1. Overview

LoRa6100 is a wireless transceiver data transmission module, based on SX1276/1278 chips from Semtech. This module adopts LORA technology to achieve high effective sensitivity and superior anti-interference. The communication distance and receiver sensitivity are far exceeds the FSK, GFSK modulation. With superior anti-interference. Lora6100 has 1W output power and TTL/RS232/RS485 interface available. It is widely applied in meter reading, remote industrial control, etc

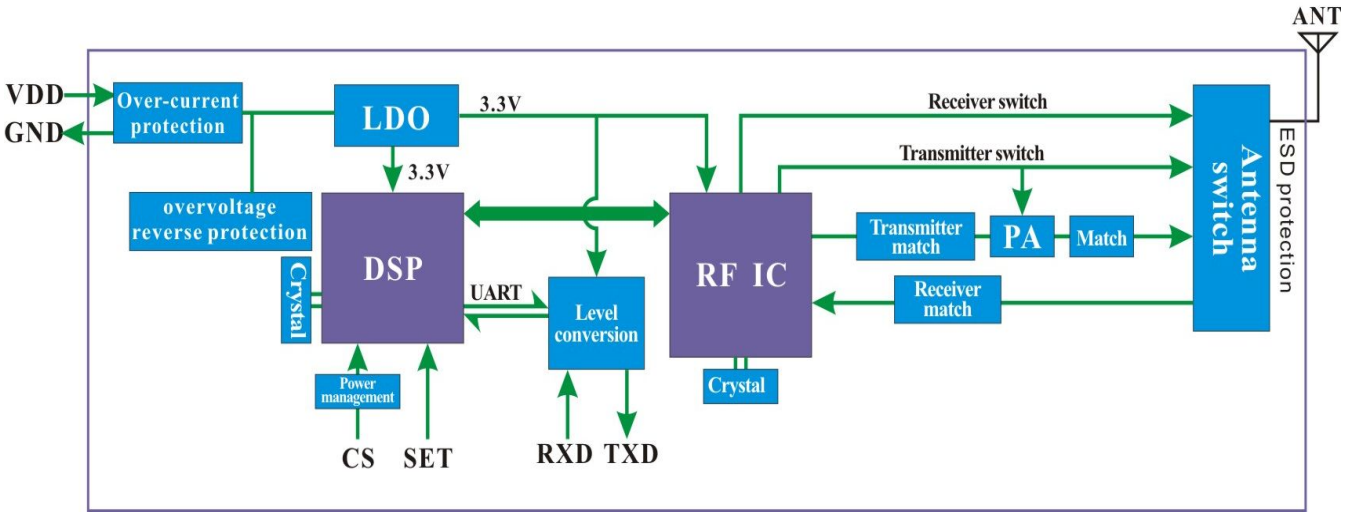
2. Feature

- Transmission distance in open area up to 8000 meters @ 91bps
- 433/470 (1W) MHz
  868/915 (500Mw) MHz
- 40 channels
- LoRa modulation
- Interface: TTL/RS232/RS485
- Sensitivity: -139 dBm
- Max output power: 1W/500mW
  （+30dBm/+27dBm）
- Working voltage: 3.3 ~ 6.5 V
- Working temperature: -40 ~ +85 °C

3. Application

- Remote control telemetry
- Remote meter reading
- Security system
- Industrial data acquisition
- Home automation
- Wireless data communication
- Access system
- Robot control

4. Block Diagram



5. Electrical Characteristics

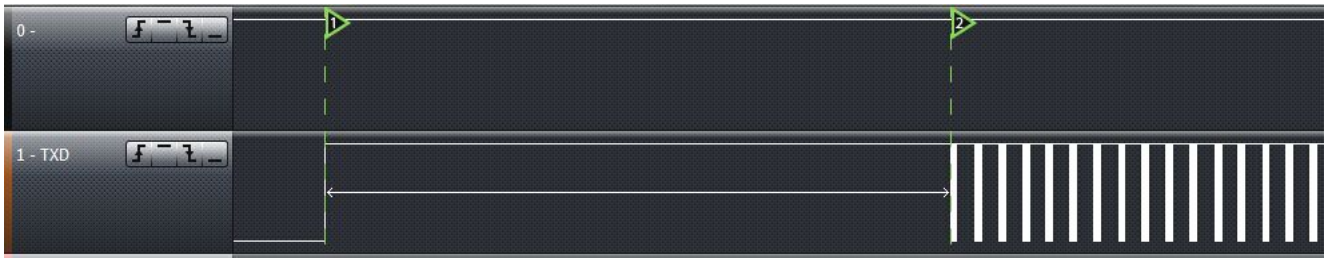
Note: High quality 3.3V LDO is integrated, and Pin CS / SET is 3.3V interface. TXD/RXD is also 3.3V for LoRa610-TTL

Parameters	Min.	Typ.	Max.	Unit	Condition
Working condition					
Voltage range	3.3	5.0	6.5	V	
Operating Temperature	-40	25	+85	℃	
Current consumption					
Rx current		<20		mA	TTL level
Tx current		<600		mA	@30dBm
Sleep current		<40		uA	
RF parameters					
Frequency range	414.92	433.92	453.92	MHZ	@433MHZ
	470.92	490.92	509.92	MHZ	@470MHZ
	849.92	868.92	888.92	MHZ	@868MHZ
	895.92	914.92	934.92	MHZ	@915MHZ
Data rate	91	656	17353	bps	LoraTM
Output power range	0	/	+30	dBm	@433MHz @470MHz
	0	/	+27	dBm	@868MHz @915MHz
Sensitivity		-139		dBm	91bps

6. Operation

1) Power on Reset

Standard supply voltage of 5V (ordinary lithium battery of 4.2V is also applicable)，After powered on reset, the TX LED (Red) and RX LED (Blue) will blink 3 times,（If no lights, module may damaged）,The total reset time is around 2s, as below:



Note：Contact us to customize if you want to shorten the POR time.

2) Working Mode

The CS and SET Pin is internally pulled up. Pull CS pin high or leave it open will make LoRa6100 enter into working mode.

In working mode, LoRa6100 stay in receiving mode and wait for the series signal and RF signal.

SV6100 can connect with any device which is standard TTL interface.

When series signal comes, LoRa6100 will check the input series signal if there is any error, and then transmit the received data out via RF automatically if no errors found.

When RF signal comes, LoRa6100 will check the input RF signals if there is any error, and then transmit the received data out via series port automatically if no errors found.

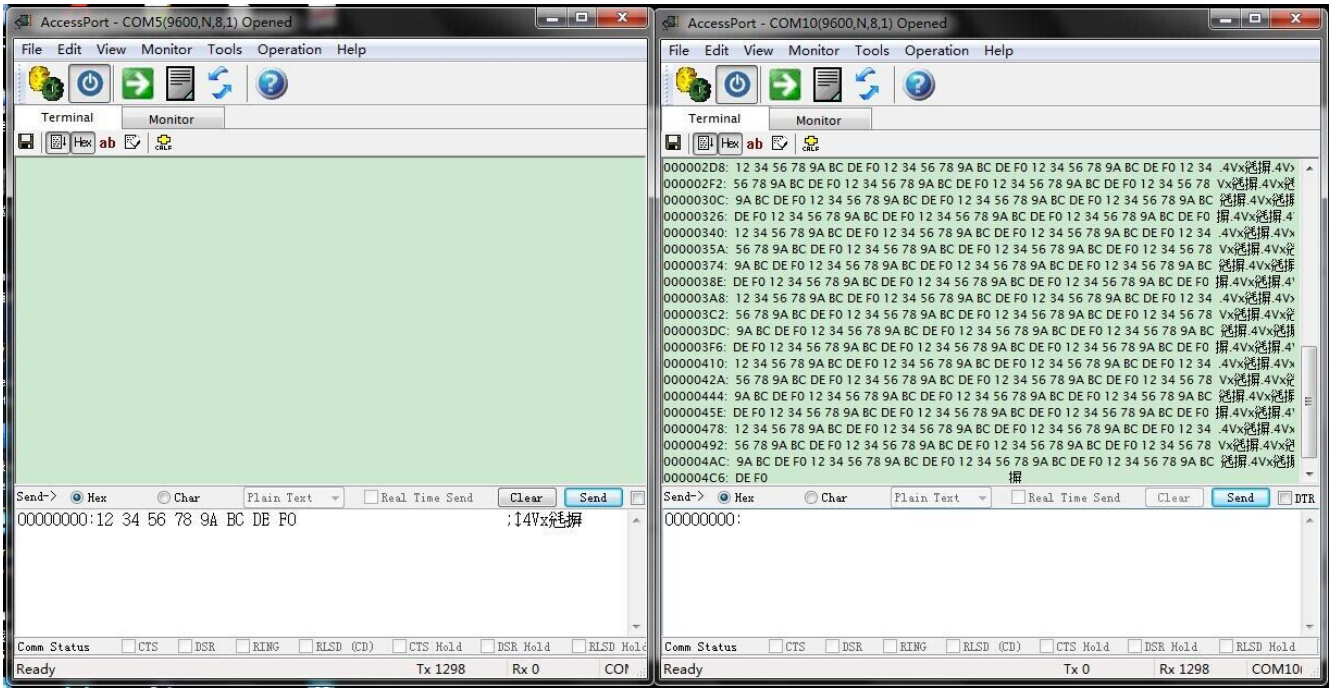
When one packet is transmitted successfully, the Red LED will blink once.

When one packet is received and verified with no problem, the Blue LED will blink once.

The easiest way to test the module is using computer. The corresponding PC software is “Series Debugging assistant” can be downloaded at: http://www.nicerf.com/downpwd.aspx?id=102, the password for download is “nicerf”. User can use our USB bridge board SU108 –TTL to connect SV6100 with computer.

The GUI of the software is as below:

Lora6100 transmit the data transparently. In one side, signal input to the transmitter, in other side (receiver), the signal will be output same as the input. The signal is encrypted to guarantee the safety during the transmission. Serial port or computer with USB bridge board can be used to input signal to the module. Below is the GUI for data transmission and reception.



★ To ensure the stability of communication, please notice the following tips:

a) Parameter matching

The series parameter between the device and LoRa6100 should be same,

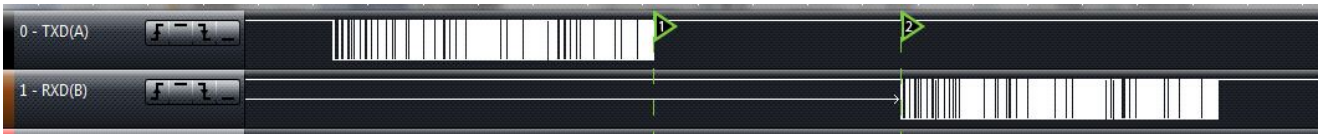
RF parameters should be same in Tx and Rx.

The Net ID should be same in Tx and Rx.

Note: Default setting is : 9600, 8, N,1

Delay Time

Data delay is exist between series input of the transmitter and series output of the receiver. This Delay Time is different from the series data rate, RF data rate and payload length. Detailed value is as below:



Speed rate	91	164	296	656	830	1557	2932	4750	9501	17353
1byte transceiver time(ms)	2240	1120	560	283	285	146	76	41	23	16
56bytes transceiver time(ms)	5840	3089	1712	940	737	392	220	139	73	45

3) Dataflow

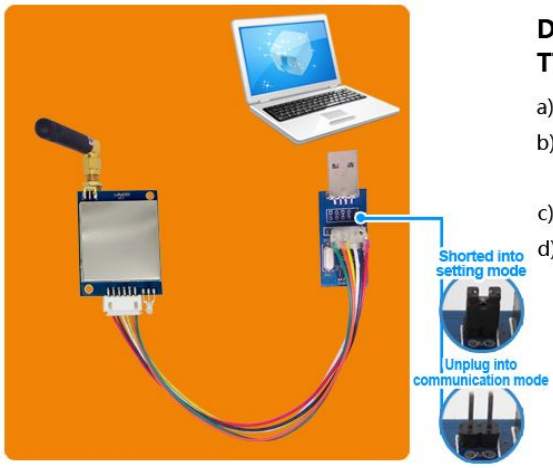
One packet more than 200 bytes is a long package. The RF data rate should be set 2 level higher than series data for long package transmission. The distance will be shorter with higher RF data rate.

For example, if the serial data rate is 4800, the RF data rate should be set at 17353bps or higher for continuous long package.

4) Setting mode

In working mode, pull low the SET pin to force LoRa6100 into setting mode. When using USB bridge board, simply put on the short cap to enter into setting mode.

In setting mode, both blue and red LED will light on, shown as below:



Data Transceiver Module
TTL Interface Diagram

a) Install the USB driver and PC software.
b) Connect module with the related interface bridge board through 6 pins terminal wire.
c) Put the USB bridge board head into the USB of PC.
d) Module has been into setting mode this time, duplex-color light keep lighting, show as above.

In setting mode, users can set the parameters by PC software or customer's own device. The parameters will be stored and keep unchanged even powered off.

Step to set the module with PC:

◆ Download the PC software at: http://www.nicerf.com/downpwd.aspx?id=103, the password is "nicerf".

◆ Download the USB driver at: http://www.nicerf.com/downpwd.aspx?id=105, the password is "nicerf".

◆ Install the PC software and USB driver into computer.

◆ Connect RF module with USB Bridge, put on the short cap, and insert into the PC.

◆ Open the PC software, the GUI is as below:

Select the right COM port and click "OPEN" button, all the parameters stored in the module will be read out and display, the status bar will appear the message "Device Found".

If SV6100 hasn't connected with PC correctly or wrong COM port is chosen, the status bar will show "Device Not Found".

Note: About the Net ID and Node ID

After connected with PC correctly, all the parameters can be set freely including Net ID and Node ID. The Net ID is the group name for transmitter and receiver, all the transmitter and receiver with the same Net ID can communicate with each other. The only exception is 0000. When the Net ID is set as 0000, it can receive the signal of all the transmitter even the Net ID is not 0000.

The Node ID can be thought as the name of the module. Each module can be set with one Node ID. The Node can set and read out freely. The Node ID can be used in the application which the receiver should identify who is the transmitter. User can read out the Node ID of the module, and add the Node ID into the payload, then in Rx side; it can identify who is the transmitter.

5) Communication Protocol

Besides PC, user can set all the parameters by their own device. The communication protocol is as below:

Baud rate=9600 bps; Data bit=8 bits Stop bit:1 Parity bit: none

Command format : AA FA + command +[parameters]

Command is 1 byte, parameters are 0 or 14 bytes in Hex format.

Return value ended with "\r\n".

a) Command : Read module name and version:

Instruction format: AA FA AA

Return value is:"LORA6100_VER1.0\r\n"

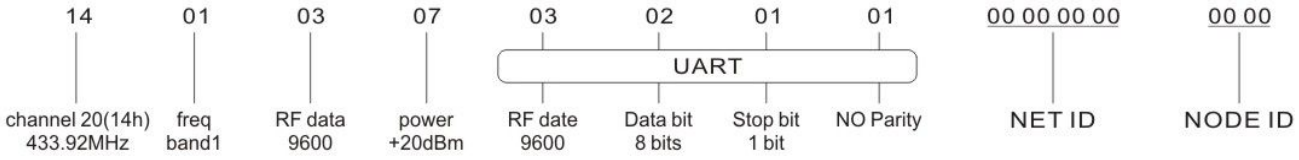
b) Command: Read out all the parameters:

Instruction format: AA FA 01

The return value in turn is:

RF channel / RF band / RF data rate / RF power / Serial data rate / Series Data bit / Series Stop bit / Series Parity bit / NET ID / NODE ID /\r\n

For example, when module is default setting, the return are as below:



c) Command : Reset to default setting

Instruction format: AA FA 02

The return value in turn is: "OK \ r \ n" or "ERROR \ r \ n"

After this command, the module will reset to default setting, which is

Frequency: Tx = Rx = CH20 = 433.92 MHz (Band = 433MHz)

RF data rate: Tx = Rx=9600 bps

RF power= 7 (Max output）

Serial: baud rate = 656 bps Data bit= 8 Bits Stop bit = 1 Bits Parity bit=None

NET ID = 00 00 00 00 NODE ID = 00 00

d) Command: Set the group parameters

Length of the command is 16 bytes, set 16 bytes of the parameters into the module, and format as

follows:

Instruction format: AA FA 03 RF Channel / RF Band / RF Rate / RF Power / Serial transmission date / data bits / stop bits / parity / NET ID / NODE ID

The return is: "OK \ r \ n" or "ERROR \ r \ n"

6) Parameters Description:

a) RF Channel = RF Frequency

Each frequency band is divided into 40 channels; user can select one of the 40 channels to use. The corresponding frequency is as below, Also we can customized the specified frequency which is not in the table.

frequency band1	channel	1	2	3	4	5	6	7	8	9	10
433MHz	frequency	414.92	415.92	416.92	417.92	418.92	419.92	420.92	421.92	422.92	423.92
	channel	11	12	13	14	15	16	17	18	19	20
	frequency	424.92	425.92	426.92	427.92	428.92	429.92	430.92	431.92	432.92	433.92
	channel	21	22	23	24	25	26	27	28	29	30
	frequency	434.92	435.92	436.92	437.92	438.92	439.92	440.92	441.92	442.92	443.92
	channel	31	32	33	34	35	36	37	38	39	40
	frequency	444.92	445.92	446.92	447.92	448.92	449.92	450.92	451.92	452.92	453.92

frequency band2	channel	1	2	3	4	5	6	7	8	9	10
470MHz	frequency	470.92	471.92	472.92	473.92	474.92	475.92	476.92	477.92	478.92	479.92
	channel	11	12	13	14	15	16	17	18	19	20
	frequency	480.92	481.92	482.92	483.92	484.92	485.92	486.92	487.92	488.92	489.92
	channel	21	22	23	24	25	26	27	28	29	30
	frequency	490.92	491.92	492.92	493.92	494.92	495.92	496.92	497.92	498.92	499.92
	channel	31	32	33	34	35	36	37	38	39	40
	frequency	500.92	501.92	502.92	503.92	504.92	505.92	506.92	507.92	508.92	509.92

frequency band3	channel	1	2	3	4	5	6	7	8	9	10
868MHz	frequency	849.92	850.92	851.92	852.92	853.92	854.92	855.92	856.92	857.92	858.92
	channel	11	12	13	14	15	16	17	18	19	20
	frequency	859.92	860.92	861.92	862.92	863.92	864.92	865.92	866.92	867.92	868.92
	channel	21	22	23	24	25	26	27	28	29	30
	frequency	869.92	870.92	871.92	872.92	873.92	874.92	875.92	876.92	877.92	878.92
	channel	31	32	33	34	35	36	37	38	39	40
	frequency	879.92	880.92	881.92	882.92	883.92	884.92	885.92	886.92	887.92	888.92

frequency band4	channel	1	2	3	4	5	6	7	8	9	10
915MHz	frequency	895.92	896.92	897.92	898.92	899.92	900.92	901.92	902.92	903.92	904.92
	channel	11	12	13	14	15	16	17	18	19	20
	frequency	905.92	906.92	907.92	908.92	909.92	910.92	911.92	912.92	913.92	914.92
	channel	21	22	23	24	25	26	27	28	29	30
	frequency	915.92	916.92	917.92	918.92	919.92	920.92	921.92	922.92	923.92	924.92
	channel	31	32	33	34	35	36	37	38	39	40

b) Working Band

The working band is as below

Parameter	01	02	03	04
Frequency	433 MHz	470 MHz	868 MHz	915 MHz
	414.92 ~ 453.92	470.92 ~ 509.92	849.92 ~ 888.92	895.92 ~ 934.92

Note：Changing working band is not suggested

c) RF data rate

The RF data rate is as below : 91 164 296 656 830 1557 1932 4750 9501 17353 bps

Parameter	0	1	2	3	4	5	6	7	8	9
TX/RX rate(bps)	91	164	296	656	830	1557	1932	4750	9501	17353

d) RF output power

The output power is as below:

Set level	0	1	2	3	4	5	6	7
TX/RX power	18 dBm	20.5 dBm	22.5 dBm	24 dBm	25.4 dBm	27 dBm	28 dBm	30 dBm

e) Serial baud rate

Series data rate is as below: .

Parameter	0	1	2	3	4	5	6	7	8	9
Serial rate(bps)	1200	2400	4800	9600	14400	19200	38400	57600	76800	115200

f) Serial data bit

Series data bit is as below:

Parameter	1	2	3
Data Bits	7 bits	8 bits	9 bits

g) Serial stop bit

Series stop bit is as below:

Parameter	1	2
Stop bit	1 bits	2 bits

h) Serial parity

Series Parity bit is as below:

Parameter	1	2	3
Parity bit	No	Odd	Even

i) NET ID：

The Net ID is 4 bytes, and range from 00 00 00 00 to FF FF FF FF

Note: if the modules' NET ID setting are different, then they can't communicate with each other except when the Net ID = 0000, it will receive all the message despite the Net ID is difference.

j) NODE ID

The Node ID is 2 bytes, range from 00 00 to FF FF.

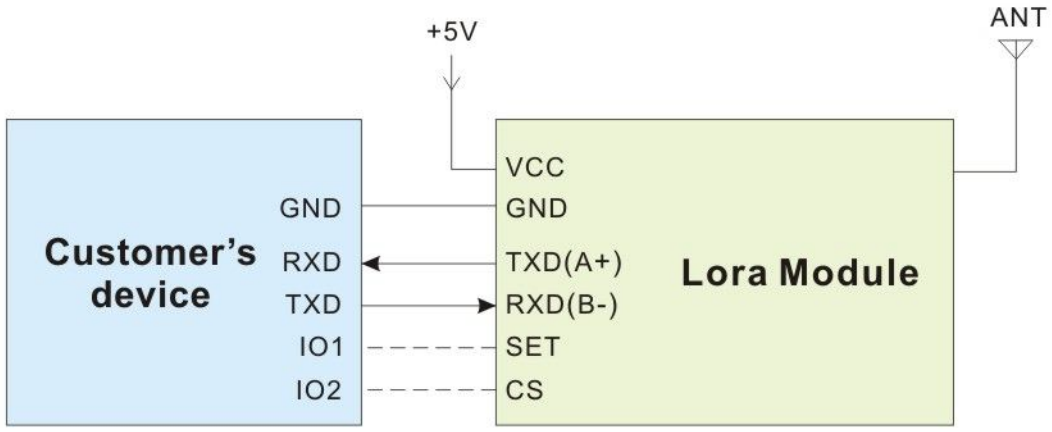
7) Sleep mode

After Power on Reset, the module enters into sleep mode when CS pin is pulled low. In this mode, the current consumption is very small. In Sleep mode, the module can't do any communication and cant' be set even Set Pin is pulled low. All the parameters will be kept unchanged in Sleep mode. User can wake up the module by pulling high the CS Pin.

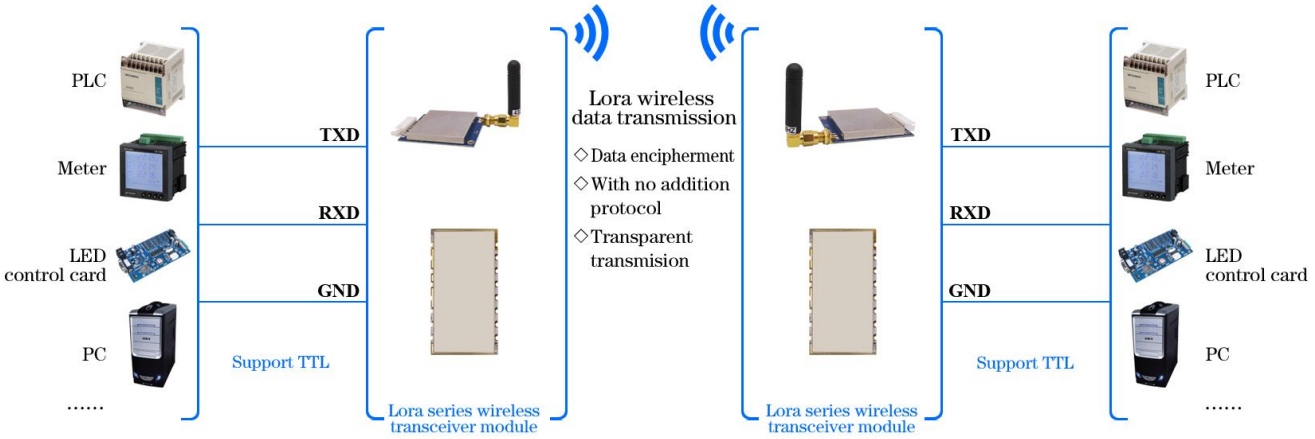
7. Application circuit

The typical schematic circuit is as below:

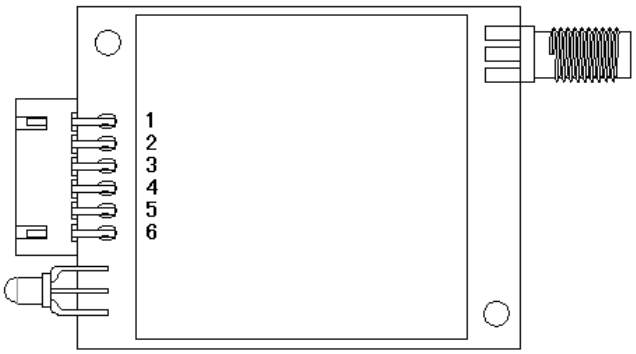
Note: The ground pin of the module and device should be connected together.



Typical application:：

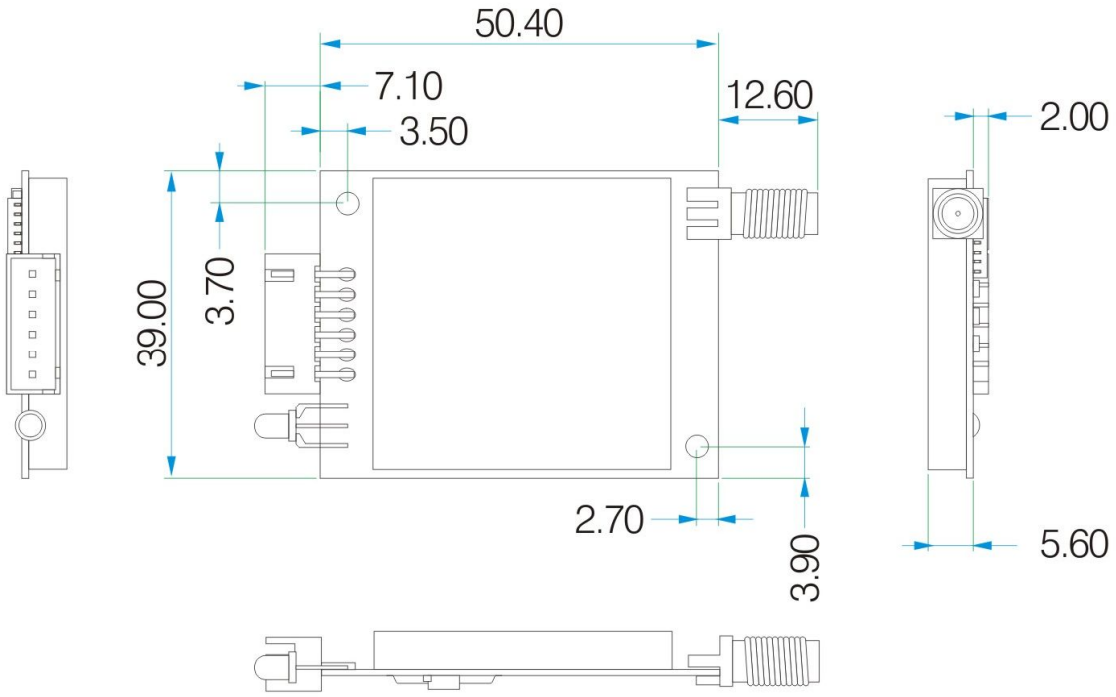


8. Pin definition



Pin No.	Definition	Description
1	VCC	Connected to the positive power supply (typical 5V)
2	GND	Connected to ground
3	TXD/A	connect to A@485
4	RXD/B	connect to B@485
5	SET	Configuration mode enable (low to enter into the setting mode, leave open or connect high level to exit setting mode) Valid when CS Pin is high or leave open.
6	CS	Module working Enable（Pull Low to make the module enter into sleep mode, Leave open or connect high level make the module enter into normal working mode）

9. Mechanical dimension



10. Order information

If the customer needs 433MHZ band then part number of released order shall be: LoRa6100-TTL-433 (Note: Lora6100 only has TTL interface)

Product Name	Description
LoRa6100-TTL-433	433MHZ，TTL interface
LoRa6100-232-433	433MHZ，232 interface
LoRa61100-485-433	433MHZ，485 interface
LoRa6100-TTL-470	470MHZ，TTL interface
LoRa6100-232-470	470MHZ，232 interface
LoRa6100-485-470	470MHZ，485 interface
LoRa6100-TTL-868	868MHZ，TTL interface
LoRa6100-232-868	868MHZ，232 interface
LoRa6100-485-868	868MHZ，485 interface
LoRa6100-TTL-915	915MHZ，TTL interface
LoRa6100-232-915	915MHZ，232 interface
LoRa6100-485-915	915MHZ，485 interface