



MKL62BA LoRaWAN Module AT Command

Version V1.0



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1 About This Document

This document provides a comprehensive description of MKL62BA AT commands. It is based on the LoRaWAN A/C protocol, and it is recommended to review the LoRaWAN specifications before using the MKL62BA module.

2 Format and Error description

All AT commands are required to use uppercase letters, and it should be end with Enter. The response message should leave a space between colon and parameter.

Item	Format	Response
Query	AT+COMMAND=?	+COMMAND: PARAMETER
Query	AT+COMMAND?	AT+COMMAND: COMMAND instruction
Set	AT+COMMAND=PARAMETER	+COMMAND: PARAMETER OK
RUN	AT+COMMAND	+COMMAND: OK

Error Code	Description
ERROR (-1)	AT command error
ERROR (-2)	AT parameter error
ERROR (-3)	Busy
ERROR (-5)	Not join the network
ERROR (-7)	Timeout

3 Command List

Item	Command	Description
General AT Commands	AT	Attention test command
	ATE	AT command echo status
	BAUD	Serial port baud rate
	SLEEP	Sleep mode
	RESET	Software reset
	FACTORY	Factory data reset
BLE AT Command	LADDR	BLE MAC address
	NAME	BLE broadcast name
	ADVI	BLE advertising interval
	UUID	BEL service UUID
	ADVD	BLE custom advertising field define
	SCAN_STD	BLE scan status
	SCAN_NAME	BLE scan name
	SCAN_RSSI	BLE scan RSSI
LoRa Network Management AT Command	JOIN_MODE	LoRaWAN Join mode
	DEVEUI	LoRaWAN DEVEUI
	APPEUI	LoRaWAN APPEUI
	APPKEY	LoRaWAN APPKEY
	NWKSKEY	LoRaWAN NWKSKEY



	APPSKEY	LoRaWAN APPSKEY
	DEVADDR	LoRaWAN DEVADDR
	REGION	LoRaWAN regional frequency
	CLASS	LoRaWAN CLASS(A/C)
	JOINING	LoRaWAN OTAA joining request
	JOIN_STD	LoRaWAN OTAA joining status
	AUTO_JOIN	LoRaWAN OTAA automatic join network
	NWKID	LoRaWAN Network ID
	LCR	LoRaWAN network connect check
	ADR	LoRaWAN ADR status
	TX-POWER	LoRaWAN TX-POWER grade (0-14)
	DR	LoRaWAN data rate
	CH	LoRaWAN channel
Send and Receive Packets	TX_LEN	Send data length
	CONFIRM	Uplink data type confirmed or unconfirmed
	SENDB	Send hexadecimal data
	SEND	Send character string data
	RECVB	Receive hexadecimal data
	RECV	Receive character string data
	DUTY_CYCLE	LoRaWAN transmit
	UP_CNT	Uplink frame counter
DOWN_CNT	Downlink frame counter	
LoRa Multicast Management	MC	LoRaWAN multicast management
	MC_DEVADDR	LoRaWAN multicast DEVADDR
	MC_NWKSKEY	LoRaWAN multicast NWKSKEY
	MC_APPKEY	LoRaWAN multicast APPSKEY
	MC_CNT	LoRaWAN multicast downlink frame counter
TEST	TEST	Enter or exit test mode
	TEST_CONF	Test RF parameter configuration
	TEST_TXLORA	Test modes send data
	TEST_RXLORA	Test modes receive data
	TEST_SCAN	Test modes BLE scan condition
	TEST_BLE_CON	Test modes send BLE connection request
TEST_PIOXX	Test GPIO port	

4 Command with Response Examples

Noted: All the AT command examples are based on the ATE status is on.

4.1 General AT Commands

4.1.1 AT

Attention, used to verify the COM channel is working. AT required at the beginning of using command.



```
AT
+AT: OK
```

Query all AT command and current value

```
AT?
AT+<CMD>? : Help on <CMD>
AT+<CMD> : Run <CMD>
AT+<CMD>=<value>: Set the value AT+<CMD>=? : Get the value
AT+LADDR: Get ble mac addr +LADDR: D0:C0:55:39:BF:71
AT+NAME: Get set ble adv name +NAME: MKL-BF71
AT+ADVI: Get set ble adv interval +ADVI: 100
AT+UUID: Get set ble service uuid +UUID: FFC3
AT+ADVD: Get set ble adv data +ADVD: DOC05539BF71010004
AT+SCAN_STD: Get set ble scan switch +SCAN_STD: OFF
AT+SCAN_NAME: Get set ble scan name +SCAN_NAME:
AT+SCAN_RSSI: Get set ble scan rssi +SCAN_RSSI: -127
AT+SLEEP: Get set ble sleep para +SLEEP: OFF
AT+BAUD: Get set ble uart baud +BAUD: 9600
AT+ATE: Get set ble ate para +ATE: ON
AT+RESET: Trig a reset of the MCU
AT+DEVEUI: Get the Device EUI +DEVEUI: 11:12:13:14:15:16:FF:51
AT+DEVADDR: Get or Set the Device address +DEVADDR: 55:39:BF:71
AT+APPKEY: Get or Set the Application Key +APPKEY:2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
AT+NWKSKEY: Get or Set the Network Session Key +NWKSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
AT+APPSKEY: Get or Set the Application Session Key +APPSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
AT+APPEUI: Get or Set the App Eui +APPEUI: 70:B3:D5:7E:D0:02:6B:87
AT+JOIN_MODE: Get or Set the Network Join Mode. (ABP, OTAA) +JOIN_MODE: OTAA
AT+CLASS: Get or Set the Device Class +CLASS: C
AT+JOINING: Join network
AT+JOIN_STD: Get the join status +JOIN_STD: JOINED
AT+AUTO_JOIN: Get or Set is otaa auto join mode +AUTO_JOIN: ON
AT+TX_LEN: Get max send data len in current dr +TX_LEN: 51
AT+SENDB: send hex data
AT+SEND: send string
AT+RECVB: receive hex data +RECVB:
AT+RECV: receive string +RECV:
AT+CONFIRM: Get or Set send data with ack +CONFIRM: OFF
AT+UP_CNT: Get or Set up cnt +UP_CNT: 0
AT+DOWN_CNT: Get down cnt +DOWN_CNT: 0
AT+DR: Get or Set datarate +DR: 0
AT+LCR: Get lorawan net state
AT+ADR: Get or Set ADR ON OFF +ADR: ON
AT+TX_POWER: Get or Set lora power +TX_POWER: 1
AT+CH: Get or Set CHANNEL +CH: 0-7
AT+DUTY_CYCLE: Get or Set DUTY CYCLE +DUTY_CYCLE: 0
AT+PN_MODE: Get or Set Private protocol on off +PN_MODE: OFF
AT+RX2FQ: Get or Set RX2 frequency +RX2FQ: 869525000
AT+RX2DR: Get or Set RX2 datarate +RX2DR: 0
AT+RX1DL: Get or Set rx1 watch dealy ms +RX1DL: 1000
AT+RX2DL: Get or Set rx2 watch dealy ms +RX2DL: 2000
```



```
AT+JN_RX1DL: Get or join rx1 watch dealy ms      +JN_RX1DL: 5000
AT+JN_RX2DL: Get or join rx2 watch dealy ms      +JN_RX2DL: 6000
AT+REGION: Get or Set region      +REGION: EU868
AT+VER: Get at version      +VER: 1.0.4
AT+SNR: Get lora net snr      +SNR: 7
AT+RSSI: Get lora net rssi      +RSSI: -85
AT+BAT: Get battery      +BAT: 3.2
AT+MC_DEVADDR: Get or Set MC address +MC_DEVADDR: 02:5E:64:58
AT+MC_NWKSKEY: Get or Set MC NWKSKEY +MC_NWKSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
AT+MC_APPSKEY: Get or Set MC APPSKEY +MC_APPSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
AT+MC_CNT: Get or clear MC cnt      +MC_CNT: 0
AT+MC: Get or Set MC SWITCH      +MC: OFF
AT+FACTORY: device factory set
AT+MC_CNT: Get or clear MC cnt      +MC_CNT: 0 AT+TEST_TXLORA: test mode send data
AT+TEST_CONF: test mode config +TEST_CONF: 902300000:14:125:10:4_5
AT+TEST_SCAN: Get or set Query scan time, RSSI and MAC +TEST_SCAN: 0:-127:FFFFFFFFFFFF
AT+TEST_PIO: Get or set      pio state
AT+TEST_BLE_CON: send connect bel connect request
AT+NWKID: Get NWKID +NWKID: 00:00:00:00
AT+TEST: Get or set test mode      +TEST: OFF
```

4.1.2 ATE

ATE is used to query and set echo status. If ATE default status is ON, it will display the send message. If ATE is OFF, it will only display the response message.

Query ATE when the status is ON

```
AT+ATE=?
+ATE: ON
```

Set ATE OFF

```
AT+ATE=OFF
+ATE: OFF
OK
```

Query ATE when the status is OFF

```
+ATE: OFF
```

4.1.3 BAUD

UART baud query and set, the default baud value is 9600.

Default UART configuration:



```
Baud: 9600
DATA: 8
Stop: 1
Parity: no
```

Query BAUD

```
AT+BAUD=?
BAUD: 9600
```

Set BAUD

Settable BAUD is 115200,57600,38400,19200,9600.

```
AT+BAUD=115200
BAUD: 115200
OK
```

4.1.4 SLEEP

The default setting of MCU do not sleep after restart or power on. When the MCU in sleep status (ON), it can be awakened in 1ms after sending any character. The sleep status can be set ON or OFF.

Query SLEEP status

```
AT+SLEEP=?
+SLEEP: OFF
```

Set SLEEP status

```
AT+SLEEP=ON
+SLEEP: ON
OK
```

4.1.5 RESET

RESET command can be used to restart MCU.

```
AT+RESET
+ATZ: OK
=====SYSTEM START=====
=====SOFT VERSION:01.00.04=====
=====LORA VERSION:1000300=====
=====LORA REGION:US915=====
```




4.1.6 FACTORY

FACTORY command can be used to factory data reset.

```
AT+FACTORY
+FACTORY: OK
=====SYSTEM  START=====
=====SOFT  VERSION:01.00.04=====
=====LORA  VERSION:1000300=====
=====LORA  REGION:US915=====
```

4.2 BLE AT Command

4.2.1 LADDR

LADDR command only can be used to query the MCU MAC address.

```
AT+LADDR=?
+LADDR: ED:5B:72:7D:71:CC
```

4.2.2 NAME

NAME command can be used to query and set the BLE broadcast name. The default name is MKL-XXXX. XXXX is the last two bytes of the MAC address.

Query NAME

```
AT+NAME=?
+NAME: MKL-71CC
```

Set NAME

The new setted name will be valid after restart MCU.

```
AT+NAME=MOKO
+NAME: MOKO
OK
```

4.2.3 ADVI



ADVI command can be used to query and set the BLE advertising interval time. The default interval time is 100ms. It can be set to 0 and 100ms to 6000ms , 0 means close advertising.

Query ADVI

```
AT+ADVI=?  
+ADVI: 100
```

Set ADVI

The new ADVI will be valid after restart MCU.

```
AT+ADVI=200  
+ADVI: 200  
OK
```

4.2.4 UUID

UUID command can be used to query and set the BLE service UUID. The default service UUID is 0XFFC3. The length must be two bytes.

Query UUID

```
AT+UUID=?  
+UUID: FFC3
```

Set UUID

The new UUID will be valid after restart MCU.

```
AT+UUID=FFFF  
+UUID: FFFF  
OK
```

4.2.5 ADV D

ADV D command can be used to query and set the BLE custom broadcast field. The default ADV D is MAC with software version.

Query ADV D

```
AT+ADV D=?  
+ADV D: ED5B727D71CC010004
```

Set ADV D

The new ADV D will be valid after restart MCU. And the length should be 2 bytes to 9 bytes.



```
AT+ADVD=ED5B727D71CC
+ADVD: ED5B727D71CC
OK
```

4.2.6 SCAN_STD

The default BLE scan status is off. It can be set to on at the slave mode.

Query SCAN_STD

```
AT+SCAN_STD=?
+SCAN_STD: OFF
```

Set SCAN_STD

```
AT+SCAN_STD=ON
+SCAN_STD: ON
OK
```

4.2.6 SCAN_NAME

The default BLE scan name is null. It can be set to on at the slave mode.

Query SCAN_NAME

```
AT+SCAN_NAME=?
+SCAN_NAME:
```

Set SCAN_NAME

```
AT+SCAN_NAME=1
+SCAN_NAME: 1
OK
```

4.2.7 SCAN_RSSI

The default BLE scan RSSI is -127dBm. It can be set to on at the slave mode. And the range is -127 to 0.

Query SCAN_RSSI



```
AT+SCAN_RSSI=?  
+SCAN_RSSI: -127
```

Set SCAN_RSSI

```
AT+SCAN_RSSI=-50  
+SCAN_RSSI: -50  
OK
```

4.3 LoRa Network Management AT Command

Noted: All the LoRa Network Management AT command will be valid after the MCU restart.

4.3.1 JOIN_MODE

The JOIN_MODE can be set to OTAA or ABP mode. The default setting is OTAA.

For over-the-air activation (OTAA), end-devices must follow a join procedure prior to participating in data exchanges with the network server. An end-device must go through a new join procedure every time it has lost the session context information.

The join procedure requires the end-device to be personalized with the following information before it starts the join procedure: a globally unique end-device identifier (DevEUI), the application identifier (AppEUI), and an AES-128 key (AppKey).

Under certain circumstances, end-devices can be activated by personalization (ABP). Activation by personalization directly ties an end-device to a specific network by-passing the join request-join accept procedure.

Activating an end-device by personalization means that the DevAddr and the two session keys NwkSKey and AppSKey are directly stored into the end-device instead of the DevEUI, AppEUI and the AppKey. The end-device is equipped with the required information for participating in a specific LoRa network when started.

Query JOIN_MODE

```
AT+JOIN_MODE=?  
+JOIN_MODE: OTAA
```

Set JOIN_MODE

```
AT+JOIN_MODE=ABP  
+JOIN_MODE: ABP  
OK
```



4.3.2 DEVEUI

DEVEUI is a global uniquely identifies the end-device. The default DEVEUI is BLE MAC plus two bytes FFFF.

Query DEVEUI

```
AT+DEVEUI=?  
+DEVEUI: ED:5B:72:FF:FF:7D:71:CC
```

Set DEVEUI

```
AT+DEVEUI=30:32:35:38:6B:37:5F:03  
+DEVEUI: 30:32:35:38:6B:37:5F:03  
OK
```

4.3.3 APPEUI

APPEUI only can be set at OTAA mode, and the length must be 8 bytes. The default value is 70:B3:D5:7E:D0:02:6B:E6.

Query APPEUI

```
AT+APPEUI=?  
+APPEUI: 70:B3:D5:7E:D0:02:6B:87
```

Set APPEUI

```
AT+APPEUI=70:B3:D5:7E:D0:02:6B:E5  
+APPEUI: 70:B3:D5:7E:D0:02:6B:E5  
OK
```

4.3.4 APPKEY

APPKEY only can be set at OTAA mode, and the length must be 16 bytes. The AppKey is an AES-128 root key specific to the end-device. Whenever an end-device joins a network via over-the-air activation, the AppKey is used to derive the session keys NwkSKey and AppSKey specific for that end-device to encrypt and verify network communication and application data.

The default value is 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30.

Query APPKEY

```
AT+APPKEY=?  
+APPKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
```



Set APPKEY

```
AT+APPKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
+APPKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
OK
```

4.3.5 NWKSKEY

NWKSKEY only can be set at ABP mode, and the length must be 16 bytes. The default value is 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30.

Query NWKSKEY

```
AT+NWKSKEY=?
+APPKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
```

Set NWKSKEY

```
AT+NWKSKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
+APPKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
OK
```

4.3.6 APPSKEY

APPSKEY only can be set at ABP mode, and the length must be 16 bytes. The default value is 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30.

Query APPSKEY

```
AT+APPSKEY=?
+APPSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
```

Set APPSKEY

```
AT+APPSKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
+APPSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:30
OK
```

4.3.7 DEVADDR

DEVADDR only can be set at ABP mode, and the length must be 4 bytes. The default value is the latest two bytes of the MAC address.



Query DEVADDR

```
AT+DEVADDR=?  
+DEVADDR: 72:7D:71:CC
```

Set DEVADDR

```
AT+DEVADDR=72:7D:71:BB  
+DEVADDR: 72:7D:71:BB  
OK
```

4.3.8 REGION

REGION command can be used to query and set the frequency region. The default region is US915, the set region will be valid after restart MCU.

The different hardware support different frequency region. Right now, the 868MHZ hardware module supports and can be configured with EU868, IN865 and RU864. The 915MHZ hardware module supports and can be configured with US915, AU915 and AS923.

Query REGION

```
AT+REGION=?  
+REGION: US915
```

Set REGION

```
AT+REGION=AU915  
+REGION: AU915  
OK
```

4.3.9 CLASS

MKL62BA module support Class A and Class C. Default is Class A.

Query CLASS

```
AT+CLASS=?  
+CLASS: A
```

Set CLASS

```
AT+CLASS=C  
+CLASS: C  
OK
```



4.3.10 JOINING

JOINING command only can be used to OTAA mode for request joining the network, the default mode is OTAA mode.

The device should be registered on the LoRa server before send joining request.

```
AT+JOINING
+JOINING: JOINED
OK
```

If the device cannot join the network, it will return join failed as below. If the device is under connecting the network, it will return busy ERROR (-3). It will return ERROR (-2) when device is ABP mode.

```
AT+JOINING
+JOINING: JOIN FAILED
OK
```

4.3.11 JOIN_STD

JOIN_STD command can be used to query the join status. There are three different status, joined, joining and join fail. Please note if the module is in ABP mode, It will return ERROR(-2) when sending this command.

```
AT+JOIN_STD=?
+JOIN_STD: JOINED
```

4.3.12 AUTO_JOIN

The device default AUTO_JOIN status is off. When AUTO_JOIN status is on and the device restart in OTAA mode, the device will join network automatically.

Query AUTO_JOIN

```
AT+AUTO_JOIN=?
+AUTO_JOIN: OFF
```

Set AUTO_JOIN

```
AT+AUTO_JOIN=ON
+AUTO_JOIN: ON
OK
```




4.3.13 NWKID

NWKID is assigned number by LoRa server after joining the network. Only can be queried in OTAA device.

```
AT+NWKID=?  
+NWKID: 00:00:00:00
```

4.3.14 LCR

LCR is link check request and it used to check the network. It will send a blank packet to server after send AT+LCR=?, if there is no ACK received by device that means the network is abnormal or disconnected.

Query LCR when the device has connected to the network

```
AT+LCR=?  
+RECVB: -106: -1:ACK
```

Query LCR when the device disconnects with the network

```
AT+LCR=?  
ERROR(-5)
```

4.3.15 ADR

ADR default is ON, the actual DR range will follow the LoRaWAN V1.0.2 specification. The DR value only can be changed when ADR is OFF.

Query ADR

```
AT+ADR=?  
+ADR: ON
```

Set ADR

```
AT+ADR=OFF  
+ADR: OFF  
OK
```



4.3.16 TX-POWER

TX-POWER command can be used to query and set power grade. The range is 0 to 14. Different frequency range transfer to dBm are different. It can refer to LoRaWAN V1.0.2 specification. Such as US915 dBm=30-2*TX_POWER, EU868 dBm =16-2*TX_POWER-2.15

Query TX-POWER

```
AT+TX_POWER=?  
+TX_POWER: 0 # 30-2*0=30dBm
```

Set TX-POWER

```
AT+TX_POWER=5  
+TX_POWER: 5 # 30-2*5=20dBm  
OK
```

4.3.17 DR

DR command can be used to query and set DR value. The DR only can be set when ADR is off. When ADR is ON, the DR value will follow the LoRaWAN standard based on the frequency. The default configuration refers to the table of default DR and CH.

And the DR only can be set in single value.

Query DR

```
AT+DR=?  
+DR: 3
```

Set DR

```
AT+DR=0  
+DR: 0  
OK
```

4.3.18 CH

CH command can be used to query and set CH value. The default CH configuration refer to the table of default DR and CH with different frequency.

Query CH

```
AT+CH=?  
+CH: 0-7 # For the US915/AU915 will auto match the high speed CH64
```

Set CH



```
AT+CH=0-7
+CH: 0-7 # For the US915/AU915 will auto match the high speed CH64
OK
```

Please refer to below table about default configuration of DR and CH in different frequency

Frequency	Frequency Range	Default CH	CH Range	Default DR	DR Range	Default RX2FQ
EU868	863-870	0-2	0-15	0-5	0-15	869.525 MHz / DR0 (SF12, 125 kHz)
US915	902-928	0-7	0-71	0-4	0-15	923.3MHz / DR8
CN779	779-787	0-5	0-15	0-5	0-15	786 MHz / DR0
EU433	433-434	0-2	0-15	0-5	0-15	434.665MHz / DR0 (SF12, 125kHz)
AU915	915-928	0-7	0-71	0-6	0-15	923.3MHz / DR8
CN470	470-510	0-7	0-95	0-5	0-15	505.3 MHz / DR0
AS923	915-928	0-1	0-15	0-5	0-15	923.2 MHz / DR2 (SF10/125KHz)
KR920	920-923	0-2	0-15	0-5	0-15	921.90MHz / DR0 (SF12, 125 kHz)
IN865	865-867	0-2	0-15	0-5	0-15	866.550 MHz / DR2 (SF10, 125 kHz)
RU864	864-870	0-1	0-15	0-5	0-15	869.1MHz / DR0 (SF12, 125 kHz)

4.4 Send and Receive Packets

4.4.1 TX_LEN

TX_LEN is the length of send data, the command only can be used to query what the current max data length can be send. The data length is limited by DR value.

```
AT+TX_LEN=?
+TX_LEN: 11
```

4.4.2 CONFIRM

CONFIRM command is used to query and set uplink message type. The default set is OFF .

OFF: unconfirmed uplink data



ON: confirmed uplink data

Query CONFIRM

```
AT+CONFIRM=?  
+CONFIRM: OFF
```

Set CONFIRM

```
AT+CONFIRM=ON  
+CONFIRM: ON  
OK
```

4.4.3 SENDB

SENDER command used to send hexadecimal data.

Send data format: Retransmission times: Port: Data content
Retransmission times only valid for confirmed message.

Send confirmed message

```
AT+SENDER=3:12:ABCDEF #Send hexadecimal data ABCDEF at port 12,  
retransmission times is 3 when it is confirmed message and no ACK.  
+SENDER: 3:12:ABCDEF  
OK  
+RECVB: -102:3:ACK #Auto return message, if there is no downlink message will  
return ACK, otherwise return the downlink data.
```

Send unconfirmed message

```
AT+SENDER=3:12:ABCDEF Send hexadecimal data ABCDEF at port 12,  
retransmission times is 3 when it is confirmed message and no ACK.  
+SENDER: 3:12:ABCDEF  
OK
```

4.4.4 SEND

SEND command used to send character string data.

Send data format: Retransmission times:Port:Data content
Retransmission times only valid for confirmed message.

Send confirmed message



```
AT+SEND=3:12:hello world      Send hexadecimal data ABCDEF at port 12,
retransmission times is 3 when it is confirmed message and no ACK.
+SEND: 3:12:hello world
OK
+RECVB: -104:1:ACK           #Auto return message, if there is no downlink message
will return ACK, otherwise return the downlink data.
```

Send unconfirmed message

```
AT+SEND=3:12:hello world
+SEND: 3:12:hello world
OK
```

4.4.5 RECVB/RECV

RECVB command is used to query the latest message received from server in hexadecimal. And it is also used for the auto return ACK message. Please refer to the SENDB and SEND command.

Received message format

```
+RECVB: RSSI:SNR:Port:LENGTH:DATA
Or
+RECVB: RSSI:SNR:ACK
```

RECV command is used to query the latest message received from server in string.

Received message format

```
+RECV: RSSI:SNR:Port:LENGTH:DATA
```

If there is no downlink message, query RECVB will return empty message as below:

```
AT+RECVB=?
+RECVB:
```

If server send a hexadecimal downlink message 3132333435363738

Query RECVB will return message as below:

```
AT+RECVB=?
+RECVB: -102:-4.0:8:8:3132333435363738
```

Query RECV will return message as below:

```
AT+RECV=?
+RECV: -102:-4.0:8:8:12345678
```



4.4.6 DUTY_CYCLE

DUTY_CYCLE command can be used to query and set duty cycle time. The configurable range is 0-15. According to the standard LoRaWAN specification, the default value is 0.

Query DUTY_CYCLE

```
AT+DUTY_CYCLE=?  
+DUTY_CYCLE: 0
```

Set DUTY_CYCLE

```
AT+DUTY_CYCLE=0  
+DUTY_CYCLE: 0  
OK
```

4.4.7 UP_CNT

UP_CNT is uplink frame counter, UP_CNT command can be used to query and set uplink frame counter to 0.

Query UP_CNT

```
AT+UP_CNT=?  
+UP_CNT: 5
```

Set MC_CNT to 0

```
AT+UP_CNT=0  
+UP_CNT: 0  
OK
```

4.4.8 DOWN_CNT

DOWN_CNT is downlink frame counter, DOWN_CNT command only can be used to query downlink frame counter.

```
AT+DOWN_CNT=?  
+DOWN_CNT: 10
```



4.5 LoRa Multicast Management

4.5.1 MC

MC is multicast, multicast messages are sent to multiple end-devices. All devices of a multicast group must share the same multicast address and associated encryption keys.

MC command can be used to query and set multicast function status on or off. The default multicast function is off. The multicast function will be valid only when the MC status is on and the end devices are working on Class C.

Query MC

```
AT+MC=?  
+MC: OFF
```

Set MC

```
AT+MC=ON  
+MC: ON  
OK
```

4.5.2 MC_DEVADDR

MC_DEVADDR is multicast address,MC_DEVADDR command can be used to query and set multicast DEVADDR. The default MC_DEVADDR is 02:5E:64:58, the length should be four bytes.

Query MC_DEVADDR

```
AT+MC_DEVADDR=?  
+MC_DEVADDR: 02:5E:64:58
```

Set MC_DEVADDR

```
AT+MC_DEVADDR=02:5E:64:59  
+MC_DEVADDR: 02:5E:64:59  
OK
```

4.5.3 MC_NWKSKEY



MC_NWKSKEY is multicast network session key,MC_NWKSKEY command can be used to query and set multicast NWKSKEY. The default MC_NWKSKEY is 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C, the length should be 16 bytes.

Query MC_NWKSKEY

```
AT+MC_NWKSKEY=?  
+MC_NWKSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
```

Set MC_NWKSKEY

```
AT+MC_NWKSKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3B  
+MC_NWKSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3B  
OK
```

4.5.4 MC_APPSKEY

MC_APPSKEY is multicast application session key,MC_APPSKEY command can be used to query and set multicast APPSKEY. The default MC_APPSKEY is 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C, the length should be 16 bytes.

Query MC_APPSKEY

```
AT+MC_APPSKEY=?  
+MC_APPSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
```

Set MC_APPSKEY

```
AT+MC_APPSKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3B  
+MC_APPSKEY: 2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3B  
OK
```

4.5.5 MC_CNT

MC_CNT is multicast frame counter, MC_CNT command can be used to query and set multicast frame counter to 0.

Query MC_CNT

```
AT+MC_CNT=?  
+MC_CNT: 0
```

Set MC_CNT to 0



```
AT+MC_CNT=0
+MC_CNT: 0
OK
```

4.6 Test

In test mode, user could use Peer to Peer communication do RF performance test quickly. The test command is disabled in default, user need set the test mode status on then enter the test mode. And all the test commands only can be used in test mode.

4.6.1 TEST

TEST command is used to query and set test mode status. The default set is OFF, disable test mode. It will enter test mode after set the TEST ON.

Query TEST

```
AT+TEST=?
+TEST: OFF
```

Set TEST

```
AT+TEST=ON
+TEST: ON
OK
```

4.6.2 TEST_CONF

In test mode, TEST_CONF command can be used to set RF configuration.

Format

+TEST_CONF: Frequency:TX_Power:BW:SF:CR

Query TEST_CONF

```
AT+TEST_CONF=?
+TEST_CONF: 902300000:14:125:10:4_5
```

Set TEST_CONF



```
AT+TEST_CONF=903300000:14:125:10:4_5
+TEST_CONF: 903300000:14:125:10:4_5
OK
```

4.6.3 TEST_TXLORA/TEST_RXLORA

TEST_TXLORA command can be used to send string data, the max data length are 100 bytes.
TEST_RXLORA command is the auto return received data in hexadecimal.

Send string 1234

```
AT+TEST_TXLORA=1234
```

Return

```
+TEST_RXLORA:-22:29:4:31323334 #Format: +TEST_RXLORA: RSSI:SNR:Length:Data
OK
```

4.6.4 TEST_SCAN

TEST_SCAN command can be used to query and set BLE scan condition.

Format: +TEST_SCAN: TIME:RSSI:MAC

TIME: BLE scan time, Range:0-99,Unit: S. 0 means always scan, no limit time. RSSI: range -127~0 dBm

MAC: It must be 6 bytes, FFFFFFFF means no MAC limit.

Query TEST_SCAN

```
AT+TEST_SCAN=?
+TEST_SCAN: 0: -127: FFFFFFFF
```

Set TEST_SCAN

```
AT+TEST_SCAN=30:-50:AABBCCDDEEFF
+TEST_SCAN: 30:-50:AABBCCDDEEFF
OK
```

4.6.5 TEST_BLE_CON

TEST_BLE_CON can be used to send BLE connection request.



Send connection request

```
AT+TEST_BLE_CON
```

Return

```
+TEST_BLE_CON: SUCCEEDED
or
+TEST_BLE_CON: FAILED
```

4.6.6 TEST_PIOXX

TEST_PIOXX command can be used to query the input of GPIO after power on and set the output of GPIO .

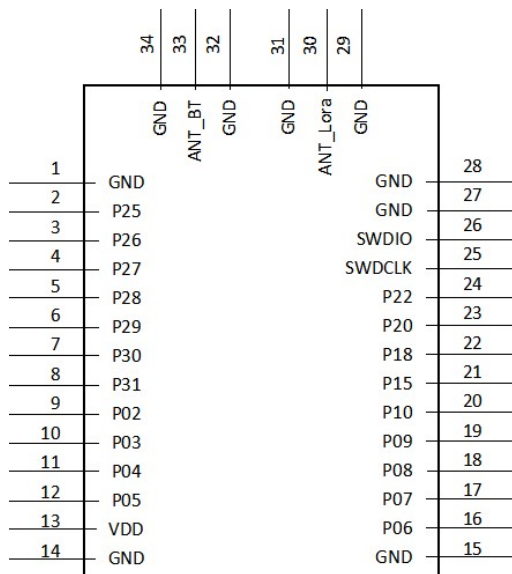
Query input of GPIO

```
AT+TEST_PIO25=?
TEST_PIO25: 0 # 0:low level; 1: high level
```

Set output of the GPIO

```
AT+TEST_PIO26=0
+TEST_PIO26: 0
OK
```

TEST_PIO corresponds to module pins as follows:





TEST_PIO	Module Pin Number	Module Pin Name
PIO25	2	P25
PIO26	3	P26
PIO27	4	P27
PIO28	5	P28
PIO29	6	P29
PIO30	7	P30
PIO03	10	P03
PIO04	11	P04
PIO05	12	P05
PIO06	16	P06
PIO07	17	P07
PIO08	18	P08
PIO09	19	P09
PIO10	20	P10
PIO15	21	P15
PIO18	22	P18
PIO20	23	P20
PIO22	24	P22

5 Revision

Version	Description	Editor	Date
1.0	Initial version	Iris	2020-6-11