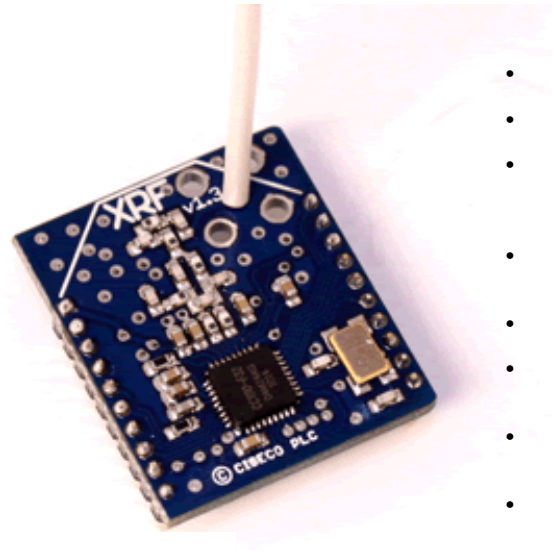
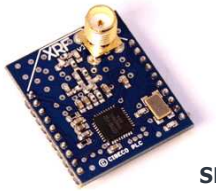
CISECO PLC
energy and control

XRF Wireless UART Serial Data Module





SMA connector

- Standard 2 wire serial (RX/TX)
- 2v to 3.6v operating range
- Range exceeding 300m LOS, greater distances (over a mile) achieved by using external antennas. See below for tested range
- Works "out of the box", requires no setup to get a pair (or more) to communicate
- 128 bit AES encryption for high security
- Over 65,000 network PANID's to segregate traffic if desired
- Ultra low sleeping power consumption 0.2ua makes battery powering a reality.
- Based on the Texas Instruments CC1110 combined 8051 micro & RF transceiver
- Software support for 315/433/868/915Mhz (physical circuit is tuned for 868-915)
- Firmware upgradable by 2 wire serial
- AT commands to set firmware features
- Familiar XBee sized layout for easy connection to many existing systems

Features

Extremely easy to use.

Build prototypes in minutes and hours, requires no complex programming.

Fits the XBee style connector, so is often a "drop in" replacement.

Appears as transparent serial. What you send, is what you receive. All the error checking, encoding, packetisation, CRC's are all done for you.

Supports serial 2 wire serial updating for XRF firmware versions without a hardware programmer.

Whip antenna can be replaced with a straight or right angled RP-SMA for easy connection to external antennas to achieve greater distances.

Advanced use

The module can be loaded with "personalities" to turn it into a fully fledged wireless sensor (to be released over time, see our website)

The module can be utilised as a combined 8051 micro and RF solution, this can be programmed using the free kick start version of IAR's C compiler and some open source C compilers. (requires TI CC hardware programmer)

Break out board available for easy bread boarding and connecting to the TI programmer. See our products for Xino Basic for XRF.

The XRF has been designed to be very easy to use, offer unmatched value, exceptionally high performance, long range and with high levels of security. Prototyping FCC/ETSI compliant solutions has never been easier.

The XRF in your designs

The firmware and schematics are available for integration of the XRF technology into your own devices. The TI chip is available at under £1 in large quantities. Licensing our transparent software saves many months of costly development work.

Price breaks for modules are also available for those seeking low production quantities in an to use easy form factor. Custom designs where prototype functions are rolled into "the radio" are a common use of our consultancy.

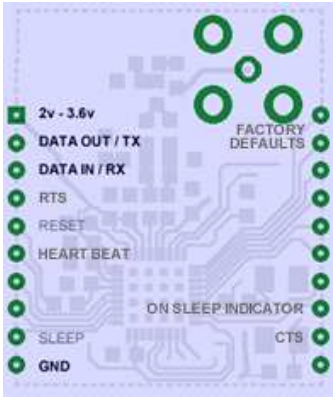
Tested range

Tested at +10dB output, 250kbps over the air rate, 9600bps serial.

Wire whip to wire whip	570 Mtrs
Yagi to wire whip	1,684 Mtrs

Only 4 connections are required for transparent serial mode.

Power, Ground, TX, RX



All other pins are optional

*The RTS function buffers the incoming wireless data until the host is ready to receive. Very useful for when the use of interrupts are either unavailable or undesirable.

Tech specs

Supply voltage	2.0v to 3.6v
Serial data rates	1200-115200
Power consumption TX	36.2ma @ +10dBm (default) 21ma @ 0dBm 20ma @ -6dBm
Power consumption RX	23.8ma max@868.3Mhz can be lowered, see TI docs
Power consumption in sleep mode	ATSM1 – sleep pin low 123.2ua @2.6v ATSM2 – sleep pin high 0.2ua @2.6v
Receiver sensitivity	-110dBm at 1.2kB
Open air range	300+ meters (570m in latest tests with 82.2mm whip)
Wall penetration (est. ave. home)	3 to 5
Range extender / bridge mode	Yes
Default operating frequency	868.3Mhz
Change frequency within software	Yes 314/433/434/868/900/915 Mhz
Supports external compiler	Yes (TI CC1110, free version IAR)
Upgradable with serial RX/TX	Yes
5v tolerant data pins	No (3.6v max)
Suitable for OpenKontrol/aProtocol	Yes (see www.openkontrol.org)

Using the C1110 as SOC

5V to 3.3v level conversion

Using the XRF as a project board for programming the CC1110 – S.O.C. 8051

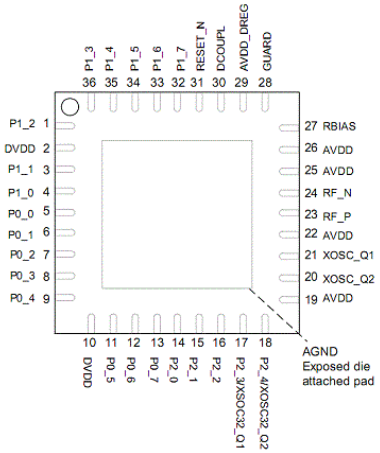
The module has the TI CC1110 at it's core, it has a powerful 26Mhz industry standard 8051 micro, encryption engine and RF transceiver on one chip. All the necessary I/O is brought out on the header pins to allow direct programming of the CC device and access to the majority of the remaining I/O pins.

The accompanying optional XINO basic for XRF is an Arduino shaped base board that has all the connections for easy access to the I/O pins, the debugger connector and the serial pins.
http://focus.ti.com/docs/toolsw/folders/print/cc-debugger.html

XRF pin to the physical connections on the TI CC1110 transceiver ports (image on right)

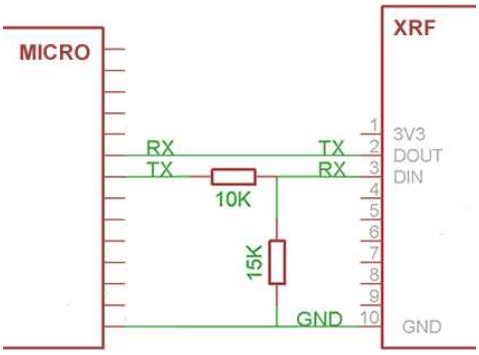
```
01 - +3V3          20 - P2_4
02 - P0_3          19 - P2_3
03 - P0_2          18 - P2_2
04 - P0_4          17 - P2_1
05 - Reset         16 - P2_0
06 - P1_7          15 - P0_7
07 - P1_6          14 - P0_6
08 - P1_5          13 - P0_5
09 - P1_4          12 - P0_0
10 - GND           11 - P0_1
```

NB. Pins 1(P1_2), 3(P1_1), 4(P1_0) & 36(P1_3) on the CC1110 are not connected to the 2 x 10 way headers.



5v Microcontroller to 3.3v XRF

Simple example for level conversion of data lines.



Note on radio regulations

Any end user product sold within the US which contains an RF transceiver requires FCC certification in addition to the normal EMC/CE type testing.

ETSI and other standards vary, self certified compliance may be appropriate within your country, check your local legislation.

For FCC certification the actual end product is the item requiring testing and final certification. The radio module, as a component part does not indemnify the end product, user or manufacturer from such tests being a legal requirement.