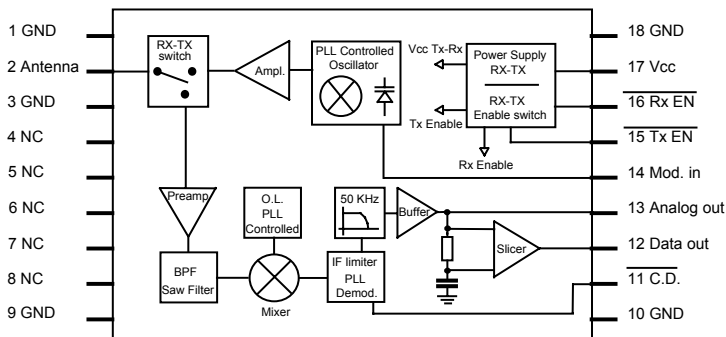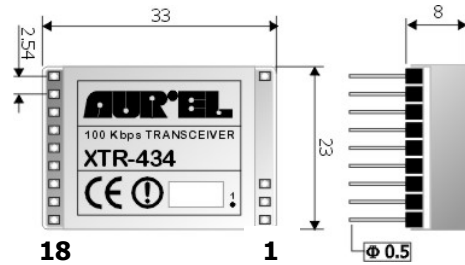# Transceiver mod. XTR-434

Miniaturized data transceiver modules, **100 Kbps [XTR-434]**, or **50 Kbps [XTR-434L]** maximum speed, 433.92 MHz operating frequency.

Pin-Out and Block diagram

Dimensions

Connections

Pin 1-3	RF GND	RF circuit GND.
Pin 2	Antenna	50Ω impedence antenna connection
Pin 9-10-18	GND	Connections to GND. Internally connected also to the module's shield.
Pin 11	CD	Carrier Detect. With enabled receiver, a low signal [voltage level 0V], indicates that the receiver detects an RF carrier. The line activates with an RF signal of about −96 dBm applied to pin 2 [antenna]. High impedance output available only for loads under CMOS logic.
Pin 12	RXD	Receiver data output. Load impedance allowed: over >100KΩ. No capacitance allowed.
Pin 13	AF	Filtered and buffered output representing the analogic output of the FM detector. Load impedance allowed: over 2KΩ and less than 100pF.
Pin 14	TXD	Input to transmitter; accepts serial data in TTL logic [0 ÷ 5V] with a 10KΩ load impedance.
Pin 15	TX ENABLE	Active when low, [voltage level 0V], enables the transmitter circuit, 1mA required current.
Pin 16	RX ENABLE	Active when low, [voltage level 0V], enables the receiver circuit, 1mA required current.
Pin 17	Vcc	Connection to the positive pole of the supply voltage [+5V ± 10%].

The technical tests and reports have been carried out and obtained by the laboratories:
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Technical features are subject to change without notice. AUR°EL S.p.A does not assume responsibilities for any damage caused by the device's misuse.

Technical features

Characteristics	Min	Typical	Max	Unity	Remarks
Voltage supply	4,5	5	5,5	Vdc	
Supply current [TX ON]	24	28	32	mA	
Supply current [RX ON]	10	11	12	mA	
Supply current [TX/RX OFF]			100	nA	
RX SECTION					
Reception frequency		433.92		MHz	
RF sensitivity [XTR-434]		-100	-102	dBm	See note 1
RF sensitivity [XTR-434L]		-103	-105	dBm	See note 1
IF passband		150		KHz	
Interferences rejection [at 5% band limits]		-80		dB	
RF spurious emissions in antenna		absent			See note 2
Output square wave [XTR-434]	10		50	KHz	
Output square wave [XTR-434L]	2.5		25	KHz	
Output low logic level		0,1		V	See note 4
Output high logic level		3.5		V	See note 4
Carrier Detect [CD] threshold	-96	-98		dBm	
TX SECTION					
Transmission frequency		433.92		MHz	
Modulation passband [XTR-434]	10		50	KHz	
Modulation passband [XTR-434L]	2.5		25	KHz	
FM deviation		±25		KHz	
TX output power			10	dBm	
Antenna impedance		50		Ω	
RX switch-on time		1		ms	
TX switch-on time		1		ms	
Working temperature	-20		+80	°C	
Working temperature [ETS 300 220]	-20		+55	°C	
Dimensions	33 x 23 x 8 mm				

Note1
[XTR-434]: test as Fig. 3 , RF IN −100 dBm, FM Deviation ± 25KHz and Modulation frequency 40 KHz.
[XTR-434L]: test as Fig. 3 , RF IN −103 dBm, FM Deviation ± 25KHz and Modulation frequency 20 KHz.
Note2: The R.F. emission measure has been obtained by direct connection of the spectrum analyser to XTR module pin 2.
Note3: Switch-on time is the time required by the device to acquire the declared characteristics, from the very moment the enable signal is applied.
Note4: Values obtained with a 10KΩ load applied.

TX/RX Enabling

Pin 15 [TX ENABLE] and 16 [RX ENABLE] can acquire the following status:

Pin 15 TX ENABLE	Pin 16 RX ENABLE	Functions
1	1	Disabled module
1	0	Enabled receiver
0	1	Enabled transmiter
0	0	Not to be used condition

Considerations over the TX/RX serial data

Pulse amplitude time: the circuit characteristics [passband in base band and AC couplings] determine the length of the time between each two consecutive level transitions on the line of the serial signal.
For the correct operation of the **XTR-434**, such time must be comprised between 10 μs and 200 μS and for **XTR-434L** between 20 μS and 1000 μS.

Settling time of the Data Slicer requires, that for 1 ms [**XTR-434**] and 2 ms [**XTR-434L**] before the data themselves, a preamble, composed by a square wave, is transmitted in order to consider reliable the data coming out from the RXD line.

Bit ON/Bit OFF relation: the Data Slicer is optimized for a 50:50 duty cycle. It will continue to operate, even with bigger distortion and less tolerance to interferences, till a 30:70 or 70:30 duty-cycle. Therefore there is no possibility to directly transmit an RS232 sequence if no action is done to balance the 1 and 0 bits ratio, as the duty-cycle could reach up to 90% preventing the proper performance of receiverIt will continue to operate, even with bigger distortion and less tolerance to interferences, till a 30:70 or 70:30 duty cycle.

XTR-434

While modulation is applied to TX, conditioning input pin [pin 14] with a logic signal, it is reccomended not to exceed 200 μs continuous time with no transition from ON to OFF or OFF to ON. This not to downgrade the RX sensitivity. It is requested that modultation is carried on with techniques that allow a low duty-cycle, such as Manchester coding, 8 to 12 bit coding or other available technique. If no bit balancing technique is used, if it is requested to work with RS232 protocol, a minimum speed of 57.600 bps is required to assure maximum performance, transmitting, for example, one byte followed by the complementary byte [byte balancing].

XTR-434L

While modulation is applied to TX, conditioning input pin [pin 14] with a logic signal, it is reccomended not to exceed 1000 μs continuous time with no transition from ON to OFF or OFF to ON. This not to downgrade the RX sensitivity. It is requested that modultation is carried on with techniques that allow a low duty-cycle, such as Manchester coding, 8 to 12 bit coding or other available technique. If no bit balancing technique is used, if it is requested to work with RS232 protocol, a minimum speed of 9.600 bps is required to assure maximum performance, transmitting, for example, one byte followed by the complementary byte [byte balancing].
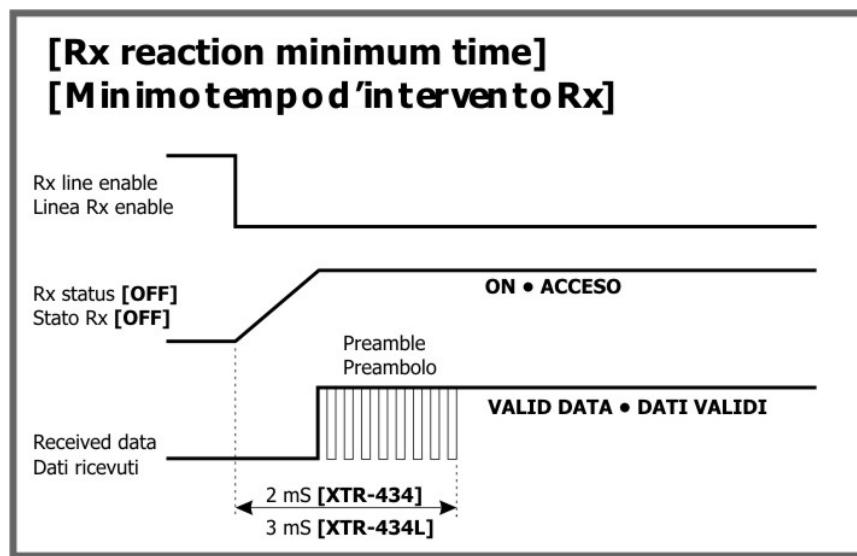
Technical features are subject to change without notice. AUR°EL S.p.A does not assume responsibilities for any damage caused by the device's misuse.
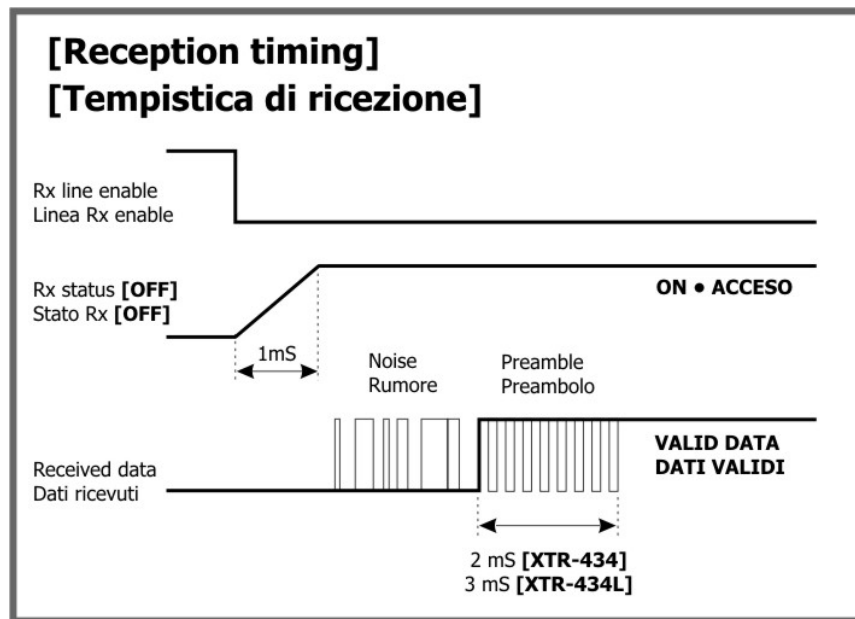
Device Usage

To take advantage of the performances detailed in the Technical Specifications, and in order to comply with the operating conditions which characterize the Certification, the transmitter must be fitted on a printed circuit considering the followings:

5 V dc supply:
1. The transceiver must be supplied by a very low voltage source, safety protected against short circuits.
2. Maximum voltage variations allowed: ± 0,5 V
3. De-coupling, next to the transmitter, by means of a minimum 100.000 pF ceramic capacitor.
4. It is suggested to place in series to the suppl, a 10 Ω resistance, as closer as possible to pin 17.

Reference curves


Usage of devices in net systems

The devices were designed to have the minimum switching time between reception and transmission, taking into account the minimum transmission speed required. **XTR-434** model has the lowest time, being in operation in 2 ms after Rx/Tx inversion. **XTR-434L** model will require 3 ms turn around time for same function.
It is reccomended that above minimum times are taken in consideration while choosing the desired device as opposed to a very short switching time, an ultrafast modulation technique is required, with difficulties to carry it on.

RF Sensitivity

The declared technical features have been obtained by applying the following testing system:
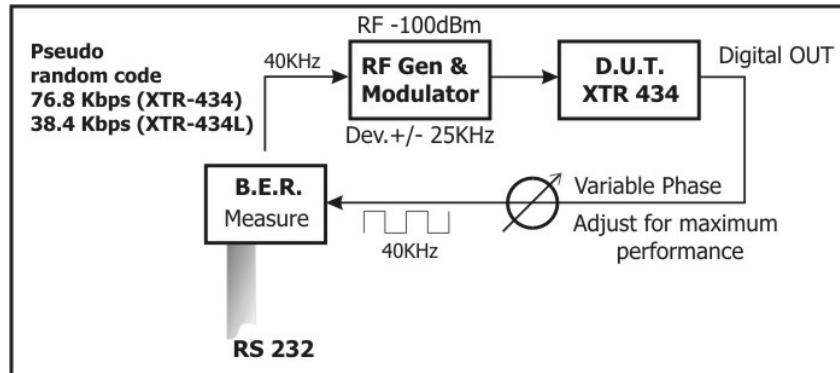
Ground:
1. It must surround at the best the welding area of the module. The circuit must be double layer, with throughout vias to the ground planes, approximately each 15 mm.
2. It must be properly dimensioned, specially in the antenna connection area, in case a radiating whip antenna is fitted in it [an area of approximately 50 mm radius is suggested].
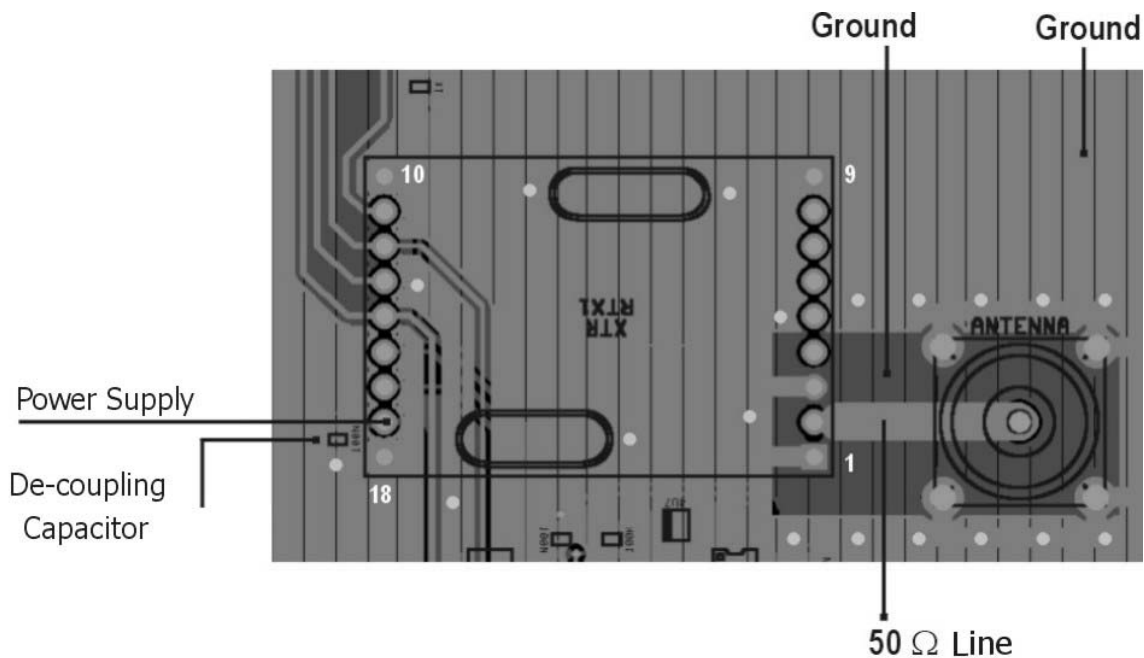
50 Ohm Line [connection between antenna and pin 2]:
1. It must be the shortest as possible.
2. 1,8 mm wide for 1 mm thick FR4 printed circuits and 2,9 mm wide for 1,6 mm thick FR4 printed circuits. On the same side, it must be kept 2 mm away from the ground circuit.
3. On the opposite side a ground circuit area must be present.

Antenna connection:
1. It may be utilized as the direct connection point for the radiating whip antenna.
2. 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.

Antenna:
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 transceiver.
The antenna body must be keep 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.

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 CE 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.

4. 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.

Reference Rules

The **XTR-434** transceiver is CE certified and in particular it complies with the European set of Rules **EN 300 220-3,** and **EN 300 489**. 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 directly bear 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 utilisation 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.