# Lora AT COMMAND GUIDE

## APPLY FOR：

1. RYLR405

2. RYLR406

3. RYLR895

4. RYLR896

## THE SEQUENCE OF USING AT COMMAND

1. Use "**AT+ADDRESS**" to set ADDRESS. The ADDRESS is regard as the identification of transmitter or specified receiver.

2. Use "**AT+NETWORKID**" to set the ID of Lora network. This is a Group function. Only by setting the same NETWORKID can the modules communicate with each other. If the ADDRESS of specified receiver is belong to different group, it is not able to communicate with each other.
The recommend value: 1~15

3. Use" **AT+BAND**" to set the center frequency of wireless band. The transmitter and the receiver are required to use the same frequency to communicate with each other.

4. Use" **AT+PARAMETER**" to set the RF wireless parameters. The transmitter and the receiver are required to set the same parameters to communicate with each other. The parameters of which as follows:

[1] <Spreading Factor>: The larger the SF is, the better the sensitivity is. But the transmission time will take longer.

[2] <Bandwidth>: The smaller the bandwidth is, the better the sensitivity is. But the transmission time will take longer.

[3] <Coding Rate>: The coding rate will be the fastest if setting it as 1.

[4] <Programmed Preamble>: Preamble code. If the preamble code is bigger, it will result in the less opportunity of losing data. Generally preamble code can be set above 10 if under the permission of the transmission time.

Communication within 3 km: Recommend to set "**AT + PARAMETER = 10,7,1,7**"

More than 3 km: Recommend to set " **AT + PARAMETER = 12,4,1,7**"

5.  Use "**AT+SEND**" to send data to the specified ADDRESS. Please use "Lora Modem Calculator Tool" to calculate the transmission time. Due to the program used by the module, the payload part will increase more 8 bytes than the actual data length.

# AT Command Set

It is required to key in "enter" or "\r\n" in the end of all AT Commands.
Add" ? "in the end of the commands to ask the current setting value.
It is required to wait until the module replies +OK so that you can execute the next AT command.

1.  **AT** Test if the module can respond to Commands.

| Syntax | Response |
| --- | --- |
| AT | +OK |

2.  **Software RESET**

| Syntax | Response |
| --- | --- |
| AT+RESET | +RESET |
| | +READY |

3. **AT+MODE** Set the work mode

| Syntax | Response |
|---|---|
| AT+MODE=<parameter> <br><br> <parameter>range from 0 to 1 <br> 0：Transmit and Receive mode (default). <br> 1：Sleep mode. <br> *During the sleep mode, once the pin3(RX) receive any input data, the module will be woken up.* <br><br> Example : Set the sleep mode, <br> AT+MODE=1 | +OK |
| AT+MODE? <br> Any text | +MODE=0　'Transmit and Receive mode <br> +READY　　'Sleep mode. |

4. **AT+IPR** Set the UART baud rate

| Syntax | Response |
|---|---|
| AT+IPR=<rate> <br><br> <rate> is the UART baud rate： <br> 300 <br> 1200 <br> 4800 <br> 9600 <br> 19200 <br> 28800 <br> 38400 <br> 57600 <br> 115200(default). <br><br> Example: Set the baud rate as 9600, <br> AT+IPR=9600 <br> *The settings will be memorized in EEPROM.* | +OK |
| AT+IPR? | +IPR=9600 |

5. **AT+PARAMETER** Set the RF parameters

| Syntax | Response |
|---|---|
| AT+PARAMETER=<Spreading Factor>, <Bandwidth>,<Coding Rate>, <Programmed Preamble> <br><br> <Spreading Factor>7~12, (default 12) <br><br> <Bandwidth>0~9 list as below <br> 0 : 7.8KHz (not recommended, over spec.) <br> 1 : 10.4KHz (not recommended, over spec.) <br> 2 : 15.6KHz <br> 3 : 20.8 KHz <br> 4 : 31.25 KHz <br> 5 : 41.7 KHz <br> 6 : 62.5 KHz <br> 7 : 125 KHz (default). <br> 8 : 250 KHz <br> 9 : 500 KHz <br><br> <Coding Rat>1~4, (default 1) <br><br> <Programmed Preamble> 4~7(default 4) <br><br> Example : Set the parameters as below: <br> <Spreading Factor> 7,<Bandwidth> 20.8KHz, <br> <Coding Rate> 4,<Programmed Preamble>5, <br> AT+PARAMETER=7,3,4,5 <br> *Parameters will not be stored in EEPROM so they need to be reset in every initialization.* | +OK |
| AT+PARAMETER? | +PARAMETER=7,3,4,5 |

6. **AT+BAND** Set RF Frequency

| Syntax | Response |
|---|---|
| AT+BAND=<parameter><br><br><parameter>is the RF Frequency, Unit is Hz<br>470000000: 470000000Hz(default: RYLR40x)<br>915000000: 915000000Hz(default: RYLY89x)<br><br>Example : Set the frequency as 868500000Hz,<br>AT+BAND=868500000<br><br>*Parameters will not be stored in EEPROM so they need to be reset in every initialization.* | +OK |
| AT+BAND? | +BAND=868500000 |

7. **AT+ADDRESS** Set the ADDRESS of module

| Syntax | Response |
|---|---|
| AT+ADDRESS=<Address><br><br><Address>=0~65535(default 0)<br><br>Example : Set the address of module as 120,<br>AT+ADDRESS=120<br>*The settings will be memorized in EEPROM.* | +OK |
| AT+ADDRESS? | +ADDRESS=120 |

8. **AT+NETWORKID** Set the network ID

| Syntax | Response |
|---|---|
| AT+NETWORKID=<Network ID><br><br><Network ID>0~16(default 0)<br><br>Example : Set the network ID as 6,<br>AT+NETWORKID=6<br>*The settings will be memorized in EEPROM.*<br>*The"0" is the public ID of Lora. It is not recommend to set 0 to make the distinction of NETWORK.* | +OK |
| AT+NETWORKID? | +NETWORK=6 |

9. **AT+CPIN** Set the AES128 password of the network.

| Syntax | Response |
|---|---|
| AT+CPIN=<Password><br><br><Password>: An 32 character long AES password<br>From 00000000000000000000000000000001 to<br>FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF<br>Only by using same password can the data be recognized.<br>After resetting, the previously password will disappear.<br><br>Example : Set the password as below:<br>FABC0002EEDCAA90FABC0002EEDCAA90<br>AT+CPIN=FABC0002EEDCAA90FABC0002EEDCAA90<br><br>*Parameters will not be stored in EEPROM so they need to be reset in every initialization.* | +OK |
| AT+CPIN? | +CPIN=FABC0002EEDCAA90FABC0002EEDCAA90<br>+CPIN=No Password!    'Default value |

10. **AT+CRFOP** Set the RF output power

| Syntax | Response |
|---|---|
| AT+CRFOP=<power><br><br><power>0~15<br>15：15dBm(default)<br>14：14dBm<br>......<br>01：1dBm<br>00：0dBm<br><br>Example: Set the output power as 10dBm,<br>AT+CRFOP=10<br>*Parameters will not be stored in EEPROM so they need to be reset in every initialization.* | +OK |
| AT+CRFOP? | +CRFOP=10 |

11. **AT+SEND** Send data to the appointment Address

| Syntax | Response |
|---|---|
| AT+SEND=<Address>,<Payload Length>,<Data><br><br><Address>0~65535, When the <Address> is 0, it will send data to all address (From 0 to 65535.)<br><br><Payload Length>Maximum 240bytes<br><br><Data>ASCII Format<br><br>Example : Send HELLO string to the Address 50,<br>AT+SEND=50,5,HELLO | +OK |
| AT+SEND? | +SEND=50,5,HELLO |

12. **+RCV** Show the received data

| Syntax | Response |
|---|---|
| +RCV=<Address>,<Length>,<Data>,<RSSI>,<SNR>,<br><br><Address>Transmitter Address ID<br><br><Length>Data Length<br><br><Data>Data<br><br><RSSI> Received Signal Strength Indicator<br><br><SNR> Signal-to-noise ratio | |
| Example: Module received the ID Address 50 send 5 bytes data,<br>Content is HELLO string ,RSSI is -99dBm, SNR is 40, It will show as below:<br> +RCV=50,5,HELLO,-99,40 | |

13. **AT+VER?** to inquire the firmware version

| Syntax | Response |
|---|---|
| AT+VER? | +VER=RYLR406_Vx.x.x(RYLR40x)<br>+VER=RYLR89C_Vx.x.x(RYLR89x) |

14. **AT+UID?** to inquire the unique ID number of the module

| Syntax | Response |
|---|---|
| AT+UID?<br>12 Bytes Unique ID | +UID=164738323135383200100025 |

15. **AT+FACTORY** Set all current parameters to manufacturer defaults

| Syntax | Response |
|---|---|
| AT+FACTORY<br><br>Manufacturer defaults：<br><br>BAND：915MHz<br><br>UART：115200<br><br>Spreading Factor：12<br><br>Bandwidth：125kHz<br><br>Coding Rate：1<br><br>Preamble Length：4<br><br>Address：0<br><br>Network ID：0<br><br>CRFOP：15 | +FACTORY |

16. **Other messages**

| Syntax | Response |
|---|---|
| After RESET | +READY |

17. **Error result codes**

| Syntax | Response |
|---|---|
| There is not "enter" or 0x0D 0x0A in the end of the AT Command. | +ERR=1 |
| The head of AT command is not "AT" string. | +ERR=2 |
| There is not "=" symbol in the AT command. | +ERR=3 |
| Unknow command. | +ERR=4 |
| TX is over times. | +ERR=10 |
| RX is over times. | +ERR=11 |
| CRC error. | +ERR=12 |
| TX data more than 240bytes. | +ERR=13 |
| Unknow error. | +ERR=15 |

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