

Features

- Complete UHF transmitter
- Frequency range 300MHz to 450MHz
- ASK 0/2data selectable
- Output Power to 10dBm
- Low external part count Minimal external components
- Low voltage operation (down to 2.0V)
- 2²⁴ maximum address and data codes
- Data active: D0~D1

Applications

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

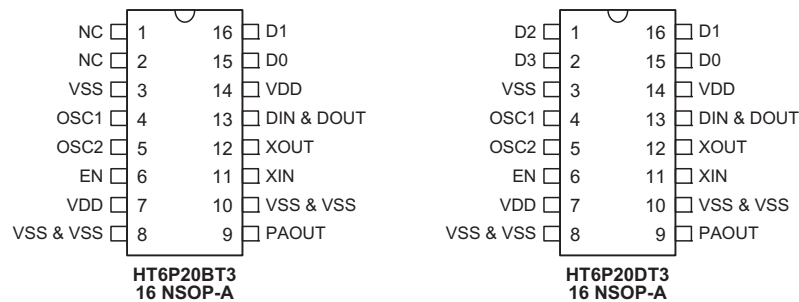
General Description

The HT6P20BT3/HT6P20DT3 is a CMOS LSI encoder designed for remote control system applications. It encodes 24 bits of information and then serially transmits it via the PA_OUT pin upon receipt of transmission enable (DATA pins: D0~D7) signals. The combination of address and data bits of the HT6P20BT3/HT6P20DT3 is designed using one time programmable process. In addition, the chip offers various packaging for flexible combination of programmable address/data so as to meet various applications. Its programmable address/data is transmitted together with the anti-code bits via RF transmission medium upon receipt of a trigger signal.

The HT6P20BT3/HT6P20DT3 is a high performance, easy to use, single chip ASK Transmitter IC for remote wireless applications in the 300 to 450MHz frequency band. This transmitter IC is a true "data-in, antenna-out" monolithic device. HT6P20BT3/HT6P20DT3 is high performance in three areas: power delivery, operating voltage, and operating temperature. In terms of power,

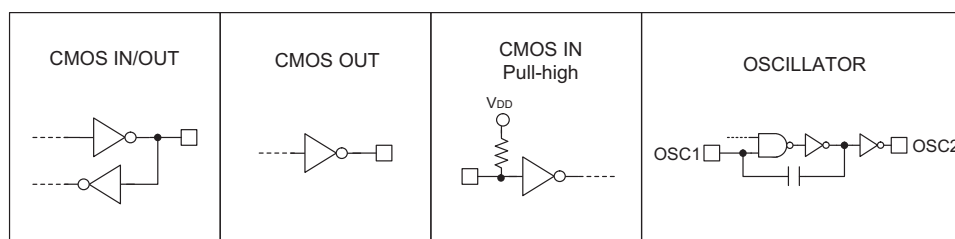
the HT6P20BT3/ HT6P20DT3 is capable of delivering +10 dBm into a 50 load. This power level enables a small form factor transmitter (lossy antenna) such as a key fob transmitter to operate near the maximum limit of transmission regulations. In terms of operating voltage, the HT6P20BT3/HT6P20DT3 operates from 3.6V to 1.8V. Many transmitter ICs in the same frequency band stop operating below 2.0V. The HT6P20BT3/HT6P20DT3 will work with most batteries to the end of their useful limits. The HT6P20BT3/HT6P20DT3 is easy to use. One only needs a reference frequency (RF carrier frequency divided by 32 times) generated from a crystal with a few additional external parts to create a complete versatile transmitter. The HT6P20BT3/HT6P20DT3 operates with ASK/OOK (Amplitude Shift Keying/On-Off Keyed) UHF receiver types from wide-band super-regenerative radios to narrow-band, high performance super-heterodyne receivers.

Pin Assignment



Pin Description

Pin Name	I/O	Internal Connection	Description
NC	—	—	No connection for HT6P20BT3
D2~D3	I	CMOS IN Pull-high	Data input and transmission enable (active low). They can be externally set to VSS or left open for HT6P20DT3.
VSS	—	—	Negative power supply, ground
OSC1	I	Oscillator	Oscillator input pin
OSC2	O	Oscillator	Oscillator output pin
EN	I	RF enable pin	RF enable active high; When set low, RF is enabled by data input
VDD	—	—	Positive power supply
VSS	—	—	Negative power supply, RF ground
PA_OUT	O	Power amplify output	L/C matching circuit
XIN	O	Crystal Fs input	Crystal value is 9.84375MHz at 315MHz and 13.56MHz at 433.92MHz
XOUT	I	Crystal Fs output	
DOUT	O	CMOS OUT	Data serial transmission output
D0~D1	I	CMOS IN Pull-high	Data input and transmission enable (active low) They can be externally set to VSS or left open.

Approximate internal connection circuits

Absolute Maximum Ratings

Supply Voltage	$V_{SS}-0.3V$ to $V_{SS}+12V$	Storage Temperature	$-50^{\circ}C$ to $125^{\circ}C$
Input Voltage	$V_{SS}-0.3V$ to $V_{DD}+0.3V$	Operating Temperature	$-20^{\circ}C$ to $75^{\circ}C$

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, Freq. X'tal OSC=13.560MHz, EN=VDD. Bold values indicate -20°C to +70°C unless otherwise noted. 1kbps data rate 50% duty cycle. RL 50Ω load (matched).

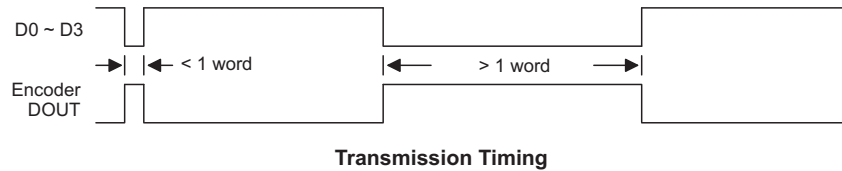
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V _{DD}	Conditions				
V _{DD}	Operating Voltage	—	—	2	—	5	V
V _{IH}	"H" Input Voltage	—	—	0.8V _{DD}	—	V _{DD}	V
V _{IL}	"L" Input Voltage	—	—	0	—	0.2V _{DD}	V
R _{PH}	D0~D1 Pull-high Resistance	5V	—	—	—	300	kΩ
f _{OSC}	Oscillator Frequency	5V	R _{OSC} =1.4MΩ	—	3	—	kHz
I _{ON}	Mark Supply Current On	3V	315MHz, POUT=+10dBm	—	17	—	mA
			433.92MHz, POUT=+10dBm	—	17	—	mA
I _{STB}	SPACE Supply Current	3V	315MHz	—	3	—	mA
			433.92 MHz	—	3	—	mA
	Output Power Level	3.3V	315MHz	—	10	—	dBm
			433.92MHz	—	10	—	dBm
	Harmonics Output for 315MHz	3V	630MHz, 2nd harm	—	-49	—	dBc
			945MHz, 3rd harm	—	-43	—	dBc
	Harmonics Output for 433.92MHz	3V	867.84MHz, 2nd harm	—	-42	—	dBc
			1301.76MHz, 3rd harm	—	-53	—	dBc
	Extinction Ratio for ASK	3V	—	—	70	—	dBc
	Data Rate	3V	—	—	10	—	kbps
	Occupied Bandwidth	3V	315MHz	—	<700	—	kHz
			433.92MHz	—	<1000	—	kHz
	315MHz Single Side Band Phase Noise	3V	100kHz from Carrier	—	-76	—	dBc/Hz
			1000kHz from Carrier	—	-79	—	dBc/Hz
	433.92MHz Single Side Band Phase Noise	3V	100kHz from Carrier	—	-72	—	dBc/Hz
			1000kHz from Carrier - 79dBc/Hz	—	-81	—	dBc/Hz
	XTLIN, XTLOUT	3V	Pin capacitance	—	2	—	pF
	External Capacitance	3V	See application circuit C3, C4	—	18	—	pF
	Output Blanking	3V	Standby transition from low to high	—	500	—	μs
	ASK to RF Out Response Time	3V	Delta between ASK input transition from Low To High to RF output transition from low to high	—	1	—	μs
	CREF Clock Output Frequency	3V	315MHz	—	167	—	Hz
			433.92MHz	—	200	—	Hz

Note: For V_{DD}=3.0V, Ta=25°C, Freq XYtal OSC=13.560MHz, EN=0, standby current < 10μA.

Functional Description

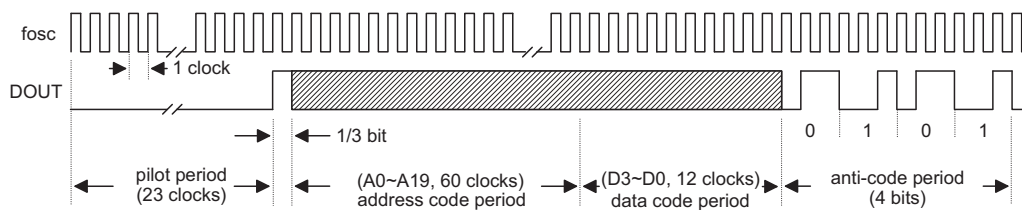
Normal Operation

The HT6P20BT3/HT6P20DT3 encodes and transmits address/data to a decoder upon receipt of a trigger signal. The address codes of the HT6P20BT3/HT6P20DT3 are always transmitted as long as power (VDD) is supplied. The transmission function of the HT6P20BT3/HT6P20DT3 is enabled by the D0~D1 pins (active low). The following is the transmission timing of the HT6P20BT3/HT6P20DT3:



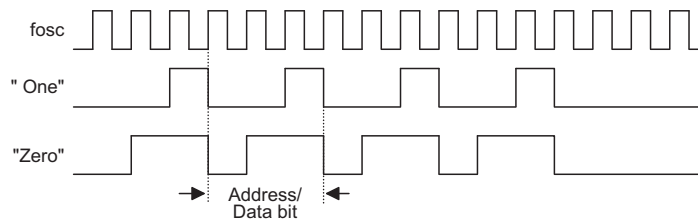
Transmission Timing

A Complete code word of the HT6P20DT3 consists of 3 periods as shown below.

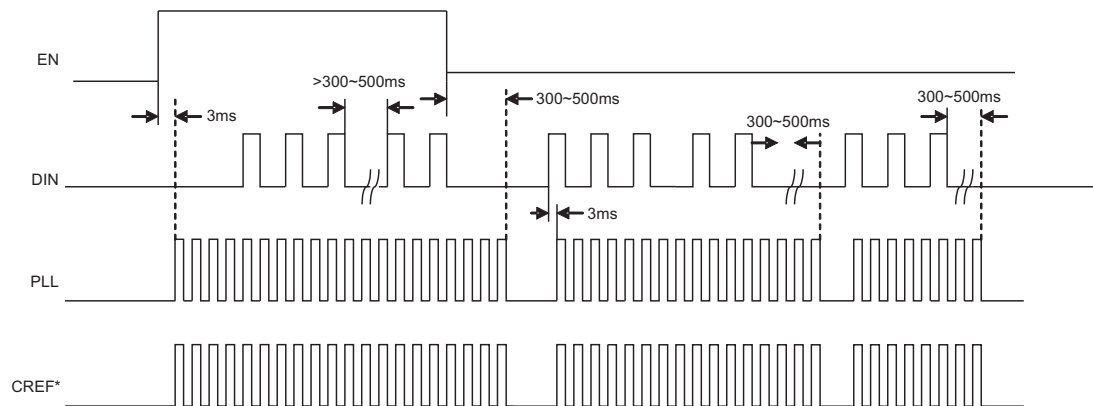


A complete code word for the HT6P20DT

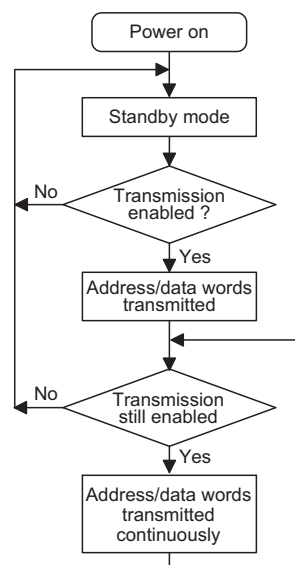
The HT6P20BT3/HT6P20DT3 detects the logic state of the internal programmed address and the external data pins, and then transmits the detected information during the code period. Each address/data bit can be set to one of the following two logic states:



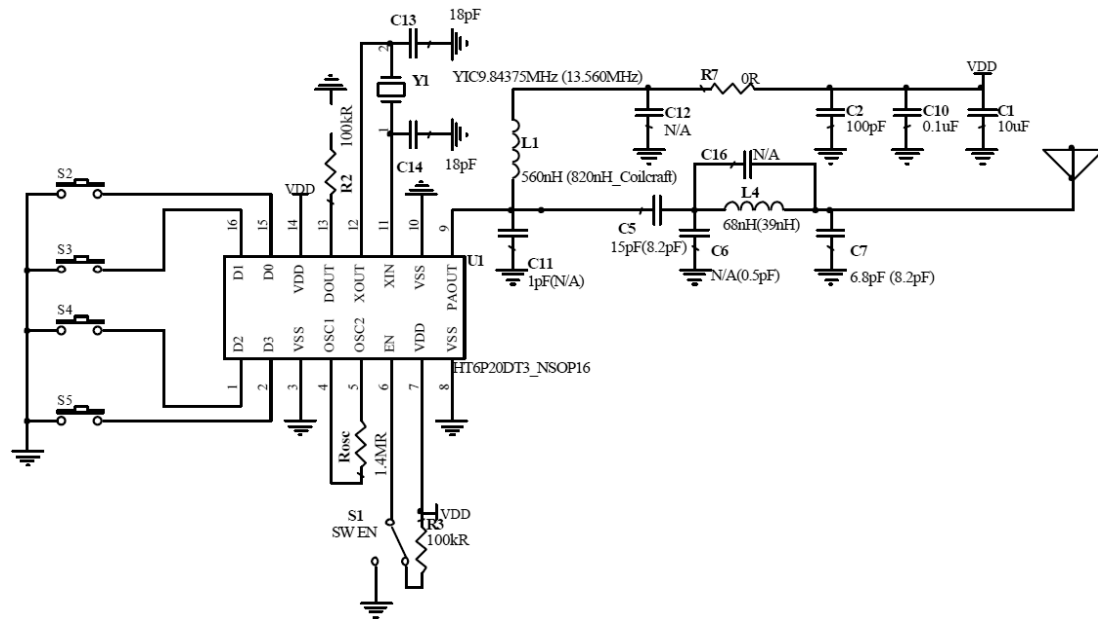
Timing Diagram

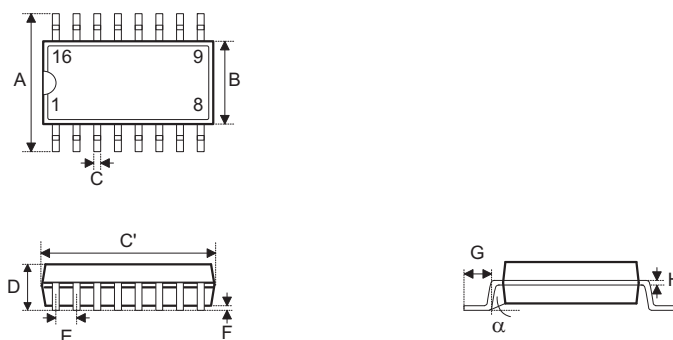


Flow Chart

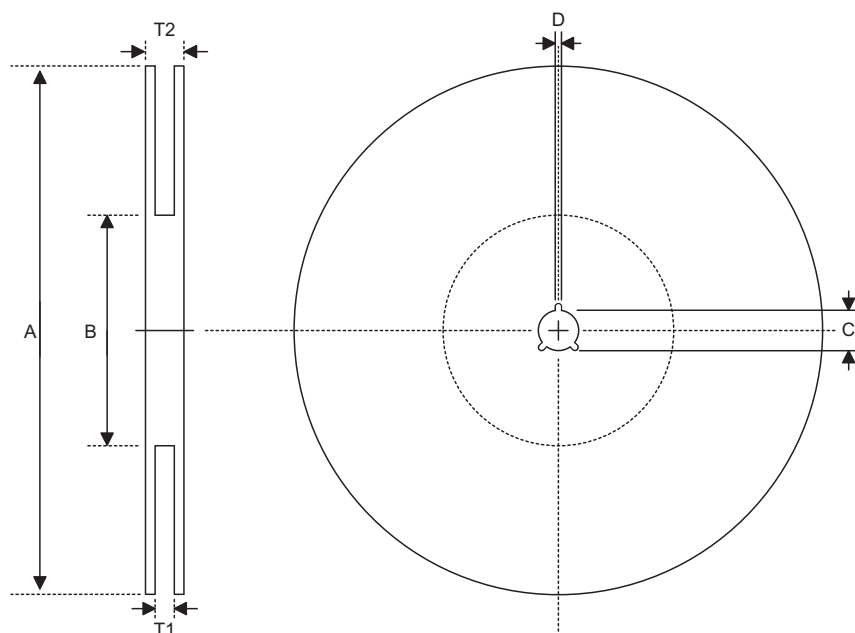


Application Circuits



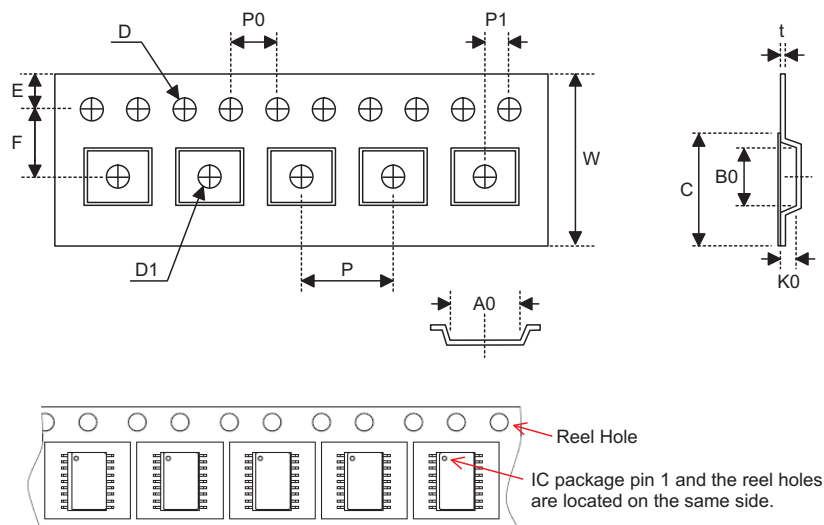
Package Information
16-pin NSOP (150mil) Outline Dimensions

• 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

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 ^{+0.10/-0.00}
D1	Cavity Hole Diameter	1.50 ^{+0.25/-0.00}
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

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