

### Features

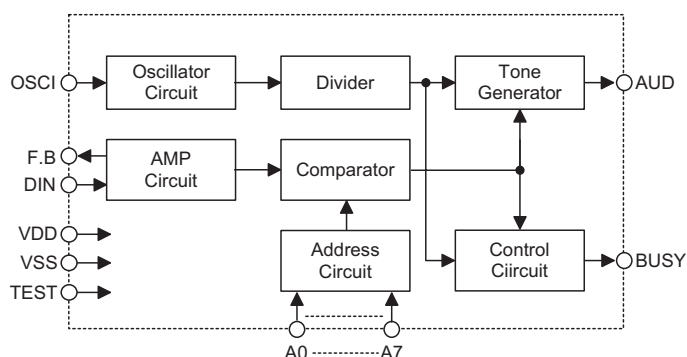
- Operating voltage: 2.4V~5.0V
- Built-in AMP
- 2-channel dual tone generator
- One pin oscillator
- Current type D/A output
- Tone optional: Ding-Dong/Westminster's tunes
- Pair with HT12E encoder
- 16-pin DIP package

### General Description

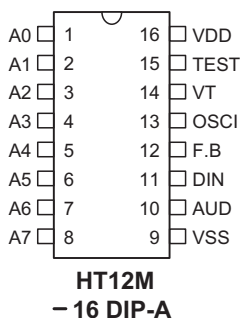
The main application area for the HT12M device is for remote control doorbells working together with HT12E. Containing all the functions of the Holtek HT12D decoder and with an added amplifier and tone generator, the device eliminates the need for customers to incorporate an external op-amp and tone generator IC within their product applications, in the process significantly reducing overall product costs.

In addition to being fully compatible with the HT12D circuitry, the device includes the following features; internal Inverting AMP with can also operate as standard independent inverter, internal 2 channel tone generator and current type audio output.

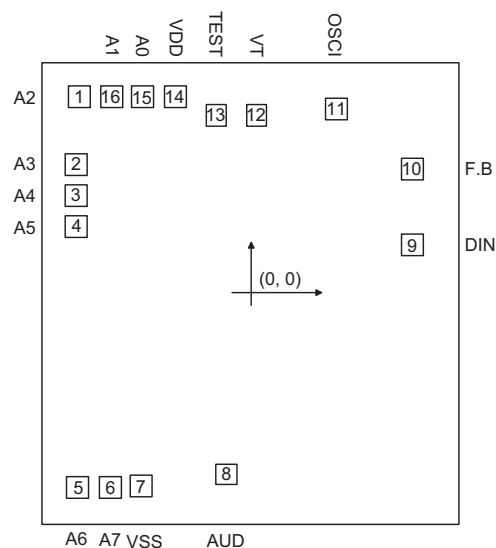
### Block Diagram



### Pin Assignment



## Pad Assignment



Chip size: 1530 × 1690 μm

## Pad Coordinates

Unit: μm

Pad No.	X	Y
1	-610.00	701.90
2	-622.00	461.60
3	-622.00	350.60
4	-622.00	239.70
5	-616.00	-695.20
6	-502.00	-695.20
7	-388.50	-687.70
8	-87.95	-647.80
9	575.80	172.40
10	575.80	444.20
11	308.30	660.40
12	22.10	635.90
13	-122.40	638.40
14	-270.40	701.90
15	-384.50	701.90
16	-495.50	701.90

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

## Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Description
1~8	A0~A7	I	NMOS Open Drain	Address pin
9	VSS	—	—	Negative power supply, ground
10	AUD	O	PMOS Open Drain	Audio out
11	DIN	I	COMS IN	Serial data input
12	F.B	O	CMOS	Amp feed back
13	OSCI	I	—	Oscillator input pin
14	VT	O	CMOS	Busy, data valid
15	TEST	I	CMOS IN	Test pin
16	VDD	—	—	Positive power supply

## Absolute Maximum Ratings

Supply Voltage .....	$V_{SS}-0.3V$ to $V_{SS}+5.5V$	Storage Temperature .....	-50°C to 125°C
Input Voltage .....	$V_{SS}-0.3V$ to $V_{DD}+0.3V$	Operating Temperature .....	-25°C to 70°C

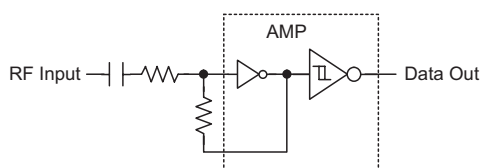
Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

## D.C. Characteristics

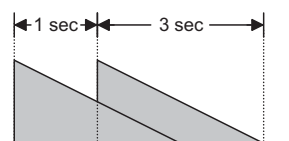
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V <sub>DD</sub>	Conditions				
V <sub>DD</sub>	Operating Voltage	—	—	2.4	—	5	V
I <sub>STB</sub>	Standby Current	5V	OSC stop amp Off	—	0.1	1	μA
		5V	OSC stop amp On	—	10	20	μA
I <sub>DD</sub>	Operating Current	5V	No load f <sub>OSC</sub> =150kHz	—	1.5	2	mA
I <sub>AUD</sub>	AUD Output Current	5V	Transistor B load	3	5	—	mA
I <sub>VT</sub>	VT Output Source Current	5V	V <sub>OH</sub> =4.5V	-2	-3	—	mA
	VT Output Sink Current	5V	V <sub>OL</sub> =0.5V	2	3	—	mA
V <sub>IH</sub>	High Input Voltage	5V	—	3.5	—	5	V
V <sub>IL</sub>	Low Input Voltage	5V	—	0	—	1	V
f <sub>OSC</sub>	Oscillator Frequency	5V	R <sub>OSC</sub> =820kΩ	—	190	—	kHz

## Functional Description

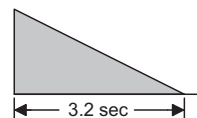
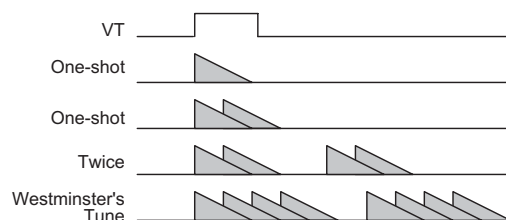
### Built-in Inverter Amp



Single tone has 4 second total length, dual tone has 1 second total length.



### Trigger Mode



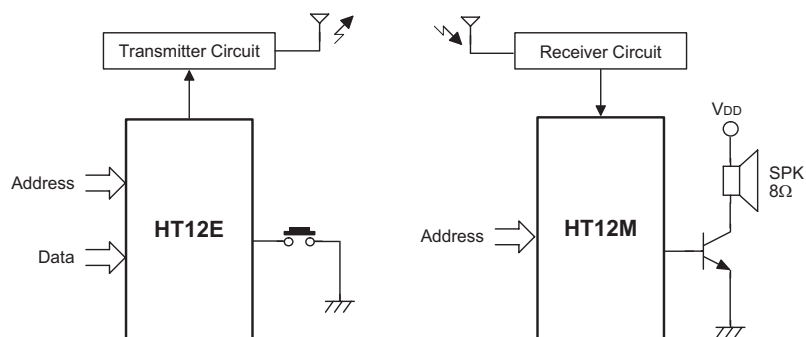
The Ding-Dong sound: is determined by the D8~D11 pins on the HT12E. While the Re-trigger/Non-trigger function is determined by the D11 pin on the HT12E.

	D11	D10	D9	D8	Sound	Notes
1		0	0	0	Mi	1
2		0	0	1	Mi Do	2
3		0	1	0	Mi Do — Mi Do	Repeat
4		0	1	1	Mi/Do	Single tone
5		1	0	0	Mi Do Re Sol — Sol Re Mi Do	Westminster's tune
6		1	0	1	Mi/Do Do/Sol	Double tone
7		1	1	0	Sol Re Mi Do	4
8		1	1	1	Mi/Do Do/Sol — Mi/Do Do/Sol	Dual Tone-repeat

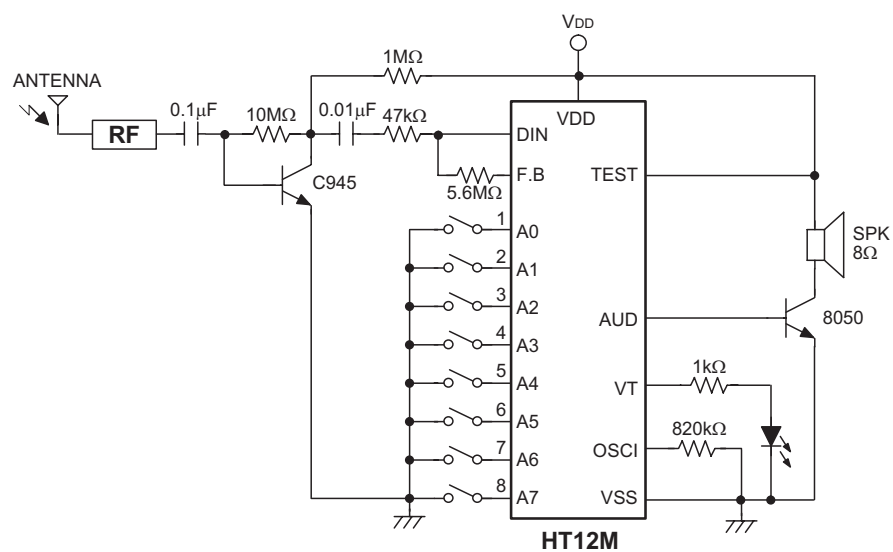
Note: Section time: 0.8sec × 2 = 1.6sec

## Application Circuit

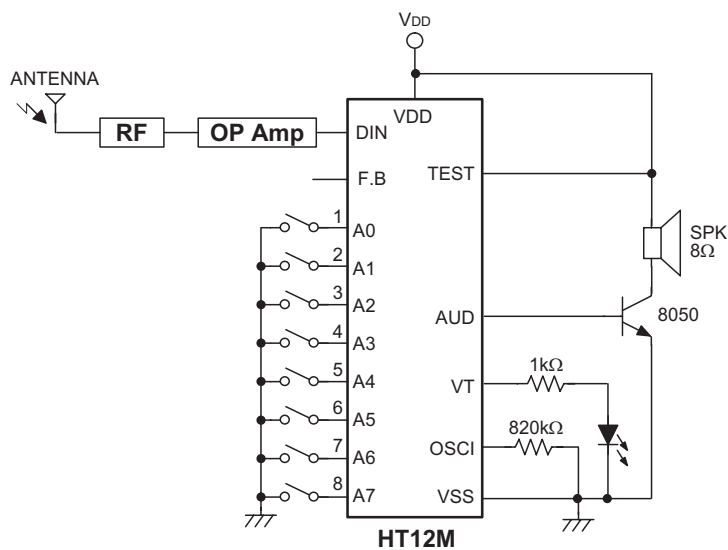
### HT12E/HT12M Pairing Application Circuit



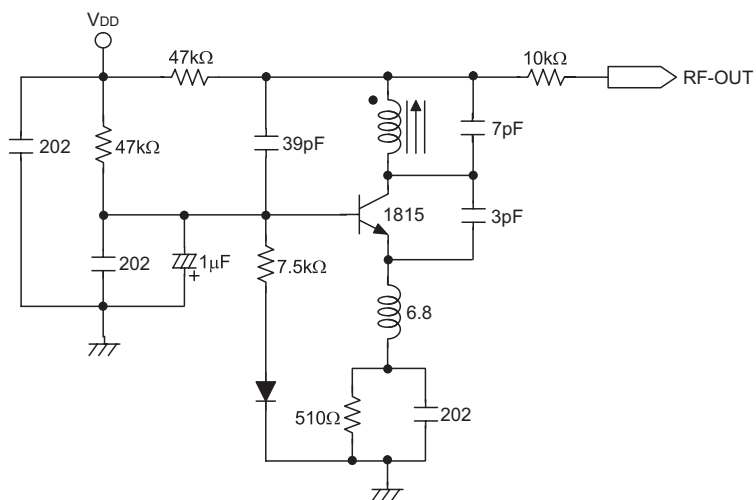
### Using Internal OP Amplifier Circuit

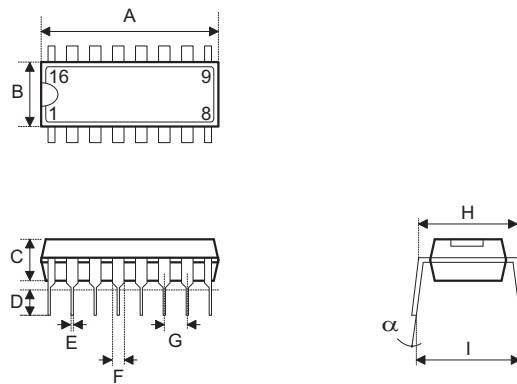


### Using External OP Amplifier Circuit



### Typical RF-Receiver Circuit



**Package Information**
**16-pin DIP (300mil) Outline Dimensions**


Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	745	—	775
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
$\alpha$	0°	—	15°

**Holtek Semiconductor Inc. (Headquarters)**

No.3, Creation Rd. II, Science Park, Hsinchu, Taiwan  
Tel: 886-3-563-1999  
Fax: 886-3-563-1189  
<http://www.holtek.com.tw>

**Holtek Semiconductor Inc. (Taipei Sales Office)**

4F-2, No. 3-2, YuanQu St., Nankang Software Park, Taipei 115, Taiwan  
Tel: 886-2-2655-7070  
Fax: 886-2-2655-7373  
Fax: 886-2-2655-7383 (International sales hotline)

**Holtek Semiconductor Inc. (Shanghai Sales Office)**

7th Floor, Building 2, No.889, Yi Shan Rd., Shanghai, China 200233  
Tel: 021-6485-5560  
Fax: 021-6485-0313  
<http://www.holtek.com.cn>

**Holtek Semiconductor Inc. (Shenzhen Sales Office)**

43F, SEG Plaza, Shen Nan Zhong Road, Shenzhen, China 518031  
Tel: 0755-8346-5589  
Fax: 0755-8346-5590  
ISDN: 0755-8346-5591

**Holtek Semiconductor Inc. (Beijing Sales Office)**

Suite 1721, Jinyu Tower, A129 West Xuan Wu Men Street, Xicheng District, Beijing, China 100031  
Tel: 010-6641-0030, 6641-7751, 6641-7752  
Fax: 010-6641-0125

**Holmate Semiconductor, Inc. (North America Sales Office)**

46712 Fremont Blvd., Fremont, CA 94538  
Tel: 510-252-9880  
Fax: 510-252-9885  
<http://www.holmate.com>

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