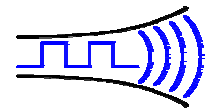


NEW

Radiometrix



Hartcran House, Gibbs Couch, Watford, WD19 5EZ, England

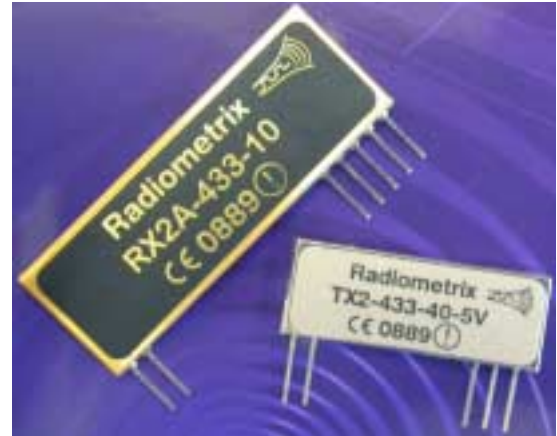
Issue A, 21 April 2004

Tel: +44 (0) 20 8428 1220, Fax: +44 (0) 20 8428 1221

RX2A

UHF FM receiver module with RSSI

The RX2A is a miniature PCB mounting UHF radio data receiver. It is an updated version of the Radiometrix RX2 incorporating a received signal strength indicator (RSSI). It allows the simple implementation of data links at speeds up to 64kb/s and distances up to 75 metres in-building or 300 metres over open ground.



Features

- ◆ Designed to comply with harmonised radio standard EN 300 220-3
- ◆ Designed to comply with harmonised EMC standard EN 301 489-3
- ◆ Data rates up to 64kb/s
- ◆ Usable range up to 300m
- ◆ Versions available on 433.92MHz and 434.42MHz
- ◆ Fully screened

RX2A-433-10

TX2-433-40

Available for operation at 433.92MHz or 434.42MHz in the UK and Europe, the RX2A combines full screening with internal filtering to ensure EMC compliance by minimising spurious radiation and susceptibility. The module suits one-to-one and multi-node wireless links in applications including car and building security, EPOS and inventory tracking, remote industrial process monitoring and computer networking. Because of the small size and low power requirements, the RX2A is ideal for use in portable, battery-powered applications such as hand-held terminals.

Technical Summary

- ◆ Single conversion FM superhet
- ◆ SAW front end filter gives >50dB image rejection
- ◆ Operation from 2.7V to 16V @ 12mA
- ◆ Built-in regulator for improved stability and supply noise rejection
- ◆ -101dBm sensitivity @ 1ppm BER, 64kb/s version
- ◆ -108dBm sensitivity @ 1ppm BER, 10kb/s version
- ◆ RSSI output with 60dB range
- ◆ Extremely low LO leakage, <-100dBm

Pin description

RF IN (pin 1)

50Ω input from the antenna, DC isolated

RF GND (pin 2)

RF ground pin, internally connected to the module screen and pin 4 (0V). This pin should be connected to the RF return path (coax braid, main PCB ground plane etc.)

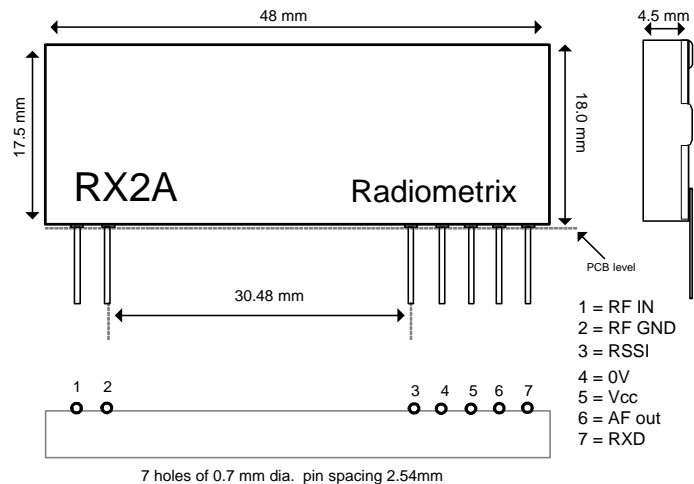


Figure 1: Physical dimensions

RSSI (pin 3)

Received signal strength indicator with 60dB range. See page 4 for typical characteristics.

0V (pin 4)

DC supply ground. Internally connected to pin 2 and module screen.

Vcc (pin 5)

+2.7V to +16.0V DC supply. Max ripple content $0.1V_{p-p}$. Decoupling is not generally required.

AF out (pin 6)

Buffered and filtered analogue output from the FM demodulator. Standing DC bias 1.1V approx. External load should be $>10k \parallel <100pF$.

RXD (pin 7)

Digital output from the internal data slicer. The data is a squared version of the signal on pin 6 (AF) and is true data, i.e. as fed to the transmitter. Output is "open-collector" format with internal $10k$ pull-up to Vcc (pin 5).

Absolute maximum ratings

Exceeding the values given below may cause permanent damage to the module.

Operating temperature-	-20°C to +70°C
Storage temperature	-40°C to +100°C
Vcc (pin 5)	-0.1V to +16V
RSSI, AF, RXD (pins 3,6,7)	-0.1V to + 3V
RF IN (pin 1)	±8V DC, +10dBm RF

Performance specifications: RX2A

(Vcc = 5.0V / temperature = 20°C unless stated)

	pin	min.	typ.	max	units	notes
DC supply						
Supply voltage	5	2.7	5.0	16.0	V	
Supply current	5	11	11.6	13	mA	1
RF/ IF						
RF sensitivity for 10dB (S+N/N)	1,6	-	-115	-	dBm	10kb/s version
RF sensitivity for 10dB (S+N/N)	1,6	-	-108	-	dBm	64kb/s version
RF sensitivity for 1ppm BER	1,7	-	-108	-	dBm	10kb/s version
RF sensitivity for 1ppm BER	1,7	-	-101	-	dBm	64kb/s version
RSSI range	1,3	-	60	-	dB	
IF bandwidth	-	-	180	-	kHz	
Image rejection	1	50	53	-	dB	
½-IF spurious rejection	1	-	94	-	dB	
LO leakage, conducted	1	-	-120	-100	dBm	
Baseband						
Baseband bandwidth @ -3dB	6	0	-	7.8	kHz	10kb/s version
Baseband bandwidth @ -3dB	6	0	-	50	kHz	64kb/s version
AF level	6	-	500	-	mV _{P-P}	2
DC offset on AF out	6	0.45	1.1	1.75	V	3
Distortion on recovered AF	6	-	1	5	%	3
Ultimate (S+N)/N	6	-	40	-	dB	
Load capacitance, AFout/RXD	6,7	-	-	100	pF	
DYNAMIC TIMING						
Power up with signal present						
Power up to valid RSSI	3,5	-	1	-	ms	
Power up to stable data	5,7	-	10	30	ms	3, 10kb/s version
Power up to stable data	5,7	-	5	10	ms	3, 64kb/s version
Signal applied with supply on						
RSSI response time (rise/fall)	1,3	-	100	-	µs	
Signal to stable data	1,7	-	5	30	ms	3, 10kb/s version
Signal to stable data	1,7	-	5	10	ms	3, 64kb/s version
Time between data transitions	7	0.1	-	15	ms	4, 10kb/s version
Time between data transitions	7	15.6	-	1500	µs	4, 64kb/s version
Mark:space ratio	7	20	50	80	%	5

- Notes:**
1. Current increases at higher RF input levels (>-20dBm and above)
 2. For received signal with ±40kHz FM deviation.
 3. Typical figures are for signal at centre frequency, max. figures are for ±50kHz offset.
 4. For 50:50 mark to space ratio (i.e. square wave).
 5. Average over 30ms (10kb/s version) or 3ms (64kb/s version) at maximum data rate.

Power supply requirements

The RX2A incorporates a built-in regulator which delivers a constant 2.8V to the module circuitry when the external supply voltage is 2.85V or greater, with 40dB or more of supply ripple rejection. This ensures constant performance up to the maximum permitted supply rail and removes the need for external supply decoupling except in cases where the supply rail is extremely poor (ripple/noise content $>0.1V_{p-p}$).

Note, however, that for supply voltages lower than 2.85V the regulator is effectively inoperative and supply ripple rejection is considerably reduced. Under these conditions the ripple/noise on the supply rail should be below $10mV_{p-p}$ to avoid problems. If the quality of the supply is in doubt, it is recommended that a $10\mu F$ low-ESR tantalum or similar capacitor be added between the module supply pin (Vcc) and ground, together with a 10Ω series feed resistor between the Vcc pin and the supply rail.

Received Signal Strength Indicator (RSSI)

The module incorporates a wide range RSSI which measures the strength of an incoming signal over a range of approximately 60dB. This allows assessment of link quality and available margin and is useful when performing range tests.

The output on pin 3 of the module has a standing DC bias in the region of 0.3V with no signal, rising to around 1.2V at maximum indication. The RSSI output source impedance is high ($\sim 50k\Omega$) and external loading should therefore be kept to a minimum.

To ensure a fast response the RSSI has limited internal decoupling of 1nF to ground. This may result in a small amount of ripple on the DC output at pin 3 of the module. If this is a problem further decoupling may be added at the expense of response speed, in the form of a capacitor from pin 3 to ground. For example, adding 10nF here will increase RSSI response time from $100\mu s$ to around 1ms. The value of this capacitor may be increased without limit.

Typical RSSI characteristic is as shown below:

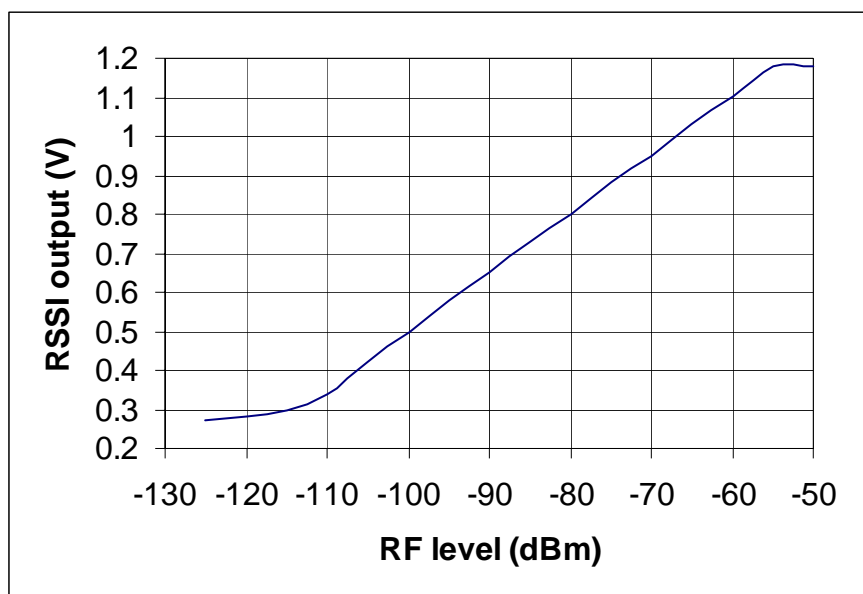


Figure 2: RSSI response curve

Module mounting considerations

The module may be mounted vertically or bent horizontal to the motherboard. Good RF layout practice should be observed – in particular, any ground return required by the antenna or feed should be connected directly to the RF GND pin at the antenna end of the module, and not to the OV pin which is intended as a DC ground only. All connecting tracks should be kept as short as possible to avoid any problems with stray RF pickup.

If the connection between module and antenna does not form part of the antenna itself, it should be made using 50Ω microstrip line or coax or a combination of both. It is desirable (but not essential) to fill all unused PCB area around the module with ground plane.

The module may be potted if required in a viscous compound which cannot enter the screen can.

Warning: *DO NOT wash the module. It is not hermetically sealed.*

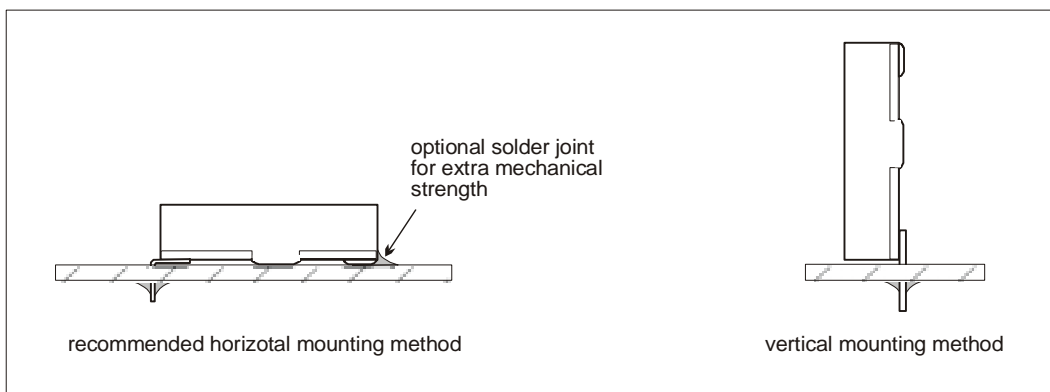


Figure 3: Module mounting options

Variants and ordering information

The RX2A receiver is manufactured in several variants:

<i>Data rate:</i>	Slower version: (suffix -10)	7.8kHz baseband B/W,	data rate up to 10kb/s
	Faster version: (suffix -64)	50kHz baseband B/W,	data rate up to 64kb/s
<i>Frequency:</i>	433.92MHz (suffix -433)		
	434.42MHz (suffix -434)		

The following variants are standard:

RX2A-433-10	433.92MHz, 10kbps
RX2A-433-64	433.92MHz, 64kbps

For other variants please contact Sales department.

Radiometrix Ltd
Hartcran House, Gibbs Couch,
Watford, WD19 5EZ, ENGLAND
Tel: +44 (0)20 8428 1220,
Fax: +44 (0)20 8428 1221
info@radiometrix.co.uk
www.radiometrix.co.uk

Copyright notice

This product data sheet is the original work and copyrighted property of Radiometrix Ltd. Reproduction in whole or in part must give clear acknowledgement to the copyright owner.

Limitation of liability

The information furnished by Radiometrix Ltd is believed to be accurate and reliable. Radiometrix Ltd reserves the right to make changes or improvements in the design, specification or manufacture of its subassembly products without notice. Radiometrix Ltd does not assume any liability arising from the application or use of any product or circuit described herein, nor for any infringements of patents or other rights of third parties which may result from the use of its products. This data sheet neither states nor implies warranty of any kind, including fitness for any particular application. These radio devices may be subject to radio interference and may not function as intended if interference is present. We do NOT recommend their use for life critical applications. The Intrastat commodity code for all our modules is: 8542 6000

R&TTE Directive

After 7 April 2001 the manufacturer can only place finished product on the market under the provisions of the R&TTE Directive. Equipment within the scope of the R&TTE Directive may demonstrate compliance to the essential requirements specified in Article 3 of the Directive, as appropriate to the particular equipment.

Further details are available on Radiocommunications Agency (RA) web site:

<http://www.radio.gov.uk/topics/conformity/conform-index.htm>

*The Library and Information Service
The Radiocommunications Agency
Wyndham House
189 Marsh Wall
London
United Kingdom
E14 9SX
Tel: +44 (0)20 7211 0502/0505
Fax: +44 (0)20 7211 0507
library@ra.gsi.gov.uk*

For further information on radio matters
contact the Agency's 24 Hour Telephone
Enquiry Point: +44 (0)20 7211 0211

*European Radiocommunications Office (ERO)
Midtermolen 1
DK 2100 Copenhagen
Denmark
Tel. +45 35250300
Fax +45 35250330
ero@ero.dk
www.ero.dk*