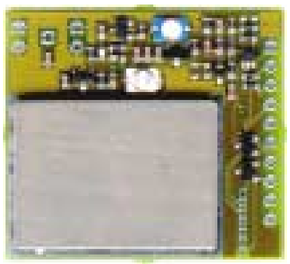
FSK HALF-DUPLEX SINGLE-CHANNEL TRANSCEIVER 433.920MHz

DESCRIPTION



The RT606-S module is a single channel transceiver that works at a frequency of 433.920MHz in accordance with CEPT/ERC/REC 70-03.
The module conforms to European Standard ETSI EN 300 220 for SRDs (Short Range Devices).

The speed of data transfer can vary between 1,200 and 38,400bps.

The unit's physical size as well as its excellent electrical characteristics and a reasonable price, make this module suitable for innumerable applications that require wireless connections over short distances.

APPLICATIONS

- ✗ Automation
- ✗ Computer networks
- ✗ Telemetry
- ✗ Security systems
- ✗ Bar code readers
- ✗ Portable terminals
- ✗ Monitoring of industrial processes
- ✗ Portable electrical medical instruments

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ABSOLUTE MAXIMUM RATINGS

PARAMETER	MIN	TYPICAL	MAX	UNIT
Power Supply Voltage	0		6	V
Input voltage	0		6	V
Operating temperature	-20		+55	°C
Storage temperature	-40		+100	°C

TIMINGS

PARAMETER	MIN	TYPICAL	MAX	UNIT
Start up time			3	ms
TX / RX switching			3	ms
RX / TX switching			0.5	ms

POWER SUPPLY

PARAMETER	MIN	TYPICAL	MAX	UNIT
Operating voltage (Vdd)	4.5	5.0	5.5	V

GENERAL CHARACTERISTICS

Temperature: +25°C
Power Supply: +5V

TRANSMITTER

PARAMETER	MIN	TYPICAL	MAX	UNIT
Supply current		18	22	mA
Transmission frequency		433.920		MHz
Frequency precision	-75		+75	kHz
Output power at 50Ω	+6	+8	+10	dBm
FSK deviation	15	20	25	kHz
Serial line data speed *	1.2		38.4	kbps
Modulating signal		Digital		

** Applies to NRZ code (asynchronous serial line).*

RECEIVER

PARAMETER	MIN	TYPICAL	MAX	UNIT
Supply current		17	20	mA
RX frequency		433.920		MHz
1st Lo frequency		418.000		MHz
1st Lo freq. accuracy	-75		+75	kHz
RX Sensitivity*	-100			dBm
IF		15.920		MHz
IF bandwidth	300	400	500	kHz
AF level		600		mVpp
Image frequency rejection	30			dB

** for 12dB S/N modulated signal: sinusoid 1kHz, frequency deviation ±20kHz.*

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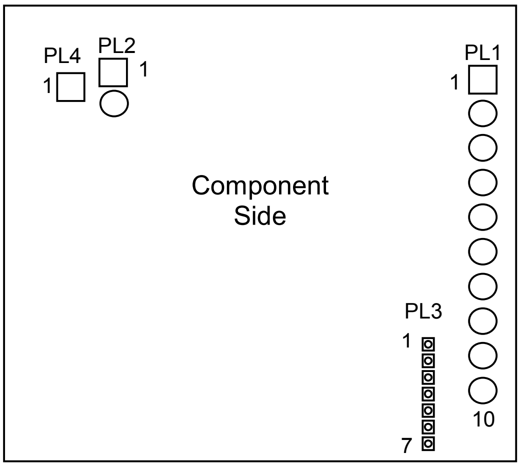
PIN DESCRIPTION



PL1

PIN	FUNCTION
1	GND
2	Data input
3	Carrier Detect
4	Data out
5	Audio out
6	GND
7	Vdd
8	TX Cmd
9	RX Cmd
10	GND

PL2

PIN	FUNCTION
1	GND
2	GND

PL3

PIN	FUNCTION
1	GND
2	Data out
3	Data input
4	RX Cmd
5	Vdd
6	Carrier Detect
7	TX Cmd

PL4

PIN	FUNCTION
1	RF in/out

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CONTROL SIGNALS

The commands that can be sent to this module include **RX Cmd**, **TX Cmd**, **Data inp**

TX CMD (PIN 8)

Electronic switch - when closed, the module is in TX mode.

Transmission	**$2.5V \le V_{PIN8} \le Vdd + 0.7V$**
Off	**$V_{PIN8} \le 0.7V$**

RX CMD (PIN 9)

Electronic switch - when closed, the module is in RX mode.

Reception	**$2.5V \le V_{PIN9} \le Vdd + 0.7V$**
Off	**$V_{PIN9} \le 0.7V$**

INPUT SIGNAL

DATA INPUT (PIN 2)

Data input line, at C-MOS compatible levels.
This module is optimised for speeds between 1.2 and 38.4kbps.
The modulator works properly also with NRZ data type, therefore the Data Input could be connected to an asynchronous port of a PC.
Data can be sent at the same time as the TX command.

OUTPUT SIGNALS

Two types of signals are available:

1. Signals involving use of the module in operating mode:	**Data out** **Carrier Detect**
2. Signals used when the module is tested:	**Audio out**

DATA OUTPUT (PIN 4)

The module processes the digital signal and changes it into the format used for a packet of data transmitted by a similar module.
The data out line is at C-MOS compatible levels. When there is no signal, there is always noise due to the receiver's noise.

CARRIER DETECT (PIN 3)

A digital signal, at a C-MOS compatible level, that indicates the presence of a radio frequency.
The carrier detect responds after a maximum delay of **2ms** from picking up a radio frequency.
The carrier detect is extracted directly from the demodulator chip and it's not optimizable.
To decide if there is a valid data transmission is opportune to search for the signal on Data Output pin.
Carrier detect activation could be critical at extreme temperatures.

NOTE: CD pin should be loaded with ≥ 100kΩ.

Absence of RF:	**high level.**
Presence of RF:	**low level.**

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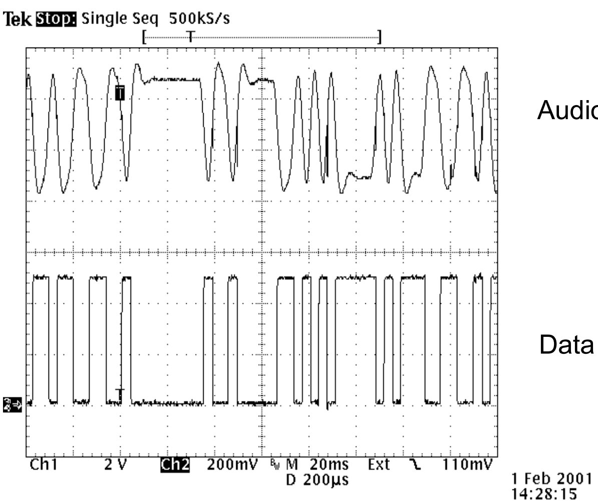
WARNING!
The carrier detect can also be activated by:

1. General spurious signals generated by external sources that cannot be controlled.

2. Signals generated by the system in which the module is embedded.
In this case it is advisable to optimise the layout of the system and filter lines that may induce disturbance (e.g.: power supply, data, clocks, …).

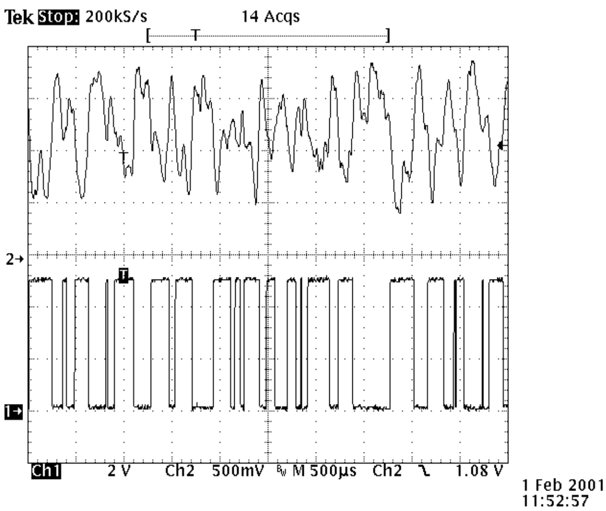
AUDIO OUTPUT (PIN 5)

An analogue signal, drawn from the detector, amplified and filtered before being changed into a digital signal. Used in the module checking and testing phase.
When there is no radio frequency, there is a noise.
If spurious unmodulated signals are received, the noise level reduces in direct proportion to the power of the disturbance signal. The noise disappears altogether if the receiver is saturated.



Audio out

Data out



Modulated carrier
NRZ 38400bps

Absence of RF carrier

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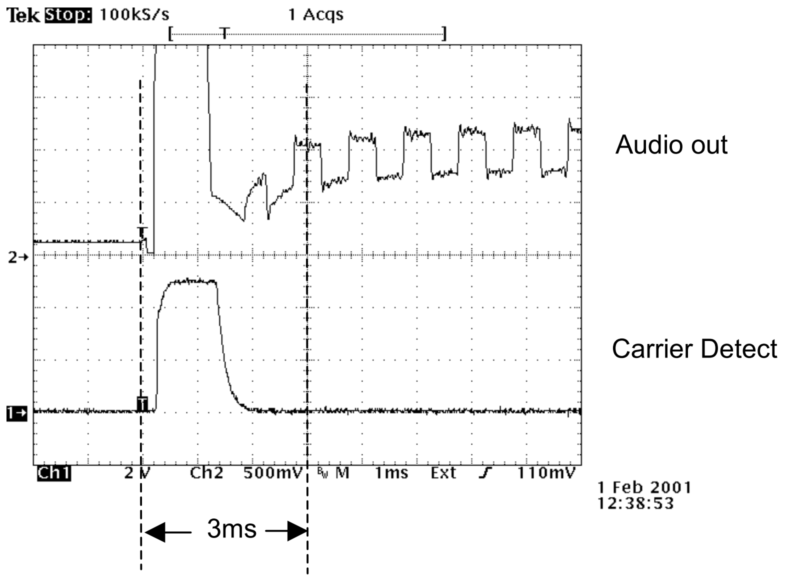
RECEPTION

The receiver is a superheterodina type, the local oscillator frequency is obtained using SAW resonator of a 418MHz resonating frequency.

RECEIVER ACTIVATION TIME

After the switch on command is given, the module is ready to receive at a frequency of 433.920MHz.
The receiver is on standby ready to receive after less than **3ms**.



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TRANSMISSION

The transmitter is made of an oscillating stage controlled by a SAW resonator which resonating frequency is 433.920MHz.
The oscillator is followed by two amplifiers that ensure the correct power and separate itself from the output, making it immune from an eventual mismatching of the antenna load.

ANTENNA

The correct layout and antenna must be provided to avoid malfunctioning of the module, especially during the transmission.

The antenna is definitely the most important part of a reception/transmission system, especially in devices where the antenna position is not always ideal. This means that antennas that are declared to have been calibrated for the working frequency are no longer tuned when used by the system. The antenna manufacturer always indicates how the antenna has been measured. Where a $\lambda/4$ stylus is used, this is always placed on a grounding board of clearly defined dimensions. For common use it is almost impossible to have an ideal counterweight for the antenna. This means that the radiant part must be optimised in relation to the container and circuits that are in the immediate vicinity. This can be obtained by using a network measurer to measure the impedance, and then lengthening or shortening the antenna until the required impedance is obtained.

Where working on the length of the antenna does not suffice, an LC adaptation network must be provided.

Metal or earthing parts in general positioned near the antenna cause it to become unsuitable.
The better it is adapted, the less the effect of unsuitability resulting from the causes indicated above.

For correct operation of the module the antenna must be as free as possible and must not be affected by objects that are external to the system in which the RT606-S is embedded.

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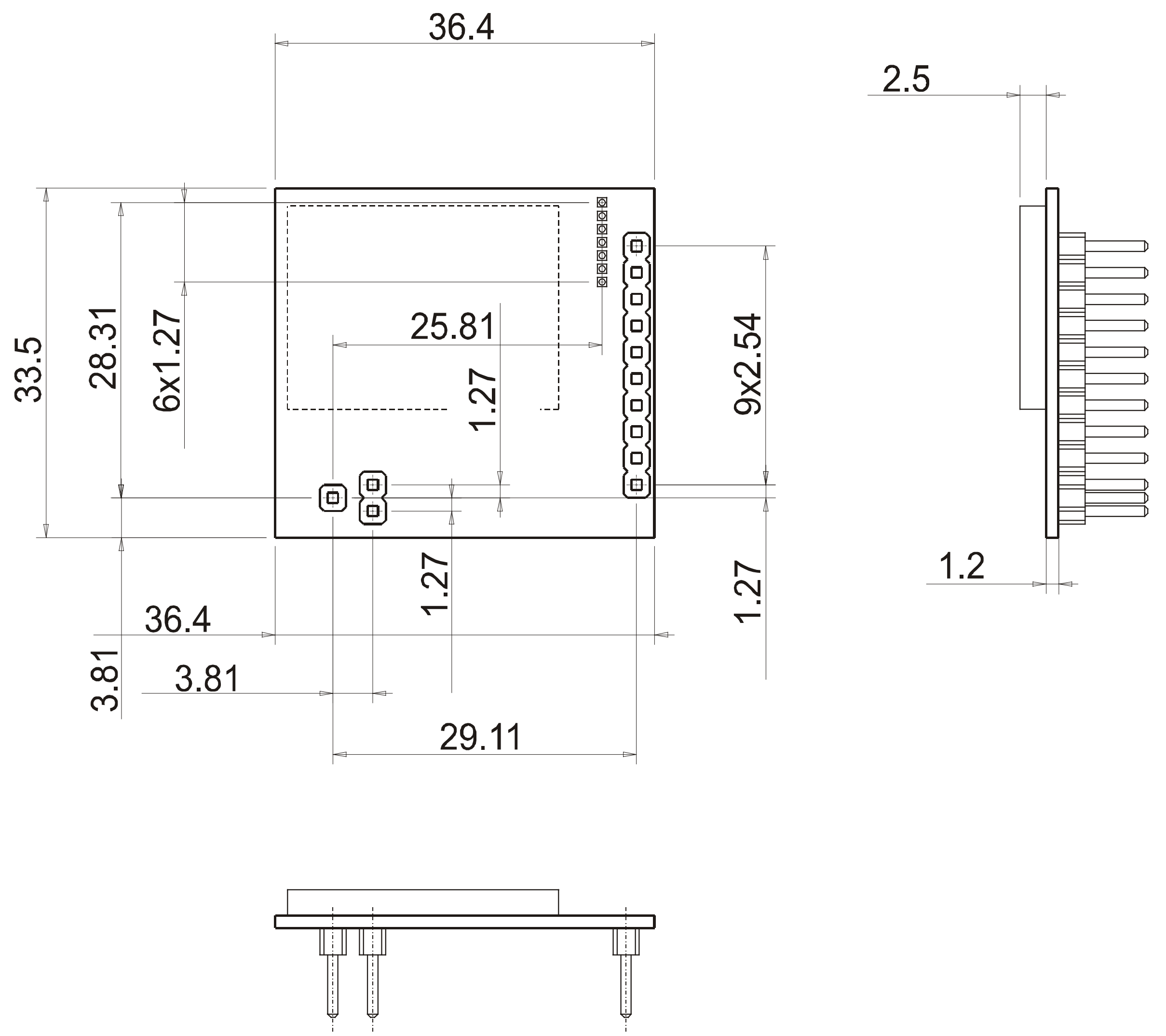
PHYSICAL DIMENSIONS

Dimensions:	*mm*
Tolerance:	*0.2mm unless otherwise specified*
Recommended hole diameters for the mother board:	*1.0 mm*
Pin centres:	*2.54 mm*



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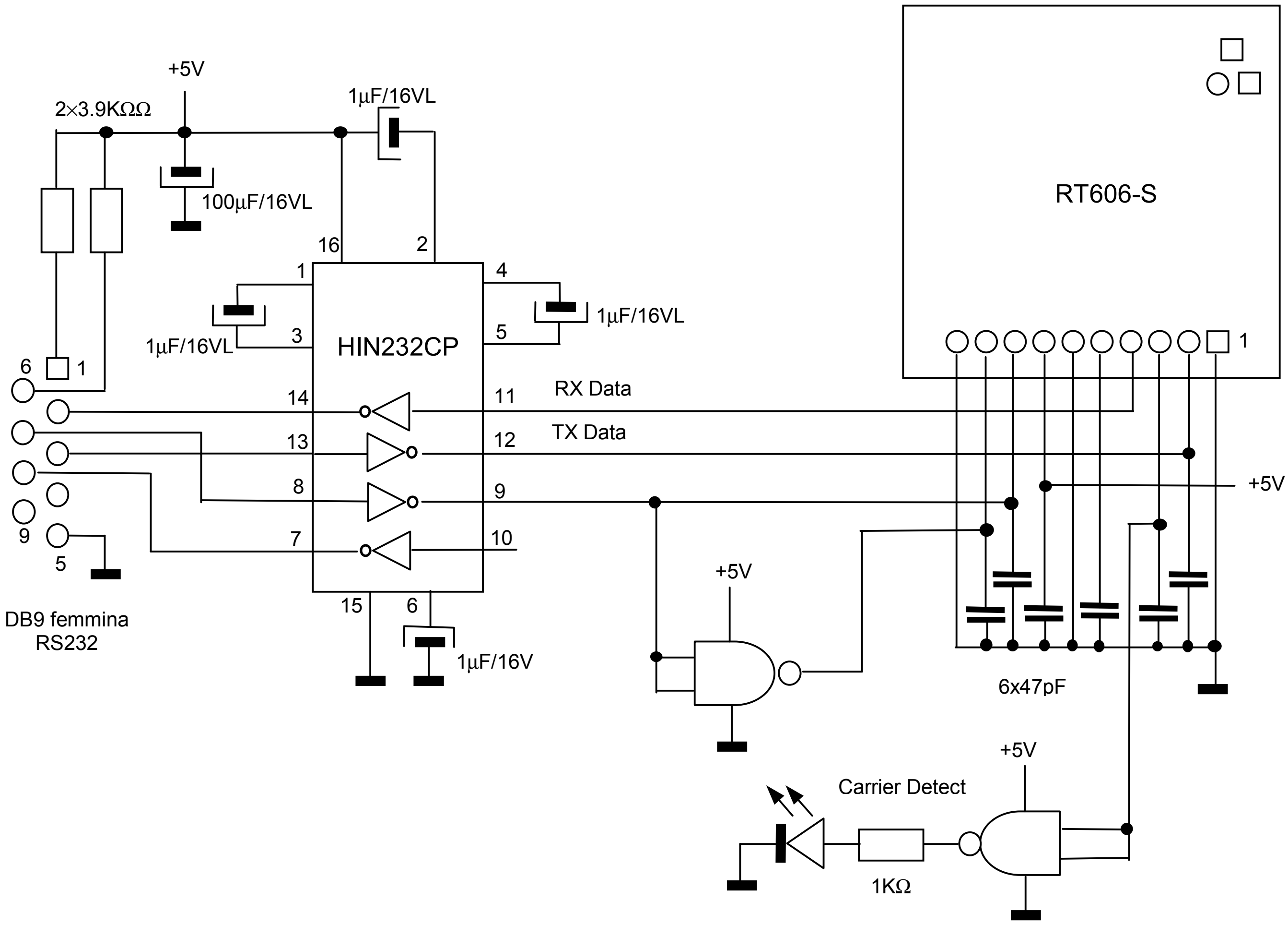
RT606-S/PC INTERFACE DIAGRAM



DEMO KIT

WP040069AQ Software for remote control of the module using a PC (DOS operating system).
AF050066AQ TJ56 jig: demo for RT606-S module.

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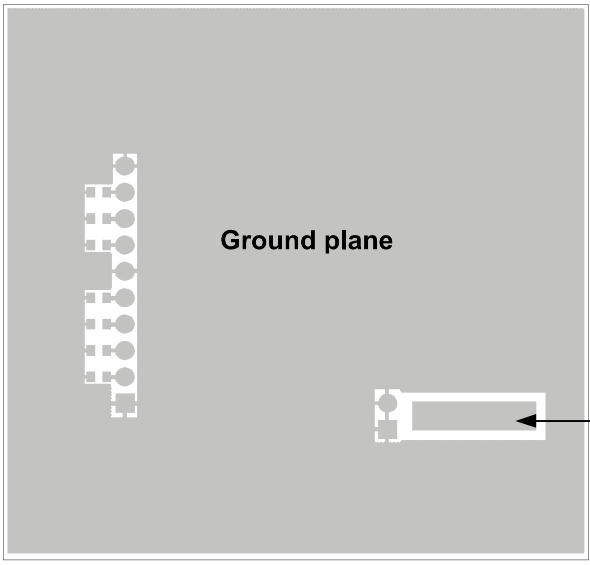
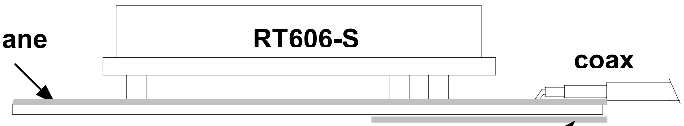
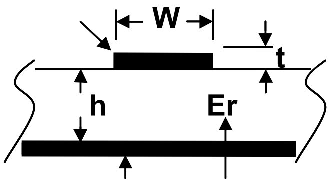
RECOMMENDED LAYOUT





Strip Line calculation



$$W = \frac{7.475h}{e^{\frac{Z_0\sqrt{\varepsilon_r+1.41}}{87}}} - 1.25t$$

Z_0 = characteristic impedance (in Ω)
W = line width (in mm)
t = line thickness (in mm)
ε_r = dielectric constant of circuitboard
h = dielectric thickness (in mm)

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