# TOSUN



# TE Series Product Family

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**tosunai.com**

Copyright Information

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## What Is the TE Series Product Family？

TOSUN has a wide range of product series, such as the TC series, TP series, TE series, TLog series, TTS series, and so on. Among them, the TE series is a set of tools specifically designed for Ethernet communication, covering standard Ethernet/in-vehicle Ethernet media conversion tools, Ethernet-to-USB interface tools, and Ethernet switch tools.

## What Products Are Included in the TE Series？

| TE1021 | TE1051 | TE1105 | |
|--------|--------|--------|--|

## What Can They Do？

- In-vehicle Ethernet data monitoring and analysis;
- In-vehicle Ethernet communication testing;
- In-vehicle Ethernet bus simulation;
- Standard Ethernet/in-vehicle Ethernet media conversion;
- In-vehicle Ethernet message forwarding;
- DoIP and SOME/IP functionality;
- ...

# Contents

# 1. About this User Manual

## 1.1 Warranty

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## 2. Product Overview



TE1021        TE1051        TE1105

|  | **TE1021** | **TE1051** | **TE1105** |
|---|---|---|---|
| Product Type | Ethernet media conversion tool | Ethernet-to-USB interface tool | Ethernet switch |
| Number of channels | 1 | 1 | 5 |
| Ethernet Speed | Gigabit/100 Megabit | Gigabit/100 Megabit | Gigabit/100 Megabit |
| Ethernet Interface | RJ45+TE MATEnet or Rosenberger H-MTD | RJ45+TE MATEnet or Rosenberger H-MTD | RJ45+TE MATEnet |
| Galvanic Isolation | Network transformer/capacitor isolation | Network transformer/capacitor isolation | Network transformer/capacitor isolation |
| Power Supply | 9V-30V (phoenix terminal power supply) | 5V (USB power supply) | 9V-28V (phoenix terminal power supply) |
| Case Material | Metal | Metal | Metal |
| Dimension | Approx. 110*70*36mm | Approx. 110*70*36mm | Approx. 332*112*30mm |
| Weight | Approx. 140g | Approx. 140g | Approx. 934g |

# 3. TE1021

## 3.1 Overview

The TE1021, developed by TOSUN, is a media conversion tool that translates 100/1000Base-T1 automotive Ethernet to 100/1000Base-TX standard Ethernet. It allows mode selection between master and slave through a button, enabling lossless data conversion between automotive Ethernet and 100/1000Base-TX Ethernet. Data transfer is full-duplex in both directions, and mode configuration is easily handled through DIP switch.

The TE1021 is an ideal, cost-effective conversion tool for interfacing 100/1000Base-T1 automotive Ethernet with PC systems.

It is suitable for R&D professionals, ECU production lines, test engineers, and after-sales engineers.

## 3.2 Features

✓ 100/1000Base-T1 100/1000Mbit/s full-duplex over 2 pairs of UTP (unshielded twisted pair)

✓ Lossless data conversion between automotive Ethernet and standard Ethernet

✓ Two automotive Ethernet interface options: TE MATEnet or Rosenberger H-MTD

✓ RJ45 interface with LED indicators for standard Ethernet

✓ LED indicators for Ethernet data communication status

✓ Master/slave mode, 100/1000Mbps configurable via button, with LED status display

✓ DIP switch for easy configuration

✓ Power supply: DC 9~30V (phoenix terminal)

✓ Message forwarding delay (for reference only): Gigabit T1 to Tx: 640ns, Gigabit Tx to T1: 4.84μs, 100 Mbps T1 to Tx: 840ns, 100 Mbps Tx to T1: 1.74μs

## 3.3 Technical Data

| Channel | Standard/In-vehicle Ethernet 100/1000Base-T1 |
|---|---|
| PC Interface | RJ45+TE MATEnet or Rosenberger H-MTD |
| Galvanic Isolation | Network transformer/capacitor isolation |
| Power Supply | DC9-30V (phoenix terminal power supply) |
| Power Consumption | 1.5W |
| Case Material | Metal |
| Dimension | Approx. 110*70*36mm |
| Weight | Approx. 140g (without packaging)/ Approx. 322g (with packaging) |
| Operating Temperature | -40°C～80°C |
| 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 | DC power supply | Ethernet conversion | 9 | 12 | 30 | V |
| Operating Current | DC power supply | Ethernet conversion | -- | 0.12 | -- | A |
| Power Consumption | DC power supply | Ethernet conversion | -- | 1.5 | -- | W |
| EMC Compatibility | EFT | IEC61000-4-4 standard | ±4 | -- | -- | kV |
| | ESD | IEC61000-4-2 standard | Contact discharge :±15 Air discharge :±15 | -- | -- | kV |

## 3.5 Mechanical Data

TE1021-R:
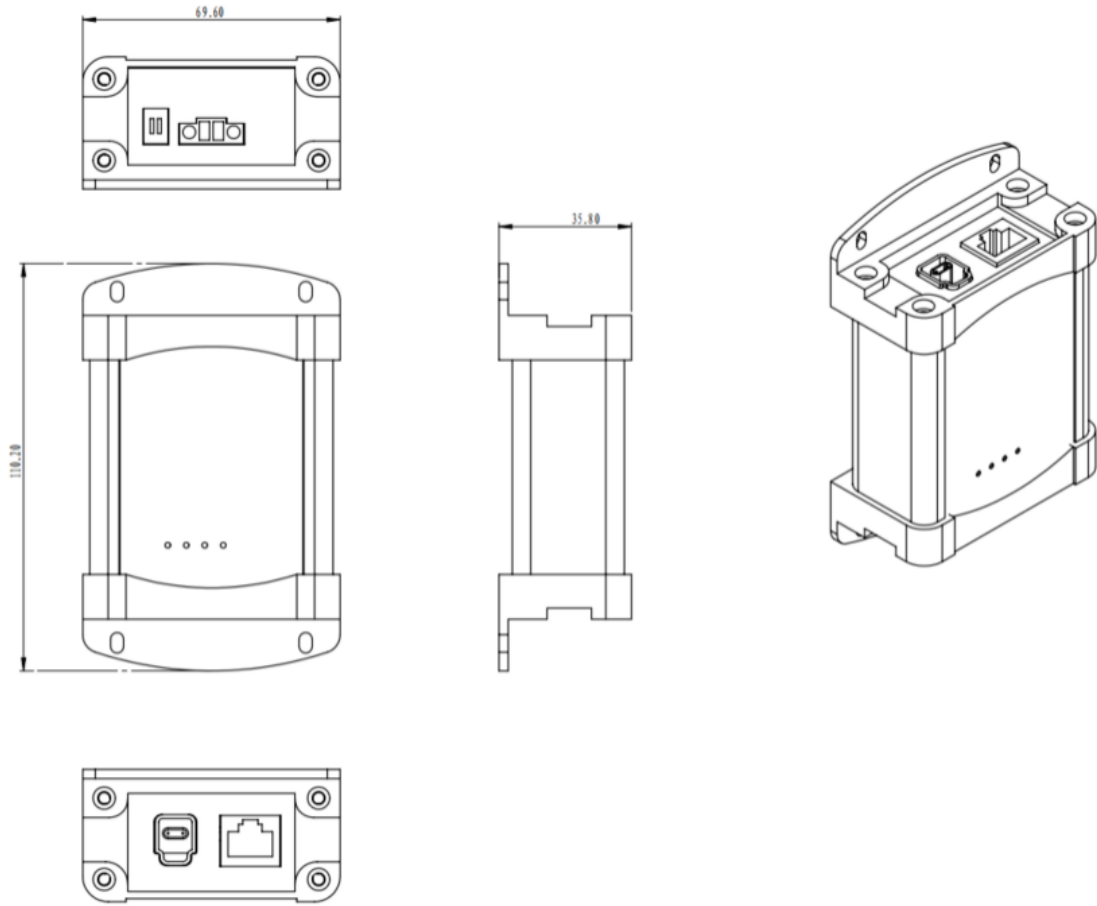
TE1021-M:
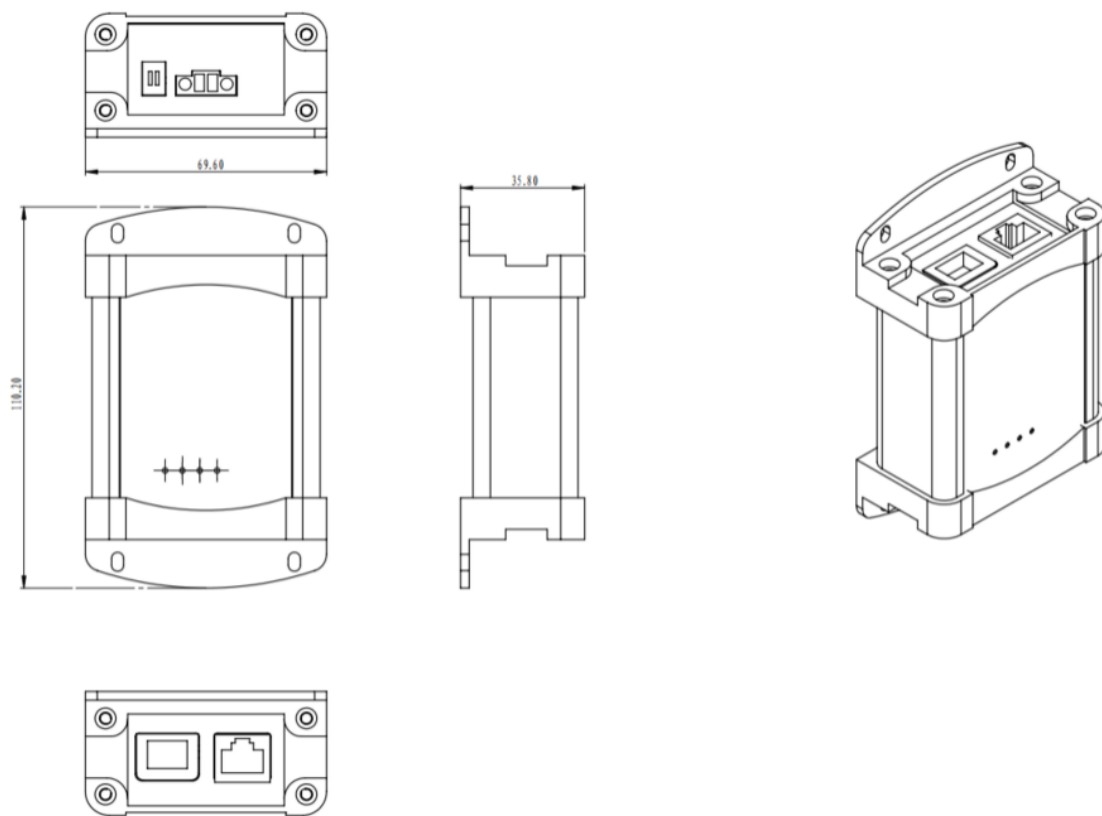
## 3.6 Scope of Delivery

✓ Main device: TE1021



✓ Rosenberger Ethernet cable (1 male, 1 female) (optional)

✓ Rosenberger Ethernet cable (dual female) (optional)



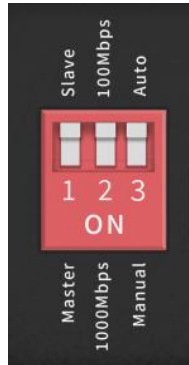✓ TE MATENET Ethernet cable (dual female) (optional)



## 3.7 Hardware Interface



TE1021-M

TE1021-R

➢ RJ45 interface

➢ In-vehicle Ethernet Interface (MATENET or Rosenberger)

➢ DIP Switch



| DIP | Status | Description |
|-----|--------|-------------|
| 1 | Up | Slave mode |
| | Down | Master mode |
| 2 | Up | 100 Mbps mode |
| | Down | 1 Gbps mode |
| 3 | Up | Enable auto-negotiation |
| | Down | Disable auto-negotiation |

➢ 2-Pin phoenix terminal power supply port

\* Note: The TE1021 also has a version with a two-key DIP switch (early version, which has now been replaced by the three-key version). If you receive the two-key version, the DIP switch settings are as follows：



➢ DIP Switch:

| DIP | Status | Description |
|---|---|---|
| 1 | Up | Slave mode |
| | Down | Master mode |
| 2 | Up | 100 Mbps mode |
| | Down | 1 Gbps mode |

## 3.8 LED

Diagram of LED indicator:



Description of indicator:

| Indicator | Definition | Description |
|---|---|---|
| Power | Indicator for power. | Always on when powered. |
| T1_Link | Indicator for T1 | Blinks during T1 port communication |
| Master | Indicator for master/slave mode | Always on in master mode/off in slave mode |

| 1000Mbps | Indicator for 100M/1000M | Always on in 1000M mode/off in 100M mode |
|---|---|---|

## 3.9 Quick Start

**Hardware Connection:**
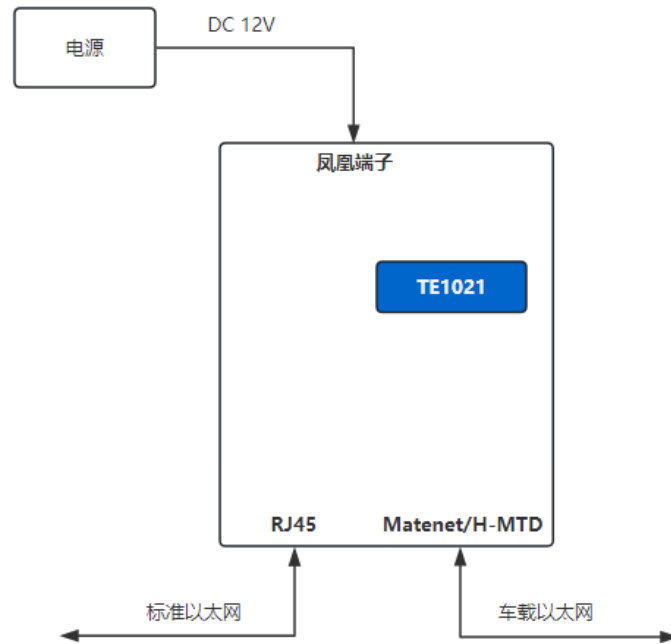


The TE1021 device is powered with 12V DC via the phoenix terminal interface, and the Power LED lights up green.

By connecting the RJ45 interface to a standard Ethernet network and the Matenet/H-MTD interface to an in-vehicle Ethernet network, the device enables conversion between standard Ethernet and in-vehicle Ethernet. Configuration for master/slave mode, 1000 Mbps/100 Mbps mode, and auto-negotiation can be adjusted using the DIP switches on the TE1021 device.

# 4.TE1051

## 4.1 Overview

The TE1051 is a tool launched by TOSUN that provides one Ethernet to USB interface.

Users can transmit data from standard Ethernet 100Base-TX/1000Base-T or in-vehicle Ethernet 100/1000Base-T1 to a PC via the USB interface. With the TSMaster software, it allows for monitoring, simulation, analysis, and testing of Ethernet data, as well as supporting functions like DoIP and SOME/IP. The TE1051 connects to the PC using a USB interface and does not require additional power, making it convenient to use.



## 4.2 Features

- ✓ 100 us (microsecond) level hardware message timestamp
- ✓ Driverless design for Windows 10/11 system, and driver installation is required for Windows 7
- ✓ 1 channel 100Base-Tx 1000Base-T 100/1000Base-T1
- ✓ Selection can be switched at any time through software
- ✓ In-vehicle Ethernet interface types: TEMATEnet or Rosenberger H-MTD
- ✓ LED indicator for the operating status of in-vehicle/standard Ethernet
- ✓ LED indicator for the system operating status, including rate and master/slave mode
- ✓ In-vehicle Ethernet messages parsing;
- ✓ Supports DoIP and SOME/IP;
- ✓ Secondary development API interface for Windows system, supporting timestamped Ethernet

for easier secondary development;

✓ Supports receiving/sending RAW message format, modifying message CRC and events of send completion

✓ Offers example projects based on API interfaces and lwIP protocol stack for TCP/IP

✓ Loopback maximum rate is approximately 7 Mbytes (full-duplex transmission and reception)

## 4.3 Technical Data

| | |
|---|---|
| Channel | Standard Ethernet 100Base-TX/1000Base-T or in-vehicle Ethernet 100/1000Base-T1 |
| PC Interface | USB 2.0 interface |
| Ethernet Interface | RJ45+TE MATEnet or Rosenberger H-MTD |
| Driver | Driverless design to offer excellent system compatibility |
| Timestamp Accuracy | 100 us (microsecond) level hardware message timestamp |
| Galvanic Isolation | Network transformer/capacitor isolation |
| Power Supply | USB power supply |
| Power Consumption | 1.5W |
| Case Material | Metal |
| Dimension | Approx. 110*70*36mm |
| Weight | Approx. 140g (without packaging)/Approx. 438g (with packaging) |
| 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 | Ethernet message transmission | 4.8 | 5.0 | 5.2 | V |
| Operating | USB power | Ethernet message | -- | 0.23 | -- | A |

| Current | supply | transmission | | | | |
|---------|--------|--------------|---|---|---|---|
| Power Consumption | USB power supply | Ethernet message transmission | -- | 1.2 | -- | W |
| EMC Compatibility | EFT | IEC61000-4-4 standard | ±4 | -- | -- | kV |
| | ESD | IEC61000-4-2 standard | Contact discharge :±15 Air discharge :±15 | -- | -- | kV |

## 4.5 Mechanical Data

TE1051-M:
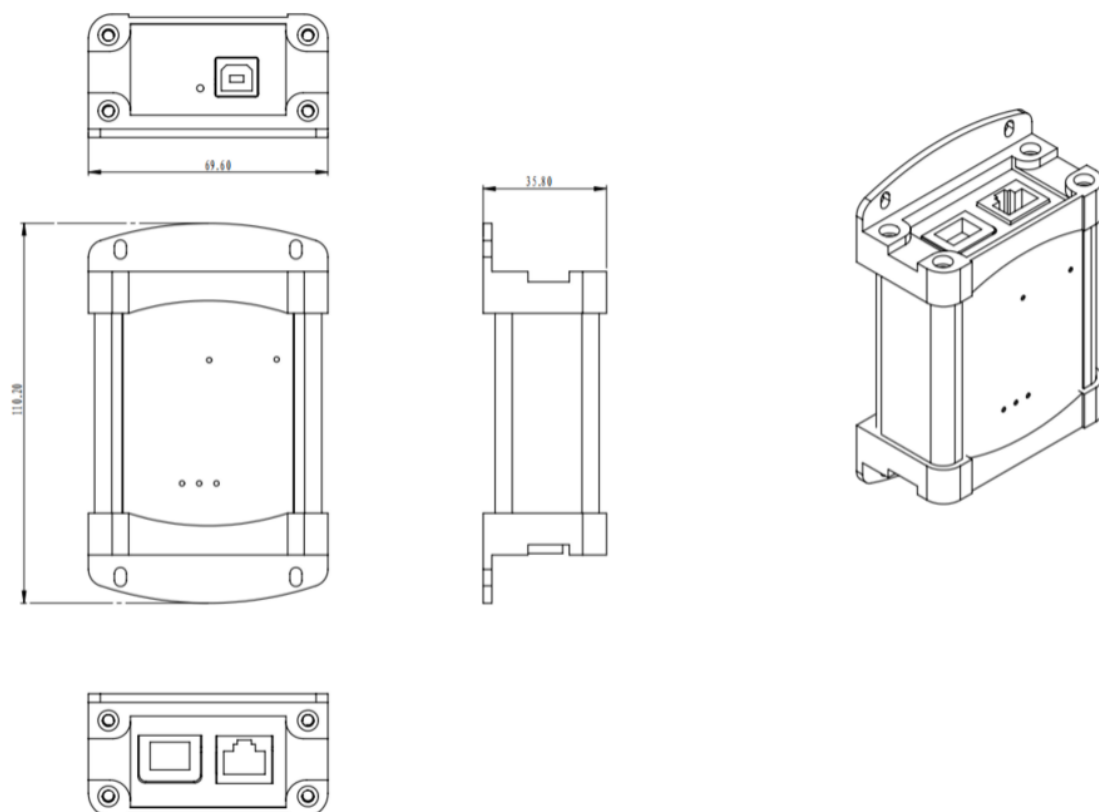


TE1051-R:
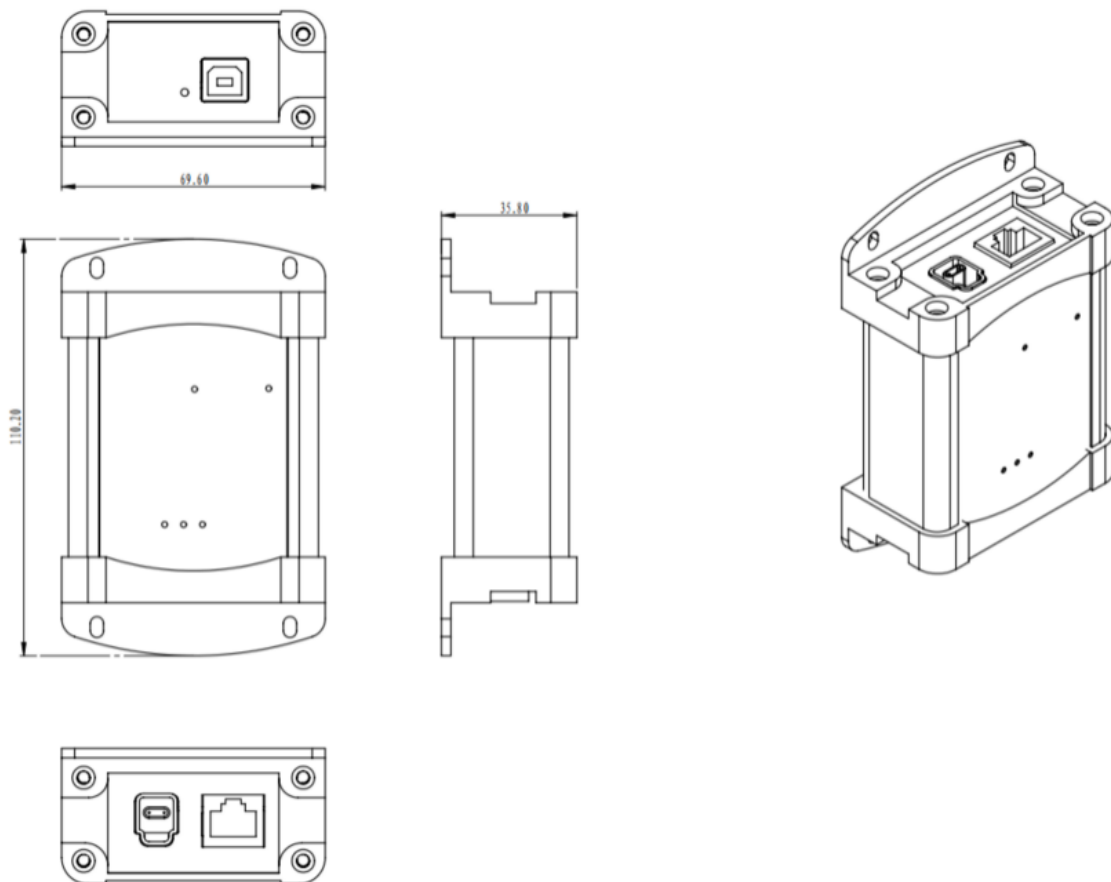
## 4.6 Scope of Delivery

✓ Main device: TE1051



✓ USB cable*1

✓ Cat 6 Gigabit Ethernet cable*1



✓ Rosenberger Ethernet cable (1 male, 1 female) (optional)



✓ Rosenberger Ethernet cable (dual female) (optional)



✓ TE MATENET Ethernet cable（dual female）(optional)

## 4.7 Hardware Interface



TE1051-M



TE1051-R

- ➤ RJ45 interface;
- ➤ in-vehicle Ethernet interface (MATENET or Rosenberger);
- ➤ USB 2.0 interface;

## 4.8 LED

Diagram of LED indicator:
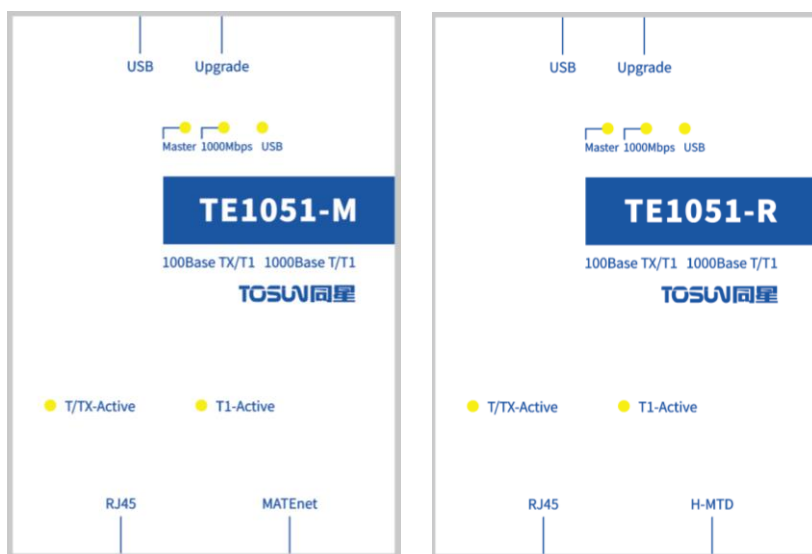
Description of indicator:

| Indicator | Definition | Description |
|---|---|---|
| Master | Indicator for master/slave mode | Always on in master mode/off in slave mode |
| 1000Mbps | Indicator for 100M/1000M | Always on in 1000M mode/off in 100M mode |
| USB | Indicator for USB | Always on when USB is connected |
| T/TX-Active | Indicator for T/TX | Blinks during standard Ethernet communication |
| T1-Active | Indicator for T1 | Blinks during in-vehicle Ethernet communication |

## 4.9 Quick Start

**Hardware Connection:**
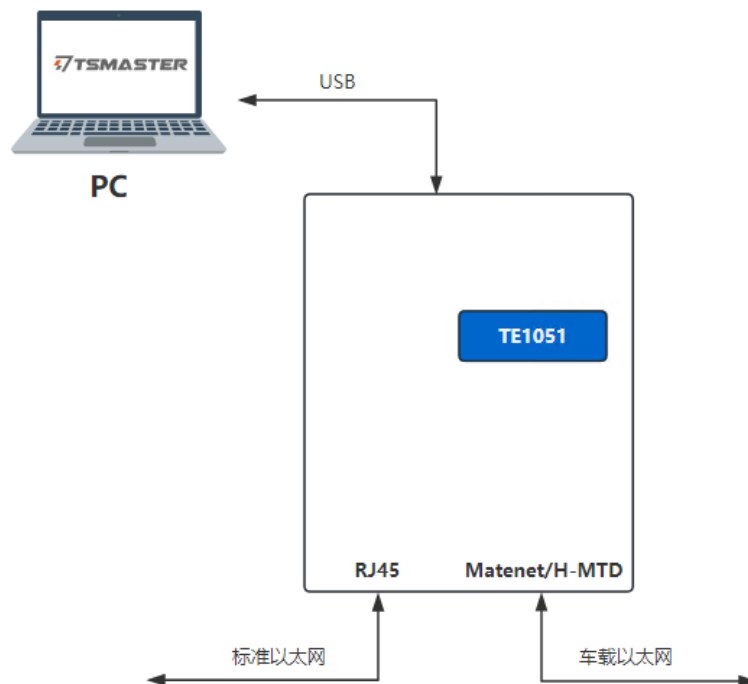


Connect the TE1051 device's USB port to the PC, and connect the standard Ethernet interface or in-vehicle Ethernet interface to the ECU. This allows users to monitor, simulate, analyze, and test Ethernet data on the PC using the TSMaster software. After purchasing the TOSUN licensed license, users can also use DoIP and SOME/IP functionalities.

**Connect the device with TSMaster:**

In TSMaster, click Hardware->Channel Selection->Ethernet, and select the TE1051 hardware.
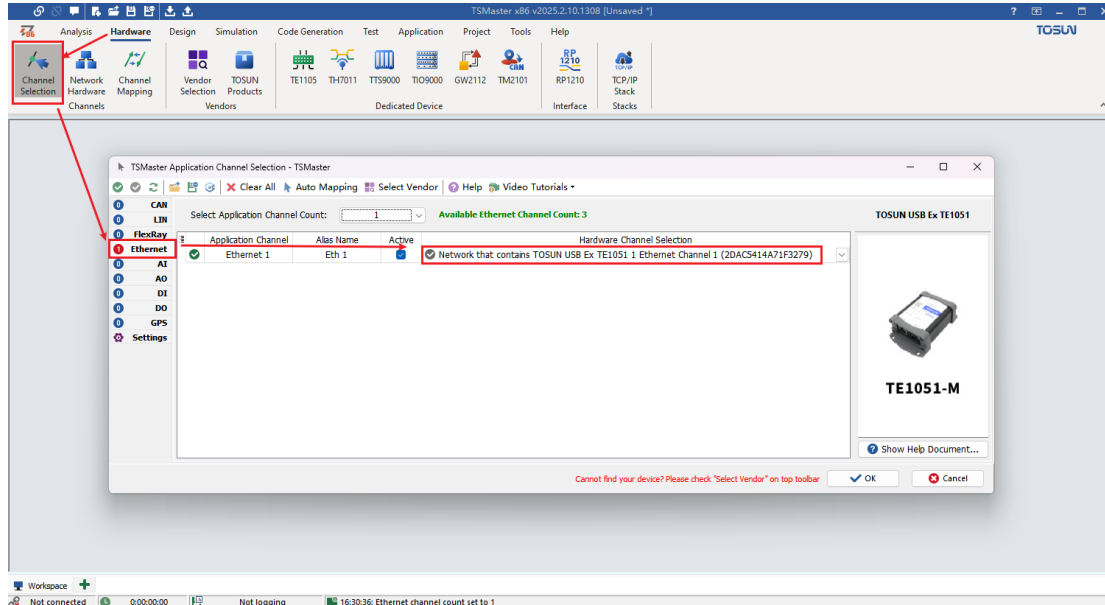


In Network Hardware, select the Ethernet channel, and users can configure the Ethernet-related parameters.
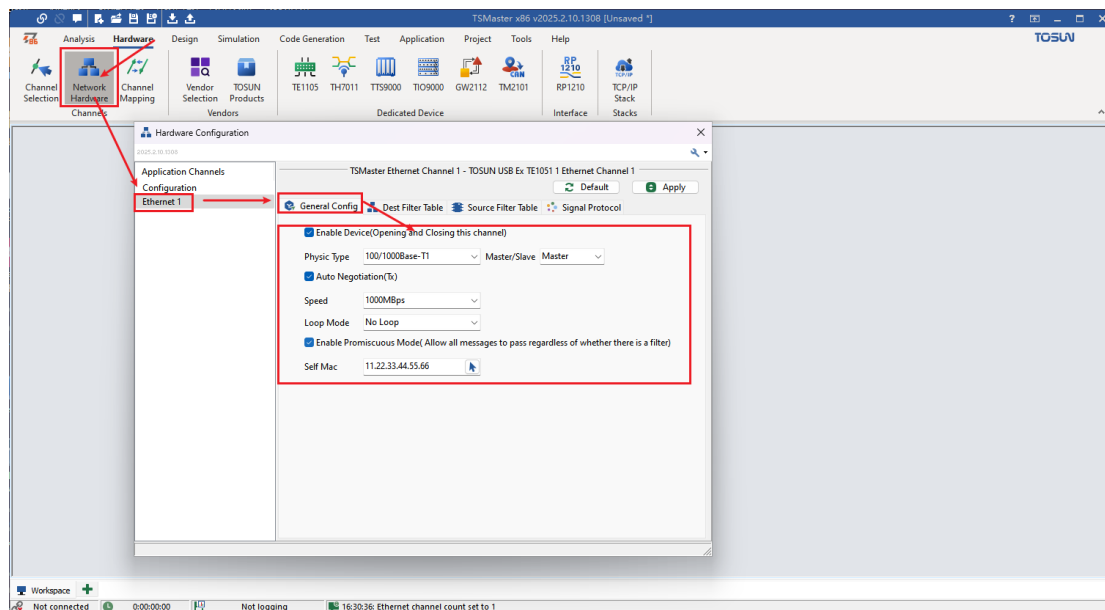


After the configuration, click Analysis->Start and connect the TE1051 device to efficiently carry out works such as bus development, testing, ECU production line, etc. with the powerful

TSMaster software. For more detailed instructions on using the TSMaster software, please refer to the TSMaster software manual and the quick start guide.

# 5.TE1105

## 5.1 Overview

The TE1105 is a 5-port Ethernet switch launched by TOSUN. It enables data exchange and message monitoring between any port of standard Ethernet (100Base-TX/1000Base-T) or in-vehicle Ethernet (100/1000Base-T1) and the terminal network.

It supports IEEE 802.1Q (VLAN) mode, MAC filtering during mirroring, IEEE 802.1Qav AVB traffic shaping, and IEEE 802.1Qat time-sensitive scheduling.

The device allows users to select between normal mode and custom mode via button. A DIP switch can toggle between master mode and slave mode, enabling lossless conversion of Ethernet data between automotive Ethernet and 100/1000Base-TX Ethernet. The TE1105 is an ideal, cost-effective converter tool between 100/1000Base-T1 automotive Ethernet and PC systems.

It is suitable for R&D professionals, ECU production lines, test engineers, and after-sales engineers.

## 5.2 Features

✓ 5 ports for 100Base-Tx/1000Base-T and 100/1000Base-T1, which can be switched at any time via DIP switches

✓ In-vehicle Ethernet interface type: TEMATEnet

✓ Supports Ethernet packet forwarding and monitoring

✓ Supports 2 custom configurations for defining VLAN, TSN time scheduling, AVB traffic shaping, and port filtering rules, etc.

✓ Mirror function: Allows for message mirroring using a pair of in-vehicle Ethernet channels

✓ Transparent function: Enables direct message transmission to the PC via RJ45

✓ LED indicator for the operating status of in-vehicle/standard Ethernet

✓ Master/slave mode, 100/1000Mbps configurable via DIP switches, with LED status display

✓ High-quality cables

## 5.3 Technical Data

| Channel | 5 ports for 100Base-Tx 1000Base-T, or in-vehicle Ethernet 100/1000Base-T1 |
|---|---|
| PC Interface | USB 2.0 interface |
| Ethernet Interface | RJ45+TE MATEnet |

| Galvanic Isolation | Network transformer/capacitor isolation |
|---|---|
| Power Supply | DC9-28V (phoenix terminal power supply) |
| Power Consumption | 6W |
| Case Material | Metal |
| Dimension | Approx. 332*112*30mm |
| Weight | Approx. 934g (without packaging)/ Approx. 1569g (with packaging) |
| Operating Temperature | -40℃～80℃ |
| Operating Humidity | 10% ～ 90% (non-condensing) |
| Operating Environment | Keep away from corrosive gases |

## 5.4 Electrical Data

| Parameter | | Test Condition | Minimum Value | Typical Value | Maximum Value | Unit |
|---|---|---|---|---|---|---|
| Operating Voltage | DC power supply | Ethernet data exchange | 9 | 12 | 30 | V |
| Operating Current | DC power supply | Ethernet data exchange | -- | 0.47 | -- | A |
| Power Consumption | DC power supply | Ethernet data exchange | -- | 5.7 | -- | W |
| EMC Compatibility | EFT | IEC61000-4-4 standard | ±4 | -- | -- | kV |
| | ESD | IEC61000-4-2 standard | Contact discharge :±15 Air discharge :±15 | -- | -- | kV |

## 5.5 Mechanical Data
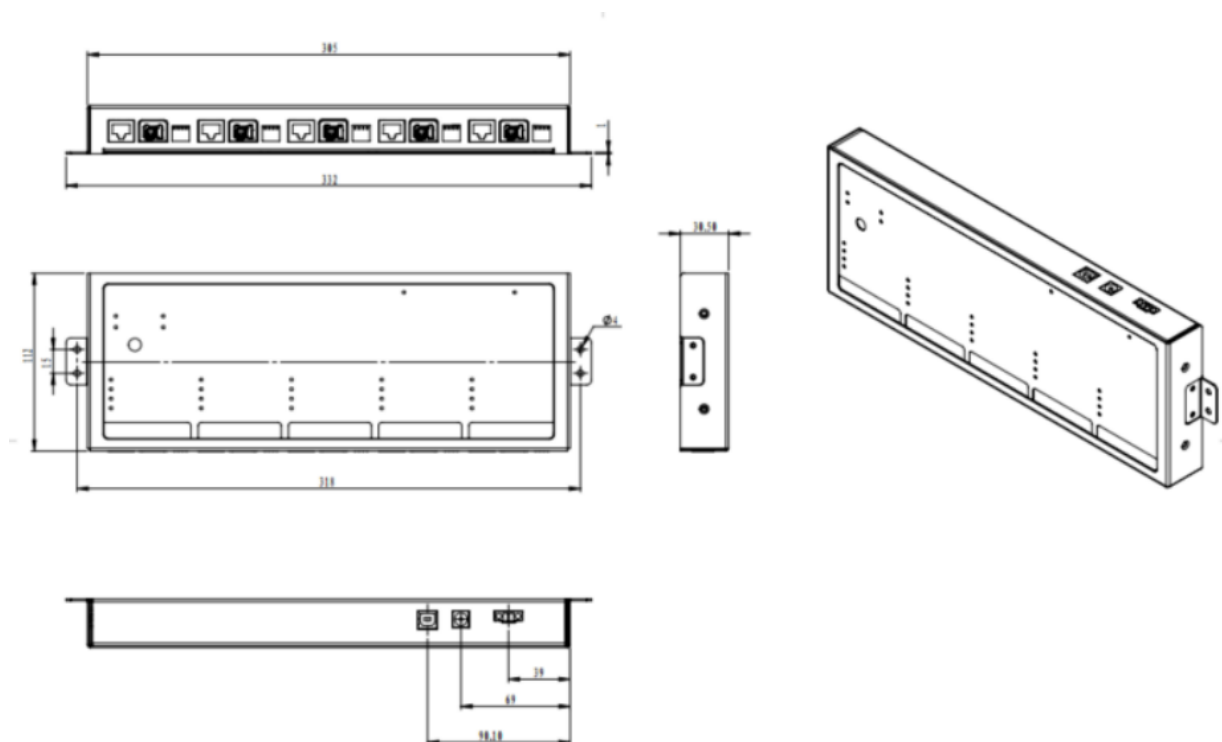
## 5.6 Scope of Delivery

✓ Main device: TE1105



✓ USB cable*1



✓ 12V 2A power adapter *1

✓ MATENET Ethernet cable *5



## 5.7 Hardware Interface
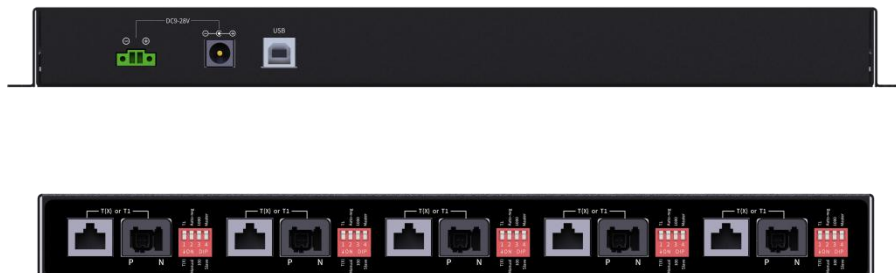




➢ 2-Pin phoenix terminal power supply port

➢ DC power supply port

➢ USB 2.0 interface

➢ Ethernet interface (MATENET)

➢ DIP switch:
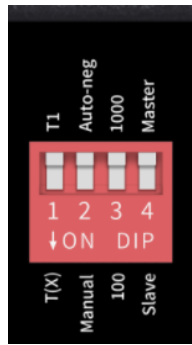
| DIP | Status | Description |
|-----|--------|-------------|
| 1 | Up | T1 mode |
| | Down | T(X) mode |
| 2 | Up | Enable auto-negotiation |
| | Down | Disable auto-negotiation |
| 3 | Up | 1 Gbps mode |
| | Down | 100 Mbps mode |
| 4 | Up | Master mode |
| | Down | Slave mode |

## 5.8 LED

Diagram of LED indicator:
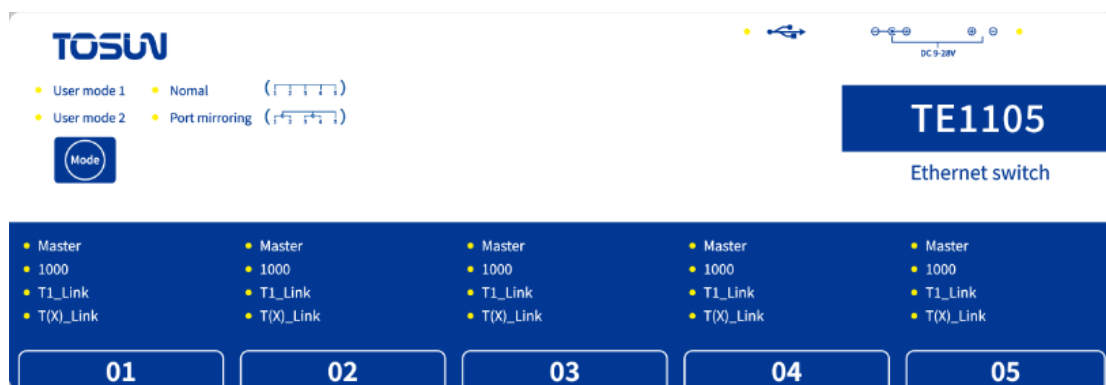


Description of indicator:

| Indicator and DIP Switch | Definition | Description |
|--------------------------|------------|-------------|
| ⊖ ⊕ • | Indicator for power | Always on when powered |

| | | | |
|---|---|---|---|
| ⊷ | Indicator for USB | Always on when USB is connected |
| User mode1 | Indicator for user custom mode 1 | Always on when this mode is turned on |
| User mode2 | Indicator for user custom mode 2 | Always on when this mode is turned on |
| Normal | Indicator for normal mode (switch mode) | Always on when this mode is turned on |
| Port mirroring | Indicator for port mirroring mode | Always on when this mode is turned on |
| Master | Indicator for master/slave mode | Always on in master mode/off in slave mode |
| 1000Mbps | Indicator for 100M/1000M | Always on in 1000M mode/off in 100M mode |
| T1_Link | Indicator for T1 port link. | Blinks during T1 port communication |
| T(X)_Link | Indicator for T(X) port link. | Blinks during T(X) port communication |

## 5.9 Quick Start

**Hardware Connection:**
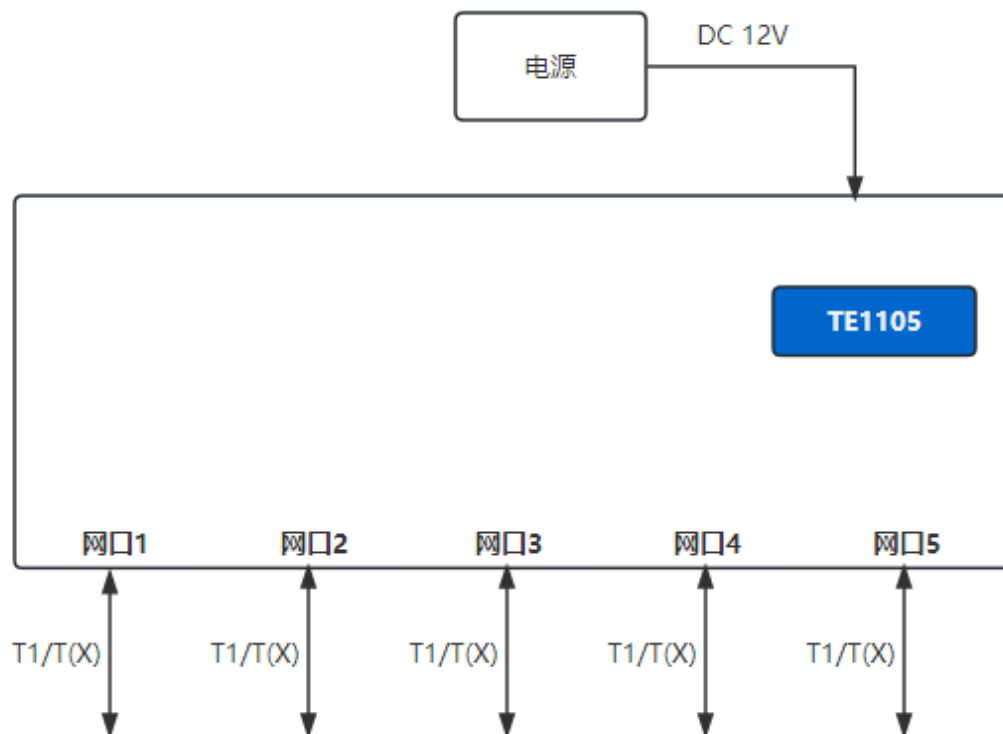


1.   Switch mode (normal mode)

In normal mode, the switch determines which port to forward a data packet to base on the destination MAC address of the received packet. In this mode, the switch learns the MAC addresses of each port and builds a MAC address table to optimize the packet forwarding path, ensuring effective communication between devices in the network.

2. Port mirroring Mode



Port mirroring mode allows for copying packets from one or more source ports to another port (mirror port), while the packets from the source ports continue to be forwarded normally. This mode is typically used for network monitoring and analysis, including both inbound and outbound packets. The mirror port mode is very useful for network fault diagnosis, performance evaluation, and security auditing.

3. User Mode
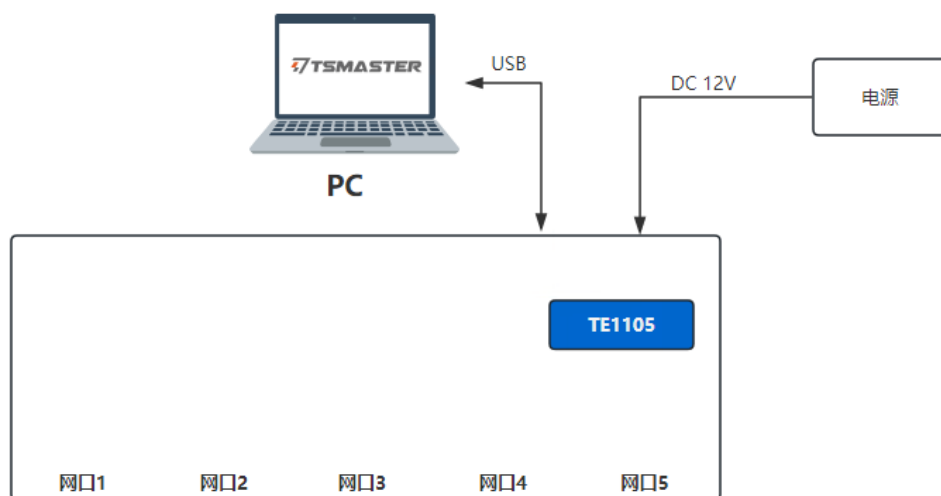


User custom mode requires connecting the TE1105 device to a PC via USB, and using TSMaster on the PC for custom configuration.

Basic Configuration:

(1) Open the TSMaster software, click Hardware, and select TE1105, then select "Basic Config" to open the configuration panel.
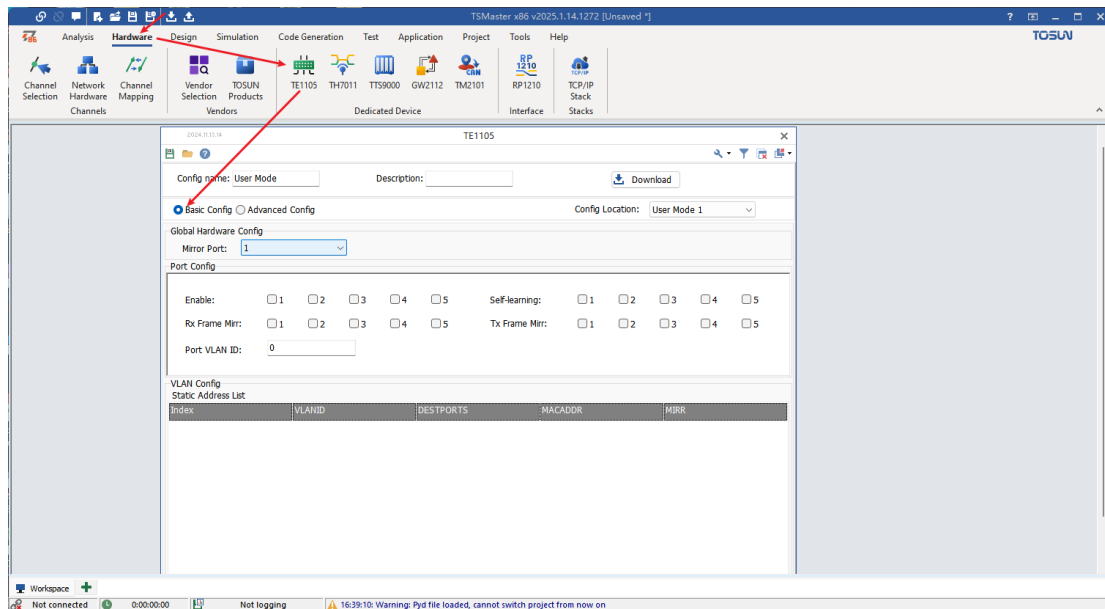


Global Hardware Config: Mirror Port --- 1~5 indicates that the port is a mirror port, while "Invalid" means there is no mirror port.

Port Config:

Enable: Indicates whether the receive and transmit functions of the corresponding port are enabled.

Self-learning: Activates the self-learning feature for the corresponding port.

Rx Frame Mirr: Mirrors the frames received on the corresponding port to the mirror port.

Tx Frame Mirr: Mirrors the frames sent from the corresponding port to the mirror port.

Port VLAN ID: Configurable VLAN ID range is 0-4095. If the switch receives a frame without a VLAN tag, it will automatically tag the frame with this VLAN ID and priority.

(2) Static Address List (supports a maximum of 1024 entries)

Right-click to open the selection window, the MACADDDR format is in the standard MAC address format.
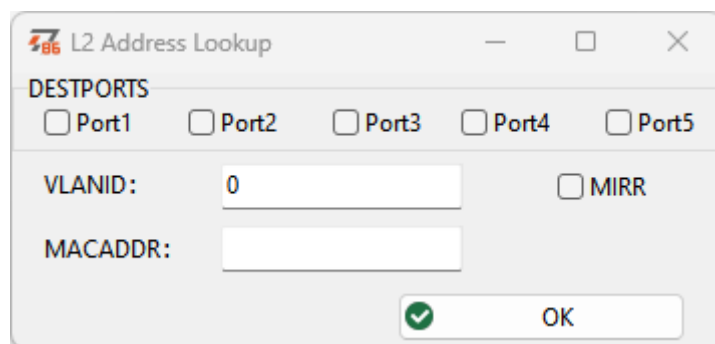
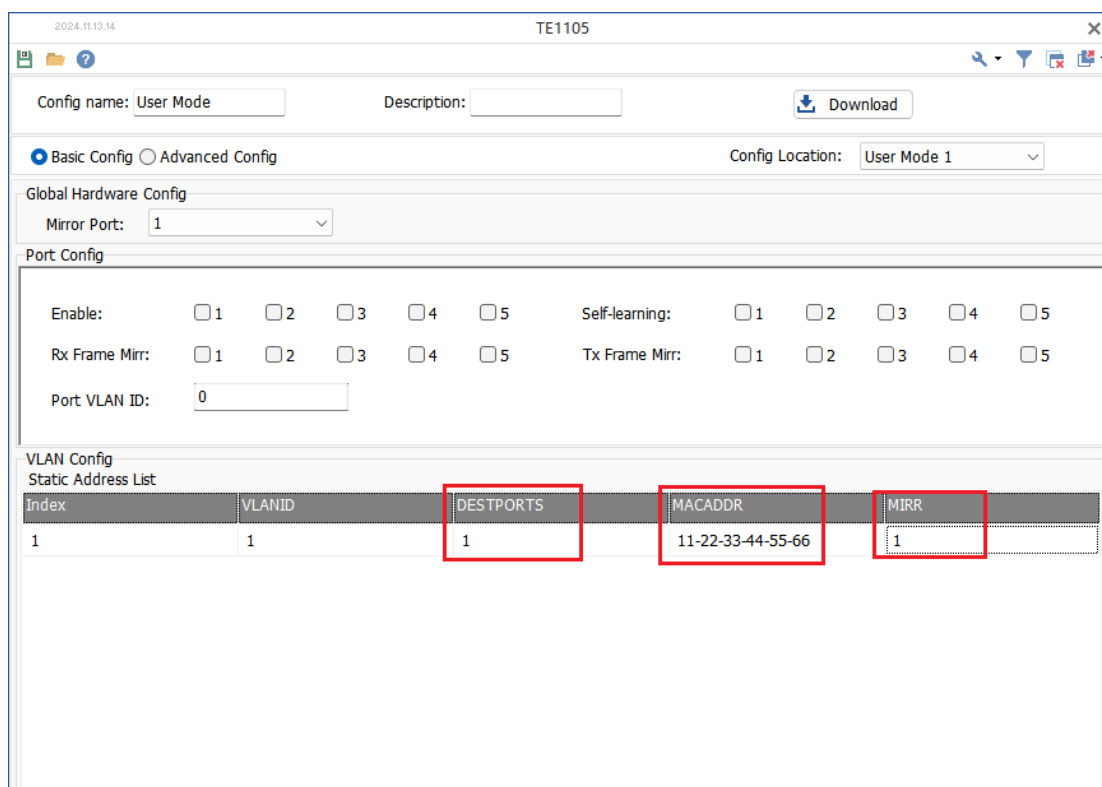DESTPORTS: If the MAC address and VLAN ID of the received packet match this entry, the packet will be forwarded to the corresponding selected port.

MACADDRE: MAC address (FF-FF-FF-FF-FF-FF format)

MIRR: When set to 1, if the destination or source MAC address of the frame matches, the switch will mirror that frame to the mirror port (as specified in the Global Hardware Config above).



Advanced Configuration:

The left-side navigation bar includes six submodules: General Parameters、Mac Configuration Table、 L2 Forwarding Table、L2 Address Lookup Table、L2 Lookup Parameters

Table and VLAN Lookup Table. By clicking on the corresponding submodule, the specific configuration interface will be displayed on the right side, allowing users to configure as needed.
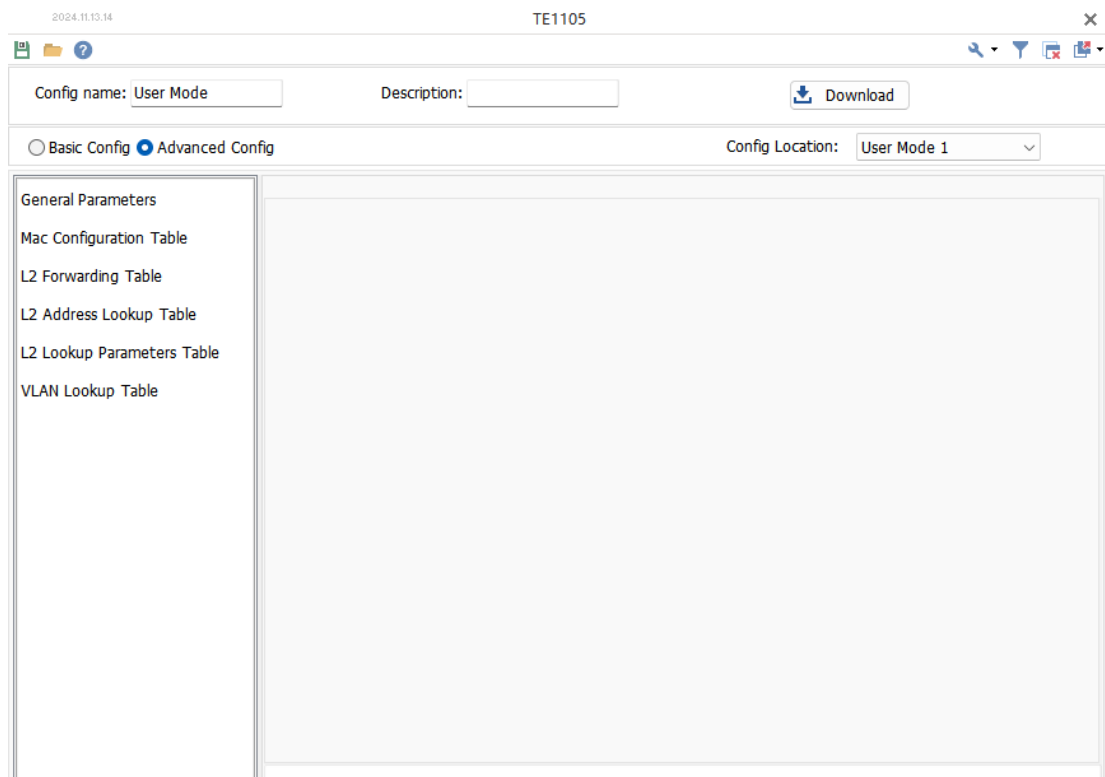


After completing the basic or advanced configuration, click "Download" to download the parameters settings to the TE1105. During the download process, the USB indicator will blink slowly, and once the download is completed, the USB indicator will change from slow blinking to fast blinking.

# 6. Inspection and Maintenance

The main electrical components of TE 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 | No accumulation | Clean and protect the equipment. |

| | Check Item | Standard | Method |
|---|---|---|---|
| | metal shavings | | |
| | 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 range | Install padding or other shock-absorbing devices if necessary. |
| | 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. |

# 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
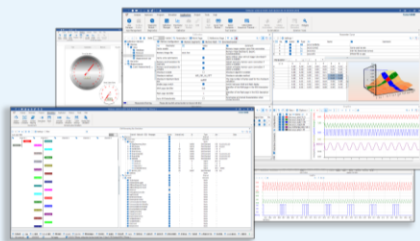


## TSMASTER

## 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   lin   FlexRay   OPEN ALLIANCE
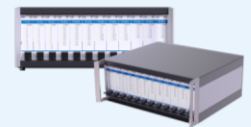
## Solutions

• 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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