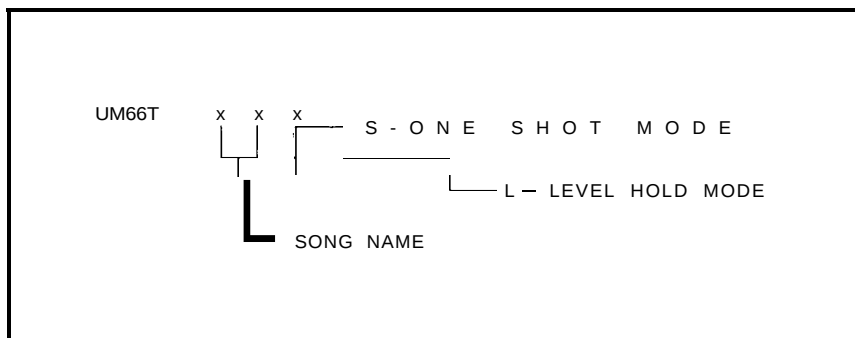

ONE SHOT MODE FOR PIEZO

(Normal closed switch)


LEVEL HOLD MODE FOR PIEZO

ONE SHOT MODE FOR SPEAKER

(Normal closed switch)


LEVEL HOLD MODE FOR SPEAKER


Ordering Information

Song Series List

Part No.	Song Name
UM66T01 L/S	Jingle Bells + Santa Claus is Coming to Town + We Wish You a Merry X'mas
UM66T02 L/S	Jingle Bells
UM66T04 L/S	Jingle Bells + Rudolph, the Red-nosed Reindeer + Joy to the World
UM66T05 L/S	Home Sweet Home
UM66T06 L/S	Let Me Call You Sweetheart
UM66T08 L/S	Happy Birthday to You
UM66T09 L/S	Wedding March (Mendelssohn)
UM66T11 L/S	Love Me Tender, Love Me True
UM66T13 L/S	Easter Parade
UM66T19 L/S	For Elise
UM66T32 L/S	Waltz
UM66T33 L/S	Mary Had a Little Lamb
UM66T34 L/S	The Train is Running Fast
UM66T68 L/S	It's a Small World

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