HT3012
Rhythm Generator

Features

- Operating voltage: 2.4V~5.0V
- Direct drive output transistor
- Low standby current
- Minimal external components
- Demo function
- Key function: retriggerable

- 2 output pins for:
  - OUT1B=LED flash (4Hz) output
  - OUT2B=LED indicator following sound level output
- Dice form or package form

Applications

- Toys
- Rhythm generator

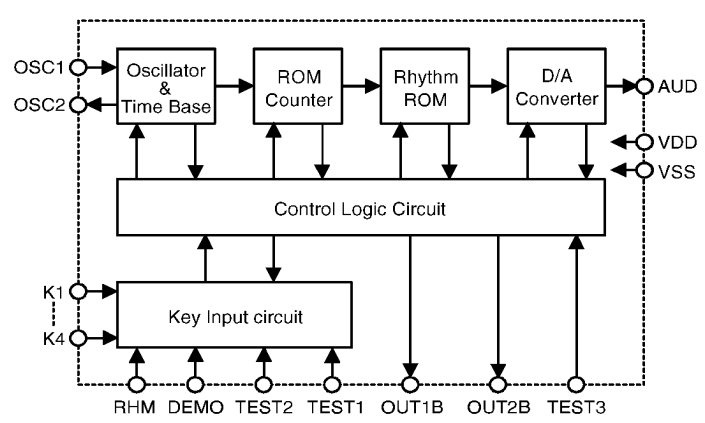- Sound effect generator

General Description

The HT3012 is a single chip rhythm generator, capable of generating 4 drums and 4 fill-in sounds. It can run in either auto or manual mode.

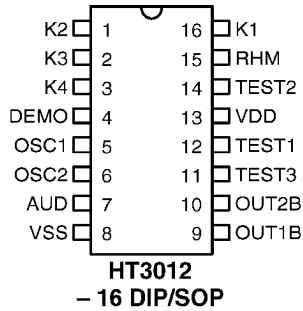In manual mode the input pins K1~K4 select the various drum sounds, while in auto mode the same pins add fill-in sounds to the continu-ously playing rhythm. Auto or manual mode is selected by the toggle action RHM pin.

There are 2 indicator outputs provided; one provides a flashing LED output and the other a sound level indicator. The IC is offered in dice form or package form.
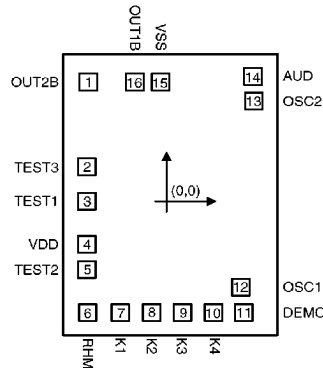
Block Diagram

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Pin Assignment

HT3012
– 16 DIP/SOP

Pad Coordinates

Unit: μm

Chip size: $1460 \times 2180 \ (\mu m)^2$

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

Pad No.	X	Y	Pad No.	X	Y
1	−535.25	852.75	9	108.65	−796.75
2	−546.25	246.85	10	321.45	−796.75
3	−546.35	−0.85	11	528.05	−796.75
4	−546.35	−307.25	12	509.05	−615.65
5	−546.35	−487.65	13	596.35	717.75
6	−538.05	−796.75	14	590.75	892.75
7	−315.45	−796.75	15	−41.85	852.75
8	−102.95	−796.75	16	−217.85	852.75

Pad Description

Pad No.	Pad Name	I/O	Internal Connection	Description
1	OUT2B	O	NMOS Open Drain	Sound level indicator, open drain, low active output
2	TEST3	I	—	For IC test only
3	TEST1	I	—	For IC test only
4	VDD	I	—	Positive power supply
5	TEST2	I	—	For IC test only
6	RHM	I	Pull-High	Manual or auto mode selection input. Toggle function, low active.
7	K1	I	Pull-High	Trigger key input, low active

Pad No.	Pad Name	I/O	Internal Connection	Description
8	K2	I	Pull-High	Trigger key input, low active
9	K3	I	Pull-High	Trigger key input, low active
10	K4	I	Pull-High	Trigger key input, low active
11	DEMO	I	Pull-High	Trigger key, low active. One demo rhythm is played 7 times. See functional description for more details.
12	OSC1	I	—	Oscillator input pin
13	OSC2	O	—	Oscillator output pin
14	AUD	O	PMOS Output	Sound output for driving external transistor
15	VSS	—	—	Negative power supply (GND)
16	OUT1B	O	NMOS Open Drain	4Hz flash output, low active output

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 70°C

*Note: Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Functional operation of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extened periods may affect device reliability.

Electrical Characteristics

(Ta=25°C)

Symbol	Characteristic	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.4	3	5.0	V
I_{DD}	Operating Current	3V	F_{OSC}=180kHz No load.	—	150	300	µA
I_{STB}	Standby Current	3V	—	—	1	3	µA
I_O	Max. AUD Output Current	3V	V_{OH}=0.6V	−1.5	−2.5	—	mA
I_{OL}	OUTB Pin Sink Current	3V	V_{OL}=0.3V	3.0	5.0	—	mA
V_{IL}	"L" Input Voltage	—	—	—	—	0.2V_{DD}	V
V_{IH}	"H" Input Voltage	—	—	0.8V_{DD}	—	—	V
T_{KEY}	Key Debounce Time	—	F_{OSC}=180kHz	—	7.5	—	ms

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Functional Description

K1~K4 function

All of the 4 trigger keys can be optioned as retriggerable or nonretriggerable. Manual or auto selection is controlled by the toggle action RHM pin.

Key	Manual	Auto
K1	Drum 1	Fill-in 1
K2	Drum 2	Fill-in 2
K3	Drum 3	Fill-in 3
K4	Drum 4	Fill-in 4

RHM function

The HT3012 can be operated in either manual or auto mode, determined by the RHM toggle action pin. In the manual mode the pins K1~K4 control which drum sound to be played whereas in the auto mode pins K1~K4 add fill-in sound to the continuously playing rhythm, and the rhythm is played continuously until the manual mode is re-entered or power is off.

DEMO function

In the manual mode, when the DEMO key is pressed, the LSI enters the demo mode and the demo rhythm is played 7 times and then stops. At this time, the system goes into the manual mode.

There is one thing that should be noted. In the demo mode, when the demo rhythm is being played pressing one of the keys K1~K4 causes the corresponding fill-in to play twice. After that, the system returns to the demo mode, where the demo rhythm will be played for 5 times more. Then, the LSI goes to the manual mode.

However, if the RHM key is pressed when the demo rhythm is being played the system will switch to auto mode. In the auto mode, the rhythm will be played continuously until the RHM key is pressed, and then enters the manual mode. Notice that in the auto mode, the DEMO key is disabled.
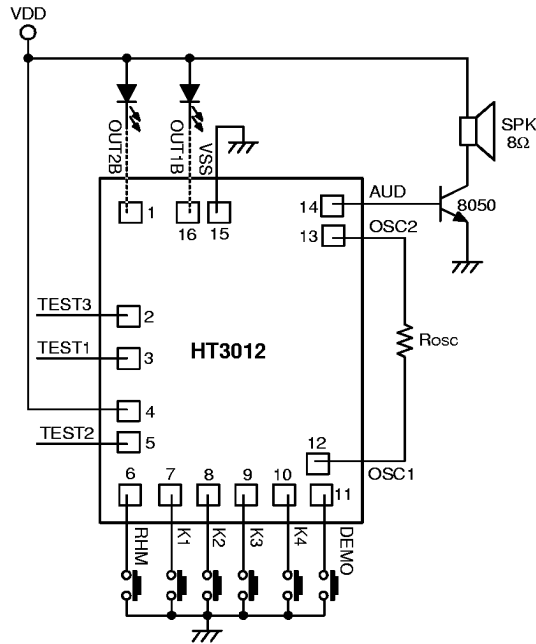
OUT pins

Both OUT1B and OUT2B indicate various output functions. OUT1B is a 4Hz LED flash output and OUT2B displays the sound level.
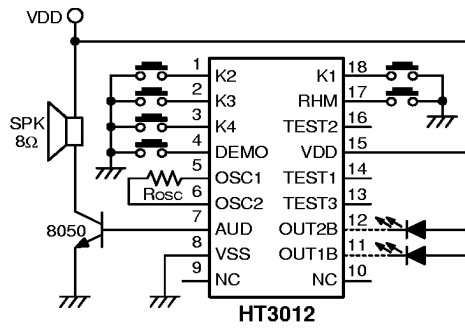
Operation sequence

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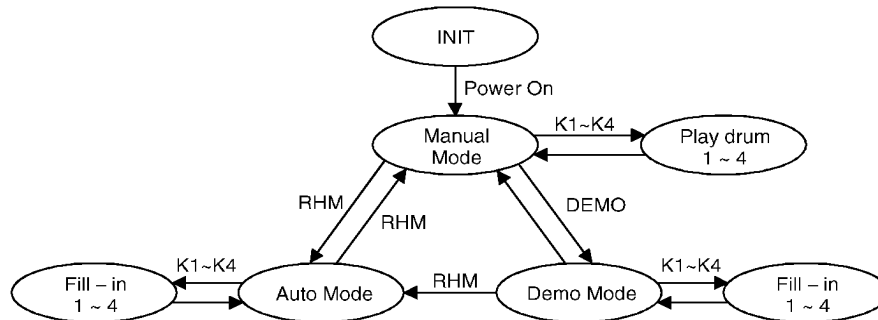
Application Circuit

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

| | Function | Manual Mode | | | | Auto Mode | | | | Rosc |
Type		K1	K2	K3	K4	K1	K2	K3	K4	
3012A		Ride Cymbal	Bass Drum	Low Conga	Snare Drum	Fill-in 1	Fill-in 2	Fill-in 3	Fill-in 4	82K