LoRa® Wireless Communication Module

LM-130H1 / LM-533

AT Command Reference Guide

VER: 1.3

GlobalSat WorldCom Corporation
16F., No. 186, Jian 1st Rd, Zhonghe Dist.,
New Taipei City 23553, Taiwan
Tel: 886.2.8226.3799 / Fax: 886.2.8226.3899
lora@globalsat.com.tw
www.globalsat.com.tw

USGlobalSat Incorporated
14740 Yorba Court Chino, CA 91710
Tel: 888.323.8720 / Fax: 909.597.8532
sales@usglobalsat.com
www.usglobalsat.com

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1. Introduction

1.1 Product Description

The GlobalSat LM-130H1/LM-533 is a RF module that based on LoRa® technology which provides long-range, low data rate IoT connectivity to sensors, electronic meter reading, geolocation devices, industrial monitoring and control, home and building automation, long range irrigation systems, and all kinds of IoT/M2M equipment. It can work as the end-node devices in the LoRaWAN™ infrastructure or in GlobalSat proprietary MOST-Link mode.

1.2 AT Command

All of the LM-130H1/LM-533 module's settings and commands are transmitted over UART using the ASCII interface. All commands need to be terminated with <CR><LF> and any replies they generate will also be terminated by the same sequence. The settings for the UART interface are 57600 bps, 8 bits, no parity, 1 stop bit, no flow control.

After setting LM-130H1/LM-533 module, you must use AT command (**AAT1 Save**) to save the settings to the flash. You would see "ok" when the settings are saved. Then use AT command (**AAT1 Reset**) to run the new settings.

Note: All AT commands are case sensitive

2. How to Switch Device Protocol

The default protocol of LM-130H1/LM-533 is **LoRaWAN™**.
Use AT command (**AAT1 LW=1**) to switch protocol to be **MOST-Link**.
* Ref. Appendix Table A.

Command	Description
AAT1 LW=parameter	Set LoRa® Device Transmission Protocol [parameter]: x (Default=1) **0**: protocol is LoRaWAN™ **1**: protocol is MOST-Link Response: **ok** – parameter is valid **invalid_param** – parameter is not valid
AAT1 LW=?	Read LoRa® Device Transmission Protocol status Response: x **0** – LoRaWAN™ **1** – MOST-Link
AAT1 Save	All parameters are saved to flash.
AAT1 Reset	Reboot the LM-130H1/LM-533.
AAT1 Restore	Restore to default parameters and reboot.
AAT1 UpdateFW	LT-130H1 is ready for new firmware upgrade.

3. LoRaWAN™ AT Command

AAT1 – Command for parameters setting up and send / receive data.
AAT2 – Command for functions setting up under **LoRaWAN™**.

Save Settings	
Command	Description
AAT1 Save	Respond ***ok*** after parameters are saved.
Read Firmware Version	
Command	Description
AAT1 FwVersion	Respond firmware version
Reset and reboot LM-130 module	
Command	Description
AAT1 Reset	Respond ***ok*** after entering the command.
Switch to Sleep Mode	
Command	Description
AAT1 SLEEP	Respond ***ok*** after entering the command. Note: To leave sleep mode, enter 0xFF by UART to wake up LM-130H1/LM-533.
Restore to Default Value	
Command	Description
AAT1 Restore	Respond ***ok*** after entering the command.
Enable/ disable Test mode	
Command	**Description**
AAT1 TestMode=[parameter1]	[parameter1]: 0: Disable 1: Enable; send report according to cycle of EVK_Tx Respond: ***ok*** if parametet1 is 0 or 1 ***invalid_param*** if parameter1 is 0 or 1
Read the state of Test mode	
Command	**Description**
AAT1 TestMode=?	Respond: 0- disable 1- enable, send report according to cycle of EVK_Tx
Set Device Address	
Command	**Description**
AAT2 DevAddr=[parameter1]	[parameter1]: device address in 4-byte hexadecimal characters, from 00000001 – FFFFFFFF.

	Respond: ***ok*** if address is valid ***invalid_param*** if device address is not valid Device address must be unique in the current network. This must be directly set solely for activation by personalization devices (ABP mode).
Read Device Address	
Command	**Description**
AAT2 DevAddr=?	Respond: device address in 4-byte hexadecimal characters from 00000001 ~ FFFFFFFF.
Set Device EUI	
Command	**Description**
AAT2 DevEui=[parameter]	[parameter]: Device EUI in 8-byte hexadecimal character. Respond: ***ok*** if device EUI is valid ***invalid_param*** if device EUI is not valid This command sets the globally unique device identifier for the module.
Read Device EUI	
Command	**Description**
AAT2 DevEui=?	Response: Device EUI in 8-byte hexadecimal character.
Set Application EUI	
Command	**Description**
AAT2 AppEui=[parameter]	[parameter]: the application EUI in 8-byte hexadecimal character. Response: ***ok*** if application EUI is valid ***invalid_param*** if application EUI is not valid Default AppEUI: 0000000000010203 .
Read Application EUI	
Command	**Description**
AAT2 AppEui=?	Response: the application EUI in 8-byte hexadecimal character. To perform a hard reset, press and hold the power button for 8 to 10 seconds.
Set Network Session Key	
Command	**Description**
AAT2 NwkSKey=[parameter]	[parameter]: the network session key in 16-byte hexadecimal character Response:

	ok if network session key is valid ***invalid_param*** if network session key is not valid Default network session key: 28AED22B7E1516A609CFABF715884F3C
Read Network Session Key	
Command	**Description**
AAT2 NwkSKey=?	Response: the network session key in 16-byte hexadecimal character
Set Application Session Key	
Command	**Description**
AAT2 AppSKey=[parameter]	[parameter]: the application session key in 16-byte hexadecimal character Response: ***ok*** if application session key is valid ***invalid_param*** if application session key is not valid Default network session key: 1628AE2B7E15D2A6ABF7CF4F3C158809
Read Application Session Key	
Command	**Description**
AAT2 AppSKey=?	Response: the application session key in 16-byte hexadecimal character
Set Application Key	
Command	**Description**
AAT2 AppKey=[parameter]	[parameter]: application key in 16-byte hexadecimal character. Response: ***ok*** if application key is valid ***invalid_param*** if application key is not valid Default application key: 0123456789ABCDEFEFCDAB8967452301
Read Application Key	
Command	**Description**
AAT2 AppKey=?	Response: application key in 16-byte hexadecimal character.
Enable/ disable ADR (Adaptive Data Rate)	
Command	**Description**
AAT2 ADR=[parameter]	[parameter]: 0: disable ADR function 1: enable ADR function Response: ***ok*** if parameter is 0 or 1 ***invalid_param*** if parameter1 is not 0 or 1

Read State of ADR (Adaptive Data Rate)	
Command	**Description**
AAT2 ADR=?	Response: 0: disable ADR function 1: enable ADR function
Set Cycle of EVK's transmission	
Command	**Description**
AAT1 EVK_TxCycle=[parameter]	[parameter]: report interval in seconds from 1 to 254. This command will only take effect when "Test Mode"=1. Response: ***ok*** if parameter1 is from 1~254 ***invalid_param*** if parameter1 is not from 1~254
Read Cycle of EVK's transmission	
Command	**Description**
AAT1 EVK_TxCycle=?	Response: report interval in seconds from 1 to 254. .
Set Activation Type of Module	
Command	**Description**
AAT2 JoinMode=[parameter]	[parameter]: 0: ABP mode 1: OTAA mode Response: ***ok*** if parameter1 is 0 or 1 ***invalid_param*** if parameter1 is not 0 or 1
Read Activation Type of Module	
Command	**Description**
AAT2 JoinMode=?	Response: 0- ABP mode 1- OTAA mode
Set Retries Number of Uplink	
Command	**Description**
AAT2 reTx=[parameter1]	[parameter1]: the retries number of an uplink confirmed packet from 0 to 8 while not getting acknowledgement from server downlink Response: ***ok*** if parameter 1 is from 0 to 8 ***invalid_param*** if parameter1 is not from 0 to 8
Read Retrial Times of Uplink	
Command	**Description**
AAT2 reTx=?	Response: the retries number of an uplink confirmed

	packet from 0 to 8 while not getting acknowledgement from server downlink.
Set Delay Time	
Command	**Description**
AAT2 RxDelay1=[parameter]	[parameter]: delay between the transmission window and the first reception window in microseconds from 100000 to 10000000. Response: ***ok*** if parameter1 is from 100000 to 10000000 ***invalid_param*** if parameter1 is not from 100000 to 10000000.
Read Delay Time	
Command	**Description**
AAT2 RxDelay1=?	Response: delay between the transmission and the first reception window in microseconds from 100000 to 10000000.
Set Payload	
Command	**Description**
AAT2 Tx=[parameter1],[parameter2],[parameter3]	**Note:** Payload content can only be set when Test Mode is disabled. (AAT1 TestMode=0) [parameter1]: the port number from 1 to 223. [parameter2]: string representing the uplink payload type, either ***"cnf"*** or ***"uncnf".*** (cnf = confirmed, uncnf = unconfirmed) [parameter3]: payload value in hexadecimal character. The length of payload is limited to the data rate. (Please refer to the LoRaWAN™ Specification for further details) Response: This command would get two responses. The first one responding if the command is valid or not. The second one responding after the end of the uplink transmission. (Please refer to the LoRaWAN™ Specification for further details.) Response after entering the command: ● ***ok*** - if parameters and configurations are valid. ● ***Invalid_param*** – if parameters

	([parameter1],[parameter2],[parameter3]) are not valid. ● ***Tx_ok*** - if “cnf” radio Tx return with ACK ● ***Tx_ok*** - if “uncnf” radio Tx return ● ***Tx_noACK*** – if ”cnf” radio Tx return without ACK ● ***Rx < parameter1> < parameter2>*** – if transmission is successful, [parameter1] port number, from 1 to 223; [parameter2] hexadecimal character that is received from the server.
Enable/ disable Duty Cycle	
Command	**Description**
AAT2 DutyCycle=[parameter]	[parameter]: 0- disable Duty Cycle 1- enable Duty Cycle Response: ***ok*** if parameter1 is 0 or 1 ***invalid_param*** if parameter1 is not 0 or 1
Read the state of Duty Cycle	
Command	**Description**
AAT2 DutyCycle=?	Response: 0-Duty Cycle is disabled. 1-Duty Cycle is enabled.
Enable/disable to check Payload size	
Command	**Description**
AAT2 PLCheck=[parameter]	[parameter]: 0: disable to check payload size 1: enable to check payload size Response: ***ok*** if parameter 1 is 0 or 1 ***invalid_param*** if parameter1 is not 0 or 1
Read if module would check Payload size	
Command	**Description**
AAT2 PLCheck=?	Response: 0-firmware would not check payload size 1-firmware would check payload size
Set Rx2 Frequency and data rate	
Command	**Description**
AAT2 Rx2_Freq_DR= [parameter1],[parameter2]	[parameter1]: Rx2 frequency in decimal number from 000000001 to 999999999 in Hz. [parameter2]: Rx2 Data Rate from 0 to 15.

	Response: ***ok*** if Rx2 frequency and data rate are valid ***invalid_param*** if Rx2 frequency or data rate is not valid Example, Set Rx2 frequency and data rate to be 866.5MHz and DR3. The command is AAT2 Rx2_Freq_DR=866500000,3.
Read Rx2 Frequency and data rate	
Command	**Description**
AAT2 Rx2_Freq_DR=?	Response: the frequency and Data Rate of RX2. Example, When RX2 frequency is 915MHz and Data Rate is 3, the response message is “Freq.915000000, DR3”.
Set LoRaWAN™ Class	
Command	**Description**
AAT2 ClassMode=[parameter]	[parameter]: 0- Class A 2- Class C Response: ***ok*** if parameter 1 is 0 or 2 ***invalid_param*** if parameter1 is not 0 or 2
Read LoRaWAN™ Class	
Command	**Description**
AAT2 ClassMode=?	Response: 0: Class A 2: Class C
Set Offset of Rx1 Data Rate	
Command	**Description**
AAT2 Rx1DrOffset=[parameter]	[parameter1]: the offset of Rx1’s data rate The Rx1DrOffset sets the offset between the uplink data rate and the downlink data rate used to communicate with the end-device on the first reception slot (Rx1). As a default this offset is 0. The offset is used to take into account maximum power density constraints for base stations in some regions and to balance the uplink and downlink radio link margins.
Read Offset of Rx1 Data Rate	
Command	**Description**
AAT2 Rx1DrOffset=?	Response: the offset between the uplink data rate and the downlink data rate.
Set Tx Channel (the frequency, Data Rate, status and the number of band grouping)	
Command	**Description**
AAT2	[parameter1]: the channel number. The range for US is

Tx_Channel=[parameter1],[parameter2] [parameter3],[parameter4] [parameter5]	from 0 to 71. The range for EU is from 0 to 15. [parameter2]: the frequency of Tx channel from 000000001 to 999999999 in Hz. [parameter3]: the operating range of Data Rate. (The left one is DR's Max, the right one is DR's Min.) The range of DR is from 0 to 15. Note: According to LoRaWAN_Regional_Parameter.pdf, Data Rate in some regions will be limited in a particular range. For example, upstream 64 channels numbered 0 to 63 utilizing LoRa® 125 kHz BW varying from DR0 to DR3 for US. [parameter4]: 0/1 representing the channel is close/open. [parameter5]: the number of band grouping. The range for US is 0. The range for EU is from 0 to 3. Please refer to **AAT2 Tx_Band=[parameter1], [parameter2],[parameter3] for further understanding.** Response: ***ok*** if parameters are valid ***invalid_param*** if one of parameters is not valid. For example: Set to open Channel 3 to use frequency of 977.3MHz with maximum data rate DR4, and minimum data rate DR0 and use band grouping 0's Tx power and duty cycle. The command is as following. AAT2 Tx_Channel=3,973300000,40,1,0
Read specific Tx Channel	
Command	**Description**
AAT2 Tx_Channel***x***=?	Fill the channel number at the variable **x** field Response: the specific Tx channel's information. For example: Read the Channel 15's Tx information AAT2 Tx_Channel15=? Response: channel_15,Freq.905300000,DrRange.0-3,Status0, Band0
Set the duty cycle and Tx power index for Tx band	
Command	**Description**
AAT2 Tx_Band=	[parameter1]: the number of band grouping. The

[parameter1], [parameter2], [parameter3]	number of US is 0. The range of EU is from 0 to 3. [parameter2]: the value of duty cycle, from 1 to 9999. The real duty cycle could be calculated as (100% / duty cycle value). [parameter3]: the index of Tx power, from 0 to 15. Response: ***ok*** if all parameters are valid ***invalid_param*** if one of parameters is not valid. For example: Set band grouping 0 to use duty cycle as 2% and Tx power index 5 AAT2 Tx_Band=0,50,5 (for US) Note : The value of duty cycle 2% in command= 100% / 2%=50
Read all Tx band's duty cycle and Tx power index	
Command	**Description**
AAT2 Tx_Band=?	Response: the list of all Tx bands' duty cycle and Tx power index.
Read specific Tx band's duty cycle and Tx power index	
Command	**Description**
AAT2 Tx_Band***x***=?	Fill the band grouping at the variable **x** field Response: the specific band grouping number's duty cycle and Tx power index. For example, read band 0's duty cycle and Tx power index: AAT2 Tx_Band0=? Response: Band_0, DutyCycle.1, TxPower.5
Read the number of uplink frame counter	
Command	**Description**
AAT2 Uplink_Count=?	Response: the number of uplink frame counter.
Read the number of downlink frame counter	
Command	**Description**
AAT2 Downlink_Count=?	Response: the number of downlink frame counter.
Set the Tx power index table	
Command	**Description**
AAT2 Tx_Power= [parameter1],[parameter2]	[parameter1]: the index of Tx power from 0 to 15. [parameter2]: the corresponding Tx Power. The range for US is 0 dBm to 30 dBm. The range for EU is from 0 dBm to 20 dBm. Response:

	ok if the parameters are valid ***invalid_param*** if one of parameters is not valid
Read the Tx power index and corresponding power	
Command	**Description**
AAT2 Tx_Power=?	Response: the entire Tx power index and the corresponding power.
Read the specific Tx index's corresponding Tx power	
Command	**Description**
AAT2 Tx_Power***x***=?	Fill the specific Tx index in the variable x field Response: The specific Tx power index's corresponding power. For example, read the Tx power index 2's corresponding Tx power The command is AAT2 Tx_Power2=? Response: TxPower_2, 26 dBm.
Set the maximum payload size (without repeater) of different Data Rate	
Command	**Description**
AAT2 Pl_Max_Length= [parameter1],[parameter2]	[parameter1]: Data Rate from 0 to 15. [parameter2]: maximum payload size (N) from 0 to 255. Response: ***ok*** if parameters are valid ***invalid_param*** if one of parameters is not valid
Read the maximum payload size (without repeater) of all Data Rates	
Command	**Description**
AAT2 Pl_Max_Length=?	Response: maximum payload size of all Data Rate
Read the maximum payload size (without repeater) of specific Data Rate	
Command	**Description**
AAT2 Pl_Max_Length***x***=?	Fill the specific level of Data Rate in the variable x field Response: the maximum length of the specific Data Rate's payload. Example, read the maximum payload size of Data Rate 3 The command is AAT2 Pl_Max_Length3=? Response: DR_3, MaxLength.242
Set the maximum payload size (with repeater) of different Data Rate	
Command	**Description**
AAT2 Plre_Max_Length= [parameter1],[parameter2]	[parameter1]: Data Rate from 0 to 15. [parameter2]: maximum payload size (N) from 0 to 255.

	Response: ***ok*** if parameters are valid ***invalid_param*** if one of parameters is not valid
Read the maximum payload size (with repeater) of all Data Rates	
Command	**Description**
AAT2 Plre_Max_Length=?	Response: the maximum payload size of all Data Rate.
Read the maximum payload size (with repeater) of specific Data Rate	
Command	**Description**
AAT2 Plre_Max_Length***x***=?	Fill the specific level of Data Rate in the variable x field Response: the maximum payload size of specific Data Rate.
Set the channel number that Network Server cannot send command to change	
Command	**Description**
AAT2 DefChannelLimit=[parameter]	[parameter]: US range:1-71, default=71 EU range:1-15, default=3 Response: ***ok*** if parameter is valid ***invalid_param*** parameter is not valid
Read the channel number that Network Server cannot send command to change	
Command	**Description**
AAT2 DefChannelLimit=?	Response: the channel number that Network Server cannot send command to change it.
Set the LBT function	
Command	**Description**
AAT2 LBTMode=[parameter]	[parameter]: 1/0 1: enable LBT function 0: disable LBT function LBT is the acronym of Listen Before Talk. Before sending the uplink, LM-130H1/LM-533 would “listen” if the noise reaches to the threshold, LM-130H1/LM-533 would not send the uplink. Response: ***ok*** if parameter is valid ***invalid_param*** parameter is not valid
Read the LBT function status	
Command	**Description**
AAT2 LBTMode=?	Response: 1-LBT function is enabled. 0-LBT function is disabled.
Set the RSSI limit for LBT function	

Command	Description
AAT2 LBTRssiLimit=[parameter]	[parameter]: the threshold of noise that LM-130 would not send uplink to prevent from failure of uplink. Range:-1dBm~-150dBm, default=-80dBm Response: ***ok*** if parameter is valid ***invalid_param*** parameter is not valid
Read the RSSI limit for LBT function	
Command	**Description**
AAT2 LBTRssiLimit=?	Response: the threshold of noise that LM-130 would not send uplink

The following AT commands would only be available on EU standard firmware.

Read the ISM Band to EU standard or AS923 Specs.	
Command	**Description**
AAT2 ISM_Band=?	Response: 1-AS923 Specs. 0-EU standard
Set the ISM Band to EU standard or AS923 Specs.	
Command	**Description**
AAT2 ISM_Band=[parameter]	[parameter]: 0/1 1: AS923 Spec. 0: EU standard Response: ***ok*** if parameter is valid ***invalid_param*** parameter is not valid
Read the AS923 downlink dwell time	
Command	**Description**
AAT2 Down_Dwelltime=?	Response: 1-Transmission time must be within 400ms. 0-No limit to transmission time
Set the AS923 downlink dwell time	
Command	**Description**
AAT2 Down_Dwelltime=[parameter]	[parameter]: 1: Transmission time must be within 400ms. 0: No limit to transmission time Response: ***ok*** if parameter is valid ***invalid_param*** parameter is not valid
Read the AS923 uplink dwell time	
Command	**Description**
AAT2 Up_Dwelltime=?	Response: 1-Transmission time must be within 400ms. 0-No limit to transmission time
Set the AS923 uplink dwell time	
Command	**Description**
AAT2 Up_Dwelltime=[parameter]	[parameter]: 1: Transmission time must be within 400ms. 0: No limit to transmission time Response: ***ok*** if parameter is valid ***invalid_param*** parameter is not valid.

Set the maximum payload size (without repeater) of different Data Rate when AS923 uplink/downlink dwell time=1	
Command	**Description**
AAT2 PlMax_DT_Length= [parameter1],[parameter2]	[parameter1]: Data Rate from 0 to 15. [parameter2]: maximum payload size (N) from 0 to 255. Response: ***ok*** if parameters are valid ***invalid_param*** if one of parameters is not valid Note: When AS923 uplink/downlink dwell time=0, the command for setting maximum payload size is AAT2 PlMax_Length=[parameter1],[parameter2]
Read the maximum payload size (without repeater) of all Data Rates when AS923 uplink/downlink dwell time=1	
Command	**Description**
AAT2 PlMax_DT_Length=?	Response: maximum payload size of all Data Rate
Read the maximum payload size (without repeater) of specific Data Rate when AS923 uplink/downlink dwell time=1	
Command	**Description**
AAT2 PlMax_DT_Length***x***=?	Fill the specific level of Data Rate in the variable x field Response: the maximum length of the specific Data Rate's payload. Example, read the maximum length of Data Rate 3's payload The command is AAT2 Pl_Max_Length3=? Response: DR_3, MaxLength.242
Set the maximum payload size (with repeater) of different Data Rate when AS923 uplink/downlink dwell time=1	
Command	**Description**
AAT2 Plre_Max_DT_Length= [parameter1],[parameter2]	[parameter1]: Data Rate from 0 to 15. [parameter2]: maximum payload size (N) from 0 to 255. Response: ***ok*** if parameters are valid ***invalid_param*** if one of parameters is not valid
Read the maximum length (with repeater) of all Data Rates when AS923 uplink/downlink dwell time=1	
Command	**Description**
AAT2 Plre_Max_DT_Length=?	Response: the maximum payload size of all Data Rate.
Read the maximum payload size (with repeater) of specific Data Rate	
Command	**Description**
AAT2 Plre_Max_DT_Length***x***=?	Fill the specific level of Data Rate in the variable x field Response: the maximum payload size of specific

	Data Rate.
Read the Rx1 frequency for specific Tx channel	
Command	**Description**
AAT2 Rx1_Freqx=?	Fill the specific Tx channel in the variable x field Response: the Rx1 frequency for specific Tx channel.

4. MOST-Link AT Command

AAT1 – Command for parameters setting up and send / receive data.
AAT3 – Command for functions setting up under **MOST-Link**.

Under this protocol, the default mode is **Disable** (P0=0), which is the payload data transmission in transparent. It only supports command **A0, A1** for AES128 encryption function.
Use AT command [AAT3 P0=1] to **Enable** MOST-Link mode. (Ref. Appendix Table A.)

Save Settings	
Command	**Description**
AAT1 Save	Respond ***ok*** after parameters are saved.
Reset and Reboot CPU of LM-130H1/LM-533	
Command	**Description**
AAT1 Reset	Respond ***ok*** after entering the command.
Restore to Firmware Default Value	
Command	**Description**
AAT1 Restore	Respond ***ok*** after entering the command.
Enable / Disable MOST Link mode	
Command	**Description**
AAT3 P0=[parameter]	[Parameter]:1/0 **1**: enable MOST-Link **0**: disable MOST-Link Response: **ok** – parameter is valid **invalid_param** – parameter is not valid
Read MOST-Link mode status	
Command	**Description**
AAT3 P0=?	Response: **1**-MOST-Link is enabled **0**-MOST-Link is disabled
Set Operation Mode of LM-130H1/LM-533	

Command	Description
AAT3 MD=[parameter]	[parameter]: Range: 1-3, Default=1 **1**: Mode 1, Normal mode **2**: Mode 2, Wake up mode **3**: Mode 3, Power saving mode Response: **ok** – parameter is valid **invalid_param** – parameter is not valid Note: 1. In Wake up mode, LM-130H1/LM-533 stays awake and send wake up code (i.e. Normal mode plus with preamble byte) while transmitting data. 2. In Power-saving mode, LM-130H1/LM-533 sleeps all the time. Send [AAT1 WK] or any command would get “ACK” as a wake up code. After getting “ACK” within 0.5 second, send [AAT3 MD=1] to change it to Normal Mode. LM-130H1/LM-533 would only accept commands [AAT3 MD] and [AAT1 Save] in power-saving mode.
Read Operation Mode of LM-130H1/LM-533	
Command	**Description**
AAT3 MD=?	Response: **1** – Normal mode **2** – Wake up mode **3** – Power saving mode
Read LoRa® MAC of LM-130H1/LM-533	
Command	**Description**
AAT1 L0=?	Response: LoRa® MAC of LM-130H1/LM-533 (16 Bytes) Example, 9B667C111B001B80
Read Model Name	
Command	**Description**
AAT1 L1=?	Response: Model name (7 Bytes)

	Example, LM-130H1/LM-533
Read LoRa® Firmware Version	
Command	**Description**
AAT1 L2=?	Response: Firmware version (16 Bytes) Example, F-0LR-14-1704191
Set LoRa Group ID	
Command	**Description**
AAT1 L3=[parameter]	[Parameter]: The number of LoRa® group ID. The range is 0~255. 0=disable group ID function. Default=0 Response: **ok** – parameter is valid **invalid_param** – parameter is not valid
Read LoRa® Group ID	
Command	**Description**
AAT1 L3=?	Response: The group ID (Range:0~255)
Set Rx/Tx Frequency of LoRa® Channel	
Command	**Description**
AAT1 L4=[parameter1],[parameter2]	[Parameter1]: Rx frequency in KHz from 865000 to 928000 [Parameter2]: Tx frequency in KHz from 865000 to 928000 Response: **ok** – parameters are valid **invalid_param** – one or both parameter are not valid Example, set Rx frequency as 915MHz and Tx frequency as 915MHz The command is AAT1 L4=915000,915000
Read Rx/Tx Frequency of LoRa® Channel	
Command	**Description**
AAT1 L4=?	Response: Rx frequency in KHz, Tx frequency in KHz
Set Data Rate of LoRa® Channel	

Command	Description
AAT1 L5=[parameter]	[Parameter]: Data rate from 0 to 5 0=0.81K, 1=1.46K, 2=2.6K, 3=4.56K, 4=9.11K, 5=18.23K bps Default=3 Response: **ok** – parameter is valid **invalid_param** – parameter is not valid
Read Data Rate of LoRa® Channel	
Command	**Description**
AAT1 L5=?	Response: Data Rate from 0 to 5
Set Wakeup Time of LoRa® Channel	
Command	**Description**
AAT1 L6=[parameter]	[Parameter]: Wakeup time from 0 to 9 0=200ms, 1=400ms, 2=600ms, 3=1s, 4=1.5s, 5=2s, 6=2.5s, 7=3s, 8=4s, 9=5s Default=3 **Response:** **ok** – parameter is valid **invalid_param** – parameter is not valid
Read Wakeup Time of LoRa® Channel	
Command	**Description**
AAT1 L6=?	Response: Wakeup time from 0 to 9
Set the index of LoRa® Channel's Tx Power	
Command	**Description**
AAT1 L7=[parameter]	[Parameter]: Index of Tx power from 0 to 7 0=5dBm, 1=7dBm, 2=9dBm, 3=11dBm, 4=13dBm, 5=15dBm, 6=17dBm, 7=20dBm Default=7 **Response:** **ok** – parameter is valid **invalid_param** – parameter is not valid
Read the index of LoRa® Channel's Tx Power	
Command	**Description**
AAT1 L7=?	Response: Index of Tx power from 0 to 7

Set LM-130H1/LM-533's Role	
Command	**Description**
AAT1 MA=[parameter]	[Parameter]: 1/0 0: set LM-130H1/LM-533 as Node 1: set LM-130H1/LM-533 as Gateway Default=0 Response: **ok** – parameter is valid **invalid_param** – parameter is not valid
Read LM-130H1/LM-533's Role Status	
Command	**Description**
AAT1 MA=?	Response: **0**– Node **1**– Gateway
Send Payload by M.O.S.T. protocol	
Command	**Description**
AAT1 T1=[parameter] * MOST-Link disable, P0=0	[Parameter]: Payload value in hexadecimal character (1-99 Bytes). **Response**: This command would get two responses. The first one responding if the command is valid or not. After the payload is sent out, it would get the second response. **1st Response:** **ok** – parameter is valid **invalid_param** – parameter is not valid **2nd Response:** **TX_OK**– payload is sent out **TX_BUSY**– payload is not sent out **Received Data from End Node** **AAT1 R1=RSSI,Data** • **RSSI:** The received signal strength indicator (Range: 1~160). The bigger the value is, the stronger the signal strength is.

	• **Data:** in hexadecimal character (1-99 Bytes). It is ended with <CR><LF
Send Payload by MOST-Link protocol (LM-130H1/LM-533 is gateway, MA=1)	
Command	**Description**
AAT1 T2=[parameter1],[parameter2],[paramaeter3] * MOST-Link enable, P0=1	[Parameter1]:1/0 **1**: ACK enable **0**: ACK disable [Parameter2]:LoRa® _MAC The LoRa® MAC that assigned to get the payload [Parameter3]:payload Payload value in hexadecimal character (1-84 Bytes). **Response**: This command would get two responses. The first one responding if the command is valid or not. After the payload is sent out, it would get the second response. 1st Response: **ok** – parameters are valid **invalid_param** – parameter is not valid **2nd Response:** **TX_OK**– payload is sent out **TX_NO_ACK**– payload is sent out, but not get ACK **TX_BUSY**– payload is not sent out **Received Data from End Node** **AAT1 R2=RSSI,0,flag,data** • **RSSI:** The received signal strength indicator (Range: 1~160). The bigger the value is, the stronger the signal strength is.

	• **flag:** MOST-Link AT Command Flag (1 Byte in hexadecimal value) • **Data:** in hexadecimal character (1-84 Bytes). It is ended with <CR><LF>
Send Payload by MOST-Link protocol (LM-130H1/LM-533 is end node, MA=0)	
Command	**Description**
AAT1 T3=[parameter1],[parameter2] * MOST-Link enable, P0=1	[Parameter1]:1/0 **1**: ACK enable **0**: ACK disable [Parameter2]:payload Payload value in hexadecimal character (1-84 Bytes). **Response**: This command would get two responses. The first one responding if the command is valid or not. After the payload is sent out, it would get the second response. 1st Response: **ok** – parameters are valid **invalid_param** – parameter is not valid **2nd Response:** **TX_OK**– payload is sent out **TX_NO_ACK**– payload is sent out, but not get ACK **TX_BUSY**– payload is not sent out **Received Data from Gateway** **AAT1 R2=RSSI,LoRa_MAC,flag,data** • **RSSI:** The received signal strength indicator (Range: 1~160). The bigger the value is, the stronger the signal strength is. • **LoRa_MAC:** The LoRa® MAC of end node that sends payload to gateway (16 Bytes) • **flag:** MOST-Link AT Command Flag (1 Byte

	in hexadecimal value) • **Data:** in hexadecimal character (1-84 Bytes). It is ended with <CR><LF>
Enable/ disable AES128 Encryption	
Command	**Description**
AAT3 A0=[parameter]	[Parameter]:1/0 **1**: Enable AES128 Encryption **0**: Disable AES128 Encryption Response: **ok** – parameter is valid **invalid_param** – parameter is not valid
Read AES128 Encryption Status	
Command	**Description**
AAT3 A0=?	Response **1**- Enable AES128 Encryption **0**- Disable AES128 Encryption
Set AES128 Encryption	
Command	**Description**
AAT3 A1=[parameter]	[Parameter]: AES128 Key in hexadecimal character(16 Bytes) Response: **ok** – parameter is valid **invalid_param** – parameter is not valid Default=**476C6F62616C53617432303136616263**
Read AES128 Encryption	
Command	**Description**
AAT3 A1=?	Response: AES128 Key in hexadecimal character
Set Retries Number and Timeout of MOST-Link	
Command	**Description**
AAT3 P3=[parameter1],[parameter2]	[Parameter1]: Retries number of MOST-Link while not getting ACK (0~9) 0=disable, Default=0 [Parameter2]: Timeout of getting ACK (1~255

	seconds) Default=3 Response: **ok** – parameter are valid **invalid_param** – one or both parameter are not valid
Read Retries Number and Timeout of MOST-Link	
Command	**Description**
AAT3 P3=?	Response: Retries number,timeout

5. Appendix

Command	Protocol	
AAT1 LW = 0	LoRaWAN™ (Default)	
AAT1 LW = 1	MOST-Link	Disable (P0=0)
		Enable (P0=1)

Table A. – Device Protocol Definition

MOST Link	Send	Received-ends
Disable (Default)	T1	R1
Enable	T2 [Gateway, MA=1]	R2 [LoRa® MAC=0]
	T3 [Node, MA=0]	R2 [LoRa® MAC=16 Bytes]

Table B. – MOST-Link mode Send and Received-ends relational