

# User Manual

**Multi-Display Savant**

**Aetina M4-P107mDP**

**Aetina M9-P107**

**Aetina M12-P107**

## Document Change History

Version	Date	Description	Authors
v01	2018/3/31	Initial Release.	Jackal Chen
v02	2018/4/20	Highlight Notes.	Jackal Chen
v03	2018/5/9	Added NVIDIA Surround limitation (Win10).	Jackal Chen
v04	2018/7/20	Correct Primary port.	Jackal Chen

## Contents

1. General Overview .....	- 1 -
1.1 Features .....	- 2 -
1.1.1 GPU .....	- 2 -
1.1.2 Board.....	- 2 -
1.1.3 Memory Configuration .....	- 2 -
1.1.4 Display Support.....	- 3 -
1.1.5 Cooling System.....	- 3 -
1.1.6 Operating System Support.....	- 3 -
1.2 Configuration .....	- 4 -
2. Getting Started.....	- 5 -
2.1 System Requirements .....	- 5 -
2.2 Performing a Quick Installation .....	- 6 -
3. Software Installation.....	- 7 -
3.1 Install Graphics Driver.....	- 7 -
3.2 Install iCube.....	- 9 -
4. Display Configuration.....	- 10 -
4.1 Display Configuration.....	- 10 -
4.2 Change Display Configuration.....	- 12 -
4.2.1 Horizontal mode. (System formation: 4 x 1 / Monitor formation: 12 x 1).....	- 12 -
4.2.2 Vertical mode. (System formation: 1 x 4 / Monitor formation: 3 x 4) .....	- 13 -
4.2.3 Matrix mode. (System formation: 2 x 2 / Monitor formation: 6 x 2) .....	- 14 -
4.3 NVIDIA Surround setting.....	- 15 -
4.3 Other display modes example .....	- 16 -
5. Functional Description .....	- 18 -
5.1 Board Architecture.....	- 18 -
5.2 General Purpose Graphics Processing Unit .....	- 19 -

5.2.1 GPU Resources .....	- 19 -
5.3 Display Interface .....	- 19 -
5.3.1 Graphics Output channels .....	- 19 -
5.3.2 Digital Output.....	- 20 -
5.3.4 Analog Output.....	- 20 -
5.3.5 EDID caching .....	- 20 -
5.3.6 Hot Plug.....	- 20 -
5.3.7 Bezel Compensation .....	- 20 -
5.4 PCI Express .....	- 20 -
6. Mechanical Specifications.....	- 21 -
6.1 PCI Express System .....	- 21 -
6.2 Placement of Standard I/O Connectors .....	- 22 -
6.3 Component Information .....	- 23 -
6.3.1 mini DisplayPort Connector .....	- 23 -
6.3.2 DVI-D Connector .....	- 24 -
6.3.3 HDMI Connector .....	- 25 -
6.4 Dimension .....	- 26 -
7. Thermal Specifications.....	- 28 -
8. Certificates and Agencies.....	- 29 -
8.1 Certifications .....	- 29 -
8.2 Agencies .....	- 29 -
9. Appendix .....	- 30 -
9.1 Ordering Information.....	- 30 -



## 1. General Overview

Aetina MDS P-series is a single graphics card with a single GPU that drives up to 12 displays for the large 3x4 video wall @5760x4320 resolution to meet the commercial requirement of 4K UHD content displaying. Powered by NVIDIA GeForce GTX 1050Ti GPU, 768 CUDA cores, support DirectX 12, OpenGL 4.5, Open CL 1.1 and high speed 4GB GDDR5 on board memory with 112 GB/sec memory bandwidth, provides high throughput and unprecedented picture quality, delicate image scaling and seamless HD video playback.

It is built to deliver high flexibility, reliability, stability and computing power, support multi-monitors as 4, 6, 8, 9 and up to 12 displays. Allowing flexible multi-display mode in clone, independent or stretched. Especially, it is the first in the world to support 12x1 landscape or 1x12 portrait in the market.

## 1.1 Features

- Powered by NVIDIA Pascal GeForce GTX 1050Ti.
- Support EDID caching intelligently optimize displaying quality and stability.
- Maximum resolution @5760 x 4320 (Surround 1 x 4 landscape mode).
- Discrete Digital Multi-Point Audio (DDMA) - Simultaneously output multiple, independent audio streams.
- Support NVIDIA Surround multi display technology, OpenCL 1.2, OpenGL 4.5, DirectX 12 API.
- Ideal for industrial and government multi-display applications including process control centers, video- walls, digital signage, security, advertising and more.

### 1.1.1 GPU

- NVIDIA GeForce GTX 1050Ti
- Stream Processing Unites: 768
- Core clock: 1290 MHz
- Voltage: Variable

### 1.1.2 Board

#### M4-P107mDP

- 8-layer printed circuit board (PCB)
- 16-lanes PCI Express 3.0 capable
- Physical dimensions: 169.57mm x 68.9mm
- Board power : 75 W
- High-Bandwith Digital Content Protection (HDCP) support

#### M9-P107 & M12-P107

- 8-layer printed circuit board (PCB)
- 16-lanes PCI Express 3.0 capable
- Physical dimensions: 203.64mm x 111.15mm
- Board power : 75 W
- High-Bandwith Digital Content Protection (HDCP) support

### 1.1.3 Memory Configuration

- Memory clock: 3500 MHz (7.0 Gbps)
- Interface: 128-bit
- Local frame buffer: 4GB (4 pieces 256M x 32 GDDR5, FBGA-170 package)

### 1.1.4 Display Support

#### M4-P107mDP

- Mini DisplayPort
  - Maximum resolution over mini DisplayPort: 7680 x 4320

#### M9-P107 & M12-P107

- VHDCI to DVI-D
  - Maximum resolution over 1 set port: 5760 x 1080
- VHDCI to HDMI
  - Maximum resolution over 1 set port: 5760 x 1080

### 1.1.5 Cooling System

- One slot Fan for M4-P107mDP
- Two slot Fan for M9-P107 and M12-P107

### 1.1.6 Operating System Support

- Windows 7 - 10 32/64bit
- Linux

## 1.2 Configuration

Table 1.1 lists the SKU configuration currently available for the MDS P-series graphics board.

Table 1.1 Board configuration

Specification	M4-P107mDP	M9-P107	M12-P107
Chip	GeForce GTX 1050Ti	GeForce GTX 1050Ti	GeForce GTX 1050Ti
Core clock	1290 MHz	1290 MHz	1290 MHz
Memory clock	7.0 Gbps	7.0 Gbps	7.0 Gbps
Frame buffer	4GB GDDR5	4GB GDDR5	4GB GDDR5
Memory interface	128-bit	128-bit	128-bit
Memory type	256M x 32 GDDR5 FBGA-170 package	256M x 32 GDDR5 FBGA-170 package	256M x 32 GDDR5 FBGA-170 package
Memory AVL	Samsung K4G80325FB-HC28	Samsung K4G80325FB-HC28	Samsung K4G80325FB-HC28
Maximum board power	75 W	75 W	75 W
Connectors	Mini DisplayPort	VHDCI	VHDCI
Maximum output	4	9	12
HDCP support	Yes	Yes	Yes
Operating Temperature	0 to +55 °C	0 to +55 °C	0 to +55 °C
Operating Humidity	20~90%, No Condensation.	20~90%, No Condensation.	20~90%, No Condensation.

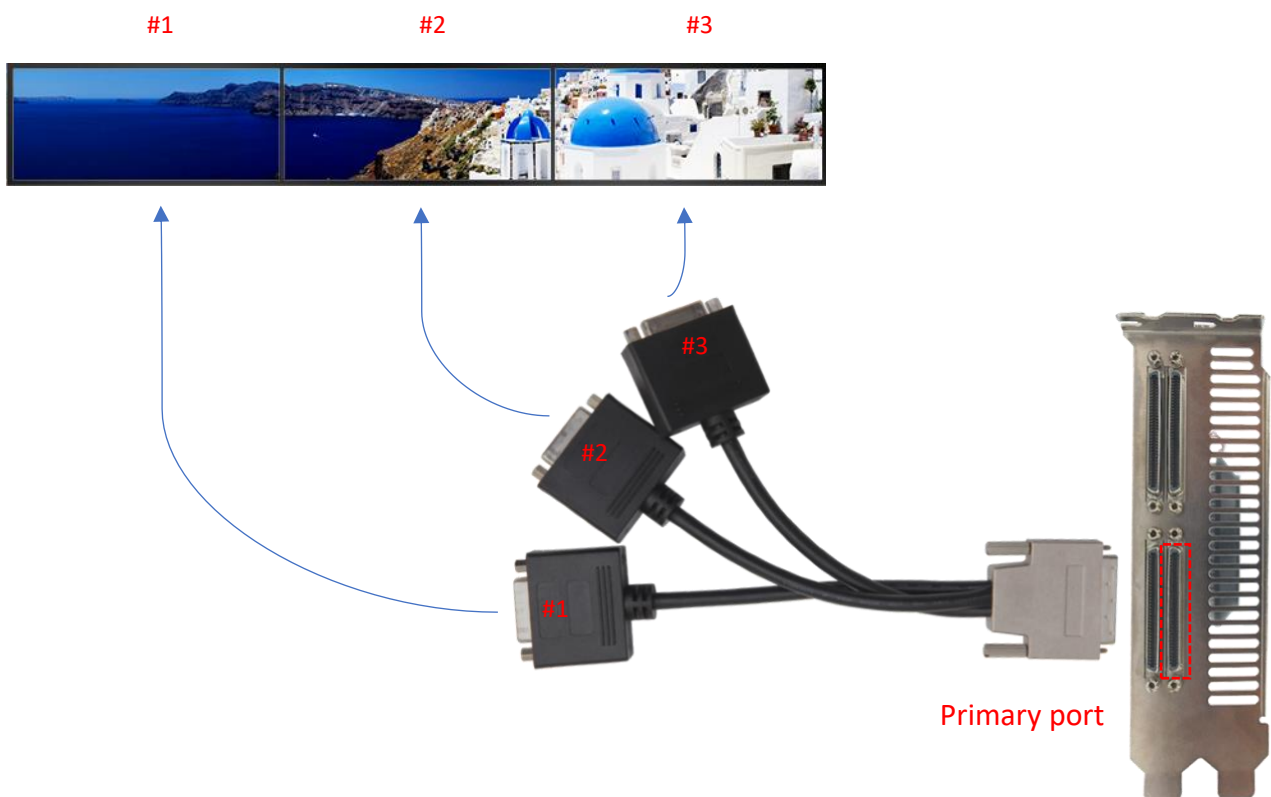


## 2. Getting Started

Before you begin installing your new NVIDIA multi-display graphics card, please make sure you have the proper system requirements and have completed the required pre-installation tasks as outlined in this chapter.

### 2.1 System Requirements

- AMD Ryzen/ AMD Opteron or Intel Core i / Xeon processor or latest.
- 16GB of system memory; 24GB or more recommended for better performance.
- Motherboard with available ×16 lane PCI Express connection slot
- Internet access for software installation.
- Operating System:
  - Windows 7 - 10 32-bit or 64-bit
  - Linux 32-bit or 64-bit
- Monitor: Same resolution (1920x1080) and type recommended



#### Note:

1. M9 and M12 series, please connect in the correct position for each monitor from left to right for normal wide viewing.

## 2.2 Performing a Quick Installation

Experienced users and system administrators can follow these brief instructions for installing Aetina MDS P-series products. Other users should refer to the detailed installation instructions.

1. Uninstall the drivers and software for any installed graphics card(s).  
\*Note: If you are using a motherboard containing an on-board graphics solution and do not intend to use it as part of a multiple monitor display, disable it.
2. Shut down and disconnect your computer system.
3. Remove any installed graphics card(s).
4. Install your new Aetina MDS graphics card.
5. Reassemble and connect your computer system.
6. Install the Aetina MDS graphics drivers and configuration software from the Aetina official website.

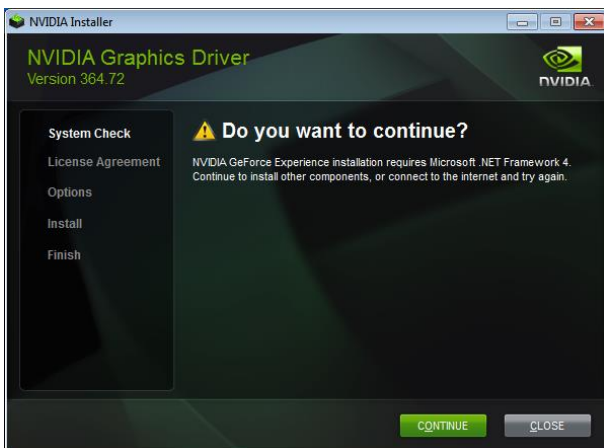
### 3. Software Installation

Notice the following guidelines before installing the drivers:

1. First uninstall previous graphics card driver.
2. Make sure your system has installed DirectX 9 or later version.
3. Make sure your system has installed the appropriate motherboard drivers (for the motherboard drivers, please contact the motherboard manufacturer).

#### 3.1 Install Graphics Driver

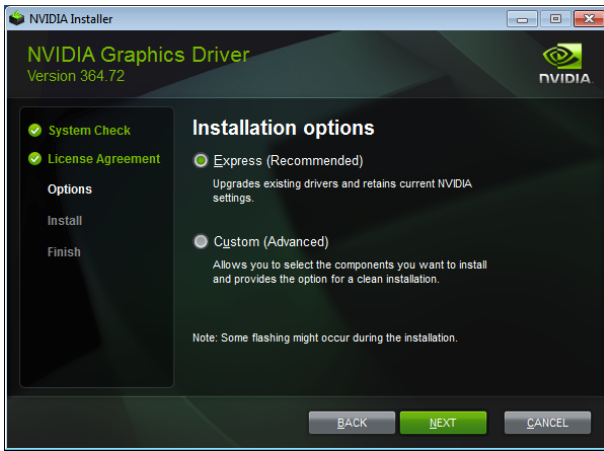
After installing the operating system, download MDS driver from Aetina official website. Then, go to My Computer, double-click the Download folder and execute the setup.exe program.



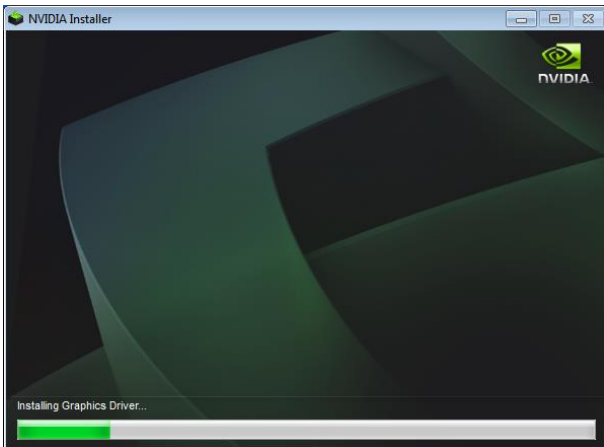
Click the "CONTINUE" button



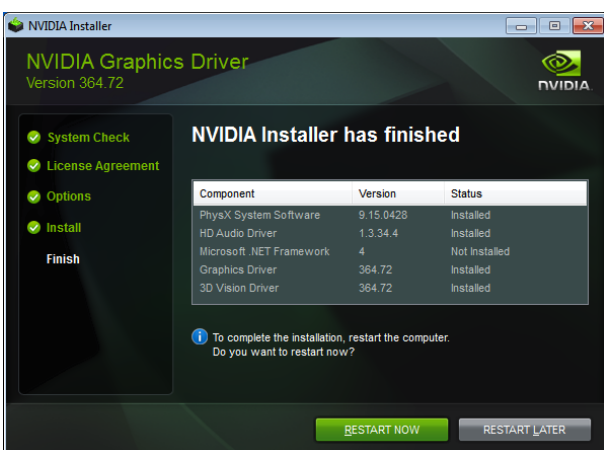
Click the "AGREE AND CONTINUE"



Choose “Express (Recommended)” or “Custom (Advanced)” then click “NEXT”



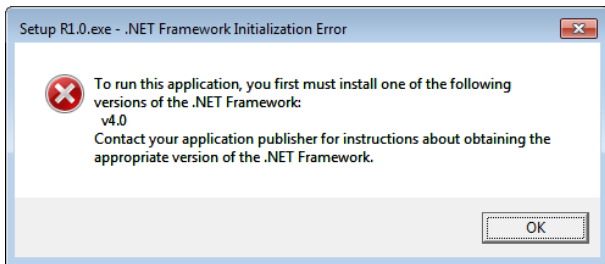
The system is installing the components



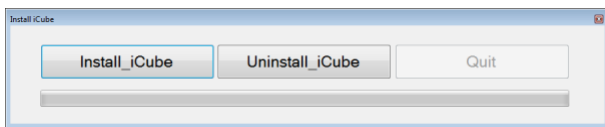
Click the “RESTART NOW” button to restart the computer. Then the driver installation is done

### 3.2 Install iCube

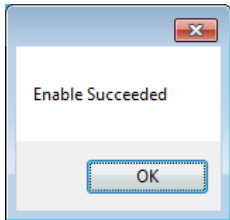
After installing the MDS driver, download iCube from Aetina official website. Then, go to My Computer, double-click the Download folder and execute the setup.exe program.



Before install iCube, please make sure that .NET Framework already installed and the version is v4.6 or later.



Click "Install\_iCube" to install software.



Click the "Enable Succeeded" button. Then the iCube installation is done

#### Note:

1. iCube only support M9 and M12 series.
2. After enable iCube, the iCube will DISABLE "Sleep mode" and "On resume, display logon screen" in the Microsoft Windows system.
  - \*Sleep mode path: Control Panel→System and Security→Power Options→Edit Plan Settings.
  - \*Logon screen path: Control Panel→Appearance and Personalization→Personalization→Screen Saver.

## 4. Display Configuration

iCube is a software that develops from Aetina for MDS M9 and M12 series. That can enlarge the display resolution up-to 5760 x 1080 per set (1920 x 1080 per single monitor) and bring you a good experience.

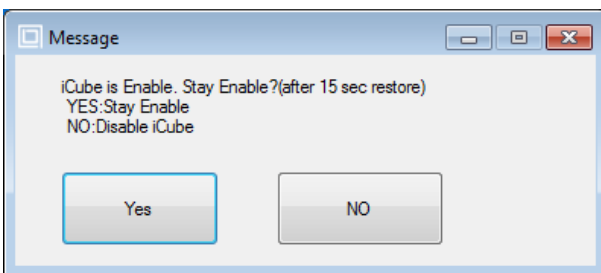
### 4.1 Display Configuration



Execute iCube.exe from Desktop.



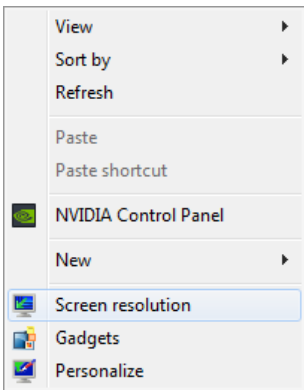
Click "Enable" bottom to enable iCube.



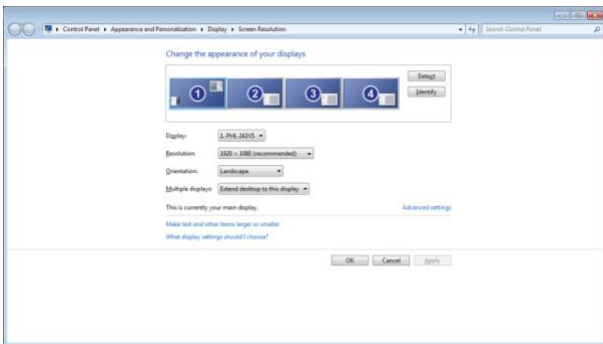
Click "Yes" to stay enable.

#### Note:

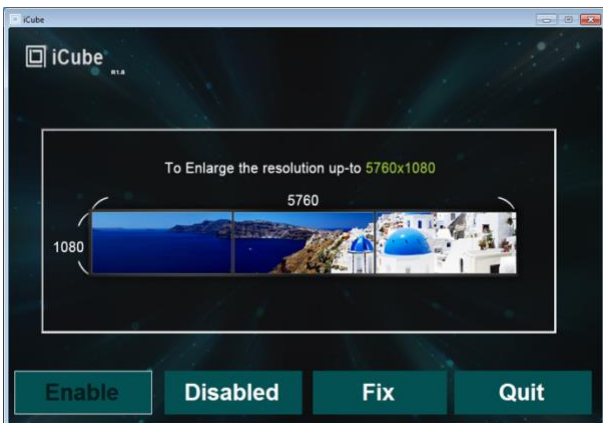
1. Please DO NOT use NVIDIA Control Panel to set display configuration.
2. The "Fix" bottom only use on Windows 7 – 8.



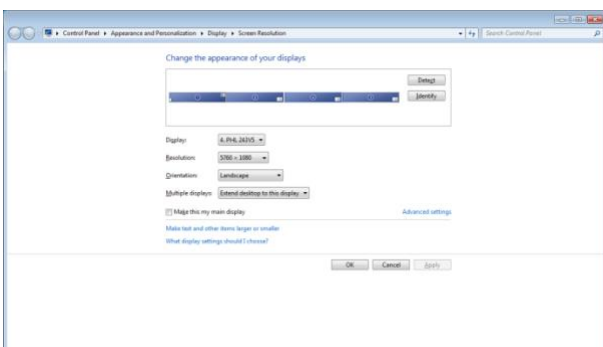
Click Right bottom of the mouse on Desktop, then click “Screen resolution”.



Organize the Monitor Configuration, then click “Apply”.



Click “Fix” to set resolution.

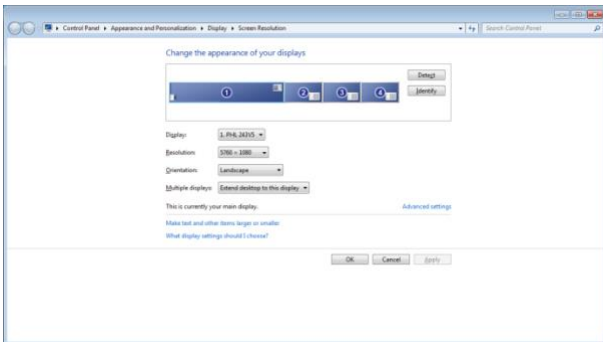


Done.

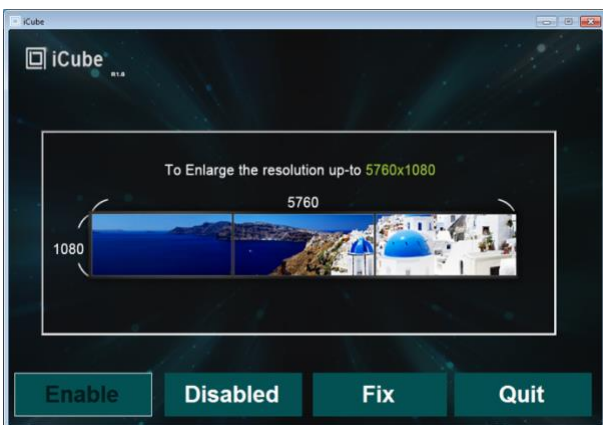
## 4.2 Change Display Configuration

The MDS M4 and M12 series support Horizontal, Vertical and Matrix display configurations. Please follow the below steps to change the display configuration.

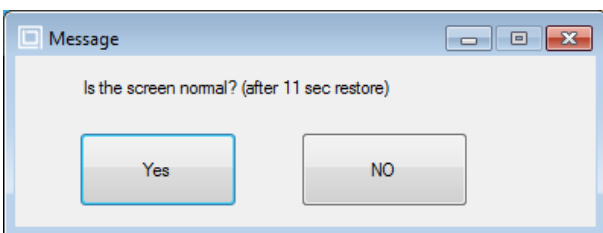
### 4.2.1 Horizontal mode. (System formation: 4 x 1 / Monitor formation: 12 x 1)



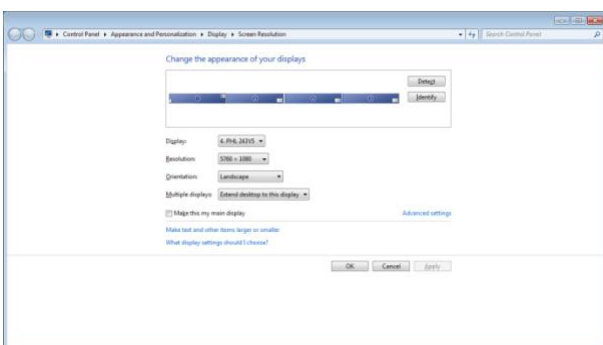
Please change the resolution of Main Display to 5760 x 1080 and others to 1920 x 1080. Then click “Apply”.



Click iCube “Fix” bottom to set the resolutions to 5760 x 1080 for each display set.



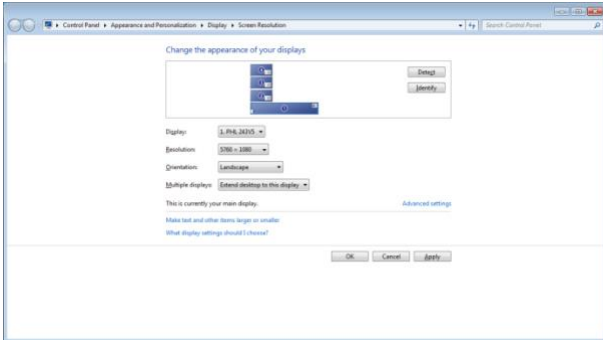
Click “Yes” to confirm.



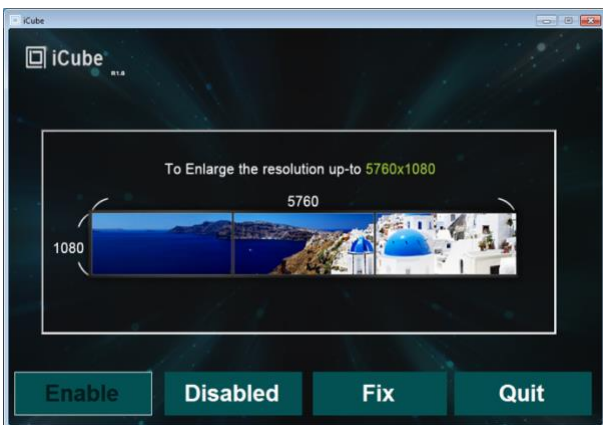
Done.



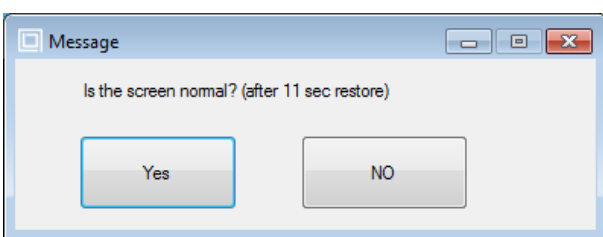
#### 4.2.2 Vertical mode. (System formation: 1 x 4 / Monitor formation: 3 x 4)



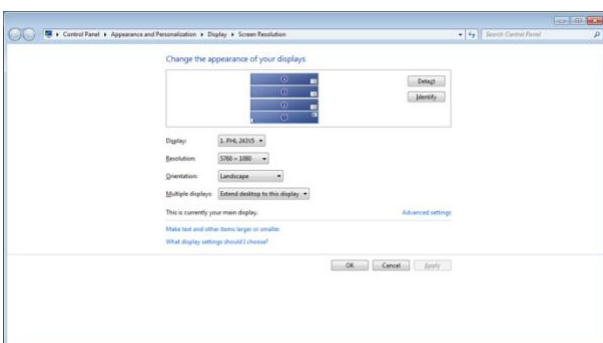
Please change the resolution of Main Display to 5760 x 1080 and others to 1920 x 1080. Then click “Apply”.



Click iCube “Fix” bottom to set the resolutions to 5760 x 1080 for each display set.

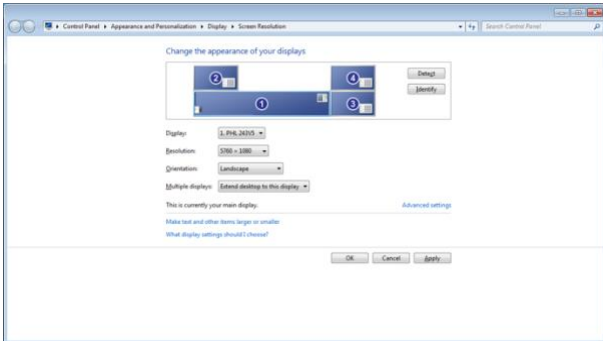


Click “Yes” to confirm.



Done.

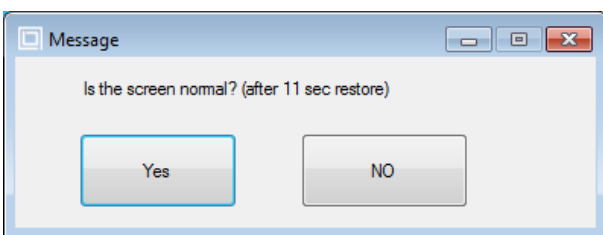
### 4.2.3 Matrix mode. (System formation: 2 x 2 / Monitor formation: 6 x 2)



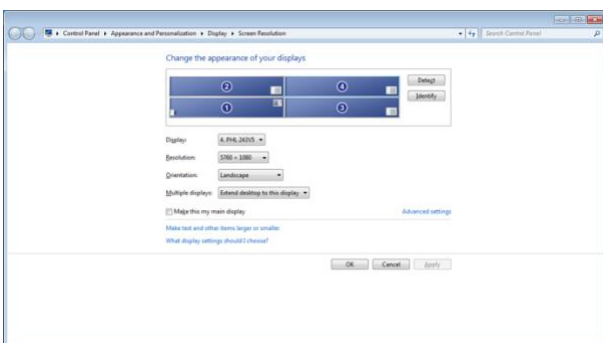
Please change the resolution of Main Display to 5760 x 1080 and others to 1920 x 1080. Then click “Apply”.



Click iCube “Fix” bottom to set the resolutions to 5760 x 1080 for each display set.

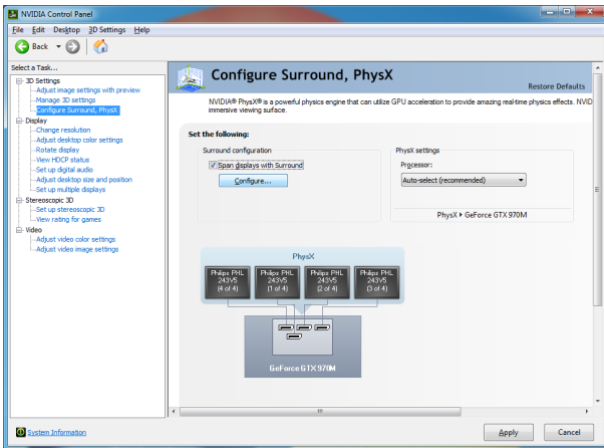


Click “Yes” to confirm.

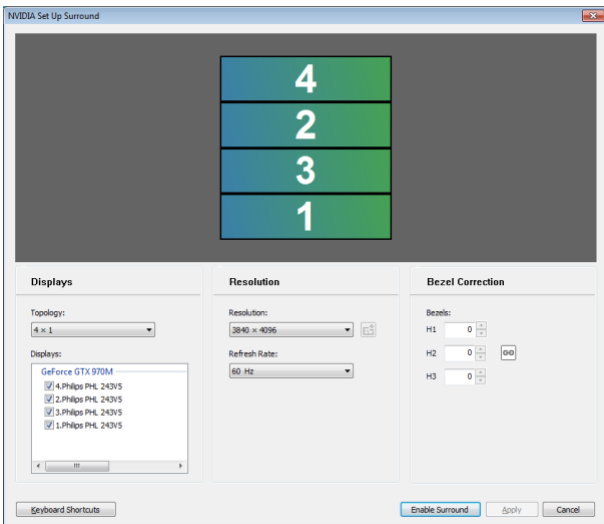


Done.

### 4.3 NVIDIA Surround setting



Choose “Configure Surround, PhysX”, and then click “Span displays with Surround” → “Configure...”



Choose Topology type, and then click the display numbers in sequence from top to bottom

After clicking the display numbers, click “Enable Surround”



Close setup window to finish the Surround configure.

### 4.3 Other display modes example

#### M9-P107:

Resolution Configuration

#### 9-displays



**Support: 3 sets of 5760x1080**  
Create an ultra-large desktop to expand a single application across multiple screens.



**Clone Mode:**  
9 displays @1920x1080 FHD



**Stretched Mode 1:**  
NVIDIA Surround 3x1 for 9x displays (5760x3240), support an ultra-large desktop across all screens.



**Stretched Mode 2:**  
NVIDIA Surround 1x3 for 9x displays (17280x1080), support an ultra-large desktop across all screens.

NVIDIA Surround	monitor formation Row x Column	Resolution
9x Displays 3x1	3x3	5760 x 3240
9x Displays 1x3	9x1	17280 x 1080
6x Displays 1x2	6x1	11520 x 1080
6x Displays 2x1	3x2	5760 x 2160
6x Displays 3x1	2x3	3840 x 3240
6x Displays 1x3	6x1	11520 x 1080

#### 6-displays



**Support: 2 sets of 5760x1080**  
Create an ultra-large desktop to expand a single application across multiple screens.



**Clone Mode:**  
6 displays @1920x1080 FHD



**Stretched Mode 1:**  
NVIDIA Surround 2x1 for 6x displays (5760x2160), support a large desktop across all screens.



**Support: 3 sets of 3840x1080**  
Create a large desktop to expand a single application across multiple screens.



**Clone Mode:**  
6 displays @1920x1080 FHD



**Stretched Mode 2:**  
NVIDIA Surround 3x1 for 6x displays (3840x3240), support a large desktop across all screens.



**Stretched Mode 3:**  
NVIDIA Surround 1x3 for 6x displays(11520x1080), support an ultra-large desktop across all screens.

## M12-P107:

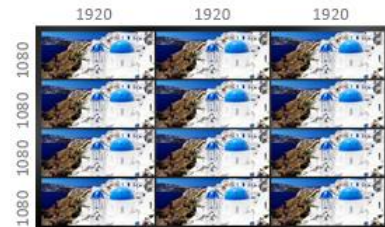
### Resolution Configuration



**Support:**  
**4 sets of 5760x1080 displays**  
 Create an ultra-large desktop to expand a single application across multiple screens.



**Stretched Mode 1:**  
 NVIDIA Surround 4x1 mode for 12x displays (5760x4320), support an ultra-large 4K2K desktop across all screens.



**Clone Mode:**  
 12 displays @1920x1080 FHD



**Stretched Mode 2:**  
 NVIDIA Surround 1x4 mode for 12x1 displays (23040x1080)



**Stretched Mode 3:**  
 NVIDIA Surround 2x2 mode for 6x2 displays (11520x2160)

NVIDIA Surround	monitor formation Row x Column	Resolution
12x Displays 4x1	3x4	5760 x 4320
12x Displays 1x4	12x1	23040 x 1080
12x Displays 2x2	6x2	11520 x 2160
8x Displays 2x2	4x2	7680 x 2160
8x Displays 4x1	2x4	3840 x 4320
8x Displays 1x4	8x1	15360 x 1080

12xDVI / HDMI ports @1920x1080 FHD  
 or 4 sets of 5760x1080 resolution display

### Note:

- The limitation of horizontal resolution per one monitor in Windows 10 is BELOW 15360 pixels. NVIDIA Surround mode does not support 1x3 and 1x4 topology when horizontal resolution is bigger than 15360 pixels in Windows 10.



## 5. Functional Description

### 5.1 Board Architecture

The AETINA MDS P-series is based on PCI Express 3.0 form factor.

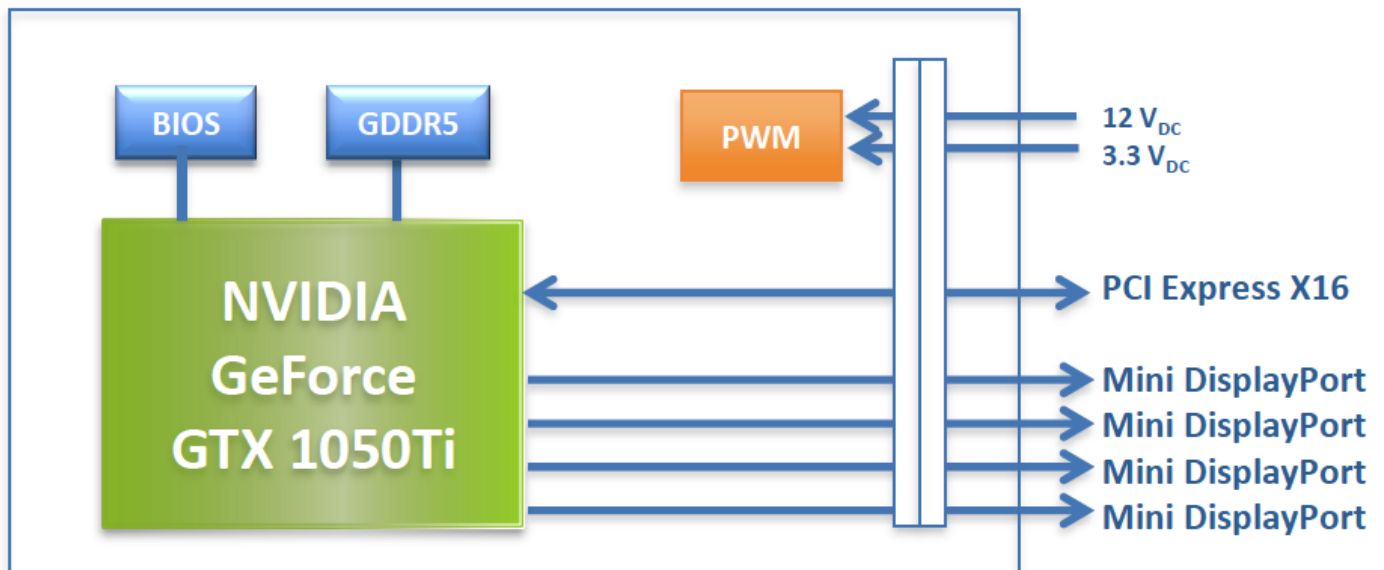


Figure 5.1 M4-P107mDP Block diagram

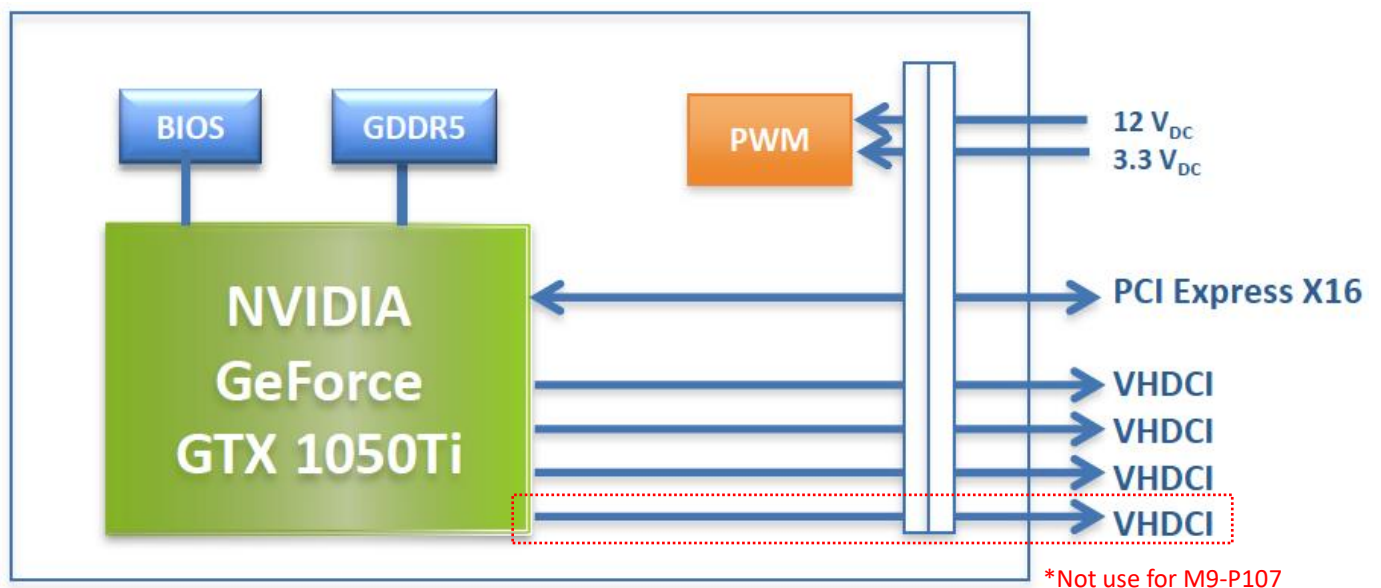


Figure 5.2 M9-P107 and M12-P107 Block diagram

## 5.2 General Purpose Graphics Processing Unit

The AETINA MDS P-series is based on Pascal GeForce GTX 1050Ti GPU from NVIDIA. 768 CUDA core enabled. Base core clock is 1290 MHz. The MDS P-series is compliant with NVIDIA's CUDA computing capability 6.1.

### 5.2.1 GPU Resources

- GDDR5 SDRAM
  - 4 pieces 256M x 32 GDDR5, total capacity of 4096 Mbytes
  - 128bit data bus width
  - 7.0 Gbps clock frequency
- BIOS ROM
  - 4Mbit SPI FLASH for BIOS image

## 5.3 Display Interface

The M4-P107mDP provides four digital output channels, M9-P107 provides nine digital output channels and M12-P107 provides twelve digital output channels. All the digital output channels can be active at the same time.

### 5.3.1 Graphics Output channels



Figure 5.3 Output channels

### 5.3.2 Digital Output

The M4-P107mDP supported 4x digital outputs via mini DisplayPort connector.

- Maximum resolution over mini DisplayPort: 7680 x 4320

The M9-P107 supported 9x digital outputs via VHDCI connector.

- Maximum resolution over 1set Port: 5760 x 1080

The M12-P107 supported 12x digital outputs via VHDCI connector.

- Maximum resolution over 1set Port: 5760 x 1080

### 5.3.4 Analog Output

This model does not support Analog output.

### 5.3.5 EDID caching

M9-P107 and M12-P107 prevents display default configuration reset while monitor malfunction or disconnection, optimizes displaying quality and stability.

### 5.3.6 Hot Plug

The MDS P-series supports Hot Plug detect for digital monitors.

### 5.3.7 Bezel Compensation

The M9-P107 and M12-P107 ONLY supports Bezel function between each SET port.

## 5.4 PCI Express

The MDS P-series supports a native x16 PCI Express Gen3/2/1 bus interface and also supports x8, x4, x1 lane widths.



## 6. Mechanical Specifications

### 6.1 PCI Express System

The AETINA MDS P-series graphics board (Figure 6.1 & 6.2) conforms to the PCI Express form factor (169.57 x 68.9 mm & 203.64 x 111.15 mm) graphics add-in card using the Pascal GeForce GTX 1050Ti GPU.



Figure 6.1 M4-P107mDP (169.57 x 68.9 mm)

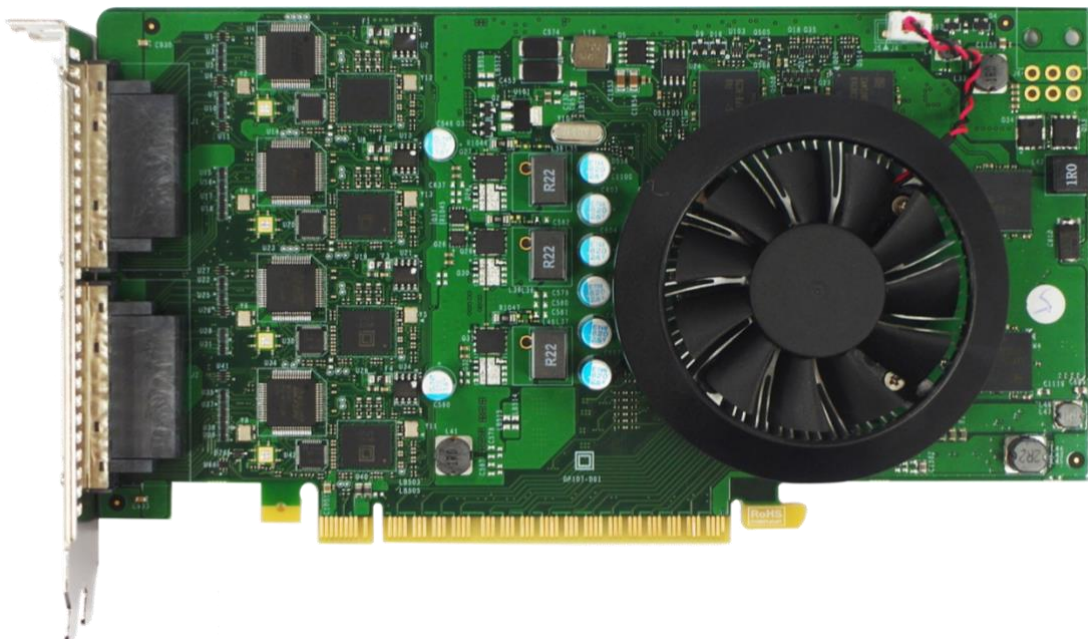


Figure 6.2 M12-P107 (203.64 x 111.15 mm)

## 6.2 Placement of Standard I/O Connectors



Figure 6.3 Shows the standard locations for the connector.

### 6.3 Component Information

The M4-P107mDP graphics board supports the following connectors.

- Mini DisplayPort

The M9-P107 and M12-P107 graphics board supports the following connectors.

- DVI-D via VHDCI
- HDMI via VHDCI

#### 6.3.1 mini DisplayPort Connector

The M4-P107mDP graphics board supports the use of a VESA standard 20-pin mini DisplayPort connector (Figure 6.4). Table 6.1 provides the connector pinout.

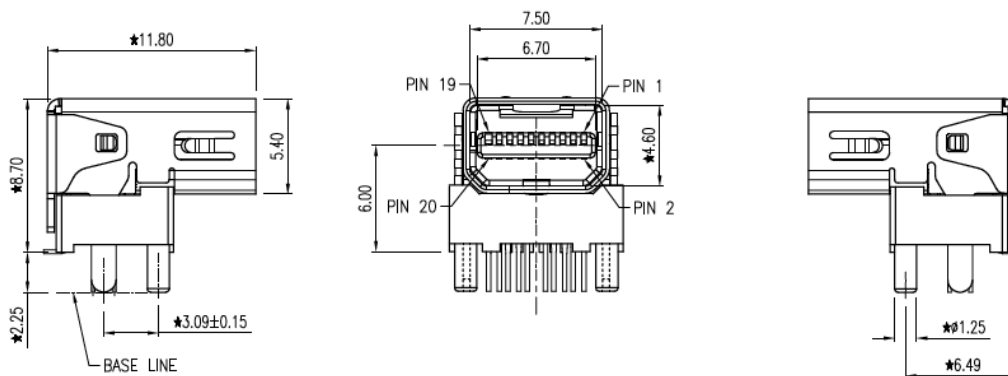


Figure 6.4 mini DisplayPort Connector

Table 6.1 mini DisplayPort Connector Pinout

Pin	Signal	Pin	Signal
1	Ground	11	ML_Lane 1-
2	Hot plug detected	12	ML_Lane 3-
3	ML_Lane 0+	13	Ground
4	CONFIG1	14	Ground
5	ML_Lane 0-	15	ML_Lane 2+
6	CONFIG2	16	AUX+
7	Ground	17	ML_Lane 2-
8	Ground	18	AUX-
9	ML_Lane 1+	19	Ground
10	ML_Lane 3+	20	DP_PWR

### 6.3.2 DVI-D Connector

The M9-P107 and M12-P107 graphics board supports DVI-D connector (Figure 6.5). Table 6.2 provides the connector pinout.

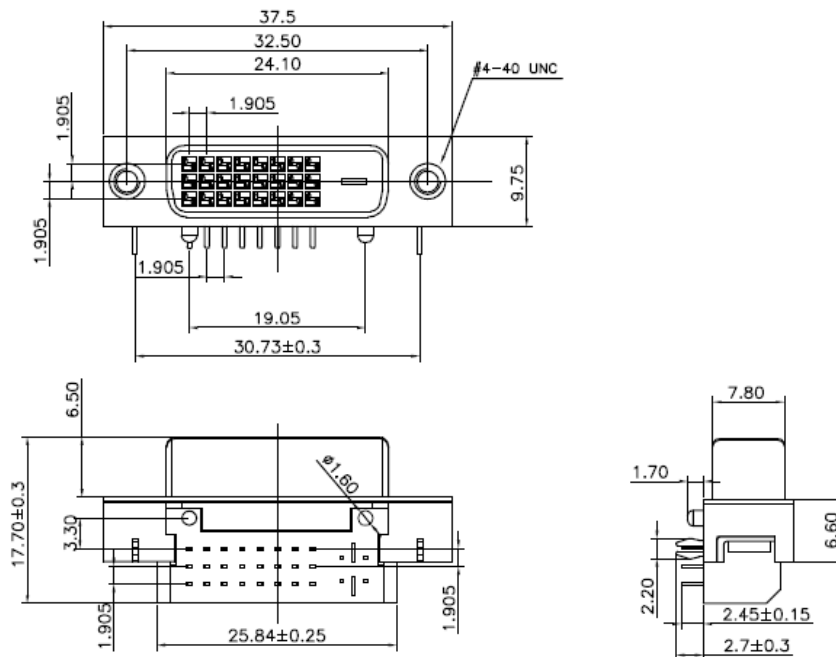


Figure 6.5 DVI-D Connector

Table 6.2 DVI-D Connector Pinout

Pin	Signal	Pin	Signal
1	TMDS data 2-	13	TMDS data 3+
2	TMDS data 2+	14	+5VDC power
3	TMDS data 2/4 shield	15	Ground (Return for +5V)
4	TMDS data 4-	16	Hot plug detected
5	TMDS data 4+	17	TMDS data 0-
6	DDC clock	18	TMDS data 0+
7	DDC clock	19	TMDS data 0/5 shield
8	Analog vertical sync	20	TMDS data 5-
9	TMDS data 2-	21	TMDS data 5+
10	TMDS data 2+	22	TMDS clock shield
11	TMDS data 2/4 shield	23	TMDS clock+
12	TMDS data 3-	24	TMDS clock-

### 6.3.3 HDMI Connector

HDMI (High-Definition Multimedia Interface) is an industry-supported, uncompressed, all-digital audio/video interface. HDMI provides an interface between any audio/video source, such as a multimedia PC system, DVD player or A/V receiver and an audio and/or video monitor, such as a LCD monitor, over a single cable (Figure 6.6).

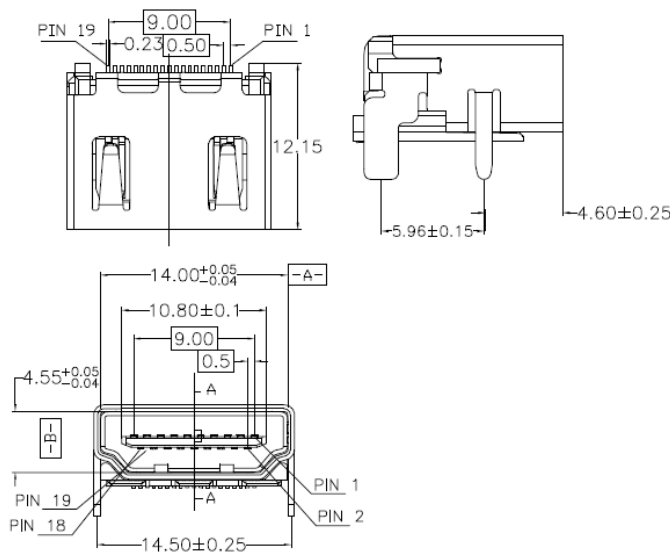


Figure 6.6 HDMI Connector

Table 6.3 HDMI Connector Pinout

Pin	Signal	Pin	Signal
1	TMDS Data 2+	11	TMDS Clock Shield
2	TMDS Data 2 Shield	12	TMDS Clock-
3	TMDS Data 2-	13	No Connect
4	TMDS Data 1+	14	No Connect
5	TMDS Data 1 Shield	15	DDC Clock
6	TMDS Data 1-	16	CCL Data
7	TMDS Data 0+	17	Ground
8	TMDS Data 0 Shield	18	+5V Power
9	TMDS Data 0-	19	Hot Plug Detect
10	TMDS Clock+		

### 6.4 Dimension

The dimensions of M4-P107mDP and M12-P107 are shown in Figure 6.7 and 6.8

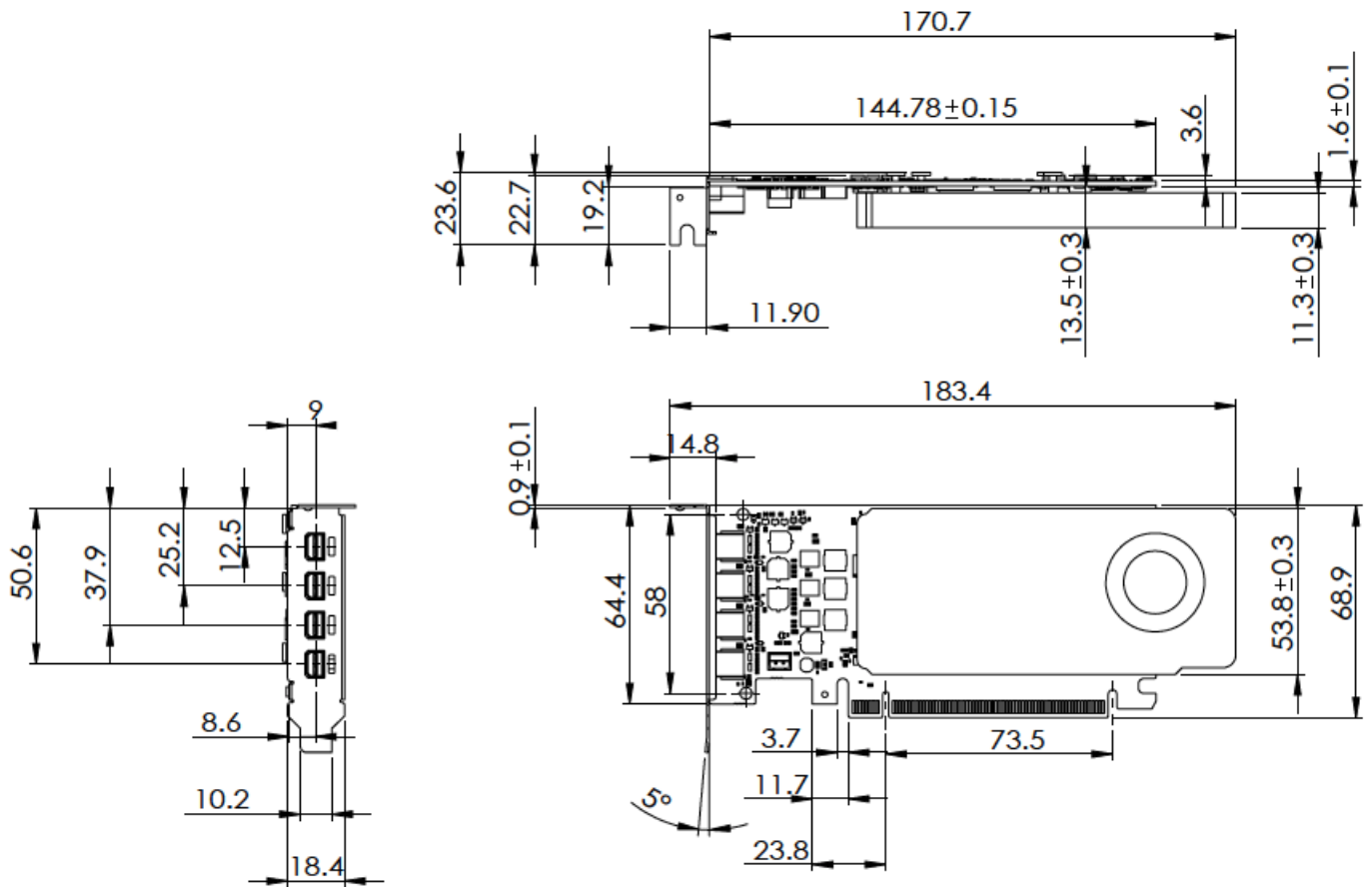


Figure 6.7 Dimensions of M4-P107mDP

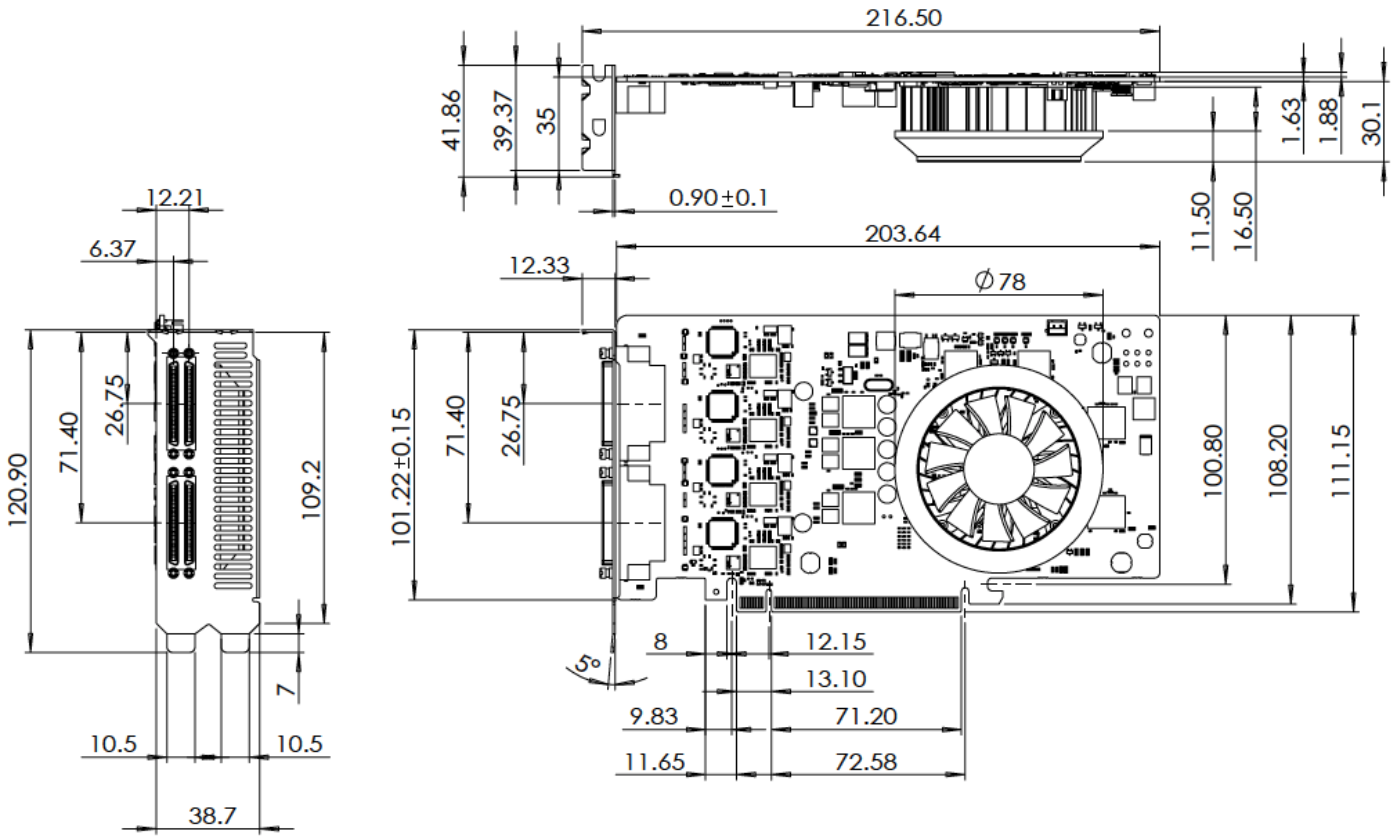


Figure 6.8 Dimensions of M12-P107

## 7. Thermal Specifications

Table 7.1 Thermal Specification

Application	Temperature (°C)
Maximum GPU temperature	97



## 8. Certificates and Agencies

### 8.1 Certifications

Driver for WHQL certified Windows 7 - 10 available from NVIDIA.

### 8.2 Agencies

Bureau of Standards, Metrology, and Inspection (BSMI): TBD  
Conformité Européenne (CE): TBD

## 9. Appendix

### 9.1 Ordering Information

Table 9.1 Models available

Model Number	Description
M4-P107mDP	4-displays, PCI-Express 16X, NVIDIA GeForce GTX 1050Ti, 4GB GDDR5, mini DisplayPort, 0°C to +55°C
M9-P107D	9-displays, PCI-Express 16X, NVIDIA GeForce GTX 1050Ti, 4GB GDDR5, with VHDCI to DVI cable, 0°C to +55°C
M9-P107H	9-displays, PCI-Express 16X, NVIDIA GeForce GTX 1050Ti, 4GB GDDR5, with VHDCI to HDMI cable, 0°C to +55°C
M12-P107D	12-displays, PCI-Express 16X, NVIDIA GeForce GTX 1050Ti, 4GB GDDR5, with VHDCI to DVI cable, 0°C to +55°C
M12-P107H	12-displays, PCI-Express 16X, NVIDIA GeForce GTX 1050Ti, 4GB GDDR5, with VHDCI to HDMI cable, 0°C to +55°C

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