# UDT1FR-I

unis warm
electronics for robots

HARDWARE DATASHEET

# USB interface with CAN Fd and RS485

## Description

UDT1FR-I product is a high end debugger for UniSwarm products or others brands. Can act as master in RS485 or CAN communication.

## Features

- Monitor bus activity and view frames contents
- Send frames on RS485 and CAN bus
- Set parameters on external boards
- Updated firmware

## Interfaces

- 480Mb/s High Speed USB 2.0
- CAN Fd bus up to 8 Mbps compatible with CANOpen and CANOpen Fd
- RS485 / RS422 interface (up to 50 Mbds) for protocols like Modbus, Profibus or DMX512...
- 1 kV isolation between USB-side and interface-side

## Compatibility

- Linux module to work as a standard SocketCAN interface
- Future windows driver

| Reference | Package | RJ45 | USB | RS485 | CAN | Isolated |
|---|---|---|---|---|---|---|
| UDT1FR-IP | Aluminium | 2 | 1 | 1 | 1 | 1000V |
| UDT1FR-I | PCB only | | | | | |

# Contents


Page

**1 Specifications** **3**
- 1.1 Technical data . . . 3
- 1.2 Connectors . . . 3
- 1.3 Electrical . . . 4
  - 1.3.1 Power input . . . 4
  - 1.3.2 Buses . . . 4
  - 1.3.3 Leds . . . 5
- 1.4 Option . . . 5
- 1.5 Drawings . . . 6

**2 Driver installation** **7**
- 2.1 Linux . . . 7
  - 2.1.1 DKMS method . . . 7
  - 2.1.2 Installation rules udev . . . 7
  - 2.1.3 Automatic installation dkms and rules udev . . . 7
  - 2.1.4 To remove all installed files . . . 7
  - 2.1.5 Classic method . . . 7
- 2.2 Windows . . . 8

**3 Usage** **9**
- 3.1 Linux . . . 9
- 3.2 Configuration . . . 9
- 3.3 Tools . . . 9

**A Hardware revision history** **10**

**B Datasheet revision history** **11**

# Chapter 1

# Specifications

## 1.1 Technical data

| **Electrical** | |
|---|---|
| Nominal power supply voltage (Vin) | 5 V |
| ESD protection | 35 kV |
| **Interfaces** | |
| USB | max 480 Mbit/s |
| CAN | max 8 Mbit/s |
| RS-485 | max 50 Mbit/s |
| Isolation | 1 kV |
| **Physical** | |
| Operating temperature | 0řC...+85řC |
| Dimensions (L x W) | 80 mm x 42 mm |
| Mounting | 4 mounting holes for M3 screws |

## 1.2 Connectors

UDT1FR-I have connectors.

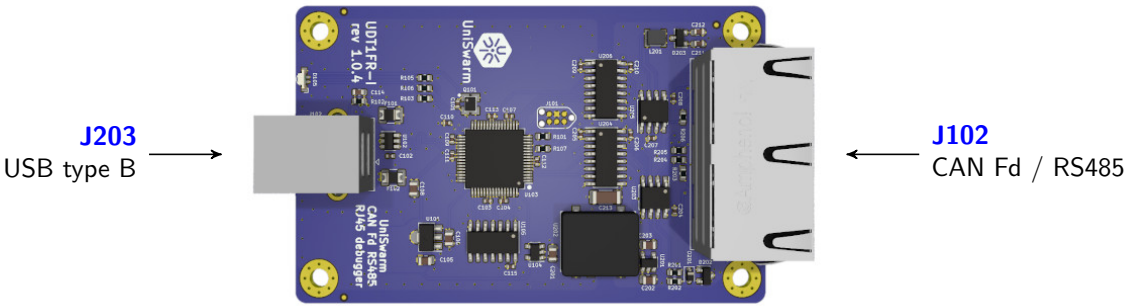



Figure 1.1: UDT1FR-I connectors

## 1.3 Electrical

### 1.3.1 Power input

The board is powered through the USB type B connector. This port is used to power the board and communicate to a computer with a maximal speed of 480 Mbit/s.

#### Connector J102, USB

| Pins | Name | Description |
|---|---|---|
| 1 | Vbus | 5V 500mA power |
| 2 | DATA-N | USB data+ |
| 3 | DATA-P | USB data- |
| 4 | GND | Ground |
| 5 | Shield | Shield ground connected |

Figure 1.2: J102 pins

#### Recommended connector references

Standard USB type B cable

### 1.3.2 Buses

Both buses (RS485 and CAN Fd) have 30 kV Electrostatic Discharge (ESD) protection and high quality filters for noisy environment.

A full 1kV isolation is present between bus-side and power-side to prevent damage and avoid noise to propagate through the bus.

The bus use a dual RJ45 socket (J203 connector). Both ports are connected together, to daisy chain the bus without external Y cable or adapter.

Thanks to it's two ports the UDT1FR-I can be used in line or in termination of the bus. If the board is at the end of the network, it is necessary to add a 120 Ohm line plug on the unused port.

The speed of both buses can be set by software.

The CAN Bus can reach 8 Mbps and the RS-485 can reach 50 Mbps.

#### Connector J203, CAN Fd / RS485

| Pins | Name | Description |
|---|---|---|
| 1 | CAN H | CAN Fd dominant |
| 2 | CAN L | CAN Fd recessive |
| 3 | GND | Ground, connected to 7 |
| 4 | RS485 B | RS485 B side |
| 5 | RS485 A | RS485 A side |
| 6 | - | Unused, but pins 6 of two connectors are connected together |
| 7 | GND | Ground, connected to 3 |
| 8 | - | Unused, but pins 8 of two connectors are connected together |

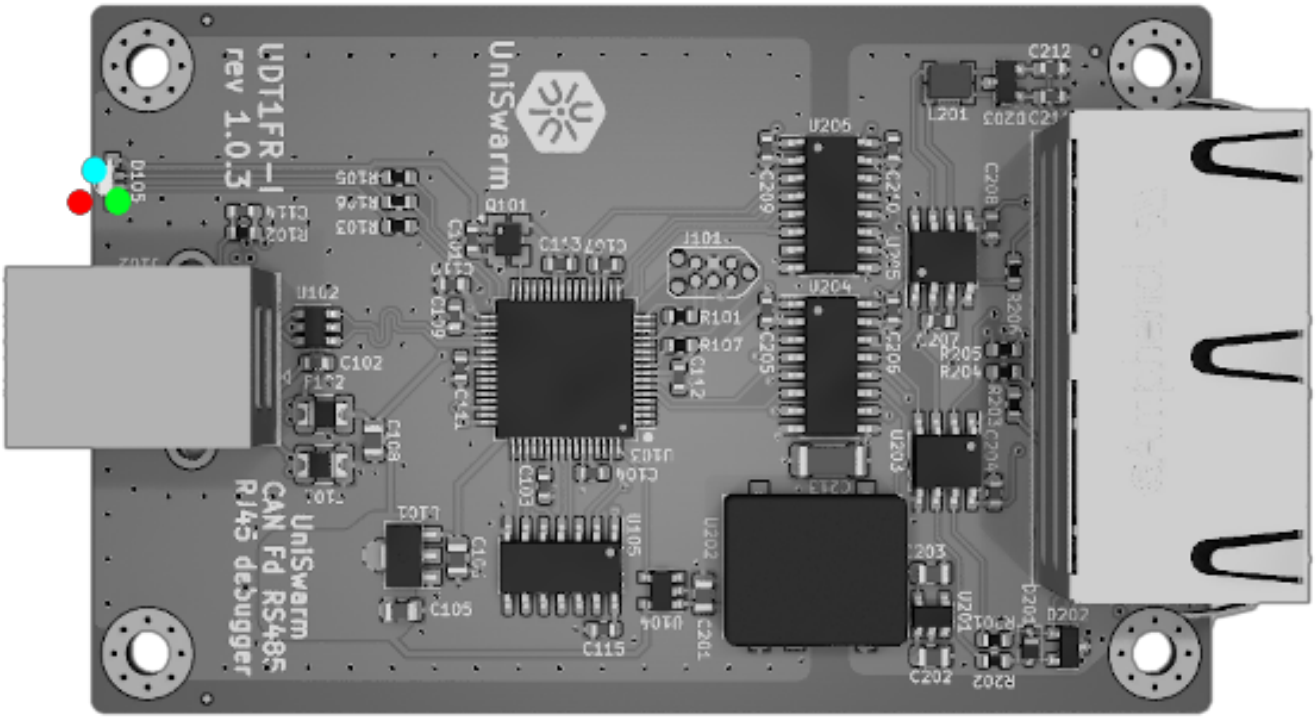
Figure 1.3: J203 pins

#### Recommended connector references

Standard straight RJ45 cable.

### 1.3.3 Leds

The UDT1FR-I board have a RGB Led on the same side of the USB. It provides information about the status of the board.



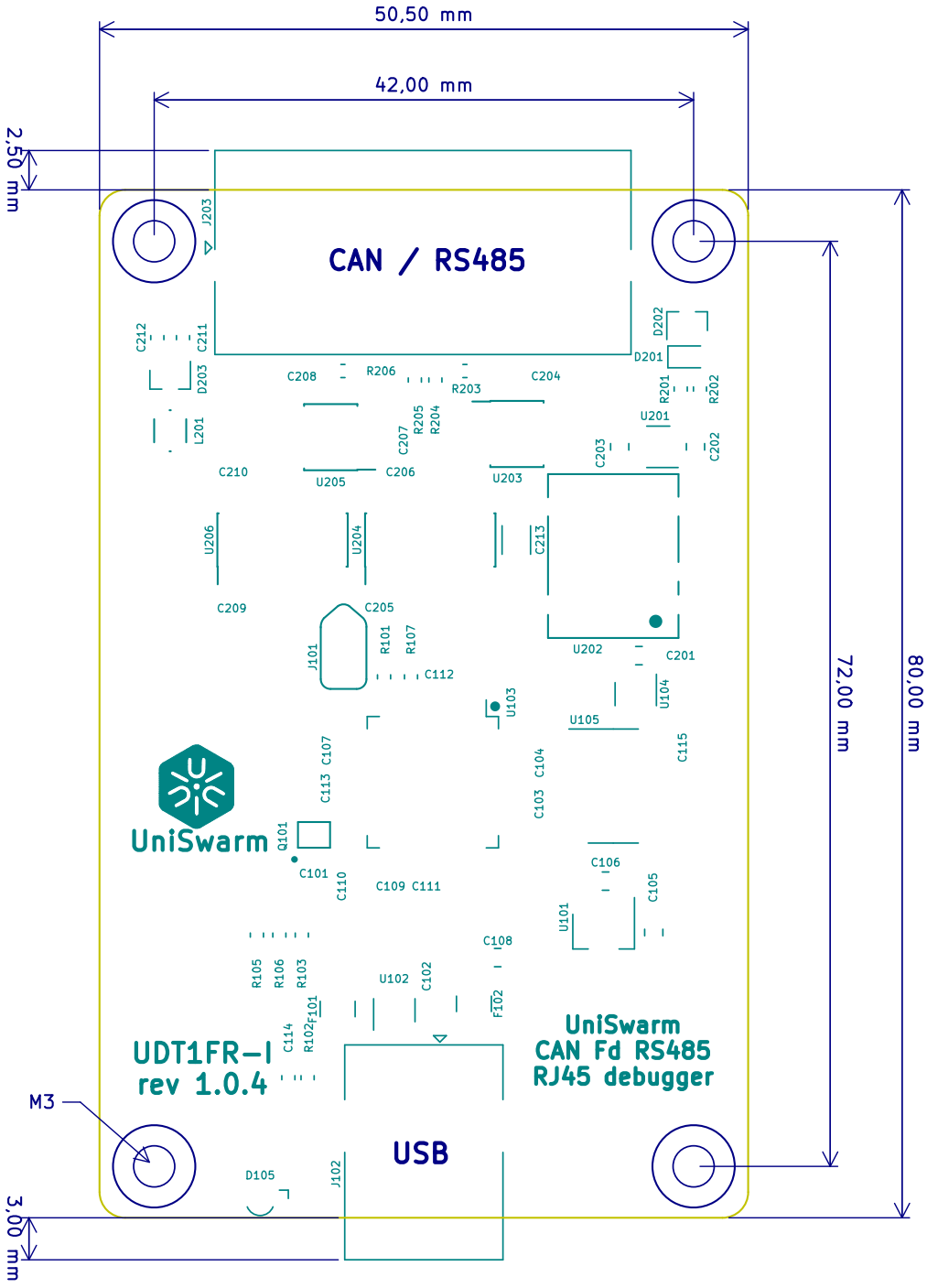

## 1.4 Option

The UDT can be provided in two versions.

- The first one is just the pcb without any accessory.
- The second option is a closed aluminium case that protects the board from the environment.

In addition it is possible to obtain a 120 Ohm line plugs in order to be sure to perfectly receive CAN and RS-485 communications.

## 1.5 Drawings




Maximum height : 17.00 mm
Size of package : 57.5 x 86.5 x 28.0 mm

# Chapter 2

# Driver installation

## 2.1 Linux

All are command line style.
Download the Repository to your local machine:

```
git clone https://github.com/UniSwarm/udt1_linux_driver.git
```

```
cd udt1_linux_driver
```

### 2.1.1 DKMS method

```
sudo make dkms
```

if UEFI Secure Boot is actived follow instruction:

- Configuring Secure Boot :
  - Ok and enter new pasword
  - reboot
- Perform MOK management :
  - select "Enroll MOK"
  - select "Continue" → "Ok" → enter password
  - reboot

### 2.1.2 Installation rules udev

```
sudo make udev_install
```

### 2.1.3 Automatic installation dkms and rules udev

```
sudo make run_auto
```

### 2.1.4 To remove all installed files

```
sudo make_remove_all
```

### 2.1.5 Classic method

```
sudo make modules_install run
```

if there are error :

```
make clean
sudo make modules_install run
```

After that, you can simply connect the debugger to PC with USB B.

## 2.2 Windows

soon

# Chapter 3

# Usage

## 3.1 Linux

## 3.2 Configuration

As a standard network connection, you need to configure the interface and up it.

```
sudo ip link set can0 type can bitrate 1000000
sudo ip link set can0 up
```

## 3.3 Tools

You can use some useful standard tools to dump the can bus or send frames. Theses tools are included inside the can-utils package.

```
sudo apt install can-utils
```

To check what is sent on can0 interface :

```
candump can0
```

And to send frame on can0 :

```
candsend can0 123#00010203
```

# Appendix A

# Hardware revision history

| Version | Date | Change |
|---|---|---|
| v1.0.1 | 2020/09/01 | Initial public version |

# Appendix B

# Datasheet revision history

| Revision | Date | Change |
|---|---|---|
| A | 2020/09/07 | Initial public revision |