SEMTECH SX1280 2.4GHz Development Kit User Guide

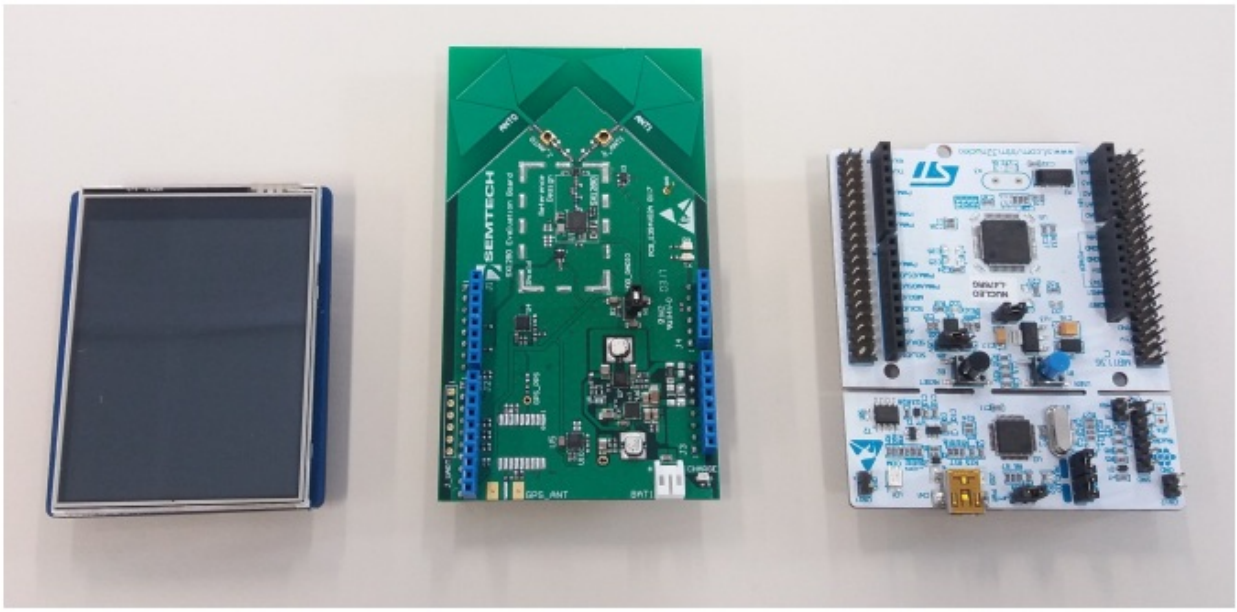
Contents

SEMTECH SX1280 2.4GHz Development Kit

Contents of delivery

- The Development Kits for the SX1280 and SX1281 transceivers are delivered with the following contents:
  – 2 SX1280 Development Kits
  – 2 connection cables Mini-USB / USB

Before powering the kit, make sure to assemble the three parts shown in the image below



When you assemble the parts, make sure that they are correctly oriented, as shown below:

First Use

Connect the SX1280 Development Kit

- Plug the mini-USB / USB cable into the mini-USB socket of the SX1280 Development Kit
- Plug the mini-USB / USB cable into the USB socket of your PC The SX1280 Development Kit will power on and connect to your PC.

Welcome Display

The welcome screen with the top menu is visible upon power-on. You can access the following test modes:

- **– DEMO Ping Pong**
  This performs a bidirectional range test between a pair of radio units.
- **– DEMO PER**
  – This performs a unidirectional packet error rate test between user-defined Master and Slave units.
- – **DEMO Ranging**
  This performs a ranging test between user-defined Master and Slave units.

Figure 3: Welcome Display

Additionally, you can access the Radio Test Modes, which provide access to the basic operating modes of the radio. The Radio Settings allow you to modify the communication and modem settings used in the demos. The Utilities menu provides information about the peripherals and version of the installed firmware.

. How to Navigate with the Touch Screen

In the kit the following conventions are adopted:

- Menus, functions and configuration of settings are indicated in Green
- Data that cannot be modified is indicated in White
- Result data from tests are indicated in Yellow

Check and Upload the Firmware File

Before using the SX1280 Development Kit, make sure to have the latest firmware:

- Go to the Utilities section on page 14.
- Check the Firmware Version.
- If it is not the latest version, download the firmware from the website www.semtech.com and save it to your PC

The firmware can then be uploaded to the SX1280 Development Kit.

To upload the firmware file:

- Connect the SX1280 Development Kit as explained in Section 2
- Allow your computer to display the kit as an extra device
- Drag and drop the .bin file that has been provided to you or that you have downloaded from the Semtech

website.

- The kit will initialize and eventually ask you to calibrate the screen, simply follow the on-screen instructions.

Ping Pong Demo

A Ping Pong Test is a bidirectional test between a pair of SX1280 kits. One needs to be configured as the Ping Pong Master and the other as the Ping Pong Slave. Communication is initiated by the Master whose packet is received by the Slave from which the PER may be calculated.
In response to this packet the Slave sends an acknowledgement, which also contains statistical information about the link calculated by the Slave. The Master, upon receiving this response, will then display both the PER for the Master to Slave and the Slave to Master packet exchanges.

Figure 4. PING PONG Demo Slave Display

Press on Demo Ping Pong from the Welcome Display to access this test. You can change the radio settings from this menu:

Press SETTINGS to adjust the same radio settings on the Master and the Slave units. See Section 7 for more details on the radio settings.

Before starting the test:

- Place the Slave unit into the desired position
- Place the Master unit into the desired position
- Press SLAVE to toggle a unit to MASTER and vice-versa

To start the Ping Pong test:

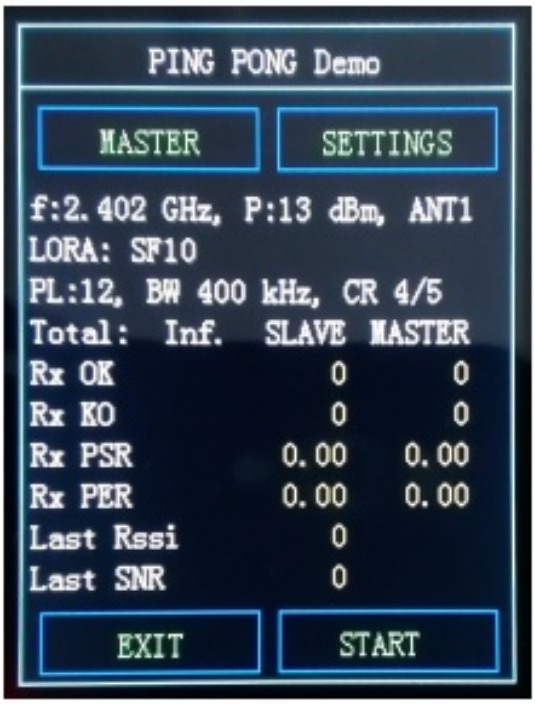


Figure 5: PING PONG Demo Master Display

Press START first on the Slave unit then on the Master Unit

- Both units will exchange data until you press STOP on either unit.
- The reception and transmission of data are indicated by LEDs on each unit.
- The result of the test is displayed on the screen of the Master unit:
- Rx OK : number of packets completely received
- Rx KO: number of packets not completely received
- Rx PSR: Percentage Packet Success Rate for the last packet exchange
- Rx PER: Percentage Packet Error Rate for the last packet exchange
- Last RSSI: Received Signal Strength Indication [dBm]
- Last SNR: Signal to Noise Ratio for the last packet exchange [dB]

PER Demo

A Packet Error Rate (PER) test is a unidirectional test where one kit is configured as a Master and the other as a Slave. In this case the Master will assume the role of transmitter and the Slave that of receiver. The aggregate PER of the packets received by the Slave, expressed as a percentage, is calculated and displayed on the receiver (Slave). Given this is a unidirectional test, the packet error rate is not displayed on the transmitter (Master).

Press on Demo PER from the Welcome Display to access this test. You can change the radio settings from this menu:

Press SETTINGS to adjust the same radio settings on the Master and the Slave units. See Section 7 for more details on the radio settings.

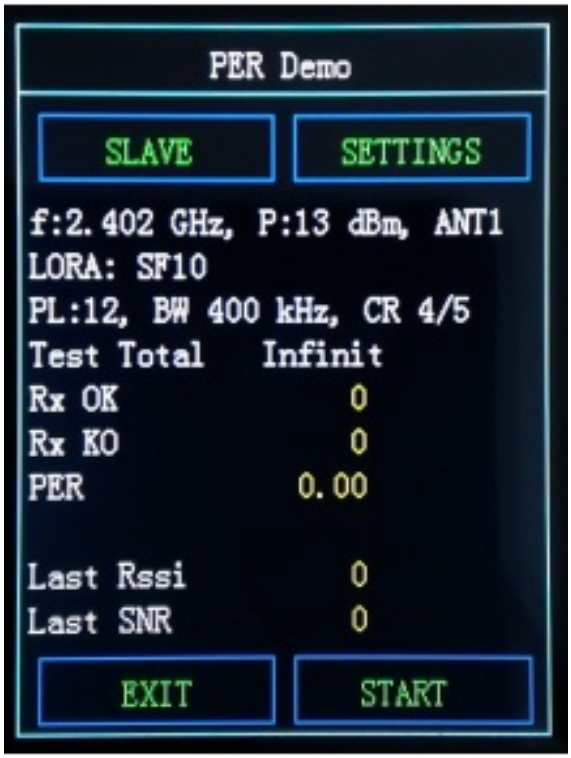


Figure 6: PER Demo Slave Display

Before starting the test:

- Place the Slave unit into the desired position
- Place the Master unit into the desired position
- Press SLAVE to toggle the unit to MASTER and vice-versa

To start the PER test:

Press START first on the Slave unit then on the Master Unit

- Both units will exchange data until you press STOP on either unit.
  The reception and transmission of data are indicated by LEDs on each unit.
- The result of the Demo is displayed on the screen of the Slave unit:
- Rx OK : number of packets completely received
- Rx KO: number of packets not completely received
- Rx PSR: Percentage Packet Success Rate for the last packet exchange
- Rx PER: Percentage Packet Error Rate for the last packet exchange
- Last RSSI: Received Signal Strength Indication [dBm]
- Last SNR: Signal to Noise Ratio for the last packet exchange [dB]

Figure 7: PER Demo Master Display

Ranging Demo5. Ranging Demo

Press on Demo Ranging from the Welcome Display to access this test.

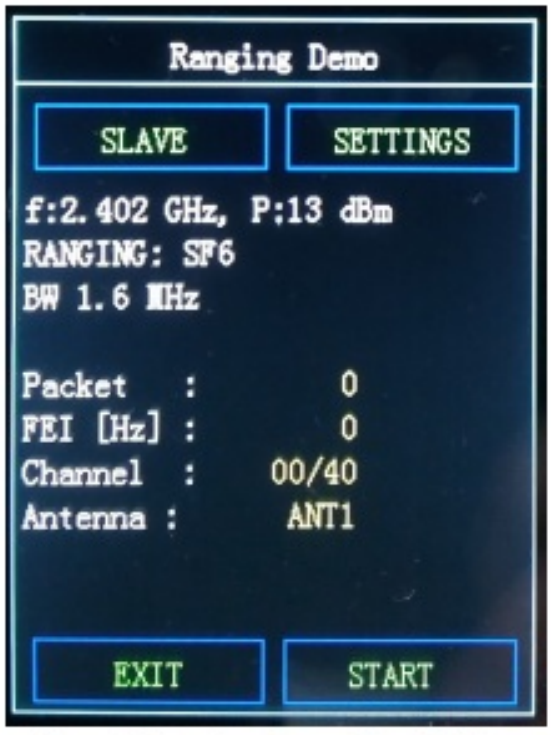


Figure 8: Ranging Demo Slave Display

You can change the radio settings from this menu:

Press SETTINGS to adjust the same radio settings on the Master and the Slave units. See Section 7 for more details on the radio settings.

From the Radio Settings menu you can change the ranging settings:

`Press RANGING SETTINGS

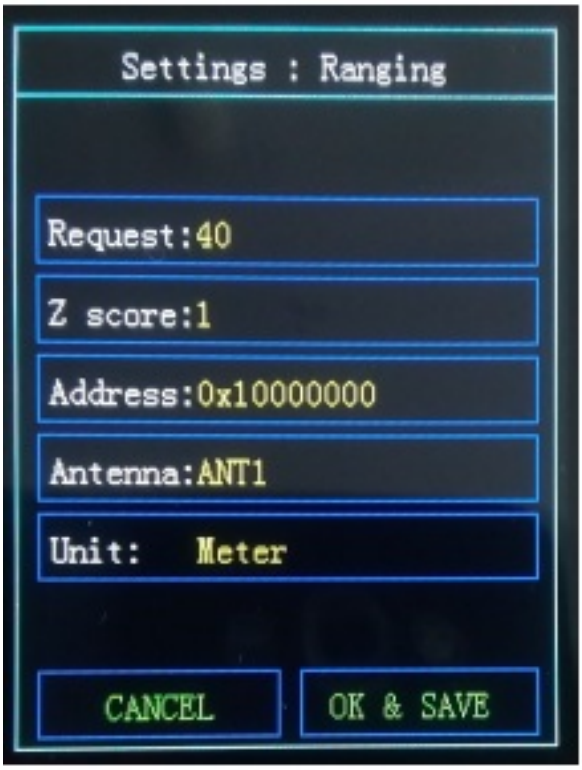


Figure 10: Ranging Demo Settings Display

Before starting the test:

- Place the Slave unit into the desired position
- Place the Master unit into the desired position

- Press SLAVE to toggle the unit to MASTER and vice-versa

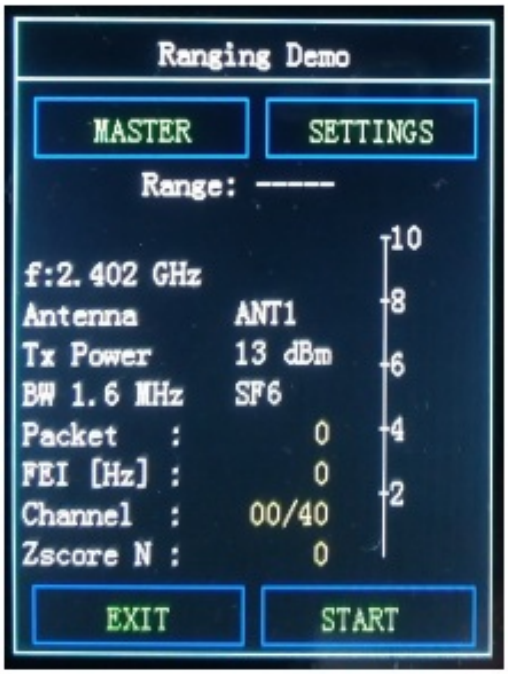


Figure 11: Ranging Demo Master Display before start

When testing in Ranging Demo, refresh the result and the graphical illustration by hitting the REFRESH button.

Radio Test Modes

The Radio Test Modes menu allows you to select certain preset test modes. These test modes allow the test of consumption of the radio in the respective modes, additionally that can be of use for testing the specification claims of the datasheet or various modem performances without the need to create custom firmware.

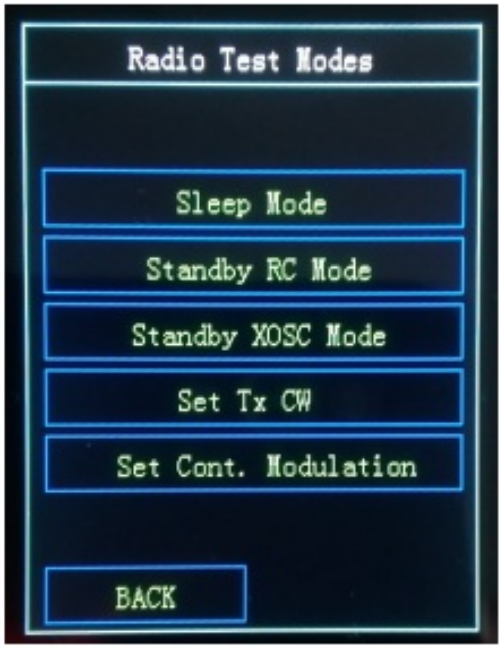


Figure 13: Radio Test Modes Display

Radio Settings

The radio settings available depend upon the modulation, denoted Mod in the sub-menu Radio Settings. For each modem you can modify the modulation and power parameters. The registered settings are proper to each modulation.

LORA Modulation

The radio settings available for LORA modulation are:

- The Frequency (Freq) as described in Section 7.5
- The Transmission Power (Tx Pow): in steps of 1 dBm between -18 dBm and + 13 dBm
- Param 1: choose a Spreading Factor between SF5 and SF10
- Param 2 : choose a BandWidth (BW) of either 400 kHz, 800 kHz or 1.6 MHz
- Param 3: The Coding Rate (CR) of the Forward Error Correction applied to the packet, of either CR 4/5, 4/6,4/7, 4/8 or CRLI 4/5, 4/6, 4/7
- Payload: size of the payload between 12 and 248 bytes

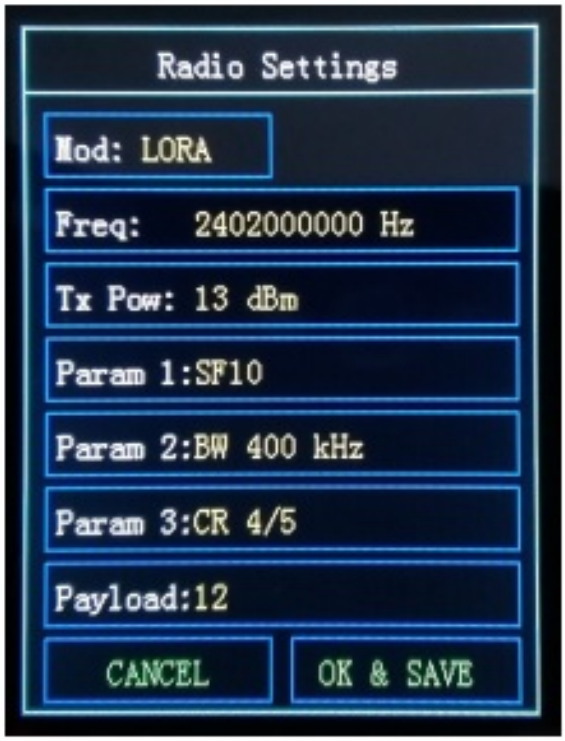


Figure 14: LORA Radio Settings Display

FLRC Modulation

The radio settings available for FLRC modulation are:

- The Frequency (Freq) as described in Section 7.5
- The Transmission Power (Tx Power): in steps of 1 dBm between -18 dBm and +13 dBm
- Param 1: choose a data rate and an associated bandwidth (BW)
- Param 2 : The Coding Rate (CR) of the Forward Error Correction applied to the packet, of either 1, ½ or 3/4
- Param 3: Bandwidth-Time bit period product (BT) of either 1, 0.5 or OFF
- Payload: size of the payload between 12 and 120 bytes

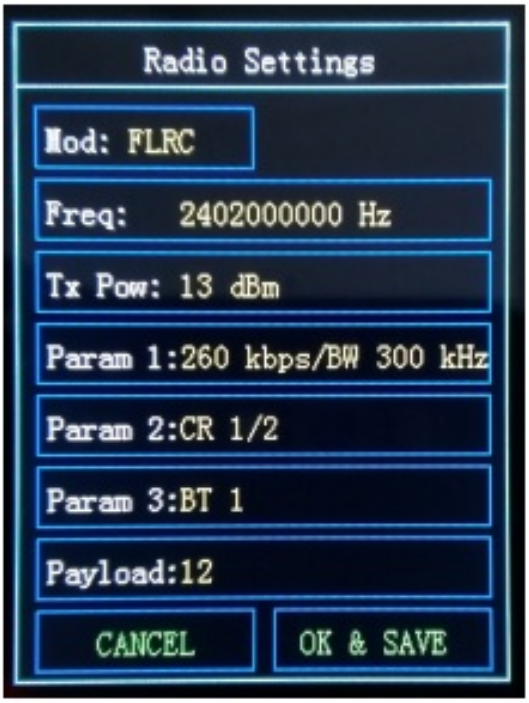


Figure 15: FLRC Radio Settings Display

GFSK Modulation

The radio settings available for GFSK modulation are:

- The Frequency (Freq) as described in Section 7.5
- The Transmission Power (Tx Power): in steps of 1 dBm between -18 dBm and +13 dBm
- Param 1: choose a data rate and an associated bandwidth (BW)
- Param 2 : Modulation Index (Mod. i) between 0.35 and 4-
- Param 3: Bandwidth-Time bit period product (BT) of either 1, 0.5 or OFF
- Payload: size of the payload between 12 and 248 bytes

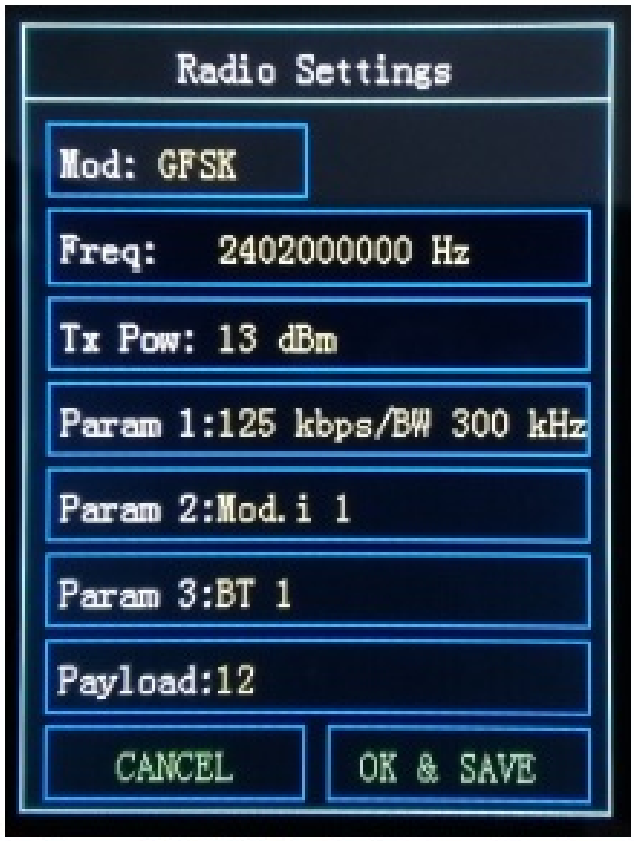


Figure 16: GFSK Radio Settings Display

Ranging Modem

The radio settings available for the Ranging Modem are:

- -The Frequency (Freq) as described in Section 7.5
- The Transmission Power (Tx Pow): in steps of 1 dBm between -18 dBm and + 13 dBm
- Param 1: choose a Spreading Factor between SF5 and SF10
- Param 2 : choose a BandWidth (BW) of either 400 kHz, 800 kHz or 1.6 MHz
- Param 3: The Coding Rate (CR) of the Forward Error Correction applied to the packet, of either CR 4/5, 4/6,4/7, 4/8 or CRLI 4/5, 4/6, 4/7
- Payload: size of the payload between 12 and 248 bytes
- The button BEST SET selects the best settings for ranging

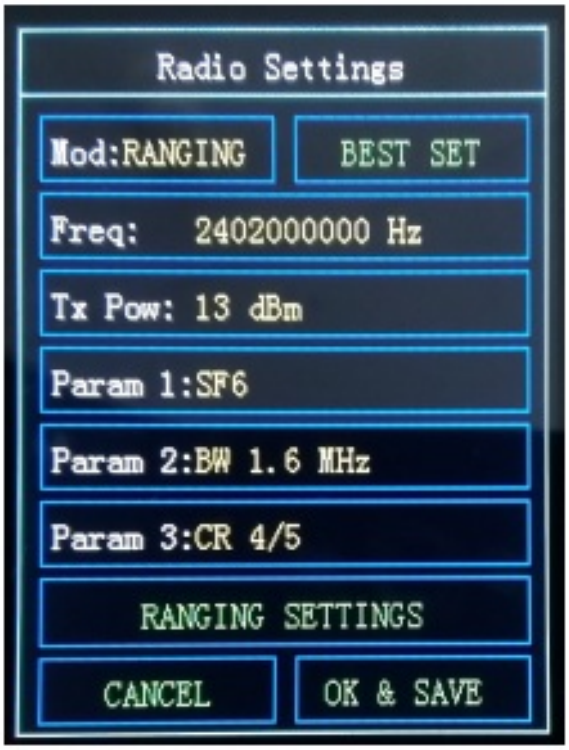


Figure 17: Ranging Modem Radio Settings Display

From this menu you can also access the Ranging Settings as in Section 5.

Frequency Setting

In this menu you can set the frequency for each modulation:

- -Select the frequency Step that you wish to tune: from 1 Hz to 10 MHz
- With – and + change the value of the step of your tuned frequency
- The resulting frequency in displayed in Freq
- Additionally you can select one of the three Preset frequencies by simply pressing the desired frequency value.
-

Figure 18: Frequency Setting Display

8. Utilities

In this menu you can reset the SX1280 Development Kit to its factory settings:
Press on **Fact. Reset**

The Utilities section is also useful to check:

- the Firmware Version
- the GPS satellites that the unit sees and the resulting position in Pos.
  If no satellite can be seen, the unit will display Satellites searching
- the Proximity sensor output – each antenna has an independent capacitive proximity sensor that allows the detection of proximate objects – here we see the raw sensor output.

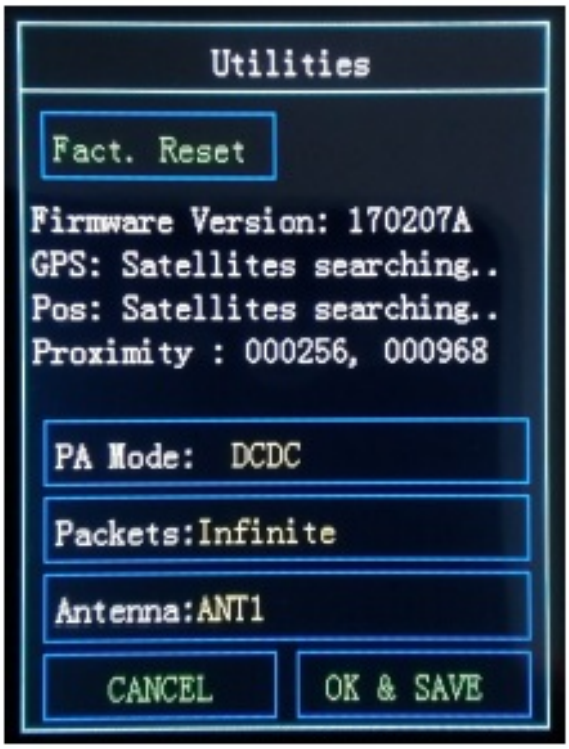


Figure 19: Utilities Display

You can modify:

- the Power Amplifier mode (PA Mode): either DCDC or LDO
- the Packets limit: Infinite, 100, 200, 500 or 1000
- the Antenna in use: either ANT1 or ANT2

Important Notice

Contact Information

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Documents / Resources

	SEMTECH SX1280 2.4GHz Development Kit [pdf] User Guide SX1280, 2.4GHz Development Kit, SX1280 2.4GHz Development Kit, SX1280 SX1281 Long Range Low Power 2.4 GHz Transceiver, SX1281