Linx

TECHNOLOGIES

TRM-xxx-DP1203
Data Guide
(Preliminary)

Wireless made simple®

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TRM-xxx-DP1203

Data Guide (Preliminary)

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General Description

The TRM-xxx-DP1203 is a complete Radio Transceiver Module operating in the 433, 868 and 915 MHz license free ISM (Industrial Scientific and edical) frequency bands. The TRM-xxx-DP1203 offers the unique advantage of high data rate communication up to 152.3kbps. 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.
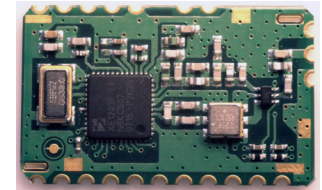

Figure 1: TRM-xxx-DP1203 Module

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

Features

- True UART to antenna solution
- 433/868/925MHz
- No RF knowledge required
- 30.5mm x 18.5mm
- Direct Digital Interface
- Fully assembled and tested
- Surface mount
- Supply voltage 2.4V–3.6V
- Frequency synthesizer step size of 500Hz
- Output power is programmable up to 15dBm
- High Rx 0.1% sensitivity down to –113dBm at 4.8kbps
- Data rate up to 153.2kbps
- Current consumption Tx = 62mA at 15dBm, Rx = 14mA
- Digital RSSI (Received Signal Strength Indicator)
- Digital FEI (Frequency Error Indicator)

Applications

- Home automation
- Process, access and building controls
- Home appliance interconnections

Electrical Specifications

Absolute Maximum Ratings

Absolute Maximum Ratings			
Description	Min.	Max.	Unit
Vdd – Power Supply	2.4	3.6	VDC
Operating Temperature	−40	+85	℃
Storage Temperature	−55	+125	℃
Soldering Temperature (max 15 seconds)		+260	℃

Figure 2: Absolute Maximum Ratings

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

Warning: Linx radio frequency ("RF") products may be used to control machinery or devices remotely, including machinery or devices that can cause death, bodily injuries, and/or property damage if improperly or inadvertently triggered, particularly in industrial settings or other applications implicating life-safety concerns. No Linx Technologies product is intended for use in any application without redundancies where the safety of life or property is at risk.

The customers and users of devices and machinery controlled with RF products must understand and must use all appropriate safety procedures in connection with the devices, including without limitation, using appropriate safety procedures to prevent inadvertent triggering by the user of the device and using appropriate security codes to prevent triggering of the remote controlled machine or device by users of other remote controllers.

All RF products are susceptible to RF interface that can prevent communication.

Do not use any Linx product over the limits in this data guide. Excessive voltage or extended operation at the maximum voltage could cause product failure. Exceeding the reflow temperature profile could cause product failure which is not immediately evident.

Do not make any physical or electrical modifications to any Linx product. This will void the warranty and regulatory and UL certifications and may cause product failure which is not immediately evident.

Detailed Electrical Specifications

Figure 3 gives the specifications of the TRM-xxx-DP1203 modules under the following conditions:

Supply voltage VDD = 3.3V, temperature = 25°C, frequency deviation Δf = 5kHz, Bit-rate = 4.8kbps, base-band filter bandwidth BWSSB = 10kHz, carrier frequency fc = 434MHz for the TRM-433-DP1203, fc = 869MHz for the TRM-868-DP1203 and fc = 915MHz for the TRM-915-DP1203, bit error rate BER = 0.1% (measured at the output of the bit synchronizer), antenna output matched at 50Ω.

Detailed Electrical Specifications						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
FR	Synthesized Frequency Range	TRM-433-DP1203	433		435	MHz
		TRM-868-DP1203	868		870	MHz
		TRM-915-DP1203	902		928	MHz
IDDSL	Sleep Mode Supply Current			0.2	1	µA
IDDST	Standby Mode Supply Current	39MHz running		0.85	1.1	mA
IDDR	Rx Mode Supply Current			14	17	mA
IDDT	Tx Mode Supply Current	P_{RF} = 5dBm		33	40	mA
		P_{RF} = 11dBm		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	kbps
P_{RF}	RF Output Power	RFOP1 (programmable)	−3	0		dBm
		RFOP2 (programmable)	+2	+5		dBm
		RFOP3 (programmable)	+7	+10		dBm
		RFOP3 (programmable)	+12	+15		dBm
TS_TR	Transmit Wake-up Time	From Oscillator Enabled		150	250	µs
TS_RE	Receive Wake-up Time	From Oscillator Enabled		0.5	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	%

Figure 3: Detailed Electrical Specifications

Application Information

Pin-out Diagram
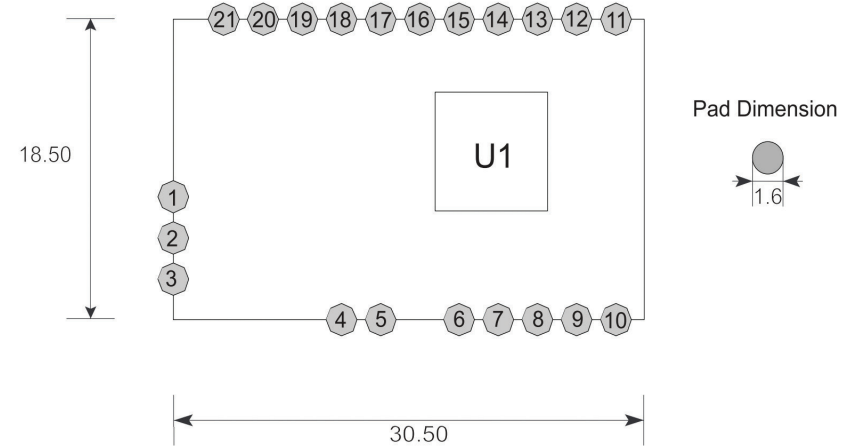
Figure 4: Pin-out Diagram

Pin Descriptions

Pin Descriptions			
Pin	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	IN	Ground
11	GND	IN	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 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

Figure 5: Pin Descriptions

Functional Description

The TRM-xxx-DP1203 is a cost-effective, high-performance, radio transceiver module designed for the wireless transmission of digital information over distances of greater than 500 meters in free space.
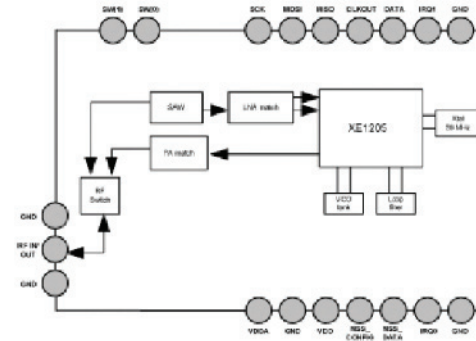

Figure 6: Antenna Switch

Operating Modes

When operating the DP1203, it might by 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 DP1203 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 DP1203 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, SWITCH pin and SWParam Configuration Register

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

Figure 7: ConfigSwitch, SWITCH pin and SWParam Configuration Register

Standard Sequence for Switching between Receiver and Transmitter

The TRM-xxx-DP1203 is able to switch between any configuration by using the 3-wire bus or by using the pin SWITCH. This section (Figures 8 and 9) describes the switching sequence from Set #1 to Set #2.

Switching sequence by using the 3-wire bus

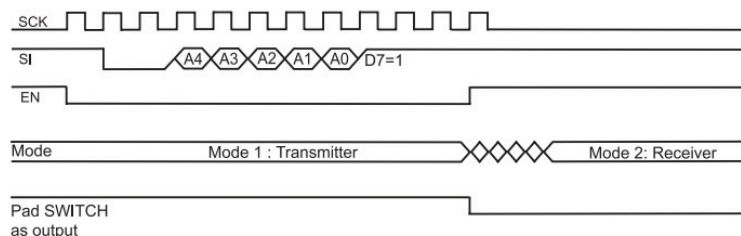Switch_ext = 0 (Bit 3, Address 00010)

Figure 8: Switching Sequence Using 3-wire Bus

Switching sequence by pad SWITCH

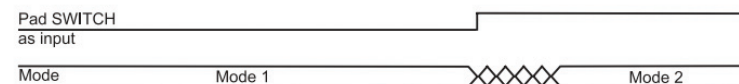Switch_ext = 1 (Bit 3, Address 00010)


Figure 9: Switching Sequence by Pad SWITCH

Serial Control Interface

A 3-wire bidirectional bus (SCK, SI, SO) is used to control the TRM-xxx-DP1203 (Figure 9). The output signal, SO, is provided by the TRM-xxx-DP1203 in opposition to the SCK and SI, which need 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).

For more information about the 3-wire bus, please refer to the XE1203 datasheet chapter; *Serial Interface Definition and Principles of Operation.*
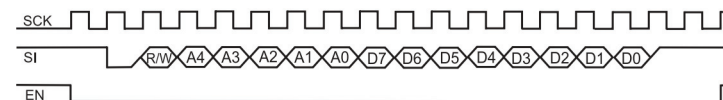
Write sequence into configuration register
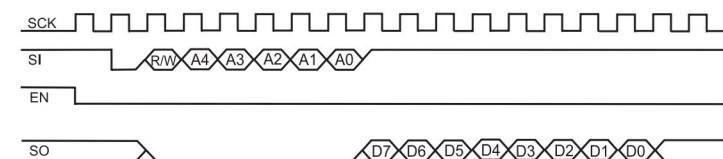
Read sequence of configuration register

Figure 10: 3-wire Bidirectional Bus

Typical Applications

The schematic in Figure 11 shows the TRM-xxx-DP1203 interfaced with a SEMTECH's microcontroller XE8806A.
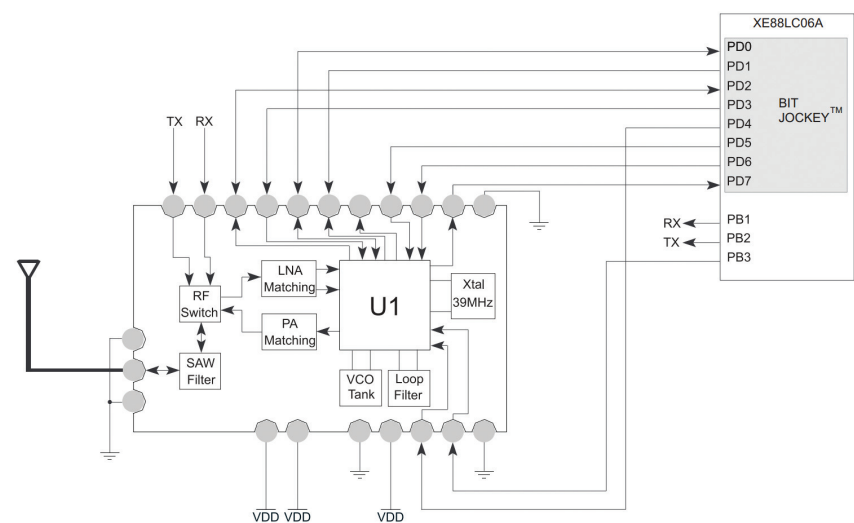

Figure 11: TRM-xxx-DP1203 and XE8806A Interfaced Schematic

Mechanical Dimensions

Figure 12 shows the physical footprint and dimensions of the TRM-xxx-DP1203 module, which should be implemented on the motherboard.
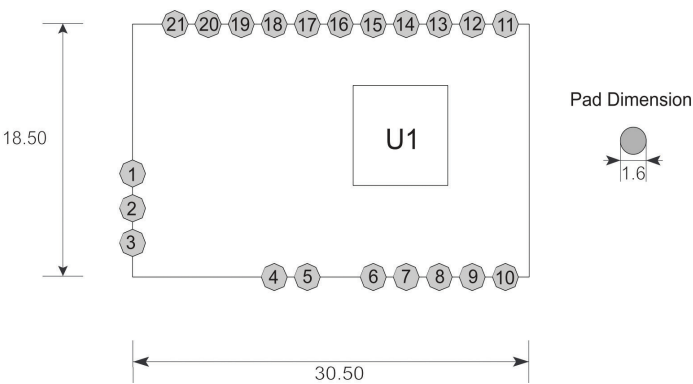

Figure 12: Mechanical Dimensions

Custom Applications

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

Ordering Information

Ordering Information		
Part No.	**Description**	**Radiotronix Part No.**
TRM-433-DP1203	433MHz DP1203 RF Transceiver Module	Wi.DP1203-433-R
TRM-868-DP1203	868MHz DP1203 RF Transceiver Module	Wi.DP1203-868-R
TRM-915-DP1203	915MHz DP1203 RF Transceiver Module	Wi.DP1203-915-R

Figure 13: Ordering Information

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