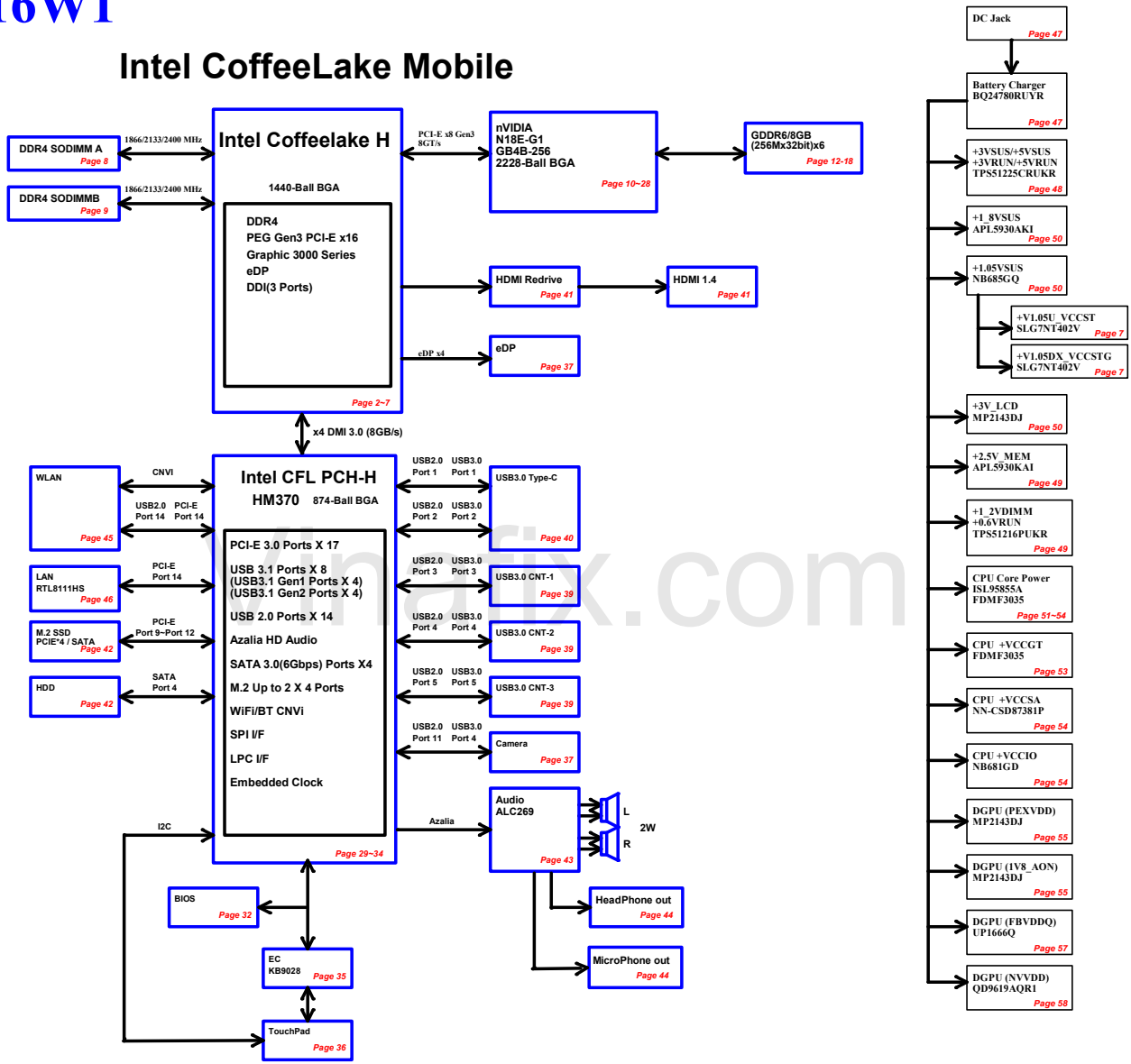
MS-16W1

Ver:10 Intel CoffeeLake Mobile



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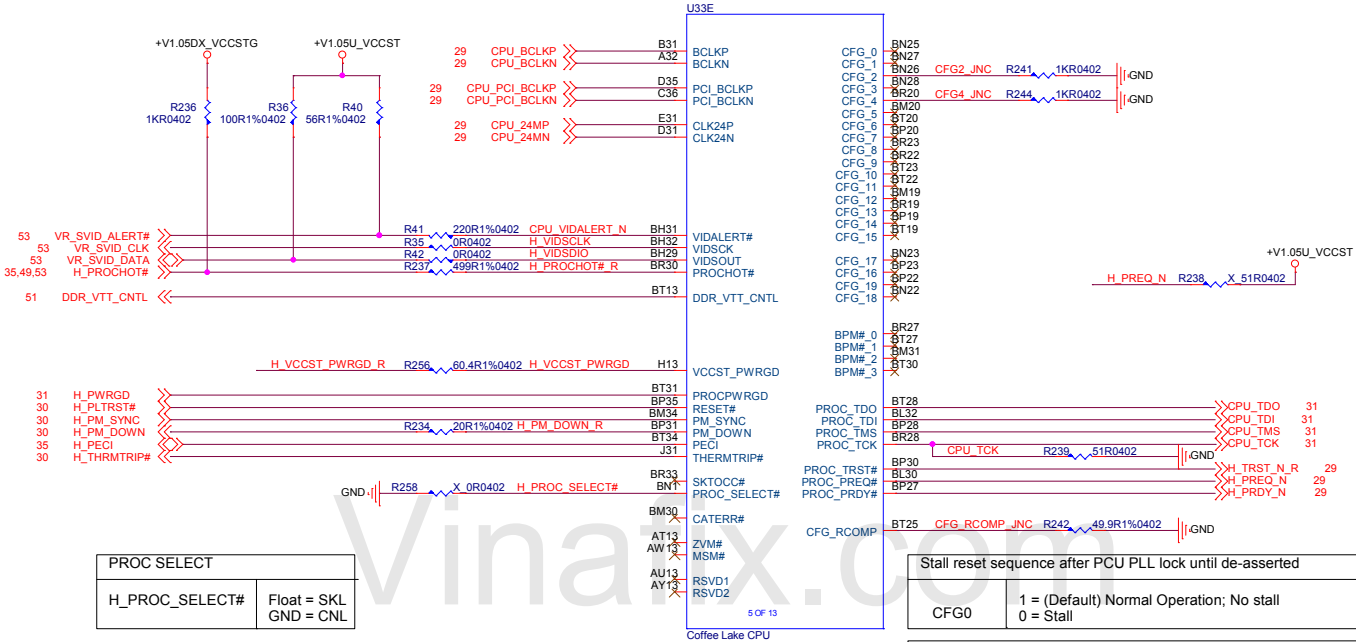
MICRO-STAR INT'L CO.,LTD.

Block Diagram

MS-16W1

10



PROC SELECT	
H_PROC_SELECT#	Float = SKL GND = CNL

Stall reset sequence after PCU PLL lock until de-asserted	
CFG0	1 = (Default) Normal Operation; No stall 0 = Stall

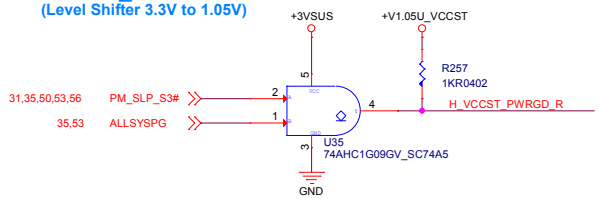
PCIE Express * Static X16 Lane Numbering Reversal	
CFG2	1 = Normal operation 0 = Lane numbers reversed.

eDP Enable	
CFG4	1 = Disabled 0 = Enabled

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*

PEG DEFER TRAINING	
CFG7	1: (default) PEG Train immediately following RESET# de assertion. 0: PEG Wait for BIOS for training

VCCST_PWRGD
(Level Shifter 3.3V to 1.05V)



I7-9750H

I7_9750

A0D-9750H05-I06

X_I7-9750

I5-9300H

I5-9300

A0C-9300H05-I06

X_I5-9300

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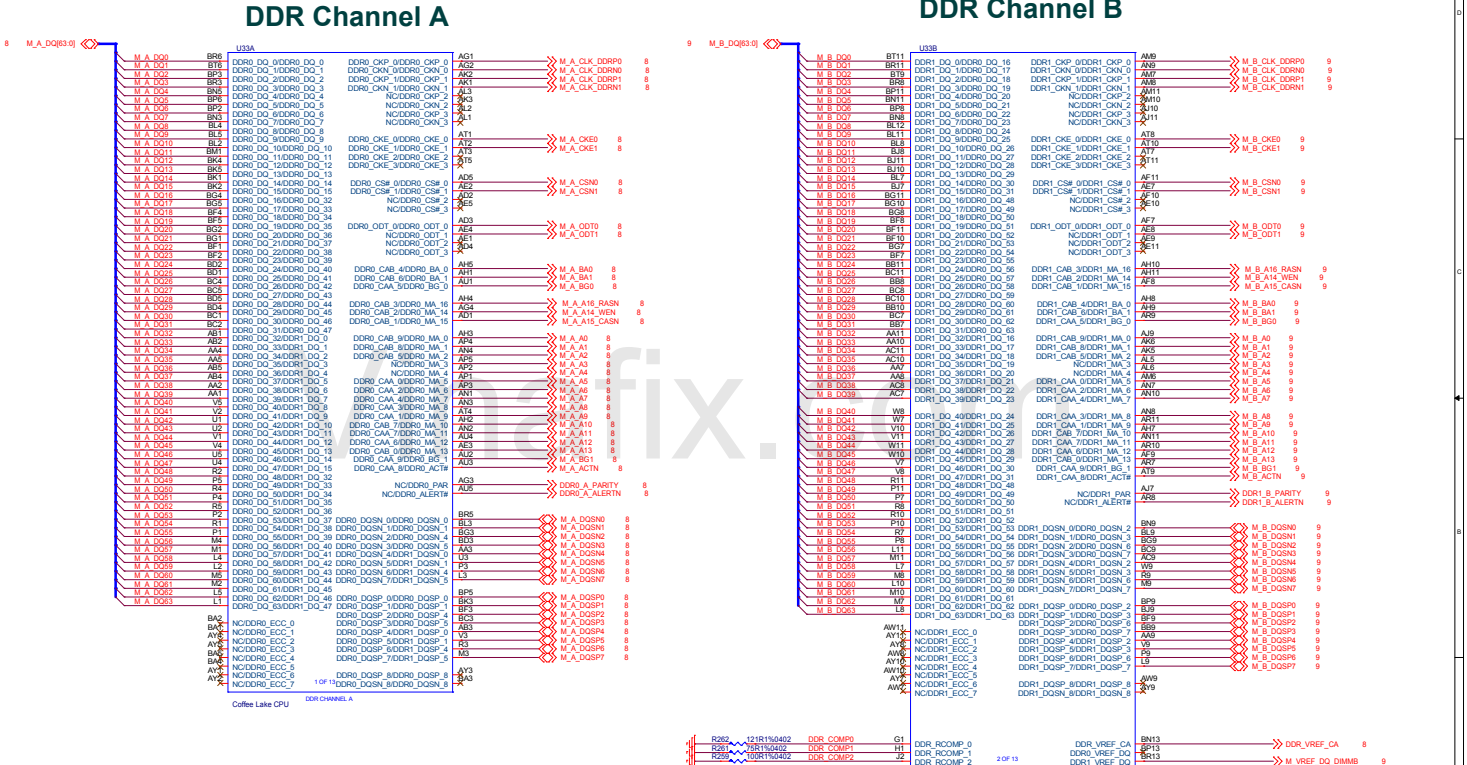
msi	MICRO-STAR INT'L CO.,LTD.
Title	Coffeelake(HOST)
Size: Custom	Document Number: MS-16W1
Rev	10
Date: Tuesday, August 13, 2019	Sheet 2 of 66



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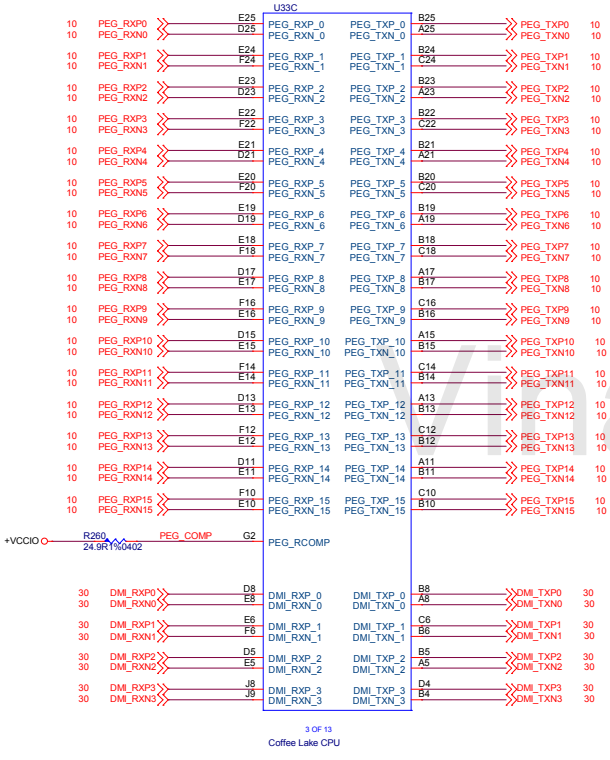
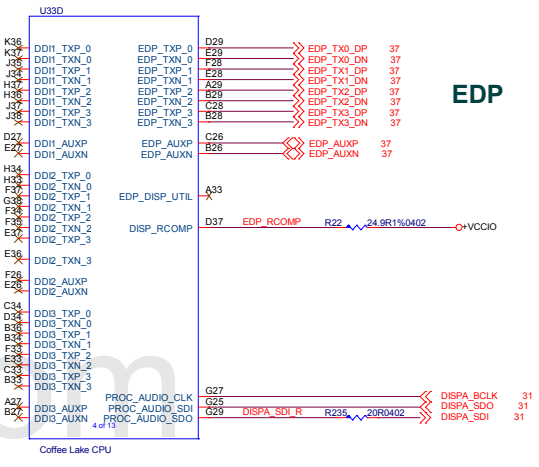
msi	MICRO-STAR INT'L CO.,LTD.		
Title	Coffeelake(DDR4)		
Size	Document Number		Rev
Custom	MS-16W1		10
Date:	Tuesday, August 13, 2019	Sheet 3 of 66	





EDP

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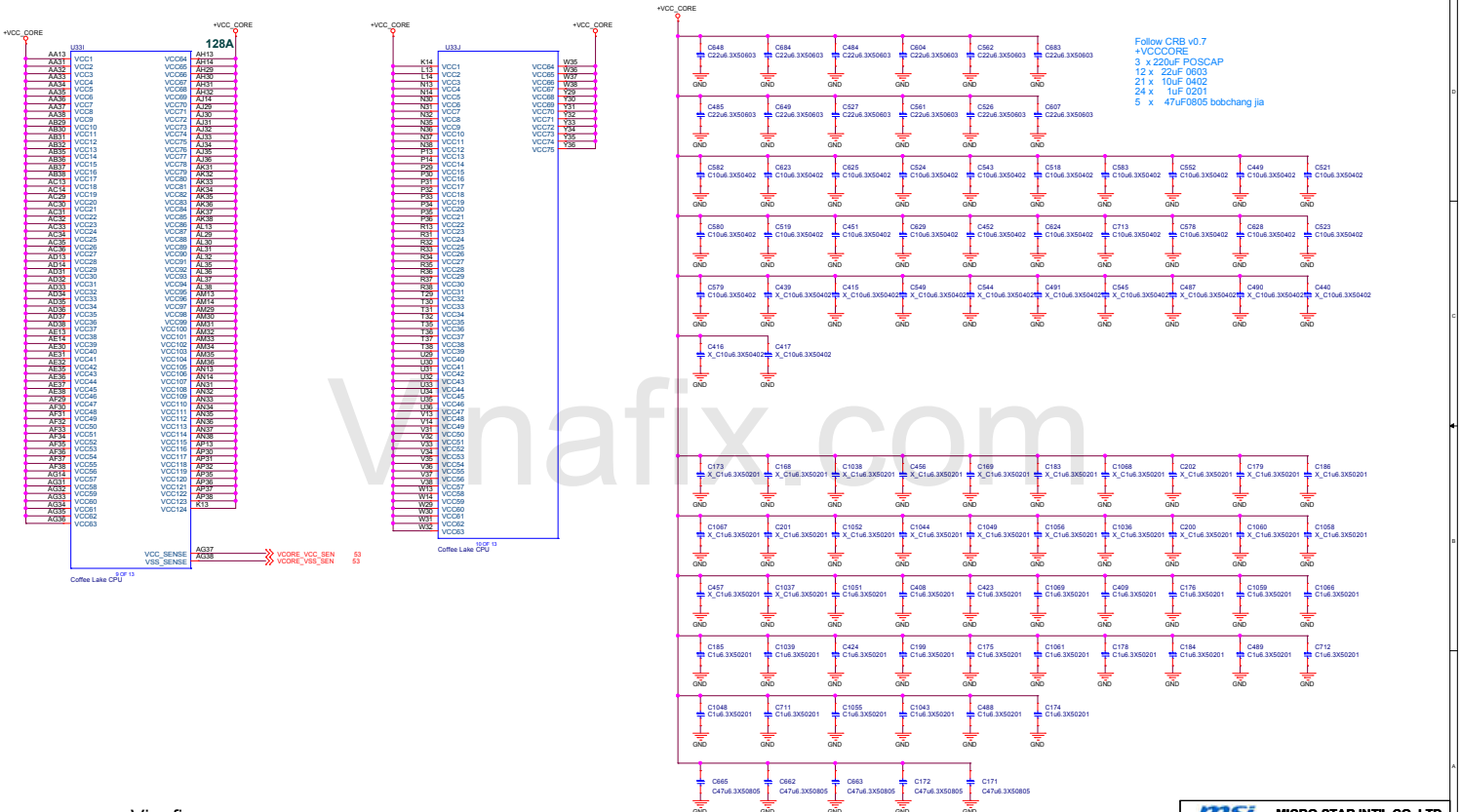
msi	MICRO-STAR INT'L CO.,LTD.		
Title	Coffeelake(DMI/Display)		
Size: Custom	Document Number: MS-16W1		Rev: 10
Date: Tuesday, August 13, 2019	Sheet 4 of 66		



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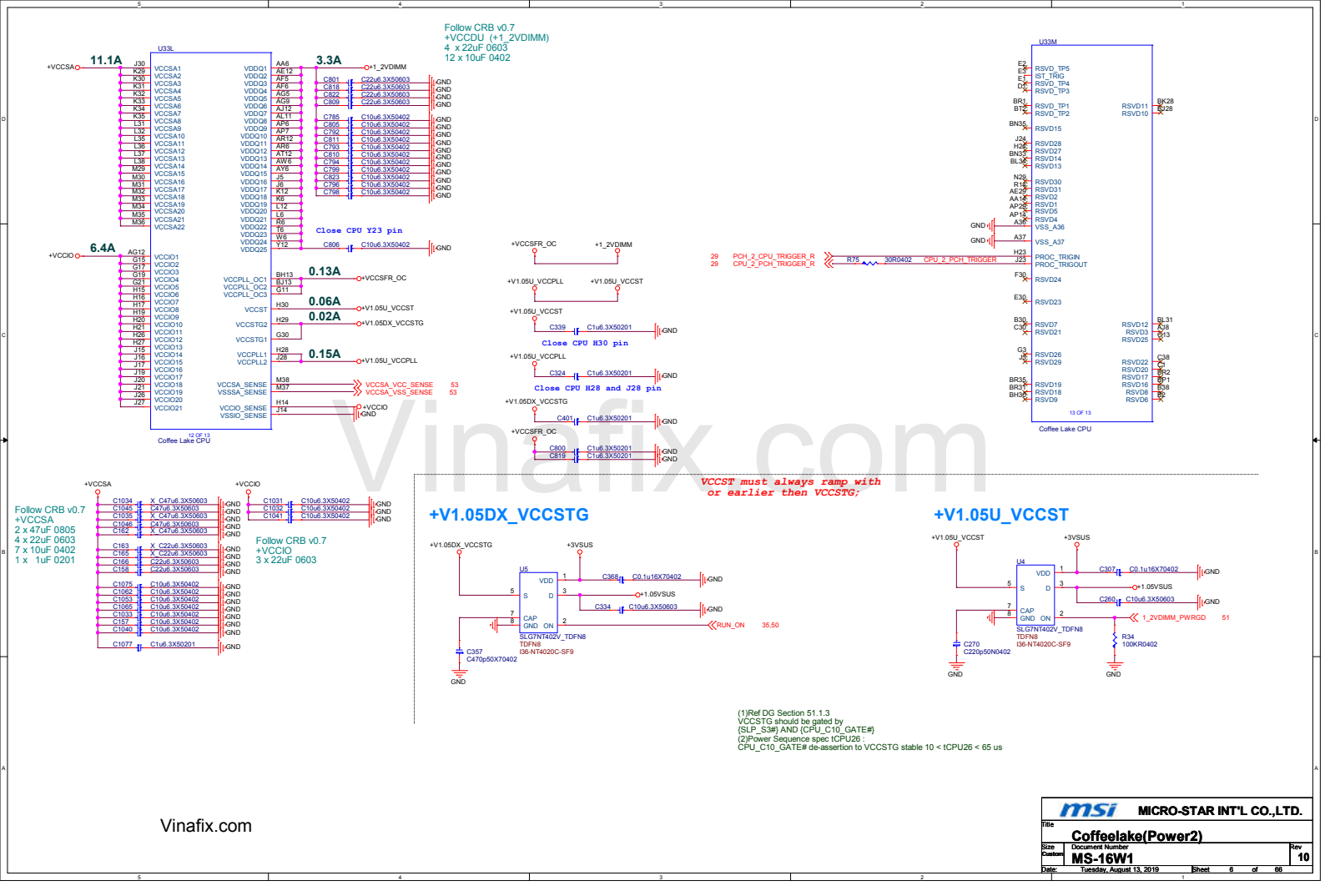
msi	MICRO-STAR INT'L CO.,LTD.		
Title	Coffeelake(Power1)		
Size: Custom	Document Number: MS-16W1	Rev: 10	
Date: Tuesday, August 13, 2019	Sheet 5 of 66		


Follow CRB v0.7
+VCCDU (+1_2VDIMM)
4 x 22uF 0603
12 x 10uF 0402
U33L
+VCCSA
11.1A
VCCSA1
VCCSA2
VCCSA3
VCCSA4
VCCSA5
VCCSA6
VCCSA7
VCCSA8
VCCSA9
VCCSA10
VCCSA11
VCCSA12
VCCSA13
VCCSA14
VCCSA15
VCCSA16
VCCSA17
VCCSA18
VCCSA19
VCCSA20
VCCSA21
VCCSA22
3.3A
+1_2VDIMM
C801 C818 C822 C809 C22u6.3X50603
C785 C805 C792 C811 C793 C810 C794 C799 C823 C796 C798 C10u6.3X50402
GND
Close CPU Y23 pin
C806 C10u6.3X50402
+VCCIO
6.4A
VCCIO1
VCCIO2
VCCIO3
VCCIO4
VCCIO5
VCCIO6
VCCIO7
VCCIO8
VCCIO9
VCCIO10
VCCIO11
VCCIO12
VCCIO13
VCCIO14
VCCIO15
VCCIO16
VCCIO17
VCCIO18
VCCIO19
VCCIO20
VCCIO21
12 OF 13
Coffee Lake CPU
VCCPLL_OC1
VCCPLL_OC2
VCCPLL_OC3
0.13A
+VCCSFR_OC
VCCST
0.06A
+V1.05U_VCCST
VCCSTG2
VCCSTG1
0.02A
+V1.05DX_VCCSTG
VCCPLL1
VCCPLL2
0.15A
+V1.05U_VCCPLL
VCCSA_SENSE
VSSSA_SENSE
VCCSA_VCC_SENSE 53
VCCSA_VSS_SENSE 53
VCCIO_SENSE
VSSIO_SENSE
+VCCSFR_OC
+1_2VDIMM
+V1.05U_VCCPLL
+V1.05U_VCCST
C339 C1u6.3X50201
Close CPU H30 pin
+V1.05U_VCCPLL
C324 C1u6.3X50201
Close CPU H28 and J28 pin
+V1.05DX_VCCSTG
C401 C1u6.3X50201
+VCCSFR_OC
C800 C819 C1u6.3X50201
U33M
RSVD_TP5
IST_TRIG
RSVD_TP4
RSVD_TP3
RSVD_TP1
RSVD_TP2
RSVD11
RSVD10
RSVD15
RSVD28
RSVD27
RSVD14
RSVD13
RSVD30
RSVD31
RSVD2
RSVD1
RSVD5
RSVD4
VSS_A36
VSS_A37
PROC_TRIGIN
PROC_TRIGOUT
RSVD24
RSVD23
RSVD7
RSVD21
RSVD12
RSVD3
RSVD25
RSVD26
RSVD29
RSVD22
RSVD20
RSVD17
RSVD16
RSVD19
RSVD18
RSVD9
RSVD6
13 OF 13
Coffee Lake CPU
29 PCH_2_CPU_TRIGGER_R
29 CPU_2_PCH_TRIGGER_R
R75 30R0402 CPU_2_PCH_TRIGGER
Follow CRB v0.7
+VCCSA
2 x 47uF 0805
4 x 22uF 0603
7 x 10uF 0402
1 x 1uF 0201
+VCCSA
+VCCIO
C1034 C1045 C1035 C1046 C1162 X_C47u6.3X50603
C163 C165 C166 C158 X_C22u6.3X50603 C22u6.3X50603
C1075 C1062 C1053 C1065 C1033 C157 C1040 C10u6.3X50402
C1077 C1u6.3X50201
C1031 C1032 C1041 C10u6.3X50402
Follow CRB v0.7
+VCCIO
3 x 22uF 0603
VCCST must always ramp with
or earlier then VCCSTG;
+V1.05DX_VCCSTG
+V1.05DX_VCCSTG
+3VSUS
U5
VDD
S
D
CAP
GND
ON
SLG7NT402V_TDFN8
TDFN8
I36-NT4020C-SF9
C368 C0.1u16X70402
+1.05VSUS
C334 C10u6.3X50603
RUN_ON 35,50
C357 C470p50X70402
+V1.05U_VCCST
+V1.05U_VCCST
+3VSUS
U4
C307 C0.1u16X70402
+1.05VSUS
C260 C10u6.3X50603
1_2VDIMM_PWRGD 51
C270 C220p50N0402
R34 100KR0402
(1)Ref DG Section 51.1.3
VCCSTG should be gated by
{SLP_S3#} AND {CPU_C10_GATE#}
(2)Power Sequence spec tCPU26 :
CPU_C10_GATE# de-assertion to VCCSTG stable 10 < tCPU26 < 65 us
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MICRO-STAR INT'L CO.,LTD.
Title
Coffeelake(Power2)
Size
Custom
Document Number
MS-16W1
Rev
10
Date: Tuesday, August 13, 2019
Sheet 6 of 66

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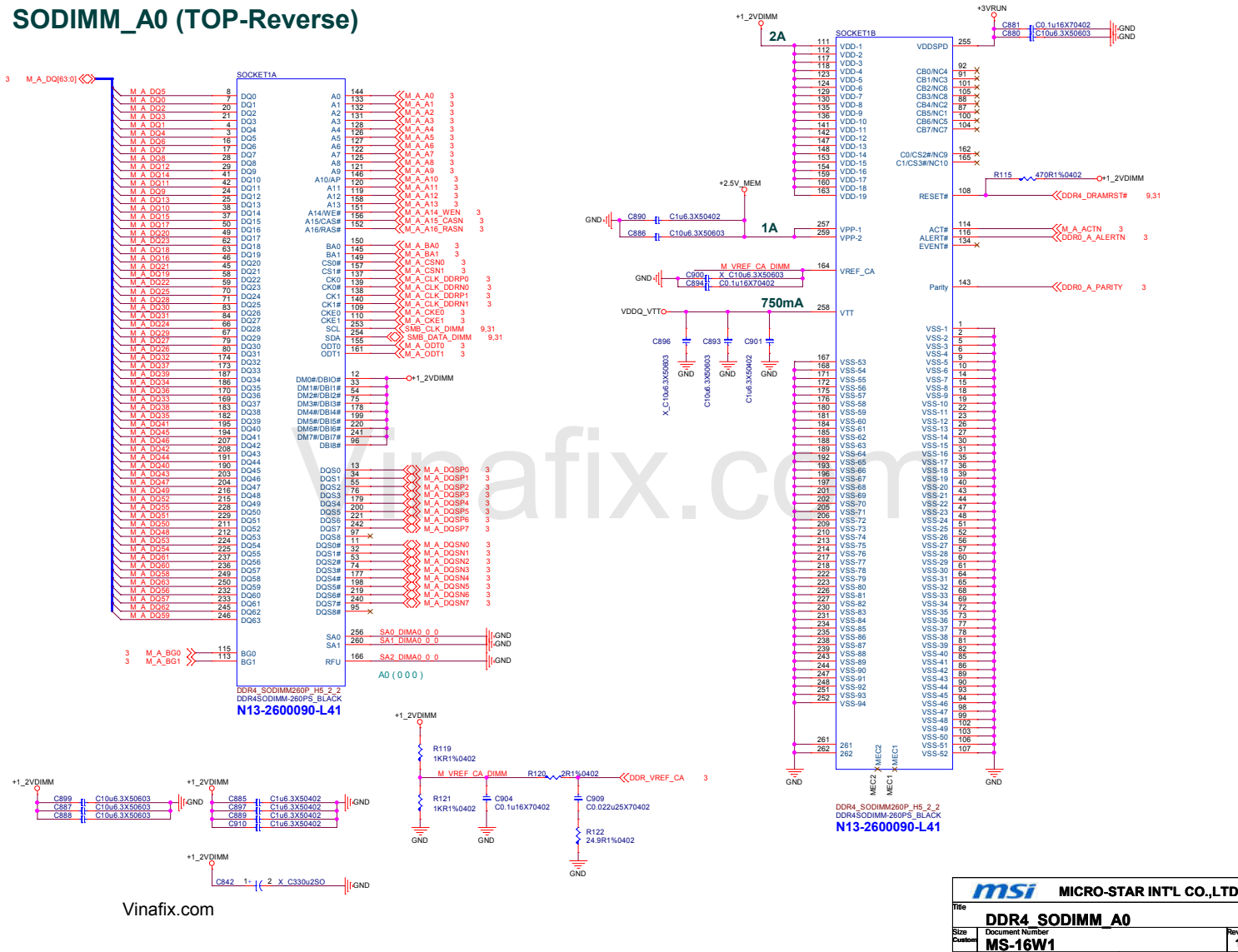
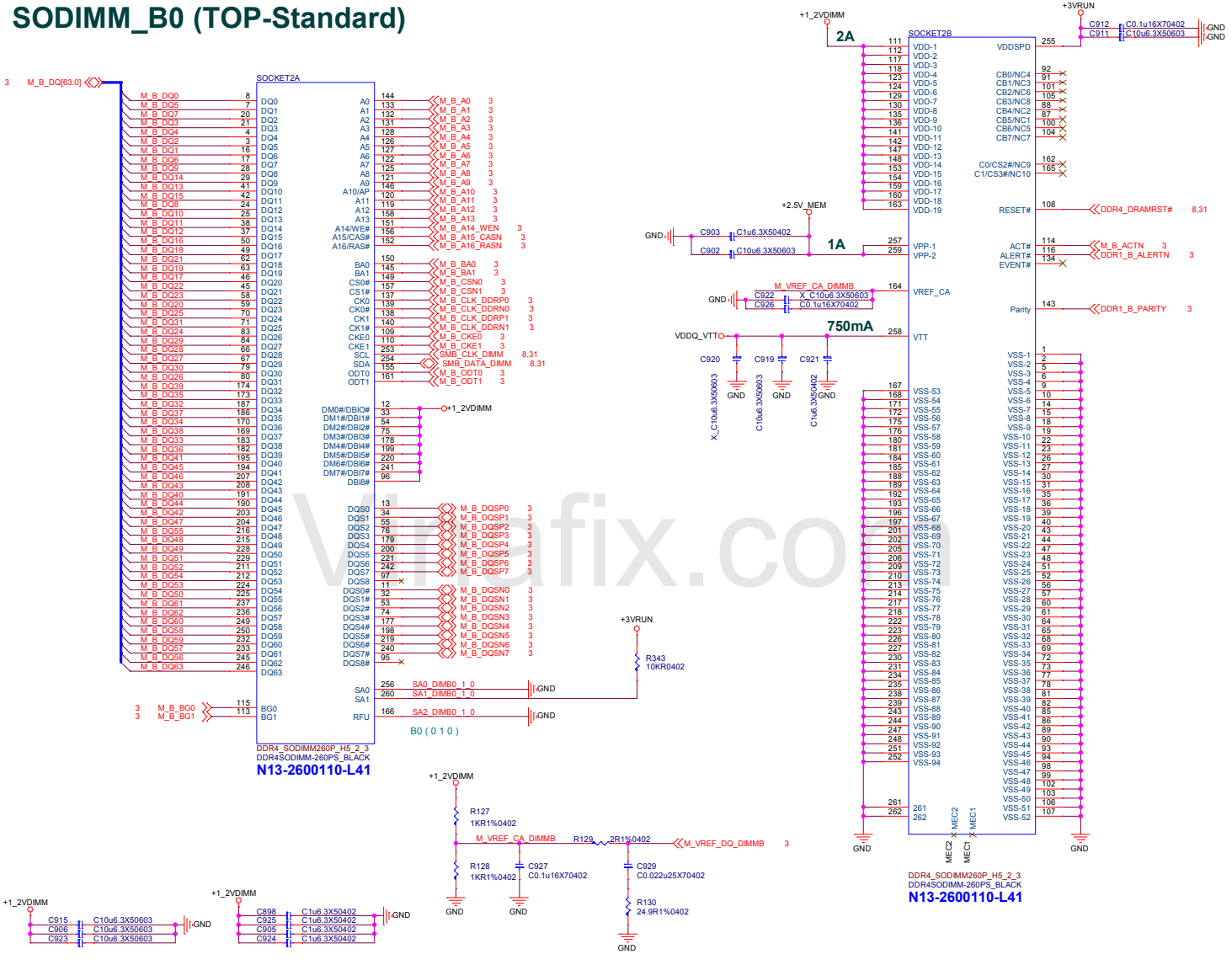
msi	MICRO-STAR INT'L CO.,LTD.		
Title	Coffeelake(Power3)		
Size / Custom	Document Number: MS-16W1		Rev: 10
Date: Tuesday, August 13, 2019	Sheet 7 of 66		

SODIMM_A0 (TOP-Reverse)



MSI	MICRO-STAR INT'L CO.,LTD.
Title	DDR4_SODIMM_A0
Size: Custom	Document Number: MS-16W1
Rev	10
Date:	Tuesday, August 13, 2019
Sheet	8 of 66

SODIMM_B0 (TOP-Standard)



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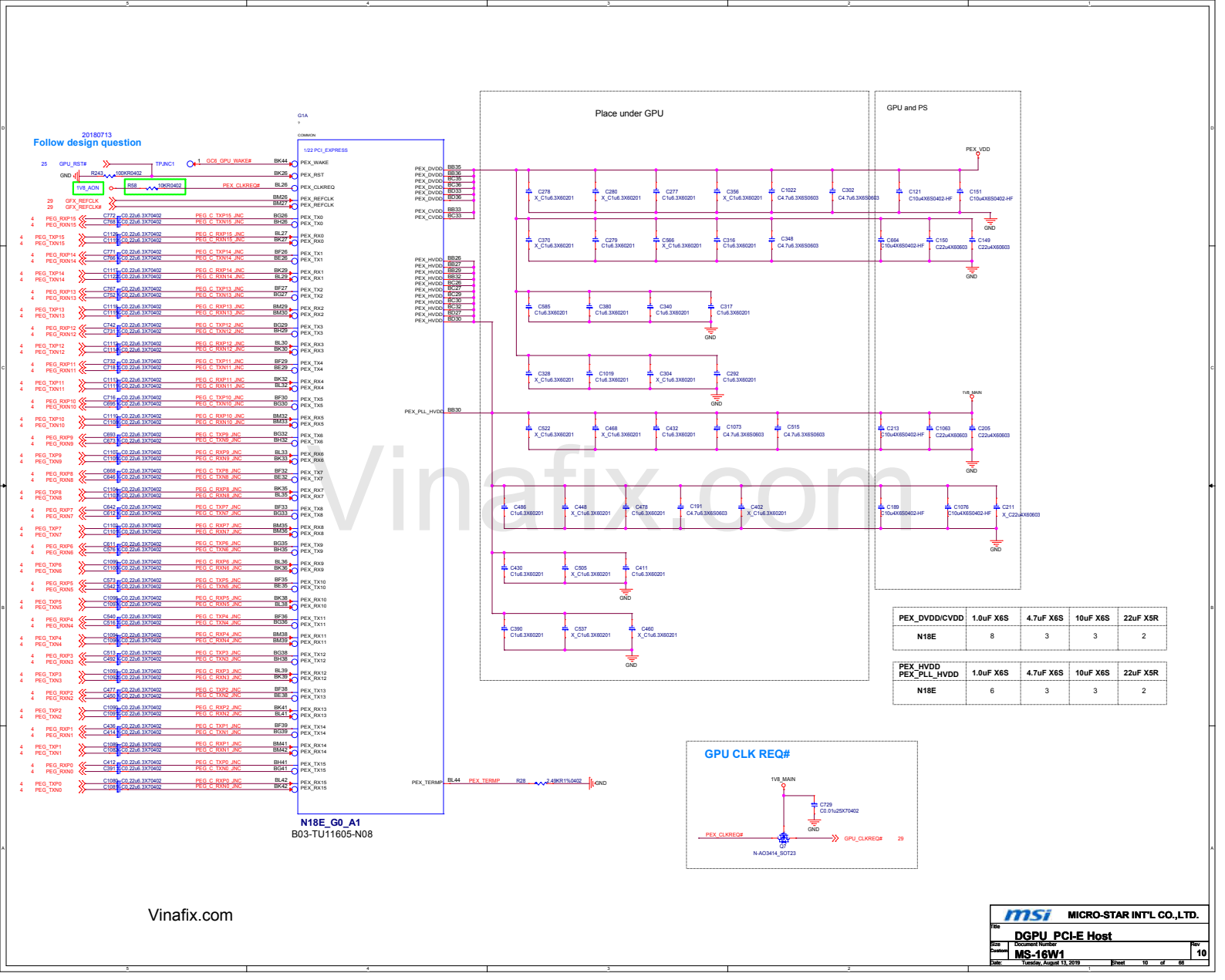
Title	DDR4_SODIMM_B0
Size: Custom	Document Number: MS-16W1
Rev	10
Date:	Tuesday, August 13, 2019
Sheet	9 of 66

MICRO-STAR INT'L CO.,LTD.



PEX_DVDD/CVDD	1.0uF X6S	4.7uF X6S	10uF X6S	22uF X5R
N18E	8	3	3	2

PEX_HVDD PEX_PLL_HVDD	1.0uF X6S	4.7uF X6S	10uF X6S	22uF X5R
N18E	6	3	3	2

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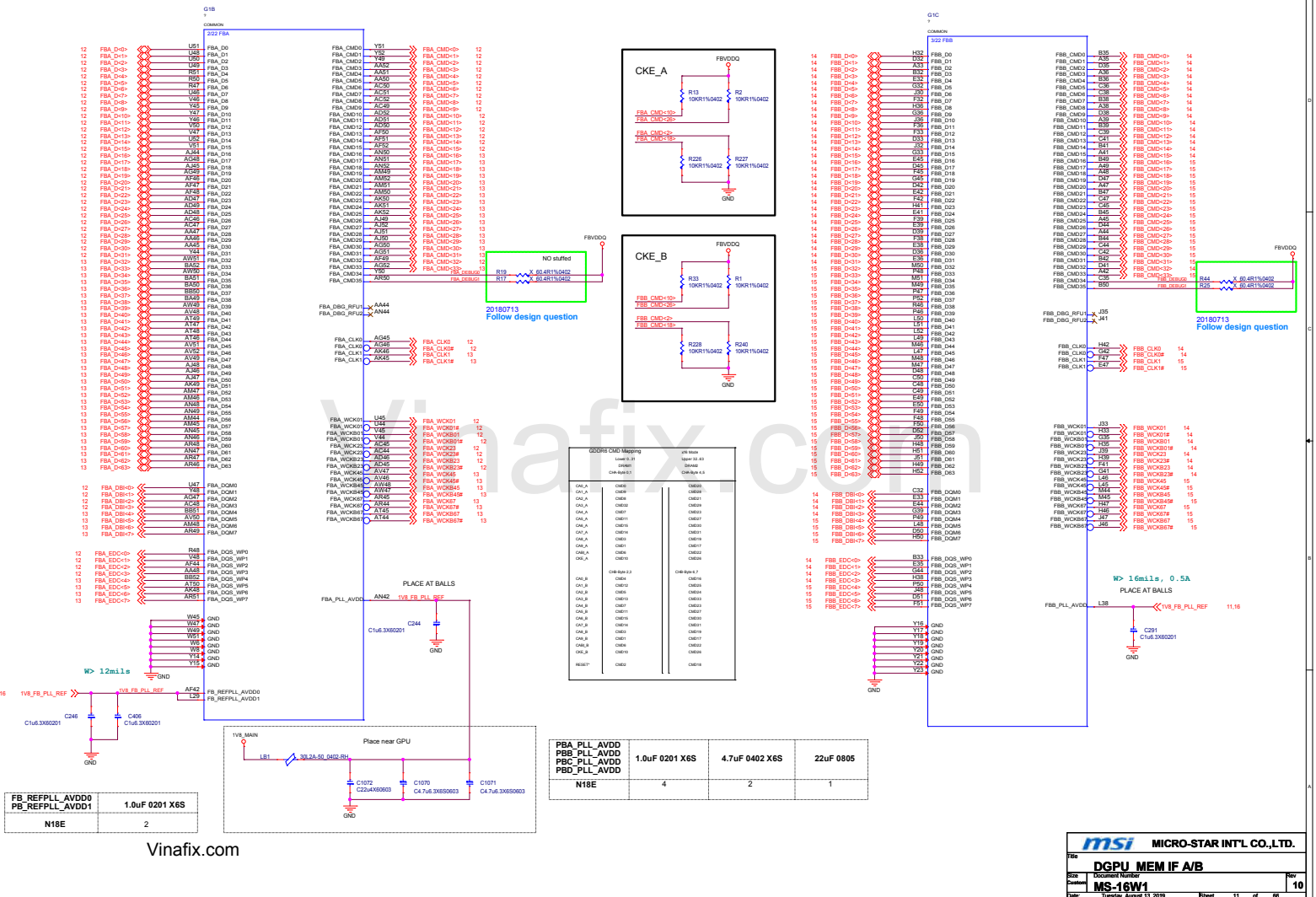
MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_PCI-E Host
Size: Custom	Document Number: MS-16W1
Rev	10
Date: Tuesday, August 13, 2019	Sheet 10 of 66



FB_REFPLL_AVDD0 PB_REFPLL_AVDD1	1.0uF 0201 X6S
N18E	2

PBA_PLL_AVDD PBB_PLL_AVDD PBC_PLL_AVDD PBD_PLL_AVDD	1.0uF 0201 X6S	4.7uF 0402 X6S	22uF 0805
N18E	4	2	1

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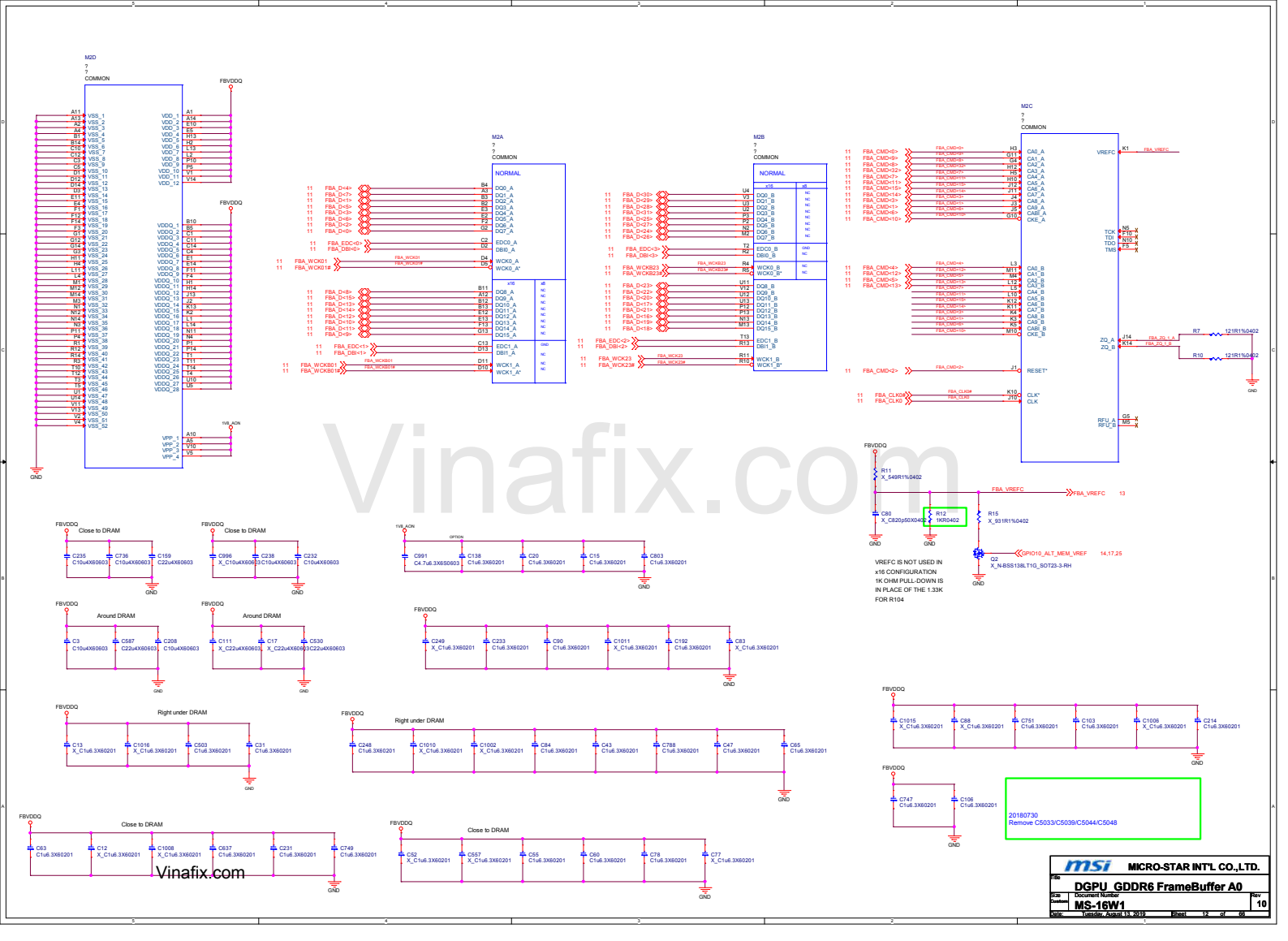
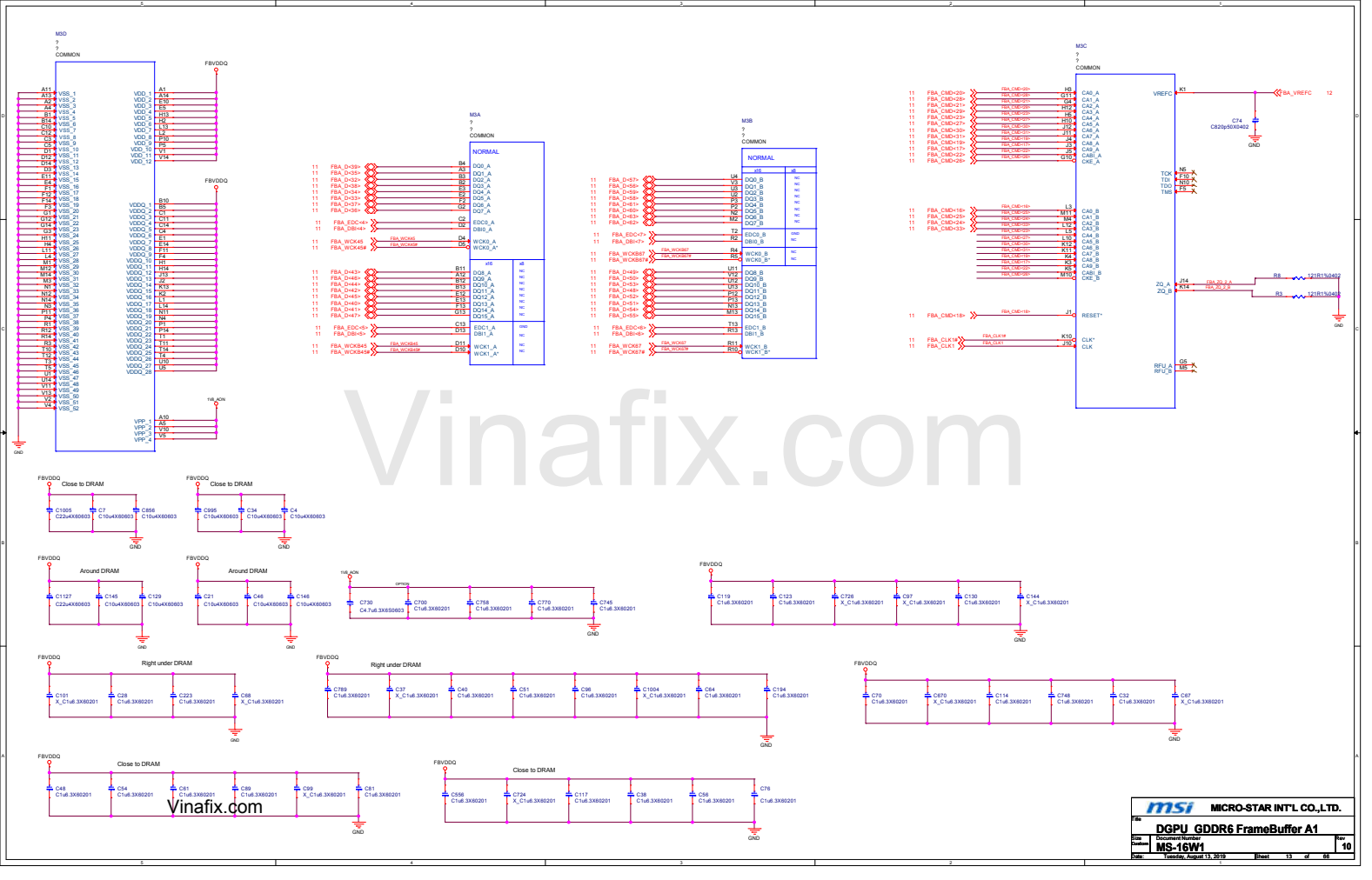
MICRO-STAR INT'L CO.,LTD.

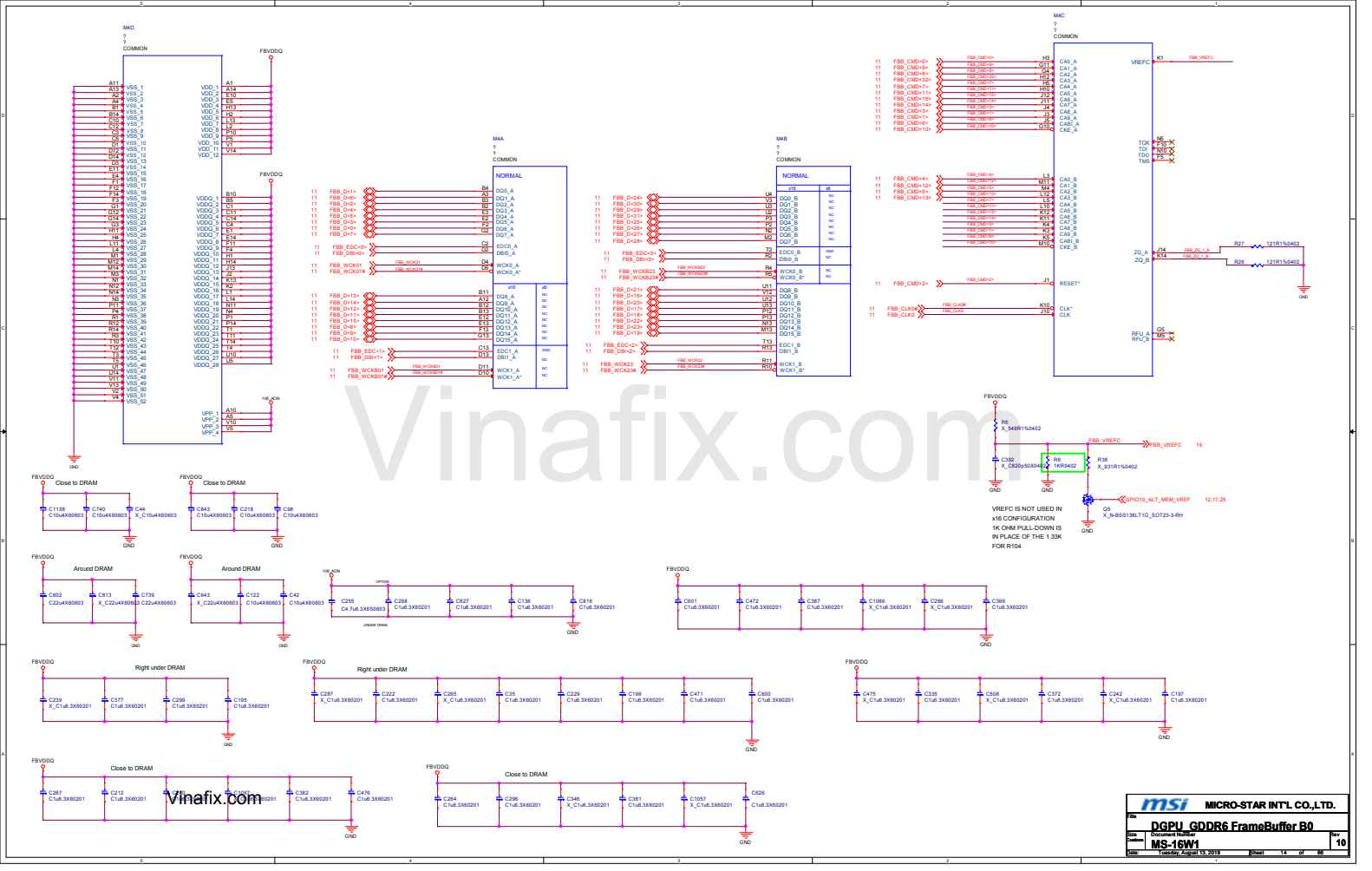
Title: DGPU_MEM IF A/B

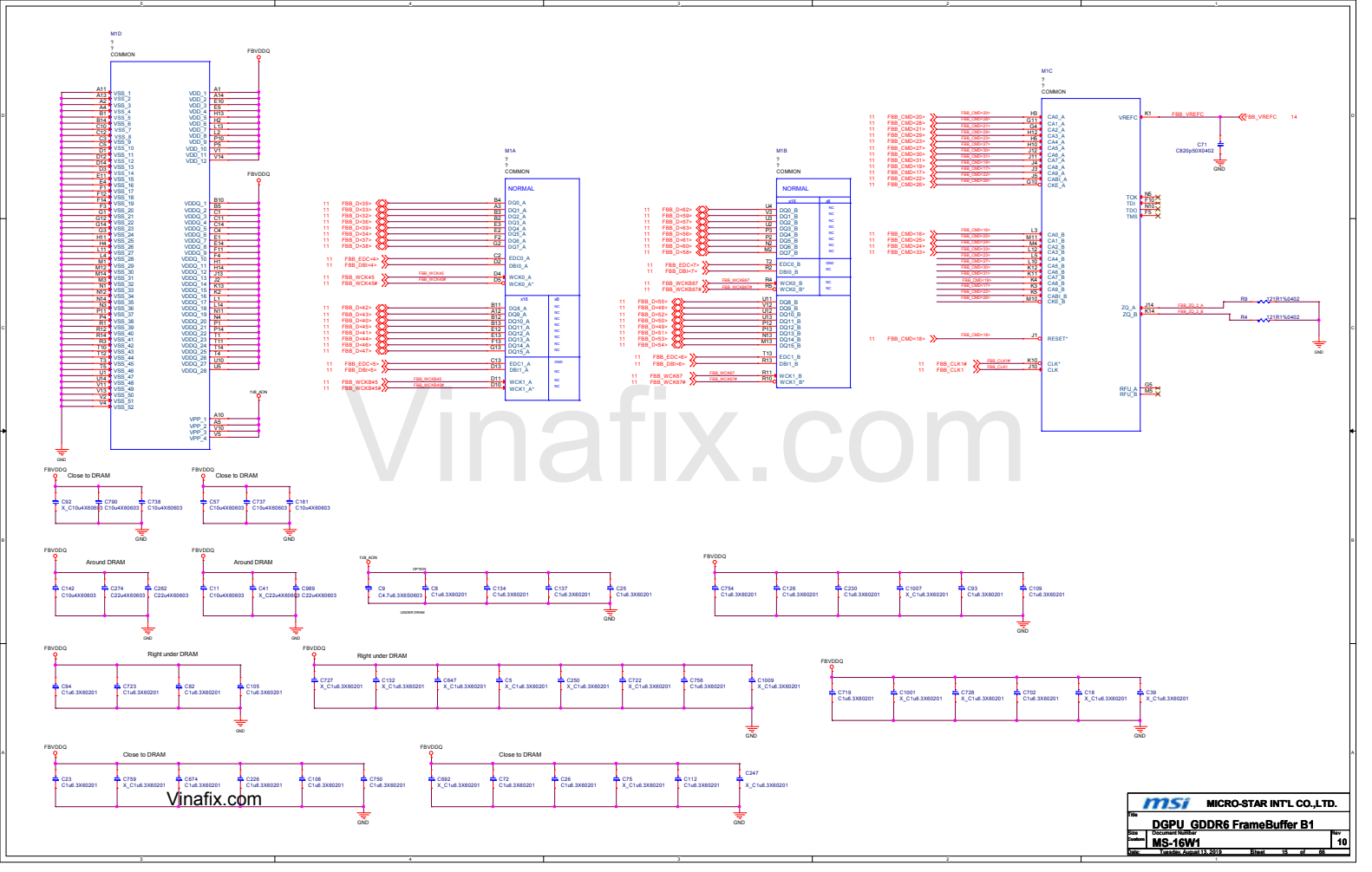
Size: Document Number: MS-16W1 Rev: 10

Date: Tuesday, August 13, 2019 Sheet 11 of 66


M2D
COMMON
M2A
NORMAL
M2B
NORMAL
M2C
COMMON
FBVDDQ
GND
Close to DRAM
Around DRAM
Right under DRAM
VREFC IS NOT USED IN
x16 CONFIGURATION
1K OHM PULL-DOWN IS
IN PLACE OF THE 1.33K
FOR R104
20180730
Remove C5033/C5039/C5044/C5048
MICRO-STAR INT'L CO.,LTD.
DGPU_GDDR6 FrameBuffer A0
MS-16W1
Rev 10
Tuesday, August 13, 2019
Vinafix.com


MSD
COMMON
M3A
NORMAL
M3B
NORMAL
M3C
COMMON
FBVDDQ
Close to DRAM
Around DRAM
Right under DRAM
Close to DRAM
Close to DRAM
Vinafix.com
MICRO-STAR INT'L CO.,LTD.
DGPU_GDDR6 FrameBuffer A1
MS-16W1
Tuesday, August 13, 2019
13
66
10


M4D
COMMON
FBVDDQ
M4A
NORMAL
M4B
M4C
VREFC
FBB_VREFC
TCK
TDI
TDO
TMS
ZQ_A
ZQ_B
RESET*
CLK*
RFU_A
RFU_B
R27 121R1%0402
R26 121R1%0402
Close to DRAM
Around DRAM
Right under DRAM
R5 X_549R1%0402
C392 X_C820p50X0402
R6 1KR0402
R38 X_931R1%0402
Q5 X_N-BSS138LT1G_SOT23-3-RH
VREFC IS NOT USED IN x16 CONFIGURATION
1K OHM PULL-DOWN IS IN PLACE OF THE 1.33K FOR R104
MICRO-STAR INT'L CO.,LTD.
DGPU_GDDR6 FrameBuffer B0
MS-16W1
Rev 10
Tuesday, August 13, 2019
Sheet 14 of 66
Vinafix.com


M1D
COMMON
M1A
NORMAL
M1B
NORMAL
M1C
COMMON
Close to DRAM
Around DRAM
Right under DRAM
Close to DRAM
Right under DRAM
Close to DRAM
Vinafix.com
MICRO-STAR INT'L CO.,LTD.
DGPU_GDDR6 FrameBuffer B1
MS-16W1
10
Tuesday, August 13, 2019

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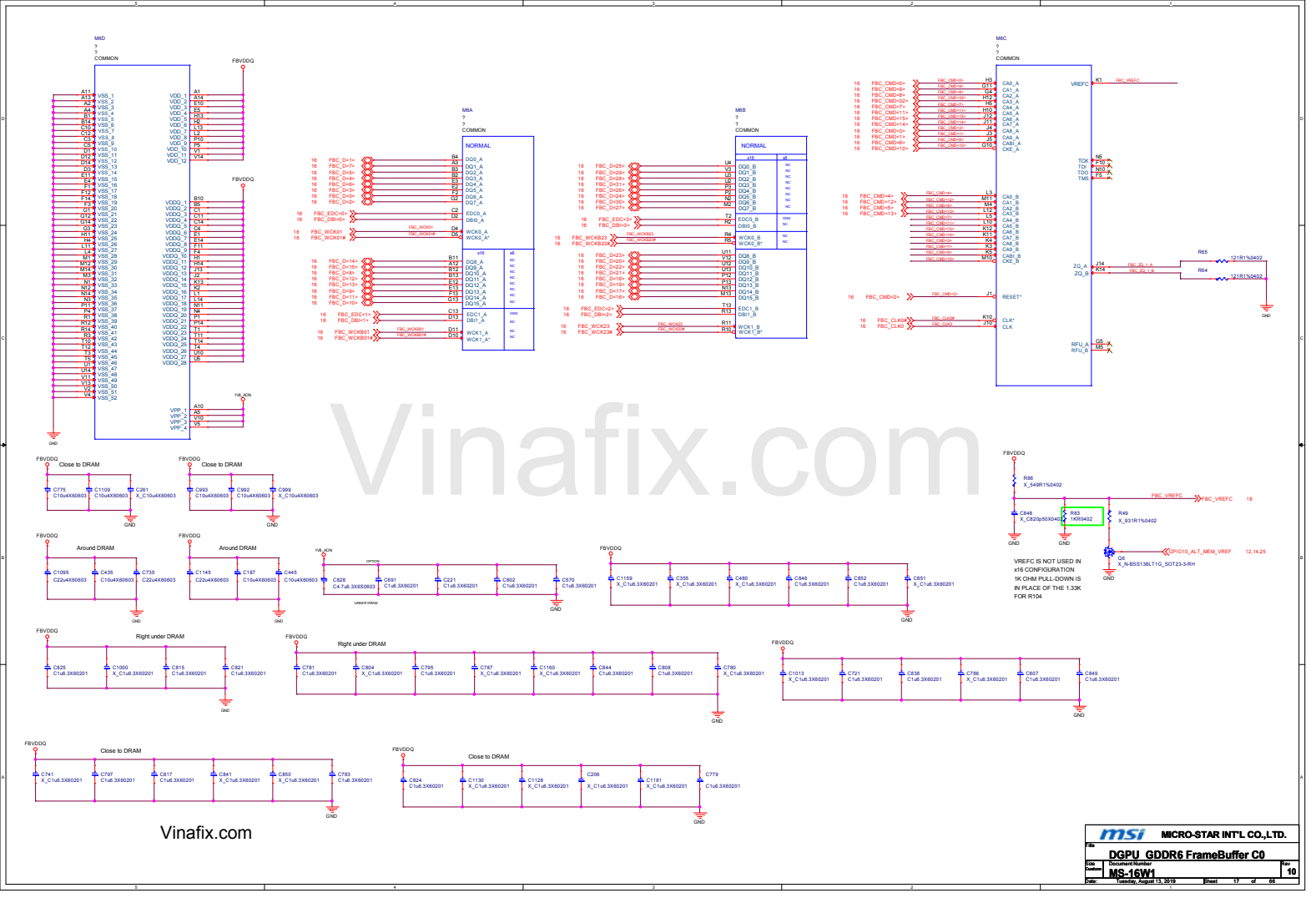
MSI	MICRO-STAR INT'L CO.,LTD.		
Title	DGPU_MEM IF C/D		
Size	Document Number		Rev
Custom	MS-16W1		1.0
Date:	Tuesday, August 13, 2019	Sheet 16 of 66	


M6D
COMMON
M6A
NORMAL
M6B
NORMAL
M6C
COMMON
FBVDDQ
Close to DRAM
Around DRAM
Right under DRAM
VREFC IS NOT USED IN x16 CONFIGRATION
1K OHM PULL-DOWN IS IN PLACE OF THE 1.33K FOR R104
MICRO-STAR INT'L CO.,LTD.
DGPU GDDR6 FrameBuffer C0
MS-16W1
Tuesday, August 13, 2019
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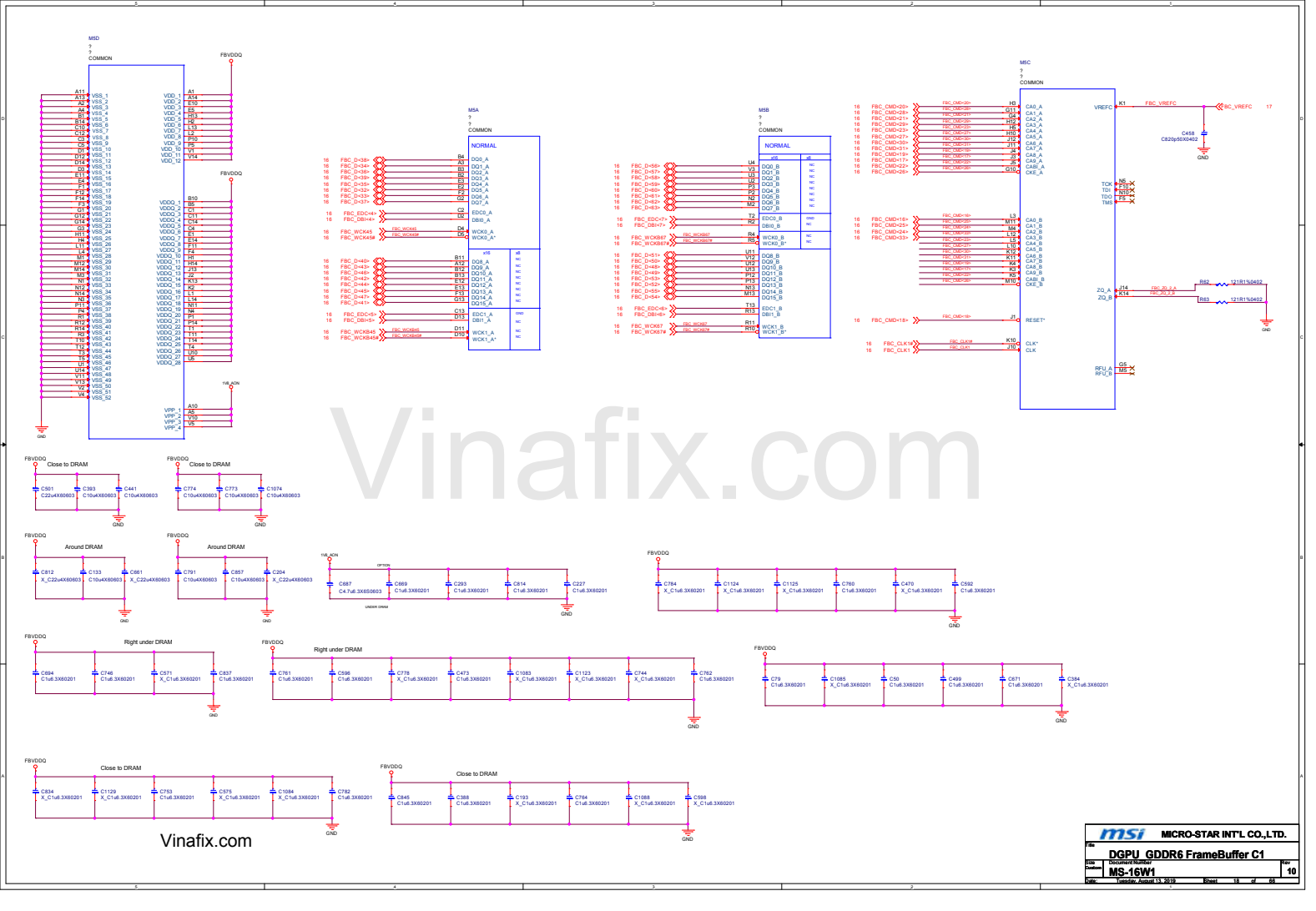
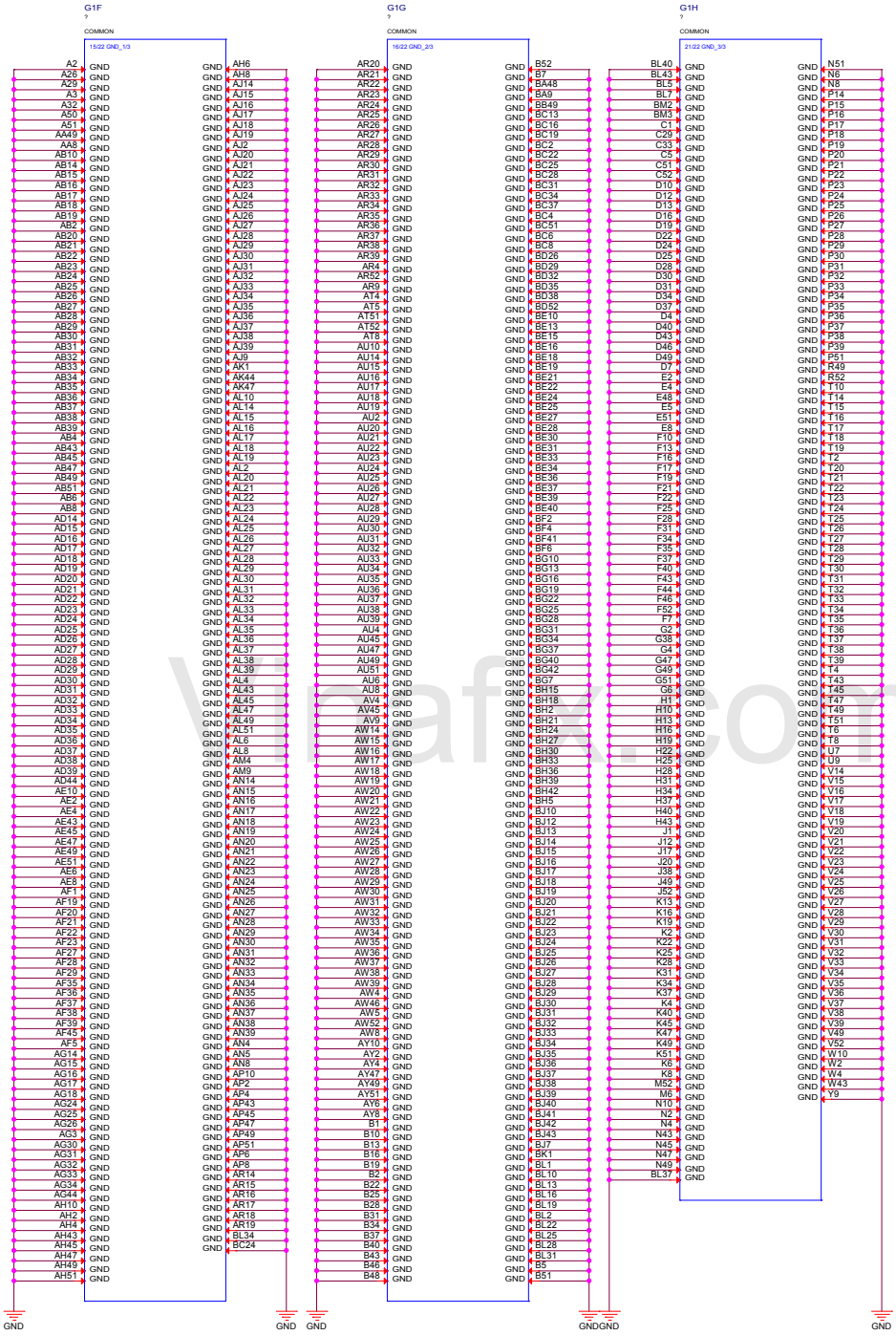

MSD
COMMON
MSA
NORMAL
MSB
NORMAL
MSC
COMMON
Close to DRAM
Around DRAM
Right under DRAM
Close to DRAM
Close to DRAM
Vinafix.com
MICRO-STAR INT'L CO.,LTD.
DGPU_GDDR6 FrameBuffer C1
MS-16W1
10
Tuesday, August 13, 2019



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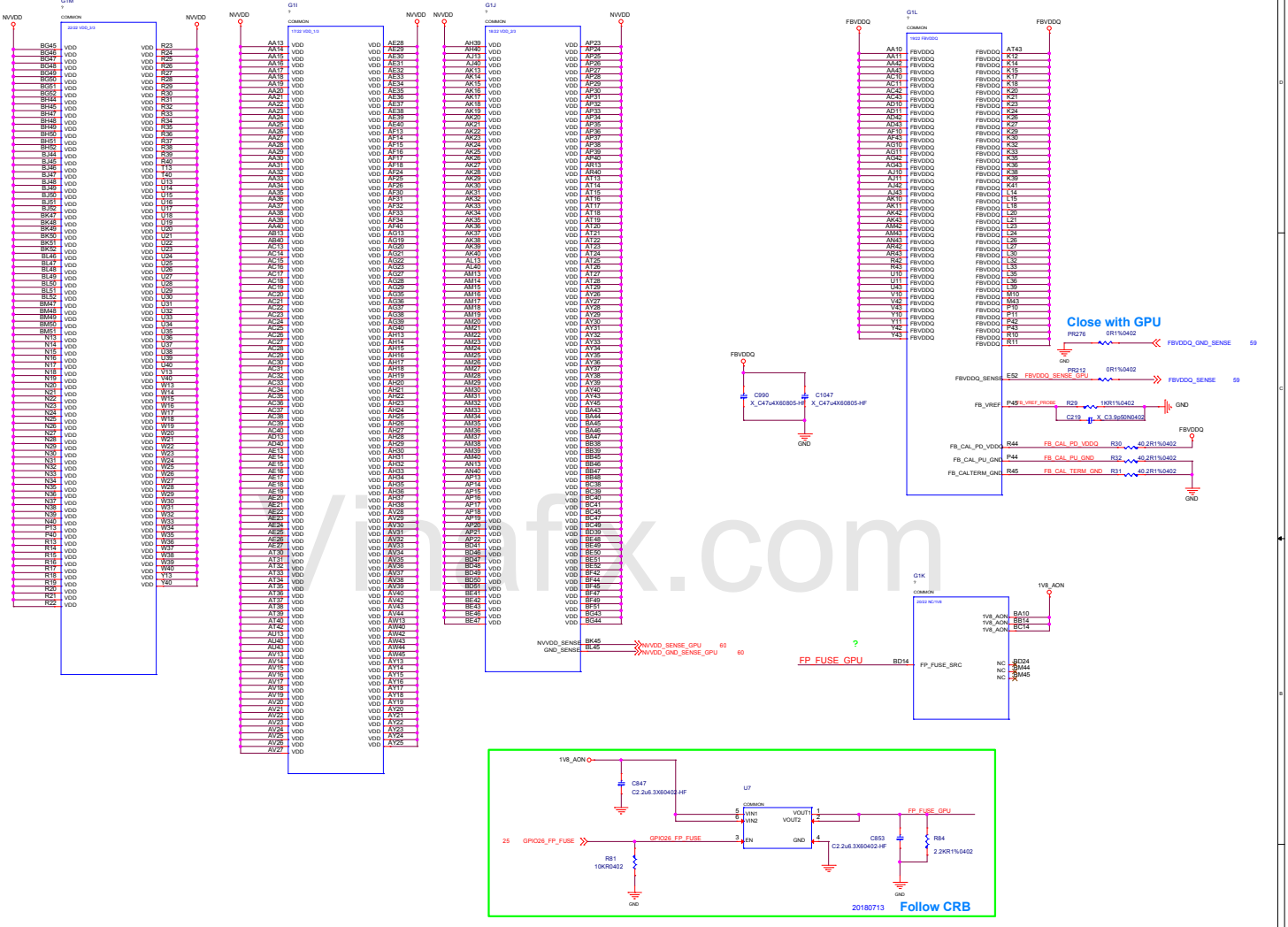
msi MICRO-STAR INT'L CO.,LTD.			
Title: DGPU GND			
Size: Custom	Document Number: MS-16W1		Rev: 10
Date: Tuesday, August 13, 2019	Sheet 19 of 66		



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MICRO-STAR INT'L CO.,LTD.			
Title: GPU Power			
Size:	Document Number: MS-16W1	Rev: 10	
Date: Tuesday, August 13, 2019	Sheet 20 of 66		

GPU Decoupling

FBVDDQ_GPU

FBVDDQ

24x 1uF(Under GPU)
8 x 10uF(Under GPU)

4 x 10uF(Near GPU)
9 x 22uF(Near GPU)

GPU DECOUPLING A

NVVDD

NVVDD+NVDDS

93 x 1uF X6S0201(Under GPU)
23 x 10uF X6S0603(Under GPU)
4 x 22uF X6S0805(Under GPU)
3 x 47uF X6S0805(Under GPU)

2 x 470uF(Near GPU)

1V8_AON

3x 1uF X6S 0201 (Under GPU)

3 x 1uF X6S 0402(Near GPU)
3 x 4.7uF X6S 0603(Near GPU)

1V8_AON

Partition A

Partition B

Partition C

Partition D

Place Close to GPU

Place Close to GPU

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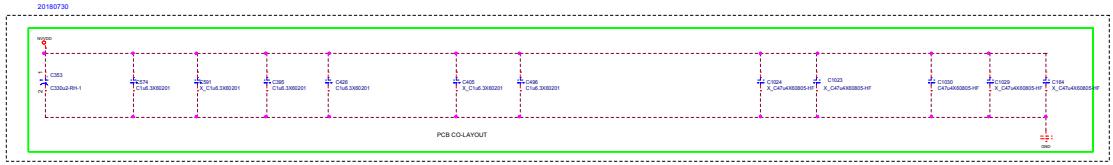
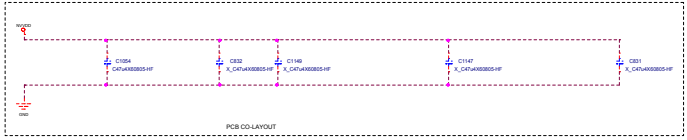
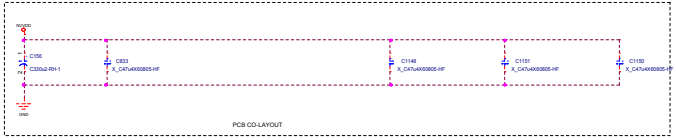
MICRO-STAR INT'L CO.,LTD.	
DGPU_GPU DECOUPLING A	
Model Name: MS-16W1	Rev: 19

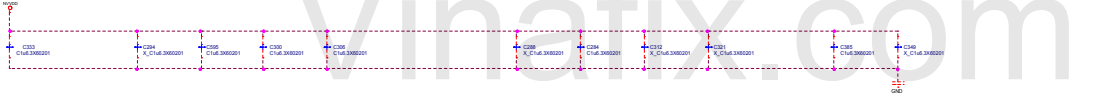
GPU DECOUPLING
B

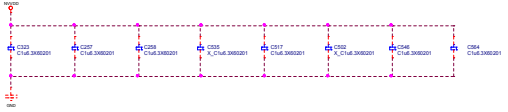
GPU Decoupling

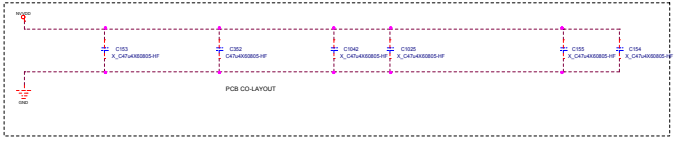








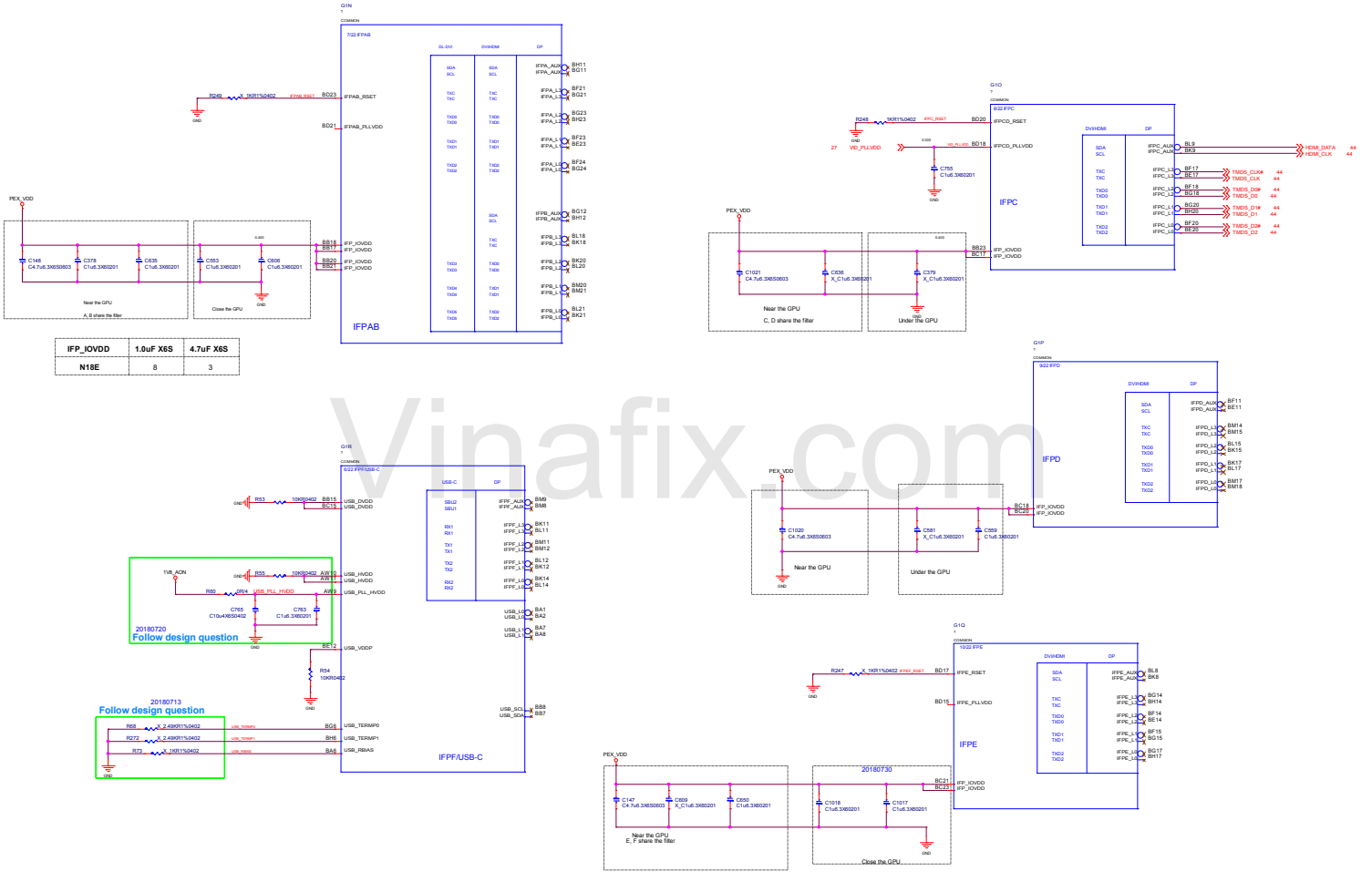




Vinafix.com

MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_GPU DECOUPLING B
Size	Document Number: MS-16W1
Rev	10
Date	Tuesday, March 13, 2018
Sheet	14 of 38

DACA,Display IF



IFP_IOVDD	1.0uF X6S	4.7uF X6S
N18E	8	3

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MICRO-STAR INT'L CO.,LTD.

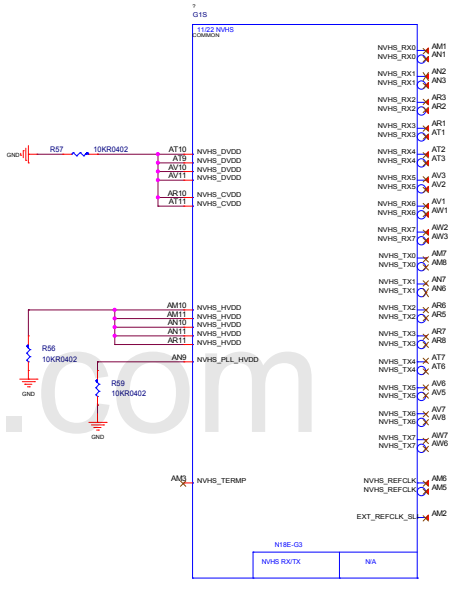
DGPU_DACA,Display IF

MS-16W1

Rev: 1.0

Tuesday, August 13, 2019

Sheet 23 of 66



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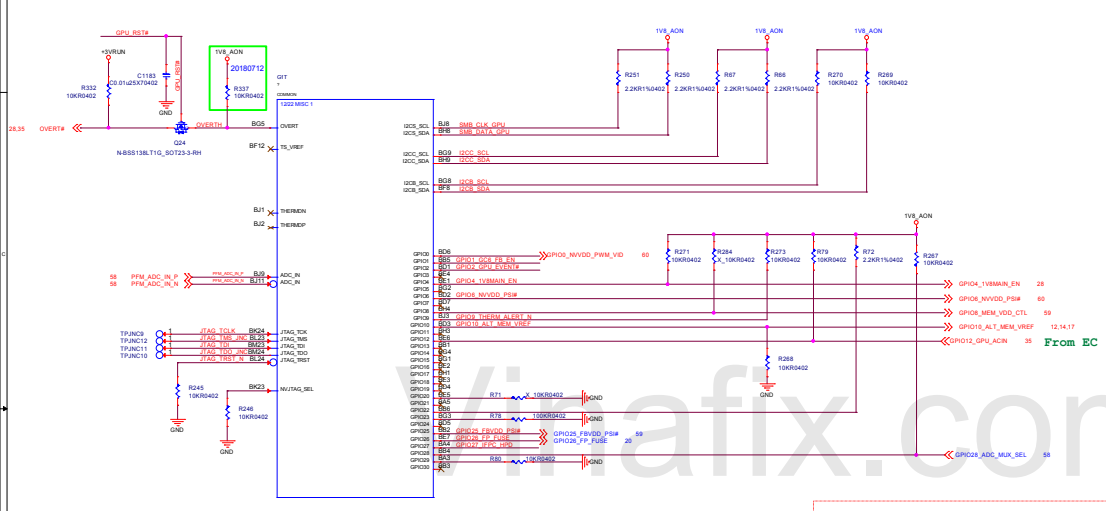
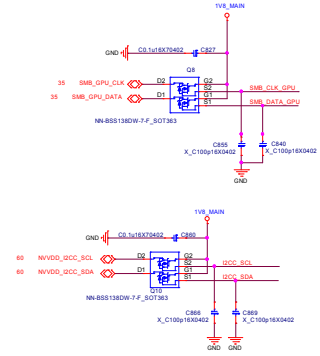
MICRO-STAR INT'L CO.,LTD.

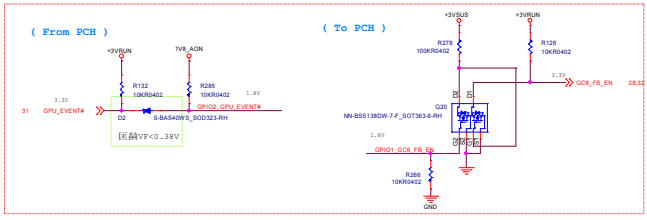
Title: DGPU NVLink & Framelock

Size: Custom | Document Number: MS-16W1 | Rev: 10

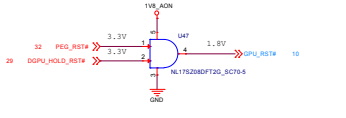
Date: Tuesday, August 13, 2019 | Sheet 24 of 66





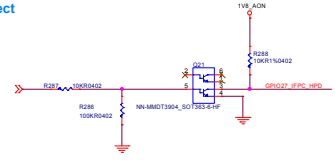


Pin Name	Normal function	I/O	Functional Description	Recommended Default Pull-up or Pull-down
GPIO0	**NVDD_PWM_VID**	O	PWM Output to control NVVDD	0 to 1V8 PWM output (No Pull Up or Down)
GPIO1	GC6_FB_EN	O	FB Enable for GC6 2.1	10K pull-down
GPIO2	GPU_EVENT#	I	GPU wake signal for GC6 2.1	10K pull-up to 1V8 _AON
GPIO3	**UNUSED**	O		
GPIO4	**1V8_MAIN_EN**	O	GPU POWER Sequencing for GC6 2.1	10K pull-up to 1V8 _AON
GPIO5	**FRAME_LOCK**	I	Active low Frame Lock	10K pull-up to 1V8 _AON
GPIO6	**NVDD_PSI**	O	Phase shedding	10K pull-up to 1V8 _AON
GPIO7	LCD_BL_PWM	O	LCD Panel Backlight PWM	100K pull-down
GPIO8	**MEM_VDD_CTL**	O	Memory Voltage Control	pull-up/pull-down to set the FBVDDQ 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	10K pull-down
GPIO11	LCD_VCC	O	Panel Power Enable	10K pull-down
GPIO12	PWR_LEVEL	I	AC power detect or power supply overdraw input	10K pull-up to 1V8_AON
GPIO13	**UNUSED**	O		
GPIO14	**HPD_IFPA**	I	Hot Plug Detect for IFPA	10K pull-up to 1V8_AON
GPIO15	**HPD_IFPB**	I	Hot Plug Detect for IFPB	10K pull-up to 1V8_AON
GPIO16	**UNUSED**	O		
GPIO17	**HPD_IFPD**	I	Hot Plug Detect for IFPD	10K pull-up to 1V8_AON
GPIO18	**HPD_IFPE**	I	Hot Plug Detect for IFPE	10K pull-up to 1V8_AON
GPIO19	**Reserved**	O		
GPIO20	**NB_FGC6**			10K pull-down
GPIO21	**LCD_BLEN**		**LCD Panel Backlight Enable**	100K pull-down
GPIO22	**SWAPRDY_IN**			2.2K pull-up to 1V8_AON
GPIO23	**RASTER_SYNC1**			100K pull-down
GPIO24	HPD_IFPF/USBC_HPD or DONGLE_DET	I	**Hot Plug Detect for IFPF or USBC**	10K pull-up to 1V8_AON
GPIO25	**FBVDD_PSI**	O		
GPIO26	**FP_FUSE**			10K pull-down
GPIO27	**HPD_IFPC**	I	Hot Plug Detect for IFPC	10K pull-up to 1V8_AON
GPIO28	**INA_HT/ADC_MUX_SEL**	O		10K pull-up
GPIO29	**IDLE_IN_SW**	I		10K pull-down
GPIO30	**UNUSED**			



Hot Plug detect

HDMI



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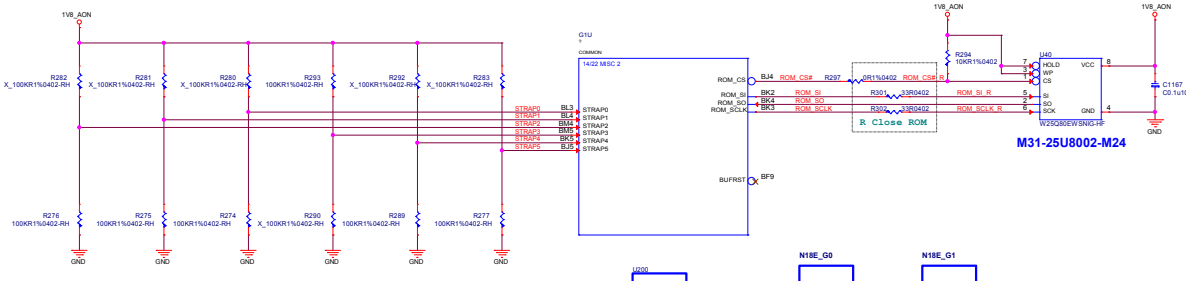
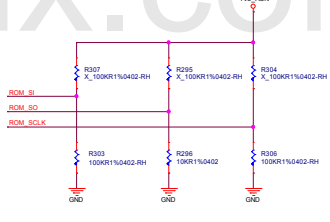
msi	MICRO-STAR INT'L CO.,LTD.		
Title	DGPU_GPIO,I2C		
Size: Custom	Document Number: MS-16W1		Rev: 1.0
Date: Tuesday, August 13, 2019		Sheet 25 of 66	



STRAP 5	STRAP 4	STRAP 3	
L	L	L	Optimus
L	L	H	Discrete
H	L	H	Discrete with Gsync

STRAP 2	STRAP 1	STRAP 0	N18E-G1		
L	L	L	0x0	Samsung K4Z80325BC-HC14	256M*16
L	L	H	0x1	Micron MT61K256M32JE-14:A	

			N18E-G1
ROM_SO	ROM_SI	ROM_SCLK	FS_OVERT# Function
L	L	L	ENABLED
L	L	H	DISABLED
L	H	L	Invalid Do not configure
L	H	H	
H	H	H	
H	H	M	



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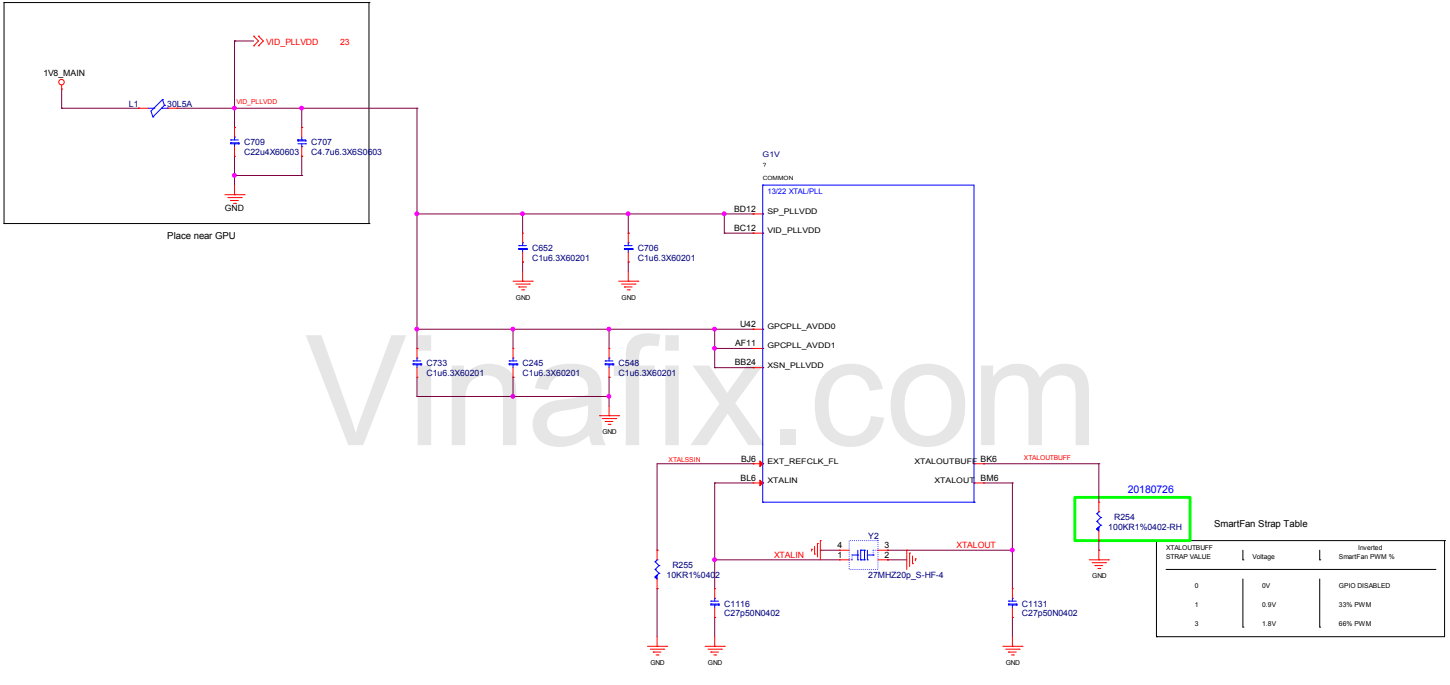
msi	MICRO-STAR INT'L CO.,LTD.	
Title	DGPU_ROM,HW Straps	
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 26 of 66	

Check!!!!!!



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MICRO-STAR INT'L CO.,LTD.

Title: DGPU MIO & XTAL

Size: A3 | Document Number: MS-16W1 | Rev: 10

Date: Tuesday, August 13, 2019 | Sheet 27 of 66

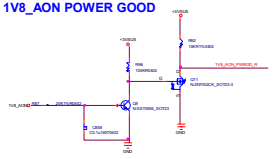
nVIDIA Power Sequence Control

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

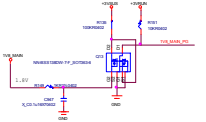
Power down = NVDDS -> PEX_VDD -> NVVDD/FBVDDQ -> 3V3_NV -> 1V8_MAIN -> 1V8_AON

1V8_AON

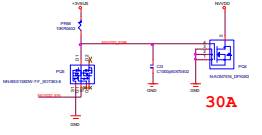
1V8_AON POWER GOOD



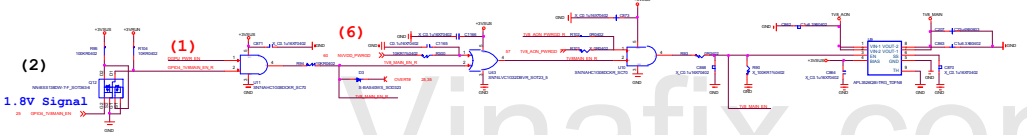
1V8_MAIN POWER GOOD

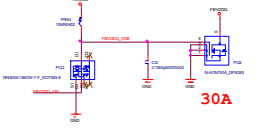


Discharge

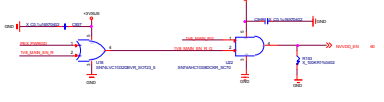


1V8_MAIN

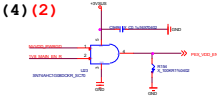


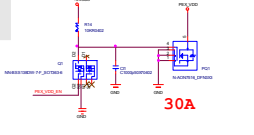


NVVDD



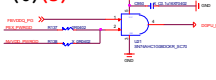
PEX_VDD

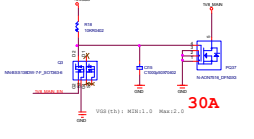




FBVDDQ

DGPU POWER GOOD





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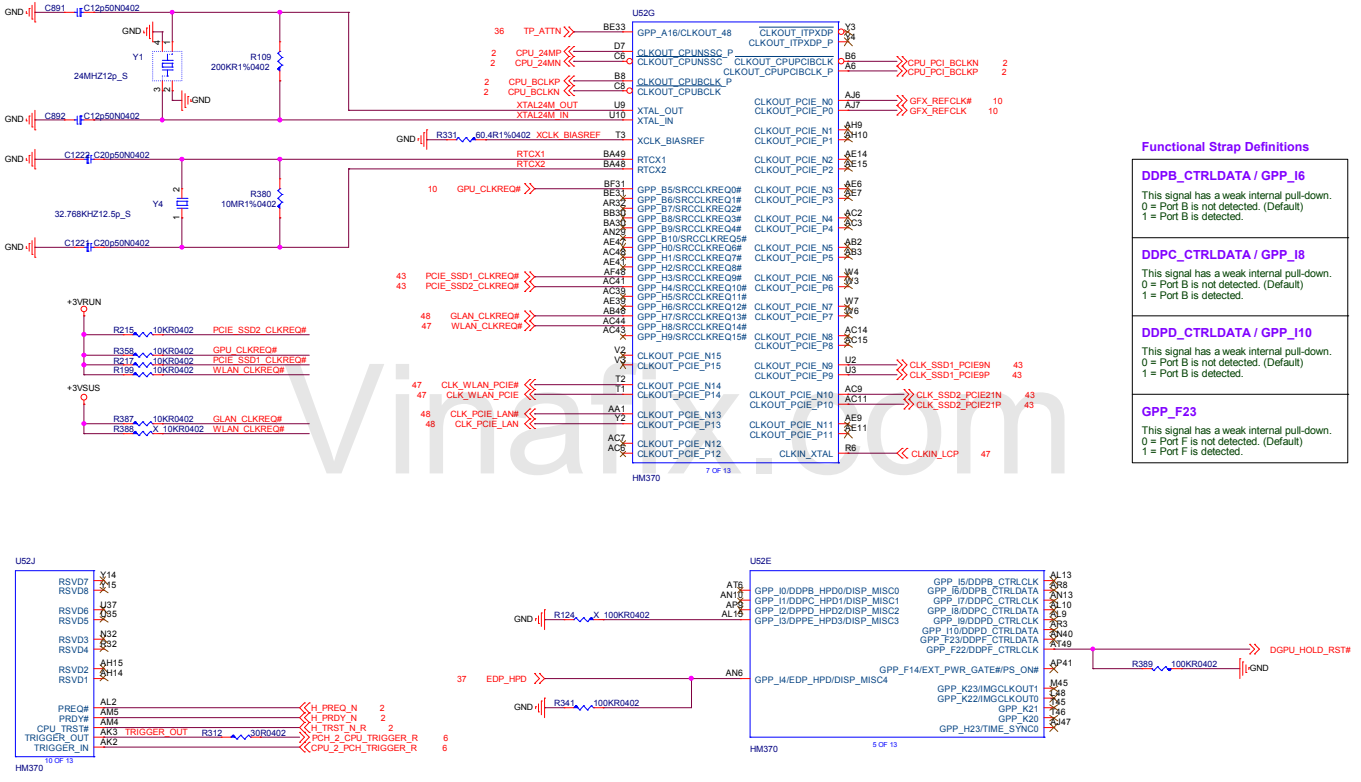
msi	MICRO-STAR INT'L CO.,LTD.
Title	DGPU_POWER_Sequence control
Size	Document Number: MS-16W1
Date	Sheet 10 of 10

HM370 (RTC/PCIE_Clock/Clock/RSVD)



Functional Strap Definitions

DDPB_CTRLDATA / GPP_I6

This signal has a weak internal pull-down.
0 = Port B is not detected. (Default)
1 = Port B is detected.

DDPC_CTRLDATA / GPP_I8

This signal has a weak internal pull-down.
0 = Port B is not detected. (Default)
1 = Port B is detected.

DDPD_CTRLDATA / GPP_I10

This signal has a weak internal pull-down.
0 = Port B is not detected. (Default)
1 = Port B is detected.

GPP_F23

This signal has a weak internal pull-down.
0 = Port F is not detected. (Default)
1 = Port F is detected.

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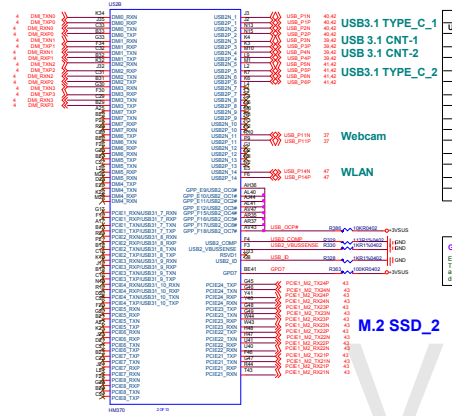
MICRO-STAR INT'L CO.,LTD.

Title	PCH-1(CLK/DDI)	
Size	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 29 of 66	

HM370 (DMI/PCIE/USB3.1/USB2.0/CNVi)



USB3.1 TYPE_C_1
USB 3.1 CNT-1
USB 3.1 CNT-2
USB3.1 TYPE_C_2
Webcam
WLAN
M.2 SSD_2

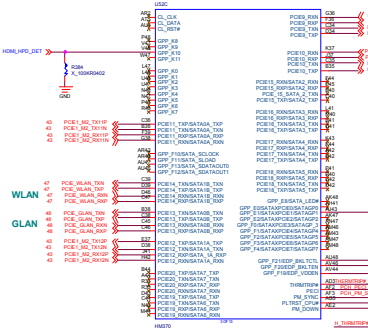
USB			
USB 2.0	USB 3.1	Device	Note
1	1	USB TYPE_C-1	
2	3	USB TYPE_C-2	
3	3	USB TYPE_A-1	
4	4	USB TYPE_A-2	
5	5	USB TYPE_A-3	
6			
7			
8			
9			
10			
11		WebCam	
12			
13			
14		WLAN	

High Speed I/O Ports			
	HM370		Device
1	USB3.1 Gen 1		NC
2	USB3.1 Gen 1		NC
3	N/A		NC
4	N/A		NC
5	INTEL LAN Only		NC
6	N/A		NC
7	N/A		NC
8	N/A		NC
9	PCIE/LAN		
10	PCIE	PCIE Configurable M.2	M.2 SSD-1
11	PCIE/SATA0A		
12	PCIE/LAN/SATA1A		
13	PCIE/LAN/SATA0B		LAN
14	PCIE/SATA1B		WLAN
15	PCIE		NC
16	PCIE		NC
17	PCIE/SATA4		HDD
18	PCIE/SATA5		NC
19	PCIE		NC
20	PCIE		NC
21	PCIE		
22	PCIE		NC
23	PCIE		
24	PCIE		

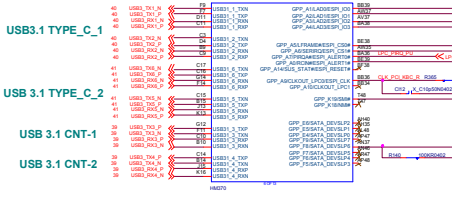
SATA Lane 0 has the flexibility to be mapped to PCIE 11 or 13
SATA Lane 1 has the flexibility to be mapped to PCIE 12 or 14

GPP_K10	
N17P	PULL LOW
N18P	PULL HIGH

GPD7
External pull-up is required. Recommend 100K.
This strap should sample HIGH. There should NOT be any on-board device driving it to opposite direction during strap sampling



PCIE 9-12(M2)
M.2 SSD_1



GPP_A6
PCI Interrupt Request Ax
Note: An external Pull-up is required

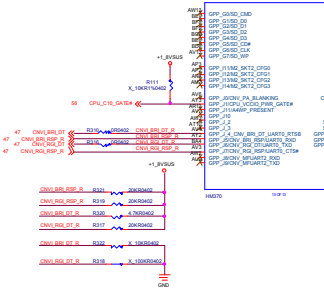
GPP_A7
PCI Interrupt Request Ax
Note: An external Pull-up is required

GPP_A14
LPC Mode - Suspend Status:
This signal is asserted by the PCH to indicate that the system will be entering a low power state soon.

GPP_J4 / CNV_BRI_DT
This signal has a weak internal pull-down.
An external pull-up is required on this strap since 38.4 MHz XTAL is not supported on the PCH.
0 = 38.4 XTAL frequency selected. (Default)
1 = 24MHz XTAL frequency selected.

GPP_J6 / CNV_RGI_DT
An external pull-up or pull-down is required.
0 = Integrated CNVi enable.
1 = Integrated CNVi disable.

GPP_J9
The signal has a weak internal pull-down
0 = VCCSPI is connected to 3.3V rail
1 = VCCSPI is connected to 1.8V rail



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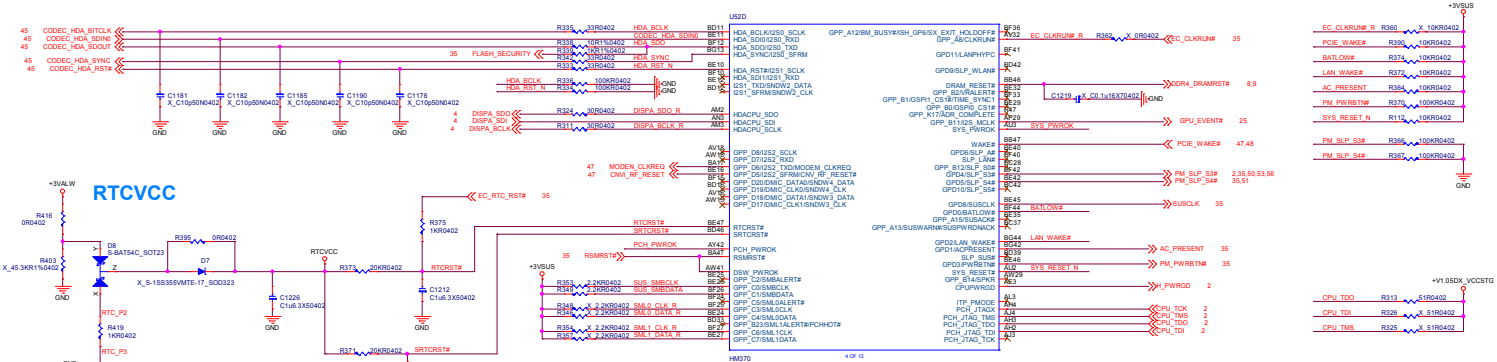
MICRO-STAR INT'L CO.,LTD.			
Title: PCH-2(DMI/PCIE/USB/SATA)			
Size:	Document Number: MS-16W1	Rev: 10	
Date: Tuesday, August 13, 2019	Sheet 30 of 56		


RTCVCC
N32-10200Q0-A81
D06-0105701-K26
PCH_PWROK
SYS_PWROK
HDA_SDO / I2S0_TXD
SMBALERT# / GPP_C2
SML0ALERT# / GPP_C5
SML1ALERT# / PCHHOT# / GPP_B23
SPKR / GPP_B14
DG/ RTC Well Input Strap
RSMRST# & DSW_PWROK, PCH_PWROK : PD
RTCRST#, SRTCRST#, INTRUDER# : PU
ALLSYSPG delay 99ms
to generated EC_PCH_PWROK
MICRO-STAR INT'L CO.,LTD.
PCH-3(HDA/RTC/SMBUS)
MS-16W1
10

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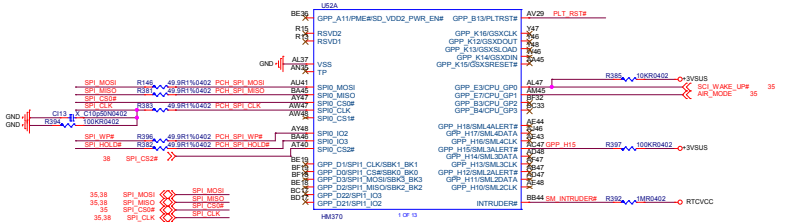
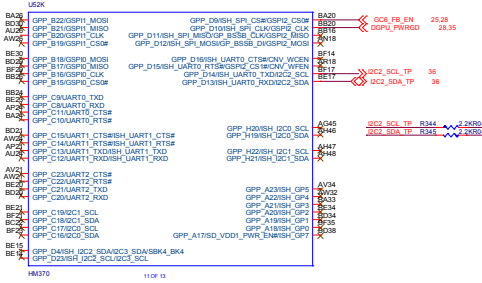
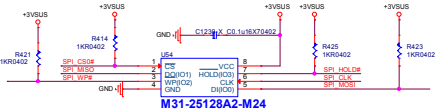
HM370 (UART/I2C/SPI)



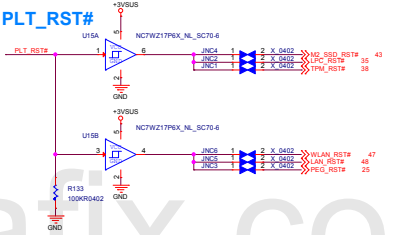


SPI FLASH ROM 16MB



Supported types of Flash Memory
Command:0x03 & 0x0B & 0xBB

PLT_RST#



Functional Strap Definitions

SML3ALERT# / GPP_H15

External pull-up is required.
Recommend 100K if pulled up to 3.3V or 75K if pulled up to 1.8V.

GSPI1_MOSI / GPP_B22

This Signal has a weak internal pull-down.

Bit 6 Boot BIOS Destination	
0	SPI (Default)
1	LPC

GSPI0_MOSI / GPP_B18

The signal has a weak internal pull-down.
0 = Disable No Reboot mode. (Default)
1 = Enable No Reboot mode

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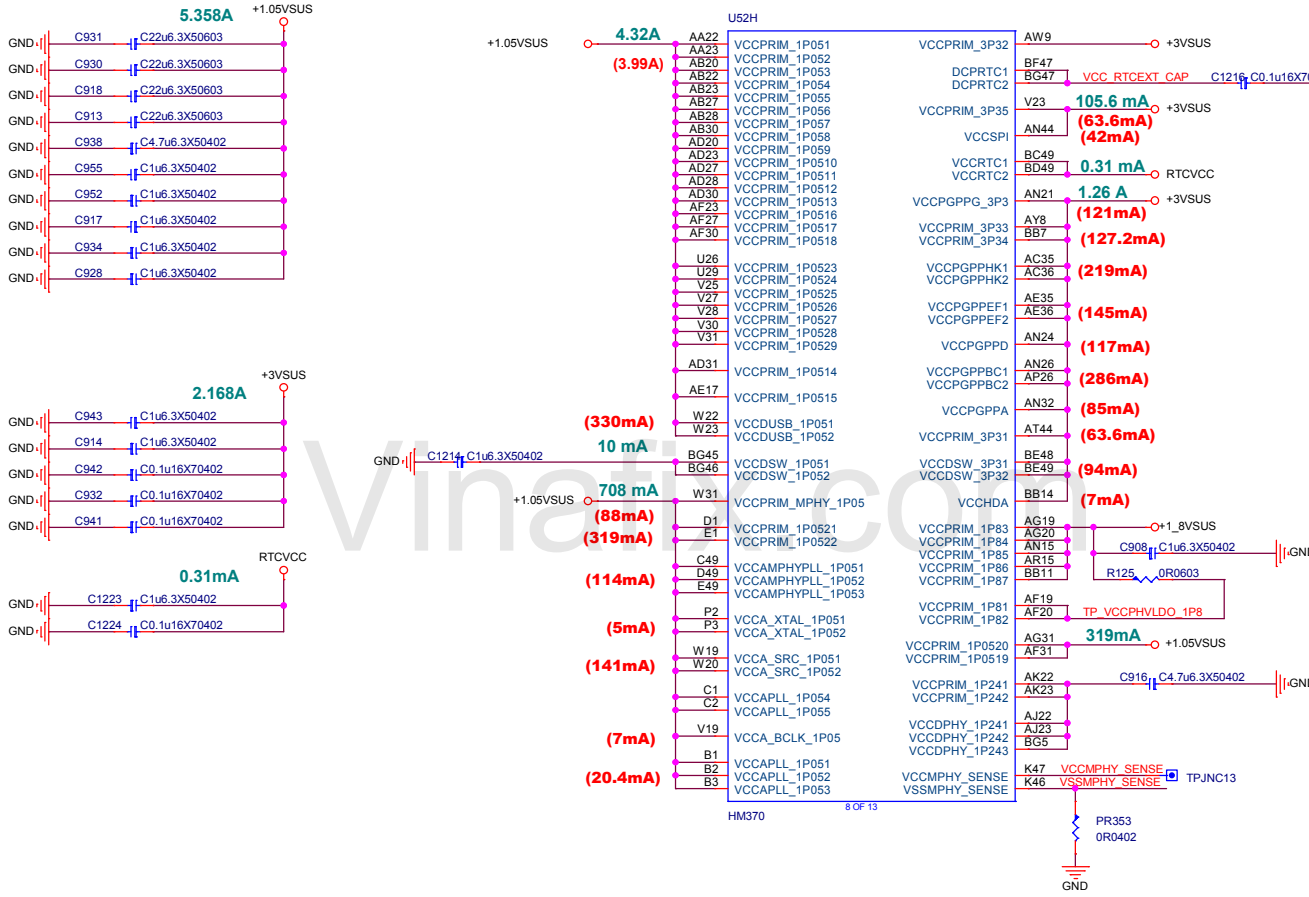
msi	MICRO-STAR INT'L CO.,LTD.	
Title	PCH-4(SPI/GPIO)	
Size	Document Number MS-16W1	Rev 10
Date: Tuesday, August 13, 2019	Sheet 32 of 68	

HM370 (Power)



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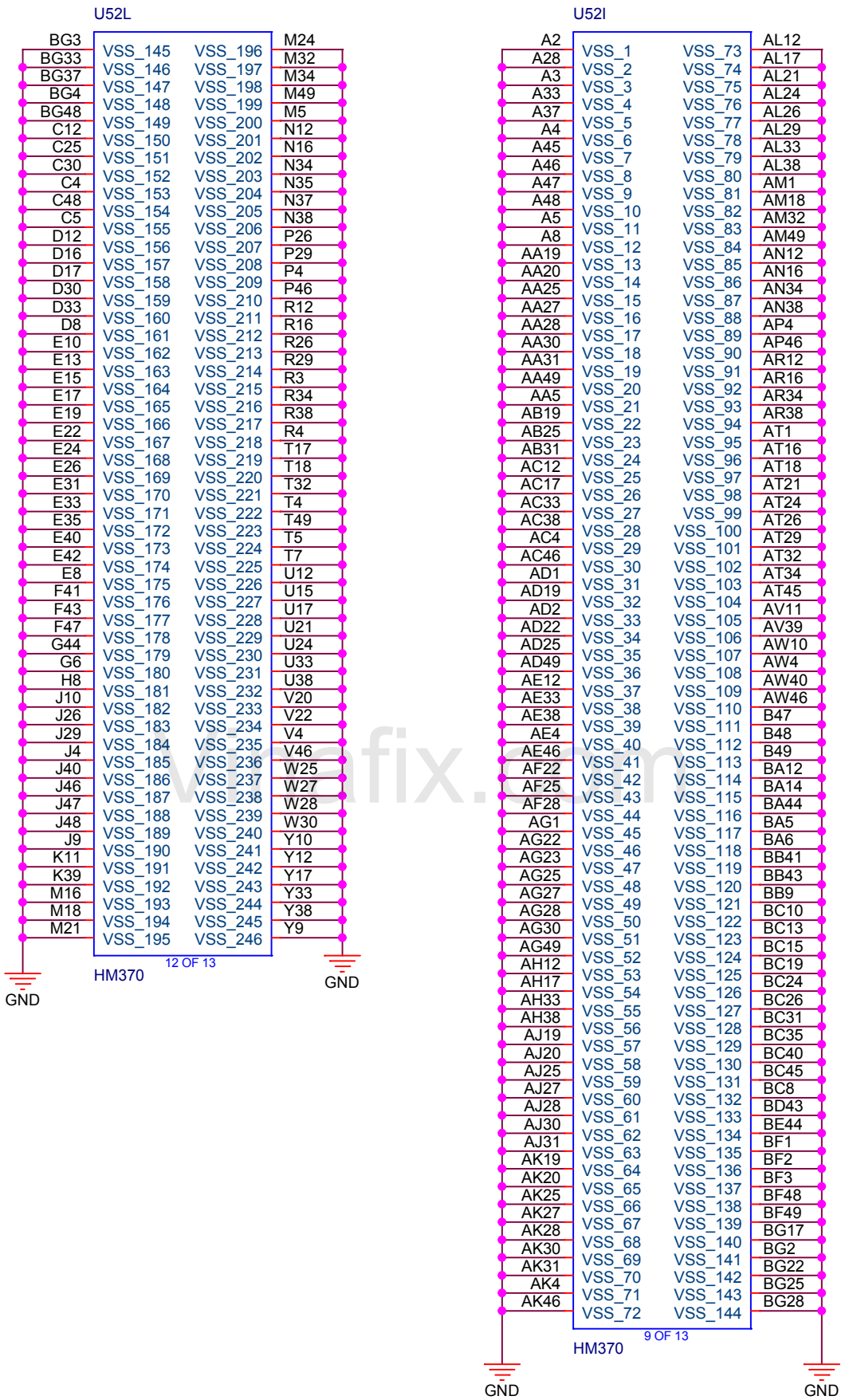
MICRO-STAR INT'L CO.,LTD.

Title: PCH-5(Power)

Size: Custom | Document Number: MS-16W1 | Rev: 10

Date: Tuesday, August 13, 2019 | Sheet 33 of 66

PCH-H(GND)



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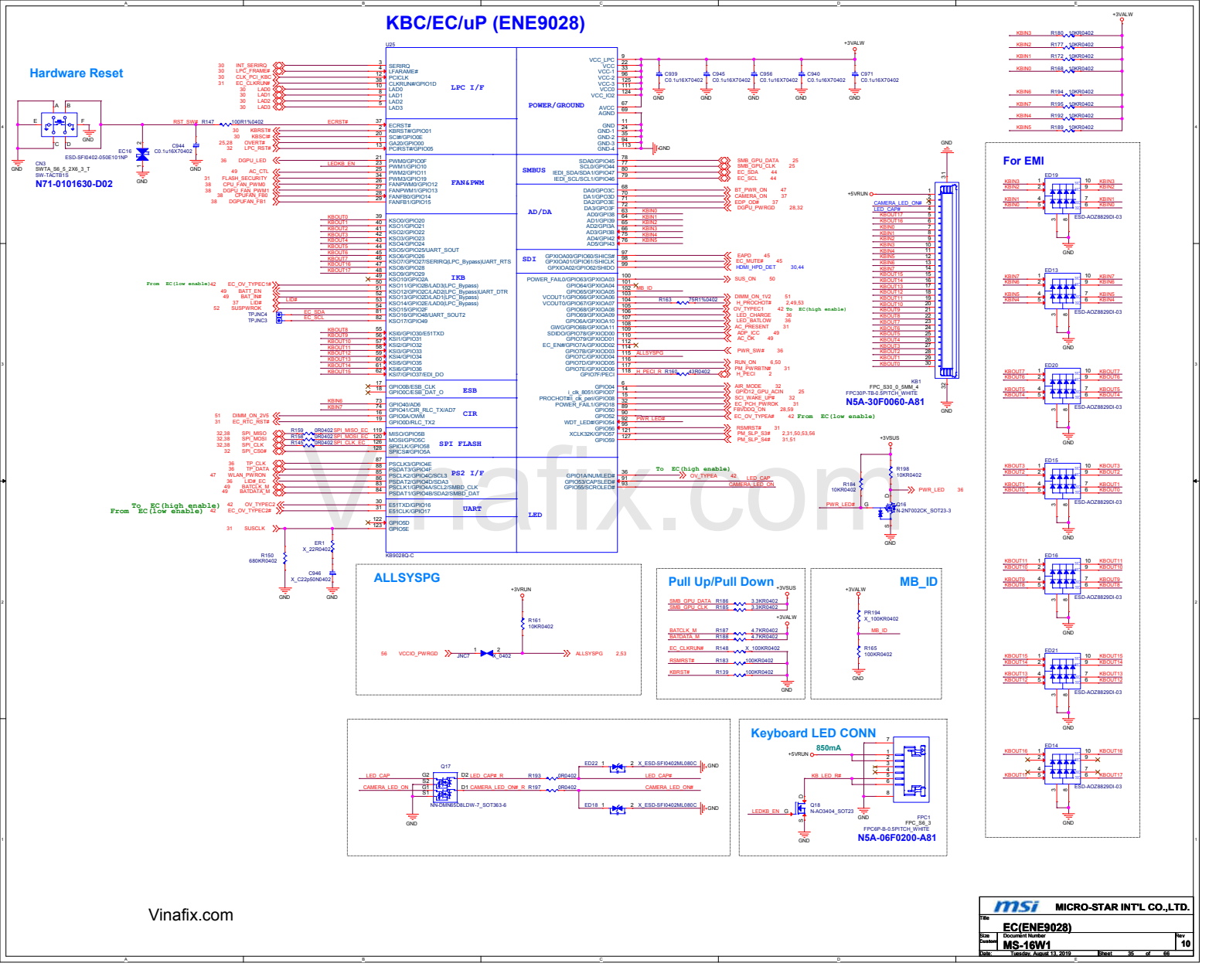
MICRO-STAR INT'L CO.,LTD.		
Title: PCH-6(GND)		
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 34 of 66	

KBC/EC/uP (ENE9028)



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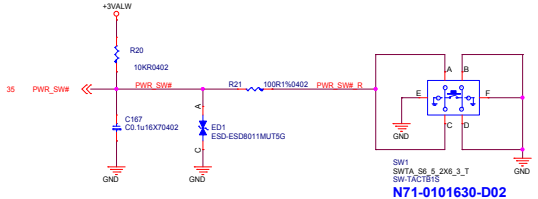
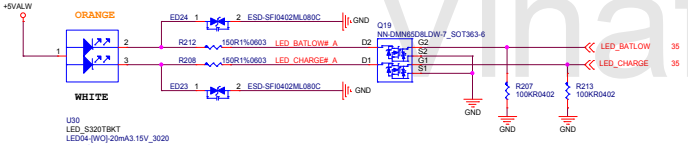
Power Switch /Touch Pad / LED

Power Switch

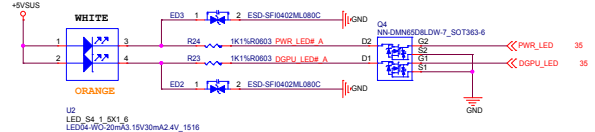


N71-0101630-D02

LED



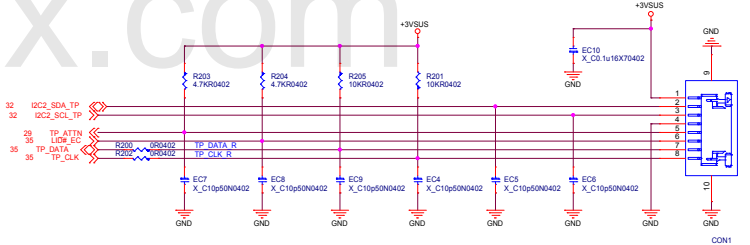
D0C-040M700-L05



D0C-040H800-L05

Vinafix.com

Touch Pad Board



N5A-08F0170-A81

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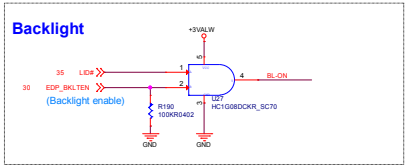
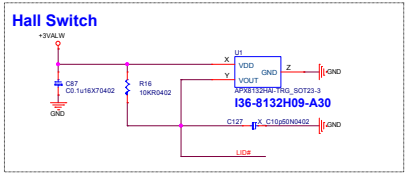
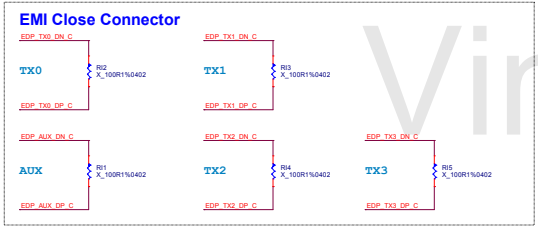
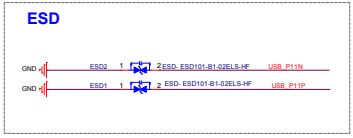
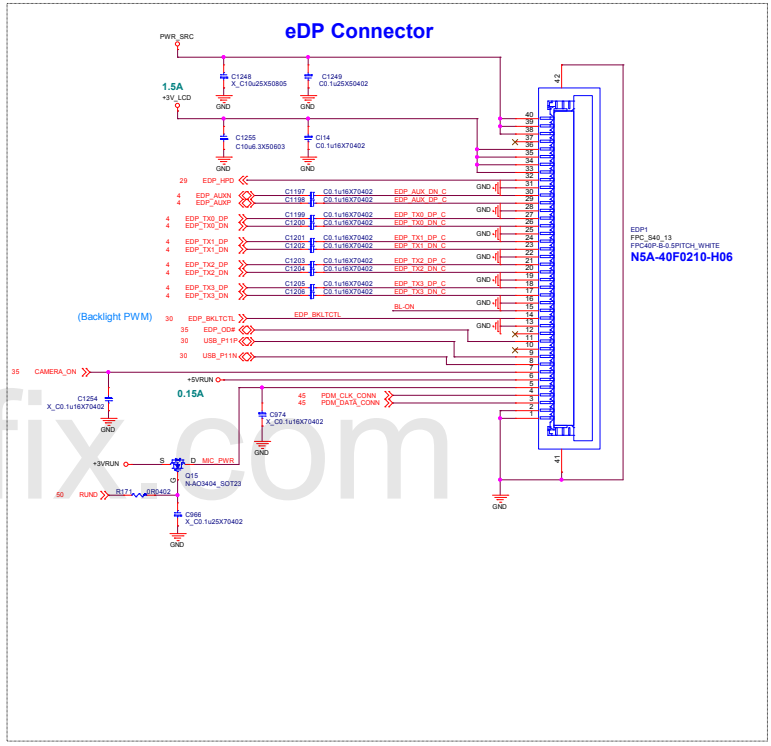
msi	MICRO-STAR INT'L CO.,LTD.		
Title	Power Switch/FAN/Touch Pad/LED		
Size: Custom	Document Number: MS-16W1		Rev: 10
Date: Tuesday, August 13, 2019		Sheet 38 of 66	











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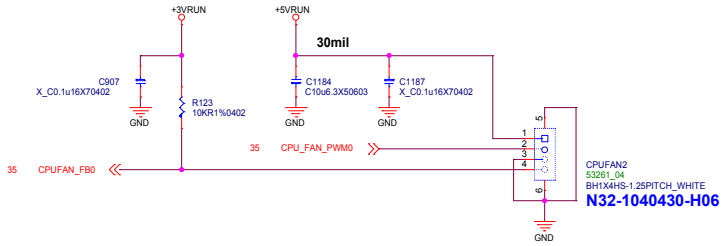
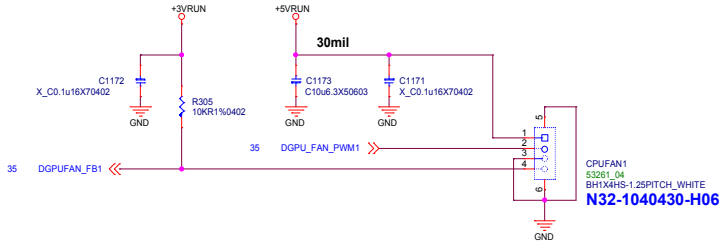
msi	MICRO-STAR INT'L CO.,LTD.	
Title: eDP Connector/Camera/LID		
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 37 of 68	

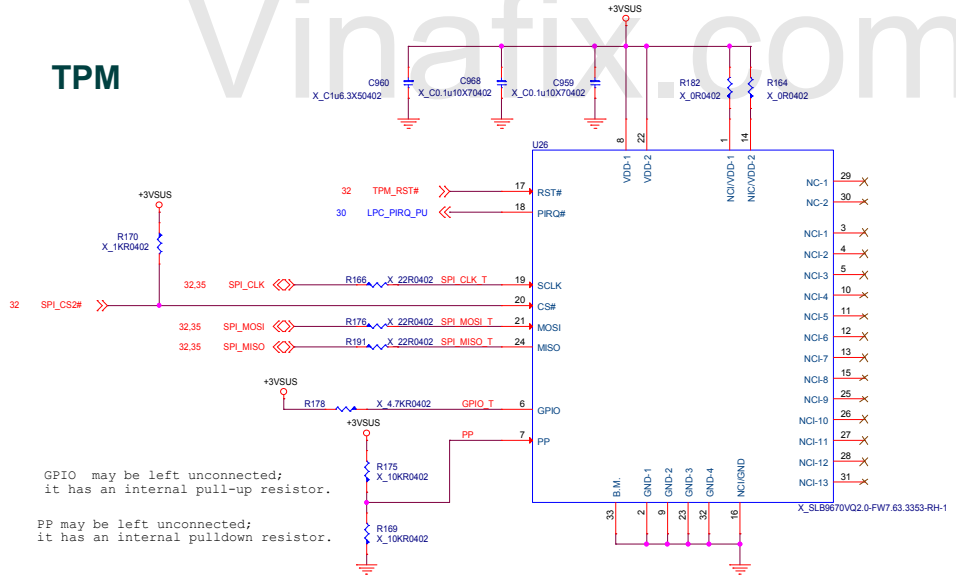
CPU FAN



DGPU FAN



TPM



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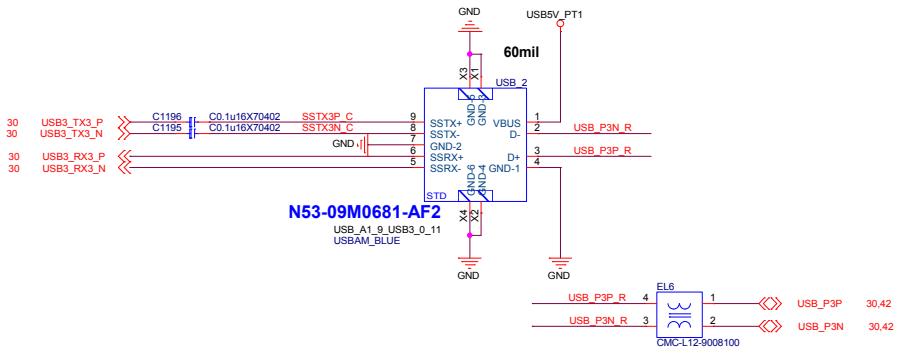
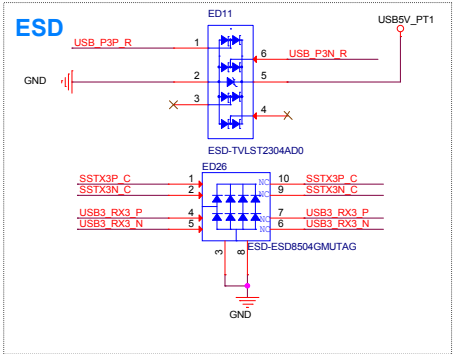
msi	MICRO-STAR INT'L CO.,LTD.	
Title	FAN	
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 38 of 66	

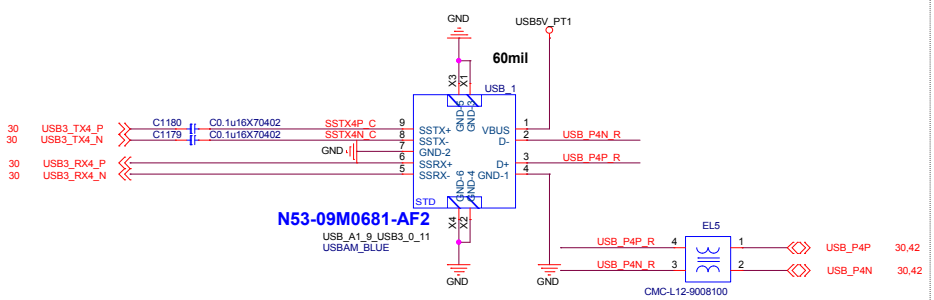
USB3.0 CNT-1



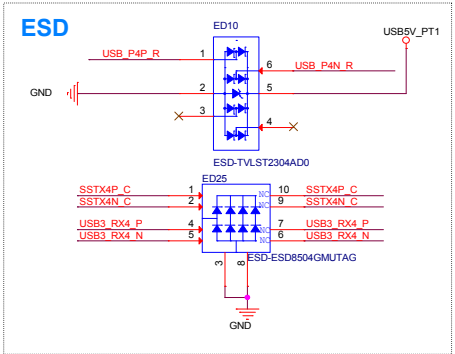
ESD



USB3.0 CNT-2



ESD



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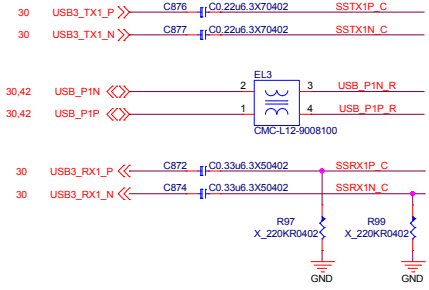
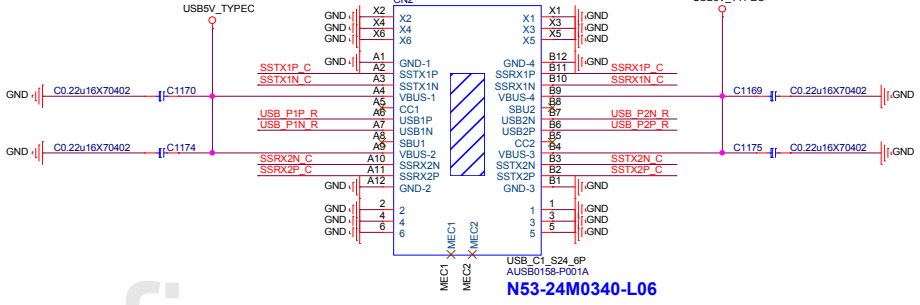
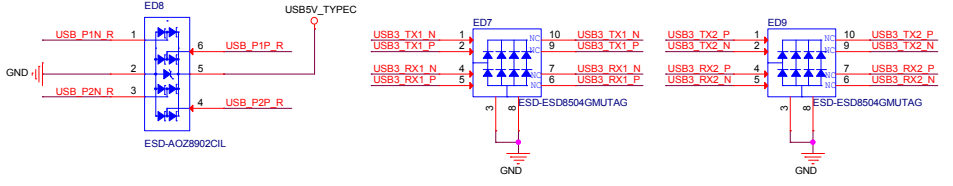
msi	MICRO-STAR INT'L CO.,LTD.	
Title	USB 3.0 TYPE_A	
Size	Document Number MS-16W1	Rev 10
Date: Tuesday, August 13, 2019	Sheet 39 of 66	

USB 3.0 TYPE_C_1





ESD



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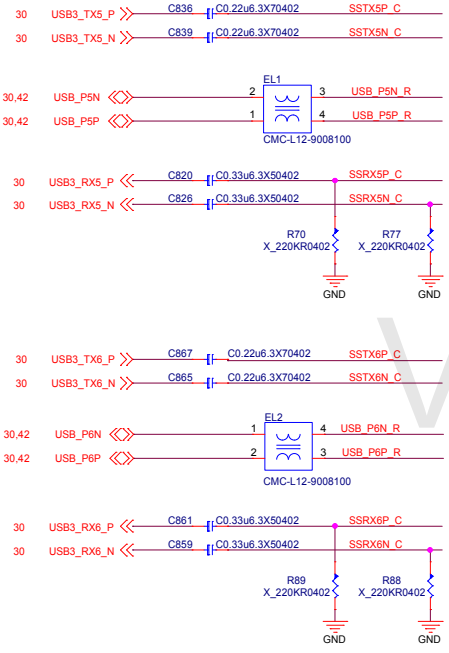
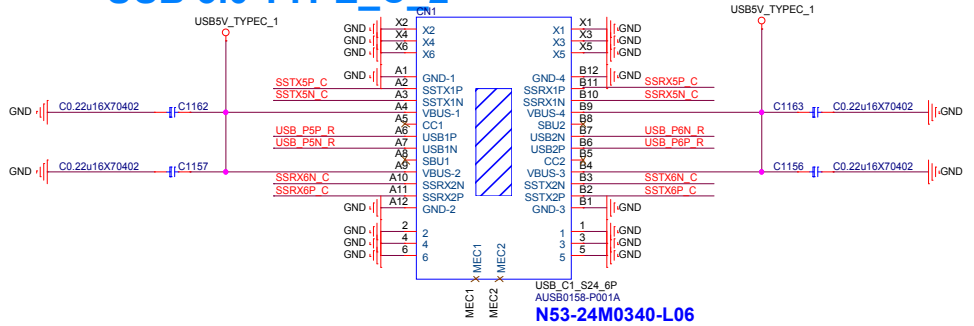
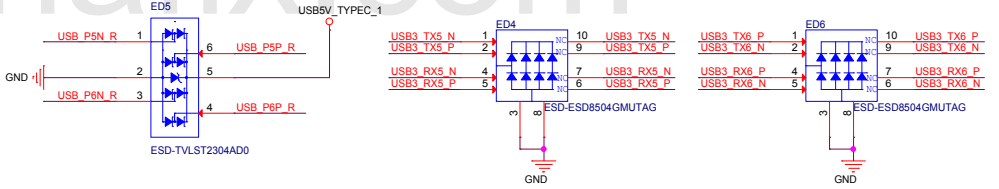
msi MICRO-STAR INT'L CO.,LTD.			
Title: USB 3.0 TYPE_C			
Size: Custom	Document Number: MS-16W1		Rev: 10
Date: Tuesday, August 13, 2019	Sheet 40 of 66		

USB 3.0 TYPE_C_2





ESD



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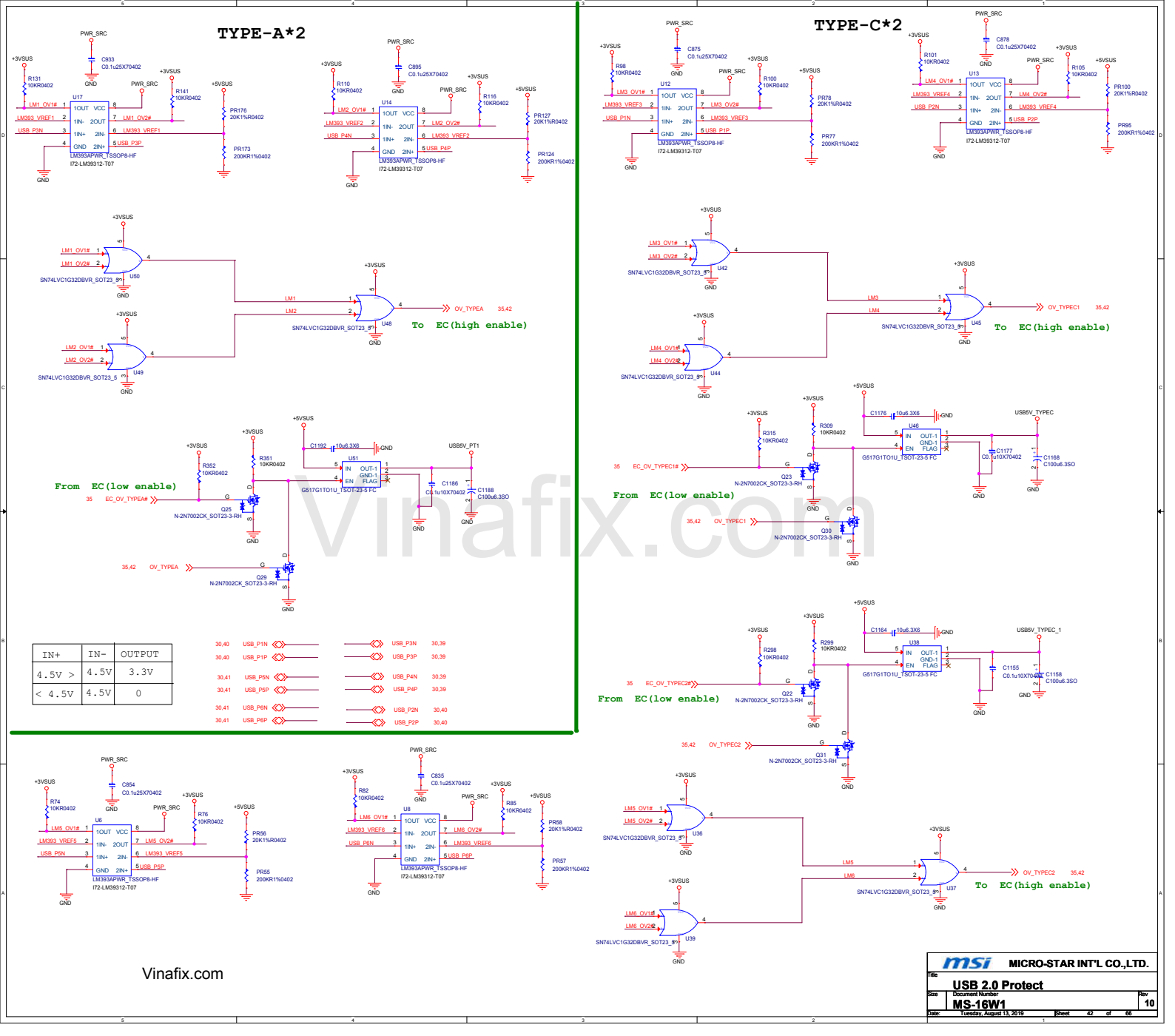
MICRO-STAR INT'L CO.,LTD.

Title: USB 3.0 TYPE_C

Size: Custom | Document Number: MS-16W1 | Rev: 10

Date: | Sheet 41 of 66


TYPE-A*2
TYPE-C*2
To EC(high enable)
From EC(low enable)
IN+ | IN- | OUTPUT
4.5V > | 4.5V | 3.3V
< 4.5V | 4.5V | 0
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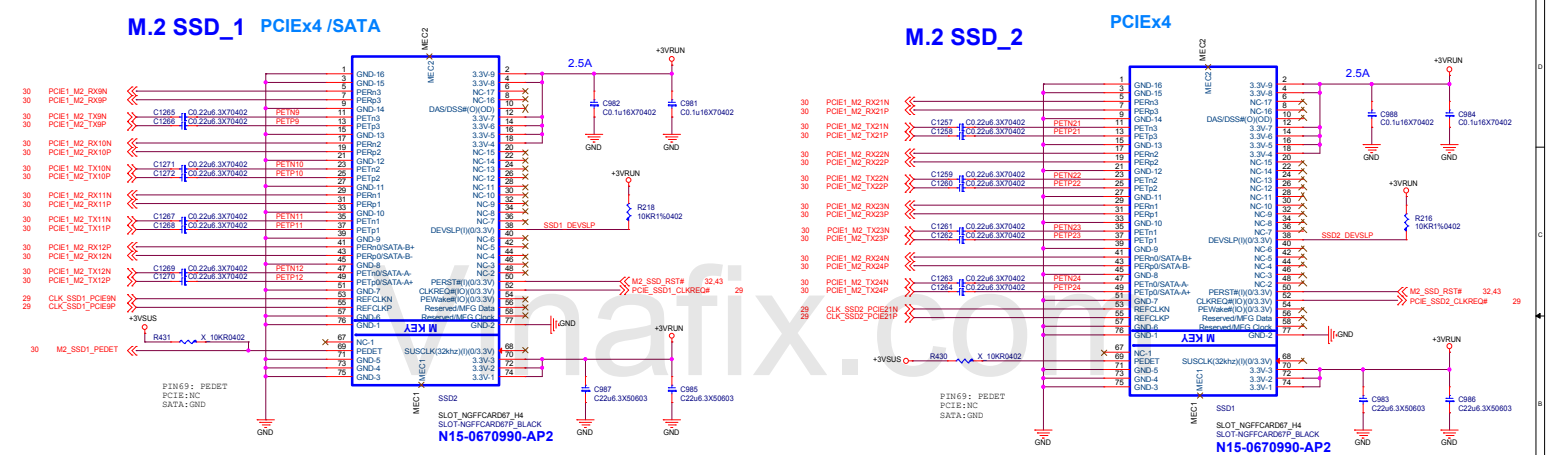
MICRO-STAR INT'L CO.,LTD.
USB 2.0 Protect
MS-16W1
Tuesday, August 13, 2019



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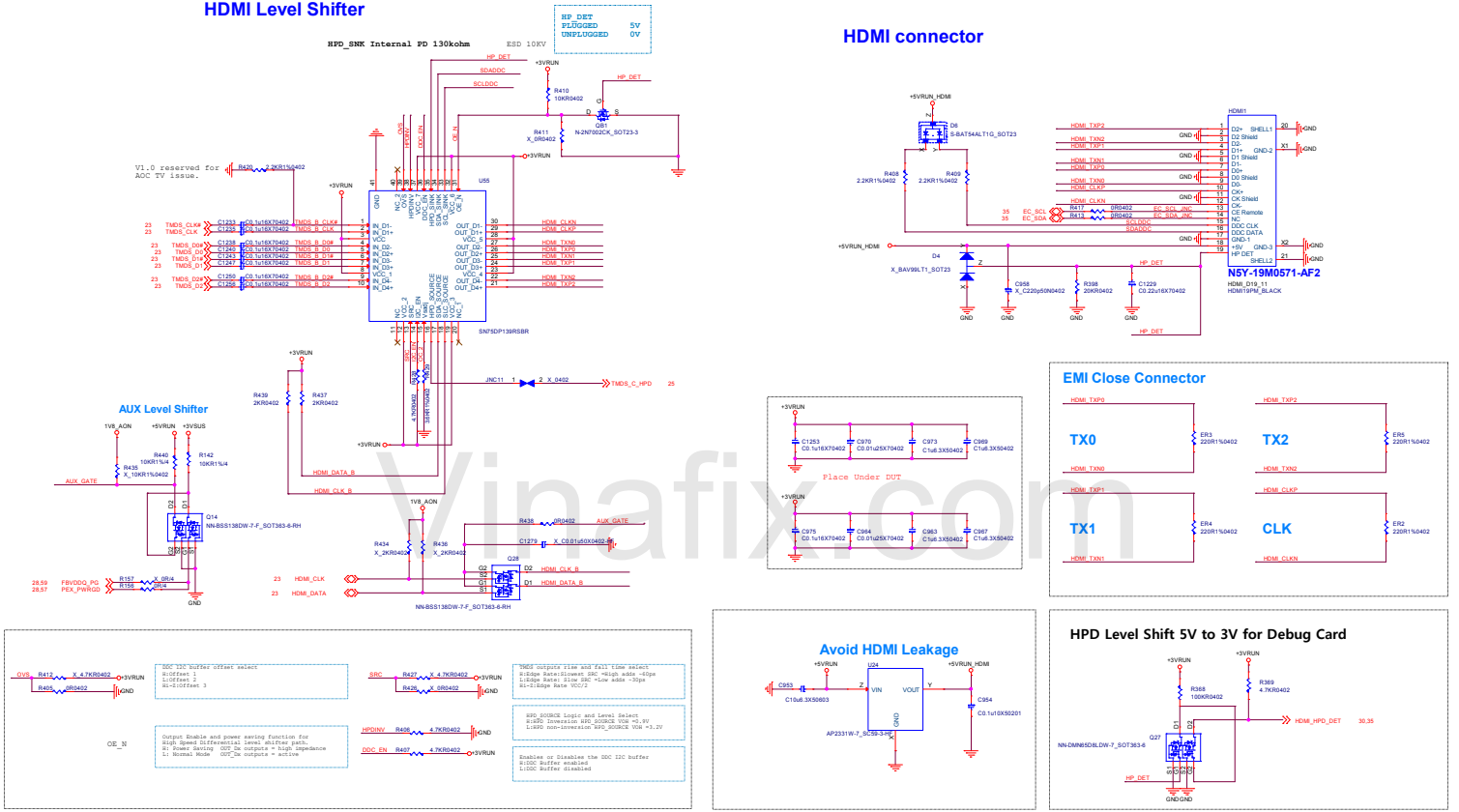
msi	MICRO-STAR INT'L CO.,LTD.		
Title	M.2 SSD/HDD		
Size	Document Number		Rev
Custom	MS-16W1		10
Date:	Tuesday, August 13, 2019	Sheet 43 of 66	



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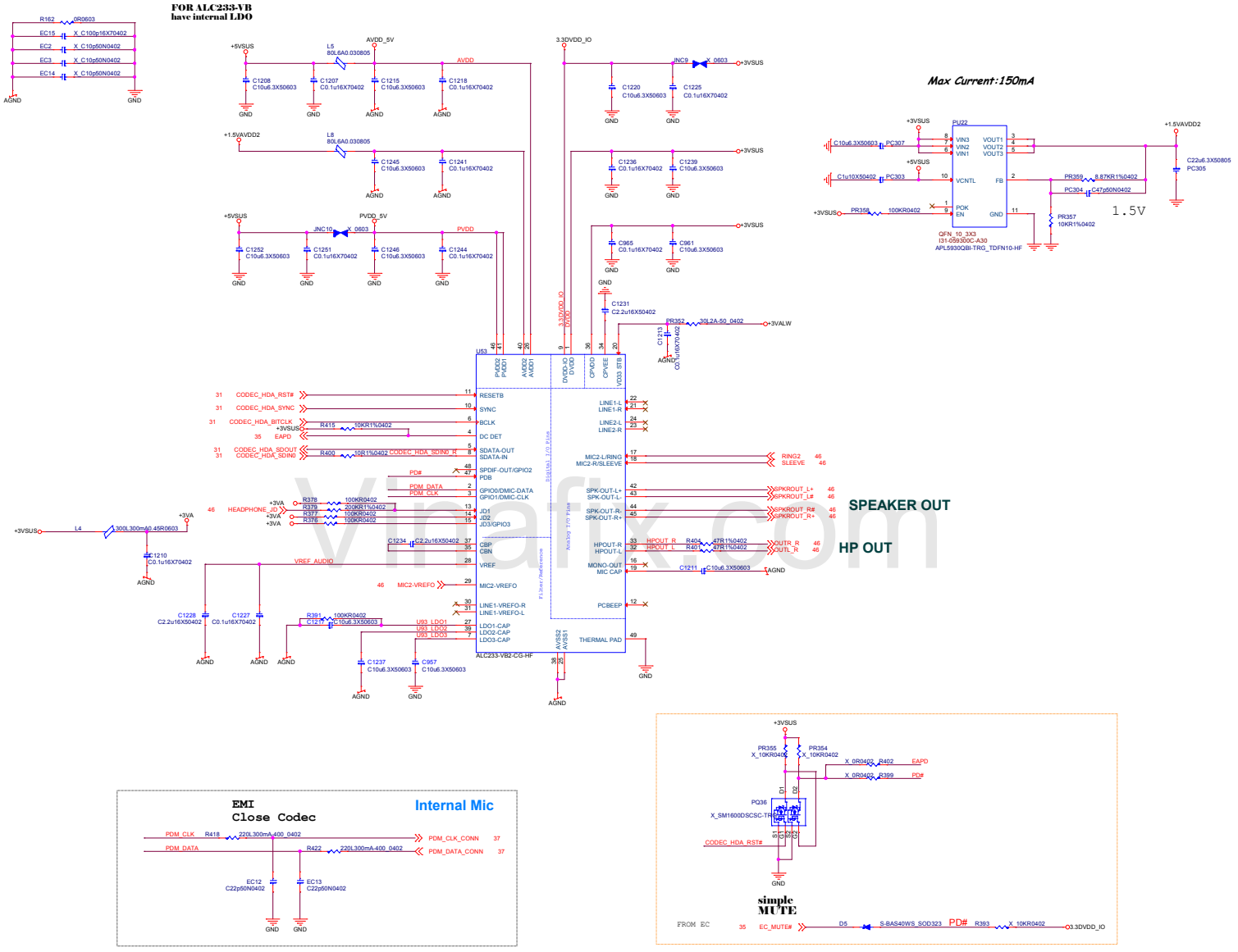
MICRO-STAR INT'L CO.,LTD.			
Title: HDMI			
Size: Custom	Document Number: MS-16W1		Rev: 10
Date: Tuesday, August 13, 2019	Sheet 44 of 66		



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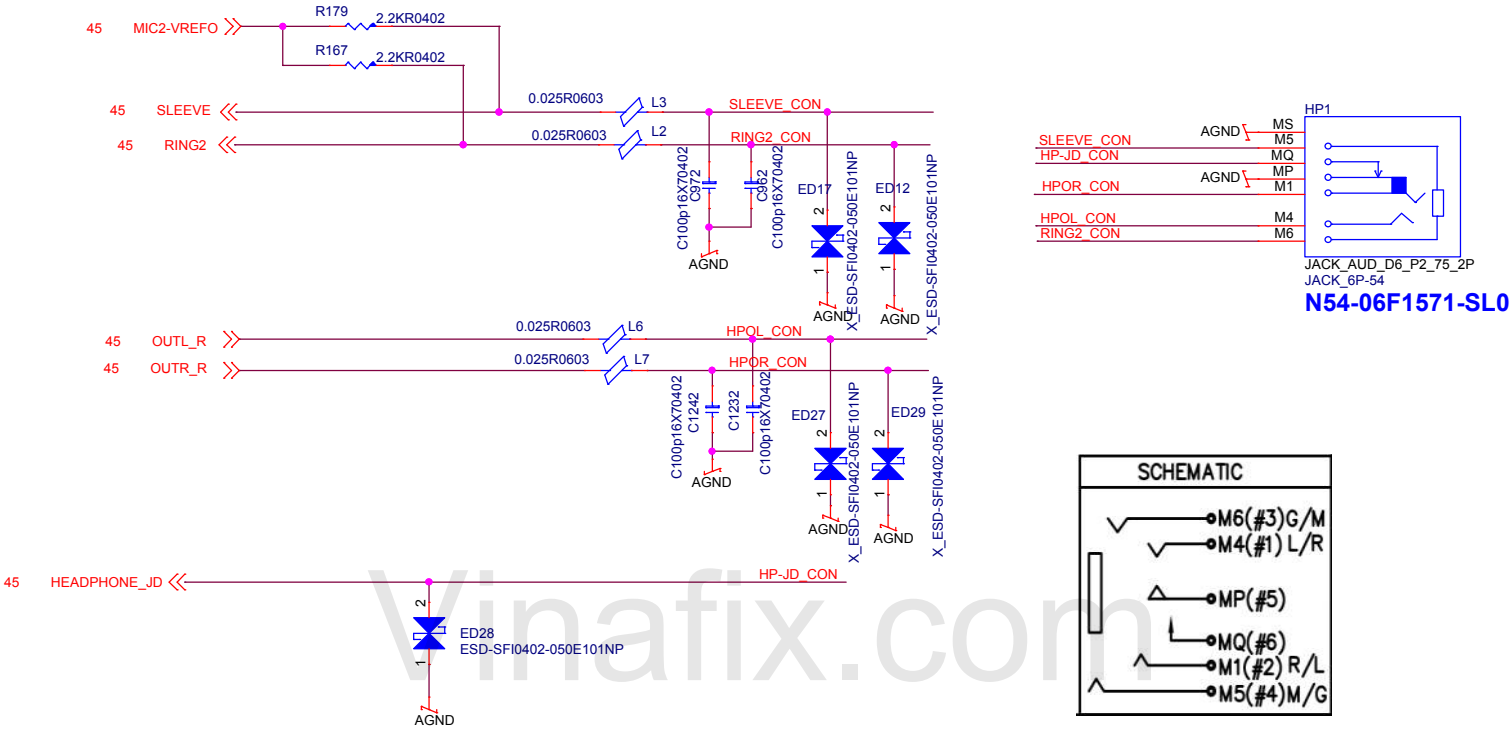
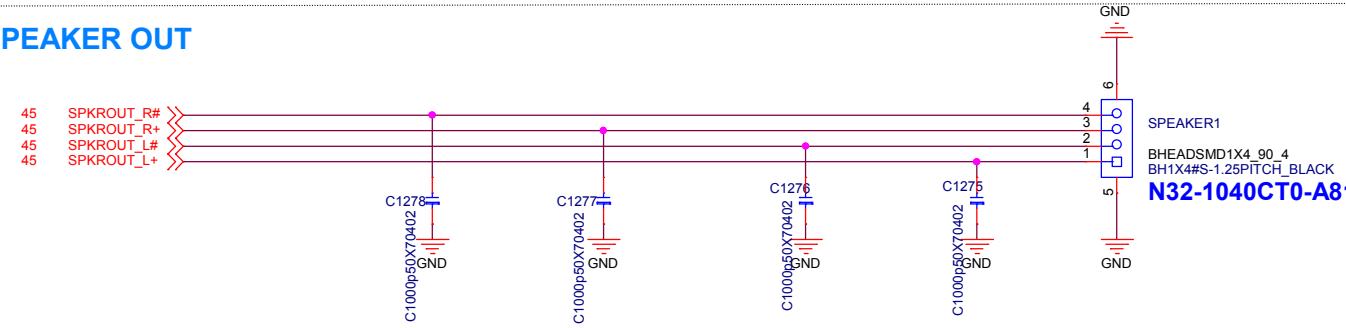
msi	MICRO-STAR INT'L CO.,LTD.		
Title	Audio CODEC(ALC233)		
Size	Document Number		Rev
Custom	MS-16W1		10
Date:	Tuesday, August 13, 2019	Sheet 45 of 66	

Universal Jack



SPEAKER OUT



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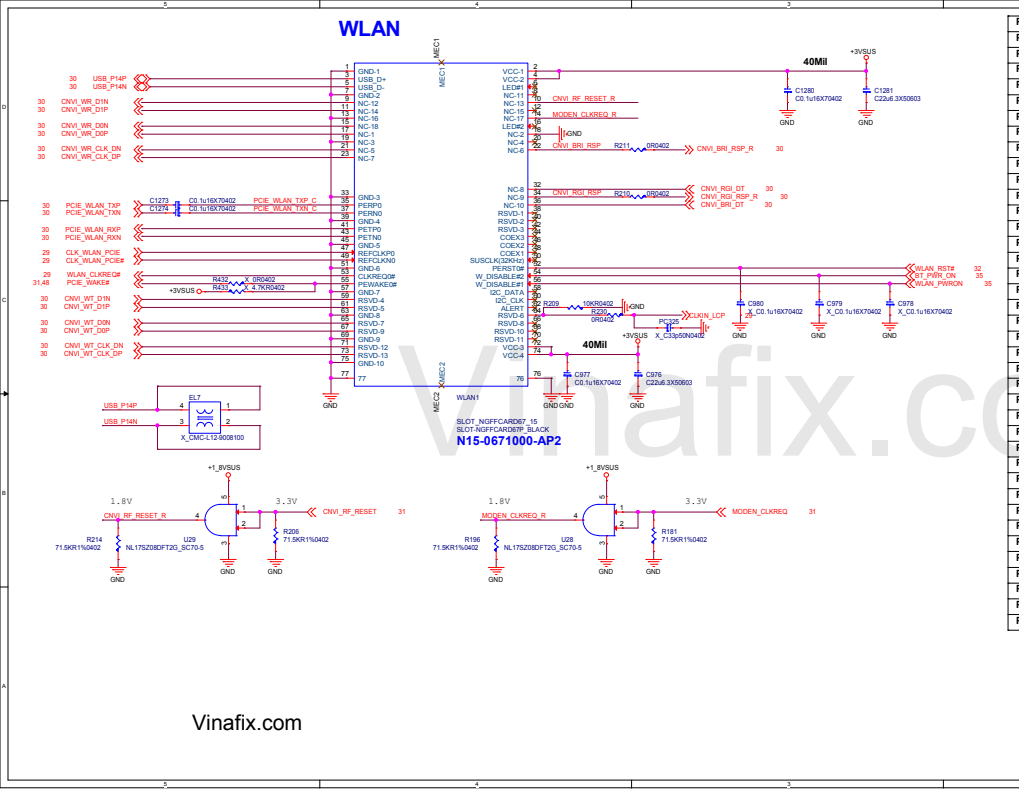
MICRO-STAR INT'L CO.,LTD.		
Title: Audio CONN		
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 46 of 66	



Pin #	M.2 WLAN	INTEL CNVi WLAN	Pin #	M.2 WLAN	INTEL CNVi WLAN
Pin 1	GND	GND	Pin 2	3.3V	3.3V
Pin 3	USB_D+	N/C	Pin 4	3.3V	3.3V
Pin 5	USB_D-	N/C	Pin 6	LED1#	LED1#
Pin 7	GND	GND	Pin 8	Module Key	N/C
Pin 9	Module Key	WGR_D1N	Pin 10	Module Key	RF_RESET_B(1.8V)
Pin 11	Module Key	WGR_D1P	Pin 12	Module Key	N/C
Pin 13	Module Key	GND	Pin 14	Module Key	CLKREQ0(1.8V)
Pin 15	Module Key	WGR_D0N	Pin 16	LED2#	LED2#
Pin 17	N/C	WGR_D0P	Pin 18	GND	GND
Pin 19	N/C	GND	Pin 20	N/C	N/C
Pin 21	N/C	WGR_CLKN	Pin 22	N/C	BRI_RSP(1.8V)
Pin 23	N/C	WGR_CLKP	Pin 24	Module Key	Module Key
Pin 25	Module Key	Module Key	Pin 26	Module Key	Module Key
Pin 27	Module Key	Module Key	Pin 28	Module Key	Module Key
Pin 29	Module Key	Module Key	Pin 30	Module Key	Module Key
Pin 31	Module Key	Module Key	Pin 32	N/C	RGI_DT(1.8V)
Pin 33	GND	GND	Pin 34	N/C	RGI_RSP(1.8V)
Pin 35	PERP0	N/C	Pin 36	N/C	BGI_DT(1.8V)
Pin 37	PERN0	N/C	Pin 38	N/C	N/C
Pin 39	GND	GND	Pin 40	N/C	N/C
Pin 41	PETP0	N/C	Pin 42	N/C	N/C
Pin 43	PETN0	N/C	Pin 44	N/C	N/C
Pin 45	GND	GND	Pin 46	N/C	N/C
Pin 47	REFCLKP0	N/C	Pin 48	N/C	N/C
Pin 49	REFCLKN0	N/C	Pin 50	SUSCLK (32KHz)	SUSCLK (32KHz)
Pin 51	GND	GND	Pin 52	PERST0#	N/C
Pin 53	CLKREQ0#	N/C	Pin 54	BT_EN (W_DISABLE2#)	BT_EN (W_DISABLE2#)
Pin 55	PEWAKE0#	N/C	Pin 56	WLAN_EN (W_DISABLE2#)	WLAN_EN (W_DISABLE2#)
Pin 57	GND	GND	Pin 58	N/C	N/C
Pin 59	N/C	WT_D1N	Pin 60	N/C	N/C
Pin 61	N/C	WT_D1P	Pin 62	N/C	N/C
Pin 63	GND	GND	Pin 64	Resever	REFCLK0(38.4MKz)
Pin 65	N/C	WT_D0N	Pin 66	N/C	N/C
Pin 67	N/C	WT_D0P	Pin 68	N/C	N/C
Pin 69	GND	GND	Pin 70	N/C	N/C
Pin 71	N/C	WT_CLKN	Pin 72	3.3V	3.3V
Pin 73	N/C	WT_CLKP	Pin 74	3.3V	3.3V
Pin 75	GND	GND			

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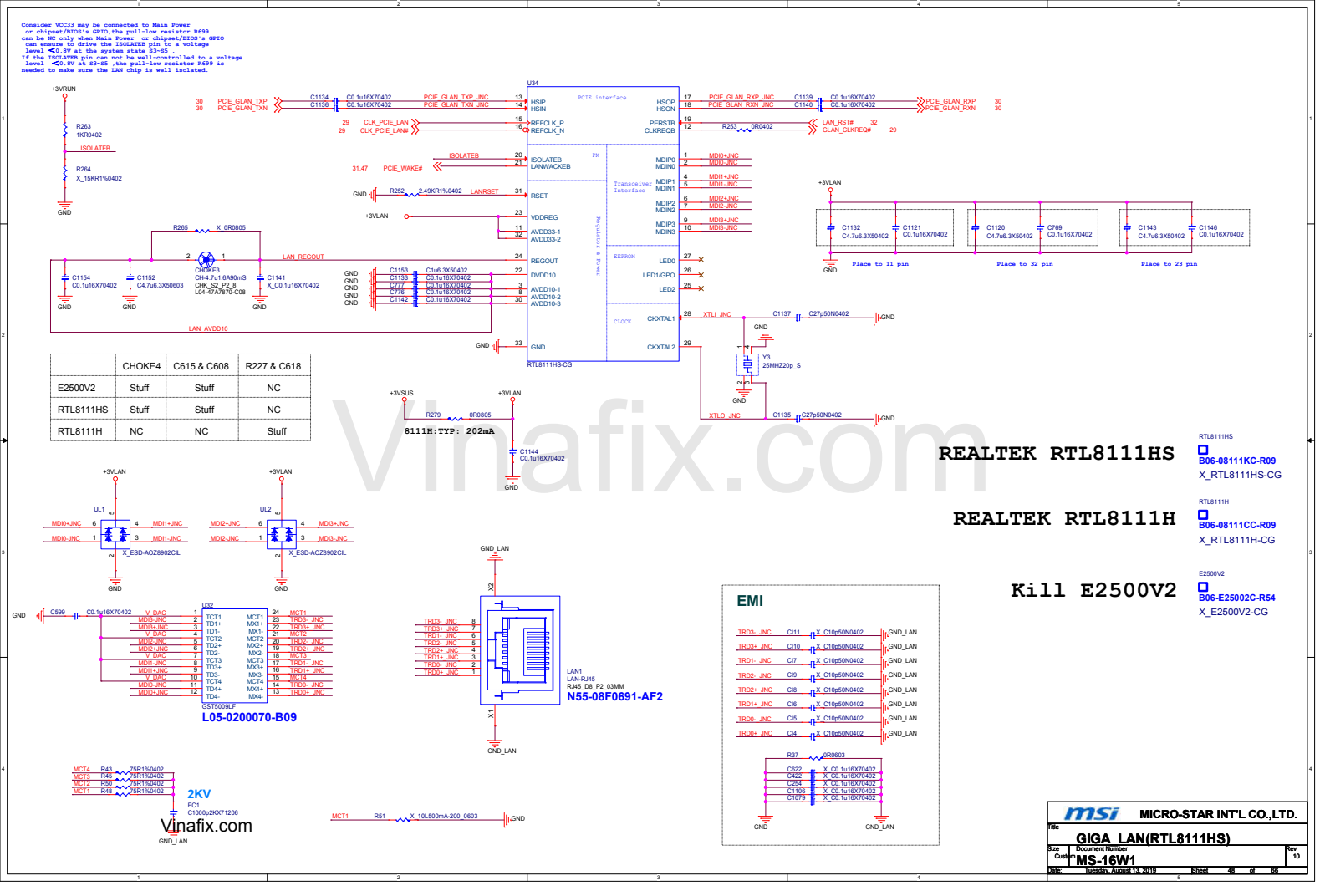
MICRO-STAR INT'L CO.,LTD.

Title: WLAN

Size: Custom | Document Number: MS-16W1 | Rev: 10

Date: Tuesday, August 13, 2019 | Sheet 47 of 88



	CHOKE4	C615 & C608	R227 & C618
E2500V2	Stuff	Stuff	NC
RTL8111HS	Stuff	Stuff	NC
RTL8111H	NC	NC	Stuff

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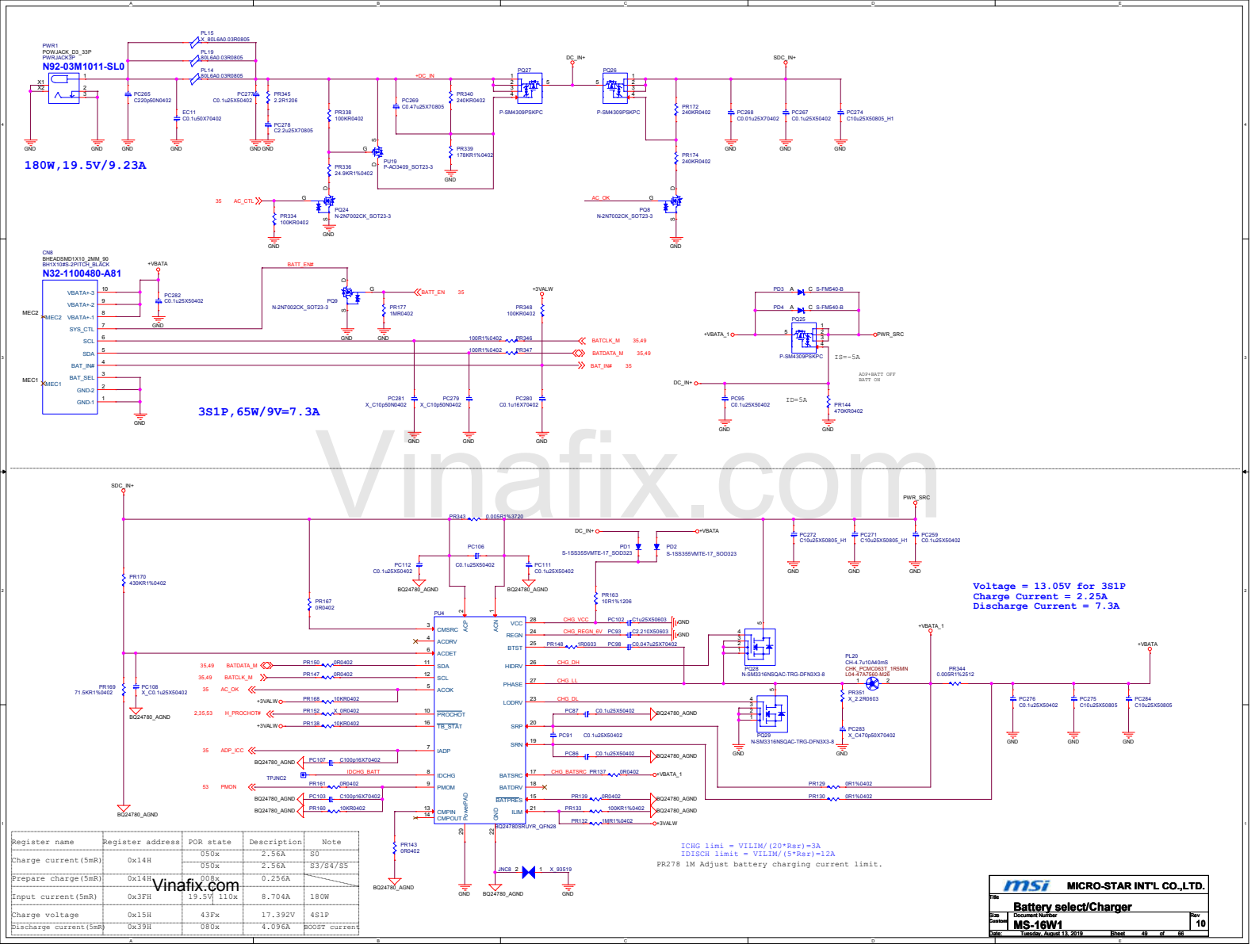

Register name	Register address	POR state	Description	Note
Charge current(5mR)	0x14H	050x	2.56A	S0
		050x	2.56A	S3/S4/S5
Prepare charge(5mR)	0x14H	008x	0.256A	
Input current(5mR)	0x3FH	19.5V 110x	8.704A	180W
Charge voltage	0x15H	43Fx	17.392V	4S1P
Discharge current(5mR)	0x39H	080x	4.096A	BOOST current

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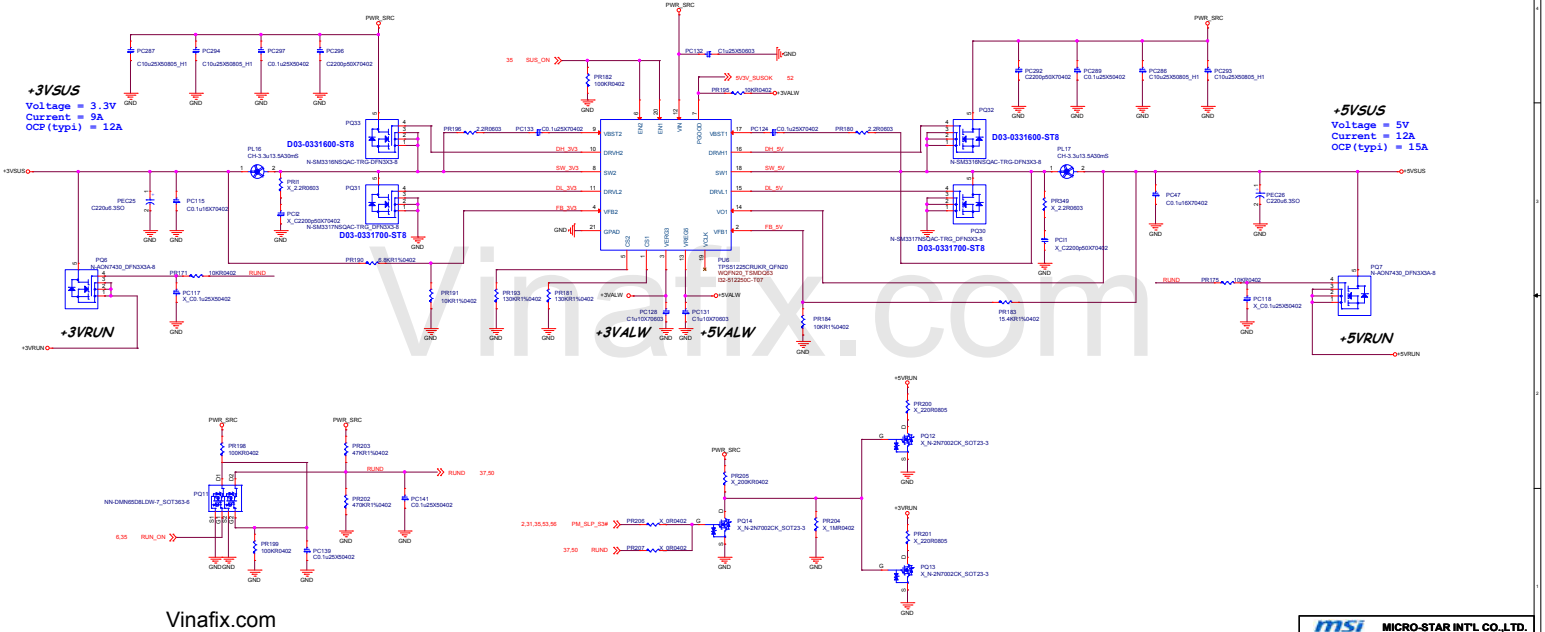
Title	MICRO-STAR INT'L CO.,LTD.
	Battery select/Charger
Size / Document Number	MS-16W1
Rev	10
Date: Tuesday, August 13, 2019	Sheet 49 of 68

System Power



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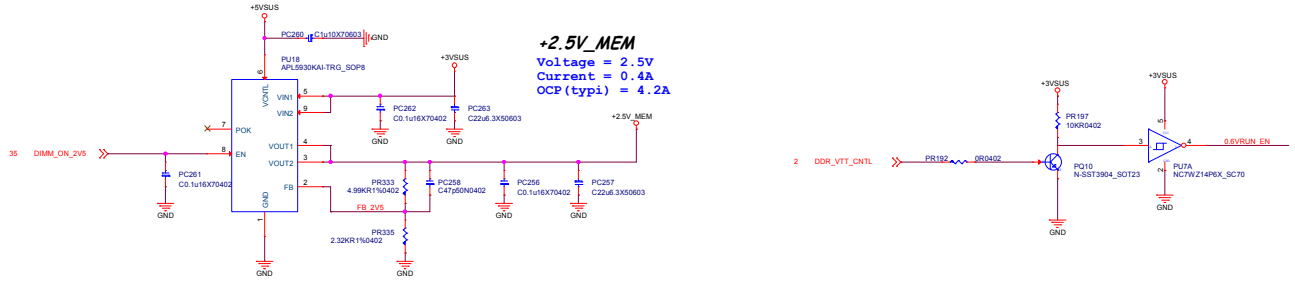
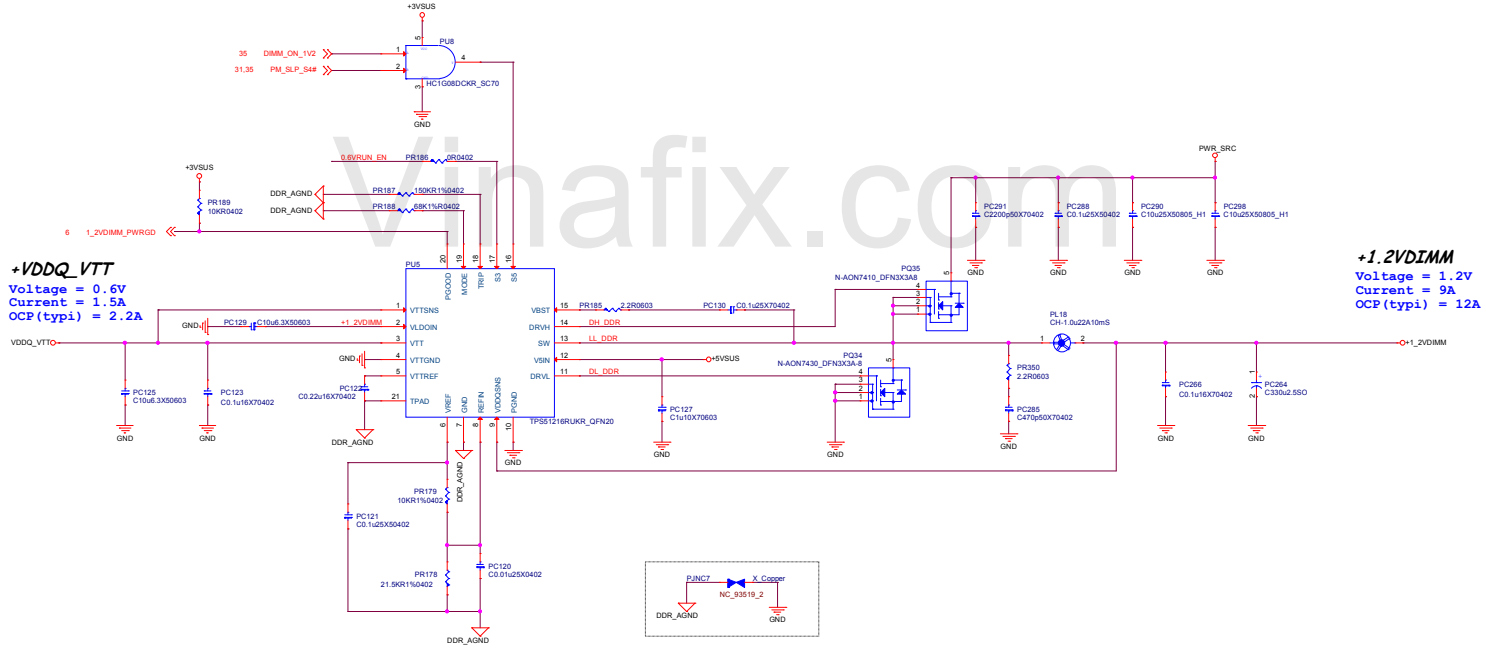
msi	MICRO-STAR INT'L CO.,LTD.	
File	System Power	
Size / Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2013	Sheet 50 of 66	

+2.5V_MEM



+2.5V_MEM
Voltage = 2.5V
Current = 0.4A
OCP(typi) = 4.2A

+1.2VDIMM / VDDQ_VTT(0.6V)



+VDDQ_VTT
Voltage = 0.6V
Current = 1.5A
OCP(typi) = 2.2A

+1.2VDIMM
Voltage = 1.2V
Current = 9A
OCP(typi) = 12A

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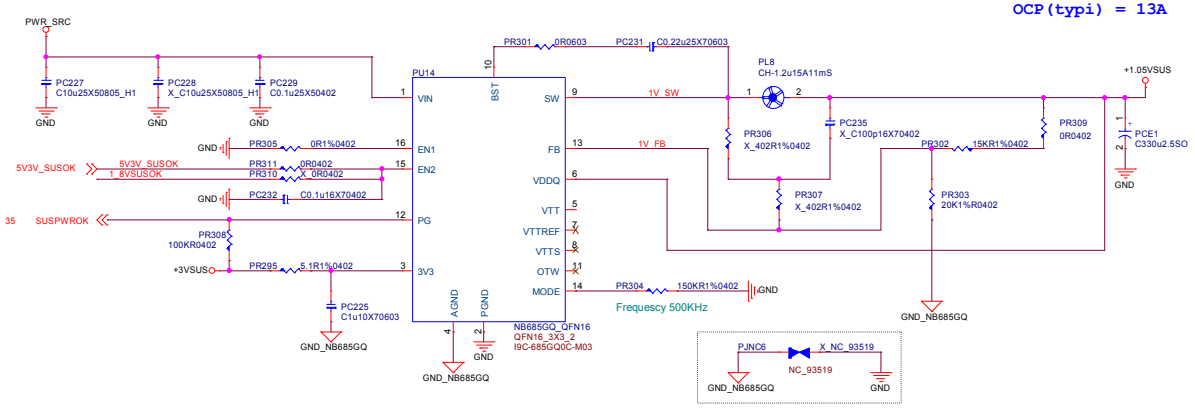
msi	MICRO-STAR INT'L CO.,LTD.	
Title	+2.5VMEM/+1.2VDIMM/VDDQ_VTT	
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 51 of 66	

+1.05VSUS

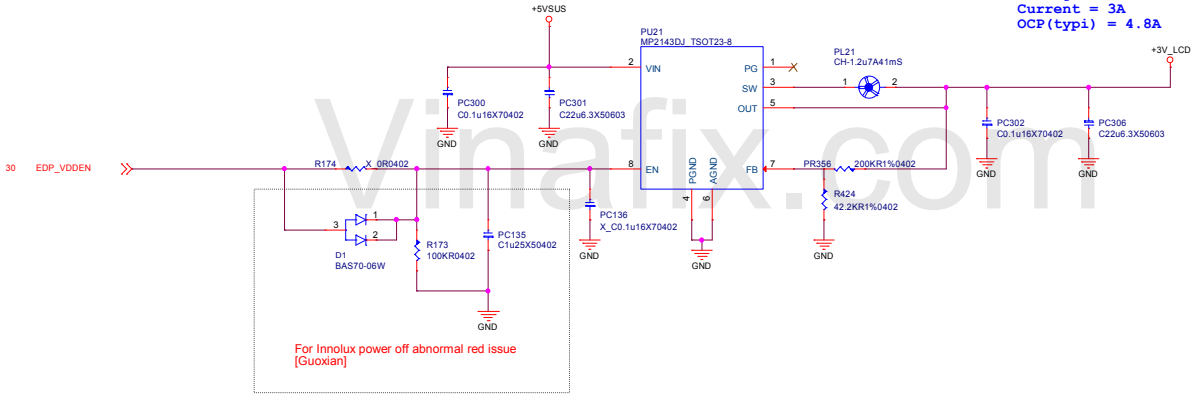
Voltage = 1.05V
Current = 10A
OCP(typi) = 13A



+3V_LCD

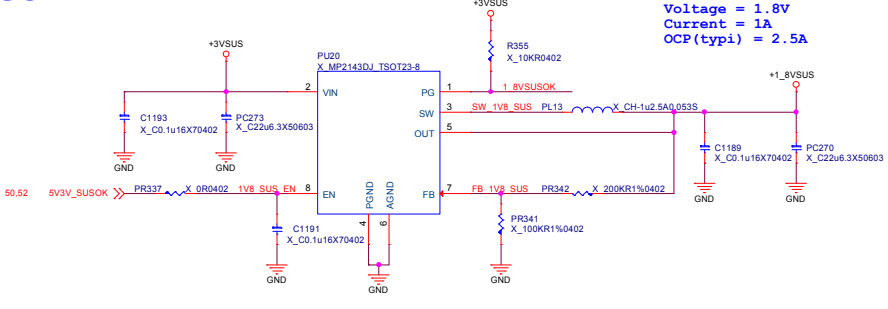
Pannel Device Logic Power

Voltage = 3.45V
Current = 3A
OCP(typi) = 4.8A



+1_8VSUS

Voltage = 1.8V
Current = 1A
OCP(typi) = 2.5A



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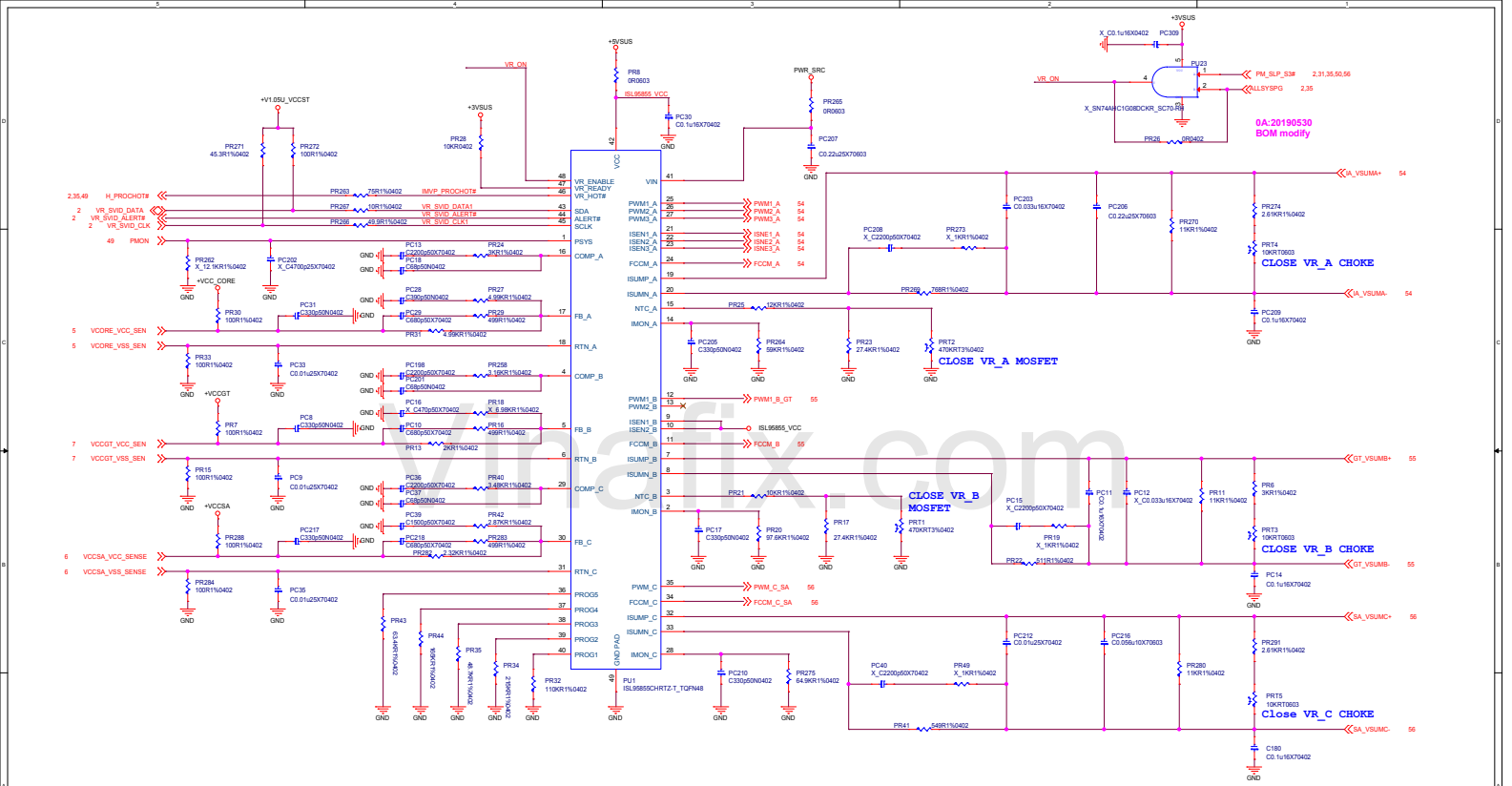
MICRO-STAR INT'L CO.,LTD.		
Title: +1.05VSUS/+3V_LCD/+1_8VSUS		
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 52 of 66	



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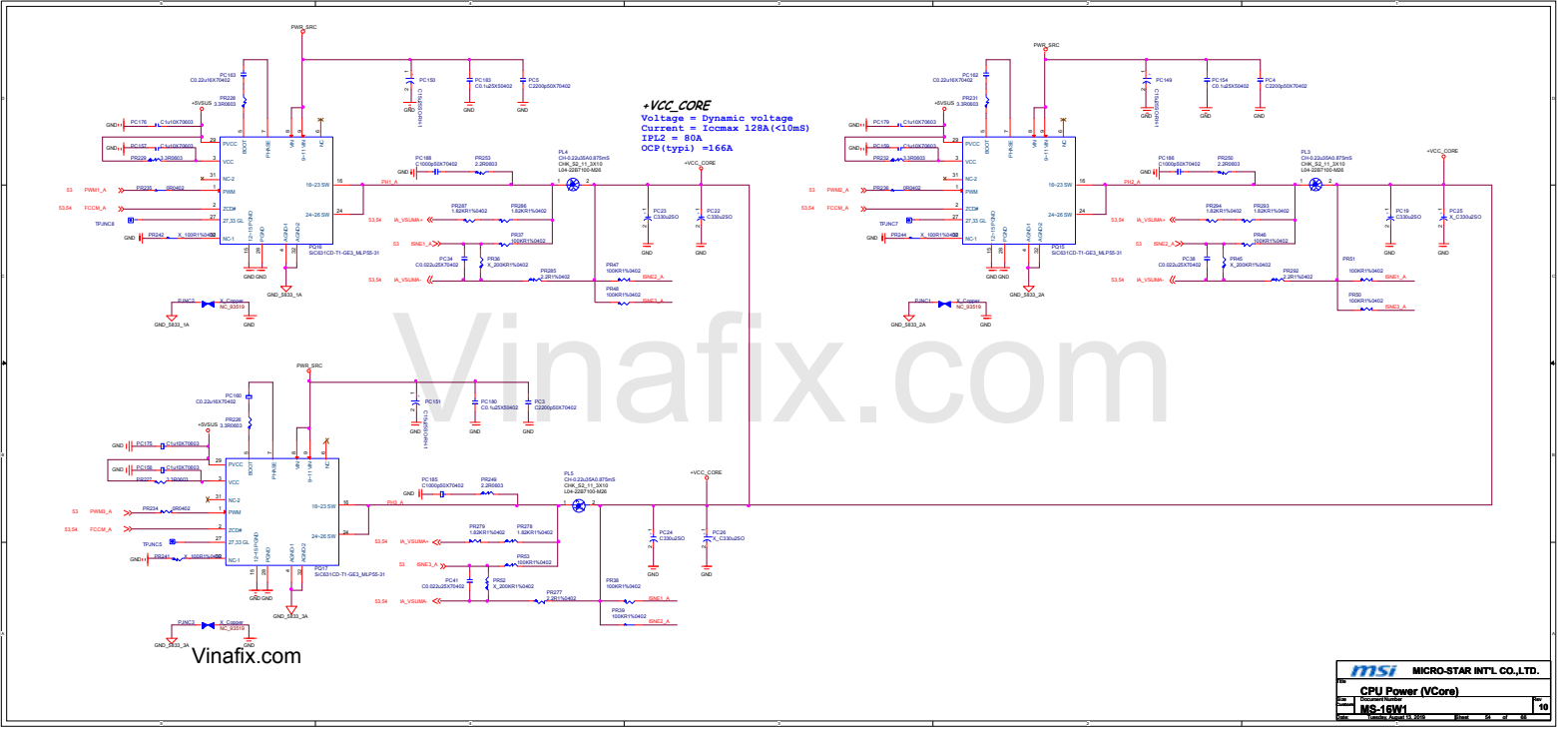
msi	MICRO-STAR INT'L CO.,LTD.	
Title	CPU Power (ISL95855)	
Size	Document Number	Rev
Custom	MS-16W1	1.0
Date:	Tuesday, August 13, 2019	Sheet 53 of 66



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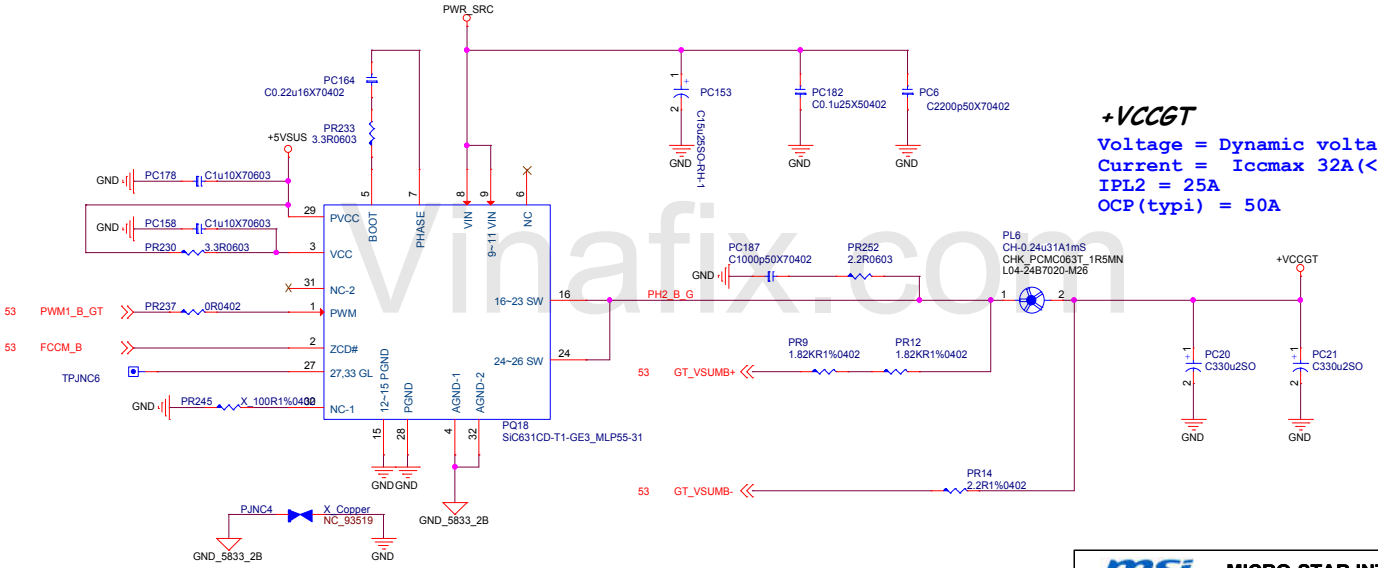
msi	MICRO-STAR INT'L CO.,LTD.	
Title	CPU Power (VCore)	
Size	Document Number	Rev
Custom	MS-16W1	1.0
Date: Tuesday, August 03, 2010	Sheet 54 of 66	

+VCCGT



+VCCGT

Voltage = Dynamic voltage
Current = Iccmax 32A(<10mS)
IPL2 = 25A
OCP(typi) = 50A

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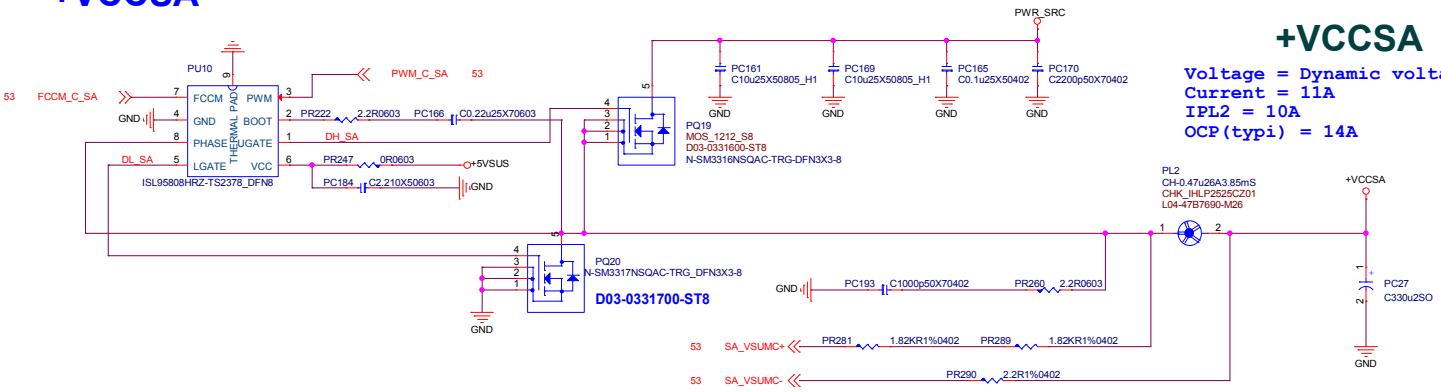
MICRO-STAR INT'L CO.,LTD.		
Title: CPU Power (VCCGT)		
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 55 of 66	

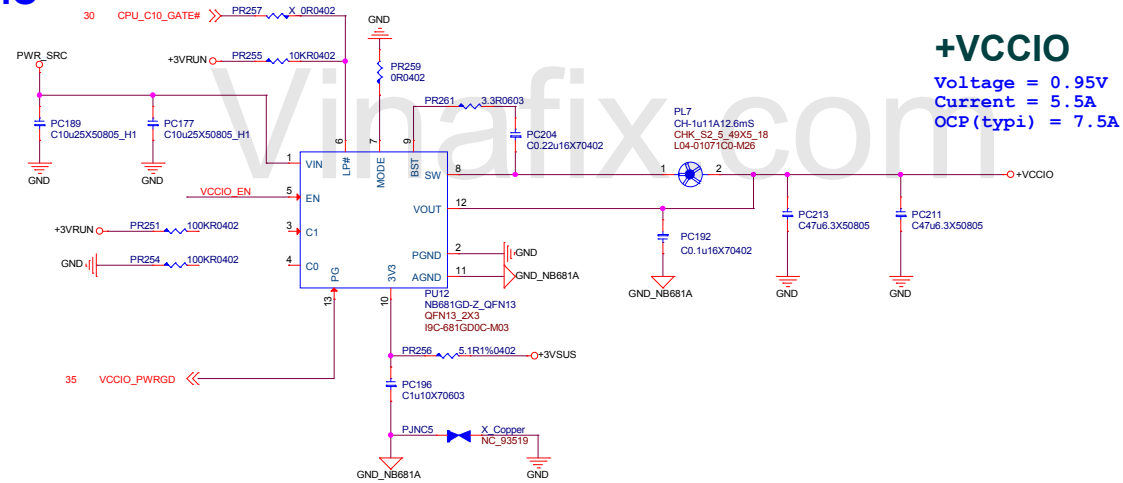
+VCCSA



+VCCSA

Voltage = Dynamic voltage
Current = 11A
IPL2 = 10A
OCP(typi) = 14A

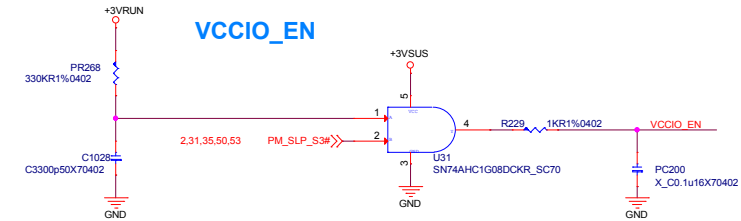
+VCCIO



+VCCIO

Voltage = 0.95V
Current = 5.5A
OCP(typi) = 7.5A

VCCIO_EN



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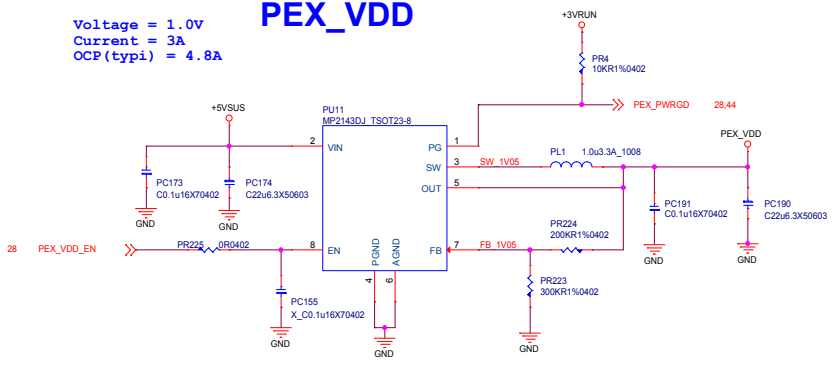
MICRO-STAR INT'L CO.,LTD.		
Title: CPU Power (VCCSA/VCCIO)		
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 56 of 66	

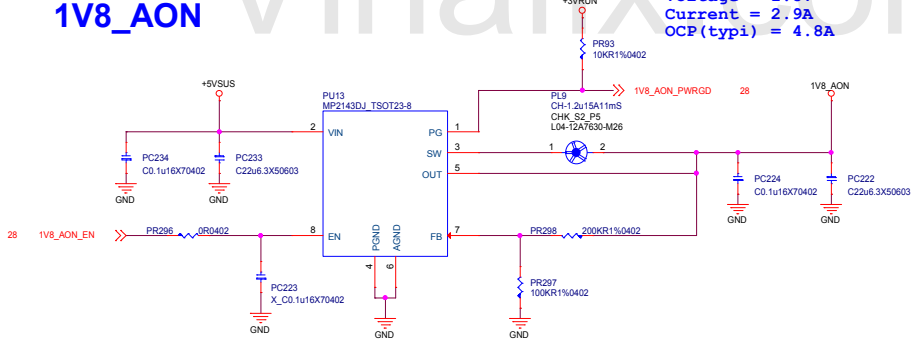
PEX_VDD

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



1V8_AON

Voltage = 1.8V
Current = 2.9A
OCP(typi) = 4.8A



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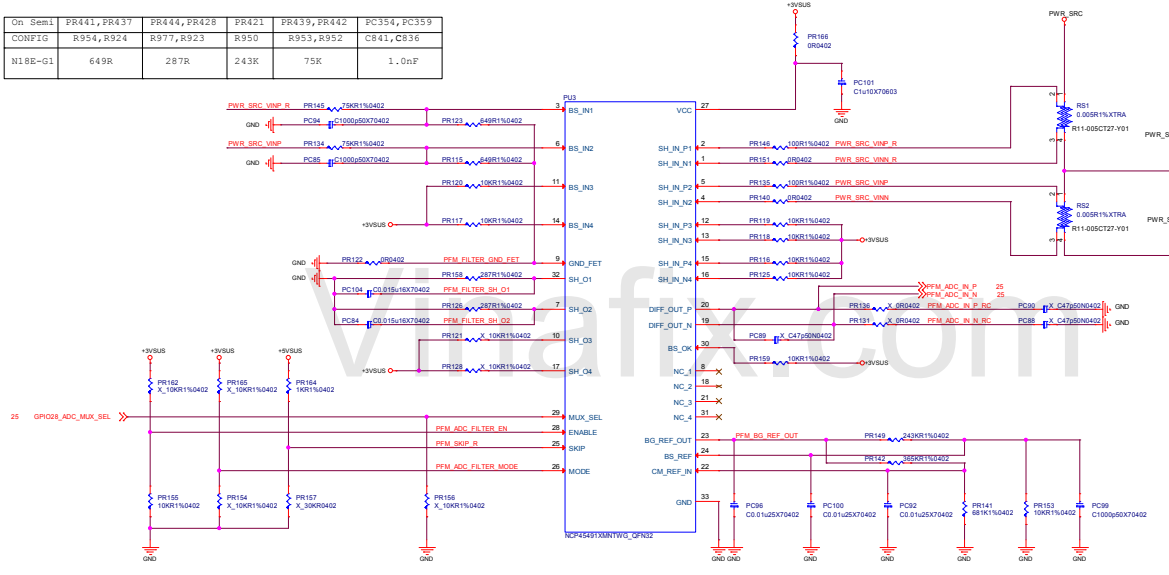
msi MICRO-STAR INT'L CO.,LTD.		
Title: DGPU POWER PEX_VDD/1V8_AON		
Size: B	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 57 of 66	

On Semi	PR441,PR437	PR444,PR428	PR421	PR439,PR442	PC354,PC359
CONFIG	R954,R924	R977,R923	R950	R953,R952	C841,C836
N18E-G1	649R	287R	243K	75K	1.0nF



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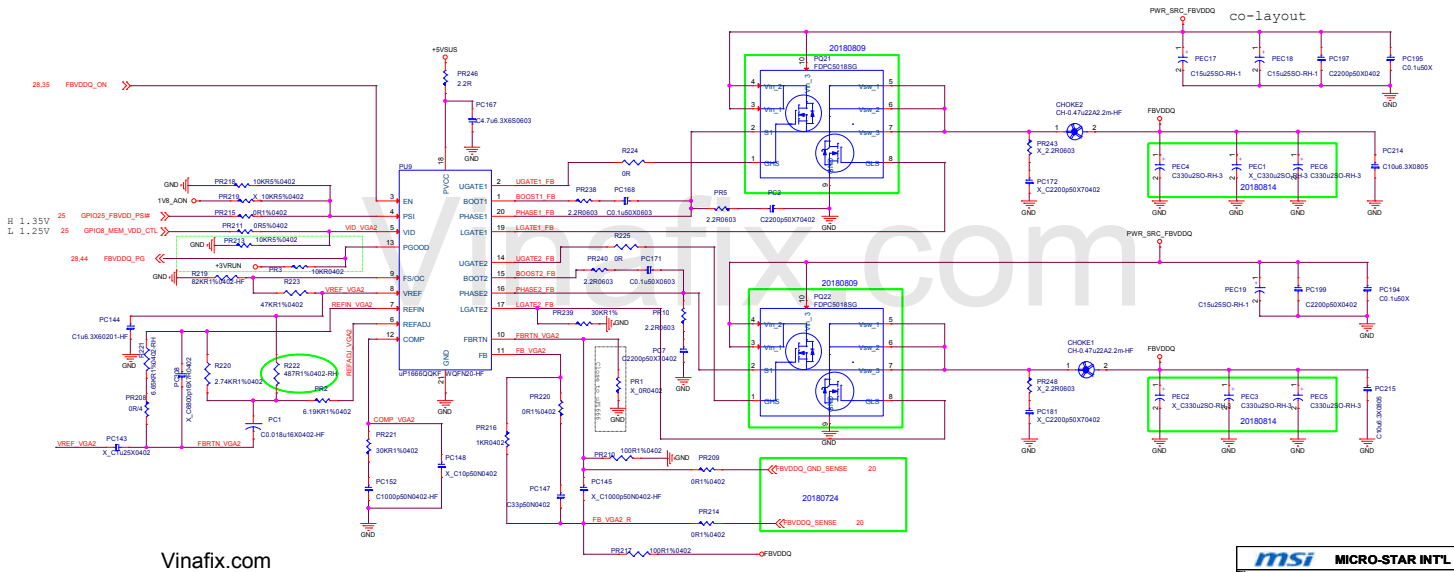
msi	MICRO-STAR INT'L CO.,LTD.		
Title	DGPU POWER Current Measure		
Size	Document Number		Rev
	MS-16W1		10
Date:	Tuesday, August 13, 2019	Sheet 58 of 66	

N18E-G1 FBVDDQ / UP1666P

VBoot:1.35V
Vmin:1.25V / Vmax:1.35V

AVG:35A
PEAK:47A
OCP:64A



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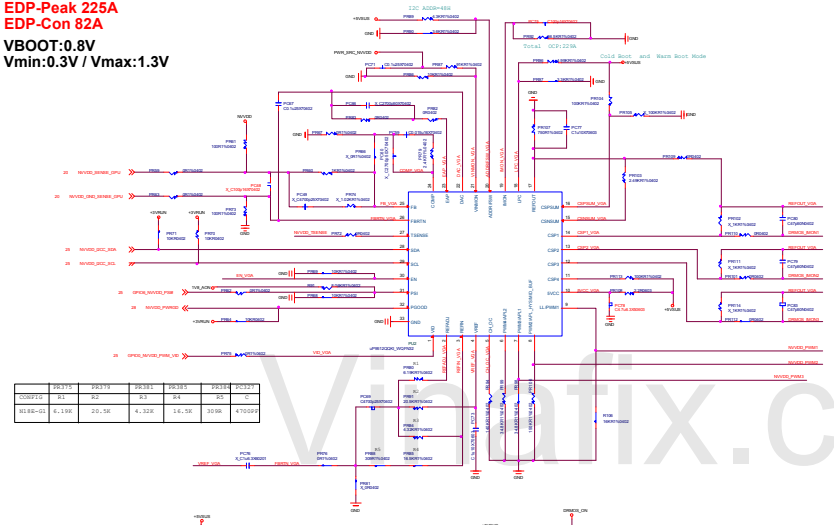
Title	DGPU POWER FBVDDQ
Size	Document Number: MS-16W1
Rev	10
Date:	Sheet 59 of 68

MICRO-STAR INT'L CO.,LTD.

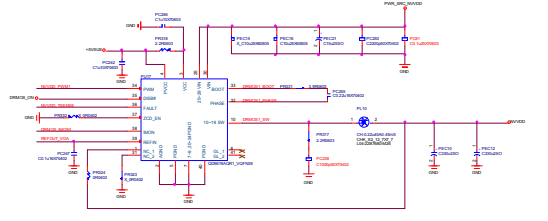
DGPU POWER NVVDD
UP9512Q

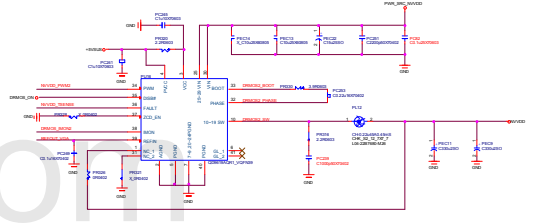
EDP-Peak 225A
EDP-Con 82A

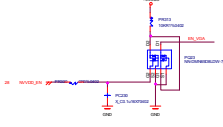
VBOOT:0.8V
Vmin:0.3V / Vmax:1.3V

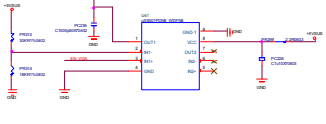


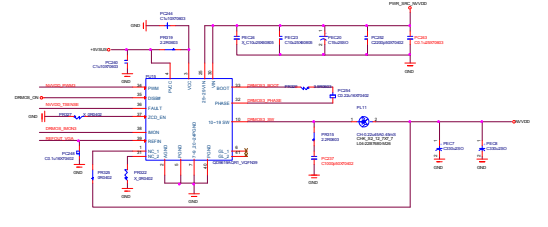
	PR375	PR379	PR381	PR385	PR394	PC527
CONFIG	R1	R2	R3	R4	R5	C
3V8E-G1	6.19K	20.5K	4.32K	14.5K	309K	470pPF











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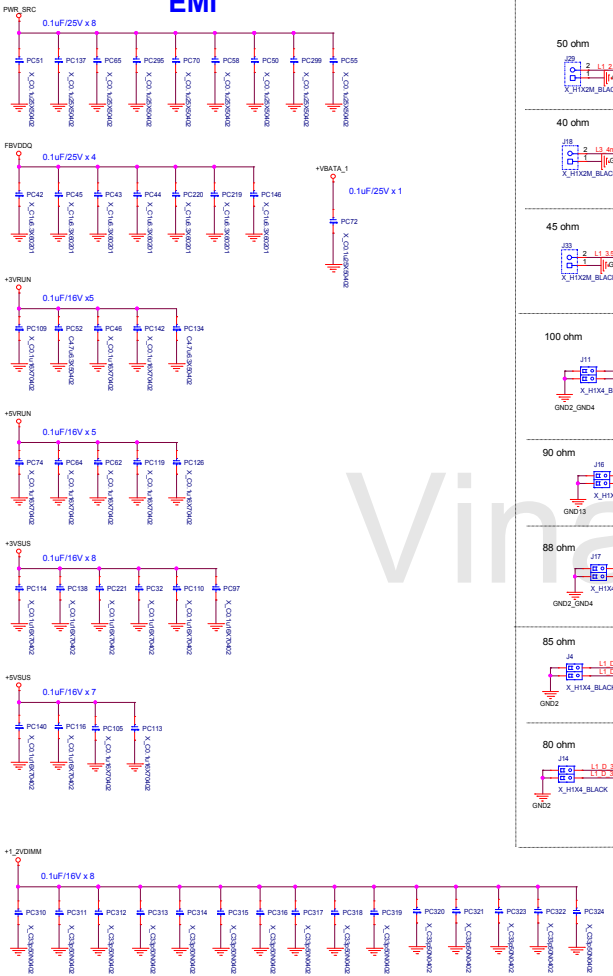
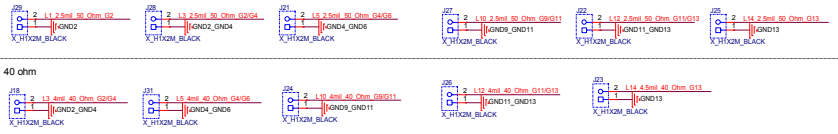
MICRO-STAR INT'L CO.,LTD.
DGPU POWER NVVDD
Model Name: MS-16W1
Rev: 1B

EMI

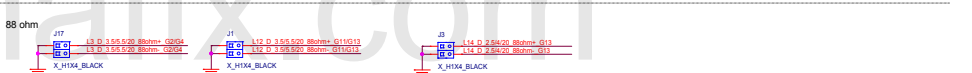


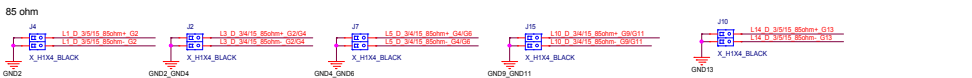
Impedence

Single End



Differential





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msi	MICRO-STAR INT'L CO.,LTD.	
Title	EMI/Impedance	
Size: Custom	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 61 of 66	

DGPU Holes

MGPU4 H_R142D126BR197_MB_N X_CPU_HOLE — GND
MGPU1 H_R142D126BR197_MB_N X_CPU_HOLE — GND
MGPU2 H_R142D126BR197_MB_N X_CPU_HOLE — GND
MGPU3 H_R142D126BR197_MB_N X_CPU_HOLE — GND

CPU Holes

MCPU1 H_R142D126BR197_MB_N X_CPU_HOLE — GND
MCPU2 H_R142D126BR197_MB_N X_CPU_HOLE — GND
MCPU3 H_R142D126BR197_MB_N X_CPU_HOLE — GND

MH4 H_R197D91_N X_H_R197D91_N — GND
MH2 H_R197D91_N X_H_R197D91_N — GND
MH3 H_R197D91_N X_H_R197D91_N — GND
H2 X_H_R197D91_N H_R197D91_N — GND
MH6 NPTH_80 X_NPTH_80
MH9 NPTH_80 X_NPTH_80

MH11 H_R197D118_PT_N X_H_R197D118_PT_N — GND
MH8 H_R197D118_PT_N X_H_R197D118_PT_N — GND
MH1 H_R197D118_PT_N X_H_R197D118_PT_N — GND

XX1 NPTH118 X_NPTH118
XX2 NPTH118 X_NPTH118
XX3 NPTH118 X_NPTH118
XX4 NPTH118 X_NPTH118

MH7 H_R315D118_1_N X_H_R315D118_1_N — GND
MH10 H_R315D118_1_N X_H_R315D118_1_N
MH5 H_R315D118_1_N X_H_R315D118_1_N — GND

CPU/GPU BRACKET

UME3 CPU BKT — CPU BRACKET — 307-6R10111-HG0
UME4 GPU BKT — GPU BRACKET — 307-6P10211-HG0

UME23 ADHESIVE TYPE — ADHESIVE_TYPE — E2Y-0115911-Y42
UME22 LED SPONGE — LED_SPONGE — E2Y-6W10411-Y42

MYLAR

UME5 DDR MYLAR — DDR_MYLAR — E2Y-6S11211-CA7
UME6 DDR MYLAR — DDR_MYLAR — E2Y-6S11211-CA7
UME17 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME18 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME19 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME7 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME8 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME9 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME10 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME11 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME12 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME13 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME14 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME15 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME16 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME20 MB MYLAR — MB_MYLAR — E2P-6P11311-G40
UME21 MB MYLAR — MB_MYLAR — E2P-6P11311-G40

UME2 BIOS Lable — X_UEFI_CODE_BIOS_LABEL — G51-N1CO041-A09
UME1 HDMI Lable — X_HDMI ROYALTY — Y01-RHDMI03-000

PCB1 — PD0-16W1110-H73 — PD0-16W1110-H73

EMI

E3 — X_HS-MS1011 — GND
E1 — X_HS-MS1011 — GND
E2 — X_HS-MS1011 — GND

FM25 FM21 FM11 FM24 — X_F_PAD_NB_2
FM10 FM20 FM6 FM7 — X_F_PAD_NB_2

FM9 FM2 FM15 FM3 FM8 — X_F_PAD_X
FM1 FM12 FM4 FM13 FM14 — X_F_PAD_X
FM5 FM16 FM17 FM18 FM22 — X_F_PAD_X
FM19 FM23 FM26 FM28 FM27 — X_F_PAD_X

MB STAND OFF

H1 Spacer Support — GND — E2B-1P10020-A89 — H_R240D150_PT_N — E2B-1P10020
H4 Spacer Support — GND — E2B-1P10020-A89 — H_R240D150_PT_N — E2B-1P10020
H3 Spacer Support — GND — E2B-1P10020-A89 — H_R240D150_PT_N — E2B-1P10020

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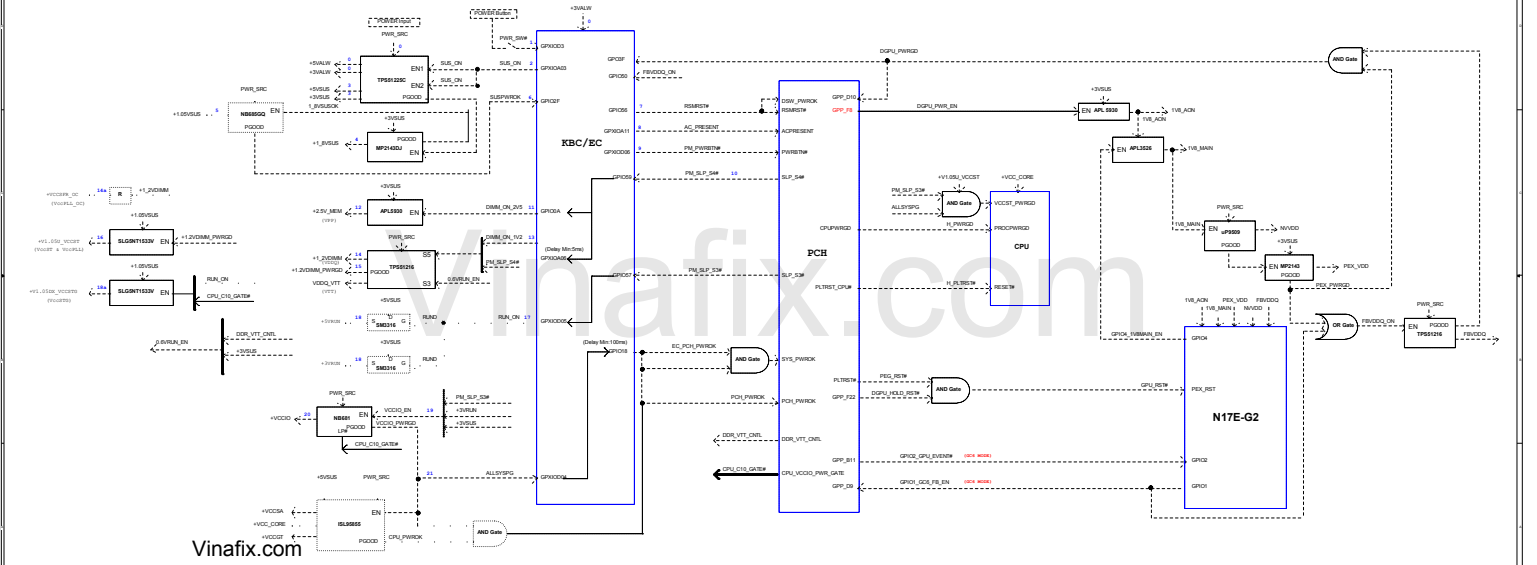
Title	Screw/ME	
Size	Document Number MS-16W1	Rev 10
Date: Tuesday, August 13, 2019	Sheet 62 of 66	

MS-16R1 Power on Block Diagram



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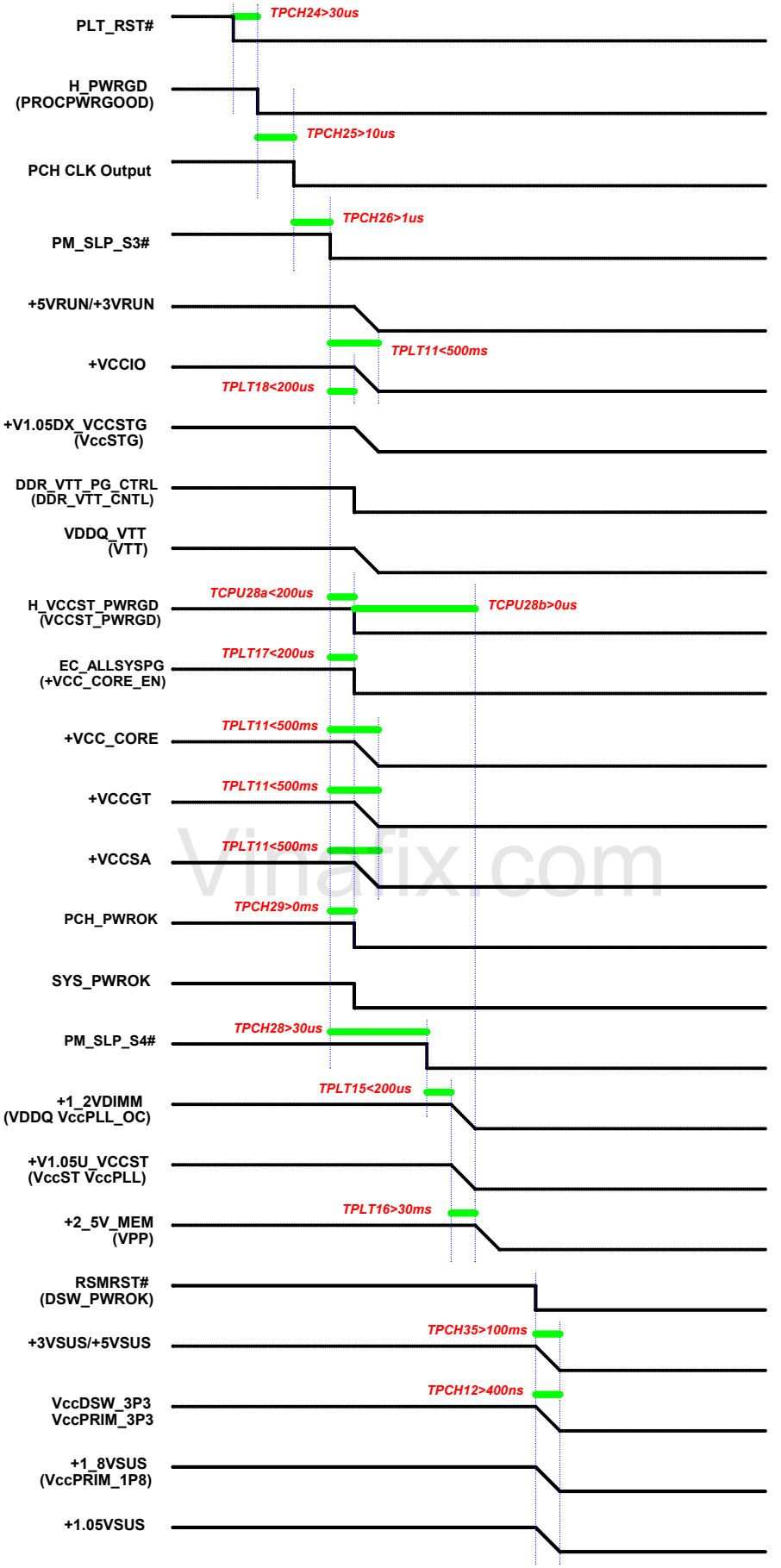
MICRO-STAR INT'L CO.,LTD.	
[A]16R1 LED/Hall Switch	
MS-16W1	1.0

S0 -> G3



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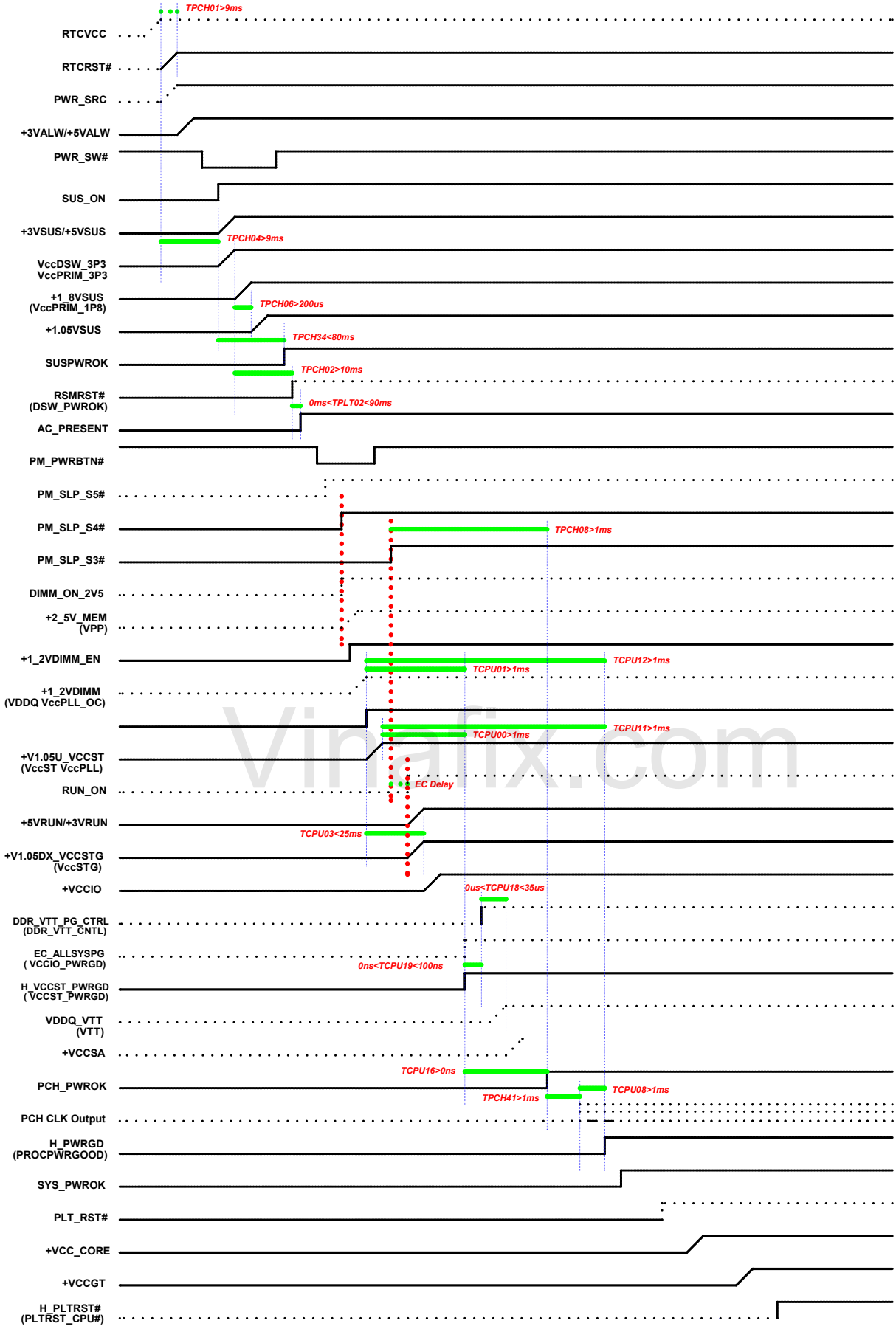
msi MICRO-STAR INT'L CO.,LTD.		
Title: Power on Sequence		
Size	Document Number: MS-16W1	Rev: 10
Date: Tuesday, August 13, 2019	Sheet 64 of 66	

G3 -> S0



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History

DATE	PAGE	DESCRIPTION	DATE	PAGE	DESCRIPTION	DATE	PAGE	DESCRIPTION	DATE	PAGE	DESCRIPTION

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MICRO-STAR INT'L CO.,LTD.

History

Document Number

Size: C | Rev: 1.0

Custom: MS-16W1

Date: Tuesday, August 13, 2019 | Sheet 65 of 65