



TOSUN-TC1014Pro

User Manual

Product Features & Interface Overview

4-channel CAN FD to USB interface, 4-channel DI/DO, 3-channel AI/AO

Product Name	Channel
TC1014Pro	CAN FD × 4, DI/DO × 4, AI/AO × 3

Copyright Information

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Typical Application

- Multi-channel CAN FD/CAN data acquisition for vehicle-level applications
- Development and integration of automated test systems
- UDS diagnostics, ECU flashing, and CCP/XCP calibration
- Online and offline playback of BLF and ASC files
- I/O signal acquisition, output, and bus-interaction testing

Product Highlights

- High Precision and Efficiency: Microsecond-level (μ s) hardware message timestamps for demanding applications
- Driver-Free Compatibility: Driver-free design for Windows and Linux, providing excellent system compatibility
- Multi-Channel Connectivity: Supports 4 CAN/CAN FD channels, 4 DI/DO channels, and 3 AI/AO channels
- High-Speed Communication: Adjustable CAN bit rates from 125 kbps to 1 Mbps; CAN FD supports data rates of up to 8 Mbps
- Flexible Termination: Built-in 120 Ω CAN termination resistors with software-configurable enable/disable control
- Self-ACK Support: Supports software-configurable CAN Self-ACK
- Recording and Playback: Supports data recording and online/offline playback in BLF and ASC formats
- Time Synchronization: Supports hardware time synchronization across multiple devices
- Secondary Development: Provides API-based example projects for secondary development

Contents

Product Features & Interface Overview	2
Typical Application	3
Product Highlights	3
1. Introduction	5
1.1. Technical Specifications	5
1.2. Electrical Specifications	7
1.3. Pin Definitions	10
1.4. Termination Resistor	12
1.5. LED Indicators	12
1.6. System Requirements	13
1.7. Packing List	14
2. Application Example in Windows	15
2.1. Hardware Connection	15
2.2. Software Connection	15
2.3. Usage	17
2.4. Usage Example	17
2.4.1. Sending a CAN Frame	17
3. Appendix	22
3.1. Software Installation	22
4. Inspection and Maintenance	27

1. Introduction

The TC1014 Pro is a 4-channel CAN FD interface device with I/O capabilities, supporting data rates of up to 8 Mbps. The device connects to a PC via a USB 2.0 interface. Its driver-free design for Windows provides excellent system compatibility.

When used with the powerful TSMaster software, the TC1014 Pro supports DBC and ARXML database files, enabling convenient monitoring, analysis, and simulation of CAN FD bus data, as well as UDS diagnostics, ECU flashing, and CCP/XCP calibration.

The device also provides cross-platform APIs for secondary development on Windows and Linux, supporting development environments such as C++, C#, LabVIEW, and Python. This makes it easy to integrate the device into various test systems.

The product package includes:

- TSMaster bus monitoring and analysis software
- Cross-platform secondary development library (with a dedicated programming manual)



This document covers the operation of the device on Windows. For usage on Linux and other operating systems, please refer to the separate user manual.

1.1. Technical Specifications

➤ Device Specifications

Parameter	Description
PC Interface	USB 2.0
CAN FD Interface	DB9
Driver	Driver-free design for Windows/Linux, providing excellent system capability
Buffer	Hardware buffer; the transmit buffer of each channel supports up to 700 CAN frames
Timestamp Resolution	1 μ s hardware message timestamp for demanding applications

Termination Resistor	Built-in 120 Ω termination resistor, software-configurable
Maximum Message Throughput	Maximum transmit rate: 20,000 frames/s; maximum receive rate: 20,000 frames/s (single channel, 1 Mbps, 0-byte data field)
Isolation	2500 V DC isolation between CAN channels; ESD protection: ± 8 kV contact discharge and ± 15 kV air discharge
Power Supply	9 - 32 V DC
Power Consumption	4 W / 10 W (PWM output in push-pull mode on all DO channels)
Enclosure Material	Metal
Dimensions	Approx. 178 × 113 × 38 mm
Weight	Approx. 435 g (unpackaged) / approx. 1333 g (packaged)
Operating Temperature	-40°C to 80°C
Operating Humidity	10% ~ 90% RH (no condensing)
Operating Environment	Keep away from corrosive gases

➤ CAN/CAN FD

Parameter	Description
CAN	Supports CAN 2.0A and CAN 2.0B, compliant with ISO 11898-1, with bit rates from 125 kbps to 1 Mbps
CAN FD	Supports ISO and non-ISO CAN FD, with bit rates from 125 kbps to 8 Mbps
Data Recording	Supports data recording and online/offline playback in BLF and ASC formats
Self-ACK	Supports CAN Self-ACK configuration
Hardware Time Synchronization	Supports hardware time synchronization across multiple devices

➤ **DI/DO**

Parameter	Description
DI Input Voltage Range	0 - 40 V
Vref Range	0 - 3.3 V
Threshold Range	$VAH = (330 + 499 \times Vref) / 1098$; $VAL = 0.455 \times Vref$
DO Output Level	Low level: 0 V; high level: 5 V / 12 V (not suitable for driving loads)

➤ **AI/AO**

Parameter	Description
AI Input Voltage Range	0 - 39 V
AO Output Voltage Range	0 - 30 V
AI Sampling Rate	1 - 1000 Hz
AI/AO Accuracy	1%

1.2. Electrical Specifications➤ **Power Supply Characteristics**

Parameter	Condition	Min	Typ.	Max	Unit
Operating Voltage	DC power supply, CAN transmit/receive	9	12	32	V
Operating Current	DC power supply, CAN transmit/receive	--	0.3	--	A
Power Consumption	DC power supply, CAN transmit/receive	--	4	--	W

➤ **CAN Interface Characteristics**

Parameter	Condition	Min	Typ.	Max	Unit
Bus Pin Withstand Voltage	CANH, CANL	-58	--	58	V
Termination Resistance	Termination resistor enabled	--	120	--	Ω
Isolation Withstand Voltage	Leakage current < 1mA	2500	--	--	VDC

➤ **EMC Performance**

Test Item	Standard	Condition	Level	Unit
ESD	IEC 61000-4-2	Contact discharge	± 8	kV
		Air discharge	± 15	kV
EFT/Burst	IEC 61000-4-4	Electrical fast transient burst	± 2	kV
Surge	IEC 61000-4-5	Surge	± 2	kV

➤ Mechanical Dimensions

Unit: mm

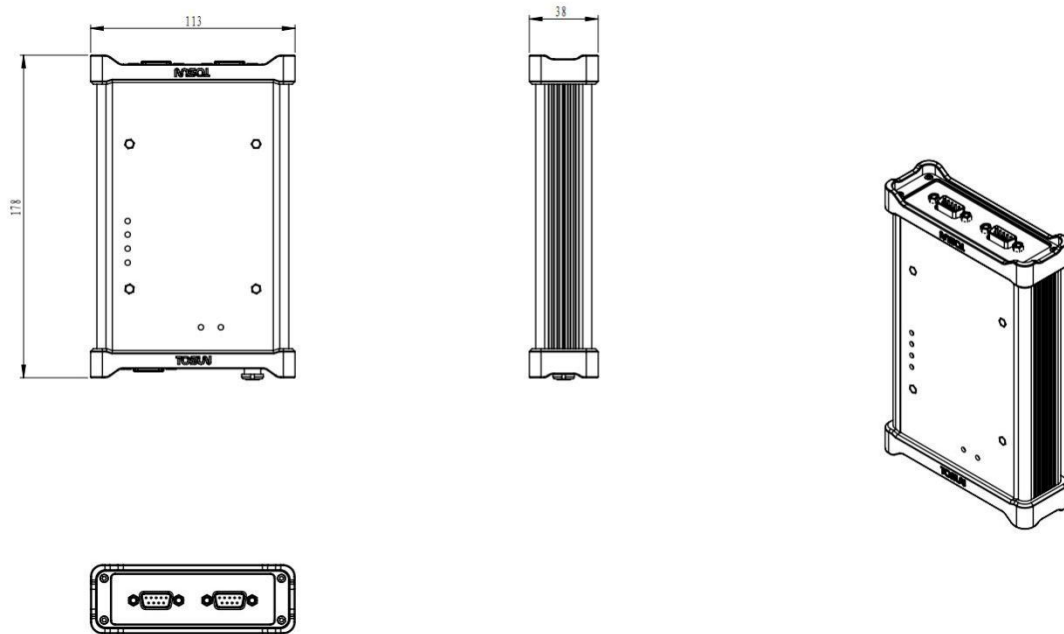


Figure 1-1 Mechanical Dimensions

1.3. Pin Definitions

➤ Hardware Interfaces



Figure 1-2 Hardware Interface (CAN FD)

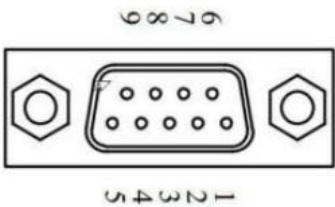


Figure 1-3 Pin Definition (CAN FD)

Channel	Pin	Definition	Channel	Pin	Definition
CAN FD 1/3	Pin 2	CAN FD1_Low	CAN FD 2/4	Pin 2	CAN FD2_Low
	Pin 3	CAN FD_GND		Pin 3	CAN FD_GND
	Pin 4	CAN FD3_Low		Pin 4	CAN FD4_Low
	Pin 5	CAN FD_Shield		Pin 5	CAN FD_Shield
	Pin 7	CAN FD1_High		Pin 7	CAN FD2_High
	Pin 8	CAN FD3_High		Pin 8	CAN FD4_High

➤ I/O Pin Interface



Figure 1-4 Hardware Interface (I/O)

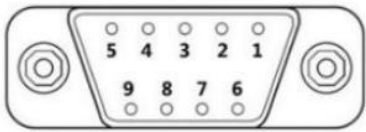


Figure 1-5 Pin Definition (I/O)

Channel	Pin	Definition
I/O	Pin 1	DIDO_1
	Pin 2	DIDO_3
	Pin 3	DGND
	Pin 4	AIAO_1
	Pin 5	AIAO_3
	Pin 6	DIDO_2
	Pin 7	DIDO_4
	Pin 8	AGND
	Pin 9	AIAO_2

1.4. Termination Resistor

The CAN channels of the TC1014Pro feature built-in 120 Ω termination resistors, which can be enabled or disabled through software. For a CAN bus, it is recommended to enable one 120 Ω termination resistor at each end of the bus so that the equivalent resistance of the bus remains approximately 60 Ω .

1.5. LED Indicators



Figure 1-6 Product Front Panel Label

➤ Indicator Description

Indicator	Description
CAN FD 1 ~ 4	CAN FD channel 1 ~ 4 indicators
DC 9 ~ 32 V	Power indicator
LINK	Hardware connection indicator

➤ Indicator Status

Indicator	Color	Description
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CAN FD	Green	Normal frame transmission/reception
	Red	Frame transmission/reception error — configuration, protocol, or wiring fault
DC 9 ~ 32 V	Green	Device powered on normally
Link	Green	Device connected successfully



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

1.6. System Requirements

➤ PC Requirements

- Operating System: Windows or Linux
- One available USB 2.0 port
- 9–32 V DC power supply (12 V / 2 A power adapter included)

➤ Driver Installation

- The TC1014Pro features a driver-free design for Windows and Linux, providing excellent system compatibility.

➤ Downloads

- TSMaster software
- PDF user manual
- Programming library (for secondary development)



The download link is available on the official website of Shanghai TOSUN Technology Ltd.: <https://www.tosunai.com/>

1.7. Packing List

Item	Qty.	Illustration	Standard/Optional
TC1014Pro Main Device	1		Standard
USB Cable	1		Standard
12 V / 2 A Power Adapter	1		Standard
DB9 Female-to-Dual-Male Signal Cable	1		Standard
DB9 Male Solderless Terminal Block Connector	1		Standard

2. Application Example in Windows

2.1. Hardware Connection

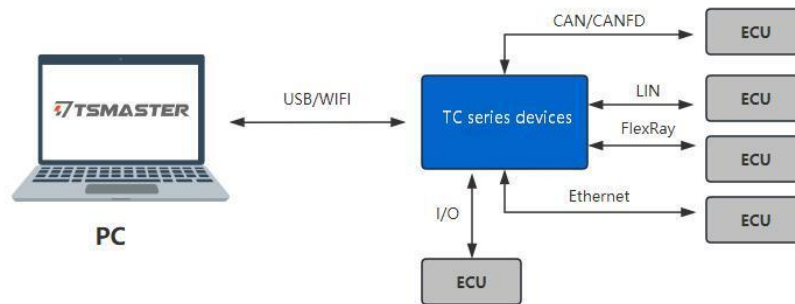


Figure 2-1 Hardware Connection

- The CAN FD channels are connected via DB9 male connectors. CAN FD 1/3 and CAN FD 2/4 correspond to different DB9 connectors. For detailed pin assignments, see the Pin Definitions section.
- The I/O interface is connected via a DB9 female connector. For the DI/DO and AI/AO pin assignments, see the Pin Definitions section.
- When connecting to a CAN bus, enable 120 Ω termination resistors at both ends of the bus according to the bus topology.

2.2. Software Connection

1. Power the TC1014 Pro using the 12 V / 2 A power adapter.
2. Connect the device to the PC via the supplied USB cable.
3. In TSMaster, go to “Hardware” → “Channel Selection”, and select the device and CAN FD channels to be connected in the Channel Selection window.

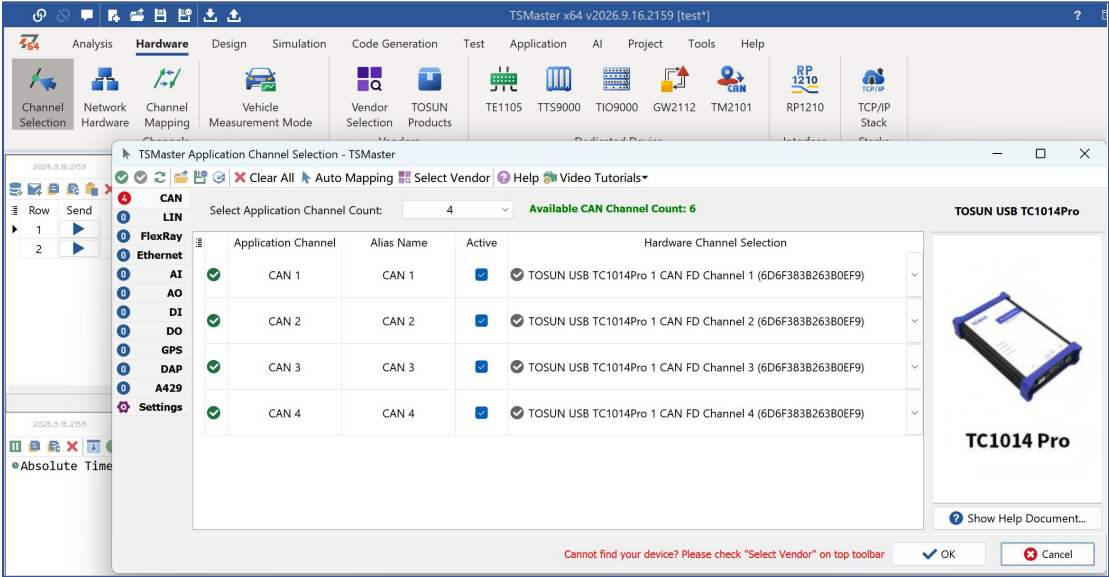


Figure 2-2 Channel Selection

4. In “Network Hardware”, configure parameters such as the protocol, bit rate, controller mode, Self-ACK, and termination resistor.

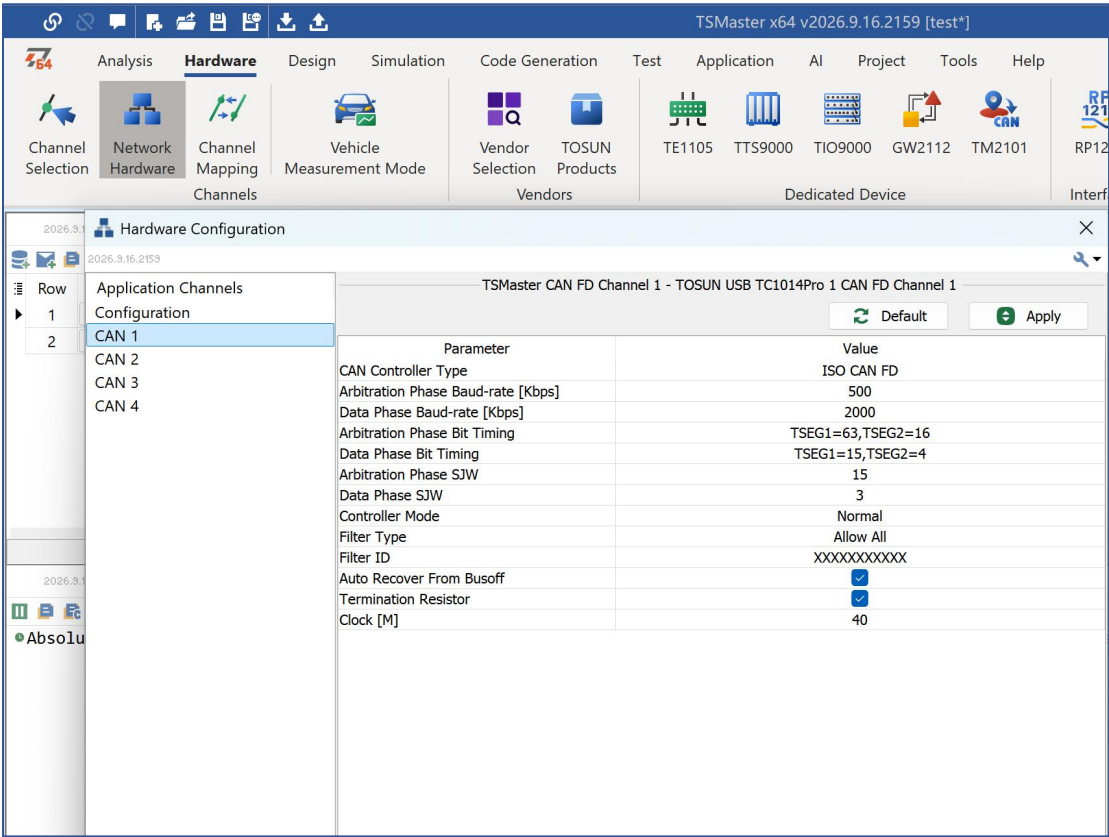


Figure 2-3 Channel Configuration

5. After configuration is complete, click “Start” to connect the hardware.

2.3. Usage

After the connection is established, the TC1014 Pro can be used with TSMaster for CAN FD bus monitoring and analysis, simulation and testing, UDS diagnostics, ECU flashing, CCP/XCP calibration, and I/O interaction testing.



For TSMaster installation instructions, please refer to the appendix.

2.4. Usage Example

2.4.1. Sending a CAN Frame

After configuring and connecting the software and hardware, messages can be sent through the “CAN/CAN FD Message Transmission” window in TSMaster or via a mini-program. Message details can be viewed in the “CAN/CAN FD Message Information” window.

➤ Via GUI

1. After configuration and connection, click “Analysis → Data Analysis → Message Transmission → Add CAN/CAN FD Transmission” to open the CAN/CAN FD Transmission window. Add a cyclic message as shown below, then click Send.

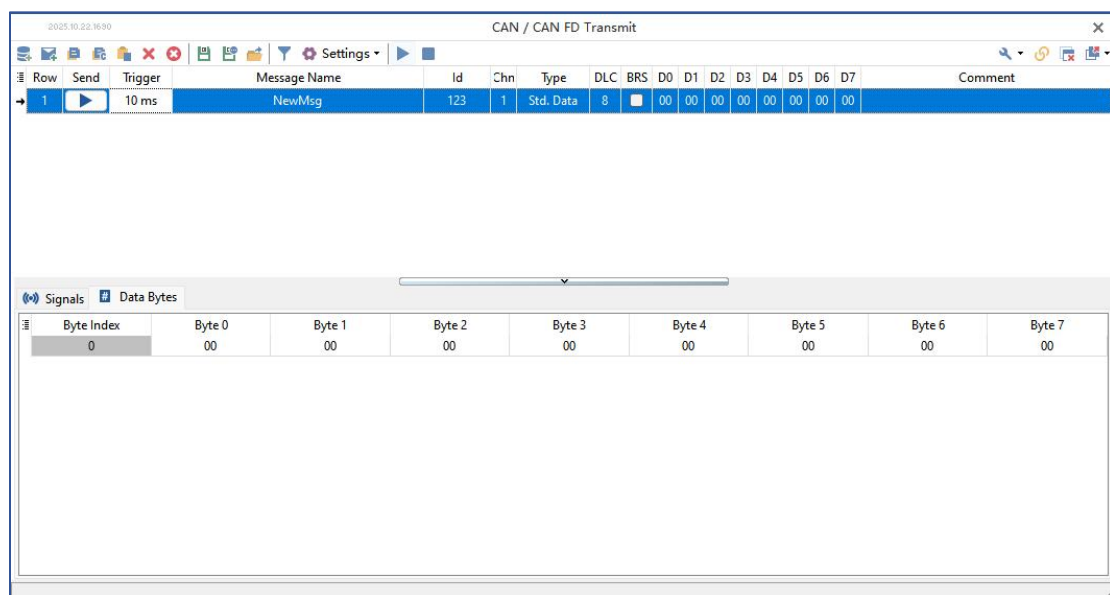


Figure 2-4 Adding CAN Message

2. Message information can be viewed under “Analysis → Data Analysis → Message Analysis → Add CAN/CAN FD Message Information.”

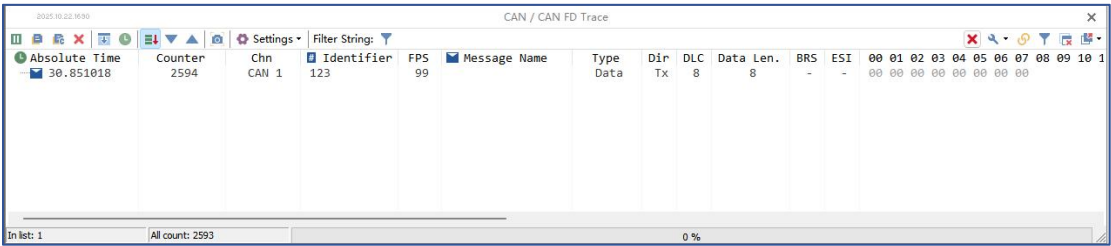


Figure 2-5 CAN Message Information

3. Bus statistics can be viewed under “Analysis → Data Analysis → Statistics → Show CAN Statistics” (example shows one channel).

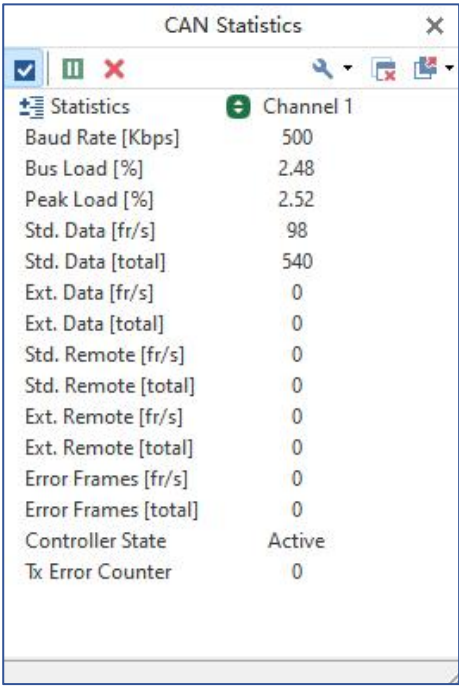


Figure 2-6 CAN Statistics

➤ **Via C Script**

1. In the “CAN/CAN FD Transmission” window, right-click a message and select “Copy as C Script” to display example code. Copy the generated code.

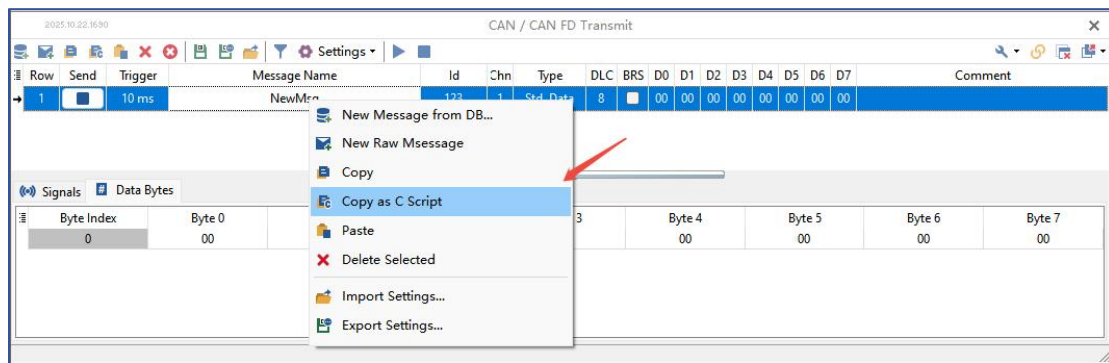


Figure 2-7 Quick Access to C Code

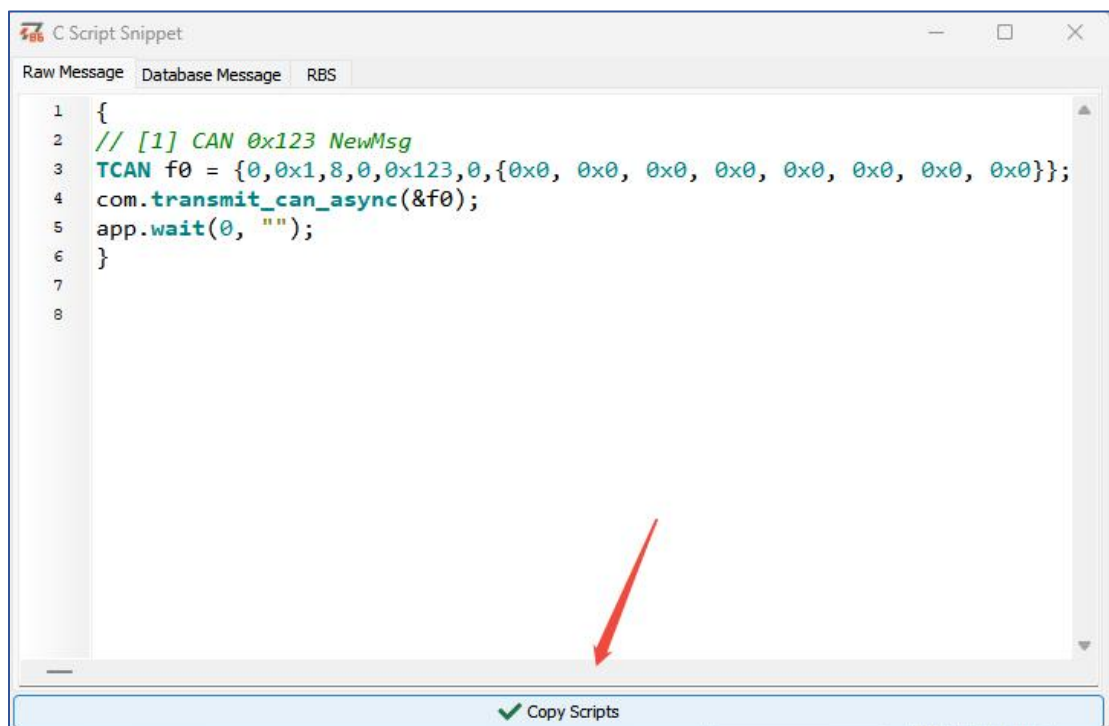


Figure 2-8 Copying the C Code

2. In the mini-program module, click “Design → Mini-program → Add C Mini-Program Editor” to open the C code editor.

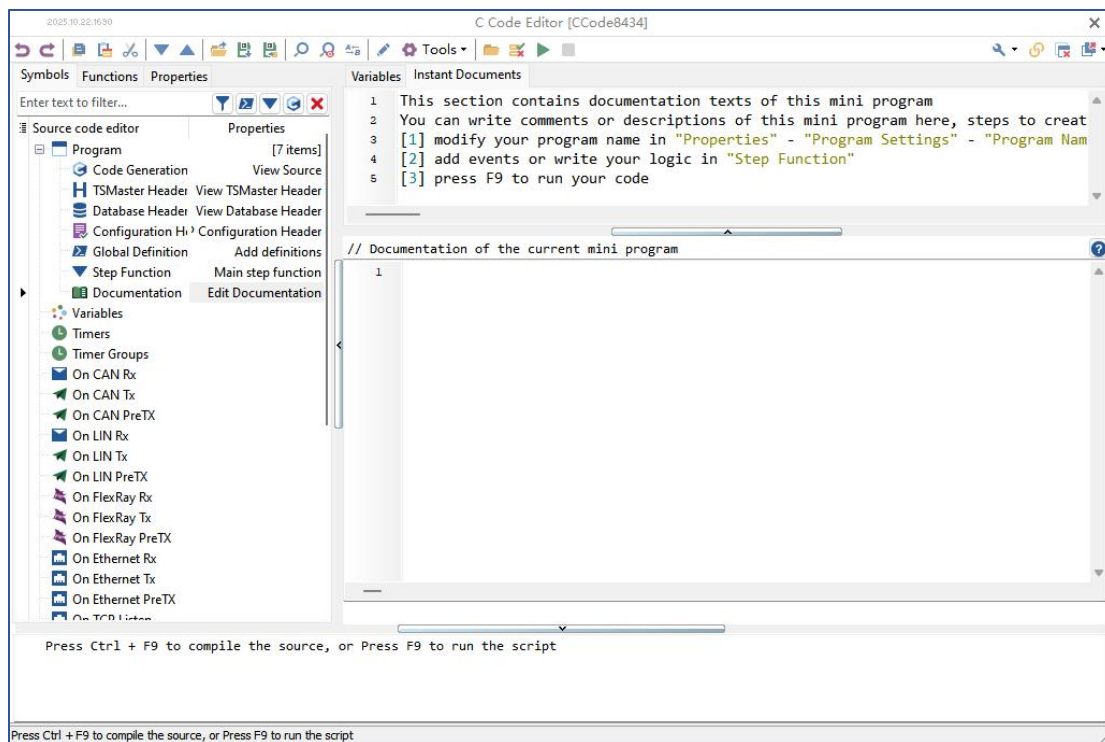


Figure 2-9 Adding a C Mini-Program Editor

3. In the C Code Editor, add a key event (e.g., Key A), paste the copied code into the event handler, then click Compile and Run.

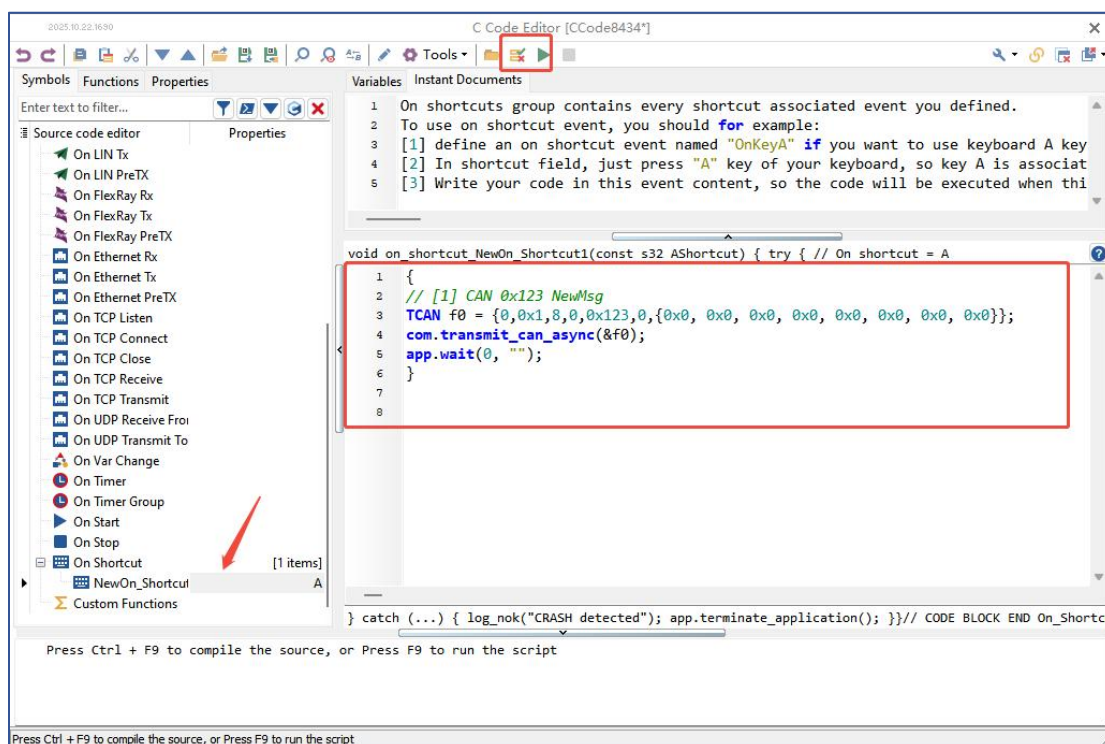


Figure 2-10 Building a C Mini-Program (CAN)

4. Each time Key A is pressed, a CAN message will be transmitted.

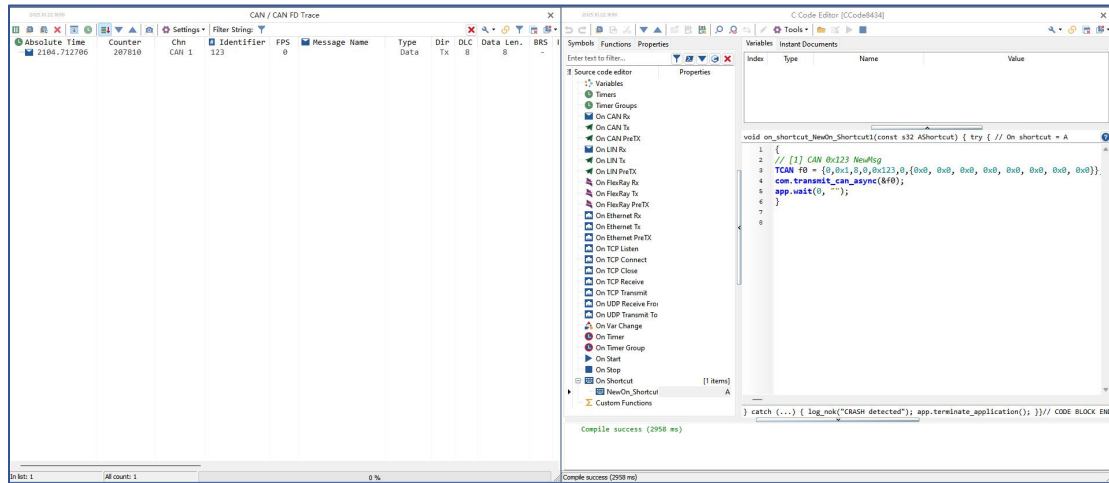


Figure 2-11 Sending CAN Messages via C Mini-Program

3. Appendix

3.1. 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 3-1 TOSUN Official WeChat Account

➤ Software Installation

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

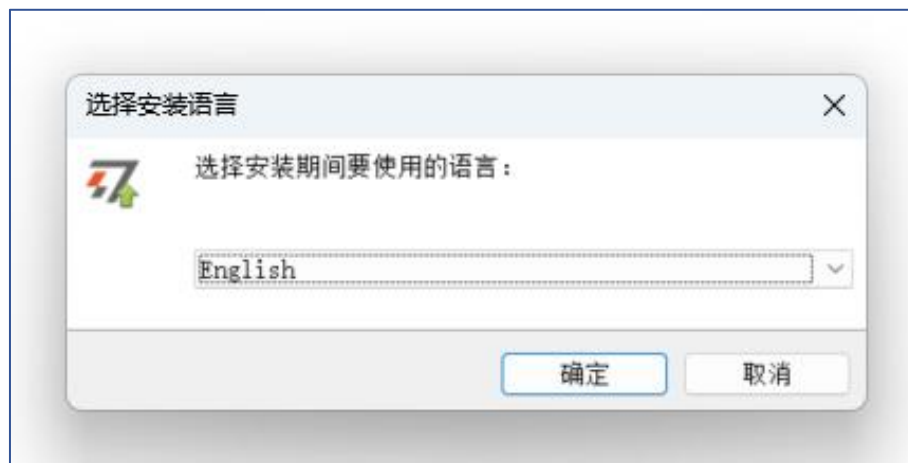


Figure 3-2 TSMaster Installation

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

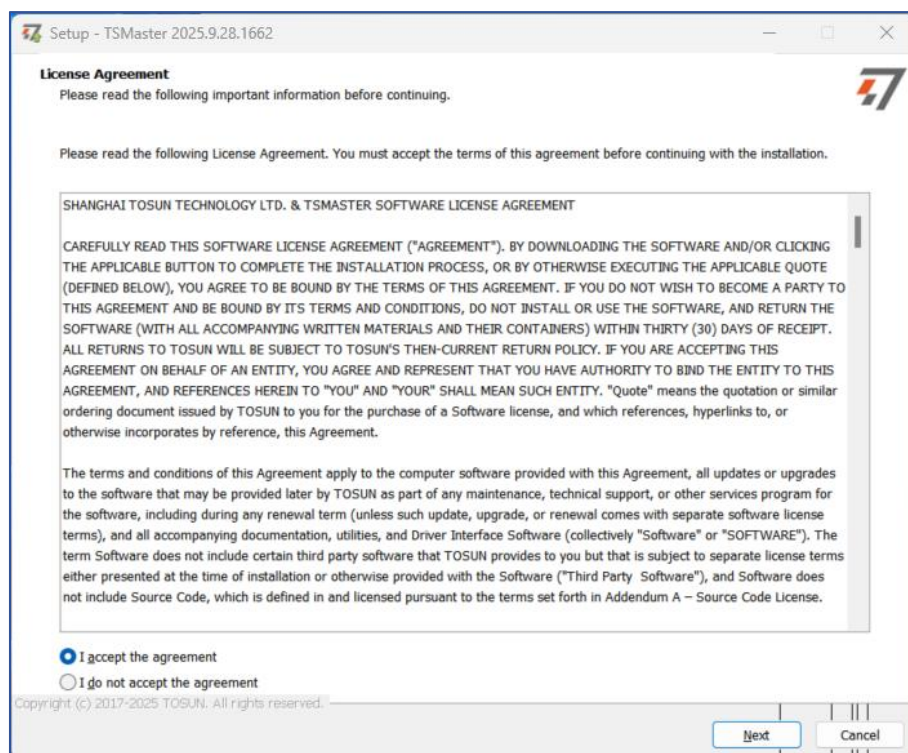


Figure 3-3 TSMaster Installation

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

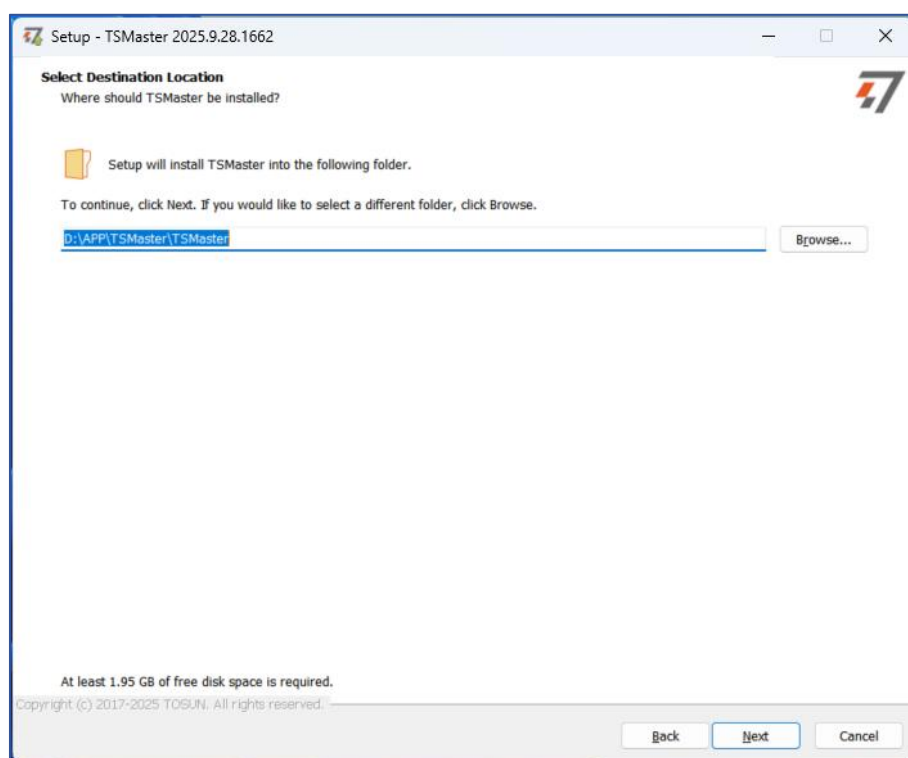


Figure 3-4 TSMaster Installation

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

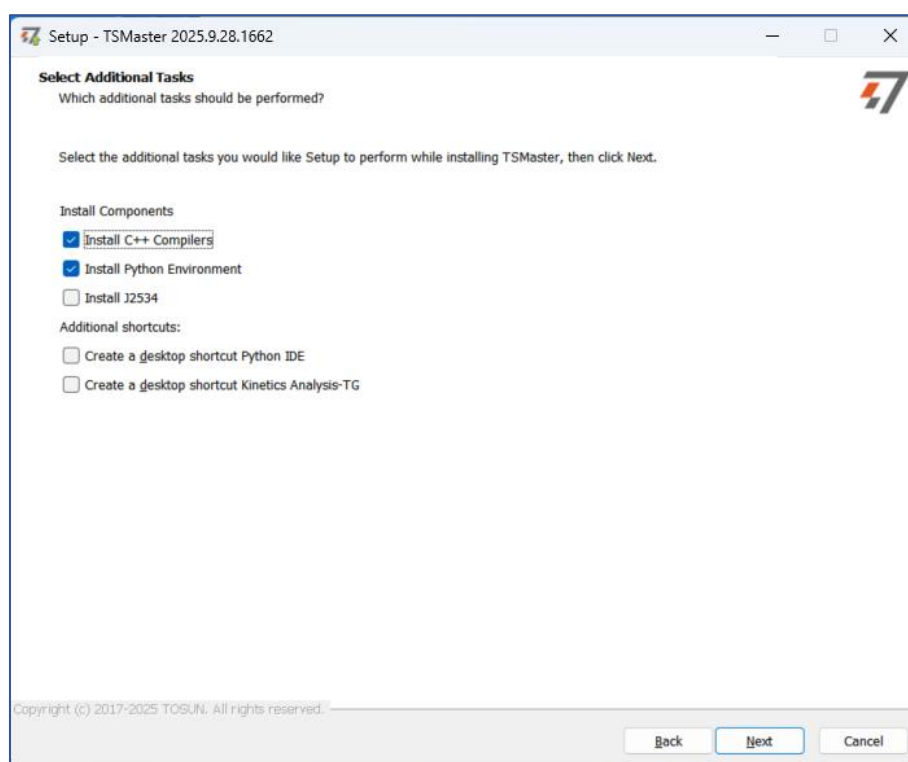


Figure 3-5 TSMaster Installation

5. Click “Install” and wait for completion.

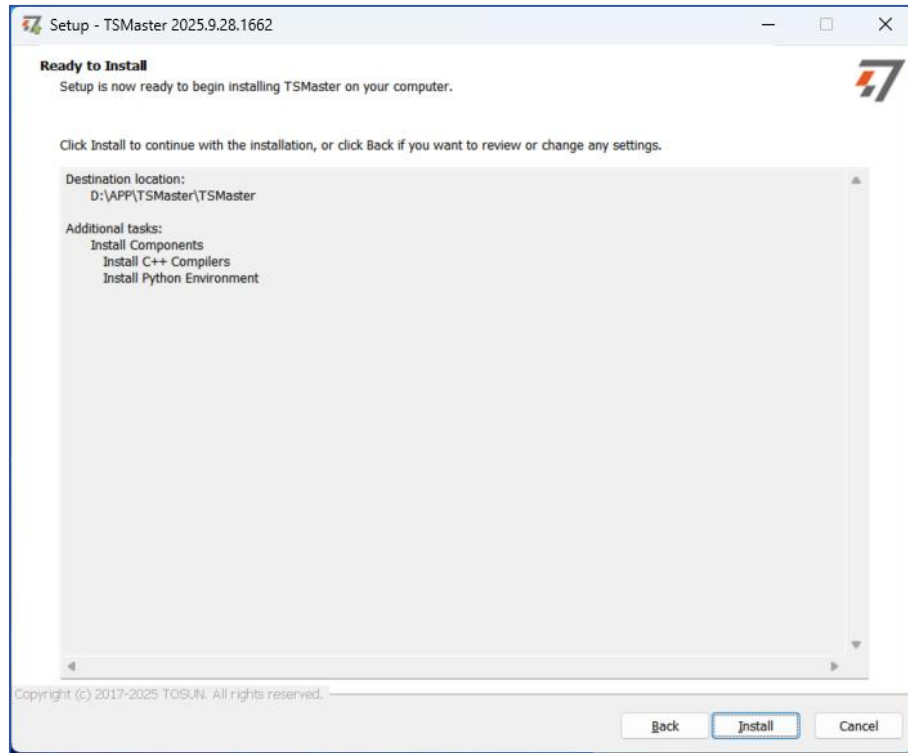


Figure 3-6 TSMaster Installation

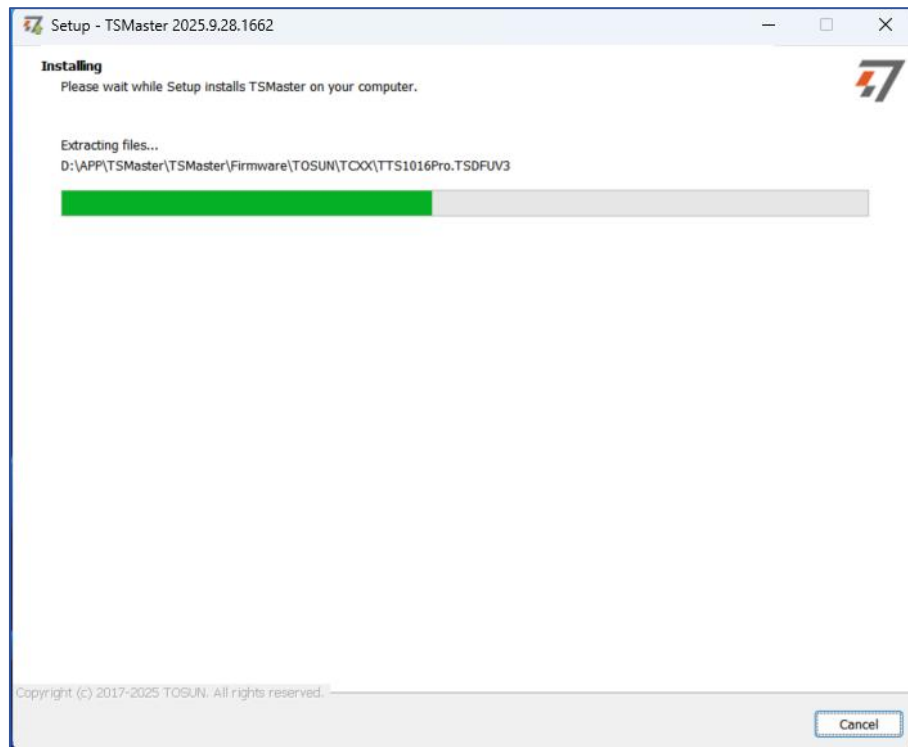


Figure 3-7 TSMaster Installation

6. Click “Finish” to complete installation.

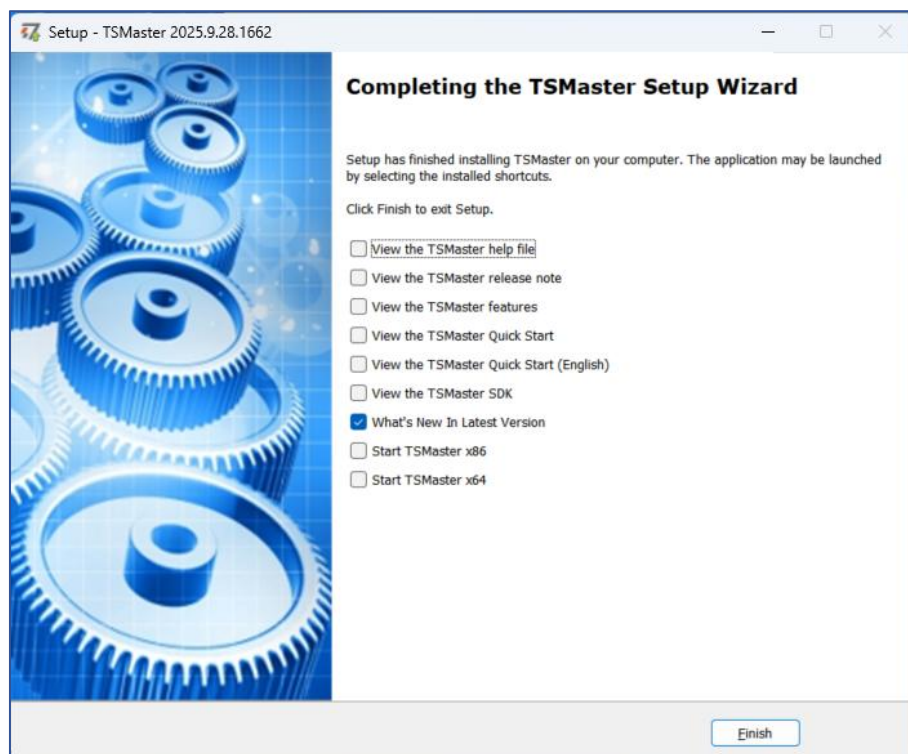


Figure 3-8 TSMaster Installation

4. Inspection and Maintenance

The TC1014Pro 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	Power port: 9 ~ 30 V DC	Use a voltmeter at the input; ensure voltage fluctuation is within range
Ambient Conditions	Check ambient temperature (including internal temperature within enclosures)	-40°C ~ +80°C	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
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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**

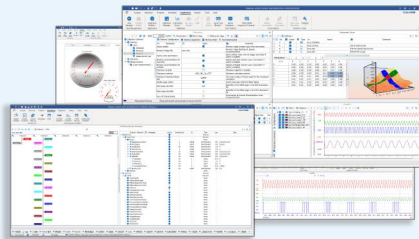
Item	Check Content	Standard/Range	Action/Measure
Mechanical Stress	Check vibration and shock levels	Within specified limits	Install padding or vibration isolation measures if necessary
Electromagnetic Environment	Check for noise sources near the device	No significant noise sources	Isolate or shield the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

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/Transmitting/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



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



Quality Assurance
ISO9001:2015

CE Certification



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