QUADRO AND NVS DISPLAY RESOLUTION SUPPORT

DA-07089-001_v06 | April 2017

Application Note

DOCUMENT CHANGE HISTORY

DA-07089-001_v06

Version	Date	Authors	Description of Change
01	November 1, 2013	AP, SM	Initial Release
02	October 28, 2014	AP, SM	•Updated with the following products: Quadro K5200, Quadro K4200, Quadro K2200, Quadro K620, and Quadro K420 •Added “HDMI 2.0” section •Added “VGA Via DisplayPort to VGA Adaptor” section •Added “Display Color Depth” section
03	June 13, 2016	JK, AP, PV, SM	•Added Quadro K1200, Quadro M2000, Quadro M4000, Quadro M5000, Quadro M6000 and NVS 810 •Updated the display resolution tables •Added NVIDIA Maxwell generation support
04	September 23, 2016	JK, SM	•Added Quadro P5000 and Quadro P6000 •Added “DP 1.4” section •Updated the display resolution tables
05	September 29, 2016	JK, SM	Updated display connectors table (Table 4)
06	April 28, 2017	JK, SM	Added Pascal generation support for Quadro

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OVERVIEW

This application note lists the display resolutions capabilities of the NVIDIA® Kepler™, NVIDIA Maxwell™, and NVIDIA® Pascal™ generations of NVIDIA® Quadro® and/or NVIDIA® NVS™ Professional Graphics Solutions. On Quadro boards, the "K" in the product name identifies the Kepler generation (for example, Quadro K6000), the "M" in the product name identifies the NVIDIA Maxwell generation (for example, Quadro M6000) and the "P" in the product name identifies the Pascal generation (for example, Quadro P6000).

The NVS boards do not have a family identifier in their name. The NVS 510 and NVS 315 boards are part of the Kepler family, and the NVS 810 board is part of the NVIDIA Maxwell family.

Table 1. NVIDIA Kepler Generation GPUs

Quadro Boards	Quadro Mobile or MXM Boards[1]	NVS Boards
Quadro K6000	Quadro K5100M	NVS 510
Quadro K5000	Quadro K4100M	
Quadro K4000	Quadro K3100M	
Quadro K2000	Quadro K2100M	
Quadro K2000D	Quadro K610M	
Quadro K600	Quadro K510M	
Quadro 410	Quadro K5000M	
Quadro K5200	Quadro K4000M	
Quadro K4200	Quadro K3000M	
Quadro K2200	Quadro K2000M	
Quadro K620	Quadro K1000M	
Quadro K420	Quadro K500M	

Note:
[1]Since the Mobile and MXM boards do not ship from NVIDIA with display connectors attached, you will need to verify display connector specifics with the system vendor.

Table 2. NVIDIA Maxwell Generation GPUs

Quadro 1st Gen Boards	Quadro 2nd Gen Boards	Quadro 1st Gen Mobile or MXM Boards[1]	Quadro 2nd Gen Mobile or MXM Boards[1]	NVS Boards
Quadro K2200 Quadro K1200 Quadro K620	Quadro M6000 24GB Quadro M6000 Quadro M5000 Quadro M4000 Quadro M2000	Quadro M2000M Quadro M1000M Quadro M600M Quadro M500M	Quadro M5500 Quadro M5000M Quadro M4000M Quadro M3000M	NVS 810

Note:
[1]Since the Mobile and MXM boards do not ship from NVIDIA with display connectors attached, you will need to verify display connector specifics with the system vendor.

Table 3. NVIDIA Pascal Generation GPUs

Quadro Boards	Quadro Mobile or MXM Boards[1]
Quadro GP100 Quadro P6000 Quadro P5000 Quadro P4000 Quadro P2000 Quadro P1000 Quadro P600 Quadro P400	Quadro P5000 Quadro P4000 Quadro P3000 Quadro M2200 Quadro M1200 Quadro M620 Quadro M520

Note:
[1]Since the Mobile and MXM boards do not ship from NVIDIA with display connectors attached, you will need to verify display connector specifics with the system vendor.

DISPLAY CONNECTORS

The Kepler, NVIDIA Maxwell, and Pascal generations of the Quadro and NVS boards have a combination of dual-link DVI (DL) and/or VESA® DisplayPort™ 1.2 or 1.4 (output) connectors on the board. Most have the ability to drive a single VGA display through a DVI-VGA adaptor. Other display connections, like HDMI™, can be achieved through the use of DisplayPort or DVI adaptor cables.

Table 4. Display Connectors

Board	Connector Type	DisplayPort 1.4	Single-Link DVI	Dual-Link DVI	VGA	HDMI
Quadro GP100 Quadro P6000 Quadro P5000	5. DVI-D	X	✓	✓	X	DVI->HDMI
	4. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
Quadro P4000 Quadro P2000 Quadro P1000 Quadro P600	4. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
Quadro P400	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI

Board	Connector Type	DisplayPort 1.2	Single-Link DVI	Dual-Link DVI	VGA	HDMI
Quadro M6000 24GB Quadro M6000 Quadro M5000	5. DVI-I	X	✓	✓	DVI->VGA	DVI->HDMI
	4. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
Quadro M4000 Quadro M2000	4. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
Quadro K6000 Quadro K5000	4. DVI-D	X	✓	✓	X	DVI->HDMI
	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI

Quadro K5200	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DVI-I	X	✓	✓	DVI->VGA	DVI->HDMI

Quadro K4000 Quadro K2000 Quadro K4200 Quadro K2200	3. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DVI-I	X	✓	✓	DVI->VGA	DVI->HDMI

Board	Connector Type	DisplayPort 1.2	Single-Link DVI	Dual-Link DVI	VGA	HDMI
Quadro K2000D	3. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. DVI-D	X	✓	✓	X	DVI->HDMI
	1. DVI-I	X	✓	✓	DVI->VGA	DVI->HDMI

Quadro K1200	4. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI

Quadro K600 Quadro 410 Quadro K620 Quadro K420	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DVI-I	X	✓	✓	DVI->VGA	DVI->HDMI

NVS 810	8. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	7. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	6. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	5. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	4. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI

NVS 510	4. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	3. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	2. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. mDP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI

NVS 315	DMS59	DMS->DP	DMS->DVI	X	DMS->VGA	X

NVS 310	2. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI
	1. DP	✓	DP->DVI-SL	DP->DVI-DL	DP->VGA	DP->HDMI

COMMON SUPPORTED RESOLUTIONS

Table 5 and Table 6 list the most common supported resolutions for the Kepler and NVIDIA Maxwell, and Pascal generations boards.

Table 5. Common Supported Resolutions

Resolution at 60 Hz	Single-Link DVI	VGA[1]	Dual-Link DVI	DisplayPort
640 × 480	✓	✓	✓	✓
720 × 480	✓	✓	✓	✓
720 × 576	✓	✓	✓	✓
800 × 600	✓	✓	✓	✓
1024 × 768	✓	✓	✓	✓
1152 × 864	✓	✓	✓	✓
1280 × 720	✓	✓	✓	✓
1280 × 768	✓	✓	✓	✓
1280 × 800	✓	✓	✓	✓
1280 × 960	✓	✓	✓	✓
1280 × 1024	✓	✓	✓	✓
1360 × 768	✓	✓	✓	✓
1600 × 900	✓	✓	✓	✓
1600 × 1024	✓	✓	✓	✓
1600 × 1200	✓	✓	✓	✓
1680 × 1050	✓	✓	✓	✓
1920 × 1080	✓	✓	✓	✓
1920 × 1200	✓	✓	✓	✓
1920 × 1440		✓	✓	✓
2048 × 1152	✓	✓	✓	✓
2048 × 1536		✓	✓	✓

Resolution at 60 Hz	Single-Link DVI	VGA[1]	Dual-Link DVI	DisplayPort
2560 × 1440			✓	✓
2560 × 1600			✓	✓

Note:
[1]Native connection or through DVI-VGA adaptor.

Table 6. Common Supported Resolutions 4K and Over

Resolution at 60 Hz		DisplayPort 1.2	DisplayPort 1.4	HDMI 2.0
3840 × 2160	Ultra HD	✓	✓	✓
4096 × 2160	Cinema 4K	✓	✓	✓
5120 × 2880	5K	2 connectors	✓	
7680 × 4320 (8K)	8K	4 connectors	2 connectors	

Note:
Through DVI-HDMI cable or DP-HDMI adaptor.

Note: For more information on 4K displays refer to the “Single Connector 4K” section of this application note.

MAXIMUM SUPPORTED RESOLUTIONS

There is no single maximum resolution for a given connector type. The maximum resolution is defined by a couple of constraints which are different for each connector type:

- **The maximum number of pixels per second that can be carried across the link:** It doesn't matter to the graphics processing unit (GPU) if those pixels are allocated onto a single large desktop refreshing slowly or a small desktop refreshing quickly. The maximum desktop size allowed by the GPU is 16 k × 16 k pixels – the different operating systems may have different limitations.
- **The maximum bandwidth available on the link:** This is most important to DisplayPort connections.

The rest of this application note covers the physical connector types (DVI and DisplayPort) and the common connections that can be reached with adaptors (VGA and HDMI).

DISPLAY PIXEL CLOCK AND BANDWIDTH

All the display connection technologies have a maximum bandwidth. In general, any resolution and refresh rate that fits within this bandwidth will work.

The display bandwidth is defined by the pixel clock and how many bits per pixel are requested. The easiest way to compute the pixel clock is with the NVIDIA Control Panel's custom resolution calculator.

You can access the calculator at:

Display / Change Resolution / Customize / Create Custom Resolution

Enter the desired horizontal and vertical pixels and refresh rate. Then select the timing standard. On the bottom right you will see the pixel clock needed. As long as the requested pixel clock is within the capabilities of the connection the timing is valid.

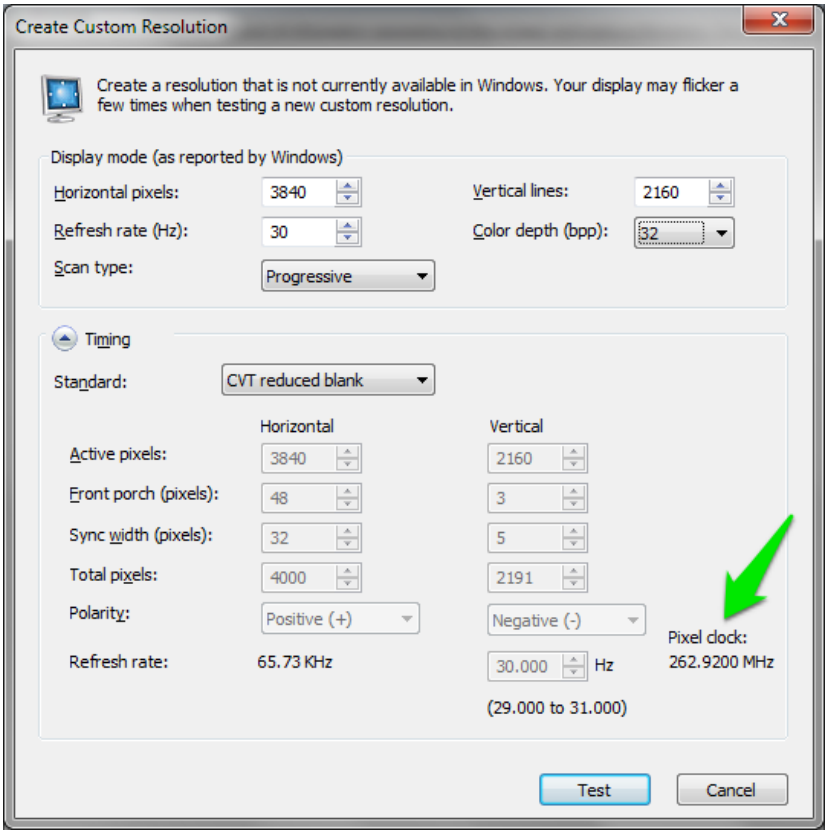

Figure 1. Create Custom Resolution Calculator

Display Bandwidth mainly applies to the DisplayPort connection. For the purpose of this application note it is the pixel clock multiplied by the number of color bits per pixel. As an example:

200 MHz pixel clock × 30 bits per pixel = 6,000 M bits per second (or 6 G bits per second Gbps)

DISPLAY COLOR DEPTH

Along with the frame-rate and resolution displays and connectors can also vary the bit depth of the color information for each pixel. Standards like DVI define that each pixel must be made of a Red, Green and Blue component 8 bits each or 24 bits per pixel. HDMI and DisplayPort offer 8, 10 or 12-bit per component as well. The display device defines the bit depth that it wants to receive and the GPU will honor it if it can.

On supported displays, the **Change Resolution** section of the control panel offers a choice to select the Output Color Depth. On connections like DisplayPort reducing the color depth may enable higher resolutions or frame rates.

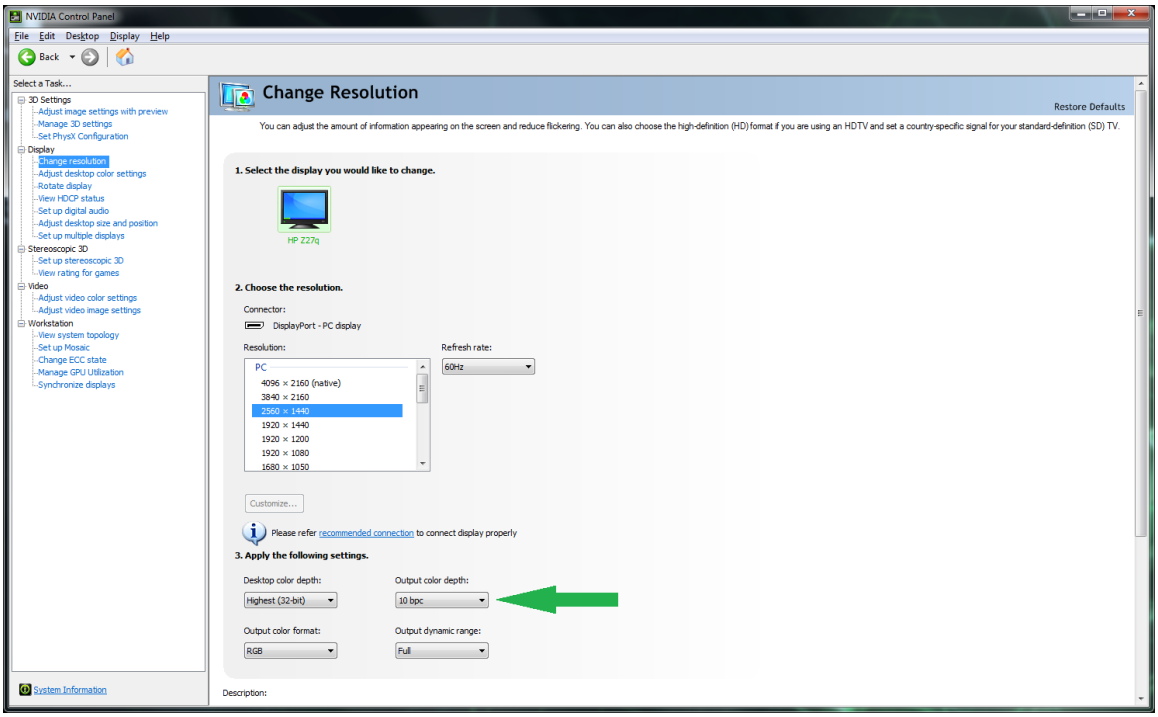

Figure 2. Color Depth Setting

In this application note the following terms are used in relation to color:

- **BPC:** Bits Per Component. How many bits represent each component in the pixel: 8, 10 or 12
- **BPP:** Bits Per Pixel: The number of bits for color in each pixel: 24, 30, 36
- **RGB:** The colors in a pixel are made up of a Red, Green and Blue components.
- **YCbCr:** The colors in a pixels are made up of a Luminance (Y) and two color/chroma channels (Cb and Cr)

- **YCbCr 4:2:0:** In a YCbCr image it possible to sample the chroma or color information at different rates from the Luminance information. 4:2:0 means all the Luminance information is sent, but only 1/4 of the color information. This compression means each frame of a 4:2:0 compressed stream uses half the data of an uncompressed (or 4:4:4) frame.

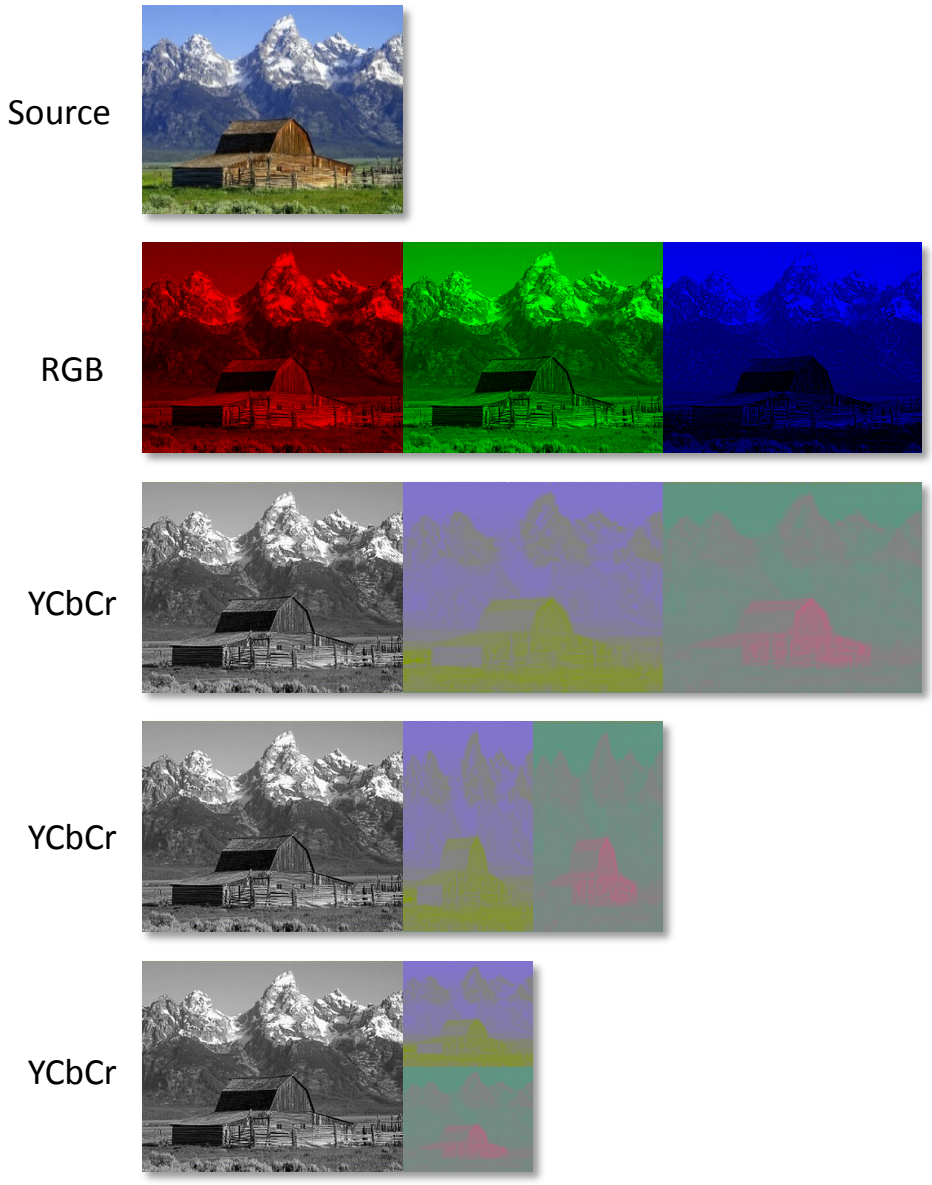

Figure 3. Color Term Examples

Note: There is no assumed color space on a display link. Color management is handled in the display or GPU.

DUAL-LINK DVI (DVI-DL)

- **Maximum Pixel Clock:** 330 MHz
- **Maximum Bandwidth:** N/A - DVI is always 24 bits per pixel
- **Common Supported Maximum Resolutions (at CVT-RB timing):**
  - 1920 × 1200 at 120 Hz
  - 1920 × 2160 at 60 Hz
  - 2560 × 1600 at 60 Hz
  - 2048 × 2160 at 60 Hz
  - 4096 × 2160 at 30 Hz

Note: There are two types of DisplayPort to dual-link DVI adaptors. For the full 330 MHz of dual-link DVI make sure to select the stereo capable adaptors.

SINGLE-LINK DVI (DVI-SL)

- **Maximum Pixel Clock:** 167 MHz
- **Maximum Bandwidth:** N/A - DVI is always 24 bits per pixel
- **Common Supported Maximum Resolutions (at CVT-RB timing):**
  - 1920 × 1200 at 60 Hz
  - 1280 × 720 at 120 Hz

VGA VIA DVI-I TO VGA ADAPTOR

- **Maximum Bandwidth:** 400 MHz DAC
- **Common Supported Maximum Resolutions (at CVT-RB timing):**
  - 2048 × 1536 at 85 Hz

VGA VIA DISPLAYPORT TO VGA ADAPTOR

- **Maximum Bandwidth:** Adaptor specific
- **Common Supported Maximum Resolutions (at CVT-RB timing):**
  - 1920 × 1200 at 60 Hz

HDMI 1.4

- **Maximum Pixel Clock:** 297 MHz
- **Maximum Bandwidth:** N/A
- **Common Supported Maximum Resolutions (from CEA timing specifications):**
  - 3840 × 2160 at 30 Hz 24 bpp
  - 1920 × 1080 at 60 Hz 36 bpp
  - 4096 × 2160 at 24 Hz 24 bpp
  - 1920 × 1080 at 120 Hz 24 bpp – HDMI stereo

Note: Quadro boards do not have native HDMI connectors, so an adaptor must be used. High quality DVI-to-HDMI cables or Type II DisplayPort-to-HDMI adaptors are required for full performance.

HDMI 2.0

HDMI 2.0 is supported on Windows 7 and newer with the R340 and newer display driver.

Quadro boards do not have native HDMI connectors, so an adaptor must be used. High quality DVI-to-HDMI cables or Type II DisplayPort-to-HDMI adaptors are required for full performance.

Kepler and NVIDIA Maxwell 1st Gen GPUs

- **Maximum Pixel Clock:** 297 MHz
- **Maximum Bandwidth:** N/A
- **Common Supported Maximum Resolutions (from CEA timing specifications):**
  - 3840 × 2160 at 60 Hz in 4:2:0 YCbCr 8 bpc

NVIDIA Maxwell 2nd Gen and Pascal GPUs

- **Maximum Pixel Clock:** 594 MHz
- **Maximum Bandwidth:** N/A
- **Common Supported Maximum Resolutions (from CEA timing specifications):**
  - 3840 x 2160 at 60 Hz in YCbCr 4:2:0 8 bpc (actually only requires HDMI 1.4 PHY)
  - 3840 x 2160 at 60 Hz in RGB 8 bpc
  - 3840 x 2160 at 60 Hz in YCbCr 4:2:2 and YCbCr 4:2:0 12 bpc

DISPLAYPORT 1.2

- **Maximum Pixel Clock:**
  - NVIDIA Maxwell and Pascal GPUs
    – 1080 MHz
  - Kepler GPUs
    – 592 MHz
  - All other boards displays
    – 540 MHz
- **Maximum Boards Bandwidth:** 17.2 Gbps usable
- **Common Supported Maximum Resolutions (at CVT Reduced Blank Timings):**
  - NVIDIA Maxwell and Pascal GPUs
    – 4096 × 2160 at 60 Hz 30 bpp
    – 2560 × 1600 at 120 Hz 30 bpp
  - Kepler GPUs
    – 4096 × 2160 at 60 Hz 30 bpp
    – 2560 × 1600 at 120 Hz 30 bpp
  - All displays
    – 4096 × 2160 at 48 Hz 36 bpp
    – 2560 × 1440 at 120 Hz 30 bpp
    – 3840 × 2160 at 60 Hz 30 bpp

DISPLAYPORT 1.2 MULTI-STREAMING

- **Maximum Pixel Clock for Each Display:**
  - NVIDIA Maxwell GPUs
    – 1080 MHz
  - Kepler GPUs
    – 592 MHz
  - All other boards displays
    – 540 MHz
- **Total Bandwidth for All Displays:** 17.2 Gbps usable

When using DisplayPort 1.2 multi-streaming, multiple displays are combined on the same DisplayPort link. Each display can have the full pixel clock available in the GPU, but all heads share the bandwidth of the link. For example:

- 4 heads of 1920 × 1200, 24 bpp at 60 Hz
  - 4 × 154.128 MHz Pixel Clock × 24 bpp = 14.8 Gbps – which works
- 4 heads of 1920 × 1200, 30 bpp at 60 Hz
  - 4 × 154.128 MHz Pixel Clock × 30 bpp = 18.5 Gbps – which does not work
- 3 heads of 1920 × 1200, 30 bpp at 60 Hz
  - 3 × 154.128 MHz Pixel Clock × 30 bpp = 13.4 Gbps – which works

CAUTION: Since DisplayPort 1.2 MST relies upon an external device to receive and re-broadcast the data the hub used may reduce usable bandwidth.

There are a few other restrictions with multi-streaming so if designing a system that pushes the boundaries of the pixel clock on the heads, contact your NVIDIA field engineering resources for assistance.

- **Common Supported Maximum Resolutions (at CVT-RB timing):**
  - 4× 1920 × 1200 at 60 Hz 24 bpp
  - 2× 2560 × 1600 at 60 Hz 24 bpp

DISPLAYPORT 1.4

- **Maximum Pixel Clock:**
  - NVIDIA Pascal GPUs
    - 1325 MHz
- **Maximum Boards Bandwidth:** 32.4 Gbps usable
- **Common Supported Maximum Resolutions (at CVT Reduced Blank Timings):**
  - NVIDIA Pascal GPUs
    - 4096 × 2160 at 60 Hz 30 bpp
    - 2560 × 1600 at 120 Hz 30 bpp

DISPLAYPORT 1.4 MULTI-STREAMING

- **Maximum Pixel Clock for Each Display:**
  - NVIDIA Pascal GPUs
    – 1325 MHz
- **Total Bandwidth for All Displays:** 32.4 Gbps usable

When using DisplayPort 1.4 multi-streaming, multiple displays are combined on the same DisplayPort link. Each display can have the full pixel clock available in the GPU, but all heads share the bandwidth of the link. For example:

- 2 heads of 3840 × 2160, 24 bpp at 60 Hz
  - 2 × 522.092 MHz Pixel Clock × 24 bpp = 25.1 Gbps – which works
- 2 heads of 3840 × 2160, 30 bpp at 60 Hz
  - 2 × 522.092 MHz Pixel Clock × 30 bpp = 31.3 Gbps – which works
- 3 heads of 3840 × 2160, 30 bpp at 60 Hz
  - 3 × 522.092 MHz Pixel Clock × 30 bpp = 47.0 Gbps – which does not work

CAUTION: Since DisplayPort 1.2 MST relies upon an external device to receive and re-broadcast the data the hub used may reduce usable bandwidth.

There are a few other restrictions with multi-streaming so if designing a system that pushes the boundaries of the pixel clock on the heads, contact your NVIDIA field engineering resources for assistance.

- **Common Supported Maximum Resolutions (at CVT-RB timing):**
  - 4× 1920 × 1200 at 60 Hz 24 bpp
  - 2× 2560 × 1600 at 60 Hz 24 bpp

SINGLE CONNECTOR 4K

There are two main display definitions for 4K: UltraHD (3,840 × 2,160) and what is commonly called Cinema 4K (4096 × 2160). Depending on the frame-rate, connector, and bit depth, different GPUs support different options as covered in Table 7 and Table 8.

Table 7. UltraHD (3840 x 2160) Option Support

Bit Depth		HDMI 1.4/2.0	DisplayPort 1.2 MST	DisplayPort 1.2 Single	DisplayPort 1.4 MST	DisplayPort 1.4 Single
24 Hz	24 bpp	✓	✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp		✓	✓	✓	✓
30 Hz	24 bpp	✓	✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36bpp		✓	✓	✓	✓
48 Hz	24 bpp		✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp		✓	✓	✓	✓
60 Hz	24 bpp	✓ 4:2:0 YCbCr	✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp		✓		✓	✓
60 Hz (NVIDIA Maxwell 2nd and Pascal Gen)	24 bpp	✓	✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp	✓ 4:2:0 YCbCr 4:2:2 YCbCr	✓		✓	✓

Note: Only NVIDIA Pascal Generation GPUs have DisplayPort 1.4 support.

Table 8. Cinema 4K (4096 x 2160) Option Support

Bit Depth		HDMI 1.4/2.0	DisplayPort 1.2 MST	DisplayPort 1.2 Single	DisplayPort 1.4 MST	DisplayPort 1.4 Single
24 Hz	24 bpp	✓	✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp		✓	✓	✓	✓
30 Hz	24 bpp		✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp		✓	✓	✓	✓
48 Hz	24 bpp		✓	✓	✓	✓
	30 bpp		✓	✓	✓	✓
	36 bpp		✓	✓	✓	✓
60 Hz	24 bpp		✓	Quadro K6000 Quadro K5200 Quadro K2200 Quadro K620 All NVIDIA Maxwell boards All NVIDIA Pascal boards	✓	✓
	30 bpp		✓		✓	✓
	36 bpp		✓		✓	✓

Note: Only NVIDIA Pascal Generation GPUs have DisplayPort 1.4 support.

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