HT3810 Series
128 Note Melody Generators

Features

- Operating voltage: 2.4V~5.0V
- 7 tempo options: 469, 234, 156, 117, 94, 78, 67
- 2 Envelope sustain durations: 1 beat, 2 beat
- 2 "CHA" sustain duration options: 1/8 beat or 1/4 beat
- One octave lower transposition output by bonding option

- Extremely few external components
- Drive an 8Ω speaker through an NPN transistor
- Drive piezo directly
- Flashing follows one or both of the 2 tone generators
- Enclosed TO-92 package

Applications

- Telephones

- Toys

General Description

The HT3810 series are single-chip 128 note melody generators implemented in CMOS technology. A melody of 128 notes can be automatically played when power is switched on.
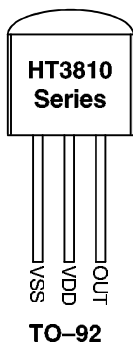
A customer merely needs to supply a melody sample which can be programmed into the ROM by changing a mask layer during device fabrication.

The IC contains two independent tone generators, "CHA" sound accompaniment circuit, envelope generator, time base generator and an output driver. With such powerful functions various special musical effects can be created,
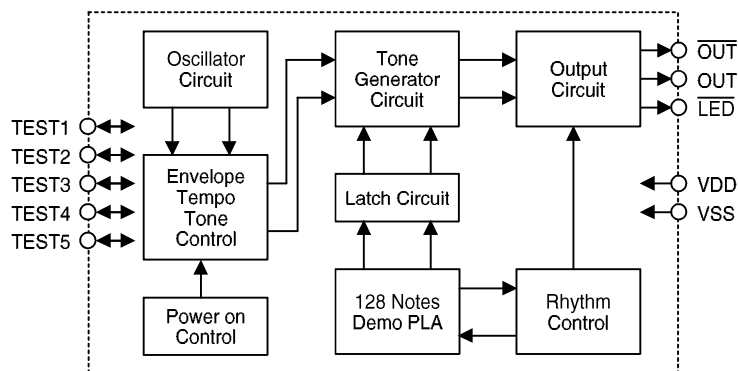
such as Chords, Broken Chords, "CHA" sound accompaniments, etc. The mask option can be made to accommodate various melodies, tempos, envelopes and "CHA" sound duration.
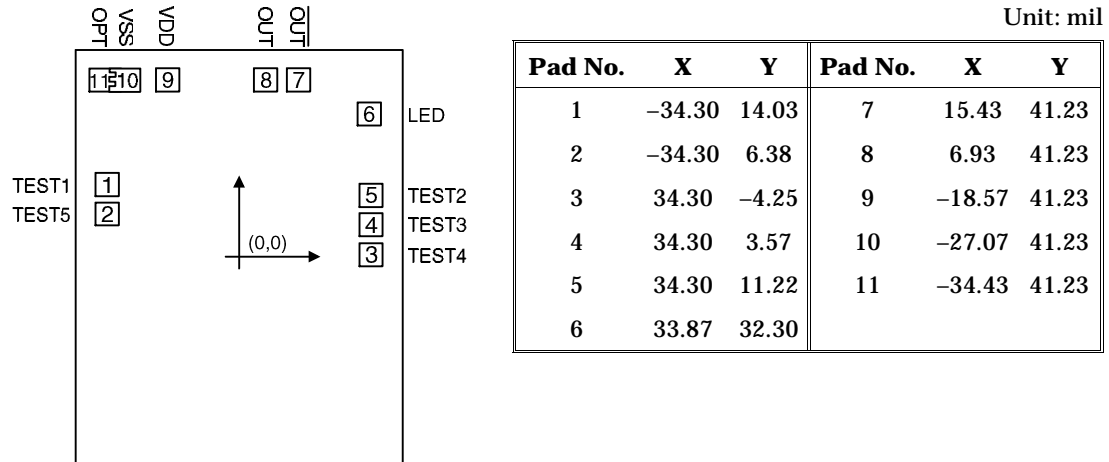
The LED driver may be set to flash following one or both of the two tone generators. The output driver can drive a piezo buzzer directly or an 8 ohm speaker through an external NPN transistor. The HT3810 series are ultra-miniature and require almost no external components for normal applications. They are offered in chip form or in a TO-92 package. Refer to the selection table for standard melodies.

Pin Assignment

Block Diagram

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Pad Assignment

Unit: mil

Pad No.	X	Y	Pad No.	X	Y
1	−34.30	14.03	7	15.43	41.23
2	−34.30	6.38	8	6.93	41.23
3	34.30	−4.25	9	−18.57	41.23
4	34.30	3.57	10	−27.07	41.23
5	34.30	11.22	11	−34.43	41.23
6	33.87	32.30			

Chip size: 81×95 (mil)^2

∗ The IC substrate should be connected to VDD in the PCB layout artwork.

Pad Description

Pad Name	I/O	Internal Connection	Description
TEST1	I/O	CMOS	250 KHz output for IC test
TEST5	I/O	CMOS	For IC test only
TEST3	I/O	CMOS	For IC test only
TEST4	I/O	CMOS	For IC test only
TEST2	I/O	CMOS	For IC test only
$\overline{\text{LED}}$	O	NMOS	LED flash output, active low
$\overline{\text{OUT}}$	O	CMOS	Melody signal output pin, complement to OUT
OUT	O	CMOS	Melody signal output pin, complement to $\overline{\text{OUT}}$
OPT	I	CMOS Pull-High	Option for an octave lower transposition output (Open=normal output, VSS=lower transposition output)
VDD	—	—	Power supply (positive)
VSS	—	—	Power supply (negative)

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Approximate internal connection circuits
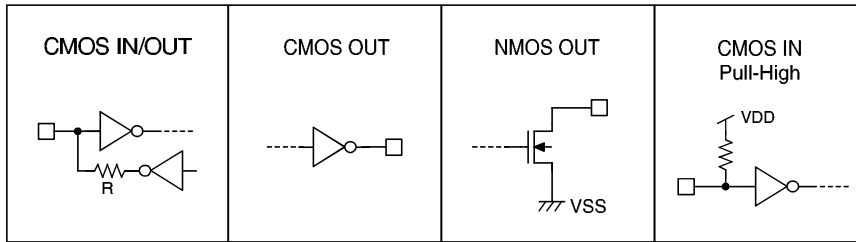
Absolute Maximum Ratings

Supply Voltage .... −0.3V to 5.5V

Input Voltage .... V_{SS}−0.3V to V_{DD}+0.3V

Storage Temperature .... −50°C to 125°C

Operating Temperature .... −20°C to 75°C

Electrical Characteristics

(Ta=25°C)

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
		V_{DD}	Condition				
V_{DD}	Operating Voltage	—	—	2.4	—	5	V
I_{DD}	Operating Current	3V	No load	—	0.4	1.0	mA
		5V		—	0.8	2.0	
I_{OH}	Output Source Current (OUT, $\overline{OUT}$)	3V	V_{OH}=0.9V_{DD}	−0.3	−0.6	—	mA
		5V		−0.5	−0.9	—	
I_{OL1}	Output Sink Current (OUT, $\overline{OUT}$)	3V	V_{OL}=0.1V_{DD}	0.4	0.7	—	mA
		5V		0.6	1	—	
I_{OL2}	$\overline{LED}$ Output Sink Current	3V	V_{OL}=0.1V_{DD}	4	7	—	mA
		5V		8	14	—	
F_{SYS}	System Frequency	3V	TEST1 pad	—	250	—	KHz

HT3810 Series Melody Selection Table

Children's Song Series

ITEM	MELODY	TEMPO	CHA
HT3810A	Karinka	234	1/4
HT3810B	Happy Birthday To You	117	1/4
HT3810C	Are You Sleeping?	156	1/4
HT3810D	The Peddler	234	1/4

ITEM	MELODY	TEMPO	CHA
HT3810E	It Is a Small World	117	1/4
HT3810F	Home Sweet Home	94	1/4
HT3810G	The More We Get Together	156	1/4
HT3810H	Landler Tanz	156	1/4
HT3810I	When The Saints Go Marching In	234	1/4
HT3810J	Cuckoo Waltz	156	1/4
HT3810K	Yankee Doodle	234	1/4
HT3810L	Oh! Susannah	234	1/4
HT3810M	Cradle Song	117	1/4
HT3810N	London Bridge Is Falling Down + The Train Is Running Fast	234	1/4
HT3810P	Tom Dooley	156	1/4
HT3810Q	Little Brown Jug	156	1/4
HT3810R	Rock a Bye Baby	117	1/4
HT3810S	Old Folk At Home	117	1/4
HT3810T	Little Bees	156	1/4
HT3810U	Donkey Donkey	234	1/4
HT3810V	Song Of Joy	156	1/4
HT3810W	Old Macdonald Had a Farm	156	1/4
HT3810X	If You Are Happy	156	1/4
HT3810Y	I Am So Happy	156	1/4
HT3810Z	My Little Tricycle	156	1/4
HT3811A	Popeye The Sailor Man	156	1/4
HT3811B	Row! Row! Row Your Boat	156	1/4
HT3811C	Fly Birdie Fly	156	1/4
HT3811D	Good-Bye Little Fish	156	1/4
HT3811E	Who's Afraid Of The Big Bad Wolf	156	1/4
HT3811F	Picnic	117	1/4
HT3811G	Mary Had a Little Lamb	156	1/4

Lyrical Song Series

ITEM	MELODY	TEMPO	CHA
HT3812A	Green Sleeves	117	1/4
HT3812B	Music Box Dancer	234	1/4
HT3812C	Love Story	78	1/4
HT3812D	For Elise	94	1/4
HT3812E	Moonight On The Colorado	117	1/4
HT3812F	Home On The Range	156	1/4
HT3812G	Love Me Tender	117	1/4
HT3812H	Yesterday	94	1/4
HT3812I	Romance De Amor	156	1/4
HT3812J	Love Is Blue	94	1/4
HT3812K	Unchained Melody	156	1/4
HT3812L	Somewhere In Time	78	1/4
HT3812M	Dona Dona	156	1/4
HT3812N	If You Love Me	94	14
HT3812P	Fly Me To The Moon	117	1/4
HT3812Q	Let Me Call You My Sweet Heart	156	1/4

Christmas Song Series

ITEM	MELODY	TEMPO	CHA
HT3813A	Jingle Bells	156	1/4
HT3813B	Santa Claus Is Coming To Town	156	1/4
HT3813C	Rudolph The Red-Nosed Reindeer	156	1/4
HT3813D	Silent Night	156	1/4
HT3813E	We Wish You a Merry Christmas	156	1/4
HT3813F	Parade Of The Wooden Soldiers	156	1/4
HT3813G	The Twelve Days Of Christmas	156	1/4
HT3813H	Frosty The Snow Man	156	1/4
HT3813I	Away In a Manger	156	1/4
HT3813J	It Came Upon The Midnight Clear	156	1/4
HT3813K	Sleigh Ride	156	1/4
HT3813L	Jesus Loves Me + The First Noel	156	1/4
HT3813M	Hark The Herald Angels Sing + The Twelve Days Of Christmas	156	1/4

Popular Song Series

| ITEM	MELODY	TEMPO	CHA
HT3814A	You Are My Sunshine	234	1/4
HT3814B	Wooden Heart	234	1/4
HT3814C	The Yellow Rose Of Texas	156	1/4
HT3814D	Butterfly (short CHA accompaniment)	94	1/8
HT3814E	Bengawan Solo	117	1/4
HT3814F	You Light Up My Life	117	1/4
HT3814G	Lambada I	234	1/4
HT3814H	Lambada II	234	1/8
HT3814I	Hey Jude	156	1/4
HT3814J	Changing Partner	117	1/4
HT3814K	I Just Called To Say I Love You	117	1/4
HT3814L	My Way	94	1/4
HT3814M	Wedding March	156	1/4

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Application Circuits

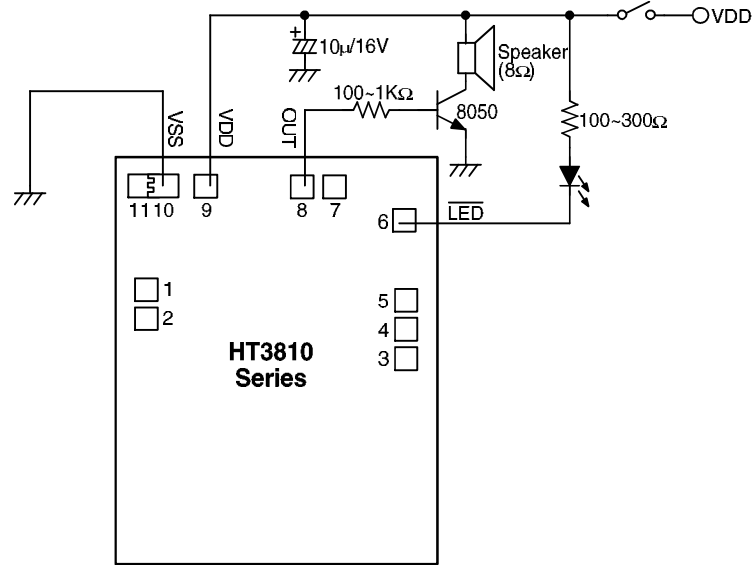**Chip form piezo application (normal output)**
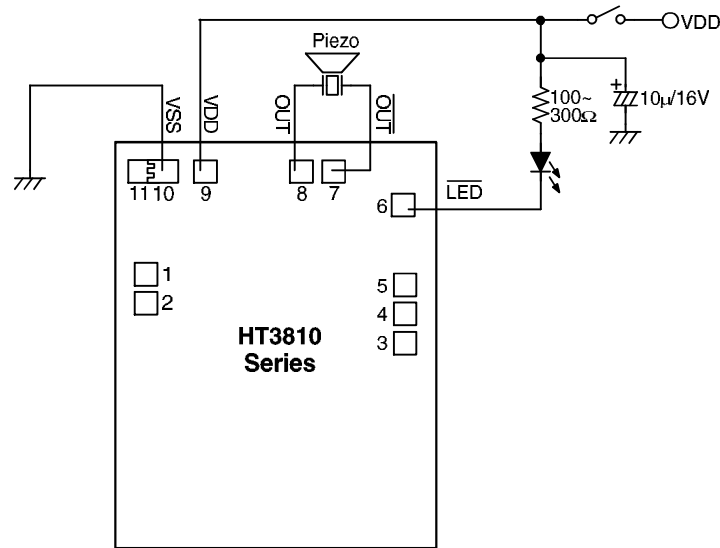
* The substrate should be connected to VDD in the PCB layout artwork.

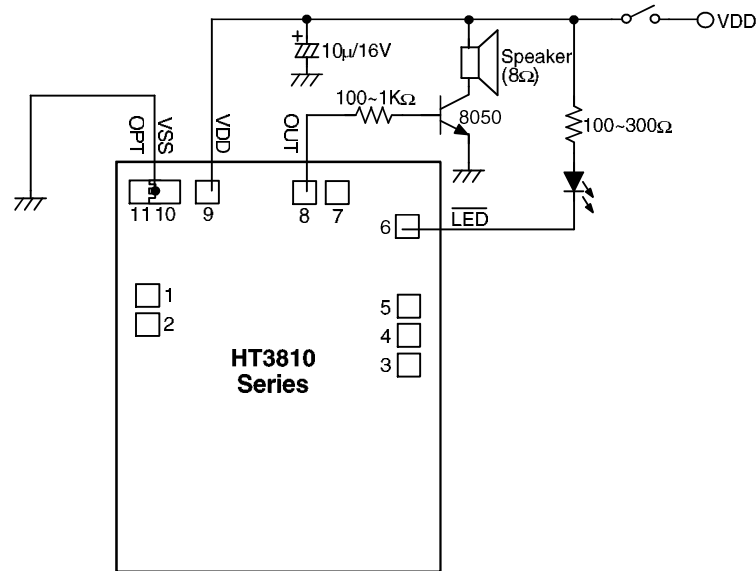**Chip form piezo application (one octave lower transposition output)**
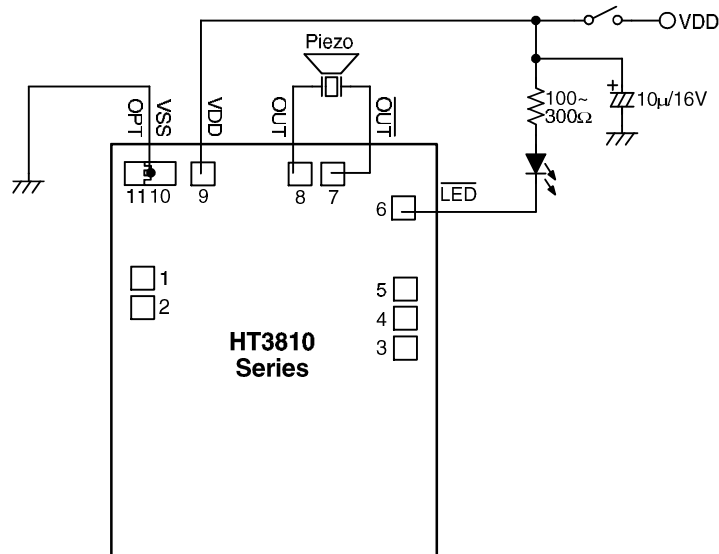
* The substrate should be connected to VDD in the PCB layout artwork.

Chip form speaker application (normal output)

* The substrate should be connected to VDD in the PCB layout artwork.

Chip form speaker application (one octave lower transposition output)

* The substrate should be connected to VDD in the PCB layout artwork.

For 3-pin package