RCL Semiconductors Ltd.

Melody Chip with Blinking LED Output   C57023
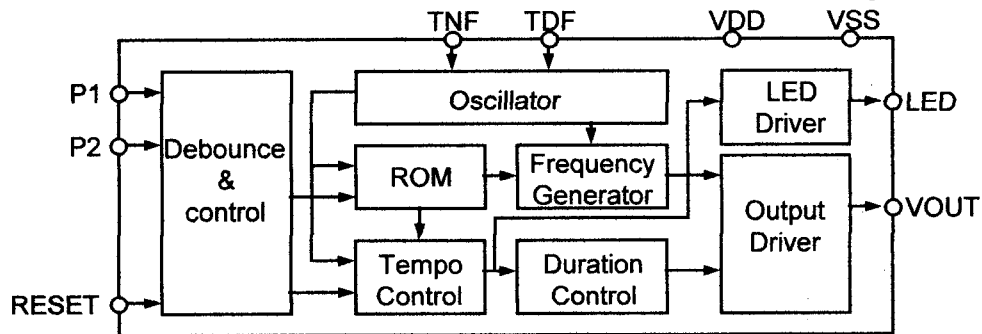
GENERAL DESCRIPTION

The C57023 is a silicon-gate CMOS LSI for playing musical tune through an external piezo-electric buzzer. It also drives an LED that blinks while the melody is being played. The melody can be customized by a ROM mask. This melody chip is specially designed for building up a low cost and long battery-life module with attractive LED blinking feature, such as melody greeting cards or toys. It can also be used to make door bells, etc. by driving speaker through an external transistor.

FEATURES

- Wide supply range (2.4~ 5 V).
- Drives LED directly.
- Built in RC oscillator, no external trimmer required.
- Low standby power dissipation.
- 5 operation modes selectable by bonding.
- Wide frequency range: G3~B7 (196~3951Hz).
- 16 mask programmable tempos (45~714).

- Direct drive piezoelectric buzzer.
- Can drive speaker through external transistor.
- Support CdS input trigger.
- Debounce circuit included.
- 128-word note ROM.
- Each note can be individually programmed to be staccato or legato.

BLOCK DIAGRAM

PIN DESCRIPTION

SYMBOL	DESCRIPTION
VDD	Positive power supply
VSS	Negative power supply
P1/P2	Trigger inputs with built-in pull down resistor
LED	LED blinking output
VOUT	Piezoelectric buzzer output
TNF	Test frequency input (for testing only)
TDF	Bidirectional test pad (for testing only)
RESET	Master reset (for testing only)

ABSOLUTE MAXIMUM RATINGS

Parameter	Value	Unit
Power supply voltage (VDD - Vss)	- 0.3 ~ + 5.5	V
Voltage applied to any pin with respect to Vss	- 0.2 ~ VDD + 0.2	V
Storage temperature	- 55 ~ + 125	° C
Operation temperature	0 ~ + 70	° C

Note: If absolute maximum ratings are exceeded, the device may be permanently damaged. Functional operation should be restricted to conditions indicated in the operational section of this specification. Prolonged exposure to higher than operational voltages or temperature could affect reliability.

Although all inputs are protected against electrostatic discharge, care must be taken in handling the chip to avoid damage by the building up of electrostatic charge.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{DD} = 3V, T_a = 25 °C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Operating voltage	V_{DD}	2.4	3	5	V	–
Oscillator frequency	f_{OSC}	78	97.5	117	KHz	–
Power supply current (standby)	I_{DD1}	–	0.1	1	µA	All inputs open
Power supply current (operating)	I_{DD2}	–	–	100	µA	No load
Input current (at P1, P2)	I_{IL}	–	5	–	µA	Vin = 0.4V
	I_{IH}	–	12	–	µA	Vin = 3V
Output current (at LED)	I_{OL1}	–	17.5	–	mA	Vout = 1.5V
	I_{OH1}	–	-17.5	–	mA	Vout = 1.5V
Output current (at VOUT)	I_{OL2}	–	17.5	–	mA	Vout = 1.5V
	I_{OH2}	–	-17.5	–	mA	Vout = 1.5V

OPERATION MODES
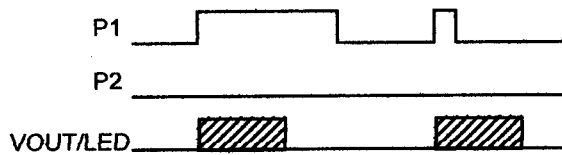
1) Mode 1 (Edge Trigger)

4) Mode 4 (Power up One Shot)

2) Mode 2 (Level Hold)

5) Mode 5 (Card Mode)

3) Mode 3 (Level Trigger)
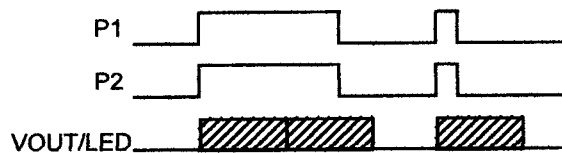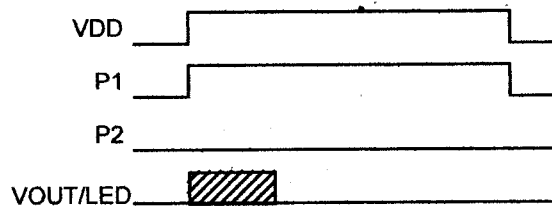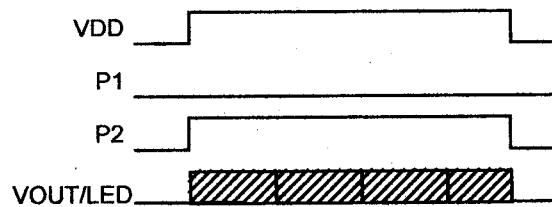
MUSICAL SPECIFICATION

1) Note and Rest Duration

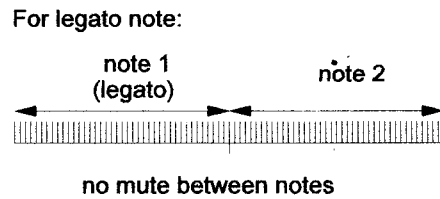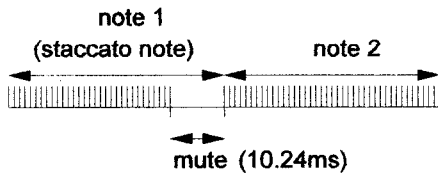| NOTE	♪	♪	♪.	♩	♩+♪	♩.	♩..	♩
REST	𝄿	𝄾	𝄾·	𝄽	𝄽+𝄿	𝄽·	𝄽··	𝄻

Available durations

8 available note and rest durations are provided. Other duration can be programmed by adding an extension code on the following address. Longer rest can be programmed by adding another rest on the following address.

2) Tempo

16 mask programmable tempos

♩	Tempo
45	Adagissimo
48	
51	
55	Largo
60	
65	
71	
80	Larghetto
90	
102	Adagio
119	
143	Andante
179	Presto
238	
357	
714	Prestissimo

Duration of ♪

= 60/Tempo(value under ♩ column)(sec)

3) Staccato/Legato

Each note can be individually programmed to be staccato or legato.

For staccato note:

For legato note:

note 1
(staccato note)   note 2

note 1
(legato)   note 2

mute (10.24ms)

no mute between notes

LED BLINKING

The LED blinking frequency depends on the mask programmable tempo only. The frequency is equal to the tempo(value under quarter note column of the above tempo table) divided by thirty. For example, the blinking frequency is about 4.8Hz for tempo 143. The LED pad still has output during rest or mute.
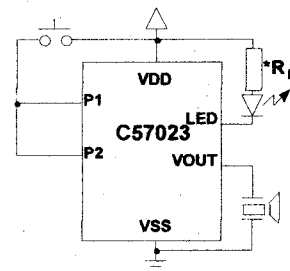
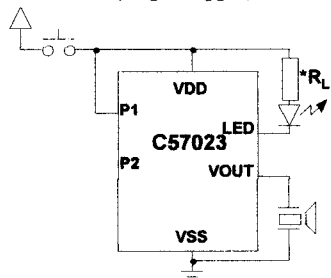## APPLICATION

1) Basic Applications
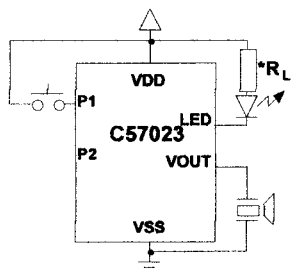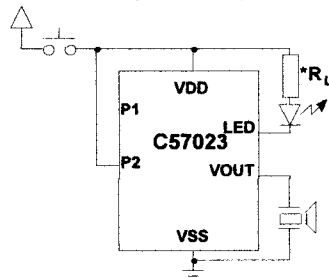
Mode 1 (Edge Trigger)
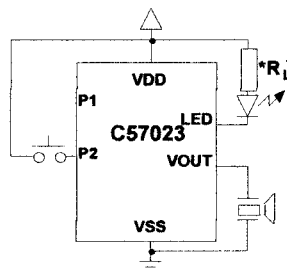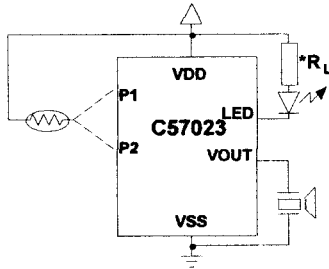
Mode 2 (Level Hold)

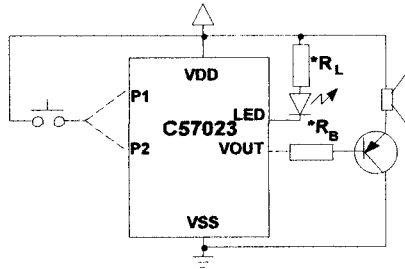Mode 3 (Level Trigger)

Mode 4 (Power up One Shot)

Mode 5 (Card Mode)

2) Cds Application

3) Driving Speaker Application

*R_L :This resistor is chosen to limit the current flow of the LED, typically 510Ω.

*R_B :This resistor is chosen so that the transistor will operate at saturation region when VOUT is high, typically 1KΩ.

PAD ASSIGNMENT

Die Size 53milX54mil
Pad Size 100竹X120竹
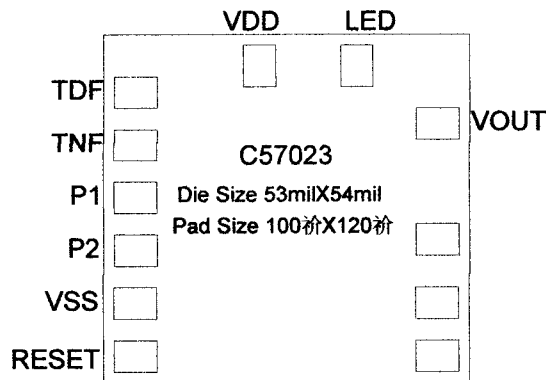
Pad Name	Coordinate	
TNF	-571	143
TDF	-571	323
VDD	-153.2	471.4
LED	181.2	475.4
VOUT	478.5	354.2
RESET	-57.1	-592.5
VSS	-571	-412.5
P2	-571	-230.5
P1	-571	-50.5

NOTE : Substrate should be connected to VSS or left floating.

C5702 Song Option List

Option I.D.	Content
1	Happy birthday
2	It's a small world
3	Beep beep beep (Six Times)
4	London bridge is falling down + Twinkle twinkle little star + Are you sleeping brother John + Row row row your boat
5	Love story + Love me tender + Let me call you sweet heart
7	Jingle bell + Santa Claus is coming to town + We wish you a merry Christmas
8	Fur Elise
9	Jingle bell + Silent Night
10	Feliz Navidad & We Wish You Merry Christmas
12	Las Mananitas
13	Love story
14	Door bell
15	Jiao xiang yue (Symphony)
16	Ai yue (Sorrow Music)
17	The Song Box
20	Happy Birthday (Play Twice)
21	I Just Call To Say I Love You
25	Oh, Susana
26	Happy Birthday
27	Oh, Susana
32	Home, Sweet Home
35	Telephone Ring Sound
37	The West Minster Chimes
39	The West Minster Chimes
40	Macarena
41	For Longer Than Forever
42	Hello Kitty
45	SM0002A
46	The Merry-Go-Round Broke Down
48	Jingle Bell
49	London Bridge is Falling Down
50	Cielito Lindo

C5702 Song Option List

Option I.D.	Content
51	Joy
52	Bach
53	Canadian National Anthem
54	Evening Prayer
55	Goose Lake
101	Tai yang zui hong, mao zhu xi zui qin (The sun is the reddest,Chairman Mao is thebest)
102	Tong fang hong (East Red)
103	Chun jiang hua ye (Spring River and Flower Night)
104	Shi wu de yue liang (The moon on August 15th.)
106	Gan wen lu zai he fang (Ask Which direction we go)
107	Ji Gong zhuan (Song of Ji Gong)
108	Lan hua cao (Lan Hua Grass)
109	Jin she kuang wu (Gold snakes dances)
114	Ke wang (Expectation)
117	Nan Ni wuan (Nan Ni wuan is name of a country)
118	Xiang feng he bi xiang shi (Meeting No need to knowing)
119	Xiu jin bian (making golden flags)
120	Shi jie zhen xi xiao, shi jie zhi you ma ma hao (The world is small + Mother is the best Person in the world)
121	Kang ding qing ge (Kang ding Loving songs)
122	Chao Yuan qing ge (Chao Yuan loving songs)
123	Liu Yang he (River Liu Yang)
125	Joy to the world+ Deck the halis+ Silent night, holy night
131	Pearly shells
132	Ding, Ding, Dong (Sound of ding ding dong)
133	Japanese Song "Fanfare"
134	Thailand Song
135	(Custom-made Product)

Jan 14, 2002.