



TL1021 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 the principle of providing better services to users, Shanghai TOSUN Technology Ltd (hereinafter referred to as "TOSUN Technology") will present as much detailed and accurate product information as possible in this manual. However, due to the timeliness of the content in this manual, TOSUN Technology cannot fully guarantee the timeliness and applicability of this document at any time.

If there are any changes to the information and data in this manual, no separate notice will be given. To obtain the latest version of the information, please visit the [official website of TOSUN Technology](#) or contact the staff of TOSUN Technology. Thank you for your understanding and support!

TOSUN reserves all rights to this document and its contents. Without the written permission of TOSUN Technology, no part of this manual may be copied in any form or by any means.

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

What Is a UART On LIN Device?

A UART On LIN device is a device that transmits UART data using the LIN physical layer.

What Can a UART On LIN Device Do?

- Meet specific industry standards
- ...

Contents

TL1021 Product Manual.....	1
1. About this User Manual	5
1.1 Warranty	5
1.2 Copyright	5
2. TL1021	6
2.1 Overview	6
2.2 Features	6
2.3 Technical Data.....	7
2.4 Electrical Data.....	7
2.5 Mechanical Data.....	8
2.6 Scope of Delivery.....	8
2.7 Hardware Interface.....	9
2.8 LED.....	9
2.9 Optional Accessories.....	10
3. Quick Start	11
3.1 System Connection.....	11
3.2 Driver Installation	11
3.3 Software Overview.....	12
3.4 Software Installation	13
3.5 Fundamental Usage.....	13
4. Inspection and Maintenance.....	15

1. About this User Manual

1.1 Warranty

This document is provided for reference only and does not constitute any form of guarantee or commitment from TOSUN. TOSUN Technology reserves the right to modify the content and data of the document without further notice. TOSUN Technology assumes no responsibility for the accuracy of the document or for any damages arising from the use of the document. TOSUN Technology greatly appreciates for pointing out errors or making suggestions for improvement, so that we can provide more efficient products in the future.

1.2 Copyright

TOSUN Technology retains all rights to this document and its contents. Without the explicit written permission of TOSUN Technology, it is prohibited to copy, distribute, transmit, disseminate, republish, or use any part of this document in any manner.

2. TL1021

2.1 Overview

The TL1021 is a UART On LIN device designed to provide a "transparent data transmission" mechanism. This means that the data format and content at the sending and receiving ends remain consistent, with only the transmission medium switching from UART to the LIN bus physical layer.



2.2 Features

- ✓ Input Interface: Standard UART, used for data input and output
- ✓ Output Interface: Standard LIN bus interface, used for transmitting LIN signals
- ✓ Data Processing: Convert the received UART data into LIN physical layer signals and transmit them via the LIN bus.

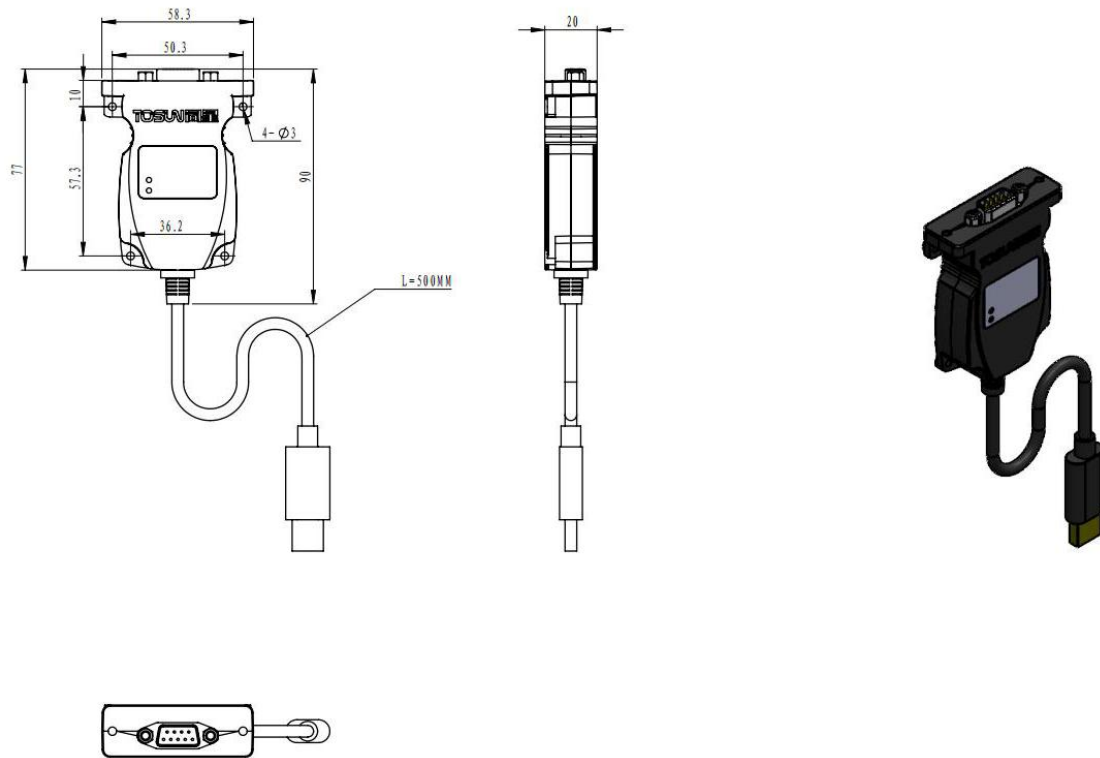
2.3 Technical Data

Interface	1 * UART (USB2.0), 1 * LIN
Driver	Driverless design for Windows system, offering excellent system compatibility
UART Baud Rate	Maximum 20Kbps
Forwarding Delay	< 2.1 μ s
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	--	0.15	--	A
Power Consumption	USB power supply	UART transmission	--	1	--	W
LIN Interface	Bus pin voltage resistance	LIN	-40	--	40	V
	VBAT voltage		5.5	12	36	V

2.5 Mechanical Data



2.6 Scope of Delivery

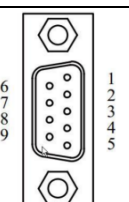
- ✓ Main device: TL1021



2.7 Hardware Interface



➤ DB9 male:

DB9 Pin	PIN Number	Definition
	PIN3	GND
	PIN8	LIN
	PIN9	V_Bat

2.8 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.

2.9 Optional Accessories

N/A.

3. Quick Start

3.1 System Connection

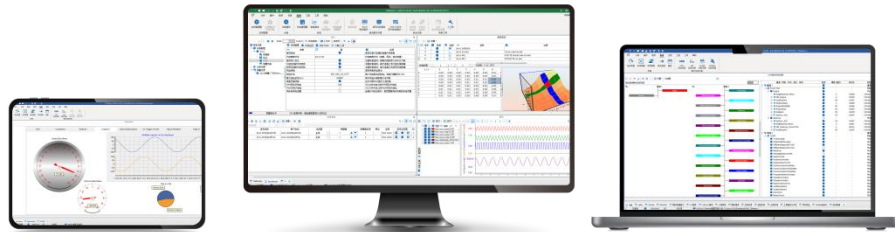


As shown in the figure above, two TL1021 devices are connected via a DB9 cable, and each TL1021 is connected to a UART interface using the USB cables provided with the devices. Communication between the two TL1021 devices occurs over the LIN physical layer, while communication outside the two devices 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

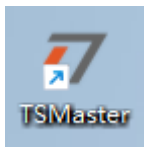
TSMaster software download link:

<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

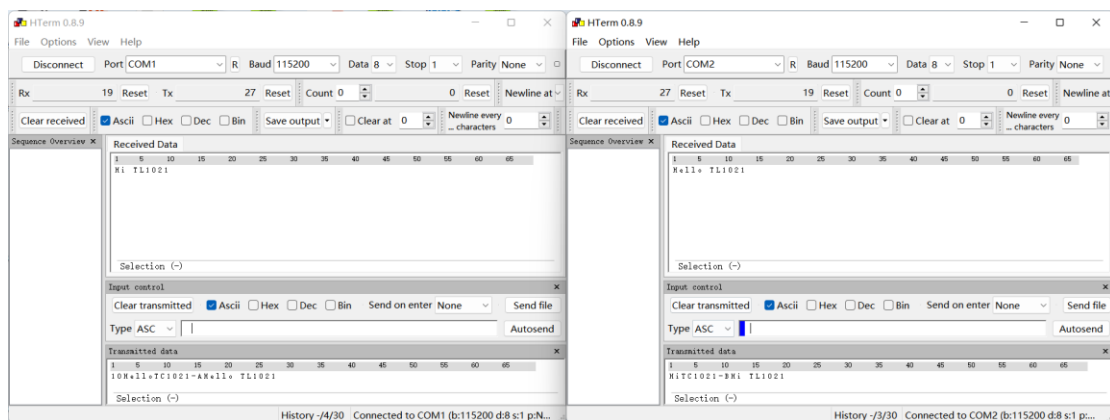
3.5.1 Working Principle of the Device

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 LIN bus physical layer.
 3. LIN signals are transmitted on the LIN bus physical layer.
- Receiving end:
 1. Data is received from the LIN 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 TL1021 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 TL1021 devices have successfully established communication.



4. Inspection and Maintenance

The main electrical components of the TL1021 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.

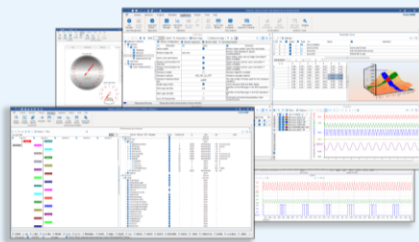
It is recommended to conduct inspections at least once every 6 months to 1 year. Under improper environmental, more frequent inspections should be conducted. As shown in the table below, if you encounter problems during maintenance, please read the following content to find the possible causes of the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

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

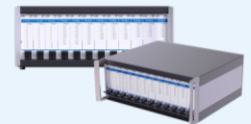
Hardware

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



Contact Us :

+86 21-5956 0506
 sales@tosunai.com

website :

www.tosunai.com

