HT6026
Remote Control Encoder

Features

- Operating voltage: 4V~18V
- Low standby current
- Low power and high noise immunity CMOS technology
- 3^9 difference codes
- Two transmission words minimum
- Built-in oscillator needs only 5% resistor
- Interface with RF or infrared transmission medium
- Minimal external components
- 16-pin DIP/NSOP package

Applications

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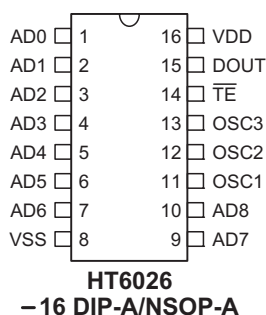- Other remote control systems

General Description

The HT6026 is a CMOS LSI encoder designed for use in remote control system. It is capable of encoding 9 bits of information which consists of N address bits and 9□N data bits. Each address/data input is externally trinary programmable by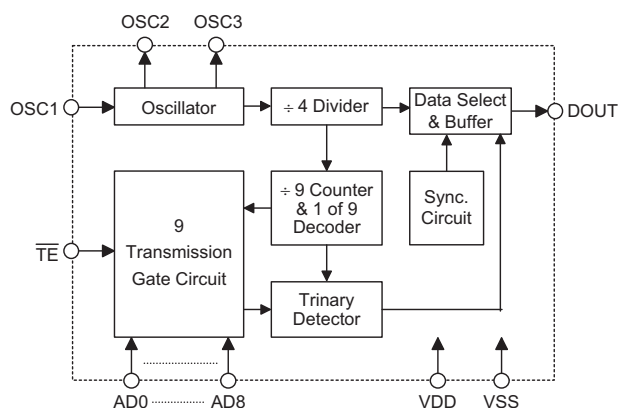 external switches. The programma-ble address/data is transmitted along with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal ($\overline{TE}$).
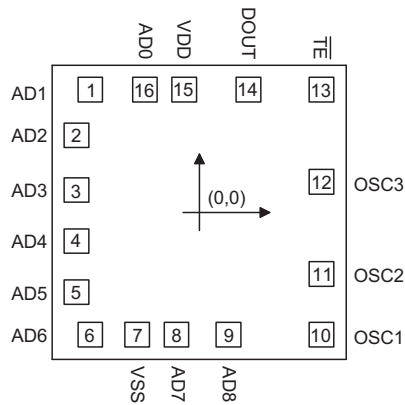
The HT6026 is pin compatible with the MC145026.

Pin Assignment

AD0	1	16	VDD
AD1	2	15	DOUT
AD2	3	14	$\overline{TE}$
AD3	4	13	OSC3
AD4	5	12	OSC2
AD5	6	11	OSC1
AD6	7	10	AD8
VSS	8	9	AD7

HT6026
□16 DIP-A/NSOP-A

Block Diagram

Pad Assignment

Chip size: 1650 × 1680 (μm)^2

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

Pad Coordinates

Unit: μm

Pad No.	X	Y	Pad No.	X	Y
1	−598.00	689.00	9	160.00	−687.00
2	−674.00	433.00	10	670.00	−687.00
3	−674.00	126.00	11	670.00	−347.00
4	−674.00	−162.00	12	670.00	172.00
5	−674.00	−449.00	13	670.50	689.50
6	−598.00	−687.00	14	270.00	689.00
7	−342.00	−687.00	15	−84.00	689.00
8	−127.00	−687.00	16	−299.00	689.00

Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Description
1~7	AD0~AD6	I	Transmission Gate	Input pins for address/data AD0~AD6 setting They can be externally set to V_{DD}, V_{SS} or left open
8	VSS	—	—	Negative power supply, ground
9~10	AD7~AD8	I	Transmission Gate	Input pins for address/data AD7~AD8 setting They can be externally set to V_{DD}, V_{SS} or left open
11 12 13	OSC1 OSC2 OSC3	I O O	Oscillator	Oscillator input pin
14	$\overline{TE}$	I	CMOS IN Pull-High	Transmission enable, active low
15	DOUT	O	CMOS OUT	Encoder data serial transmission output
16	VDD	—	—	Positive power supply

Approximate Internal Connection Circuits
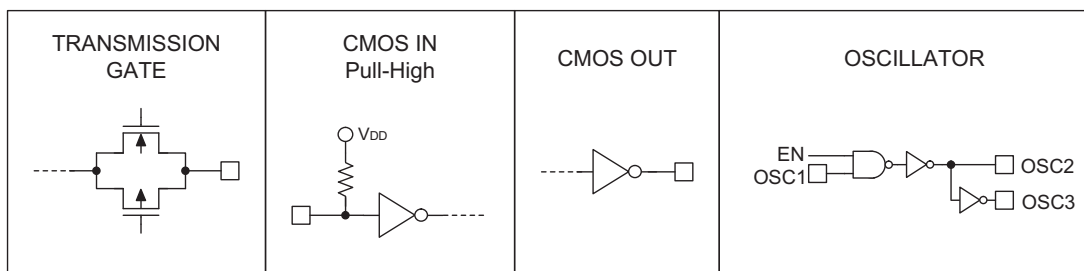
Absolute Maximum Ratings

Supply Voltage ....V_{SS}–0.3V to V_{SS}+24V

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	—	—	4	—	18	V
I_{STB}	Standby Current	5V	Oscillator stops	—	0.1	0.3	μA
		15V		—	0.1	0.5	μA
I_{DD}	Operating Current	5V	No load, f_{OSC}=18kHz	—	500	900	μA
		15V	No load, f_{OSC}=22kHz	—	2000	3000	μA
I_{DOUT}	Output Drive Current	5V	V_{OH}=0.9 V_{DD} (Source)	−1.0	−1.7	—	mA
		15V		−8.0	−14.0	—	mA
		5V	V_{OL}=0.1 V_{DD} (Sink)	0.8	1.5	—	mA
		15V		5.0	10.0	—	mA
V_{IH}	"H" Input Voltage	—	—	0.7V_{DD}	—	V_{DD}	V
V_{IL}	"L" Input Voltage	—	—	0	—	0.3V_{DD}	V
$R_{\overline{TE}}$	$\overline{TE}$ Pull-High Resistance	5V	$V_{\overline{TE}}$=0V	—	800	—	kΩ
		15V		—	250	—	kΩ
f_{OSC}	Oscillator Frequency	5V	R_{EXT}=10kΩ, C_{EXT}=2000PF R_S=20kΩ	—	18	—	kHz
		15V		—	22	—	kHz

Functional Description

Operation

The HT6026 encoder begins a one-word transmission cycle upon receipt of a transmission enable ($\overline{TE}$, active low). This cycle will repeat itself as long as the transmission enable ($\overline{TE}$) is held low. Once the transmission enable returns high, the encoder output completes its final N×2 word cycle, and then stops as shown in Figure 1. The total number of transmission cycles allowed is always adjusted to an even number automatically.
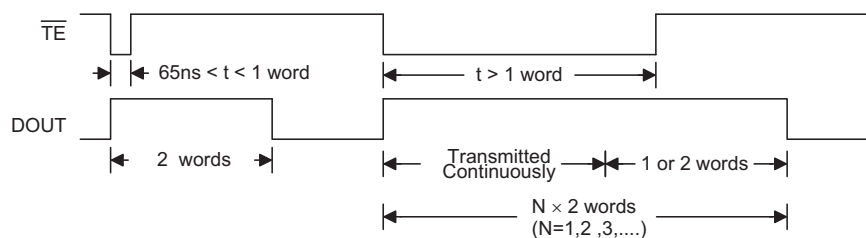

Figure 1. Transmission timing

Information Word
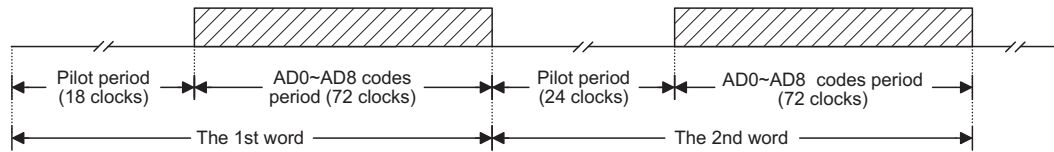
An information word consists of 2 periods as shown:

Figure 2. Composition of information

Address/data Waveform

Each programmable address/data pin can be externally set to one of the following three logic states:
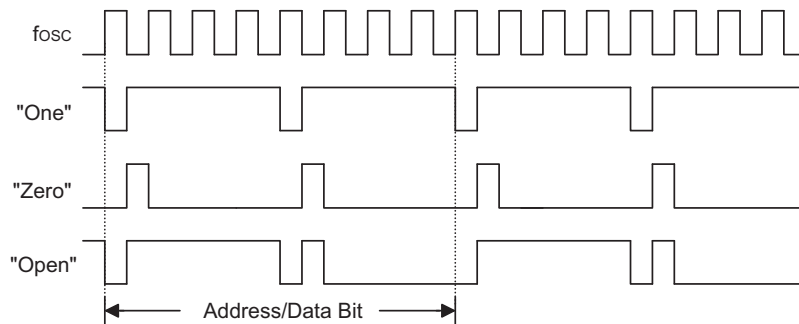

Figure 3. Address/Data bit waveform

Address/Data Programming (Preset)

The status of each address/data pin can be individually pre-set to logic ″high″, ″low″ or ″floating″. If a transmission enable signal is applied, the encoder scans and transmits the status of 9-bit address/data serially in the order AD0 to AD8. But if the trigger signal is not applied, the chip only consumes a standby current which is less than 1μA (for V_{DD}=5V).

The address pins are usually pre-set to transmit data codes with their own particular security codes by the DIP switches or PCB wiring, while the data is selected by the push button or electronic switches.

The following figure demonstrates an application using the HT6026:
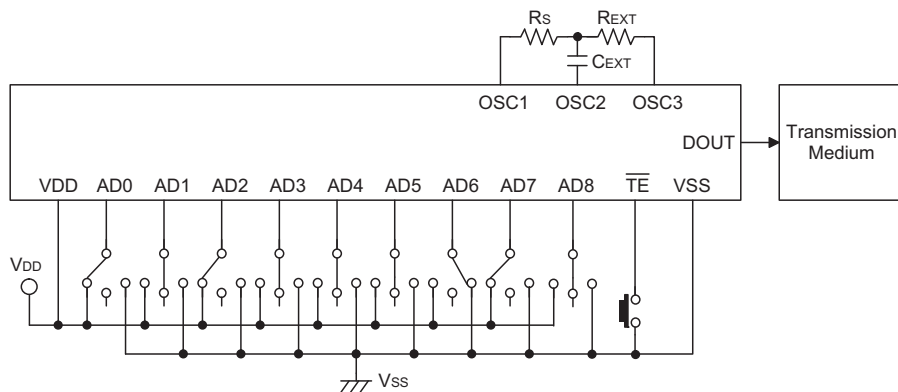
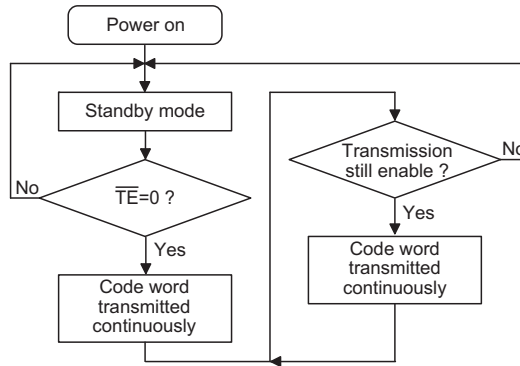The transmitted information is as listed:

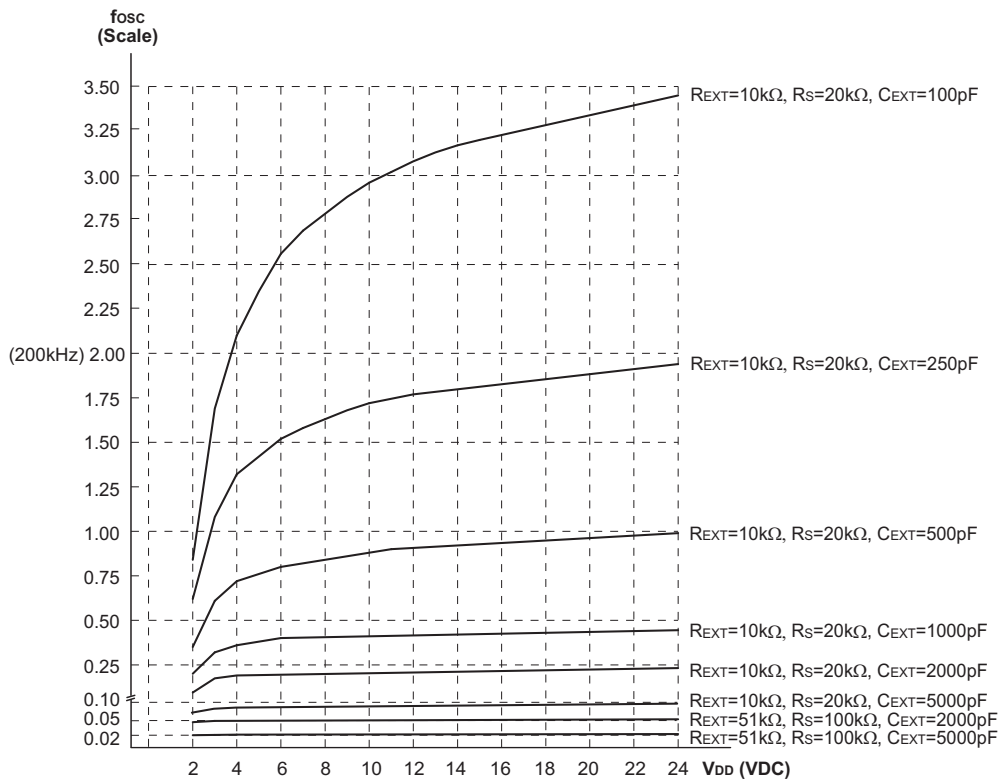| Pilot & Sync.	AD0	AD1	AD2	AD3	AD4	AD5	AD6	AD7	AD8
	1	Z	1	Z	Z	Z	0	1	Z

Z: floating

Transmission Enable

Transmission is enabled by applying a low signal to the $\overline{\text{TE}}$ pin. The HT6026 is enabled and outputs address/data codes from DOUT pin when the $\overline{\text{TE}}$ is set to "low" and more than 65ns.
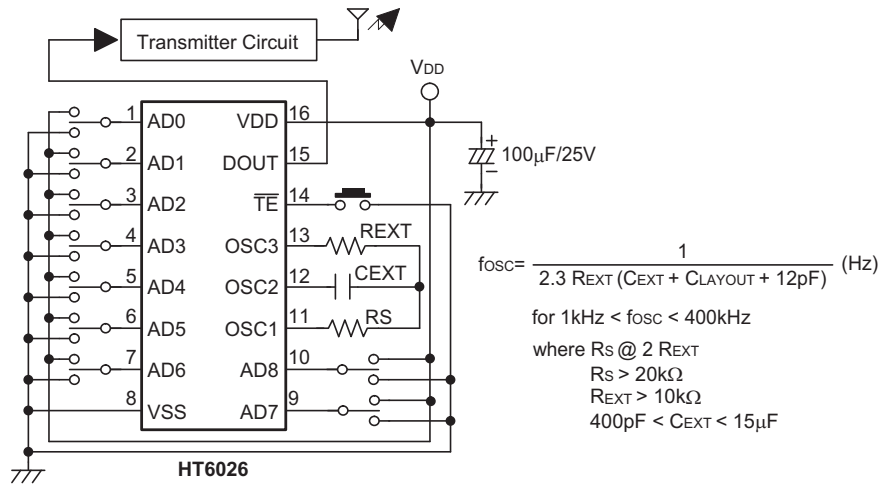
Flowchart

Oscillator Frequency vs Supply Voltage

Application Circuit

$$f_{OSC} = \frac{1}{2.3\, R_{EXT}\, (C_{EXT} + C_{LAYOUT} + 12pF)}\ \text{(Hz)}$$

for $1kHz < f_{OSC} < 400kHz$

where $R_S \approx 2\, R_{EXT}$

$R_S > 20k\Omega$

$R_{EXT} > 10k\Omega$

$400pF < C_{EXT} < 15\mu F$

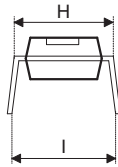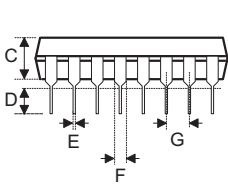## Package Information

16-pin DIP (300mil) Outline Dimensions
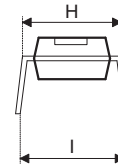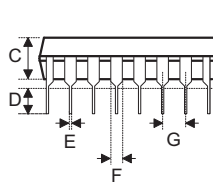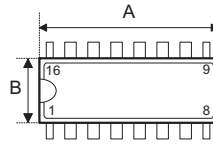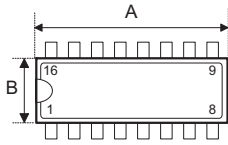
Fig1. Full Lead Packages

Fig2. 1/2 Lead Packages

- MS-001d (see fig1)

Symbol	Dimensions in mil		
	Min.	**Nom.**	**Max.**
A	780	—	880
B	240	—	280
C	115	—	195
D	115	—	150
E	14	—	22
F	45	—	70
G	—	100	—
H	300	—	325
I	—	—	430

- MS-001d (see fig2)

Symbol	Dimensions in mil		
	Min.	**Nom.**	**Max.**
A	735	—	775
B	240	—	280
C	115	—	195
D	115	—	150
E	14	—	22
F	45	—	70
G	—	100	—
H	300	—	325
I	—	—	430

• MO-095a (see fig2)

Symbol	Dimensions in mil		
	Min.	**Nom.**	**Max.**
A	745	—	785
B	275	—	295
C	120	—	150
D	110	—	150
E	14	—	22
F	45	—	60
G	—	100	—
H	300	—	325
I	—	—	430

16-pin NSOP (150mil) Outline Dimensions
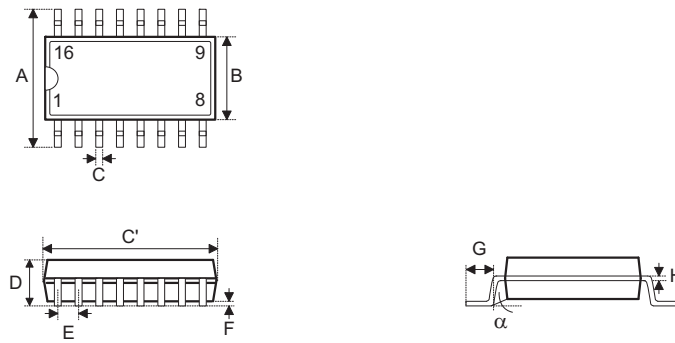
• MS-012

Symbol	Dimensions in mil		
	Min.	**Nom.**	**Max.**
A	228	—	244
B	150	—	157
C	12	—	20
C′	386	—	394
D	—	—	69
E	—	50	—
F	4	—	10
G	16	—	50
H	7	—	10
α	0°	—	8°

Product Tape and Reel Specifications

Reel Dimensions
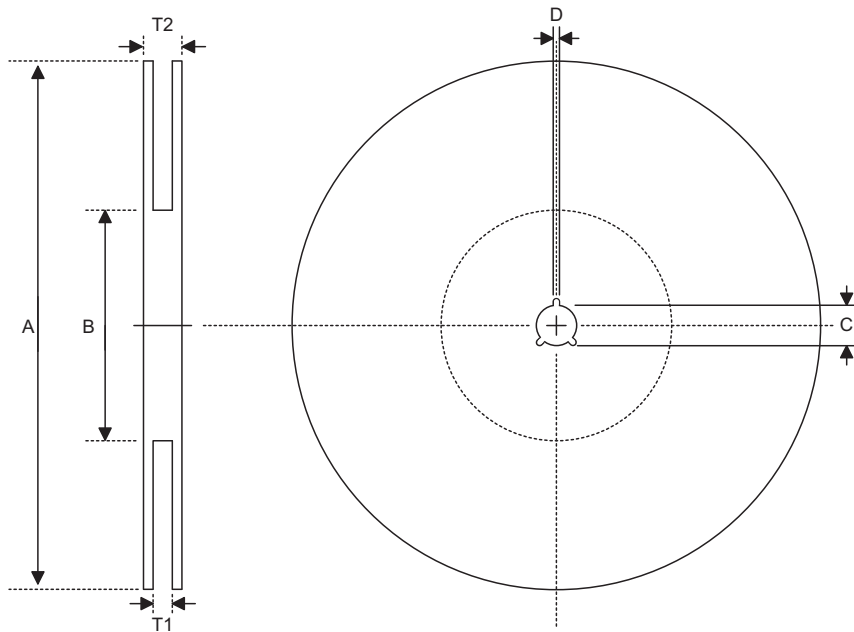
SOP 16N (150mil)

Symbol	Description	Dimensions in mm
A	Reel Outer Diameter	330.0±1.0
B	Reel Inner Diameter	100.0±1.5
C	Spindle Hole Diameter	13.0 $^{+0.5/-0.2}$
D	Key Slit Width	2.0±0.5
T1	Space Between Flange	16.8 $^{+0.3/-0.2}$
T2	Reel Thickness	22.2±0.2

Carrier Tape Dimensions

Reel Hole

IC package pin 1 and the reel holes
are located on the same side.
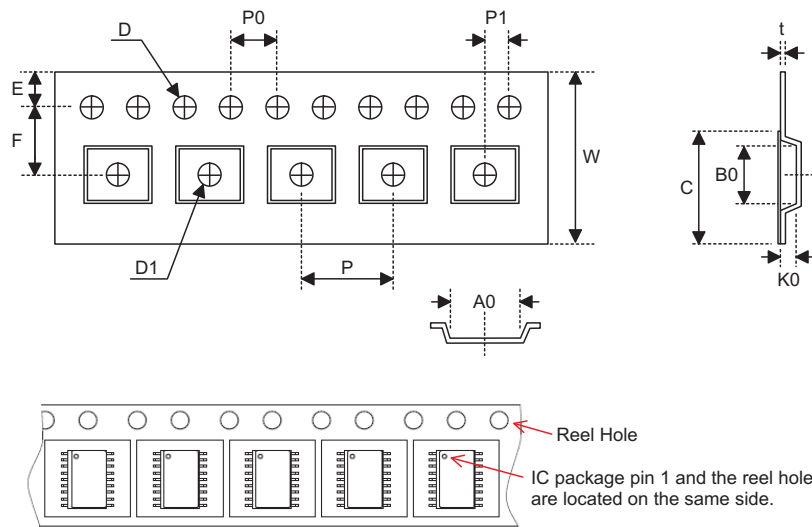
SOP 16N (150mil)

Symbol	Description	Dimensions in mm
W	Carrier Tape Width	16.0±0.3
P	Cavity Pitch	8.0±0.1
E	Perforation Position	1.75±0.1
F	Cavity to Perforation (Width Direction)	7.5±0.1
D	Perforation Diameter	1.55 $^{+0.1/-0.0}$
D1	Cavity Hole Diameter	1.50 $^{+0.25/-0.0}$
P0	Perforation Pitch	4.0±0.1
P1	Cavity to Perforation (Length Direction)	2.0±0.1
A0	Cavity Length	6.5±0.1
B0	Cavity Width	10.3±0.1
K0	Cavity Depth	2.1±0.1
t	Carrier Tape Thickness	0.30±0.05
C	Cover Tape Width	13.3±0.1