

Foxconn Release Document

User's Manual

Part number: T77I718.01

Product English name: LoRa Module

Revised History:

| Date | Summary | FW Version | Act By |
|------------|--------------------------------|---------------|------------|
| 2016/6/20 | Initial release | V2.03 | Allen Chen |
| 2016/6/20 | Add some items | V2.03 | Johnny Wu |
| 2016/07/07 | Add pin definition | V2.03 | Johnny Wu |
| 2016/09/01 | Translate into English version | V2.03 | Johnny Wu |
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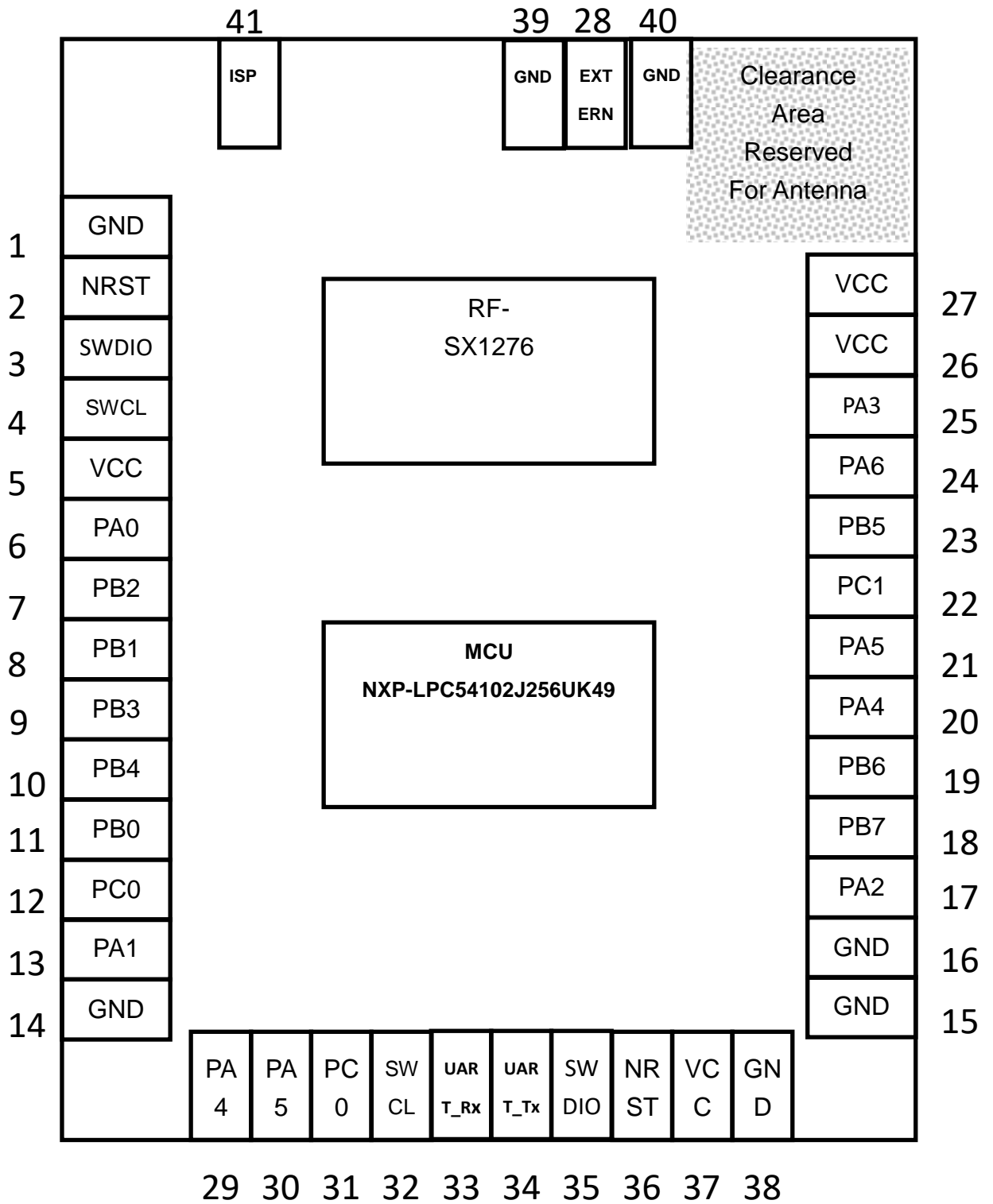
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Pin description

| Pin Number | Pad Name | Pin Description | Pin Number on LPC54102 (WLPCSP49) |
|------------|----------|---------------------------------|-----------------------------------|
| 1 | GND | GND | GND |
| 2 | NRST | Active Low Chip Reset | G1 |
| 3 | SWDIO | Programming and debug interface | G5 |
| 4 | SWCLK | Programming and debug interface | F5 |
| 5 | VCC | 2.5V-3.5V DC power supply | VCC |
| 6 | PA0 | GPIO | G4 |
| 7 | PB2 | GPIO / SPI_MI | C5 |
| 8 | PB1 | GPIO / SPI_MO | B5 |
| 9 | PB3 | GPIO / SPI_CLK | B3 |
| 10 | PB4 | GPIO / SPI_SS | A5 |
| 11 | PB0 | GPIO | E6 |
| 12 | PC0 | GPIO | F3 |
| 13 | PA1 | GPIO / IIC_SDA | D1 |
| 14 | GND | GND | GND |
| 15 | GND | GND | GND |
| 16 | GND | GND | GND |
| 17 | PA2 | GPIO / IIC_CLK | D2 |
| 18 | PB7 | GPIO | C6 |
| 19 | PB6 | GPIO | C7 |
| 20 | PA4 | GPIO / ADC0 | C3 |
| 21 | PA5 | GPIO / ADC1 | C1 |
| 22 | PC1 | GPIO / ADC2 | B1 |
| 23 | PB5 | GPIO / ADC3 | B2 |
| 24 | PA6 | GPIO | D7 |
| 25 | PA3 | GPIO | A2 |
| 26 | VCC | 2.5V-3.5V DC power supply | VCC |

| | | | |
|----|-------------|---|-----|
| 27 | VCC | 2.5V-3.5V DC power supply | VCC |
| 28 | RF OUT | Reserved for external on-board printed antenna. | NC |
| 29 | PA4 | GPIO / ADC0 | C3 |
| 30 | PA5 | GPIO / ADC1 | C1 |
| 31 | PC0 | Programming and debug interface | F3 |
| 32 | SWCLK | Programming and debug interface | F5 |
| 33 | PC2/UART_RX | Programming and debug interface | A6 |
| 34 | PC3/UART_TX | Programming and debug interface | B6 |
| 35 | SWDIO | Programming and debug interface | G5 |
| 36 | NRST | Active Low Chip Reset | G1 |
| 37 | VCC | 2.5V-3.6V DC power supply | VCC |
| 38 | GND | GND | GND |
| 39 | GND | GND | GND |
| 40 | GND | GND | GND |
| 41 | ISP | Pull low to program FW | ISP |

Pin Assignment

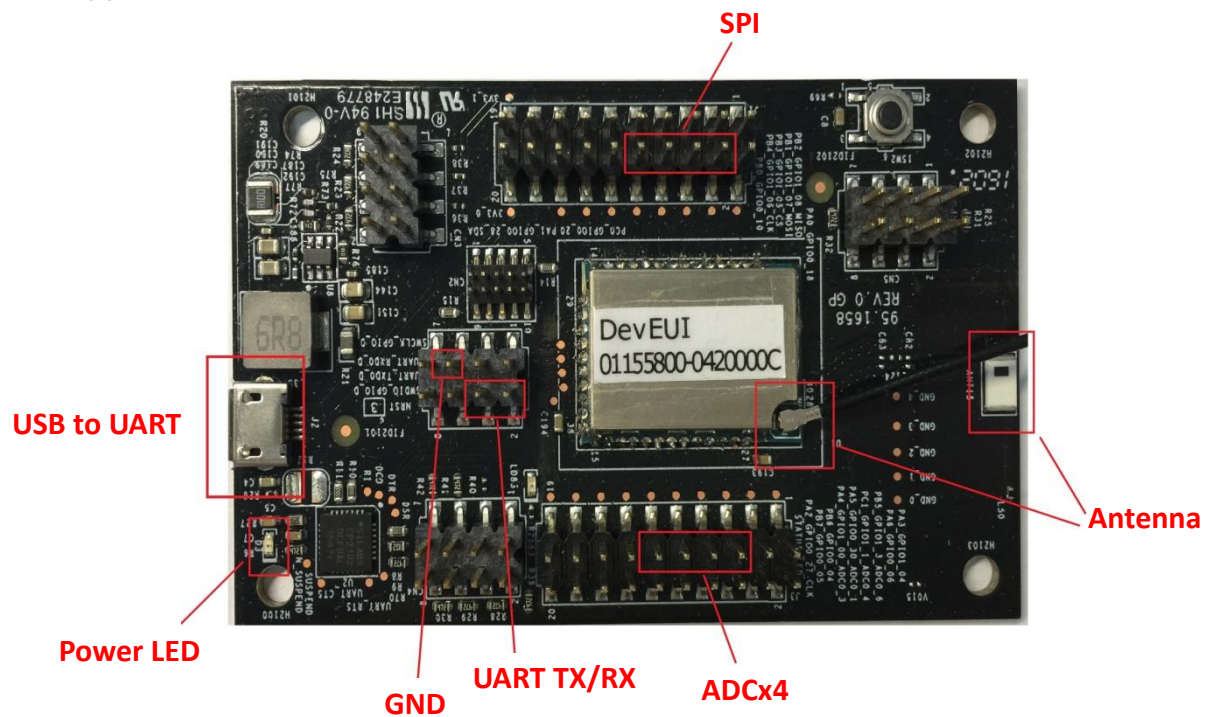


Get Started: Installation

LoRa module is a wireless transceiver which provides an easily controllable CMD interfaces(CLI/UART) that the user would send data quickly with wireless communication protocol. Prepare only one usb cable, users could use any kind of terminal utilities such as TeraTerm, Putty and HyperTerminal to access the CMD interfaces(CLI/UART).

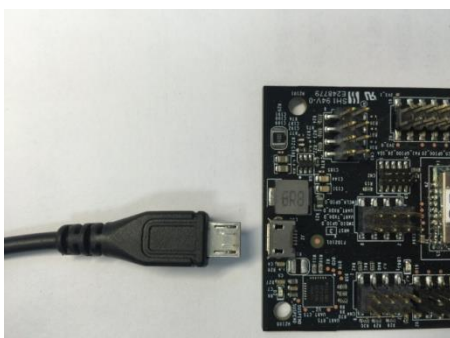
1. Hardware introduction

As the following figures, you can see a LoRa module mounted on a debugger board. The red frame indicates the main interfaces on the debugger board, includes UART, ADC and SPI and so on.

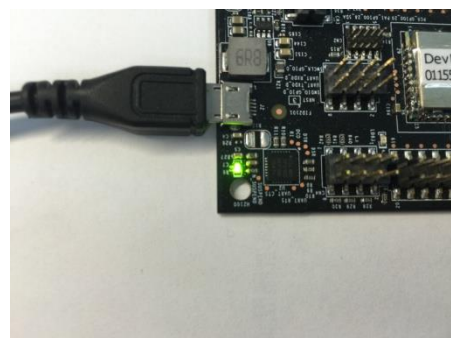


2. Connect to the computer

Use a micro USB cable to connect to the computer with debug board. When it is connected, the power LED will turn on.

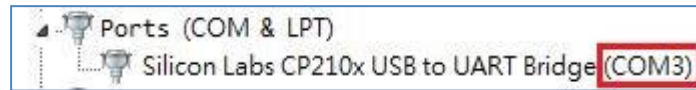


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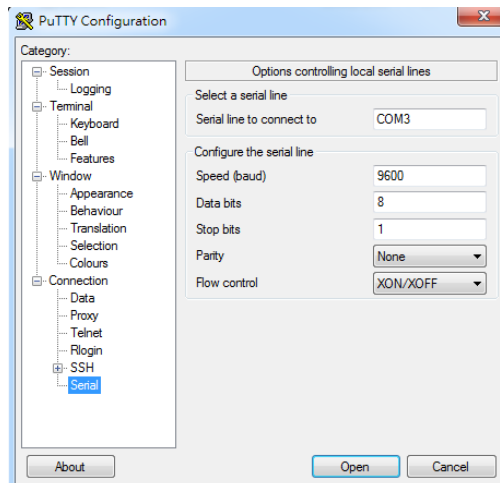
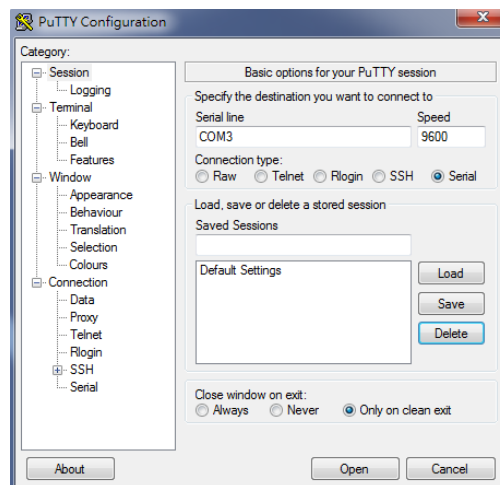
3. Get the comport information

After connected micro USB cable to PC, user can check the COM number in "Device Manager", for instances, below figure indicates the COM number is 3.

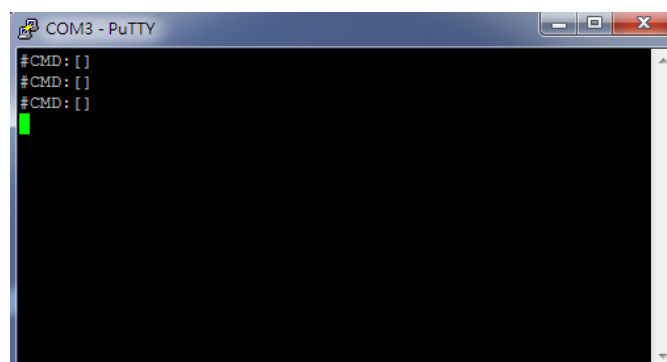


4. Execute the terminal utility(PuTTY)

The connection information of LoRa Module is Baud Rate 9600, Data bits 8, Parity none, Stop bits 1 and Flow control none. Here is an example using PuTTY to access UART interface.



Click the *Open* button, then, click the *Enter* button on the keyboard. When you see the #CMD:[] which means the connection is successful.



Sending data

This section provides command examples that used for sending user data.

Example 1: Send a two-byte data 0x1234

```
senddata 1234
```

```
#CMD:[senddata 1234]
#CMD:[Success]
924.00 MHz SF10 14 dBm Seq 1 [60]
```

After perform this command, user will see a *success* state which indicates the command is correct. Due to the minimum transmission period(default is 60 seconds), user data will not be sent immediately. It can only be sent at the 60, 120, 180... second of system time. As you can see in above figure, the user data is sent at the 60 second of system time.

Example 2: Perform two senddata commands in a short time. User data are 0x5678 and 0x1234.

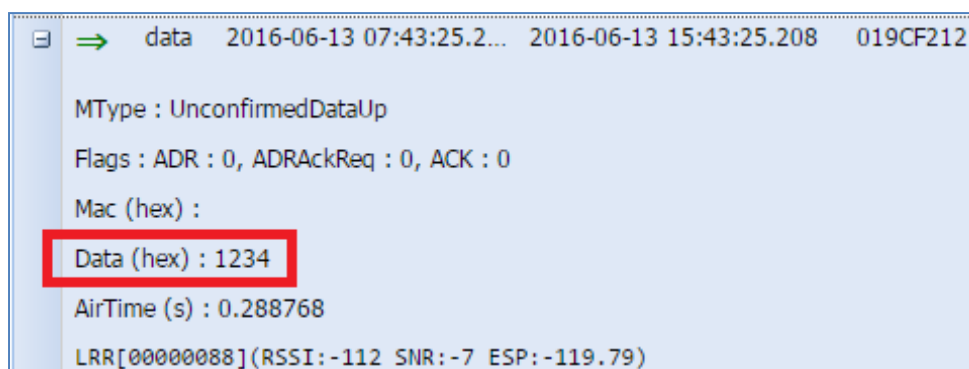
```
senddata 5678
```

```
senddata 1234
```

```
#CMD:[senddata 5678]
#CMD:[Success]
#CMD:[senddata 1234]
#CMD:[Success]
924.40 MHz SF10 14 dBm Seq 3 [300]
```

There will always keep one set of user data during the transmission period. So the old data 0x5678 will be overwritten by new data 0x1234. In this case, only the data 0x1234 will be sent.

To check the user data on website, please contact your system provider to create new account.



The screenshot shows a network packet analysis tool interface. At the top, there is a header bar with a green arrow icon, the word 'data', and three columns of text: '2016-06-13 07:43:25.2...', '2016-06-13 15:43:25.208', and '019CF212'. Below the header, the packet details are listed: 'MType : UnconfirmedDataUp', 'Flags : ADR : 0, ADRAckReq : 0, ACK : 0', 'Mac (hex) :', 'Data (hex) : 1234', 'AirTime (s) : 0.288768', and 'LRR[00000088](RSSI:-112 SNR:-7 ESP:-119.79)'. The 'Data (hex) : 1234' line is highlighted with a red rectangular box.

Commands Usage:

senddata <data>

Description: Sending user data by transmission period(default period is 60 seconds)

<data>: continuously hexadecimal value without the “0x” or “0X” prefix. The length of <data> bytes capable of being transmitted is dependent upon the data rate.

Receiving data

The receiving task just after each transmit operation, if a downlink data was received, following message will be displayed:

[Output]

[!] Receive FPort=3, Length=3

[DATA:AA5531]

```
#CMD:[senddata 6789]
#CMD:[Success]
923.00 MHz SF10 14 dBm Seq 4 [1258]
[!] Receive FPort=3, Length=3
[DATA:AA5531]
```

In this case, the received data is three-byte length and the contents: 0xAA 0x55 0x31.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Country Code selection feature to be disabled for products marketed to the US/CANADA

Integration instructions for host product manufacturers

Applicable FCC rules to module

FCC Part 15.247

Summarize the specific operational use conditions

The module is must be installed in mobile device.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Limited module procedures

Not applicable

Trace antenna designs

Not applicable

RF exposure considerations

20 cm separation distance and co-located issue shall be met as mentioned in "Summarize the specific operational use conditions".

Product manufacturer shall provide below text in end-product manual

"This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body."

Antennas

| Brand name | Model name | Antenna type | Antenna gain | Antenna connector |
|------------|----------------|--------------|--------------|---------------------------|
| Unictron | H2B1SD1A2C0300 | PCB antenna | 2.0 dBi | 1 i-pex external antennas |

Label and Compliance Information

Product manufacturers need to provide a physical or e-label stating

"Contains FCC ID: **2AQ68-N718US**" with finished product

Information on Test Modes and Additional Testing Requirements

Test tool: Tera Term shall be used to set the module to transmit continuously.

Additional Testing, Part 15 Subpart B Disclaimer

The module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed