



深圳市科视连电子科技有限公司

版本号：	V3.0
编写：	
确认：	

Product specification

产品名称：433/315RF Receiver IC

产品型号：WL119

客户：_____

确认：_____

日期：_____

1、The product description

WL119UHF ASK receiver applied to 300 MHz to 450 MHz short transceiver front-end low power consumption, low cost, support ASK/baton modulation mode. The electric road has a high sensitivity (110 DBM) and performance, low power consumption and high dynamic range (greater than 60 db). Circuit integrated a complete rf front end and ASK simulation solution part, has the very high level of integration. WL119 can work in + 3 v ~ + 5 v power supply voltage, the receive frequency is 315 MHZ, the current consumption is only 4.5 mA; Receive frequency is 433 MHZ, consumption current 6.0 mA, consumption in off mode current is less than 1 ua.

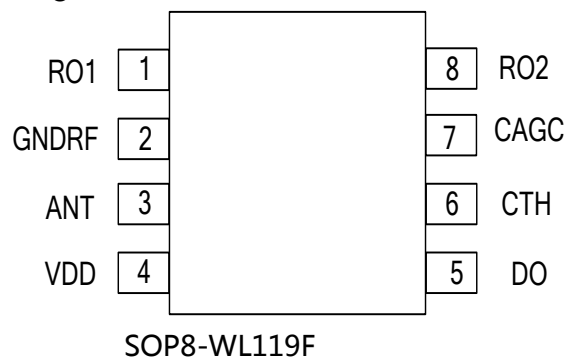
Product features

- with high sensitivity (110 DBM)、
- highest KBPS rate can be up to 2
- high dynamic range (greater than 60 db)。
- without external filter
- work in + 3 v ~ + 5 v power supply voltage
- FRF = 315 MHZ, the current consumption is only 4.5 mA
- FRF = 433.92 MHz, consumption current 6.0 mA
- in off mode current consumption is less than 1 uA
- SOP8、SOP16L

Working temperature range - 40 °C ~ 85 °C

Encapsulation and pins

WL119 Using SOP8 and SOP16L (9.9 mm x 6.0 mm) encapsulation, encapsulation and pins are arranged as shown in figure 1.



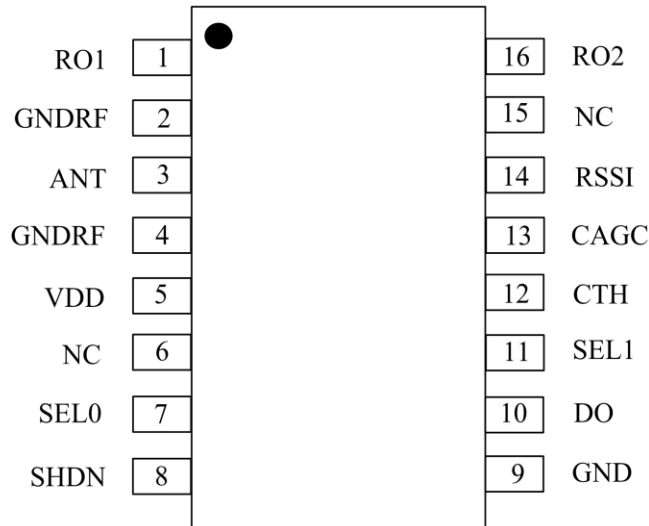


图 1 Terminal is arranged
SOP16-WL119B/C

2、Absolute maximum rating

Power supply voltage: 5 v lead resistance welding temperature: 250 °C maximum input power: + 10 DBM

Storage temperature: 65 ~ 150 °C

Power supply voltage and power consumption

Operating voltage: 3.3 + / - 10% working current: 6 or less ma working temperature: - 45 ~ 85 °C

Terminal serial	Operator	name	Terminal serial	Operator	name
1	RO1	Reference frequency input	9	GND	GND
2	GNDRF	GNDRF	10	DO	The decoding output
3	ANT	Rf input	11	SEL1	Bandwidth choice 1
4	GNDRF	GNDRF	12	CTH	The reference voltage end
5	VDD	The powe	13	CAGC	AGC capacity external side
6	NC	unused	14	RSSI	Power output testing
7	SEL0	Bandwidth 0	15	NC	unused
8	SHDN	Power saving mode	16	RO2	2 reference frequency input

Working frequency: 300 MHZ to 450 MHZ

3、主要特征曲线

VDD=3.3V , TA=+25°C

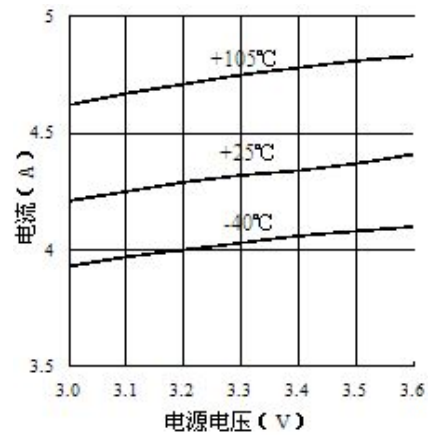
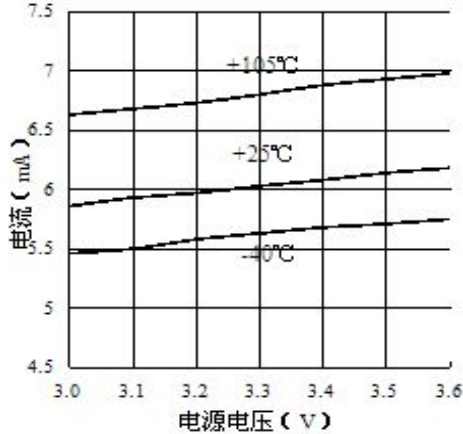


Figure 2 current changing with the power supply voltage curve (fRF = 433.92 MHz) figure 3 current changing with the power supply voltage curve (fRF = 315 MHz)

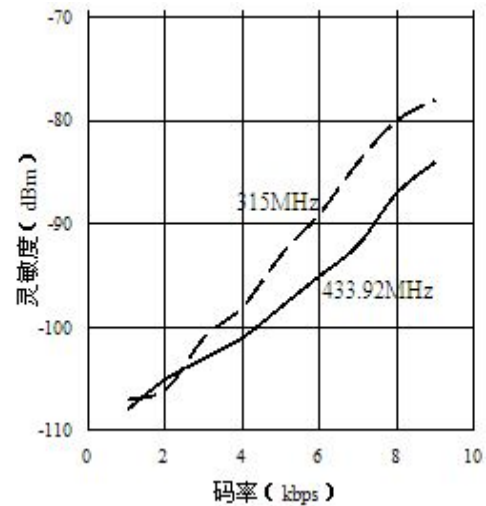
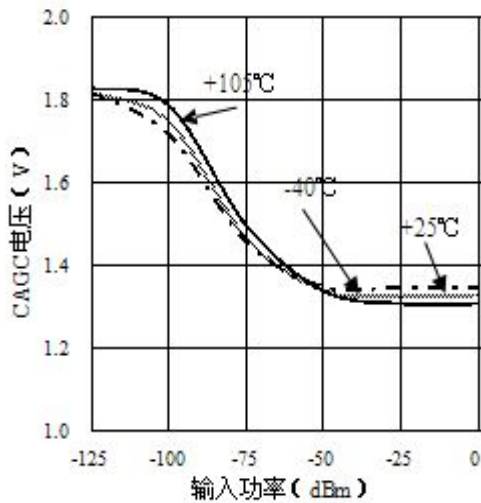


Figure 4 CAGC voltage change with the input signal power curve figure 5 receiving sensitivity change with rate curve (VSEL1 = VSEL0 = 0 v)

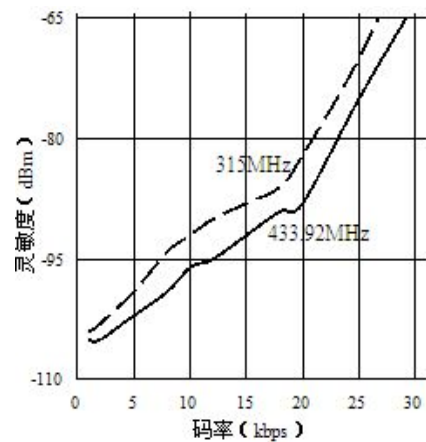
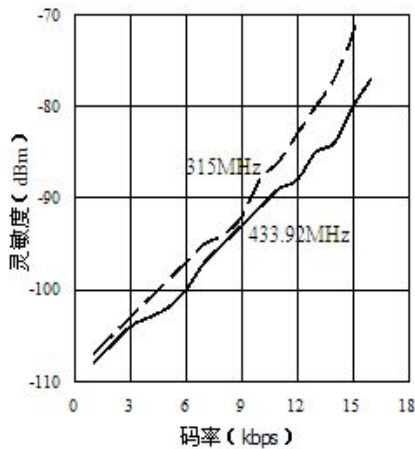


Figure 6 receiving sensitivity rate curve (VSEL1=0V , VSEL0=3.3V)

Figure 7 receiving sensitivity ratecurve (VSEL1=3.3V , VSEL0=0V)

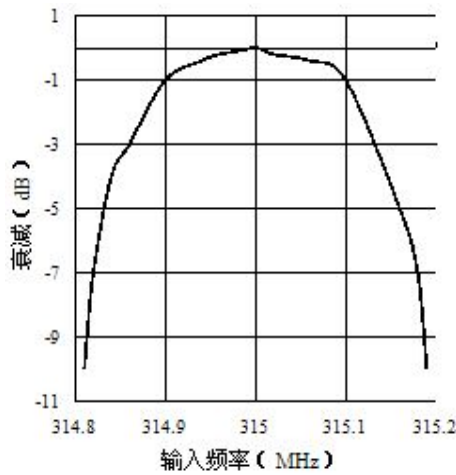


Figure 8 intermediate frequency ($f_{REF} = 13.52313$ MHz) - 3 db bandwidth

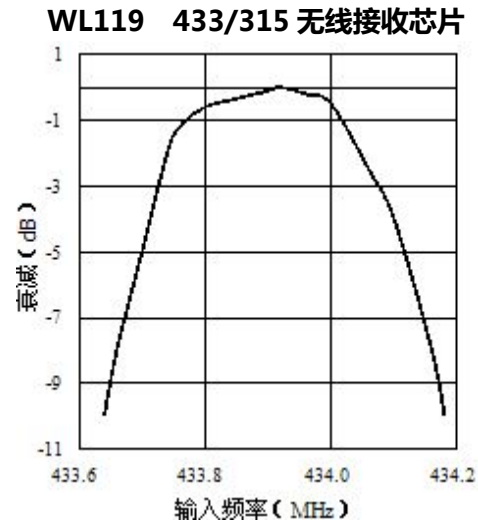


Figure 9

4、the principle block diagram

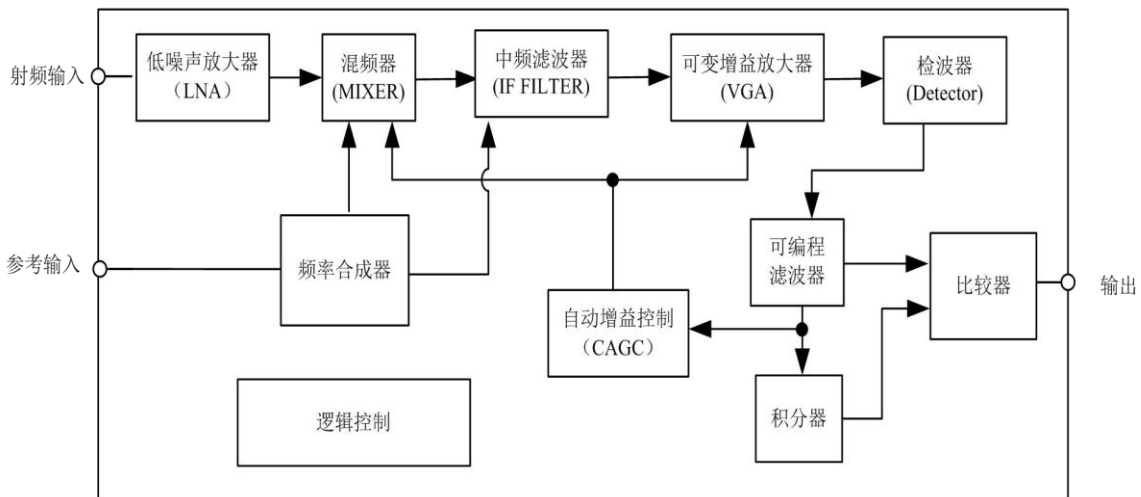


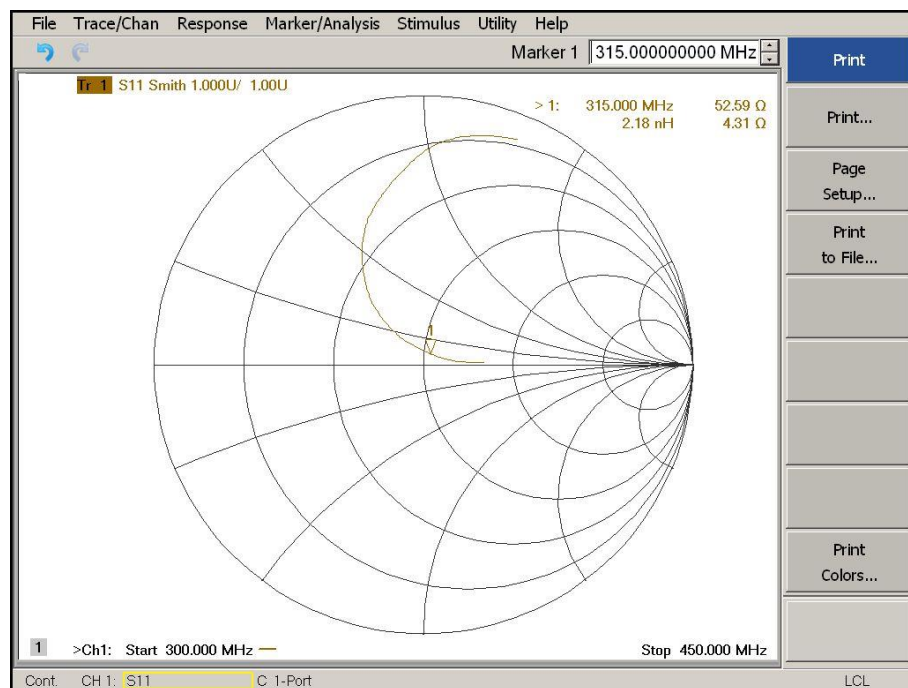
Figure 10 circuit principle diagram

5、Functional description :

WL119 UHF ASK integrates the complete rf and analog demodulation receiver part, has the very high level of integration. Including rf front end by the low noise amplifier, mixer, intermediate frequency filter, a variable gain amplifier and frequency synthesizer; Analog demodulation part consists of detector, programmable filter, integrator and units such as the comparator. Low noise amplifier (LNA), MIXER (MIXER) LNA USES the common source common grid structure, has the characteristics of high gain and low noise. Rf signal (f_{RF}) single-ended input, through the LNA enlarged, double side output to two double balanced mixer. Mixer adopts gilbert structure, its gain by CAGC terminal output voltage control. LNA and mixer bias current size are controlled by the frequency synthesizer (PLL), under the different reference frequency, its ?

Table 1 the LNA input impedance under different receive frequency (including PCB parasitic)

接收频率(f_{RF})	LNA 输出阻抗(Ω)
315MHz	6.13-j71.44
433.92MHz	6.20-j45.68



**图 11 匹配后 LNA 输入阻抗
($f_{RF}=315\text{MHz}$)**

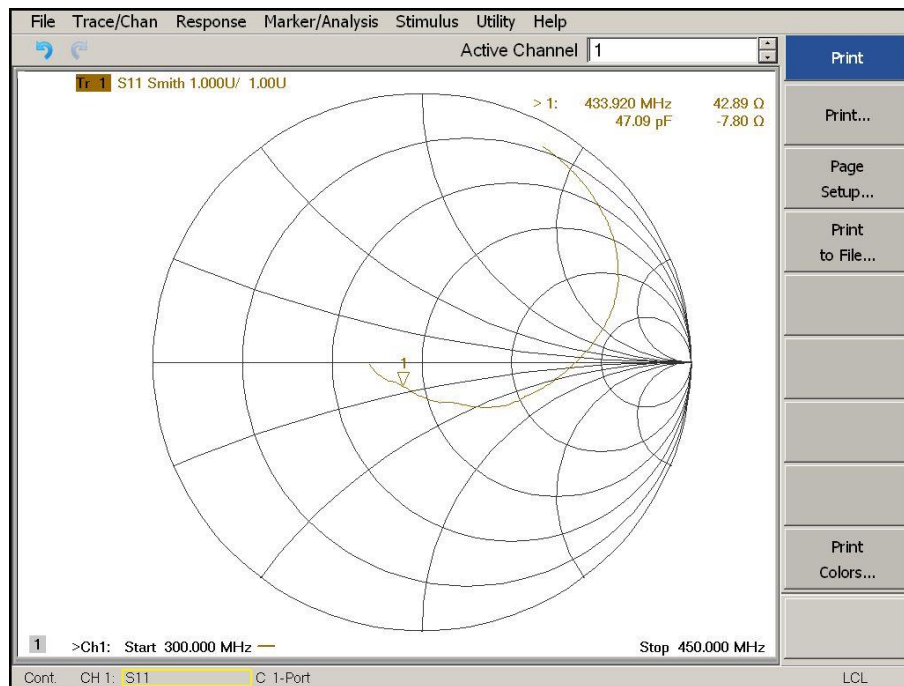


图 12 匹配后 LNA 输入阻抗($f_{RF}=433.92\text{MHz}$)

Intermediate frequency filter

Intermediate frequency filter for transconductance capacitance ($G_m - C$) filter, with functions of automatic tuning and image reject, can be adjusted automatically according to the size of the reference frequency center frequency and bandwidth. When the circuit receive frequency is 433.92 MHz, intermediate frequency for the filter bandwidth 330kHz ($BWIF@433.92\text{MHz}=330\text{kHz}$). Other receive frequency (f_{RF}), intermediate frequency filter bandwidth can be calculated using formula (1), the center frequency can be according to the reference frequency (f_{REF}) size, calculated using formula

(2). $BWIF = BWIF@433.92\text{MHz} \times$ formula (1)

$f_{IF} = f_{REF} \times$ formula (2)

Variable gain amplifier (VGA)

Variable gain amplifier gain by CAGC unit control, provide demodulator with fixed voltage swing of intermediate frequency signal. Electric circuit on fast model is established. CAGC terminal output 120 μA (CCAGC) charging current for the external capacitance, CAGC terminal output voltage increases, which circuit receives the channel gain increased. When the VGA output voltage amplitude of intermediate frequency signal to reach the required, the DO output high level, CAGC terminal 120 μA charging current is shut off, receiving channel gain is fixed. Received signal arrival, circuit into fast stable mode. CAGC terminal 600 μA discharge current, the CAGC outlet voltage is reduced, reduce circuit receives the channel gain. When the VGA output intermediate frequency signal when the voltage required margins, CAGC terminal 600 μA discharge current was shut off, receiving channel gain basic?

ASK/baton Demodulator (Demodulator)

ASK/baton demodulator is mainly composed of Detector (Detector), programmable filter, integrator, comparator and other units. Detector used for detection of intermediate frequency signal amplitude variable gain amplifier output. Detector based on intermediate frequency signal voltage peak value, the load capacitance charging and discharging continuously, make the load capacitance voltage is equal to the intermediate frequency signal peak voltage, so as to realize intermediate frequency signal peak voltage detection. Programmable filter for low pass filter structure, its size can be adjusted automatically according to the rate of different bandwidth, is used to filter out the letter Harmonic noise component. Integrator, according to the volume of programmable filter output signal to a reference voltage comparator. Comparison is used to signal the size comparison function. When the programmable filter output signal exceeds the integral

Frequency synthesizer (PLL)

PLL (FLO), the vibration signal for mixer adopts ring oscillator structure, greatly reduce the power consumption of the circuit. The vibration signals generated by PLL frequency size 32 times for reference frequency (fREF), then the natural frequency of vibration is obtained by using the formula (3) size.

$FLO = 32 \times fREF$ formula (3)

According to the formula (3), (2) and formula to calculate the required reference frequency under different receive frequency (fRF) size. Reference frequency calculation formula as shown in formula (4).

$FREF = fRF / (32 \div)$ formula (4)

Control interface

A, SHDN energy-saving control pin for circuit, when the SHDN for high electric circuit into energy saving mode, at ordinary times SHDN is low

The electricity at ordinary times, the normal work of the circuit.

B, SEL0 and SEL1 choose port for bit rate, control instructions are shown in table 2

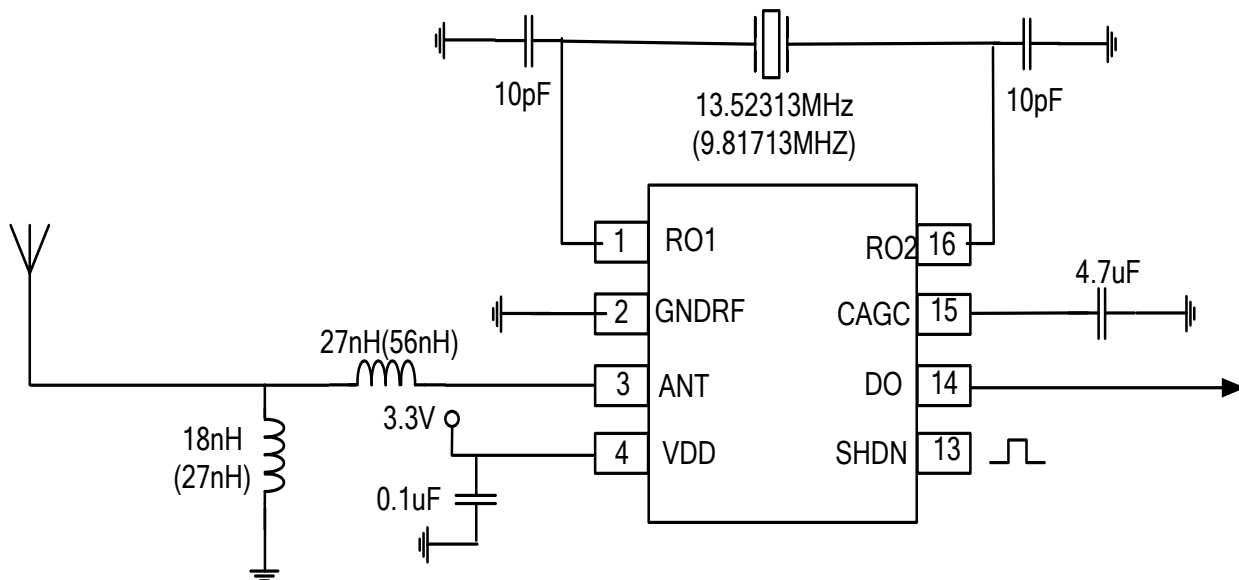
Table 2 shows control pin

码率	SEL0 状态	SEL1 状态
800bps~1.2Kbps	0	0
1.2Kbps~5Kbps	1	0
5Kbps~20Kbps	0	1

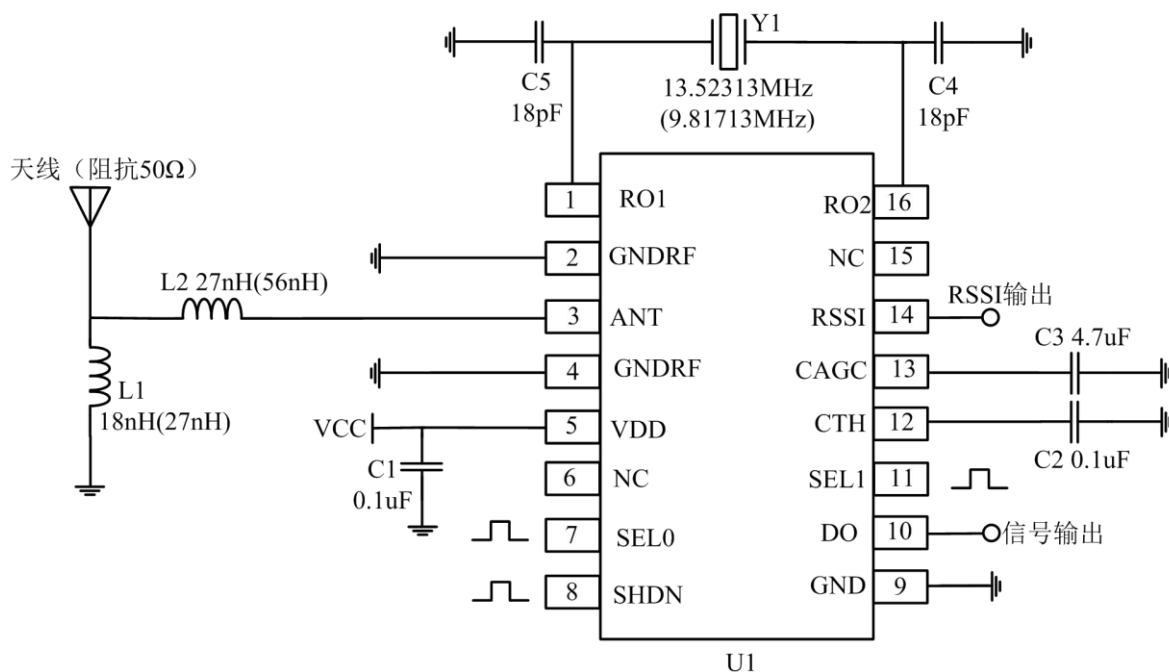
6、典型应用图

Receive frequency 433.92 MHz, application circuit shown in figure 13 (receive frequency 315 MHz peripheral components are shown in brackets)

WL119 433/315 无线接收芯片



WL119F 应用电路图



WL119B/C 应用电路图

The peripheral components under different receive frequency list are shown in table 3 and table 4.

Table 3 $f_{RF} = 433.92 \text{ MHz}$, peripheral components list

项目	数量	符号	参考值	PCB 印刷脚	元件型号	制造商
1	2	C1,C2	0.1uF	0603	GRM188F51H104ZA01D	muRata
2	1	C3	4.7uF	0603	GRM188R61C475KAAJD	muRata
3	1	C4,C5	18pF	0603	GRM1885C1H180JA01D	muRata
4	1	L1	18nH	0603	0603CS-018NXJB	Vishay
5	1	L2	27nH	0603	0603CS-027NXJB	Vishay
6	1	U1	WL119		WL119	Wireless
7	1	Y1	13.52313MHz(晶体)		HC-49S-13.52313MHz-20p	

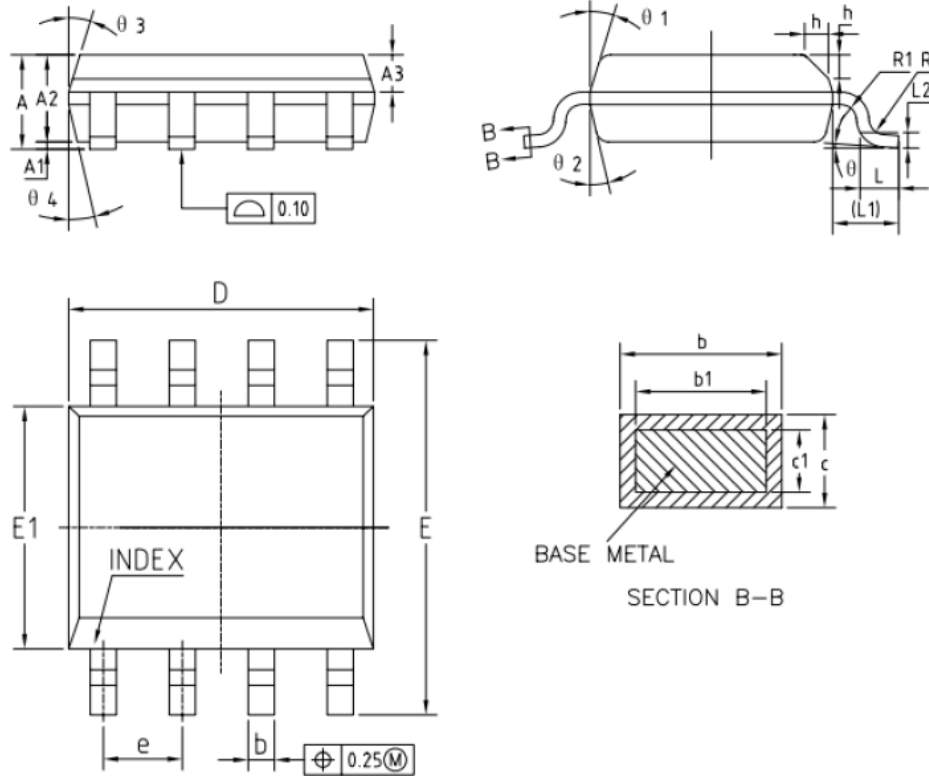
表 4 $f_{RF} = 315 \text{ MHz}$ 时，外围元器件清单

项目	数量	符号	参考值	PCB 印刷脚	元件型号	制造商
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1	2	C1,C2	0.1uF	0603	GRM188F51H104ZA01D	muRata
2	1	C3	4.7uF	0603	GRM188R61C475KAAJD	muRata
3	1	C4,C5	18pF	0603	GRM1885C1H180JA01D	muRata
4	1	L1	27nH	0603	0603CS-027NXJB	Vishay
5	1	L2	56nH	0603	0603CS-056NXJB	Vishay
6	1	U1	WL119		WL119	Wireless
7	1	Y1	9.81713MHz(晶体)		HC-49S-9.81713MHz-20pp	

7、封装尺寸：

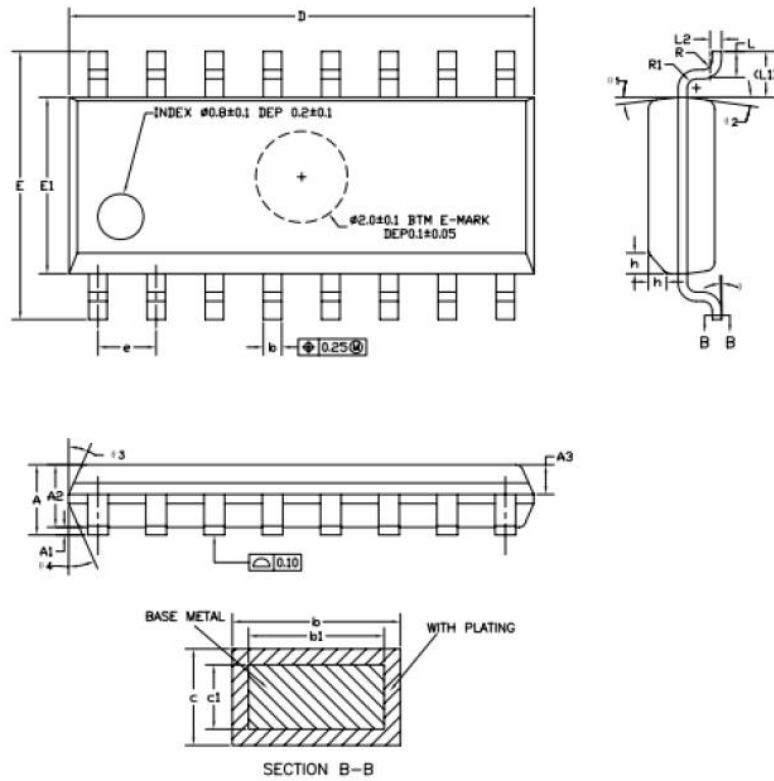
SOP8 (WL119F)



(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	—	0.51
b1	0.37	0.42	0.47
c	0.17	—	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	—	—
R1	0.07	—	—
h	0.30	0.40	0.50
theta	0°	—	8°
theta 1	15°	17°	19°
theta 2	11°	13°	15°
theta 3	15°	17°	19°
theta 4	11°	13°	15°

SOP16L (WL119B/C)



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.60	1.75
A1	0.10	0.15	0.25
A2	1.25	1.45	1.65
A3	0.55	0.65	0.75
b	0.36	—	0.51
b1	0.35	0.40	0.45
c	0.17	—	0.25
c1	0.17	0.20	0.23
D	9.80	9.90	10.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	—	—
R1	0.07	—	—
h	0.30	0.40	0.50
θ	0°	—	8°
θ 1	6°	8°	10°
θ 2	6°	8°	10°
θ 3	5°	7°	9°
θ 4	5°	7°	9°

Matters needing attention

- 1, this device is static sensitive devices, shall be used in the transport and use anti-static measures.**
- 2, according to the typical application recommended by using devices.**
- 3, the product specifications are subject to change without prior notice.**