CON-FMC User Manual

Version 0 Revision 7

June 10, 2019 (March 15, 2018)

Future Design Systems, Inc.
www.future-ds.com / contact@future-ds.com

Abstract

CON-FMC is an USB3.0 interface board complying with ANSI/VITA 57.1-2008, FPGA Mezzanine Card (FMC) standard.

Table of Contents

Copyright © 2018-2019 Future Design Systems, Inc. 1
Abstract 1
Table of Contents 1
1 Overview 3
    1.1 CON-FMC board 3
    1.2 Block diagram 4
    1.3 Supporting environment 5
        1.3.1 Host computer 5
        1.3.2 FPGA board (Carrier board) 5
2 Hardware 5
    2.1 Power 5
    2.2 LED 6
    2.3 Switches and jumps 6
    2.4 FMC connector 7
    2.5 USER GPIO A and B 8
3 Software installation 8
    3.1 Ubuntu for Intel x86 64-bit 9
        3.1.1 Installing LibUsb 9
        3.1.2 Installing confmc 10
    3.2 CentOS for Intel x86 64-bit 10
        3.2.1 Installing LibUsb 10
        3.2.2 Installing confmc 10
    3.3 Ubuntu for ARMv7 32-bit 11
        3.3.1 Installing LibUsb 11
        3.3.2 Installing confmc 11
    3.4 Windows 11
        3.4.1 Installing confmc 11

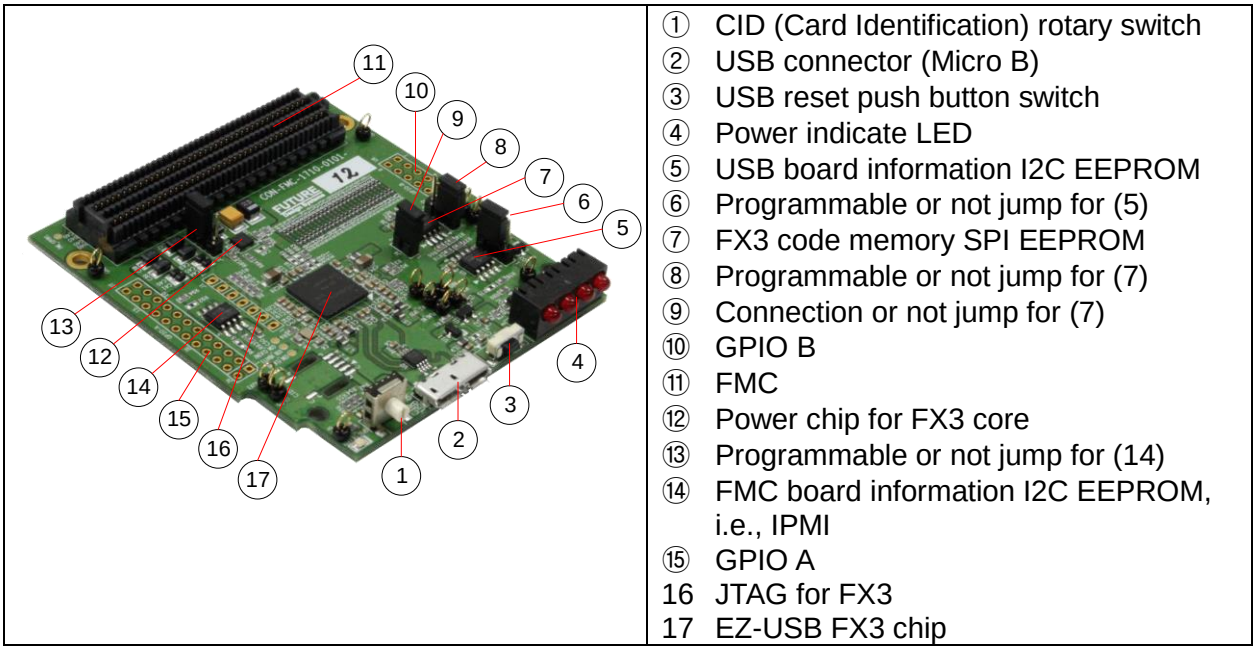
3.4.2 Installing WinUSB driver 12
3.4.2.1 First time install 12
3.4.3 Installing libusb-1.0.22.win 14
3.5 Android 14
4 Software API 15
5 FPGA design tips 15
5.1 AMBA buses 16
6 FX3 pin assignment 17
7 FMC pin assignment 18
8 Board information 20
9 Code memory 20
10 IPMI (Intelligent Platform Management Interface) 20
11 Carrier board constraints 21
11.1 Xilinx SP605: Spartan-6 xc6slx45t 21
11.2 Xilinx ML605: Virtex-6 xc6vlx240t 21
11.3 Xilinx ZC706: Zynq-7000 xc7z045 21
11.4 Xilinx VCU108: Virtex UltraScale xcvu095 21
11.5 Xilinx ZC702: Zynq-7000 xc7z020 21
11.6 Avnet ZedBoard: Zynq-7000 xc7z020 21
12 Trouble shooting 21
12.1 undefined reference to ‘libusb_sterror’ 21
12.2 /usr/bin/ld: cannot find -lusb-1. 22
12.3 undefined reference to `__ms_vsnprintf' 22
12.4 cannot initialize CON-FMC 22
12.5 cannot get gpif2mst info 23
12.6 Errors while compiling CON-FMC related program 23
Wish list 24
Related documents 24
Revision history 24

1 Overview

CON-FMC is an USB3.0 interface board complying with ANSI/VITA 57.1-2008, FPGA Mezzanine Card (FMC) standard.

1.1 CON-FMC board

Figure 1 shows CON-FMC PBA (Printed Board Assembly) Version 1710-0101.



① CID (Card Identification) rotary switch
② USB connector (Micro B)
③ USB reset push button switch
④ Power indicate LED
⑤ USB board information I2C EEPROM
⑥ Programmable or not jump for (5)
⑦ FX3 code memory SPI EEPROM
⑧ Programmable or not jump for (7)
⑨ Connection or not jump for (7)
⑩ GPIO B
⑪ FMC
⑫ Power chip for FX3 core
⑬ Programmable or not jump for (14)
⑭ FMC board information I2C EEPROM, i.e., IPMI
⑮ GPIO A
16 JTAG for FX3
17 EZ-USB FX3 chip

Figure 1: CON-FMC PBA board

Figure 2 shows mechanical dimension of CON-FMC and it complies with ANSI/VITA 57.1 standard.

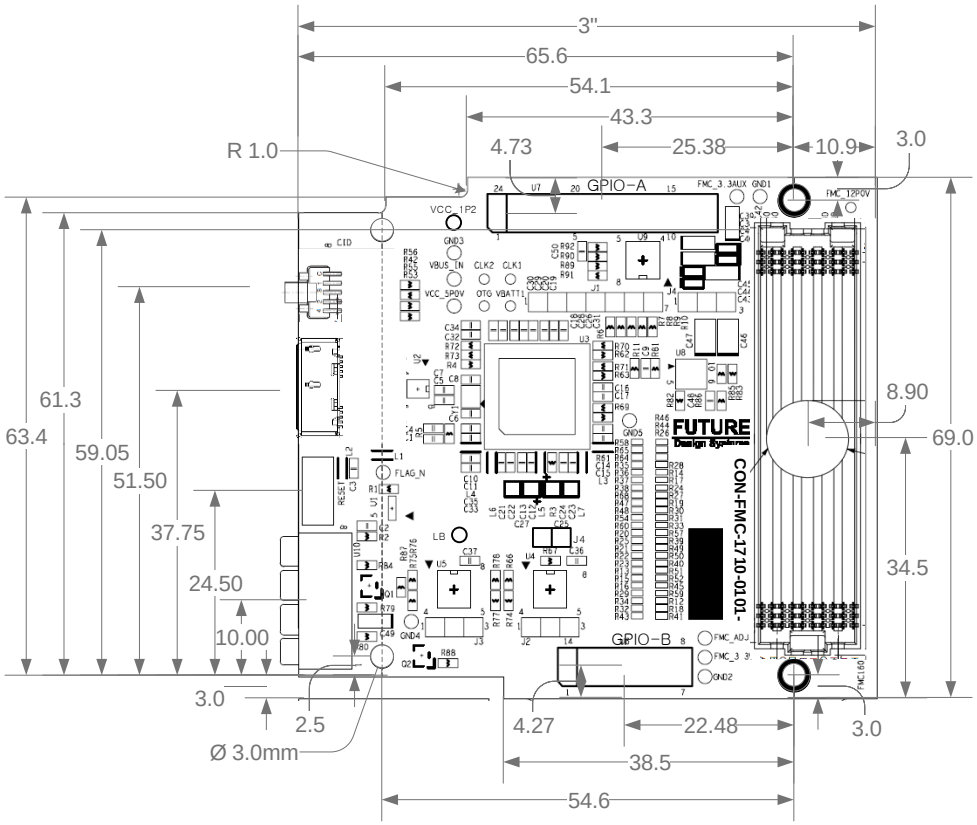


Figure 2: CON-FMC mechanical dimension

1.2 Block diagram

Figure 3 shows block diagram of CON-FMC.

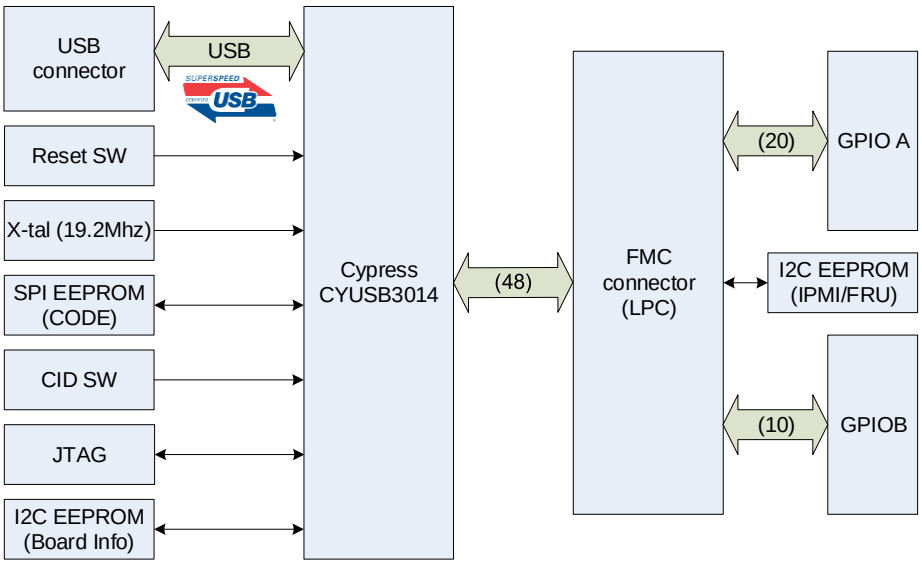


Figure 3: CON-FMC block diagram

1.3 Supporting environment

1.3.1 Host computer

CON-FMC supports industry standard platforms including Windows, Linux, and Android.

- Linux
  - ✧ Ubuntu Release 16.04, Kernel 4.15.0-24-generic, x86_64[1]
  - ✧ Ubuntu Release 16.04, arm7l[2]
  - ✧ Raspbian, arm7l[3]
- Windows
- Android

1.3.2 FPGA board (Carrier board)

CON-FMC can be used with FMC supporting FPGA board, which includes LPC, HPC, and HPC+. Refer to 'Section 11 Carrier board constraints' for more details,

2 Hardware

2.1 Power

CON-FMC uses two DC power sources; one from USB and the other from FMC. As a result, there is no need to additional power for CON-FMC.

- The former (5Vdc from USB) is fed to FX3 for USB connection
- The latter (from FMC) is divided further in to three
  - ✧ 3.3V for FMC board information EEPROM
  - ✧ 3.3V fixed for not FMC connected pins of FX3 including FX3 core
  - ✧ FMC VADJ for FMC connected pins of FX3
    - ✓ Actual voltage is determined by the value of certain field of FMC board information EEPROM that contains IPMI/FRU.

[1] Intel PC
[2] Odroid
[3] Raspberry Pi

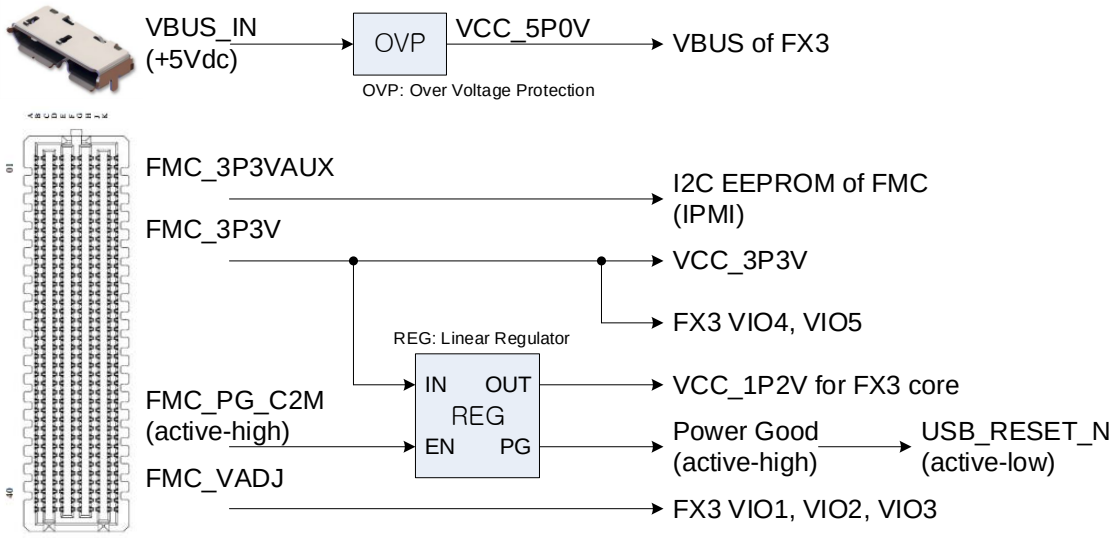


Figure 4: CON-FMC power plan

2.2 LED

Figure 5 shows LEDs, which indicate status of power.

- VADJ (FMC): FMC main power for most FMC signal pins
- 3.3V (FMC): FMC 3.3V power
- 1.2V (FMC → FX3): FX3 core 12V voltage derived from FMC 3.3V
- 5.0V (USB): User bus power

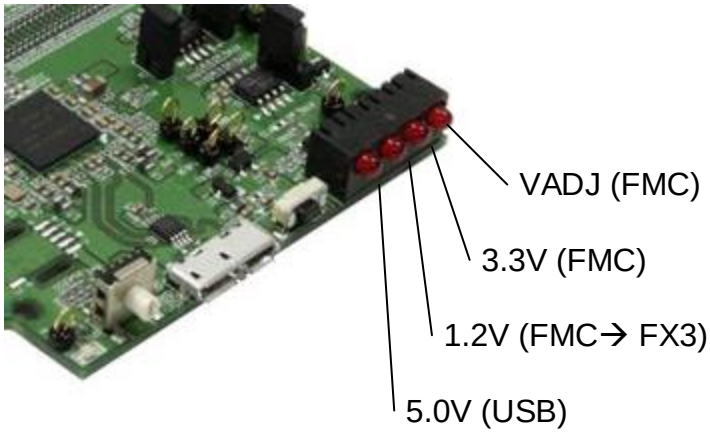


Figure 5: LED indicating power status

2.3 Switches and jumps

Location of switches and jumps can be found from Figure 6.

- CID rotary switch (1)
  - ✧ It provides 3-bit binary to FX3 GPIO (52, 51, 50).

- USB reset switch (3)
  - ✧ It causes reset to FX3 and makes initialize FX3.
- USB board information PROM program jump (6)
  - ✧ See Figure 6
- FX3 code PROM program jump (8)
  - ✧ See Figure 6
- FX3 code PROM connection jump (9)
  - ✧ It connects MISO signal lines in order to boot FX3 from PROM.
  - ✧ It should be removed to boot FX3 from internal code.
  - ✧ See Figure 6
- FMC board information PROM program jump (13)
  - ✧ This jump should remain in protected. (1-2 connected)

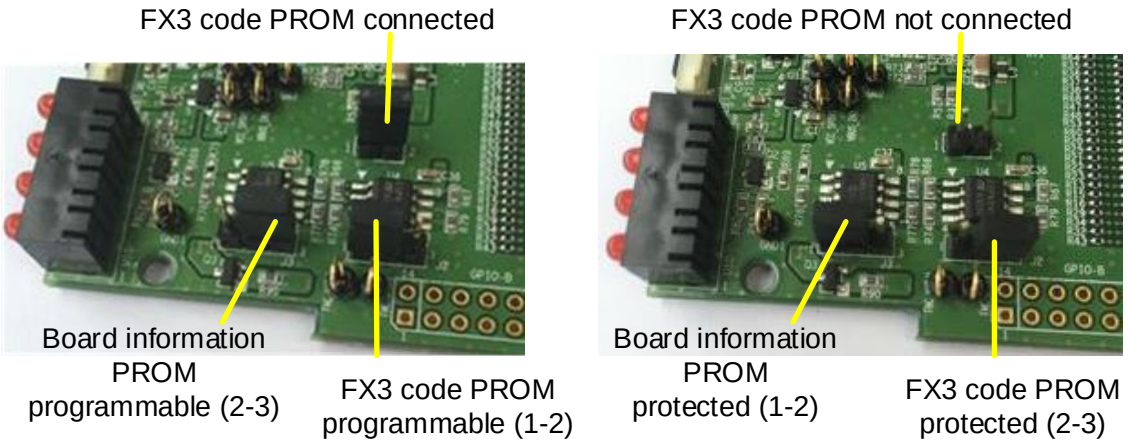


Figure 6: Jump settings

2.4 FMC connector

FMC pins are divided in to groups as shown in Figure 7.

- Power group
- EZ-USB FX3 GPIF II group: 48 pins are connected to EX-USB FX3 chip
- Board information PROM group+
- USERGPIO group
- JTAG loop from carrier board (not connected to any in the FMC board)

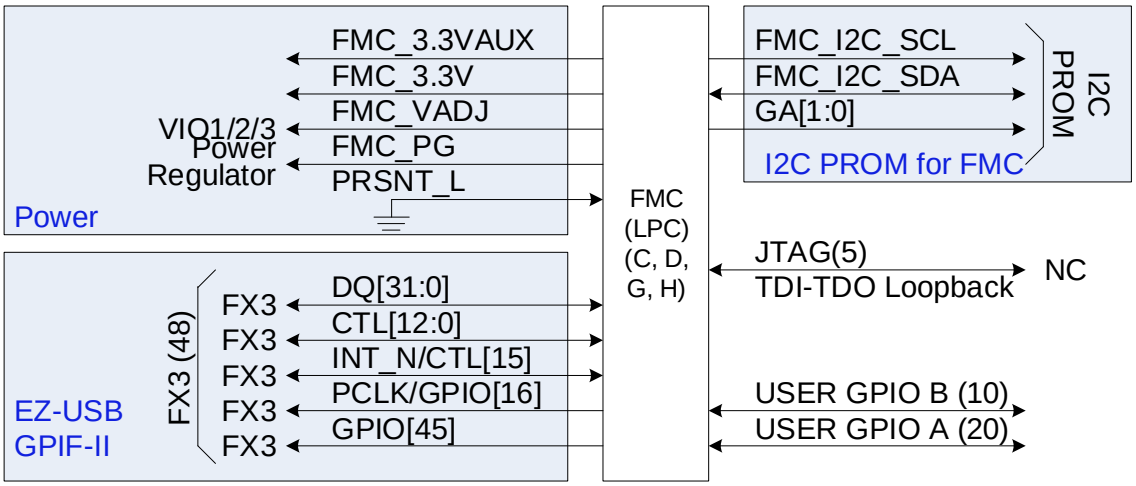


Figure 7: FMC pins

Details of pin assignment is given in ‘Section 7 FMC pin assignment’.

2.5 USER GPIO A and B

GPIO A provides 20 pins from FMC to CON-FMC and GPIO B provides 10 pins from FMC to CON-FMC. The signal voltage is determined by FMC_VADJ.

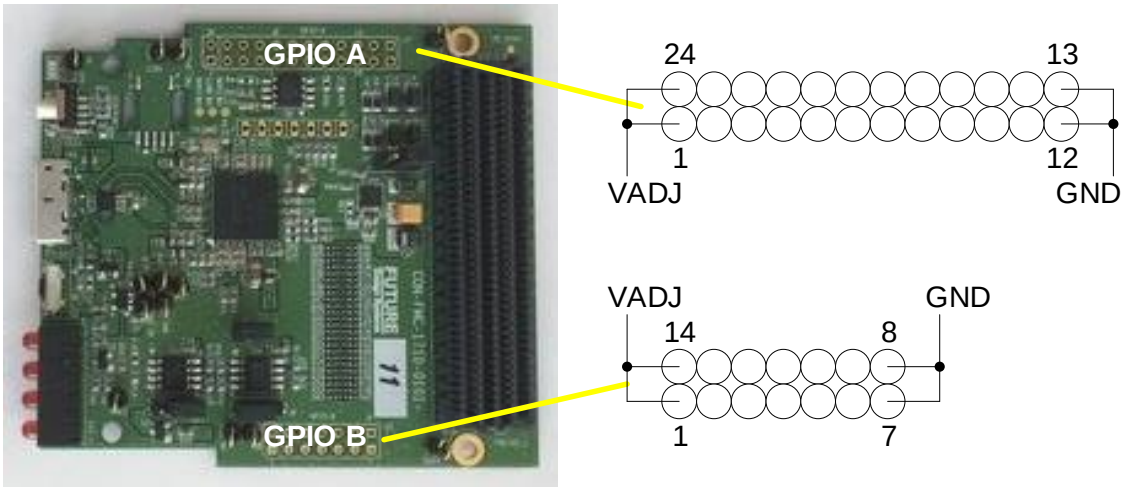


Figure 8: GPIO A and B

3 Software installation

Figure 9 shows conceptual structure of how ‘user application’ interacts with ‘user design’ in the FPGA through CON-FMC, where CON-FMC connects the

host computer and the FPGA through USB3.0 using Cypress EZ-USB FX3 chipset[4].

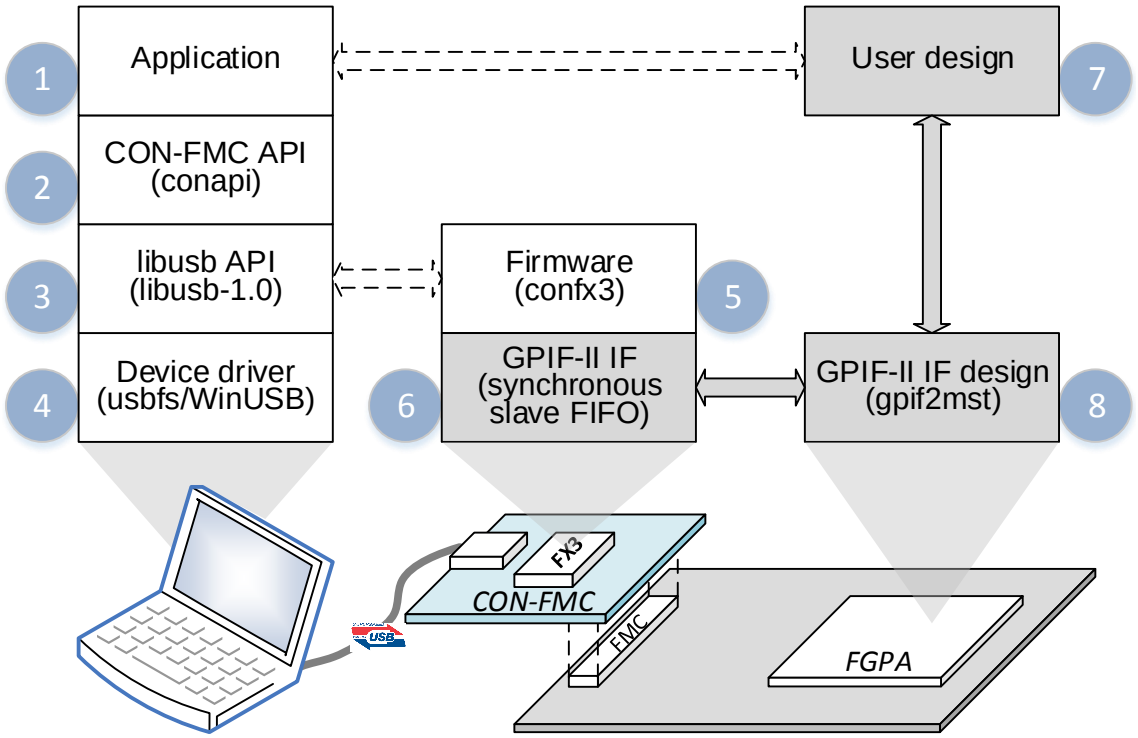


Figure 9: CON-FMC software environment

This section is about installing LIBUSB API (3), ad CON-FMC API (2).

Up-to-date version of the package will be found at the following site.

- https://github.com/github-fds

3.1 Ubuntu for Intel x86 64-bit

3.1.1 Installing LibUsb

It requires 'LibUsb[5]' and if it is not ready[6] then install it as follows.

```
$ dpkg –l libusb-1.0*
// if libusb is not installed, then install
$ sudo apt-get install libusb-1.0.0-dev
// or $ sudo apt-get install libusb-1.0
```

[4] Cypress Semiconductor, EZ-USB FX3 SuperSpeed USB Controller, CYUSB301X, 2012.
[5] LibUSB is a user-space USB library.
[6] Try "$ ldconfig –p | grep libusb" to figure out if LibUSB is installed or not.

3.1.2 Installing confmc

Get CON-FMC package such as ‘confmc.x86_64.linux.tgz’. Untar it and run ‘coninstall.sh’ with root permission.

```
$ tar xfz confmc.x86_64.linux.tgz
$ cd confmc.x86_64.linux
$ sudo ./coninstall.sh
// follow on-screen instructions
// re-boot the system if required.
```

By default, the CON-FMC package is installed at ‘/opt/confmc/2018.05’.

Run following script before using CON-FMC.

```
$ . /opt/confmc/2018.05/settings.sh
// this set ‘CONFMC_HOME’ environment variable
```

Followings are required to compile user application.

- Header files in ‘include’ directory
- Libraries in ‘lib’ directory[7]
  - ✧ lib/linux_x86_64

3.2 CentOS for Intel x86 64-bit

3.2.1 Installing LibUsb

It requires ‘LibUsb’ and if it is not ready then install it as follows.

```
$ rpm –qa | grep -i libusb
// if libusb1-1.0.* and libusb1-devel-1.0.* are missing, then install
$ sudo yum install libusb-1.0.0-dev
// or $ sudo yum install libusb1-devel
```

3.2.2 Installing confmc

Get CON-FMC package such as ‘confmc.x86_64.linux.tgz’. Untar it and run ‘coninstall.sh’.

```
$ tar xfz confmc.x86_64.linux.tgz
$ cd confmc.x86_64.linux
$ sudo ./coninstall.sh
// follow on-screen instructions
// re-boot the system if required.
```

[7] This directory uses file extension conventions, such as ‘.lib’ for static and ‘.dll’ for dynamic.

By default, the CON-FMC package is installed at '/opt/confmc/2018.05'.

Run following script before using CON-FMC.

```
$ . /opt/confmc/2018.05/settings64.sh
// this set 'CONFMC_HOME' environment variable
```

3.3 Ubuntu for ARMv7 32-bit

3.3.1 Installing LibUsb

This is about ARM-based platforms including Raspberry Pi, Odroid, and ARTIK.

It requires 'LibUsb[8]' and if it is not ready[9] then install it as follows.

```
$ dpkg –l libusb-1.0*
// if libusb is not installed, then install
$ sudo apt-get install libusb-1.0.0-dev
```

3.3.2 Installing confmc

Get CON-FMC package such as 'confmc.armv7l.ubuntu_16.04.tgz'. Untar it and run 'coninstall.sh' with root permission.

```
$ tar xfz confmc.armv7l.ubuntu_16.04.tgz
$ cd confmc.armv7l.ubuntu_16.04
$ sudo ./coninstall.sh
// follow on-screen instructions
// re-boot the system if required.
```

By default, the CON-FMC package is installed at '/opt/confmc/2018.05'.

Run following script before using CON-FMC.

```
$ . /opt/confmc/2018.05/settings.sh
// this set 'CONFMC_HOME' environment variable
```

3.4 Windows

3.4.1 Installing confmc

Get CON-FMC package such as 'confmcx86_64.mingw.2019.06' and then copy the package to somewhere such as

```
> copy confmc.x86_64.mingw.2019.06  C:\confmc\2019.06
```

[8] LibUSB is a user-space USB library.
[9] Try "$ ldconfig –p | grep libusb" to figure out if LibUSB is installed or not.

Set ‘CONFMC_HOME’ environment variable to ‘C:\confmc\2019.06’

```
> setx -m CONFMC_HOME C:\confmc\2019.06
```

Followings are required to compile user application.

- Header files in ‘include’ directory
- Libraries in ‘lib’ directory[10]
  - MS32
  - MS64
  - libusb-1.0
  - mingw_i686
  - mingw_x86_64

3.4.2 Installing WinUSB driver

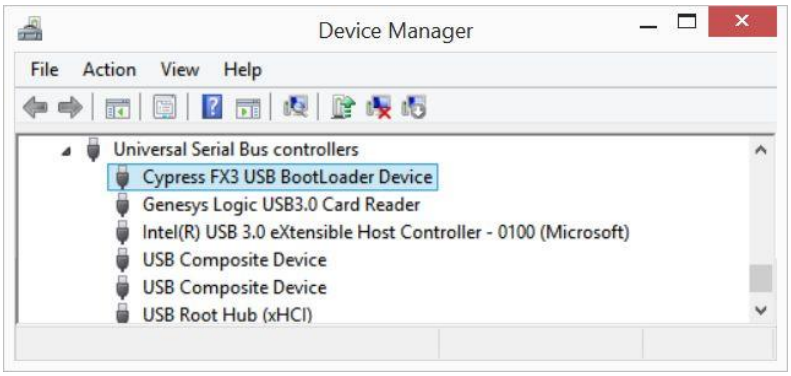
CON-FMC uses LibUsb that requires system-level USB driver and “WinUSB” is used for it.

More details can be found in https://github.com/pbatard/libwdi/wiki/Zadig.

3.4.2.1 First time install

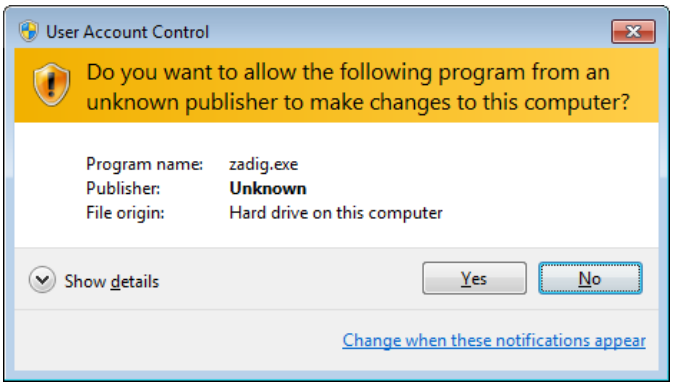
Below is an overview for a typical driver installation:

1. Plug CON-FMC or you can also plug CON-FMC device after Zadig is running. When possible, we recommend that you leave only the device you want to install a driver for, and unplug any other USB device. As shown below, CON-FMC will be listed in ‘Device Manager’ as ‘Cypress FX3 USB BootLoader Device’.

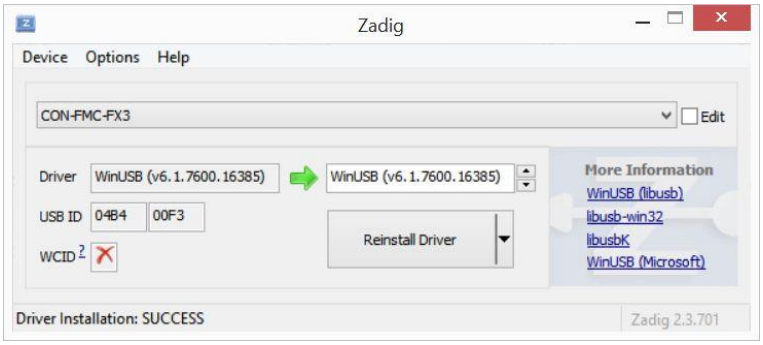


2. The first screen you will see when launching Zadig is the User Account Control prompt displayed below. This is because the application needs to run with administrative privileges. To be able to install a driver, you should answer Yes.

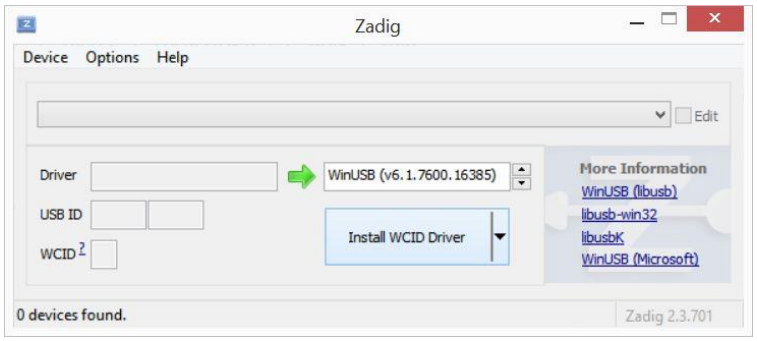
[10] This directory uses file extension conventions, such as ‘.lib’ for static and ‘.dll’ for dynamic.



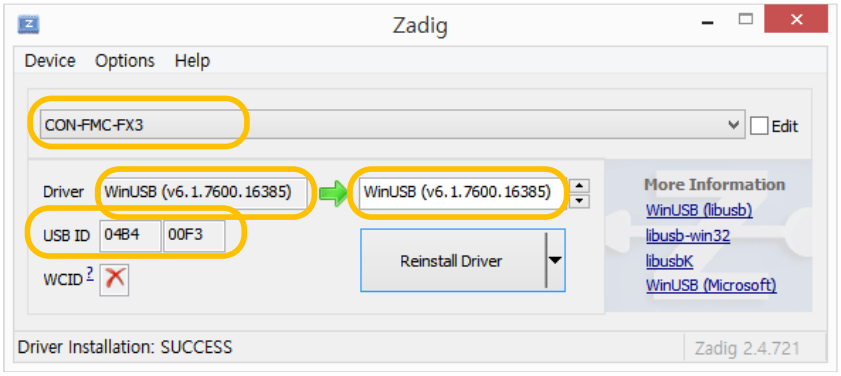
3. You should see CON-FMC USB device appear in the dropdown list (click on the dropdown to see all devices). When the left part of 'Driver' is 'CYUSB3' something, 'WinUSB' should be reinstalled.



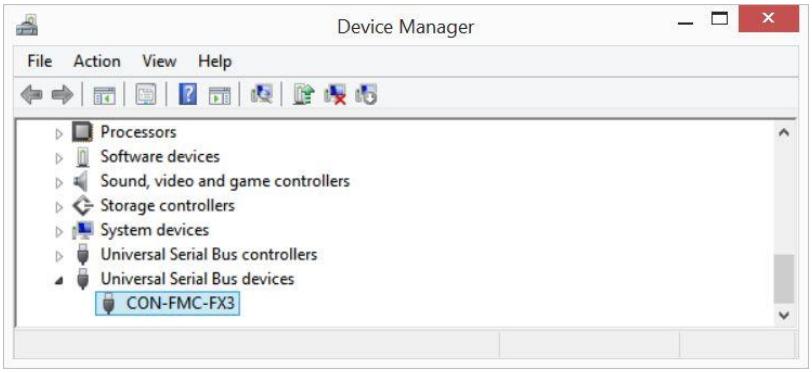
If CON-FMC is not listed as follows. This means that it already has a driver installed. To see USB devices that already have a driver installed, go to the Options menu and select List All Devices.



4. A window should pop up saying "Installing Driver..." and then be replaced by one saying "The driver was installed successfully." Close that window and then the Zadig program.



5. See as follows.



At any time, you can check to be sure that your CON-FMC is recognized by the operating system by going to the Start menu and choosing Computer Management. In the left pane, click on Device Manager. In the center pane, under the libusb (WinUSB) devices category, you should see the USBasp entry, without any exclamation mark or yellow warning sign

3.4.3 Installing libusb-1.0.22.win

Prebuild binary is available at https://github.com/libusb/libusb/wiki/Windows[11]. This prebuild binaries are locates at following directories.

- $CONFMC_HOME/conapi/libusb-1.0.22.win/MinGW32: 32-bit for MinGW
- $CONFMC_HOME/conapi/libusb-1.0.22.win/MinGW64: 64-bit for MinGW
- $CONFMC_HOME/conapi/libusb-1.0.22.win/MS32: 32-bit for Microsoft Visual Studio and DDK/WDK
- $CONFMC_HOME/conapi/libusb-1.0.22.win/MS32: 64-bit for Microsoft Visual Studio and DDK/WDK

3.5 Android

[11] https://sourceforge.net/projects/libusb/files/ or https://github.com/libusb/libusb/releases

To be added

4 Software API

Refer to ‘CON-FMC API based on LIBUSB’.

5 FPGA design tips

Figure 10 shows an interface of EZ-USB FX3 GPIF-II. In terms of ‘user design’, this interface does not matter since ‘user design’ only uses FIFO IF.

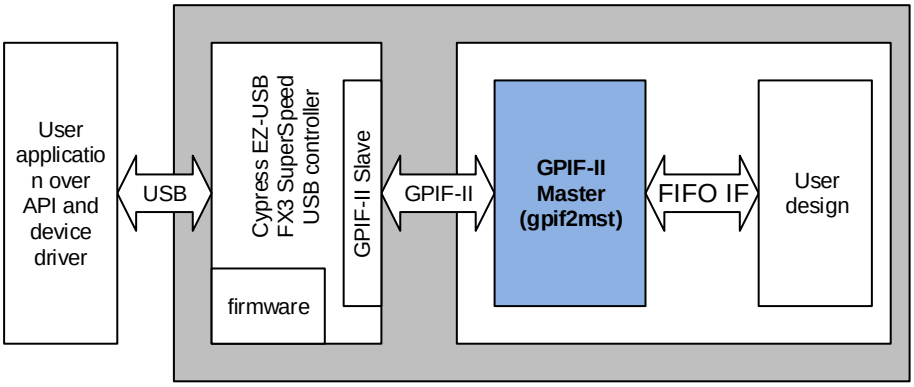


Figure 10: GPIF-II interfaces

Figure 11 shows conceptual interface for ‘user design’, which uses dual-ready FIFO interface such as data in ‘data[…]’ is moved at the rising edge of ‘clk’ when both ‘ready’ and ‘valid’ are one.

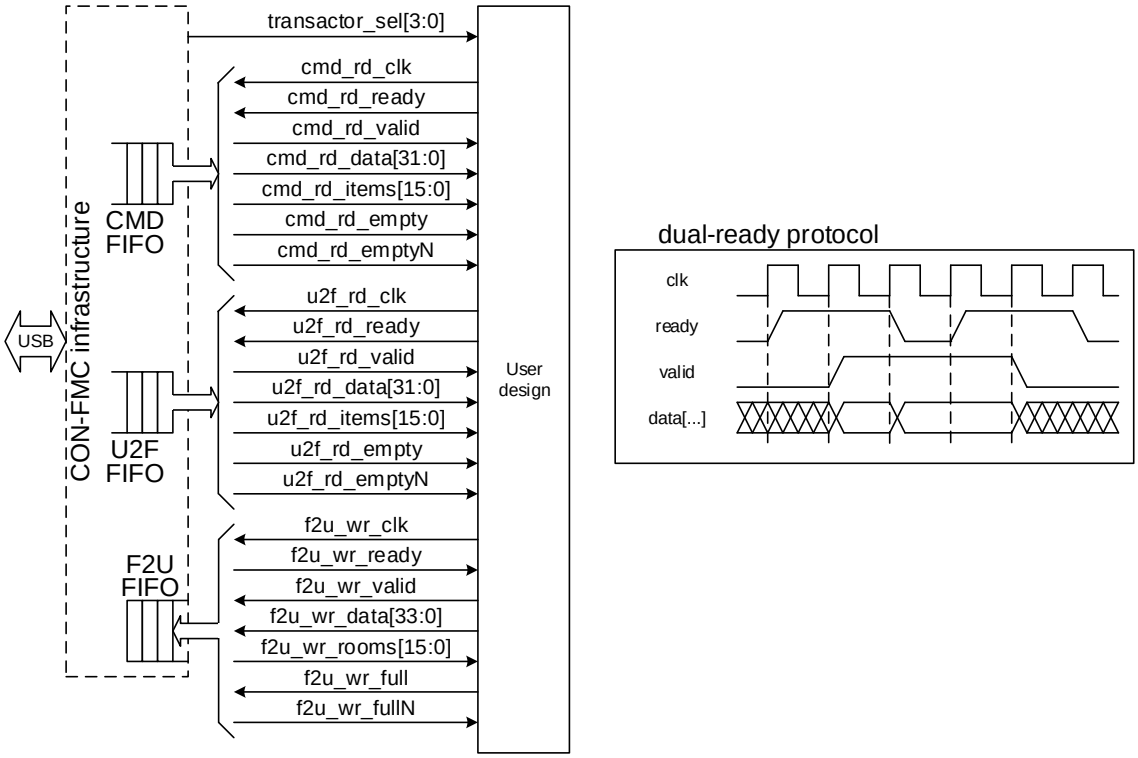


Figure 11: User side interface

It should be noted that ‘items[...]’ and ‘rooms[...]’ indicate guaranteed value not exact value, where ‘items[...]’ reflects the number of items can be read and ‘rooms[...]’ reflects the number of rooms ca be written.

‘f2u_data[33:32]’ are used to control end-of-packet or zero-length-packet. If you are not familiar with USB protocol, just tie them 0.

It is highly recommeded to copy example design in ‘$CONFMC_HOME/examples’ directory[12] and then modify it as you need.

- use ‘fex_0001_loopback’ for FIFO interface

5.1 AMBA buses

There are many on-chip bueses and AMBA family is one of most popular industrial standard bues. CON-FMC supports the AMBA bus.
It is highly recommeded to copy example design in ‘$CONFMC_HOME/examples’ directory[13] and then modify it as you need.

[12] ‘CONFMC_HOME’ is a default macro indicating the directory where CON-FMC package reside, e.g., /opt/confmc/2018.05.
[13] ‘CONFMC_HOME’ is a default macro indicating the directory where CON-FMC package reside, e.g., /opt/confmc/2018.05.

- use ‘fex_0002_amba_ahb_mem’ for AMBA AHB interface
- use ‘fex_0003_amba_axi_mem’ for AMBA AXI interface

6 FX3 pin assignment

(If you need more details, please contact at contact@future-ds.com).

Name	Ref name	Remarks
GPIO0_DQ0	SL_DT[0]	
GPIO1_DQ1	SL_DT[1]	
GPIO2_DQ2	SL_DT[2]	
GPIO3_DQ3	SL_DT[3]	
GPIO4_DQ4	SL_DT[4]	
GPIO5_DQ5	SL_DT[5]	
GPIO6_DQ6	SL_DT[6]	
GPIO7_DQ7	SL_DT[7]	
GPIO8_DQ8	SL_DT[8]	
GPIO9_DQ9	SL_DT[9]	
GPIO10_DQ10	SL_DT[10]	
GPIO11_DQ11	SL_DT[11]	
GPIO12_DQ12	SL_DT[12]	
GPIO13_DQ13	SL_DT[1]3	
GPIO14_DQ14	SL_DT[1]4	
GPIO15_DQ15	SL_DT[1]5	
GPIO16_PCLK	SL_PCLK	
GPIO17_CTL0		
GPIO18	SL_WR_N	
GPIO19	SL_OE_N	
GPIO20	SL_RD_N	
GPIO21	SL_FLAGA	
GPIO22	SL_FLAGB	
GPIO23	SL_FLAGC	
GPIO24	SL_PKTEND_N	
GPIO25	SL_FLAGD	
GPIO26	SL_RST_N	
GPIO27	SL_MODE[0]	
GPIO28		
GPIO29_CTL12		
GPIO30	PMODE0	1
GPIO31	PMODE1	Float
GPIO32	PMODE2	0
GPIO33	SL_DT[16]	
GPIO44	SL_DT[27]	
GPIO45	SL_MODE[1]	
GPIO46	SL_DT[28]	
GPIO47	SL_DT[29]	
GPIO48	SL_DT[30]	
GPIO49	SL_DT[31]	
GPIO50	CID[0]	
GPIO51	CID[1]	
GPIO52	CID[2]	
GPIO53	SPI_SCK	FX3 code PROM

GPIO54	SPI_SSN	FX3 code PROM
GPIO55	SPI_MISO	FX3 code PROM
GPIO56	SPI_MOSI	FX3 code PROM
GPIO57	LB_LED	
GPIO58	I2C_SCLK	Board information PROM
GPIO59	I2C_SDA	Board infromation PROM
GPIO60	N.C	

7 FMC pin assignment

Following two parts are related to this FMC pin assignment.

- CON-FMC: SAMTEC ASP-134604-01
- Carrier board for LPC[14]: SAMTEC ASP-134603-01

FMC Pin	FMC Signal Name	CON-FMC Signal	FMC Pin	FMC Signal Name	CON-FMC Signal
C1	GND		D1	FMC_PG_C2M	
C2	FMC_DP0_C2M_P		D2	GND	
C3	FMC_DP0_C2M_N		D3	GND	
C4	GND		D4	FMC_GBTCLK0_M2C_P	
C5	GND		D5	FMC_GBTCLK0_M2C_N	
C6	FMC_DP0_M2C_P		D6	GND	
C7	FMC_DP0_M2C_N		D7	GND	
C8	GND		D8	FMC_LA01_P_CC	SL_DT[2]
C9	GND		D9	FMC_LA01_N_CC	SL_DT[3]
C10	FMC_LA06_P	SL_DT[12]	D10	GND	
C11	FMC_LA06_N	SL_DT[13]	D11	FMC_LA05_P	SL_DT[10]
C12	GND		D12	FMC_LA05_N	SL_DT[11]
C13	GND		D13	GND	
C14	FMC_LA10_P	SL_RD_N	D14	FMC_LA09_P	SL_WR_N
C15	FMC_LA10_N	SL_FLAGA	D15	FMC_LA09_N	SL_OE_N
C16	GND		D16	GND	
C17	GND		D17	FMC_LA13_P	SYS_RST_N
C18	FMC_LA14_P	SL_AD[1]	D18	FMC_LA13_N	SL_MODE[0]
C19	FMC_LA14_N	SL_AD[0]	D19	GND	
C20	GND		D20	FMC_LA17_P_CC	SL_DT[20]
C21	GND		D21	FMC_LA17_N_CC	SL_DT[21]

[14] Since CON-FMC uses FMC-LPC, it can be mounted on HPC and HPC+.

C22	FMC_LA18_P_CC	SL_DT[22]	D22	GND	
C23	FMC_LA18_N_CC	SL_DT[23]	D23	FMC_LA23_P	SL_DT[31]
C24	GND		D24	FMC_LA23_N	
C25	GND		D25	GND	
C26	FMC_LA27_P		D26	FMC_LA26_P	
C27	FMC_LA27_N		D27	FMC_LA26_N	
C28	GND		D28	GND	
C29	GND		D29	NC	
C30	FMC_SCL		D30	FMC_TDI	
C31	FMC_SDA		D31	FMC_TDO	
C32	GND		D32	FMC_3P3VAUX	
C33	GND		D33	NC	
C34	FMC_GA0		D34	NC	
C35	FMC_12P0V		D35	FMC_GA1	
C36	GND		D36	FMC_3P3V	
C37	FMC_12P0V		D37	GND	
C38	GND		D38	FMC_3P3V	
C39	FMC_3P3V		D39	GND	
C40	GND		D40	FMC_3P3V	

FMC Pin	**FMC Signal Name**	**CON-FMC Signal**	**FMC Pin**	**FMC Signal Name**	**CON-FMC Signal**
G1	GND		H1	NC	
G2	FMC_CLK1_M2C_P		H2	FMC_PRSNT	
G3	FMC_CLK1_M2C_N		H3	GND	
G4	GND		H4	FMC_CLK0_M2C_P	
G5	GND		H5	FMC_CLK0_M2C_N	
G6	FMC_LA00_P_CC	SL_DT[0]	H6	GND	
G7	FMC_LA00_N_CC	SL_DT[1]	H7	FMC_LA02_P	SL_DT[4]
G8	GND		H8	FMC_LA02_N	SL_DT[5]
G9	FMC_LA03_P	SL_DT[6]	H9	GND	
G10	FMC_LA03_N	SL_DT[7]	H10	FMC_LA04_P	SL_DT[8]
G11	GND		H11	FMC_LA04_N	SL_DT[9]
G12	FMC_LA08_P	SL_PCLK	H12	GND	
G13	FMC_LA08_N	SL_CS_N	H13	FMC_LA07_P	SL_DT[14]
G14	GND		H14	FMC_LA07_N	SL_DT[15]
G15	FMC_LA12_P	SL_PKEND_N	H15	GND	
G16	FMC_LA12_N	SL_FLAGD	H16	FMC_LA11_P	SL_FLAGB
G17	GND		H17	FMC_LA11_N	SL_FLAGC
G18	FMC_LA16_P	SL_DT[18]	H18	GND	

G19	FMC_LA16_N	SL_DT[19]	H19	FMC_LA15_P	SL_DT[16]
G20	GND		H20	FMC_LA15_N	SL_DT[17]
G21	FMC_LA20_P	SL_DT[26]	H21	GND	
G22	FMC_LA20_N	SL_DT[27]	H22	FMC_LA19_P	SL_DT[24]
G23	GND		H23	FMC_LA19_N	SL_DT[25]
G24	FMC_LA22_P	SL_DT[29]	H24	GND	
G25	FMC_LA22_N	SL_DT[30]	H25	FMC_LA21_P	SL_MODE[1]
G26	GND		H26	FMC_LA21_N	SL_DT[28]
G27	FMC_LA25_P		H27	GND	
G28	FMC_LA25_N		H28	FMC_LA24_P	
G29	GND		H29	FMC_LA24_N	
G30	FMC_LA29_P		H30	GND	
G31	FMC_LA29_N		H31	FMC_LA28_P	
G32	GND		H32	FMC_LA28_N	
G33	FMC_LA31_P		H33	GND	
G34	FMC_LA31_N		H34	FMC_LA30_P	
G35	GND		H35	FMC_LA30_N	
G36	FMC_LA33_P		H36	GND	
G37	FMC_LA33_N		H37	FMC_LA32_P	
G38	GND		H38	FMC_LA32_N	
G39	VCC_VADJ		H39	GND	
G40	GND		H40	VCC_VADJ	

8 Board information

CON-FMC has an I2C EEPROM (Figure 1 component 5) that contains board information, which is accessed through USB channel. *It is not recommended user to modify its contents*.[15]

9 Code memory

CON-FMC has an SPI EEPROM (Figure 1 component 7) that contains code, which is accessed by the USB controller. *It is not recommended user to modify its contents*.[16]

10 IPMI (Intelligent Platform Management Interface)

CON-FMC has an I2C EEPROM (Figure 1 component 14) that contains board information supporting Field Replaceable Unit (FRU) Information, which is

[15] CON-FMC API may not work when its contents altered.
[16] CON-FMC may not be detected by the host computer when its contents altered.

accessed through FMC channel. *It is not recommended user to modify its contents*.[17]

11 Carrier board constraints

UCF or XDC are available in the example directory. Consult with Future Design Systems for additional boards.

11.1 Xilinx SP605: Spartan-6 xc6slx45t

$CONFMC_HOME/examples/fex_0001_loopback/hw.single/pnr/ise.sp605.lpc/ucf

11.2 Xilinx ML605: Virtex-6 xc6vlx240t

$CONFMC_HOME/examples/fex_0001_loopback/hw.single/pnr/ise.ml605.lpc/ucf

11.3 Xilinx ZC706: Zynq-7000 xc7z045

$CONFMC_HOME/examples/fex_0001_loopback/hw.single/pnr/vivado.zc706.lpc/xdc

11.4 Xilinx VCU108: Virtex UltraScale xcvu095

$CONFMC_HOME/examples/fex_0001_loopback/hw.single/pnr/vivado.vcu108.hpc0/xdc

11.5 Xilinx ZC702: Zynq-7000 xc7z020

$CONFMC_HOME/examples/fex_0001_loopback/hw.single/pnr/vivado.zc702.lpc0/xdc

11.6 Avnet ZedBoard: Zynq-7000 xc7z020

$CONFMC_HOME/examples/fex_0001_loopback/hw.single/pnr/vivado.zed.lpc/xdc

12 Trouble shooting

12.1 undefined reference to ‘libusb_sterror’

[17] FPGA carrier board may not work when its contents altered.

- Symptom: Compiler exits with following error.

```
undefined reference to `libusb_strerror'
```

- Reason: LibUSB version is lower than required since ‘libconapi.a’ needs LibUSB version 1.0.22 or higher.
- Solution: Install latest LibUSB.

The version of LibUSB of CON-FMC library can be found from ‘libusb_version.txt’ in $CONFMC_HOME/include directory. The version of LibUSB of system can be found from ‘libusb.h’ in ‘/usr/include/libusb-1.0’ directory, where ‘LIBUSB_API_VERSION'

12.2 /usr/bin/ld: cannot find -lusb-1.

- Symptom: Compiler exits with following error.

```
/usr/bin/ld: cannot find -lusb-1.
```

- Reason: linker cannot find the location of ‘libusb-1.0.so’
- Solution: check the location of “libusb-1.0.so”

```
$ /sbin/ldconfig –p | grep “libusb-1.0.so”
```

and add ‘-L path’

```
-L /usr/lib64 -lusb-1.0
```

12.3 undefined reference to `__ms_vsnprintf'

- Symptom: MinGW32 gcc compiler exits with following error.

```
undefined reference to `__ms_vsnprintf'
```

- Reason: ‘__ms_vsnprintf’ function is missing
- Solution: add following code in your source

```
#include <stdio.h>
#include <stdarg.h>

int __cdecl __ms_vsnprintf(char * __restrict__ d,size_t n,const char *
__restrict__ format
,va_list arg)
{
    return vsnprintf(d, n, format, arg);
}
```

12.4 cannot initialize CON-FMC

- Symptom:

```
cannot initialize CON-FMC
```

- Checking on Linux (1/2)
  - ✧ 'lsusb' does not list as follows and which means CON-FMC is not recognized yet.

```
$ lsusb
….
Bus 005 Device 003: ID 04b4:00f3 Cypress Semiconductor Corp.
….
```

- Checking on Linux (2/2)
  - ✧ 'dmesg does not list as follows and which means CON-FMC is not recognized yet.

```
$ dmesg | tail
….
[25162.333730] usb 5-2: new high-speed USB device number 3 using xhci_hcd
[25162.933960] usb 5-2: New USB device found, idVendor=04b4, idProduct=00f3
[25162.933964] usb 5-2: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[25162.933966] usb 5-2: Product: CON-FMC-FX3
[25162.933968] usb 5-2: Manufacturer: Future Design Systems
[25162.933970] usb 5-2: SerialNumber: 0
….
```

- Reason: Linux system did not recognize CON-FMC yet
- Solution1: just wait a few minutes
- Solution2: type following

```
$ udevadm trigger
```

- Solution3: turn off and then turn on CON-FMC
- Solution4: disconnect CON-FMC while turned on and then connect it again

- Reason: CON-FMC is not turned on yet
- Solution: turn on the power

- Reason: CON-FMC package is not installed yet
- Solution: install CON-FMC package

12.5 cannot get gpif2mst info

- Symptom:

```
cannot get gpif2mst info
```

- Reason: FPGA does not have CON-FMC related design yet
- Solution: program FPGA using the correct bit-stream.

12.6 Errors while compiling CON-FMC related program

Refer to 'Trouble shooting' section in the reference [1].

Wish list

- ☐

Related documents

[1] Future Design Systems, CON-FMC API based on LIBUSB, FDS-TD-2018-04-004.
[2] Future Design Systems, Board information format for I2C PROM, FDS-TD-2018-04-001. (Internal document)
[3] Future Design Systems, Cypress EZ-USB FX3 GPIF-II firmware for CON-FMC, FDS-TD-2018-04-003. (Internal document)
[4] Future Design Systems, IPMI handling program user guide, FDS-TD-2017-12-001. (Internal document)
[5] Future Design Systems, CON-FMC board connection guide, FDS-TD-2019-06-001. (Internal document)

Revision history

- ☐ 2019.06.10: ‘Section 7 FMC pin assignment’ updated.
- ☐ 2018.08.14: ‘12. Trouble shooting’ added by Ando Ki.
- ☐ 2018.07.13: ‘Related documents’ added by Ando Ki.
- ☐ 2018.06.06: LED picture added by Ando Ki.
- ☐ 2018.03.15: Document started by Ando Ki (adki@future-ds.com)

– End of document –