TOSUN


# TH7012-ISO 16845 Product Manual

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tosunai.com

Copyright Information

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## Why is the TH7012-ISO 16845 Test Equipment Needed?

The ISO 16845 protocol is an international standard developed by the International Organization for Standardization (ISO) for Controller Area Network (CAN) Conformance Testing. It is primarily used to verify whether CAN controllers and transceivers comply with the ISO-11898-1 standard. This standard ensures that CAN devices from different manufacturers are interoperable at both the data link layer and the physical layer. It also ensures that CAN-related products developed by different manufacturers, known as the Implementation Under Test (IUT), adhere to international standards, thereby enhancing the overall system performance and reliability.

The TH7012-ISO 16845 test equipment, developed by TOSUN Smart, is specifically designed to test whether the CAN IP core of an IUT meets the ISO 11898-1 standard.

## What Can the TH7012-ISO 16845 Test Equipment Do?

- Verify IUT handling of special identifiers, stuff bits, data length, and asymmetric modes.
- Verify IUT handling of errors, including BIT errors, CRC errors, stuffing errors, and format errors.
- Verify IUT handling of overload frames to ensure proper error management.
- Verify IUT behavior in passive error states, ensuring the system behaves as expected in error conditions.
- Verify IUT CAN frame bit timing, ensuring that the timing conforms to the standards.
- ...

**Contents**

# 1. About this User Manual

## 1.1 Disclaimer

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# 2.TH7012-ISO 16845

## 2.1 Overview

The TH7012-ISO 16845 CAN conformance tester is an integrated device used to test the conformance of CAN IP cores. It connects to a PC via an RJ45 Ethernet interface and features a Windows driver-free design, ensuring excellent system compatibility.

When paired with the host software, the TH7012-ISO 16845 supports testing the IUT (Implementation Under Test) for its ability to receive and transmit standard frames, extended frames, CANFD frames, and CANFD extended frames with various identifiers and frame lengths. Additionally, it supports testing the IUT's error handling functions, including BIT errors, CRC errors, STUFF errors, FORM errors, and overload frame errors. The device can also evaluate the IUT's behavior under active error and passive error states.

The TH7012-ISO 16845 CAN conformance tester is ideal for verifying whether the CAN IP core of the device under test complies with the ISO-11898-1 CAN communication protocol.

## 2.2 Features

- ✓ Supports validating the IUT's response to special lengths and identifiers.
- ✓ Supports validating IUT's handling of standard CAN frames.
- ✓ Supports validating IUT's handling of CAN extended frames.
- ✓ Supports validating IUT's handling of CANFD frames.
- ✓ Supports validating IUT's handling of CANFD extended frames.
- ✓ Supports validating IUT's response to BIT errors.
- ✓ Supports validating IUT's response to STUFF errors.
- ✓ Supports validating IUT's response to FORM errors.
- ✓ Supports validating IUT's response to CRC errors.
- ✓ Supports validating the IUT's CAN frame bit timing.
- ✓ Supports validating IUT's handling of overload frames.
- ✓ Supports validating IUT's response to non-nominal bit positions and error counter detection.

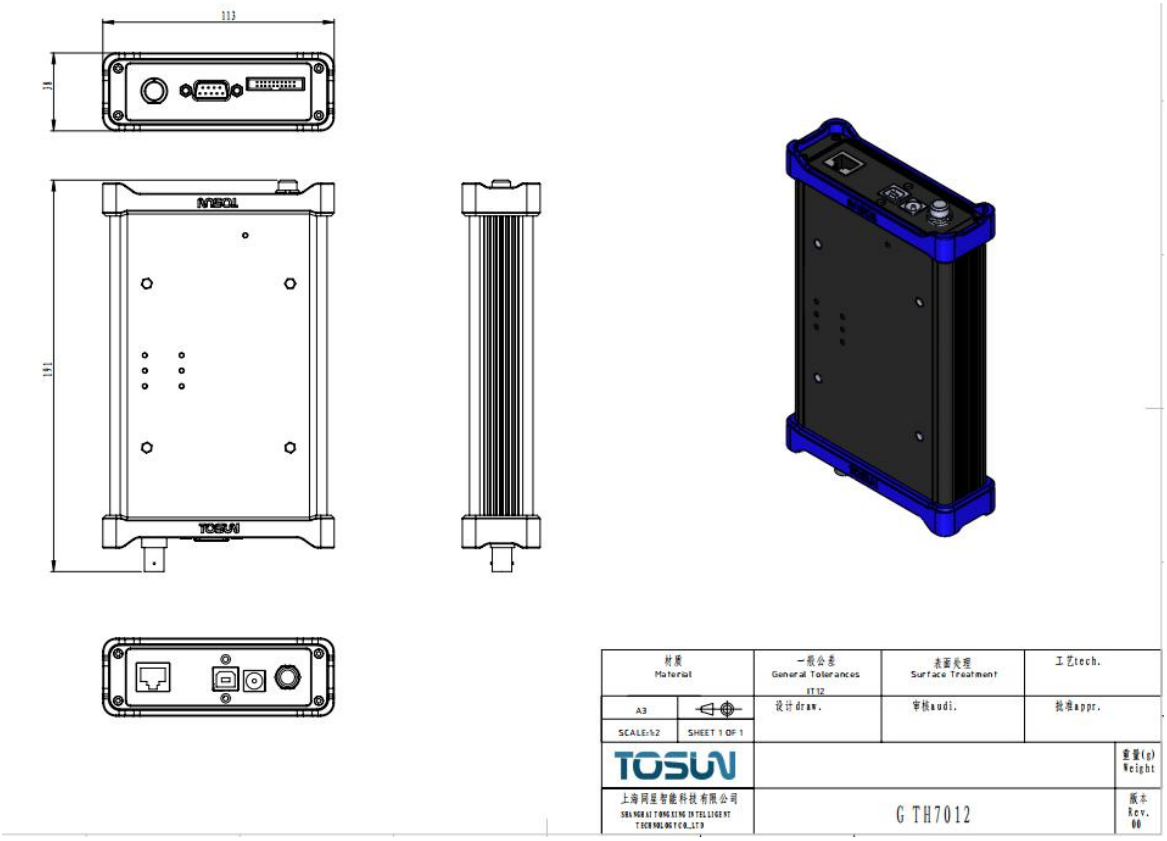
## 2.3 Technical Data

| | |
|---|---|
| Channel | 1* LIN<br>1* CAN<br>1* UART |
| PC Interface | USB 2.0<br>RJ45 Ethernet |
| Driver | Driver-free for Windows |
| Power Supply | USB-powered or external DC input (9-36V) |
| Power Consumption | 3W |
| Enclosure Material | Metal enclosures |
| Dimensions | Approx. 191*118*38mm |
| Weight | Approx. 420g (without packaging)/775g (with packaging) |
| Operating Temp. | -40℃~80℃ |
| Operating Humidity | 10% ～ 90% RH (non-condensing) |
| Environment | Avoid corrosive gases |

## 2.4 Electrical Data

| Parameter | | Test Conditions | Min | Typical | Max | Unit |
|---|---|---|---|---|---|---|
| Operating Voltage | USB power | LIN Tx/Rx | -- | 5 | -- | V |
| | External DC power | LIN Tx/Rx | 9 | 12 | 36 | V |
| Operating Current | USB power | LIN Tx/Rx | -- | 0.15 | -- | A |
| | External DC power | LIN Tx/Rx | -- | 0.25 | -- | A |
| Power Consumption | External DC power | LIN Tx/Rx | -- | 3 | -- | W |
| LIN Interface | Bus pin voltage tolerance | LIN-to-GND voltage | 0 | -- | 40 | V |
| | Isolation voltage | Leakage ＜ 1mA | 0 | -- | 2500 | VDC |
| CAN Interface | Bus pin voltage tolerance | CANH, CAHL | -58 | -- | +58 | V |
| | Isolation voltage | Leakage ＜ 1mA | 0 | -- | 2500 | VDC |
| UART Interface | Bus pin voltage tolerance | UART Tx/Rx | 0 | -- | 5 | V |
| | Isolation voltage | Leakage ＜ 1mA | 0 | -- | 2500 | VDC |

## 2.5 Mechanical Dimensions



## 2.6 Packing List

✓ Main device: TH7012-ISO 16845


✓ USB cable

✓ Category 6 Gigabit Ethernet cable

✓ 12V 2A power adapter

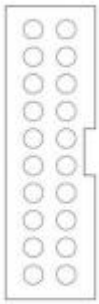
## 2.7 Hardware Interface



- SYNC Interface
- DC Power Input
- USB 2.0 Port
- RJ45 Ethernet Port
- Trigger Output
- DB9 Connector Pins:

| DB9 Pin | PIN Number | Definition |
|---|---|---|
| CAN FD/LIN | PIN2 | CAN_L |
| | PIN3 | GND |
| | PIN7 | CAN_H |
| | PIN8 | LIN |

- 20-Pin I/O interface:

| I/O Pin | PIN Number | Definition | PIN Number | Definition |
|---|---|---|---|---|
|  | PIN1 | TXD/16845-CAN-TXD | PIN2 | AIAO0 |
| | PIN3 | RXD/16845-CAN-RXD | PIN4 | AIAO1 |
| | PIN5 | GND | PIN6 | AIAO2 |
| | PIN7 | DI1/16845-UART_RX | PIN8 | AIAO3 |
| | PIN9 | DI2 | PIN10 | AIAO4 |
| | PIN11 | DI3 | PIN12 | AIAO5 |
| | PIN13 | GND | PIN14 | GND |
| | PIN15 | DO1/16845-UART_TX | PIN16 | GND |
| | PIN17 | DO2 | PIN18 | VCC_5V |
| | PIN19 | DO3 | PIN20 | VCC_5V |

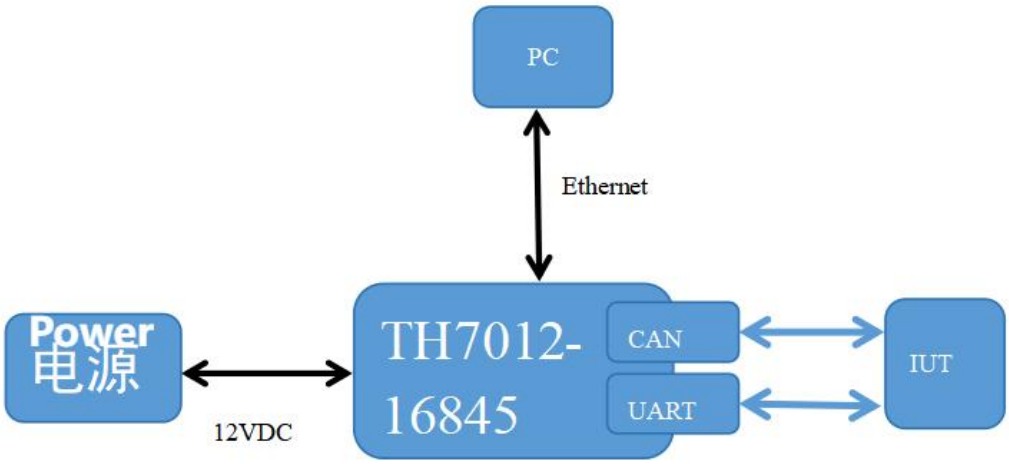
In the TH7012-ISO 16845 device, PIN1 and PIN3 are used for the CAN interface to perform consistency testing, while PIN7 and PIN15 are used for UART to verify the data transmission and send configuration information to the IUT.

## 2.9 Optional Accessories

NA

# 3. Quick Start

## 3.1 System Connections




TH7012-ISO 16845 device connects to a PC via Ethernet (RJ45), and the UART and CAN interfaces of the IUT are connected to the TH7012-ISO 16845 device via a 20-pin cable. On the PC side, users can control the TH7012-ISO 16845 device for CAN conformance testing using the host software.

## 3.2 Driver Installation

All hardware is designed with a driver-free architecture, ensuring excellent system compatibility. No additional driver installation is required across various operation systems, including Windows7/8/10/11 and Linux.

## 3.3 Function Configuration

Before using TH7012-ISO 16845 device, a functional configuration is required. After connecting the device to the PC via RJ45, users can proceed with the configuration. TOSUN provides the DLL (Dynamic Link Library), header files, and the usage guide to control the TH7012-ISO 16845 device from the PC.

### 3.3.1 Device Connection

The following steps describe how to connect to the TH7012-ISO 16845 device from a PC:

1. Based on the provided DLL and header files, the PC uses the host application to establish an Ethernet connection with the device. Use `tsdev_api_get_netif_cnt(&cnt)` to obtain the number of network interfaces on the PC. Then, iterate with `tsdev_api_get_netif_name(i, &netif_name)` to get the name of each network interface and print them out.

```
net 0 Realtek PCIe GbE Family Controller
net 1 Microsoft Wi-Fi Direct Virtual Adapter
net 2 Microsoft Wi-Fi Direct Virtual Adapter #2
net 3 Intel(R) Wi-Fi 6 AX201 160MHz
net 4 SEC-Windows Adapter V10
net 5 VMware Virtual Ethernet Adapter for VMnet1
net 6 VMware Virtual Ethernet Adapter for VMnet8
net 7 Bluetooth Device (Personal Area Network)
net 8 Software Loopback Interface 1
```

As shown in the figure, there are 8 network interfaces. Physically, interface 0 is connected to TH7012-ISO 16845, so interface 0 is selected.

Ensure that the PC and TH7012 are on the same subnet but not using the same IP address of TH7012-ISO 16845 (default IP: 192.168.1.10). Use `tsdev_api_get_netif_connect_status(0, &sta)` to establish the connection.

2. Create a handle using `tsdev_api_create(&ctx, &handle_p, NULL)`. This handle will be used throughout the testing process. Set `ctx.com_par.eth.netif_name` to the selected network interface.

3. Call `tsdev_api_scan(handle_p, &cnt, 500, 0)` to scan for online TOSUN devices. A return value of cnt > 0 indicates that devices are found.

4. Call `tsdev_api_get_info(handle_p, 0, &info)` to retrieve information on the first detected device.

5. Call `tsdev_api_open(handle_p, info.uid, NULL, 10000)` to open the connection to the device.

After these steps, the PC is successfully connected to the TH7012-ISO 16845.

### 3.3.2 Test Function

First, define the data content of the frame used in the current TH7012-ISO 16845 test, including the frame type, baud rate, test case ID, and timeout. This is done by configuring the th7011_16845_test_case_frame_data structure.

Next, use the tsdev_api_th7011_16845_test_start function to deliver the configuration information to the device. At this point, the test function is fully set up.

Finally, the tsdev_api_th7011_16845_test_get_result function is provided to query the test results.

# 4. Inspection and Maintenance

The TH7012-ISO 16845 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.<br>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.<br>(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 | Within allowable | Install padding or vibration |

| | | | |
|---|---|---|---|
| | mechanical shock | limits | 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. |

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**Engineer Everything !**

## Software

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

UDS diagnostics/ECU flashing/CCP/XCP calibration

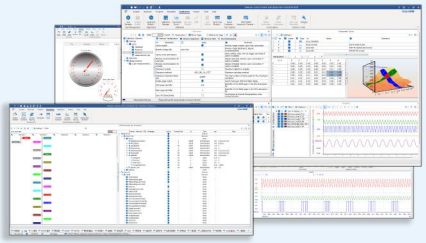
Embedded code generation/Application builder

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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