N83624 Series Programming Guide
CANDBC Protocol

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1 Preface

Dear Customers,

First of all, we greatly appreciate your choice of N83624 series battery simulator (N83624 for short). We are also honored to introduce our company, Hunan Next Generation Instrumental T&C Tech. Co., Ltd. (NGI for short).

About Company

NGI is a professional manufacturer of intelligent equipment and test & control instruments, mainly engaged in design, production, sales, installations and maintenance of instruments and meters, electronic products, mechanical equipment, automatic test systems, computer software, automatic control equipment, automatic monitoring and alarm systems.

NGI maintains close cooperation with many universities and scientific research institutions, and maintains close ties with many industry leaders. We strive to develop high-quality, technology-leading products, provide high-end technologies, and continue to explore new industry measurement and control solutions.

About Manual

This manual is applied to N83624 series battery simulator, including programming guide based on CANDBC protocol. The copyright of the manual is owned by NGI. Due to the upgrade of instrument, this manual may be revised without notice in future versions.

This manual has been reviewed carefully by NGI for the technical accuracy. The manufacturer declines all responsibility for possible errors in this operation manual, if due to misprints or errors in copying. The manufacturer is not liable for malfunctioning if the product has not correctly been operated.

To ensure the safety and correct use of N83624, please read this manual carefully, especially the safety instructions.

Please keep this manual for future use.

Thanks for your trust and support.

2 Safety Instructions

In the operation and maintenance of the instrument, please strictly comply with the following safety instructions. Any performance regardless of attentions or specific warnings in other chapters of the manual may impair the protective functions provided by the instrument.
NGI shall not be liable for the results caused by the neglect of those instructions.

2.1 Safety Notes

- **Confirm the AC input voltage before supplying power**.
- **Reliable grounding**: Before operation, the instrument must be reliably grounded to avoid the electric shock.
- **Confirm the fuse**: Ensure to have installed the fuse correctly.
- **Do not open the chassis**: The operator cannot open the instrument chassis. Non-professional operators are not allowed to maintain or adjust it.
- **Do not operate under hazardous conditions**: Do not operate the instrument under flammable or explosive conditions.
- **Confirm the working range**: Make sure the DUT is within N83624's rated range.

2.2 Safety Symbols

Please refer to the following table for definitions of international symbols used on the instrument or in the user manual.

Table 1

Symbol	Definition	Symbol	Definition
⎓	DC (direct current)	N	Null line or neutral line
~	AC (alternating current)	L	Live line
≂	AC and DC	I	Power-on
3~	Three-phase current	O	Power-off
⏚	Ground	⏻	Back-up power
⏚	Protective ground	▭	Power-on state
⏚	Chassis ground	▯	Power-off state
⊥	Signal ground	⚠	Risk of electric shock
WARNING	Hazardous sign	⚠	High temperature warning
Caution	Be careful	⚠	Warning

3 CANDBC Overview

DBC file is a CAN bus diagnostic file format. It is an XML format file used to define CAN bus communication protocol in the Controller Area Network (CAN) bus diagnostic tool. DBC files contain CAN communication signals, message IDs, data lengths, cycles and other information, which can help developers develop, test, diagnose and analyze CAN communication protocols.

4 Communication Method

The CAN protocol used by N83624 supports CAN DBC protocol. Before use, please connect CAN interface and configure CAN interface parameters. For example, please set the extension ID starting address to 1. Please refer to the corresponding user manual for specific methods. The process of N83624 remote control through CAN is as follows:

1. Set the extended ID starting address to 1. Note: The IDs of channel 1-channel 24 are 24*(N-1)+1 respectively. N is the starting address of the extended ID.
2. Factory default CAN baud rate: 250K (adjustable, effective after restart)
3. The PC sends a message to set the upload cycle to the device, and N83624 starts uploading information.
4. The PC sends a setting message to the device and sets the N83624 parameters.

Subsequent chapters will introduce specific interaction messages and setting messages in detail.

5 CAN Frame Format Introduction

Different CAN analysis tools display different requirements and fields. The actual tool shall prevail. The following content will describe the meaning of some fields in different tools for reference during use.

In conventional tools, users need to pay attention to the extended frame ID (hereinafter referred to as frame ID) and frame data when sending CAN commands.

For example, send the command to set the upload cycle:

Frame ID	Frame Data	Remark
0x00010071	E8 03 00 00 30 20 00 00	Set upload cycle to 1000ms

Detailed introduction:

The calculation method of frame ID: sending and receiving direction (1bit) + channel ID (12bit) + register starting address (16bit). In this document, the CAN Address (channel ID) is 01 as an example. The frame ID is detailed as follows:

Sending and receiving direction	0-PC sending 1-PC receiving
Channel ID	Related to the extended ID starting address. For example, set the extended ID starting address to 1. Note: The IDs of channel 1-channel 24 are 24*(N-1)+1 respectively. N is the starting address of the extended ID.
Register starting address	Device register address. See below for details.

Frame data: Different functions correspond to different instructions and different parameter values. For details, please refer to the command introduction in subsequent chapters.

Example frame description:

Data E8 03 00 00, converted to hexadecimal, is 0x000003E8 = 1000, which means setting the device's upload cycle to 1000ms.

6 Commands

6.1 Upload

6.1.1 Upload Readback Voltage and Current

Frame ID requirements:

Sending and receiving direction: 1

Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.

Register starting address: 3

For channel 1, the frame ID is 0x10010003.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	Readback voltage data bit	0.00001V	N/A	Signed
BYTE2				
BYTE3				

BYTE4				
BYTE5	Readback current data bit	0.00001mA	N/A	Signed
BYTE6				
BYTE7				
BYTE8				

Note: After the upload cycle is set by writing the upload switch in the upload command, the device automatically uploads.

6.1.2 Upload Readback Power and mAh

Frame ID requirements:
Sending and receiving direction: 1
Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.
Register starting address: 5
For channel 1, the frame ID is 0x10010005.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	Readback power data bit	0.001V	N/A	Unsigned
BYTE2				
BYTE3				
BYTE4				
BYTE5	Readback mAh data bit	0.01mAh	N/A	Unsigned
BYTE6				
BYTE7				
BYTE8				

6.1.3 Upload Channel Status and Event

Frame ID requirements:
Sending and receiving direction: 1
Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.
Register starting address: 1
For channel 1, the frame ID is 0x10010001.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	Readback status data bit	1	N/A	Unsigned
BYTE2				
BYTE3				
BYTE4				
BYTE5	Readback event data bit	1	N/A	Unsigned
BYTE6				
BYTE7				
BYTE8				

Note: Bit 0: ON/OFF status

Bit 1: over voltage protection

Bit 2: over current protection

Bit 3: over power protection

Bit 4: over temperature protection

Bit 16-18: readback range, 0 for high range, 1 for medium range, 2 for low range

6.2 Output Control

6.2.1 Current Setting

Frame ID requirements:
Sending and receiving direction: 0
Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.
Register starting address: 21
For channel 1, the frame ID is 0x10015.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	Setting current data bit	0.000001mA	N/A	Unsigned
BYTE2				
BYTE3				
BYTE4				
BYTE5	Rev			

BYTE6				
BYTE7				
BYTE8				

6.2.2 Voltage Setting

Frame ID requirements:
Sending and receiving direction: 0
Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.
Register starting address: 20
For channel 1, the frame ID is 0x10014.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	Setting voltage data bit	0.000001V	N/A	Unsigned
BYTE2				
BYTE3				
BYTE4				
BYTE5	Rev			
BYTE6				
BYTE7				
BYTE8				

6.2.3 Upload Cycle Setting

Frame ID requirements:
Sending and receiving direction: 0
Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.
Register starting address: 113
For channel 1, the frame ID is 0x10071.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	Setting upload cycle data bit	1	N/A	Unsigned
BYTE2				
BYTE3				

BYTE4				
BYTE5	Rev			
BYTE6				
BYTE7				
BYTE8				

6.2.4 ON/OFF Setting

Frame ID requirements:
Sending and receiving direction: 0
Channel ID: 24*(N-1)+1. N is the configured extended ID starting address.
Register starting address: 10
For channel 1, the frame ID is 0x1000A.

Format requirement

Byte	Data	Unit Coefficient	Offset	Remark
BYTE1	0-OFF	1	N/A	Unsigned
BYTE2	1-ON			
BYTE3				
BYTE4				
BYTE5	Rev			
BYTE6				
BYTE7				
BYTE8				

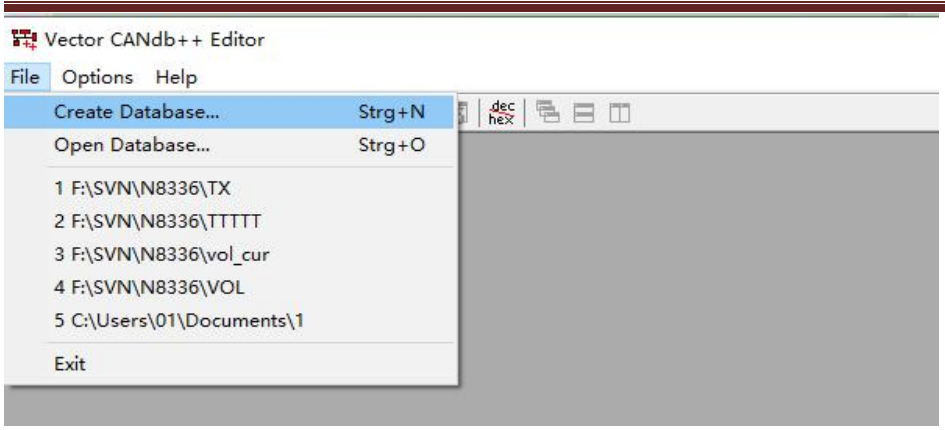
7 DBC Test Method

7.1 Environment Requirement

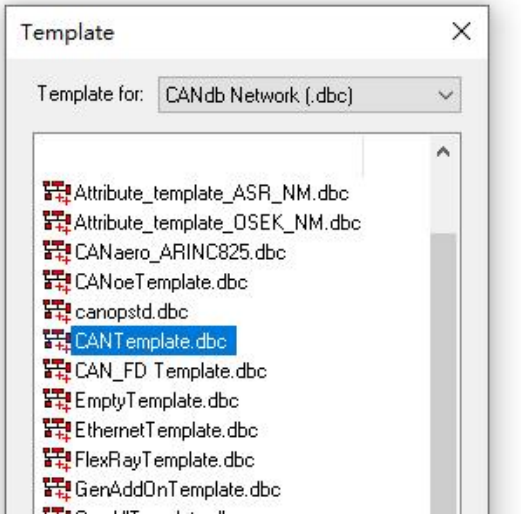
Operating system: win7 and above operating system, memory 2G or above
Installation software: CANdb++ 3.1, CANPro protocol analysis platform

7.2 DBC File Generation

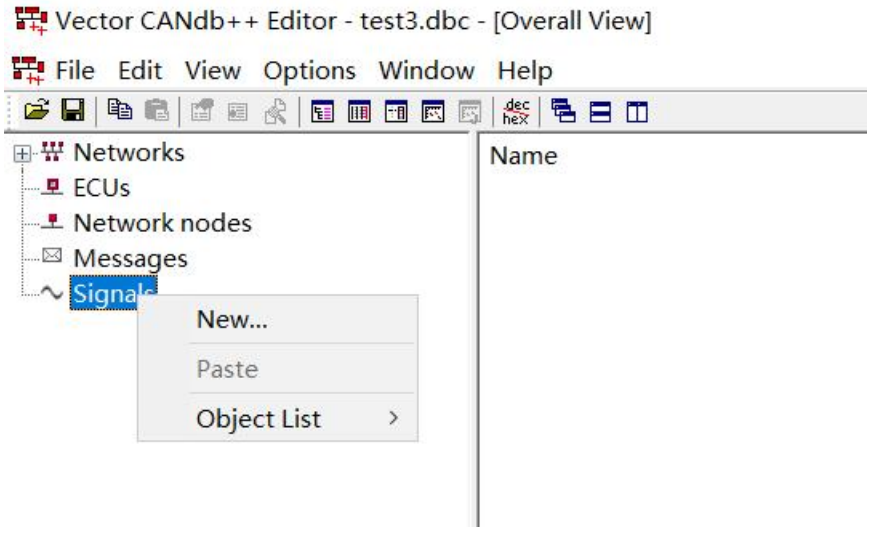
1) Open CANdb++ software, click File->Create Database



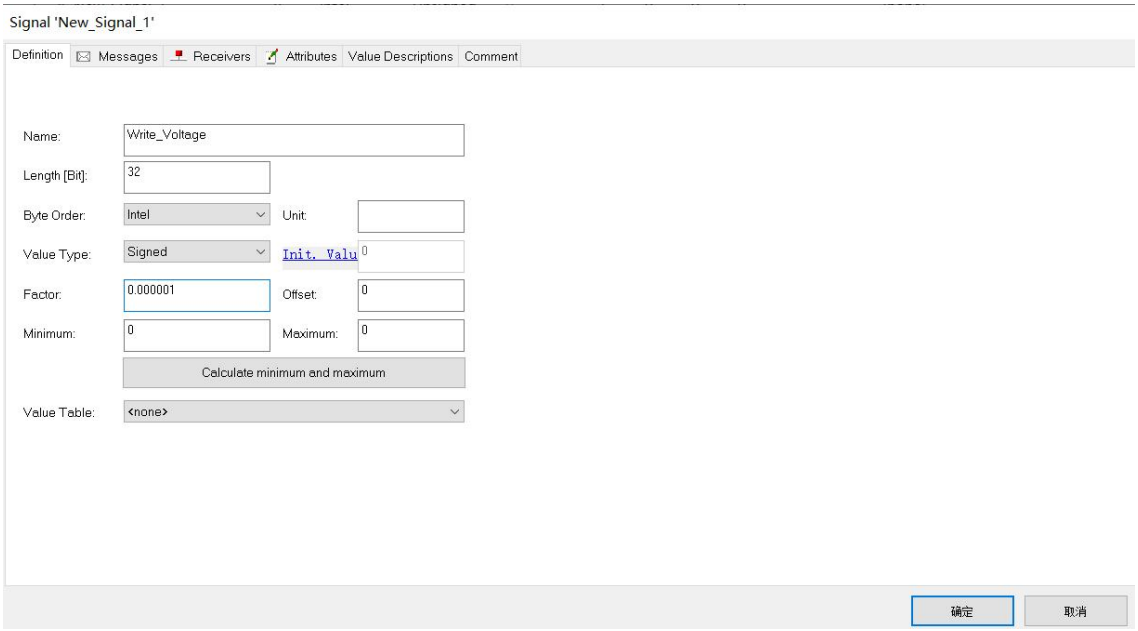
2) Select CANTemplate.dbc, click OK, save the file in the project file and name it.



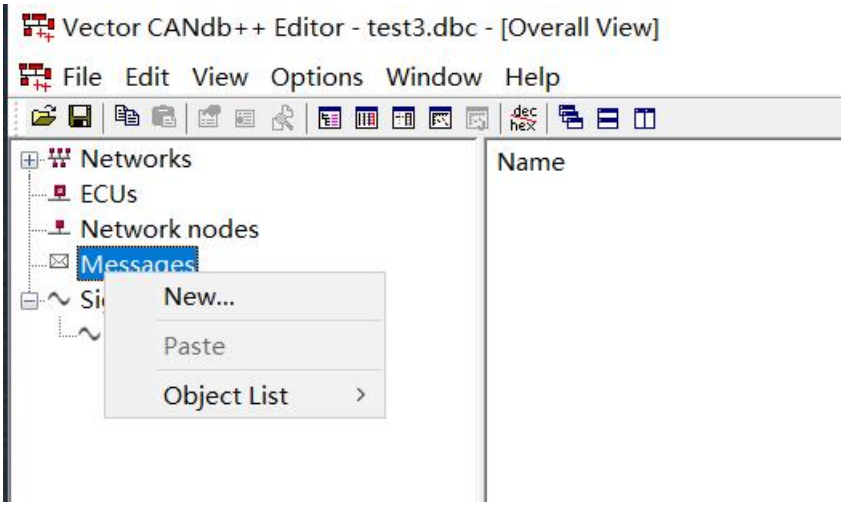
3) Click Signals, right click and select New.



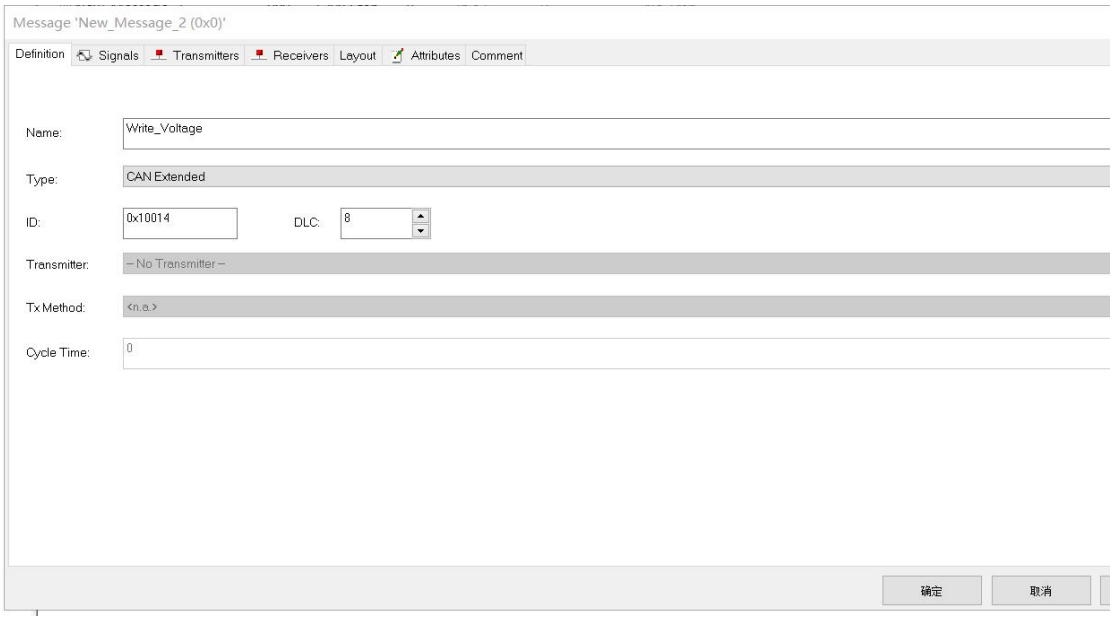
4) Fill the below edit box according to the requirement and click OK.



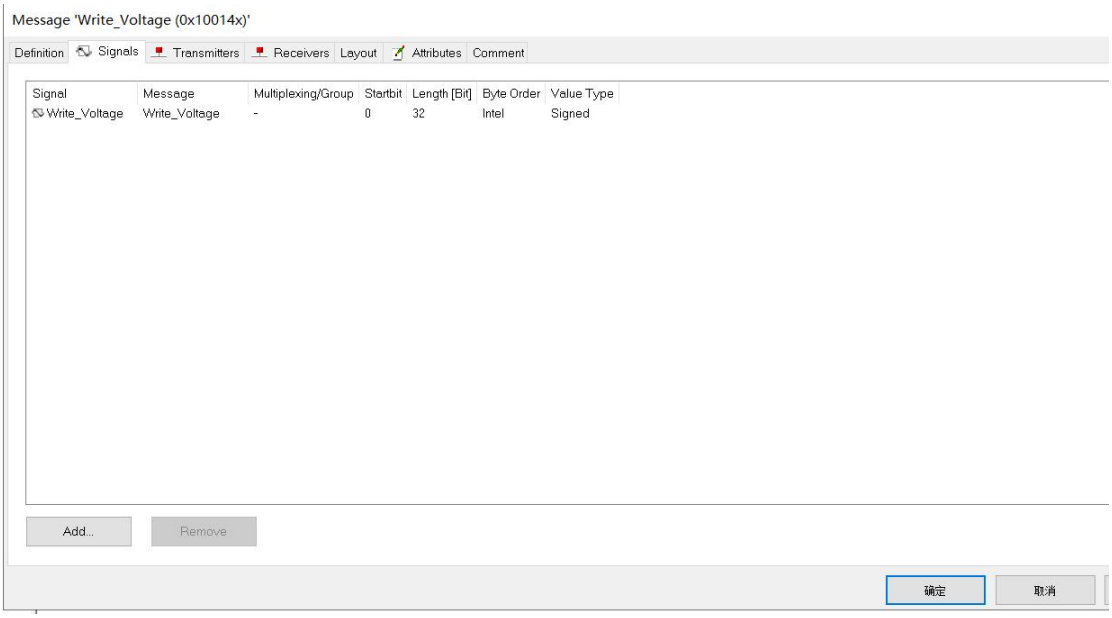
5) Click Messages, right click and select New.



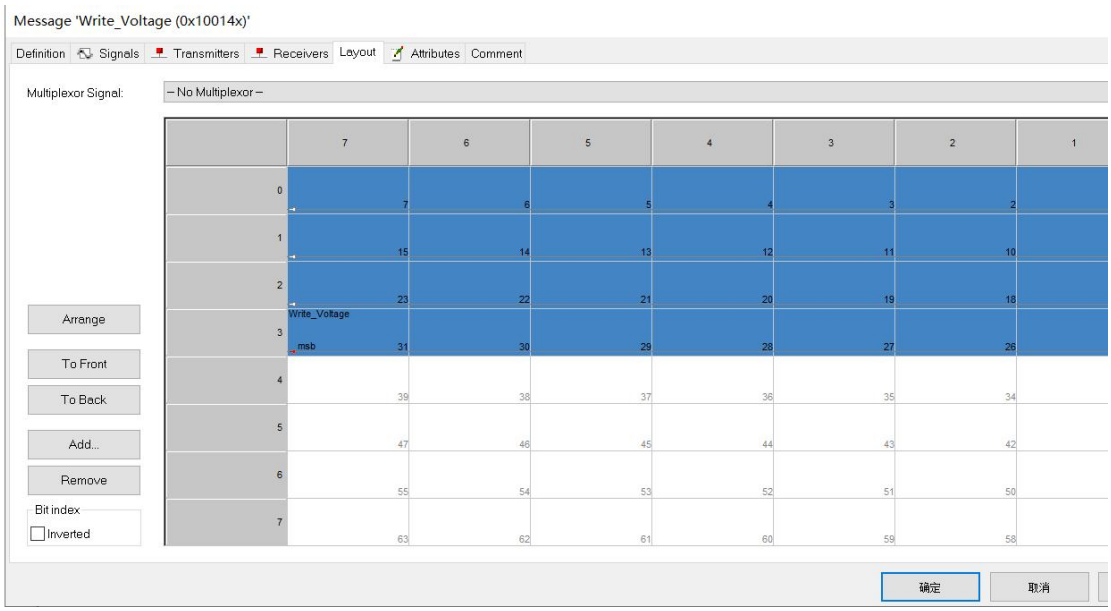
6) Fill the below edit box according to the requirement.



7) Click Signals and Add.

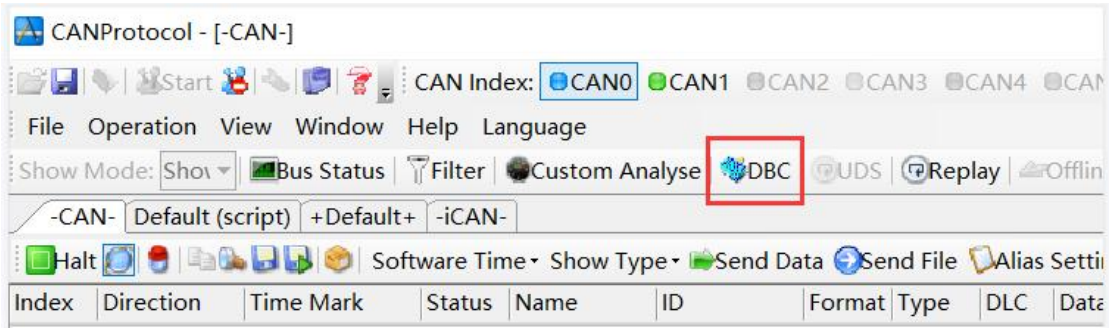


8) Select the required signal, click Layout, select the position for the signal in the whole data frame, click OK. Until now, DBC file is completed.



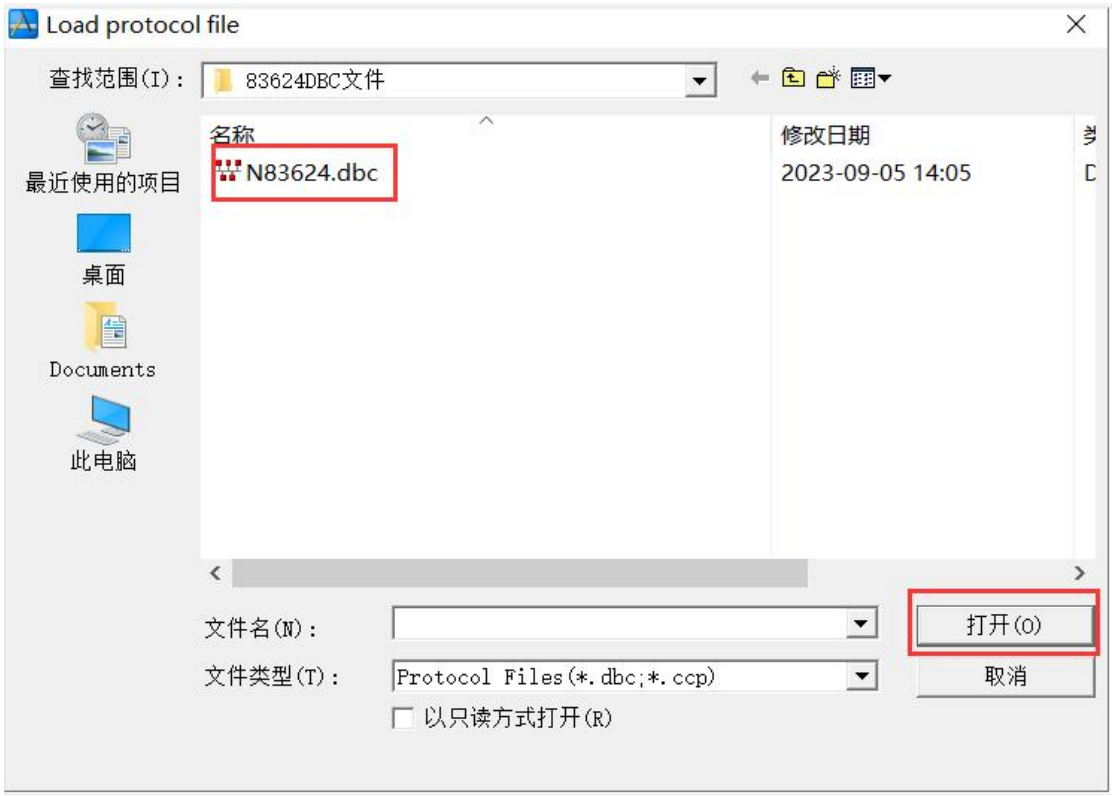
7.3 DBC File Application

1) Start CANPro, click the item in the below red box.

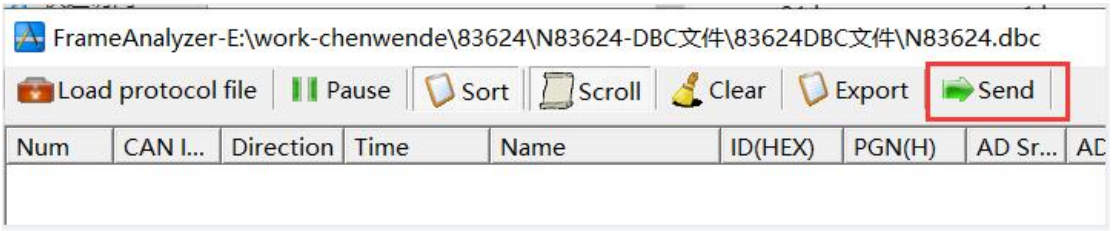


2) Click Upload protocol file

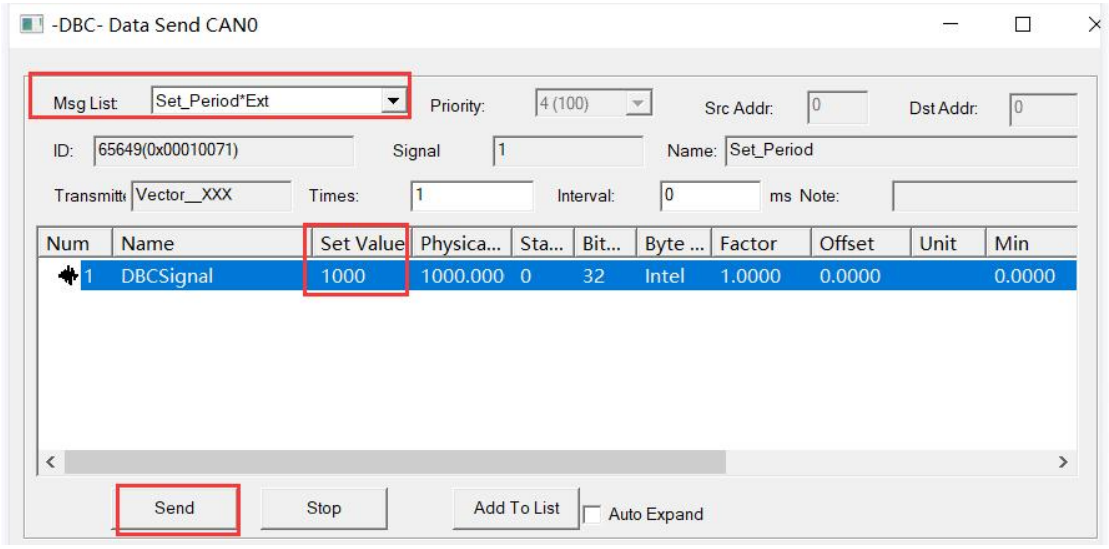
3) Select the DBC file and click open.



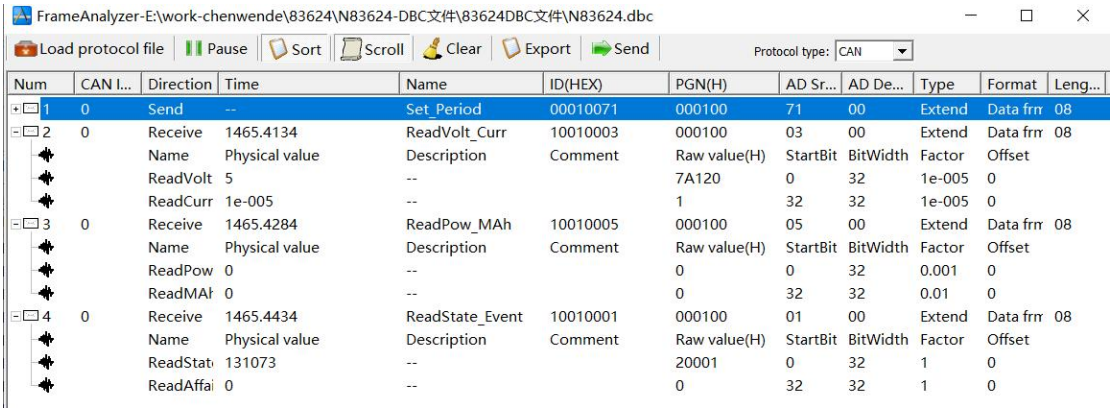
4) Click Send.



5) Click Message List, select Set_Period*Ext, set value to 1000ms, click Send.



6) You can see the information uploaded.



7.4 Attention

If you use CANPro to parse the DBC file, you need to use a text editing tool to open the generated xxx.dbc file and change the scientific notation of the coefficients to ordinary data expression, as shown below. The picture on the left is before modification, and the picture on the right is after modification.