

Revision

1.0.0



# WI.DP1203-XXX-R DATASHEET

RADIOTRONIX, INC.

# WI.DP1203-XXX-R DATASHEET

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## 1. Description

The Wi.DP1203-XXX-R™ are complete Radio Transceiver Modules operating in the 433, 868 and 915 MHz license free ISM (Industrial Scientific and Medical) frequency bands. Based on the XE1203F transceiver, the Wi.DP1203-XXX-R™ offers the unique advantage of high data rate communication up to 152.3 kbit/s. Combining high output power and exceptional receiver sensitivity, the radio modules is suitable for applications seeking to satisfy the European (ETSI EN300-220-1 and EN301 439-3) or the North American (FCC part 15.247 and 15.249) regulatory standards.

The Wi.DP1203-XXX-R™ modules can be used in any environment where wireless remote connection is an advantage. The Wi.DP1203-XXX-R™ modules are perfect for complex wireless networks involving high speed data rate applications.

### 1.1. Features

- True UART to Antenna Solution
- 433/868/915 MHz
- No RF Knowledge Required
- Digital Direct Interface
- Fully Assembled and Tested
- Surface Mount
- 30.5 mm x 18.5 mm
- Supply Voltage 2.4 V – 3.6 V
- Frequency Synthesizer Steps 500 Hz
- Output Power is programmable up to 15 dBm
- High Rx 0.1% Sensitivity down to -113 dBm at 4.8 kbps
- Data Rate up to 152.3 kbit/s
- Current Consumption Tx= 62 mA at 15 dBm
- Current Consumption Rx= 14 mA
- Digital RSSI (Received Signal Strength Indicator)
- Digital FEI (Frequency Error Indicator)



### 1.2. Applications

- Process, Access, and Building Controls
- Home Automation
- Home Appliance Interconnections

## 2. Application Information

### 2.1. Pin-out Diagram

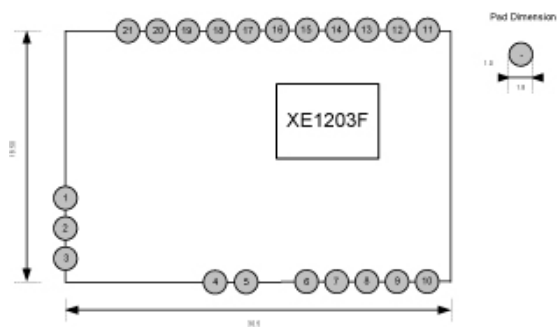


Figure 1: Pin-out Diagram

### 2.2. Pin Description

No.	Name	I/O	Description
1	GND		Ground
2	RF_IN/ OUT	IN/ OUT	RF Input/ Output Terminal
3	GND		Ground
4	VDDP		Supply Voltage/ Advised NC
5	VDDA		Supply Voltage
6	GND		Ground
7	VDD		Supply Voltage
8	EN	IN	3-wire interface communication enable signal
9	SWITCH	IN/ OUT	Operating mode selection
10	GND		Ground
11	GND		Ground
12	SO	OUT	Data output of the 3-wires interface
13	SI	IN	Data input of the 3-wires interface
14	SCK	IN	Input clock of the 3-wires interface
15	CLKOUT	OUT	Output clock at quartz frequency divided by 4, 8, 16 or 32
16	DCLK	OUT	Transmitter or Receiver clock
17	DATA	IN/ OUT	Transmitter input data or Receiver output data
18	DATAIN	IN	Transmitter input data
19	PATTERN	OUT	Output of the pattern recognition block
20	RX	IN	Antenna switch RX select
21	TX	IN	Antenna switch TX select

Table 1, Module Pin Descriptions

## 3. Electrical Specifications

### 3.1. Absolute Maximum Ratings

Parameter	Min	Max	Units
Vdd- Power Supply	2.4	3.6	VDC
Soldering Temperature (max 15 sec)		+260	°C
Operating Temperature	-40	+85	°C
Storage Temperature	-55	+125	°C

Table 2, Absolute Maximum Ratings

CAUTION: ESD sensitive device.

Precaution should be taken when handling the device in order to prevent permanent damage.



## 3.2. Detailed Electrical Specifications

The table below gives the specifications of the Wi.DP1203-XXX-R™ modules under the following conditions:

Supply voltage VDD = 3.3V, temperature = 25°C, frequency deviation  $\Delta f$  = 5 kHz, Bit-rate = 4.8 kbit/s, base-band filter bandwidth BWSSB = 10 kHz, carrier frequency  $f_c$  = 434 MHz for the Wi.DP1203-433-R™,  $f_c$  = 869 MHz for the Wi.DP1203-868-R™ and  $f_c$  = 915 MHz for the Wi.DP1203-915-R™, bit error rate BER = 0.1% (measured at the output of the bit synchronizer), antenna output matched at 50  $\Omega$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Units
FR	Synthesizer Frequency Range	Wi.DP1203-433-R	433		435	MHz
		Wi.DP1203-868-R	868		870	MHz
		Wi.DP1203-915-R	902		928	MHz
IDDSL	Sleep Mode Supply Current		0.2	1	$\mu$ A	
IDDST	Standby Mode Supply Current	39 MHz Running		.85	1.1	mA
IDDR	Rx Mode Supply Current			14	17	mA
IDDT	Tx Mode Supply Current	$P_{RF} = 5$ dBm		33	40	mA
		$P_{RF} = 15$ dBm		62	75	mA
RFS	RF Sensitivity	A-mode		-111	-108	dBm
FDA	Frequency Deviation	Programmable	1		255	kHz
BR	Bit Rate	Programmable	1.2		152.3	Kb/s
$P_{RF}$	RF Output Power	RFOP1 (programmable)	-3	0		dBm
		RFOP2 (programmable)	+2	+5		dBm
		RFOP3 (programmable)	+7	+10		dBm
		RFOP4 (programmable)	+12	+15		dBm
TS_TR	Transmit Wake-up Time	From Oscillator Enabled		150	250	$\mu$ s
TS_RE	Receive Wake-up Time	From Oscillator Enabled		.5	08	ms
TS_OS	Quartz Oscillator Wake-up Time	Fundamental		1	2	ms
XTAL	Quartz Oscillator Frequency			39		MHz
VIH	Digital Input Level High	% VDD	75			%
VIL	Digital Input Level Low	% VDD			25	%

Table 3, Detailed Specifications

# Chapter 4

## 4. Functional Description

The Wi.DP1203-XXX-R™ is a cost effective high performance radio transceiver module designed for the wireless transmission of digital information over distances of >500 meters in free space. The module is based on the RF transceiver circuit from SEMTECH, the XE1203F. . For more information on the XE1203F, please refer to the datasheet, available from the Semtech website: <http://www.semtech.com>.

The module incorporates an antenna switch and a SAW Filter placed on the Rx path.

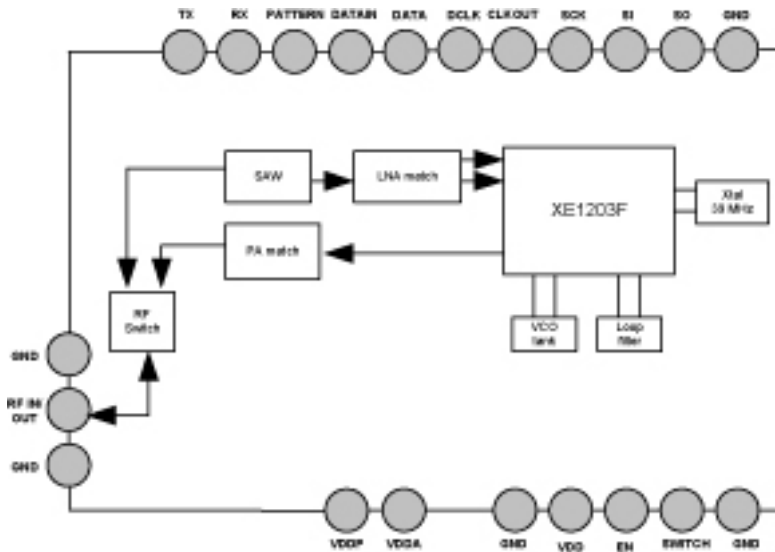


Figure 2: Antenna Switch

## 5. Operation Modes

When operating the XE1203F, it might be useful to quickly switch between two pre-defined operating modes, to save time and traffic on the 3-wire serial interface bus. This may occur when the XE1203F is required to switch quickly between receive and transmit mode, when it has to operate on two different carrier frequencies, or when it has to switch between the high linearity mode B and the high sensitivity mode A. For that purpose, the five parameters stored in the SWParam Configuration Register are duplicated: the configuration set#1 and the configuration set #2.

Depending on the ConfigSwitch 1-bit Register or the input level at the SWITCH pin, the XE1203F transceiver will use either the SWParam configuration set#1 or the set #2. If the RTParam\_Switch\_ext configuration parameter is low, then the SWParam configuration set is selected by the ConfigSwitch parameter – set#1 if ConfigSwitch is “0”, set#2 if ConfigSwitch is “1”. If the RTParam\_Switch\_ext configuration parameter is high, then the SWParam configuration set is selected by the SWITCH pin – set#1 if SWITCH is low, set#2 if SWITCH is high.

ConfigSwitch Register	Switch pin	RTParam_switch_ext configuration parameter	SWParam configuration set selected
0	Switch is an output: '1' in transmitter mode '0' in the other mode	0	Set #1 SWParam_mode_1 SWParam_Power_1 SWParam_Rmode_1 SWParam_t_delsig_in_1 SWParam_freq_1
1	Switch is an output: '1' in transmitter mode '0' in the other mode	0	Set #2 SWParam_mode_2 SWParam_Power_2 SWParam_Rmode_2 SWParam_t_delsig_in_2 SWParam_freq_2
X	0	0	Set #1 SWParam_mode_1 SWParam_Power_1 SWParam_Rmode_1 SWParam_t_delsig_in_1 SWParam_freq_1
X	1	0	Set #2 SWParam_mode_2 SWParam_Power_2 SWParam_Rmode_2 SWParam_t_delsig_in_2 SWParam_freq_2

Table 4, ConfigSwitch, SWITCH pin and SWParam Configuration Register

For more information about the data operation modes, please refer to the XE1205 datasheet chapter: *Description*. You can find this at <http://www.semtech.com>.

## 5.1. Standard Sequence for Switching between Receiver and Transmitter

The drop-in module Wi.DP1203-XXX-R™ is able to switch between any configuration by using the 3-wire bus or by using the pin SWITCH. This section describes the switching sequence from Set #1 to Set #2.

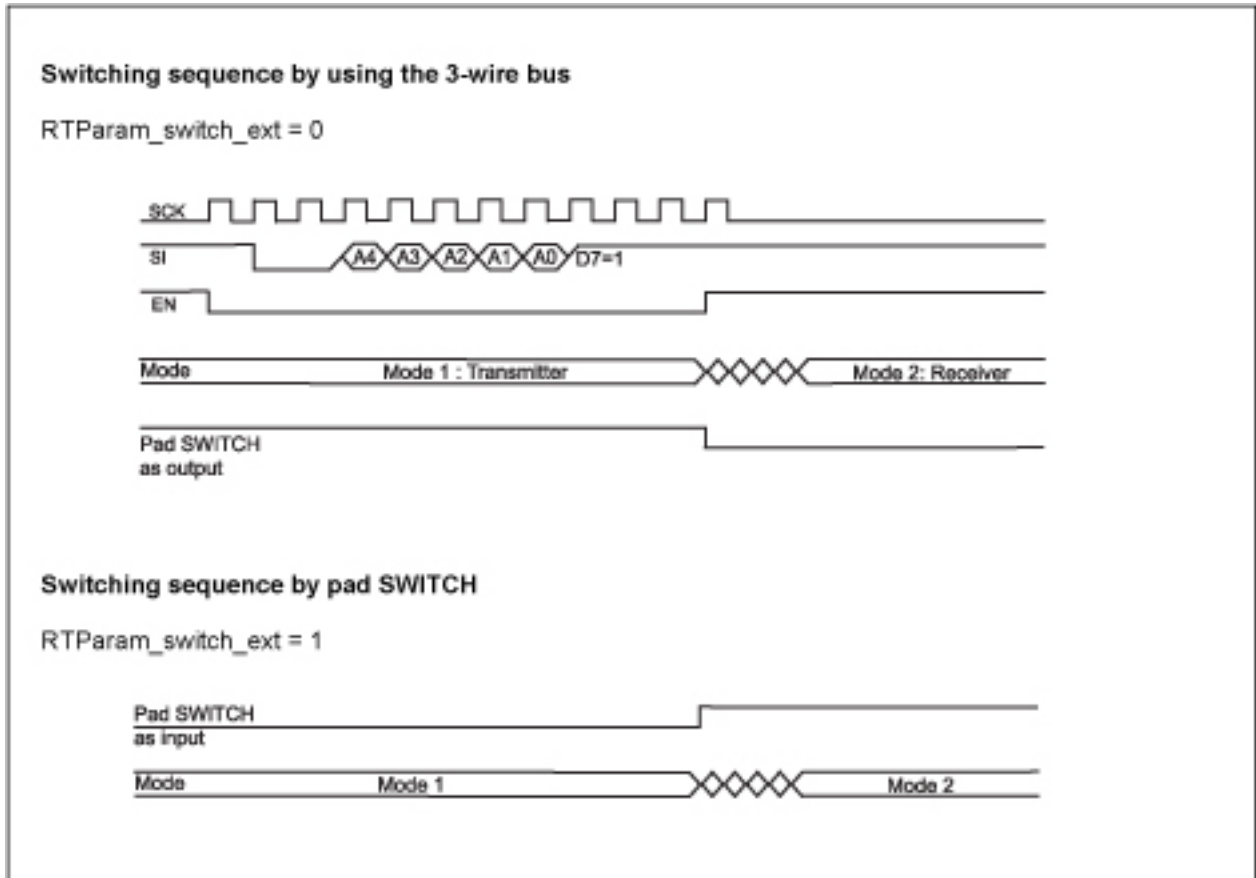


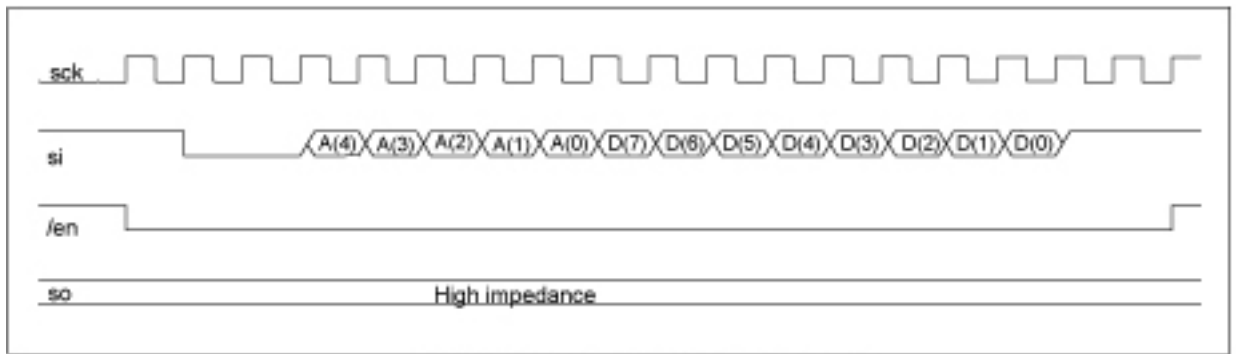
Figure 3: Switching Sequence

# Chapter 6

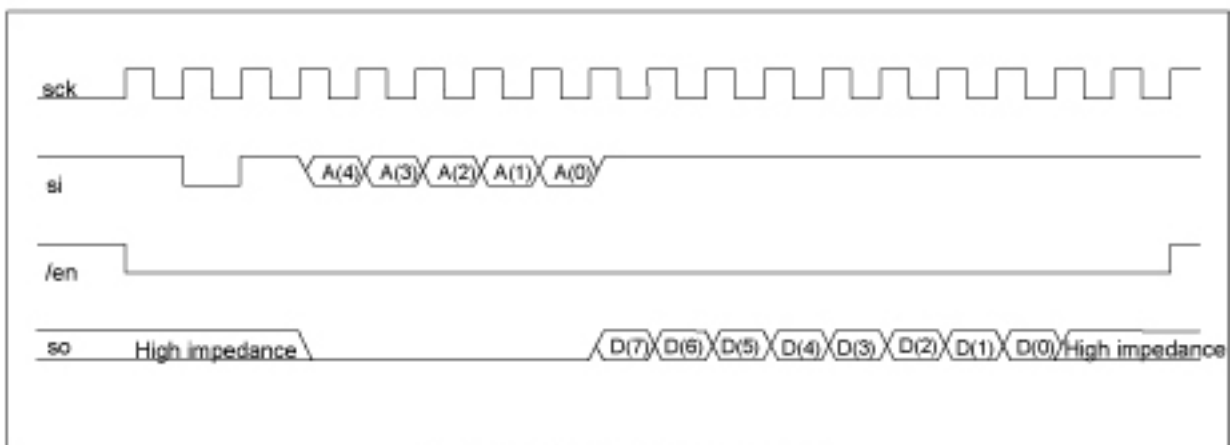
## 6. Serial Control Interface

A 3-wire bi-directional bus (SCK, SI, SO) is used to control the DP1203F. The output signal, SO, is provided by the Wi.DP1203-XXX-R™ in opposition to the SCK and SI which needs to be provided by the external application as an 8-bit microcontroller. An access *Read* or *Write* with the XE1203F is possible only when the enable signal is active (active LOW).

For more information about the 3-wire bus, please refer to the XE1203F datasheet chapter; *Serial interface definition and principles of operation*.



Write sequence into configuration register



Read sequence of configuration register

Figure 4: Serial Control Interface

# Chapter 7

## 7. Typical Application

The schematic below shows the Wi.DP1203-XXX-R™ interfaced with a SEMTECH's microcontroller XE8806A.

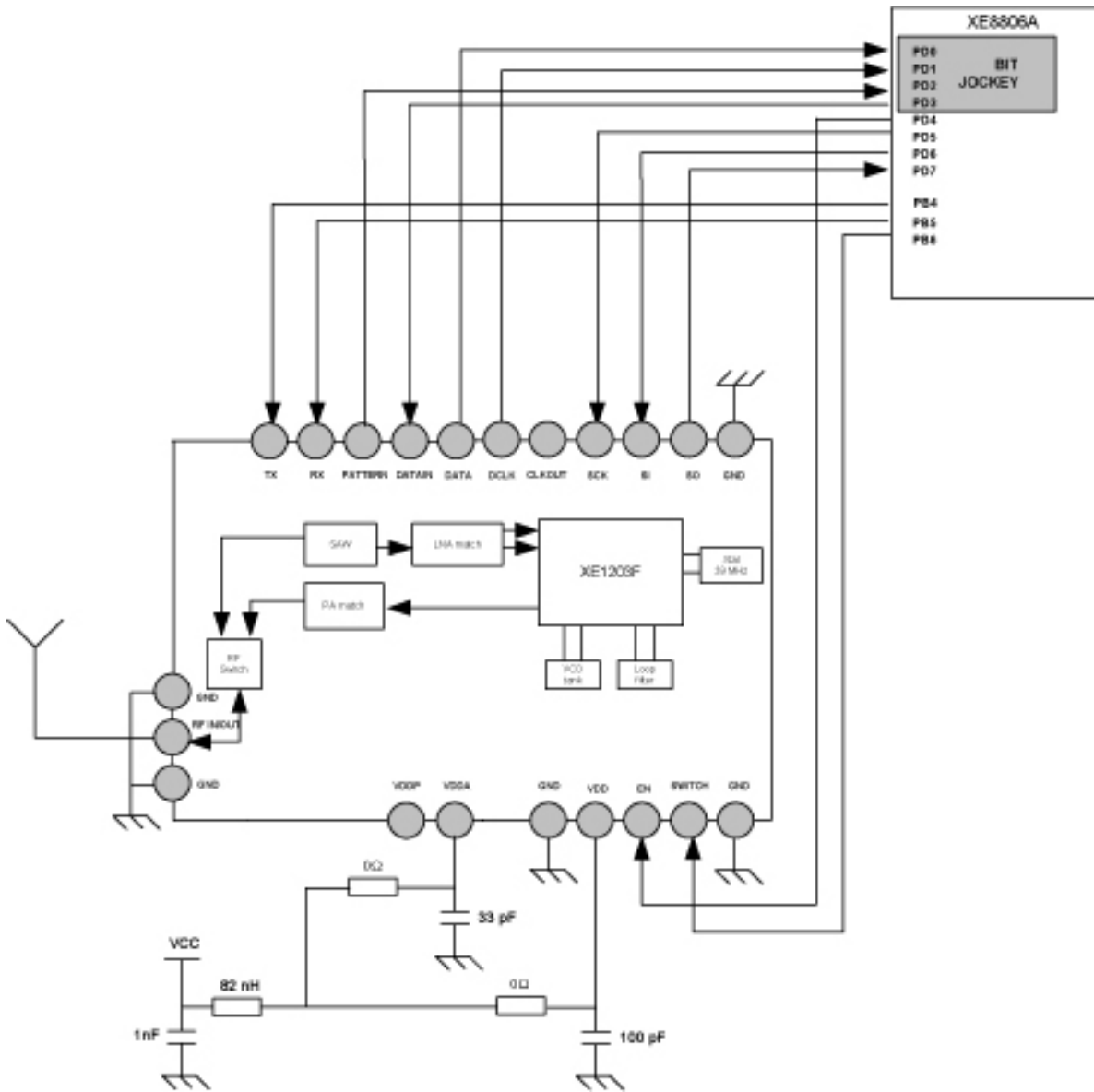


Figure 5: Wi.DP1203-XXX-R™ and XE8806A Interfaced Schematic

# Chapter 8

## 8. Mechanical Dimensions

The following diagram shows the physical footprint and dimensions of the Wi.DP1203-XXX-R™ drop-in module, which should be implemented on the mother board.

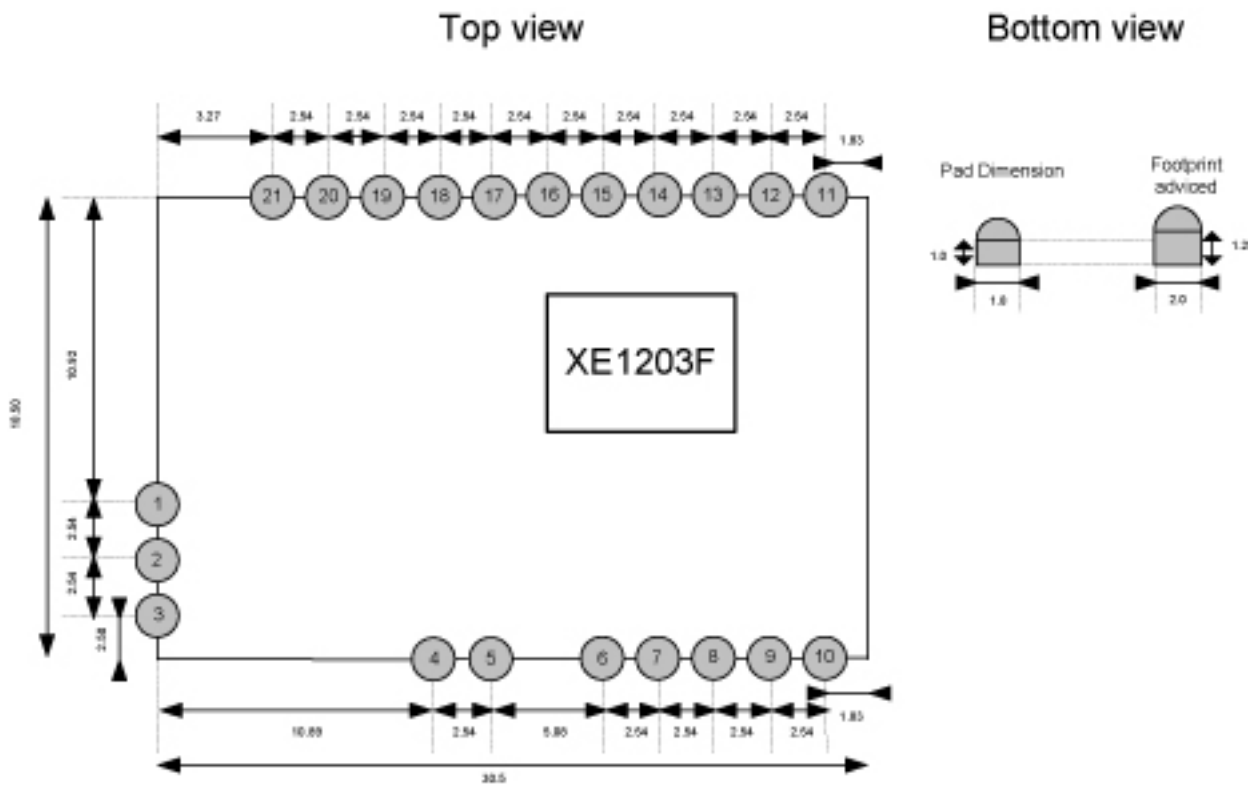
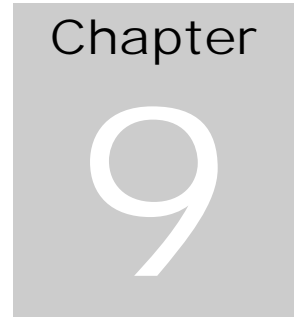


Figure 6: Mechanical Dimensions



## 9. Custom Applications

For cost-sensitive applications, such as wireless sensors and AMR, Radiotronix can embed the application software directly into the microcontroller built into the module. For more information on this service, please contact Radiotronix.



## 10. Ordering Information

Product Part Number	Description
Wi.DP1203-433-R	Embedded Wireless Module (433 MHz)
Wi.DP1203-868-R	Embedded Wireless Module (868 MHz)
Wi.DP1203-915-R	Embedded Wireless Module (900 MHz)

### 10.1. Contact Information

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#### 10.1.1. Technical Support

Radiotronix has built a solid technical support infrastructure so that you can get answers to your questions when you need them. Our primary technical support tools are the support forum and knowledge base found on our website. We are continuously updating these tools. To find the latest information about these technical support tools, please visit <http://www.radiotronix.com/support>. Our technical support engineers are available Mon-Fri between 9:00 am and 5:00 pm central standard time. The best way to reach a technical support engineer is to submit a Webcase. Webcase submissions can be made at <http://www.radiotronix.com/support/webcase.asp>. For customers that would prefer to talk directly to a support engineer, we do offer phone support free of charge.

#### 10.1.2. Sales Support

Our sales department can be reached via e-mail at [sales@radiotronix.com](mailto:sales@radiotronix.com) or by phone at 405-794-7730. Our sales department is available Mon-Fri between 8:30 am and 5:00 pm central standard time. Visit our web site at <http://www.radiotronix.com/corpsales.asp> for information on where to buy our products.