



# Product Specification

**WMDS-183-SX1302 SPI ver.**

**LoRa Module**

**BROWAN COMMUNICATIONS INC.**

BQW\_01\_0010.001

## Revision History

<b>Revision</b>	<b>Date</b>	<b>Description</b>	<b>Author</b>
1.0	Aug. 23, 2021	1 <sup>st</sup> Release	Gordon Chang
1.1	Apr. 27, 2022	Add US915 band	Gordon Chang
1.2	Jul. 06, 2022	Add SX1262	Gordon Chang
1.3	Oct. 04, 2022	Modified	Gordon Chang
1.4	Feb. 22, 2023	Add pin definitions	Terry Hsieh
1.5	Oct. 24,2023	Add PCB Diagram title	Alice Huang

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## General Specification

No.	Item	Description
1	SKU	<ul style="list-style-type: none"> <li>US915/AU915/AS923</li> <li>EU868</li> <li>CN470</li> </ul>
2	Chipset	<ul style="list-style-type: none"> <li>SX1302+SX1250</li> <li>Additional SKU with SX1262 for LBT</li> </ul>
3	Bandwidth	Follow LoRaWAN Regional Parameters <ul style="list-style-type: none"> <li>125KHz</li> <li>500KHz</li> </ul>
4	RF Power	<ul style="list-style-type: none"> <li>US915 +26.5 (+/-1) dBm</li> <li>EU868 +14 (+/-1) dBm</li> </ul>
5	Power Supply	5VDC, 400mA (max)
6	Antenna	1 MHF1/UFL connector on board for external antenna
7	Interface	<ul style="list-style-type: none"> <li>SPI for data communication</li> <li>I2C for temperature IC (SHT20)</li> </ul>
8	GPIOs	To control SX1262 (spectral scan) ** <ul style="list-style-type: none"> <li>Chip select (Low-active)</li> <li>Reset</li> </ul>
9	Form Factor	<ul style="list-style-type: none"> <li>Mini-PCle</li> <li>40 x 50 (w/golden pins) x 3 mm</li> </ul>
10	Channel Plan	Follow LoRaWAN Regional Parameters <ul style="list-style-type: none"> <li>US915</li> <li>EU868</li> <li>AU915</li> <li>AS923</li> <li>CN470</li> </ul>
Note ** Shared SPI		

## LoRa RF Specification – US915

No.	Item	Description																		
1	Channels	US915 (known as US 902-928)																		
2	Bandwidth	125KHz/ 500KHz																		
3	Channel Plan -US915	<ul style="list-style-type: none"> <li><b>Upstream</b> (64 channels @ 125KHz BW, starting at 902.3MHz and incrementing linearly by 200KHz to 914.9MHz)</li> </ul> <table border="0"> <thead> <tr> <th>Frequency (MHZ)</th> <th>Spreading Factor</th> </tr> </thead> <tbody> <tr> <td>■ 902.3</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 902.5</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 902.7</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 902.9</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 903.1</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 903.3</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 903.5</td> <td>SF7BW125 to SF10BW125</td> </tr> <tr> <td>■ 903.7</td> <td>SF7BW125 to SF10BW125</td> </tr> </tbody> </table>	Frequency (MHZ)	Spreading Factor	■ 902.3	SF7BW125 to SF10BW125	■ 902.5	SF7BW125 to SF10BW125	■ 902.7	SF7BW125 to SF10BW125	■ 902.9	SF7BW125 to SF10BW125	■ 903.1	SF7BW125 to SF10BW125	■ 903.3	SF7BW125 to SF10BW125	■ 903.5	SF7BW125 to SF10BW125	■ 903.7	SF7BW125 to SF10BW125
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■ 903.7	SF7BW125 to SF10BW125																			

No.	Item	Description
		■ <b>903.9 SF7BW125 to SF10BW125</b>
		■ <b>904.1 SF7BW125 to SF10BW125</b>
		■ <b>904.3 SF7BW125 to SF10BW125</b>
		■ <b>904.5 SF7BW125 to SF10BW125</b>
		■ <b>904.7 SF7BW125 to SF10BW125</b>
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		■ <b>905.1 SF7BW125 to SF10BW125</b>
		■ <b>905.3 SF7BW125 to SF10BW125</b>
		■ 905.5 SF7BW125 to SF10BW125
		■ 905.7 SF7BW125 to SF10BW125
		■ 905.9 SF7BW125 to SF10BW125
		■ 906.1 SF7BW125 to SF10BW125
		■ 906.3 SF7BW125 to SF10BW125
		■ 906.5 SF7BW125 to SF10BW125
		■ 906.7 SF7BW125 to SF10BW125
		■ 906.9 SF7BW125 to SF10BW125
		■ 907.1 SF7BW125 to SF10BW125
		■ 907.3 SF7BW125 to SF10BW125
		■ 907.5 SF7BW125 to SF10BW125
		■ 907.7 SF7BW125 to SF10BW125
		■ 907.9 SF7BW125 to SF10BW125
		■ 908.1 SF7BW125 to SF10BW125
		■ 908.3 SF7BW125 to SF10BW125
		■ 908.5 SF7BW125 to SF10BW125
		■ 908.7 SF7BW125 to SF10BW125
		■ 908.9 SF7BW125 to SF10BW125
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		■ 909.7 SF7BW125 to SF10BW125
		■ 909.9 SF7BW125 to SF10BW125
		■ 910.1 SF7BW125 to SF10BW125
		■ 910.3 SF7BW125 to SF10BW125
		■ 910.5 SF7BW125 to SF10BW125
		■ 910.7 SF7BW125 to SF10BW125
		■ 910.9 SF7BW125 to SF10BW125
		■ 911.1 SF7BW125 to SF10BW125
		■ 911.3 SF7BW125 to SF10BW125
		■ 911.5 SF7BW125 to SF10BW125
		■ 911.7 SF7BW125 to SF10BW125
		■ 911.9 SF7BW125 to SF10BW125
		■ 912.1 SF7BW125 to SF10BW125
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		■ 912.5 SF7BW125 to SF10BW125
		■ 912.7 SF7BW125 to SF10BW125
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		<ul style="list-style-type: none"> <li>■ 914.1 SF7BW125 to SF10BW125</li> <li>■ 914.3 SF7BW125 to SF10BW125</li> <li>■ 914.5 SF7BW125 to SF10BW125</li> <li>■ 914.7 SF7BW125 to SF10BW125</li> <li>■ 914.9 SF7BW125 to SF10BW125</li> </ul> <p>- <b>Upstream</b> (8 channels @ 500KHz BW, starting at 903.0MHz and incrementing linearly by 1.6MHz to 914.2MHz)</p> <table> <thead> <tr> <th>Frequency (MHZ)</th> <th>Spreading Factor</th> </tr> </thead> <tbody> <tr> <td>■ 903.0</td> <td>SF8BW500</td> </tr> <tr> <td>■ <b>904.6</b></td> <td><b>SF8BW500</b></td> </tr> <tr> <td>■ 906.2</td> <td>SF8BW500</td> </tr> <tr> <td>■ 907.8</td> <td>SF8BW500</td> </tr> <tr> <td>■ 909.4</td> <td>SF8BW500</td> </tr> <tr> <td>■ 911.0</td> <td>SF8BW500</td> </tr> <tr> <td>■ 912.6</td> <td>SF8BW500</td> </tr> <tr> <td>■ 914.2</td> <td>SF8BW500</td> </tr> </tbody> </table> <p>- <b>Downstream</b> (8 channels @ 500KHz BW, starting at 923.3MHz and incrementing linearly by 600KHz to 927.5MHz)</p> <table> <thead> <tr> <th>Frequency (MHZ)</th> <th>Spreading Factor</th> </tr> </thead> <tbody> <tr> <td>■ <b>923.3</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>923.9</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>924.5</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>925.1</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>925.7</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>926.3</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>926.9</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>927.5</b></td> <td><b>SF7BW500 to SF12BW500 (RX1)</b></td> </tr> <tr> <td>■ <b>923.3</b></td> <td><b>SF12BW500 (RX2)</b></td> </tr> </tbody> </table>	Frequency (MHZ)	Spreading Factor	■ 903.0	SF8BW500	■ <b>904.6</b>	<b>SF8BW500</b>	■ 906.2	SF8BW500	■ 907.8	SF8BW500	■ 909.4	SF8BW500	■ 911.0	SF8BW500	■ 912.6	SF8BW500	■ 914.2	SF8BW500	Frequency (MHZ)	Spreading Factor	■ <b>923.3</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>923.9</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>924.5</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>925.1</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>925.7</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>926.3</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>926.9</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>927.5</b>	<b>SF7BW500 to SF12BW500 (RX1)</b>	■ <b>923.3</b>	<b>SF12BW500 (RX2)</b>
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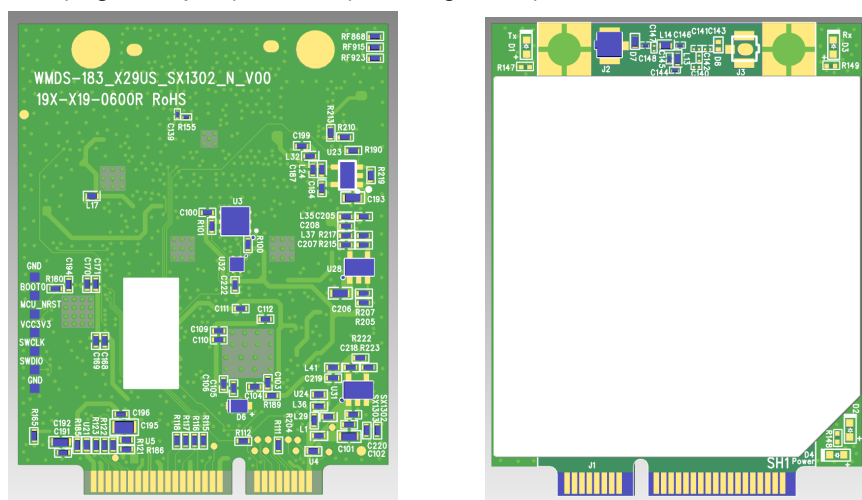
## LoRa RF Specification – EU868

No.	Item	Description												
1	Channels	EU868 (known as EU 863-870)												
2	Bandwidth	125KHz/ 250KHz												
3	Channel Plan -EU868	<p>- <b>Upstream</b></p> <p>-</p> <table> <thead> <tr> <th>Frequency (MHZ)</th> <th>Spreading Factor</th> </tr> </thead> <tbody> <tr> <td>■ 868.1</td> <td>SF7BW125 to SF12BW125</td> </tr> <tr> <td>■ 868.3</td> <td>SF7BW125 to SF12BW125 and SF7BW250</td> </tr> <tr> <td>■ 868.5</td> <td>SF7BW125 to SF12BW125</td> </tr> <tr> <td>■ 867.1</td> <td>SF7BW125 to SF12BW125</td> </tr> <tr> <td>■ 867.3</td> <td>SF7BW125 to SF12BW125</td> </tr> </tbody> </table>	Frequency (MHZ)	Spreading Factor	■ 868.1	SF7BW125 to SF12BW125	■ 868.3	SF7BW125 to SF12BW125 and SF7BW250	■ 868.5	SF7BW125 to SF12BW125	■ 867.1	SF7BW125 to SF12BW125	■ 867.3	SF7BW125 to SF12BW125
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■ 867.1	SF7BW125 to SF12BW125													
■ 867.3	SF7BW125 to SF12BW125													

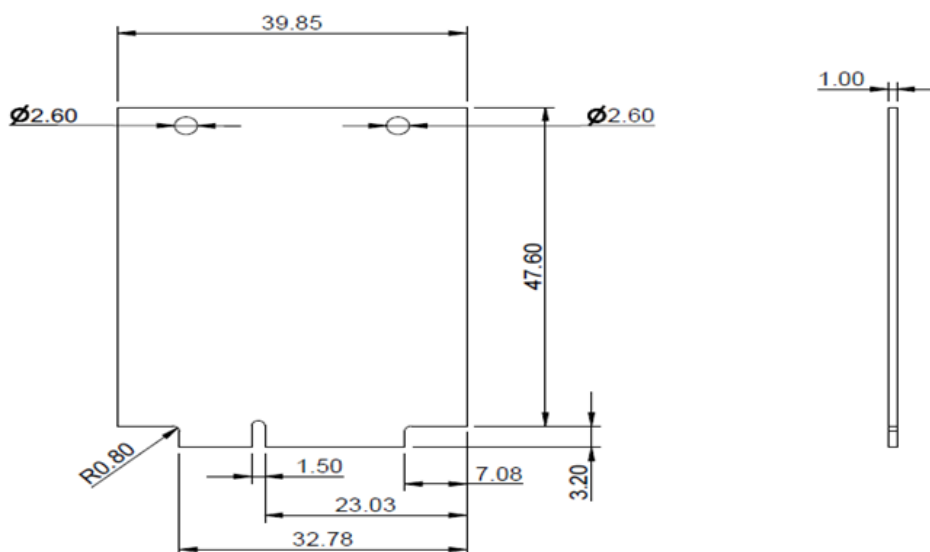
No.	Item	Description
		<ul style="list-style-type: none"> <li>■ 867.5 SF7BW125 to SF12BW125</li> <li>■ 867.7 SF7BW125 to SF12BW125</li> <li>■ 867.9 SF7BW125 to SF12BW125</li> <li>■ 868.8 FSK</li> </ul> <p>- <b>Downstream</b></p> <p>-</p> <p>Frequency (MHZ)      Spreading Factor</p> <ul style="list-style-type: none"> <li>■ Uplink channels 1-9 (RX1)</li> <li>■ 869.525 MHz / DR0 (SF12, 125 kHz)</li> </ul>
Note		

## LoRa Module Size

Size: 39.85 x 50.8 (w/golden pins) x 3 mm (shielding frame)

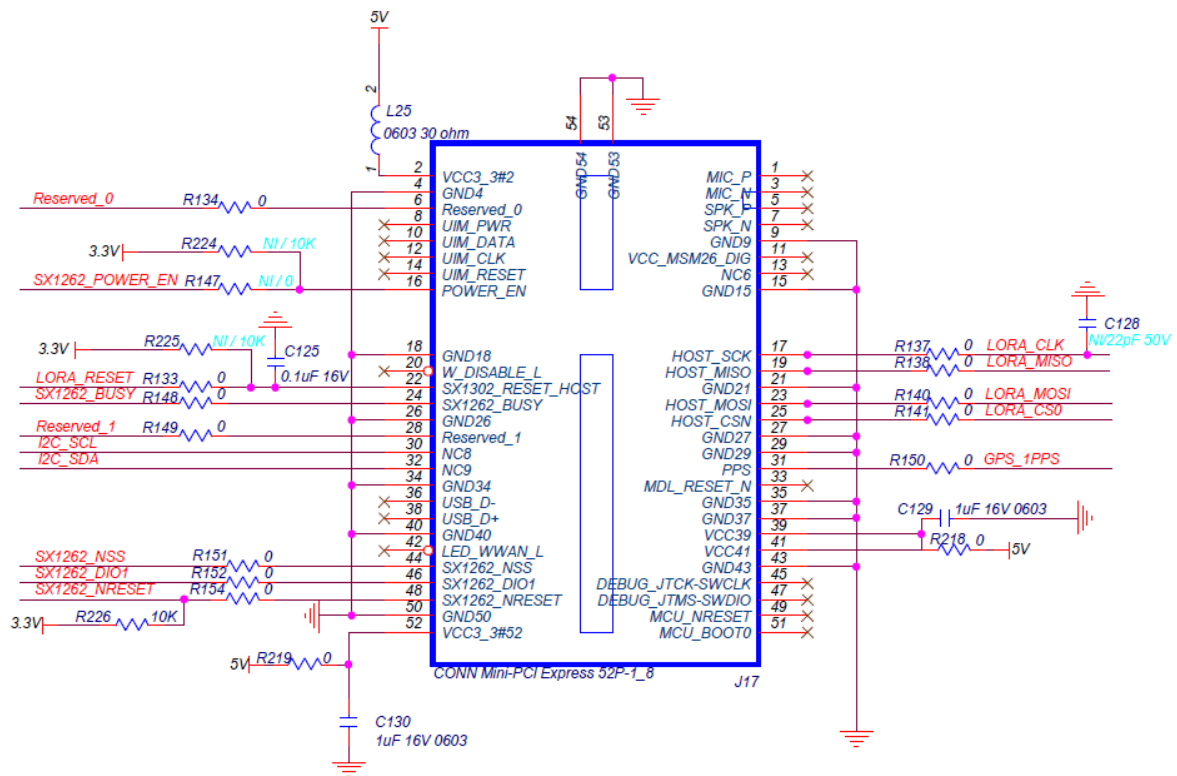


PCB Diagram





# LoRa Mini-PCle Pin Definition



Pin#	Signal Name	Host I/O
6	Reserved_0	GPIO
16	SX1262_POWER_EN	GPIO
22	LORA_RESET	GPIO
24	SX1262_BUSY	GPIO
28	Reserved_1	GPIO
30	I2C_SCL	I2C
32	I2C_SDA	I2C
44	SX1262_NSS	SPI SS1
46	SX1262_DIO1	GPIO
48	SX1262_NRESET	GPIO

Pin#	Signal Name	Host I/O
17	LORA_CLK	SPI CLK
19	LORA_MISO	SPI MISO
23	LORA_MOSI	SPI MOSI
25	LORA_CS0	SPI SS0
31	GPS_1PPS	GPS

Pin#	Signal Name	Host I/O
2,39,41,52	+5V	Vcc
4,18,26,34,40,50, 9,11,13,15,21,27, 29,35,37,43	GND	Ground

## Pinout Description

Type	Description
IO	Bidirectional
DI	Digital input
DO	Digital Output
PI	Power input
NC	No Connection

Pin Number	Mini PCIe Pin Rev. 2.0	WMDS-183 Pin	Type	Description	Remarks
6	1.5V	Reserved_0	NC	No Connection	
16	UIM_VPP	POWER_EN	NC	No Connection	
22	PERST#	SX1302_RESET_HOST	DI	WMDS-183 reset input	Active high, > 200ns for SX1302 reset. 47K pulled down internally.
Pin Number	Mini PCIe Pin Rev. 2.0	WMDS-183 Pin	Type	Description	Remarks
24	3.3Vaux	SX1262_BUSY	DO	SX1262 BUSY	SX1262 busy indicator
28	1.5V	Reserved_1	IO	Reserved	Connect to SX1302 GPIO[8]. Leave open if not used.
30	SMB_CLK	NC8	DI	I2C_SCL	Connect to SHT20
32	SMB_DATA	NC9	IO	I2C_SDA	Connect to SHT20
44	LED_WLAN#	SX1262_NSS	D1	SX1262 SPI CS	
46	LED_WPAN#	SX1262_DIO1	DO	SX1262 DIO1	Internal use only. Leave open if not used.
48	1.5V	SX1262_NRESET	DI	SX1262 Reset	Active low, > 100us for SX1262 reset. 47K pulled up internally.
Pin Number	Mini PCIe Pin Rev. 2.0	WMDS-183 Pin	Type	Description	Remarks
17	RESERVED	HOST_SCK	DI	SPI clock	For SX130x and SX126x
19	RESERVED	HOST_MISO	DO	SPI MISO	For SX130x and SX126x
23	PERn0	HOST_MOSI	DI	SPI MOSI	For SX130x and SX126x
25	PERp0	HOST_CSN	D1	SX130x SPI CS	
31	PETn0	PPS	DI	External GPS 1 PPS Pulse Input	To SX130x
Pin Number	Mini PCIe Pin Rev. 2.0	WMDS-183 Pin	Type	Description	Remarks
2,39,41,52	3.3Vaux	VCCxx	PI	DC 5V	