

### Features

- CMOS Metal-Gate Process Technology
- Operating voltage: 1.2V~4.5V
- Low standby current: 1 $\mu$ A Typ. at 3V
- Built-in oscillator (F<sub>OSC</sub>: 32KHz)
- ON/OFF control function for the HT2013H, HT2013M, HT2013L
- 1/8 duty cycle output
- Directly driving an LED
- Minimum external components
- TO-92 package (only for the HT2012H, HT2014M, HT2014L)
- Flash rate options:
  - HT2013H  $\rightarrow$  about 4Hz
  - HT2012H  $\rightarrow$  about 4Hz (No ON/OFF control function)
  - HT2013M  $\rightarrow$  about 2Hz
  - HT2014M  $\rightarrow$  about 2Hz (No ON/OFF control function)
  - HT2013L  $\rightarrow$  about 1Hz
  - HT2014L  $\rightarrow$  about 1Hz (No ON/OFF control function)

### General Description

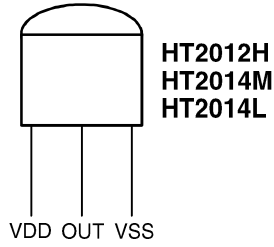
The HT201XX series is a low cost, low power CMOS LSI chip designed for lamp and LED flash drivers. It can be operated without any external components, thus suitable for applica-

tions on flashing badges, gift cards, flashing earrings, and other products that require flashing lights.

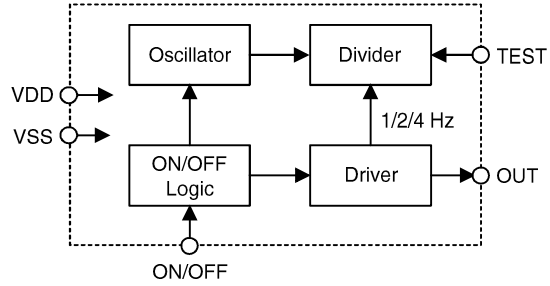
### Selection Table

Part No.	Flash Rate	ON/OFF Control		Package	
		Yes	No	TO-92	Dice
HT2013H	4Hz	√			√
HT2012H	4Hz		√	√	√
HT2013M	2Hz	√			√
HT2014M	2Hz		√	√	√
HT2013L	1Hz	√			√
HT2014L	1Hz		√	√	√

**Pin Assignment**

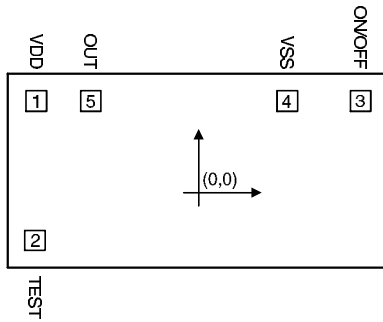


**Block Diagram**



**Pad Coordinates**

Unit: mil



Pad No.	X	Y
1	-23.9	13.5
2	-24.13	-7.055
3	23.89	13.5
4	13.09	13.5
5	-15.89	13.5

Chip size:  $60 \times 38$  (mil)<sup>2</sup>

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

**Pad Description**

Pad No.	Pad Name	I/O	Internal Connection	Description
1	VDD	—	—	Power supply (positive)
2	TEST	—	—	For IC test only
3	ON/OFF	I	CMOS Pull-High	Lamp/LED flash ON/OFF control pad
4	VSS	—	—	Power supply (ground)
5	OUT	O	NMOS Open Drain	Lamp/LED flash output

**Absolute Maximum Ratings**

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

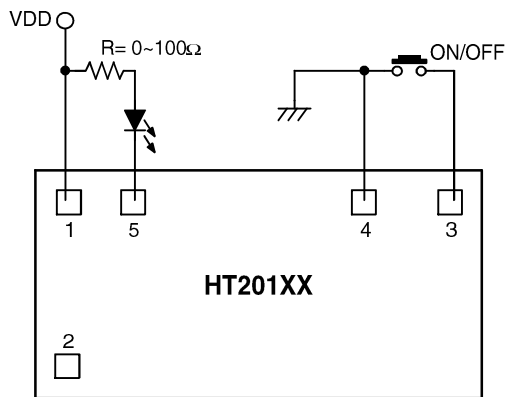
**Electrical Characteristics**

( $T_a=25^\circ C$ )

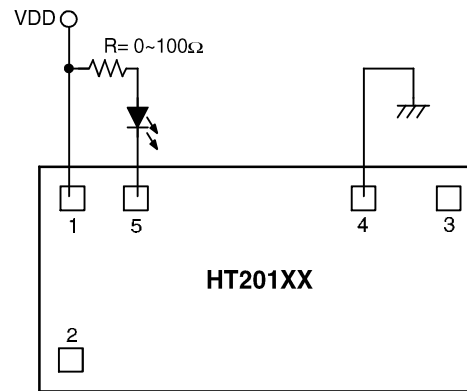
Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Units
		VDD	Condition				
V <sub>DD</sub>	Operating Voltage	—	—	1.2	3	4.5	V
I <sub>STB</sub>	Standby Current	3V	—	—	1	2	μA
I <sub>DD</sub>	Operating Current	3V	No load	—	200	500	μA
I <sub>OL</sub>	OUT Pad Sink Current	1.5V	V <sub>OL</sub> =0.15V	5	12	—	mA
		3V	V <sub>OL</sub> =0.3V	10	30	—	mA
F <sub>OSC</sub>	System Frequency	3V	—	—	32K	—	Hz

**Application Circuit**

Chip form with ON/OFF control



Chip form without ON/OFF control



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

Package form application

