Gowin USB Programming Download Cable

User Guide

UG112-1.1.1E, 07/21/2022

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Revision History

Date	Version	Description
03/28/2017	1.0E	Initial version published.
07/15/2022	1.1E	The descriptions of PL-U2X-Cable added.
07/21/2022	1.1.1E	Figure 2-4 Cable Functional Block Diagram updated.

Contents

List of Figures

List of Tables

1 About This Guide

1.1 Purpose

This guide includes two parts:

1. The features, functions, signal definitions of Gowin USB programming download cable;
2. How to install, download, and use Gowin USB programming download cable.

For simplification, Gowin USB programming download cable is hereinafter referred to as the “cable”.

1.2 Supported Products

The cable in the guide applies to all Gowin FPGA products.

1.3 Related Documents

The latest user guides are available on the GOWINSEMI Website. You can find the related documents at www.gowinsemi.com:

1. DS100, GW1N series of FPGA Products Data Sheet
2. UG103, GW1N series of FPGA Products Package and Pinout User Guide
3. UG290, Gowin FPGA Products Programming and Configuration Guide
4. DS102, GW2A series of FPGA Products Data Sheet
5. UG111，GW2A series of FPGA Products Package and Pinout User Guide

1.4 Terminology and Abbreviations

The terminology and abbreviations used in this manual are as shown in Table 1-1.

Table 1-1 Terminology and Abbreviations

Terminology and Abbreviations	Meaning
FPGA	Field Programmable Gate Array
USB	Universal Serial Bus

1.5 Support and Feedback

Gowin Semiconductor provides customers with comprehensive technical support. If you have any questions, comments, or suggestions, please feel free to contact us directly by the following ways.

Website: www.gowinsemi.com

E-mail: support@gowinsemi.com

2 Introduction

Gowin USB programming download cable is mainly used to download the bit stream file generated by Gowin Software to Gowin FPGA chip or external storage device. Gowin USB programming download cable is available in two versions, including PL-USB-Cable and PL-U2X-Cable.

2.1 Appearance and Composition

The appearance of PL-USB-Cable is shown in Figure 2-1.

Figure 2-1 The Appearance of PL-USB-Cable

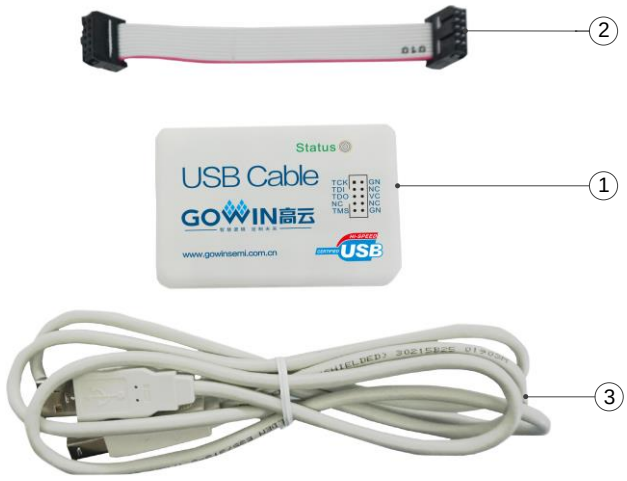
The appearance of PL-U2X-Cable is shown in Figure 2-2.

Figure 2-2 The Appearance of PL-U2X-Cable

As shown in Figure 2-3, in addition to the download cable ①, a flat cable ② and a connection cable ③ are also contained in Gowin USB cable box. The list is as follows:

1. One download cable
2. One 10 Pin cable
3. One USB-A to USB-B type connection cable

Figure 2-3 Box List



① Download Cable
② Flat Cable
③ Connection Cable

Note!

The red line in cable ② is Pin1(TCK).

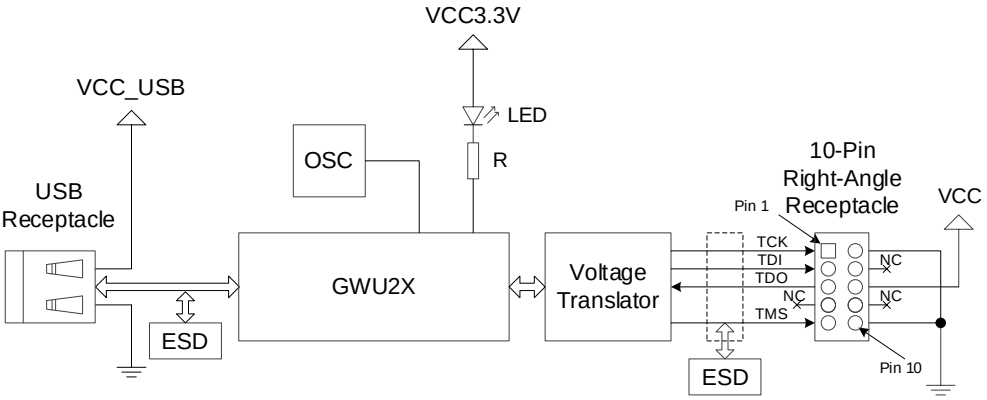
2.2 Features

- Support Windows and Linux operating systems;
- Support all series of Gowin FPGA products;
- Download the bitstream file of the internal SRAM, on-chip Flash, and off-chip Flash via JTAG.
- The USB interface supports USB1.0, USB2.0;
- The USB interface supports DC +5V power supply;
- The JTAG interface supports 1.2V~3.3V programming download;
- PL-USB-Cable JTAG interface up to 30MHz; PL-U2X-Cable JTAG interface at a fixed rate of 1.33MHz;
- LED power supply, download instructions;
- Conform to RoHS standard.

2.3 Functional Block Diagram

The functional block diagram of the cable mainly includes USB interface socket, ESD, OSC, USB interface circuit. FPGA, LED, level conversion circuit, and JTAG socket. The USB programming download cable supports JTAG download of all series of Gowin FPGA products, downloading bitstream files from FPGA SRAM, on-chip Flash, and off-chip Flash. It also supports Gowin online logic analyzer.

Figure 2-4 Cable Functional Block Diagram



2.4 Signal Definition

Table 2-1 JTAG Interface Signal Definition

Pin No.	Signal Name	I/O	Description
1	TCK	O	Clock signal
2	GND	-	GND
3	TDI	O	Data sent to the device
4	NC	-	-
5	TDO	I	Data received from the device
6	VCC		Input VCC on the device
7	NC	-	-
8	NC	-	-
9	TMS	O	Control signal of state machine
10	GND	-	GND

Table 2-2 Signal Definition of USB Interface

Pin No.	Signal Name	I/O	Description
1	VCC_USB	I	Input power on USB
2	USB_D+	I/O	Differential data on USB interface
3	USB_D-	I/O	Differential data on USB interface
4	GND	-	Power Ground

2.5 AC/DC Characteristic

The limit working parameters of the cable and the recommended working parameters of VCC are introduced follows. It is recommended to use advised working conditions to ensure reliably operation of the cable.

Table 2-3 Limit Operating Parameters

Item	Description	Min.	Max.	Unit
VCC	Device-side power supply	-0.3	4.6	V
VCC_USB	USB-side power supply	-0.5	6.0	V
I_O	Output current	-50	50	mA
I_I	Input current	-50	50	mA

Table 2-4 Recommended Operating Parameters Based on VCC

Item	I/O Level	Min.	Max.	Unit
VCC	3.3	3.0	3.6	V
	2.5	2.375	2.625	V
	1.8	1.71	1.89	V
	1.5	1.43	1.57	V
	1.2	1.14	1.26	V

2.6 ESD Features

Comply with IEC 61000-4-2 standard.

ESD protection ±15kV for contacting discharge and ±8kV for air discharge.

3 Cable Driver

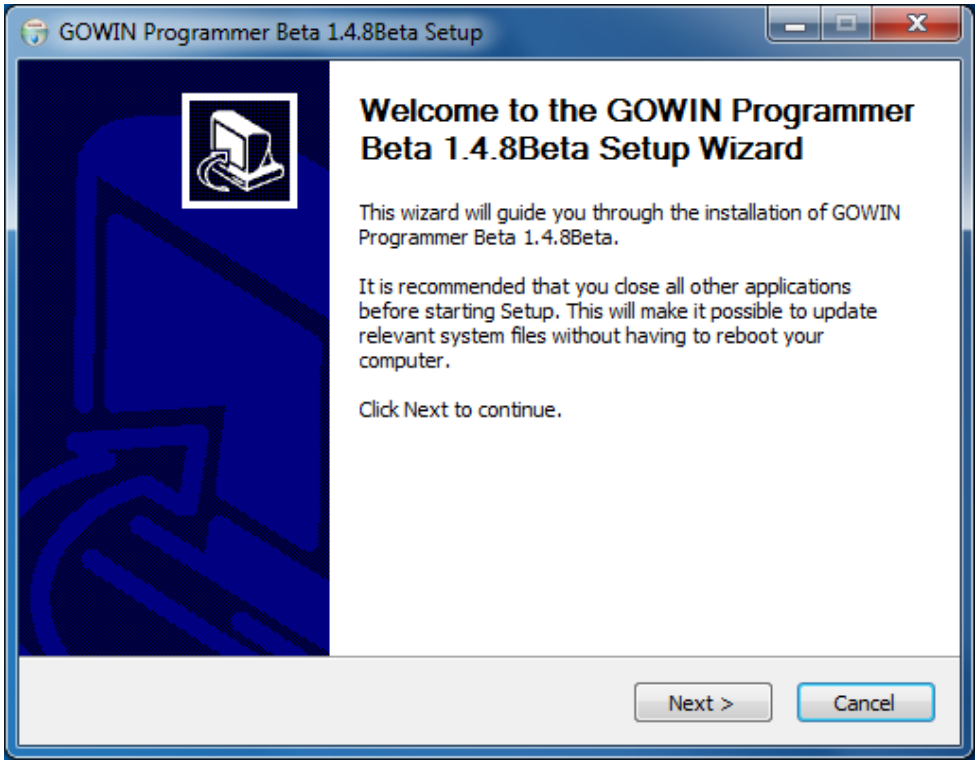
3.1 PL-USB-Cable Driver

3.1.1 Windows

Before using the cable, you need to install the driver on your Windows system. Download the Programmer installer from the support and download interface of Gowin Website.

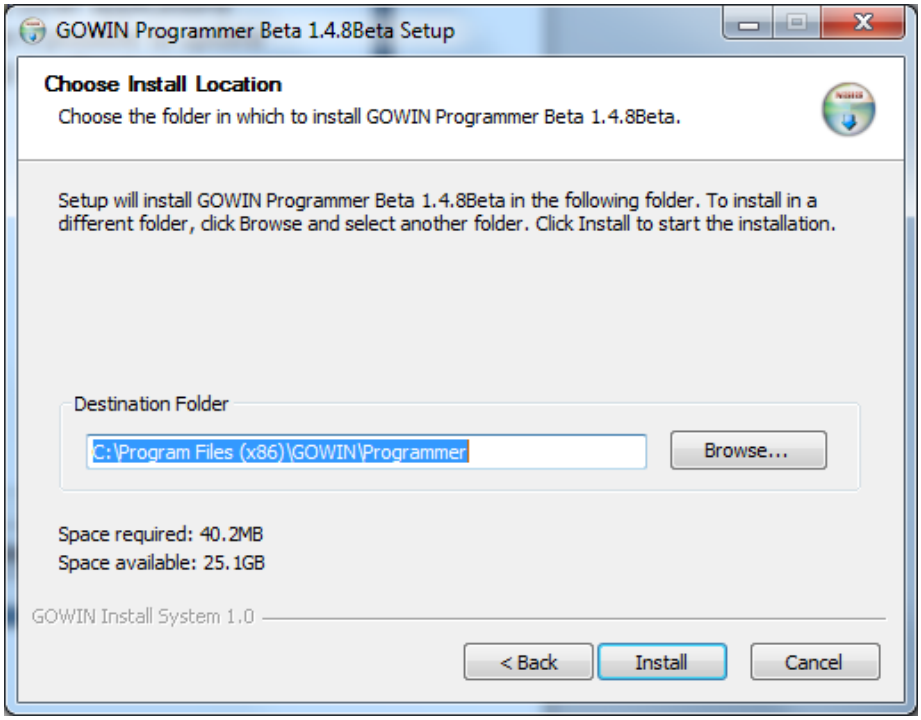
1. Double click the installer after finishing download. The interface pops up, as shown in Figure 3-1.

Figure 3-1 Programmer Setup



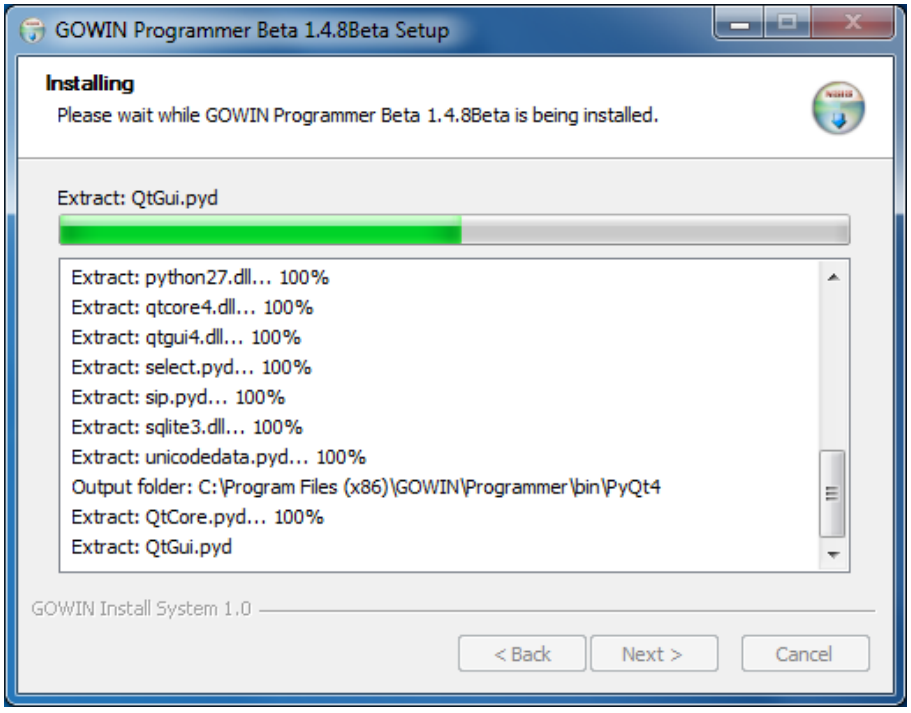
2. Click "Next>" to install Programmer, as shown in Figure 3-2.

Figure 3-2 Select Programmer Installation Directory



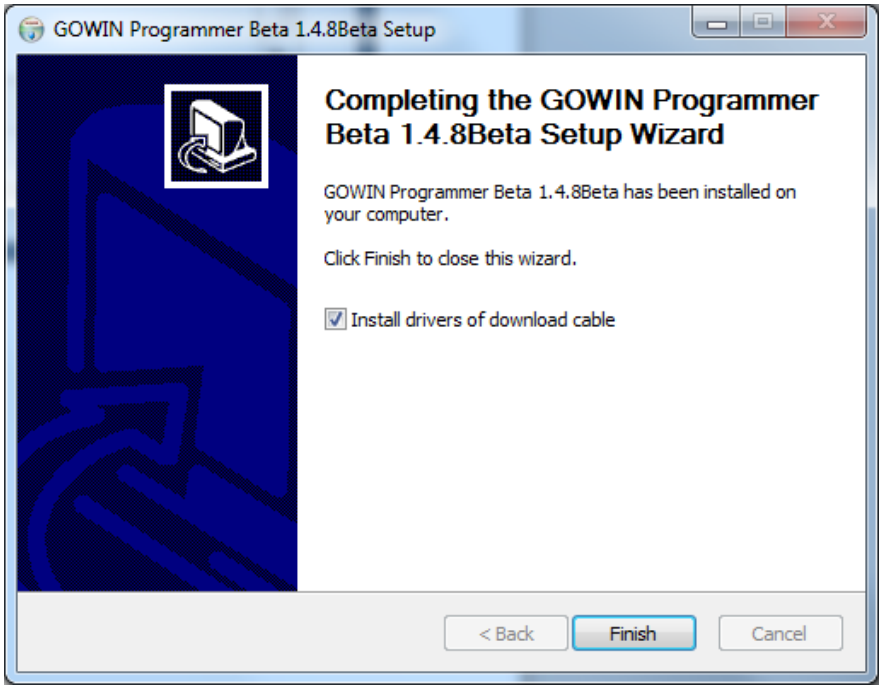
3. Install via clicking "Install" after selecting the installation directory, as shown in Figure 3-3.

Figure 3-3 Installing Programmer



4. Click "Finish" to install Programmer, as shown in Figure 3-4.

Figure 3-4 Finish Installing Programmer



5. After installing Programmer, click "Extract" to start extracting the cable driver, as shown in Figure 3-5. The interface of extracting the cable driver is as shown in Figure 3-6.

Figure 3-5 Start to Unpack Cable Driver

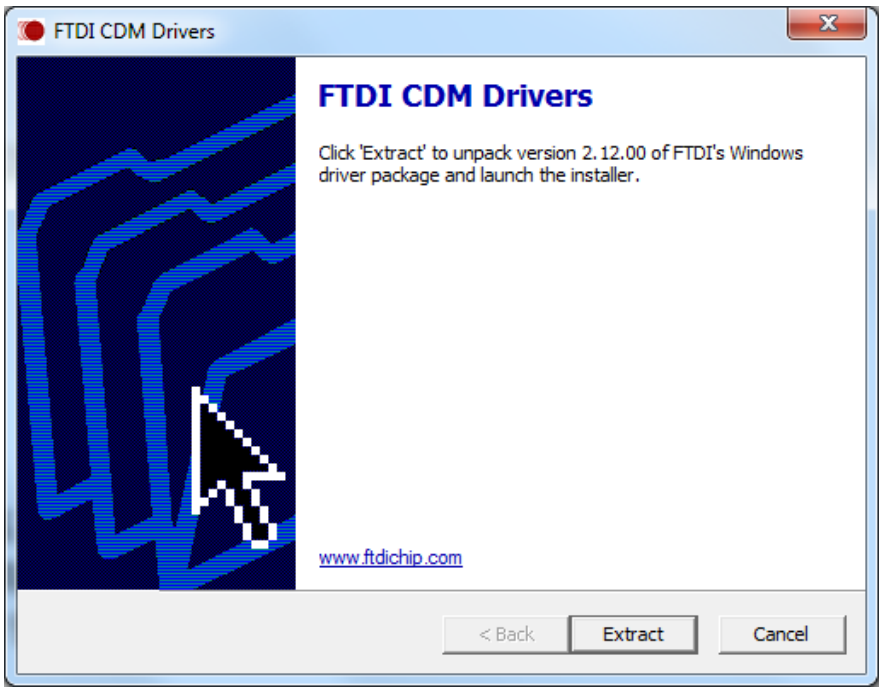
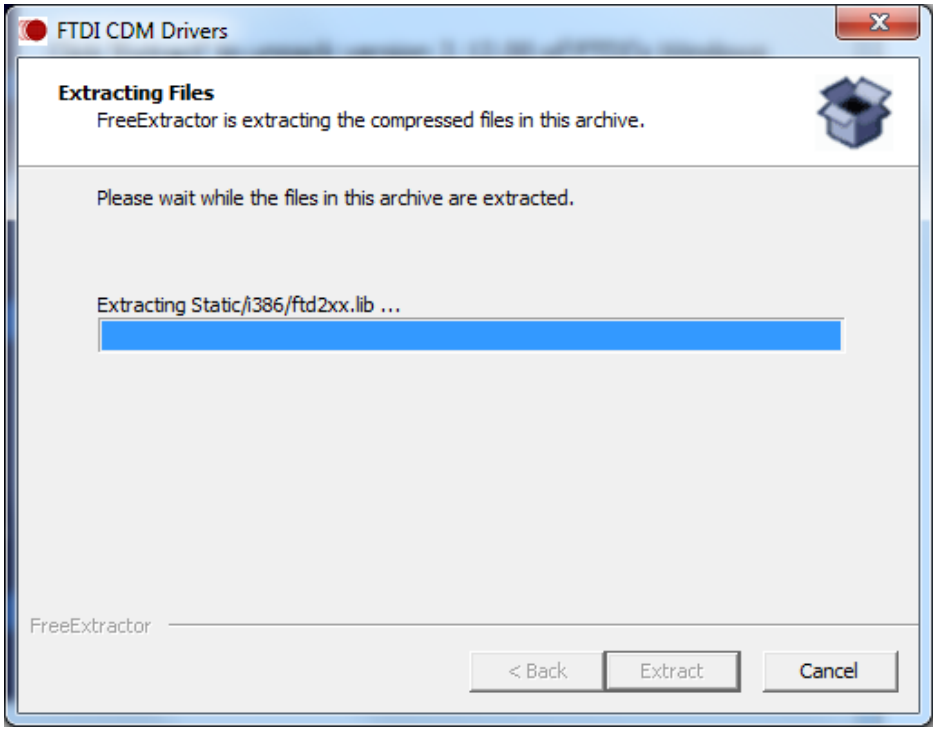
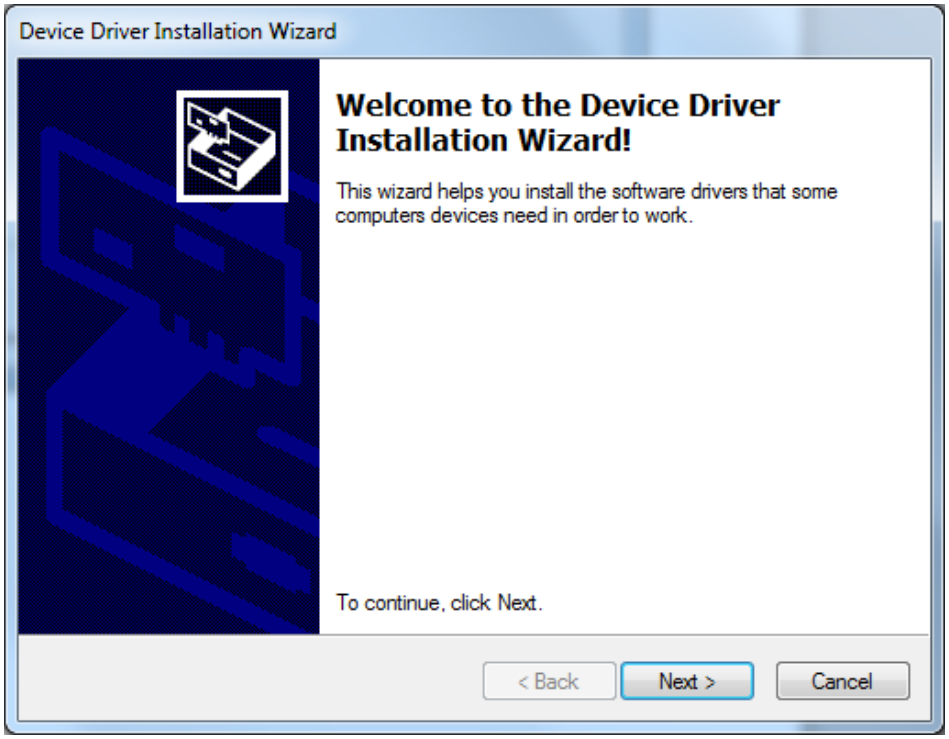


Figure 3-6 Unpacking Cable Driver



6. After finish unpacking, click "Next>" to the next step, as shown in Figure 3-7.

Figure 3-7 Finish Installing Cable Driver



7. Select "I accept this agreement" and click "Next>" to install, as shown in Figure 3-8. The cable driver installation interface is as shown in Figure 3-9.

Figure 3-8 Agreement License

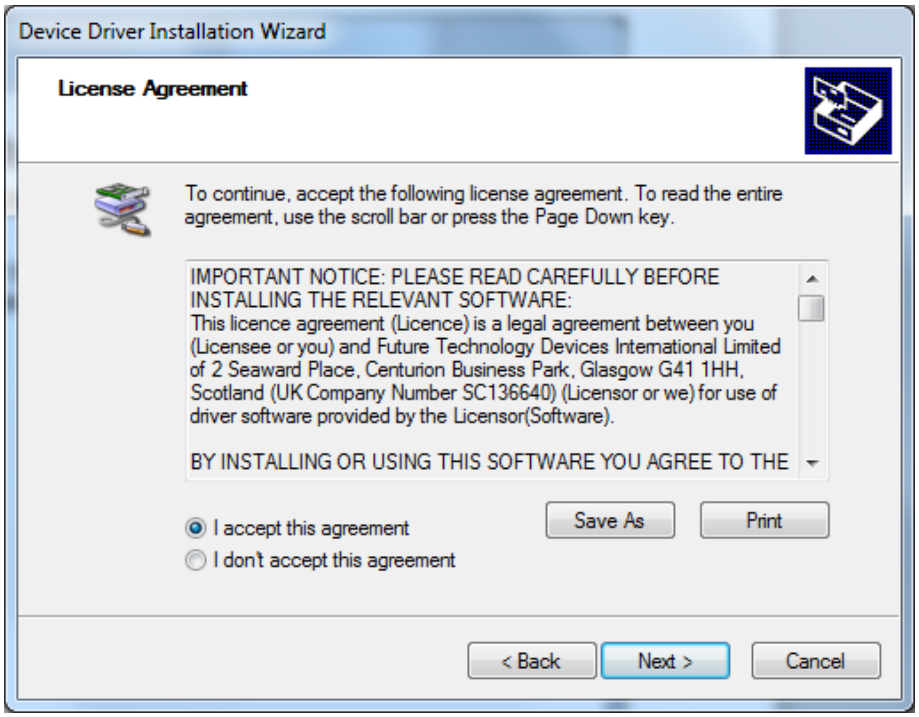
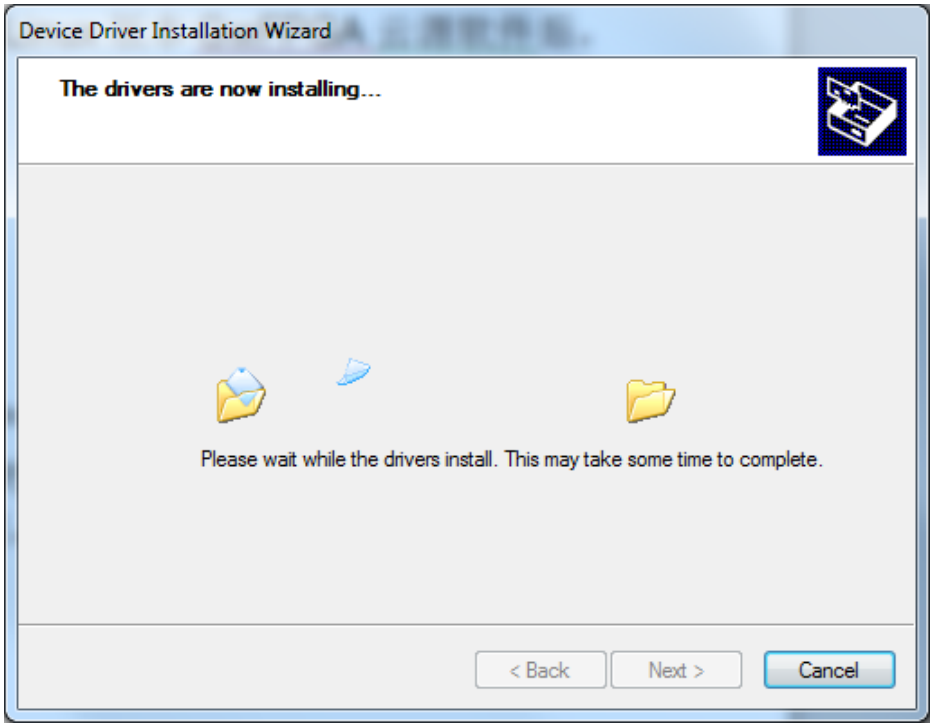
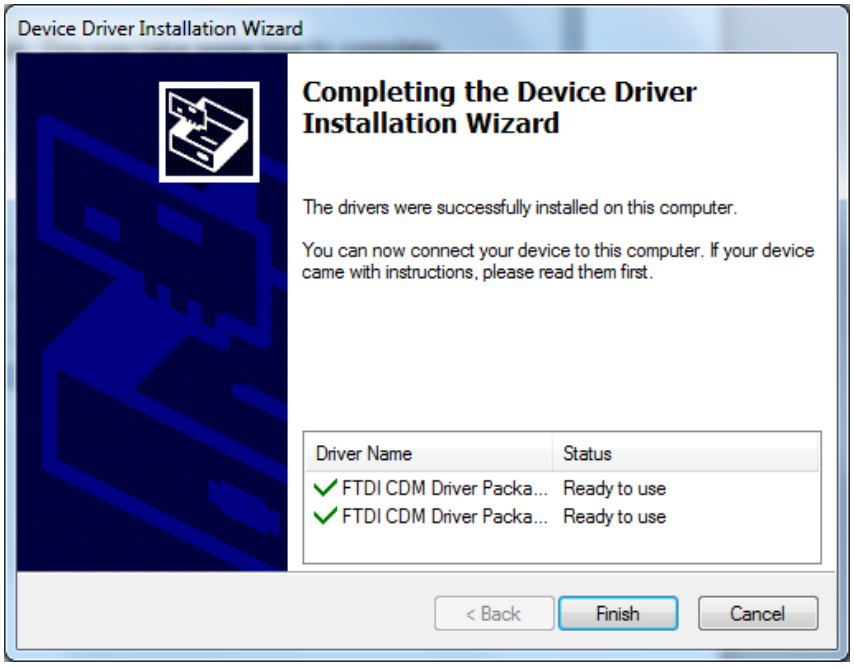


Figure 3-9 Installing Cable Driver



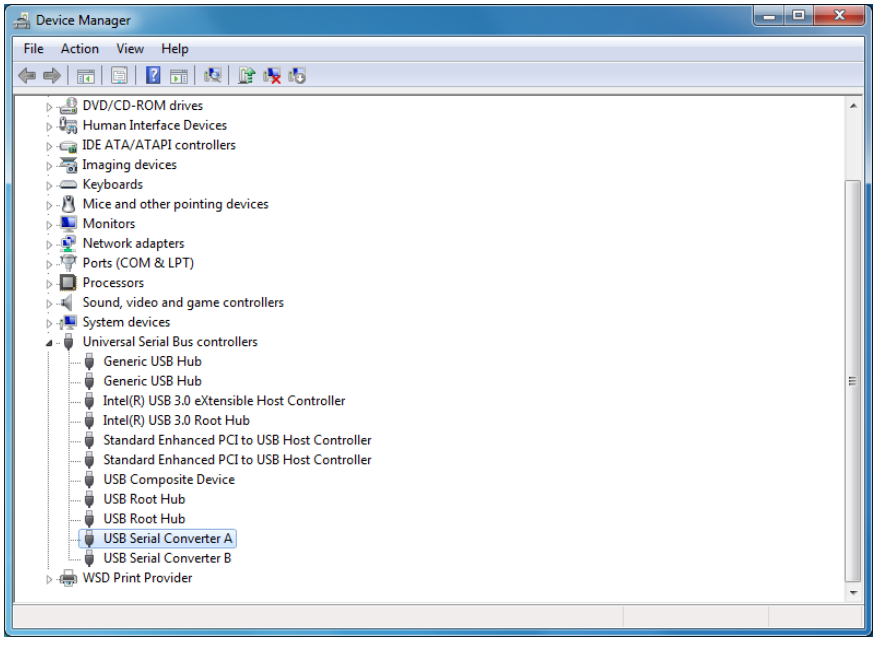
8. Click "Finish" to finish installing the cable driver, as shown in Figure 3-10.

Figure 3-10 Finish Installing Cable Driver



9. The “USB Serial Converter A” is appeared at the end of the Universal Serial Bus controller after the USB download cable is connected to the PC, which means that the cable driver is installed successfully and you can download/configure the FPGA through the download cable, as shown in Figure 3-11.

Figure 3-11 Cable Driver Interface on PC



3.1.2 Linux

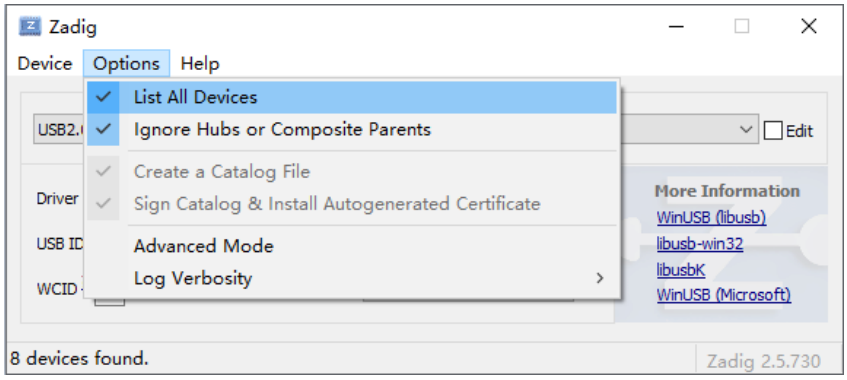
The cable driver is not required to be installed. You can use the USB download cable after downloading the Gowin Software of Linux version.

3.2 PL-U2X-Cable Driver

3.2.1 Windows

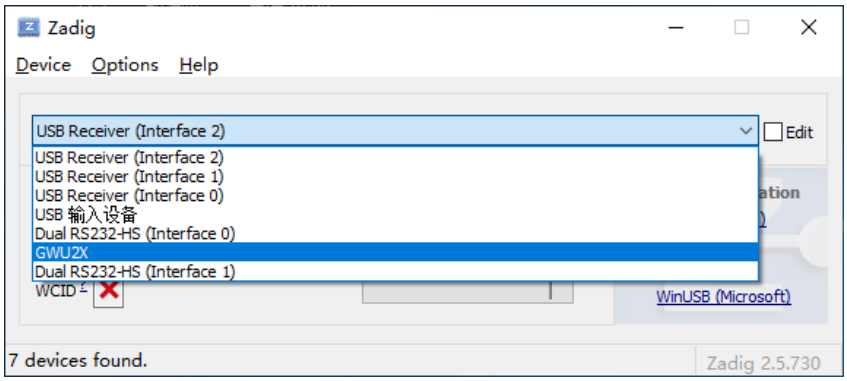
1. Download and save Zadig driver installer:https://github.com/pbatard/libwdi/releases/download/v1.4.1/zadig-2.7.exe.
2. Connect GWU2X device to the computer USB interface, double-click to open Zadig (administrator privileges required), click “Options”, and check the "List All Device" option. All USB devices connected to the computer will be listed, as show in Figure 3-12.

Figure 3-12 Check “List All Device” Option



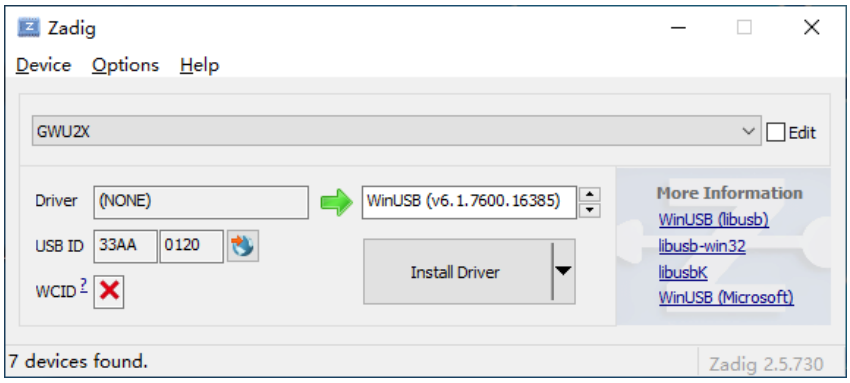
3. Select the GWU2X device that requires driver installation, as show in Figure 3-13.

Figure 3-13 Select the Device that Requires Driver Installation



4. Select the driver to be installed, use libusb+WinUSB, and select WinUSB, as show in Figure 3-14.

Figure 3-14 Select the Driver to be Installed



5. Click “Install Driver”. The driver will be installed after a few moments.

Note!

The button displays "Install Driver" if the driver is not currently installed, and "Replace Driver" if another driver is currently installed.

3.2.2 Linux

The cable driver is not required to be installed.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