

# LSM1x0A LoRa CLI Command interface manual

Rev 1.1

SJIT

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## History

Date	Contents	Version	
2022-01-28	Create	V1.0	
2024-01-23	Set Channel Mask - AT+CHMASK=channel mask Change Baudrate - AT+BAUDRATE=baudrate Add additional explanation of Rx2 Datarate Maintain Uplink Count - AT+DADDR=addr,1 Add content of Default Region Add a table of Tx power for explanation Set Tx Count - AT+UNCNFRETx=<count> Change the company name Set Devnonce count - AT+DEVNONCE=<count>	V1.1	

## 1. AT command complete set

A typical serial terminal emulator can also be used to control the EVK instead of the proposed test SW. In that case the following parameters should be used:

- Speed : 9600 bauds
- Data bits: 8
- Stop bits: 1
- Parity: None

The following table gather all AT command available:

## 2. LoRa RF Test Description

### 2.1 Configure RF test

General Setting

**\* Conf RF Test Setting**(Required to set every device reset)

The screenshot shows the SEONG JI LoRa Manual software interface. The 'Conf RF Test' section is highlighted with a red box. The settings are as follows:

Region Band ID	Set Network ID	Set ETSI DutyCycle
0:AS923	ID: [ ]	<input type="checkbox"/> ENABLE

EUI / ADDRESS Value	Set Device Class	Join Network Mode
EUI: [ ]	A	<input type="checkbox"/> 0: ABP <input type="checkbox"/> 1: OTAA

Set Freq / Datarate	LoRa Device Setting	Set Delay
Rx Datarate: [ ] Hz	Adaptive Datarate: [ ]	RX1DL: [ ] ms
Tx Datarate: [ ]	Tx Datarate: [ ]	Tx Power: [ ]

Key Write	AT SEND
ID: App Eui Value: [ ]	Port: [ ] 0: Unconfirmed Payload: [ ]

RF Test	RF Tx Hopping
Fstart(MHz): [ ] Fstop: [ ] Fdelta: [ ] Packed Num: [ ]	Test Start

Conf RF Test
TCONF: [ ] Freq(Hz): 868300000 PW(dBm): 15 Bandwidth(KHz): 4:125 SF: 7 CodingRate: 5 LNA: <input type="checkbox"/> Boost: <input type="checkbox"/> Modulation: 1 PayloadLen: 16
fskDev: 0 LowDrOpt: 2:Auto BT Product: 0:No Gaussian

Buttons: Set, Get

- As in the picture above, enter parameters without spaces and Set

AT+TCONF=<Frequency>:<Power>:<LoRa Bandwidth>:<Lora SF>:<CodingRate>:<Lna>:<PA Boost>:<Modulation>:<PayloadLen>:<FskDeviation>:<LowDrOpt >:<BTproduct>:<CR>

Ex) AT+TCONF=868300000:10:4:5:4/5:0:0:1:16:0:0:0

## Tx Test

After selecting Tx in the Packet part, set the number of times to repeat Value and Send.

Ex) AT+TTX=10

The screenshot shows the SEONG JI LoRa Manual software interface. The 'Port Set' section at the top left shows 'DUTCOM: 15' with 'Connect' and 'Close' buttons. The 'UART Log' on the left displays a series of status messages including 'OK', 'AT+TTX=10', 'TTxStart', and a list of transmission results (e.g., '7946491:Tx LoRa Test', '7946555:Tx 1 of 10', etc.), ending with 'TTxEnd' and 'OK'. The 'LoRa Manual' section on the right contains various configuration fields. The 'Packet' section at the bottom is highlighted with a red box, showing 'Tx' selected in the 'Packet' dropdown, 'Value' set to '10', and a 'Send' button. Other sections include 'Region Band ID', 'Set Network ID', 'Set ETSI DutyCycle', 'Join Network Mode', 'Set Device Class', 'Set Freq / Datarate', 'LoRa Device Setting', 'Key Write', 'AT SEND', 'RF Test', 'Conf RF Test', and 'Verify'.

## Rx Test

After selecting Rx in the Packet part, set the number of times to repeat Value and Send.

- ➔ if received success display "OnRxDone"
- ➔ if received fail display "OnRxTimeout"

Ex) AT+TRX=5

The screenshot shows the SEONG JI LoRa Manual software interface. The 'Port Set' section at the top left shows 'DUTCOM: 15' with 'Connect' and 'Close' buttons. The 'UART Log' on the left displays a series of status messages including 'OK', 'AT+TRX=5', 'TrxStart', and a list of reception results (e.g., '7s257:OnRxDone', '7s257:RssiValue=-111 dBm, SnrValue=3dB', etc.), ending with 'TrxEnd' and 'OK'. The 'LoRa Manual' section on the right contains various configuration fields. The 'Packet' section at the bottom is highlighted with a red box, showing 'Rx' selected in the 'Packet' dropdown, 'Value' set to '5', and a 'Send' button. Other sections include 'Region Band ID', 'Set Network ID', 'Set ETSI DutyCycle', 'Join Network Mode', 'Set Device Class', 'Set Freq / Datarate', 'LoRa Device Setting', 'Key Write', 'AT SEND', 'RF Test', 'Conf RF Test', and 'Verify'.

## 2.2 RF test – OTAA

1) Select region band ID

Ex) EU- AT+BAND=5, Korea- AT+BAND=6

The screenshot shows the SEONG JI LoRa Manual software interface. The 'Port Set' section at the top left has 'DUTCOM: 7' and 'Connect' and 'Close' buttons. The 'UART Log' section on the left displays the command 'AT+BAND=6' and its output, which includes OTAA mode settings and device addresses. The 'LoRa Manual' section on the right contains various configuration fields. The 'Region Band ID' field is highlighted with a red box and set to '6KR920'. Other fields include 'Set Network ID', 'Set ETSI DutyCycle', 'Join Network Mode' (set to 1: OTAA), 'Set Device Class', 'Set Freq / Datarate', 'LoRa Device Setting', 'Key Write', 'AT SEND', 'RF Test', 'Conf RF Test', 'Packet', and 'Verify'.

2) Join the basesyarion

Ex) AT+JOIN=1

The screenshot shows the SEONG JI LoRa Manual software interface. The 'Port Set' section at the top left has 'DUTCOM: 7' and 'Connect' and 'Close' buttons. The 'UART Log' section on the left displays the command 'AT+JOIN=1' and its output, which includes OTAA mode settings and device addresses. The 'LoRa Manual' section on the right contains various configuration fields. The 'Join Network Mode' field is highlighted with a red box and set to '1: OTAA'. Other fields include 'Region Band ID', 'Set Network ID', 'Set ETSI DutyCycle', 'Set Device Class', 'Set Freq / Datarate', 'LoRa Device Setting', 'Key Write', 'AT SEND', 'RF Test', 'Conf RF Test', 'Packet', and 'Verify'.

### 3) Send data

Ex) AT+SEND=48:0:1245

Port Set

DUTCOM: 7 Connect Close

UART Log

AT+SEND=48:0:1245  
445s866:TX on freq 922100000 Hz at DR 0  
OK  
447s171:MAC txDone  
448s057:RX\_1 on freq 922100000 Hz at DR 0  
448s402:IRQ\_RX\_TX\_TIMEOUT  
448s402:MAC rxTimeOut  
449s057:RX\_2 on freq 921900000 Hz at DR 0  
449s402:IRQ\_RX\_TX\_TIMEOUT  
449s402:MAC rxTimeOut

LoRa Manual

Region Band ID  
5:EU868 Set Get

EUI / ADDRESS Value  
EUI Set Get

Set Freq / Datarate  
Hz Set Get  
Rx Datarate Set Get  
0 Set Get

Set Network ID  
ID: Set Get

Set Device Class  
A Set Get

Set ETSI DutyCycle  
☐ ENABLE

Join Network Mode  
☐ 0: ABP ☒ 1: OTAA

Verbose Level  
Value Set Get

LoRa Device Setting  
Adaptive Datarate  
0:OFF Set Get  
Tx Datarate Set Get  
0 Set Get  
Set Delay  
RX1DL Set Get ms  
Tx Power Set Get  
0 Set Get

Key Write  
ID: App Eui Value: Set Get

AT SEND  
Port 48 0 : Unconfirmed Payload 1245 AT SEND

RF Test  
RF Tx Hopping  
Fstart(MHz) Fstop Fdelta Packed Num Test Start

Conf RF Test  
Freq(Hz) PW(dBm) Bandwidth(KHz) SF CodingRate  
TCONF 15 4:125 7  
fskDev LowDrOpt 2:Auto BT Product 0:No Gaussian Set Get

Packet  
Tx Value Send

Verify  
Reset FW Version Get Local Time Link Check BATTERY Level

RSSI Test CW Test Modulation CW Test RF Test Stop



### 3. LoRa Command

Command	Name	Description
AT?	Help on all <CMD>	Help on All Commands.  Ex) AT? (CR)
ATZ	Reset	Trig a MCU reset.  Ex) ATZ (CR)
AT+BAT=?	Battery level	Get the battery level (in mV).  Ex) AT+BAT=? (CR)
AT+VL=level AT+VL=?	Verbose level	Set or Get the verbose level. <level>: [ 0: off ~ 3: High ] Ex) AT+VL=3 (CR)
AT+MODE=mode AT+MODE=?	Mode Change	LoRa & Sigfox Mode Change. After a MCU reset. <mode>: [ 0: SigFox, 1: LoRa ]  Ex) AT+MODE=1 (CR)
AT\$SSWVER=?	Software version	Get the Software version.  Ex) AT\$SSWVER=? (CR)
AT+VER=?	Firmware and library versions	Get the version of firmware and libraries.  Ex) AT+VER=? (CR)
AT+LTIME=?	Local time in UTC format	Get the local time in UTC format.  Ex) AT+LTIME=? (CR)
AT+LINKC?	Link Check	Piggyback a Link Check Request to the next uplink.  Ex) AT+LINKC? (CR)
AT+APPEUI=eui AT+APPEUI=?	Application EUI	Set or Get the Application EUI.  Ex) AT+APPEUI=00:00:00:00:00:00:00:07 (CR)
AT+NWKKEY=key AT+NWKKEY=?	Network Key	Set or Get the Network Key.  Ex) AT+NWKKEY=00:11:22:33:44:55:66:77:88:99:AA:BB:CC:DD:EE:FF (CR)



Command	Name	Description
AT+APPKEY=key AT+APPKEY=?	Application Key	Set or Get the Application Key.  Ex) AT+APPKEY=00:11:22:33:44:55:66:77:88:99:AA:BB:CC:DD:EE:FF (CR)
AT+NWKSKEY=key AT+NWKSKEY=?	Network Session Key	Set or Get the Network Session Key.  Ex) AT+NWKSKEY=00:11:22:33:44:55:66:77:88:99:AA:BB:CC:DD:EE:FF (CR)
AT+APPSKEY=key AT+APPSKEY=?	Application Session Key	Set or Get the Application Session Key.  Ex) AT+APPSKEY=00:11:22:33:44:55:66:77:88:99:AA:BB:CC:DD:EE:FF (CR)
AT+DADDR=address AT+DADDR=?	Device address	Set or Get the Device address. <b>If use 'AT+DADDR=address,1', Uplink count is maintained</b>  Ex) AT+DADDR=00:11:22:33 (CR) Ex) AT+DADDR=00:11:22:33,1 (CR)
AT+DEUI=?	Device EUI	Get the Device EUI.  Ex) AT+DEUI=? (CR)
AT+NWKID=id AT+NWKID=?	Network ID	Set or Get the Network ID. <id>: [ 0 ~ 127 ].  Ex) AT+NWKID=100 (CR)
AT+JOIN=mode AT+JOIN=?	Join network with Mode	Join network with Mode. <mode> [ 0: ABP, 1: OTAA ]  Ex) AT+JOIN=1 (CR)
AT+SEND=port:ack:data	Send binary data	Send binary data with the application <Port> [ 1 ~ 199 ] <Ack> [ 0: unconfirmed, 1: confirmed ]  Ex) AT+SEND=1:1:123456789012345678901234567890123456789012345678901234567890123456 (CR)
AT+ADR=mode AT+ADR=?	Adaptive DataRate	Set or Get the Adaptive DataRate setting. <mode>: [ 0: Off, 1: On ]  Ex) AT+ADR=0 (CR)

Command	Name	Description																						
AT+DR=datarate AT+DR=?	Tx DataRate	<p>Set or Get the Tx DataRate.</p> <p>Activation when ADR off Only</p> <p>&lt;datarate&gt;: [ 0 ~ 7 ]</p> <p>[ EU868 ]</p> <p>0: LoRa - SF12 / 125 kHz, bit rate – 250 bit/s</p> <p>1: LoRa - SF11 / 125 kHz, bit rate - 440 bit/s</p> <p>2: LoRa - SF10 / 125 kHz, bit rate - 980 bit/s</p> <p>3: LoRa - SF9 / 125 kHz, bit rate - 1760 bit/s</p> <p>4: LoRa - SF8 / 125 kHz, bit rate - 3125 bit/s</p> <p>5: LoRa - SF7 / 125 kHz, bit rate - 5470 bit/s</p> <p>6: LoRa - SF7 / 250 kHz, bit rate - 11000 bit/s</p> <p>7: FSK - 50 kbps, bit rate - 5000 bit/s</p> <p>Ex) AT+DR=0 (CR)</p>																						
AT+TXP=power AT+TXP=?	Transmit Power	<p>Set or Get the Transmit Power.</p> <p>(valid range according to region)</p> <p>&lt;power&gt;: [ 0 ~ 15 ]</p> <p>AS923: [ 0~7 ] AU915: [ 0~14 ] CN779: [ 0~5 ]</p> <p>EU868: [ 0~7 ] KR920: [ 0~7 ] IN865: [ 0~10 ]</p> <p>US915: [ 0~14 ] RU864: [ 0~7 ]</p> <p>Ex) AT+TXP=0 (CR) ( in KR920 0: MAX ERP )</p> <table><tr><th>TXPower</th><th>Configuration (EIRP)</th></tr><tr><td>0</td><td>Max EIRP</td></tr><tr><td>1</td><td>Max EIRP – 2dB</td></tr><tr><td>2</td><td>Max EIRP – 4dB</td></tr><tr><td>3</td><td>Max EIRP – 6dB</td></tr><tr><td>4</td><td>Max EIRP – 8dB</td></tr><tr><td>5</td><td>Max EIRP – 10dB</td></tr><tr><td>6</td><td>Max EIRP – 12dB</td></tr><tr><td>7</td><td>Max EIRP – 14dB</td></tr><tr><td>8..14</td><td>RFU</td></tr><tr><td>15</td><td>Defined in [TS001]Error! Bookmark not defined.</td></tr></table> <p>Table 71: KR920-923 TXPower</p>	TXPower	Configuration (EIRP)	0	Max EIRP	1	Max EIRP – 2dB	2	Max EIRP – 4dB	3	Max EIRP – 6dB	4	Max EIRP – 8dB	5	Max EIRP – 10dB	6	Max EIRP – 12dB	7	Max EIRP – 14dB	8..14	RFU	15	Defined in [TS001]Error! Bookmark not defined.
TXPower	Configuration (EIRP)																							
0	Max EIRP																							
1	Max EIRP – 2dB																							
2	Max EIRP – 4dB																							
3	Max EIRP – 6dB																							
4	Max EIRP – 8dB																							
5	Max EIRP – 10dB																							
6	Max EIRP – 12dB																							
7	Max EIRP – 14dB																							
8..14	RFU																							
15	Defined in [TS001]Error! Bookmark not defined.																							
AT+DEVNONCE=count AT+DEVNONCE=?	Devnonce count	<p>Set or Get Devnonce count</p> <p>Ex) AT+DEVNONCE=0</p> <p>Ex) AT+DEVNONCE=?</p>																						

Command	Name	Description
AT+BAND=band AT+BAND=?	Active Region Band ID	Set or Get the Active Region Band ID. [ 0 ~ 9 ] <band>: [0: AS923, 1: AU915, 2: CN470, 3: CN779, 4: EU433, 5: EU868, 6: KR920, 7: IN865, 8: US915(default band), 9: RU864] Note: Bands are not saved when rebooting  Ex) AT+BAND=0 (CR)
AT+UNCNFRETX=retxnb AT+UNCNFRETX=?	Unconfirmed Uplink Retransmission	Set or Get Number for the Unconfirmed Uplink Retransmission <retxnb>: [ 1 ~ 15 ]  Ex) AT+UNCNFRETX=1 (CR)

Command	Name	Description
AT+CLASS=class AT+CLASS=?	Device Class	Set or Get the Device Class. <Class>: [A, C] <b>Class B to be update</b>  Ex) AT+CLASS=? (CR)
AT+DCS=mode AT+DCS=?	ETSI DutyCycle	Set or Get the ETSI DutyCycle. <mode>: [ 0: disable, 1: enable ] - Only for testing  Ex) AT+DCS=0 (CR) ( for KR920, AS923, AU915,.. )
AT+RX2FQ=freq AT+RX2FQ=?	Rx2 window Freq	Set or Get the Rx2 window. <b>After setting DR of Rx2, also Rx C will be set</b> <freq>: Frequency (in Hz)  Ex) AT+RX2FQ=869525000 (CR)
AT+RX2DR=datarate AT+RX2DR=?	Rx2 window DataRate	Set or Get the Rx2 window DataRate. <b>After setting DR of Rx2, also Rx C will be set</b> <datarate>: [ 0 ~ 13 ] AS923: [ 0~7 ] AU915: [ 2~13 ] CN779: [ 0~7 ] EU868: [ 0~7 ] KR920: [ 0~5 ] IN865: [ 0~5 ] US915: [ 8~13 ] RU864: [ 0~7 ]  Ex) AT+RX2DR=0 (CR)
AT+RX1DL=delay AT+RX1DL=?	Delay between end of Tx and Rx Window 1	Set or Get the delay between the end of the Tx and the Rx Window 1. <delay>: delay (in ms)  Ex) AT+RX1DL=1000 (CR)
AT+RX2DL=delay AT+RX2DL=?	Delay between end of Tx and Rx Window 2	Set or Get the delay between the end of the Tx and the Rx Window 2 in ms. <delay>: delay (in ms)  Ex) AT+RX2DL=2000 (CR)
AT+JN1DL=delay AT+JN1DL=?	Join Accept Delay between end of Tx and Join Rx Window 1	Set or Get the Join Accept Delay between the end of the Tx and the Join Rx Window 1 in ms. <delay>: delay (in ms)  Ex) AT+JN1DL=5000 (CR)

AT+JN2DL=delay AT+JN2DL=?	Join Accept Delay between end of Tx and Join Rx Window 2	Set or Get the Join Accept Delay between the end of the Tx and the Join Rx Window 2 in ms.  <delay>: delay (in ms)  Ex) AT+JN2DL=6000 (CR)
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Command	Name	Description
AT+TTH=fstart:fstop:fdelta:packetnb	Test Tx Hopping	<p>Starts RF Tx hopping test from Fstart to Fstop in Hz or MHz, Fdelta in Hz. Class B test.</p> <p>&lt;fstart&gt;: frequency (in Hz or MHz)</p> <p>&lt;fstop&gt;: frequency (in Hz or MHz)</p> <p>&lt;fdelta&gt;: frequency (in Hz)</p> <p>Ex) AT+TTH=867:869:500000:10 (CR)</p>
AT+TCONF=frequency:power:bandwidth:sf:coding rate:lna:paboost:modulation:payloadlen:fskdeviation:lowdropt:btproduct	Configure RF	<p>Configure RF test.</p> <p>&lt;Frequency&gt;: [ ex: 868300000 ]Hz</p> <p>&lt;Power&gt;: [ -9 ~ 22 ]dBm      Max 15dBm at Low Power</p> <p>&lt;Bandwidth&gt;: Lora [ 4: 125, 5: 250, 6: 500 ]kHz, or FSK: [ 4800Hz : 467000 ]Hz</p> <p>&lt;SF&gt;: [ 7 ~ 12 ] or &lt;FSK&gt;: [ 600 ~ 300000 ]</p> <p>&lt;CodingRate&gt;: [ 4/5, 4/6, 4/7, 4/8 ]</p> <p>&lt;Lna&gt;: [ 0: Off, 1: On ]</p> <p>&lt;PA Boost&gt;: [ 0: Off, 1: On ]</p> <p>&lt;Modulation&gt;: [ 0: FSK, 1: LoRa, 2: BPSK ]</p> <p>&lt;PayloadLen&gt;: [ 1 ~ 256 ]</p> <p>&lt;FskDev&gt;: FSK Only [ 600 ~ 20000 ]</p> <p>&lt;LowDrOpt&gt;: Lora Only [ 0: off, 1: On, 2: Auto ]</p> <p>&lt;BTproduct&gt;: [ 0: no Gaussian Filter Applied, 1: BT=0,3, 2: BT=0,5, 3: BT=0,7, 4: BT=1 ]</p> <p>Ex) AT+TCONF=922300000:14:4:12:4/5:1:0:1:16:0:2:3 (CR)</p>
AT+TTONE	RF Tx Tone test	<p>Starts RF Tx Tone test (<b>CW Test Mode</b>)</p> <p>Ex)AT+TTONE (CR)</p>
AT+TRSSI	RF Rx RSSI test	<p>Starts RF Rx RSSI test.</p> <p>Ex) AT+TRSSI (CR)</p>
AT+TTX=packetnb	Test RF Tx	<p>Starts RF Tx test: Nb of packets sent.</p> <p>Ex) AT+TTX=16 (CR)</p>
AT+TRX=packetnb	Test RF Rx	<p>Starts RF Rx test: Nb of packets expected.</p> <p>Stop by input 'X'</p> <p>Ex) AT+TRX=16 (CR)</p>

Command	Name	Description
AT+MTX	Test RF Modulation wave	Starts RF Tx test: Modulation Continuous Wave  Ex) AT+MTX (CR)
AT+MRX	Test RF Continuous Rx	Starts RF Rx test: Continuous receive <b>Stop by input 'X'</b>  Ex) AT+MRX (CR)
AT+TOFF	Stop RF test	Stops on-going RF test.  Ex) AT+TOFF (CR)
AT+CHMASK=mask AT+CHMASK=?	Channel Mask	Set Region Channel Mask  Configurable mask Dynamic Channel(AS923, EU868, etc) – Channel mask[0] Fixed Channel(US915, AU915) – Channel mask[0:5]  Ex) Dynamic channel: AT+CHMASK=0x7F (CR) Ex) Fixed channel: AT+CHMASK=0x7F,0000,0000,001F,0000,0000 (CR)
AT+BAUDRATE=baudrate AT+BAUDRATE=?	Set Baudrate	Set Baudrate <b>Set baudrate to '9600' before setting 'Sigfox Mode'</b> <Baudrate> [9600, 115200]  EX) AT+BAUDRATE=9600 (CR)