

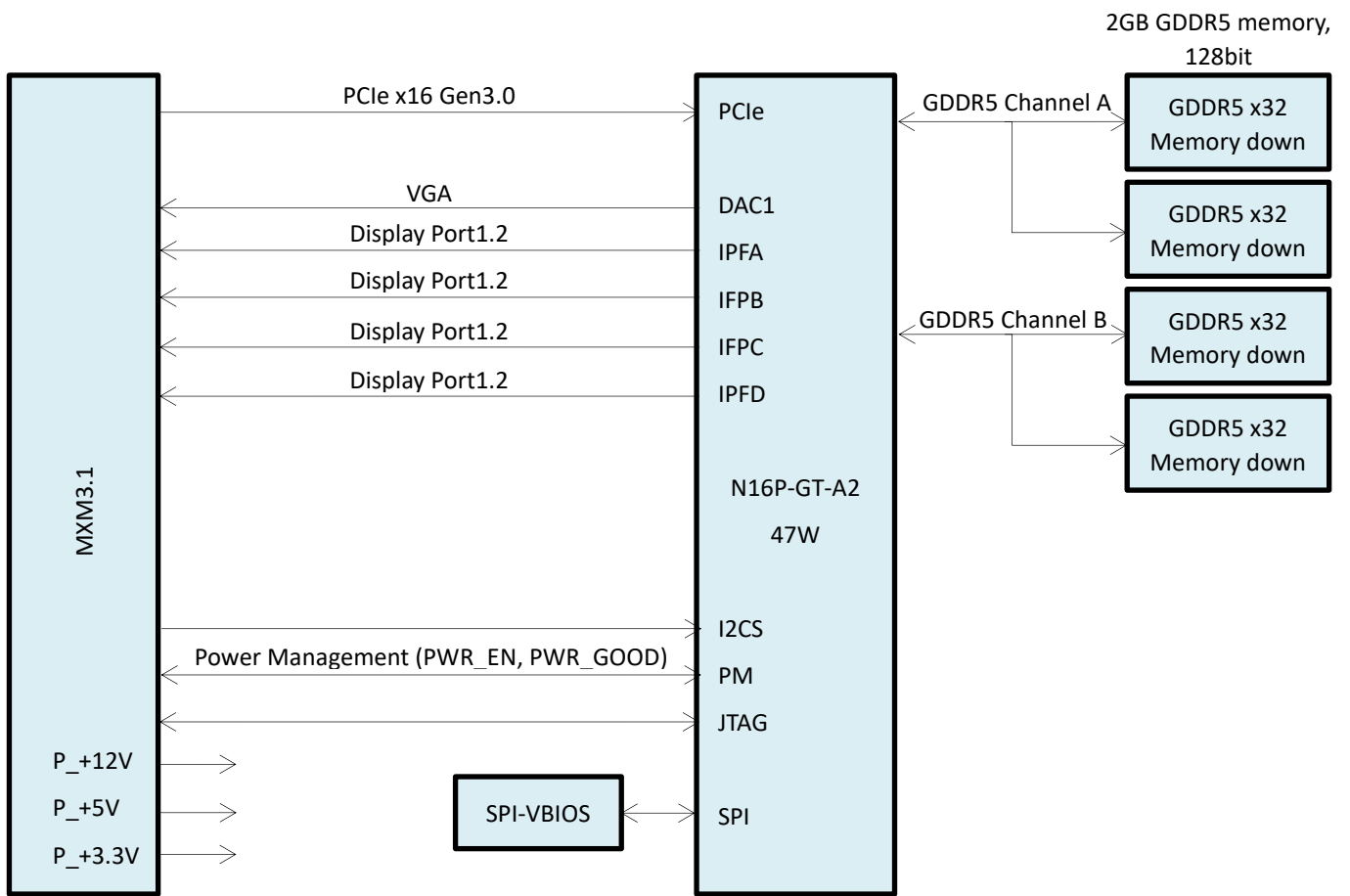
## 1. Specifications:

<b>Model Name</b>	MM950A5-2G
<b>GPU Architecture</b>	NVIDIA Maxwell™
<b>Graphics Processing Unit</b>	GeForce GTX950m
<b>NVIDIA CUDA Cores</b>	640
<b>Graphics Clock (MHz)</b>	914
<b>Single-Precision Floating Point (GFLOPS)</b>	1277
<b>Memory Size</b>	2GB GDDR5
<b>Memory Clock (MHz)</b>	2500
<b>Memory Interface Width</b>	128bit
<b>Memory Bandwidth (GB/sec)</b>	80
<b>DirectX / OpenGL</b>	12 / 4.5
<b>NVIDIA CUDA enabled</b>	Support
<b>NVIDIA Technology</b>	Optimus / PhysX / GPU Boot2.0 / Direct Compute
<b>Operation System</b>	Windows XP / 7 / 8.1 / 10 32/64bit, Linux 32/64bit
<b>Max Display Per Board</b>	4
<b>Display Features</b>	DP A: Display Port1.2++ DP B: Display Port1.2++ DP C: Display Port1.2++ DP D: Display Port1.2++ VGA
<b>Others</b>	H.264, VC1, MPEG2 1080p video decoder
<b>Max Board Power Consumption(W)</b>	47W (Option 30W)
<b>Form Factor</b>	MXM Graphics Module Version 3.0 Type A
<b>Dimensions</b>	70x82mm
<b>Operating Temperature</b>	0°C~45°C (Option -20°C)
<b>Storage Temperature</b>	-20°C~75°C
<b>VIN Range</b>	DC 12~19V, 3.3V & 5V; +/-5%

## 2. Performance:

3Dmark13	3797	Cuda	
3Dmark11	P5279 X1671	single kernels	985.578 / 34.8618
3Dmark Vantage	13107	N=10 w/o streams	1051.51 / 39.5078
Heaven	1554	N=10 with streams	1293.04 / 42.0842
鲁大师	49219	N=10 batched	1264.26 / 42.5193

### 3.Block Diagram:



#### 4.MXM Board Outlines:

Figure 4.1 shows the board outlines (top side view) for Type A MXM modules. An additional system keep-out of 0.5mm [0.020] per side is allowed on the PCB to accommodate whatever means of production panelization is required. This additional clearance is above and beyond the dimensional limits presented here. The location of these features is not specified or controlled.

Figure 4.1: Board Outlines

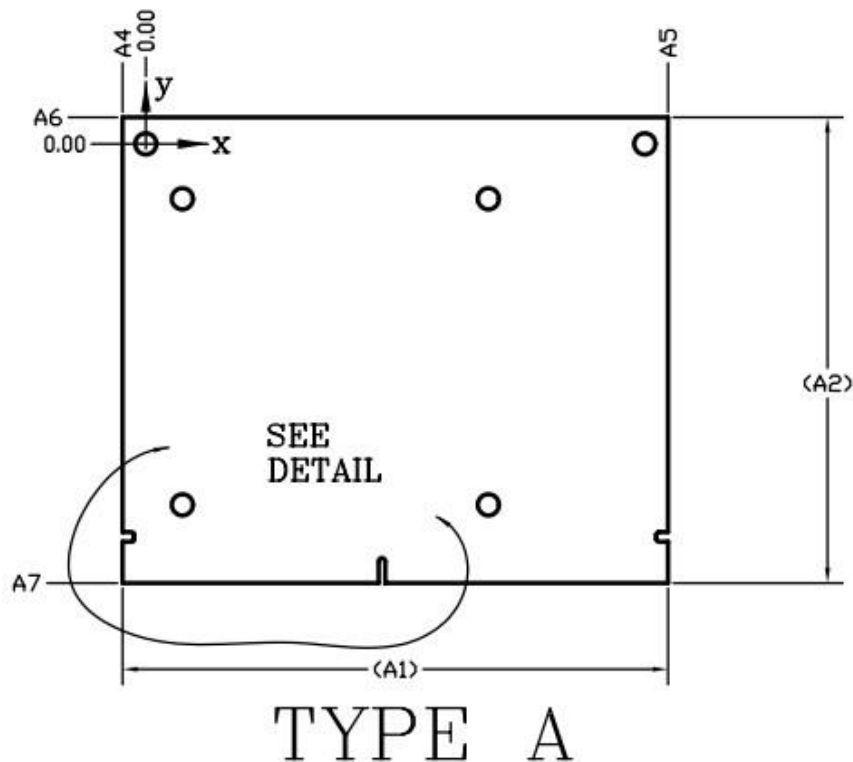


Table 4.1: Board Outline Dimensions

Symbol	[mm]			[in]		
	min	nom	max	min	nom	max
A1		82.00			3.228	
A2		70.00			2.756	
A3		105.00			4.134	
A4	3.37	3.50	3.63	0.133	0.138	0.143
A5	78.37	78.50	78.63	3.085	3.091	3.096
A6	3.87	4.00	4.13	0.152	0.157	0.163
A7	65.87	66.00	66.13	2.593	2.598	2.604
A8	38.87	39.00	39.13	1.530	1.535	1.541

Figure 4.2: Board Slots Detail

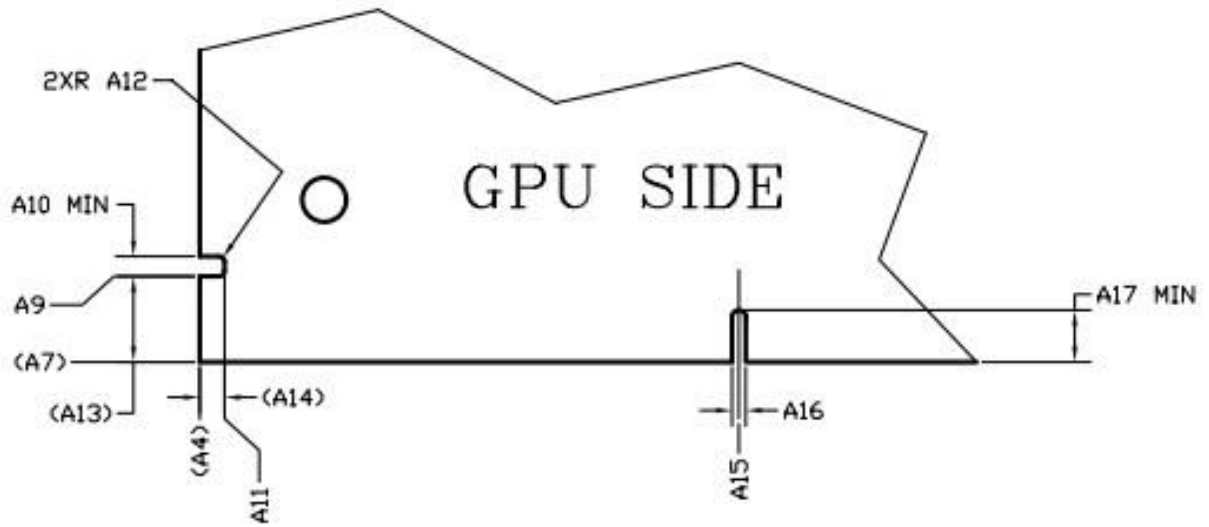


Table 4.2: Board Slots Dimensions

Symbol	[mm]			[in]		
	min	nom	max	min	nom	max
A4		3.50			0.138	
A7		66.00			2.598	
A9	59.67	59.80	59.93	2.349	2.354	2.359
A10	1.45			0.057		
A11	1.57	1.70	1.83	0.062	0.067	0.072
A12	0.32	0.50	0.58	0.013	0.020	0.023
A13		6.20			0.244	
A14		1.80			0.071	
A15	35.37	35.50	35.63	1.393	1.398	1.403
A16	0.95	1.00	1.05	0.037	0.039	0.041
A17	3.75			0.148		

## 5.MXM PCB Mounting Holes:

All MXM version 3.1 modules have 6 holes. Two are used to secure the board to the system and the other four to fasten the thermal solution to the module.

Figure 5.1: Mounting Holes

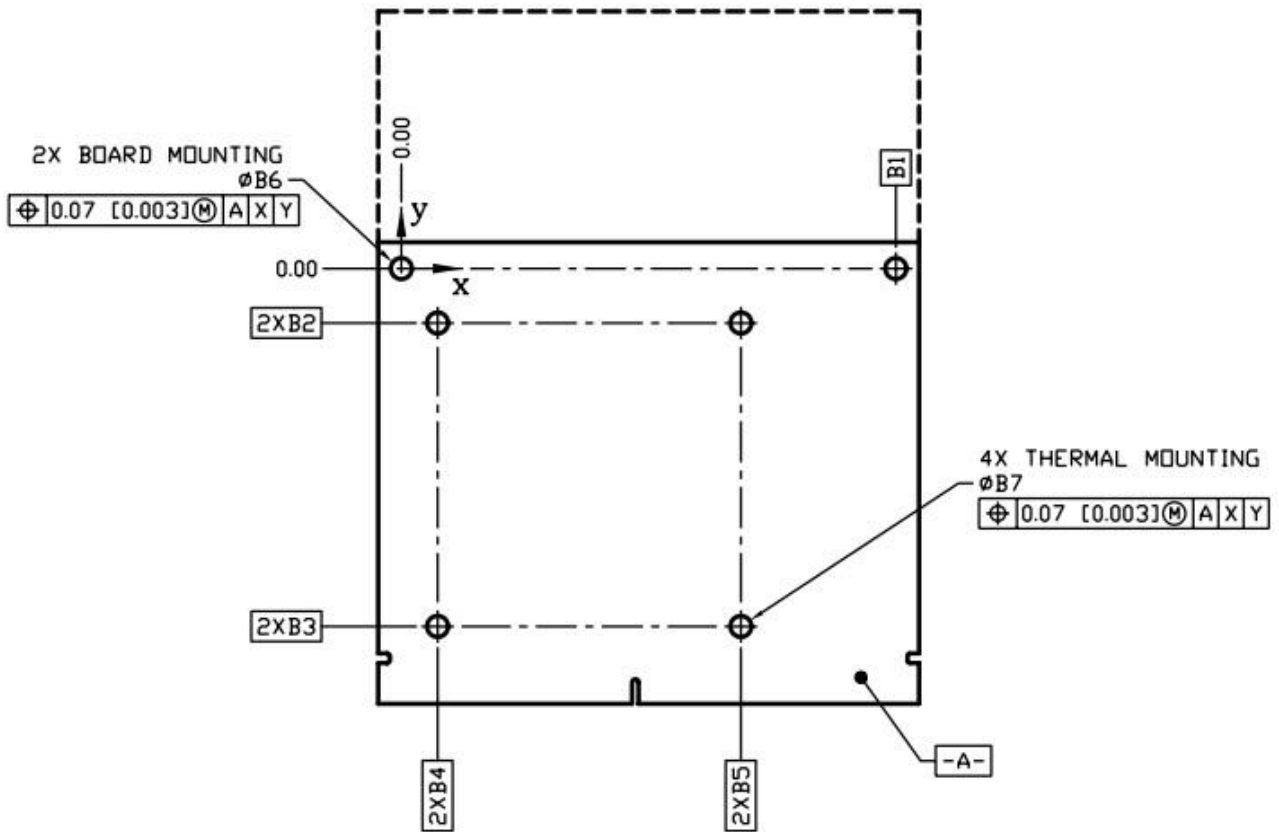


Table 5.1: Mounting Holes Dimensions

Symbol	[mm]			[in]		
	min	nom	max	min	nom	max
B1		75.00			2.953	
B2		8.25			0.325	
B3		54.25			2.136	
B4		5.50			0.217	
B5		51.50			2.028	
B6	3.07	3.20	3.33	0.121	0.126	0.131
B7	3.07	3.20	3.33	0.121	0.126	0.131

## 6.Connector Pinout:

Table 6.1, Table 6.2 and Table 6.3 list the connector pinout.

Table 6.1: Connector Pinout

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
E1	PWR_SRC	E2	PWR_SRC	57	PEX_RX14	58	GND
E3	GND	E4	GND	59	GND	60	PEX_TX13#
1	5V	2	PRSNT_R#	61	PEX_RX13#	62	PEX_TX13
3	5V	4	WAKE#	63	PEX_RX13	64	GND
5	5V	6	PWR_GOOD	65	GND	66	PEX_TX12#
7	5V	8	PWR_EN	67	PEX_RX12#	68	PEX_TX12
9	5V	10	27MHZ_REF	69	PEX_RX12	70	GND
11	GND	12	GND	71	GND	72	PEX_TX11#
13	GND	14	LVDS_U_HPD	73	PEX_RX11#	74	PEX_TX11
15	GND	16	JTAG_TESTEN	75	PEX_RX11	76	GND
17	GND	18	PWR_LEVEL	77	GND	78	PEX_TX10#
19	PEX_STD_SW#	20	TH_OVERT#	79	PEX_RX10#	80	PEX_TX10
21	VGA_DISABLE#	22	TH_ALERT#	81	PEX_RX10	82	GND
23	N/A	24	TH_PWM	83	GND	84	PEX_TX9#
25	N/A	26	GPIO0	85	PEX_RX9#	86	PEX_TX9
27	N/A	28	GPIO1	87	PEX_RX9	88	GND
29	HDMI_CEC	30	GPIO2	89	GND	90	PEX_TX8#
31	LVDS_L_HPD	32	SMB_DAT	91	PEX_RX8#	92	PEX_TX8
33	LVDS_DDC_DAT	34	SMB_CLK	93	PEX_RX8	94	GND
35	LVDS_DDC_CLK	36	GND	95	GND	96	PEX_TX7#
37	GND	38	OEM0	97	PEX_RX7#	98	PEX_TX7
39	OEM1	40	OEM2	99	PEX_RX7	100	GND
41	OEM3	42	OEM4	101	GND	102	PEX_TX6#
43	OEM5	44	OEM6	103	PEX_RX6#	104	PEX_TX6
45	OEM7	46	GND	105	PEX_RX6	106	GND
47	GND	48	PEX_TX15#	107	GND	108	PEX_TX5#
49	PEX_RX15#	50	PEX_TX15	109	PEX_RX5#	110	PEX_TX5
51	PEX_RX15	52	GND	111	PEX_RX5	112	GND
53	GND	54	PENX_TX14#	113	GND	114	PEX_TX4#
55	PEX_RX14#	56	PEX_TX14	115	PEX_RX4#	116	PEX_TX4

Table 6.2: Connector Pinout(continued)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
117	PEX_RX4	118	GND	183	LVDS_UTX2	184	LVDS_LTX3
119	GND	120	PEX_TX3#	185	GND	186	GND
121	PEX_RX3#	122	PEX_TX3	187	LVDS_UTX1#	188	LVDS_LTX2#
123	PEX_RX3	124	GND	189	LVDS_UTX1	190	LVDS_LTX2
125	GND	126	KEY	191	GND	192	GND
127	KEY	128	KEY	193	LVDS_UTX0#	194	LVDS_LTX1#
129	KEY	130	KEY	195	LVDS_UTX0	196	LVDS_LTX1
131	KEY	132	KEY	197	GND	198	GND
133	GND	134	GND	199	DP_C_L0#	200	LVDS_LTX0#
135	PEX_RX2#	136	PEX_TX2#	201	DP_C_L0	202	LVDS_LT0
137	PEX_RX2	138	PEX_TX2	203	GND	204	GND
139	GND	140	GND	205	DP_C_L1#	206	DP_D_L0#
141	PEX_RX1#	142	PEX_TX1#	207	DP_C_L1	208	DP_D_L0
143	PEX_RX1	144	PEX_TX1	209	GND	210	GND
145	GND	146	GND	211	DP_C_L2#	212	DP_D_L1#
147	PEX_RX0#	148	PEX_TX0#	213	DP_C_L2	214	DP_D_L1
149	REX_RX0	150	PEX_TX0	215	GND	216	GND
151	GND	152	GND	217	DP_C_L3#	218	DP_D_L2#
153	PEX_REFCLK#	154	PEX_CLK_REQ#	219	DP_C_L3	220	DP_D_L2
155	PEX_REFCLK	156	PEX_RST#	221	GND	222	GND
157	GND	158	VGA_DDC_DAT	223	DP_C_AUX#	224	DP_D_L3#
159	JTAG_TDO	160	VGA_DDC_CLK	225	DP_C_AUX	226	DP_D_L3
161	JTAG_TDI	162	VGA_VSYNC	227	RSVD	228	GND
163	JTAG_TCLK	164	VGA_HSYNC	229	RSVD	230	DP_D_AUX#
165	JTAG_TMS	166	GND	231	RSVD	232	DP_D_AUX
167	JTAG_TRST#	168	VGA_RED	233	RSVD	234	DP_C_HPD
169	LVDS_UCLK#	170	VGA_GREEN	235	RSVD	236	DP_D_HPD
171	LVDS_UCLK	172	VGA_BLUE	237	RSVD	238	RSVD
173	GND	174	GND	239	RSVD	240	3V3
175	LVDS_UTX3#	176	LVDS_LCLK#	241	RSVD	242	3V3
177	LVDS_UTX3	178	LVDS_LCLK	243	RSVD	244	GND
179	GND	180	GND	245	RSVD	246	DP_B_L0#
181	LVDS_UTX2#	182	LVDS_LTX3#	247	RSVD	248	DP_B_L0

Table 6.3: Connector Pinout(continued)

Pin	Signal Name	Pin	Signal Name	Pin	Signal Name	Pin	Signal Name
249	RSVD	250	GND	267	DP_A_L2	268	GND
251	GND	252	DP_B_L1#	269	GND	270	DP_B_AUX#
253	DP_A_L0#	254	DP_B_L1	271	DP_A_L3#	272	DP_B_AUX
255	DP_A_L0	256	GND	273	DP_A_L3	274	DP_B_HPD
257	GND	258	DP_B_L2#	275	GND	276	DP_A_HPD
259	DP_A_L1#	260	DP_B_L2	277	DP_A_AUX#	278	3V3
261	DP_A_L1	262	GND	279	DP_A_AUX	280	3V3
263	GND	264	DP_B_L3#	281	PRSNT_L#	-	
265	DP_A_L2#	266	DP_B_L3				

**7.MXM Connector:**

Figure 7.1 MXM Connector (Card Top)

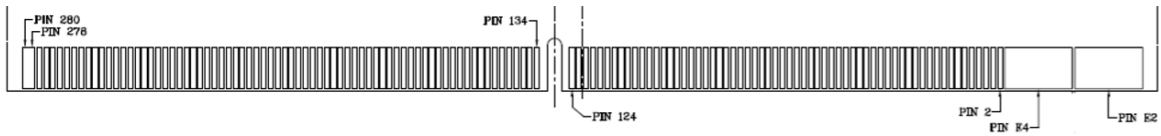
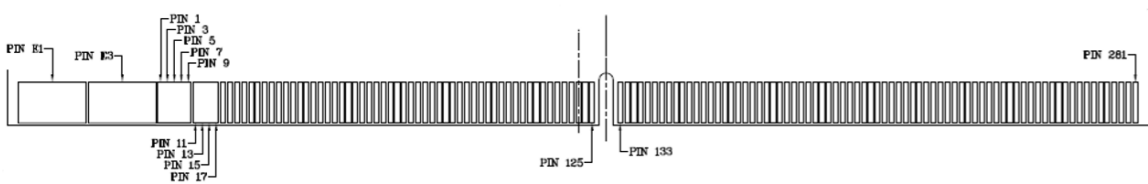


Figure 7.2 MXM Connector (Card Bottom)





## 8. Power Group:

Table 8.1 shows the MXM module power requirements. The voltage tolerances in the table are specified as measured on module edge finger. The system must be able to supply the full specified current on rails (except PWR\_SRC) at all times. The current capability of the PWR\_SRC rail must be defined by the system in the MXM system information structure.

Table 8.1: MXM Power Rails

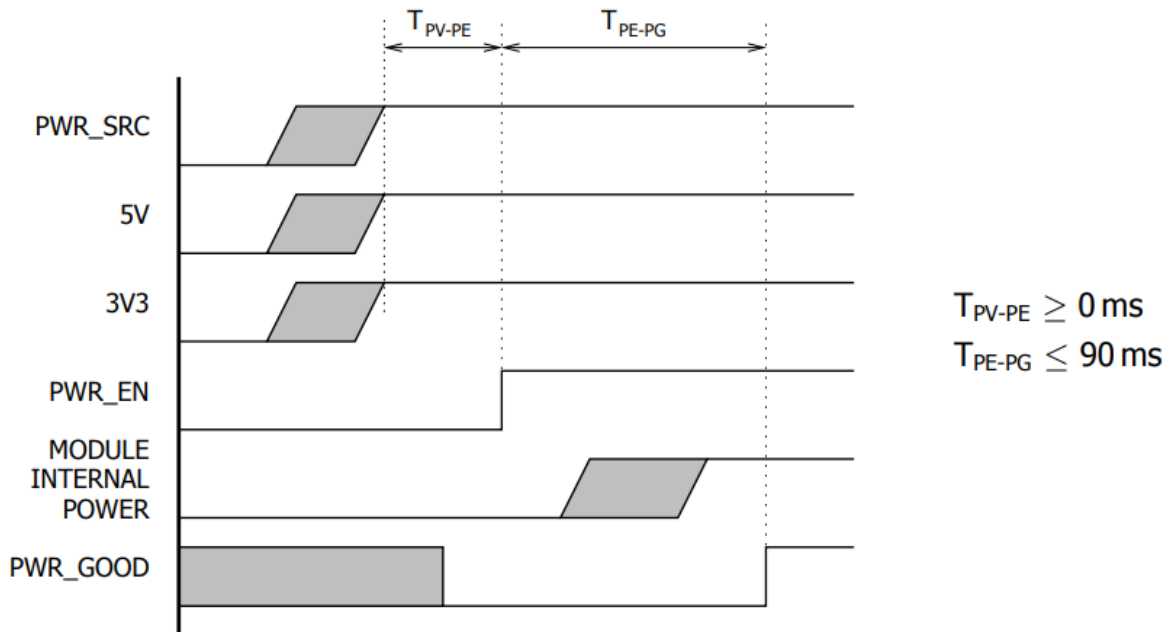
Signal Name	I/O	Type	Impedance	Voltage	Current
PWR_SRC	I	Power	N/A	7-20V	up to 10A
5V	I	Power	N/A	5.0V $\pm$ 6%	2.5A
3.3V	I	Power	N/A	3.3V $\pm$ 6%	2.0A

**Note:** PWR\_SRC voltage range is assumed to be DC or RMS. However under any circumstances the maximum peak voltage shall not exceed 22V and minimum voltage shall not fall below 6.5V.

## 9. Power Sequencing:

There is no power sequencing requirement for the input voltages to the MXM module. However the PWR\_EN signal may be asserted only after all power rails are within specified tolerance. The state of PWR\_GOOD is undefined until all rails are fully ramped. Refer to Figure 9.1 for details

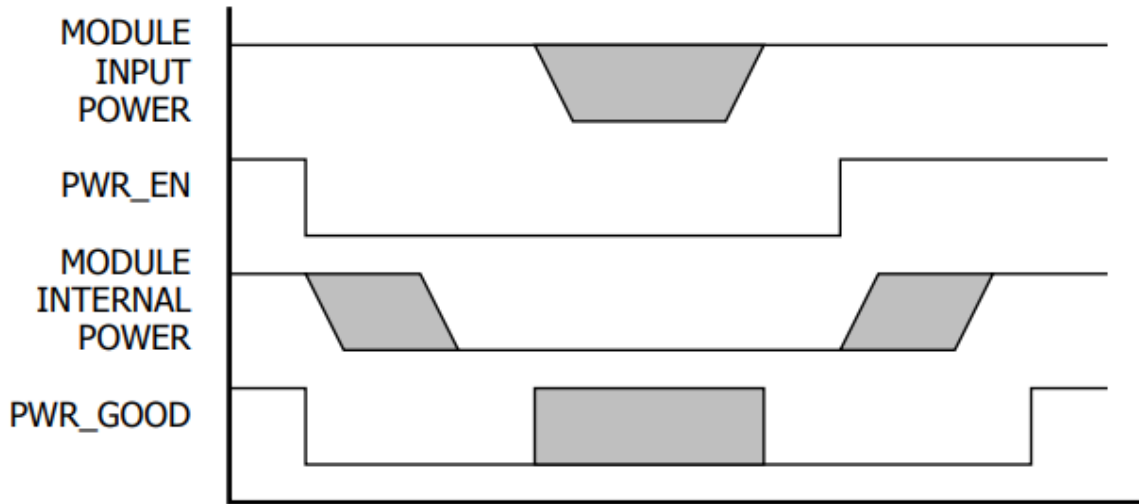
Figure 9.1 Power Sequencing



## 10. Module Power Down and Power Up:

The MXM module may be powered down using the PWR\_EN signal. The system designer may choose to shut down or keep the input power while the module is powered down. Refer to Figure 10.1 for details.

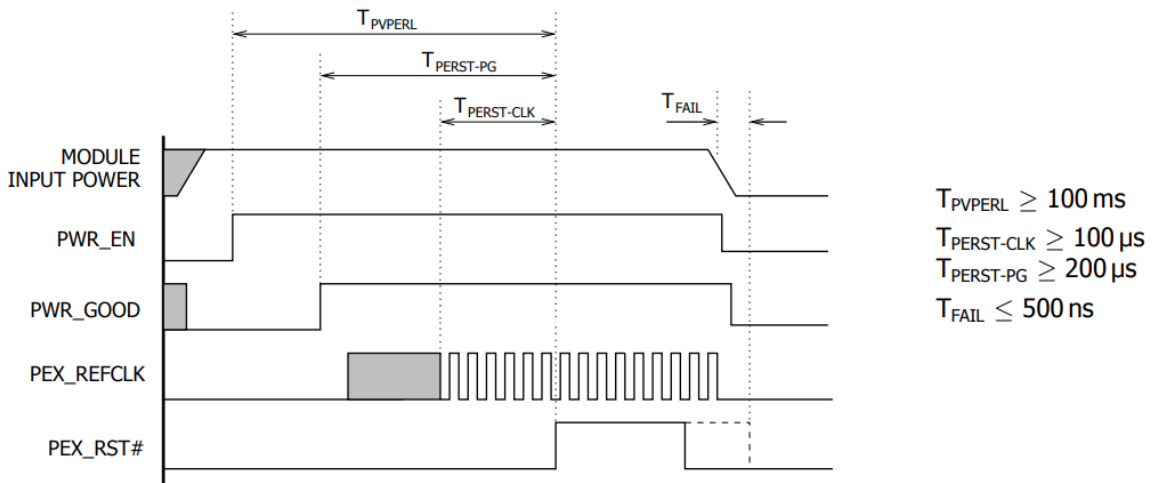
Figure 10.1 Module Power Down



## 11. Reset Requirements:

System reset may be deasserted only after the assertion of the PWR\_GOOD signal. Figure 11.1 shows the reset requirements relative to the PWR\_EN and PWR\_GOOD signals. This sequence must be followed on initial power on, system reset and resume from suspend/hibernate.

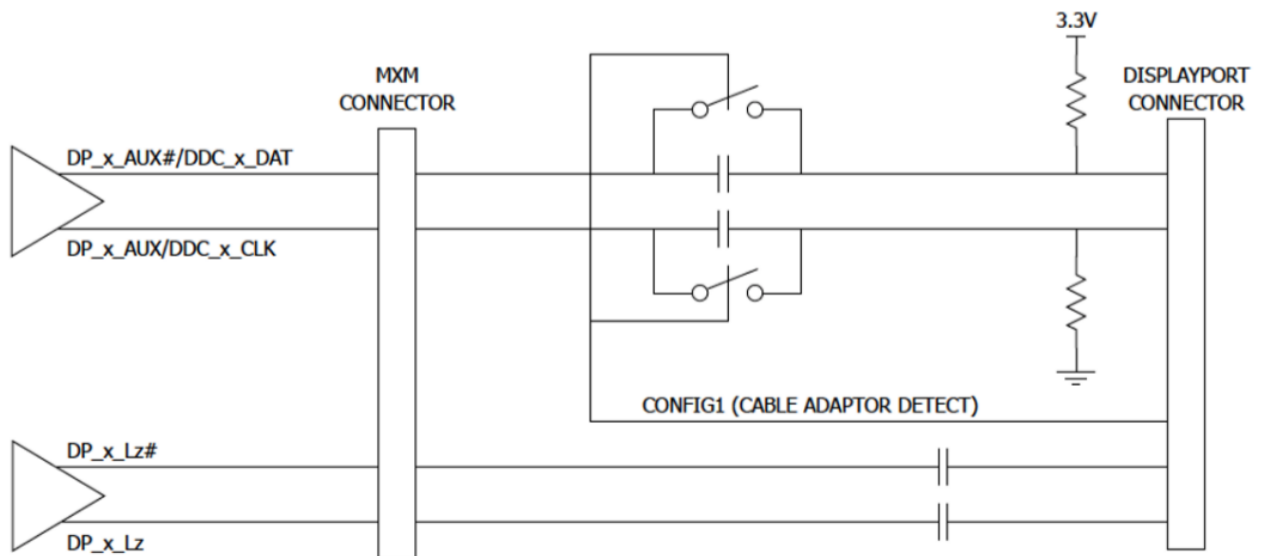
Figure 11.1 Reset Sequencing



## 12.DisplayPort Interface:

DC blocking capacitors of DisplayPort must be placed on the system board. In addition to the MXM implementation of Dual-mode DisplayPort requires the circuit in Figure 12.1 on the AUX lines for proper dongle detection. The HPD signal conditioning must also be placed on the system board.

Figure 12.1 Dual-mode DisplayPort Implementation



### 13.DVI/HDMI on DP Interface:

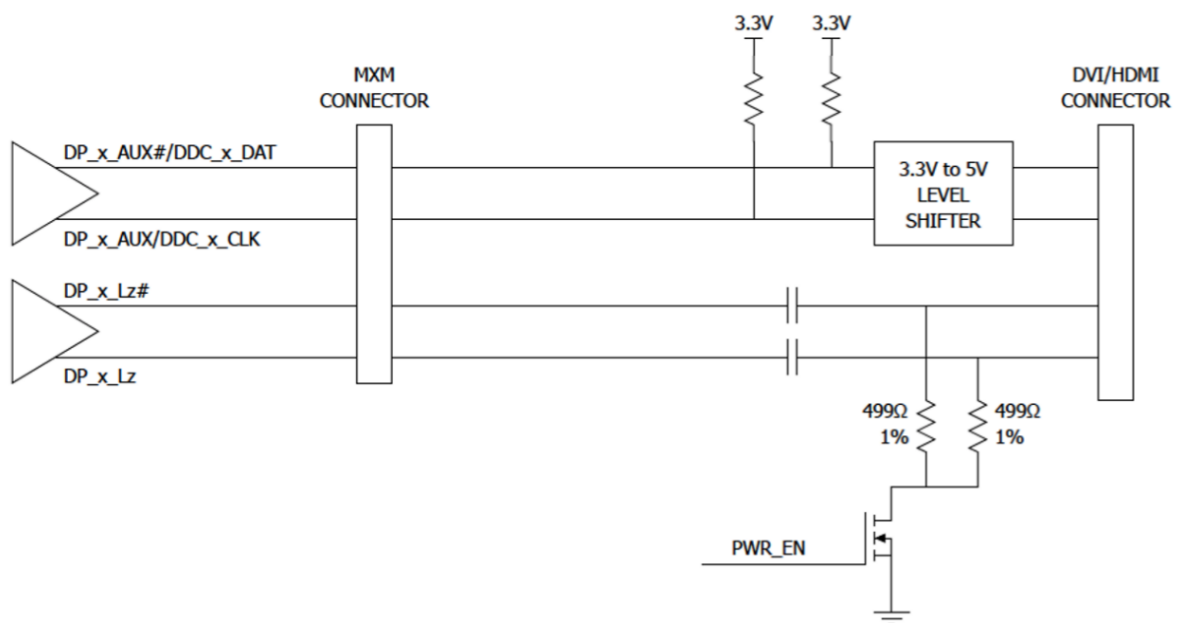
Native DVI or HDMI connector support can be implemented using a DisplayPort interface. Additional circuitry is required on the system and the proper signal mapping must be observed. As Figure 13.1 shows, 499Ω 1% pull-down resistors to ground on the DP lane signals must be placed on the connector side of AC coupling capacitors gated by a FET to limit the leakage. Additionally level shifting circuits must also be implemented on DDC Data and Clock.

Table 13.1 shows the mapping to connect the signals from the MXM connector to the HDMI/DVI connector.

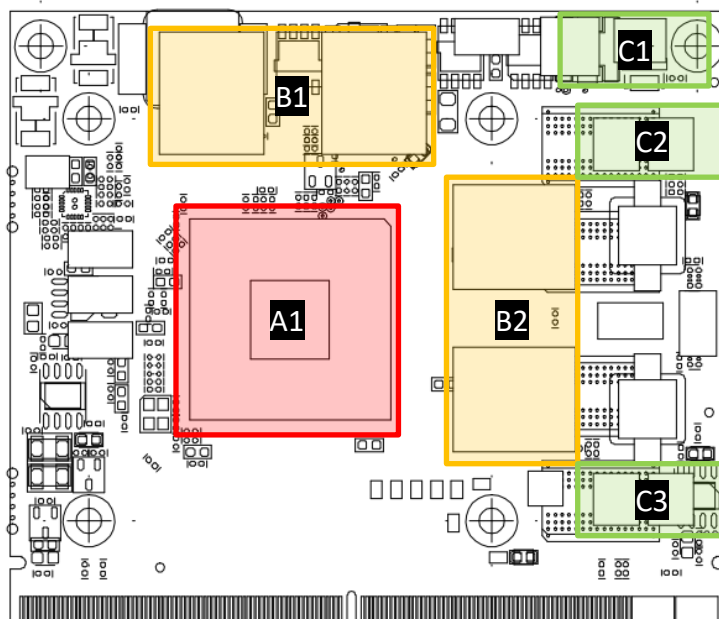
Table 13.1: DisplayPort Multiplexed Signal Definition

Pin Name	DVI/HDMI
DP_xL0	TX_x_D2
DP_xL0#	TX_x_D2#
DP_x_L1	TX_x_D1
DP_x_L1#	TX_x_D1#
DP_x_L2	TX_x_D0
DP_x_L2#	TX_x_D0#
DP_x_L3	TX_x_CLK
DP_x_L3#	TX_x_CLK#
DP_x_AUX	DDC_x_CLK
DP_x_AUX#	DDC_x_DAT

Figure 13.1 DVI/HDMI Implementation Using DP Interface



## 14.Thermal:



Components	Area	TDP	Height
GPU	A1	47W	1.7mm
Memory	B1	1.5W*2	0.9mm
Memory	B2	1.5W*4	0.9mm
Mosfet	C1、C2、C3	2W*3	0.75mm

Chipset		Specification
Dimensions		13.2*13.2mm
Stress	Maximum	75 PSI
	Normal	30-40 PSI

### Cooling Suggestion:

- 1、显卡建议先固定在散热器上，散热器外径为 4mm，M2 的螺柱。
- 2、散热器的重量要用箱体来支撑固定。
- 3、显存和 MOS 要加导热垫。

Components	满载限温（环温 45℃）
GPU	95℃
Memory	85℃
Mosfet	105℃

\*显存和 MOS 由“探针”监测；GPU 由“Furmark (1920\*1080)”监测。

## 15.Driver:

Windows 10 64bit:

<https://cn.download.nvidia.com/Windows/456.71/456.71-notebook-win10-64bit-international-dch-whql.exe>

Windows 8.1 64bit:

<https://cn.download.nvidia.com/Windows/456.71/456.71-notebook-win8-win7-64bit-international-whql.exe>

Windows 8.1 32bit:

<http://cn.download.nvidia.com/Windows/391.35/391.35-notebook-win8-win7-32bit-international-whql.exe>

Windows 8 64bit:

<https://cn.download.nvidia.com/Windows/456.71/456.71-notebook-win8-win7-64bit-international-whql.exe>

Windows 8 32bit:

<http://cn.download.nvidia.com/Windows/391.35/391.35-notebook-win8-win7-32bit-international-whql.exe>

Windows 7 64bit:

<https://cn.download.nvidia.com/Windows/456.71/456.71-notebook-win8-win7-64bit-international-whql.exe>

Windows 7 32bit:

<http://cn.download.nvidia.com/Windows/391.35/391.35-notebook-win8-win7-32bit-international-whql.exe>

Linux 32bit:

<https://cn.download.nvidia.com/XFree86/Linux-x86/390.138/NVIDIA-Linux-x86-390.138.run>

Linux 32bit ARM:

<https://cn.download.nvidia.com/XFree86/Linux-x86-ARM/390.138/NVIDIA-Linux-armv7l-gnueabi-hf-390.138.run>

Linux Aarch64:

<https://cn.download.nvidia.com/XFree86/aarch64/455.28/NVIDIA-Linux-aarch64-455.28.run>

Linux 64bit:

[https://cn.download.nvidia.com/XFree86/Linux-x86\\_64/455.28/NVIDIA-Linux-x86\\_64-455.28.run](https://cn.download.nvidia.com/XFree86/Linux-x86_64/455.28/NVIDIA-Linux-x86_64-455.28.run)

Solaris x86/x64:

[https://cn.download.nvidia.com/XFree86/Linux-x86\\_64/455.28/NVIDIA-Linux-x86\\_64-455.28.run](https://cn.download.nvidia.com/XFree86/Linux-x86_64/455.28/NVIDIA-Linux-x86_64-455.28.run)

FreeBSD x86:

<https://cn.download.nvidia.com/XFree86/FreeBSD-x86/390.138/NVIDIA-FreeBSD-x86-390.138.tar.g>

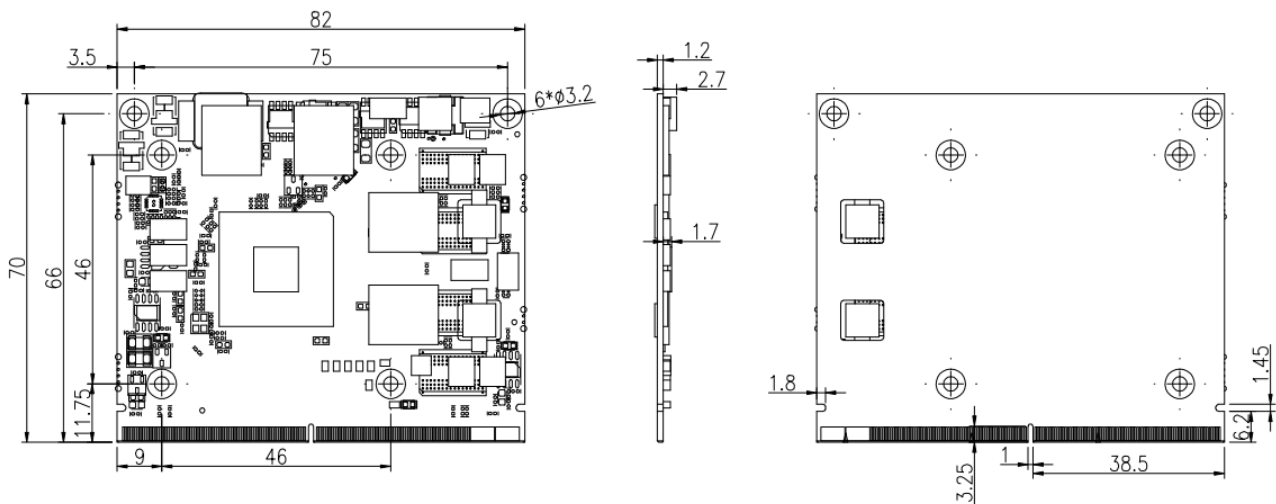
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FreeBSD x64:

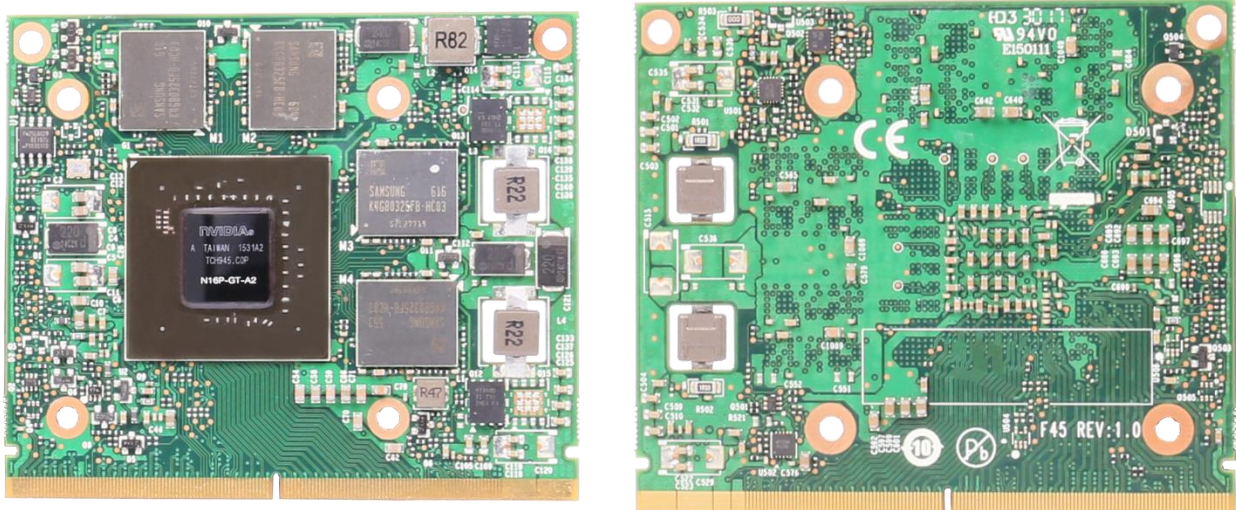
[https://cn.download.nvidia.com/XFree86/FreeBSD-x86\\_64/455.28/NVIDIA-FreeBSD-x86\\_64-455.28.tar.gz](https://cn.download.nvidia.com/XFree86/FreeBSD-x86_64/455.28/NVIDIA-FreeBSD-x86_64-455.28.tar.gz)

The latest drive or the drive cannot be downloaded here, please log on the official website to download: <https://www.nvidia.cn/geforce/drivers/>

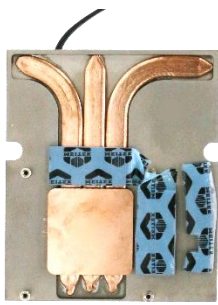
### 16. Dimensions:



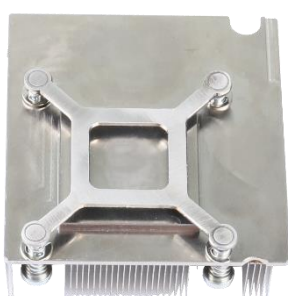
### 17.Photo:



## 18.Cooling Option:

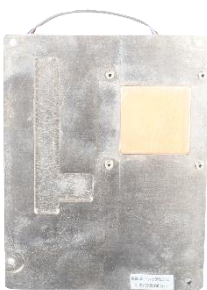


<b>1.ZRT.48-6209-00-A00</b>	
Dimension	96*80.2*25mm
Rated Speed	4500
Out of Frame Lead Wires	150mm
Connector	4Pin 2.54

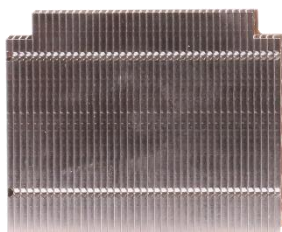


<b>1.ZRT.48-6197-00-A00</b>	
Dimension	75.5*71*22.5mm
Rated Speed	N/A
Out of Frame Lead Wires	N/A
Connector	N/A

\*需搭配风扇辅助散热。



<b>1.ZRT.48-6140-00-A00</b>	
Dimension	133*103*26.5mm
Rated Speed	3800
Out of Frame Lead Wires	100mm
Connector	4Pin 2.54



<b>1.ZRT.48-6111-00-A00</b>		
<b>1.ZRT.48-6153-00-A00</b>		
Dimension	Heat Sink	82*65.5*21mm
	Fan	75*75*15mm
Rated Speed	3600	
Out of Frame Lead Wires	80mm	
Connector	4Pin 2.54	



## 19.Question:

故障	排除
不开机	1、更改 pgood 信号。(部份主板) 2、确认 PCIE 复位信号。 3、主板 BIOS 更改为 UEFI BIOS。
不显示	<b>Windows 10</b> : (需 1809 版本之后) 在主板 BIOS 下, 将 CSM 中 CSM Support 设置由 Enabled 更改为 Disabled。 <b>Windows7</b> : 在主板 BIOS 下, 将 CSM 中 CSM Support 设置由 Enabled 更改为 Disabled , 并将 Video 设置由 legacy 更改为 UEFI。
不显示 (HDMI 输出)	1、4K 60Hz 显示屏, 确认 HDMI 线材是否为 HDMI2.0。 2、将显示器分辨率降为 2K 60Hz。
设备管理器出现惊叹号	1、原系统显卡驱动删除干净。(请使用 Display Driver Uninstaller 删除, <a href="https://www.wagnardsoft.com/">https://www.wagnardsoft.com/</a> ) 2、Windows 10 版本 16299 不支持, 需更新至最新版 (17763、17134 均可)。 3、Windows 7 打补丁 KB2685811。 4、确认核显驱动是否已安装。(不需独立显卡显示)
显卡不工作	量下 3V3/5V/2V/Reset 信号是否有电/短路? 若有电, 显卡就会工作。
显卡无法辨视	检查 PCIE LANE Numbering Reversal 设置。
安装 Linux 系统, 图形界面异常/无限循环登陆界面, 无法登录系统	装驱动的时, 加上 --no-opengl-files。 (禁用 opengl, 若系统上有用到这套组件, 将无法使用)
控制面板无法正常开启	仅可在独显显示时, 才能正常开启; 若使用集显显示, 将无法正常开启。
集显及独显在 Win7 下, 无法同时开启 3D 启动	打系统补丁 (KB2685811), 解压后, 把所有文件 COPY 到 C 盘 根目录下运行 BAT 文件。
X86 在中标麒麟系统下, 显卡驱动后集显输出不能进系统	将 xorg.conf 文件内容清空。

## 20.Part Number:

Model	Part Number	Specification
MM950A5-2G	8.ZRT.80-6127-00-LFF	F45 GTX950m 2G 128bit GDDR5 4DP MXM Type A-工包六十入
	8.ZRT.80-6127-08-LFF	F45 GTX950m 2G 128bit GDDR5 Samsung 4DP MXM Type A-ZRT 彩包二十入
	8.ZRT.80-6127-03-LFF	F45 GTX950m 2G 128bit GDDR5 4DP MXM Type A-ZRT 彩包二十入
MM950A5-2G(-20)	8.ZRT.80-6127-01-LFF	F45 GTX950m 2G 128bit GDDR5 4DP MXM Type A -20 度-ZRT 彩包二十入
MM950A5-2G(30W)	8.ZRT.80-6127-07-LFF	F45 GTX950m 2G 128bit GDDR5 4DP MXM Type A 30W-ZRT 彩包二十入
MM950A5-2G(30W-20)	8.ZRT.80-6127-14-LFF	F45 GTX950m 2G 128bit GDDR5 4DP MXM Type A 30W -20 度-ZRT 彩包二十入
MM950A5-2G(Sam/-20)	8.ZRT.80-6127-04-LFF	F45 GTX950m 2G 128bit GDDR5 Samsung 4DP MXM Type A -20 度-ZRT 彩包二十入
	8.ZRT.80-6127-05-LFF	F45 GTX950m 2G 128bit GDDR5 Samsung 4DP MXM Type A -20 度-工包六十入