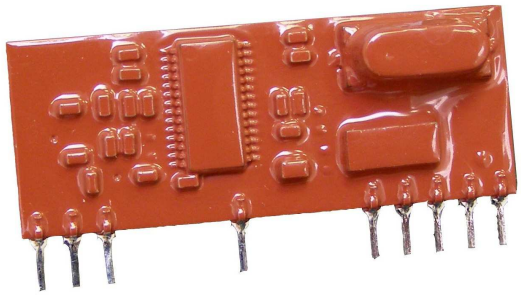
AM SUPERHETERODYNE RECEIVER AM-RRQ3-XXXCTC AM-RRQ8-433CTC

- Compact Hybrid Module.
- Ceramic Substrate
- Very High Frequency Stability
- Receiving Range Up To 100 Metres.
- CMOS/TTL Compatible Output.
- Single Supply Voltage 5V.
- Compatible with R.F. Solutions AM Transmitters.
- Compliant to ETS300-220
- **RRQ3 Version**
  - Sleep Mode
  - Sensitivity Typically –107 dBm
  - 315 / 433 / 868MHz Available
  - Protective Conformal Coating
- **RRQ8 Version**
  - Front End SAW Filter Option
  - Sensitivity Typically –113 dBm
  - Improved Image Rejection

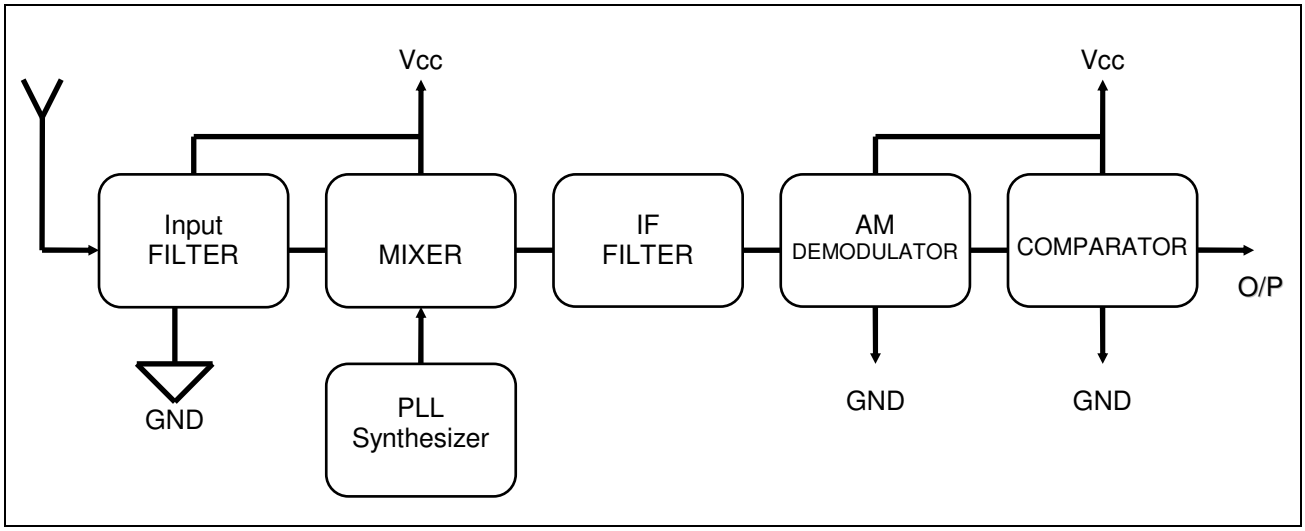


Description

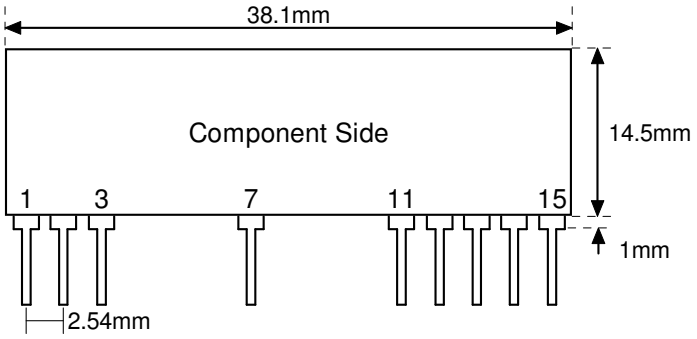
The RF Solutions AM Superheterodyne Receivers are compact modules, which can be used to capture undecoded data from any equivalent AM Transmitter, such as R.F. Solutions AM-RT40 range of transmitters. (See AM Transmitter datasheet).

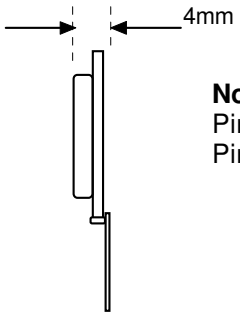
Receivers are manufactured on a ceramic substrate, the RRQ3 incorporates an LC Filter, pre amplifier front end and PLL Synthesizer for high sensitivity and reduced EMC emissions. The RRQ8 incorporates an optional SAW Filter to provide a further increase in the module sensitivity. The modules show a very high frequency stability over a wide operating temperature even when subjected to mechanical vibrations or manual handling offering a very cost effective solution.

Block diagram



AM-RRQ3 Mechanical Dimensions





Notes
Pins on 0.1" pitch
Pin Dims :0.25 x 0.50mm

Pin Descriptions

RRQ3	
Pin No	**Pin Name**
1	+Vcc
2	GND
3	DATA IN (Antenna)
7	GND
11	GND
12	+Vcc
13	RSSI (output)
14	DATA OUT
15	PD (Power Down input) 0 = Standby Mode ($I_{standby}$100nA max) 5V = Normal Operation

RSSI Output

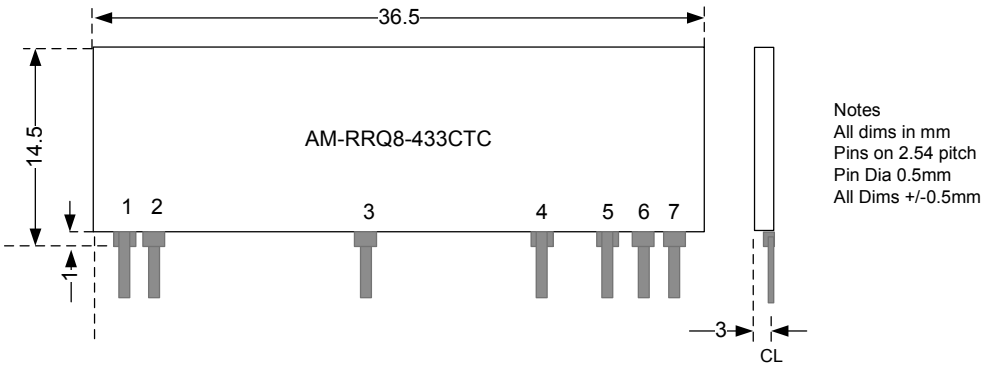
RF In (dBm)	RSSI (V)
-120	1.20
-110	1.32
-100	1.50
-90	1.78
-80	2.06
-70	2.35
-60	2.62
-50	2.72
-40	2.75

Electrical Characteristics

Ambient temperature = 25°C.

Electrical Characteristics	Min	Typical	Max	Dimension
Supply Voltage (Vcc)	4.5	5	5.5	V
Supply Current		5	6	mA
Receiver Frequency 315MHz variants		315		MHz
Receiver Frequency 433MHz variants		433.92		MHz
Receiver Frequency 868MHz variants		868.35		MHz
Low Level Output Voltage (I=10uA)			0.8	V
High Level Output Voltage (I=200uA)	Vcc-1			V
Operating Temperature Range	-25		+80	°C
R.F Sensitivity (100% AM) at 315 / 433MHz		-106		dBm
R.F Sensitivity (100% AM) at 868MHz		-101		dBm
3dB Bandwidth		+/-150		KHz
Max Data Rate			4.8	KHz
Level of Emitted Spectrum			-70	dBm

AM-RRQ8 Mechanical Dimensions



Pin Descriptions

RRQ8	
Pin No	**Pin Name**
1	GND
2	DATA IN (Antenna)
3	GND
4	AGC Control(0=ON, 1=OFF)
5	RSSI (output)
6	DATA OUT
7	+Vcc

Electrical Characteristics

Ambient temperature = 25°C.

Electrical Characteristics	Min	Typical	Max	Dimension
Supply Voltage (Vcc)	4.5	5	5.5	V
Supply Current		7.5	9	mA
Receiver Frequency 433MHz variants		433.92		MHz
Low Level Output Voltage (I=10uA)			0.8	V
High Level Output Voltage (I=200uA)	Vcc-1			V
Operating Temperature Range	-25		+80	°C
R.F Sensitivity (100% AM)	-110	-113		dBm
3dB Bandwidth		+/-150		KHz
Max Data Rate			4.8	KHz
Level of Emitted Spectrum			-60	dBm

Automatic Gain control (AGC)

Applying a Logic Low into this pin activates the internal AGC circuit. Using AGC enables the receiver module to operate with maximum efficiency when receiving an RF data input within the -114 to 0dBm range.

Applying a logic high into this pin disables the internal AGC circuit and the receiver module is forced to maximum sensitivity regardless of the input signal level. If the RF data input signal is below the threshold for valid data, then the module will operate within its linear region. If the RF data input is a higher level then the receiver will operate in a saturated mode. This can be useful to determine if the transmitter is within close proximity to the receiver module.

Received Signal Strength Indication (RSSI)

Fig 1 shows the RSSI output voltage relative to the received RF data input level.

This characteristic was generated with a modulated AM signal with 99% modulation of a 1KHz square wave. The RSSI pin also had a 10uF capacitor to GND.

The RSSI output is linear where the RF Data input is upto -40dBm after which it flattens off at approx 2.2V (saturation level).

In the linear region the RSSI output is proportional to RF Data input power and may be used as a measure of received signal strength. When the RSSI output flattens it no longer represents a output proportional to the RF Data input. This region of the curve can be used to confirm the close proximity of the transmitter

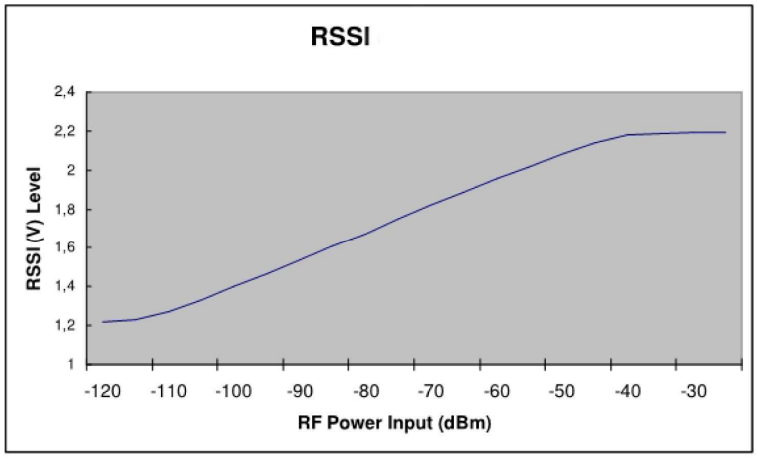
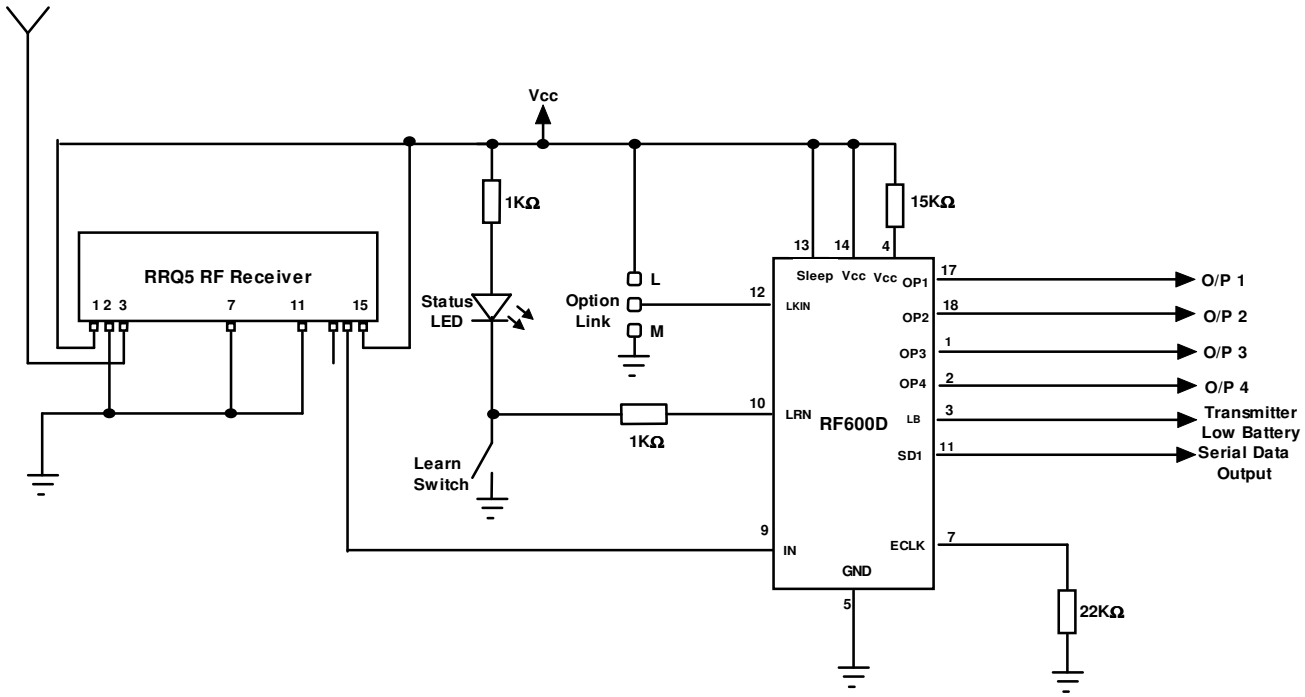


Fig. 1 - RSSI exit level related to RF Power received

Application Circuit



Notes

- Do not use Veroboad or Stripboard to mount the module!
- Ensure the supply is stable (ideally <10mVpk ripple).
- Keep the module away from other EMF generating components.
- Mount the antenna as close to the module as possible.

Part numbering

AM-RRQ3-315	Receiver Module 315MHz
AM-RRQ3-433CTC	Receiver Module 433MHz (conformally Coated)
AM-RRQ3-868	Receiver Module 868MHz
AM-RRQ8-433	Receiver Module, SAW Filter, 433MHz

Should you require further assistance, please call:
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RF Solutions is a member of the Low Power Radio Association.

