ADVANTECH

Enabling an Intelligent Planet

96VG-I310FX8-6T

Performance PCIe Graphics

4 x HDMI

MPN：1A1-S004240ADP

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1. Specification

Model Name	IA30GD-LK4A
Graphics Engine	Intel® Arc™ A310
Process Node	6 nm
GPU Clock	1000MHz
Graphics Memory	64-bit, 4 GB, GDDR6
Memory Clock	15.5 Gbps
Bus Interface	PCI Express® 4.0 (x8)
Xe-core	6
Intel® XMX AI engines	96
Shader Processing Units	768
Floating Point Performance (FP32)	1.54 TFLOPs
DirectX® Capability	DirectX® 12
OpenGL™	OpenGL™ 4.6
OpenCL™	OpenCL™ 3.0
VULKAN™	VULKAN™ 1.3
Unified Video Decoder	Xe Media Engine
BIOS Mode	UEFI
Display Interface	4 x HDMI
Maximum Resolution	HDMI: 3840x2160
Power Consumption	50 W
Operating Temperature	0°C ~ 45°C
Dimension	145 x 111 mm

* The product specifications are subject to change without notice.

2. Functional Overview

2.1. Graphics Memory

A310 memory subsystem supports GDDR6 technology with the data rate from 14 GT/s to 15.5 GT/s. A310 memory controllers supports independent 16 bits x 4 channels. The total capacity of graphics memory is up to 4 GB. A310 memory controller trains the memory interface to achieve the best performance.

2.2. Media Support

A310 implements multiple media video codecs in hardware as well as a rich set of image processing algorithms. Multi-format hardware assisted decode/encode pipeline and Mid-Level Cache (MLC) are used for superior high definition playback, video quality, and improved 3D performance and media.

Hardware Accelerated Video Decode

A310 implements a high-performance and low-power hardware acceleration for video decoding operations for multiple video codecs.

The hardware decode is exposed by the graphics driver using the following APIs:

- Direct3D* 9 Video API (DXVA2)
- Direct3D* 12 Video API
- Intel® Media SDK
- MFT (Media Foundation Transform) filters
- Intel® VA API

A310 supports full HW accelerated video decoding for VC/VC1/MPEG2/HEVC/VP9/JPEG/AV1.

NOTE

Actual performance depends on content bit rate, and memory frequency. Hardware decode for H264 SVC is not supported.

Hardware Accelerated Video Encode

A310 implements a low-power low-latency fixed function encoder and a high-quality customizable encoder with hardware assisted motion estimation engine which supports AVC, MPEG-2, HEVC, and VP9.

The hardware encode is exposed by the graphics driver using the following APIs:

- Intel® Media SDK

- MFT (Media Foundation Transform) filters

Supports full hardware accelerated video encoding for AVC/MPEG2/HEVC/VP9/JPEG.

Hardware Accelerated Video Processing

There is hardware support for image processing functions such as:

- De-interlacing
- Film cadence detection
- Advanced Video Scaler (AVS)
- Detail enhancement
- Image stabilization
- Gamut compression
- HD adaptive contrast enhancement
- Skin tone enhancement
- Total color control
- Chroma de-noise
- SFC (Scalar and Format Conversion)
- Memory compression
- Localized Adaptive Contrast Enhancement (LACE)
- Spatial de-noise
- Out-Of-Loop De-blocking (from AVC decoder)
- 16 bpc support for de-noise/de-mosaic

The hardware video processing is exposed by the graphics driver using the following APIs:

- Direct3D* 9 Video API (DXVA2)
- Direct3D* 12 Video API
- Intel® Media SDK
- MFT (Media Foundation Transform) filters
- Intel® IGCC SDK

NOTE

Not all features are supported by all the above APIs.

2.3. Display System

Display Technologies Support

Technology	Standard
DisplayPort 2.0,1.4	VESA* DisplayPort* Standard 2.0,1.4 VESA* DisplayPort* PHY Compliance Test Specification 2.0,1.4 VESA* DisplayPort* Link Layer Compliance Test Specification 2.0,1.4
HDMI 2.0b	High-Definition Multimedia Interface Specification Version 2.0b TMDS Compatible High-Definition Multimedia Interface Specification Version 2.1 supported using external Protocol Converter.

Display Configuration

Display Ports Availability and Link Rate

Port	Link Rate
DDI A	DP* up to UHBR10 (10 Gbps) HDMI* up to 5.94 Gbps
DDI B	DP* up to UHBR10 (10 Gbps) HDMI* up to 5.94 Gbps
DDI C	DP* up to UHBR10 (10 Gbps) HDMI* up to 5.94 Gbps
DDI D	DP* up to UHBR10 (10 Gbps) HDMI* up to 5.94 Gbps

Display Features

General Capabilities

- Up to four simultaneous displays
- Audio stream support on external ports
- Gamma Correction
- Color space conversion
- HDR support
- Low Power optimized pipe
  - — LACE (Localized Adaptive Contrast Enhancement), supported up to 5K resolutions
  - — 3D LUT, power efficient pixel modification function for color processing

Multiple Display Configurations

The following multiple display configuration modes are supported (with appropriate driver software):

- Single Display is a mode with one display port activated to display the output to one display device.
- Display Clone is a mode with up to four display ports activated to drive the display content of same color depth setting but potentially different refresh rate and resolution settings to all the active display devices connected.
- Extended Desktop is a mode with up to four display ports activated to drive the content with potentially different color depth, refresh rate, and resolution settings on each of the active display devices connected.

High-bandwidth Digital Content Protection (HDCP)

HDCP is the technology for protecting high-definition content against unauthorized copy or unreceptive between a source (computer, digital set top boxes, and so on) and the sink (panels, monitor, and TVs). A310 supports both HDCP 2.3 and 1.4 content protection over wired displays (HDMI* and DisplayPort*). The HDCP 1.4/2.3 keys are integrated into A310 and customers are not required to physically configure or handle the keys.

2.4. DisplayPort (DP) Features

- Support main link of 1, 2, or 4 data lanes
- Aux channel for Link/Device management
- Support up to 36 BPP (Bit per Pixel)
- Support SSC
- Support YCbCR 4:4:4, YCbCR 4:2:0, and RGB color format
- Support MST (Multi-Stream Transport)
- Support VESA DSC 1.1
- Adaptive Sync

DisplayPort* Maximum Resolution

Standard	Maximum Resolution
DP*	4x 4K60, 2x 8K60
Notes: 1. Maximum resolution is based on the implementation of 4 lanes at UHBR10 link data rate. 2. bpp - bit per pixel. 3. Resolution support is subject to memory bandwidth availability.	

2.5. HDMI Features

- DDC (Display Data Channel) channel
- Support YCbCR 4:4:4, YCbCR 4:2:0, and RGB color format
- Support up to 36 bpp (bit per pixel

HDMI* Maximum Resolution

Standard	Maximum Resolution
HDMI2.0b TMDS Compatible	4K60
Notes: 1. bpp - bit per pixel. 2. Resolution support is subject to memory bandwidth availability. 3. HDMI 2.1 is supported through Protocol Converter	

Integrated Audio

HDMI* and DisplayPort* interfaces carry audio along with the video. A310 supports four High Definition audio streams on four digital ports simultaneously.

2.6. PCI Express Support Features

A310 PCI Express* interface is a 8-lane (x8) port. A310 supports the following:

- Dynamic lane reversal
- Dynamic width capability
- PCI Express* reference clock is a 100-MHz differential clock
- Power Management Event (PME) functions

PCI Express* Maximum Transfer Rate and Theoretical Bandwidth

PCI Express* Generation	Encoding	Maximum Transfer Rate [GT/s]	Theoretical Bandwidth [GB/s]
			x8
Gen 1	8b/10b	2.5	2.0
Gen 2	8b/10b	5	4.0
Gen 3	128b/130b	8	7.9
Gen 4	128b/130b	16	15.8

3. PIN Assignment and Description

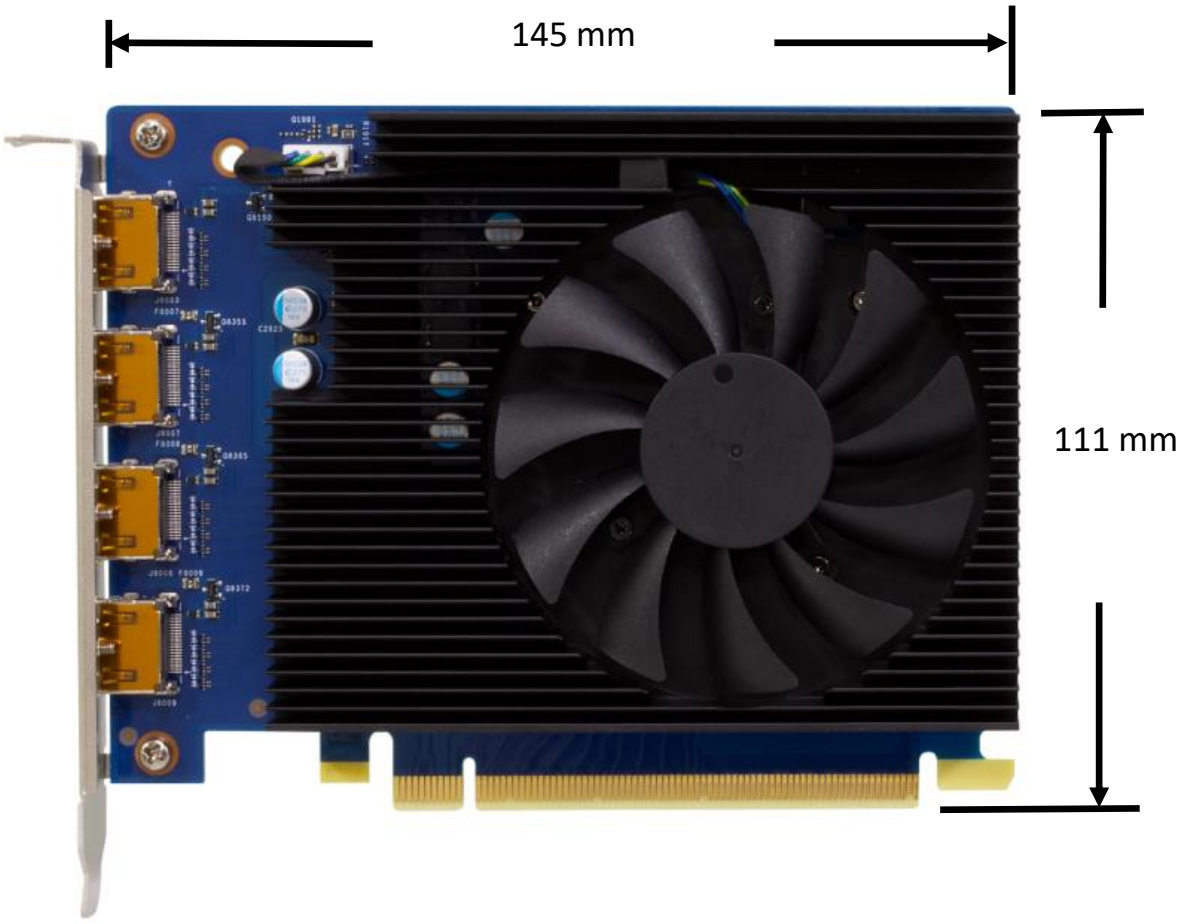
Pin	Side B Connector		Side A Connector	
#	**Name**	**Description**	**Name**	**Description**
1	+12v	+12 volt power	PRSNT#1	Hot plug presence detect
2	+12v	+12 volt power	+12v	+12 volt power
3	RSVD	Reserved	+12v	+12 volt power
4	GND	Ground	GND	Ground
5	SMCLK	SMBus clock	JTAG2	TCK
6	SMDAT	SMBus data	JTAG3	TDI
7	GND	Ground	JTAG4	TDO
8	+3.3v	+3.3 volt power	JTAG5	TMS
9	JTAG1	+TRST#	+3.3v	+3.3 volt power
10	3.3Vaux	3.3v volt power	+3.3v	+3.3 volt power
11	WAKE#	Link Reactivation	PWRGD	Power Good
Mechanical Key				
12	RSVD	Reserved	GND	Ground
13	GND	Ground	REFCLK+	Reference Clock Differential pair
14	HSOp(0)	Transmitter Lane 0, Differential pair	REFCLK-	
15	HSOn(0)		GND	Ground
16	GND	Ground	HSIp(0)	Receiver Lane 0, Differential pair
17	PRSNT#2	Hotplug detect	HSIn(0)	
18	GND	Ground	GND	Ground
19	HSOp(1)	Transmitter Lane 1, Differential pair	RSVD	Reserved
20	HSOn(1)		GND	Ground
21	GND	Ground	HSIp(1)	Receiver Lane 1, Differential pair
22	GND	Ground	HSIn(1)	

Pin	Side B Connector		Side A Connector	
#	Name	Description	Name	Description
23	HSOp(2)	Transmitter Lane 2, Differential pair	GND	Ground
24	HSOn(2)		GND	Ground
25	GND	Ground	HSIp(2)	Receiver Lane 2, Differential pair
26	GND	Ground	HSIn(2)	
27	HSOp(3)	Transmitter Lane 3, Differential pair	GND	Ground
28	HSOn(3)		GND	Ground
29	GND	Ground	HSIp(3)	Receiver Lane 3, Differential pair
30	RSVD	Reserved	HSIn(3)	
31	PRSNT#2	Hot plug detect	GND	Ground
32	GND	Ground	RSVD	Reserved
33	HSOp(4)	Transmitter Lane 4, Differential pair	RSVD	Reserved
34	HSOn(4)		GND	Ground
35	GND	Ground	HSIp(4)	Receiver Lane 4, Differential pair
36	GND	Ground	HSIn(4)	
37	HSOp(5)	Transmitter Lane 5, Differential pair	GND	Ground
38	HSOn(5)		GND	Ground
39	GND	Ground	HSIp(5)	Receiver Lane 5, Differential pair
40	GND	Ground	HSIn(5)	
41	HSOp(6)	Transmitter Lane 6, Differential pair	GND	Ground
42	HSOn(6)		GND	Ground
43	GND	Ground	HSIp(6)	Receiver Lane 6, Differential pair
44	GND	Ground	HSIn(6)	
45	HSOp(7)	Transmitter Lane 7, Differential pair	GND	Ground
46	HSOn(7)		GND	Ground

Pin	Side B Connector		Side A Connector	
#	Name	Description	Name	Description
47	GND	Ground	HSIp(7)	Receiver Lane 7, Differential pair
48	PRSNT#2	Hot plug detect	HSIn(7)	
49	GND	Ground	GND	Ground

4. Board Configuration

4.1 Board Dimension

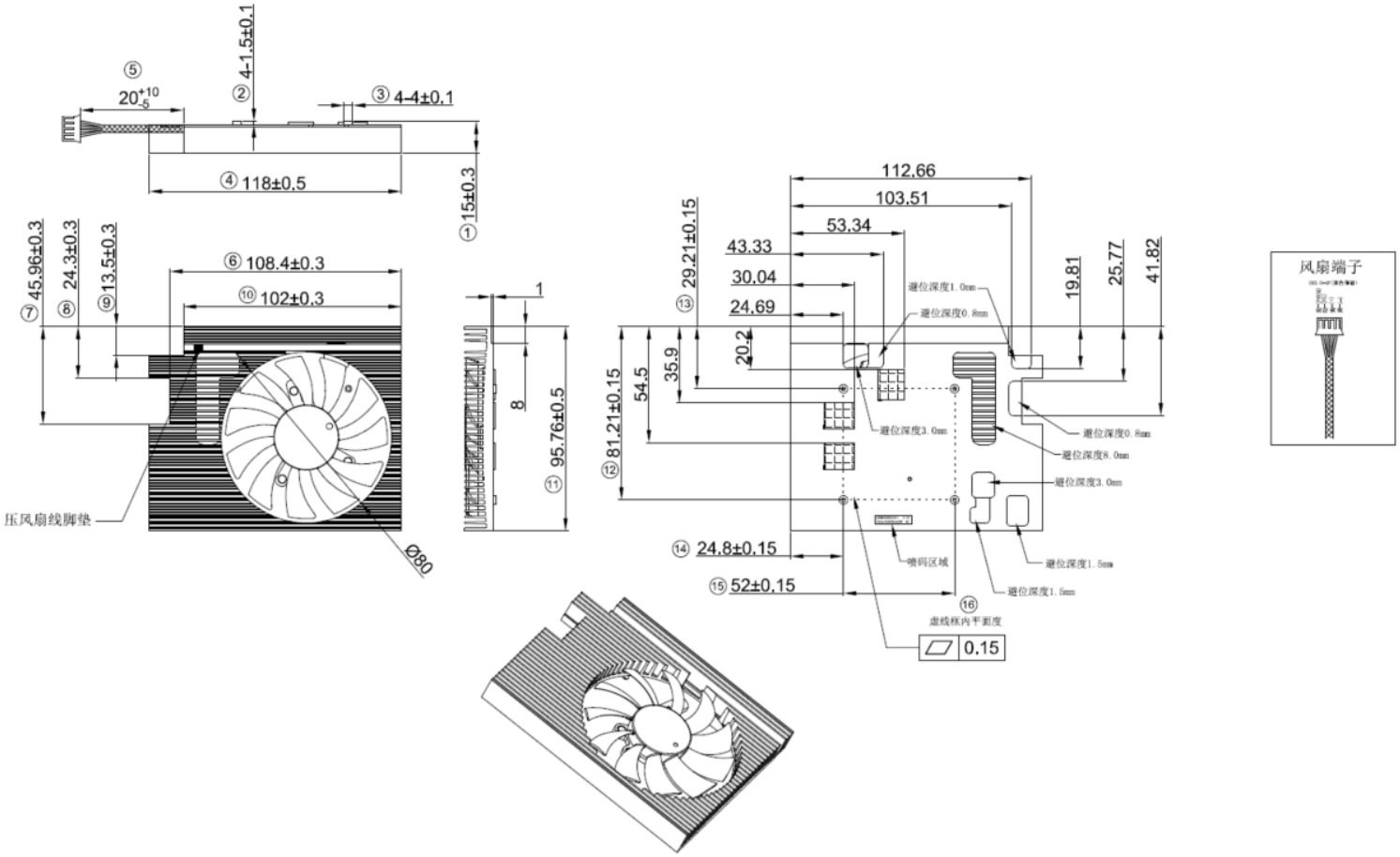


4.2 Display Interface

5. Thermal Mechanism

5.1 Fan Thermal Module

(Unit : mm)



Change log list

Rev.	Data	History
1.0	2024/10/04	IA30GD-LK4A datasheet