UM3641 Series

Voice Controller(Whistle)

Features

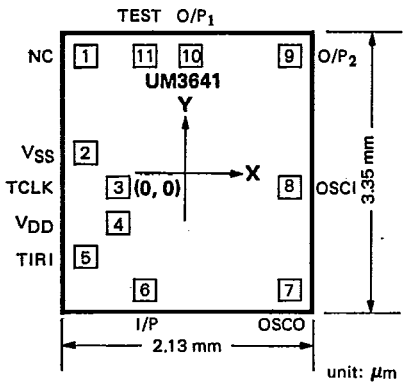
- Typical 3V operating voltage and low power consumption
- Direct piezo drive
- Auto stop capability
- On-chip analog signal amplifiers
- One shot mode
- Whistle is used for controlling
- 64-note ROM memory

General Description

The UM3641 series is a CMOS LSI circuit which contains analog signal amplifiers and frequency detector for playing musical tunes. It is designed for use in electronic devices, musical toys and other similar applications.

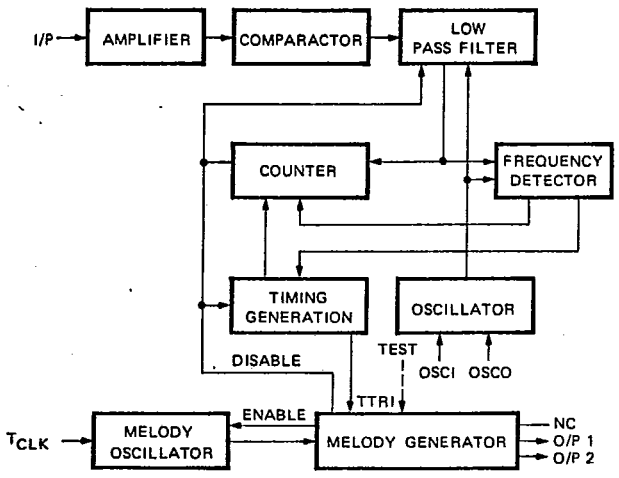
CMOS technology, used to produce these devices, consumes very low power. A compact melody module can be constructed with only two resistors, one capacitor and a piezo buzzer as external components.

Bonding Diagram



Pad No.	Designation	X	Y
1	NC	−900.68	1526.79
2	V_{SS}	−900.68	54.61
3	TCLK	−719.33	− 377.95
4	V_{DD}	−747.78	− 934.72
5	TIRI	−883.92	−1267.46
6	I/P	−310.90	−1516.38
7	OSCO	913.38	−1480.82
8	OSCI	921.00	− 393.70
9	O/P2	884.68	1526.79
10	O/P1	− 16.00	1526.79
11	TEST	−354.33	1526.79

Block Diagram



Absolute Maximum Ratings*

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

Apply Voltage on any Pin . . . . V_{SS} −0.3V to V_{DD} +0.3V

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} = 18 KHz, unless otherwise specified.)

Parameter	Symbol	Min.	Typ.	Max.	Condition
Operating Voltage	V_{DD}	2.7V	3V	3.3V	
Operating Current	I_{DD}	–	–	100μA	V_{DD} = 3V O/P_1, O/P_2 open
Stand-by Current	I_{STB}	–	–	60μA	V_{DD} = 3V
Input Voltage-High	V_{IH}	V_{DD} −0.3V	–	V_{DD}	
Input Voltage-Low	V_{IL}	V_{SS}	–	V_{SS} +0.3V	
I/P Sensitivity	V_{SEN}	–	10m V_{PP}	–	@ fin ≅ 1.2 KHz
Effective I/P Frequency	$F_{I/P}$	1.2 KHz	–	1.8 KHz	Fosc/10 ~ Fosc/15
O/P 1 (O/P 2) Drive Current	I_{OD1} (I_{OD2})	1mA	–	–	V_{DD} = 3V V_{OH} = 2.6V
O/P 1 (O/P 2) Sink Current	I_{OS1} (I_{OS2})	1mA	–	–	V_{DD} = 3V V_{OL} = 0.5V
OSCO Drive Current	I_{OSD}	25μA	–	–	V_{DD} = 3V V_{OSLO} = 2.6V
OSCO Sink Current	I_{ASS}	25μA	–	–	V_{DD} = 3V V_{OSLO} = 0.4V
Built-in Oscillator Frequency	Fin (OSC)	52 KHz	65 KHz	100 KHz	V_{DD} = 3V

Function Description

Oscillating Circuit

The two kinds of oscillating circuit are as follows:

(1) Melody oscillator is built-in. The oscillation frequency is used as a time base for tone and beat generators.

(2) Detecting oscillator with one external resistor. Its frequency is generated by an astable multivibrator which depends on an on-chip capacitor and a resistor connected between OSCO PIN and OSCI PIN.

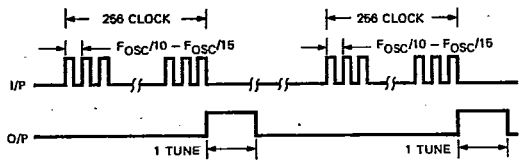


Figure 1. Waveform at I/P and O/P

Tone Output

This gives the effective frequency to I/P PIN. The melody plays once then automatically stops. The relation between input waveform and output waveform is shown in Figure 1.

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

The 15 available tempos in the Um3641 are as follows: 128, 137, 148, 160, 175, 192, 213, 240, 274, 310, 384, 480, 640, 960, 1920 ♩/minute.

Rhythm Generator

The rhythm generator is also a programmed divider. It contains 15 available rhythms 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 ♩. Four rhythms can be selected from these.

Pad Description

Pad No.	Designation	Description
1	NC	No connection
2	V_{SS}	Negative power supply
3	T_{CLK}	This pad is used for testing
4	V_{DD}	Positive power supply
5	T_{TRI}	Testing trigger pin
6	I/P	Whistle signal input
7	OSCO	RC oscillator pin or inverted clock output
8	OSCI	RC oscillator pin
9	O/P 2	Melody output 2 (Tri-state O/P buffer)
10	O/P 1	Melody output 1
11	TEST	This pad is used for testing in normal operation; this pad is open

Test Circuit

The signal of desired frequency ($F_{OSC}/10 \sim F_{OSC}/15$) is input to I/P pin of the device. (F_{OSC} = 18 KHz). The test circuit is shown in Figure. 2.

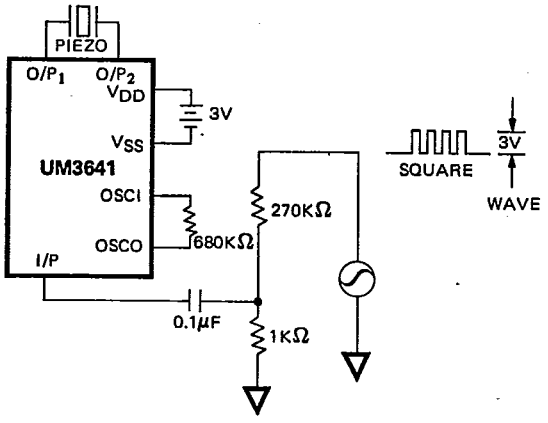
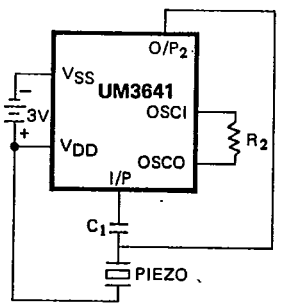


Figure 2. Test circuit

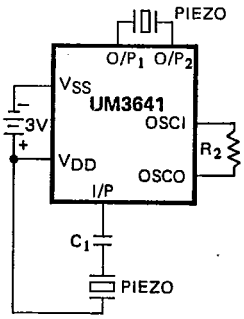
Application Circuit

A. SINGLE PIEZO



C_1 = 6.8nF R_2 = 560KΩ~680KΩ

B. DOUBLE PIEZO



C_1 = 6.8nF
R_2 = 560KΩ~680KΩ

Song List

UM3641-1	COO COO WALTZ	UM3641-4	FOR ELISE
UM3641-2	JINGLE BELL	UM3641-5	CHORAL SYMPHONY
UM3641-3	CONGRATULATIONS		