GCAN-202(CANET-II)

Ethernet-CAN converter

User Manual

Document version 3.01 (2017/12/01)

Revision History:

Version	Date	Reason
V1.00	2013/06/16	Create document
V2.01	2013/12/20	Fixed working parameters
V3.01	2015/04/22	Add some parameters

Contents

1 Introduction

1.1 Overview

The GCAN-202 (CANET-II) is a high-performance CAN-Bus converter that integrates with two CAN-Bus channels & one Ethernet channel. CAN-Bus can connect to Ethernet via GCAN-202, which makes the interconnection easier and extends the application scope of CAN-Bus.

The GCAN-202 is a professional tool with CAN-Bus product development and data conversion. Computer can connect to the CAN-Bus network by the Ethernet interface quickly. The converter integrates with electrical isolation protection module to protect Ethernet and CAN interfaces, which can avoid the damage for converter due to instantaneous over current or over voltage.

Source code of sample program in VB supply for some basic secondary development, conform to Socket work mode.

1.2 Performance

1.2.1 Hardware Features

- High speed 32-bit industrial grade processor
- Embedded Watchdog timer
- FLASH storage, can store parameters
- External voltage (DC+9~30V), current (DC+24V 50mA)
- Electrostatic discharge (ESD) Immunity level: Contact Discharge: ±2KV, Air Discharge: ±15KV
- Fast transient Burst Impedance Level: ±1KV
- Surge immunity level: ±1KV
- Working temperature: -40.00℃~ 85.00℃
- Working humidity: 5%~95%, no condensation
- Dimensions: 118mm (L) * 93mm (W) * 23mm (H)

1.2.2 CAN Features

- Integrate two CAN-Bus channels, with terminal connection
- Support CAN2.0A and CAN2.0B, conform to ISO/DIS11898
- Support communication baud rate: 5Kbps~1Mbps
- Electric isolation, insulation level: DC 3000V
- 32 FIFO receiving buffers, maximum flow: transmit 8000 FPS, receive14000 FPS

1.2.3 Ethernet Features

- Restore the network connection automatically after disconnecting, can establish a TCP connection.
- SOCKET working mode compatibility (TCP Server, TCP Client, UDP, etc), program communication software according to standard SOCKET rules

2 Installation

This chapter introduces the dimension of GCAN-202, the method connected to computer and some attentions first used.

2.1 Fix and installation

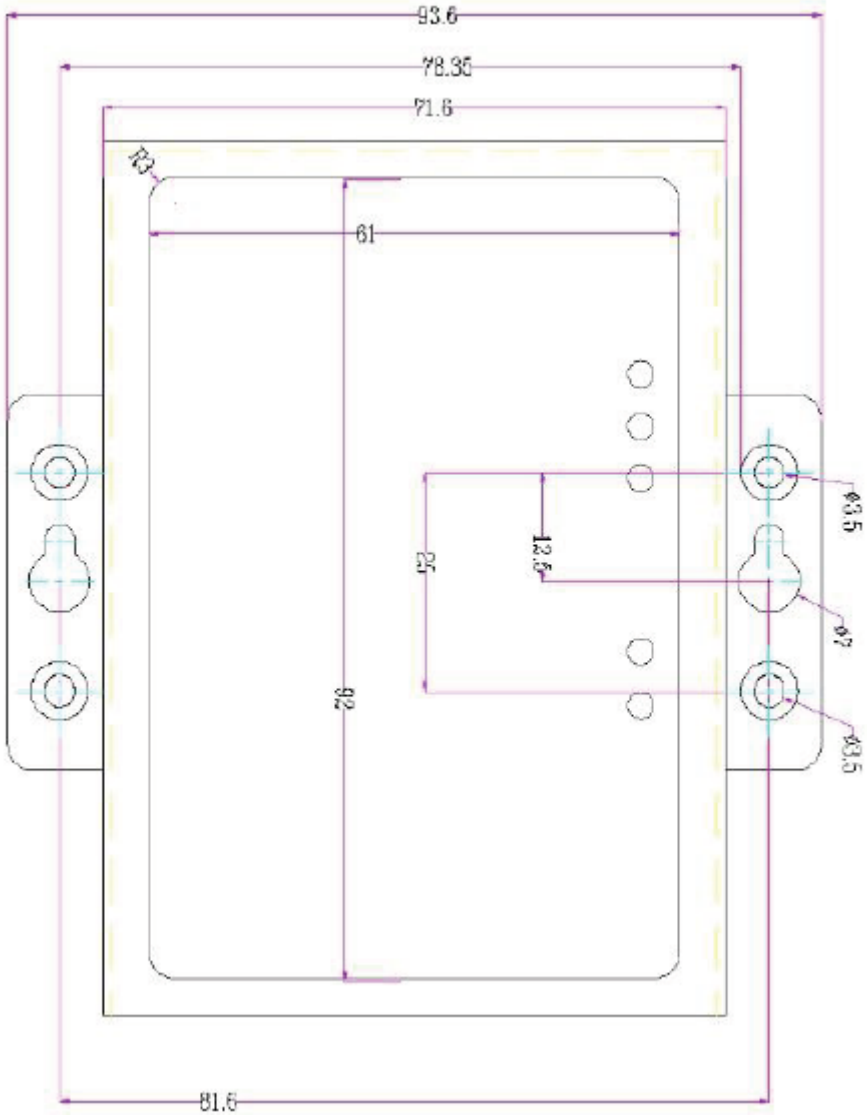


Figure2.1 Dimensions of GCAN-202

2.2 Software installation

The software has no need for installation, just double-click to open and use.

2.3 Connect with computer

The LAN interface of GCAN-202 make communication with Ethernet interface of computer directly.

2.4 CAN-Bus connection

The GCAN-202 has two CAN-Bus channels, and it can connect one or two devices of CAN-Bus network or CAN-Bus interface.

Port	Name	Function
CAN1	CAN1-H	CAN_H signal line
	CAN1-G	CAN1-GND
	CAN1-L	CAN1_L signal line
CAN2	CAN2-H	CAN2_H signal line
	CAN2-G	CAN2_GND
	CAN2-L	CAN2_L signal line

Table 2.1 the definition of CAN-Bus interface

3 Usage

3.1 Connect with computer for configuration

After supply power, use "CANet Config" software to configure working mode and some basic operating parameters. (Recommend +12V/+24V standard power)

3.1.1 Restore Factory Settings

The default IP of GCAN-202: 192.168.1.10.

Press and hold "reset" button about five to six second until SYS & CAN 1 & CAN 2 blinking by turns. It has been restored factory setting successfully. As Figure 3.1 shows.

Note: All the parameters configured will lost after restoring factory settings.

Figure 3.1 Restore Factory Settings of GCAN-202

3.1.2 Change the computer’s IP address

Please ensure the computer with an Ethernet card. And the computer and GCAN-202 must be in the same network segment. If not, users must change the computer's IP address.

3.2 Ethernet connection

GCAN-202 has three working modes: TCP Server, TCP Client, UDP.

3.2.1 TCP Server mode

In TCP Server mode, GCAN-202 won’t take the initiative to establish connection with other equipments, and it always wait to connect with TCP Client. The process of

building the connection as Figure 3.2 shows.

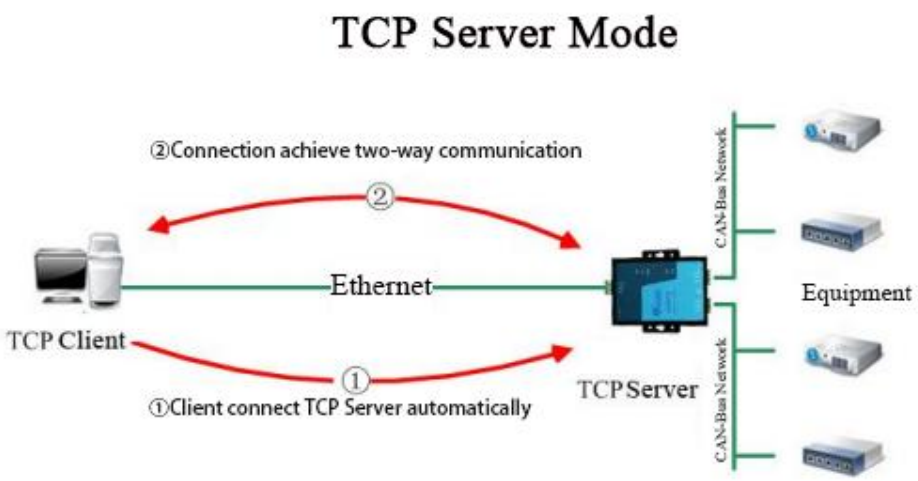


Figure 3.2 TCP Server mode

3.2.2 TCP Client mode

In TCP Client mode, GCAN-202 will take the initiative to establish connection with the pre-set TCP server. If failed, client will keep trying to connect TCP according to the setting condition. The process of building the connection as Figure 3.3 shows.

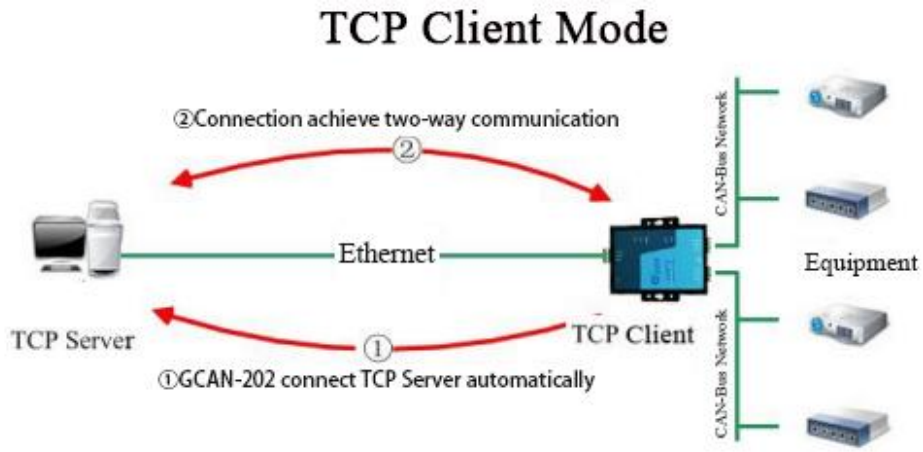


Figure 3.3 TCP Client mode

3.2.3 UDP mode

In UDP mode, make the data communication through UDP protocol. UDP mode is a simple communication mode, it won't add too much traffic, which can supply a faster communication than TCP mode to ensure real-time data package. The process of building the connection as Figure 3.4 shows.

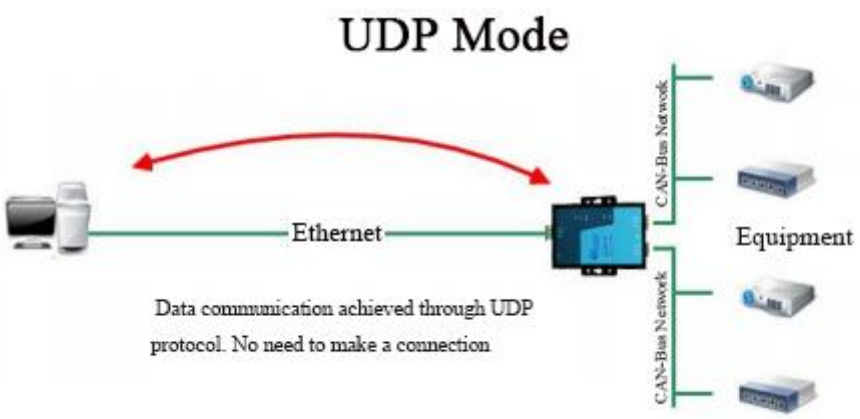


Figure 3.4 UDP mode

3.3 CAN-Bus connection

The GCAN-202 converter must be installed two 120 ohms terminal resistance at the farthest end of CAN-Bus network. If the node number is more than 2, intermediate nodes needn't to install 120 ohms terminal resistance. For branch connections, the length should not exceed 3 meters.

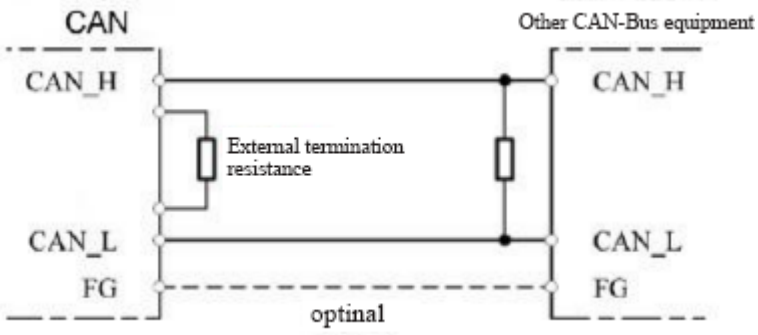


Figure 3.5 the CAN-Bus connect with other nodes

Note: CAN-Bus cable can be used with ordinary twisted-pair and shielded twisted-pair.

Baud rate	Distance
1 Mbit/s	40m
500 kbit/s	110m
250 kbit/s	240m
125 kbit/s	500m
50 kbit/s	1.3km
20 kbit/s	3.3km
10 kbit/s	6.6km

5 kbit/s	13km

Table 3.1 the relationship between CAN-Bus length and baud rate

3.4 System status indicator light

GCAN-202 has five indicator lights as shown in Table 3.2.

Indicator	Colour	State
PWR	Green	Power indicator
SYS	Green	System indicator
LAN	Green	Ethernet signal
CAN1	Red/Green	CAN1signal
CAN2	Red/Green	CAN2signal

Table 3.2 converter status indicator light

The meaning and status of indicator light as shown in Table 3.3

Indicator	State	Meaning
PWR	ON	Power supply normal
	OFF	Power supply error
SYS	OFF	Initialization failed
	Blinking	Standby mode
	Stop blinking	Error
CAN1、CAN2	Red	CAN-Bus communication error
	Green Blinking	CAN-Bus data transmission
	Blinking with SYS by turns	Reset state

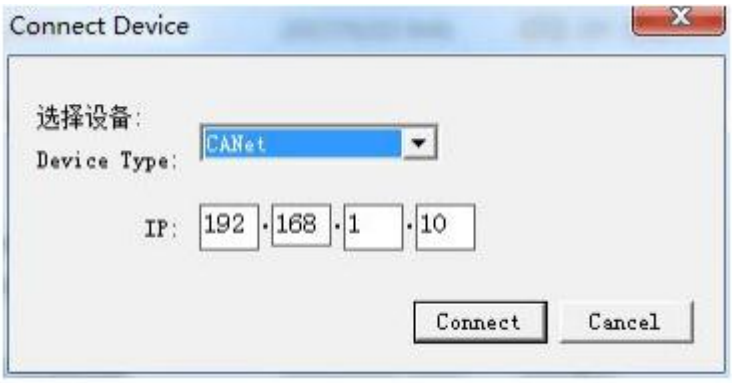
Table 3.3 the meaning & status of indicator light

4 CANet Config software

The GCAN-202 can configure parameters by "CANet Config" software, can set working mode, IP address, CAN working mode, CAN's baud rate and other basic parameters.

4.1 Connection

IP address must be filled when connecting to GCAN-202. If forget it, please restore factory settings and the default IP is 192.168.1.10. See chapter 3.1.1 for details.



Click "Connect", and it shows the following software interface.

The meaning of the button:

"Connect" - connect the converter (Do not need to click again).

"Upload" – read configuration information in converter.

"Download" - download the configuration information into the converter's Flash.

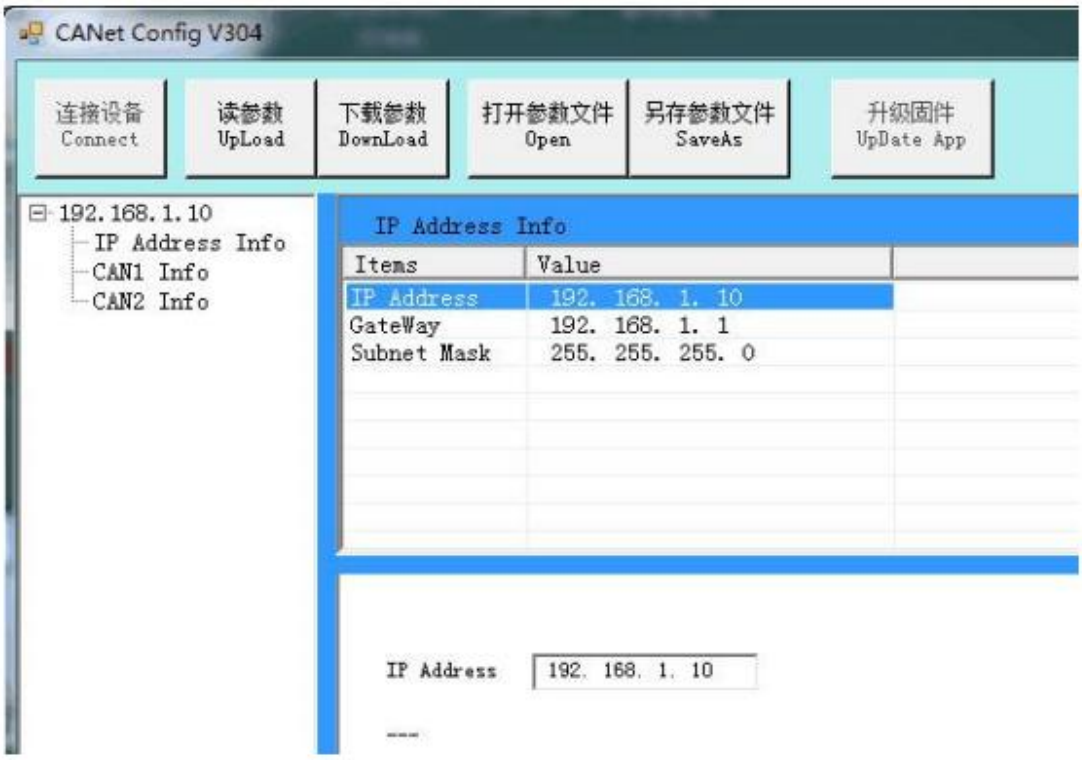
"Open" – open and read the configuration information file in the computer.

"SaveAs" - save the configuration information file into computer.

"UpDate App" - upgrade the GCAN-202 firmware kernel. (Please use this function under guidance)

4.2 Configure basic information

After finished the connection, click "UpLoad" to download the parameters of the converter to the computer.



"IP Address Info" - Ethernet-side parameters setting.

"CAN1 / CAN2 Info" - CAN-Bus parameters setting.

4.2.1 Ethernet parameters setting

Click "IP Address Info" to enter into the interface of Ethernet parameter settings.

"IP Address" - set the GCAN-202 IP address.

"Gateway" - set the GCAN-202 gateway.

"Subnet Mask" - set the GCAN-202 subnet mask.

4.2.2 CAN-Bus parameter setting

Click "CAN1/CAN2 Info" to enter the interface of CAN-Bus parameters setting.

"TCP Port" - set the CAN-Bus communication port.

"Can Baud" - set the CAN-Bus communication baud rate; details in Table 4.1.

"Can Mode" - set the CAN-Bus working mode.

"Can Filter" - not open, the default is 0.

"TCP Mode" - set the TCP working mode.

"Remote IP" - set the IP address of the target server.

"Remote Port" - set the port number of the target server.

Note: "Remote IP", "Remote Port" is valid only in TCP Client mode and UDP mode.

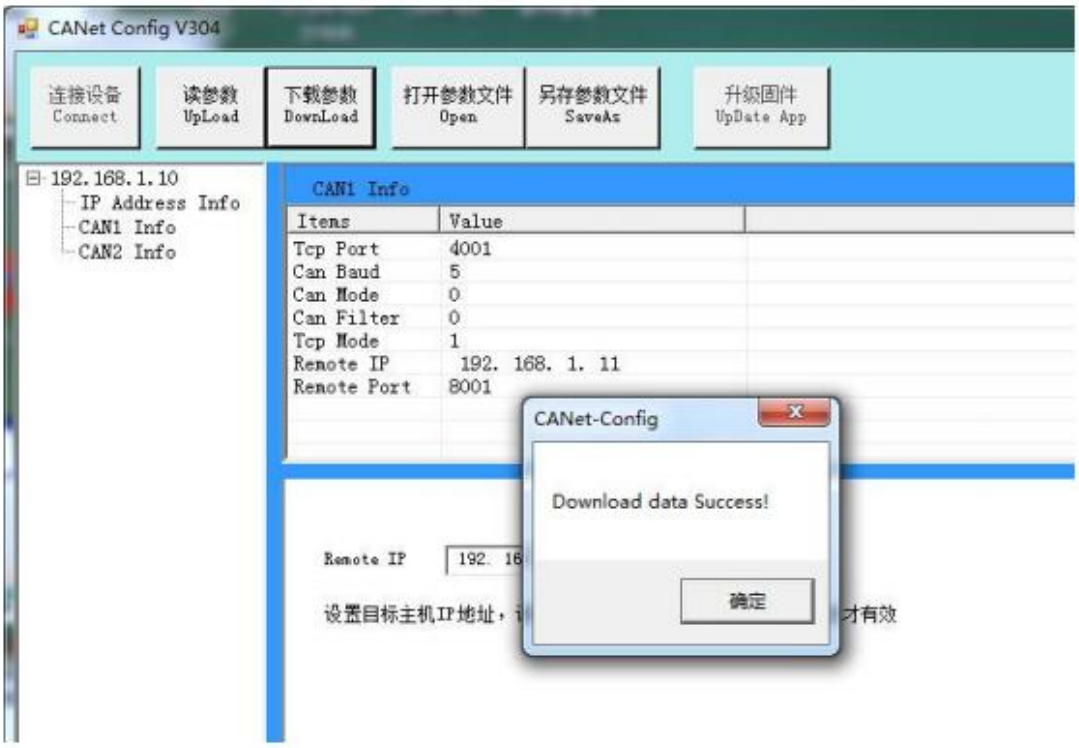
Baud rate	No	Baud rate	No
1 Mbit/s	0	100 Mbit/s	8
800 kbit/s	1	80 kbit/s	9
666 kbit/s	2	50 kbit/s	10
500 kbit/s	3	40 kbit/s	11
400 kbit/s	4	20 kbit/s	12
250 kbit/s	5	13.3 kbit/s	1491123
200 kbit/s	6	10 kbit/s	13
125 kbit/s	7	5 kbit/s	14

Table 4.1 baud rate and corresponding number

Note: you want the custom baud rate, please contact us.

4.3 Finish the configuration

After a parameter has been modified, this part got red. When the configuration is completed, click "DownLoad" to download the configuration information into the "Flash" of GCAN-202.



Note: re-power after completed the download, and then the new configuration will take effect.

4.4 Save/load configured files

"SaveAs" - save the configured files in your computer for later using.

"Open" - open the earlier configured files from your computer.

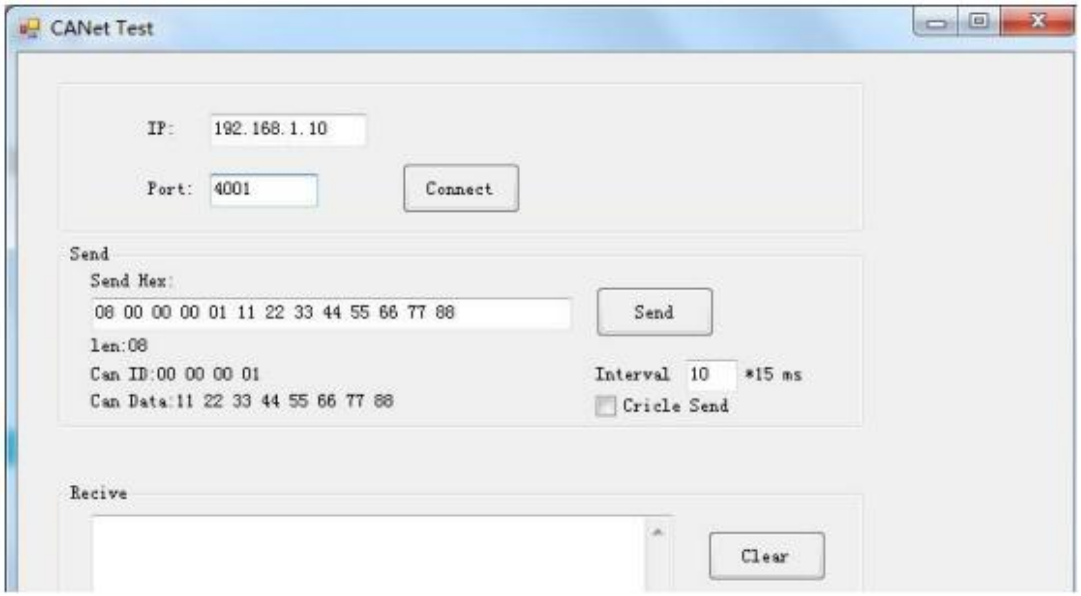
4.5 Update firmware kernel of GCAN-202.

Please contact us.

5 Usage of "CANet test" software

This software can test some basic functions of GCAN-202 if are normal in TCP Server mode. User will be supplied some basic VB routine to develop testing system by themselves.

Input the IP address and Port Number of GCAN-202, and click "Connect" to connect the equipment.



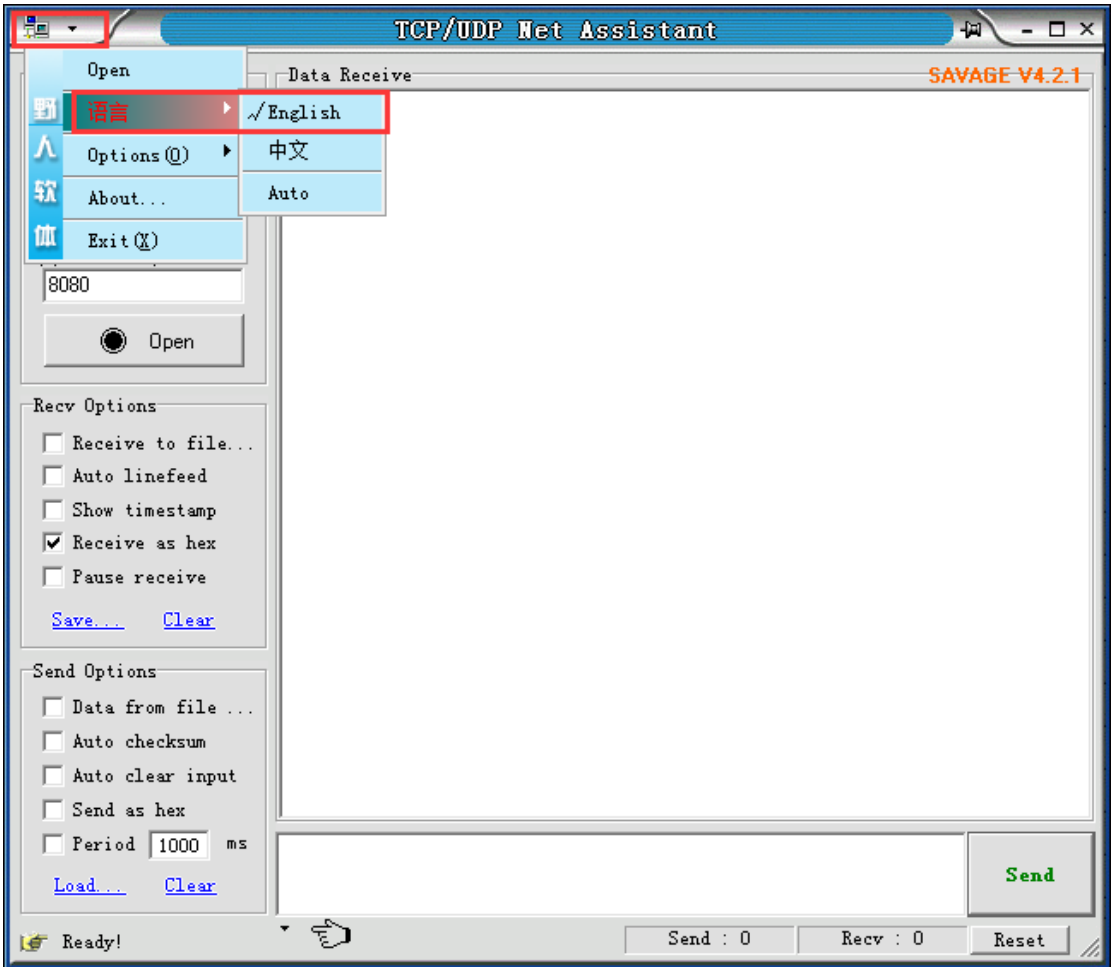
6 Usage of "Net Assist" software

In three modes (TCP Sever, TCP Client, UDP), "Net Assist" can provide to test receiving/transmitting data function.

6.1 Preparatory work

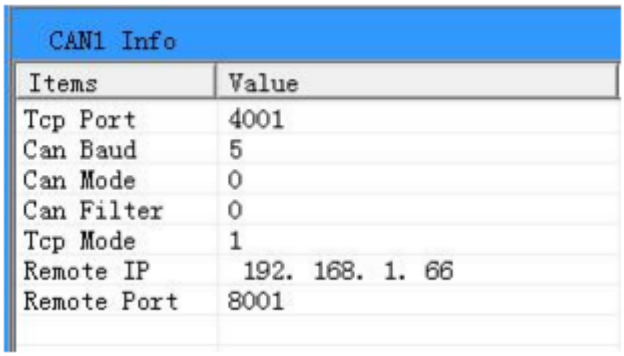
Before the testing, please make sure:

- GCAN-202's CAN_H & CAN_L have been connected to CAN interface of the target equipment
- GCAN-202 has finished the configuration
- Two 120 ohms terminal resistance must be installed at the both end of CAN-Bus network
- The default language of the software is Chinese, can switch to the language you want



6.2 Test in TCP Sever mode

Make sure GCAN-202 is in TCP Sever mode.



CAN1 Info

Items	Value
Tcp Port	4001
Can Baud	5
Can Mode	0
Can Filter	0
Tcp Mode	1
Remote IP	192. 168. 1. 66
Remote Port	8001

Open "Net Assist"

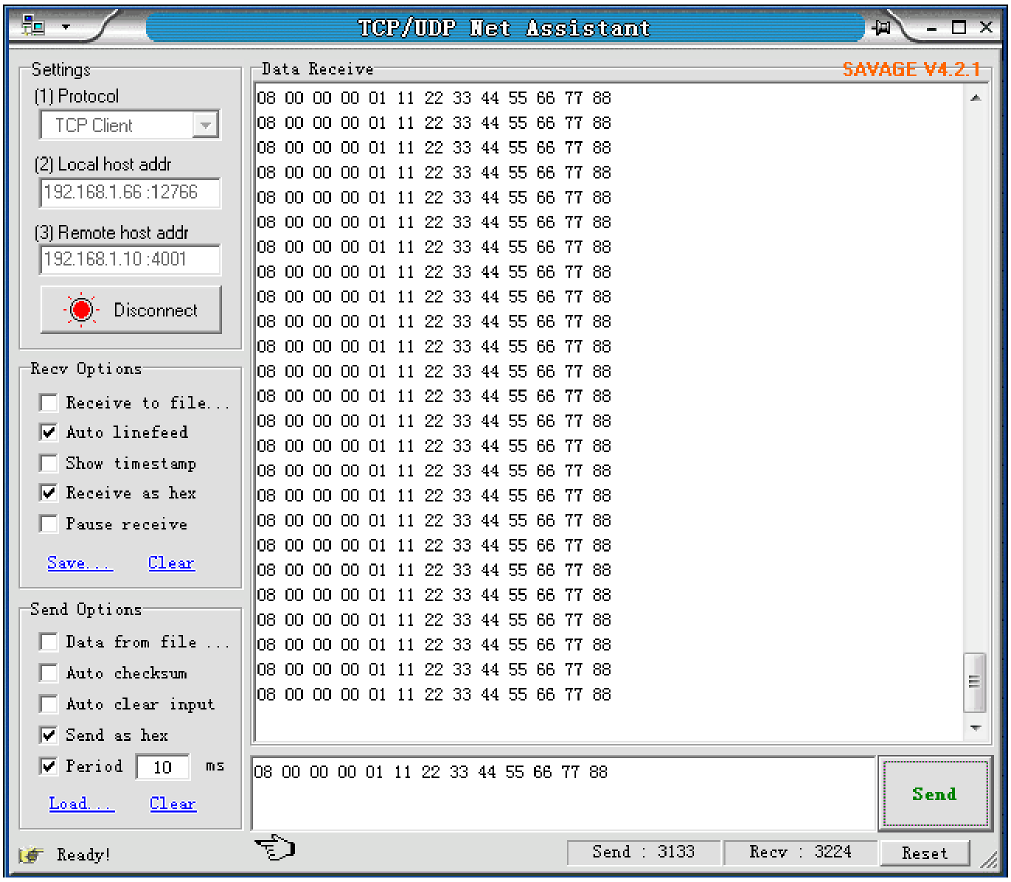
Choose protocol of "TCP Client"

Fill in the "Local host addr"

Fill in the "Remote host address" (default: 192.168.1.10:4001)

If there isn’t CAN-Bus data transmission, the message will show:

"AA 00 FF 00 00 00 00 00 00 00 00 00 55 ". It has 13 bytes, and transmits one message every two seconds. When CAN-Bus’s data receive/transmit normally, this message stops transmitting.



Note: re-power after completed configuration, need to check "hex display" and "send as hex".

6.3 Test in TCP Client mode

Make sure GCAN-202 is in TCP client mode.

CAN1 Info

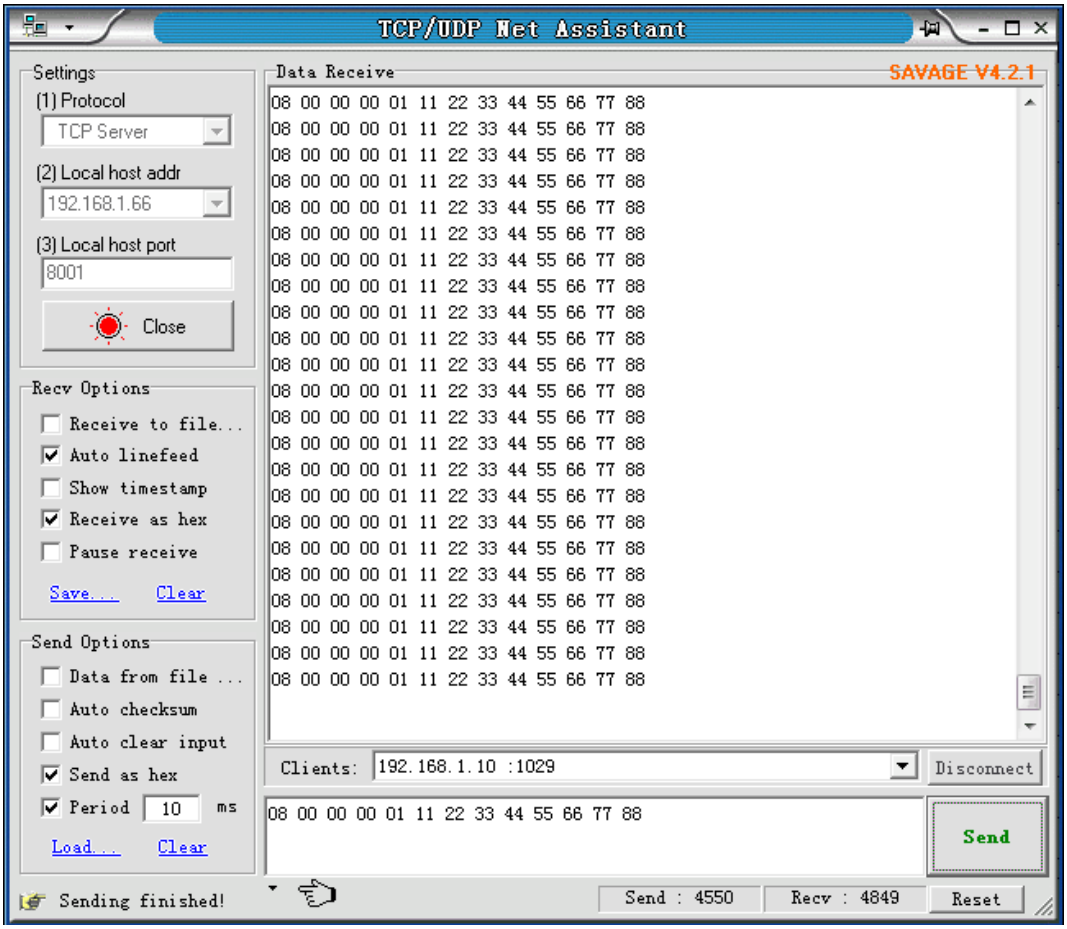
Items	Value
Tcp Port	4001
Can Baud	5
Can Mode	0
Can Filter	0
Tcp Mode	2
Remote IP	192. 168. 1. 66
Remote Port	8001

Open "Net Assist"

Choose protocol of "TCP Sever"

Fill in the "Local host add"

Fill in the "Local host port" (default: 8001)



Note: re-power after complete configuration. "Receive as hex" and "send as hex" must be ticked.

6.4 Test in UDP mode

Make sure GCAN-202 is in UDP mode.

CAN1 Info

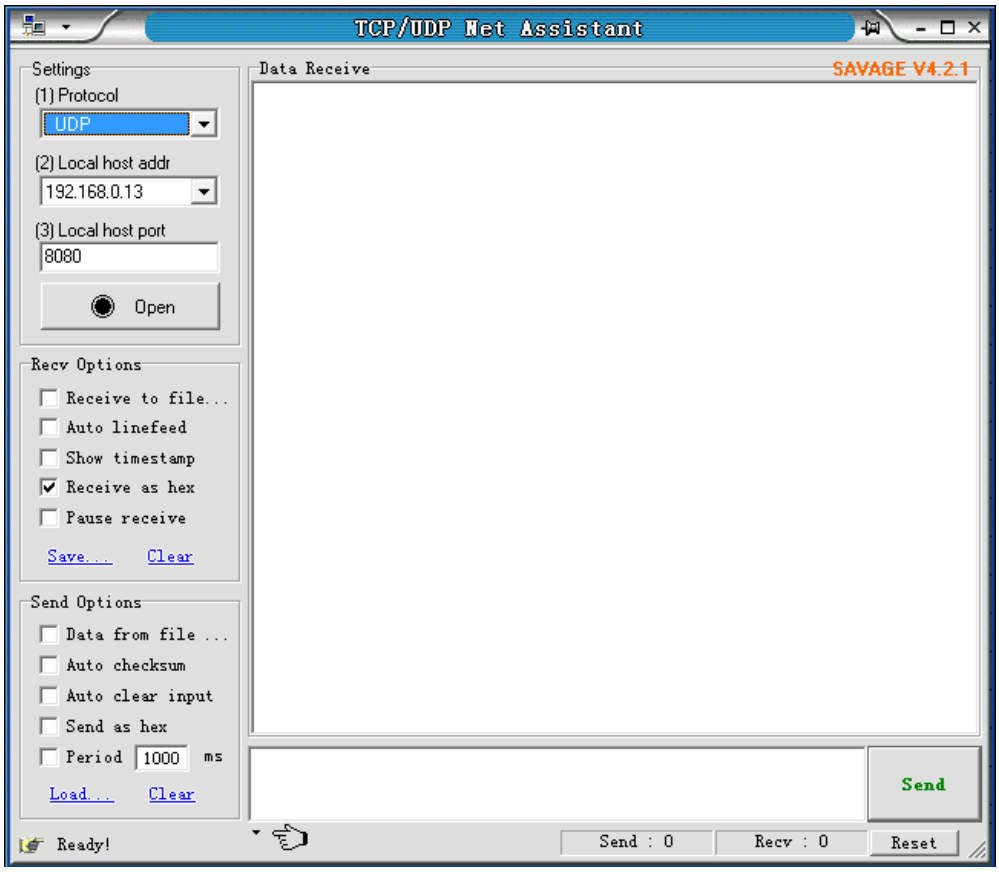
Items	Value
Tcp Port	4001
Can Baud	5
Can Mode	0
Can Filter	0
Tcp Mode	3
Remote IP	192. 168. 1. 66
Remote Port	8001

Open "Net Assist"

Choose protocol of "UDP"

Fill in the "Local host addr"

Fill in the "Local host port" (default: 8001)



Please note: re-power after complete configuration. "Receive as hex" and "send as hex" must be ticked.

7 Baud rate modification online

7.1 Function Description

In TCP Sever mode, GCAN-202 supports CAN-Bus baud rate modification online via Ethernet. Write the instructions into the upper computer to achieve modification of baud rate. It's more concise and faster.

7.2 Format Description

The instructions should be sent via Ethernet, as shown in table. Only Byte6, 7, 8, 10 can be modified.

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8	Byte9	Byte10	Byte11	Byte12	Byte13
10	00	00	08	01	baud rate set/take effect		CAN1/ CAN2	00	baud rate	00	00	00

Byte6, Byte7: 02 01 means baud rate set; 0B 03 takes effect immediately.

Byte8: 01 means CAN 1; 02 means CAN 2

Byte10: 00=1000K, 01=800K, 02=666K, 03=500K, 04=400K, 05=250K, 06=200K, 07=125K, 08=100K, 09=80K, 10=50K, 11=40K, 12=20K, 13=10K, 14=5K.

7.3 Example

Transmit to GCAN-202:

10 00 00 08 01 02 01 01 00 05 00 00 00 set CAN 1's baud rate, 250K.

GCAN-202 will transmit:

10 00 00 08 01 02 01 01 00 05 00 00 00 modified, take effect after re-power.

Transmit to GCAN-202:

10 00 00 08 01 02 01 02 00 00 00 00 00 set CAN 1's baud rate to 1000K.

GCAN-202 will transmit:

10 00 00 08 01 02 01 02 00 05 00 00 00 modified, take effect after re-power.

Transmit to GCAN-202:

10 00 00 08 01 0B 03 01 00 05 00 00 00 CAN 1 & CAN 2 baud rate setting

take effect immediately.

GCAN-202 will transmit:

10 00 00 08 01 02 01 01 00 05 01 00 00 earlier modified take effect immediately.

Note: these three group data should be sent in order. If the message of "take effect immediately" not be transmit, it will take effect after re-power.

8 Secondary development

Depend on needs, Ethernet can achieve the function configuration of integrating with GCAN-202 in the specific upper computer by configuration protocol. Meanwhile detail library and explanation can be offered to secondary development.

Also the source code of "CANet test" software provided can achieve secondary development.

"Net Assist" software can test Ethernet Socket communication. And all of these support Socket communication.

9 Technical specifications

Connection	
PC	Ethernet, RJ45
CAN	OPEN3 terminal
Interface	
Ethernet	10/100M auto-detect
CAN	ISO 11898 standard, support CAN2.0A/B
CAN baud rate	5Kbit/s~1Mbit/s
Isolation	3000V, DC-DC
CAN terminal resister	Integrated, code switch to enable
Power	
Voltage	+9~30V DC
Current	50mA (24V DC)
Environment	
Temperature	-40℃~+85℃
Humidness	15%~90%RH, without condensation
EMC test	EN 55024:2011-09 EN 55022:2011-12
IP grade	IP 20
Basic	
Dimension	118mm *93mm *23mm
Weight	220g

Appendix A: CAN2.0B protocol frame format

CAN2.0 standard frame

CAN standard frame information is 11 bytes, including two parts: information and data parts. The three bytes at the beginning are the information parts.

Byte \ Bit	7	6	5	4	3	2	1	0
1	FF	RTR	×	×	DLC			
2	(Message identifier)				ID.10—ID.3			
3	ID.2—ID.0			×	×	×	×	×
4	data 1							
5	data 2							
6	data 3							
7	data 4							
8	data 5							
9	data 6							
10	data 7							
11	data 8							

Figure A1

Byte 1: frame information

Bit7 (FF): frame format

FF=0: standard frame

FF=1: in the extend frame

Bit6 (RTR): type of frame

RTR=0: data frame

RTR=1: remote frame

Bit0~Bit3 (DLC): the actual data length in the data frame.

Byte 2~3: message ID, 11bits are valid.

Byte 4~11 are the actual data of the data frame, remote frame (RTR=1) is invalid.

CAN2.0 extend frame

CAN extend frame information is 13 bytes, including two parts, information and data parts. The five bytes at the beginning are the information parts.

Bit / Byte	7	6	5	4	3	2	1	0
1	FF	RTR	×	×	DLC			
2	(Message identifier) ID.28—ID.21							
3	ID.20—ID.13							
2	ID.12—ID.5							
3	ID.4—ID.0					×	×	×
4	data 1							
5	data 2							
6	data 3							
7	data 4							
8	data 5							
9	data 6							
10	data 7							
11	data 8							

Figure A2

Byte 1: frame information

Bit 7(FF): frame format

FF=0: standard frame

FF=1: in the extend frame

Bit6 (RTR): type of frame

RTR=0: data frame

RTR=1: remote frame

Bit0~Bit3 (DLC): the actual data length in the data frame.

Byte 2~5: message ID, 29bits are valid.

Byte 6~13 are the actual data of the data frame, remote frame(RTR=1) is invalid.

Appendix B: definition of data flow

Multiple data of CAN-Bus is in one Ethernet data.

Definition of Ethernet & CAN-Bus data flow:

One frame data contains 13 bytes.

Frame information include length & type,1 byte in length.

BIT7							BIT0
FF	RTR	Reserved	Reserved	B3	B2	B1	B0

FF: Standard frame & Extended frame identification bit, 1=Extended frame, 0=Standard frame.

RTR: Remote frame & data frame identification bit, 1=Remote frame, 0=data frame.

B3~B0: data length, the length of CAN frame.

Frame ID: 4 byte in length, standard frame has 11 bits,Extended frame has 29 bits.

High byte			Low byte
12h	34h	56h	78h

Extended frame ID: 0X12345678

High byte			Low byte
00h	00h	01h	23h

Extended frame ID: 0X123

Frame data: 8 byte in length, the valid length decide by frame information B3~B0

DATA1							DATA8
11h	22h	33h	44h	55h	66h	77h	88h

As above is the valid data of 8 bytes.

DATA1							DATA8
11h	22h	33h	44h	55h	66h	77h	88h

As above is the valid data of 5 bytes.

For example:

A extend frame data: 8 byte in length, frame ID 0×12345678, valid data of 8 bytes(11h,22h,33h,44h,55h,66h,77h,88h).

88h	12h	34h	56h	78h	11h	22h	33h	44h	55h	66h	77h	88h

Note: Every frame must be 13 bytes, must complement 0 if don't have enough 13 bytes in both case: frame ID is less than 4 bytes or frame data is less than 8 bytes.

Sales and service

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