

USB TO CAN Module

SPECIFICATION



SPECIFICATION: SPECIFICATION

Model:USB TO CAN

Description:Serial port to CAN module

Production Standard

Enterprise quality system standard: ISO9001:2016

Sensor production standard : GB/T191SJ 20873-2016

Criterion of detection : GB/T191SJ 20873-2016

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1 Description

The module is convert TTL signals into CAN signals,using the serial port as the interface of the embedded system,simple date transfer,no need to learn CAN protocol,shorten development cycles and reduce development costs,module compatible with 3.3V, 5v power supply,small size, half-hole process, easier to embed in the system

The module is equipped with a 32-bit STM32 processing chip and a CAN level conversion chip. 14 sets of shielding filters,each with five frame filtering methods.Parameters set to AT command set mode, instructions simple and refined, only 6 instructions. Wider baud rate range and network adaptability is strong.

The serial port of this module is TTL signal, can't connect with 232 signal

Full support for CAN bus 2.0A and 2.0B specifications

The processor adopt with Cortex M3 core has stronger data processing ability and lower power consumption. The processor integrates CAN controller, which saves time for transmission.

Wider CAN baud rate,3K-1Mbps can be programmed arbitrarily.

The sampling point is automatically adjusted to CIA value or close to the CIA value.

14 sets of 32-bit screen filters, arbitrary selection, arbitrary settings.

Setting command adopt with AT command,easier to set.

Message date length 0-8 bytes can be set arbitrary

Serial port interface, more convenient operation, shorten development cycle.

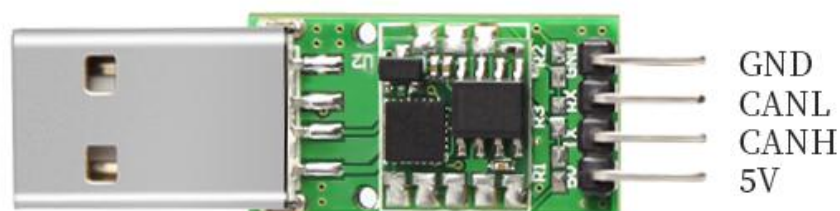
It has surge protection circuit to control transient interference and protect internal circuit.

Compatible with 5 V /3. 3 V power supply, the embedded system with TTL interface can connected.

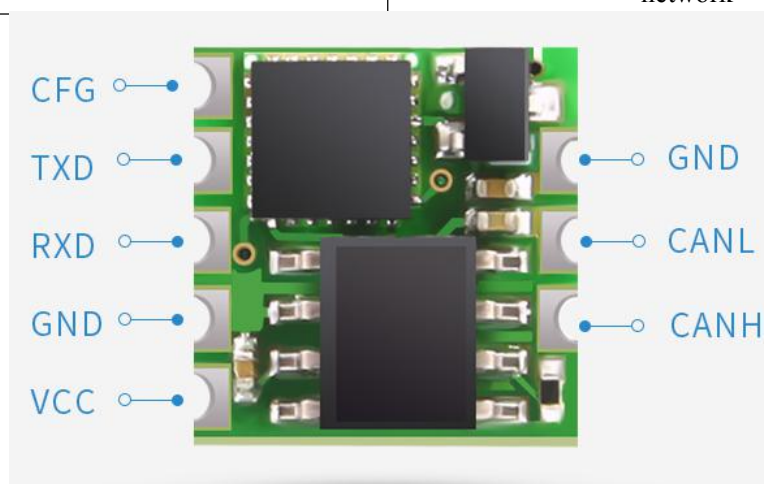
2 Features

- 1) Voltage:3.3~5V
- 2) Consumption current:5.5~6mA
- 3) Volume:10mm*10mm*5mm
- 4) Pad pitch:up and down 2mm,left and right 10mm
- 5) Baud rate:serial port:4800~406800kBps, CAN:4K~1MBps
- 6) Offline self-recovery function
- 7) 14 sets of shielding filters
- 8) The parameter can be set by AT command and saved after power down.
- 9) Hardware, software two restore default parameters
- 10) Application of module:Intelligent building、 industrial equipment、 smart home furnishing、 automotive electronics and so on.

3 Pin description



Number	Screen printing on board	Description
1	5V	5V power supply
2	GND	Power ground
3	CANL	CANL signal line connected to CAN network
4	CANH	CANH signal line connected to CAN network



Number	Screen printing on board	Description
1	VCC	3.3V/5V power supply
2	GND	Power ground
3	CFG	Default recovery
4	TXD	TXD pin connected to the target board
5	RXD	RXD pin connected to the target board
6	CANL	CANL signal line connected to CAN network
7	CANH	CANH signal line connected to CAN network

4 Function

Install the USB-TTL driver ch340.

The drive:

CH340:https://wiki.wit-motion.com/english/doku.php?id=communication_module

5 Factory default parameter description and recovery parameter operation

Number	Parameter type	Default	Remark
1	CAN work mode	0	Working in normal mode
2	CAN data transparent transmission frame format	1,0,136,0	Enable, standard data frame,the standard frame ID is 0x88 (hexadecimal is 136), the extend frame ID is 0x00
3	CAN filter group	Full enable	Default is to receive all frames on the bus
4	CAN baud rate	100Kbps	100Kbps
5	Serial port configuration parameter	9600,0,1,0	Baud rate is 9600, data bit is 8 bit, stop bit is 1 bit,check bit no

Operation instructions for restoring default parameters:

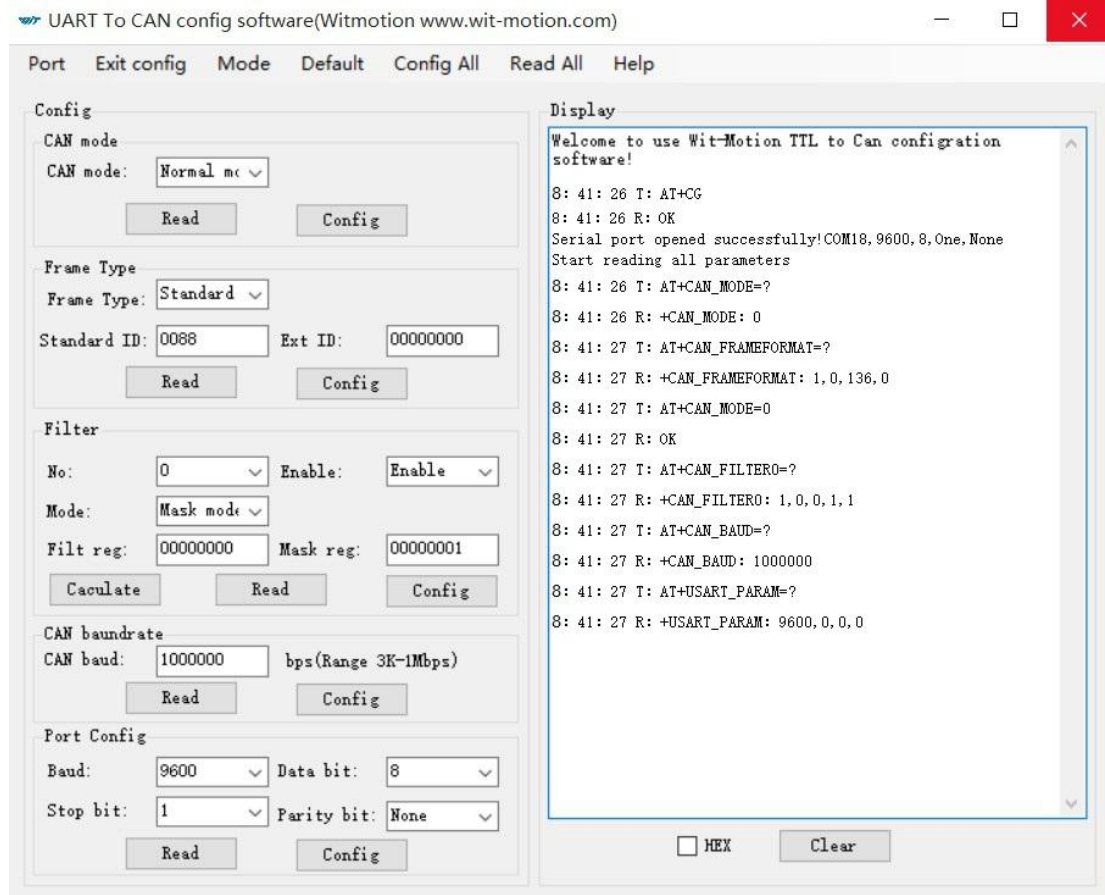
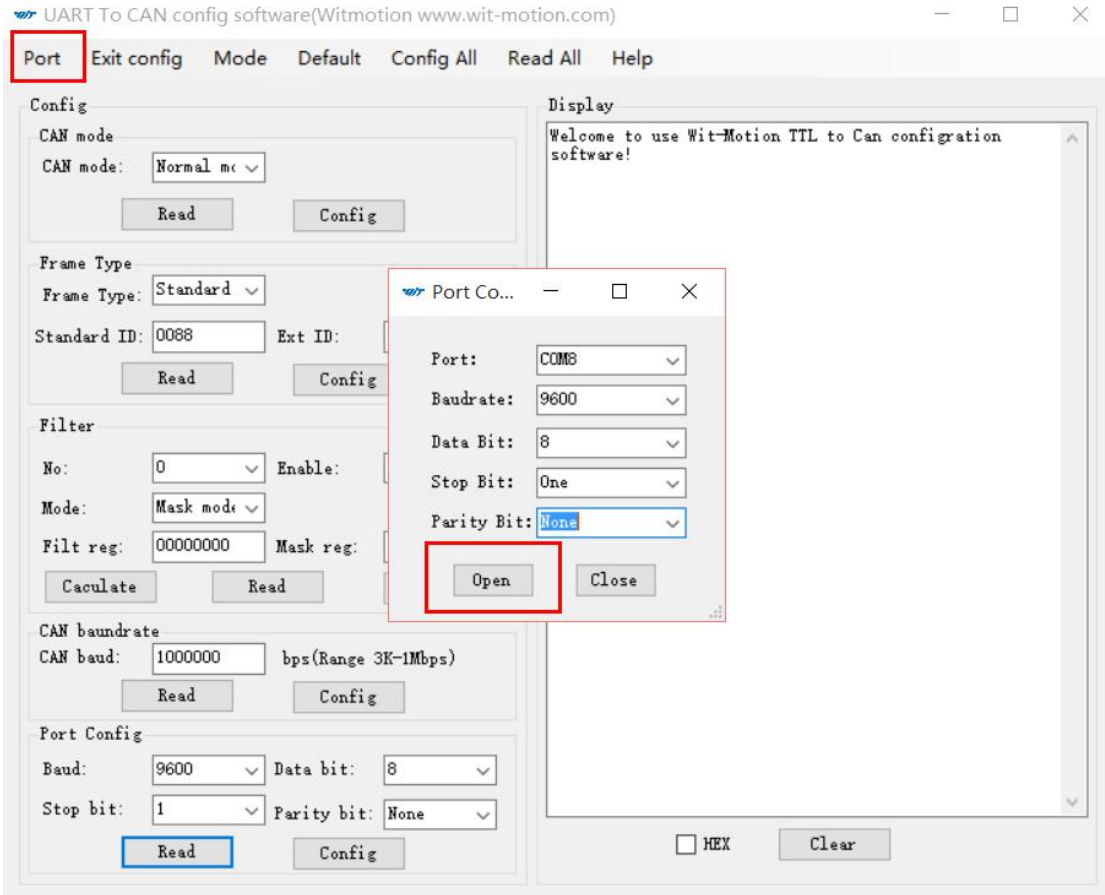
Method 1 hardware recovery:First, the CFG pin of the module was lowered(followed by GND)for 3-5 seconds, then open the parameter set software and select port number, configure baud rate of the serial port(default 9600), then open the serial port and the PC software automatically read the module parameters,this method is used without knowing baud rate of serial port.

Method 2 software recovery:Open the parameter setting software, select port number,configure baud rate of the serial port(default 9600), click restore default on the PC software,the module return to OK.

6 Parameter setting

1、Set the software interface as shown below:

Open the parameter setting software,configure serial number,baud rate,click on open, PC software automatically read module parameter.

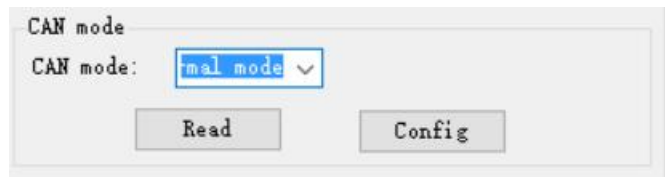


The software has five sets of parameters setting. Which are:

- a)、CAN work mode parameters
- b)、CAN data transparent transmission frame format parameters
- c)、CAN filter group parameters
- d)、CAN baud rate parameters
- e)、Serial port parameters

2、CAN work mode parameter setting

The setting interface on the PC software:



There are two working mode optional:

- a)、Normal working mode

The mode is used for normal data collection and transmission

- b)、Loop mode

The module is used for module self-testing, that is self-collection and self-transmission, used to check correctness of the data send and receive by the program.

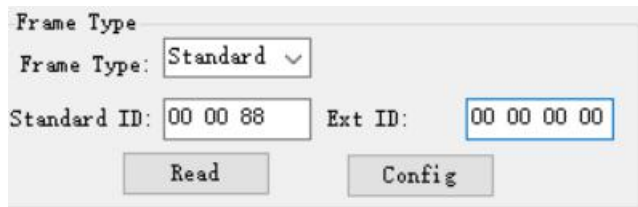
AT setting instruction is: AT+CAN_MODE=<0><LF>

Please view AT instruction table for details

When leaving the factory, the working mode default to normal working mode

3、Set CAN data transparent transmission frame format parameter

Set interface on the PC software:



This function is used for data transparent transmission, that it doesn't need to add frame header, direct transmission data

There are four setting parameters for the function:

- a)、Transparent transmission capacity: data transparent transmission is only when enable
- b)、Frame format selection
- c)、Standard frame ID: maximum value is 0x07FF
- d)、Extend frame ID: maximum value is 0x1F FF FF FF

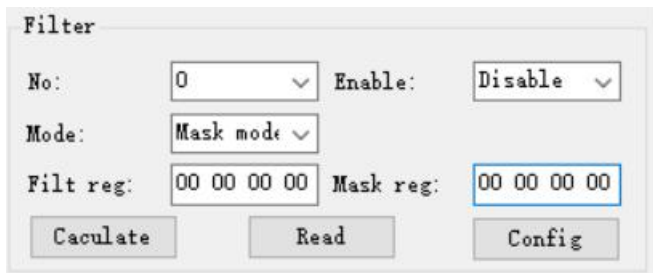
AT setting instruction is: AT+CAN_FRAMEFORMAT=<1>,<0>,<136>,<0><LF>

Please view AT instruction table for details

When leaving the factory, the transparent transmission mode is enabled, frame format is default to standard data frame, the standard frame ID is 0x88, the extend frame ID is 0x00

4、CAN filter group parameter setting

Set interface on the PC software:



Filter

No: 0 Enable: Disable

Mode: Mask mode

Filt reg: 00 00 00 00 Mask reg: 00 00 00 00

Calculate Read Config

The first parameter filter group number is only used for selecting which filter to use, selection 0 is the first filter and selection 1 is the second filter

The group parameter setting involves five parameters:

- a) 、 Filter enable: only when enable, the currently set filter group will work
- b) 、 Filter mode: there are shielded bit mode and other mode, but currently can only set to shielded bit mode.
- c) 、 Frame format: there are five selection parameters, which format should be selected or which frame format is allowed to pass.
- d) 、 Filter register: maximum set value is 0x1F FF FF FF
- e) 、 Shield register: that means which to filter

Take the first group filters as an example (the red number represents the group number of the filter)

AT setting instruction is:

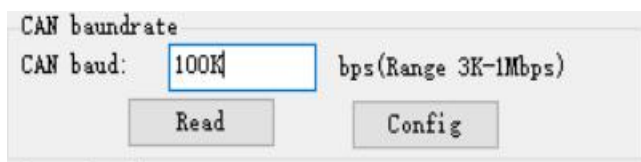
AT+CAN_FILTER0=<1>,<0>,<0>,<102760448>,<536608768><LF>

Please view instruction table for details

When leaving the factory, all filters are closed by default and the frames aren't filtered.

5、CAN baud rate parameter setting

Set interface on the PC software:



CAN baudrate

CAN baud: 100K bps (Range 3K-1Mbps)

Read Config

CAN baud rate parameter setting is set the data transmission rate of the CAN node. when the parameter is set, there are two ways: one is to select on the commonly use table, the parameter of commonly use table is communication transmission rate commonly use in engineering; another way is set according to the actual application, range is 3Kbps-1Mbps, don't exceed this range, otherwise, the module doesn't work properly.

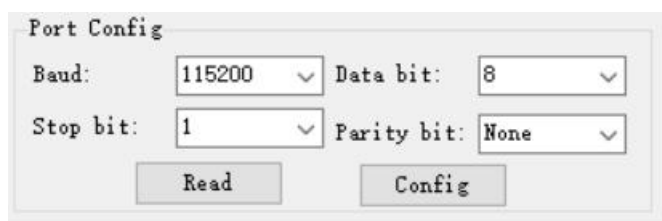
The available range is: 3Kbps-1Mbps. Recommended to enable baud rate of 4Kbps-1Mbps. The higher baud rate, the higher requirement for wire, the transmission distance is shorter. So when selecting baud rate, it must be set according to the actual engineering application.

For example: Set to 100Kbps, AT setting instruction is: AT+ CAN_BAUD=<100000><LF>

Please view AT instruction table for details

6、Serial port parameter setting

Set interface on the PC software



Serial port parameter setting, which four parameters, as show below:

- a) 、 Serial port baud rate: range of values is 4800bps-460800bps
- b) 、 Data bit: 8 or 9 bit (optional)
- c) 、 Stop bit: 0.5、 1、 1.5、 2 bit(optional)
- d) 、 Parity bit: None(no parity)、 Odd(odd parity)、 Even(even parity)

For example: set baud rate is 115200, data bit is 8 bit, stop bit is 1 bit, check bit is None

AT setting instruction is :AT+ CAN_BAUD=<115200>,<0>,<1>,<0><LF>

Please view AT instruction table for details

7 Frame format

There are five frame format, as show below:

1、 Transparent transmission mode

You must enable this feature before using it. The mode only as data transmission. Only data frame can be transmitted in this mode. A frame transmission up to 8 bytes.

2、 Standard data frame

Frame format is: 00 00 00 07 FF 08 01 02 03 04 05 06 07 08

Frame analysis description as shown below:

Byte range	Number of byte	Description
The first byte	1	Used to distinguish frame format, 0 is standard data frame 1 is standard remote frame 2 is extend data frame 3 is extend remote frame
The second to fifth byte	4	Respective frame ID, if they are standard frame, the maximum value is 0x07 FF, if they are extend frame, the maximum value is 0x1F FF FF FF.
The sixth byte	1	Data byte length, if they are remote frame, it must be 0; if they are data frame, the value of byte is 0-8
The seventh to fourteenth byte	0-8	If they are remote frame, so there isn't data and the segment doesn't exist. If they are data frame, the number of bytes in this segment can be 0-8 bytes, the number of data bytes of finally transferred is

		determined by the sixth byte,if the sixth byte is 0.so the segment doesn't exist
--	--	--

As shown above,each frame consists of four segments, but the existence of the last data segment is determined by the third(the sixth byte) .

3、Standard remote frame

Frame format is: 01 00 00 07 FF 00

Remote frame don't contain data

Frame analysis is shown in the table at point 2

4、Extend data frame

Frame format is:02 1F FF FF FF 08 01 02 03 04 05 06 07 08

Frame analysis is shown in the table at point 2

5、Extend remote frame

Frame format is: 03 1F FF FF FF 00

Remote frame don't contain data

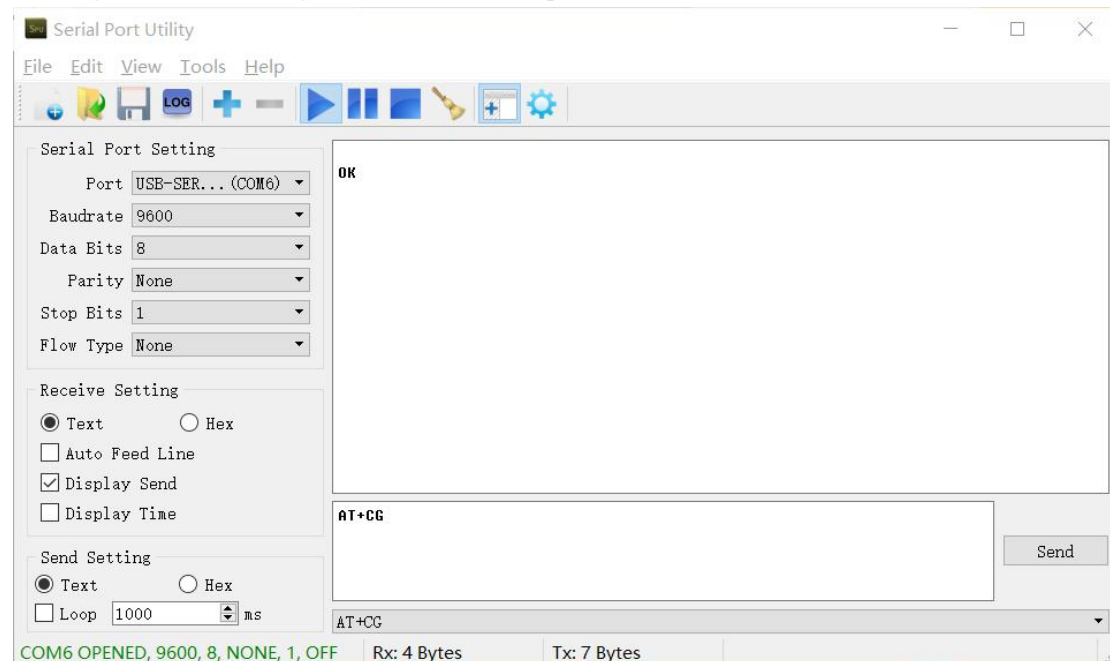
Frame analysis is shown in the table at point 2

8、Serial port debugging demonstration

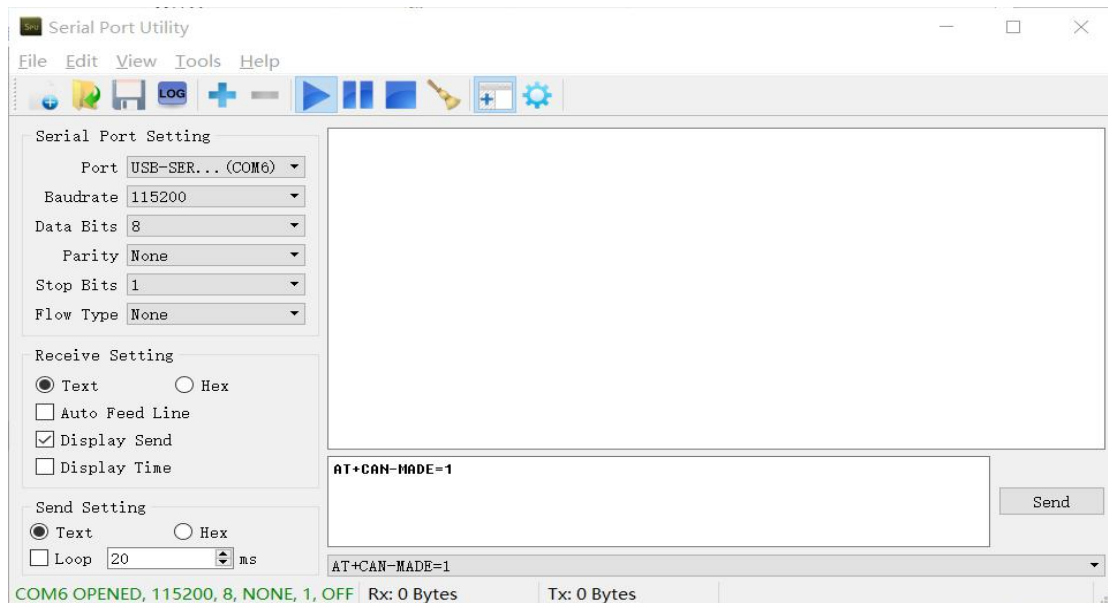
Instruction:<LF> express carriage return sign, parentheses don't exist when sending data

Open the serial port debugging assistant,as shown below:

Sending instructions and get module into serial port set mode



After the module reply OK, enter the serial port set mode.

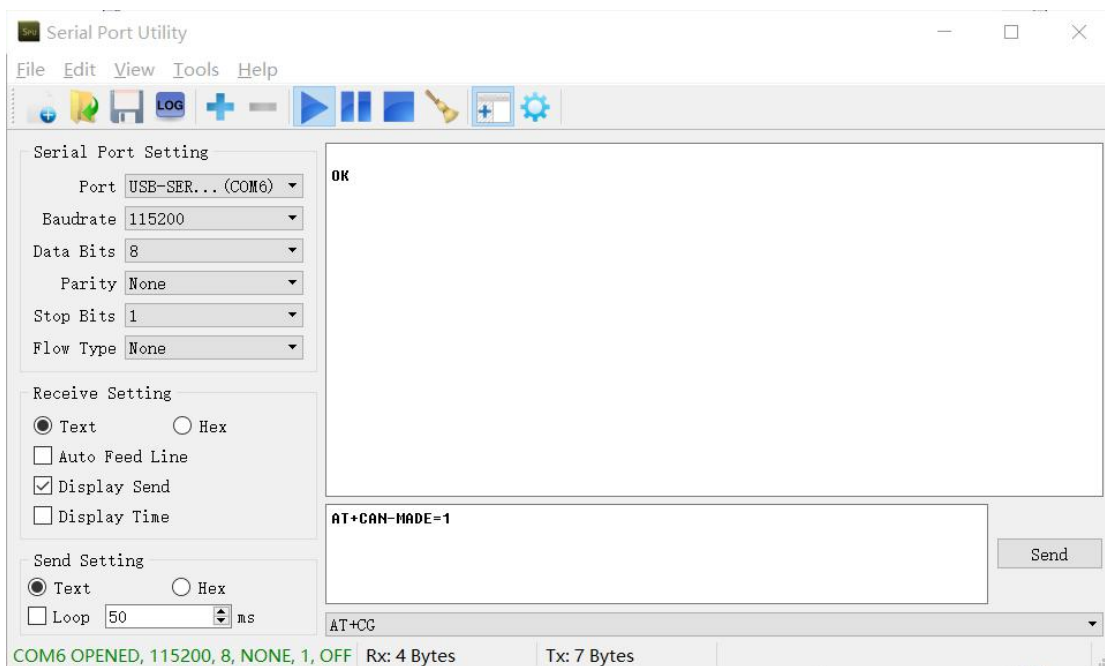


1、Set work mode as a loop mode

Send instruction: AT+CAN_MODE=<1><LF>

After set successfully, the module will return: OK<LF>

As shown below:

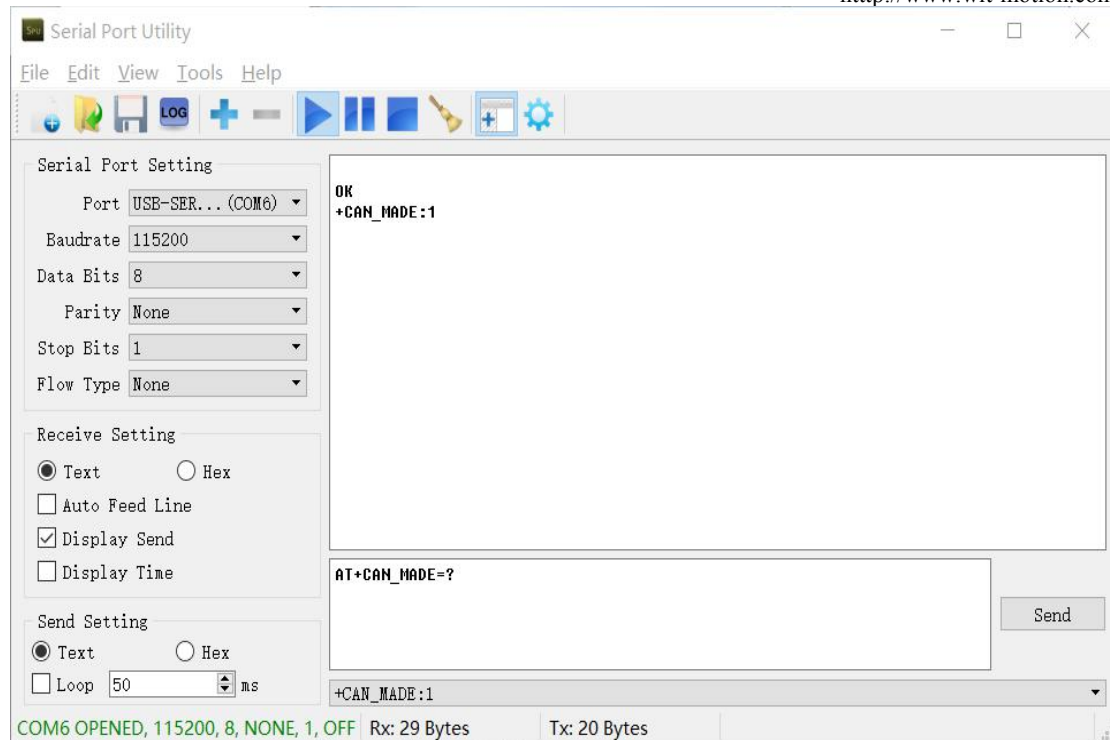


Query work mode:

Send instruction: AT+CAN_MODE=?<LF>

Module will return: +CAN_MODE:1<LF>

As shown below:



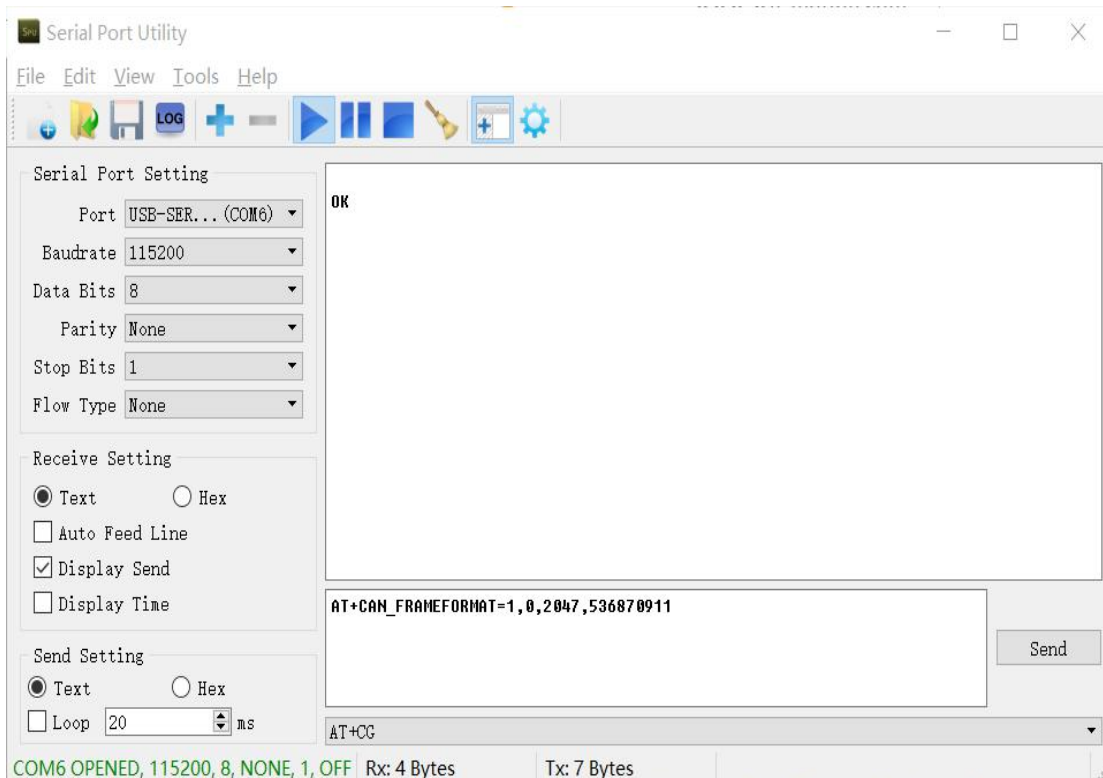
2、Set transparent transmission format

Enable transparent transmission frame transmission, frame format set standard data frame, standard frame ID is 0x00 00 07 FF (decimal is 2047), extend frame ID is 0x01 FF FF FF (decimal is 536 870 911)

Send instruction: AT+CAN_FRAMEFORMAT=1,0,2047,536870911<LF>

After set successfully, the module will return: OK<LF>

As shown below:

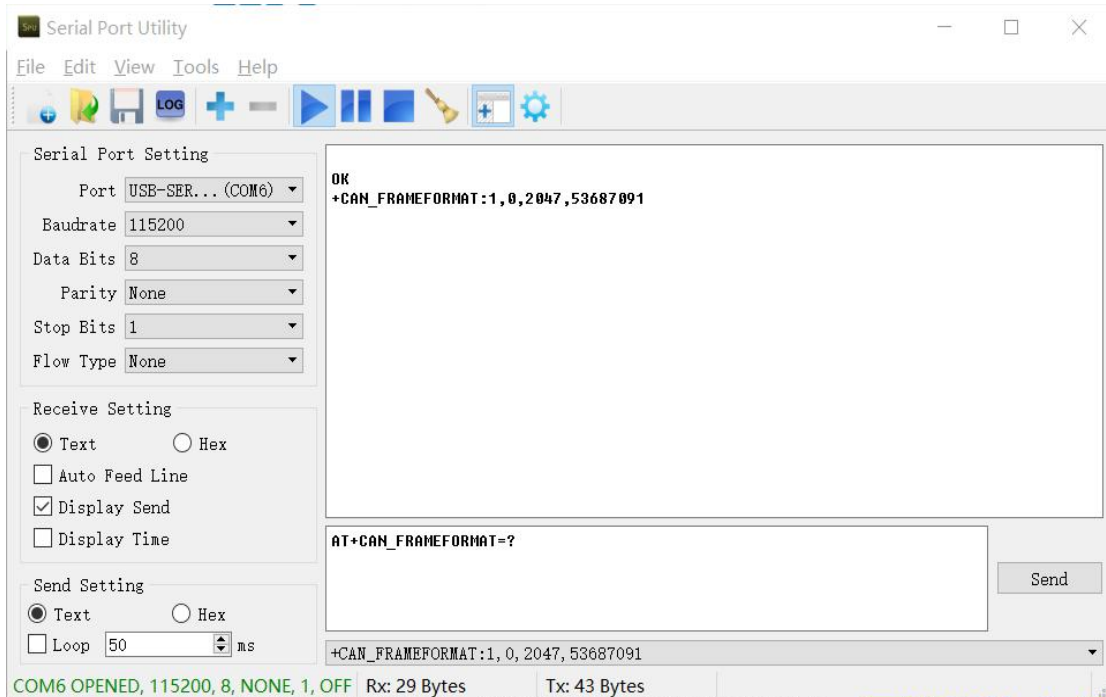


Query transparent transmission format AT instruction:

Send instruction:AT+CAN_FRAMEFORMAT=?<LF>

Module will return :+CAN_FRAMEFORMAT:1,0,2047,536870911<LF>

As shown below:



3、Set CAN filter

Take the second group filters as an example(14 group filter,number is 0-13 and the second stage number is 1),

Filter enable,

Set shield bit mode,

Frame format is extend data frame,

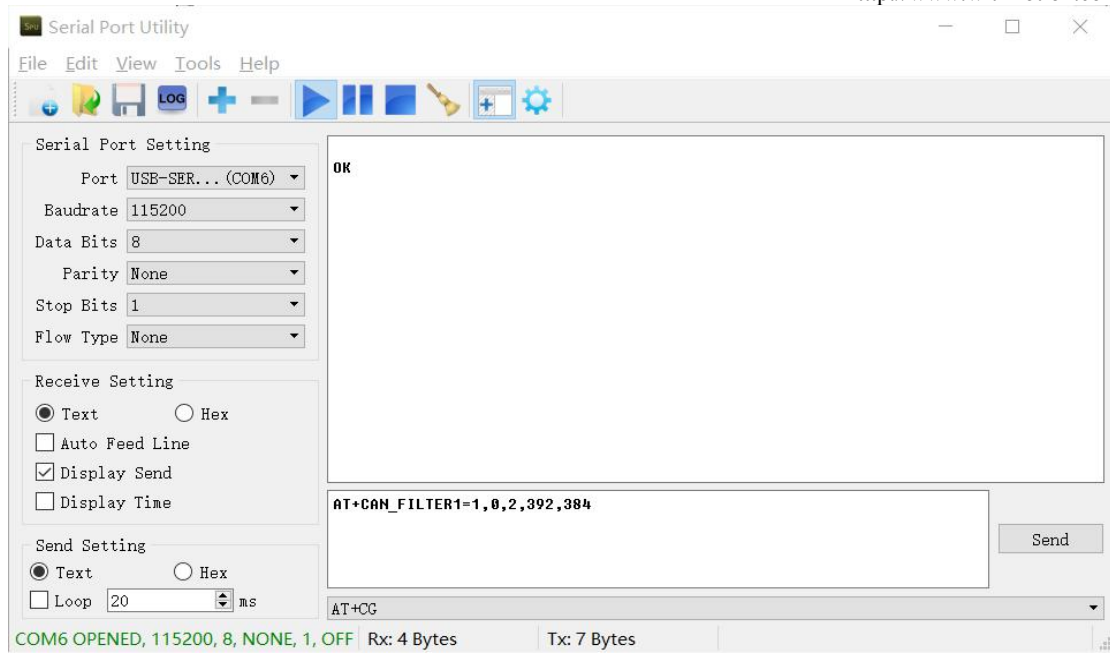
Set filter register value is 0x00 00 01 88(decimal is 392)

Set shield register value is 0x00 00 01 80(decimal is 384)

Send instruction:AT+CAN_FILTER1=1,0,2,392,384<LF>

After set successfully,the module will return:OK<LF>

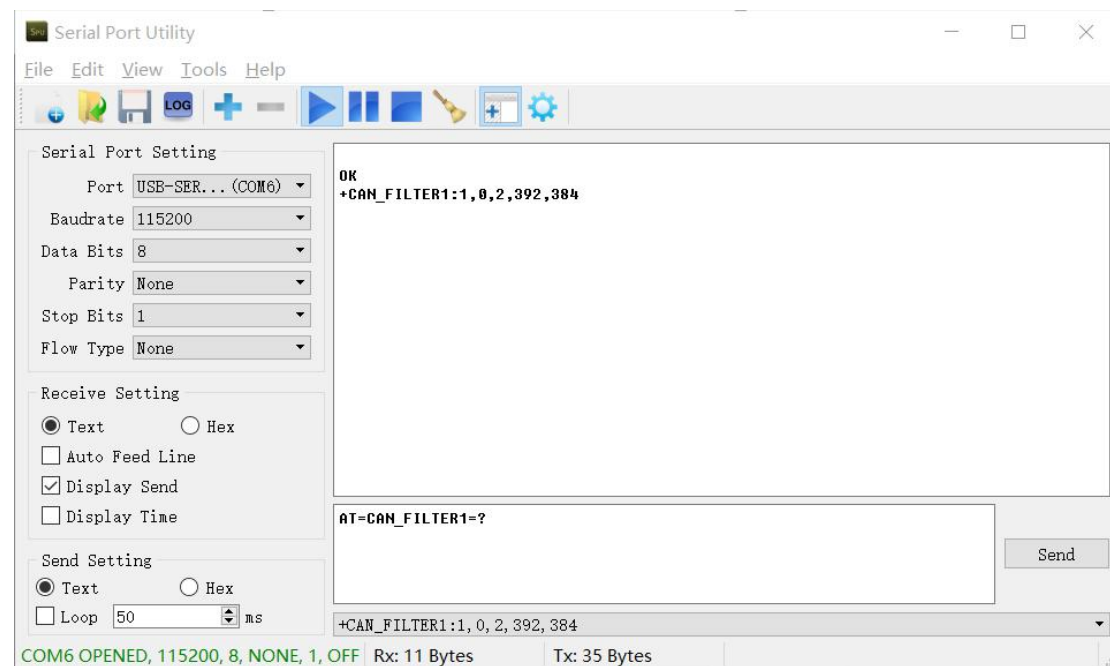
As shown below



Send inquire instruction: AT+CAN_FILTER1=?<LF>

Module will return: +CAN_FILTER1:1,0,2,392,384<LF>

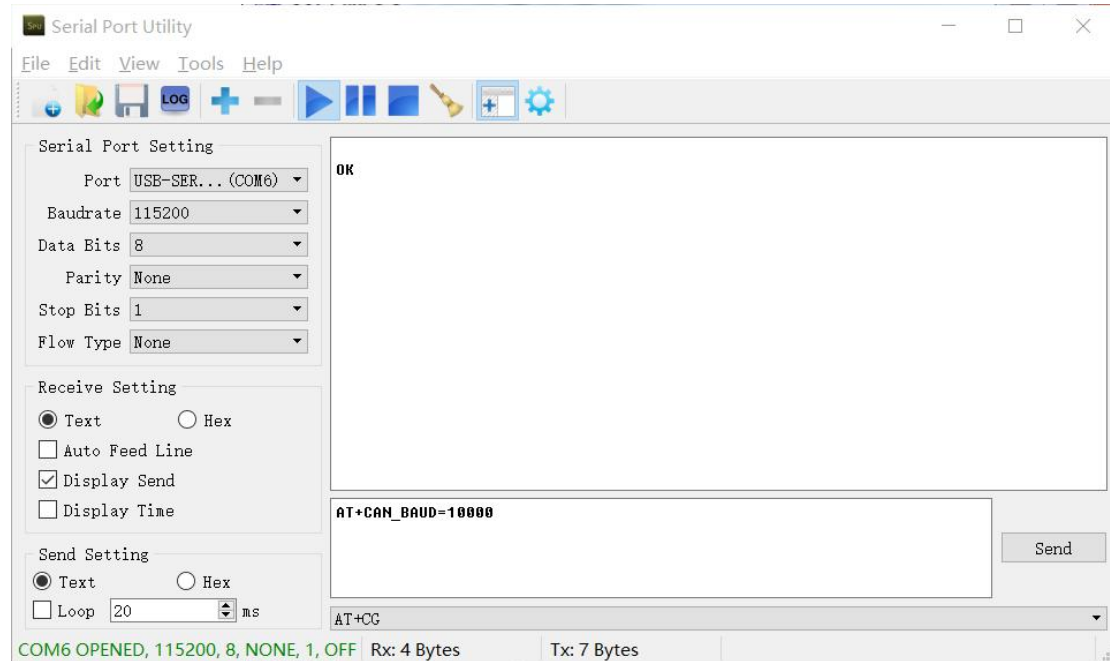
As shown below:



Send instruction:AT+CAN_BAUD=10000<LF>

After set successfully,module will return :OK<LF>

As shown below:

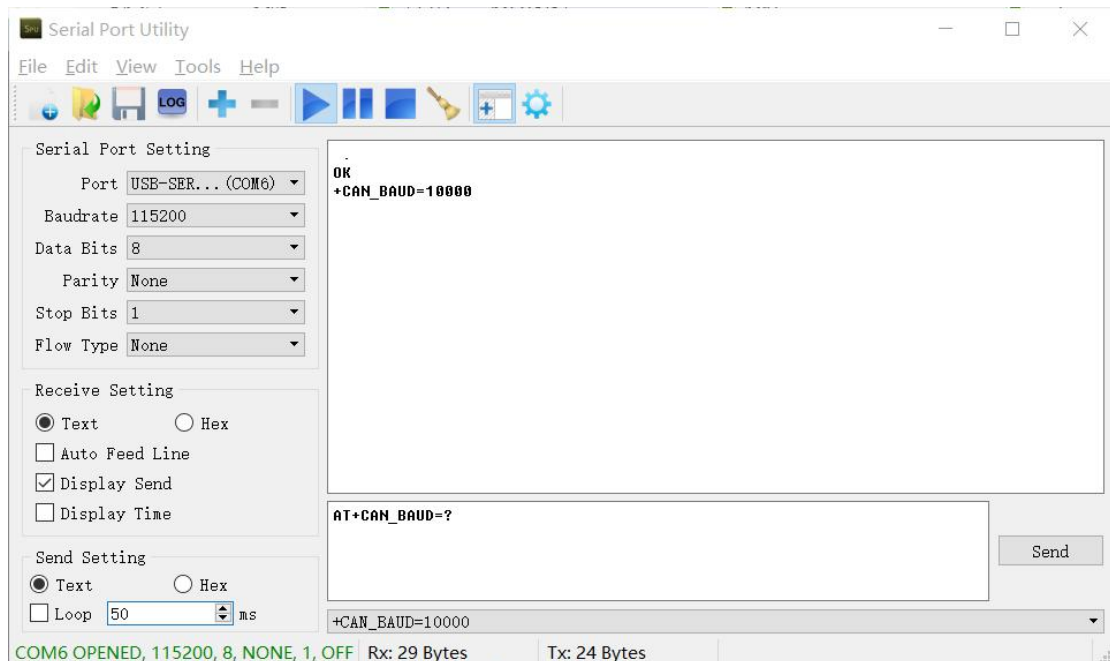


Query CAN baud rate

Send inquire instruction:AT+CAN_BAUD=?<LF>

Module will return:+CAN_BAUD :10000<LF>

As shown below:



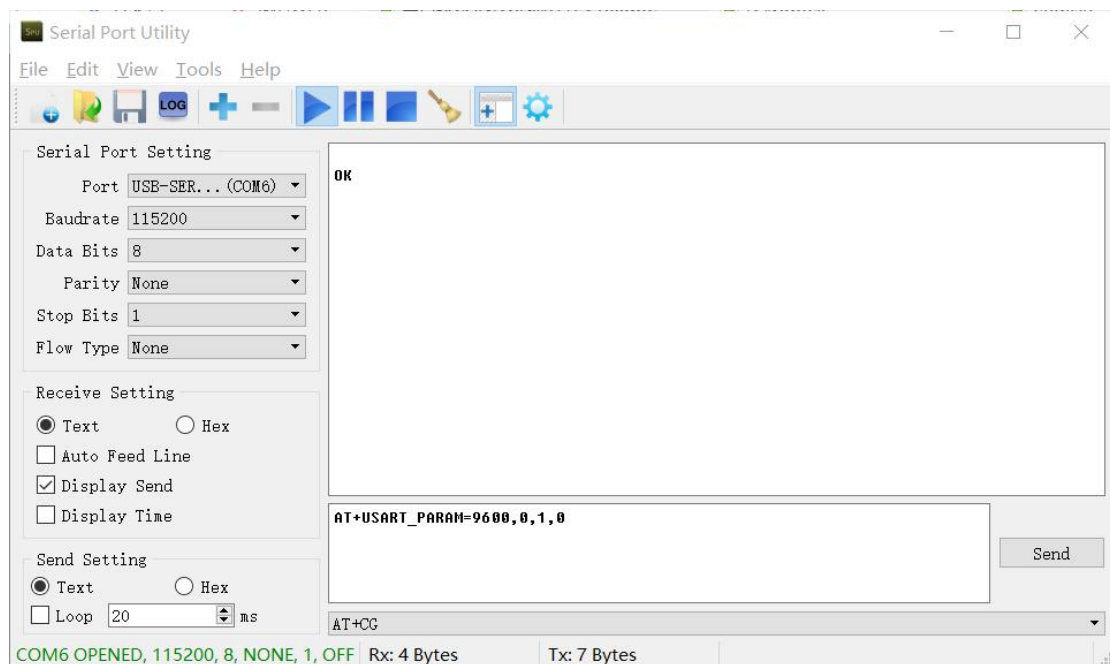
5、Set serial port parameter

Set baud rate is:9600, data bit is 8 bit, stop bit is 1 bit, check bit is None.

Send instruction:AT+USART_PARAM=9600,0,1,0<LF>

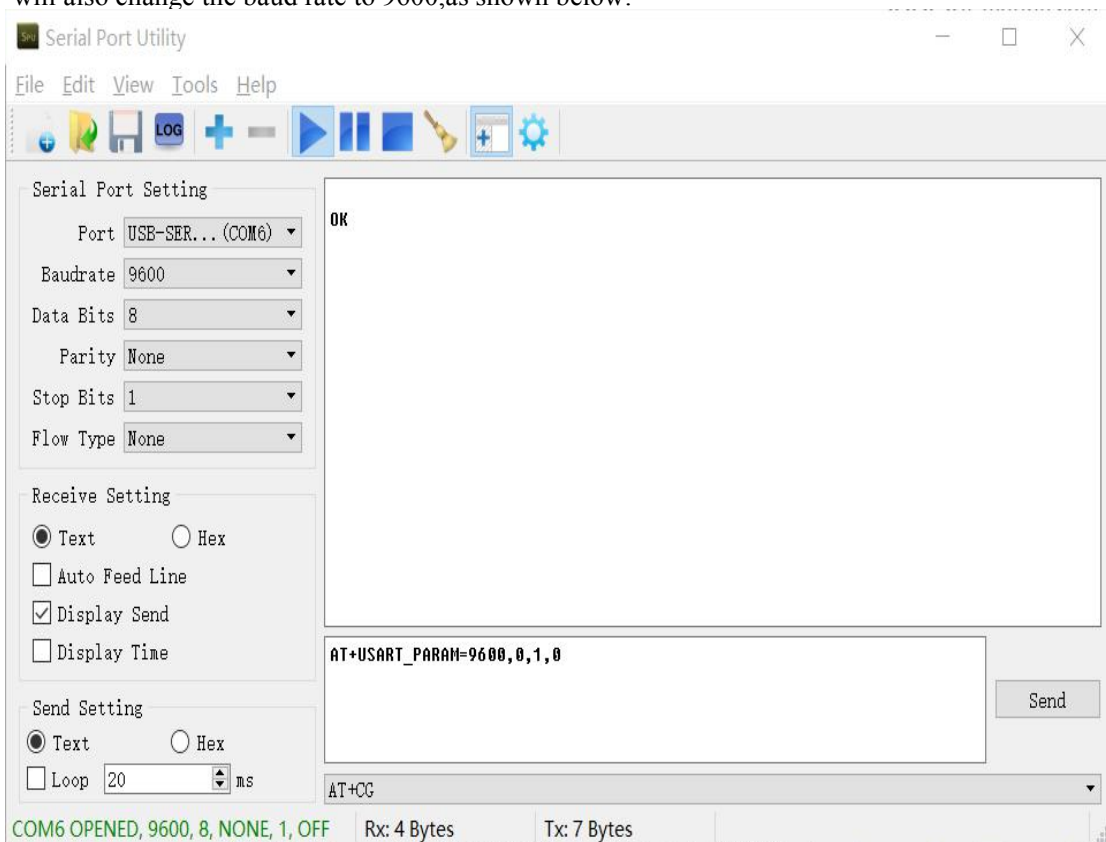
After set successfully,module will return:OK<LF>

As shown below



Query serial port parameter

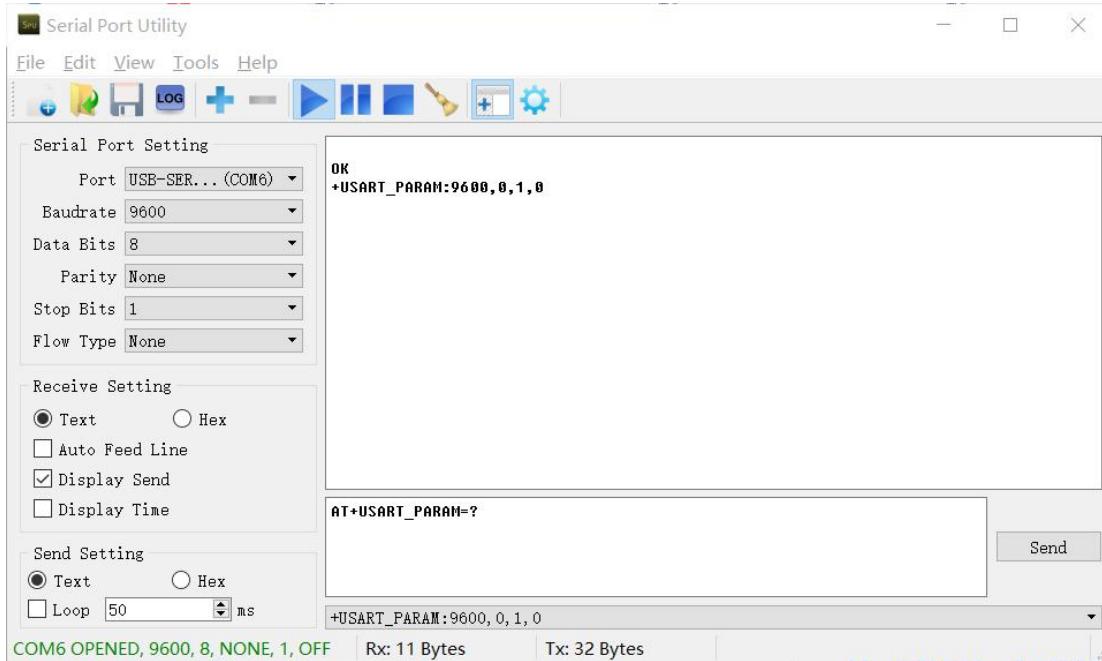
Because the serial port baud rate has been set to 9600, so the serial port debugging assistant will also change the baud rate to 9600, as shown below:



Send inquire instruction: AT+USART_PARAM=?<LF>

Module will return: +USART_PARAM:9600,0,1,0<LF>

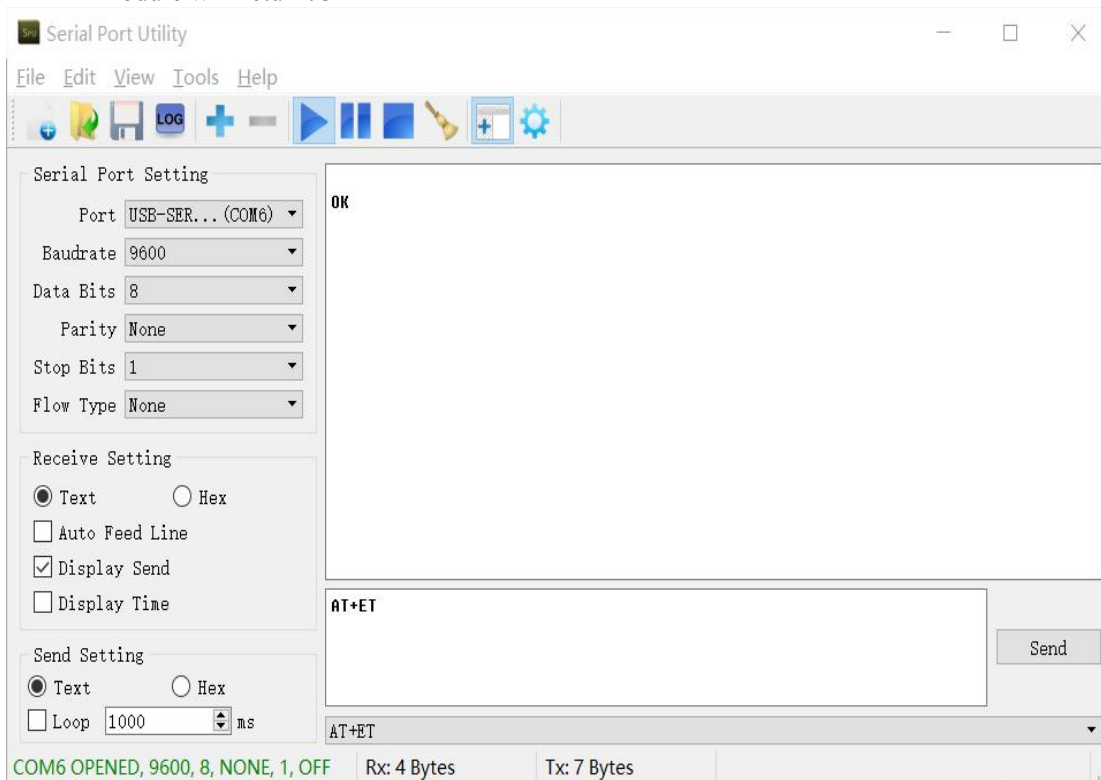
As shown below:



6、Withdrawing serial port set mode

Send withdraw instruction: AT+ET<LF>

Module will return: OK



9 instruction introduction

9.1 AT test command

Execute command: AT<LF>

Function :using to test serial port to CAN in configuration mode

Reply :OK<LF>

For example:

Controller send: AT<LF>

Network relay reply: OK<LF>

9.2 AT+CAN_MODE set、 query the work mode of CAN module

9.2.1 Query serial port to CAN working mode

Execute command: AT+CAN_MODE=?<LF>

Function : query serial port to CAN working mode

Reply : AT+CAN_MODE=<MODE><LF>

Figure 2-2-1<MODE> status value table:

<MODE>	Working mode	Remark
0	Normal working mode	Loop mode is used for self-collection and self-sending testing of module
1	Loop mode	

For example:

read the CAN module's working mode

Controller send: AT+CAN_MODE=?<LF>

Module reply: +CAN_MODE:0<LF>

9.2.2 Set the working mode of the module

Execute command: AT+CAN_MODE=<MODE><LF>

Function :set the working mode of the serial port to CAN

Reply :Command executed successfully:OK<LF>

Command error:ERROR<LF>

For example:

Controller send: AT+CAN_MODE=0<LF>

Module reply: OK<LF>

Controller send: AT+CAN_MODE=2<LF>

Module reply: ERROR<LF>

9.3 AT+CAN_FRAMEFORMAT query and set transparent transmission format of the data

9.3.1 Query transparent transmission format of the data

Execute command: AT+CAN_FRAMEFORMAT=?<LF>

Function : query transparent transmission format of the data

Reply : command executed successfully:

+CAN_FRAMEFORMAT:<Enable>,<FrameFormat>,<StdID>,<ExtID><LF>

Command error: ERROR<LF>

Figure 2-3-1<Enable>value table:

<Enable>	Transparent transmission enable	Remark
0	Prohibit	Transparent transmission enable of the data
1	Enable	

Figure 2-3-2<FrameFormat>value table:

<FrameFormat>	Selection of the frame format	Remark
0	Standard data frame	This state is data frame selection, when a standard data frame is selected, the maximum of transmission frame ID is 0x7FF
1	Extend data frame	

Figure 2-3-3<StdID>value table:

<StdID>	Standard frame ID	Remark
Range of value	0 -- 0x7 FF	The corresponding decimal is: 0 -- 2047

Figure 2-3-4<ExtID>value table:

< ExtID >	Extend frame ID	Remark
Range of value	0 -- 0x1F FF FF FF	The corresponding decimal: 0 -- 536870911

For example:

query data transparent transmission format

Controller send: AT+CAN_FRAMEFORMAT=?<LF>

Module reply: +CAN_FRAMEFORMAT:1,0,136,0<LF>

9.3.2 Set data transparent transmission format

Execute command:

AT+CAN_FRAMEFORMAT=<Enable>,<FrameFormat>,<StdID>,<ExtID><LF>

Function :set data transparent transmission mode

Reply :command executed successfully OK<LF>

command error ERROR<LF>

For example

Controller send: AT+CAN_FRAMEFORMAT=1,0,136,0<LF>

Module reply: OK<LF>

9.4 AT+CAN_FILTERn query and set CAN filter

9.4.1 Query filter parameter

Execute command: AT+CAN_FILTERn=?<LF>

Function :query CAN filter parameter

Reply: command executed successfully:

+CAN_FILTERn:<Enable>,<Mode>,<Id>,< MaskId><LF>

Command error: ERROR<LF>

Figure 2-4 n parameter comparison table:

<value>	Filter group number	Remark
	0-13	Respectively correspond to the first to fourteenth groups of filter, 0 is the first group filter

Figure 2-4-1<Enable>parameter comparison table:

<value>	Filter enable sign	Remark
0	Prohibition of current group filter	Respectively correspond the first and fourteenth groups of filter
1	Enable current group filter	

Figure 2-4-2<Mode>parameter comparison table:

<value>	Work mode of the filter group	Remark
0	Shield bit mode	

Figure 2-4-4<ID>parameter comparison table:

<value>	Range of value	Remark
	0 – 0x1F FF FF FF	This value is the bit to be detected by the filter

Figure 2-4-5<MaskID>parameter comparison table:

<value>	Range of value	Remark
	0 – 0x1F FF FF FF	Specifies the bit that must be filtered, when frame ID

		match with the specified bit, can be pass filtration of the filter
--	--	--

For example(take the first group filter as an example):

Controller send: AT+CAN_FILTER0=?<LF>

Module reply:+CAN_FILTER0:0,0,0,0<LF>

9.4.2 Set CAN filter parameter

Execute command:

AT+CAN_FILTERn=<Enable>,<Mode>,<Id>,< MaskId><LF>

Function :query CAN filter parameter

Reply :command executed successfully:OK<LF>

command error: ERROR<LF>

For example(take the first group filter as an example):

Controller send:AT+ CAN_FILTER0=0,0,0,0<LF>

Module reply:OK<LF>

9.5 AT+CAN_BAUD query or set CAN baud rate parameter

9.5.1 Query CAN baud rate parameter

Execute command:AT+CAN_BAUD=?<LF>

Function :query CAN baud rate

Reply :command executed successfully:+CAN_BAUD:<Baud><LF>

command error: ERROR<LF>

Figure 2-4<Baud>parameter comparison table:

<value>	Baud rate range of value	Remark
	3000bps -- 1000 000bpx	

For example:

Controller send:AT+CAN_BAUD=?<LF>

Module reply:+CAN_BAUD:100000<LF>

9.5.2 Set CAN baud rate parameter

Execute command:AT+CAN_BAUD=<Baud><LF>

Function :set CAN baud rate

Reply :command executed successfully:OK<LF>

command error:ERROR<LF>

For example(set baud rate is 100Kbps):

Controller send:AT+CAN_BAUD=100000<LF>

Module reply:OK<LF>

9.6 AT+USART_PARAM query or set serial port parameter

9.6.1 Query module serial port parameter

Execute command:AT+USART_PARAM=?<LF>

Function :query module serial port parameter

Reply :+USART_PARAM:<Baud>,<DataBit>,<StopBit>,< ParityBit><LF>

Figure 2-6-1<Baud> comparison table:

<value>	Serial port baud rate range of value	Remark
	4800 -- 460800	

Figure 2-6-1<DataBit>comparison table:

<value>	Data bit	Remark
0	8 bit	
1	9 bit	

Figure 2-6-1<StopBit>comparison table:

<value>	Stop bit	Remark
0	0.5 bit	
1	1 bit	
2	1.5 bit	
3	2 bit	

Figure 2-6-1<ParityBit>comparison table:

<value>	Parity bit	Remark
0	None bit	
1	Odd bit	
2	Even bit	

For example:

Controller send:AT+USART_PARAM=?<LF>

Network relay reply: +USART_PARAM:115200,0,1,0<LF>

9.6.2 Set serial port parameter of the module

Execute command:

AT+USART_PARAM=<Baud>,<DataBit>,<StopBit>,< ParityBit><LF>

Function:set module serial port parameter

Reply :command executed successfully:OK<LF>

command error:ERROR<LF>

For example:

Controller send:AT+USART_PARAM=115200,0,1,0<LF>

Module reply:OK<LF>

9.7 AT+DEFAULT recovery of factory default parameters

Execute command:AT+DEFAULT<LF>

Function :recovery of factory default parameters

Reply :command executed successfully:OK<LF>

command error:ERROR<LF>

For example:

Controller send:AT+DEFAULT<LF>

Module reply:OK<LF>

9.8 AT+CG enter into configuration mode

Execute command: AT+CG<LF>

Function :enter into configuration mode

Reply :command executed successfully:OK<LF>

command error:ERROR<LF>

For example:

Controller send:AT+CG<LF>

Module reply:OK<LF>

9.9 AT+ET drop out configuration mode

Execute command:AT+ET<LF>

Function :drop out configuration mode

Reply: command executed successfully:OK<LF>

command error:ERROR<LF>

For example:

Controller send:AT+ET<LF>

Module reply:OK<LF>

9.10 AT+AT enter into imitation CAN mode

Execute command: AT+AT<LF>

Function : drop out configuration mode

Reply : command executed successfully: OK<LF>

command error: ERROR<LF>

For example:

Controller send: AT+AT<LF>

Module reply: OK<LF>

AT mode (imitate CAN) data format:

Head	ID 4Byte	Length of data	data	End
AT				0x0d,0x0a (\r\n)

ID illustration: 4Byte make up a 32 bit data, high bit in front

bit31-bit21	bit20-bit3	Bit2	Bit1	Bit0
Standard frame id, 11 bits before extend frame id	18 bits after extend frame	1 express extend frame 0 express standard frame	1 express data frame 0 express remote frame	Fixed is 0

Note : length of remote frame data should be 0

For example:

Receive data: 0x41 0x54 0x01 0x00 0x00 0x02 0x00 0x0d 0x0a

Standard remote frame expressing ID 0x008

10 Appendix

1、 Basic understand of data frame

Standard data frame and extend data frame can be carry or without carry data during transmission

2、 Basic understand of remote frame

Standard remote frame and extend remote frame don't carry any data. Only when the node receives remote frame, it will respond to the request of remote frame, return the requested data. For example: when A request B through a remote frame to return temperature of B device, After B receives the request of A, it send own temperature to A right away. sending request isn't carry data, so when sending or inquiring command, using remote frame is more appropriate.

3、 Serial port automatic frame function

Serial port automatic frame is based on the current baud rate, when 2 bytes interval time is greater than 5 bytes of transmission time, the current frame is considered to over, the next byte is the first byte of the next frame. Take the baud rate of 9600 as an example, supposed that serial port transmission start bit is 1 bit, data bit is 8 bit, stop bit is 1 bit. 1 byte of transmission time is time of 10 byte, about 1000 bytes per second, the time of transmission 1 byte is 1 millisecond, transmission time of 5 bytes is 5 millisecond. When A byte has been received, after interval 6 milliseconds to receive B byte, so A byte is considered to the last byte of the previous frame, B byte is considered to the first byte of the next frame

In the same frame of data, sending time interval between two bytes can't be greater than transmission time of 5 bytes



深圳维特智能科技有限公司

WitMotion ShenZhen Co., Ltd

Serial to CAN module

TEL : (+86) 755-33185882

E-mail : wit@wit-motion.com

Website : www.wit-motion.com

Aliexpress : <https://witmotion.aliexpress.com>

Alibaba : <https://witmotion.en.alibaba.com>

Wit-wiki : <https://wiki.wit-motion.com/english>

Address : Honghai building 1306 Songgang town Baoan District Shenzhen
Guangdong Province China