

USB to CAN Equipment Specification (V1.01)

Contents

Version	Prepared by	Date	Modification contents
V1.0	Li Xinghua	2012-08-28 Aug. 28, 2012	Initial version
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Chapter I Product Introduction

1.1 Overview

UT-8251 is an adapter from USB to CAN equipment. Since it applies USB2.0 protocol and plug and play, the user needs not to install USB drive. The user can connect with CAN profibus via this adapter and conveniently debug profibus equipment, gather and control data by PC computer.

The harsh electrical environment of profibus is fully considered in designing UT-8251. The CAN bus applies independent DCDC power module for optoelectronic isolation to make the port adapter have strong anti-interference capability and not easy to be damaged which can greatly improve utilization reliability of the system in harsh environment. During the design process of the software, we combine the large-capacity data caching technology and real time transport technology to enable the equipment to obtain high data throughput; therefore UT8251 adapter can be widely used in the fields such as the laboratory, industrial control, intelligent building and automotive electronics to carry out data treatment, data gathering, data transmission and control for CAN profibus equipment.

UT-8251 can send and receive data for CAN bus equipment by PC computer software and write their own software according to the DLL dynamic link libraries and routines provided by the manufacturer of UTEK or integrate them into the existed software system. In using this adapter, the user needn't to get familiar with USB protocol and can operate the CAN bus by direct application of the provided interface function.

1.2 Performance index and specification

- ☆ Conversion from USB2.0 protocol to CAN bus protocol
- ☆ 1 USB port and 1 CAN channel
- ☆ Support CAN controller status monitoring
- ☆ Support CAN2.0A and CAN2.0B protocol, support standard frame and extended frame
- ☆ Support double-way transmission, CAN sending and CAN receiving
- ☆ Support data frame, remote frame format
- ☆ The baud rate of CAN controller is available within 5Kbps~1Mbps, software configuration is available
- ☆ CAN bus port applies optoelectronic isolation, DC-DC power isolation
- ☆ The maximum flow is 4000 frame/sec. CAN bus data
- ☆ Capacity of internal CAN receive buffer is 600Messages (7800 bytes)
- ☆ The internal send buffer is double buffer structure, providing buffer ability of 800Messages
- ☆ USB direct power supply, with no need for external power source
- ☆ Isolation insulation voltage: 2500Vrms

- ☆ Working temperature: -20~85℃
- ☆ Working current: <100mA
- ☆ Shell dimension: 112.5mm*64mm*25mm, metal aluminum

1.3 Typical application

- ☆ Realize CAN bus network sending and receiving by the USB port of PC or notebook
- ☆ Fast CAN network data gathering and data analysis
- ☆ CAN bus—USB gateway
- ☆ USB port to CAN network port
- ☆ Extent network communication length of CAN bus
- ☆ Industrial site CAN network data monitoring
- ☆ On-site debugging for CAN bus equipment

1.4 Product sales list

One UT-8251 port adapter

One USB connection wire

1 piece of optical disk (two instruction books, equipment specification, testing software and programming manual, CAN bus communication testing software and routine DLL and IB development files and CAN bus relevant data, etc.)

Chapter II Appearance and Port Description

2.1 Product appearance



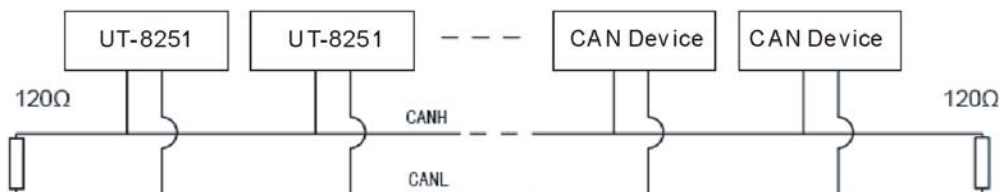
2.2 Port description

Pin	Pin description	Pin definition
1	CANH	Information connecting terminal
2	CANL	Information connecting terminal
3	RES-	Distribution resistance terminal first
4	RES+	Distribution resistance terminal second
5	RST	Reset
6	GND	Signal line
7	SET	Set

2.3 Indicator light description

Indicator light	Color	Function	Description
PWR	Red	Working power supply	Light on mean that the power of converter works normally
TXD	Green	CAN CAN sending	Light flashes mean that the CAN equipment is sending data to profibus
RXD	Yellow	CAN CAN receiving	Light flashes mean that the CAN equipment is receiving data from profibus

2.4 CAN bus connection



CAN equipment CAN equipment

When the UT-8251 converter connects with CAN bus, the CANL connects with CANL and CANH connects with CANH. According to ISO 11898 norms, in order to enhance reliability of CAN-bus communication, the terminal matched resistance (120Ω) shall be usually be added at the two terminals of CAN-bus network, as indicated above. The magnitude of terminal matched resistance is determined by the characteristic impedance of transmission cable, for example, the characteristic impedance of twisted pair is 120Ω , and then the two terminals of profibus shall integrate 120Ω terminal resistance.

The internal circuit of UT-8251 converter integrates 120Ω terminal resistance. When the UT-8251 converter is used as terminal equipment, the user can connect the internal terminal resistance by short circuit at the CAN port of UT-8251 converter, i.e. between pin 3 “Res-” and pin 4 “Res+”.

The twisted pair and shield twisted pair can be used as CAN communication wire. If the communication distance surpasses 1KM, the section area of the wire shall be ensured to surpass

1.0mm². The specific specification shall be determined as per distance. Normally, it shall be increased as the distance lengthens.

2.5 Default setting


Ex-factory default: CAN baud rate is 100Kbit/s and the mask code is 00000000, without mask bit. Receiving CANID is 00000001. When it starts up, CAN receiving interrupt is closed. It's in ordinary working mode, not testing mode.

The setting of CANID is right alignment.


Chapter III Software Tool Utilization

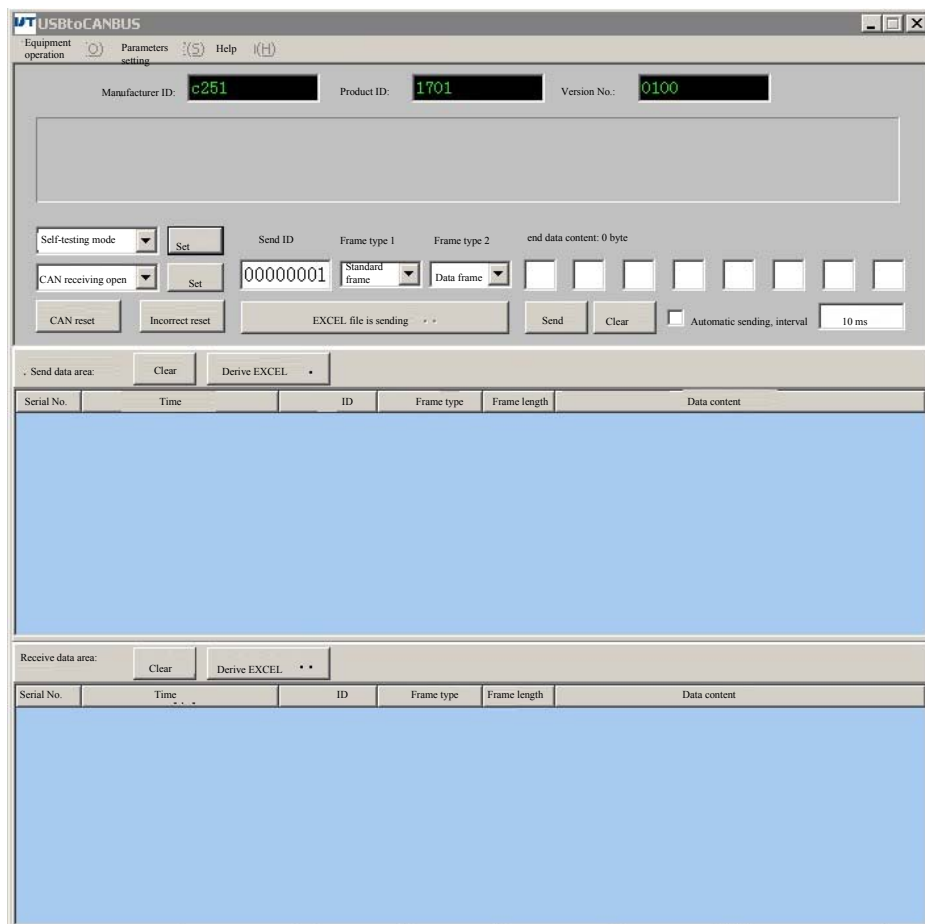
3.1 Software installation

Double click the file “CanToolInstall.EXE” to enter installation process. After installation, the

icon of  will be displayed at desktop.

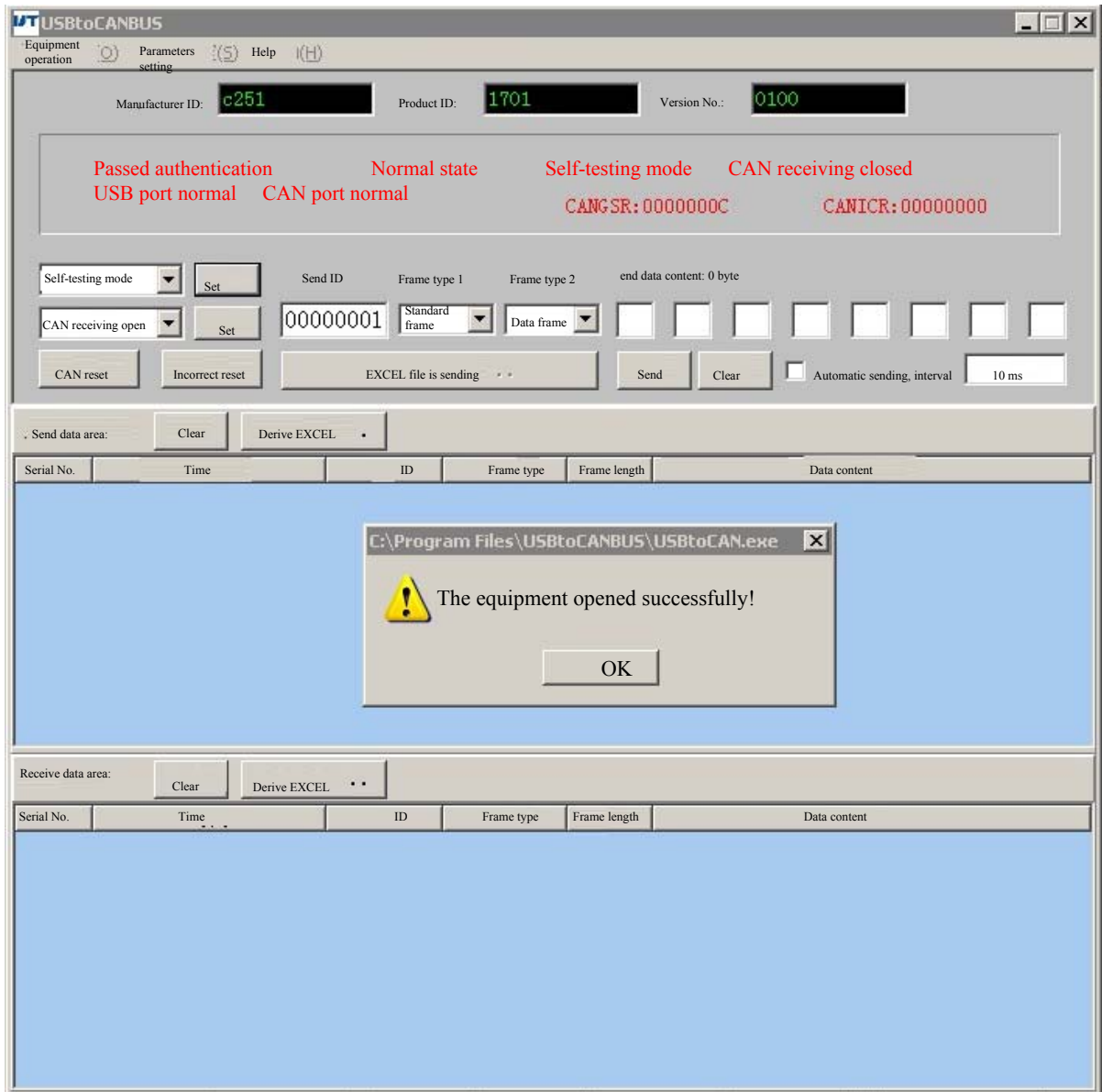
3.2 Initial operation interface

Double click , the following initial operation interface will appear



3.3 Activate software

After connecting the UT-8251 converter, select “start equipment” at the equipment operation pull-down menu, the prompt information of “Opened successfully” will occur, click “OK”; the software enters into active state.



Equipment operation Parameters setting Help
 Manufacturer ID: c251 Product ID: 1701 Version No.: 0100
 Passed authentication Normal state Self-testing mode CAN receiving closed
 USB port normal CAN port normal
 Self-testing mode Set Send ID Frame type 1 Frame type 2 Send data content: 0 byte
 CAN receiving open Set 00000001 Standard frame Data frame
 CAN reset Incorrect reset EXCEL file is sending Send Clear Automatic sending, interval 10 ms
 Send data area: Clear Derive EXCEL

Serial No. Time ID Frame type Frame length Data content

The equipment opened successfully!

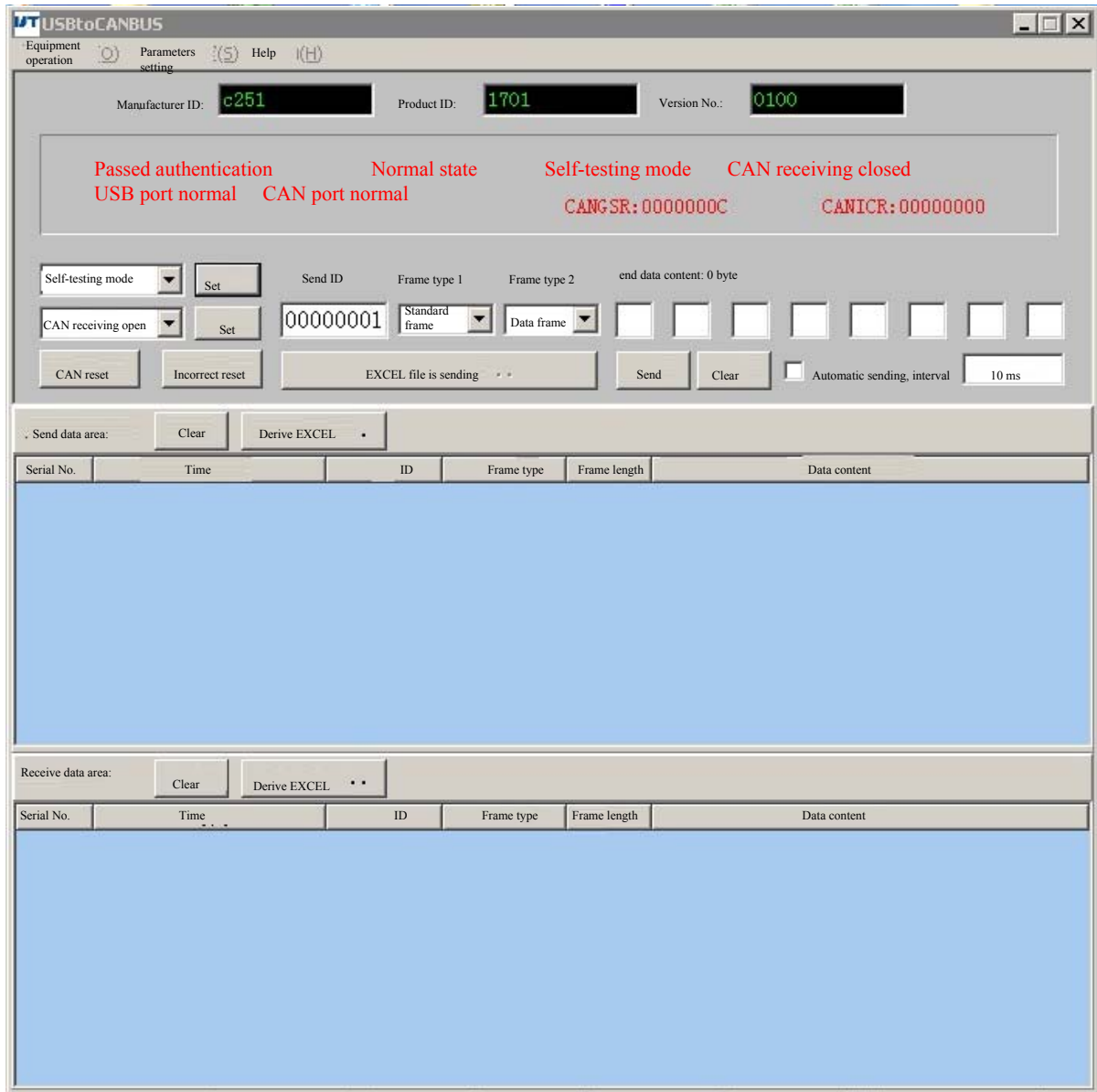
OK

Receive data area: Clear Derive EXCEL

Serial No. Time ID Frame type Frame length Data content

3.4 Software conventional interface

When the software is successfully activated, the following interface will occur.



3.4.1 Status prompt

The status bar area includes the description entries of equipment states as follows:

- A. Passed authentication, mean that the equipment has been authenticated as legal equipment
- B. Normal mode, the equipment applies normal mode for normal operation. If the user needs to authenticate the quality of equipment's CAN port, select testing mode to set by mode selection

entry. When the equipment works in testing mode, please shortly connect RES+ and RES- to connect external load.

C. CAN port closed, mean that the CAN port doesn't receive data from profibus; CAN port open, mean that the CAN port can receive data from profibus. This status is also selectable. Select CAN receiving closed for setting, enter the status of CAN receiving closed; Select CAN receiving open for setting, enter the status of CAN receiving open;

D. USB port normal, mean that there is no data overflow from CAN bus to USB;

E. CAN port normal, mean that there is no data overflow from USB to CAN bus

F. CANGSR, CAN port status register content, 32 bits, hex data display

The following is the description of the binary bit significance in CANGSR from left to right and from high order to low order:

Bit order	31:24	23:16	15:8	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Name	TXERR	RXERR	Reserved	BS	ES	TS	RS	TCS	TBS	DOS	RBS
Significance	Sent incorrect counter value	Receive incorrect counter value		0, CAN bus open, 1, CAN bus closed	0, two incorrect counter value are less than alarm value, 1, at least one incorrect counter value is more than alarm value	0, CAN control is idle, 1, CAN control is sending message	CAN 0, CAN controller is idle; 1, CAN controller is receiving a message	0, at least one request has not sent successfully; 1, all sending requests have been successfully completed	at least one SCITX BUF cannot be used by CPU; 1, all the three buffers can be used	there is no overflow; 1, there is overflow	0, there is no message in receive buffer; 1, receive buffer receivers at least one message

G. CANICR, CAN port status register content, 32 bits, hex data display

The following is the description of the binary bit significance in CANICR from left to right and

from high order to low order:

Bit order	Name	Value	Significance
31:24	ALCBIT	00	Arbitration is lost at the first bit (MS) of identifier
		11	Arbitration is lost at SRTS bit (RTR bit reported by standard frame)
		12	Arbitration is lost at IDE bit
		13	Arbitration is lost at the twelfth bit of identifier (only applicable to extended frame)
		30	Arbitration is lost at the last bit of identifier (only applicable to extended frame)
		31	Arbitration is lost at RTR bit (only applicable to extended frame)
23:22	ERRC1:0	00	Bit error
		01	Format error
		10	Filling error
		11	Other errors
21	ERRDIR	0	Error during sending process
		1	Error during receiving process
20:16	ERRBIT	Error code capture: when the CAN controller detects profibus error, the frame error position is captured in ERRBIT field. These capture values reflect the internal state variables, so they are not completely linear:	
		00011	Frame start
		00010	ID28...ID21
		00110	ID20...ID18
		00100	Start bit
		00101	IDE bit
		00111	ID17...13
		01111	ID12...ID5
		01110	ID4...ID0
		01100	RTR bit
		01101	Reserved bit 1
		01001	Reserved bit 0
		01011	Data length code
		01010	Data field
		01000	CRC sequence
		11000	CRC separator
		11001	Reply slot
		11011	Reply separator
		11010	Frame over
		10010	Suspend
10001	Activate mismatch		
10110	Accept mismatch		
10011	Allowable dominant bit		
10111	Error separator		
11100	Overload mark		

3.4.2 Working mode setting

When the equipment is electrified, the default working mode is normal working mode; if you need to test the equipment, select testing mode to set.

3.4.3 Open CAN receiving

When the equipment is electrified, the default is receiving closed; if you need to receive data from CAN, just select “CAN receiving open” to set.

3.4.4 Data transmitting

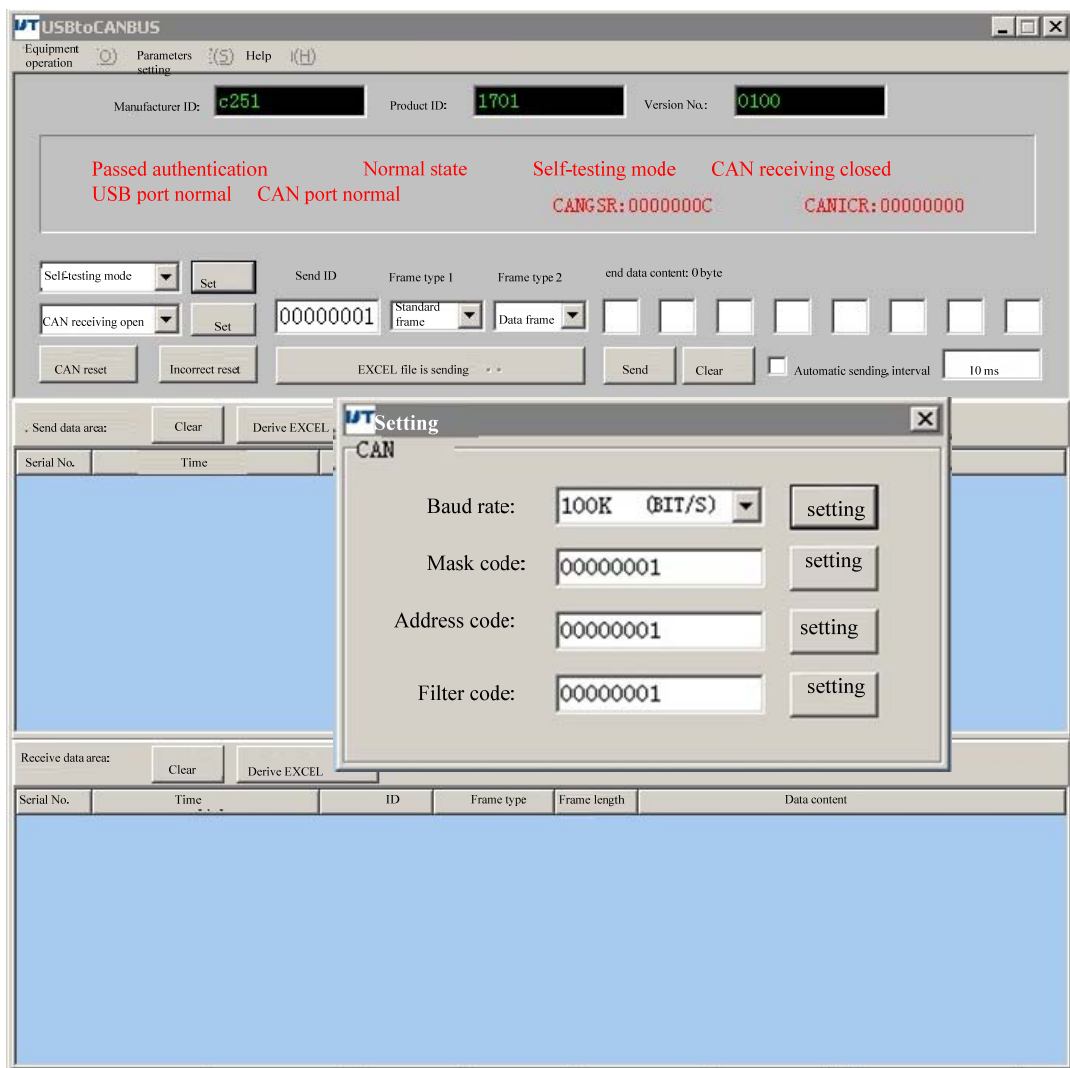
1. Fill correct ID at “Send ID” column, use hex format, four bytes, right alignment high-order fill 0;
2. Select frame type (extended frame, standard frame)
3. Select data type (remote frame, data frame)
4. Fill hex data at data content column.
5. Click send, i.e. send by hand. Each click of the data indicates send data once. If automatic sending is used, please select proper interval (unit: ms), and select automatic sending.

3.4.5 Data receiving

If the CAN receiving open is selected for setting, and the baud rate, filter code and mask code are set correctly, the correct data will be displayed at the data receiving box.

3.5 Parameter setting

Click “Parameter setting” at menu bar, the following interface will occur.



Before using the equipment, please correctly set the following parameters:

Baud rate, optional

5KBIT/S, 10KBIT/S, 20KBIT/S

50KBIT/S, 100KBIT/S, 125KBIT/S, 250KBIT/S, 500KBIT/S,

800KBIT/S, 1000KBIT/S

B. Mask code

Use hexadecimal number identification, four bytes in total, right alignment mode

1. Corresponding position

1, representing that the address code of this bit (receiving address code) no longer participates in the identifying process for receiving address, i.e. be ignored and shielded

2, corresponding to 0, representing that the address (receiving address code) is effective and participates in the identifying process for receiving address

E.g. 0X00000002

BIT1 bit of shield receiving CANID, for example: receiving CANID (SourceID) is 00000000000000000000000000000000x1 (binary system), CAN information frame CANID(ID) mean that the 00000000000000000000000000000000x1(binary system) information is received.

Graphical representation:

Special case 1: if you want to receive all CAN bus data, set the mask code as 0xFFFFFFFF

Special case 2: if you want to receive the bus equipment data of some specific ID, set the mask code as 0X00000000

C. Filter code

The equipment determines whether receive the data from CAN bus port according to this address and mask code. If the address is matched, then receive the data of this frame; otherwise ignore the data of this frame. Right alignment mode, high order fill 0, hexadecimal system, four bytes.

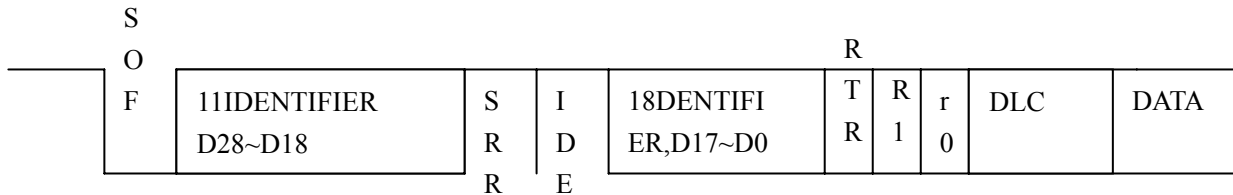
Chapter IV Standard Frame, Extended Frame Format

4.1 Standard frame format



The length of identifier is 11 bit (11bit IDENTIFIER); RTR bit is remote transmit request bit; data frame is dominant while remote frame is recessive. IDE is dominant while extended frame is recessive. R0 is reserved bit and dominant. The 11bit IDENTIFIER here right align with CANID in UT-8251.

4.2 Extended frame format



Identifier is 29 bit, including 11 (D28~D18) basic ID and 18 bit extended ID; they are 29 bit CANID in right alignment. As for CANID setting, obey the rule in which the highest four bit can't be 1 simultaneously.