3^{12} Series of Decoders

Features

- Operating voltage: 2.4V~12V
- Low power and high noise immunity CMOS technology
- Low standby current
- Capable of decoding 12 bits of information
- Pair with Holtek's 3^{12} series of encoders
- 8~12 address pins
- 0~4 data pins
- Trinary address setting
- Received data are checked two times
- Built-in oscillator needs only 5% resistor
- VT goes high during a valid transmission
- Easy interface with an RF or an infrared transmission medium
- Minimal external components
- Package information: refer to Selection Table

Applications

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

General Description

The 3^{12}decoders are a series of CMOS LSIs for remote control system applications. They are paired with 3^{12}series of encoders. For proper operation a pair of encoder/decoder with the same number of address and data format should be selected (refer to the encoder/decoder cross reference tables).

The 3^{12} series of decoders receive serial address and data from its corredponding series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. Then it compares the serial input information twice continuously with its local address. If no errors or unmatched codes are encountered, the input data codes are decoded and transferred to the output pins. The VT pin also goes high to indicate a valid transmission.

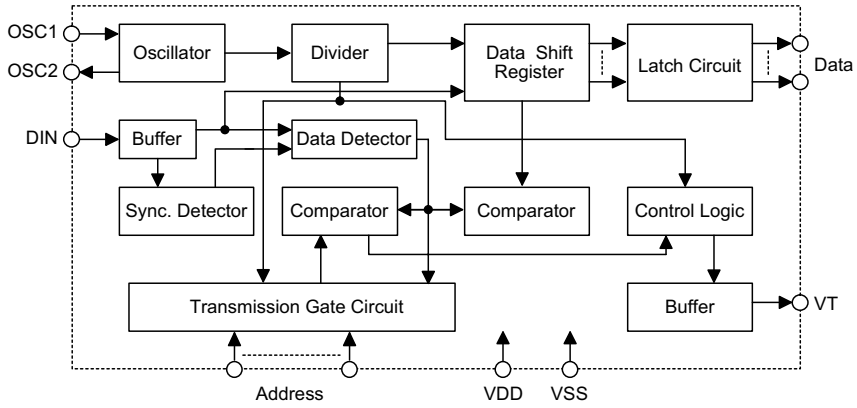
The 3^{12} series of decoders are capable of decoding 12 bits of information that consists of N bits of address and 12–N bits of data. To meet various applications they are arranged to provide a number of data pins ranging from 0 to 4 and an address pin ranging from 8 to 12. Thus, various combinations of address/data number are available in different packages.

Selection Table

Function / Part No.	Address No.	Data		VT	Oscillator	Trigger	Package
		No.	Type				
HT6030	12	0	—	√	RC oscillator	DIN active "Hi"	18 DIP/20 SOP
HT6032	10	2	L	√	RC oscillator	DIN active "Hi"	18 DIP/20 SOP
HT6034	8	4	L	√	RC oscillator	DIN active "Hi"	18 DIP/20 SOP

Note: Data type: L stands for latch type data output.
VT can be used as a momentary data output.

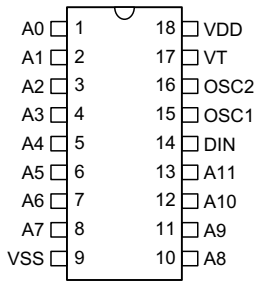
Block Diagram



Note: The address/data pins are available in various combinations (refer to the address/data table).

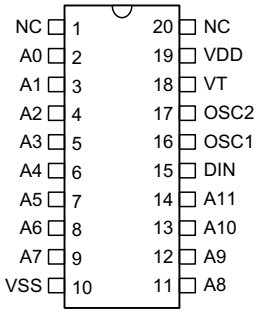
Pin Assignment

12-Address 0-Data



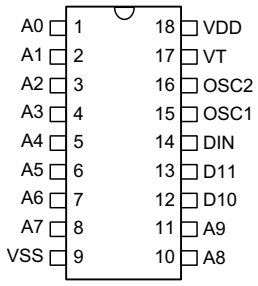
HT6030 – 18 DIP

12-Address 0-Data



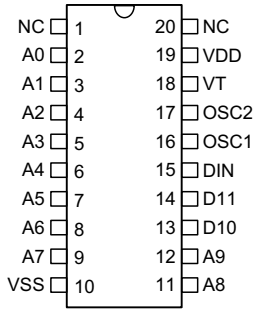
HT6030 – 20 SOP

10-Address 2-Data



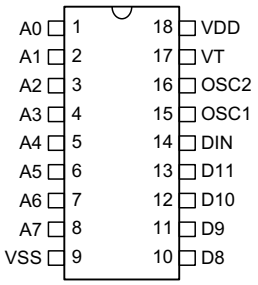
HT6032 – 18 DIP

10-Address 2-Data



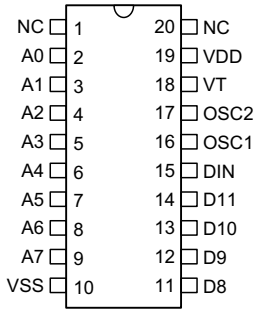
HT6032 – 20 SOP

8-Address 4-Data



HT6034 – 18 DIP

8-Address 4-Data

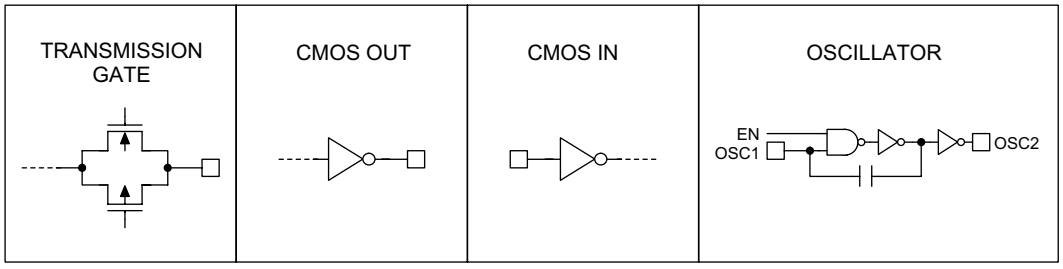


HT6034 – 20 SOP

Pin Description

Pin Name	I/O	Internal Connection	Description
A0~A11	I	TRANSMISSION GATE	Input pins for address A0~A11 setting They can be externally set to VDD, VSS, or left open.
D8~D11	O	CMOS OUT	Output data pins
DIN	I	CMOS IN	Serial data input pin
VT	O	CMOS OUT	Valid transmission, active high
OSC1	I	OSCILLATOR	Oscillator input pin
OSC2	O	OSCILLATOR	Oscillator output pin
VSS	—	—	Negative power supply, ground
VDD	—	—	Positive power supply

Approximate internal connections



Absolute Maximum Ratings

Supply Voltage.....–0.3V to 13V
Input Voltage.....V_{SS}–0.3 to V_{DD}+0.3V
Storage Temperature.....–50°C to 125°C
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.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	2.4	5	12	V
I_{STB}	Standby Current	5V	Oscillator stops	—	0.1	1	μA
		12V		—	2	4	μA
I_{DD}	Operating Current	5V	No load f_{OSC}=100kHz	—	250	500	μA
I_O	Data Output Source Current (D8~D11)	5V	V_{OH}=4.5V	–0.5	–1	—	mA
	Data Output Sink Current (D8~D11)	5V	V_{OL}=0.5V	0.5	1	—	mA
I_{VT}	VT Output Source Current	5V	V_{OH}=4.5V	–2	–4	—	mA
	VT Output Source Current Only For HT6033/35/45			–0.35	–0.6	—	
	VT Output Sink Current		V_{OL}=0.5V	1	2	—	
	VT Output Sink Current Only For HT6033/35/45			0.35	0.6	—	
V_{IH}	"H" Input Voltage	5V	—	3.5	—	5	V
V_{IL}	"L" Input Voltage	5V	—	0	—	1	V
f_{OSC}	Oscillator Frequency	5V	R_{OSC}=91kΩ	—	100	—	kHz

Functional Description

Operation

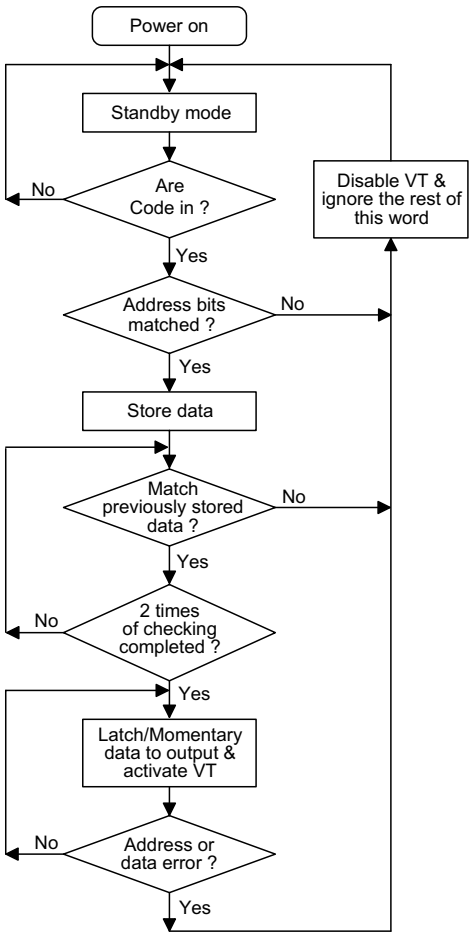
The 3^{12} series of decoders provide various combinations of address and data pins in different packages. They are paired with 3^{12}series of encoders. The decoders receive data transmitted by the encoders and interpret the first N bits of the code period as addresses and the last 12–N bits as data (where N is the address code number). A signal on the DIN pin then activates the oscillator which in turn decodes the incoming address and data. The decoders check the received address twice continuously. If all the received address codes match the contents of the decoder′s local address, the 12–N bits of data are decoded to activate the output pins and the VT pin is set high indicating a valid transmission. That will last until the address code is incorrect or no signal is received.

The output of the VT pin is high only when the transmission is valid. Otherwise it is always low.

Output type

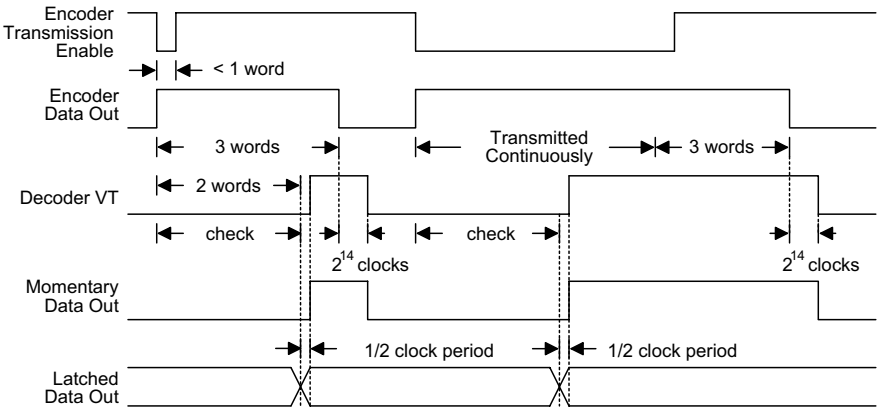
The data outputs follow the encoders during a valid transmission and are then latched in this state until the next valid transmission occurs.

Flowchart



The oscillator is disabled in the standby state and activated as long as a logic ″high″ signal is applied to the DIN pin. i.e., the DIN pin should be kept ″low″ if there is no signal input.

Decoder timing



Encoder/Decoder cross reference tables

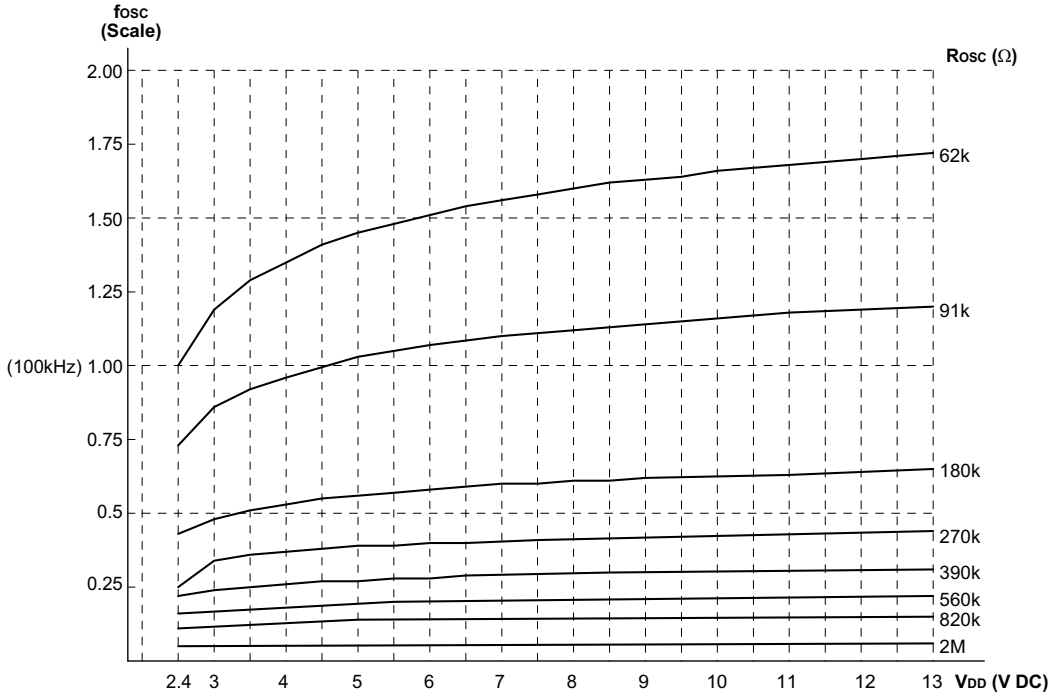
Part No.	Data Pins	Address Pins	VT	Pair Encoder	Package			
					Encoder		Decoder	
					DIP	SOP	DIP	SOP
HT6030	0	12	√	HT6010	18, 20	20	18	20
HT6032	2	10	√	HT6010	18, 20	20	18	20
				HT6012	18	20	18	20
HT6034	4	8	√	HT6010	18, 20	20	18	20
				HT6014	18	20		

Address/Data sequence

The following table describes the position of the address/data sequence for various models of the 3^{12} series of decoders. A correct device should be selected according to the requirements of individual address and data.

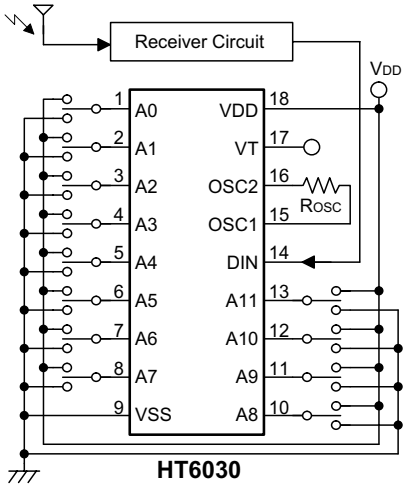
Part No.	Address/Data Bits											
	0	1	2	3	4	5	6	7	8	9	10	11
HT6030	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11
HT6032	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	D10	D11
HT6034	A0	A1	A2	A3	A4	A5	A6	A7	D8	D9	D10	D11

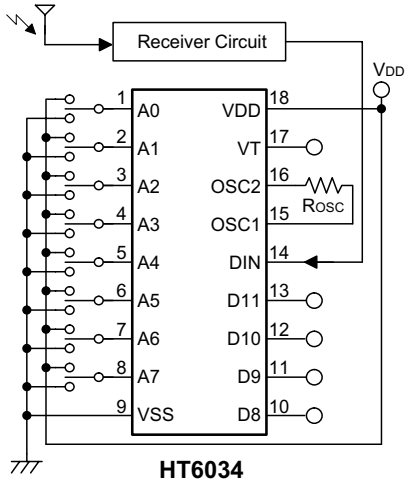
Oscillator frequency vs supply voltage



The recommended oscillator frequency is f_{OSCD} (decoder) ≅ 33 f_{OSCE} (encoder)

Application Circuits





Note: Typical infrared receiver: PIC-12043T/PIC-12043S (KODESHI CORP.)
or LTM9052 (LITEON CORP.)

Typical RF receiver: JR-200 (JUWA CORP.)
RE-99 (MING MICROSYSTEM, U.S.A.)

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