



TC1021 Product Manual

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tosunai.com

Copyright Information

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Why Is a UART On CAN Device Necessary?

UART communication is typically limited to short distances (a few meters to a few dozen meters) and is prone to noise interference over longer distances, leading to data loss or errors. In contrast, the transmission range of a CAN bus can reach several hundred meters or more (standard CAN supports up to 500 meters, while high-speed CAN supports 100 meters) and offers superior noise immunity. By converting UART data to CAN signals, long-distance and highly reliable data transmission can be achieved.

Additionally, UART signals are susceptible to electromagnetic interference, especially in industrial environments or scenarios with strong electromagnetic disturbances. The CAN bus uses differential signaling (CAN_H and CAN_L), which provides high noise immunity and ensures stable operation in harsh environments.

What Can a UART On CAN Device Do?

- Extend the communication range of UART
- Enhance noise immunity
- Meet specific industry standards
- ...

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1. About this User Manual

1.1 Warranty

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2. TC1021

2.1 Overview

The TC1021 is a UART On CAN device designed to provide a "transparent data transmission" mechanism, meaning that the data format and content at the sending and receiving ends remain consistent, with only the transmission medium switching from UART to the CAN bus physical layer.

The demand for such devices arises from their significant advantages in extending communication range and enhancing noise immunity. These devices solve challenges in fields such as industry, automotive, and the Internet of Things (IoT), enabling users to build more efficient and reliable communication systems. If your project requires integrating UART devices into a CAN bus network, this device is an ideal choice.



2.2 Features

- ✓ Input Interface: Standard UART, used for data input and output
- ✓ Output Interface: Standard CAN bus physical layer interface, used for transmitting CAN signals

- ✓ Data Processing: The device transmits data received from the UART through the CAN physical layer

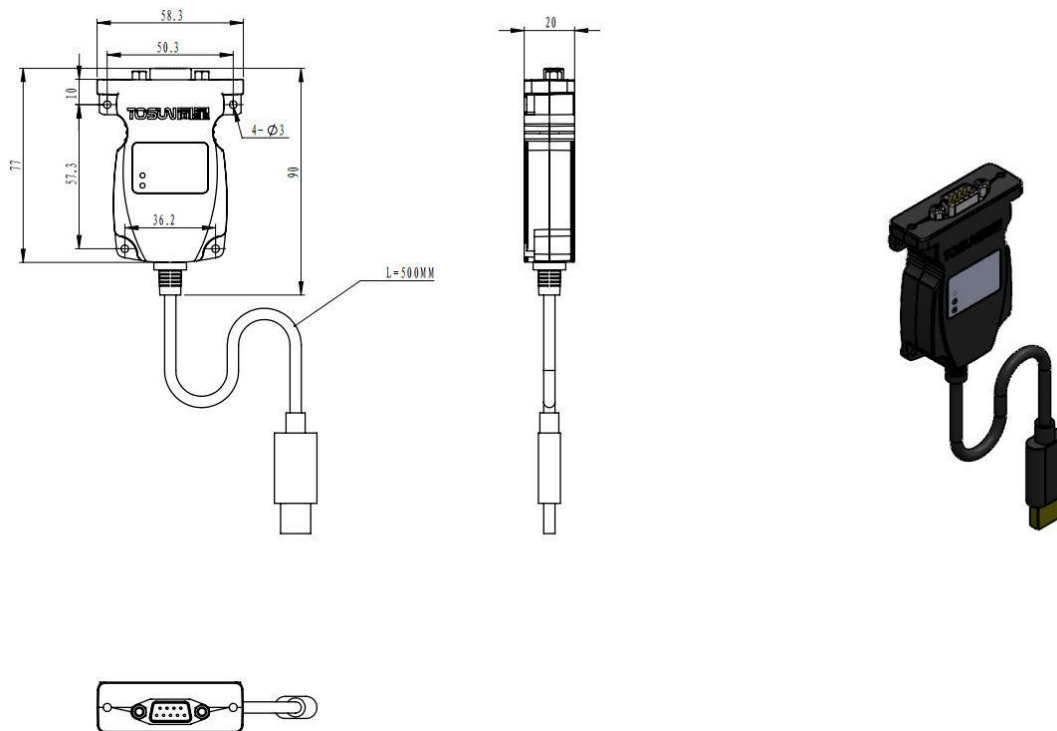
2.3 Technical Data

Interface	1 * UART (USB2.0), 1 * CAN
Driver	Driverless design for Windows system, offering excellent system compatibility
Terminal Resistor	N/A
UART Baud Rate	Maximum 1M bps
Forwarding Delay	< 80 ns
Power Supply	USB power supply
Power Consumption	1W
Case Material	Plastic
Dimension	Approx. 94*48*24mm
Weight	Approx. 77g (without packaging) / Approx. 122g (with packaging)
Operating Temperature	-40°C~80°C
Operating Humidity	10% ~ 90% (non-condensing)
Operating Environment	Keep away from corrosive gases

2.4 Electrical Data

Parameter		Test Condition	Minimum Value	Typical Value	Maximum Value	Unit
Operating Voltage	USB power supply	UART transmission	--	5	--	V
Operating Current	USB power supply	UART transmission	--	0.13	--	A
Power Consumption	USB power supply	UART transmission	--	1	--	W
CAN Interface	Bus pin voltage resistance	CAN_H, CAH_L	-58	--	+58	V
	Isolation withstand voltage	Leakage current less than 1mA	2500	--	--	VDC

2.5 Mechanical Data



2.6 Scope of Delivery

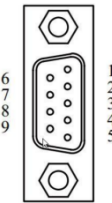
- ✓ Main device: TC1021



2.7 Hardware Interface



➤ DB9 male:

DB9 Pin	PIN Number	Definition
	PIN2	CAN_L
	PIN3	GND
	PIN5	Shield
	PIN7	CAN_H

2.8 LED

Diagram of LED indicator:



Description of indicator:

Indicator	Definition
CAN	Indicator for CAN channel
LINK	Indicator for hardware connection

Description of LED color:

Color	Description
LINK Green	The device is connected
CAN Green	CAN channel data frame is sent or received correctly

CAN Red	CAN channel sends or receives error frames, indicating a configuration, protocol, or wiring error
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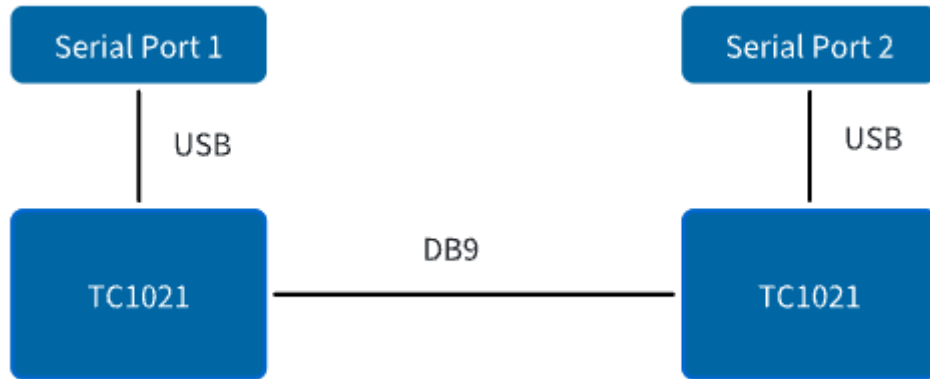
Note: The blinking frequency depends on the bus load.

2.9 Optional Accessories

N/A.

3. Quick Start

3.1 System Connection

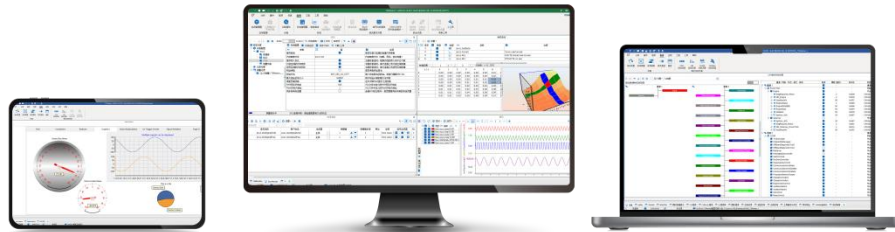


As shown in the figure above, two TC1021 devices are connected via a DB9 cable, and each TC1021 is connected to a UART interface using the USB cables provided with the devices. Communication between the two TC1021 devices occurs over the CAN physical layer, while communication outside the two devices is conducted via UART.

3.2 Driver Installation

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

3.3 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.

3.4 Software Installation

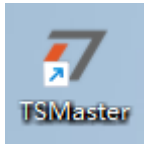
TSMaster software download link:

<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.



3.5 Fundamental Usage

3.5.1 Working Principle of the Device

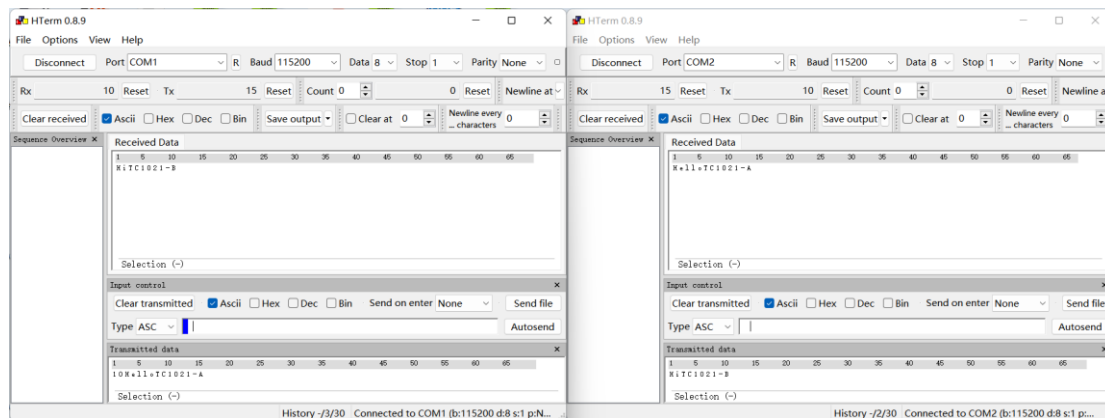
The working principle of the device is as follows:

- Transmitting end:
 1. The UART interface receives data from the device.
 2. The UART data is transmitted via the CAN bus physical layer.

3. CAN signals are transmitted on the bus through differential signaling (CAN_H and CAN_L).
- Receiving end:
 1. Data is received from the CAN bus physical layer.
 2. The data is sent to the target device.

3.5.2 Usage Example

As shown in the figure below, open two serial port debugging tool windows, each corresponding to one TC1021 device. For connection methods, please refer to section 3.1 System Connection. By sending and receiving messages through the serial port debugging tool, you can monitor the communication status. At this point, the two TC1021 devices have successfully established communication.



4. Inspection and Maintenance

The main electrical components of the TC1021 product 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.

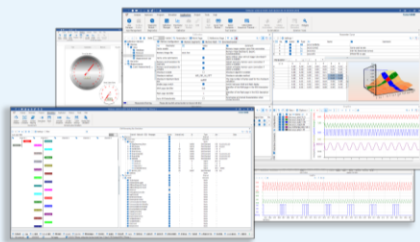
It is recommended to conduct inspections at least once every 6 months to 1 year. Under improper environmental, more frequent inspections should be conducted. As shown in the table below, if you encounter problems during maintenance, please read the following content to find the possible causes of the 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 DC	Use a USB power 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	No presence	Inspect by the smell, or using a sensor.

	gases in the equipment area		
	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.

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

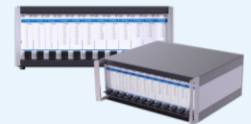
Hardware

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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