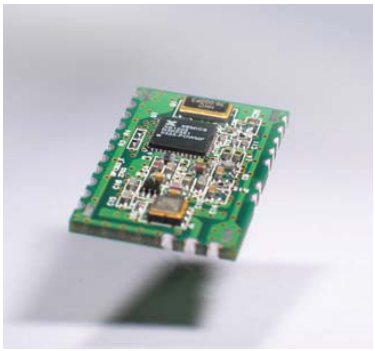

DP1203 – C433/C868/C915

433, 868 and 915 MHz Drop-In RF Transceiver Modules

Small Form Factor and Direct Digital Interface Modules

GENERAL DESCRIPTION

The DP1203 is a 30mm x 18mm radio transceiver module available for use in 433-435MHz, 868-870MHz or 902-928MHz ISM bands. The module is suitable for circuit applications which have to satisfy either European (ETSI EN300-220-1, EN301-489-3) or the North American (FCC part 15.247, 15.249) regulatory standards.

Virtually no RF knowledge is required to use this RF module. Wireless communication can be obtained with just the addition of a suitable antenna and a microcontroller. The DP1203 fulfils a wide range of application requirements, ranging from basic point-to-point communication to more complex multipoint process control functions.

The module is suitable for surface mount reflow assembly.

Anylink provides basic firmware routines for controlling the module and typical applications.

APPLICATIONS

- Home automation and access control
- Process and building control
- Cable replacement
- Telemetry solutions

KEY PRODUCT FEATURES

- Instant RF – solder and use!
- No RF knowledge required
- Small size 30mm x 18mm
- Direct Digital Interface
- Supply voltage 2.4V – 3.6V
- Minimum frequency synthesizer step size of 500Hz
- Konnex-compatible operation mode
- 11-bit Barker encoder/decoder
- Maximum output power of +15dBm
- Receiver sensitivity of -114dBm
- Very high data rate up to 153.2kbps
- Current consumption Tx = 62mA @ 15dBm
- Current consumption Rx=14mA
- RSSI (Received Signal Strength Indicator)
- FEI (Frequency Error Indicator)

DEVICE OPTIONS

Part	Frequency band		Pin Package
DP1203C433	433 - 435	MHz	Board
DP1203C868	868 - 870	MHz	Board
DP1203C915	902 - 928	MHz	Board

Table of Contents

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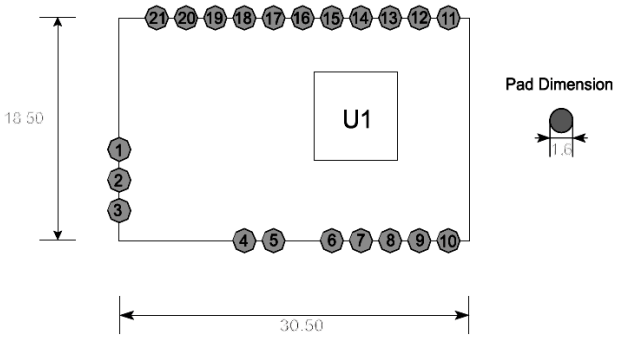
1. PIN DESCRIPTION



PIN	NAME	I/O	DESCRIPTION
1	GND	IN	Ground
2	RF	IN/OUT	RF input / output terminal
3	GND	IN	Ground
4	VDDP		VDD for power amplifier
5	VDDA		VDD for analog blocks
6	GND		Ground
7	VDD		Supply voltage
8	/EN	IN	3-wire interface communication enable signal
9	SWITCH	IN/OUT	Receiver or transmitter mode selection
10	GND	IN	Ground
11	GND	IN	Ground
12	SO	OUT	3-wire serial data interface: Data Out
13	SI	IN	3-wire serial data interface: Data In
14	SCK	IN	3-wire serial data interface: Data Clock
15	CLKOUT	OUT	Programmable reference clock output
16	DCLK	OUT	Receiver data clock
17	DATA	IN/OUT	Transmitter data input or receiver data output
18	DATAIN	IN	Transmitter data input
19	PATTERN	OUT	Receiver pattern recognition output
20	RX	IN	Antenna Switch RX Select
21	TX	IN	Antenna Switch TX Select

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2. ELECTRICAL CHARACTERISTICS

2.1. ABSOLUTE MAXIMUM OPERATING RANGES

Description	Min	Max	Unit
Supply voltage	2.4	3.6	V
Operating temperature	-40	+85	°C
Storage temperature	-55	125	°C
Soldering temperature (max 15 sec)		260	°C

CAUTION: ESD sensitive device.
Precaution should be taken when handling the device in order to prevent permanent damage

Life Support Policy and Use in Safety Critical Applications

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2.2. SPECIFICATIONS

The table below gives the specifications of the DP1203 Modules under the following conditions:
Supply Voltage VDD = 3.3V, Temperature = 25 °C, 2-level FSK without pre-filtering, Carrier Frequency fc = 915 MHz, Frequency Deviation ∆f = 55 kHz, Bit Rate BR = 4.8 kbit/s, Base Band Filter Bandwidth BBW = 200 kHz, Bit Error Rate BER = 0.1% (measured at the output of the bit synchronizer), LNA input and RF PA output matched to 50Ω,

Symbol	Parameter	Conditions	Min	Typ	Max	Units
f_{SYNTH}	Synthesizer Frequency Range	DP1203-C433	433	--	435	MHz
		DP1203-C868	868	--	870	MHz
		DP1203-C915	902	--	928	MHz
IDD_{SL}	Sleep mode supply current		-	0.2	1	uA
IDD_{ST}	Standby mode supply current	39 MHz running	-	0.85	1.1	mA
IDD_{RX}	RX mode supply current			14	17	mA
IDD_{TX}	TX mode supply current	P_{RF} = 3 dBm		33	45	mA
		P_{RF} = 15 dBm		62	75	mA
RFS_48	RF Sensitivity at 4.8 kbps	A-Mode		-114	-111	dBm
RFS_327	RF Sensitivity at 32.7 kbps	A-Mode		-109	-106	dBm
Δ_f	Frequency Deviation	Programmable	1	-	255	kHz
DR	Bit rate	Programmable	1.2	-	152.3	Kb/s
PRF	RF output power	Programmable.				
		RFOP1	-3	0	-	dBm
		RFOP2	+2	+5	-	dBm
		RFOP3	+7	+10	-	dBm
		RFOP4	+12	+15	-	dBm
T_{TX}	Transmitter wake-up time	From oscillator enabled	-	150	250	us
T_{RX}	Receiver baseband wake up time	From oscillator enabled	-	0.5	0.8	ms
T_{XTAL}	Quartz oscillator wake up time		-	-	1	ms
f_{XTAL}	Quartz oscillator frequency	Fundamental mode osc.		39		MHz
V_{IH}	Digital input level high	% VDD	75	-	-	%
V_{IL}	Digital input level low	% VDD	-	-	25	%
V_{OH}	Digital output level high	% VDD	75	-	-	%
V_{OL}	Digital output level low	% VDD	-	-	25	%

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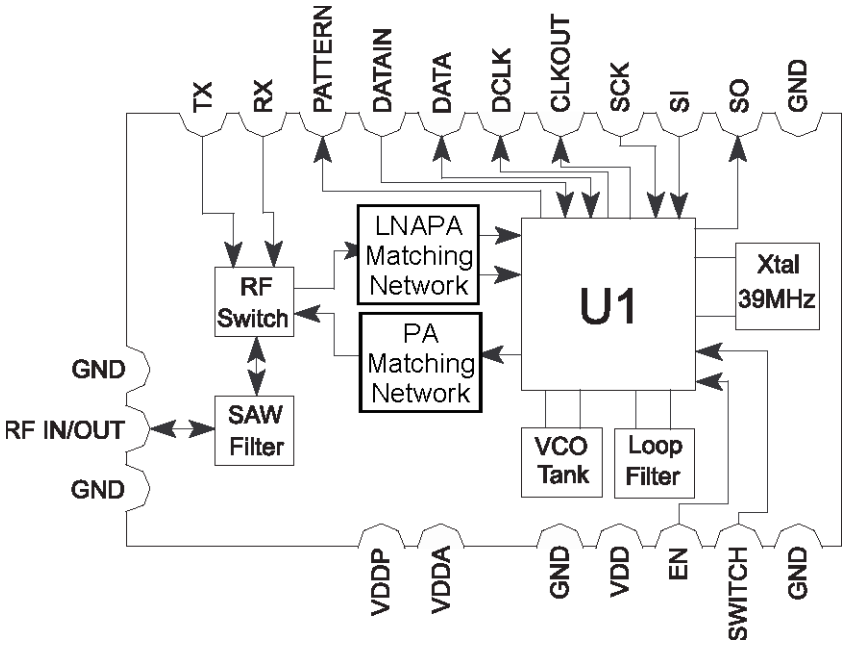
3. FUNCTIONAL DESCRIPTION

The DP1203 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.

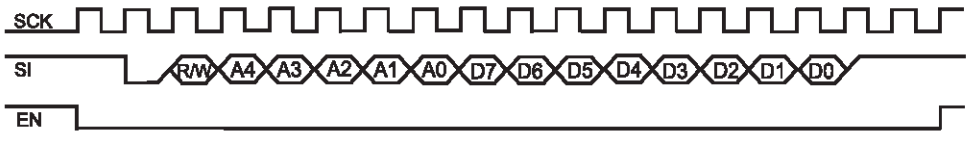
The Module is based on the RF transceiver circuit from Semtech, the XE1203. For more information on the XE1203, please refer to the XE1203 datasheet, available from the Semtech website http://www.semtech.com/XE1203F .

The Module is also available with all high frequency circuits and the 39MHz reference crystal enclosed inside a shielding case. The Module incorporates an antenna switch driven by two external pins (RX and TX), and a SAW Filter placed between the antenna port (RF IN/OUT). The switch provides a superior margin to satisfy the European or the North American regulatory standards.

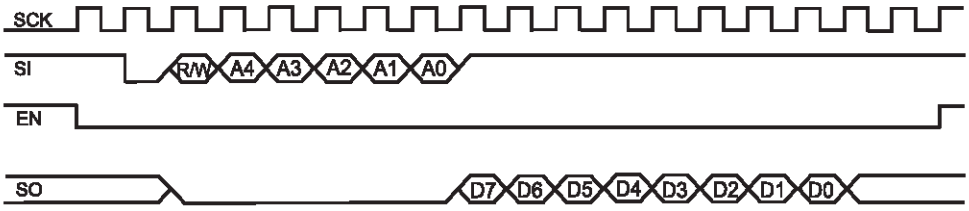


4. SERIAL CONTROL INTERFACE

A 3-wire bi-directional bus (SCK, SI, SO) is used to control the DP1203. The output signal, SO, is provided by the DP1203 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 XE1203 is possible only when the enable signal is active (active LOW).



Write sequence into configuration register



Read sequence of configuration register

For more information about the 3-wire bus, please refer to the XE1203 datasheet chapter; *Interface definition, principles of operation*. You can find this at http://www.semtech.com/XE1203F .

5. OPERATING MODES

The DP1203 has 2 main operating modes (Mode 1, Mode 2); each mode is subdivided into 4 modes illustrated in the table below. The switching between Mode 1 and Mode 2 can be done either through the 3-wire bus (Chip_config register) or by using the pin SWITCH. The selection depends on the Switch_ext which is a XE1203 register.

Switch_ext Bit 3, Address 00010	**Chip_config** Bit 0, Address 00000	**SWITCH (pin)**	**Mode selected**
0	0	Set in Output - "1" DP1203 is in transmitter - "0" DP1203 other modes	Mode 1 Bit 7-6, Address 00110 - 0 0 : sleep mode - 0 1 : standby mode - 1 0 : receiver mode - 1 1 : transmitter mode
0	1	Set in Output - "1" DP1203 is in transmitter - "0" DP1203 other modes	Mode 2 Bit 7-6, Address 01001 - 0 0 : sleep mode - 0 1 : standby mode - 1 0 : receiver mode - 1 1 : transmitter mode
1	X	0	Mode 1 Bit 7-6, Address 00110 - 0 0 : sleep mode - 0 1 : standby mode - 1 0 : receiver mode - 1 1 : transmitter mode
1	X	1	Mode 2 Bit 7-6, Address 01001 - 0 0 : sleep mode - 0 1 : standby mode - 1 0 : receiver mode - 1 1 : transmitter mode

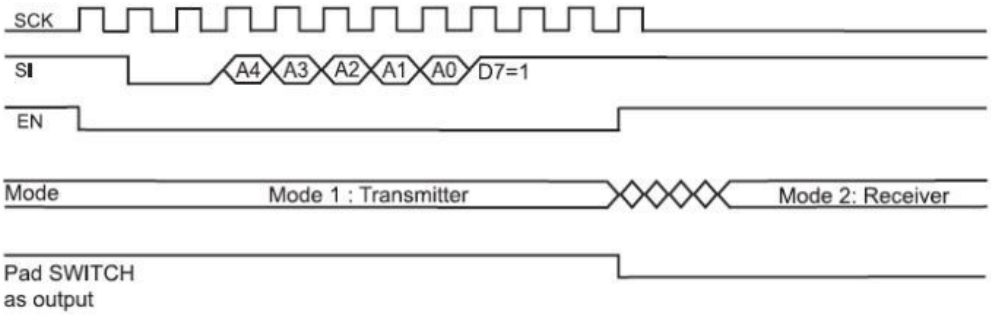
For more information about the modes of operation, please refer to the XE1203 Datasheet on the Semtech website http://www.semtech.com/XE1203F .

5.1. STANDARD SEQUENCE FOR SWITCHING BETWEEN RECEIVER AND TRANSMITTER

The drop-in module DP1203 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 Mode 1 to Mode 2.

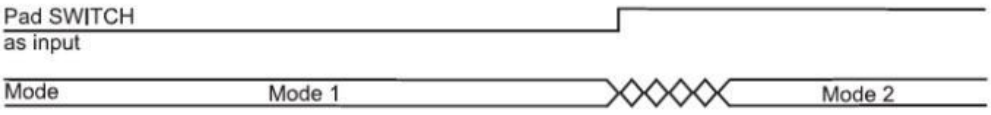
Switching sequence by using the 3-wire bus

Switch_ext = 0 (Bit 3, Address 00010)



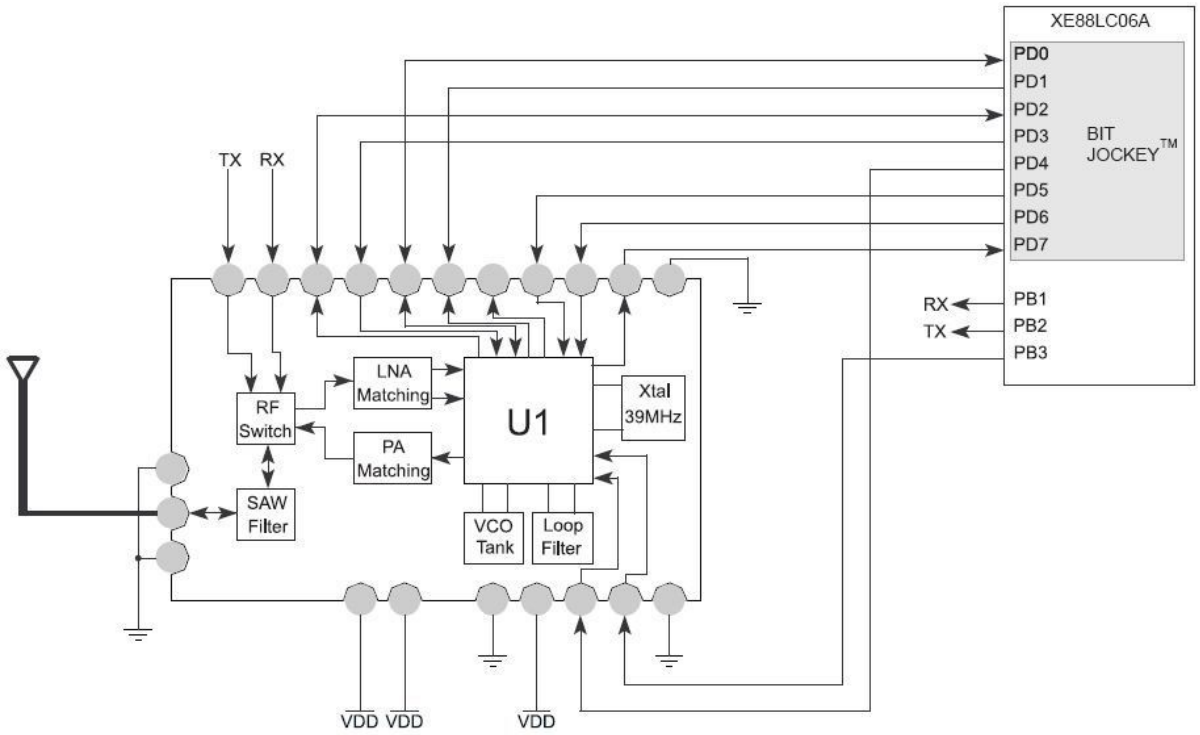
Switching sequence by pad SWITCH

Switch_ext = 1 (Bit 3, Address 00010)



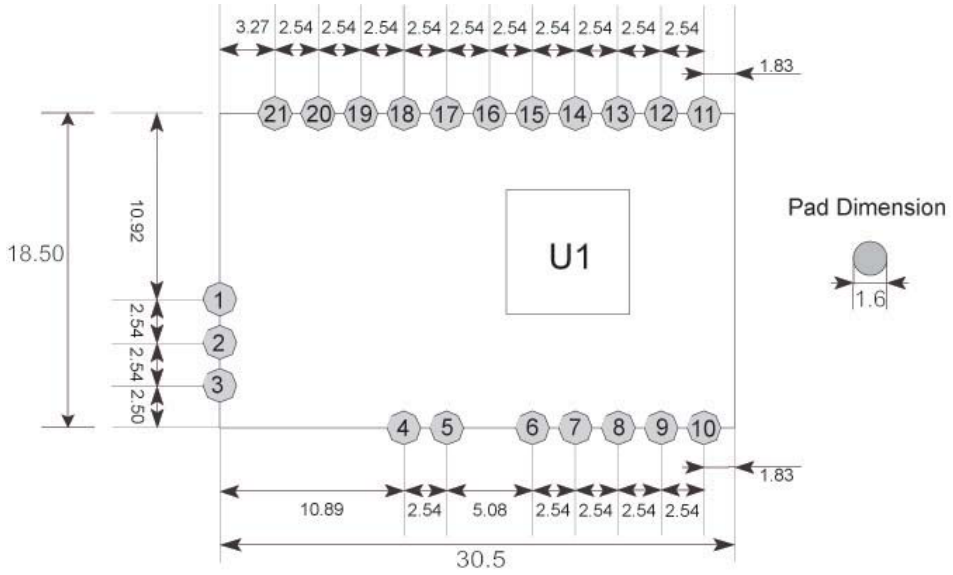
6. TYPICAL APPLICATION

The schematic below shows the DP1203 interfaced with a XEMICS' microcontroller XE88LC06A. In this typical Application, the pad SWITCH is used as an input and the two signals TX and RX are controlled directly by the Microcontroller.



7. MECHANICAL DIMENSIONS

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



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Version	Create Date:	Creater	Changes
01	21.09.10	Hermann	Create new Datasheet
02	04.10.10	Hermann	Update
03	21.06.11	Hermann	Update
04	13.10.11	Hermann	Update
05	01.07.12	Hermann	New Address

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