HT604L/HT614/HT692
3^{18} Series of Decoders

Features

- Operating voltage: 2.4V~12V
- Low power and high noise immunity CMOS technology
- Low standby current
- Capable of decoding 18 bits of information
- 9~10 address pins
- 2~8 data pins
- Trinary address setting
- Two times of receiving check
- Built-in oscillator needs only a 5% resistor
- Valid transmission indicator
- Easy interface with an RF or an infrared transmission medium
- Minimal external components
- Pair with Holtek's 3^{18} series of encoders
- HT604L/HT614: 20-pin DIP/SOP package
  HT692: 18-pin DIP package

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^{18} decoders are a series of CMOS LSIs for remote control system applications. They are paired with the 3^{18} series of encoders. For proper operation, a pair of encoder/decoder pair with the same number of address and data format should be selected (refer to the encoder/decoder cross reference tables).

The 3^{18} series of decoders receive serial address and data from that series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. It then compares the serial input data twice continuously with its local address. If no errors or unmatched codes are encountered, the input data codes are decoded and then transferred to the output pins. The VT pin also goes high to indicate a valid transmission.

The 3^{18} decoders are capable of decoding 18 bits of information that consists of N bits of address and 18–N bits of data. To meet various applications they are arranged to provide a number of data pins whose range is from 0 to 8 and an address pin whose range is from 8 to 18. In addition, the 3^{18} decoders provide various combinations of address/data number in different packages.

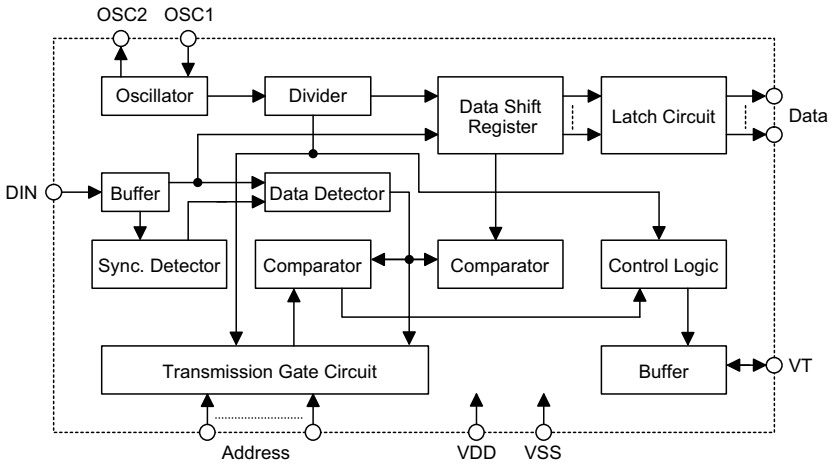
Selection Table

Function / Part No.	Address No.	Data		VT	Oscillator	Trigger	Package
		No.	Type				
HT604L	10	4	L	√	RC oscillator	DIN active ″Hi″	20DIP/SOP
HT614	10	4	M	√	RC oscillator	DIN active ″Hi″	20DIP/SOP
HT692	10	2	M	√	RC oscillator	DIN active ″Hi″	18DIP

Note: Data type: M stands for momentary type data output.
L stands for latch type data output.

VT can be used as a momentary data output.

Block Diagram

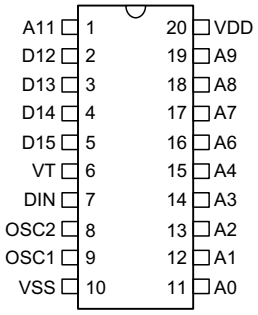


Note: The address/data pins are available in various combinations (refer to the address/data table).

Pin Assignment

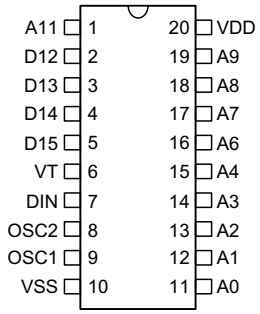
Latch Series **Momentary Series**

10-Address 4-Data



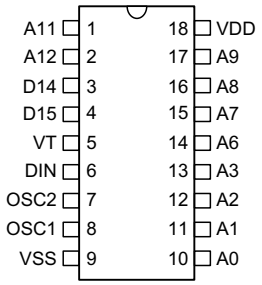
HT604L
– 20 DIP-A/SOP-A

10-Address 4-Data



HT614
– 20 DIP-A/SOP-A

10-Address 2-Data

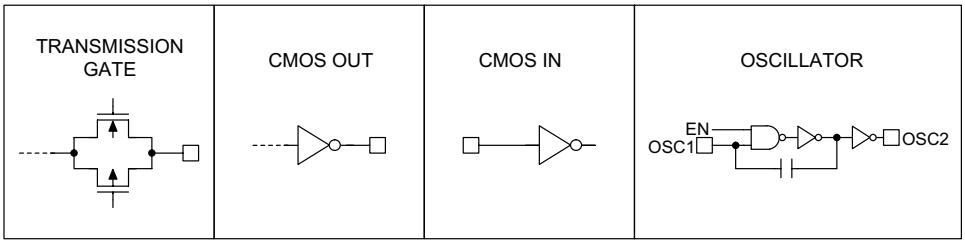


HT692
– 18 DIP-A

Pin Description

Pin Name	I/O	Internal Connection	Description
A0~A12	I	TRANSMISSION GATE	Input pins for address A0~A12 setting They can be externally set to VDD, VSS or left open.
D10~D17	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 ..... V_{SS}–0.3V to V_{SS}+13V

Input Voltage ..... V_{SS}–0.3V 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	—	—	3	—	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	—	0.2	1	mA
I_O	Data Output Source Current (D10~D17)	5V	V_{OH}=4.5V	–0.5	–1	—	mA
	Data Output Sink Current (D10~D17)		V_{OL}=0.5V	0.25	1	—	mA
I_{VT}	VT Output Source Current	5V	V_{OH}=4.5V	–2	–4	—	mA
	VT Output Sink Current		V_{OL}=0.5V	0.25	1	—	mA
V_{IH}	"H" Input Voltage	5V	—	3.5	—	5	V
V_{IL}	"L" Input Voltage	5V	—	0	—	1	V
f_{OSC}	Oscillator Frequency	10V	R_{OSC}=330kΩ	—	100	—	kHz

Functional Description

Operation

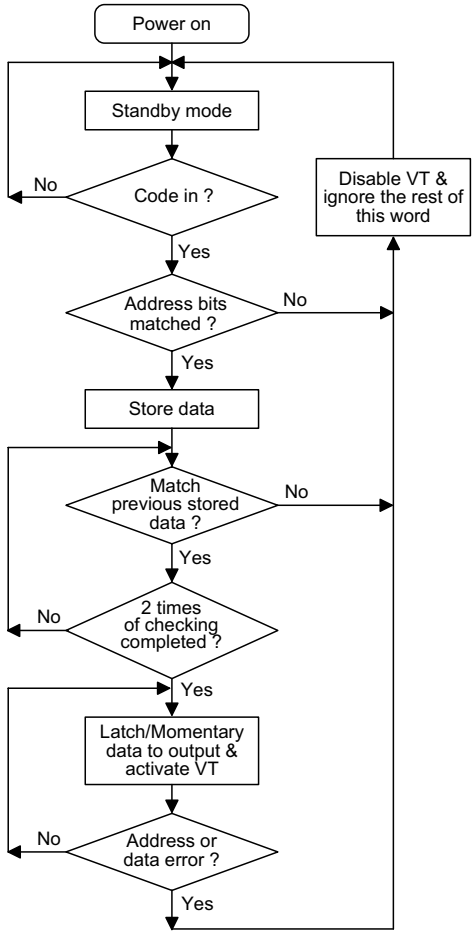
The 3^{18} series of decoders provide various combinations of address and data pins in different packages. It is paired with the 3^{18} series of encoders. The decoders receive data transmitted by the encoders and interpret the first N bits of the code period as address and the last 18–N bits as data (where N is the address code number). A signal on the DIN pin then activates the oscillator which in turns decodes the incoming address and data. The decoders will check the received address twice continuously. If all the received address codes match the contents of the decoder's local address, the 18–N bits of data are decoded to activate the output pins, and the VT pin is set high to indicate a valid transmission. That will last until the address code is incorrect or no signal has been received. The output of the VT pin is high only when the transmission is valid. Otherwise it is always low.

Output Type

There are two types of output to select from:

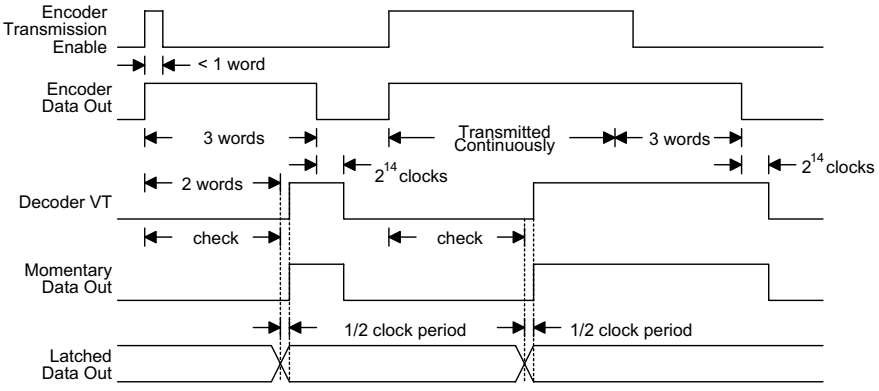
- Momentary type
  The data outputs follow the encoder during a valid transmission and then reset.
- Latch type
  The data outputs follow the encoder during a valid transmission, and are then latched in this state until the next valid transmission occurs.

Flowchart



Note: 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 should be kept "low" if there is no signal input.

Decoder timing



Encoder/Decoder Selection Tables

- Latch type of data output

Part No.	Data Pins	Address Pins	VT	Pair Encoder	Package					
					Encoder			Decoder		
					DIP	SOP	SKDIP	DIP	SOP	SKDIP
HT604L	4	10	√	HT600	20	20	—	20	20	—
				HT6207	20	—				

- Momentary type of data output

Part No.	Data Pins	Address Pins	VT	Pair Encoder	Package					
					Encoder			Decoder		
					DIP	SOP	SKDIP	DIP	SOP	SKDIP
HT692	2	10	√	HT680	18	—	—	18	—	—
HT614	4	10	√	HT600	20	20	—	20	20	—
				HT6207	20	—				

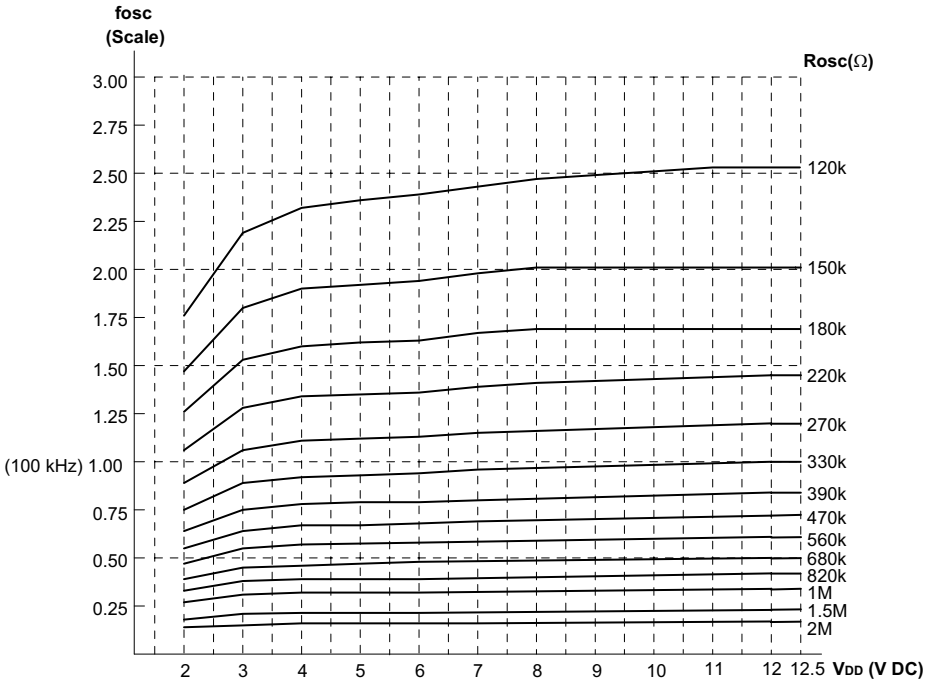
Address/Data Sequence

The following provides a table of address/data sequence for various models of the 3^{18} series decoders.

Part No.	Address/Data Bits											
	0~3	4	5	6~9	10	11	12	13	14	15	16	17
HT604L	A0~A3	A4	—	A6~A9	—	A11	D12	D13	D14	D15	—	—
HT614	A0~A3	A4	—	A6~A9	—	A11	D12	D13	D14	D15	—	—
HT692	A0~A3	—	—	A6~A9	—	A11	A12	—	D14	D15	—	—

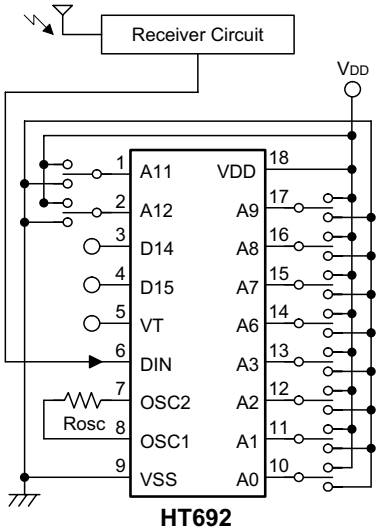
Note: "—" is a dummy code which is left "open" and not bonded out.

Oscillator Frequency vs. Supply Voltage

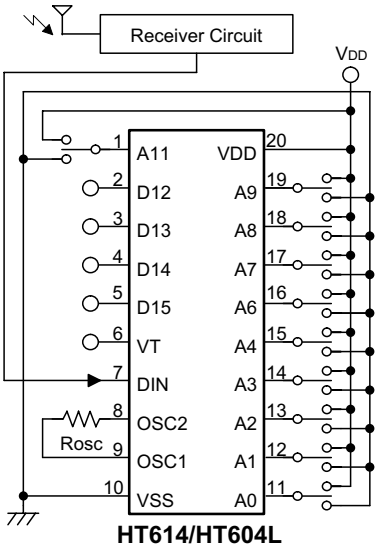


The recommended oscillator frequency is f_{OSCD} (decoder) ≅ f_{OSCE} (encoder)

Application Circuits



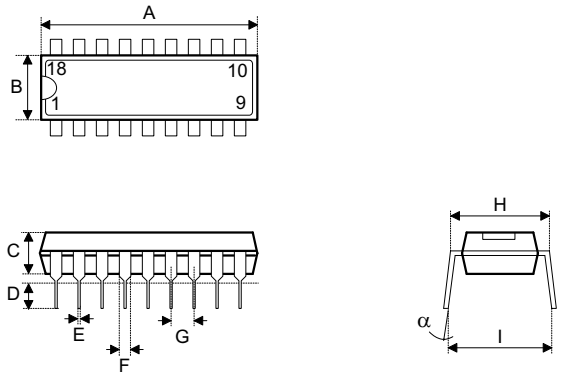
HT692



HT614/HT604L

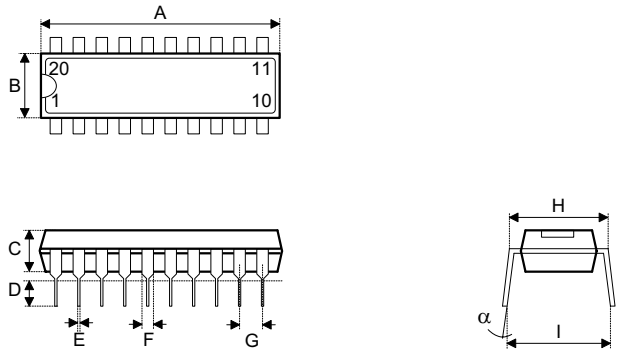
Package Information

18-pin DIP (300mil) Outline Dimensions



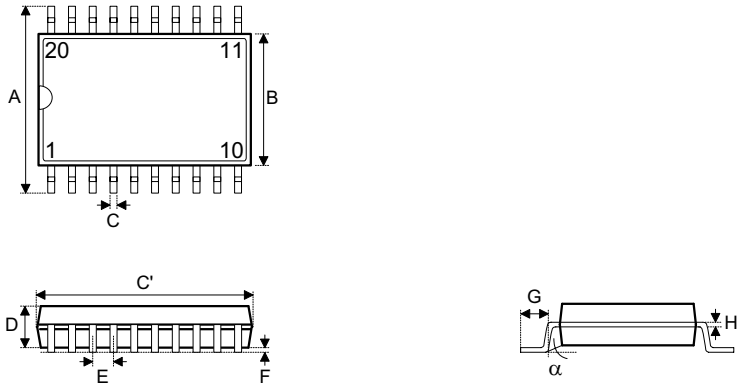
Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	895	—	915
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
α	0°	—	15°

20-pin DIP (300mil) Outline Dimensions



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	1020	—	1045
B	240	—	260
C	125	—	135
D	125	—	145
E	16	—	20
F	50	—	70
G	—	100	—
H	295	—	315
I	335	—	375
α	0°	—	15°

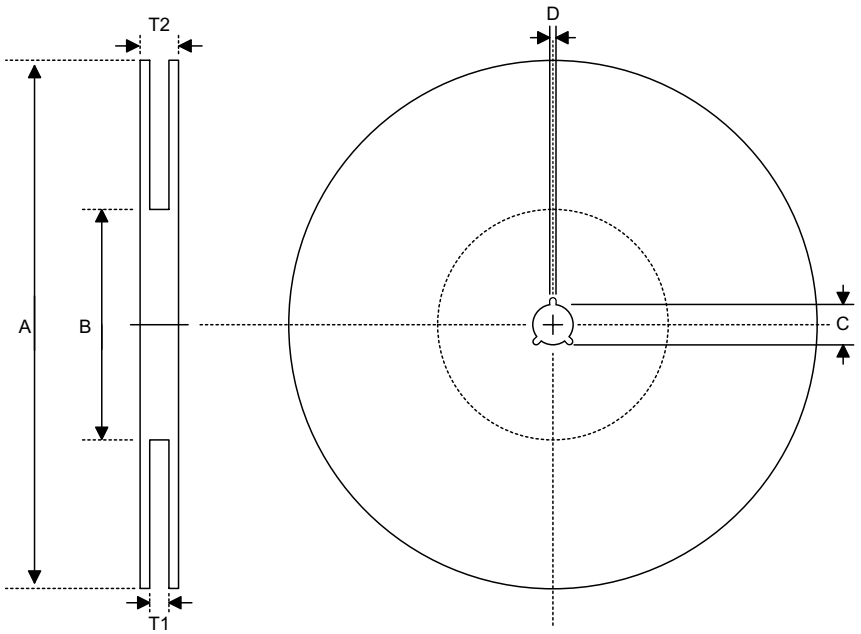
20-pin SOP (300mil) Outline Dimensions



Symbol	Dimensions in mil		
	Min.	Nom.	Max.
A	394	—	419
B	290	—	300
C	14	—	20
C′	490	—	510
D	92	—	104
E	—	50	—
F	4	—	—
G	32	—	38
H	4	—	12
α	0°	—	10°

Product Tape and Reel Specifications

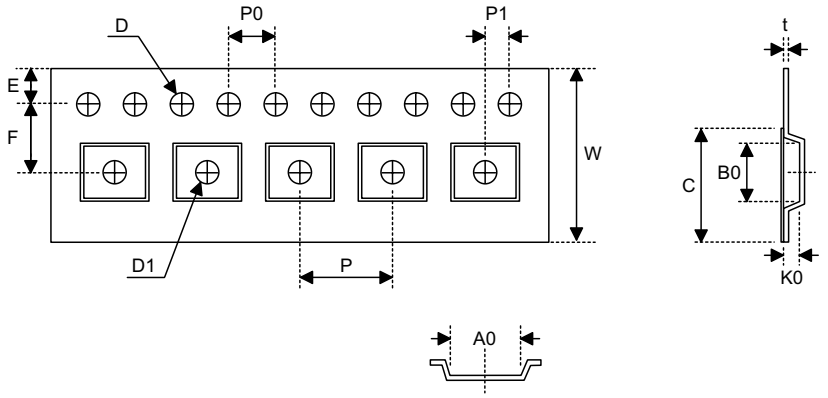
Reel Dimensions



SOP 20W

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330±1.0
B	Reel Inner Diameter	62±1.5
C	Spindle Hole Diameter	13.0+0.5 −0.2
D	Key Slit Width	2.0±0.5
T1	Space Between Flange	24.8+0.3 −0.2
T2	Reel Thickness	30.2±0.2

Carrier Tape Dimensions



SOP 20W

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	24.0+0.3 −0.1
P	Cavity Pitch	12.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	11.5±0.1
D	Perforation Diameter	1.5+0.1
D1	Cavity Hole Diameter	1.5+0.25
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	10.8±0.1
B0	Cavity Width	13.3±0.1
K0	Cavity Depth	3.2±0.1
t	Carrier Tape Thickness	0.3±0.05
C	Cover Tape Width	21.3

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