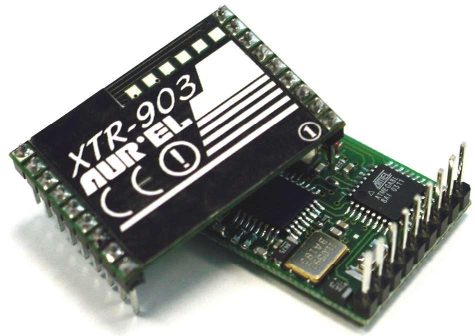


XTR-903-A4 radio transceiver represents a simple and cheap solution to the problem of wireless data transmission: the employment of an **embedded microprocessor** allows a transparent **TTL RS-232** throughput without any need of packaging and data encoding, avoiding user to write complex software routines for the transmission management.
It's possible to set up input serial speed (9600-19200-38400 bps) by means of two input lines (SP1 e SP2) and it is automatically assigned a different degree of redundancy and protection on the forwarded RF packet depending on the selected speed: Hamming+Manchester at 9600 bps, Manchester at 19200 bps and Scrambling at 38400 bps.
Module is a multichannel transceiver which enables **10 channels**. Channel selecting is highly straightforward and takes place through easy AT commands, as well as emitted power selection (from –8 dBm to +10 dBm) and monitoring of channel occupation.
The device works using Gaussian frequency modulation (GFSK) that guarantees a better immunity to noise than amplitude modulation: it's possible to cover 200 m in open air with omnidirectional antennas.
Module looks very compact, keeping the same small dimensions of its predecessor XTR (33 x 23 mm).
Timing guarantees a max delay of 20 ms between data sending and its real reception: this minimum delay includes the necessary time for the device to switch from RX to TX and transmit a synchronization header.
Supply voltage is 3V stabilized and it is provided for the transceiver to switch to power down mode, reducing current consumption to less than 10 µA

Features

- **Transparent throughput of RS-232 signals**
- **No data encoding and no preamble required**
- **No data packaging**
- **Easy AT commands for channel selection, emitted power level and monitoring of channel occupation**
- **HyperTerminal* compatible**
- **Channels: 10**
- **Embedded microprocessor**
- **Small size (23x33 mm)**
- **Bit rate: 9600, 19200 o 38400 bps**
- **Emitted power: max 10 mW**
- **Supply voltage: 3V**
- **Covering range: 200 m**

Applications

- **Wireless handsfree**
- **Home automation**
- **Telemetry**
- **Access control**
- **Instruments monitoring**
- **Data acquisition**
- **POS terminals**

* Trademark registered by Hilgraeve

Absolute Ratings

Operating Temperature	-20 °C ÷ +70 °C
Storage Temperature	-40 °C ÷ +100 °C
Supply Voltage	+6V
Input Voltage	-1.0 ÷ Vcc + 0.3V
Output Voltage	-1.0 ÷ Vcc + 0.3V

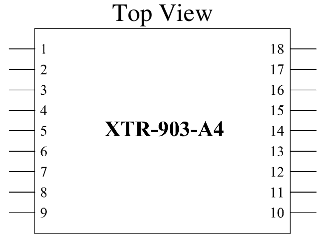
Technical Features

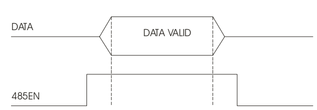
	Min.	Typ.	Max.	Unit
DC Levels				
Supply voltage	2.7	3	3.3	V
Supply current (rx mode)		30		mA
Supply current (tx mode @ -8 dBm)		25		mA
Supply current (tx mode @ 10 dBm)		40		mA
Supply current (power down mode)		8	10	µA
Input/output logic level “1”	0.7xVcc		Vcc	V
Input/output logic level “0”	0		0.3xVcc	V
RF				
Frequency band	433.05÷434.87			MHz
Modulation type		GFSK		
Receiver sensitivity		-104		dBm
RF output power (tx)	-8		10	dBm
Performance				
Input Bit Rate[1]	9600, 19200 e 38400			bps
Outdoor range		200		m
Number of channels			10	
Channel spacing		153.6		kHz
Switching times				
PWRDN → RX	20			ms
TX → RX			20	ms
RX → TX			20	ms
Default values				
Channel		0		
RF output power (tx)		10		dBm

[1]Input signal has to be made up of 1 start bit, 8 data bit and 1 stop bit, no parity.

Pin Description

Top View



<table>
<tr><th>Pin Name</th><th>Pin Num.</th><th>Description</th></tr>
<tr><td>RF GND</td><td>1,3</td><td>Connection for the ground plane of the RF part</td></tr>
<tr><td>ANT</td><td>2</td><td>Connection for the antenna, 50 ohm impedance</td></tr>
<tr><td>N.U.</td><td>4, 5, 6, 7, 8</td><td>Unused. For compatibility with the XTR-434 previous model, these pins can be cut. Future developments are foreseen for their use.</td></tr>
<tr><td>GND</td><td>9,10,18</td><td>Ground connection (0V)</td></tr>
<tr><td>SP1, SP2</td><td>11,15</td><td>Selection pins of the input and output serial speed from the device. It is possible to select a speed according to the disposal of these pins; the selection must be done before switching on the device.
The table shows the connections which must be realized in order to set up the selected speed
<table>
<tr><th>SP1</th><th>SP2</th><th>Speed</th></tr>
<tr><td>Vcc</td><td>Vcc</td><td>9600</td></tr>
<tr><td>GND</td><td>Vcc</td><td>19200</td></tr>
<tr><td>Vcc</td><td>GND</td><td>38400</td></tr>
<tr><td>GND</td><td>GND</td><td>Test Mode</td></tr>
</table>
It is assigned to each speed a different degree of redundancy and protection on the forwarded RF packet: that means that choosing more reduced speeds, it is possible to obtain a higher level of reliability and/or larger distances</td></tr>
<tr><td>RSRX</td><td>12</td><td>Data output from receiver in TTL RS-232 logic with 1 start bit (0V), 8 data bits and 1 stop bit (3V). The line must be kept at a high logic level (3V).</td></tr>
<tr><td>485EN</td><td>13</td><td>This signal is put at a low logic level. 485EN assumes a high logic level, returning immediately at a low one, only in correspondence of transmitted data on RSTX line. That allows to pilot a probable external transceiver which manages the interface between serial communications RS-232 and RS-485.

</td></tr>
<tr><td>RSTX</td><td>14</td><td>Data input to receiver, in TTL RS-232 logic, with 1 start bit (0V), 8 data bits and 1 stop bit (3V). The line must be kept at a high logic level.</td></tr>
<tr><td>PWRDN</td><td>16</td><td>If PWRDN is piloted at a high logic level, the module goes into Power Down Mode cutting down consumption to less than 10 µA. With the signal kept at a low logic level, XTR-903-A4 appears on and in a normal way of working.
<table>
<tr><th>PWRDN</th><th>STATE</th></tr>
<tr><td>0</td><td>ON</td></tr>
<tr><td>1</td><td>OFF</td></tr>
</table></td></tr>
<tr><td>Vcc</td><td>17</td><td>Connection at the positive value of the voltage (3V), properly filtrate and regulated</td></tr>
</table>

Tab. 1: pin out of the device

Use Conditions

The use of an embedded microcontroller avoids the user worries about implementation of a protocol of synchronization between the transmitting unit and the receiving one, cutting down considerably the development times of a project which takes into consideration a wireless data transfer. The transceiver actually allows the transfer of signals, in RS232-TTL logic, coming from a microprocessor or from the serial port of a PC (after the translation of electric levels), without codifying them. In fact the transmission and reception become so transparent, allowing the transfer of data packets without limits about length* and with a delay which is not exceeding 20 ms between data sending and its real reception: the communication, therefore, takes place at an actual serial speed of 9600, 19200 or 38400 bps.

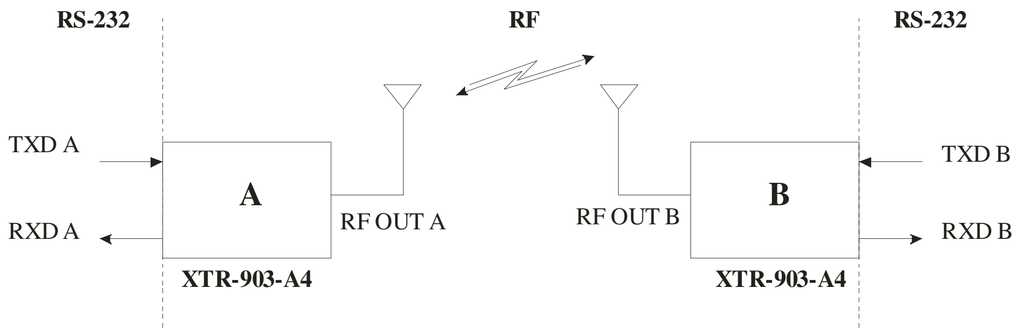


Fig.1: Dialogue between two XTR-903-A4 transceivers.

The operating modes of the device can be summarized into 6 states (Fig. 2):

- **Test Mode**
- **Idle Mode**
- **RF Transmit Mode**
- **RF Receive Mode**
- **Power Down Mode**
- **Command Mode**

*The maximum length of the in input data packet results from the precision of the bit rate of the signal. Anyway, it results superior than 4k Byte on average.

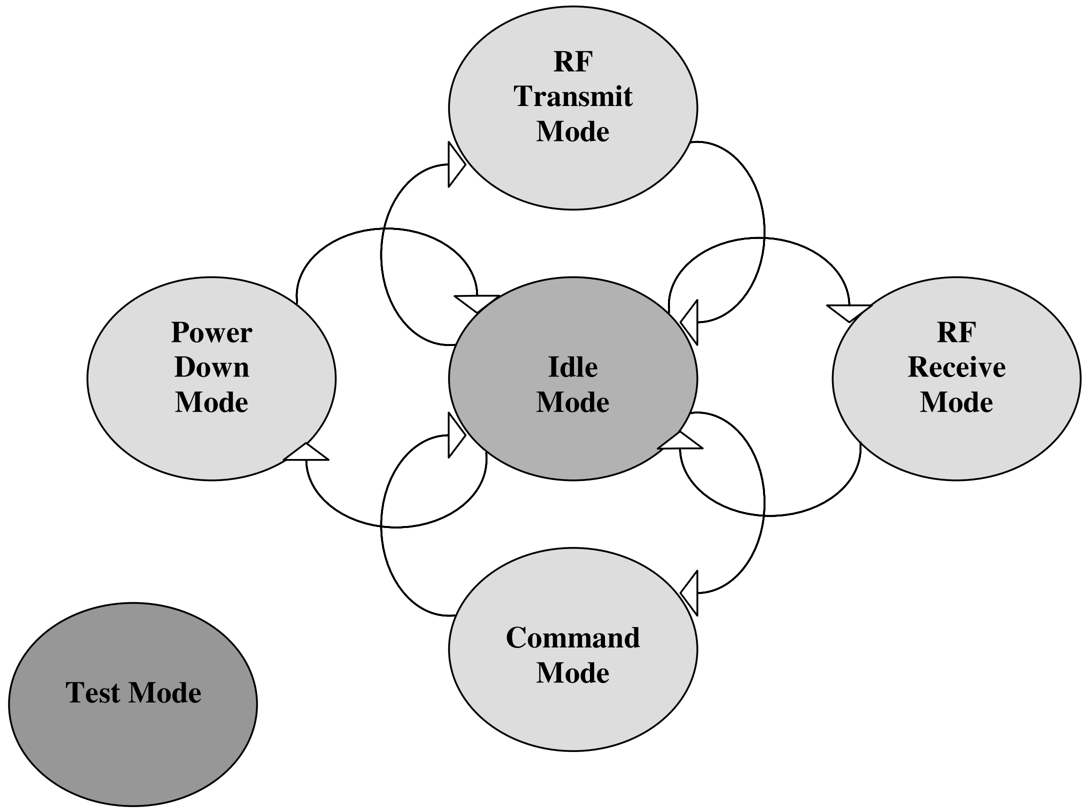


Fig. 2: Operating Modes

Test Mode

It is possible to enter Test Mode short-circuiting the SP1 and SP2 pins towards ground, before switching on the device. In this mode, it takes place the continuous transmission towards RF of a carrier modulated by a 20 kHz signal, which is constituted by a data pseudorandom sequence. In order to go out from this state, it is necessary to cut off the power supply and choose a new SP1 and SP2 configuration.

Idle Mode

Starting rest state where it is situated the switching on device (if SP1 and SP2 do not force the device in Test Mode): in this operating mode the transceiver is waiting for receiving data from the radio frequency or from the RSTX serial line.

RF Transmit Mode

From the condition of inactivity (Idle Mode), the module passes to a transmission state at radio frequency when on the line of RSTX input (pin 14) there is a start bit (low logic level, 0V).
The modality of transfer through RF of the serial input data is transparent and it does not add any checksum or CRC: the discrimination, between valid packets and packets which might be polluted, is made by the user.

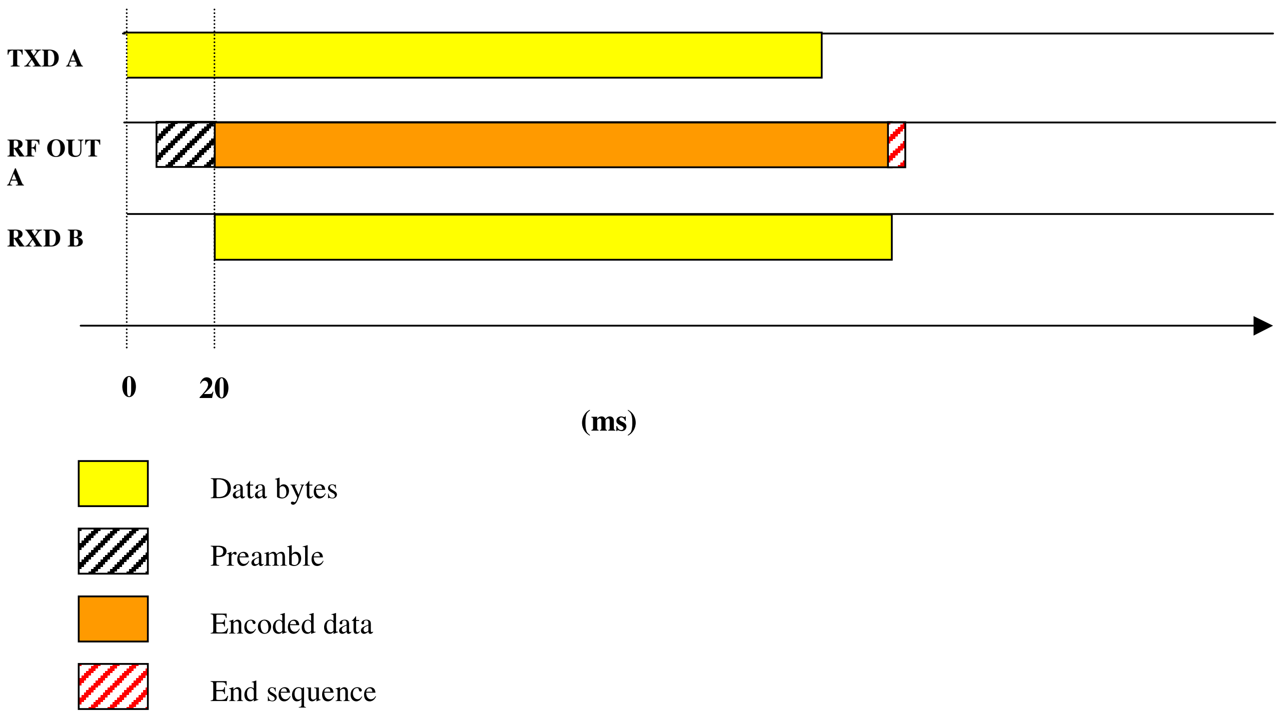


Fig. 3: Temporal chart of transmission of a data packet

As you can see from the temporal chart (Fig. 3), it spends 20 ms at most from the starting moment (instant 0) which the data is going to go into the module in, until the moment which it is received on the remote module in. This delay is due to the preamble that the transceiver automatically places before the packet to send to RF in order to synchronize with the receiving. At the end of the packet, it is automatically added a bytes sequence of end of the communication.
The input data speed towards the input of the RSTX receiver (pin 14), from 9600 bps to 38400 bps, is selected through the two pins SP1 (pin 11) and SP2 (pin 15), you can see "description of the pins". A different redundancy degree of the RF packet corresponds to the different serial speeds (Tab. 2).

Speed	Encoding
38400	**Scrambling:** it is carried out a pseudo-random balancing of the bits which constituting the single bytes of the data packet. In this case the data, which are received by the remote module, do not have recovery systems of possible errors
19200	**Manchester:** the passed on RF byte is balanced with equal number of "0" and "1". The system recognizes a single error per data bit and, in that case, it interrupts the serial transmission of the received through RF data
9600	**Manchester + Hamming:** Hamming encoding allows the correction of a single error every data nibble (4 bit). This speed guarantees data input even more, since the system corrects possible errors at single bit level

Tab. 2: Redundancy degrees assigned to the serial chosen speed

RF Receive mode

The commutation from Idle to RF Receive Mode occurs as soon as the module recognizes the preamble of synchronism on the RF. From this point on the transceiver remains linked into reception until the sequence of the packet closing is not received. The received by RF data are made available on the RSRX line (pin 12).
Every input data on the RSTX line (pin 14), while the module is in RF Receive Mode, is not considered.

Power Down mode

Putting the pin 16 (PWRDN) to a high level (+3V), the device goes into a state of energy conservation, cutting down consumption to less than 10 µA: in this modality the transceiver is not able neither to receive nor to transmit and it is necessary to bring the pin 16 to a low level (0V) to bring again to a normal operative state (Idle mode).
In this state the RSTX line must be kept at a high logic level (+3V) in order to avoid a wrong data sending to the switching on again of the module.

Command mode (XTR-903-A4 MODULE PROGRAMMING)

The Command Mode state allows user to configure the principal working parameters of the device. The programming occurs through "AT" commands which are sent on the RSTX line (pin 14) to a speed planned through SP1 and SP2 (pin 11 and 15).
The answers to the module will be given on the RSRX line (pin 12)

In order to go into Command Mode from the Idle state, it is necessary to send on the RSTX line (pin 14) a sequence of 3 characters ASCII plus (+++) consecutive, without waiting times among them. The module will confirm the entry in programming mode after about 35 ms from the entry of the last character "+".

REGISTERS AND AVAILABLE COMMANDS

The commands which can be given to the XTR-903-A4 module concern the reading and the writing of registers containing settings up about the device working.
The reading and writing of the registers of configuration and the sending of commands to the module occur making precede the "AT" sequence at command name.
The programmable registers are 16 (from S1 to S16); some of them can be only read while some others can be both written and read.

Register	Name	Function	Value	R/W
S1	**BAND**	Band which works the transceiver on.	**0 = 433-434 MHz ***	**R**
S2	**CHANNEL**	Working channel	**0 = 433,19 MHz * 1 = 433,34 MHz 2 = 433,50 MHz 3 = 433,65 MHz 4 = 433,80 MHz 5 = 433,96 MHz 6 = 434,11 MHz 7 = 434,27 MHz 8 = 434,42 MHz 9 = 434,57 MHz**	**R/W**
S3	**POWER**	Power level outgoing from the device	**0 = - 8 dBm 1 = - 2 dBm 2 = + 4 dBm 3 = + 10 dBm ***	**R/W**
S4	**RFON**	It switches on or off the power of transmission	**0 = RF Power ON * 1 = RF Power OFF**	**R/W**
S16 (#)	**RSSI**	It provides a digital indication about the level of received power, with gradual scale from 0 to 9.	**0 = Min received power 9 = Max received power**	**R**

* = default value

Command	Name	Function
WR	**WRITE**	Writing of registers values into EEPROM
CC	**COMMAND CLOSE**	Exit from Command Mode

Tab. 3: Registers and available commands

(#) Note about the use of S16 register
The S16 register reading entails the starting up of a procedure of analysis of the RF channel which the module has been programmed on. This routine has got a fixed duration of about 200 ms. The analysis result is given at the end of the operation. During this interval it must not be managed any other operation.
The channel analysis can be employed both to verify if it is already occupied by an interfering source, and to verify the reception quality if you want to test the quality of a connection which it is
being planned. On this point it is advised to start a XTR-903-A4 module in Test Mode, to move it to the different points where you want to analyse the covering then monitor the radio signal quality received by reading repeatedly the S16 register of another XTR-903-A4, which is programmed on the same channel.

Answers to the commands and to the operations on the registers

Positive answer:	**OK<*CR*><*LF*>**	<CR> Carriage Return, character ASCII 13; <LF> Line Feed, character ASCII 10
Negative answer:	**ERROR<*CR*><*LF*>**	
Forbidden operation:	**NO ACCESS<*CR*><*LF*>**	

Reading of a register

Syntax: **ATSx<*CR*><*LF*>** (x = 1, ..., 16 register to be read)
Answer: the value included in the register when the command has been given correctly

The registers value is given back numeral per numeral in ASCII value

Example: "16" is the succession of the ASCII 0X31,0X36 codes, corresponding to the "1" and "6" numerals. It is necessary to follow this procedure of interpretation also in the case of the value writing of a register.

Writing of a register

Syntax: **ATSx=Y<*CR*><*LF*>** (x = 1, ..., 16 register to be written, Y= value to be inserted)
Answer: See "Answers to the commands"

Every value inserted into the registers has a temporary validity and it is lost at the moment of the switching off of the device, unless it is saved in the EEPROM of the microcontroller with the specially provided command: in that case the changed values will be active during the next switching on.

Saving command of the register value in EEPROM

Syntax: **ATWR<*CR*><*LF*>**

Answer: See "Answers to the commands"

Exit command from Command Mode

Syntax: **ATCC<*CR*><*LF*>**

Answer: See "Answers to the commands"

The exit from Command Mode, without the command ATCC, takes place anyway automatically after 5 seconds of inactivity.

Concatenation of operations

It is possible to link more operations together mixing actions on the registers and commands using one command line through the comma (,) operator.
In the following example, it is put at 2 the value of the S3 register, it saves the modification and it goes out from the programming:

Example #1: **ATS3=2,WR,CC<*CR*><*LF*>**
OK<*CR*><*LF*>

As you see from the example, the AT prefix is only used for the first line command, while it must be omitted for the next ones. The concatenation of the commands is only possible for writing operations, while if it is carried out with a reading command, it gives an answer of error.
.

Example #2: **ATS1,CC<*CR*><*LF*>**
ERROR<*CR*><*LF*>

The commands are not case sensitive, so it does not matter if they are dialled in capitol or small letters.

See Appendix A for other examples

Application Example

In Fig. 4 it is shown a typical application of the XTR-903-A4 linked to a microcontroller which, besides receiving and transmitting data on the two input and output lines (TXD and RXD), pilots also the two lines for the selection of the serial speed (SP1 and SP2) and the PWRDN.

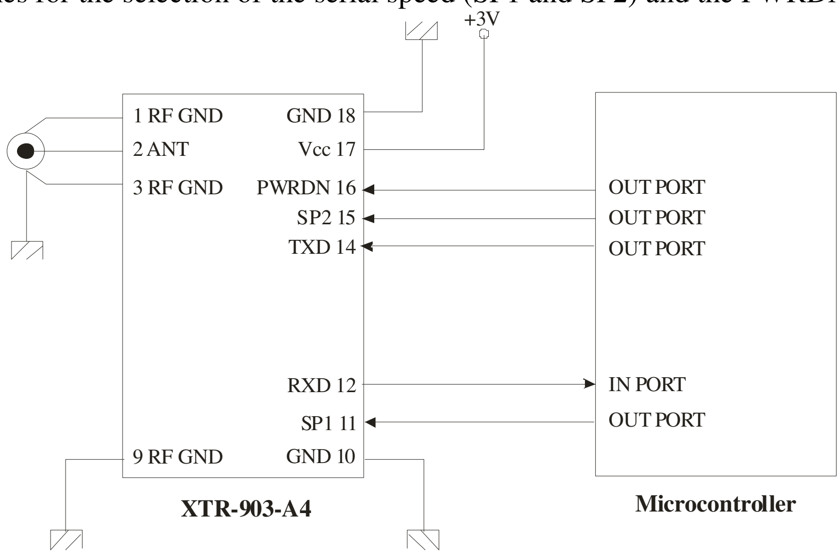


Fig. 4: Example of link between XTR-903-A4 and a microcontroller

In Fig. 5 it is shown an example of link between the module XTR-903-A4 and the serial port of a PC: the IC, interposed between the transceiver and the port, has got only the function to conversion among the electric levels of the RS-232 and the TTL logic.
Through the RTS signal (pin 7 of the DB9 port) it is possible to pilot the PWRDN line, while the selection of the serial speed is fixed at 9600 bps.

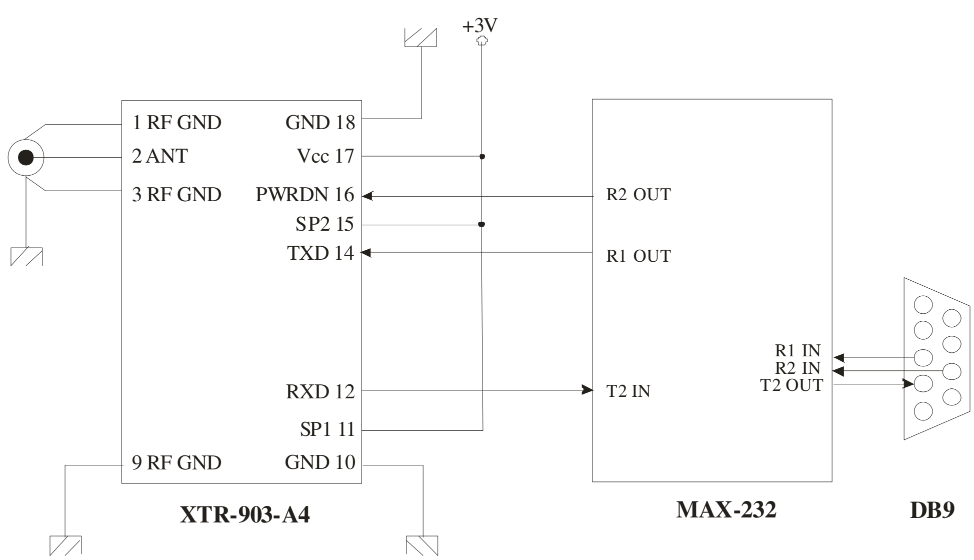


Fig. 5: Example of link between XTR-903-A4 and serial port RS-232 at 9600 bps.

Use guidelines

PCB

The printed circuit, which XTR-903-A4 will be installed on, must be realized in double face and the substrate thickness can be adapted according to need, but considering that the connection track between the pin 2 of the module and the antenna must have a controlled impedance equal to 50 Ohm and therefore its width will change according to the substrate thickness. For instance, a FR4 substrate of 1 mm thickness and dielectric constant of 4.8 requires a track width equal to 1.8 mm (see Fig. 6), while a thickness of 1.56 mm requires a width of 2.8 mm.

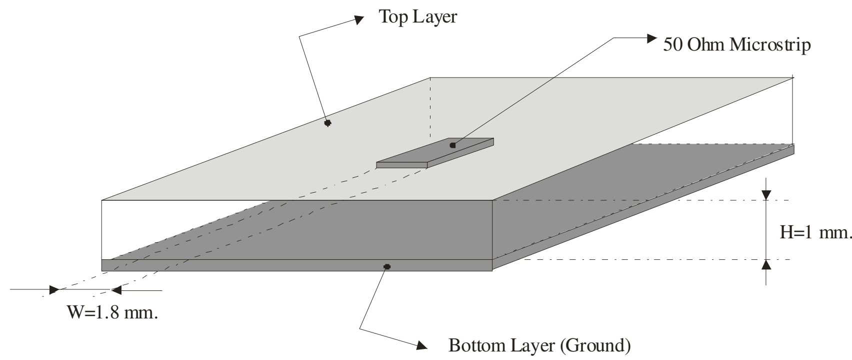


Fig. 6

Layer definition of PCB

1- The inferior layer (bottom side) must be put at ground plane. If it were necessary to interrupt this plane with signal tracks at low frequency or supply voltages tracks, it must be paid attention not to create isolated ground areas unlinked with the principal area (see Fig. 7). Besides, a ground big enough plane must be situated in correspondence of the connection track of antenna, where it is necessary guarantee an impedance value of the same track of 50 Ohm (see Fig. 8).

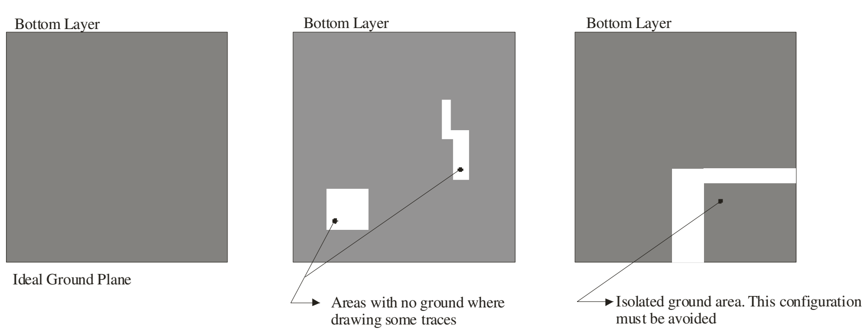


Fig. 7

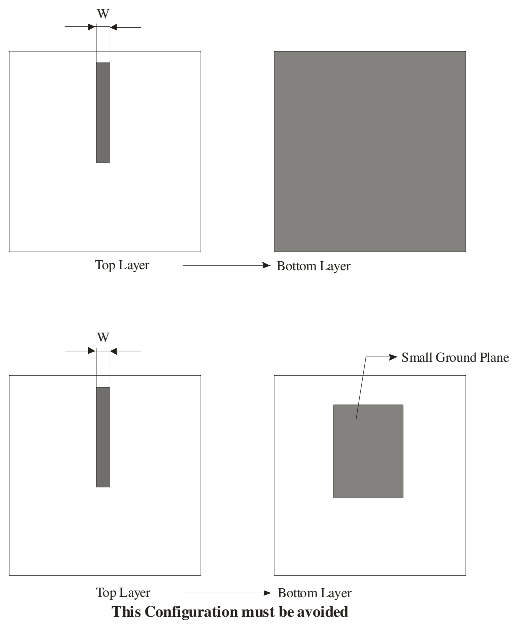


Fig. 8

2- Module must be mounted on the top layer as well as the connections to data and supply lines. For example fig. 9 shows the top and bottom layer of Aurel's WIZ-903-A4:

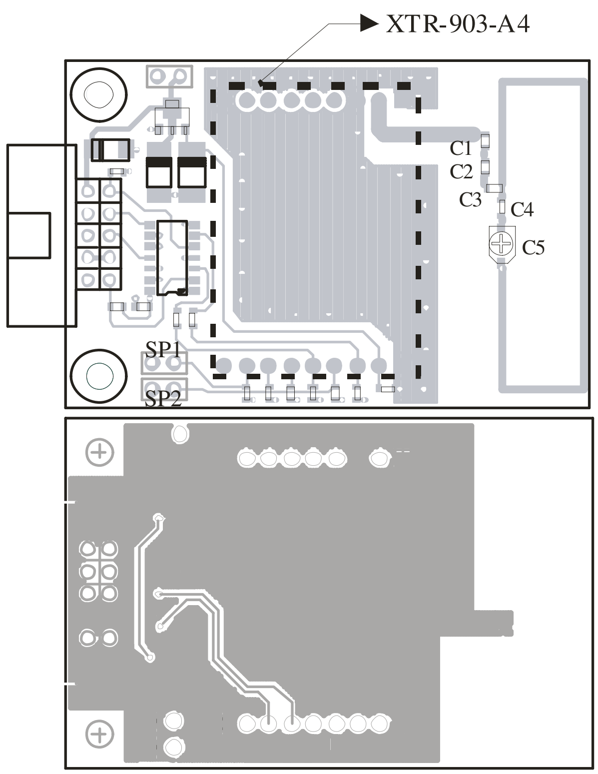


Fig. 9

Mounting of the module

Module must be mounted keeping in mind that connection pins have to be shortest as possible. It is absolutely discouraged the use of sockets to mount the component on PCB. Best solution is illustrated in fig. 10

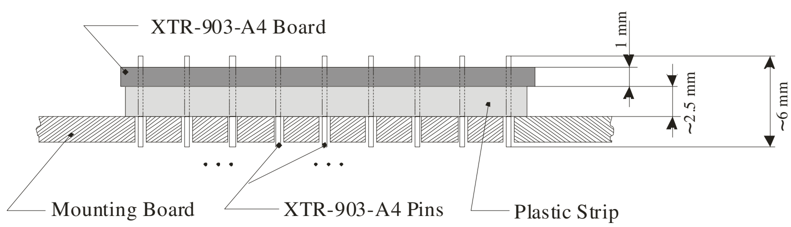


Fig. 10

Placement of components and connections

1- The region under the module must be surrounded by ground plane areas as large as possible. A large number of via holes (diameter 0.3-0.5 mm and distance of 15 mm between them) connect the top layer ground areas to the bottom layer ground plane. These ground planes must be kept 3 mm distant from any other RF line.

2- Connection lines with pins 11, 12, 13, 14, 15, 16 and 17 have to be shortest as possible. It is preferable to mount a capacitor (470 pF) between pin and ground.

3- Further attention has to be paid to supply lines: it is absolutely advised to avoid twisted or ring tracks and it is better to mount large decoupling capacitors to filter noise on pin 17. In case of digital components mounted on PCB (microprocessor and clock circuits) their supply lines must be decoupled from those of the module and connected each other only in one point properly dimensioned and filtered by decoupling capacitors (see fig.11).

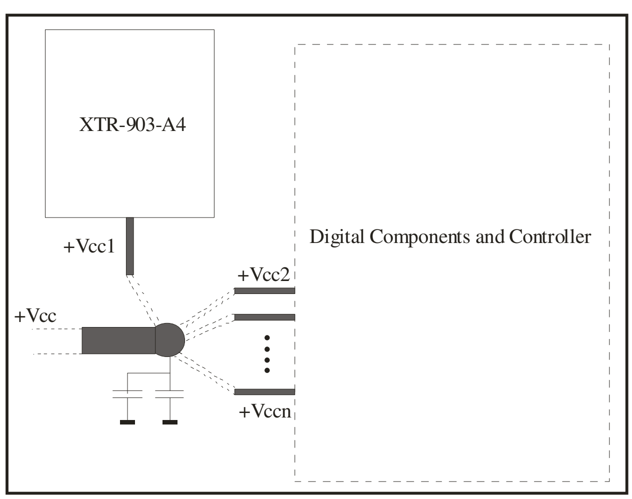


Fig. 11

4- Keep separate the module from all other components of the circuit (more than 5 mm). Don't fit components around 50 Ohm antenna line. At least keep them at 5 mm distance.

5- If the antenna connection is directly used for a radiating stylus keep at least a 5 cm radius free area. In case of coaxial cable connection 5 mm radius will suffice.

Antenna and antenna connection

RF output is available on pin 2 of the XTR-903-A4. Antenna connection usually is made of 50 Ohm impedance line whose track has to be shortest and straight as possible. Termination depends highly on the type of antenna to be used:

1- **Stylus antenna:** a whip antenna, 17.3 cm long and approximately 1 mm diameter, brass or copper wire made, must be connected to the RF input of the transceiver. 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). 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. In fact to achieve a good efficiency with this kind of antenna it is necessary to have a ground plane properly dimensioned.

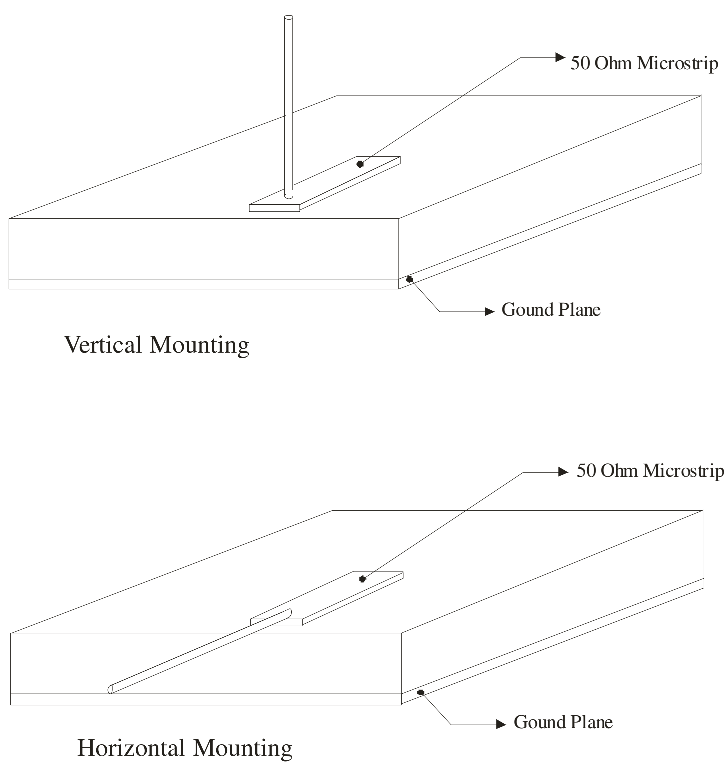


Fig. 12

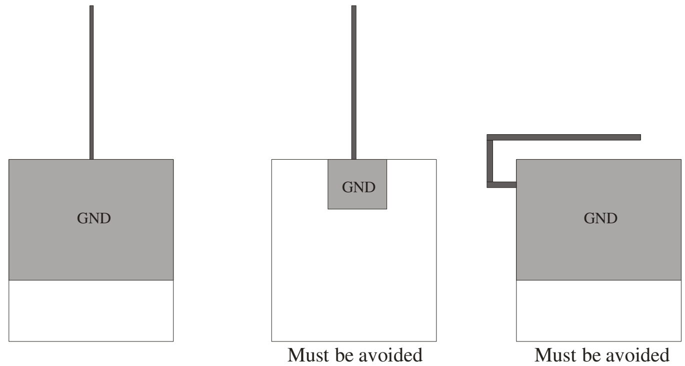


Fig. 13

By fitting whips too different from the described ones the CE certification is not assured.

2- **Loop Antenna (adjustable):** in this case antenna is made directly on PCB considering the proper project methodologies. This kind of antenna is less sensitive to the presence of a good ground plane than the stylus one, however you have to avoid to overlap directly loop antenna and ground plane on the two opposite layers. This means that the area under the loop has to be free of digital lines and ground areas.

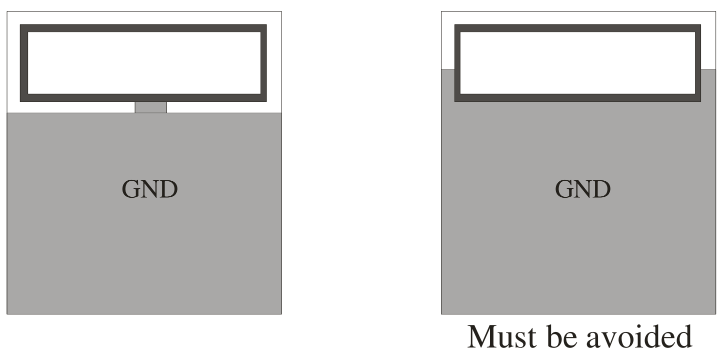


Fig. 14

A capacitive trimmer in the loop circuit makes possible to adjust antenna, changing the resonance frequency of antenna. Goal of the adjusting operation is to set the trimmer to a correct value of capacitance to make the loop resonate on the 434 MHz band. As application example, fig.15 shows the details of WIZ-903-A4 (figure is not in scale) and fig.16 and 17 (not in scale) show the details of the loop antenna and of adjusting circuit:

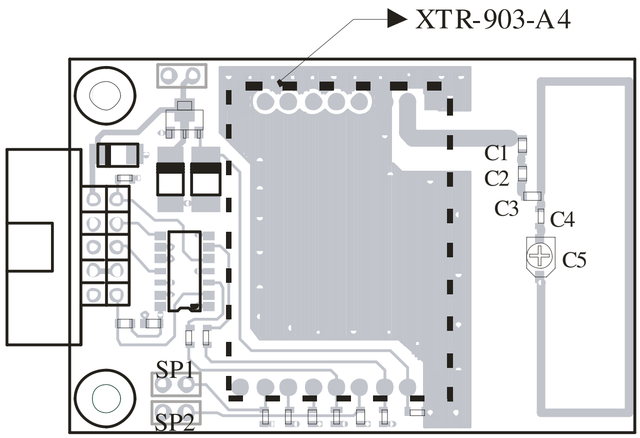


Fig. 15

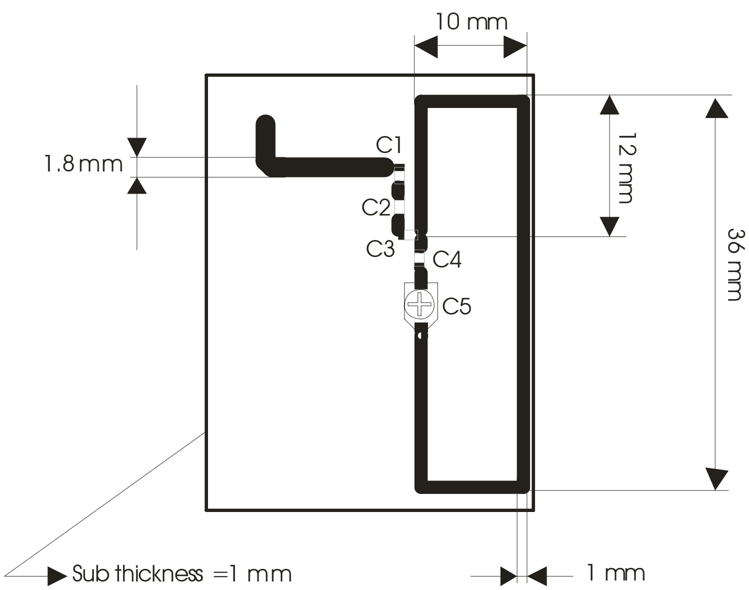


Fig. 16

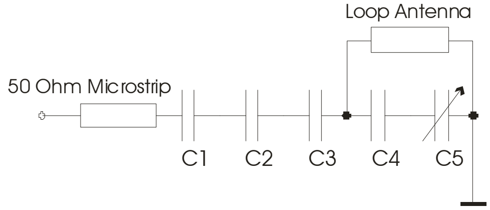


Fig. 17

where:

C1 = 1 pF
C2 = 1 pF
C3 = 1 pF
C4 = 2.2 pF
C5 = (2÷5) pF (trimmer)

Operatively, the testing system to adjust antenna is the following:

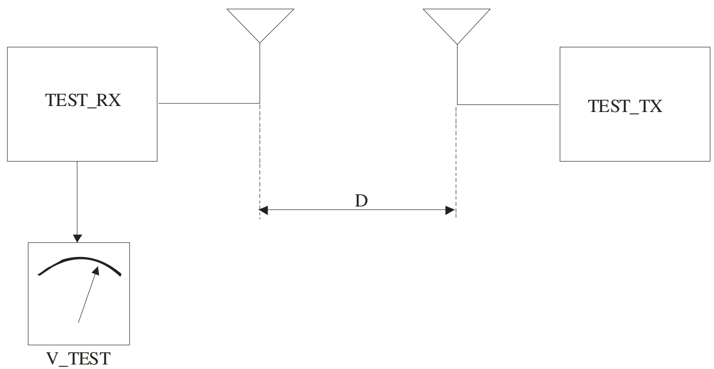


Fig. 18

Referring to fig.18, the measurement configuration includes:

- **TEST_RX** = Test receiver which provides a DC voltage as output proportional to the strength of the received field (RSSI). In this case it is possible to use the Super-het RSSI Receiver **RX-AM4SF** by Aurel, as illustrated in fig.19:

Pin-out

1 = + Vcc Preamp.
2 = GND
3 = Antenna
7 = GND
11 = Gain
13 = RSSI output
14 = Data output
15 = + Vcc

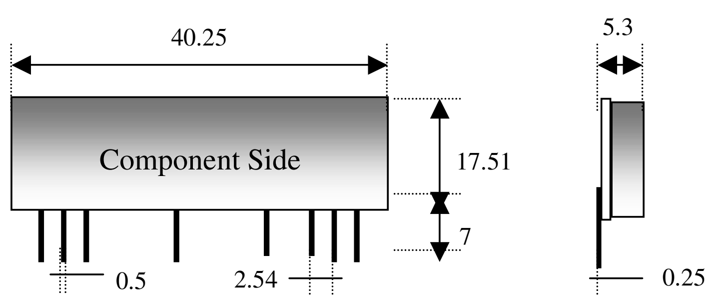


Fig. 19

- **V_TEST** = Voltmeter to measure RSSI voltage level.
- **WIZ-903-A4** = Board configurated as PSRND (continuous forwarding of pseudo-random code).

Therefore the schematic is illustrated in fig.20, where TEST_RX and WIZ-903-A4 have to be placed distant (D) as much as the deviation of RSSI output is linear. To achieve this goal is preferable to avoid mounting antenna on the receiver. It is better to turn on the receiver and measure the value of voltage keeping turned off the Board (by using RX-AM4SF this value is within 1 and 1.2V). Then you can turn on the Board and check that the voltage shifting is not so big to saturate the voltmeter scale (less than 2.4V for RX-AM4SF). If this measure is too high you need to move away the two devices.

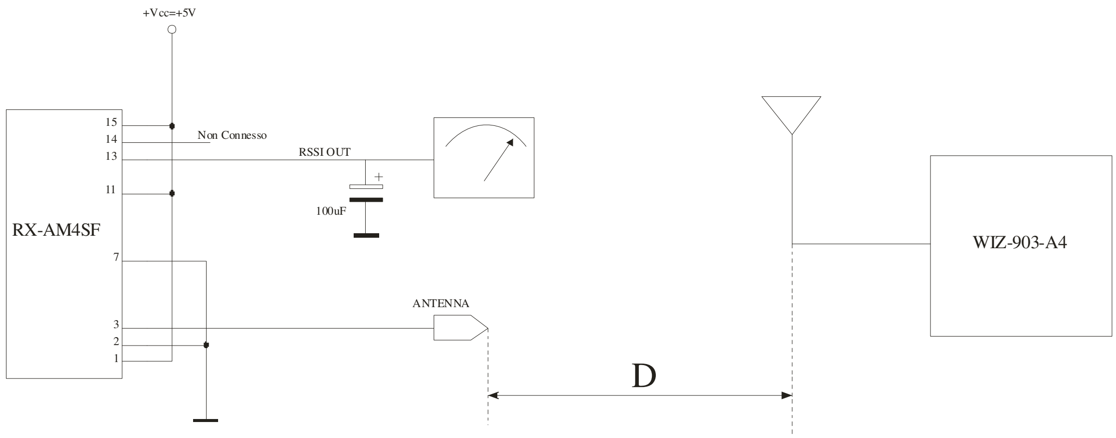


Fig. 20

After doing these set up operations you can begin the adjusting operation. You begin to rotate the capacitor trimmer on the loop antenna and check if the RSSI voltage goes up or down. This operation has to be repeated until you find the trimmer position where RSSI voltage is maximum. Now the loop antenna is rightly adjusted to resonate.
Pay attention that this procedure can be replaced by other methodologies. For example, if a spectrum analyzer is available it is sufficient to view the modulated RF carrier emitted by WIZ-903-A4 and rotate the trimmer to make maximum the power level read by the analyzer itself.

By fitting antenna too different from the described ones the CE certification is not assured.

3- **Remote antenna via cable:** It is possible to weld a coaxial cable directly on the PCB to connect a remote antenna. The hot wire has to be welded on RF output line while the braid has to be welded to the ground in a close point. Pay attention that the use of particular antennas (highly directive or high gain) or connection cables too long don't assure the CE certification.

General considerations: in spite of a lower efficiency in terms of radiation resistance compared to whip antenna, the loop antenna represents a good compromise among gain, bandwidth (so selectivity) and space. For all these reasons it has been used in WIZ-903-A4 radiomodem by Aurel.

Reference Rules

The **XTR-903-A4** transceiver is CE certified and in particular it complies with the European set of Rules **EN 300 220,** and **EN 301 489**. Tests have been carried on by using Pseudo Random Code (CEPT 70-03). Spectrum occupancy has been tested by using Pseudo Random Code at 38400 bps.
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 transceiver must be supplied by a very low voltage safety source protected against short circuits.
The use of the transceiver 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 bear directly the electrostatic charges foreseen by the a.m. provision**.**

CEPT 70-03 Recommendation

In order to comply with such rule, the maximum hourly duty cycle of the device must be the 10% [i.e.: 6 min. per hour].
The utilization of such device inside any national territory is subject to the Postal Code and Telecommunications rules in force. In Italy is art. 334 and subsequents.

Mechanical Characteristics

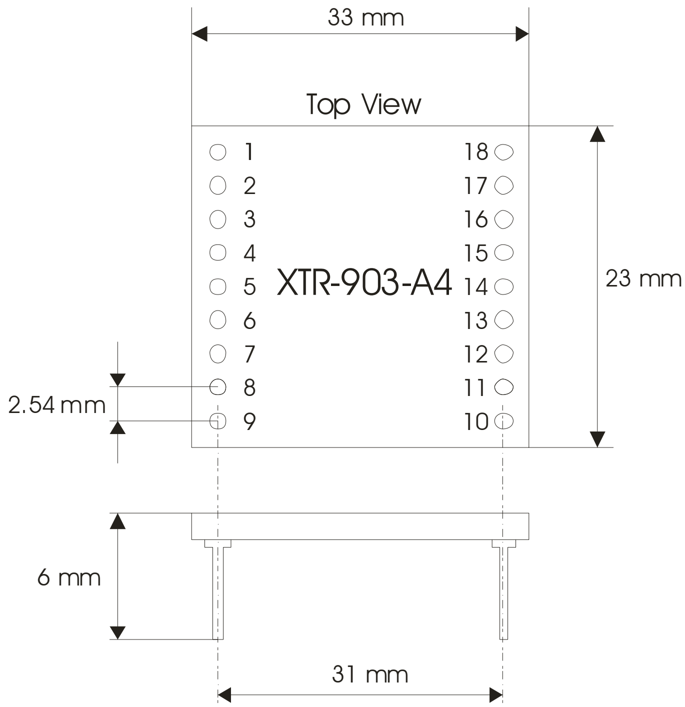


Fig. 21: Micro Embedded Transceiver.

Appendix A – More examples of register operations

Example #3: Reading of operational band of the module

+++OK<CR><LF>
ATS1<CR><LF>
0<CR><LF> [0= 433-434 MHz band]

Example #4: Changing the operational band of the module

+++OK<CR><LF>
ATS1=2<CR><LF>
NO ACCESS<CR><LF>

Syntax error: S1 is a read only register!

Example #5: Reading the channel

+++OK<CR><LF>
ATS2<CR><LF>
2<CR><LF> [2= 433.5 MHz channel]

Example #6: Channel selection

+++OK<CR><LF>
ATS2=8<CR><LF> [8= 434.42 MHz channel]
OK<CR><LF>

Example #7: Reading of emitted power

+++OK<CR><LF>
ATS3<CR><LF>
1<CR><LF> [1= -2dBm power]

Example #8: Selection of emitted power

+++OK<CR><LF>
ATS2=3<CR><LF> [3= +10 dBm power]
OK<CR><LF>

Example #9: Reading of received signal strength

+++OK<CR><LF>
ATS16<CR><LF>
9<CR><LF> [9= channel is occupied, max received power]

Example #10: Reading of received signal strength

+++OK<CR><LF>
ATS16<CR><LF>
0<CR><LF> [0= free channel, min received power]