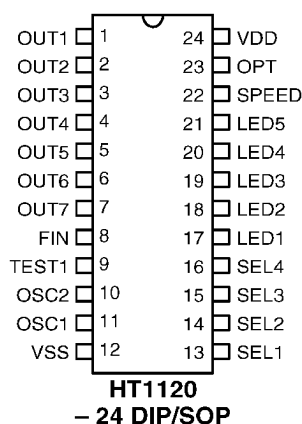# HOLTEK

HT1120
Chase Me Game Controller

Features

- Operating voltage: 2.4V~5.0V
- Four kinds of animal sound controlling outputs
- Four key inputs
- Five LED indication
- LED5 flash for "fail" indication
- LED1~LED4 sequential flash for "pass" indication
- LED1~LED4 for 4 kinds of animal sound indication

- 3 or 4 key selection
- Two speed selection
- "Select" sound controlling output
- "Fail" melody controlling output
- "Pass" melody controlling output
- Seven successive passes for a round
- Five rounds for a game
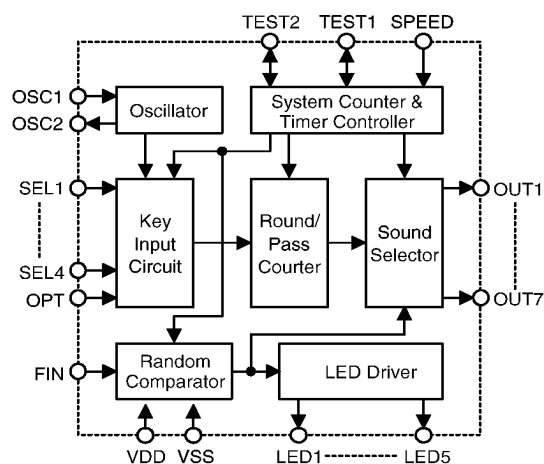- Working with HT2887D sound generator
- 24 pin DIP/SOP

General Description

The HT1120 is a chase me game controller IC. It can output four kinds of animal sounds as well as three kinds of prompting sounds when combined with the HT2887D. These four kinds of animal sounds are randomly produced. The corresponding LED will flash with respect to the sound produced. A correct guess is made if the key corresponding to the output animal sound is pressed within the assigned time. Oth-

erwise, a wrong guess is made. A round is comprised by seven successive passes and five rounds in succession achieves the game. However, the according prompting sounds will be yielded regardless of making a wrong guess, passing or pressing a selection key. In addition, the HT1120 provides 5 LEDs for indication of various statuses.
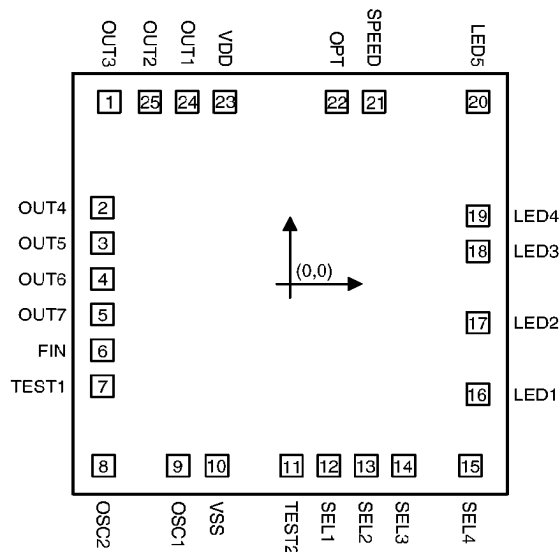
Pin Assignment

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OUT1 |1        24| VDD
OUT2 |2        23| OPT
OUT3 |3        22| SPEED
OUT4 |4        21| LED5
OUT5 |5        20| LED4
OUT6 |6        19| LED3
OUT7 |7        18| LED2
FIN  |8        17| LED1
TEST1|9        16| SEL4
OSC2 |10       15| SEL3
OSC1 |11       14| SEL2
VSS  |12       13| SEL1
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HT1120
– 24 DIP/SOP

Block Diagram

Pad Coordinates

Chip size: $113 \times 115 \ (\text{mil})^2$

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

Unit: mil

Pad No.	X	Y	Pad No.	X	Y
1	−48.83	51.37	14	30.60	−51.41
2	−50.67	21.53	15	48.60	−51.41
3	−50.67	11.45	16	50.67	−31.16
4	−50.67	1.37	17	50.67	−11.00
5	−50.67	−8.71	18	50.67	9.16
6	−50.67	−18.79	19	50.67	19.24
7	−50.67	−28.87	20	50.67	51.37
8	−50.31	−51.41	21	22.64	51.37
9	−30.24	−51.41	22	12.56	51.37
10	−19.80	−51.41	23	−17.69	51.37
11	0.36	−51.41	24	−27.77	51.37
12	10.44	−51.41	25	−37.85	51.37
13	20.52	−51.41			

Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Descriptions
1	OUT1	O	CMOS	Active low output. It is used to control KEY1 of the HT2887D which generates a dog sound.
2	OUT2	O	CMOS	Active low output. It is used to control KEY2 of the HT2887D which generates a bird sound.
3	OUT3	O	CMOS	Active low output. It is used to control KEY3 of the HT2887D which generates a frog sound.
4	OUT4	O	CMOS	Active low output. It is used to control KEY4 of the HT2887D which generates a chicken sound.

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Pin No.	Pin Name	I/O	Internal Connection	Descriptions
5	OUT5	O	CMOS	Active low output. It is used to control KEY5 of the HT2887D which generates a sound indicating a selection key is pressed.
6	OUT6	O	CMOS	Active low output. It is used to control KEY6 of the HT2887D which generates a prompting sound indicating a wrong guess.
7	OUT7	O	CMOS	Active low output. It is used to control the DEMO key of the HT2887D which generates a prompting sound indicating "pass".
8	FIN	I	CMOS	Connected to OSC2 pin of the HT2887D. FIN pin is used to generate random signals which control the four kinds of animal sounds.
9	TEST1	I/O	CMOS	For IC test only
10	OSC2	O	CMOS	Oscillator output
11	OSC1	I	CMOS	Oscillator input
12	VSS	I	—	Negative power supply (GND)
13	SEL1	I	CMOS Pull-High	A selection key corresponds to OUT1. A correct guess is made by pressing this key within the assigned time after a dog sound is output which is generated by activating OUT1 upon the HT2887D.
14	SEL2	I	CMOS Pull-High	A selection key corresponds to OUT2. A correct guess is made by pressing this key within the assigned time after a bird sound is output which is generated by activating OUT2 upon the HT2887D.
15	SEL3	I	CMOS Pull-High	A selection key corresponds to OUT3. A correct guess is made by pressing this key within the assigned time after a frog sound is output which is generated by activating OUT3 upon the HT2887D.
16	SEL4	I	CMOS Pull-High	A selection key corresponds to OUT4. A correct guess is made by pressing this key within the assigned time after a chicken sound is output which is generated by activating OUT4 upon the HT2887D.
17~20	LED1~LED4	O	CMOS	1. LED1 will be lit when OUT1 is active. However, LED1 will be turned off when a selection key is pressed, and so forth. 2. LED1~LED4 will flash in sequence and be turned off after around four cycles if a wrong guess is made. On the other hand, only LED1~LED3 will be active when OPT pin is low. 3. All of LED1~LED4 are active low.
21	LED5	O	CMOS	LED5 will flash eight times and stop if a wrong guess is made. Active low

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Pin No.	Pin Name	I/O	Internal Connection	Descriptions
22	SPEED	I	CMOS Pull-High	This pin is used for selecting the progressing speed of the game. SPEED=high: fast speed SPEED=low: slow speed
23	OPT	I	CMOS Pull-High	OPT=high: four kinds of animal sound output, namely dogs, birds, frogs and chickens OPT=low: three kinds of animal sound output, namely dogs, birds and frogs
24	VDD	I	—	Positive power supply with a range from 2.4V~5.0V

Absolute Maximum Ratings

Supply Voltage ....−0.3V to 5.5V

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

Storage Temperature ....−55°C to 125°C

Operating Temperature ....0°C to 75°C

Electrical Characteristics

(Ta=25°C)

Symbol	Parameter	Test Condition V_{DD}	Test Condition Condition	Min.	Typ.	Max.	Unit
V_{DD}	Operating Voltage	—	—	2.4	3	5	V
I_{DD}	Operating Current	3V	No load	—	40	120	μA
I_{STB}	Stand-by Current	3V	Oscillator off	—	0.5	3	μA
V_{IH}	Input High Voltage	3V	—	$0.8V_{DD}$	—	3V	V
V_{IL}	Input Low Voltage	3V	—	0	—	0.2VDD	V
I_{OH1}	OUT1~OUT7 Source Current	3V	V_{OH}=2.7V	−0.2	−0.5	—	mA
I_{OL1}	OUT1~OUT7 Sink Current	3V	V_{OL}=0.3V	0.4	1	—	mA
I_{OH2}	LED1~LED5 Source Current	3V	VOH=2.7V	−0.7	−1.8	—	mA
I_{OL2}	LED1~LED5 Sink Current	3V	V_{OL}=0.3V	1.5	4	—	mA
R_{PH1}	SEL1~SEL4 Pull-High Resistor	3V	V_{IL}=0V	150	350	700	KΩ
R_{PH2}	SPEED, OPT Pull-High Resistor	3V	V_{IL}=0V	150	350	700	KΩ
F_{SYS}	System Frequency	3V	R_{OSC}=270K C_{OSC}=0.01μF	—	320	700	Hz

Functional Description

The HT1120 is a chase me game controller IC. It provides four kinds of animal sounds, namely dogs, chickens, frogs and birds, as well as three kinds of prompting sounds by controlling the external sound effect generator of the HT2887D. Five LEDs can be driven to indicate various conditions. In addition, the HT2887D provides 4 key inputs.

Circuit connection
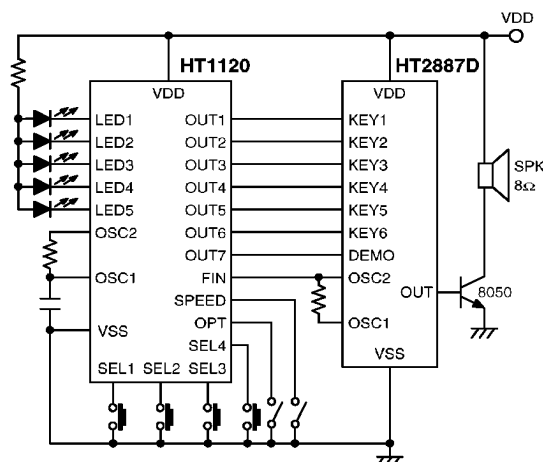
Sounds of the HT2887D

KEY1	Dog sound
KEY2	Bird sound
KEY3	Frog sound
KEY4	Chicken sound
KEY5	Sound for pressing a selection key
KEY6	Sound for making a wrong guess
KEY7	Sound for pass

Operation

• **Stand-by state**

The HT1120 and HT2887D stay at the stand-by state if no key is input after the power is turned on. At this time, the oscillator will be switched off, and OUT1~OUT7 as well as LED1~LED5 remain high, and only little power will be consumed (<1μA Typ.).

During operation, the IC goes into the stand-by state after LED5 flashes if a wrong guess is made.

• **Game procedure**

The HT1120 is triggered by pressing one of SEL1~SEL4. KEY5 of the HT2887D will gen-erate a sound indicating the pressing of a selection key. After that, the game starts. An animal sound is yielded once the game begins. In addition, the corresponding LED will be turned on. The correspondence of the animal sounds, LEDs and selection keys is shown in the following table:

Activated Output	Sound	LED	Correct Selection Key
OUT1	Dogs	LED1	SEL1
OUT2	Birds	LED2	SEL2
OUT3	Frogs	LED3	SEL3
OUT4	Chickens	LED4	SEL4

A right guess is made when the correct selection key is pressed within the assigned time after the animal sound is output. Otherwise, a wrong guess is made. For instance, LED1 will flash when dog sounds are output. At this time, a right guess is made by pressing SEL1. If the remaining keys (SEL2~SEL3) are pressed instead, a wrong guess is made. What's more, the answer is wrong if no press-ing is made within the assigned time.

* A wrong guess

A voice indicating wrong guesses is gener-ated if a wrong guess is made. LED5 will flash about eight times. After that, the IC enters the stand-by state and waits for the restart of a new game.

* A right guess

An animal sound is output every a period of time when a right guess is made. The an-swer is counted a right answer only if the correct selection key is pressed within the assigned time.

* A round

A round is achieved by making the right guesses seven times successively. At this time, music indicating "pass" is played, and LED1~LED4 will flash four times in se-quence. Afterwards, the next round comes into play. The speed for animal sound out-put in the current round will always be faster than that in the previous round. The music indicating "pass" will be played once when the first round is achieved, and it will be played twice when the second round is achieved, and so on. The maximum number of the game round is five. When the fifth round is achieved, music indicating "pass" will be played five times, and LED1~LED4 will flash four times in sequence. Then, the game restarts from the first round.

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• Speed for game procedure

The speed of the procedure of a game is determined by the SPEED pin as well as the round number of the game.

* Time limit

The right selection key has to be pressed within the assigned time right after an animal sound is generated.

Speed	Time Limit
0	1.8 seconds
1	1.2 seconds

Note: 0=VSS;
    1=VDD or open

* The interval between the pressing of the correct selection key and the output of an animal sound is influenced by the SPEED pin as well as the number of the round achieved.

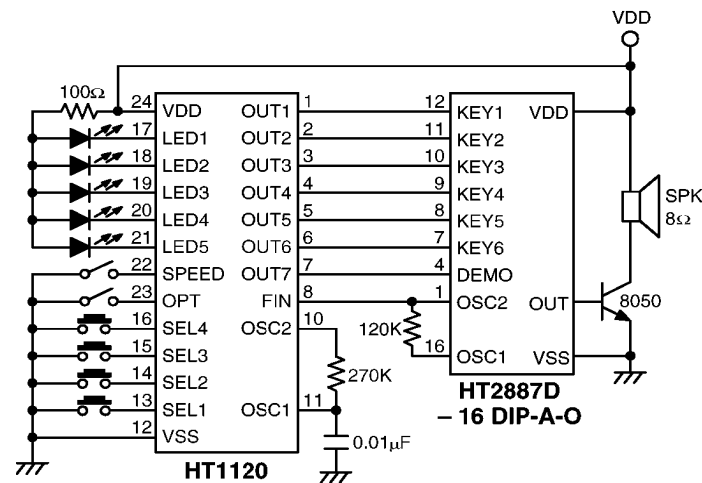| Speed	Duration				
	1st Round	2nd Round	3rd Round	4th Round	5th Round
0	1.2 s	1 s	0.8 s	0.6 s	0.4 s
1	1.8 s	1.6 s	1.4 s	1.2 s	1 s

• Selection for the number of animal sounds

The OPT pin is used to select the three kinds of animal sounds or four kinds of animal sounds. All of SEL1~SEL4, OUT1~OUT4 and LED1~LED4 are active when the four kinds of animal sounds are selected. On the other hand, only SEL1~SEL3, OUT1~OUT3 and LED1~LED3 are active when the three kinds of animal sounds are chosen.
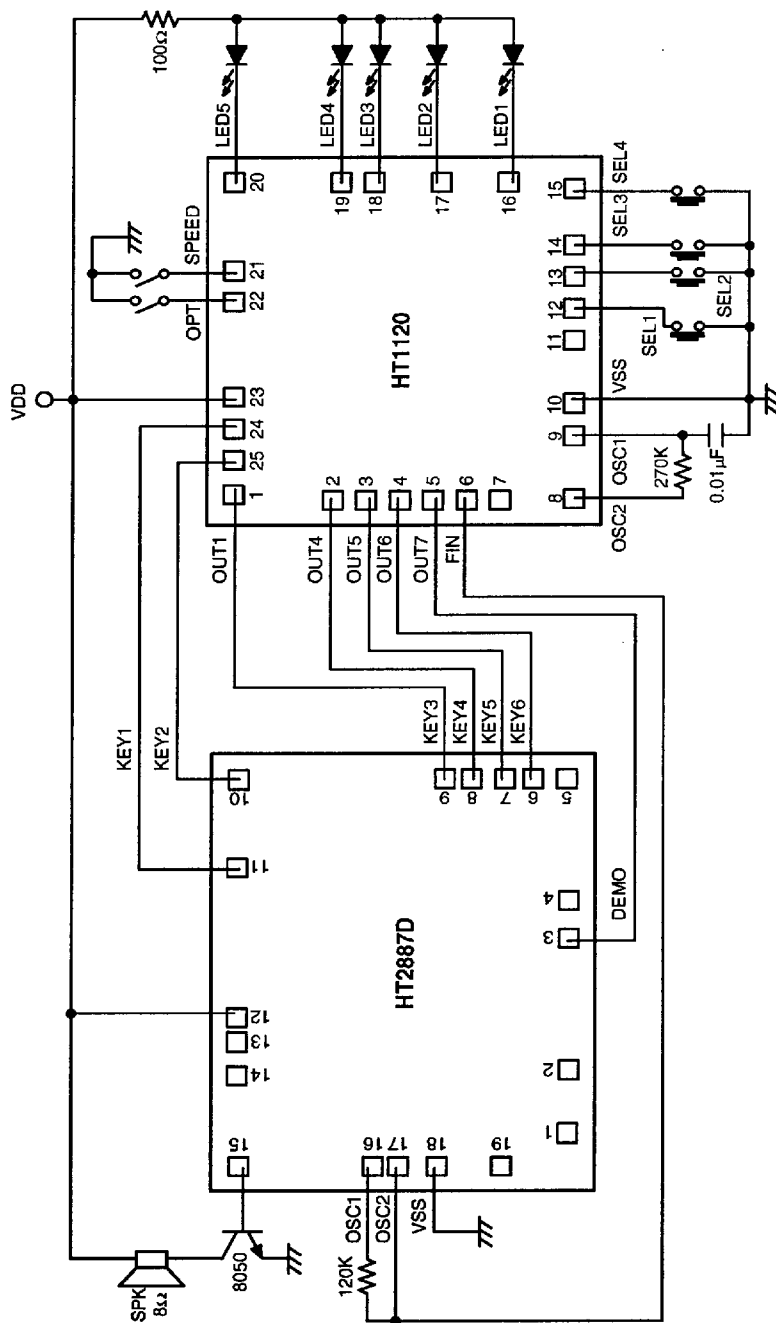
OPT	Animal Sounds
0	3
1	4

Note: 0=VSS;
    1=VDD or open

Application Circuit

Package form

Chip form