Document Number	QW_02_0024.001

GIOT AT Command for LoRa Module

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1 Purpose

1.1 Scope

This document is intended as a reference guide to the usage of the AT command set for the LoRa module unit. This document only applies to the Gemtek GIOT series.
The intended audiences for this document are the field test engineers, product and intelligent peripheral developers.

1.2 Terms and Abbreviations

Asynchronous
: A serial data transmission method that uses Start and Stop bits to synchronize reception.

AT Commands
: A group of commands that can be sent by a terminal or host computer to control the ISU in Command mode.

Baud
: One signaling element per second. This is a measure of the signaling rate on the telephone

LMU
: Lora module unit

LoRaWAN
: Long Range network protocol

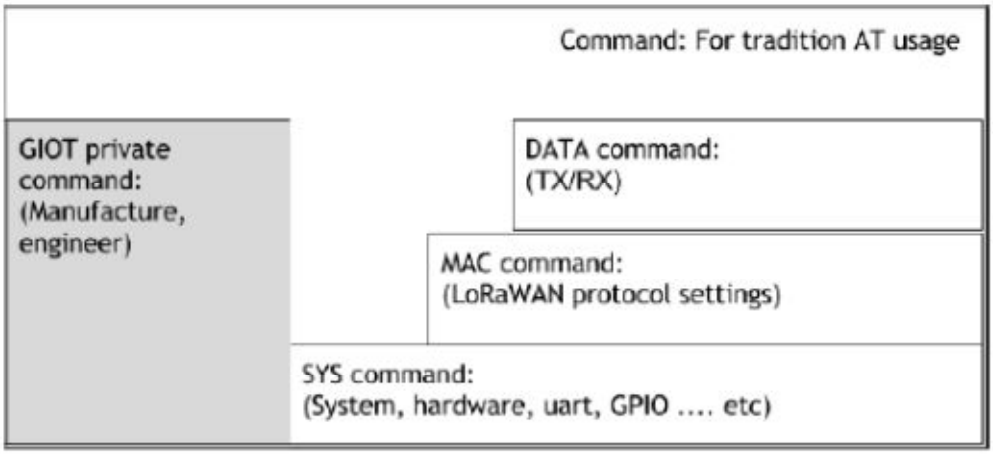
1.3 Uart

Uart - Universal Asynchronous Receiver/Transmitter, the baud rate depends on the hw platform. We expect that the default baud is 9600.

2 Command Overview

2.1 Command groups

The LMU employs three principle types of AT commands group: common, data, mac, and sys. The two types have differing syntax used to query and update their settings. They also have unique reference standards.



2.1.1 Common commands

These commands are used to perform AT behavior or debug usage.

2.1.2 Data commands

A specific communication AT command is used to transmit and receive LoRaWAN message. It consist of all ASCII alpha character but below list is not accepted: "

2.1.3 MAC Configuration commands

Media access control command. Configuration of AT commands is for query and adjusts LoRaWAN™ protocol settings. Most configuration commands include a prefix of + followed by a single alpha character.

2.1.4 SYS Configuration commands

Configuration of AT commands is for query and adjusts hardware (GPIO, Baud rate, etc). Most configuration commands include a prefix of + followed by a single alpha character.

2.2 Commands example

Example:

Enter:	AT+SGMR?	Display firmware version
LMU return:	+SGMR:"1.1.0"	Revision for the LUM
Enter:	AT+CSF=9	Set spreading factor to LMU
LMU return:	OK	SF was set correctly

2.3 Commands line

ATCMD1<CR>
ATCMD2=12<CR>
AT+CMD3=,,15;<CR>
AT+CMD4?<CR>
AT+CMD5=?<CR>

- <CR> command line termination character
- ,, subparameters may be omitted
- + extended command
- ; extended commands are delimited with semicolon

2.4 Information responses and result codes

<CR><LF>+CMD1:3,0,14,"GIOT"<CR><LF>
<CR><LF>+CMD2: (0-3),(0,1),(0-12,15),("GIOT","GEMTEK")<CR><LF>
<CR><LF>OK<CR><LF>

- +CMD1 is response of +CMD1?
- +CMD2 is response of +CMD2=?
  0-12 means range like 0~12
  "GIOT" as a string
- If the command line is performed successfully, the string “OK” is sent.

2.5 Error of responses

<CR><LF>+CMD ERROR:<reason><CR><LF>

- All command need to have ERROR reply
- If the command is not supported or unknown, either "+CMD ERROR: unknown" or "+CMD ERROR:operation not supported" is sent

2.6 Default value

If the command parameters are optional, they can be left out in the command line. If not otherwise specified, the default values are assumed as follows

- In case of Number type parameters, the default value is 0
- In case of String type parameters, the default value is an empty string

3 AT command list

- Command support list depends on each platform. Before development, please use *AT&H* to list down available commands for reference.

3.1 Common command list

Command	Description
AT	Attention command
A/	Repeat previous command line
ATZ	Reset peer client device
AT&F	Resets the current profile to factory-defined defaults.
AT&W	Save current configuration
AT&H	List all available AT commands

3.2 Data command list

Command	Description
AT+DTX	Transmit message to LoRa server
AT+DRX	Query the latest message from buffer of LMU
AT+DRXI	Clear and query indication of RX buffer status
AT+DTTX	Transmit dummy message to LoRa server

3.3 MAC Configuration command list

Command	Description
AT+CPIN	Query PIN code
AT+CSID	Querry system ID
AT+CSQ	Signal strength indication
AT+CSYNC	Asynchronous and Synchronous with gateway's ack
AT+CRPTM	Set and query Reporter mode to enable or disable

AT+CQCH	Query channel frequency
AT+CAPORT	Set the port used for application data
AT+CBAP	Enable application port filter
AT+CDEVADDR	Set or query device address in ABP or GIOT mode
AT+CDEVMI	Query the device address in OTAA mode
AT+CTXP	Set and query Tx power
AT+CAPPEUI	Set and query AppEUI
AT+CDEVEUI	Set and query DevEUI
AT+CAPPKEY	Set and query AppKey
AT+CJOIN	Do join flow for OTAA
AT+CMODE	Set and query mode for OTAA, ABP and GIOT mode
AT+CAPPSKEY	Set and query AppSkey
AT+CNWKSKEY	Set and query NwkSkey
AT+CLCR	Send out mac to validate its connectivity to a network
AT+CADR	Set Link ADR commands
AT+CDCYCLE	Set and query end-device transmit duty cycle
AT+CRXP	Set receive windows parameters
AT+CDEVS	Get end-device status
AT+CNCH	Create or Modification of a channel
AT+CRXD	Setting delay between TX and RX
AT+CSLRM	Save LoRa Mac Command configurations
AT+CRLRM	Restore LoRa Mac Command configurations

3.4 SYS Configuration command list

Command	Description
AT+IBR	Specifies the data rate(baud rate) at which the DCE accepts commands on UART interface.
AT+ECHO	Enable or disable uart echo
AT+SPWMOD	Select power saving mode of LMU

AT+SLMR	Revision of LoRa module
AT+SGMR	Firmware version
AT+SGMI	Manufacture ID
AT+SGMM	Model identification
AT+SGMD	MAC and serial number of LMU
AT+STIMER	Enable timer for reporting GPIO status
AT+SIRQ	Enable IRQ trigger types
AT+SGPIO	Query GPIO status

4 Command Description

4.1 Definitions

GIOT AT is "GIOT's Attention" which is sent from TE(Terminal Equipment) or DTE(Data terminal equipment) to TA(Terminal Adapter) or DCE (Data Circuit Terminating Equipment). There are four types:

1. **No variable command**: AT[+|&]<Command>
   Example: ATZ, AT+DTX, AT&H

2. **Read command:** AT[+|&]<Command>?
   Example: AT+CLMR?

3. **Test command:** AT[+|&]<Command>=?
   Example:AT+CLMR=?

4. **Execute/Set command:** AT[+|&]<Command>=<var1>,<var2>...
   Example:AT+CSF=9

4.2 Common command

☐ AT

The AT commands are used to control the operation of your LMU. They are called AT commands because the characters AT must precede each command to get the ATtention of the device. This command always returns OK. It can use to wake-up device.

Type	Syntax	Response/Action
	AT	OK

☐ A/

This command repeats the last command of the open session. Only the A/ command itself cannot be repeated. If this command is the first one of the open session, the response is OK without any treatment.

Type	Syntax	Response/Action
	A/	
Example	AT+SLMR? A/	+SLMR:"1.1.0" OK +SLMR:"1.1.0" OK

☐ ATZ

This command restores the configuration profile from non-volatile memory (EEPROM) and reset LMU.

Type	Syntax	Response/Action
	ATZ	none

☐ AT&F

Restore factory-defined defaults to memory(EEPORM). The configurations of IBR, ECHO, SPWMOD, CSF, CTXP, CRPTM, SIRQ and STIMER will be reset.

Type	Syntax	Response/Action
	AT&F	OK

☐ AT&W

This command saving the current profile to non-volatile memory (EEPROM)

Type	Syntax	Response/Action
	AT&W	OK

☐ AT&H

List all available AT commands

Type	Syntax	Response/Action
	AT&H	... OK

Example:

AT&H AT,A/,ATZ,AT&F,AT&W,
+IBR, +DTX,...
OK

4.3 Data command

☐ AT+DTX

Transmit message through LMU. Transmitting mode supports two ways, asynchronous and synchronous, depend on configuration command AT+CSYNC

- Synchronous mode: Transmitting done with RF then return OK when it is in transmitting memory buffer. After transmit success, return "Receive ACK" means gateway has reveive success and ACK was get by LMU. If LMU return "Tx timeout", it means this transmission does not arrive in gateway.
- Asynchronous mode: Messages is ready in transmitting memory buffer, then return OK

NOTE: In different SF setting, the payload length would be also changed. It depends on channel assignment and channel hopping limitation. You can query the limitation through command "AT+DTX=?"

For example in 0.4s limitation:

SF	Max length (bytes)	Remark
10	11	
9	50	
8	50	
7	50	

Type	**Syntax**	**Response/Action**
Set	AT+DTX=<length>,<val> NOTE: length of val is 11 with ASCII character in SF10 NOTE: length of val is 22 with Hex in SF10	OK When error: +DTX ERROR:<report>
Read	None	
Test/Help	AT+DTX=?	+DTX=length, payload OK

Example:

AT+DTX=11,"12345ABCdef" OK
AT+DTX=22,0123456789abcdef012345 OK

NOTE: The char " can not be transmitted through ASCII mode
NOTE: Different SF uses different length of payload
NOTE: The number of length MUST be even in Hex mode.

NOTE:
915 - US version:
OTAA and ABP mode max length is 128
GIOT mode max length is 11 when using DR_0, otherwise max length is 50
868 - EU version:
OTAA and ABP mode max length is 128
GIOT mode max length is 11 when using DR_0,DR_1,DR_2, otherwise max length is 50

☐ AT+DRX

Query message from buffer of LMU and clear by command. When message is in RX buffer, Pin PA8 will be indicated.

Pin	Indication	Remark
PA8	0/1	

Type	Syntax	Response/Action
Set	None	
Read	AT+DRX?	+DRX:<length>,<Hex> OK When error: +DRX ERROR:<report>
Test/Help	AT+DRX=?	+DRX=<length of Rx data>,<value of Rx data> OK

Example:

AT+DRX? +DRX:12,012345abcdef
OK

☐ AT+DRXI

Clear and query status of pin PA8, this variable of +DRXI only can be set to 0 by this command

Type	Syntax	Response/Action
Action	AT+DRXI=<val>	OK
Read	AT+DRXI?	+DRXI=<status:0/1>
Test/Help	AT+DRXI=?	+DRXI=<status of pin>

Example:

AT+DRXI=0 OK

☐ AT+DTTX

Transmit debug message through LMU to cloud server for testing purpose.

Content of message: MAC address of LMU.
EX: 04000001 will be transmitted to cloud server.

Type	Syntax	Response/Action
Action	AT+DTTX	OK
Read	None	
Test/Help	None	

Example:

AT+DTTX OK

Note: The transmit error code can reference function of DTX

4.4 MAC command

☐ AT+CPIN

Update and query PIN code of LMU

Type	Syntax	Response/Action
Set	None	
Read	AT+CPIN?	+CPIN:<value> OK
Test/Help	None	

Example:

AT+CPIN? +CPIN:1234
OK

☐ AT+CSID

Update and query system ID of LMU

Type	Syntax	Response/Action
Set	None	
Read	AT+CSID?	+CSID:"System ID" OK
Test/Help	None	

Example:

AT+CSID? +CSID:"04"
OK

☐ AT+CSQ

Scanning for signal strength indication

Type	Syntax	Response/Action
Set	None	
Read	AT+CSQ?	+CSQ: 1:<Channel 1 rssi> 2:<Channel 2 rssi> … 15:<Channel 15 rssi>
Test/Help	None	

Example:

AT+CSQ? +CSQ:
0:-157
1:-157
2:-157
3:-157
4:-157
5:-157
6:-157
7:-157
8:-164
9:-164
10:-164
11:-157
12:-157
13:-157
14:-157
15:-157
OK

☐ AT+CSYNC

Query or change Asynchronous or Synchronous mode when transmitting. When it is in sync mode, the timeout value is default to 60s. Transmit will be terminated if new transmit task coming.

Type	Syntax	Response/Action
Set	AT+CSYNC=<0-1>	OK
Read	AT+CSYNC?	+CSYNC:<val> OK
Test/Help	AT+CSYNC=?	+CSYNC=<0-1>

AT+CSYNC? +CSYNC:1
OK

☐ AT+CRPTM

Set and query Reporter mode to enable or disable

Type	Syntax	Response/Action
Set	AT+CRPTM=<0-1>	OK
Read	AT+CRPTM?	+CRPTM:<val> OK
Test/Help	AT+CRPTM=?	+CRPTM=<0-1>

AT+CRPTM? +CRPTM:1
OK

☐ AT+CQCH

Query channel frequency

Type	Syntax	Response/Action
Set		
Read	AT+CQCH?	

AT+CQCH?

+CQCH:
Channel[i]: Frequency, DrRange, Band
Channel[0]: 902300000, 48, 0
Channel[1]: 902500000, 48, 0
Channel[2]: 902700000, 48, 0
Channel[3]: 902900000, 48, 0
Channel[4]: 903100000, 48, 0
Channel[5]: 903300000, 48, 0
Channel[6]: 903500000, 48, 0
…
OK

☐ AT+CAPORT

Set and query the port used for application data. This command will change the LoRaWAN packet which has an associated port value. Port 0 is reserved for MAC command and 1-223 are available. Default is 1.

Type	Syntax	Response/Action
Set	AT+CAPORT=<1-223>	OK
Read	AT+CAPORT?	+CAPORT:<val> OK
Test/Help	AT+CAPORT=?	+CAPORT=<1-223>

AT+CAPORT?

+CAPORT:1
OK

☐ AT+CBAP

Set and query the port used for assigning which Rx port want to receive. Port value -1 is received all Rx port. Default is -1.

Type	Syntax	Response/Action
Set	AT+CBAP=<-1,1-223>	OK
Read	AT+CBAP?	+CBAP:<val> OK
Test/Help	AT+CBAP=?	+CBAP=<-1,1-223>

AT+CBAP=1

OK

AT+CBAP?

+CBAP:1
OK

☐ AT+CDEVADDR

Set and query the device address in ABP or GIOT mode. In GIOT mode can only use query function.

Type	Syntax	Response/Action
Set	AT+CDEVADDR=<Device address>	OK
Read	AT+CDEVADDR?	+CDEVADDR:<val> OK
Test/Help	AT+CDEVADDR=?	+CDEVADDR=<Device address of ABP mode>

AT+CDEVADDR=00ffff04 OK
AT+CDEVADDR? +CDEVADDR:00ffff04(Device address of ABP mode)
OK

☐ AT+CDEVMI

Query the device address in OTAA mode which is from server.

Type	Syntax	Response/Action
Set	None	
Read	AT+CDEVMI?	+CDEVMI:<val> OK
Test/Help	AT+CDEVMI=?	+CDEVMI=<Device address of OTAA mode>

AT+CDEVMI? +CDEVMI:00ffff05
OK

☐ AT+CTXP

Set and query Tx power index.

Tx Power Index	Configuration (if supported)
0	20 dBm(if supported)
1	14 dBm
2	11 dBm
3	8 dBm
4	5 dBm
5	2 dBm
6..15	RFU

Type	Syntax	Response/Action
Set	AT+CTXP=<index>	OK
Read	AT+CTXP?	+CTXP:<val> OK
Test/Help	AT+CTXP=?	+CTXP=+CTXP=<Tx Power index>, [min,max]

AT+CTXP? +CTXP:0
OK

☐ AT+CAPPEUI

Set and query AppEUI for OTAA mode useage

Type	Syntax	Response/Action
Set	AT+CAPPEUI=<val>	
Read	AT+CAPPEUI?	+CAPPEUI:<val> OK
Test/Help	AT+CAPPEUI=?	+CAPPEUI=<AppEUI:length is 16>

AT+CAPPEUI=1122334455667788 +OK
AT+CAPPEUI? +CAPPEUI:1122334455667788
OK

☐ AT+CDEVEUI

Set and query DevEUI for OTAA mode useage

Type	Syntax	Response/Action
Set	AT+CDEVEUI=<val>	
Read	AT+CDEVEUI?	+CDEVEUI:<val> OK
Test/Help	AT+CDEVEUI=?	+CDEVEUI=<DevEUI:length is 16>

AT+CDEVEUI=3835383859357619 +OK
AT+CDEVEUI? +CDEVEUI:3835383859357619
OK

☐ AT+CAPPKEY

Set and query AppKey for OTAA mode usage

Type	Syntax	Response/Action
Set	AT+CAPPKEY=<val>	
Read	AT+CAPPKEY?	+CAPPKEY:<val> OK
Test/Help	AT+CAPPKEY=?	+CAPPKEY=<AppKey:length is 32>

AT+CAPPKEY=53A6B13B1E372D384C577BA3F76B429C +OK
AT+CAPPKEY?
+CAPPKEY:53A6B13B1E372D384C577BA3F76B429C
OK

☐ AT+CJOIN

Do join flow for OTAA mode

Type	Syntax	Response/Action
Set	None	
Read	AT+CJOIN?	+CJOIN:<val> OK
Test/Help	AT+CJOIN=?	+CJOIN: Do join flow for OTAA

☐ AT+CMODE

Set and query mode for OTAA, ABP and GIOT-ABP
0 - OTAA
1 - ABP
2 - GIOT-ABP

Type	Syntax	Response/Action
Set	AT+CMODE=<0-2>	
Read	AT+CMODE?	+CMODE:<val> OK
Test/Help	AT+CMODE=?	+CMODE=<0-2>

AT+CMODE=1 OK
AT+CMODE? +CMODE:1
OK

☐ AT+CNWKSKEY

Set and query **Network Session Key**

Type	Syntax	Response/Action
Set	AT+CNWKSKEY=<val>	
Read	AT+CNWKSKEY?	+CNWKSKEY:<val> OK
Test/Help	AT+CNWKSKEY=?	+CNWKSKEY=<NetworkSession key:length is 32>

AT+CNWKSKEY=53A6B13B1E372D384C577BA3F76B429C +OK

AT+CNWKSKEY? +CNWKSKEY:53A6B13B1E372D384C577BA3F76B429C
OK

☐ AT+CAPPSKEY

Set and query **Application session key**

Type	Syntax	Response/Action
Set	AT+CAPPSKEY=<val>	
Read	AT+CAPPSKEY?	+CAPPSKEY:<val> OK
Test/Help	AT+CAPPSKEY=?	+CAPPSKEY=<AppKey:length is 32>

AT+CAPPSKEY=53A6B13B1E372D384C577BA3F76B429C +OK

AT+CAPPSKEY? +CAPPSKEY:53A6B13B1E372D384C577BA3F76B429C
OK

☐ AT+CLCR

Send out mac to validate its connectivity to a network

Type	Syntax	Response/Action
Action	AT+CLCR	
Read		
Test/Help	AT+CLCR=?	+CLCR=Send out mac to validate its connectivity to a network

AT+CLCR OK
Radio Tx Done
RadioTxDelayDone
SRV_MAC_LINK_CHECK_ANS:(22,1)

☐ AT+CADR

Set and query Link ADR

Type	Syntax	Response/Action
Set	AT+CADR=<DataRate>,<TxPower>,<ChMask>,<ChMaskCntl>,<NbRep>	
Read	AT+CADR? AT+CADR?<channel set>	+CADR:<DataRate>,<TxPower>,<ChMask>,<ChMaskCntl>,<NbRep> +CADR:<DataRate>,<TxPower>,<ChMask>,<Channelsetl>,<NbRep>
Test/Help	AT+CADR=?	+CADR=<DataRate>,<TxPower>,<chMask>,<chMaskCntl>,<NbRep>

AT+CADR=1,1,FF,6,0 OK

AT+CADR?1 +CADR=1,1,FF,1,0

Note: This command have to use AT+CSLRM to save configuration.

☐ AT+CDCYCLE

Set and query end- device transmit duty cycle

Type	Syntax	Response/Action
Set	AT+CDCYCLE=<MaxDCycle>	
Read	AT+CDCYCLE?	+CDCYCLE:<val>
Test/Help	AT+CDCYCLE=?	+CDCYCLE=<0-F>

AT+CDCYCLE=1 OK

Note: This command have to use AT+CSLRM to save configuration.

☐ AT+CRXP

Set receive windows parameters

Type	Syntax	Response/Action
Set	AT+CRXP=<RX1DRoffest>,<RX2DataRate>,<Frequency>	
Read	AT+CRXP?	+CRXP:<RX1DRoffest>,<RX2DataRate>,<Frequency>
Test/Help	AT+CRXP=?	+CRXP=<Rx1DRoffset>,<Rx2DataRate>,<Frequency>

AT+CRXP=1,1,9020000 OK

Note: This command have to use AT+CSLRM to save configuration.

☐ AT+CDEVS

Request status information from device

Type	Syntax	Response/Action
Set	AT+CDEVS	
Read		
Test/Help	AT+CDEVS=?	+CDEVS=Request status information from device

AT+CDEVS
OK

MOTE_MAC_DEV_STATUS_ANS:(255,0)

☐ AT+CNCH

Set receive windows parameters

Type	Syntax	Response/Action
Set	AT+CNCH=<ChIndex>,<Freq>,<MaxDR>,<MinDR>	
Read		
Test/Help	AT+CNCH=?	+CNEWCH=<ChIndex>,<Freq>,<MaxDR>,<MinDR>

AT+CNCH=1,9020000,1,2 OK

Note: This command have to use AT+CSLRM to save configuration.

☐ AT+CRXD

Setting delay between TX and RX

Type	Syntax	Response/Action
Set	AT+CRXD=<Delay>	
Read	AT+CRXD?	+CRXD:<Delay>
Test/Help	AT+CRXD=?	+CRXD=<Delay>

AT+CRXD=1 OK

Note: This command have to use AT+CSLRM to save configuration.

☐ AT+CSLRM

Save LoRa Mac configuration

Type	Syntax	Response/Action
Set	AT+CSLRM	OK
Read		
Test/Help	AT+CSLRM=?	+CSLRM=Save LoRaMac Configuration.

AT+CSLRM OK

☐ AT+CRLRM

Restore LoRa Mac configuration

Type	Syntax	Response/Action
Set	AT+CRLRM	OK
Read		
Test/Help	AT+CRLRM=?	+CRLRM=Restore LoRaMac Configuration.

AT+CRLRM OK

4.5 SYS command

☐ AT+IBR

Specifies the data rate(baud rate) at which the DCE accepts commands on UART interface. The default value is 9600.

Note:

1. Please make sure cable quality with device, if you want to select baud rate over 9600.
2. The working baud rate also depends on your cable quality and uart chipset of host.

Type	Syntax	Response/Action
Set	AT+IBR=<val> <val> 0 - Default 1 - 9600 bit/s 2 - 19200 bit/s 3 - 38400 bit/s 4 - 57600 bit/s 5 - 115200 bit/s	OK
Read	AT+IBR?	+IBR:<val> OK
Test/Help	AT+IBR=?	+IBR=<0-5> OK

Example:

AT+IBR=0 OK
AT+IBR? +IBR:0
OK

☐ AT+ECHO

Enable or disable uart echo function

Type	Syntax	Response/Action
Set	AT+ECHO=<0-1>	OK
Read	AT+ECHO? <val> 0,1	AT+ECHO:<val> OK
Test/Help	AT+ECHO=?	+ECHO=<0-1> OK

Example:

AT+ECHO=1 OK
AT+ECHO? +ECHO:1
OK

☐ AT+SPWMOD

Select power saving mode of LMU. User can use IRQ1(PB7) to wake up LMU from low power mode.

Type	Syntax	Response/Action
Set	AT+SPWMOD=<val> <val> 0 - normal 1 - sleep	OK
Read	AT+SPWMOD?	+SPWMOD:<val> OK
Test/Help	AT+SPWMOD=?	+SPWMOD=<0-1> OK

Example:

AT+SPWMOD=0 OK
AT+SPWMOD? +SPWMOD:0
OK

☐ AT+SLMR

Displays the revised hardware version.

Type	Syntax	Response/Action
Set	None	
Read	AT+SLMR?	+SLMR:<val> OK
Test/Help	None	

Example:

AT+SLMR? +SLMR:"0.1"
OK

☐ AT+SGMR

Displays the firmware version of LMU

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMR?	+SGMR:”val” OK
Test/Help	None	

Example:

AT+SGMR? +SGMR:"v1.08"
OK

☐ AT+SGMI

Displays the manufacturer identification.

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMI?	+SGMI:”val” OK
Test/Help	None	

Example:

AT+SGMI? +SGMI:"GEMTEK"
OK

☐ AT+SGMM

Displays the Model identification.

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMM?	+SGMM:”val” OK
Test/Help	None	

Example:

AT+SGMM? +SGMM:"WMDS-203"
OK

☐ AT+SGMD

Query the MAC and serial number.

Type	Syntax	Response/Action
Set	None	
Read	AT+SGMD?	+SGMD:”mac”,”sn” OK
Test/Help	AT+SGMD=?	+SGMD="MAC:length is 8","SN:length is 13"

Example:

AT+SGMD? +SGMD:"00000179","GLN015430004D"
OK

☐ AT+STIMER

Enable timer for reporting GPIO status. If val of day is set, val of minutes should be 0 otherwise val of day will be ignored. Double 0 in "minutes" and "days" mean disable timer.

- When LMU is in report mode, it upload data format as:

Example: 00040020002002

14 0

Index:1 **ex:00**	GPIO Status:1 **ex:04**	ADC0 - PB0 **ex:0020**	ADC1 - PB1 **ex:0020**	IRQ Status:1 **ex:02**
RFU	0 R2D (PB8) 1 Status(PA8) 2 GPIn (PA11) 3 GPIn (PA12) ... RFU 7 RFU	(Pin Voltage)*10 Ex: 33	(Pin Voltage)*10 Ex: 33	0 IRQ0 (PB6) 1 Timer (PB7) ... RFU 7 RFU

Pin definition:

PIN	Type	Remark
PB6	IRQ0	0/1 trigger TX
PB8	R2D	0/1 Use to restore to default and back to normal mode
PA11	GPIn	0/1
PA12	GPIn	0/1
PB0	ADC	12 bits
PB1	ADC	12 bits

Type	**Syntax**	**Response/Action**
Set	AT+STIMER=<val of minutes>,<val of days>	OK
Read	AT+STIMER?	+STIMER:<val>, <val> OK
Test/Help	AT+STIMER=?	+STIMER="val of minutes: 1-1440","val of days: 1-365"

Example:

AT+STIMER=30 OK // trigger in every 30 minutes
AT+STIMER=0,5 OK // trigger in every five days
AT+STIMER=0,0 OK // Disable timer
AT+STIMER? +STIMER:0,5
OK

☐ AT+SIRQ

Enable/Disable IRQ0 and IRQ. IRQ0 is used to trigger LoRa frame sending in report mode. IRQ1 is used to wake-up MCU from power saving mode and it can not be disabled by command.

PIN	Type	Remark
PB6	IRQ0	0 - disable 1 - enable
PB7	IRQ1	Can't be disabled

Type	**Syntax**	**Response/Action**
Set	AT+SIRQ=<val>	OK
Read	AT+SIRQ?	+SIRQ:<val of IRQ0> OK
Test/Help	AT+SIRQ=?	+SIRQ=<0-1>

Example:

AT+SIRQ=1 OK
AT+SIRQ? +SIRQ:1
OK

☐ AT+SGPIO

Query GPIO status through PIN list

PIN	Type	Remark
PB6	IRQ0	0/1
PB7	IRQ1/GPIn	0/1
PB8	GPIn	0/1
PA11	GPIn	0/1
PA12	GPIn	0/1
PB0	ADC	12 bits
PB1	ADC	12 bits

Type	**Syntax**	**Response/Action**
Set	None	
Read	AT+SGPIO?	+SGPIO:<PB6>,<PB7>,<PB8>,<PA11>,<PA12>,<PB0>,<PB1> OK
Test/Help	AT+SGPIO=?	+SGPIO="Display status of PINs:<PB6>,<PB7>,<PB8>,<PA11>,<PA12>,<PB0>,<PB1>"

Example:

AT+SGPIO? +SGPIO:0,0,1,0,1,500,2055
OK