

RX1000

433.92 MHz ASH Receiver



- Ideal for 433.92 MHz, 3 V Receivers in Europe (I-ETS 300 220)
- High-Sensitivity Passive Design with No RF Oscillation
- Baseband Data Rate of 2400 b/s
- Simple to Apply with External Parts Count
- Rugged, Surface-Mount Package with 130 mm² 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 -100 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 1.1 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, security and data-link devices operating in Europe under ETSI I-ETS 300 220.

Electrical Characteristics

Characteristic		Sym	Notes	Minimum	Typical	Maximum	Units
Operating Radio Frequency		f _C	2, 3	433.92 Nominal			MHz
Received Carrier Modulation Type			4, 5	Pulse Modulation (OOK)			
RF Band	Sensitivity		6		-100		dBm
	Operating Signal Strength				-10		
	Channel Width			f _C ±200			kHz
	Input Impedance	Z _{IN}		50 Nominal			Ω
Interference Rejection	Half-Frequency Spurious		7		105		dB
	f _C ±1 MHz				20		
Sequencing (Sampling)	Sample Duration		8		700		ns
	Sample Repetition Rate				250		kHz
Baseband	Data Rate		9		2.4		kb/s
	3 dB Bandwidth				2.4		kHz
Comparator Threshold	Default (Terminal 5 NC)		10		25		mV
	Override (Terminal 5 LOW)				0		
Digital Output	CMOS Load Capacitance		11			10	p ^F
	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			9		μs
	Fall Time	t _F			9		
Power Supply	Operating Voltage	V _{CC}	1	2.7	3.0	3.5	VDC
	Current at 25C and 3.0 V	I _{CC}			1.1	1.25	mA
Operating Ambient Temperature		T _A	1	-40		+85	°C
Lid Symbolization (in addition to Lot and/or Date Codes)		RFM RX1000					

The RX Series SMT Hybrid ASH Receivers



CAUTION: Electrostatic Sensitive Device. Observe precautions for handling.

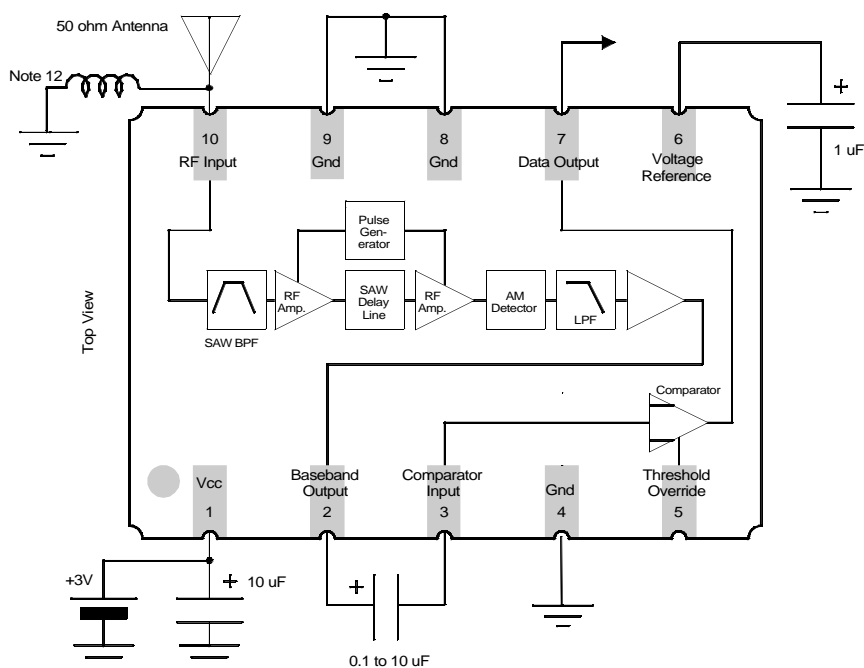
Notes:

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

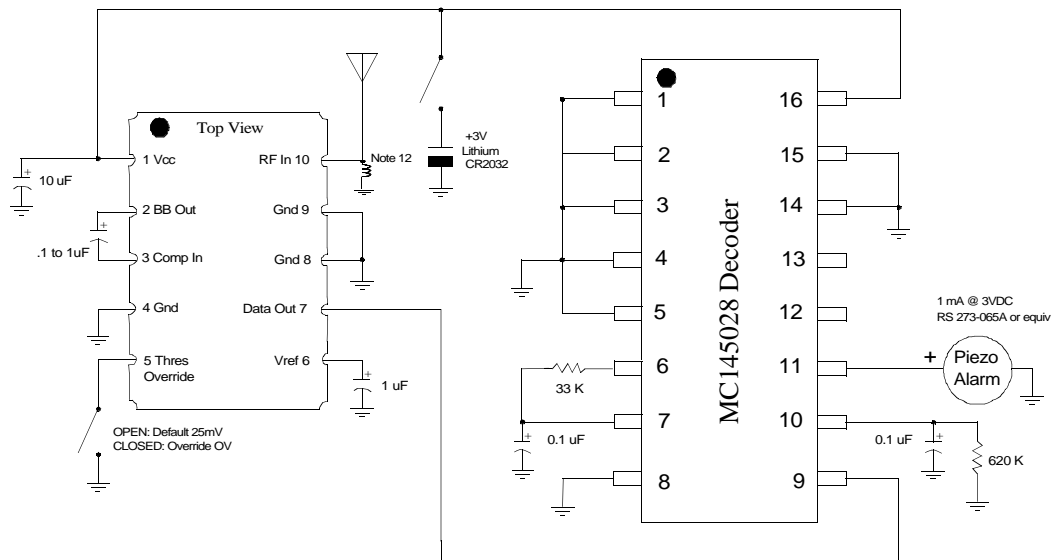
Rating	Value	Units
Incident RF Power	+10	dBm
Power Supply Voltage (V_{CC} to Ground) (Observe ESD Precautions)	-0.3 to +4.0	VDC
ESD (100 pF, 1.5 k Ω)	Terminals 2, 3, or 7 to Ground	± 2000
	All Other Terminals to Ground	± 300
Case Temperature	-40 to +100	$^{\circ}\text{C}$

Block Diagram and Electrical Connections



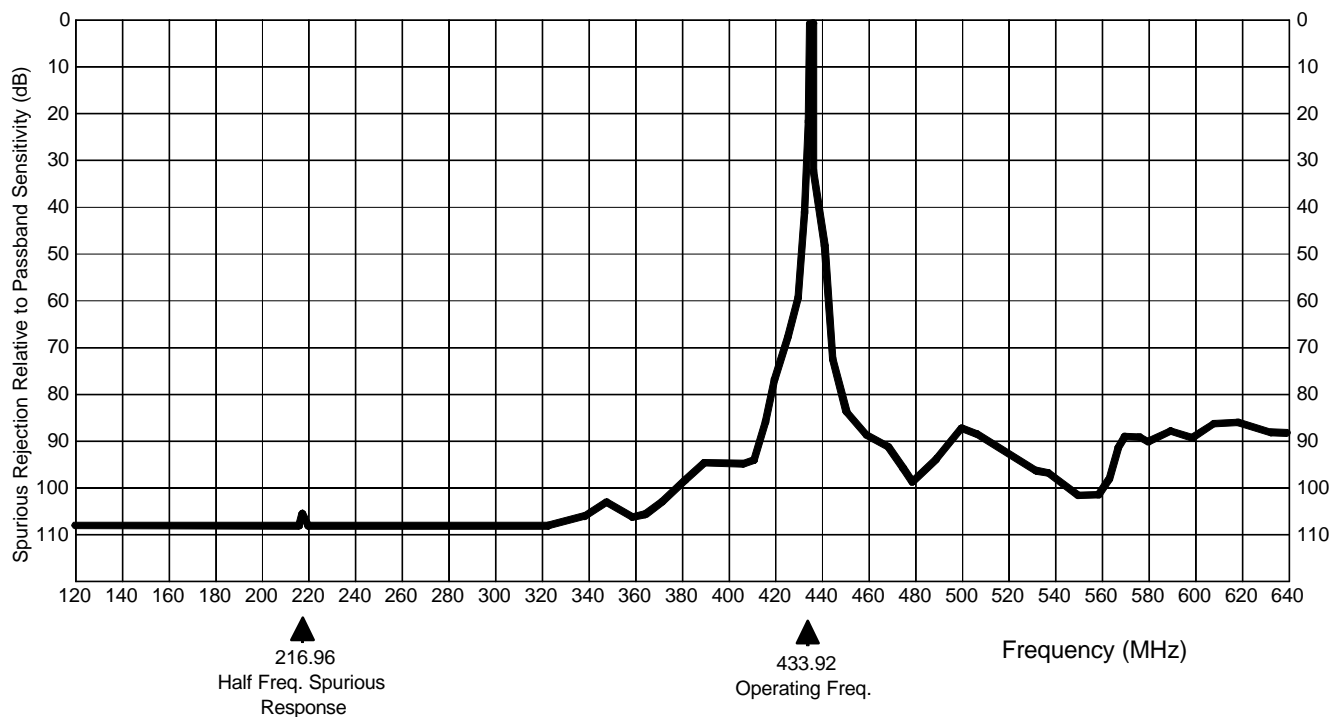
The RX Series SMT Hybrid ASH Receivers

Demonstration Circuit



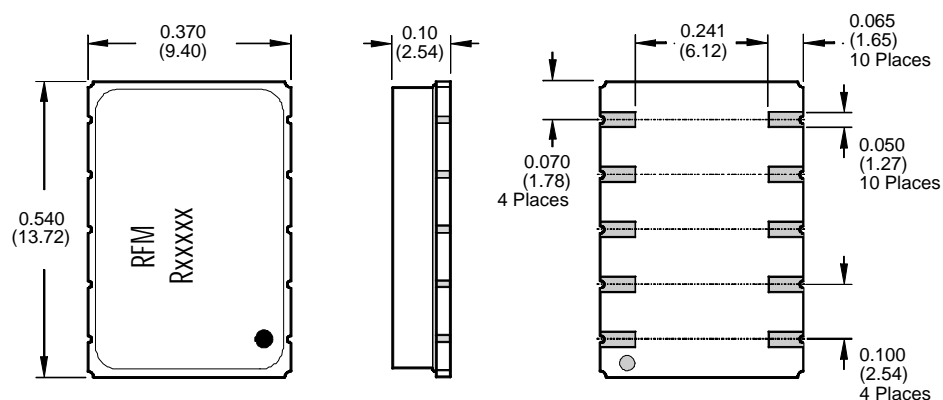
Typical Modulated Interference Rejection (433.92 MHz RX1000 Shown)

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.

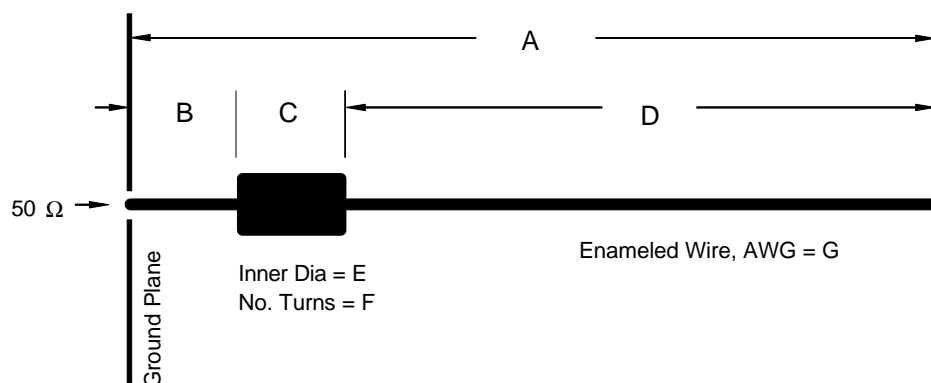


The RX Series SMT Hybrid ASH Receivers

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