Data Sheet

DLi

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D4100 DVI to DMD (D2D) Interface Board

Revisions		
Rev	Description	Date
Rev1	Initial Document Release	9/15/09
Rev2	Add 24-bit binary expansion	1/25/11
Rev 3	Add 24-bit binary expansion for 1080p	3/14/11

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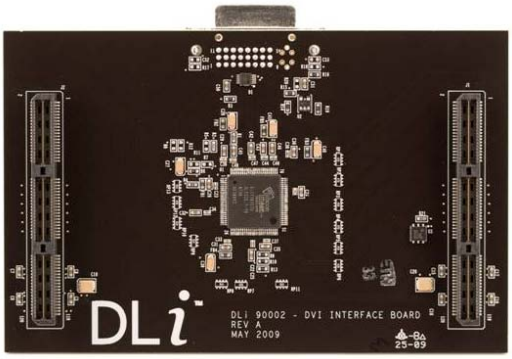
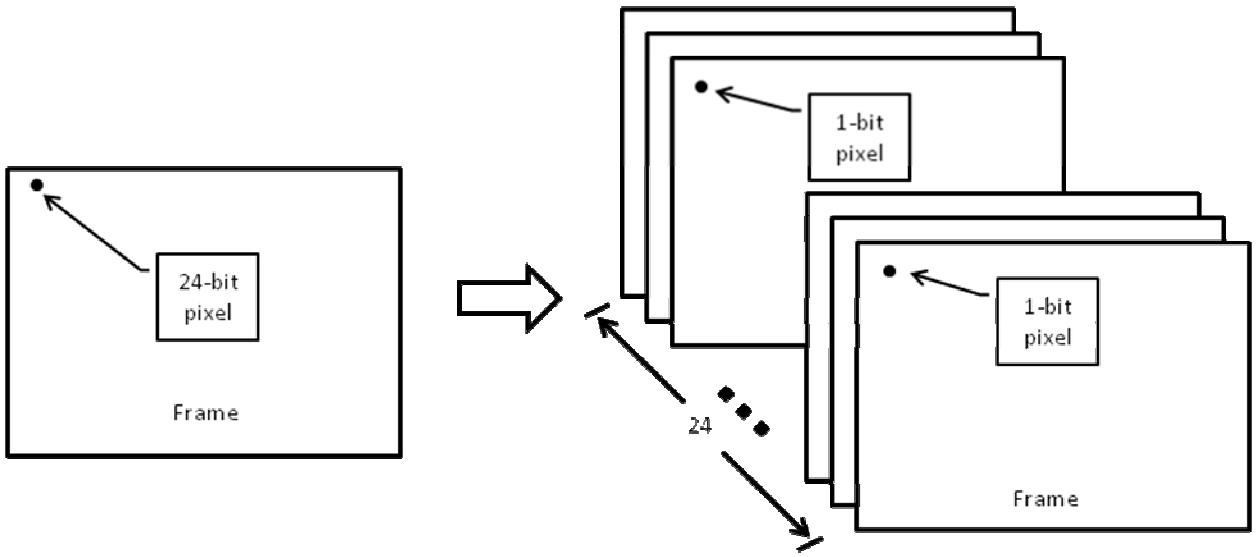
INTRODUCTION

The DLi DVI to DMD (D2D) Interface board works with the Texas Instruments DLP Discovery 4100 (D4100) to display video on the DMD using a DVI interface. After the D4100 and D2D board have been properly setup and configured, the DMD will display video sent over the DVI cable.

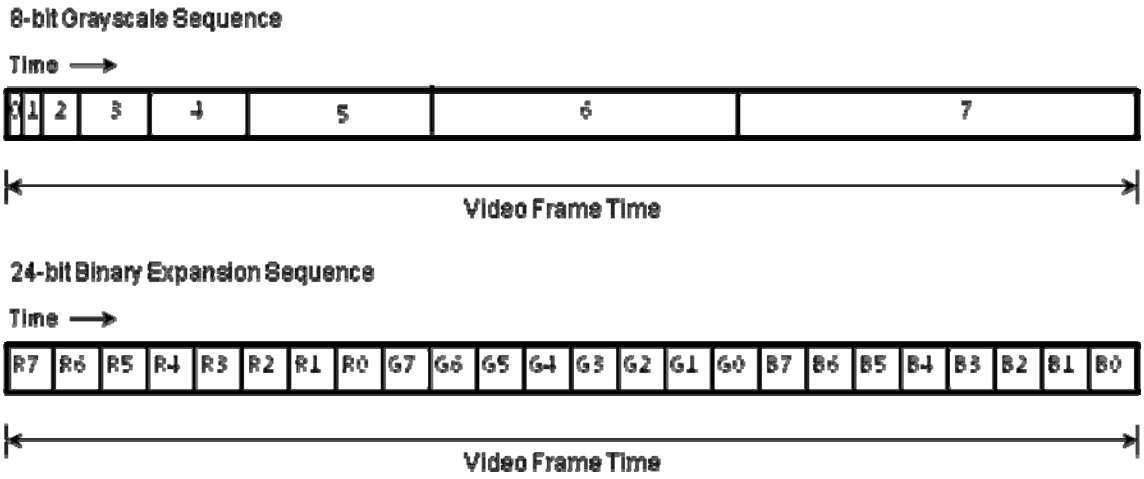


The D2D board creates an extremely easy to use interface to the DMD. The source video can be supplied by a computer with DVI output using any of a number of methods: creating a custom video or AVI, DirectX or OpenGL rendering, an image "slideshow", etc.

The D2D interface board has been upgraded to support 24-bit binary expansion in addition to its existing 8-bit grayscale capability. 24-bit binary expansion mode takes a single frame of 24-bit color pixels and expands it to 24 frames of 1-bit pixels. In the following figure the 24-bit color pixel frames run at 60Hz while the 1-bit pixel frames run at 1440Hz (60 Hz + 24 = 1440)



The 8-bit grayscale and 24-bit binary expansion sequence is shown below.



When using the binary expansion mode it is important to disable any gamma or color correction which could alter the 24 bit RGB data. This may be done using your video card control panel or through Windows.

The DLi D2D Manager software will configure the D4100 APPS FPGA for 60 Hz grayscale or binary expansion mode.

SYSTEM REQUIREMENTS

The DLi D2D Interface board requires the following:

- Windows XP or Vista (32 bit versions only)
- A USB 2.0 connection
- A USB 2.0 cable of Type A (**included**)
- A Male to Male DVI Cable (**included**)
- 2 GB SODIMM memory module (**included**)

Figure 1: USB Type A to Mini B

The DVI source video can come from anything (computer, DVD player, etc.) that supports the standard DVI-D specification with up to 100 Hz XGA resolution or 60 Hz 1080P resolution.

SOFTWARE INSTALLATION

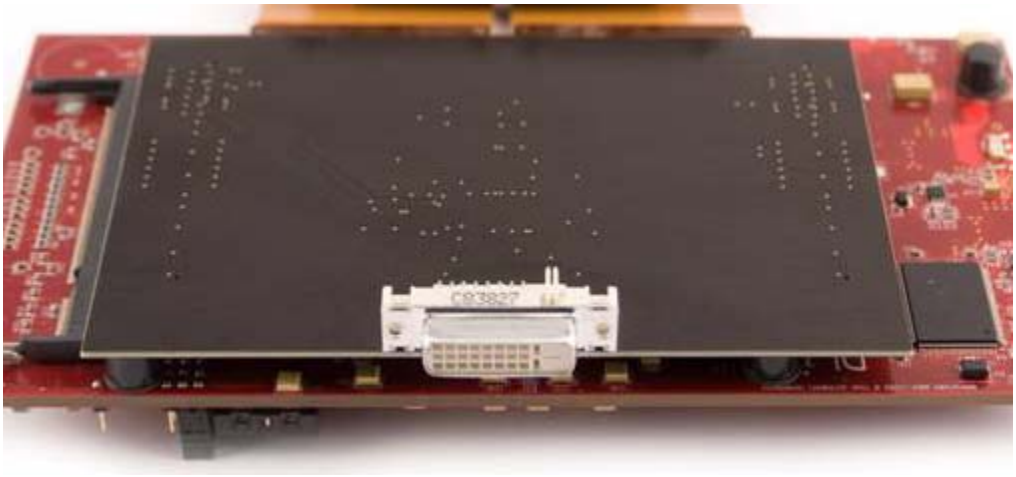
A full installation file, “D2D Installation.exe”, encompasses the D2D package. It will check for the necessary .NET framework and unpack the D2D configuration manager, the required files, and the drivers. The standard D2D grayscale software is available online at: http://www.dlinnovations.com/products/D2D.html.

To install the D2D platform, run the installation program and follow the prompts. The default installation path is: %ProgramFiles%/D2D Manager.

The D2D binary expansion software is available only on CD. First install the D2D grayscale software as described above. Then copy from the CD \bin files\24bitbinexp*.bin to ProgramFiles/D2D Manager/Bin.

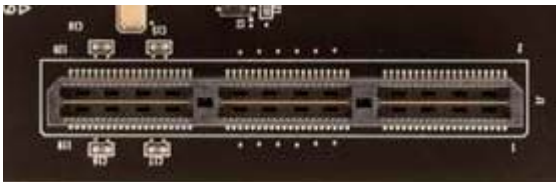
HARDWARE INSTALLATION

Do NOT try to plug the D2D interface card into the D4100 while it is connected to power. Make sure that power is OFF.



DLi has included a heat sink in the D2D package for use on the larger FPGA (U5). It is strongly recommended that you use this heat sink. Before attaching it, clean the top of the FPGA with a soft cloth. Then peel of the sticker back on the FPGA, and press the adhesive side of the heat sink firmly to the FPGA for 10-20 seconds.

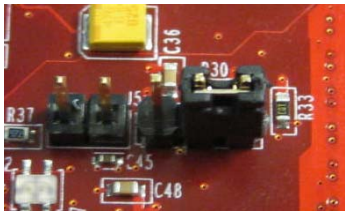
The D2D Interface card fits into the EXP connectors on the D4100 so that the DVI connector is not directly underneath the D4100.

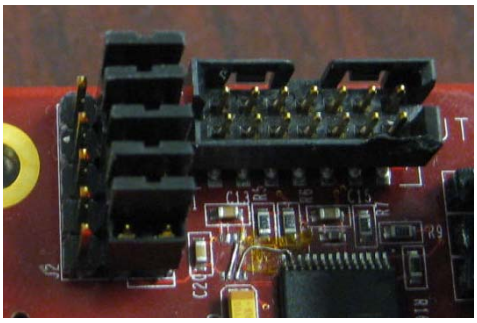


The EXP connectors will only fit in one direction, and must be aligned before attaching the boards. Once the EXP connectors are aligned gently press on both sides of the board to connect them. Make sure the board is firmly connected and secure.

HARDWARE CONFIGURATION

The D4100 must to be configured to allow USB in order for the D2D manager to program the settings. To enable USB, jumper J5 on the D4100 must have a jumper on pins one and two, or on pins two and three. Either combination is acceptable.





In addition, all of the jumpers on J2 jumper block must be on pins 2-3.

USB Jumper J5 *Jumper bank J2*

Included in the D2D package is a 2GB SODIMM memory module. This memory is necessary for the operation of the D2D Interface board, and must be connected prior to operation. The memory is inserted into the SODIMM connector on the D4100 at an angle, and then snapped down into place. Observe the orientation of the notch on the memory card, it will only fit in one direction. Do not force it in.

SODIMM and correct orientation of notch

The D4100 board must then be plugged into a 5V 6A source and turned on. Finally plug the D4100 into the computer via a Type A to Mini B USB cable.

DRIVERS

Windows will prompt you for drivers once the USB cable is plugged in. If you have previously installed the D4100 software, it may not prompt you to install them. This is fine, as the drivers will be the same.

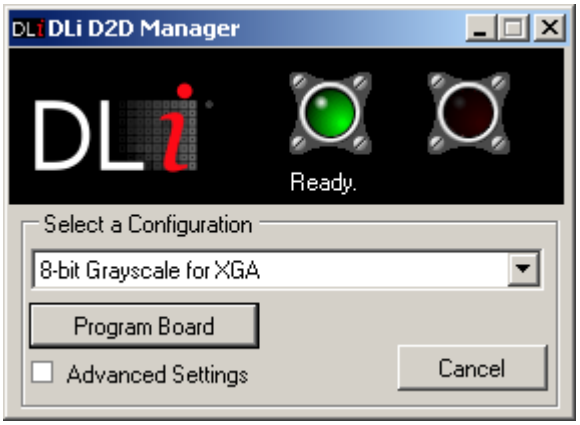
If you have not installed the D4100 software previously and windows does not prompt you for the drivers, go to start, Control Panel, System, Hardware tab, Device Manager button, Right click the “unknown device”, and select update drivers.

Do not check “look online for drivers” Select the option to locate the drivers yourself, or “have disk”. Point it to the: “%ProgramFiles%/D2D Manager/Drivers” folder (most often “C:\Program Files\D2D

Manager\Drivers"). Allow the drivers to install. You will be prompted again for a second set of drivers. This set includes the loader for the firmware and the drivers that interface to the firmware once it has been loaded. For installation, just follow the same procedure as above.

D2D MANAGER

The D2D Manager allows you to configure the D4100 for use with the D2D Interface card. The D4100 must be configured with the D2D manager each time the D4100 board is restarted.



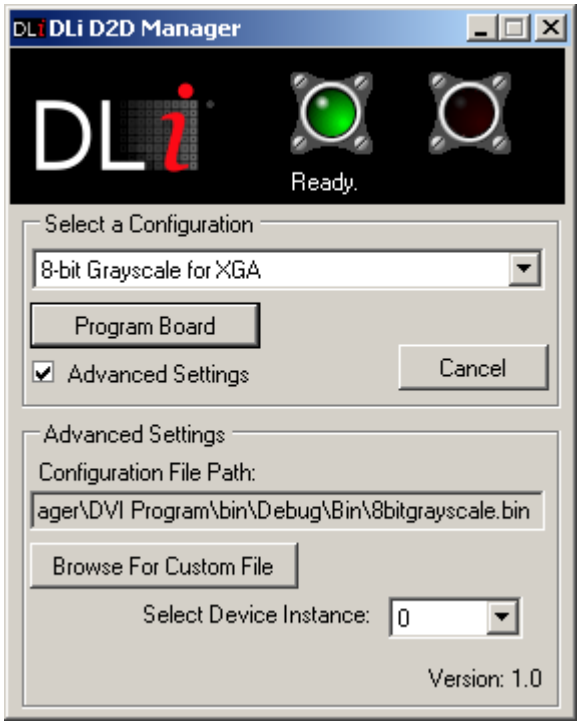
For basic operation, select the configuration you want from the dropdown menu, and hit the program button. The "**Program Board**" button will be disabled if the D4100 is not configured properly, the drivers are not installed, or the board is not plugged in. The green status button will turn off, and the utility will take five to ten seconds to finish programming the 4100. While it is programming the red status light will turn on, and a "Programming…" message will appear.

While programming, on the D4100 board LED D1 will turn green and LED D2 will turn red while the board is being programmed.

If the board programmed successfully, a "Completed Successfully!" message will appear to the right of the Program Board button.

ADVANCED SETTINGS

The checkbox labeled “Advanced Settings” allows the user access to a panel of other, more advanced, options. These will not need to be used by the majority of users; however you will need to select “Advanced Settings” to configure the D4100 in binary expansion mode.



The “**Browse For Custom File**” button allows you to select an FPGA configuration file of your choosing (*.bin or *.bit). To configure binary expansion, click on **“Browse For Custom File”** and point to the: “%ProgramFiles%\D2D Manager\bin\24bitbinexp*.bin file. Click **“Program Board”** button to complete the configuration.

The “Select Device Instance” box will allow you to select different Discovery boards that are plugged in at the same time to program. The utility updates the instance numbers as the boards are added or removed and there is no guarantee a specific board will always have a specific number.

The advanced options panel also shows how long the programming process took, and how much data was transferred.

D4100 LED INDICATORS

After the D4100 is programmed with a configuration file, the four LEDs on the D4100 can be used to determine the status of the D4100 and the D2D board:

LED D9 represents the DDC heartbeat and will blink during regular operation.
LED D10 will be on if DDC is on, connected, and functioning.
LED D11 will be on if the D2D board is connected properly. If this LED is off, try re-seating the D2D interface board. If it is still off please contact DLi.
LED D12 will turn on when the memory is initialized. If this LED is off the memory is either not connected, or it is bad. Once the DVI cable is connected to both the D2D board and your computer, LED D12 will then act as a DVI heartbeat signal (but only if the memory is correctly initialized) and will blink as DVI data is transferred to the D2D board.

COMPUTER VIDEO SETTINGS

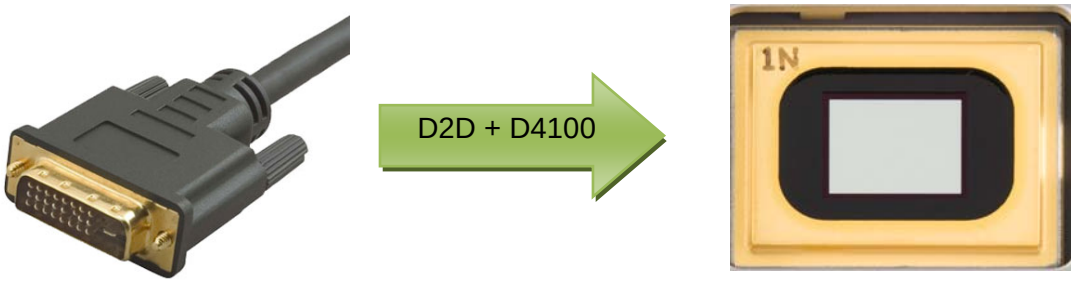
The computer’s resolution and refresh rate must be set correctly for the images to appear on the DMD. The computer’s resolution can be changed by right clicking the desktop, selecting “Properties”, clicking on “Settings” and using the screen resolution slider. After that to change the refresh rate, click on “Advanced”, and then the “Monitor” tab, and select the correct refresh rate. Supported refresh rates will vary depending upon the purchased D2D product.

Grayscale:	XGA:	Resolution -> 1024x768	Refresh Rate-> 60Hz
Binary Expansion:	XGA:	Resolution -> 1024x768	Refresh Rate-> 60Hz
Binary Expansion:	XGA:	Resolution -> 1024x768	Refresh Rate-> 100Hz, or
Binary Expansion:	1080P:	Resolution -> 1920x1080	Refresh Rate-> 60Hz

OPERATION

Once the D4100 has been programmed with the correct configuration file, the DVI interface can be used. Use the included male to male DVI cable and connect the computer with the D2D interface board's DVI port. If everything was properly configured, you should see the video data on the DMD.

In grayscale mode, the DMD will display what a monochrome monitor would display if it were plugged into the DVI. In binary expansion mode the display will display an image similar to a monochrome monitor, however shading will be incorrect.



D4100 RESET AND DIP SWITCHES

The D4100 can be soft reset using the push button SW2. This soft reset keeps the current configuration file, and a new one will not need to be programmed.

The dip switch panel is labeled SW1 on the D4100, and the first three switches provide various configuration options:

SW1-1 provides an East – West flip: available only on grayscale
SW1-2 provides a North – South flip: available on grayscale and binary expansion
SW1-3 when off uses an 8-bit grayscale mode, using the 8 bits of blue color data for grayscale control. The 8 bits of red and green information is ignored. This mode is preferred for 8-bit grayscale input data. When switch 3 is on the D4100 uses a luminance grayscale approximation mode that is more pleasing to the eye and uses all 24 bits of color data. This mode is preferred for 24-bit color input data: available only on grayscale

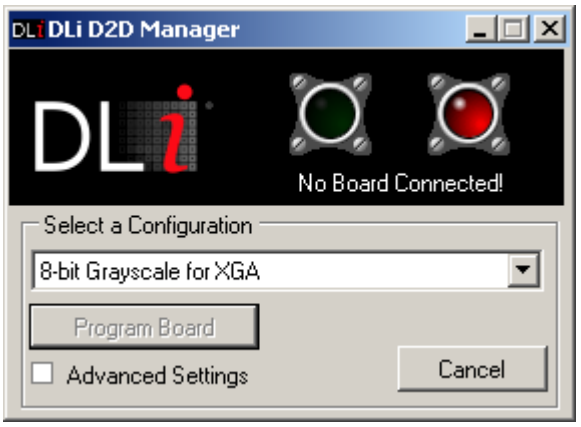
STANDALONE OPERATION

Included in the Bin folder of the D2D install directory is an MCS file called "D2DXGA8b001.mcs". The APPS FPGA flash can be programmed with this file, and a Xilinx FPGA programmer. This will remove the need to program the board with the D2D Manager on every D4100 board restart. For binary expansion mode the file on the CD \bin\24bitbinexp*.mcs should be used.

CUSTOM VIDEO REQUIREMENTS

Custom D2d resolution, refresh and grayscale bit depth configurations are available from DLi, please contact DLi Sales for more information.

TROUBLESHOOTING



Problem: the status button is red and says “No Board Connected!”

Possible fixes:

1. Make sure the board is turned on, and connected via USB
2. Make sure the drivers are installed and working correctly
    a. You can check this by going into the device manager, and under USB devices the D4100 should be listed as “TI D4100 EXPLORER V1”
    b. If the device manager does not have the correct listing, follow the instructions in the “Drivers” section above

Problem: Error messages display on startup about missing files

“D4000_usb.dll is missing! Please keep the DLL in the same directory as the executable”

“bin.ini file is missing. Please make sure bin.ini is in the same directory as the executable”

“8-bit Grayscale for XGA file is missing from the Bin directory”

“24-bit binary expansion for XGA file is missing from the Bin directory”

“24-bit binary expansion for 1080P file is missing from the Bin directory”

Possible fix: Uninstall the D2D manager using “Add/Remove Programs” in the control panel, and re-install it with “D2D Installation.exe”Problem: Video is not showing up on the DMD

Possible fixes:

1. Check the DVI Heartbeat LED. If it is blinking, that means the D4100 is receiving DVI information, and the problem is most likely with the DMD.
2. Make sure the computer and video card is configured to output the correct resolution for your DMD type
3. Verify that the D2D manager successfully programmed the configuration file
4. Turn the power off on the D4100 and make sure the D2D interface board is firmly connected. Make sure to re-program the D4100 with the D2D manager once it has powered on

5. Check the Board validation LED. If it is blinking make sure the D2D interface board is connected to the D4100 correctly. If it is connected and the validation LED is still blinking, you will need to contact DLi.