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***NVIDIA GT610***

***PCIe® ADD-IN BOARD***

***Datasheet***

***GFX-N3A1-01FMS1***

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## 1. Feature

Model Name	GFX-N3A1-01FMS1
<b>Graphics Processing Unit</b>	
GPU	GT520/GT610(GF119-300-A1)
Process Technology	40 nm
Graphics Engine Operating Frequency (max)	810 MHz
Form Factor	Low profile (144 X 68.9 mm)
Card Interface	PCI Express® 2.0 (X16)
CUDA Cores	48
Texture Fill Rate(billion/sec)	6.5
DirectX® capability	DirectX® 11
Shader Model	Shader Model 5.0
OpenGL	OpenGL™ 4.2
Video Decoder	H.264, VC-1, MPEG-2, MPEG-4 part 2 decode, MVC, 3D Blu Ray
<b>Memory</b>	
Memory Operating Frequency (max)	500 MHz / 1 Gbps
Configuration, type	64-bit wide, 1 GB, DDR3
<b>Display Interface</b>	
Dual-Link DVI	Dual Link DVI-I
HDMI 1.4a	HDMI x1
VGA	Optional standard VGA via header and cable

## 2. Functional Overview

### 2.1. GPU Block diagram

Figure 1.1 shows a simplified block diagram of the GF119 GPU.

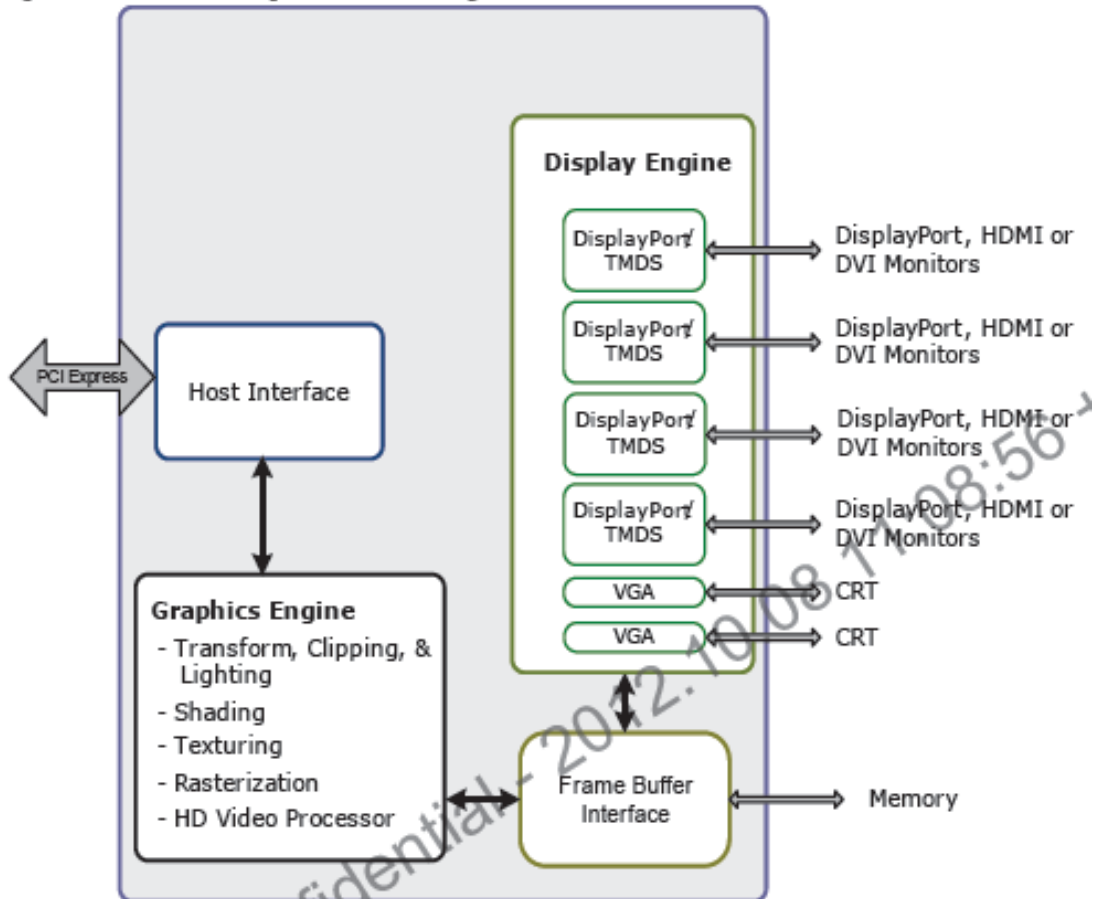


Figure 1.1 GF119 Simplified Block Diagram

### 2.2. GPU

Core clock:810 MHz

Voltage:1.040V (Voltage 1) and 1.110V (Voltage 2)

Packing size:23mmx23mm flip-chip plastic ball Grid array (FCPBGA)

## 2.3. Memory

Memory clock: 500MHz

Interface: 64-bit

Local framer buffer: 1024MB

8 piece 128M x 8 DDR3, FBGA-78 package

## 2.4. Features and Technologies

- ▶ Fully DirectX® 11 compliant and Shader Model 5.0
- ▶ OpenGL 4.2
- ▶ NVIDIA® Ageia PhysX™ technology
- ▶ NVIDIA® CUDA technology

## 2.5. Display Support

- ▶ Dual 400MHz integrated RAMDACs
- ▶ Maximum resolution/refresh:2048x1536x32bpp at 75Hz
- ▶ Internal dual-link TMDS
  - Maximum resolution over digital port:2560x1600x32bpp at 60HZ
- ▶ HDMI 1.4a
  - PC mode:1920x1200 at 60Hz
  - TV mode:1080p(1920x1080 at 60Hz)
- ▶ High definition digital content protection(HDCP)support

## 2.6. Digital Audio

- ▶ Supports for HD Audio over PCI Express
- ▶ Support for secure premium audio (e.g. 7.1 Audio)
- ▶ Data rates of 44.1KHz, 48KHz, 88.2KHz, 96KHz, 176KHz and 192KHz
- ▶ Word sizes of 16-bit, 20bit, and 24-bit

## 2.7. Video

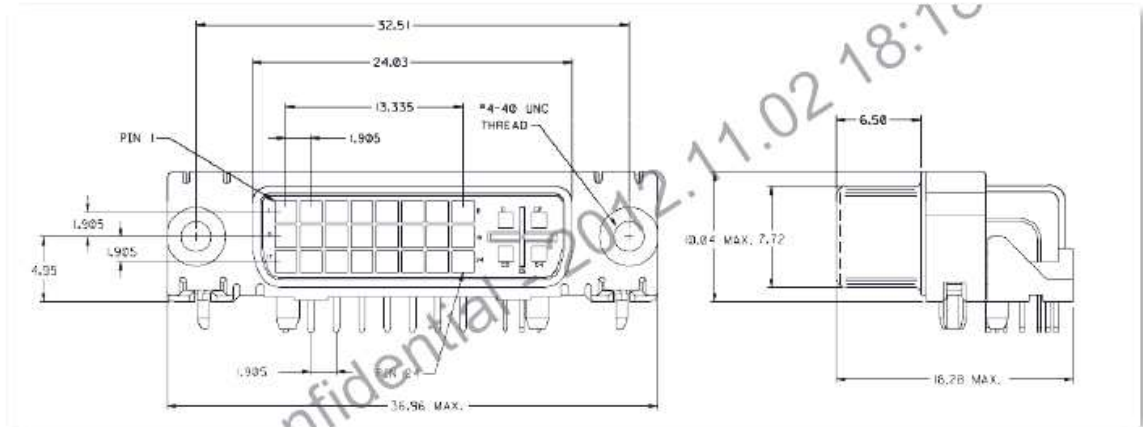
The following video formats are supported:

- ▶ MPEG-2
- ▶ MPEG-4 Part 2 Advanced Simple Profile
- ▶ H.264 SVC codec support
- ▶ Support for 3D Blu Ray
- ▶ VC1
- ▶ DivX version 3.11 and later
- ▶ MVC

A full range of video resolutions are supported including 1080p, 1080i, 720p, 480p and 480i

## 3. PIN Assignment and Description

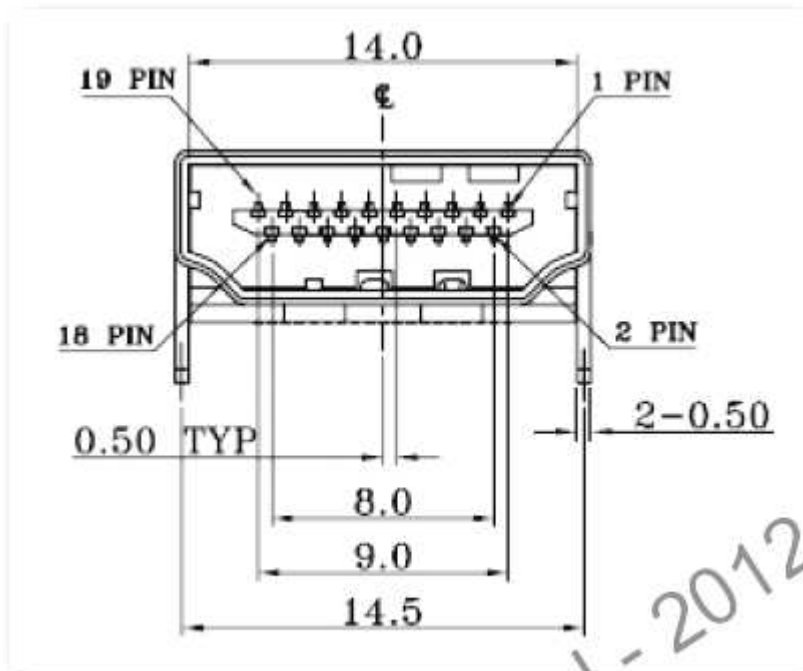
### 3.1 DVI-I Connector Pinout



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 +5)
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 data	19	TMDS data 0/5 shield
8	Analog vertical sync	20	TMDS data 5-
9	TMDS data 1-	21	TMDS data 5+
10	TMDS data 1+	22	TMDS clock shield
11	TMDS data 1/3 shield	23	TMDS clock+
12	TMDS data 3-	24	TMDS clock-
C1	Analog red	C4	Analog horizontal sync
C2	Analog green	C5	Analog ground (RGM return)
C3	Analog blue		

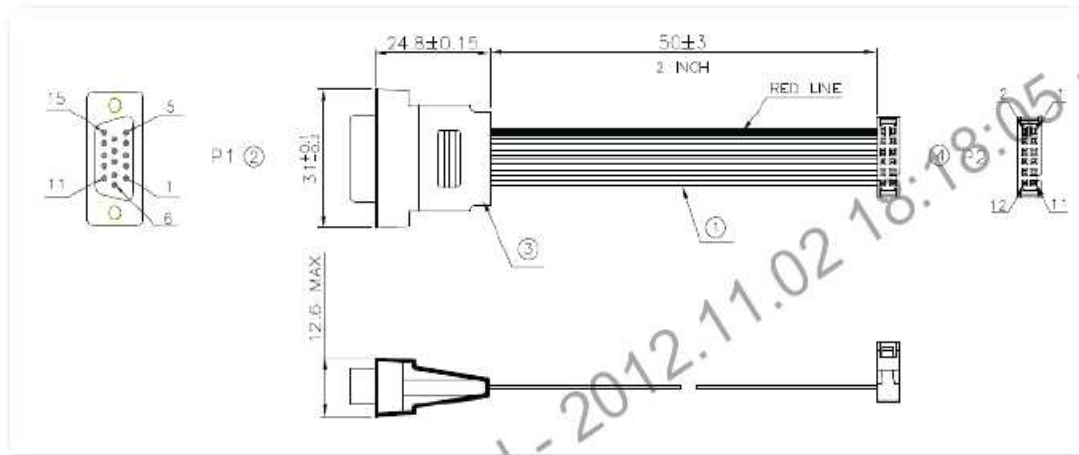


## 3.2 HDMI 1.4a Connector Pinout



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	DDC 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+		

## 3.3 VGA Connector Pinout



Pin	Signal	Description
1	Red	Red
2	Green	Green
3	Blue	Blue
4	Reserved	Macintosh sense , RW
5	Ground	DDC return
6		Red ground
7		Green ground
8		Blue ground
9	+5V	DDC power
10	SGND	Sync ground
11	ID0	Monitor ID bit 0 (Opt)
12	SDA	Serial data (DDC2B)
13	HSYNC	Horizontal sync
14	VSYNC	Vertical sync
15	SCL	Serial clock (DDC2B)

### 3.4 VGA Header Pinout

Pin	Signal	Description
1	SCL	Serial clock (DDC2B)
2	SDA	Serial data (DDC2B)
3	+5V	DDC power
4	VSYNC	Vertical sync
5	HSYNC	Horizontal sync
6	GND	Ground
7	Red	Red
8	GND	Ground
9	Green	Green
10	GND	Ground
11	Blue	Blue
12	GND	Ground

## 4. Power Specifications

Parameter	Value	Unit
<b>Input Board Power (Estimated)</b>		
PCI Express edge connector (12V) (estimated input power)	2.4	A
	28.5	W
PCI Express edge connector (3V3) (estimated input power)	0.15	A
	0.5	W
Total estimated input graphics power (estimated TGP)	29	W
<b>Component Power (Estimated)</b>		
GPU (TDP, estimated)	18.7	W
Memory power (estimated; eight components)	3.6	W
Power supplies	4.5	W
PCB and others losses	2.2	W

## 5. Thermal Specifications

Parameter	Value	Unit
Fan inlet temperature (max.)	55	°C
GPU slowdown temperature (max.Tj)	102	°C
GPU shutdown temperature (max.Tj)	107	°C
GPU junction temperature (estimated)	75	°C
Memory case temperature (max.)	56.1	°C
Power FET case temperature (max.)	73.1	°C

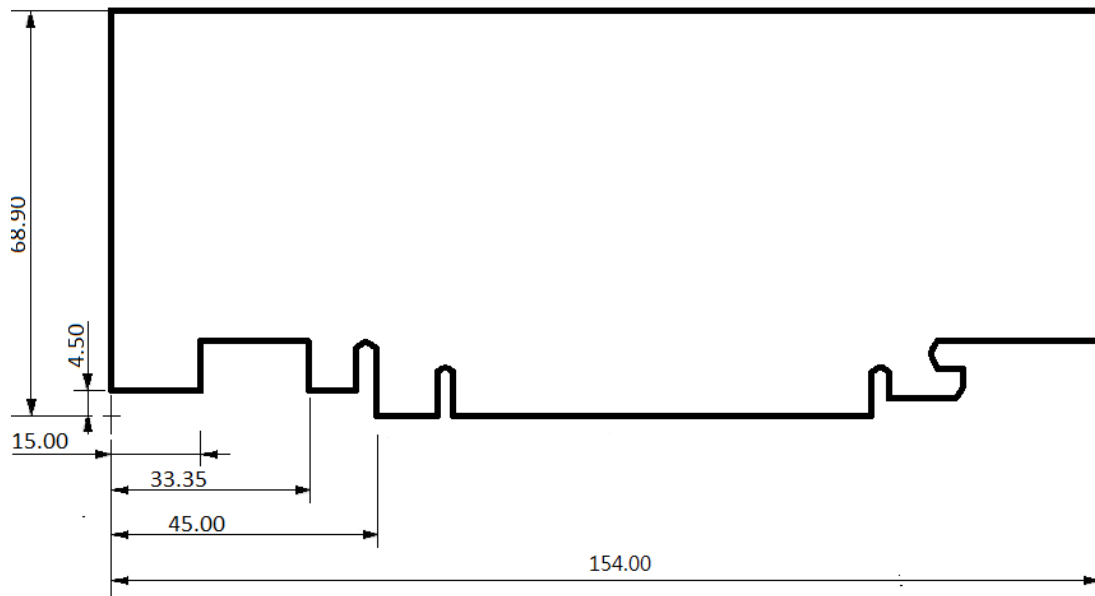
## 6. Output configuration and Board Dimension

### 6.1. Output Configuration



## 6.2 Board Dimension

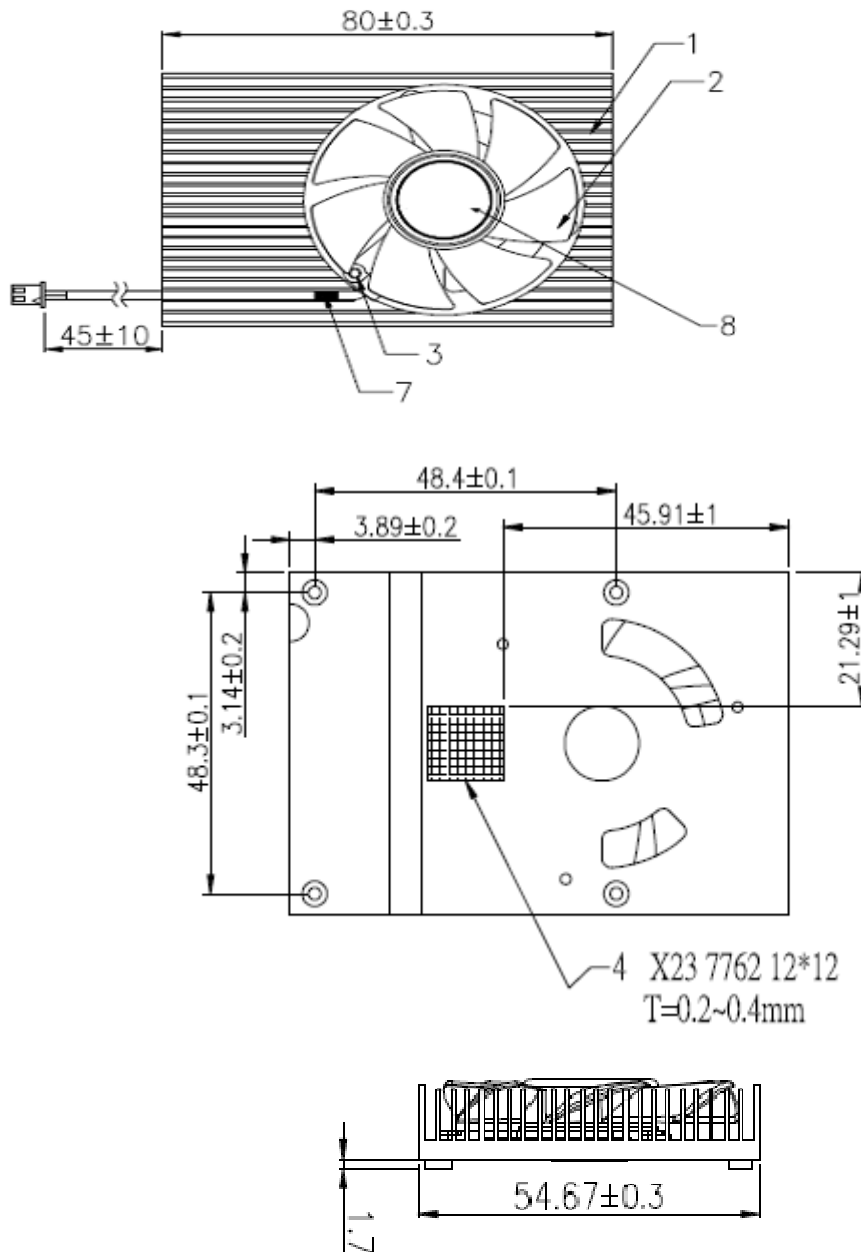
**(Unit : mm)**



**Tolerances : +/- 0.13 mm**

## 7. Thermal Mechanism

(Unit : mm)



## Change log or update history

<b>Rev.</b>	<b>Data</b>	<b>History</b>
0.1	2012/9/26	1 <sup>st</sup> Draft
0.2	2012/10/19	2 <sup>nd</sup> Draft
0.3	2012/11/05	3 <sup>rd</sup> Draft