

# Lora AT Command Lists

(Version: DL7X1X-AT-CMD-LRWAN1\_1-V2.0)

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## **Background & Summary**

The purpose of this document is to describe for DL7611, DL7612, DL7811 and DL7812 AT Command Lists. This document is intended for the programming or testing to implement Lora module.

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## Revision History

Revision	Date	Author	Descriptions
V1.0	17.01.11	Michael Li	Created
V1.2	17.03.20	Michael Li	Add New Commands: SCFG,FWUP, RTFTY; Add "PASSTHROUGH" mode of "AT+ SM".
V1.4	17.06.16	Michael Li	Add New Commands: ISMBAND,BW,RX2BW Modify Command: CH, RX2CH, DUTC
V1.5	17.11.03	Michael Li	Add New Commands: RXWIN2,ADR,MSG,HEXMSG,AMSG,HEXMSG Modify Command: CH
V1.6	17.12.13	Michael Li	Add New Commands: PORT Modify Command: OTA
V1.7	18.10.08	Michael Li	AT command redesign
V2.0	19.01.16	Michael Li	Design for LoRaWAN 1.1

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# 1 Introduction

## 1.1 Purpose

The purpose of this document is to describe the AT Commands to implement and test with MAXIIOT's Lora module. This document is intended for the programming or testing to implement Lora module as a guideline.

The main function of the specification shall be on the testing of Lora Module.

- AT Command List
- Description for using each command
- Checking the status of Lora Module.

## 1.2 Definition, Abbreviations and Acronyms

No	Terminology/Abbreviation	Description
1	Lora	Long Range
2	NVM	Non Volatile Memory
3	EUI	Extended Unique Identifier

## 2 Command Architecture

### 2.1 System Context View



The above figure depicts an overall architecture for testing with AT command. The UART Program sends command with 115,200 baud rate.

### 2.2 UART Configuration

Baud Rate	115,200bps
Data bit	8bit
Stop bit	1bit
Parity bit	None

### 2.3 Definition

<CR>: Carriage return character;

<LF>: Line feed character;

<.>: Parameter name. Angle brackets do not appear on command line;

[.]: Optional parameter. Square brackets do not appear on the command line.

## 3 AT Command Overview

### 3.1 Product Basic Command Overview

Command	Description	R/W
AT	Check serial connection	R
AT+INFO	Display product identification information	R
AT+CGMI	Request manufacturer identification	R
AT+CLAC	List available commands	R
AT+NRB	Reboot the product	W
AT+RESTORE	Restore product factory parameters	W
AT+SLEEP	Put product into sleep mode	
AT+SAVE	Save product configuration parameters	W
AT+DEBUG	Enter or quit product debug mode	R/W

### 3.2 Device Activation Command Overview

Command	Description	R/W
<b>Before Activation</b>		
AT+DEVEUI	Get end-device identifier (DevEUI)	R
AT+ADDR	Get or set end-device address (DevAddr)	R/W
AT+NWKEY	Get or set network key (NwkKey)	R/W
AT+APPKEY	Get or set application key (AppKey)	R/W
AT+FNWKSINTKEY	Get or set FNWKSINTKEY	
AT+SNWKSINTKEY	Get or set NWKSINTKEY	
AT+NWKSENCKEY	Get or set NWKSENCKEY	
AT+NWKSKEY	Get or set network session key (NwkSKey)	R/W
AT+JOINEUI	Get or set JOINEUI	
AT+CLASS	Get or set end-device class type	R/W
AT+ACTIVATE	Get or set end-device activation way (Over-the-Air Activation, Activation by Personalization)	R/W
AT+CHMASK	Get or set the mask of each channel	R/W
AT+RXWIN2	Get or set rxwin2 parameter	R/W
AT+CGATT	Queries device activation status.	R

### 3.3 Device General Command Overview

Command	Description	R/W
---------	-------------	-----

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After Activation		
AT+UTC	Get the global UTC time	R
AT+CSQ	Get received signal strength indicator	R
AT+POWER	Get or set end-device radio TX power	R/W
AT+PORT	Get or set end-device uplink message 's port	R/W
AT+ADR	Get or set adaptive data rate	R/W
AT+DR	Get or set end-device uplink message's data rate	R/W
AT+CFM	Get or set the confirm message mode	R/W
AT+NMGS	Send an uplink frame by hex format immediately	W
AT+NCMGS	Send an uplink frame by ascii format immediately	W
AT+NQMGS	count the status of uplink transmission	R
AT+NSMI	Get or set indications of send message	R/W
AT+NMGR	Extract received downlink data frames	R
AT+NQMGR	count the status of downlink transmission	R
AT+NNMI	Get or set new message indications	R
AT+LCHECK	Add a "LinkCheckReq" command	W
AT+PINGSLOTDR	Get the ping slot data rate	R
AT+PINGSLOTPY	Get or set ping slot periodicity	R/W
AT+BEACON	Statistical the status of beacon transmission	R

## 4 Product Basic Commands

### 4.1 AT Check serial connection

The execution command can be used to check whether the serial connection is ok.

AT Check serial connection	
Execution Command <b>AT&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

#### Example

```
>>AT  
OK
```



## 4.2 AT+INFO Display product identification information

The execution command returns product identification information.

AT+INFO Display product identification information	
Execution Command <b>AT+INFO&lt;CR&gt;&lt;LF&gt;</b>	Response <b>MAXIIOT</b> <b>&lt;Object Id&gt;</b> <b>Revision:&lt;revision&gt;</b> <b>Date:&lt;date&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

<b>&lt;Object Id&gt;</b>	Identifier of device type
<b>&lt;revision&gt;</b>	Revision of software release
<b>&lt;date&gt;</b>	date of software release XXXX-XX-XX (year-month-date)

### Example

```
>>AT+INFO
MAXIIOT
DL7612
Revision:LRWAN110_R02A01
Date:2019-01-16
OKOK
```

## 4.3 AT+CGMI Request manufacturer identification

The execution command returns manufacturer identification.

AT+CGMI Request manufacturer identification	
Execution Command <b>AT+CGMI&lt;CR&gt;&lt;LF&gt;</b>	Response <b>&lt;manufacturer&gt;</b> <b>OK</b>  If there is any error, response:

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	+ERROR:<err>
--	--------------

### Parameter

<manufacturer> Manufacturer information.

### Example

```
>>AT+CGMI
```

```
MAXIOT
```

```
OK
```

## 4.4 AT+CLAC List available commands

The command lists the available AT commands.

AT+CLAC List available commands	
Execution Command	Response
AT+CLAC<CR><LF>	1, <AT Command>
	...
	N, <AT Command>
	OK
	If there is any error, response:
	+ERROR:<err>

### Parameter

< AT Command > Defines the AT command including the prefix AT.

### Example

```
>>AT+CLAC
```

```
1,AT
```

```
2,AT+INFO
```

```
3,AT+CGMI
```

```
4,AT+CLAC
```

```
.....
```

```
40,AT+UTC
```

```
41,AT+BEACON
```

```
OK
```

## 4.5 AT+NRB Reboot the product

The command reboot the product.

AT+NRB Reset the product	
Execution Command <b>AT+NRB&lt;CR&gt;&lt;LF&gt;</b>	Response <b>REBOOTING</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Example

---

```
>>AT+NRB  
REBOOTING
```

---

## 4.6 AT+RESTORE Restore product factory parameters

The command will restore product to factory configuration parameters and restart it.

AT+RESTORE Restore product factory parameters	
Execution Command <b>AT+RESTORE&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Example

---

```
>>AT+RESTORE  
OK
```

---

## 4.7 AT+SLEEP Put product into sleep mode

The command put product into sleep mode. If you need to wake up the product, it can be waken up any AT commands. Wake-up time is just 4 ms.

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AT+SLEEP Put product into sleep mode	
Execution Command <b>AT+SLEEP&lt;CR&gt;&lt;LF&gt;</b>	Response <b>SLEEPING</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Example

---

```
>>AT+SLEEP
```

```
SLEEPING
```

```
>>AT (Any AT command is ok)
```

```
AWAKE
```

---

## 4.8 AT+SAVE Put product into sleep mode

The command saves product configuration parameters.

AT+SAVE Save product configuration parameters	
Execution Command <b>AT+SAVE&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Example

---

```
>>AT+SAVE
```

```
OK
```

---

## 4.9 AT+DEBUG Enter or quit product debug mode

The command put product enter or quit debug mode. In debug mode, it can show the working process of LORAWAN.

AT+DEBUG Enter or quit product debug mode	
---	--

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Execution Command <b>AT+DEBUG=&lt;enable&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
Read Command <b>AT+DEBUG[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+DEBUG:&lt;enable&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

- < enable > Bool type. It put the product enter debug mode or not.
- 0 quit debug mode (default)
  - 1 enter debug mode

### Example

---

```
>>AT+DEBUG=1
```

```
OK
```

```
>>AT+DEBUG
```

```
+DEBUG:1
```

---

## 5 Device Activation Commands

### 5.1 AT+DEVEUI Get end-device identifier

The command returns end-device identifier. It is seen as DevEUI for LORAWAN server.

<b>AT+DEVEUI Get end-device identifier</b>	
Read Command <b>AT+DEVEUI[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+DEVEUI:&lt;DevEUI&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

< DevEUI > String type hexadecimal format indicating the DevEUI number  
The length must be 8 bytes.

### Example

---

```
>>AT+DEVEUI
```

```
+DEVEUI:24c5d9e63257f347
```

```
OK
```

---

## 5.2 AT+ADDR Get or set end-device address

The command gets or set end-device address (DevAddr)

AT+ADDR Get or set end-device address (DevAddr)	
Execution Command <b>AT+ADDR=&lt;address&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
Read Command <b>AT+ADDR[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+ADDR:&lt;address&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

<address> uint32\_t type in hexadecimal format.  
The length must be 4 bytes.

### Example

---

```
>>AT+ADDR=3257F347
```

```
OK
```

```
>>AT+ADDR
```

```
+ADDR:3257F347
```

```
OK
```

---

### 5.3 AT+NWKKEY Get or set network key

The command set or get end-device network key. It is seen as NwkKey for LORAWAN server.

AT+NWKKEY Get or set network key	
Execution Command <b>AT+NWKKEY=&lt;NwkKey&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+NWKKEY[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NWKKEY:&lt; NwkKey &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

#### Parameter

< NwkKey > String type hexadecimal format indicating the NwkKey number  
 The length must be 16 bytes.

#### Example

```
>>AT+NWKKEY=2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

```
>>AT+NWKKEY
```

```
+NWKKEY:2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

### 5.4 AT+APPKEY Get or set application key

The command set or get end-device application key. It is seen as AppKey for LORAWAN server.

AT+APPKEY Get or set application key	
Execution Command <b>AT+APPKEY=&lt;AppKey&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>

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	If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+APPKEY[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+APPKEY:&lt;AppKey&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**< AppKey >** String type hexadecimal format indicating the AppKey number  
The length must be 16 bytes.

### Example

```
>>AT+APPKEY=2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

```
>>AT+APPKEY
```

```
+APPKEY:2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

## 5.5 AT+ FNWKSINTKEY Get or set FNWKSINTKEY

The command set or get FNWKSINTKEY. It is necessary for over the activation by personalization.

AT+FNWKSINTKEY Get or set FNWKSINTKEY	
Execution Command <b>AT+FNWKSINTKEY=&lt;FNwkSIntKey&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+FNWKSINTKEY[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+FNWKSINTKEY:&lt; FNwkSIntKey &gt;</b> <b>OK</b>



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	If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
--	---

### Parameter

**< FNwkSIntKey >** String type hexadecimal format indicating the FNWKSINTKEY number  
The length must be 16 bytes.

### Example

```
>>AT+FNWKSINTKEY=2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

```
>>AT+FNWKSINTKEY
```

```
+ FNWKSINTKEY:2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

## 5.6 AT+ SNWKSINTKEY Get or set SNWKSINTKEY

The command set or get SNWKSINTKEY. It is necessary for over the activation by personalization.

AT+SNWKSINTKEY Get or set SNWKSINTKEY	
Execution Command <b>AT+SNWKSINTKEY=&lt;SNwkSIntKey&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+SNWKSINTKEY[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+SNWKSINTKEY:&lt; SNwkSIntKey &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**< SNwkSIntKey >** String type hexadecimal format indicating the SNWKSINTKEY number

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The length must be 16 bytes.

### Example

```
>>AT+SNWKSINTKEY=2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

```
>>AT+SNWKSINTKEY
```

```
+SNWKSINTKEY:2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

## 5.7 AT+ NWKSENCKEY Get or set NWKSENCKEY

The command set or get NWKSENCKEY. It is necessary for over the activation by personalization.

AT+FNWKSINTKEY Get or set FNWKSINTKEY	
Execution Command <b>AT+NWKSENCKEY=&lt;NwkSEncKey&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+NWKSENCKEY[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NWKSENCKEY:&lt; NwkSEncKey &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< NwkSEncKey > String type hexadecimal format indicating the NwkSEncKey number.

The length must be 16 bytes.

### Example

```
>>AT+NWKSENCKEY=2B7E151628AED2A6ABF7158809CF4F3C
```

```
OK
```

```
>>AT+NWKSENCKEY
```

```
+NWKSENCKEY:2B7E151628AED2A6ABF7158809CF4F3C
```

OK

## 5.8 AT+NWKSKEY Get or set network session key

The command gets or set network session key. It is seen as NWKSKEY for LORAWAN server.

AT+NWKSKEY Get or set network session key	
Execution Command <b>AT+NWKSKEY=&lt;NwkSKey&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+NWKSKEY [?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NWKSKEY:&lt; NwkSKey &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< NwkSKey > String type hexadecimal format indicating the NWKSKEY number  
The length must be 16 bytes.

### Example

```
>>AT+NWKSKEY=2B7E151628AED2A6ABF7158809CF4F3C
```

OK

```
>>AT+ NWKSKEY
```

```
+NWKSKEY:2B7E151628AED2A6ABF7158809CF4F3C
```

OK

## 5.9 AT+JOINEUI Get or set JoinEUI

The command gets or set JoinEui. It is necessary for over the air activation.

AT+JOINEUI Get or set application identifier	
Execution Command <b>AT+JOINEUI=&lt;JoinEUI&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+JOINEUI[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+JOINEUI:&lt;AppEUI&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< JoinEUI > String type hexadecimal format indicating the JoinEUI number  
 The length must be 8 bytes.

### Example

```
>>AT+JOINEUI=0102030405060708
```

```
OK
```

```
>>AT+JOINEUI
```

```
+JOINEUI:0102030405060708
```

```
OK
```

## 5.10 AT+CLASS Get or set end-device class type

The command set or get end-device target class type. They are Class-A, Class-B or Class-C.

AT+CLASS Get or set end-device class type	
Execution Command	Response

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<b>AT+CLASS=&lt;target class&gt;&lt;CR&gt;&lt;LF&gt;</b>	<b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+CLASS[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+CLASS:&lt;current class&gt;, &lt;target class&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< current class > Device current class. Char type.

- A Class-A mode
- B Class-B mode
- C Class-C mode

< target class > Device target class. Char type.

- A Class-A mode
- B Class-B mode
- C Class-C mode

### Example

---

```
>>AT+CLASS=B
```

```
OK
```

```
>>AT+CLASS
```

```
+CLASS:A(current), B(target)
```

```
OK
```

---

## 5.11 AT+ACTIVATE Get or set end-device activation way

The command set or get end-device activation way. It can be “Over-the-Air Activation” or “Activation by Personalization”

If the new activation way is set, device will reactivate according to the new activation way.

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AT+ACTIVATE Get or set end-device activation way	
Execution Command <b>AT+ACTIVATE=&lt;way&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+ACTIVATE[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+ACTIVATE:&lt; way &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**<way>** Integer type.

- 0** "Activation by Personalization"
- 1:** "Over-the-Air Activation" (default)

### Example

```
>>AT+ACTIVATE=1
```

```
OK
```

```
>>AT+ACTIVATE
```

```
+ACTIVATE:1
```

```
OK
```

## 5.12 AT+CHMASK Get or set the mask of each channel

The command set or get end-device channel mask of current ISM band.

AT+CHMASK Get or set the mask of each channel	
Execution Command <b>AT+CHMASK=</b>	Response <b>OK</b>

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<code>&lt;mask[0]&gt;, &lt;mask[1]&gt;, &lt;mask[2]&gt;, &lt;mask[3]&gt;, &lt;mask[4]&gt;, &lt;mask[5]&gt;&lt;CR&gt;&lt;LF&gt;</code>	If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <code>AT+CHMASK[?]&lt;CR&gt;&lt;LF&gt;</code>	Response <b>+CHMASK:&lt;mask[0]&gt;, &lt;mask[1]&gt;, &lt;mask[2]&gt;, &lt;mask[3]&gt;, &lt;mask[4]&gt;, &lt;mask[5]&gt;, OK</b> If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**< mask >** uint16\_t array type with 6 elements in hexadecimal format.

From the lowest bit to the highest bit, it represents channel 0 to channel 95. If the channel mask bit is 1, it means the corresponding channel is enabled. Otherwise it is disabled. The details of each channel configuration parameter reference to <<LoRaWAN Regional Parameters v1.1.0>>.

mask[0] bit0 to bit15: channel 0 to channel 15  
mask[1] bit0 to bit15: channel 16 to channel 31  
mask[2] bit0 to bit15: channel 32 to channel 47  
mask[3] bit0 to bit15: channel 48 to channel 63  
mask[4] bit0 to bit15: channel 64 to channel 79  
mask[5] bit0 to bit15: channel 80 to channel 95

Note: If all channels are disabled, channel 0 will enable automatically.

### Example

---

Enable channel 0 to channel 15:

```
>>AT+CHMASK=00FF,0000,0000,0000,0000,0000
```

```
OK
```

```
>>AT+CHMASK
```

```
+CHMASK:00FF,0000,0000,0000,0000,0000
```

```
OK
```

---

## 5.13 AT+RXWIN2 Get or set rxwin2 parameter

The command set or get end-device rxwin2 parameter.

AT+RXWIN2 Get or set rxwin2 parameter	
Execution Command <b>AT+RXWIN2=&lt;frequency&gt;,&lt;DR&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+RXWIN2[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+RXWIN2:&lt;frequency&gt;,&lt;DR&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**<frequency>** Integer type. Rxwin2 frequency

Must more than 430000000

**<DR>** Integer type. Rxwin2 data rate. The details of data rate reference to <<LoRaWAN Regional Parameters v1.1.0>>.

Range from 0 to 15.

### Example

```
>>AT+RXWIN2=923200000,0
```

```
OK
```

```
>>AT+RXWIN2
```

```
+RXWIN2:923200000,0
```

```
OK
```

## 5.14 AT+CGATT Query device activation status

The command queries device activation status. The command will only be effective when



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activation way is “Over-the-Air Activation”.

<status> can show whether end-device has activated. It will set to 1 when end-device has activated. when “AT+ACTIVATE” is set to 1 or device reboot, <status> will set to 0.

When device reboot, it will try to activate automatically until it activates successfully.

If activation way is “Activation by Personalization”, it will return nothing.

AT+CGATT Set attach, detach or query whether the end-device is activated	
Read Command <b>AT+CGATT[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+CGATT:&lt;status&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

<status> Integer type. Indicates the state of activation.

- 0 Detached
- 1 Attached

### Example

```
>>AT+CGATT
+CGATT:1
OK
```

## 6 Device General Commands

### 6.1 AT+UTC Get the UTC time

The command gets the UTC time from network server. It need the gateway has GPS module.

AT+UTC Get the UTC time	
Execution Command <b>AT+UTC[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+UTC:&lt;utc_s&gt;s, &lt;utc_ms&gt;ms</b> <b>OK</b>

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	If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
--	---

### Parameter

< utc\_s > Integer type, the second time of UTC. Unit: s.

< utc\_ms > Integer type, the millisecond time of UTC. Unit: ms

### Example

---

```
>>AT+UTC
```

```
+UTC:1547607649s,554ms
```

---

## 6.2 AT+CSQ Get Signal Strength Indicator

The command gets signal strength indicator of the last received message.

AT+CSQ Get Signal Strength Indicator	
Execution Command <b>AT+CSQ[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+CSQ: rssi &lt;rssi&gt;, snr &lt;snr&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

< rssi > Integer type, Received signal strength. Unit: dBm.

< snr > Integer type, Received signal SNR. Unit: dB.

### Example

---

```
>>AT+CSQ
```

```
+CSQ:rssi -27,snr 7
```

---

## 6.3 AT+POWER    Get or set end-device radio TX power

The command gets or set end-device radio TX power. The default setting is 1.

If ADR is enabled, the power will be changed by network server.

AT+POWER    Get or set end-device radio TX power	
Execution Command <b>AT+POWER=&lt;power&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+POWER [?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+POWER:&lt;power&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

<b>&lt; power &gt;</b>	Integer type
0:	TX_POWER_0      Max EIRP
1:	TX_POWER_1      Max EIRP – 2dB
2:	TX_POWER_2      Max EIRP – 4dB
3:	TX_POWER_3      Max EIRP – 6dB
4:	TX_POWER_4      Max EIRP – 8dB
5:	TX_POWER_5      Max EIRP – 10dB
6:	TX_POWER_6
7:	TX_POWER_7
8:	TX_POWER_8
9:	TX_POWER_9

Note:

Different end-device's maximum power is different, please choose the right power to use.

The details of tx\_power reference to the [TX power table](#) of <<LoRaWAN Regional Parameters v1.1.0>>.

### Example

```
>>AT+POWER=1
```

---

OK

>>AT+POWER

+POWER:1

OK

---

## 6.4 AT+PORT Get or set uplink message 's port

The command gets or set end-device uplink message 's port.

AT+PORT Get or set end-device uplink message 's port	
Execution Command <b>AT+PORT=&lt;port&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+PORT [?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+PORT:&lt;port&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< port > Integer type, from 1 to 255

### Example

---

>>AT+PORT=5

OK

>>AT+PORT

+PORT:5

OK

---

## 6.5 AT+ADR Get or set adaptive data rate

The command gets or set adaptive data rate.

The default setting is 1,

AT+ADR Get or set adaptive data rate	
Execution Command <b>AT+ADR=&lt;enable&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>  If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+ADR [?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+ADR:&lt;enable&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>  If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< enable > Bool type  
0 disable adaptive data rate  
1 enable adaptive data rate (default)

### Example

```
>>AT+ADR=1
```

```
OK
```

```
>>AT+ADR
```

```
+ADR:1
```

```
OK
```

## 6.6 AT+DR Get or set uplink message data rate

The command gets or set uplink message data rate.

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AT+DR Get or set uplink message data rate	
Execution Command <b>AT+DR=&lt;data rate&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+DR [?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+DR:&lt; data rate &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< data rate > Integer type, uplink message data rate. The details of each data rate reference to <<LoRaWAN Regional Parameters v1.1>>.

0	DR0
1	DR1
2	DR2
3	DR3
4	DR4
5	DR5
6	DR6
7	DR7
8	DR8
9	DR9
10	DR10
11	DR11
12	DR12
13	DR13
14	DR14
15	DR15

### Example

```
>>AT+DR=0
```

```
OK
```

```
>>AT+DR
```

```
+DR:5
```

OK

## 6.7 AT+CFM Get or set the confirm message mode

The command gets or set the confirm message mode.

If <enable> is set to 1, when an uplink message is sent to server, server will return an ACK message to device. The ACK message can help "NSMI" to know that uplink message has sent successfully.

If <enable> is set to 0, server will not send ACK message so that "AT+NSMI" will be Invalid.

The default setting is 1.

AT+CFM Get or set the confirm message mode	
Execution Command <b>AT+CFM=&lt;enable&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
Read Command <b>AT+CFM [?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+CFM:&lt;enable&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< enable > Bool type  
0 unconfirm frame mode  
1 confirm frame mode (default)

### Example

```
>>AT+CFM=1
```

OK

```
>>AT+CFM
```

+CFM:1

OK

## 6.8 AT+NMGS Send a message by hex format

The command sends a message by hex format. The end-device needs to be activated before using this command.

AT+NMGS Send a message by hex format	
Execution Command <b>AT+NMGS=&lt;length&gt;, &lt;data&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NMGS: OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>  If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**< length >** Integer type, decimal length of message  
The maximum length of data to be sent is limited by uplink message data rate.  
The details of maximum payload for each data rate reference to the [maximum payload size](#) table of <<LoRaWAN Regional Parameters v1.1>>.

**< data >** Integer type, data to be transmitted in hex string format.

### Example

---

```
>>AT+NMGS=5,AA112233BB
```

```
+NMGS: OK
```

---

## 6.9 AT+NCMGS Send a message by char format

The command sends a message by char format. The end-device needs to be activated before using this command.

AT+NCMGS Send a message by char format	
Execution Command <b>AT+NCMGS=&lt;length&gt;, &lt;data&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NCMGS: OK</b>



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	If there is any error, response: <b>+ERROR:&lt;err&gt;</b> If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>
--	---

### Parameter

**< length >** Integer type, decimal length of message  
The maximum length of data to be sent is limited by uplink message data rate.  
The details of maximum payload for each data rate reference to the [maximum payload size](#) table of <<LoRaWAN Regional Parameters v1.1>>.

**< data >** Integer type, data to be transmitted in char string format.

### Example

---

```
>>AT+NCMGS=5,HELLO
```

```
+NCMGS: OK
```

---

## 6.10 AT+NQMGS count the status of uplink transmission

The command counts the status of uplink transmission.

AT+NQMGS count the status of uplink transmission	
Execution Command <b>AT+NQMGS&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NQMGS:&lt;send&gt;, &lt;error&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

**< send >** Integer type, the total number of successful uplink messages

**< error >** Integer type, the number of messages that could not be sent

### Example

---

```
>>AT+NQMGS
```

```
+NQMGS:30,0
```

```
OK
```

---

## 6.11 AT+NSMI Get or set indications of send message

The command gets or set indications of send message.

This command will only be useful when confirm frame mode is opened.

If sent message indications are turned on, the unsolicited informational response: “+NSMI:<status>” will be issued when a new message is sent.

The default setting is 1, which indicates indications are sent.

AT+NSMI Get or set indications of send message	
Execution Command <b>AT+NSMI=&lt;enable&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
Read Command <b>AT+NSMI[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NSMI Enable:&lt;enable&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
Uplink message has sent	If NSMI is enabled, response: <b>+NSMI:&lt;status&gt;</b>

### Parameter

- < enable >** Bool type
  - 0 No indications
  - 1 Indications will be sent (default)
- < status >** Bool type
  - 0 No ack form server
  - 1 Receive ack from server

### Example

```
>>AT+NSMI=1
```

```
OK
```

```
>>AT+NSMI
```

```
+NSMI Enable:1
```

```
OK
```

```
If NSMI is enabled, when an uplink message is sent and receive ACK:
```

```
+NSMI:1
```

## 6.12 AT+NMGR Get a message by hex format

The command gets a message by hex format.

The command returns the oldest buffered message and deletes it from the buffer. If there are no messages, then no command response will be given. If new message indications (AT+NNMI=1) are turned on, then received messages will not be available via this command.

Cache up to 5 downlink messages.

AT+NMGR Get a message by hex format	
Execution Command <b>AT+NMGR&lt;CR&gt;&lt;LF&gt;</b>	Response <b>[+NMGR:&lt;length&gt;, &lt;data&gt;]</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>

### Parameter

< length > Integer type, decimal length of message

< data > Integer type, data received in hex string format.

### Example

---

```
>>AT+NMGR
+NMGR:5,AA112233BB
OK
```

```
>>AT+NMGR
OK
```

---

## 6.13 AT+NQMGR count the status of downlink transmission

The command counts the status of downlink transmission.

The default setting is 1, the <status> will restore to the default value (1 by default) after reboot.

AT+NQMGR Query the status of messages received	
Execution Command	Response

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AT+NQMGR<CR><LF>	+NQMSR:<buffered>, <received>, <not ack> OK  If there is any error, response: +ERROR:<err>
------------------	--

### Parameter

- < buffered > Integer type, the number of messages waiting to be read in the downstream buffer  
Cache up to 5 downlink messages.
- < received > Integer type, the total number of messages received from network server
- < not ack > Integer type, the number of messages lost from network server

### Example

```
>>AT+NQMGR
+NQMGR:0,30,0
OK
```

## 6.14 AT+NNMI Get or set new message indications

The command gets or set new message indications.

AT+NNMI Get or set new message indications	
Execution Command <b>AT+NNMI=&lt;enable&gt;&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
Read Command <b>AT+NNMI[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+NNMI Enable:&lt;enable&gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
downlink message detected	If indications only, response <b>+NNMI:&lt;status&gt;</b>  If indications and message, response <b>+NNMI:&lt;length&gt;, &lt;data&gt;</b>

### Parameter

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---

- < enable >** Integer type
- 0 No indications
  - 1 Indications and message (default)
  - 2 Indications only
- < status >** Bool type
- 1 Indications
- < length >** Decimal length of message.
- < data >** Data to be transmitted in hex string format

### Example

---

```
>>AT+NNMI=1
```

```
OK
```

```
>>AT+NNMI
```

```
+NNMI Enable:1
```

```
OK
```

```
If NNMI is enabled, when a downlink message received:
```

```
+NNMI:1
```

```
Or
```

```
+NNMI:5,AA112233BB
```

---

## 6.15 AT+LCHECK Add a “LinkCheckReq” command

The command will add a “LinkCheckReq” mac command of LORAWAN protocol. User should send an uplink frame by “AT+NMGS” or “AT+NCMGS” to make a request to the network server. The end-device needs to be activated before using this command.

AT+LCHECK Get or set the confirm message mode	
Execution Command <b>AT+LCHECK&lt;CR&gt;&lt;LF&gt;</b>	Response <b>OK</b> <b>Please send an uplink frame</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>  If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Example

---

---

>>AT+LCHECK

OK

Please send an uplink frame

---

## 6.16 AT+PINGSL0TDR Get the ping slot data rate

The command gets the ping slot data rate. Only when the device switches to Class-B, ping slot is valid.

AT+PINGSL0TDR Get the ping slot data rate	
Read Command	Response
<b>AT+PINGSL0TDR[?]&lt;CR&gt;&lt;LF&gt;</b>	<b>+PINGSL0TDR:&lt; data rate &gt;</b> <b>OK</b>
	If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
	If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

< data rate > Integer type, uplink message data rate. The details of each data rate reference to <<LoRaWAN Regional Parameters v1.1>>.

- 0 DR0
- 1 DR1
- 2 DR2
- 3 DR3
- 4 DR4
- 5 DR5
- 6 DR6
- 7 DR7
- 8 DR8
- 9 DR9
- 10 DR10
- 11 DR11
- 12 DR12
- 13 DR13
- 14 DR14
- 15 DR15

### Example

---

```
>>AT+PINGSL0TDR
```

```
+PINGSL0TDR:3
```

```
OK
```

## 6.17 AT+PINGSL0TPY Get the ping slot periodicity

The command gets the ping slot periodicity. Only when the device switches to Class-B, ping slot is valid.

AT+PINGSL0TPY Get the ping slot periodicity	
Read Command <b>AT+PINGSL0TPY[?]&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+PINGSL0TPY:&lt; num &gt;</b> <b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>  If command execution failed: <b>+FAIL:&lt;fail id&gt;</b>

### Parameter

**< num >** Integer type, range from 0 to 7. Periodicity is equal to  $2^{\text{<num>}}$  seconds.  
For example:  $2^3 = 8$  seconds. The end-device will open an Rx ping slot every 8 seconds.

### Example

```
>>AT+PINGSL0TPY
```

```
+PINGSL0TPY:3
```

```
OK
```

## 6.18 AT+BEACON count the status of beacon transmission

The command counts the status of beacon transmission. Including received beacons and missed beacons.

AT+BEACON count the status of beacon transmission	
Execution Command <b>AT+BEACON&lt;CR&gt;&lt;LF&gt;</b>	Response <b>+BEACON:&lt; received num &gt;, &lt; missed num &gt;</b>

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	<b>OK</b>  If there is any error, response: <b>+ERROR:&lt;err&gt;</b>
--	--

### Parameter

< received num > Integer type, the number of received beacons.

< missed num > Integer type, the number of missed beacons.

### Example

---

```
>>AT+BEACON
```

```
+BEACON:30,0
```

```
OK
```

---

## 7 Error and Fail values

This chapter introduces the error and fail values related to product.

### 7.1 Error ID

The error codes listed in the following table

<err>	Description	Remarks
1	AT command timeout	lack of <CR><LF>
2	No such command	
3	Non-standard format	
4	Non-standard parameters	
5	No activation	Device need to be activated

### 7.2 Fail ID

The fail codes listed in the following table

<fail id>	Status	Remarks
0	LORAMAC_STATUS_OK	
1	LORAMAC_STATUS_BUSY	



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2	LORAMAC_STATUS_SERVICE_UNKNOWN	
3	LORAMAC_STATUS_PARAMETER_INVALID	
4	LORAMAC_STATUS_FREQUENCY_INVALID	
5	LORAMAC_STATUS_DATARATE_INVALID	
6	LORAMAC_STATUS_FREQ_AND_DR_INVALID	
7	LORAMAC_STATUS_NO_NETWORK_JOINED	
8	LORAMAC_STATUS_LENGTH_ERROR	
9	LORAMAC_STATUS_REGION_NOT_SUPPORTED	
10	LORAMAC_STATUS_SKIPPED_APP_DATA	
11	LORAMAC_STATUS_DUTYCYCLE_RESTRICTED	
12	LORAMAC_STATUS_NO_CHANNEL_FOUND	
13	LORAMAC_STATUS_NO_FREE_CHANNEL_FOUND	
14	LORAMAC_STATUS_BUSY_BEACON_RESERVED_TIME	
15	LORAMAC_STATUS_BUSY_PING_SLOT_WINDOW_TIME	
16	LORAMAC_STATUS_BUSY_UPLINK_COLLISION	
17	LORAMAC_STATUS_CRYPTO_ERROR	
18	LORAMAC_STATUS_FCNT_HANDLER_ERROR	
19	LORAMAC_STATUS_MAC_COMMMAD_ERROR	
20	LORAMAC_STATUS_CLASS_B_ERROR	
21	LORAMAC_STATUS_CONFIRM_QUEUE_ERROR	
22	LORAMAC_STATUS_ERROR	