MS-V378-22
E2904
4GB GDDR5, 128b, 256Mx32
modular displays

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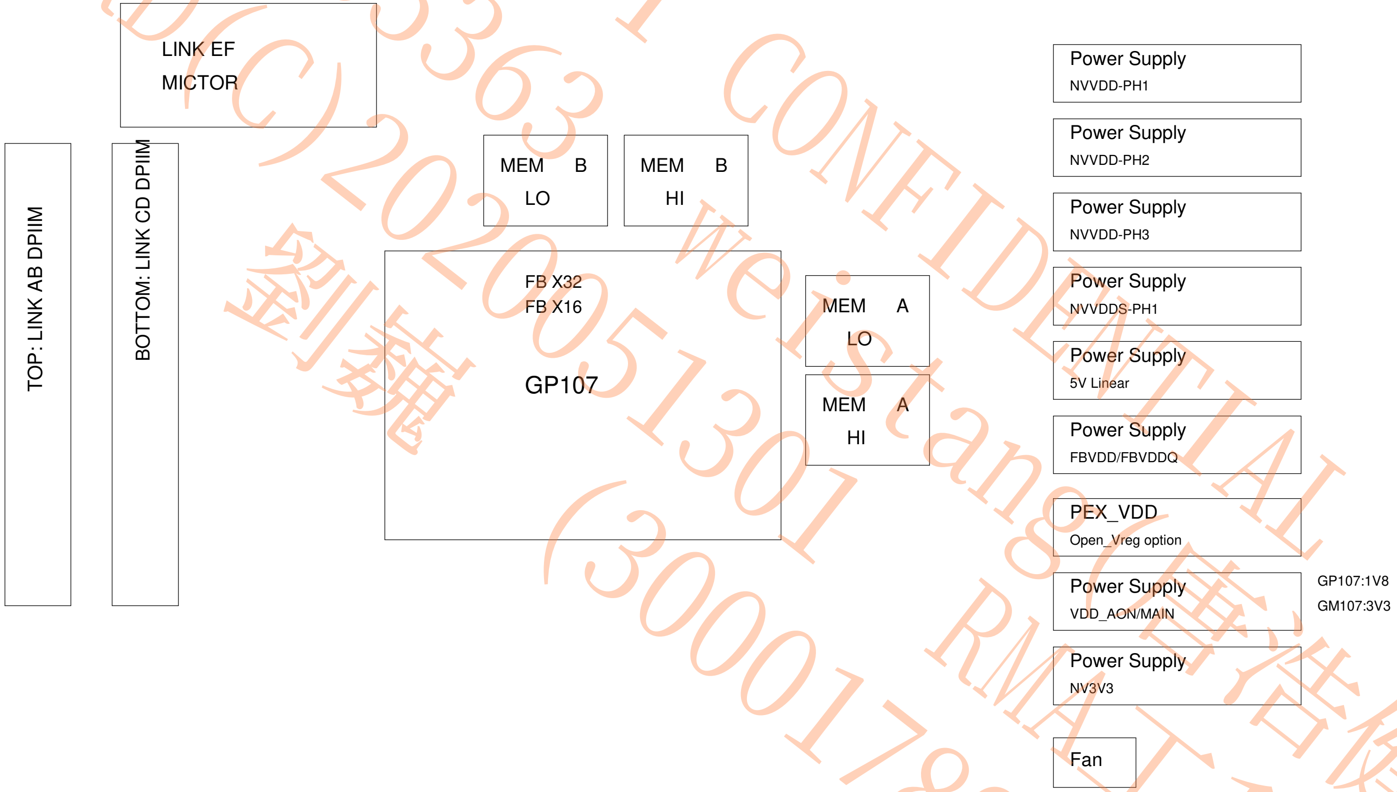
Page2: Block Diagram



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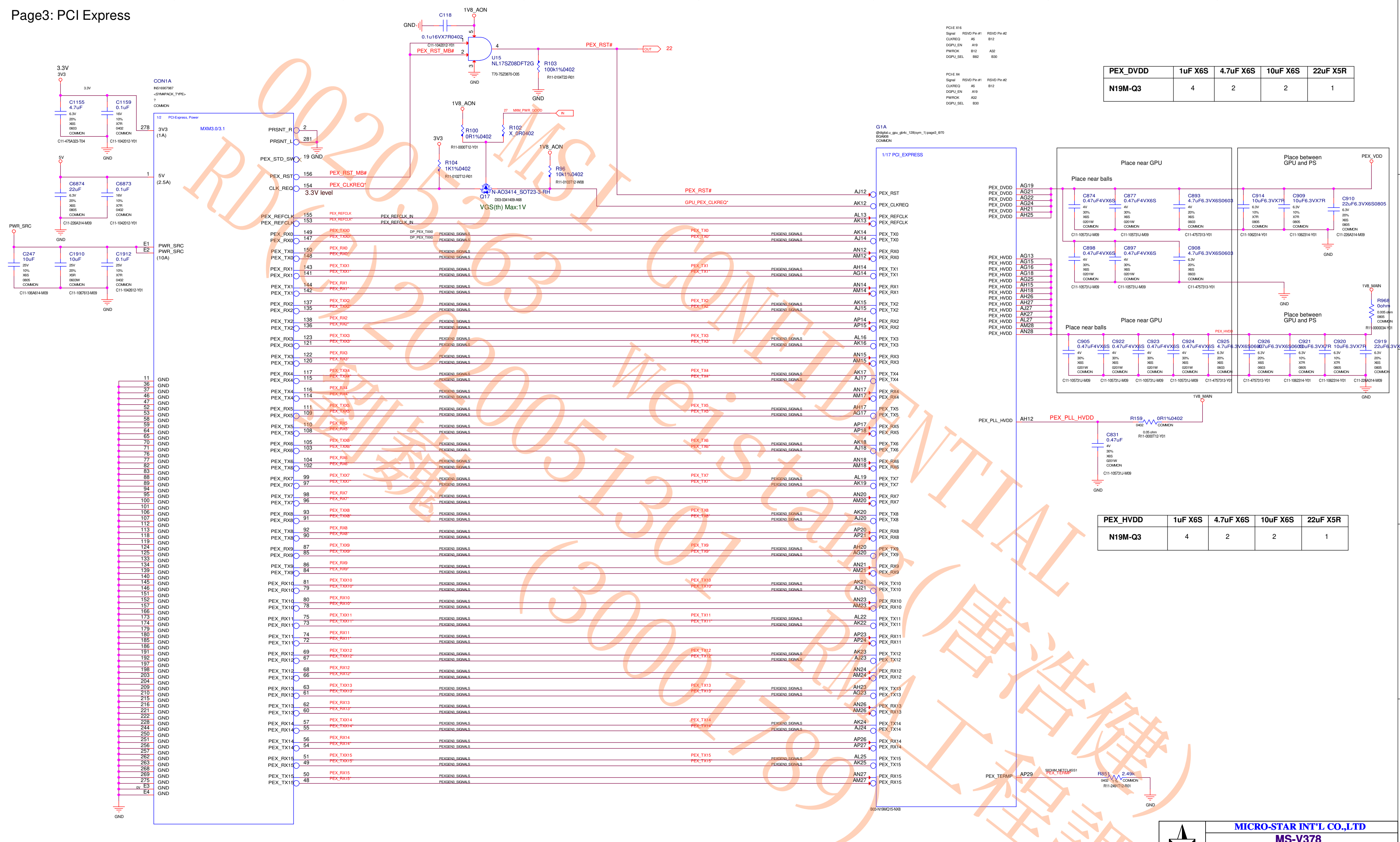
Page3: PCI Express



PEX_DVDD	1uF X6S	4.7uF X6S	10uF X6S	22uF X5R
N19M-Q3	4	2	2	1

PEX_HVDD	1uF X6S	4.7uF X6S	10uF X6S	22uF X5R
N19M-Q3	4	2	2	1

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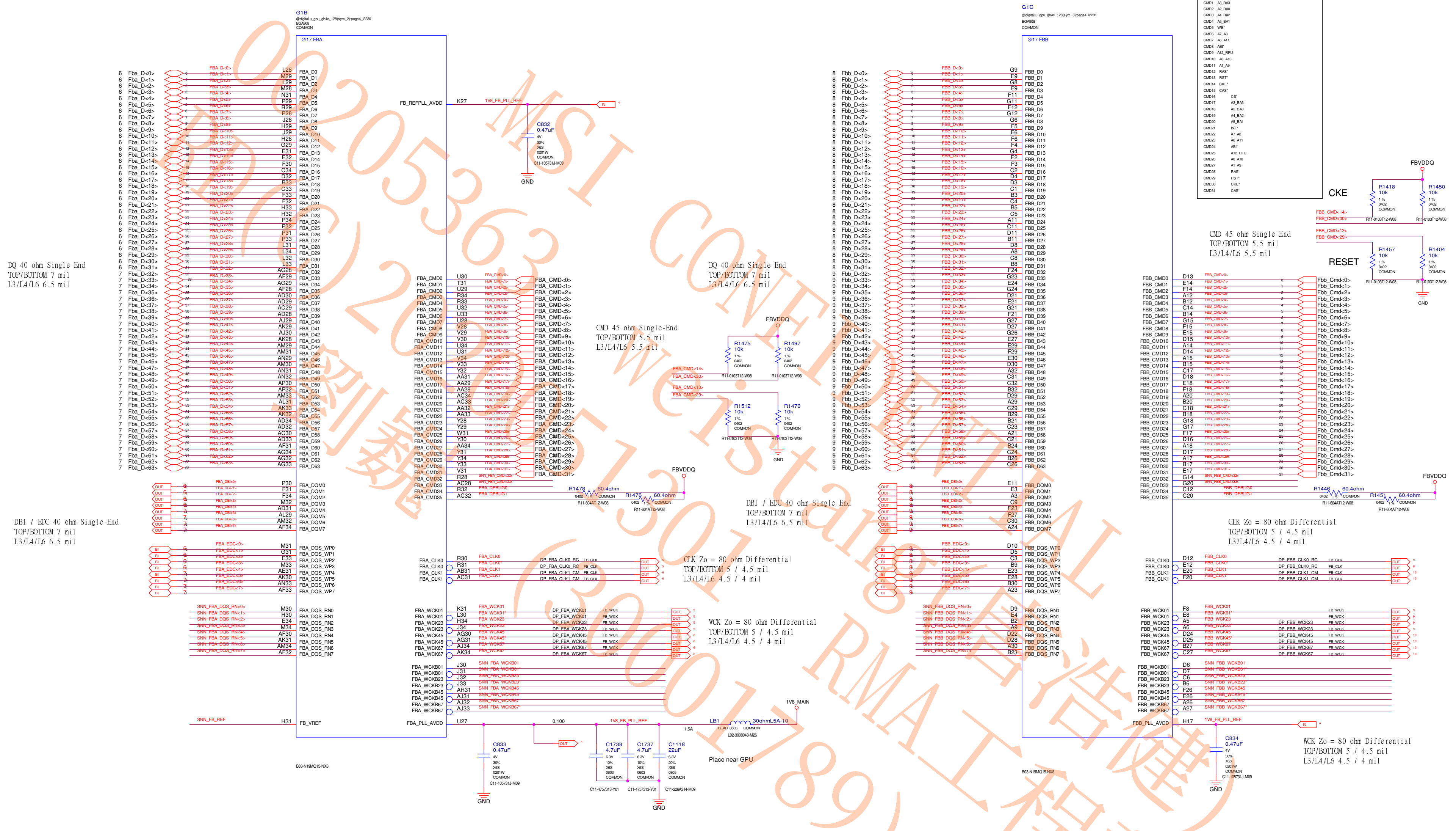
Page4: MEMORY: GPU Partition A/B



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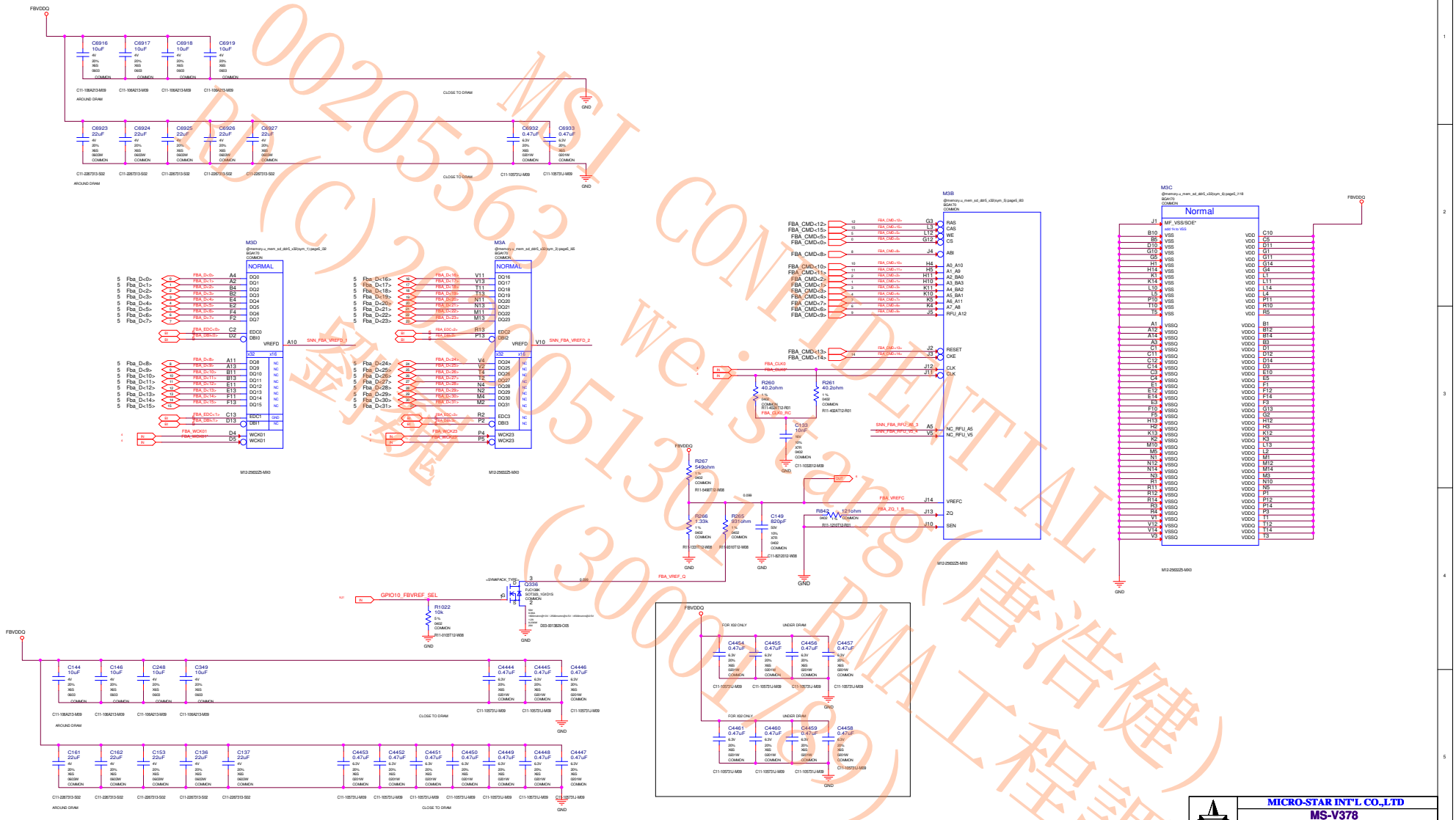
Page5: MEMORY: FBA Partition 31..0



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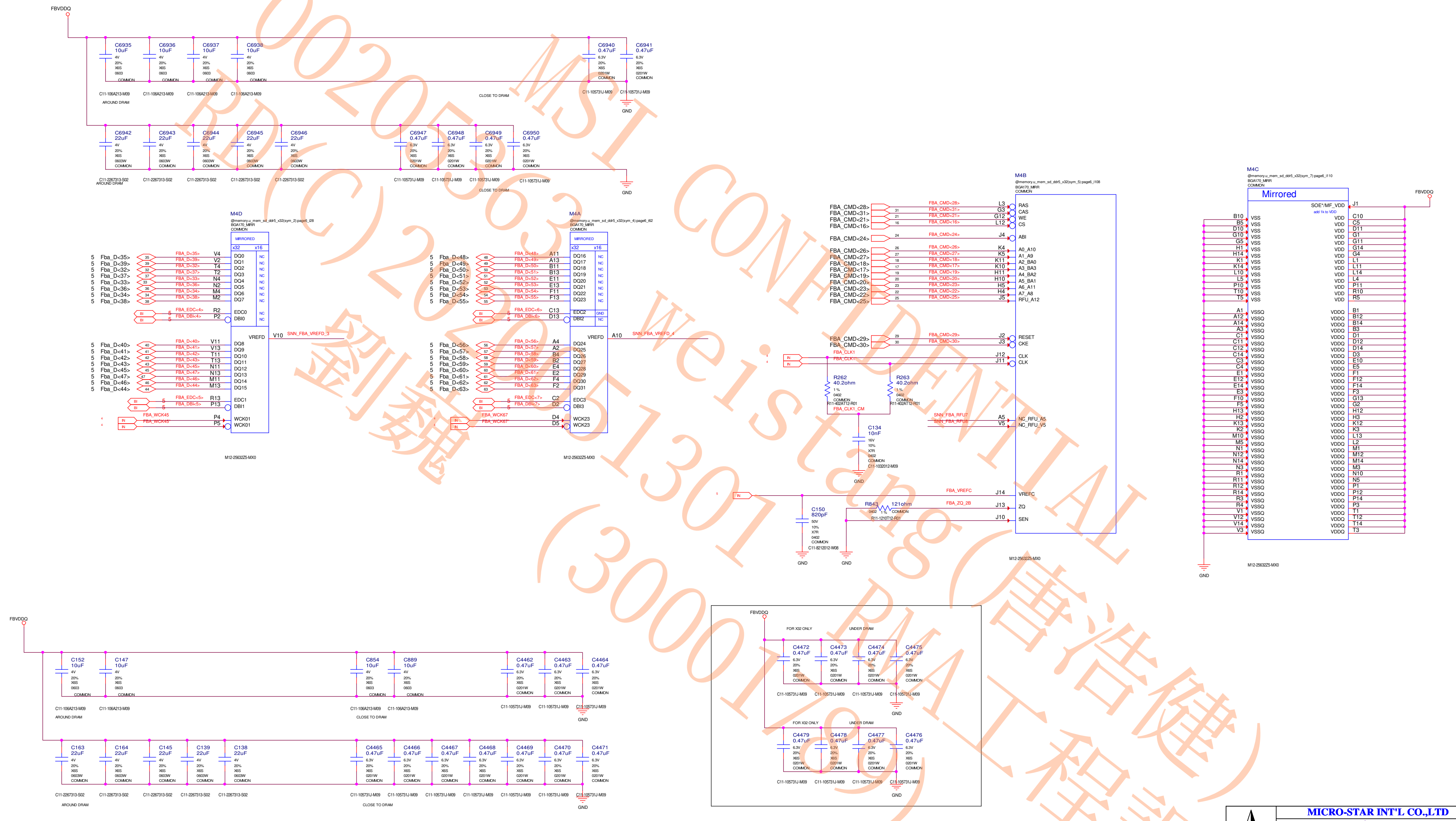
Page6: MEMORY: FBA Partition 63..32



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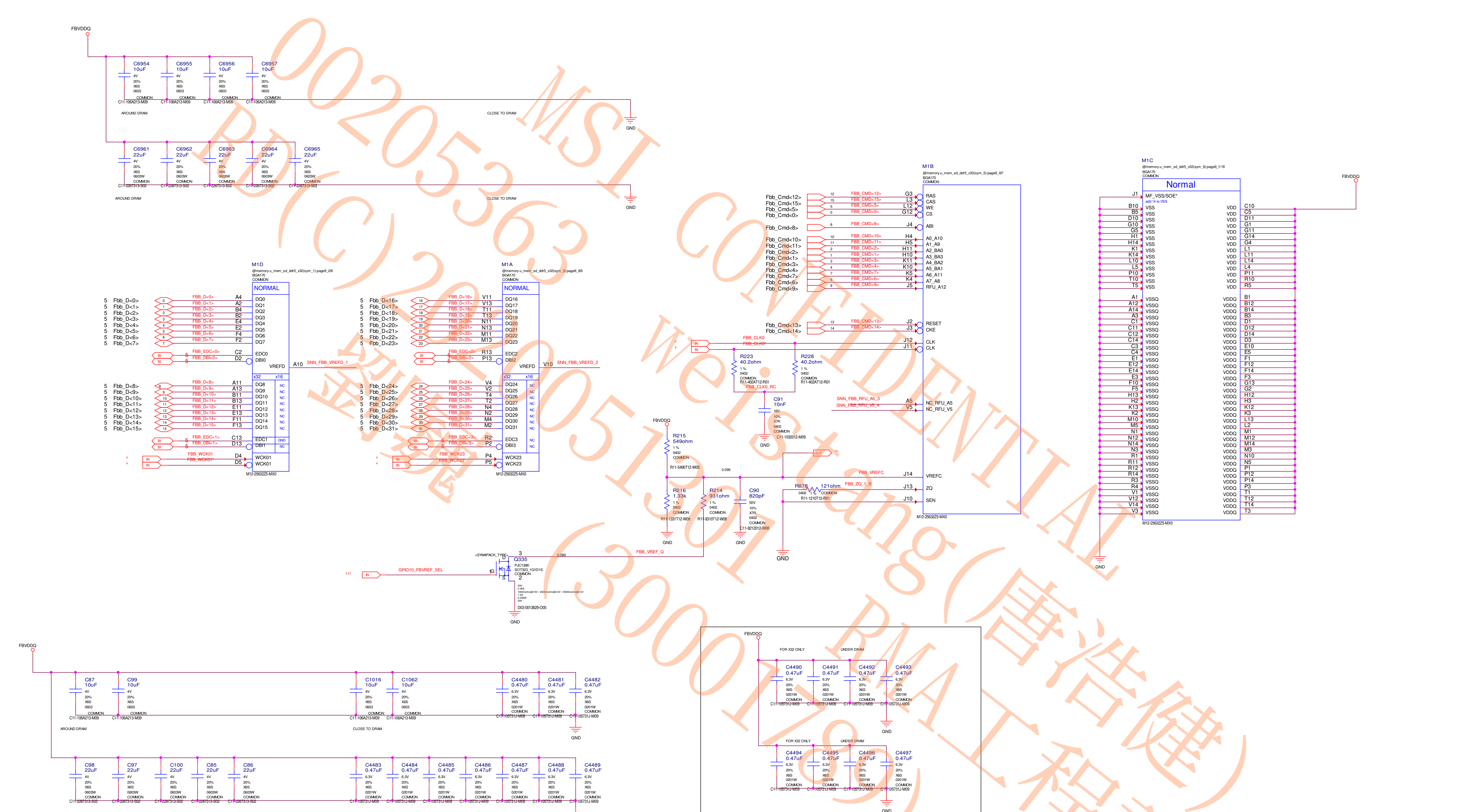
Page7: MEMORY: FBB Partition 31..0



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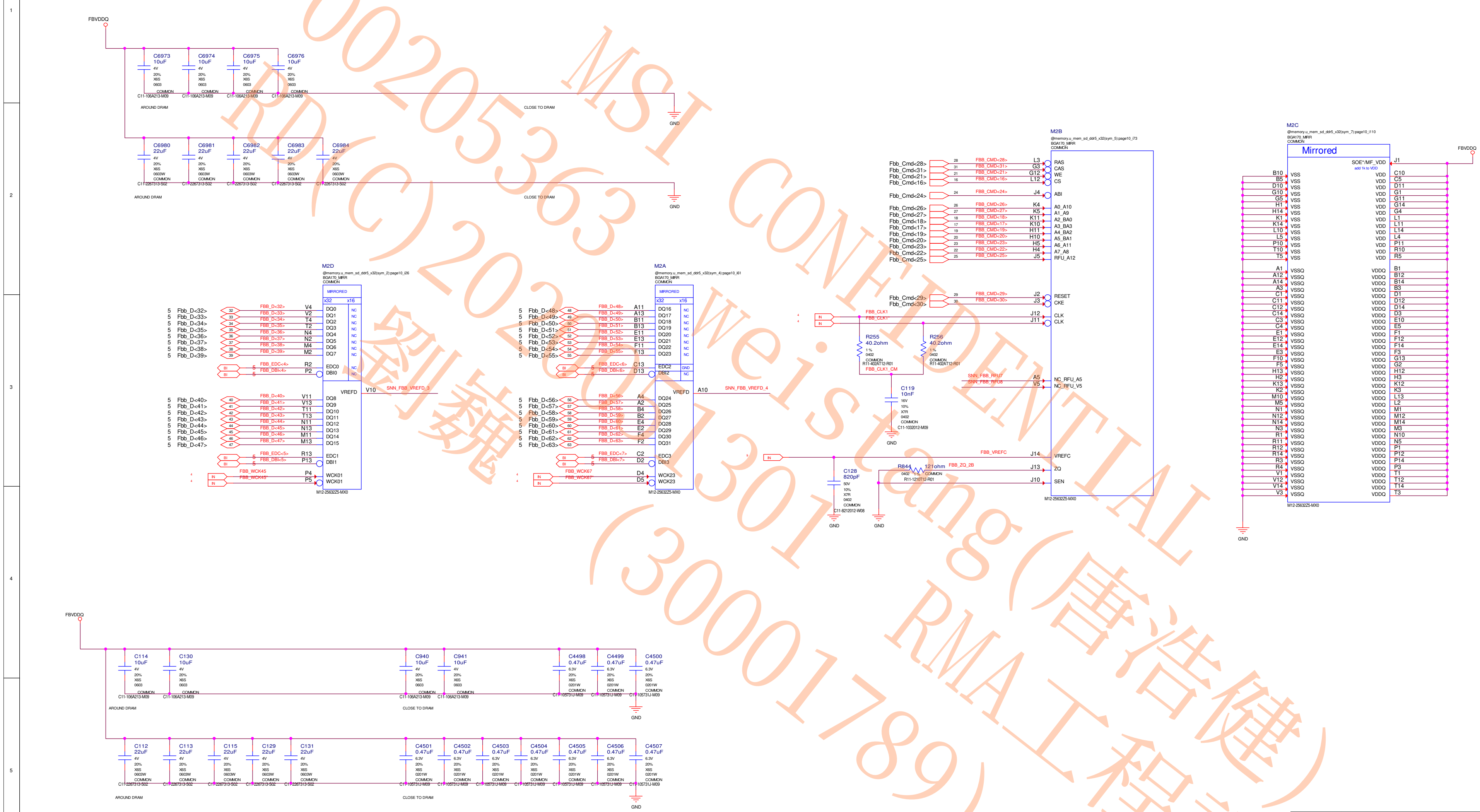
Page8: MEMORY: FBB Partition 63..32



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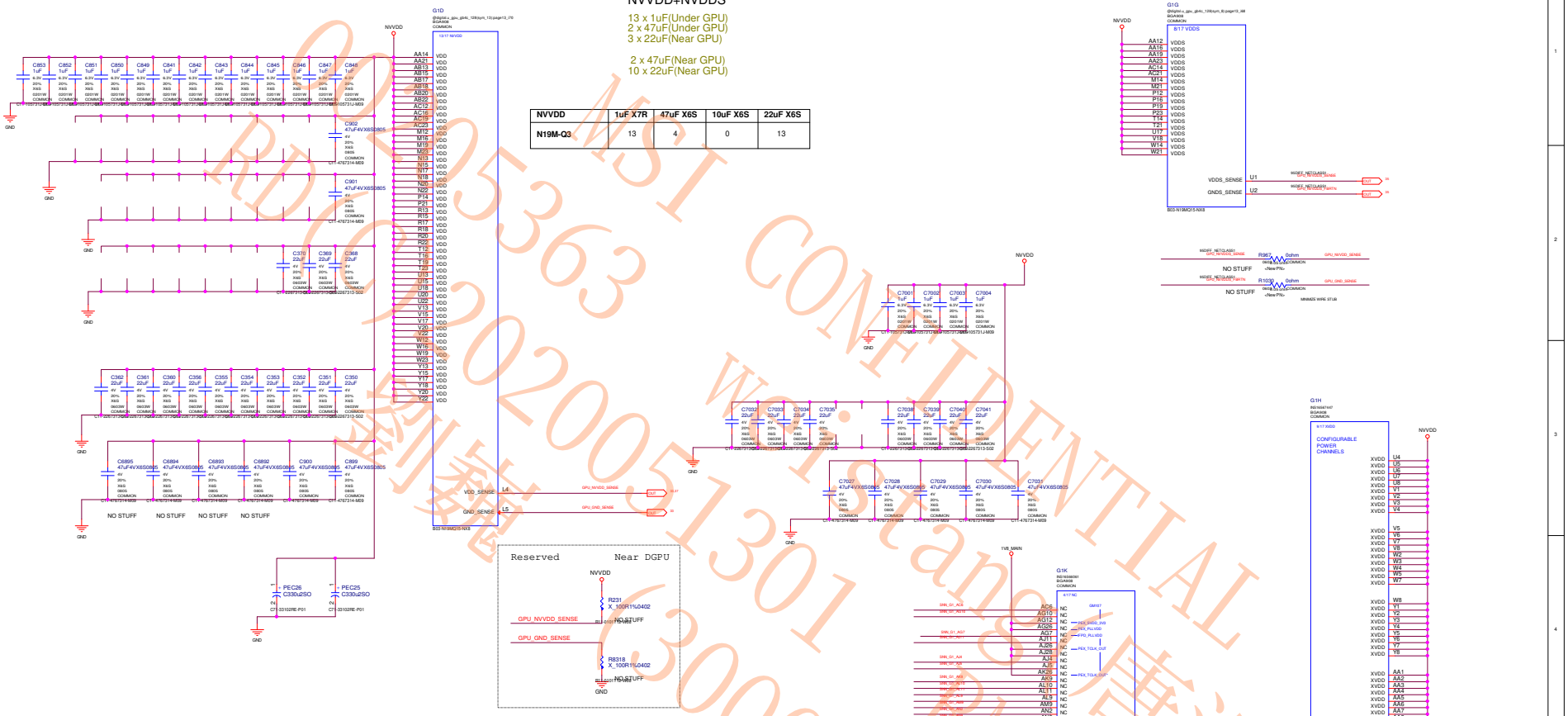
Page09: GPU PWR

NVVDD+NVDDS

13 x 1uF(Under GPU)
2 x 47uF(Under GPU)
3 x 22uF(Near GPU)

2 x 47uF(Near GPU)
10 x 22uF(Near GPU)

NVVDD	1uF X7R	47uF X6S	10uF X6S	22uF X6S
N19M-Q3	13	4	0	13



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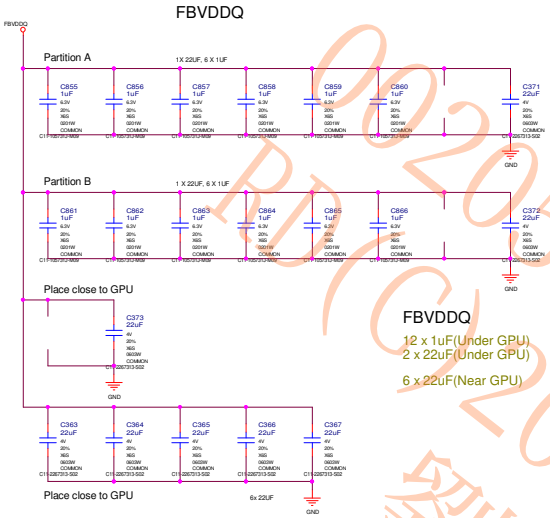
PAGE 10: GPU GND FBVDDQ

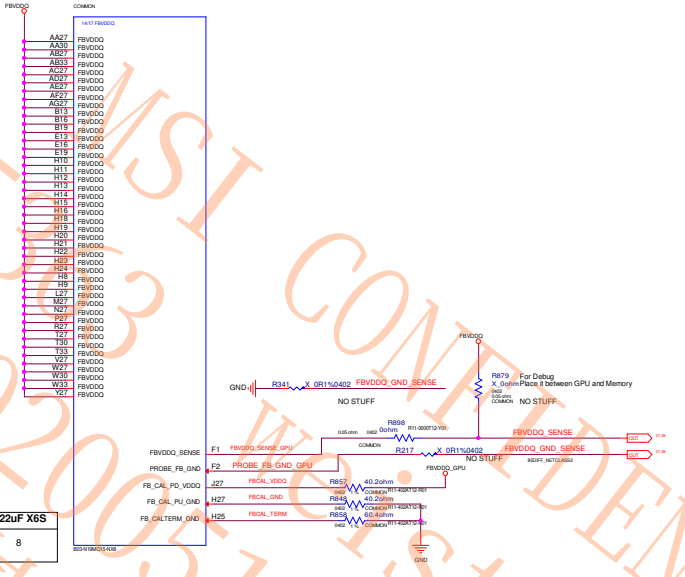


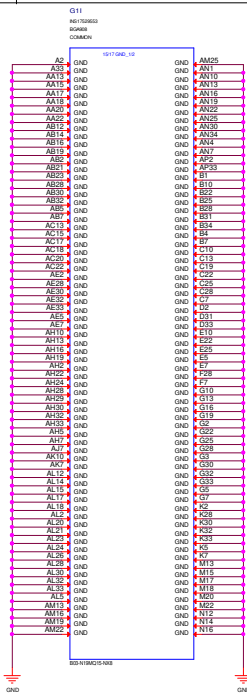
FBVDDQ

12 x 1uF(Under GPU)
2 x 22uF(Under GPU)

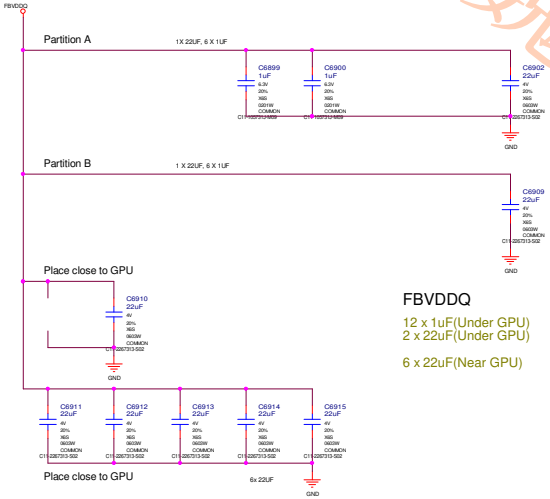
6 x 22uF(Near GPU)

FBVDDQ	1uF X7R	10uF X6S	22uF X6S
N19M-Q3	12	0	8





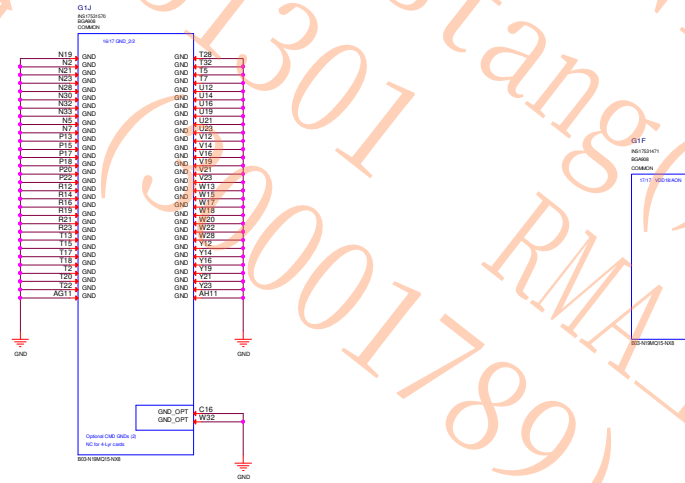
1V8_AON	0.1uF X7R	1uF X6S	4.7uF X6S
N19M-Q3	2	1	1

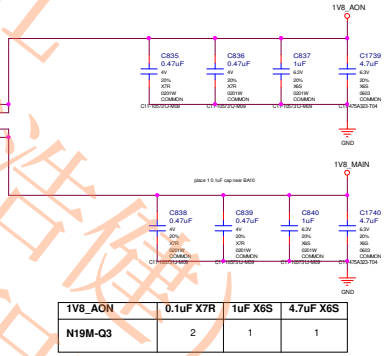


FBVDDQ

12 x 1uF(Under GPU)
2 x 22uF(Under GPU)

6 x 22uF(Near GPU)





1V8_AON	0.1uF X7R	1uF X6S	4.7uF X6S
N19M-Q3	2	1	1

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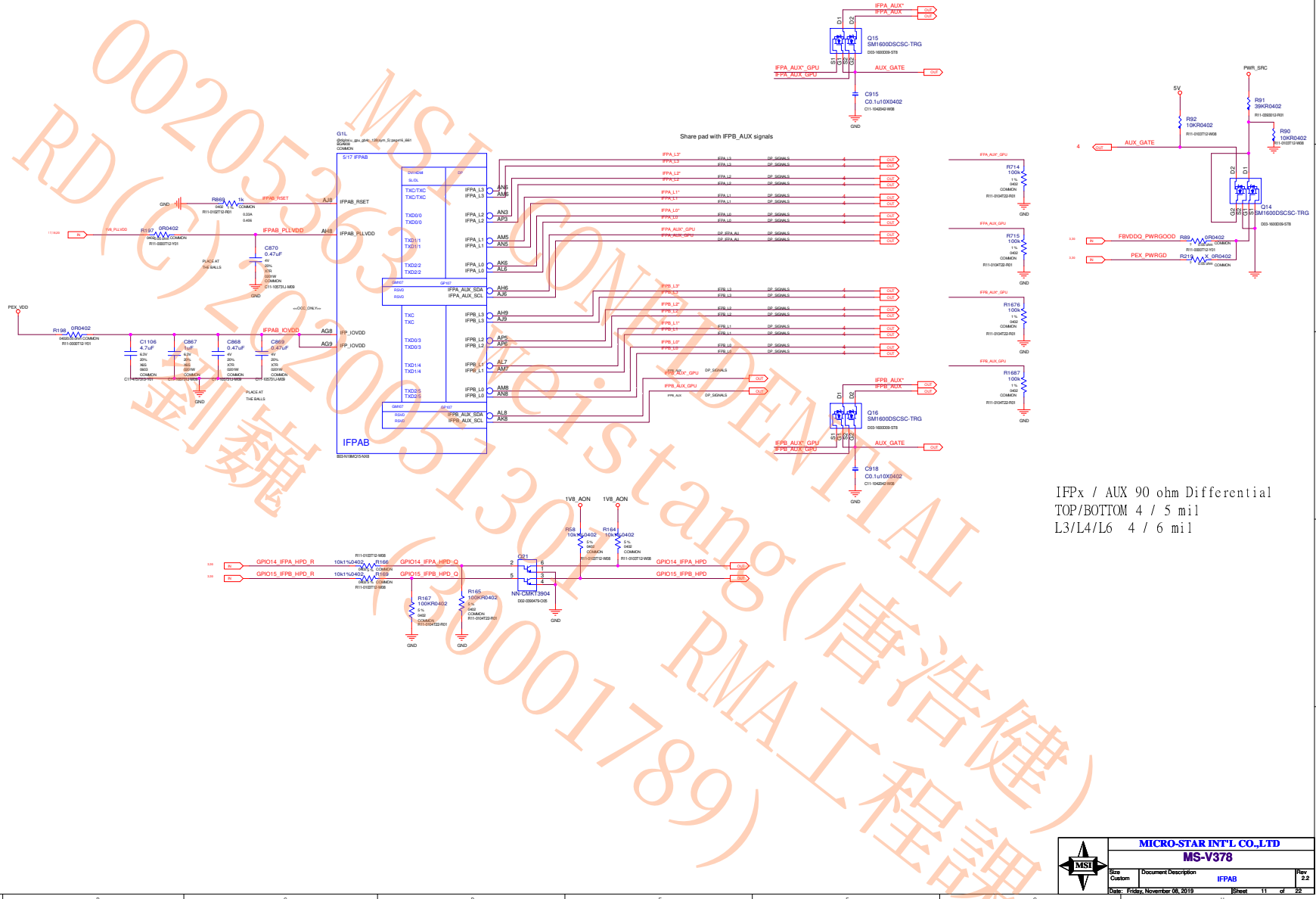
Page11: IFPAB



IFPx / AUX 90 ohm Differential
TOP/BOTTOM 4 / 5 mil
L3/L4/L6 4 / 6 mil

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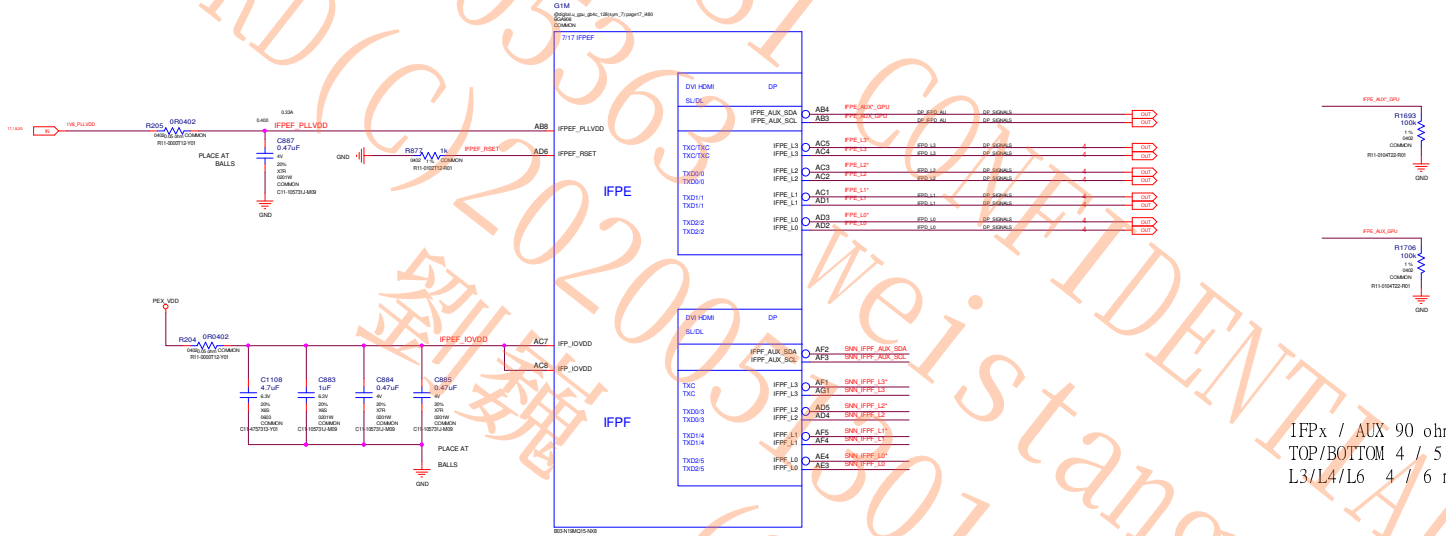
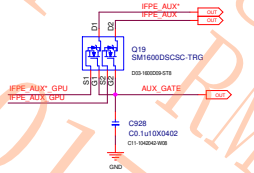
Page12: IFPEF



IFPx / AUX 90 ohm Differential
TOP/BOTTOM 4 / 5 mil
L3/L4/L6 4 / 6 mil



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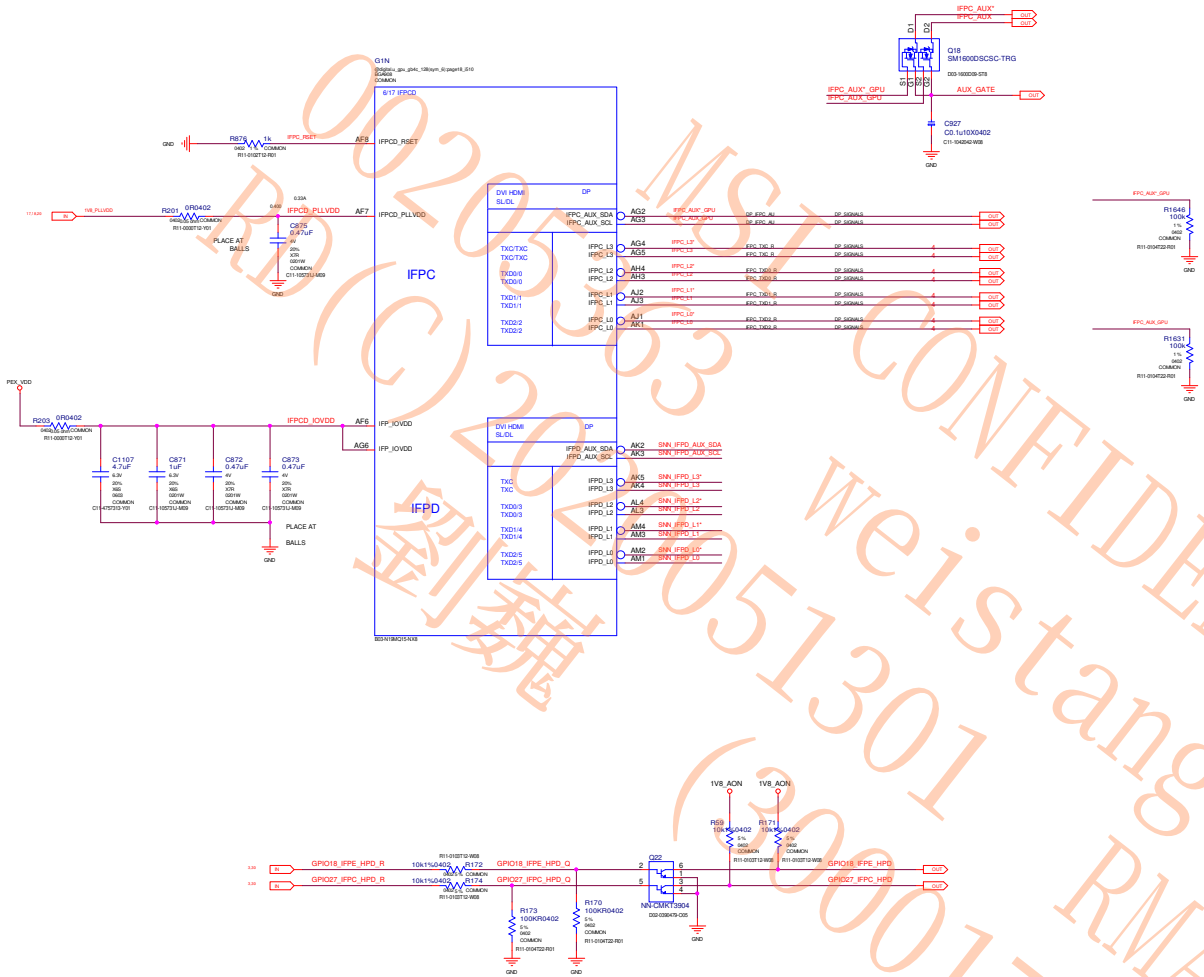
Page13: IFPCD



IFPx / AUX 90 ohm Differential
TOP/BOTTOM 4 / 5 mil
L3/L4/L6 4 / 6 mil

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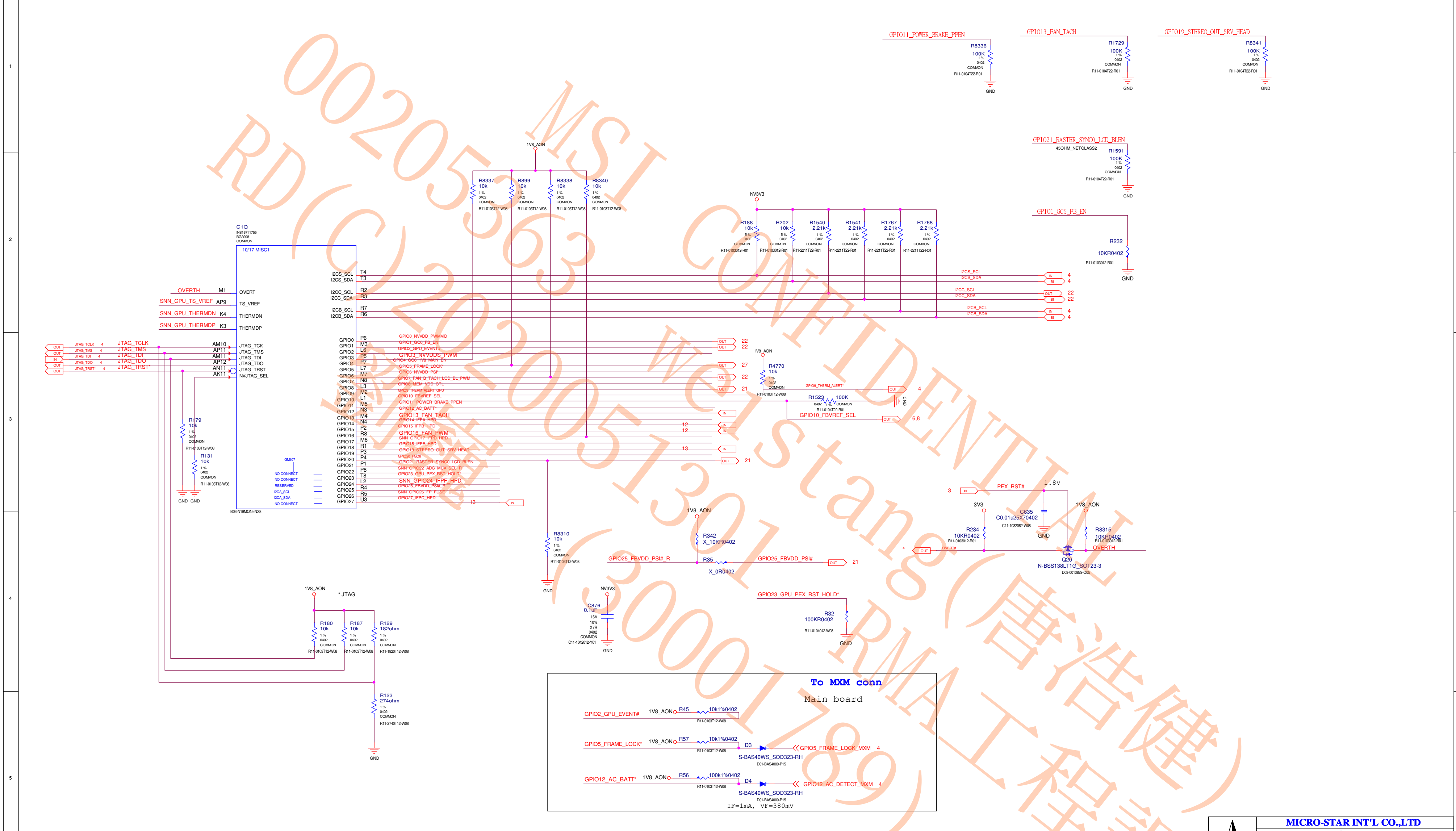
Page14: GPIO, THERMAL, MISC



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Page15: Straps,ROM, XTAL

STRAP2	STRAP1	STRAP0	RAMCFG[4:0]	
L	L	L	0000	SAMSUNG 256x32
L	L	H	0001	MICRON-F 256x32 8G
L	H	L	0010	HYNIX-M 256x32 8G
L	H	H	0011	
H	H	L	0110	HYNIX-A 128Mx32 4G
H	H	H	0111	SAMSUNG-E 128Mx32 4G
L	L	M	1000	HYNIX-B 128x32 4G

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	

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

H=High :Tied to 1.8V
M=Middle:Tied to 0.9V
L=Low :Tied to 0V

1:SMB_ALT_ADDR ENABLE
0:SMB_ALT_ADDR DISABLE

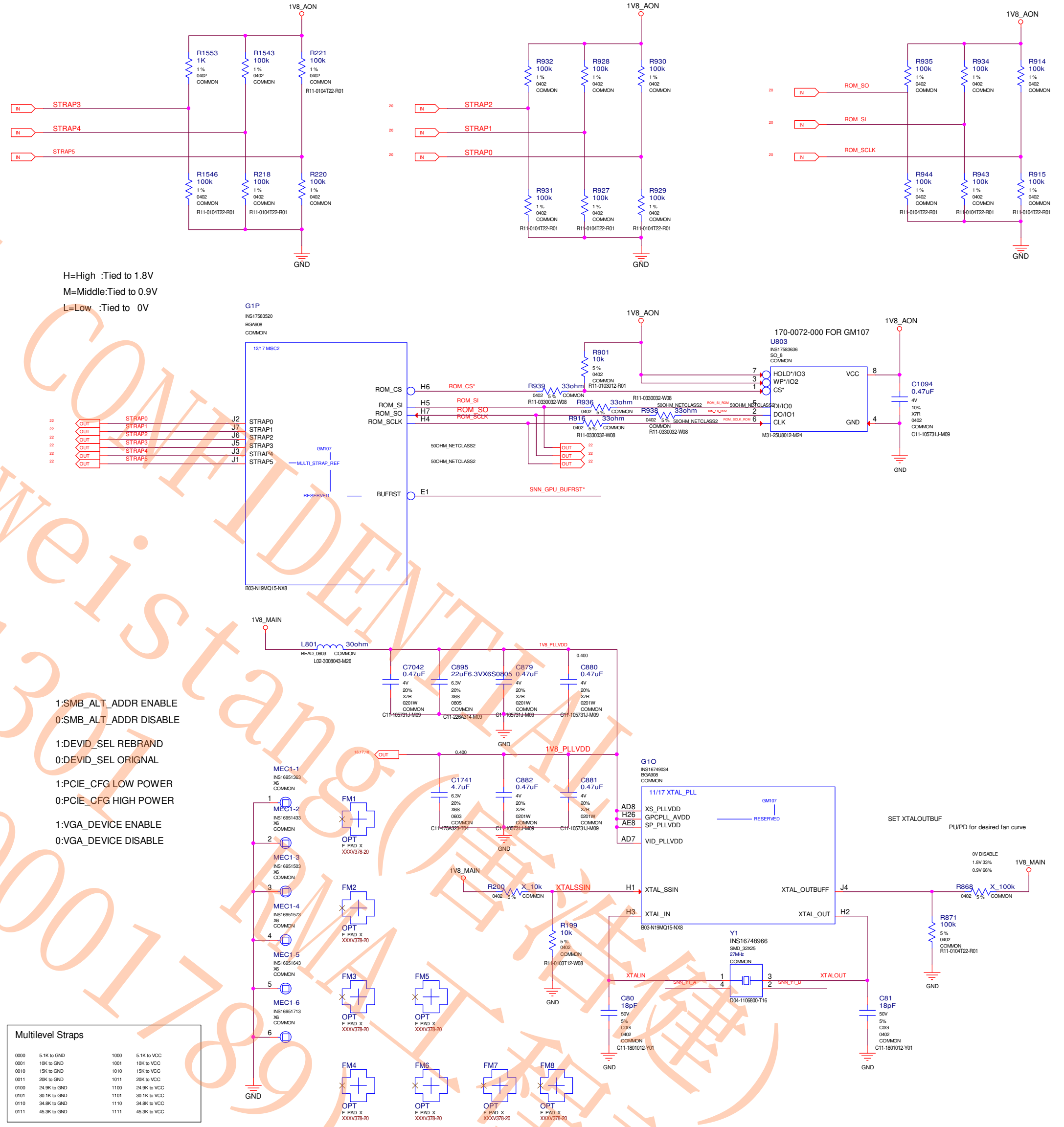
1:DEVID_SEL REBRAND
0:DEVID_SEL ORIGNAL

1:PCIE_CFG LOW POWER
0:PCIE_CFG HIGH POWER

1:VGA_DEVICE ENABLE
0:VGA_DEVICE DISABLE

Multilevel Straps

0000	5.1K to GND	1000	5.1K to VCC
0001	10K to GND	1001	10K to VCC
0010	15K to GND	1010	15K to VCC
0011	20K to GND	1011	20K to VCC
0100	24.9K to GND	1100	24.9K to VCC
0101	30.1K to GND	1101	30.1K to VCC
0110	34.8K to GND	1110	34.8K to VCC
0111	45.3K to GND	1111	45.3K to VCC



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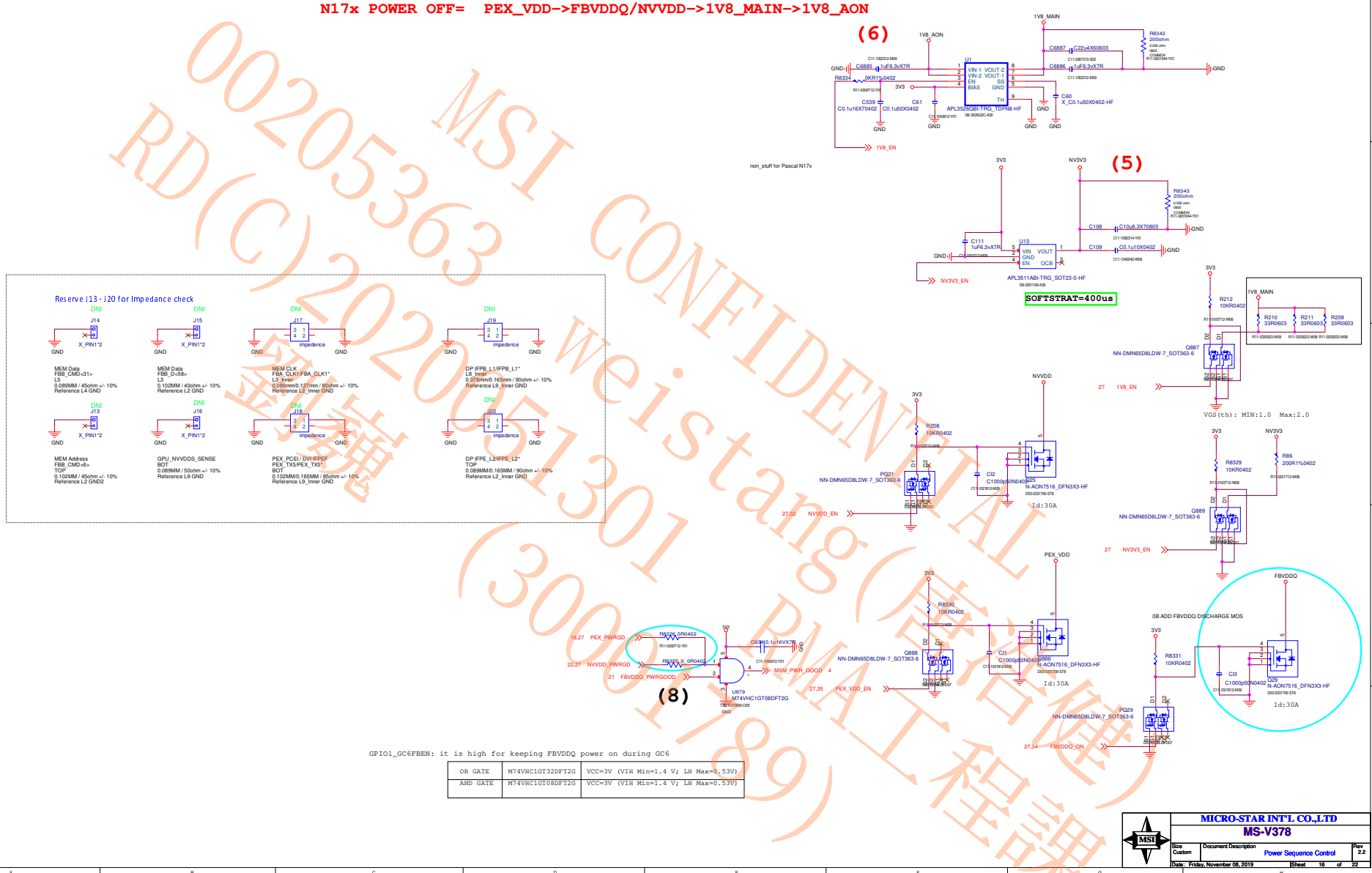
Page16: Power Sequence Control

N17x POWER ON= 1V8_AON->1V8_MAIN->NVVDD->PEX_VDD->FBVDDQ->DGPU_PWRGD

N17x POWER OFF= PEX_VDD->FBVDDQ/NVVDD->1V8_MAIN->1V8_AON



GPIO1_GC6FBEN: it is high for keeping FBVDDQ power on during GC6

OR GATE	M74VHC1GT32DFT2G	VCC=3V (VIH Min=1.4 V; LH Max=0.53V)
AND GATE	M74VHC1GT08DFT2G	VCC=3V (VIH Min=1.4 V; LH Max=0.53V)

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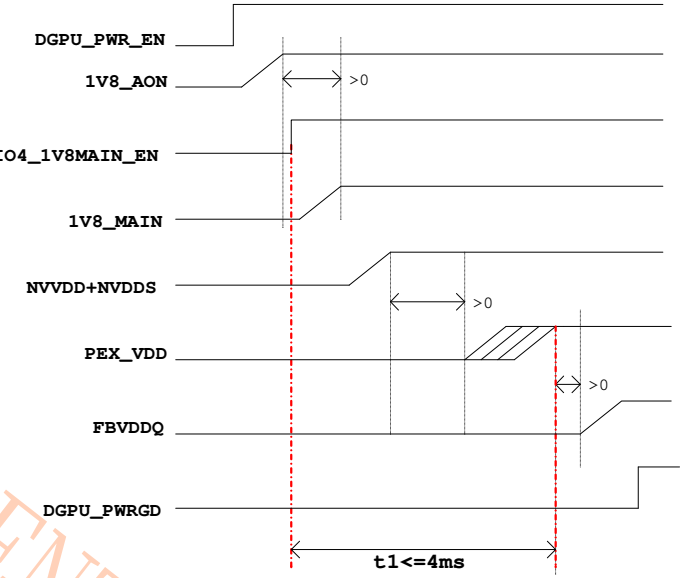
PAGE 17: 1V8_AON

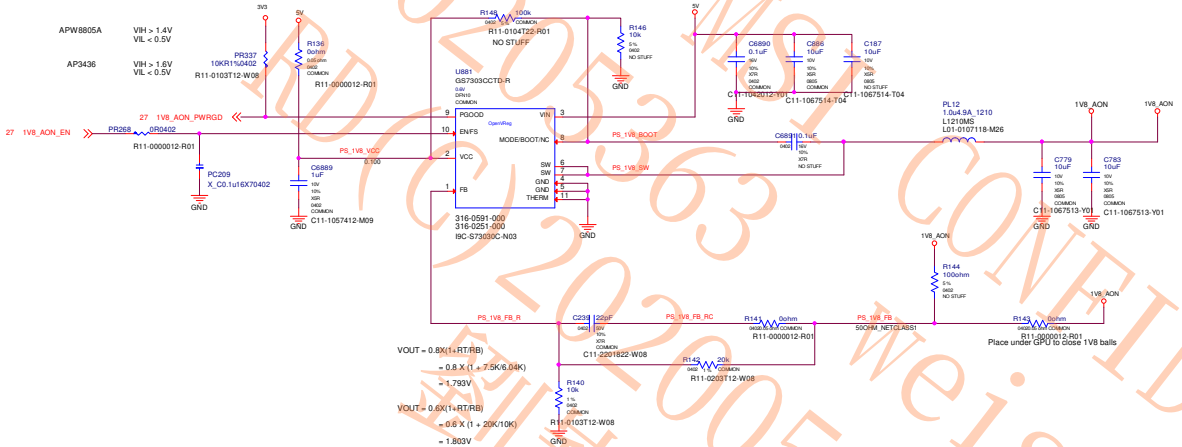
POWER UP Sequence

1V8_AON -> 1V8_MAIN->NV3V3 -> NVVDD -> NVVDDS / PEX_VDD -> FBVDDQ

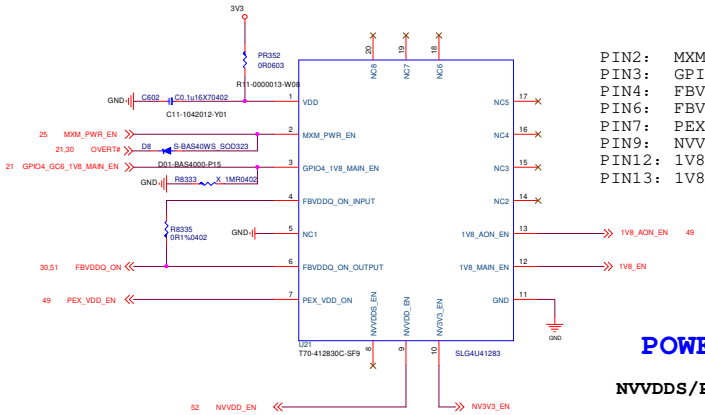


Voltage = 1.8V
Current = ? A
OCP(typi) = ? A

1V8_AON



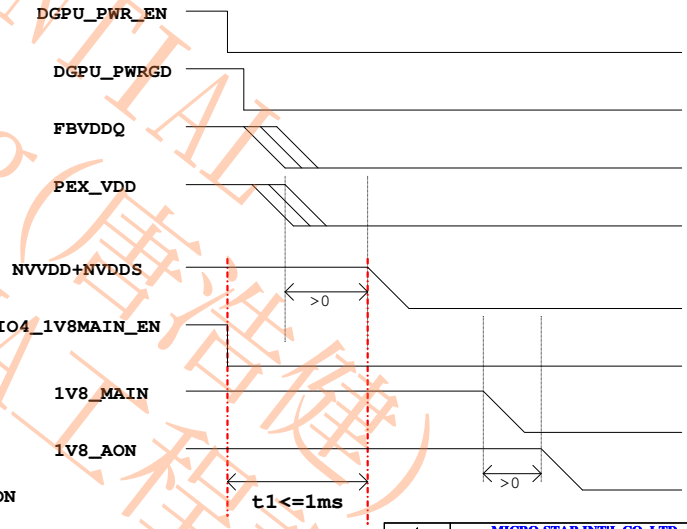
Power Sequence Control



PIN2: MXM_PWR_EN is 3.3V INPUT
PIN3: GPIO4_GC6_PWR_EN is 1.8V INPUT
PIN4: FBVDDQ_ON_INPUT 3.3V INPUT
PIN6: FBVDDQ_ON_OUTPUT 3.3V OUTPUT
PIN7: PEX_VDD_EN_IC 3.3V OUTPUT
PIN9: NVVDD_EN_IC 3.3V OUTPUT
PIN12: 1V8_MAIN_EN_IC 3.3V OUTPUT
PIN13: 1V8_AON_EN_IC 3.3V OUTPUT

POWER Down Sequence

NVVDDS/PEX_VDD/FBVDDQ ->NVVDD/NV3V3->1V8_MAIN> 1V8_AON



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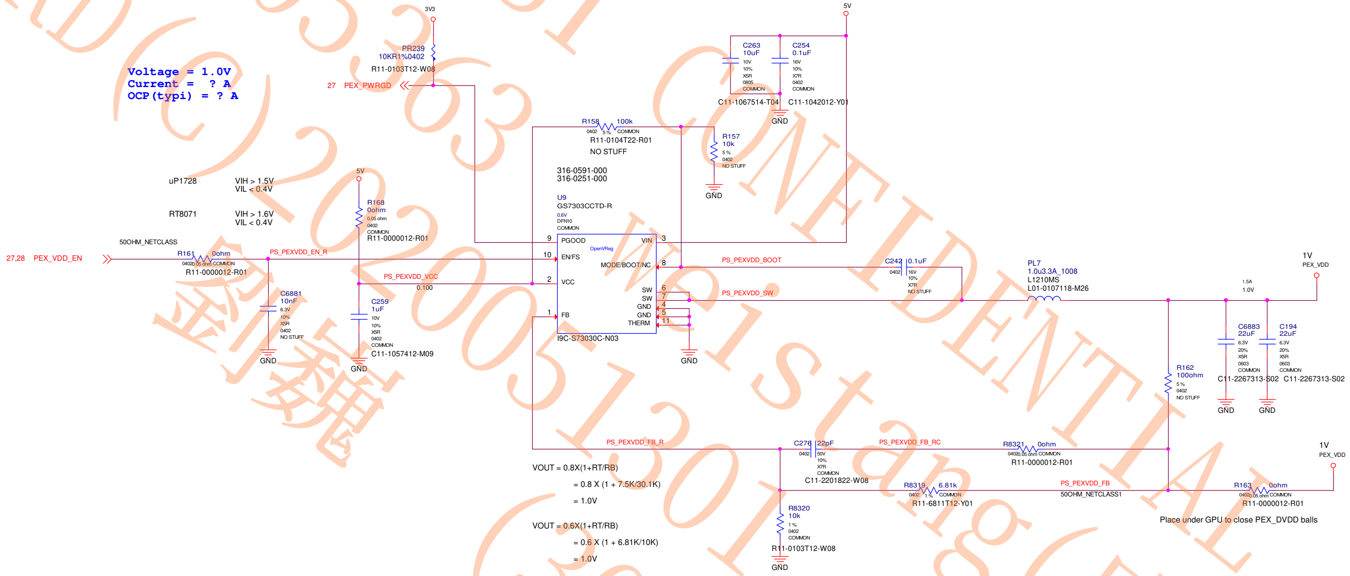
PAGE 18: PEXVDD



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Page 19: FBVDD CONTROLLER

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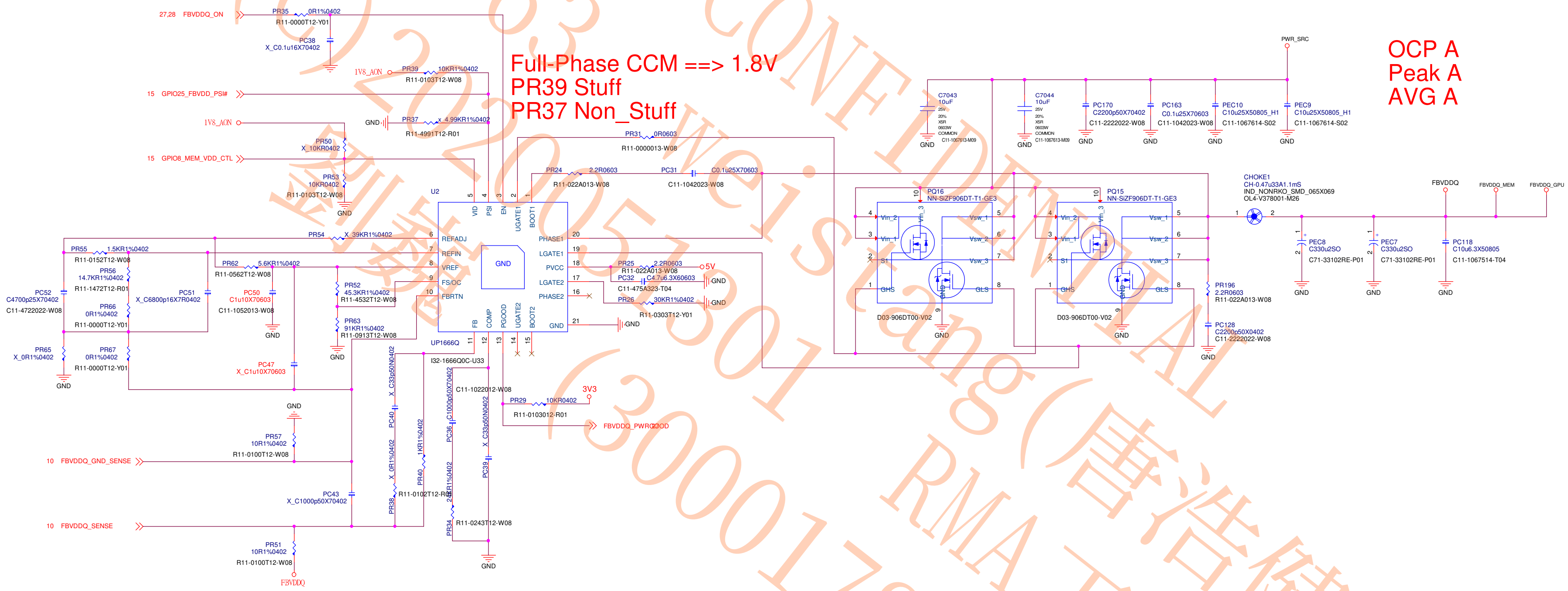
MS-16R3-1.0

Full-Phase CCM ==> 1.8V
PR39 Stuff
PR37 Non_Stuff

OCP A
Peak A
AVG A



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Page20: NVVDD CONTROLLER

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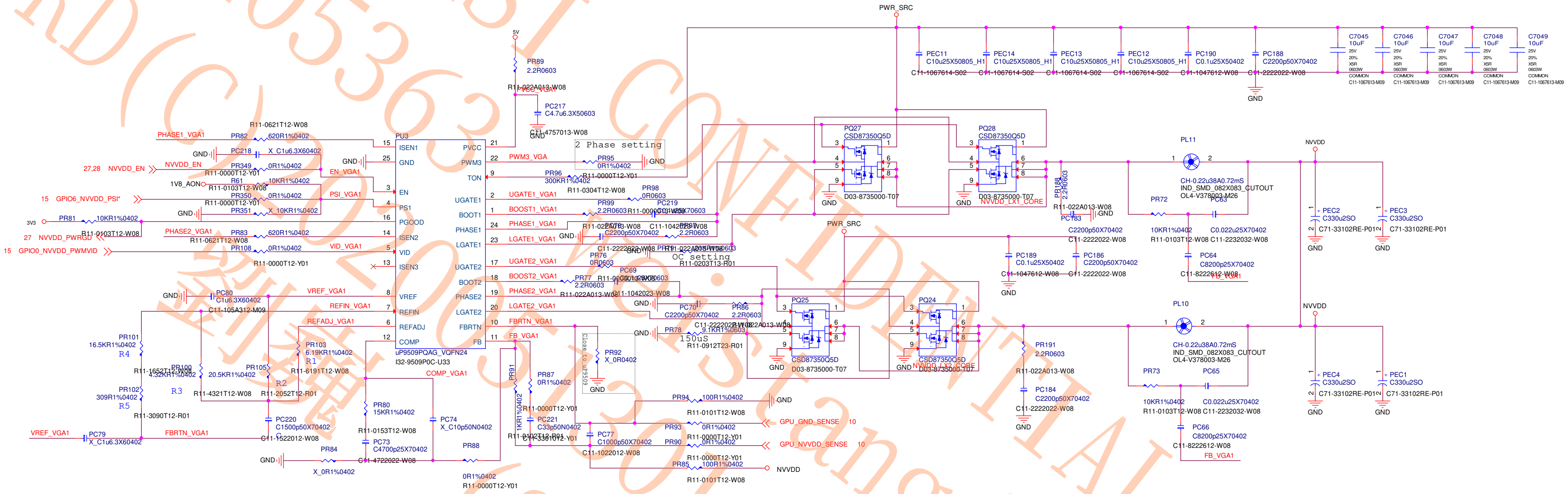
MS-16R1-1.0

UP9509P

EDP-Peak 90A
EDP-Con 47A

VBoot:0.8V
Vmin:0.5V / Vmax:1.25V



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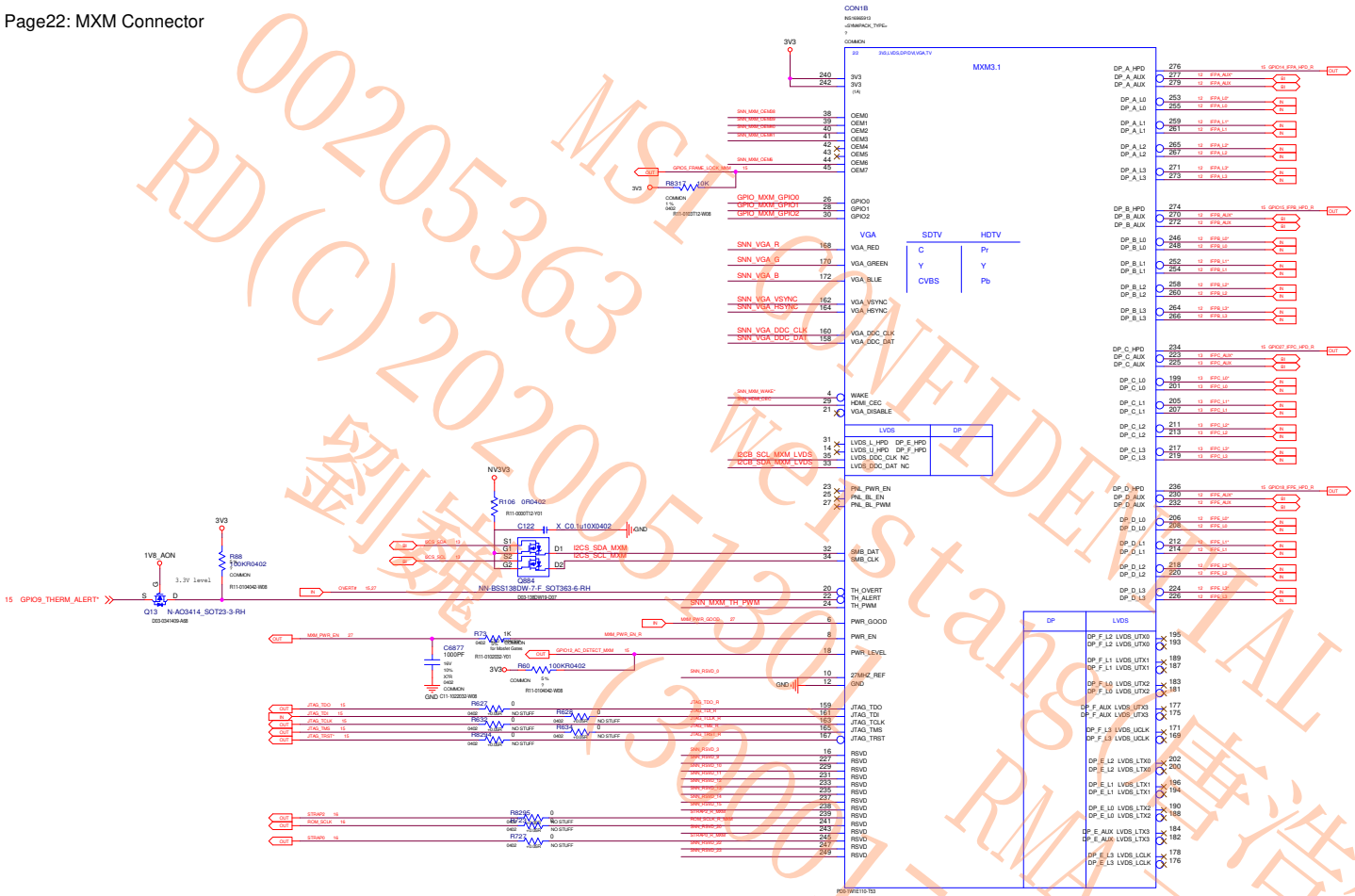
Page22: MXM Connector



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Page23: GPIO Pin Define

Pin Name	N17P	N18P	N17P Functional Description	N17P Recommended Default Pull-up or Pull-down	N18P Recommended Default Pull-up or Pull-down
GPIO0	NVVDD_PWM	NVVDD_PWM_VID	PWM Output to control NVVDD	0 to 1V8 PWM output	
GPIO1	GC6_FB_EN	GC6_FB_EN	FB Enable for GC6 2.1	OD, 10K pull-down	OD, 10K pull-down
GPIO2	GPU_EVENT#	GPU_EVENT#	GPU wake signal for GC6 2.1	10K pull-up to 1V8 _AON	10K pull-up to 1V8 _AON
GPIO3	NVVDDS_PWM	UNUSED	PWM output to control the NVVDDS power supply	0 to 1V8 output	
GPIO4	1V8_MAIN_EN	1V8_MAIN_EN	GPU POWER Sequencing for GC6 2.1	OD, 10K pull-up to 1V8 _AON	OD, 10K pull-up to 1V8 _AON
GPIO5	FRM_LCK#	FRM_LCK#	Active low Frame Lock	OD, 10K pull-up to 1V8 _AON	OD, 10K pull-up to 1V8 _AON
GPIO6	NVVDD_PSI	NVVDD_PSI	Phase shedding	10K pull-up to 1V8 _AON	10K pull-up to 1V8 _AON
GPIO7	LCD_BL_PWM	LCD_BL_PWM	Panel Backlight PWM Brighteness Control	100K pull-down	100K pull-down
GPIO8	MEM_VDD_CTL	MEM_VDD_CTL	Memory Voltage Control	pull-up/pull-down to set the FBVDD/Q power-on voltage	pull-up/pull-down to set the FBVDD/Q power-on voltage
GPIO9	THERM_ALERT	THERM_ALERT	Active Low Thermal Alert	OD, 10K pull-up to 1V8_AON	OD, 10K pull-up to 1V8_AON
GPIO10	MEM_VREF_CTL	MEM_VREF_CTL	Memory VREF Control	100K pull-down	100K pull-down
GPIO11	LCD_VCC	LCD_VCC	Panel Power Enable	100K pull-down	100K pull-down
GPIO12	PWR_LEVEL	PWR_LEVEL	AC power detect or power supply overdraw input	100K pull-up to 1V8_AON	10K pull-up to 1V8_AON
GPIO13	LCD_BLEN	UNUSED	Panel Backlight Enable	100K pull-down	
GPIO14	HPD_A	HPD_A	Hot Plug Detect for IFPA		10K pull-up to 1V8 _AON
GPIO15	HPD_B	HPD_B	Hot Plug Detect for IFPB		10K pull-up to 1V8 _AON
GPIO16	SYS_PEX_RST_MON#	UNUSED	System side PCIe reset monitor	10K pull-up to 1V8 _AON	
GPIO17	HPD_D	HPD_D	Hot Plug Detect for IFPD		10K pull-up to 1V8 _AON
GPIO18	HPD_E	HPD_E	Hot Plug Detect for IFPE		10K pull-up to 1V8 _AON
GPIO19	3DVision	UNUSED	3D Vision L/R signal	100K pull-down	
GPIO20	GC5_MODE	NB_GC6			10K pull-down
GPIO21	UNUSED	LCD_BLEN			100K pull-down
GPIO22	UNUSED	ADC_MUX_SEL			2.2K pull-up See Circuit
GPIO23	GPU_PEX_RST_HOLD#	RESERVED	GPU PCIe self-reset control	OD, 10K pull-up to a gated 3V3	100K pull-down
GPIO24	HPD_F	UNUSED	Hot Plug Detect for IFPF		
GPIO25	UNUSED	FBVDD_PSI#			
GPIO26	UNUSED	FP_FUSE			10K pull-down
GPIO27	HPD_C	HPD_C	Hot Plug Detect for IFPC		10K pull-up to 1V8 _AON

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