TRDP-UDP

Datasheet

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Building Blocks of Communication

Foreword

Notational Conventions

The following categorized signal words with defined meaning might appear in the manual.

Signal Words	Meaning
 DANGER	Indicates a high potential hazard which, if not avoided, will result in death or serious injury.
 CAUTION	Indicates a potential risk which, if not avoided, could result in property damage, data loss, lower performance, or unpredictable result.
 ANTISTATIC	Indicates static sensitive equipment.
 DANGER! ELECTRIC SHOCK	Indicates High voltage danger.
 TIPS	Provides methods to help you solve a problem or save you time.
 NOTE	Provides additional information as the emphasis and supplement to the text.

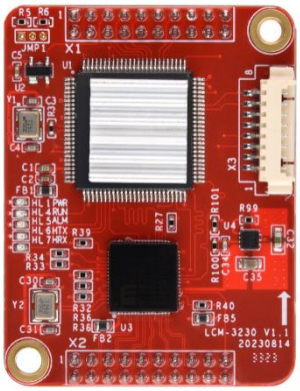
Table of Contents

1 Overview

1.1 Introduction

The Yacer dual redundant TRDP embedded module, provides two TRDP redundant 100M Ethernet interfaces, one TCP/IP Ethernet interface and one UART serial port to implement protocol conversion between TRDP and UDP or serial port.

35x45mm small size, 2.0mm pin connector. +3.3V power supply, low power consumption. Industrial grade wide temperature, suitable for embedded applications.



1.2 Applications

- Protocol conversion between TRDP and UDP;
- Protocol conversion between TRDP and serial port;
- Train Control and Management System (TCMS);
- Train Communication Network (TCN);
- Embedded development and application.

1.3 Features

- Two 100M full-duplex Ethernet interfaces, supports TRDP protocol;
- One 100M adaptive Ethernet interface, supports TCP/IP protocol;
- One UART serial port;
- Optional one CAN bus interface;
- Support TRDP PD acquisition function
- +3.3V power supply, low power consumption;
- Small size, industrial wide temperature.

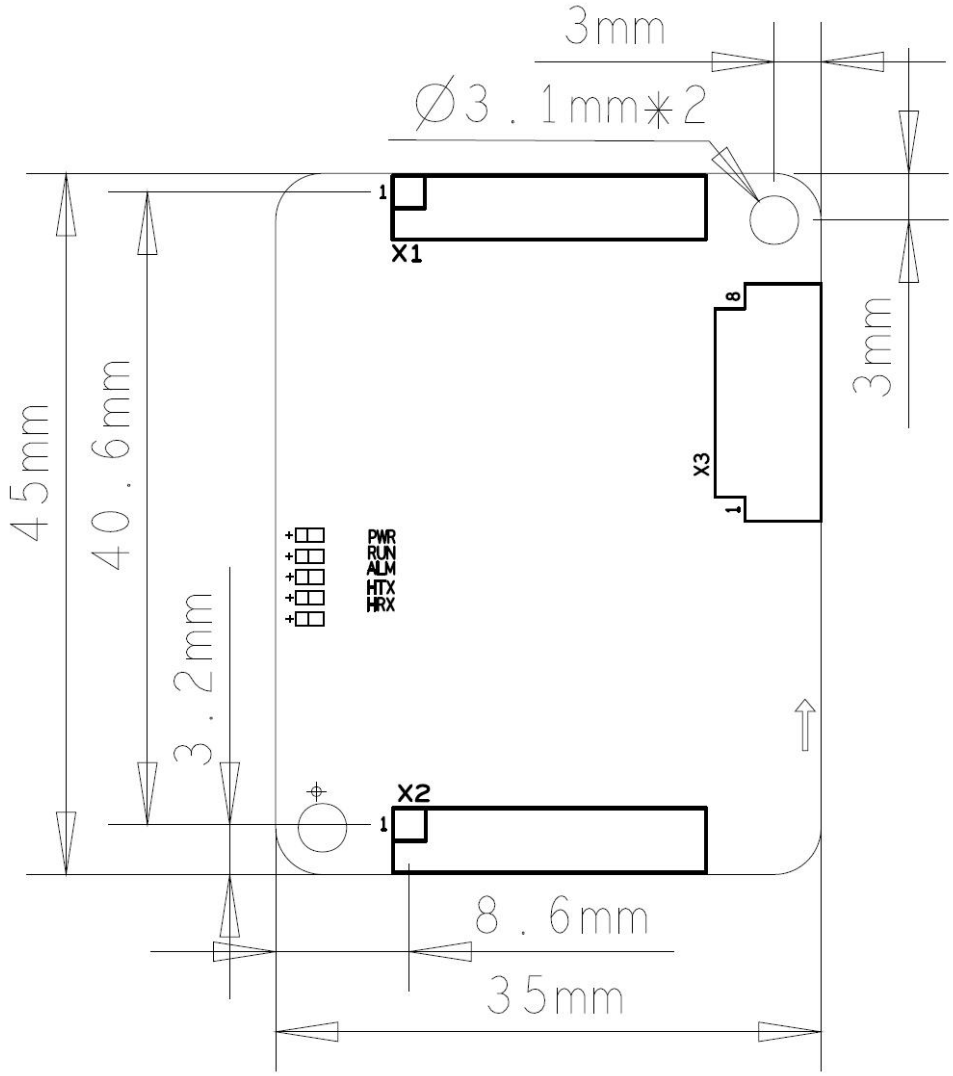
1.4 Order Information

Product Model	Ethernet Interface	Serial Port	CAN
TRDP-UDP-300	3 x 10/100M PHY	1 x UART	NA
TRDP-UDP-300C	3 x 10/100M PHY	1 x UART	1 x CAN

1.5 Technical Specifications

Item	Parameters	Details
TRDP Ethernet Interface	Number	2 x 100M PHY
	Rate	100 Mbps full-duplex
	Protocol	TRDP
TCP/IP Ethernet Interface	Number	1 x 100M PHY
	Rate	100 Mbps adaptive
	Protocol	TCP/IP
UART Interface	Level Standard	3.3V LVCMOS
	Duplex Mode	Full-duplex
	Baud Rate	≤ 921.6 Kbps
CAN Interface	Level Standard	3.3V LVCMOS
	Working Mode	CAN 2.0A、CAN2.0B，ISO 11898
	Baud Rate	≤ 1 Mbps
Configuration Management	Configuration Tool	yacer-DMS configuration management software
	Console Interface	Ethernet Interface Dedicated DMS-UART interface (with Yacer ' s DMS-UART-8P configuration cable)
Power Requirements	Input Voltage	+3.3 VDC
	Power Consumption	< 2 W
Mechanical Characteristics	Dimensions	35 x 45 mm
	Weight	25g
Operating Environment	Operating temperature	-40 ~ +85℃
	Storage temperature	-40 ~ +85℃
	Operating humidity	5 ~ 95% RH (no condensation)

1.6 Mechanical Dimensions



2 Hardware and Physical Interface

2.1 LED Indicators

LED	Description
RUN	Running indicator, Green light flashes during normal operation
ARM	Alarm indicator ● Initialization phase blinking: waiting for the host computer configuration command ● Normal operation status off: the device is working normally ● Normal operation status on: device failure
PWR	Power indicator
HTX	Serial port transmit indicator
HRX	Serial port receive indicator

2.2 X1: 2x10 2.0mm pitch connector

Pin	Signal	Type	Description
1	GND		Ground
2	GND		Ground
3	VCC3V3	I	Power input, +3.3 VDC
4	VCC3V3	I	Power input, +3.3 VDC
5	RESET_IN	I	Module reset input, active low. Power-On Reset supported, Pin can be suspended.
6	LED_RUN	O	System operation indication, drive LED negative
7	LED_ALARM	O	System alarm indication, drive LED negative
8	LED_TX	O	Serial transmission Indication, drive LED negative
9	LED_RX	O	Serial reception Indication, drive LED negative
10	NC		Must be left suspended
11	UART_TxD	O	Serial port data transmission
12	UART_RxD	I	Serial port data reception
13	CAN_TX	O	CAN interface data transmission
14	CAN_RX	I	CAN interface data reception
15	NC		Must be left suspended
16	NC		Must be left suspended
17	NC		Must be left suspended
18	NC		Must be left suspended

Pin	Signal	Type	Description
19	GND		Ground
20	GND		Ground

2.3 X2: 2x10 2.0mm pitch connector

Pin	Signal	Type	Description
1	GND		Ground
2	GND		Ground
3	TRDP0_RX+		Rx+ for TRDP0 Ethernet PHY interface, external network transformer required
4	TRDP0_RX-		Rx- for TRDP0 Ethernet PHY interface, external network transformer required
5	TRDP0_TX+		Tx+ for TRDP0 Ethernet PHY interface, external network transformer required
6	TRDP0_TX-		Tx- for TRDP0 Ethernet PHY interface, external network transformer required
7	TRDP1_RX+		Rx+ for TRDP1 Ethernet PHY interface, external network transformer required
8	TRDP1_RX-		Rx- for TRDP1 Ethernet PHY interface, external network transformer required
9	TRDP1_TX+		Tx+ for TRDP1 Ethernet PHY interface, external network transformer required
10	TRDP1_TX-		Tx- for TRDP1 Ethernet PHY interface, external network transformer required
11	TCPIP_RX+		Rx+ for TCPIP Ethernet PHY interface, external network transformer required
12	TCPIP_RX-		Rx- for TCPIP Ethernet PHY interface, external network transformer required
13	TCPIP_TX+		Tx+ for TCPIP Ethernet PHY interface, external network transformer required
14	TCPIP_TX-		Tx- for TCPIP Ethernet PHY interface, external network transformer required
15	GND		Ground
16	GND		Ground
17	LED_TRDP0	O	Link/Act indication for TRDP0 Ethernet port, drive LED negative
18	LED_TRDP1	O	Link/Act indication for TRDP1 Ethernet port, drive LED negative
19	LED_TCPIP	O	Link/Act indication for TCPIP Ethernet port, drive LED negative
20	NC		Must be left suspended

3 System and Configuration

3.1 Module Configuration

TRDP-UDP provides a variety of easy and flexible configuration functions to meet different application scenarios.

3.1.1 Static Configuration

The TRDP-UDP module has internal FLASH memory to save the configuration. When the module enters the normal operation state, users can use the following methods to configure the TRDP-UDP:

- Use yacer-DMS configuration management software to configure it interactively through the DMS-UART interface or network port;
- The host computer gives configuration commands through the serial port;

The new configuration generated by the above methods is saved in FLASH, and the configuration takes effect after the module is rebooted.

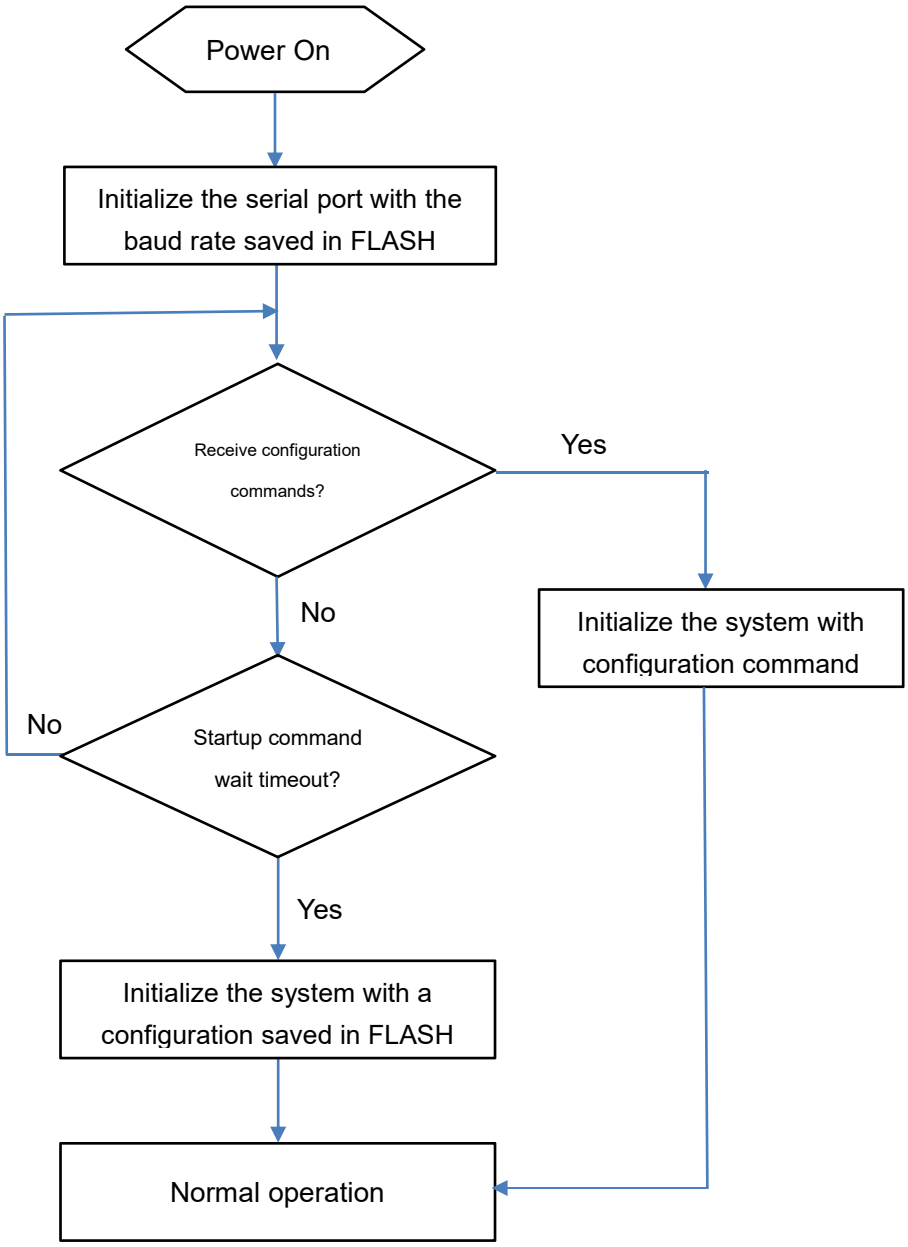
3.1.2 Dynamic Configuration

When the module is powered up and started, it initializes the serial port with the baud rate parameters saved in FLASH (factory default is 115200bps) and waits for the configuration command from the host computer.

If a legitimate configuration command is received within the waiting time window, the TRDP-UDP is initialized with the configuration parameters carried by the command. If no configuration command is received after the timeout period, the TRDP-UDP is initialized with the configuration saved in FLASH.

The wait time window defaults to 5 seconds and can be modified via static configuration. If the window is set to 0, the configuration is initialized by loading it directly from FLASH.

3.2 Startup Process



4 yacer-DMS Configuration Management

4.1 Get Configuration Management software yacer-DMS

Users can obtain the compressed package yacer-DMS.zip of configuration management software through the following ways:

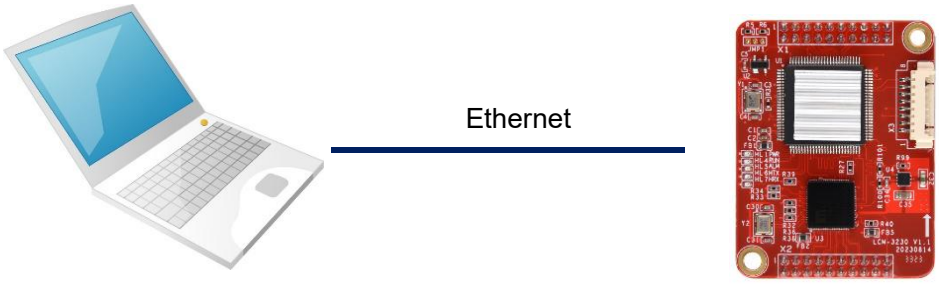
- “Softwares” directory of TRDP-UDP accompanied U-Disk;
- Official website of Yacer (http://www.yacer.com.cn) Software channel.

The yacer-DMS is an installation free application software, unzip yacer-DMS.zip, enter the working directory and double click the file yacer-DMS.exe to run.

4.2 Connect Configuration Computer to TRDP-UDP

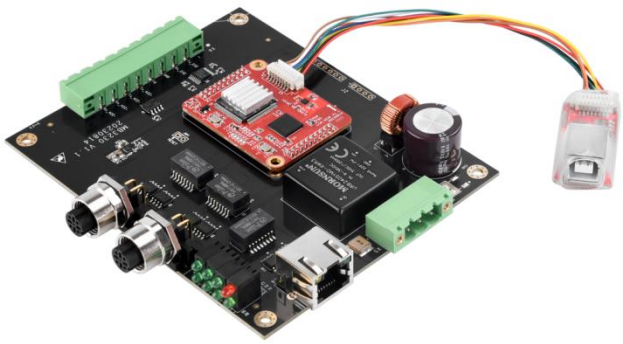
4.2.1 Configuration via Ethernet port

Connect the management computer with any Ethernet interface port of TRDP-UDP through network cable, and run yacer-DMS configuration management software on the computer to configure the parameters and monitor running status of TRDP-UDP.



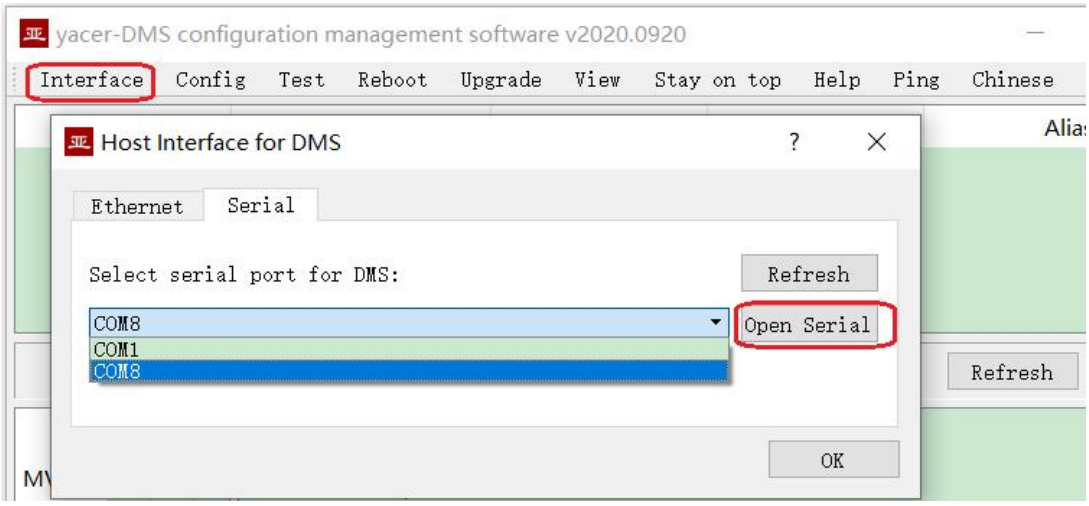
4.2.2 Configuration via DMS-UART (X3) interface

If the TRDP-UDP's Ethernet port is occupied, the DMS-UART-8P configuration cable can be used to connect the TRDP-UDP's DMS-UART interface to the computer's USB port.

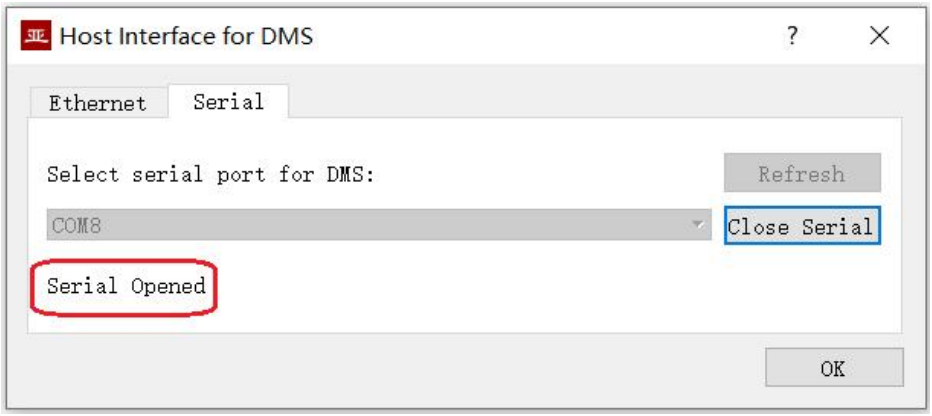


When DMS-UART-8P configuration cable is connected to the management computer USB interface, the computer will add a USB simulation serial port.

Click the “Interface” button on the toolbar to pop up the “Host Interface for DMS” configuration dialog. Enter the “Serial” page, select the serial port of the computer connected to TRDP-UDP from the drop-down list, and click “Open Serial” button.



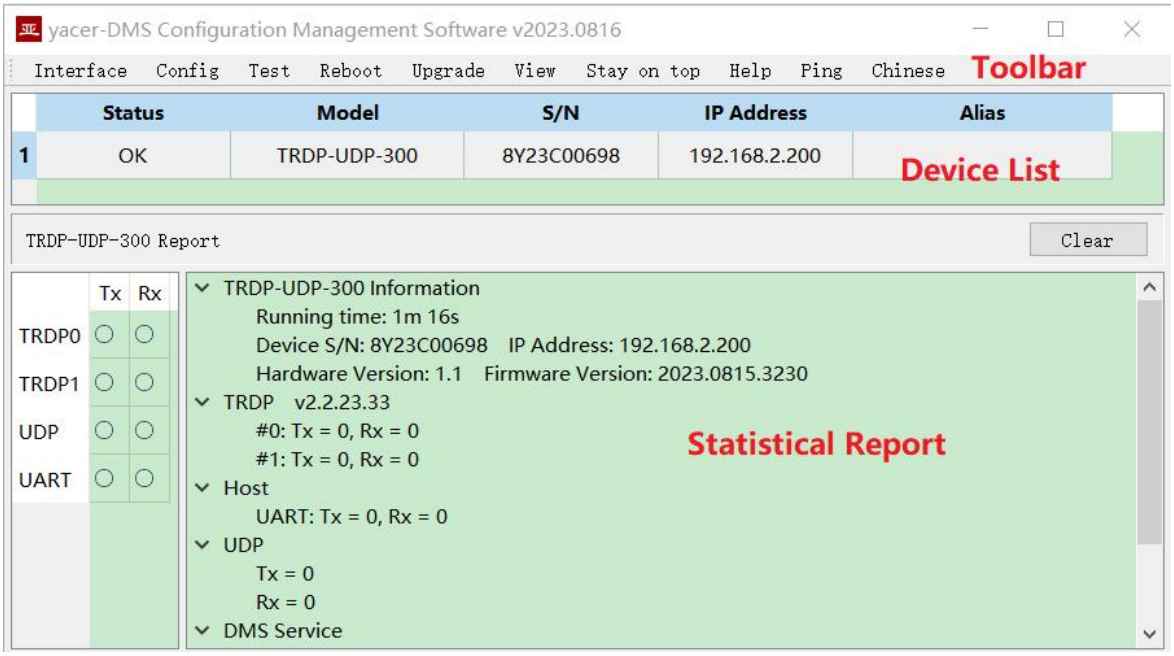
If the serial port is successfully opened, the status is as follows:



4.3 Main Window of yacer-DMS

The following figure is the main interface of the configuration management software, which can be divided into three parts:

- Toolbar: Functional operation buttons;
- Device List: Displaying the basic information and operation status of online devices;
- Statistical Report: Displaying the receive/transmit indication & statistics, and device details.



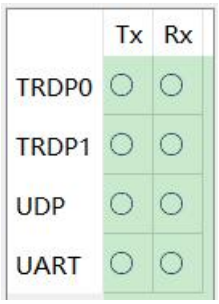
4.4 Statistical Report

The statistical report has three panels: control panel, receive/transmit indication panel and information panel.

4.4.1 Control Panel

Statistical reports are refreshed once per second, and the statistics can be cleared by clicking the "Clear" button.

4.4.2 Receive/Transmit Indication Panel



- Tx: The interface sends a frame of data, corresponding Tx indicator blinks once;
- Rx: The interface receives a frame of data, corresponding Rx indicator blinks once.

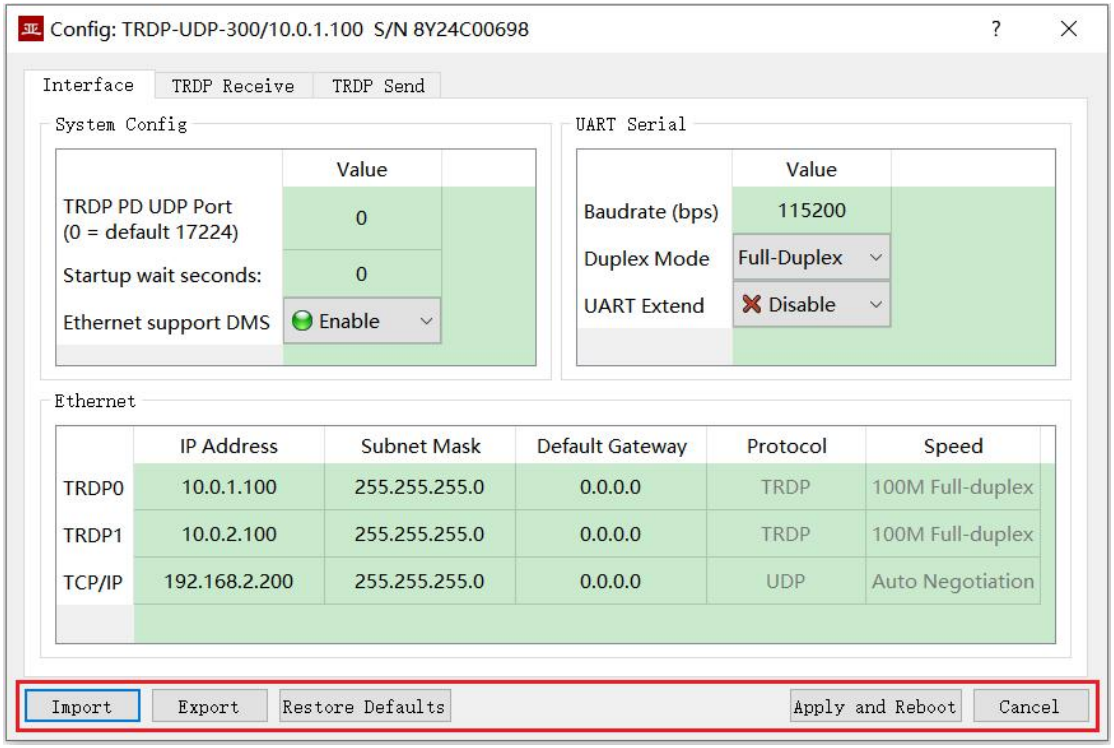
4.4.3 Information Panel

Display the following contents:

- Device information: Running time, S/N, IP address and Version number;
- TRDP: TRDP protocol transceiver statistics;
- Host Interface: Serial port receive/transmit statistics;
- UDP: UDP transceiver statistics;
- DMS Service: DMS message receive/transmit statistics.

4.5 Configure Device

Click the 'Config' button on the toolbar or double-click the selected device in the device list, yacer-DMS pops up the configuration dialog. According to the interface and function, the dialog divides the configuration items into several configuration pages.



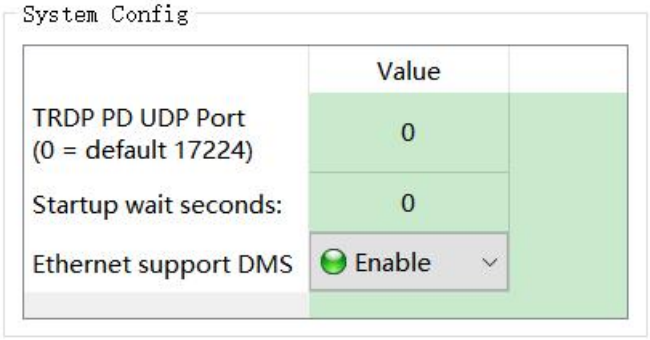
The bottom of the dialog box includes the following operation buttons:

Button	Function
Import	Open the configuration file, read the configuration parameters refresh the configuration dialog
Export	Export configuration parameters from the configuration dialog to a file for saving
Restore Defaults	Refresh the configuration dialog with the factory paramters
Apply and Reboot	Write the configuration parameters in the dialog to the deivce, and restart the device to make the configuration take effect
Cancel	Cancel current configuration operation

4.6 System Configuration

The system configuration includes the following:

- TRDP PD UDP Port: TRDP process data UDP port, if set to 0 it works on default port 17224;
- Startup Command Wait Seconds: users can set the startup command wait time here to adjust the dynamic configuration time window;
- Ethernet Support DMS: if enabled allows the Ethernet port to support yacer-DMS configuration.



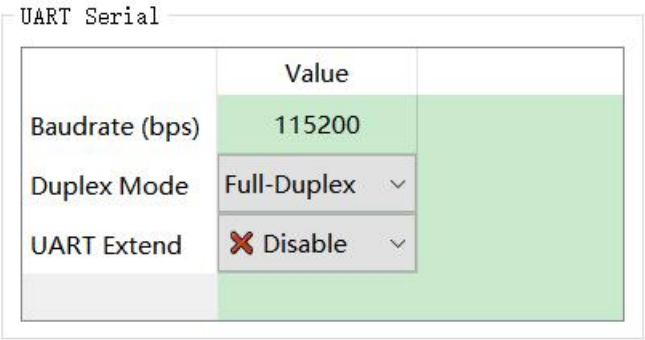
4.7 UART Serial Port Configuration

Serial port configuration includes the following:

- Baud rate: Configure the serial port communication baud rate;
- Duplex Mode: Full-duplex, half-duplex selection;
- Extended Mode: The serial port works in RS-232 mode when disable, and RS-422 mode when enable.

The other parameters of the serial UART are forced to be:

- Data bits: 8
- Checksum bits: none
- Stop bit: 1



4.8 Ethernet Interface

TRDP0 and TRDP1 are dual redundant TRDP network ports, which are forced to work in 100M full-duplex mode.

The TCP/IP network port works in adaptive mode and uses UDP to communicate with the host computer.

Ethernet

	IP Address	Subnet Mask	Default Gateway	Protocol	Speed
TRDP0	10.0.1.100	255.255.255.0	0.0.0.0	TRDP	100M Full-duplex
TRDP1	10.0.2.100	255.255.255.0	0.0.0.0	TRDP	100M Full-duplex
TCP/IP	192.168.2.200	255.255.255.0	0.0.0.0	UDP	Auto Negotiation

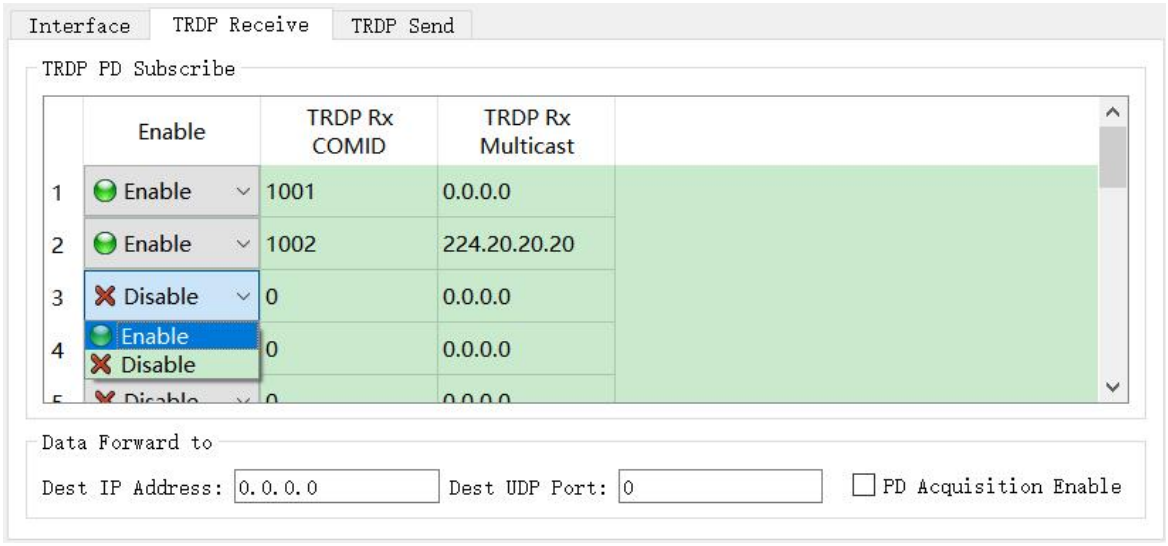
4.9 TRDP Receive Configuration

This page configures up to 16 TRDP Subscription PD entries.

If the destination IP for data forwarding is a legitimate unicast, multicast, or broadcast address, the subscribed TRDP PD data is forwarded to the destination IP in real time via the Ethernet port.

If the destination IP is 0, the subscribed TRDP PD data is forwarded to the host computer through the UART interface.

If the 'PD Acquisition Enable' is checked, all TRDP PD data on the network that the destination IP is multicast or broadcast is collected in real time and forwarded to the destination IP through Ethernet.

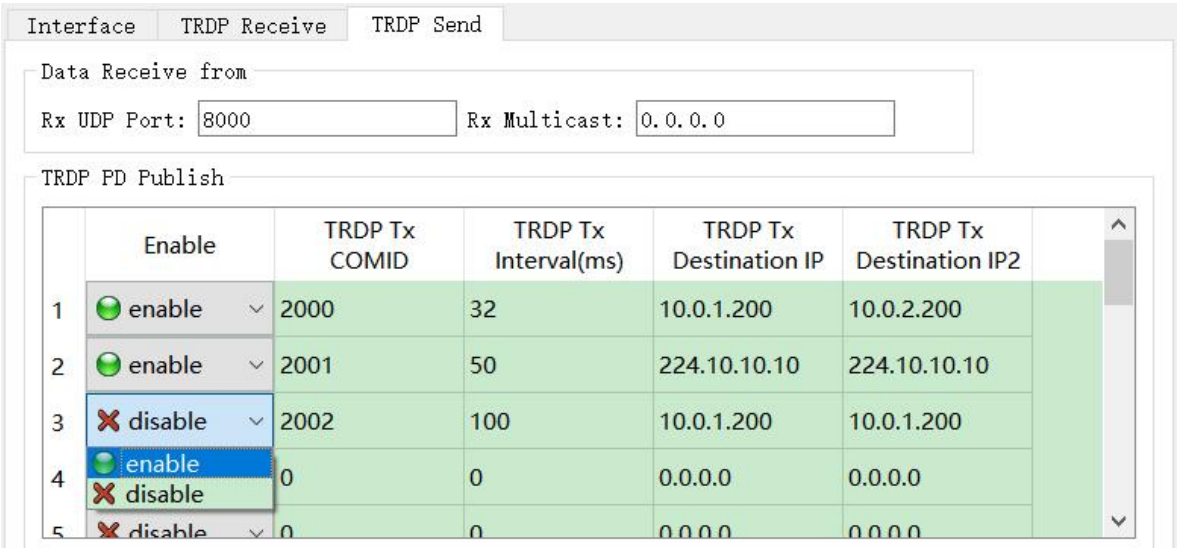


4.10 TRDP Send Configuration

This page configures up to 16 TRDP Publish PD entries.

When the UDP receive port is 0, the TRDP-UDP receives data from the host computer through the serial port, flushes the PD buffer of the TRDP protocol, and then periodically sends the PD data according to the PD publishing configuration, whose destination address can be unicast, multicast, or broadcast.

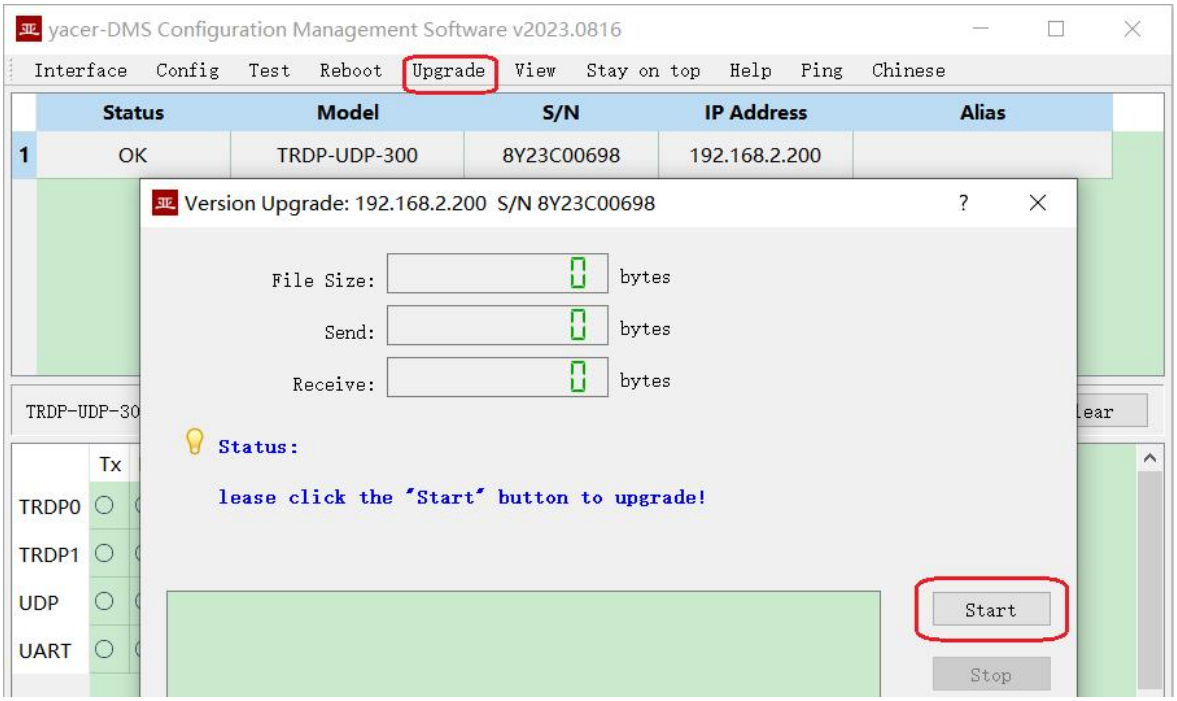
When the UDP receive port is a legal port number, the TRDP-UDP receives the PD data to be forwarded over Ethernet. If you wish to receive multicast data, you need to set the corresponding receive multicast address.



4.11 Firmware Version Upgrade

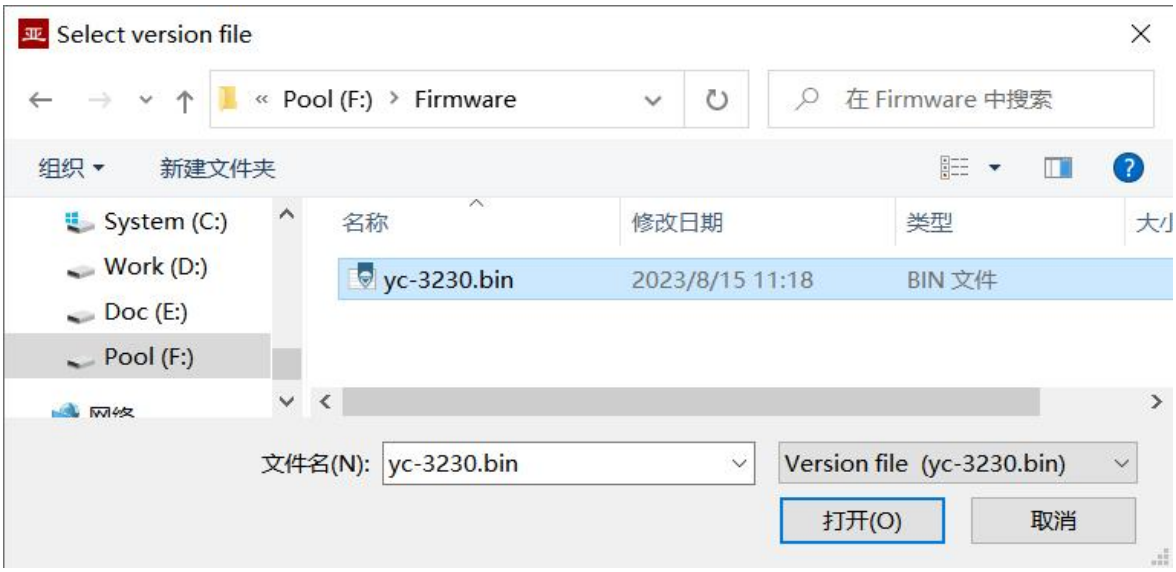
4.11.1 Start Upgrade

Click the “Upgrade” button on the toolbar to pop up the version upgrade dialog, and then click the “Start” button.



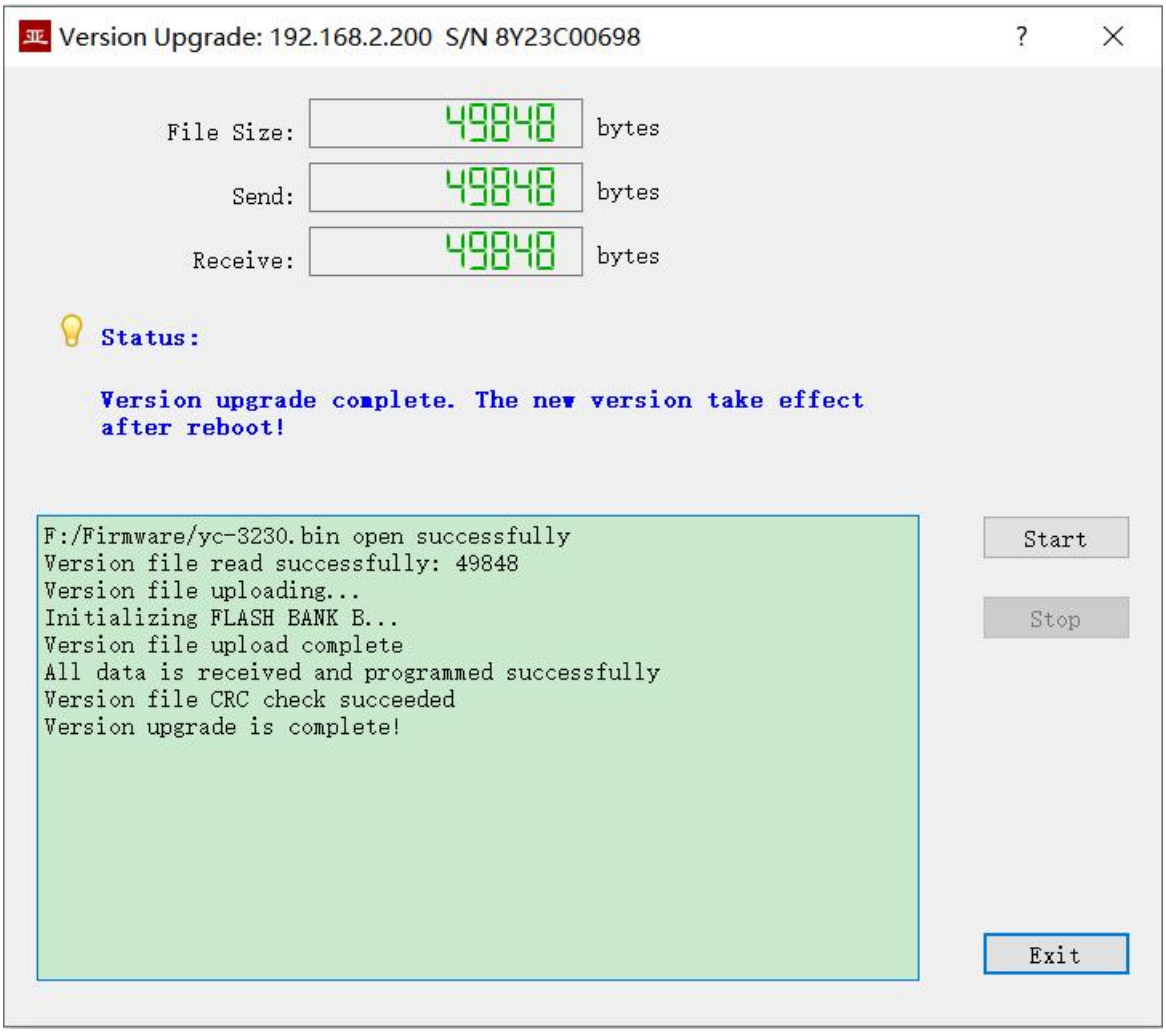
4.11.2 Select Version File

Pop up the “Select version file” dialog, and find the firmware version file to be updated, select it and click "Open".



4.11.3 Complete Upgrade

When the page displays “Version upgrade complete” status, it indicates that the version upgrade is completed.



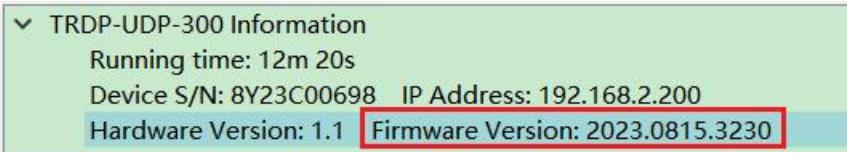
4.11.4 Re-Power Up to Take Effect

Re-power the device and wait a minute or so for the new version to boot up and take effect.

NOTE: The device cannot be powered down during the waiting period.

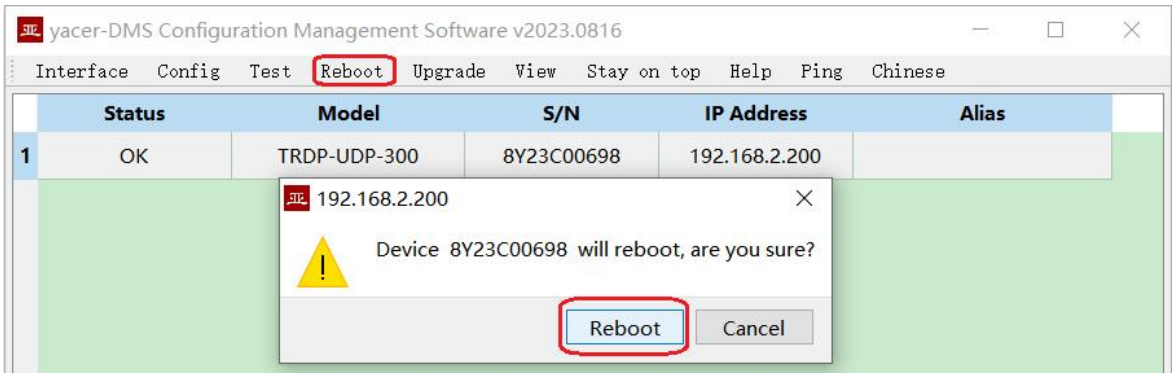
4.11.5 Confirm Upgrade

After the upgrade is completed, power up the device again, observe the version information in the statistical report, and determine whether the new version is successfully updated by the version date.



4.12 Reboot Device

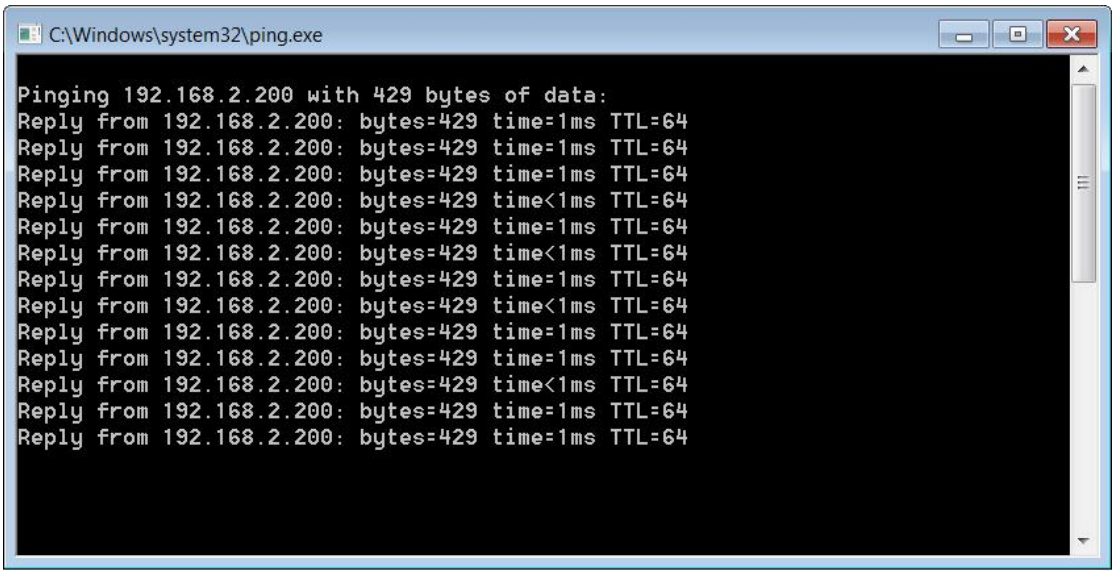
Click the “Reboot” button on the toolbar to pop up the device reboot dialog, and then click the “Reboot” button to reboot the device.



4.13 Ping

By clicking the "Ping" button on the toolbar, DMS automatically starts the ping command on the selected device to check whether the network connection between the configuration management computer and TRDP-UDP is working properly.

Before executing the Ping command, first make sure that the IP addresses of the computer and TRDP-UDP are in the same subnet.



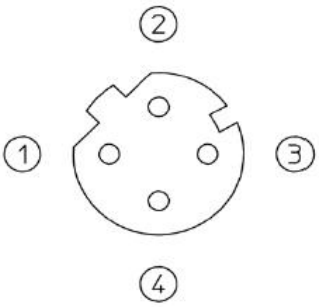
5 Hardware Development

5.1 Ethernet Interface Development

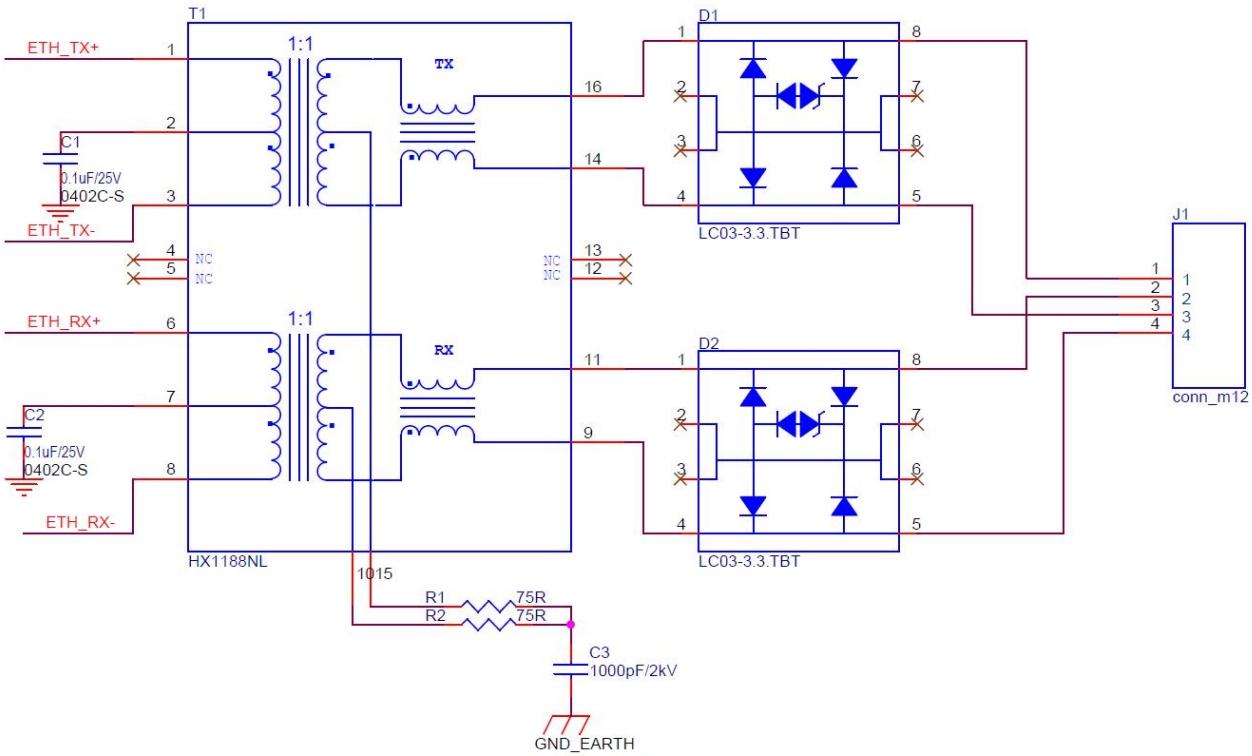
5.1.1 M12 Connector

The train Ethernet interface uses the M12 connector (D-type coded hole) of IEC 61706-2-101 standard. The socket front view and pins are defined as follows:

Pin	Description
1	TD +
2	RD +
3	TD -
4	RD -



5.1.2 Reference Circuit



6 Software Development

Reference:

- *TCN-PACKET Programming Manual*
- *TCN-UMS Programming Manual*

UART-PPP protocol implementation C code:

- yacer_uart_ppp.c

About the Manual

- The manual is for reference only. If there is inconsistency between the manual and the actual product, the actual product shall prevail.
- We are not liable for any loss caused by the operations that do not comply with the manual.
- All the designs and software are subject to change without prior written notice. The product updates might cause some differences between the actual product and the manual. Please contact the customer service for the latest program and supplementary documentation.
- There still might be deviation in technical data, functions and operations description, or errors in print. If there is any doubt or dispute, we reserve the right of final explanation.
- Upgrade the reader software or try other mainstream reader software if the manual (in PDF format) cannot be opened.
- Please visit our website, contact the supplier or customer service if there is any problem occurring when using the device.
- If there is any uncertainty or controversy, we reserve the right of final explanation.