

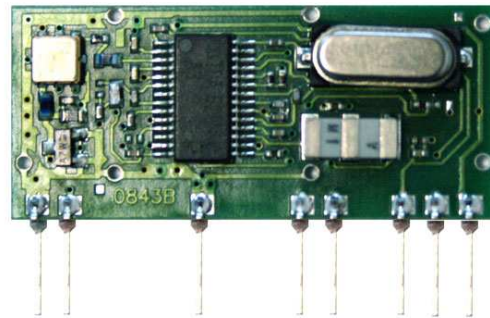
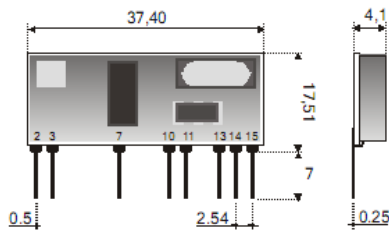
RX-FM4SF 433,92 MHz

The super-heterodyne FM receiver RX-FM4SF with High sensitivity and selectivity. It is equipped by front-end SAW filter that allows an High noise immunity.

Enable pin allows to reach power-down mode to reduce the power consumption up to 0,5 uA.

Ideal for Microchip Keeloq decoders

Pin-out



Connections

Pin 2-7-11	Ground	GND connections. Connected to the same ground plane.
Pin 3	Antenna	Antenna input, impedance 50 ohm
Pin 10	Enable	Receiver enable active when HIGH. Internal Pull down.
Pin 13	RSSI	Output RSSI proportional to the amplitude of the input signal
Pin 14	Data Out	Data output from the receiver. Loads higher than 1 K Ω
Pin 15	+V	Positive voltage supply +5V \pm 5%.

Technical Features

	Min	Typ	Max	Unit	Notes
Reception frequency		433.92		MHz	
Supply Voltage Vdd	4.5	5	5.5	V	
Power Down		0.5		μ A	
Supply Current		5.6	6.0	mA	
RF Sensitivity		-105	-106	dBm	See note 1
RF passing band at -3dB		600		KHz	
IF passing band at -3dB		110		KHz	
Output square wave	0.5	3.0	3.8	KHz	
Logic level "0"			0.2 Vd	V	See note 4
Logic level "1"	0.8 Vd			V	See note 4
Spurious RF emission in antenna			-60	dBm	See note 2
Switch-on time		1.5	2.0	mS	See note 3
Operating temperature range	-20		+80	$^{\circ}$ C	See Fig.5

Le caratteristiche tecniche possono subire variazioni senza preavviso. La AUREL S.p.A non si assume la responsabilità di danni causati dall'uso improprio del dispositivo.

Dimensions	37.0 x 12.4 x 4.2 mm
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- Note1:** Values have been obtained by applying the test system as Fig.1, with a square wave 99% as modulation index.
Note2: The RF emission measurement has been obtained by connecting the spectrum analyser directly to the RX pin 14
Note3: By switch on time is meant the time required by the receiver to acquire the declared characteristics from the very moment the power supply is applied.
Note4: Values obtained with 10K Ω maximum load applied.

The declared technical characteristics have been obtained by using the following test system:

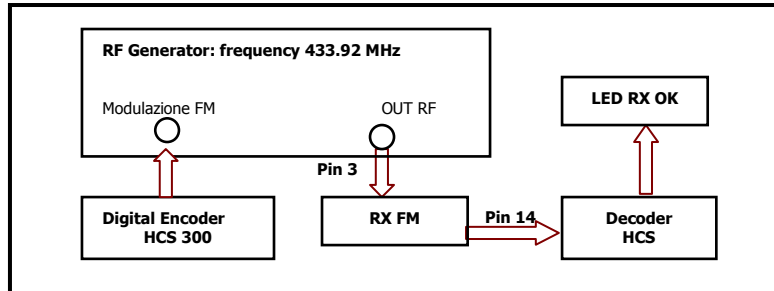


Fig. 1 – Measurement of sensitivity.

Enable pin

Pin 10 is used to set the receiver in power down mode, this allows a lower current consumption when the RF signal is not received. Typical current consumption in power-down mode is 0.5 μ A. After switching-on the enable pin 10, the receiver is ready for a correct reception of the signal in 1,5 ms. The module is on when enable pin is connected to VDD, it's sufficient do not connect it to set the power-down mode.

Device usage

In order to take advantage of the performances described in the technical specifications and to comply with the operating conditions which characterize the Certification, the receiver has to be fitted on a printed circuit, considering what follows:

5 V dc supply:

1. The receiver must be supplied by a very low voltage source, safety protected against short circuits.
2. Maximum voltage variations allowed: $\pm 0,50$ V.
3. De-coupling, next to the receiver, by means of a minimum 100.000 pF. ceramic capacitor

Ground:

1. It must surround at the best the welding area of the receiver. The circuit must be double layer, with throughout vias to the ground planes, approximately each 15 mm.
2. It must be properly dimensioned, specially in the antenna connection area, in case a radiating whip antenna is fitted in it (an area of approximately 50 mm radius is suggested.)

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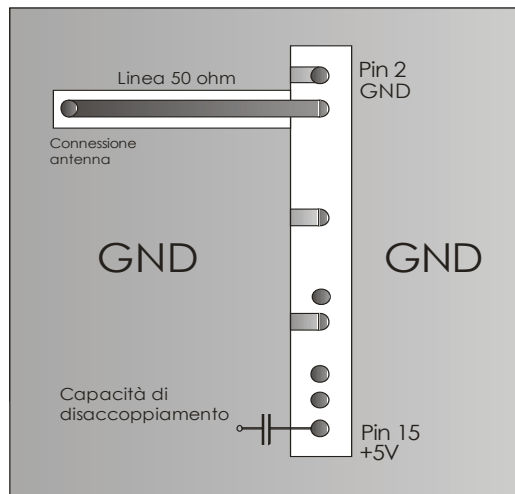


Fig.2 - Suggested lay-out for the device correct usage

Antenna:

1. A **whip** antenna, 16,5 mm long and approximately 1 mm dia, brass or copper wire made, must be connected to the RF input of the receiver.
2. The antenna body must be kept straight as much as possible and it must be free from other circuits or metal parts (5 cm minimum suggested distance.)
3. It can be utilized both vertically or horizontally, provided that the connection point between antenna and receiver input, is surrounded by a good ground plane

50 Ohm line:

1. It must be the shortest as possible.
2. 1,8 mm wide for 1 mm thick FR4 printed circuits and 2,9 mm wide for 1,6 mm thick FR4 printed circuits. On the same side, it must be kept 2 mm away from the ground circuit.
3. On the opposite side a ground circuit area must be present.

Antenna connection:

3. It may be utilized as the direct connection point for the radiating whip antenna.
4. It can bear the connection of the central wire of a 50 Ω coaxial cable. Be sure that the braid is welded to the ground in a close point.

N.B: As an alternative to the a.m. antenna it is possible to utilize the whip model manufactured by Aurel (see related Data Sheet ed Application Notes).

By fitting whips too different from the described ones, the EEC Certification is not assured

Other components:

1. Keep the receiver separate from all other components of the circuit (more than 5 mm).
2. Keep particularly far away and shielded all microprocessors and their clock circuits.
3. Do not fit components around the 50 Ohm line. At least keep them at 5 mm distance.

If the Antenna Connection is directly used for a radiating whip connection, keep at least a 5 cm radius free area. In case of coaxial cable connection 5 mm radius will suffice.

Pin.13 "RSSI" Output

In fig 3 it is reported grafically the behaviour of the voltage at the RSSI output in function of the power of the input signal. Measure has been made with 20KHz deviation to the RF signal and square wave modulation 1KHz drawn directly from a signal generator with impedance probe of 10M Ω .

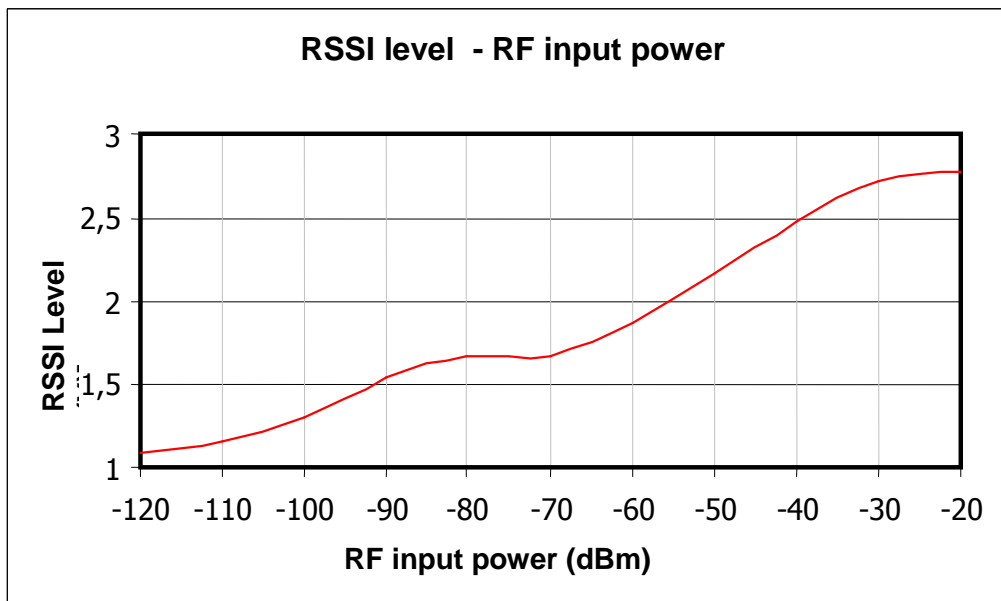


Fig. 3 – RSSI level according to RF power received

Reference curves

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In fig 4 it is reported the behaviour of module supply current in function of Power supply

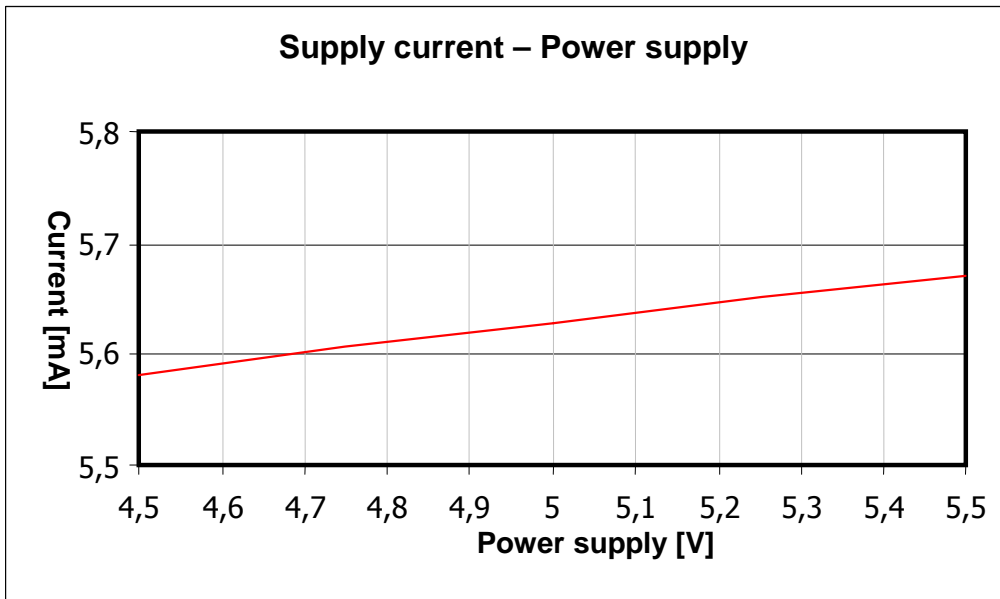


Fig. 4

In fig 5 it is reported the behaviour of receiver sensitivity in function of temperature. Values are referred to the nominal power supply of 5.0V

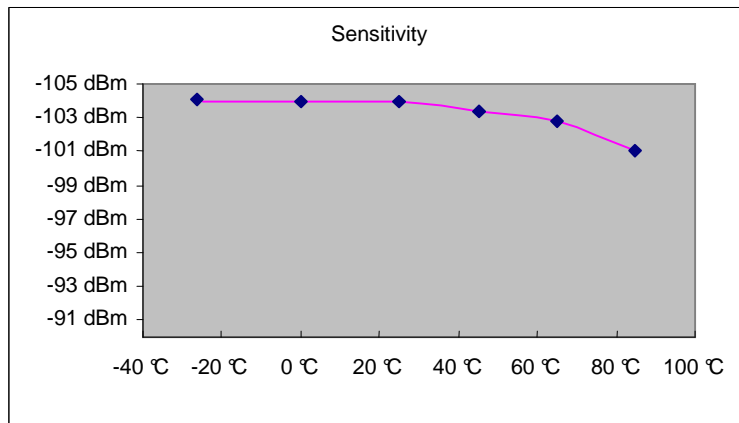


Fig. 5

In fig 6 it is reported the blocking measurement performed under ETSI rules. Power DELTA value it was obtained from difference between power absolute values of useful modulated signal and interfering signal value

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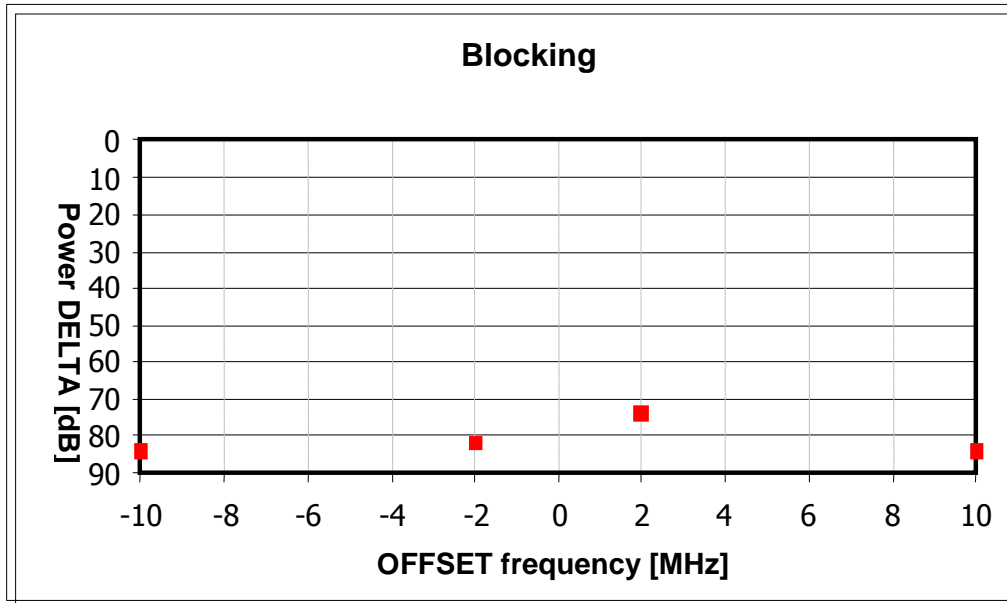


Fig. 6 – ETSI EN 300 220-1 rules

Reference Rules

The **RX-FM4SF** receiver is EEC certified and in particular it complies with the European set of Rules **EN 300 220-1 V2.3.1 for class 2, and EN 301 489-1 V1.8.1 for class 1**. The equipment has been tested according to rule EN 60950 and it can be utilized inside a special insulated housing that assures the compliance with the above mentioned rule. The receiver must be supplied by a very low voltage safety source protected against short circuits. The use of the receiver module is foreseen 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 insulation of the external antenna connection, and of the antenna itself since the RF output of the receiver is not built to directly bear the electrostatic charges foreseen by the a.m. provision.

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