IZ8057
MULTI MELODY GENERATOR WITH ACCOMPANEMENT

DESCRIPTION

The IZ8057 series is a CMOS LSI chip designed for use in advance clock products. It is designed to play the melodies
according to previously programmed information. The IZ8057 is capable of generating songs with or without the bell sound effect.
By pushing the sequence trigger key, all songs can be sequentially selected and played with autostop function This device also
includes a buffer for directly drive piezoelectric buzzer and a pre-amplifier that provides a simple interface to the drives circuit.
The IZ8057 has LED terminal for direct drive light emitting diode with rhythm of melody.
Upon customer's request, new melodies may be programmed.

FEATURES

- 1024-note ROM memory
- 1.3V to 5V power supply
- Low power consumption
- 14 tempos available through mask setting
- 15 beats available
- 27 notes (including rest) available
- 1 sequence trigger key
- LCD direct drive terminal

FUNCTIONS

- Chime function
- Natural sound effect; two individual external envelope circuits
- Dynamic speaker can be driven with an external NPN transistor
- Power on reset; melody begins from the first note
- Output push-pull buffer for directly drive piezoelectric buzzer
- On chip envelope circuit and pre-amplifier
- DIP-16 or bare chip available

SONG LIST

1:00	Hush Little Baby	+ 1 Chimes	13:00	Hush Little Baby	+ 1 Chimes
2:00	Down the Mountainside We Go	+ 2 Chimes	14:00	Down the Mountainside We Go	+ 2 Chimes
3:00	Twinkle Twinkle Little Star	+ 3 Chimes	15:00	Twinkle Twinkle Little Star	+ 3 Chimes
4:00	Home on the Range	+ 4 Chimes	16:00	Home on the Range	+ 4 Chimes
5:00	The Fire Man	+ 5 Chimes	17:00	The Fire Man	+ 5 Chimes
6:00	Spring is Coming	+ 6 Chimes	18:00	Spring is Coming	+ 6 Chimes
7:00	Oh! My Darling	+ 7 Chimes	19:00	Oh! My Darling	+ 7 Chimes
8:00	Did You Ever See	+ 8 Chimes	20:00	Did You Ever See	+ 8 Chimes
9:00	Rockaby Baby	+ 9 Chimes	21:00	Rockaby Baby	+ 9 Chimes
10:00	Three Blind Mice	+ 10 Chimes	22:00	Three Blind Mice	+ 10 Chimes
11:00	The Framer in the Dell	+ 11 Chimes	23:00	The Framer in the Dell	+ 11 Chimes
12:00	Bingo	+ 12 Chimes	24:00	Bingo	+ 12 Chimes
Remark: The chip IZ8057-01 generates the Chimes signals, only.					

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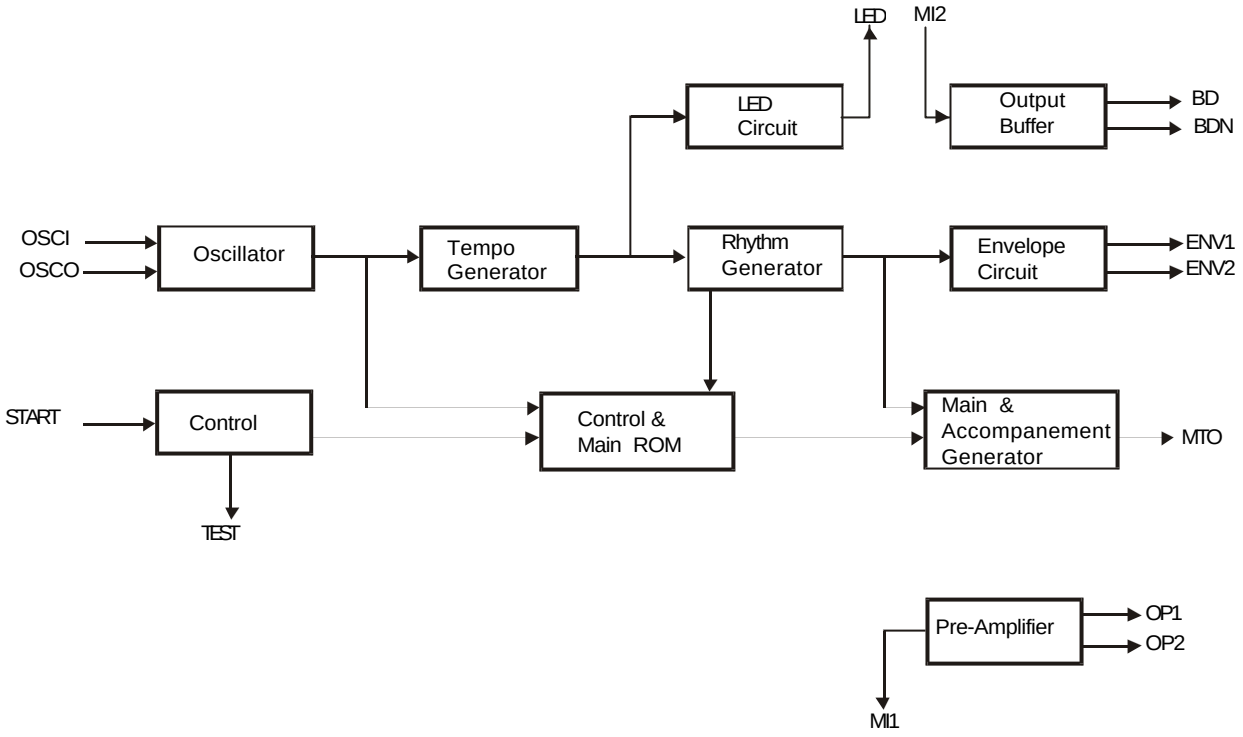
BELMICROSYSTEMS

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Ta = 25°C)

Characteristic	Symbol	Value	Unit
DC Supply Voltage	V_{CC} - V_{SS}	-0 ~ 5.0	V
Input/Output Voltage	V_{IN}	V_{SS} - 0.2 ~ V_{DD} + 0.2	V
Operating Temperature	T_{opr}	- 10 ~ + 60	°C
Storage Temperature	T_{stg}	- 25 ~ + 125	°C

ELECTRICAL CHARACTERISTICS

(T_a = 25°C, V_{CC} = 3V, V_{SS} = 0V; unless otherwise specified)

Characteristic		Symbol	Test Condition	Min	Typ	Max	Unit
Operating Voltage		V_{CC}		1.3	3.0	5.0	V
Supply Current	Stand-by	I_{STB}			2	10	mkA
	Operating	I_{CC}			1	2	mA
Output Current (OP1)		I_{OH}	V_O = 2.0V	3.0			mA
Output Current (OP2)		I_{OL}	V_O = 1.0V	3.0			
Output Current (BD, BDN)		I_{OH}	V_O = 1.5V	1.0			
Output Current (BD, BDN)		I_{OL}	V_O = 1.5V	1.0			
Output Current (BUZY)		I_{OH}	V_O = 1.0V	0.1			
Output Current (LED)		I_{OH}	V_O = 2.0V	8.0			

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FUNCTIONAL DESCRIPTION

Oscillator Circuit
The oscillation frequency is used as a time base for tone and tempo generators, the accuracy of which affects the quality of which
affects the quality of the melody generator.

Tempo Generator
There are 14 tempos available in this embodiment: 82, 88, 95, 103, 112, 123, 137, 154, 176, 205, 246, 308, 410 and 615 notes per minute.

Tone Generator
The tone generator is a programmed divider. The tone frequencies are created by dividing the oscillator frequencies with M,
where M is an integer from 32 to 127. There are 27 tones selectable in this embodiment, including end code.

Rhythm Generator
The rhythm generator is also a programmed divider and is used to generate the beat for each tone. In this embodiment, 15 beats
are available as follows: 1/4, 1/2, 3/4, 1, 5/4, 3/2, 7/4, 2, 9/4, 5/2, 11/4, 13/4, 7/2 and 15/4.

ROM
The mask ROM stores the tempo, tone and rhythm data. The ROM sends these data to respective generators so as to control
the tempo of each song, the tone codes and the rhythm codes.

LED Blinking
The blinking of the light emitting diode (LED) is matched with rhythm of the melody.

Envelope Circuit
The envelope circuit made the melody and accompanement output MTO decreases exponentially.

Pre-Amplifier
The Pre-Amplifier together with external P-N-P and N-P-N transistors works as audio-amplifier. In application modulated tone
signal MTO should be connect to the input MI1 of the pre-amplifier through capacitor. Feedback resistor must be connected to
obtain the proper bias for the pre-amplifier stage. In the standby state the pre-amplifier is disabled, and OP1 is pulled up to V_{SS} ;
OP2 is pulled down to V_{CC}.

The Output Buffer
The Output Buffer amplifies signal from input MI2 and establishes two output signals BD, BDN for directly drive piezo buzzer.

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In application modulated tone signal MTO should be connected to the input MI2 of the buffer through capacitor.

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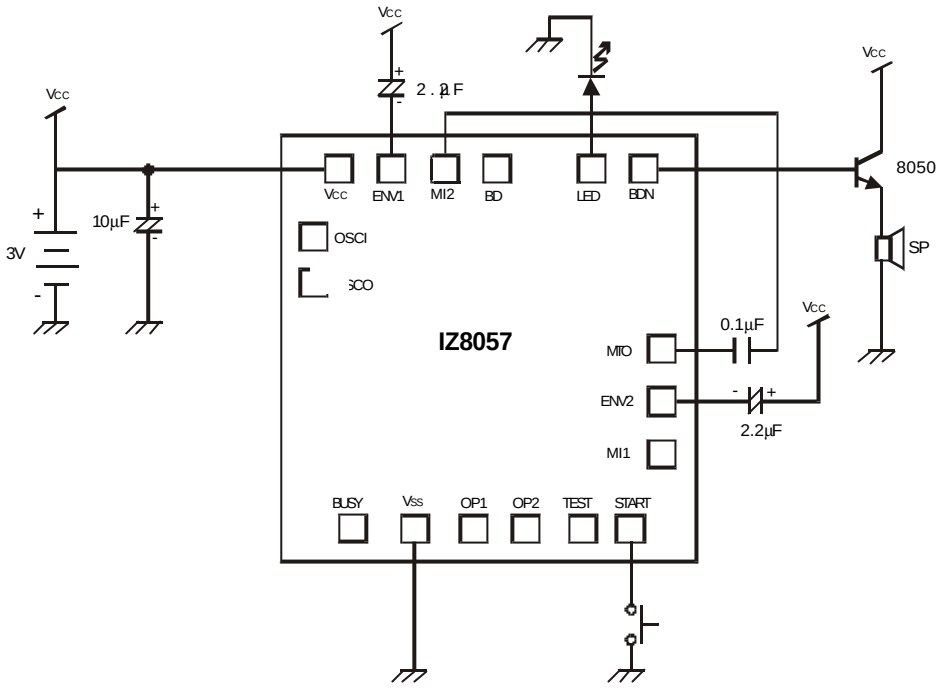
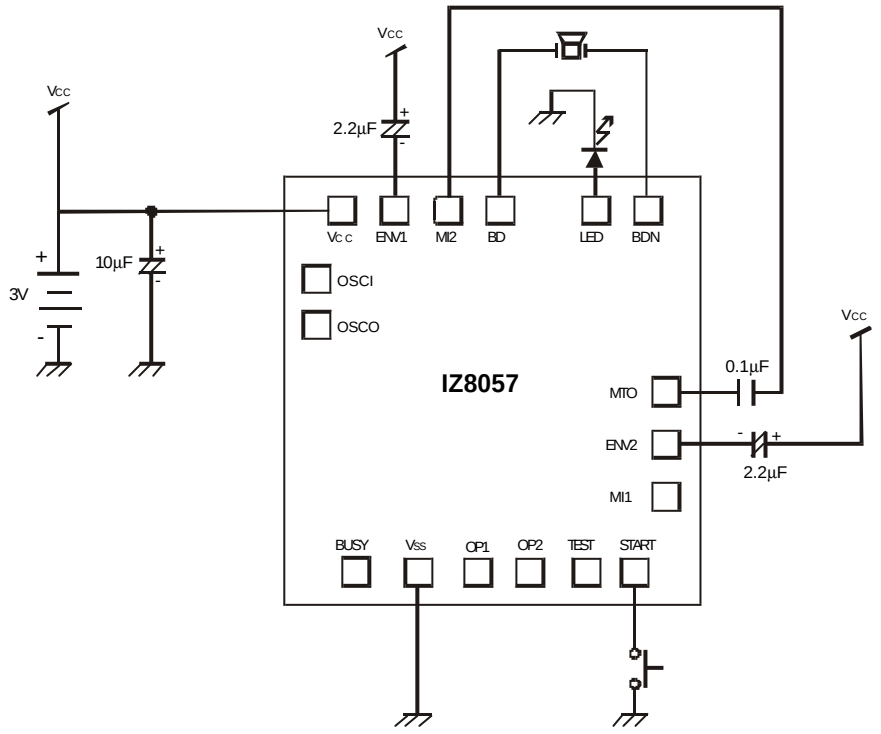
TYPICAL APPLICATION CIRCUIT

1. One - Shot application with Speaker



The die area should be connected to V_{SS}.

2. One - Shot application with Buzzer Drive



The die area should be connected to V_{SS}.

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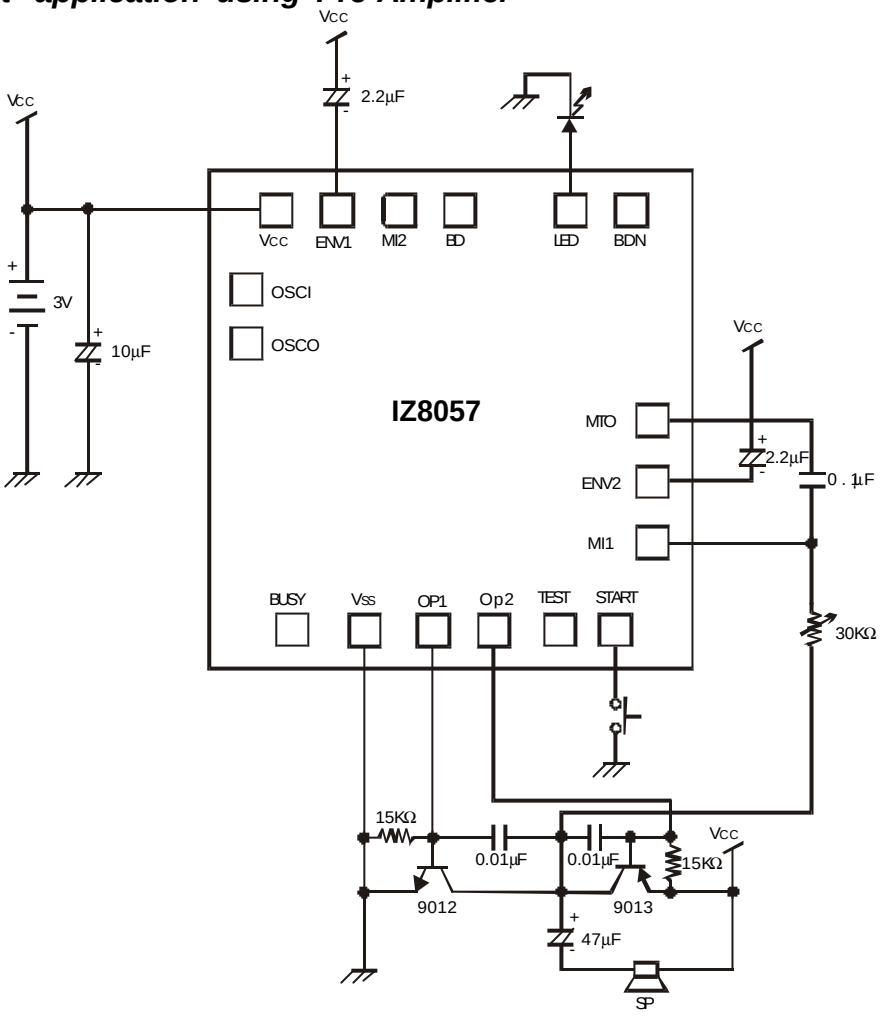
3. One - Shot application using Pre-Amplifier



The die area should be connected to V_{SS}.

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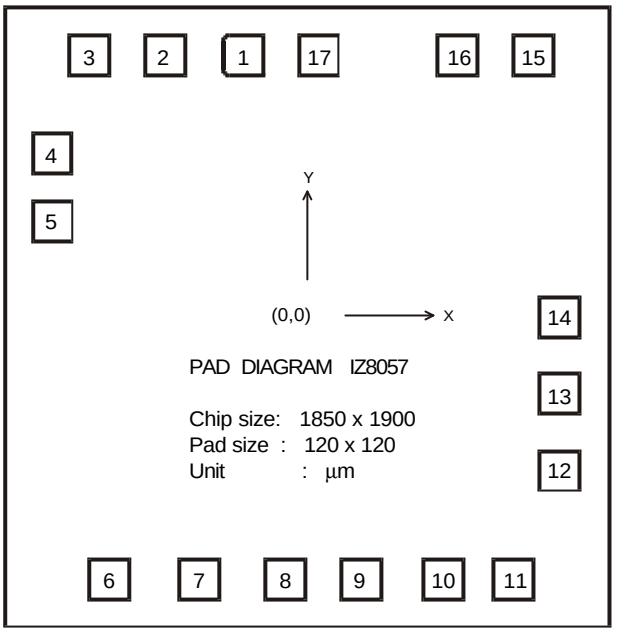
PAD LAYOUT



PAD LOCATION

(Unit: µm)

Pad No.	Pad Name	X	Y	Description
1	MI2	-196	800	Buffer Input
2	ENV1	-429	800	Envelope 1
3	V_{CC}	-665	800	Power supply (1.5V ~ 3.0V)
4	OSCI	-775	496	Oscillator Input
5	OSCO	-775	285	Oscillator Output
6	BUSY	-606	-800	BUSY Output
7	V_{SS}	-327	-800	Power supply (0V)
8	OP1	-64.5	-800	Pre-Amplifier Output
9	OP2	168	-800	Pre-Amplifier Output
10	TEST	425	-800	Test Terminal
11	START	636	-800	Start Input
12	MI1	775	-473	Pre-Amplifier Input
13	ENV2	775	-240	Envelope 2
14	MTO	775	-7	Modulated Tone Output
15	BDN	690	800	Buffer Output
16	LED	457	800	LED Terminal
17	BD	37	800	Buffer Output
The substrate is connected to V_{SS}.				

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