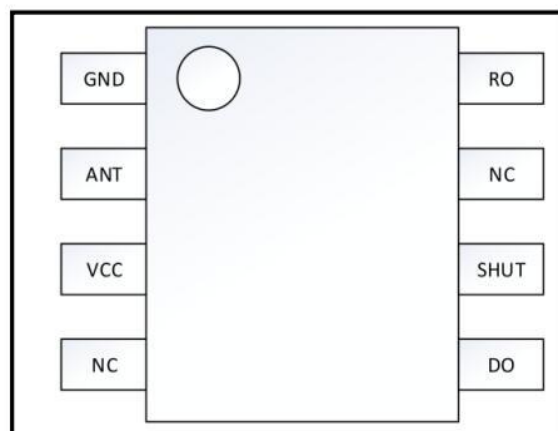
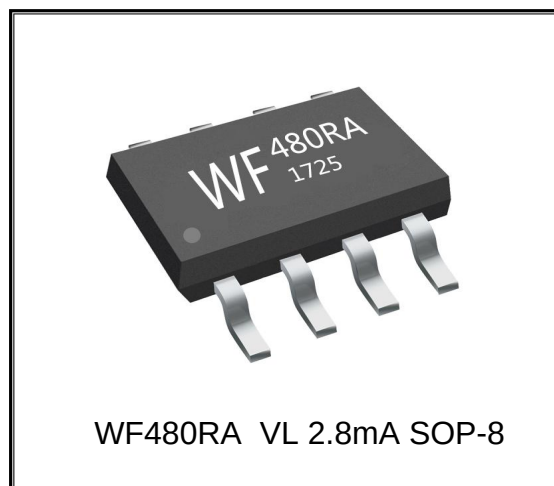


High-sensitivity, low-power 315/433MHz ASK/OOK RF receiver chip

Key Features

- Frequency range: 300 MHz – 440 MHz
- High receive sensitivity: 2 kbps, BER 10^{-2}
 - -110 dBm @ 315MHz
 - -110dBm @ 433.92MHz
- Low power consumption:
 - 2.8mA/3.3V @ 315MHz
 - 2.9mA/3.3V @ 433.92MHz
 - 0.01uA/3.3V @ Shut Down Mode
- Start-up time: <3ms
- Data rate: ≤4kbps
- Wide operating voltage: DC 2.0V – 5.5V
- Built-in image rejection; excellent interference immunity
- Reception bandwidth: ±200kHz
- High ESD protection standard: 8kV HBM
- Operates independently; no external MCU control required
- No register configuration required
- RoHS compliant
- SOP8 package



WF480RA VL 2.8mA Pin diagram

Applications

- Low-cost consumer electronics applications, such as remote-controlled fans, lights, doors, and toys.
- Remote Keyless Entry (RKE) System
- Industrial Inspection and Control Systems
- Smart Home and Building Surveillance Automation
- Long-range RFID

Chip Overview

The WF480RA VL (2.8mA) is a highly integrated, low-power monolithic ASK/OOK RF receiver chip. All high-frequency signal reception functions are integrated on-chip to ensure highly reliable reception performance with minimal external components and at the lowest possible cost. It is, therefore, a true monolithic receiver device that accepts wireless high-frequency modulated signals as input and outputs digitally demodulated signals.

The WF480RA VL2.8mA features an SOP8 package, a normal operating voltage range of 2.0~5.5V, a normal operating current of 2.8mA, a startup time of 2.3ms, and a maximum receiving sensitivity of up to -110dBm, making it highly suitable for various devices with power consumption requirements. All RF and IF tuning is completed automatically on-chip, omitting the manual adjustment process during development and production, thereby reducing costs and accelerating time-to-market.

This upgrade is based on the original architecture of the WF480RA, which is mature and stable. Furthermore, the CTH pin capacitor has been eliminated, thoroughly resolving chip defects caused by capacitor quality.

1. Typical Application

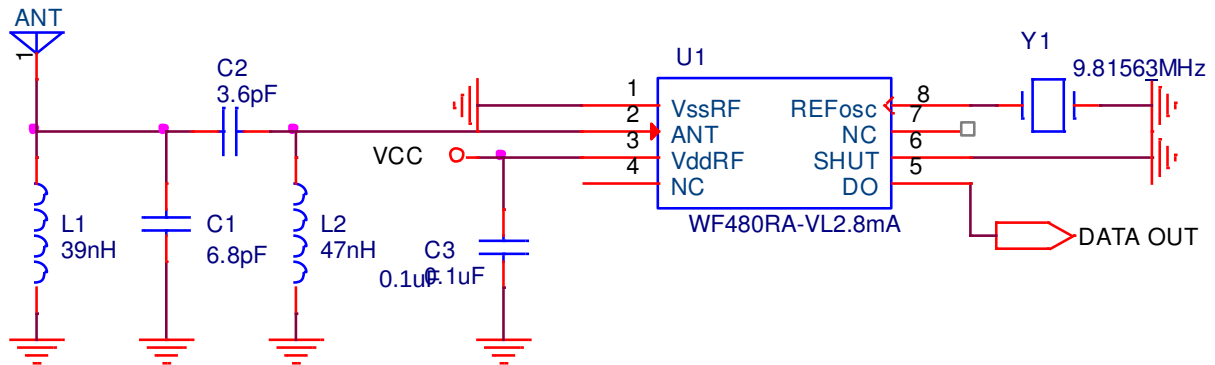


Figure 1. Typical 315 MHz, 1.5 kbps circuit

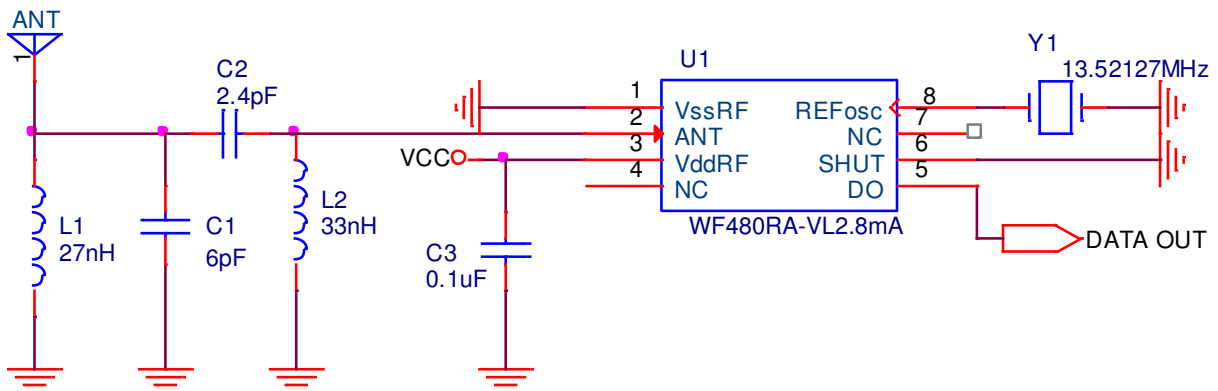


Figure 2. Typical 433 MHz, 1.5 kbps circuit

2. Pin Definitions

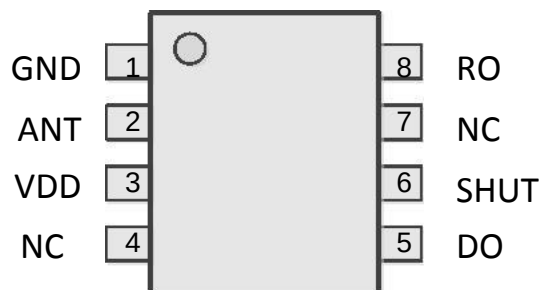


Figure 3. Pinout diagram of the WF480RA VL2.8mA.

Table 1. WF480RA VL 2.8mA Pin Definitions

No.	Name	Type	Description
1	GND	P	Ground pin
2	ANT	I	RF signal input pin
3	VDD	P	Power supply pin, DC 2.0~5.5V
4	NC	--	No connection (Leave floating)
5	DO	O	Decoded data signal output
6	SHUT	I	Operating mode selection pin. Shutdown mode: Connect to VDD; Operating mode: Connect to GND
7	NC	--	No connection (Leave floating)
8	RO	I	External oscillator pin

3. Electrical Characteristics

3.1. Operating Conditions

No.	Parameters	Condition	Min	Type	Max	Unit
VDD	Supply voltage		2.0	3.3	5.5	V
TA	Operating temperature		-40		+125	°C
	Supply voltage ramp rate		1			mV/μs

3.2. Limiting Parameters

No.	Parameters	Condition	Min	Type	Max	Unit
VDD	Supply voltage[1]		-0.3		5.5	V
V _{IN}	Interface voltage		-0.3		VDD+ 0.3	V
T _J	Junction temperature		-40		150	°C
T _{STG}	Storage temperature		-65		150	°C
T _{SDR}	Soldering temperature	Lasting at least 30 seconds			255	°C
V _{HBM}	ESD Class [2]	Human Body Model (HBM)	-8		8	kV

Notes

[1] Exceeding the maximum ratings may cause permanent damage to the device; please operate within these limits to ensure equipment safety.

[2] This chip features a high level of ESD protection; however, please ensure that all operations are performed at a workstation with proper ESD protection measures.

3.3. Receiver Specifications

No.	Parameters	Condition	Min	Type	Max	Unit
VDD	Supply voltage		2.0		5.5	V
f _{RF}	Operating frequency range	f _{RF} =9.81563MHz		315		MHz
		f _{RF} =13.52127MHz		433.92		MHz
DR	Data rate				10	kbps
I _{OP}	Operating current	f _{RF} =315MHz, VDD=3.3V		2.81		mA
		f _{RF} =315MHz, VDD=5V		2.84		mA
		f _{RF} =433.92MHz, VDD=3.3V		2.92		mA
		f _{RF} =433.92MHz, VDD=5V		2.96		mA
I _{STBY}	Quiescent current	V _{SHUT} =VDD		0.01		μA
	Receiver sensitivity	f _{RF} = 315MHz / 2kbps		-110		dBm
		f _{RF} = 433.92MHz / 2kbps		-110		dBm
BW	Receiver bandwidth	f _{RF} = 315MHz		250		kHz
		f _{RF} = 433.92MHz		250		kHz
f _{IF}	Intermediate frequency			0.86		MHz
f _{BW}	Intermediate frequency bandwidth			0.43		MHz
	Saturation input level	RSC = 50Ω		-20		dBm
	Spurious Reverse Isolation	ANT pin, R _{SC} = 50Ω		30		μVr/ms
Z _{REFOSC}	Reference Oscillator Input Impedance			290		kΩ
	Reference Oscillator Source Current			5.2		μA
f _T	Crystal oscillator frequency			13.52127 433.92M		MHz
Z _{CTH}	CTH Source Impedance			145		kΩ
I _{ZCTH(leak)}	CTH Leakage Current	TA = +85°C		±100		nA
	Receiver Startup Time	From VDD power-up to receive mode		3		ms
	SHUT Startup Time	SHUT pin pulled to receive mode		2.3		ms

3.4. Crystal Oscillator Specifications

No.	Parameters	Condition	Min	Type	Max	Unit
FXTAL315	Crystal frequency [1]	FRF =315 MHz	2.0	9.81563		MHz
FXTAL390		FRF =390 MHz		12.15269		MHz
FXTAL318		FRF =418 MHz		13.02519		MHz
FXTAL433.92		FRF =433.92 MHz		13.52127		MHz
	Crystal frequency accuracy [2]			±20		ppm
CLOAD	Load capacitance			15		pF
Rm	Crystal equivalent resistance				60	Ω
tXTAL	Crystal start-up time [3]			400		μs

Notes:

- [1] The REFOSC pin can be driven directly by an external reference clock via a coupling capacitor. The peak-to-peak voltage of the external clock signal must be between 0.3 V and 0.7 V.
- [2] This parameter selection is for reference only; the acceptable crystal frequency error is constrained by the receiver bandwidth and the RF frequency offset relative to the paired transmitter.
- [3] This parameter depends heavily on the choice of crystal.

The WF480RA employs a standard Colpitts crystal oscillator circuit with integrated load capacitors; it requires only an external crystal oscillator of the appropriate frequency to provide an accurate reference clock.

The crystal oscillator frequency is calculated using the following formula:

$$FOSC = FRF / (32 + 1.1/12)$$

For 433.92 MHz, FOSC = 13.52127 MHz.

In sleep mode, the current is 0.1 μA, and the DO pin outputs a low level.

4. SHUTDOWN function

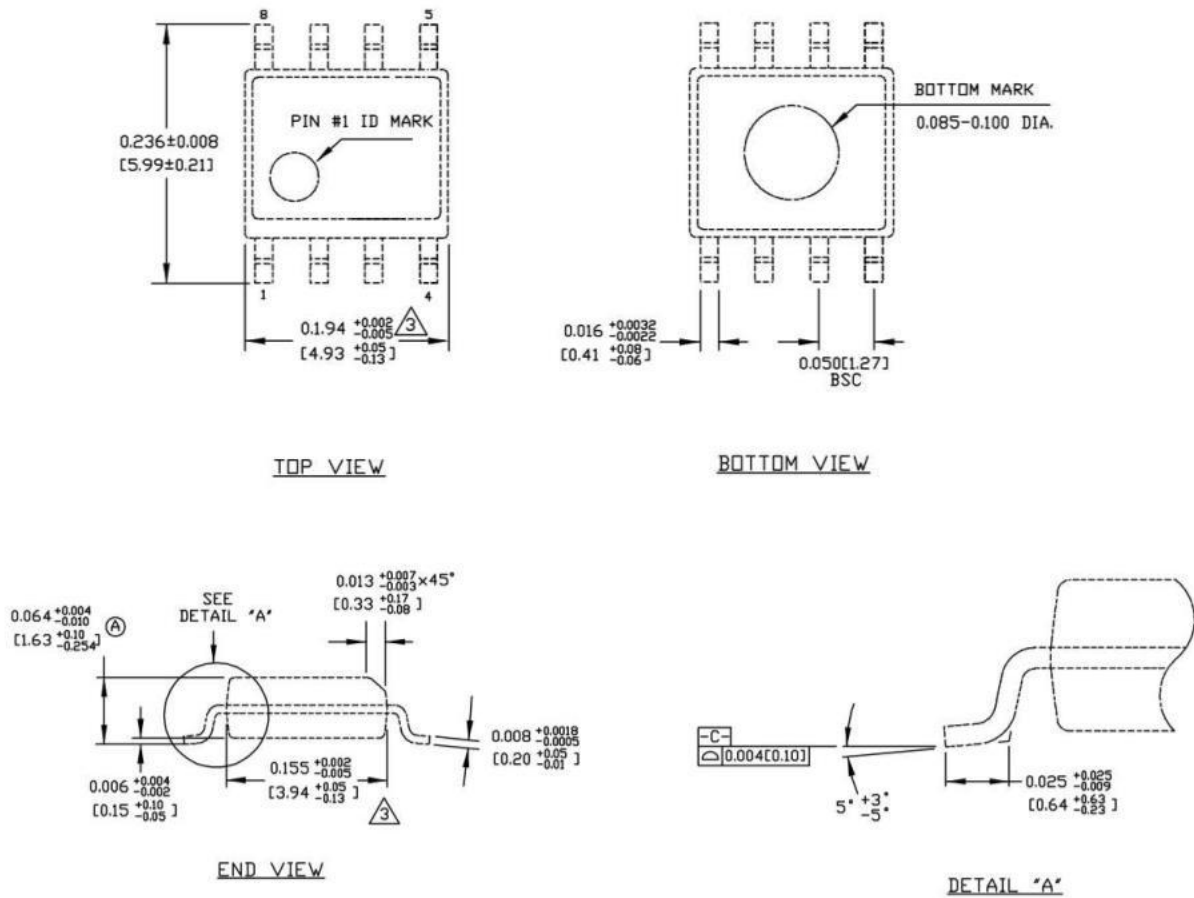
The SHUT pin (Pin 6) is used to control the operating state of the WF480RA VL2.8mA chip.

When SHUT is high, the WF480RA VL2.8mA

When SHUT is low, the WF480RA VL2.8mA operates normally (current: 2.8mA at 315MHz), and the DO pin outputs either a fixed voltage level or the demodulated signal.



5. Pin package



NOTES:

1. DIMENSIONS ARE IN INCHES[MM].
2. CONTROLLING DIMENSION: INCHES.
3. DIMENSION DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS, EITHER OF WHICH SHALL NOT EXCEED 0.010[0.25] PER SIDE.

8-Pin SOP Package