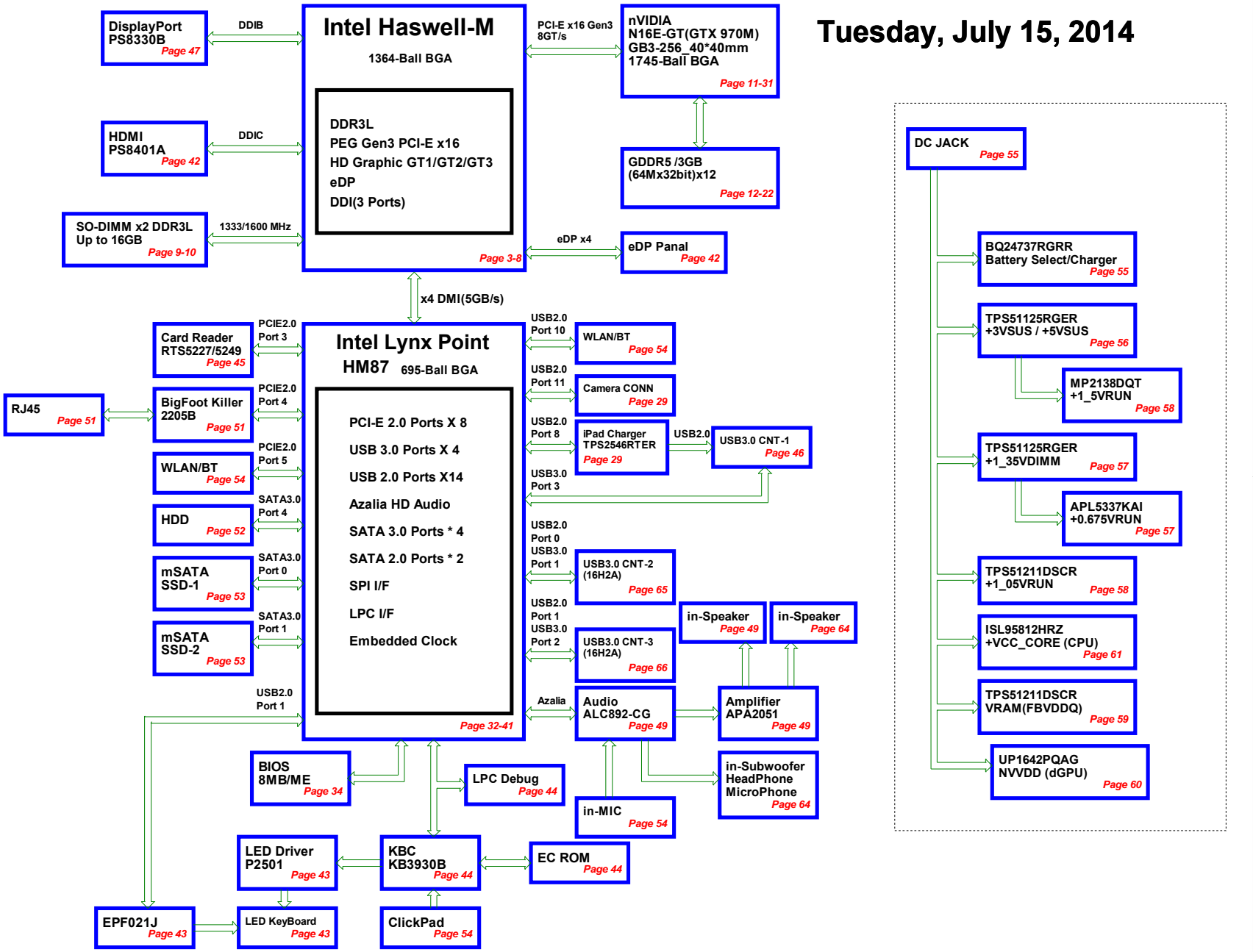
MS-16H5 Ver:1.1

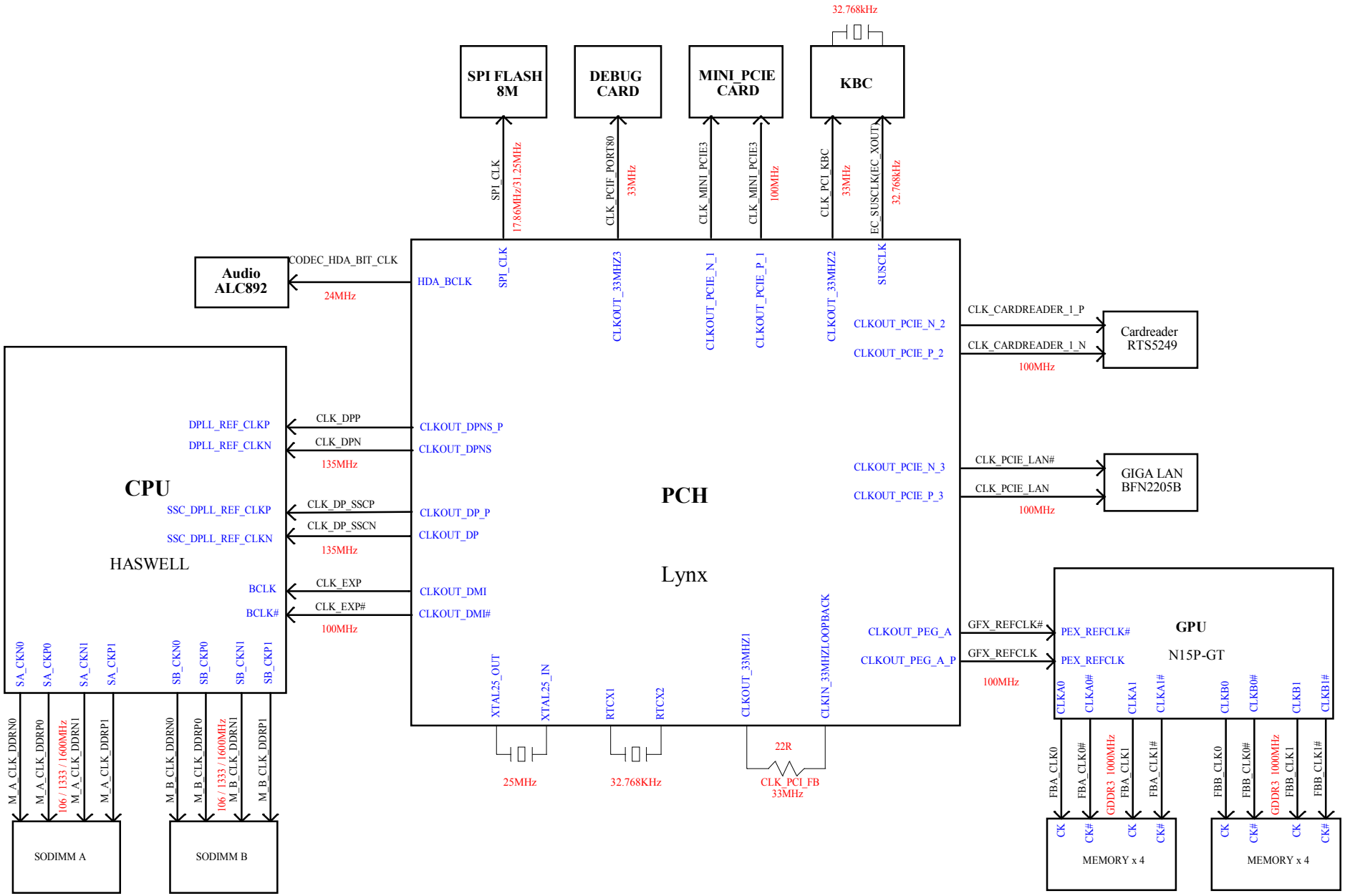
Shark Bay Mobile

Tuesday, July 15, 2014



MICRO-STAR INT'L CO.,LTD.

Title: Block Diagram
Size: Document Number: MS-16H5
Rev: 1.1
Date: Sheet 1 of 72

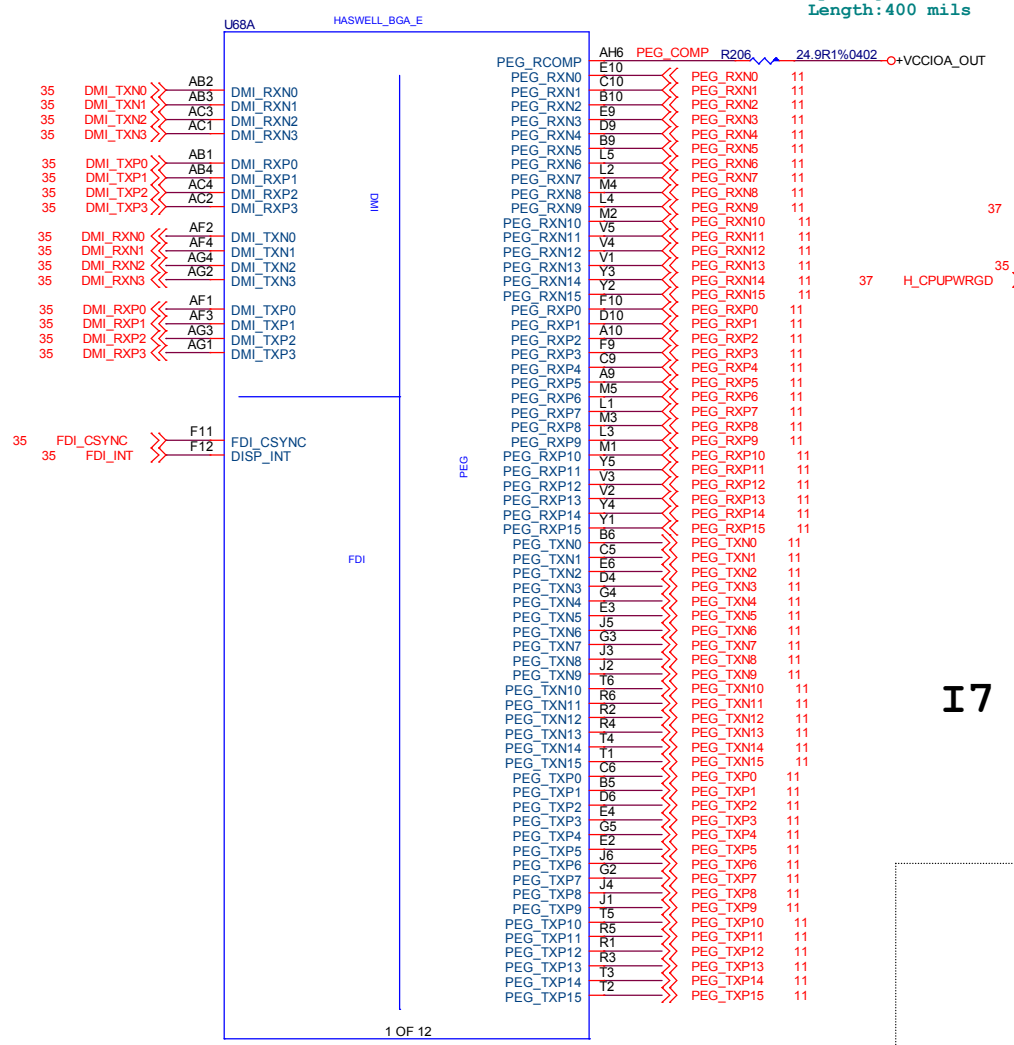


msi MICRO-STAR INT'L CO.,LTD.

Title	CLock Delivery chart	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 2 of 72	

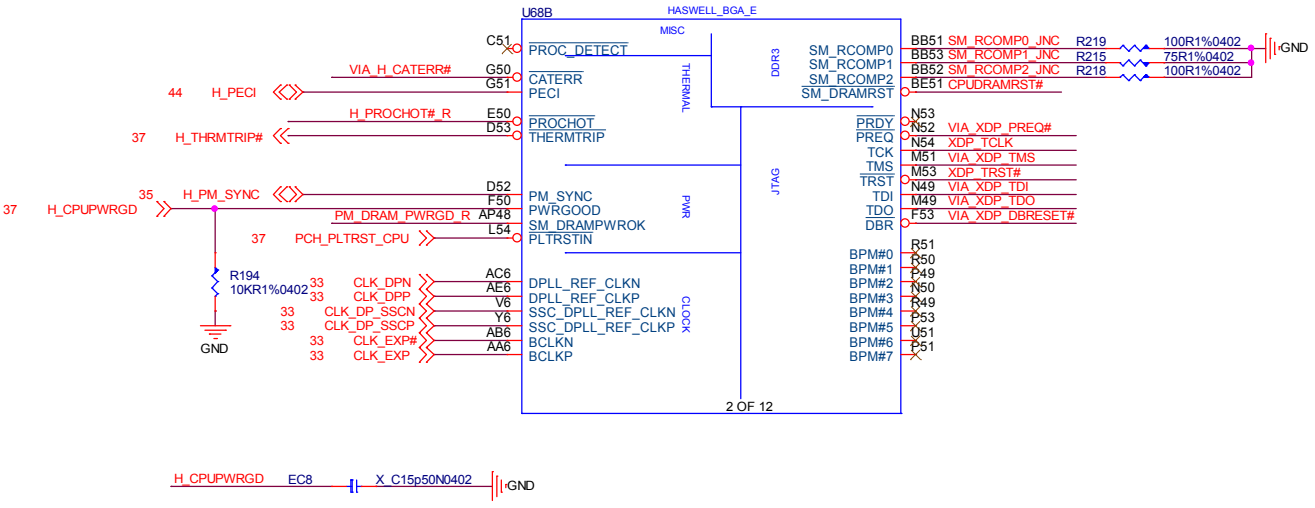
Haswell (DMI,PEG,FDI)

PEG_RCOMP
Width:12 mils
Spacing:15 mils
Length:400 mils



Haswell (CLK,MISC,JTAG)

SM_RCOMP_0/1/2 : 15/20/25/15/20/25
SM_RCOMP_0/1/2 Length max: 500mil

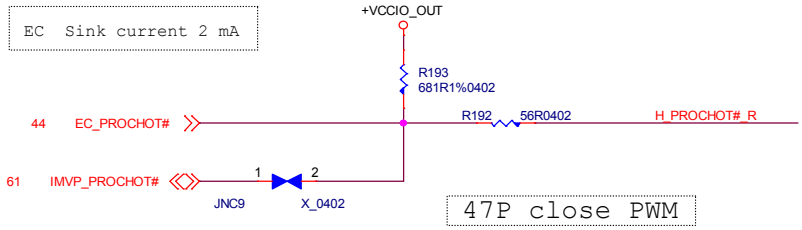


H_CPUPWRGD EC8 X_C15p50N0402 GND

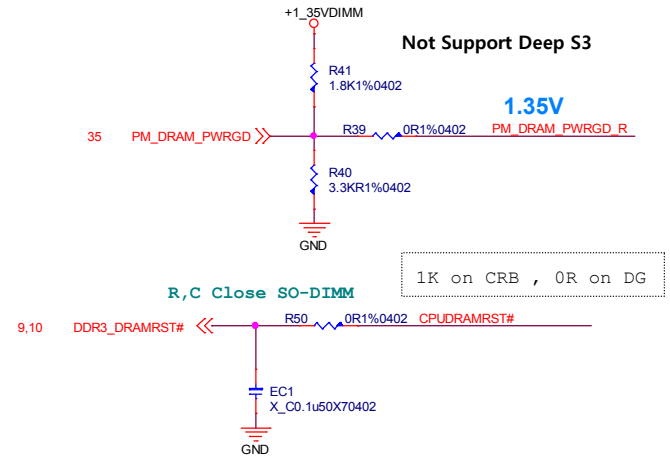
I7 4860

I7_4860
OA3-AF18001

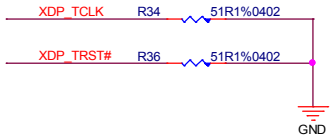
EC Sink current 2 mA



47P close PWM



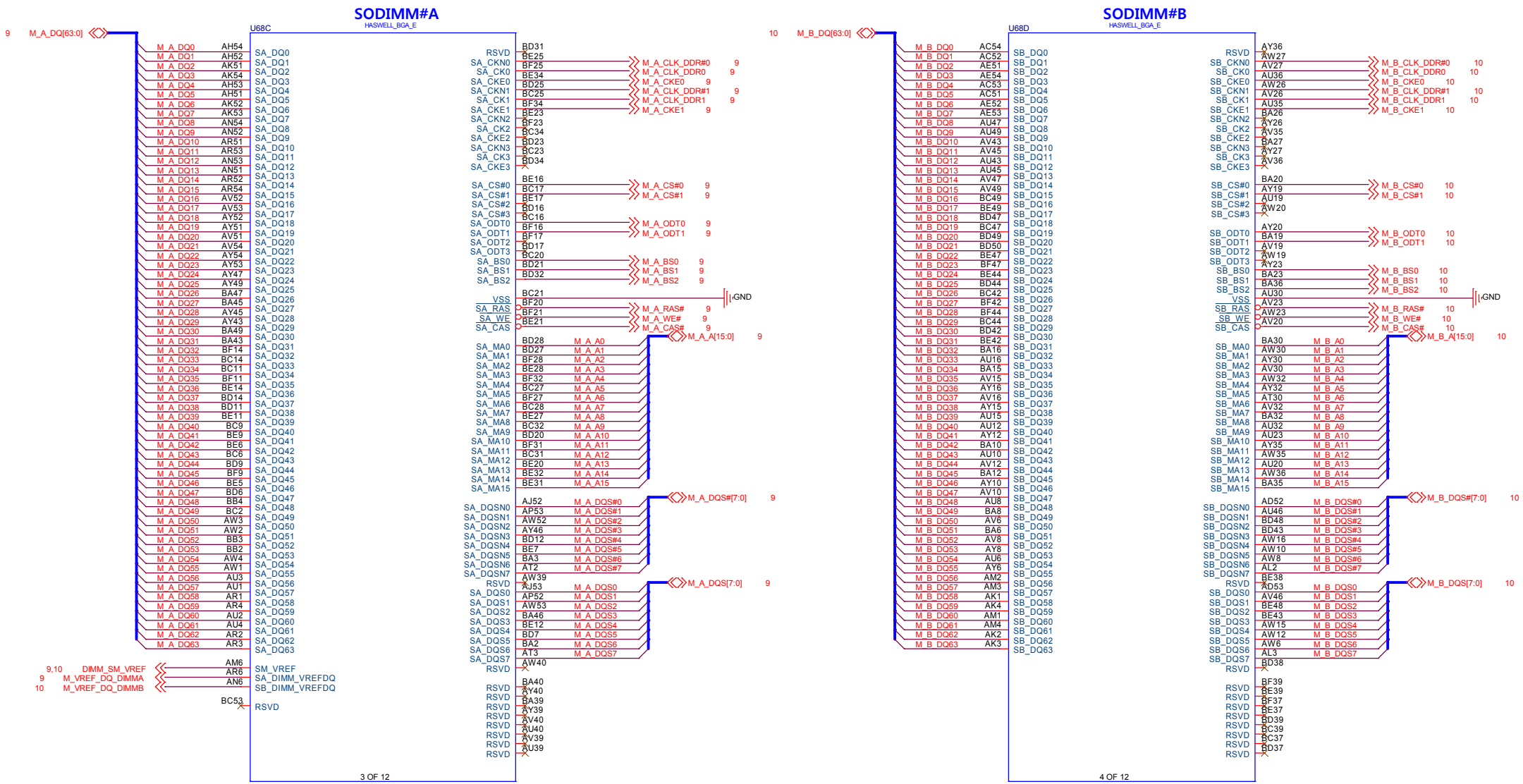
p.11 479493_479493_SharkBay_HSW_ext_rev2.0.pdf
Processor JTAG (TDI, TDO, TMS, TRST#, TCK) signals, PREQ# and PRDY# signals signals have adequate internal bias resistances to support the removal of the external pull up and pull down on the board when debug is no longer needed.



MICRO-STAR INT'L CO.,LTD.

Title	CPU-1 (Host Bus)	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 3 of 72	

Haswell (DDR3L)



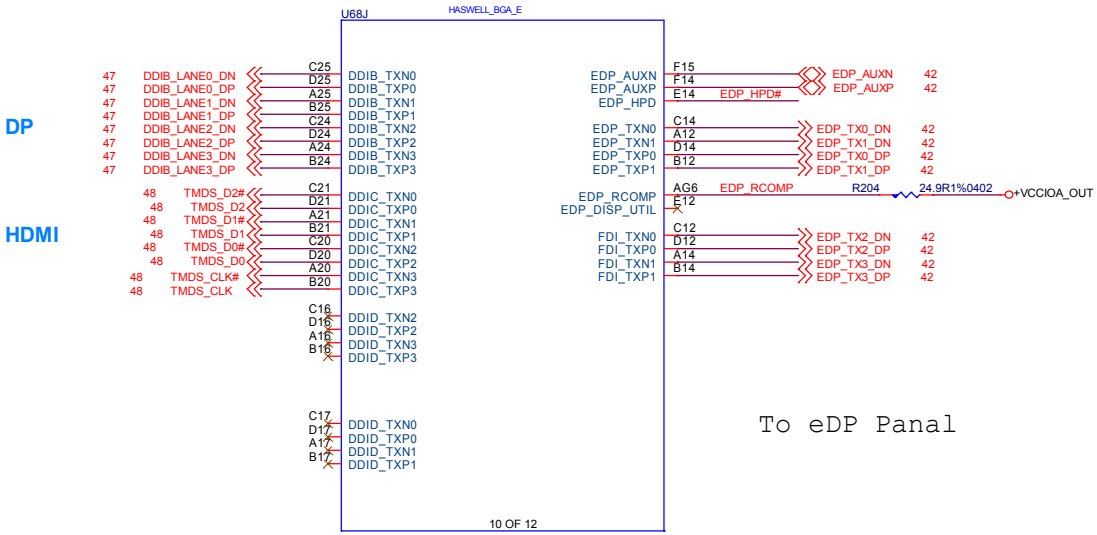
MICRO-STAR INT'L CO.,LTD.

Title: CPU-2 (DDR3L)

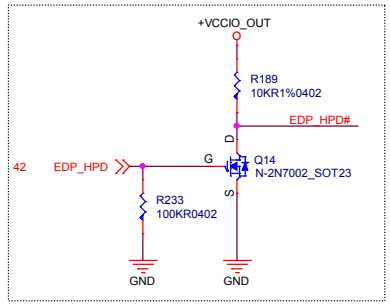
Size: | Document Number: MS-16H5 | Rev: 1.1

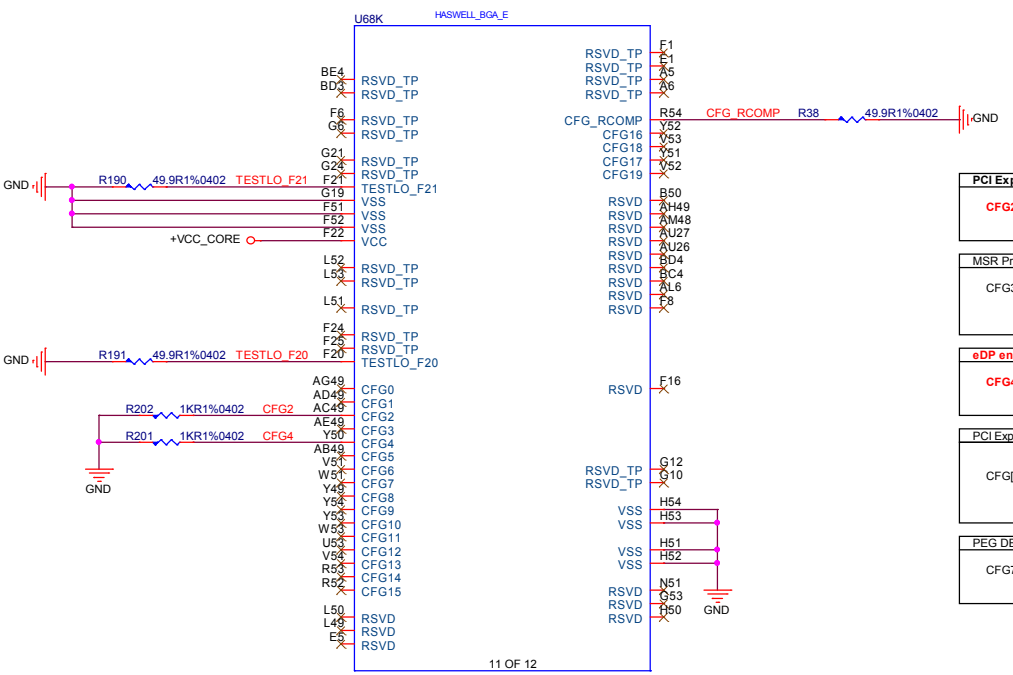
Date: Tuesday, July 15, 2014 | Sheet 4 of 72

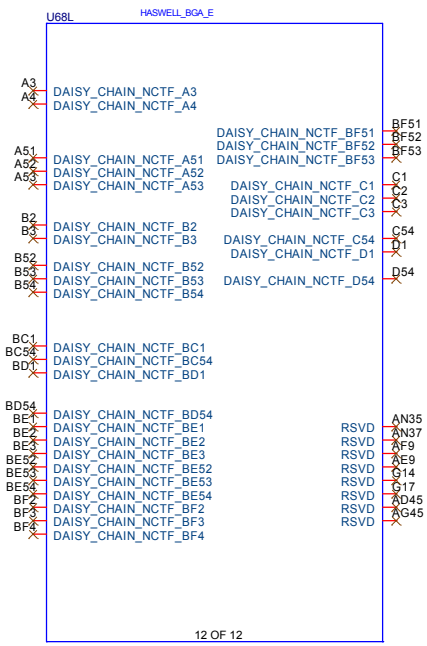
Display/Reserved



To eDP Panal







PCI Express* Static x16 Lane Numbering Reversal	
CFG2	1 = Normal operation 0 = Lane numbers reversed.

MSR Privacy Bit Feature	
CFG3	1 = Debug capability is determined by IA32_Debug_Interface_MSR (0xC80) bit[0] setting 0 = IA32_Debug_Interface_MSR (0xC80) bit[0] default setting overridden

eDP enable	
CFG4	1 = Disabled 0 = Enabled

PCI Express* Bifurcation	
CFG[5:6]	00 = 1 x8, 2 x4 PCI Express 01 = reserved 10 = 2 x8 PCI Express 11 = 1 x16 PCI Express

PEG DEFER TRAINING	
CFG7	1: (Default) PEG Train immediately following xxRESETB de assertion 0: PEG Wait for BIOS for training

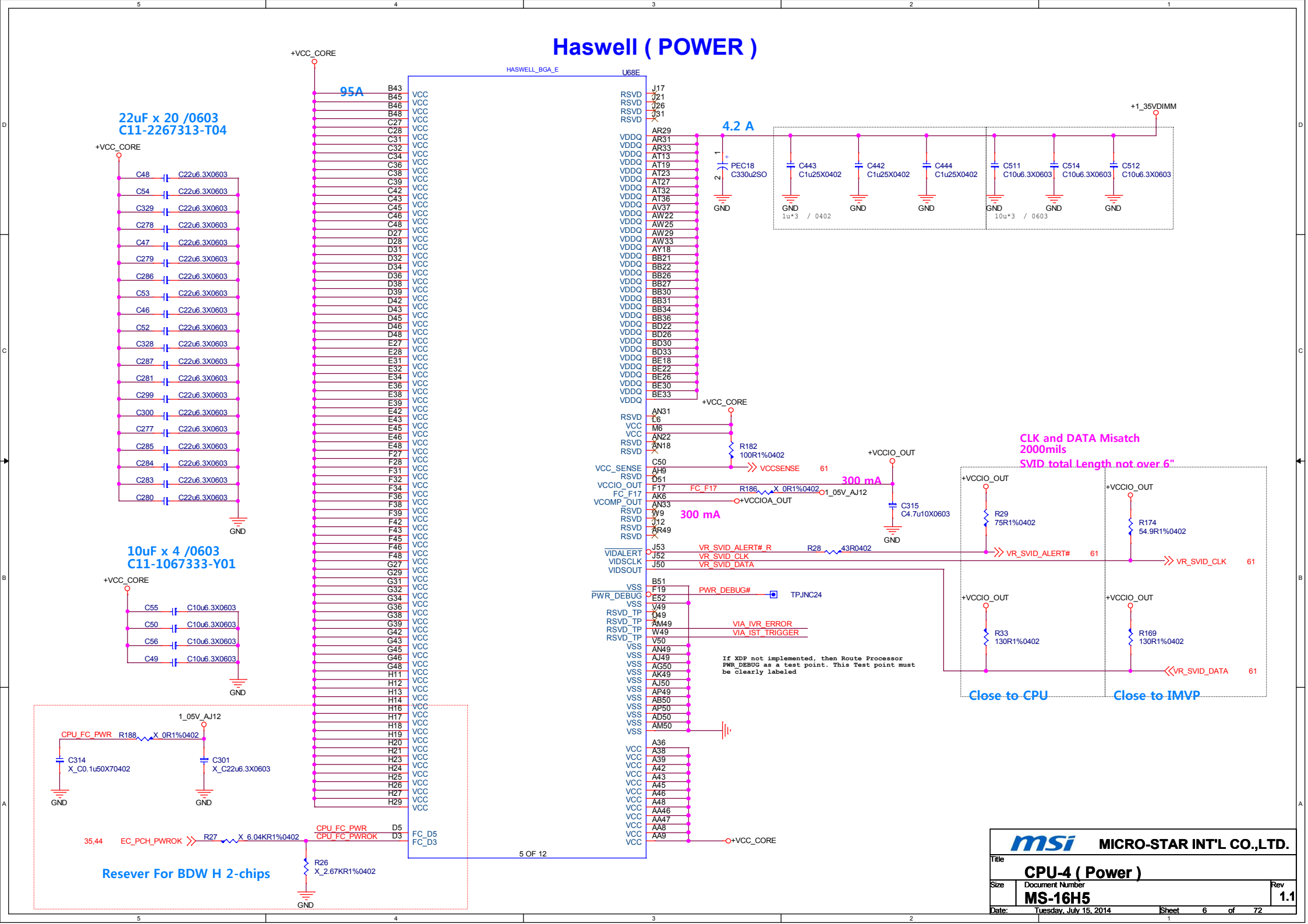
MICRO-STAR INT'L CO.,LTD.

Title: CPU-3 (Display/Reserved)

Size: | Document Number: MS-16H5 | Rev: 1.1

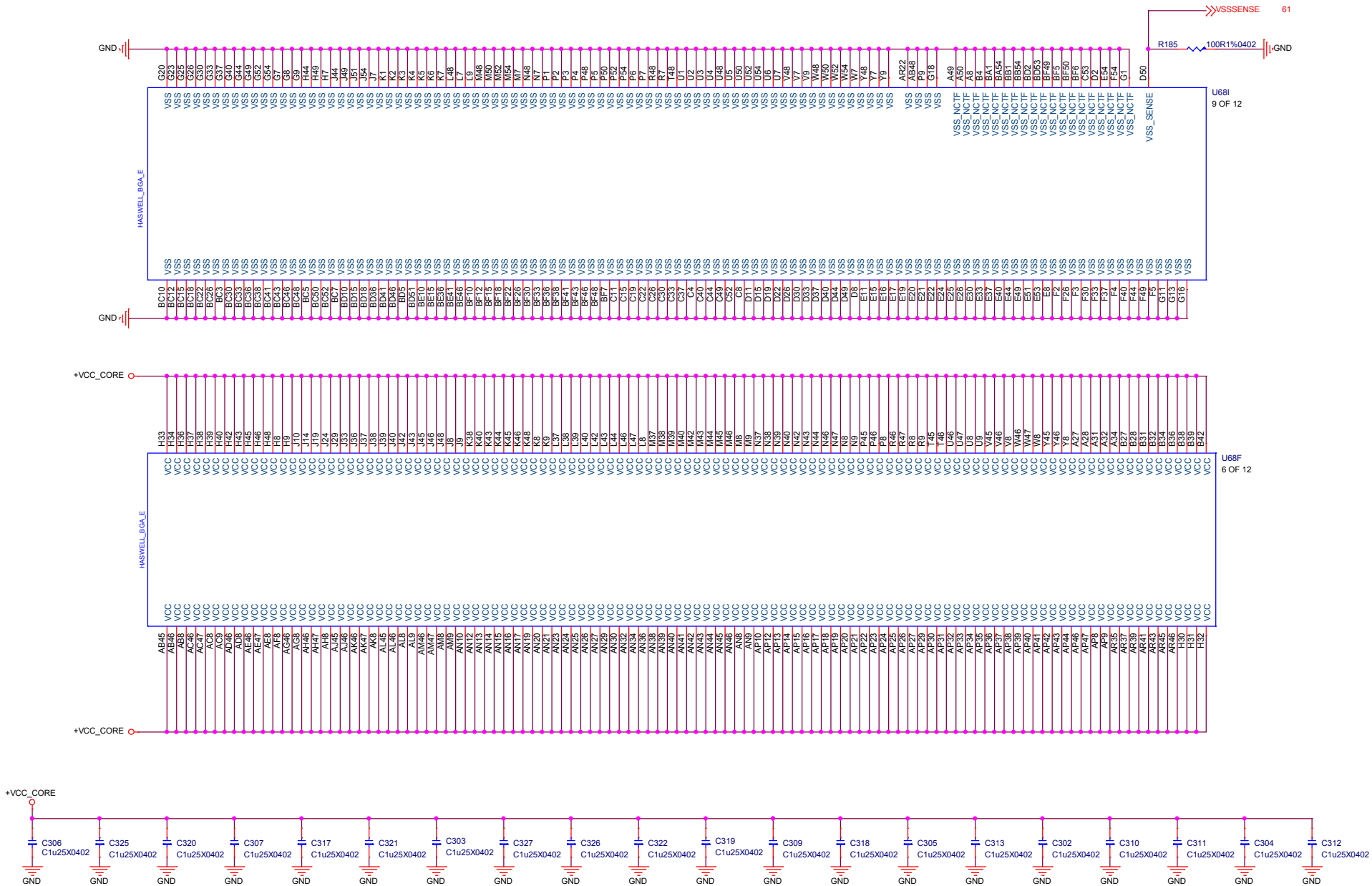
Date: Tuesday, July 15, 2014 | Sheet 5 of 72

Haswell (POWER)



Company	MICRO-STAR INT'L CO.,LTD.
Title	CPU-4 (Power)
Size	
Document Number	MS-16H5
Rev	1.1
Date:	Tuesday, July 15, 2014
Sheet	6 of 72

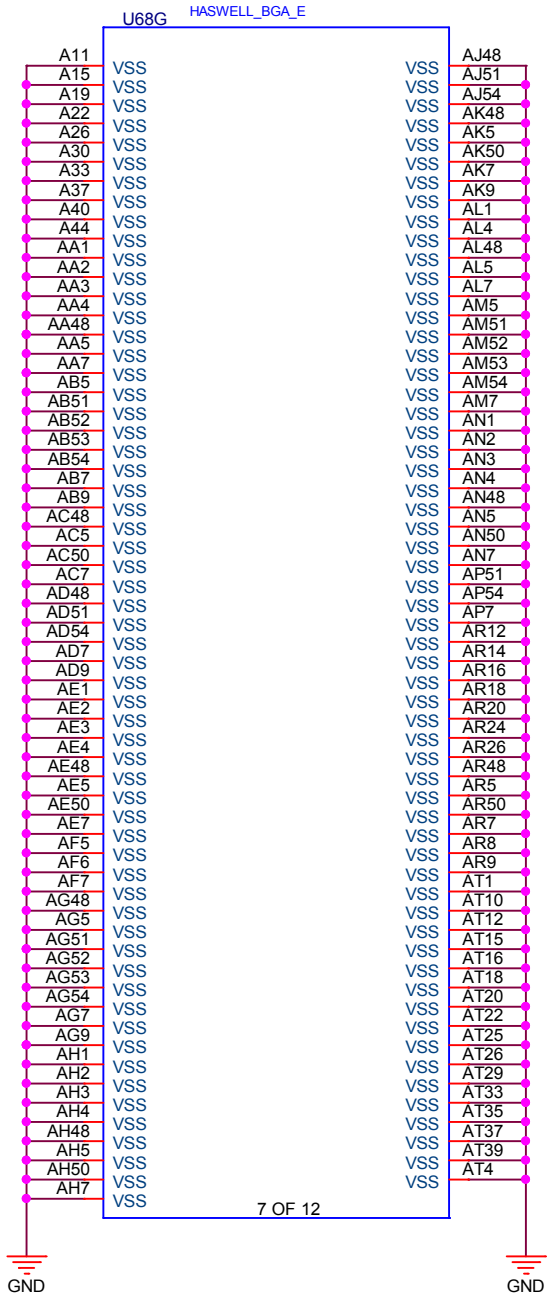
Haswell (Power & GND)

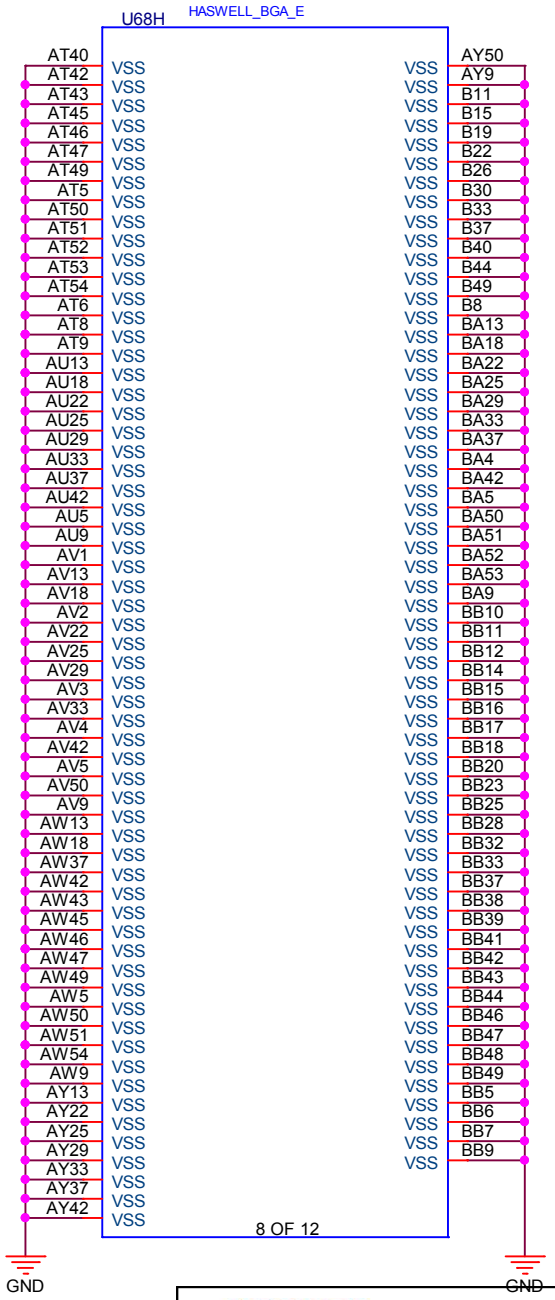


MICRO-STAR INT'L CO.,LTD.

Title	CPU-6 (Power & GND)	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 7 of 72	

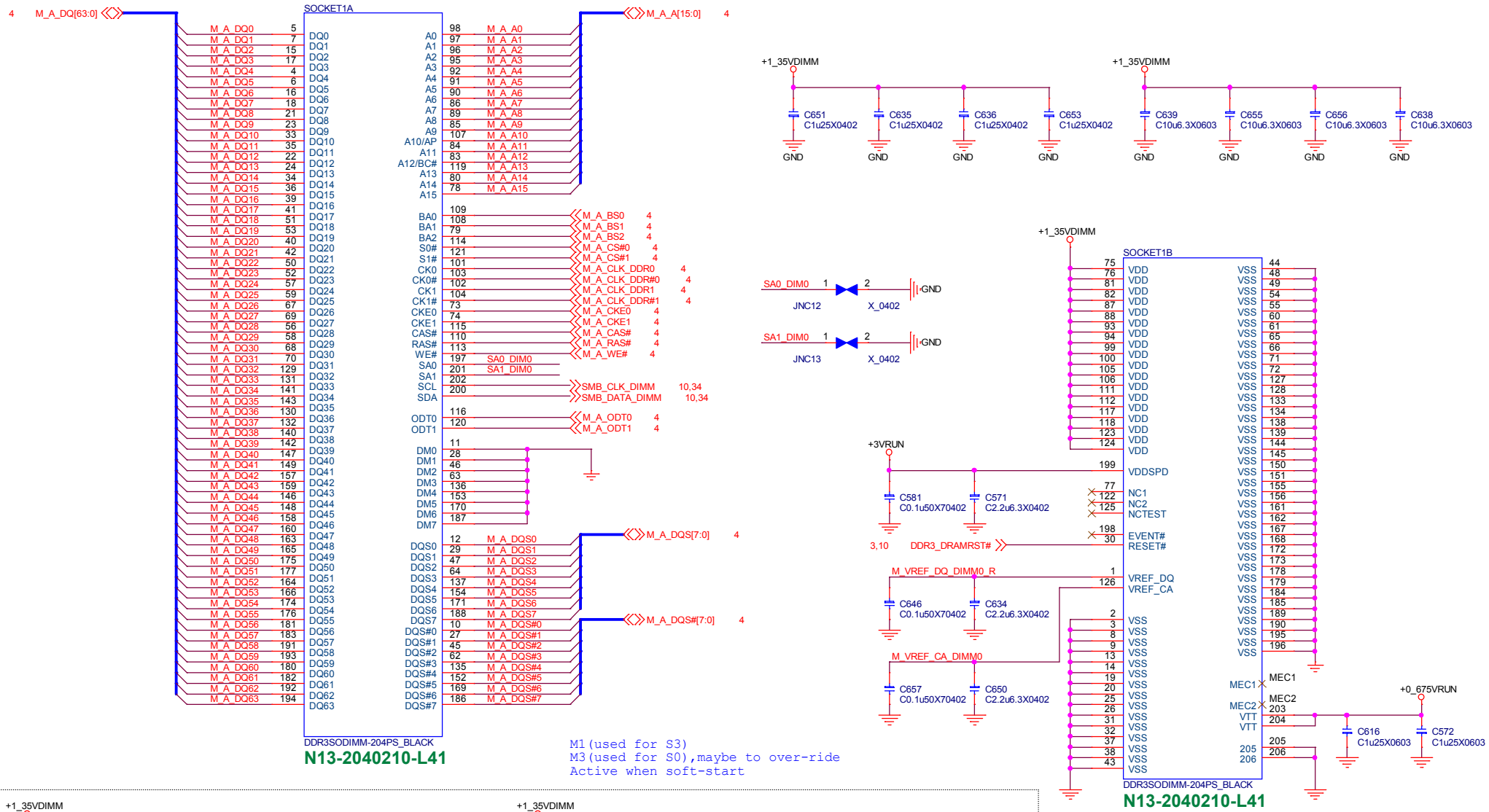
Haswell (GND)



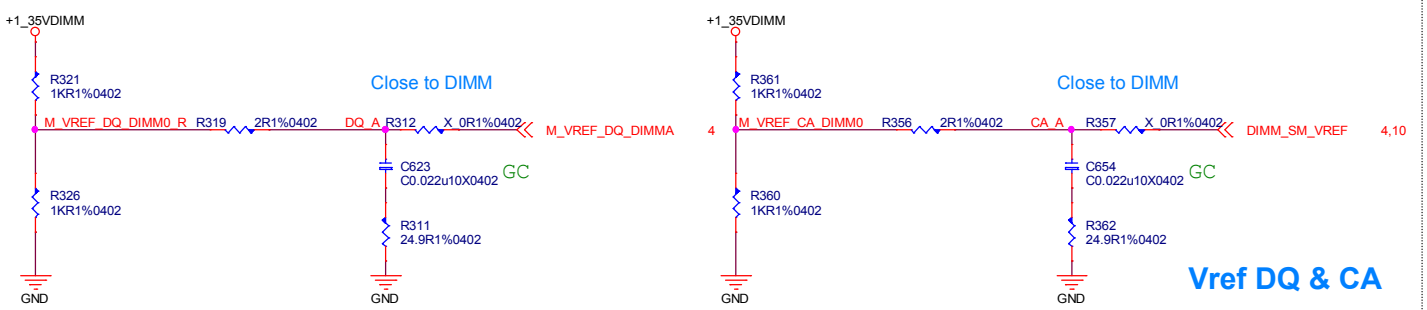


MICRO-STAR INT'L CO.,LTD.		
Title: CPU-5 (GND)		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 8 of 72	

SODIMM#A

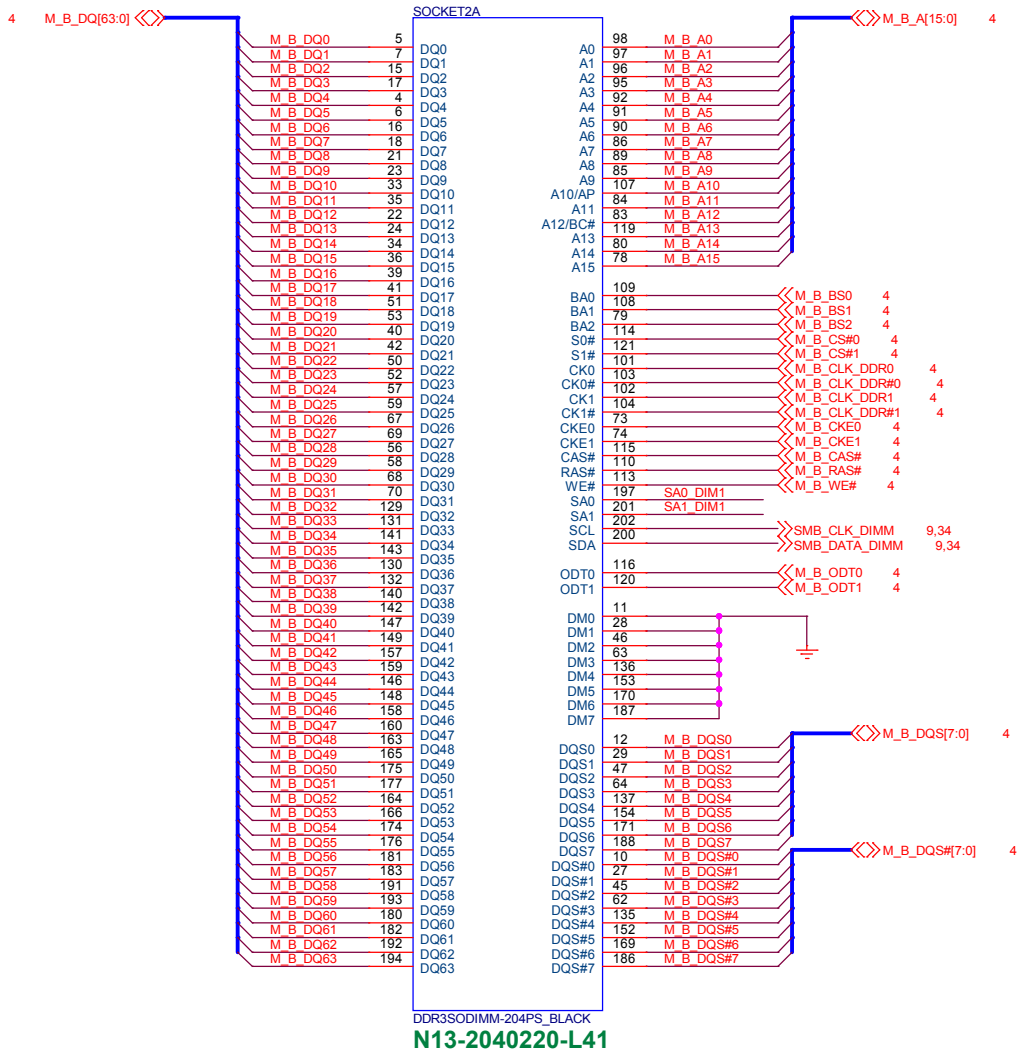


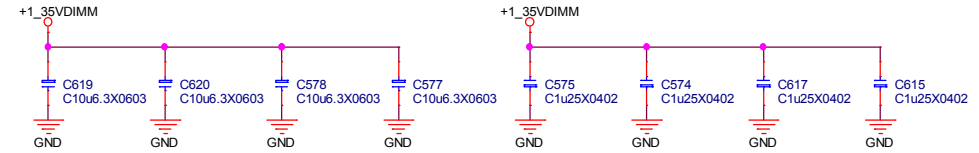
M1(used for S3)
M3(used for S0),maybe to over-ride
Active when soft-start

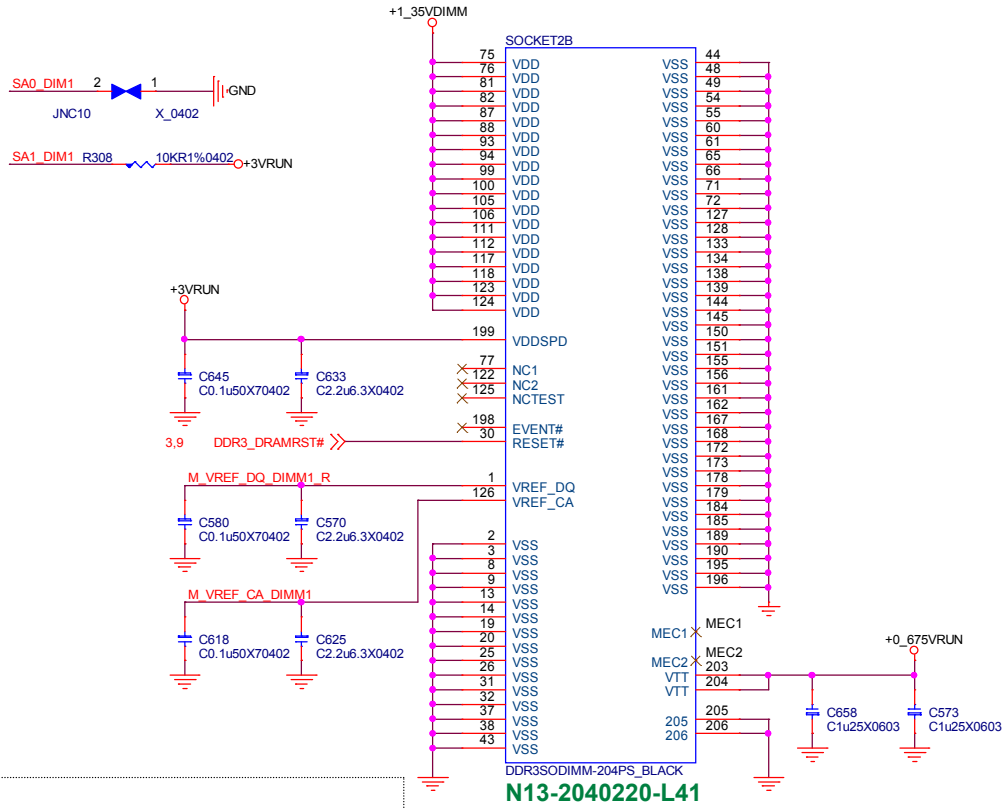


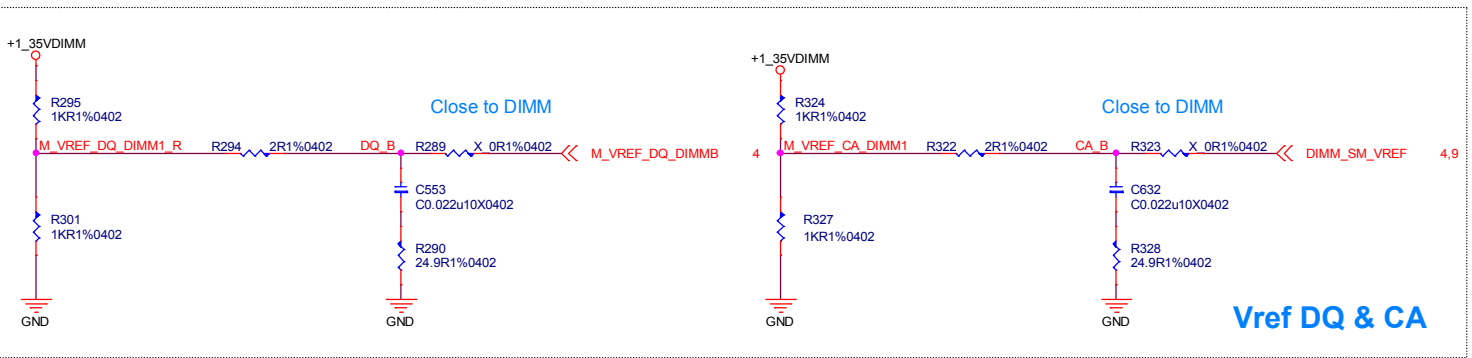
MICRO-STAR INT'L CO.,LTD.		
Title: DDR3L SODIMM 0		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 9 of 72	

SODIMM#B









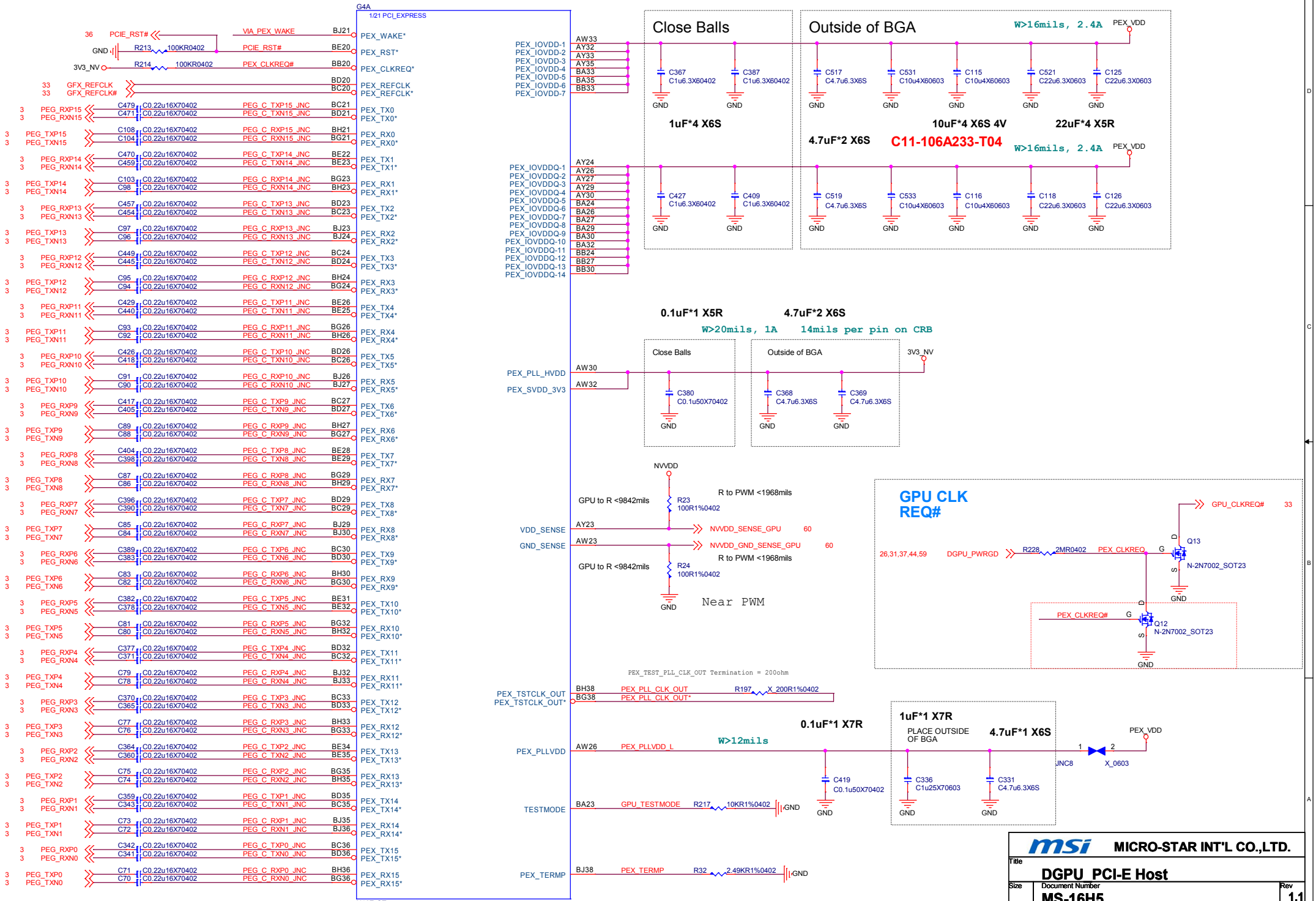
MICRO-STAR INT'L CO.,LTD.

Title: DDR3L SODIMM 1

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 10 of 72

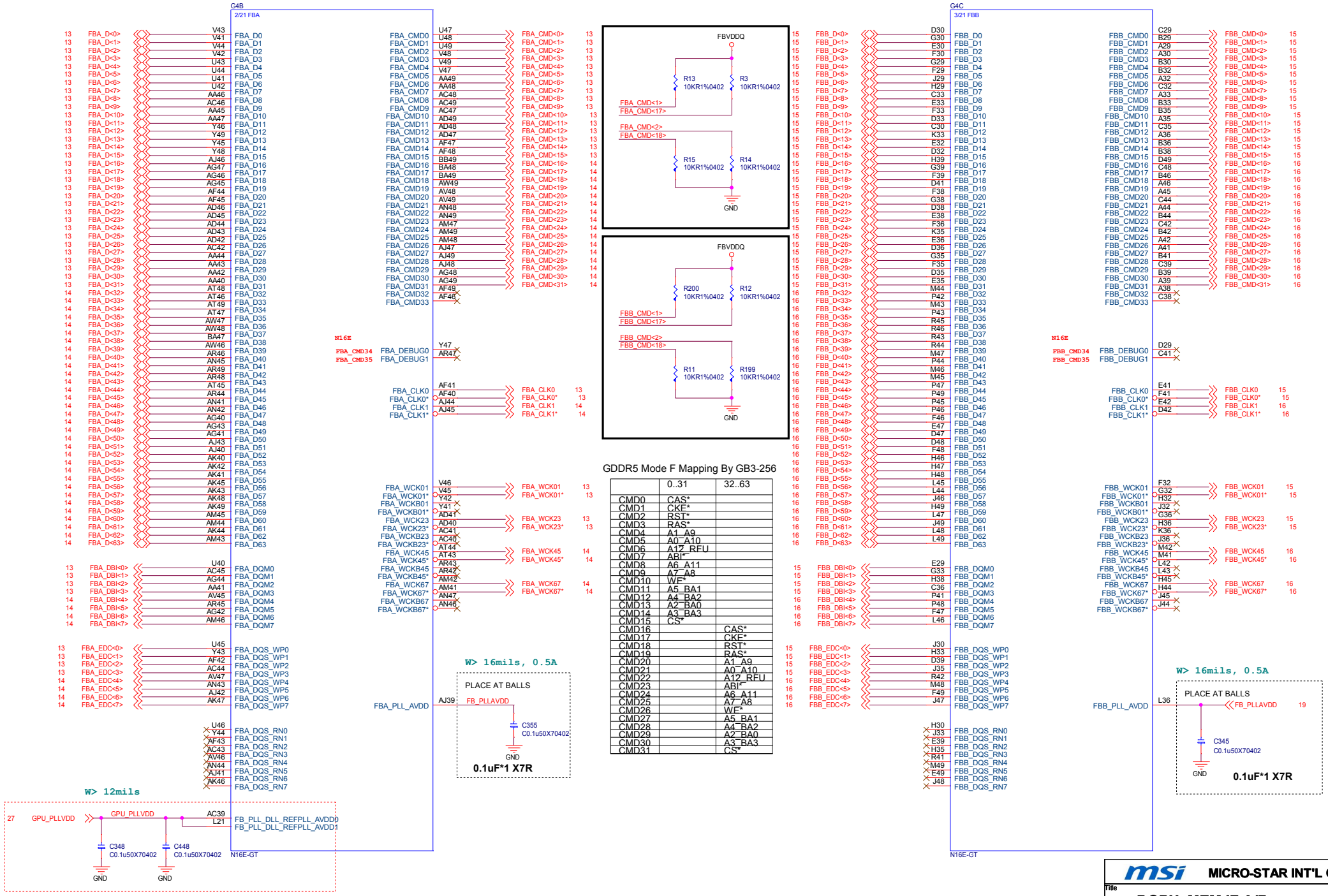
GPU PCI EXPRESS



MICRO-STAR INT'L CO.,LTD.

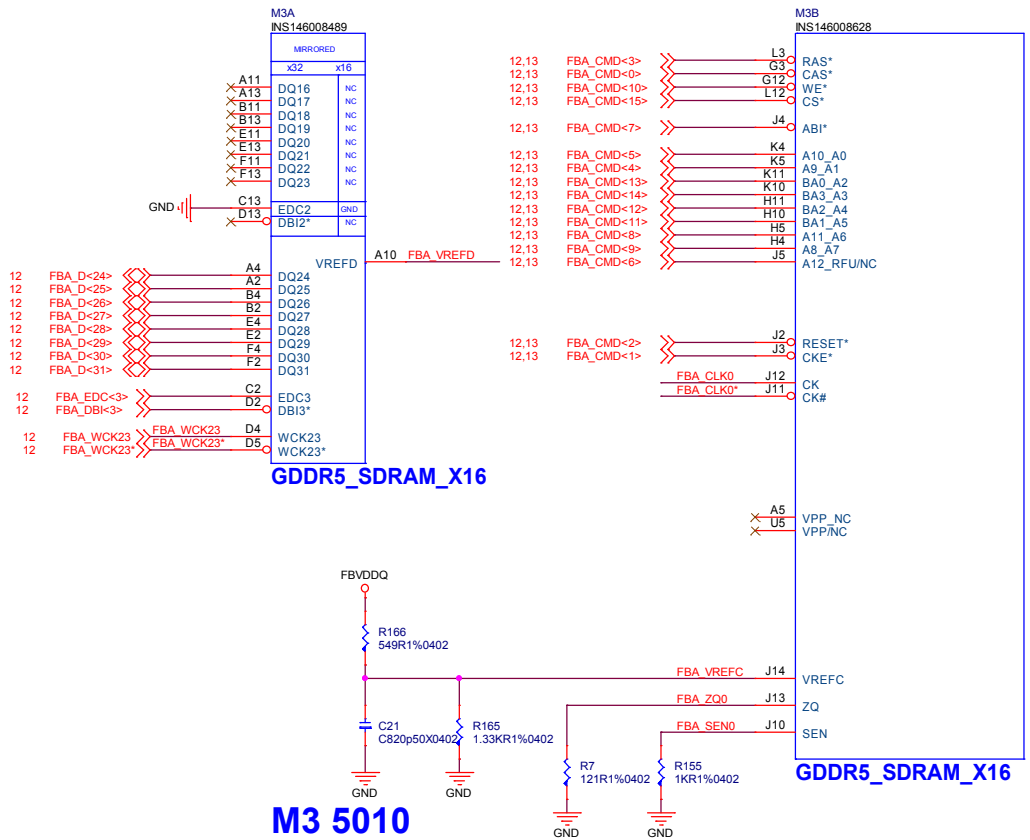
Title	DGPU PCI-E Host	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 11 of 72	

GPU Frame Buffer Partition A/B

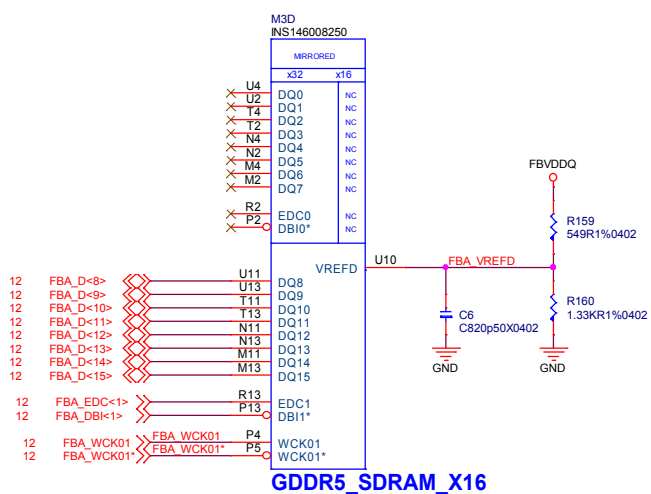


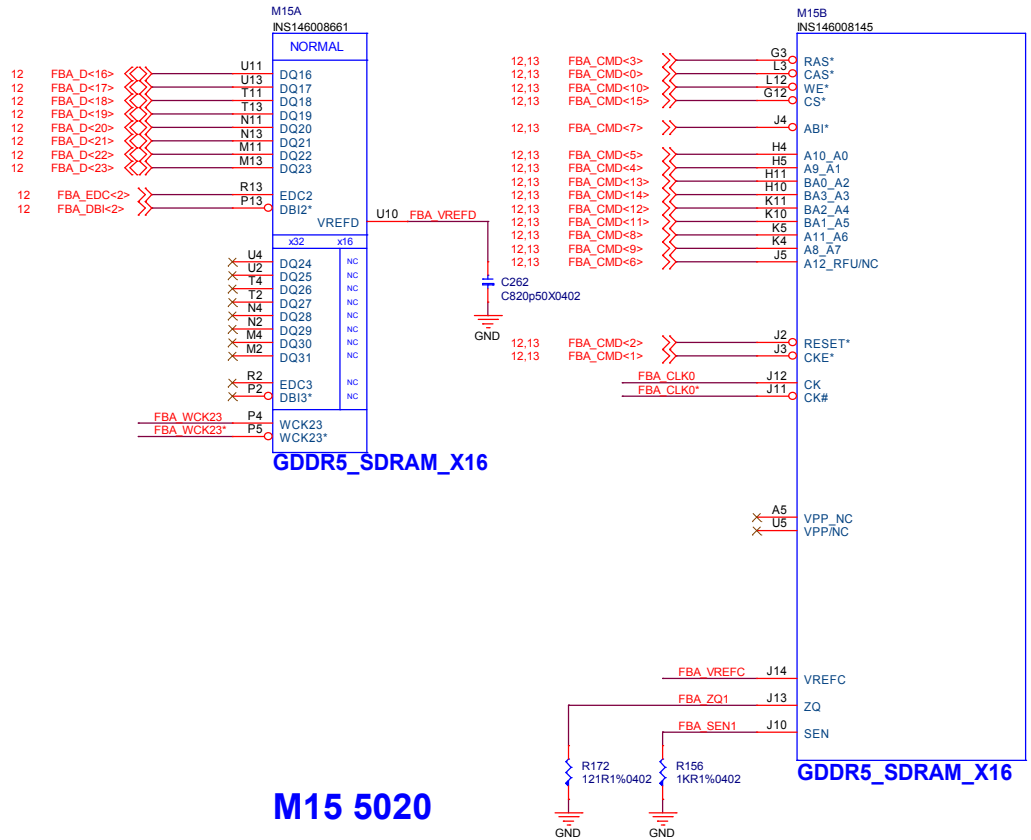
Title			
MICRO-STAR INT'L CO.,LTD.			
DGPU_MEM IF A/B			
Size	Document Number		Rev
	MS-16H5		1.1
Date: Tuesday, July 15, 2014		Sheet 12 of 72	

DGPU_GDDR5 FrameBuffer A0

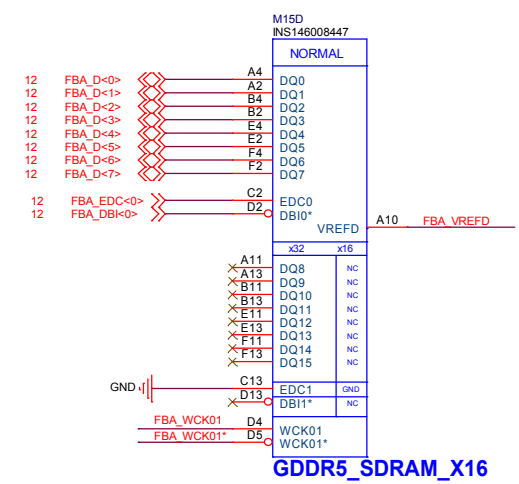


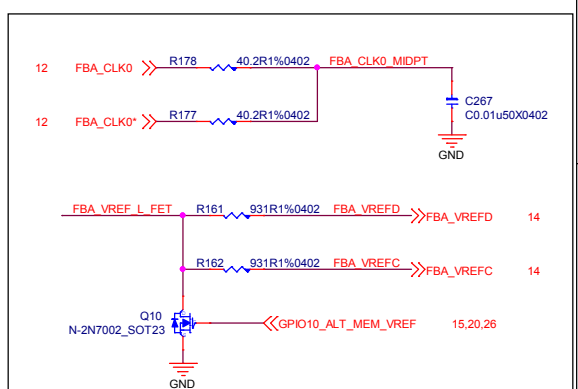
M3 5010





M15 5020

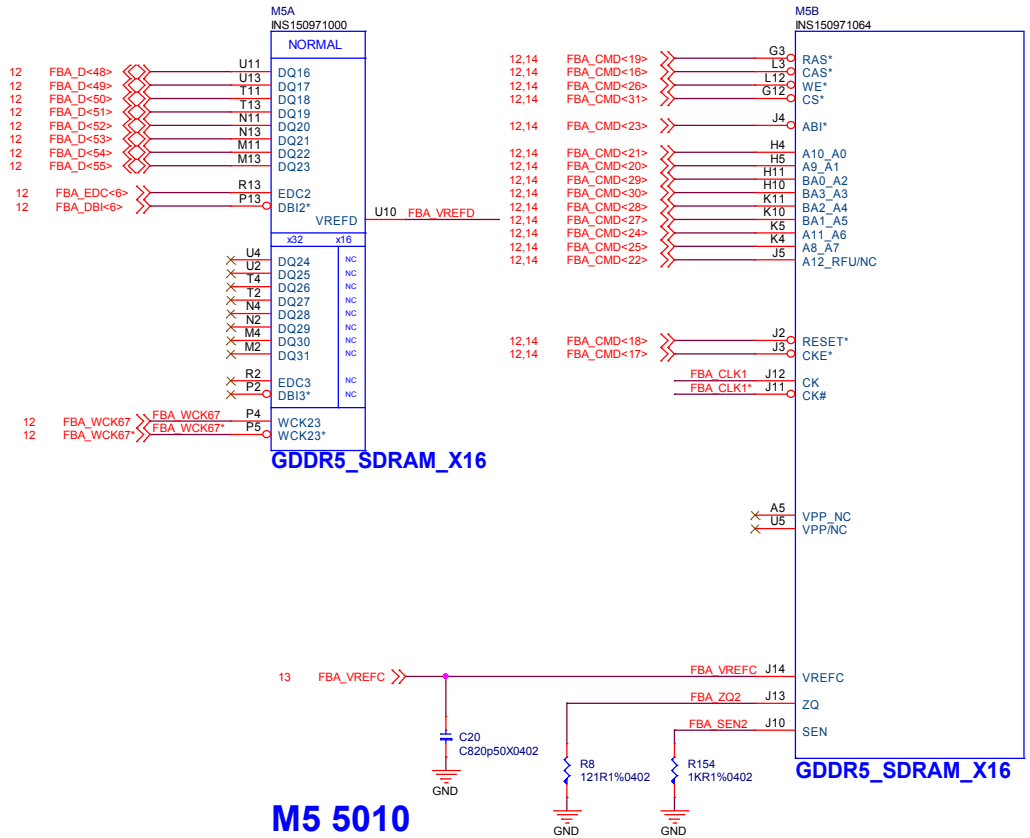


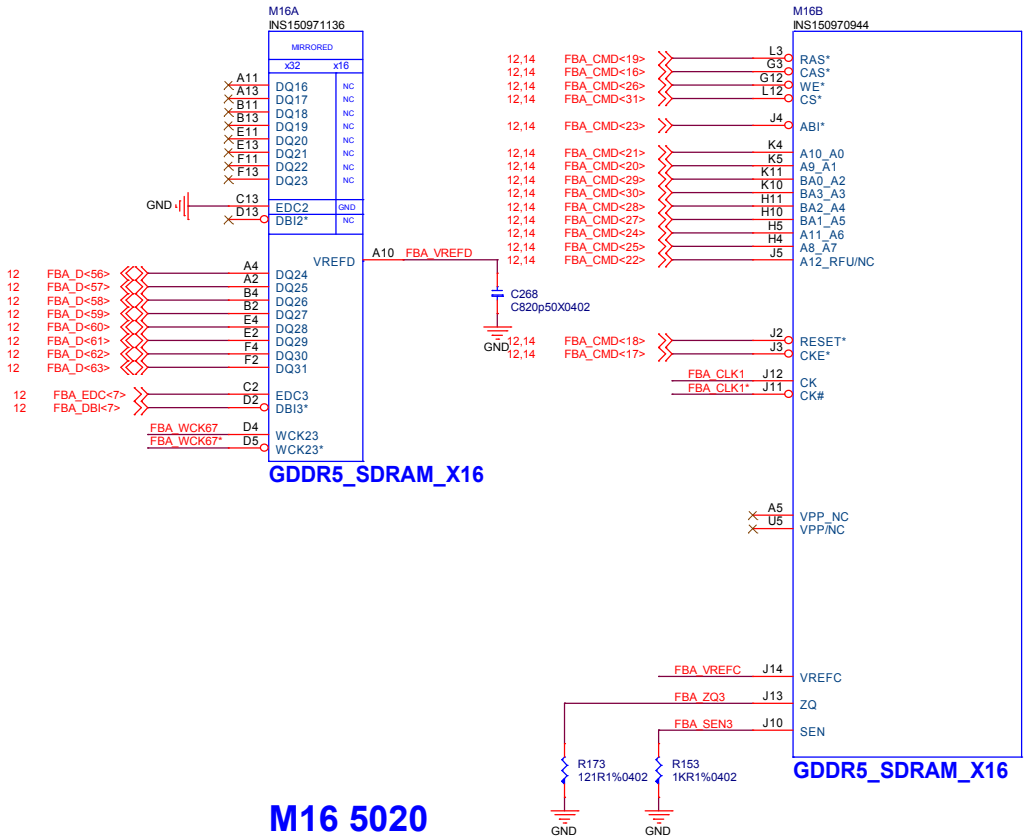


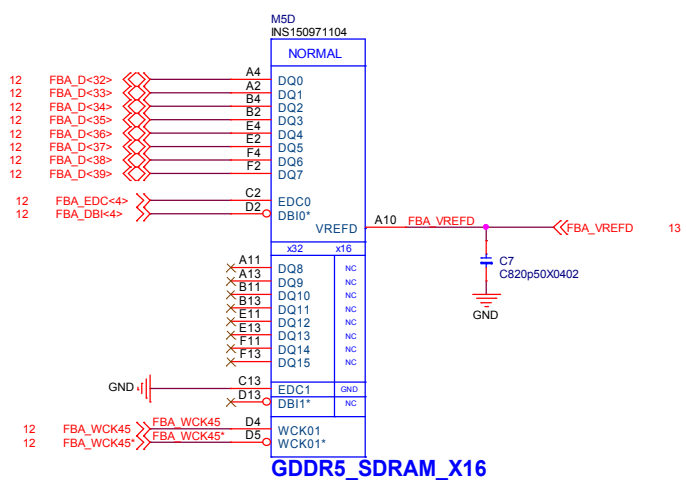
MICRO-STAR INT'L CO.,LTD.

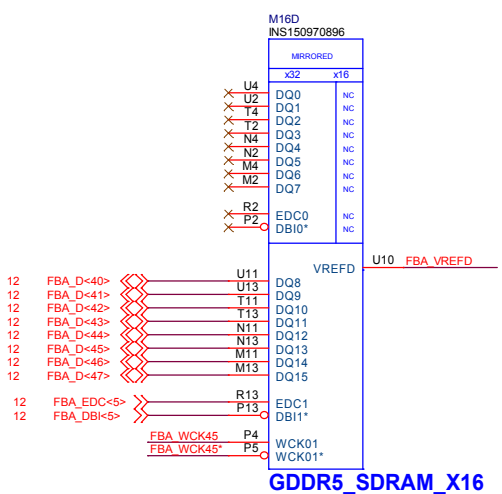
Title	DGPU_GDDR5 FrameBuffer A0	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 13 of 72	

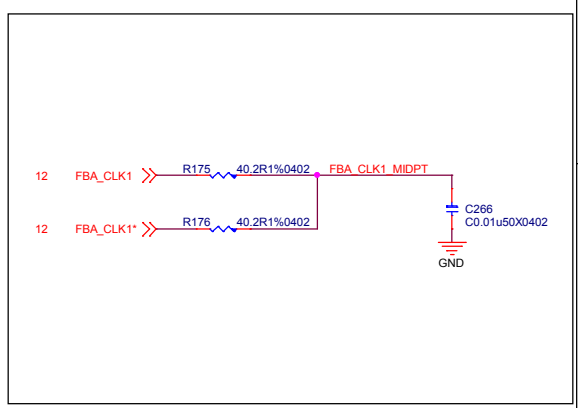
DGPU_GDDR5 FrameBuffer A1







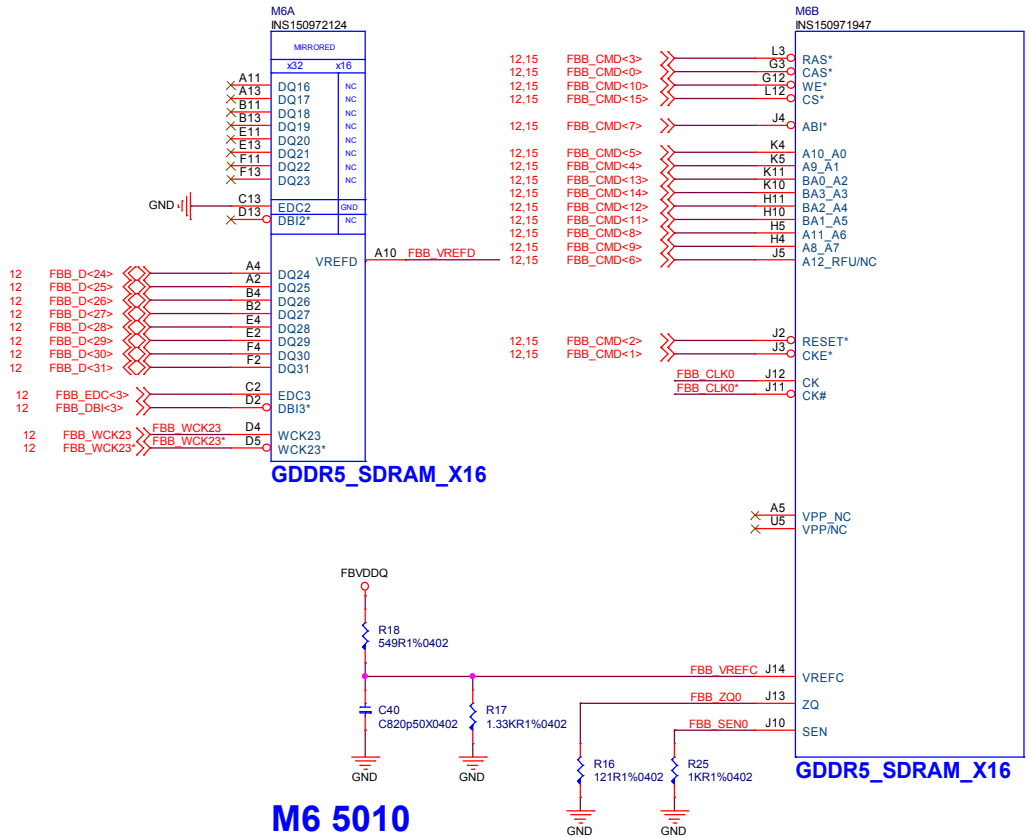




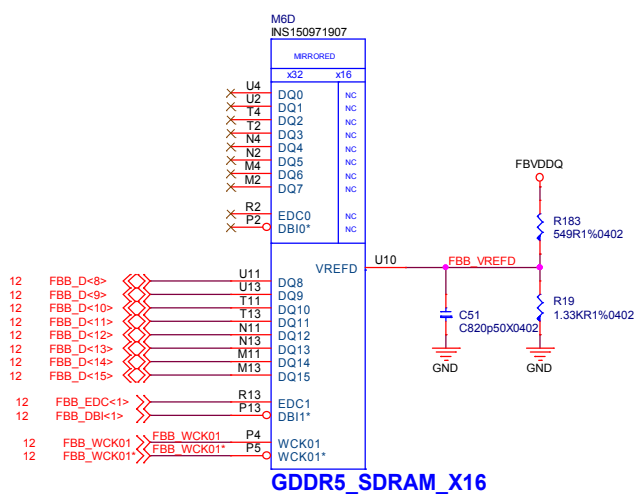
MICRO-STAR INT'L CO.,LTD.

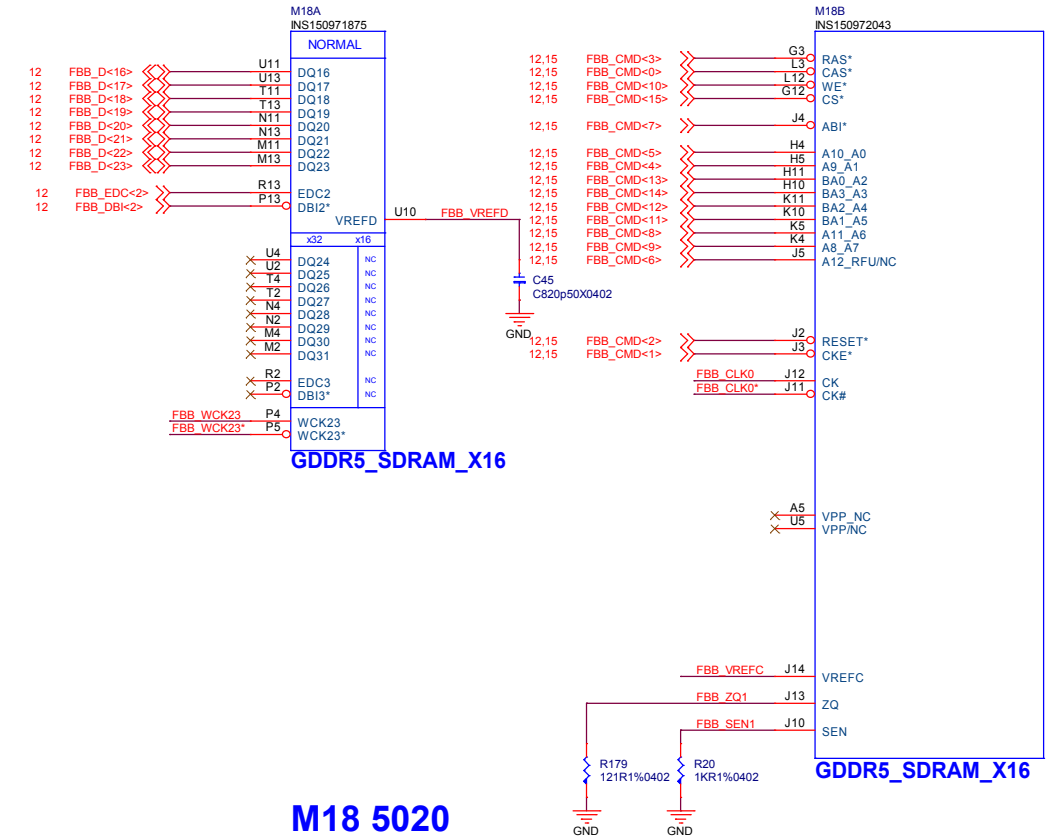
Title	DGPU_GDDR5 FrameBuffer A1	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 14 of 72	

DGPU_GDDR5 FrameBuffer B0

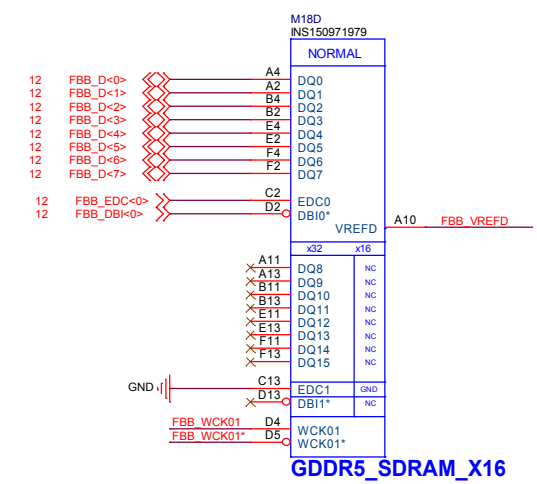


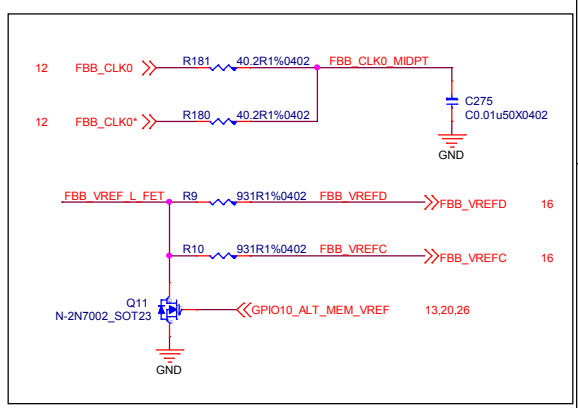
M6 5010





M18 5020

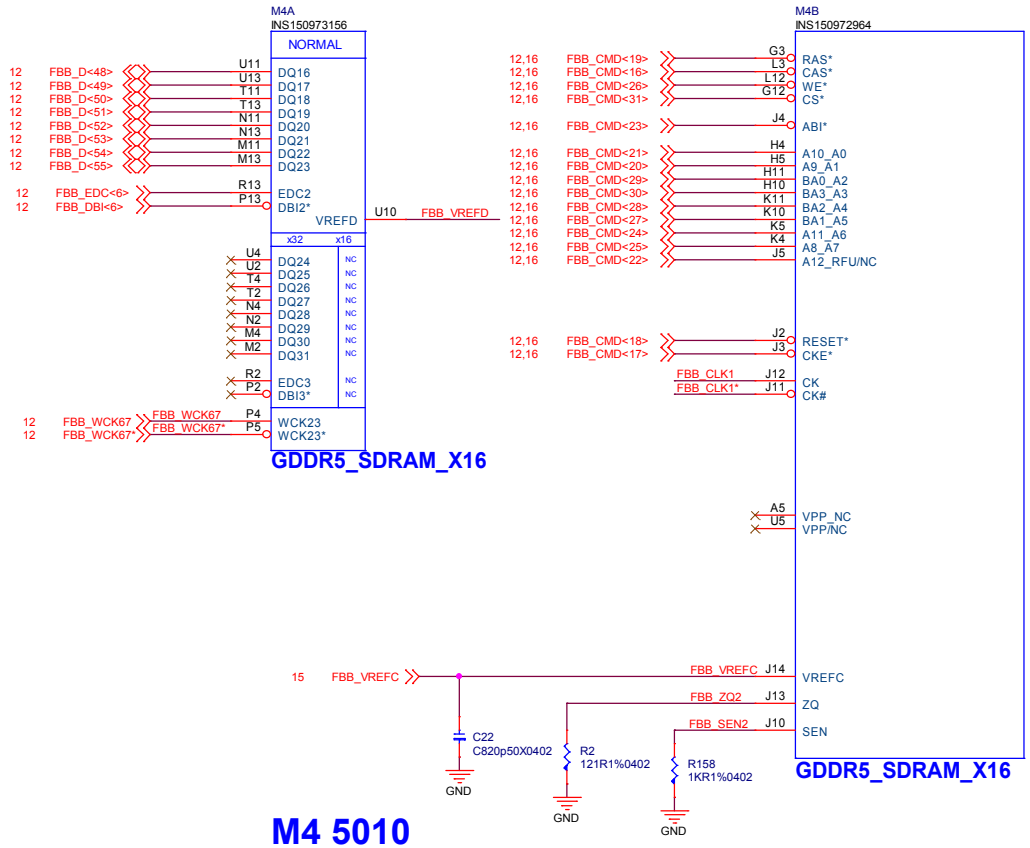


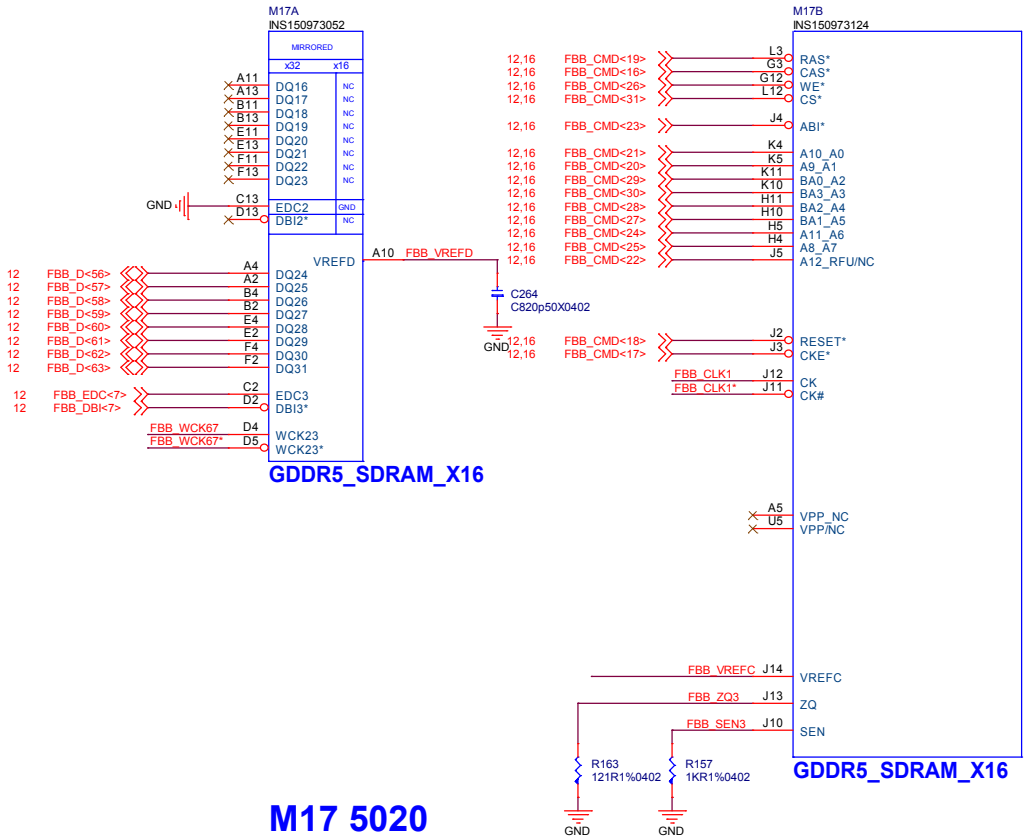


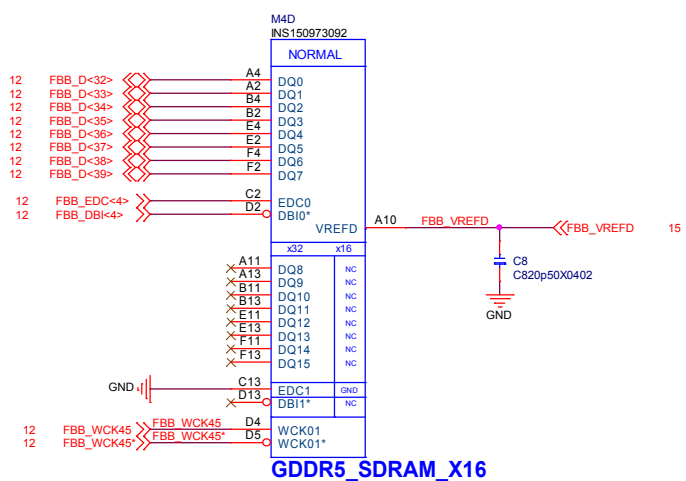
MICRO-STAR INT'L CO.,LTD.

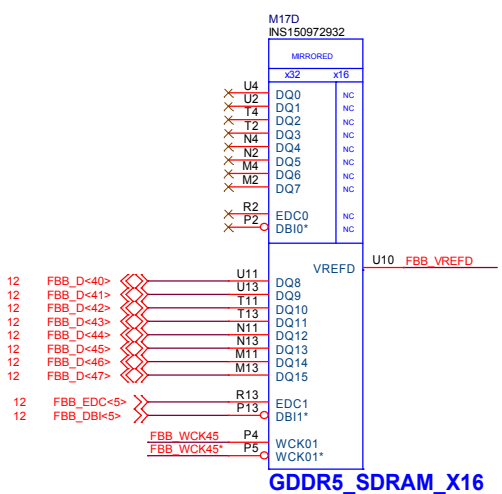
Title	DGPU_GDDR5 FrameBuffer B0	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 15 of 72	

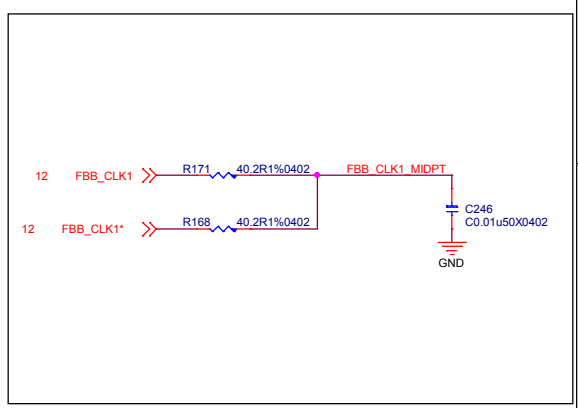
DGPU_GDDR5 FrameBuffer B1











MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FrameBuffer B1	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 16 of 72	

Frame Buffer Partition A Decoupling

FBVDDQ

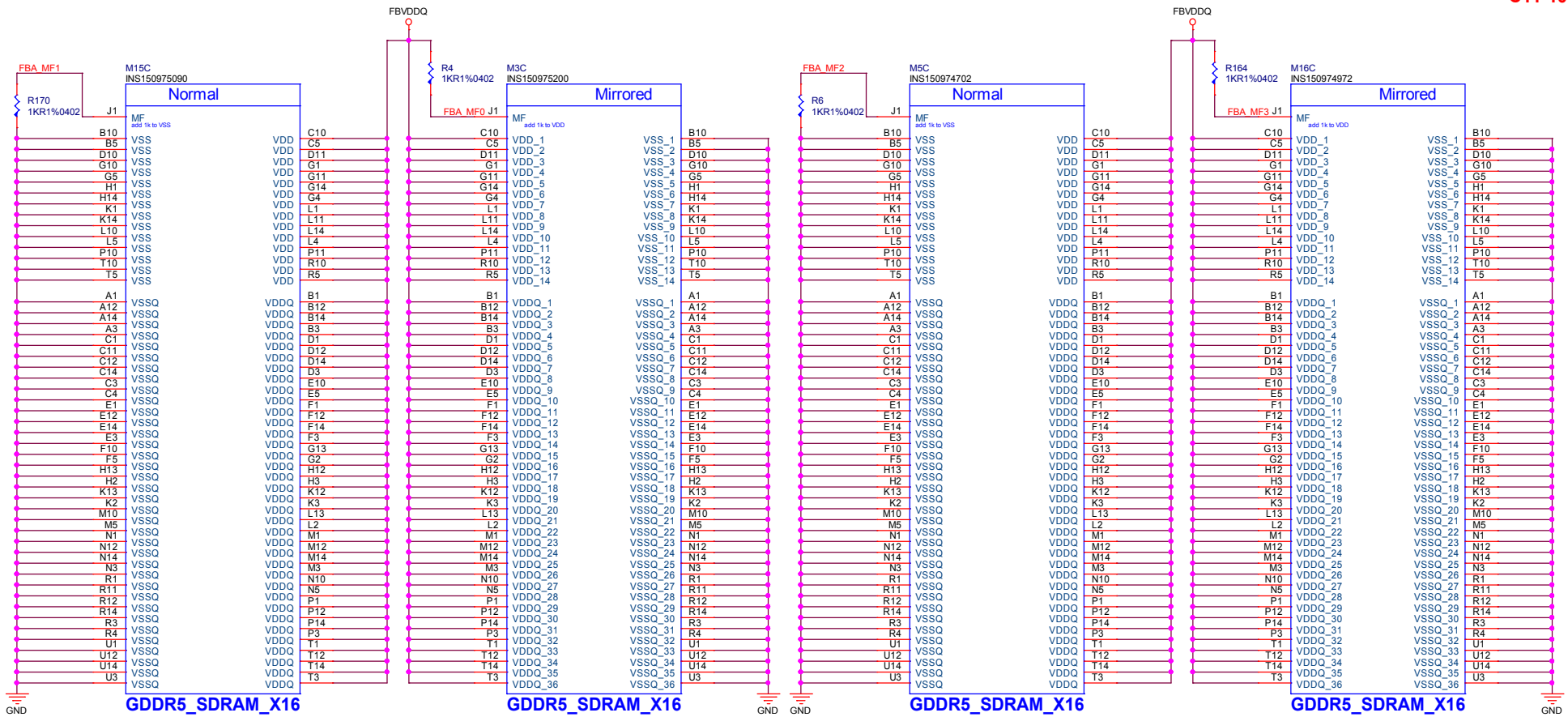
SPARE

DECOUPLING AROUND FBA MEMORIES (DQ0-DQ31)

C255 C0.1u50X70402 · C240 C0.1u50X70402 · C16 C0.1u50X70402 · C30 C0.1u50X70402 · C27 C1u6.3X60402 · C254 C1u6.3X60402 · C242 C1u6.3X60402 · C15 C1u6.3X60402 · C26 C1u6.3X60402 · C32 C1u6.3X60402 · C260 C4.7u6.3X6S · C237 C4.7u6.3X6S · C35 C4.7u6.3X6S · C12 C4.7u6.3X6S · C233 C10u4X60603 · C9 C10u4X60603

GND

C11-106A233-T04



FBVDDQ

SPARE

DECOUPLING AROUND FBA MEMORIES (DQ32-DQ63)

C23 C0.1u50X70402 · C243 C0.1u50X70402 · C31 C0.1u50X70402 · C14 C0.1u50X70402 · C252 C1u6.3X60402 · C256 C1u6.3X60402 · C241 C1u6.3X60402 · C29 C1u6.3X60402 · C253 C1u6.3X60402 · C17 C1u6.3X60402 · C235 C4.7u6.3X6S · C238 C4.7u6.3X6S · C11 C4.7u6.3X6S · C13 C4.7u6.3X6S · C234 C10u4X60603 · C10 C10u4X60603

GND

C11-106A233-T04

MICRO-STAR INT'L CO.,LTD.

Title: DGPU_GDDR5 FB-A_DECOUPLING

Size: | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 17 of 72

Frame Buffer Partition B Decoupling

FBVDDQ

SPARE

DECOUPLING AROUND FBB MEMORIES (DQ0-DQ31)

C272 C0.1u50X70402 — C269 C0.1u50X70402 — C24 C0.1u50X70402 — C19 C0.1u50X70402 — C271 C1u6.3X60402 — C250 C1u6.3X60402 — C245 C1u6.3X60402 — C42 C1u6.3X60402 — C43 C1u6.3X60402 — C39 C1u6.3X60402 — C270 C4.7u6.3X6S — C261 C4.7u6.3X6S — C41 C4.7u6.3X6S — C36 C4.7u6.3X6S — C257 C10u4X60603 — C492 C10u4X60603

GND

C11-106A233-T04

FBB_MF1 — R30 1KR1%0402 — J1

M18C INS150977791 — Normal — MF (add 1k to VSS) — GDDR5_SDRAM_X16

FBVDDQ — R31 1KR1%0402 — FBB_MF0 J1

M6C INS150977435 — Mirrored — MF (add 1k to VDD) — GDDR5_SDRAM_X16

FBB_MF2 — R5 1KR1%0402 — J1

M4C INS150977949 — Normal — MF (add 1k to VSS) — GDDR5_SDRAM_X16

FBVDDQ — R167 1KR1%0402 — FBB_MF3 J1

M17C INS150977569 — Mirrored — MF (add 1k to VDD) — GDDR5_SDRAM_X16

GND

FBVDDQ

SPARE

DECOUPLING AROUND FBB MEMORIES (DQ32-DQ63)

C236 C0.1u50X70402 — C251 C0.1u50X70402 — C62 C0.1u50X70402 — C332 C0.1u50X70402 — C347 C1u6.3X60402 — C249 C1u6.3X60402 — C244 C1u6.3X60402 — C18 C1u6.3X60402 — C239 C1u6.3X60402 — C28 C1u6.3X60402 — C263 C4.7u6.3X6S — C335 C4.7u6.3X6S — C37 C4.7u6.3X6S — C64 C4.7u6.3X6S — C288 C10u4X60603 — C258 C10u4X60603

GND

C11-106A233-T04

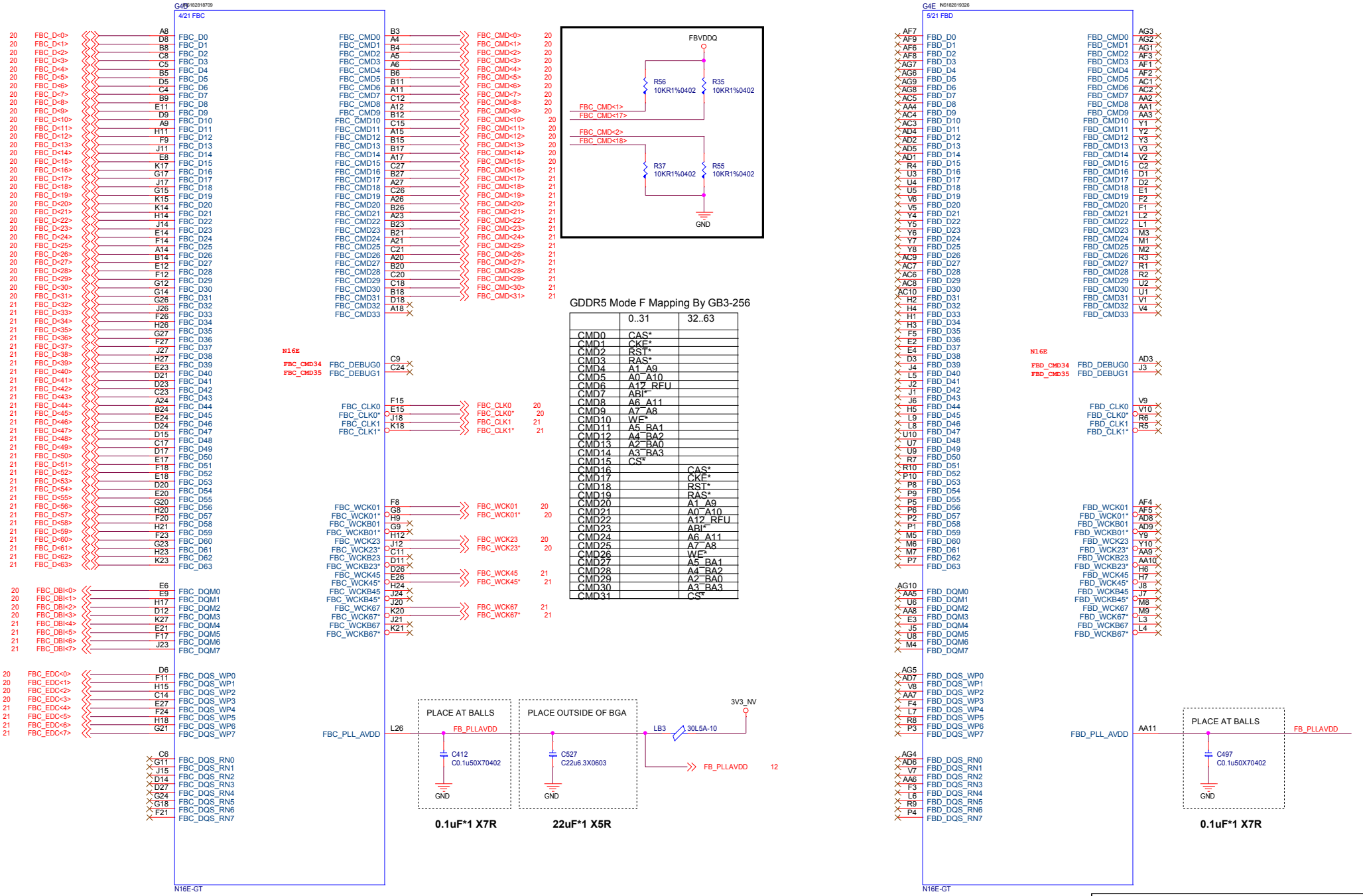
MICRO-STAR INT'L CO.,LTD.

Title: DGPU_GDDR5 FB-B_DECOUPLING

Size: — Document Number: MS-16H5 — Rev: 1.1

Date: Tuesday, July 15, 2014 — Sheet 18 of 72

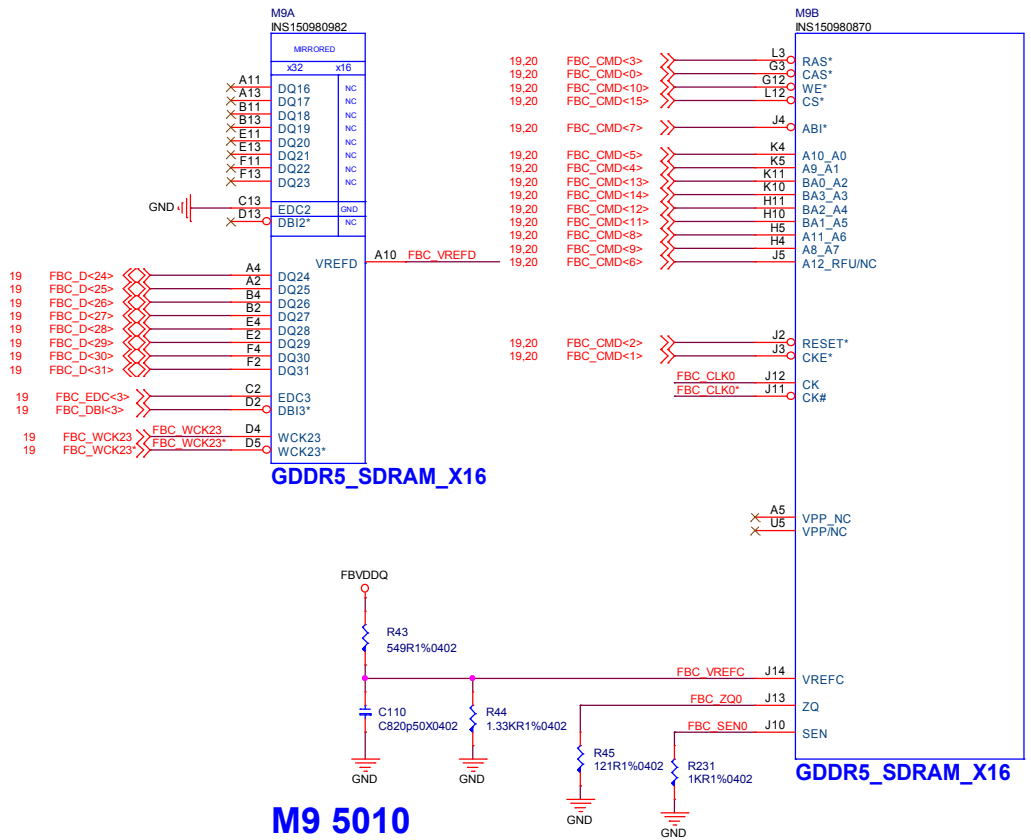
GPU Frame Buffer Partition C/D



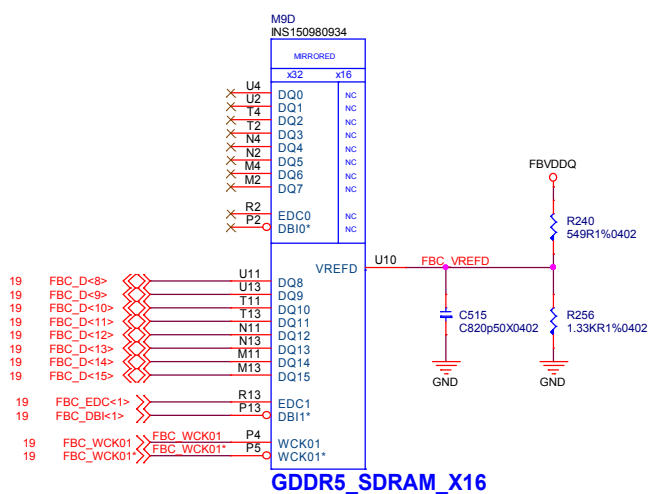
MSI	MICRO-STAR INT'L CO.,LTD.
Title	DGPU_MEM IF C/D
Size	Document Number: MS-16H5
Rev	1.1
Date:	Tuesday, July 15, 2014
Sheet	19 of 72

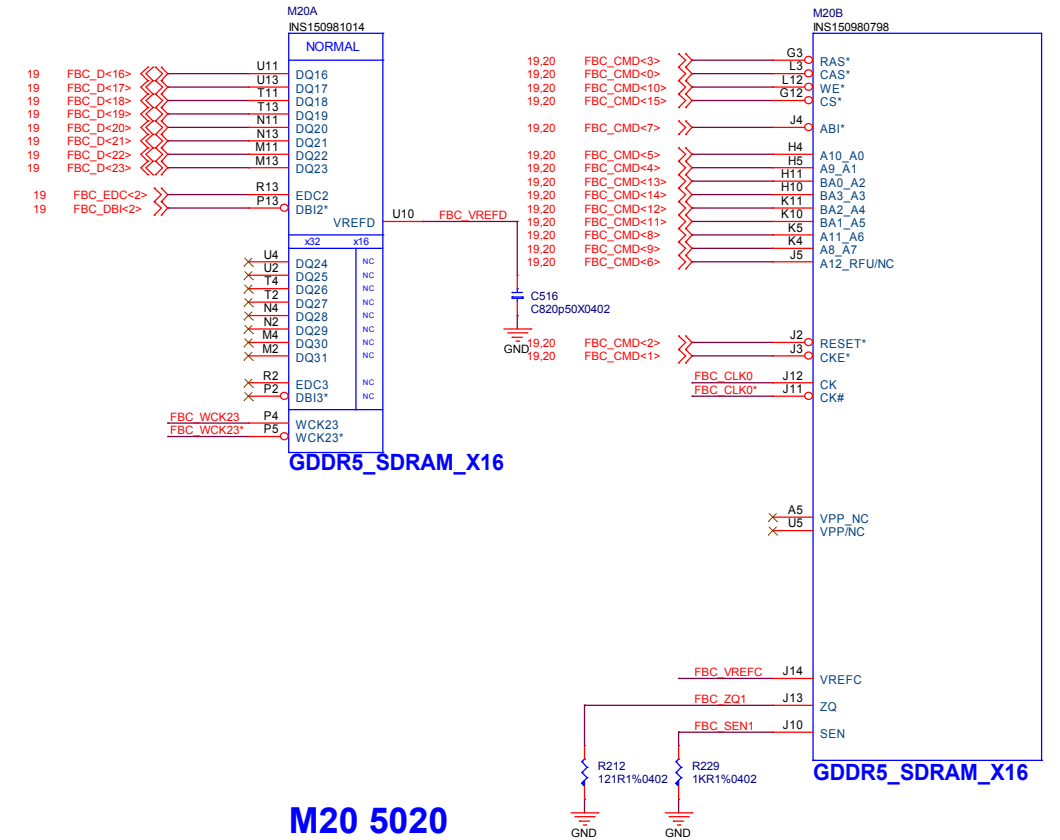
DGPU_GDDR5 FrameBuffer C0

(N16P-GX-B ALL unstuff)

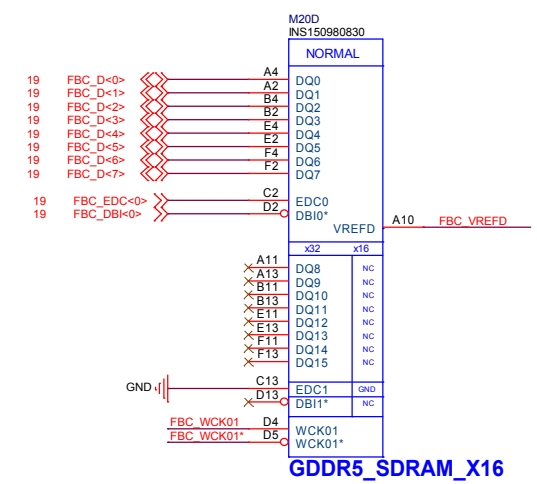


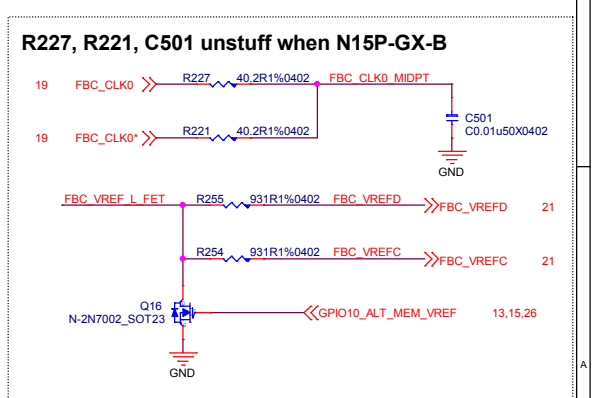
M9 5010





M20 5020

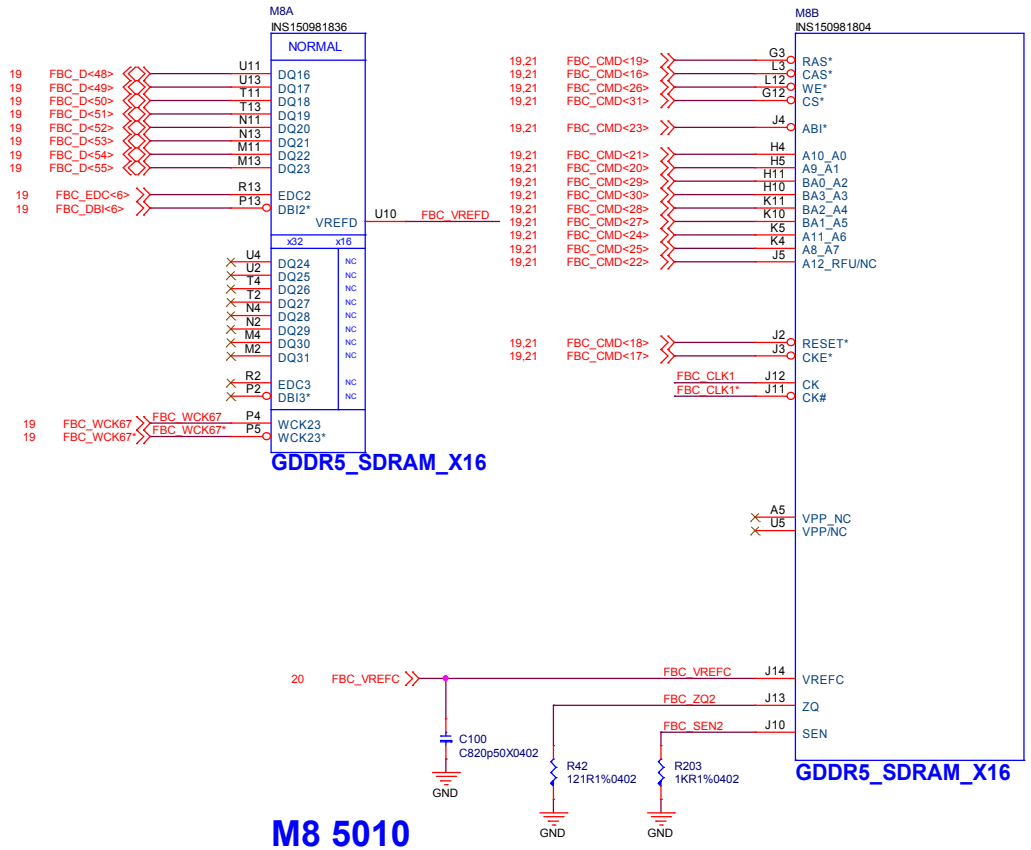




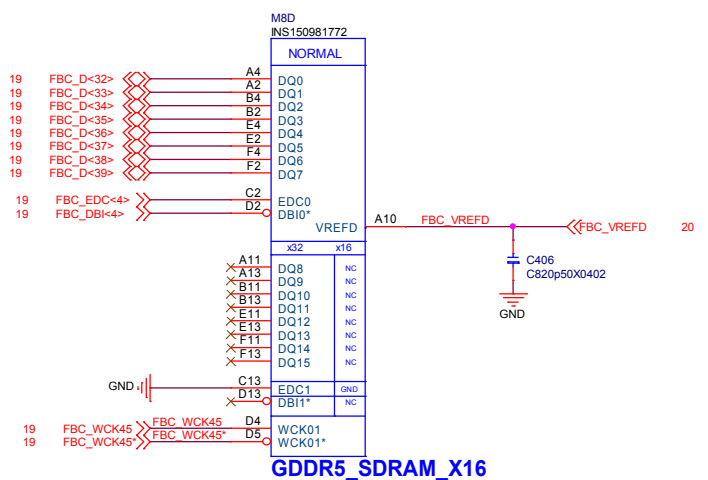
MICRO-STAR INT'L CO.,LTD.			
Title: DGPU_GDDR5 FrameBuffer C			
Size	Document Number: MS-16H5		Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 20 of 72		

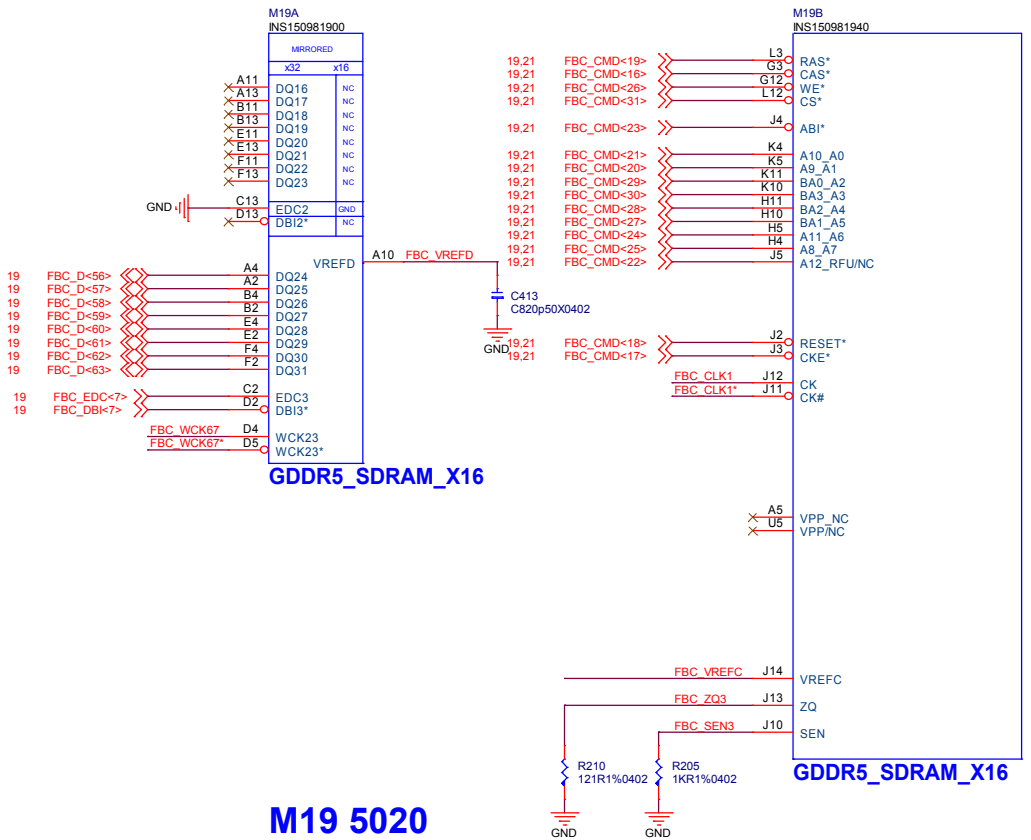
DGPU_GDDR5 FrameBuffer C1

(N16P-GX-B ALL unstuff)

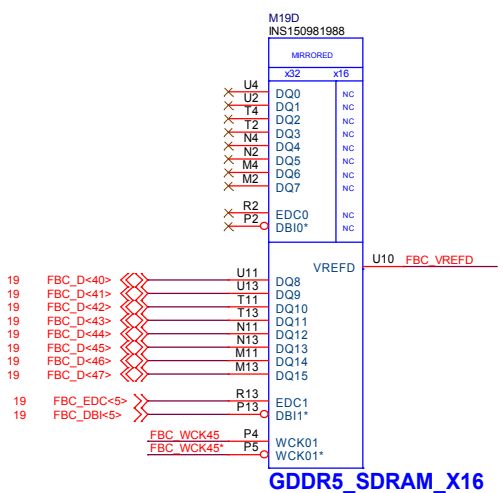


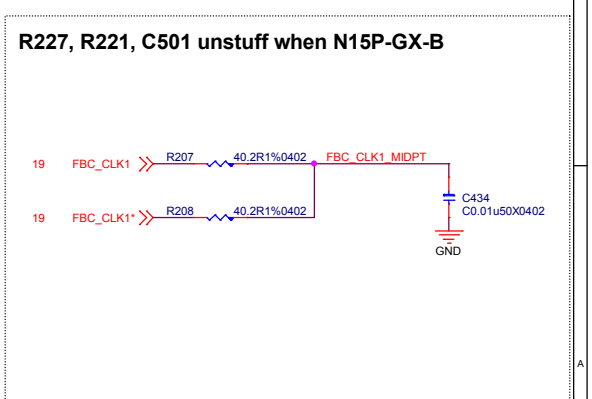
M8 5010





M19 5020





MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FrameBuffer C	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 21 of 72	

Frame Buffer Partition C Decoupling

(N16P-GX-B ALL unstuff)

FBVDDQ

SPARE

DECOUPLING AROUND FBC MEMORIES (DQ0-DQ31)

C333 C0.1u50X70402 · C337 C0.1u50X70402 · C99 C0.1u50X70402 · C102 C0.1u50X70402 · C338 C1u6.3X60402 · C461 C1u6.3X60402 · C462 C1u6.3X60402 · C68 C1u6.3X60402 · C69 C1u6.3X60402 · C61 C1u6.3X60402 · C530 C4.7u6.3X6S · C65 C4.7u6.3X6S · C67 C4.7u6.3X6S · C124 C4.7u6.3X6S · C334 C10u4X60603 · C66 C10u4X60603

GND

C11-106A233-T04

FBC_MF1 — R248 1KR1%0402 — J1

M20C INS150983487 — Normal — MF (add 1k to VSS) — GDDR5_SDRAM_X16

R61 1KR1%0402 — FBC_MF0 — J1

M9C INS150983985 — Mirrored — MF (add 1k to VDD) — GDDR5_SDRAM_X16

FBC_MF2 — R196 1KR1%0402 — J1

M8C INS150983787 — Normal — MF (add 1k to VSS) — GDDR5_SDRAM_X16

R195 1KR1%0402 — FBC_MF3 — J1

M19C INS150983645 — Mirrored — MF (add 1k to VDD) — GDDR5_SDRAM_X16

DECOUPLING AROUND FBC MEMORIES (DQ32-DQ63)

FBVDDQ

SPARE

C484 C0.1u50X70402 · C483 C0.1u50X70402 · C122 C0.1u50X70402 · C123 C0.1u50X70402 · C528 C1u6.3X60402 · C101 C1u6.3X60402 · C529 C1u6.3X60402 · C109 C1u6.3X60402 · C111 C1u6.3X60402 · C112 C1u6.3X60402 · C476 C4.7u6.3X6S · C475 C4.7u6.3X6S · C106 C4.7u6.3X6S · C107 C4.7u6.3X6S · C477 C10u4X60603 · C105 C10u4X60603

GND

C11-106A233-T04

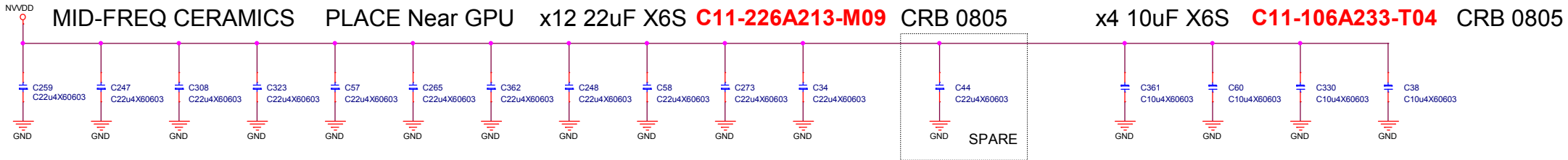
MICRO-STAR INT'L CO.,LTD.

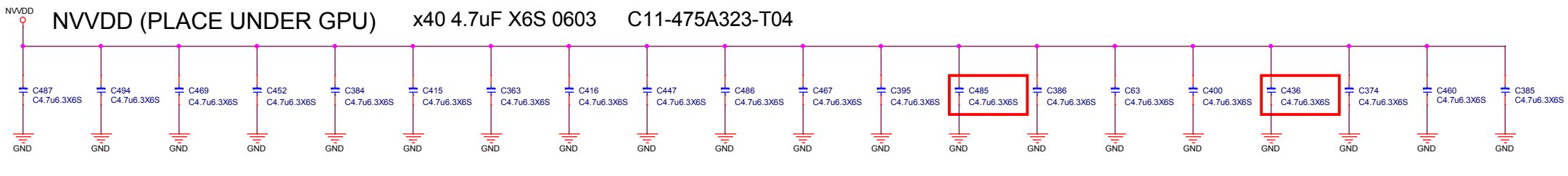
Title: DGPU_GDDR5 FB-C_DECOUPLING

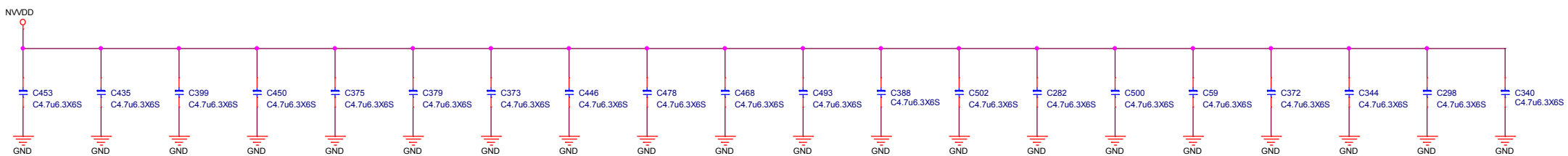
Size: — Document Number: MS-16H5 — Rev: 1.1

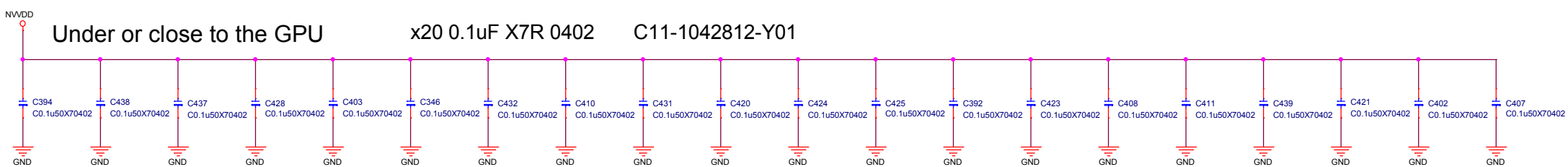
Date: Tuesday, July 15, 2014 — Sheet 22 of 72

GPU DECOUPLING A





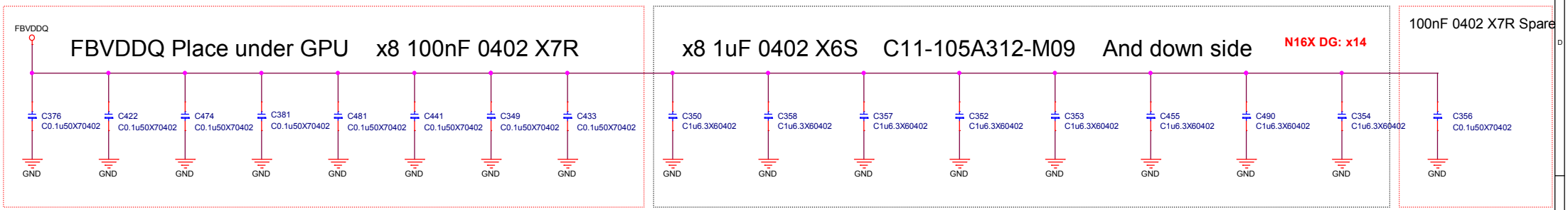


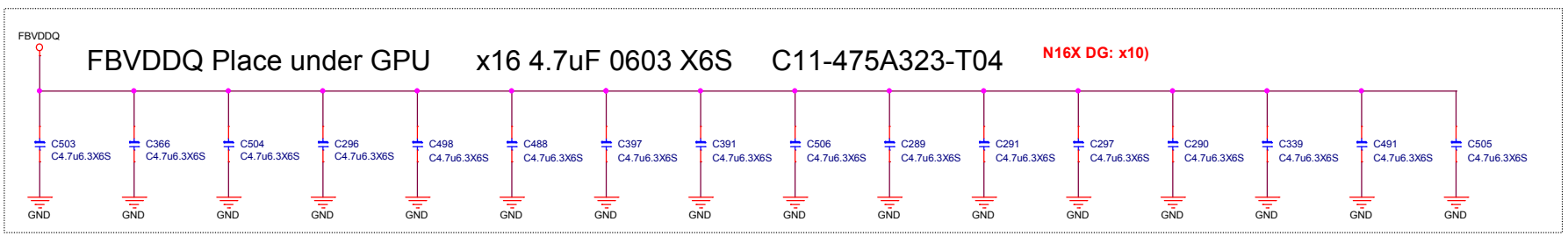


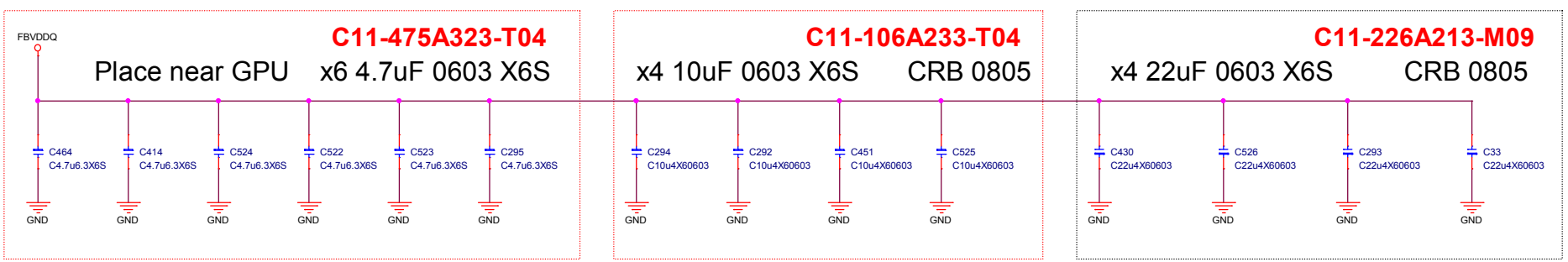
MICRO-STAR INT'L CO.,LTD.

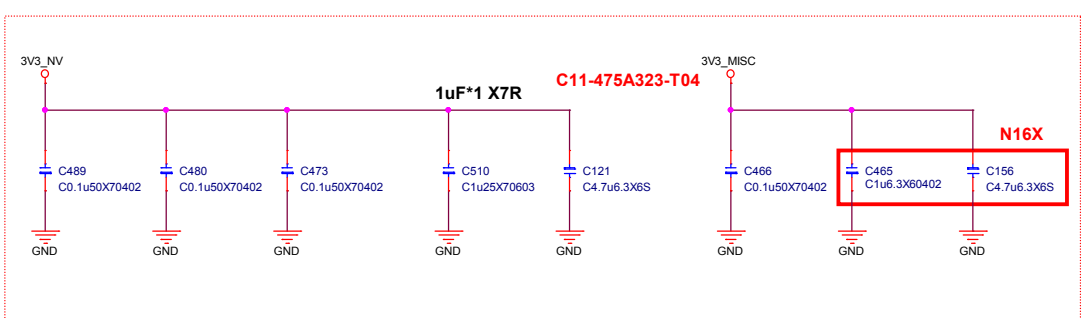
Title	DGPU_GPU DECOUPLING A	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 23 of 72	

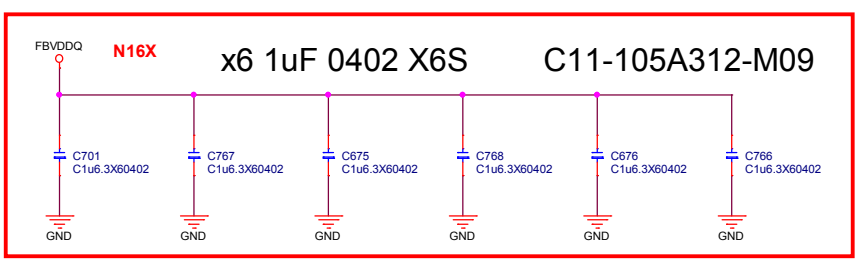
GPU DECOUPLING B











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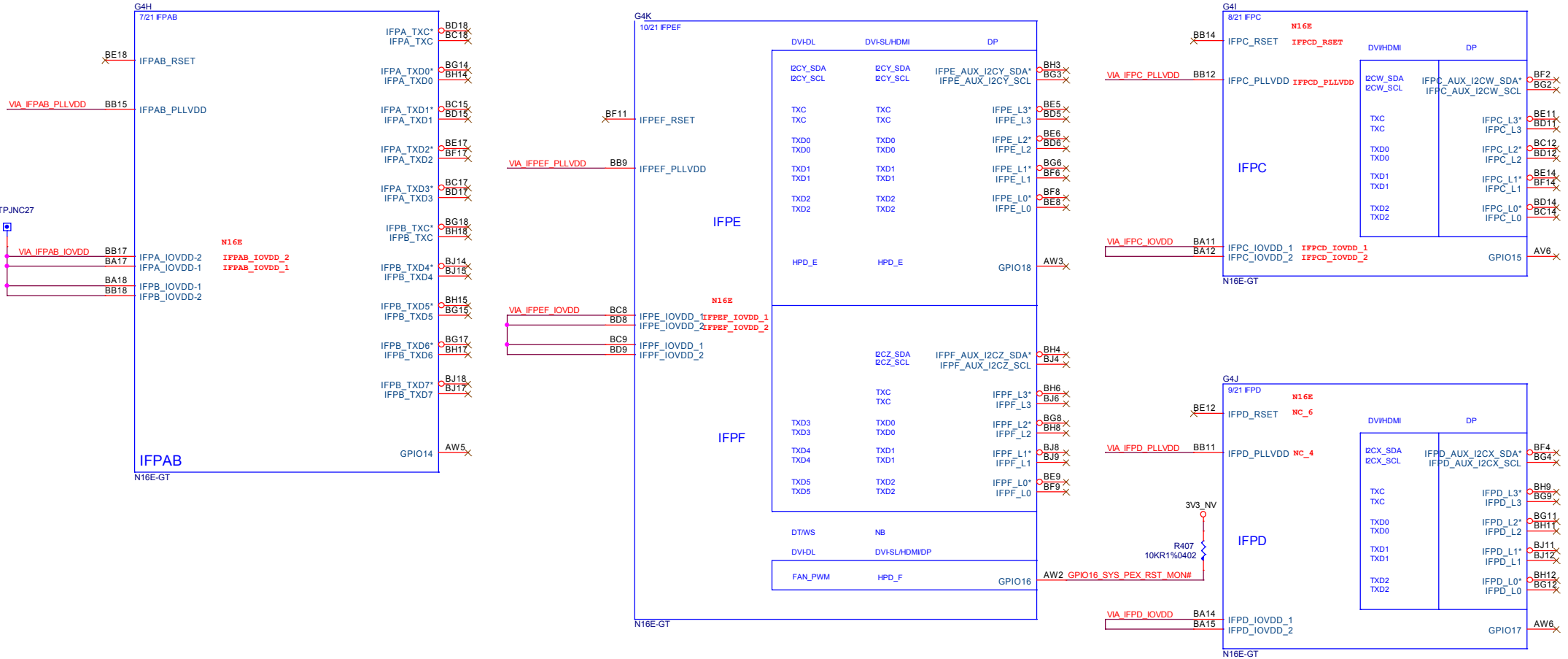
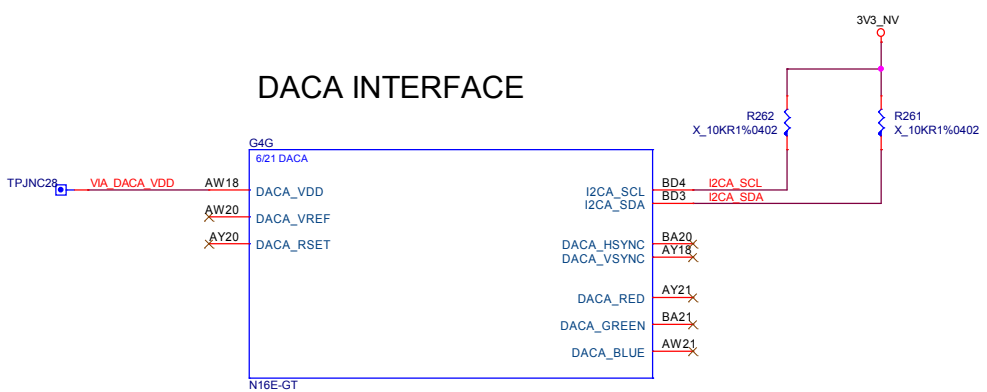
Title	DGPU_GPU DECOUPLING B	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 24 of 72	

DACA,Display IF



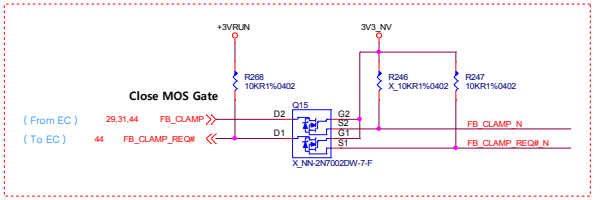
DACA INTERFACE

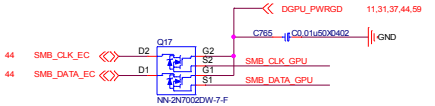


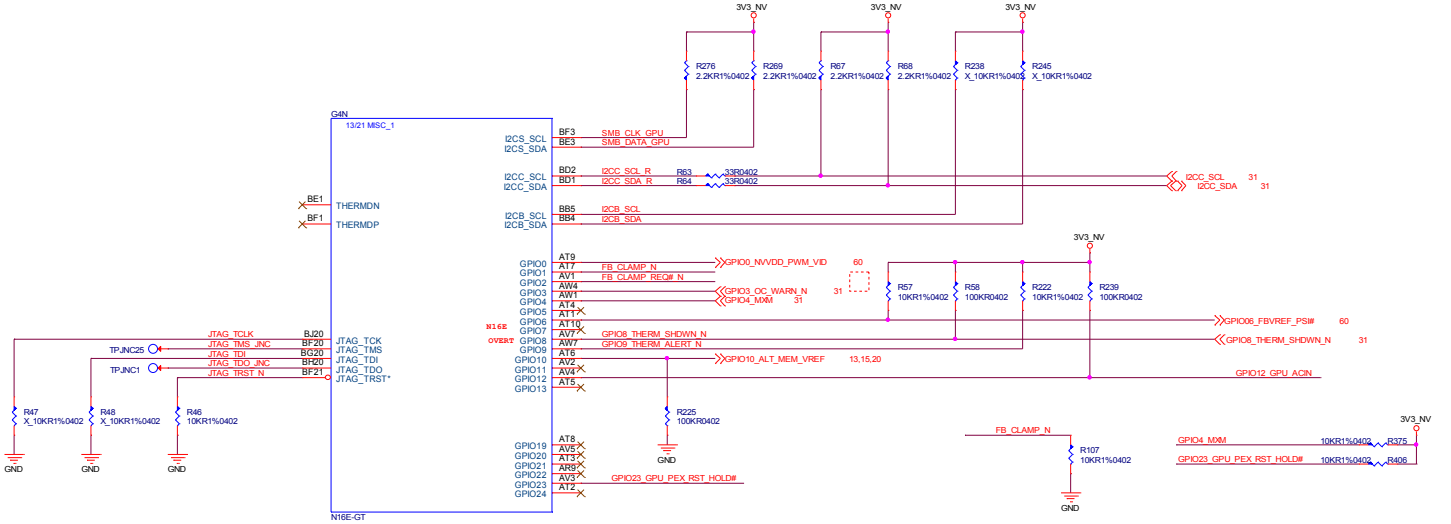
MICRO-STAR INT'L CO.,LTD.

Title	DGPU_DACA,Display IF	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 25 of 72	

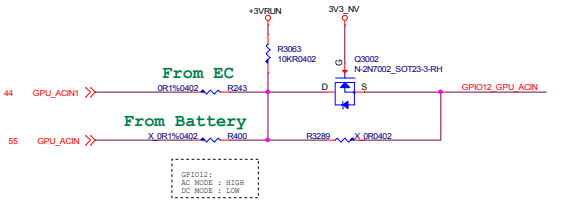
DGPU GPIO, I2C







Pin Name	Normal function	I/O	Functional Description	Recommended Default Pull-up or Pull-down
GPIO0	PWR_VID	O	GPU Core VDD PWM control signal	
GPIO1	GC6_FB_EN	O	FB Enable for GC6 2.0	10K pull-down
GPIO2	GPU_EVENT#	I	GPU wake signal for GC6 2.0	10K pull-up to 3V3 _AON
GPIO3	OC_WARN	I	Over current throttling	10K pull-up to 3V3 _AON
GPIO4	3V3_MAIN_EN	O	GPU POWER Sequencing for GC6 2.0	10K pull-up to 3V3 _AON
GPIO5	RESERVED			
GPIO6	PSI	O	Phase shedding	
GPIO7	LCD_BL_PWM	O	Panel Backlight PWM Brighteness Control	100K pull-down
GPIO8	HPD_F	I	Hot Plug Detect for IFPDF	
GPIO9	THERM_ALERT	I/O	Active Low Thermal Alert	10K pull-up to 3V3 _AON
GPIO10	MEM_VREF_CTL	O	Memory VREF Control	100K pull-down
GPIO11	LCD_VCC	O	Panel Power Enable	100K pull-down
GPIO12	PWR_LEVEL	I	AC power detect or power supply overdraw input	100K pull-up to 3V3 _AON
GPIO13	LCD_BLEN	O	Panel Backlight Enable	100K pull-down
GPIO14	HPD_A	I	Hot Plug Detect for IFPAB	
GPIO15	HPD_C	I	Hot Plug Detect for IFPC	
GPIO16	SYS_PEX_RST_MON#	I	System side PCI reset Monitor	10K pull-up to 3V3 _AON
GPIO17	HPD_D	I	Hot Plug Detect for IFPD	
GPIO18	HPD_E	I	Hot Plug Detect for IFPE	
GPIO19	3DVision	O	3D Vision L/R signal	100K pull-down
GPIO20	RESERVED			
GPIO21	SLI_RASTER_SYNC	I	SLI Raster Sync	100K pull-down
GPIO22	SLI_SWAP_DRY	I	SLI Swap Ready	1K pull-up to 3V3 _AON
GPIO23	GPU_PEX_RST_HOLD	O	GPU PCIE self-reset control	10K pull-up to 3V3 _AON
GPIO24	MEM_VDD_CTL	O	Memory VDD VID	
GPIO25	RESERVED			
GPIO26	RESERVED			
GPIO27	HPD_B	I	Hot Plug Detect for IFPB	
OVERT	OVERT(OVERT#)	I/O	Catastrophic Over Temperature	100K pull-up to 3V3 _AON



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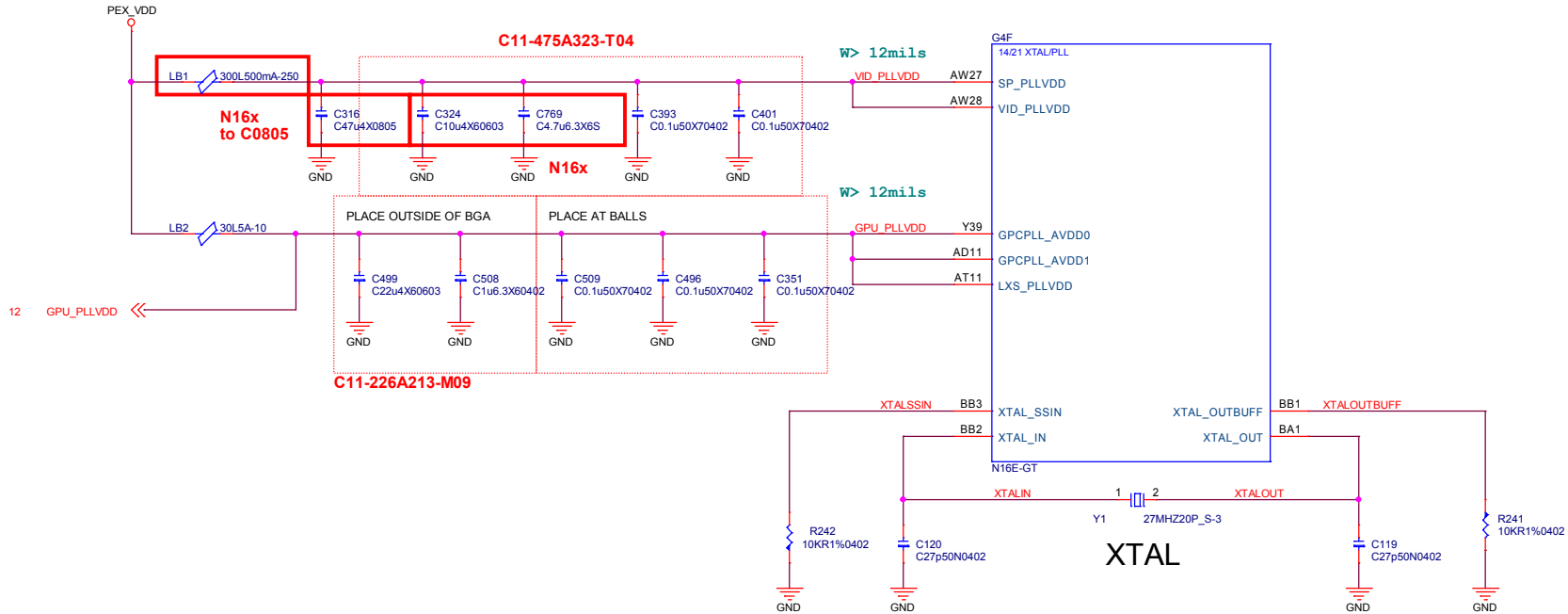
Title: DGPU_GPIO,I2C

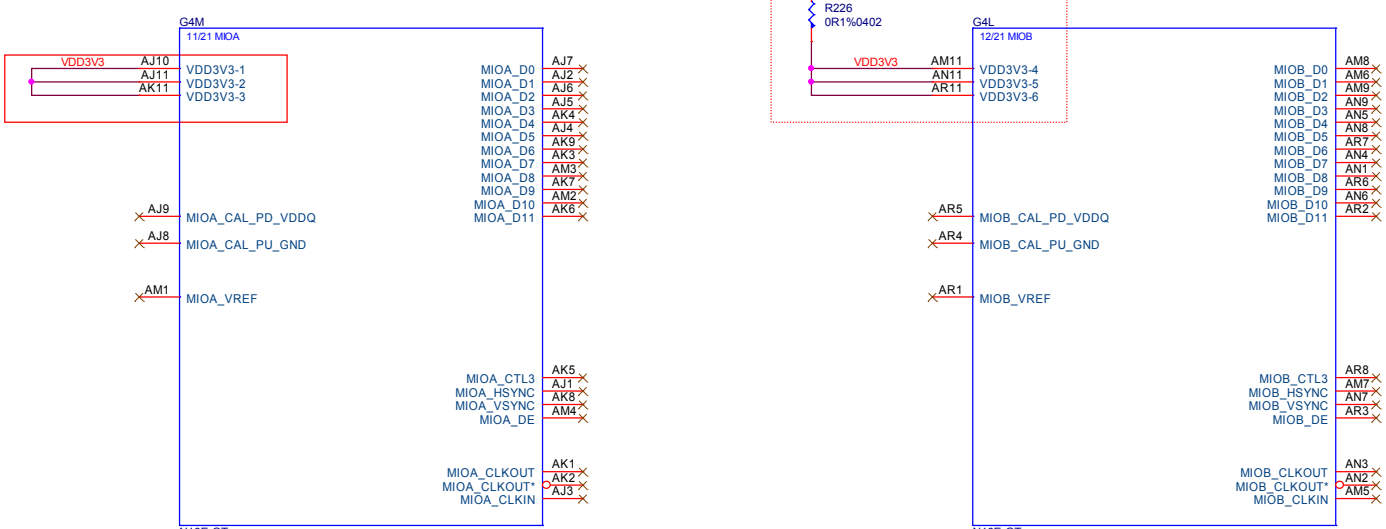
Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 26 of 72

DGPU MIO & XTAL



Multi-use IO(MIO) Interface



MICRO-STAR INT'L CO.,LTD.

Title: DGPU MIO & XTAL

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 27 of 72

ROM, MULTI-LEVEL STRAPS

	GND	3V3
5K	0000	1000
10K	0001	1001
15K	0010	1010
20K	0011	1011
25K	0100	1100
30K	0101	1101
35K	0110	1110
45K	0111	1111
	PD	PU

ROM_SI10K **Hynix** V_TOP1 V_BOT1

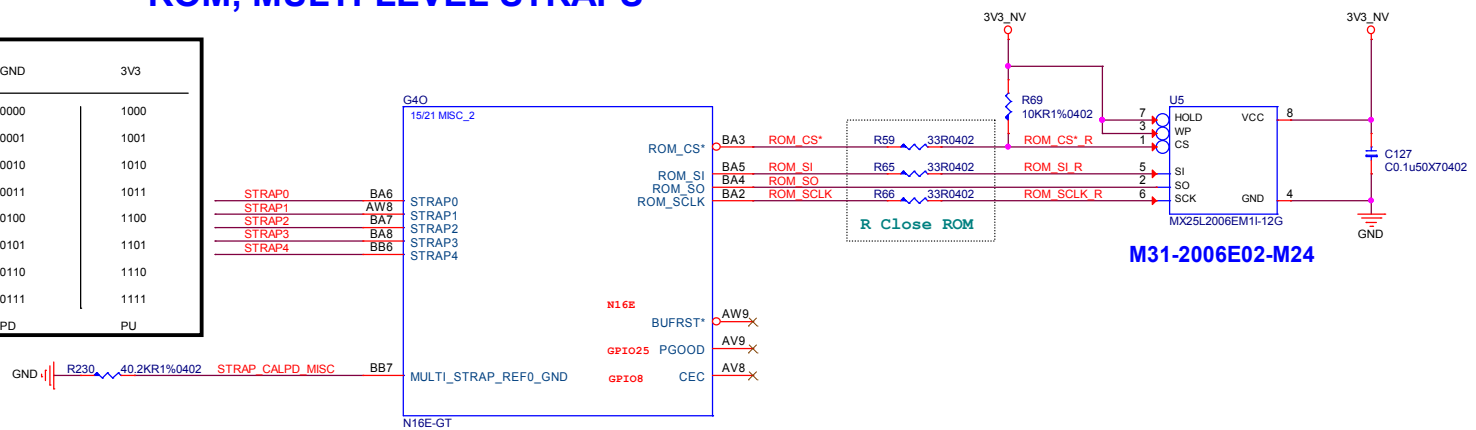
128Mx16bit **5010** **5020**

R11-0103T12-W08	M12-5GC2H05-H23	M12-5GC2H05-H23
X_10KR1%0402	X_H5GC2H24BFR-T2C	X_H5GC2H24BFR-T2C

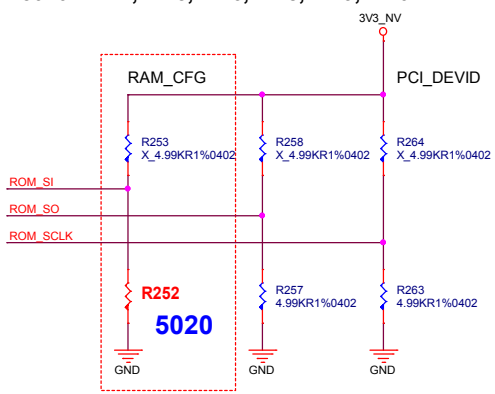
ROM_SI5K **Samsung** V_TOP2 V_BOT2

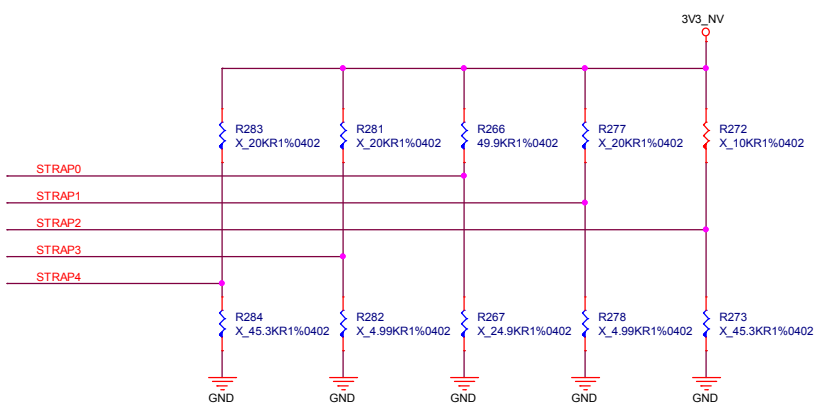
128Mx16bit **5010** **5020**

R11-4991T12-W08	M12-2032585-S02	M12-2032585-S02
X_5KR1%0402	X_K4G20325FD-FC03	X_K4G20325FD-FC03



GDDR5 Parts
5010 : M4 , M3 , M5 , M6 , M8 , M9
5020 : M17, M15, M16, M18, M19, M20





	N16E-GT ES		N16E-GT QS	
ROM_SI	35K PD	Hynix 128x16bit	10K PD	Hynix 128x16bit
	45K PD	Samsung 128x16bit	5K PD	Samsung 128x16bit
ROM_SO	5K PD			
ROM_SCLK	5K PD			
STRAP0	50K PU 3V3_AON			
STRAP1	Reserved			
STRAP2	Reserved			
STRAP3	Reserved			
STRAP4	Reserved			

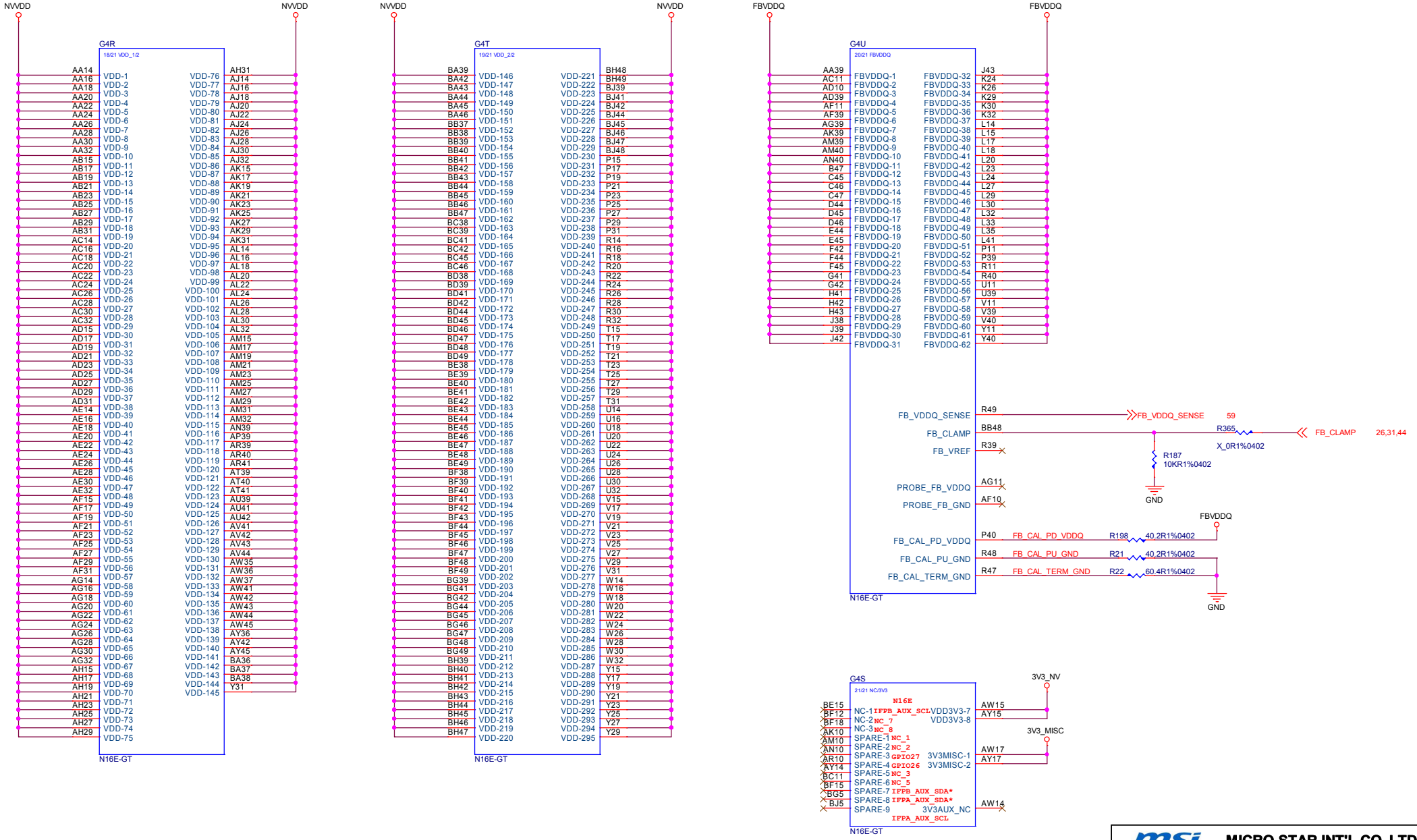
MICRO-STAR INT'L CO.,LTD.

Title: DGPU_ROM,HW Straps

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 28 of 72

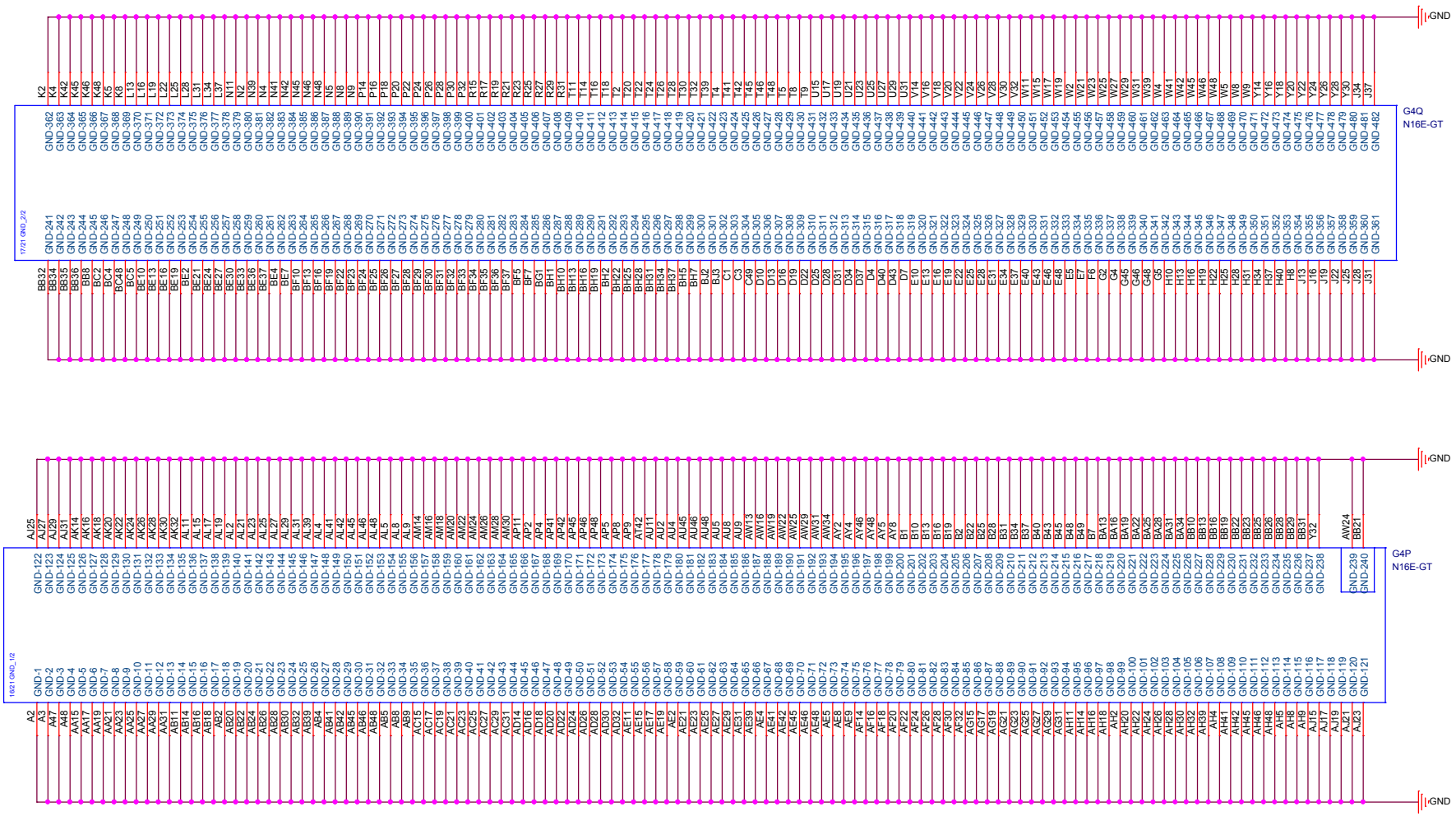
GPU NVVDD, FBVDDQ



Title	DGPU NVVDD, FBVDDQ
Size	
Document Number	MS-16H5
Rev	1.1
Date:	Tuesday, July 15, 2014
Sheet	29 of 72

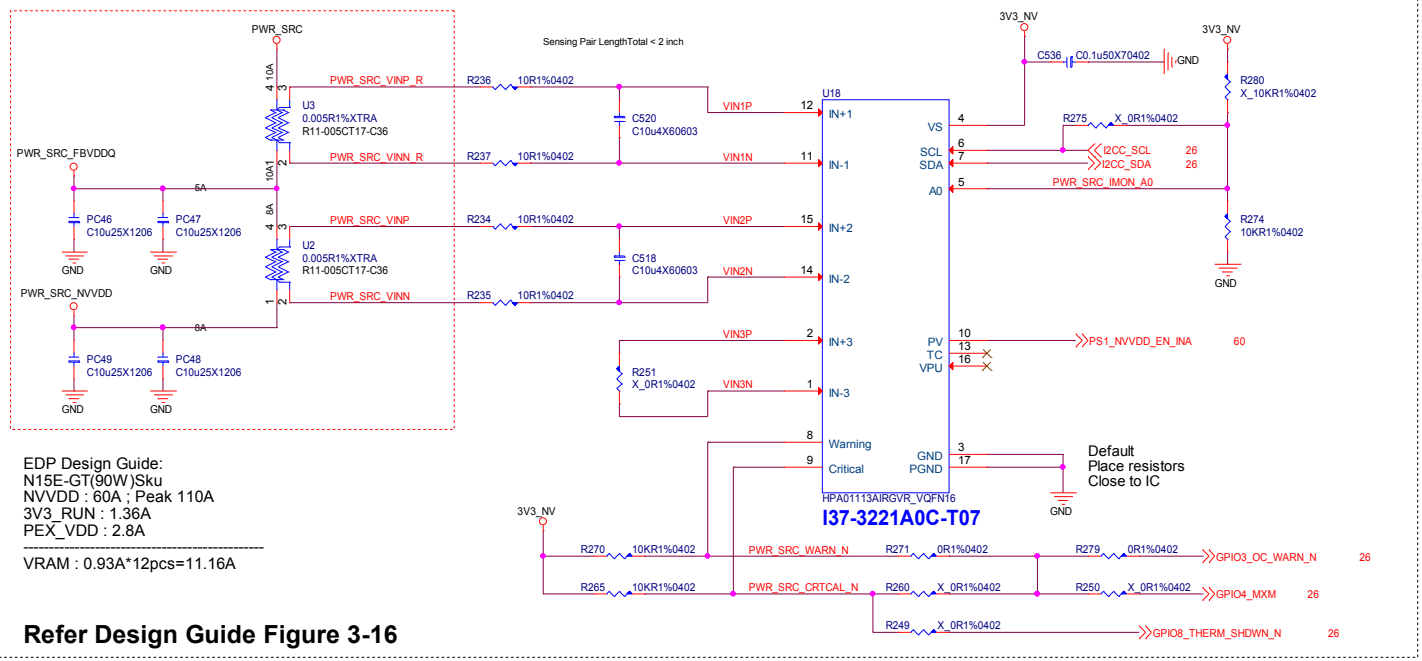
MICRO-STAR INT'L CO.,LTD.

DGPU GND



MSI	MICRO-STAR INT'L CO.,LTD.		
Title	DGPU GND		
Size	Document Number MS-16H5		Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 30 of 72		

DGPU_Power Control



EDP Design Guide:
N15E-GT(90W)Sku
NVVDD : 60A ; Peak 110A
3V3_RUN : 1.36A
PEX_VDD : 2.8A

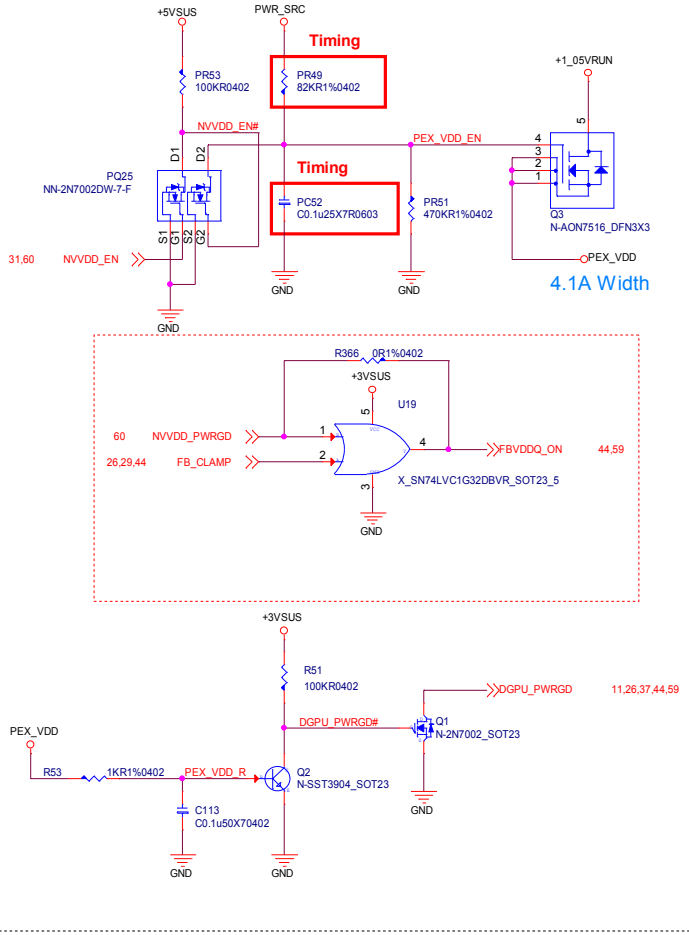
VRAM : 0.93A*12pcs=11.16A

Default
Place resistors
Close to IC

I37-3221A0C-T07

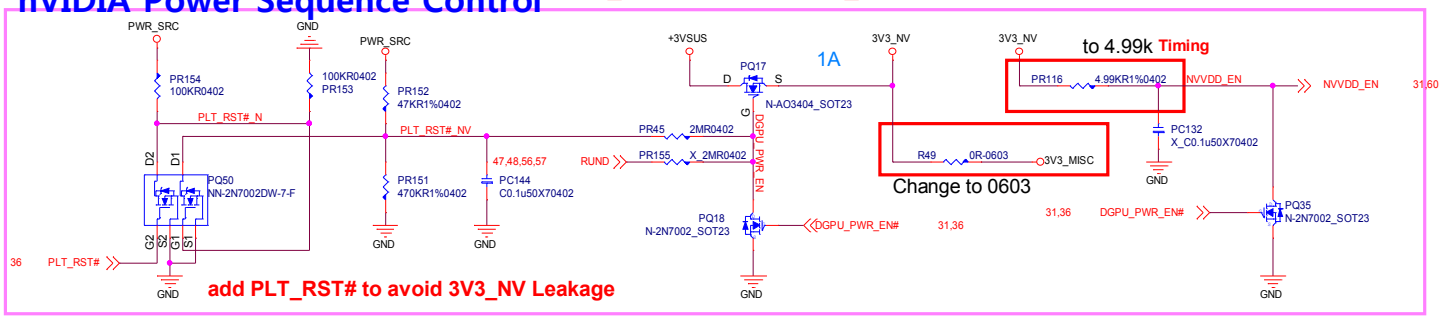
Refer Design Guide Figure 3-16

PEX_VDD

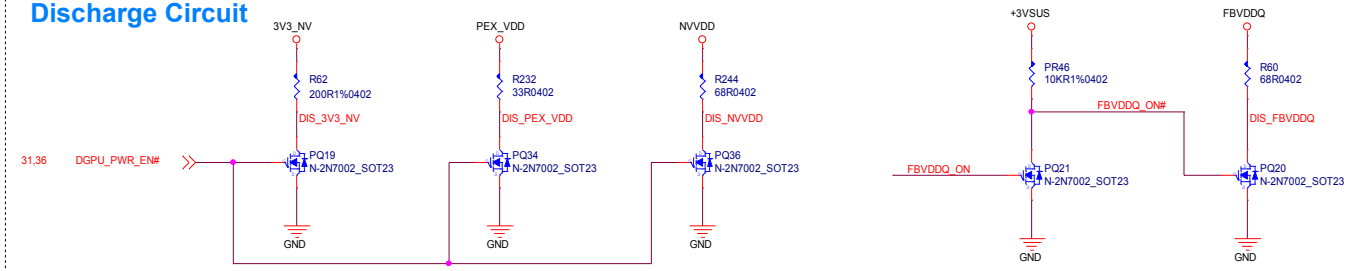


nVIDIA Power Sequence Control

3V3_NV -> NVVDD, PEX_VDD -> FBVDDQ -> DGPUPWRGD



Discharge Circuit

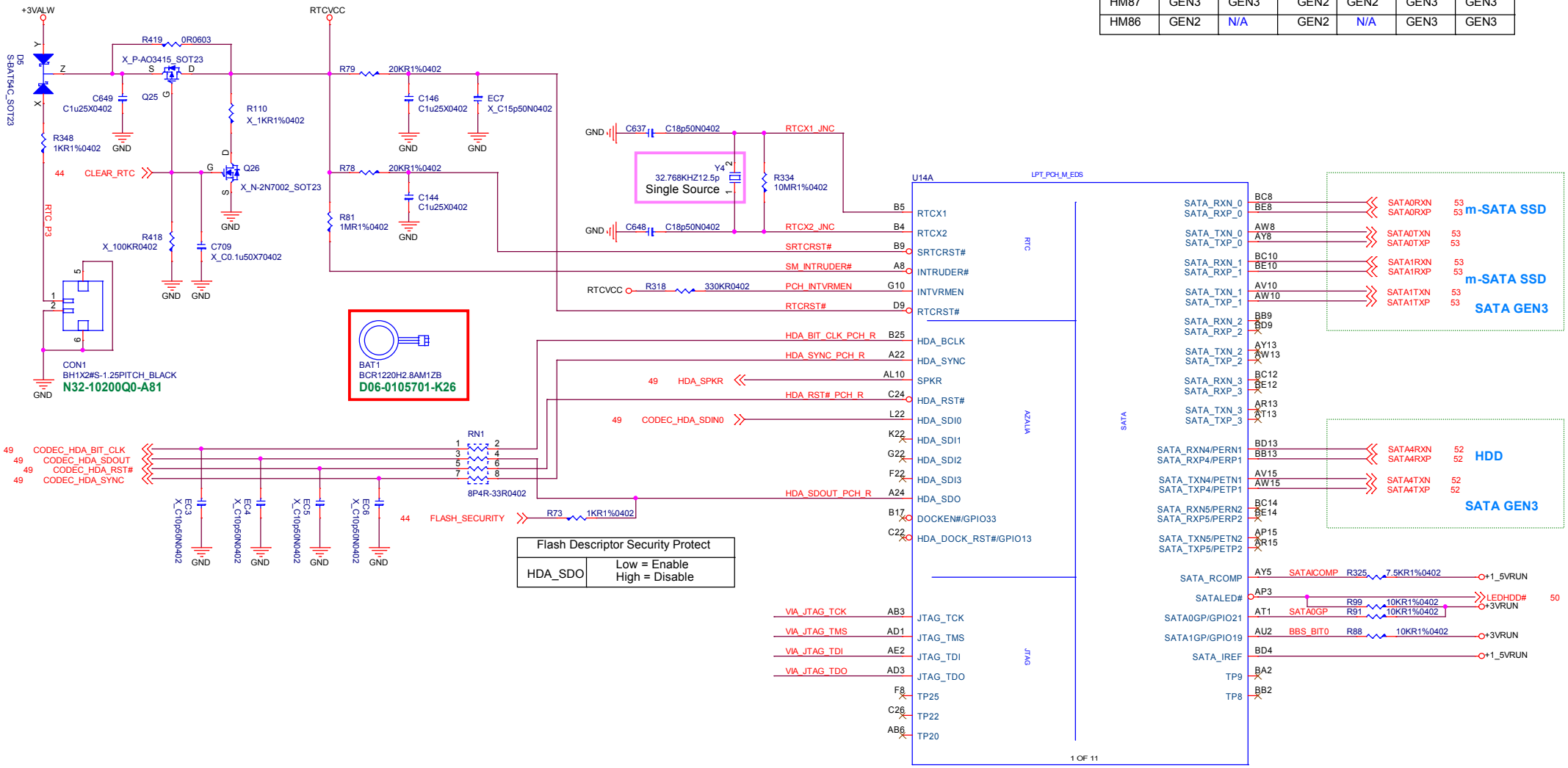


MICRO-STAR INT'L CO.,LTD.

Title	DGPU_Power Control	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 31 of 72	

Lynx Point (HDA/JTAG/SATA)

SKU	High Speed SATA I/O Ports					
	SATA-0	SATA-1	SATA-2	SATA-3	SATA-4	SATA-5
HM87	GEN3	GEN3	GEN2	GEN2	GEN3	GEN3
HM86	GEN2	N/A	GEN2	N/A	GEN3	GEN3



Flash Descriptor Security Protect	
HDA_SDO	Low = Enable High = Disable

SPK	The Signal has a weak internal pull-down Note: the internal pull-down is disabled after PLTRST# deasserts. If the signal is sampled high, this indicates that the system is strapped to the "No Reboot" mode (Panther Point will disable the TCO Timer system reboot feature)

MICRO-STAR INT'L CO.,LTD.

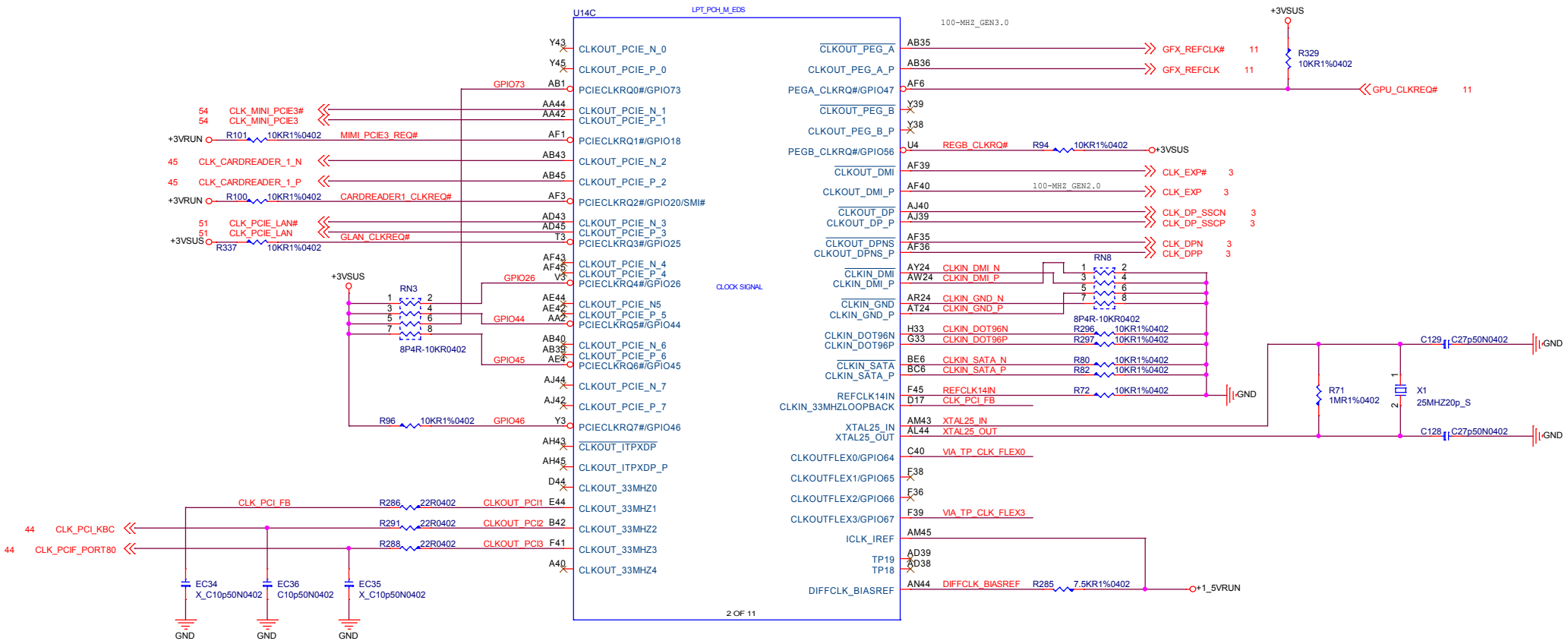
Title: PCH-1 (HDA/JTAG/SATA)

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 32 of 72

Lynx Point (Clock)

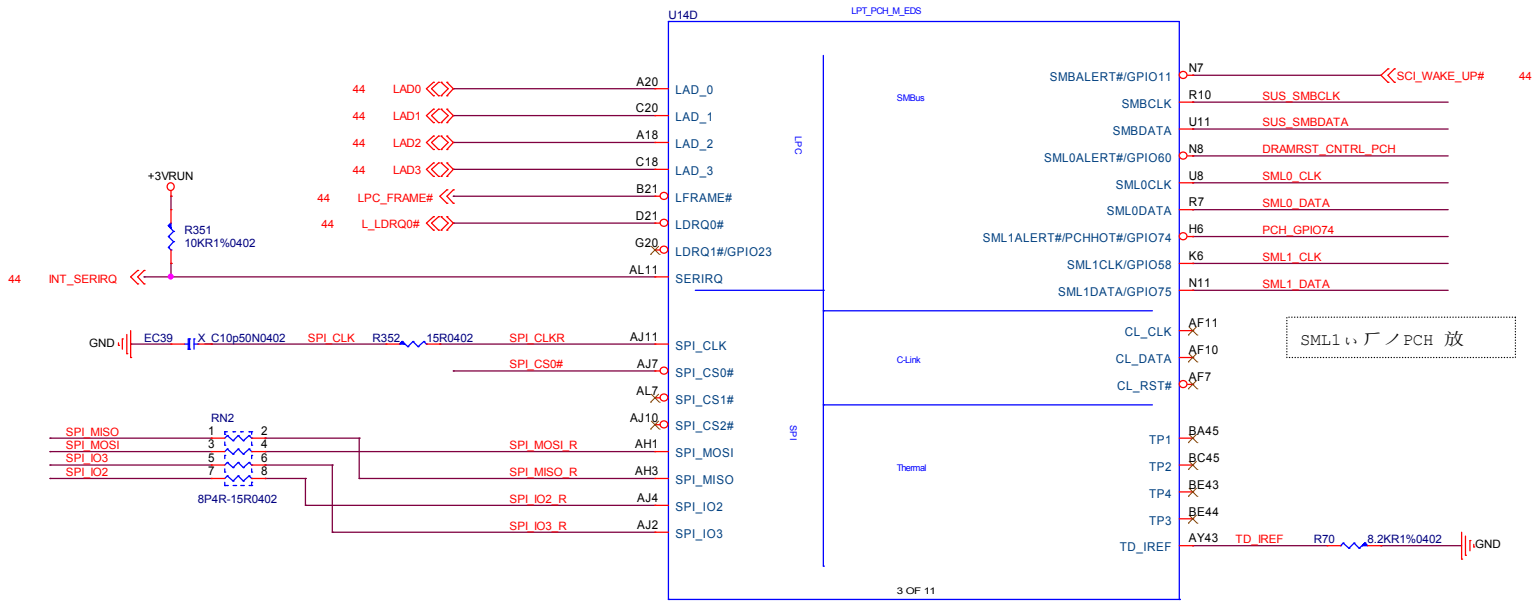
PCIe devices or addin cards that do NOT support CLKREQ# functionality should not route this signal to PCH.
Intel recommends terminating PCIECLKRQx# pin on PCH with 10 k ±10% external pull-up resistor instead of No Connect.
Only PCIECLKRQ[2:1]# on PCH are core well powered. All other PCIECLKRQx# are suspend well powered.

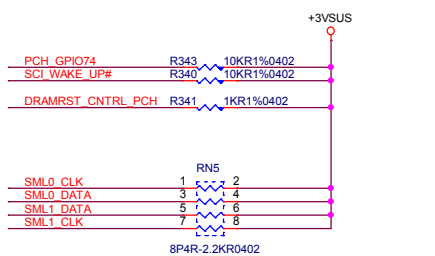


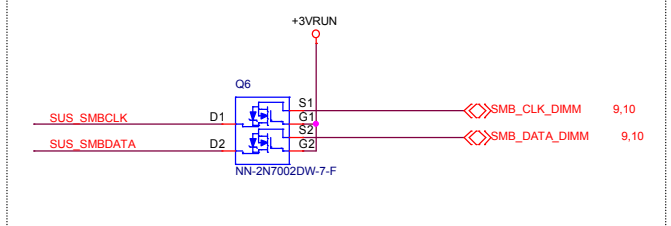
The CLKREQ# function can be disabled via intel management engine FW .Please refer to INTEL ME FW Bring up guide for configuring/disabling CLKREQ#

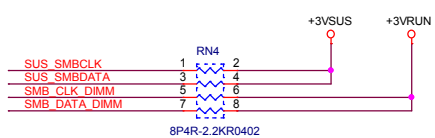
MICRO-STAR INT'L CO.,LTD.		
Title: PCH-2 (CLK)		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 33 of 72	

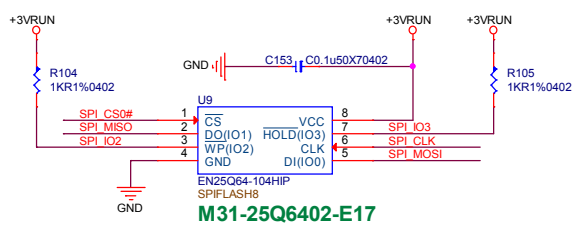
Lynx Point (LPC,SMBUS)





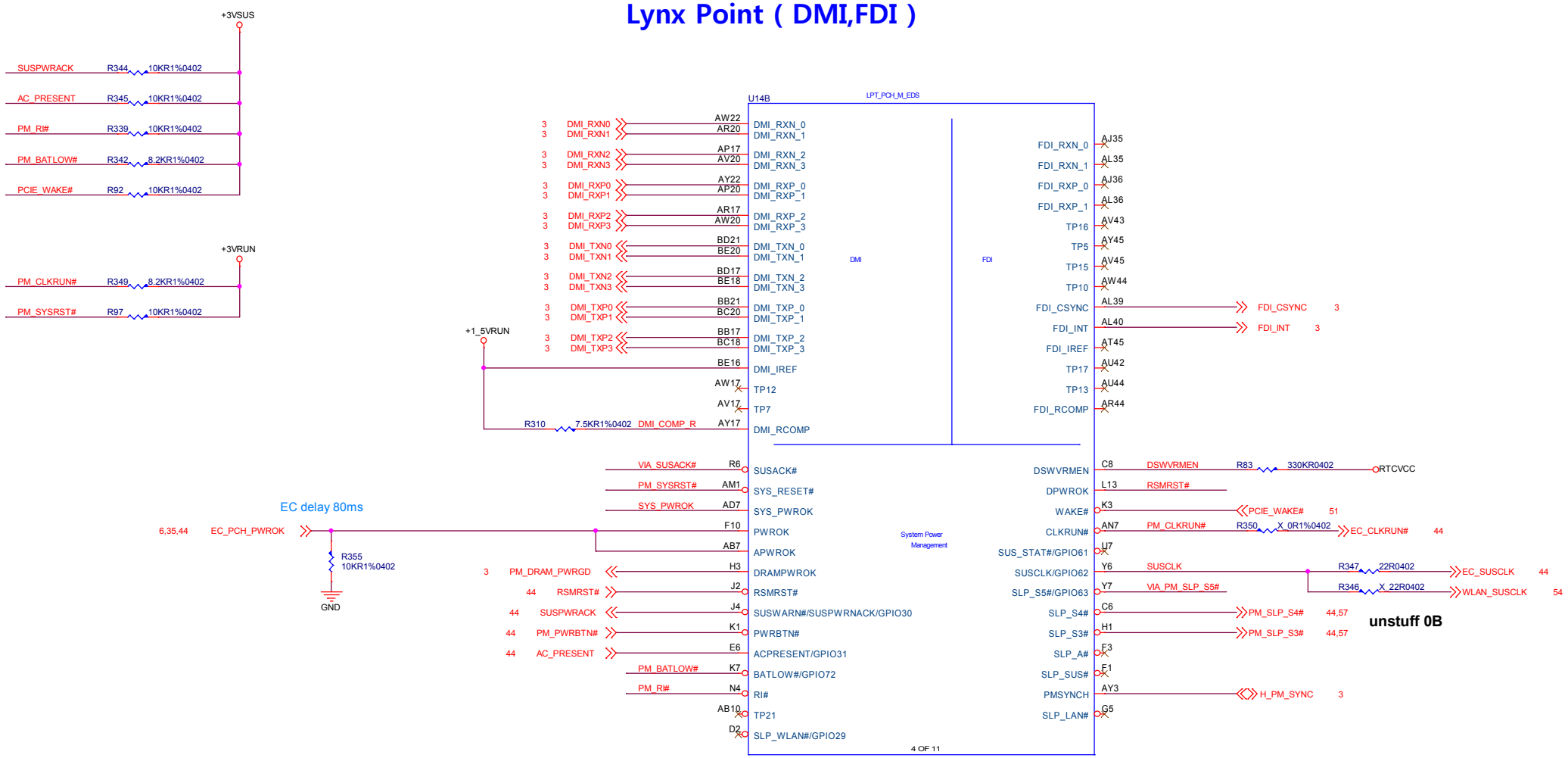


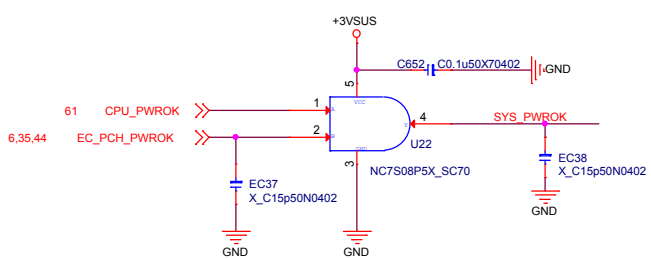




MICRO-STAR INT'L CO.,LTD.		
Title: PCH-3 (LPC,SMBUS)		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 34 of 72	

Lynx Point (DMI,FDI)





APWROK not supporting Intel AMT , it can be connected to PWROK
GPIO31 : If not used,require pull up +3VSUS
DSWVRMEN - On Die DSW VR Enable HIGH : Enable internal 1.05V regulator LOW : Disable
DPWROK Without deep s4/s5 support tied together with RSMRST#

GPIO Setting : Ref 486708_LPT_EDS Section2.18

PLL ON DIE VR_ENABLE	
GPIO62	Internal pull high (Enable)
	Low: Disable

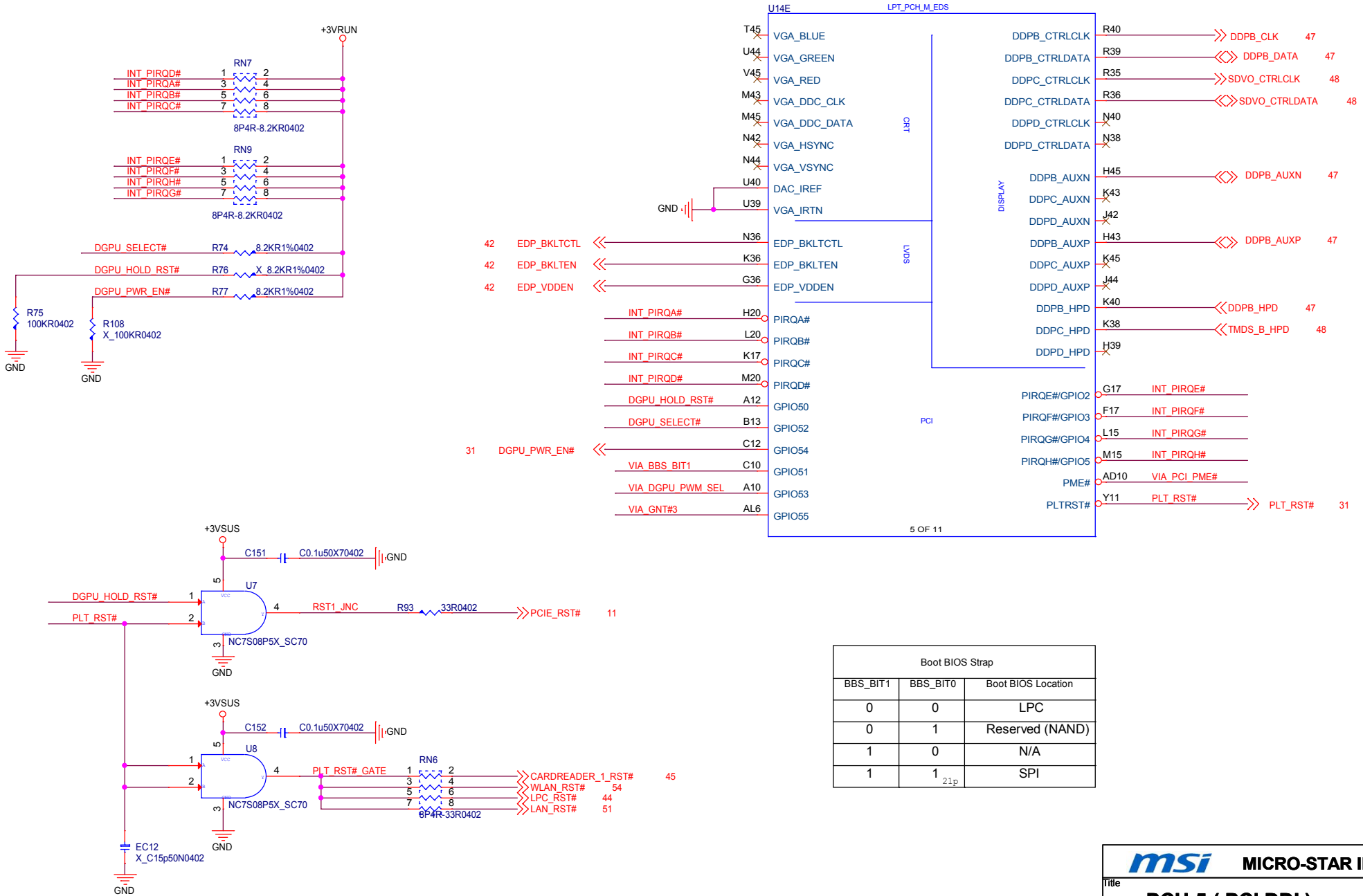
MICRO-STAR INT'L CO.,LTD.

Title: PCH-4 (DMI,FDI)

Size: | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 35 of 72

Lynx Point (PCI,DDI)



Boot BIOS Strap		
BBS_BIT1	BBS_BIT0	Boot BIOS Location
0	0	LPC
0	1	Reserved (NAND)
1	0	N/A
1	1	SPI

MICRO-STAR INT'L CO.,LTD.

Title: PCH-5 (PCI,DDI)

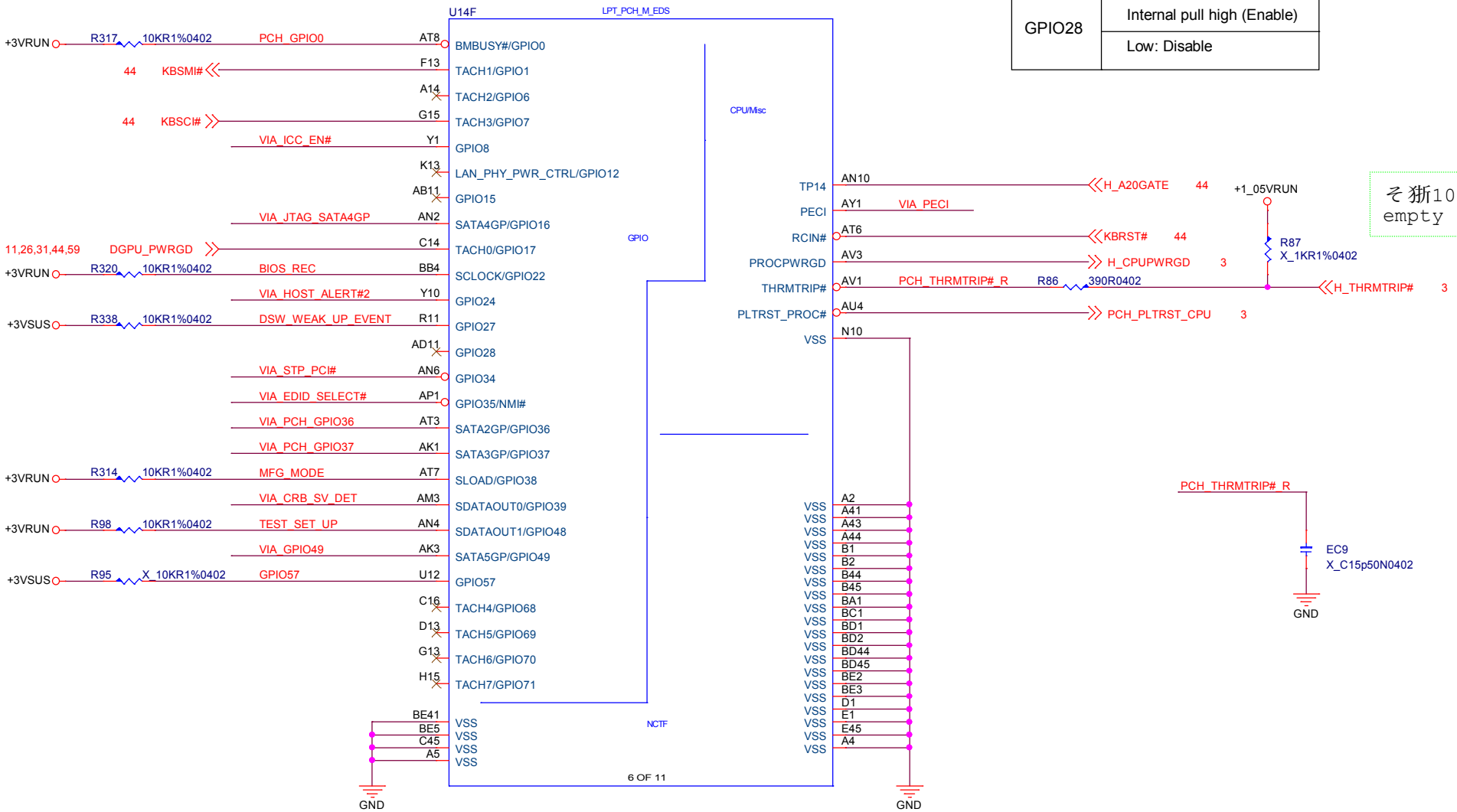
Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 36 of 72

Lynx Point (GPIO,MISC)

GPIO Setting : Ref 486708_LPT_EDS Section2.24

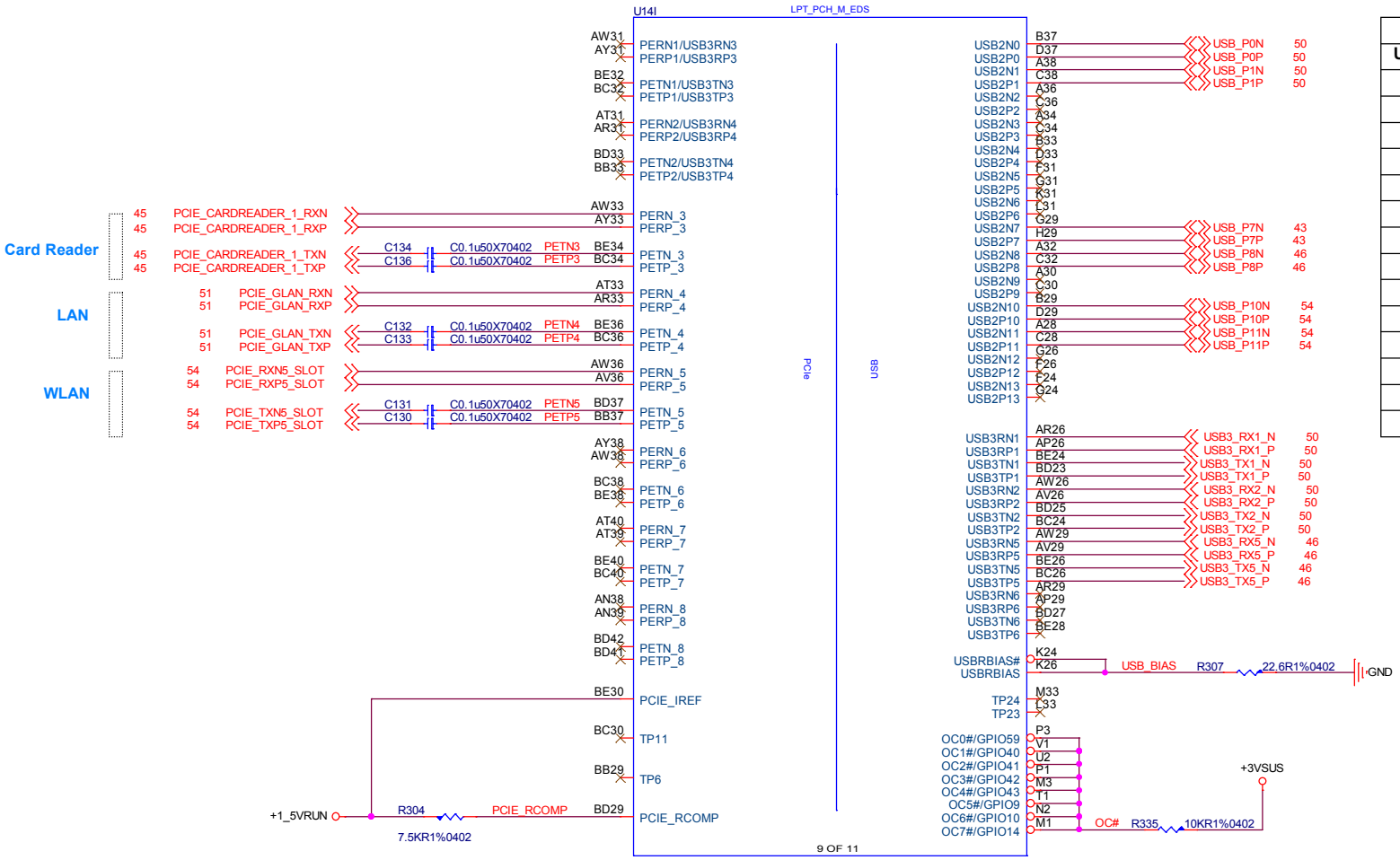
PLL ON DIE VR_ENABLE	
GPIO28	Internal pull high (Enable)
	Low: Disable



MSI	MICRO-STAR INT'L CO.,LTD.	
Title	PCH-6 (GPIO,MISC)	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 37 of 72	

Lynx Point (PCIE,USB)

Intel Lynx Point ECHI USB(2.0) debug transport 惠钡Port1 or Port9



USB			
USB 2.0	USB 3.0	Device	Note
0	1	USB 3.0 Port 1	16H5A
1	2	USB 3.0 Port 2	16H5A
2			
3			NC
4			NC
5			NC
6			NC
7		EPF021	
8	3	USB 3.0 Port 5	16H51
9			NC
10		WLAN	
11		WebCam	
12			NC
13			NC

HM86 ⊿USB3.0 PORT 5,6

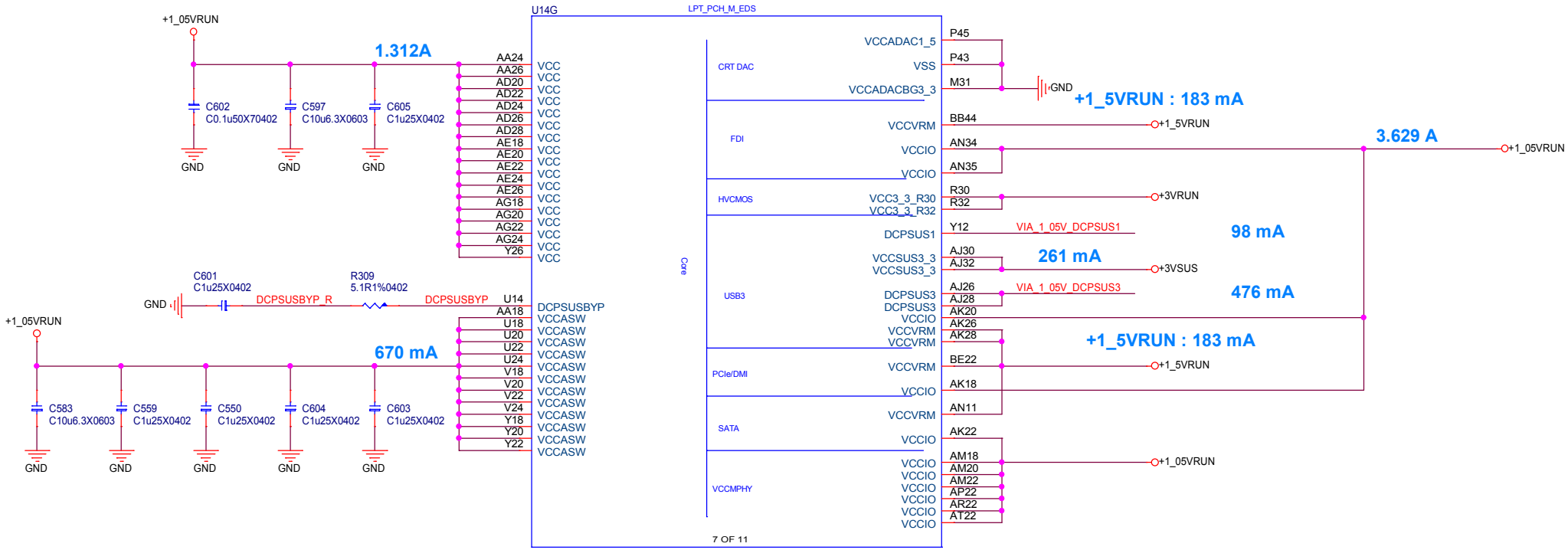
MICRO-STAR INT'L CO.,LTD.

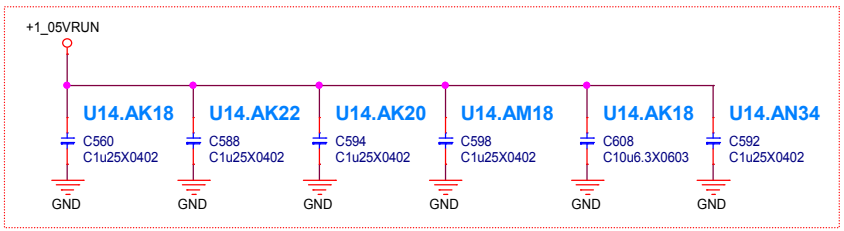
Title: PCH-7 (PCIE,USB)

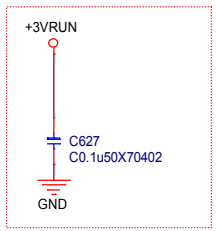
Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 38 of 72

Lynx Point (Power)



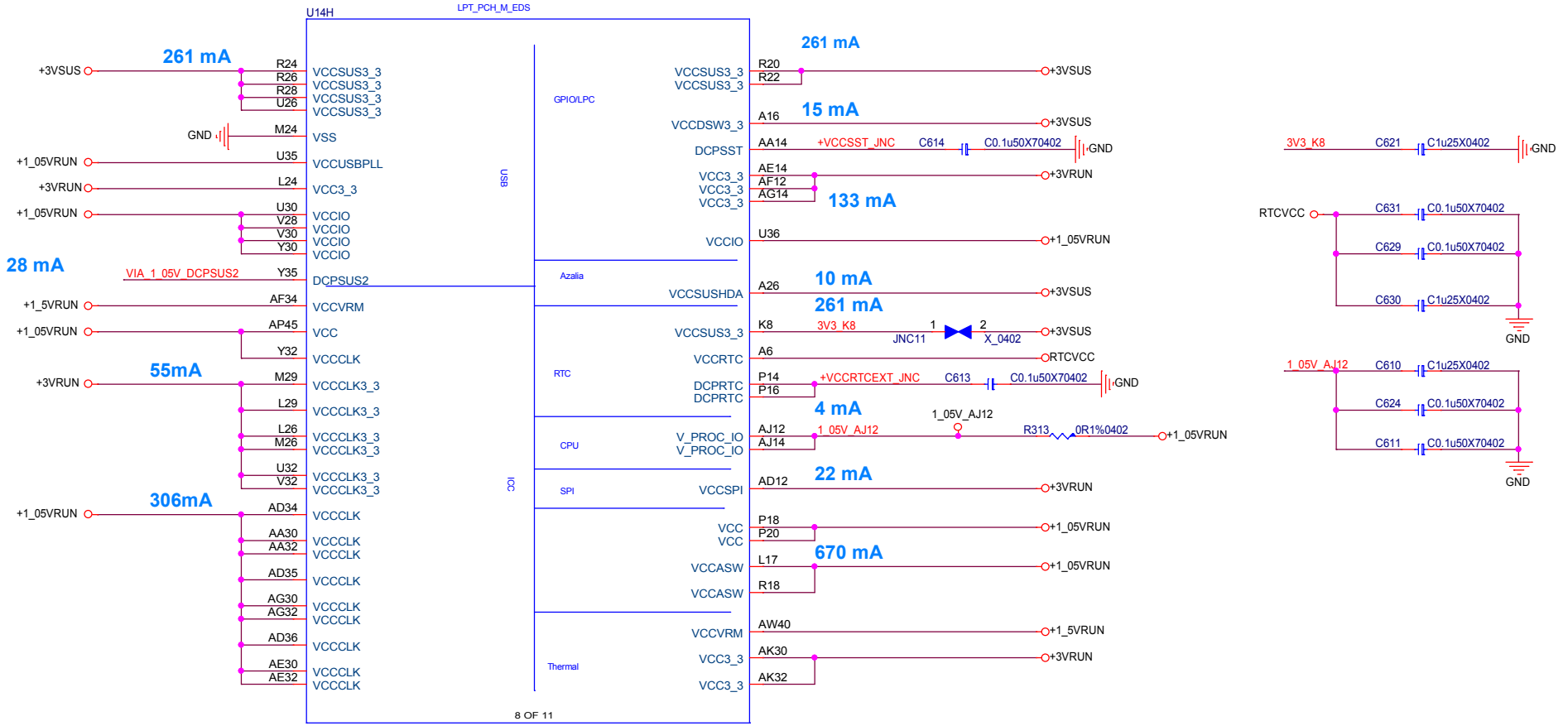


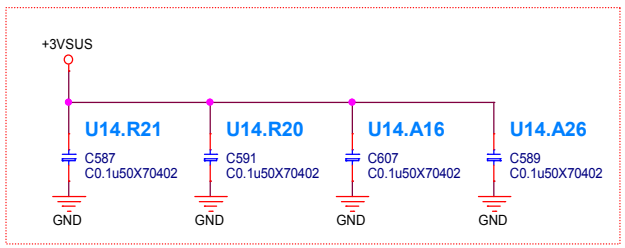


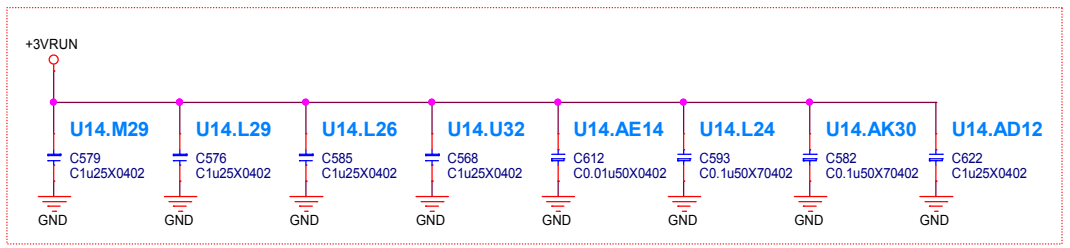
MICRO-STAR INT'L CO.,LTD.

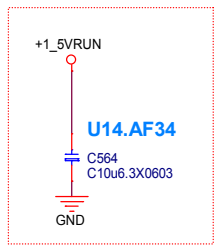
Title	PCH-8 (Power)	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 39 of 72	

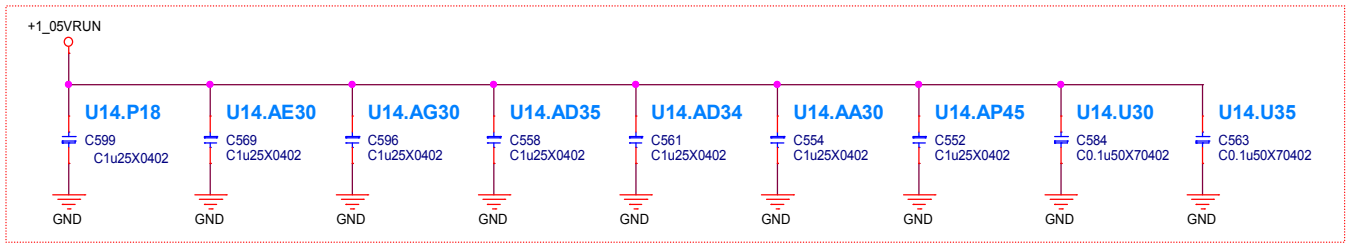
Lynx Point (Power)







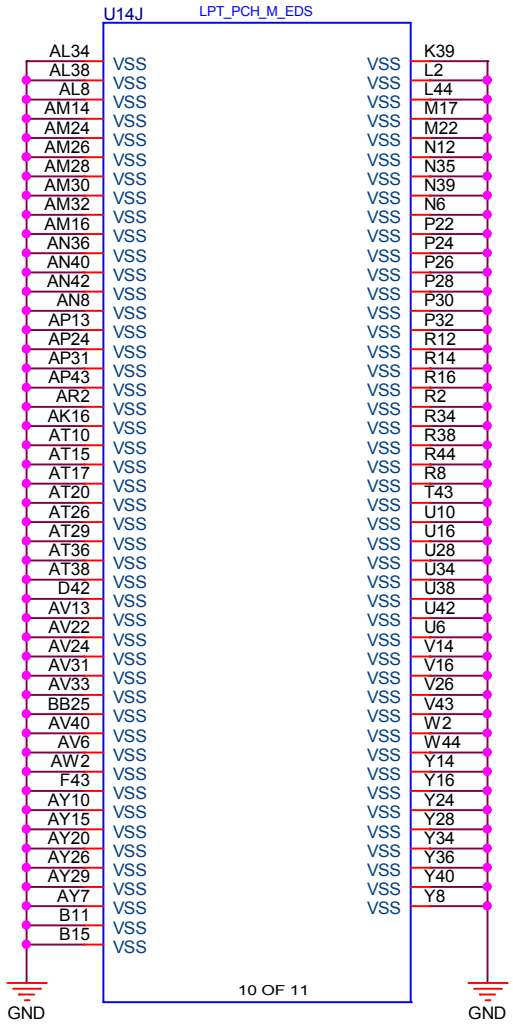


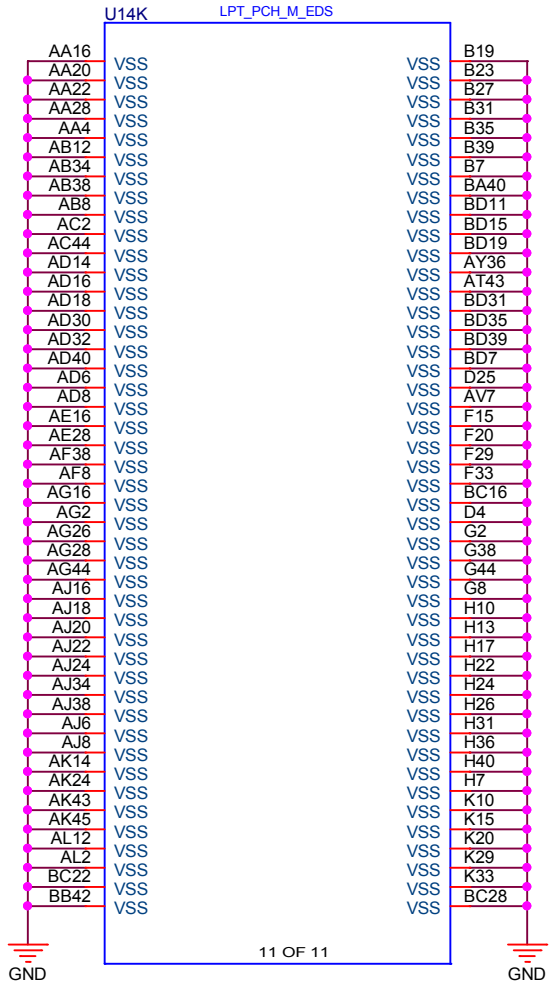


MICRO-STAR INT'L CO.,LTD.

Title	PCH-8 (Power)	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 40 of 72	

Lynx Point (GND)

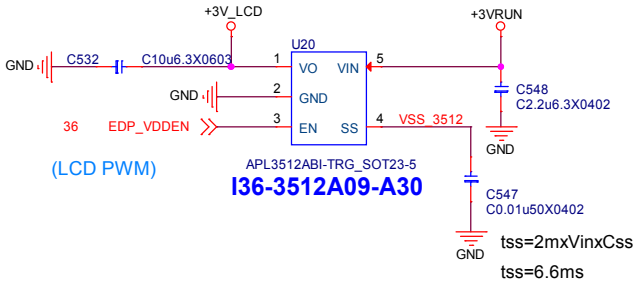




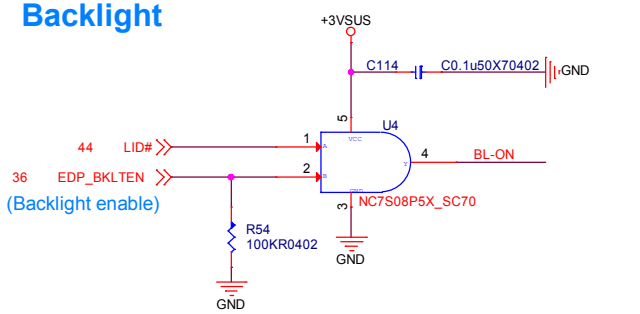
MICRO-STAR INT'L CO.,LTD.		
Title: PCH-8 (GND)		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 41 of 72	

eDP Connector

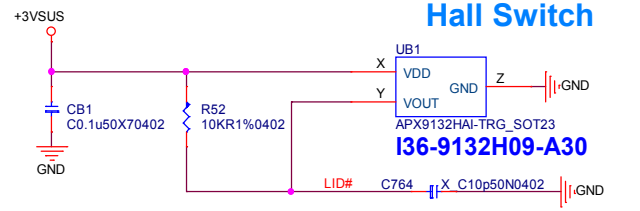
Pannel Device Logic Power



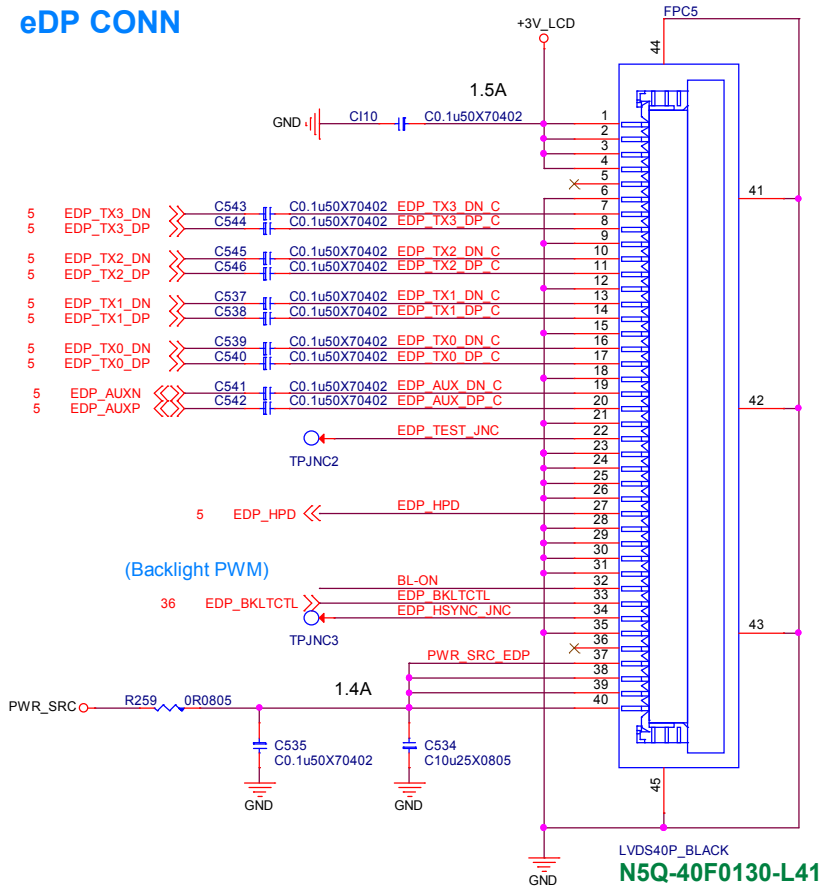
Backlight



Hall Switch

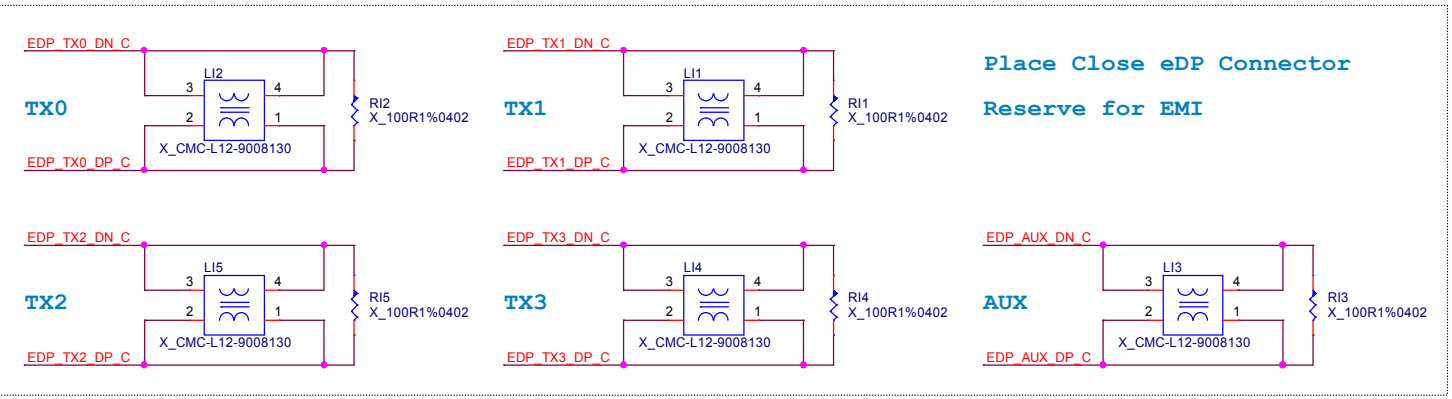


eDP CONN



LCD Module Pin Define

Pin No	Symbol	Description
1	WP	EEPROM Write Protect(Keep open)
2	H_GND	High Speed Ground(0V)
3	eDP_Rx_3N	Complement Signal Link Lane 3
4	eDP_Rx_3P	True Signal Link Lane 3
5	H_GND	High Speed Ground(0V)
6	eDP_Rx_2N	Complement Signal Link Lane 2
7	eDP_Rx_2P	True Signal Link Lane 2
8	H_GND	H_GND
9	eDP_Rx_1N	Complement Signal Link Lane 1
10	eDP_Rx_1P	True Signal Link Lane 1
11	H_GND	H_GND
12	eDP_Rx_0N	Complement Signal Link Lane 0
13	eDP_Rx_0P	True Signal Link Lane 0
14	H_GND	H_GND
15	eDP_AUX_CH_P	True Signal Aux Channel
16	eDP_AUX_CH_N	Complement Signal Aux Channel
17	H_GND	H_GND
18	LCD_VCC	LCD logic and driver power
19	LCD_VCC	LCD logic and driver power
20	LCD_VCC	LCD logic and driver power
21	LCD_VCC	LCD logic and driver power
22	TEST	LCD Test Port
23	LCD_GND	LCD logic and driver ground(0V)
24	LCD_GND	LCD logic and driver ground(0V)
25	LCD_GND	LCD logic and driver ground(0V)
26	LCD_GND	LCD logic and driver ground(0V)
27	eDP_HPD	HPD signal pin
28	BL_GND	Backlight ground(0V)
29	BL_GND	Backlight ground(0V)
30	BL_GND	Backlight ground(0V)
31	BL_GND	Backlight ground(0V)
32	BL_ENABLE	Backlight enable
33	BL_PWM_DIM	System PWM signal input
34	SDA	I2C-bus Data
35	SCL	I2C-bus Clock
36	BL_PWR	Backlight power (5~21V)
37	BL_PWR	Backlight power (5~21V)
38	BL_PWR	Backlight power (5~21V)
39	BL_PWR	Backlight power (5~21V)
40	HSYNC	HSYNC output from Tcon



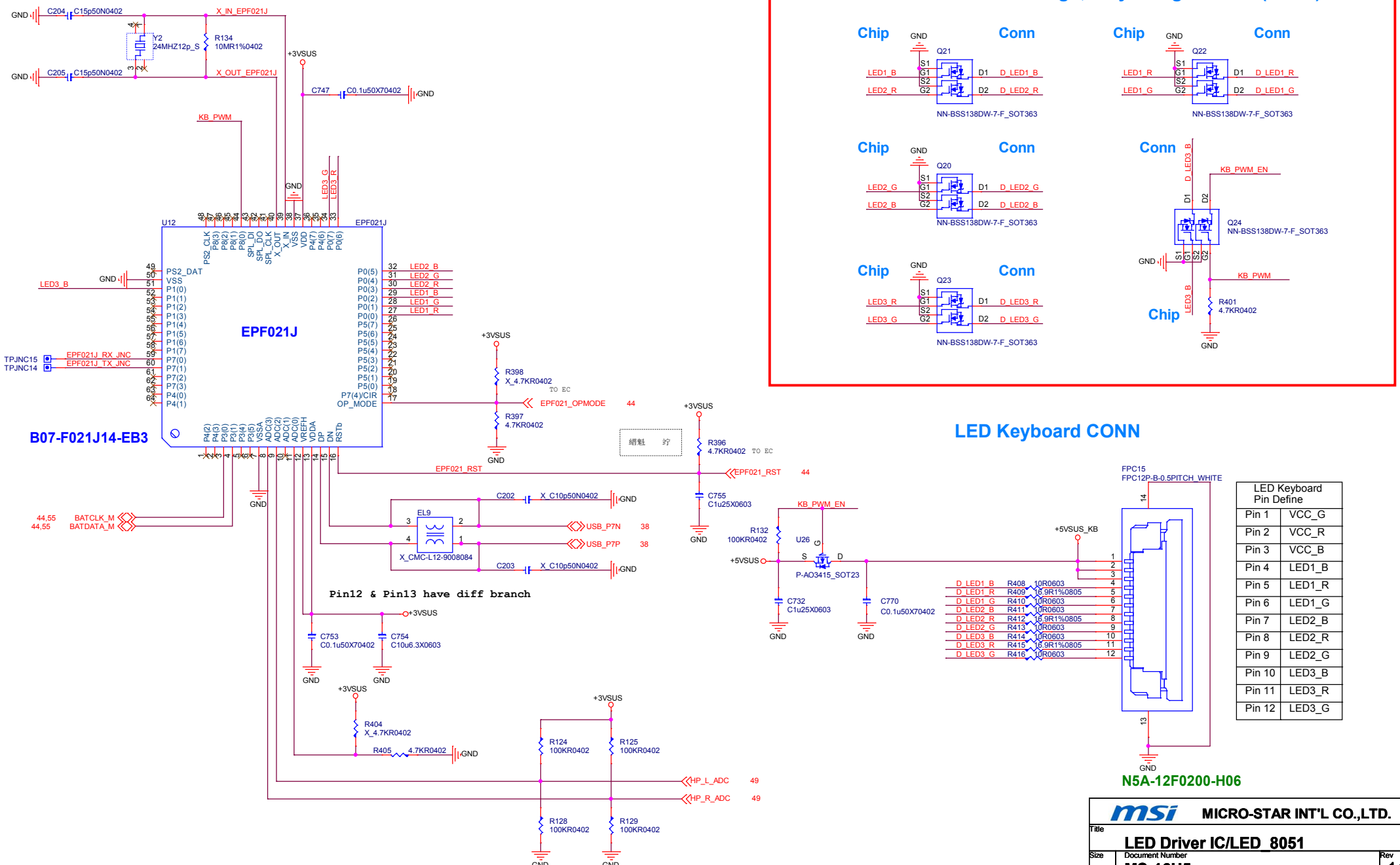
MICRO-STAR INT'L CO.,LTD.

Title: eDP Connector

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 42 of 72

LED 8051 Controller



KBC(KB3930QFB1)

Hardware Reset

ED before RC

RC and R Close SW

R114 33R0402

RST_SW#

MEC1 MEC2 SW1 SW-TACTB1-4PS5

ED1 ESD-SFI0402-050E101NP

R113 47KR1%0402

C183 C0.1u50X70402

N71-0100560-D02

SW Debug (LPC)

CON3 BH1X14#S-1PITCH

LPC_FRAME# LAD3 LAD2 LAD1 LAD0 L_LDRQ0# CLK_PCIF_PORT80 INT_SERIRQ LPC_RST# FWH_ID0

C700 X_C10p50N0402

R377 X_10KR1%0402

+5VRUN +3VRUN

N32-1140130-H06

U1 KB3930QFB1

LPC I/F
SERIRQ LFRAME# PCICLK CLKRUN#/GPIO1D LAD0 LAD1 LAD2 LAD3

POWER/GROUND
VCC VCC VCC VCC VCC VCC AVCC AGND GND GND GND GND GND

EC_AVCC

L4 80L700mA-150

C188 C0.1u50X70402 C186 C10u6.3X0603 C194 C0.1u50X70402 C742 C0.1u50X70402 C191 C0.1u50X70402

C752 C0.1u50X70402 C206 C0.1u50X70402

+3VALW +3VRUN GND

ECRST# KBRST# SCI#/GPIO0E GA20 PCIRST#

FAN&PWM
PWM0/GPIO0F PWM1/GPIO10 GPIO11/PWM2 GPIO19/PWM3 FANPWM0/GPIO12 FANPWM1/GPIO13 FANFB0/GPIO14 FANFB1/GPIO15

SMBUS
SDA0/GPIO45 SCL0/GPIO44 SDA1/GPIO47 SCL1/GPIO46

BATDATA_M BATCLK_M SMB_DATA_EC SMB_CLK_EC

AD/DA
DA0/GPO3C DA1/GPO3D DA2/GPO3E DA3/GPO3F AD0/GPI38 AD1/GPI39 AD2/GPI3A AD3/GPI3B AD4/GPI42 AD5/GPI43

EPF021_RST EPF021_OPMODE DGPU_ON# CTL1_EC FBVDDQ_ON MB_ID ADP_ICC SUSPWRACK AC_OK# BAT_IN#

SDI
GPXIOA00/SDICS# GPXIOA01/SDICLK GPXIOA02/SDIMOSI

AC_PRESENT SUS_ON RSMRST#

IKB
KSO0/GPIO20/TP_TEST KSO1/GPIO21/TP_PLL KSO2/GPIO22/TP_ANA_TEST KSO3/GPIO23/TP_ISP KSO4/GPIO24 KSO5/GPIO25 KSO6/GPIO26 KSO7/GPIO27 KSO8/GPIO28 KSO9/GPIO29 KSO10/GPIO2A KSO11/GPIO2B KSO12/GPIO2C KSO13/GPIO2D KSO14/GPIO2E KSO15/GPIO2F/E51_RXD(ISP) KSO16/GPIO48 KSO17/GPIO49

KSI0/GPIO30/E51TXD(ISP) KSI1/GPIO31 KSI2/GPIO32 KSI3/GPIO33 KSI4/GPIO34/EDI_CS KSI5/GPIO35/EDI_CLK KSI6/GPIO03/EDI_DIN KSI7/GPIO37/EDI_DO

KBOUT0 KBOUT1 KBOUT2 KBOUT3 KBOUT4 KBOUT5 KBOUT6 KBOUT7 KBOUT8 KBOUT9 KBOUT10 KBOUT11 KBOUT12 KBOUT13 KBOUT14 KBOUT15 KBOUT16 KBOUT17

KBIN0 KBIN1 KBIN2 KBIN3 KBIN4 KBIN5 KBIN6 KBIN7

GPXIOA03 GPXIOA04 GPXIOA05 GPXIOA06 GPXIOA07 GPXIOA08 GPXIOA09 GPXIOA10 GPXIOA11 GPXIOD0 GPXIOD1 GPXIOD2 GPXIOD3 GPXIOD4 GPXIOD5 GPXIOD6 GPXIOD7/PECI

DIMM_ON RUN_ON EC_PCH_PWROK CLEAR_RTC WLAN_PWRON LED_ACPI# LED_CHARGE# LED_BATLOW# LED_BLUETOOTH# SUSPWROK PM_SLP_S4# PM_SLP_S3# EC_ALLSYSPG PWR_SW# SCI_WAKE_UP# LID# H_PECI

R392 43R0402 H_PECI_R C741 X_C47p50N0402

Pin 105-108 8mA-16mA Sink

ESB
GPIO0B/ESB_CLK GPIO0C/ESB_DAT_O/ESB_DAT_I

EC_MUTE# BAT_BIN#

CIR
GPIO40/CIR_RX/AD6 GPIO41/CIR_RLC_TX/AD7 GPIO0A/RLC_RX2 GPIO0D/RLC_TX2

EAPD FB_CLAMP_REQ# FB_CLAMP

SPI FLASH
MISO MOSI SPICLK/GPIO58 SPICS#

EC_RD# EC_WR# EC_SPI_CLK EC_CS#

PS2 I/F
PSCLK2/GPIO4E PSDAT2/GPIO4F PSCLK1/GPIO4C PSDAT1/GPIO4D PSCLK0/GPIO4A/P80CLK PSDAT0/GPIO4B/P80DAT

TP_CLK TP_DATA CTL2_EC CTL3_EC EC_PROCHOT# USB_ENABLE

UART
E51TXD/GPIO16 E51RXD/GPIO17

E51TXD_JNC E51RXD_JNC TPJNC12 TPJNC11

LED
GPIO1A/NUMLED# E51TMR1/GPIO53/CAPSLED# E51INT0/GPIO55/SCROLED#

LED_NUM# LED_CAP# SCROLED#_JNC TPJNC17

Pin 39,91 16mA-20mA Sink

GPIO004 GPIO07/i_clk_8051 GPIO08/i_clk_peri GPIO18 GPIO50 E51CS#/GPIO52 E51TMR0/GPIO54/WDT_LED# E51INT1/GPIO56 GPIO57/XCLK32K GPIO59/TEST_CLKSPICLKI

GPU_ACIN1 DGPU_PWRGD KBSMI# BATT_OFF LED_WLAN# PM_PWRBTN# BT_PWR_ON CAMERA_ON#

Pin 92 16mA-20mA Sink

GPIO
GPIO004 GPIO07/i_clk_8051 GPIO08/i_clk_peri GPIO18 GPIO50 E51CS#/GPIO52 E51TMR0/GPIO54/WDT_LED# E51INT1/GPIO56 GPIO57/XCLK32K GPIO59/TEST_CLKSPICLKI

XCLK
XCLKI XCLKO

EC_XIN EC_XOUT R136 0R1%0402 R135 X_10MR1%0402 Y3 X_32.768KHZ12.5p C207 X_C18p50N0402 C208 X_C18p50N0402 C740 C4.7u10X0603 R137 680KR0402 ER15 X_22R0402 SUSCLK_RC C210 X_C22p50N0402 EC_SUSCLK

V18R
V18R

B02-0393024-E18

Keyboard conn

CON5 FPC26P-B-1PITCH_BLACK

KBOUT17 KBOUT16 KBIN0 KBIN1 KBIN2 KBIN3 KBIN4 KBIN5 KBIN6 KBIN7 KBOUT15 KBOUT14 KBOUT13 KBOUT12 KBOUT11 KBOUT10 KBOUT9 KBOUT8 KBOUT7 KBOUT6 KBOUT5 KBOUT4 KBOUT3 KBOUT2 KBOUT1 KBOUT0

N5A-26F0340-H06

CNI4 CNI3 CNI1 CNI2 8P4C-100p50N0402

KBOUT0 KBOUT1 KBOUT2 KBOUT3 KBOUT4 KBOUT5 KBOUT6 KBOUT7 KBOUT8 KBOUT9 KBOUT10 KBOUT11 KBOUT12 KBOUT13 KBOUT14 KBOUT15 KBOUT17 KBOUT16 CI14 CI13 C100p50N0402

ROM

R143 2.2KR1%0402 WP#_EC_ROM

R144 10KR1%0402

U13 MX25L512EMI-10G

SPI_HOLD# EC_SPICLK EC_WR# EC_CS# EC_RD#

M31-2551222-M24

EC_SPI_CLK ER12 22R0402 EC_SPICLK EC26 C22p50N0402

ALLSYSPG

R394 10KR1%0402

+1_5VRUN_PWRGD JNC15 X_0402

+1_05VRUN_PWRGD JNC17 X_0402

+1_35VDIMM_PWRGD JNC14 X_0402

EC_ALLSYSPG

PU/PD

BATCLK_M R119 2.2KR1%0402

BATDATA_M R123 2.2KR1%0402

SMB_CLK_EC R126 2.2KR1%0402

SMB_DATA_EC R127 2.2KR1%0402

KBRST#, H_A20GATE

KBRST# R133 X_100KR0402

RSMRST# R90 10KR1%0402

MB_ID

PR72 X_100KR0402

MB_ID

R115 X_10KR1%0402

MICRO-STAR INT'L CO.,LTD.

Title: KBC(KB3930QFB1)

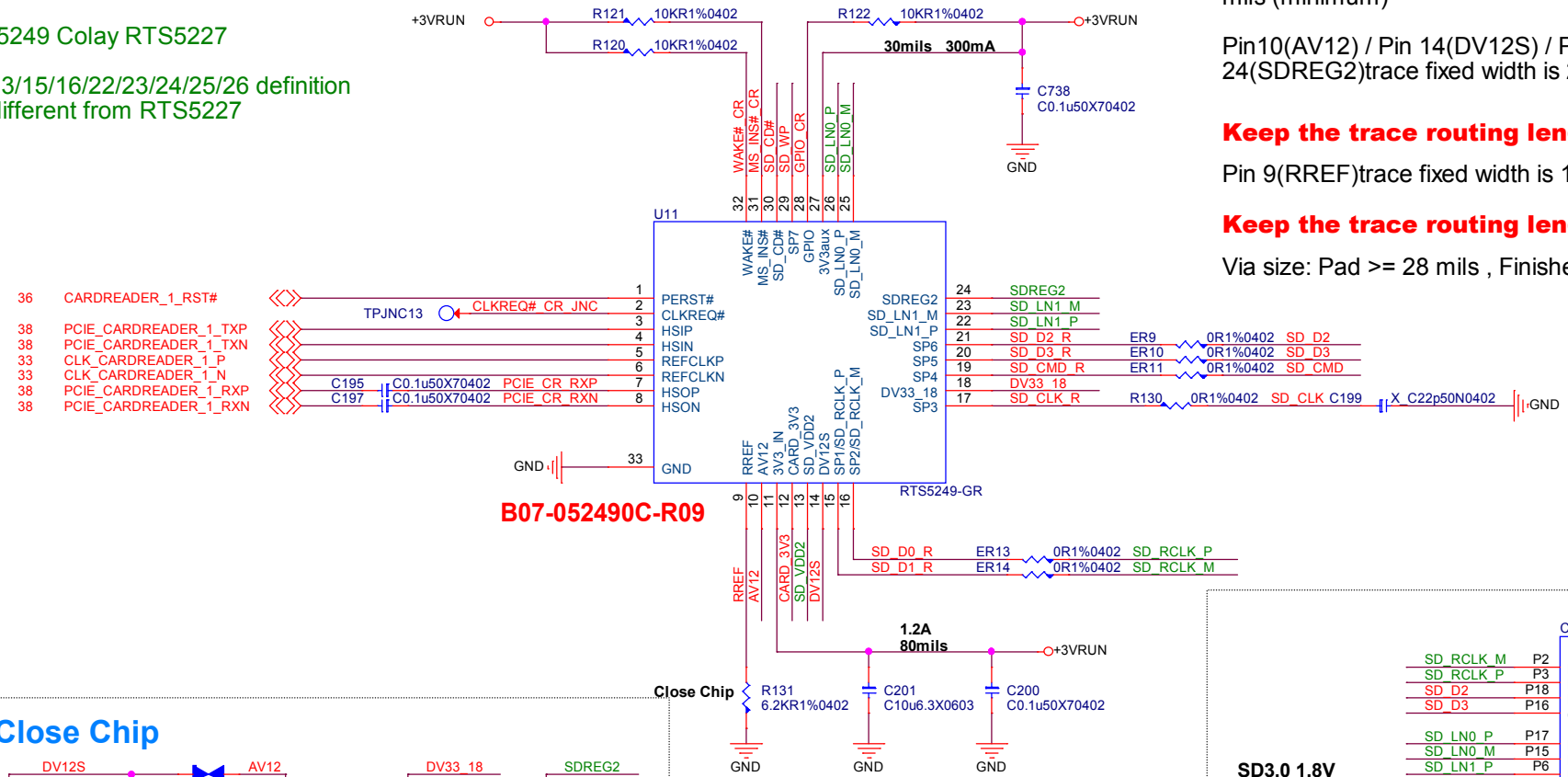
Size: Document Number: MS-16H5 Rev: 1.1

Date: Tuesday, July 15, 2014 Sheet 44 of 72

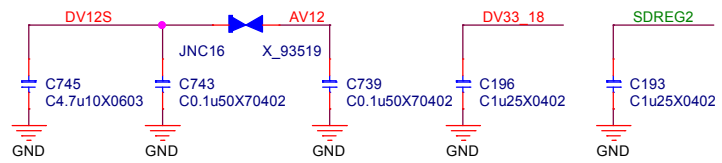
CardReader (RTS5249)

RTS5249 Colay RTS5227

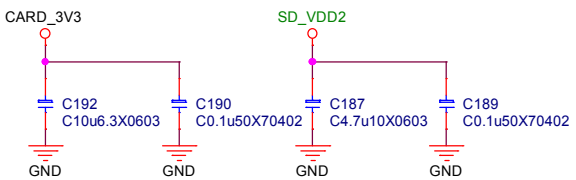
Pin 13/15/16/22/23/24/25/26 definition are different from RTS5227



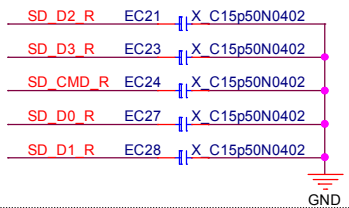
Close Chip



Close Connector



EMI



Power Trace

Pin11(3V3_IN) / Pin 12(CARD_3V3)trace fixed width is 40 mils (minimum)

Pin27(3V3aux) / Pin 13(SD_VDD2)trace fixed width is 30 mils (minimum)

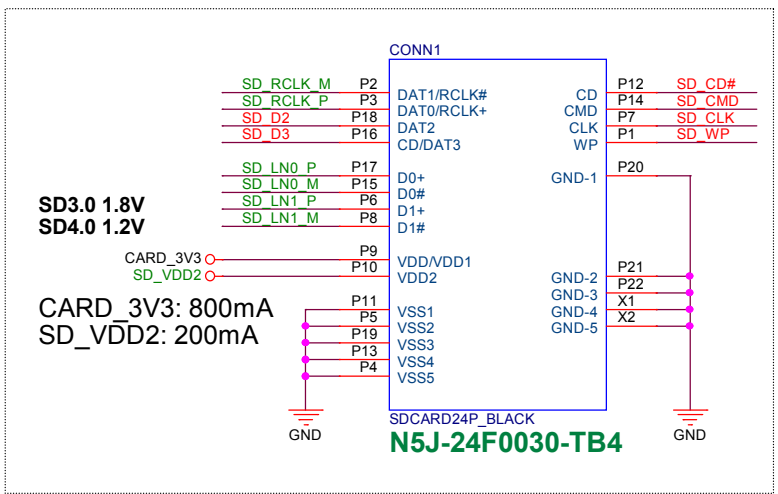
Pin10(AV12) / Pin 14(DV12S) / Pin 18(DV33_18) / Pin 24(SDREG2)trace fixed width is 20 mils (minimum)

Keep the trace routing lengths is limit to 200 mils

Pin 9(RREF)trace fixed width is 12 mils (minimum)

Keep the trace routing lengths is limit to 200 mils

Via size: Pad >= 28 mils , Finished hole >= 16 mils.

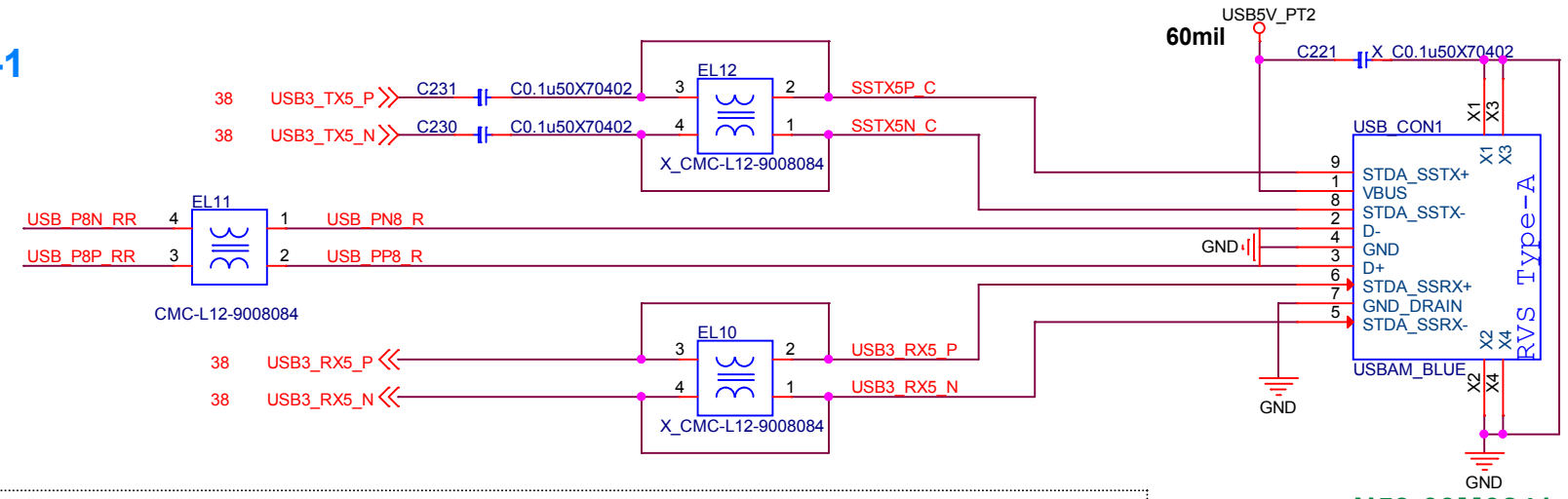


MSI	MICRO-STAR INT'L CO.,LTD.	
Title	Card Reader	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 45 of 72	

USB 3.0 / iCharger

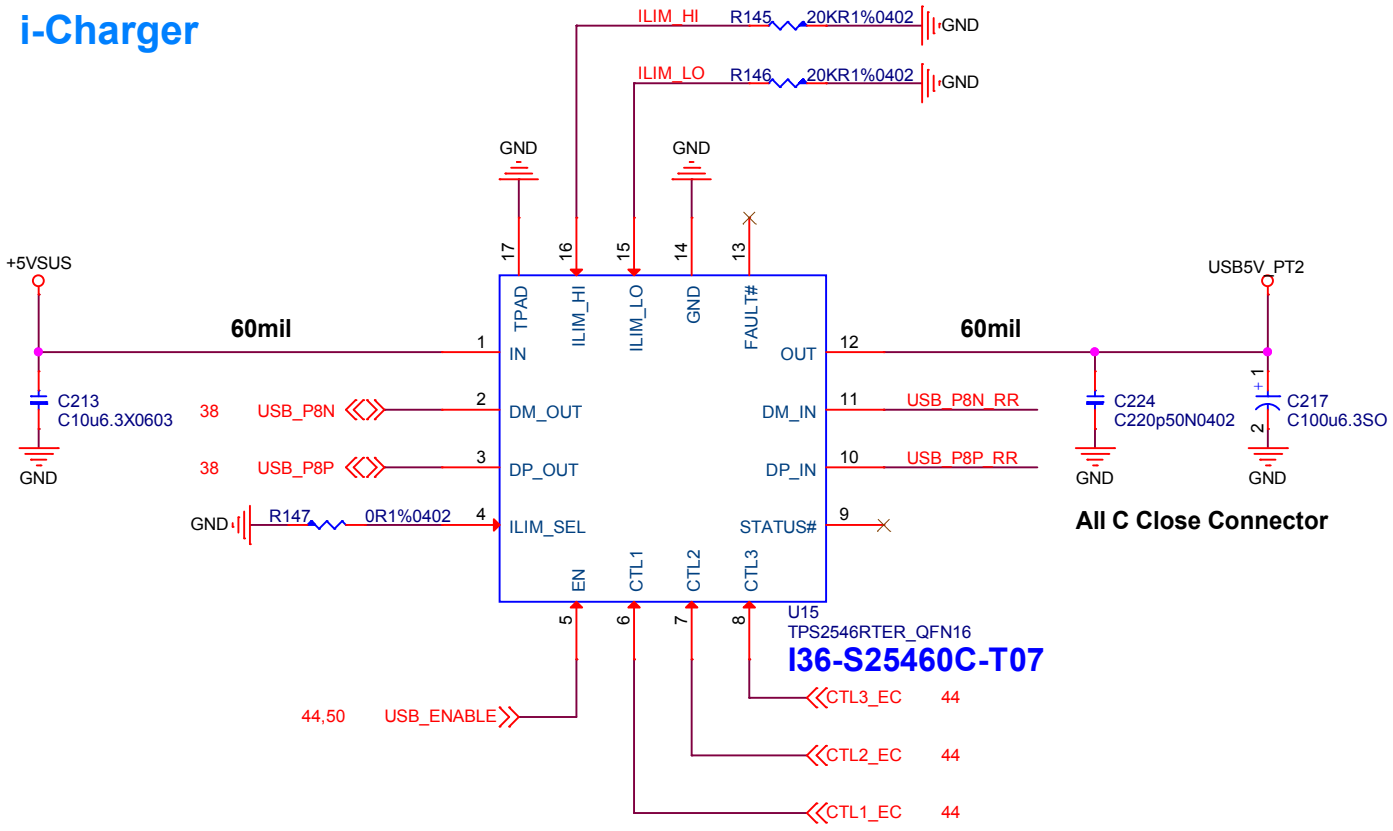
USB3.0 CNT-1

USB3.0 Port-6
USB2.0 Port-8

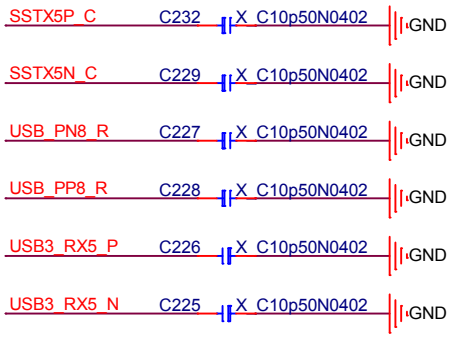


N53-09M0241-AF2

i-Charger



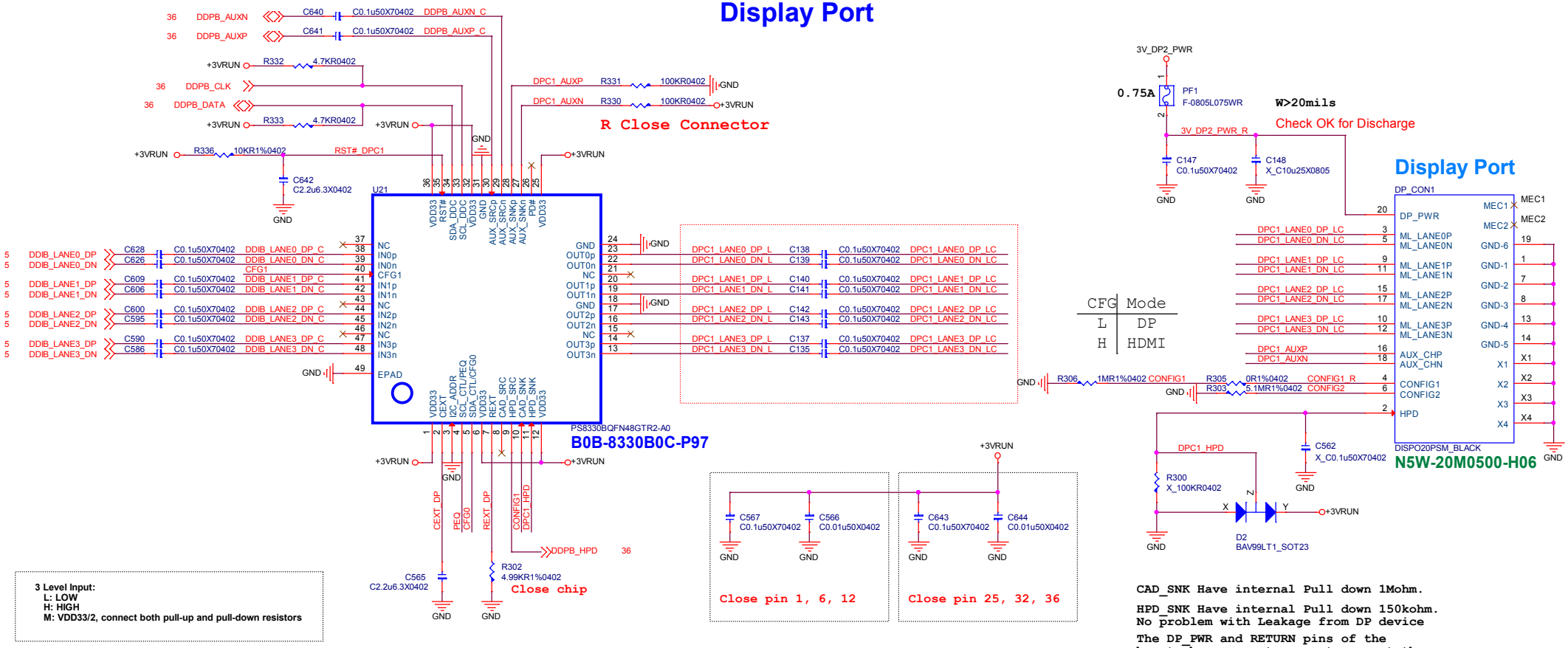
EMI

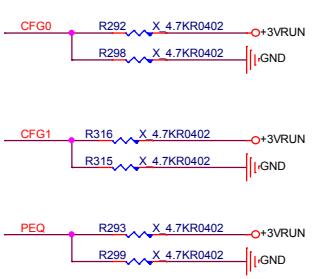


MICRO-STAR INT'L CO.,LTD.

Title	USB 3.0 / iCharger	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 46 of 72	

Display Port



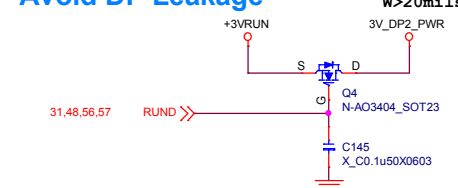


Configuration pin for automatic EQ and AUX interception; Internal pull down at ~150k Ohm, 3.3V I/O.
L: default, automatic EQ enable & AUX interception enable
H: automatic EQ disable & AUX interception enable
M: automatic EQ disable & AUX interception disable, no pre-emphasis, 600mVpp swing

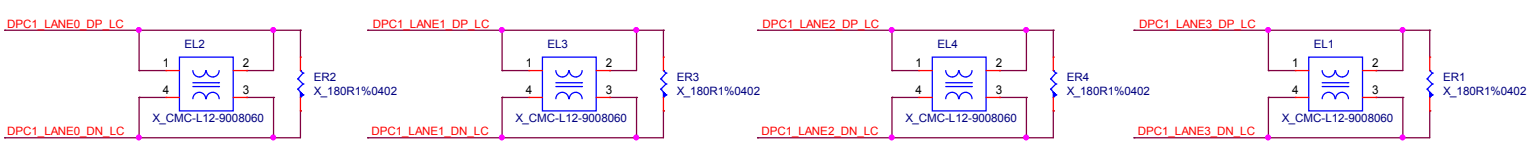
Configuration pin for auto test and input offset cancellation, 3.3V IO, internal pull up at ~150K Ohm
H: default, auto test disable & input offset cancellation enable
L: auto test enable & input offset cancellation enable
M: auto test disable & input offset cancellation disable

Programmable input equalization levels; Internal pull down at ~150k Ohm, 3.3V I/O.
L: default, LEQ, compensate channel loss up to 12dB @ HBR2
H: HEQ, compensate channel loss up to 15dB @ HBR2
M: LLEQ, compensate channel loss up to 5dB @ HBR2

Avoid DP Leakage



EMI Close Connector



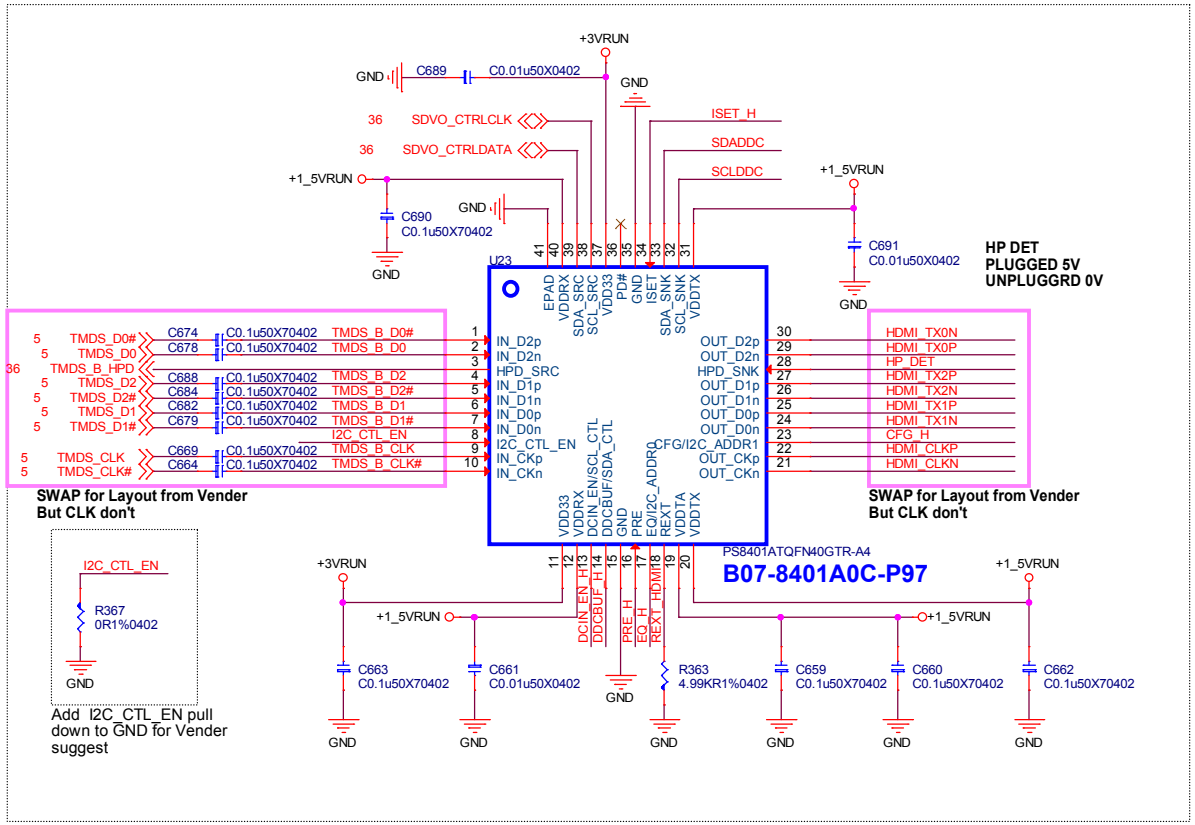
MICRO-STAR INT'L CO.,LTD.

Title: DP witch Repeater

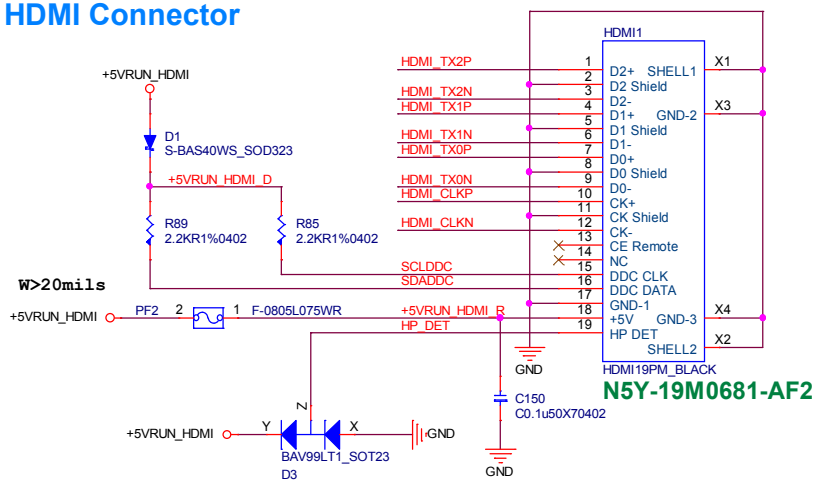
Size: | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 47 of 72

HDMI Repeater



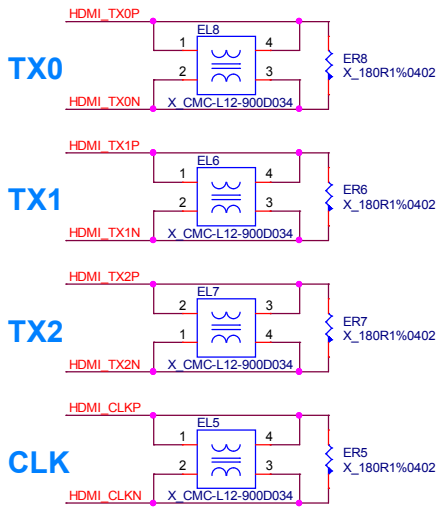
HDMI Connector

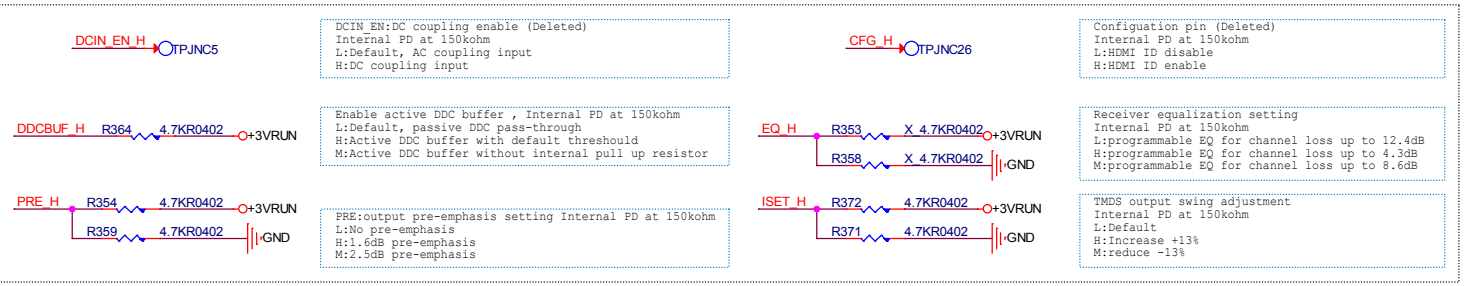


An HDMI Source shall have +5V Power signal over-current protection of no more than 0.5A.

HPD_SNK Internal PD 150kohm

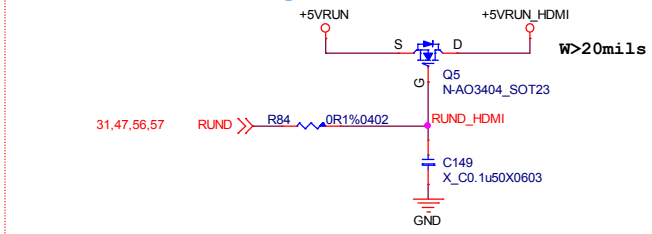
EMI Close Connector





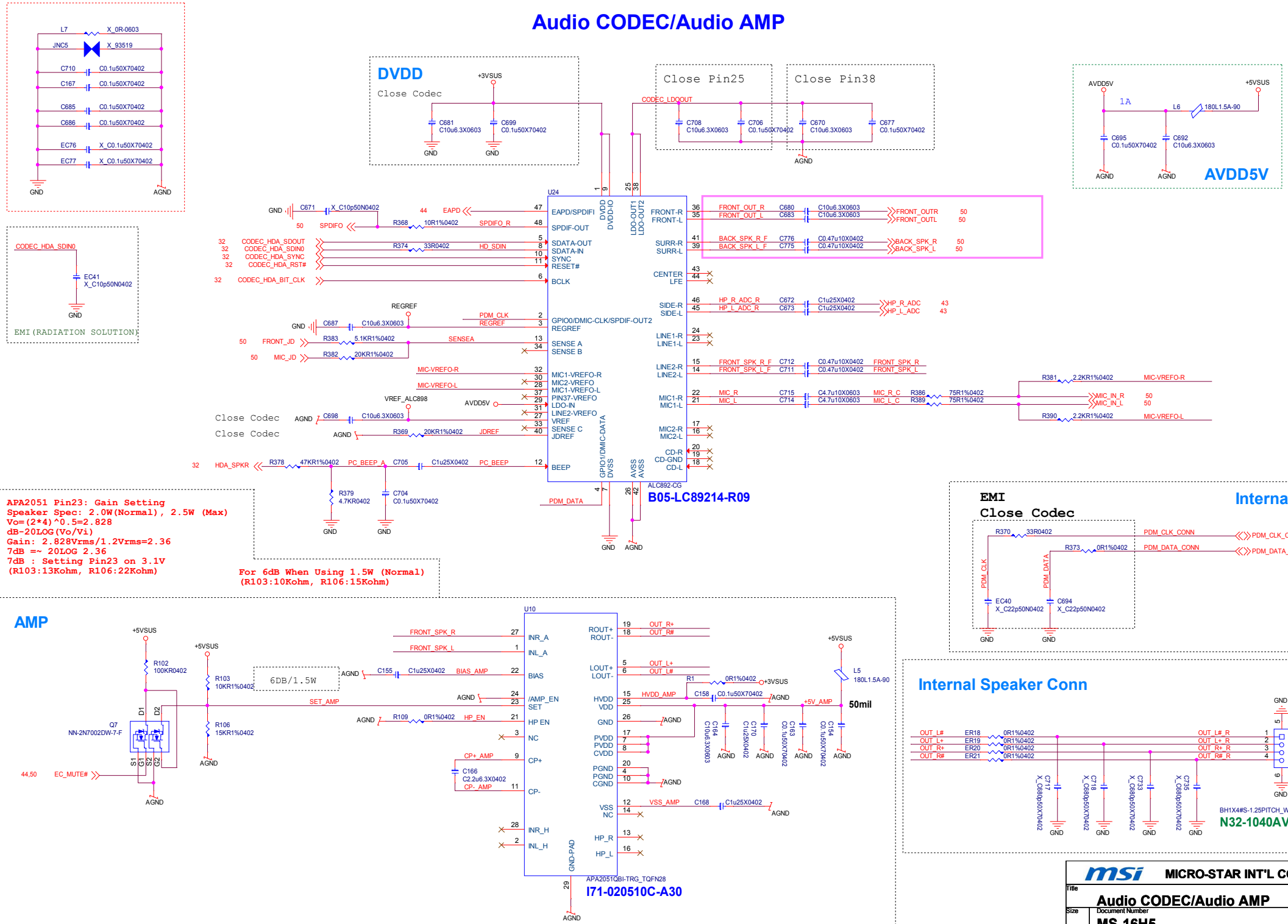
ADDR1 (CFG)	ADDR0 (EQ)	I2C control bus address (Internal pull down at ~150k , 3.3V I/O)
0	0	0x4C / 4D (default)
0	1	0x5C / 5D
1	0	0xCC / CD
1	1	0xEC / ED

Avoid HDMI Leakage



MICRO-STAR INT'L CO.,LTD.		
Title: HDMI Repeater		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 48 of 72	

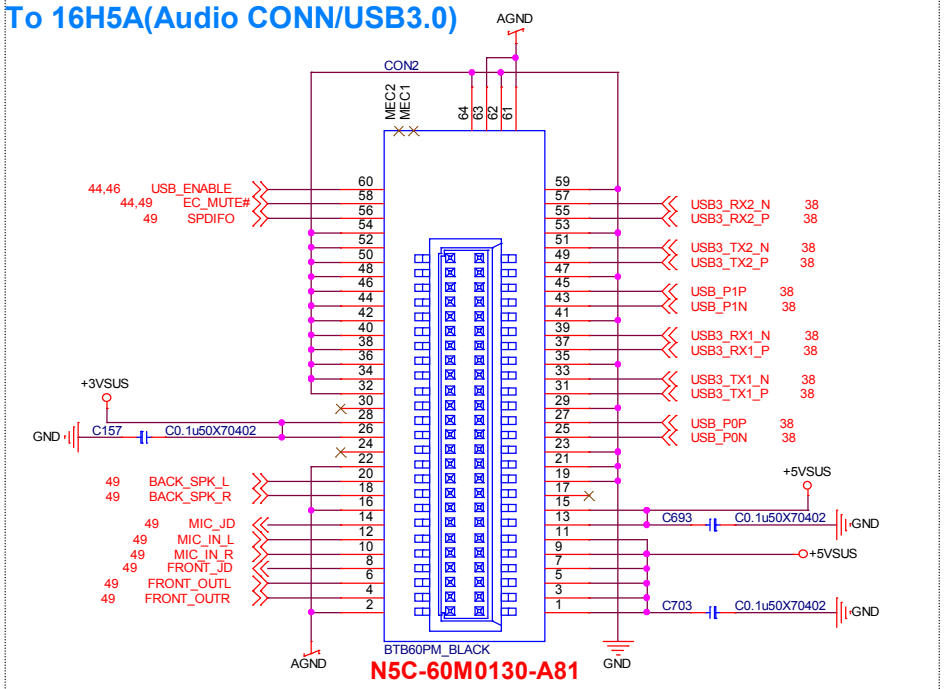
Audio CODEC/Audio AMP



MSI	MICRO-STAR INT'L CO.,LTD.	
Title	Audio CODEC/Audio AMP	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 49 of 72	

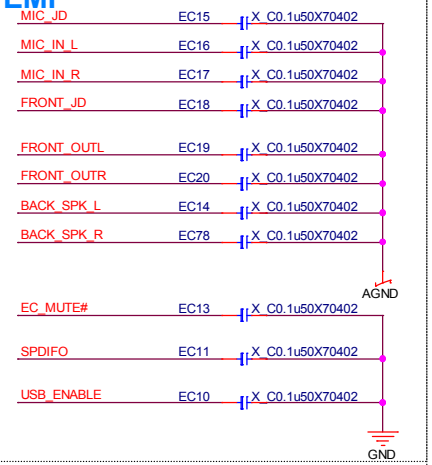
CPU FAN/BTB CONN

To 16H5A(Audio CONN/USB3.0)

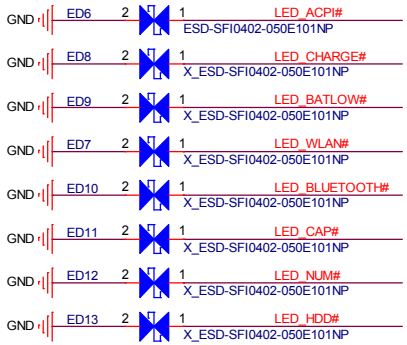


N5C-60M0130-A81

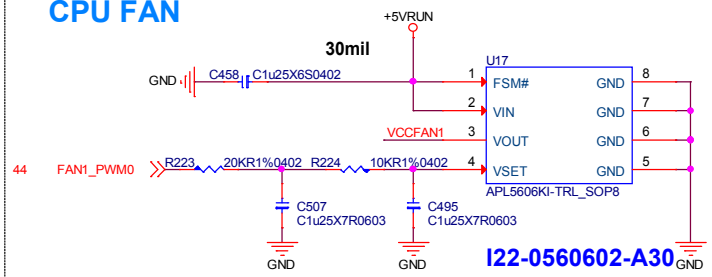
EMI



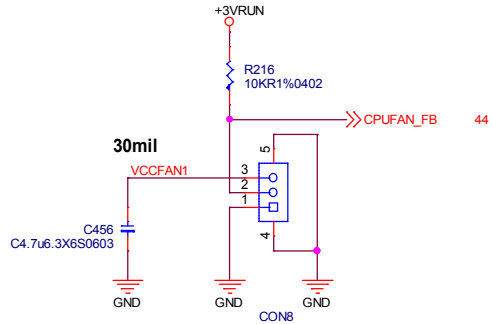
EMI



CPU FAN

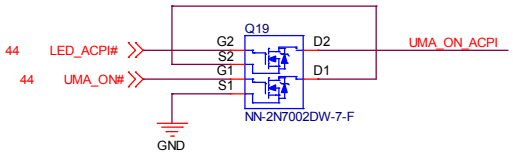


I22-0560602-A30

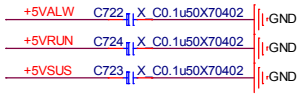


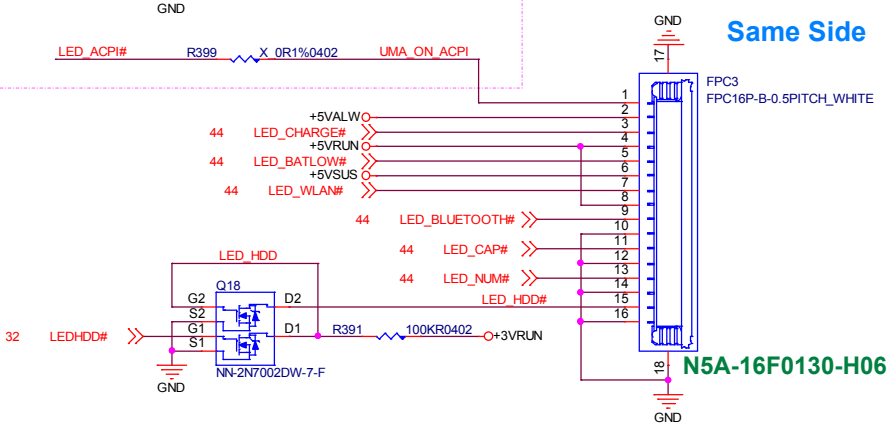
N32-1030AP0-H06

S3 Breath
S0 No active



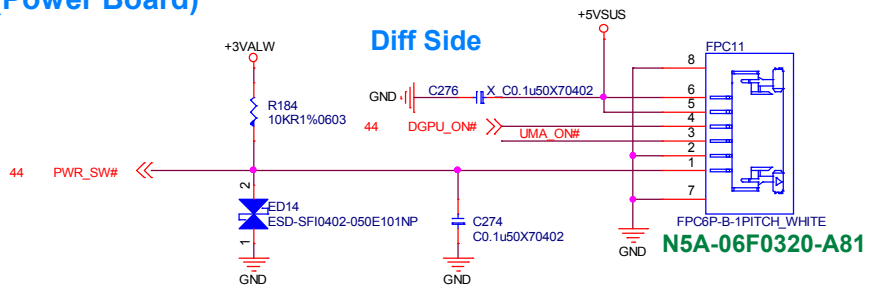
To 16H5B(LED Board)





N5A-16F0130-H06

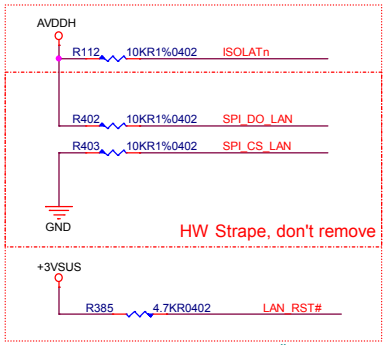
To 16H5C (Power Board)

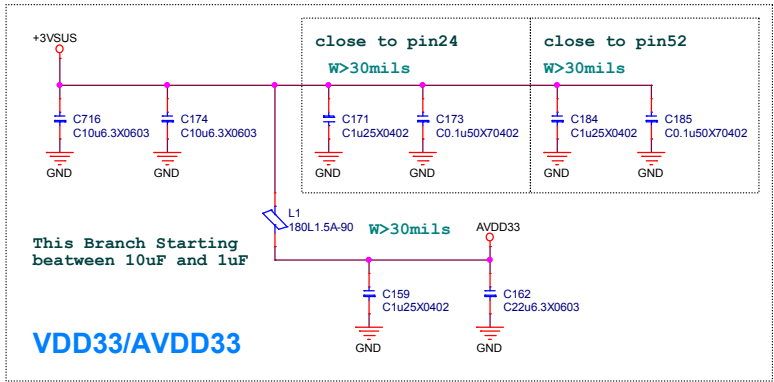


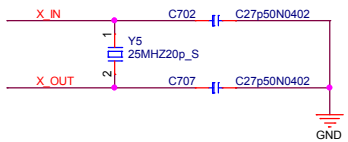
N5A-06F0320-A81

MICRO-STAR INT'L CO.,LTD.		
Title: CPU FAN/BTB CONN		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 50 of 72	

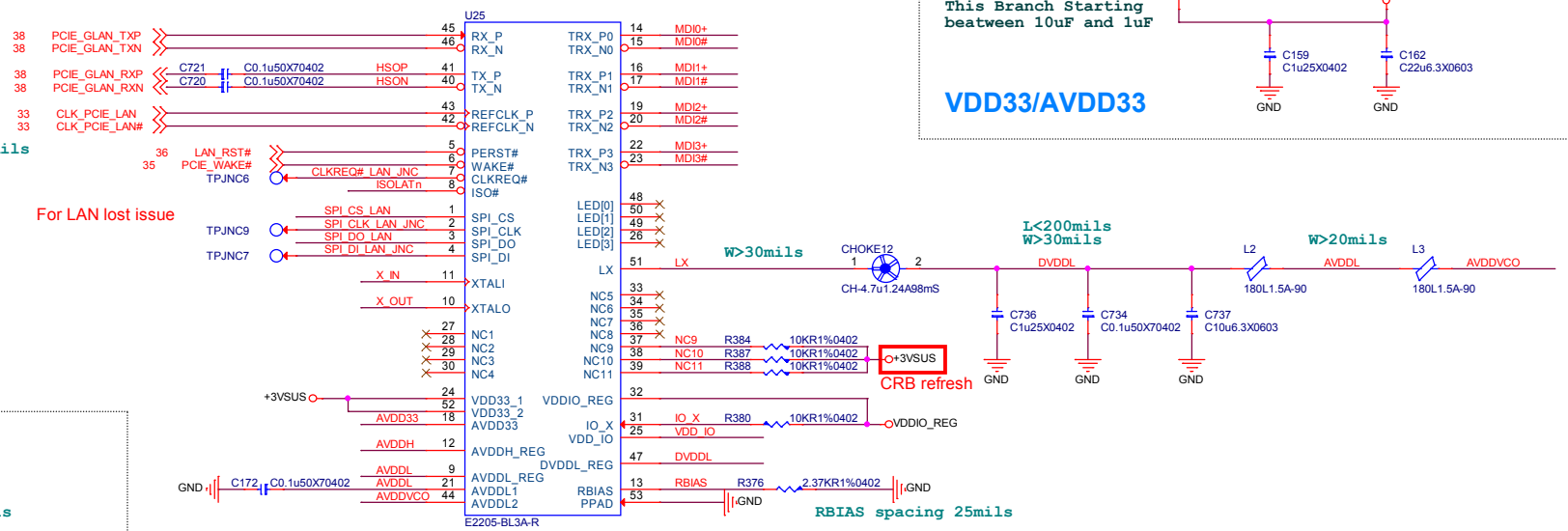
GIGA LAN(BigFoot BFN2205B)





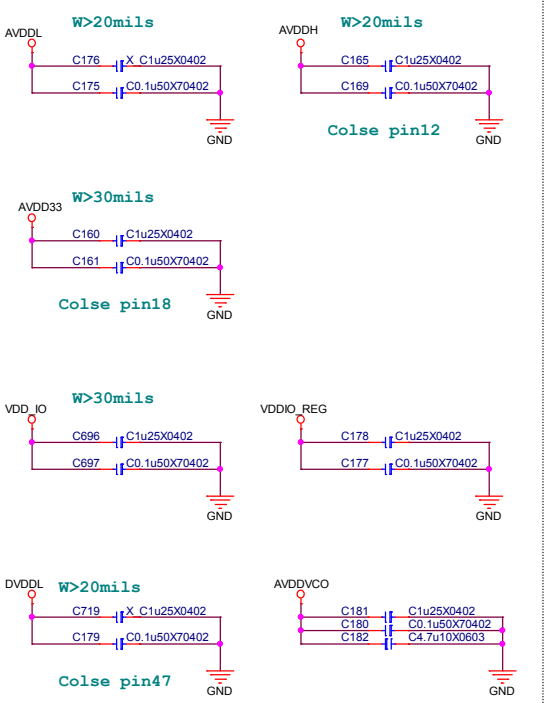


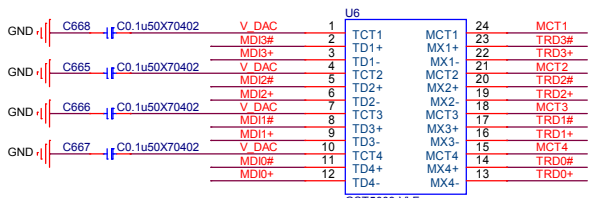
For LAN lost issue

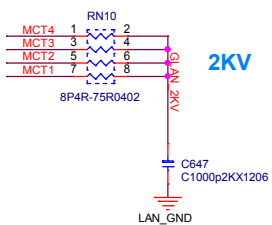


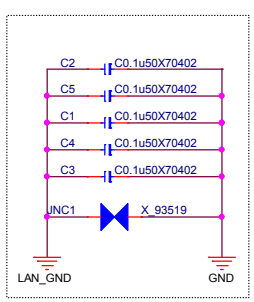
MAC 繕 CHIP
ず,TΩ计

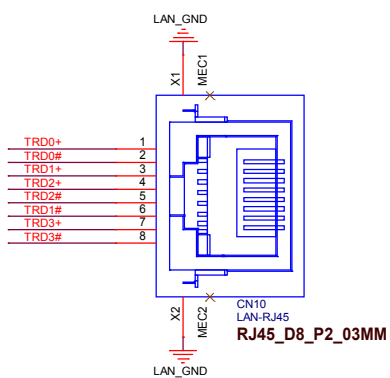
Power CAP

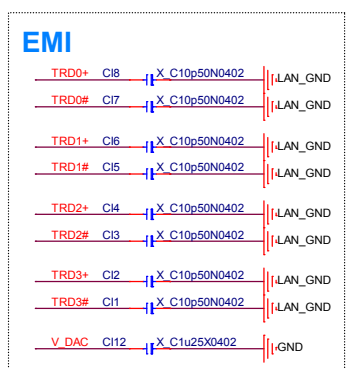






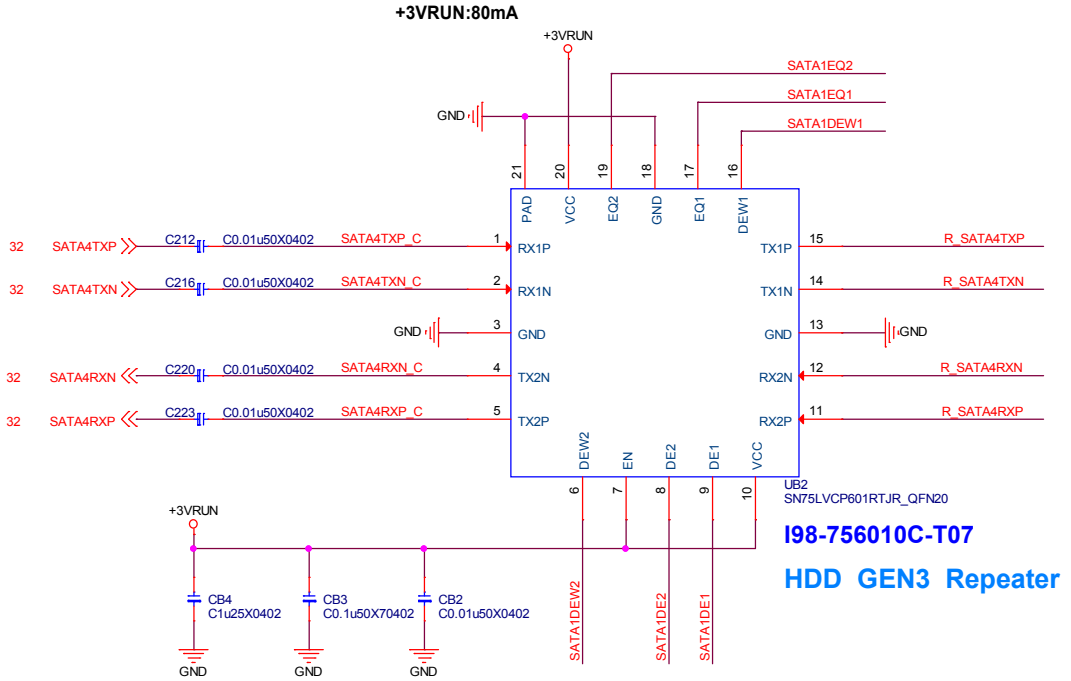






MSI	MICRO-STAR INT'L CO.,LTD.	
Title	GIGA LAN(BigFoot BFN2205B)	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 51 of 72	

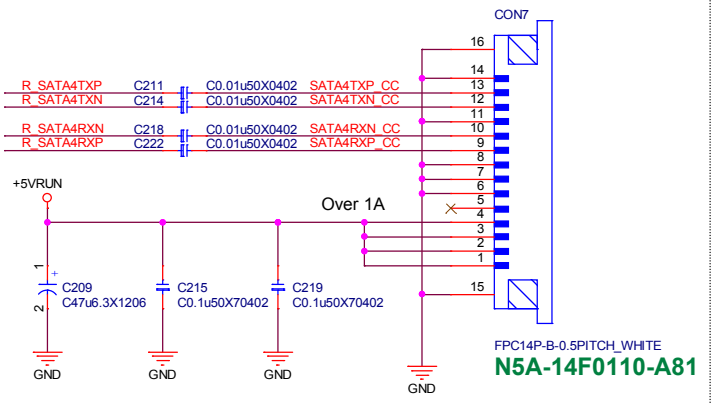
HDD (With Repeater)



I98-756010C-T07

HDD GEN3 Repeater

BTB Connecter



N5A-14F0110-A81

SATA1EQ1 R142 X_10KR1%0402 +3VRUN
SATA1EQ2 R141 X_10KR1%0402 +3VRUN
SATA1DE1 TPJNC19
SATA1DE2 TPJNC18
SATA1DEW1 R140 0R1%0402 GND
SATA1DEW2 R148 0R1%0402 GND

TI SN75LVCP601RTJR HW Setting

DE1/DE2	CH1/CH2De-Emphasis dB(at 6Gbps)	DQ1/DQ2	CH1/CH2De-Emphasis dB(at 6Gbps)
NC(default)	-4	NC(default)	0
0	0	0	7
1	-2	1	14

DEW1/DEW2	Device Function --> De Width for CH1/CH2
0	De-emphasis Pulse duration, short(recommended setting when linkoperates at SATA 1.5/3/6 Gbps)
1(default)	De-emphasis Pulse duration, long(recommended setting when linkoperates at SATA 1.5/3/6 Gbps)

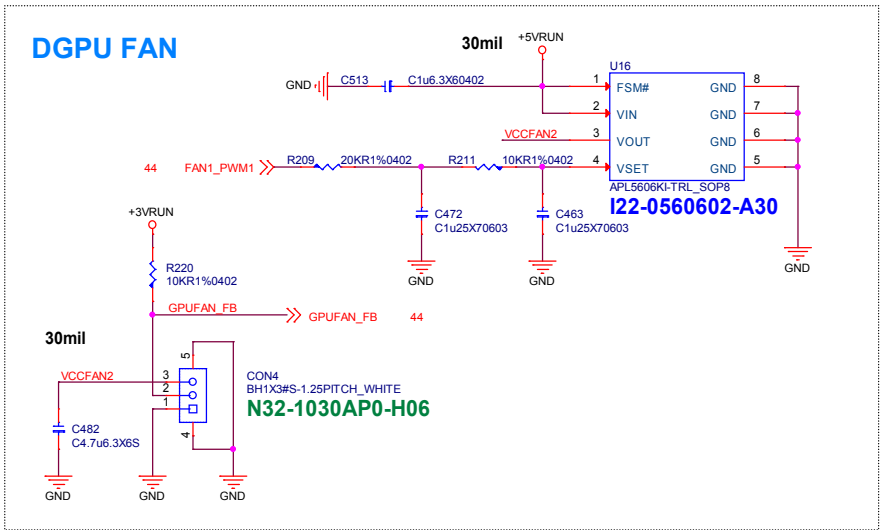
MICRO-STAR INT'L CO.,LTD.

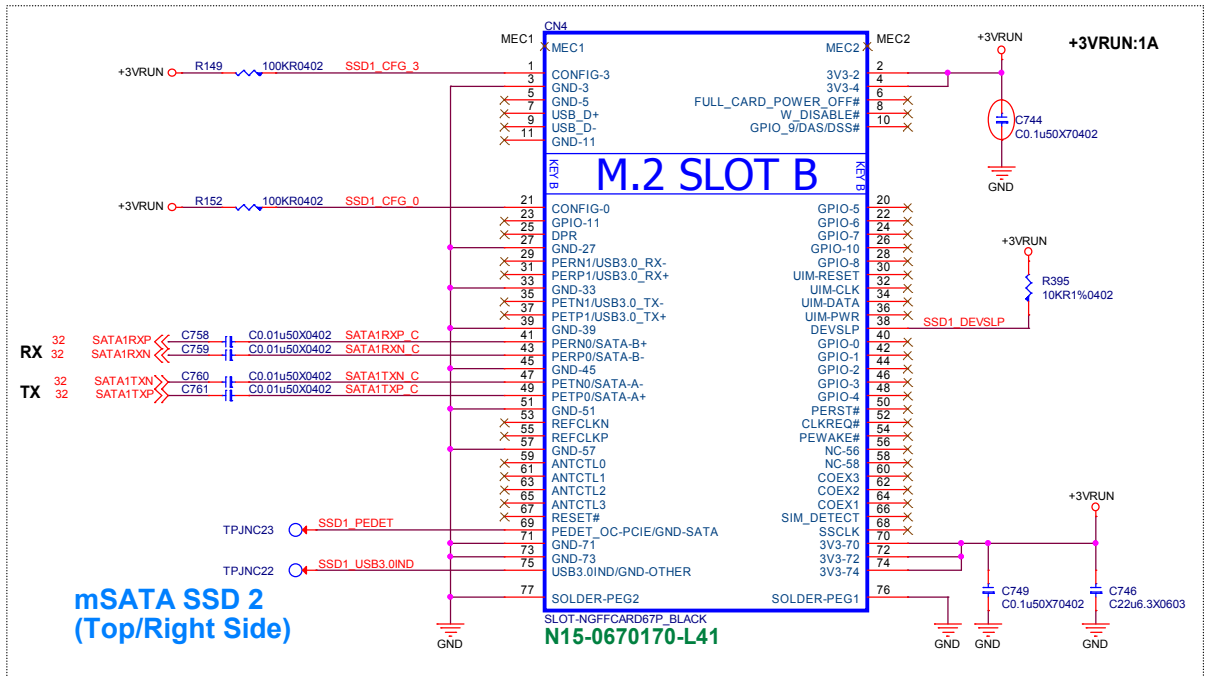
Title: HDD With Repeater

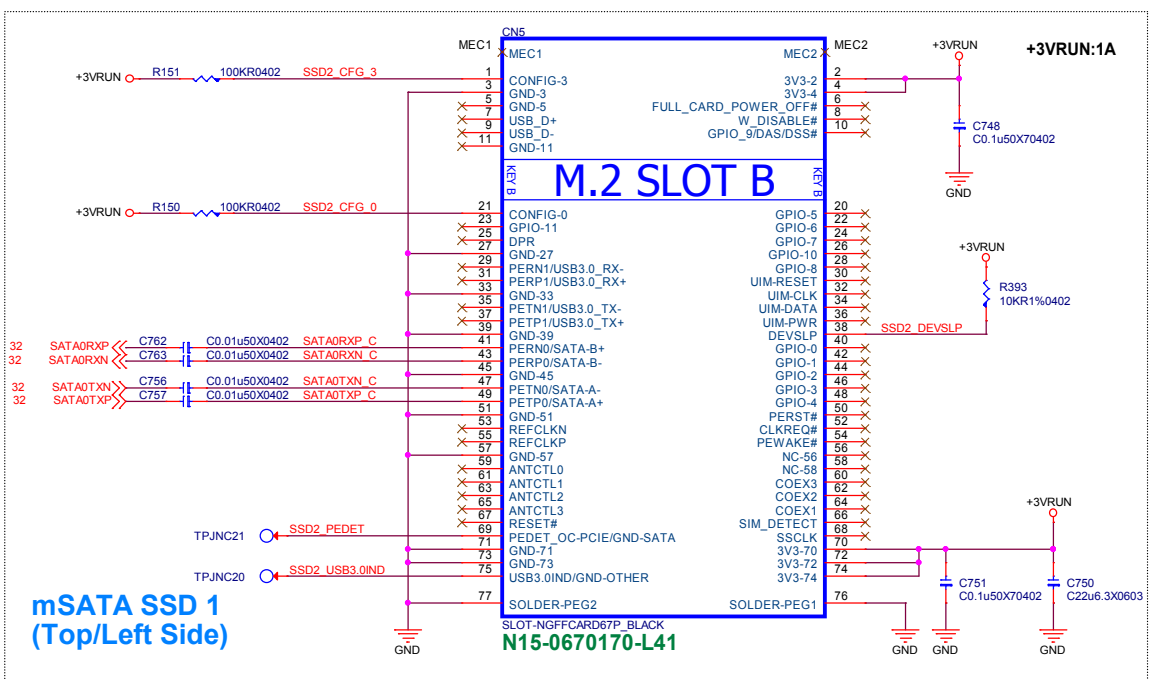
Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 52 of 72

SSD/ DGPU FAN







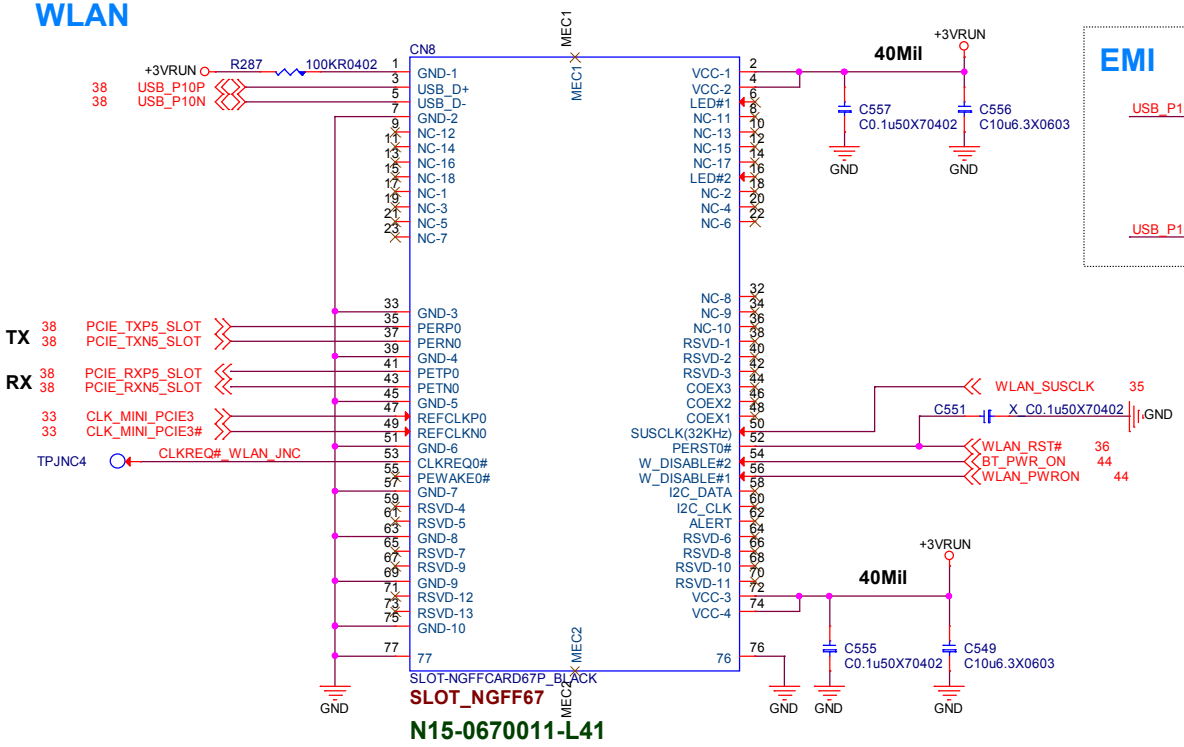
40	NC	No Connect
41	SATA-B+/PERn0	Host receiver differential singal pair
42	NC	No Connect
43	SATA-B-/PERp0	Host receiver differential singal pair
44	NC	No Connect
45	GND	Ground
46	NC	No Connect
47	SATA-A-/PETn0	Host Transmitter differential singal pair
48	NC	No Connect
49	SATA-A+/PETp0	Host Transmitter differential singal pair

MICRO-STAR INT'L CO.,LTD.

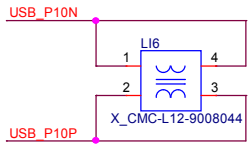
Title	SSD/ DGPU FAN	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 53 of 72	

WLAN /Camera/ClickPad/FP

WLAN

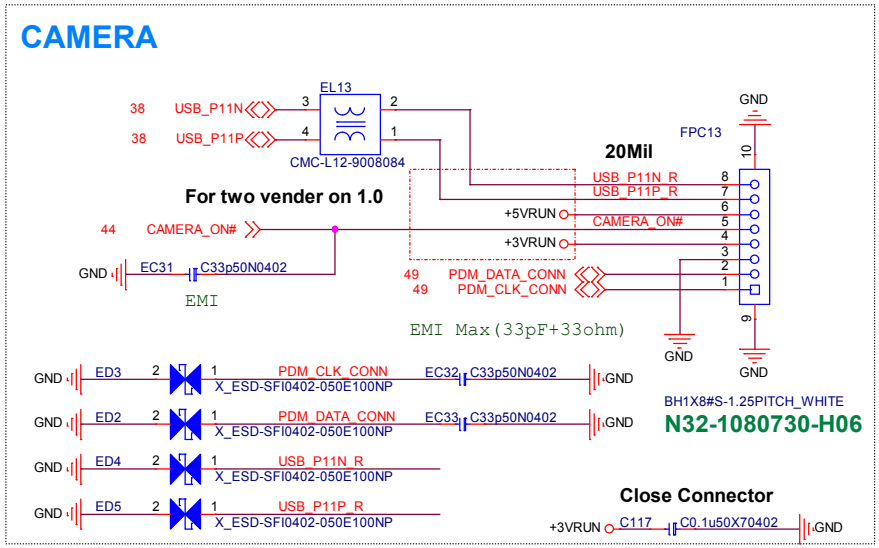


EMI

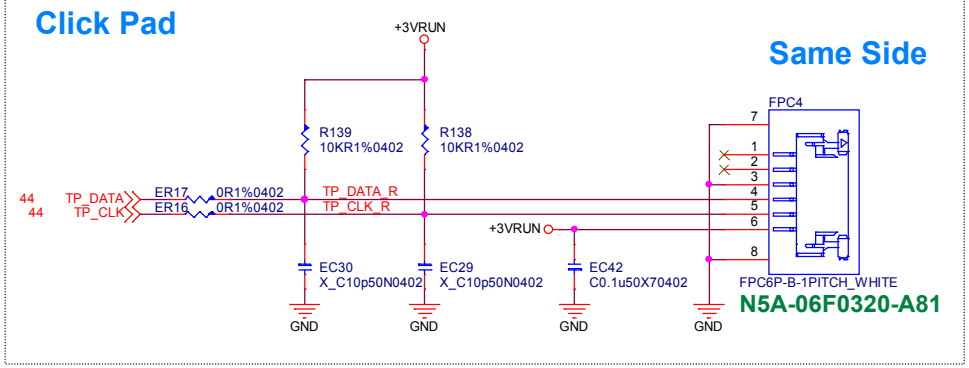


Pin 1	GND		
Pin 3	USB_D+	Pin 2	3.3V
Pin 5	USB_D-	Pin 4	3.3V
Pin 7	GND	Pin 6	LED1#
Pin 9	Module Key	Pin 8	Module Key
Pin 11	Module Key	Pin 10	Module Key
Pin 13	Module Key	Pin 12	Module Key
Pin 15	Module Key	Pin 14	Module Key
Pin 17	N/C	Pin 16	LED2#
Pin 19	N/C	Pin 18	GND
Pin 21	N/C	Pin 20	N/C
Pin 23	N/C	Pin 22	N/C
Pin 25	Module Key	Pin 24	Module Key
Pin 27	Module Key	Pin 26	Module Key
Pin 29	Module Key	Pin 28	Module Key
Pin 31	Module Key	Pin 30	Module Key
Pin 33	GND	Pin 32	N/C
Pin 35	PERP0	Pin 34	N/C
Pin 37	PERN0	Pin 36	N/C
Pin 39	GND	Pin 38	Clink Reset (I 3.3V)
Pin 41	PETP0	Pin 40	N/C
Pin 43	PETN0	Pin 42	N/C
Pin 45	GND	Pin 44	N/C
Pin 47	REFCLKP0	Pin 46	N/C
Pin 49	REFCLKN0	Pin 48	N/C
Pin 51	GND	Pin 50	N/C (SUSCLK (32kHz) for DSx)
Pin 53	CLKREQ0#	Pin 52	PERST0#
Pin 55	PEWAKE0#	Pin 54	BT_EN (W_DISABLE2#)
Pin 57	GND	Pin 56	WLAN_EN(W_DISABLE2#)
Pin 59	N/C	Pin 58	N/C
Pin 61	N/C	Pin 60	N/C
Pin 63	GND	Pin 62	N/C
Pin 65	N/C	Pin 64	Resever
Pin 67	N/C	Pin 66	N/C
Pin 69	GND	Pin 68	N/C
Pin 71	N/C	Pin 70	N/C
Pin 73	N/C	Pin 72	3.3V
Pin 75	GND	Pin 74	3.3V

CAMERA



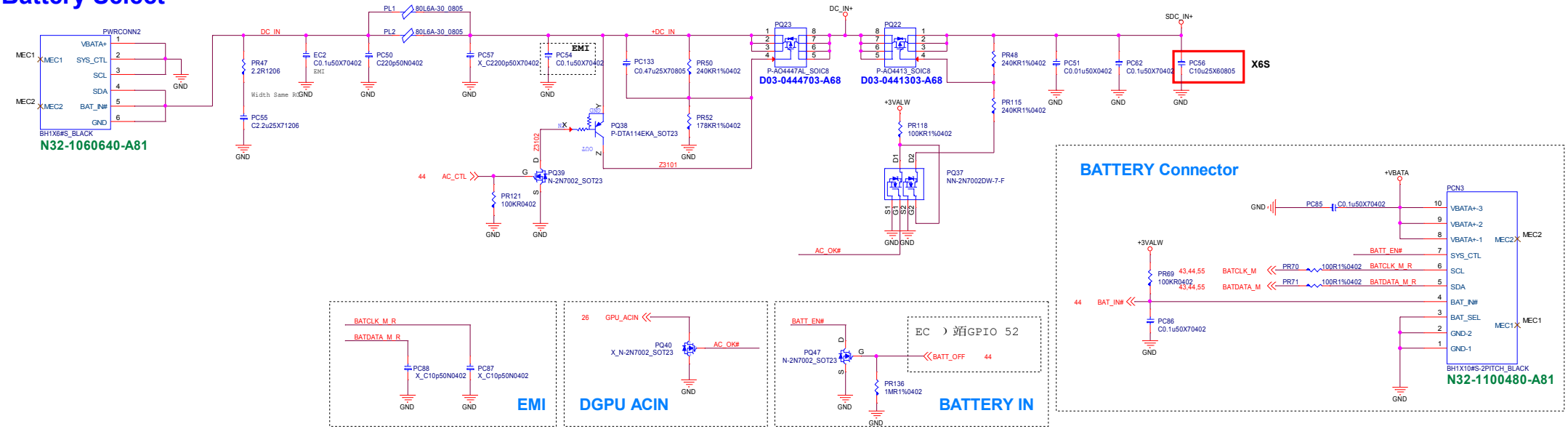
Click Pad



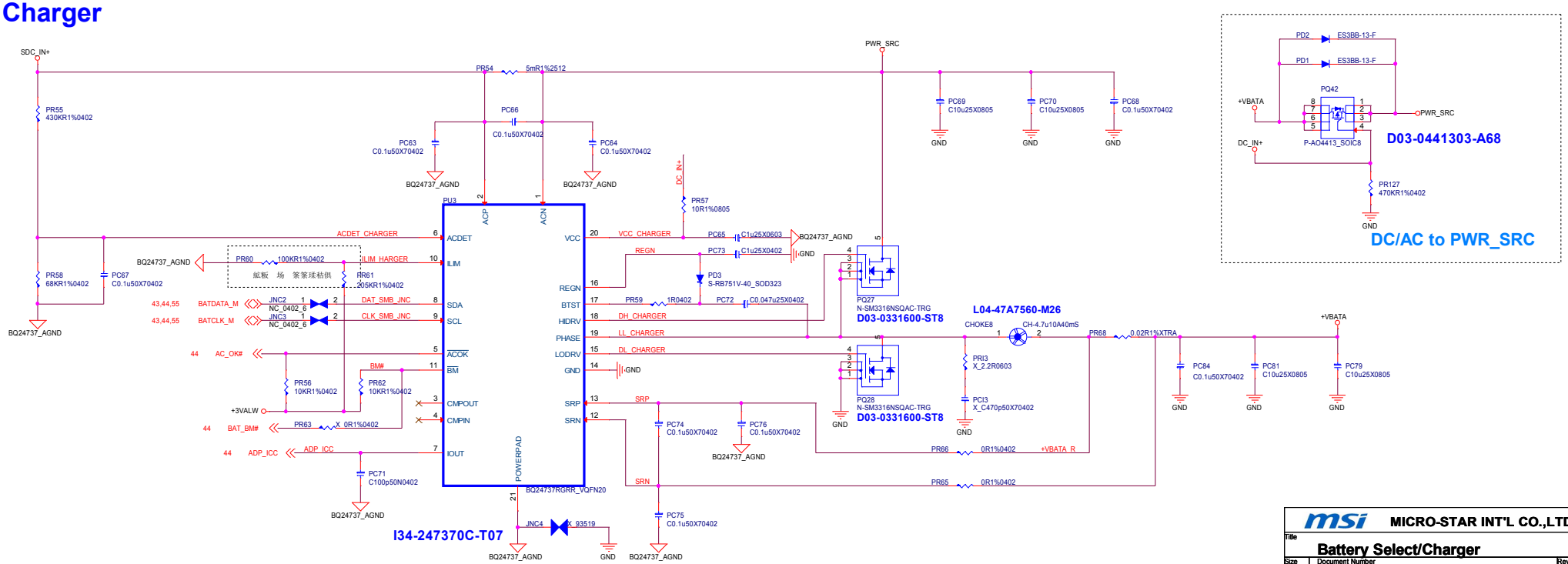
MSI	MICRO-STAR INT'L CO.,LTD.	
Title	WLAN /Camera/ClickPad/FP	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 54 of 72	

Battery Select/Charger

Battery Select

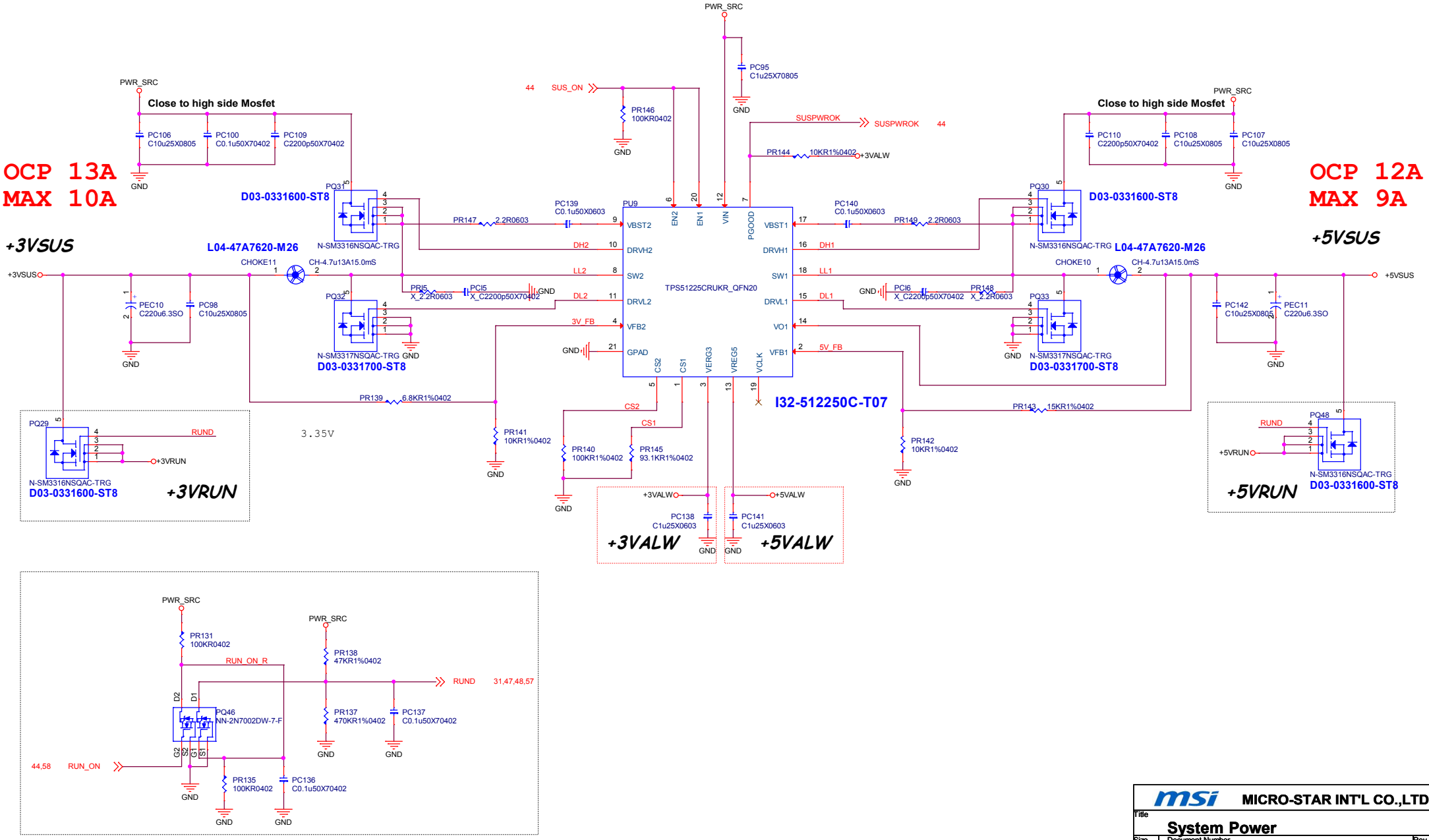


Battery Charger



MICRO-STAR INT'L CO.,LTD.
Title: Battery Select/Charger
Size: Document Number: MS-16H5
Rev: 1.1
Date: Tuesday, July 15, 2014
Sheet 55 of 72

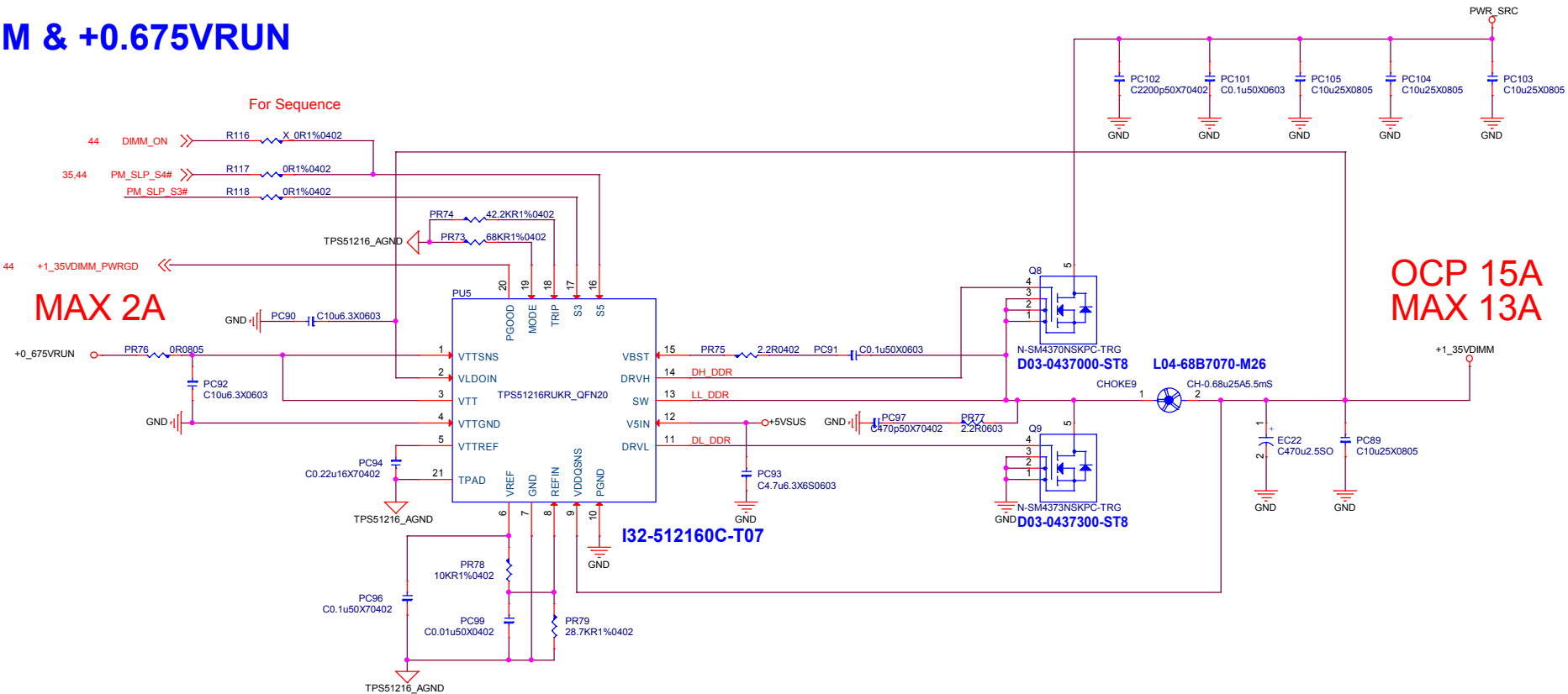
System Power



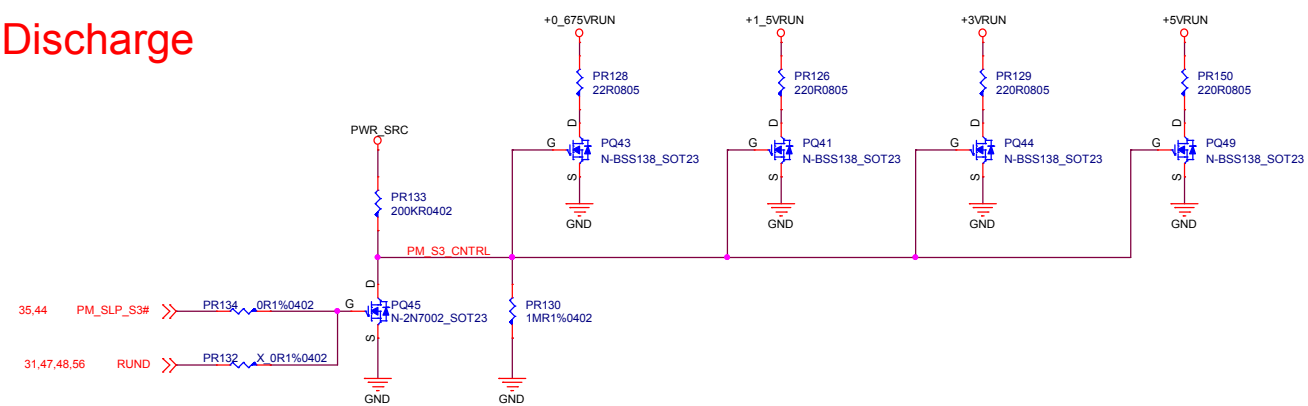
MICRO-STAR INT'L CO.,LTD.		
Title: System Power		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 56 of 72	

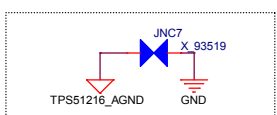
+1.35VDIMM/+0.675VRUN

+1.35VDIMM & +0.675VRUN



Discharge

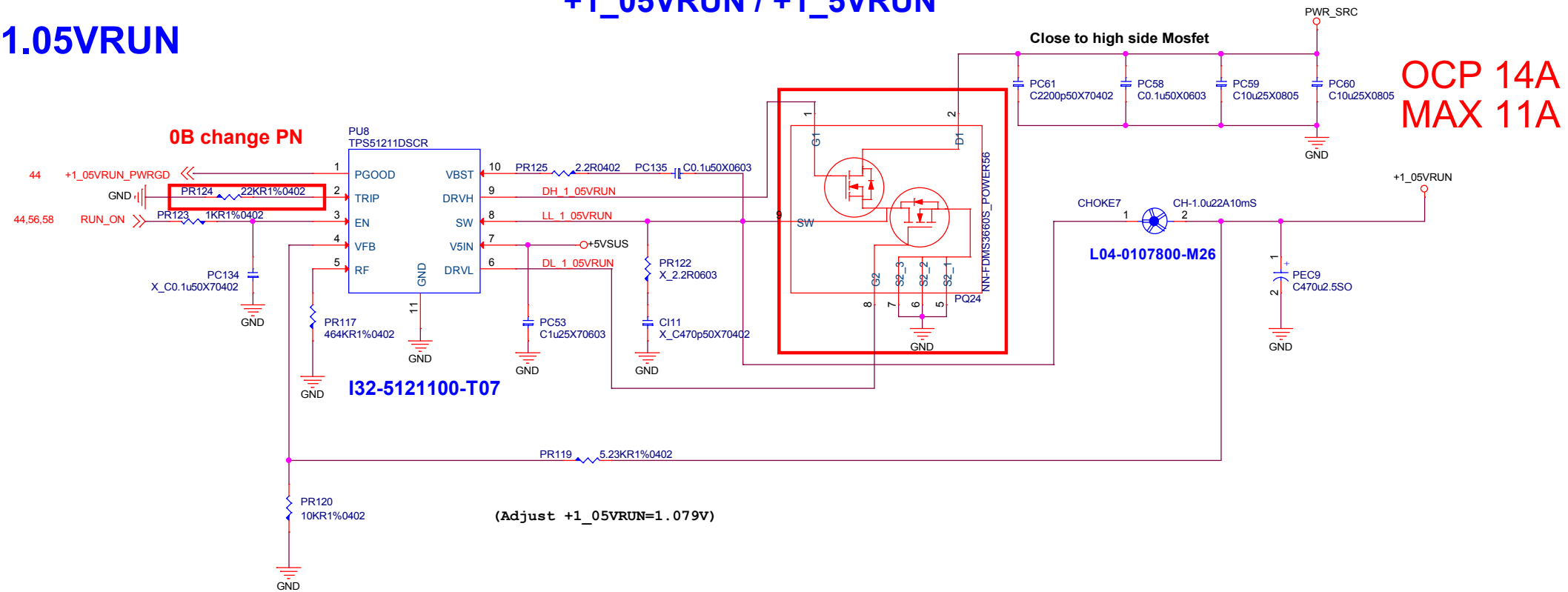




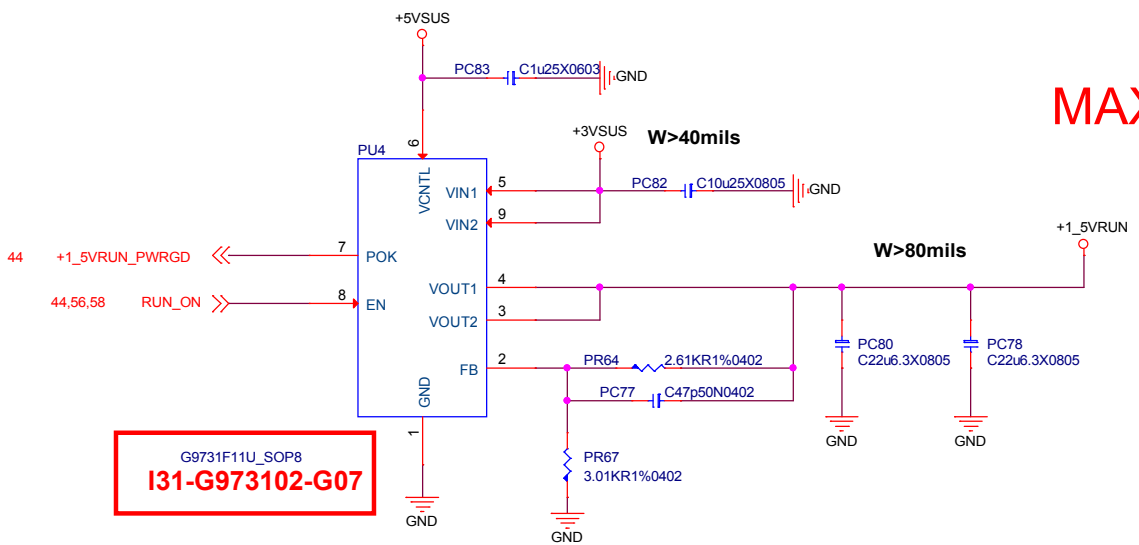
MICRO-STAR INT'L CO.,LTD.		
Title: +1.35VDIMM/+0.675VRUN		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 57 of 72	

+1_05VRUN / +1_5VRUN

+1.05VRUN



+1.5VRUN



MICRO-STAR INT'L CO.,LTD.

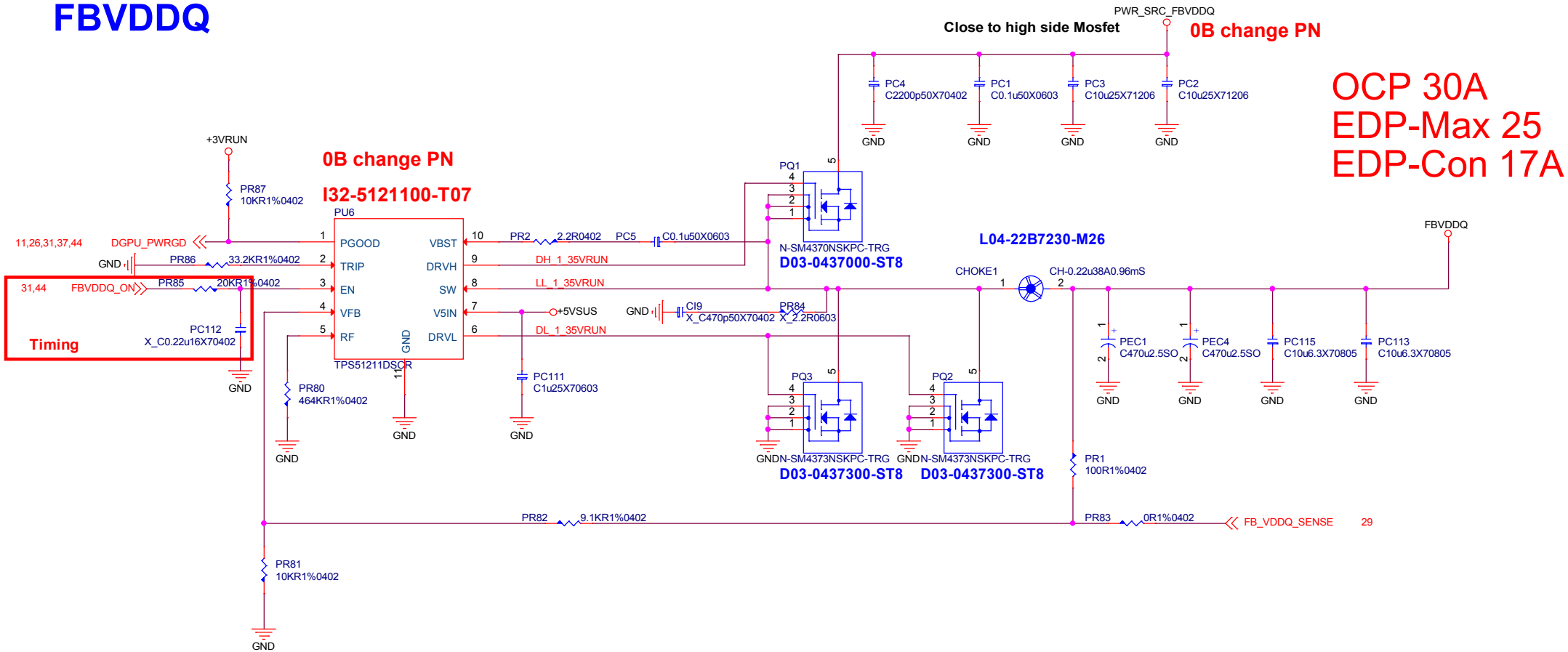
Title: +1_05VRUN / +1_5VRUN

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 58 of 72

DGPU POWER FBVDDQ

FBVDDQ



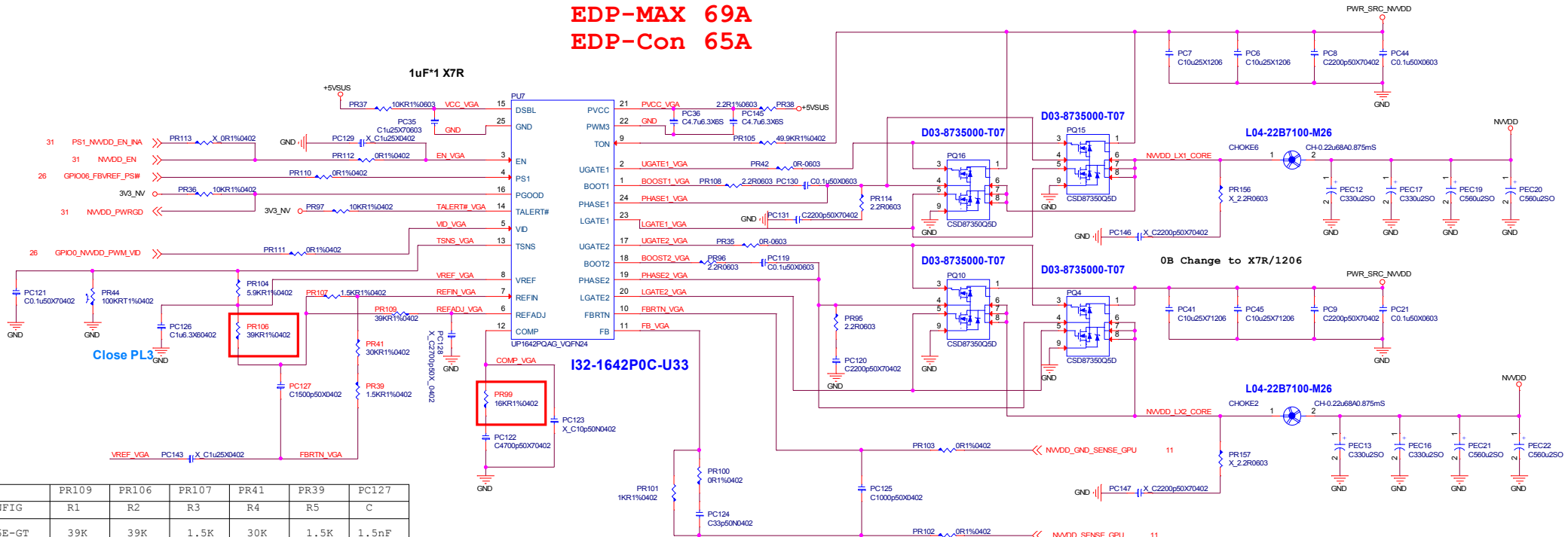
MICRO-STAR INT'L CO.,LTD.		
Title: DGPU POWER FBVDDQ		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 59 of 72	

DGPU POWER NVVDD

DGPU POWER / UP1642PQAG

CONFIG B
VBoot:0.9V
Vmin:0.6V / Vmax:1.2V

EDP-Peak 130A
EDP-MAX 69A
EDP-Con 65A



	PR109	PR106	PR107	PR41	PR39	PC127
CONFIG	R1	R2	R3	R4	R5	C
N16E-GT	39K	39K	1.5K	30K	1.5K	1.5nF

MICRO-STAR INT'L CO.,LTD.

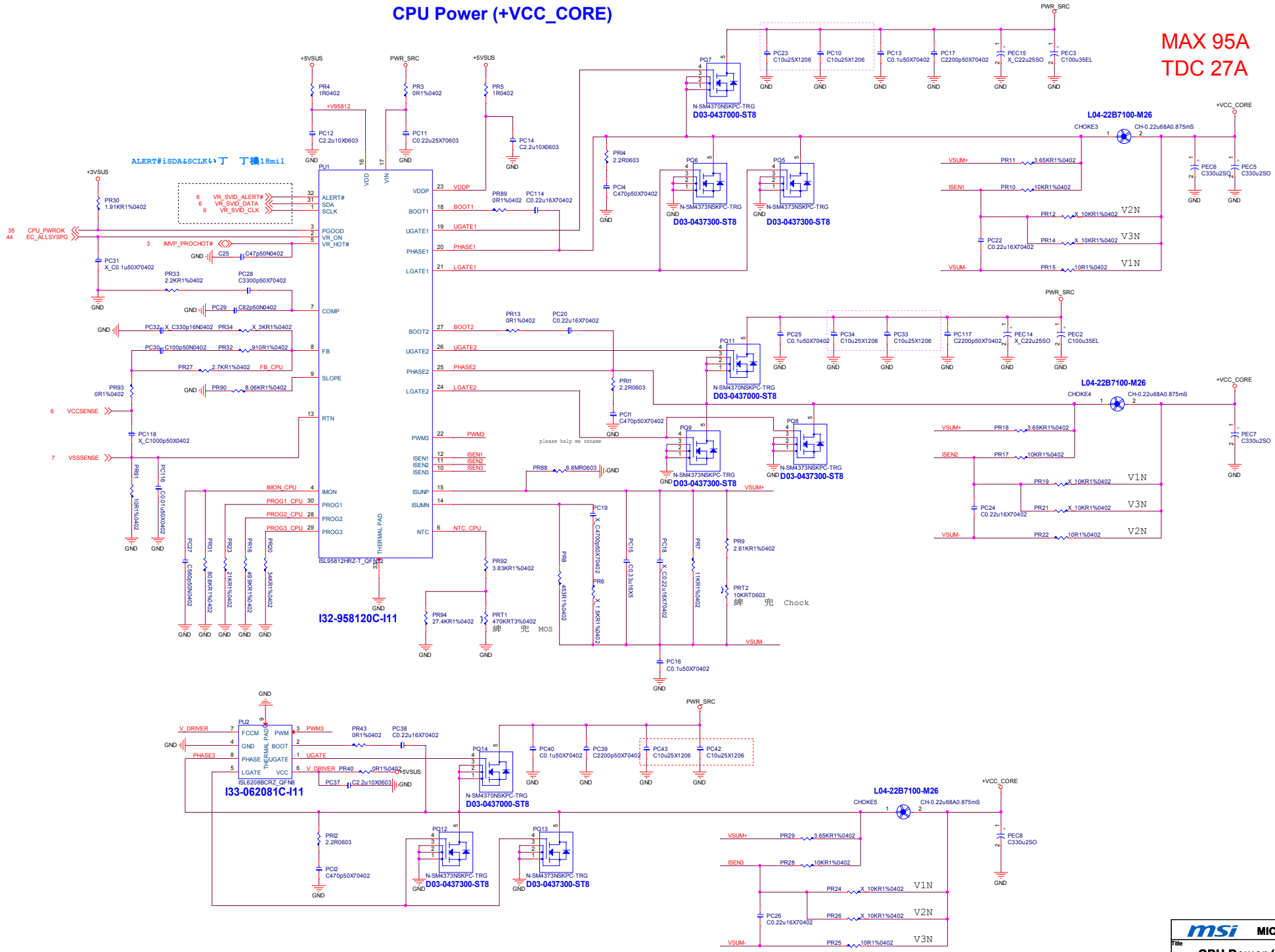
Title: DGPU POWER NVVDD

Size | Document Number: MS-16H5 | Rev: 1.1

Date: Tuesday, July 15, 2014 | Sheet 60 of 72

CPU Power (+VCC_CORE)

MAX 95A
TDC 27A



EMI/ Impedence

Impedence Connector No PN

40 ohm

J1 2 L1_6.5mil_40_Ohm 1 GND2 — X_H1X2M_BLACK

J2 2 L3_5mil_40_Ohm 1 GND2_GND4 — X_H1X2M_BLACK

J3 2 L10_5mil_40_Ohm 1 GND9_GND11 — X_H1X2M_BLACK

45 ohm

J4 2 L1_5.5mil_45_Ohm 1 GND2 — X_H1X2M_BLACK

J5 2 L3_4mil_45_Ohm 1 GND2_GND4 — X_H1X2M_BLACK

J6 2 L5_4mil_45_Ohm 1 GND4_GND6 — X_H1X2M_BLACK

J7 2 L10_4mil_45_Ohm 1 GND9_GND11 — X_H1X2M_BLACK

J8 2 L12_5.5mil_45_Ohm 1 GND11 — X_H1X2M_BLACK

50 ohm

J13 2 L1_4mil_50_Ohm 1 GND2 — X_H1X2M_BLACK

J9 2 L3_3mil_50_Ohm 1 GND2_GND4 — X_H1X2M_BLACK

J10 2 L5_3mil_50_Ohm 1 GND4_GND6 — X_H1X2M_BLACK

J11 2 L10_3mil_50_Ohm 1 GND9_GND11 — X_H1X2M_BLACK

J12 2 L12_4mil_50_Ohm 1 GND11 — X_H1X2M_BLACK

80 ohm

J14 L1_DIFF_4.5/4/4.5_80ohm+ / L1_DIFF_4.5/4/4.5_80ohm- — X_H1X4_BLACK — GND2	J15 L3_DIFF_4.5/7/4.5_80ohm+ / L3_DIFF_4.5/7/4.5_80ohm- — X_H1X4_BLACK — GND2_GND4	J16 L5_DIFF_4.5/7/4.5_80ohm+ / L5_DIFF_4.5/7/4.5_80ohm- — X_H1X4_BLACK — GND4_GND6	J17 L10_DIFF_4.5/7/4.5_80ohm+ / L10_DIFF_4.5/7/4.5_80ohm- — X_H1X4_BLACK — GND9_GND11	J18 L12_DIFF_4.5/4/4.5_80ohm+ / L12_DIFF_4.5/4/4.5_80ohm- — X_H1X4_BLACK — GND11

85 ohm

J19 L1_DIFF_4.5/4.5/4.5_85ohm+ / L1_DIFF_4.5/4.5/4.5_85ohm- — X_H1X4_BLACK — GND2	J20 L3_DIFF_4/6.5/4_85ohm+ / L3_DIFF_4/6.5/4_85ohm- — X_H1X4_BLACK — GND2_GND4	J21 L5_DIFF_4/6.5/4_85ohm+ / L5_DIFF_4/6.5/4_85ohm- — X_H1X4_BLACK — GND4_GND6	J22 L10_DIFF_4/6.5/4_85ohm+ / L10_DIFF_4/6.5/4_85ohm- — X_H1X4_BLACK — GND9_GND11	J23 L12_DIFF_4.5/4.5/4.5_85ohm+ / L12_DIFF_4.5/4.5/4.5_85ohm- — X_H1X4_BLACK — GND11

88 ohm

J24 L1_DIFF_4.5/6/4.5_88ohm+ / L1_DIFF_4.5/6/4.5_88ohm- — X_H1X4_BLACK — GND2	J25 L3_DIFF_3.5/4.5/3.5_88ohm+ / L3_DIFF_3.5/4.5/3.5_88ohm- — X_H1X4_BLACK — GND2_GND4	J26 L10_DIFF_3.5/4.5/3.5_88ohm+ / L10_DIFF_3.5/4.5/3.5_88ohm- — X_H1X4_BLACK — GND9_GND11	

90 ohm

J27 L1_DIFF_4/6/4_90ohm+ / L1_DIFF_4/6/4_90ohm- — X_H1X4_BLACK — GND2	J28 L3_DIFF_3.5/5.5/3.5_90ohm+ / L3_DIFF_3.5/5.5/3.5_90ohm- — X_H1X4_BLACK — GND2_GND4	J29 L5_DIFF_3.5/5.5/3.5_90ohm+ / L5_DIFF_3.5/5.5/3.5_90ohm- — X_H1X4_BLACK — GND4_GND6	J30 L10_DIFF_3.5/5.5/3.5_90ohm+ / L10_DIFF_3.5/5.5/3.5_90ohm- — X_H1X4_BLACK — GND9_GND11	J31 L12_DIFF_4/6/4_90ohm+ / L12_DIFF_4/6/4_90ohm- — X_H1X4_BLACK — GND11

100 ohm

J32 L1_DIFF_3.5/7.5/3.5_100ohm+ / L1_DIFF_3.5/7.5/3.5_100ohm- — X_H1X4_BLACK — GND2	J33 L3_DIFF_3/10/3_100ohm+ / L3_DIFF_3/10/3_100ohm- — X_H1X4_BLACK — GND2_GND4	J34 L5_DIFF_3/10/3_100ohm+ / L5_DIFF_3/10/3_100ohm- — X_H1X4_BLACK — GND4_GND6	J35 L10_DIFF_3/10/3_100ohm+ / L10_DIFF_3/10/3_100ohm- — X_H1X4_BLACK — GND9_GND11	J36 L12_DIFF_3.5/7.5/3.5_100ohm+ / L12_DIFF_3.5/7.5/3.5_100ohm- — X_H1X4_BLACK — GND11

CLAMP1 GND — E21-5801010-RH

CLAMP2 GND — E21-5801010-RH

CLAMP4 GND — E21-5801010-RH

CLAMP5 GND — E21-5801010-RH

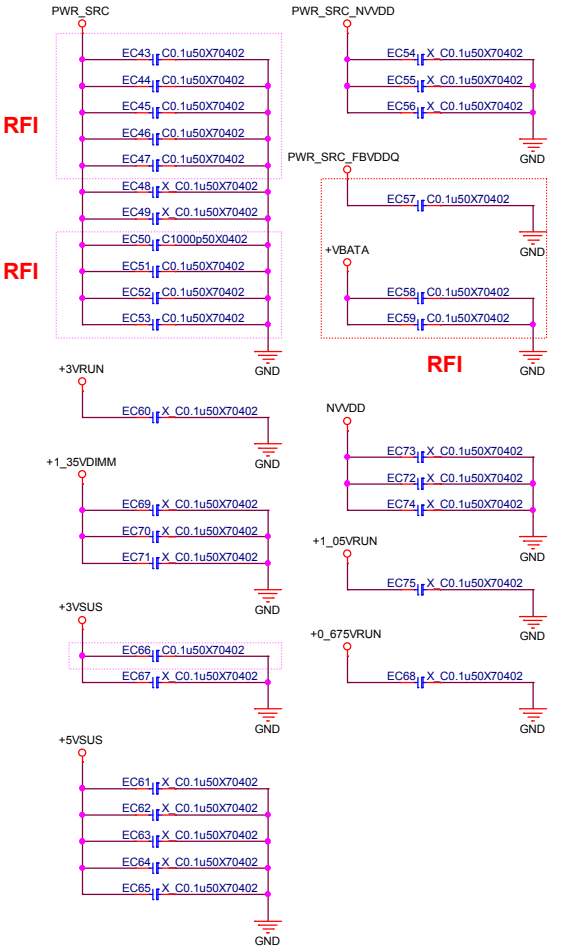
CLAMP6 GND — E21-5801010-RH

CLAMP7 GND — E21-5801010-RH

CLAMP8 GND — E21-5801010-RH

CLAMP9 GND — E21-5801010-RH

EMI



msi	MICRO-STAR INT'L CO.,LTD.		
Title	EMI/ Impedence		
Size	Document Number MS-16H5		Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 62 of 72		

CPU/GPU Holes

MCPU4 H_R200D150 — GND X_CPU_HOLE
MCPU2 H_R200D150 — GND X_CPU_HOLE
MCPU3 H_R200D150 — GND X_CPU_HOLE
MCPU1 H_R200D150 — GND X_CPU_HOLE

MGPU2 H_R276D169_PB — GND X_CPU_HOLE
MGPU4 H_R276D169_PB — GND X_CPU_HOLE
MGPU1 H_R276D169_PB — GND X_CPU_HOLE
MGPU3 H_R276D169_PB — GND X_CPU_HOLE

M2 X_H_R197D118_PT_V3 H_R197D118_PT_V3 — GND
M7 X_H_R197D118_PT_V3 H_R197D118_PT_V3 — GND

Fan Hole

MH1 H_R197D91 X_ME_ SCREW HOLE — GND

SSD Stand off

MH3 H_R220D146_PTB E2B-16H2020 — GND
MH2 H_R220D146_PTB E2B-16H2020 — GND

MH4 NPTH157 X_NPTH157

EMI

SPRING1 HS-MS-1721 — GND — E2M-7213211-CA7 — ATE_C006_106
SPRING2 HS-MS1058 — GND — E2M-2142011-CA7 — ATE_C006_106
SPRING3 HS-MS-1029 — GND — E23-1029060-CA7 — ATE_C006_106

MYLAR1 — E2P-6H22111-Y42 — MYLAR
MYLAR3 — E2P-6H22711-Y42 — MYLAR
MYLAR4 — E2P-6H23011-Y42 — MYLAR
MYLAR5 — E2P-6H23111-Y42 — MYLAR
MYLAR6 — E2P-6G13911-Y42 — MYLAR
GASKET1 — E2Y-X005511-CA7 — GASKET

RUBBER1 — E2Y-6H20712-Y40 — RUBBER
RUBBER2 — E2Y-6H21312-Y40 — RUBBER
RUBBER3 — E2Y-6H21312-Y40 — RUBBER

BRACKET1 — 307-6H20111-C22 — CPU_BRACKET
BRACKET2 — 307-6H20111-C22 — CPU_BRACKET
BRACKET3 — 307-6H20211-C22 — GPU_BRACKET

FM1 X_F_PAD_X
FM2 X_F_PAD_X
FM3 X_F_PAD_X
FM4 X_F_PAD_X
FM5 X_F_PAD_X
FM6 X_F_PAD_X
FM7 X_F_PAD_X
FM8 X_F_PAD_X

UME1 — HDMI Lable — HDMI ROYALTY — Y01-RHDMI03-000
UME2 — BIOS Lable — BIOS_LABEL — G51-LA01678-A09

For MP

PCB1 — PF0-16H5111-H73
PF0-16H5111-H73
Hannstar: PF0-16H5111-H73
TRIPOD: PF0-16H5111-T53

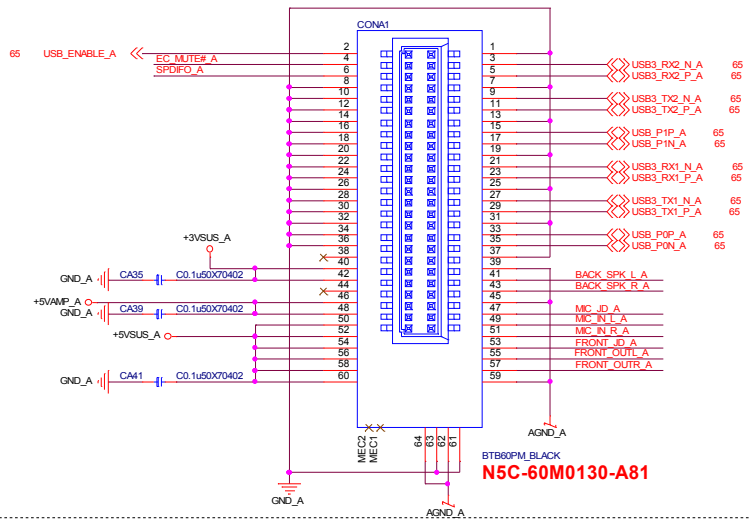
MICRO-STAR INT'L CO.,LTD.

Title	Screw/ME	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 63 of 72	

16H5-A Board (Audio CONN)

BTB Connector From MB

CONN Pin Current Capability : 0.5A/Pin



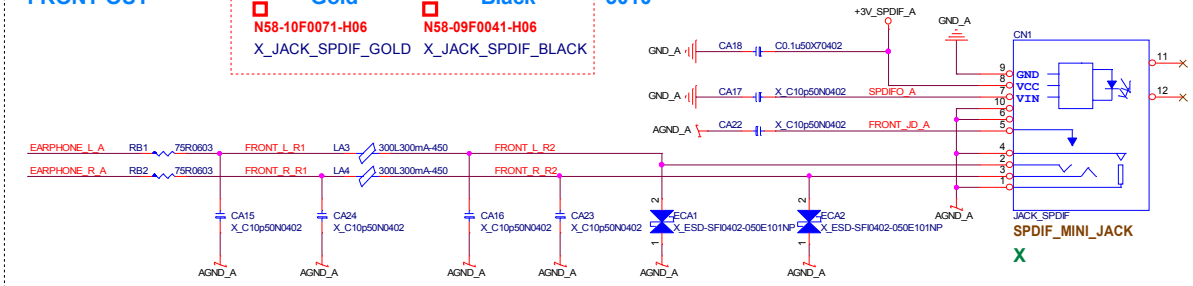
N5C-60M0130-A81

FRONT OUT

SPDIF1 Gold — N58-10F0071-H06 — X_JACK_SPDIF_GOLD

SPDIF2 Black — N58-09F0041-H06 — X_JACK_SPDIF_BLACK

5010



SPDIF_MINI_JACK

X

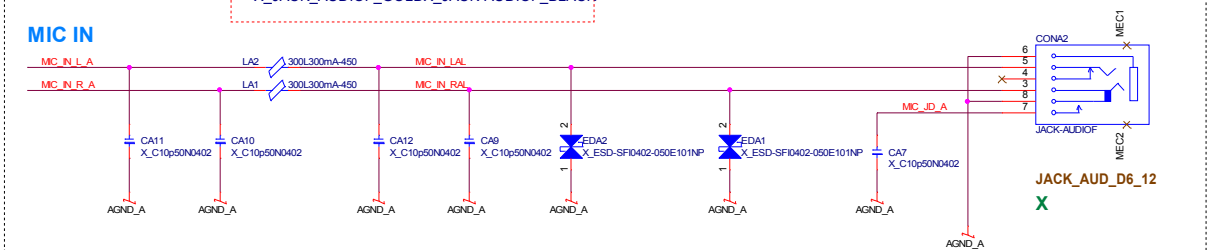
MIC IN

MIC1 Gold — N54-06F1191-H06

MIC2 Black — N54-06F0481-H06

X_JACK_AUDIOF_GOLDX_JACK-AUDIOF_BLACK

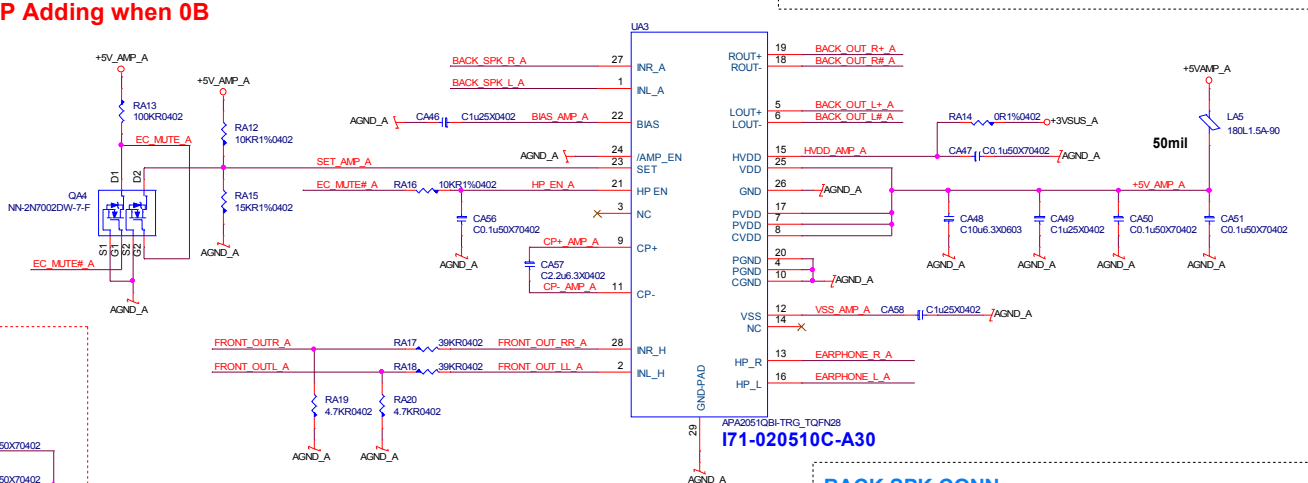
5010



JACK_AUD_D6_12

X

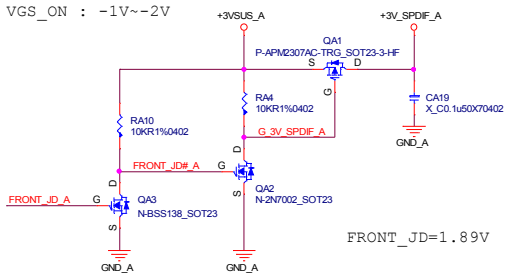
AMP Adding when 0B



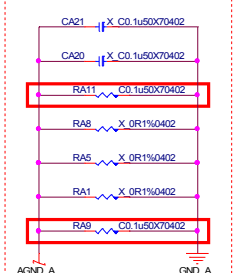
I71-020510C-A30

SPDIF Power

VGS_ON : -1V~-2V



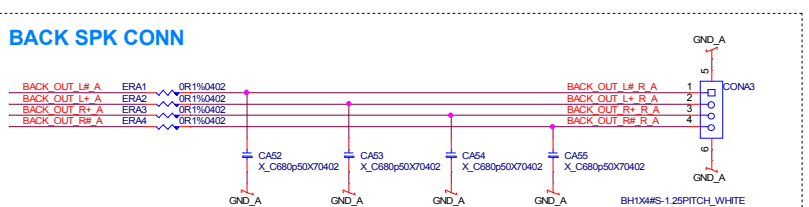
EMI



Change to Cap

Change to Cap

BACK SPK CONN

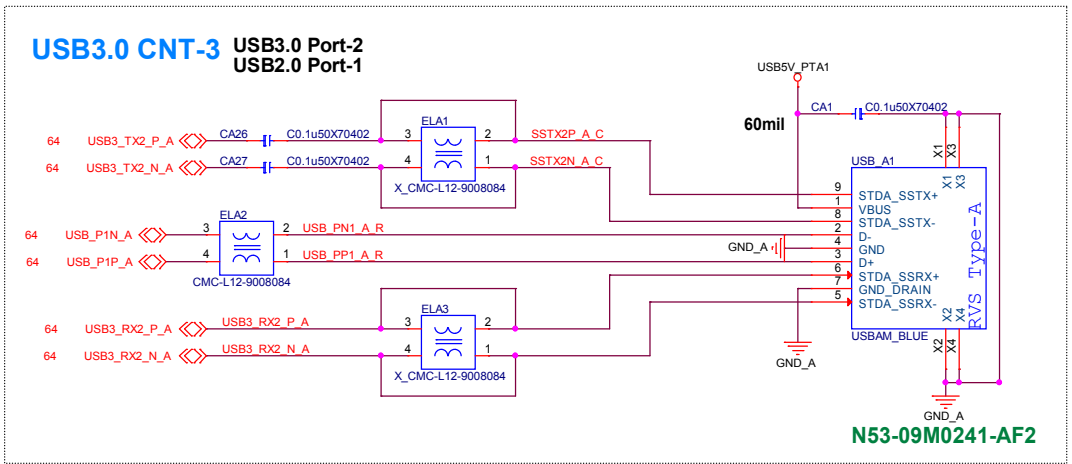


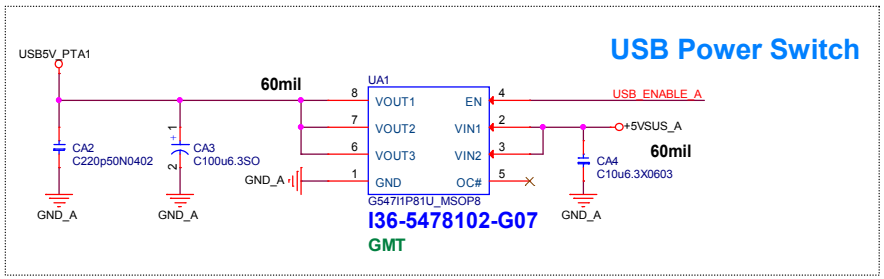
N32-1040AV0-H06

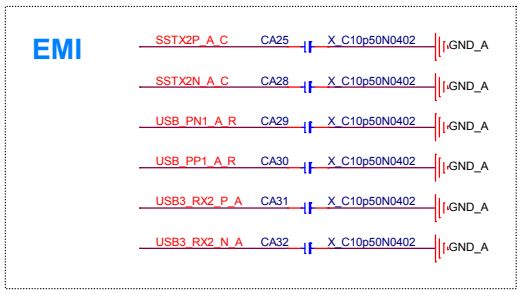
MICRO-STAR INT'L CO.,LTD.

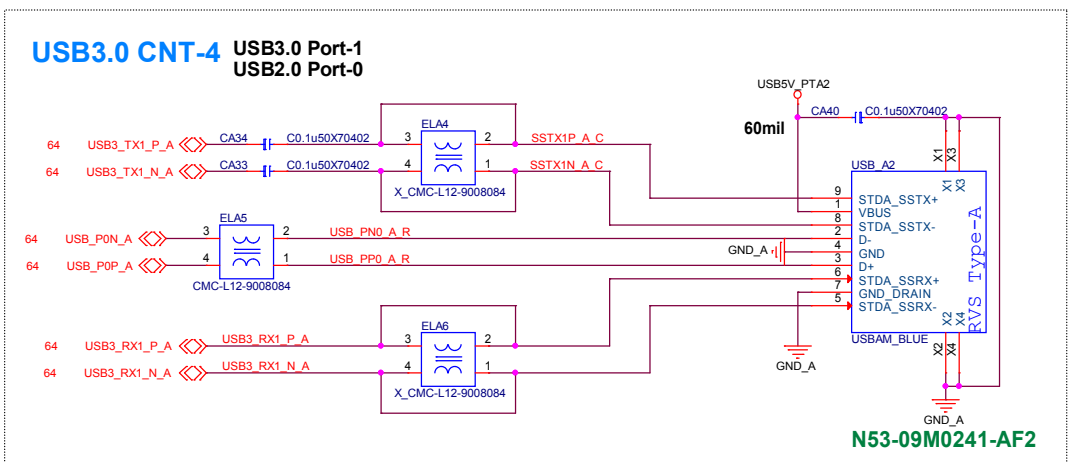
Title	[A] Audio	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 64 of 72	

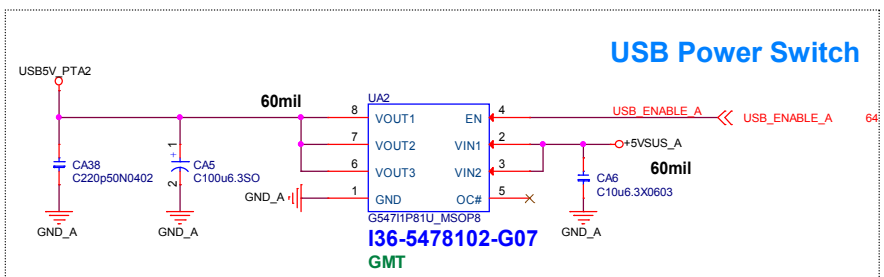
[A] USB3.0 CNT-2/-3

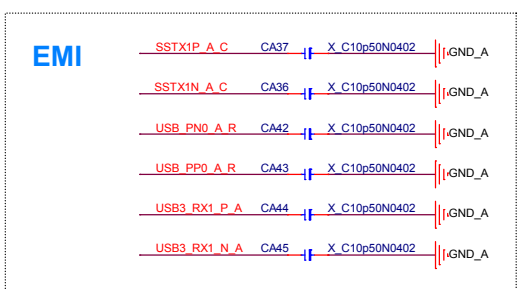


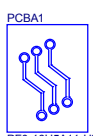












PF0-16H5A11-H73

Hannstar: PF0-16H5A11-H73
TRIPOD: PF0-16H5A11-T53

MYLARA1	MYLARA2
E2P-6H22812-G40	E2P-6H22311-G40
MYLAR	MYLAR

MICRO-STAR INT'L CO.,LTD.

Title	[A] USB3.0 CNT-3/-4	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 65 of 72	

16H5-B Board (LED Board)

LED

BLUE (HDD)

+5VRUN_B → RB4 1KR1%0603 → HDD_LIGHT_A → DB2 LED04-B-20mA2.8V_1608 → LED_HDD# _B

D0C-04018F0-L05

GND_B → EDB3 2 → 1 X_ESD-DIODE

BLUE (BT)

RB6 1KR1%0603 → BT_LIGHT_A → DB5 LED04-B-20mA2.8V_1608 → LED_BLUETOOTH# _B

D0C-04018F0-L05

GND_B → EDB6 2 → 1 X_ESD-DIODE

BLUE (WLAN)

RB7 1KR1%0603 → WLAN_LIGHT_A → DB6 LED04-B-20mA2.8V_1608 → LED_WLAN# _B

D0C-04018F0-L05

GND_B → EDB7 2 → 1 X_ESD-DIODE

ORANGE (BATLOW)

+5VALW_B → RB8 220R0603 → BATL_LIGHT_A → DB7 LED04-O-30mA2.6V_1608 → LED_BATLOW# _B

D0C-040E200-L05

GND_B → EDB8 2 → 1 X_ESD-DIODE

BLUE (CHARGE)

RB10 1KR1%0603 → CHA_LIGHT_A → DB8 LED04-B-20mA2.8V_1608 → LED_CHARGE# _B

D0C-04018F0-L05

GND_B → EDB1 2 → 1 X_ESD-DIODE

BLUE (CAP)

+5VRUN_B → RB9 1KR1%0603 → CAP_LIGHT_A → DB4 LED04-B-20mA2.8V_1608 → LED_CAP# _B

D0C-04018F0-L05

GND_B → EDB5 2 → 1 X_ESD-DIODE

BLUE (NUM)

RB5 1KR1%0603 → NUM_LIGHT_A → DB3 LED04-B-20mA2.8V_1608 → LED_NUM# _B

D0C-04018F0-L05

GND_B → EDB4 2 → 1 X_ESD-DIODE

BLUE (ACPI)

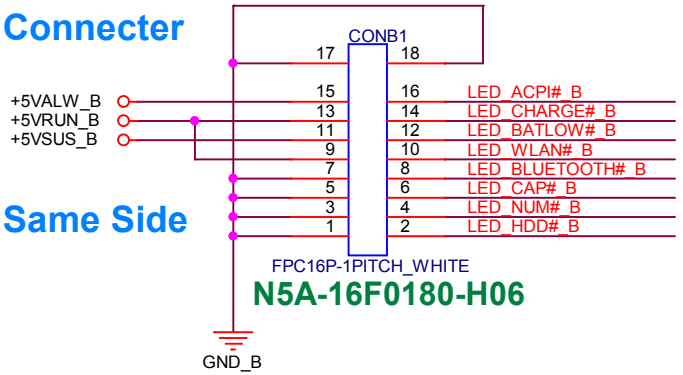
+5VSUS_B → RB3 1KR1%0603 → ACPI_LIGHT_A → DB1 LED04-B-20mA2.8V_1608 → LED_ACPI# _B

D0C-04018F0-L05

GND_B → EDB2 2 → 1 ESD-DIODE

Connecter

Same Side

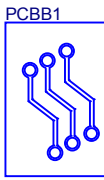


FPC16P-1PITCH_WHITE

N5A-16F0180-H06

MHB1 H_R197D91 X_ME_SCREW HOLE → GND_B

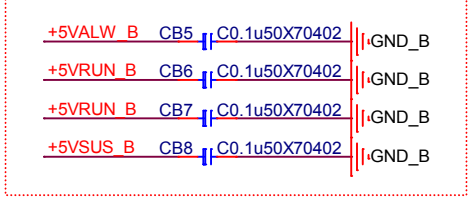
MHB2 H_R197D91 X_ME_SCREW HOLE → GND_B



PF0-16H5B11-H73

PF0-16H5B11-H73

Hannstar: PF0-16H5B11-H73
TRIPOD: PF0-16H5B11-T53

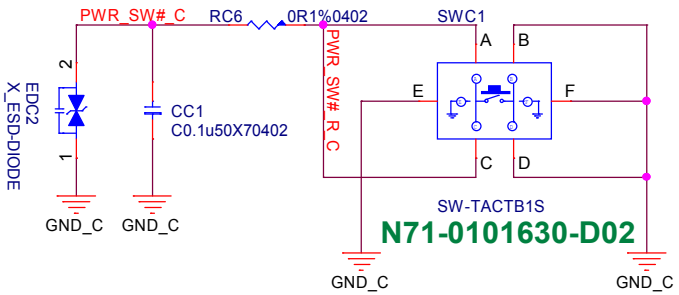


MICRO-STAR INT'L CO.,LTD.

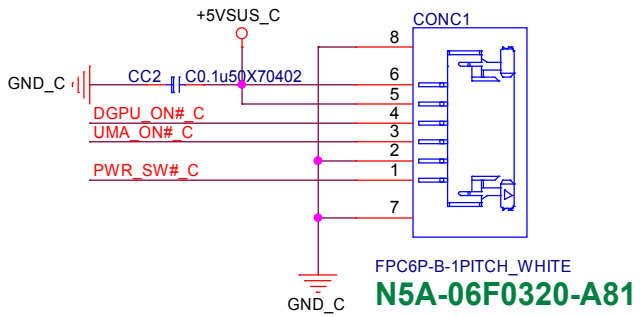
Title	LED Board	
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 66 of 72	

16H5-C Board (Power SW Board)

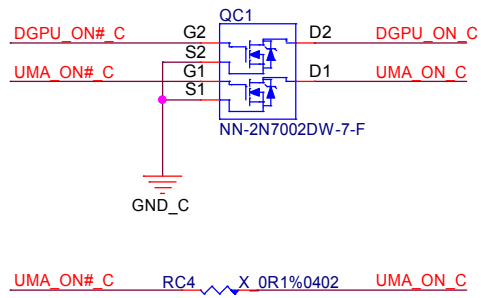
Power Switch



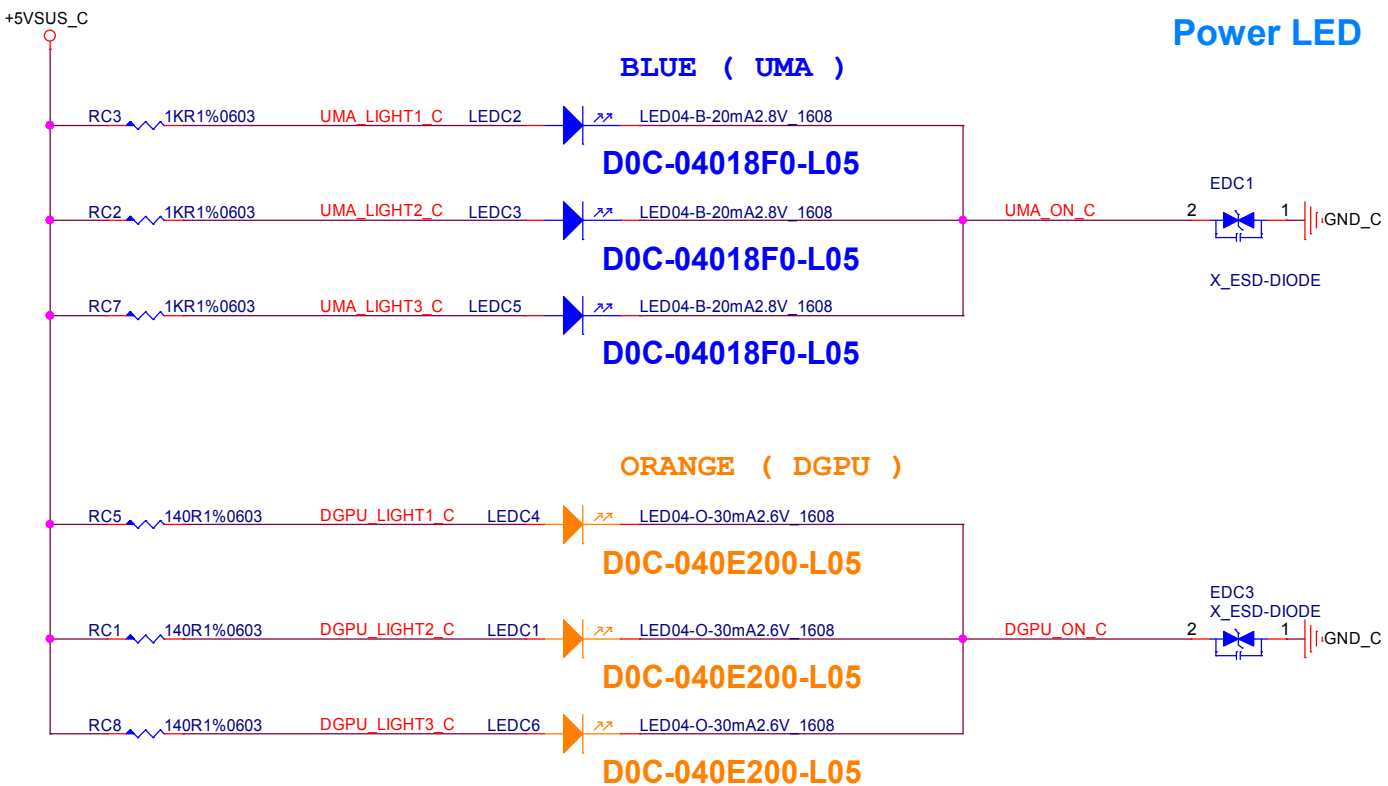
Diff Side Connecter

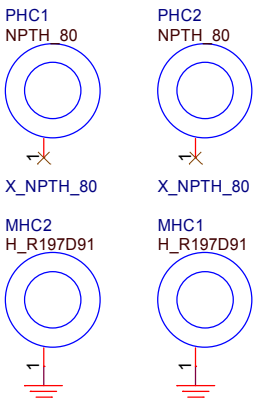


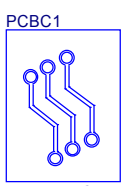
UMA/DGPU Logic



Power LED







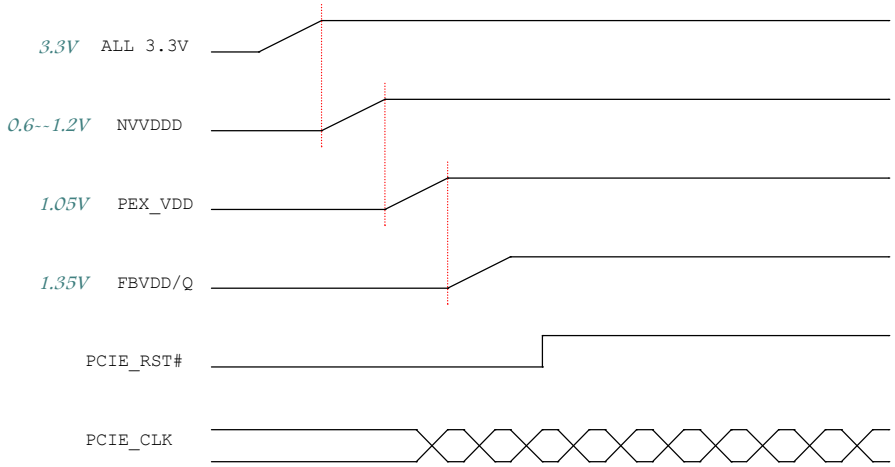
PF0-16H5C11-H73

Hannstar: PF0-16H5C11-H73
TRIPOD: PF0-16H5C11-T53

MICRO-STAR INT'L CO.,LTD.		
Title: Power SW Board		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 67 of 72	

MS-16H5 DGPU POWER SEQUENCE

GPU POWER ON SEQUENCE

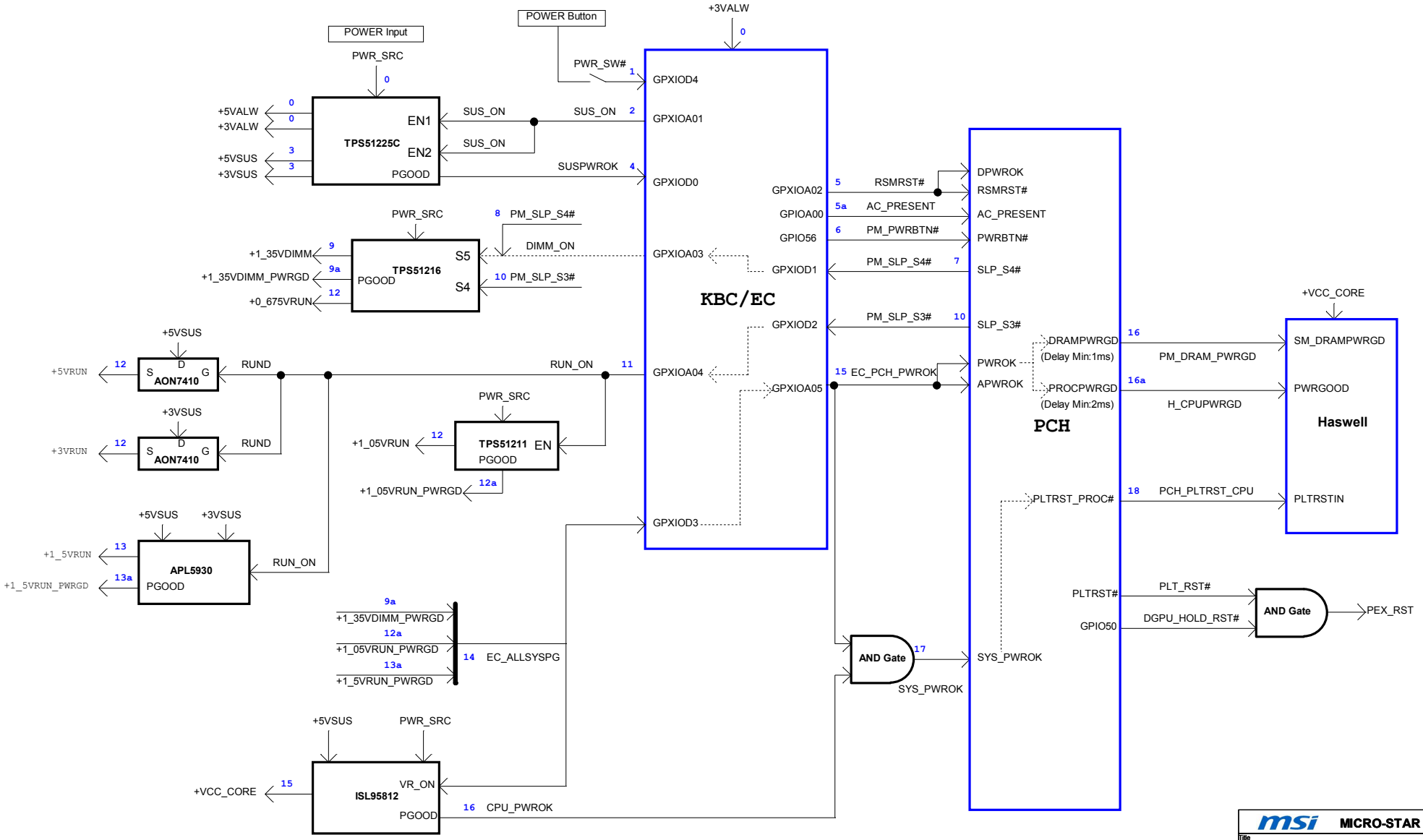


NOTES:

1. The ramp time for any rail must be more than 40 us and is recommended to be less than 2ms.
2. The ramp up overshoot should not exceed the silicon reliability limit voltagr.
3. A VDD33 must ramp up to 90% before NVVDD and PEX_VDD in sequence can ramping up.
   NVVDD must ramp up to 90% before FBVDD/Q in sequence can ramping up.
3. No signal should be applied to the GPU before the power rails are fully ramped.
4. Refer to JEDEC Memory Specification for memory related power sequencing.

msi MICRO-STAR INT'L CO.,LTD.		
Title: DGPU POWER SEQUENCE		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 68 of 72	

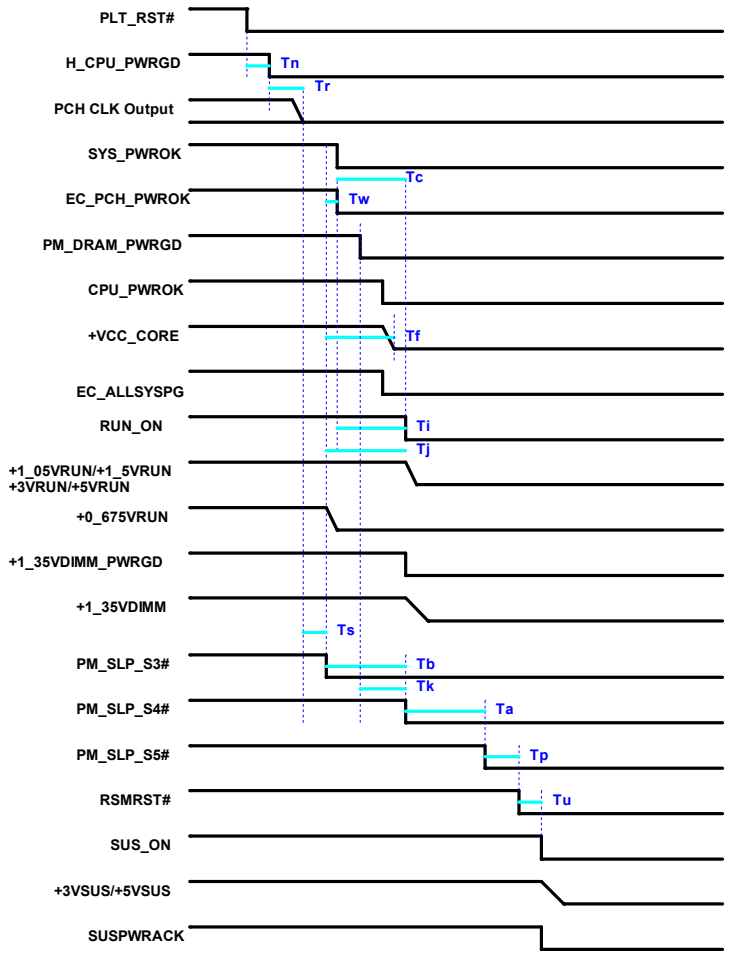
MS-16H5 Power on Block Diagram



MICRO-STAR INT'L CO.,LTD.			
Title: Power on Block Diagram			
Size	Document Number: MS-16H5		Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 69 of 72		

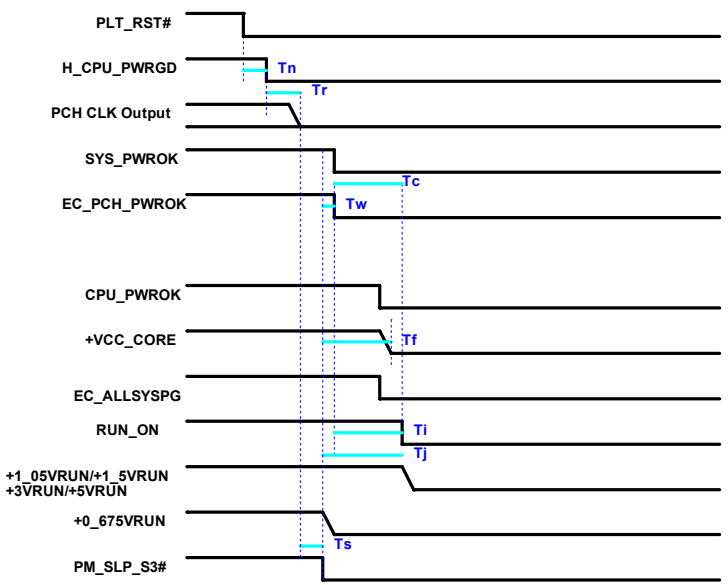
Power down Sequence

S0 -> G3



	MIN	MAX	Units	Description
Ta	30		us	SLP_S4# assertion to SLP_S5# assertion.
Tb	30		us	SLP_S3# assertion to SLP_S4# assertion.
Tc	40		ns	APWROK de-assertion to VCCASW/VCCSPI rails falling.
Tf		500	ms	SLP_S3# assertion to VCCIN(CPU) rail completely off.
Ti	40		ns	PWROK de-assertion to VCCCore (PCH) rail falling (-5% of nominal value).
Tj	5		us	SLP_S3# assertion to VCCCore (PCH) rails falling (-5% of nominal value).
Tk	-100		ns	DRAMPWROK de-assertion to SLP_S4# assertion
Tn	30		us	PLTRST# assertion to CPUPWRGOOD de-assertion.
Tp	500		us	Last SLP_Sx# or SLP_A# assertion to RSMRST# assertion
Tr	10		us	CPUPWRGOOD de-assertion to PCH clock outputs turning off.
Ts	1		us	PCH Clock outputs turning OFF to SLP_S3# assertion.
Tu	40		ns	RSMRST# assertion to VCCSUS rails falling (-5% of nominal value).
Tw	0		ms	SLP_S3# assertion to PWROK de-assertion.

S0 -> S3



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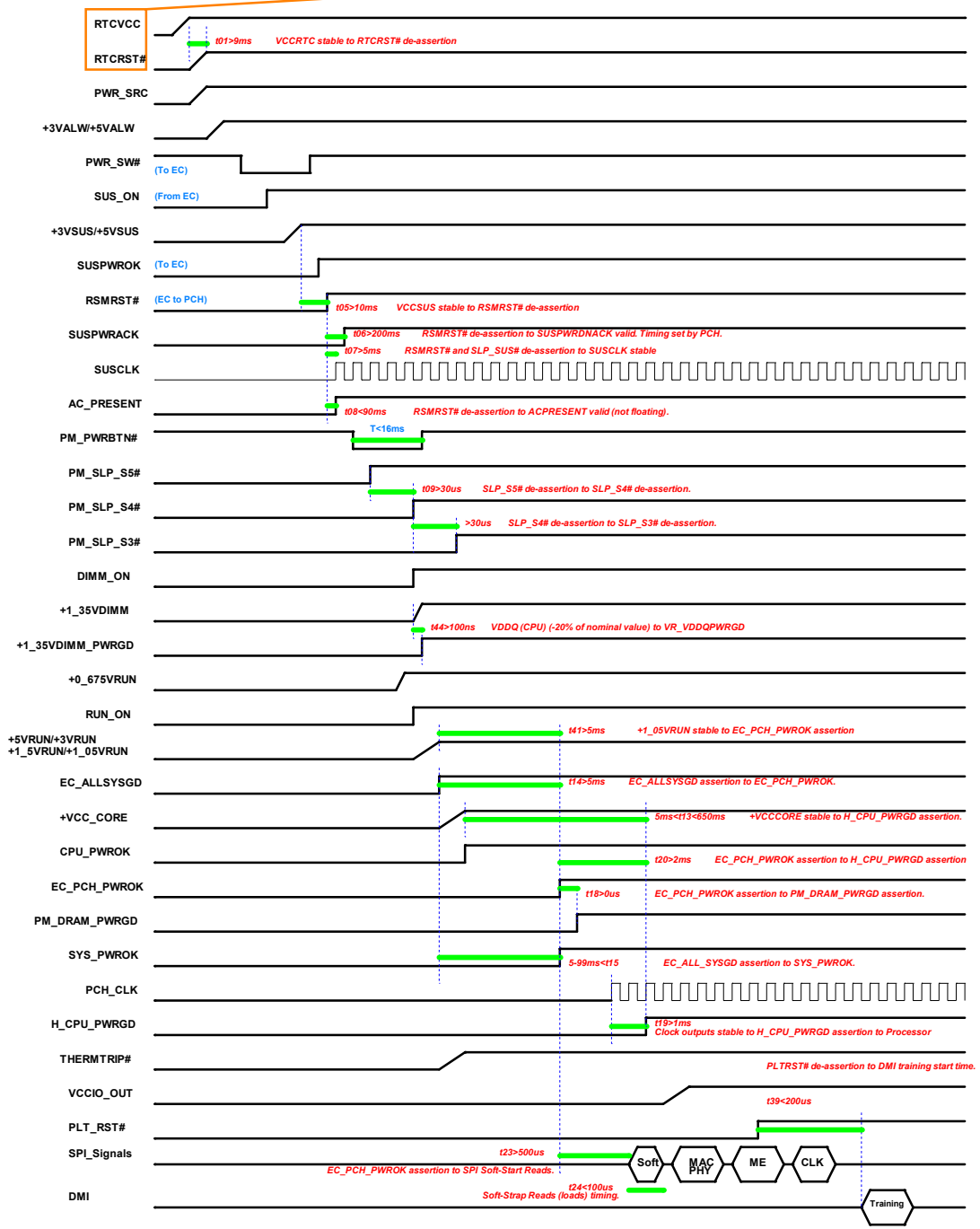
Title: Power down Sequence

Size | Document Number: MS-16H5 | Rev: 1.1

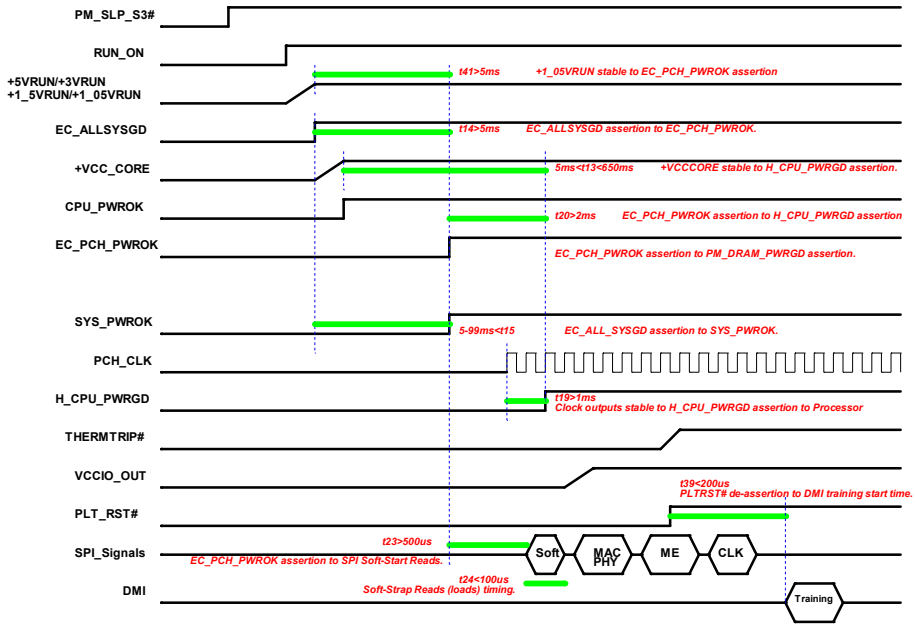
Date: Tuesday, July 15, 2014 | Sheet 70 of 72

Power on Sequence

G3 -> S0



S3-> S0



msi	MICRO-STAR INT'L CO.,LTD.	
Title	Power on Sequence	
Size	Document Number MS-16H5	Rev 1.1
Date: Tuesday, July 15, 2014	Sheet 71 of 72	

History

1.1: 2014/7/3

01. P32 ADD R419 R418 R110
    ADD Q25 Q26
    ADD C709

02. P36 ADD R108 TO DGPU_PWR_EN#

03. P43 ADD R408 TO FPC15 PIN4
    ADD R409 TO FPC15 PIN5
    ADD R410 TO FPC15 PIN6
    ADD R411 TO FPC15 PIN7
    ADD R412 TO FPC15 PIN8
    ADD R413 TO FPC15 PIN9
    ADD R414 TO FPC15 PIN10
    ADD R415 TO FPC15 PIN11
    ADD R416 TO FPC15 PIN12

2014/7/8

01. P56 Remove JNC6

2014/7/10

01. P43 ADD C770 TO +5VSUS_KB

MICRO-STAR INT'L CO.,LTD.		
Title: History		
Size	Document Number: MS-16H5	Rev: 1.1
Date: Tuesday, July 15, 2014	Sheet 72 of 72	