

Features

- Operating voltage: 2.4V~5.1V
- System frequency: 512KHz
- Pull-High resistance is 50KΩ
- 15-key instrument and compass range from C4~D5
- Auto power off
- 6 timbres
- 15 melodies
- Mode selection by either a push-button or a slide switch
- One-key-playing function
- 28 DIP enclosed

General Description

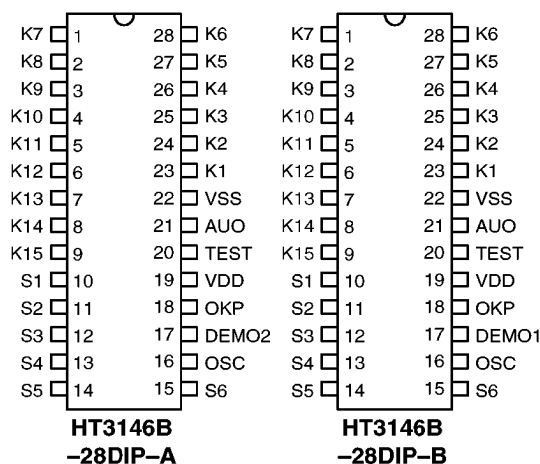
The HT3146B is a CMOS LSI designed for use in musical instruments. The chip is equipped with 15 playing melodies coded in a ROM of 512 notes. The timbre of the song for demonstration can be altered by pressing S1~S6.

The HT3146B provides 15 retriggerable tone keys (C4~D5) and 6 timbres. Each tone key stands for a specific timbre scale. The chip also

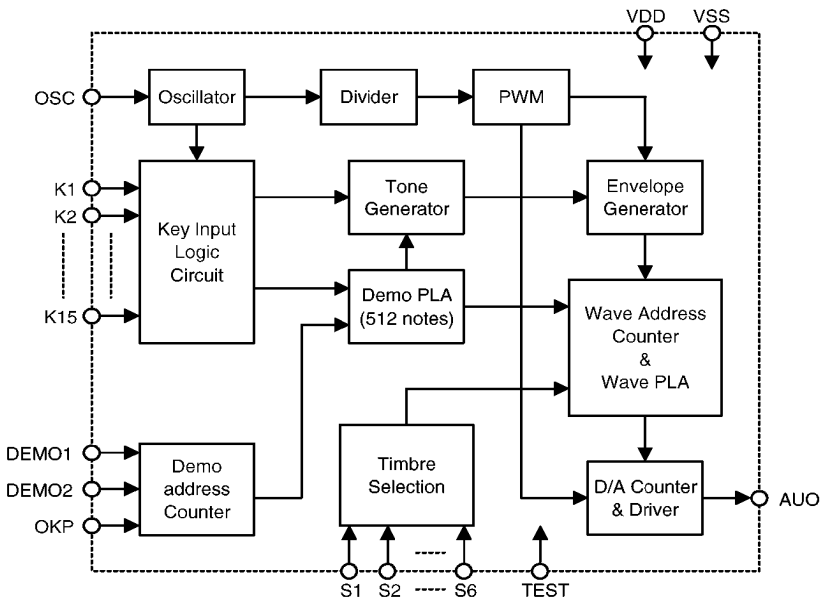
embodies an auto-power-off function. When there is no key entry or when the demonstration song is terminated, power is automatically turned off and the chip holds the pervious timbre.

The HT3146B enters the demo mode either by toggle controlling the on/off state of DEMO1 or by switching the high/low state of DEMO2.

Pin Assignment

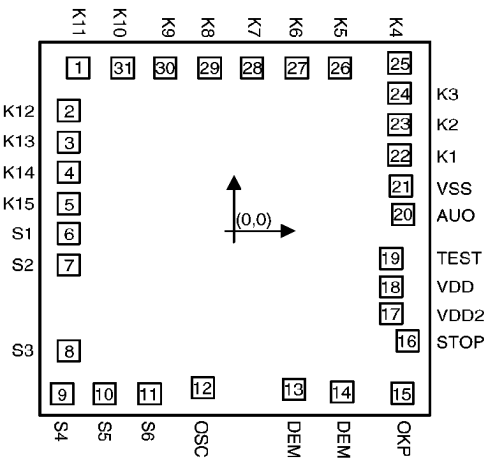


Block Diagram



Pad Coordinates

Unit: μm



Chip size: $1820 \times 2440 (\mu\text{m})^2$

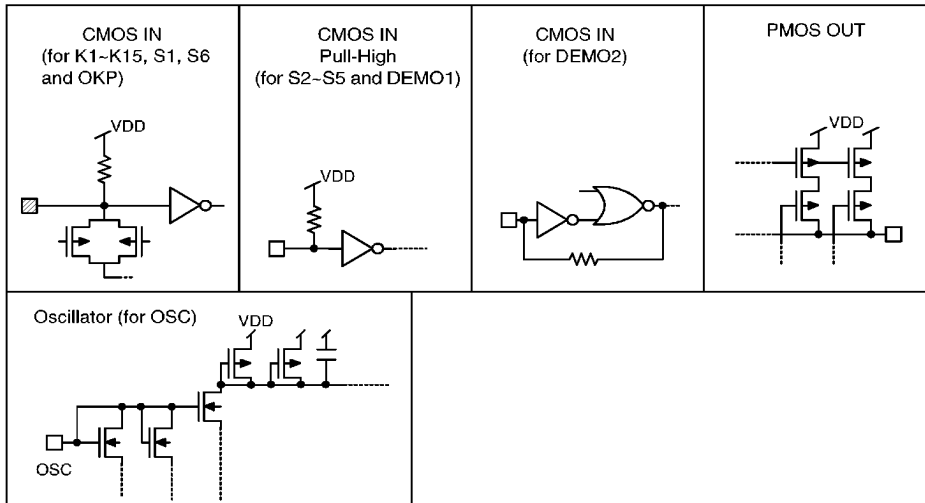
* The IC substrate should be connected to VSS in the PCB layout artwork.

Pad No.	X	Y	Pad No.	X	Y
1	-656.05	976.20	17	661.85	-495.30
2	-696.25	720.00	18	661.85	-335.30
3	-696.25	531.60	19	661.85	-165.30
4	-696.25	352.00	20	712.45	100.40
5	-696.25	163.60	21	703.45	270.40
6	-696.25	-16.00	22	696.35	456.70
7	-696.25	-204.40	23	696.35	636.30
8	-696.25	-717.20	24	696.35	824.70
9	-724.45	-976.20	25	696.35	1004.30
10	-544.85	-976.20	26	445.95	976.20
11	-356.45	-976.20	27	264.35	976.20
12	-131.45	-938.90	28	77.95	976.20
13	253.95	-948.70	29	-103.65	976.20
14	455.85	-963.70	30	-290.05	976.20
15	708.25	-972.50	31	-469.65	976.20
16	731.85	-657.10			

Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Description
23~28, 1~9	K1~K15	I	CMOS Pull-High	Key inputs The compass of K1~K15 ranges from C4 to D5.
10~15	S1~S6	I	CMOS Pull-High	Timbre selection inputs There are 6 timbres, namely piano, violin, trumpet, xylophone, saxophone, and tuba to change the timbre of the demonstration song or to play a simulative instrument from the 6 timbres.
16	OSC	I	—	Oscillator input A resistor is connected to VDD for an internal system clock.
17	DEMO1	I	CMOS Pull-High	Demonstration melody trigger input DEMO1 is a toggle input to switch the on/off state of the demo mode.
17	DEMO2	I	CMOS	Demonstration melody trigger input Connect DEMO2 to VDD to enter the demo mode or connect DEMO2 to VSS to play the songs of keys.
18	OKP	I	CMOS Pull-High	One-key-playing function play input Press OKP to play the next note of the demo melody.
19	VDD	I	—	Power supply (positive)
20	TEST	I	CMOS Pull-High	For IC test only
21	AUO	O	PMOS	Audio signal output The output of the AUO pin is of a current type D/A. An NPN transistor is driven for applications.
22	VSS	I	—	Power supply (negative)

Approximate internal connection



Absolute Maximum Ratings

Supply Voltage -0.3V to 6V Storage Temperature..... -50°C to 125°C
 Input Voltage..... $V_{SS}-0.3V$ to $V_{DD}+0.3V$ Operating Temperature..... 0°C to 70°C

Electrical Characteristics

($T_a=25^\circ\text{C}$)

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
		VDD	Condition				
VDD	Operating Voltage	—	—	2.4	—	5.2	V
ISTB	Stand-by Current	3V	—	—	0.1	2	μA
		4.5V		—	0.2	3	
IDD	Operating Current	3V	No load $F_{OSC}=512\text{KHz}$	—	285	570	μA
		4.5V		—	636	1200	
IAUO	Max. AUO Output Current	3V	$V_{OH}=0.6V$	—	2.5	3.6	mA
		4.5V		—	3.7	5.1	
IIL	Input Low Current (Pull-High resistance 50K Ω)	3V	$V_{IL}=V_{SS}$	16	32	48	μA
		4.5V		41	82	123	
VIL	Input Low Voltage	—	—	V_{SS}	—	$0.2V_{DD}$	V
VIH	Input High Voltage	—	—	$0.8V_{DD}$	—	V_{DD}	
FOSC	System Frequency	3V	$R_{OSC}=240K\Omega$	—	512K	—	V
		4.5V	$R_{OSC}=240K\Omega$	—	512K	—	

Functional Description

Initial status

When power is first supplied, the HT3146B is in the normal playing mode and the timbre is the piano by default. If there is no key input the system will stay at the stand-by mode to reduce power consumption.

Key tone

There are totally 15 direct input keys in the HT3146B. The compass of the keys is from C4 to D5.

6 timbre

Pressing a key of S1~S6 selects a timbre to play. While a demo song is playing, the timbre of the playing melody can be altered by pressing a key of S1~S6.

Pin Name	Timbre
S1	Piano
S2	Violin
S3	Trumpet
S4	Xylophone
S5	Saxophone
S6	Tuba

OKP

The system enters the one-key-playing mode from the normal playing mode by pressing the OKP key. Then, the OKP key can be pressed successively to play the current demo melody notes serially. To return to the normal playing mode, a key of K1~K15 may be pressed.

When the system is in the demo mode, the OKP key can be pressed to enter the one-key-playing mode, followed by successive pressing of the OKP key to play the melody note by note. At this time, if the OKP input ceases more than 4 sec-

onds, the system will return to the demo mode and play the remaining tones.

When the system enters the one-key-playing mode from the demo mode, a key of K1~K15 can be pressed to select a melody for playing.

Demo mode

There are totally 15 demo melodies in the HT3146B. The system can enter the demo mode by momentarily connecting DEMO2 to VDD or DEMO1 to VSS in the normal playing mode.

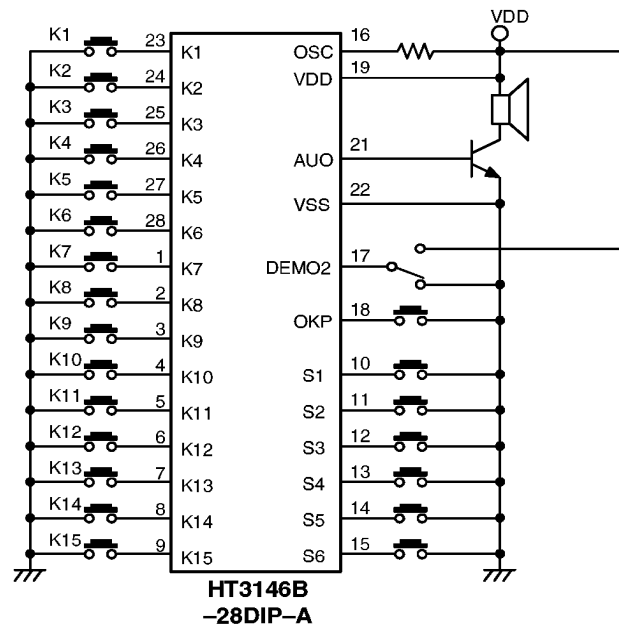
The following table illustrates the relationship between the 15 keys and the corresponding melodies:

Key Name	Melody Name
K1	Yankee Doodle
K2	What a Friend we Have in Jesus
K3	Massa's In De Cold, Cold Ground
K4	Vnterlanders Heimweh
K5	Clementine
K6	Tom Dooley
K7	Londonderry Air
K8	A Parrot that Can Imitate People's Talking
K9	Cachito
K10	La Cucaracha
K11	Bibbidi-Bobbidi-Boo
K12	Children in the Snow
K13	A Doll Story
K14	Michael, Row the Boat Ashore
K15	Camptown Races

Application Circuits

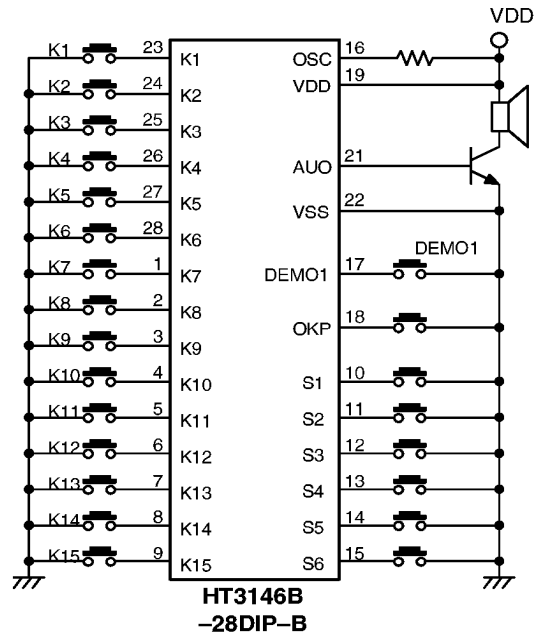
Package form

- HT3146B-A application



*Note: Switch the DEMO2 high to enter the demo mode or low to enter play mode.

- HT3146B-B application



*Note: Press the DEMO1 to toggle enter the demo mode or play mode.