Hardware IFU—TC1001

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catalogue

1. Product profile

1.1 Product Overview

TC1001 is a portable, easy to install 1-way CAN bus to USB interface device with the highest rate of 1Mbps. The product adopts high-speed USB2.0 interface and PC connection. Windows system drive-free design makes the device have excellent system compatibility.

With the powerful TSMaster software, support loading DBC and ARXML database files, can easily monitor, analyze, simulate CAN bus data, can also support UDS diagnosis, ECU brush, CCP / XCP calibration and other functions.

Can be used for the secondary development API of Windows and Linux, can support various development environments, such as C + +, C #, LabView, Python, etc., convenient integration into various test systems, efficient and easy to use.

1.2 Typical applications

✓ Vehicle CAN bus data collection

✓ Domain Controller Test

✓ Various automated test systems

1.3 Functions and parameters

1.3.1 Functional characteristics

✓ US (microsecond) level hardware message timestamp to meet higher order requirements.

✓ Portable design, unique designed mounting holes for easy integration into various devices or instrument panels.

✓ High-speed USB2.0 interface, Windows, Linux system system drive-free design, with excellent system compatibility.

✓ CAN channel DC2500V sequestration.

✓ Automotive grade design, support for dbc file, a2l file, blf file, asc file.

✓ CAN channel port rate 125 Kbps—1Mbps tunable.

✓ Support for blf, asc format data recording and offline / online playback.

✓ The UDS diagnosis and CCP calibration can be supported.

✓ Support for the UDS-based Flash Bootloader.

✓ Support Windows, Linux system secondary development interface.

✓ Built-in 120 euro terminal resistance can be used in software configuration.

✓ Loadable TSMaster all charge license.

1.3.2 Technical parameters

channel	1 *CAN
PC terminal interface	High-speed of USB2.0
CAN terminal interface	DB9
drive	Windows, Linux system free drive free design, with excellent system compatibility
cache	Hardware cache, each channel send buffer support to 1000 frames CAN
CAN	Support CAN2.0A, B protocol, comply with ISO11898-1 specification, port rate 125 Kbps—1Mbps
Time stamp accuracy	1us, the hardware message timestamp, to meet the high-order requirements
terminal resistance	Built-in 120 euro terminal resistance can be used in software configuration
Send a message per second *	Maximum of 20,000 frames / s
Receipt of message messages per second *	Maximum of 20,000 frames / s
insulate	CAN channel DC 2500V isolation, electrostatic grade contact discharge ± 8KV
supply electricity	USB supply electricity
Case material	plastics
working temperature	-40℃～80℃
Working humidity	10% ~ 90% (no condensation)
work environment	Stay away from the corrosive gases

* Single-channel 1Mbps, 0-byte data domain case

1.3.3 Electrical parameters

parameter		test condition	least value	represent ative value	crest value	unit
working voltage	USB supply electricity	CAN sending and receiving	5.10	5.12	5.14	V
working current	USB supply electricity	CAN channels	0.15	0.17	0.19	A
power	USB supply electricity	CAN channels	0.77	0.87	0.98	W
CAN joggle	Bus pin pressure resistance	CANH、CAHL	-42	--	42	V
	terminal resistance	Enable terminal resistance	--	120	--	Ω
	Isolation and pressure resistance	The leakage current is less than 1 mA	2500	--	--	VDC

Note: CAN load is full when sent and receiving.

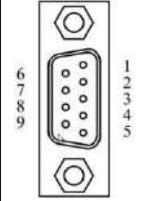## 1.4 Shipping list

✓ TC1001 Host machine

2. Hardware interface description

2.1 Interface description

- USB high-speed 2.0 interface;
- DB9 Male：

DB9 pin	pin	definition
	PIN2	CAN_Low
	PIN3	CAN_GND
	PIN5	CAN_Shield
	PIN7	CAN_High

2.2 LED indicator light instructions

Physical picture of the indicator light:

Instructions for indicator light:

pilot lamp	definition
CAN	The CAN channel indicator lamp
LINK	Hardware connection indicator light

Description of the color of the indicator light:

pigment	description
LINK green light	The device hardware is connected
CAN green light	The CAN channel data frame is sent or received correctly
CANred lantern	The CAN channel sends or receives incorrect frames, configuration, protocol, or wiring errors

Note: The flicker frequency depends on the bus load.

3. Quick use

3.1 Download and install the TSMaster host computer

TSMaster Software download link：   .

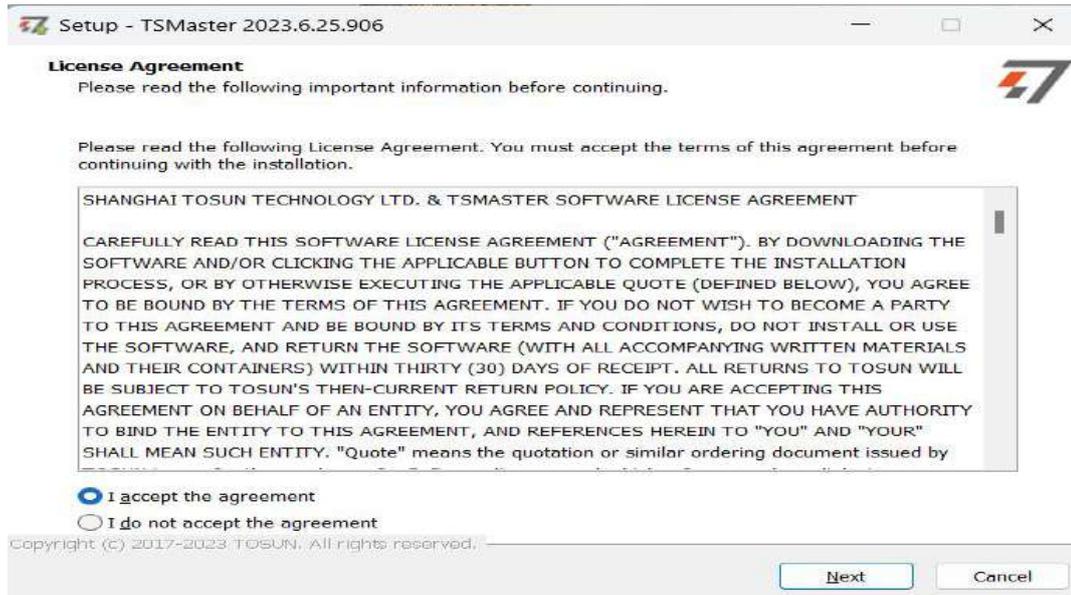http://www.tosun.tech/TOSUNSoftware/TSMaster_Setup_beta.exe

If not accessible, you can contact the corresponding sales staff or log in to the official website of the same star to get the upper machine, and you can also scan the code to follow the public account to get the download link.
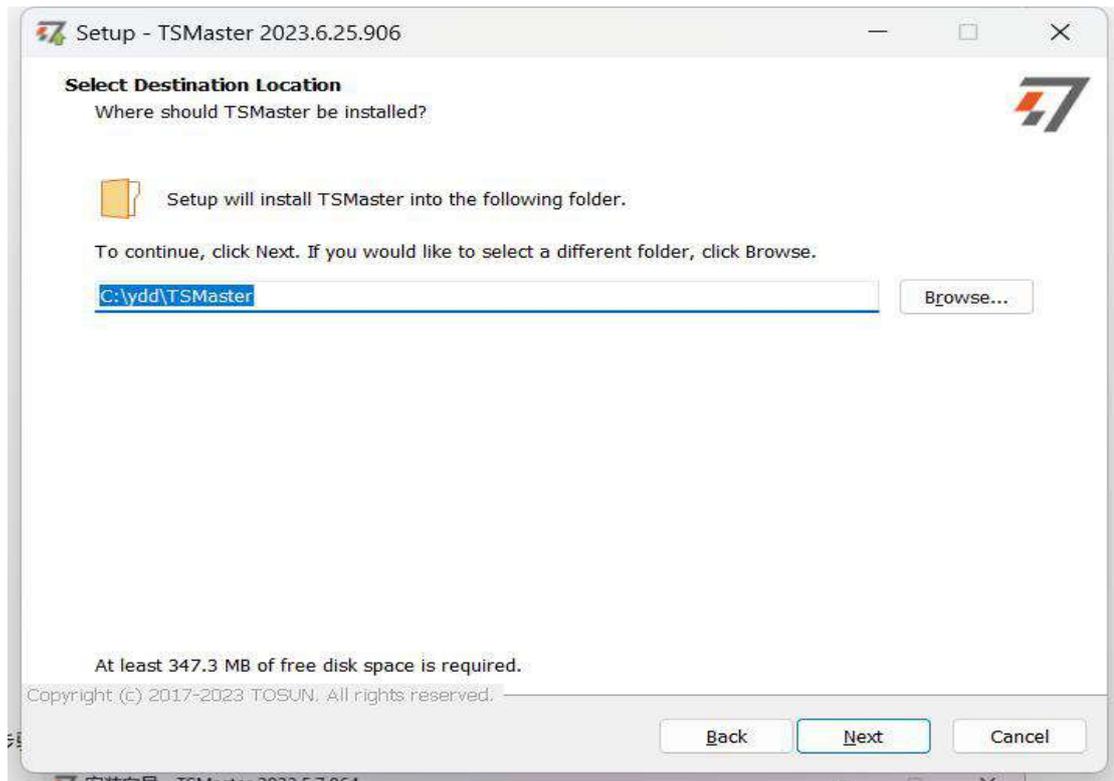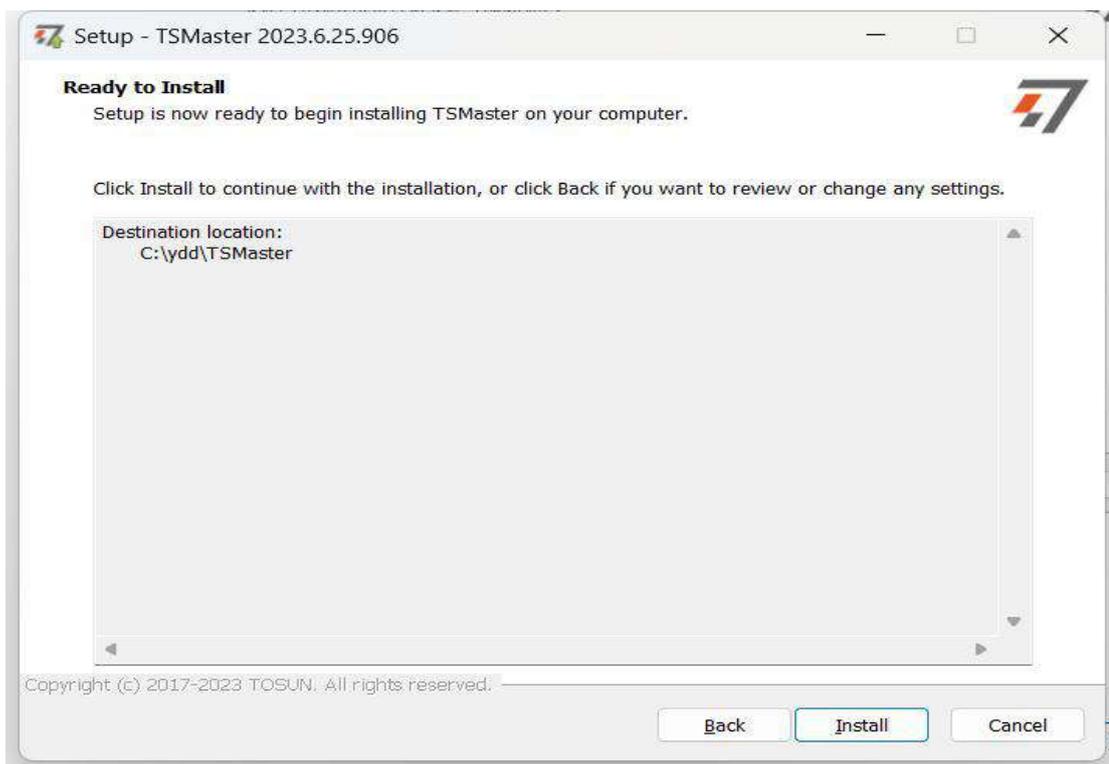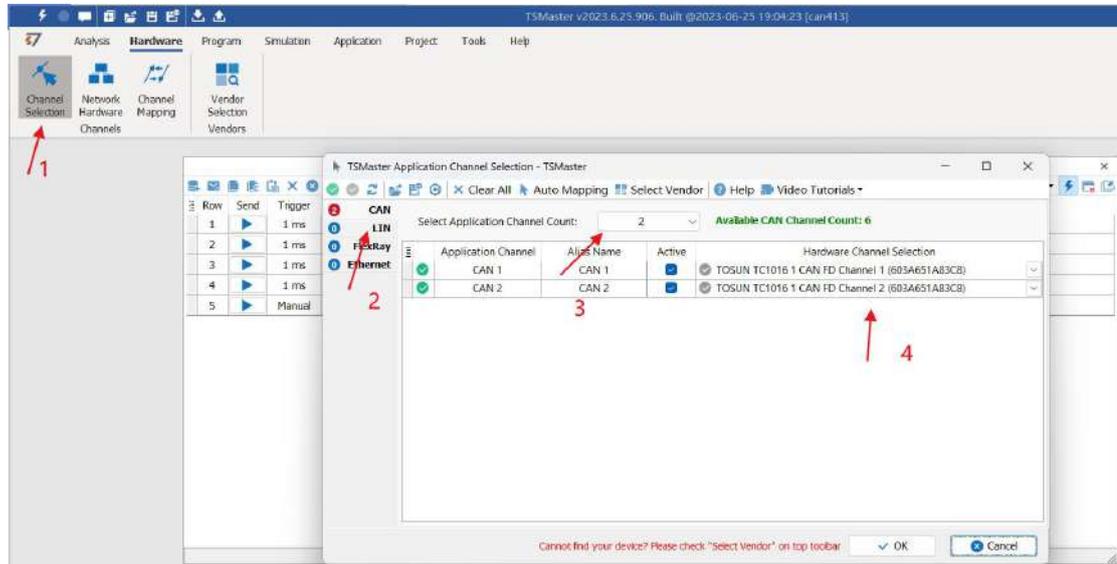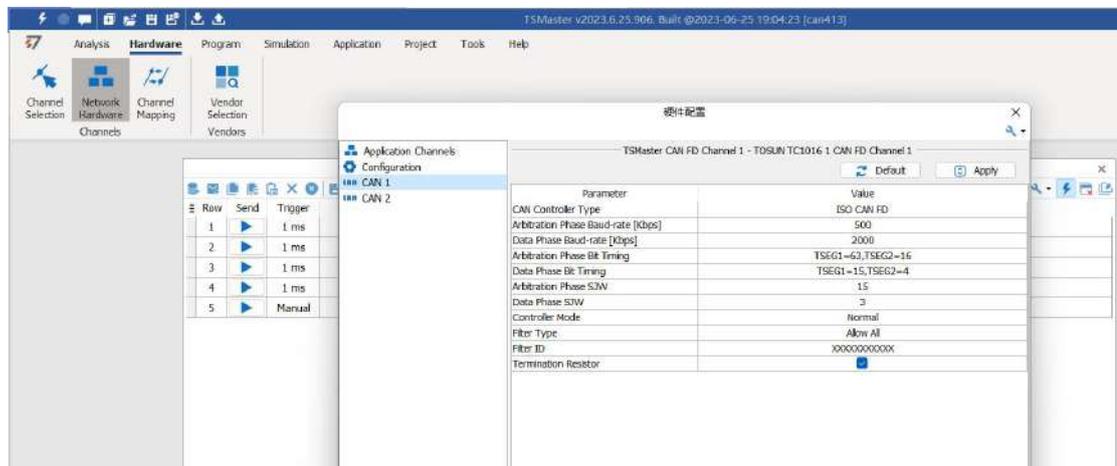

Step 1:

Step 2:

Step 3:

Step 4:

Complete installation:

3.2 Connect devices and configure channels

All TOSUN devices are drive-free, and can connect directly without download driver.

In TSMaster software interface: Click Hardware-click channel selection-drop-down box Select number of channels-select hardware channel-click OK
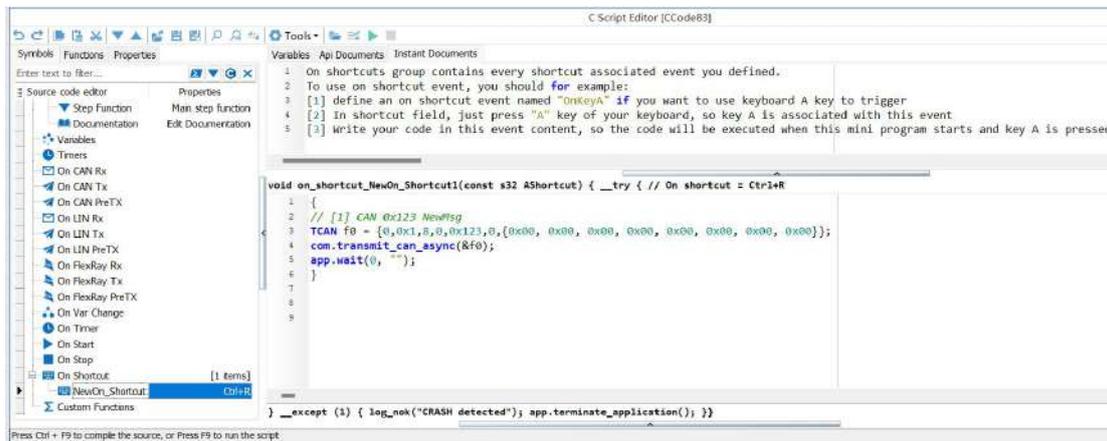

In the hardware configuration, the CAN / CAN FD protocol can be switched, and the baud rate and switch terminal resistance can be adjusted. After the configuration is completed, click application can take effect.

3.3 Message sending

After the hardware connection is completed and the software is configured, the function of message sending can be realized:

operating steps:

a. Message Send-Add CAN / CAN FD message to send

b. Right mouse button to create a new original message / add a message from the database, and set the message name / identifier / channel, etc

c. Message am trigger setting, manual trigger / cycle trigger, cycle trigger can set the sending cycle

d. Message information right click can generate a C script to quickly add to the C small program for programming

The following is an example of the a C script:

Support for quick copy and paste to a C script to add send events:

3.4 Help with documentation and video teaching

Various instructions and help manuals are provided in the TSMaster help bar.
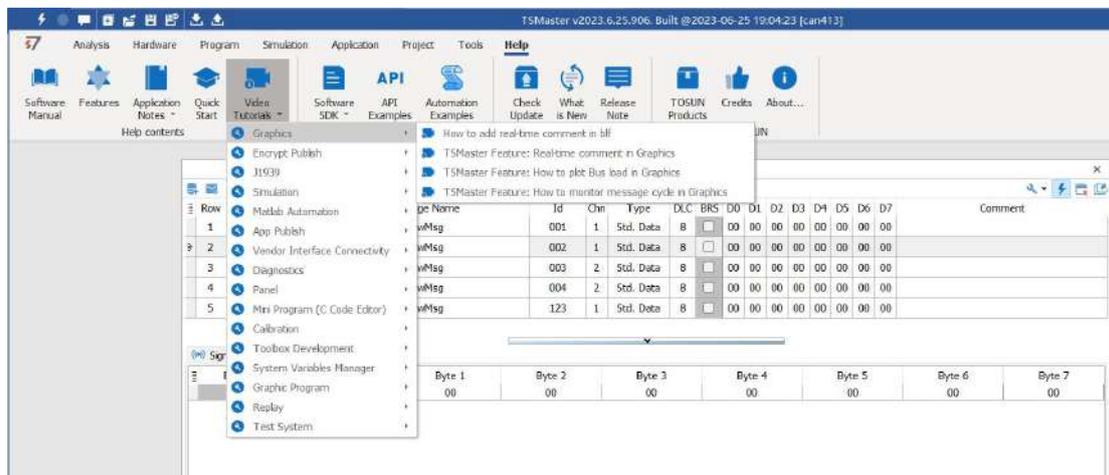
At the same time, a large number of teaching videos can enter B station

 http s: / /space.bilibili.com / 2042371333, follow the tosun intelligent official number, watch all the teaching videos.

3.5 TSMaster API Secondary development

In the TSMaster help bar API routine, a variety of common language API is provided to facilitate users' secondary development. Efficient and easy-to-use secondary development functions that can support all kinds of development environments, such as C, Python, C #, Labview, etc.
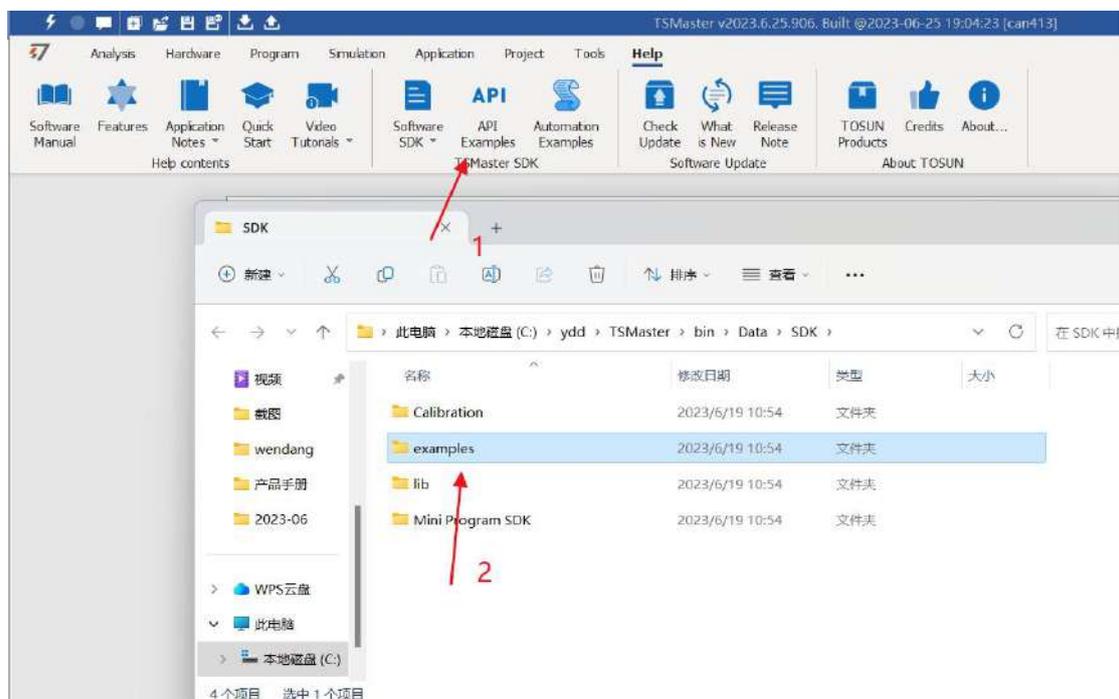
3.5.1 Python calls the dynamic library

Windows32-Position Python:

（1）pip install TSMasterAPI

(2) Using the TSMasterAPI form TSMasterAPI import * for

(3) Example synchronous upload github, address: https: / / github.com/sy950915/TSMasterAPI.git

Windows64 bit Python / Li nux:

（1）pip install libTSCANAPI

(2) Using the TSMasterAPI form libTSCANAPIimport * for

(3) Example synchronous upload github, address: https: / / github.com/sy950915/ libTSCANAPI.git

3.5.2 C calls the dynamic library

(1) Include TSMaster in a file with a path of TSMaster \ bin \ Data \ SDK \ lib \ x86.h header file.

Such as: # include " TSMaster.h"

(2) Include TSMaster in a file with the path TSMaster \ bin \ Data \ SDK \ lib \ x86. The lib file is connected to TSMaster.lib document.

In the C environment, add TSMaster to the Configuration Property connector input additional dependencies in the project property page.lib document.

3.5.3 Example of the calling of the interface

Windows, The Linux system provides the secondary development interface, easy to connect and use the equipment. The operation step are: select channel-generate C code-use C code / python code to call the interface. Take the code C as an example:
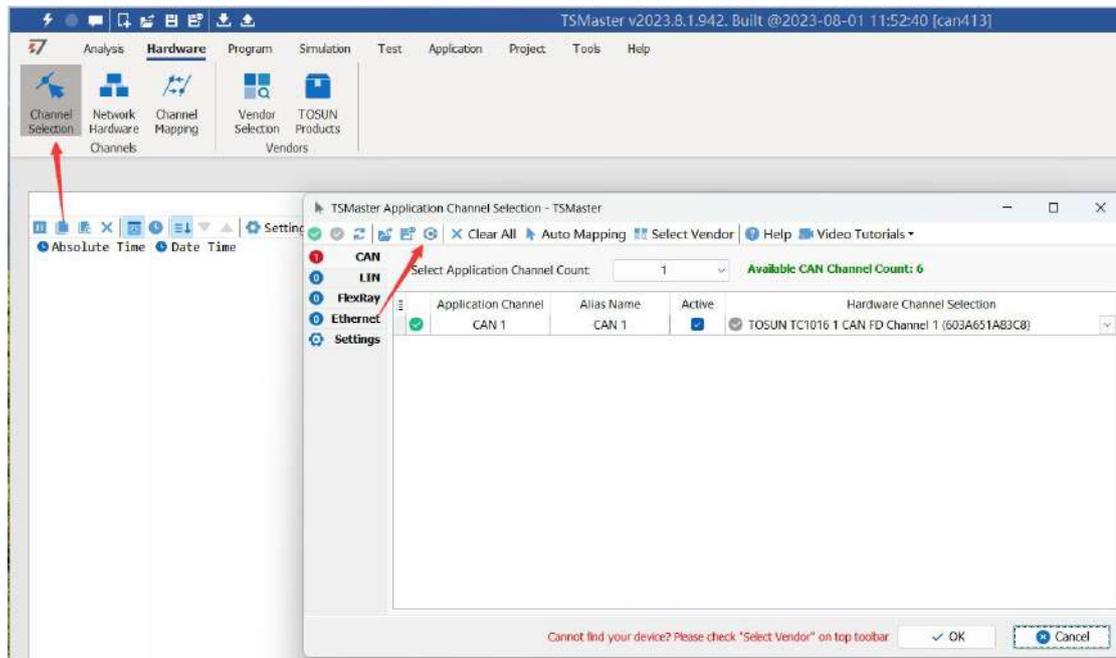
C Script Fragments:

```
 7  C脚本片段

 1  initialize_lib_tsmaster("TSMaster");
 2  tsapp_set_can_channel_count(1);
 3  tsapp_set_lin_channel_count(0);
 4  tsapp_set_flexray_channel_count(0);
 5  tsapp_set_ethernet_channel_count(0);
 6
 7  TLIBTSMapping m;
 8
 9  // TSMaster CAN 通道 1 - TOSUN TC1001 1 CAN 通道 1
10  m.init();
11  sprintf_s(m.FAppName, "%s", "TSMaster");
12  sprintf_s(m.FHWDeviceName, "%s", "TOSUN TC1001");
13  m.FAppChannelIndex = 0;
14  m.FAppChannelType = (TLIBApplicationChannelType)0;
15  m.FHWDeviceType = (TLIBBusToolDeviceType)3;
16  m.FHWDeviceSubType = 3;
17  m.FHWIndex = 0;
18  m.FHWChannelIndex = 0;
19  if (0 != tsapp_set_mapping(&m)) { /* handle error */ };
20
21  if (0 != tsapp_connect()){ /* handle error */ };
22
23  /* do your work here */
24
25  tsapp_disconnect();
26  finalize_lib_tsmaster();
27
```

C script call function description:

initialize _ lib _ tsmaster ("TSMaster"); / / TSMaster initialization function

Tsapp _ set _ can _ channel _ count (1); / / Set the number of can channels

The tsapp _ set _ lin _ channel _ count (0); / / Set the number of lin channels

The tsapp _ set _ flexray _ channel _ count (0); / / Set the number of flexray channels

The tsapp _ set _ ethernet _ channel _ count (0); / / Set the number of ethernet channels

TLIBTSMapping m; / / Initialize the construct

/ / Set the TSMaster CAN channel 1-TOSUN TC1001 CAN channel 1 channel mapping

m. The init (); / / initial construct m

sprintf_s(m. FAppName, "%s", "TSMaster"); / / Print the application name "TSMaster"

sprintf_s(m. FHWDeviceName, "%s", "TOSUN TC1001"); / / Print the hardware device name

m. FAppChannelIndex = 0; / / Application channel index

m. FAppChannelType = (TLIBApplicationChannelType) 0; / / Application channel type

m. FHWDeviceType = (TLIBBusToolDeviceType) 3; / / Hardware device type

m. FHWDeviceSubType = 3; / / corresponding parameters of hardware equipment *

m. FHWIndex = 0; / / Hardware index

m. FHWChannelIndex = 0; / / Hardware channel index

if (0 != Tsapp _ set _ mapping (& m)) {/ * handle error * /}; / / If the return value is not equal to the 0 mapping failure
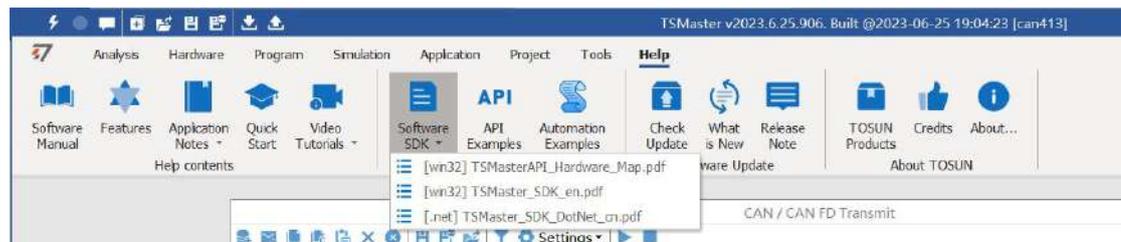
The tsapp _ disconnect(); / / Disconnect the device

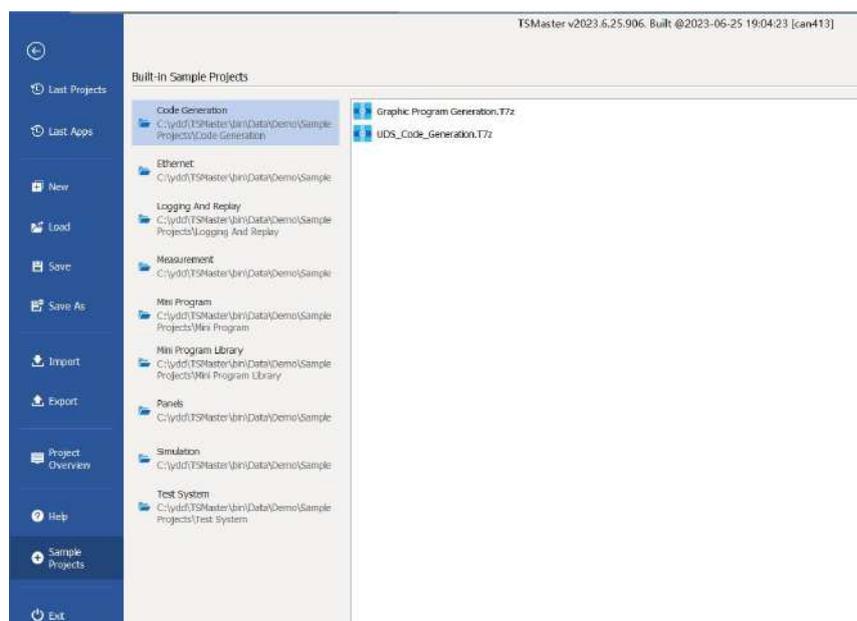finalize _ lib _ tsmaster(); / / Release the C script module

* Note: The corresponding parameters of the hardware equipment can be found in the TSMaster-Help-Software Development Package:

TSMasterAPI_Hardware_Map.pdf

3.6 Sample Works

The example project provides a lot of Demo for user reference, greatly improving the user development efficiency.

4. Inspection and maintenance

TC1001 The main electrical component is the semiconductor component, although it has a long life, it may accelerate aging in the incorrect environment, greatly reducing the life. Therefore, regular inspections should be conducted during the use of the equipment to ensure that the use environment maintains the required conditions. It is recommended to check it up at least once every 6 months to a year. Under adverse environmental conditions, more frequent examinations should be performed. In the table below, if you encounter problems during maintenance, read below to find the possible cause of the problem. If the problem still cannot be solved, please contact Shanghai Tongxing Intelligent Technology Co., LTD.

project	check up	standard	move about
power supply	Check the voltage fluctuation at the power supply side	+12V DC	Use the voltmeter to check the source at the power supply input end. Take the necessary measures to make the voltage fluctuation within the range
surrounding environment	Check the ambient temperature (Including the internal temperature of the enclosed environment)	-40℃~+80℃	Use the thermometer to check the temperature and ensure that the ambient temperature remains within the allowable range
	Check ambient humidity (Including the internal humidity in the closed environment)	Without air conditioning, the relative humidity must be at 10%~90%	Use a humidity meter to check the humidity and ensure that the ambient humidity remains within the allowable range
	Check for the accumulation of dust, powder, salt, and metal debris	No accumulation	Clean and protect the equipment
	Check water, oil, or chemical spray collision into the device	No spray touched the equipment	If the cleaning and protection equipment is required
	Check for corrosive or	No easily	Check by smelling or using

|			
	flammable gases in the equipment area	corrosive or flammable gases	a sensor
	Check the vibration and shock levels	The vibration and shock are within the specified limits	Install the liner or other shock absorber, if required
	Check the noise sources near the equipment	There are no significant noise signal source	Isolation equipment and noise sources or protection equipment
Install wiring	Check the crimp connectors in the external wiring	There is sufficient space between the connectors	Visual scopic inspection adjust if necessary
	Check for the damage to the external wiring	No damage	Visual inspection and replace wiring if necessary

5. Common questions and answers

## 5.1 The line is connected correctly but cannot communicate properly:

Solution: Check if the number of channels is set. If CAN Channel Count = 0, of course no online hardware cannot display. And the software is configured by default virtual channel, you need to select the hardware real channel.
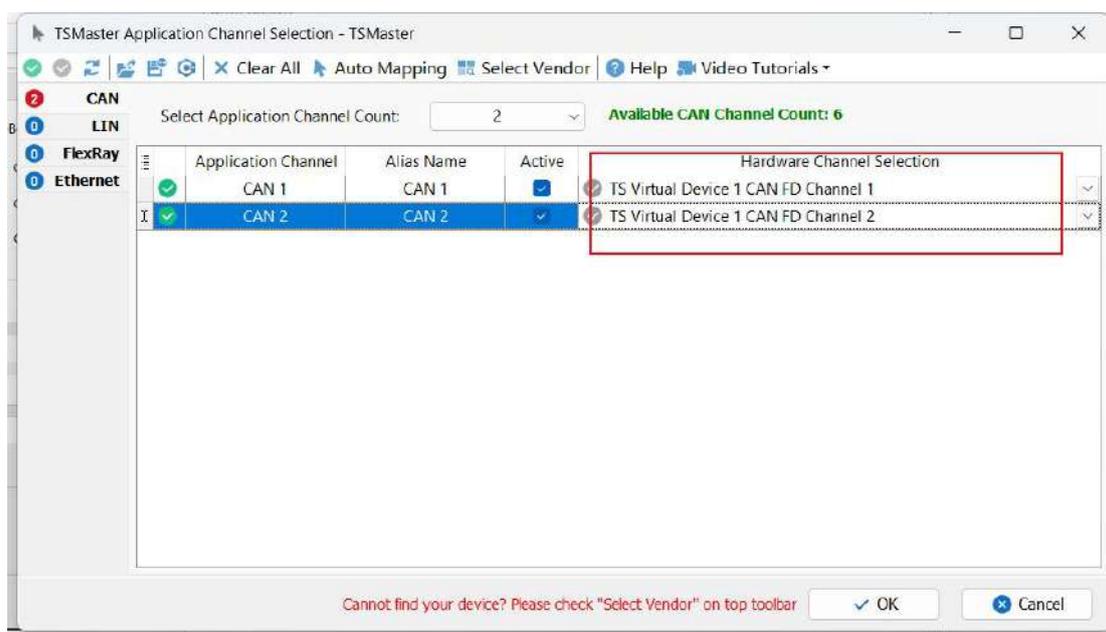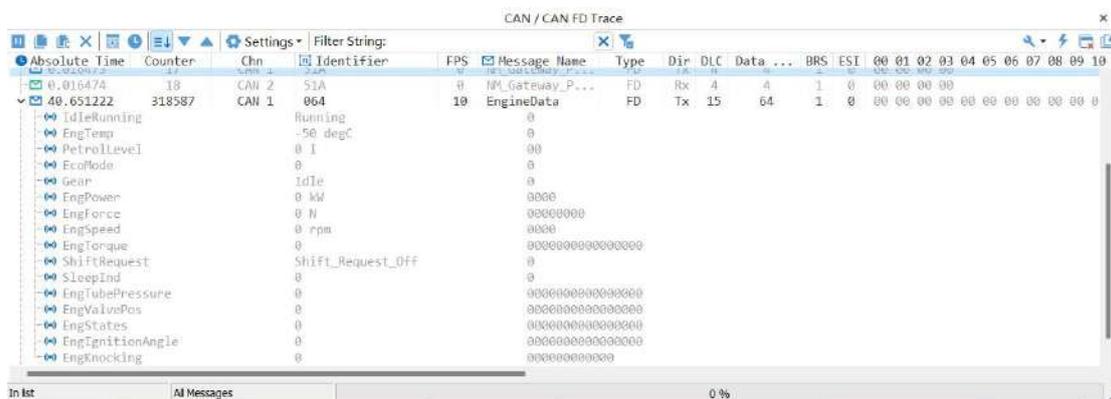

Automatically map or manually click to select the hardware real channel:
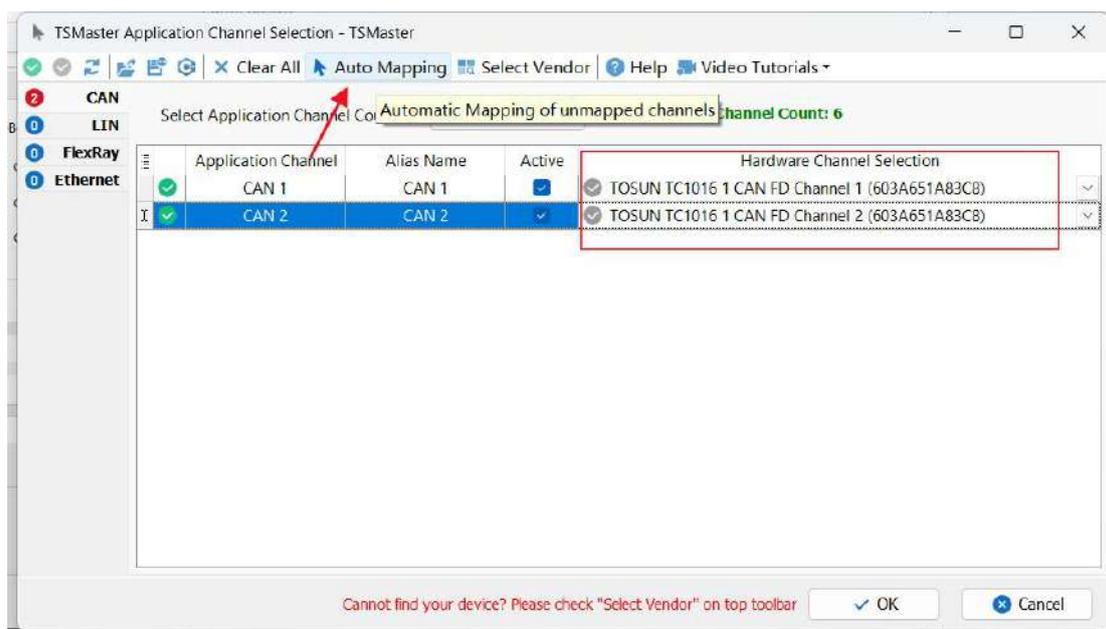
If the channel is selected correctly, it is necessary to ensure consistent port communication between the two channels, as shown in the figure below:
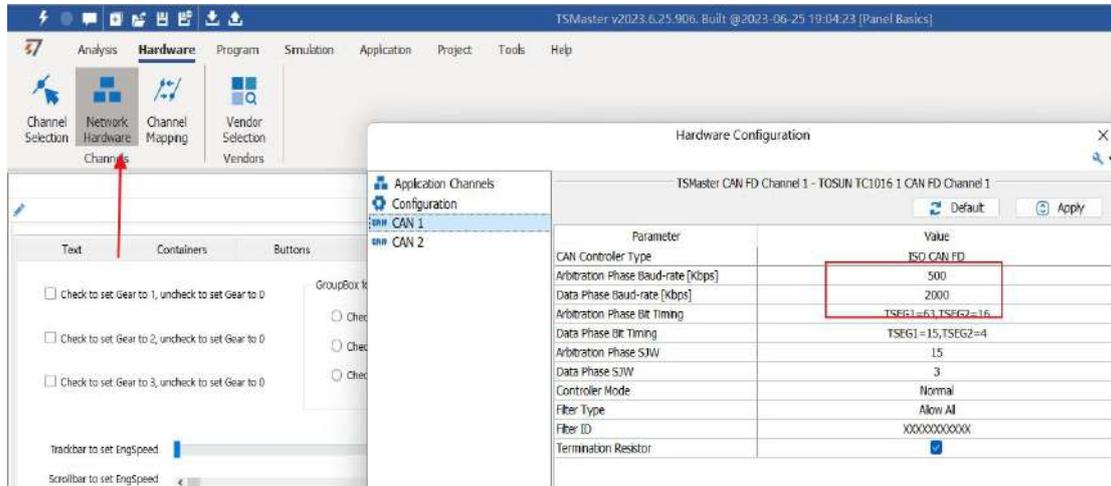
## 5.2 Inconvenient message observation and signal filtering:

Solution: display in a fixed display or time order, expand or fold the signal display, and filter the string, click the following icon to operate:
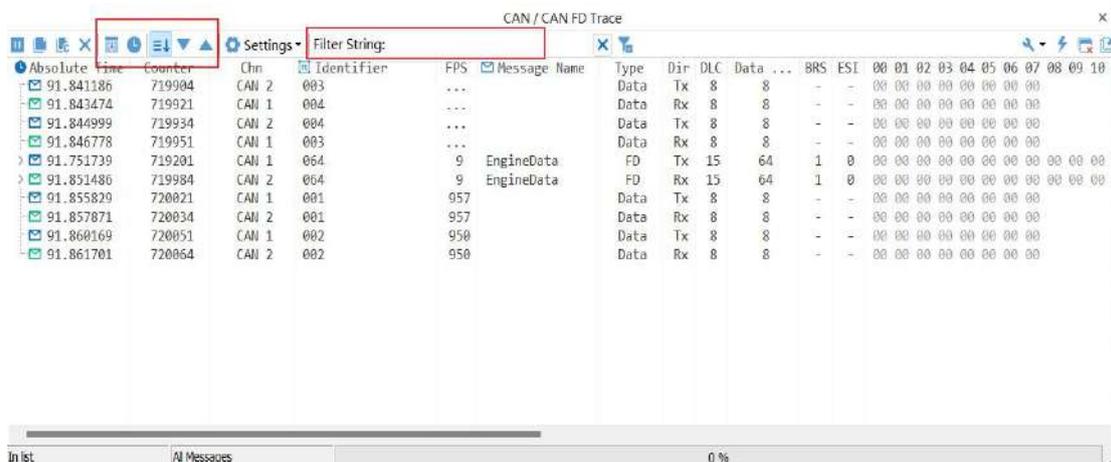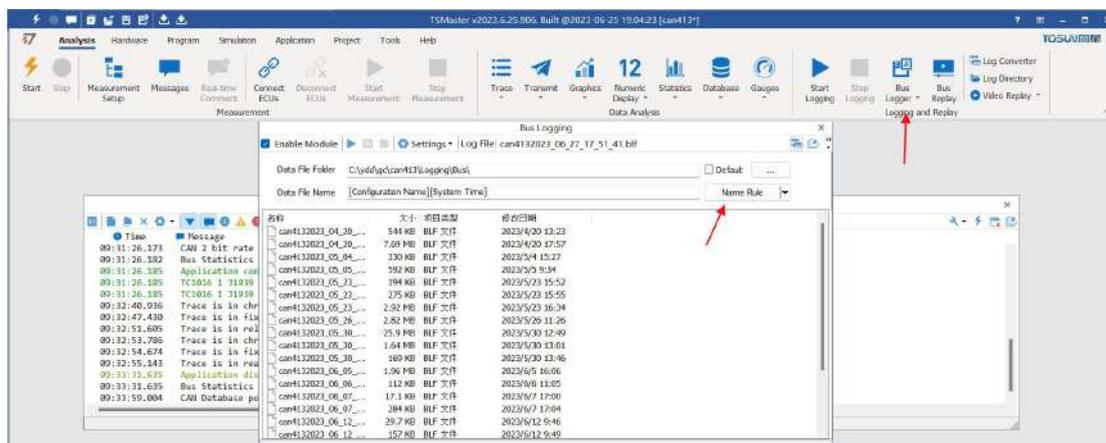
5.3 How to load the database:

Select the can / lin / flexray database, click the upper left corner icon to add the database file, or drag the file directly into this window to be automatically loaded, and then click the left channel to associate the database.
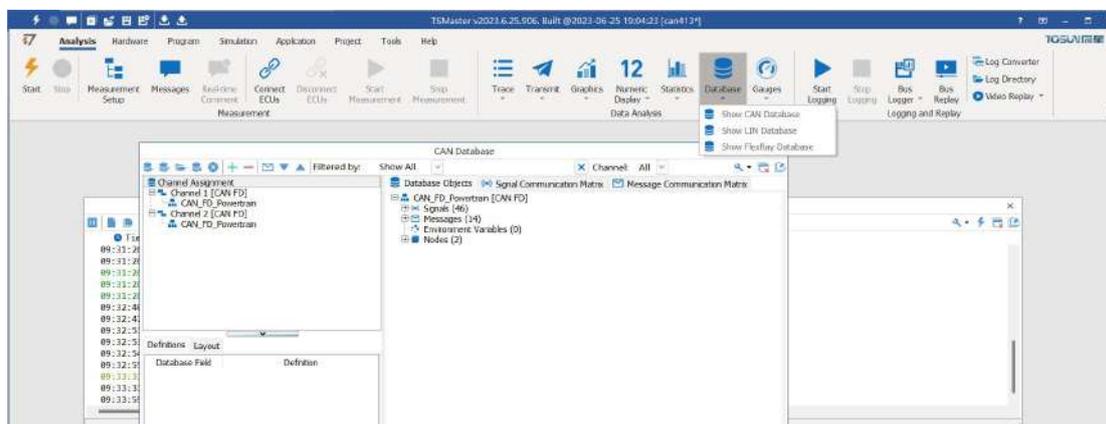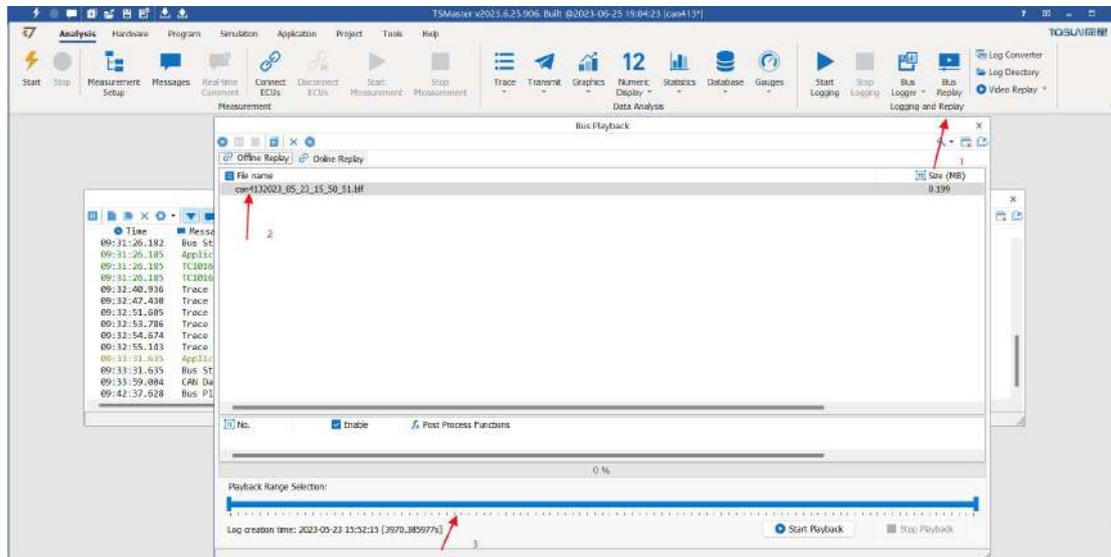

## 5.4 How to automatically record the message messages:

operating steps:

a. Analysis- -bus record

b. Add a name rule to distinguish between different save files

c. Add the self-start function

d. Start the record

## 5.5 How to replay messages (offline and online playback):

operating steps:

a. Bus playback

b. Offline playback, add the need to be played packets, can drag and drop file add directly

c. Select the range of message playback. Since the number of message display window is limited, you can choose the time period required for the message
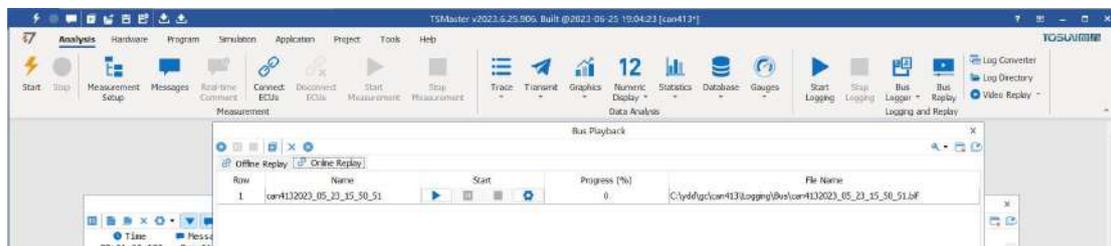
d. Bus playback-online playback-add recording files

e. Online playback can playback the message according to the acquisition time stamp,and set the playback data
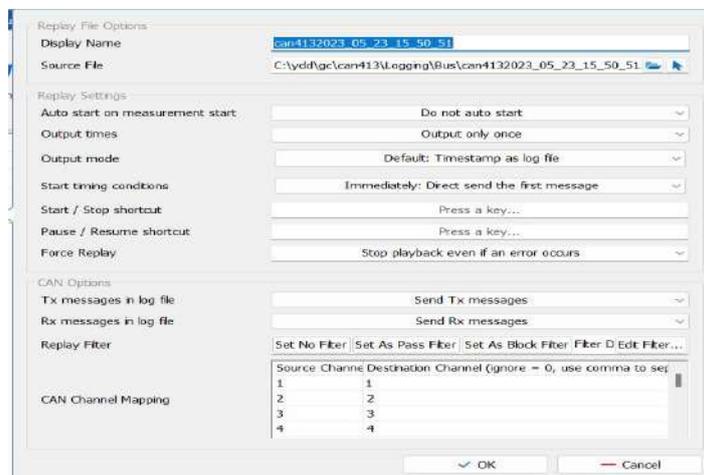
6. Appendix

6.1 CAN 2.0 Standard Frame:

The CAN standard frame information is 11 bytes, consisting of two parts: information and data parts. The first 3 bytes are for the information section.

	7	6	5	4	3	2	1	0
Bytes 1	FF	RTR	x	x	DLC (Data Length)			
Bytes 2	(Message identification code) ID.10-ID.3							
Bytes 3	ID.2-ID.0			x	x	x	x	x
Bytes 4	Data 1							
Bytes 5	Data 2							
Bytes 6	Data 3							
Bytes 7	Data 4							
Bytes 8	Data 5							
Bytes 9	Data 6							
Bytes 10	Data 7							
Bytes 11	Data 8							

Byte 1 is the frame information. The 7th bit (FF) represents the frame format, in the standard frame, FF=0; the 6th bit (RTR) represents the type of frame, RTR = 0 is a data frame, RTR = 1 is a remote frame; the DLC represents the actual length of data at the data frame.

Bytes 2 and 3 are the message identification codes, and the 11 bits are valid.

Bytes 4~11 is actual data of data frame, remote frame is invalid.

6.2 CAN 2.0 Expansion Frame:

CAN extended frame information for 13 bytes, including two parts, information and data parts. The first 5 bytes are for the information section.

	7	6	5	4	3	2	1	0
Bytes 1	FF	RTR	x	x	DLC (Data Length)			
Bytes 2	(Message identification code) ID.28-ID.21							
Bytes 3	ID.20-ID.13							
Bytes 4	ID.12-ID.5							
Bytes 5	ID.4-ID.0					x	x	x
Bytes 6	Data 1							
Bytes 7	Data 2							
Bytes 8	Data 3							
Bytes 9	Data 4							
Bytes 10	Data 5							
Bytes 11	Data 6							
Bytes 12	Data 7							
Bytes 13	Data 8							

Byte 1 is the frame information. The 7th (FF) indicates the frame format, FF = 1; the 6th (RTR)

It represents the type of frame, RTR = 0 as a data frame and RTR = 1 as a remote frame; DLC represents the actual data length at the data frame.

Byte 2~5 is the message identification code, and its high 29 bits is valid.

Bytes 6~13 is actual data of data frame, remote frame is invalid.

6.3 matters need attention

① Connect the lines to avoid short circuit.

② Before using the equipment, please carefully check the pin information in the product manual.

③ During the operation of the equipment, be sure to connect the power cord correctly and avoid plugging and unplugging.

④ Attention! Damage caused by electrostatic discharge (ESD).

7. disclaimer

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