



## Getting Started

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### Mpression USB 3.0 Type-C PD Card

Revision 1.10

2018/03/19

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# 1. Read This First

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## 1.1 Important Information

### READ FIRST:

- **READ** Getting Started before using this product.
- **Keep** Getting Started so you can refer to it when necessary.
- **Do not attempt** to use the board until you fully understand its mechanisms.

### Purpose of the Product:

- This product is intended for evaluation and verification of systems that used Power Delivery and USB 3.0 Type-C interfaces with evaluation boards equipped with FPGA from Intel. It provides support for verification of both software and hardware. Be sure to use this product correctly for this purpose.

### For Users of This Product:

- This product should be used only by individuals who have carefully read and understand these materials and the reference manual. Use of this product requires a basic knowledge of FPGAs, logic circuits, electronic circuits, and microcomputers.

### Precautions to be taken when using This Product:

- This product is to be used for development of a program, and the evaluation stage. **You cannot install the board in your product** and cannot use the board for mass-production. When mass-producing a program you have finished developing, be sure to decide at your own responsibility whether it can be put to practical use by performing integration test, evaluation, or some other experiment.
- In no event shall Macnica Inc. be liable for any consequence arising from the use of this product.
- Macnica Inc. shall make effort to provide a workaround or fix for failures of this product, with or without charge. This does not mean, however, that Macnica Inc. guarantees to provide a workaround or fix under all circumstances.
- Macnica Inc. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in Getting Started and on the product are therefore not all-inclusive. Use this product correctly and safely at your own responsibility.
- Even if a device installed on this product has a failure, it cannot be replaced.
- The USB 3.0 Type-C interface is not guaranteed to connect to all equipment.
- Remodeling or damages caused by the customer is not guaranteed.
- This product is a lead-free mounting product.
- Generally, the brand names carried in this Getting Started each constitute a maker's trademark or registered trademark.

**Improvement Policy:**

- Macnica Inc. pursues a policy of continuous improvement in design, performance, and safety of the product.  
Macnica Inc. reserves the right to change, wholly or partially, specifications, design, Getting Started, and other documentation at any time without notice.

**Warranty:**

- Macnica Inc. offers exchange of this product free of charge only in a set range of cases of initial trouble for this product, and within 30 days from when the customer received delivery of the Board.  
Macnica Inc. cannot exchange products in cases where breakdown is caused for the following reasons:  
(1) Misuse, abuse of the product or use under abnormal conditions  
(2) Remodeling or repair  
(3) A fire, earthquake, fall or other accidents

**Figures:**

- Some figures in this reference manual may differ from your system as purchased.

## 1.2 Developer Information

The Developer of this product is:

Macnica Inc.

1-6-3 Shin-Yokohama, Kouhoku-ku, Yokohama, 222-8561 JAPAN

## 1.3 Inquires

In case you have any inquiries about the use this product, please contact your local Macnica company or make inquiries through the contact form in the following web site:

<http://www.m-pression.com/contact>




Macnica companies:

- |                  |                       |   |
|------------------|-----------------------|---|
| • China & HK:    | Cytech Technology     | <a href="http://www.cytech.com/">http://www.cytech.com/</a>                     |
| • ASEAN & India: | Cytech Global         | <a href="http://www.cytechglobal.com/">http://www.cytechglobal.com/</a>         |
| • Taiwan:        | Galaxy Far East Corp. | <a href="http://www.gfec.com.tw/">http://www.gfec.com.tw/</a>                   |
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|                  | Elsena                | <a href="http://www.elsena.co.jp">http://www.elsena.co.jp</a>                   |



## 2. For Ensuring Safe Use



Be sure to follow the precautions given here, which are intended to prevent harm to the user and others as well as material damage.


### 2.1 Legend

 <b>Danger</b>	Indicates an imminent hazardous situation which if not avoided will result in death or serious injury.
 <b>Warning</b>	Indicates a potentially hazardous situation which if not avoided could result in death or serious injury.
 <b>Caution</b>	Indicates a potentially hazardous situation which if not avoided may result in minor or moderate injury or in property damage.

### 2.2 Cautions

 <b>Danger</b>	<p>Be sure to use the AC adapter (included in the package), which meets the specifications described in this manual.</p> <p>Using an AC adapter not meeting the specifications described in this Manual may cause the kit to emit heat, explode, or ignite.</p>
 <b>Warning</b>	<p>Do not apply strong impacts or blows to the kit.</p> <p>Doing so may cause the kit to emit heat, explode, or ignite, or the equipment in the kit to fail or malfunction. This may also cause fire.</p>
	<p>Do not put the main unit or the AC adapter in cooking appliances such as microwave ovens, or high-pressure containers. Doing so might cause the main unit or AC adapter to emit heat, explode, ignite, or emit smoke, or its parts to break or warp.</p>
	<p>Do not wrap the main unit that is in use with cloth or other materials that are likely to allow heat to build up inside the wrapping.</p> <p>This will cause heat to build up inside the wrapping which may cause the main unit to ignite or malfunction.</p>
	<p>When disposing of the main unit, do not dispose of it along with general household waste.</p> <p>Throwing the main unit into fire may cause it to explode. Dispose of the main unit following the laws, regulations, and ordinances governing waste disposal.</p>
	<p>Do not pull the power supply cable with excessive force or place heavy items on it.</p> <p>Do not damage, break, bundle, or tamper with the power supply cable.</p> <p>Damaged parts of the power supply cable might cause a short circuit resulting in fire or accidents involving electrical shock.</p>
	<p>Do not plug or unplug the power plug with wet or moist hands.</p> <p>This might cause injuries or equipment malfunctions or failures due to electrical shock.</p>

 <b>Warning</b> (Continued from previous page)	<p>Plug the power plug securely into the outlet.</p> <p>If the power plug is not securely plugged into the outlet, it may cause accidents involving electrical shock or fire due to the heat that is emitted.</p>
	<p>Do not connect many electrical cords to a single socket or connect an AC adapter to an outlet that is not rated for the specified voltage.</p> <p>Doing so may cause the equipment to malfunction or fail, or lead to accidents involving electrical shock or fire due to the heat that is emitted.</p>
	<p>Periodically remove any dust accumulated on the power plug and around the outlet (socket).</p>
	<p>Do not use a power plug with dust accumulated on it because doing so will lead to insulation failure due to moisture which may lead to fire.</p>
	<p>Remove any dust on the power plug and around the outlet with dried cloth.</p>
	<p>Do not place any containers such as cups or vases filled with water or other liquid on this Board.</p> <p>If this Board is exposed to water or other liquids it may cause the Board to malfunction or lead to accidents involving electrical shock. If you spilled water or other liquid on this Board, immediately stop using the Board, turn off the power, and unplug the power plug. If you have any requests for repairs or technical consultation, please contact the local Macnica company or Mpression inquiry URL.</p>
 <b>Caution</b>	<p>Keep this board and accessories out of reach of children. Failure to do so may lead to injuries.</p>
	<p>Do not place the kit on unstable places such as shaky stands or tilted locations. Doing so may cause injuries or cause this Board to malfunction if the Board should fall.</p>
	<p>Do not attempt to use or leave the kit in places subject to strong direct sunlight or other places subject to high temperatures such as in cars in hot weather. Doing so might cause the kit to emit heat, break, ignite, run out of control, warp, or malfunction. Also, some parts of the equipment might emit heat causing burn injuries.</p>
	<p>Do not use the kit in places subject to extremely high or low temperatures or severe temperature changes.</p> <p>Doing so may cause the kit to fail or to malfunction. Always be sure to use the kit within a temperature range of 5°C to 35°C and a humidity range of 0% to 85%.</p>
	<p>Unplug the power supply cable when carrying out maintenance of devices in which the main unit is embedded.</p> <p>Failure to do so may lead to accidents involving electrical shock.</p>
	<p>Do not place the board in locations where excessive force may be applied to it. Doing so may cause the PC board to warp, leading to breakage of the PC board, missing parts or malfunctioning parts.</p>
	<p>When using the kit together with expansion boards or other peripheral devices, be sure to carefully read each of their manuals and to use them correctly.</p> <p>Developer does not guarantee the operation of specific expansion boards or peripheral devices when used in conjunction with this Board unless they are specifically mentioned in this Manual or their successful operation with this Board has been confirmed in separate documents.</p>

 <p><b>Caution</b> (Continued from previous page)</p>	<p>Be sure to turn off the power switch when moving this Board to connect to other devices. Failure to do so may cause this Board to fail or lead to accidents involving electrical shock.</p>
	<p>Do not clean this Board by using a rag containing chemicals such as benzine or thinner. Failure to do so will likely to cause this Board to deteriorate. When using a chemical cloth be sure to comply with any directions or warnings.</p>
	<p>Do not immediately turn on the power if you find that water or moisture had condensed onto the main unit after removing the board from the package. Condensation might occur on this Board when taking it out of the box, if the board is cool yet the room temperature is warm. Do not apply power to the Board while water or moisture has condensed on it because the moisture may cause the Board to break or may shorten the service life of the parts.</p>
	<p>When you first take this Board out of the box be sure to leave it at room temperature for a while before using it. If condensation or moisture has occurred on this Board, first wait for the moisture to fully evaporate before installing or connecting the Board to other devices.</p>
	<p>Do not disassemble, dismantle, modify, alter, or recycle parts unless they are clearly described as customizable in this Manual. Although this kit is customizable, overall product operation cannot be guaranteed if parts needed for basic operations which are not specified in this Manual as customizable are modified in any way. Please contact the local Macnica company or Mpression inquiry URL beforehand if you wish to customize or modify any parts that are not described in this Manual as customizable.</p>



## 3. Advanced Preparations

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### 3.1 About this Manual

This manual explains how to use the reference designs used for this board. In addition, the following is also described in this manual.

- Basic specifications of the board
- Execution of sample designs used for Mpression Sodia -Cyclone® V ST evaluation board

### 3.2 Advanced Preparations

#### 3.2.1 Preparing Reference Designs

The following items are included with the reference designs that are provided.

- Reference Design (Verilog-HDL)
- Set of project files for Intel Quartus Prime
- Set of binary files for Cypress firmware  
(\* Including firmware for FX3 and firmware for CCG3)
- Board documentation  
Circuit diagram  
List of parts  
Layout

Download the designs above from the URL noted below.

<https://service.macnica.co.jp/catalog/124765>

Furthermore, you can see details about Mpression Sodia board here.

[Mpression Sodia board](#)

#### 3.2.2 Preparing Equipment

Prepare the following equipment to execute all of the functions of these designs.

- This board: 1 ea.
- Mpression Sodia board: 1 ea.
- Microtroix's HDMI Receiver/Transmitter HSMC Daughter Card: 1 ea.  
(An internal color bar appears if you do not connect this daughter.)
- DVI compatible monitor: 1 ea.
- DVI cable: 1 ea.
- USB 3.0 Type-C cable: 1 ea.
- PC that supports USB 3.0 Type-C video imaging output: 1 ea.
- Image output device: 1 ea.
- Intel FPGA download cable: 1 ea.
- Cable for downloading Cypress programs (PSOC MiniProg3): 1 ea.

<http://japan.cypress.com/documentation/development-kitsboards/cy8ckit-002-psoc-miniprogram-and-debug-kit>

### 3.2.3 Preparing Tools

Prepare the following tools before operating these designs.

- Intel Quartus Prime 16.1
- Free tool VLC media player  
<http://www.videolan.org/vlc/index.ja.html>
- Cypress USB Control Center (included in EZ-USB FX3 Software Development Kit)  
<http://japan.cypress.com/documentation/software-and-drivers/ez-usb-fx3-software-development-kit>
- PSoC® Programmer 3.25  
<http://japan.cypress.com/documentation/software-and-drivers/psoc-programmer-3245>

### 3.2.4 Intel's IP Used for These Reference Designs

These reference designs use the following Intel IPs. Prepare the necessary licenses if you are going to recompile.

- Display Port IP
- VIP (Video and Image Processing Suite)

### 3.2.5 Evaluation Environment

1) Desktop PC environment

Manufacturer: Dell

Model: Optiplex 920

Processor: Intel(R) Core(TM) i7-4770 CPU @ 3.40 GHz

Equipped memory: 24.0 GB

Operating system: Windows 7 Professional 64bit

- Desktop evaluation environment A:  
Environment should use the USB controller in the desktop PC to connect the board to a USB 3.0 host connector Type-A using a USB 3.0 Type-A to USB 3.0 Type-C conversion cable.
- Desktop evaluation environment B:  
Environment should use a commercially available USB 3.0 Type-C expansion PCI card inserted in the PCI slot of the desktop PC to connect the USB 3.0 Type-C connector on the PCI card to the board using a USB Type-C cable.

USB 3.0 Type-C expansion PCI card: REX-PEU31-AC

Manufacturer: RATOC Systems

<http://www.ratocsystems.com/products/subpage/peu31ac.html>

2) Notebook PC environment

Manufacturer: Apple

Model: MacBook Pro Retina 2600

Processor: Core i5 2.6 GHz/2 core

Equipped memory: 8 GB

Operating system: macOS Sierra

## 4. Setup

### 4.1 Board Specifications

This section explains the board's layout and major parts. The board's layout is shown below.

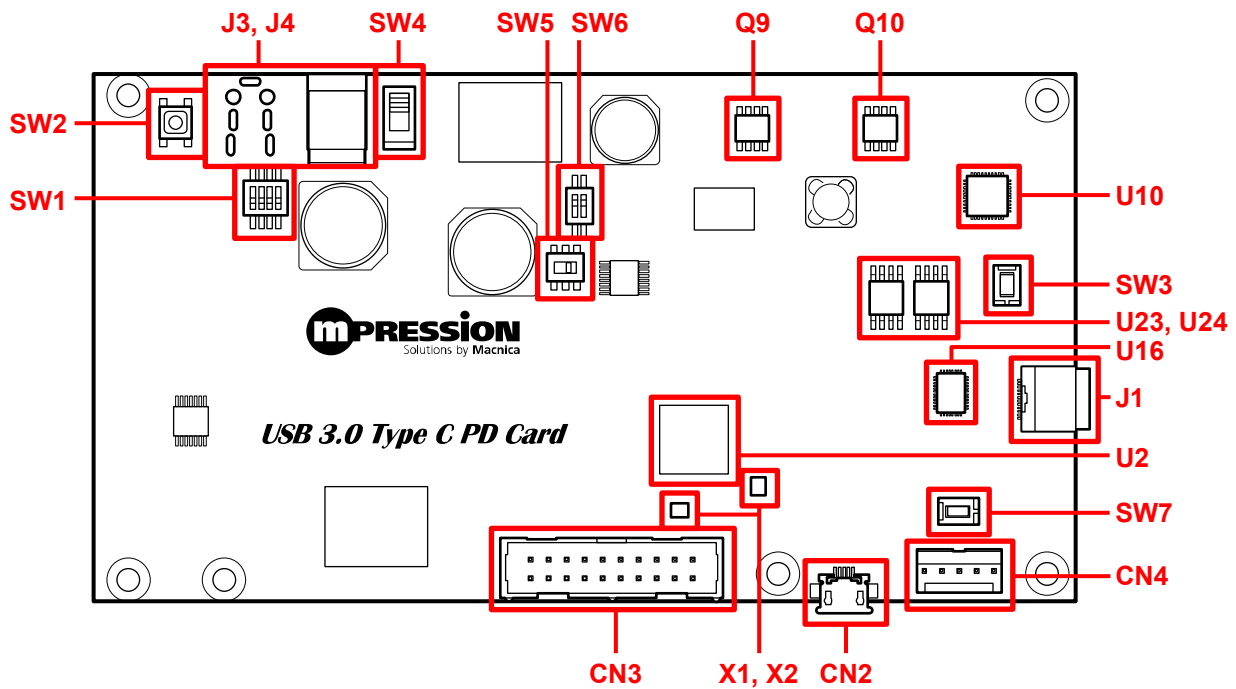


Figure 4-1 Layout (Top View)

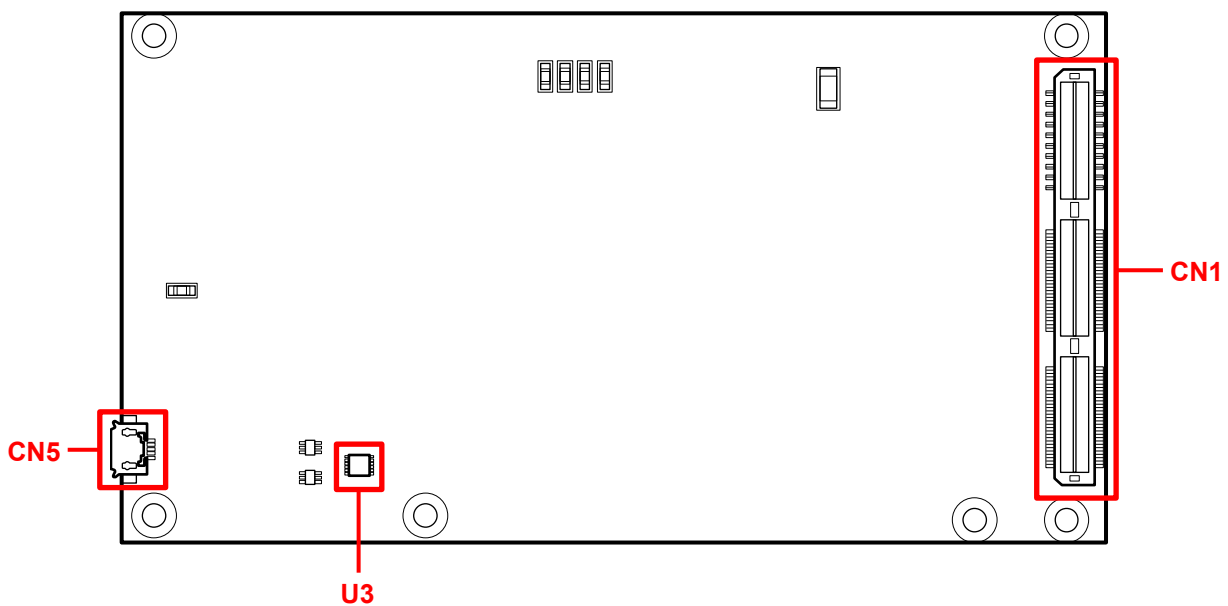


Figure 4-2 Layout (Bottom View)

Table 1 Major Parts of the Board


	Reference	Function	Details
<b>Device</b>			
1	U2	Cypress EZ-USB®FX3	SuperSpeed USB controller
2	U10	Cypress EZ-PD™ CCG3	USB Type-C port controller
3	U16	PARADE PS8742	USB device/USB Type-C redriver switch for DisplayPort sinking
4	Q9, Q10	N channel MOSFET	For controlling USB PD
5	U3	USB to UART bridge	USB to UART bridge chip
6	U23, U24	EEPROM	EEPROM for FX3 FW
7	X1, X2	19.2 MHZ liquid crystal oscillator, 32.768 KHZ liquid crystal oscillator	Clock for FX3
<b>Interface</b>			
8	J1	USB Type-C connector	USB Type-C connector
9	J3, J4	DC jack	24 VDC power input
11	CN1	HSMC connector	Connector for FPGA main board
10	CN2	USB Micro-B connector	Connector for FX3 UART
11	CN3	JTAG connector	Connector for FX3 JTAG
12	CN4	All-purpose connector	Connector for CCG3 program
13	CN5	USB Micro-B connector	Connector for CCG3 debugging
14	SW1	FX3 boot mode selection switch	Boot mode can be selected by setting of SW1 [3:1]
15	SW2	FX3 reset push switch	FX3 reset
16	SW3	CCG3 reset push switch	CCG3 reset
17	SW4	Power switch	
18	SW5	Switch for selecting VBUS output	Can switch from automatic control to manual control via the CCG3
19	SW6	Switch for manual control of VBUS output	Can control output voltage to VBUS via SW6[2:1] if the SW5 setting is set to manual control
20	SW7	Push switch for CCG3 interruption	External interruption switch for CCG3
21	LD1, LD10	HSMC 3.3 V status LED	LEDs for hot plug status of DisplayPort Sink and 3.3 V from HSMC: Lights when operating normally
22	LD3, LD4, LD5, LD6, LD7, LD8, LD9	Power status LED	FX3's 1.2V, 2.5 V, 3.3 V, 5 V, USB_P_PWR (USB provide power), other (Except FX3's) 3.3 V, 5 V power statuses: Lights when operating normally

## 4.2 Board Setup

### 4.2.1 How to Connect to the Evaluation Environment

Set up the evaluation environment before activating the board. The setup method is shown below.

- 1) Connect the board to the HSMC Port A on a Sodia board.
- 2) Connect an HDMI Receiver/Transmitter HSMC Daughter Card to the HSMC Port B on the Sodia board.
- 3) Connect the DVI cable to the DVI monitor and CN9 on the Sodia board.
- 4) Connect the USB 3.0 Type-C cable to J1 on the board.  
 (\* Connect the Type-C cable to the PC to execute reference designs.)
- 5) Connect an HDMI cable to the HDMI port on the image output device and the RX port on the HDMI Receiver/Transmitter HSMC Daughter Card.
- 6) Connect Sodia's AC adapter to Sodia's DC jack (CN14).
- 7) Connect the 24 VAC adapter for the board to the board's DC jack (J3).
- 8) Connect the Intel FPGA download cable to Sodia's J12.

 <b>Warning</b>	<p>The rated voltage for the output of the AC adapter for the board and the AC adapter for Sodia are different.          Be careful to not mistake which DC jack you insert them into.          Inserting them into the wrong jack will damage this board and the Sodia board.</p> <p>Rated voltage for AC adapter output for the board: 24 V          Rated voltage for AC adapter output for the Sodia board: 12 V</p> <p>Furthermore, operation of the board is not guaranteed if you use an AC adapter other than the one provided with the board. Always use the AC adapter provided.</p>
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## 4.2.2 External View of Evaluation Environment

Connect the board to HSMC Port A on the Sodra board and connect the HDMI Receiver/Transmitter HSMC Daughter Card to the HSMC Port B and secure them with the provided spacers, as shown in Figure 4-3.

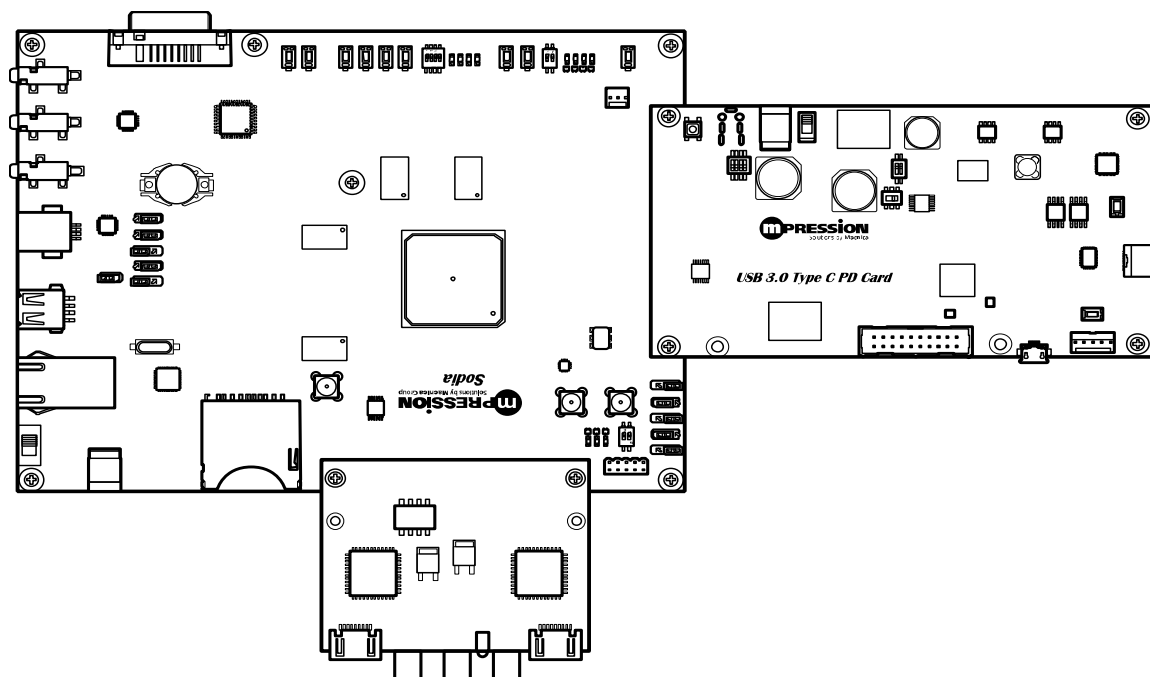



Figure 4-3 How to Secure the Boards

## 4.2.3 Switch Settings

The board's switch settings are shown below.

Reference	Name of Signal	Settings
SW1	FX3 boot mode selection switch	SW1[4:1] OFF ON OFF OFF (I2C only)
SW5	Switch for selecting VBUS output	SW5 1, 4 sides (controls VBUS output from CCG3 device)
SW6	Switch for manual control of VBUS output	SW6[2:1]: OFF OFF

 <b>Warning</b>	<p>Operating SW5 while the power to the board is on and an external device is connected to the USB Type-C connector may damage or break the board and the device connected via USB.</p> <p>In addition, operating SW5 while evaluating firmware on EZ-PD CCG3 may cause unexpected problems to occur.</p> <p>Do not use SW5 to set "Manual control by SW6".</p>
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## 5. Reference Designs

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### 5.1 About Reference Designs

These reference designs are intended to be operated on a Sodиа board. USB Type-C has Display Port, USB 3.0, and Power Delivery functions, so you can evaluate the various functions by using this board and a Sodиа board.

- The Display Port function reference design converts the Display Port signal that is received via the USB Type-C interface from the video output function in the PC and displays to a monitor at 1920 x 1080 @ 60 fps from the DVI interface on the Sodиа board.

Reference design name: DP\_ref\_design

This reference design is explained for an evaluation using a MacBook Pro.

- The reference design for the USB 3.0 function uses EZ-USB FX3 to implement UVC (USB Video Class) and to then transfer the video data acquired from the Sodиа board via FX3 GPIF™ II over USB to the host PC where the video is then displayed on the host PC.

Reference design name: USB\_ref\_design

Reference design name: USB\_ref\_design\_with\_FB

This reference design is explained for an evaluation using a desktop PC.

If you are using “3.2.5 Evaluation Environment 1. Desktop PC environment A”, use the Reference Design: USB\_ref\_design, which has no frame buffer.

If you are using “3.2.5 Evaluation Environment 1. Desktop PC environment B”, use the Reference Design: USB\_ref\_design\_with\_FB, which has a frame buffer.

- The Power Delivery function is automatically controlled by the CCG3 firmware and can be implemented with the reference design for the Display Port function described above. The Type-C Power Delivery’s power receive/power supply modes can be switched automatically by using the EZ-PD CCG3 to negotiate with the PC that is connected.

CCG3 firmware file name: Type\_C\_DisplayPort\_Demo.hex

This reference design is explained for an evaluation using a MacBook Pro.

## 5.1.1 Block Diagram

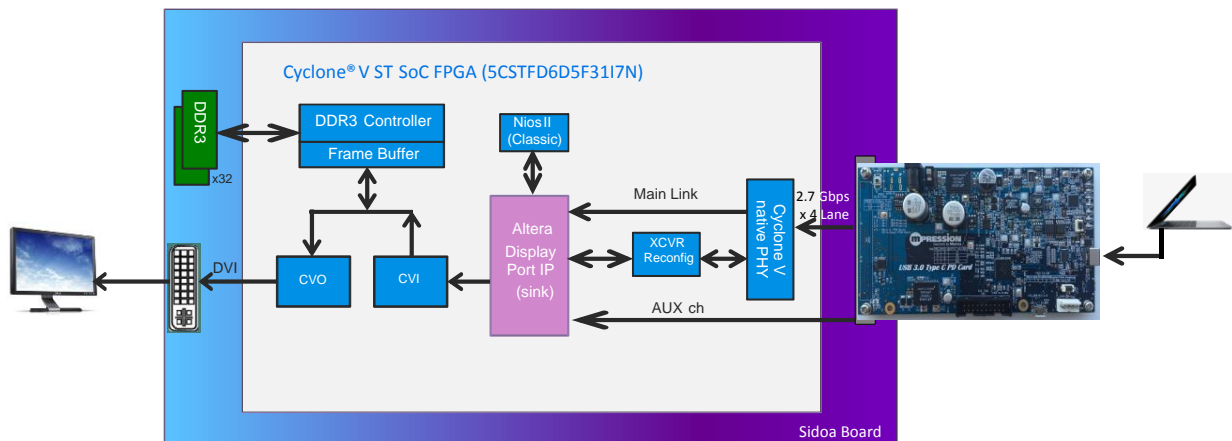


Figure 5-1 Example of Display Port Connections and Data Flow

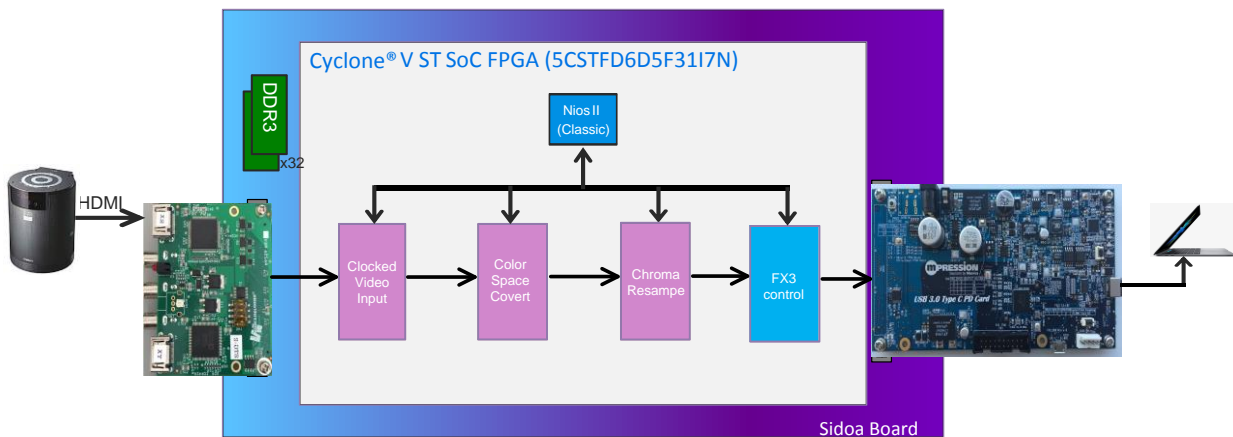


Figure 5-2 Example of USB 3.0 Connections and Data Flow



## 5.2 Writing Reference Designs

The method for writing these reference designs is shown below.

- 1) Connect the Intel FPGA download cable to the JTAG connector (J12) on the Sodia board.
- 2) Turn on the power to the Sodia board.
- 3) Start up Quartus Prime Programmer, and then download DP\_ref\_design.sof (or USB\_ref\_design.sof) to Cyclone V SoC 5CSTFD6D5F31I7.

(The NiosII firmware is included in the sof files noted above.)

## 5.3 Downloading FX3 Firmware

The method for writing the reference designs for FX3 is shown below. Install the board on the Sodia board, turn on the power, and write the FX3 firmware.

- 1) On the PMODE setting switch (SW1), set number 3 to OFF, 2 to ON, and 1 to ON (USB boot).
- 2) Turn on power of the Sodia board and this board.
- 3) Push SW2(Reset SW for FX3) of the this board.
- 4) Use the USB Type-C cable to connect the host PC and the Type-C board.
- 5) Install the device driver for FX3 to the host PC.  
Refer to the following Cypress documents for the method to install the device driver.  
· GettingStartedWithFX3SDK.pdf  
\* Directory bus: [EZ-USB FX3 SDK install directory]\1.3\doc\firmware
- 6) Start up USB Control Center. Confirm that this card is recognized as the Cypress Benicia Boot Device in the USB Control Center. (\* If this board do not recognize, repeat from Step 2)

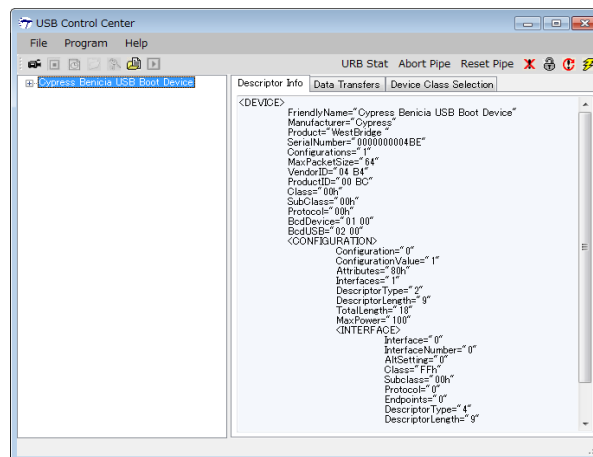


Figure 5-3 Window at Startup of USB Control Center

- 7) Select the Cypress Benicia Boot Device, and after it is highlighted, on the menu bar, open [Program] ⇒ [FX3] and click [I2C EEPROM].

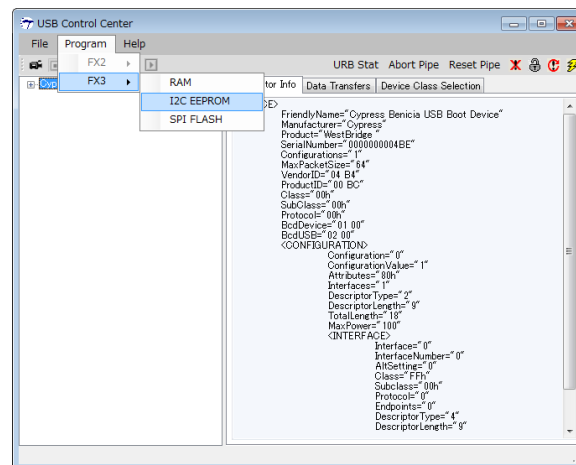


Figure 5-4 Selection of FW Writing Device

- 8) The Select New Programming File window opens. Select the firmware's binary image file for FX3 (USBVideoClassBulk.img), and then click [Open].
- 9) After confirming the FX3 firmware is successfully downloaded, set switch SW1[3:1] to ON, OFF, OFF (I2C only).
- 10) Resetting FX3 by push SW2, the host PC recognizes image device "FX3".

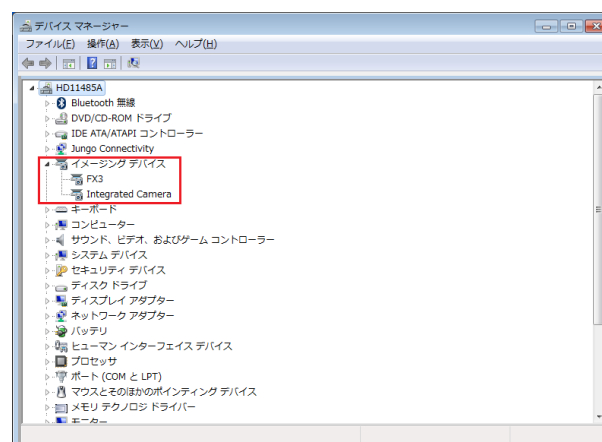


Figure 5-5 Recognition of Image Device

## 5.4 Downloading CCG3 Firmware

The method for writing the reference designs for CCG3 is shown below.

- 1) Connect the Cypress MiniProg3 to the connector (CN4) for the CCG3 program on the board.
- 2) Start up the PSoC Programmer and confirm that MiniProg3 is recognized.

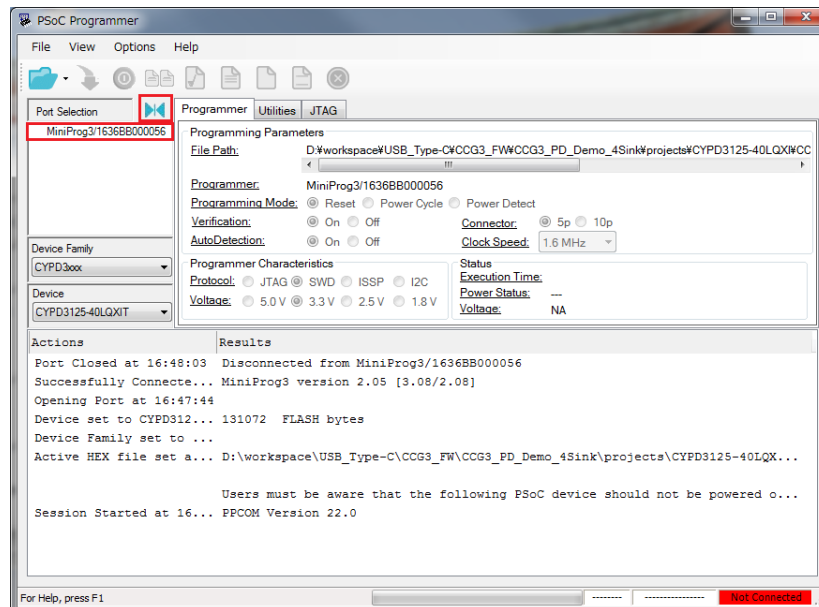



Figure 5-6 Startup of the PSoC Programmer

- 3) Click the connect button  to connect the PC and the MiniProg3.

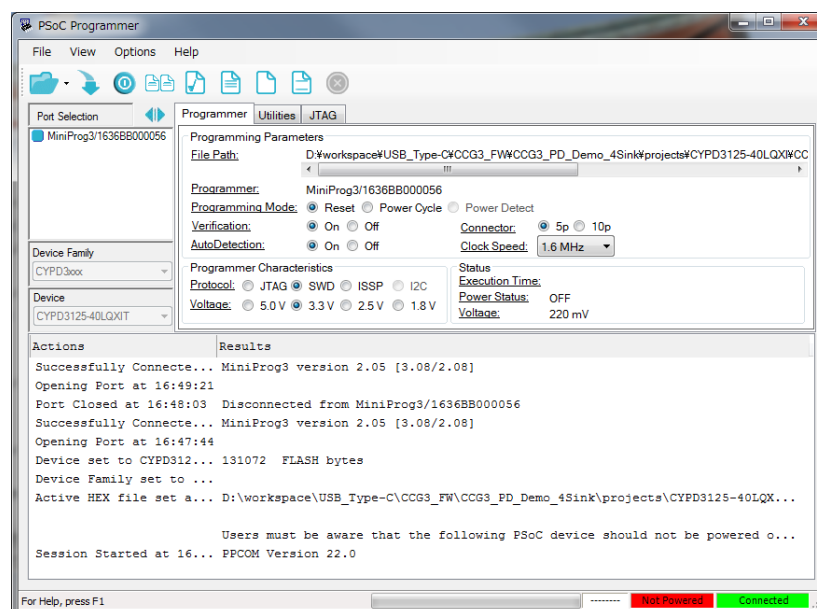




Figure 5-7 Connection of PC and MiniProg3

- 4) Click the open button  and select the CCG3 firmware's binary image file Type\_C\_DisplayPort\_demo.hex (or Type\_C\_SuperSpeed\_demo.hex).

- 5) As shown in Figure 5-7, click the power on button [  ] to turn on power to the board.

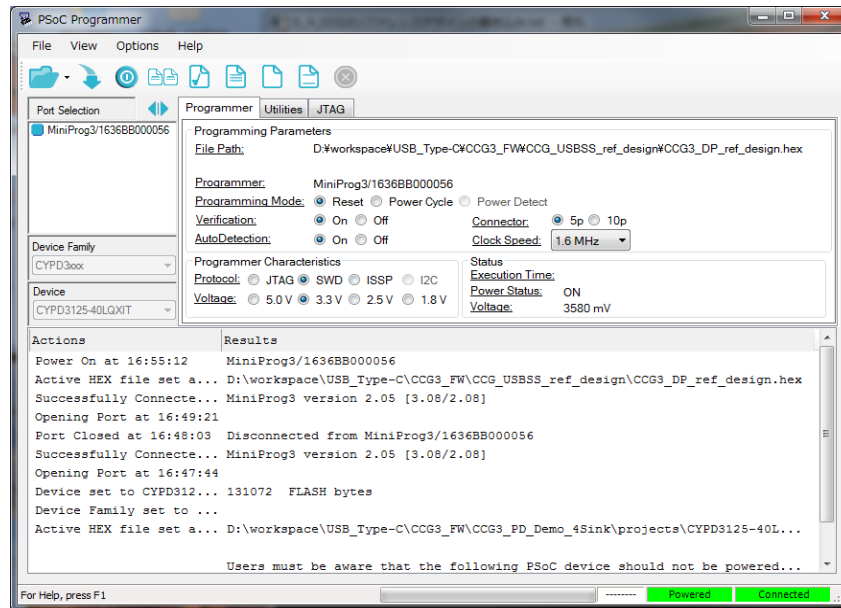


Figure 5-8 Turning on Power to the Board

- 6) Click the download button [  ] to start downloading the CCG3 device FW.

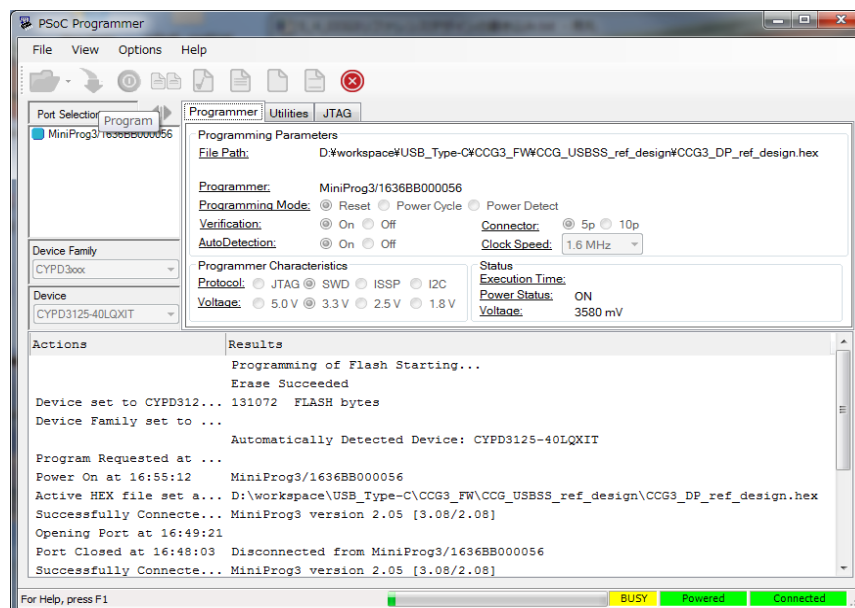


Figure 5-9 Downloading CCG3 Device FW

7) The CCG3 device FW download is complete when you can confirm it, as shown in Figure 5-10.

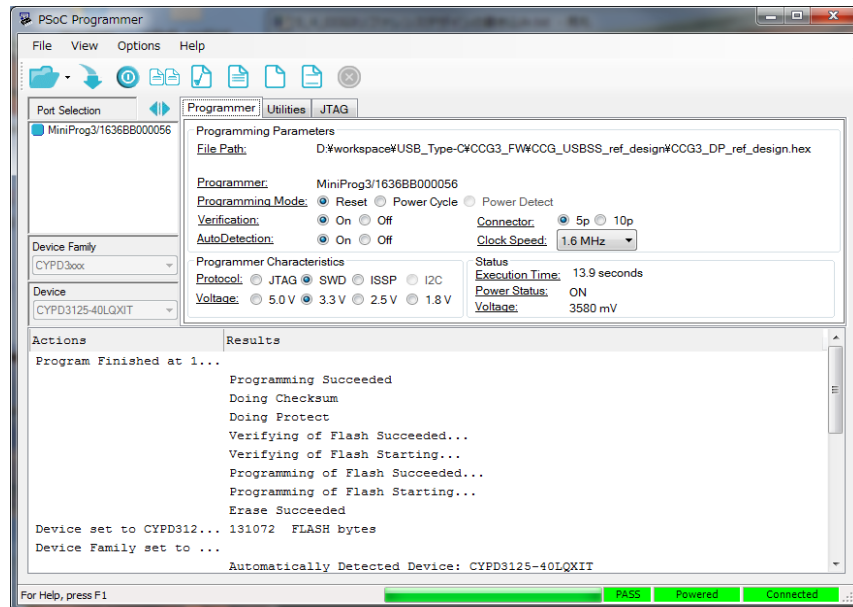


Figure 5-10 Completion of CCG3 Device FW Download

## 5.5 Executing Reference Designs

### 5.5.1 Executing the Display Port Reference Design


- 1) Set up the environment according to the method in 4.2.1 How to Connect to the Evaluation Environment.
- 2) Turn on power to the Sodia board, and write the DP\_ref\_design.sof to the FPGA according to the procedure in 5.2 Writing Reference Designs. Download the CCG3 firmware according to the procedure in 5.4 Downloading CCG3 Firmware.
- 3) Turn on the power to the board.
- 4) Connect the USB 3.0 Type-C cable that is connected to J1 on the board to the USB Type-C connector on the host PC.
- 5) Clicking the “Display” environment setting tag “” in the upper right corner of the PC (MacBook Pro for this reference design) equipped with a video output function, allows the DVI monitor that is connected to the Sodia board to be detected as an expansion monitor.

Figure 5-11 is a captured screenshot of the detection of a DELL P2211H monitor used for our in-house evaluation environment.

(\* If the “Expansion monitor” is not detected, reconnect the USB Type-C connector or press the reset switch SW3 on the board to reset the EZ-PD CCG3.)

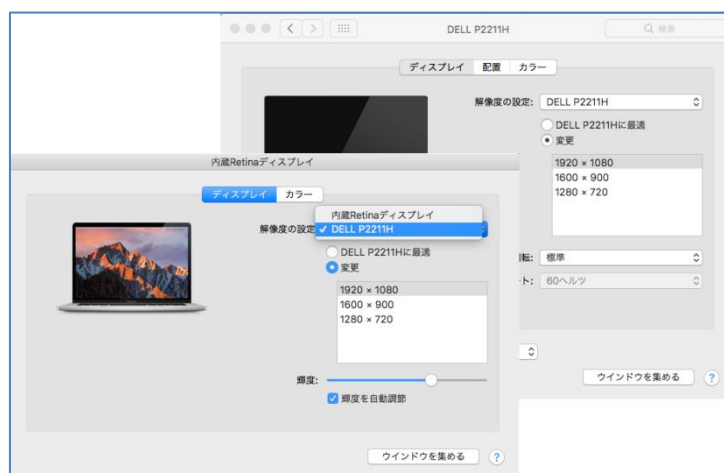


Figure 5-11 Detection of Expansion Monitor

- 6) The desktop screen of the PC equipped with a video output function appears on the external monitor that is connected via the Sodia board.

## 5.5.2 Executing the USB 3.0 (UVC) Reference Design

- 1) Set up the environment according to the method in 4.2.1 How to Connect to the Evaluation Environment.
- 2) Download the media player, VLC Media Player, from the following link and install it on the host PC that is connected to the board via the USB 3.0 Type-C cable.  
<http://www.videolan.org/vlc/index.ja.html>
- 3) Input the video via HDMI from the video output device and then stream the video to the PC as a USB Video Class (UVC) via this board and the Sodia board, or do not use the video output device and select a mode to stream the color bar in the FPGA to the PC.
  - Streaming video as UVC from video output device: Set the Sodia board's FPGA DIP SW-1 to "OFF"
  - Streaming color bar in the FPGA: Set the Sodia board's FPGA DIP SW-1 to "ON"

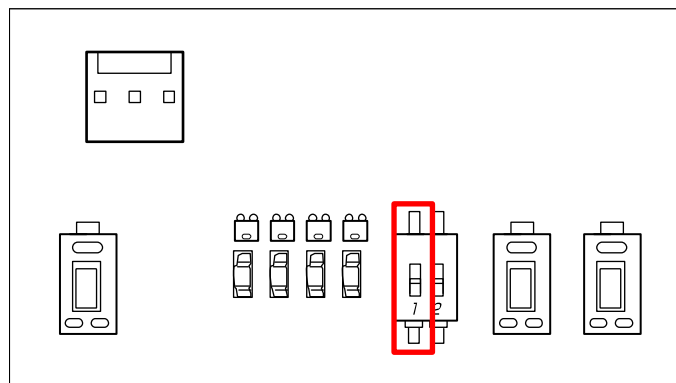


Figure 5-12 Sodia Board FPGA DIP SW Settings

- 4) Turn on power to the Sodia board, and write the USB\_ref\_design.sof (or USB\_ref\_design\_with\_FB.sof) to the device according to the procedure in 5.2 Writing Reference Designs. Download the FX3 firmware according to the procedure in 5.3 Downloading FX3 Firmware.  
 (\* If you have already downloaded the FX3 firmware, then you do not need to do this procedure.)
- 5) Download the CCG3 firmware according to the procedure in 5.4 Downloading CCG3 Firmware.
- 6) Slide the SW on the board to turn on the power.
- 7) Input a 1980 x 1080p video signal from the video output device to the HDMI daughter board.
- 8) Connect the USB 3.0 Type-C cable that is connected to J1 on the board to the USB 3.0 Type-A or the USB Type-C connector on the desktop PC.
- 9) This board is recognized as "USB Video Device" (or "FX3") by the host PC's Device Manager imaging devices.  
 (\* If the "USB Video Device" is not detected, reconnect the USB Type-C connector or press the reset switch SW2 on the board to reset the FX3.)

- 10) Start up VLC media player on the host PC and select Media (M) menu ⇒ Open Capture Device in that order.

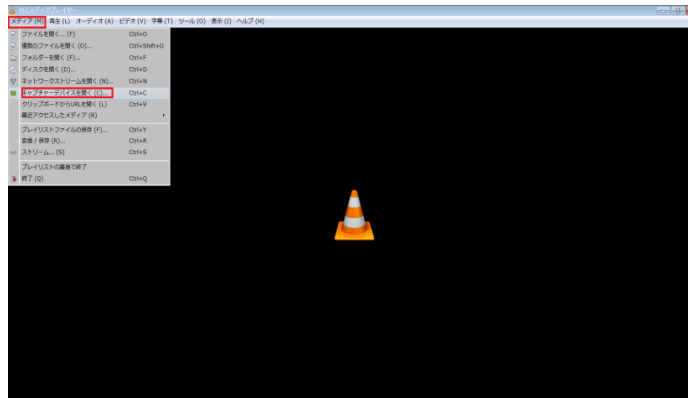


Figure 5-13 VLC Media Player

- 11) Select “USB Video Device” (or “FX3”) for the item in Audio device name.

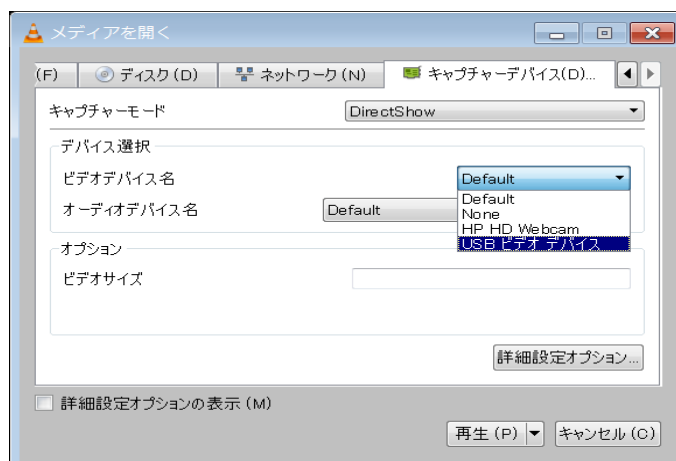


Figure 5-14 Selection of Device

- 12) Change the picture aspect ratio in the Advanced Options window to “16:9”, and then click the [OK] button.

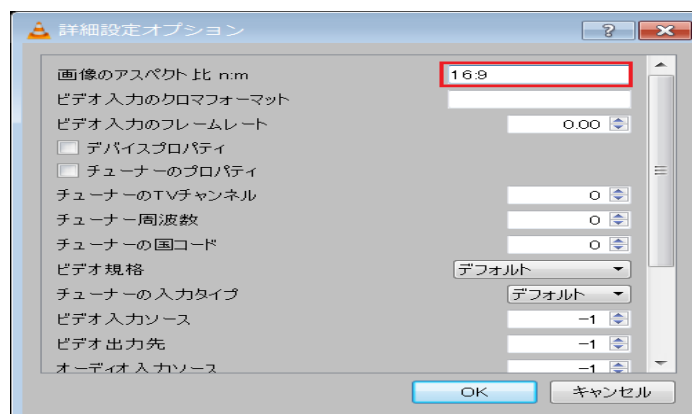


Figure 5-15 Image Aspect Settings



- 13) The video from the video output device is streamed to the PC monitor from the conversion of the reference design as shown below.

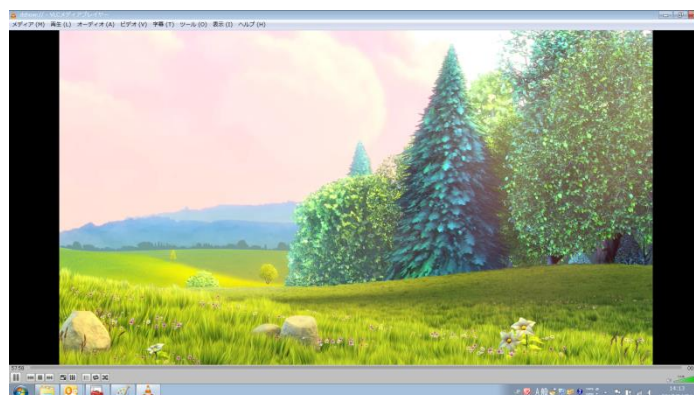



Figure 5-16 Video from the Video Source Is Shown on the Monitor of the PC

### 5.5.3 Confirming Power Receive/Power Supply of the Power Delivery Function

The Power Delivery (PD) function is controlled by Cypress's CCG3 firmware and can be verified at the same time as data from the Display Port noted above is transferred. It negotiates with the party to be connected (for example, a PC with a PD function), and automatically switches the power receive/power supply modes.

- 1) For example, click the battery mark “” for MacBook Pro. The battery's charge and the time remaining to full charge are shown, as in Figure 5-17. This shows that the battery in the MacBook Pro is being charged by the board.

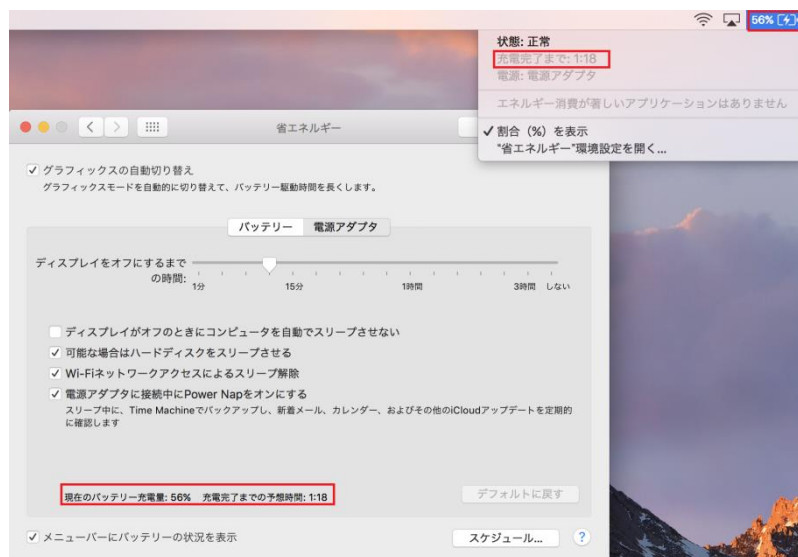


Figure 5-17 Confirming Power Is Received by MacBook

- 2) “Power Source: Battery” and “Current battery charge” appear, as shown in Figure 5-18. This shows that the MacBook Pro battery operations are supplying power to the board.

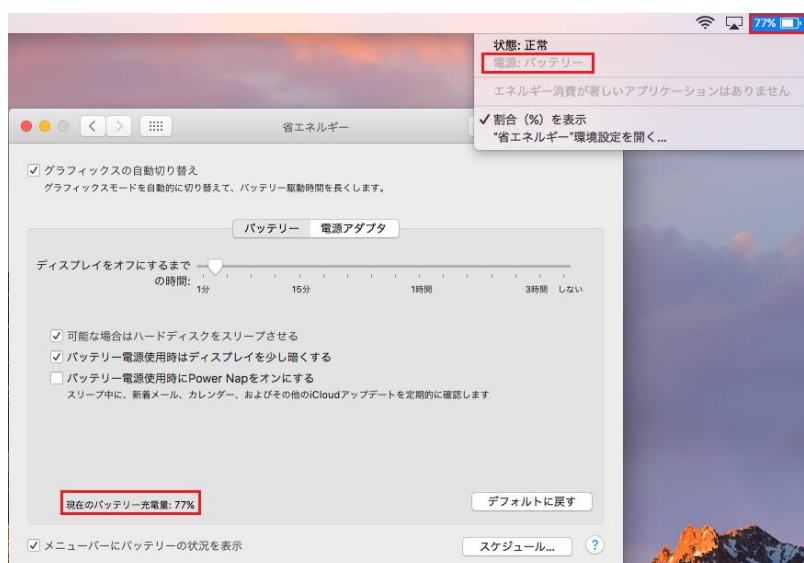


Figure 5-18 Confirming Power Is Being Supplied by MacBook

## 6. Reference Information

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- Mpression Sodia – Cyclone® V ST evaluation board  
<https://service.macnica.co.jp/catalog/121189>
- Materials for Cypress FX3 devices  
<http://japan.cypress.com/documentation/datasheets/cyusb301x-cyusb201x-ez-usb-fx3-super-speed-usb-controller>
- Materials for Cypress CCG3 devices  
<http://japan.cypress.com/documentation/datasheets/ez-pd-ccg3-datasheet-usb-type-c-controller-power-delivery>

## 7. Document Revision History

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Date	Revision	Changes
Sep 1, 2017	1.00	<ul style="list-style-type: none"><li>• Document created</li></ul>
Mar 19, 2018	1.10	<ul style="list-style-type: none"><li>• Added explanation for FX3 firmware writing method</li></ul>
		<ul style="list-style-type: none"><li>• </li></ul>