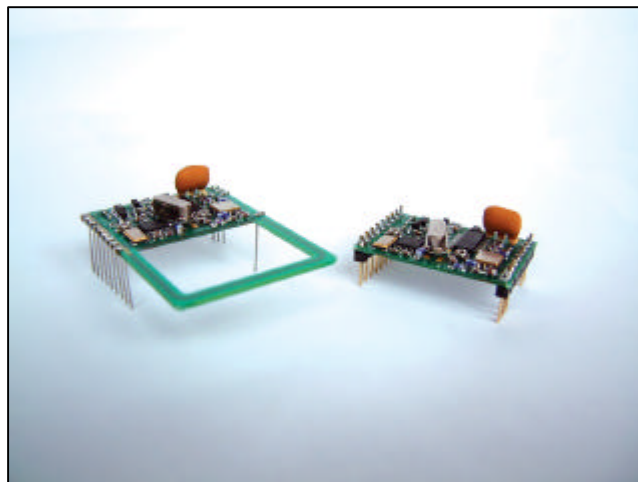




Features

- Operation on 434.075, 868.40 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 over 300m range
- EN 300 220-1, 300 683 & FCC compliant
- Immune to Tetra and High power Radio Amateur Repeater Stations



Applications

- EPOS Terminals
- Wireless Networking
- Domestic And Commercial Wireless Security Systems
- Panic Attack Facility
- Remote Control For Cranes Etc

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 at several frequency options, these modules have been designed to provide a reliable wire free link within the presence of other interference at the same frequency, 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

Operating temperature:	-25°C to +55°C
Storage temperature:	-40°C to +100°C
Supply Voltage (pin 3)	6V
Data input (pin 5)	V _{cc} + 0.3V
RF Input	0dBm

Electrical Characteristics:

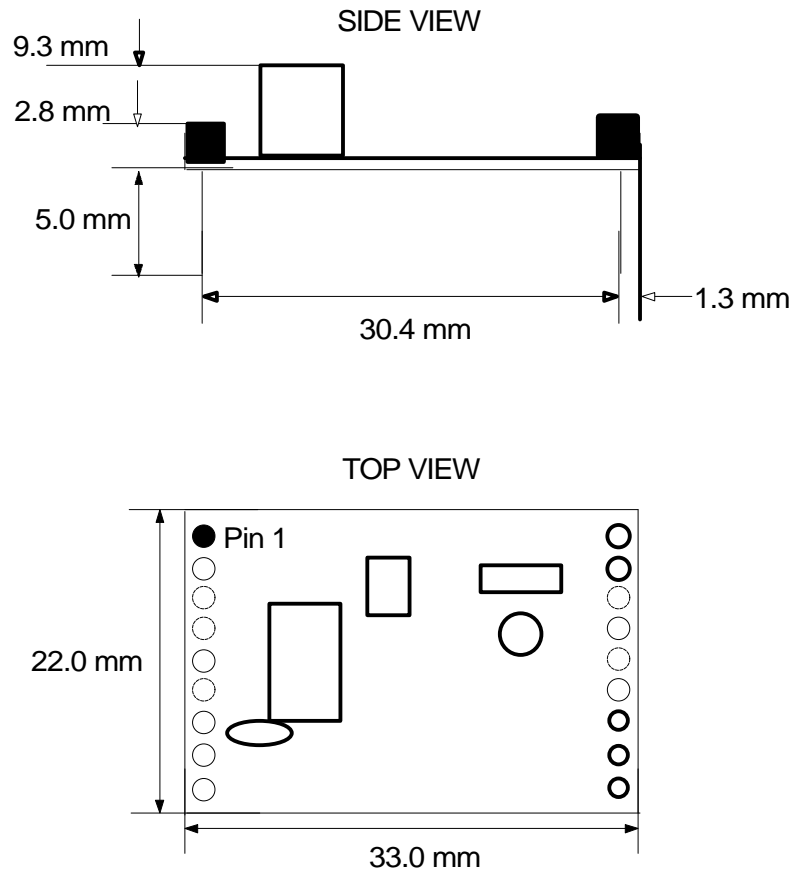
Performance data measured at 20°C and +5 volt supply and RF = 434.075 MHz.

	pin	min.	typ.	max.	units	notes
DC LEVELS						
Supply voltage	17	4.5	5	5.5	V	
Supply current (receiver enabled)	17		7		mA	
Supply current (transmitter enabled)	17		8		mA	
Leakage current with V _{cc} connected				1	uA	1
Data input/output high	12,14	0.7xV _{cc}		V _{cc}	V	
Data input/output low	12,14	0		0.0xV _{cc}	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			+/-10		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	
Max / Min data pulse width		0.1		1	mS	3
Data Bit rate		1000		10,000	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.

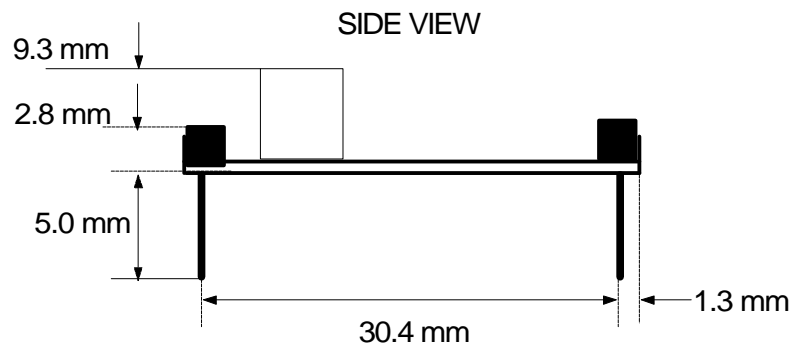
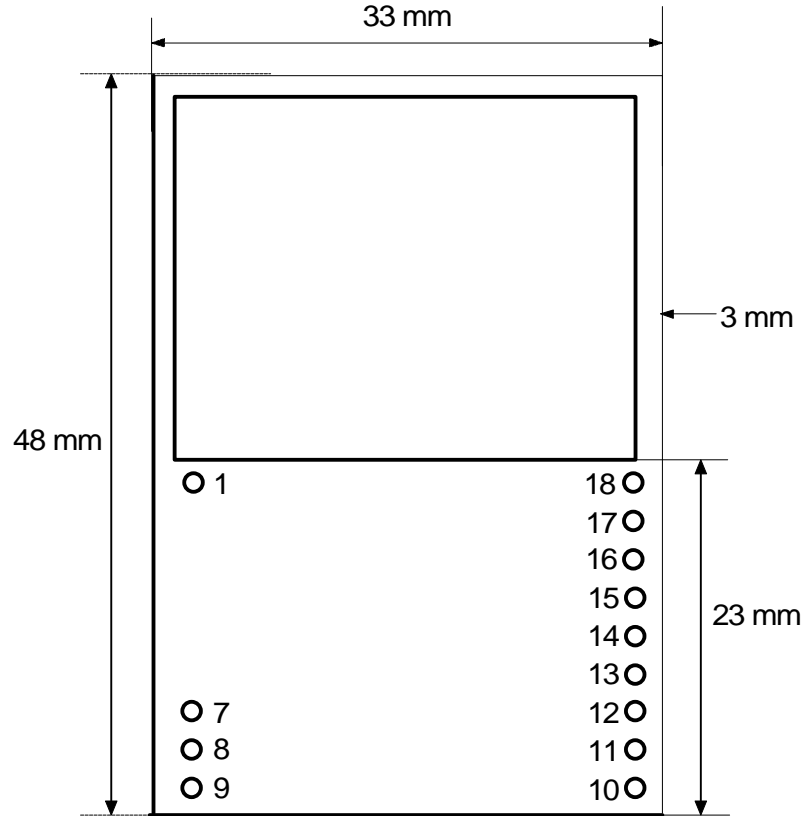
X2010 Mechanical Detail



Notes

1. Recommended PCB hole diameter to accommodate the connecting pins = 1.2mm
2. Pins are on a 2.54mm pitch
3. Pins 4,5,6 and 7 are internally floating (unconnected)

X2011 Mechanical Detail



Notes

1. Recommended PCB hole diameter to accommodate the connecting pins = 1.2mm
4. Pins are on a 2.54mm pitch



Pin Functional Description

Pin No.	Description	Details
1 & 3	RF Ground	Ideally connected to antenna ground plane.
2	Antenna	Nominal 50 ohm input/output impedance capacitively isolated from internal circuit.
4,5,6	NC	Not connected internally on X2010 module.
7	NC Ground	X2010 : This is unconnected X2011 : RF Ground.
8	RSSI	Receiver signal strength indicator. DC voltage proportional to the RF signal strength being received.
9,10,18	Ground	Supply ground points.
11	CD	Carrier detect output, active low.
12	RxD	Receiver data output (CMOS logic out)
13	AF	Audio frequency output.
14	TxD	Transmitter data input.
15	Tx Enable	Active low, applying Vcc disables the transmitter.
16	Rx Enable	Active low, applying Vcc places the receiver in sleep mode.
17	Vcc	Supply voltage.

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 enabled. This mode is to be avoided as damage to the module will eventually occur.

RSSI Output

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





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 @ $\frac{1}{4}$ wavelength (15.5cm @ 433.92MHz). Further range may be achieved if the $\frac{1}{4}$ 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

Part Numbers

Part Number	Description
X2010-434	Narrow Band Transceiver 434.075MHz
X2011-434	Narrow Band Transceiver 434.075MHz Integral Antenna
X2010-868	Narrow Band Transceiver 868.4MHz
X2011-868	Narrow Band Transceiver 868.4MHz Integral Antenna
X2010-915	Narrow Band Transceiver 914.5MHz
X2011-915	Narrow Band Transceiver 914.5MHz Integral Antenna

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