

Keywords: transmitter, RF, receiver, alarm, RF perimeter

## APPLICATION NOTE 5099

# Alarm Sounds When RF Transmitter is Out of Range

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 Aug 02, 2011

*Abstract: This design idea explains how a 915MHz receiver can sound an alarm when a transmitter moves beyond a predetermined boundary.*

A similar version of this design idea appeared in the December 12, 2010 issue of *EDN*.

The receiver circuit of **Figure 1** sounds an audio alarm when the **MAX2623** transmitter (**Figure 2**) moves beyond a designated perimeter. The trigger distance depends on conditions and antenna design. In tests in a home environment with simple wire antennas, the distance was about five feet (1.5 meters).



[Click here for an overview of the wireless components used in a typical radio transceiver.](#)

The transmitter is a voltage-controlled oscillator, set to approximately 915MHz in the unlicensed industrial/scientific/medical (ISM) band. It has a tuning voltage of  $1.5V = 3 \times R2 / (R1 + R2)$ , which lets you easily adjust the frequency by varying resistor values R1 and R2.

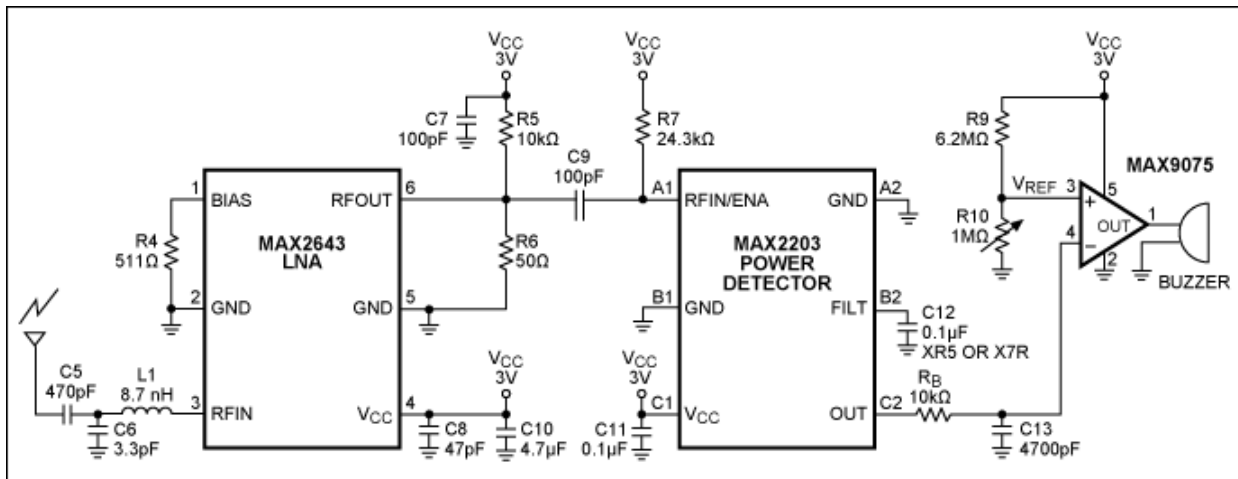


Figure 1. This 915MHz receiver sounds an alarm when the comparator's inverting-input voltage drops below 400mV.

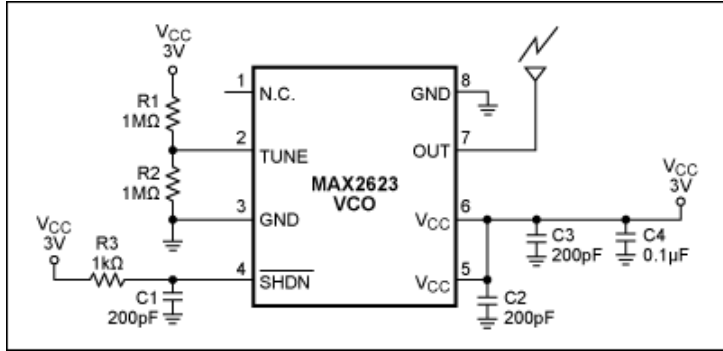


Figure 2. The transmitter consists of a voltage-controlled oscillator, tuned by R1 and R2 to approximately 915MHz.

The receiver consists of the MAX2643 low-noise amplifier (LNA), the MAX2203 power detector, the MAX9075 comparator, and a buzzer. When the transmitter is within range (carried by a child or a pet, for example), the receiver detects the RF signal and provides a voltage greater than 400mV at the inverting terminal of the comparator. Because the reference voltage at the comparator's noninverting terminal is preset to approximately 400mV by resistors R9 and R10 ( $V_{REF} = 3 \times R10 / (R9 + R10)$ ), the comparator output remains low.

When the transmitter moves outside the predetermined boundary, the detected RF produces less than 400mV at the comparator. The comparator then generates an output of approximately 3V, which turns on the buzzer and sounds an alert that the child or pet has wandered beyond the restricted perimeter. To increase the detection range, you can place additional LNAs or variable-gain amplifiers (VGAs) in front of the power detector. You can also increase or decrease the desired perimeter by adjusting R10 to change the comparator reference voltage  $V_{REF}$ .

#### Related Parts

|         |  |                              |
|---------|--|------------------------------|
| MAX2203 | RMS Power Detector                                   |                              |
| MAX2623 | Monolithic Voltage Controlled Oscillators            | <a href="#">Free Samples</a> |
| MAX2643 | 900MHz SiGe, High-Variable IP3, Low-Noise Amplifier  | <a href="#">Free Samples</a> |
| MAX9075 | Low-Cost, Ultra-Small, 3μA Single-Supply Comparators | <a href="#">Free Samples</a> |

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