

# USR-LG206-C User Manual

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## Features

- Adopt LoRa concentrator communication protocol.
- Support active reporting mode and polling waking mode
- Data encryption transmission.
- Support RS232/RS485 interface.
- Transmission distance: 2000 meters.
- Receiving sensitivity: -138.5dBm.
- Support AT command mode.
- Support hardware watchdog.
- 5~36V power supply.
- Support ESD protection.
- Support power supply anti-surge protection.
- Support RS485 anti-surge protection.

## 1. Get Start

If user has any question, please submit it back to customer center: [h.usriot.com](http://h.usriot.com).

### 1.1. Product introduction

USR-LG206-C is half duplex LoRa serial server which supports LoRa concentrator communication protocol and can realize communication between user serial device and LoRa concentrator. USR-LG206-C working frequency band are: -L: 398~525MHz; -H: 803~930MHz. LG206-C transmits/receives data by serial and it can lower the wireless application threshold. LG206-C has concentrated power density, powerful anti-interference capacity and communication distance can reach 2000 meters(Open area, 5dBi antenna gain, height is greater than 2 meters, 2.5K air rate).

Model	Frequency
USR-LG206-L-C	398Mhz~525Mhz
USR-LG206-H-C	803Mhz~930Mhz

### 1.2. Basic parameters

Parameter	Value	
<b>Wireless parameters</b>	Frequency band	-L: 398~525MHz; -H: 803~930MHz
	Transmitting power	10dBm~20dBm
	Receiving sensitivity	-138.5dBm@0.268Kbps
	Transmission distance	2000 meters. Test condition: Open area, clear weather, 20dBm transmitting power, 5dBi antenna gain, height is greater than 2 meters, 2.5K air rate.
	Antenna	SMA
<b>Hardware parameters</b>	Data interface	Serial port: Support RS232/RS485. Baud rate: 1200bps~115200bps
	Working voltage	5~36V
	Working current	Transmitting current: 111mA@5V. Standby mode: 45mA@5V.
	Working temperature	-30℃ ~ +80℃
	Storage temperature	-45℃ ~ +90℃
	Working humidity	5~95%RH
	Storage humidity	1~95%RH

**Figure 1 Basic parameters**

### 1.3. Application diagram

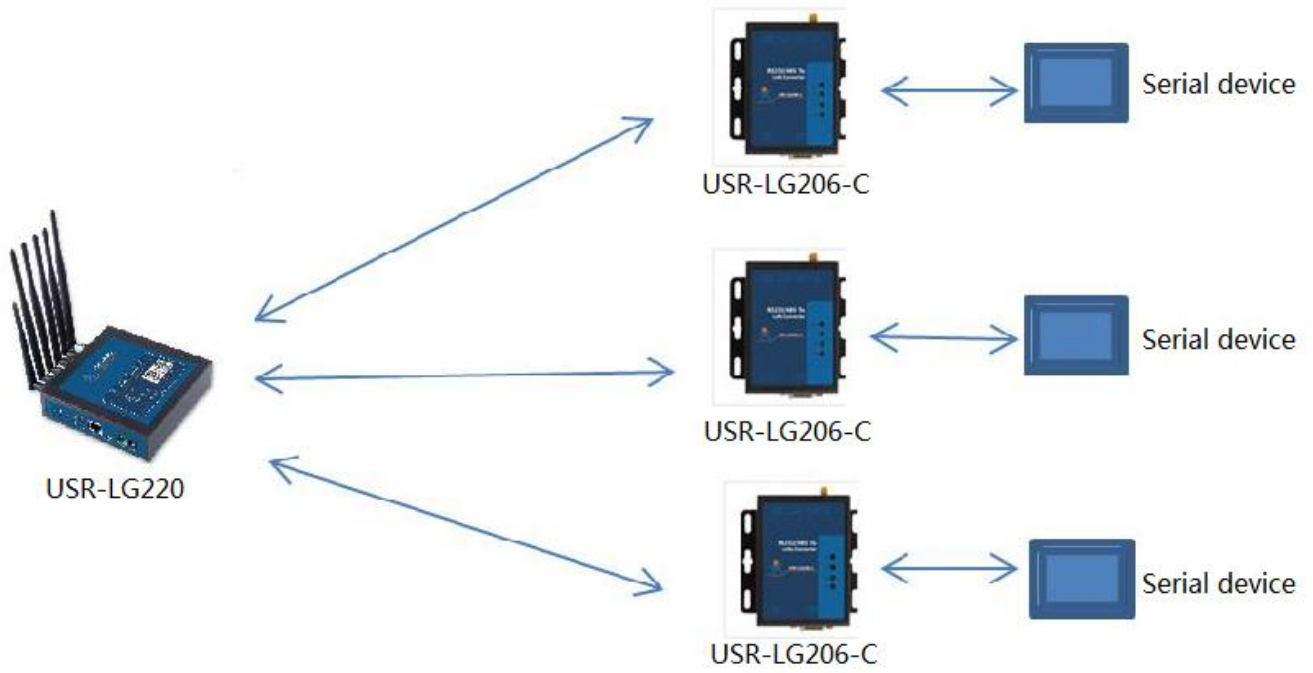
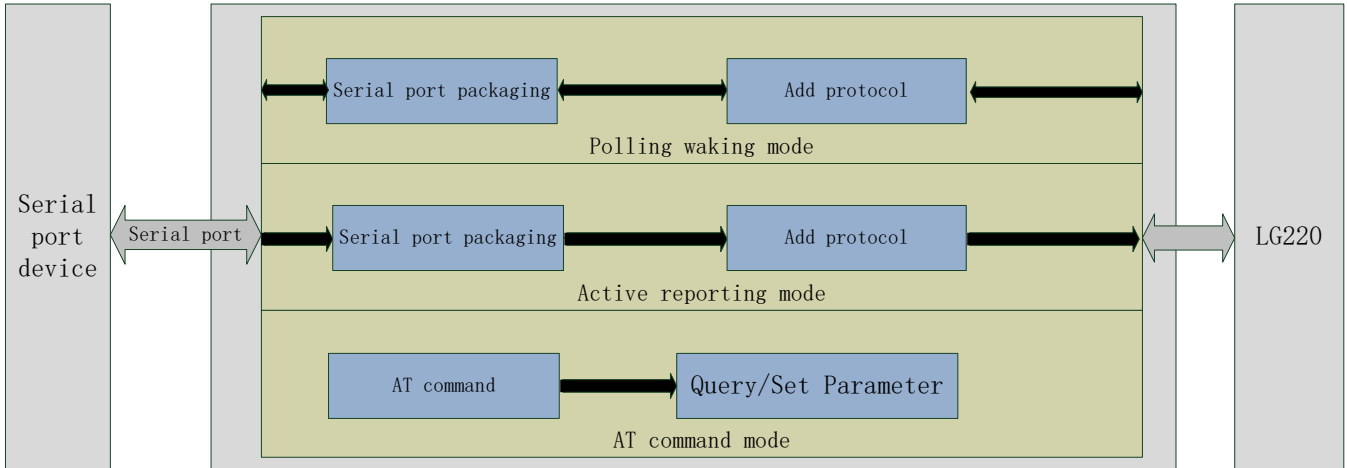


Figure 2 Application diagram

## 2. Product function

USR-LG206-C functional diagram as follow:



**Figure 3 Functional diagram**

Default parameters:

	Parameter	Default value
1	Rate	5
2	Device ID	ID code
3	Application ID	00000002
4	Serial port parameters	115200/8/N/1 RS485 mode
5	Transmitting power	20db
6	Waking up data	123456
7	Echo	Enable

**Figure 4 Default parameters**

### 2.1. Work mode

USR-LG206-C supports three work modes:

- AT command mode
- Active reporting mode
- Polling waking mode

Active reporting mode and polling waking mode are decided by work mode of LG220. LG206-C will acquire work mode after accessing LG220 network.

**Note:** Length of serial single data package can't exceed 200 bytes in active reporting mode and polling waking mode, otherwise the package will be discarded. AT command mode only supports single parse and no cache.

#### 2.1.1. AT command mode

In AT command mode, user can send AT command to query/set LG206 parameters by serial. User can refer to **3. AT command** to enter AT command mode and send AT commands.

### 2.1.2. Active reporting mode

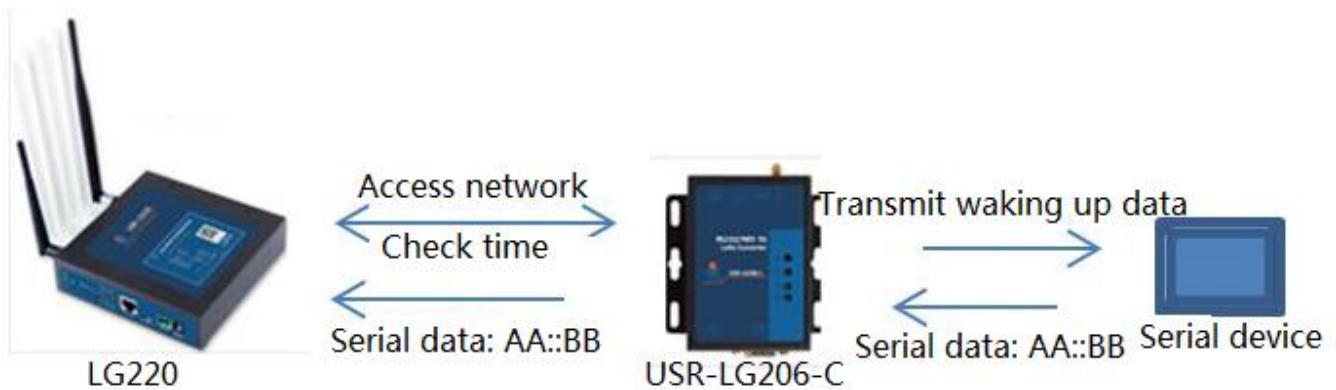
In active reporting mode, LG206-C will automatically access network and automatically report data according to slot time and period that configured by Web Server of LG220(Support uploading 200 bytes data at most). The advantages of this mode are: can realize networking without manual setting, adopts TDM technology which can avoid interference and power consumption is low.

Following four conditions should be met to realize communication:

- Set concentrator LG220 into node active reporting mode.
- Concentrator LG220 administration channel(channel 1) and LG206-C have same channel.
- Concentrator LG220 administration channel(channel 1) and LG206-C have same rate.
- Concentrator LG220 administration channel(channel 1) and LG206-C have same application ID.

**Note:** LG206-C has unique node ID. LG206-C in same system(Concentrator LG220 communicates with multiple devices) have same application ID as LG220.

In active reporting mode, working process as follow: power on LG206-C, LG206-C accesses concentrator network, check time, LG206-C transmits waking up data to inform external serial device according to second report interval that configured by LG220, serial device transmits data to LG206-C after receiving waking up data, LG206-C reports data to concentrator LG220 after receiving serial data. Application diagram as follow:



**Figure 5 Active reporting mode**

**Note:** If external serial device transmits data to LG206-C without receiving waking up data, LG206-C will also report data to concentrator LG220. But this situation may cause data collision and influence system performance.

Related AT command:

	Command	Function
1	SPD	Query/Set LoRa air rate level
2	CH	Query/Set channel
3	NID	Query/Set node ID(device address)
4	AID	Query/Set application ID(application address)
5	MCU	Query/Set waking up data

**Figure 6 Active reporting mode AT commands**

### 2.1.3. Polling waking mode

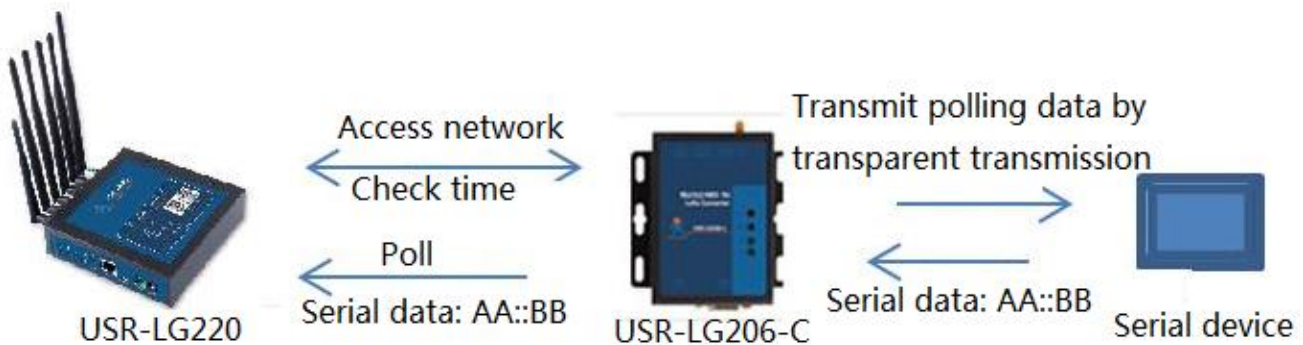
In polling waking mode, LG206-C will automatically access network after powering on. Concentrator LG220 will poll LG206-C in network according to interval that configured by Web Server of LG220 and LG206-C will transmit polling data to external serial device by transparent transmission after receiving polling data from LG220. If external serial device has response data, LG206-C will transmit response data to LG220 by transparent transmission (Length of single response data package can't exceed 200 bytes and don't support multiple response).

Following four conditions should be met to realize communication:

- Set concentrator LG220 into polling waking mode.
- Concentrator LG220 administration channel(channel 1) and LG206-C have same channel.
- Concentrator LG220 administration channel(channel 1) and LG206-C have same rate.
- Concentrator LG220 administration channel(channel 1) and LG206-C have same application ID.

**Note:** LG206-C has unique node ID. LG206-C in same system (Concentrator LG220 communicates with multiple devices) have same application ID as LG220.

In polling waking mode, working process as follow: set waking up period and polling data by Web Server of LG220, LG206-C that be polled will transmit polling data to external serial device by transparent transmission, then external serial device can return response data (Length of single response data package can't exceed 200 bytes) or doesn't handle polling data. Application diagram as follow:



**Figure 7 Polling waking mode**

**Note:** If external serial device transmits data to LG206-C without receiving polling data, LG206-C will also report data to concentrator LG220. But this situation may cause data collision and influence system performance.

Related AT command:

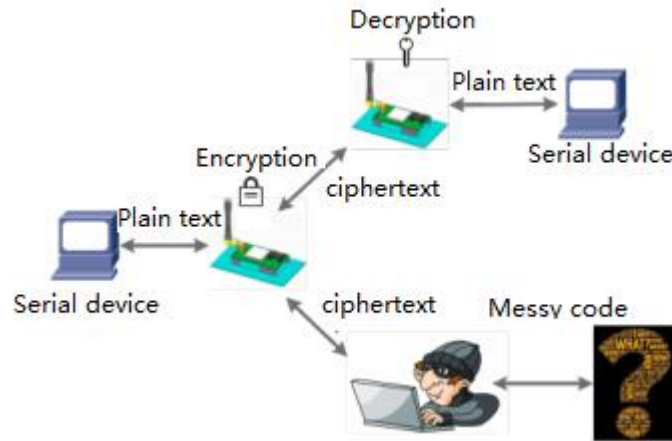
	Command	Function
1	SPD	Query/Set LoRa air rate level
2	CH	Query/Set channel
3	NID	Query/Set node ID(device address)
4	AID	Query/Set application ID(application address)

**Figure 8 Polling waking mode AT command**

## 2.2. Data security



LG206-C will encrypt data to make data transmission more secure.



**Figure 9 Data security**

### 3. AT command

User can refer to <https://www.usriot.com/support/faq/enter-serial-command-mode.html> to enter AT

command mode.

### 3.1. AT command return code

Return code	Description
OK	Successful response
ERR-1	Invalid command format
ERR-2	Invalid command
ERR-3	Invalid operator
ERR-4	Invalid parameter
ERR-5	Operation is not allowed

### 3.2. AT command set

Number	Command	Function
<b>Basic command</b>		
1	<b>ENTM</b>	Exit AT command mode.
2	<b>E</b>	Query/Set AT command echo function enable/disable.
3	<b>Z</b>	Restart LG206.
4	<b>CFGTF</b>	Save current settings as default settings.
5	<b>RELD</b>	Reset to default settings.
6	<b>CLEAR</b>	Reset to factory settings.
7	<b>VER</b>	Query firmware version
8	<b>UART</b>	Query/Set serial port parameters.
9	<b>MCU</b>	Query/Set waking up data
<b>LoRa command</b>		
10	<b>SPD</b>	Query/Set rate level
11	<b>NID</b>	Query/Set node ID(device address)
12	<b>AID</b>	Query/Set application ID(application address)
13	<b>CH</b>	Query/Set channel.
14	<b>PWR</b>	Query/Set transmitting power.

### 3.3. AT command details

#### 3.3.1. AT+ENTM

Format	
Set	AT+ENTM<CR>
Return	<CR><LF><CR><LF>OK<CR><LF>

#### 3.3.2. AT+E

Parameter	Description	Default Value	Range
<Status>	Status of AT command Echo function	ON	ON/OFF

Format	
Query	AT+E<CR>
Return	<CR><LF>OK=<Status><CR><LF>
Set	AT+E=<Status><CR>
Return	<CR><LF><CR><LF>OK<CR><LF>

### 3.3.3. AT+Z

Format	
Set	AT+Z<CR>
Return	<CR><LF>OK<CR><LF>

### 3.3.4. AT+CFGTF

Format	
Set	AT+CFGTF<CR>
Return	<CR><LF>+CFGTF:SAVED<CR><LF><CR><LF>OK<CR><LF>

### 3.3.5. AT+RELD

Format	
Set	AT+RELD<CR>
Return	<CR><LF>REBOOTING<CR><LF>

### 3.3.6. AT+CLEAR

Format	
Set	AT+CLEAR<CR>
Return	<CR><LF>REBOOTING<CR><LF>

### 3.3.7. AT+VER

Parameter	Description
<VER>	Firmware version
Format	
Query	AT+VER<CR>
Return	<CR><LF>+VER:<VER><CR><LF><CR><LF>OK<CR><LF>

### 3.3.8. AT+UART

Parameter	Description	Default Value	Range
<Baud rate>	Baud rate	115200	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
<Data bits>	Data bits	8	8
<Stop bits>	Stop bits	1	1, 2
<Parity>	Parity	NONE	NONE, EVEN, ODD
<Flow Control>	Flow Control	485	NFC: No flow control
			485: Enable RS485
Format			
Query	AT+UART<CR>		
Return	<CR><LF>+UART:<Baud rate>,<Data bits>,<Stop bits>,<Parity><Flow Control><CR><LF><CR><LF>OK<CR><LF>		
Set	AT+UART=<Baud rate>,<Data bits>,<Stop bits>,<Parity><Flow Control><CR>		
Return	<CR><LF><CR><LF>OK<CR><LF>		

### 3.3.9. AT+MCU

Parameter	Description	Default Value	Range
<Data>	Waking up data	123456	
<Style>	Data format	ascii	ascii, hex
Format			
Query	AT+MCU<CR>		
Return	<CR><LF>+MCU:<Data>,<Style><CR><LF><CR><LF>OK<CR><LF>		
Set	AT+MCU=<Data>,<Style><CR>		
Return	<CR><LF><CR><LF>OK<CR><LF>		

### 3.3.10. AT+SPD

Parameter	Description	Default Value	Range
<Class>	LoRa air rate level	10	0: 146bps

			<b>1: 268bps</b>
			<b>2: 488bps</b>
			<b>3: 537bps</b>
			<b>4: 878bps</b>
			<b>5: 977bps</b>
			<b>6: 1758bps</b>
			<b>7: 3125bps</b>
			<b>8: 6250bps</b>
			<b>9: 10937bps</b>
			<b>10: 21875bps</b>
Format			
<b>Query</b>	AT+SPD<CR>		
<b>Return</b>	<CR><LF>+SPD:<Class><CR><LF><CR><LF>OK<CR><LF>		
<b>Set</b>	AT+SPD=<Class><CR>		
<b>Return</b>	<CR><LF><CR><LF>OK<CR><LF>		

### 3.3.11. AT+NID

Parameter	Description	Range
<ADDR>	Node ID	0~FFFFFFFF
Format		
<b>Query</b>	AT+NID<CR>	
<b>Return</b>	<CR><LF>+NID:<ADDR><CR><LF><CR><LF>OK<CR><LF>	
<b>Set</b>	AT+NID=<ADDR><CR>	
<b>Return</b>	<CR><LF><CR><LF>OK<CR><LF>	

### 3.3.12. AT+AID

Parameter	Description	Default Value	Range
<ADDR>	Application ID	00000002	0~FFFFFFFF
Format			
<b>Query</b>	AT+AID<CR>		
<b>Return</b>	<CR><LF>+AID:<ADDR><CR><LF><CR><LF>OK<CR><LF>		
<b>Set</b>	AT+AID=<ADDR><CR>		
<b>Return</b>	<CR><LF><CR><LF>OK<CR><LF>		

### 3.3.13. AT+CH

Parameter	Description	Range
<Channel>	Channel	0~127. Working frequency band=(398+<Channel>)MHz

Format	
Query	AT+CH<CR>
Return	<CR><LF>+CH:<Channel><CR><LF><CR><LF>OK<CR><LF>
Set	AT+CH=<Channel><CR>
Return	<CR><LF><CR><LF>OK<CR><LF>

### 3.3.14. AT+PWR

Parameter	Description	Default Value	Range
<Status>	Transmitting power	20dbm	10dBm~20dBm
Format			
Query	AT+PWR<CR>		
Return	<CR><LF>+PWR:<Status><CR><LF><CR><LF>OK<CR><LF>		
Set	AT+PWR=<Status><CR>		
Return	<CR><LF><CR><LF>OK<CR><LF>		

## 4. Contact Us

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## 5. Disclaimer

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## 6. Update History

2018-05-09 V1.0.9.01 established based on Chinese version V1.0.9.