MVB-UART

Datasheet

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yacer 亚册
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.

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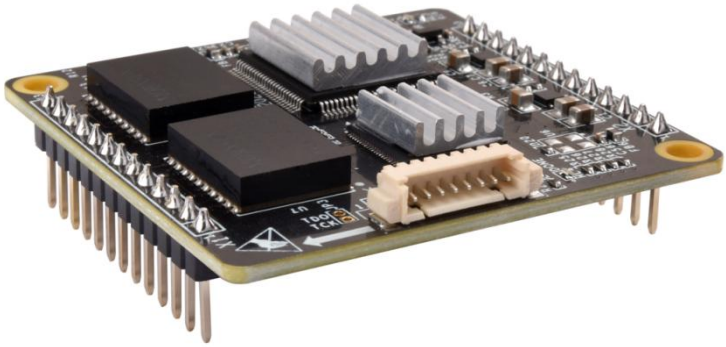
1 Overview

1.1 Introduction

The Yacer MVB-UART isolated embedded slave NIC module, provided full-feature MVB redundant interface and one UART interface, and realized protocol conversion between MVB and serial port.

46.5 x 48 mm small size, 2.54 mm pin connector. + 5V power supply, low power consumption. Industrial wide temperature, suitable for embedded applications.



1.2 Features

- *Full feature MVB redundant interface, support EMD, ESD+ interface, compliant with IEC61375 standard;*
- *Support MVB slave protocol and multiple PD source and sink ports;*
- *Support MVB bus PD data acquisition function;*
- *One UART extended serial port, realizing bi-directional conversion between MVB and serial port;*
- *+ 5V power supply, Low power consumption;*
- *Small size, Industrial wide temperature.*

1.3 Applications

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

1.4 Order Information

Model	Description
MVB-UART-200	1 x Dual redundancy MVB + 1 x UART extension

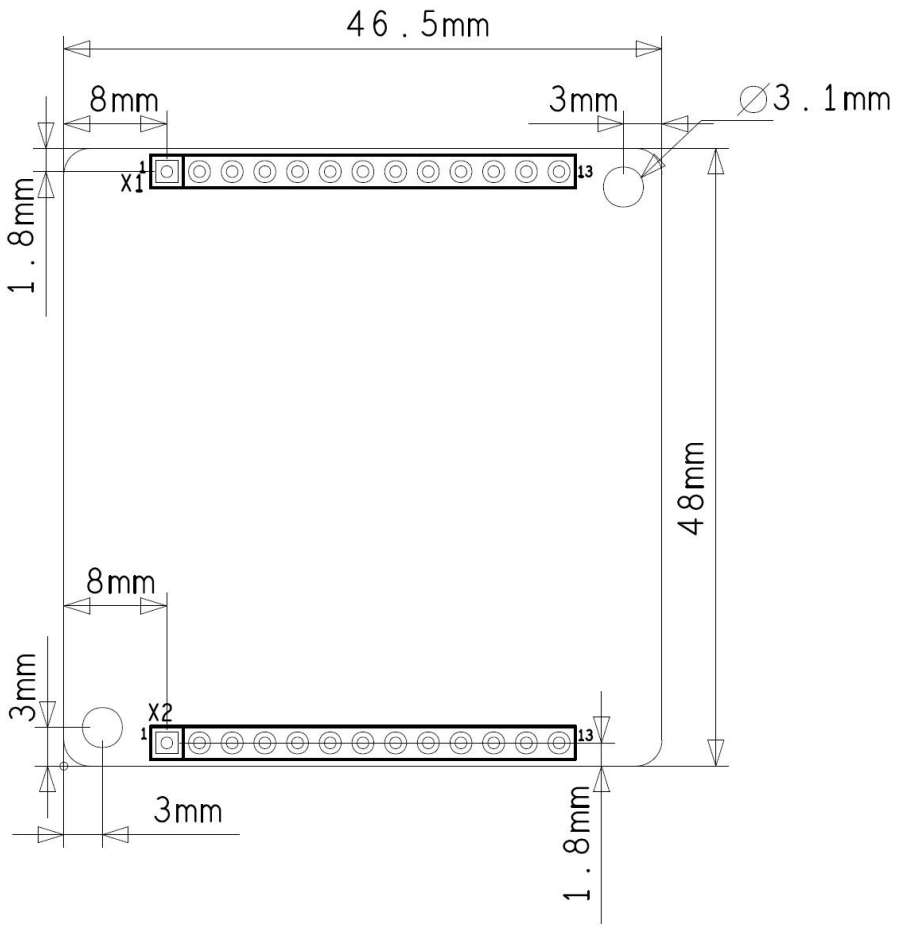
1.5 Technical Specifications

Item	Parameters	Details
MVB Interface	Media support	EMD, ESD+
	Device Class	Class 1
	Device Capabilities	Device_Status, Process_Data(PD)
	Number of PD ports	16
	Isolation	2.5 kVrms
UART Interface	Level standard	3.3V LVCMOS
	Duplex mode	Full-duplex
	Working mode	Asynchronous UART
	Baud rate	≤ 921.6 Kbps
Configuration Management	Configuration interface	Dedicated DMS-UART interface (with Yacer ' s DMS-UART-8P configuration cable)
	Configuration tool	yacer-DMS configuration management software
Power Requirements	Input voltage	+5V DC
	Power consumption	< 2 W
Mechanical Characteristics	Connector	Two 2.54mm pitch 13 PIN single-row pin connectors
	Dimensions	46.5 mm x 48 mm
	Weight	15g
Operating Environment	Operating temperature	-40 ~ +85℃
	Storage temperature	-40 ~ +85℃

Item	Parameters	Details
	Operating humidity	5 ~ 95% RH (no condensation)

NOTE: If you need to support more MVB PD ports, please contact the manufacturer.

1.6 Mechanical Data

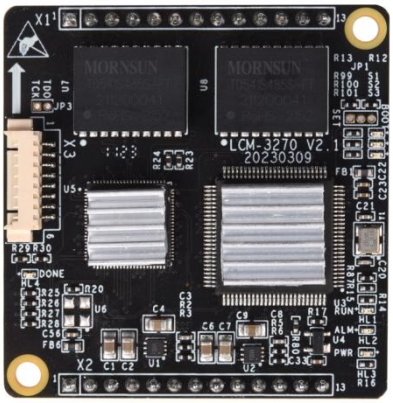


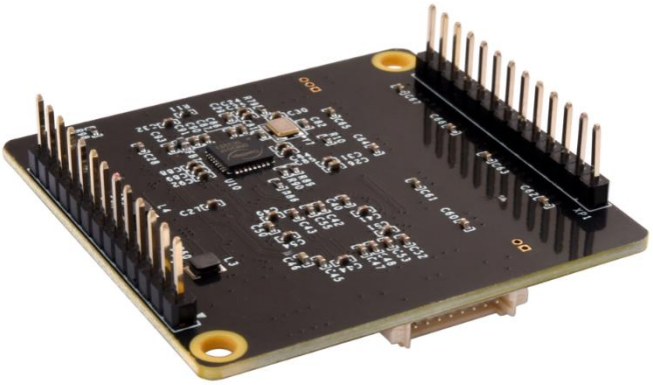
2 Hardware and Physical Interface

2.1 Appearance

The positive and negative sides of the module are as follows, and the signal is drawn through pin X1, X2.

X3 is the configuration interface, connect the DMS-UART-8P configuration cable, and configure online through the management computer's USB interface.





2.2 LED Indicators

LED	Description
RUN	Running indicator, flashing during normal operation
ALARM	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
POWER	Power indicator, always on after power on

2.3 Extended Pin Definition

2.3.1 X1: 1x13 2.54mm pitch connector

Pin	Signal	Direction	Description
1	MVB_A_5V_OUT	O	MVB interface Line A power output
2	MVB_A_TxD +	O	MVB interface Line A transmit positive (+)
3	MVB_A_TxD -	O	MVB interface Line A transmit negative (-)
4	MVB_A_RxD +	I	MVB interface Line A receive positive (+)
5	MVB_A_RxD -	I	MVB interface Line A receive negative (-)
6	MVB_A_GND		MVB interface Line A ground
7	NC		Standby, must be left suspended
8	MVB_B_5V_OUT	O	MVB interface Line B power output
9	MVB_B_TxD +	O	MVB interface Line B transmit positive (+)
10	MVB_B_TxD -	O	MVB interface Line B transmit negative (-)
11	MVB_B_RxD +	I	MVB interface Line B receive positive (+)
12	MVB_B_RxD -	I	MVB interface Line B receive negative (-)
13	MVB_B_GND		MVB interface Line B ground

NOTE: User must short connect TxD+ & RxD+, TxD- & RxD- of MVB.

2.3.2 X2: 1x13 2.54mm pitch connector

Pin	Signal	Dir	Description
1	GND		Logic ground
2	NC		Standby, must be left suspended
3	NC		Standby, must be left suspended
4	NC		Standby, must be left suspended
5	NC		Standby, must be left suspended
6	NC		Standby, must be left suspended
7	UART_TxEn_LED	O	● UART half duplex: Serial port transmitter enable, enable level is high ● UART full duplex: MVB transceiver indication,driving LED positive
8	UART_RxD	I	Serial data receive
9	UART_TxD	O	Serial data transmit
10	RESET_IN	I	Module reset input, active low. Module has POR function, pins can be suspended
11	NC		Standby, must be left suspended
12	+5V	I	Power input, +5V DC
13	GND		Logic ground

3 System and Configuration

3.1 Module Configuration

MVB-UART provides a variety of easy and flexible configuration functions to meet the different application scenarios of users.

3.1.1 Static Configuration

The MVB-UART module has internal FLASH memory to save the configuration. When the module is in normal running operation, the user can configure the MVB-UART using the following methods:

- *Interactive configuration via the DMS-UART interface using the yacer-DMS configuration management software;*
- *The host computer gives the configuration commands through the UART interface.*

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

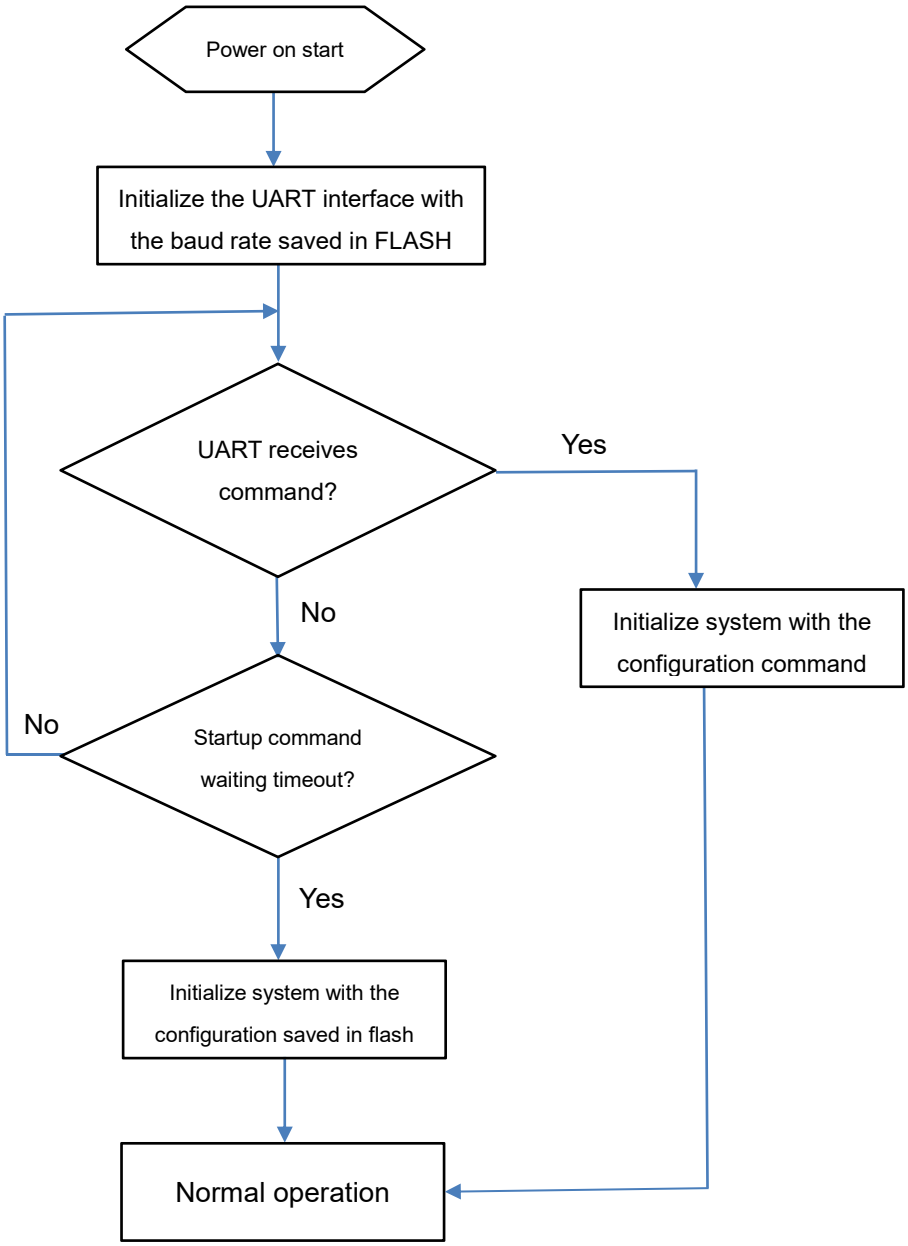
3.1.2 Dynamic Configuration

When the module is powered up, the UART interface is initialized with the baud rate parameters saved in FLASH (factory default 115200bps) and waits for a configuration command from the host computer.

If a legitimate configuration command is received within the waiting time window, the MVB-UART is initialized with the configuration parameters carried by the command. If the configuration command is not received within the timeout, the MVB-UART is initialized with the configuration saved in FLASH.

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

3.2 Startup Process



4 Build Configuration Environment

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 MVB-UART 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 Management Computer to MVB-UART

Connect the DMS-UART interface (X3) of MVB-UART to the USB interface of the computer with the DMS-UART-8P configuration cable.

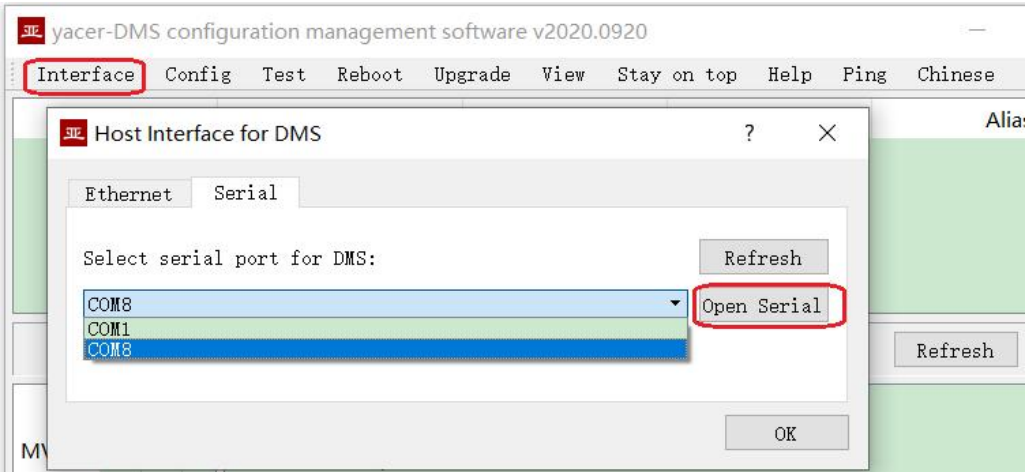
4.3 Run yacer-DMS Software

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.

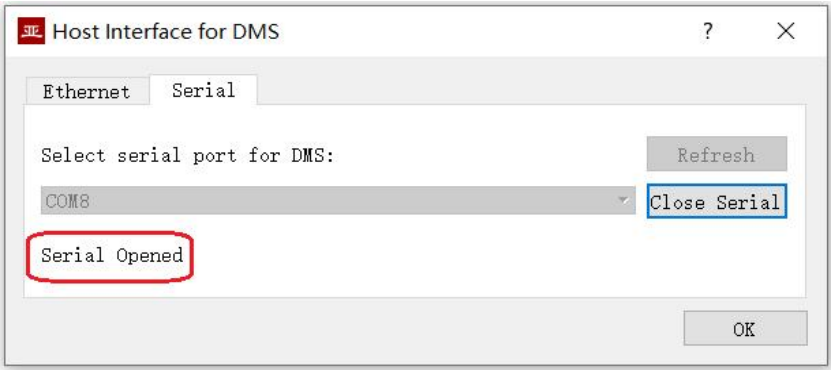
4.4 Select and Open the Configuration Serial Port

When the DMS-UART-8P configuration cable is connected to the USB interface of the management computer, the computer adds a USB emulation serial port.

Click the 'Interface' button on the yacer-DMS toolbar to pop up the “Host Interface for DMS” configuration dialog. Enter the “Serial” page, select the USB simulation serial port or other serial ports involved in the configuration from the drop-down list, click “Open Serial”.



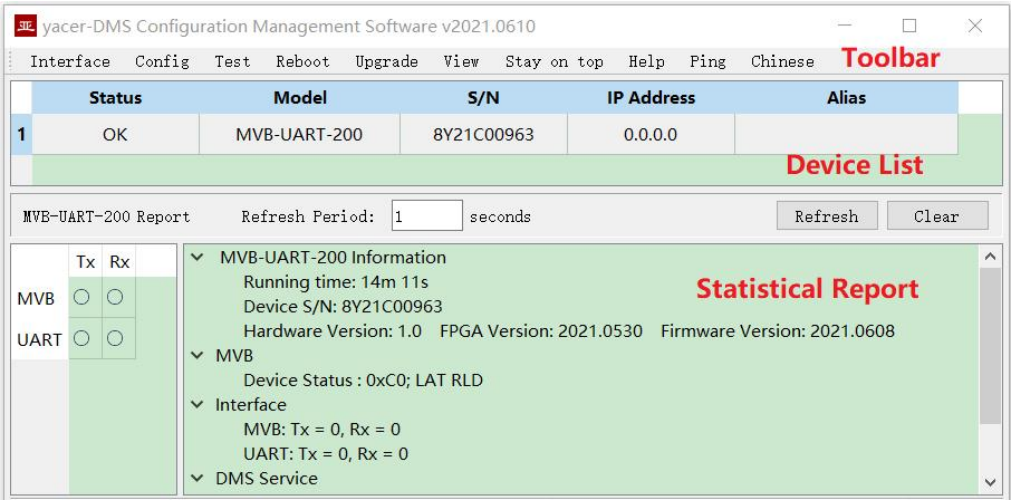
If the serial port is successfully opened, the state is as follows:



4.5 Main Window of yacer-DMS

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

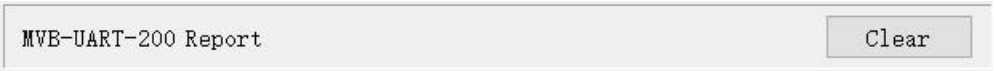
- *Toolbar: Functional operation buttons;*
- *Device List: Displaying the basic information and operation status of online devices;*
- *Statistical Report: Displaying the receive/transmit indication & statistics, and device details.*



4.6 Statistical Report

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

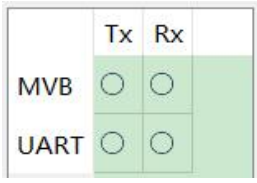
4.6.1 Control Panel



Control Widget	Function
Clear	Clear the statistical report

4.6.2 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.*



4.6.3 Information Panel

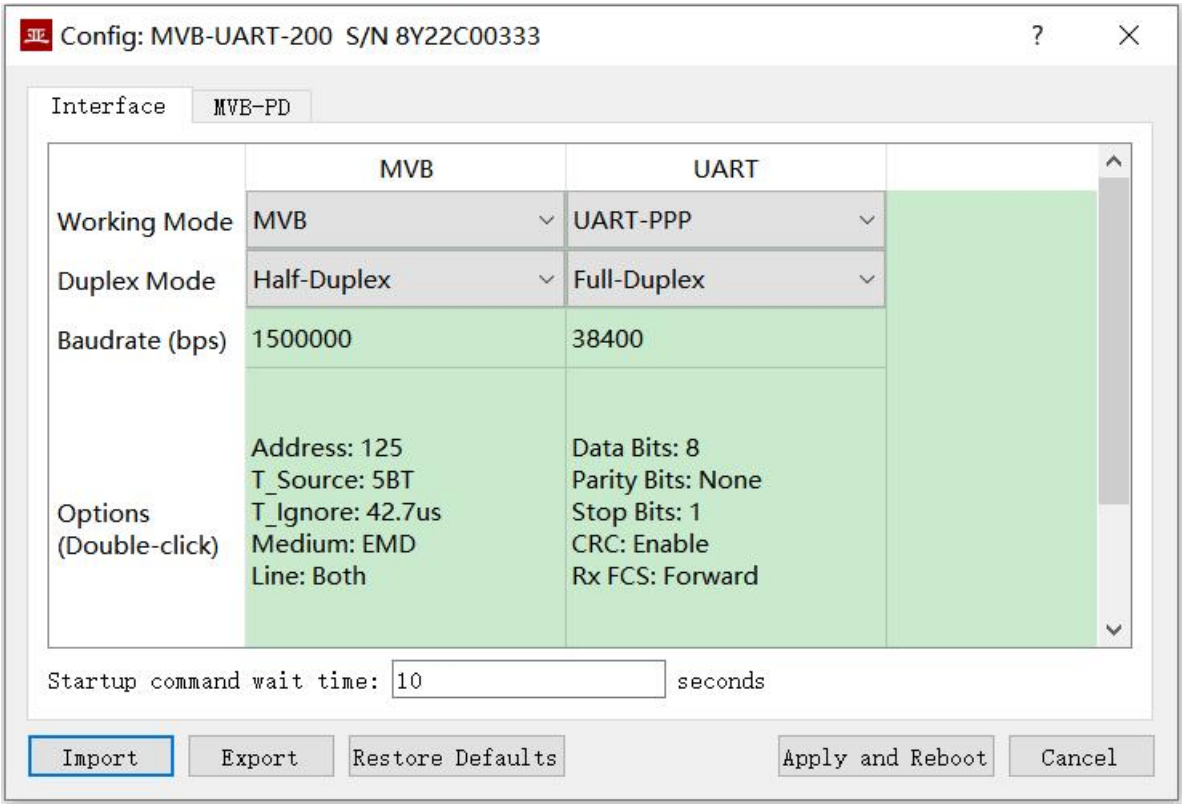
The right side of the statistical report is the information panel, which can display the following contents:

- *Device information: Running time, S/N number, version number;*
- *Interface: Receive/transmit statistics of MVB and UART interface;*

- *DMS Service: Configuration management message receive/transmit statistics.*

4.7 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.



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

5 Function and Configuration

5.1 System Configuration

Startup Command Wait Seconds: Users can set the startup command wait time here to adjust the dynamic configuration time window.

System Config

	Value
Startup wait seconds:	0

5.2 Extended serial port configuration

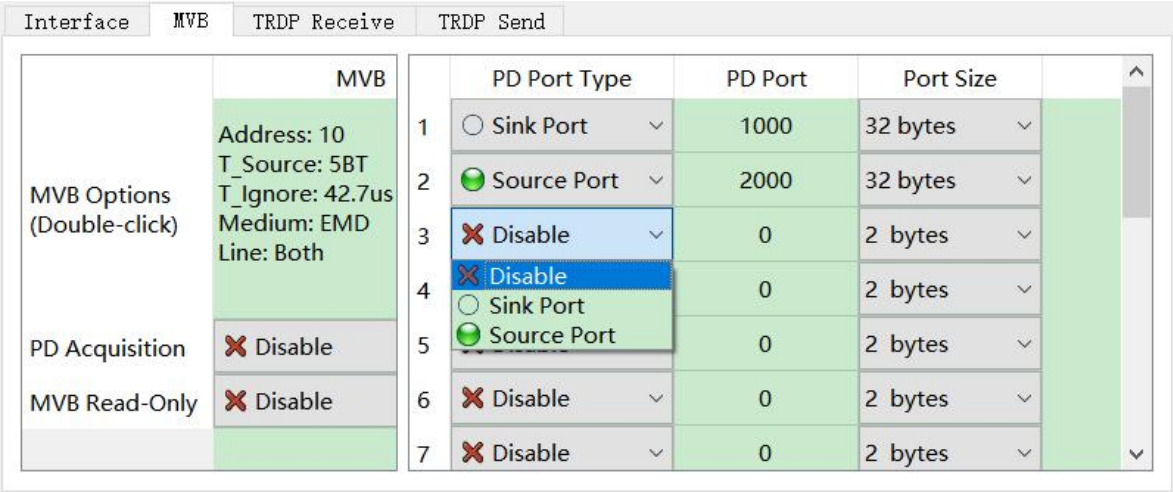
It is possible to communicate with the UART of the host computer through the extended serial port to transmit MVB data or control commands. Since UART sends and receives character stream without head and tail, in order to transmit an MVB packet, a UART-PPP frame is constructed by adding 0x7E as the start and end flag at the beginning and end of the packet, and inserting a frame check sequence.

Serial

	UART
Working Mode	UART-PPP
Duplex Mode	Full-Duplex
Baudrate (bps)	115200
Options (Double-click)	Data Bits: 8 Parity Bits: None Stop Bits: 1 CRC: Enable Rx FCS: Discard

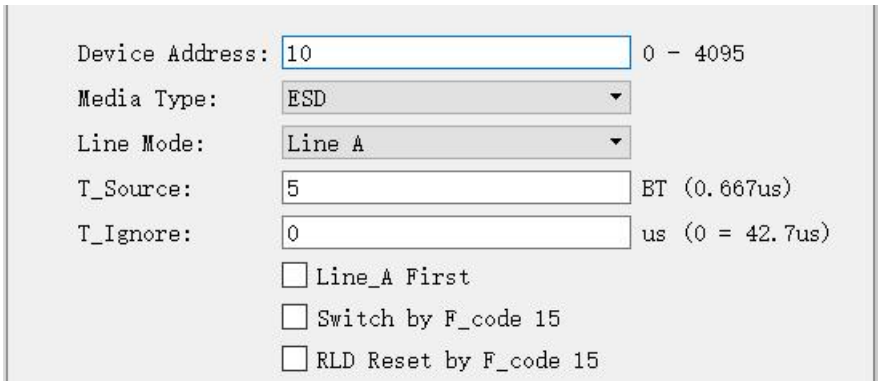
5.3 MVB Configuration

The MVB configuration page is shown below, with the MVB interface and forwarding configuration on the left, and the PD port configuration table on the right.



5.3.1 MVB Interface Configuration

Double-click the advanced option cell to pop up the MVB parameter configuration dialog.

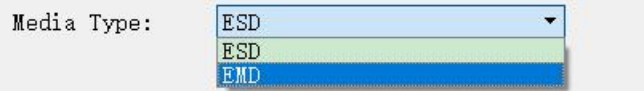


5.3.1.1 Device Address

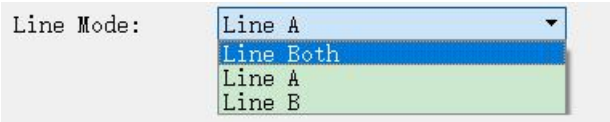
Users configure device address in the range of 0 to 4095 according to field requirements.

5.3.1.2 Media Type

According to the application requirements, users can choose the medium type.



5.3.1.3 Line Type



Users can choose:

- *Line Both: double-line redundancy;*
- *Line A: A line single line mode;*
- *Line B: B line single line mode.*

5.3.1.4 Other Parameters

Using default values, users do not modify or adjust as much as possible.

5.3.2 Serial to MVB Configuration

MVB-UART receives data from the host computer through the UART interface and refreshes the time buffer of the PD source port. When the MVB interface receives a process data request from the master station, the MVB-UART automatically sends a process data response carrying the latest data content.

The serial to MVB function of the MVB-UART is turned on automatically and does not need to be configured.

5.3.3 MVB to Serial Configuration

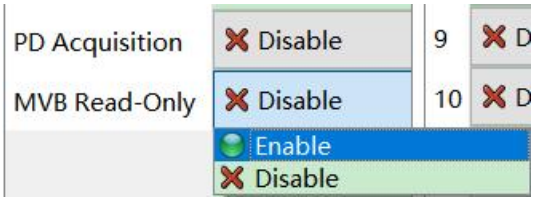
The PD data of the MVB sink port is forwarded to the host computer through the UART interface.

The serial to MVB function of the MVB-UART is turned on automatically and does not need to be configured.

5.3.4 PD Acquisiton

Acquisition of all PDs:

- *Enable: MVB-UART receives all PD frames on the MVB bus and forwards them to the host computer；*
- *Disable: MVB-UART only receives data from the sink port in the PD port configuration table.*



If the MVB Read-only mode is Enable, the MVB-UART module works in pure receive mode and does not output all frames including device status and PD to the MVB bus.

5.3.5 PD Port Configuration Table

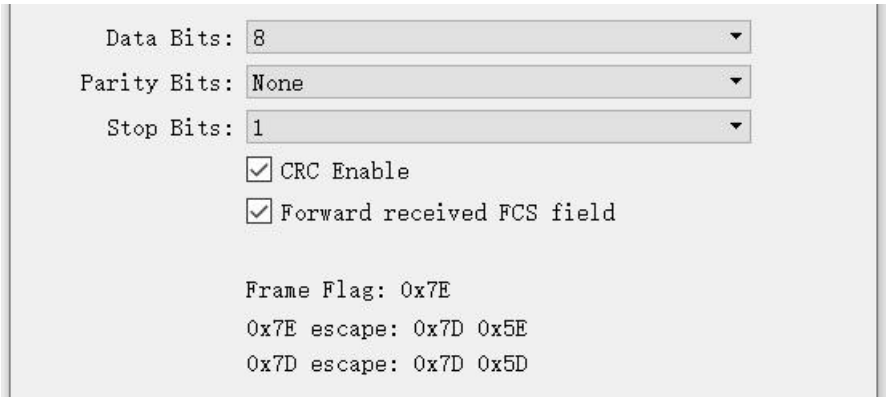
The default version of MVB-UART supports the configuration of up to 16 process data ports. If users need to configure more PD ports, please contact the manufacturer for customization.

Each PD port entry includes the following parameters:

- *PD Port Type: Sink or Source port, disable means this entry is invalid;*
- *PD Port: Set port number 0 ~ 4095;*
- *Port Size: 2, 4, 8, 16, 32 bytes correspond to 0 ~ 4 of fcode;*

5.3.6 UART Configuration

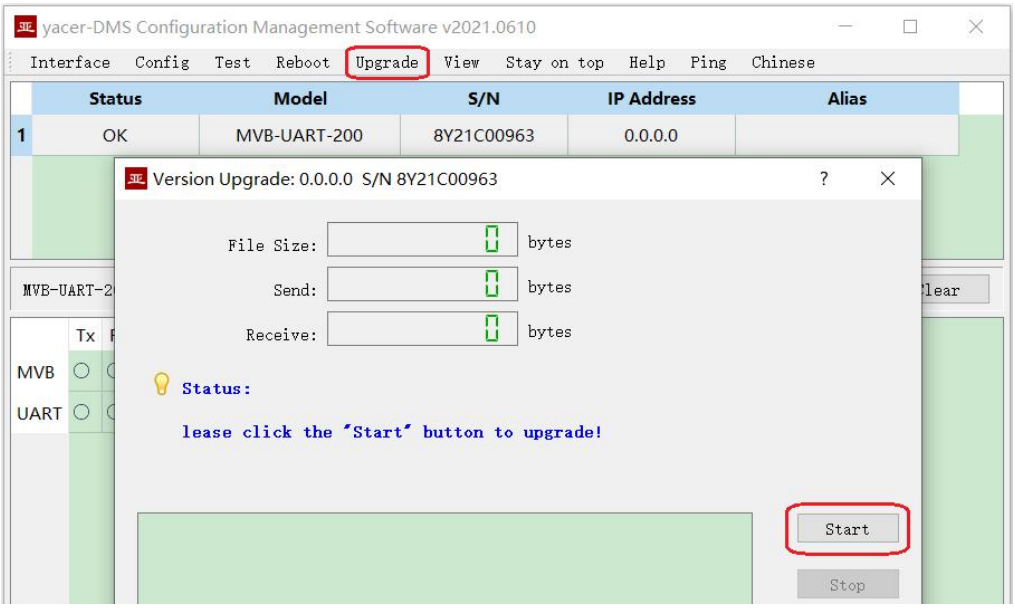
Since UART sends and receives character stream without head and tail, in order to transmit an MVB packet, a UART-PPP frame is constructed by adding 0x7E as the start and end flag at the beginning and end of the packet, and inserting a frame check sequence.



5.4 Firmware Version Upgrade

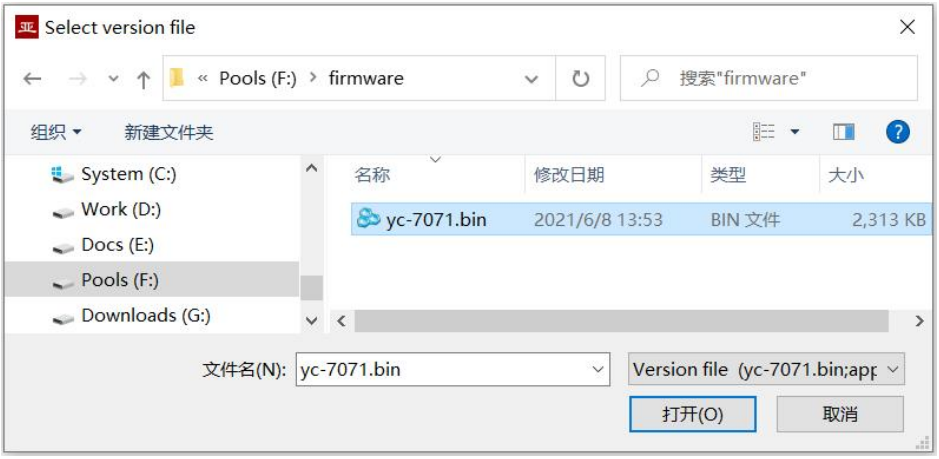
5.4.1 Start Upgrade

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



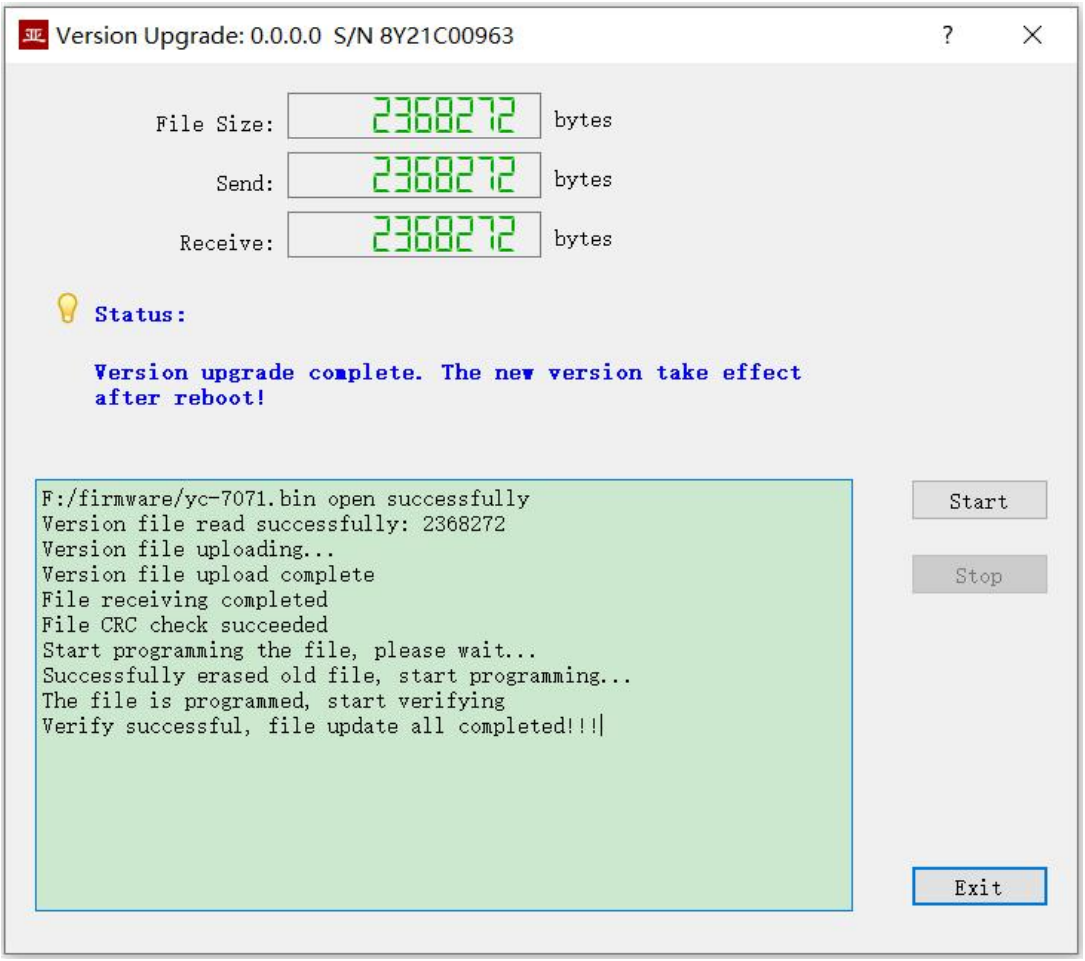
5.4.2 Select Version File

Pop up the “Select version file” dialog, and find the folder where the latest firmware version is stored, select the corresponding file, and click “Open” to start the update.



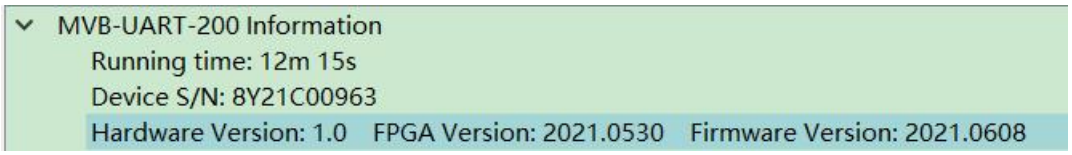
5.4.3 Complete Upgrade

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



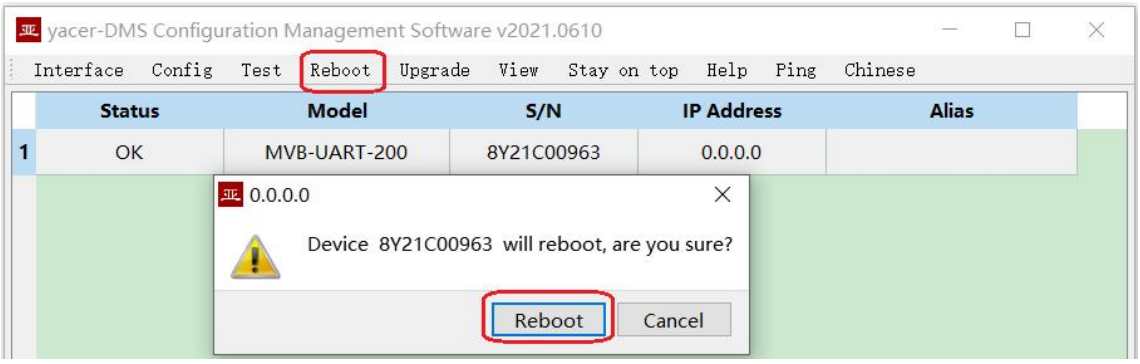
5.4.4 Confirm Upgrade

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.



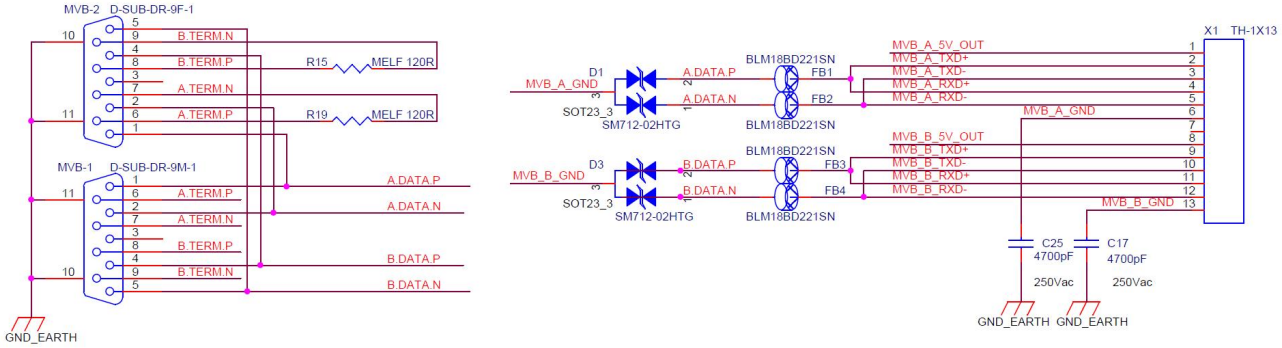
5.5 Reboot Device

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


yacer-DMS Configuration Management Software v2021.0610
Interface
Config
Test
Reboot
Upgrade
View
Stay on top
Help
Ping
Chinese
Status
Model
S/N
IP Address
Alias
1
OK
MVB-UART-200
8Y21C00963
0.0.0.0
0.0.0.0
Device 8Y21C00963 will reboot, are you sure?
Reboot
Cancel

6 Hardware Development

MVB-EMD Reference circuit:



- The length of the data signal pin to DB9 connector bus is not more than 8cm.
- The recommended short wiring width between DB9 is not less than 15 mil.

7 Software Development

Reference:

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

8 Verification and Debugging of MVB

8.1 Auxiliary Equipment

- Yacer MB3270 evaluation board;
- Yacer MVB-Analyzer;
- Computer;
- MVB cable.

8.2 Auxiliary Software

The following software can be obtained by MVB-UART attached U-Disk or accessing *http://www.yacer.cn* 'Software' channel:

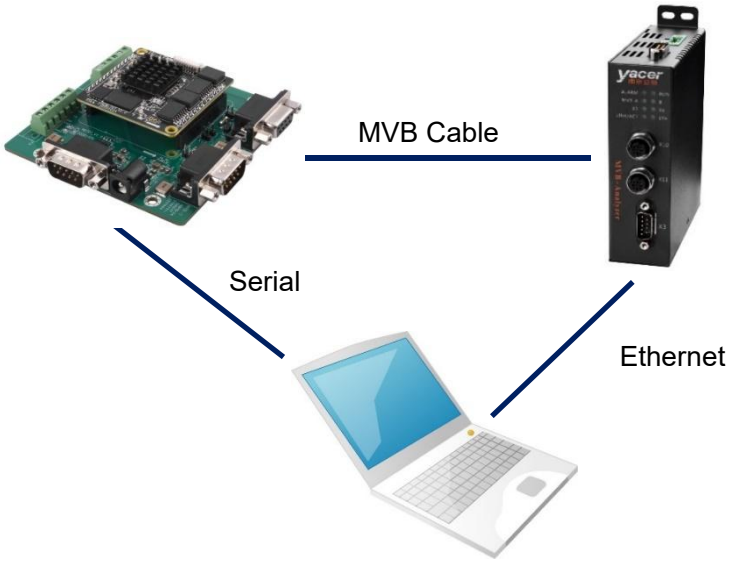
- yacer-DMS configuration management software;
- MVB-Monitor monitoring and analysis software;
- MVB-Serial debugging assistant.

8.3 Debugging and Testing Scheme

MVB-UART is installed on the evaluation board. The MVB bus is connected with the MVB-Analyzer through the MVB cable, and connect the serial port of the computer through a serial cable.

MVB-Analyzer connects the network port of the computer through the network cable. The MVB-Monitor software running on the computer can control the MVB-Analyzer to simulate the host, so as to realize the data transceiver of MVB interface of MVB-UART.

At the same time, MVB-Serial debugger is running on the computer to simulate the communication between the host computer and the UART interface of MVB-UART.



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.*