FM Transmitter & Receiver Hybrid Modules

Features

- FM Radio Transmitters & Receivers
- Transmit Range up to 250m
- Miniature Packages
- Data Rate up to 9.6Kbps
- No Adjustable Components
- Very Stable Operating Frequency
- Operates from –20 to +85^{0}C
- EMC Compliant for use in Europe
- FCC Compliant for use in USA



RTFQ1

Transmitter

- 3V / 4-12V Supply Voltage Versions
- SIL, DIL or SMT Packages available



RTFQ2

Receiver

- PLL XTAL Design
- CMOS/TTL Output
- RSSI Output
- Standby Mode (max 100nA)
- 5V Supply Voltage



RRFQ1

Applications

- Wireless Security Systems
- Car Alarms
- Remote Gate Controls

- Remote Sensing
- Data Capture
- Sensor Reporting

Description

These miniature RF modules provide a cost effective high performance FM Radio data link, at, 433.92MHz. The modules uses no adjustable components ensuring very reliable operation.

This transmitter and receiver pair enables the simple implementation of a data link at distances up to 75 metres in-building and 250 metres open ground.

The modules have been approved for operation with Europe and USA within FCC part15.

These modules will suit 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 their small size and low power requirements both modules are ideal for use in portable, battery-powered applications such as hand-held terminals.

Transmitters

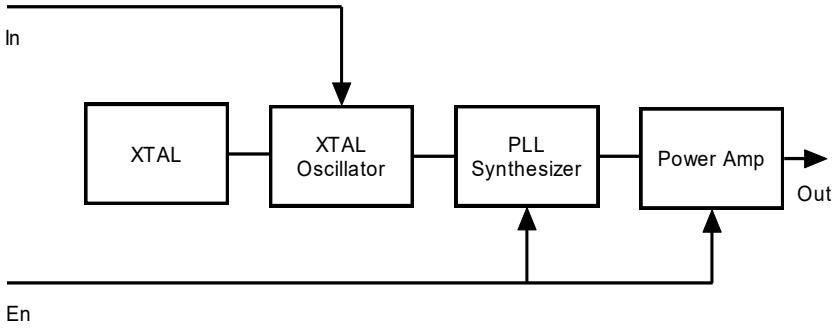
There are three versions of transmitter:

RTFQ1; A dual in line package operating at 3.3V. This provides the most rugged mechanical fixing to the host PCB. Power down mode is also available.

RTFQ1 SM: A dual in line surface mount package operating at 3.3V. This provides the quickest and most efficient mechanical fixing to the host PCB.

RTFQ2; A Single in line package operating at 3.3V

Transmitter Block Diagram



Transmitter Part Numbering

433MHz Transmitter Modules	
Part Number	**Description**
FM-RTFQ1-433P	DIL Module
FM-RTFQ1-433PSO	SMT Module
FM-RTFQ2-433R	SIL Module

868MHz Transmitter Modules	
Part Number	**Description**
FM-RTFQ1-868P	DIL Module
FM-RTFQ1-868PSO	SMT Module
FM-RTFQ2-868R	SIL Module

The following parts are Manufactured in Asia
Note: These modules are manufactured in ASIA with the sole purpose of reducing costs. (the soldering of the legs is a manual process and therefore lower cost.

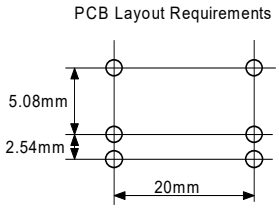
The modules are built to the same design, layout and tested to the same level providing a finished product with the same RF performance.

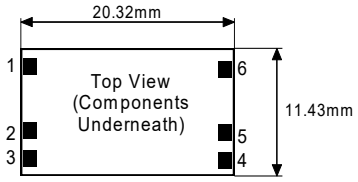
There is a difference in the dimension of the legs used. For ASIAN manufacture products the leg dimensions are 0.25 x 0.4mm.

433MHz Transmitter Modules	
Part Number	**Description**
FM-RTFQ1A-433P	DIL Module
FM-RTFQ2C-433P	SIL Module

FM Transmitter & Receiver Modules

RTFQ1 Mechanical Dimensions

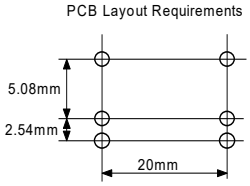


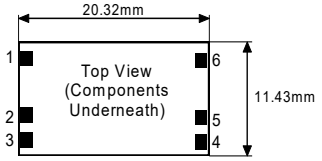


Module Thickness 2mm

Pins on "0.1 pitch
Pin Dimensions :
0.25mm x 0.50mm
Tolerance + 0.2 / - 0.0mm
(Legs may be tinned during manufacture)

RTFQ1 SMT Mechanical Dimensions

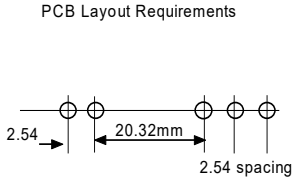


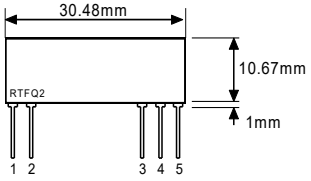


Module Thickness 2mm

Pins on "0.1 pitch
Pin Dimensions :
0.25mm x 0.50mm
Tolerance + 0.2 / - 0.0mm
(Legs may be tinned during manufacture)

RTFQ2 Mechanical Dimensions





Module Thickness 2mm

Pins on "0.1 pitch
Pin Dimensions :
0.25mm x 0.50mm
Tolerance + 0.2 / - 0.0mm
(Legs may be tinned during manufacture)

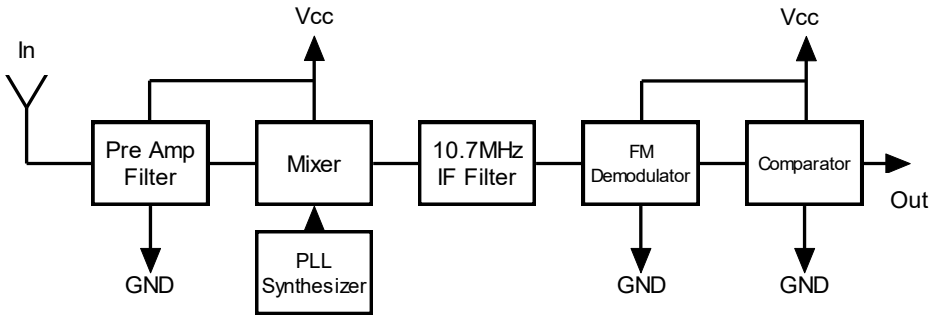
Pin Description

RTFQ1	RTFQ2	Name	Description
1	N/A	En	Enable (active high)
2	5	IN	Data input
3	1	GND	Ground, Connect to RF earth return path
4	3	Vcc	Supply Voltage
5	4	GND	Ground, Connect to RF earth return path
6	2	EA	External Antenna

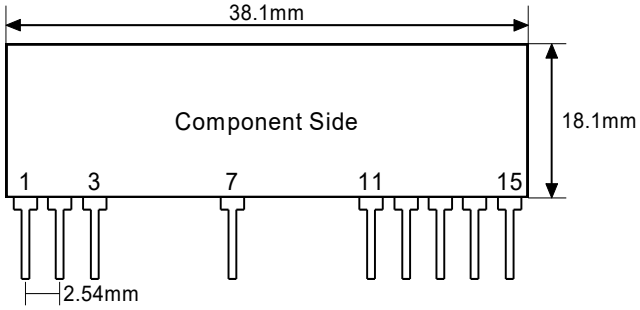
Technical Specifications RTFQ1P. RTFQ2P

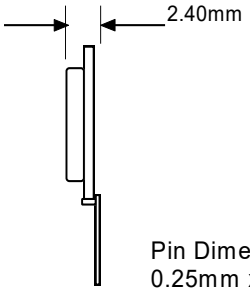
Electrical Characteristics	MIN	TYPICAL	MAX	DIMENSION
Supply Voltage R Version	2.1 4	3.3	4.00 12	V
Supply Current		7	8	mA
Standby Current (IN = EN = Low)			100	nA
Frequency		315.00 433.92 868.35		MHz
RF Output into 50W (Vcc=3.3V)			10	dBm
Initial Frequency Accuracy	-35	0	+35	KHz
FM Deviation	25	30	35	KHz
Harmonic Spurious Emissions		-50		dBc
Input High Voltage RTFQ1	1.5		Vcc	V
Input High Voltage RTFQ2	1.5		5.5	V
Power up Time (En to full RF)			1	mS
Power up Time (Power on to full RF)			5	mS
Max Data Rate			9.6	KHz
Power up Time (Power on to full RF)			5	mS
Max Data Rate			9.6	Kbit/s
Operating Temperature	-20		+85	°C

Receiver Block Diagram



RRFQ1 Mechanical Details





Pin Dimensions :
0.25mm x 0.50mm

Tolerance + 0.2 / - 0.0mm

(Legs may be tinned during manufacture)

Receiver Part Numbering

The following parts are UK manufactured

433MHz Receiver Modules	
Part Number	**Description**
FM-RRFQ1-433P	SIL Module

868MHz Receiver Modules	
Part Number	**Description**
FM-RRFQ1-868P	SIL Module

The following parts are Manufactured in Asia
Note: These modules are manufactured in ASIA with the sole purpose of reducing costs. (the soldering of the legs is a manual process and therefore lower cost.

The modules are built to the same design, layout and tested to the same level providing a finished product with the same RF performance.

There is a difference in the dimension of the legs used. For ASIAN manufacture products

433MHz Receiver Modules	
Part Number	**Description**
FM-RRFQ1C-433P	SIL Module

Pin Description

RRFQ1	Pin Description
1	+Vcc
2, 7,11	GND
3	Data In (Antenna)
12	NC
13	Received Signal Strength Output
N/A	AF Output
14	Data Out
15	Power Down 0V = Standby 5V = Operating

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

RSSI Output

The RSSI provides a DC Voltage proportional to the peak value of the receive data signal. This output can be used as an indicator for the received signal strength to use in wake-up circuits etc.

An used to provide the timing for the RSSI signal. The modules have a 10nF capacitor internally connected tRC circuit is normally o GND, therefore a pull down resistor (to GND) connected to the RSSI pin may be used to generate a simple RC network time constant for the RSSI signal output.

Please note that the maximum output current is typically 950μA, the discharge current is lower than 2μA

Technical Specifications

Electrical Characteristics	Min	Typical	Max	Dimension	Notes
Supply Voltage (Vcc)	4.5	5	5.5	V	
Supply Current (Operating)		5.7	6.8	mA	
Supply Current (Standby)			100	nA	
Receiver Frequency		315.00 433.92 868.35		MHz	
R.F Sensitivity 315 ,433MHZ versions 868MHz versions		 -103 -100		dBm	
3dB Bandwidth		+/-150		KHz	
Data Rate RRFQ1 CTC RRFQ1 /RRFQ2	 300 300		 9,600 4,800	Hz	
Turn on Time			5	mSecs	1
Turn on Time		8		mSecs	2
Level of Emitted Spectrum			-70	dBm	
Low Level Output Voltage			0.8	V	I = 200uA
High Level Output Voltage	Vcc-1			V	I = 200uA
RSSI Output		0.95		mA	
Operating Temperature Range	-25		+80	°C	

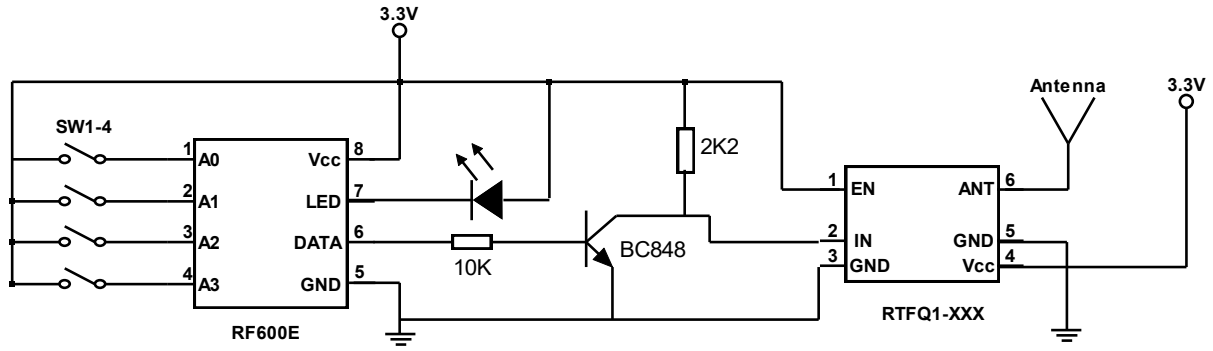
Notes

Time from PD pin going high to stable data. (RRFQ1 only)
Time from Power ON to stable data.

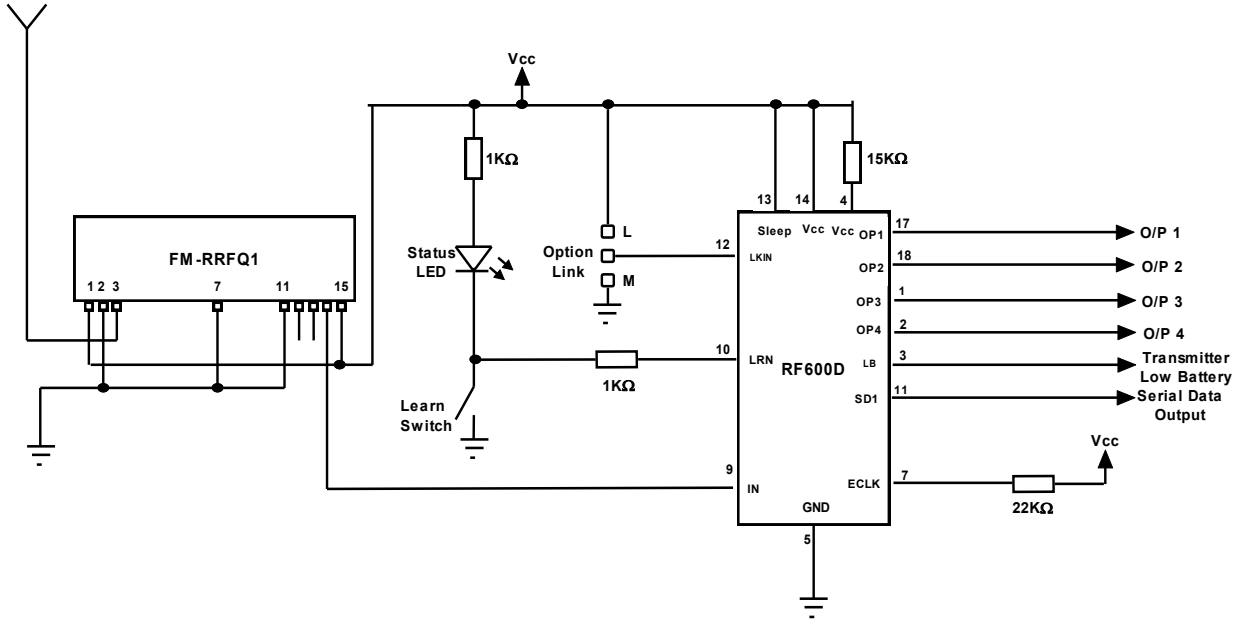
Typical Application

The following circuits show a remote control system with 'self learning feature'. Please refer to datasheet DS600 for more information.

Transmitter Circuit



Receiver Circuit



Prototyping Hints

It is essential when building any Low Power Radio System that you have a 'clean' DC power source. Typically the ripple voltage should be less than 10mV Peak to Peak. Normally a 470uF de-coupling capacitor is sufficient de-coupling for an AC derived DC power source. Small capacitors of 10-100nF can also be used across the power supply to filter high frequency noise.

Never place a Transmitter or Receiver directly into Vero-Board or any similar prototyping board. This will severely restrict the range. Rather, use small lengths of wire from the prototyping board to the pins of the Transmitter or Receiver.

A useful antenna, for testing purposes, for both the Transmitter and Receiver on 433MHz is to use a piece of wire 17.3cm long (23.8cm at 315MHz) soldered directly to the antenna pin.

Data should be encoded before it is transmitted over a wireless link to ensure reliability and reduce the effect of interference and cross talk. A range of encoders IC's are available from RF Solutions, please refer to the RF Solutions website for further information.

Simplified Declaration of Conformity (RED)

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FM Transmitter & Receiver Modules

Important European compliance information for module datasheets

This RF Solutions radio module meets the essential requirements of the European Radio Equipment Directive 2014/53/EU and has been tested to European Harmonised Standards and CE marked where space allows. A copy of the EU Declaration of Conformity can be located on the RF Solutions Website, www.rfsolutions.co.uk/certification-i59.

When using the module in an end product, continued compliance can only be assured by incorporating the module in accordance with RF Solutions specific installation instructions and in accordance with the published information on the RF Solutions product data sheet. The antenna gain specification must be adhered to at all times.

Article 3.1a and 3.1b of the EU Radio Equipment Directive 2014/53/EU should be assessed in the final product.

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