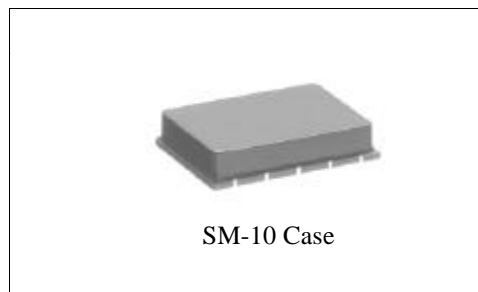


# RX2010

## 916.5 MHz ASH Receiver



- Ideal for 916.5 MHz, 3 V Data Receivers in the USA and Canada
- High-Sensitivity Passive Design with No RF Oscillation
- Baseband Data Rate of 10 kb/s
- Simple to Apply with External Parts Count
- Rugged, Surface-Mount Package with 130 mm<sup>2</sup> Footprint



This amplifier-sequenced hybrid (ASH) receiver is based on several leading-edge technologies that allow outstanding performance in a small and simple-to-apply module. Two surface-acoustic-wave (SAW) devices are employed. Front-end filtering by a low-loss coupled-resonator SAW filter provides excellent selectivity. Typical sensitivity better than -80 dBm is achieved with no RF oscillating or regenerative circuits. This results in virtually no RF spurious emissions. A low-loss SAW delay line provides the time delay necessary to sequence the two RF amplifiers. Time sequencing of the RF gain eliminates the need for frequency conversion prior to AM detection. This receiver is designed to operate from 3 V lithium battery with typically 2.5 mA current. For system design flexibility, the baseband output is accessible, and the comparator threshold can be changed externally between two settings. Typical applications include unlicensed wireless remote-controls, and digital data links operating in the USA under FCC Part 15.249 and in Canada under DOC RSS-210.

### Electrical Characteristics

| Characteristic   | Sym                       | Notes | Minimum                | Typical        | Maximum  | Units   |
|--|---------------------------|-------|------------------------|----------------|----------|---------|
| Operating Radio Frequency                                | $f_C$                     | 2, 3  | 916.50 Nominal         |                |          | MHz     |
| Received Carrier Modulation Type                         |                           | 4, 5  | Pulse Modulation (OOK) |                |          |         |
| RF Band  | Sensitivity               | 6     |                        | -74            |          | dBm     |
|  | Operating Signal Strength |       |                        |                | -10      |         |
|  | Channel Width             |       | $f_C \pm 200$          |                |          | kHz     |
|  | Input Impedance           |       | $Z_{IN}$               | 50 Nominal     |          |         |
| Interference Rejection                                   | Half-Frequency Spurious   | 7     |                        | 80             |          | dB      |
|  | $f_C \pm 1$ MHz           |       |                        | 15             |          |         |
| Sequencing (Sampling)                                    | Sample Duration           | 8     |                        | 700            |          | ns      |
|  | Sample Repetition Rate    |       |                        | 625            |          | kHz     |
| Baseband   | Data Rate                 | 9     |                        | 10             |          | kb/s    |
|  | 3 dB Bandwidth            |       |                        | 12             |          | kHz     |
| Comparator Threshold                                     | Default (Terminal 5 NC)   | 10    |                        | 25             |          | mV      |
|  | Override (Terminal 5 LOW) |       |                        | 0              |          |         |
| Digital Output   | CMOS Load Capacitance     | 11    |                        |                | 10       | pF      |
|  | Output HIGH Voltage       |       | $V_{OH}$               | $V_{CC} - 0.2$ | $V_{CC}$ | V       |
|  | Output LOW Voltage        |       | $V_{OL}$               | 0.0            | 0.2      |         |
|  | Rise Time                 |       | $t_R$                  |                | 5        | $\mu$ s |
|  | Fall Time                 |       | $t_F$                  |                | 5        |         |
| Power Supply   | Operating Voltage         | 1     | 2.7                    | 3.0            | 3.5      | VDC     |
|  | Current at 25C and 3.0 V  |       | $I_{CC}$               |                | 2.5      | 3.0     |
| Operating Ambient Temperature                            | $T_A$                     | 1     | -40                    |                | +85      | °C      |
| Lid Symbolization (in addition to Lot and/or Date Codes) | RFM RX2010                |       |                        |                |          |         |

# The RX Series SMT Hybrid ASH Receivers



**CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.**

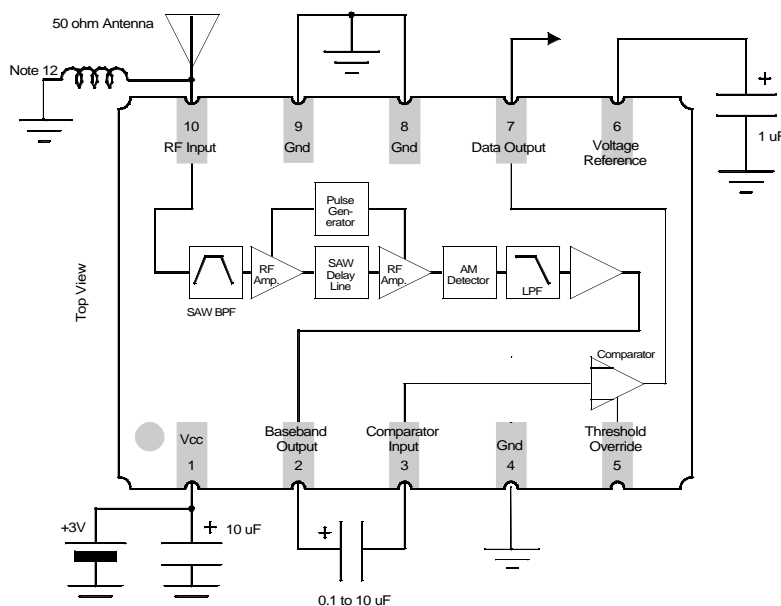
## Notes:

1. Unless noted otherwise, specifications apply over the entire specified operating temperature and voltage ranges.
2. One or more of the following United States patents apply: 4,454,488; 4,616,197; 4,749,964; 4,902,925. Other patents are pending.
3. Typically, equipment utilizing this device requires emissions testing and government approval, which is the responsibility of the equipment manufacturer.
4. The design, manufacturing process, and specifications of this device are subject to change without notice.
5. A variety of on-off-keyed (OOK) pulse modulation schemes are possible since digital decoding is an external function (not included in the ASH receiver).
6. These parameters apply over the absolute minimum operating passband which is referenced to  $f_c$ .
7. With interfering signal matched to the receiver modulation and code. See "Typical Modulated Interference Rejection" for a more detailed view.
8. Sample repetition rates greater than 1 MHz are available in custom versions. Contact RFM for details.
9. Baseband data rates are available to 20 kbps, respectively, in custom versions. Contact RFM for details. See HX/RX Designer's Guide for details on data rate limits.
10. The default comparator threshold (with terminal 5 not connected) is optimized for low duty-cycle, or "bursty" data and eliminates noise output when there is no RF signal. The override threshold (with terminal 5 connected to ground) is optimized for continuous data.
11. The ASH receiver is designed to drive a single CMOS load.
12. For ESD protection

## Absolute Maximum Ratings

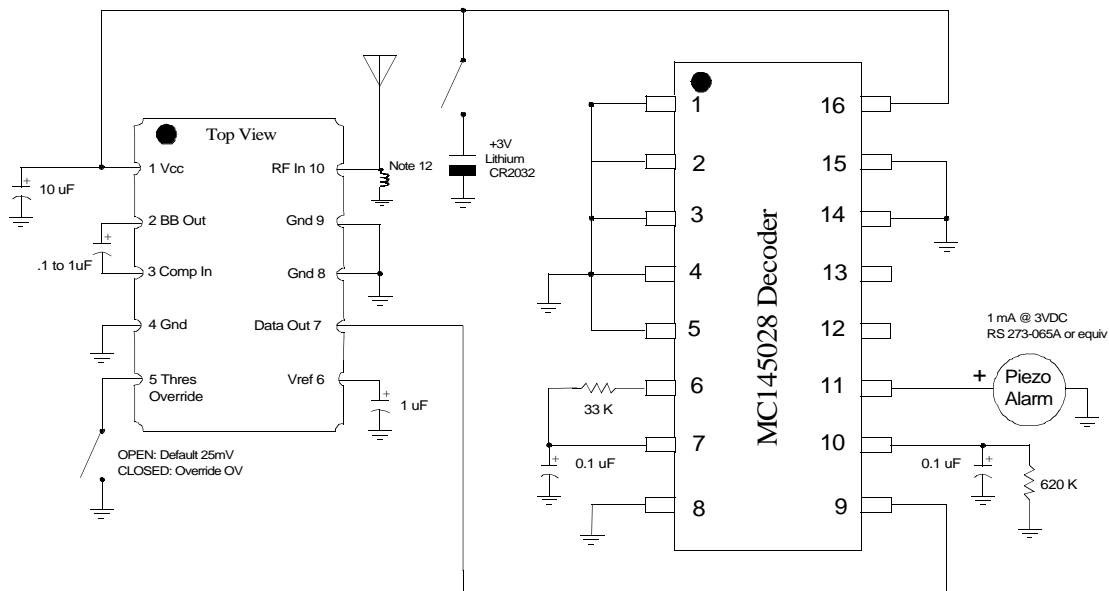
| Rating   | Value                          | Units              |
|--|--------------------------------|--------------------|
| Incident RF Power  | +10                            | dBm                |
| Power Supply Voltage ( $V_{CC}$ to Ground) (Observe ESD Precautions) | -0.3 to +4.0                   | VDC                |
| ESD (100 pF, 1.5 kW)   | Terminals 2, 3, or 7 to Ground | $\pm 2000$         |
|  | All Other Terminals to Ground  | $\pm 300$          |
| Case Temperature <sup>1</sup>  | -40 to +100                    | $^{\circ}\text{C}$ |

## Block Diagram and Electrical Connections



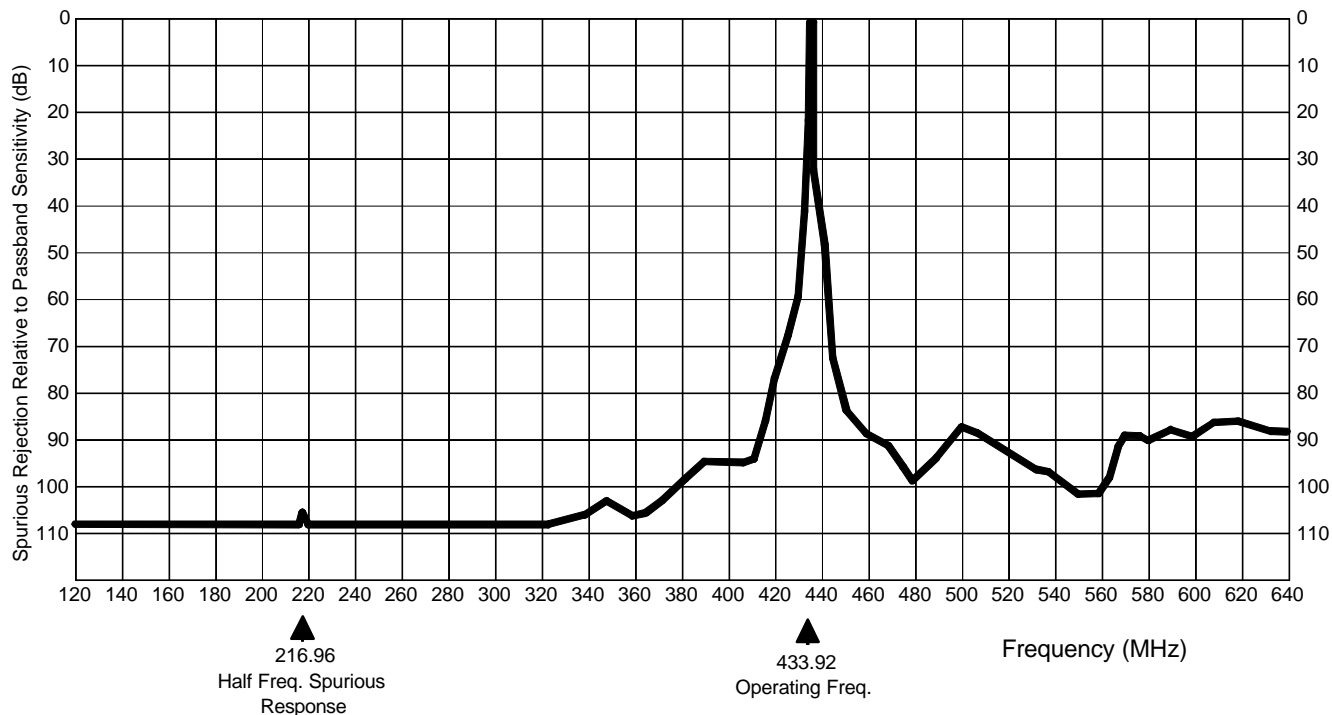
# The RX Series SMT Hybrid ASH Receivers

## Demonstration Circuit



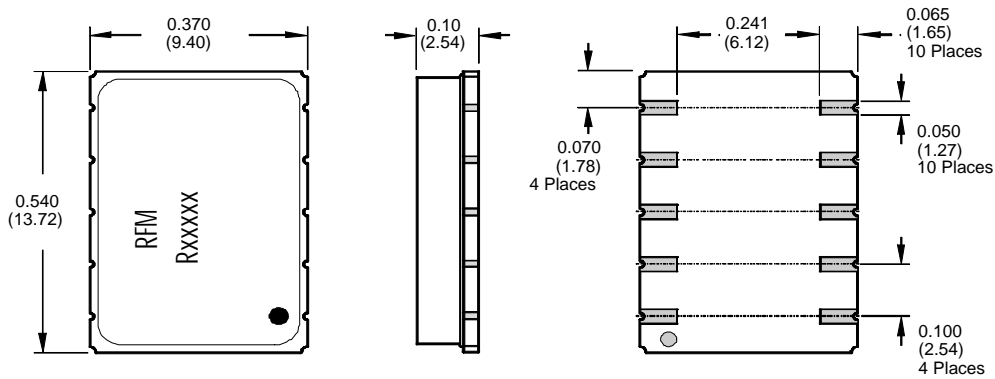
## Typical Modulated Interference Rejection (433.92 MHz RX1000 Shown)

This plot is for an interfacing signal modulated with the receiver's modulation and code. Continuous wave (CW) or signals with other modulation or codes typically result in significantly better rejection performance.

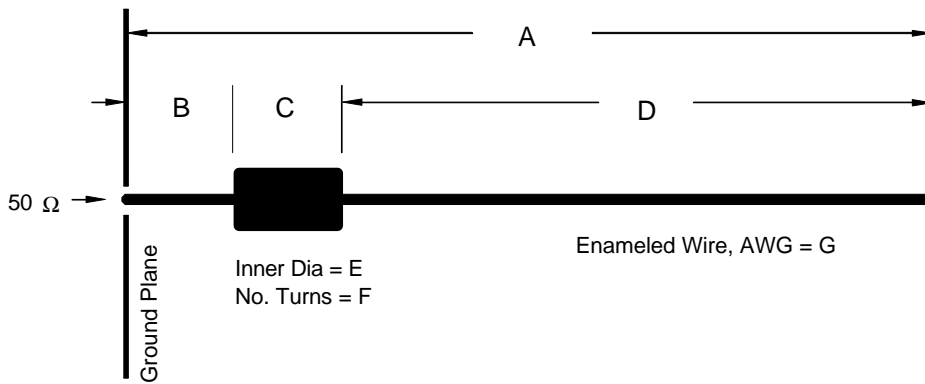


# The RX Series SMT Hybrid ASH Receivers

## Case Design



## Typical Antennas



| Dimensions | Units           | Frequency |       |        |       |
|------------|-----------------|-----------|-------|--------|-------|
|            |                 | 303.825   | 418.0 | 433.92 | 916.5 |
| A          | Inches          | 5.35      | 3.9   | 3.55   | 1.58  |
|            | Millimeters     | 135.89    | 99.06 | 90.17  | 40.13 |
| B          | Inches          | 1.0       | 0.6   | 0.6    | 0.4   |
|            | Millimeters     | 25.4      | 15.24 | 15.24  | 10.16 |
| C          | Inches          | 0.25      | 0.6   | 0.55   | 0.18  |
|            | Millimeters     | 6.35      | 15.24 | 13.97  | 4.57  |
| D          | Inches          | 3.7       | 2.7   | 2.4    | 1.0   |
|            | Millimeters     | 93.98     | 68.58 | 60.96  | 25.4  |
| E          | Inches          | 0.375     | 0.1   | 0.1    | 0.1   |
|            | Millimeters     | 9.53      | 2.54  | 2.54   | 2.54  |
| F          | Number of Turns | 4T        | 16T   | 15T    | 7T    |
| G          | AWG             | #20       | #22   | #22    | #24   |