

AT Commands

We recommend “RealTerm” tool to send AT command. The sensor node’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.

When you set the parameters, please use AT command (DEV+DTX_STOP) to stop the transmission for the sensor node. Otherwise, it may cause the command failed.

- For AT commands with header “DEV”, they would take effect immediately after setting.
- For AT commands with header “AAT”, you must use AT command (AAT1 Save) to save the settings to the flash after setting. You would see “ok” when the settings are saved. Then use AT command (AAT1 Reset) to run the new settings.

The settings for the UART interface are 57600 bps, 8 bits, no parity, 1 Stop bit, no flow control.

Note: All AT commands are case sensitive.

Start Data Transmission	
Command	Description
DEV+DTX_START	Respond <i>data_tx_started</i> after entering the command.
Stop Data Transmission	
Command	Description
DEV+DTX_STOP	Respond <i>data_tx_stopped</i> after entering the command.
Read the State of Data Transmission	
Command	Description
DEV+DTX_STATE?	Respond <i>data_tx_started</i> or <i>data_tx_stopped</i> .
Set the Report Interval	
Command	Description
DEV+DTX_RATE= [parameter1]	[parameter1]: decimal number representing report interval in second, from 5 to 65535. The default value is 60. Respond: <i>tx_transmission_rate = [parameter1]</i> seconds if parameter1 is valid.

	<i>invalid_parameters</i> if parameter1 is not valid.
Read the Report Interval	
Command	Description
DEV+DTX_RATE?	Respond decimal number representing the interval, in seconds, from 5 to 65535.
Set the LoRa Port Number	
Command	Description
DEV+LORA_PORT=[parameter1]	[parameter1]: decimal number representing the port number, from 1 to 223. Respond: lorawan_port=[parameter1] if parameter1 is valid invalid_parameters if parameter1 is not valid
Read the LoRa Port Number	
Command	Description
DEV+LORA_PORT?	Respond decimal number representing the port number, from 1 to 223.
Set the Data Transmission to be confirmed/unconfirmed	
Command	Description
DEV+LORA_CNF=[parameter1]	[parameter1]: 0: unconfirmed transmission 1: confirmed transmission Respond: cnf_setting=[parameter1] if parameter1 is valid unknown_command if parameter1 is not valid
Read the Type of Data Transmission	
Command	Description
DEV+LORA_CNF?	Respond: 0: disable 1: enable
Read the Criteria for LED Indicator	
Command	Description
DEV+CRITERIA_GET?	Respond: For example, Low Criterion: 800 ppm High Criterion: 1000 ppm

	<p>The default range of LS-11x is as following.</p> <p>CO₂- Low Criterion: 800 ppm CO₂- High Criterion: 1000 ppm CO- Low Criterion: 9 ppm CO- High Criterion: 12 ppm PM_{2.5}- Low Criterion: 35 µg/m³ PM_{2.5}- High Criterion: 55 µg/m³</p>
Set Low Criterion for LED Indicator	
Command	Description
DEV+CRITERIA_L=[parameter1]	<p>[parameter1]: decimal number representing the air density, from 1 to 9998.</p> <p>Note: parameter1 must be lower than high criterion.</p>
Set high criterion for LED indicator	
Command	Description
DEV+CRITERIA_H=[parameter1]	<p>[parameter1]: decimal number representing the air density, from 1 to 9998.</p> <p>Note: parameter1 must be higher than low criterion.</p>
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	<p>Respond ok after entering the command.</p> <p>Note: To leave sleep mode, enter 0xFF by UART to wake up LM-130H1.</p>

Restore to Default Value	
Command	Description
AAT1 Restore	Respond ok after entering the command.
Set Device Address	
Command	Description
AAT2 DevAddr=[parameter1]	<p>[parameter1]: device address in 4-byte hexadecimal characters, from 00000001 – FFFFFFFF.</p> <p>Respond: ok if address is valid invalid_param if device address is not valid</p> <p>Device address must be unique in the current network. This must be directly set solely for activation by personalization devices (ABP mode).</p>
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]	<p>[parameter]: Device EUI in 8-byte hexadecimal character.</p> <p>Respond: ok if device EUI is valid invalid_param if device EUI is not valid</p> <p>This command sets the globally unique device identifier for the module.</p>
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-

	<p>byte hexadecimal character.</p> <p>Response: ok if application EUI is valid invalid_param if application EUI is not valid Default AppEUI: 0000000000010203 .</p>
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]	<p>[parameter]: the network session key in 16-byte hexadecimal character</p> <p>Response: ok if network session key is valid invalid_param if network session key is not valid Default network session key: 28AED22B7E1516A609CFABF715884F3C</p>
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]	<p>[parameter]: the application session key in 16-byte hexadecimal character</p> <p>Response: ok if application session key is valid invalid_param if application session key is not valid Default network session key: 1628AE2B7E15D2A6ABF7CF4F3C158809</p>
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]	<p>[parameter]: application key in 16-byte hexadecimal character.</p> <p>Response: ok if application key is valid invalid_param if application key is not valid Default application key: 0123456789ABCDEFCDAB896745230 1</p>
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]	<p>[parameter]: 0: disable ADR function 1: enable ADR function</p> <p>Response: ok if parameter is 0 or 1 invalid_param if parameter1 is not 0 or 1</p>
Read State of ADR (Adaptive Data Rate)	
Command	Description
AAT2 ADR=?	Response: 0: disable ADR function 1: enable ADR function
Set Activation Type of Module	
Command	Description
AAT2 JoinMode=[parameter]	<p>[parameter]: 0: ABP mode 1: OTAA mode</p> <p>Response:</p>

	<p><i>ok</i> if parameter1 is 0 or 1 <i>invalid_param</i> if parameter1 is not 0 or 1</p>
Read Activation Type of Module	
Command	Description
AAT2 JoinMode=?	<p>Response: 0- ABP mode 1- OTAA mode</p>
Set Retries Number of Uplink	
Command	Description
AAT2 reTx=[parameter1]	<p>[parameter1]: the retries number of an uplink confirmed packet from 0 to 8 while not getting acknowledgement from server downlink</p> <p>Response: <i>ok</i> if parameter 1 is from 0 to 8 <i>invalid_param</i> if parameter1 is not from 0 to 8</p>
Read Retrial Times of Uplink	
Command	Description
AAT2 reTx=?	<p>Response: the retries number of an uplink confirmed packet from 0 to 8 while not getting acknowledgement from server downlink.</p>
Set Delay Time	
Command	Description
AAT2 RxDelay1=[parameter]	<p>[parameter]: delay between the transmission window and the first reception window in microseconds from 100000 to 10000000.</p> <p>Response: <i>ok</i> if parameter1 is from 100000 to 10000000 <i>invalid_param</i> if parameter1 is not from 100000 to 10000000.</p>
Read Delay Time	
Command	Description
AAT2 RxDelay1=?	<p>Response: delay between the transmission and the first reception</p>

	window in microseconds from 100000 to 10000000.
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:

	<p>ok if Rx2 frequency and data rate are valid</p> <p>invalid_param if Rx2 frequency or data rate is not valid</p> <p>Example, Set Rx2 frequency and data rate to be 866.5MHz and DR3.</p> <p>The command is AAT2 Rx2_Freq_DR=866500000,3.</p>
Read Rx2 Frequency and data rate	
Command	Description
AAT2 Rx2_Freq_DR=?	<p>Response: the frequency and Data Rate of RX2.</p> <p>Example, When RX2 frequency is 915MHz and Data Rate is 3, the response message is "Freq.915000000, DR3".</p>
Set Offset of Rx1 Data Rate	
Command	Description
AAT2 Rx1DrOffset=[parameter]	<p>[parameter1]: the offset of Rx1's data rate</p> <p>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.</p>
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 Tx_Channel=[parameter1],[parameter2][para	[parameter1]: the channel number. The

<p>meter3],[parameter4] [parameter5]</p>	<p>range for US is from 0 to 71. The range for EU is from 0 to 15.</p> <p>[parameter2]: the frequency of Tx channel from 000000001 to 999999999 in Hz.</p> <p>[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.</p> <p>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.</p> <p>[parameter4]: 0/1 representing the channel is close/open.</p> <p>[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</p> <p>Tx_Band=[parameter1], [parameter2],[parameter3] for further understanding.</p> <p>Response: ok if parameters are valid invalid_param if one of parameters is not valid.</p> <p>For example: Set to open Channel 3 to use frequency of 977.3MHz with maximum data rate DR4, and minimum data rate DR0 and</p>
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	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_Channelx=?	<p>Fill the channel number at the variable x field Response: the specific Tx channel's information.</p> <p>For example: Read the Channel 15's Tx information AAT2 Tx_Channel15=? Response: channel_15,Freq.905300000,DrRange.0 -3,Status0, Band0</p>
Set the duty cycle and Tx power index for Tx band	
Command	Description
AAT2 Tx_Band= [parameter1], [parameter2], [parameter3]	<p>[parameter1]: the number of band grouping. The number of US is 0. The range of EU is from 0 to 3.</p> <p>[parameter2]: the value of duty cycle, from 1 to 9999. The real duty cycle could be calculated as (100% / duty cycle value).</p> <p>[parameter3]: the index of Tx power, from 0 to 15.</p> <p>Response: ok if all parameters are valid invalid_param if one of parameters is not valid.</p> <p>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</p>
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_Bandx=?	<p>Fill the band grouping at the variable x field</p> <p>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</p>
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]	<p>[parameter1]: the index of Tx power from 0 to 15.</p> <p>[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.</p> <p>Response: ok if the parameters are valid invalid_param if one of parameters is not valid</p>
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_Powerx=?	<p>Fill the specific Tx index in the variable x field Response: The specific Tx power index's corresponding power.</p> <p>For example, read the Tx power index 2's corresponding Tx power The command is AAT2 Tx_Power2=? Response: TxPower_2, 26 dBm.</p>
Set the maximum payload size (without repeater) of different Data Rate	
Command	Description
AAT2 PI_Max_Length= [parameter1],[parameter2]	<p>[parameter1]: Data Rate from 0 to 15. [parameter2]: maximum payload size (N) from 0 to 255.</p> <p>Response: ok if parameters are valid invalid_param if one of parameters is not valid</p>
Read the maximum payload size (without repeater) of all Data Rates	
Command	Description
AAT2 PI_Max_Length=?	Response: maximum payload size of all Data Rate
Read the maximum payload size (without repeater) of specific Data Rate	
Command	Description
AAT2 PI_Max_Lengthx=?	<p>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 PI_Max_Length3=?</p>

	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_Lengthx=?	Fill the specific level of Data Rate in the variable x field Response: the maximum payload size of specific Data Rate.

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