Introduction

The evaluation board is designed to help the customer evaluate the following devices.

| Product Number | Description |
|----------------|---|
| 9FGL0841 | 8-output PCIe Clock Generator 3.3V Zout = 100Ω |
| 9FGV0841 | 8-output PCIe Clock Generator 1.8V ZOUT = 100Ω |
| 9FGU0841 | 8-output PCIe Clock Generator 1.5V ZOUT = 100Ω |
| 9FGL0851 | 8-output PCIe Clock Generator 3.3V ZOUT = 85Ω |

The devices are programmable through SMBus interface. This user guide details the board set and connection as well as the companion GUI installation for communicating to the device. The board has a self contained USB to SMBus interface.

Board Overview

Use the following diagram and table to identify: power supply jacks, USB connector, input and output frequency SMA connectors.

Figure 1. Evaluation Board Overview for the 9FGL0841–100 Ω Differential



Table 1: EBV Pins and Functions

| Item | Name | On-Board Connector Label | Function |
|------|----------------------------------|-----------------------------|---|
| 1 | Outputs 0-7 | J1-J16 | Low power HCSL outputs |
| 2 | USB Interface | J21 | Used for connection with a PC and for interaction with the IDT PCIe GUI |
| 3 | I ² C Connection Port | J17 | Used for an external I ² C connection |
| 4 | Input Voltage Selector | J20 | Used for selection of USB power supply or external power supply from J18 |
| 5 | Power Supply Jack | J18 | Input power supply |
| 6 | Ground Jack | J19 | Used for GND |
| 7 | DIP Switch | SW1 | S1: FG_OE_0 S2: FG_OE_1 S3: FG_OE_3:2 S4: FG_OE_5:4 S5: FG_OE_7:6 S6: CK_REF S7: FG_PD# S8: FG_SS_EN |

Board Power Supply

By default, the board is powered from the USB connector.

Bench Power Supply – An external power supply can be used by connecting jumper J20 between the central pin and the VDD_J position. VDD_J must then be connected to the appropriate power supply for the device ordered.

- 9FGL= 3.3V
- 9FGV= 1.8V
- 9FGU = 1.5V

USB Power Supply – When the board is connected to a PC through a USB cable, on-board voltage regulators can supply the appropriate voltage to the clock chip. USB power is selected by connecting J20 between the central pin and the VDD_USB pin.

Depending on the evaluation board ordered, the R22 resistor will be pre-populated as follows:

- For VDD = 1.5V: R22 = 49.9Ω
- For VDD = 1.8V: R22 = 107Ω
- For VDD = 3.3V: R22 = 402Ω

Figure 2. Connecting the jumper to VDD_J or VDD_USB. Default is to power by USB



Connecting the Board

The board is connected to a PC through a USB connector for configuring the device, as shown in Figure 3 below. The USB interface will also provide +5V power supply to the board, from which on-board voltage regulators generate various voltages for the core as well as for each output. LED LD2 will light up to indicate a successful connection

The board can also be powered by a bench power supply by connecting one banana jack J18 for the core voltage, respectively. Please see board power supply section for details.

Figure 3. Connecting the Board with USB Port for Communications with Software GUI



PCIe GUI Installation Setup

First the GUI requires a driver for the FTDI IC that interface between the USB and SMBus interfaces.

- 1. Unzip the files from the PCIe GUI archive on your PC. PCIe GUI zip file can be found at http://www.idt.com/document/swr/software-pcie-evaluation-kits
- 2. Extract the FTDI windows driver from the PCIe GUI archive or go to the FTDI website to download the latest driver and install on your computer.

Note: For non-Windows operating systems, download the respective driver from the FTDI website.

http://www.ftdichip.com/Drivers/D2XX.htm

Currently Supported D2XX Drivers:

| | Processo | | | | | | | | |
|-------------------------|-----------------|---|-----------------|-------|--|---------|---------|---------|--|
| Operating System | Release Date | x86 (32-bit) | x64 (64-bit) | PPC | ARM | MIPSII | MIPSIV | SH4 | Comments |
| Windows* | 2014-09-29 | 4-09-29 Contact support1@ftdichip.com if looking to create cusomised drivers | | - | - | - | - | - | 2.12.00 WHQL Certified Available as setup executable <u>Release Notes</u> |
| Windows RT | 2014-07-04 | <u>1.0.2</u> | - | - | <u>1.0.2</u> | - | - | - | A guide to support the driver (AN_271) is available here |
| Linux | 2012-06-29 | 1.1.12 | 1.1.12 | - | 1.1.12 Suitable for Raspberry Pi | - | - | - | ReadMe |
| Mac OS X | 2012-10-30 | 1.2.2 | 1.2.2 | 1.2.2 | - | - | - | - | Requires Mac OS X 10.4 (Tiger) or later ReadMe |
| Windows CE 4.2-5.2** | 2014-22-04 | 1.0.1.10 | - | - | 1.0.1.10 | 1.0.1.6 | 1.0.1.6 | 1.0.1.6 | |
| Windows CE 6.0/7.0 | 2014-22-04 | 1.0.1.10 CE 6.0 CAT CE 7.0 CAT | - | - | 1.0.1.10 CE 6.0 CAT CE 7.0 CAT | 1.0.1.6 | 1.0.1.6 | 1.0.1.6 | For use of the CAT files supplied for ARM and x86 builds refer to <u>AN_319</u> |

3. Double click the executable file to install the driver.

4. Connect the board to the computer using the supplied USB cable. Double click on the Application file ClockCtl.exe to start the PCIe GUI support application.

If no board is connected, the following message will appear:

| ClockCtl | |
|--------------|-----------------|
| No FT4222 de | evice is found! |
| | |

5. PCIe Clock/Buffer GUI main window:

| | IDT PCIe devices SMBus register tool | | | | <u> </u> | |
|-----|--------------------------------------|------------|-----------|-----------|-----------|-----|
| 6.1 | PCIe Cle | ock/Buffer | | | | |
| | | | | | | |
| 6.2 | Interface Speed Address D0 | Reg# 0 | 1 2 | 3 4 5 | 6 7 | |
| - | USB_SMBus 🗨 100 TypeXfer Blk 💌 | Rd 00 | 00 00 | | | |
| | Begin Rd Reg# 0 Read Byte Cnt 18 | Wrt 00 | 00 00 | | | |
| 6.3 | Begin WrReg# 0 WrtByte Cnt 18 | Reg# 8 | 9 10 | 11 12 1 | 3 14 15 | |
| - I | Byte Cnt Reg# 8 Header Byte Cnt 22 | Rd 00 | 00 00 | 00 00 0 | 0 00 00 4 | |
| | Read Rd->Wrt Write Undo | Wrt 00 | 00 00 | 00 00 0 | 0 00 00 | |
| 6.4 | | Roatt 16 | 17 10 | 10 20 2 | 1 22 22 | |
| | | Rd 00 | | | | 6.7 |
| | Write Register File to Device | Wrt 00 | 00 00 | 00 00 0 | 0 00 00 | |
| 6.5 | | | | | | |
| | | Reg# 24 | 25 26 | 27 28 2 | 9 30 31 | |
| | Save Register's Value to File | Rd 00 | 00 00 | | | |
| 6.6 | | Witt UU | 00 00 | 00 00 0 | | |
| | | Reg# 7 | 6 5 | 4 3 2 | 1 0 • | 6.8 |
| | | 0 | | | | |
| | | 0-31 | C 32-63 | C 64-95 | C 96-127 | 6.9 |
| | | C 128-159 | C 160-191 | C 192-223 | C 224-255 | |
| | | | | | | |
| | Tetermeted Device Technology | | | | | |
| | Integrated bevice lecimology | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

6.1 Slave address

| Address | DO |
|-----------|-------|
| Type Xfer | Blk 💌 |

The address is 7-bit slave address combined with 0 in LSB, for example if the slave address is 1101000, D0 should be filled.

Type Xfer

| Type Xfer | Blk 💌 | |
|---------------|----------------------------------|---|
| Read Byte Cnt | <mark>Blk</mark> Byte Word | I |

6.2 SMbus interface

| Interface | Speed |
|-------------|-------|
| USB_SMBus 💌 | 100 |

Only USB to SMBus is available, you can change the SMBus speed, but please note that the speed of SMBus is from 10KHz to 100KHz.

6.3 Begin Reg# and Byte Count

| Begin Rd Reg# | 0 | Read Byte Cnt | 18 |
|---------------|---|-----------------|----|
| Begin Wr Reg# | 0 | Wrt Byte Cnt | 18 |
| Byte Cnt Reg# | 8 | Header Byte Cnt | 22 |

- Begin Rd Reg# is the begin register address of read operation.
- Read Byte Cnt is the byte count of read operation.
- Begin Wr Reg# is the begin register address of write operation.
- Wrt Byte Cnt is the byte count of write operation.
- 6.4 Register Operations
 - 6.4.1 Read Operation



Pressing the read button will initiate a read. If a chipset is used for reading, the byte count is determined by the value in the device byte count register. The byte count cannot be larger than 32 dec. Non-read locations in the read grid will be grayed out.

Rd->Wrt Operation



Pressing the Rd>Wrt button will copy all of the read cells to the write cell contents

6.4.2 Write Operation



Write button operation. If the chipset is used for writing, the byte count is controlled by the value in the GUI panel byte count register. Registers that will not be written because of the starting location setting and byte count will be grayed out.

The hex values for data to be written will be in a cell with a white background.

6.4.3 Undo Operation



Reverts the last performed operation.



6.5 Write from file

| | _ | Write | Register | File to | Device | _ | | |
|-----------|---------------|----------------|------------|--------------|---------------|-------|-------|--------|
| | | <u> </u> |) | | <u> </u> | | | |
| Ie device | s SMBus reg | gister tool | | | | | | |
| | | | PCle | Clock/Buffe | it. | | | |
| en la te | 510 | Addres | \$\$ VL | Reg# | 0 1 2 | 3 4 | 5 6 | |
| SB_SMBus | ş 🕶 📔 I UL | J Туре≻ | Kfer Bik 👻 | Rd | 00 00 00 | 00 00 | 00 0 | 00 |
| 🚺 Loa | d register va | alue from file | | | | × | 00 0 | 00 |
| eg | Look in: | DCle GUI | | - | 🗢 🗈 💣 📰 | • | 13 1 | 4 |
| | 5. | Name | ~ | | Date modified | Туре | 00 0 | 00 |
| R Recei | nt Places | | No item | s match your | search. | | 00 0 | 00 |
| 1 | | | | | | | 24 | |
| De | esktop | | | | | | 00 0 | 10 |
| | | | | | | | 00 0 | 00 |
| Lib | praries | | | | | | | |
| | | | | | | | 29 3 | 30 |
| Cor | mputer | | | | | | 00 0 | 10 |
| | | | | | | | | |
| Ne | stwork | | | | | | 2 1 | |
| | | • | m | | | ۰, | | |
| | | File name: | | | • | Open | C 9 | 6-127 |
| | | | | | | | 1 (2 | 24.255 |

To Write register from file, click "Write Register File to Device" button, it will pop up a window, select the file path and the file name, then click "Open", the GUI will read all registers' value from the file then down load to device.

6.6 Save registers to file

| | Sa | ave Re | gister's | s Value t | o File | | |
|---------------------------|---------------------------------|--------------------------------------|-----------------|------------------|-------------------|----------------|----------------|
| | | 0 | | (|) | | |
| PCIe devices SM | IBus register to | pol | | | | | |
| | | | PCIe CI | ock/Buffer | | | |
| USB SMBus 🔻 | | Address Type Xfer | D2 Blk 🔻 | Reg# 0 Rd 00 | 1 2 3 00 00 00 | 4 5 | 6 7 00 00 |
| Begin Bd B | Write register' | s value to file | | | | | 00 00 |
| Begin Wr R Byte Cnt Re | Look in: | PCle GUI Name | * | • | 🗢 🗈 💣 📰 | Type | 14 15 |
| Read R | ecent Places | | No | items match your | search. | | 00 00 22 23 |
| Write | Libraries | | | | | | 00 00 30 31 |
| Save | Computer Computer Network | | | | | | 00 00 |
| | | • | | | | | |
| | | File <u>n</u> ame: Files of type: | Registers Files | (*.txd) | • | Open Cancel | 224-255 |
| Integrat | ed Devic | e Technolo | ogy | | | | |

To save registers to file, click "Save Registers Value to File" button, it will pop up a window, select the file path and fill the file name, then click "Save", the GUI will dump all registers' value then save to the file.

6.7 Register Value field

| Reg# | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|----|----|----|----|----|----|----|----|
| Rd | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |
| Wrt | 00 | 00 | 00 | 00 | 00 | 00 | 00 | 00 |

The hexadecimal read information will be grayed background reminding the user that it cannot be altered. Hexadecimal write information will be on a white background.

6.8 Binary display table



Clicking on a Reg# Rd window will display the binary decode of the hex value. This may be used for entering binary data instead of hexadecimal data.

6.9 Byte count range switch

| 0-31 | C 32-63 | O 64-95 | O 96-127 |
|-----------|-----------|-----------|-----------|
| C 128-159 | C 160-191 | O 192-223 | 0 224-255 |

Since there is 32-byte value could be display at the time, if the byte count exceed 32, need to switch the range.

6. Read/Write Operations

Read

Pressing the read button will initiate a read. If a chip set is used for reading, the byte count is determined by the value in the device byte count register. The byte count cannot be larger than 32 dec. Non-read locations in the read grid will be grayed out.

Rd->Wrt

Pressing the Rd>Wrt button will copy all of the read cells to the write cell contents.

Write

Write button operation. If the chip set is used for writing, the byte count is controlled by the value in the GUI panel byte count register. Registers that will not be written because of the starting location setting and byte count will be grayed out.

The hex values for data to be written will be in a cell with a white background.



7. Read/Write from file

| alate 3 | Addres | | Reg# | 0 1 | 2 3 | 4 | 5 | 6 | 7 |
|-----------------|-------------------|-----------------------|------------|------------|-------|--------|----|-------|----|
| SB SMBus | r value from file | ster Bik 🔻 🔳 | Rd | 00 00 | 00 00 | | | 00 | 00 |
| er | | | | | | | | 00 | 00 |
| eg Look in | | | _ | | | | 13 | 14 | 15 |
| yt 🔄 | Name | | | Date modif | ied | Туре | 00 | 00 | 00 |
| R Recent Places | | No items | match your | search. | | | 00 | 00 | 00 |
| 5 🗾 | | | | | | | | | |
| Desktop | | | | | | | 21 | 22 | 23 |
| | | | | | | | 00 | 00 | 00 |
| Librarias | | | | | | | 00 | 00 | 00 |
| | | | | | | | 29 | 30 | 31 |
| | | | | | | | 00 | 00 | 00 |
| Computer | | | | | | | 00 | 00 | 00 |
| | | | | | | | | _ | |
| Network | | | | | | | 2 | 1 | 0 |
| | • | m | | | | + | | | - |
| | File name: | | | • | | Open | | 96-12 | 7 |
| | Files of type: | Registers Files(*.bd) | | - | | Cancel | | 224-2 | 55 |
| | | | | | | | | | |

To Write register from file, click "Write Register File to Device" button, it will pop up a window, select the file path and the file name, then click "Open", the GUI will read all registers' value from the file then down load to device.

| irestate | Sired | Address Turna Vitar | D2 | Reg# 0 | 1 2 3 | 4 5 | 6 | 7 |
|-------------|----------------|------------------------|-----------------|-----------------|---------------|--------|------|----|
| DSB_SMBUs | Write register | s value to file | BIK | MU UU | 00 00 00 | | 00 | 00 |
| Begin Wr R | Look in: | 🔒 PCle GUI | | • | 🗢 🗈 💣 📰 | | 14 | 15 |
| Byte Cnt Re | G. | Name | ^ | | Date modified | Туре | 00 | 00 |
| Read | Recent Places | | No | items match you | r search. | | 00 | 00 |
| 00 | - | | | | | | 22 | 23 |
| | Desktop | | | | | | 00 | 00 |
| Write | | | | | | | 00 | 00 |
| | Libraries | | | | | | 30 | 31 |
| Save | Computer | | | | | | 00 | 00 |
| | Computer | | | | | | 00 | 00 |
| | Network | | | | | | 1 | 0 |
| <u></u> | | • | | m | 6 | ۲ | | |
| | | File name: | | | • | Open | 6-12 | 1 |
| | | Files of type: | Registers Files | (* txt) | • | Cancel | 24-2 | 55 |
| L L | | | | | | | | |

To save registers to file, click "Save Registers Value to File" button, it will pop up a window, select the file path and fill the file name, then click "Save", the GUI will dump all registers' value then save to the file.

Note: LED LD1 will light up on every SDATA operation.

Board Schematics

Figure 4. 9FGL0841 Schematics



RENESAS

Figure 5. USB Interface and Power



Orderable Part Numbers

The following evaluation board part numbers are available for order.

Table 2: Orderable Part Numbers

| Part Number | Description |
|-------------|-------------------------|
| EVK9FGL0841 | 9FGL0841 Evaluation Kit |
| EVK9FGV0841 | 9FGV0841 Evaluation Kit |
| EVK9FGU0841 | 9FGU0841 Evaluation Kit |
| EVK9FGL0851 | 9FGL0851 Evaluation Kit |

