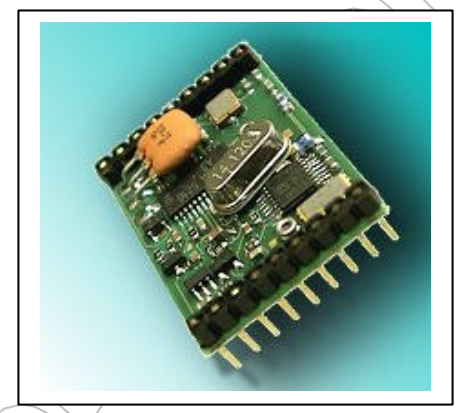
Features

- Operation on 434.075, 868.45 and 914.5 MHz
- X2011 version includes integrated pcb loop antenna. (434 & 868 MHz versions)
- Double RF filtering = High Reliability RF Link
- Data rates to 20 kbps (Wide-band 64 kbps version available to order)
- -112 dBm receiver sensitivity (434 version)
- CD **and** RSSI outputs
- Crystal stabilised accurate RF
- Hence narrower BW filter utilised
- Results in 300m range (434 MHz version)
- EN 300 220-1, 300 683 & FCC compliant
- Immune to Tetra and High power Radio Amateur Repeater Stations

The X series



Applications

- EPOS TERMINALS
- REMOTE TELEMETRY & TELECOMMAND
- REMOTE METER READING
- DOMESTIC AND COMERCIAL SECURITY

General Description

The X2010 radio transceiver module was designed to provide reliable wireless operation at moderate data rates for use throughout the world. Its unique features of narrower RF channel bandwidths and hence high interference rejection capability at SAW module prices make the X2010 the ideal choice for next generation applications.

Available for operation at the major frequency allocations world-wide in the same package, these modules have been designed to provide a reliable wire free link for the next century, accounting for the increased traffic from other legal users of the radio spectrum.

The transmitter section uses a PLL design that utilises a highly stable and accurate reference crystal oscillator. This results in a RF transmission tightly controlled in its frequency spread and over its operating temperature range. This is exploited in the receiver design.

The receiver section uses a single conversion super-het design, again using PLL technology. Hence narrower bandwidth RF filters are utilised which result in superior rejection of interference as well as providing good receiver sensitivity and hence range.

Absolute Maximum Ratings: Receiver

Operating temperature:	-10◦C to +55◦C
Storage temperature:	-40◦C to +100◦C
Supply Voltage	6V
Data input	Vcc + 0.3v
RF Input	0dBm

Electrical Characteristics:

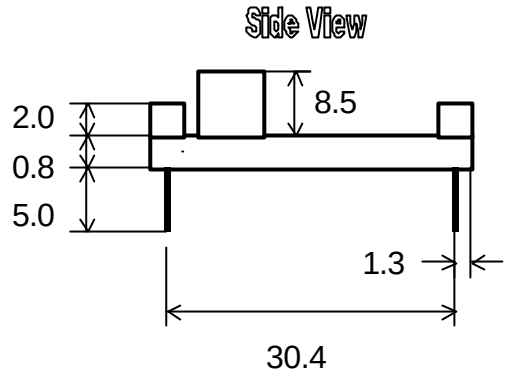
Performance data measured at 20^{o}C and +5 volt supply and RF = 434.075 MHz.

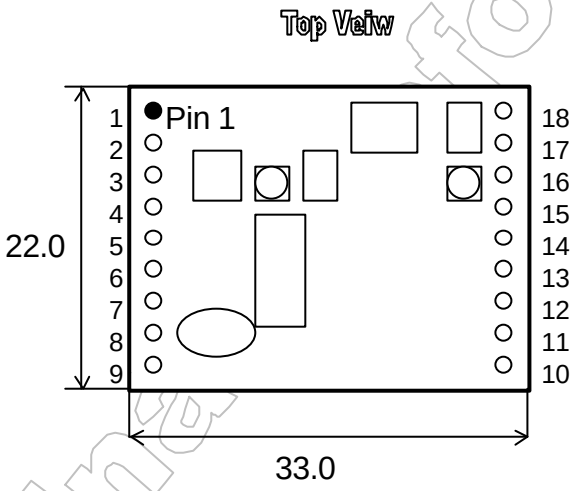
	pin	min.	typ.	max.	units	notes
DC LEVELS						
Supply voltage	17	4.75	5	5.25	V	
Supply current (receiver enabled)	17		7		mA	
Supply current (transmitter enabled)	17		8		mA	
Leakege current with Vcc connected				1	uA	1
Data input/output high	12,14	0.7xVcc		Vcc	V	
Data input/output low	12,14	0		0.0xVcc	V	
RF						
Receiver sensitivity (12 dB SINAD on AF output)	13		-112		dBm	
Image rejection			50		dB	
RF power out (transmitter)			1		mW	
FM Deviation			+/-15		KHz	
Initial frequency accuracy			±100		Hz	
Overall frequency accuracy			+/-10		KHz	
Max R.F. input to receiver			0		dBm	
E.M.C.						
Spurious responses upto 1GHz			<-36		dB	
LO leakage, conducted			<60		dBm	
LO leakage, radiated			<60		dBm	
DYNAMIC TIMING						
RX enable to valid RSSI / CD				1	mS	
RX enable to stable receiver data out			6		mS	
TX enable to full RF out			5		mS	
Allowable data pulse widths		0.05		1	mS	3
Data Bit rate		1000		20,000	bps	2

Notes

1) Sleep mode, that is with tx and rx not enabled
2) 1 Hz = 2 bps
3) The data slicer is optimised for a 50:50 duty cycle hence for reliable communications data should be encoded using a suitable scheme such as Manchester Encoding, although pulse width modulation up to 70:30/30:70 can also be used.

X2010 – Mechanical Description

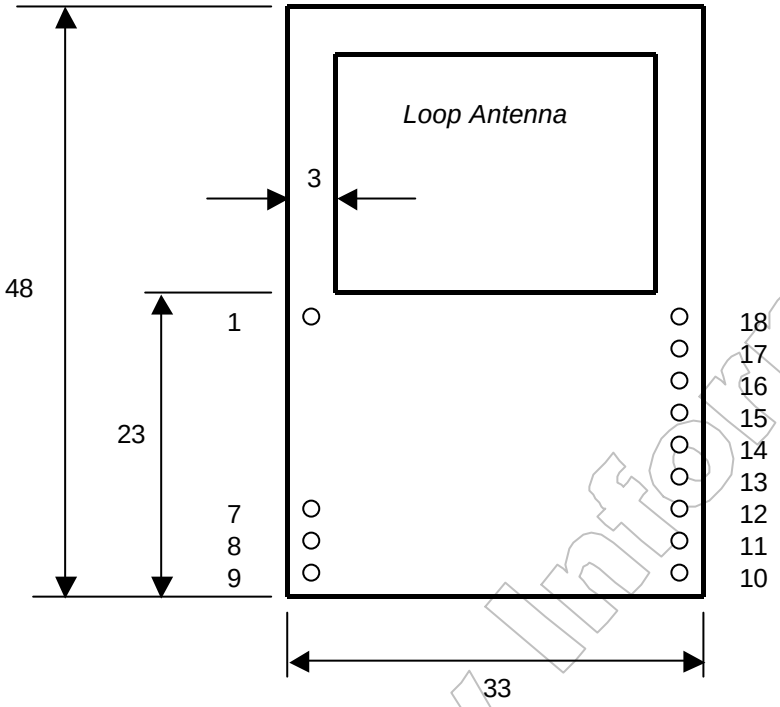




Notes

- Recommended PCB hole diameter to accommodate the connecting pins = 1.2mm
- All dimensions are in mm
- Distance between each connecting pin = 2.54mm
- Pins 4,5,6 and 7 are internally floating not connected to anything

X2011 – Mechanical Description



Notes

1) All dimensions are in mm
2) Recommended PCB hole diameter to accommodate the connecting pins = 1.2mm
3) Distance between each connecting pin = 2.54mm

X2010 / 11 – Pin Functional description

Pin No.	Description	Details
1 & 3	RF Ground	For best results, these pins should be connected to the ground plane against which the antenna radiates.
2	Antenna	Nominal 50 ohm input/output impedance capacitively isolated from internal circuit. See application notes for antenna examples.
9,10,18	Ground	Supply ground points.
4,5,6 & 7	NC	Not connected internally.
7 (X2011)	gnd	RF gnd only on X2011
8	RSSI	Receiver signal strength indicator. DC voltage proportional to RF signal strength being received.
11	CD	Digital Carrier Detect Output – Active Low
12	RxD	Receiver digital data output (CMOS logic out) representing true data as supplied to the transmitter.
13	AF	Audio Frequency Output'
14	TxD	Data input to the transmitter can be directly interfaced to CMOS logic drive operating on the same supply voltage as the transceiver.
15	Tx Enable	Active Low. Applying Vcc disables the transmitter.
16	Rx En	Active Low. Applying Vcc places the receiver in sleep mode.
17	Vcc	Supply voltage range from 4.5 to 5.5volts. Note that module is not reverse polarity protected.

State Table

Tx (Pin 15)	Rx (Pin 16)	Mode
1	1	Power down mode. Supply current < 1uA
1	0	Receiver only enabled. Data, AF, CD and RSSI outputs valid.
0	1	Transmitter only enabled. Tx data input valid.
0	0	Tx and Rx on. Avoid this mode as it will eventually destroy the module.

Application Information

Antenna Design

The design and positioning of the antenna is as crucial as the module performance itself in achieving a good wireless system range. The following will assist the designer in maximising system performance.

The antenna should be kept as far away from sources of electrical interference as physically possible. If necessary, additional power line decoupling capacitors should be placed close to the module.

The antenna 'hot end' should be kept clear of any objects, especially any metal as this can severely restrict the efficiency of the antenna to receive power. Any earth planes restricting the radiation path to the antenna will also have the same effect.

Best range is achieved with either a straight piece of wire, rod or PCB track @ ¼ wavelength (15.5cm @ 433.92MHz). Further range may be achieved if the ¼ wave antenna is placed perpendicular in the middle of a solid earth plane measuring at least 16cm radius. In this case, the antenna should be connected to the module via some 50 ohm characteristic impedance coax

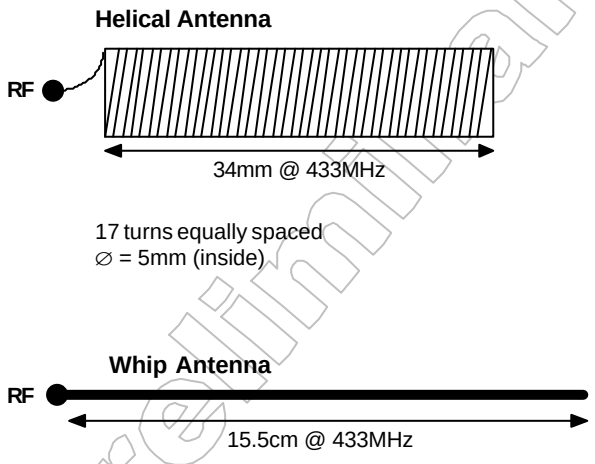


Figure 2: Antenna Configurations To Be Used With The X2010

RSSI Values

The RSSI output provides a dc voltage that is proportional to the RF signal strength picked up on the antenna (pin 2) port of the module.

The table below gives typical values of RSSI for varying degrees of RF signal strength applied.

RF Input (dBm)	RSSI (V)
-105	0.82
-100	0.88
-90	1.12
-80	1.43
-70	1.75
-60	2.06
-50	2.36
-40	2.57
-30	2.6
-20	2.6

Applications Support Hotline

Your questions may be forwarded to us at the following email address;

appsupport@mkconultants.prestel.co.uk

Ordering Information

Standard Product;

Part No	Description
X2010 - 434	434.075 MHz Transceiver
X2010 - 868	868.45 MHz Transceiver
X2010 - 914	914.5 MHz Transceiver
X2011 - 434	Integrated Antenna 434.075 MHz Transceiver
X2011 - 868	Integrated Antenna 868.40 MHz Transceiver

International Headquarters

M.K.Consultants (UK) Ltd
288a-290 Queens Road
Halifax
West Yorkshire
HX1 4NS
England

Tel +44 (0) 1422 321216
Fax +44 (0) 1422 353153
Email Sales@mkconsultants.prestel.co.uk

Internet http://www.mkconsultants.co.uk

Your Local Distributor:

Disclaimer

MKConsulatnts have a policy to continually improve the reliability and performance of their products. We therefore reserve the right to upgrade our product performance without notice.
Although the data contained herewidth is believed to be accurate, however we do not assume any responsibility whatsoever for errors or omissions this document may contain. In addition, we do not imply warranty or fitness for any particular application especially life support applications where this product may be used.