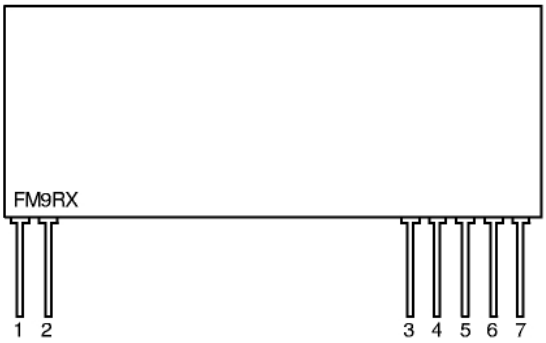
FM9RX 914.5MHz FM Receiver Module

The FM9RX miniature RF receiver module enables the implementation of a reliable telemetry link at data rates of up to 20Kbit/s when used with the compatible FM9TX transmitter modules. The receiver is based on the classical single conversion superhet principle, utilizing a crystal based phase lock loop for accurate generation of the local oscillator. This allows use of high Q bandpass filters resulting in good adjacent channel selectivity and high interference immunity.

The FM9RX module will suit one-to-one and multi-node wireless links in applications including building and car security, remote industrial process monitoring and computer networking. Because of its small size and low power requirements, the module is ideal for use in portable battery powered wireless applications. The module is highly suited for operation in harsh electrical environments where a reliable wireless link is essential.

Features

- Miniature SIL package
- Single conversion FM Super-het using RF SAW and ceramic IF filtering at 10.7 MHz. (Image rejection 50dB)
- Incorporates AGC for improved dynamic range
- Dynamic range better than 120dB
- Fully shielded
- Analogue, Digital and true RSSI outputs
- Data Rates up to 20Kbps
- 914.5 MHz
- High Sensitivity (-103 dBm)
- Very low current consumption (6mA)
- 5V operation
- Compatible with the ATRT100 transceiver
- Compatible with the FM9TX transmitter module



Typical Applications

- Telemetry systems
- Remote switching applications
- Paging systems
- Domestic and commercial security
- Robotics
- SCADA

Pin Designation

1 — RF IN
2 — RF GND
3 — RSSI/Carrier detect
4 — GND
5 — Vcc
6 — AF
7 — Data out

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Absolute Maximum Ratings: Receiver

Operating temperature: -40 to + 80 deg C option available	-10°C to +55°C
Storage temperature:	-40°C to +100°C
Supply Voltage (pin 5)	7V
RF Input (pin 1)	+20 dBm (100mW)

Electrical Characteristics: Receiver

(20 Kbits/sec version)

	min.	typ.	max.	units	notes
DC LEVELS					
Supply voltage	4.5	5	5.5	V	
Supply current		6		mA	
Supply ripple	-	-	10	mVP-P	
Data output high		=>4.5		V	
Data output low		<= 0.5		V	
RF					
RF sensitivity		-103		dBm	
IF Bandwidth		230		KHz	1
Initial frequency accuracy		±10		KHz	
Max R.F. input		20		dBm	
Operating Frequency		914.5		MHz	
E.M.C.					
Spurious responses upto 1GHz		<60		dB	
LO leakage, conducted		<60		dBm	
LO leakage, radiated		<60		dBm	
Image rejection		60		dB	
DYNAMIC TIMING					
Power up to stable data (*with RF signal present)*		6		mS	2
Signal to stable data (*with power supply already on)*		5		mS	2
Power up to valid RSSI *(with RF signal present)*			1	mS	2
Mark: space ratio		50		%	
Bit rate	100		20000	bps	

Notes

1) IF bandwidth available down to 27KHz
2) Timings are to be confirmed.

Pin Descriptions

RF IN *(pin 1)*
50Ω, RF input from antenna, connect using shortest possible route. This input is isolated from the internal circuit using the air gap of the front end SAW RF filter.

RF GND *(pin 2)*
RF ground connection, preferably connected to a solid ground plane.

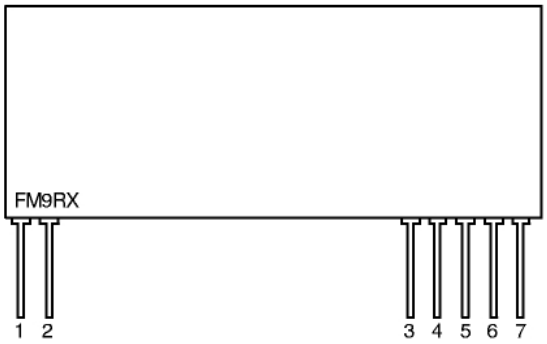
RSSI / Carrier Detect *(pin 3)*
The Received Signal Strength Indicator provides a DC output voltage proportional to the RF input signal. The amplitude of the RSSI voltage increases with increasing RF signal strength. A simple transistor interface can yield a carrier detect logic output.

Gnd *(pin 4)*
Connect to power supply ground

VCC *(pin 5)*
Positive supply pin. Operation from a 5V supply able to source 10mA at less than 10mV$_{P-P}$ ripple.

AF *(pin 6)*
Audio frequency output (max 40uA source)

DATA OUT *(pin 7)*
CMOS compatible output. This may be used to drive external decoders.



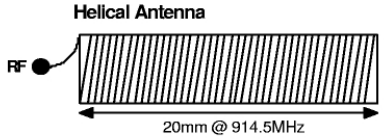
Antenna Design

The design and positioning of the antenna is as crucial as the module performance itself in achieving a good wireless system range. The following will assist the designer in maximizing system performance.

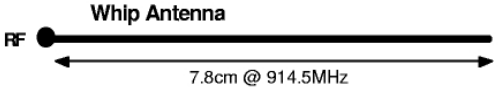
The antenna should be kept as far away from sources of electrical interference as physically possible. If necessary, additional power line decoupling capacitors should be placed close to the module.

The antenna 'hot end' should be kept clear of any objects, especially any metal as this can severely restrict the efficiency of the antenna to receive power. Any earth planes restricting the radiation path to the antenna will also have the same effect.

Best range is achieved with either a straight piece of wire, rod or PCB track @ ¼ wavelength (7.8cm @ 914.5MHz). Further range may be achieved if the ¼ wave antenna is placed perpendicular in the middle of a solid earth plane measuring at least 10cm radius. In this case, the antenna should be connected to the module via some 50 ohm characteristic impedance coax such as RG174U cable.



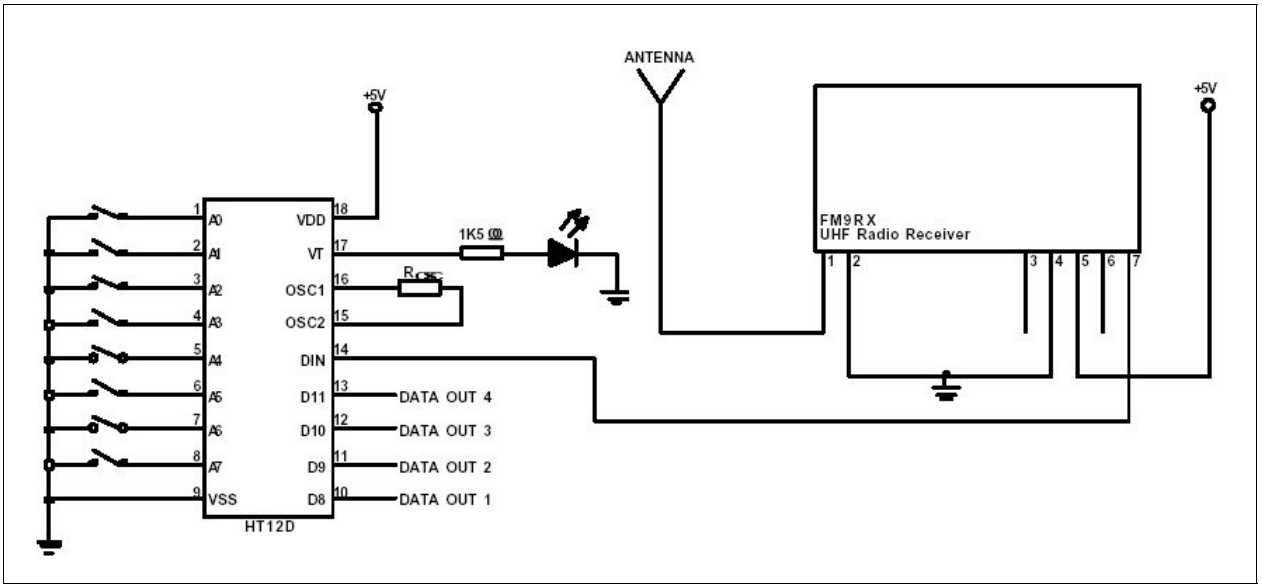
9 turns equally spaced
∅ = 5mm (inside)



Application Circuit

The following simple application circuit shows how the FM9RX receiver can easily be integrated to establish a wireless remote control link. For the transmitter side of this application, refer to the FM9TX data sheet.

Please visit our website www.abacomdirect.com for other data encoders and decoders suitable for a wide range of applications.

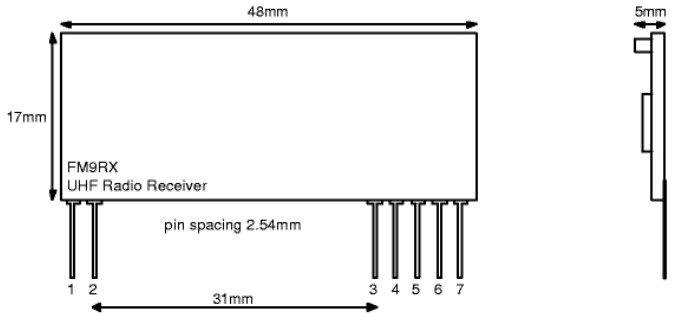


RSSI Values

The FM9RX RSSI (Received Signal Strength Indication) output provides a DC output proportional to the RF input signal. The table below shows the typical RSSI values relative on the RF signal strength.

RF Signal Strength / dBm	RSSI / V
-110	1.35
-100	1.50
-90	1.74
-80	1.8
-70	1.8
-60	2.00
-50	2.30
-40	2.58
-30	2.69
-20	2.70

Mechanical Dimensions



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