TOSUN

TL Series Product Family

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Copyright Information

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What Is the TL Series Product Family？

TOSUN has a wide range of product series, such as the TC series, TP series, TE series, TLog series, TTS series, TL series, and so on. Among them, the TL series is specifically designed for LIN bus communication.

What Products Are Included in the TL Series？
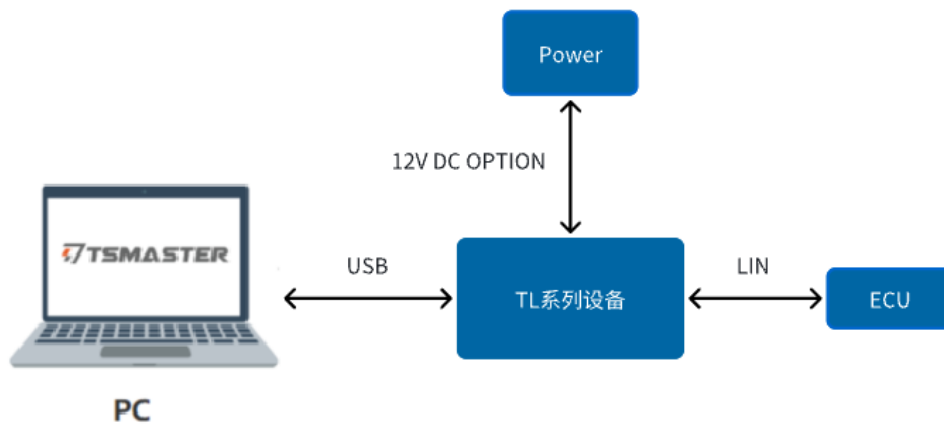
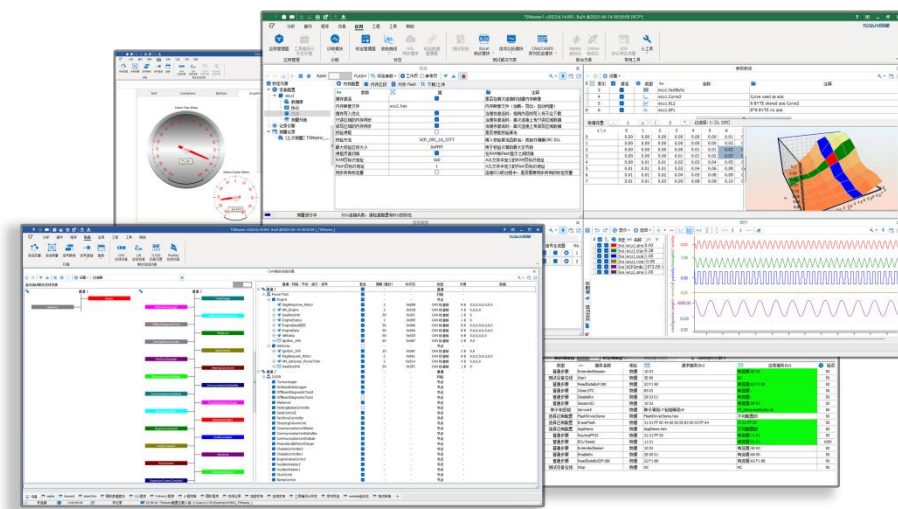| TL1001	TL1011

What Can They Do？

- LIN bus data monitoring and analysis;
- Domain controller testing;
- Offline/online replay for blf and asc format files;
- Configuring LIN bus nodes through TSMaster software;
- UDS diagnostics;
- ...

How to Use TL Series Product？

After connecting the TL series devices to a PC through USB, on the PC, users can perform LIN communication between the device and ECU using the powerful TSMaster software.

Contents

1. About this User Manual

1.1 Warranty

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2. Product Overview

	TL1001	TL1011
Channel	1x LIN	1x fast LIN
Port Rate (LIN)	0~20Kbps	0~100Kbps
PC Interface	USB 2.0	USB 2.0
Bus Interface	DB9	DB9
Isolate	2500V	2500V
Power Supply	5V (USB power supply) + 12V (DC power supply)	5V (USB power supply) + 12V (DC power supply)
Case Material	Plastic	Plastic
Dimension	Approx. 77*58*20mm	Approx. 77*58*20mm
Weight	Approx. 76g	Approx. 76g

3. TL1001

3.1 Overview

The TL1001, launched by TOSUN Technology, is a portable and easy-to-install device that converts a single LIN bus to a USB interface. It supports LIN bus rates from 0 to 20 Kbps and uses a USB 2.0 interface to connect with a PC. The device supports external DC power supply and features a driverless design for Windows and Linux systems, providing excellent system compatibility.

With the powerful TSMaster software, it supports loading DBC, LDF, etc. database files, making it very convenient to monitor, analyze, and simulate LIN bus data. It also supports functions such as UDS diagnostics, ECU flashing and so on.

The secondary development APIs for Windows and Linux can support various development environments such as C++, C#, LabView, Python, etc., making it highly efficient and easy to use, and is convenient to integrate into various testing systems.

3.2 Features

✓ us (microsecond) level hardware message timestamps to meet advanced requirements

✓ Portable design with uniquely designed mounting holes, facilitating integration into various devices or instrument panels

✓ USB 2.0 interface, with a driverless design for Windows and Linux systems, offering excellent system compatibility

✓ The unique free transmission mode can reduce the barriers to developing and debugging the LIN bus systems

✓ Automotive-grade design, supporting DBC files, LDF files, XML files, etc.

✓ Supports UDS diagnostics based on LIN bus

✓ Supports UDS based Bootloader flashing

✓ Supports secondary development interfaces for Windows and Linux systems

✓ The LIN bus primary and secondary nodes can be configured via software

✓ Supports blf and asc format data recording and offline/online playback

✓ Built-in script editor, supporting virtual simulation and HIL simulation

3.3 Technical Data

Channel	1 *LIN
PC Interface	USB 2.0
LIN Interface	DB9
Driver	Driverless design for Windows and Linux systems, offering excellent system compatibility
LIN	Supports LIN 1.3 and LIN 2.x, with baud rates from 0 to 20Kbps
Timestamp Accuracy	1 us, hardware message timestamp, can meet advanced requirements
Schedule Table	Supports LDF files and running schedule tables, and also allows for self-configuration of schedule tables
Relay Type	Signal relay (not magnetic latching)
Power Supply	USB power supply, supports external DC power supply (9-36V)
Power Consumption	1W (typical)
Case Material	Plastic
Dimension	Approx. 77*58*20mm
Weight	Approx. 76g (without packaging)/Approx. 271g (with packaging and wiring)

Operating Temperature	-40℃～80℃
Operating Humidity	10% ～ 90% (non-condensing)
Operating Environment	Keep away from corrosive gases

3.4 Electrical Data

Parameter		Test Condition	Minimum Value	Typical Value	Maximum Value	Unit
Operating Voltage	USB power supply	LIN transmission	--	5	--	V
	External DC power supply	LIN transmission	9	12	36	V
Operating Current	USB power supply	LIN transmission	--	0.15	--	A
	External DC power supply	LIN transmission	--	0.01	--	A
Power Consumption	USB/DC total	LIN transmission	--	1	--	W
LIN Interface	Bus pin voltage resistance	LIN	-40	--	40	V
	VBAT voltage		9	12	36	V

3.5 Mechanical Data
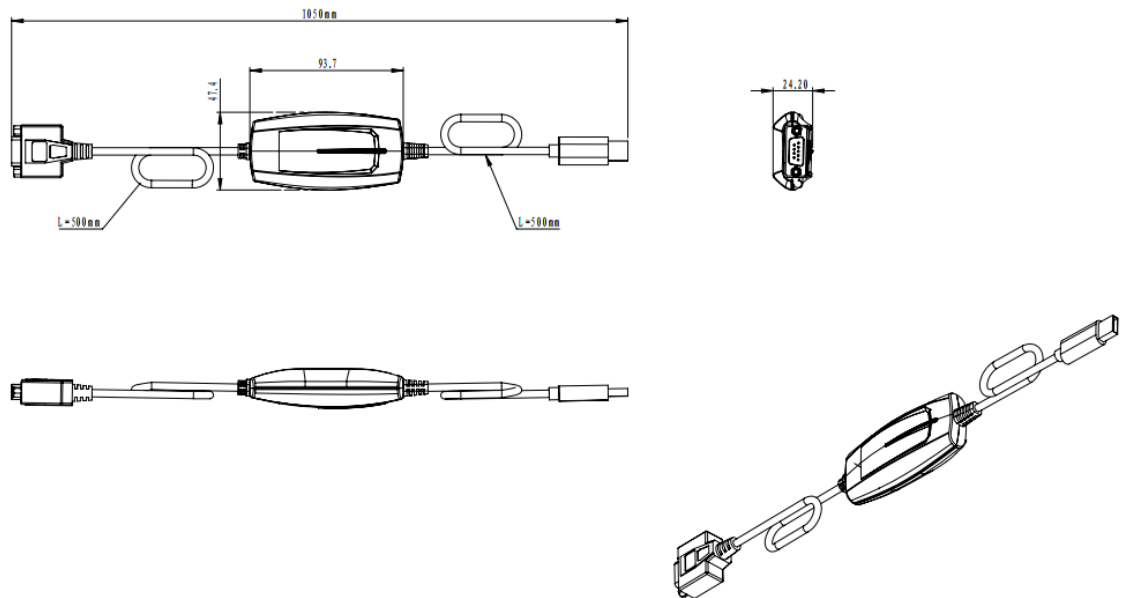
3.6 Scope of Delivery

✓ Main device: TL1001
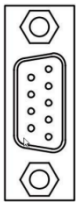
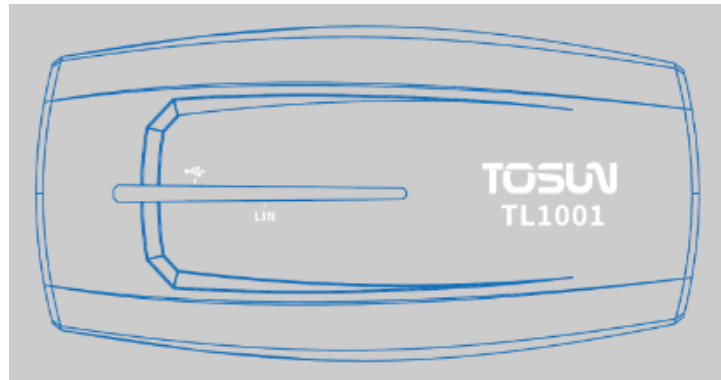✓ DB9 to 3 banana plugs LIN cable

3.7 Hardware Interface

➢ USB 2.0 interface;

➢ DB9 male:

DB9 Pin	PIN Number	Definition
	PIN3	GND
	PIN8	LIN
	PIN9	VBAT_LIN

3.8 LED

Diagram of LED indicator:

Description of indicator:

Indicator	Definition
LIN	Indicator for LIN channel
LINK	Indicator for hardware connection

Description of LED color:

Color	Description
LINK Green	The device is connected
LIN Green	LIN channel data frame is sent or received correctly
LIN Red	LIN channel sends or receives error frames, indicating a configuration, protocol, or wiring error

Note: The blinking frequency depends on the bus load.

3.9 Optional Accessories

N/A.

4.TL1011

4.1 Overview

The TL1011, launched by TOSUN, is a portable single-channel fast LIN bus-to-USB interface device. The LIN bus port supports rates from 0 to 200 Kbps. The product connects to a PC via a USB 2.0 interface and supports external DC power. It features a driverless design for Windows and Linux systems, providing excellent system compatibility.

With the powerful TSMaster software, it supports loading DBC, LDF, etc. database files, making it very convenient to monitor, analyze, and simulate LIN bus data. It also supports functions such as UDS diagnostics, ECU flashing and so on.

The secondary development APIs for Windows and Linux can support various development environments such as C++, C#, LabView, Python, etc., making it highly efficient and easy to use, and is convenient to integrate into various testing systems.

4.2 Features

- ✓ us (microsecond) level hardware message timestamps to meet advanced requirements
- ✓ Portable design, facilitating integration into various devices or instrument panels
- ✓ USB 2.0 interface, with a driverless design for Windows and Linux systems, offering excellent system compatibility
- ✓ The unique free transmission mode can reduce the barriers to developing and debugging the LIN bus systems
- ✓ Automotive-grade design, supporting DBC files, LDF files, XML files, etc.
- ✓ Supports UDS diagnostics based on LIN bus
- ✓ Supports UDS based Bootloader flashing
- ✓ Supports secondary development interfaces for Windows and Linux systems
- ✓ The LIN bus primary and secondary nodes can be configured via software
- ✓ Supports blf and asc format data recording and offline/online playback
- ✓ Built-in script editor, supporting virtual simulation and HIL simulation

4.3 Technical Data

Channel	1 *fastLIN
PC Interface	USB 2.0
LIN Interface	DB9
Driver	Driverless design for Windows and Linux systems, offering excellent system compatibility
LIN	Supports LIN 1.3 and LIN 2.x, with baud rates from 0 to 200Kbps
Timestamp Accuracy	1 us, hardware message timestamp, can meet advanced requirements
Schedule Table	Supports LDF files and running schedule tables, and also allows for self-configuration of schedule tables
Relay Type	Signal relay (not magnetic latching)
Power Supply	USB power supply, supports external DC power supply (9-36V)
Power	1W (typical)

Consumption	
Case Material	Plastic
Dimension	Approx. 94*48*24mm
Weight	Approx. 108g (without packaging)/Approx. 303g (with packaging and wiring)
Operating Temperature	-40℃～80℃
Operating Humidity	10% ～ 90% (non-condensing)
Operating Environment	Keep away from corrosive gases

4.4 Electrical Data

Parameter		Test Condition	Minimum Value	Typical Value	Maximum Value	Unit
Operating Voltage	USB power supply	LIN transmission	--	5	--	V
	External DC power supply	LIN transmission	9	12	36	V
Operating Current	USB power supply	LIN transmission	--	0.18	--	A
	External DC power supply	LIN transmission	--	0.01	--	A
Power Consumption	USB/DC total	LIN transmission	--	1	--	W
LIN Interface	Bus pin voltage resistance	LIN	-40	--	40	V

4.5 Mechanical Data
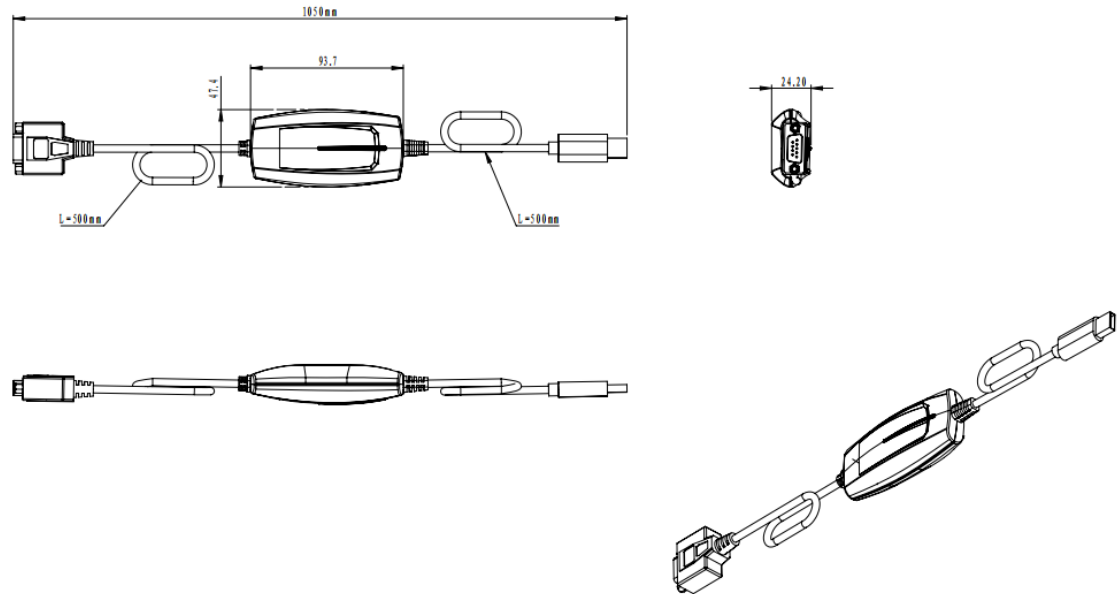
4.6 Scope of Delivery

✓ Main device: TL1011
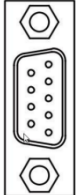
✓ DB9 to 3 banana plugs LIN_cable
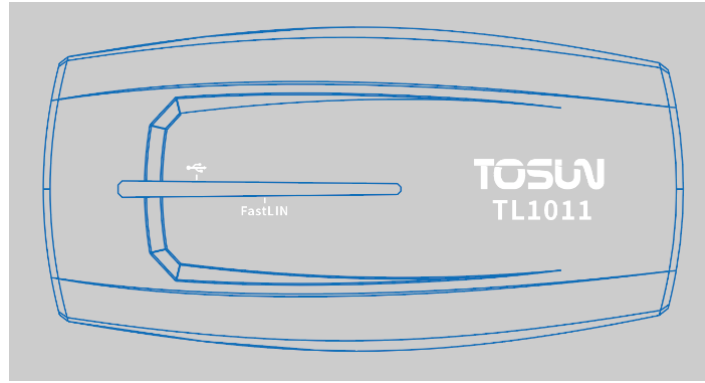

4.7 Hardware Interface

➤ USB 2.0 interface；

➤ DB9 male：

DB9 Pin	PIN Number	Definition
	PIN3	GND
	PIN8	LIN
	PIN9	VBAT_LIN

4.8 LED

Diagram of LED indicator:

Description of indicator:

Indicator	Definition
FastLIN	Indicator for FastLIN channel
LINK	Indicator for hardware connection

Description of LED color:

Color	Description
LINK Green	The device is connected
FastLIN Green	FastLIN channel data frame is sent or received correctly
FastLIN Red	FastLIN channel sends or receives error frames, indicating a configuration, protocol, or wiring error

Note: The blinking frequency depends on the bus load.

# 5. Quick Start

5.1 System Connection
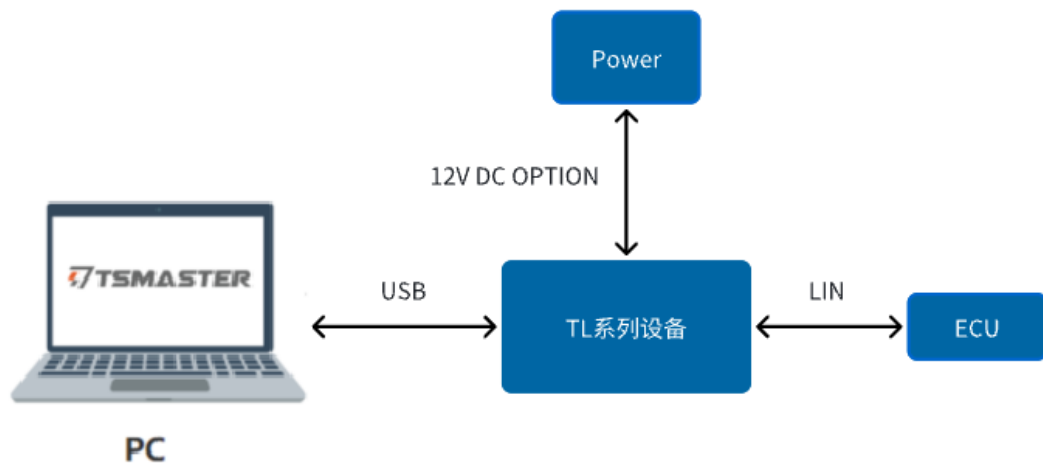
Connect the TL series device to a computer via the USB interface and connect the LIN communication interface to the ECU. Optionally, power the device using a DC power supply. Then on the PC side, users can control the LIN communication between the device and the ECU with the powerful TSMaster software.

5.2 Driver Installation

All TOSUN hardware adopts a driverless design, offering excellent system compatibility. The hardware allow for direct use on various operating systems (Windows 7/8/10/11, Linux) without the need to install drivers.

5.3 Software Overview
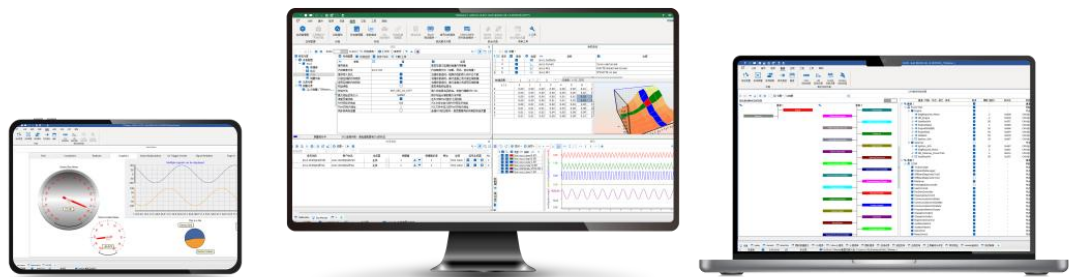
TSMaster is a powerful and comprehensive tool that can connect, configure, and control all TOSUN hardware tools and devices, enabling functions such as automotive bus embedded code generation, monitoring, simulation, development, UDS diagnostics, CCP/XCP calibration, ECU flashing, I/O control, test measurement, and so on.

TSMaster supports Matlab Simulink co-simulation and CarSim dynamic model ECU algorithm simulation testing (soft real-time HIL). It provides users with a series of convenient functions and editors, allowing them to directly execute ECU code within TSMaster and supports C script and Python script editing. At the same time, TSMaster also offers a mini-program

function, enabling users to customize the simulation test panel, test process, test logic, and even the entire test system, and automatically generate reports. The code written by users based on TSMaster is hardware-independent, and can be easily shared, referenced, and used on different hardware platforms.

TSMaster supports multiple commonly used bus tool brands, including Vector, Kvaser, PEAK, IXXAT, as well as mainstream instruments in the market (such as oscilloscopes, waveform generators, and digital multimeters) and boards (such as AI, DI, DO, etc.). Its design concept is to perfectly integrate with the test system to achieve joint simulation and testing of multiple hardware and multiple channels. This enables TSMaster to meet the PV/DV test verification needs for various automotive electronic components and assemblies, as well as the inspection requirements for the production line.

5.4 Software Installation

TSMaster software download link:

https://www.tosunai.com/downloads

If the link is not accessible, you can contact the corresponding sales personnel or visit the official TOSUN website to obtain the software. Meanwhile, you can scan the QR code to follow the TOSUN official account to get the download link.
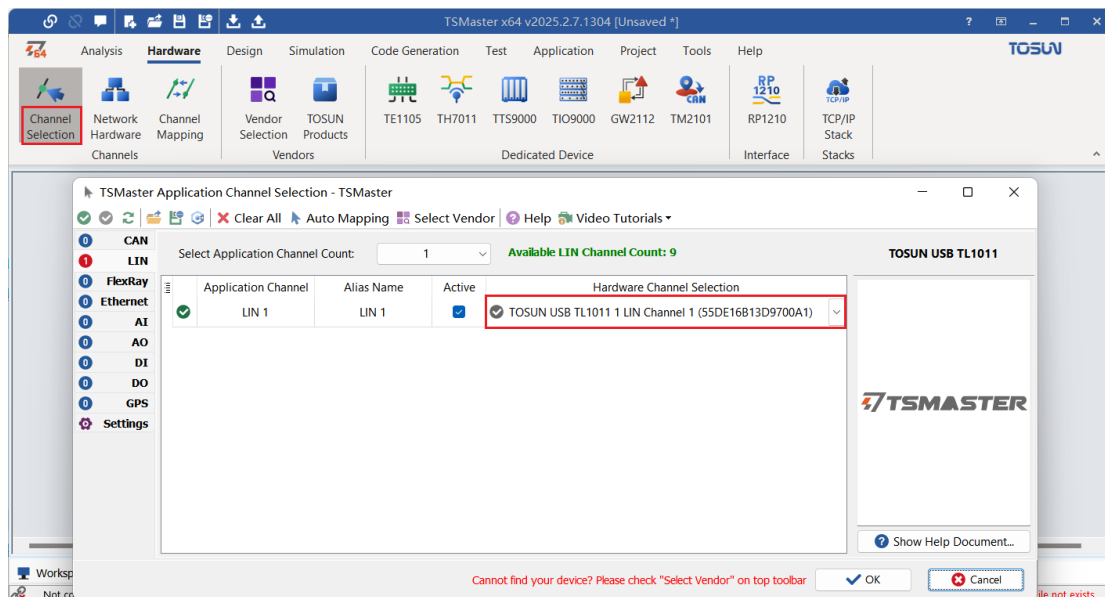

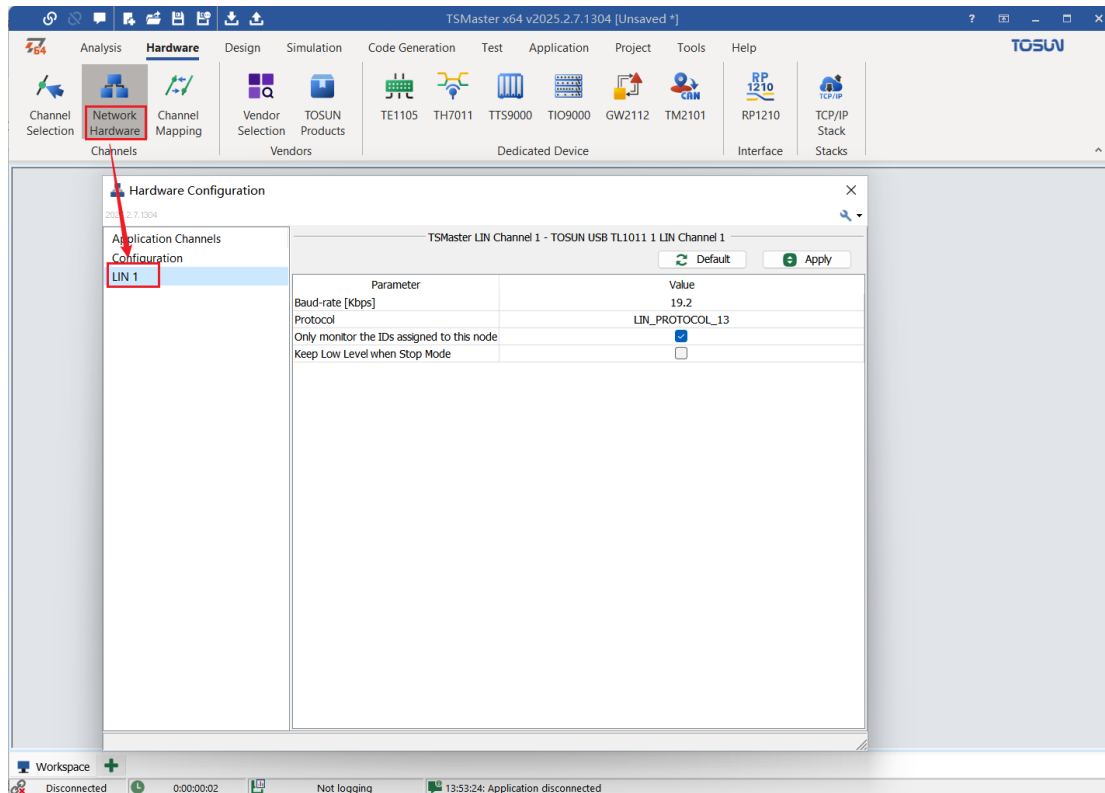After the installation，you can see the following software on the PC.

5.5 Use TSMaster with the Hardware

In TSMaster, click Hardware-Channel Selection. In the channel selection GUI, select the device you want to connect.

In Network Hardware, a series of controller parameters can be configured, such as baud rate, protocol, etc.

After the configuration, click Analysis->Start and connect the hardware to efficiently carry out works such as bus development, testing, ECU production line, etc. with the powerful TSMaster software. For more detailed instructions on using the TSMaster software, please refer to the TSMaster software manual and the quick start guide.

6. Inspection and Maintenance

The main electrical components of TL series products are semiconductor components. Although the equipment has a long service life, they may also accelerate aging and significantly reduce their service life under an incorrect environment. Therefore, during the use of the equipment, periodic inspection should be carried out to ensure that the use environment maintains the required conditions.

It is recommended to conduct inspections at least once every 6 months to 1 year. Under improper environmental, more frequent inspections should be conducted. As shown in the table below, if you encounter problems during maintenance, please read the following content to find

the possible causes of the problem. If the problem still cannot be solved, please contact Shanghai

TOSUN Technology Ltd.

Item	Inspection	Standard	Action
Power Supply	Inspect for voltage fluctuations at the power supply end	USB port +5V Power supply port +12V DC	Use a USB power meter/voltage meter to check the power input end. Take necessary actions to keep the voltage fluctuations within the acceptable range.
Surrounding Environment	Check the ambient temperature of the surrounding environment. (Including the internal temperature of enclosed environments)	-40°C~+80°C	Use a thermometer to check the temperature and ensure that the ambient temperature within in the acceptable range.
	Check the ambient humidity. (Including the internal humidity of enclosed environments)	The relative humidity must be within the range of 10% to 90%	Use a hygrometer to check the humidity and ensure that the ambient humidity within the acceptable range.
	Check for the accumulation of dust, powder, salt, and metal shavings	No accumulation	Clean and protect the equipment.
	Check for any contact with water, oil, or chemical sprays on the equipment	No contact	Clean and protect the equipment if necessary.
	Check for the presence of corrosive or flammable gases in the equipment area	No presence	Inspect by the smell, or using a sensor.
	Check for levels of vibration and shock	Vibration and shock are within the acceptable	Install padding or other shock-absorbing devices if necessary.

|	range	
	Check for noise sources near the equipment	No significant noise source	Isolate the equipment from noise sources or protect the equipment.
Wiring Installation	Check the crimped connectors in the external wiring	Ensure enough space between the connectors	Visually inspect and adjust if necessary.
	Check for damage in the external wiring	No damage	Visually inspect and replace the wiring if necessary.

7. Appendix

Comparison of rising edge time between ordinary LIN and fastLIN waveforms:

Ordinary LIN waveform rising edge time: approximately 5.8us
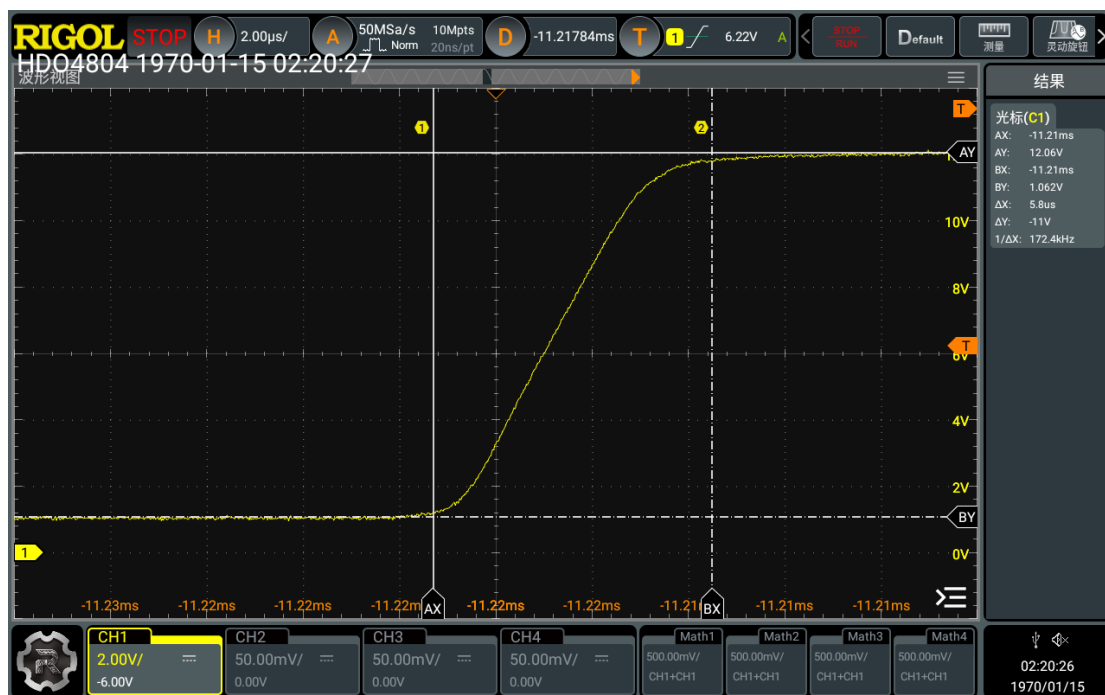
fastLIN waveform rising edge time: approximately 1.5us

TOSUN
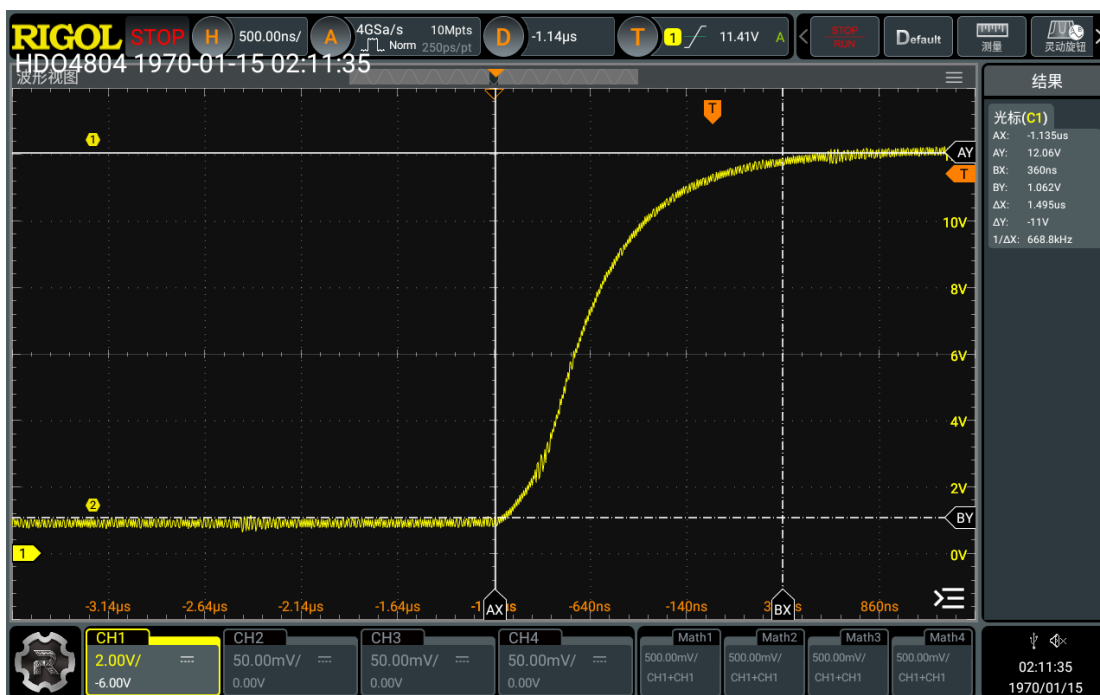
Software

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
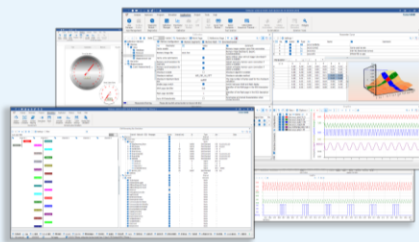
TSMASTER

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 lin FlexRay OPEN ALLIANCE
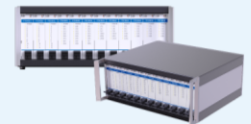
Solutions

• 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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