

MIO Tools Manual

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Please email to us, to get a copy of the MIO Tools software.



MIO Tools Manual

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1. MIO-Lora

a. Specifications

Item	Description
Power	DC 5-12V, max current consumptions < 200mA.
Wireless Technology	Lora 915MHz module.
Size	8.5 cm x 8.5 cm x 5.0 cm
DIP Switch	8-bit for RID, 4-bit for FID, 4-bit for Setting.
Program port	One TTL 3-pin port.
Digital Input	One. Vary depends on model.
Relay	One. Vary depends on model.
Cable layout	V+, V-, Relay COM, Relay NC, Relay NO.

b. General

MIO-Lora is a Lora-based wireless panic button. When the button is pressed, the onboard relay will trigger, and signal will be sent out to remote Host. After receiving the signal, the remote Host should decode it to get information from where the signal comes from. The button will be latched until released by the key. As long as the button is latched, the on board relay will be energized. A siren or strobe light can be connected to the relay, to show alert.

The relay trigger pattern can be configured at the Setting DIP switch; it could trigger ON and OFF, or alternately, or constantly ON.

We need to set the Lora frequency channel (FID) correctly, so that the receiver at the remote Host can receive the signal. The transmitter and receiver channel must be same for the communication to take place. The FID can be set at the CID DIP switch on board. Total 16 channels available.

We also need to set the Device ID (RID), so that the host will know the signal comes from which device. The RID can be set at the DID DIP switch on board.

In cases where longer range is required, this device can be a stepping stone to access farther device. By turning ON the repeater feature, this device will retransmit the signal it just received. Devices that located beyond reach by the Host, could be reached by the device or repeater located between Host and end device. But we should enable the repeater function only when necessary. This is to avoid too many duplicated wireless signal that could cause heavy work load on the receiver.

Most country only allow certain frequencies band for Lora, therefore we need to select a channel that is allowed to use. By default the device has built in the following frequency band for the 16 channels.

Default Channel Frequency			
Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	902.0	8	915.0

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1	903.625	9	916.625
2	905.25	10	918.25
3	906.875	11	919.875
4	908.5	12	921.50
5	910.125	13	923.125
6	911.75	14	924.75
7	913.375	15	926.375

But if your frequency is not listed above, you may program it using MIO Tools. By doing so, you are not using the default channel.

After every setting change, either hardware or software, remember to restart power for the new setting to take effect.

c. Hardware setting

After every setting change, remember to reset the device's power.

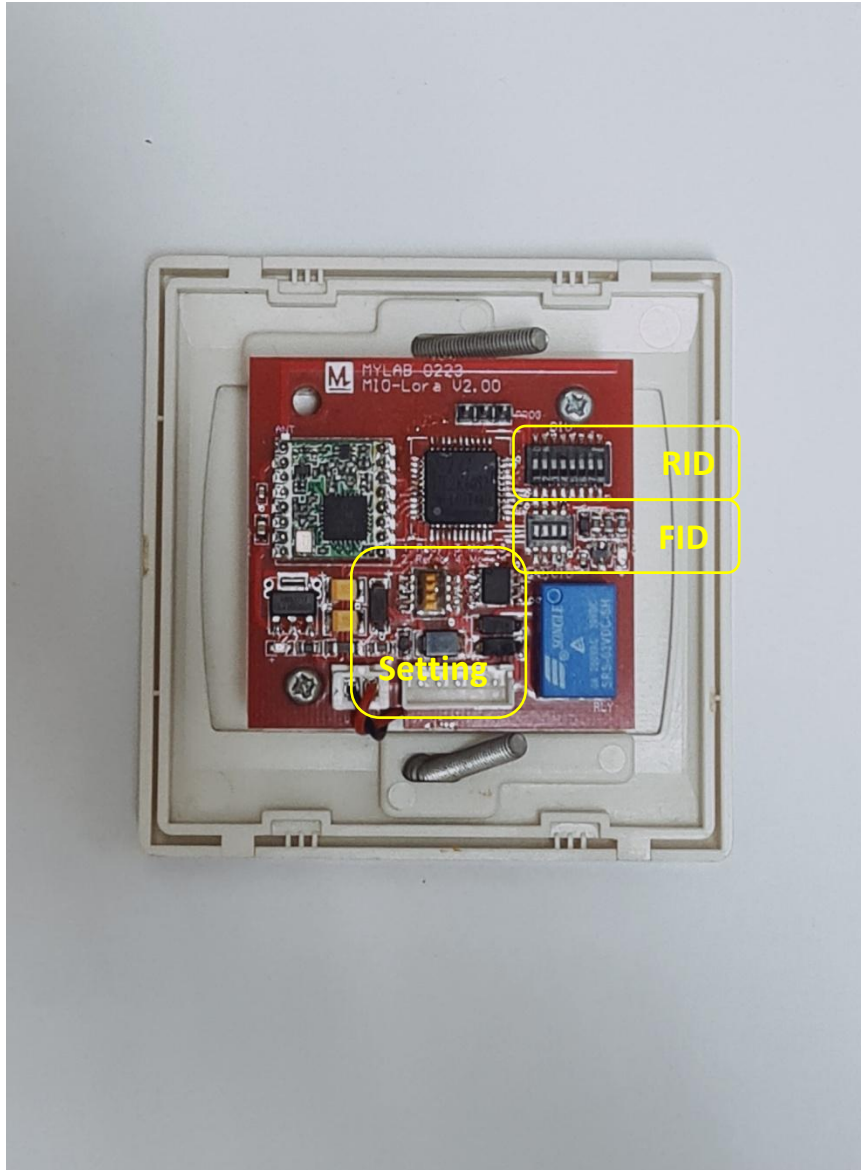


The FID and RID can be set at the onboard DIP switch.

Item	Description
RID	Device ID ranges from 0 to 255 (00 hex to FF hex)
Setting	Bit 1 – Default OFF, Relay 2 will alternate when IO is triggered. Push to ON to select constant

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	relay output when IO is triggered. Bit 2 – Default OFF, no repeater function. Push to ON to enable repeater. When enabled, the device will retransmit the signal received. Hence, it helps to deliver signal to a greater distance. Bit 3 – Default OFF, Regularly Send Out status. Push to ON to select send status only when IO is pressed. Bit 4 – Default OFF, use default channel frequencies. Push to ON to enable EEPROM Frequency List. Prior programming is needed before use. Download MIO Tools to set the frequency list to the EEPROM.
FID	Channel ID ranges from 00 to 15 (00 hex to 0F hex)



2. MIO Tools



Plug in MIO-USB or Converter then launch the MIO Tools. **MIOTools**

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Port Demo Info

Before launching this program:
- Install FT232RL driver,
- Plug in MIO USB or Converter.

If device is detected, the Port will display the Port Number. Then click 'Open' to start.

Port: COM4
Open Close

ID: FID: 2 RID: 2
Read

Frequency List (MHz)

Channel 0:		Channel 8:	
Channel 1:		Channel 9:	
Channel 2:		Channel 10:	
Channel 3:		Channel 11:	
Channel 4:		Channel 12:	
Channel 5:		Channel 13:	
Channel 6:		Channel 14:	
Channel 7:		Channel 15:	

Range: 902 - 928
Read Write

Enable Eeprom Freq (MIO-USB Only)

After enabling the Eeprom freq below:

- Both MIO model will get the channel freq list from the saved Eeprom,
- For MIO-USB, the current channel no is from the saved Eeprom below,
- For MIO-Lora, the current channel no is from the DIP switch on the board.

Enable ? : Off
Which Channel no ? : 0
Read Write

Main screen.

If Serial Com Port available, or USB Virtual Com available, it will be shown on screen.

Port

COM4
Open
Close

Select the port where reader is connected, then click  to open port.

Upon open port, reader will send command to get ID. Getting ID should be the first command to execute, because if the ID is not matched, device will not response.

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1.0 Protocol

To ease development, sending and receiving protocols are recorded and saved in the **C:\Mylab\MIO Tools** folder, as shown below:

Function : Open Port

3:29:15 PM, TX : 02 22 00 00 01 00 02 23 03 (Read ID)

3:29:15 PM, RX : 02 22 01 01 04 00 02 00 **01 01** 26 03 (01 01 = FID RID)

They are briefly explained as below:

Communication Protocol:

Item	Value
Baud rate	9600
Data bit	8
Parity	None
Stop bit	1

TX : 02 / 22 / FID / RID / No of byte / Command / Data / BCC / 03

RX : 02 / 22 / FID / RID / No of byte / Command / Message / Data / BCC / 03

Item	Length	Meaning
STX (Start of Text)	1	02
MID	1	22
Channel ID/FID	1	00 – 0F hex
Device ID/RID	1	00 – FF hex
No of byte/NOB	2	No of byte in TX Data or RX Data (LSB, MSB)
Command/CMD	1	Refer manual or sending protocol 0 = none 02 hex = read id 04 hex = read setting (For MIO-USB) 05 hex = write setting (For MIO-USB) 10 hex = read freq list 11 hex = write freq list 47 hex = status
Message/MESG	1	00 – Success, others – Error
Data	variable	Transmit or Received string
BCC	1	Exclusive-Or from byte STX to the byte before BCC
ETX (End of Text)	1	03

If you decide to use the default frequency, then after open the port, you may go to page Demo to see how the Lora-based Panic button works.

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1.1 Set Frequency List

If you don't want to use the default built in frequency list, you may add your own list. But as mentioned previously, most countries have their own frequency band for Lora, therefore you should check with the local government for the allowed band before setting this page.

Assuming the frequency range is from 919.0 to 923.0, then fill the Frequency List field as follow. Don't leave it blank, fill the extra slot with default values.

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Port Demo Info

Before launching this program:
- Install FT232RL driver,
- Plug in MIO USB or Converter.

If device is detected, the Port will display the Port Number. Then click 'Open' to start.

Port: COM4
Open Close

ID
FID : 2
RID : 2
Read

Frequency List (MHz)

Channel 0 : 919	Channel 8 : 923
Channel 1 : 919.5	Channel 9 : 919
Channel 2 : 920	Channel 10 : 919
Channel 3 : 920.5	Channel 11 : 919
Channel 4 : 921	Channel 12 : 919
Channel 5 : 921.5	Channel 13 : 919
Channel 6 : 922	Channel 14 : 919
Channel 7 : 922.5	Channel 15 : 919

Range : 902 - 928
Read Write

Enable EEprom Freq (MIO-USB Only)

After enabling the Eeprom freq below:

- Both MIO model will get the channel freq list from the saved Eeprom.
- For MIO-USB, the current channel no is from the saved Eeprom below.
- For MIO-Lora, the current channel no is from the DIP switch on the board.

Enable ? : Off
Which Channel no ? : 0
Read Write

Click  to start saving the list to the device.

From the **C:\MyLab\MIO Tools** folder, we know that the write process is successful.

Function : Write Freq List

10:34:17 AM, TX : 02 22 01 01 31 00 11 E5 C0 00 E5 E0 00 E6 00 00 E6 20 00 E6 40 00 E6 60 00 E6 80 00 E6 A0 00 E6 C0 00 E5 C0 00 E5 C0 00 E5 C0 00 E5 C0 00 E5 C0 00 E5 C0 00 03 03

10:34:18 AM, RX : 02 22 01 01 02 00 11 00 33 03 (OK)

After this, you may click  to download the list from the device, and view them to confirm.

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So you have saved the frequency list to the device's Eeprom. For model MIO-Lora, to enable the list, just turn ON bit-4 of the Setting DIP switch, as mentioned in the Hardware Setting page above, and reset power. Now the channel 0 frequency is 919MHz, not the default 902MHz.

1.2 MIO-USB

This MIO-USB is the receiver connected to the PC Host. Same as MIO-Lora, it has built in default channel frequency, but you may load your own frequency list as mentioned in the previous chapter, using MIO Tools.



But for MO-USB, you need to enable the list, and select the active channel by sending command, not by setting DIP switch.

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Port Demo Info

Before launching this program:
- Install FT232RL driver,
- Plug in MIO USB or Converter.

If device is detected, the Port will display the Port Number. Then click 'Open' to start.

Port: COM4
Open Close

ID: FID: 2 RID: 2
Read

Frequency List (MHz)

Channel 0: 919	Channel 8: 923
Channel 1: 919.5	Channel 9: 919
Channel 2: 920	Channel 10: 919
Channel 3: 920.5	Channel 11: 919
Channel 4: 921	Channel 12: 919
Channel 5: 921.5	Channel 13: 919
Channel 6: 922	Channel 14: 919
Channel 7: 922.5	Channel 15: 919

Range: 902 - 928
Read Write

Enable Eeprom Freq (MIO-USB Only)

After enabling the Eeprom freq below:

- Both MIO model will get the channel freq list from the saved Eeprom,
- For MIO-USB, the current channel no is from the saved Eeprom below,
- For MIO-Lora, the current channel no is from the DIP switch on the board.

Enable ? : Off
Which Channel no ? : 0
Read Write

If you wish to use the Eeprom Frequency List, set the Enable to ON, and select an active channel number. Then click **Write** to save to the device. By doing this, you are not using the default frequency list, your active channel is channel 2, and the frequency is 920MHz. You may click **Read** to view the setting.

Function : Write Setting

11:38:29 AM, TX : 02 22 01 01 03 00 05 **55 02** 71 03 (55 hex = Turn On, 02 = Channel no)

11:38:29 AM, RX : 02 22 01 01 02 00 05 00 27 03

Function : Read Setting

11:38:31 AM, TX : 02 22 01 01 01 00 04 25 03

11:38:31 AM, RX : 02 22 01 01 04 00 04 00 55 02 77 03

1.3 Demo

We will now see how the devices work. We will demo using the default frequency list.

Power off both MIO-Lora (Transmitter) and MIO-USB (Receiver). Set both devices as follow:

Set MIO-Lora DIP switches:

- RID = 05

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- FID = 01 (Channel 1)
- Setting = 0000 (All '0' states; alternate relay, regularly send out device status, disable repeater, disable Eeprom Frequency List)

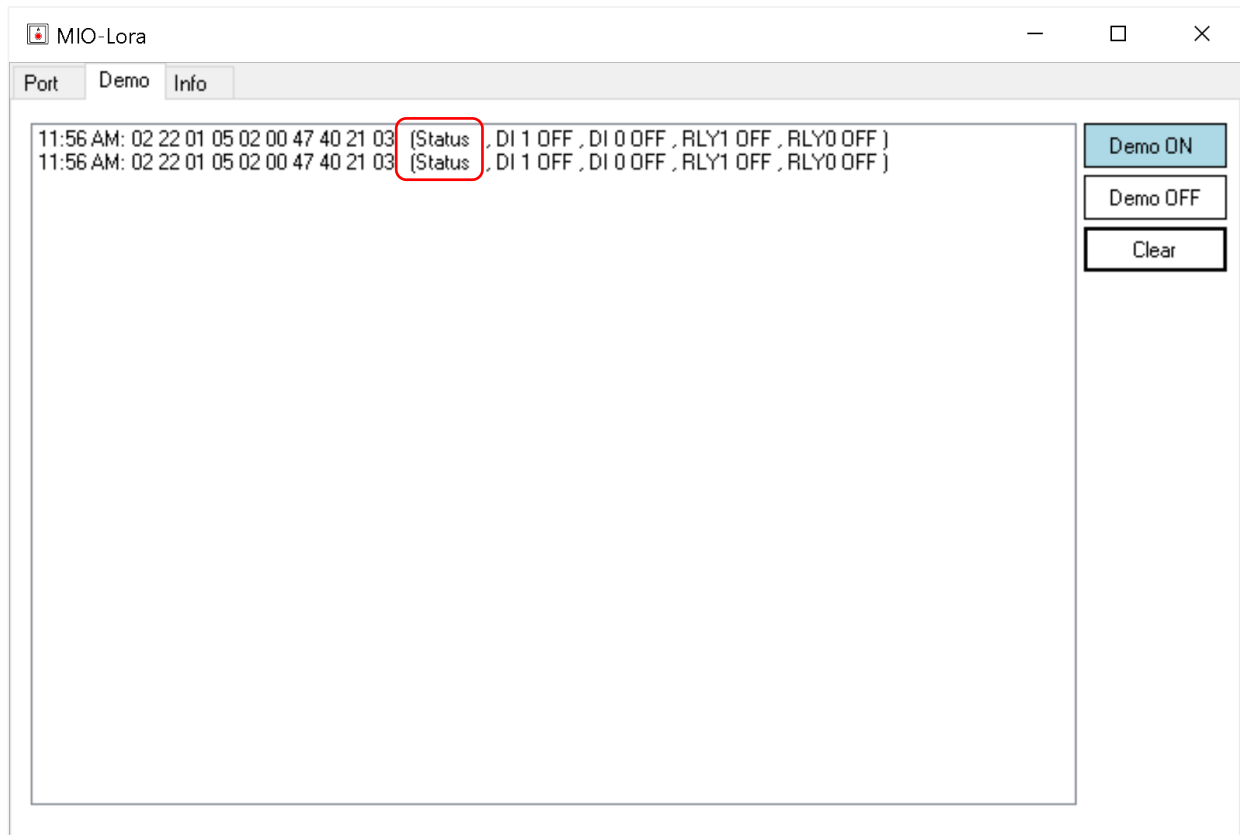
Set MIO-USB DIP switch:

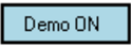
- FID = 01 (Channel 1)

Both devices must be at the same channel.

Now Power on the MIO-Lora, and plug in the MIO-USB to PC.

Launch the MIO Tools, open Port, go to page "Demo".

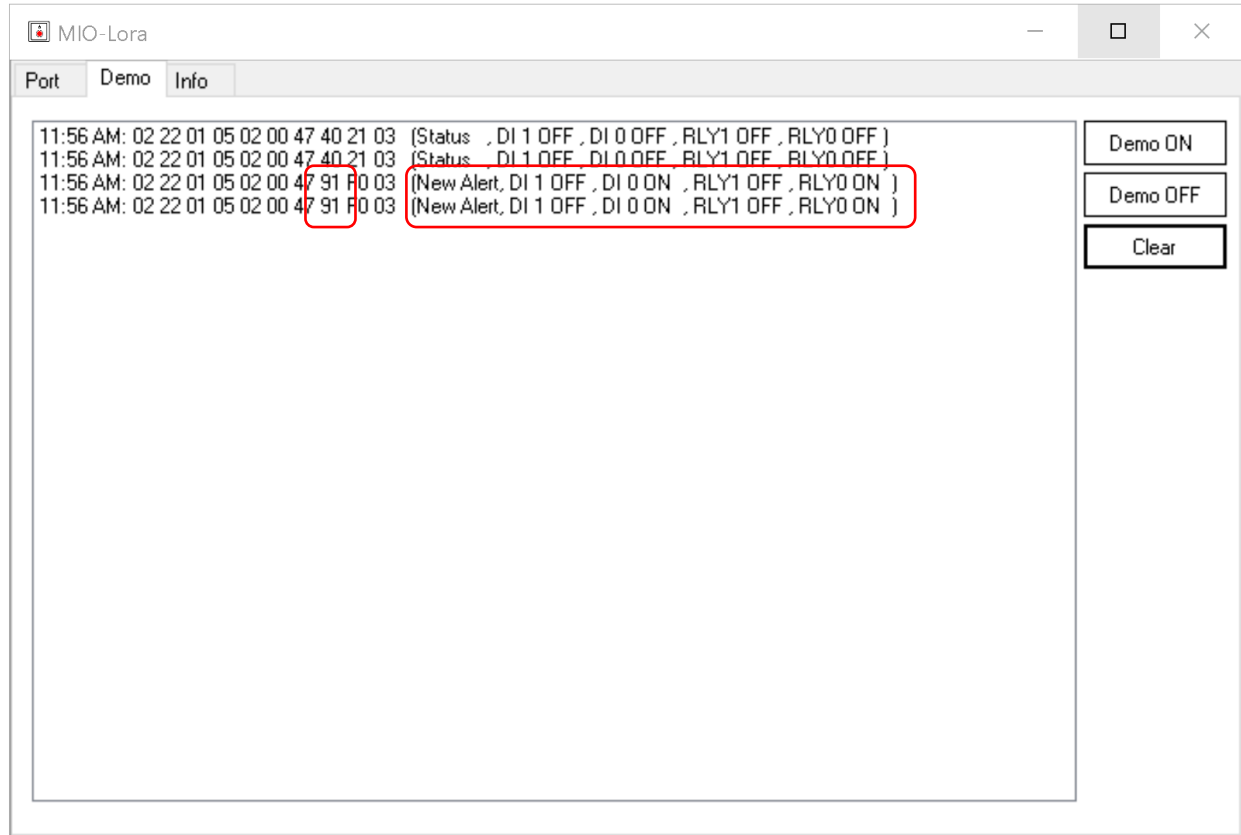


Click  to start the demo.

Since we have turn on the Regularly Send Out Status, or Bit-3 of Setting DIP switch on MIO-Lora, then we will receive the device status every 2 or 3 minutes. But if there are many devices installed, it is good to turn off the Regularly Send Out feature, to avoid heavy work load on receiver. Select Send out when button is pressed is recommended.

Now we press the MIO-Lora red button.

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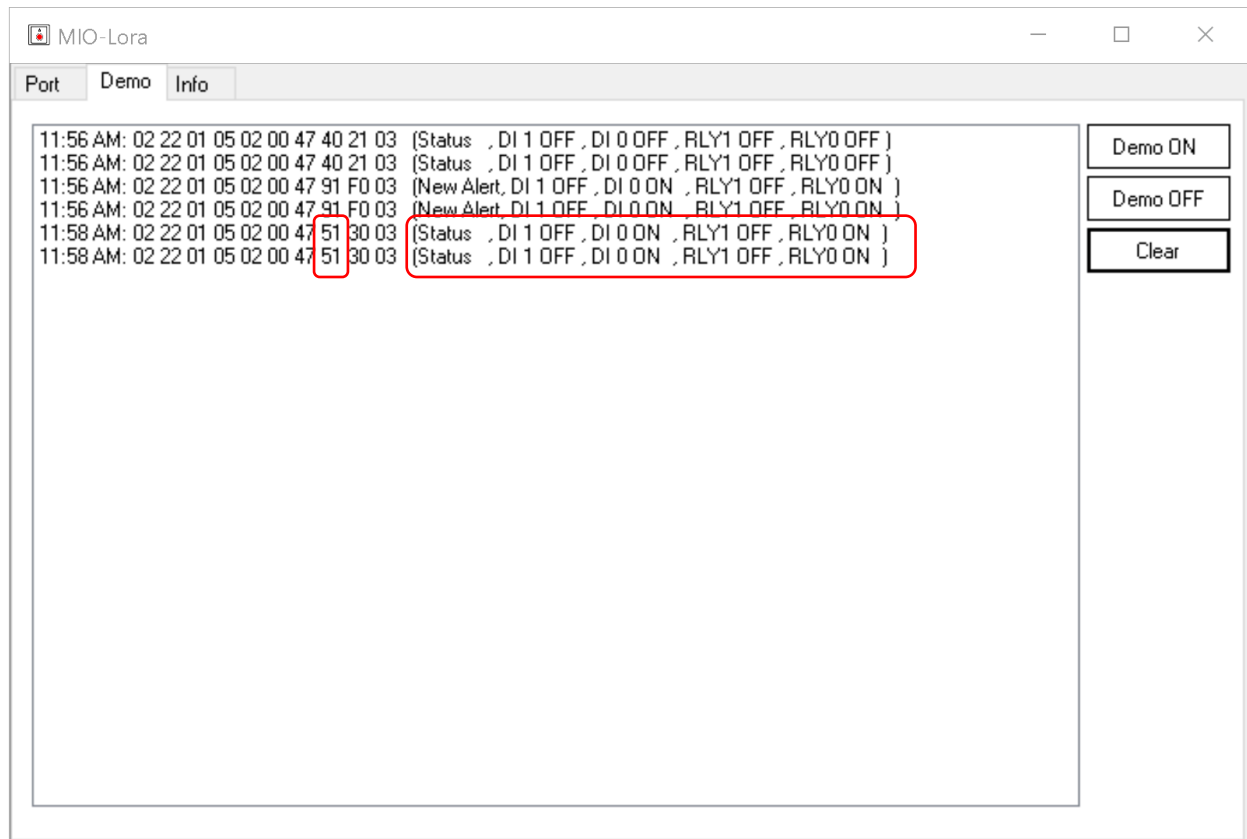


New alert message arrived, telling that device ID 05 has triggered DI 0, and relay0 is energized.

We will explain the received string now:

Item	Length	Meaning
STX (Start of Text)	1	02
MID	1	22
Channel ID/FID	1	01
Device ID/RID	1	05
No of byte/NOB	2	02 00 (LSB MSB)
Command/CMD	1	47 hex = message
Data	1	91 hex or 1001 0001b Bit7 – new alert Bit6 – status Bit5 – DI 1 Bit4 – DI 0 Bit3 – reserved Bit2 – reserved Bit1 – Relay 1 Bit0 – Relay 0
BCC	1	Exclusive-Or from byte STX to the byte before BCC
ETX (End of Text)	1	03

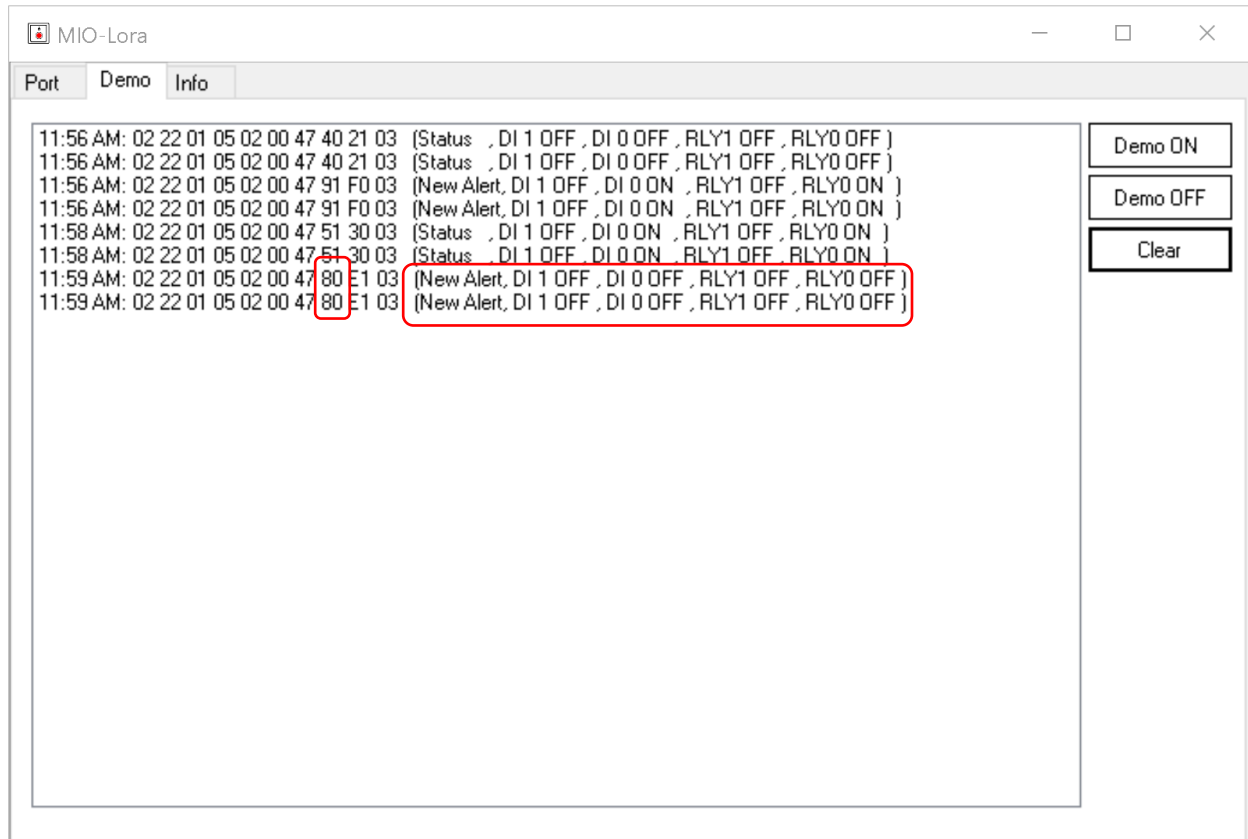
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Received regular status from device ID 5.

Now we release the red button by using the provided key.

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Received new alert saying the device ID 5 has triggered off the DI 0, and now the relay 0 is de-energized.

We will now switch to use the saved frequency list, instead of the default frequency list.

Power off both MIO-Lora (Transmitter) and MIO-USB (Receiver). Set both devices as follow:

Set MIO-Lora DIP switches:

- RID = 05
- FID = 02 (Channel 2, 920MHz)
- Setting = 0001 (Bit4 set to '1'; alternate relay, regularly send out device status, disable repeater, enable Eeprom Frequency List)

Set MIO-USB channel and enable the Eeprom frequency list by using MIO Tools :

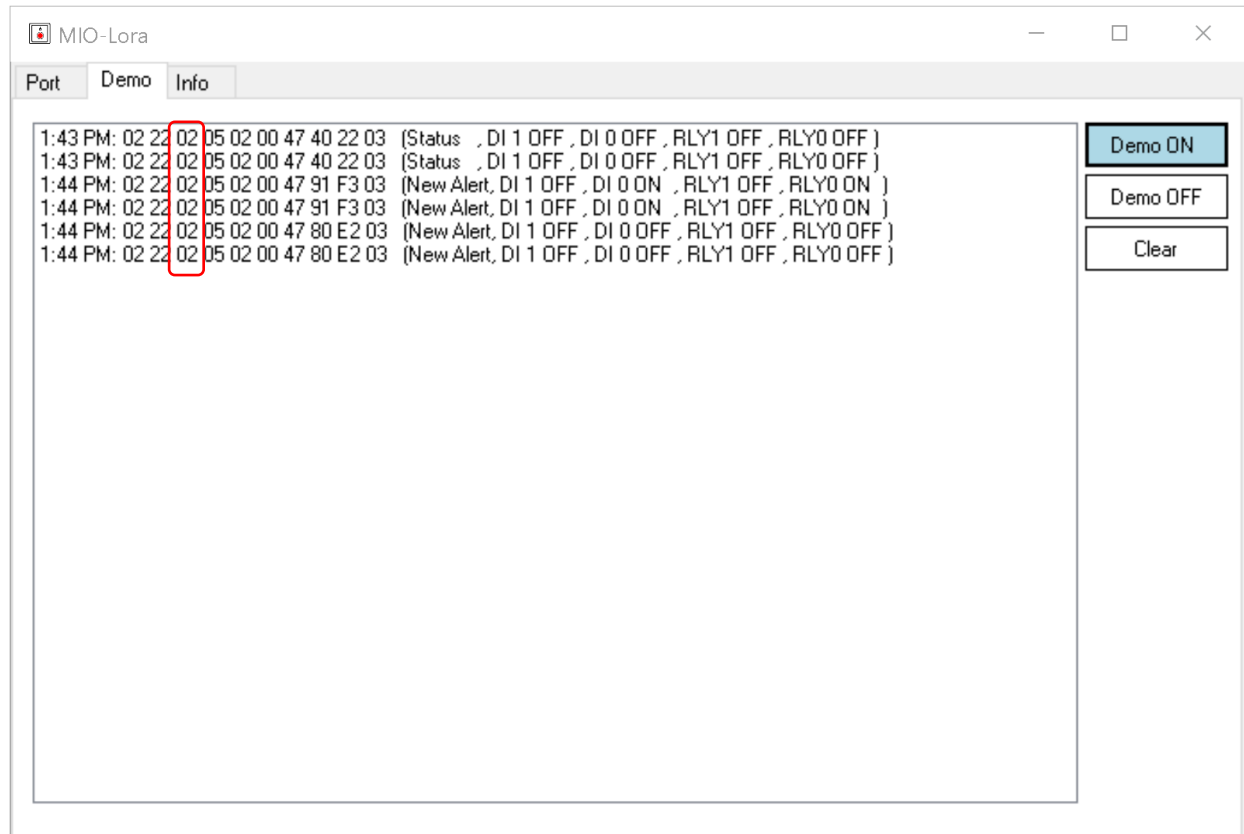
- FID = 02 (Channel 2, 920MHz)

Both devices must be at the same channel.

Now Power on the MIO-Lora, and plug in the MIO-USB to PC.

Launch the MIO Tools, open Port, go to page "Demo".

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As you can see, they work the same. Both devices work on Channel 2, frequency 920MHz.

3. End