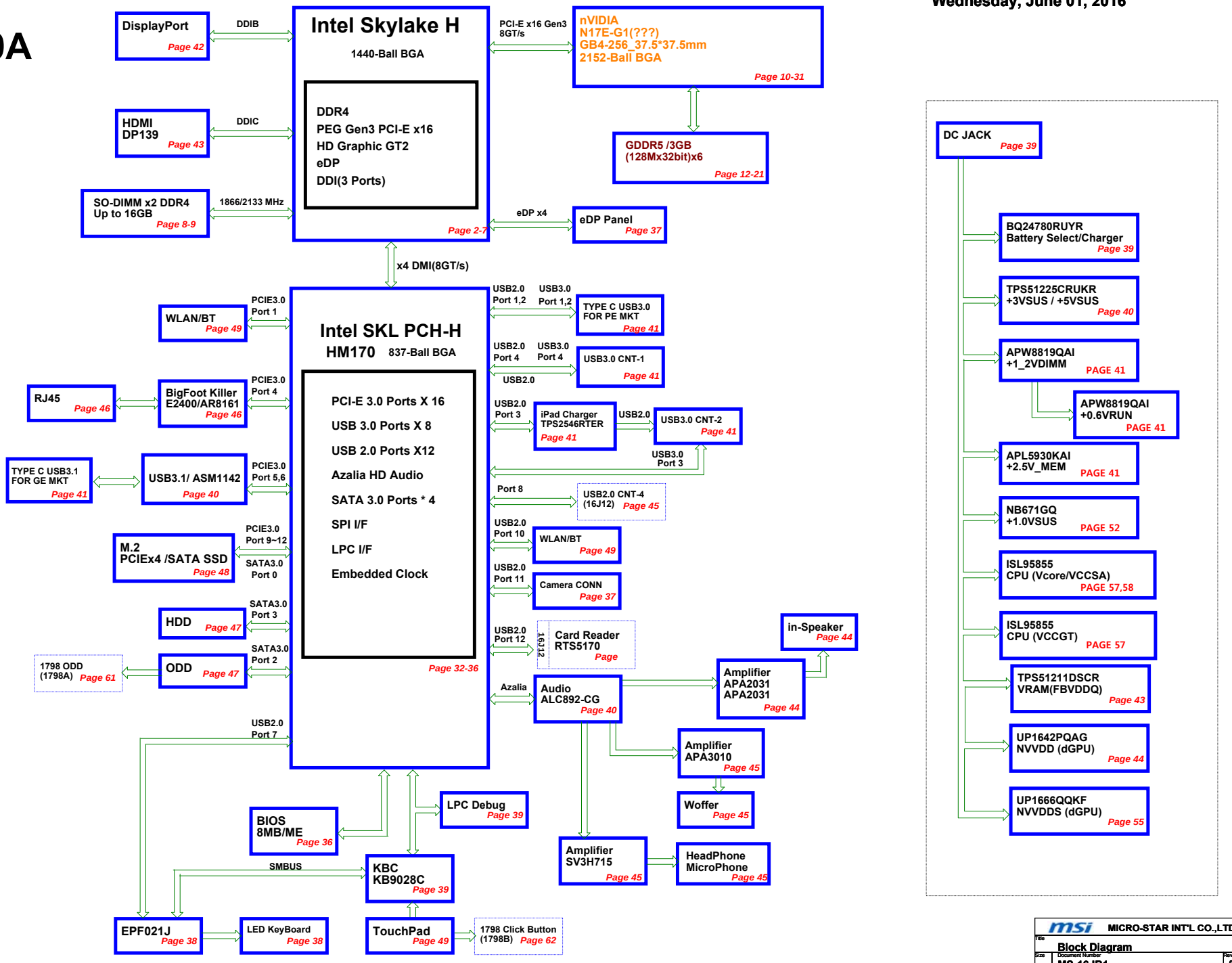
MS-16JB/MS-179B

Intel Skylake Mobile

Ver:0A

Wednesday, June 01, 2016



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

Title: Block Diagram

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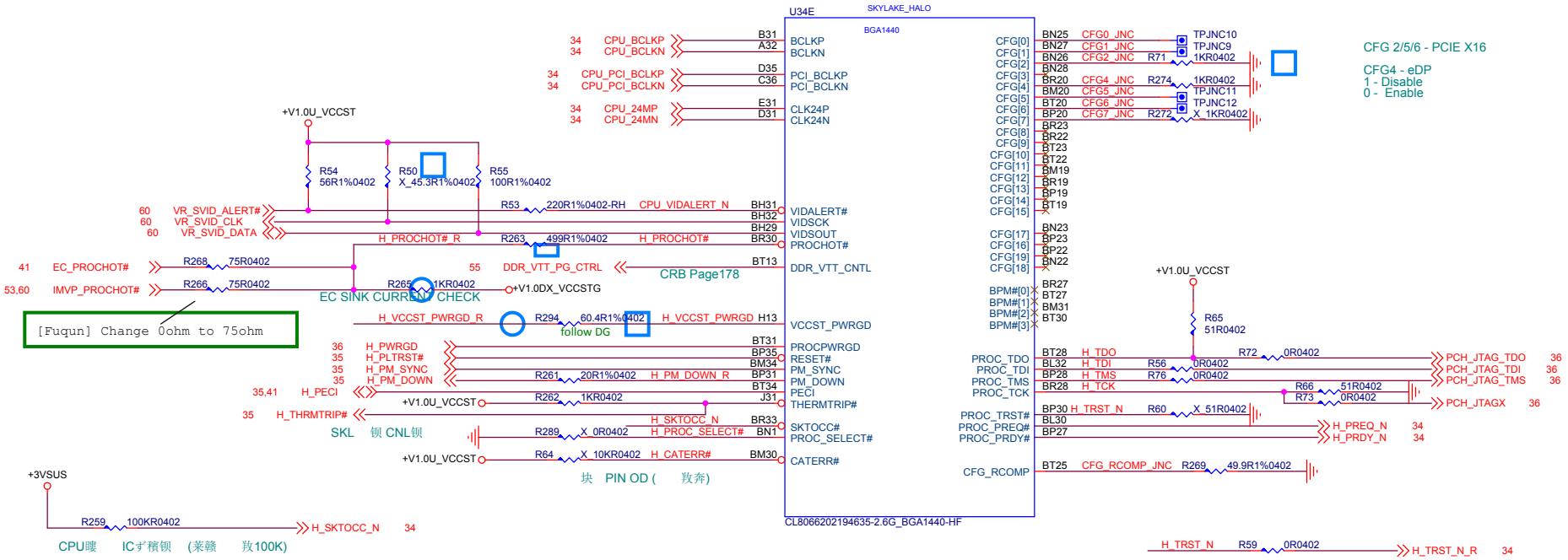
Date: | Sheet 1 of 71



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

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

PCIE Express * Static X16 Lane Numbering Reversal	
CFG2	CFG[2]: PCI Express* Static x16 Lane Numbering Reversal. 1 = Normal operation 0 = Lane numbers reversed.

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

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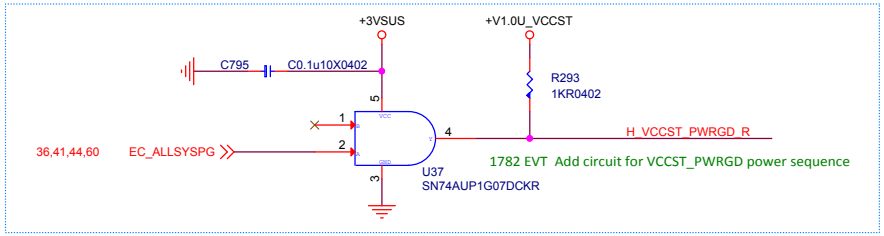

MICRO-STAR INT'L CO.,LTD.			
Title: Skylake(HOST)			
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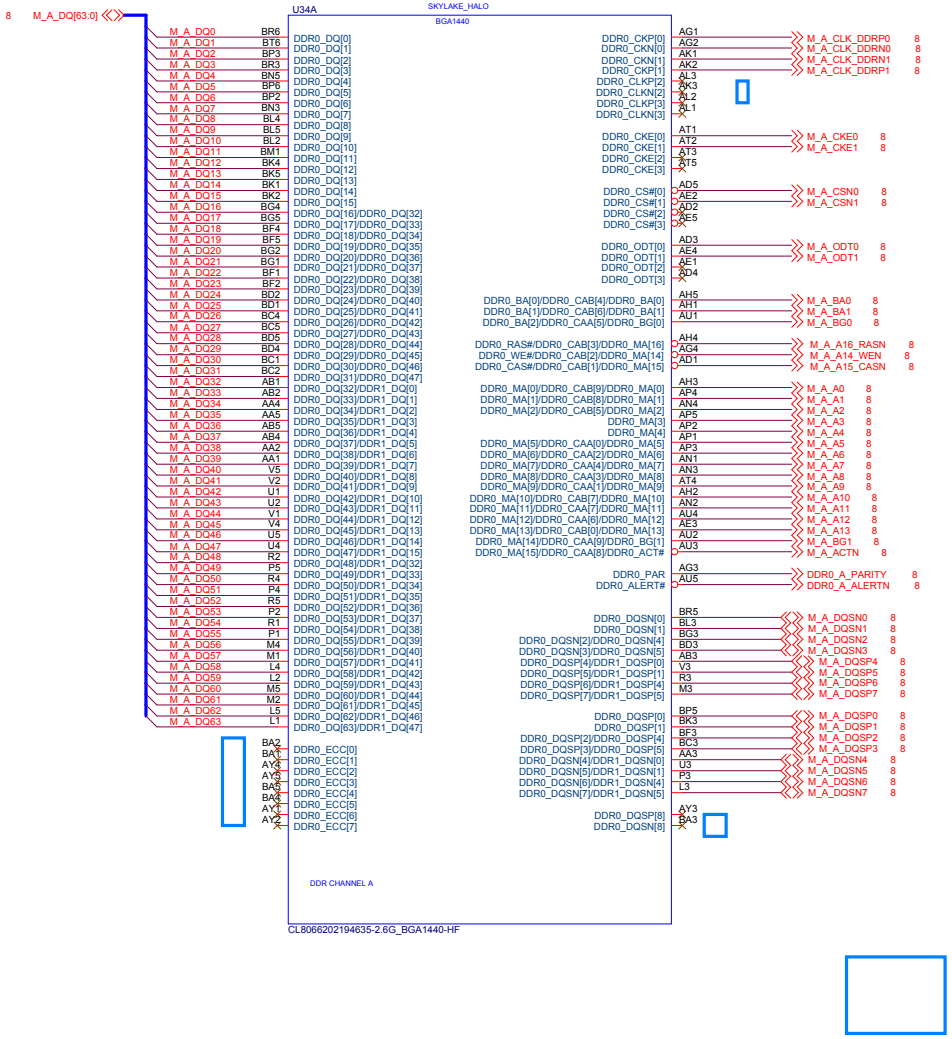
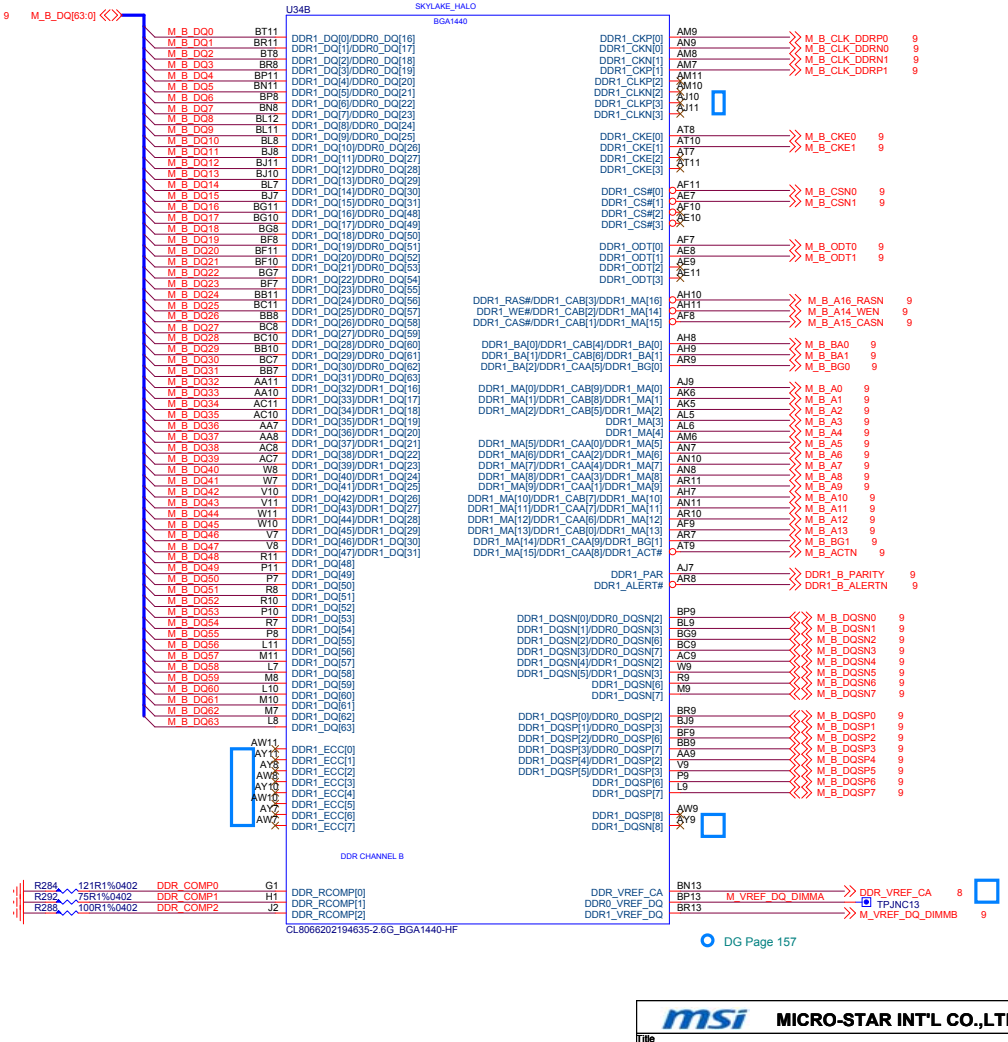
DDR Channel A



DDR Channel B



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MICRO-STAR INT'L CO.,LTD.

Title	Skylake(DDR4)	
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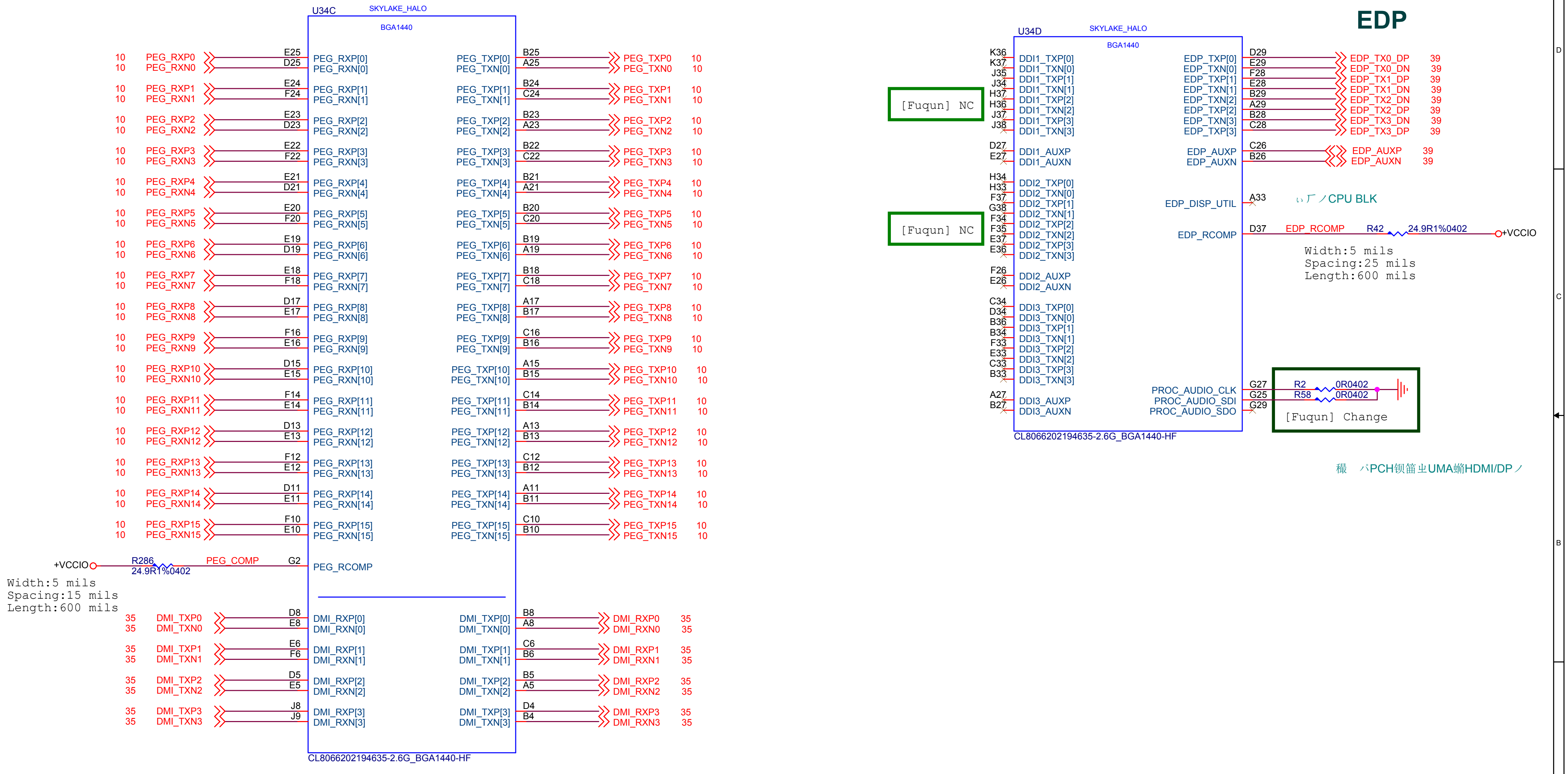

MICRO-STAR INT'L CO.,LTD.

Title: **Skylake(DMI/Display)**

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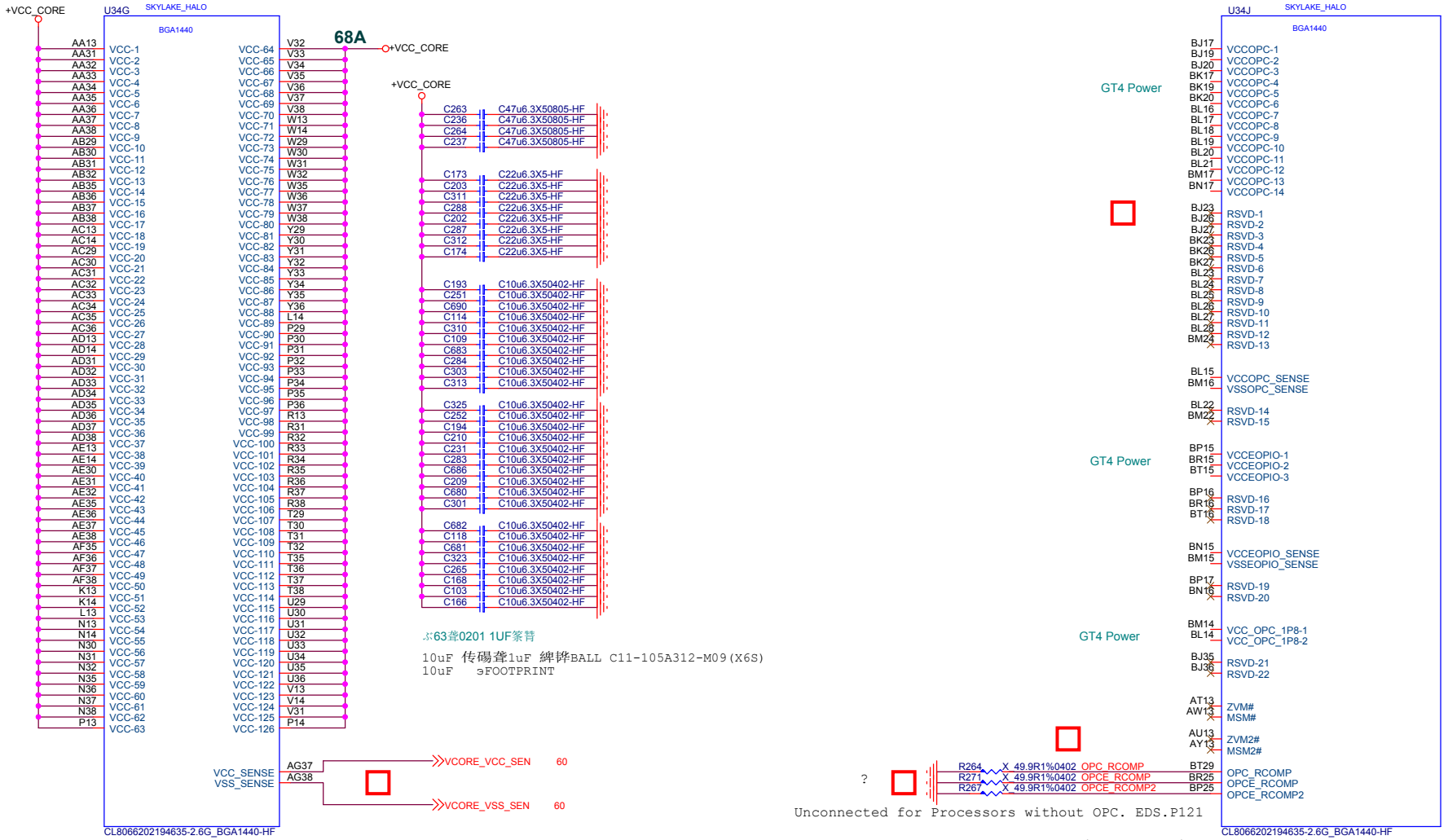
B	MS-16JB1	0A

Date: Wednesday, May 25, 2016 — Sheet 4 of 71

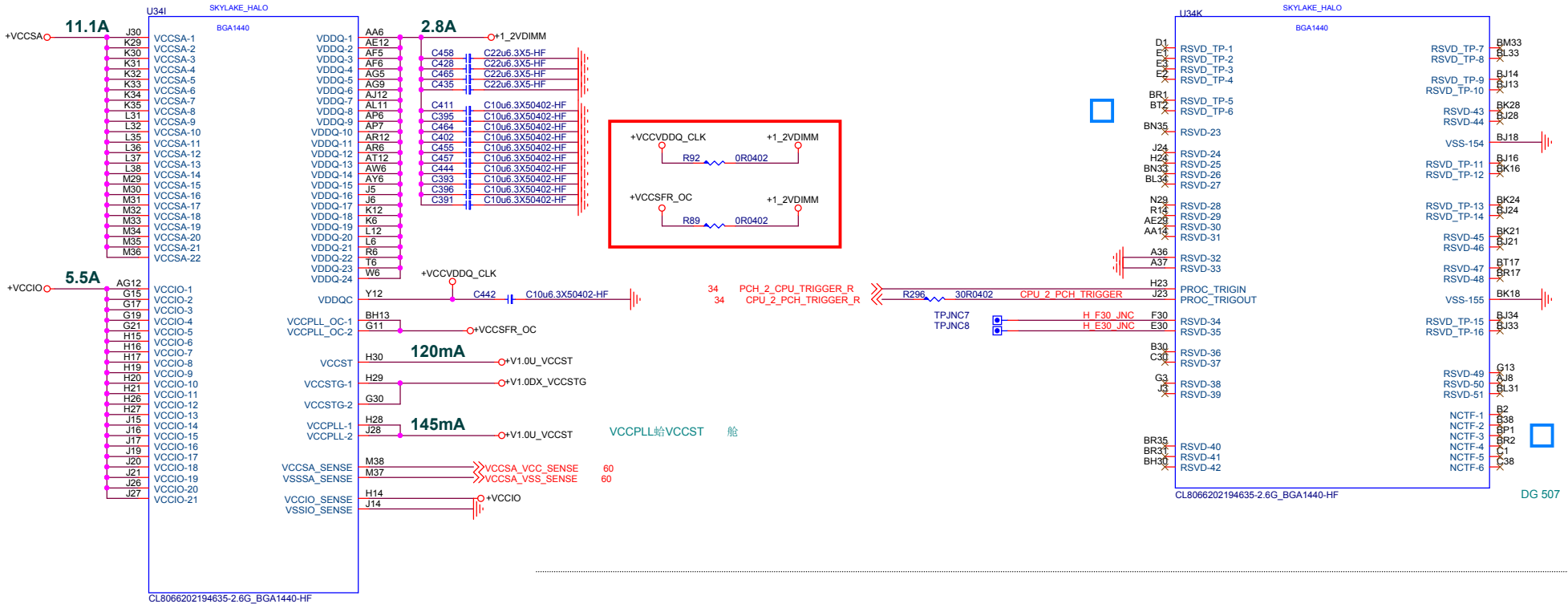


MICRO-STAR INT'L CO.,LTD.

Title: Skylake(Power1)

Size: A3 | Document Number: MS-16JB1 | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 5 of 71


U34I
SKYLAKE_HALO
BGA1440
11.1A
+VCCSA
VCCSA-1
VCCSA-2
VCCSA-3
VCCSA-4
VCCSA-5
VCCSA-6
VCCSA-7
VCCSA-8
VCCSA-9
VCCSA-10
VCCSA-11
VCCSA-12
VCCSA-13
VCCSA-14
VCCSA-15
VCCSA-16
VCCSA-17
VCCSA-18
VCCSA-19
VCCSA-20
VCCSA-21
VCCSA-22
5.5A
+VCCIO
VCCIO-1
VCCIO-2
VCCIO-3
VCCIO-4
VCCIO-5
VCCIO-6
VCCIO-7
VCCIO-8
VCCIO-9
VCCIO-10
VCCIO-11
VCCIO-12
VCCIO-13
VCCIO-14
VCCIO-15
VCCIO-16
VCCIO-17
VCCIO-18
VCCIO-19
VCCIO-20
VCCIO-21
2.8A
+1_2VDIMM
C458 C22u6.3X5-HF
C428 C22u6.3X5-HF
C465 C22u6.3X5-HF
C435 C22u6.3X5-HF
C411 C10u6.3X50402-HF
C395 C10u6.3X50402-HF
C464 C10u6.3X50402-HF
C402 C10u6.3X50402-HF
C455 C10u6.3X50402-HF
C457 C10u6.3X50402-HF
C444 C10u6.3X50402-HF
C393 C10u6.3X50402-HF
C396 C10u6.3X50402-HF
C391 C10u6.3X50402-HF
+VCCVDDQ_CLK
+1_2VDIMM
R92 0R0402
+VCCSFR_OC
+1_2VDIMM
R89 0R0402
VDDQC
+VCCVDDQ_CLK
C442 C10u6.3X50402-HF
VCCPLL_OC-1
VCCPLL_OC-2
+VCCSFR_OC
120mA
VCCST
+V1.0U_VCCST
VCCSTG-1
+V1.0DX_VCCSTG
VCCSTG-2
145mA
VCCPLL-1
VCCPLL-2
+V1.0U_VCCST
VCCPLL始VCCST 舱
VCCSA_SENSE
VSSSA_SENSE
VCCSA_VCC_SENSE 60
VCCSA_VSS_SENSE 60
VCCIO_SENSE
VSSIO_SENSE
+VCCIO
CL8066202194635-2.6G_BGA1440-HF
34 PCH_2_CPU_TRIGGER_R
34 CPU_2_PCH_TRIGGER_R
R296 30R0402
CPU_2_PCH_TRIGGER
TPJNC7
TPJNC8
H_F30_JNC
H_E30_JNC
U34K
SKYLAKE_HALO
BGA1440
RSVD_TP-1
RSVD_TP-2
RSVD_TP-3
RSVD_TP-4
RSVD_TP-5
RSVD_TP-6
RSVD-23
RSVD-24
RSVD-25
RSVD-26
RSVD-27
RSVD-28
RSVD-29
RSVD-30
RSVD-31
RSVD-32
RSVD-33
PROC_TRIGIN
PROC_TRIGOUT
RSVD-34
RSVD-35
RSVD-36
RSVD-37
RSVD-38
RSVD-39
RSVD-40
RSVD-41
RSVD-42
RSVD_TP-7
RSVD_TP-8
RSVD_TP-9
RSVD_TP-10
RSVD-43
RSVD-44
VSS-154
RSVD_TP-11
RSVD_TP-12
RSVD_TP-13
RSVD_TP-14
RSVD-45
RSVD-46
RSVD-47
RSVD-48
VSS-155
RSVD_TP-15
RSVD_TP-16
RSVD-49
RSVD-50
RSVD-51
NCTF-1
NCTF-2
NCTF-3
NCTF-4
NCTF-5
NCTF-6
CL8066202194635-2.6G_BGA1440-HF
DG 507
+VCCSA
C673 C47u6.3X50805-HF
C96 C47u6.3X50805-HF
C676 C10u6.3X50402-HF
C97 C10u6.3X50402-HF
C675 C10u6.3X50402-HF
C674 C10u6.3X50402-HF
C128 C10u6.3X50402-HF
C111 C10u6.3X50402-HF
C101 C10u6.3X50402-HF
+VCCIO
C664 C47u6.3X50805-HF
C665 C47u6.3X50805-HF
C708 C10u6.3X50402-HF
C709 C10u6.3X50402-HF
C721 C10u6.3X50402-HF
+VCCSFR_OC
C417 C1u6.3X70402-HF
C412 C1u6.3X70402-HF
+V1.0DX_VCCSTG
C164 C1u6.3X70402-HF
+V1.0U_VCCST
C145 C1u6.3X70402-HF
C143 C1u6.3X70402-HF
+V1.0DX_VCCSTG
+1.0VSUS
R34 0R
+V1.0U_VCCST
+1.0VSUS
R51 0R0805
[Fuqun] Remove 2pcs LDO for PCIE route min length
MICRO-STAR INT'L CO.,LTD.
Title
Skylake(Power2)
Size
Custom
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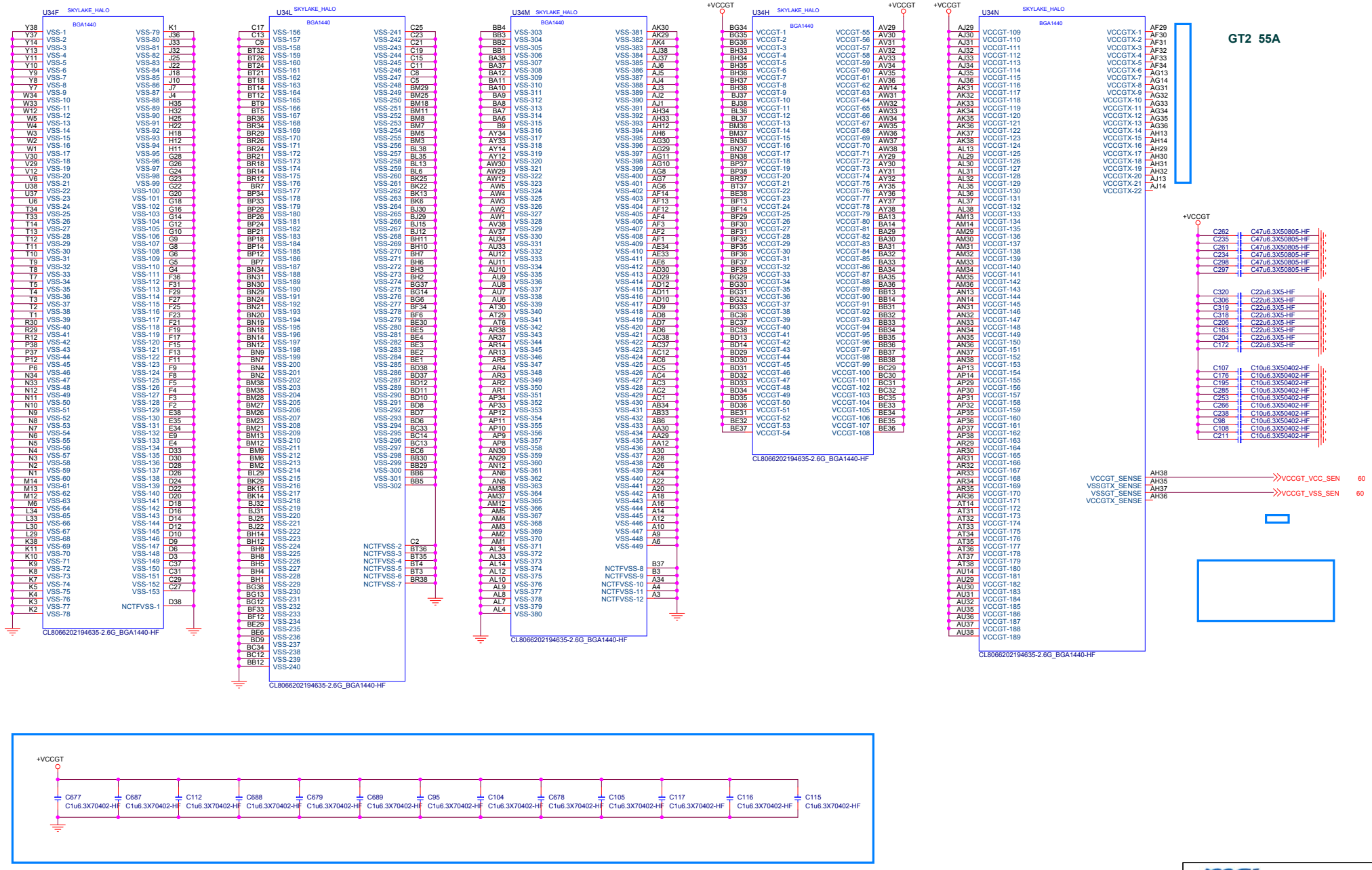

MICRO-STAR INT'L CO.,LTD.

Title: Skylake(Power3)

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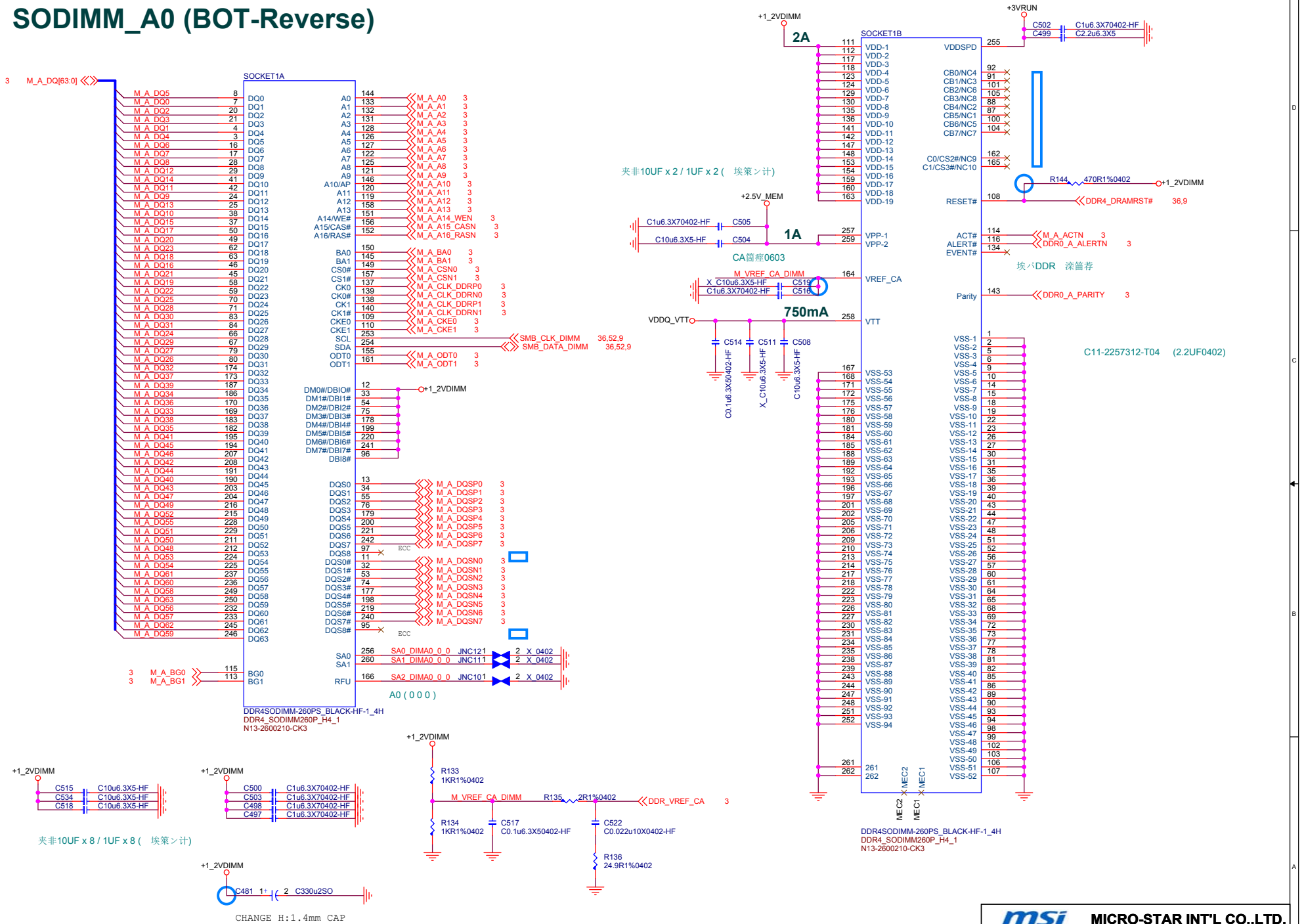
SODIMM_A0 (BOT-Reverse)



MICRO-STAR INT'L CO.,LTD.

Title	DDR4_SODIMM_A0	
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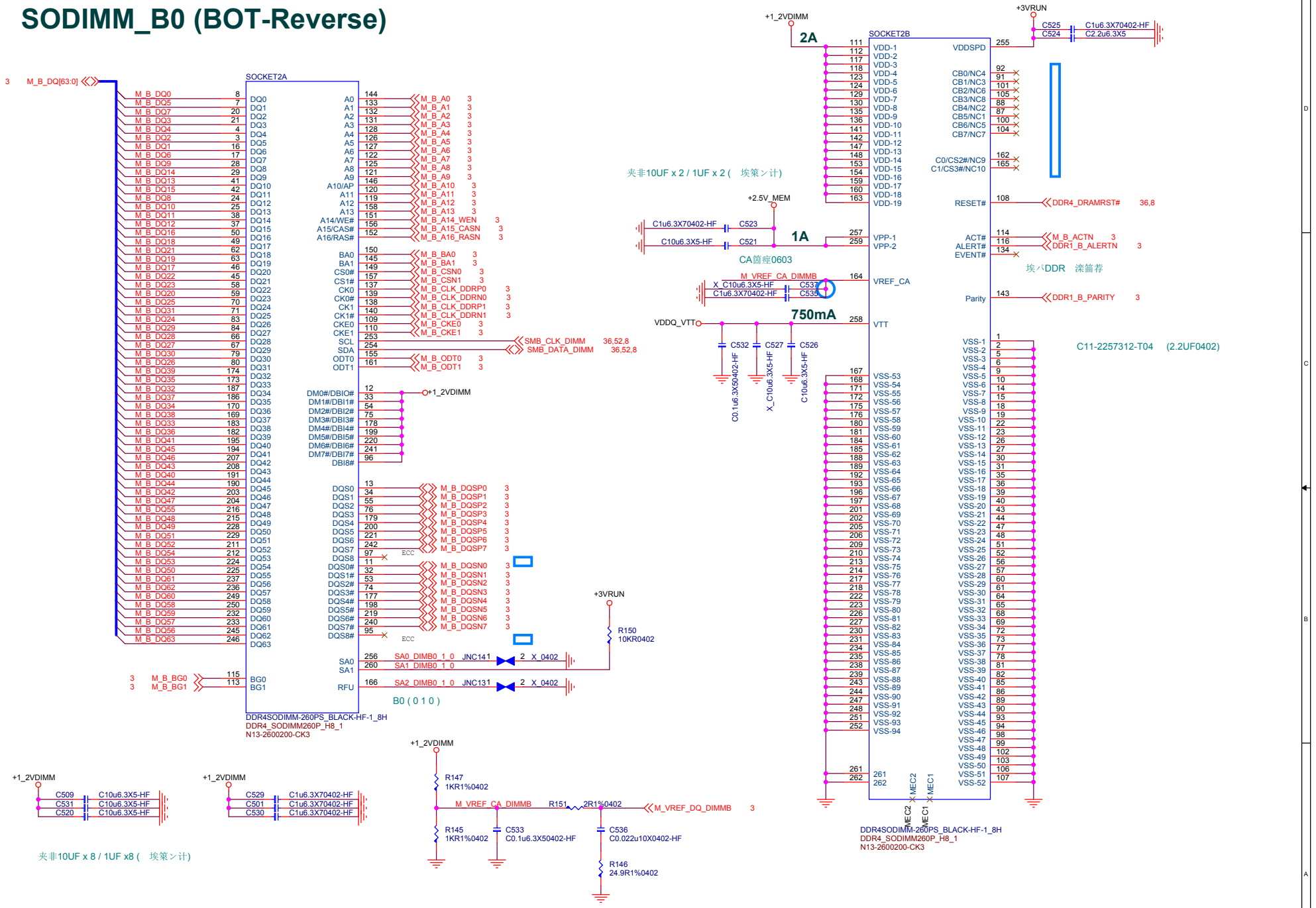
SODIMM_B0 (BOT-Reverse)



MICRO-STAR INT'L CO.,LTD.			
Title: DDR4_SODIMM_B0			
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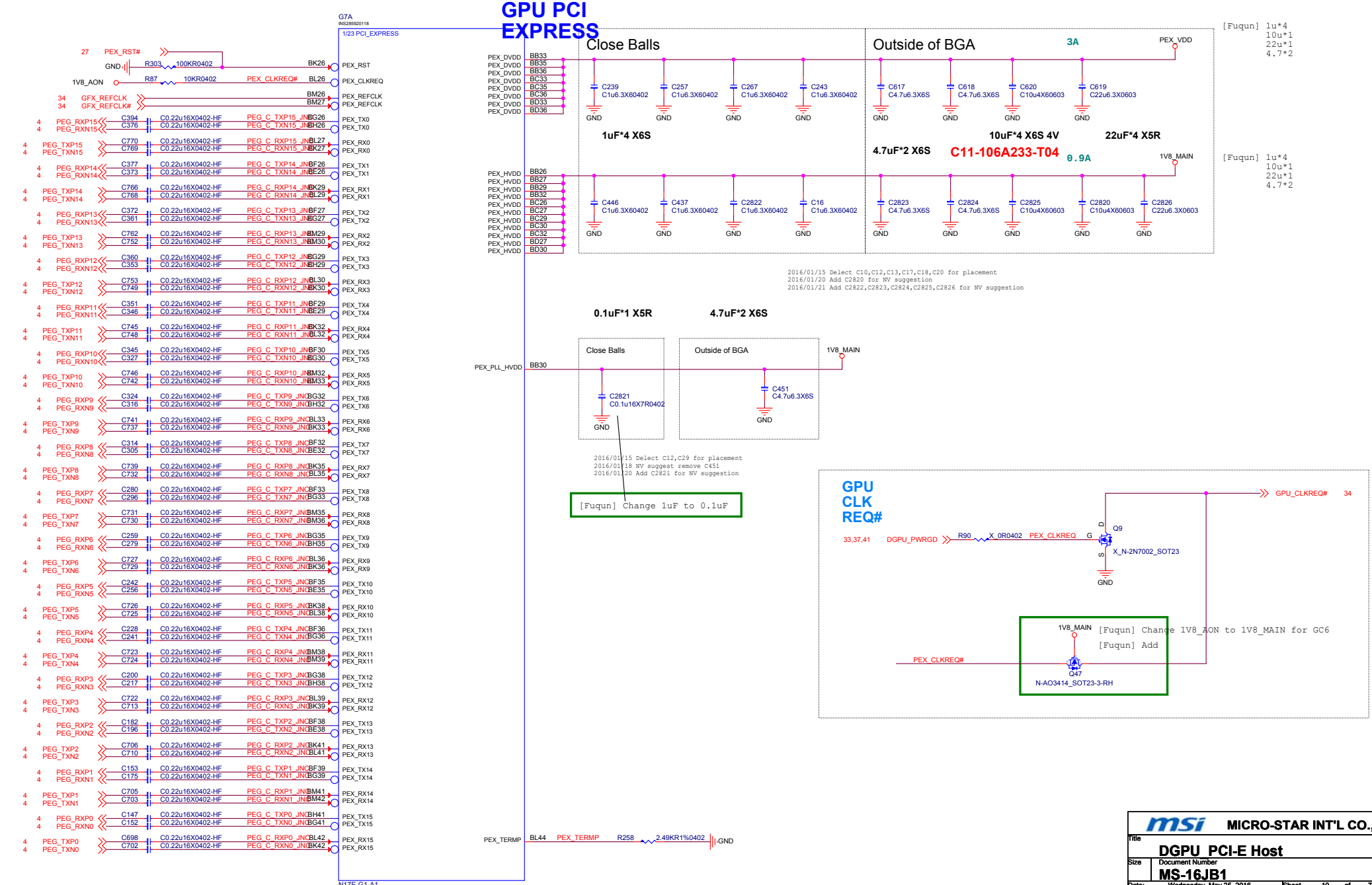
GPU PCI EXPRESS



MICRO-STAR INT'L CO.,LTD.

Title	DGPU_PCI-E Host	
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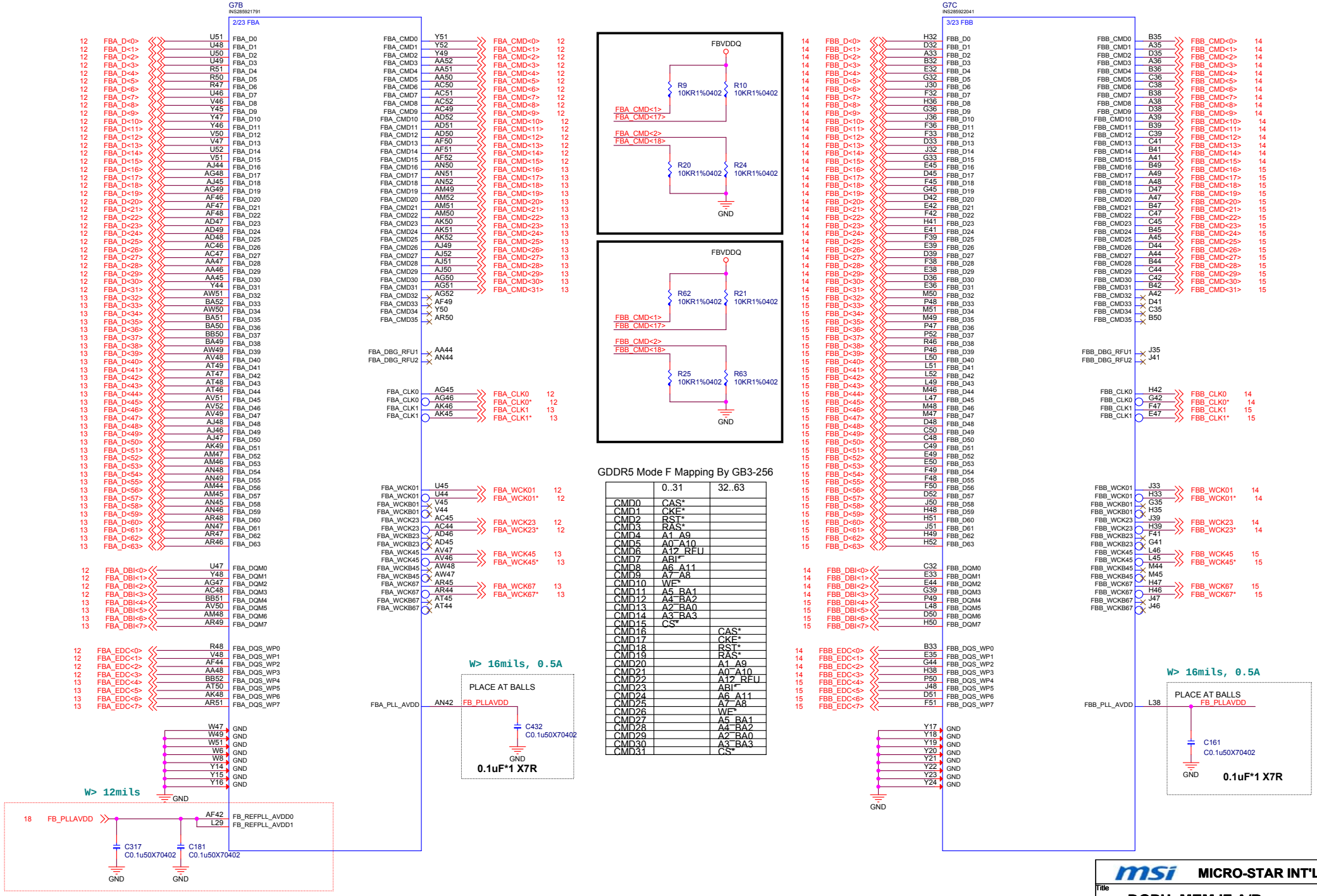
GPU Frame Buffer Partition A/B



MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_MEM IF A/B
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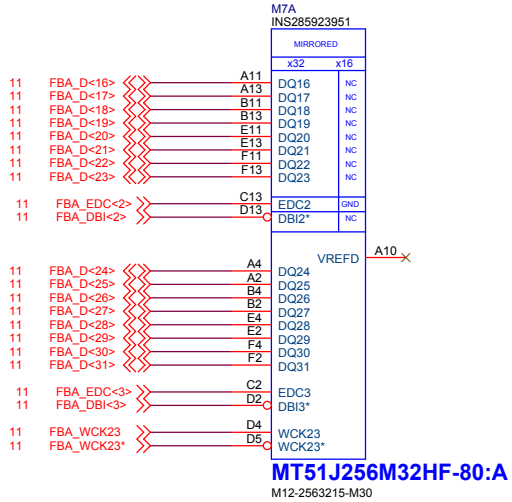
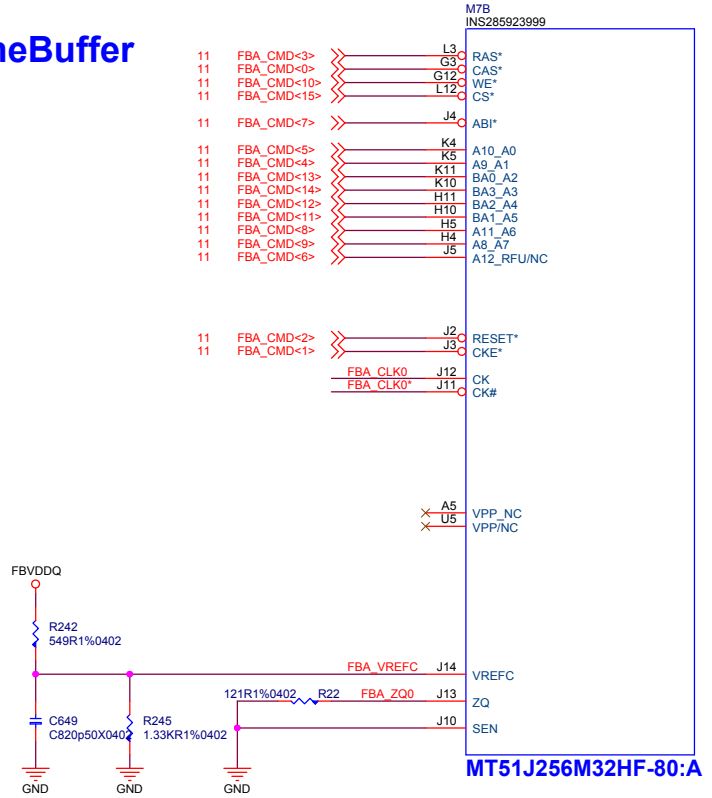
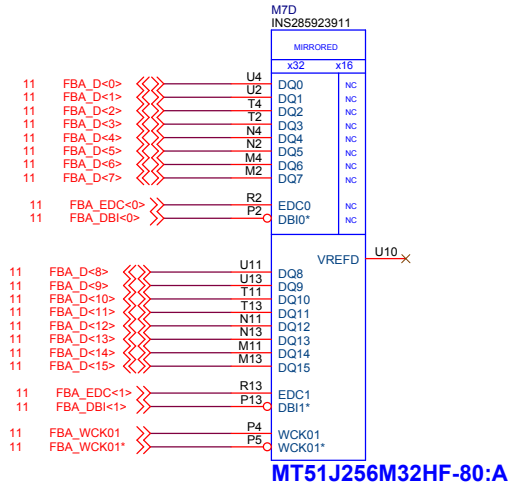
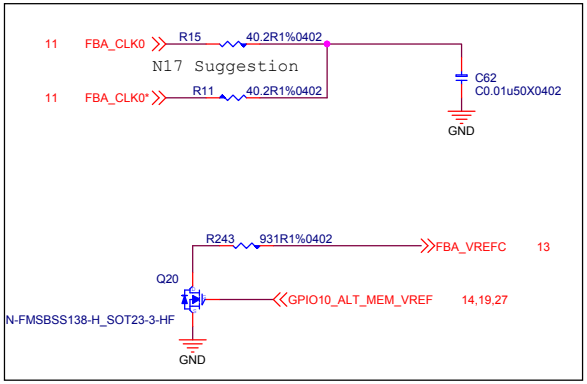
DGPU_GDDR5 FrameBuffer A0





[Fuqun] R245 footprint C0402_MXM_1 ?





Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

MICRO-STAR INT'L CO.,LTD.

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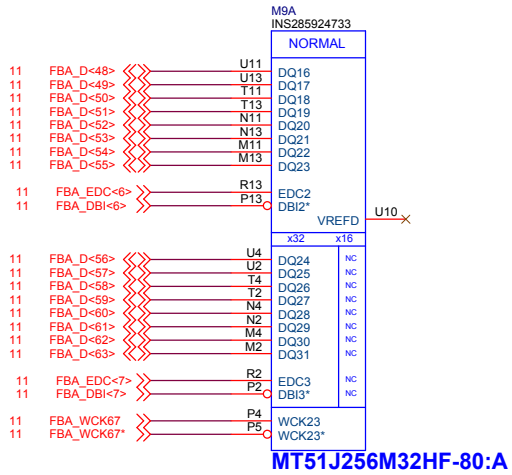
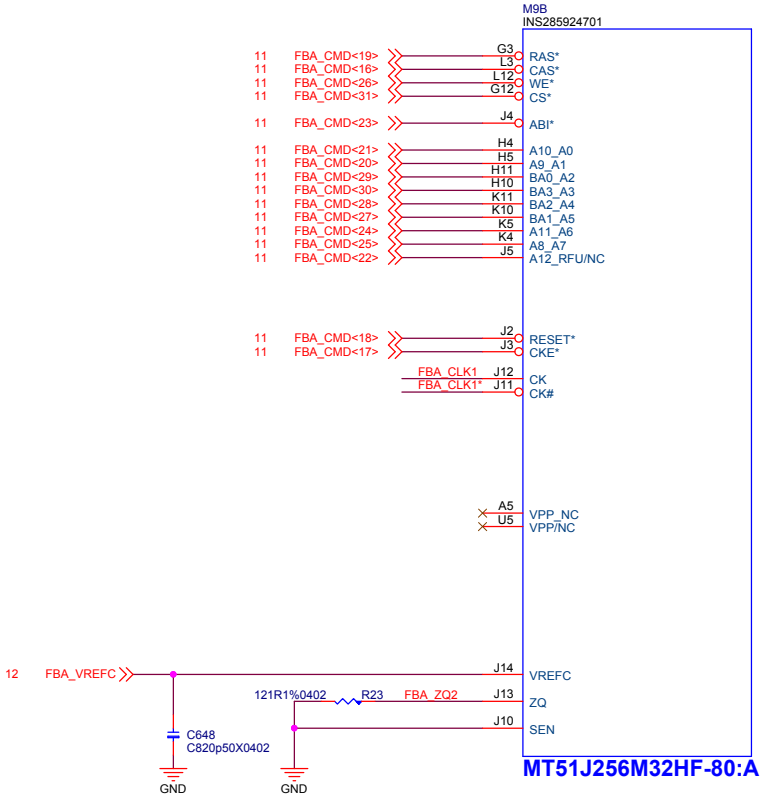
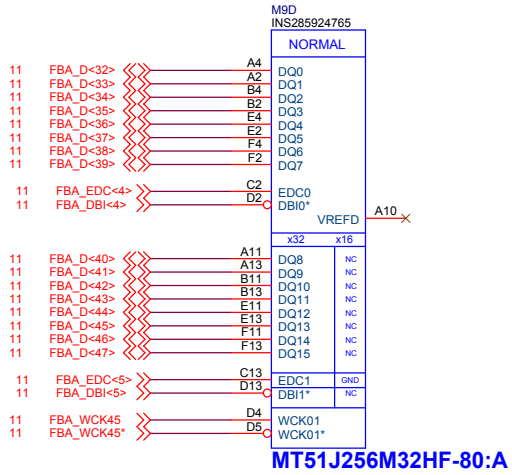
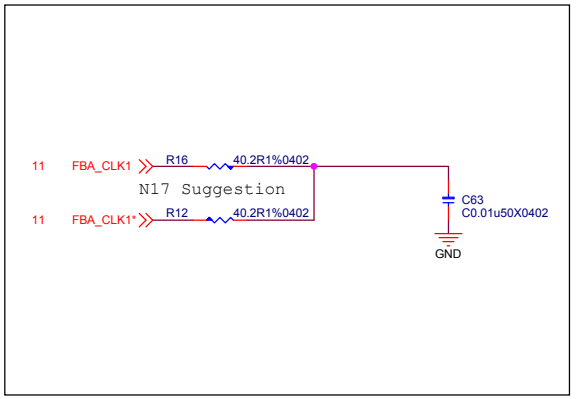
DGPU_GDDR5 FrameBuffer A1









Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FrameBuffer A1	
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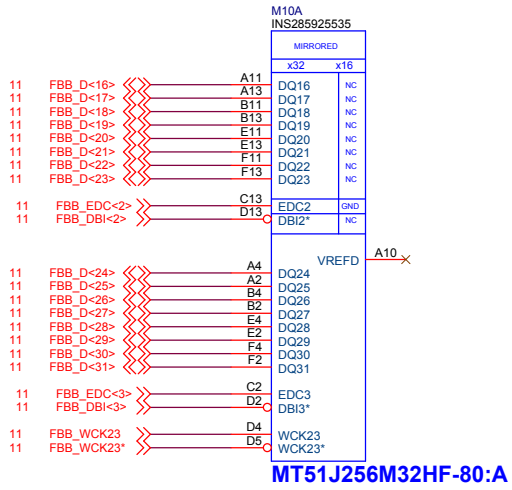
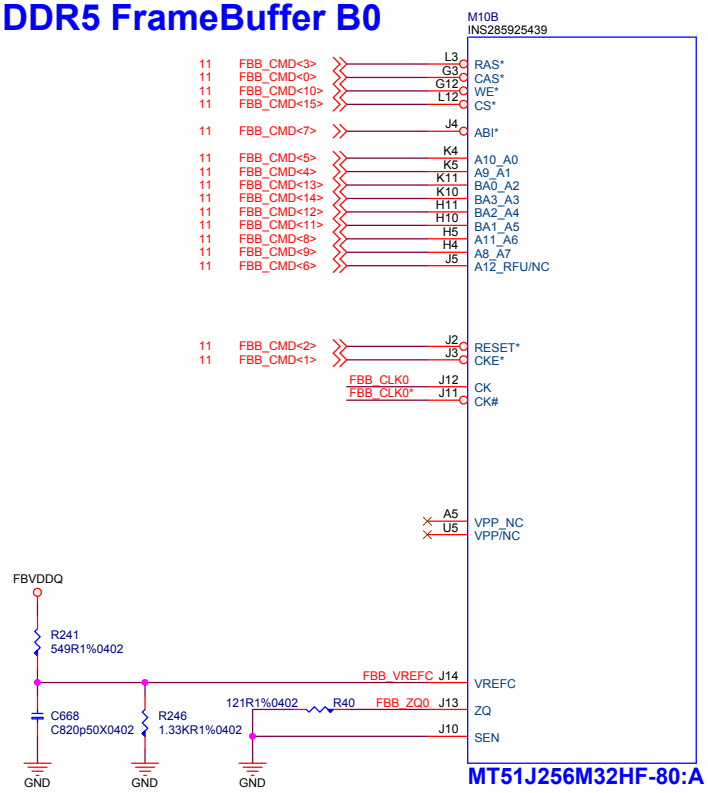
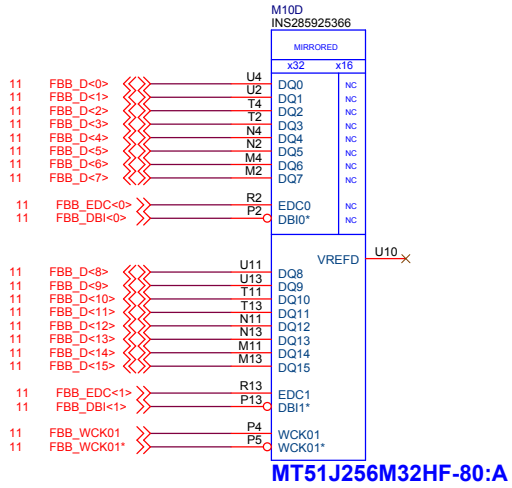
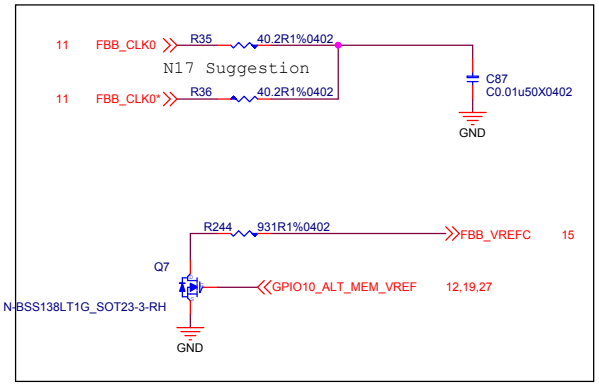
DGPU_GDDR5 FrameBuffer B0









Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FrameBuffer B0		
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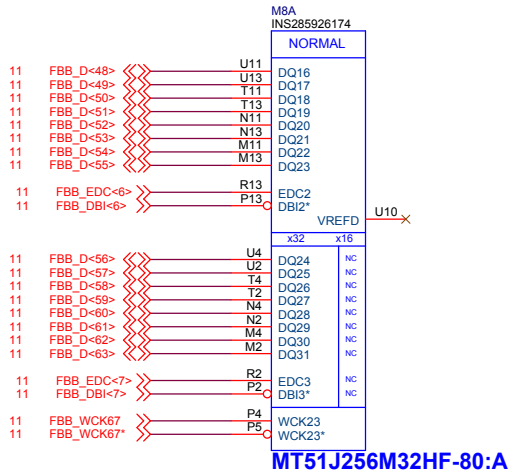
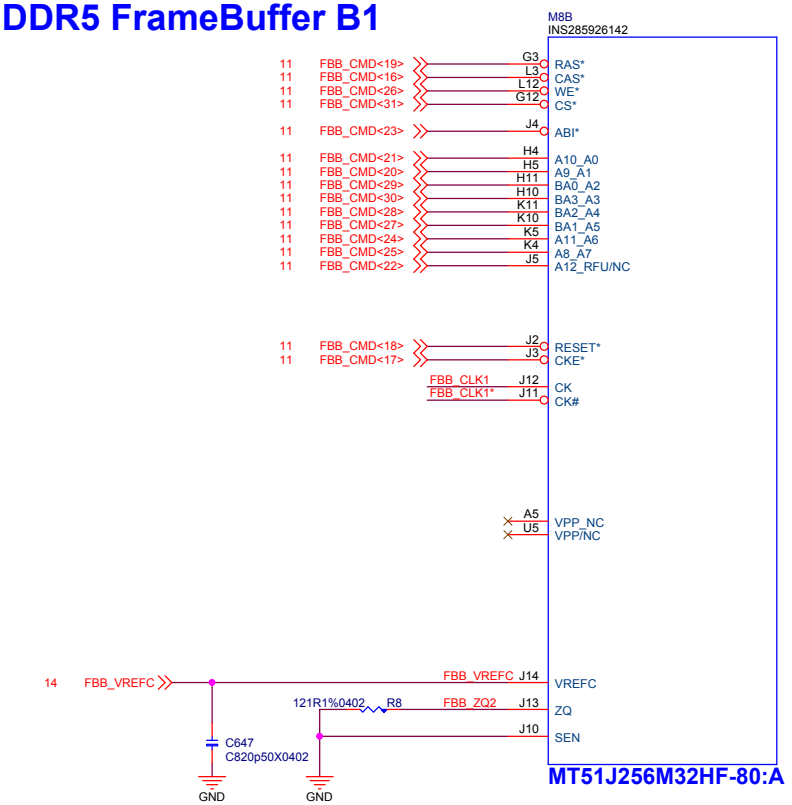
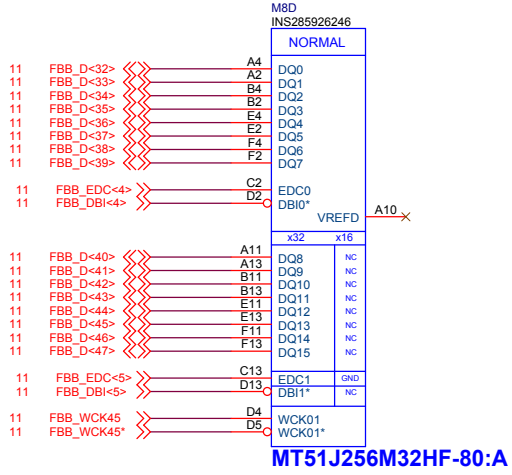
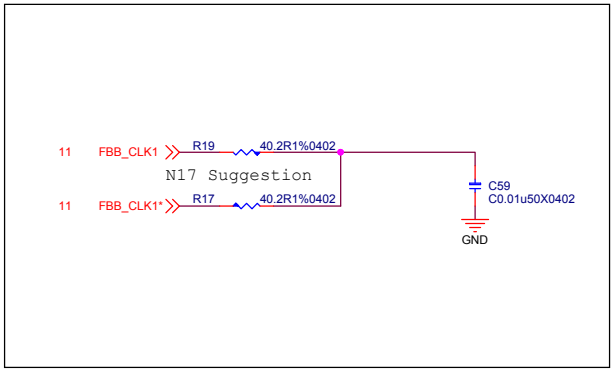
DGPU_GDDR5 FrameBuffer B1









Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

MICRO-STAR INT'L CO.,LTD.

Title: DGPU_GDDR5 FrameBuffer B1

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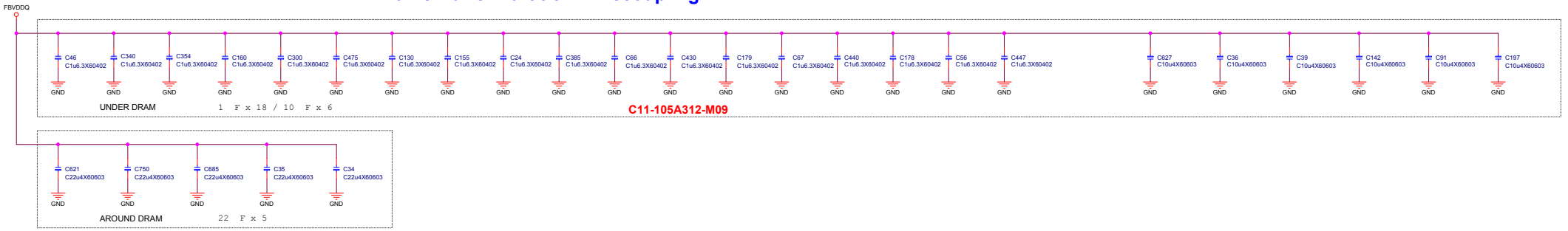
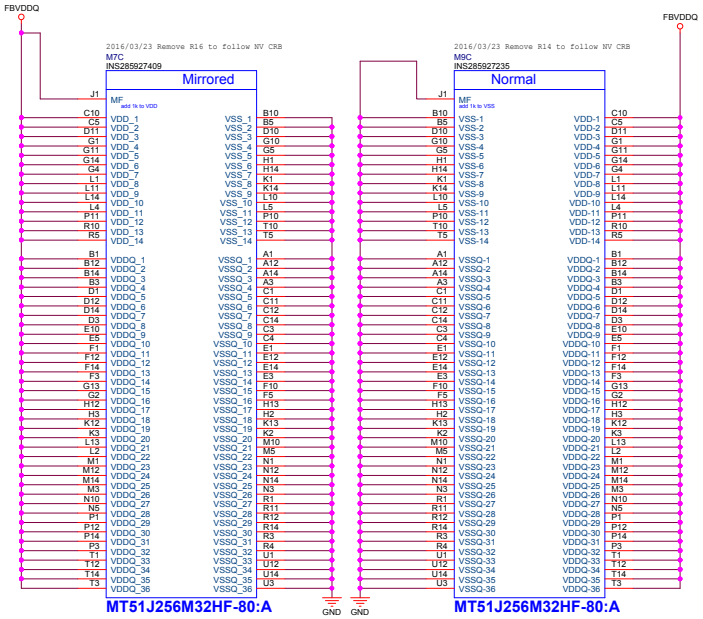
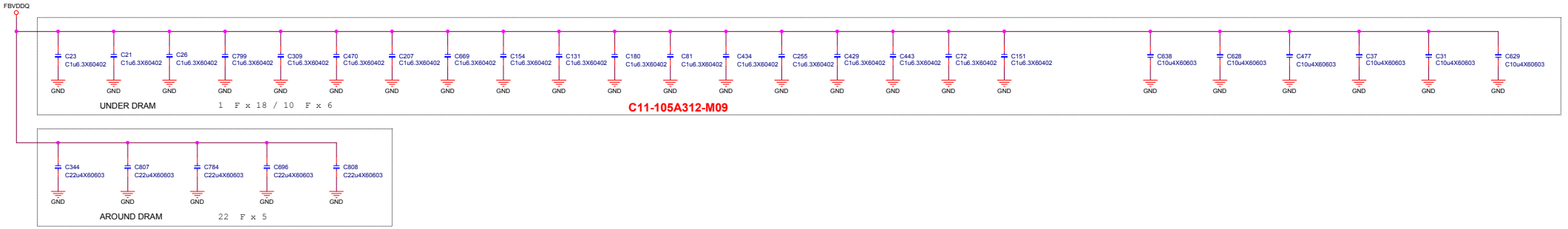
Frame Buffer Partition A Decoupling







Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FB-A_DECOUPLING	
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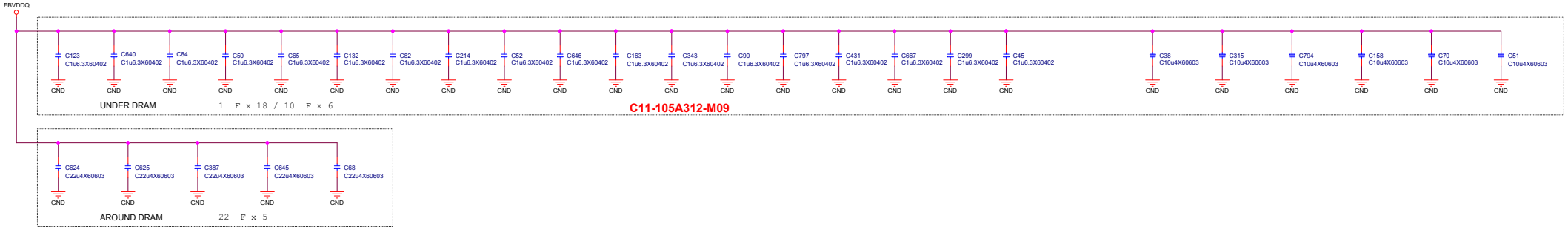
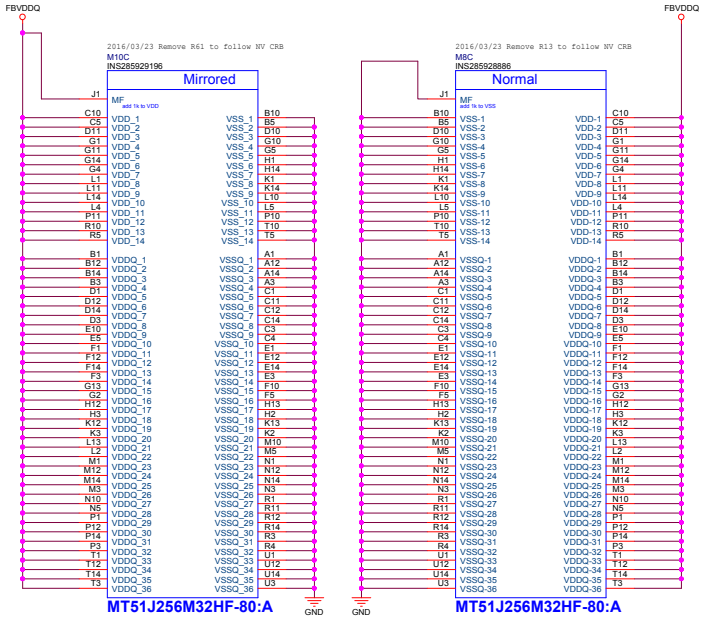
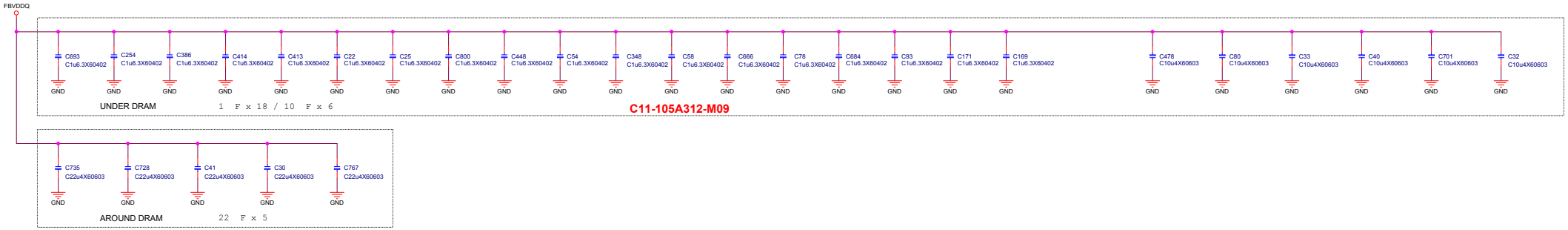
Frame Buffer Partition B Decoupling







Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

MICRO-STAR INT'L CO.,LTD.

Title	DGPU_GDDR5 FB-B_DECOUPLING	
Size	Document Number MS-16JB1	Rev 0A
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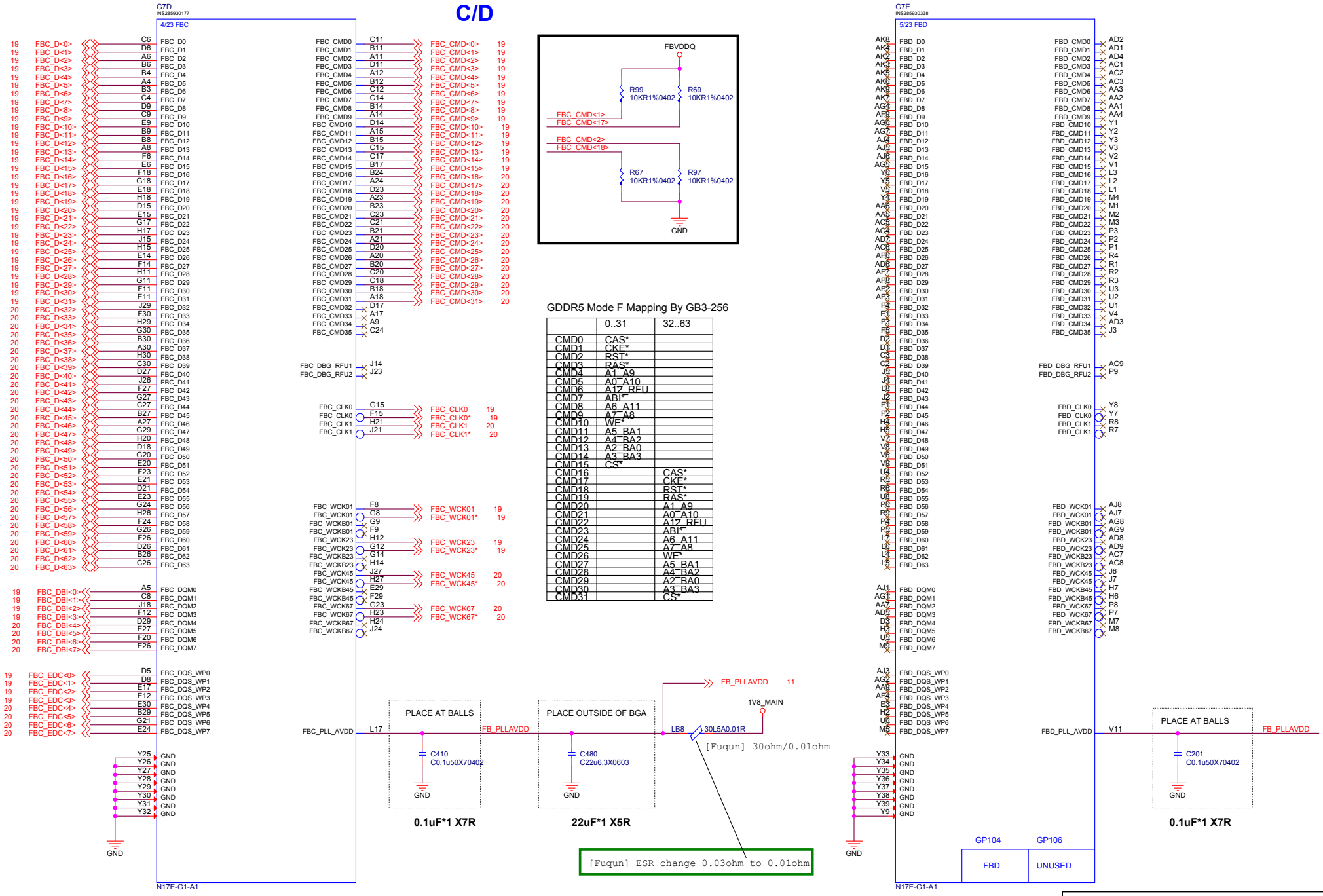
GPU Frame Buffer Partition C/D



Title	DGPU_MEM IF C/D
Size	
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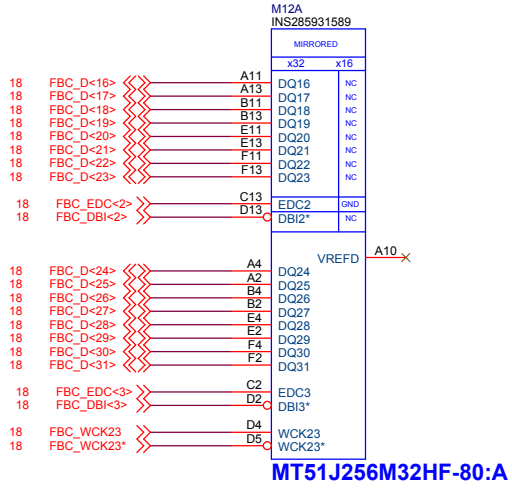
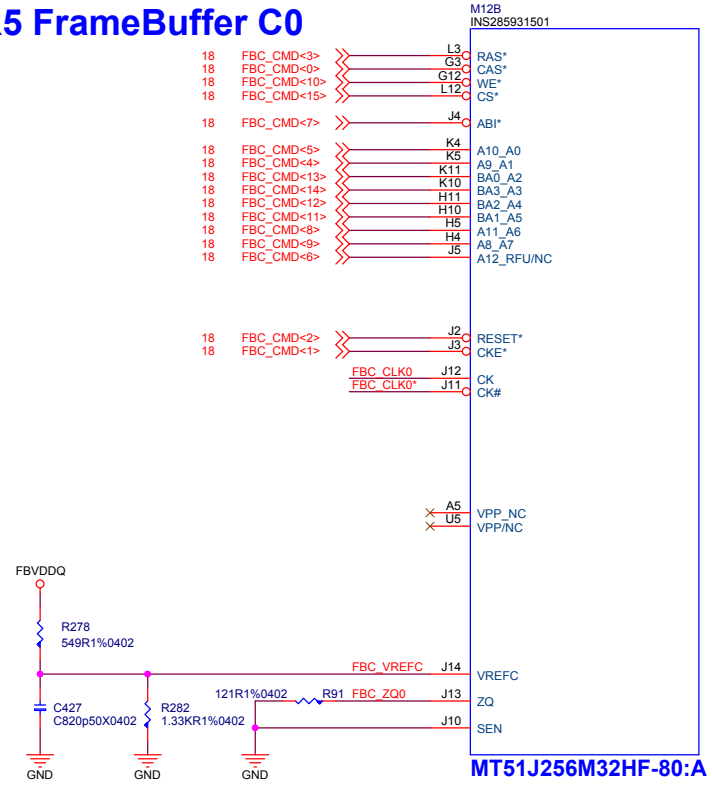
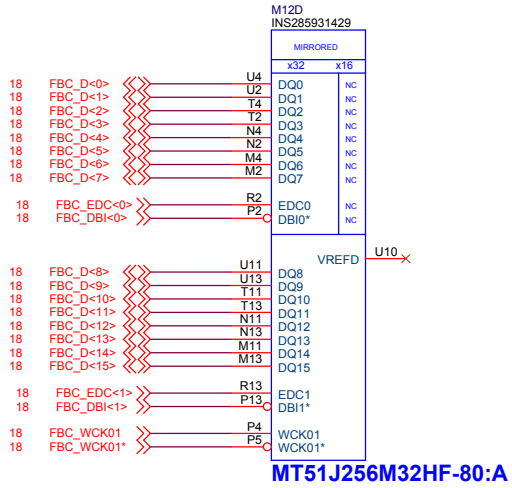
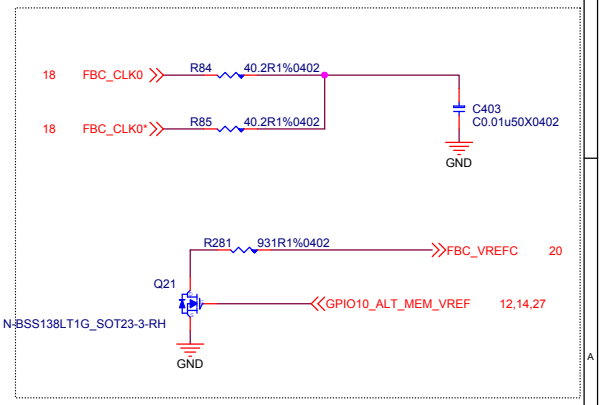
DGPU_GDDR5 FrameBuffer C0









Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

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Title: DGPU_GDDR5 FrameBuffer C

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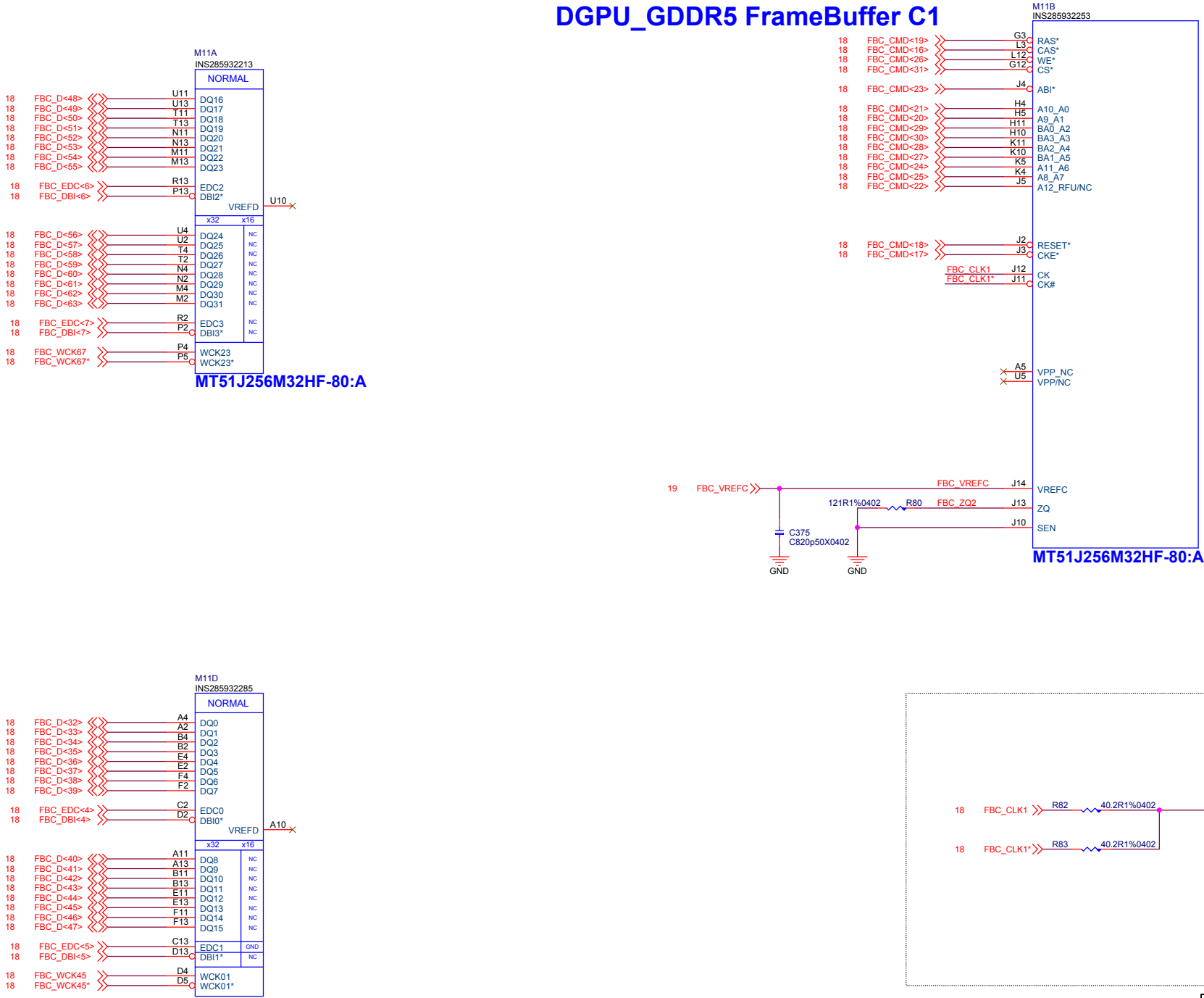
DGPU_GDDR5 FrameBuffer C1



Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

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Title	DGPU_GDDR5 FrameBuffer C	
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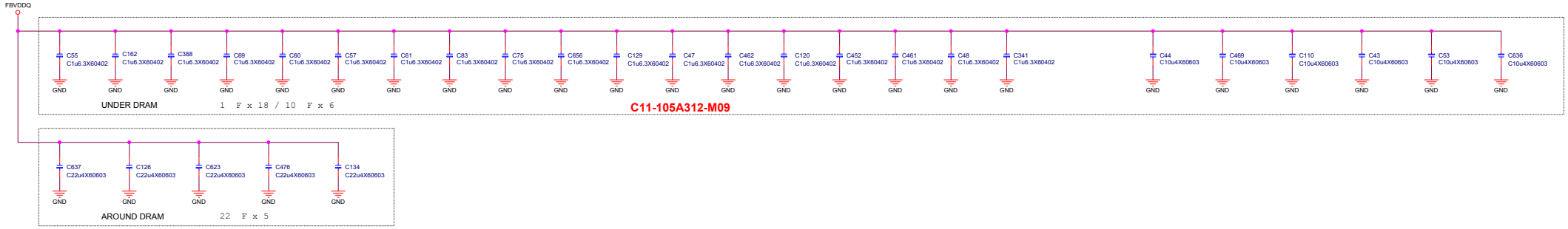
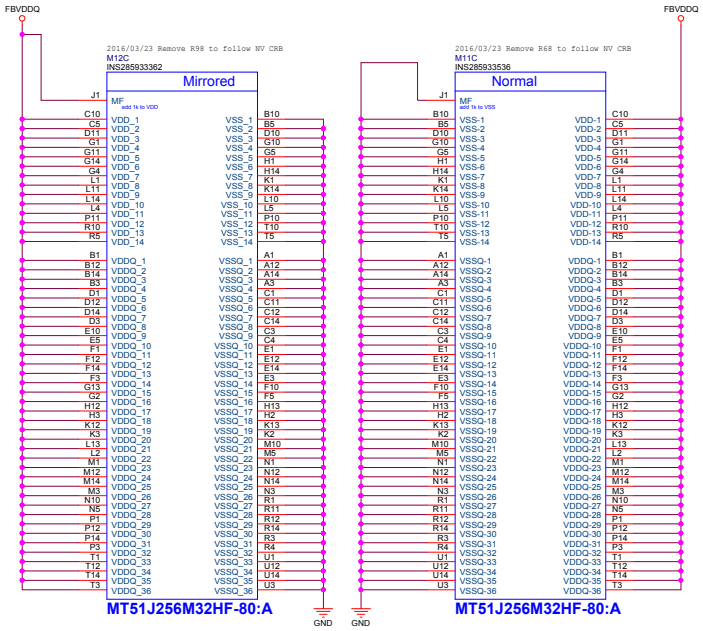
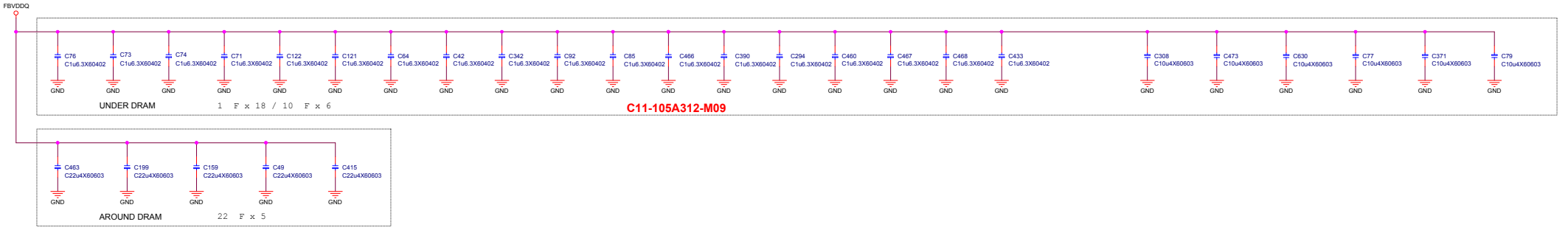
Frame Buffer Partition C Decoupling







Micron PN :M12-2563215-M30 / MT51J256M32HF-80:A (256Mx32bit)
Samsung PN : M12-8032535-S02 / K4G80325FB-HC25 (256Mx32bit)

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Title	DGPU_GDDR5 FB-C_DECOUPLING	
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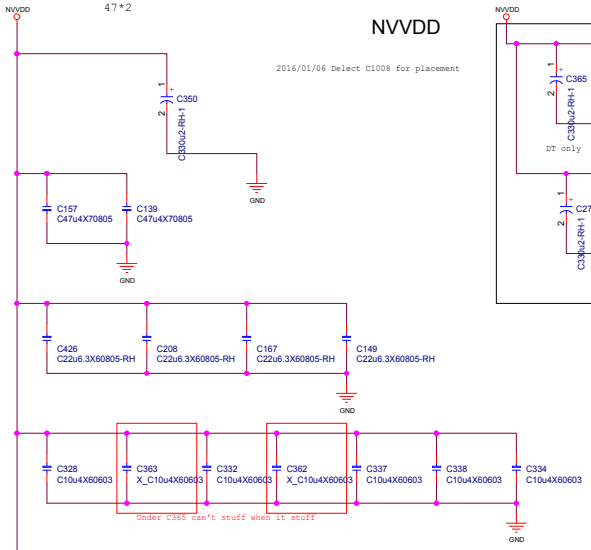
GPU DECOUPLING A

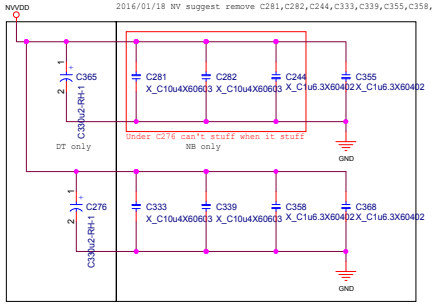
[Fuqun] 330u*2
1u*49
10u*11
22u*4
47*2

NVVDD

2016/01/06 Delect C1008 for placement

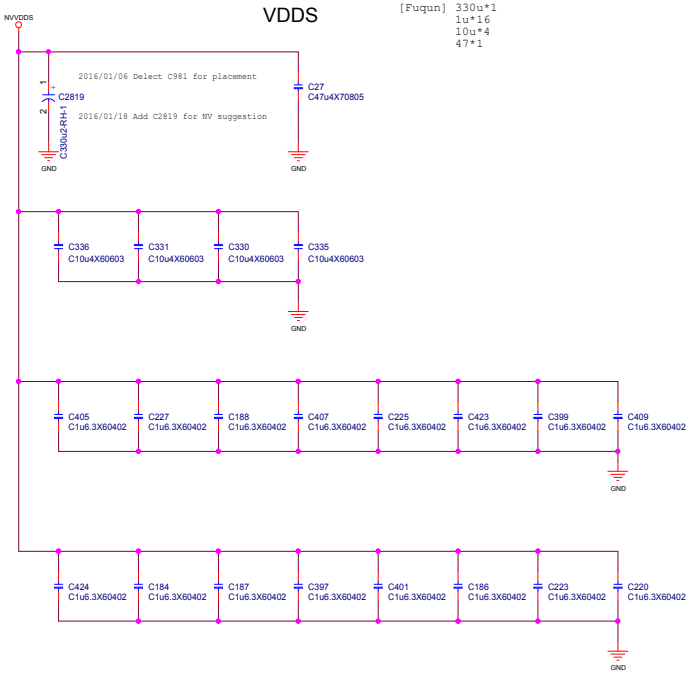


2016/01/18 NV suggest remove C281,C282,C244,C333,C339,C355,C358,C368



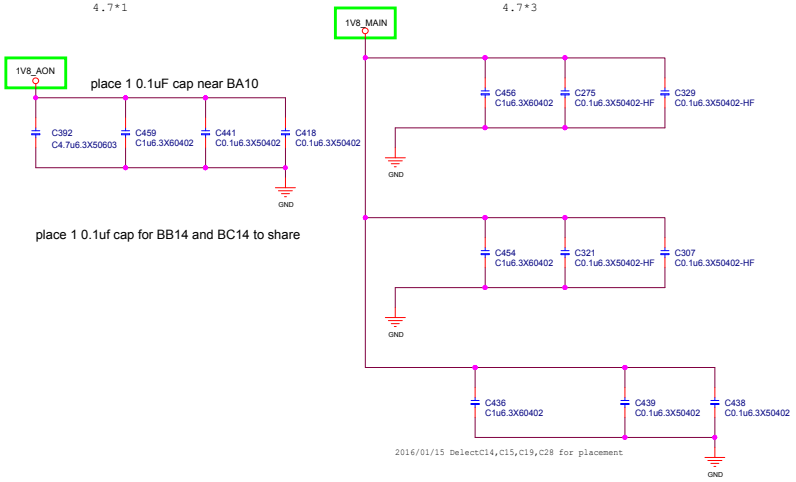
VDDS

[Fuqun] 330u*1
1u*16
10u*4
47*1



[Fuqun] 0.1u*2
1u*1
4.7*1

[Fuqun] 0.1u*7
1u*3
4.7*3



msi MICRO-STAR INT'L CO.,LTD.		
Title: DGPU_GPU DECOUPLING A		
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GPU DECOUPLING B

[Fuqun] 1u*22
10u*12
22u*9

FBVDDQ

FBVDDQ

Partition A

2 X 10UF, 6 X 1UF

C652 C1u6.3X60402
C655 C1u6.3X60402
C660 C1u6.3X60402
C642 C1u6.3X60402
C707 C1u6.3X60402
C651 C1u6.3X60402
C657 C10u4X60603
C634 C10u4X60603

GND

Partition B

2 X 10UF, 6 X 1UF

C672 C1u6.3X60402
C632 C1u6.3X60402
C644 C1u6.3X60402
C7 C1u6.3X60402
C744 C1u6.3X60402
C670 C1u6.3X60402
C720 C10u4X60603
C780 X_C10u4X60603

GND

Partition C

2 X 10UF, 6 X 1UF

C719 C1u6.3X60402
C661 C1u6.3X60402
C781 C1u6.3X60402
C658 C1u6.3X60402
C774 C1u6.3X60402
C778 C1u6.3X60402
C643 C10u4X60603
C622 X_C10u4X60603

GND

Partition D

2 X 10UF, 6 X 1UF

C772 C1u6.3X60402
C806 C1u6.3X60402
C8 C1u6.3X60402
C639 C1u6.3X60402
C635 C1u6.3X60402
C798 C1u6.3X60402
C631 C10u4X60603
C659 X_C10u4X60603

GND

Place close to GPU

4 X 10UF

C718 C10u4X60603
C654 C10u4X60603
C349 X_C10u4X60603
C626 X_C10u4X60603

GND

2016/01/18 NV suggest remove C780,C622,C659,C349,C626,C653,C633,C9,C771

C240 C22u4X60603
C419 C22u4X60603
C671 C22u4X60603
C779 C22u4X60603
C641 C22u4X60603
C653 X_C22u4X60603
C633 X_C22u4X60603
C9 X_C22u4X60603
C771 X_C22u4X60603

GND

Place close to GPU

9 x 22UF

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Title: DGPU_GPU DECOUPLING B

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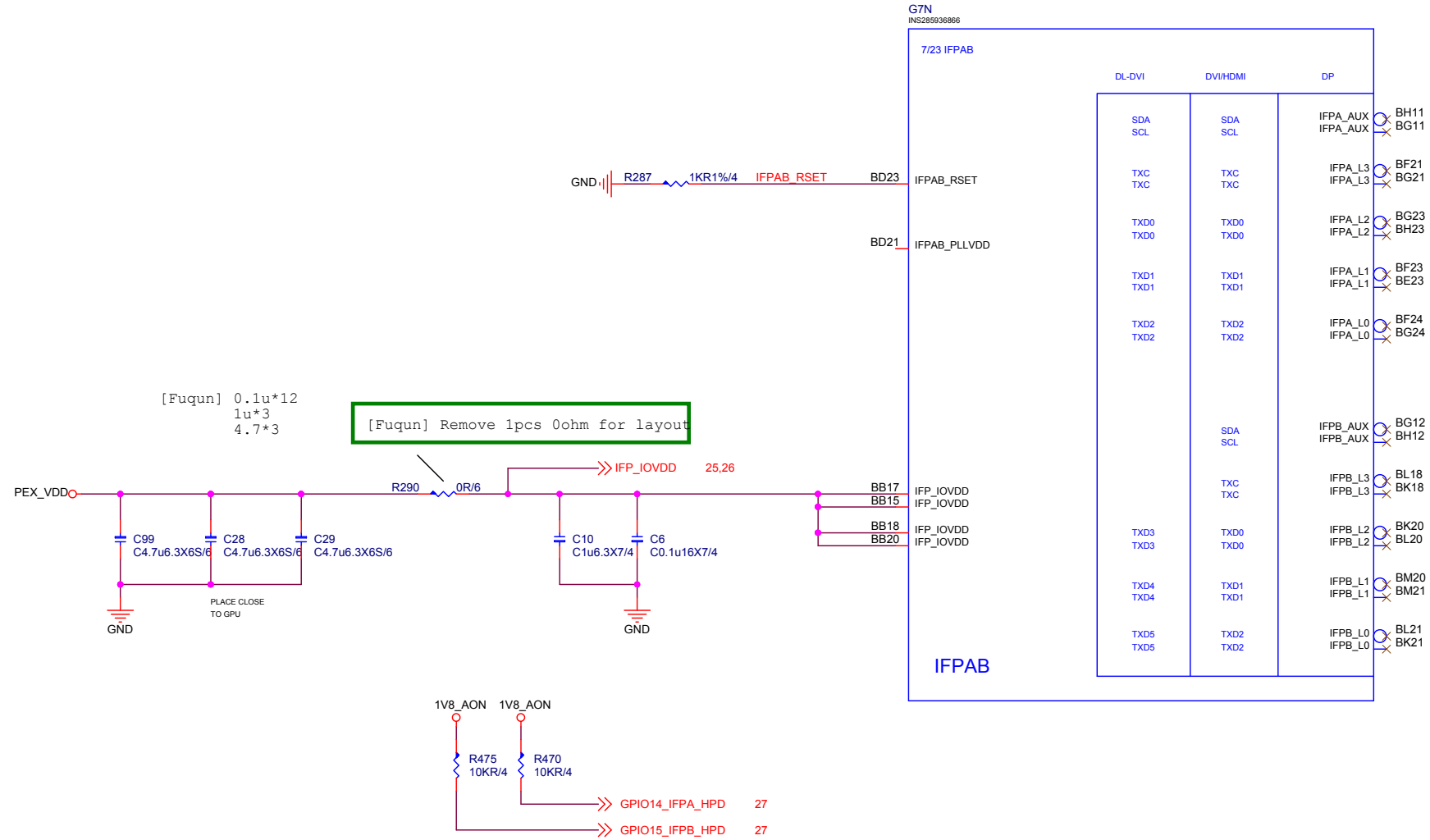
IFPCD



MICRO-STAR INT'L CO.,LTD.

Title	DGPU_DACA,Display IF	
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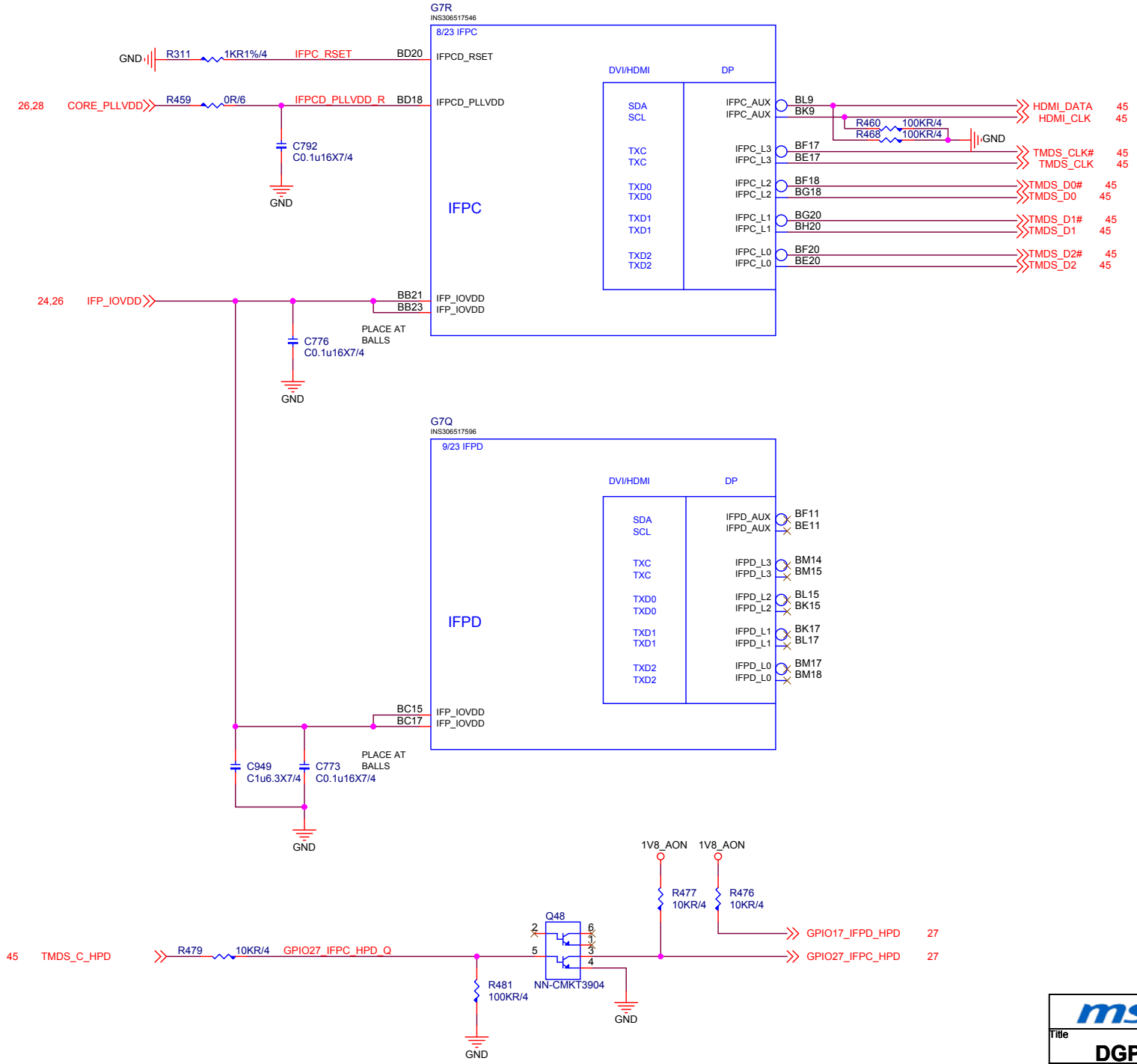
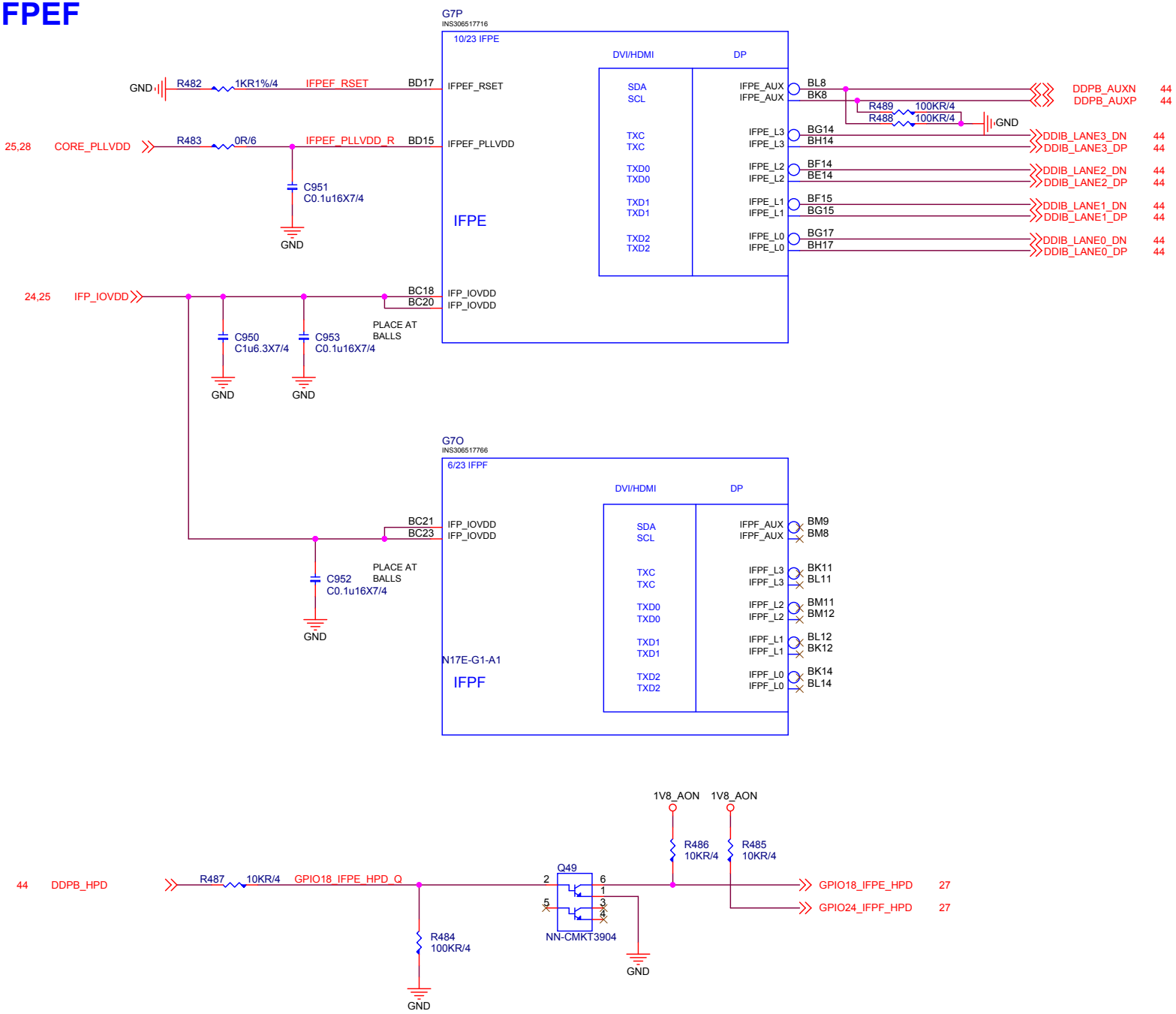
IFPCD



HDMI

MICRO-STAR INT'L CO.,LTD.			
Title: DGPU_DACA,Display IF			
Size	Document Number: MS-16JB1		Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 25 of 71		

IFPEF



DP

Title	DGPU_IFPEF		
Size	Document Number MS-16JB1		Rev 0A
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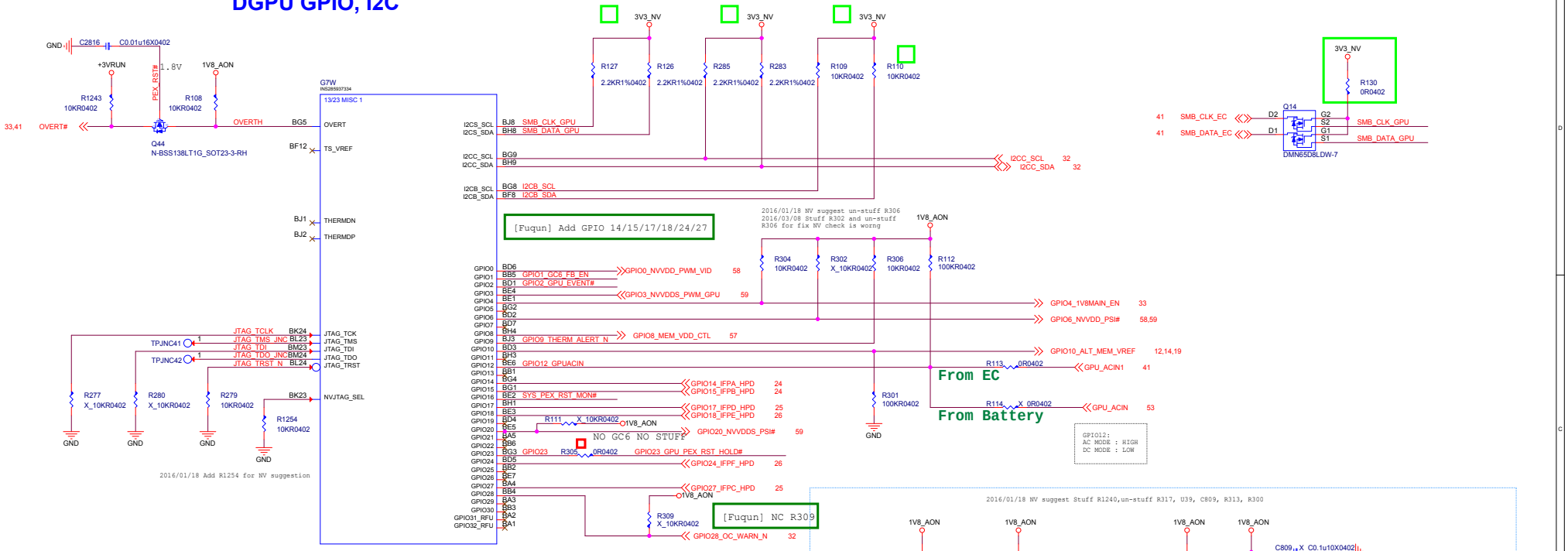
DGPU GPIO, I2C



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	0 to 1V8 PWM output
GPIO1	GC6_FB_EN	O	FB Enable for GC6 2.1	10K pull-down
GPIO2	GPU_EVENT#	I	GPU wake signal for GC6 2.1	10K pull-up to 1V8 _AON
GPIO3	**NVVDD_SRAM_PWM**	O	PWM output to control the SRAM power supply	
GPIO4	**1V8_MAIN_EN**	O	GPU POWER Sequencing for GC6 2.1	10K pull-up to 1V8 _AON
GPIO5	**FRM_LCK**	I	Active low Fram Lock	1V8 pull-up to 1V8 _AON
GPIO6	PSI	O	Phase shedding	10K pull-up to 1V8 _AON
GPIO7	LCD_BL_PWM	O	Panel Backlight PWM Brighteness Control	100K pull-down
GPIO8	**MEM_VDD_CTL**	O	Memory Voltage Control	pull-up/pull-down to set the FBVDD/Q power-on voltage
GPIO9	THERM_ALERT	I/O	Active Low Thermal Alert	10K pull-up to 1V8_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 1V8_AON
GPIO13	LCD_BLEN	O	Panel Backlight Enable	100K pull-down
GPIO14	HPD_A	I	Hot Plug Detect for IFPA	
GPIO15	**HPD_B**	I	Hot Plug Detect for IFPB	
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	**NVVDDS_PSI GC5_MODE**			
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
GPIO24	HPD_F	I	Hot Plug Detect for IFPDF	
GPIO25	RESERVED			
GPIO26	RESERVED			
GPIO27	HPD_C	I	Hot Plug Detect for IFPC	
GPIO28	OC_WARN	I	Over current throttling	10K pull-up to 1V8 _AON
GPIO29	EDPc_OUTPUT_CAP	I	Input from power supply	0 to 1V8
GPIO30	RESERVED			

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Title	DGPU_GPIO,I2C	
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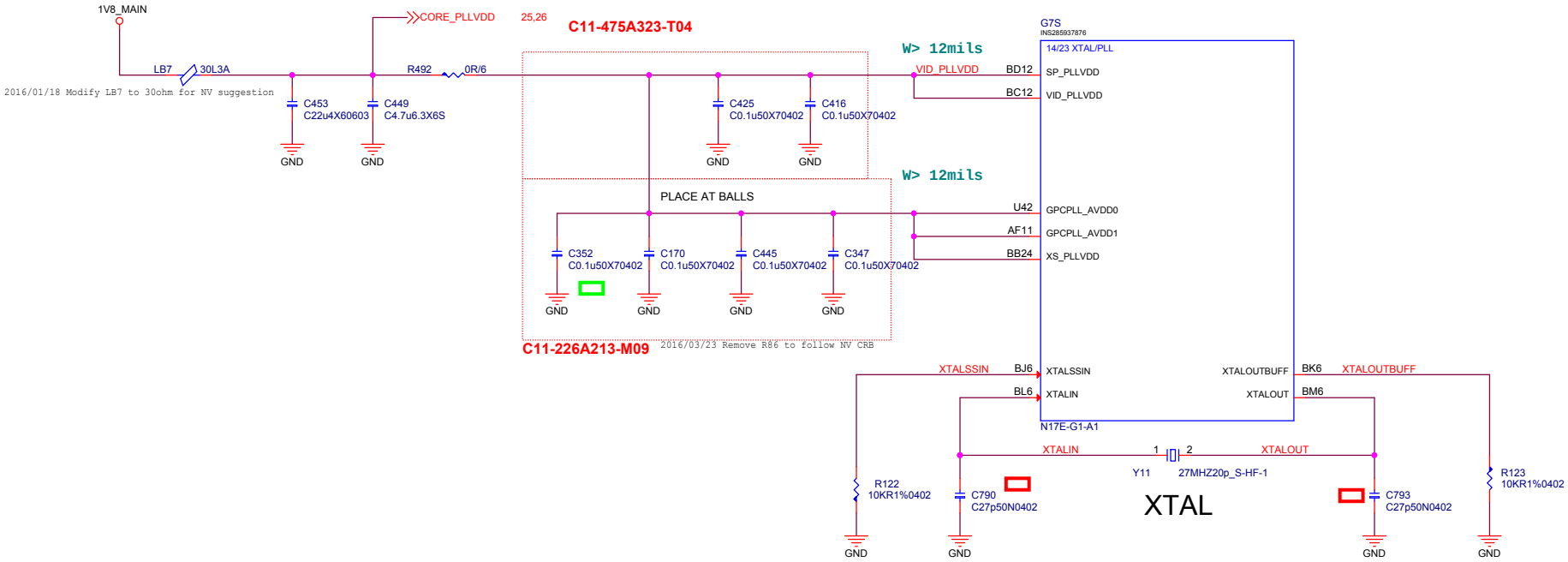
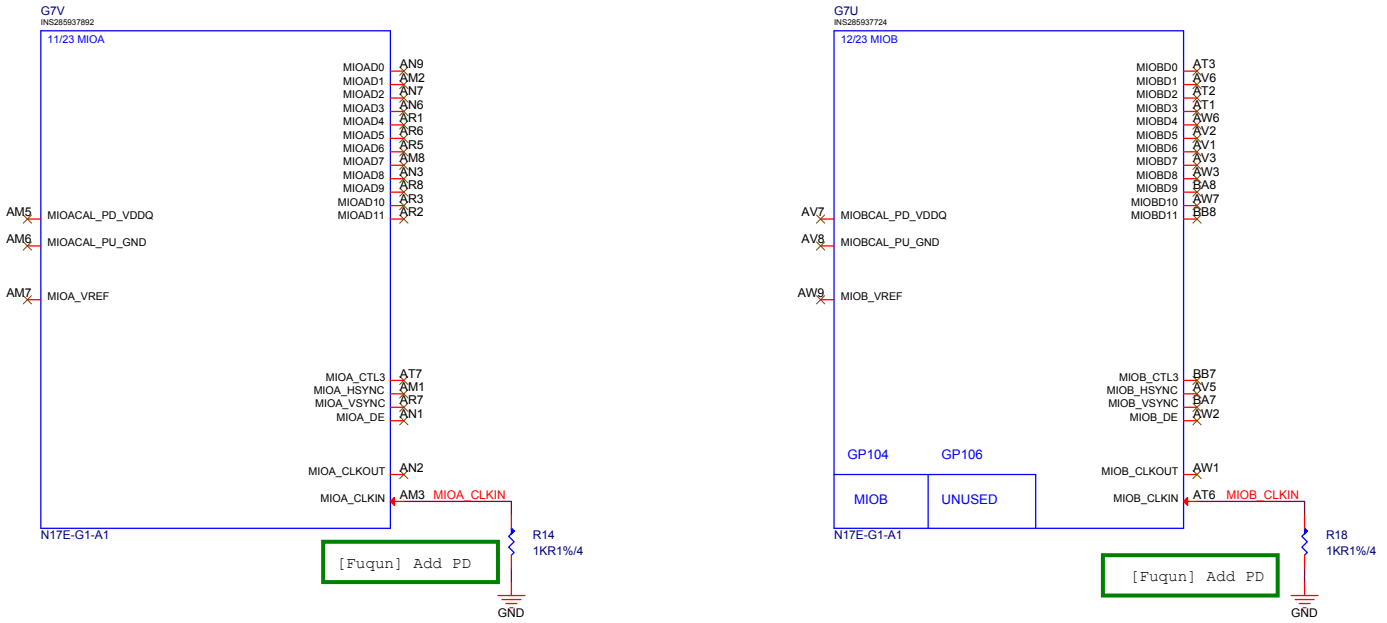
[Fuqun] Add R492

DGPU MIO & XTAL



Multi-use IO(MIO) Interface



MICRO-STAR INT'L CO.,LTD.

Title: DGPU MIO & XTAL

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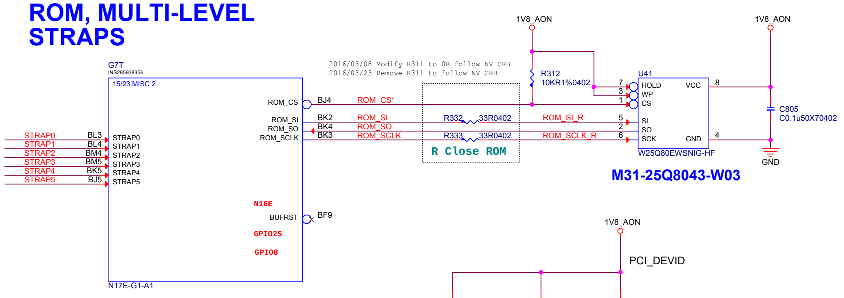
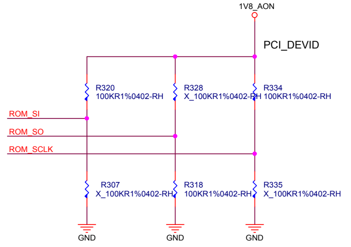
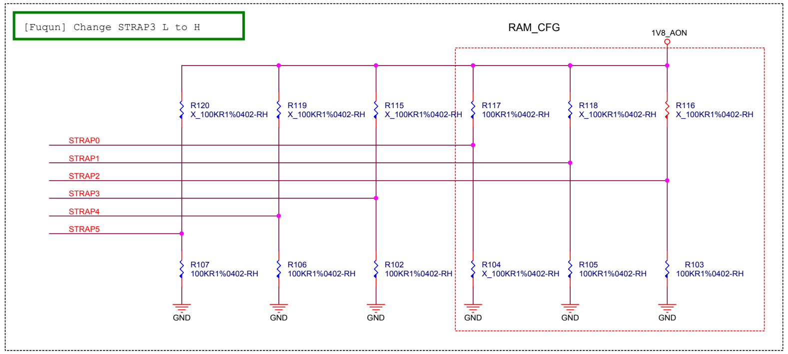
ROM, MULTI-LEVEL STRAPS







STRAP2	STRAP1	STRAP0	RAMCFG[4:0]	
L	L	L	00000	0x0 Samsung: M12-8032535-S02 / K4G80325FB-HC25
L	H	L	00010	0x1 Micron: M12-2563215-M30 / MT51J256M32HF-80:A
L	H	H	00011	0x2 Hynix: ゼ粔旋
H	H	L	00110	H=High :Tied to 1.8V M=Middle:Tied to 0.9V
H	H	H	00111	L=Low :Tied to 0V

ROM_SO	ROM_SI	ROM_SCLK	SOR_EXPOSED[3:0]	1:ENABLE 0:DISABLE
L	L	L	1111 DEFAULT	SOR0/1/2/3 ENABLE
L	L	H	1110	
L	H	L	1101	
L	H	H	1100	
H	L	L	1011	
H	L	H	1010	
H	H	L	1001	
H	H	H	1000	
L	L	M	0111	
L	M	L	0110	
L	M	H	0101	
L	H	M	0100	
H	L	M	0011	
H	M	L	0010	
H	M	H	0001	
H	H	M	0000	V

STRAP5	STRAP4	STRAP3	SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE
M	H	H	1	1	1	1
M	H	L	1	1	1	0
M	L	H	1	1	0	1
M	L	L	1	1	0	0
L	H	M	1	0	1	1
L	M	H	1	0	1	0
L	M	L	1	0	0	1
L	L	M	1	0	0	0
H	H	H	0	1	1	1
H	H	L	0	1	1	0
H	L	H	0	1	0	1
H	L	L	0	1	0	0
L	H	H	0	0	1	1
L	H	L	0	0	1	0
L	L	H	0	0	0	1 DEFAULT
L	L	L	0	0	0	0 V

1:SMB_ALT_ADDR ENABLE
0:SMB_ALT_ADDR DISABLE

1:DEVID_SEL REBRAND
0:DEVID_SEL ORIGNAL

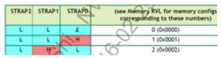
1:PCIE_CFG LOW POWER
0:PCIE_CFG HIGH POWER

1:VGA_DEVICE ENABLE
0:VGA_DEVICE DISABLE

DEFAULT SETTING　　BOT 瘬罘锣顶糷

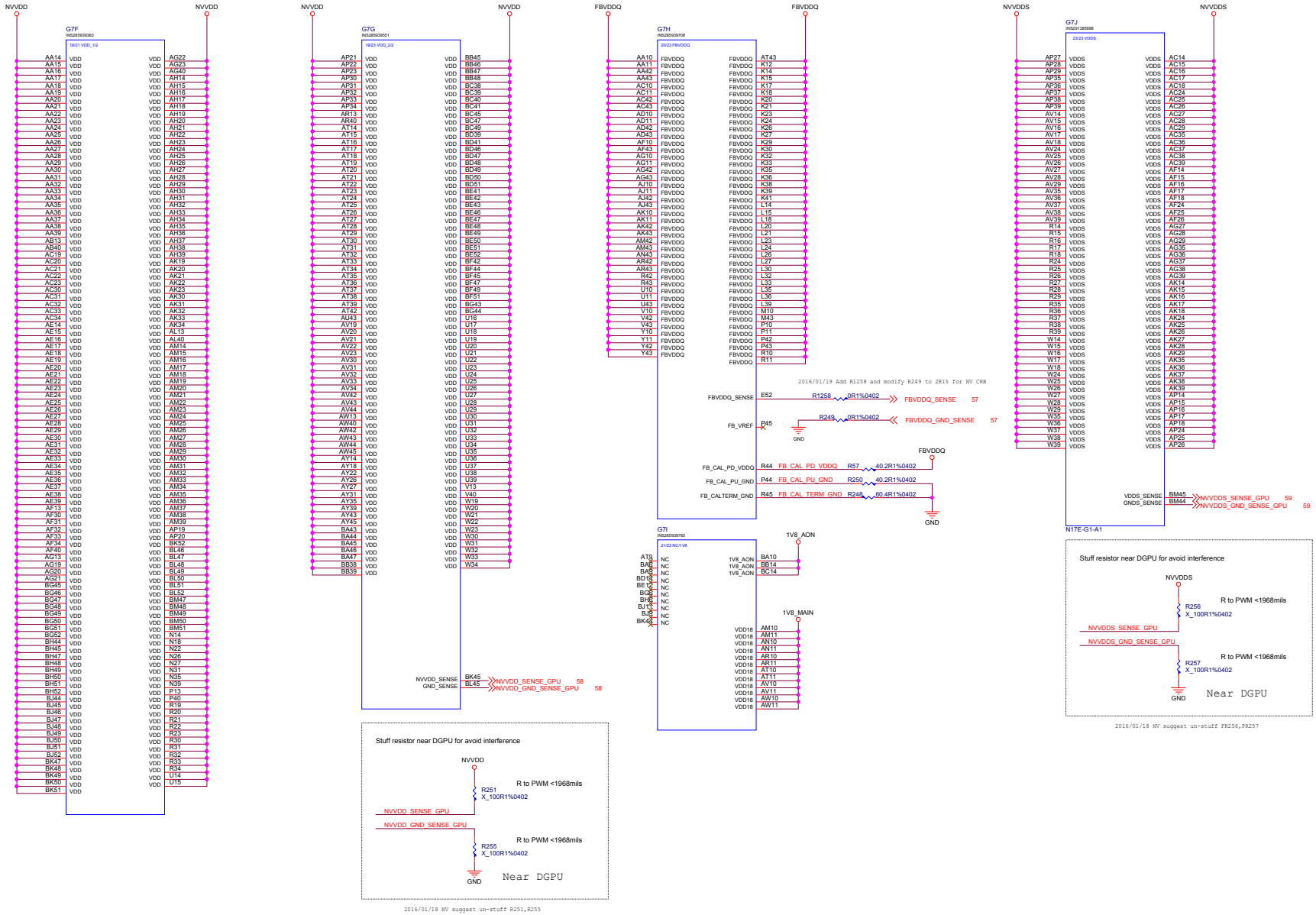
V_BOT1　　Samsung 256Mx32bit
M12-8032535-S02
X_K4G80325FB-HC25

V_BOT2　　Hynix 128Mx16bit
M12-5GC2H05-H23
X_H5GC2H24BFR-T2C

Item		N17E-G1
Device ID		1C20
Package		GB4-256
ROM_SO	0x0: HHM (all disabled)	low
ROM_SI	0X12:LHH	High
ROM_SCLK	0X12: LHH 16JB	High
Strap2	0x0: L L L	
Strap1	0x1: L L H	
Strap0	0x2: LHL 	
Strap5	0000 =optimus, LLL	Low
Strap4	0001= discrete, LLH	Low
Strap3	0101=discrete with Gsync, HLH	Low
NVVDD Boot Voltage	0.8V	0.8V

Memory Density	Allowed Memory Configuration	FBVDD/Q	Vendor	Manufacturer Part Number	Die Revision	Strap	Memory Speed Grade	Date Code Alert	Qual Plan	Status
8 Gb	256Mx32	1.35V and 1.55V[2]	Samsung	K4G80325FB-HC25	B-die	0x0	8 Gbps	N/A	Full	Production candidate
			Micron	MT51J256M32HF-80:A	A-die	0x1	8 Gbps	N/A	Full	Production candidate
			Hynix	H5GQ8H24MJR-R4C	M-die	0x2	8 Gbps	N/A	Full	Post production candidate

GPU NVVDD, FBVDDQ



MICRO-STAR INT'L CO.,LTD.			
Title: DGPU NVVDD, FBVDDQ			
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DGPU GND

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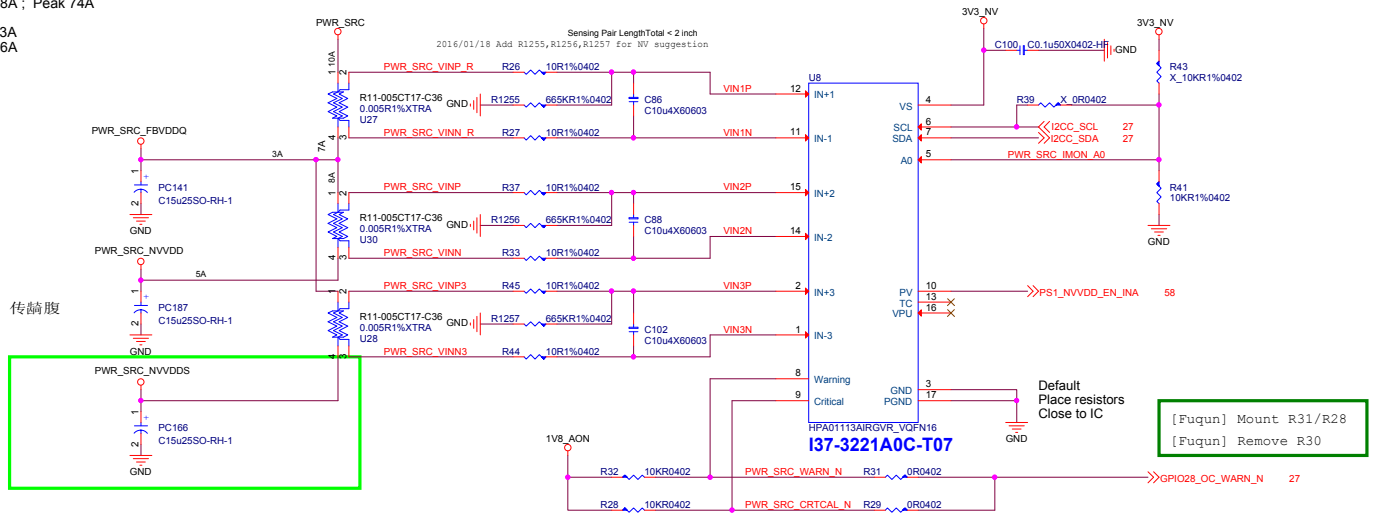
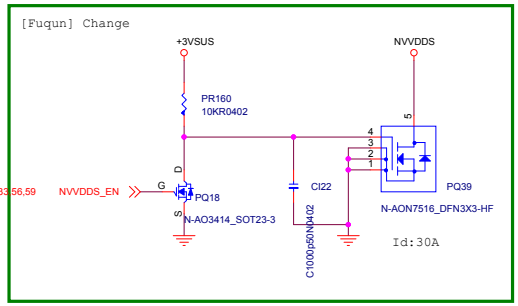
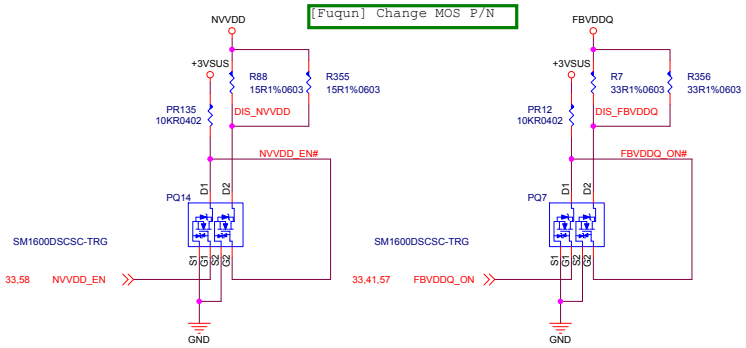
EDP Design Guide:
N17E-G1(90W)
NVVDD : 58A ; Peak 136A
NVVDDS : 28A ; Peak 74A
1.8V : 0.9A
PEX_VDD : 3A
FBVDDQ : 16A

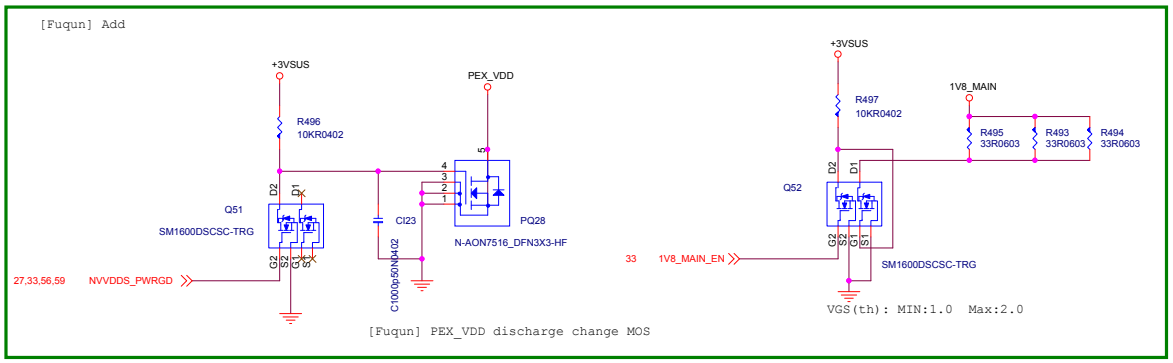
DGPU_Power Control



Discharge







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Title: DGPU_Power control, Discharge

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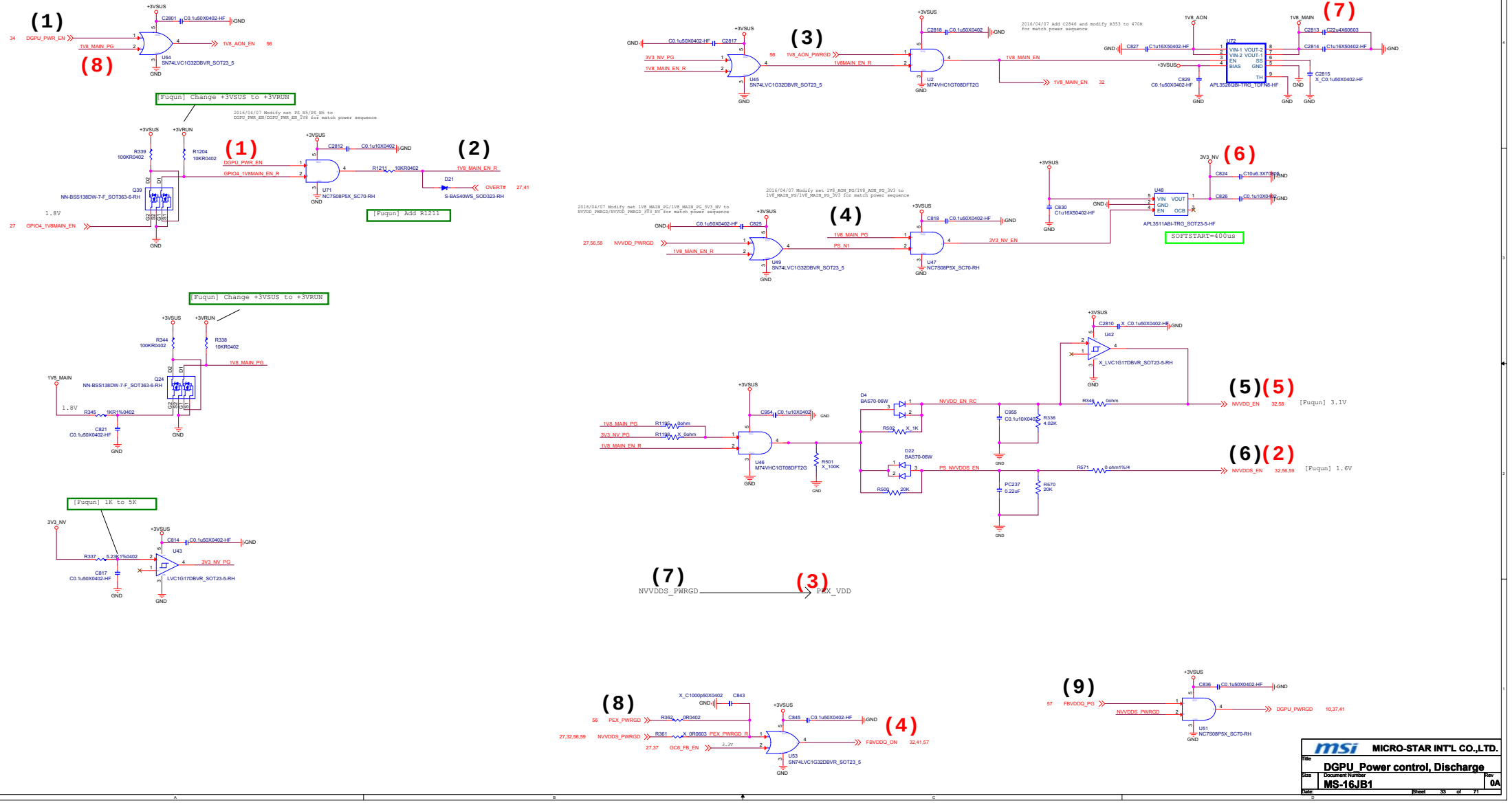
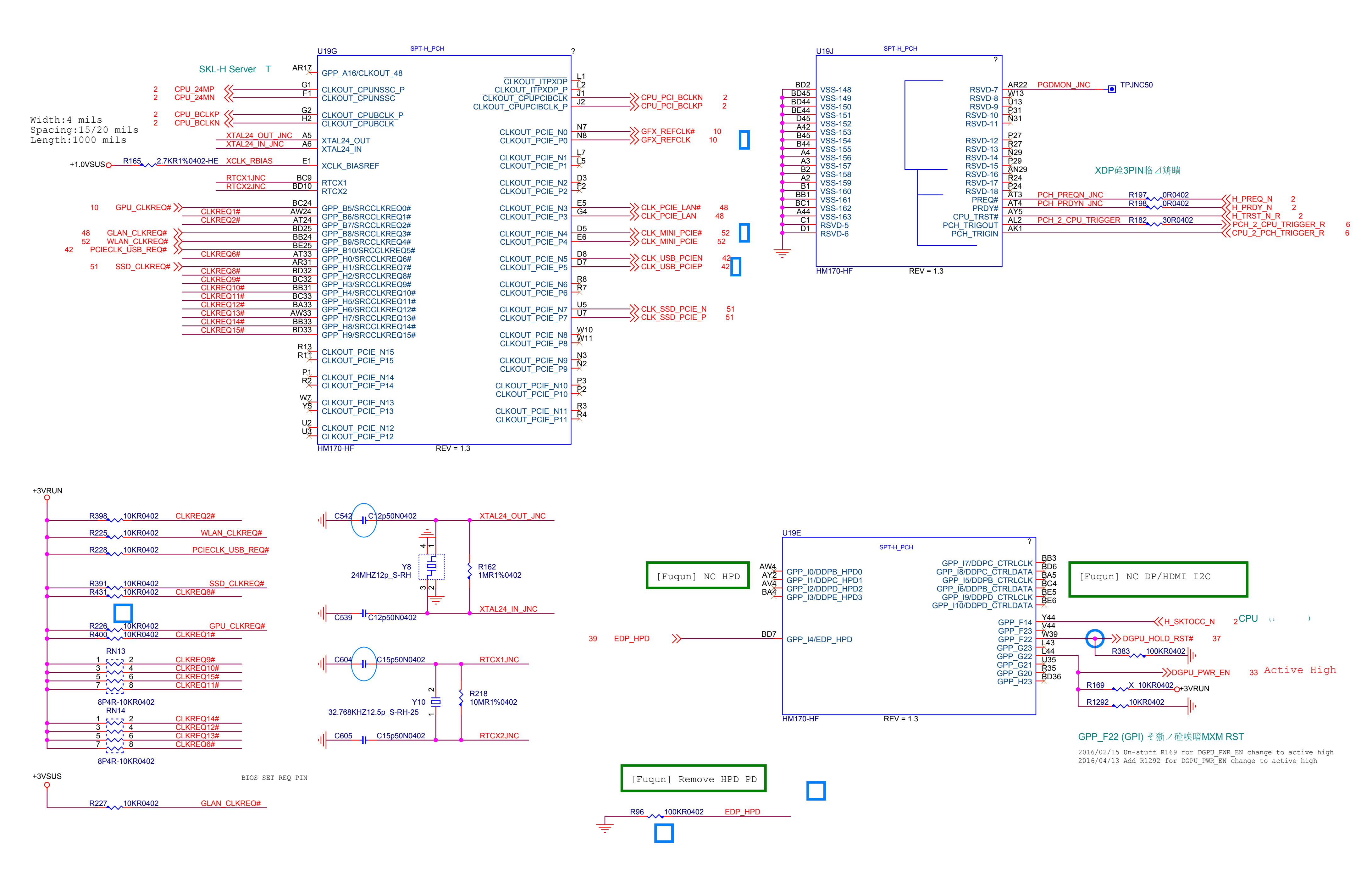
nVIDIA Power Sequence Control

Power on = 1V8_AON -> 1V8_MAIN -> 3V3_NV/NVVDD -> NVDDS/PEX_VDD -> FBVDDQ -> DGPUPWRGD

Power down = NVDDS -> PEX_VDD -> NVVDD/FBVDDQ -> 3V3_NV -> 1V8_MAIN -> 1V8_AON





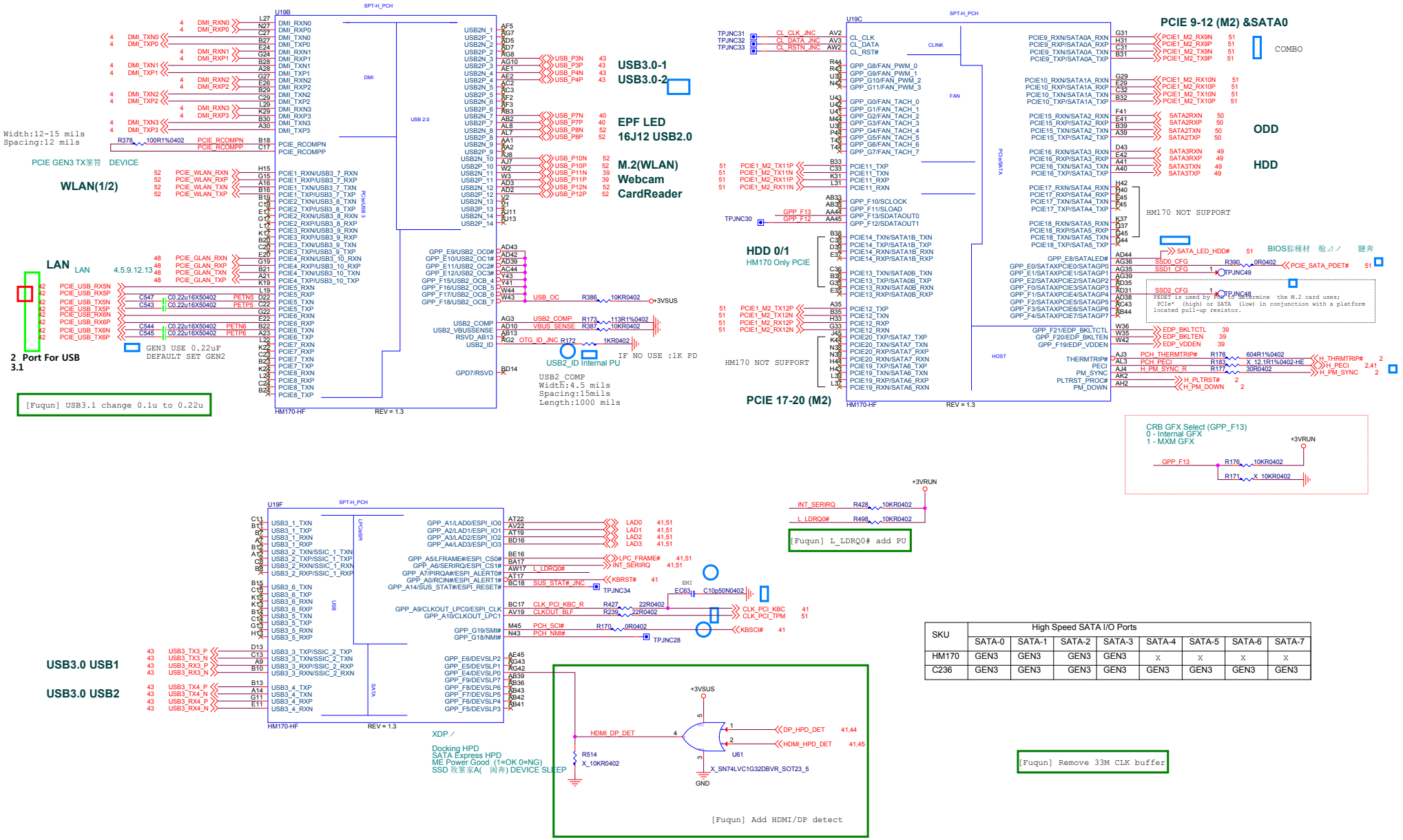
SKL-H Server T
U19G
SPT-H_PCH
GPP_A16/CLKOUT_48
CLKOUT_CPUNSSC_P
CLKOUT_CPUNSSC
CLKOUT_CPUBCLK_P
CLKOUT_CPUBCLK
XTAL24_OUT
XTAL24_IN
XCLK_BIASREF
RTCX1
RTCX2
GPP_B5/SRCCLKREQ0#
GPP_B6/SRCCLKREQ1#
GPP_B7/SRCCLKREQ2#
GPP_B8/SRCCLKREQ3#
GPP_B9/SRCCLKREQ4#
GPP_B10/SRCCLKREQ5#
GPP_H0/SRCCLKREQ6#
GPP_H1/SRCCLKREQ7#
GPP_H2/SRCCLKREQ8#
GPP_H3/SRCCLKREQ9#
GPP_H4/SRCCLKREQ10#
GPP_H5/SRCCLKREQ11#
GPP_H6/SRCCLKREQ12#
GPP_H7/SRCCLKREQ13#
GPP_H8/SRCCLKREQ14#
GPP_H9/SRCCLKREQ15#
CLKOUT_ITPXDP
CLKOUT_ITPXDP_P
CLKOUT_CPUPCIBCLK
CLKOUT_CPUPCIBCLK_P
CLKOUT_PCIE_N0 … CLKOUT_PCIE_P15
HM170-HF
REV = 1.3
Width:4 mils
Spacing:15/20 mils
Length:1000 mils
CPU_24MP
CPU_24MN
CPU_BCLKP
CPU_BCLKN
XTAL24_OUT_JNC
XTAL24_IN_JNC
+1.0VSUS
R165
2.7KR1%0402-HE
XCLK_RBIAS
RTCX1JNC
RTCX2JNC
GPU_CLKREQ#
GLAN_CLKREQ#
WLAN_CLKREQ#
PCIECLK_USB_REQ#
SSD_CLKREQ#
CPU_PCI_BCLKN
CPU_PCI_BCLKP
GFX_REFCLK#
GFX_REFCLK
CLK_PCIE_LAN#
CLK_PCIE_LAN
CLK_MINI_PCIE#
CLK_MINI_PCIE
CLK_USB_PCIEN
CLK_USB_PCIEP
CLK_SSD_PCIE_N
CLK_SSD_PCIE_P
U19J
VSS-148 … VSS-163
RSVD-5
RSVD-6
RSVD-7 … RSVD-18
PREQ#
PRDY#
CPU_TRST#
PCH_TRIGOUT
PCH_TRIGIN
PGDMON_JNC
TPJNC50
PCH_PREQN_JNC
PCH_PRDYN_JNC
PCH_2_CPU_TRIGGER
R197 0R0402
R198 0R0402
R182 30R0402
H_PREQ_N
H_PRDY_N
H_TRST_N_R
PCH_2_CPU_TRIGGER_R
CPU_2_PCH_TRIGGER_R
+3VRUN
R398 10KR0402 CLKREQ2#
R225 10KR0402 WLAN_CLKREQ#
R228 10KR0402 PCIECLK_USB_REQ#
R391 10KR0402 SSD_CLKREQ#
R431 10KR0402 CLKREQ8#
R226 10KR0402 GPU_CLKREQ#
R400 10KR0402 CLKREQ1#
RN13 8P4R-10KR0402
RN14 8P4R-10KR0402
+3VSUS
R227 10KR0402 GLAN_CLKREQ#
BIOS SET REQ PIN
C542 C12p50N0402
C539 C12p50N0402
Y8 24MHZ12p_S-RH
R162 1MR1%0402
C604 C15p50N0402
C605 C15p50N0402
Y10 32.768KHZ12.5p_S-RH-25
R218 10MR1%0402
U19E
GPP_I0/DDPB_HPD0
GPP_I1/DDPC_HPD1
GPP_I2/DDPD_HPD2
GPP_I3/DDPE_HPD3
GPP_I4/EDP_HPD
GPP_I7/DDPC_CTRLCLK
GPP_I8/DDPC_CTRLDATA
GPP_I5/DDPB_CTRLCLK
GPP_I6/DDPB_CTRLDATA
GPP_I9/DDPD_CTRLCLK
GPP_I10/DDPD_CTRLDATA
GPP_F14 GPP_F23 GPP_F22 GPP_G23 GPP_G22 GPP_G21 GPP_G20 GPP_H23
[Fuqun] NC HPD
[Fuqun] NC DP/HDMI I2C
[Fuqun] Remove HPD PD
EDP_HPD
R96 100KR0402
H_SKTOCC_N
CPU
DGPU_HOLD_RST#
R383 100KR0402
DGPU_PWR_EN
Active High
R169 X_10KR0402
R1292 10KR0402
2016/02/15 Un-stuff R169 for DGPU_PWR_EN change to active high
2016/04/13 Add R1292 for DGPU_PWR_EN change to active high

MICRO-STAR INT'L CO.,LTD.

Title: PCH_1(CLK/DDI)

Size: A3 | Document Number: MS-16JB1 | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 34 of 71



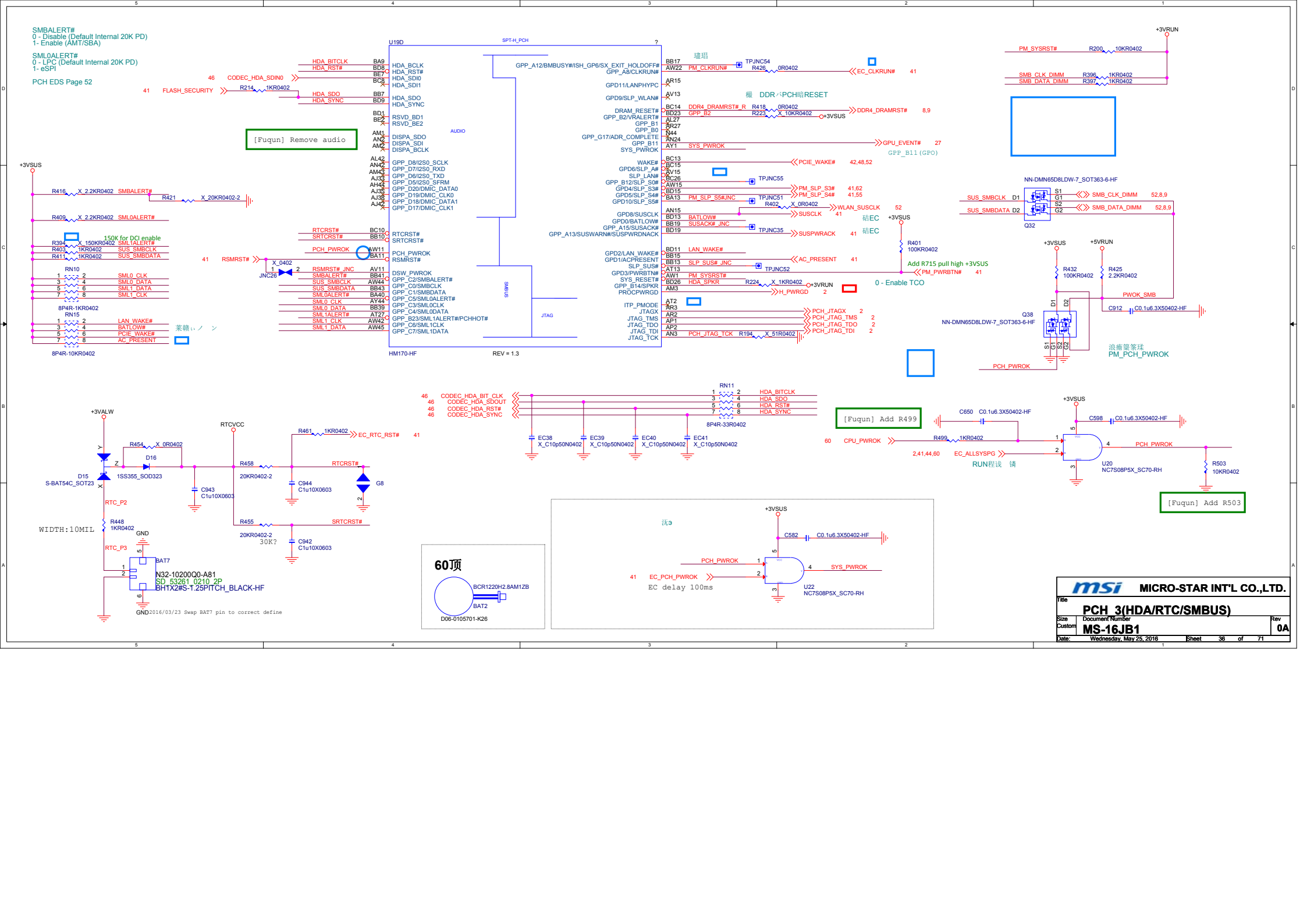
SKU	High Speed SATA I/O Ports							
	SATA-0	SATA-1	SATA-2	SATA-3	SATA-4	SATA-5	SATA-6	SATA-7
HM170	GEN3	GEN3	GEN3	GEN3	X	X	X	X
C236	GEN3	GEN3	GEN3	GEN3	GEN3	GEN3	GEN3	GEN3

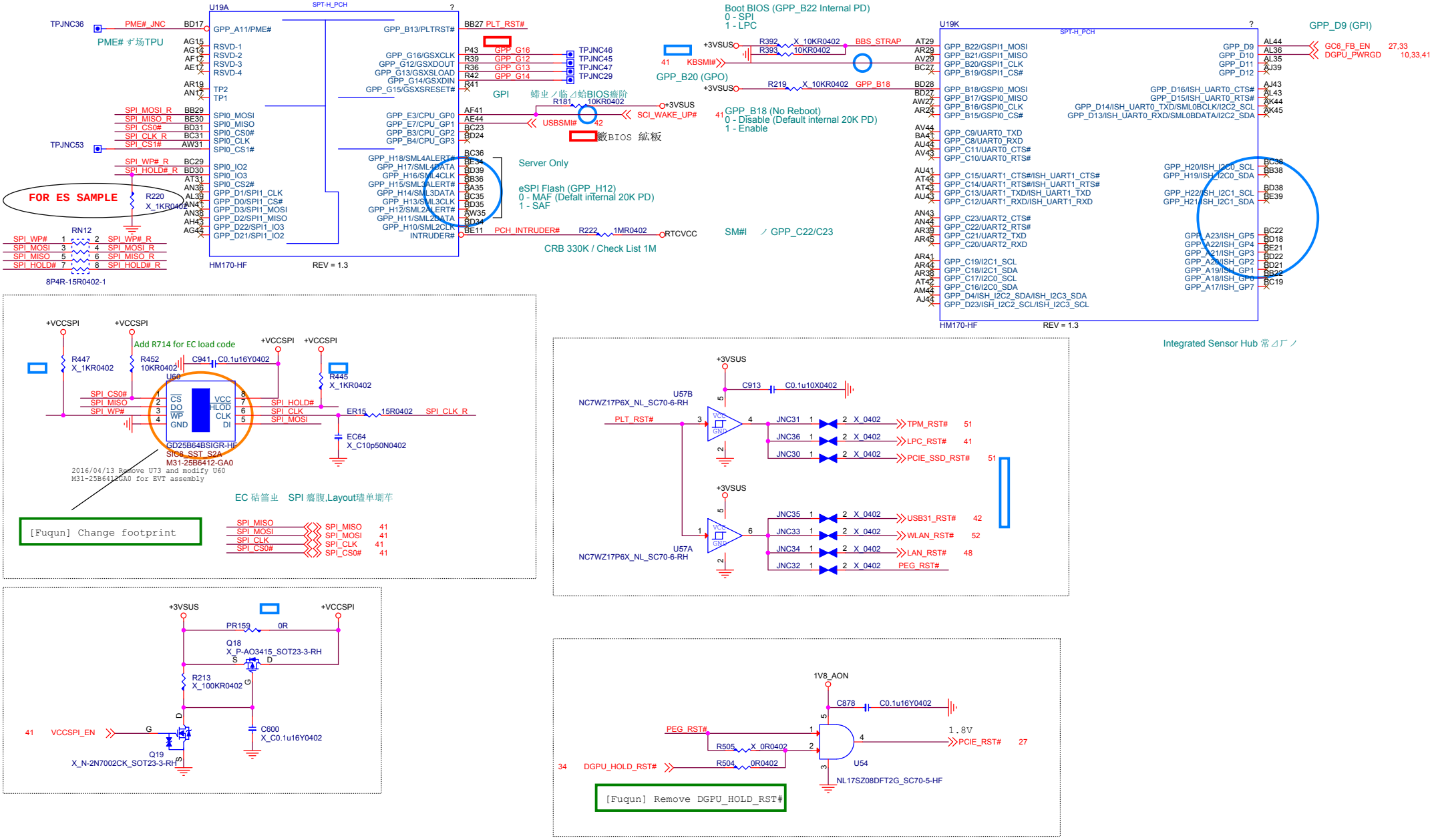
MICRO-STAR INT'L CO.,LTD.

Title: PCH_2(USB/SATA/PCIE)

Size: C | Document Number: MS-16JB1 | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 35 of 71


SMBALERT#
0 - Disable (Default Internal 20K PD)
1- Enable (AMT/SBA)
SML0ALERT#
0 - LPC (Default Internal 20K PD)
1- eSPI
PCH EDS Page 52
U19D
SPT-H_PCH
HM170-HF
REV = 1.3
[Fuqun] Remove audio
[Fuqun] Add R499
[Fuqun] Add R503
Add R715 pull high +3VSUS
0 - Enable TCO
150K for DCI enable
60顶
N32-10200Q0-A81
SD_53261_0210_2P
BH1X2#S-1.25PITCH_BLACK-HF
BCR1220H2.8AM1ZB
D06-0105701-K26
EC delay 100ms
RUN程线
MICRO-STAR INT'L CO.,LTD.
PCH_3(HDA/RTC/SMBUS)
MS-16JB1
Wednesday, May 25, 2016

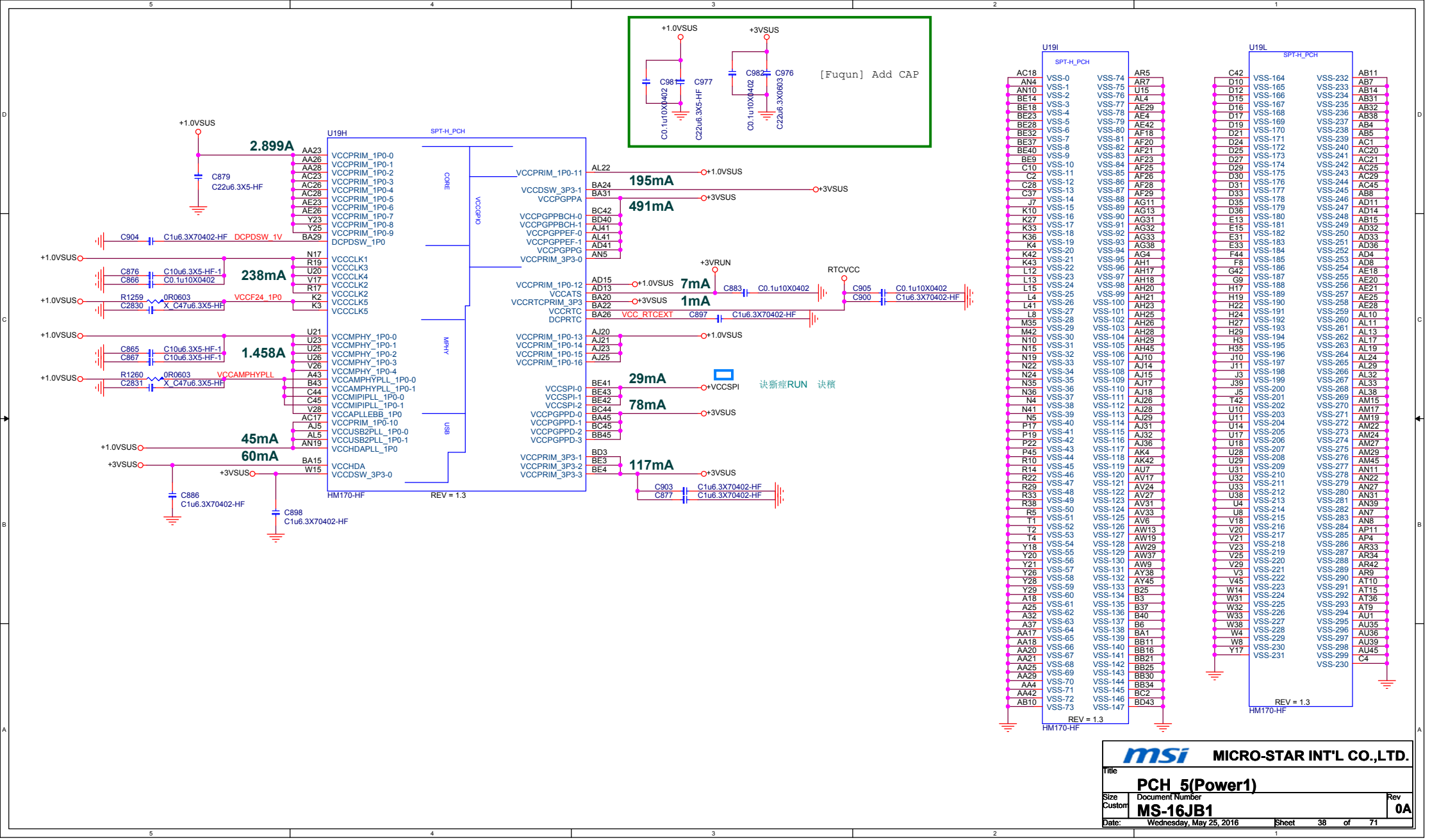


MICRO-STAR INT'L CO.,LTD.

Title: PCH_4(SPI/GPIO)

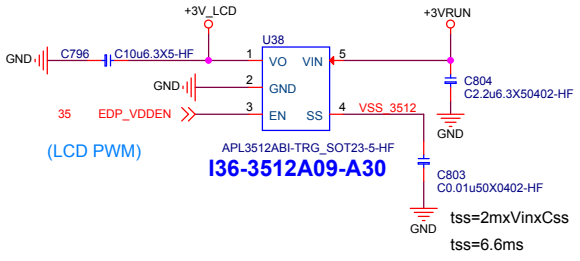
Size: Custom | Document Number: MS-16JB1 | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 37 of 71

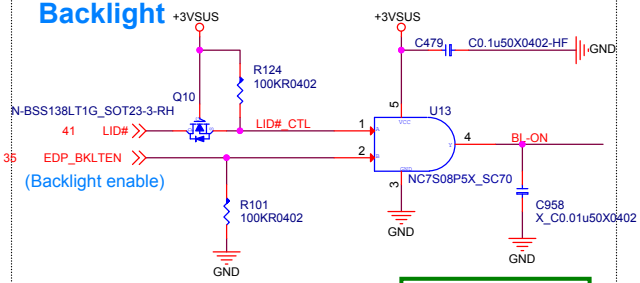

[Fuqun] Add CAP
U19H
SPT-H_PCH
HM170-HF
REV = 1.3
2.899A
195mA
491mA
238mA
7mA
1mA
1.458A
29mA
78mA
117mA
45mA
60mA
U19I
U19L
MICRO-STAR INT'L CO.,LTD.
PCH_5(Power1)
MS-16JB1
Wednesday, May 25, 2016
Sheet 38 of 71

eDP

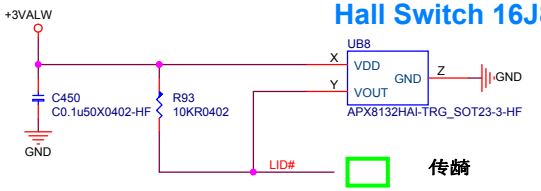
Pannel Device Logic Power



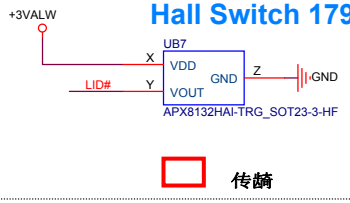
Backlight



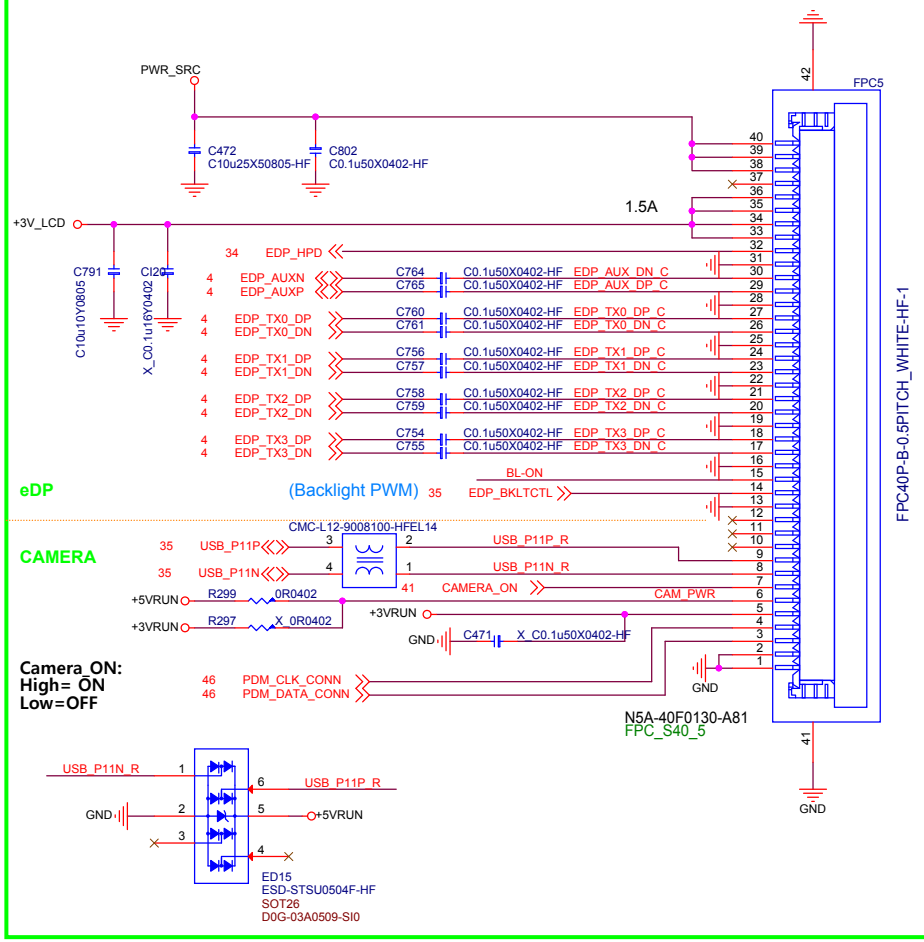
Hall Switch 16J8

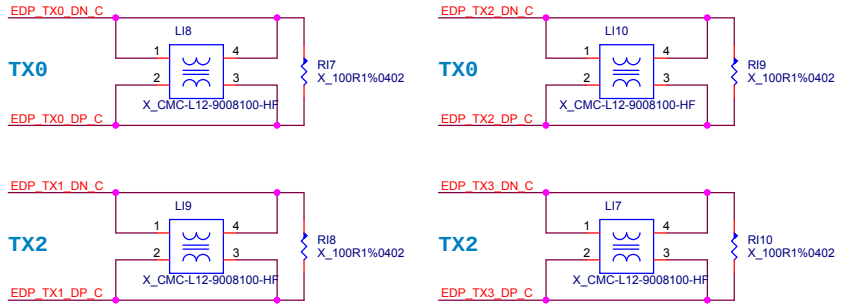


Hall Switch 1798



eDP CONN CAMERA





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 /Camera

Size | Document Number: MS-16JB1 | Rev: 0A

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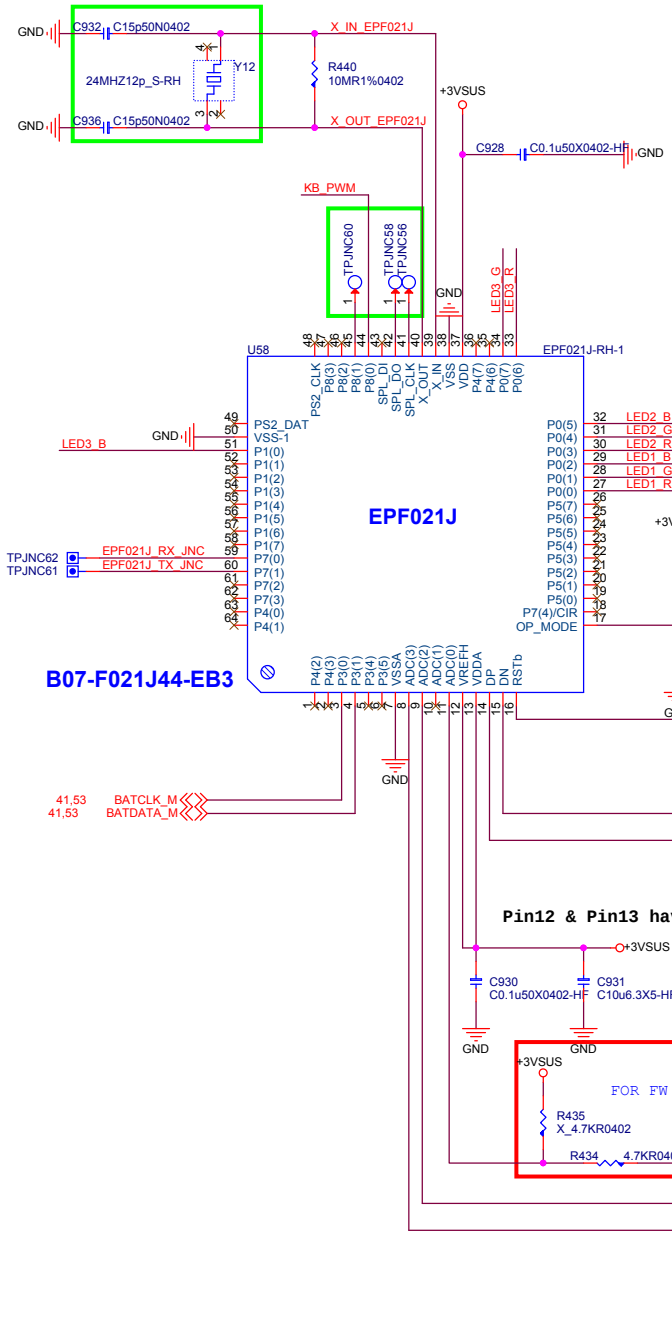
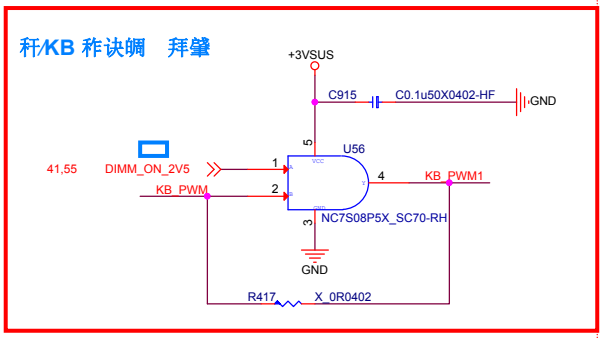
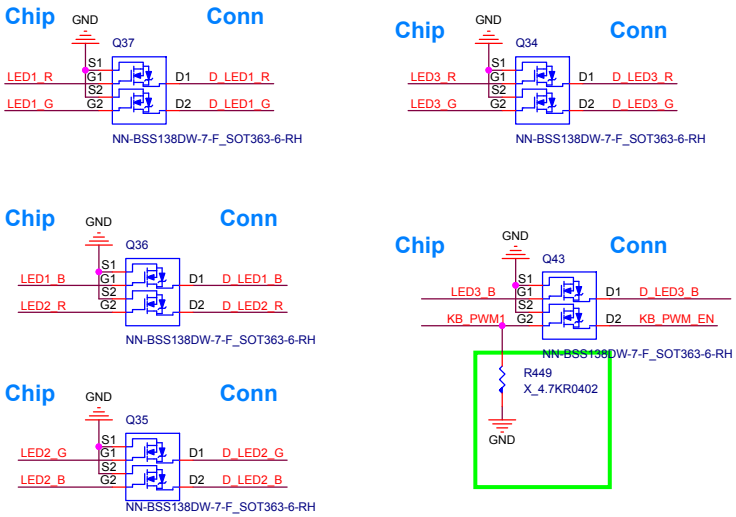
LED 8051 Controller

C749 and C750 change to 15pF for SA

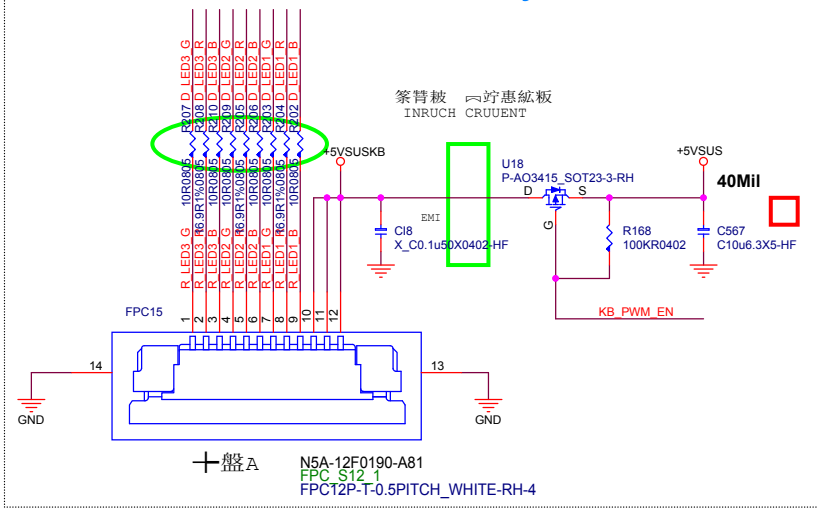




EPF021J Sink current not enough, only using BSS138 (0.22A)



LED Keyboard CONN



LED Keyboard Pin Define	
Pin 1	VCC_G
Pin 2	VCC_R
Pin 3	VCC_B
Pin 4	LED1_B
Pin 5	LED1_R
Pin 6	LED1_G
Pin 7	LED2_B
Pin 8	LED2_R
Pin 9	LED2_G
Pin 10	LED3_B
Pin 11	LED3_R
Pin 12	LED3_G

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Title: LED_8051

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KBC/EC/uP (ENE9028)

Hardware Reset

ED before RC

RC and R Close SW

hybrid power boost mode

SW9 SW-TACTB1-4PS-RH-13

ED19 ESD-SFI0402-050E101NP-LF-RH

R415 X_47KR1%0402-HF

C901 C0.1u50X0402-HF

RST_SW# R414 33R0402 EC_RST# 37

BM#_JNC3 TB_STAR# 53

DGPU_ON# 53

TB_STAR# 53

AC_CTL 53

FLASH_SECURITY 36

FAN1_PWM0 49

FAN1_PWM1 49

CPUFAN_FB 49

GPUFAN_FB 49

[Fuqun] BAT_BM#-->TB_STAR#

[Fuqun] Remove LPC debug

[Fuqun] Add EC_USB_OV#

[Fuqun] Add HDMI_DP_HPD to EC

HW Debug

MVT 簿埃

R74 10KR0402 PWR_SW# SW10 C221 X_C0.1u50X0402-HF SW-TACTB1S-HF

U59 KB9028Q-C-RH

LPC I/F

SERIRQ 35,51 INT_SERIRQ

LFRAME# 35,51 LPC_FRAME#

PCICLK 35 CLK_PCI_KBC

CLKRUN#/GPIO1D 36 EC_CLKRUN#

LAD0 35,51 LAD0

LAD1 35,51 LAD1

LAD2 35,51 LAD2

LAD3 35,51 LAD3

FAN&PWM

ECRST# KBRST# 35

KBRST#/GPIO01

SCI#/GPIO0E KBSCI# 35

GA20/GPIO00

PCIRST#/GPIO05 OVERT# 27,33

PWM0/GPIO0F DGPU_ON# 21

PWM1/GPIO10 TB_STAR# 23

PWM2/GPIO11 AC_CTL 25

PWM3/GPIO19 FLASH_SECURITY 34

FANPWM0/GPIO12 FAN1_PWM0 26

FANPWM1/GPIO13 FAN1_PWM1 27

FANFB0/GPIO14 CPUFAN_FB 28

FANFB1/GPIO15 GPUFAN_FB 29

IKB

KSO0/GPIO20 KBOUT0 39

KSO1/GPIO21 KBOUT1 40

KSO2/GPIO22 KBOUT2 41

KSO3/GPIO23 KBOUT3 42

KSO4/GPIO24 KBOUT4 43

KSO5/GPIO25/UART_SOUT KBOUT5 44

KSO6/GPIO26 KBOUT6 45

KSO7/GPIO27/SERIRQ(LPC_Bypass)UART_RTS KBOUT7 46

KSO8/GPIO28 KBOUT16 47

KSO9/GPIO29 KBOUT17 48

KSO10/GPIO2A

KSO11/GPIO2B/LAD3(LPC_Bypass) 43,52 EC_USB_OV#

KSO12/GPIO2C/LAD2(LPC_Bypass)/UART_DTR BATT_EN 53 BATT_OFF

KSO13/GPIO2D/LAD1(LPC_Bypass) 53 BAT_IN#

KSO14/GPIO2E/LAD0(LPC_Bypass) 39 LID#

KSO15/GPIO2F 56 SUSPWROK

KSO16/GPIO48/UART_SOUT2 TPJNC57 EC_SDA 81

KSO17/GPIO49 TPJNC59 EC_SCL 82

KSI0/GPIO30/E51TXD KBOUT8 55

KSI1/GPIO31 KBOUT9 56

KSI2/GPIO32 KBOUT10 57

KSI3/GPIO33 KBOUT11 58

KSI4/GPIO34 KBOUT12 59

KSI5/GPIO35 KBOUT13 60

KSI6/GPIO36 KBOUT14 61

KSI7/GPIO37/EDI_DO KBOUT15 62

ESB

GPIO0B/ESB_CLK

GPIO0C/ESB_DAT_O 52 KBLED_BACKLIGHT_SW# KBLED_BACKLIGHT_SW# 17

COOLER_BOOST_SW# KBLED_BACKLIGHT_SW# 18

CIR

铃DIMM_ON

GPIO40/AD6 KBIN6 73

GPIO41/CIR_RLC_TX/AD7 KBIN7 74

GPIO0A/OWM 40,55 DIMM_ON_2V5 16

GPIO0D/RLC_TX2 36 EC_RTC_RST# 19

SPI FLASH

MISO/GPIO5B 37 SPI_MISO 119

MOSI/GPIO5C 37 SPI_MOSI 120

SPICLK/GPIO58 37 SPI_CLK 126

SPICS#/GPIO5A 37 SPI_CS0# 128

PS2 I/F

PSCLK3/GPIO4E 52 TP_CLK 87

PSDAT3/GPIO4F 52 TP_DATA 88

PSCLK2/GPIO4C/SCL3 HDMI_DP_HPD 85

PSDAT2/GPIO4D/SDA3 86

PSCLK1/GPIO4A/SCL2/SMBD_CLK 40,53 BATCLK_M 83

PSDAT1/GPIO4B/SDA2/SMBD_DAT 40,53 BATDATA_M 84

UART

E51TXD/GPIO16 JNC28 2 X_0402 2 E51TXD_JNC 30

E51CLK/GPIO17 JNC27 2 X_0402 2 E51CLK_JNC 31

GPIO5D EC_XIN_JNC 122

GPIO5E EC_XOUT_JNC 123

POWER/GROUND

VCC_LPC 9

VCC 22

VCC-1 33

VCC-2 96

VCC-3 125

VCC0 111

VCC_IO2 124

AVCC 67

AGND 69

GND 11

GND-1 24

GND-2 35

GND-3 94

GND-4 113

C926 C0.1u10X0402

C565 C0.1u10X0402

C554 C0.1u10X0402

C902 C0.1u10X0402

C947 C0.1u10X0402

+3VALW

SMBUS

SDA0/GPIO45 78 SMB_DATA_EC 27

SCL0/GPIO44 77 SMB_CLK_EC 27

IEDI_SDA/SDA1/GPIO47 80 EC_SDA EC_SDA 45

IEDI_SCL/SCL1/GPIO46 79 EC_SCL EC_SCL 45

AD/DA

DA0/GPO3C 68 BT_PWR_ON 52

DA1/GPO3D 70 CAMERA_ON 39

DA2/GPO3E 71 SUSPWRACK 36

DA3/GPO3F 72 DGPU_PWRGD 10,33,37

AD0/GPI38 63 KBIN0

AD1/GPI39 64 KBIN1

AD2/GPI3A 65 KBIN2

AD3/GPI3B 66 KBIN3

AD4/GPI42 75 KBIN4

AD5/GPI43 76 KBIN5

EC26 C330p50N0402 GND

SDI

GPXIOA00/GPIO60/SHICS# 97 EAPD 46

GPXIOA01/GPIO61/SHICLK 98 EC_MUTE# 46,47

GPXIOA02/GPIO62/SHIDO 99 HDMI_HPD_DET 35,41,45

LED

POWER_FAIL0/GPIO63/GPXIOA03 100

GPIO64/GPXIOA04 101 SUS_ON 54,56

GPIO65/GPXIOA05 102 MB_ID VCCSPI_EN 37

VCOUT1/GPIO66/GPXIOA06 103 DIMM_ON_1V2 55

VCOUT0/GPIO67/GPXIOA07 104 EC_PROCHOT# 2

GPIO68/GPXIOA08 105 LED_WLAN# 52

GPIO69/GPXIOA09 106 LED_CHARGE# 52

GPIO6A/GPXIOA10 107 LED_BATLOW# 52

GWG/GPIO6B/GPXIOA11 108 AC_PRESENT 36

SDIDO/GPIO78/GPXIOD00 109 ADP_ICC 53

GPIO79/GPXIOD01 110 AC_OK 53

EC_EN#/GPIO7A/GPXIOD02 112 TPJNC64

PWR_SW# R R506 0R0402 PWR_SW# 52

GPIO7B/GPXIOD03 114 EC_ALLSYSPG

GPIO7C/GPXIOD04 115

GPIO7D/GPXIOD05 116

GPIO7E/GPXIOD06 117 RUN_ON 54

GPIO7F/PECI 118 H_PECI_R R467 33R0402 H_PECI 2,35

PM_PWRBTN# 36

GPIO04 6

i_clk_8051/GPIO07 14 GPU_ACIN1 27

PROCHOT#/i_clk_peri/GPIO08 15 KBSMI# 37

POWER_FAIL1/GPIO18 32 SCI_WAKE_UP# 37

GPIO50 89 EC_PCH_PWROK 36

GPIO52 90 FBVDDQ_ON 32,33,57

WDT_LED#/GPIO54 92 UMA_ON# USB_ENABLE 43,52

GPIO56 95 RSMRST# 36

XCLK32K/GPIO57 121 PM_SLP_S3# 36,62

GPIO59 127 PM_SLP_S4# 36,55

GPIO1A/NUMLED# 36 LED_NUM# 52

GPIO53/CAPSLED# 91 LED_CAP# 52

GPIO55/SCROLED# 93 COOLER_LED# 52

+3VSUS R160 10KR0402 R161 10KR0402 PQ17 UMA_ON 52 UMA_ON# G N-2N7002CK_SOT23-3-RH

+3VRUN R450 X_10KR0402 KBLED_BACKLIGHT_SW# C939 C0.1u16X70402 GND

+3VRUN R436 X_10KR0402 COOLER_BOOST_SW# C933 C0.1u16X70402 GND

Keyboard conn

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

CON5

N5A-26F0270-A81

FPC_26_C1470903

FPC26P-T-1PITCH_WHITE

ESD-SFI0508-050S500NP-A4-LF-HF CNI8 CNI7 CNI9 CNI10

CI9 CI10 ESD-SFI0402-050E101NP-LF-RH

2016/04/22 Modify CI9,CI10 to DDG-0402500-SI0 and CNI7,CNI8,CNI9,CNI10 to DDG-5000510-SI0 for EMI request

+3VALW RN8 8P4R-10KR0402 RN9 8P4R-10KR0402

EC ず场PU RぴSINK CURRENT い锛

KBIN add 10K pull high to +3VALW for EC request

ALLSYSPG

+3VRUN R466 10KR0402

VCCIO_PWRGD 44 JNC37 X_0402 EC_ALLSYSPG 2,36,44,60

PU/PD

+3VALW

BATCLK_M R451 2.2KR1%0402

BATDATA_M R453 2.2KR1%0402

+3VRUN

SMB_CLK_EC R438 2.2KR1%0402

SMB_DATA_EC R442 2.2KR1%0402

KBRST#, H_A20GATE

EC_CLKRUN# R413 X_100KR0402

KBRST# R457 100KR0402

RSMRST# R456 47KR0402

RSMRST# follow DG 10K,CRB 47K

MB_ID

GE

GS

+3VALW PR275 100KR0402 MB_ID R462 X_10KR1%0402

[Fuqun] MS-16JB GE/GS config

+3VSUS HDMI_DP_HPD DP_HPD_DET 35,44 HDMI_HPD_DET 35,41,45 R517 10KR0402 U62 SN74LVC1G32DBVR_SOT23_5

[Fuqun] Add HDMI/DP detect

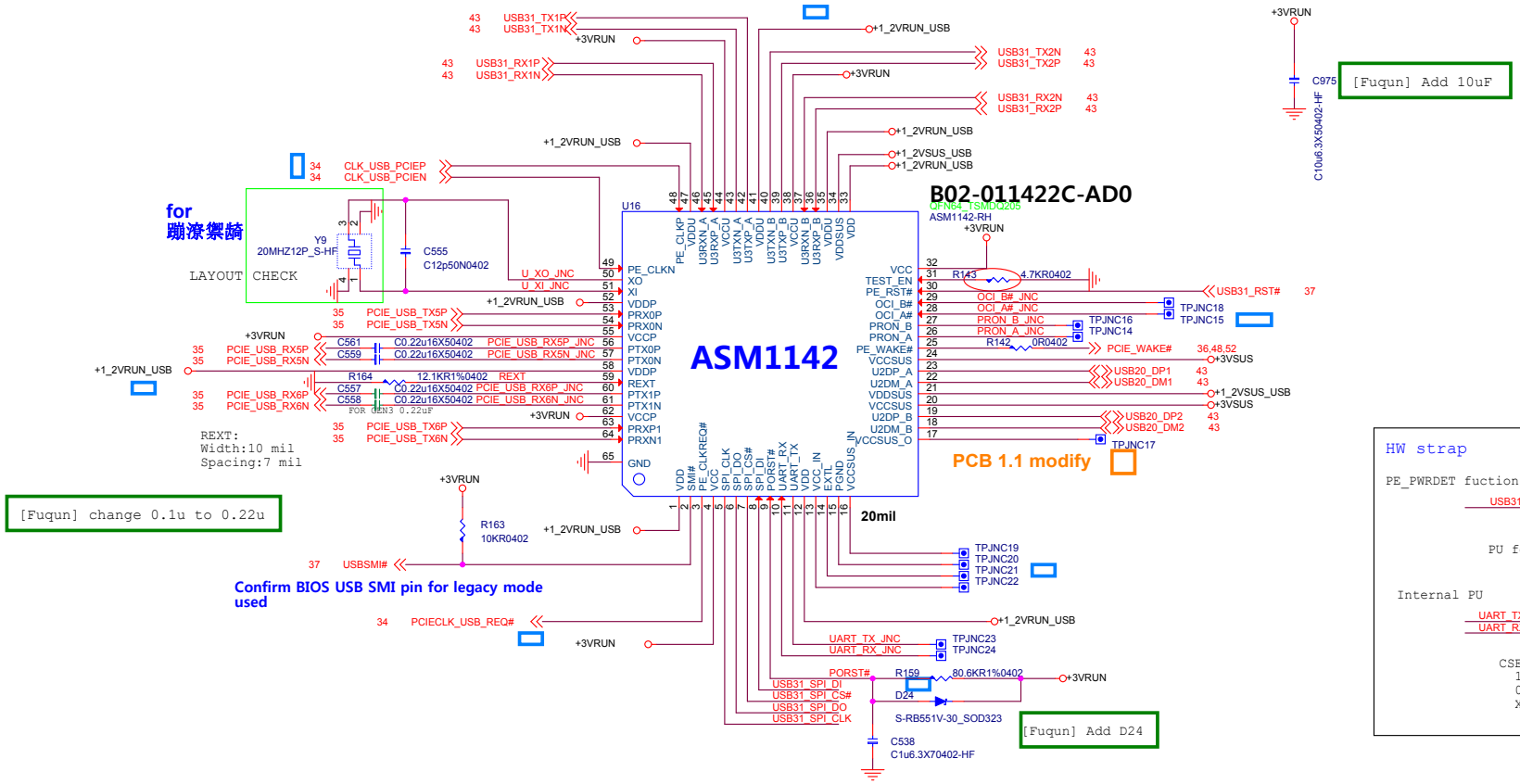
ER16 X_22R0402 Y13 X_32.768KHZ12.5p_S-RH-21 R465 680KR0402-HE C948 C945 X_C16p50N0402-RH C946 X_C16p50N0402-RH X_C22p50N0402

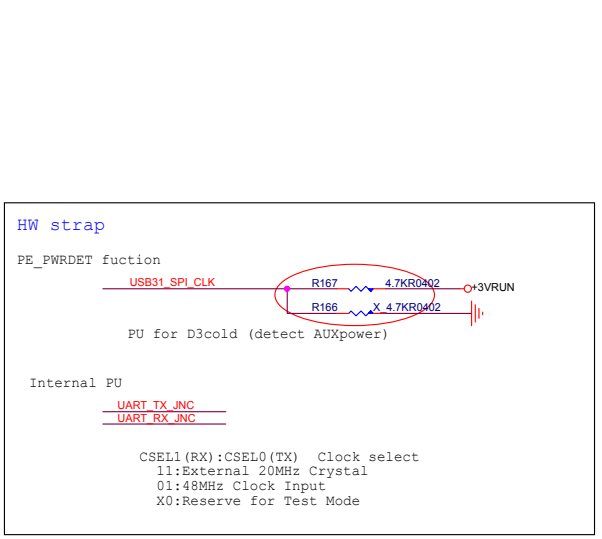
SUSCLK 36

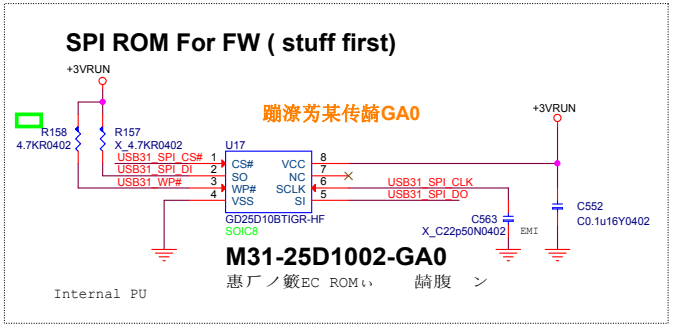
R464 0R0402

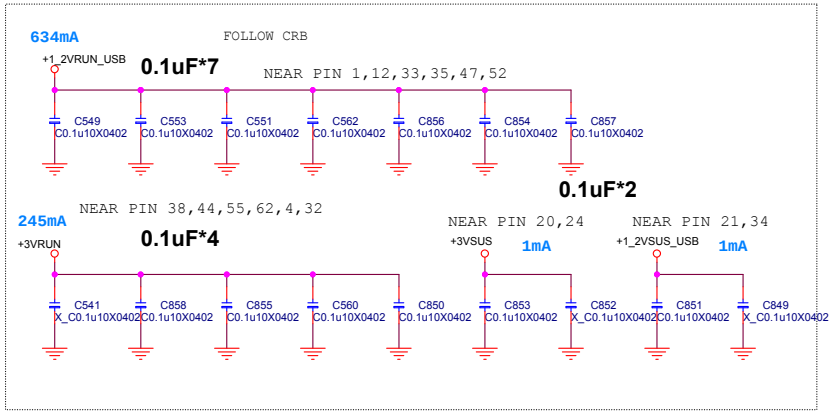
PCIE to USB 3.1

USB 3.0/ USB.3.1







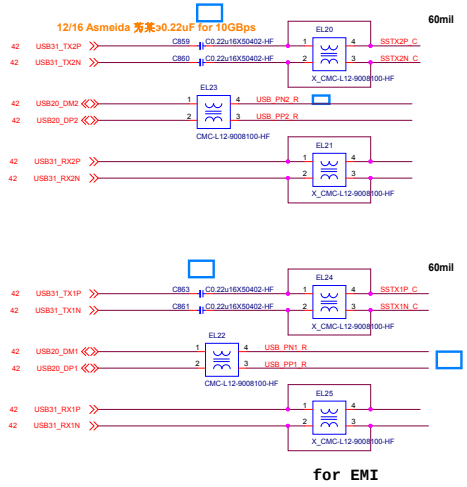


MICRO-STAR INT'L CO.,LTD.		
Title: USB 3.0 / USB 3.1		
Size	Document Number: MS-16JB1	Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 42 of 71	

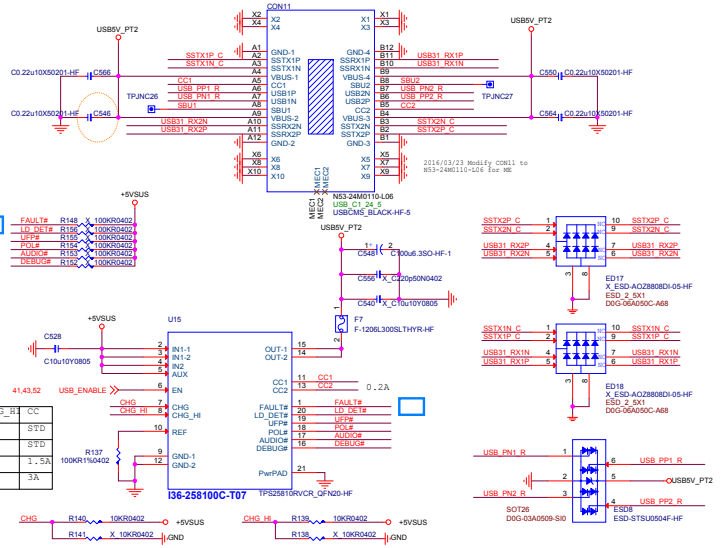
USB3.1 TYPE C

12/16 Asmeida 芳茉30.22uF for 10GBps

60mil

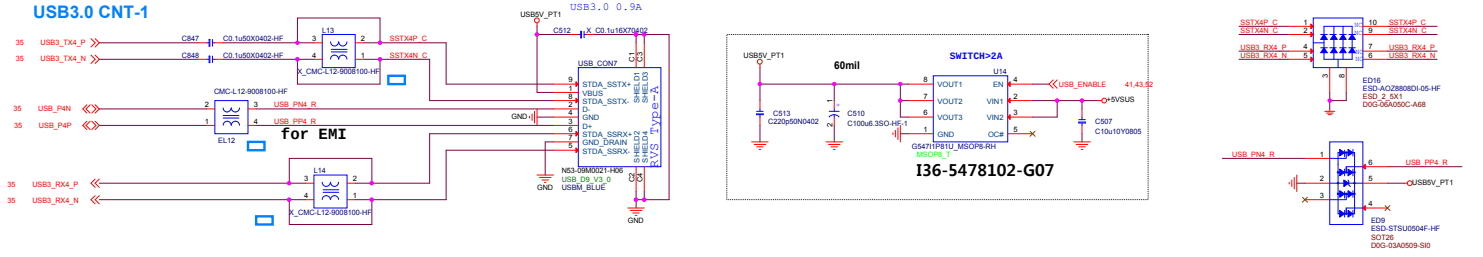


for EMI

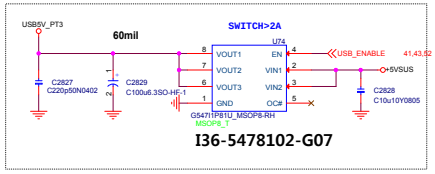


CHG	CHG_HI	CC
0	0	STD
0	1	STD
1	0	1.5A
1	1	3A

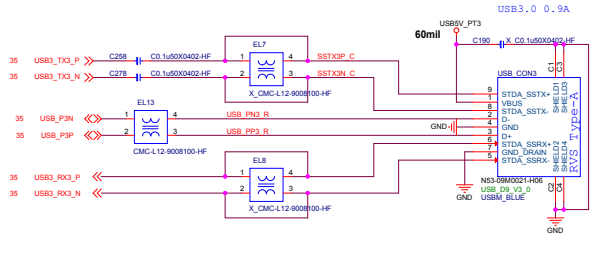
USB3.0 CNT-1

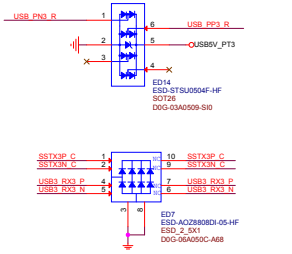


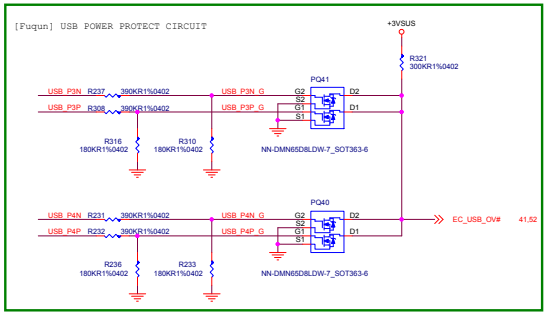
USB3.0 CNT-3



2016/03/23 Modify iCharger circuit to normal type for project spec change





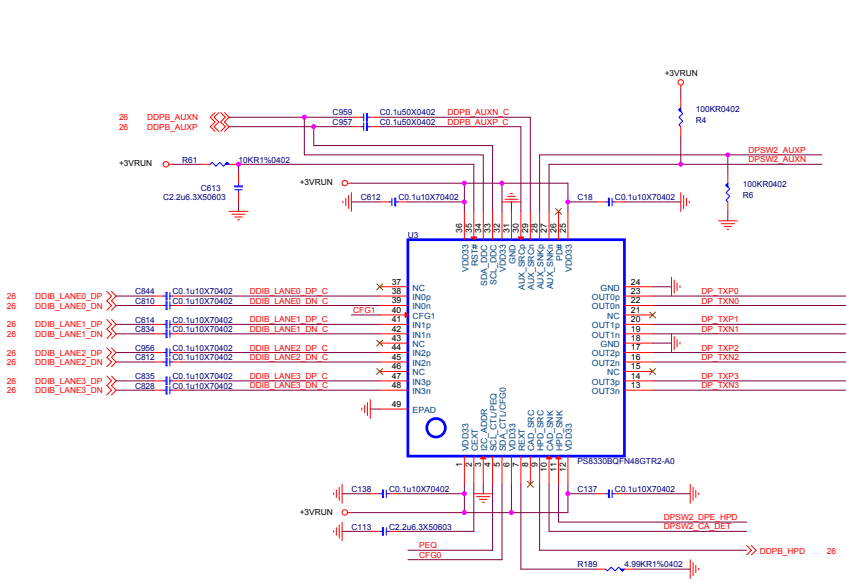


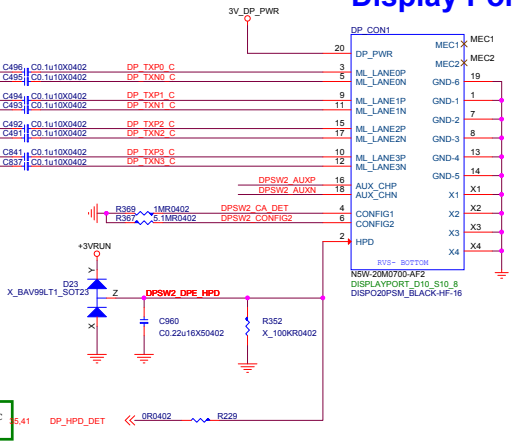
msi	MICRO-STAR INT'L CO.,LTD.			
Title	USB 3.0			
Size	Document Number			Rev
	MS-16JB1			0A
Date:	Wednesday, May 25, 2016	Sheet	43 of	71

Display Port

[Fuqun] Add level shift

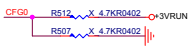
[Fuqun] Add 10uF





Display Port

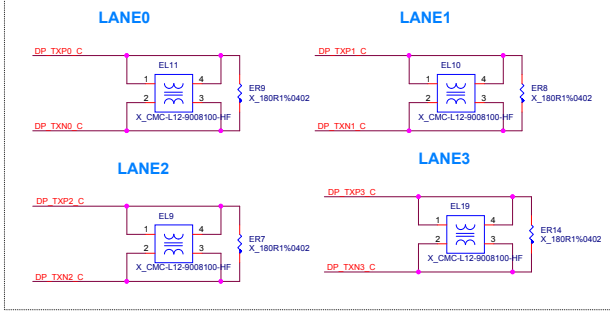
Configuration pin for automatic EQ and AUX interception; Internal pull down at ~150k Ohm, 3.3V I/O.
- L: default, automatic EQ enable & AUX interception enable
- H: automatic EQ disable & AUX interception enable
- M: automatic EQ disable & AUX interception disable, no pre-emphasis, 600mVpp swing



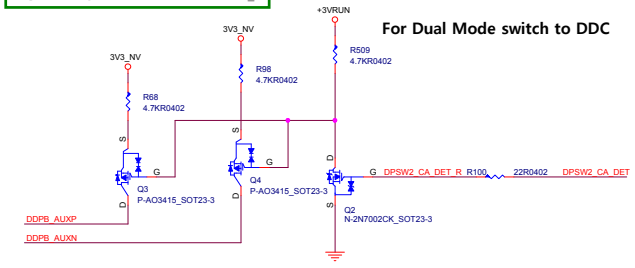
Configuration pin for auto test and input offset cancellation, 3.3V IO, internal pull up at ~150K Ohm
- H: default, auto test disable & input offset cancellation enable
- L: auto test enable & input offset cancellation enable
- M: auto test disable & input offset cancellation disable

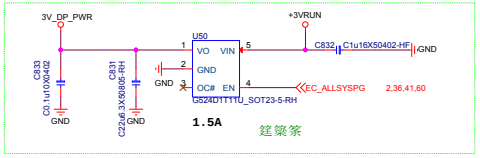
Programmable input equalization levels; Internal pull down at ~150k Ohm, 3.3V I/O.
- L: default, LEQ, compensate channel loss up to 12dB @ HBR2
- H: HEQ, compensate channel loss up to 15dB @ HBR2
- M: LLEQ, compensate channel loss up to 5dB @ HBR2

EMI Close Connector



[Fuqun] Change PU from +3VRUN to 3V3_NV





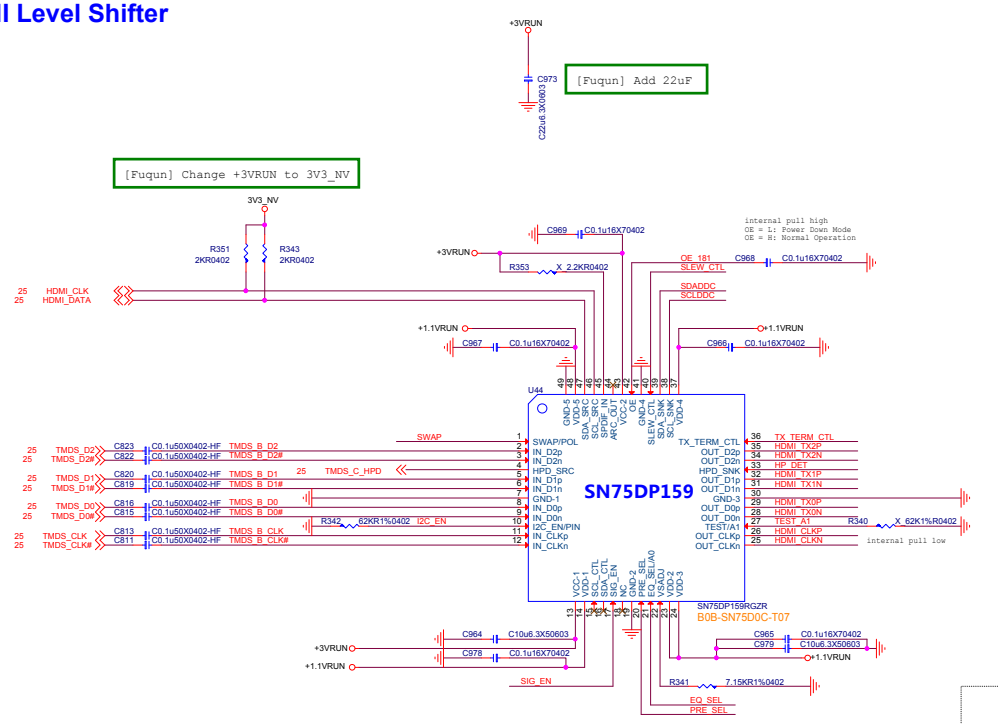
MICRO-STAR INT'L CO.,LTD.			
Title: DP			
Size	Document Number: MS-16JB1		Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 44 of 71		

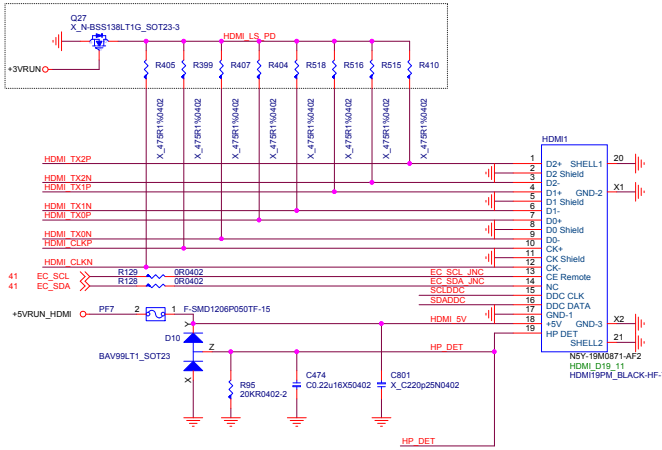
HDMI Level Shifter

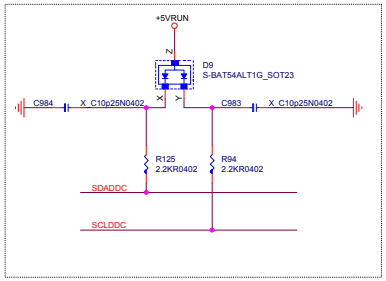
[Fuqun] Add 22uF

[Fuqun] Change +3VRUN to 3V3_NV

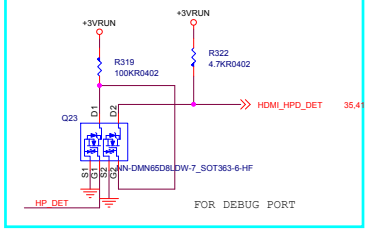
P159	NC
S181	Stuff

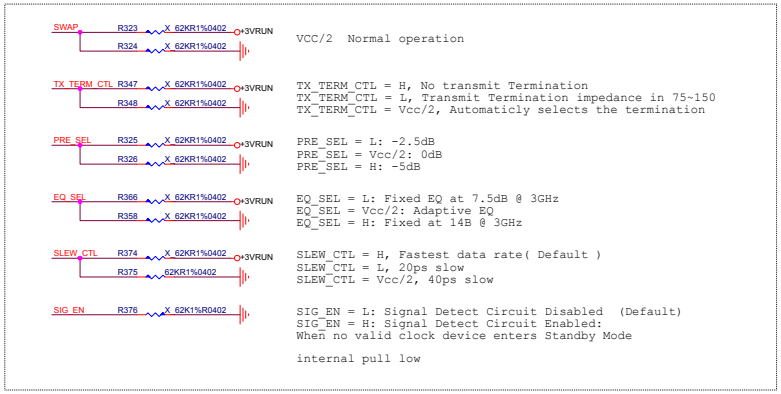






HPD Level Shift 5V to 3V





VCC/2 Normal operation

TX_TERM_CTL = H, No transmit Termination
TX_TERM_CTL = L, Transmit Termination impedance in 75~150
TX_TERM_CTL = Vcc/2, Automaticly selects the termination

PRE_SEL = L: -2.5dB
PRE_SEL = Vcc/2: 0dB
PRE_SEL = H: -5dB

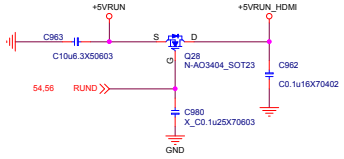
EQ_SEL = L: Fixed EQ at 7.5dB @ 3GHz
EQ_SEL = Vcc/2: Adaptive EQ
EQ_SEL = H: Fixed at 14B @ 3GHz

SLEW_CTL = H, Fastest data rate(Default)
SLEW_CTL = L, 20ps slow
SLEW_CTL = Vcc/2, 40ps slow

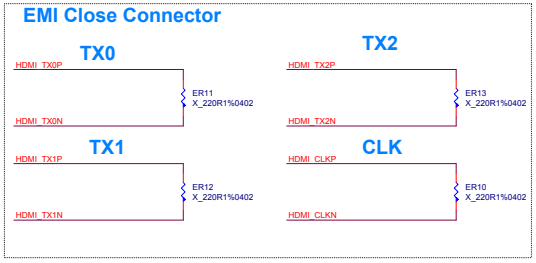
SIG_EN = L: Signal Detect Circuit Disabled (Default)
SIG_EN = H: Signal Detect Circuit Enabled:
When no valid clock device enters Standby Mode

internal pull low

Avoid HDMI Leakage



EMI Close Connector



MSI	MICRO-STAR INT'L CO.,LTD.		
Title	HDMI DP139		
Size	Document Number		Rev
	MS-16JB1		0A
Date:	Wednesday, May 25, 2016	Sheet 45 of 71	

[Fuqun] Change 3pcs cooper to cap

Audio CODEC/Audio AMP

閎MOAT 笨瑞┤ COOPER

DVDD

Close Codec

+3VSUS, +3V_AUDIO, JNC15 X_0603

C570 C0.1u50X0402-HF, C572 C10u6.3X5-HF, C586 C10u6.3X5-HF

Close Pin25 | Close Pin38 | ALC898 add C945

CODEC_LDOOUT

C899 C10u6.3X5-HF, C896 C0.1u50X0402-HF, C875 C10u6.3X5-HF, C872 C0.1u50X0402-HF, C908 C47u6.3X50805-HF

AVDD5V

AVDD5V, 1A, L15 180L2.5A-90, +5VSUS

C890 C0.1u50X0402-HF, C889 C10u6.3X5-HF

AVDD5V

JNC16 X_0603

C579 C0.1u50X0402-HF
C893 C0.1u50X0402-HF
C571 C0.1u50X0402-HF
C916 C0.1u50X0402-HF
C611 C0.1u50X0402-HF
EC61 X_C0.1u50X0402-HF
EC57 X_C0.1u50X0402-HF
EC81 X_C0.1u50X0402-HF
EC82 X_C0.1u50X0402-HF

C961 X_C0.1u50X0402-HF
C909 X_C0.1u50X0402-HF

CODEC_HDA_SDIN0
EC59 X_C10p50N0402
EMI(RADIATION SOLUTION)

20150707 Change R421 from 33R to 22R

GND C884 X_C10p50N0402

47 SPDIFO R385 10R1%0402 SPDIFO_R 48

36 CODEC_HDA_SDOUT R395 22R0402 HD_SDIN 8
36 CODEC_HDA_SDIN0
36 CODEC_HDA_SYNC
36 CODEC_HDA_RST#
36 CODEC_HDA_BIT_CLK

REGREF

C578 C10u6.3X5-HF, PDM_CLK 2, REGREF 3

47 FRONT_JD R419 5.1KR1%0402 SENSEA 13
47 MIC_JD R420 20KR1%0402 34

can't use MLCC 100UF??

AGND C100u6.3SO-HF-1 2 1 C568

MIC-VREFO-R 32
MIC-VREFO-L A_VRP 37
VREF_ALC898 AVDD5V 40mil 31
29
27
AGND C895 C10u6.3X5-HF 33
AGND R384 20KR1%0402 JDREF 40

Close Codec
Close Codec

12 BEEP

PDM_DATA 4

U55 ALC898-GR-RH LQFP48 B05-LC89804-R09

EAPD/SPDIFI 47
SPDIF-OUT
SDATA-OUT 5
SDATA-IN 10
SYNC 11
RESET#
BCLK 6
GPIO0/DMIC-CLK/SPDIF-OUT2
REGREF
SENSE A
SENSE B
MIC1-VREFO-R
MIC2-VREFO
MIC1-VREFO-L
PIN37-VREFO
LDO-IN
LINE2-VREFO
VREF
GPIO2
JDREF
GPIO1/DMIC-DATA
DVSS

DVDD 1, DVDD-IO 9
LDO-OUT1 25, LDO-OUT2 38
20mil, 20mil
AVSS 26, AVSS 42

FRONT-R 36 FRONT_OUT_R C574 C2.2u10X50402-HF FRONT_OUTR 47
FRONT-L 35 FRONT_OUT_L C580 C2.2u10X50402-HF FRONT_OUTL 47 HP

SURR-R 41 SPK_R_F C873 C0.33u16X5-HF SPK_R
SURR-L 39 SPK_L_F C874 C0.33u16X5-HF SPK_L SPK 2031

CENTER 43
LFE 44

SIDE-R 46 HP_R_ADC_R C870 C1u25X50402-HF HP_R_ADC 40
SIDE-L 45 HP_L_ADC_R C871 C1u25X50402-HF HP_L_ADC 40

LINE1-R 24 WOOFER_R C907 C0.47u10X0402 WOOFER_R_C R430 0R0402 SUBWOOFER 47
LINE1-L 23 WOOFER_L C906 C0.47u10X0402 WOOFER_L_C R429 0R0402

LINE2-R 15 FRONT_SPK_R_F C911 C0.33u16X5-HF FRONT_SPK_R
LINE2-L 14 FRONT_SPK_L_F C910 C0.33u16X5-HF FRONT_SPK_L SPK 2031

MIC1-R 22 MIC_R C587 C10u6.3X5-HF MIC_R_C R199 75R1%0402
MIC1-L 21 MIC_L C584 C10u6.3X5-HF MIC_L_C R193 75R1%0402

R201 2.2KR1%0402 MIC-VREFO-R
MIC_IN_R 47
MIC_IN_L 47
R187 2.2KR1%0402 MIC-VREFO-L
MIC

MIC2-R 17
MIC2-L 16

CD-R 20
CD-GND 19
CD-L 18

LINE1/MIC1-In input de-coupled cap. must be 10uF/X5R/0805/10V or 4.7uF DIP.

EMI

Close Codec

Internal Mic

PDM_CLK R389 220L350mA_0402 PDM_CLK_CONN 39
R388 220L350mA_0402 PDM_DATA_CONN 39
PDM_DATA

EC58 C10p50N0402
C888 C10p50N0402

WIDTH > 40 mils

+5VSUS

C594 C10u6.3X50805

U24 APA2031RI-TRL_TSSOP20-RH

PVDD-1 6, PVDD-2 15, VDD-1 16
LIN- 5 FRONT_SPK_L
RIN- 17 FRONT_SPK_R
RIN+ 7 C597 C0.47u10X RIN+, C592 C0.47u10X
LIN+ 9 LIN+
BYPASS 10 C589 C10u6.3X5-HF BYPASS
GAIN2 2
GAIN0 3 GAIN1
ROUT+ 18 OUT_R+
ROUT- 14 OUT_R#
LOUT+ 4 OUT_L+
LOUT- 8 OUT_L#
NC 12
SHUTDOWN 19 EC_MUTE# 41,47
GND-1 21, GND-2 11, GND-3 13, GND-4 20

FOR CNT は

+5VSUS
R217 X_100KR0603 GAIN2
R212 100KR0603 GAIN3
R210 100KR0603 GAIN2
R211 X_100KR0603 GAIN3

For APA2031

Av	GAIN0	GAIN1
6dB	0	0
10dB	0	1
15.6dB	1	0
21.6dB	1	1
4.3dB	X	X

WIDTH > 40 mils

+5VSUS

C576 C10u10Y0805

U21 APA2031RI-TRL_TSSOP20-RH

PVDD-1 6, PVDD-2 15, VDD-1 16
LIN- 5 SPK_L
RIN- 17 SPK_R
RIN+ 7 C581 C0.47u10X RIN2+, C573 C0.47u10X LIN2+
LIN+ 9
BYPASS 10 C569 C10u6.3X5-HF BYPASS
GAIN0 2
GAIN1 3
ROUT+ 18 OUT2_R+
ROUT- 14 OUT2_R#
LOUT+ 4 OUT2_L+
LOUT- 8 OUT2_L#
NC 12
SHUTDOWN 19 EC_MUTE#
GND-1 21, GND-2 11, GND-3 13, GND-4 20

For APA2031

Av	GAIN0	GAIN1
6dB	0	0
10dB	0	1
15.6dB	1	0
21.6dB	1	1
4.3dB	X	X

+5VSUS
R199 X_100KR0603 GAIN0
R188 100KR0603 GAIN1
R195 100KR0603 GAIN0
R189 X_100KR0603 GAIN1

Internal Speaker Conn

J29

OUT_L# 1
OUT_L+ 2
OUT_R+ 3
OUT_R# 4
OUT2_L+ 5
OUT2_L# 6
OUT2_R# 7
OUT2_R+ 8
10

C917 X_C680p50X0402-RH, C918 X_C680p50X0402-RH, C919 X_C680p50X0402-RH, C920 X_C680p50X0402-RH
C921 X_C680p50X0402-RH, C922 X_C680p50X0402-RH, C923 X_C680p50X0402-RH, C924 X_C680p50X0402-RH

N32-1080730-H06
BHEADSMD1X8_1_25MM_90
BH1X8#S-1.25PITCH_WHITE-RH-3

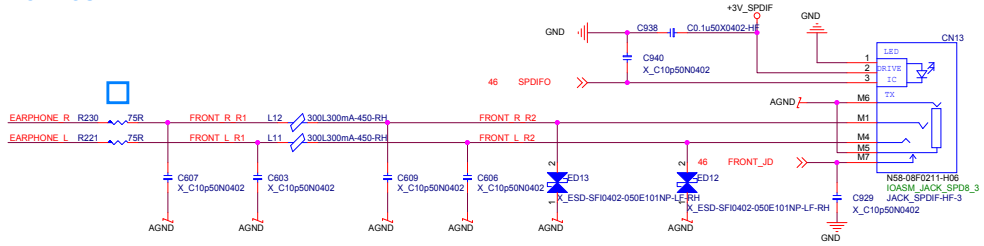
	CODEC	斥
L	-	-
L	+	+
R	+	+
R	-	-
L2	+	+
L2	-	-
R2	-	-
R2	+	+

MICRO-STAR INT'L CO.,LTD.

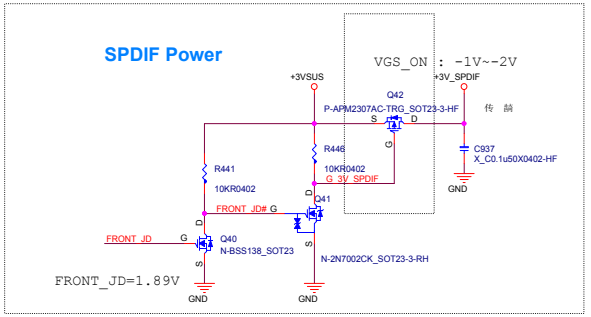
Title: Audio CODEC/Audio AMP
Size: Document Number: MS-16JB1 Rev: 0A
Date: Wednesday, May 25, 2016 Sheet 46 of 71

Audio CONN /Woffer

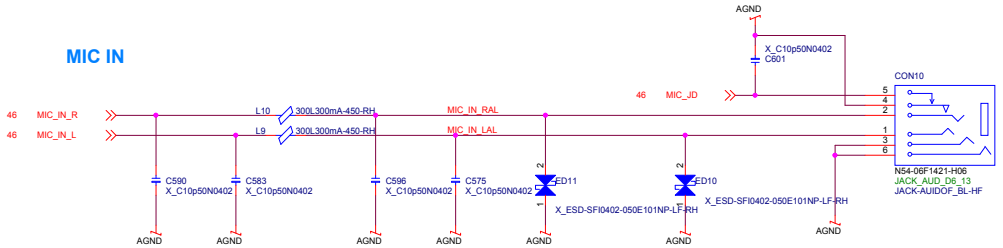
FRONT OUT



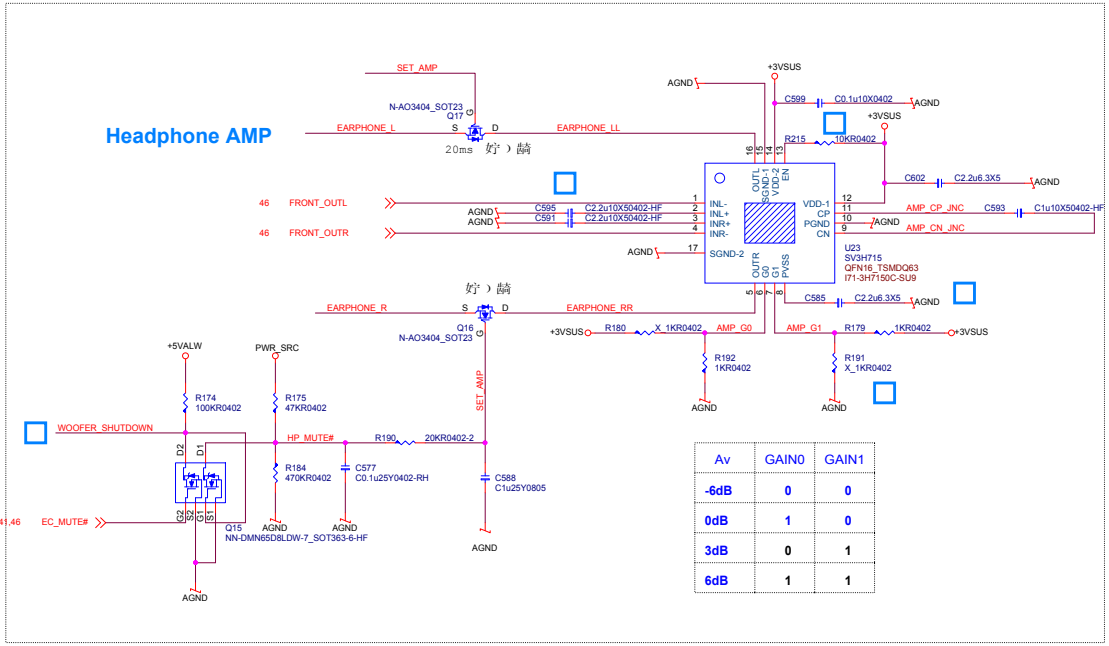
SPDIF Power



MIC IN



Headphone AMP

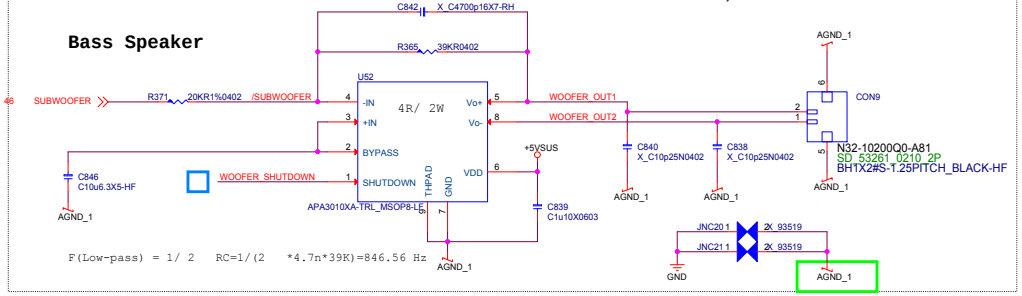


Av	GAIN0	GAIN1
-6dB	0	0
0dB	1	0
3dB	0	1
6dB	1	1

Bass Speaker

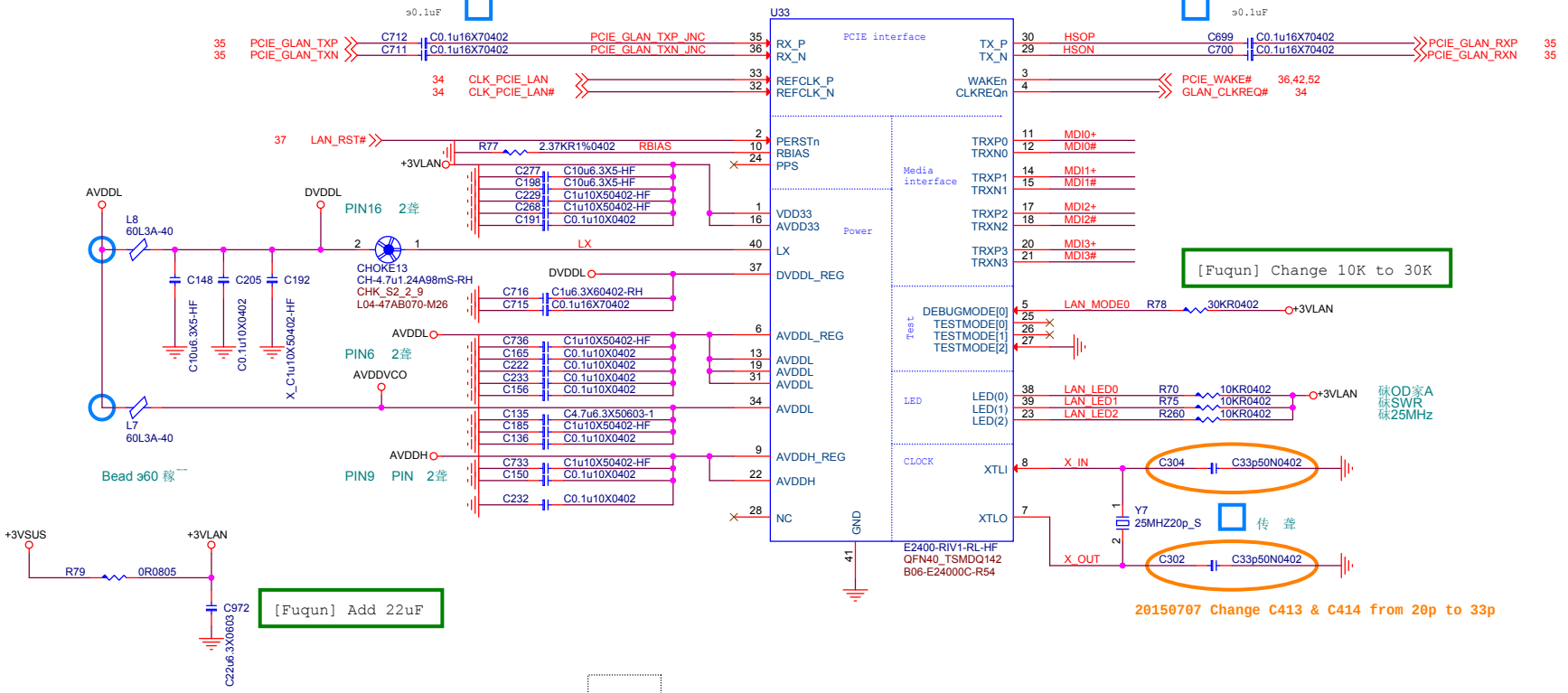
ALC892 SPC MAX 成 1.2Vrms
gain= -2*(R370/R371)= -2*(40K/20K) = -4
Vout= 0.58Vrms *4 = 2.32Vrms , Po=(2.32*2.32)/3.8=1.42W

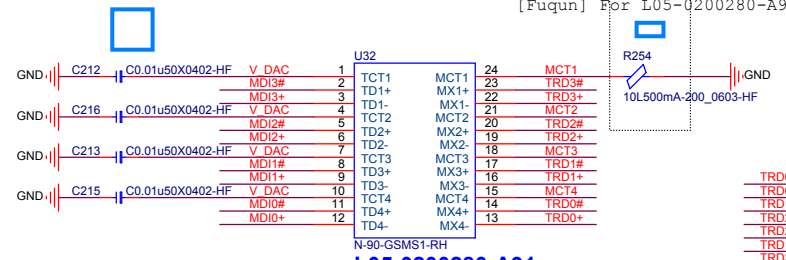
Woofer SPEC
YG 3.8ohm / normal 3W,Max 3.5W
FG 4ohm/ normal 3W,Max 3.5W

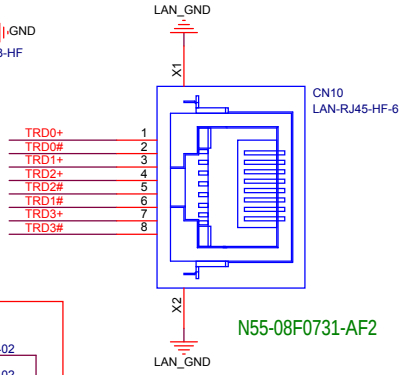


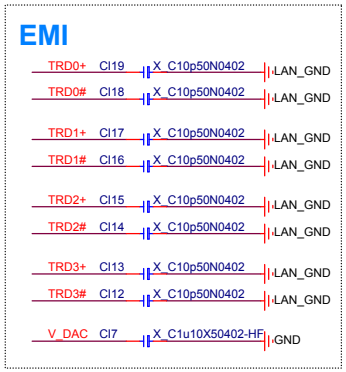
WOOFER AMP 被び环絃ミちAGND_1

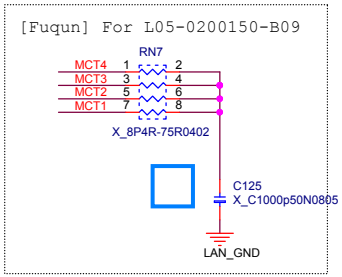
GIGA LAN(BigFoot BFN2400B)

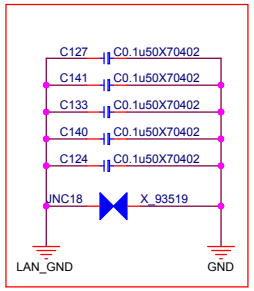












MICRO-STAR INT'L CO.,LTD.

Title: GIGA LAN(BigFoot BFN2400/AR8161)

Size | Document Number: MS-16JB1 | Rev: 0A

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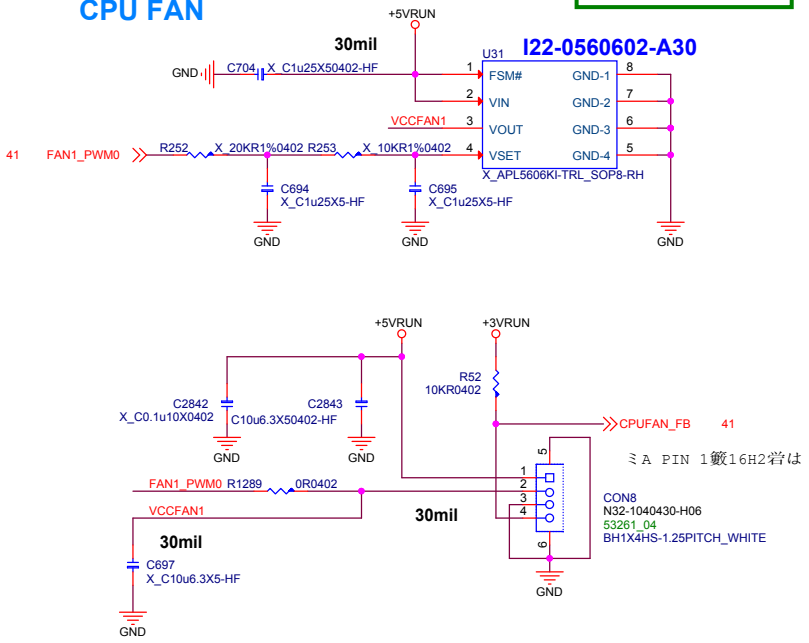
CPU FAN

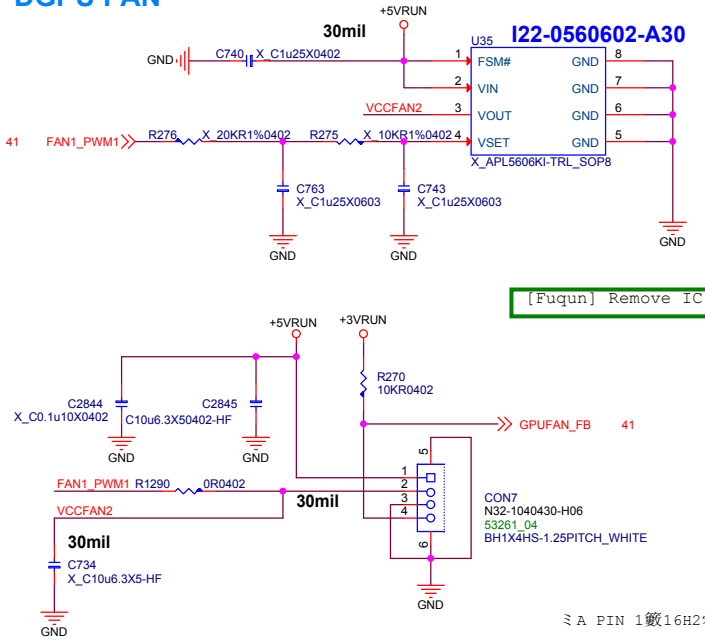
[Fuqun] Remove IC



ミA PIN 1籔16H2岩は

	Stuff parts	Un-stuff parts
PWM	R1289	R252,R253,C694,C695,c697
D△A	R252,R253,C694,C695,c697	R1289

DGPU FAN



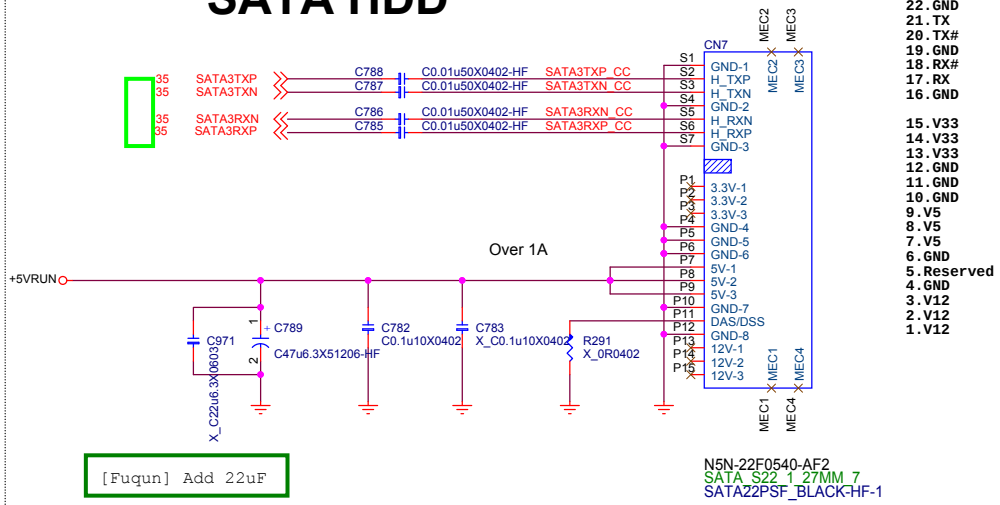
[Fuqun] Remove IC

ミA PIN 1籔16H2岩は

	Stuff parts	Un-stuff parts
PWM	R1290	R276,R275,C763,C743,C734
D△A	R276,R275,C763,C743,C734	R1290

[Fuqun] For MS-16JB GE

SATA HDD

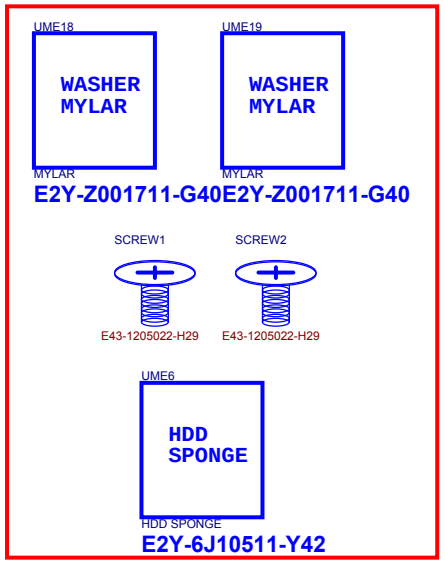


[Fuqun] Add 22uF

N5N-22F0540-AF2
SATA_S22_1_27MM_7
SATA22PSF_BLACK-HF-1

22.GND
21.TX
20.TX#
19.GND
18.RX#
17.RX
16.GND

15.V33
14.V33
13.V33
12.GND
11.GND
10.GND
9.V5
8.V5
7.V5
6.GND
5.Reserved
4.GND
3.V12
2.V12
1.V12



MICRO-STAR INT'L CO.,LTD.

Title: Main HDD/FAN

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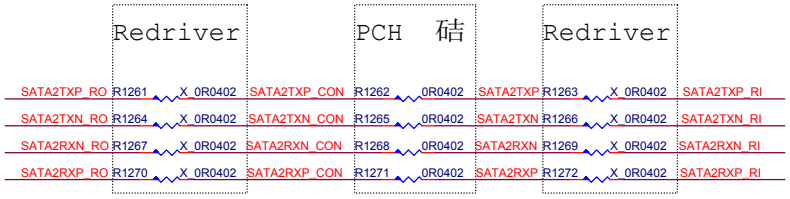
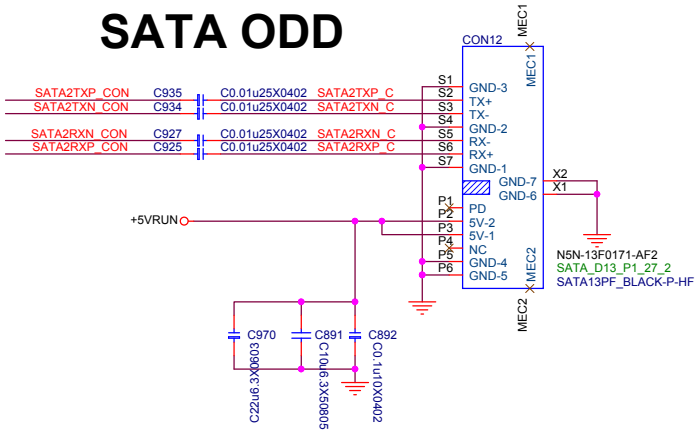
Date: Wednesday, May 25, 2016 | Sheet 49 of 71

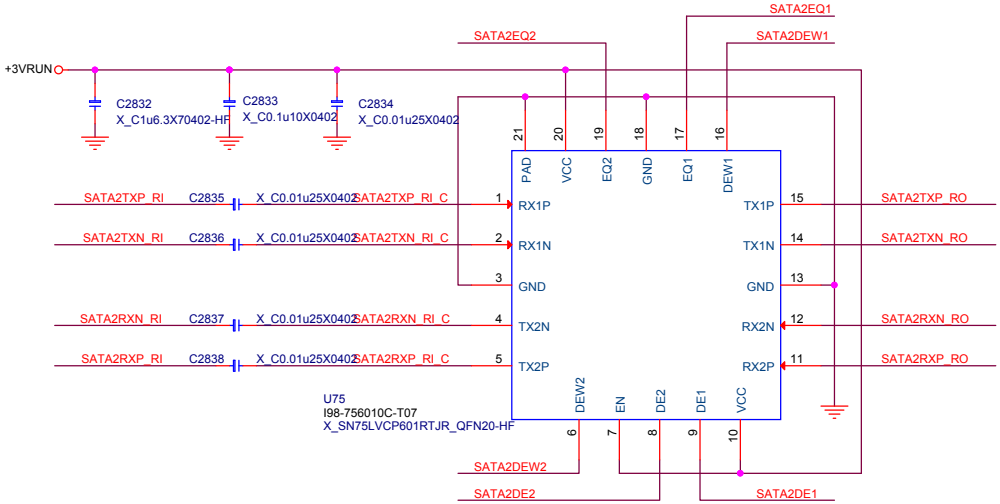


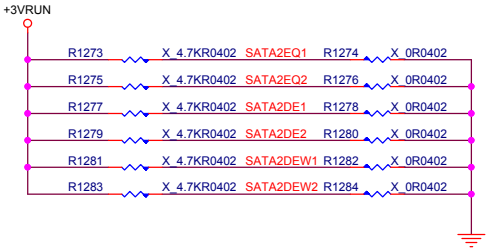
Verge HDD reDRIVER

SATA ODD



[Fuqun] Add 22uF





TX and RX EQ and DE Pulse-Duration Settings

DE1 OR DE2	CH1 OR CH2 DE-EMPHASIS dB (at 6 Gbps)	EQ1 OR EQ2	CH1 OR CH2 Equalization dB (at 6 Gbps)
NC (***default***)	–4	NC (***default***)	0
0	0	0	7
1	–2	1	14
DEW1 OR DEW2	**DEVICE FUNCTION → DE WIDTH FOR CH1/CH2**		
0	De-emphasis pulse duration, short		
1 (***default***)	De-emphasis pulse duration, long		

MICRO-STAR INT'L CO.,LTD.

Title: ODD/Verge HDD reDRIVER

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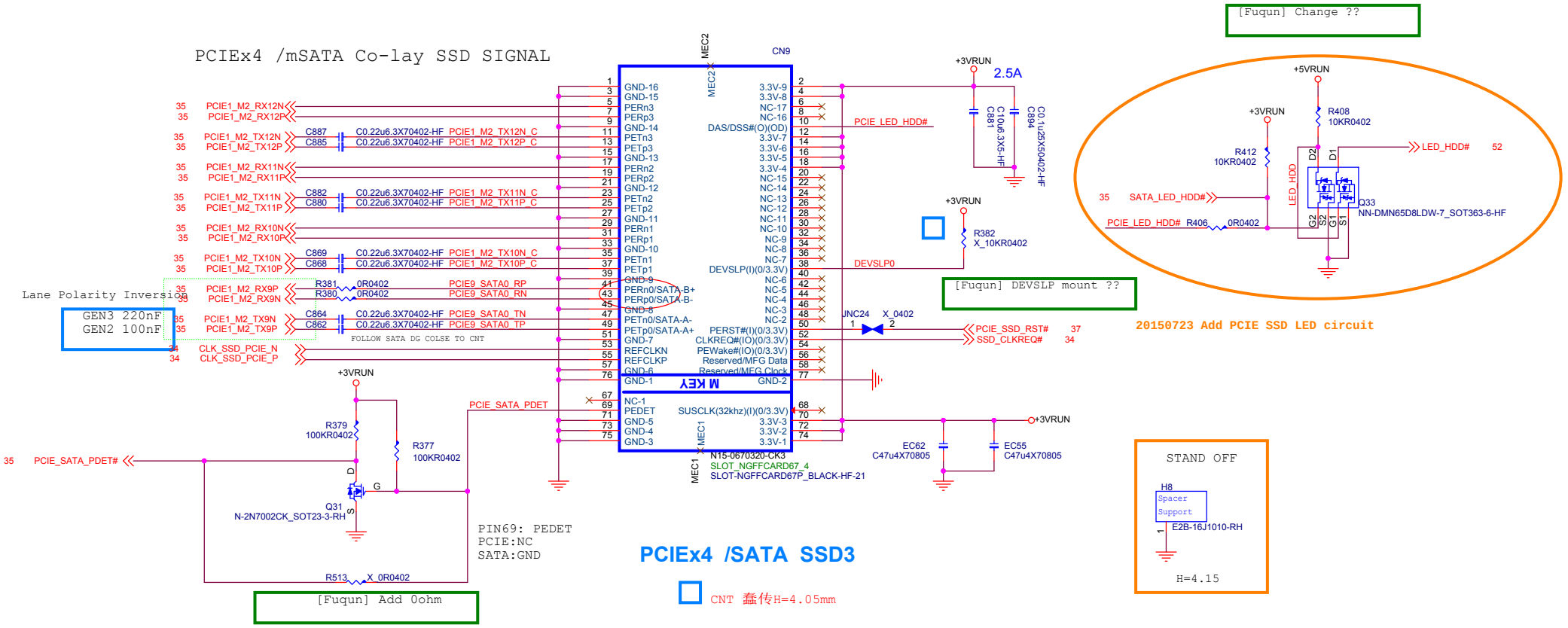

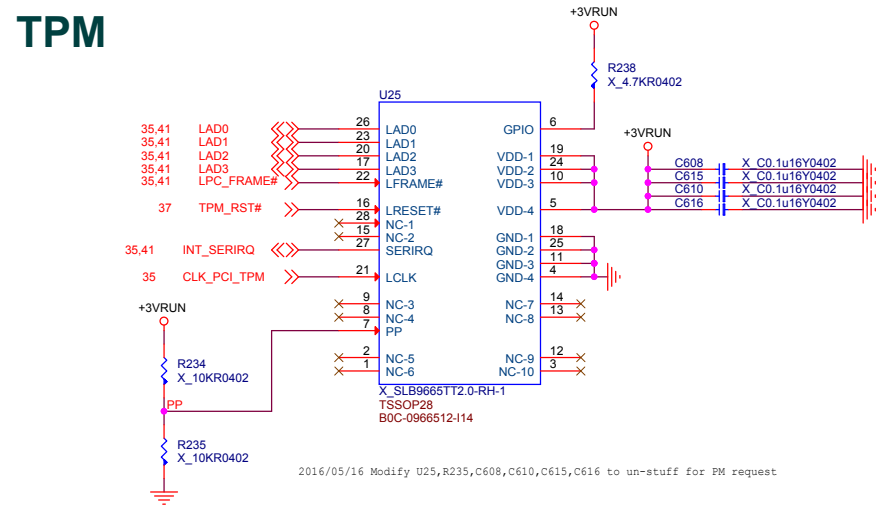

MICRO-STAR INT'L CO.,LTD.	
Title	SSD/TPM
Size	Document Number: MS-16JB1
Rev	0A
Date:	Monday, May 30, 2016
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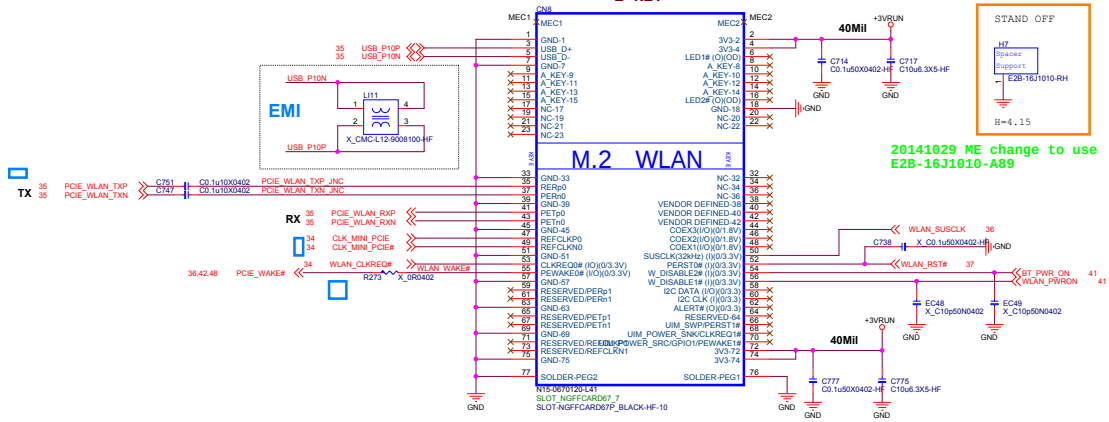
WLAN

WLAN/LED

E KEY



STAND OFF

H7 Spacer Support

E2B-16J1010-RH

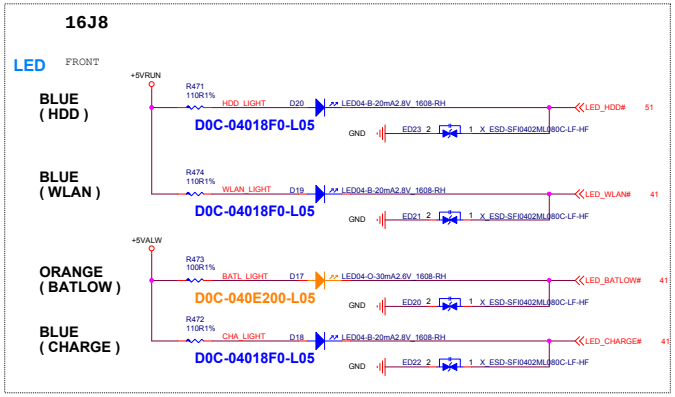
H=4.15

20141029 ME change to use E2B-16J1010-A89

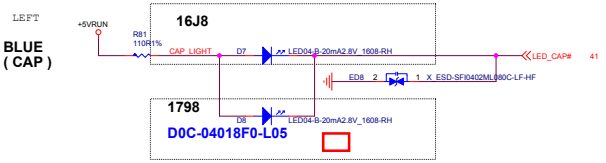
Pin 1	GND		
Pin 3	USB_D+	Pin 2	3.3V
Pin 5	USB_D-	Pin 4	3.3V
Pin 7	GND	Pin 6	LED1#
Pin 9	Module Key	Pin 8	Module Key
Pin 11	Module Key	Pin 10	Module Key
Pin 13	Module Key	Pin 12	Module Key
Pin 15	Module Key	Pin 14	Module Key
Pin 17	N/C	Pin 16	LED2#
Pin 19	N/C	Pin 18	GND
Pin 21	N/C	Pin 20	N/C
Pin 23	N/C	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

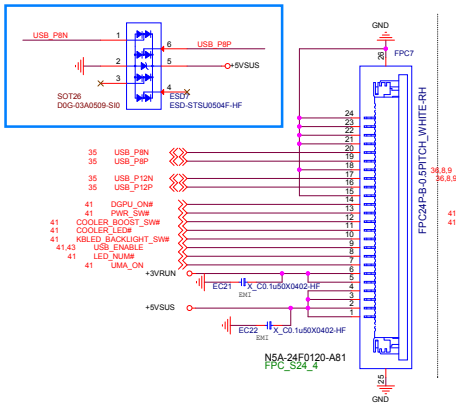
16J8

LED FRONT

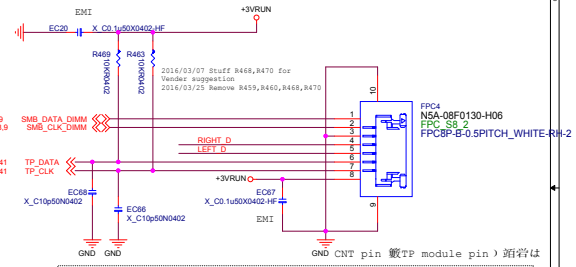


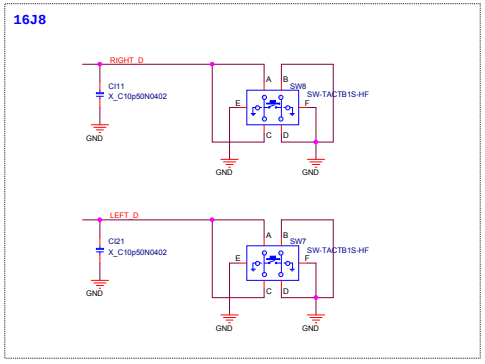
2016/05/16 Modify ED8,ED20,ED21,ED22,ED23 to D0G-2950500-SI0 for EMI request



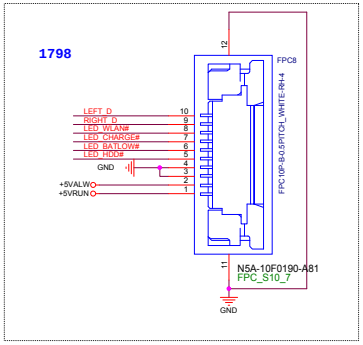


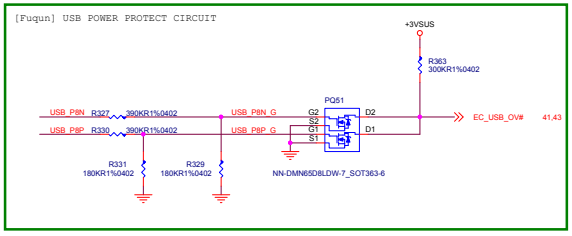
Touch Pad





1798





msi	MICRO-STAR INT'L CO.,LTD.		
Title	WLAN /LED/TP		
Size	Document Number		Rev
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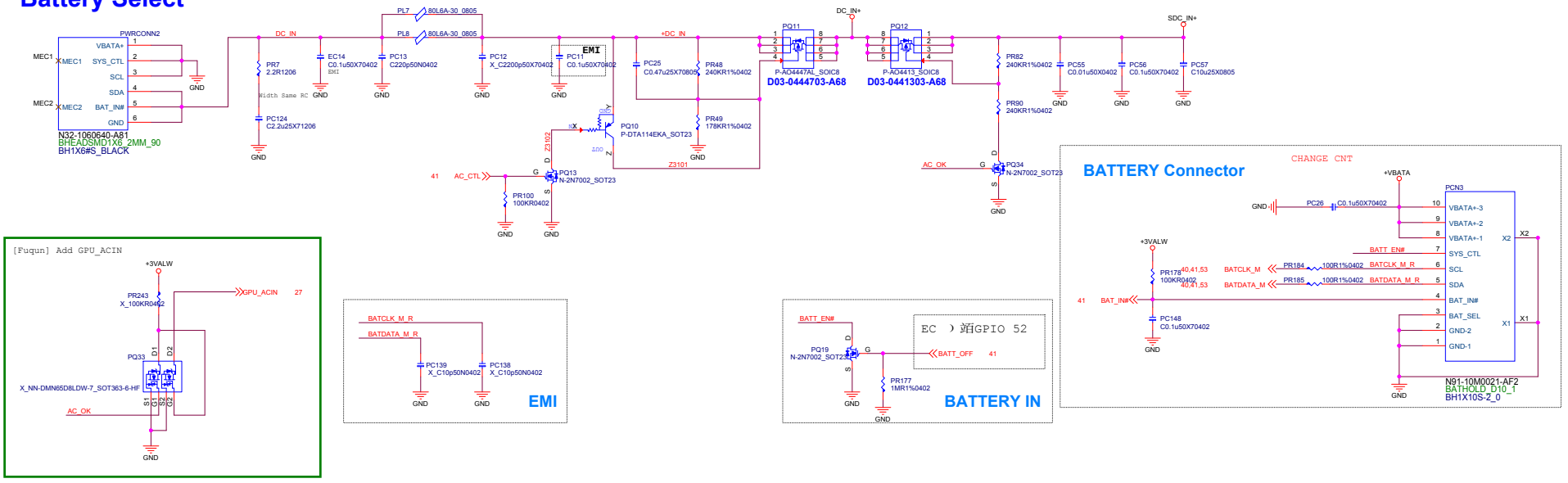
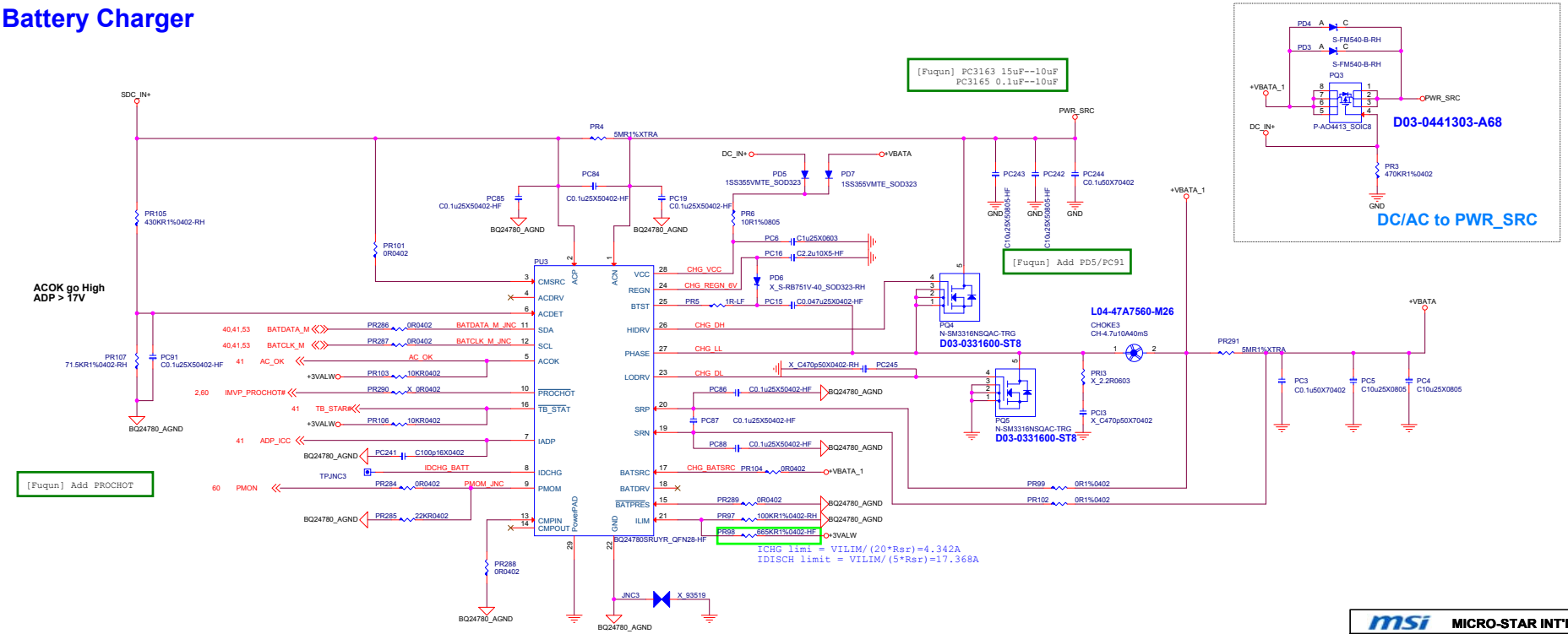
Date:	Wednesday, May 25, 2016	Sheet 52 of 71	

Battery Select/Charger

Battery Select

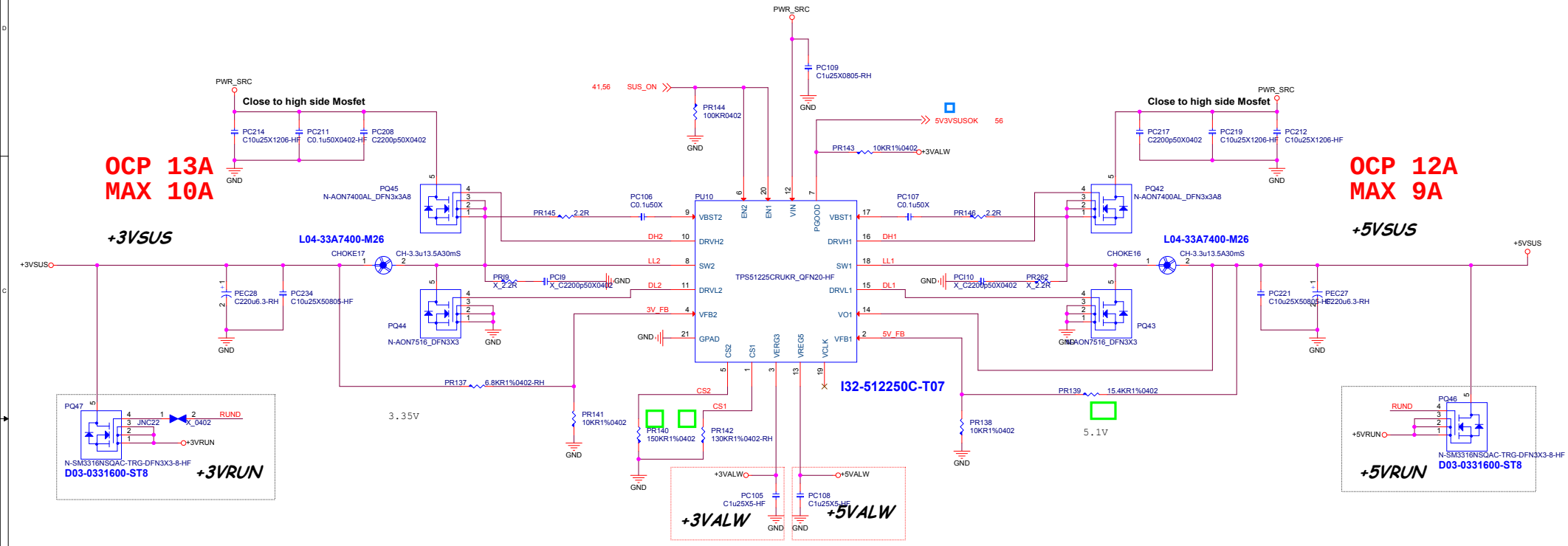


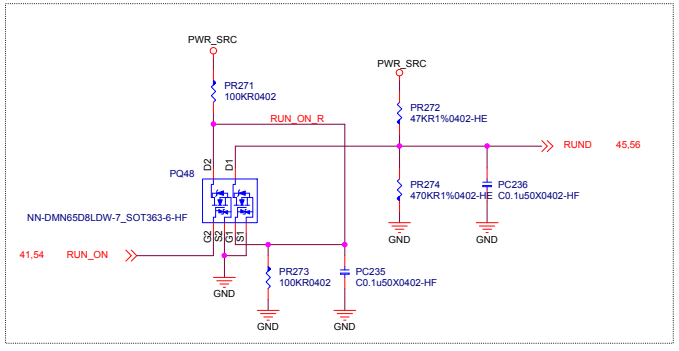
Battery Charger

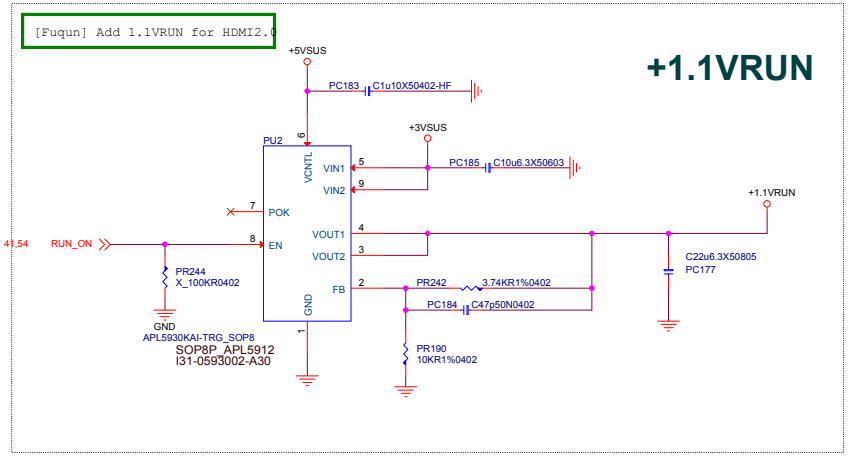


MICRO-STAR INT'L CO.,LTD.			
Title: Battery Select/Charger			
Size	Document Number: MS-16JB1		Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 53 of 71		

System Power

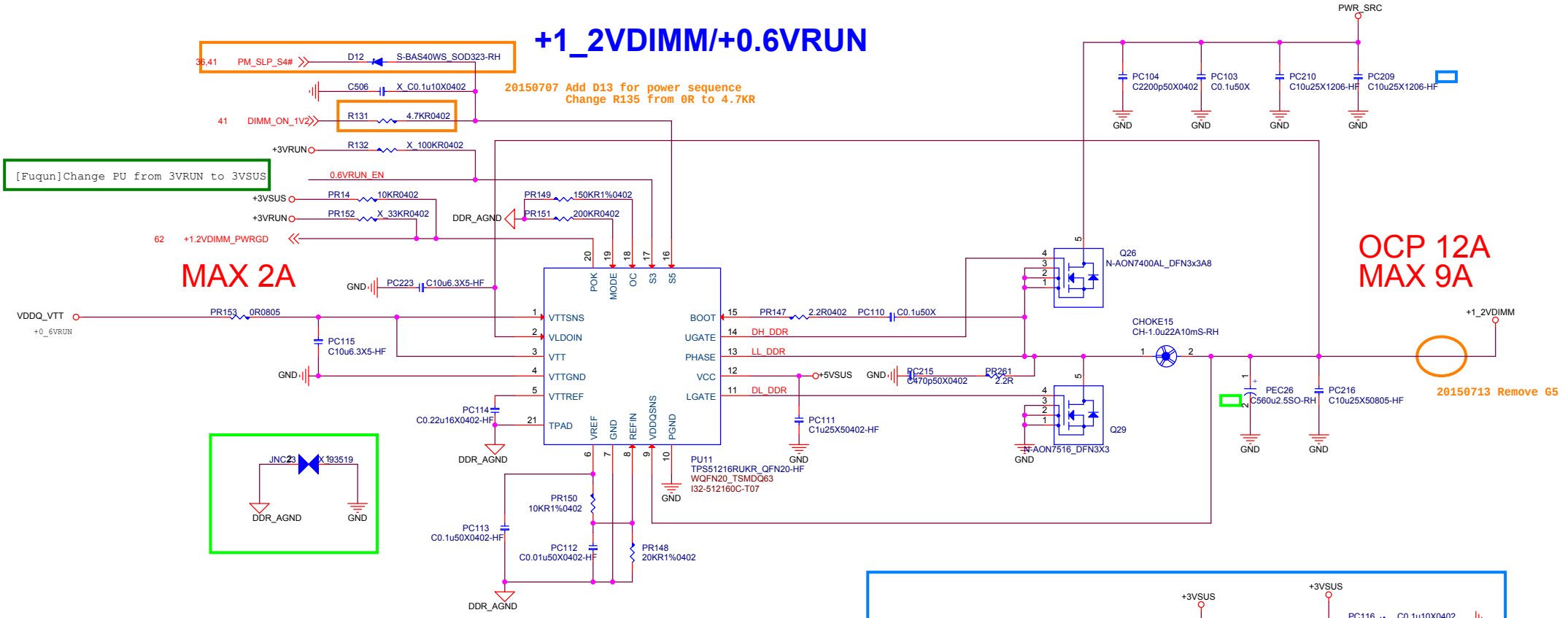




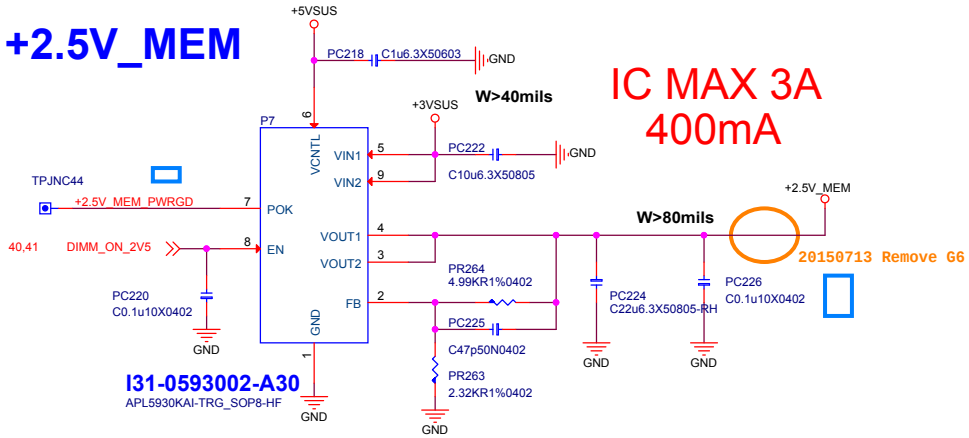


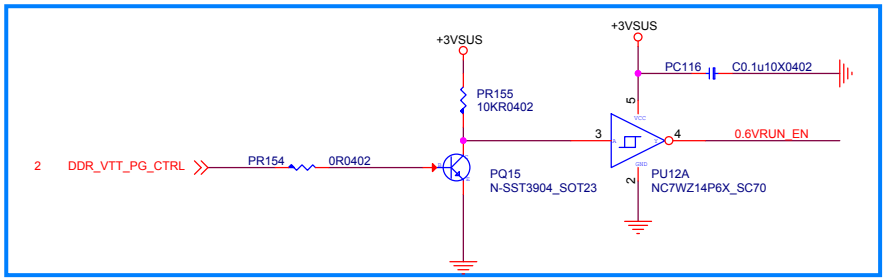
MICRO-STAR INT'L CO.,LTD.		
Title: System Power		
Size	Document Number: MS-16JB1	Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 54 of 71	

+1_2VDIMM/+0.6VRUN



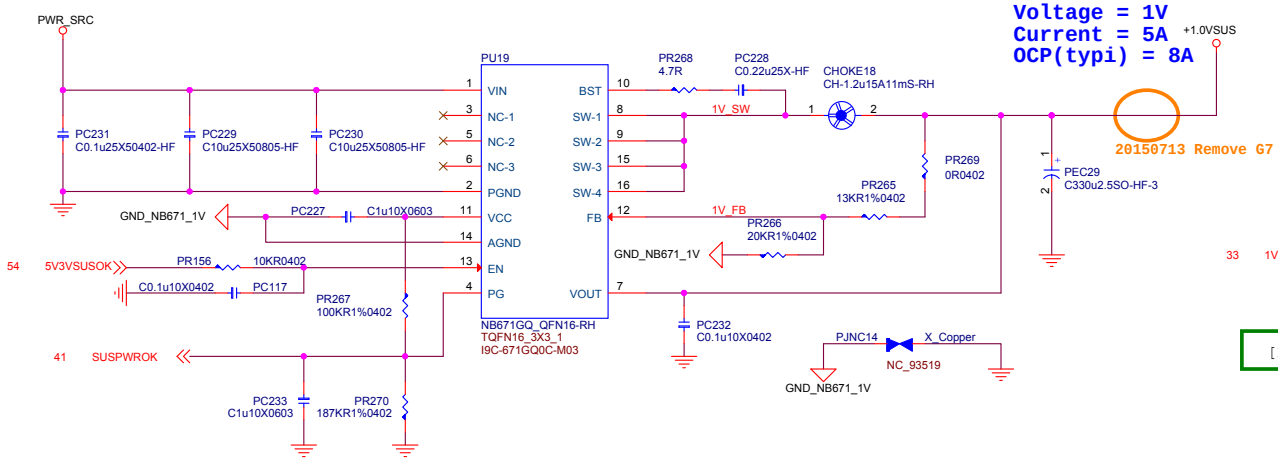
+2.5V_MEM





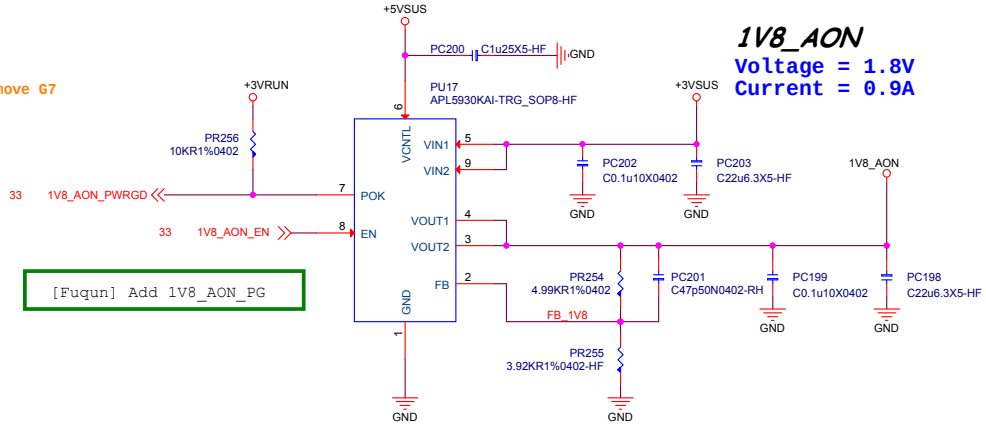
MICRO-STAR INT'L CO.,LTD.		
Title: +1.2VDIMM/+0.6VRUN/+2.5VMEM		
Size	Document Number: MS-16JB1	Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 55 of 71	

+1VSUS



+1.0VSUS
Voltage = 1V
Current = 5A
OCP(typi) = 8A

20150713 Remove G7

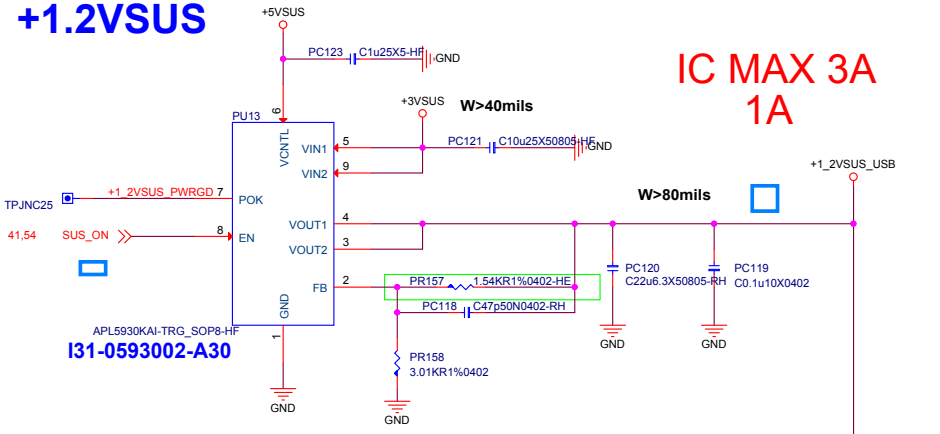


1V8_AON
Voltage = 1.8V
Current = 0.9A

[Fuqun] Add 1V8_AON_PG

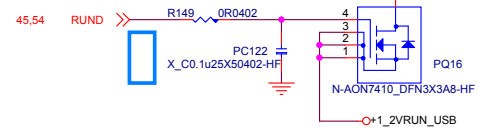
2016/02/17 Modify PR255 3.92Kohm for Power suggestion

+1.2VSUS



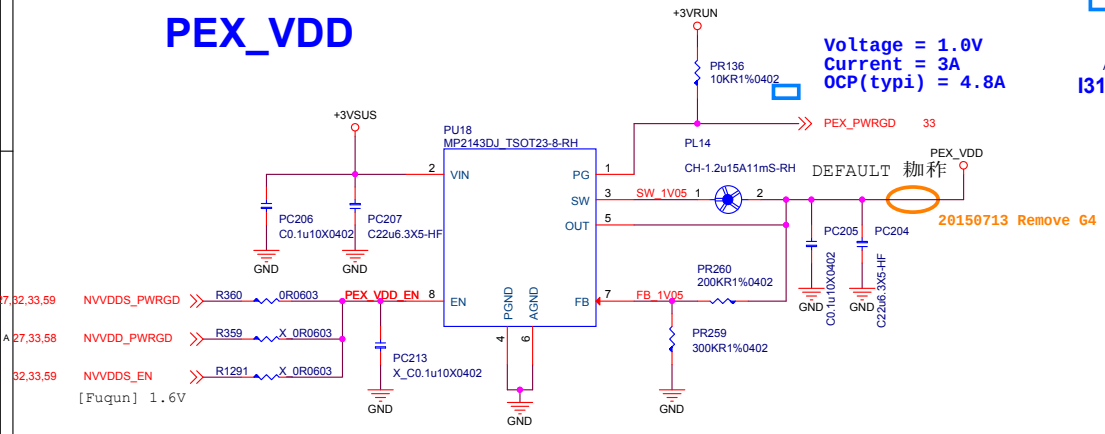
I31-0593002-A30

IC MAX 3A
1A



[Fuqun] Change PR136 from 3V3_NV to +3VRUN

PEX_VDD



Voltage = 1.0V
Current = 3A
OCP(typi) = 4.8A

[Fuqun] Change PEX_VDD_EN from NVDDS_EN to NVDDS_PG

MSI	MICRO-STAR INT'L CO.,LTD.
Title	1VSUS /PEX_VDD/1.2VSUS
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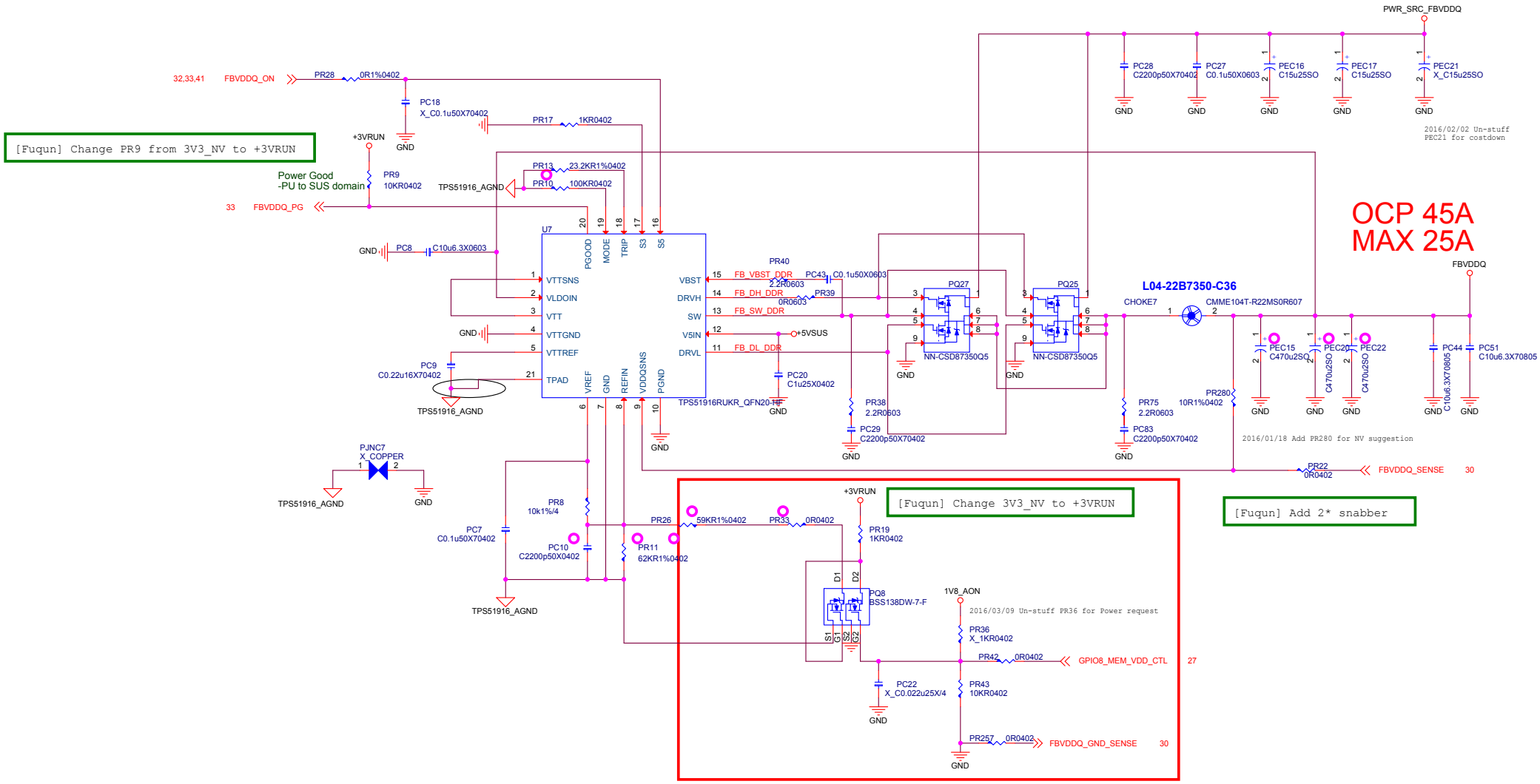
PAGE53: FBVDDQ



MICRO-STAR INT'L CO.,LTD.		
Title: FBVDDQ		
Size	Document Number: MS-16JB1	Rev: 0A
Date:	Sheet 57 of 71	

DGPU POWER / UP9509P

EDP-Peak 145A

EDP-Con 58A

DGPU POWER NVVDD

VBoot:0.8V

Vmin:0.5V / Vmax:1.25V

[Fuqun] Change PR115 from 3V3_NV to +3VRUN

[Fuqun] PR111 0ohm to 2.2ohm

[Fuqun] Add 3* snabber

	PR283	PR281	PR280	PR279	PR282	PC261
CONFIG	R1	R2	R3	R4	R5	C
N17E-G1	6.19K	20.5K	4.32K	16.5K	309R	1.5nF

Title	NVVDD PWM IC (UP1633)
Size	Document Number: MS-16JB1
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Date:	Sheet 58 of 71

MICRO-STAR INT'L CO.,LTD.

DGPU POWER / UP1666P

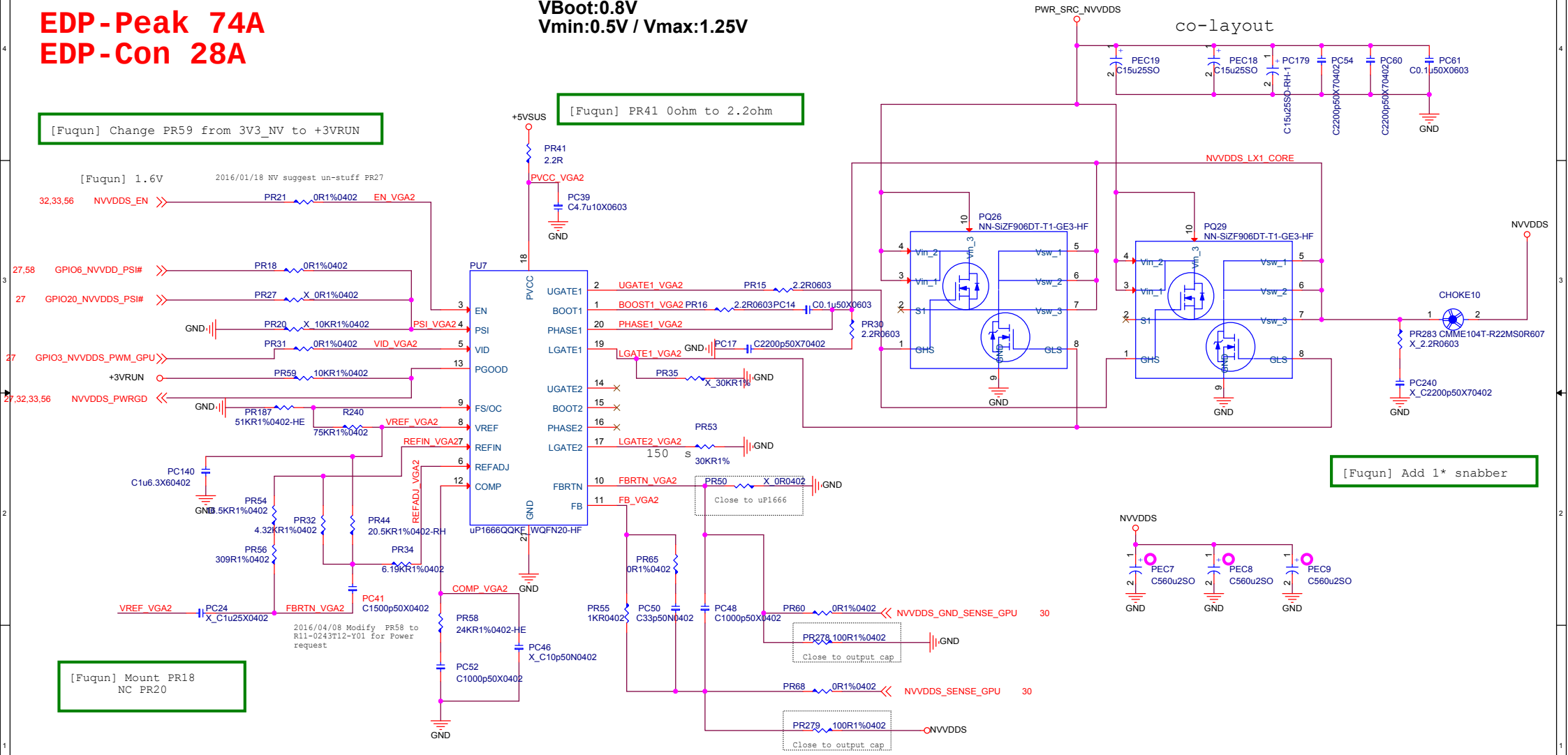
EDP-Peak 74A

EDP-Con 28A

DGPU POWER NVVDDS

VBoot:0.8V

Vmin:0.5V / Vmax:1.25V



	PR311	PR309	PR308	PR307	PR310	PC282
CONFIG	R1	R2	R3	R4	R5	C
N17E-G1	6.19K	20.5K	4.32K	16.5K	309R	1.5nF

MICRO-STAR INT'L CO.,LTD.

Title: NVVDD PHASE 1~4

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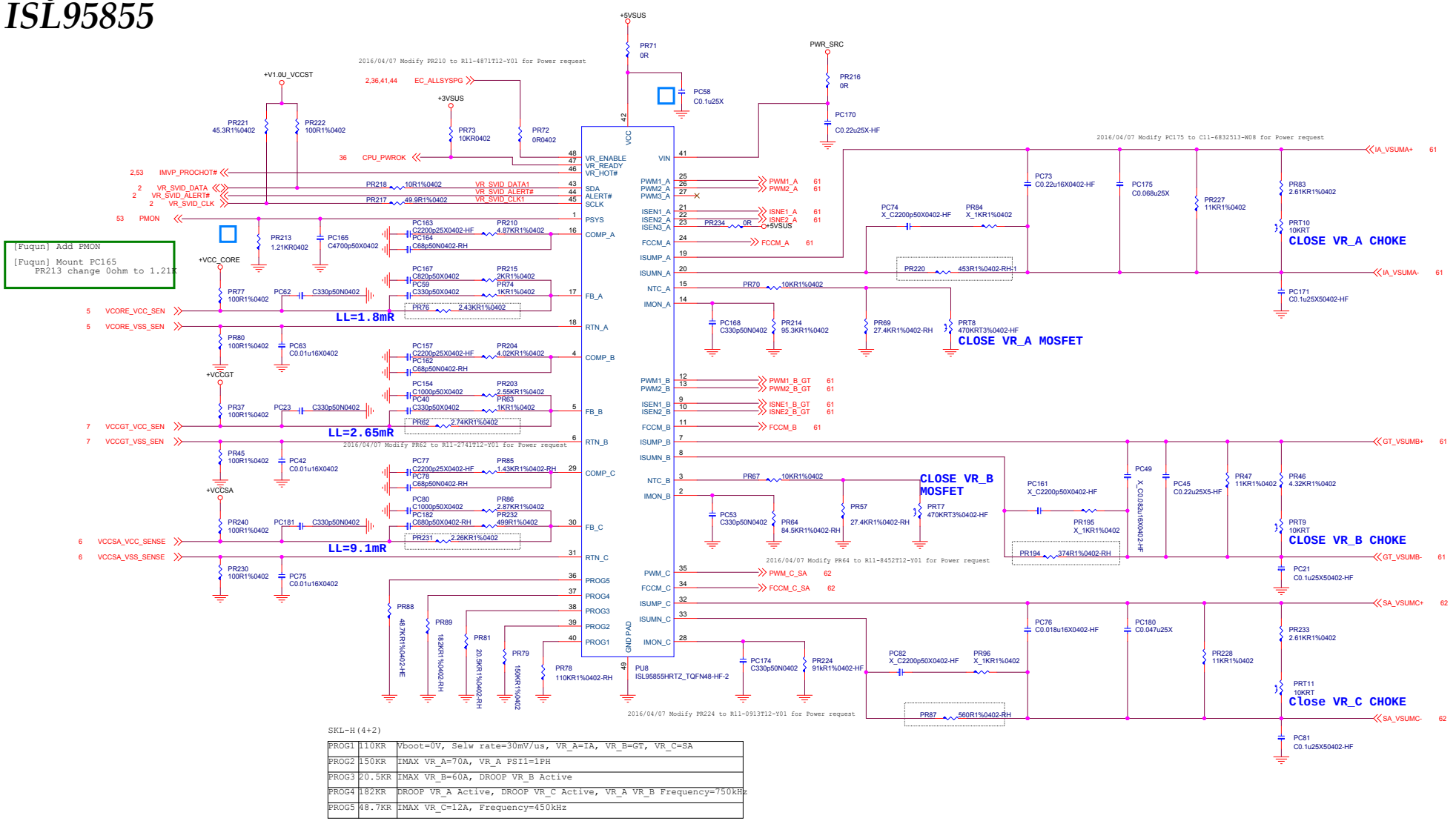
Skylake H-line 42 45W
ISL95855



SKL-H(4+2)

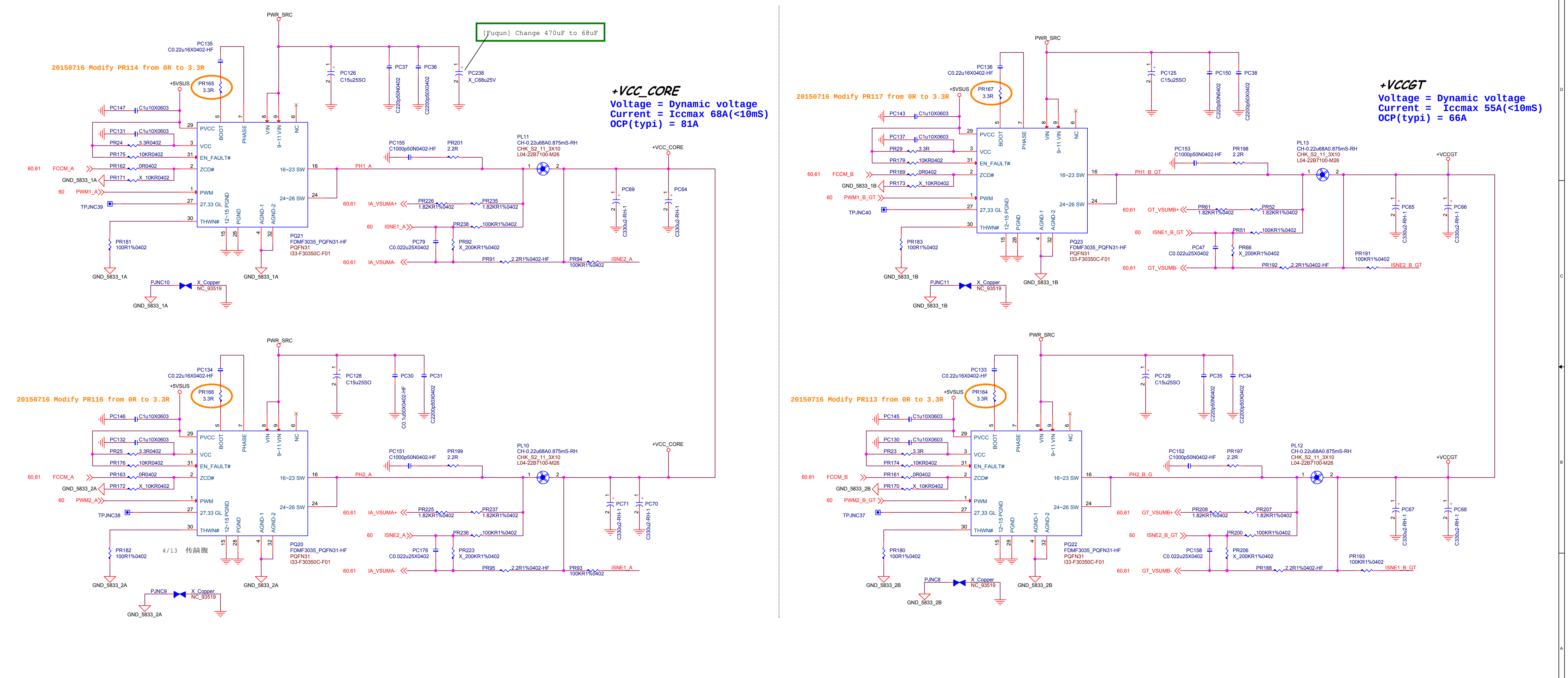
PROG1	110KR	Vboot=0V, Selw rate=30mV/us, VR_A=IA, VR_B=GT, VR_C=SA
PROG2	150KR	IMAX VR_A=70A, VR_A PSI1=1PH
PROG3	20.5KR	IMAX VR_B=60A, DROOP VR_B Active
PROG4	182KR	DROOP VR_A Active, DROOP VR_C Active, VR_A VR_B Frequency=750kHz
PROG5	48.7KR	IMAX VR_C=12A, Frequency=450kHz

MICRO-STAR INT'L CO.,LTD.

Title: Skylake CPU Power

Size | Document Number: MS-16JB1 | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 60 of 71



+VCC_CORE
Voltage = Dynamic voltage
Current = Iccmax 68A(<10mS)
OCP(typi) = 81A
+VCCGT
Voltage = Dynamic voltage
Current = Iccmax 55A(<10mS)
OCP(typi) = 66A
[Fuqun] Change 470uF to 68uF
20150716 Modify PR114 from 0R to 3.3R
20150716 Modify PR116 from 0R to 3.3R
20150716 Modify PR117 from 0R to 3.3R
20150716 Modify PR113 from 0R to 3.3R
PWR_SRC
+5VSUS
+VCC_CORE
+VCCGT
PQ21 FDMF3035_PQFN31-HF
PQ20 FDMF3035_PQFN31-HF
PQ23 FDMF3035_PQFN31-HF
PQ22 FDMF3035_PQFN31-HF
PL11 CH-0.22u68A0.875mS-RH
PL10 CH-0.22u68A0.875mS-RH
PL13 CH-0.22u68A0.875mS-RH
PL12 CH-0.22u68A0.875mS-RH
4/13 传荫腹

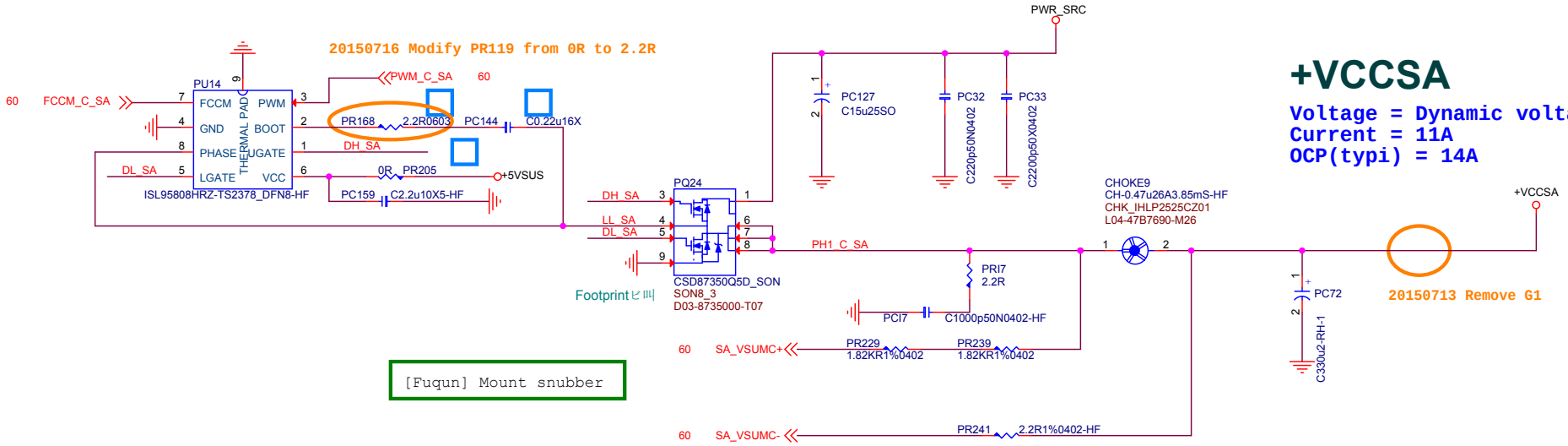
MICRO-STAR INT'L CO.,LTD.

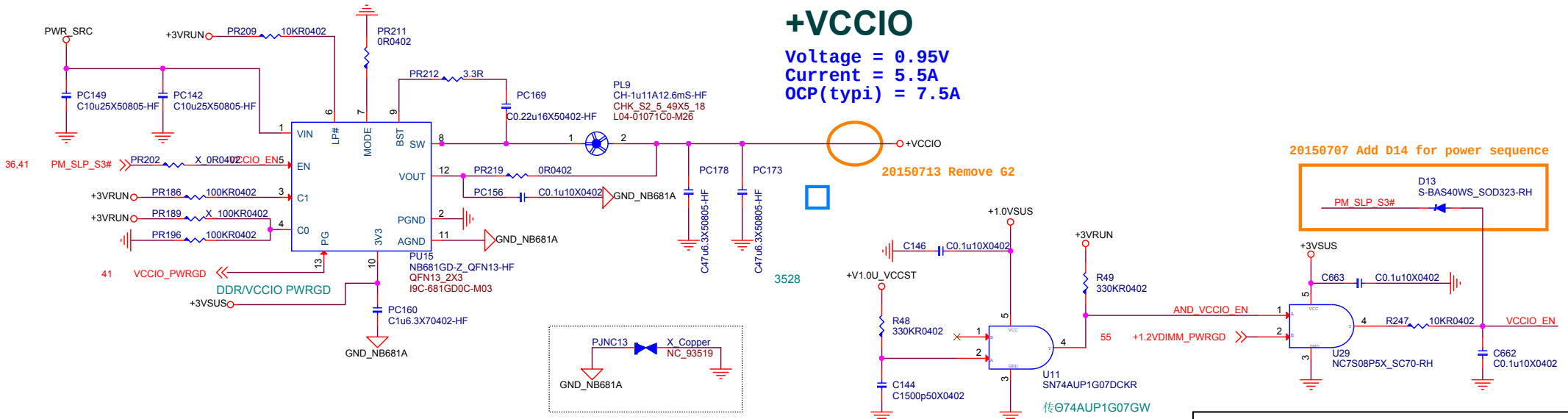
Title: Skylake VCore/VCCGT

Document Number: MS-16JB1

Rev: 0A

Date: Wednesday, May 25, 2016 — Sheet 61 of 71





MSI	MICRO-STAR INT'L CO.,LTD.		
Title	Skylake VCCSA/VCCIO		
Size	Document Number		Rev
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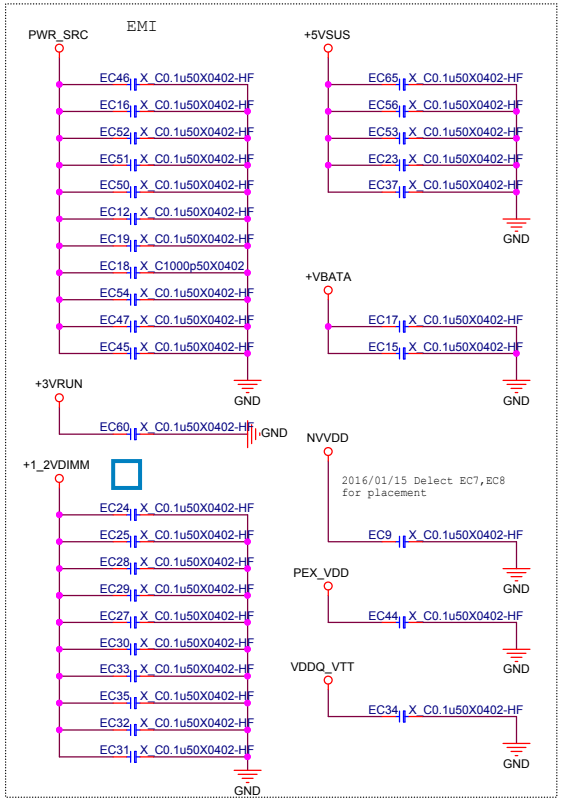

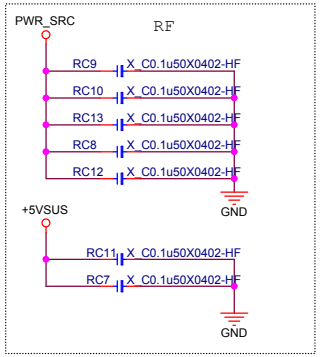

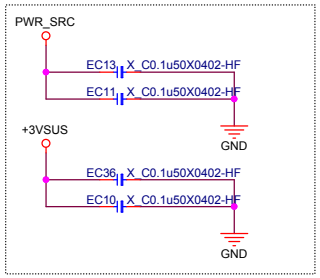

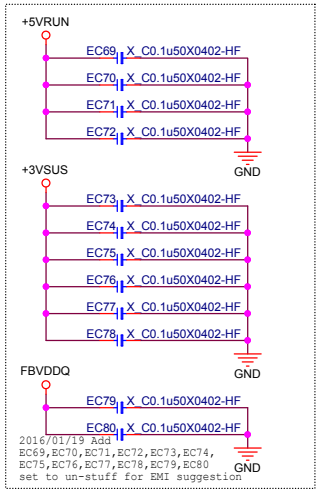

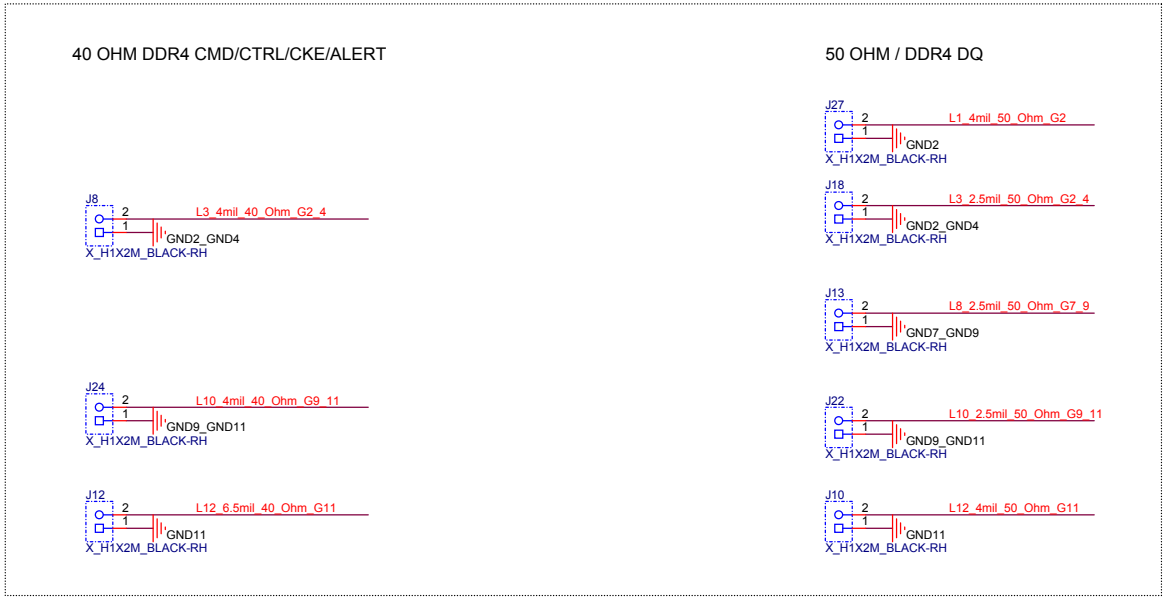

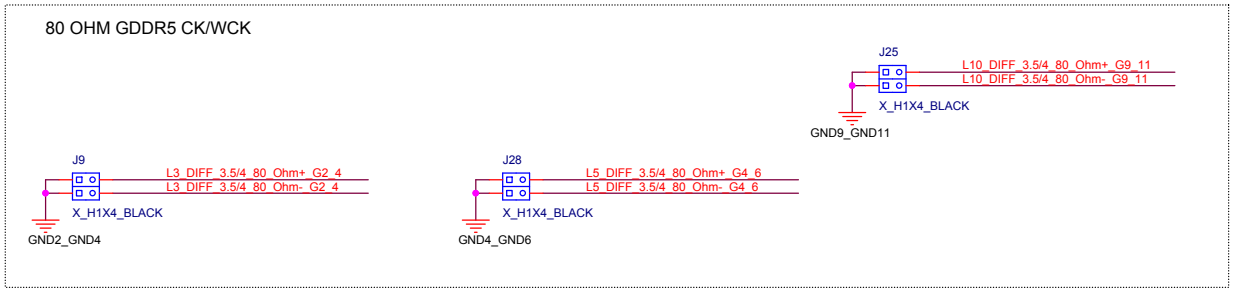

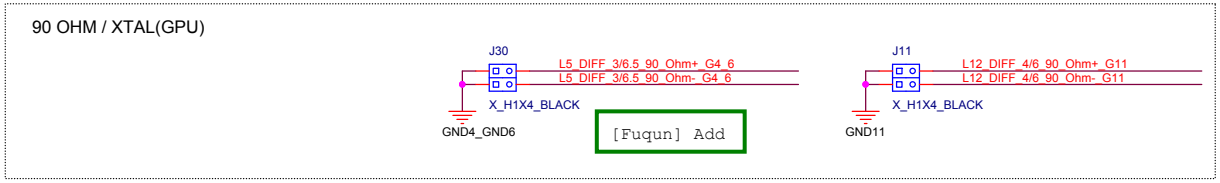

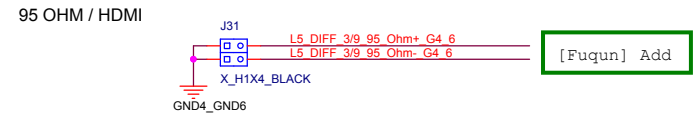

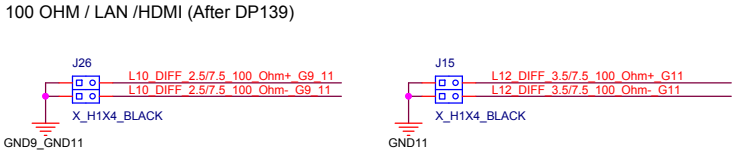

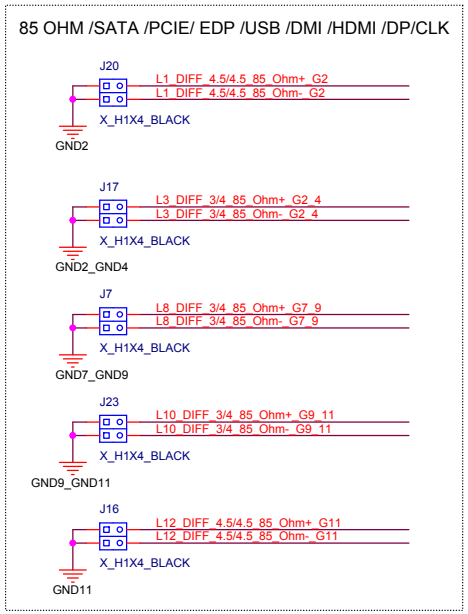

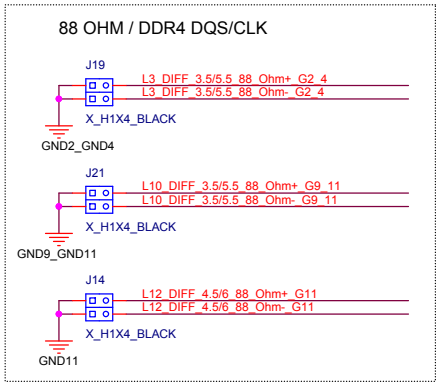

MICRO-STAR INT'L CO.,LTD.

Title: EMI/ Impedance

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Date: Monday, May 30, 2016 | Sheet 63 of 71

CPU/GPU Holes

MCPU10 H_R276D169_PB, MCPU8 H_R276D169_PB, MCPU9 H_R276D169_PB, MCPU7 H_R276D169_PB
MGPU8 H_R185D169BR276_PB, MGPU7 H_R185D169BR276_PB, MGPU9 H_R185D169BR276_PB, MGPU10 H_R185D169BR276_PB
GND, X_CPU_HOLE, X_GPU_HOLE

FM14 FM28 FM38 FM9 FM27 FM19 FM26 FM23
FM39 FM13 FM18 FM37 FM29 FM31 FM20 FM40
FM8 FM12 FM24 FM7 FM10 FM21 FM25 FM11
FM34 FM35 FM32 FM15 FM17 FM16
FM33 FM30 FM36 FM22
X_FM

4/13 穆穗

20150908 Un-stuff TP mylar UME16 for ME request
20150713 Add TP mylar UME16 for 16J4

OD 2.3

MH13 X_H_R197D118_PT_V3 H_R197D118_PT_V3
MH10 X_H_R197D118_PT_V3 H_R197D118_PT_V3

Only 16J8

UME3	UME4	UME5	UME7	UME8	UME17	UME11	UME16
CPU BKT	GPU BKT	CPU MYLAR	LED SPONGE	LED SPONGE	ME_MYLAR	HIDE_GAP_ MYLAR	TP MYLAR
CPU BKT	GPU BKT	X_CPU MYLAR	LED SPONGE	LED SPONGE	Hide Caps Lock LED_MYLAR	X_HIDE_GAP_MYLAR	X_TP_MYLAR
E2M-7810111-A89	307-6H20211-C22	E2P-6J11211-Y42	E2Y-6J10611-Y42	E2Y-6J10611-Y42	E2Y-6324111-Y42	E2P-6J11411-Y42	E2Y-6J11811-G40

H_R197D91_V8 MH15 X_ME_SCREW HOLE
H_R197D91_V8 MH11 X_ME_SCREW HOLE
H_R197D91_V8 MH12 X_ME_SCREW HOLE

Only 1798

UME1	UME12	UME14	UME13	UME15
HDMI Lable	USB3_CON_ MYLAR	HDMI/DP MYLAR	MB MYLAR	SPONGE
HDMI ROYALTY	MYLAR	MYLAR	MB MYLAR	SPONGE
Y01-RHDMI03-000	E2M-3570611-Y42	E2M-3570611-Y42	E2P-7910311-G40	E2Y-7910211-G40

UME2 BIOS Lable
X_BIOS_LABEL
G51-N1CO041-A09
For MP

燒 ず3 / 8

MH7 X_H_R197D118_PT_V3 H_R197D118_PT_V3
HOLES_8X8_D3MM_VIA8 MH14 X_8x8
MH9 X_H_R197D118_PT_V3 H_R197D118_PT_V3
MH8 X_H_R197D118_PT_V3 H_R197D118_PT_V3
GND, LAN_GND

HOLE16 NPTH_80 X_NPTH_80
HOLE17 NPTH_80 X_NPTH_80
HOLE14 H_NR118D118_1 X_H_NR118D118_1
HOLE12 H_NR118D118_1 X_H_NR118D118_1
2016/04/12 Modify HOLE12 footprint to H_NR197D118 for ME request
HOLE10 npth_98 X_npth_98
HOLE21 npth_98 X_npth_98
HOLE18 npth_98 X_npth_98
HOLE7 npth_98 X_npth_98
HOLE20 X_NPTH_80 NPTH_80
HOLE9 X_NPTH_80 NPTH_80
HOLE8 X_NPTH_80 NPTH_80
HOLE13 X_NPTH_80 NPTH_80
HOLE11 X_NPTH_80 NPTH_80
HOLE19 X_NPTH_80 NPTH_80
HOLE15 X_NPTH_80 NPTH_80

[Fuqun] Change footprint from F_PAD_NB to F_PAD_NB_1
FM41 FM42 FM43 FM44 FM45 FM46 FM47 FM48
X_F_PAD_NB
2016/04/25 Add FM41,FM42,FM43,FM44,FM45,FM46,FM47,FM48 for 較标

[Fuqun] Add 8* F_PAD_NB_2
FM49 FM50 FM53 FM51 FM52 FM56 FM54 FM55
X_F_PAD_NB
2016/04/25 Add FM41,FM42,FM43,FM44,FM45,FM46,FM47,FM48 for 較标

Top Spring

PAD12 X_HS-MS1011-RH ATE_C006_106
E23-1011040-CA7

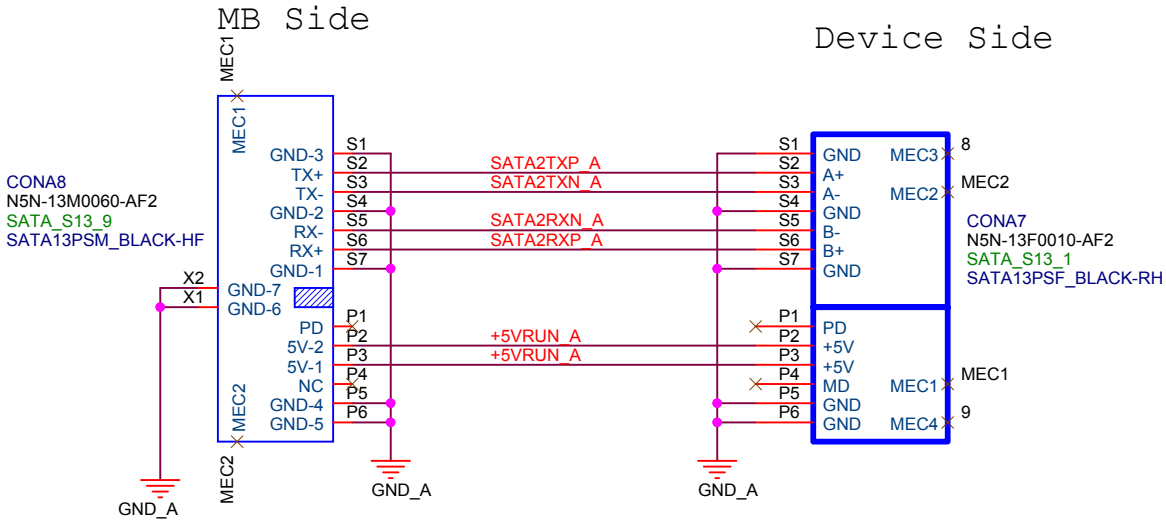
PAD8 X_HS-MS1011-RH ATE_C006_106
PAD9 X_HS-MS1011-RH ATE_C006_106
PAD10 X_HS-MS1011-RH ATE_C006_106
E23-1011040-CA7 E23-1011040-CA7 E23-1011040-CA7

BOT Spring

PAD7 X_HS-MS1011-RH ATE_C006_106
PAD11 X_HS-MS1011-RH ATE_C006_106
PAD13 X_HS-MS1011-RH ATE_C006_106
E23-1011040-CA7 E23-1011040-CA7 E23-1011040-CA7
2016/01/18 Add PAD13 for EMI suggestion

PCB1
PD0-16JB10A-H73
PD0-16JB10A-H73
Hannstar: PD0-16J810B-H73
TRIPOD: PD0-16J810B-T53

MICRO-STAR INT'L CO.,LTD.
Title: Screw/ME
Size: Document Number: MS-16JB1 Rev: 0A
Date: Tuesday, May 31, 2016 Sheet 64 of 71

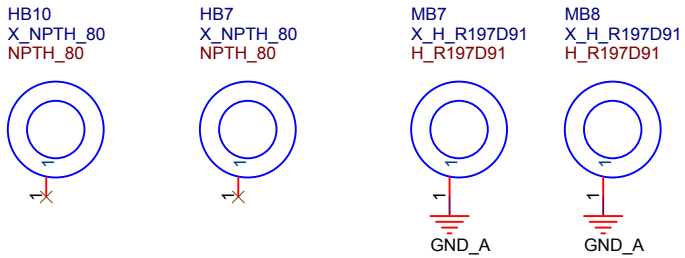


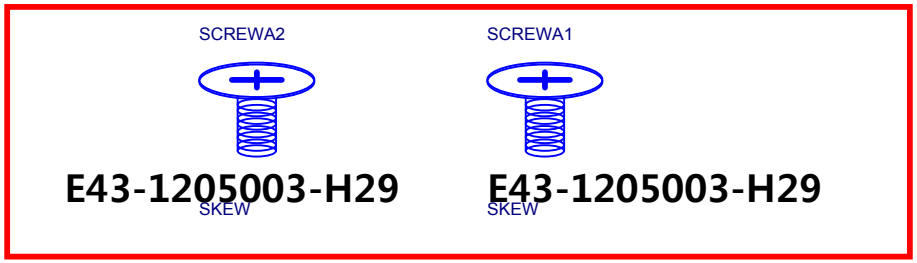
PCBA1

PD0-16J8B0A-H73

PD0-16JBA0A-H73

Hannstar: PD0-16J8A0B-H73
TRIPOD: PD0-16J8A0B-T53





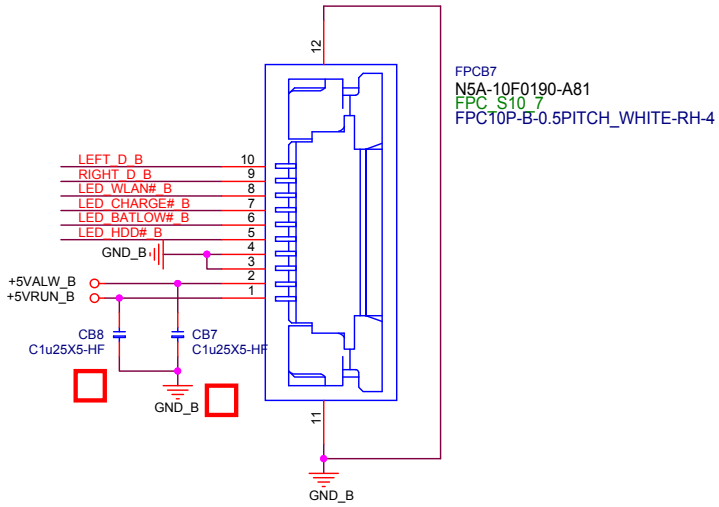
MICRO-STAR INT'L CO.,LTD.

Title: [A] 1798 ODD

Size: A4 | Document Number: MS-16JBA | Rev: 0A

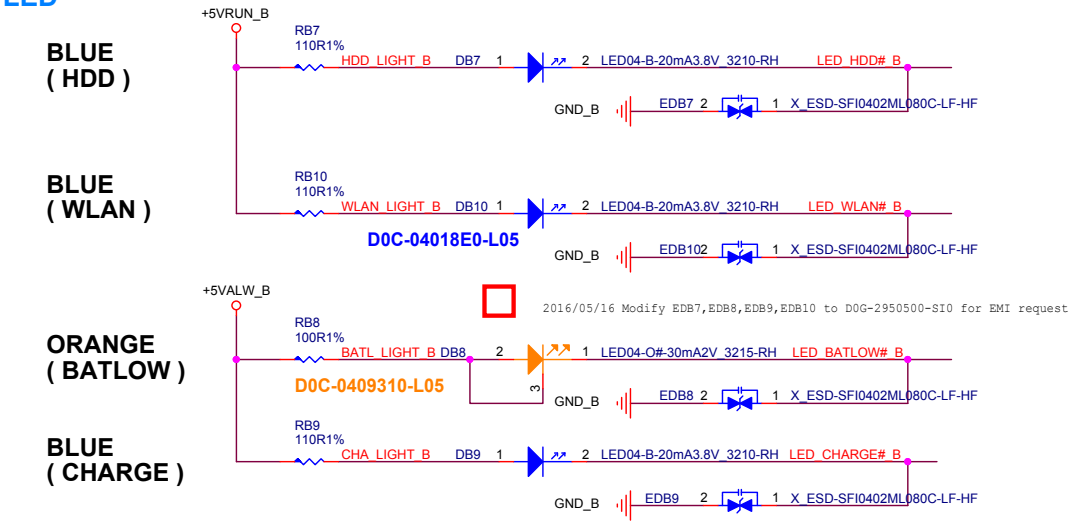
Date: Wednesday, May 25, 2016 | Sheet 65 of 71

1798

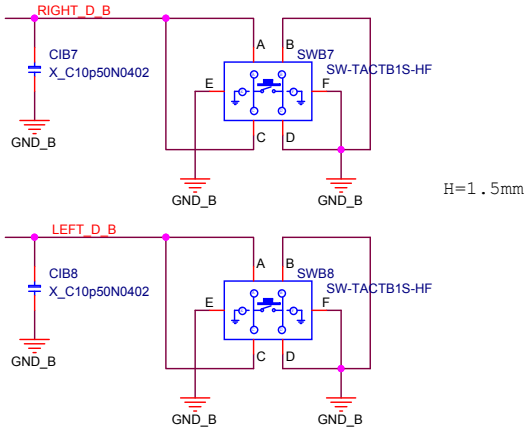


LED

FRONT

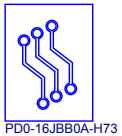


1798



H=1.5mm

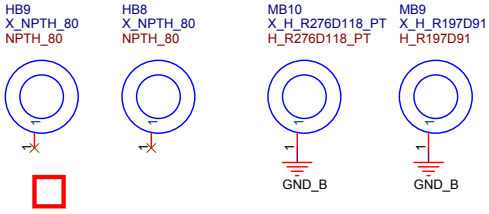
PCBB1



PD0-16JBB0A-H73

PD0-16JBB0A-H73

Hannstar: PD0-16J8B0B-H73
TRIPOD: PD0-16J8B0B-T53



UMEB1

MYLAR

LEAKAGE_MYLAR

E2P-7910811-G40

UMEB2

MYLAR

MYLAR

E2P-0113511-G40

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Title: [B] 1798 LED/ TP

Size: B | Document Number: MS-16JBB | Rev: 0A

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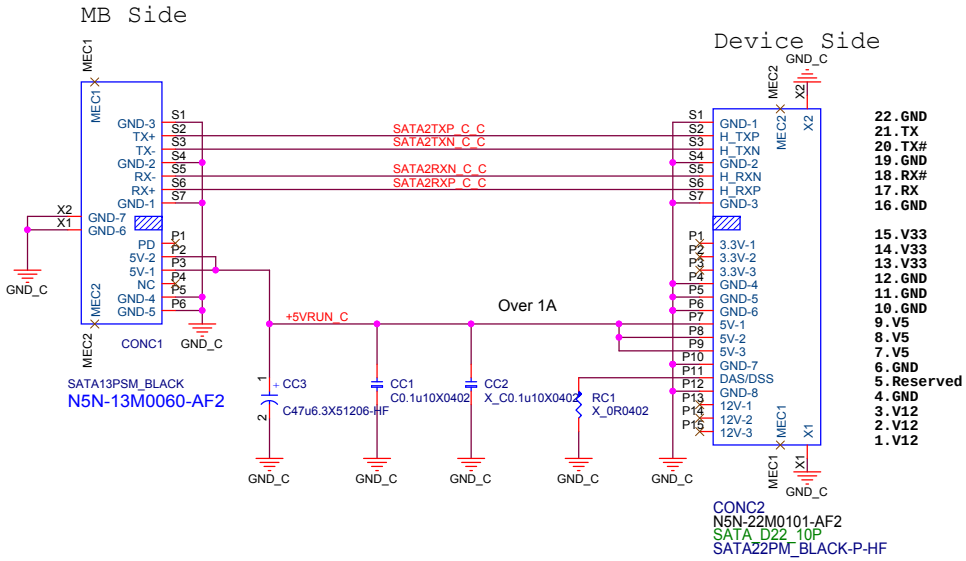
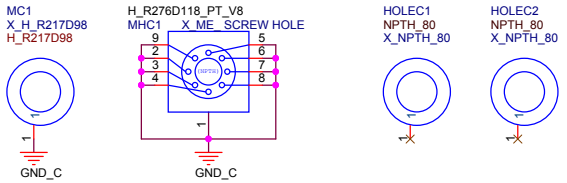
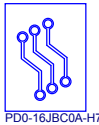
Verge SATA HDD





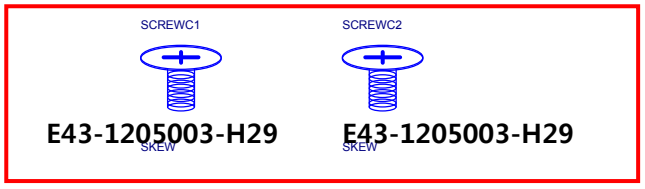
PCBC1



PD0-16JBC0A-H73

PD0-16JBC0A-H73

Hannstar: PD0-16J8C0B-H73
TRIPOD: PD0-16J8C0B-T53



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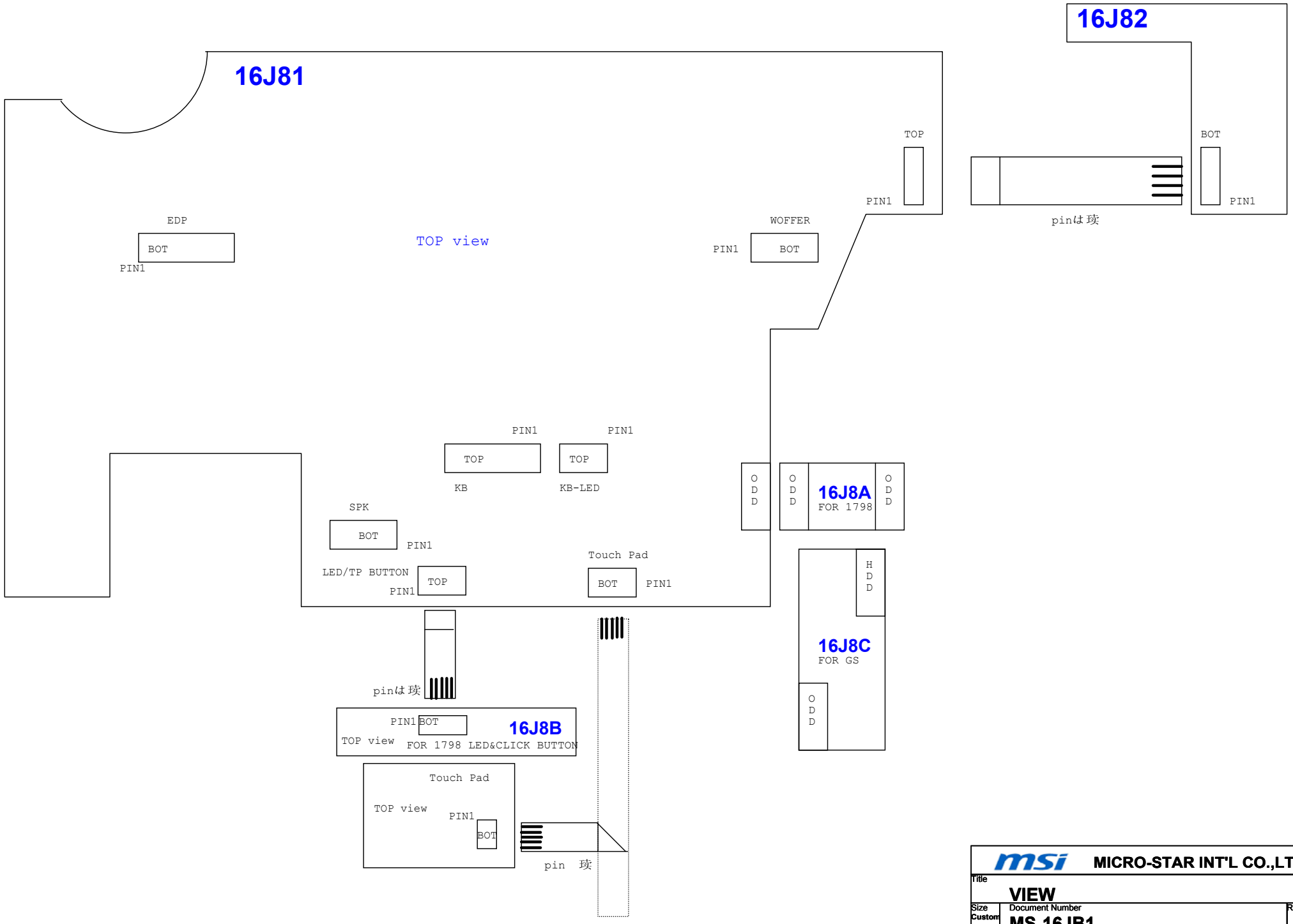
Title: [C] GS_ODD -> HDD

Size: A3 | Document Number: MS-16JBC | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 67 of 71



MICRO-STAR INT'L CO.,LTD.

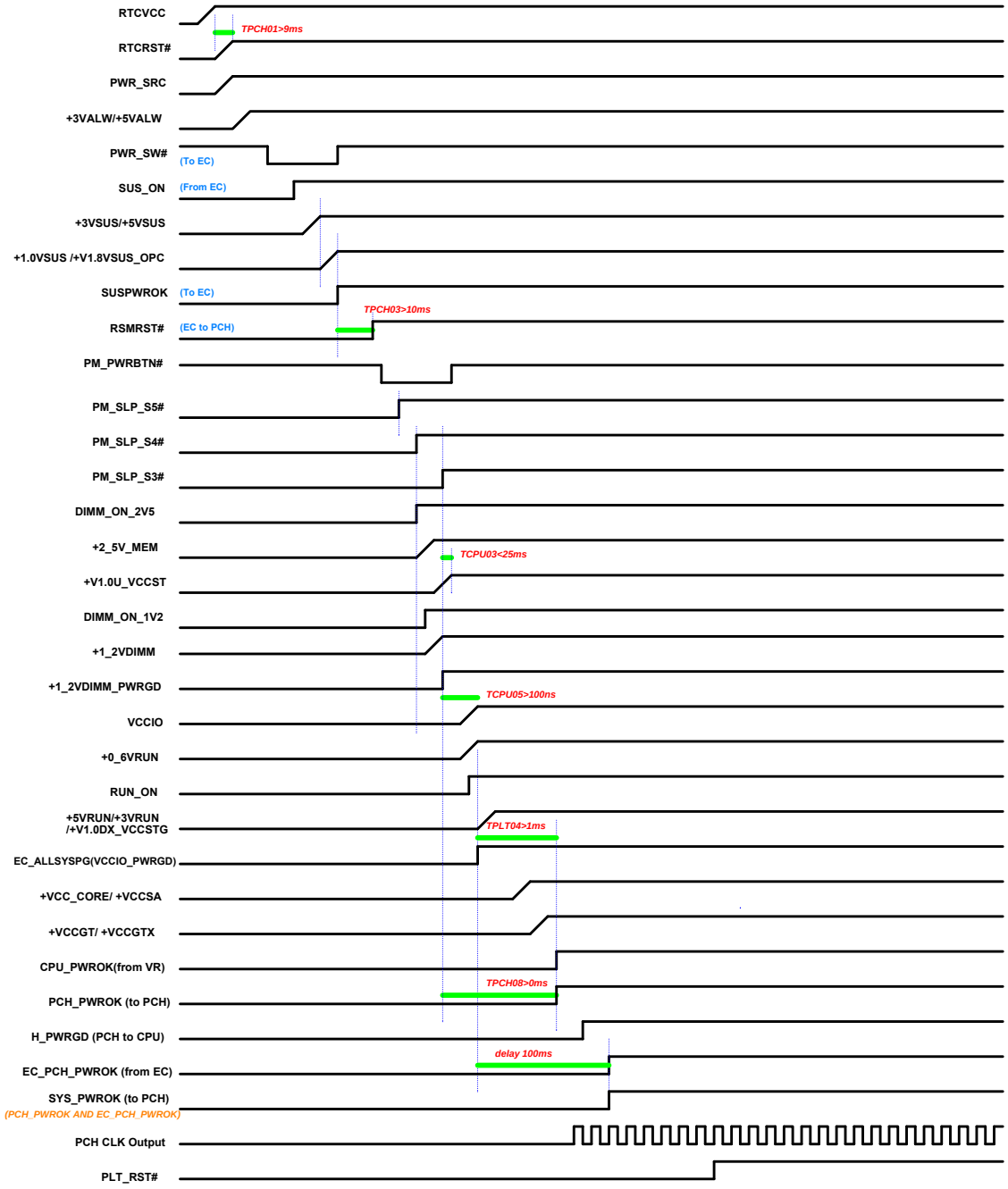
Title: VIEW

Size: Custom | Document Number: MS-16JB1 | Rev: 0A

Date: Wednesday, May 25, 2016 | Sheet 68 of 71

Power on Sequence

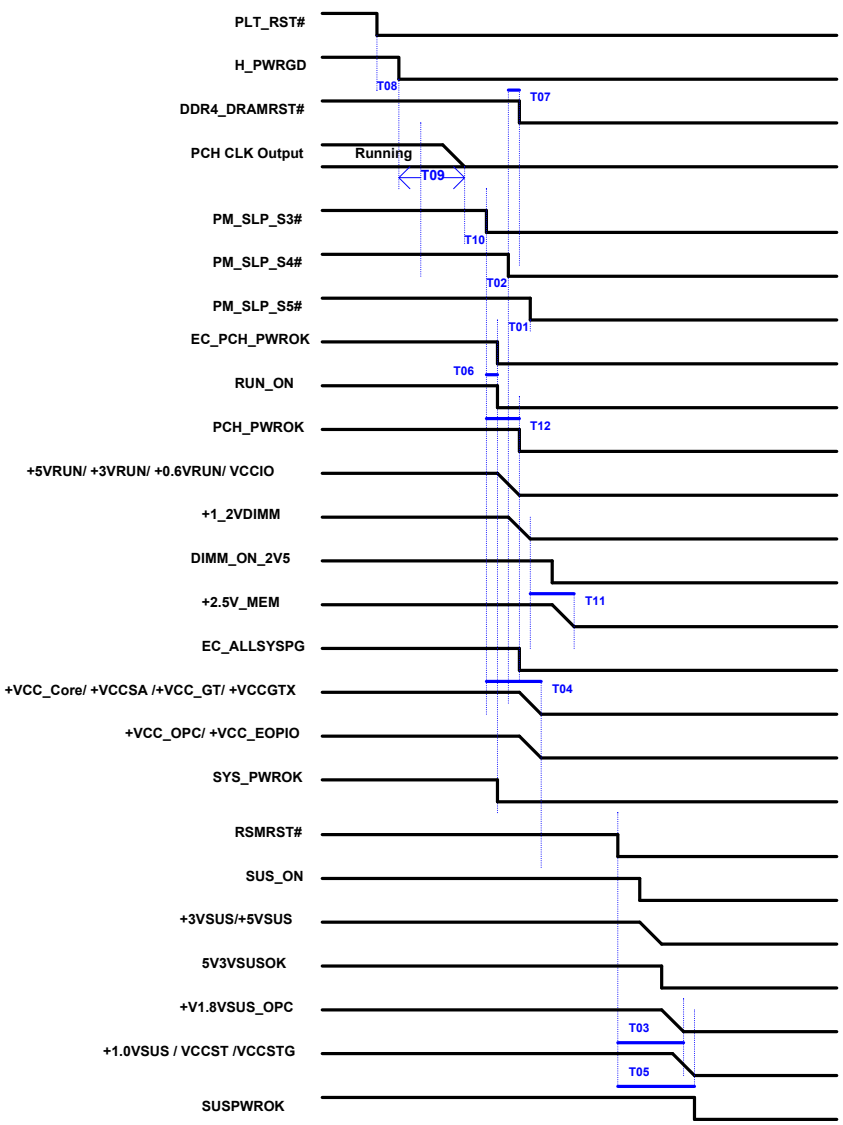
G3 -> S0



msi MICRO-STAR INT'L CO.,LTD.		
Title: Power on Sequence		
Size	Document Number: MS-16JB1	Rev: 0A
Date: Wednesday, May 25, 2016	Sheet 69 of 71	

Power down Sequence

S0 -> G3



	MIN	MAX	Units	Description
T01	30		us	SLP_S5# assertion to SLP_S4#
T02	30		us	SLP_S4# assertion to SLP_S3#
T03	1		us	RSMRST# asserting to VccPRIM dropping 5% of nominal value
T04		500	ms	SLP_S3# assertion to VCC, VCCGT, VCCIO and VCCSA rails completely off.
T05	1		us	RSMRST# asserting to VccPRIM dropping 5% of nominal value
T06		1	us	SLP_S3# assertion to VCCIO VR disabled
T07	-100		ns	DDR_RESET# assertion to SLP_S4# assertion
T08	30		us	PLTRST# assertion to PROCPWRGD deassertion
T09	10		us	PROCPWRGD de-assertion to CLKOUT_BCLK turning OFF.
T10	1		us	CLKOUT_BCLK turning OFF to SLP_S3# assertion
T11	30		ms	VDDQ ramped down to VPP ramp down
T12	0		ms	SLP_S3# assertion to PCH_PWROK deassertion

History

0A		0A		10			
Page	Description	Page	Description	Page	Description	Page	Description
2	Change R266/R268 from 0ohm to 75ohm follow intel DG						
4	Remove CPU HDMI/DP bus						
	Remove PCH to CPU AUDIO bus						
6	Remove reserved 1.0VSUS to +V1.0DX_VCCSTG/+V1.0U_VCCST LDO						
10	NC R90/Q9, Add Q47						
	Cahnge C2821 from 1u to 0.1u follow NV DG						
18	Change LB8 ESR from 0.03ohm to 0.01ohm follow NV DG						
24	Add NV display port A/B						
25	Add NV display port C/D						
26	Add NV display port E/F						
27	Add GPIO 14/15/17/18/24/27						
	NC R309, Add R300/R317/R490						
28	Add R492 and CORE_PLLVDD power						
29	Change NV STRAP3 from LOW to High for enable NV VGA						
32	Connect GPIO28_OC_WARN_N to U8.8 pin						
	Add/change NVVDDS/PEX_VDD/1V8_MAIN dischaarge						
33	Re-draw NV power sequence follow kunshan N17 MXM design						
34	Remove HDMI/DP HPD/I2C bus in PCH						
35	Cahnge ASM1142 PCIE cap from 0.1u to 0.22u follow vender DG						
	L_LDRQ0# add PU 10Kohm						
	Remove 33M CLK buffer, remove LPC debug card						
	Add HDMI/DP HPD from connector						
36	Remove PCH to CPU audio bud						
	Add R409/R503 for system power sequence						
37	Change BIOS footprint to correct						
38	Add 2pcs 1.0VSUS CAP, 2pcs 3VSUS CAP						
39	Add C958						
41	Remove LPC debug card						
	Change battery charge control function						
	Add HDMI/DP detect function						
	Add 506						
42	Cahnge ASM1142 PCIE cap from 0.1u to 0.22u follow vender DG						
	Add D24 follow verser DG						
43	Add USB POWER PROTECT CIRCUIT						
44	Add DP re-driver IC						
45	Change HDMI re-driver from 1.4b to 2.0						
46	Change 3pcs AGND to GND cooper to cap						
48	Change R78 from 10K to 30K follow vender DG						
	Add 1pcs 3VLAN CAP						
49	NC U31/U35						
51	Add R513						
	Mount TPM in 0A PCBA						
52	Add USB POWER PROTECT CIRCUIT						
53	Change battery charge IC						
54	Add 1.1VRUN for HDMI2.0 re-driver IC						
56	Change PEX_VDD_EN from NVDDS_EN to NVDDS_PG						
	Change PEX_VDD_PG PU from NV3V3 to +3VRUN						
	Add 1V8_AON_PG (PU7 pin-7)						
57	Change PR9/PR19 PU from 3V3_NV to +3VRUN						
	Add 2* snabber						
58	Change PR115 PU from 3V3_NV to +3VRUN						
	Add 3* snabber						
59	Change PR59 PU from 3V3_NV to +3VRUN						
	Add 1* snabber						
	Change PR41 from 0ohm to 2.2ohm						
	Mount PR18, NC PR20						
60	Connect PMON from charge IC						
	Mount PC165, PR213 change 0ohm to 1.21K						
61	Change PC238 from 470uF to 68uF						
62	Mount snubber						
63	Add 95ohm impadence						
67	Change ODD connect ORCad LIB						

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Title: History

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