

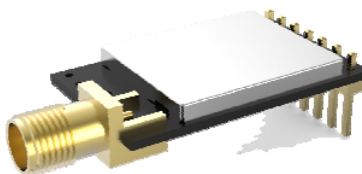


# LoRa Wireless Communication Module

## Design Guide

### LM-210 Series

VER: 1.0



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### **Product Description**

LM-210 is a low power-consuming, half-duplex module. It can wirelessly transmit data to long-distance. It is built-in high-speed and low power-consuming MCU and SX1276 modulation chipset. This chipset is applied with the forward error correction technique which greatly improves interference immunity and advances sensitivity. The coding can detect errors and automatically filter out errors and false data

LM-210 provides multi-channels. It supports various settings like baud rate, transmission power, and transmission speed, etc.

LM-210 is suitable for long-distance transmission or harsh environments.

### **Product feature**

- Ultra-high sensitive receiving ability by LoRa spread spectrum modulation technology
- Long-distance transmission (1KM to 10KM)
- Support setting various parameters like baud rate, transmission power, and transmission speed
- Multi-channel, dual data buffer (each 256 Bytes)
- Instant wake up over the air
- Four operating modes
- Built- in watchdog
- PIN connector for easy development and test



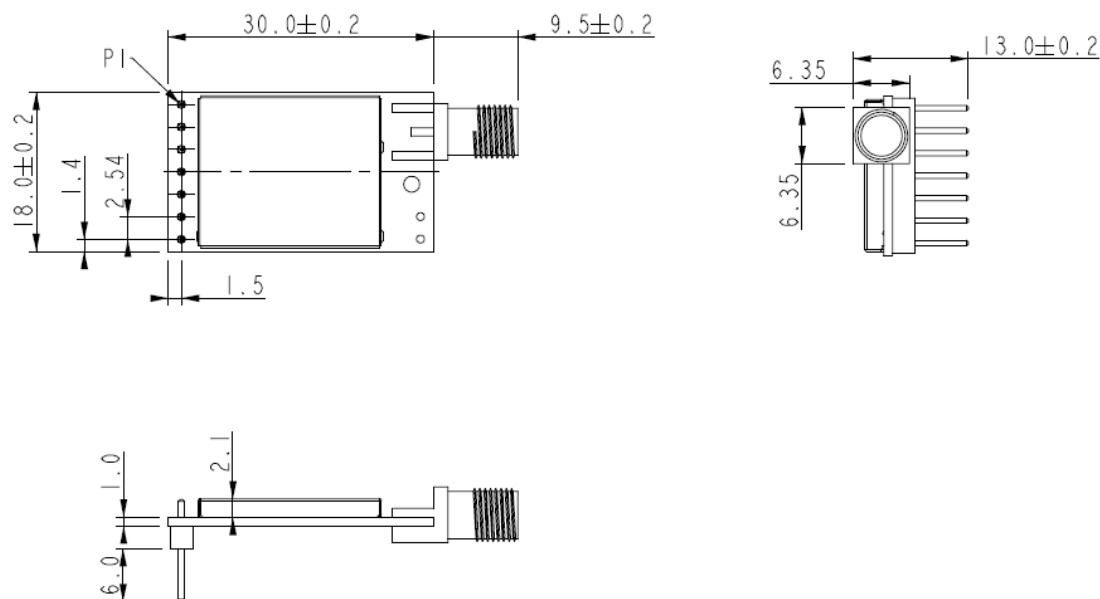
## Hardware Specifications

<b>Chipset</b>	SEMTECH LoRa SX1276
<b>Antenna</b>	SMA/50Ω
<b>Frequency</b>	410-525MHz (Model: LM-210L) , 862-1020MHz (Model: LM-210H)
<b>Transmission power</b>	100mW (MAX.)
<b>Transmission media</b>	UART
<b>UART</b>	<b>Baud Rate:</b> 1200/2400/4800/9600(Default)/19200/38400/57600bps <b>Parity:</b> 8N1/8E1/8O1
<b>Operation Voltage</b>	3.0V~6V
<b>Current consumption</b>	<b>Receiving:</b> 13 mA(typical) , <b>Transmitting:</b> 120 mA(typical) <b>Sleeping:</b> 2.2uA(typical)
<b>Transmission distance</b>	1KM~10KM(0.81Kbps)
<b>Receiving sensitivity</b>	-132dBm@0.81Kbps
<b>Operation Temperature</b>	-40°C~ 85°C
<b>Humidity</b>	5%~95%(Non-condensing)
<b>Dimension</b>	30mm x 18mm(PCBA)
<b>Connector</b>	PIN type, pitch 2.54mm

## Pin Definition

LM-210 Pin Definition			
Pin	Signal name	I/O	Description
1	GND	-	Ground
2	VCC	-	3.0V~6.0V
3	RXD	Input	UART input
4	TXD	Output	UART output
5	BZ	Output	Module's operation status
6	P2	Input	Pin2 for switching operation mode
7	P1	Input	Pin1 for switching operation mode

## Product Size





### **Operation Mode**

There are four operating modes of LM-210.

1. Normal mode
2. Wake-up mode
3. Power-saving mode
4. Setup mode.

The four operation modes are switched by the signal level of P1 and P2.

**Mode 1:** Normal mode (P1=0, P2=0)

UART is opened. Wireless channel is opened. Penetrating transmission.

**Mode 2:** Wake-up mode (P1=0, P2=1)

UART is opened. Wireless channel is opened. The only difference from normal mode is that its preamble is longer than normal mode's, so that it can make sure the receiver could be waked in the power-saving mode.

**Note:** The receiver could be waked no matter it is in normal mode or wake-up mode or power-saving mode. The receiver would automatically add the RSSI at the end of the received data.

**Mode 3:** Power-saving mode (P1=1, P2=0)

UART is closed. The wireless channel is in power-saving mode. You can set up an interval from 0.5 to 5 seconds to wake up in power-saving mode to check if there is preamble. If the receiver receives preamble, it will open UART, and wake MCU to process the received data and return data. After that, it will return to the power-saving mode.

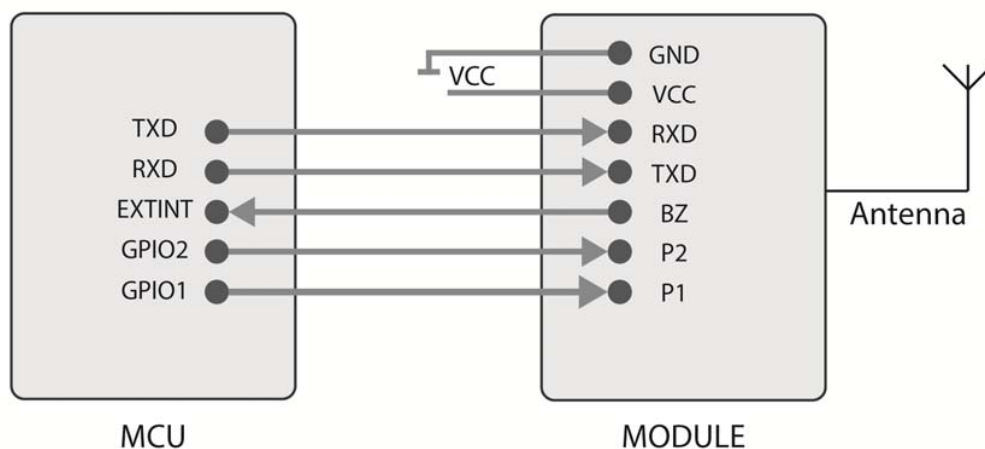
**Mode 4:** Setup mode (P1=1, P2=1)

UART is closed. Wireless channel is closed. It could only be configured.

### **Application Note**

1. For proper operation of LM-210, do not leave P1 or P2 floating. Do keep P1 and P2 at fixed level; otherwise it might cause the module instable.
2. Antenna is the important part in the communication system. The quality of antenna would directly influence the communication. Please take the antenna type and antenna's electrical characteristics into consideration while integrating LM-210 into product.

### **The Connection Diagram of the Module with MCU :**





**1) Read the setting: 0xFF 0x4C 0xCF 0x52 0xA1 0x52 0xF0 (7 bytes)**

Preamble	Model Name	FW Version	LoRa MAC Address	Group ID	RF Frequency	RF TRx Rate	RF Power	UART Baud Rate	UART Parity	Wakeup Time	End Word
0x24 (1 byte)	4 bytes	7 bytes	8 bytes	1 byte	3 bytes	1 byte	1 byte	1 byte	1 byte	1 byte	0x21 (1 byte)

Header of writing command	RF Frequency	Group ID	RF TRx Rate	RF Power	UART Baud Rate	UART Parity	Wakeup Time
0xFF 0x4C 0xCF 0x52 0xA1 0x57 0xF1 (7 byte)	3 bytes	1 byte	1 byte	1 byte	1 byte	1 byte	1 byte

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The parameters are presented as hexadecimal.

Parameter Name	Bytes	Description
Model Name	4	Show the last 4 characters of model number in hexadecimal format. The last 4 characters of LM-210L are 101L. The hexadecimal of 101L is 0x31 0x30 0x31 0x4C. Model Name is written in FLASH memory and could not be modified.
FW Version	7	Show the last 7 characters of firmware version in hexadecimal format. EX: The hexadecimal of 1507291. is 0X31 0x35 0x30 0x37 0x32 0x39 0x31. FW Version is written in FLASH memory and could not be modified.
LoRa MAC Address	8	Show the last 8 characters of MCU ID. If MCU is changed, the LoRa Mac address must also be changed. LoRa Mac Address is written in FLASH memory and could not be modified. EX. 0x2A 0x1D 0x1C 0X1D 0x1E 0x1F 0x2A 0x2B
Group ID	1	The range is from 0 to 255. Please set the same group ID for the same group's devices for proper communication in the same group. (Default: 0, this function is disabled.)
RF Frequency	3	The unit is KHz. (Default: 915000KHz, which is presented as 0x0D 0xF6 0x38.)
RF TRx Rate	1	0.81K, 1.46K, 2.6K, 4.56K, 9.11K, 18.23Kbps are represented as 0x00 to 0x05. (Default: 4.56Kbps, which is presented as 0x03)
RF Power	1	The range is from 0 to 7. It is represented as 0x00 to 0x07. It would increase about 2dBm while increasing 1 to this parameter. (Default: 20dBm, which is presented as 0x07)
UART Baud Rate	1	1200,2400,4800,9600,19200,38400,57600 bps are represented as 0x00 to 0x06. (Default: 9600 bps, which is presented as 0x03)
UART Parity	1	No parity check is presented as 0x00. Odd parity check is presented as 0x01. Even parity check is presented as 0x02. (Default: no parity check, which is presented as 0x00)
Wakeup Time	1	50ms,100ms,200ms,400ms,600ms,1s,1.5s,2s,2.5s,3s,4s,5s are presented as 0x00 to 0x0b. (Default: 1sec, which is presented as 0x05)



**For example, Module setting is as below:**

Group ID is 0. Air rate is 0.81K bps. RF frequency is 915.000MHz. RF power is 20dBm.  
UART Baud Rate is 9600bps. UART parity is none. Wakeup time is 1 sec.

**Write the setting:**

0xFF 0x4C 0xCF 0x52 0xA1 0x57 0xF1 0x0D 0xF6 0x38 0x00 0x00 0x07 0x03 0x00 0x05

**Response:**

0x24 0x31 0x30 0x31 0x4C 0x31 0x35 0x30 0x37 0x32 0x39 0x31 0x2A 0x1D 0x1C 0X1D  
0x1E 0x1F 0x2A 0x2B 0x00 0x0D 0xF6 0x38 0x00 0x07 0x03 0x00 0x05 0x21



### **Design Note**

The LM-210 LoRa modules are for being integrated into your devices for applying the LoRa technology, you can refer to the page3 of this doc.

1. GND under module should be kept into integrity.
2. Power Filter circuitry and matched resistance should be close to module.
3. The placement of the module should be kept away from the interfering source, such as WiFi Antenna, GSM Antenna, DDR CLK, and LCD line bundle, etc.

### **Quality Guarantee**

LM-210H has been certificated with FCC, FCCID certification number: RID-LR101H. To ensure the quality, every single device has to pass through testing and must be scrupulously checked for imperfections.

Trademark:  **GlobalSat**®

Product Name: LoRa Wireless Module

Model No.: LM-210H

FCC ID: RID-LR101H

### **Manual and Product Labeling Information To the End User**

The end user manual shall include all required regulate or information/warning as shown in this manual. And when this module is installed in the host product, you must include a “Contains FCC ID:RID-LR101H” in the label of the host product.