TOSUN同星

TOSUN-TC113
User Manual

tosunai.com

Product Features & Interface Overview

Product Name	Channel
TC113	CAN FD * 2

Contents

1. Introduction

The TC113 is a dual-channel CAN/CAN FD communication tool based on SocketCAN.

It is designed to make CAN communication as simple and efficient as network programming.

The TC113 supports CAN FD bus speeds up to 5Mbps (optionally up to 8Mbps) and connects to the host via USB. It is fully compatible with SocketCAN and comes with a complete Linux driver for excellent system compatibility.

Powered by a China-made main control chip, TC113 supports a fully domestic hardware configuration, making it suitable for a wide range of embedded and industrial communication applications.

1.1. Technical Specifications

➢ Device Specifications

Parameter	Description
PC Interface	USB2.0 (HS)
Driver	Linux driver support
Buffer	Hardware buffer
Connector	Standard D-Sub, 9-pin
CAN	Supports CAN 2.0 A/B protocols (ISO 11898-1 compliant); baud rate 125Kbps ~ 1Mbps
CAN FD	Supports both ISO and non-ISO CAN FD standards; baud rate 125Kbps ~ 5Mbps (8Mbps optional)
Power Supply	Powered via USB
Power Consumption	1.5W
ESD Protection	±8kV contact discharge, ±8kV air charge
Sample Point Range	Adjustable from 70% ~ 90%

Dimensions	93.7 * 47.4mm
Weight	106.2g
Operating Humidity	10% ~ 90% (no condensing)
Operating Environment	Avoid corrosive gases

➢ CAN/CAN FD Specifications

Parameter	Description
Supported Protocols	CAN 2.0 A/B (ISO 11898-1), CAN FD (ISO and non-ISO)
CAN Baud Rate	125Kbps ~ 1Mbps
CAN Frame Data Length	Up to 8 bytes
CAN FD Baud Rate	125Kbps ~ 5Mbps (8Mbps optional)
CAN FD Frame Data Length	Up to 64 bytes; supports BRS frames
Channel Count	CAN/CAN FD * 2
Buffer	Hardware buffer

1.2. Electrical Specifications

➢ Power Characteristics

Parameter	Condition	Min	Typ.	Max	Unit
Operating Voltage	USB power supply	--	5.1	--	V
Power Consumption	USB power supply	--	1.5	--	W

➢ CAN Interface Characteristics

Parameter	Condition	Min	Typ.	Max	Unit

Bus Pin Tolerance Voltage	CAN_H, CAN_L to GND	-58	--	58	V
Isolation Voltage	Leakage current < 1 mA	2500	--	--	VDC

➢ Mechanical Dimensions

Unit: mm

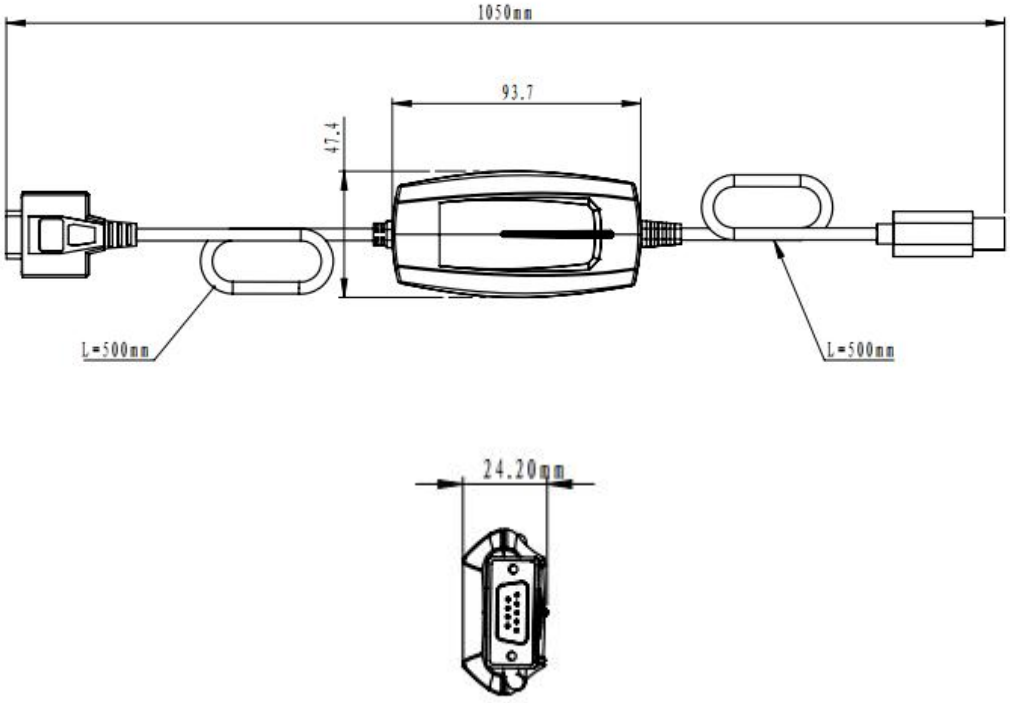
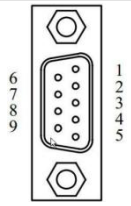


Figure 1-1 Mechanical Dimensions

1.3. Pin Definition

➢ CAN FD DB9 Interface (Male)

DB9 Pin	Channel	Pin	Definition
		PIN2	CAN FD1_Low
		PIN3	CAN FD1_GND

	CAN FD 1/2	PIN4	CAN FD2_Low
		PIN5	CAN FD_Shield
		PIN7	CAN FD1_High
		PIN8	CAN FD2_High

1.4. LED Indicators

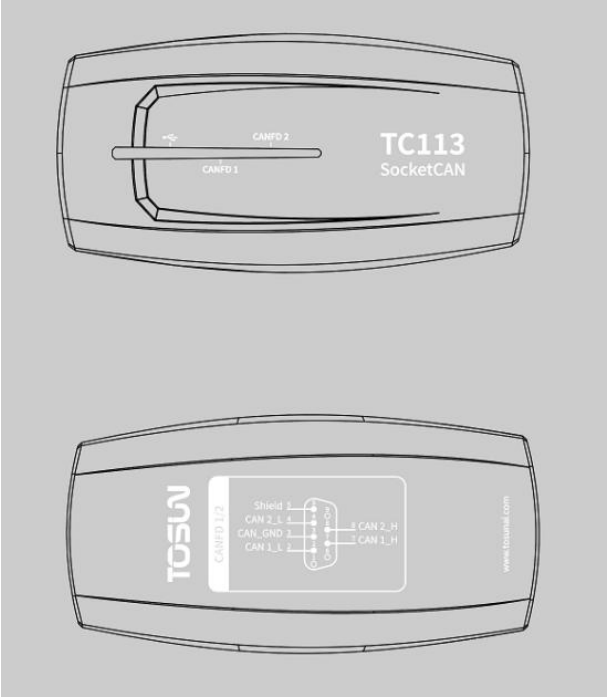


Figure 1-2 Front Panel Layout

- **LED Definitions**

Indicator	Description
CAN FD 1~2	Status of CAN FD Channel1~2
Link	Hardware connection indicator

- **LED Color Description**

Indicator	Color	Description
CAN FD	Green	Normal frame transmission/reception
	Red	Frame transmission/reception error — configuration, protocol, or wiring fault
Link	Green	Device connected successfully

The blinking frequency depends on the bus load rate — the higher the bus load, the faster it blinks.

1.5. System Requirements

➢ PC Requirements

- Operating System: Linux (official driver provided; compatible with mainstream distributions and Loongson Kylin OS)

➢ Build & Runtime Dependencies

- Kernel header package for the corresponding version
- GCC compiler
- Makefile build environment
- Shell (supported sh scripts)

1.6. Packing List

Item	Qty.	Illustration	Standard/Optional

TC113 Main Device	**1**		**Standard**

2. Application Example in Linux

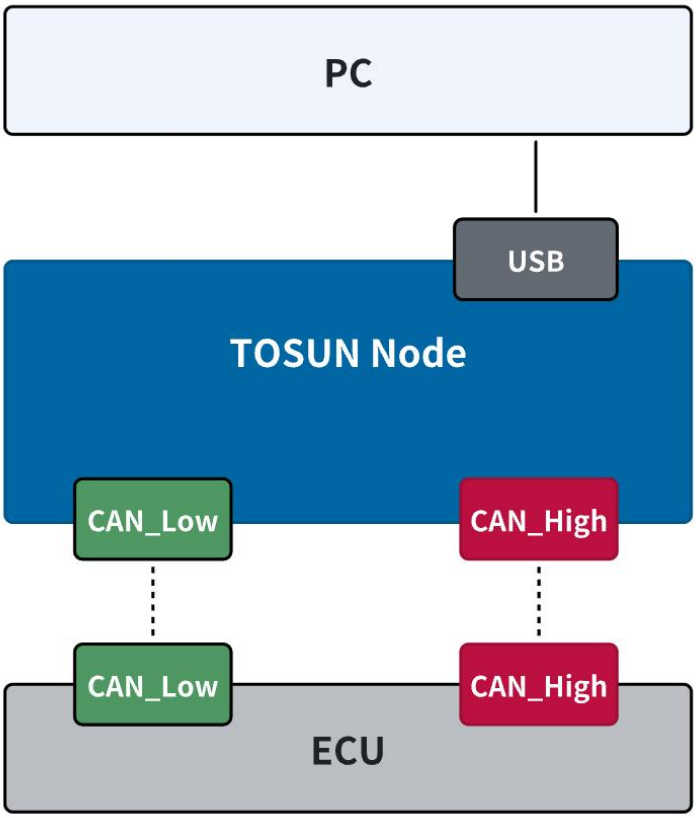


Figure 2-1 Example in Linux

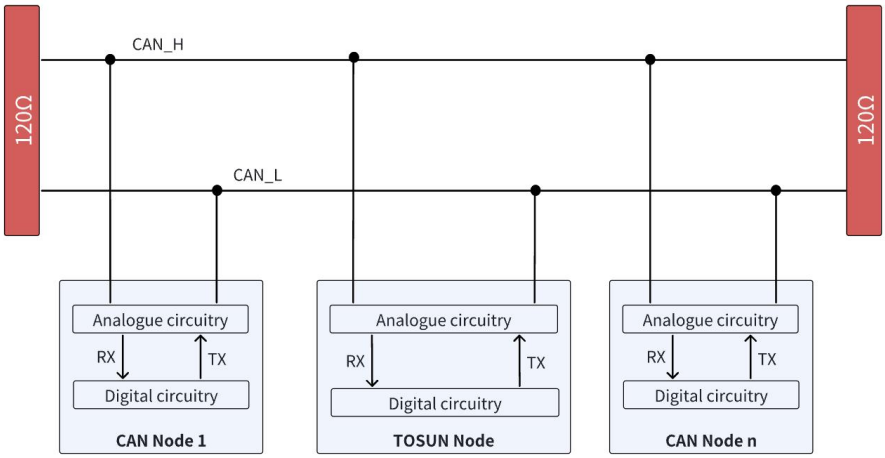


Figure 2-2 Connect to CAN Bus

2.1. Driver Installation

The TC113 provides a Linux driver with excellent system compatibility.

2.1.1. Environment Dependencies

1. Install the kernel header package for your system version (with CAN device support).
2. Install the GCC compiler.
3. Ensure Makefile support is available.
4. Enable shell script (.sh) execution environment.

2.1.2. Driver Installation Steps

1. Copy the user directory to the Linux environment and enter the directory.

```
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user$ ls
socket_can.c  socket_drv  TOSUN-SOCKET_CAN使用指南_V1.0.0.docx  TOSUN-TC113用户手册_V1.0.0.docx
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user$
```

Figure 2-3 User Directory

2. Enter the socket_drv folder and run make to compile the driver. The generated file is tosun_socket_can.ko.

```
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user$ cd socket_drv/
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user/socket_drv$ make
-e ------------------------------------------------
-e 🔍 Checking build environment...
-e ------------------------------------------------
# make
# sudo
# kernel build dir
# 必要头文件
# 必要源文件
-e ✅ Using gcc-12, version 12
-e 🔧 Building kernel module tosun_socket_can.ko for 6.8.0-65-generic...
Using CC=gcc-12
make[1]: Entering directory '/usr/src/linux-headers-6.8.0-65-generic'
warning: the compiler differs from the one used to build the kernel
  The kernel was built by: x86_64-linux-gnu-gcc-12 (Ubuntu 12.3.0-1ubuntu1~22.04) 12.3.0
  You are using:           gcc-12 (Ubuntu 12.3.0-1ubuntu1~22.04) 12.3.0
  CC [M]  /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/drivers_net_can_usb_tosun.o
  CC [M]  /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/drivers_net_can_usb_cdev.o
  CC [M]  /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/drivers_net_can_usb_tsmassage.o
  LD [M]  /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/tosun_socket_can.o
  MODPOST /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/Module.symvers
  CC [M]  /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/tosun_socket_can.mod.o
  LD [M]  /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/tosun_socket_can.ko
  BTF [M] /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/tosun_socket_can.ko
Skipping BTF generation for /home/tosun/Desktop/TC113/TC113/00_user/socket_drv/tosun_socket_can.ko due to unavailability of vmlinux
make[1]: Leaving directory '/usr/src/linux-headers-6.8.0-65-generic'
-e ✅ Build complete: tosun_socket_can.ko
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user/socket_drv$
```

Figure 2-4 Example Figure1

3. Run make install to load can_dev and hid dependencies, then install the driver.

```
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user/socket_drv$ make install
-e 📦 Installing kernel module...
-e ✅ Installed. Load with: sudo modprobe tosun_socket_can
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user/socket_drv$
```

Figure 2-5 Example Figure2

4. The driver does not produce console output during loading. After connecting the device, run dmesg to view log entries containing “tosun”, and run ip link show to verify the CAN interface.

```
[230843.208382] input: TOSUN TOSUN HS CANFD2.SOCKETCAN.TC113 as /devices/pci0000:00/0000:00:08.1/0000:04:00.3/usb1/1-2/1-2:1.0/0003:389
E:1002.004A/input/input96
[230843.221233] tosun_socket_can 0003:389E:1002.004A: input,hidraw0: USB HID v1.11 Gamepad [TOSUN TOSUN HS CANFD2.SOCKETCAN.TC113] on u
sb-0000:04:00.3-2/input0
[230843.259855] Report Type: Input, ID: 0xa5, Size: 32760 bits
[230843.259872] Report Type: Output, ID: 0xa5, Size: 32760 bits
[230843.259880] list empty
[230843.260218] serial number is 59c9462dfe1e74d5
[230843.260255] tosun_usb TOSUN_USB_CANUSB_PRODUCT_ID start
[230843.260703] tosun_socket_can 0003:389E:1002.004A can0: device can0 registered
[230843.260724] tosun_usb TOSUN_USB_CANUSB_PRODUCT_ID start
[230843.261127] tosun_socket_can 0003:389E:1002.004A can1: device can1 registered
```

Figure 2-6 Example Figure3

```
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user/socket_drv$ ip link show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN mode DEFAULT group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
2: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP mode DEFAULT group default qlen 1000
    link/ether 7c:57:58:19:12:f9 brd ff:ff:ff:ff:ff:ff
3: wlp2s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP mode DORMANT group default qlen 1000
    link/ether 38:d5:7a:99:a1:19 brd ff:ff:ff:ff:ff:ff
239: can0: <NOARP,ECHO> mtu 16 qdisc noop state DOWN mode DEFAULT group default qlen 10
    link/can
240: can1: <NOARP,ECHO> mtu 16 qdisc noop state DOWN mode DEFAULT group default qlen 10
    link/can
tosun@tosun-HP-ProBook-455-15-6-inch-G9-Notebook-PC:~/Desktop/TC113/TC113/00_user/socket_drv$
```

Figure 2-7 Example Figure4

5. To uninstall the driver, run make uninstall.

2.2. Usage Example

TC113 functions as a standard SocketCAN device, fully compatible with the Linux SocketCAN subsystem API.

- Official Documentation: For complete SocketCAN APIs, concepts, and usage, refer to the official Linux kernel documentation: Linux source tree → /Documentation/networking/can.rst

(Online version: https://www.kernel.org/doc/html/latest/networking/can.html)

- Practical Tutorial: For beginners, third-party resources such as SocketCAN – Wikipedia provide a quick overview of key concepts.

The examples in this document assume a basic understanding of SocketCAN.

Please refer to *TOSUN-SOCKET_CAN User Guide_V1.0.0* for details.

3. Reference Document

TOSUN-SOCKET_CAN User Guide_V1.0.0

4. Inspection and Maintenance

The TC113 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.

- **Power Environment Inspection**

Item	Check Content	Standard/ Range	Action/Measure
Power Supply	Check voltage fluctuation at power input	USB port:+5V DC Power port: +12V DC	Use a power meter or voltmeter at the input; ensure voltage fluctuation is within 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	Use a hygrometer to ensure humidity is within specified range

- **Contamination & Protection Check**

Item	Check Content	Standard/ Range	Action/Measure
Contamination	Check for accumulation of dust, powder, salt, and metal debris	None	Clean the device and prevent future contamination
	Check for exposure to water, oil, or chemicals	None	Clean and shield if necessary
Hazardous Gases	Check for corrosive or flammable gases	None	Use sensors or odor detection to verify

➢ Mechanical Stress & EMI Check

Item	Check Content	Standard/ Range	Action/Measure
Mechanical Stress	Check vibration and shock levels	Within specified limits	Install padding or vibration isolation measures if necessary
Electromagnetic Environment	Check for noise sources near the device	No significant noise sources	Isolate or shield the device from noise sources

➢ Installation & Wiring Check

Item	Check Content	Standard/ Range	Action/Measure
Wiring	Check crimped connectors in external wiring	Adequate clearance between connectors	Visually inspect and adjust as needed
	Check for damage to external wiring	No damage	Visually inspect and replace damaged cables if necessary

TOSUN

Engineer Everything !

Software

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

UDS diagnostics/ECU flashing/CCP/XCP calibration

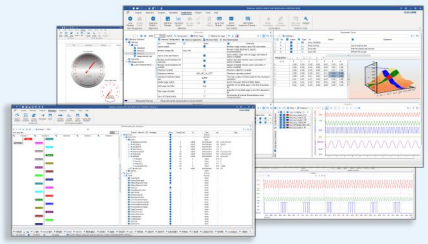
Embedded code generation/Application builder

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

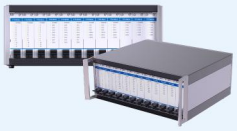
TTS test systems

-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 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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