

Features

- Operating voltage: 2.4V~12V
- Low power and high noise immunity CMOS technology
- Low standby current
- Minimum transmission word
 - Four words for $\overline{TE}$ trigger
- Built-in oscillator needs only 5% resistor
- Easy interface with an RF or an infrared transmission medium
- Minimal external components
- 18-pin DIP/20-pin DIP/SOP package

Applications

- Burglar alarm system
- Smoke and fire alarm system
- Garage door controllers
- Car alarm system
- Security system
- Cordless telephones
- Other remote control systems

General Description

The 3¹² encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding 12 bits of information which consists of N address bits and 12-N data bits. Each address/data input is externally trinary programmable if bonded out. They are otherwise set floating internally. Various

packages of the 3¹² encoders offer flexible combinations of programmable address/data to meet various applications. The programmable address/data is transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal.

The image shows two pin diagrams for the HT6062 IC. The left diagram is for the 18-DIP package, and the right diagram is for the 20-DIP/SOP package. Both diagrams show the pin numbers and their corresponding functions.

HT6062 – 18 DIP

Pin	Function
1	VDD
2	DOOUT
3	OSC2
4	OSC1
5	TE
6	AD11
7	AD10
8	AD9
9	VSS
10	AD8
11	AD9
12	AD10
13	AD11
14	TE
15	OSC1
16	OSC2
17	DOOUT
18	VDD

HT6062 – 20 DIP/SOP

Pin	Function
1	VDD
2	DOOUT
3	OSC2
4	OSC1
5	TE
6	AD11
7	AD10
8	AD9
9	VSS
10	NC
11	NC
12	AD8
13	AD9
14	AD10
15	AD11
16	TE
17	OSC1
18	OSC2
19	DOOUT
20	VDD

Pin Description

Pin Name	I/O	Internal Connection	Description
A0~A11	I		Code address Pin Nos. 0~11. These twelve tristate pins are detected by HT6062 to determine the encoded waveform bit 0 ~ bit 11. Each pin can be set to "1", "0" or "f" (floating).
VSS	—		Negative power supply
NC	—		No Connection
$\overline{\text{TE}}$	I		Transmission Enable (Internal pull-high). Active Low Signal. HT6062 outputs the encoded waveform to DOUT when this pin is pulled to low.
OSC1	I		A resistor connected between these two pins determine the fundamental frequency of the HT6062.
OSC2	O		
DOUT	O		Data output pin. The encoded waveform is serially generated to this pin. When HT6062 is not transmitting, DOUT outputs low (V_{SS}) voltage.
VCC	—		Positive power supply

Absolute Maximum Ratings

Supply Voltage.....	-0.3V to 13V	Storage Temperature.....	-50°C to 125°C
Input Voltage.....	$V_{SS}-0.3$ to $V_{DD}+0.3V$	Operating Temperature	-20°C to 75°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.

Electrical Characteristics

Ta=25°C

Symbol	Parameter	Test Conditions		Min.	Typ. (RF Mode)	Max.	Unit
		V _{DD}	Conditions				
V _{DD}	Operating Voltage	—	—	2.4	5	12	V
I _{STB}	Standby Current	5V	Oscillator Stops	—	0.03	—	μA
I _{DD}	Operating Current	5V	No load	—	190	—	μA
I _{DOUT}	Output Drive/Sink Current	5V	V _{IH} = 4.5V, V _{IL} = 0.5V	—	-3/2	—	mA
		5V	V _{IH} = 3V, V _{IL} = 3V	—	-10/7	—	mA
		8V	V _{IH} = 7.2V, V _{IL} = 0.8V	—	-7/4	—	mA
		8V	V _{IH} = 4V, V _{IL} = 4V	—	-16/14	—	mA
		12V	V _{IH} = 10.8V, V _{IL} = -1.2V	—	-13/6.5	—	mA
		12V	V _{IH} = 6V, V _{IL} = 6V	—	-52/26	—	mA

Oscillator Frequency vs. Supply Voltage (Reference Table)
HT6062

Unit	V _{DD}						Oscillator Frequency
R _{osc}	2V	3V	4V	5V	6V	7V	f _{osc}
150kΩ	85.5	102.7	109.2	110.5	111.1	110.9	kHz
180kΩ	73.2	86.5	91.2	92.5	92.6	92	kHz
200kΩ	68	79.7	84	85.4	85.4	84.6	kHz
220kΩ	63.2	73.7	77.6	78.7	78.6	78.1	kHz
240kΩ	57.4	66.3	69.5	70.4	70.4	69.8	kHz
270kΩ	52.6	60.5	63.3	64	64	63.3	kHz
300kΩ	48.1	55	57.5	58.1	58.1	57.4	kHz
330kΩ	44.8	50.8	53	53.6	53.4	52.7	kHz
360kΩ	41.3	46.5	48.5	49.2	49	48.5	kHz
390kΩ	39	43.8	45.4	45.8	45.8	45.4	kHz
430kΩ	34.3	38.2	39.6	40	40	39.5	kHz
470kΩ	31.8	35.4	36.7	37	36.7	36.5	kHz
510kΩ	30.5	33.7	34.9	35.2	35.1	34.7	kHz
560kΩ	27.7	30.5	31.6	31.8	31.7	31.3	kHz
620kΩ	25.1	27.5	28.5	28.7	28.4	28.2	kHz

Unit	V _{DD}						Oscillator Frequency
R _{OSC}	8V	9V	10V	11V	12V	13V	f _{osc}
150kΩ	109.8	109	108.5	107.5	106.8	106.4	kHz
180kΩ	91.7	90.8	90	89.2	88.5	87.7	kHz
200kΩ	84	83.3	82.5	81.8	81.1	80.5	kHz
220kΩ	77.4	76.8	76.2	75.2	74.6	74.3	kHz
240kΩ	69.2	68.5	68.1	67.3	67.1	66.2	kHz
270kΩ	62.8	62.2	61.6	61	60.4	60	kHz
300kΩ	56.8	56.5	55.8	55.2	54.8	54.5	kHz
330kΩ	52.5	51.5	51.3	50.7	50.4	50	kHz
360kΩ	48	47.6	46.7	46.2	45.8	45.8	kHz
390kΩ	45.4	44.6	43.8	43.4	43.1	42.7	kHz
430kΩ	39	38.7	38.1	38.1	37.6	37.4	kHz
470kΩ	35.9	35.7	35.2	34.9	34.7	34.2	kHz
510kΩ	34.3	34	33.5	33.3	32.8	32.4	kHz
560kΩ	31	30.6	30.3	30	29.7	29.4	kHz
620kΩ	27.8	27.5	27.1	26.8	26.6	26.3	kHz

HT6072

Unit	V _{DD}						Oscillator Frequency
R _{OSC}	2V	3V	4V	5V	6V	7V	f _{osc}
27kΩ	134.7	321.7	381.8	408.2	420.8	427.6	kHz
30kΩ	125	295	347.1	368.3	379.1	384.5	kHz
33kΩ	121.7	278.1	324.3	343.1	352.5	357.2	kHz
36kΩ	117.2	261.6	303.4	320.1	328	331.8	kHz
39kΩ	115.4	249.5	287.1	302	308.5	312.5	kHz
43kΩ	111.6	229	261.2	273.6	279	282.2	kHz
47kΩ	111.5	220	248.5	260.5	265.5	267.5	kHz
51kΩ	104.3	203.5	229.3	239.1	243.1	245.1	kHz
56kΩ	99.6	190.1	212.7	221.3	225.1	226.5	kHz
62kΩ	98.8	176.2	196	203	206.1	207.3	kHz

Unit	V _{DD}						Oscillator Frequency
R _{OSC}	2V	3V	4V	5V	6V	7V	f _{OSC}
68kΩ	93.4	167.5	185.5	191.8	194.3	195.5	kHz
75kΩ	89.5	153.5	169.2	174.2	176.5	177	kHz
82kΩ	84	140.3	153.5	157.8	159.6	160.1	kHz
91kΩ	79.6	130.4	142.3	146.3	147.5	147.7	kHz
100kΩ	76.1	120.2	130.1	133.6	134.8	135.2	kHz

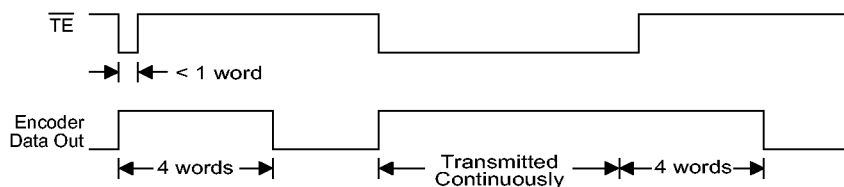
Unit	V _{DD}						Oscillator Frequency
R _{OSC}	8V	9V	10V	11V	12V	13V	f _{OSC}
27kΩ	431.5	433.8	435.2	436.2	436.5	437.2	kHz
30kΩ	387.5	389.1	390.2	390.5	390.7	390.5	kHz
33kΩ	359.5	361.1	361.5	362.1	362.2	362.1	kHz
36kΩ	334.3	335.1	335.3	335.4	335.5	335.5	kHz
39kΩ	314.1	314.8	315.2	315.5	315.4	315	kHz
43kΩ	283.2	284	284	283.9	283.6	283.4	kHz
47kΩ	268.6	269.1	269.5	269.8	268.8	268.1	kHz
51kΩ	245.5	246.2	246.2	246.2	245.2	245.1	kHz
56kΩ	227.1	227.1	227.2	226.5	226.1	226.2	kHz
62kΩ	208.1	207.8	207.5	206.9	206.5	206.1	kHz
68kΩ	196	195.5	195.1	194.8	194.1	193.8	kHz
75kΩ	177	177	176.8	176.1	175.5	175.4	kHz
82kΩ	160.2	159.6	159.6	159.1	158.5	158.0	kHz
91kΩ	147.2	147	146.5	146.2	145.5	145.2	kHz
100kΩ	135	134.6	134.1	133.6	132.8	132.6	kHz

Functional Description

Operation

The 3¹² series of encoders begin a 4-word transmission cycle upon receipt of a transmission enable ($\overline{TE}$). This cycle will repeat itself as long as the transmission enable is held low. Once the transmission enable returns high, the encoder output completes its final cycle and then stops as shown below.

Information word



Transmission timing

Single resistor oscillator

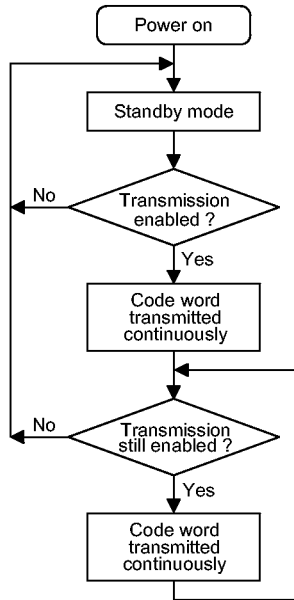
HT6062 encodes the code address and data set at A0~A11 into a special waveform and outputs it to the DOUT when $\overline{TE}$ is pulled to low state. This waveform is fed to RF modulator for transmission. The transmitted radio frequency is received by the RF demodulator and reshaped to the special waveform. HT6072 is then used to decode the waveform and set the corresponding output pins. Thus completing a remote control encoding and decoding function.

The built-in oscillator circuitry of HT6062 allows a precision oscillator to be constructed by connecting an external resistor between OSC1 and OSC2 pins. For HT6072 to decode correctly the received waveform, the oscillator frequency of HT6072 must be 2.8~7.8 times that of transmitting HT6062. The typical oscillator frequency with various resistor values for both HT6062 and HT6072 are shown below:

Recommended oscillator resistor values are shown below.

HT6062 (Encoder)		HT6072 (Decoder)	
Resistor Values	Frequency	Resistor Values	Frequency
300k Ω	64.9kHz	47k Ω	357.4kHz
330k Ω	60.6kHz	51k Ω	332.8kHz
360k Ω	55.5kHz	56k Ω	304.6kHz
390k Ω	50.7kHz	62k Ω	277.4kHz
430k Ω	46.3kHz	68k Ω	255.6kHz

Flowchart



Application Circuits

