TOSUN

TC1055 Pro Product Manual

Version：V1.0 | English

tosunai.com

Copyright Information

Shanghai TOSUN Technology Ltd

No. 9 Building, 1288 Jiasong North Road, Jiading District, Shanghai (Headquarters)

Buildings 14-17, Lane 4849 Cao'an Highway (Shanghai Research Institute)

In an effort to provide users with the best possible service, Shanghai TOSUN Technology Ltd. (hereinafter referred to as "TOSUN Technology") has made every attempt to present accurate and detailed product information as possible in this manual. However, due to the time-sensitive nature of the content, TOSUN Technology cannot guarantee the timeliness and applicability of the information at all times.

The information and data contained in this manual are subject to change without prior notice. For the latest updates, please visit the official website of TOSUN Technology or contact our support team directly. We appreciate your understanding and continued support!

@ Copyright 2024-2025, Shanghai TOSUN Technology Ltd. All rights reserved.

What Are the Advantages of Automotive Ethernet?

With the rapid development of automotive electronics, Automotive Ethernet has been widely adopted and critically important in the automotive industry. Compared to traditional CAN and LIN buses, automotive Ethernet supports higher data transmission rates, enabling faster transfer of large volume of data. This is critical for modern vehicles equipped with advanced driver assistance systems (ADAS), infotainment platforms, and other data-intensive applications.

Automotive Ethernet also offers improved transmission quality and stability, minimizing data packet loss and latency. Its versatile capabilities make it suitable not only for conventional in-vehicle communication, but also for time synchronization, audio/video streaming, and even integration with internet-based data. As automotive network demands grow in complexity, automotive Ethernet can meet these challenges with its scalability, ensuring compatibility with future technologies such as higher-speed networks and emerging communication protocols.

What Are the Advantages of TC1055 Pro?

- **Multi-Bus Technology**

  TC1055 Pro supports CAN/CAN FD, LIN and Automotive Ethernet simultaneously. In complex bus network environments, a single TC1055 Pro device enables communication with multiple ECUs across different bus protocols.

- **High Performance**

  Built with high-performance hardware, TC1055 Pro ensures reliable data processing even under demanding network loads. It connects to the PC via Gigabit Ethernet, 10-Gigabit Ethernet, or USB3.0, ensuring high-speed and stable data exchange with the host system.

- **Cost Efficiency**

  By integrating multiple bus technologies, TC1055 Pro reduces the need for separate communication modules, effectively lowering hardware costs and simplifying wiring complexity.

- **Seamless Software Integration**

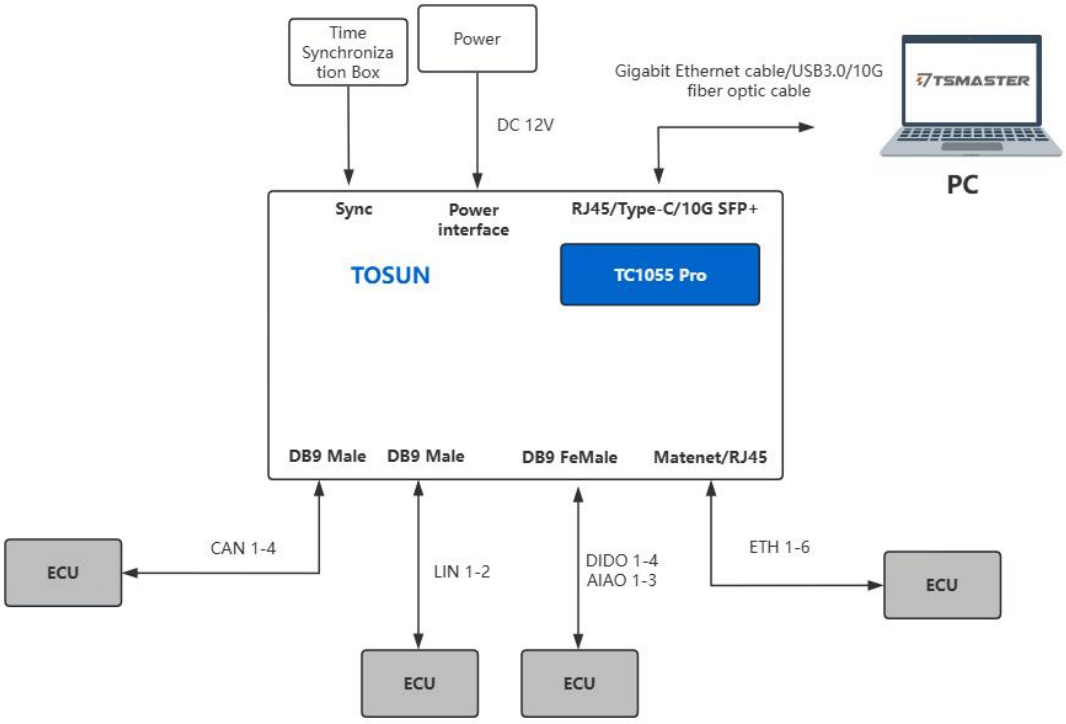
  The TC1055 Pro is fully integrated with the TSMaster software, enabling streamlined monitoring, analysis, and simulation of multi-bus communication. It supports advanced automotive protocols including UDS diagnostics, ECU flashing, CCP/XCP calibration, DoIP, and

SOME/IP, making it ideal for development, testing, and validation environments.

What Can It Do?

- Monitor, capture, and decode CAN/CAN FD bus data
- Monitor, capture, and decode LIN bus data
- Monitor, capture, and decode Automotive Ethernet data
- Support DIDO (Digital Input/Output) and AIAO (Analog Input/Output)
- Perform ECU flashing (via UDS or DoIP)
- Execute ECU-level and system-level automated testing
- ...

How to Use the TC1055 Pro Device?



Contents

1. About this User Manual

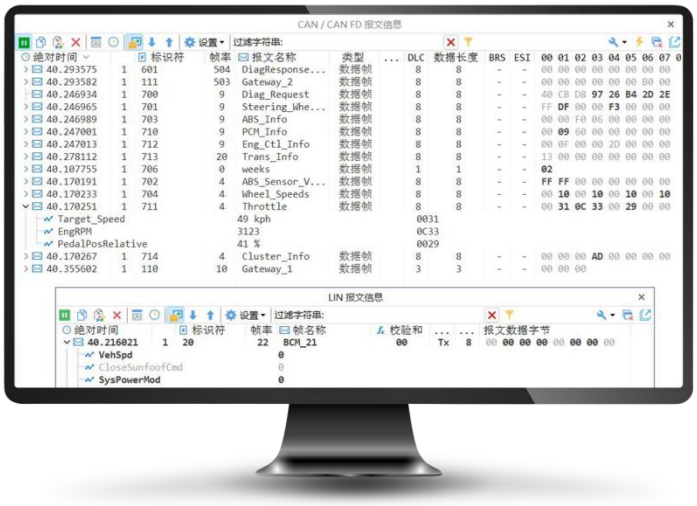
1.1 Disclaimer

The information provided in this document is for reference only and does not constitute any form of guarantee or commitment by TOSUN. TOSUN Technology reserves the right to modify the contents and data in this document without prior notice. The company assumes no responsibility for the accuracy of the information contained herein or for any damages resulting from the use of this document. We sincerely appreciate any error reports or suggestions for improvement, as they help us deliver more efficient products in the future.

1.2 Copyright

2. General Information

2.1 Bus Data Collection and Analysis



When used with TSMaster software, TC1055 Pro supports message transmission/monitoring/playback, bus statistics/logging, and graphical/numerical data analysis.

- **Bus Statistics**

  Bus statistics include: bus load rate, peak load rate, data frame rate, data frame count, error frame rate, error frame count, controller status, and transmit error count.

- **Database**

  Supports loading DBC, LDF, XML, ARXML format databases. Provides database structure view, signal communication matrix, and message communication matrix views.

- **Message Playback**

  Supports offline and online playback of recorded files in formats such as BLF and ASC.

- **Message Transmission**

  Supports manual transmission, hotkey triggering, and cyclic transmission. Message generator

and both custom and database-based messages are supported.

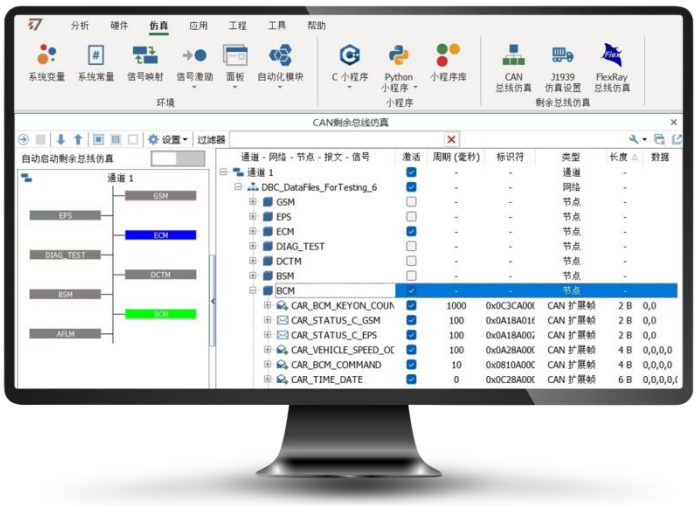
- **Message Monitoring**

Offers multiple display modes, and supports DBC decoding to view signal values. Channel and ID filtering can be configured.

- **Graphical & Numerical Display**

Y-axis of signals is fully configurable. Supports multi-axis and split-display modes, as well as pinpoint data visualization, making analysis more intuitive and accurate.

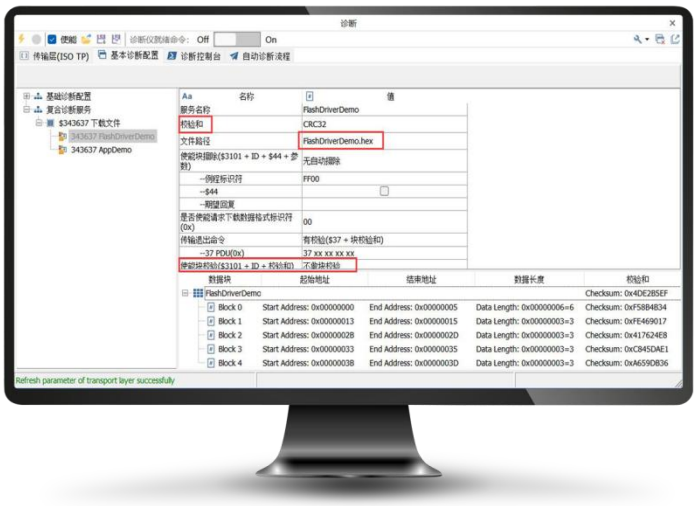
2.2 Bus Simulation



Together with TSMaster software, TC1055 Pro enables multi-bus simulation including CAN, LIN, and Automotive Ethernet, as well as code simulation via software-in-the-loop (SIL) features. The built-in Panel function allows graphical visualization of signal data linked to bus channels.

- Supports CAN bus simulation
- Supports LIN bus simulation
- Supports J1939 protocol simulation
- Supports Automotive Ethernet simulation

2.3 Diagnostic



Diagnostics are a key functionality of modern ECUs. During vehicle operation, sensors throughout the system detect various potential faults in electrical and electronic subsystems. TOSUN toolchain supports the development, verification, and UDS-based ECU flashing needed for these diagnostic operations.

- **Diagnostic Parameter Configuration**

  Includes timeout settings, TesterPresent configuration, SeedKey DLL configuration. Built-in SeedKey editor allows custom algorithms without third-party tools.

- **Basic Diagnostic Configuration**

  Users can define custom diagnostic database, including: service setup, request/response parameters, and more.

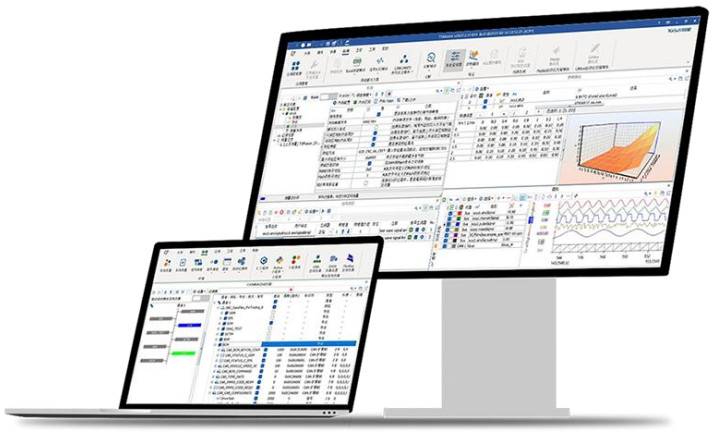
- **Diagnostic Console**

  Executes configured diagnostic database, with support for automatic verification of response results.

- **Automated Diagnostic Process**

Supports creating customized diagnostic flows and services, enabling streamlined Flash Bootloader programming processes.

2.4 Calibration

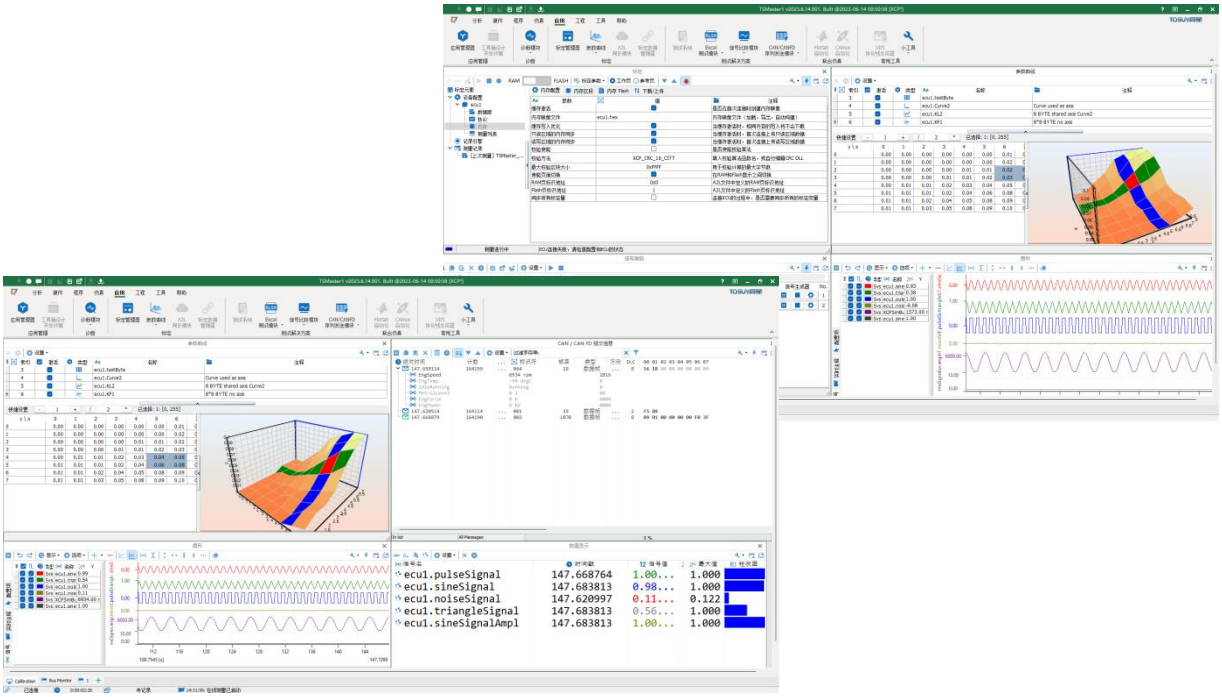


CCP (CAN Calibration Protocol): A CAN-based protocol mainly used for ECU calibration and parameter tuning. It allows engineers to read/write parameters and perform real-time testing and adjustment.

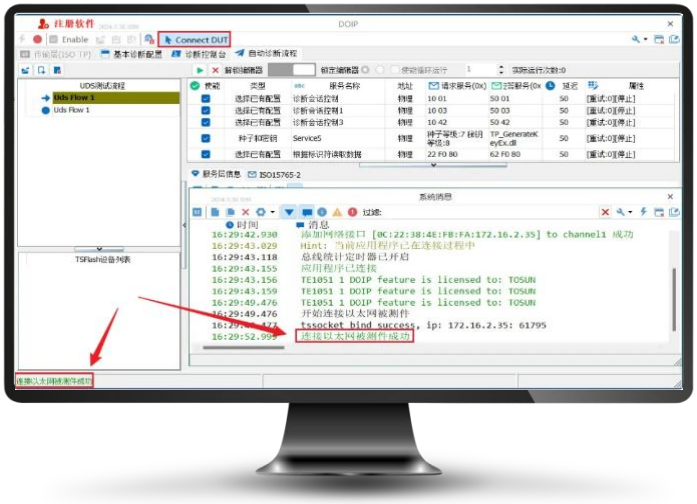
XCP (Universal Measurement and Calibration Protocol): A versatile protocol supporting multiple communication interfaces such as CAN and Ethernet. It offers high-speed data transfer and advanced diagnostic capabilities.

The automotive calibration function is a technique used in ECU development and diagnostics. It involves adjusting ECU parameters and calibration values to optimize vehicle performance and functionality. CCP and XCP allow for efficient communication between engineers and the ECU for tuning and optimizing vehicle performance.

- Supports importing A2L files
- Supports DAQ/Polling measurement modes
- Memory configuration with image loading and checksum methods
- Supports parameter curves and MAP visualizations
- Supports MDF/MF4 file storage and playback
- Graphical display for variables
- Supports management in **.par** or **.hex** format
- Integrated view for message analysis, diagnostics, calibration, and system variables
- Supports automation through system variable scripting
- Supports both single and multiple file downloads



2.5 DoIP Function (Diagnostics over Internet Protocol)



DoIP is a standardized protocol enabling diagnostic communication over Ethernet between vehicles or between diagnostic tools and vehicles. It allows engineers to remotely access and diagnose vehicle ECUs and perform controller-level flashing via Ethernet.

- **Remote Access and Diagnosis**

  Enables remote diagnostic access and ECU flashing via Automotive Ethernet.

- **Transport Layer Configuration**

  Flexible transport layer settings for various diagnostic devices and network interfaces.

- **Scalability and Flexibility**

  Easily customizable based on specific diagnostic requirements and network topologies.

- **Improve Efficiency**

  Ethernet-based communication offers faster data transfer and diagnostic processing.

- **Automated Diagnostic Workflows**

  TSMaster provides automated diagnostic flow features, including a diagnostic console and custom workflow execution.

- **Hardware Compatibility**

  Compatible with various DoIP-enabled hardware, such as TE1051, TC1054 Pro, and TC1055 Pro, to meet different application needs.

3.TC1055 Pro

3.1 Overview

The TC1055 Pro is a versatile simulation and testing tool for multi-bus automotive communication systems, supporting CAN, LIN, and Automotive Ethernet. It features four CAN channels with adjustable bit rates from 125 kbps to 1 Mbps under the classical CAN protocol, and up to 5 Mbps under CAN FD. Two LIN channels support both master and slave configurations via software and operate at bit rates ranging from 0 to 20 kbps. For Automotive Ethernet, it provides four T1 channels supporting 100/1000Base-T1, and two standard Ethernet channels supporting 100Base-TX/1000Base-T, with software-selectable modes. Bypass mode is also supported to ensure network continuity and reliability in specific test scenarios.

To guarantee high-speed and reliable data throughput, the TC1055 Pro connects to the PC via Gigabit Ethernet, 10 Gigabit Ethernet, or USB 3.0. These interfaces eliminate communication bottlenecks during high-volume bus traffic processing. The interface is driver-free for both Windows and Linux, offering broad system compatibility and ease of integration.

When paired with the powerful TSMaster software, the TC1055 Pro enables users to load and utilize database files in DBC, LDF, XML, and ARXML formats. It supports comprehensive monitoring, analysis, and simulation of bus traffic, and offers advanced functionalities such as UDS diagnostics, ECU flashing, CCP/XCP calibration, DoIP, and SOME/IP communication.

3.2 Features

- ✓ Hardware-based message timestamping with microsecond-level accuracy, meeting advanced timing requirements
- ✓ Driver-free design for Windows and Linux systems
- ✓ 4 channels of 100/1000Base-T1 and 2 channels of Base-Tx/1000Base-T, selectable via software
- ✓ 4 CAN channels (supporting CAN/CAN FD), and 2 LIN channels
- ✓ Support for DIDO (Digital Input/Output) and AIAO (Analog Input/Output)
- ✓ Configurable CAN bit rate from 125Kbps to 1Mbps; CAN FD supports up to 5Mbps
- ✓ LIN master/slave node configuration via software
- ✓ Ethernet link state indication for Automotive Ethernet channels
- ✓ Automotive-grade design, supports Ethernet frame parsing from ARXML files in TSMaster
- ✓ Software-configurable 120Ω termination resistors for CAN channels
- ✓ Supports BLF and ASC data recording formats, with online.offline playback functionality
- ✓ Supports DoIP and SOME/IP protocols
- ✓ Bypass mode for Automotive Ethernet
- ✓ Hardware time synchronization across multiple devices

✓ Example project and API interfaces provided, simplifying secondary development

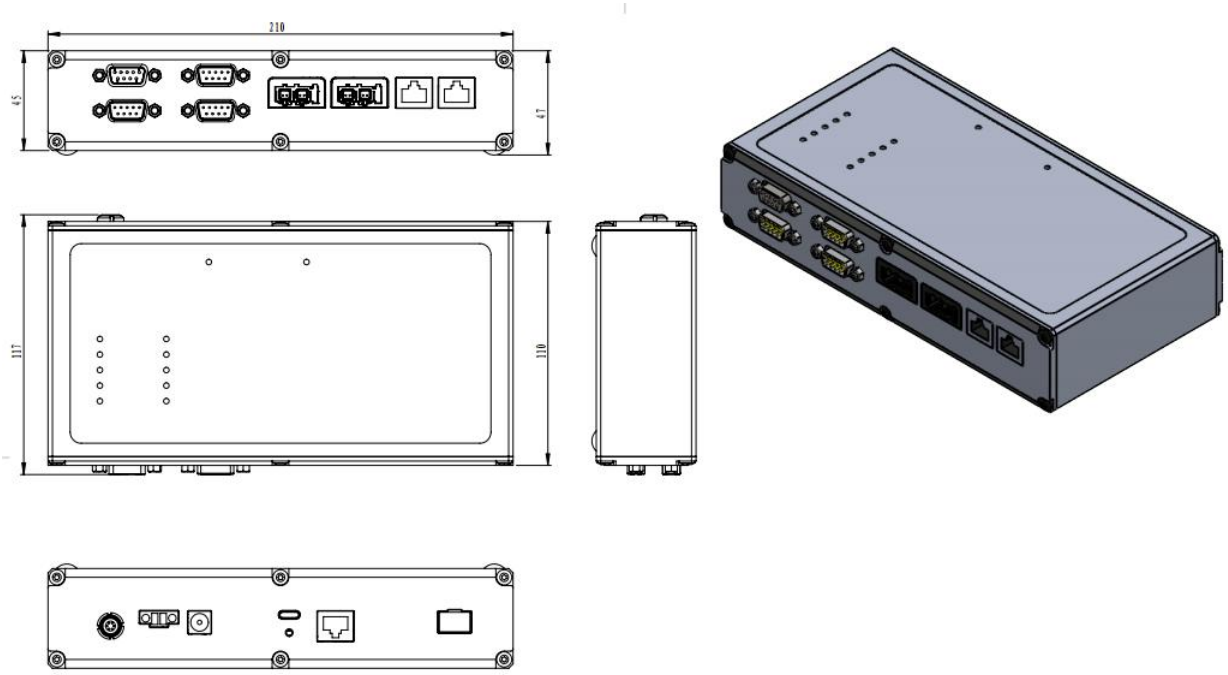
3.3 Technical Data

Channel	4* 100/1000Base-T1 2* 100Base-Tx/1000Base-T 4* CAN 2* LIN 4* DIDO 3* AIAO
PC Interface	1000Base-T / USB 3.0 / 10G Ethernet
CAN/LIN Interface	DB9 Male
I/O Interface	DB9 Female
Automotive Ethernet Interface	TE MATEnet (adaptable to Rosenberger H-MTD or RJ45 via cable)
Driver	Driver-free for Windows and Linux
Buffering	Hardware-level buffering to ensure no frame loss
CAN	Supports CAN 2.0A/B per ISO 11898-1, with baud rate 125Kbps - 1Mbps
CAN FD	Supports both ISO and non-ISO CAN FD, with baud rates from 125Kbps - 5Mbps
LIN	Supports LIN 1.3 and LIN 2.x, with baud rates from 0 to 20Kbps
Timestamp	1μs hardware-level timestamp accuracy
Termination	120Ω software-configurable termination for CAN channels
Isolation (CAN)	DC 2500V isolation per channel
DIDO	DI: 0-40V Vref:0-5V, Thresholds: VAH=(500+499*Vref)/1098; Val=0.455*Vref DO: Low 0V, high 5V/12V (no load support)
AIAO	AI：0-10V AO：0-10V
Power Supply	DC 9-28V
Power Consumption	15W
Enclosure Material	Metal enclosures
Dimensions	Approx. 210*118*47mm
Weight	Approx. 921g (without packaging)/2286g (with packaging)
Operating Temp.	-40℃~80℃
Operating Humidity	10% ～ 90% RH (non-condensing)
Environment	Avoid corrosive gases

3.4 Electrical Data

Parameter		Test Conditions	Min	Typical	Max	Unit
Operating Voltage	DC input	CAN & Ethernet active	9	12	28	V
Operating Current	DC input	CAN & Ethernet active	--	0.98	--	A
Power Consumption	DC input	CAN & Ethernet active	--	11.8	--	W
CAN Interface	Bus pin voltage tolerance	CANH, CAHL	-58	--	58	V
	Terminal resistor	Enabled	--	120	--	Ω
	Isolation voltage	Leakage ＜ 1mA	2500	--	--	VDC
LIN Interface	Bus pin voltage tolerance	LIN1, LIN2	-40	--	40	V

3.5 Mechanical Dimensions



3.6 Packing List

✓ Main device: TC1055 Pro

✓ 12V 2A power adapter

✓ Category 6 Gigabit Ethernet cable

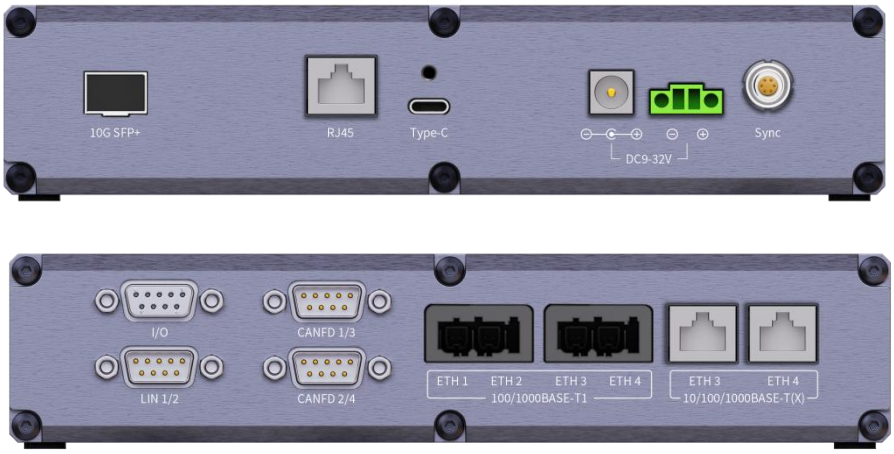
✓ DB9 female to dual male signal cable (CAN)

✓ DB9 to 5-way banana plug LIN cable harness

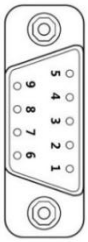
✓ DB9 male connector

✓ TE MATENET dual-ended Ethernet cable

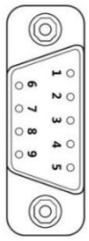
3.7 Hardware Interface



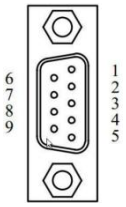
- 10G SFP+ Ethernet interface
- 1000Base-T Ethernet (RJ45)
- Type-C interface
- Power input (circular adapter)
- Power input (phoenix terminal)
- Time synchronization interface
- DB9 female connector (for I/O)

DB9 Pin	Channel	PIN Number	Definition
	I/O	PIN1	DIDO1
		PIN2	DIDO3
		PIN3	DGND
		PIN4	AIAO1
		PIN5	AIAO3
		PIN6	DIDO2
		PIN7	DIDO4
		PIN8	AGND
		PIN9	AIAO2

➢ DB9 male interface (CAN)；

DB9 Pin	Channel	PIN Number	Definition	Channel	PIN Number	Definition
	CANFD 1/3	PIN2	CAN1_Low	CANFD 2/4	PIN2	CAN2_Low
		PIN3	CAN_GND		PIN3	CAN_GND
		PIN4	CAN3_Low		PIN4	CAN4_Low
		PIN5	CAN_Shield		PIN5	CAN_Shield
		PIN7	CAN1_High		PIN7	CAN2_High
		PIN8	CAN3_High		PIN8	CAN4_High

➢ DB9 male interface (LIN)；

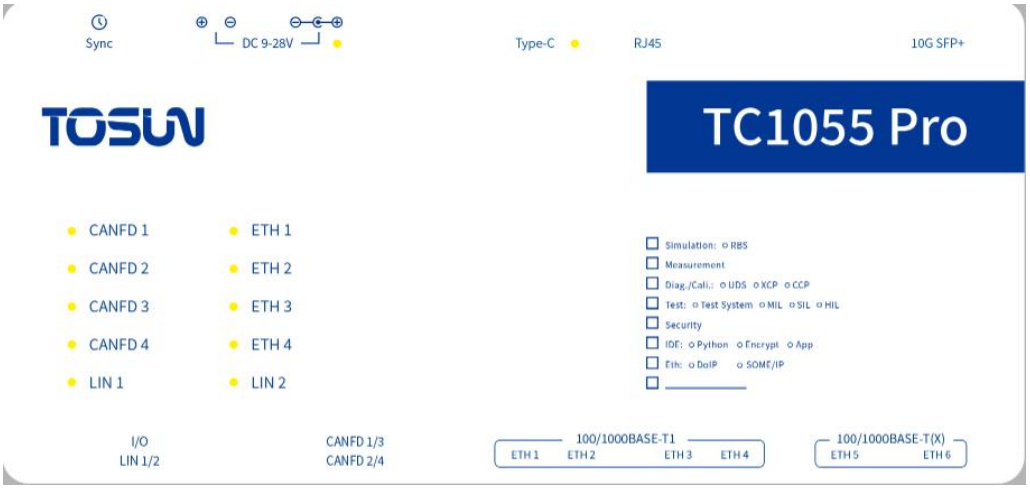
DB9 Pin	PIN Number	Definition
	PIN2	GND
	PIN3	GND
	PIN6	LIN2
	PIN8	LIN1
	PIN9	V_Bat

➢ TE MATENET connector (automotive Ethernet)；

➢ RJ45 connector (standard Ethernet)

3.8 LED Indicators

Diagram of LED indicator:



Description of indicator:

Indicator	**Definition**
DC	Indicator for power
Type-C	Indicator for USB
CANFD 1	Indicator for CANFD channel 1
CANFD 2	Indicator for CANFD channel 2
CANFD 3	Indicator for CANFD channel 3
CANFD 4	Indicator for CANFD channel 4
LIN 1	Indicator for LIN channel 1
LIN 2	Indicator for LIN channel 2
ETH 1	Indicator for automotive Ethernet channel 1
ETH 2	Indicator for automotive Ethernet channel 2
ETH 3	Indicator for automotive Ethernet channel 3
ETH 4	Indicator for automotive Ethernet channel 4

Description of LED color/status:

Color/Status	Description
DC: Green (steady)	Power supply normal
Type-C: Green (steady)	USB connection established
CAN FD: Green (blinking)	CAN FD channel transmitting or receiving data correctly
CAN FD: Red (blinking)	CAN FD channel error (e.g., configuration or protocol error)
LIN: Green (blinking)	LIN channel transmitting or receiving data correctly
LIN: Red (blinking)	LIN channel error (e.g., protocol mismatch, wiring issue)
ETH: Green (steady)	Ethernet link established
ETH: Green (blinking)	Ethernet data transmission in progress

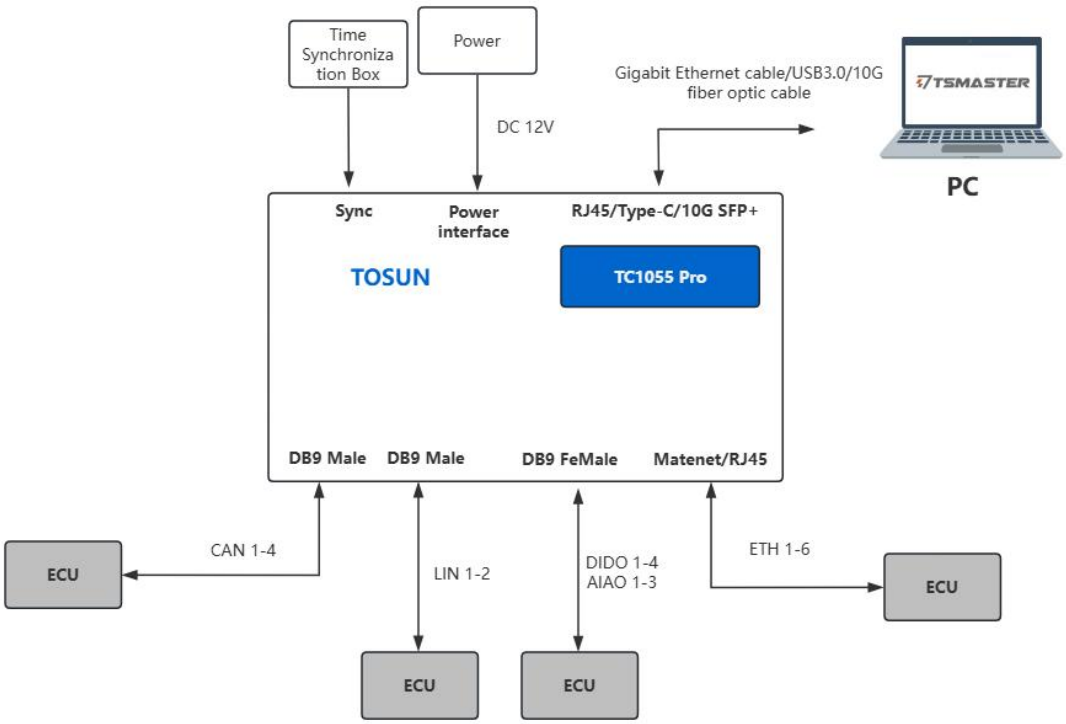
3.9 Optional Accessories

1. Mounting bracket

2. 10G optical fiber cable

4. Quick Start

4.1 System Connections



To power the TC1055 Pro, connect a 12V DC source either via the power adapter input or the Phoenix terminal. Connect the device to a PC using either the RJ45 Ethernet port or the USB Type-C port. Depending on application needs, connect the corresponding CAN FD, LIN, Automotive Ethernet, DIDO, and AIAO ports to the ECU. The device can then be configured and controlled via the TSMaster software on the PC for communication with the ECU.

10G SFP+ Interface (10-Gigabit Ethernet): The 10G SFP+ interface cannot be controlled via TSMaster software. During operation, all messages from the TC1055 Pro are simultaneously output through the 10G SFP+ interface. Connect the TC1055 Pro to the PC using a 10G fiber optical cable. Packet capture and message analysis can then be performed on the PC using Ethernet packet capture tools such as Wireshark.

4.2 Driver Installation

Driver-free design for Windows, ensuring excellent system compatibility.

4.3 Software Overview

TSMaster is a powerful and versatile tool designed to interface with, configure, and control all TOSUN hardware devices. It supports automotive bus-related functions such as embedded code generation, monitoring, simulation, development, UDS diagnostics, CCP/XCP calibration, ECU flashing, I/O control, measurement, and testing.

TSMaster also supports co-simulation with MATLAB Simulink and CarSim dynamic models for soft real-time HIL testing of ECU algorithms. It provides integrated scripting environments for C and Python, allowing users to execute ECU logic directly within the platform. Additionally, TSMaster offers customizable applets for simulation panels, test sequences, logic design, and automated report generation—making it easy to build complete, automated test systems. Code written within TSMaster is hardware-independent, allowing for easy reuse and deployment across different platforms.

TSMaster is compatible with a wide range of third-party tools and hardware interfaces including Vector, Kvaser, PEAK, IXXAT, and mainstream instruments (e.g., oscilloscopes, waveform generators, DMMs) and I/O cards (AI, DI, DO, etc.). It is designed for seamless integration into test environments, enabling multi-device and multi-channel simulation and testing.

This makes TSMaster ideal for PV/DV testing of automotive ECUs and assemblies, as well as for end-of-line testing in production.

4.4 Software Installation

TSMaster software download link:

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

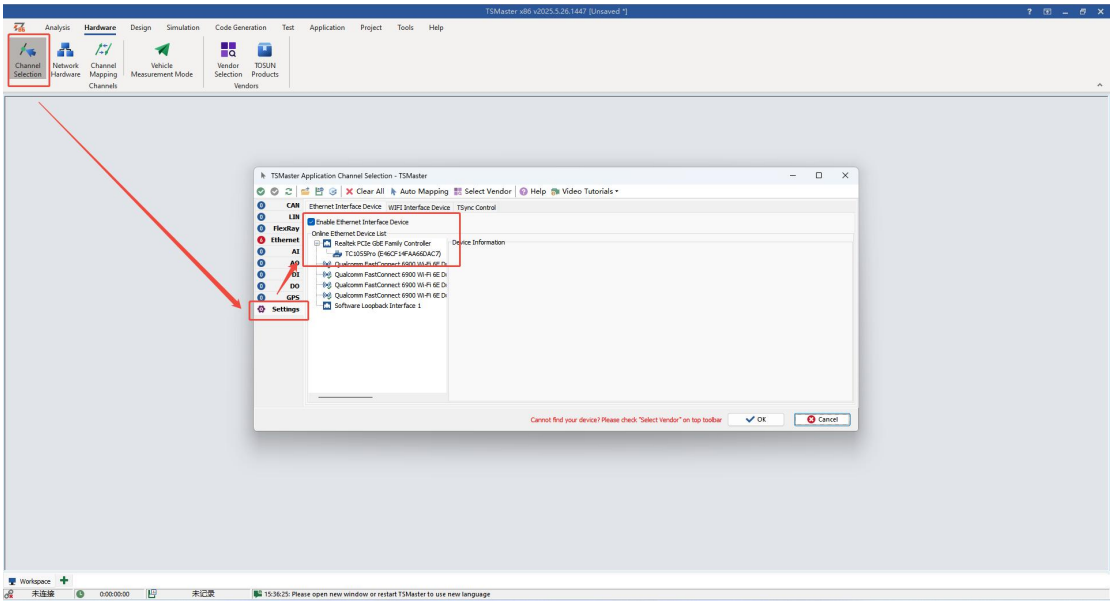
If the site is inaccessible, please contact your sales representative or visit the TOSUN official website. Alternatively, you can scan the QR to get the download link.

Once installation, the software icon will be appear on your PC desktop as shown below:

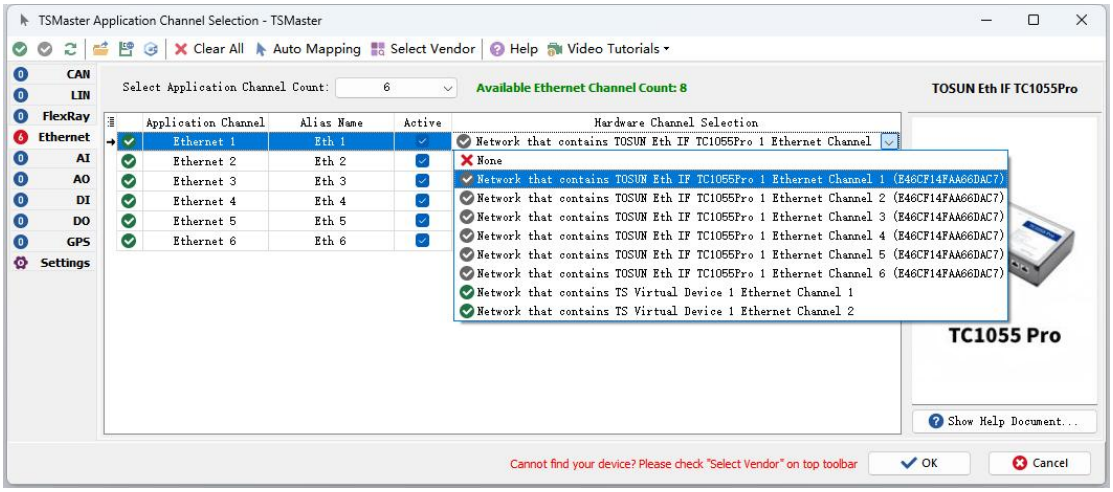
4.5 Hardware Integration with TSMaster

Set the PC's Ethernet IP address to 192.168.1.x to ensure it is in the same subnet as the TC1055 Pro).

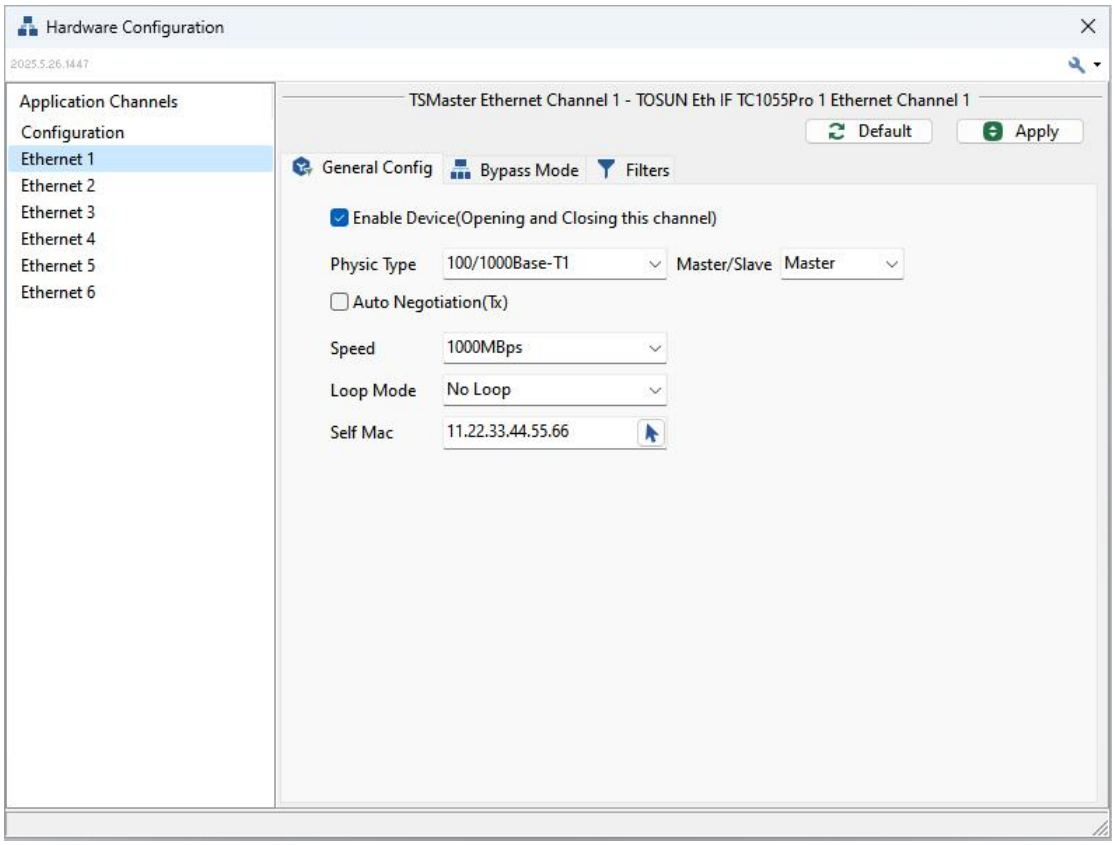
In TSMaster software interface, go to Hardware->Channel Selection. In the left panel of the channel selection window, click Settings and enable Ethernet-type interface device to make the TC1055 Pro visible.



In the “Channel Selection” interface, select the type of bus technology in the left sidebar and configure the number of channels.



In Hardware Configuration, you can configure controller parameters. For example, with Ethernet, you can adjust interface type, master/slave mode, speed, loopback mode, etc.



Once configuration is complete, click Analysis->Start to connect the hardware. The TC1055 Pro, when paired with the power TSMaster software, enables efficient development, testing, and production line operations across various automotive bus systems.

For more detailed information on TSMaster usage, refer to the TSMaster software manual and Quick Start Guide.

***Bypass Mode:**

The TC1055 Pro supports Ethernet bypass mode — a network redundancy mechanism designed to ensure communication continuity and reliability in scenarios such as equipment failure or maintenance. It helps avoid network interruption caused by single points of failure.

In bypass mode, the TC1055 Pro internally bridges specific Ethernet channels to allow data to pass through directly. While in this mode, the device can still monitor and analyze traffic but does not actively process or transmit data. This ensures uninterrupted business communication without affecting network performance.

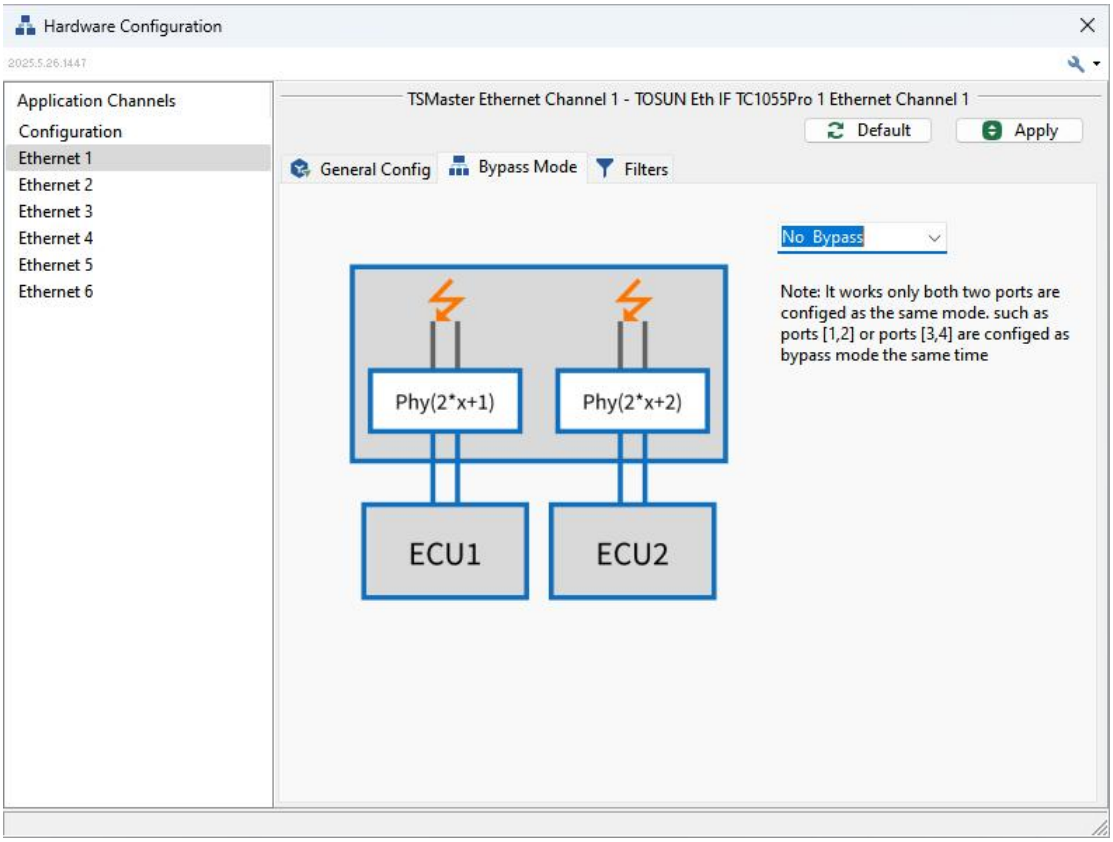
Note: In the current version, bypass mode is fixed and pre-configured as follows:

ETH1 (T1) ↔ ETH2 (T1)

ETH3 (T1) ↔ ETH5 (TX)

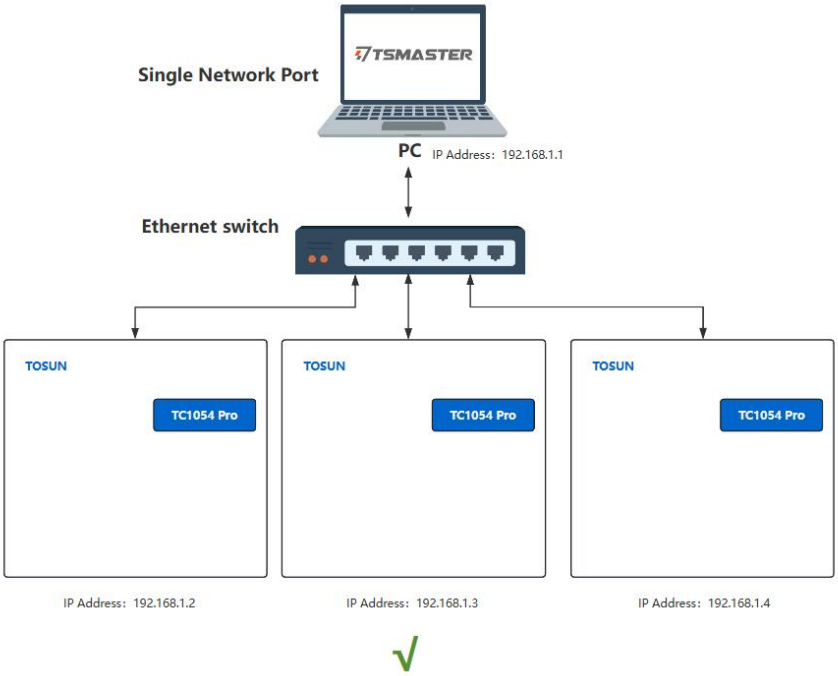
ETH4 (T1) ↔ ETH6 (TX)

Manual channel paring configuration is not yet supported.

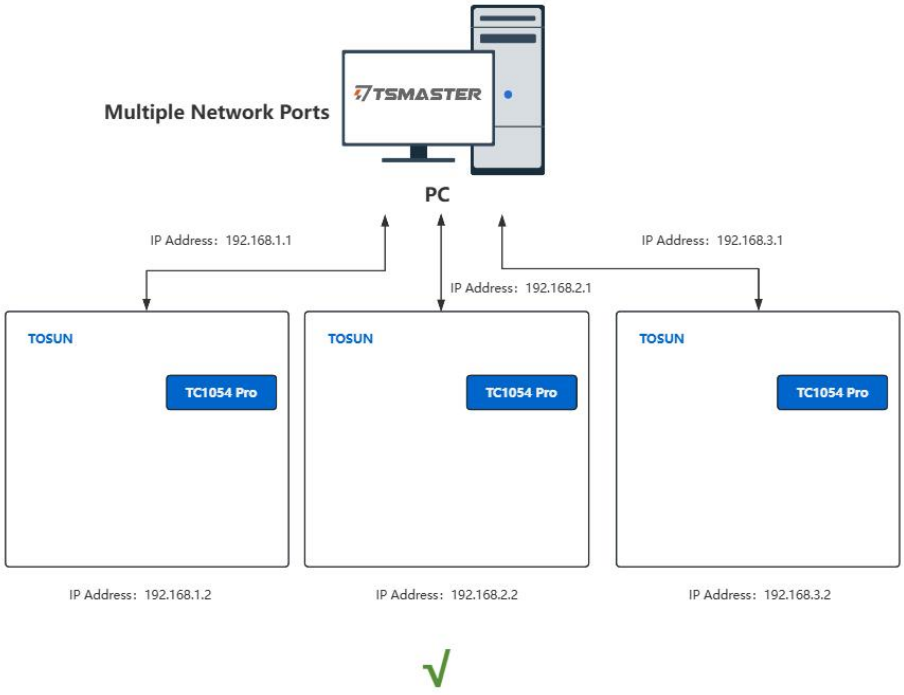


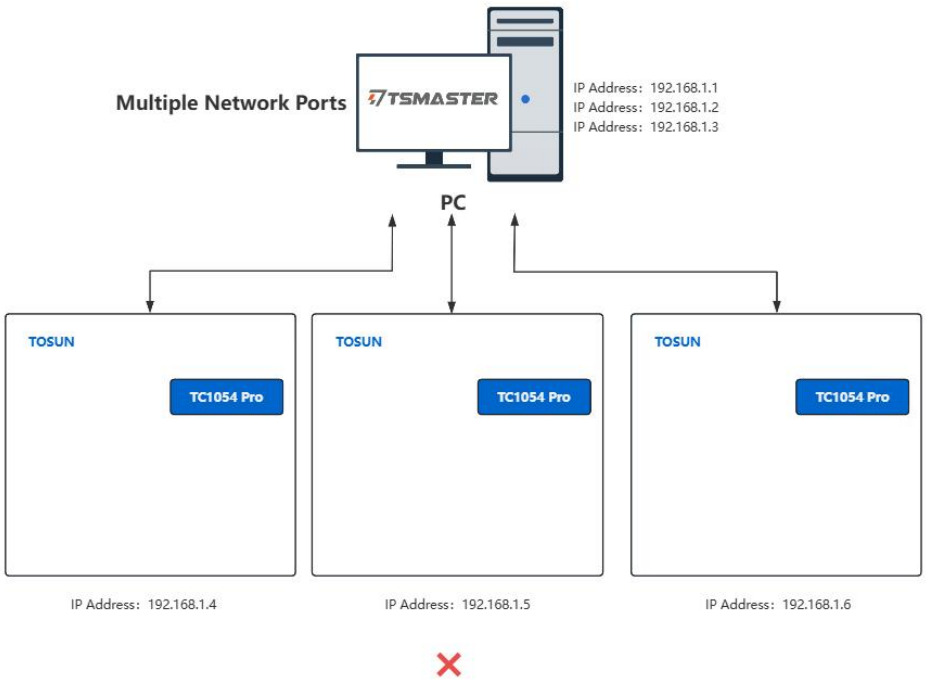
4.6 Precautions

When using multiple TC1055 Pro devices in a single PC, and the PC has only one Ethernet port, it is recommended to connect all devices via an Ethernet switch.



If the PC is equipped with multiple Ethernet ports, assign each port to a different subnet before connecting to individual TC1055 Pro devices. (If multiple Ethernet ports are configured on the same subnet, it may lead to routing table conflicts and unpredictable data forwarding. The operating system may fail to select the correct interface, resulting in communication failure or delays.)





5. Inspection and Maintenance

The TC1055 Pro 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.

Item	Inspection	Standard	Action
Power Supply	Check voltage fluctuation at power input	+12V DC at power port	Use a voltmeter to verify input voltage. Take corrective actions if out of 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, non-condensing	Use a hygrometer to ensure humidity is within specified range.
	Check for accumulation of dust, powder, salt, and metal debris	No accumulation	Clean the device and prevent future contamination.
	Check for exposure to water, oil, or chemicals	No exposure	Clean the device and improve environment protection.
	Check for corrosive or flammable gases	No presence	Use sensors or smell detection to verify.
	Check for vibration and mechanical shock	Within allowable limits	Install padding or vibration isolation measures if

			necessary.
	Check for noise sources near the device	No significant noise sources nearby	Isolate or shield the device from noise sources.
Installation & Wiring	Check crimped connectors in external wiring	Adequate clearance between connectors	Visually inspect and adjust as needed.
	Check for damage to external wiring	No visible damage	Visually inspect and replace damaged cables if necessary.

6. Appendix

（1）Thanks to its Ethernet interface, the TC1055 Pro supports remote access. For more details, please refer to the technical documentation:

Remote Access User Guide V1.0

（2）The TC1055 Pro provides cross-platform API interfaces for secondary development. For more information, please refer to the project repository at Gitee:

https://gitee.com/xujinpeng120/libTSDevBase

TOSUN

Engineer Everything !

Software

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

UDS diagnostics/ECU flashing/CCP/XCP calibration

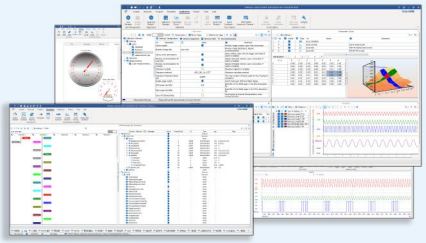
Embedded code generation/Application builder

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

Contact Us :

+86 21-5956 0506

sales@tosunai.com

website :

www.tosunai.com

Beijing/Shanghai/Guangzhou/Chengdu/Changzhou/Taipei/Stuttgart/Seoul