

Revision

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# WI.DP1205-XXX-R DATASHEET

RADIOTRONIX, INC.

# WI.DP1205-XXX-R DATASHEET

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## 1. Description

The Wi.DP1205-XXX-R's 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 XE1205 transceiver, the DP1205 offers the unique advantage of both narrow-band and wide-band communication. Offering high output power and exceptional receiver sensitivity, the radio module 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.DP1205-XXX-R is suitable for operation in the European social alarm bands (25 kHz channel spacing). Its built-in 16-byte FIFO and full SPI simplify interfacing to the host controller.

### 1.1. Features

- True UART to Antenna Solution
- 433/ 868/ 915 MHz Versions
- 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
- 16-byte FIFO
- Digital RSSI (Received Signal Strength Indicator)
- Digital FEI (Frequency Error Indicator)



### 1.2. Applications

- Narrow-band and Wide-band Security Systems
- Voice and Data over an RF Link
- Process and Building Controls
- Access Controls

- Home Automation
- Home Appliance Interconnections

## 2. Application Information

### 2.1. Pin-out Diagram

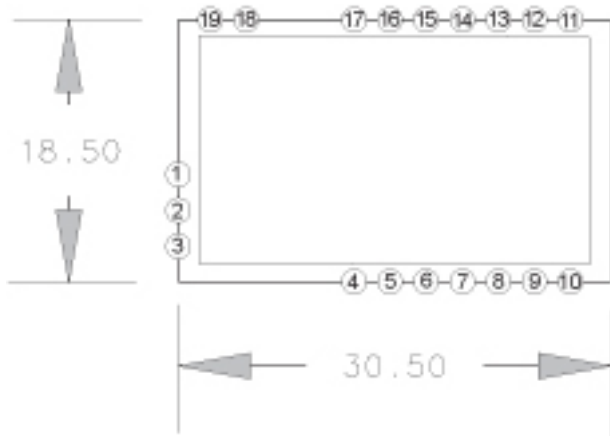


Figure 1: Pin-out Diagram

### 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	VDDA		Supply Voltage
5	GND		Ground
6	VDD		Supply Voltage
7	NSS_CONFIG	IN	SPI SELECT CONFIG
8	NSS_DATA	IN	SPI SELECT DATA/ DATAIN
9	IRQ0	OUT	Interrupt (PATTERN/FIFOEMPTY)
10	GND		Ground
11	GND		Ground
12	IRQ1	OUT	Interrupt (DCLK/FIFOFULL)
13	DATA	IN/ OUT	Data
14	CLKOUT	OUT	Output Clock at reference frequency divided by 2, 4, 8, 16, 32
15	MISO	OUT	SPI Master Input Slave Output
16	MOSI	IN	SPI Master Output Slave Input
17	SCK	IN	SPI CLOCK
18	SW(0)	IN/ OUT	Transmit/ Receive/ Standby/ Sleep Mode Select
19	SW(1)	IN/ OUT	Transmit/ Receive/ Standby/ Sleep Mode 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.DP1205-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.DP1205-433-R,  $f_c$  = 869 MHz for the Wi.DP1205-868-R and  $f_c$  = 915 MHz for the Wi.DP1205-915-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.DP1205-433-R	433		435	MHz
		Wi.DP1205-868-R	868		870	MHz
		Wi.DP1205-915-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	16.5	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		-113	-110	dBm
RFS_12	RF Sensitivity at 1.2 kbit/s	A-mode, BER = 0.1%		-118	-115	dBm
FDA	Frequency Deviation	Programmable	1		255	kHz
BR	Bit Rate	Programmable	1.2		152.3	Kb/s
RFOP	RF Output Power	RFOP1 (programmable)	-3	0		dBm
		RFOP2 (programmable)	+2	+5		dBm
		RFOP3 (programmable)	+7	+10		dBm
		RFOP4 (programmable)	+12	+15		dBm
TS_STR	Transmit Wake-up Time	From Oscillator Enabled		250	350	$\mu$ s
TS_SRE	Receive Wake-up Time	From Oscillator Enabled		700	850	$\mu$ s
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

## 4. Functional Description

The Wi.DP1205-XXX-R is a cost effective high performance radio transceiver module designed for the wireless transmission of digital information over distances up to 8 km. The module is based on the RF transceiver circuit from Semtech, the TrueRF™ XE1205. For more information on the XE1205, please refer to the datasheet, available from the Semtech website: <http://www.semtech.com>.

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

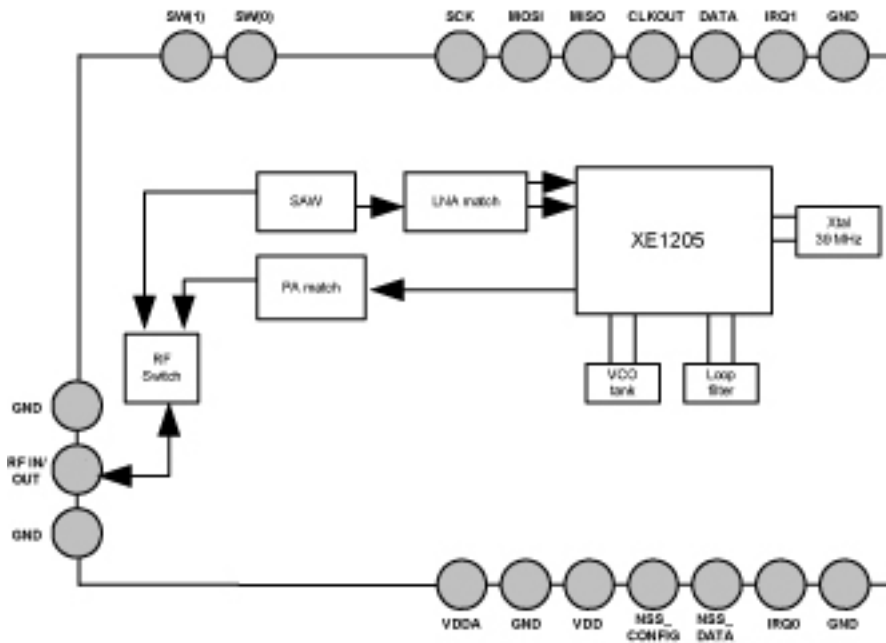


Figure 2: Antenna Switch

## 5. Data Operation Modes

The XE1205 is user-programmable between two modes of operation:

**Continuous Mode:** each bit transmitted or received is accessed directly at the DATA input/output pin.

**Buffered Mode:** a 16-byte FIFO is used to store each data byte transmitted or received. This data is written to/read from the FIFO via the SPI bus. It reduces processor overhead and reduces connections (the DATA input/output pin is not used in this operation mode)

In receiver mode, two lines are dedicated to interrupt information. The interrupt pins are IRQ0 and IRQ1. IRQ0 has 3 selectable sources. IRQ1 has 2 selectable sources. The two following tables summarize the interrupt management.

IRQParam RX irq 0	MCPParam Buffered Mode	IRQ0	IRQ0 Interrupt Source
00	1	Output	No interrupt available
01	1	Output	Write_byte
10	1	Output	/fifoempty
11	1	Output	Pattern
00	0	Output	Pattern
01	0	Output	RSSI_irq
10	0	Output	Pattern
11	0	Output	Pattern

Table 4, IRQ0 Interrupt Sources in Receive Mode

IRQParam RX irq 1	MCPParam Buffered Mode	IRQ1	IRQ1 Interrupt Source
00	1	Output	No interrupt available
01	1	Output	Fifofull
10	1	Output	RSSI_irq
11	1	Output	RSSI_irq
00	0	Output	DCLK
01	0	Output	DCLK
10	0	Output	DCLK
11	0	Output	DCLK

Table 5, IRQ1 Interrupt Sources in Receive Mode

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>.

# Chapter 6

## 6. Serial Control Interface

The XE1205 contains two SPI-compatible serial interfaces, one to send and read the chip configuration, the other to send and receive data in buffered mode. Both interfaces are configured in slave mode and share the same pins MISO (Master In Slave Out), MOSI (Master Out Slave In), SCK (Serial Clock). Two additional pins are required to select the SPI interface: NSS\_CONFIG to change or read the transceiver configuration, and NSS\_DATA to send or read data.

Figure 3 show the connections between the transceiver and a microcontroller when buffered mode is used.

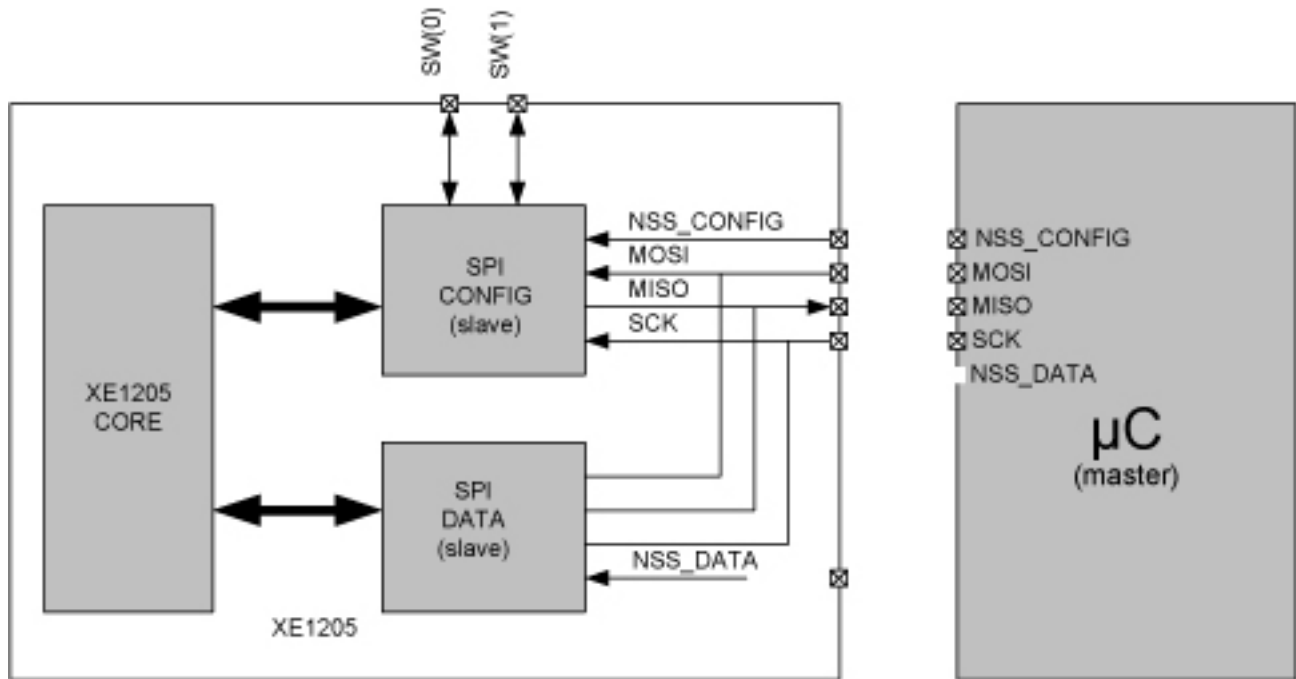


Figure 3: Serial Control Interface

## 7. Operating Modes

By default, the serial control interface is used for configuration. It is also possible to change between the four modes (sleep, stand-by, receive, transmit) by using the two-bit signal SW (1:0). This option is enabled by setting the bit MCPParam\_Select\_mode to '1' in the configuration register.

If MCPParam\_Select\_mode is low, the modes are defined by the register through the SPI\_CONFIG interface and SW(1:0) may be used as an output to control, for example, an antenna switch.

MCPParam_Select_Mode Bit 5, Address 0	SWITCH (pin) SW(1:0)	MCPParam_Chip_Mode Bit 7-6, Address 0
0	Set in Output	
	Sleep Mode -> SW(1:0) = "00"	00 -> Sleep Mode
	Receive Mode -> SW(1:0) = "01"	01 -> Receive Mode
	Transmitter mode -> SW(1:0) = "10"	10 -> Transmitter mode
	Stand-by Mode -> SW(1:0) = "11"	11 -> Stand-by Mode
1	SW(1:0) = 00 -> Sleep Mode	x
	SW(1:0) = 01 -> Receive Mode	
	SW(1:0) = 10 -> Transmitter mode	
	SW(1:0) = 11 -> Stand-by Mode	

Table 6, Operating Modes

# Chapter 8

## 8. Typical Application

The schematic below shows the Wi.DP1205-XXX-R interfaced with a Semtech microcontroller XE8801A/02/05A/06A/07A and the XF1205 used in buffered mode

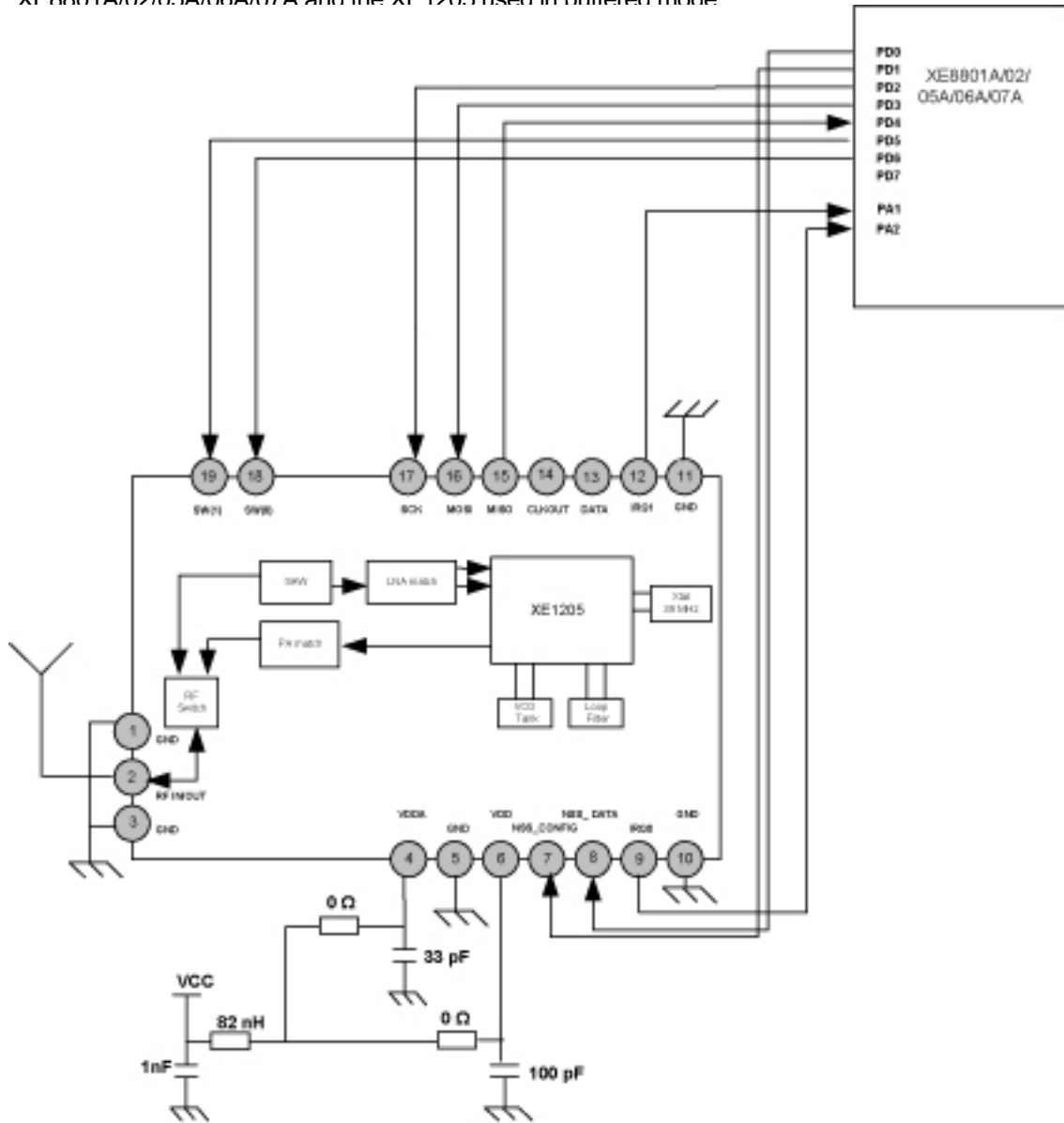


Figure 4: Wi.DP1205-XXX-R and XE8801A Interfaced Schematic

## 9. Mechanical Dimensions

The following diagram shows the physical footprint and dimensions of the Wi.DP1205-XXX-R drop-in module, which should be implemented on the mother board.

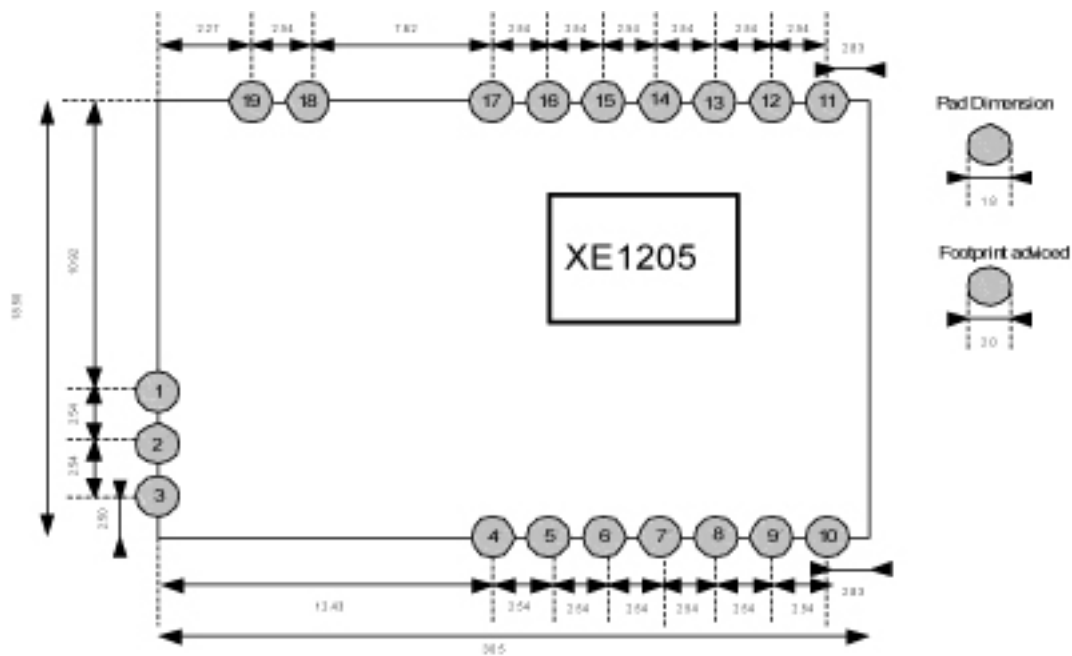


Figure 5: Mechanical Dimensions





## 10. Custom Applications

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

## 11. Ordering Information

Product Part Number	Description
Wi.DP1205-433-R	Embedded Wireless Module (433 MHz)
Wi.DP1205-868-R	Embedded Wireless Module (868 MHz)
Wi.DP1205-915-R	Embedded Wireless Module (900 MHz)

### 11.1. Contact Information

Corporate Headquarters:

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support: [support@radiotronix.com](mailto:support@radiotronix.com)

#### 11.1.1. 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.

#### 11.1.2. 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.