# DUAL-TONE MELODY GENERATOR

Features

- Wide operating voltage range: 2.4V to 5.0V
- Low Stand-by current
- 768-note ROM memory
- Direct LED drive, where LED flash is programmable.
- Typical oscillator frequency: 128 KHz
- Built-in digital envelope
- 1 sequence trigger key
- Audio output drives speaker directly.
- Power-ON Reset; melody begins from the first note.

General Description

RTS903 is a CMOS LSI designed for toys, doorbells, music boxes, and melody clocks/timers. It is designed to play pre-programmed melody and is capable of generating dual-tone melody and natural sounds in piano effect. By pushing the sequence trigger key, all songs are sequentially selected and played with an Auto-Stop function. In addition, RTS903 provides PLED and PEN pins to drive LED and the motor. The blinking of LED is programmable to meet different user applications.

Pin Assignment

NC	1			16	GND
NC	2			15	NC
OUT	3			14	OSCO
PEN	4	RTS903		13	OSCI
PTB	5			12	VDD
TRB	6			11	PLED
NC	7			10	NC
NC	8			9	NC

Block Diagram

Absolute Maximum Ratings

DC Supply Voltage......................................0V to 5.0V

Input/Output Voltage...........GND -0.2V to VDD + 0.2V

Operating Temperature............................-10 C to 60 C

Storage Temperature..............................-25 C to 125 C

Comments*

Never allow a stress to exceed the values listed under "Absolute Maximum Ratings", otherwise the device would suffer from a permanent damage. Nor is a stress at the listed values allowed to persist over a period, since an extended exposure to the absolute maximum rating condition may also affect the reliability of the device, if not causing a damage thereof.

Electrical Characteristics

(VDD=3.0V, GND=0V, T_A=25 C, unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Conditions
Operating Voltage	VDD	2.4V	-	5.0V	
Operating Current	I_{DD}	-	-	1mA	Unload
Stand-by Current	I_{STB}	-	-	A	Full load
LED Sinking Current	LED S_{INKING}	8mA	-	-	V_{oh} = 1.5V
PEN Driving Current	LED D_{RIVING}	1mA	-	-	V_{ol} = 0.7V
Out Sinking Current	Out D_{RIVING}	-	200mA	-	DAC full scale Load = 8
Oscillator Frequency Deviation Per Lot	Δ F/F	-	-	±15%	

Pin Description

Pin No.	Designation	Description
1	NC	No connection
2	NC	No connection
3	OUT	Audio output pin
4	PEN	Trigger enable output pin
5	PTB	For testing only
6	TRB	Trigger input. The sections of a song will be played sequentially with an Auto-Stop function.
7	NC	No connection
8	NC	No connection
9	NC	No connection
10	NC	No connection
11	PLED	LED drive pin
12	VDD	Positive power supply
13	OSCI	Oscillator input pin
14	OSCO	Oscillator output pin
15	NC	No connection
16	GND	Negative power supply

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Application Circuit

1.

2.

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Bonding Diagram

Designation	X	Y
OUT	105.5	883.2
PEN	132.2	673.4
PTB	126.9	546.9
TRB	126.7	414.4
PLED	1211.4	373.7
VDD	1216.7	582.6
OSCI	1207.6	793.2
OSCO	1005.6	885.4
GND	796.6	883.3
GND	660.9	883.3

Unit: in um
X: 1350 Y: 1020

Note: Substrate is connected to GND
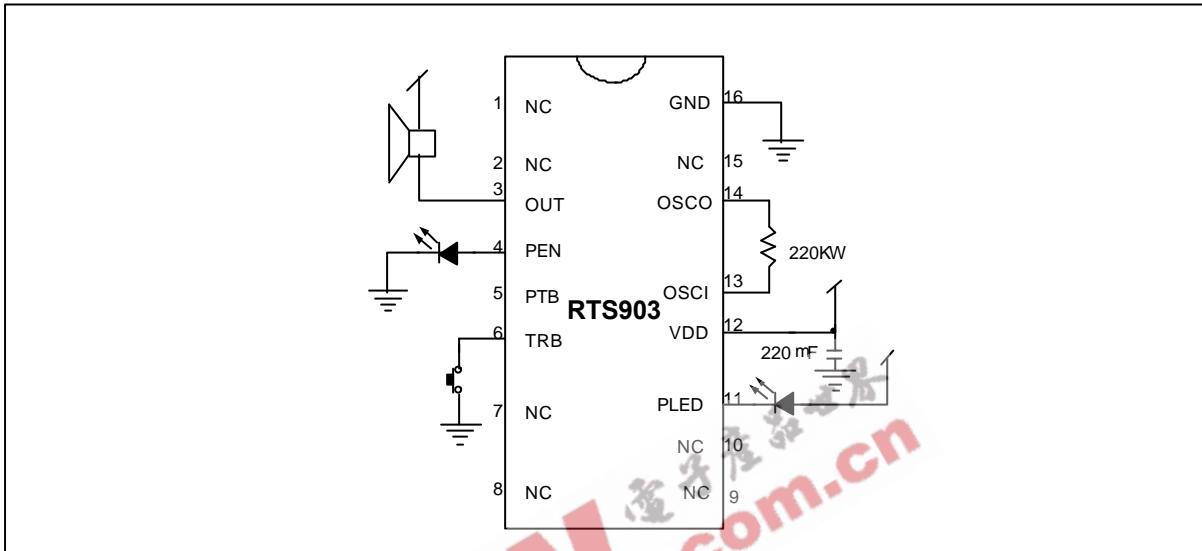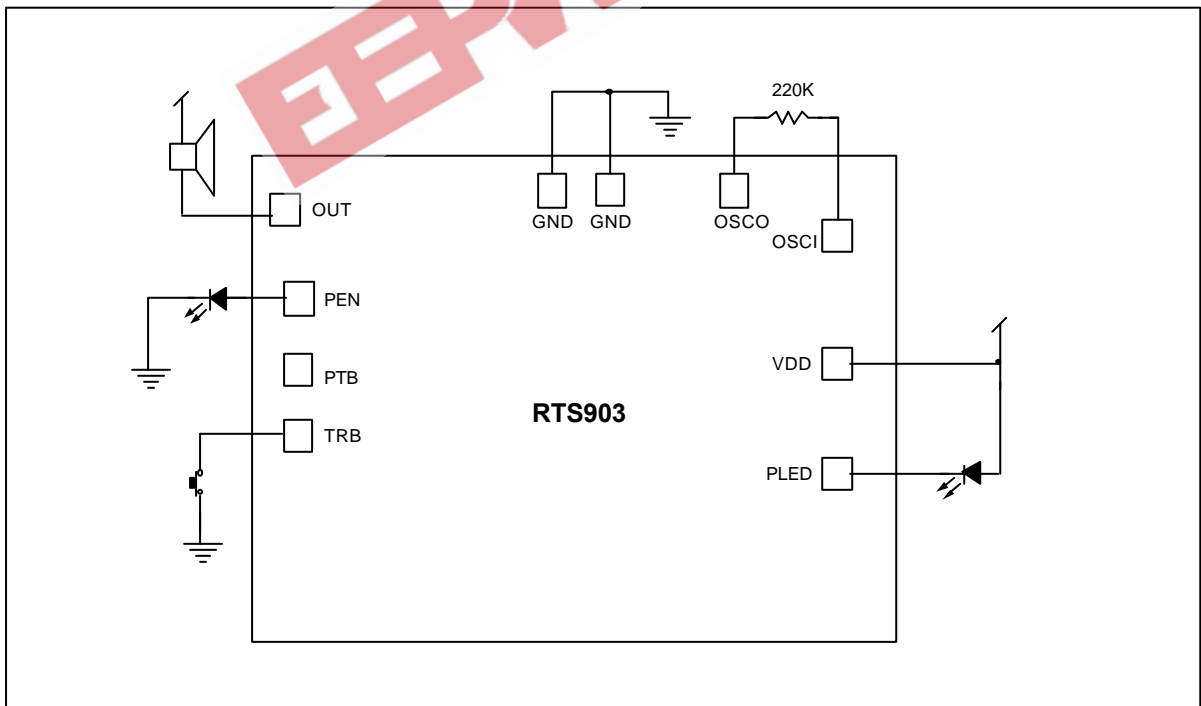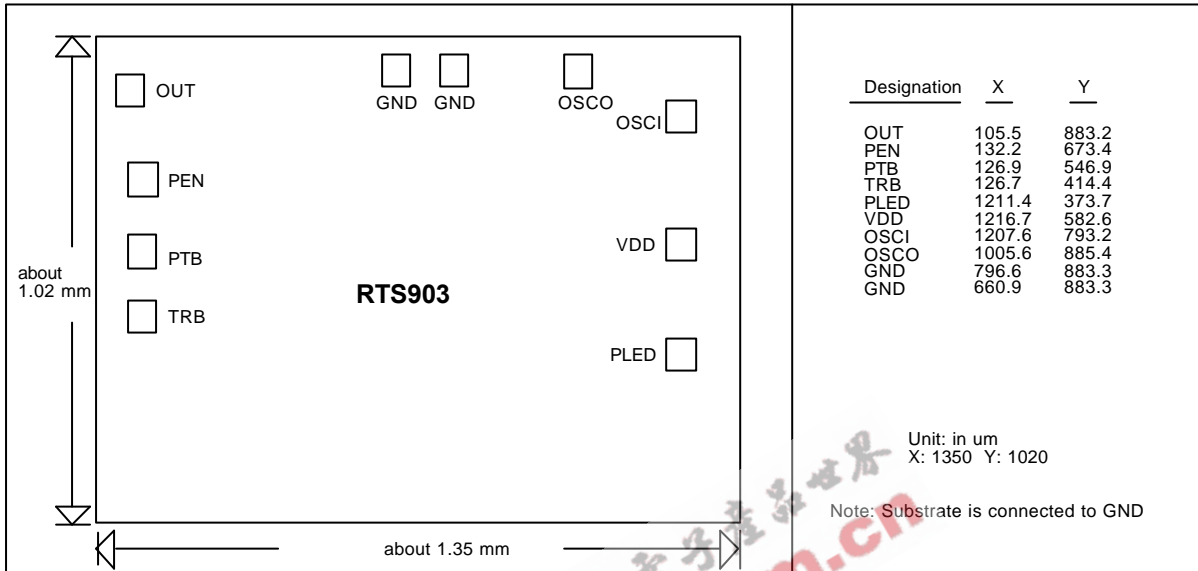
Song List

RTS903-1: Melody
1. Jingle Bell + White Christmas
2. Santa Claus is Coming to Town + We Wish You a Merry Christmas
3. The First Noel + Silent Night
4. Upon on the Housetop + Angels We Have Heard on Hight
5. It Came Upon the Midnight clear + Joy to the World
6. The Twelve Days of Christmas + Foggy the Snowman
7. Rudolph the Red-nosed Reindeer + Hark ! The Herald Angels Sing
8. O Christmas Tree + Deck the Halls
9. O Come All Ye Faithful + Silver Bells

RTS903-2: Melody
1. Hush Little Baby
2. Down the Mountainside We Go
3. Twinkle Twinkle Little Star
4. Home on the Range
5. The Fire Man
6. Spring is Coming
7. Oh! My Darling
8. Did You Ever See a Lassie
9. Rockaby Baby
10. Three Blind Mice
11. The farmer in the Dell
12. Bingo

RTS903-3: Melody
1. Angels We Have Heard on High Came
2. We Wish You a Merry Christmas
3. It Came Upon The Midnight Clear
4. The First Noel
5. Silent Night
6. O Christmas Tree
7. Upon On The Housetop
8. O Little Town Of Bethlehem
9. Hark! The Herald Angels Sing
10. Joy To The World
11. Deck The Halls
12. Santa Claus is Coming to Town

RTS903-5: Melody
1. A Time For Us
2. Love Me Tender Love Me True
3. Are You Lonesome Tonight
4. If You Love Me
5. Love is Blue
6. I Can't Stop Loving You

RTS903-7: Melody
1. We Wish You a Merry Christmas+ It Upon a Midnight Clear + Joy to theWorld
2. The Twelve Days of Christmas + Foggy the Snowman
3. Rudolph the Red-nosed Reindeer + Santa Claus is Coming to Town
4. Hark! The Herald Angels Sing + Oh! Christmas Tree
5. Deck the Halls + O Come All Ye Faithful
6. Silent Night
7. Silver Bells + Oh! Little Town of Bethlehem
8. The First Noel + Jingle Bell
9. Angels We Have Heard on High + Upon on The Housetop
10. Little Drummer Boy + Joll Old Saint Nicholas + White Christmas

RTS903C-8:

Melody + Clock Chime with 22:00 to 5:00 silence

6:00 The Blue-Bells of Scotland	+ 6 Chimes	14:00 Toy Symphony	+ 2 Chimes
7:00 The Farmer in the Dell	+ 7 Chimes	15:00 Old Black Joe	+ 3 Chimes
8:00 For Elise	+ 8 Chimes	16:00 Die Lorelei	+ 4 Chimes
9:00 Home on the Range	+ 9 Chimes	17:00 Frohlicher Landman	+ 5 Chimes
10:00 Long Long Ago	+ 10 Chimes	18:00 Home Sweet Home	+ 6 Chimes
11:00 Minuet	+ 11 Chimes	19:00 Swan Lake	+ 7 Chimes
12:00 Traumerei	+ 12 Chimes	20:00 Hush Little Baby	+ 8 Chimes
13:00 Weigenlied	+ 1 Chime	21:00 Serenata Rimpinnt	+ 9 Chimes

RTS903C-12:

1:00 Hush Little Baby	+ 1 Chime	13:00 Hush Little Baby	+ 1 Chime
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 Finn Man	+ 5 Chimes	17:00 The Finn 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 a Lassie	+ 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 Farmer in the Dell	+ 11 Chimes	23:00 The Farmer in the Dell	+ 11 Chimes
12:00 Bingo	+ 12 Chimes	24:00 Bingo	+ 12 Chimes

M-Square Technologies Corporation

A Subsidiary of Realtek Group

HEAD QUARTER

Floor 4, No. 2, Industry E. RD. IX, Science-Based
Industrial Park, Hsinchu, 300 Taiwan, R.O.C.
Tel: 886-3-6661028 Fax: 886-3-6661928

HONGKONG OFFICE

Room 1403, Charm Centre 700 Castle Peak
Rd., Lai Chi Kok Kowloon, Hong Kong
Tel: 852-29593235
Fax:852-27425267

SHENZHEN OFFICE

Room 1508, Block A, Union Square, No.-
5022 Caitian Rd..Futian,Shenzhen
Tel:6-755-2900672
Fax:86-755-2900681