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ASR650X AT Command Introduction

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[√] Modifying	Author：	Qipan Li
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ASR Microelectronics Co., Ltd

Version History

Version	Modify Date	Author	Change notes
V1.1	2018.06.21	Qipan Li	Initial Version
V2.0	2018.07.20	Qipan Li	Add AT commands
V3.0	2018.08.24	Ruilin Hao	Update
V3.1	2018.09.29	Ruilin Hao	Update
V4.0	2018.11.14	Ruilin Hao	Add some more AT commands

Table of Contents

1 **Scope**

This standard specifies the AT command sets of LoRa communication module at field of Internet of things.

This standard applies the operation of setup, manipulate, data send and receive etc. to LoRa communication module.

2 **Term、Definition and Abbreviation**

2.1 **Term and Definition**

2.1.1 **LoRa**

LoRa is one type of LPWAN communication technology, which is a solution released by Semtech company, and it owns the feature of the Spread-spectrum technology and long-distance wireless transmission. It use the free frequency-band of ISM in global, there are 433MHz, 470MHz, 868MHz, 915MHz etc.

Main features: Low power, long distance, low cost.

2.1.2 **LoRaWAN**

LoRa alliance is a non-profit association of more than 500 member companies, committed to enabling large scale deployment of Low Power Wide Area Networks (LPWAN) IoT through the development and promotion of the LoRaWAN open standard. Through standardisation and the accredited certification scheme the LoRa Alliance delivers the interoperability needed for LPWA networks to scale, making LoRaWAN™ the premier solution for global LPWAN deployments.

Network topology: Star-Structure

Network components: LoRa Module, LoRa Gateway and Lora Server (include Network Server,Network control,Application Server).

LoRaWAN classify the LoRa scenario with 3 category there are ClassA, ClassB and ClassC.

2.2 **Abbreviation**

The follow abbreviations applies to the file.

Abbreviation	English explanation
MCU	Microcontroller Unit
TA	Terminal Adaptor
TE	Terminal Equipment

3 **Overview**

Terminal Equipment(TE) would send standard AT command sets to Mobile Terminal(MT) to control its related function and network operations. Terminal Adaptor (TA) do adaption function of command and message between Terminal Equipment and Mobile Terminal. The classic implemetation of TE, TA and MT as the Figure 1 shows.

TE, TA and MT are completely independent entity.

TE is an independent entity, TA being integrated into MT.

MT is an independent entity, TA being integrated into TE.

TE, TA and MT would integrated into one entity too.

In this standard, TE being taken as the MCU module at the IoT device, TA being integrated into MT which is taken as the communication module. Communication module in this standard is the LoRa communication module.
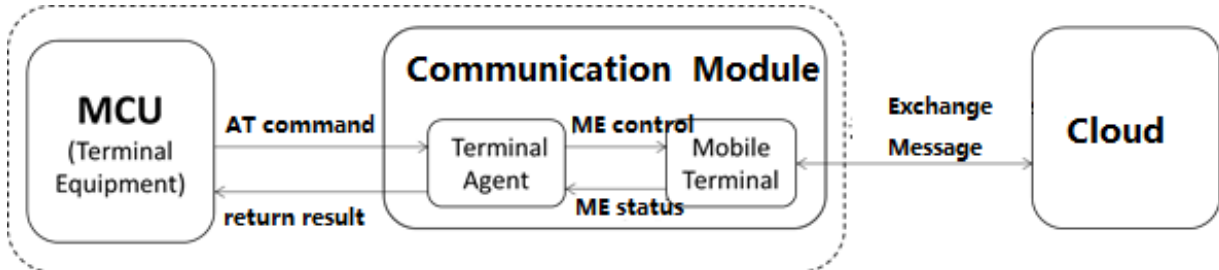
Figure 1 Architecture overview

MCU module and communication module always integrated into one IoT device, MCU can operate the TA by AT command sets, then control pass to MT, finally from MT to exchange message with Cloud.

As the interaction between IoT device and Cloud is done through LoRa technology, so in this standard it describes the LoRa realted AT command sets.

4 AT Command Syntax

AT command accpet the ASCII code's character, the command form as the follows:

Request message format is：AT+<CMD>[OP][para-1,para-2,……para-n]<\r>

Table 1 AT request message format

Field	Explaination
AT+	Command message prefix
CMD	Instruction string
Op	Instruction operator, it may be: ✓ "=" : indicate parameter setting ✓ "?" : indicate inquire parameter's current setting ✓ "" : indicate execute the instruction ✓ "=?" : indicate inquire the arguments of the instruction
para-1,para-2,…… para-n	Indicate the argument of the instruction or the specified inquired argument.
\r	Carriage return character, its ASCII code is 0x0D

Reply message format is：<\r\n>[+CMD:][para-1,para-2,……para-n]<\r\n>

or：<\r\n><STATUS><\r\n>

or both.

Table 2 AT Reply message format

Field	Explaination

\n	Line break, its ASCII code is 0x0A
+CMD	Instruction string
para-1, para-2, ⋯⋯ para-n	Instruction arguments
STATUS	Instruction execute status, may be the follows: ✓ "OK": Instruction execute success ✓ "ERROR": Instruction execute fail ✓ "+CME ERROR:\<err>": Instruction execute fail, return the related error-code.

注:
- ●〈〉: Indicate it is must include in instruction
- ●[]: Indicate it is optional include in instruction
- ●\r: Carriage return character, its ASCII code is 0x0D
- ●\n: Line break, its ASCII code is 0x0A

  For example, Inquire the connection mode of MQTT, type the command as:

  AT+IMQTTMODE?\r

  The reply message as:

  \r\n+IMQTTMODE:1\r\n

  \r\nOK\r\n

  This document will hide the '\r\n' in command format later for convince
- ●Console's parameter setting: baudrate 115200, data bit 8, stop bit 1, check bit 0
- ●Current command support the 'echo', but not support the backspace and the shortcut key of history command

5 LoRa AT Commands

5.1 Command classification

LoRa's AT command classification as the follows:

Table 3 LoRa's AT command classification

Classification	Description	Comments
General Commands	Manufactor Identification, Module Identification, Version Identification, Product Sequence Number	Detail for 3GPP〈AT command set for User Equipment (UE)〉.
Network Related Parameter Setting Commands	Frequency Band Mask, Multicast Address, Same frequency/Different frequency, Device's DevEUI	Network Related Parameters Config Commands
Control and Status Commands	Initiate Join, Work Mode, Class, Battery capacity, Model Status	Node Control and Status commands
MAC Setup Commands	LoRaWAN protocol related MAC instructions	MAC config commands
Send/Receive Data	Receive Data and Send Data	Data Commands

Commands		
Other Commands	Log Level, Restart, Reset to Factory	
Manufacture Private Commands	LoRa Manufacture's private commands	Manufacture Private Commands

5.1.1 **General Command Summary**

Table 4 LoRaWAN General Command Sets

Command	Description	Option
AT+CGMI	Read Manufacturer identification	Optional
AT+CGMM	Read Model Identification	Optional
AT+CGMR	Read Revision Identification	Optional
AT+CGSN	Read Product Serial Number Identification	Optional
AT+CGBR	Set Baudrate on UART Interface	Optional

Refer detail from 3GPP <AT command set for User Equipment (UE)>.

5.1.2 **Network Related Parameter Setup Command Summary**

Table 5 LoRaWAN Network Related Parameter Setup Command Sets

Command	Description	Option
AT+CJOINMODE	Set/Read Join Mode(OTAA, ABP)	Mandatory
AT+CDEVEUI	Set/Read DevEUI (only when OTAA join)	Mandatory
AT+CAPPEUI	Set/Read AppEUI (only when OTAA join)	Mandatory
AT+CAPPKEY	Set/Read AppKey (only when OTAA join)	Mandatory
AT+CDEVADDR	Set/Read DevAddr (only when ABP join)	Mandatory
AT+CAPPSKEY	Set/Read AppSkey (only when ABP join)	Mandatory
AT+CNWKSKEY	Set/Read NwkSkey (only when ABP join)	Mandatory
AT+CFREQBANDMASK	Set/Read FreqBand Mask	Mandatory
AT+CULDLMODE	Set/Read Ul/Dl Mode (Same frequency or different frequency)	Mandatory
AT+CADDMUTICAST	Add one Multicast Address	Optional
AT+CDELMUTICAST	Delete one Multicast Address	Optional
AT+CNUMMUTICAST	Inquire The Number of Multicast	Optional

5.1.3 **Control and Status Command Summary**

Table 6 LoRaWAN Control and Status Command Summary

Command	Description	Option
AT+CWORKMODE	Set/Read Work Mode	Mandatory
AT+CCLASS	Set/Read LoRa's Class (Class A/B/C)	Mandatory
AT+CBL	Read Device's Battery Level	Optional
AT+CSTATUS	Read Device's Status	Mandatory
AT+CJOIN	Initate OTAA	Mandatory

AT+CPINGSLOTINFOREQ	Initate PingSlot Info Request	Optional

5.1.4 **Send/Receive Data Command Summary**

Table 7 LoRaWAN Send/Receive Data Command Summary

Command	Description	Option
AT+DTRX	Send Data Frame	Mandatory
AT+DRX	Receive Data from RX Buffer then Empty the RX Buffer	Mandatory

5.1.5 **MAC Setup Command Summary**

Table 8 LoRaWAN MAC Setup Command Summary

Command	Description	Option
AT+CCONFIRM	Set/Read Send Message Type (confirm or Unconfirm)	Mandatory
AT+CAPPPORT	Set/Read Application Port	Mandatory
AT+CDATARATE	Set/Read Data Rate	Mandatory
AT+CRSSI	Get RSSI	Mandatory
AT+CNBTRIALS	Set/Read Number of Transfer	Mandatory
AT+CRM	Set/Read Report Mode	Mandatory
AT+CTXP	Set/Read TX Power	Mandatory
AT+CLINKCHECK	Enable Link check	Mandatory
AT+CADR	Enable/Disable ADR Function	Mandatory
AT+CRXP	Set/Read Receive Window Parameter	Mandatory
AT+CRX1DELAY	Set/Read RX1Delay	Mandatory
AT+CSAVE	Save Configuration	Mandatory
AT+CRESTORE	Restore to Default Configuration	Mandatory

5.1.6 **Other Commands Summary**

Table 9 Other Commands Summary

Command	Description	Option
AT+IREBOOT	Reboot	Optional
AT+ILOGLVL	Set Log Level	Optional

5.1.7 **Private Commands Summary**

Table 10 Private Commands Summary

Command	Description	Option
AT+CLPM	Enable Low Power	Optional
AT+CKEYSPROTECT	Device Private Key Encrypt	Optional
AT+CSLEEP	Low Power Test (Sleep)	Optional
AT+CMCU	Low Power Test (MCU)	Optional
AT+CSTDBY	Low Power Test (Standby)	Optional
AT+CRX	LORA Receive Test	Optional

AT+CTX	LORA TX Test	Optional
AT+CTXCW	LORA TX Contineous Test	Optional

5.2 **AT Command Format**

5.2.1 **Read Manufacturer Identification +CGMI**

Table 11 Read Manufacturer Identification

Command Type	Command Format	Response
Inquire Command	AT+CGMI?	+CGMI=<manufacturer> OK
Parameters Returns	<manufacturer>: Manufacturer Identification	
Example	AT+CGMI? +CGMI=ASR OK	
Notice		

5.2.2 **Read Model Identification +CGMM**

Table 12 Read Model Identification

Command Type	Command Format	Response
Inquire Command	AT+CGMM?	+CGMM=<model> OK
Parameters Returns	<model>: Model Identification	
Example	AT+CGMM? +CGMM=6501 OK	
Notice		

5.2.3 **Read Version Identification +CGMR**

Table 13 Read Version Identification

Command Type	Command Format	Response
Inquire Command	AT+CGMR?	+CGMR=<revision> OK
Parameters Returns	<revision>: Version Identification	
Example	AT+CGMR?	

	+CGMR=v4.0 OK	
Notice		

5.2.4 **Read Product Sequence Number +CGSN**

<p align="center">Table 14 Read Product Sequence Number</p>

Command Type	Command Format	Response
Inquire Command	AT+CGSN?	+CGMR=〈sn〉 OK
Parameters	〈sn〉: Product Sequence Number	
Returns		
Example	AT+CGSN? +CGSN=0539349E00032523 OK	
Notice		

5.2.5 **Set Baud-rate +CGBR**

<p align="center">Table 15 Set Baud-rate</p>

Command Type	Command Format	Response
Inquire Command	AT+CGBR?	+CGBR=〈baud〉 OK
Set Command	AT+CGBR=〈baud〉	OK
Parameters	〈baud〉: Baud-rate	
Returns		
Example	AT+CGBR=9600 OK	
Notice		

5.2.6 **Set/Read Join Mode +CJOINMODE**

<p align="center">Table 16 Set/Read Join Mode</p>

Command Type	Command Format	Response
Test Command	AT+CJOINMODE=?	+CJOINMODE:"mode" OK
Inquire command	AT+CJOINMODE?	+CJOINMODE:〈mode〉 OK
Set Command	AT+CJOINMODE=〈mode〉	OK or +CME ERROR:〈err〉

Parameters	<mode>: Device Node's Join Mode, there are
Returns	0: OTAA 1: ABP
	<err>: error code, refer detail from <AT command set for User Equipment (UE)>.
Example	AT+CJOINMODE=0 OK
Notice	Default using the OTAA mode; If need ABP mode, please use the command befor send any data.

5.2.7 Set/Read DevEUI +CDEVEUI

Table 17 Set/Read DevEUI

Command Type	Command Format	Response
Test Command	AT+CDEVEUI=?	+CDEVEUI=<DevEUI:length is 16>
Inquire command	AT+CDEVEUI?	+CDEVEUI:<value> OK
Set Command	AT+CDEVEUI=<value>	OK or +CME ERROR:<err>
Parameters	<value>: Device Nodes's DevEUI	
Returns		
Example	AT+CDEVEUI? +CDEVEUI=AABBCCDD00112233 OK	
Notice	Set or Read Device Node's DevEUI, the return result's format are Y1Y2...Y8 in hexdemical format, the value is 8 byte.	

5.2.8 Set/Read AppEUI +CAPPEUI

Table 18 Set/Read AppEUI

Command Type	Command Format	Response
Test Command	AT+CAPPEUI=?	+CAPPEUI=<AppEUI:length is 16>
Inquire command	AT+CAPPEUI?	+CAPPEUI:<value> OK
Set Command	AT+CAPPEUI=<value>	OK or +CME ERROR:<err>
Parameters	<value>: Device Node's AppEUI	
Returns	<err>: error code，refer detail from<AT command set for User Equipment (UE)>.	
Example	AT+CAPPEUI=AABBCCDD00112233 OK	

Notice	used in OTAA mode, Set or Read the AppEUI, the return result's format is Y1Y2...Y8 in hexdemical format, the value is 8 byte.

5.2.9 **Set/Read AppKey +CAPPKEY**

Table 19   Set/Read AppKey

Command Type	Command Format	Response
Test Command	AT+CAPPKEY=?	+CAPPKEY=<AppKey:length is 32>
Inquire command	AT+CAPPKEY?	+CAPPKEY:<value> OK
Set Command	AT+CAPPKEY=<value>	OK or +CME ERROR:<err>
Parameters	<value>: Device Node's AppKey	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CAPPKEY=AABBCCDD00112233AABBCCDD00112233 OK	
Notice	used in OTAA mode, Set or Read the AppKey, the return result's format is Y1Y2...Y16 in hexdemical format, the value is 16 byte.	

5.2.10 **Set/Read DevAddr +CDEVADDR**

Table 20 Set/Read DevAddr

Command Type	Command Format	Response
Test Command	AT+CDEVADDR=?	+CDEVADDR=<DevAddr:length is 8, Device address of ABP mode>
Inquire command	AT+CDEVADDR?	+CDEVADDR:<value> OK
Set Command	AT+CDEVADDR=<value>	OK or +CME ERROR:<err>
Parameters	<value>: Device Node's DevAddr	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CDEVADDR=00112233 OK	
Notice	Used in ABP mode, Set or Read the DevAddr, the return result's format is Y1Y2...Y4 in hexdecimal format, the value is 4 byte.	

5.2.11 **Set/Read AppSKey +CAPPSKEY**

Table 21 Set/Read AppSKey

Command Type	Command Format	Response

Test Command	AT+CAPPSKEY=?	+CAPPSKEY=<AppSKey:length is 32>
Inquire command	AT+CAPPSKEY?	+CAPPSKEY:<value> OK
Set Command	AT+CAPPSKEY=<value>	OK or +CME ERROR:<err>
Parameters	<value>: Device Node's AppSKey	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CAPPSKEY=AABBCCDD00112233AABBCCDD00112233 OK	
Notice	Used in ABP mode, Set or read AppSKey, the return result's format is Y1Y2…Y16 in hexdecimal format, the value is 16byte.	

5.2.12 Set/Read NwkSKey +CNWKSKEY

Table 22 Set/Read NwkSKey

Command Type	Command Format	Response
Test Command	AT+CNWKSKEY=?	+CNWKSKEY =<NwkSKey:length is 32>
Inquire command	AT+CNWKSKEY?	+CNWKSKEY:<value> OK
Set Command	AT+CNWKSKEY=<value>	OK or +CME ERROR:<err>
Parameters	<value>: Device Node's NwkSKey	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CNWKSKEY=AABBCCDD00112233AABBCCDD00112233 OK	
Notice	Used in ABP mode, Set or read NwkSKey, the return result's format is Y1Y2…Y16 in hexdecimal format, the value is 16byte.	

5.2.13 Set Frequency Band Mask +CFREQBANDMASK

Table 23 Set Frequency Band Mask

Command Type	Command Format	Response
Test Command	AT+CFREQBANDMASK=?	+CFREQBANDMASK:"mask" OK
Inquire command	AT+CFREQBANDMASK?	+CFREQBANDMASK:<mask> OK
Set Command	AT+CFREQBANDMASK=<mask>	OK or +CME ERROR:<err>
Parameters		

Returns	<mask>: Network workable frequency band mask, there is 16 bit to 16 frequency group, refer detail from <LoRaWAN join specifications>. For example: 0-7 channel, its mask is 0001, 8-15 channel, its mask is 0002, and so on. <err>: error code, refer detail from<AT command set for User Equipment (UE)>
Example	AT+CFREQBANDMASK=0001 OK
Notice	Need set it before the Join command.

5.2.14 Set/Read Upload/Download Same/Different Frequency +CULDLMODE

Table 24 Set/Read Upload/Download Same/Different Frequency

Command Type	Command Format	Response
Test Command	AT+CULDLMODE=?	+CULDLMODE:"mode" OK
Inquire command	AT+CULDLMODE?	+CULDLMODE:<mode> OK
Set Command	AT+CULDLMODE=<mode>	OK or +CME ERROR:<err>
Parameters	<mode>: as the follows	
Returns	1: Same Frequency Mode 2: Different Frequency Mode	
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CULDLMODE=2 OK	
Notice	Need set it before the Join command.	

5.2.15 Set/Read Work Mode +CWORKMODE

Table 25 Set/Read Work Mode

Command Type	Command Format	Response
Test Command	AT+CWORKMODE=?	+CWORKMODE:"mode" OK
Inquire command	AT+CWORKMODE?	+CWORKMODE:<mode> OK
Set Command	AT+CWORKMODE=<mode>	OK or +CME ERROR:<err>
Parameters	<mode>: as the follows	
Returns	2: Normal Work Mode	
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	

Example	AT+CWORKMODE=2
	OK
Notice	Need set it before the Join command, default is the normal work mode. Currently Only normal work mode is supported.

5.2.16 Set/Read Class +CCLASS

Table 26 Set/Read Class

Command Type	Command Format	Response
Test Command	AT+CCLASS=?	+CCLASS:"class", "branch", "para1", "para2", "para3" ,"para4"
		OK
Inquire command	AT+CCLASS?	+CCLASS:<class>
		OK
Set Command	AT+CCLASS=<class> ,[branch], [para1], [para2], [para3] , [para4]	OK
		or
		+CME ERROR:<err>
Parameters	<class>: as the follows	
Returns	0: classA 1: classB 2: classC According different device type, there are the following parameters: If class is 1 and branch is 0, then only para1 parameter is used to set the ping slot periodicity, whoes value range is 0~7, the related period time is 0.96*2^periodicity seconds; If class is 1 and branch is 1, then para1 is used to set the frequency of beacon, its unit is Hz; para2 is used to set the data rate of beacho; para3 is used to set the frequency of ping slot, its unit is Hz; para4 is used to set the data rate of ping slot. Evey parameter's value range please refer to the LoRaWAN protocol <err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CCLASS=2	
	OK	
Notice	It need be set before the "Join" procedure, the default class is ClassA.	

5.2.17 Inquire the Battery level of Device Node +CBL

Table 27　Inquire the Battery Level of Device Node

Command Type	Command Format	Response
Test Command	AT+CBL=?	+CBL: "value"
		OK

Inquire command	AT+CBL?	+CBL:<value> OK
Parameters Returns	<value>: device node's battery level, the range please refer to the LoRaWAN protocol.	
Example	AT+CBL? +CBL=100 OK	
Notice	Inquire the battery level of device node.	

5.2.18 **Inquire Device Current Status +CSTATUS**

Table 28   Inquire Device Current Status

Command Type	Command Format	Response
Test Command	AT+CSTATUS=?	+CSTATUS:"status" OK
Inquire command	AT+CSTATUS?	+CSTATUS:<status> OK
Parameters	<status>: the definition as the follows:	
Returns	Current status of the device 00 – there is no data operation 01 – there is data in sending 02 – there is data sent but failed 03 – there is data sent and success 04 – JOIN success (only appear in first join procedure) 05 – JOIN fail (only appear in first join procedure) 06 – Network may abnormal (result from Link Check) 07 – there is data sent and success but no download 08 – there is data sent and success, there is download too.	
Example	AT+CSTATUS? +CSTATUS=03 OK	
Notice	Inquire the current status of the device node	

5.2.19 **Set/Read Join +CJOIN**

Table 29 Set/Read Join

Command Type	Command Format	Response

Test Command	AT+CJOIN=?	+CJOIN:\<ParaTag1\>, [ParaTag2],…[ParaTag4]
		OK
Inquire command	AT+CJOIN?	+CJOIN:\<ParaValue1\>, [ParaValue2],…[Para Value4]
		OK
Set Command	AT+CJOIN =\<ParaValue1\>, [ParaValue2],…[Par aValue4]	OK or +CME ERROR:\<err\> If input parameter is legal, return OK firstly, then start the automatic authentication and return the result of authentication +CJOIN:OK Authentication Success +CJOIN:FAIL Authentication Fail
Parameters Returns	\<ParaTag1\>, [ParaTag2], ……[ParaTag4]: Authentication parameter1, 2, ……4's name; [ParaValue1], [ParaValue2], ……[ParaValue4]: Authentication parameter1, 2, ……4's value; ParaTag1 represent do the JOIN operation，ParaTag1's value range: 0— Stop JOIN 1— Start JOIN, restart one JOIN procedure, for module which have enable the warm boot, do the oeration will clear the parameters of JOIN procedure. ParaTag2 represent if enable the auto-JOIN function, its factory value is 1, ParaTag2's value range: 0 — Disable auto-JOIN 1 — Enable auto-JOIN. When module enter into passthrough mode, enable auto-JOIN. ParaTag3 represent the period of JOIN, ParaTag3's value range is 7~255, its unit is seconds. Factory default value：8 ParaTag4 represent the maximum retry times of JOIN, ParaTag4's value range is 1~256. \<err\>: error code, refer detail from\<AT command set for User Equipment (UE)\>	
Example	AT+CJOIN=1,1,10,8（Set JOIN parameter: enable auto-JOIN, the period of JOIN is 10s, and the maximum retry times of JOIN is 8 times） OK +CJOIN:OK	
Notice		

5.2.20 **Send/Receive Data +DTRX**

Table 30 Send/Receive Data

Command Type	Command Format	Response
Inquire Command	AT+DTRX=?	+DTRX:[confirm],[nbtrials],<Length>,<Payload> OK
Execute Command	AT+DTRX=[confirm],[nbtrials],<Length>,<Payload>	OK+SEND:TX_LEN OK+SENT:TX_CNT OK+RECV:TYPE,PORT,LEN,DATA or ERR+SEND:ERR_NUM ERR+SENT:TX_CNT or +CME ERROR:<err>
Parameters Returns	Confirm and nbtrials please refer to other related AT command, it is valid only to this send, there are optional option. Length represent the number of characters; the maximum value please refer to LoRaWAN protocol; different datarate allow different maximum transfer payload (more detail please refer to LoRaWAN protocol), 0 represent the empty package. Payload is hexdecimal(two charactors represent one digit). Return value: 1, If data send success? Confirm data: Each confirm data will have one response ack message from network server, when module can't receive ack message and exceed the maximum transmit times, data send failed with log output "ERR+SENT"; if ack message being received, data send success with log output" OK+SEND", "OK+SENT", "OK+RECV" Unconfirm data: Unconfirm data without ack message from network server, each unconfirm data send done will have log output "OK+SEND", "OK+SENT", if received the download data of network server, it will have additional log output "OK+RECV". 2, Data send status indication OK+SEND:TX_LEN represent data send success,TX_LEN: 1Byte，represent the length of data sent. OK+SENT:TX_CNT represent data send success,TX_CNT：1Byte，represent the times of data sent. ERR+SEND:ERR_NUM represent data send fail, the fail reason is represented by ERR_NUM, ERR_NUM: 1Byte.	

	0- Not Join Network success 1- Communication path bush, data send fail 2- data length exceed the allowable length, just send the MAC command ERR+SENT:TX_CNT represent data send fail, send times exceed the maximum times, TX_CNT: 1Byte TX_CNT represent the data send times. OK+RECV:TYPE,PORT,LEN,DATA represent data send success (receive the ack message when confirmed data or receive the download package from network server) TYPE: 1Byte, represent the download transfer type Bit0: 0-unconfirm, 1-confirm Bit1: 0-non-ACK, 1-ACK Bit2: 0-non-carry, 1-carry, indicate if download data have carry the ack of LINK command. Bit3: 0-non-carry, 1-carry, indicate if download data have carry the ack of TIME command. Only when the bit is 1, it means time sync success. Bit4~Bit7: default is 0, reserved PORT: 1Byte, download transport port LEN: 1Byte, download data length DATA: nByte, download data, when the LEN is 0, the DATA not exist <err>: error code, refer detail from<AT command set for User Equipment (UE)>
Example	AT+DTRX=1,2,10,0123456789 OK+SEND:03 OK+SENT:01 OK+RECV:02,01,00 Represent confirm data have send successfully, network server have received the data "0123456789", and give device node the download ack.
Notice	It is need to first join into the network, then send data later.

5.2.21 **Receive Data +DRX**

Table 31 Receive Data

Command Type	Command Format	Response
Test Command	AT+DRX=?	+DRX:<Length>,<Payload> OK
Inquire command	AT+DRX?	+DRX:<Length>,<Payload> OK or +CME ERROR:<err>
Parameters	Return value:	
Returns		

	Length：0 represent there is empty packet
	Payload: hexdecimal string characters
	OK: receive payload without abnormal issues
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>
Example	AT+DRX?
	OK
Notice	Receive payload from RX-buffer, then clear the RX-buffer

5.2.22 **Set/Read Upload Transform Type +CCONFIRM**

Table 32 Set/Read Upload Transform Type

Command Type	Command Format	Response
Test Command	AT+CCONFIRM=?	+CCONFIRM:"value"
		OK
Inquire command	AT+CCONFIRM?	+CCONFIRM:<value>
		OK
Execute Command	AT+CCONFIRM =<value>	OK
		or
		+CME ERROR:<err>
Parameters	<value>: as the follows	
Returns	0: UnConfirmed up message 1: Confirmed up message	
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CCONFIRM=1	
	OK	
Notice	The command need be used before send data.	

5.2.23 **Set/Read Upload Application Port +CAPPPORT**

Table 33 Set/Read Upload Application Port

Command Type	Command Format	Response
Test Command	AT+CAPPPORT=?	+CAPPPORT:"value"
		OK
Inquire command	AT+CAPPPORT?	+CAPPPORT:<value>
		OK
Execute Command	AT+CAPPPORT=<value>	OK
		or
		+CME ERROR:<err>
Parameters	<value>: As the follows	
Returns	The application port used in decimal format and the factory default value is 10	

	Value range:1~223. Note1: application port:0x00 is designed for LoRaWAN's MAC command 〈err〉: error code, refer detail from〈AT command set for User Equipment (UE)〉
Example	AT+CAPPPORT=10 OK
Notice	The command need be used before send data.

5.2.24 **Set/Read Data Rate +CDATARATE**

Table 34 Set/Read Data Rate

Command Type	Command Format	Response
Test Command	AT+CDATARATE=?	+CDATARATE:"value" OK
Inquire command	AT+CDATARATE?	+CDATARATE:〈value〉 OK
Execute Command	AT+CDATARATE=〈value〉	OK or +CME ERROR:〈err〉
Parameters	〈value〉: As the follows	
Returns	The factory default value is 3, its value range is: 0 - SF12, BW125 1 - SF11, BW125 2 - SF10, BW125 3 - SF9, BW125 4 - SF8, BW125 5 - SF7, BW125 〈err〉: error code, refer detail from〈AT command set for User Equipment (UE)〉	
Example	AT+CDATARATE=1 OK	
Notice	The command need be used before send data. After enable the ADR function, the command's effect will disappear.	

5.2.25 **Inquire RSSI +CRSSI**

Table 35 Inquire RSSI

Command Type	Command Format	Response
Test Command	AT+CRSSI=?	+CRSSI OK
Inquire command	AT+CRSSI FREQBANDIDX?	+CRSSI: 0:〈Channel 0 rssi〉 1:〈Channel 1 rssi〉

		...
		15:<Channel 8 rssi>
		OK
Parameters Returns	<FREQBANDIDX>: represent the frequency's serial number, it is start from 0, group 1A2's serial number is 1	
	Return all the 8 channels's RSSI in one frequency group.	
Example	AT+CRSSI 1?	
	+CRSSI:	
	0:-157	
	1:-157	
	2:-157	
	3:-157	
	4:-157	
	5:-157	
	6:-157	
	7:-157	
	OK	
Notice		

5.2.26 Set/Read Send Times +CNBTRIALS

Table 36 Set/Read Send Times

Command Type	Command Format	Response
Test Command	AT+CNBTRIALS=?	+CNBTRIALS: "MType", "value" OK
Inquire command	AT+CNBTRIALS?	+CNBTRIALS:<MType>,<value> OK
Execute Command	AT+CNBTRIALS=<MType>,<value>	OK or +CME ERROR:<err>
Parameters	<MType>:0:unconfirm package, 1:confirm package.	
Returns	<value>: maximum send times, its value range is 1~15. <err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CNBTRIALS=1,2 OK	
Notice	The command need be used before send data.	

5.2.27 Set/Read Upload Mode +CRM

Table 37 Set/Read Upload Mode

Command Type	Command Format	Response

Test Command	AT+CRM=?	+CRM:"reportMode","reportInterval" OK
Inquire command	AT+CRM?	+CTXP:\<reportMode\>, [reportInterval] OK
Execute Command	AT+CTXP=\<reportMode\>, [reportInterval]	OK or +CME ERROR:\<err\>
Parameters	The command is mainly used for test purpose.	
Returns	\<reportMode\>: 0- Non-periodic report data mode 1- Periodic report data mode \<reportInterval\>: only used when in periodic report data mode, it specify the time interval between two upload, its unit is second, for different data rate, the minimum report interval is different, they have different level as the follow table shows. <table><tr><td>Data-rate\period(s)\level</td><td>LV1</td><td>LV2</td></tr><tr><td>DR0</td><td>150</td><td>300</td></tr><tr><td>DR1</td><td>75</td><td>150</td></tr><tr><td>DR2</td><td>35</td><td>70</td></tr><tr><td>DR3</td><td>15</td><td>30</td></tr><tr><td>DR4</td><td>10</td><td>20</td></tr><tr><td>DR5</td><td>5</td><td>10</td></tr></table> \<err\>: error code, refer detail from\<AT command set for User Equipment (UE)\>	
Example	AT+CRM=1,10 OK	
Notice	The command need be used before send data.	

5.2.28 Set/Read TX Power +CTXP

Table 38 Set/Read TX Power

Command Type	Command Format	Response
Test Command	AT+CTXP=?	+CTXP:"value" OK
Inquire command	AT+CTXP?	+CTXP:\<value\> OK
Execute Command	AT+CTXP=\<value\>	OK or +CME ERROR:\<err\>
Parameters	\<value\>: represent the power of TX, the factory value is 0.	
Returns	The value is according to the specific product type, in CN470A the value range is as the follows. 0 - 17dBm	

	1 – 15dBm
	2 – 13dBm
	3 – 11dBm
	4 – 9dBm
	5 – 7dBm
	6 – 5dBm
	7 – 3dBm
	⟨err⟩: error code, refer detail from⟨AT command set for User Equipment (UE)⟩
Example	AT+CTXP=1 OK
Notice	The command need be used before send data.

5.2.29 Verify Network Link Status +CLINKCHECK

Table 39 Verify Network Link Status

Command Type	Command Format	Response
Test Command	AT+CLINKCHECK=?	+CLINKCHECK:"value" OK
Execute Command	AT+CLINKCHECK=⟨value⟩	OK or +CME ERROR:⟨err⟩
Parameters	⟨value⟩: enable the link Check or not	
Returns	0 – Disable Link Check 1 – Execute Link Check one time 2 – Module will automatically execulte one time Link Check after every Upload data. Return OK represents success. If Value is 1, a times later, it will return the second response with the follow format: +CLINKCHECK:Y0, Y1, Y2, Y3, Y4 Y0 represent the result of Link Check ● 0 – represent the Link Check execute success ● Non-0 – represent the Link Check execute fail Y1 represent the DemodMargin Y2 represent the NbGateways Y3 represent the RSSI of the command's dowmload Y4 represent the SNR of the command's download ⟨err⟩: error code, refer detail from⟨AT command set for User Equipment (UE)⟩	
Example	AT+CLINKCHECK=1 OK +CLINKCHECK: 0, 0, 1, -68, 8	
Notice	The command need be used before send data.	

5.2.30 **Enable ADR +CADR**

Table 40 Enable ADR

Command Type	Command Format	Response
Test Command	AT+CADR=?	+CADR:"value" OK
Inquire command	AT+CADR?	+CADR:<value> OK
Execute Command	AT+CADR=<value>	OK Or +CME ERROR:<err>
Parameters	<value>: as the follows:	
Returns	ADR enable setting, the factory value is 1 0 – Disable ADR 1 – Enable ADR	
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CADR=1 OK	
Notice	The command need be used before send TX data. The default setting is enable the ADR function.	

5.2.31 **Set the RX-Window Parameter +CRXP**

Table 41 Set the RX-Window Parameter

Command Type	Command Format	Response
Test Command	AT+CRXP=?	+CRXP:"RX1DRoffest","RX2DataRate","RX2Frequency" OK
Inquire command	AT+CRXP?	+CRXP:<RX1DRoffest>,<RX2DataRate>,<RX2Frequency> OK
Execute Command	AT+CRXP=<RX1DRoffest>,<RX2DataRate>,<RX2Frequency>	OK or +CME ERROR:<err>
Parameters	<RX1DRoffest>,<RX2DataRate>,<RX2Frequency> more detail please refer to the LoRaWAN Protocol	
Returns		
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CRXP=1,1,471000000 OK	
Notice	It need being setted before the data transmit. If not set, then the default value will be used.	

5.2.32 **Set Frequency Table +CFREQLIST**

Table 42 Set Frequency Table

Command Type	Command Format	Response
Test Command	AT+CFREQLIST=?	+CFREQLIST:"ULDL", "method", "number", "freqlist" OK
Inquire command	AT+CFREQLIST?	+CFREQLIST:<ULDL>,<method>,<number>,<freqlist> OK
Execute Command	AT+CFREQLIST=<ULDL>,<method>,<number>,<freqlist>	OK or +CME ERROR:<err>
Parameters	ULDL represents the frequency of TX or RX	
Returns	1-UL; 2-DL; for different frequency device node, it is need to set the frequency of download; but for same frequency device node, it is not needed. Method represents the way of frequency setting 1 – frequency table is autogenerated according to the start frequency and the number of chnanels. 2 – set logical channel's specific frequency respectivly Number represents the number of channels, its value range is1~16. Please pay attention to cooperate with the basestation. Freqlist is realted with the method being setted. If method is 1, then the freqlist is the start frequency and its unit is Hz; If method is 2, then the freqlist may be more than one parameters, which is dependent on the value of "number", its unit is Hz too; <err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CFREQLIST=1, 2, 8, 475300000, 475500000, 475700000, 475900000, 763000000, 476500000, 476700000, 476900000 OK	
Notice	It is optional, it is designed to select from set frequency mask and set frequency table. (Currently, the command is not supported please use the AT+CFREQBANDMASK)	

5.2.33 **Set/Read RX1Delay +CRX1DELAY**

Table 43 Set/Read RX1Delay

Command Type	Command Format	Response
Test Command	AT+CRX1DELAY=?	+CRX1DELAY:"Delay" OK

Inquire command	AT+CRX1DELAY?	+CRX1DELAY:<Delay> OK
Execute Command	AT+CRX1DELAY=<Delay>	OK or +CME ERROR:<err>
Parameters	Delay: how many secondes to open RX1 window after TX done, its unit is seconds	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CRX1DELAY=2 OK	
Notice	Please set it before send data, if not set using the protocol's default value.	

5.2.34 Save the MAC Configuration Parameters +CSAVE

Table 44 Save the Mac Configuration Parameters

Command Type	Command Format	Response
Test Command	AT+CSAVE=?	+CSAVE OK
Execute Command	AT+CSAVE	OK or +CME ERROR:<err>
Parameters	The command save the MAC configuration parameters into EEPROM/FLASH.	
Returns	After execute the "AT+RESET" command, module will use the new MAC configuration parameters to init the network. <err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CSAVE OK	
Notice	Save is needed before send TX data.	

5.2.35 Restore MAC Default Parameters +CRESTORE

Table 45 Restore MAC Default Parameters

Command Type	Command Format	Response
Test Command	AT+CRESTORE=?	+CRESTORE OK
Execute Command	AT+CRESTORE	OK or +CME ERROR:<err>
Parameters	The command restore the MAC default configuration parameters into EEPROM/FLASH.	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CRESTORE OK	
Notice	Save is needed before send TX data.	

5.2.36 **PingSlotInfo Request +CPINGSLOTINFOREQ**

Table 46 PingSlotInfo Request

Command Type	Command Format	Response
Test Command	AT+CPINGSLOTINFOREQ=?	+CPINGSLOTINFOREQ:〈periodicity〉 OK
Inquire command	AT+CPINGSLOTINFOREQ?	+CPINGSLOTINFOREQ:〈periodicity〉 OK
Execute Command	AT+CPINGSLOTINFOREQ=〈periodicity〉	OK or +CME ERROR:〈err〉
Parameters	periodicity：ping slot' periodic parameter	
Returns	〈err〉: error code, refer detail from〈AT command set for User Equipment (UE)〉	
Example	AT+CPINGSLOTINFOREQ=3 OK	
Notice	Only used when device node is in ClassB Mode	

5.2.37 **Add one Multicast Address +CADDMUTICAST**

Table 47 Add one Multicast Address

Command Type	Command Format	Response
Test Command	AT+CADDMUTICAST=?	+CADDMUTICAST:"DevAddr","AppSKey","NwkSKey","Periodicity","Datarate" OK
Execute Command	AT+CADDMUTICAST=〈DevAddr〉,〈AppSKey〉,〈NwkSKey〉,[Periodicity],[Datarate]	OK or +CME ERROR:〈err〉
Parameters	DevAddr: multicast address	
Returns	AppSKey: multicast application session key NwkSKey: multicast network session key Periodicity: ping slot's periodic parameter Datarate: the data rate of the multicast address 〈err〉: error code, refer detail from〈AT command set for User Equipment (UE)〉	
Example	AT+CADDMUTICAST=67678d5e, 5ac8eb2016f11f19ad19d7f530592c44, 59543069010279fa7317f85f47c46926, 2, 2 OK	
Notice	Please use the command before the "Join" procedure	

5.2.38 **Delete one Multicast Address +CDELMUTICAST**

Table 48 Delete one Multicast Address

Command Type	Command Format	Response
Test Command	AT+CDELMUTICAST=?	+CDELMUTICAST:"DevAddr" OK
Execute Command	AT+CDELMUTICAST=<DevAddr>	OK or +CME ERROR:<err>
Parameters	DevAddr: the multicast address	
Returns	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CDELMUTICAST=67678d5e OK	
Notice		

5.2.39 **Inquire the Number of Multicast +CNUMMUTICAST**

Table 49 Inquire the number of multicast

Command Type	Command Format	Response
Test Command	AT+CNUMMUTICAST=?	+CNUMMUTICAST:"number" OK
Inquire Command	AT+CNUMMUTICAST?	+CNUMMUTICAST:<number> OK
Parameters		
Returns		
Example	AT+CNUMMUTICAST? +CNUMMUTICAST:0 OK	
Notice		

5.2.40 **Reboot Module +IREBOOT**

Table 50 Reboot Module

Command Type	Command Format	Response
Test Command	AT+IREBOOT=?	+IREBOOT:"Mode" OK
Execute Command	AT+IREBOOT=<mode>	OK or +CME ERROR:<err>
Parameters	<mode>: Reboot mode;	
Returns	0:　　Reboot the module immediately	

	1: Reboot the module until the current frame being transmitted completely 7: Reboot the module and enter into the bootloader
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>
Example	AT+IREBOOT=1 OK
Notice	When the module receive the command, after it response with "OK", it will reboot the module. Before the reboot operation done, it will not receive any other AT command.

5.2.41 Set/Read Log Level +ILOGLVL

Table 51 Set/Read Log Level

Command Type	Command Format	Response
Test Command	AT+ILOGLVL=?	+ILOGLVL:"level" OK
Inquire command	AT+ILOGLVL?	+ILOGLVL:<level> OK
Execute Command	AT+ILOGLVL=<level>	OK or +CME ERROR:<err>
Parameters	<level>: Log Level	
Returns	0: Disable Log Information 1~5: Enable Log Information, the larger the number is, the more log information the console shows	
	<err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+ILOGLVL=1 OK	
Notice		

5.2.42 Encrypt Device Triple-tuple +CKEYSPROTECT

Table 52 Encrypt Device Triple-tuple

Command Type	Command Format	Response
Test Command	AT+CKEYSPROTECT=?	+CKEYSPROTECT =<ProtectKey:length is 32> OK
Inquire command	AT+CKEYSPROTECT?	+CKEYSPROTECT:<protected> OK
Set Command	AT+CKEYSPROTECT=<key>	OK or +CME ERROR:<err>

Parameters	⟨key⟩: device node's protect key
Returns	⟨err⟩: error code, refer detail from⟨AT command set for User Equipment (UE)⟩
Example	AT+CKEYSPROTECT=AABBCCDD00112233AABBCCDD00112233 OK
Notice	After use the command, device's triple-tuple will be encrypted in flash, user just can read the encrypted data but can't change it anymore.

5.2.43 **Enable Low Power Mode +CLPM**

Table 53 Enable Low Power Mode

Command Type	Command Format	Response
Test Command	AT+CLPM=?	+CLPM:"Mode" OK
Excute Command	AT+CLPM=⟨mode⟩	OK or +CME ERROR:⟨err⟩
Parameters	⟨mode⟩: Low power mode	
Returns	1: Device enter into low power mode ⟨err⟩: error code, refer detail from⟨AT command set for User Equipment (UE)⟩	
Example	AT+CLPM=1 OK	
Notice	When transmit speed > 40kbps, the start byte of UART may occur error in transmit, AT+CLPM=0 may be recognized unrightly which result in "+CME ERROR" being returned. We suggest using "000000000D0A" (hexdecimal) to do wakeup operation.	

5.2.44 **Low Power Test #1 +CSLEEP**

Table 54 Low Power Test #1+CSLEEP

Command Type	Command Format	Response
Test Command	AT+CSLEEP=?	+CSLEEP = ⟨0, 1, 2 ⟩ OK
Excute Command	AT+CSLEEP=⟨sleep_mode⟩	OK or +CME ERROR:⟨err⟩
Parameters	The command let device enter into deep sleep mode	
Returns	There are 3 types of deep sleep mode. 0 – Enter into deep sleep mode, wakeup by timer in 10s later 1 – Enter into deep sleep mode, wakeup by set_b pin through pull it in high 2 – Enter into deep sleep mode, wakeup by uart through type any keys in console ⟨err⟩: error code, refer detail from⟨AT command set for User Equipment (UE)⟩	
Example	AT+CSLEEP=0	

	deep sleep 10000 ms!=0 +CSLEEP OK
Notice	

5.2.45 **Low Power Test #2 +CMCU**

Table 55　Low Power Test #2 +CMCU

Command Type	Command Format	Response
Test Command	AT+CMCU=?	+CMCU = 〈0, 1, 2, 3 〉 OK
Excute Command	AT+CMCU=<mcu_mode>	OK or +CME ERROR:<err>
Parameters	The command do MCU test opeartion	
Returns	There are 4 types of MCU mode 0 – Power down SX1262 only 1 – MCU, watchdog, Timer still work 2 – MCU, watchdog, Timer still work, System enter into deep sleep mode and wakeup 　　　by set_b pin through pull it into high state. 3 – Enter into deep sleep mode in every 15s <err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CMCU=0 OK	
Notice		

5.2.46 **Low Power Test Command#3 +CSTDBY**

Table 56　Low Power Test Command #3 +CSTDBY

Command Type	Command Format	Response
Test Command	AT+CSTDBY=?	+CRXC = 〈0, 1〉 OK
Excute Command	AT+CSTDBY=<standby_mode>	OK or +CME ERROR:<err>
Parameters	This command enable SX1262 enter into standby mode, MCU enter into deep sleep mode	
Returns	which would be wakeup by UART. 0 – SX1262 enter into STDBY_RC mode 1 – SX1262 enter into STDBY_XOSC mode <err>: error code, refer detail from<AT command set for User Equipment (UE)>	

Example	AT+CSTDBY=0
	deep sleep wait for uart...
Notice	

5.2.47 **Test Command#1 +CRX**

Table 57 Test Command#1 +CRX

Command Type	Command Format	Response
Test Command	AT+CRX=?	+CRX:"Frequency","DataRate" OK
Excute Command	AT+CRX=<freq>,<data_rate>	OK or +CME ERROR:<err>
Parameters	The command let device enter into RX continuous mode	
Returns	Freq: 150000000-960000000 There are 6 level for the <data_rate> parameter, there are DR0~DR5, the related Spread Factor are SF12~SF7. <err>: error code，refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CRX=470000000, 0 start to recv package (freq: 470000000, dr:0)	
Notice	When enter into CRX Test, system enter into dead-loop, if you need other test then reboot the board for the next other test command.	

5.2.48 **Test Command#2 +CTX**

Table 58　Test Command#2 +CTX

Command Type	Command Format	Response
Test Command	AT+CTX=?	+CTX:"Frequency","DataRate","TxPower" OK
Excute Command	AT+CTX=<freq>,<data_rate>,<pwr>	OK or +CME ERROR:<err>
Parameters	The command let device enter into loop mode which do TX transmit in 1s interval	
Returns	Freq: 150000000-960000000 There are 6 level for the <data_rate> parameter, there are DR0~DR5, the related Spread Factor are SF12~SF7. pwr is the TX power of SX1262, the value range is 0 ~ 22. <err>: error code，refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CTX=470000000, 0, 22 start to tx data(freq: 470000000, dr: 0, power: 22): 1	
Notice	When enter into CTX Test, system enter into dead-loop, if you need other test then reboot the board for the next other test command.	

5.2.49 **Test Command #3 +CTXCW**

Table 59　Test Command #3+CTXCW

Command Type	Command Format	Response
Test Command	AT+CTXCW=?	+CTXCW:"Frequency","TxPower","PaOpt" OK
Excute Command	AT+CTXCW=<freq>,<pwr>,<opt>	OK or +CME ERROR:<err>
Parameters	The command let device enter into TX continuous mode	
Returns	Freq: 150000000-960000000 pwr is the TX power of SX1262, the value range if 0 ~ 22. opt is the PA Optimal setting of SX1262, the value range is 0-3, the default value is 0.The related match relation is as follows: 0: [0x04,0x07,0x00, 0x01], 1: [0x03,0x05,0x00,0x01], 2: [0x02,0x03,0x00,0x01], 3: [0x02,0x02,0x00,0x01]. <err>: error code, refer detail from<AT command set for User Equipment (UE)>	
Example	AT+CTXCW=470000000,22 Start to txcw (freq: 470000000, power: 22db, opt: 0) AT+CTXCW=470000000,22,2 Start to txcw (freq: 470000000, power: 22db, opt: 2)	
Notice	When enter into CTXCW Test, system enter into dead-loop, if you need other test then reboot the board for the next other test command.	