

Features

- Operating voltage: 2.4V~5.0V
- Auto-power-off function
- Few external components required
- A built-in oscillator with one resistor only
- 15 demo songs (512 notes in total)
- 4 kinds of animal voices and one piano tone
- 15 retriggerable input keys, tone area: F3~F5
- Tempo speed adjustable (by mask option)
- Highly stable system frequency
- 28 pin dual-in-line package

General Description

The HT3115/6/7/8 constitute a series of voice piano LSIs implemented in the CMOS technology. This series contains a built-in code-programmable demonstration ROM of 512 notes. The timbre of the demonstration song can be altered by pressing the PIANO key or any key of S1~S4.

There are totally 15 retriggerable tone keys (KEY1~KEY15) in this series. Each tone key represents a specific piano or voice scale. This series of ICs all provide a piano tone and 4 kinds

of animal sounds including dog, bird, frog, and cat. Different voice outputs can be obtained by changing the sampling rate and PCM codes in individual voice section.

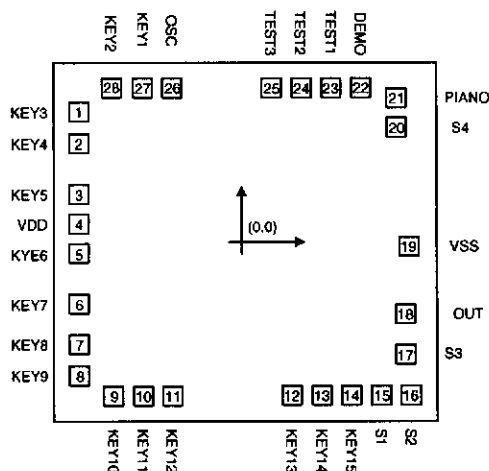
This series of ICs also provides an auto-power-off function. When there is no further key entry or when the demonstration song is terminated, the power is automatically turned off, and the chip reserves the previous voice section state. This series of ICs is enclosed in a 28 pin dual-in-line package.

Pin Assignment

OSC	1	28	NC
KEY1	2	27	TEST2
KEY2	3	26	NC
KEY3	4	25	DEMO
KEY4	5	24	PIANO
KEY5	6	23	S4
VDD	7	22	VSS
KEY6	8	21	OUT
KEY7	9	20	S3
KEY8	10	19	S2
KEY9	11	18	S1
KEY10	12	17	KEY15
KEY11	13	16	KEY14
KEY12	14	15	KEY13

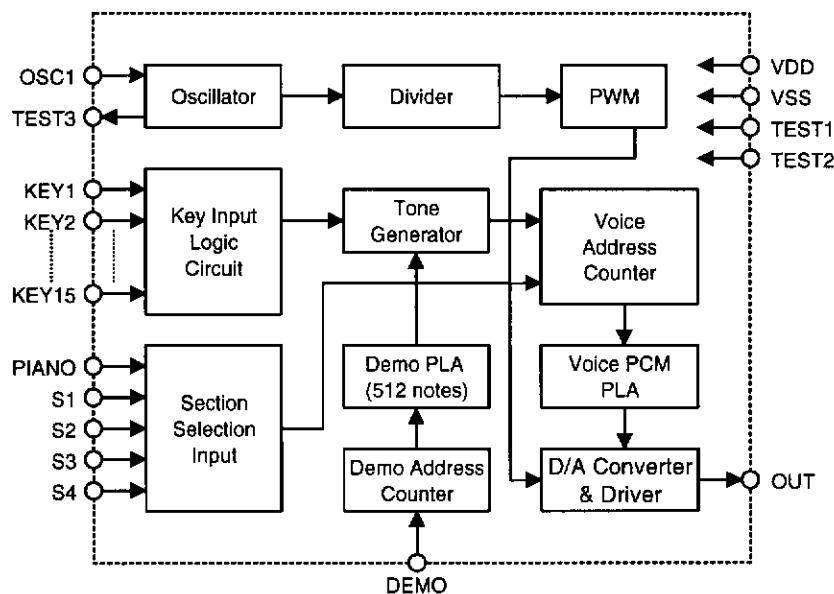
HT3115/6/7/8
- 28 DIP

Pad Assignment



Chip size: $2470 \times 2270 (\mu\text{m})^2$

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

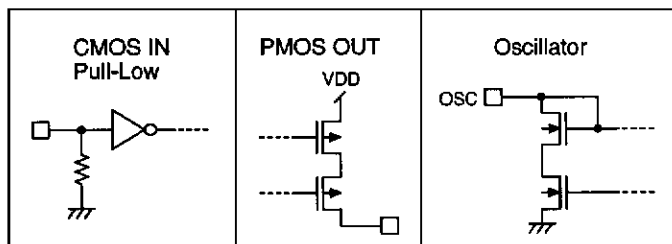
Block Diagram

Pad Coordinates

 Unit: μm

Pad No.	X	Y	Pad No.	X	Y
1	-1018.00	817.00	15	866.00	-965.00
2	-1018.50	619.50	16	1051.00	-965.00
3	-1018.50	301.00	17	1018.00	-705.00
4	-1018.50	116.00	18	1017.50	-451.50
5	-1018.50	-69.00	19	1040.50	-27.00
6	-1018.50	-387.50	20	962.00	718.50
7	-1018.50	-641.50	21	962.00	903.50
8	-1018.50	-839.00	22	742.00	968.00
9	-804.00	-968.00	23	557.00	968.00
10	-619.00	-968.00	24	372.00	968.00
11	-433.50	-968.00	25	187.00	968.00
12	311.00	-965.00	26	-434.00	968.00
13	496.00	-965.00	27	-619.00	968.00
14	681.00	-965.00	28	-804.00	968.00

Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Description
1	OSC	I	NMOS	Oscillator input
2~6	KEY1~KEY5	I	CMOS Pull-Low	Trigger inputs of piano or animal tone The tone scale of KEY1~KEY5 is F3, G3, A3, B3, and C4.
7	VDD	I	—	Power supply (positive)
8~17	KEY6~KEY15	I	CMOS Pull-Low	Trigger inputs of piano or animal tone The tone level of KEY6~KEY15 is D4, E4, F4, G4, A4, B4, C5, D5, E5, and F5.
18	S1	I	CMOS Pull-Low	Sound 1 (dog sound) selection input
19	S2	I	CMOS Pull-Low	Sound 2 (frog sound) selection input
20	S3	I	CMOS Pull-Low	Sound 3 (bird sound) selection input
21	OUT	O	PMOS	Sound output to drive an external transistor
22	VSS	I	—	Power supply (ground)
23	S4	I	CMOS Pull-Low	Sound 4 (cat sound) selection input
24	PIANO	I	CMOS Pull-Low	Sound 5 (piano timbre) selection input
25	DEMO	I	CMOS Pull-Low	Demonstration melody trigger input (toggle ON/OFF)
27	TEST2	I	CMOS Pull-Low	For IC test only
26, 28	NC	—	—	No connection

Approximate Internal connection circuits


Absolute Maximum Ratings

Supply Voltage -0.3V to 5.5V Operating Temperature..... -20°C to 75°C
 Input Voltage..... $V_{SS}-0.3V$ to $V_{DD}+0.3$ Storage Temperature..... -50°C to 125°C

Electrical Characteristics

(Ta=25°C)

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
		V _{DD}	Condition				
V _{DD}	Supply Voltage	—	—	2.4	3.0	5.0	V
I _{STB}	Stand-by Current	3V	—	—	1	5	μA
I _{DD}	Operation Current	3V	F _{OSC} =866KHz No load	—	350	500	μA
I _{OH}	Max. Tone Output Source Current	3V	V _{OH} =0.6V	-1.8	-2.5	—	mA
V _{IL}	"L" Input Voltage	—	—	—	—	0.2V _{DD}	V
V _{IH}	"H" Input Voltage	—	—	0.7V _{DD}	—	—	V
F _{OSC}	System Frequency (for TEST3)	3V	R _{OSC} =126KΩ	—	866	—	KHz

Functional Description

 Compass — (When F_{osc}=866065Hz)

Key No.	Note	Output Cycle Frequency (Hz)	Standard Cycle Frequency (Hz)	Err%	Err Cent
KEY1	F3	174.61	174.61	0.000	0.00
KEY2	G3	195.95	196.00	0.026	0.43
KEY3	A3	219.82	220.00	0.082	1.38
KEY4	B3	247.45	246.94	-0.207	3.47
KEY5	C4	260.87	261.63	0.290	4.88
KEY6	D4	294.59	293.67	-0.313	5.27
KEY7	E4	330.57	329.63	-0.285	4.79
KEY8	F4	349.23	349.23	0.000	0.00
KEY9	G4	393.68	392.00	-0.429	7.20
KEY10	A4	441.88	440.00	-0.427	7.18
KEY11	B4	492.10	493.88	0.360	6.06
KEY12	C5	521.74	523.25	0.289	4.85
KEY13	D5	585.20	587.33	0.363	6.10
KEY14	E5	656.13	659.26	0.475	7.98
KEY15	F5	698.46	698.46	0.000	0.00

* Note: $Err\% = \frac{F_s - F_o}{F_s} \times 100\%$, $Err\ Cent = \left| \frac{Err\ \%}{\sqrt{2} - 1} \right|$

where F_s is the standard frequency and F_o is the output frequency.