ADVANTECH

Enabling an Intelligent Planet

AMD Embedded PCIe® ADD-IN BOARD E6760/E6460 Datasheet

AEGX-A5T7-90FMT1\AEGX-A5T7-90FST1

CONTENTS

1. Feature

Model Name	AEGX-A5T7-90FMT1	AEGX-A5T7-90FST1
Graphics Processing Unit		
GPU	AMD Radeon E6760	
Process Technology	40 nm	
Graphics Engine Operating Frequency (max)	600 MHz	
Form Factor	ATX (145 x 110 mm)	
GPU Interface	PCI Express® 2.1 (X16)	
Shader Processing Units	6 SIMD engines x 80 processing elements = 480 shaders	
Floating Point Performance (single precision, peak)	576 GFLOPs	
DirectX® capability	DirectX® 11	
Shader Model	Shader Model 5.0	
OpenGL	OpenGL 4.1	
OpenCL™ compliant	AMD APP8, OpenCLTM 1.19, DirectCompute 11	
Unified Video Decoder (UVD)	UVD3 for H.264, VC-1, MPEG-2, MPEG-4 part 2 decode	
Memory		
Operating Frequency (max)	800 MHz / 3.2 Gbps	
Configuration, type	128-bit wide, 1 GB, GDDR5, 51.2 GB/s	
Display Interfaces		
Single / Dual-link DVI	Dual-Link DVI-I x 1 , Single Link DVI-I x1	
Thermal Solution		
Fansink / Fanless	Fansink	Fanless

2. Functional Overview

2.1. Memory Interface

AMD Radeon E6760 has four DRAM sequencers, E6460 has two DRAM sequencers. Each DRAM channel is 32-bit wide. Four/two 32 Mb × 32 GDDR5 memory chips are embedded on the ASIC for a total of 1G/512 MB Memory.

2.2. Acceleration Features

- Fully DirectX® 11 compliant, including full-speed 32-bit floating point per component operation:
- Shader Model 5.0 geometry and pixel support in a unified shader architecture.
- Support for OpenGL 4.1.
- Support for OpenCL™ 1.1
- Anti-aliasing filtering:
  - 2x/4x/8x/16x modes.
  - Multi-sample algorithm with gamma correction, programmable sample patterns, and centroid sampling.
  - Temporal anti-aliasing.
  - Adaptive anti-aliasing mode.
  - Lossless color compression (up to 8:1).
- Anisotropic filtering:
  - 2x/4x/8x/16x modes.
  - Up to 128-tap texture filtering.
  - Anisotropic biasing to allow trading quality for performance.
  - Improved quality mode due to improved sub pixel precision and higher precision LOD computations.
  - Advanced texture compression (3Dc+™).
  - High quality 4:1 compression for normal and luminance maps.
  - Works with any single- or two-channel data format
- Up to 16k × 16k textures, including 128-bit/pixel texture are supported.
- Fully associative texture, color, and z-cache design.
- Hierarchical z- and stencil-buffers with early z-test.

- Fast z-buffer clear.
- Fast color-buffer clear.

2.3. Avivo™ Display System

The AMD Avivo™ display system supports VGA, VESA super VGA, and accelerator mode graphics display on six independent display controllers. The full features of the AMD Avivo display system are outlined in the following sections.

2.4. DVI/HDMI Features

- Advanced DVI capability supporting 10-bit HDR (high dynamic range) output.
- Supports industry-standard CEA-861B video modes including 480p, 720p, 1080i, and 1080p. For a full list of currently supported modes, contact your local AMD support person.
- Maximum pixel rates for 24-bpp outputs are:
  - DVI—162 MP/s (megapixels per second) per link for 30-bpp dual-link; double for 24-bpp dual-link.
  - HDMI—148.5 MP/s.
- Fully compliant with the DVI electrical specification.

2.5. DisplayPort Features

2.5.1 DisplaPort 1.1a Features

- Supports all the mandatory features of the DisplayPort Version 1.1a Specification and the following optional features on all links:
  - 30-bit support.
  - YCbCr 444 up to 30-bpp and 422 up to 20-bpp support.
  - HDCP support.
  - DisplayPort extension for test-automation features, including test-pattern generation.
  - DisplayPort audio.
- Each DisplayPort link can support three options for the number of lanes and two options for link-data rate as follows:
  - Four, two, or one lane(s).

- 2.7- or 1.62-GHz link-data rate per lane.

- Supports all video modes supported by the display controller that do not over subscribe the link bandwidth.
  - Examples of supported pixel-rate/resolution support for four lanes at 2.7- GHz link rate:
    - Link bandwidth allows pixel clocks of up to 359 MP/s for 24 bpp or 287 MP/s for 30 bpp.
    - 2560 × 1600 @ 60Hz, 24 bpp is supported.
  - Examples of supported pixel-rate/resolution support for two lanes at 2.7- GHz link rate:
    - Link bandwidth allows pixel clocks of up to 179 MP/s for 24 bpp or 143 MP/s for 30 bpp.
    - 1920 × 1200 @ 60Hz, 24 bpp is supported.
  - The following table shows the maximum pixel rates for four, two, or one lane(s) at 2.7-GHz link rate.

2.5.2 DisplayPort 1.2 Features

- Each DisplayPort 1.2 link can transport up to six video streams; one from each display engine.
- Each DisplayPort link can support three options for the number of lanes and three options for link-data rate as follows:
  - Four, two, or one lane(s).
  - 5.4-, 2.7-, or 1.62-GHz link-data rate per lane.
- Supports all video modes supported by the display controller that do not oversubscribe the link bandwidth.
  - Examples of supported pixel-rate/resolution support for four lanes at 5.4- GHz link rate:
    - Link bandwidth allows pixel clocks of up to 718 MP/s for 24 bpp or 574 MP/s for 30 bpp.
    - 2560 × 2048 @ 60Hz, 30 bpp is supported.
  - Examples of supported pixel-rate/resolution support for two lanes at 5.4- GHz link rate:
    - Link bandwidth allows pixel clocks of up to 359 MP/s for 24 bpp or 287 MP/s for 30 bpp.
    - 2560 × 1600 @ 60Hz, 30 bpp is supported.

2.6. CRT DAC

- One integrated triple 10-bit DAC with built-in reference circuit.
- Single RGB-CRT output.
- Maximum pixel frequency of 400 MHz.
- Individual power-down feature for each of the three guns.

2.7. Bus Support Features

- Fully compliant with the PCI Express® Base Specification Revision 2.1.
- Supports ×1, ×2, ×4, ×8, and ×16 lane widths.
- Supports 2.5 GT/s and 5.0 GT/s link-data rates.

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,	RSVD	Reserved
20	HSOn(1)		GND	Ground

Pin	Side B Connector		Side A Connector	
#	Name	Description	Name	Description
		Differential pair		
21	GND	Ground	HSIp(1)	Receiver Lane 1, Differential pair
22	GND	Ground	HSIn(1)	
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,	GND	Ground

Pin	Side B Connector		Side A Connector	
#	Name	Description	Name	Description
46	HSOn(7)	Differential pair	GND	Ground
47	GND	Ground	HSIp(7)	Receiver Lane 7, Differential pair
48	PRSNT#2	Hot plug detect	HSIn(7)	
49	GND	Ground	GND	Ground
50	HSOp(8)	Transmitter Lane 8, Differential pair	RSVD	Reserved
51	HSOn(8)		GND	Ground
52	GND	Ground	HSIp(8)	Receiver Lane 8, Differential pair
53	GND	Ground	HSIn(8)	
54	HSOp(9)	Transmitter Lane 9, Differential pair	GND	Ground
55	HSOn(9)		GND	Ground
56	GND	Ground	HSIp(9)	Receiver Lane 9, Differential pair
57	GND	Ground	HSIn(9)	
58	HSOp(10)	Transmitter Lane 10, Differential pair	GND	Ground
59	HSOn(10)		GND	Ground
60	GND	Ground	HSIp(10)	Receiver Lane 10, Differential pair
61	GND	Ground	HSIn(10)	
62	HSOp(11)	Transmitter Lane 11, Differential pair	GND	Ground
63	HSOn(11)		GND	Ground
64	GND	Ground	HSIp(11)	Receiver Lane 11, Differential pair
65	GND	Ground	HSIn(11)	
66	HSOp(12)	Transmitter Lane 12, Differential pair	GND	Ground
67	HSOn(12)		GND	Ground
68	GND	Ground	HSIp(12)	Receiver Lane 12, Differential pair
69	GND	Ground	HSIn(12)	
70	HSOp(13)	Transmitter Lane 13, Differential pair	GND	Ground
71	HSOn(13)		GND	Ground

Pin	Side B Connector		Side A Connector	
#	Name	Description	Name	Description
72	GND	Ground	HSIp(13)	Receiver Lane 13, Differential pair
73	GND	Ground	HSIn(13)	
74	HSOp(14)	Transmitter Lane 14, Differential pair	GND	Ground
75	HSOn(14)		GND	Ground
76	GND	Ground	HSIp(14)	Receiver Lane 14, Differential pair
77	GND	Ground	HSIn(14)	
78	HSOp(15)	Transmitter Lane 15, Differential pair	GND	Ground
79	HSOn(15)		GND	Ground
80	GND	Ground	HSIp(15)	Receiver Lane 15, Differential pair
81	PRSNT#2	Hot plug present detect	HSIn(15)	
82	RSVD#2	Hot Plug Detect	GND	Ground

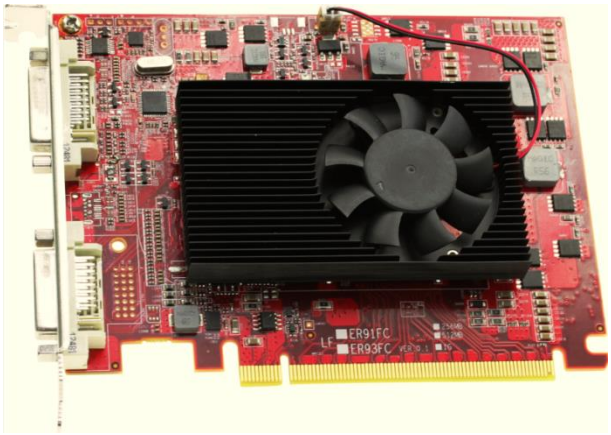
4. Power Consumption

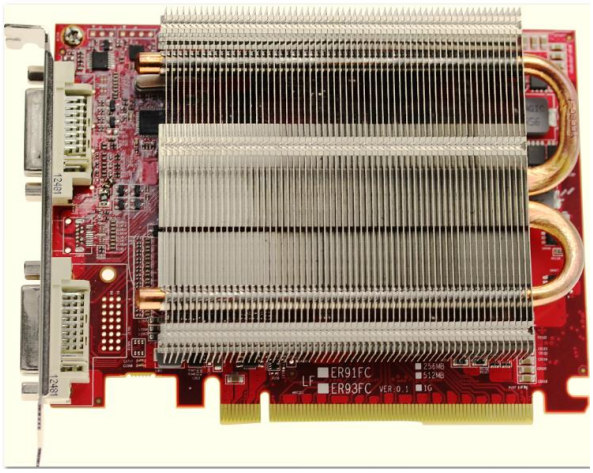
Application	Total ASIC Power + DRAM Power (W)
Static Windows - 65c	**7.73**

Application	Total ASIC Power + DRAM Power (W)
3D Mark Vantage FT6	**28.02**

5. Output configuration and Board Dimension

5.1. Output Configuration

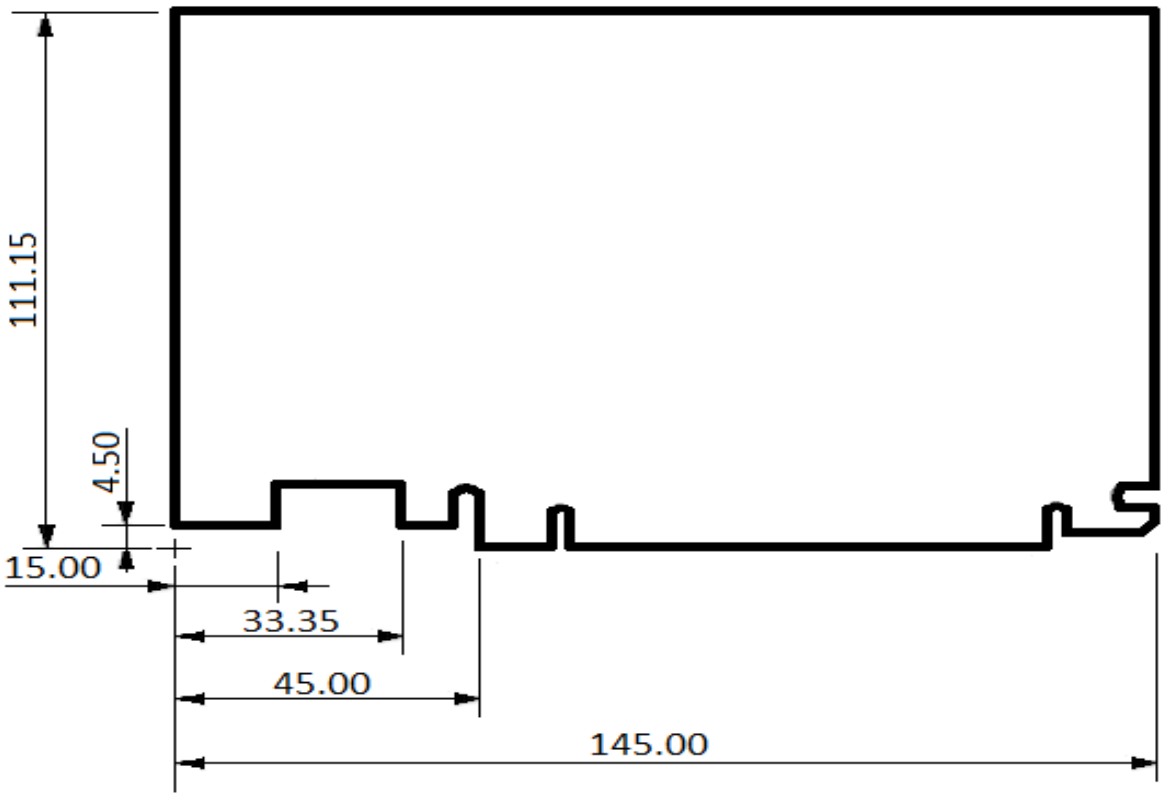




Single link DVI-I **Dual link DVI-I**

5.2 Board Dimension

(Unit : mm)

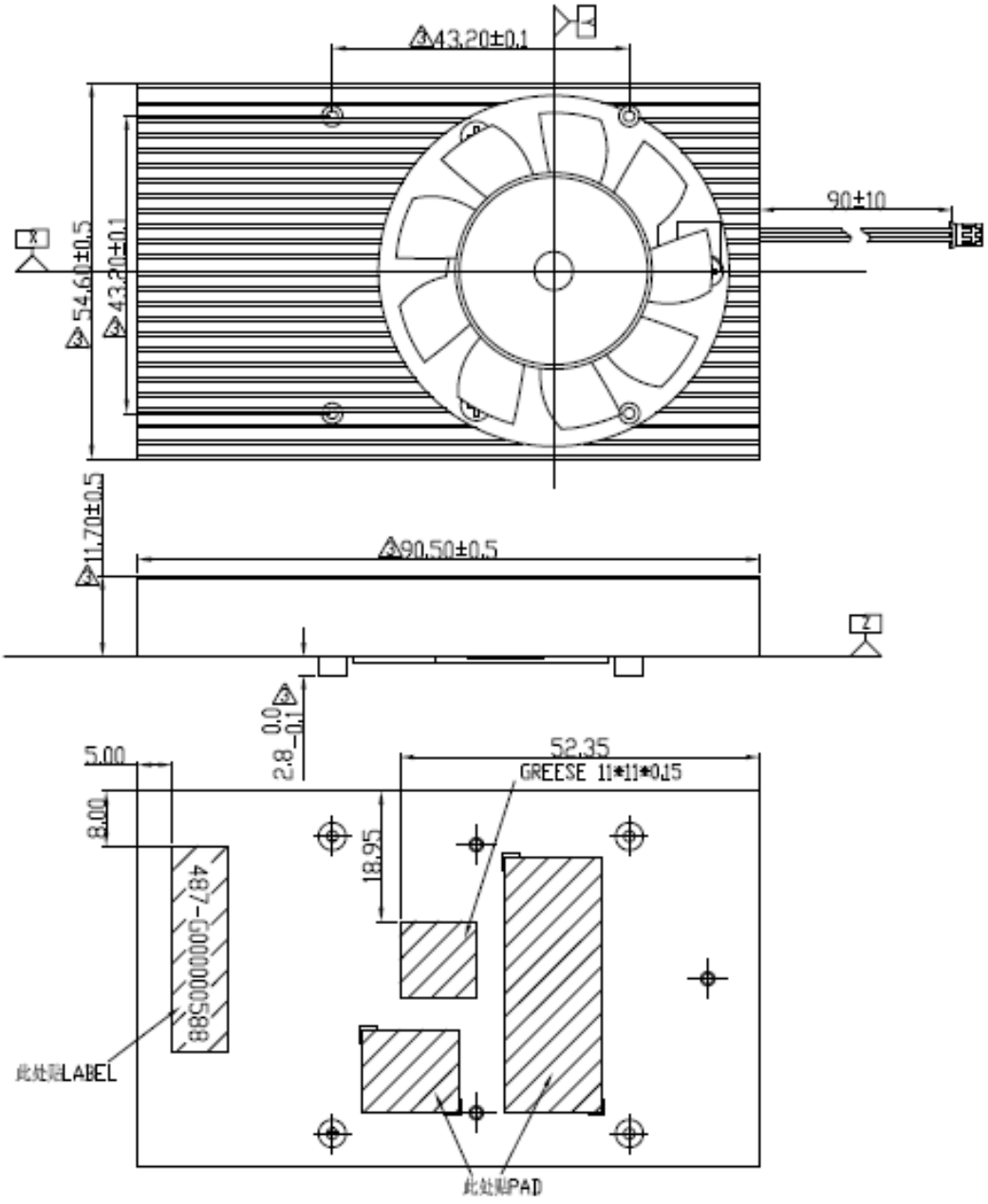


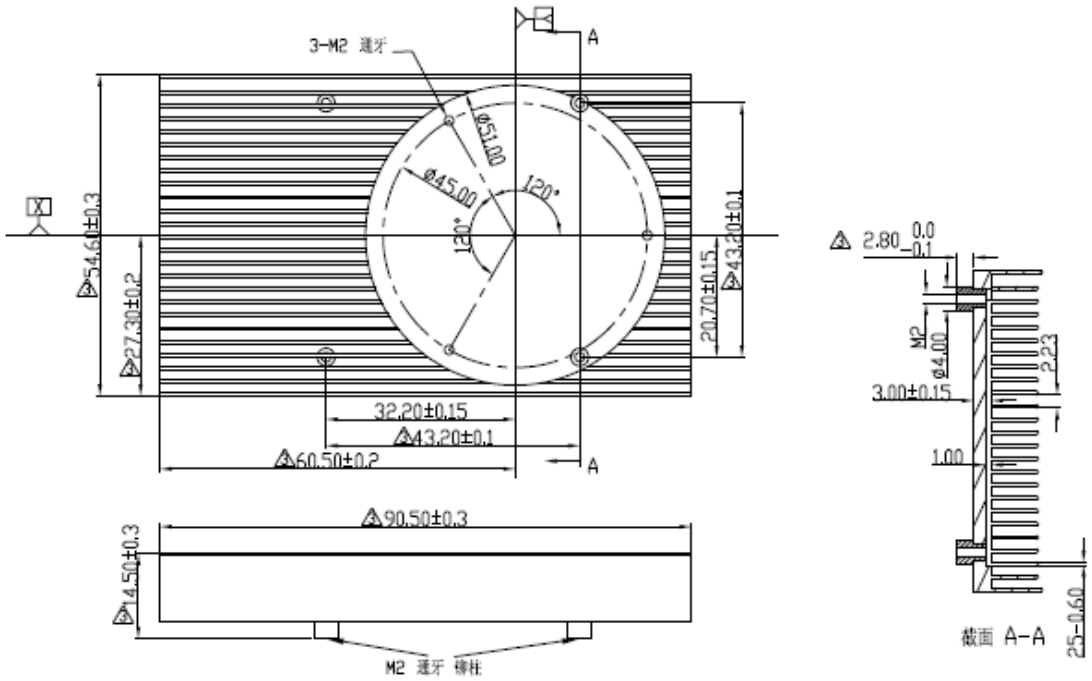
Tolerances : +/_ 0.13 mm

6. Thermal Mechanism

6.1. Fan-sink Thermal Module

(Unit : mm)

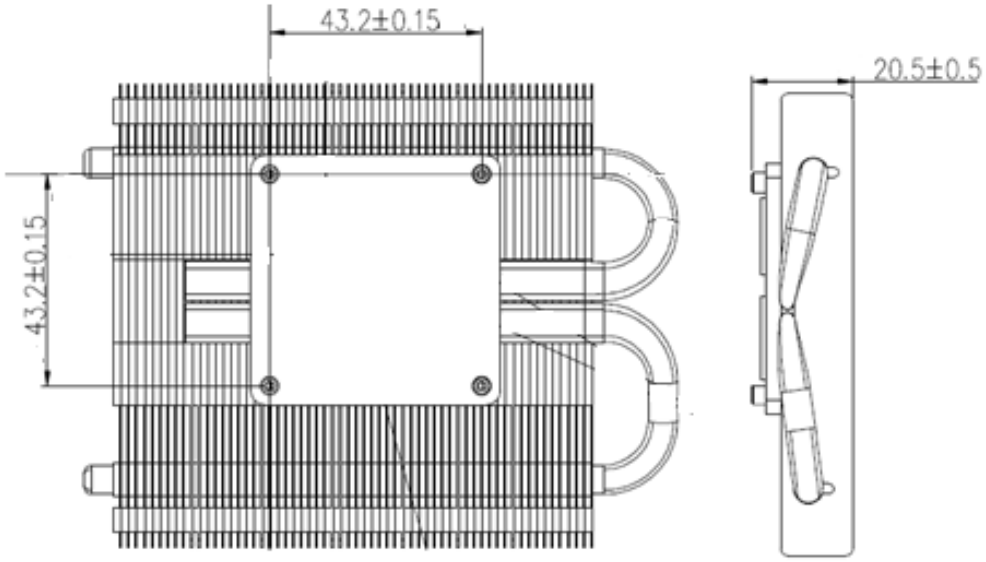


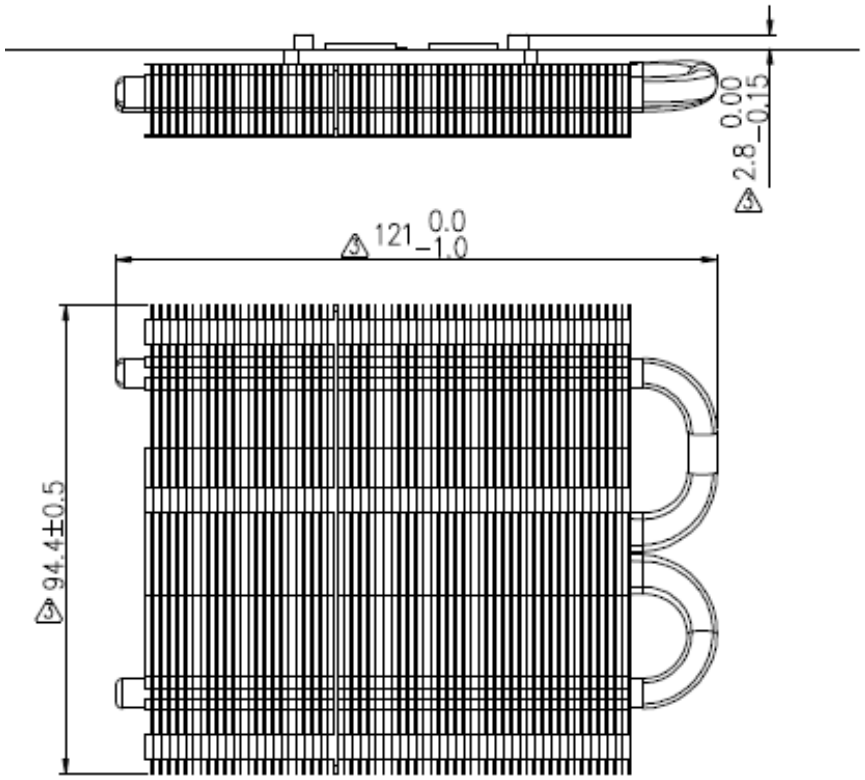


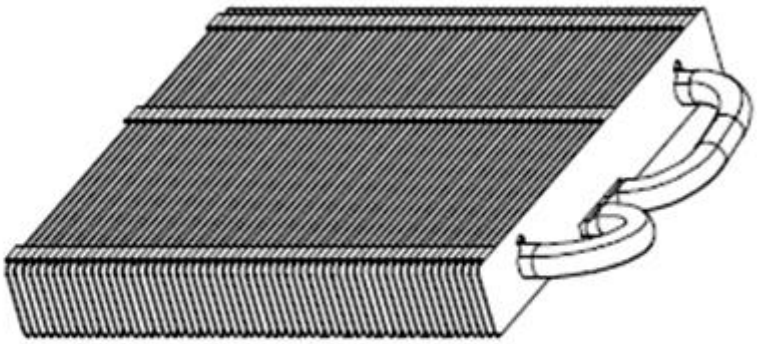
Tolerances	
0-10	+/- 0.1
10-50	+/- 0.15
50-100	+/- 0.2
100~	+/- 0.25

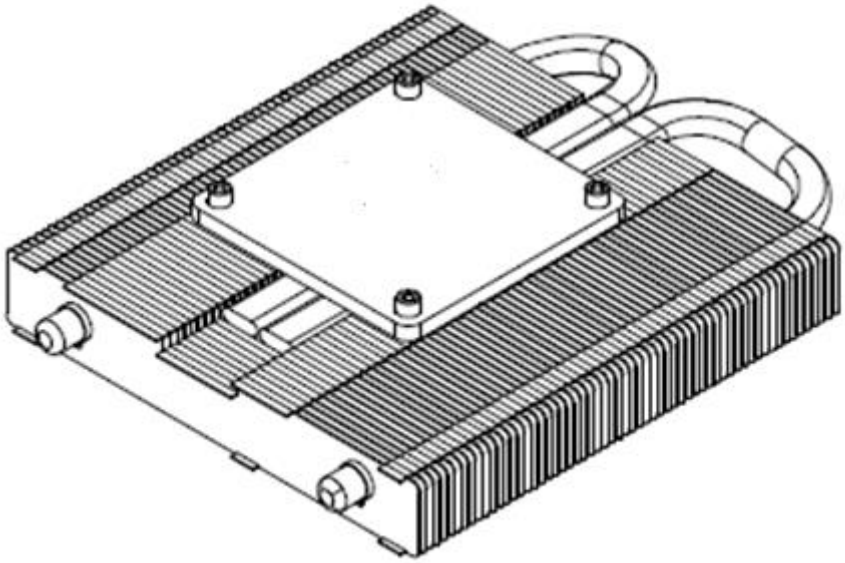
6.2. Passive Thermal Module

(Unit : mm)




2.8 0.00 -0.15
121 0.0 -1.0
94.4±0.5





Tolerances	
0-10	+/- 0.1
10-50	+/- 0.15
50-100	+/- 0.2
100~	+/- 0.25

7. Order Information

Model	GPU	Form Factor	DVI	Bracket	Thermal Solution
AEGX-A5T7-90FMT1	E6760	ATX (145 x 110 mm)	2	Full Height	Fansink
AEGX-A5T7-90FST1	E6760	ATX (145 x 110 mm)	2	Full Height	Fanless

8. Change Log Update History

Rev.	Data	History
0.1	2015/09/16	1st Draft