

# HT3834 36 Melody Music Generator

#### **Features**

- Operating voltage: 2.4V~5.0V
- R<sub>OSC</sub> Operating frequency: 6MHz
- Three operating modes for 28-pin package, MCU control mode, key control mode and manual mode
- Dual operating mode for 16-pin package, key control mode and MCU mode
- · Low voltage detect

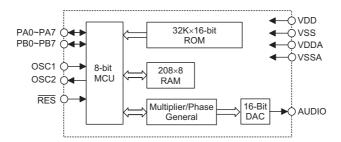
- Volume control
- Hold key
- Ring detect
- Hook detect
- · Mono output
- High D/A converter resolution: 16 bits
- · Polyphonic 4 notes
- 16/28-pin SOP package

## **General Description**

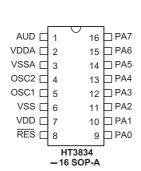
The HT3834 is a CMOS VLSI designed for musical instruments, especially 36 melody songs. The HT3834 has an integrated controller and a WTS (Wave Table Synthesizer).

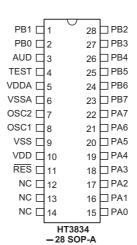
The HT3834 has applications in areas such as phone ringtones, high function toys, musical boxes, doorbells etc.

#### **Block Diagram**



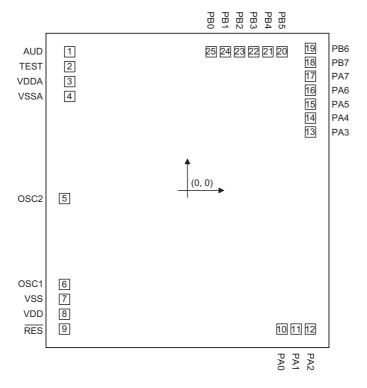
## **Pin Assignment**







## **Pad Assignment**



Chip size: 2135×2385  $(\mu m)^2$ 

## Pad Coordinates Unit: μm

Pad No.	Х	Υ	Pad No.	Х	Υ
1	-876.150	1043.000	14	916.350	514.500
2	-876.150	931.200	15	916.350	625.100
3	-876.150	817.560	16	916.350	725.100
4	-876.150	715.600	17	916.350	835.700
5	-916.350	-63.124	18	916.350	935.700
6	-916.350	-740.976	19	916.350	1046.300
7	-916.350	-842.650	20	704.250	1041.550
8	-916.350	-942.650	21	593.650	1041.550
9	-916.350	-1044.324	22	493.650	1041.550
10	710.500	-1041.350	23	383.050	1041.550
11	810.500	-1041.350	24	283.050	1041.550
12	921.100	-1041.350	25	172.450	1041.550
13	916.350	414.500			

Rev. 1.00 2 November 2, 2006

<sup>\*</sup> The IC substrate should be connected to VSS in the PCB layout artwork.



### **Pad Description**

Pad Name	I/O	Internal Connection	Function	
VDD	_	_	Positive power supply	
VDDA	_	_	DAC power supply	
VSS	_	_	Negative power supply, ground	
VSSA	_	_	DAC negative supply, ground	
PA0~PA7	I/O	Wake-up, Pull-high or None	Bidirectional 8-bit I/O port, wake-up by mask option	
PB0~PB7	I/O	Pull-high or None	Bidirectional 8-bit I/O port	
RESET	ı	_	Reset input, active low	
OSC1	ı	X'tal/Resistor	XIN for X'tal or ROSCIN for resistor by mask option	
OSC2	0	_	XOUT or T1	
AUD	0	_	DAC output interface	

## **Absolute Maximum Ratings**

Supply VoltageV <sub>SS</sub> -0.3V to V <sub>SS</sub> +5.5V	Storage Temperature50°C to 125°C
Input VoltageV <sub>SS</sub> -0.3V to V <sub>DD</sub> +0.3V	Operating Temperature –25°C to 70°C

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

### **Electrical Characteristics**

Ta=25°C

Cumbal	Parameter	Test Conditions		Min.	Tun	Mey	Unit
Symbol	Parameter	$V_{DD}$	Conditions	Wiin.	Тур.	Max.	Onit
$V_{DD}$	Operating Voltage	_	_	2.4	4.5	5	V
	0	3V	No least (OOO CMILE)	_	2	8	mA
I <sub>DD</sub>	Operating Current	4.5V	No load (OSC= 6MHz)	_	8	10	
		3V		_	1	_	
I <sub>STB</sub>	Standby Current			_	1	3	μА
	Flan Causas Comment	3V		5			^
Іон	Flag Source Current	4.5V	_	5	_	_	mA
la.	Flog Sink Current	3V		5			^
l <sub>OL</sub>	Flag Sink Current	4.5V	_	5			mA
V <sub>IH</sub>	Input High Voltage for I/O Ports	_	_	0.8V <sub>DD</sub>	_	$V_{DD}$	V
V <sub>IL</sub>	Input Low Voltage for I/O Ports	_	_	0	_	0.2V <sub>DD</sub>	V

Rev. 1.00 3 November 2, 2006



#### **Function Description**

Mode selection	PB3=1, PA7=0: Key control mode PB3=1, PA7=1: MCU control mode PB3=0: Manual control mode
Low voltage detect	PA5=0 (normal); PA5=1 (low voltage active, program stop)

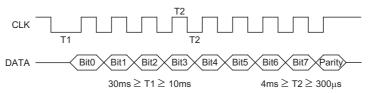
#### **Key Control Mode**

PA0: Ring Detect	When an incoming 13Hz~90Hz ring signal is detected after a period of 200ms, the music will automatically start playing. When the incoming ring signal stops, after a period of 6 seconds the music will stop playing.
PA1: Hook Detect	This line detects the on/off hook condition of the telephone. Only when the telephone is in an on-hook condition, can the music be chosen and played. If the handset is lifted to talk, the music will stop playing and the HOLD key will be effective.
PA2: Melody select key	This key chooses and plays one of the 36 stored musical melodies. When the key is pressed the next melody in the list will be selected and played. When the HOLD key is pressed, the telephone hold function will be activated and when an incoming ring signal is detected the music will be played.
PA3: Telephone Hold key	If this key is pressed during a phone conversation the phone will be put on hold and the caller can listen to the music while waiting. If, when the music is playing, the handset is lifted, the music will immediately stop playing. After this happens the HOLD function will have no effect for a period of 2 seconds.
PA4: Volume key	Controls the music volume in 8 discrete steps. Each time the key is pressed the volume will reduce one step at a time until the lowest volume is reached. When the lowest volume is reached, the next key press will return the volume to its maximum level.

#### **MCU Mode**

PA0: clock pin	Clock from external CPU
PA1: data pin	Data from external CPU

#### **Timing Chart**



Note: 50ms after power up, the device will be ready to communicate with the external CPU using the CLK and DATA

Communication via the CLK and DATA lines is conducted in a simple manner. The device will obtain its data on the high going edge of the CLK line. If the device does not receive a complete byte within 50ms then the present byte will be discarded and the next byte will then be received.

Even-parity is used for data checking. For the previous 8-bits, if the total number of "1s" is odd then the parity bit is set to "1", otherwise it is set to "0". If the parity is incorrect then the byte will be discarded.

## Data Type (Command)

00H~23H	This command will select and play one of the 36 stored musical melodies (play once).
30H~53H	This command will select and play one of the 36 stored musical melodies (repeatedly once).
5FH	Stop play
60H~6FH	16 level volume control, 60H refers to highest volume (power on default 60H)

Rev. 1.00 4 November 2, 2006



## Song Selection (Manual Selection Mode Only)

· · · · · · · · · · · · · · · · · · ·					
Mid Name	PB2	PB1	PB0	English Song Name	
All	1	1	1	Play all songs, classical $\rightarrow$ xmas $\rightarrow$ children	
Child	1	1	0	Play children songs, CHxx.mid	
Classical	1	0	1	Play classical songs, CLxx.mid	
Xmas	1	0	0	Play xmas songs, XMasxx.mid	
Shuffle	0	1	1	Random play	

### Trigger Mode

DD2		PA7				
PB3		VSS	VDD			
	PA0	Ring Detect	Clock			
	PA1	Hook	Data			
	PA2	Select	No function			
"VDD" Phone Ring	PA3	Hold	No function			
T Hone rang	PA4	Volume	No function			
	PA5	LVR	LVR			
	PA6	BusyB	BusyB			

	PA6	BusyB		Bu	syB		
		Mode 1	Mode 2	Mode 3	_		
	PA0	VDD	VDD	VSS	VSS		
	PA1	VDD	VSS	VDD	VSS		
"VSS" (See Manual Selection Mode)	PA2	Re-trigger	Toggle	Level Hold	_		
	PA3	Re-play	Toggle+10min	Non-retrigger	_		
	PA4	Volume +					
	PA5	Volume –					
	PA6		BusyB STOP				
	PA7						

PB4	PB5/PB6/PB7 Mode
VDD	PWM
VSS	On-Off

Rev. 1.00 5 November 2, 2006



### Manual Selection Mode (28-pin Package only)

- Re-trigger play Songx.mid (for chosen songs)
- · Replay the song that has been chosen by re-trigger mode, non-retriggerable (for doorbell)
- Toggle: Pressing the key once will play songs sequentially. Song1, Song2, .... SongN, Song1, Song2, ....

(There is 2sec of silence between every two songs)

Pressing the key again and the song will stop.

Pressing the key again will play the next song sequentially.

Pressing the key again and the song will stop.

- Toggle + 10 min timer
- Level Hold: Hold key, songs will play sequentially and repeatedly

(There is 2sec of silence between every two songs).

Songs will stop when the key is released.

Pressing the key again, will play sequentially from the next song.

- Non-retrigger: for bound trigger switch, in order not to be triggered during song playing.
- Volume+ / Volume -: volume up / down, power on default max volume=7. Min volume=0 (silence). 8 levels volume control.
- STOP: stop play

#### Output

- PA6: BusyB (Op amp control)
- PB5: PWM/On-Off control red LED, when stop play is high
- PB6: PWM/On-Off control blue LED, when stop play is high
- PB7: PWM/On-Off control green LED, when stop play is high

#### **Song List Data**

No.	Mid Name	English Song Name
Child		
1	CH1.mid	Lullaby
2	CH2.mid	My Bonnie
3	CH3.mid	Little Boy Blue
4	CH4.mid	Clementine
5	CH5.mid	Mary Had a Little Lamb
6	CH6.mid	Old Black Joe
7	CH7.mid	Twinkle Twinkle Little Star
8	CH8.mid	Where, Oh Where Has My Little Dog Gone ?
9	CH9.mid	Rain, Rain
10	CH10.mid	London Bridge
11	CH11.mid	Lavender's Blue
12	CH12.mid	Rock-a-bye, Baby
Classical		
1	CL1.mid	Canon
2	CL2.mid	Spring Song
3	CL3.mid	Jeanie With The Light Brown Hair
4	CL4.mid	To a Wild Rose
5	CL5.mid	ROMANCE de Amor

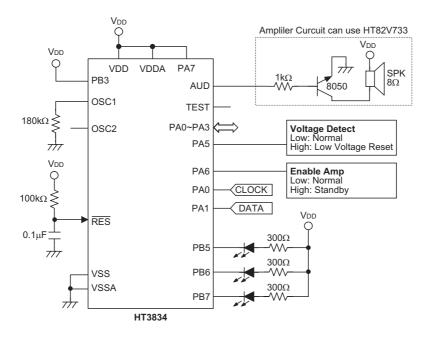
Rev. 1.00 6 November 2, 2006



No.	Mid Name	English Song Name
6	CL6.mid	Green Sleeves
7	CL7.mid	Swan Lake
8	CL8.mid	About Strange Lands and People
9	CL9.mid	Old French Song
10	CL10.mid	Impromptu
11	CL11.mid	Solveig's Song
12	CL12.mid	Berceuse
Xmas		
1	Xmas1.mid	Jingle Bells
2	Xmas2.mid	Silent Night
3	Xmas3.mid	The Twelve Days of Christmas
4	Xmas4.mid	Away in a Manger
5	Xmas5.mid	The First Noel
6	Xmas6.mid	Santa Claus Is Coming to Town
7	Xmas7.mid	We Wish You a Merry Christmas
8	Xmas8.mid	Toy Solder's March
9	Xmas9.mid	God Rest Ye Merry, Gentlemen
10	Xmas10.mid	Over the River and Through the Woods
11	Xmas11.mid	Go Tell it on the Mountain
12	Xmas12.mid	Angels We Have Heard On High

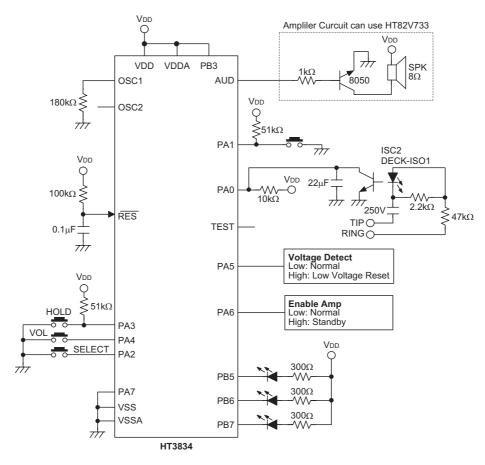
## **Application Circuits**

## MCU Mode



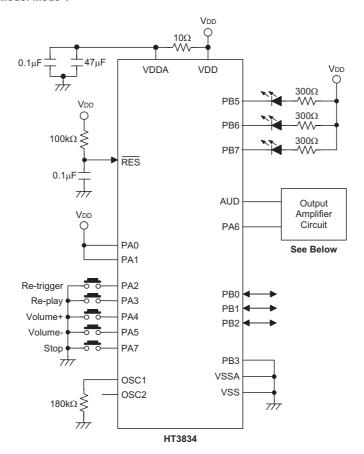


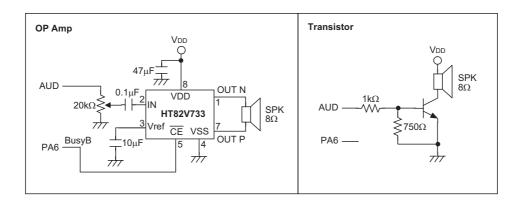
## **Key Control Mode**





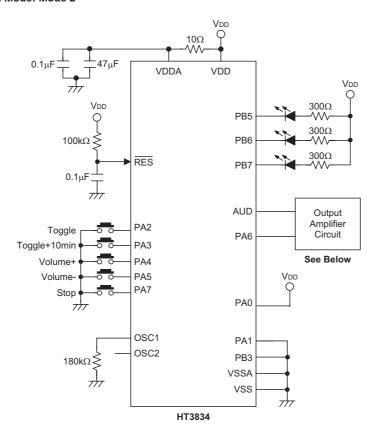
#### Manual Selection Mode: Mode 1

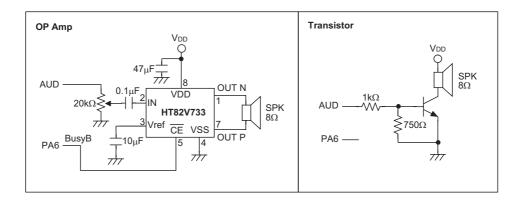






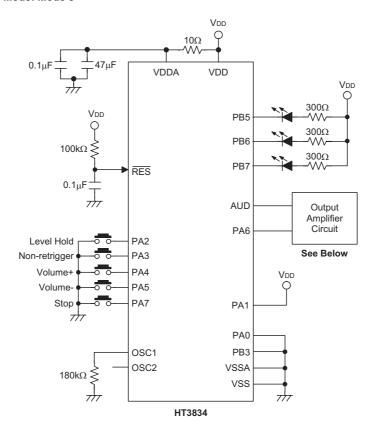
#### Manual Selection Mode: Mode 2

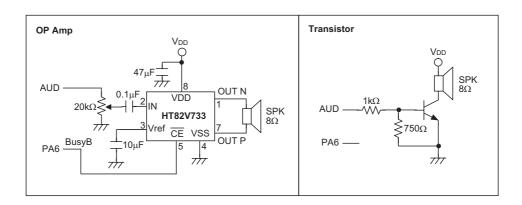






### Manual Selection Mode: Mode 3



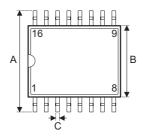


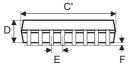
Rev. 1.00 11 November 2, 2006



## Package Information

## 16-pin SOP (300mil) Outline Dimensions



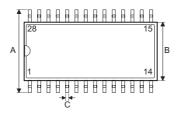


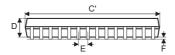


Symbol	Dimensions in mil			
	Min.	Nom.	Max.	
Α	394	_	419	
В	290	_	300	
С	14	_	20	
C'	390	_	413	
D	92	_	104	
E	_	50	_	
F	4	_	_	
G	32	_	38	
Н	4	_	12	
α	0°	_	10°	



## 28-pin SOP (300mil) Outline Dimensions





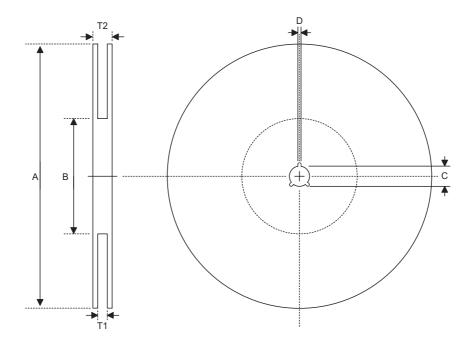


Cumbal	Dimensions in mil			
Symbol	Min.	Nom.	Max.	
А	394	_	419	
В	290	_	300	
С	14	_	20	
C'	697	_	713	
D	92	_	104	
E	_	50	_	
F	4	_	_	
G	32	_	38	
Н	4	_	12	
α	0°	_	10°	



## **Product Tape and Reel Specifications**

## **Reel Dimensions**



## SOP 16W (300mil)

Symbol	Description	Dimensions in mm
Α	Reel Outer Diameter	330±1
В	Reel Inner Diameter	62±1.5
С	Spindle Hole Diameter	13±0.5 -0.2
D	Key Slit Width	2±0.5
T1	Space Between Flange	16.8+0.3 -0.2
T2	Reel Thickness	22.2±0.2

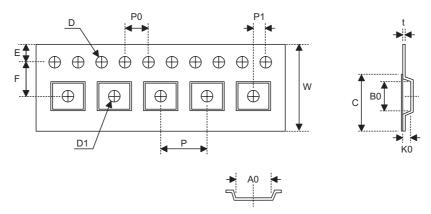
## SOP 28W (300mil)

Symbol	Description	Dimensions in mm
Α	Reel Outer Diameter	330±1
В	Reel Inner Diameter	62±1.5
С	Spindle Hole Diameter	13+0.5 -0.2
D	Key Slit Width	2±0.5
T1	Space Between Flange	24.8+0.3 -0.2
T2	Reel Thickness	30.2±0.2

Rev. 1.00 14 November 2, 2006



## **Carrier Tape Dimensions**



## SOP 16W (300mil)

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	16±0.2
Р	Cavity Pitch	12±0.1
Е	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	7.5±0.1
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4±0.1
P1	Cavity to Perforation (Length Direction)	2±0.1
A0	Cavity Length	10.9±0.1
В0	Cavity Width	10.8±0.1
K0	Cavity Depth	3±0.1
t	Carrier Tape Thickness	0.3±0.05
С	Cover Tape Width	13.3

## SOP 28W (300mil)

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	24±0.3
Р	Cavity Pitch	12±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	11.5±0.1
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4±0.1
P1	Cavity to Perforation (Length Direction)	2±0.1
A0	Cavity Length	10.85±0.1
В0	Cavity Width	18.34±0.1
K0	Cavity Depth	2.97±0.1
t	Carrier Tape Thickness	0.35±0.01
С	Cover Tape Width	21.3



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Rev. 1.00 November 2, 2006