

LSM1x0A LoRa CLI Command interface manual

Rev 1.2

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History

Date	Contents	Version	FW 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 retransmission of unconfirmed test - AT+UNCNFRETX=<count> Change the company name Set Devnonce count - AT+DEVNONCE=<count>	V1.1	V1.0.4
2024-02-28	Set retransmission of confirmed test - AT+CNFRETX=<count>	V1.2	V1.0.4

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)

Port Set: DUTCOM: 15 [Connect] [Close]

UART Log: AT+TCONF=868300000:15:4:7:4/5:0:0:1:16:0:2:0
OK

LoRa Manual

Region Band ID: 0:AS923 [Set] [Get]

Set Network ID: ID: [Set] [Get]

Set ETSI DutyCycle: ☐ ENABLE

EUI / ADDRESS Value: [Set] [Get]

Set Device Class: A [Set] [Get]

Join Network Mode: ☐ 0: ABP ☐ 1: OTAA

Verbose Level: [Set] [Get]

Set Freq / Datarate: [Set] [Get]

Rx Datarate: [Set] [Get]

Tx Datarate: [Set] [Get]

LoRa Device Setting

Adaptive Datarate: 0:OFF [Set] [Get]

Set Delay: RX1DL [Set] [Get]

Tx Power: [Set] [Get]

Key Write: ID: App Eui Value: [Set] [Get]

AT SEND: Port: 0: Unconfirmed Payload: [AT SEND]

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

Conf RF Test:

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

[Set] [Get]

Packet: Tx Value [Send]

Verify: [Reset] [FW Version] [Get Local Time] [Link Check] [BATTERY Level]

AT Command: [AT SEND]

[CLEAR] [SAVE LOG]

RSSI Test CW Test Modulation CW Test RF Test Stop

- 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 'AT+TCONF=868300000:15:4:7:4/5:0:0:1:16:0:2:0', 'OK', 'AT+TRX=5', 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 Device Class', 'Set Freq / Datarate', 'LoRa Device Setting', 'Key Write', 'AT SEND', 'RF Test', 'Conf RF Test', 'Packet', and 'Verify'.

2) Join the basesyaron

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:

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

Set Network ID
ID: Set Get

Set ETSI DutyCycle
☐ ENABLE

EUI / ADDRESS Value
EUI: Set Get

Set Device Class
A Set Get

Join Network Mode
☐ 0: ABP ☒ 1: OTAA

Set Freq / Datarate
Hz Set Get
Rx Datarate Set Get
Tx Datarate Set Get

LoRa Device Setting
Adaptive Datarate
0:OFF Set Get
Tx Datarate Set Get
Set Delay
RX1DL ms Set Get
Tx Power 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
Modulation PayloadLen
fskDev LowDrOpt 2:Auto BT Product 0:No Gaussian Set Get

Packet
Tx Value Send
RSSI Test CW Test Modulation CW Test RF Test Stop

Verify
Reset FW Version Get Local Time Link Check BATTERY Level

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. If use 'AT+DADDR=address,1', Uplink count is maintained 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><datarate>: [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><power>: [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)
AT+CNFRETX=? AT+CNFRETX= retxnb	Confirmed Uplink Retransmission	Set or Get Number for the Confirmed Uplink Retransmission <retxnb>: [1 ~ 15] Ex) AT+CNFRETX=1 (CR)

Command	Name	Description
AT+CLASS=class AT+CLASS=?	Device Class	Set or Get the Device Class. <Class>: [A, C] Class B to be update 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. After setting DR of Rx2, also Rx C will be set <freq>: Frequency (in Hz) Ex) AT+RX2FQ=869525000 (CR)
AT+RX2DR=datarate AT+RX2DR=?	Rx2 window DataRate	Set or Get the Rx2 window DataRate. After setting DR of Rx2, also Rx C will be set <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><fstart>: frequency (in Hz or MHz)</p> <p><fstop>: frequency (in Hz or MHz)</p> <p><fdelta>: 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><Frequency>: [ex: 868300000]Hz</p> <p><Power>: [-9 ~ 22]dBm Max 15dBm at Low Power</p> <p><Bandwidth>: Lora [4: 125, 5: 250, 6: 500]kHz, or FSK: [4800Hz : 467000]Hz</p> <p><SF>: [7 ~ 12] or <FSK>: [600 ~ 300000]</p> <p><CodingRate>: [4/5, 4/6, 4/7, 4/8]</p> <p><Lna>: [0: Off, 1: On]</p> <p><PA Boost>: [0: Off, 1: On]</p> <p><Modulation>: [0: FSK, 1: LoRa, 2: BPSK]</p> <p><PayloadLen>: [1 ~ 256]</p> <p><FskDev>: FSK Only [600 ~ 20000]</p> <p><LowDrOpt>: Lora Only [0: off, 1: On, 2: Auto]</p> <p><BTproduct>: [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 (CW Test Mode)</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 Stop by input 'X' 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 Set baudrate to '9600' before setting 'Sigfox Mode' <Baudrate> [9600, 115200] EX) AT+BAUDRATE=9600 (CR)