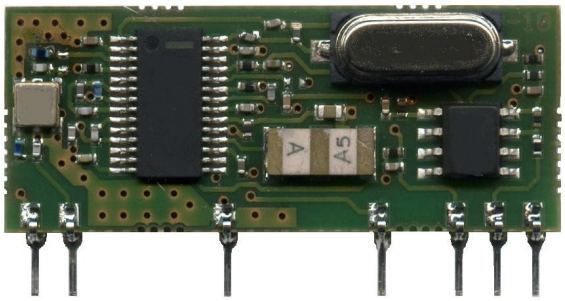
Superheterodyne Receiver

RRQ8-XXX

AM Superhet Receiver with Front End SAW Filter and Output Noise Filter



General description

The RRQ8-XXX is an AM superhet data receiver with SAW Front End Filter to obtain high immunity to electromagnetic interference.

An output filter circuit is realized to cancel short impulses (<150 usec) that can be present in the received signal and to restore impulses integrity.

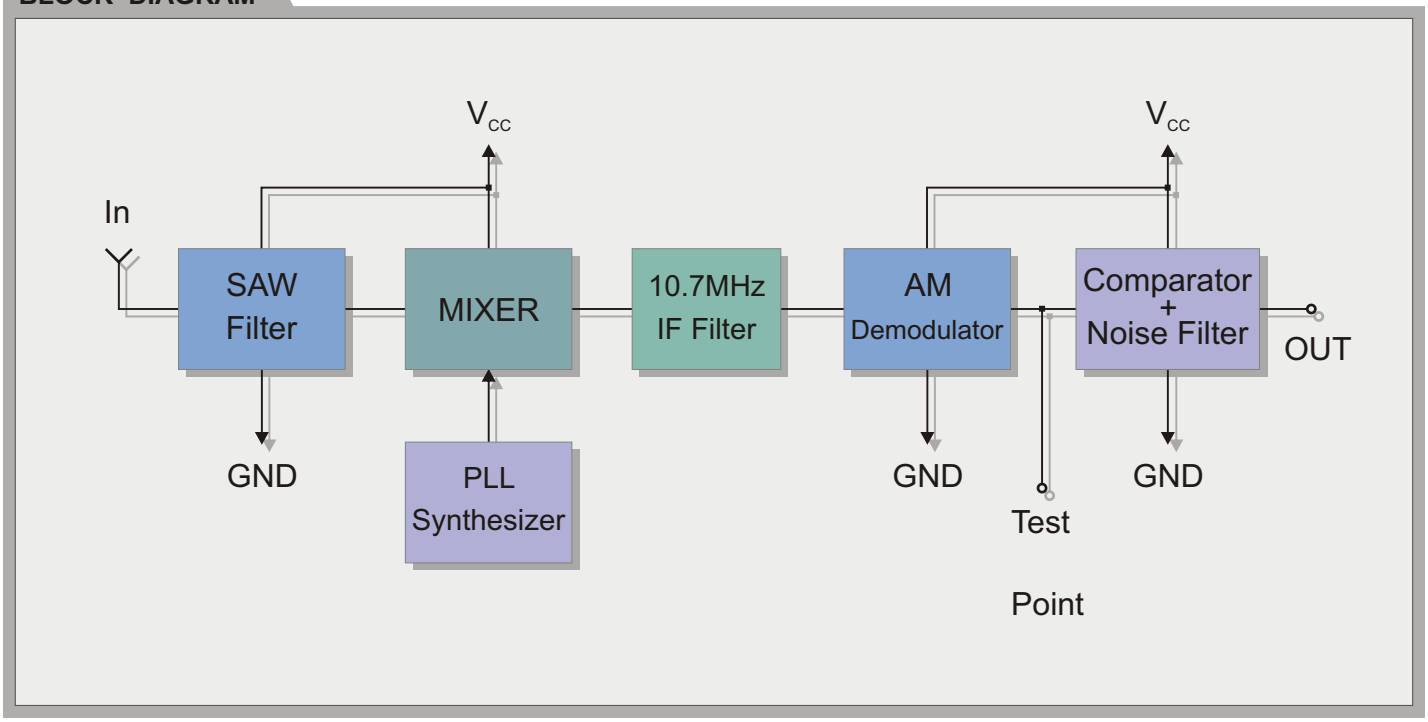
Ideal for application that needs high immunity to noise generated by electrical brushes motor.

XXX: custom-specified working frequency (433.92 MHz)

Applications

- Wireless security systems
- Car Alarm systems
- Remote gate controls
- Sensor reporting

BLOCK DIAGRAM



Electrical Characteristics

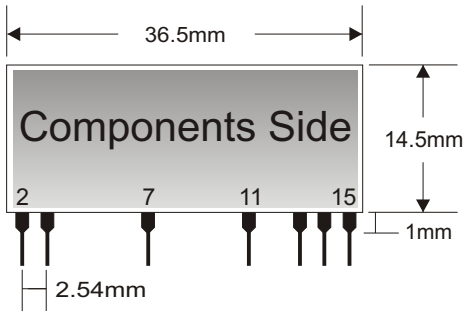
Ta = 25°C unless otherwise specified

	CHARACTERISTICS	MIN	TYP	MAX	UNIT
V_{CC}	Supply Voltage	4.5	5	5.5	VDC
I_S	Supply Current		7.5	9	mA
F_R	Receiver Frequency		433.9		MHz
	RF Sensitivity (100% AM)	-110	-113		dBm
B_w	-3dB Bandwidth		±150		KHz
	Max Data Rate			4.8	Kbit/s
	Level of Emitted Spectrum			-60	dBm
V_{ol}	Low-Level Output Voltage (RL = 10K)			$0.2V_{CC}$	V
V_{oh}	High-Level Output Voltage (RL = 10K)	$0.8V_{CC}$			V
T_{OP}	Operating Temperature Range	-25		+80	°C

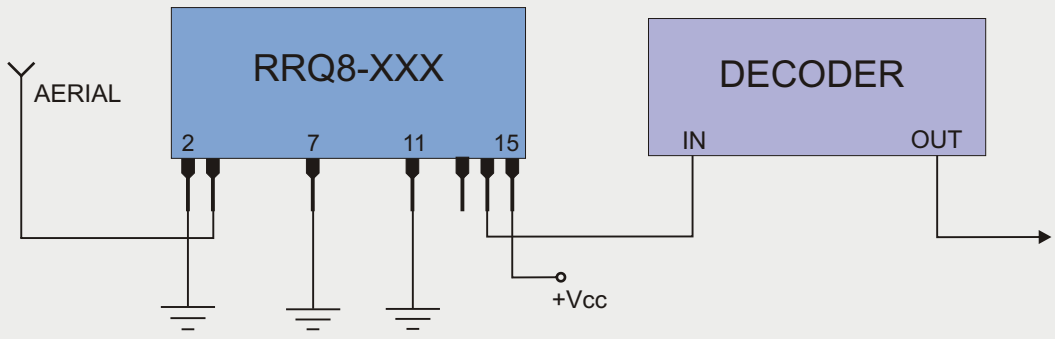
Pin Description

2	GND
3	IN
7	GND
11	AGC Control (0=ON, 1=OFF)
13	RSSI - Test Point
14	OUT
15	V_{cc}

Mechanical Dimensions



TYPICAL APPLICATION



How AGC (automatic gain control) pin works.
On the RRQ8-XXX, you can enable the Automatic Gain Control by the **pin 11**.
Applying a low logic level, AGC is active: this allows to decode correctly the RF power in the range -114dBm / 0dBm. In this way the receiver function correctly with the maximum dynamic input signal and then you can restore the sequence of data transmitted from the received power levels up to 0dBm.
If you apply a high logic level to the pin 11, the AGC is disabled and receiver is set to work always with the highest sensitivity. If the input signal strength is below a threshold power, the receiver operates in linear region, instead if the received power is higher, the receiver works in the saturation zone. This operation mode, can be used to understand if the transmitter is near to the receiver.
Here after there is presented the output trend of RSSI signal (pin 13) with the AGC (automatic gain control) disabled.

RSSI (pin 13) exit characteristic
Figure 1 shows the evolution of the RSSI output voltage as a function of power input signal with AGC turned off (pin 11 to logic level high).
The curve was obtained by applying to the antenna input (pin 3) of the receiver an RF generator, that generate a modulated AM signal with 99% of modulation and square wave of 1 kHz, and also by connecting between pin 13 and a GND a 10µF-capacitor .
Signal shall be measured using an oscilloscope with a probe of impedance 10 MOhm to avoid the alteration of the measured voltage.
The RSSI output has a linear path for power input level up to -40dBm after which becomes a value of about 2.2 V fixed. In the linear region RSSI output is proportional to the power input signal: in this case you can use the output voltage at pin 13 as a measure of the signal received and then as measure of the distance from transmitter. When the RSSI pin assumes a constant value, there is no longer a matching proportionality with the received signal level. In this case the value of output voltage to pin 13 can still be used as indication of proximity. Calculating the value of the input power above which the RSSI output sutured, you get the maximum distance over which the receiver is respect its transmitter.
The distance below which the receiver operates in the saturation zone is theoretically about 4m (transmitting and receiving antennas in line of sight and with the possibility of transmitted power of 0 dBm , typical output power of a handheld transmitter) and is highly dependent on the presence of obstacles interposed between the transmitter and receiver .
In the linear output zone, is therefore possible to use the RSSI as a measure of distance, in the zone area where the RSSI voltage is saturated it is rather useful as a measure of proximity, for example, to monitor
access gates.

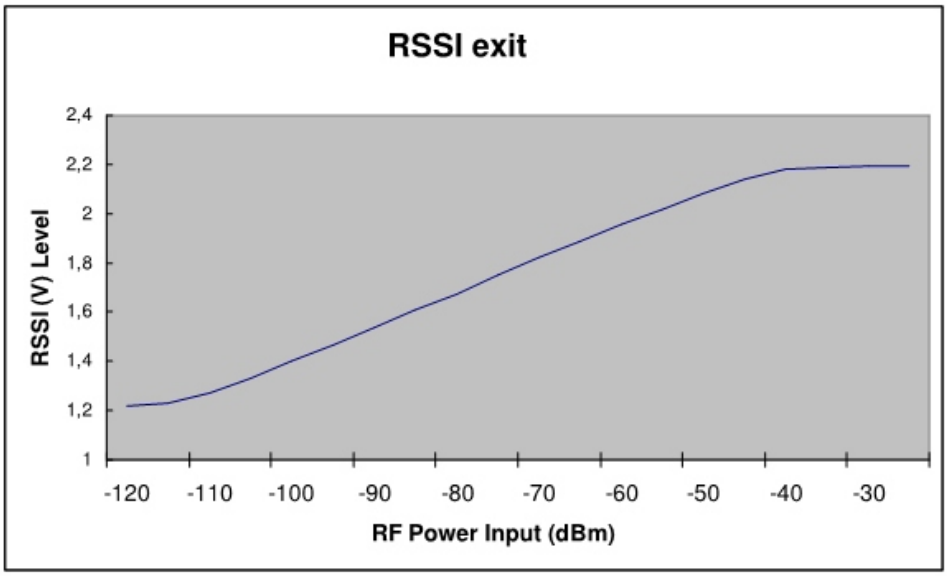


Fig. 1 - RSSI exit level related to RF Power received

Protection for RF receivers

In order to obtain the best performances from the receiver and to comply with the security rules requested by the Certifications , electrical and mechanical protection of the receiver has to be guarantee by the User with the use of suitable housing and applying the appropriate isolation techniques.

The receiver is designed to be used inside housings that assure the overcoming of the provision EN 61000-4-2, not directly applicable to the module itself.

In particular, it is at the user's care the isolation of the external antenna connection and of the antenna itself since the RF input of the receiver is not built to directly bear the electrostatic charges foreseen by the above mentioned provision.

Also the DC power supply (+ 5 Volt) must be protected from short circuits .

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Web Site: www.telecontrolli.com

HEAD OFFICE & PLANT

Via Nazionale delle Puglie, 177
80026 CASORIA (NA), Italy
Tel: +39 081 7599033
Fax: +39 081 7596494

SALES OFFICE

sales @ telecontrolli.com