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APPLICATION NOTE 5085

Circuit Detects and Locates Hidden RF Bugs

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Abstract: This design idea showcases a circuit that detects RF "bugs," such as hidden wireless cameras, eavesdropping microphones, and other spying devices that emit RF frequencies in the 100MHz to 3000MHz range. A modification to this circuit not only detects RF bugs, but also locates their hidden positions.

The circuit in **Figure 1** detects RF "bugs," such as hidden wireless cameras, eavesdropping microphones, and other spying devices that emit RF frequencies in the 100MHz to 3000MHz range. Received power levels can be as low as -35dBm or 0.32μW. The log detector (the MAX2015) senses RF signals at pin INHI, and produces an output voltage on pin 8 proportional to the power level of the received signal.



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

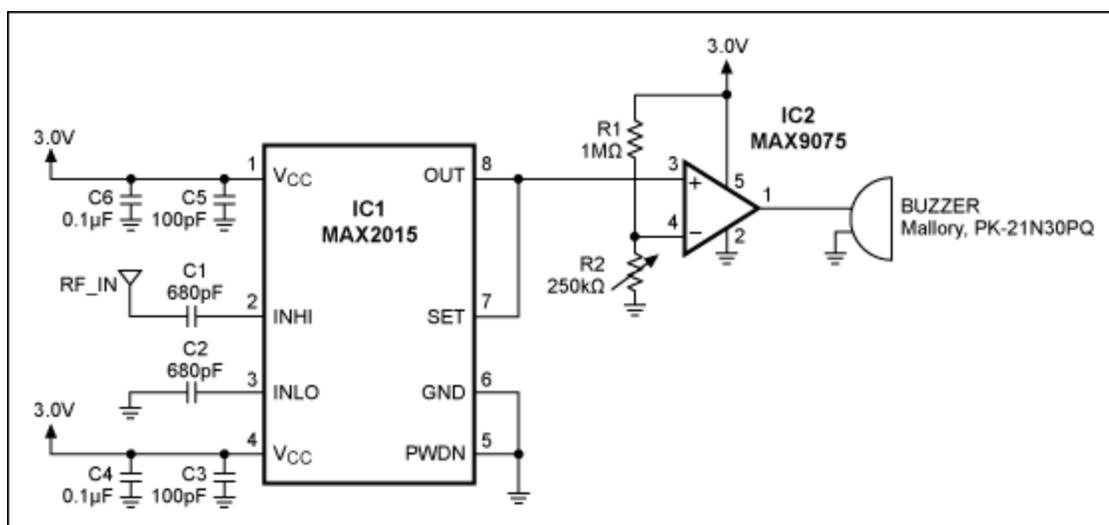


Figure 1. This circuit sounds a buzzer alarm when it detects an RF signal in the range 100MHz to 3000MHz, above approximately -35dBm.

At low input-power levels such as -35dBm at 3000MHz, the MAX2015 generates a DC output of

approximately 0.5V. This voltage increases in proportion to the input RF power level, up to approximately 2.0V. The reference voltage at the inverting terminal of the MAX9075 is preset to 0.6V by resistors R1 and R2. (To avoid false alarms, you can fine-tune the reference voltage by adjusting resistor R2.) On detecting an RF signal, the MAX2015 triggers comparator MAX9075 to generate an output voltage of 3.0V, which in turn activates a loud buzzer.

A modification to this circuit not only detects RF bugs; it also locates their hidden positions (**Figure 2**). Simply replace the MAX9075 comparator with the MAX4480 amplifier, configured for a gain of 1.5. The MAX4480 then amplifies the MAX2015 output voltage (0.5V to 2.0V) to the range (0.75V to 3.0V) for driving the buzzer. You can adjust resistor R4 to obtain the desired gain and output-tone level. The audio level generated by this buzzer is proportional to the input voltage, so as the detector approaches a hidden bug, the MAX4480's output voltage increases, intensifying the alarm and making it easy to pinpoint the bug's location.

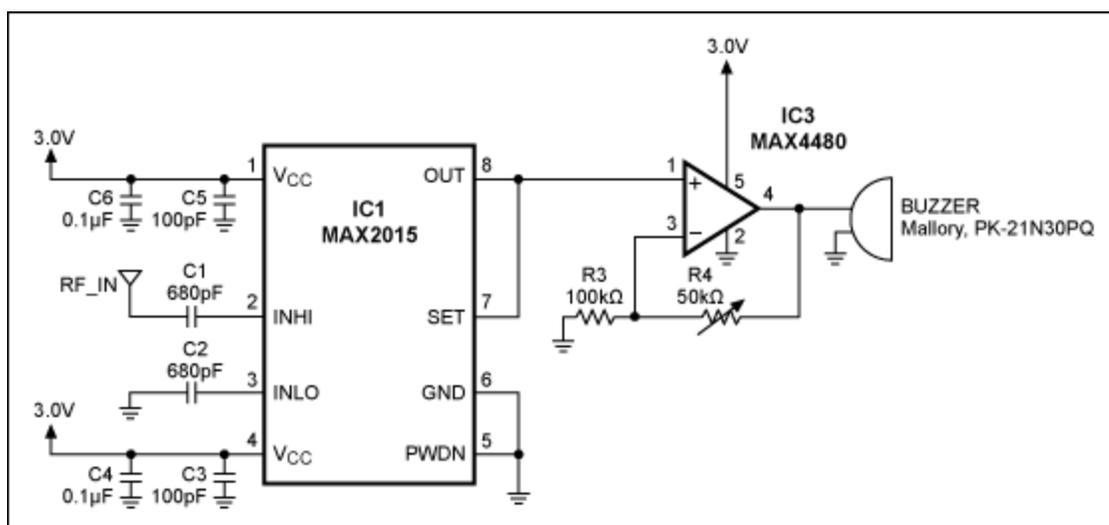


Figure 2. Substituting an op amp for the comparator in Figure 1 enables the audible alarm in this circuit to increase in volume as you approach the RF source.

Related Parts

MAX2015	0.1GHz to 3GHz, 75dB Logarithmic Detector/Controller	Free Samples
MAX4480	Single/Dual/Quad, Low-Cost, Single-Supply, Rail-to-Rail Op Amps with Shutdown	Free Samples
MAX9075	Low-Cost, Ultra-Small, 3μA Single-Supply Comparators	Free Samples

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