

TOSUN-TC1013

User Manual

tosunai.com

Product Features & Interface Overview

CAN FD to USB Interface

Product Name	Channel
TC1013	CAN FD * 2

Copyright Information

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Typical Application

- Vehicle multi-channel CAN FD / CAN bus data acquisition
- Domain Controller Test
- Various automated test systems

Product Highlights

- High Precision

Hardware-level timestamp accuracy in the microsecond range, providing precise timing references for advance simulation and diagnostics.

- Plug-and-Play Compatibility

High-speed USB 2.0 driver-free design. Fully plug-and-play under Windows and Linux with excellent system compatibility.

- Safe and Reliable

2500 VDC galvanic isolation per CAN channel. Automotive-grade design ensures stability under harsh conditions.

- Flexible Configuration

Software-configurable 120Ω CAN termination.

- Ecosystem Integration

Fully compatible with mainstream formats such as DBC, A2, BLF, ASC. Seamless integration with all TSMaster licensed features.

- Professional Toolset

Supports BLF and ASC data logging and playback, UDS diagnostics, CCP/XCP calibration, and Flash Bootloader operations.

- Open and Extensible

Supports Windows, Linux system secondary development interfaces.

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1. Introduction

The TC1013 is a portable and easy-to-integrate dual-channel CAN FD–to–USB interface device, supporting data rates up to 8Mbps. It connects to a PC via a high-speed USB 2.0 interface, and its driver-free design for Windows ensures excellent system compatibility.

When used together with the powerful TSMaster software, the device supports loading DBC and ARXML database files, enabling convenient monitoring, analysis, and simulation of CAN FD bus traffic. It also supports UDS diagnostics, ECU flashing, and CCP/XCP calibration.

Cross-platform secondary development APIs are provided for both Windows and Linux, supporting a wide range of development environments including C++, C#, LabVIEW, Python, and more, making it easy to integrate into various automated test systems with high efficiency.

1.1. Technical Specifications

Parameter	Description
Channel	2 *CAN FD
PC Interface	High-speed of USB 2.0
CAN Interface	DB9
Driver	Windows, Linux system free drive design, with excellent system compatibility
Buffer	Hardware buffer; each channel supports up to 1000 CAN/CAN FD frames in the transmit queue
CAN	Support CAN 2.0A/B protocol, compliant with ISO 11898-1; baud rate adjustable from 125kbps to 1Mbps
CAN FD	Support both ISO and non-ISO CAN FD standards; baud rate adjustable from 125kbps to 8Mbps
Timestamp Accuracy	1μs hardware timestamp, meeting advanced timing requirements
Termination Resistor	Built-in 120-ohm resistor, software configurable
Tx Frame Rate *	Up to 20,000 frames/s
Rx Frame Rate *	Up to 20,000 frames/s

Isolation	2500VDC galvanic isolation on CAN channels; ±8kV ESD (contact discharge)
Power Supply	USB powered
Enclosure Material	Plastic
Operating Temperature	-40℃～80℃
Operating Humidity	10% ~ 90% RH (no condensation)
Operating Environment	Keep away from the corrosive gases

Measured under single-channel operation at 1Mbps with a 0-byte data field.

1.2. Electrical Specifications

➢ Power Characteristics

Parameter	Condition	Min	Typ.	Max	Unit
Operating Voltage	Two CAN delivery channels	5.09	5.10	5.11	V
Operating Current	Two CAN delivery channels	0.14	0.17	0.22	A
Power Consumption	Two CAN delivery channels	0.71	0.87	1.12	W

➢ CAN Interface Characteristics

Parameter	Condition	Min	Typ.	Max	Unit
Bus Pin Tolerance	CANH, CANL	-42	--	42	V
Termination Resistance	Enabled	--	120	--	Ω
Isolation Voltage	Leakage current < 1 mA	2500	--	--	VDC

1.3. Pin Definition



Figure 1-1 Hardware Appearance

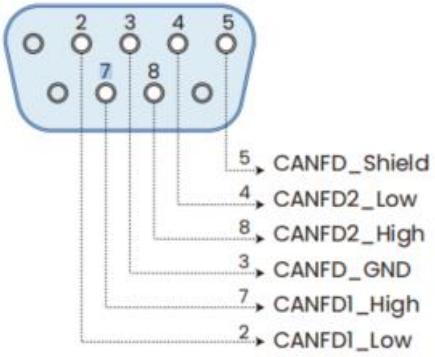


Figure 1-2 Pin Definition

1.4. LED Indicators

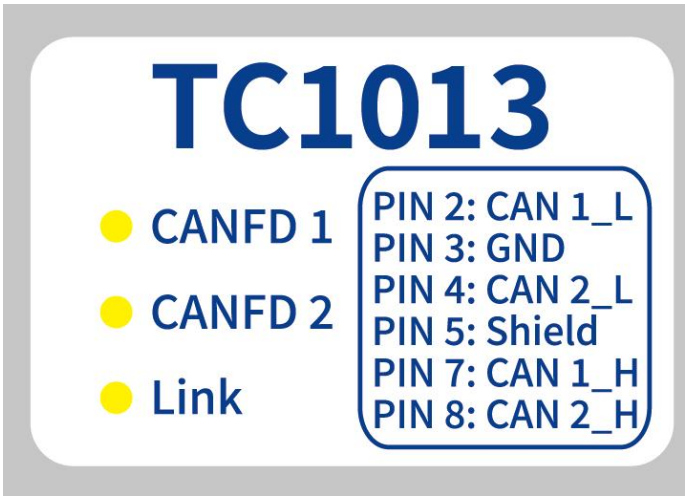


Figure 1-3 LED Indicators

➢ LED Definitions

Indicator	Description
CAN FD 1	Status of CAN FD channel 1
CAN FD 2	Status of CAN FD channel 2
Link	Hardware connection indicator

➢ LED Color Description

Indicator	Color	Description
CAN FD	Green	Normal frame transmission/reception
	Red	Frame transmission/reception error — configuration, protocol, or wiring fault
Link	Green	Device connected successfully

The blinking frequency depends on the bus load rate — the higher the bus load, the faster it blinks.

1.5. Packing List

Item	Qty.	Illustration	Standard/Optional
TC1013 Main Device	**1**		**Standard**
DB9 Female-Dual Male Signal Cable	**1**		**Standard**

2. Application Example

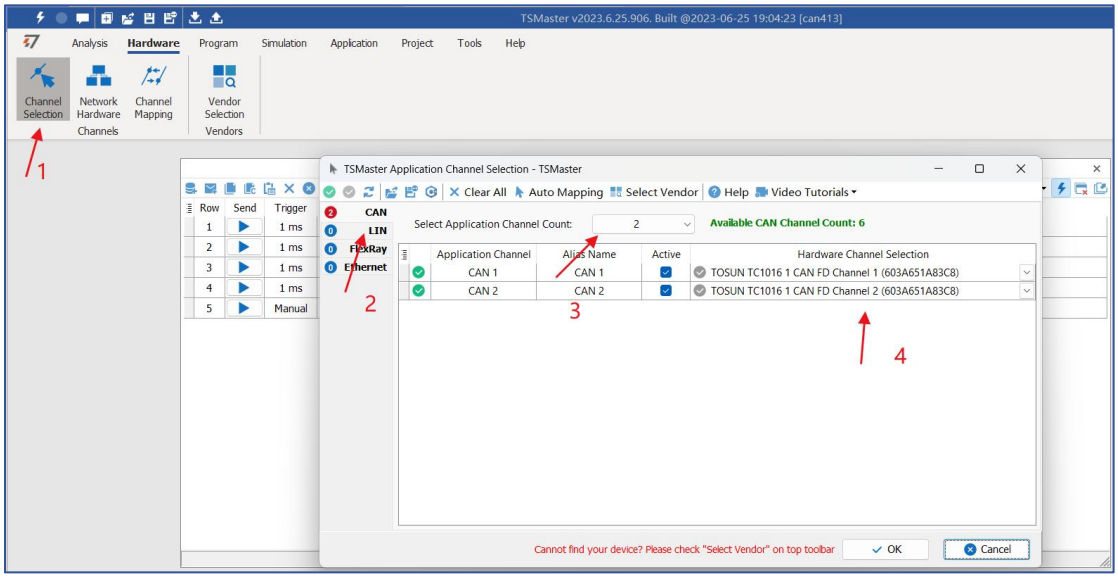
Please download and install the TSMaster software.

> For TSMaster installation instructions, please refer to the appendix.

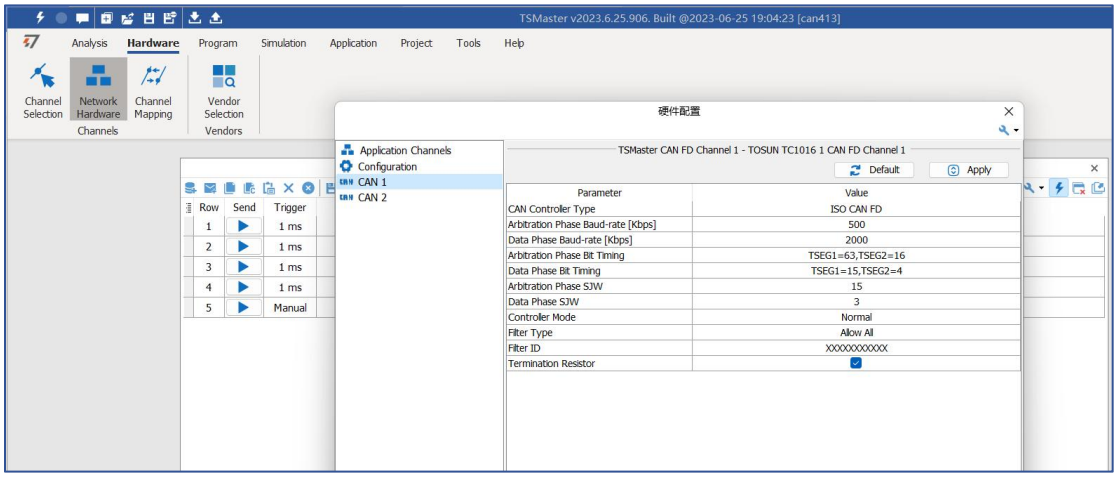
2.1. Connect Devices and Configure Channels

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

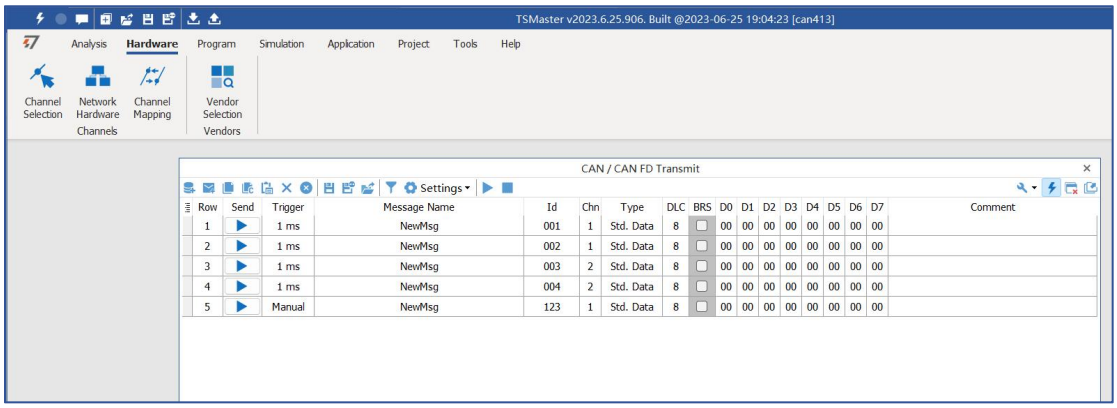
In TSMaster software interface: Click Hardware-click channel selection-drop-down box Select number of channels-select hardware channel-click OK.



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.



2.2. Send Messages



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

Operating steps:

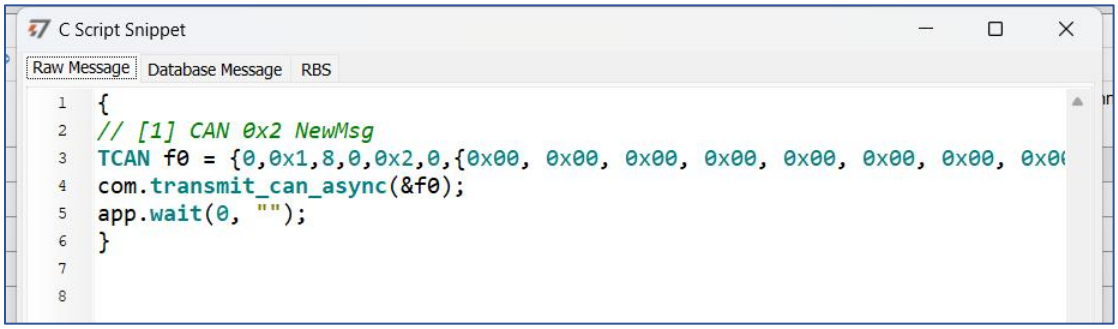
a. Message sending-Add a CAN / CAN FD message for sending

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

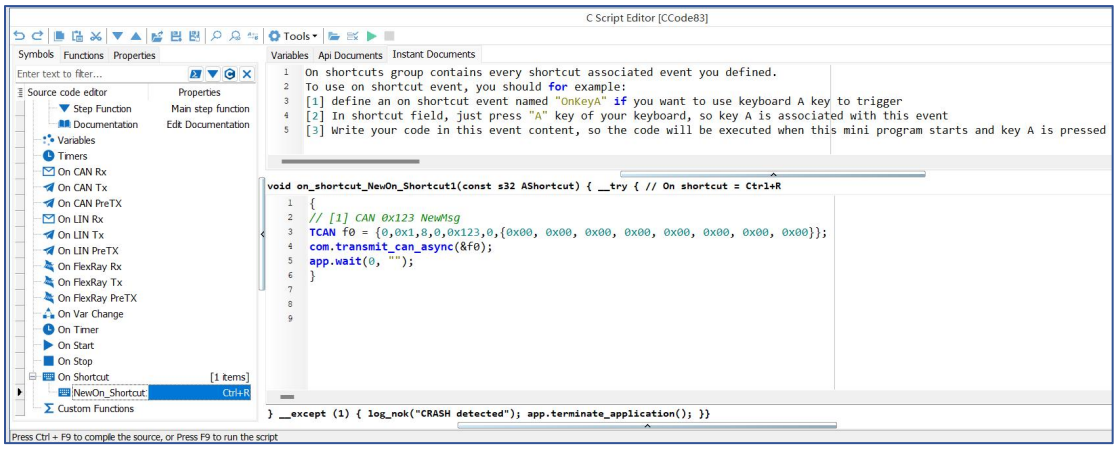
c. Message am trigger setting, manual trigger / cycle trigger, cycle trigger can set the sending cycle

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 build-C script:

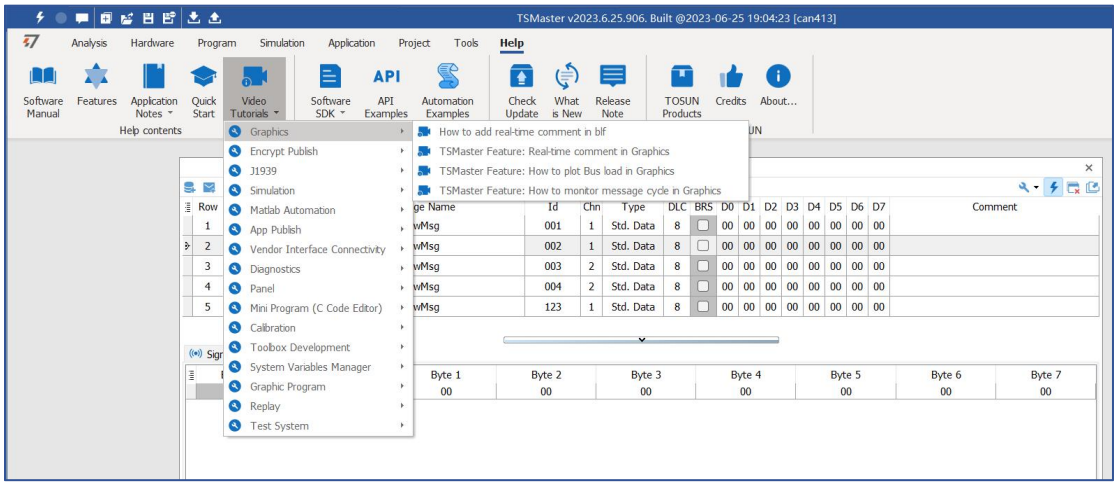


Support for quick copy and paste to a C script to add send events:



2.3. Help with documentation and video teaching

Various instructions and help manuals are provided in the TSMaster help bar.

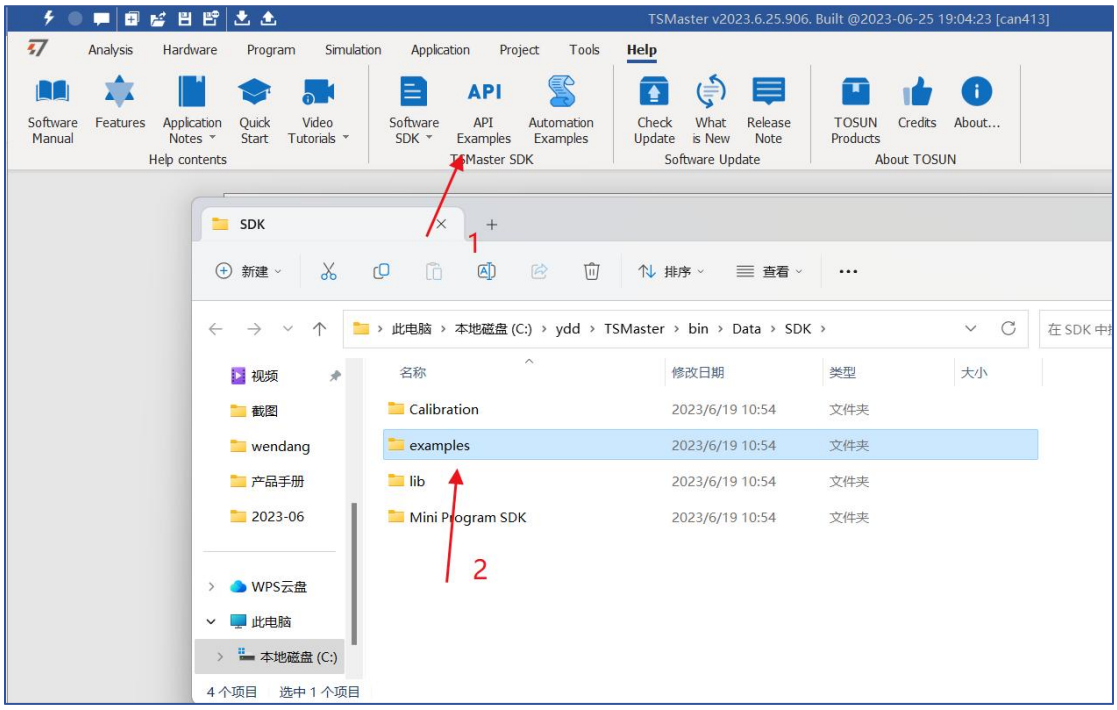


At the same time, a large number of teaching videos can found in Bilibili: http s: / /space.bilibili.com / 2042371333, following the TOSUN's official account, and you can watch all

the teaching videos.

2.4. 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.



2.4.1. 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 / Linux:

1. pip install libTSCANAPI

2. Using the TSMasterAPI form libTSCANAPIimport * for

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

2.4.2. C Calls the Dynamic Library

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

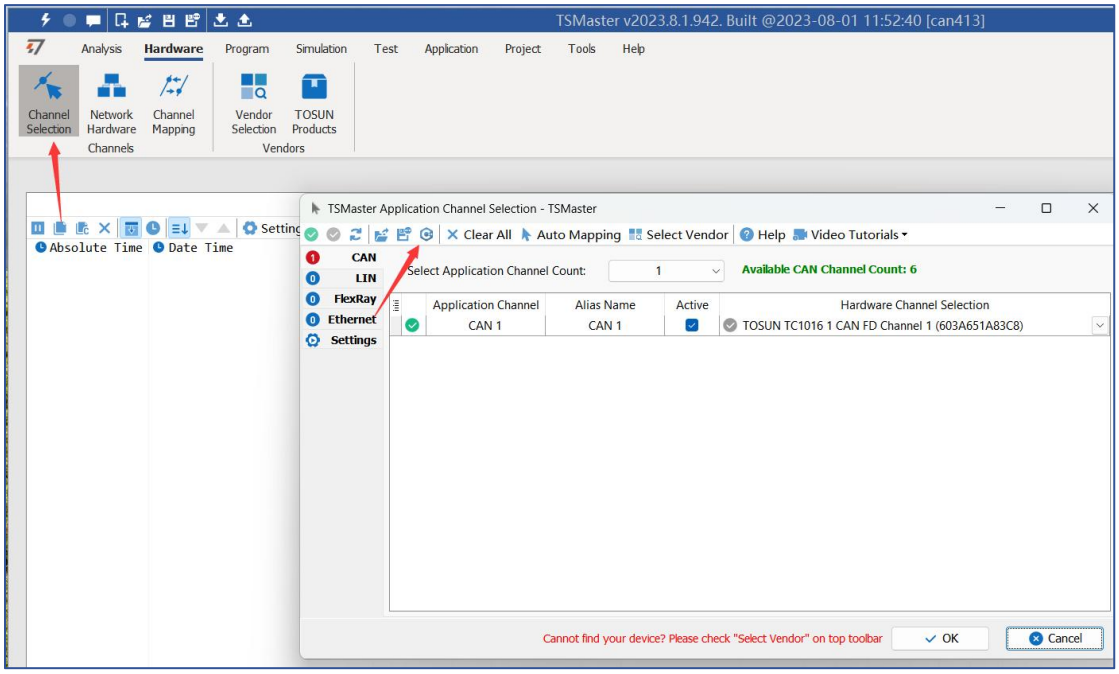
2. Such as: # include " TSMaster.h"

3. Include TSMaster in a file with a path of TSMaster \ bin \ Data \ SDK \ lib \ x86. The lib file is connected to TSMaster.lib document.

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

2.4.3. 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:

C脚本片段

```c
initialize_lib_tsmaster("TSMaster");
tsapp_set_can_channel_count(1);
tsapp_set_lin_channel_count(0);
tsapp_set_flexray_channel_count(0);
tsapp_set_ethernet_channel_count(0);

TLIBTSMapping m;

// TSMaster CAN FD 通道 1 - TOSUN TC1013 1 CAN FD 通道 1
m.init();
sprintf_s(m.FAppName, "%s", "TSMaster");
sprintf_s(m.FHWDeviceName, "%s", "TOSUN TC1013");
m.FAppChannelIndex = 0;
m.FAppChannelType = (TLIBApplicationChannelType)0;
m.FHWDeviceType = (TLIBBusToolDeviceType)3;
m.FHWDeviceSubType = 13;
m.FHWIndex = 0;
m.FHWChannelIndex = 0;
if (0 != tsapp_set_mapping(&m)) { /* handle error */ };

if (0 != tsapp_connect()){ /* handle error */ };

/* do your work here */

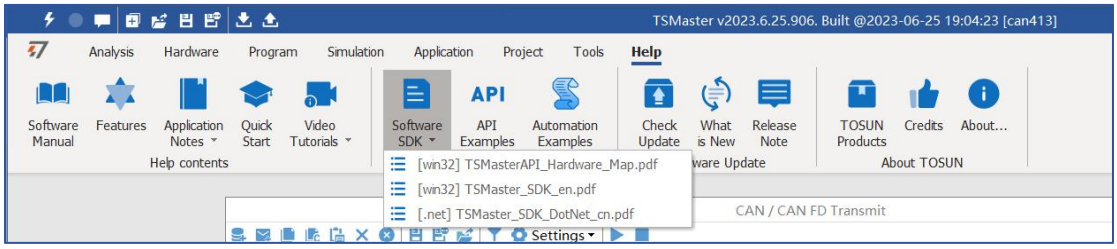
tsapp_disconnect();
finalize_lib_tsmaster();
```

C script call function description:

代码	注释
`initialize_lib_tsmaster("TSMaster")`	TSMaster initialization function
`tsapp_set_can_channel_count(1)`	Set the number of CAN channels
`tsapp_set_lin_channel_count(0)`	Set the number of LIN channels
`tsapp_set_flexray_channel_count(0`	Set the number of Flexray channels
`tsapp_set_ethernet_channel_count(0)`	Set the number of Ethernet channels
`TLIBTSMapping m`	Initialize the construct

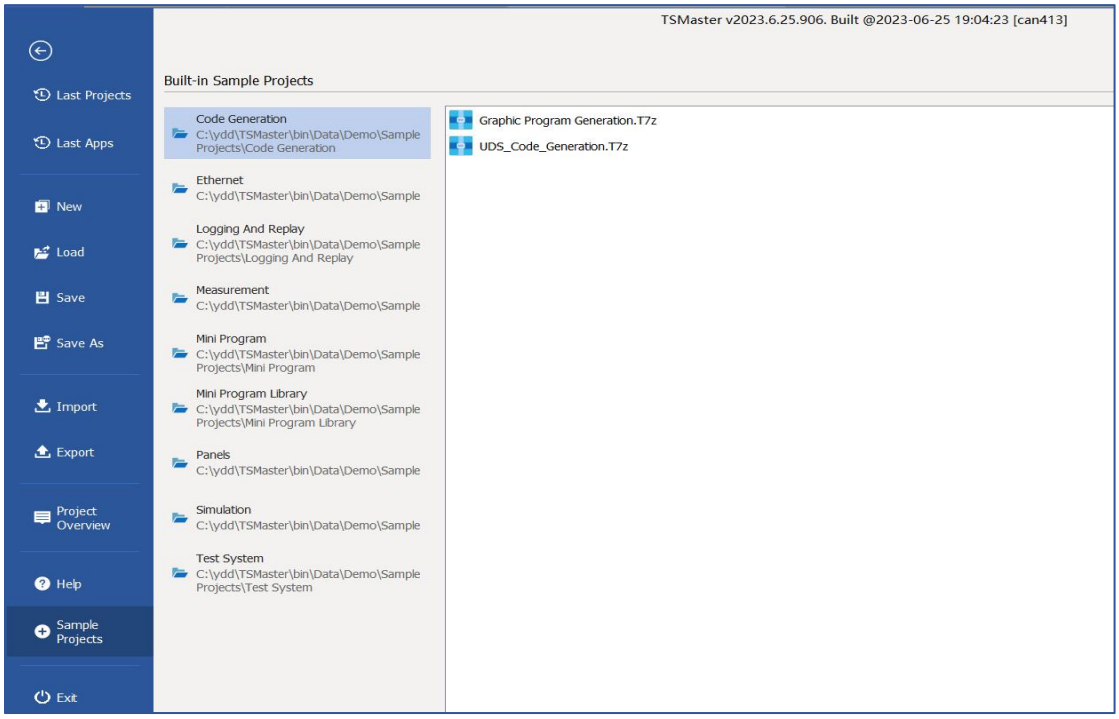
Set the TSMaster CAN FD channel 1-TOSUN TC10131 CAN FD channel 1 channel mapping	
`m.init()`	initial construct m
`sprintf_s(m.FAppName, "%s", "TSMaster")`	Print the application name "TSMaster"
`sprintf_s(m.FHWDeviceName, "%s", "TOSUN TC1013")`	Print the hardware device name
`m.FAppChannelIndex = 0`	Application channel index
`m.FAppChannelType = (TLIBApplicationChannelType)0`	Application channel type
`m.FHWDeviceType = (TLIBBusToolDeviceType)3`	Hardware device type
`m.FHWDeviceSubType = 13`	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
`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

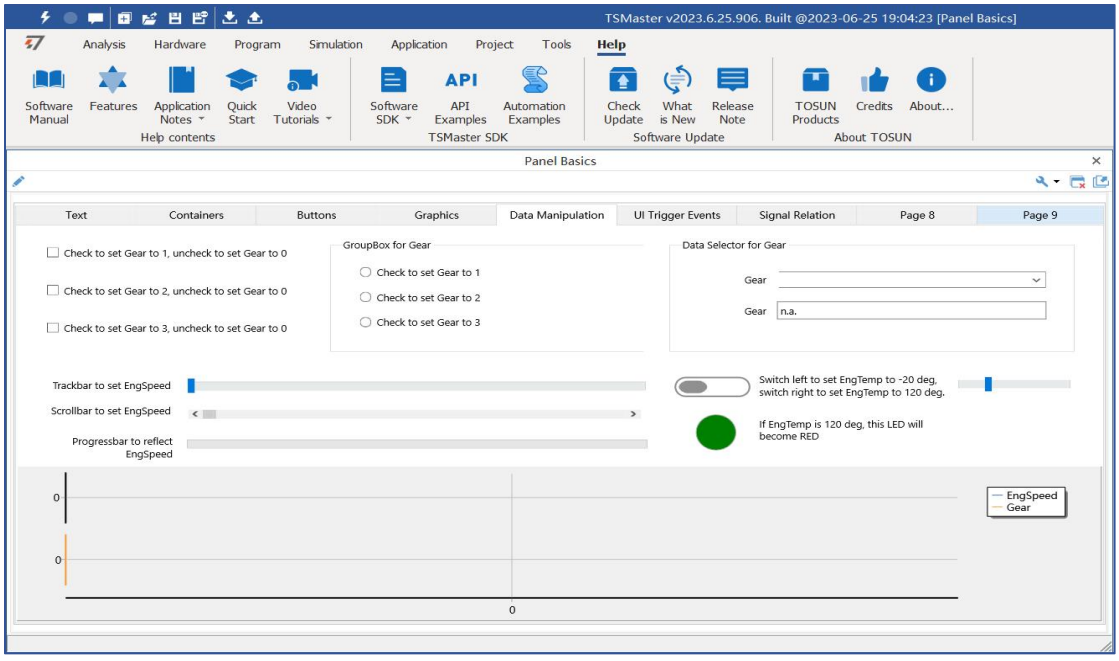


2.5. Sample Works

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



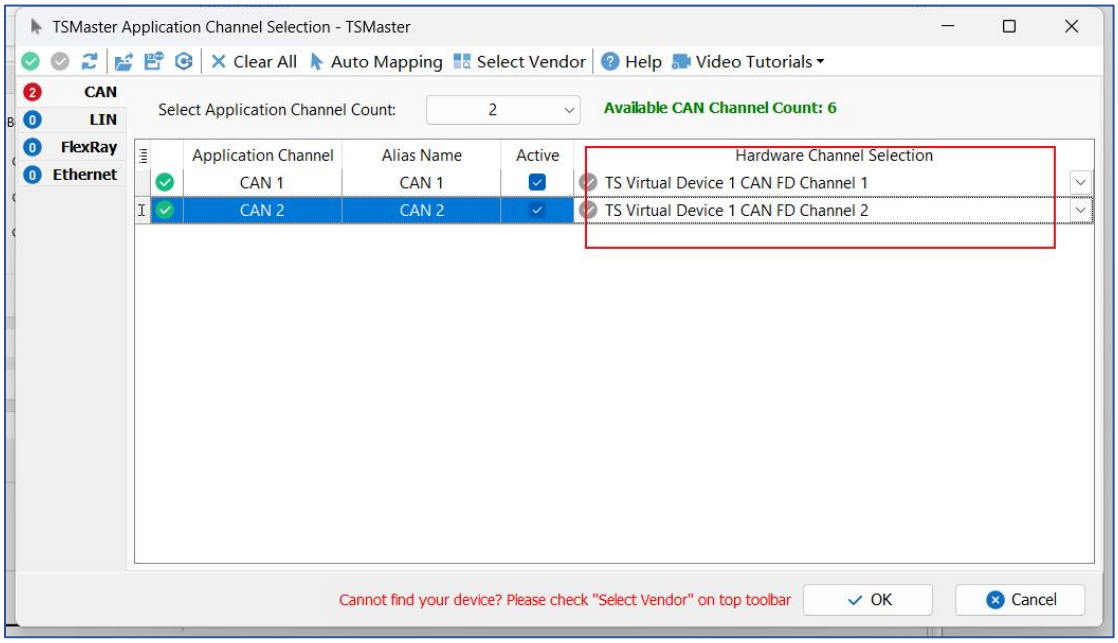
Sample project Panel:



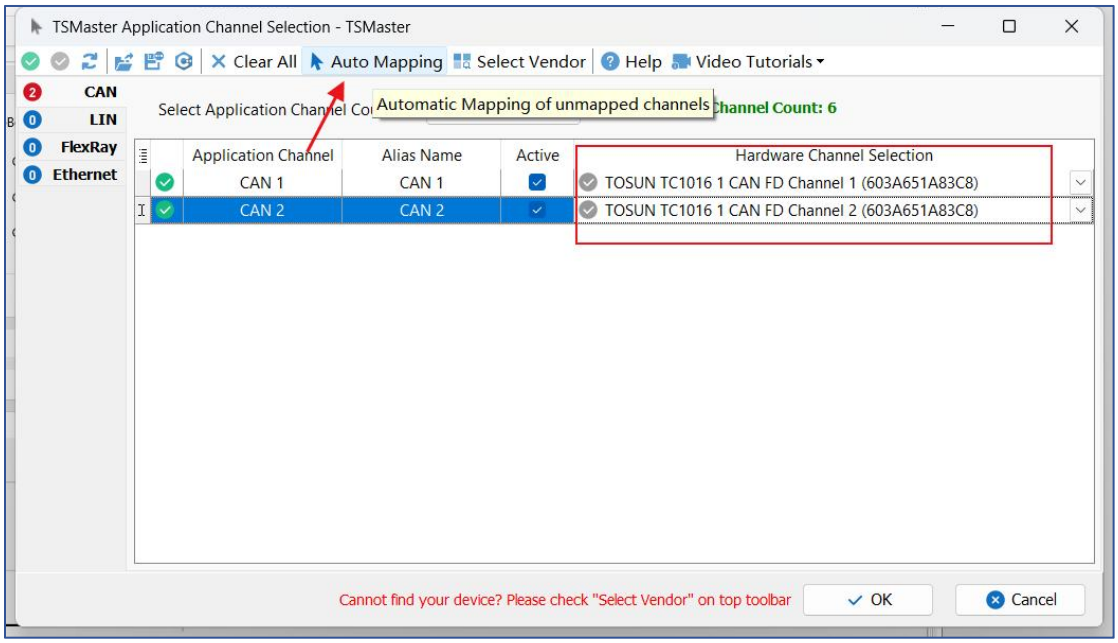
3. FAQ

3.1. Line Connected Correctly but Communication Failed

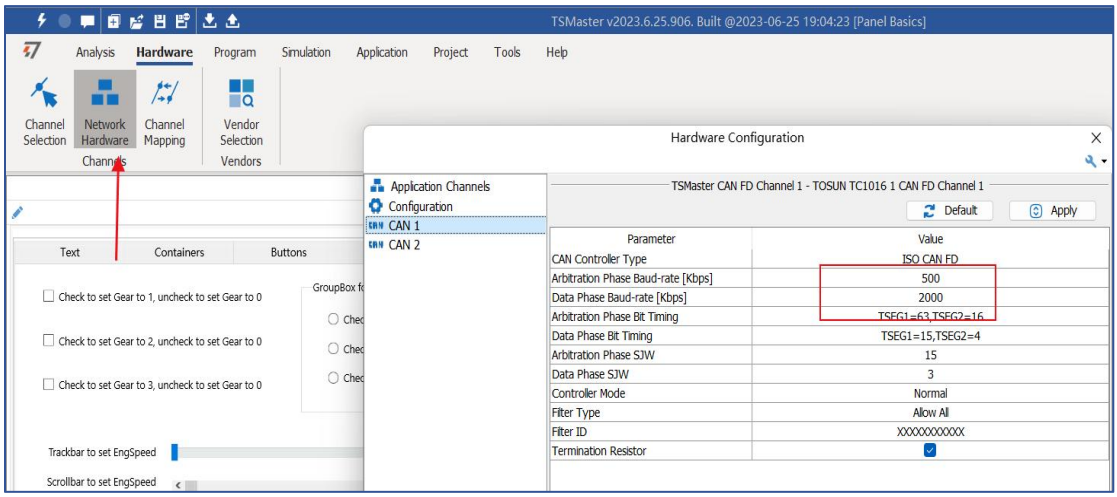
Solution: Check if the number of channels is set. If CAN Channel Count = 0, of course no online hardware cannot display. And the software is configured by default virtual channel, you need to select the hardware real channel.



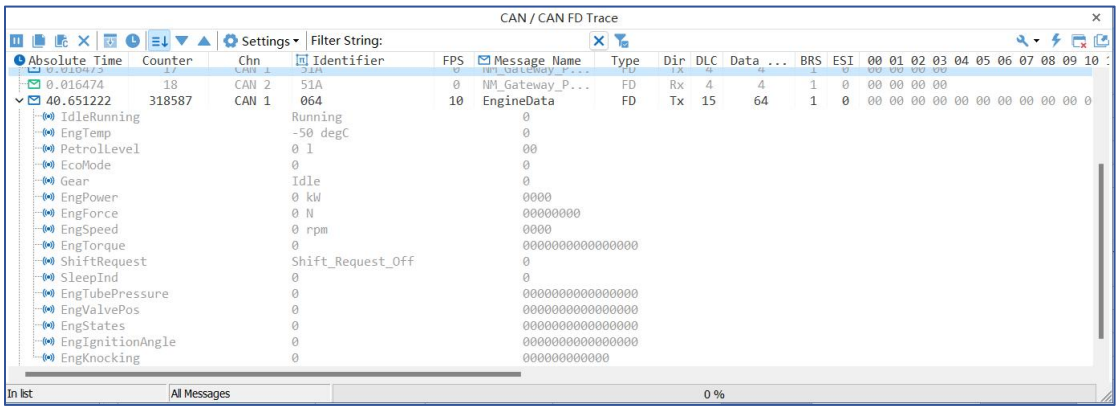
Automatically map or manually click to select the hardware real channel:



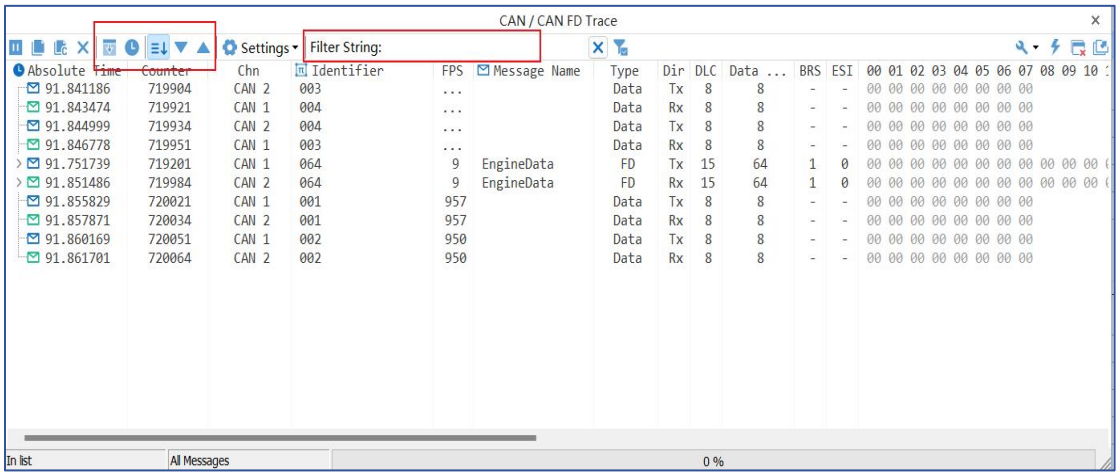
If the channel is selected correctly, it is necessary to ensure consistent port communication between the two channels, as shown in the figure below:



3.2. Inconvenient Message Observation and Signal Filtering

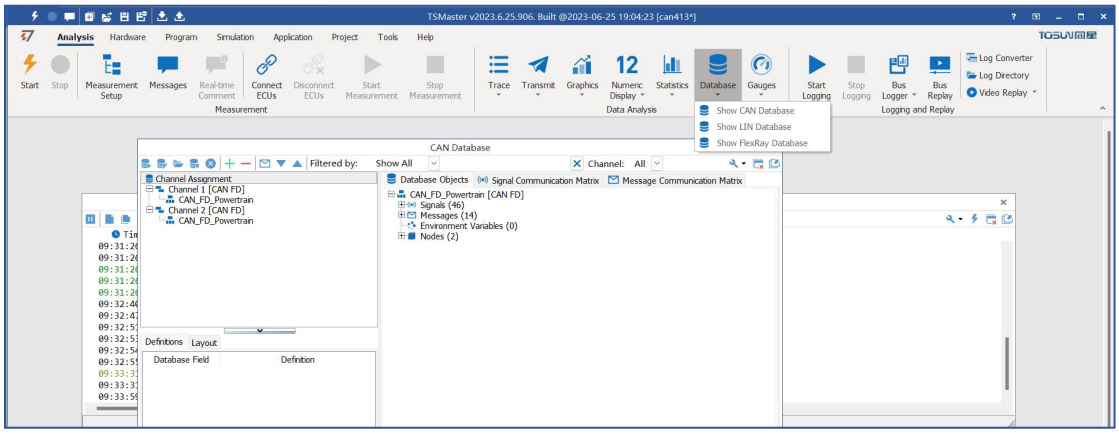


Solution: display in a fixed display or time order, expand or fold the signal display, and filter the string, click the following icon to operate:

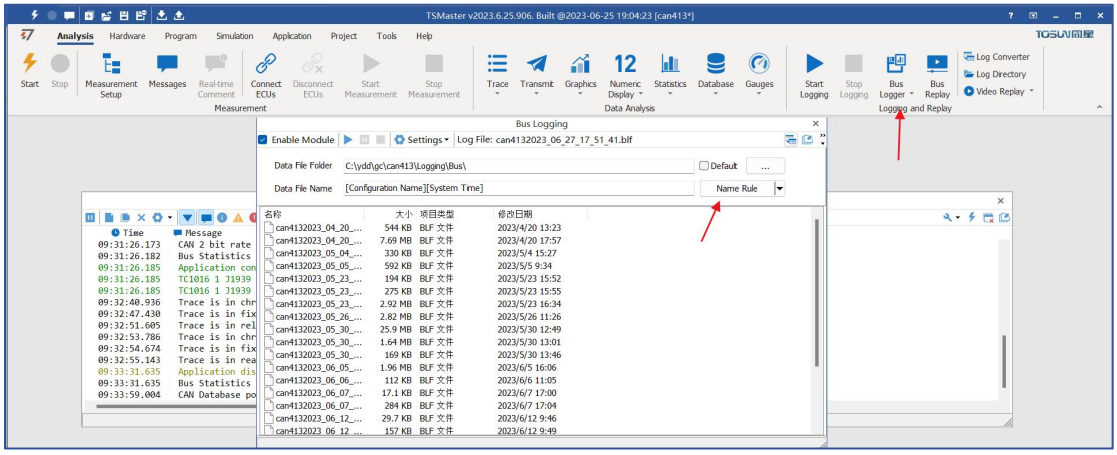


3.3. Load Database

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.



3.4. Record Messages Automatically



Operating steps:

a. Analysis- -bus record

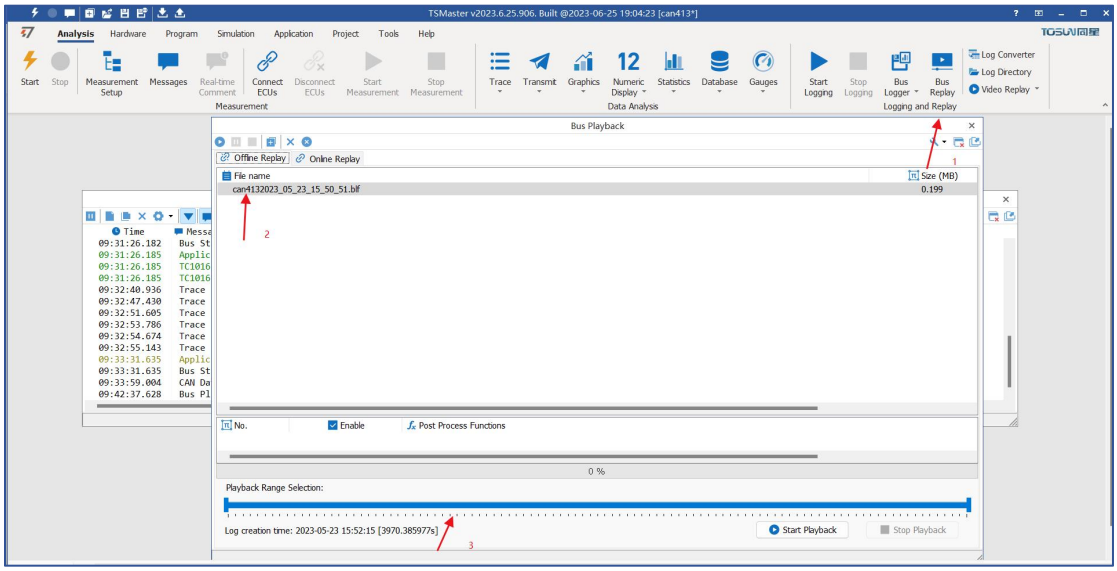
b. Add a name rule to distinguish between different save files

c. Add the self-start function

d. Start the record

3.5. Replay Messages (Offline & Online Playback)

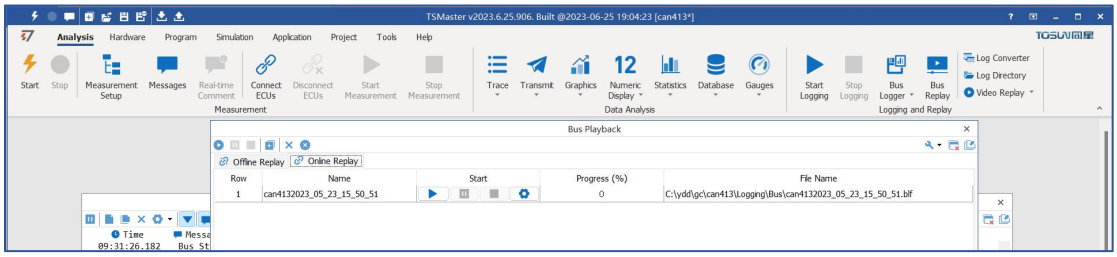
Operating steps:



a. Bus playback

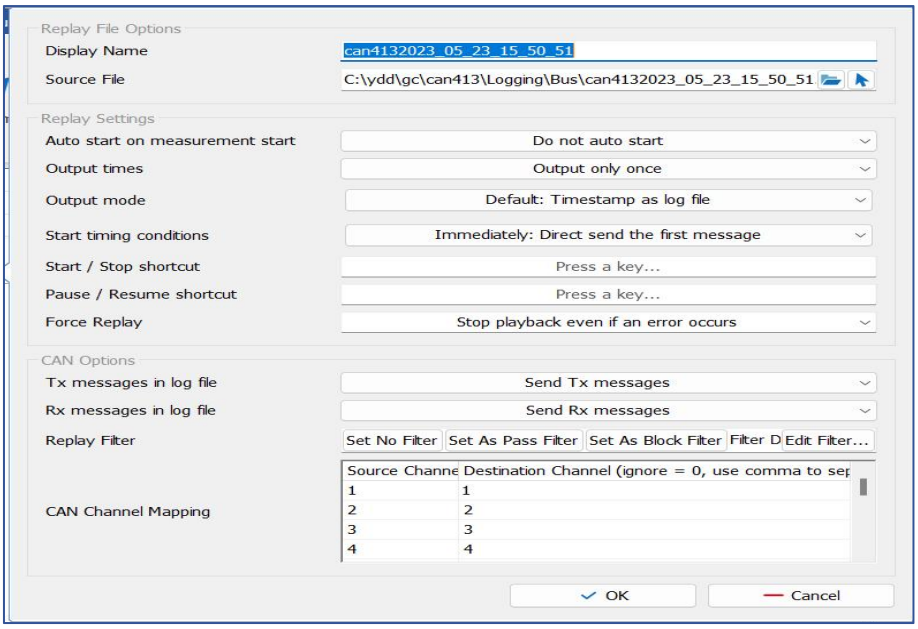
b. Offline playback, add the need to be played packets, can drag and drop file add directly

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



4. Appendix

4.1. 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 message identification codes, and 11 bits are valid.

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

4.2. CAN 2.0 Extended 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.

4.3. Points to Notes

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).

4.4. Software Installation

The section describes the steps for installing the TSMaster software on a Windows PC.

➢ TSMaster Software Download

https://www.tosunai.com/downloads/

If the site is unavailable, contact your sales representative or visit the TOSUN official website.

You may also scan the QR code below to follow the official WeChat account and obtain download links.

Figure 4-1 TOSUN Official WeChat Account

➢ Software Installation

1. Double-click the TSMaster installer and select the installation language.

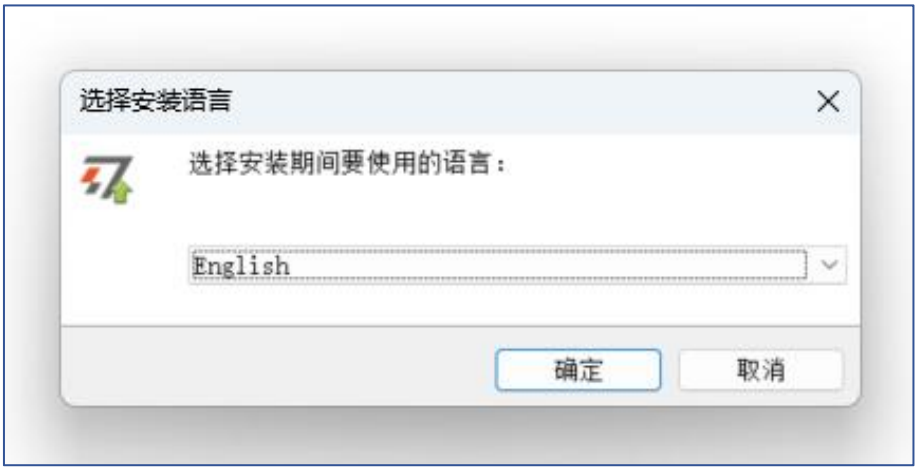


Figure 4-2 TSMaster Installation

2. Accept the license agreement and click “Next”.

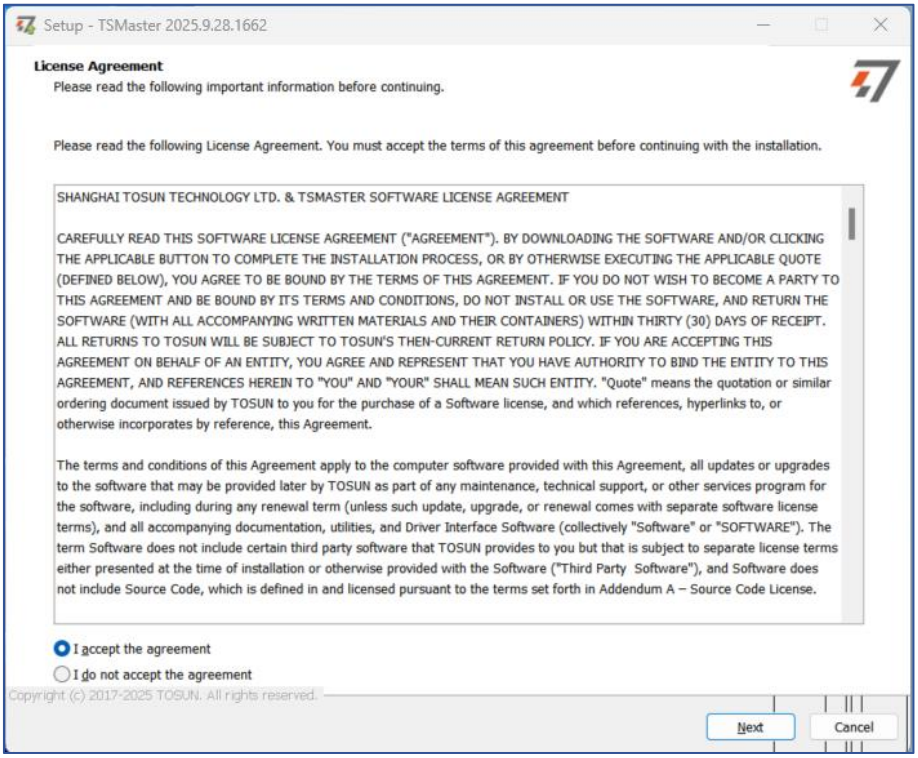


Figure 4-3 TSMaster Installation

3. Choose an installation directory and click “Next “.

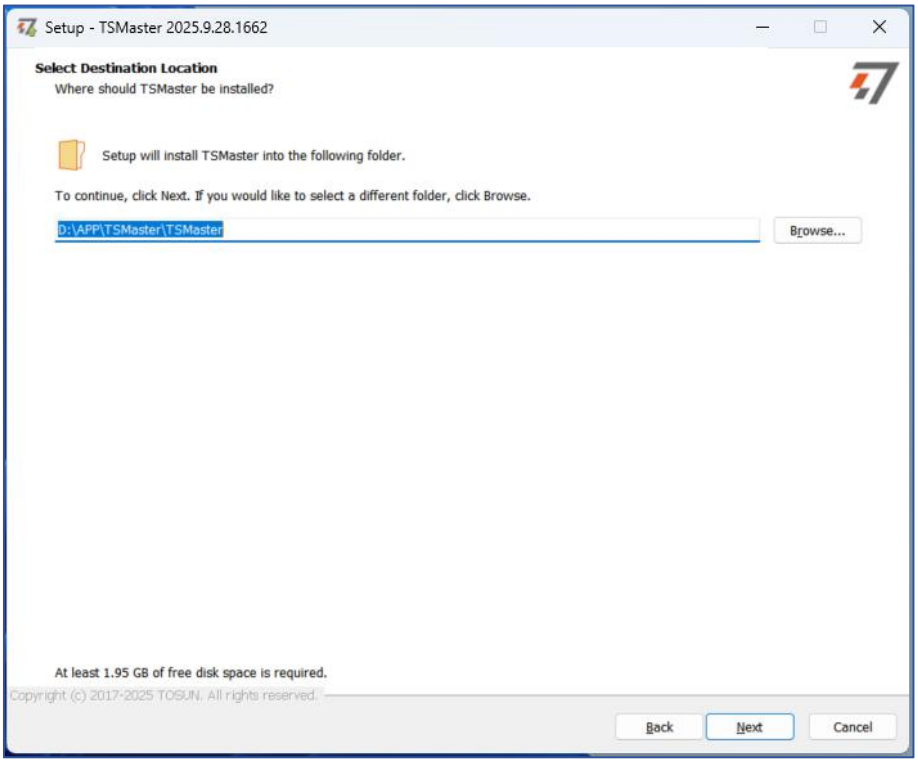


Figure 4-4 TSMaster Installation

4. Select additional tasks as needed and click “Next”.

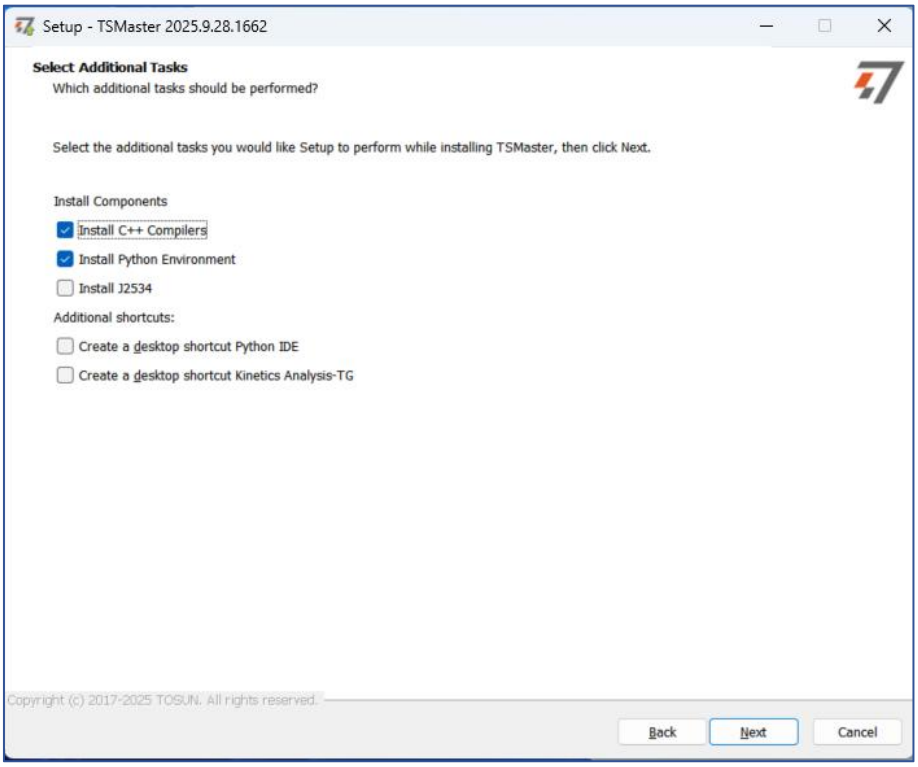


Figure 4-5 TSMaster Installation

5. Click “Install” and wait for completion.

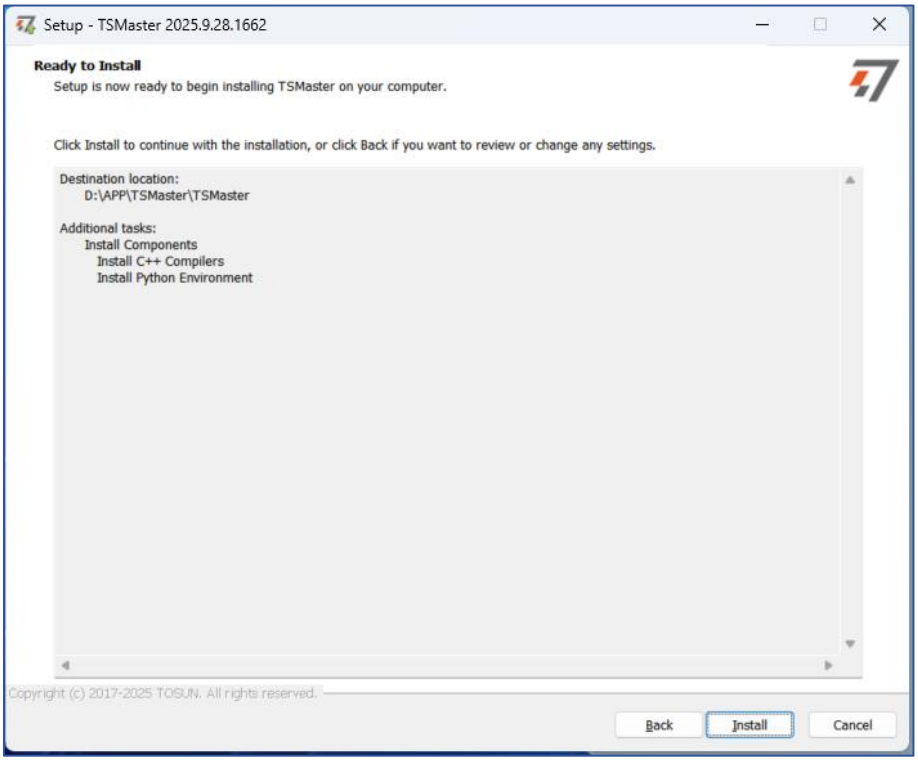


Figure 4-6 TSMaster Installation

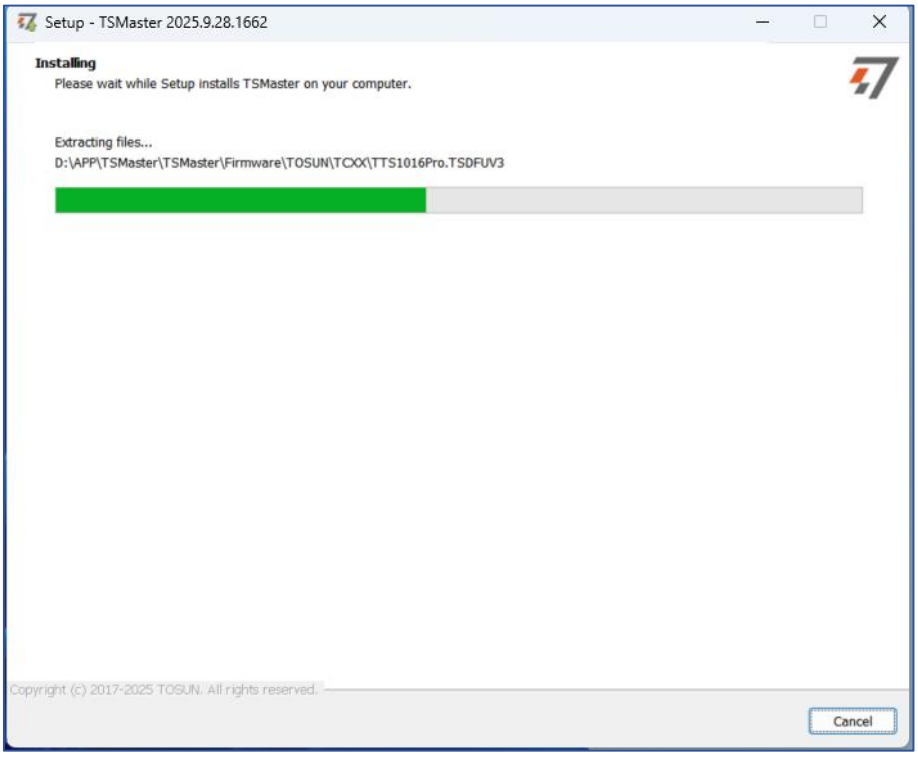


Figure 4-7 TSMaster Installation

6. Click “Finish” to complete installation.

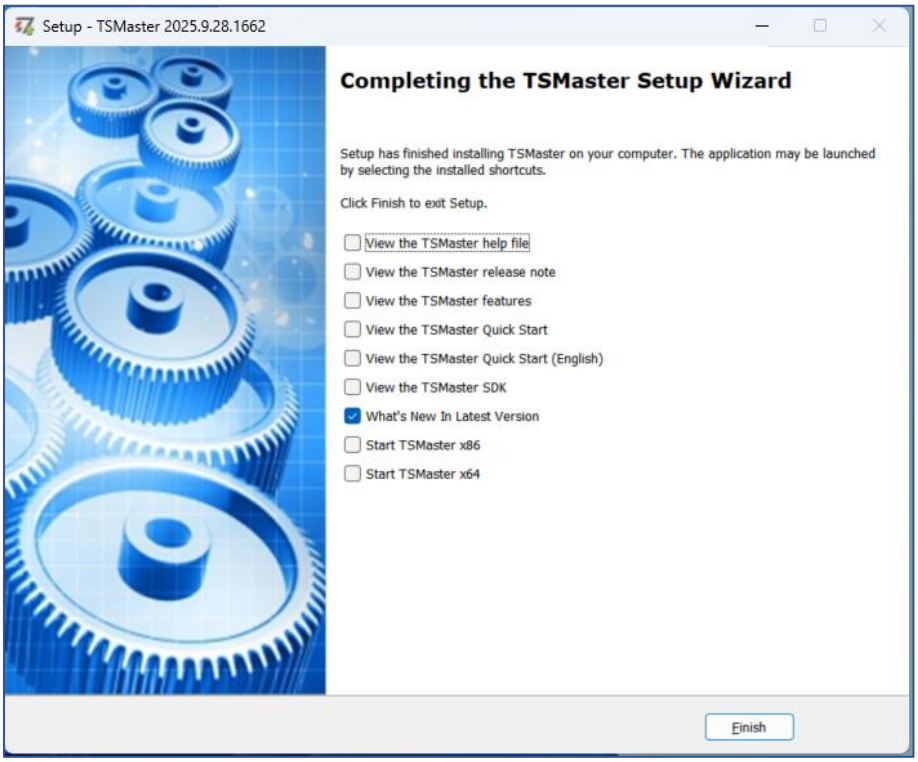


Figure 4-8 TSMaster Installation

5. Inspection and Maintenance

The TC1013 primarily contains semiconductor components, which typically have a long service life. However, adverse environmental conditions may accelerate aging and degrade performance. To ensure proper operation, regular inspections are recommended to maintain the required environmental conditions.

It is recommended to inspect the device at least once every 6 to 12 months. In harsher environments, inspections should be performed more frequently. Refer to the table below for inspection criteria and recommended actions. If issues persist, please contact Shanghai TOSUN Technology Ltd.

➢ Power Environment Inspection

Item	Check Content	Standard/ Range	Action/Measure
Power Supply	Check voltage fluctuation at power input	USB port:+12V DC	Use a power meter or voltmeter at the input; ensure voltage fluctuation is within range
Ambient Conditions	Check ambient temperature (including internal temperature within enclosures)	-40℃ ~ +80℃	Use a thermometer to ensure temperature is within specified range
	Check the ambient humidity (including internal humidity within enclosures)	10% ~ 90% RH	Use a hygrometer to ensure humidity is within specified range

➢ Contamination & Protection Check

Item	Check Content	Standard/ Range	Action/Measure

Contamination	Check for accumulation of dust, powder, salt, and metal debris	None	Clean the device and prevent future contamination
	Check for exposure to water, oil, or chemicals	None	Clean and shield if necessary
Hazardous Gases	Check for corrosive or flammable gases	None	Use sensors or odor detection to verify

➢ Mechanical Stress & EMI Check

Item	Check Content	Standard/ Range	Action/Measure
Mechanical Stress	Check vibration and shock levels	Within specified limits	Install padding or vibration isolation measures if necessary
Electromagnetic Environment	Check for noise sources near the device	No significant noise sources	Isolate or shield the device from noise sources

➢ Installation & Wiring Check

Item	Check Content	Standard/ Range	Action/Measure
Wiring	Check crimped connectors in external wiring	Adequate clearance between connectors	Visually inspect and adjust as needed
	Check for damage to external wiring	No damage	Visually inspect and replace damaged cables if necessary

TOSUN

Engineer Everything !

Software

Support CAN(FD)/LIN/FlexRay/SOME/IP and DoIP

UDS diagnostics/ECU flashing/CCP/XCP calibration

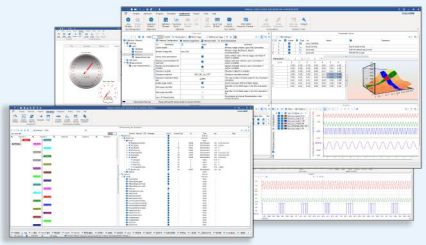
Embedded code generation/Application builder

Encrypted release/Logging and bus replay

Graphical programming/Residual bus simulation

C and Python scripting

Bus monitoring/Transmiting/Automated testing



TSMASTER

Hardware

1/2/4/8/12-channel CAN FD/CAN to USB/PCIe device

1/2/6-channel LIN to USB/PCIe device

Multi channel FlexRay/CAN FD to USB/PCIe device

Multi channel automotive Ethernet/CAN FD to USB/PCIe device

Automotive Ethernet media conversion device (T1 to Tx)

Multi-channel CAN FD/Ethernet/LIN datalogger



TTS test systems

-CAN FD/CAN/FlexRay/LIN communication boards

-Relay and fault injection boards

-Resistors for sensor simulation

-Digital I/O, Analog I/O boards available



CAN CAN FD LIN FlexRay OPEN ALLIANCE

Solutions

- Bus Conformance
- Network Automation Testing System
- Charging Testing System
- EMB Calibration Testing Equipment
- Information Security Solutions
- Steer-by-Wire Chassis Testing Solutions
- EOL Testing Equipment
- Motor Performance
- Durability Testing Solutions
- FCT







About TOSUN

The core product, TSMaster, is a comprehensive tool for automotive R&D, testing, production, and after-sales. It integrates essential functions with hardware support to streamline processes and ensure precision, making it ideal for automotive professionals.

International Organization

ASAM CiA

Quality Assurance

ISO9001:2015

CE Certification

CE



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