



# 3D STEREO SETUP WITH PROJECTOR

DA-07307-001\_v01 | June 2014

**Application Note**



## DOCUMENT CHANGE HISTORY

DA-07307-001\_v01

Version	Date	Authors	Description of Change
01	June 18, 2014	EL, SM	Initial Release

# TABLE OF CONTENTS

- Welcome**..... 1
  - About this Application Note ..... 1
  - System Requirements ..... 1
- Hardware Requirements** ..... 2
  - Connection and Cables ..... 2
    - Quadro Graphics Card Outputs ..... 2
    - Barco F35 A53D Connections ..... 4
- Setup**..... 6
  - Optional Stereo Bracket Installation ..... 6
  - Single Projector Setup ..... 8
  - Dual Projector Setup ..... 9
  - Two Node Cluster Setup ..... 10
- Projector Setup** ..... 11
- Driver Configuration** ..... 13
  - Installing the 3D Stereo Driver ..... 13
    - Configuring OpenGL Stereo ..... 13
    - Configuring DirectX Stereo..... 15
    - Configuring Linux Drivers ..... 16

## LIST OF FIGURES

Figure 1.	Quadro Card Outputs .....	3
Figure 2.	F35 Projector Connections .....	4
Figure 3.	DisplayPort to Dual-Link DVI Dongle .....	5
Figure 4.	Optional Stereo Bracket .....	6
Figure 5.	Connector Placement .....	7
Figure 6.	Quadro 5000 Connection Diagram.....	8
Figure 7.	3-Pin VESA Connector to BNC Cable .....	8
Figure 8.	Single Quadro 5000 Dual Projector .....	9
Figure 9.	Two Projectors Driven by Two Node Cluster .....	10
Figure 10.	Top Level OSD Menu for F35 Projector .....	11

# WELCOME

## ABOUT THIS APPLICATION NOTE

This application note details how to correctly connect, configure, and enable 3D stereo with a projector. For this specification application note, a *Barco F35 AS3D* projector is used as a reference.

## SYSTEM REQUIREMENTS

Visit [www.nvidia.com/3dvpro](http://www.nvidia.com/3dvpro) for a full list of supported graphics boards and applications.

# HARDWARE REQUIREMENTS

## CONNECTION AND CABLES

### Quadro Graphics Card Outputs

Figure 1 shows the outputs for the NVIDIA Quadro® graphics card. Each corresponding letter in Figure 1 represents a connection and output as defined in the following list.

- ▶ **A** – Dual-link DVI output.
  - Used to connect to the projector
  - Supports up to 120 Hz stereo
- ▶ **B** – VESA® DisplayPort™
  - If converting to DVI, it requires an active DisplayPort to dual-link DVI dongle
- ▶ **C** – Stereo bracket
  - Connects to the primary projector to determine which eye is left or right
- ▶ **D** – NVIDIA® Quadro® Sync card
  - Required for some multi-projector environments (not shown).

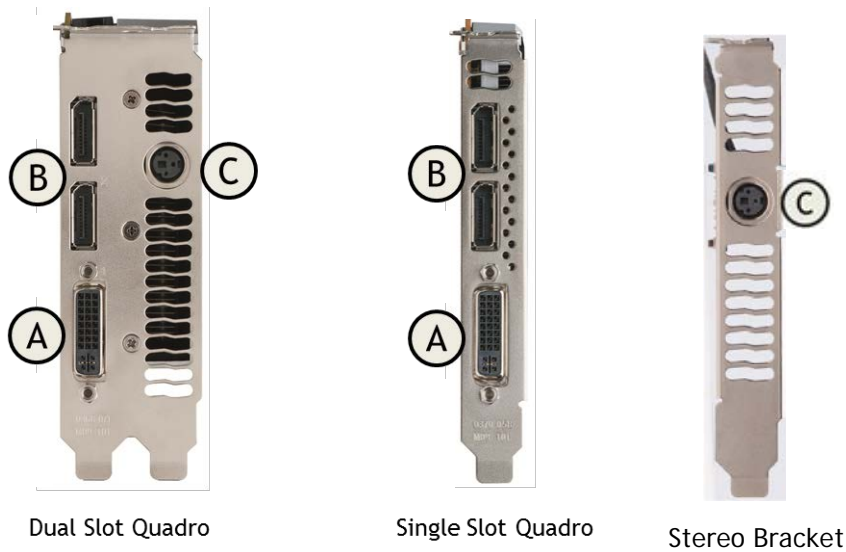


Figure 1. Quadro Card Outputs



**Note:** On Quadro Fermi cards only two outputs of the three display connections can be active.

The following list shows the recent Quadro cards supporting professional grade stereo through stereo connector:

- ▶ Quadro K6000 (2 DisplayPort + 2 DVI) + stereo bracket
- ▶ Quadro 6000 (2 DisplayPort + 1 DVI+ stereo)
- ▶ Quadro K5000 (2 DisplayPort + 2 DVI) + stereo bracket
- ▶ Quadro 5000 (2 DisplayPort + 1 DVI + stereo)
- ▶ Quadro K4000 (2 DisplayPort + 1 DVI) + stereo bracket
- ▶ Quadro 4000 (2 DisplayPort + 1 DVI) + stereo bracket



**Note:** Only Quadro 6000 and Quadro 5000 have a built in stereo connector. The other Quadro boards will require installing the optional stereo bracket.

## Barco F35 A53D Connections

Figure 2 shows the connections for the F35 A53D projector. Each corresponding letter in Figure 2 represents a connection as defined in the following list.

- ▶ **D** – 3D SYNC
  - Use to attach to glasses emitter
- ▶ **H** – SYNC-IN
  - Allows for taking an external vertical sync signal and using that with the select video input. This is mainly used in multiple projector installations with requirement of video synchronization between the units.
- ▶ **I** – SYNC-OUT
  - Constantly outputs the vertical sync signal of the active video input. This is mainly used in multiple projector installations with requirement of synchronization between the units.
- ▶ **J** – DVI-D
  - Two dual-link DVI-D connectors with bandwidth up to 330 MHz. For 120 Hz stereo connect using dual-link DVI cable from the Quadro card.



Figure 2. F35 Projector Connections



## DisplayPort to Dual-Link DVI Dongle

An active DisplayPort dongle is required for dual-link DVI bandwidth. NVIDIA recommends Bizlink dongle - [NVIDIA Part Number: 030-0378-000](#).

The dongle will support active stereo resolutions up to  $1920 \times 1200$  at 120 Hz.



**Note:** Passive dongles will only give single-link DVI speeds - 165 Hz.



Figure 3. DisplayPort to Dual-Link DVI Dongle

# SETUP

This section covers installation of the optional stereo bracket and 3 different types of setups of a Quadro graphics card to a projector. The 3 different setups are:

- ▶ Single projector setup
- ▶ Dual projector setup
- ▶ Two node cluster setup

## OPTIONAL STEREO BRACKET INSTALLATION

Installation of the optional stereo bracket requires a stereo bracket as shown in Figure 4 and an empty PCI slot next to the Quadro graphics board.



Figure 4. Optional Stereo Bracket

1. Install the optional stereo bracket over the Quadro graphics card.
2. Insert the 4-pin connector at the end of the stereo bracket cable to the 4-pin header on the Quadro graphics board.

Figure 5 depicts what the 3D stereo connector looks like on the Quadro graphics board. Placement may vary depending on the graphics board.

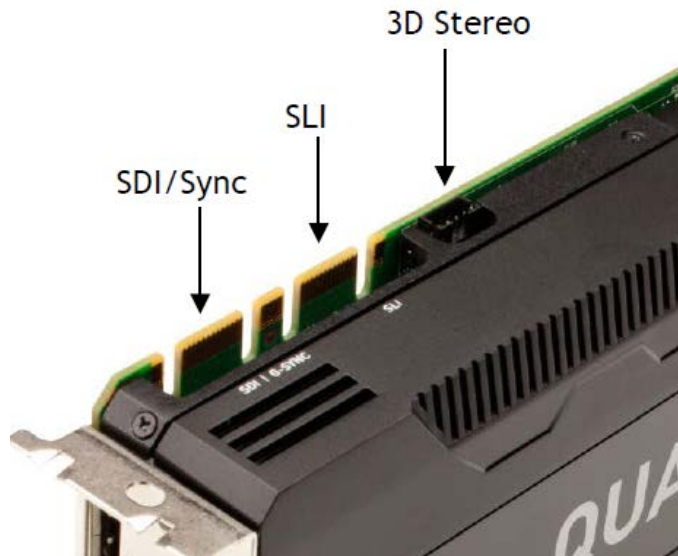


Figure 5. Connector Placement

# SINGLE PROJECTOR SETUP

Figure 6 shows a connection diagram for a single projector setup from a Quadro 5000.

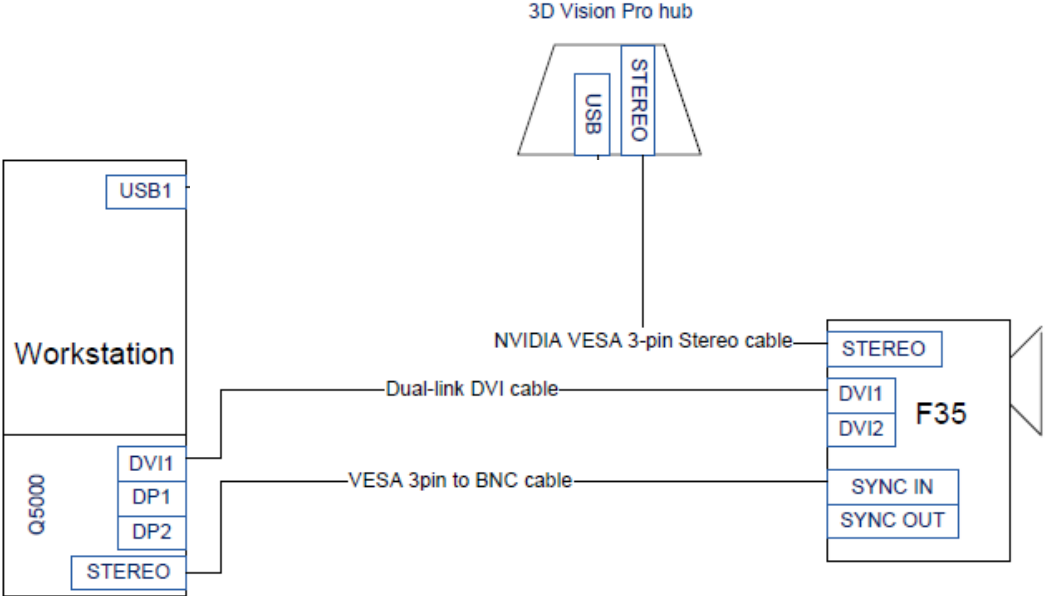


Figure 6. Quadro 5000 Connection Diagram

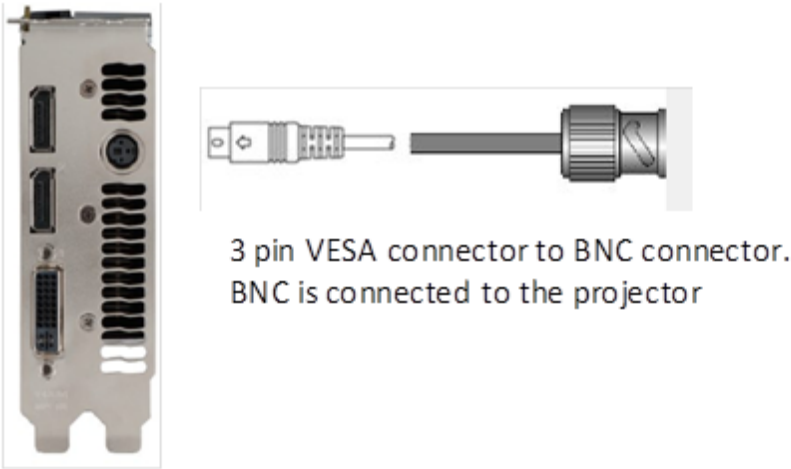


Figure 7. 3-Pin VESA Connector to BNC Cable

**!** CAUTION: This cable is not supplied by NVIDIA

# DUAL PROJECTOR SETUP

Figure 8 shows a connection diagram for a dual projector setup from a single Quadro 5000 card.

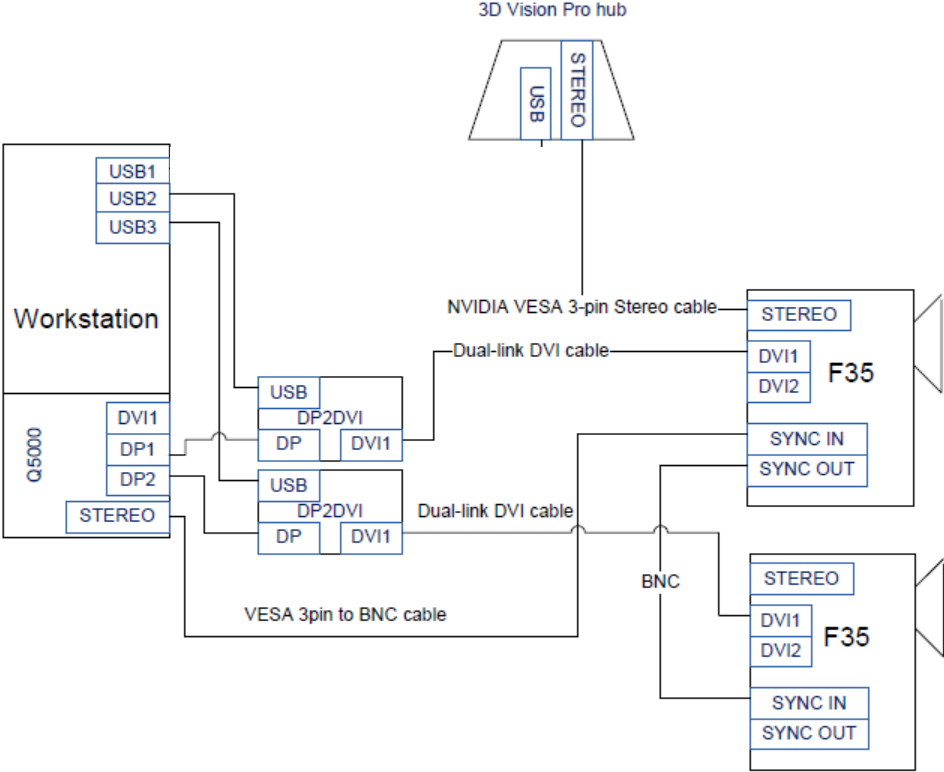


Figure 8. Single Quadro 5000 Dual Projector

**Note:** To insure synchronization of the display heads we recommend using the two DisplayPort connections as opposed to mixing DisplayPort + DVI.

**CAUTION:** For stereo to be in phase between projectors the Sync out and Sync In should be connected. Refer to the DisplayPort F35 projector for more details.

# TWO NODE CLUSTER SETUP

Figure 9 shows two projectors driven by a two node cluster.

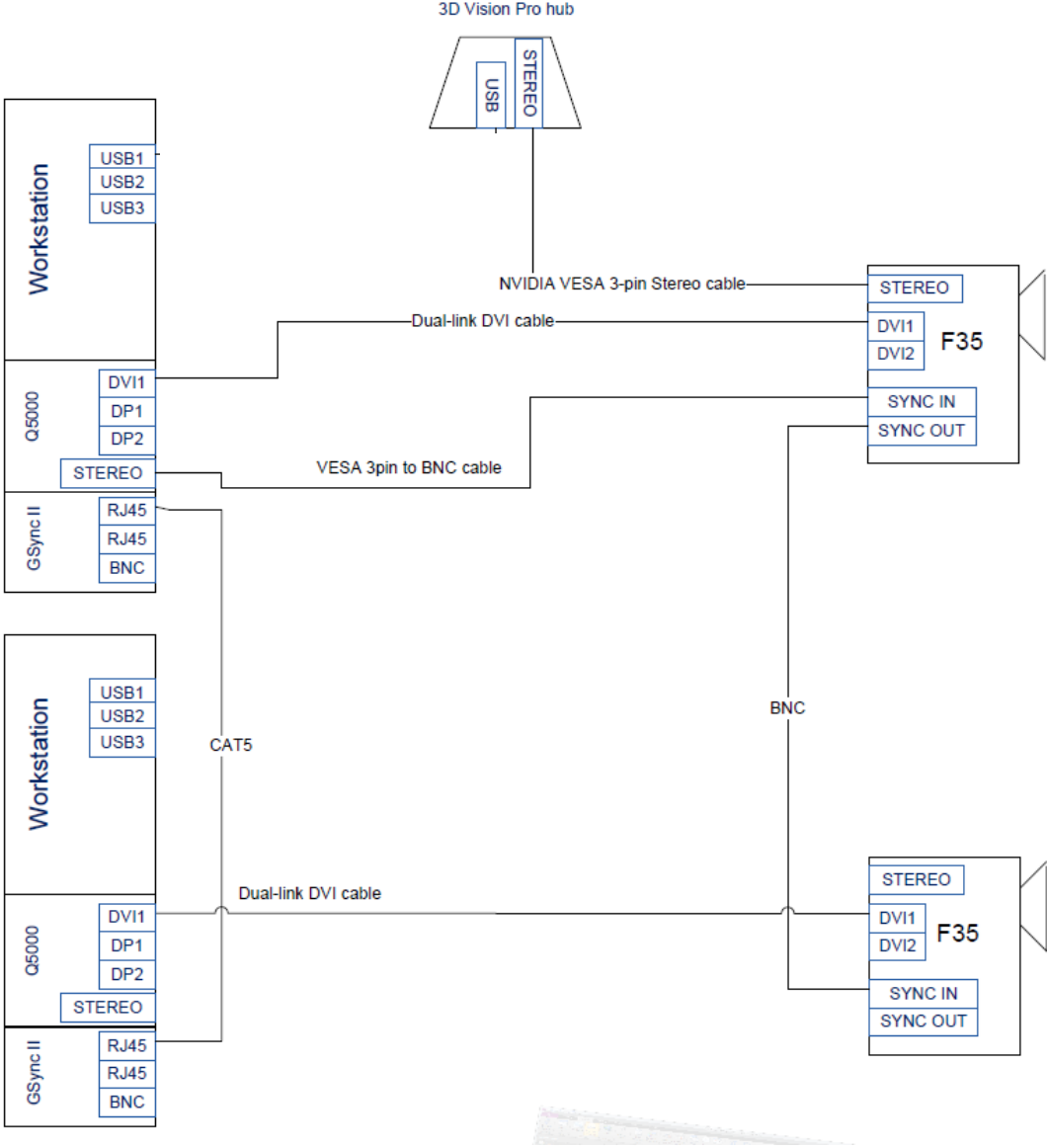


Figure 9. Two Projectors Driven by Two Node Cluster

**Note:** When used in a cluster node mode the Quadro Sync daughter card is required (Supported on Quadro 5000, Quadro 6000, Quadro K5000, and Quadro K6000). The Quadro Sync card will framelock video signals and insure it is in phase between nodes.

# PROJECTOR SETUP

The projector needs to be configured based on instructions provided by the manufacturer. The following is an example of how to setup the Barco F35 Projector.

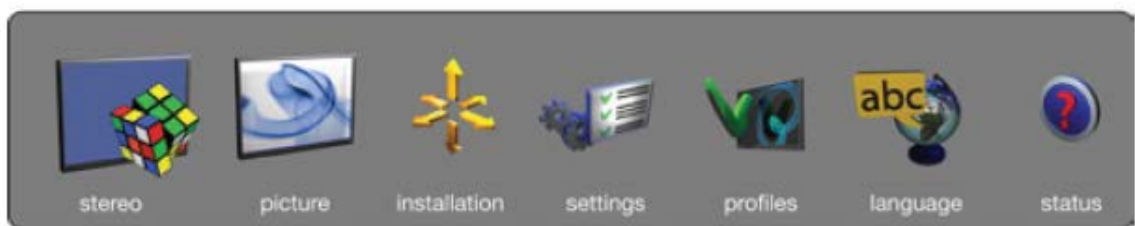


Figure 10. Top Level OSD Menu for F35 Projector

Access the stereo function via the stereo menu on the projector. To enable active stereo, select **STEREO > STEREO MODE**. Enabling stereo mode will configure the projector for the use with an active stereo source.

**Note:** The only active stereo 3D format natively supported by the projector is sequential left to right at a frequency between 100 and 120 Hz.

After enabling stereo mode, configure the glass type being used by selecting **STEREO > STEREO GLASSES TYPE**. The follow glasses are support:

- ▶ DLP Link
- ▶ IR
- ▶ IR high brightness (may cause crosstalk)

**Note:** For NVIDIA® 3D Vision Pro™ select IR or IR high brightness.

When using IR glasses it is important to configure the phase delay between the glasses and actual image. This is done using **STEREO > STEREO LOCK PHASE DELAY** with values 0 and 179 degrees.



**Note:** For 3D Vision Pro, Stereo Lock Phase delay should be set close to 0. If used in a multiple projector environment stereo lock phase delay should be similar on each projector.

If left and right data channels are swapped there will be no 3D effect in the image, only parallel distortion between the channels. This can be countered by enabling the **STEREO > SWAP EYES** feature.



**Note:** For multiple projectors the setup should be repeated on each unit with the same settings for each.



# DRIVER CONFIGURATION

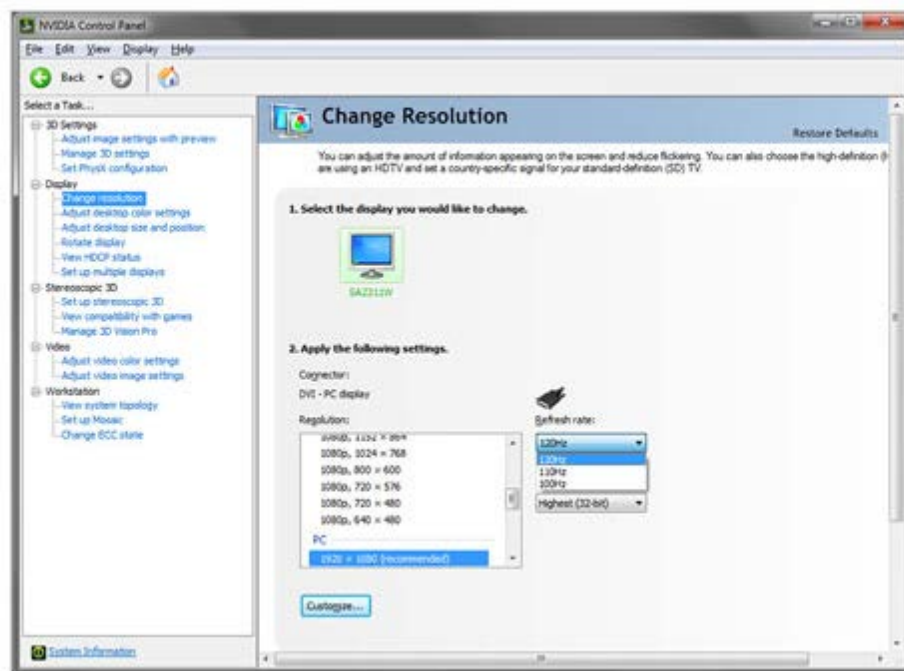
## INSTALLING THE 3D STEREO DRIVER

Download the latest NVIDIA driver from [www.nvidia.com](http://www.nvidia.com) to enable 3D stereo.

### Configuring OpenGL Stereo

1. Verify the display refresh rate. Unless your display device is designed to support stereo at a lower refresh rate, make sure to select a refresh rate of 100 Hz or higher.

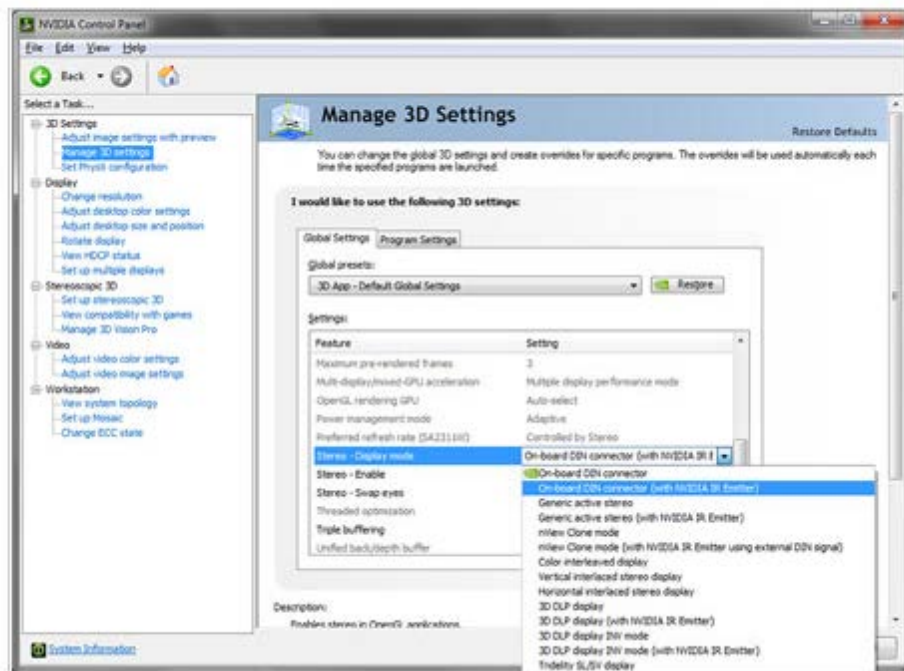
#### Verify the Display Refresh Rate



Depending on the lighting in your environment you may experience a pulsing of the image when looking through the glasses. If you notice this, you can adjust the refresh rate to align on an even multiple with your lighting refresh rate (for example, 60 Hz lighting -> 120 Hz display refresh, 50 Hz lighting -> 100 Hz display refresh).

2. Select the stereo output format in **Manage 3D Settings**. Select the correct output format for your device.

### Select the Stereo Output Format in Manage 3D Settings

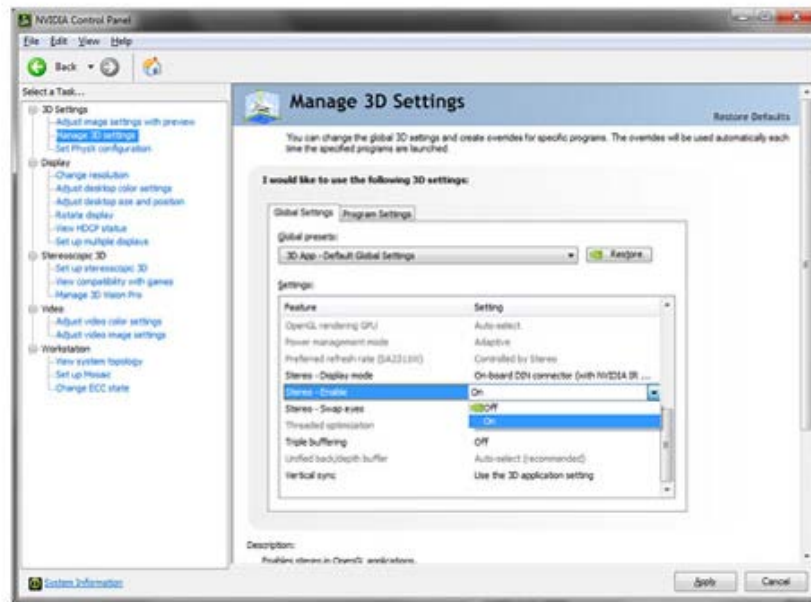


Note: For Quadro cards with stereo connector use: "on-board DIN Connector (with NVIDIA 3D Vision®)"

For Quadro cards with no stereo connector use: "Generic active stereo (with 3D Vision™)"

3. Enable stereo. Turn on stereo for supported applications

### Enable Stereo



## Configuring DirectX Stereo

The DirectX stereo driver does not need to be enabled. When enabled it will enable compatible applications including games, 3D Blu-Ray players, and supported professional applications.

Run the configuration wizard. Launch the setup wizard from the 3D stereoscopic entry in the NVIDIA Control Panel.

### Run the Configuration Wizard



## Configuring Linux Drivers

On Linux, 3D stereo requires the VESA stereo sync to be present and active, either from a supported Quadro graphics board or display device.

Only the display driver is needed on Linux.

1. Download and install display driver. Install the Linux display driver 260.19.36 or newer.
2. Configure stereo mode=3 in the XConfig file. 3D Stereo is enabled with stereo mode 3 in the XConfig file. You can set this by manually editing the xorg.conf file or using NVIDIA's nvidia-xconfig utility.

More information on settings can be found in the driver readme.

## Notice

The information provided in this specification is believed to be accurate and reliable as of the date provided. However, NVIDIA Corporation ("NVIDIA") does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information. NVIDIA shall have no liability for the consequences or use of such information or for any infringement of patents or other rights of third parties that may result from its use. This publication supersedes and replaces all other specifications for the product that may have been previously supplied.

NVIDIA reserves the right to make corrections, modifications, enhancements, improvements, and other changes to this specification, at any time and/or to discontinue any product or service without notice. Customer should obtain the latest relevant specification before placing orders and should verify that such information is current and complete.

NVIDIA products are sold subject to the NVIDIA standard terms and conditions of sale supplied at the time of order acknowledgement, unless otherwise agreed in an individual sales agreement signed by authorized representatives of NVIDIA and customer. NVIDIA hereby expressly objects to applying any customer general terms and conditions with regard to the purchase of the NVIDIA product referenced in this specification.

NVIDIA products are not designed, authorized or warranted to be suitable for use in medical, military, aircraft, space or life support equipment, nor in applications where failure or malfunction of the NVIDIA product can reasonably be expected to result in personal injury, death or property or environmental damage. NVIDIA accepts no liability for inclusion and/or use of NVIDIA products in such equipment or applications and therefore such inclusion and/or use is at customer's own risk.

NVIDIA makes no representation or warranty that products based on these specifications will be suitable for any specified use without further testing or modification. Testing of all parameters of each product is not necessarily performed by NVIDIA. It is customer's sole responsibility to ensure the product is suitable and fit for the application planned by customer and to do the necessary testing for the application in order to avoid a default of the application or the product. Weaknesses in customer's product designs may affect the quality and reliability of the NVIDIA product and may result in additional or different conditions and/or requirements beyond those contained in this specification. NVIDIA does not accept any liability related to any default, damage, costs or problem which may be based on or attributable to: (i) the use of the NVIDIA product in any manner that is contrary to this specification, or (ii) customer product designs.

No license, either expressed or implied, is granted under any NVIDIA patent right, copyright, or other NVIDIA intellectual property right under this specification. Information published by NVIDIA regarding third-party products or services does not constitute a license from NVIDIA to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property rights of the third party, or a license from NVIDIA under the patents or other intellectual property rights of NVIDIA. Reproduction of information in this specification is permissible only if reproduction is approved by NVIDIA in writing, is reproduced without alteration, and is accompanied by all associated conditions, limitations, and notices.

ALL NVIDIA DESIGN SPECIFICATIONS, REFERENCE BOARDS, FILES, DRAWINGS, DIAGNOSTICS, LISTS, AND OTHER DOCUMENTS (TOGETHER AND SEPARATELY, "MATERIALS") ARE BEING PROVIDED "AS IS." NVIDIA MAKES NO WARRANTIES, EXPRESSED, IMPLIED, STATUTORY, OR OTHERWISE WITH RESPECT TO THE MATERIALS, AND EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES OF NONINFRINGEMENT, MERCHANTABILITY, AND FITNESS FOR A PARTICULAR PURPOSE. Notwithstanding any damages that customer might incur for any reason whatsoever, NVIDIA's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the NVIDIA terms and conditions of sale for the product.

## VESA DisplayPort

DisplayPort and DisplayPort Compliance Logo, DisplayPort Compliance Logo for Dual-mode Sources, and DisplayPort Compliance Logo for Active Cables are trademarks owned by the Video Electronics Standards Association in the United States and other countries.

## Trademarks

NVIDIA, the NVIDIA logo, 3D Vision, 3D Vision Pro, and Quadro are trademarks and/or registered trademarks of NVIDIA Corporation in the U.S. and other countries. Other company and product names may be trademarks of the respective companies with which they are associated.

## Copyright

© 2014 NVIDIA Corporation. All rights reserved.