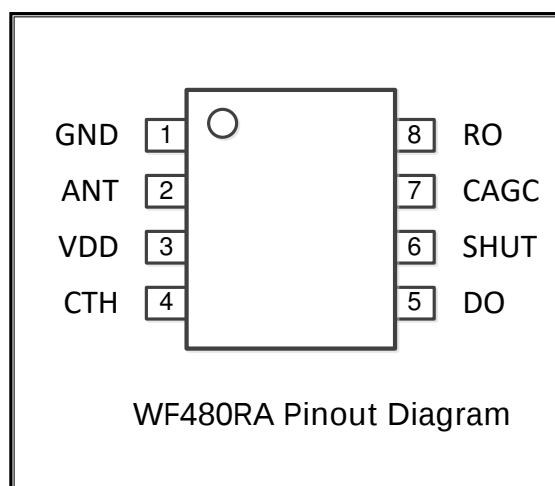


## High Sensitivity Low Power Consumption 315/433MHz ASK/OOK RF Receiver Chip

### Main Features

- Frequency range: 300MHz - 440MHz
- High reception sensitivity 2kbps, BER 10E-2
  - -113 dBm @ 315MHz
  - -113 dBm @ 433.92MHz
- Low Power Consumption
  - 5.0mA/3.3V @ 315MHz
  - 5.0mA/3.3V @ 433.92MHz
  - 0.01uA/3.3V @ Shut Down Mode
- Startup time: 3 ms
- Data rate:  $\leq 10$ kbps
- Wide operating voltage: DC 2.0V~5.5V  
Built-in image rejection for good noise immunity, Receiver bandwidth:  $\pm 300$ KHz
- High ESD protection standard:  $\pm 8$ KV HBM  
Standalone operation, no external MCU control or transmitter configuration required
- RoHS compliant
- SOP8 package



### Applications

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

### Chip Introduction

The WF480RA is a highly integrated, low-power monolithic ASK/OOK RF receiver chip. All high-frequency signal reception functions are integrated on-chip to achieve the most reliable reception with minimal external components and at the lowest cost. Therefore, it is a truly monolithic receiver device that provides "wireless high-frequency modulated signal input and digital demodulated signal output".

The WF480RA is packaged in an SOP8 package, operates within a voltage range of 2.0~5.5V, has a normal operating current of 5mA, a startup time of 3ms, and a receiver sensitivity of up to -113dBm, making it ideal for various low-power devices. All RF and IF tuning is automatically performed on-chip, eliminating manual adjustment steps during development and production, thus reducing costs and accelerating time-to-market.

## 1 Typical Applications

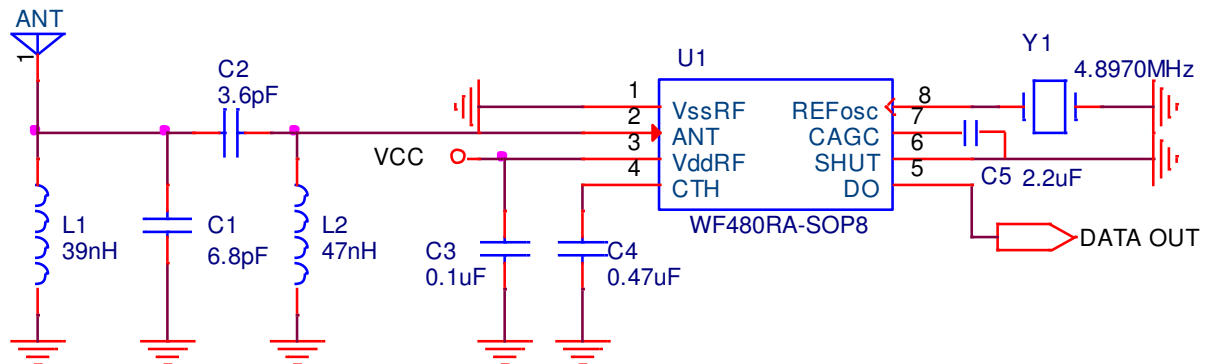


Figure 1: 315MHz 1.5kbps Typical Circuit

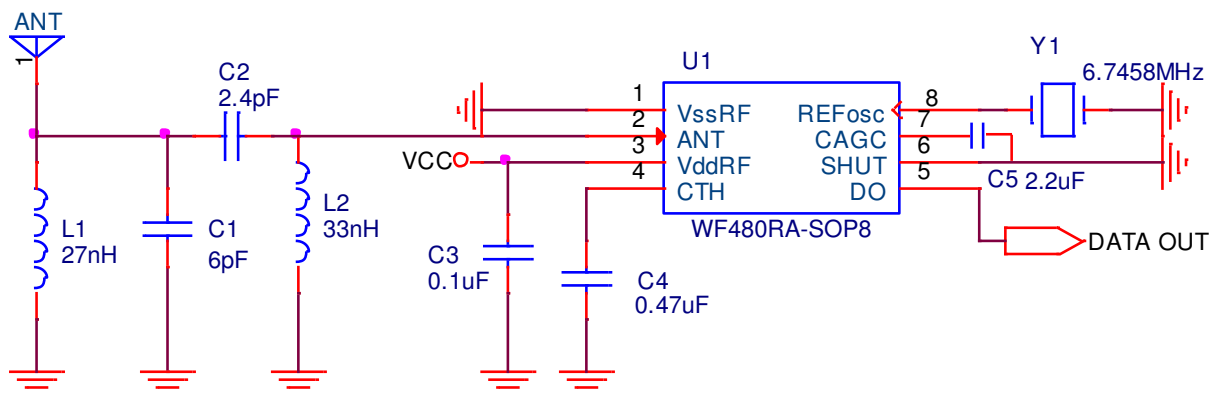


Figure 2: 433.92MHz 1.5kbps Typical Circuit

## 2 Pin Definition

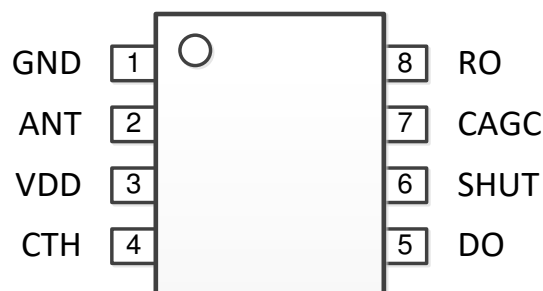


Figure 3 WF480RA Pinout Diagram

Table 1 WF480RA Pin Definitions

| Serial | Name   | Type | Description                                                        |
|--------|--------|------|--------------------------------------------------------------------|
| 1      | GND    | P    | Grounding pin                                                      |
| 2      | ANT    | I    | RF signal input pin                                                |
| 3      | VDD    | P    | Power supply pin, DC 2.0~5.5V                                      |
| 4      | CTH    | I    | Reference signal mode selection for internal data comparator       |
| 5      | DO     | O    | Demodulated data signal output                                     |
| 6      | SHUT   | I    | Shutdown mode: connected to power supply, operating mode: grounded |
| 7      | CAGC   | I    | Automatic Gain Control                                             |
| 8      | REFOSC | I    | External crystal oscillator pins                                   |

## 3 Electrical characteristics

### 3.1 Working conditions

| Symbol   | Parameters            | Conditions | Min | Type | Max  | Unit        |
|----------|-----------------------|------------|-----|------|------|-------------|
| VDD      | supply voltage        |            | 2.0 | 3.3  | 5.5  | V           |
| TA       | Operating temperature |            | -40 |      | +125 | ℃           |
| $\theta$ | supply voltage slope  |            | 1   |      |      | mV/ $\mu$ s |

### 3.2 Limit Parameters

| Symbol                                                                                                                                                                                                                                                                                                                                   | Parameters                          | Conditions          | Min  | Type | Max      | Unit |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------|------|------|----------|------|
| VDD                                                                                                                                                                                                                                                                                                                                      | Power supply voltage <sup>[1]</sup> |                     | -0.3 |      | 5.5      | V    |
| V <sub>IN</sub>                                                                                                                                                                                                                                                                                                                          | Interface voltage                   |                     | -0.3 |      | VDD+ 0.3 | V    |
| T <sub>J</sub>                                                                                                                                                                                                                                                                                                                           | Junction temperature                |                     | -40  |      | 150      | ℃    |
| T <sub>STG</sub>                                                                                                                                                                                                                                                                                                                         | Storage temperature                 |                     | -65  |      | 150      | ℃    |
| T <sub>SDR</sub>                                                                                                                                                                                                                                                                                                                         | Welding temperature                 | Last at least 30 ms |      |      | 255      | ℃    |
| V <sub>HBM</sub>                                                                                                                                                                                                                                                                                                                         | ESD grade <sup>[2]</sup>            | Human Model HBM     | -8   |      | 8        | kV   |
| Notes<br>[1] Exceeding the maximum value of the limit parameters may cause permanent damage to the device. Please use it within the limit parameter range to ensure device safety.<br>[2] This chip has reached a very high standard of ESD protection, but please pay attention to performing all operations under good ESD protection. |                                     |                     |      |      |          |      |

### 3.3 Receiver Specifications

| Symbol                  | Parameters                           | Conditions                                 | Min | Type                | Max | Unit   |
|-------------------------|--------------------------------------|--------------------------------------------|-----|---------------------|-----|--------|
| VDD                     | Power supply voltage                 |                                            | 2.0 |                     | 5.5 | V      |
| f <sub>RF</sub>         | Operating frequency range            | f <sub>RF</sub> =4.8970MHz                 |     | 315                 |     | MHz    |
|                         |                                      | f <sub>RF</sub> =6.7458MHz                 |     | 433.92              |     | MHz    |
| DR                      | Data rate                            |                                            |     |                     | 10  | kbps   |
| I <sub>OP</sub>         | Operating current                    | f <sub>RF</sub> =315MHz, VDD=3.3V          |     | 4.98                |     | mA     |
|                         |                                      | f <sub>RF</sub> =315MHz, VDD=5V            |     | 5.07                |     | mA     |
|                         |                                      | f <sub>RF</sub> =433.92MHz, VDD=3.3V       |     | 4.98                |     | mA     |
|                         |                                      | f <sub>RF</sub> =433.92MHz, VDD=5V         |     | 5.07                |     | mA     |
| I <sub>STBY</sub>       | Rest current                         | V <sub>SHUT</sub> =VDD                     |     | 0.01                |     | μA     |
|                         | Reception sensitivity                | f <sub>RF</sub> = 315MHz / 2kbps           |     | -113                |     | dBm    |
|                         |                                      | f <sub>RF</sub> = 433.92MHz / 2kbps        |     | -113                |     | dBm    |
| BW                      | Receiver bandwidth                   | f <sub>RF</sub> = 315MHz                   |     | 300                 |     | kHz    |
|                         |                                      | f <sub>RF</sub> = 433.92MHz                |     | 300                 |     | kHz    |
| f <sub>IF</sub>         | Mid-frequency frequency              |                                            |     | 0.86                |     | MHz    |
| f <sub>BW</sub>         | Mid-frequency bandwidth              |                                            |     | 0.43                |     | MHz    |
|                         | Saturation input voltage             | RSC = 50Ω                                  |     | -20                 |     | dBm    |
|                         | Spurious Reverse Isolation           | ANT pin, R <sub>SC</sub> = 50Ω             |     | 30                  |     | μVr/ms |
| Z <sub>REFOSC</sub>     | Reference Oscillator Input Impedance |                                            |     | 290                 |     | kΩ     |
|                         | Reference Oscillator Source Current  |                                            |     | 5.2                 |     | μA     |
| f <sub>T</sub>          | Crystal oscillator frequency         |                                            |     | 6.7458<br>(433.92M) |     | MHz    |
| Z <sub>CTH</sub>        | CTH Source Impedance                 |                                            |     | 145                 |     | kΩ     |
| I <sub>ZCTH(leak)</sub> | CTH Leakage Current                  | T <sub>A</sub> = +85°C                     |     | ±100                |     | nA     |
|                         | Receiver startup time                | From VDD power-up to reception             |     | 4                   |     | ms     |
|                         | SHUT startup time                    | From pulling the SHUT pin low to receiving |     | 3                   |     | ms     |

### 3.4 Crystal Oscillator Specifications

| Symbol                  | Parameters                                | Conditions      | Min | Type   | Max | Unit |
|-------------------------|-------------------------------------------|-----------------|-----|--------|-----|------|
| F <sub>XTAL315</sub>    | Crystal frequency <sup>[1]</sup>          | FRF =315 MHz    | 2.0 | 4.8970 |     | MHz  |
| F <sub>XTAL390</sub>    |                                           | FRF =390 MHz    |     | 6.0630 |     | MHz  |
| F <sub>XTAL318</sub>    |                                           | FRF =418 MHz    |     | 6.4983 |     | MHz  |
| F <sub>XTAL433.92</sub> |                                           | FRF =433.92 MHz |     | 6.7458 |     | MHz  |
|                         | Crystal frequency accuracy <sup>[2]</sup> |                 |     | ±20    |     | ppm  |
| C <sub>LOAD</sub>       | Load capacitor                            |                 |     | 15     |     | pF   |
| R <sub>m</sub>          | Crystal equivalent resistance             |                 |     |        | 60  | Ω    |
| t <sub>XTAL</sub>       | Crystal startup time <sup>[3]</sup>       |                 |     | 400    |     | μs   |

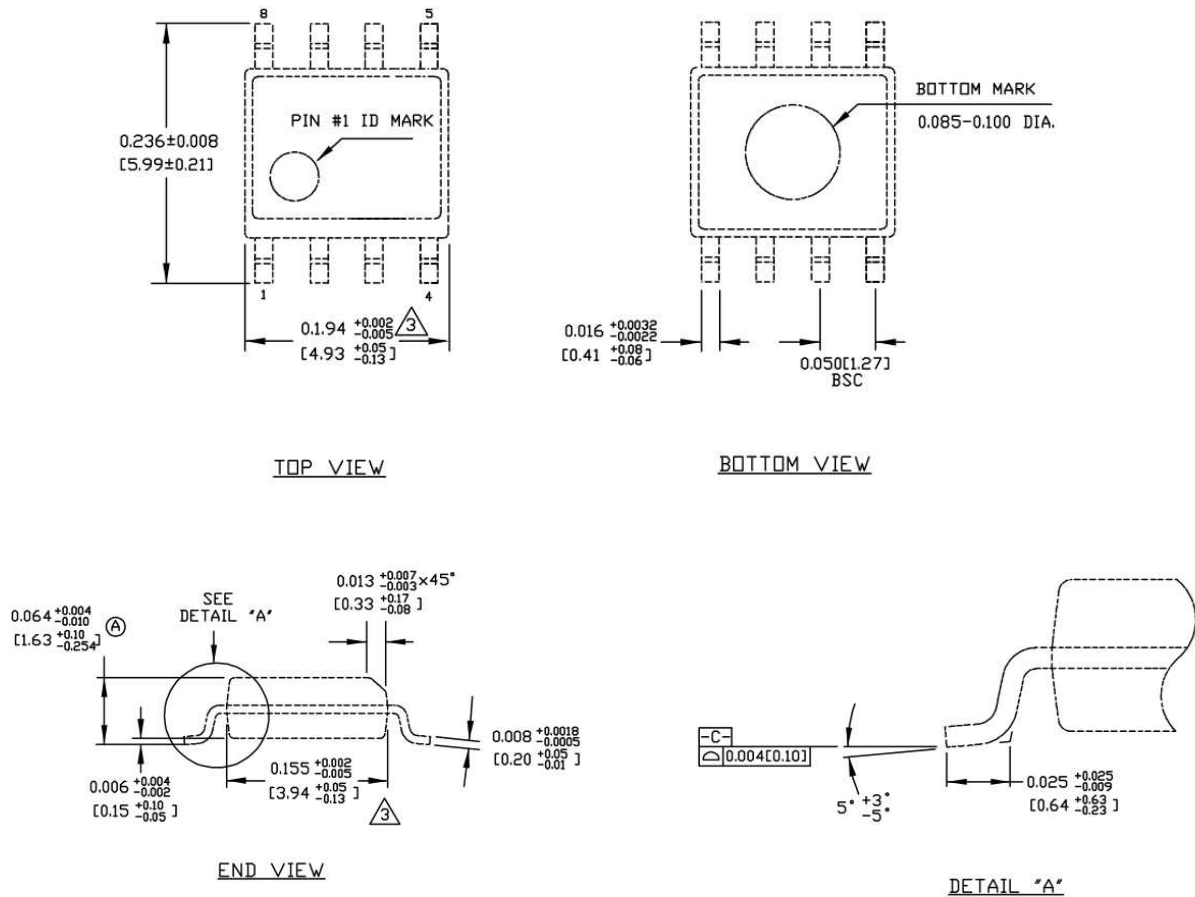
Notes:

[1] The REFOSC pin is driven directly by an external reference clock via a coupling capacitor. The peak-to-peak value of the external clock signal is required to be between 0.3 and 0.7 V.

[2] This parameter selection is for reference only. The acceptable crystal frequency error is limited by the receiver's bandwidth and the RF frequency deviation between the receiver and the transmitter.

[3] This parameter is largely related to the choice of crystal.

## 4 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