Description

WF202TBis one OOK/ASK transmitter with integrated transmitting data encoder. The circuit working frequency range is about 200MHz-500MHz. The encoder with 4 external input enable pins has 15 control options. The transmitted bit pattern is consistent with XX1527 encoder.

WF202TBintegrates most transmitter components on-chip and only requires a few external components to work as a transmitter. The WF202TB has transmission data encoder, low supply detection, and long-time mis-transmission shutdown protection features.

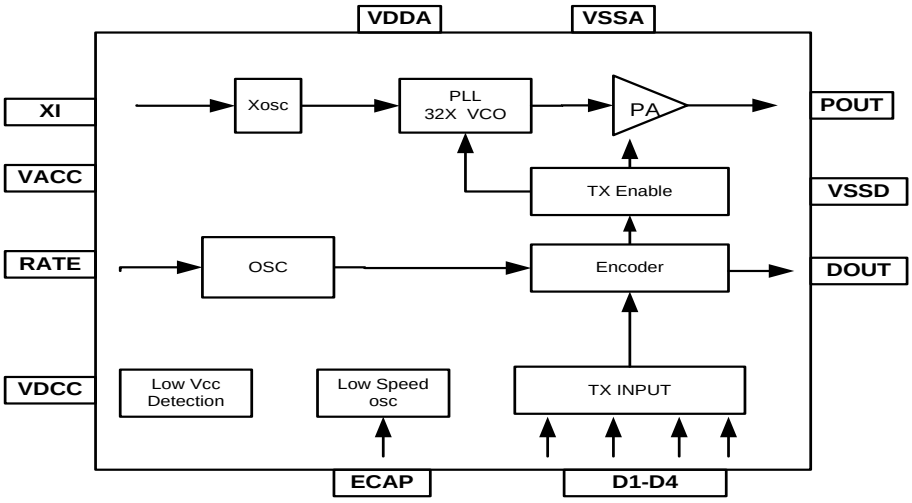
Features

- Working frequency range： 200MHz-450MHz.
- Tunable output power : 15dBm @ 5V with 50 ohm load, typ.
- Transmitted data pattern consistent with XX1527 encoder.
- Low supply voltage: 2.2V-5.5V for 315/433MHz.
- Low supply voltage detection
- Automatic shutdown protection

Applications

- Remote Keyless Entry (RKE)
- Remote Control, Garage door and gate openers
- AMR-Automatic Meter Reading
- Wireless alarm and security system.

Block Diagram



Pin Configuration

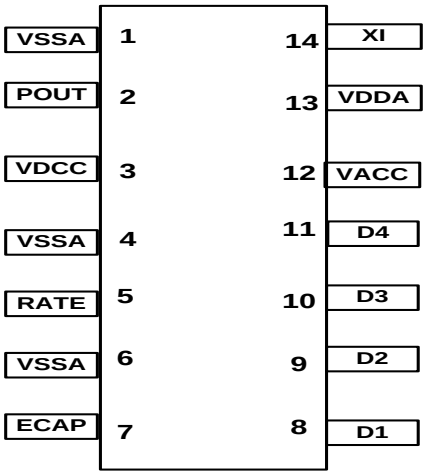


Table 1. Pin Description

Pin	Symbol	I/O	Description
1	VSSA	IO	RF Gound
2	POUT	O	Transmitted RF output
3	VDCC	I/O	LDO power for PA Driver, connected ext bypass cap.
4	VSSD		Digital part gnd
5	RATE	IO	Ext connected res， Control TX data rate
6	VSSD*		Digital part gnd
7	ECAP	IO	External cap to control transmitting time (say 20s), if D1-D4 hold high, after 20s, stop transmitting.
8	D1	I	Transmit input control, active high, default low
9	D2	I	Transmit input control, active high, default low
10	D3	I	Transmit input control, active high, default low
11	D4	I	Transmit input control, active high, default low
12	VACC	IO	LDO Power for RF part, connected ext bypass cap.
13	VDDA	IO	Vdd for whol chip
14	XI	I	Input terminal of local oscillation signal. It is connected to the crystal or driven by an external clock.

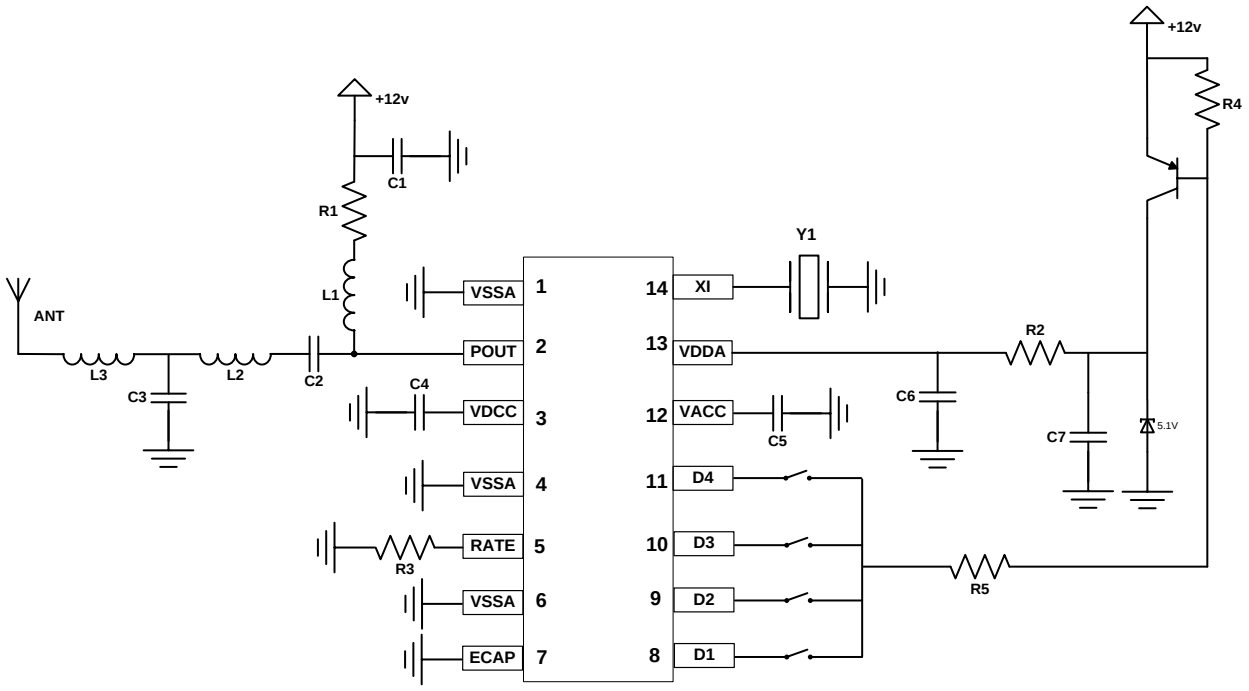
Table 2. Absolute Maximum Rating

Item	Rating
Supply Voltage, VDD	+ 5.6V
Inputs and Clock Outputs	- 0.5V to + 5.6V
Storage Temperature	- 65 to + 150 oC
Soldering Temperature	+ 260 oC

Table 3. Electrical Specifications

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Supply Voltage	V_{DD}	200MHz-500MHz	2.2		5.5	V
Supply Current	I_{DD}	Fout=434MHz, 13dBm , 3V		15		mA
		Fout=434MHz, 18dBm , 5V		25		mA
RF Power On/Off Ratio	Pratio	200MHz-500MHz		60		dB
Pout supply voltage	Pvol	200MHz-500MHz			12	V
Transmitted Power	Pout	Fin=315MHz , Vdd=5V			20	dBm
		Fin=434MHz , Vdd=5V			20	dBm
Data Rate		OOK/ASK mode	0.5		20	Kb/s
OSCI operating Frequency	F_{OSC}		9	10	20	MHz
Operating Temperature	T_a		-40	27	85	℃
Leakage Current	I_{SB}	Power down mode			1	uA

Typical Application Circuit I —315/433MHz Transmitter



Functional Description

Crystal Oscillator

The crystal oscillator circuit consists of a colpit oscillator. Pin 14 can drive one off-chip 9MHz-30MHz crystal without external capacitors required. The driving capacitors are integrated on Chip.

The crystal driver stage can also take input clock as input clock buffer. The crystal oscillator frequency is determined as follows

fosc= fvco / 32

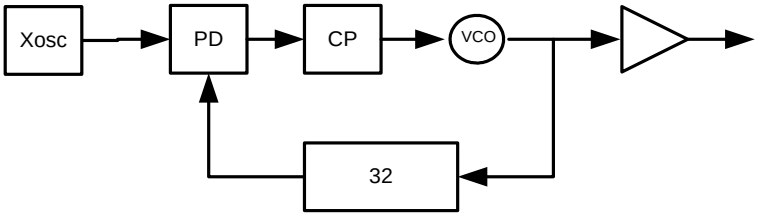
Where Fvco is VCO oscillation frequency. 32 is PLL divider value. Below table lists the required Crystal frequency. The suggested crystal ESR must be less than 50Ω.

Transmitting Frequency (MHz)	Crystal Frequency (MHz)	Note
315	9.844	
340	10.625	
390	12.188	
433.92	13.56	

PLL Block

The PLL consists of phase-frequency detector (PFD), charge pump, loop filter, voltage-controlled oscillator (VCO), and divider (32). The PFD compares two signals and produces an error signal which is proportional to the two signal phase difference. The error signal is used to control the VCO to run fast or slow.

The VCO oscillation frequency range is tunable between200MHz-450MHz.



OOK/ASK Modulation

The OOK/ASK modulation is done by external Pin D1-D4. D1-D4 turn on/off the power amplifier when D1-D4 is high or low. The PLL loop is on no matter D1-D4 is high or low. However, to save power, the whole chip is turned off after D1-D4 stay in low over one million crystal oscillation cycles. That is about 100ms for 10MHz crystal. When D1-D4 is high, the whole chip is powered up.

TX PROTECTION

When D1-D4 is high, chip transmits signal. When D1-D4 becomes low, transmission is turned off. If D1-D4 stays at LOW for a while, say 100ms, the whole chips is powered off. The leakage current is less than 1uA.

If any of the four transmitting enable pins D1-D4 is hold at high by a mistake operation, the chip will automatically stop transmitting after a period of time, say 20s. This transmitting period length is tunable with the external pin ECAP, below table lists the corresponding time with different external cap values.

Table x The transmitting time vs external cap when pins D1-D4 is hold at high.

ECAP	TX Time to stop (s)	note
4.7nF	750	
470pF	75	

47pF	7.5	

TX RATE CONTROL

The transmitting rate is controllable with external control pin RATE connected with different resistor. Below table lists the transmitting rate with different ext resistor. The bit rate changes less with supply voltage.

Table x The transmitting time vs external resistor when any pin D1-D4 is hold at high.

Ext Resistor (K.Ω)	Vcc=2.5V , 1T Bit width (ms),	Vcc=2.5V , Bit Rate (kb/s)	Note
220	0.12	8.0	
330	0.16	6.0	
470	0.25	4.0	
690	0.34	3.0	
1000	0.50	2.0	

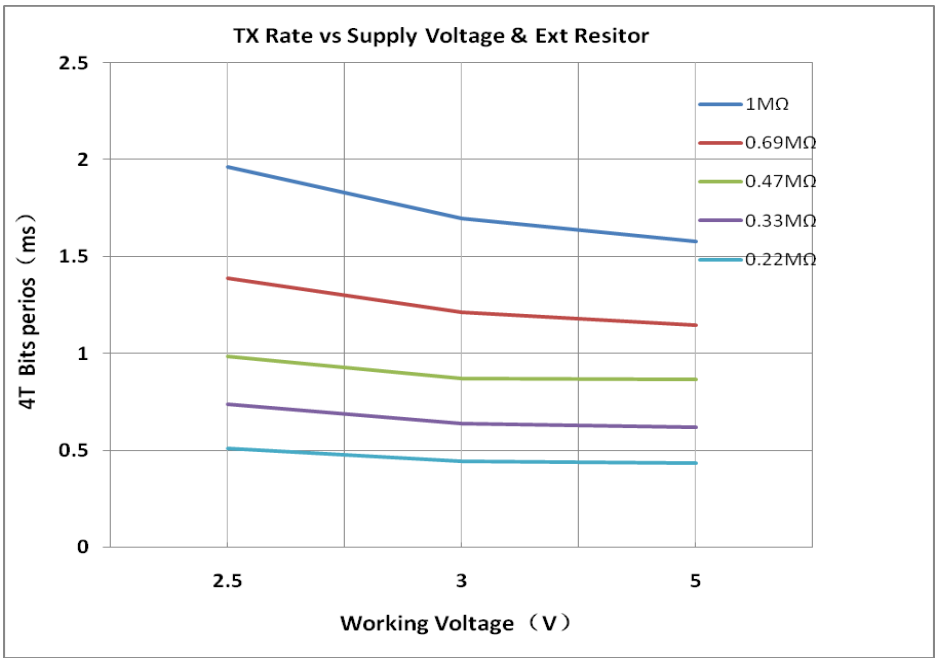
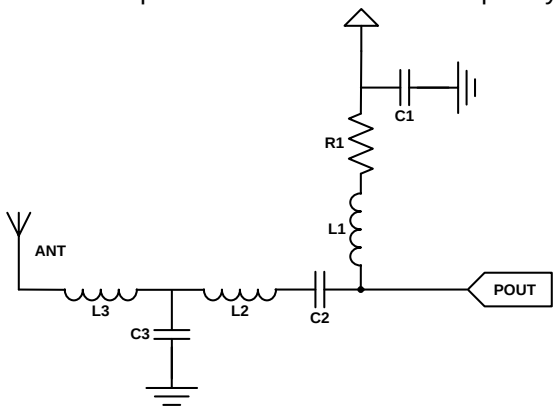


Fig. 1 Transmitting bit rate vs Supply voltage and ext bias resistor.

RF OUTPUT

The ANT pin can be matched to 50 Ohm with a Π-type circuit. The supply voltage can be as high as 12V. Below table is suggested inductor and capacitor value for different frequency.

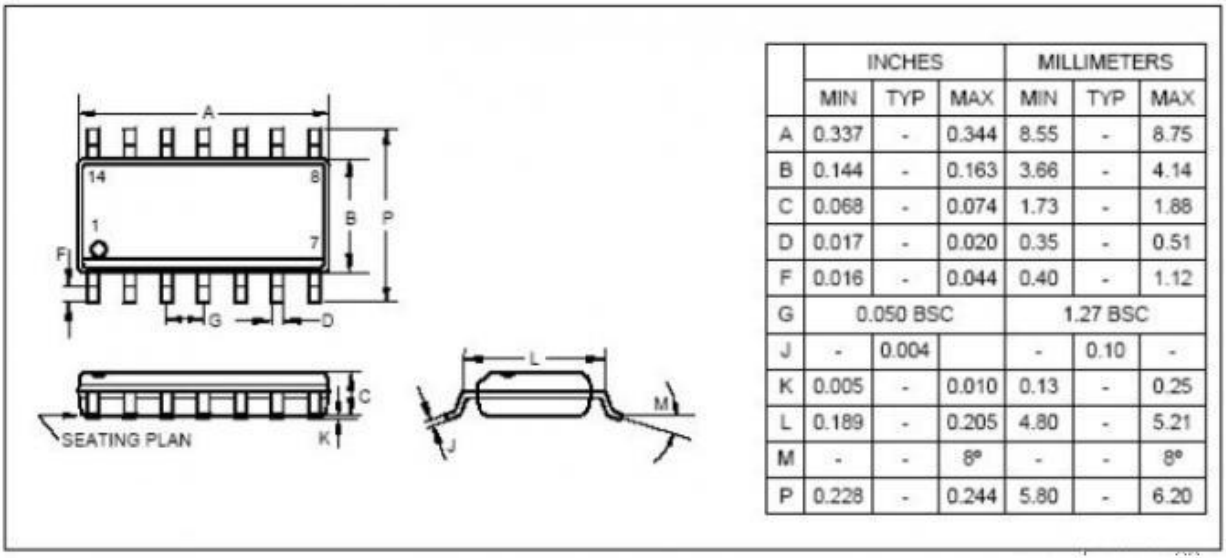


Frequency (MHz)	L1 (nH)	L2 (nH)	L3 (nH)	C1 (uF)	C2 (pF)	C3 (pF)	R1 (Ω)	Note
315	220	82	0R	1.0	10	1.8	100	
433	220	82	0R	1.0	10	1.5	100	

ENCODER

The chip integrates the control data encoder. The transmitted data pattern is encoded within the internal OTP encoder. The data pattern is consistent with market available product XX1527.

Package Information SOP-14



	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	0.337	-	0.344	8.55	-	8.75
B	0.144	-	0.163	3.66	-	4.14
C	0.068	-	0.074	1.73	-	1.88
D	0.017	-	0.020	0.35	-	0.51
F	0.016	-	0.044	0.40	-	1.12
G	0.050 BSC			1.27 BSC		
J	-	0.004		-	0.10	-
K	0.005	-	0.010	0.13	-	0.25
L	0.189	-	0.205	4.80	-	5.21
M	-	-	8°	-	-	8°
P	0.228	-	0.244	5.80	-	6.20