User Manual

UCAN Board

USB CAN bus

User Guide Revision 1.2

Revision History

Rev	Date	Note	Author
1.0	June 25, 2010	1. Initial draft	Bruce
1.1	Sept. 24, 2010	1. Revise for Hardware Spec	Bruce
1.2	Nov, 10, 2010	1. Add Windows SDK	Bruce

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CHAPTER 1

WIN-CAN USB CAN bus Product Overview

This chapter contains general information that will be useful to know before using the UCAN CAN bus Board and the details about the USB CAN bus hardware utility

Chapter 1 Product Overview

This chapter provides an overview of the UCAN CAN bus Board, which can be connected with the PC to create a simple two mode Controller Area Network (CAN) bus and it can be controlled or monitored via the PC interface.

Using the PC interface, user can configure the UCAN board registers; send CAN bus and receive CAN messages. This board is using the USB interface to connect with Windows or Linux OS Compatible PC. It is also suitable for use with laptop computers.

Any PC can be linked to CAN bus network through this unit. With the so-called isolation version of the USB CAN adapter which can tolerates up to 2500V galvanic between the PCs.

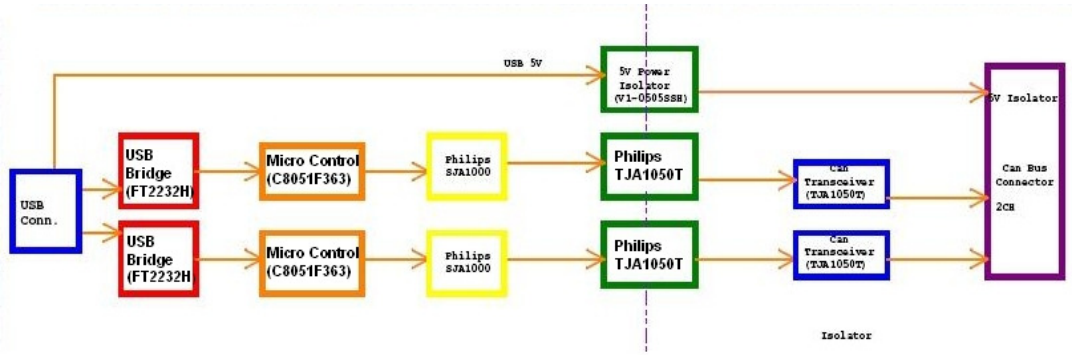


Diagram 1.1 USB CAN bus Utility

1.1 Required Properties at a glance

- Connection of a High-speed CAN (CAN specification 2.0A and 2.0B) to a PC
- Use of USB port at the PC (Prefer with USB 2.0 compatible)
- For 1M/bps High bit rate
- Power supply via USB connection
- Equipped with the CAN controller SJA1000 by Philips
- CAN bus transfers rate up to 1MB bit/s
- CAN bus connection 9-pin D-Sub male, pin assignment by CiA Recommendation DS102
- Galvanic isolation at CAN bus connection up to 2500V
- Support for operating system Windows (2000 SP4, XP, Vista, Vista 64 bit, Windows 7, Windows 7 64 bit) and Linux

1.2 Hardware Specification

UCAN board is equipped with Philips SJA1000 chips which are designed for use as the USB CAN bus application. The UCAN board delivers the baud rate up to 1M/bits per second as its data transferring speed.

CAN bus Data Transfer	bi-directional transmission speeds (Packages/Sec)
Simplex Transfer(send or receive only)	3800
Duplex Transfer(send and receive simultaneously)	1000 bi-directional

Table 1-1 CAN bus Data Transfer speed

Figure 1-1 UCAN Board Top View

Figure 1-2 UCAN Board 45-degree angle view

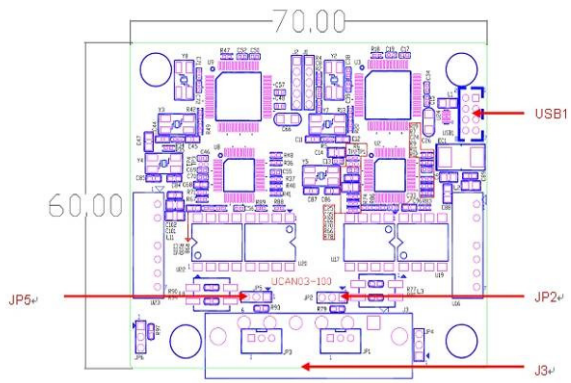


Figure 1-3 UCAN Board Dimension

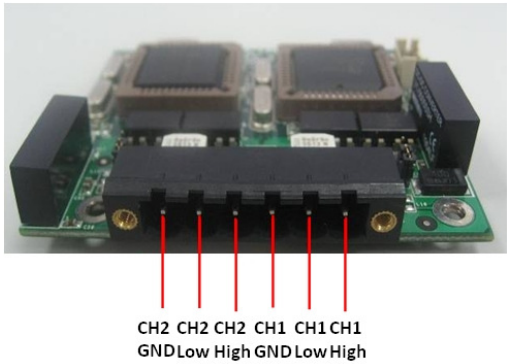
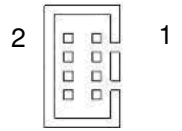


Figure 1-4 UCAN Board CAN BUS I/O Port Pin Definition

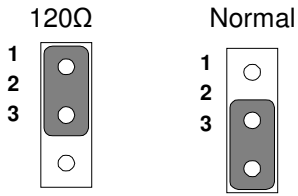
CAN bus Hardware Pin Definition

J3 ： CAN BUS Output	
Pin No.	Symbol
1	CAN1-H
2	CAN1-L
3	GND
4	CAN2-H
5	CAN2-L
6	GND

USB1 ：USB PIN HEADER	
Pin No.	Symbol
2	VCC
4	USB -
6	USB +
8	GND
1	VCC
3	USB -
5	USB +
7	GND



JP2 ： terminator resistor	
Pin No.	**Functions**
1 Short 2	120Ω
2 Short 3	Normal
JP5 ： terminator resistor	
Pin No.	**Functions**
1 Short 2	120Ω
2 Short 3	Normal



CHAPTER 2

Win-CAN Driver & AP Installations

This chapter provides how to install the CAN bus driver and software installations

.

Chapter 2 WIN-CAN Driver and AP Installation

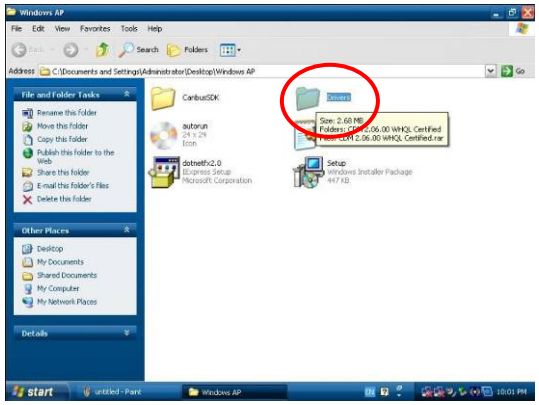
2.1 Connection to the PC

We recommend that you set up the driver before connecting the WIN-CAN USB CAN bus module to the PC for the first time. Please follow the following steps to set up the driver.

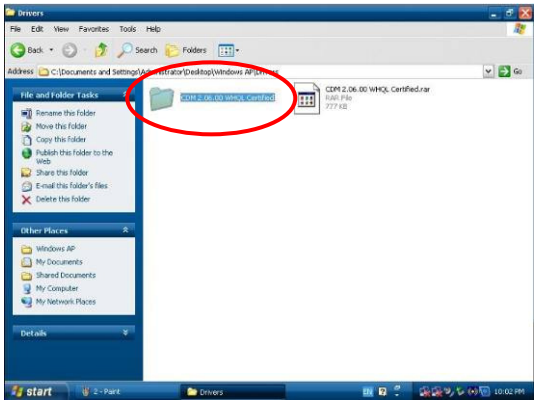
2.2 CAN Bus Driver Installation

Step1: Insert the USB CAN bus driver CD that comes with the accessories into the PC's CD-ROM. Open the file folder named "Windows AP"

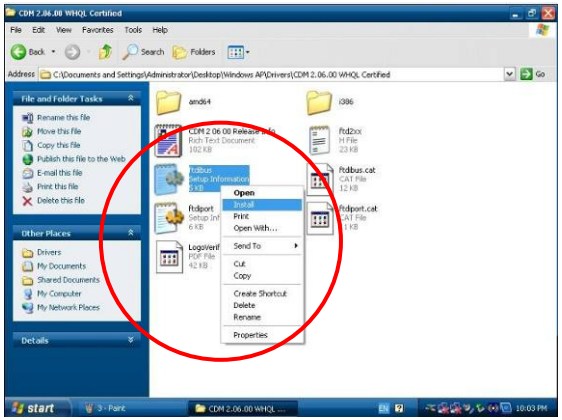
Step2: Double click the “Drivers” folder then proceed.



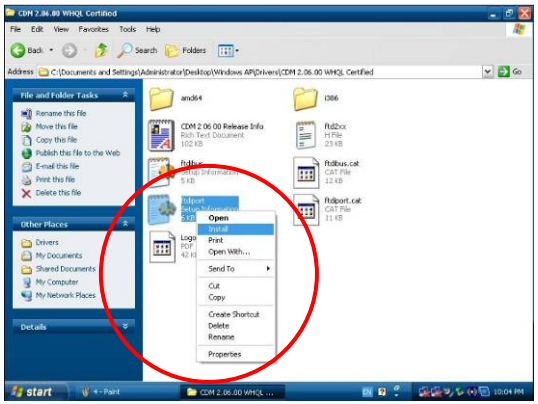
Step3: Double click the “CDM 2.06.00 WHQL Certified” folder then proceed.



Step4: Select “ftdbus.inf” and click right button of mouse, and then click “install” to proceed.

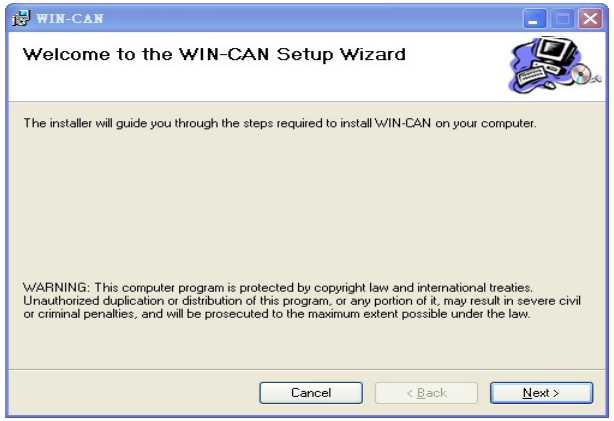


Step5: Select “ftdport.inf” and click right button of mouse, and then click “install” to finish the installation.

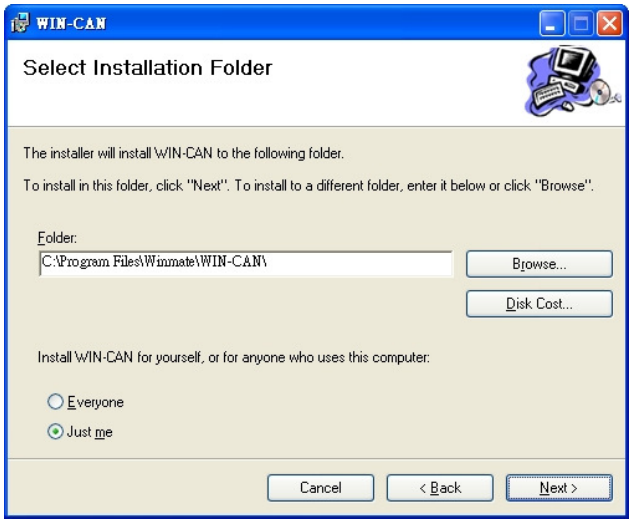


2.3 WIN-CAN Software Setup

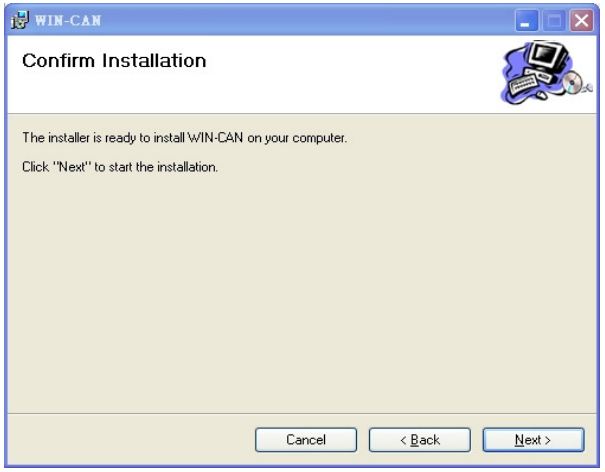
Step 1: Insert the Driver CD that comes with the accessories into the PC's CD-ROM. Open the file folder named "WIN-CAN", Click on "Setup.msi" to start the setup procedure.



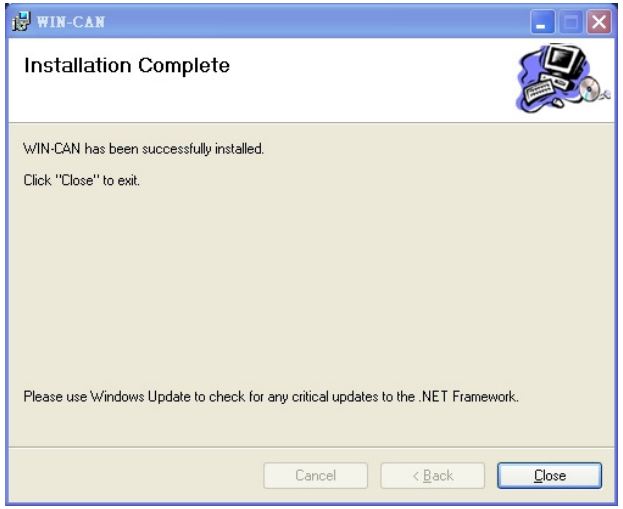
Step 2: Click on "Next" to install the USB CAN bus' driver.



Step 3: Click on "Next" to proceed.



Step 4: Click on "close" to complete the installation.



CHAPTER 3

Win CAN Software Quick Start Guide

This chapter describes how to use the WIN-CAN software and Technical Spec of CAN bus Hardware.

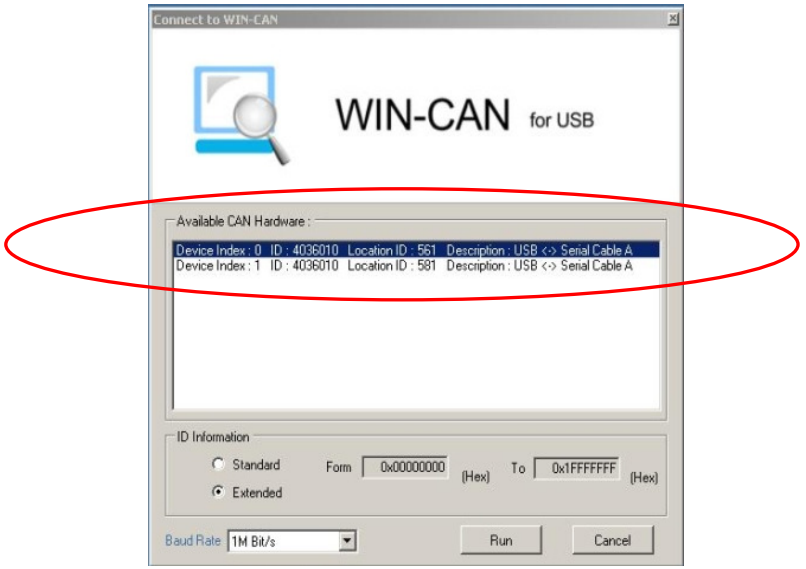
Chapter 3 WIN CAN Software Quick Start Guide

3.1 WIN-CAN Software Overview

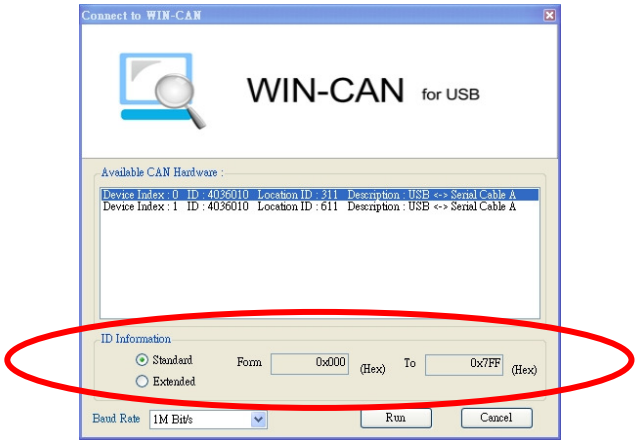
Program Start

Step 1: After you finished the installation of "WIN-CAN" driver, you can find the icon of this program as follows, please double click the" WIN-CAN" icon.

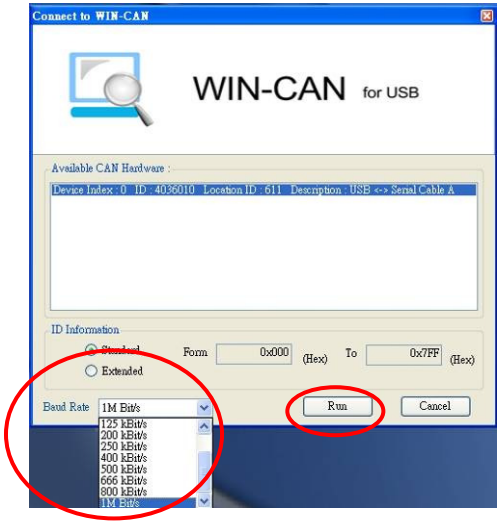
Step 2: After you executed the program of WIN-CAN, a dialog for the selection of the CAN bus hardware as well as the setting of CAN bus parameters appear after the program start.



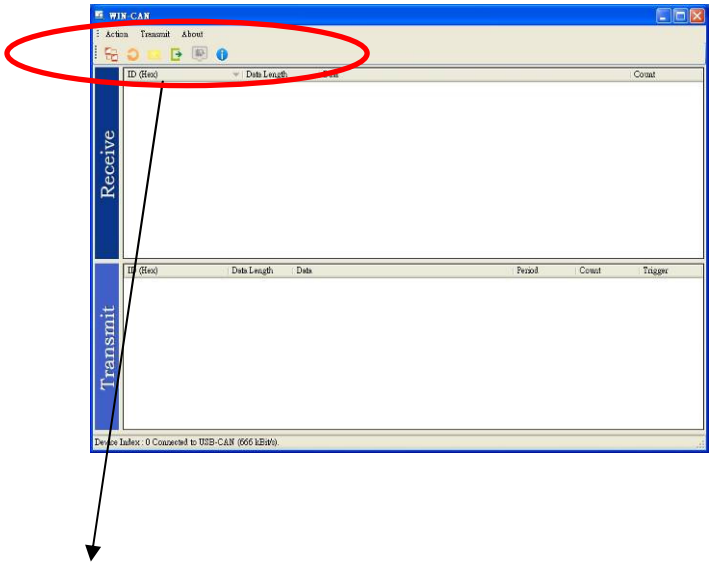
Step 3: There are “Standard” and “Extended” mode of ID information. As the Standard mode, the parameters set up from “0 x000” to “0x 7FF” by hexadecimal numbers. And the Extended mode, the parameters set up from” 0x 00000000” to “ 0 x 1FFFFFFF” also by the hexadecimal calculating ways.



Step 4: The Baud Rate speed can be adjusted from 50 kBit/s to 1Bit/s，then click” Run”. button

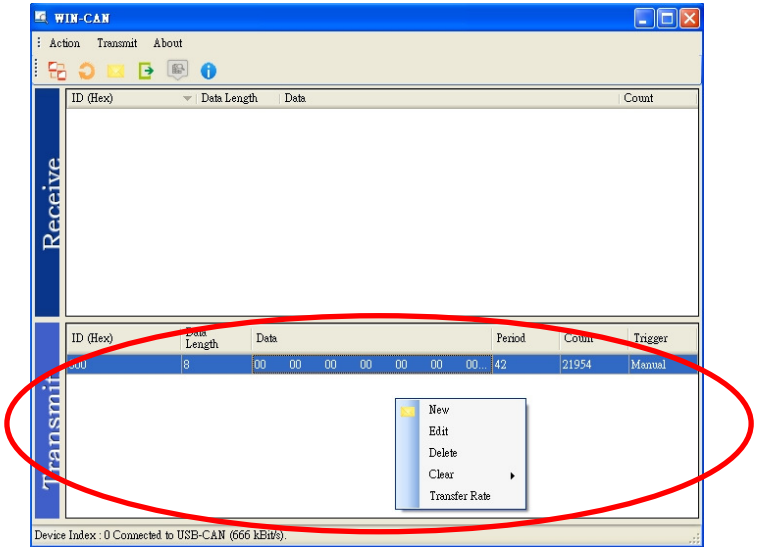


Step 5: After you click the “Run” button, the WIN-CAN Transmit/Receive window will pop up as follows: The icons are the hot keys for setting on the top left corner of the window, it is the user-friendly interface to people to operate.

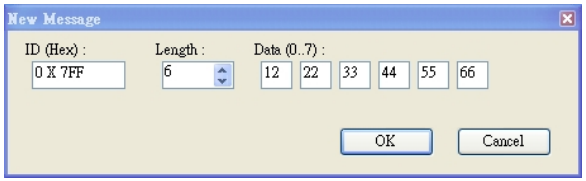


Icon	Name	Function
	Connect	It disconnects current device and reselect it again.
	Reset	It makes hardware reset and clear receive and transmit window.
	New	It adds a new transmit package.
	Exit	It exits the WIN-CAN program
	Get State Info	It shows the mode and baud rate of the current setting
	About	It shows the version of the software

Step 6: Click the right button of mouse on the transmit zone, you can set up/ edit the new transmit data in this zone.



Step 7: After click “New”, it will pop up the new message window. You need to set up the ID information (Hex), Length, and Data into the settings.



Step 8: After you finish the new data setting, click the “Transfer Rate”, it will pop up Transfer Rate, you can choose mini seconds or select full speed to transfer the data by WIN-CAN.

CHAPTER 4

Windows SDK API Specification

This chapter shows the Windows SDK API Code

Chapter 4 CAN bus Windows SDK API Specification

4.1 Define Documentation

```
// All kinds of transmitting rate.
 enum BaudRate{
        BR_20KBPS = 0,
        BR_40KBPS = 1,
        BR_50KBPS = 2,
        BR_80KBPS = 3,
        BR_100KBPS = 4,
        BR_125KBPS = 5,
        BR_200KBPS = 6,
        BR_250KBPS = 7,
        BR_400KBPS = 8,
        BR_500KBPS = 9,
        BR_666KBPS = 10,
        BR_800KBPS = 11,
        BR_1000KBPS = 12,
}
```


4.2 Function Documentation

4.2.1 FTDI .FT_STATUS _WM_OPEN(uint DeviceNo);

Description:

Open by device index.

Parameters:

DeviceNo [IN]:

If it exist two devices, device will be assigned index '0' and '1' respectively.

Type: uint

Ex :

```
using CanbusSDK;
using FTD2XX_NET;
…
canbus WinCan = new canbus();
if(WinCan._WM_OPEN(0) = = FTDI.FT_STATUS.FT_OK){
        // Open the first plugged in device successfully }
or
if(WinCan ._WM_OPEN(1) = = FTDI.FT_STATUS.FT_OK){
        // Open the second plugged in device successfully
}
```

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.2 FTDI .FT_STATUS _WM_INIT(byte[ ] bDeviceID, byte bBRateIndex, byte[ ] bAcceptMask, byte bMode);

Description:

Specify and initial the opened device.

Parameters:

bDeviceID [IN]:

Set opened device ID as 0x00~0x7FF (Standard Mode) or 0x00000000~0x1FFFFFFF (Extended Mode).

Type: byte array.

bBRateIndex [IN]:

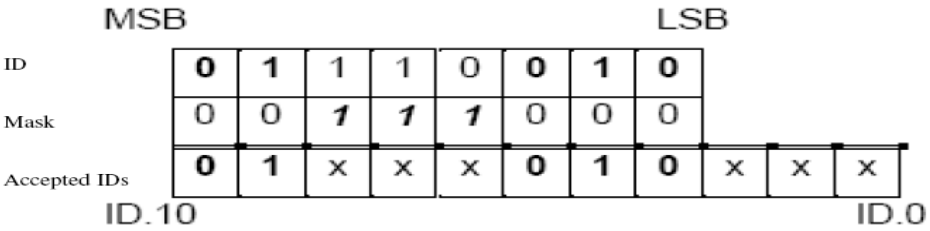
Set transmitting rate

Type: byte

bAcceptMask [IN]:

It is defined as a filter, and it determines to receive any corresponding ID sending data.

Type: byte array



X : don't care.

The identifier consist of 11 bits (ID 10 is most significant bit). Only ID.3 – ID.10 can be set. At the bit

positions containing a "1" in the mask, any value is allowed in the composition of the identifier. The same is

valid for the three least significant bits.

bMode [IN]:

It is defined as a different mode.

Mode 0 : Standard Mode

Mode 1 : Extended Mode

Type: byte

Ex :

byte[] bID = new byte[4]; bID[0] = 0x1F; bID[1] = 0xFF; bID[2] = 0xFF; bID[3] = 0xFF;

byte[] bMask = new byte[4]; bMask[0] = 0xFF; bMask[1] = 0xFF; bMask[2] = 0xFF; bMask[3] = 0xFF;

WinCan ._WM_INIT(bID, Convert.ToByte(Canbus.BaudRate.BR_1000KBPS), bMask, 1);

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.3 FTDI .FT_STATUS _WM_WriteOnePacket(byte[ ] bID, byte bLen, byte[ ] writebuf);

Description:

Write data with this ID header via opened device.

Parameters:

bID [IN]:

Set ID header for writing packet to wanted device.

Type: byte array.

bLen [IN]:

Length of data to be wrote (0 - 8).

Type: byte.

writebuf [IN]:

Written Data.

Type: byte array

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.4 FTDI .FT_STATUS _WM_WriteMultiPackets(int level, byte[,] _id, byte[,] _datalen, byte[,] _data);

Description:

Write all data with different ID headers at the same time via opened device.

Parameters:

level [IN]:

It shows numbers of IDs to be written.

Type: int.

_id [IN]:

Write all data with different ID headers sequentially.

Type: byte array of two dimensions.

_datalen [IN]:

Set every data length (0 - 8) sequentially to be written.

Type: byte array of two dimensions.

_data [IN]:

All Written Data.

Type: byte array of two dimensions.

EX:

```
byte[,] id = new byte[2, 4];
byte[,] datalen = new byte[2, 1];
byte[,] data = new byte[2, 8];
int i = 0;
for (int i = 0;i < 2;i++) {
    id[i, 0] = i;
    id[i, 1] = 0xFF;
    id[i, 2] = 0xFF;
    id[i, 3] = 0xFF;
    datalen[i, 0] = 8;
    for (int j = 0; j < 8; j++)
    { data[i, j] = j; }
}
FTDI.FT_STATUS ftStatus = cb._WM_WriteMultiPackets(i, id, datalen, data);
```

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.5 FTDI.FT_STATUS _WM_ReadPacket(ref byte[ ] bID, ref byte bLen, byte[ ] readbuf, ref int busheavy, ref int mode);

Description:

Read data via opened device.

Parameters:

ID [OUT]:

Read data with this ID header via opened device.

Type: ref byte array.

bLen [OUT]:

Received data length.

Type: ref byte.

readbuf [OUT]:

Received data.

Type: byte array

Busheavy[OUT]:

If signal ocurrs some error to result in device not to work ,it will return false.

Type: ref int.

mode[OUT]:

It show that the data format is standard or extended mode.

Type: ref int.

EX:

```
byte[] ID = new byte[4];
byte Len = 0;
int status = 0;
int mode = 0;
byte[] receivedata = new byte[8];
WinCan ._WM_ReadPacket(ref ID, ref Len, receivedata, ref status, ref mode);
```

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.6 FTDI.FT_STATUS _WM_GET_STATE(ref int Mode, ref int BaudRate, ref int ErrorCode, ref int ErrorLimit, ref int RxError, ref int TxError);

Description:

Get bus status.

Parameters:

Mode [OUT]:

It shows current executing mode.

Type: ref int.

BaudRate [OUT]:

It shows current executing transmitting rate

Type: ref int.

ErrorCode [OUT]:

It shows current executing error code.

Type: ref int.

ErrorLimit [OUT]:

It shows current executing error limit

Type: ref int.

RxError [OUT]:

It shows current executing RX error

Type: ref int.

TxError [OUT]:

It shows current executing TX error

Type: ref int.

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.7 FTDI .FT_STATUS _WM_PURGE();

Description:

It uses to purge the Tx and Rx buffer.

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.8 FTDI .FT_STATUS _WM_HW_RESET();

Description:

When the device isn't working, you need to reset the device to make sure that it could keep on working.

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

4.2.9 FTDI .FT_STATUS _WM_CLOSE();

Description:

Close the opened device.

Returns:

FTDI.FT_STATUS.FT_OK if successful, otherwise the return value is FTDI.FT_STATUS error code.

CHAPTER 5

Linux SDK API Specification

This chapter shows the Linux SDK API Code

Chapter5 CAN bus Linux SDK API Specification

5.1 Linux Driver Installation

1. unzip and untar the file given to a suitable directory

gunzip libftd2xx0.4.13.tar.gz

tar -xvf libftd2xx0.4.13.tar

2. As root user copy the following files to /usr/local/lib

cp libftd2xx.so.0.4.13 /usr/local/lib

3. Change directory to /usr/local/lib

cd /usr/local/lib

4. make symbolic links to these files using the following commands:

ln -s libftd2xx.so.0.4.13 libftd2xx.so

5. Change directory to /usr/lib

cd /usr/lib

6. make symbolic links to these files using the following commands:

ln -s /usr/local/lib/libftd2xx.so.0.4.13 libftd2xx.so

7. Add the following line to /etc/fstab:

none /proc/bus/usb usbdevfs defaults,devmode=0666 0 0

There have been reports that you may need to use the following command for some distros

none /proc/bus/usb usbdevfs defaults,mode=0666 0 0 (use usbfs in 2.6 kernels)

8. Remount all in the fstab file

mount -a

9. Copy the following files to /usr/lib

cp -f libWCan.so /usr/lib

If you have problems with this check with usbview to check the usb file system is mounted properly.

5.2 Define Documentation

```
enum {
    _WM_OK,
    _WM_ERROR,
    _WM_OPEN_ERROR,
    _WM_WRITE_ERROR,
    _WM_READ_ERROR,
    _WM_CLOSE_ERROR,
```



```
    _WM_SETID_ERROR,
    _WM_SETMASK_ERROR,
    _WM_SETBAUDRATE_ERROR
};  //Return current status.
#define BYTE unsigned char
#define DWORD unsigned long
enum DEVICE_USB_CAN
{
    USB_CAN1 =0,
    USB_CAN2 =1
};  //Support two deivces.
struct _CBUS_STRUCT
{
    FT_HANDLE ftHandle[2];
}CBUS_STRU[2];


enum Baudrate
{
      BR_20KBPS = 0,
      BR_40KBPS = 1,
      BR_50KBPS = 2,
      BR_80KBPS = 3,
      BR_100KBPS = 4,
      BR_125KBPS = 5,
      BR_200KBPS = 6,
      BR_250KBPS = 7,
      BR_400KBPS = 8,
      BR_500KBPS = 9,
      BR_666KBPS = 10,
      BR_800KBPS = 11,
```

BR_1000KBPS = 12
}; //Baudrate Setting.

5.3 Function Documentation

5.3.1 int _WM_OPEN (enum DEVICE_USB_CAN dev)

Description:

Open device by choosing device index.

Parameters:

dev [IN]:

Description : Device index.

Type : enum DEVICE_USB_CAN.

Ex :

```
if(_WM_OPEN (USB_CAN1) == _WM_OK)
{
    //Open “USB_CAN1” successfully.
}
or
if(_WM_OPEN (USB_CAN2) == _WM_OK)
{
//Open “USB_CAN2” successfully.
}
```

Returns:

_WM_OK if successful, otherwise the return value is an error code.

5.3.2 int _WM_Close (enum DEVICE_USB_CAN dev)

Description:

Close device by choosing device index.

Parameters:

dev [IN]:

Description : Device index.

Type : enum DEVICE_USB_CAN

Ex :

```
if(_WM_Close (USB_CAN1) == _WM_OK)
{
    //Close “USB_CAN1” successfully.
}
or
if(_WM_Close (USB_CAN2) == _WM_OK)
{
//Close “USB_CAN2” successfully.
}
```

Returns:

_WM_OK if successful, otherwise the return value is an error code.

5.3.3 int _WM_INIT (BYTE *bDeviceID, BYTE bBRateIndex, BYTE *bAcceptMask, BYTE bMode,enum DEVICE_USB_CAN dev)

Description:

Initial the opened device.

Parameters:

bAcceptID[ ] [IN]:

Description: Set opened device ID (0x00~0xFF).

Type: BYTE Point

bBRateIndex [IN]:

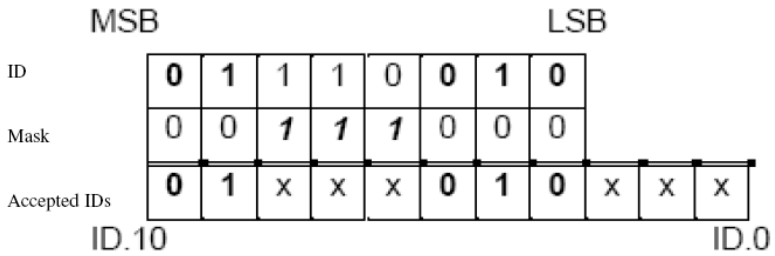
Description: Set transmitting rate

Type: BYTE

bAcceptMask[ ] [IN]:

Description: It's defined as a filter, and it determines to receive any corresponding sending data.

Type: BYTE Point



X : don't care.

The identifier consist of 11 bits (ID 10 is most significant bit). Only ID.3 – ID.10 can be set. At the bit

positions containing a "1" in the mask, any value is allowed in the composition of the identifier. The same is

valid for the three least significant bits.

bMode[ ] [IN]:

Description: 0 : Standard Mode,1 : Extended Mode.

Type: BYTE

dev [IN]:

Description : Device index.

Type : enum DEVICE_USB_CAN

Returns:

_WM_OK if successful, otherwise the return value is an error code.

5.3.4 int _WM_WritePacket(BYTE* bID, BYTE bLen, BYTE* writebuf,enum DEVICE_USB_CAN dev)

Description:

Write data with this ID header via opened device.

Parameters:

bID [IN]:

Description: Write data with this ID (0x00~0xFF) header to wanted device.

Type: BYTE Point

bLen [IN]:

Length of data to be wrote (0 - 8).

Type: BYTE

writebuf [IN]:

Description: Written Data.

Type: BYTE Point

dev [IN]:

Description : Device index.

Type : enum DEVICE_USB_CAN

Returns:

_WM_OK if successful, otherwise the return value is an error code.

5.3.5 int _WM_WriteMultiPackets(int level, BYTE* _id, BYTE* _datalen, BYTE* _data,

enum DEVICE_USB_CAN dev);

Description:

Write different data with different ID header via opened device at the same time.

Parameters:

level [IN]:

Description: It presents how many data sets to write.

Type: int

_id [IN]:

Description: Write data with this ID (0x00~0xFF) header to wanted device.

Type: BYTE Point

_datalen[IN]:

Description: Length of data to be wrote (0 - 8).

Type: BYTE Point

_data[IN]:

Description: Written Data.

Type: BYTE Point

dev [IN]:

Description: Device index.

Type: enum DEVICE_USB_CAN

Returns:

_WM_OK if successful, otherwise the return value is an error code.

5.3.6 int _WM_ReadPacket(BYTE* bID, BYTE* bLen, BYTE* readbuf, int* busheavy, int* mode,enum DEVICE_USB_CAN dev);

Description:

Read data via opened device.

Parameters:

bID [OUT]:

Description: Read data with this ID header via opened device.

Type: BYTE Point

bLen [OUT]:

Description: Received data length.

Type: BYTE Point

readbuf [OUT]:

Description: Received data.

Type: BYTE Point

busheavy[OUT]:

Description: If signal ocurrs some error to result in device not to work ,it will return non-zero value.

Type: int Point

mode[IN]:

Description: Get current mode.

Type: int Point

dev [IN]:

Description: Device index.

Type: enum DEVICE_USB_CAN

Returns:

_WM_OK if successful, otherwise the return value is an error code

5.3.7 int _WM_HW_RESET(enum DEVICE_USB_CAN dev);

Description:

Hardware Reset Function.

Parameters:

dev [IN]:

Description: Device index.

Type: enum DEVICE_USB_CAN

Returns:

_WM_OK if successful, otherwise the return value is an error code

5.3.8 int _WM_SW_RESET(enum DEVICE_USB_CAN dev);

Description:

Software Reset Function.

Parameters:

dev [IN]:

Description: Device index.

Type: enum DEVICE_USB_CAN

Returns:

_WM_OK if successful, otherwise the return value is an error code.