PG150-C03

384b GDDR6 x16
TALL DP + DP + DP + HDMI/DP + USB

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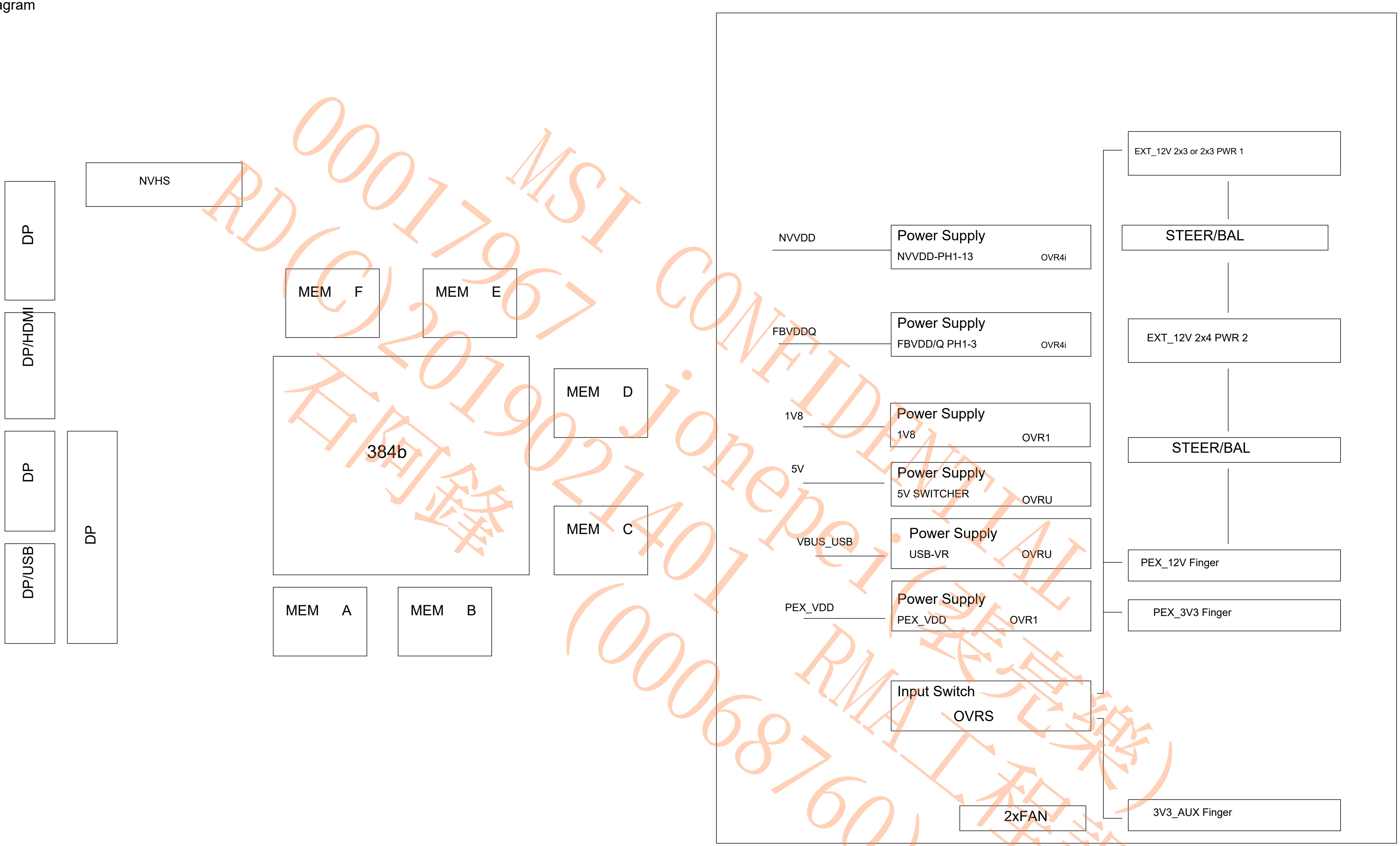
Block Diagram



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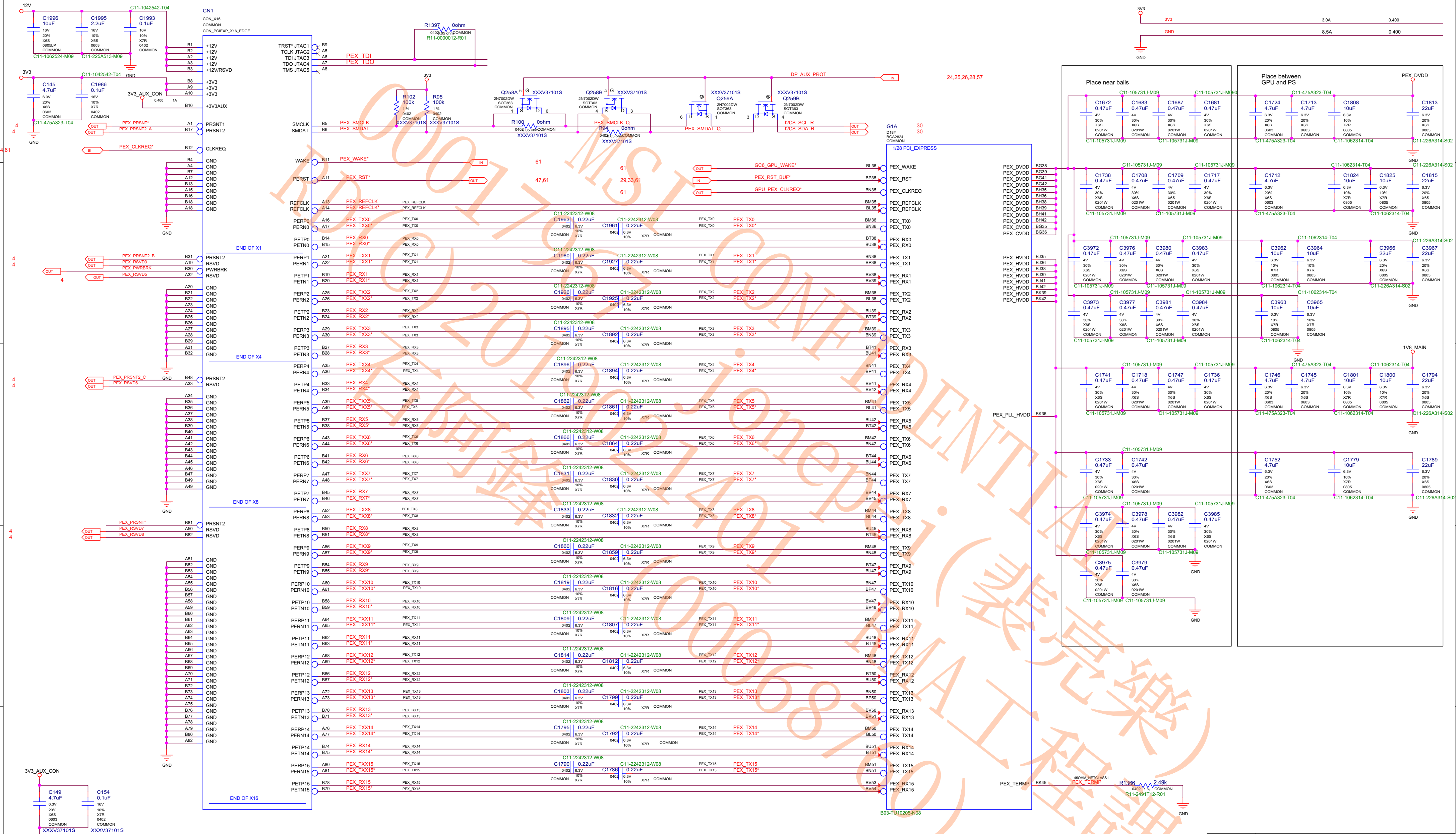
PCI Express



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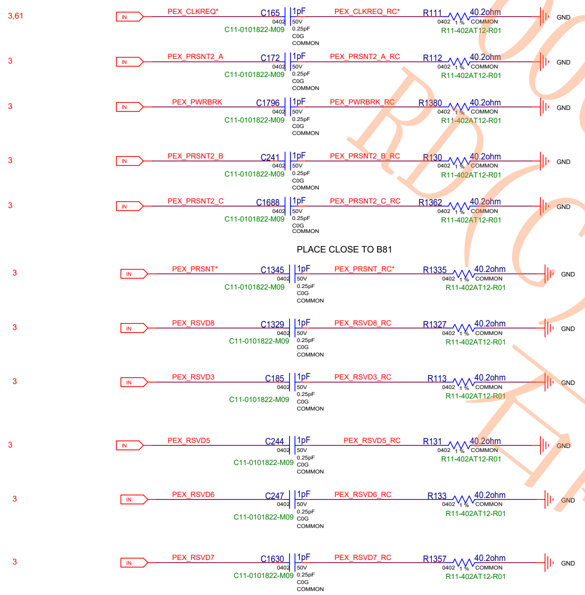
PCI TERM



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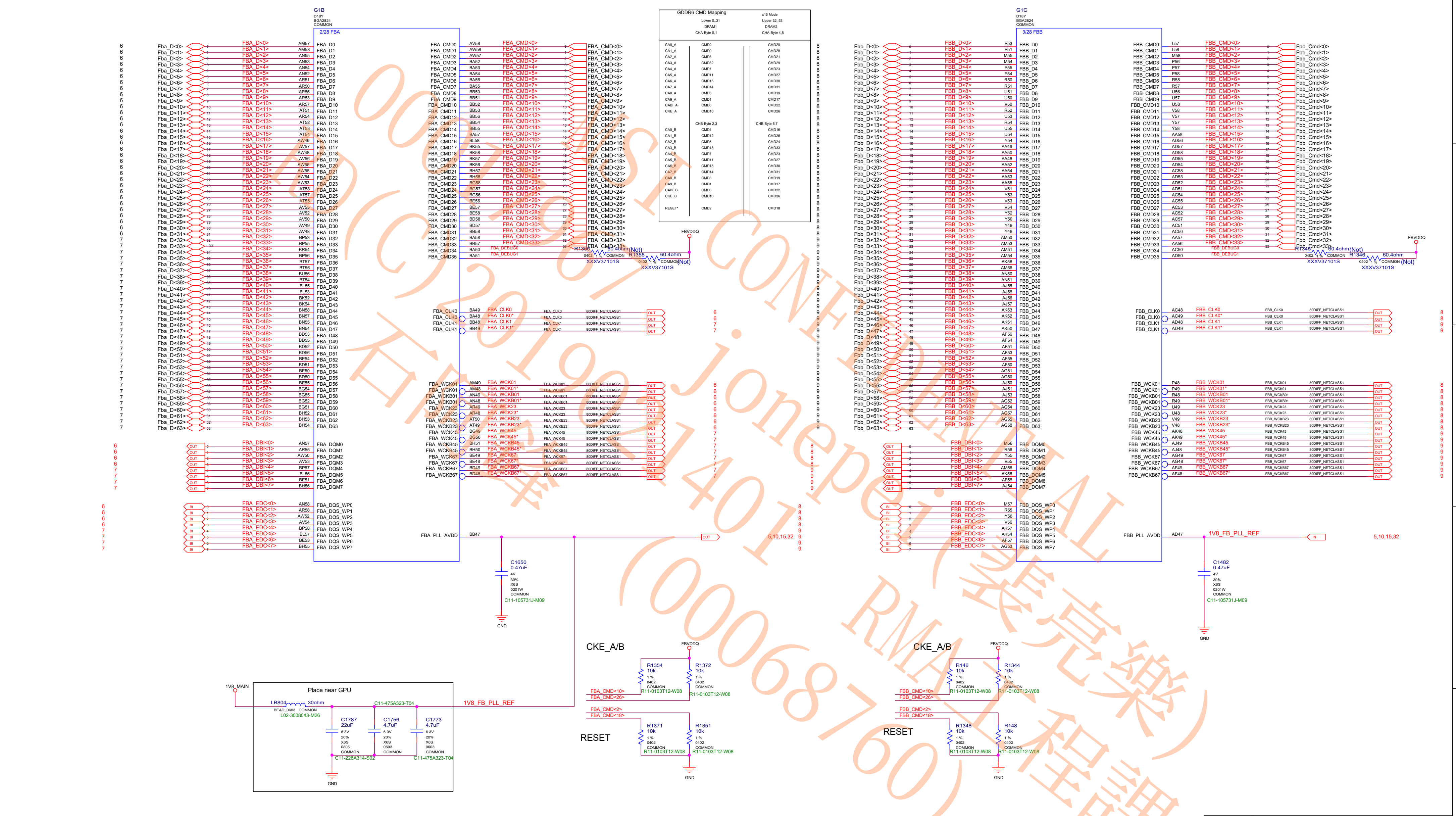
MEMORY: GPU Partition A/B



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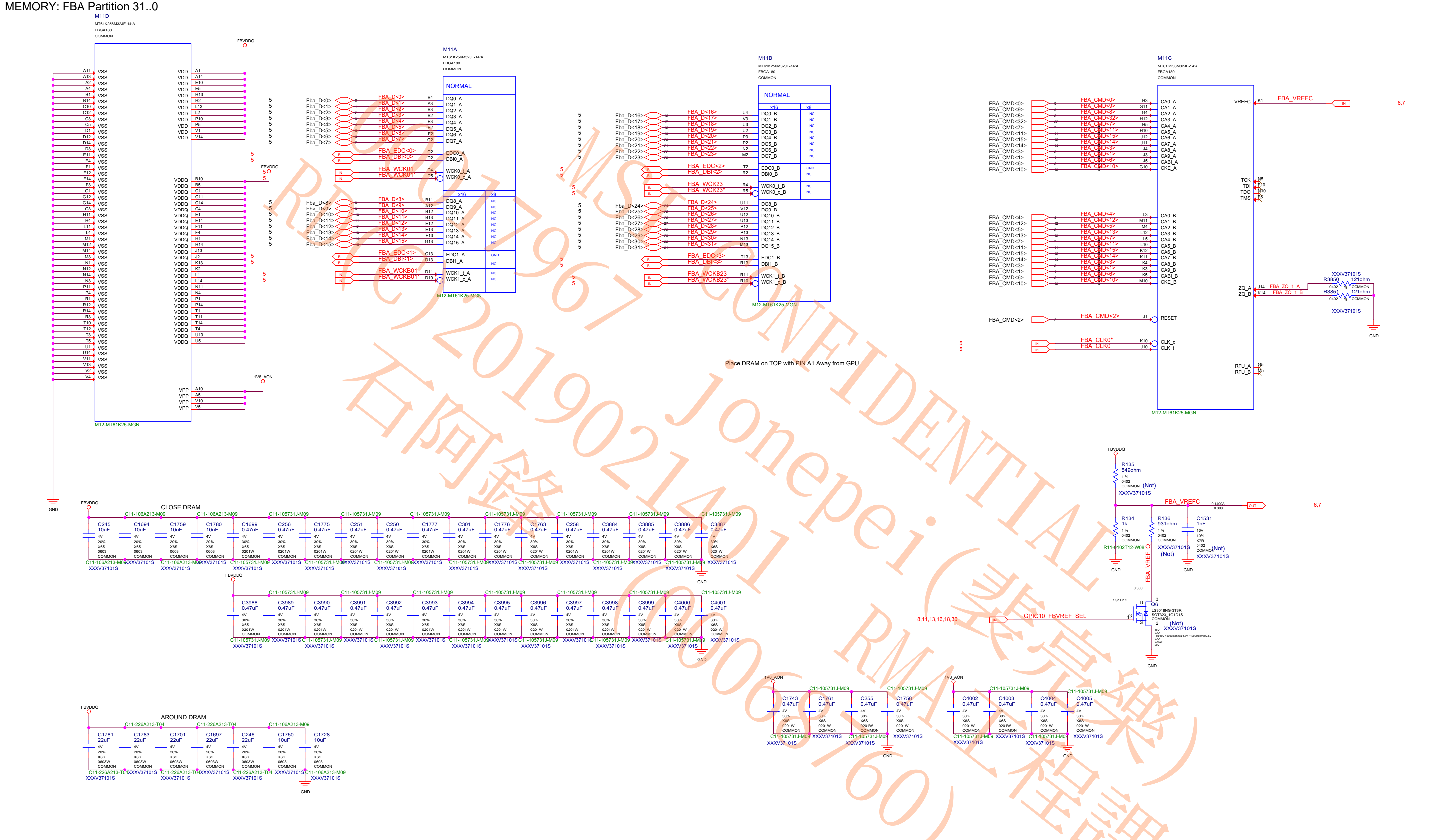
MEMORY: FBA Partition 31..0



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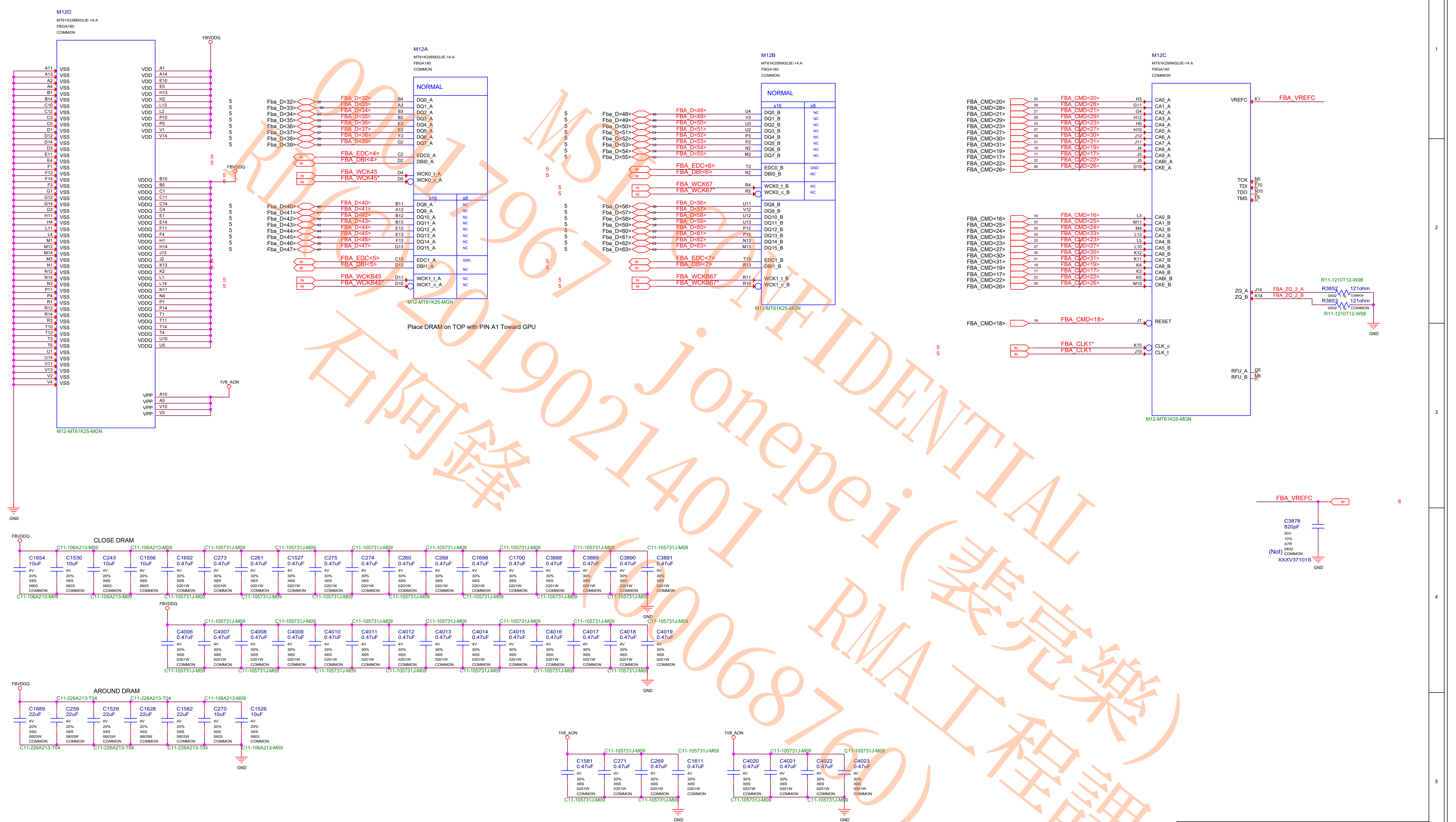
MEMORY: FBA Partition 63..32



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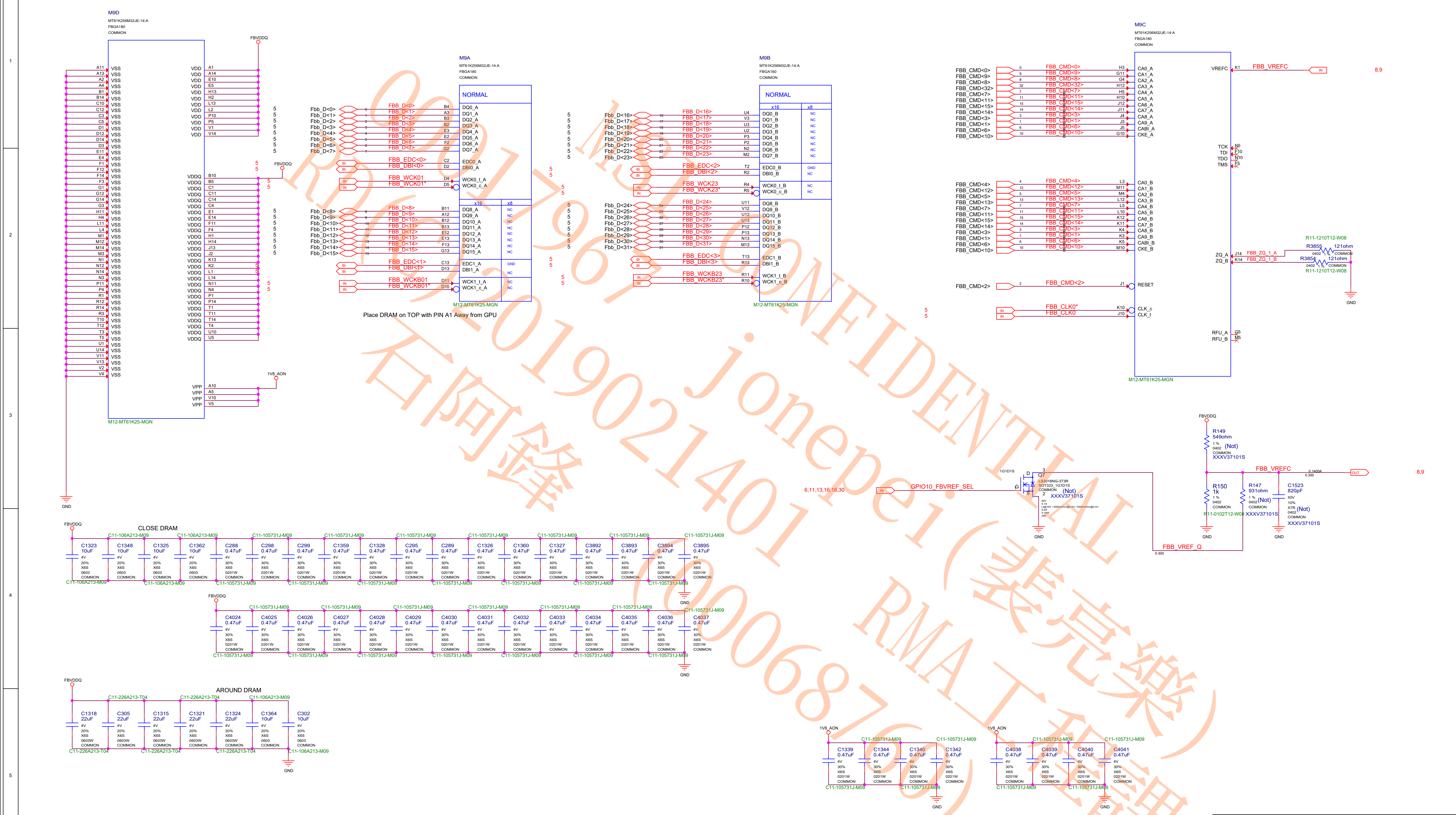
MEMORY: FBB Partition 31..0



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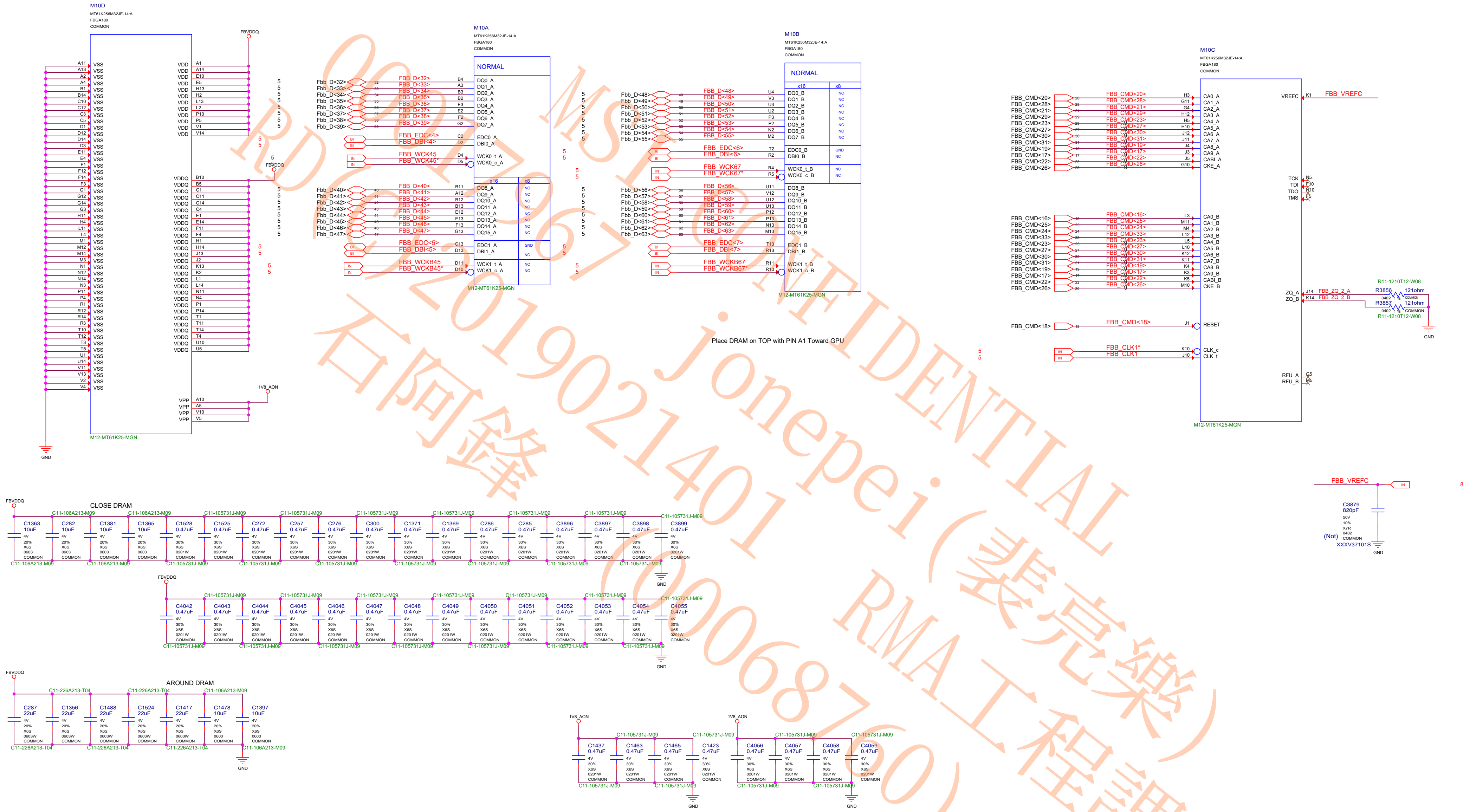
MEMORY: FBB Partition 63..32



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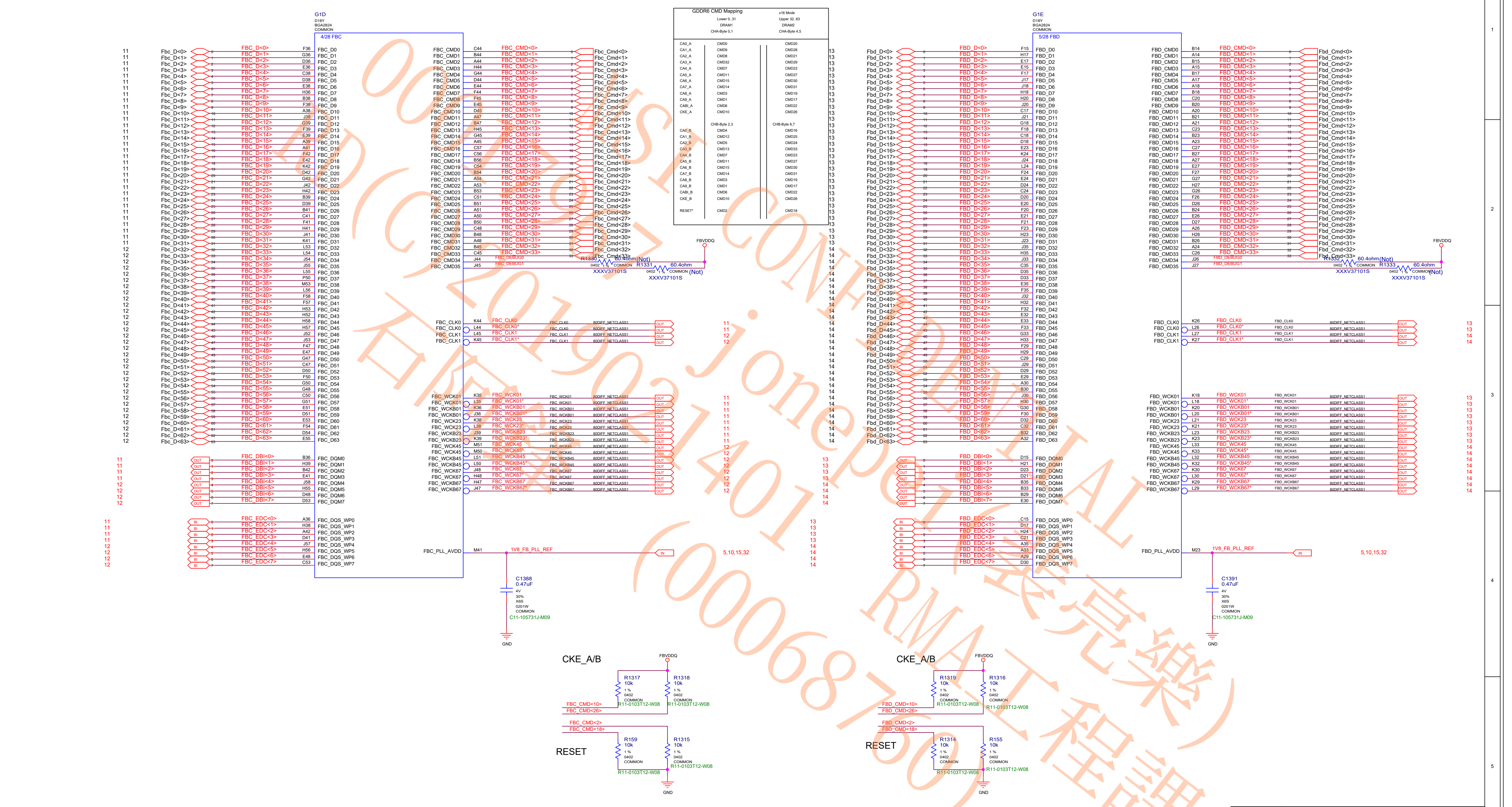
MEMORY: GPU Partition C/D



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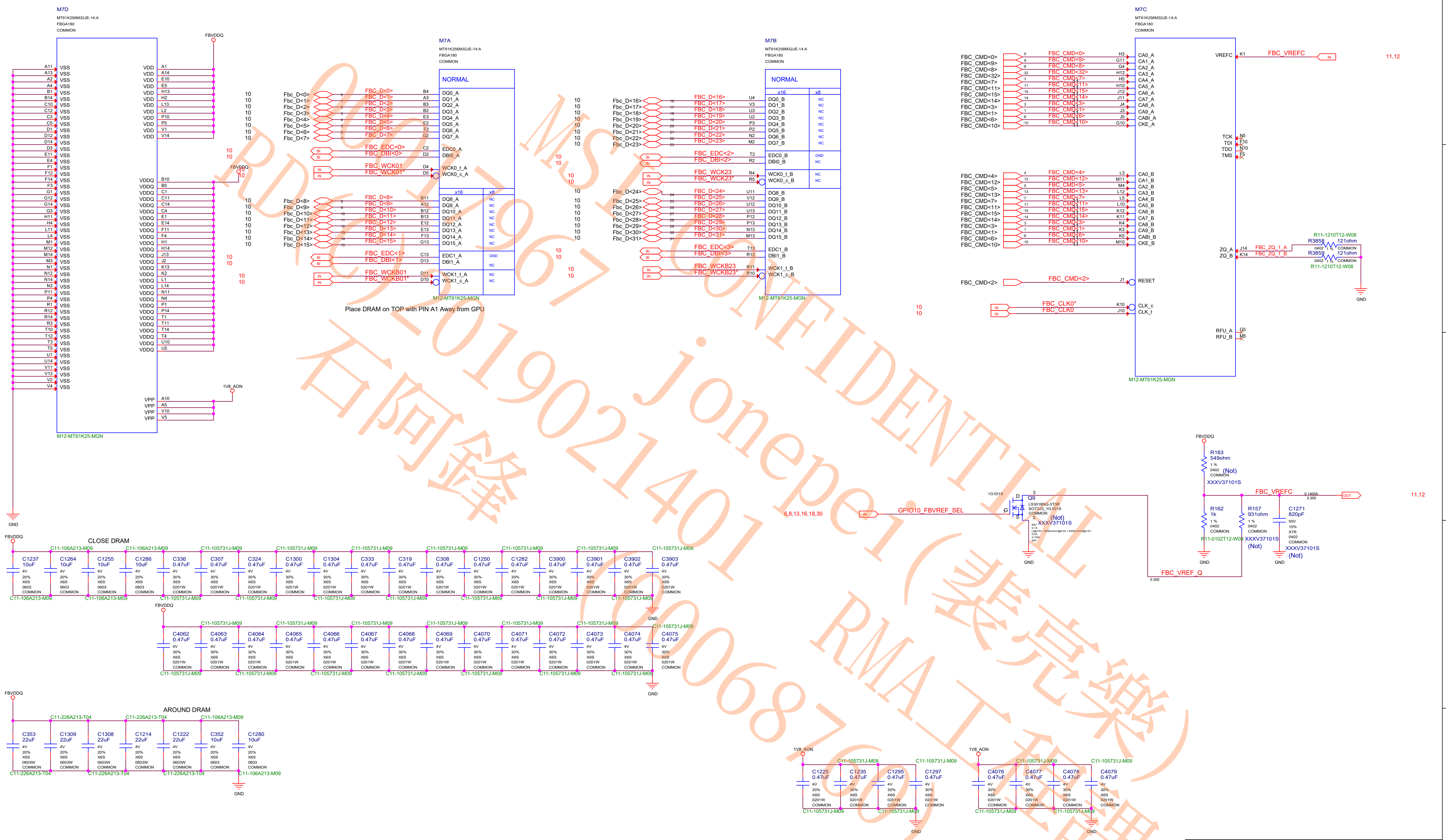
MEMORY: FBC Partition 31..0



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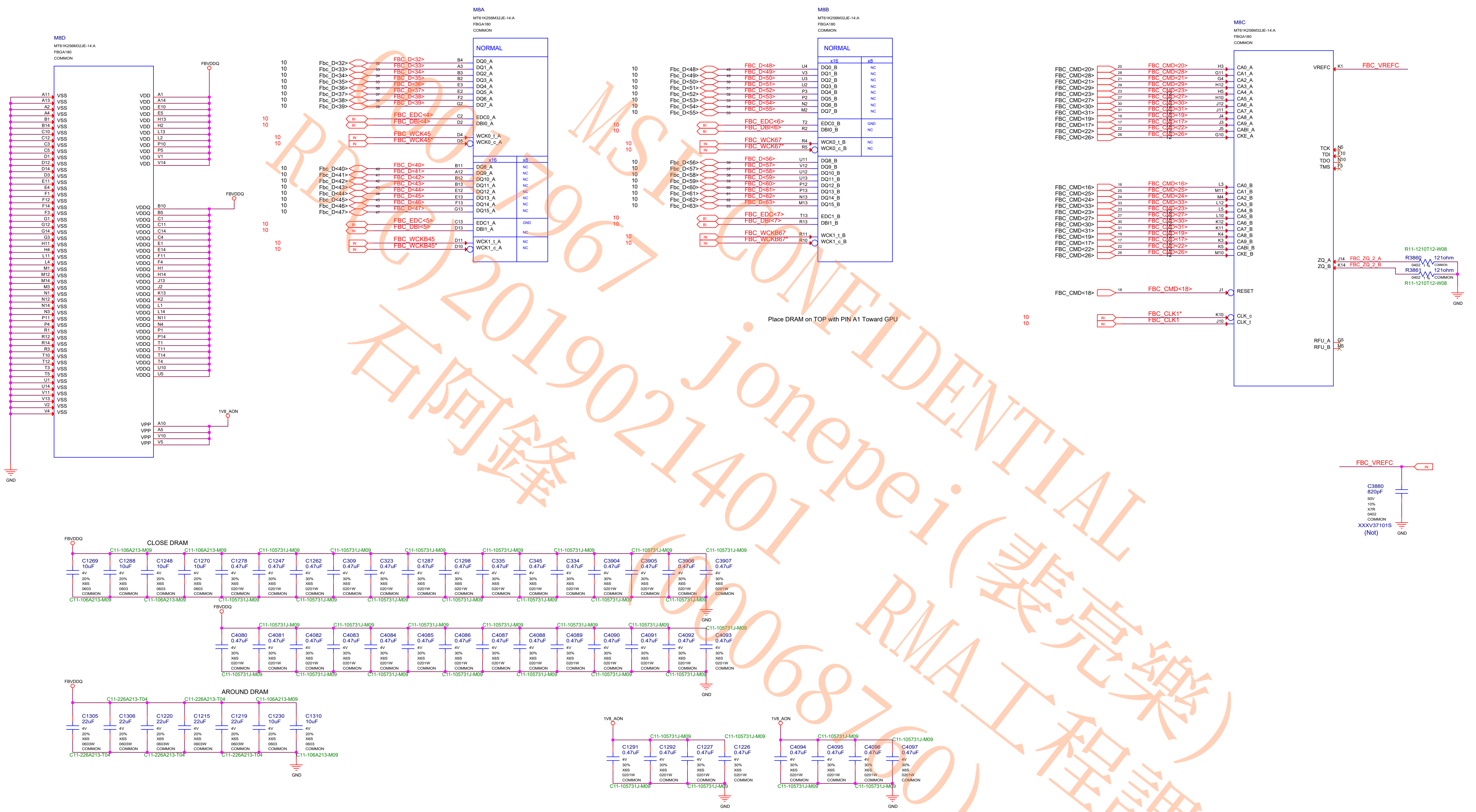
MEMORY: FBC Partition 63..32



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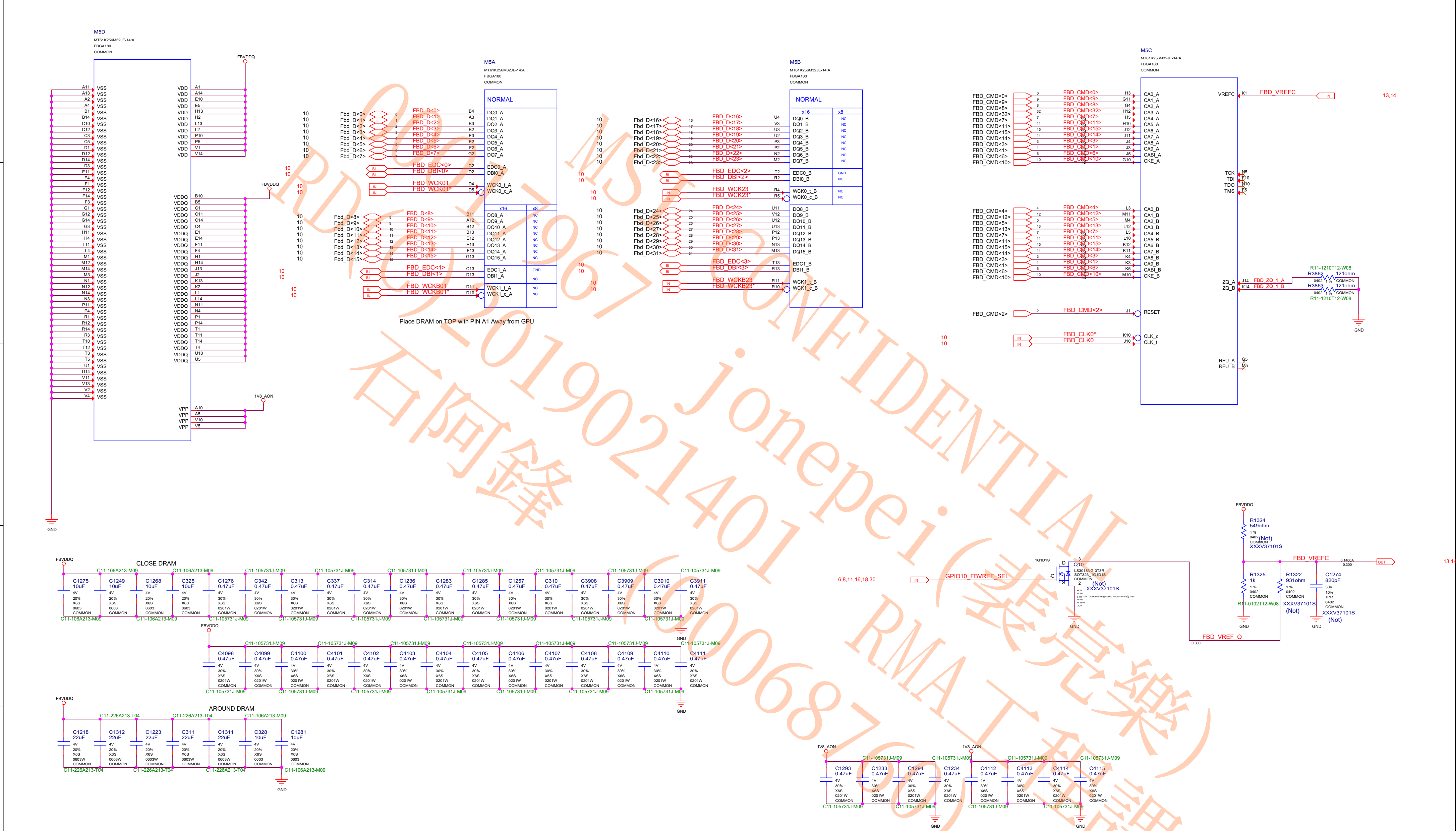
MEMORY: FBD Partition 31..0



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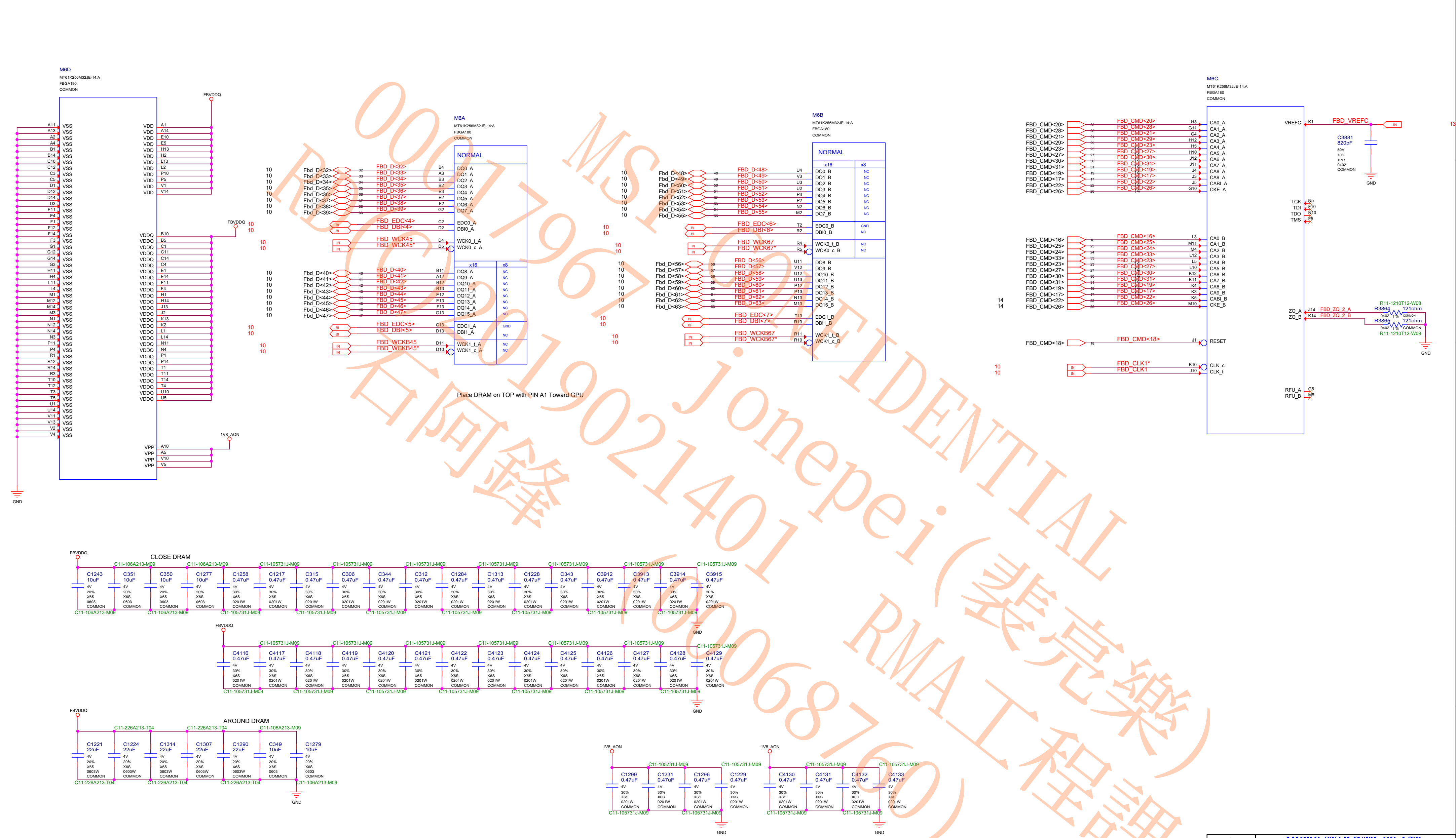
MEMORY: FBD Partition 63..32



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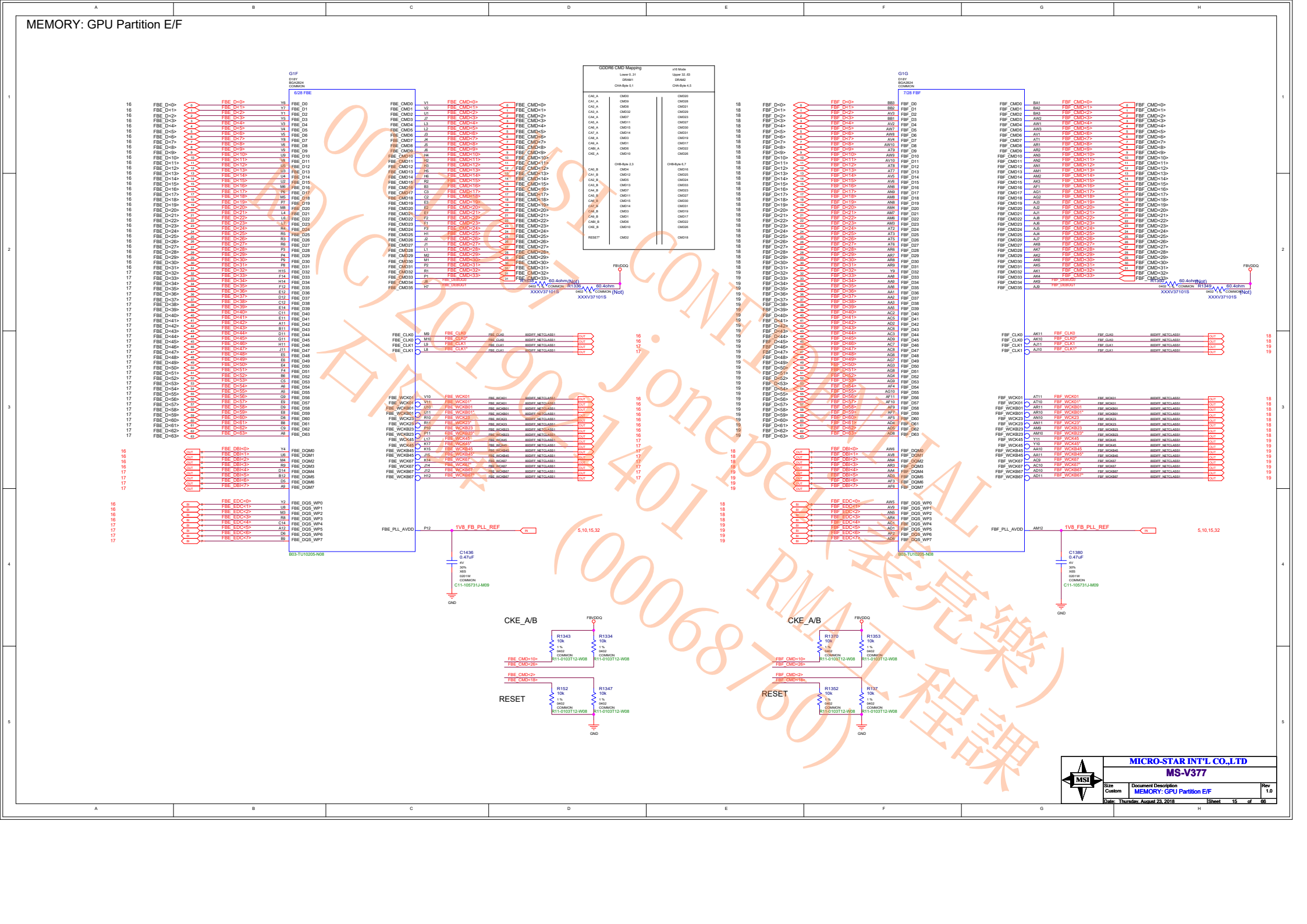
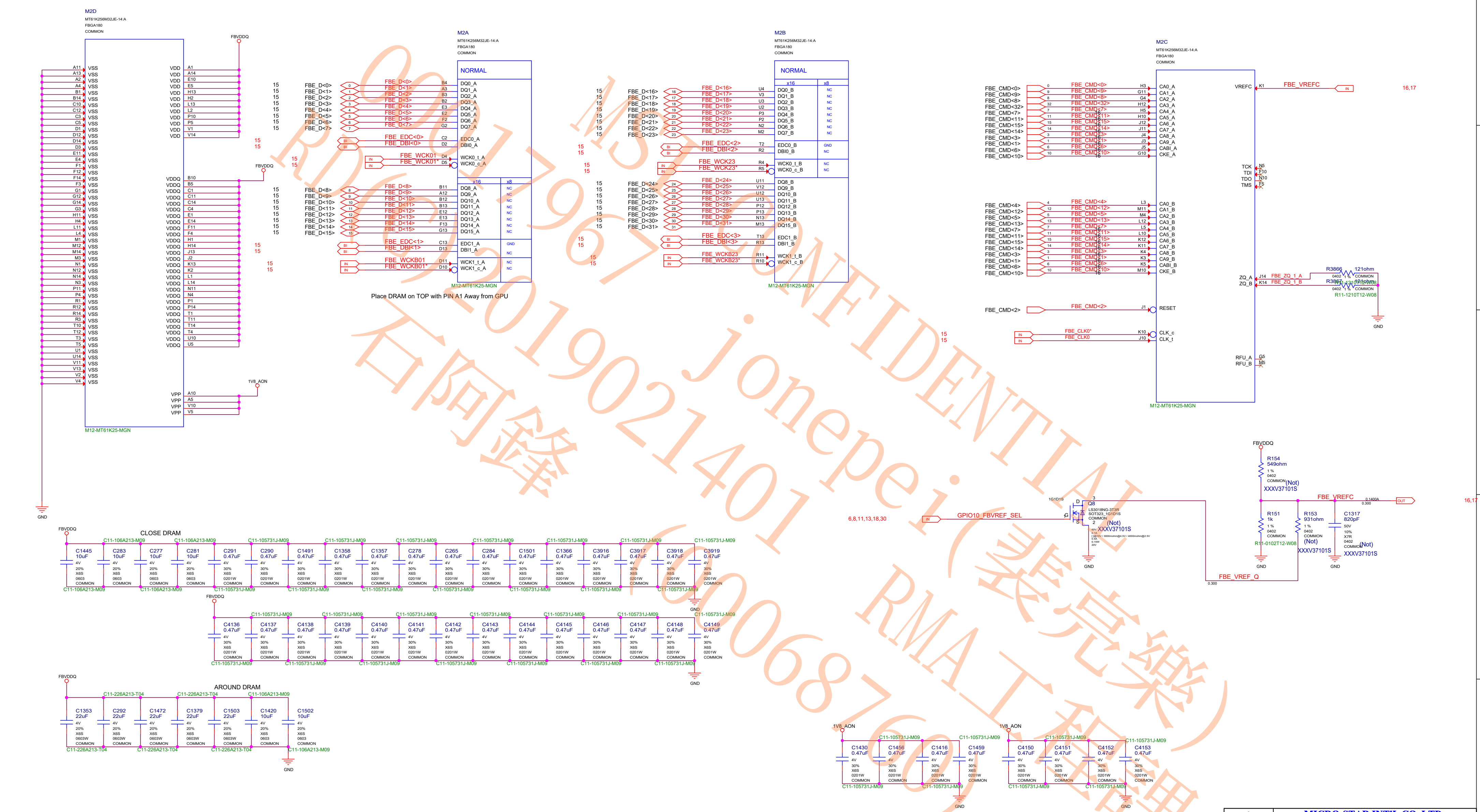
MEMORY: GPU Partition E/F



MEMORY: FBE Partition 31..0



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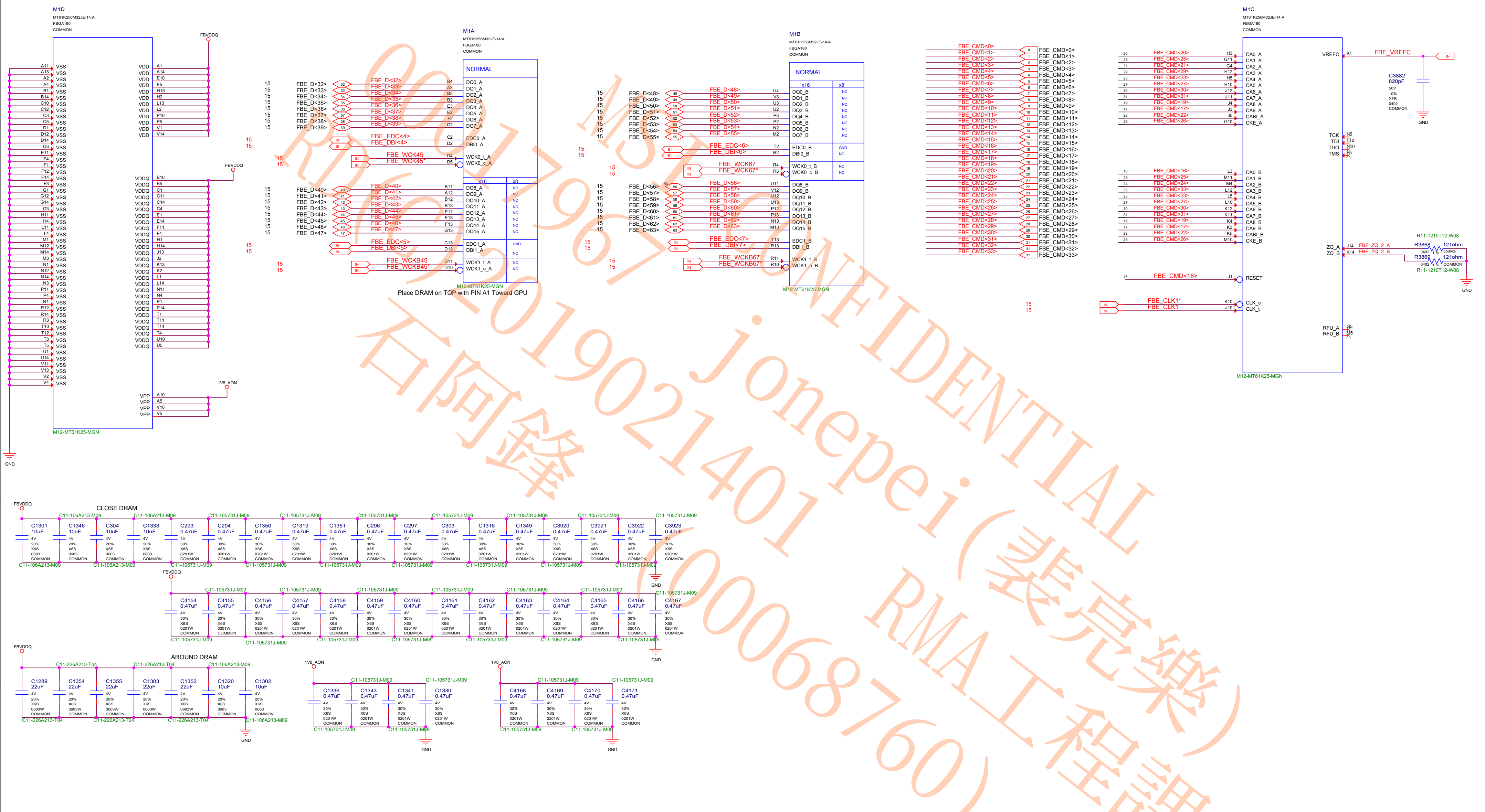
MEMORY: FBE Partition 63..32



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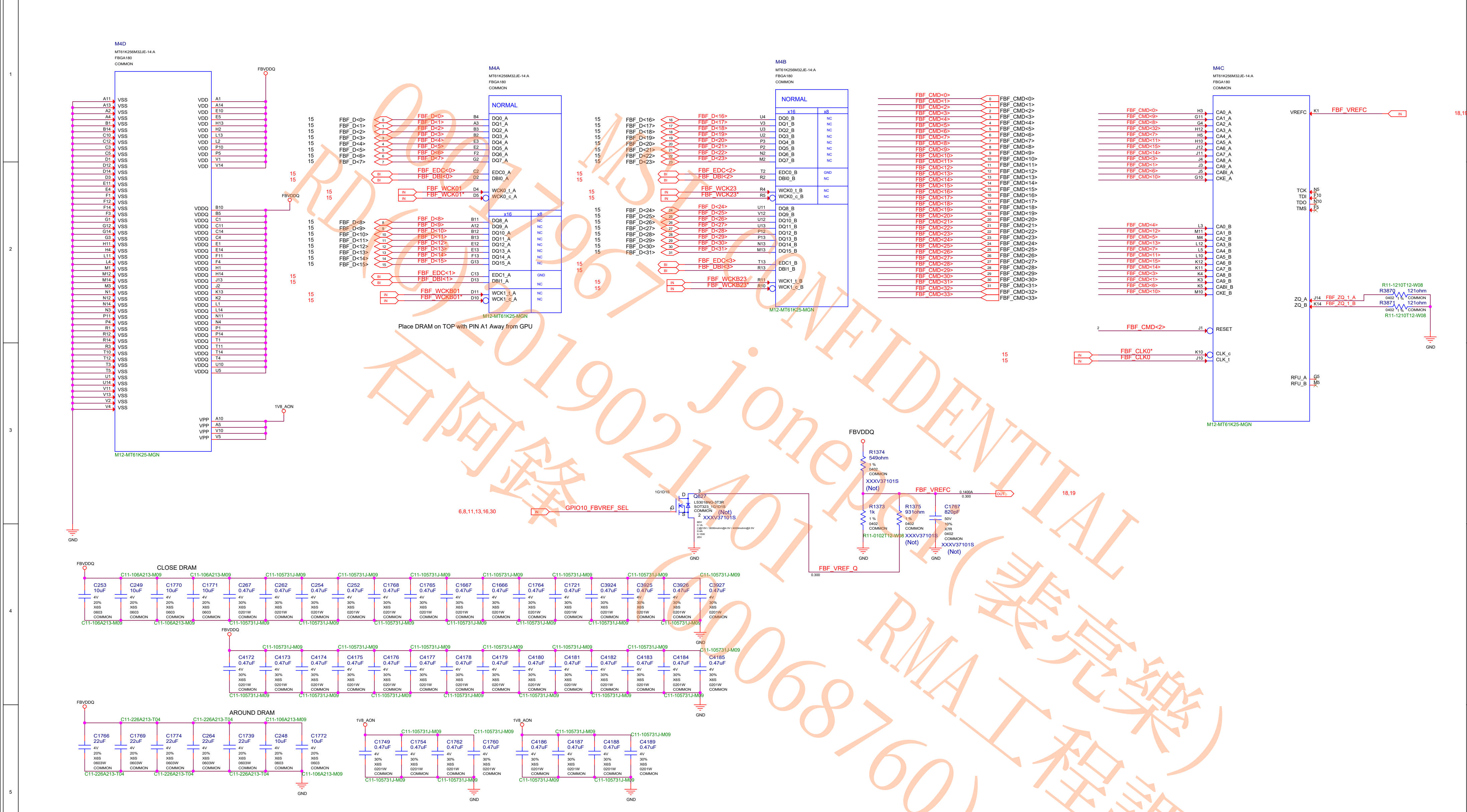
MEMORY: FBF Partition 31..0



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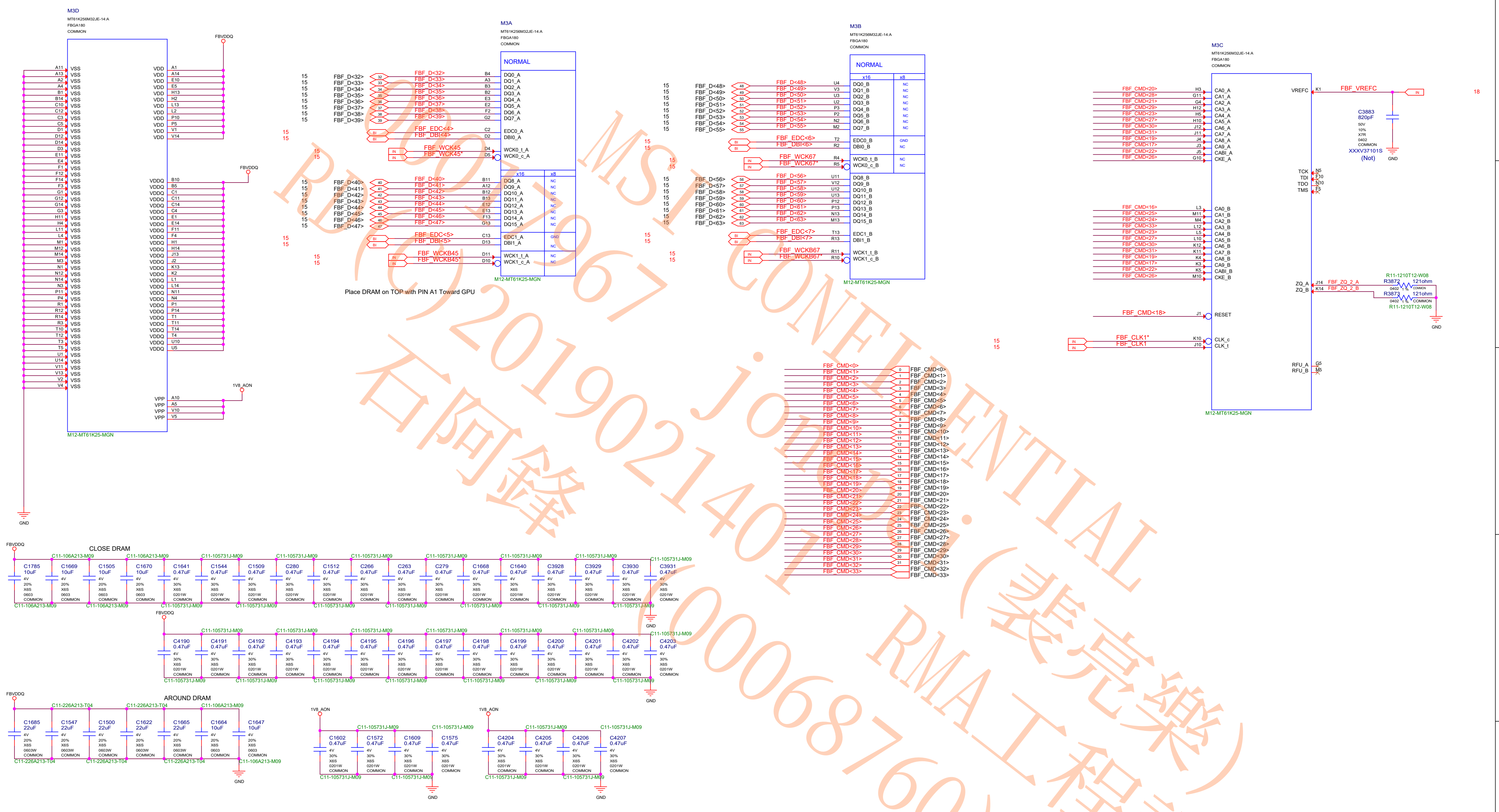
MEMORY: FBF Partition 63..32



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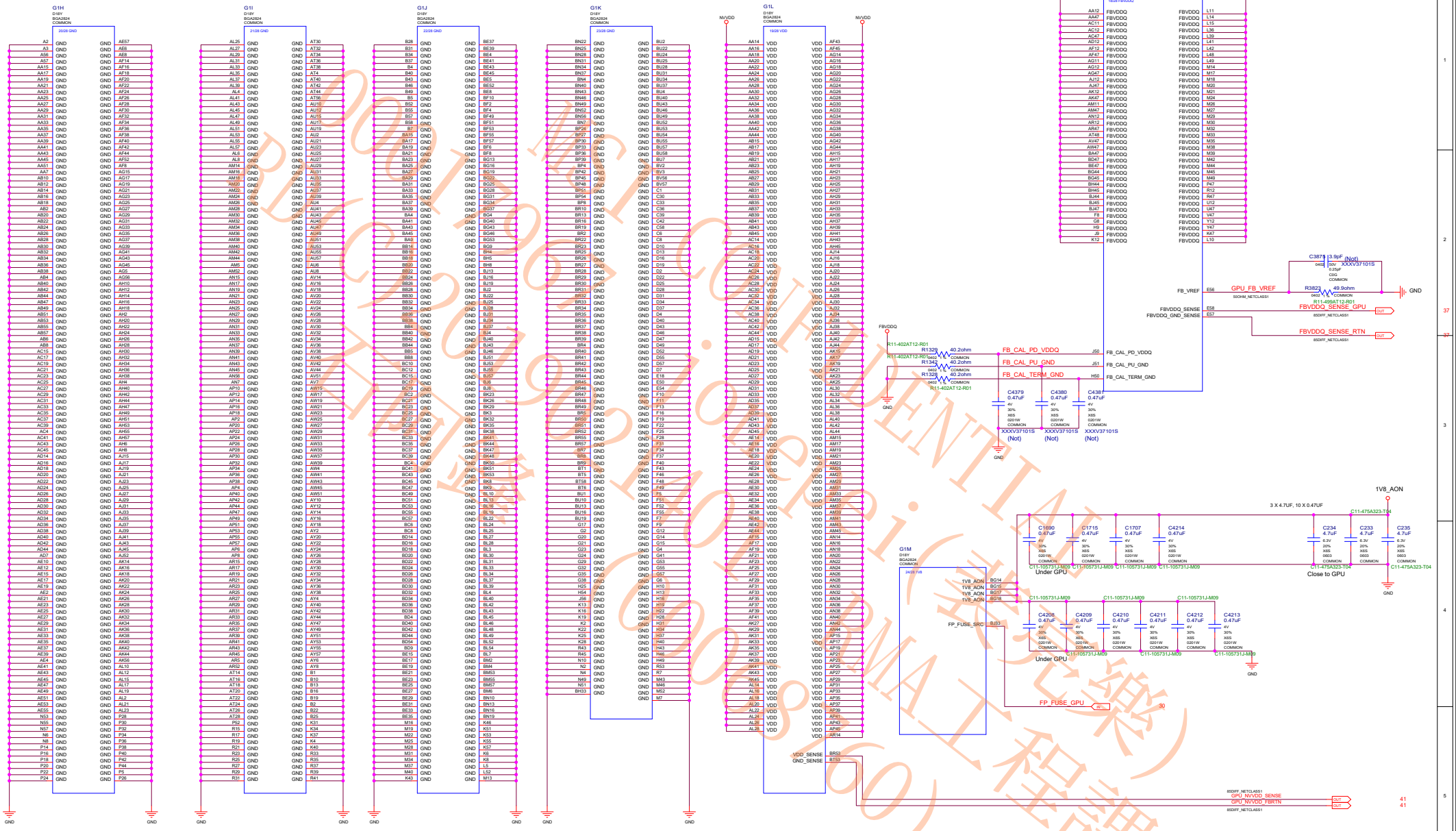
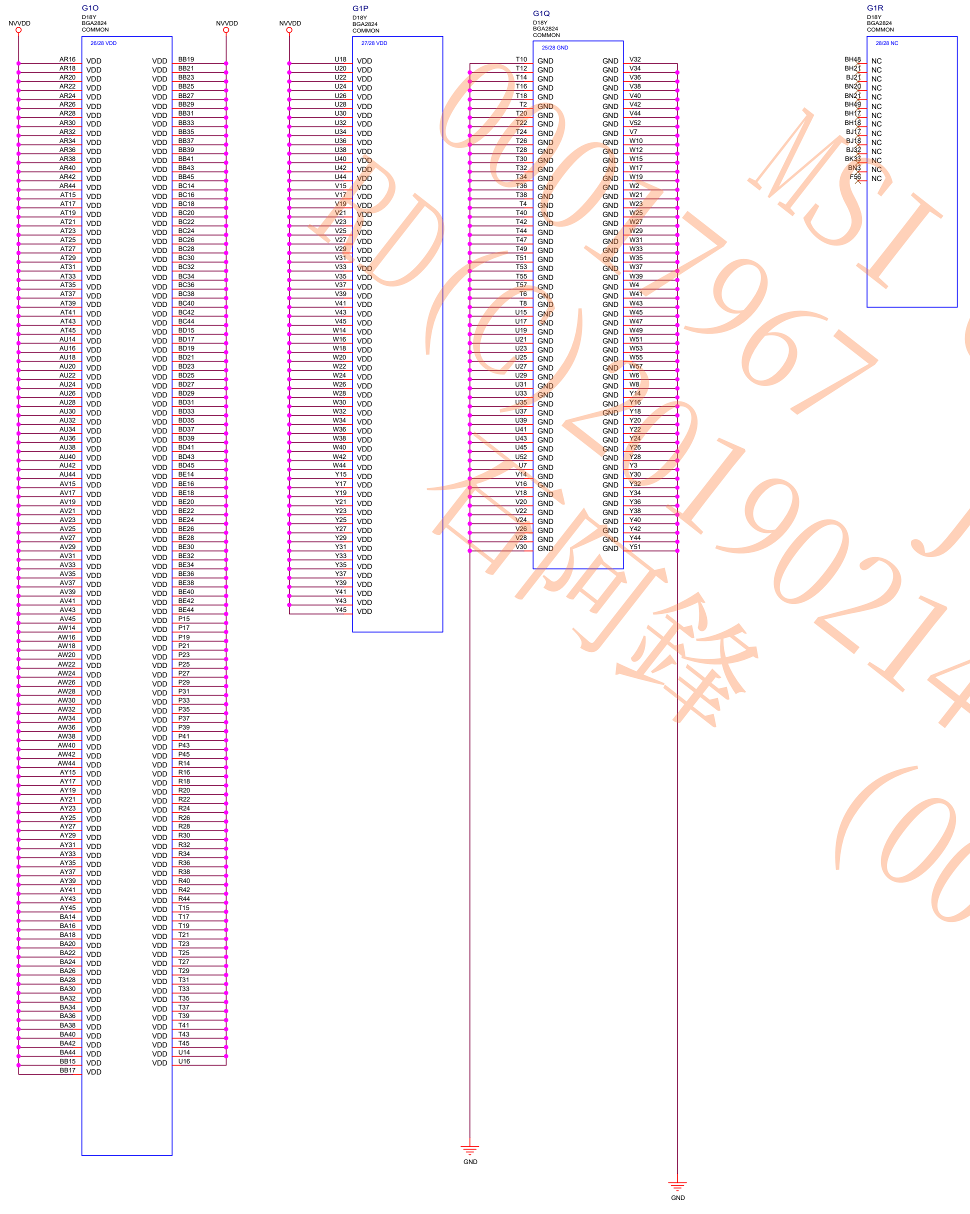
GPU PWR and GND



GPU PWR GND NCs



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GPU Decoupling
FBVDDQ
Partition A
2 X 10UF, 6 X 0.47UF
Partition B
2 X 10UF, 6 X 0.47UF
Partition C
2 X 10UF, 6 X 0.47UF
Partition D
2 X 10UF, 6 X 0.47UF
Partition E
2 X 10UF, 6 X 0.47UF
Partition F
2 X 10UF, 6 X 0.47UF
Place close to GPU
6 X 10UF
Place close to GPU
14 x 22UF
NVVDD
1 X 470UF + 10 x 47UF overlap
PCB CO-LAYOUT
12 X 47UF
6 X 22UF
30 X 10UF
16 X 4.7UF
80 X 0.47UF
GND
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GPU Decoupling

FBVDDQ

0.47uF ---->1uF

FBVDDQ

Partition A

2 X 10UF, 6 X 0.47UF

C4254 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4260 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4266 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4272 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4278 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4284 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

Partition B

2 X 10UF, 6 X 0.47UF

C4255 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4261 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4267 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4273 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4279 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4285 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

Partition C

2 X 10UF, 6 X 0.47UF

C4256 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4262 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4268 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4274 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4280 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4286 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

Partition D

2 X 10UF, 6 X 0.47UF

C4257 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4263 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4269 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4275 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4281 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4287 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

Partition E

2 X 10UF, 6 X 0.47UF

C4258 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4264 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4270 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4276 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4282 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4288 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

Partition F

2 X 10UF, 6 X 0.47UF

C4259 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4265 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4271 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4277 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4283 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09
C4289 0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

NVVDD

NVVDD

80 X 0.47UF

C4290 C4294 C4298 C4302 C4306 C4310 C4314 C4318 C4322 C4326 C4330 C4334 C4338 C4342 C4346 C4350 C4354 C4358 C4362 C4366
C4291 C4295 C4299 C4303 C4307 C4311 C4315 C4319 C4323 C4327 C4331 C4335 C4339 C4343 C4347 C4351 C4355 C4359 C4363 C4367
C4292 C4296 C4300 C4304 C4308 C4312 C4316 C4320 C4324 C4328 C4332 C4336 C4340 C4344 C4348 C4352 C4356 C4360 C4364 C4368
C4293 C4297 C4301 C4305 C4309 C4313 C4317 C4321 C4325 C4329 C4333 C4337 C4341 C4345 C4349 C4353 C4357 C4361 C4365 C4369

0.47uF 4V 30% X6S 0201W COMMON — C11-105731J-M09

GND

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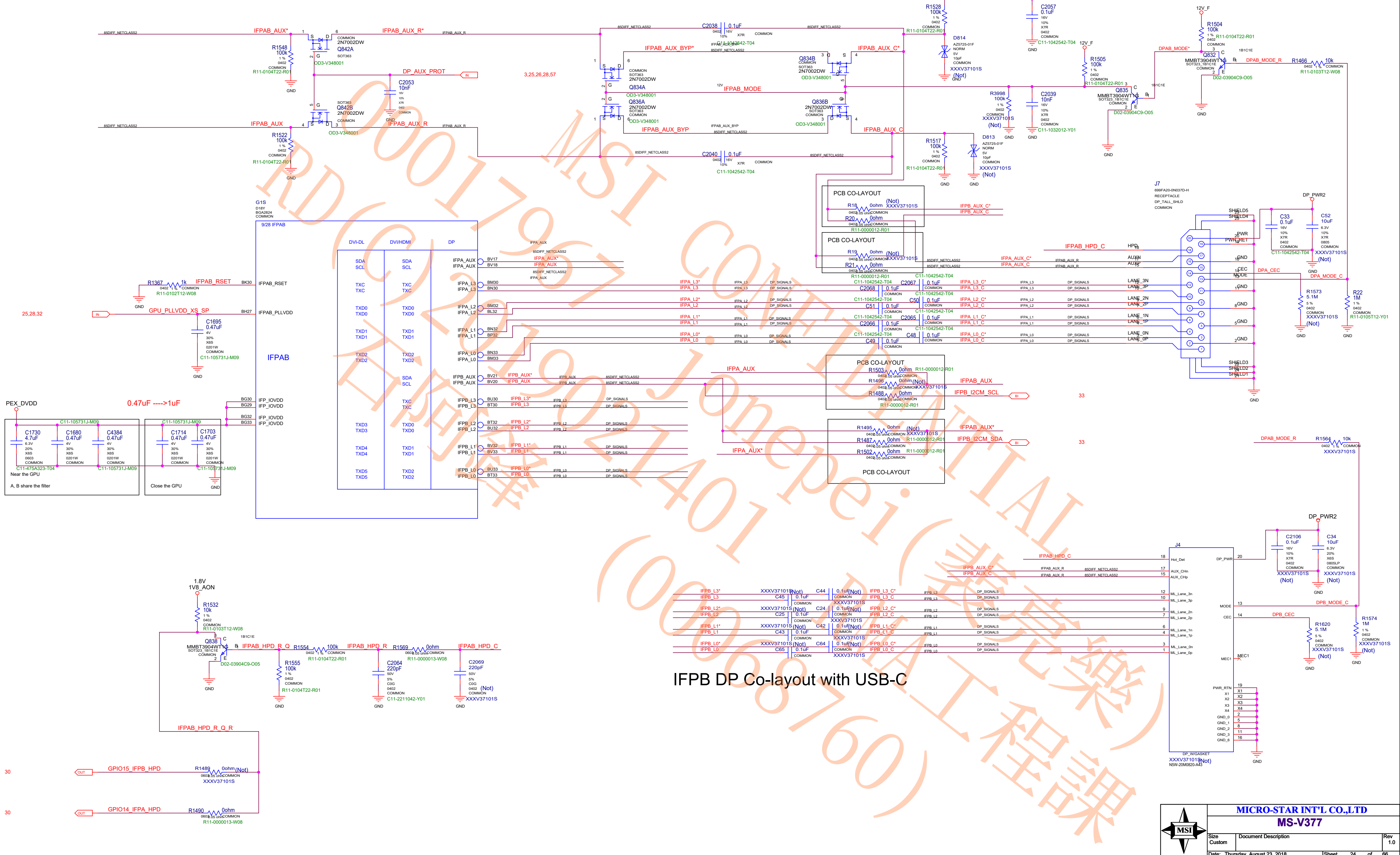
IFPAB TALL-DP



IFPB DP Co-layout with USB-C

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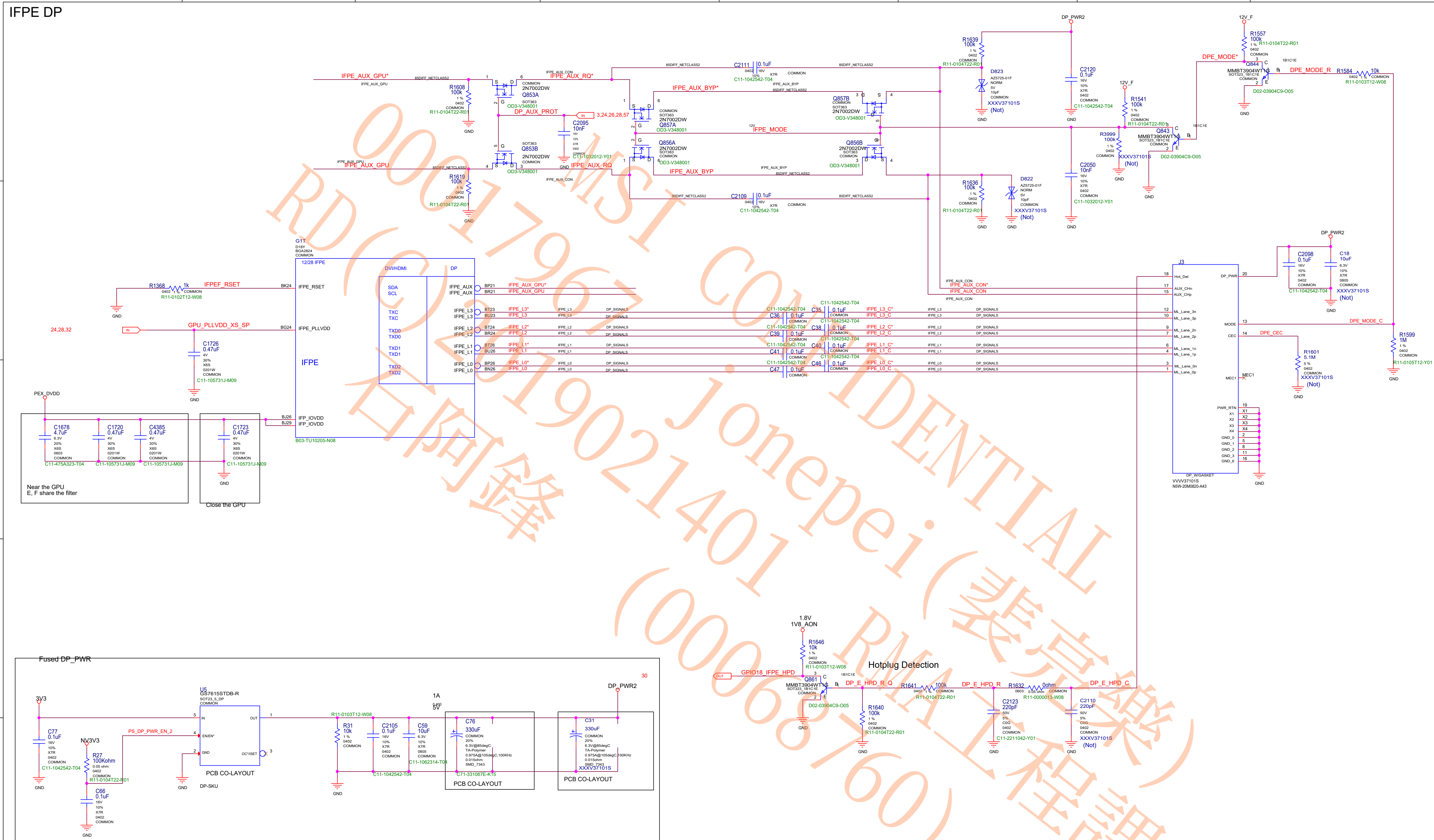
IFPE DP



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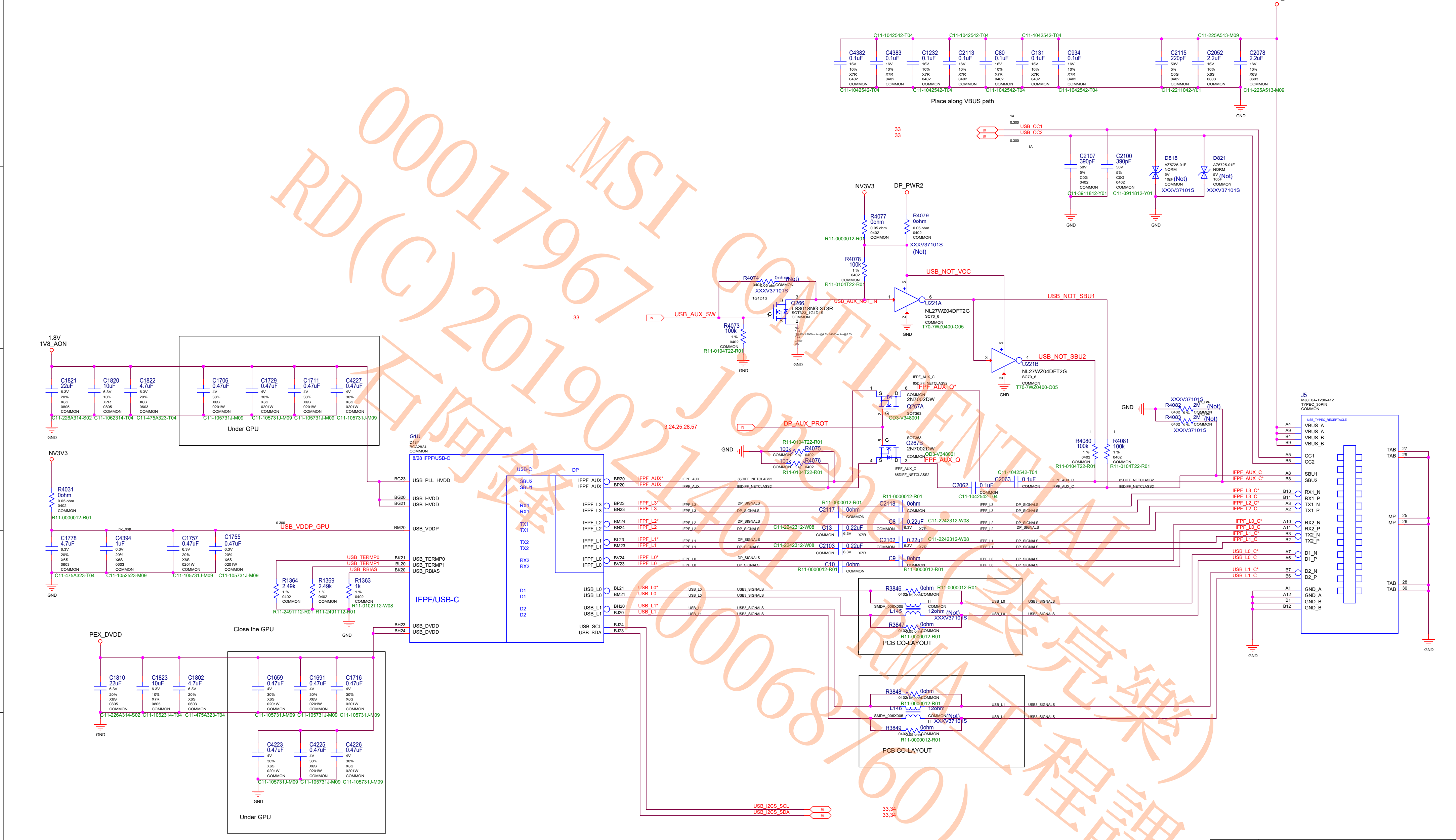
IFPF USBC



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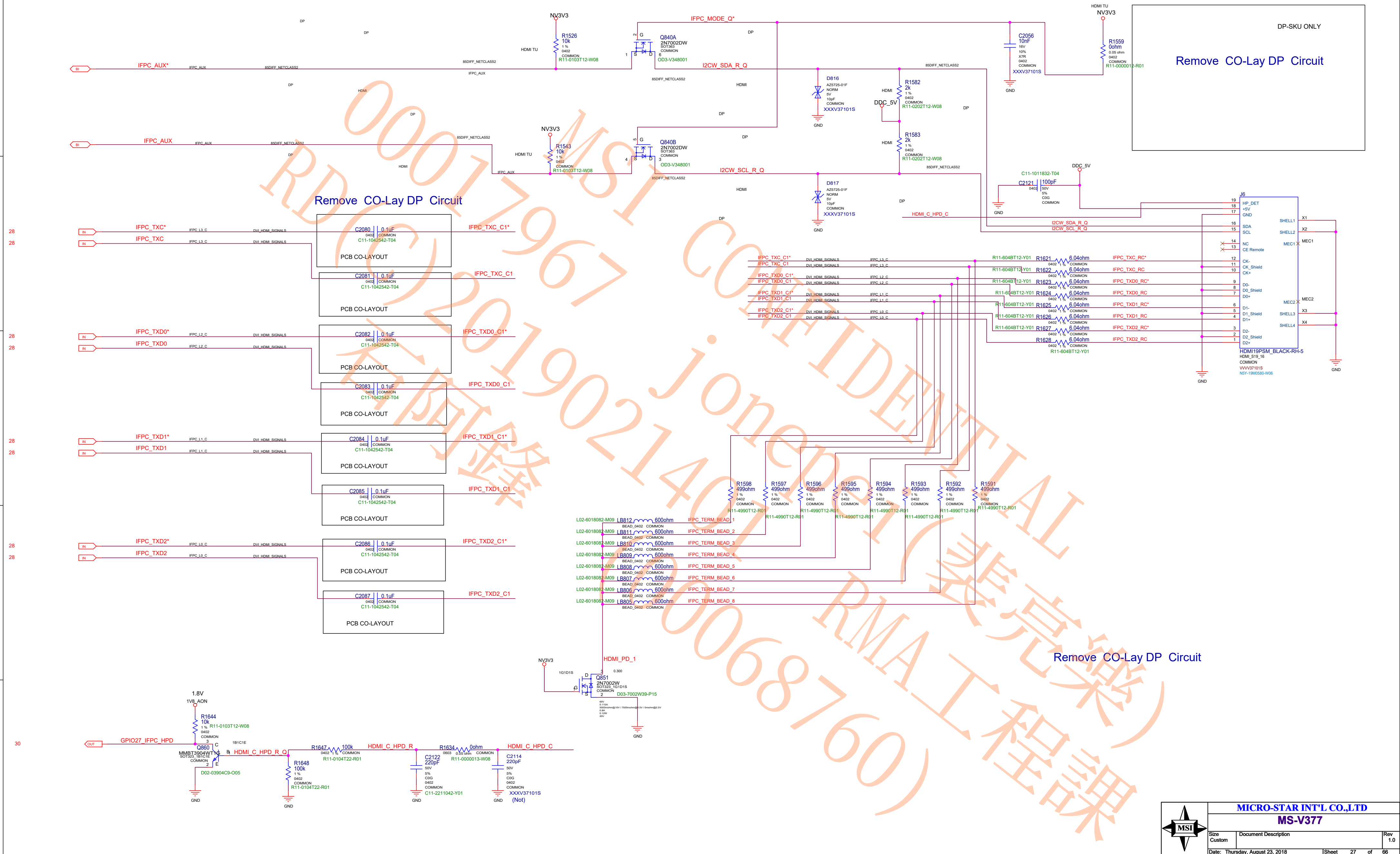
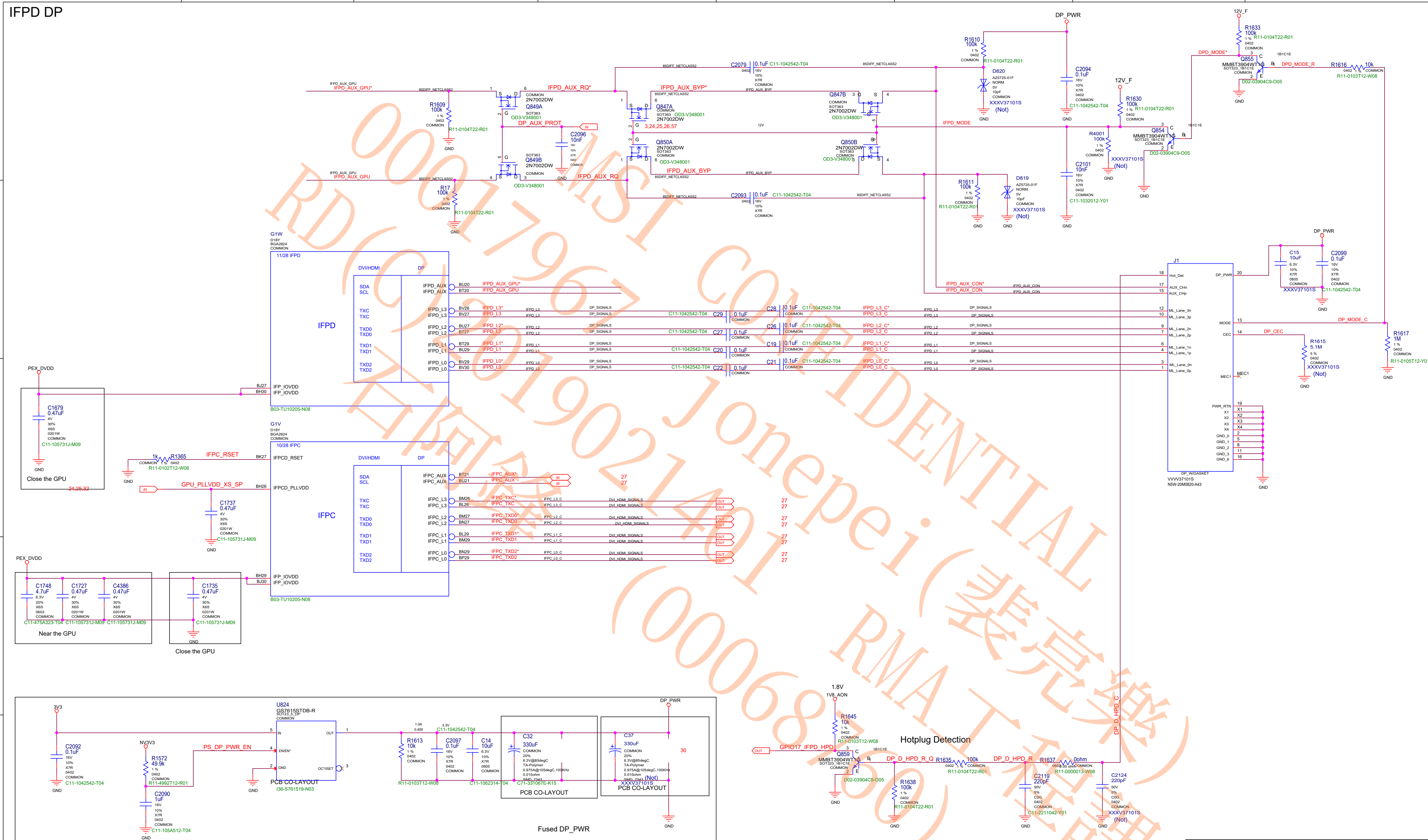
IFPC HDMI 2.0/DP



IFPD DP



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NVHS Interface and FRAME LOCK

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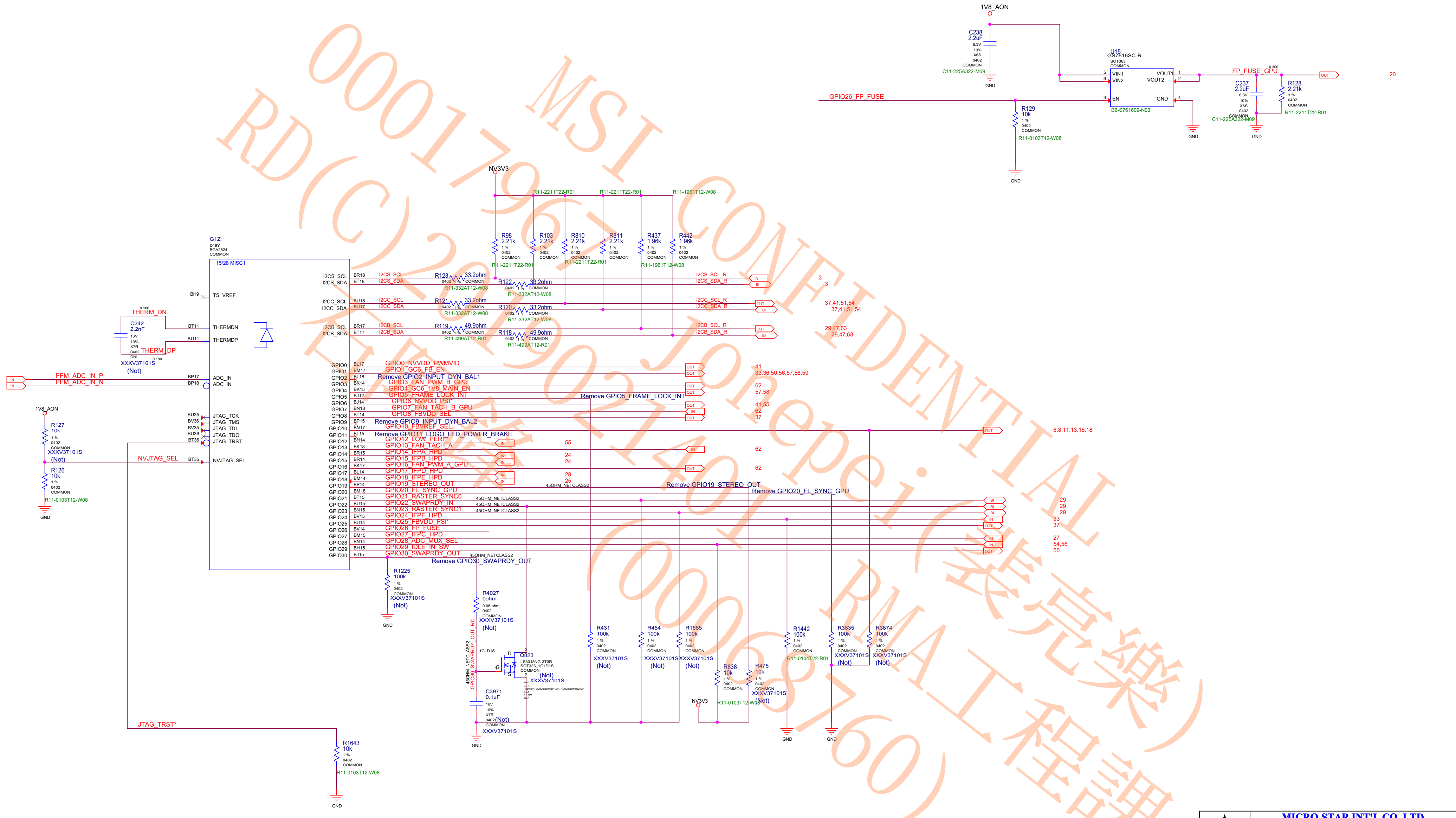
MISC1: Fan, Thermal, JTAG, GPIO, STEREO



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MISC2: ROM, Straps

STRAP2	STRAP1	STRAP0	RAMCFG[4:0]	
L	L	L	00000	
L	L	H	00001	DEFAULT
L	H	L	00010	
L	H	H	00011	
H	L	L	00100	
H	L	H	00101	
H	H	L	00110	
H	H	H	00111	
L	L	M	01000	
L	M	L	01001	

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

ROM_SO	ROM_SI	ROM_SCLK	DUMMY[2:0],FS_OVERT	1:ENABLE 0:DISABLE	
L	L	L	XXX1	FS_OVERT ENABLE	DEFAULT
L	L	H	XXX0	FS_OVERT DISABLE	

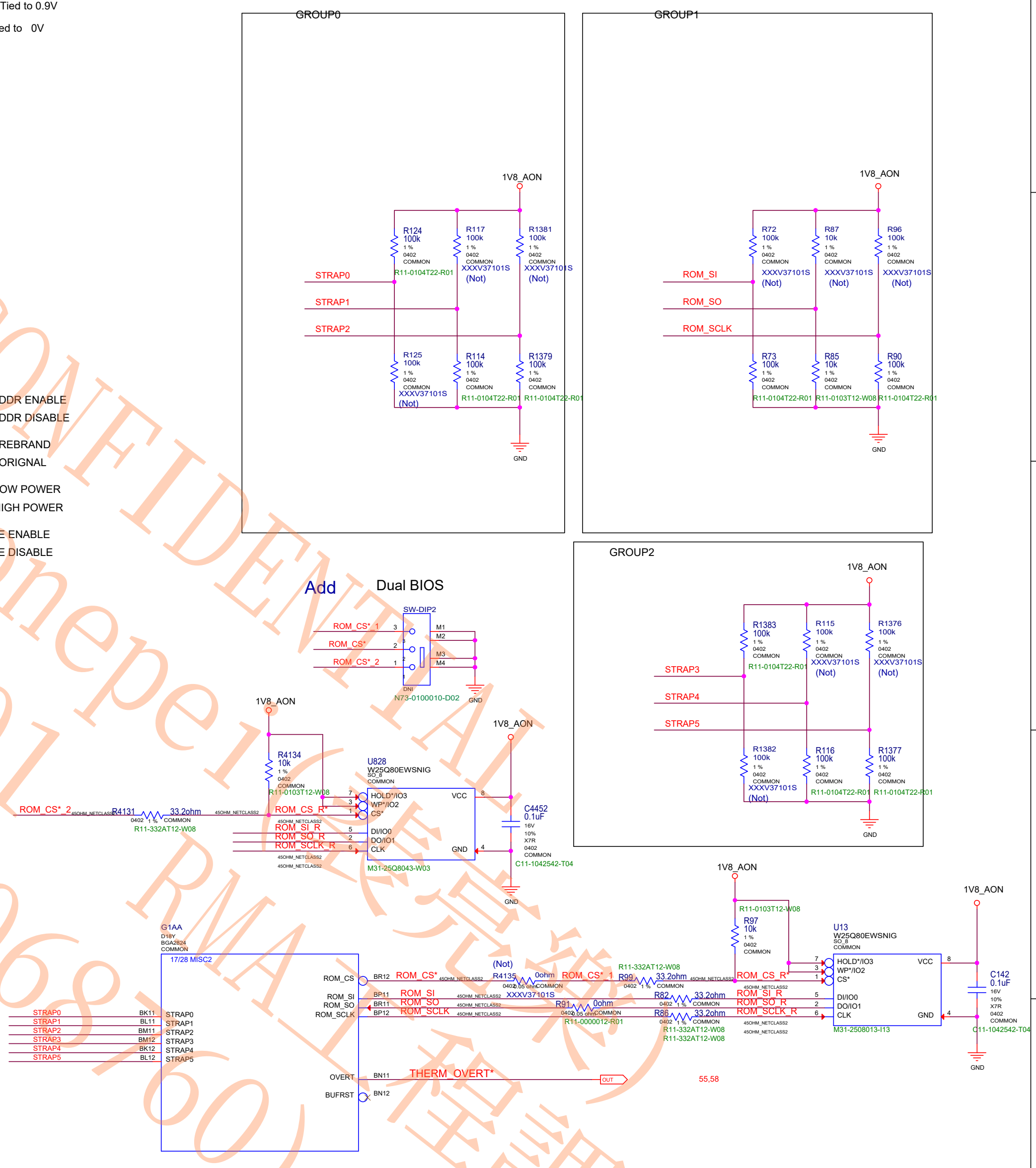
STRAP5	STRAP4	STRAP3	SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE	
M	H	H	1	1	1	1	
M	H	L	1	1	1	0	
M	L	H	1	1	0	1	
M	L	L	1	1	0	0	
L	H	M	1	0	1	1	
L	M	H	1	0	1	0	
L	M	L	1	0	0	1	
L	L	M	1	0	0	0	
H	H	H	0	1	1	1	
H	H	L	0	1	1	0	
H	L	H	0	1	0	1	
H	L	L	0	1	0	0	
L	H	H	0	0	1	1	
L	H	L	0	0	1	0	
L	L	H	0	0	0	1	Default
L	L	L	0	0	0	0	SKU 200

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



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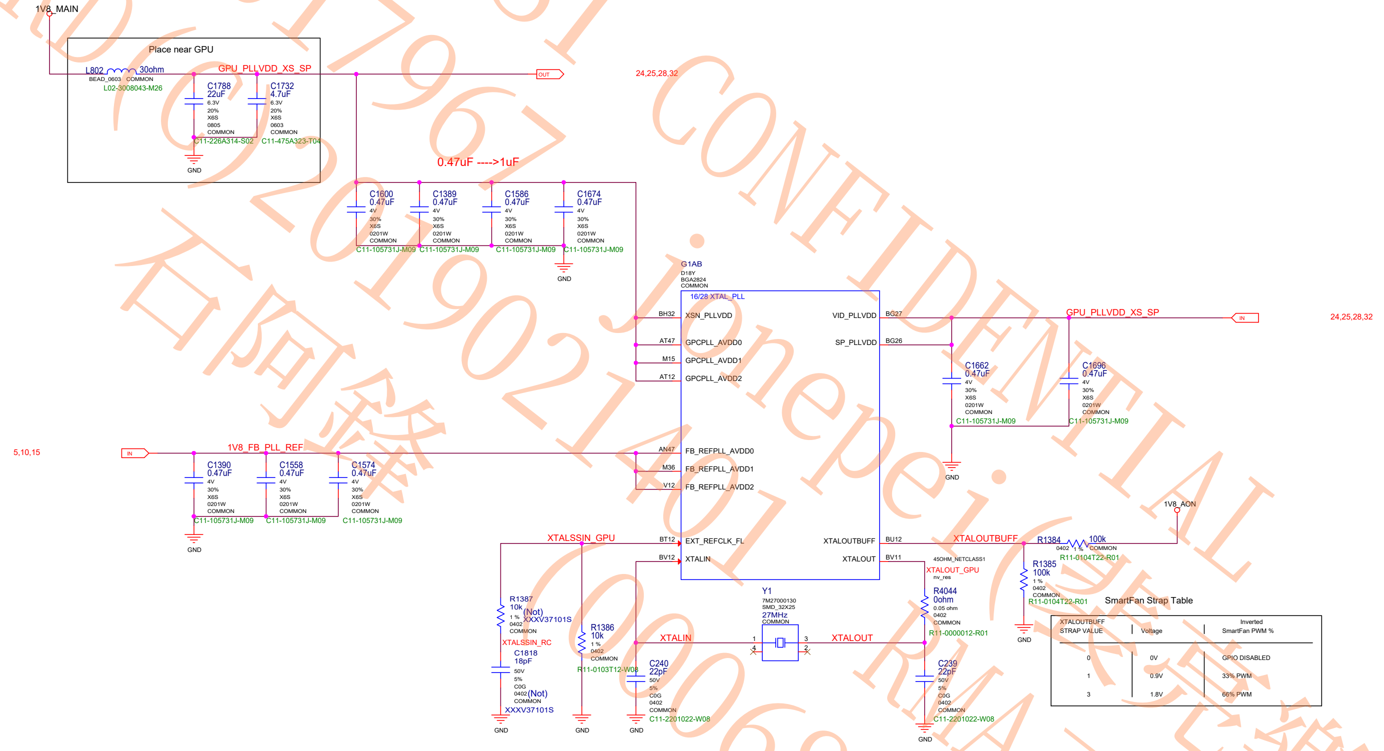
MISC2: XTAL. PLL

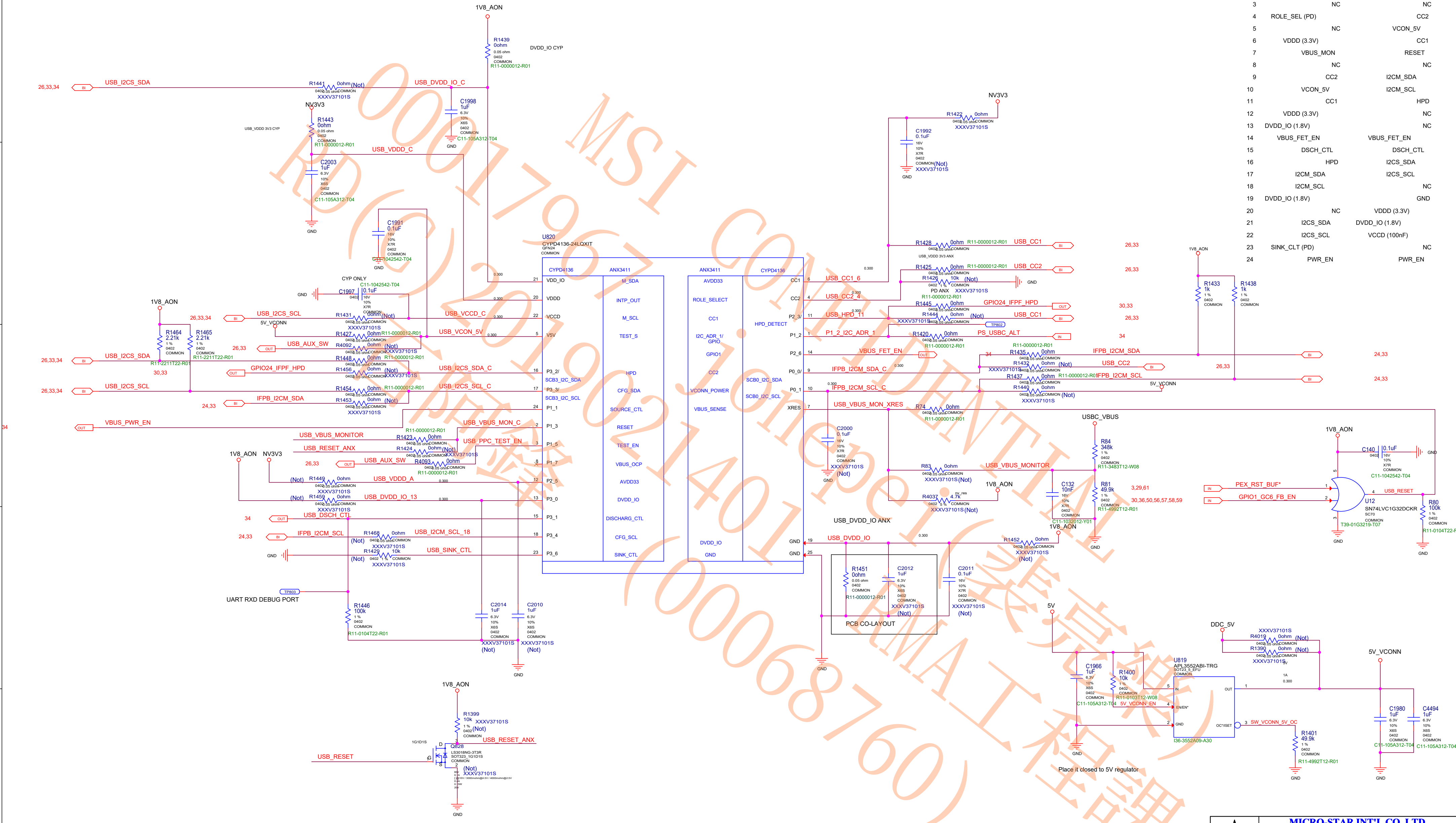


SmartFan Strap Table

XTALOUTBUFF STRAP VALUE	Voltage	Inverted SmartFan PWM %
0	0V	GPIO DISABLED
1	0.9V	33% PWM
3	1.8V	66% PWM

MISC: USB PPC

PIN	ANX	CYP
1	TP	TP
2	RESET	VBUS_MON
3	NC	NC
4	ROLE_SEL (PD)	CC2
5	NC	VCON_5V
6	VDDD (3.3V)	CC1
7	VBUS_MON	RESET
8	NC	NC
9	CC2	I2CM_SDA
10	VCON_5V	I2CM_SCL
11	CC1	HPD
12	VDDD (3.3V)	NC
13	DVDD_IO (1.8V)	NC
14	VBUS_FET_EN	VBUS_FET_EN
15	DSCH_CTL	DSCH_CTL
16	HPD	I2CS_SDA
17	I2CM_SDA	I2CS_SCL
18	I2CM_SCL	NC
19	DVDD_IO (1.8V)	GND
20	NC	VDDD (3.3V)
21	I2CS_SDA	DVDD_IO (1.8V)
22	I2CS_SCL	VCCD (100nF)
23	SINK_CLT (PD)	NC
24	PWR_EN	PWR_EN



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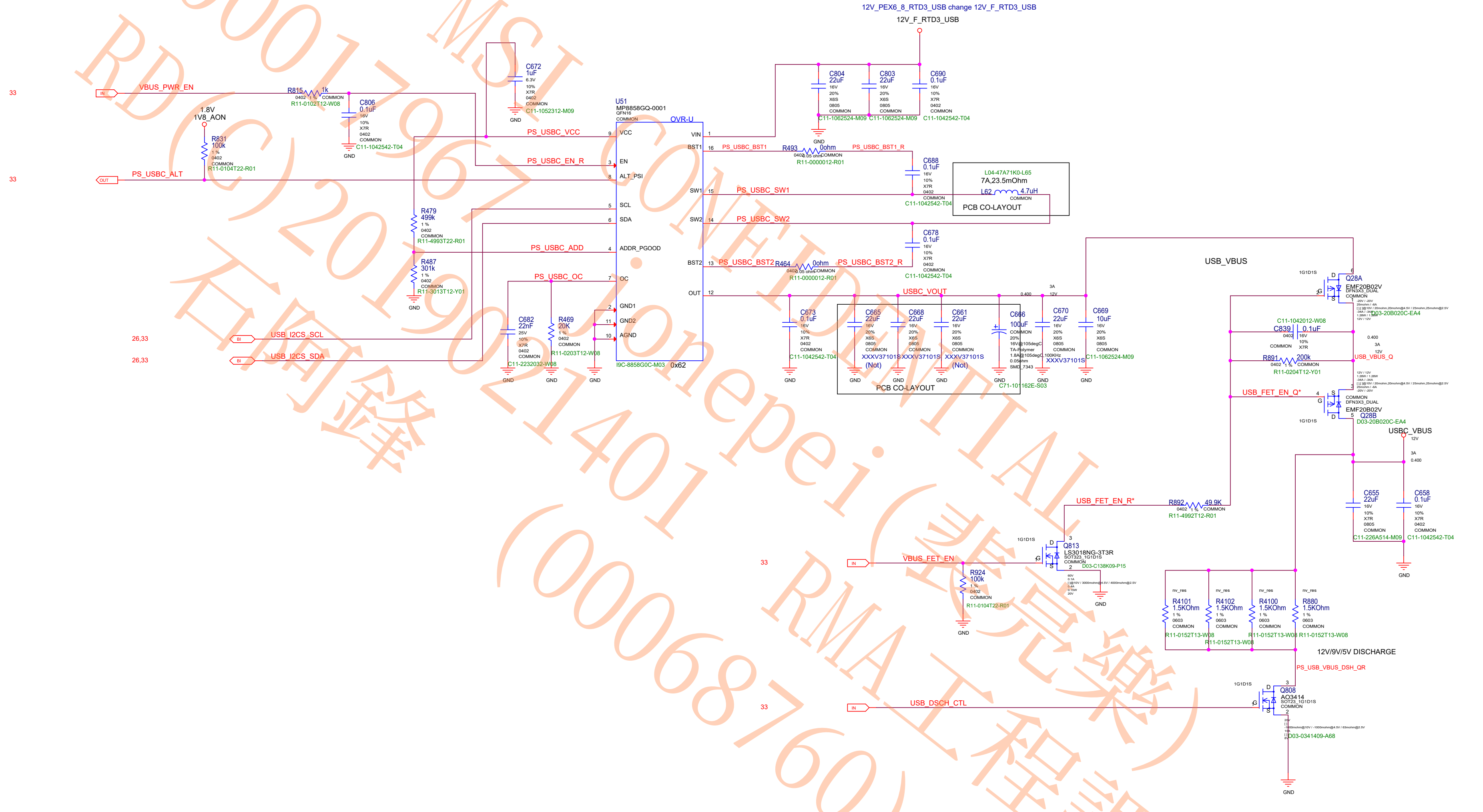
PS: USB VR



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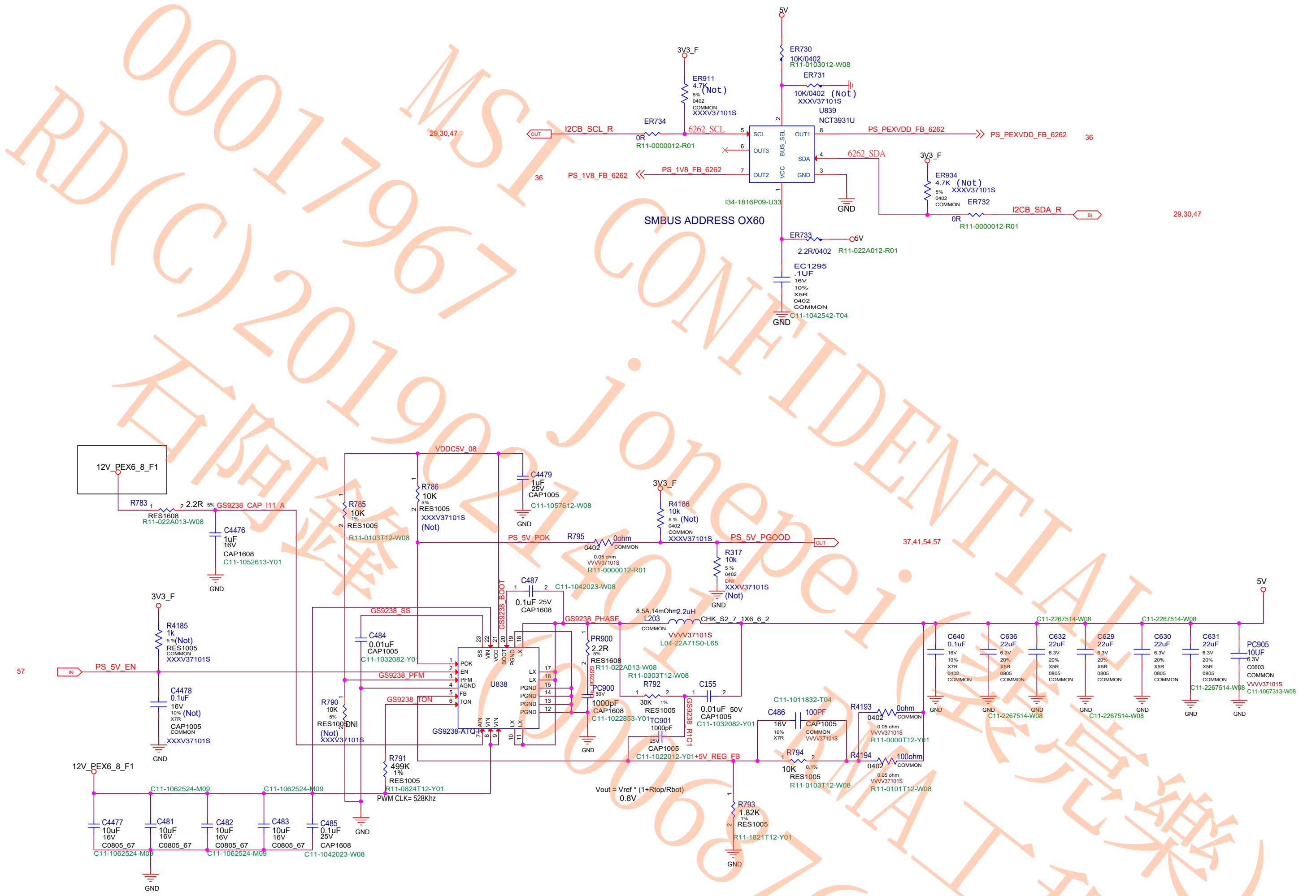
PS: 5V, 5V_BACKUP



MICRO-STAR INT'L CO.,LTD		
MS-V377		
Size: Custom	Document Description: GPU Decoupling	Rev: 1.0
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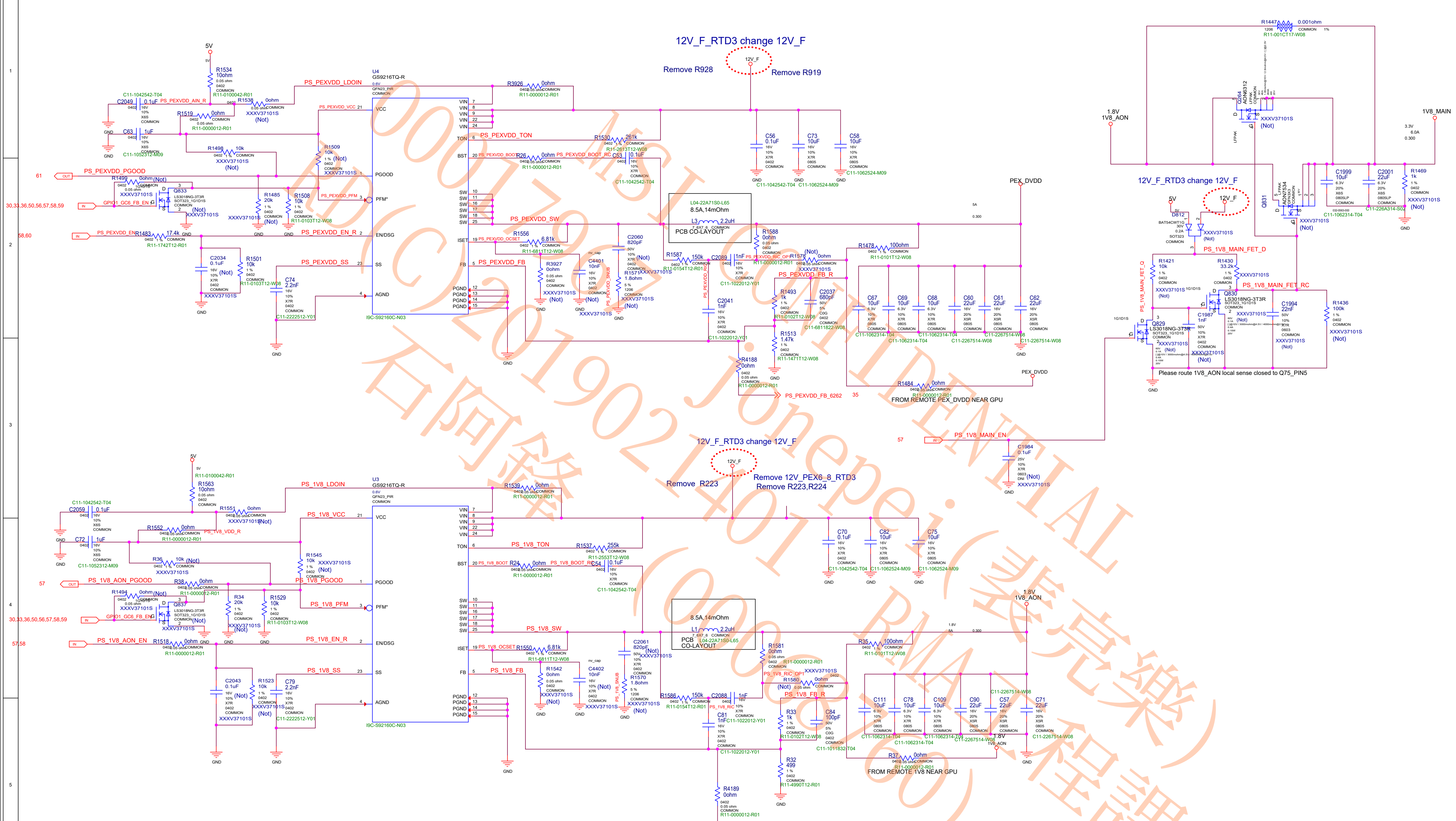
PS: PEXVDD 1V8 Rail



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Size	Document Description	Rev
Custom	PS: PEXVDD 1V8 Rail	1.0

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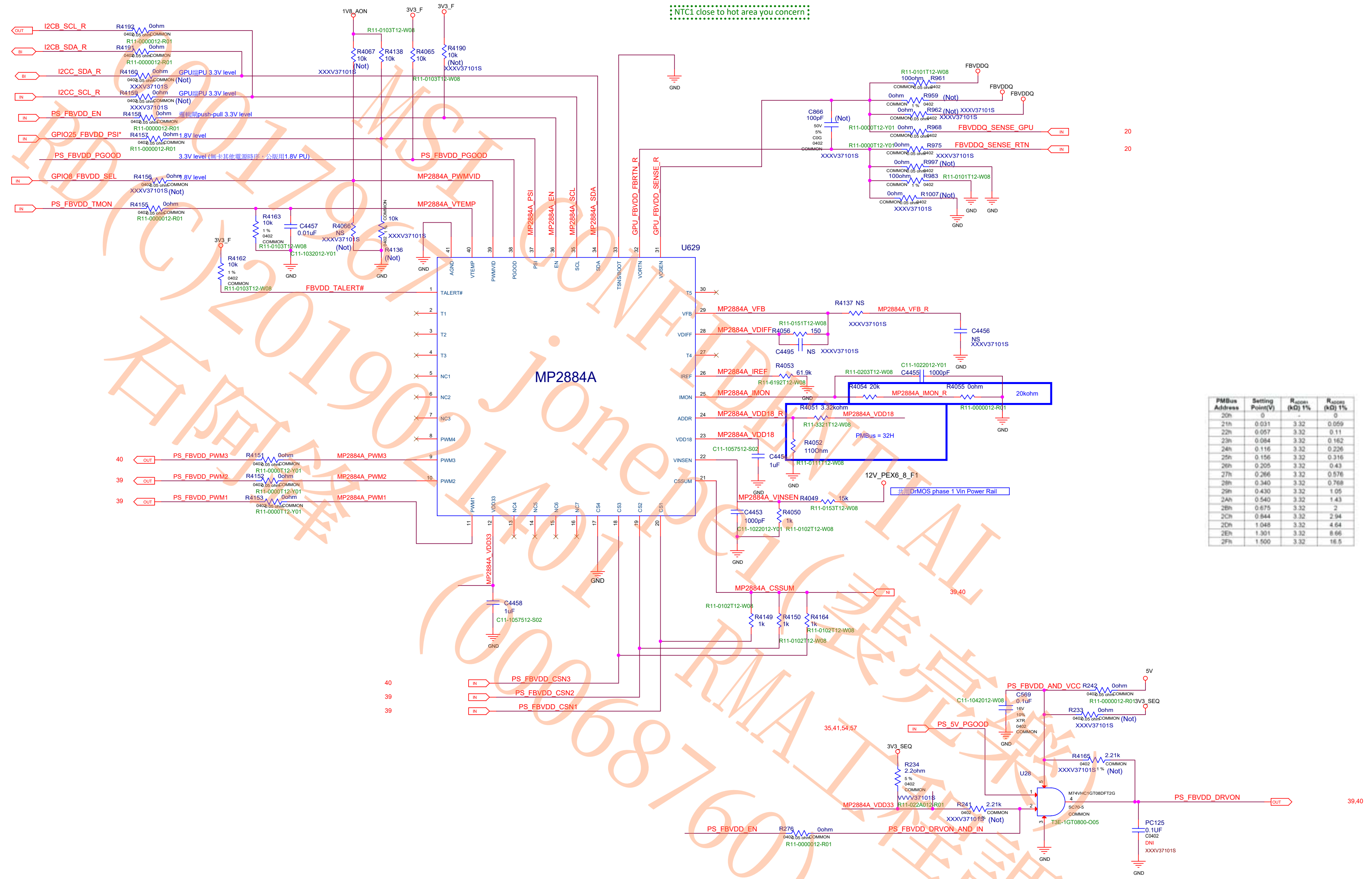
PS: FBVDD Controller

EN Type	R3
Open Drain	10k
Push Pull	NS

PSI	Mode
High	High Phase Count
Hi-Z	Auto Power Mode
Low	Low Phase Count

PWMVID	Vout
High	VID in 24h
Hi-Z	VID in 21h
Low	VID in 1Fh

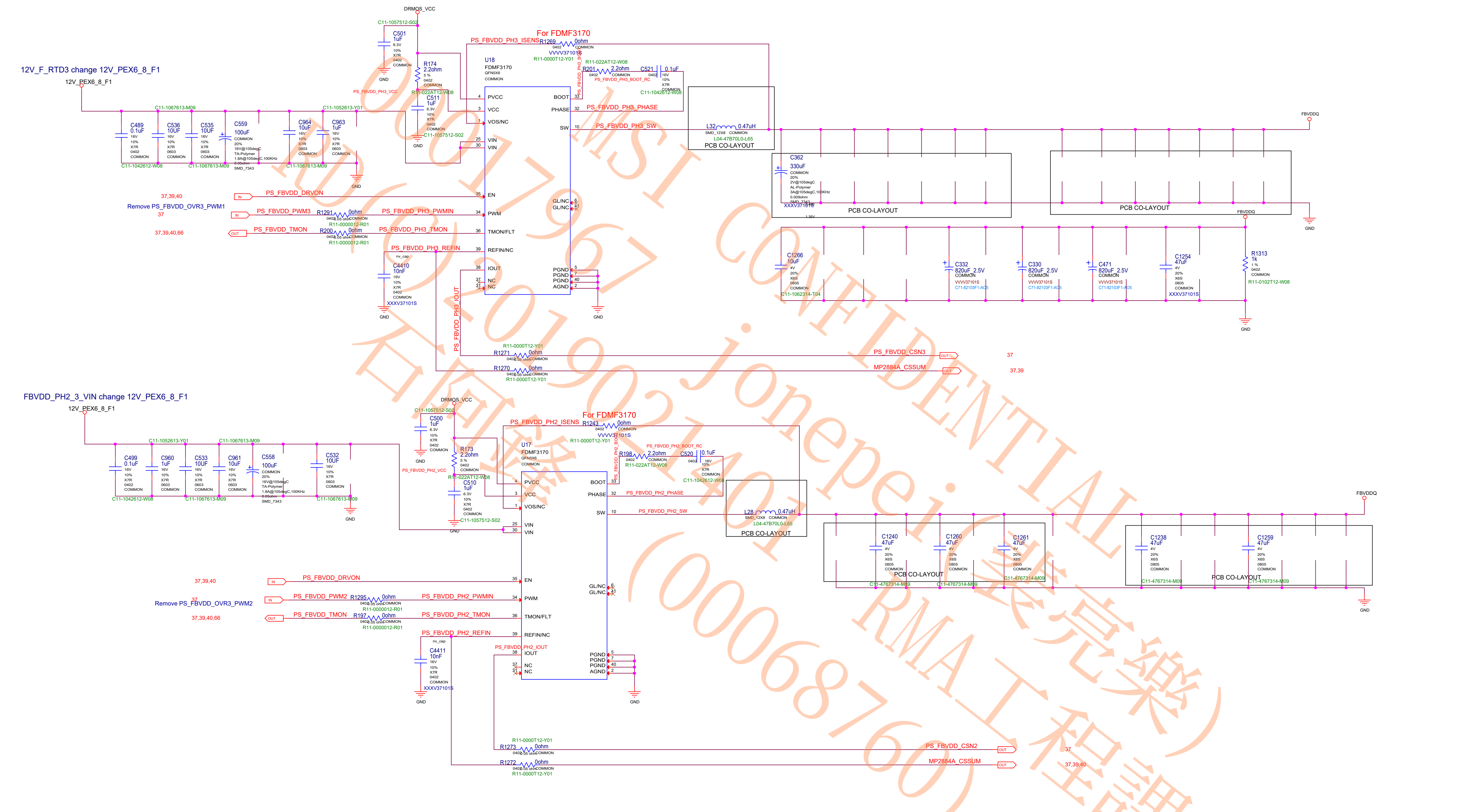
	+NVVDD
TDC	??A
IccMax	??A
Vboot	1.35V
Load Line	0mohm



PMBus Address	Setting Point(V)	R_{ADDR1} (kΩ) 1%	R_{ADDR2} (kΩ) 1%
20h	0	-	0
21h	0.031	3.32	0.059
22h	0.057	3.32	0.11
23h	0.084	3.32	0.162
24h	0.116	3.32	0.226
25h	0.156	3.32	0.316
26h	0.205	3.32	0.43
27h	0.266	3.32	0.576
28h	0.340	3.32	0.768
29h	0.430	3.32	1.05
2Ah	0.540	3.32	1.43
2Bh	0.675	3.32	2
2Ch	0.844	3.32	2.94
2Dh	1.048	3.32	4.64
2Eh	1.301	3.32	8.66
2Fh	1.500	3.32	16.5

PS: FBVDD Controller OVR3

PS: FBVDD PH2,3



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Size	Document Description	Rev
Custom		1.0

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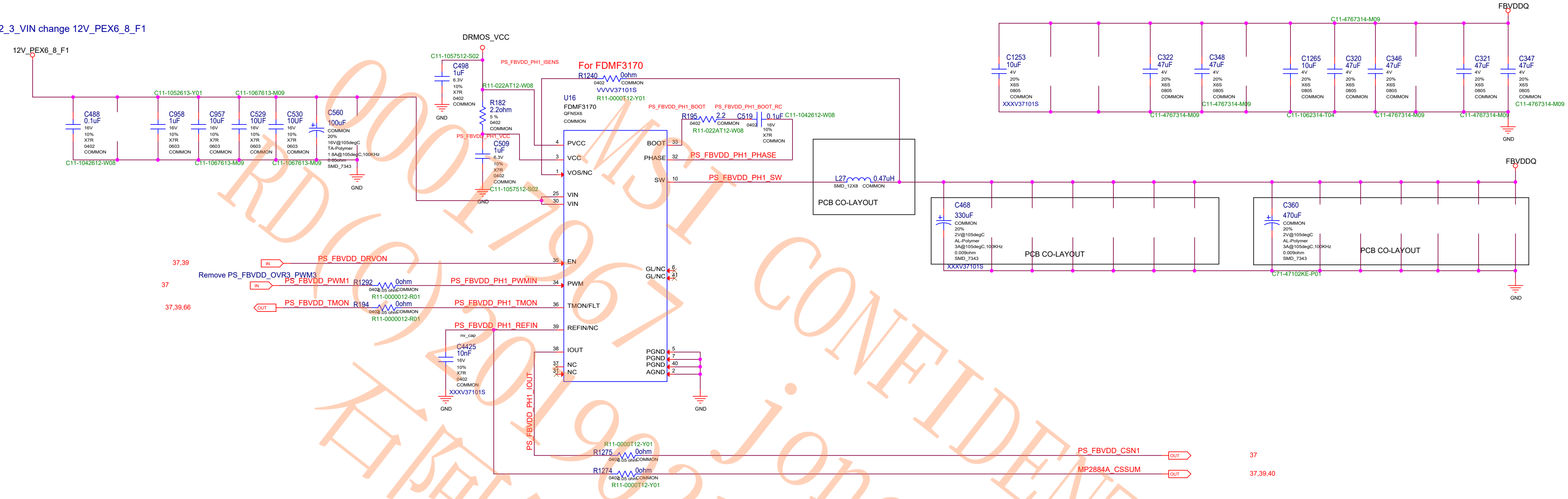
PS: FBVDD PH1

FBVDD_PH2_3_VIN change 12V_PEX6_8_F1



Remove 12V_PEX_FB --->FBVDD_PH2_3_VIN circuit

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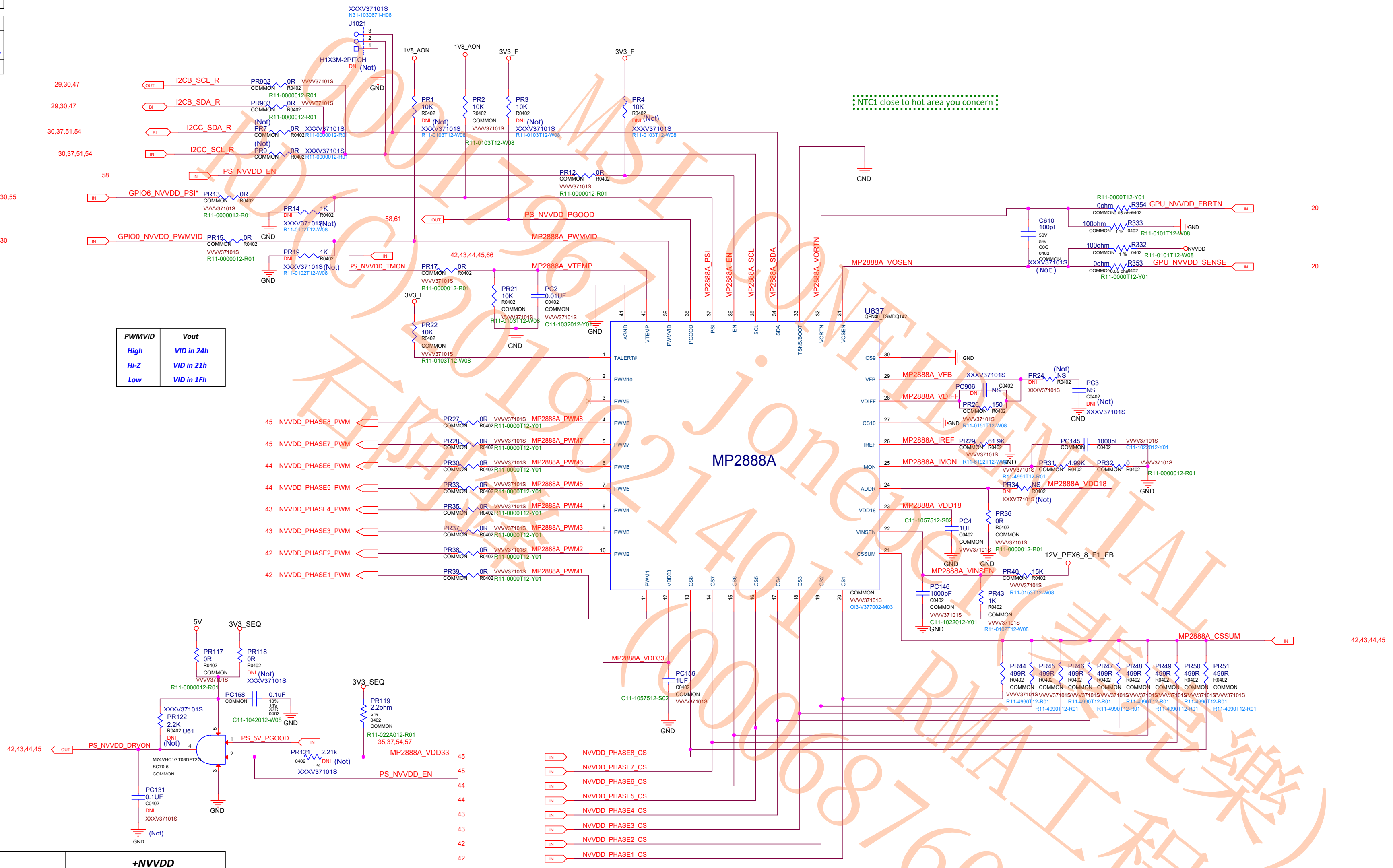
Page34: PS: NVVDD - MP2888A

EN Type	R3
Open Drain	10k
Push Pull	NS

PSI	Mode
High	High Phase Count
Hi-Z	Auto Power Mode
Low	Low Phase Count



PWMVID	Vout
High	VID in 24h
Hi-Z	VID in 21h
Low	VID in 1Fh

	+NVVDD
TDC	200A
IccMax	330A
Vboot	0.8V
Load Line	0mohm

PMBus Address	Setting Point(V)	R_{ADDR1} (kΩ) 1%	R_{ADDR2} (kΩ) 1%
20h	0	-	0
21h	0.031	3.32	0.059
22h	0.057	3.32	0.11
23h	0.084	3.32	0.162
24h	0.116	3.32	0.226
25h	0.156	3.32	0.316
26h	0.205	3.32	0.43
27h	0.266	3.32	0.576
28h	0.340	3.32	0.768
29h	0.430	3.32	1.05
2Ah	0.540	3.32	1.43
2Bh	0.675	3.32	2
2Ch	0.844	3.32	2.94
2Dh	1.048	3.32	4.64
2Eh	1.301	3.32	8.66
2Fh	1.500	3.32	16.5

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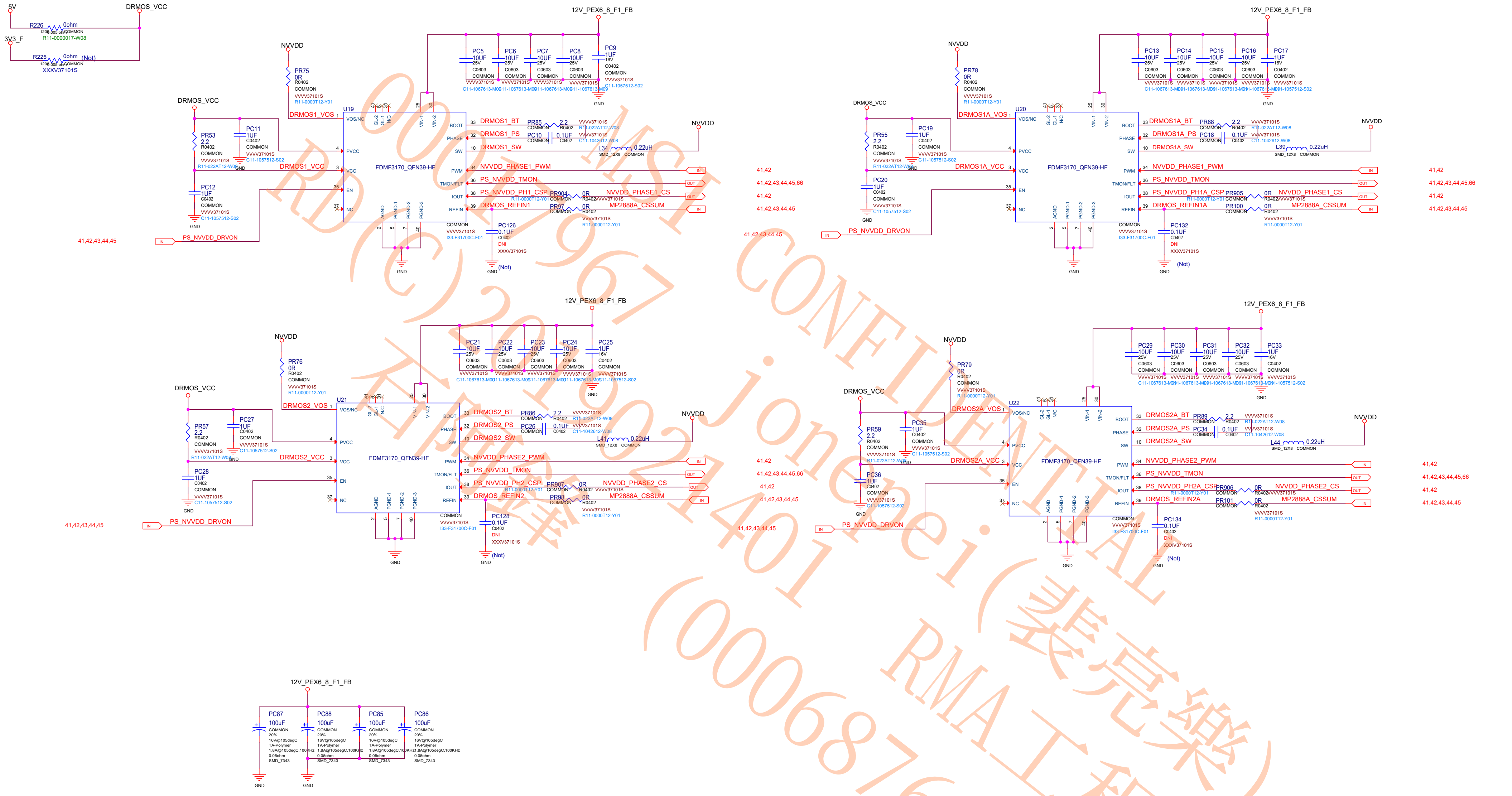
Size: Custom | Document Description: PS: NVVDD - MP2888A | Rev 1.0

PS: NVVDD Phase 1~4



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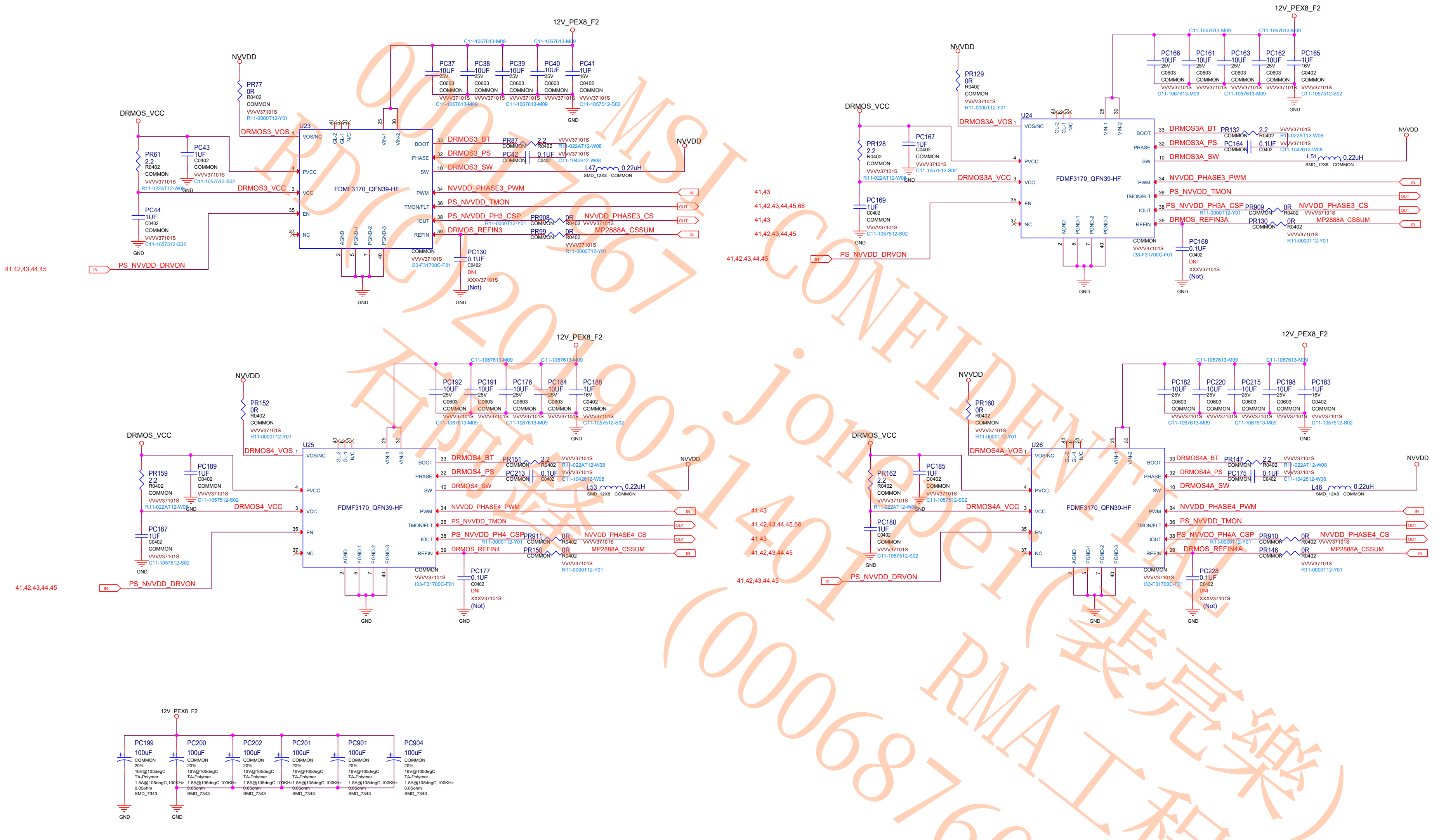
PS: NVVDD Phase 5~8



MICRO-STAR INT'L CO.,LTD		
MS-V377		
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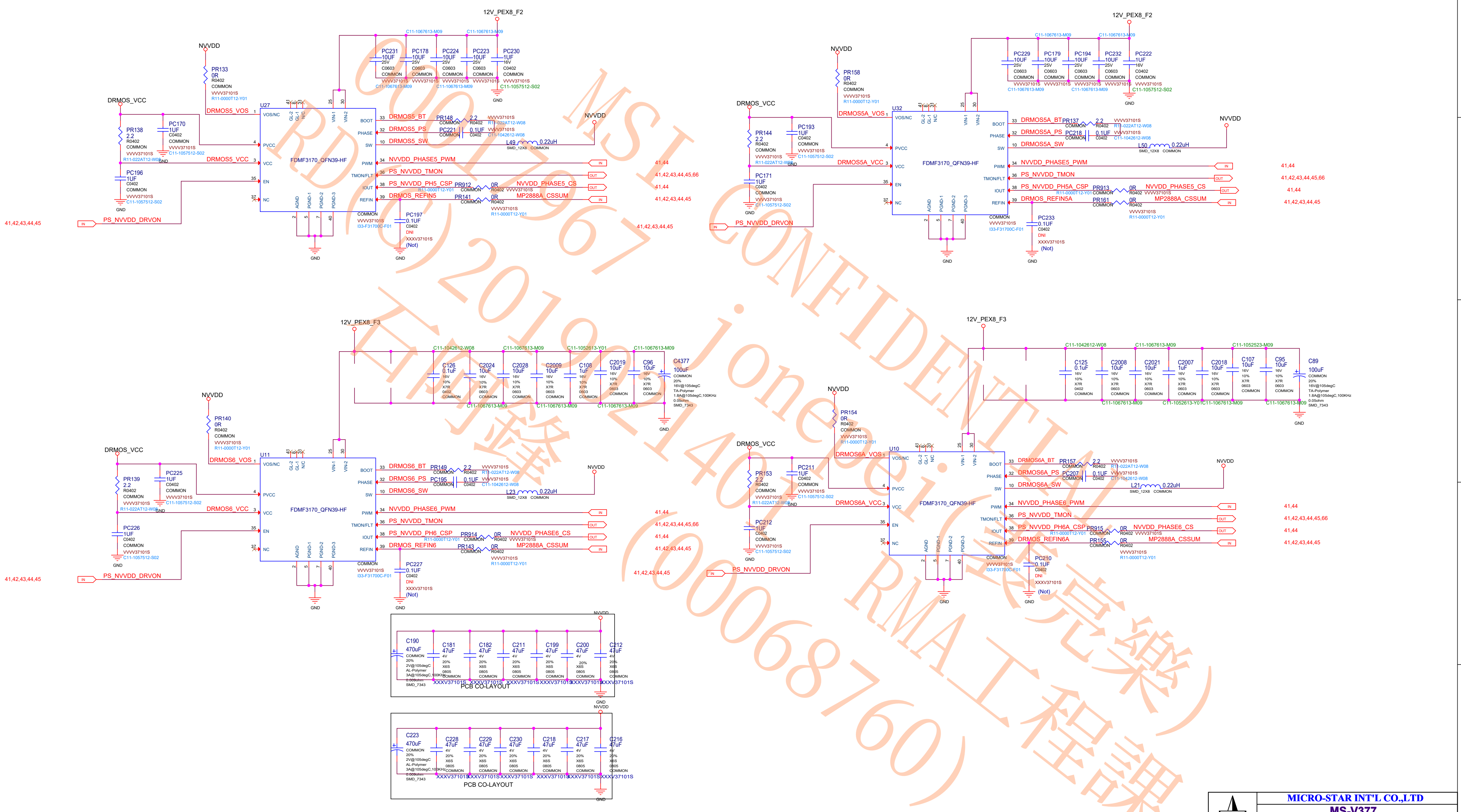
PS: NVVDD Phase 9~12



MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom		1.0

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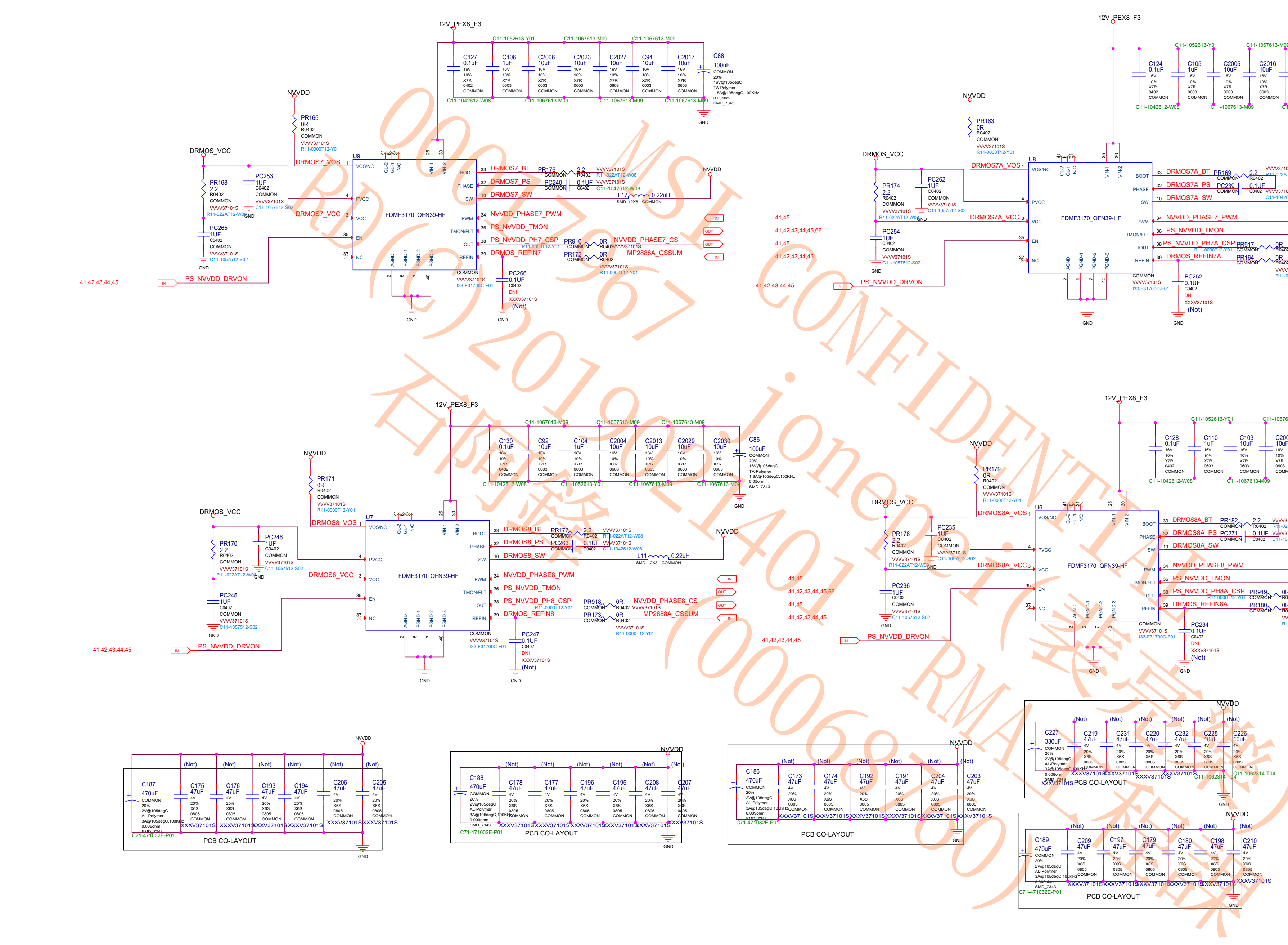
PS: NVVDD Phase 13~16



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Size	Document Description	Rev
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PS:NVVDD Phase 7, 8

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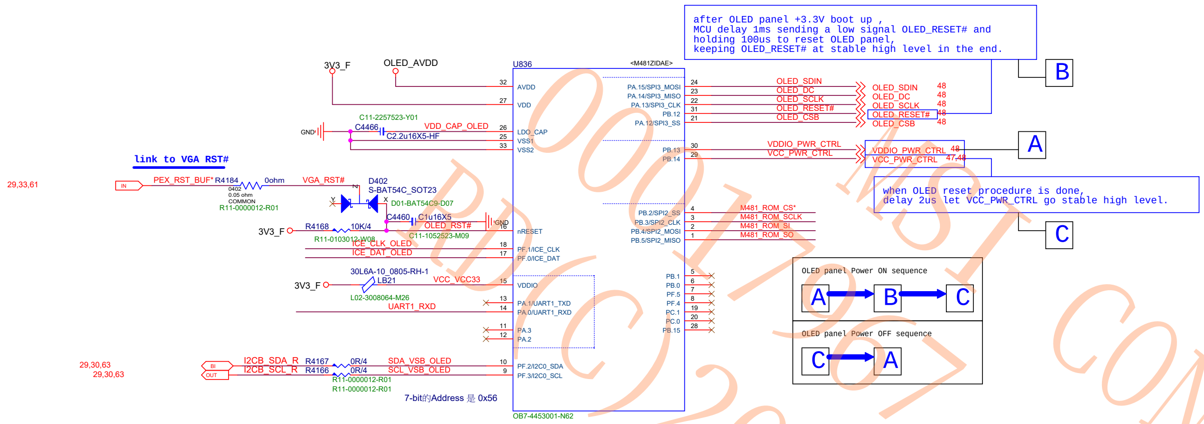
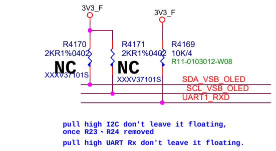
PS: NVVDD PH 9,10

32 PIN OLED MCU



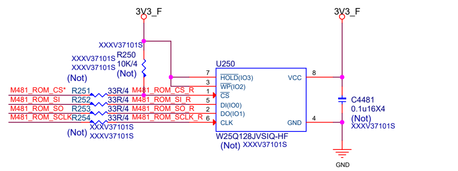
I2C and UART Reserve



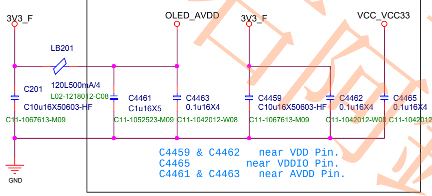
FW update

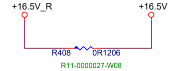
ICE_DAT_OLED
ICE_CLK_OLED
OLED_RST#

External 3.3V SPI ROM,128M(16Mx8bit)



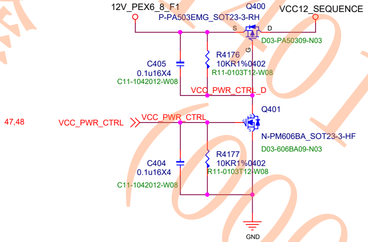
Decoupling

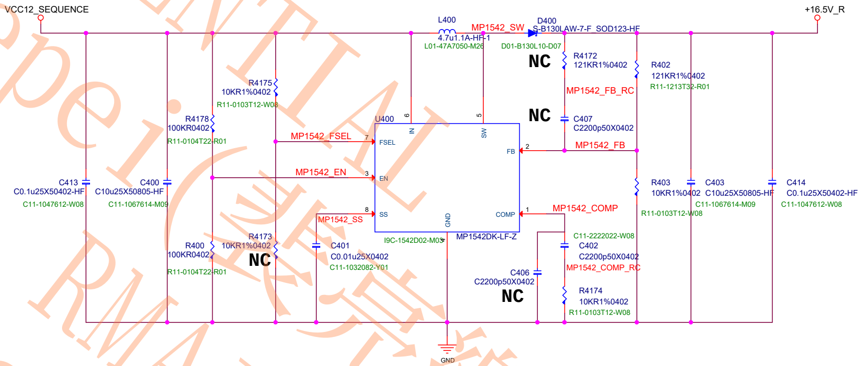




MPS1542 BUCK BOOST FOR OLED POWER 12Vin 16.5Vout

+16.5V power up sequence





PIN FUNCTIONS

Pin #	Name	Description
1	COMP	Compensation Pin. Connect a capacitor and resistor in series to ground for loop stability.
2	FB	Feedback Input. Reference voltage is 1.25V. Connect a resistor divider to this pin.
3	EN	Regulator On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input source (through a 100kΩ pull-up resistor if V_{IN} > 6V) for automatic startup. EN cannot be left floating.

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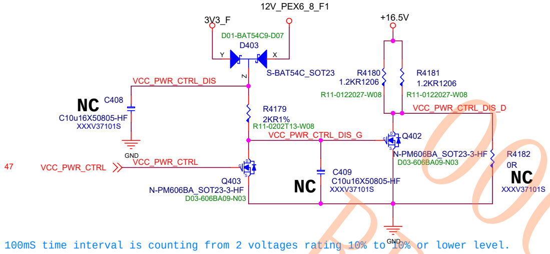
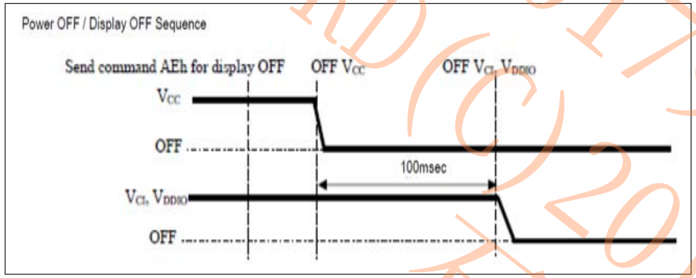
+16.5V Discharge



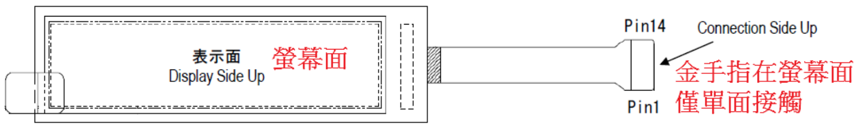
100mS time interval is counting from 2 voltages rating 10% to 10% or lower level.



12-2) 入力端子名称 Pin Assignment

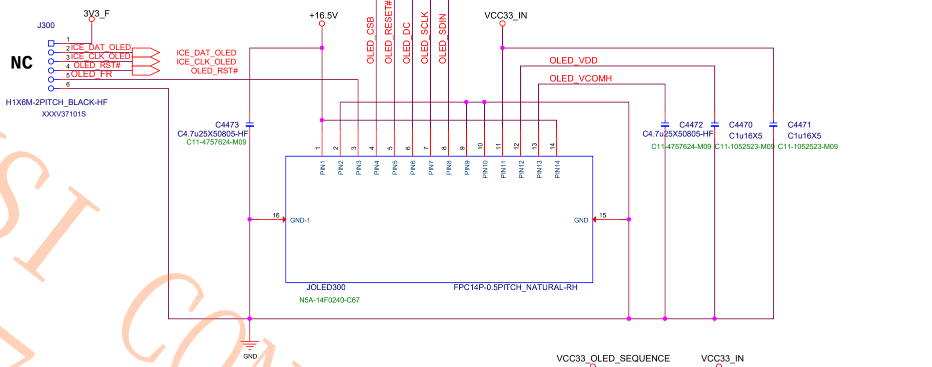
I:Input, O:Output, P:Power

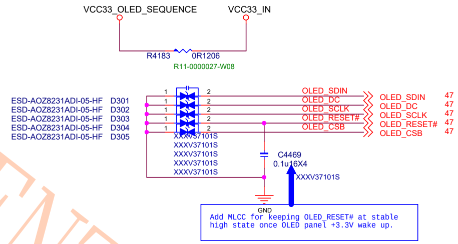
PIN No	名称 Pin Name	機能 Function Description		I/O
1	VCC	OLED駆動電源	OLED Driving Voltage	P
2	AGND	グランド	Analog Ground	P
3	FR	同期信号	Synchronization Signal	O
4	CSB	チップセレクト	Chip Select	I
5	RSTB	リセット	Reset	I
6	DC	データ/コマンド選択	Data/Command Selection	I
7	SCLK	シリアルクロック	Serial Clock	I
8	SDIN	データ	Data Input	I
9	GND	グランド	Ground Pin	P
10	AGND	グランド	Analog Ground	P
11	VCI	ロジック電源	Logic Power Voltage	P
12	VDD	コア電源	Core Voltage	P
13	VCOMH	COMH 電源	COMH Voltage	P
14	VCC	OLED駆動電源	OLED Driving Voltage	P



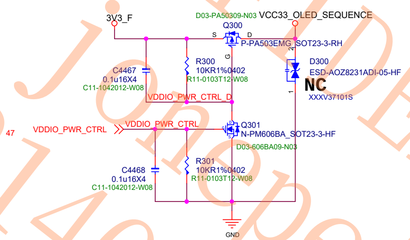
形名 Type No. ELW2106AA

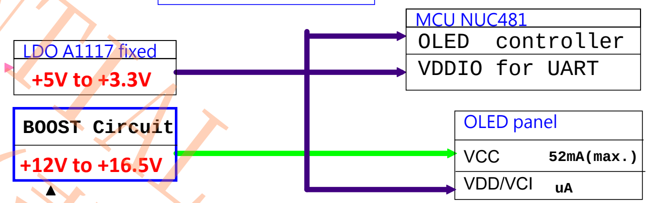
OLED housing





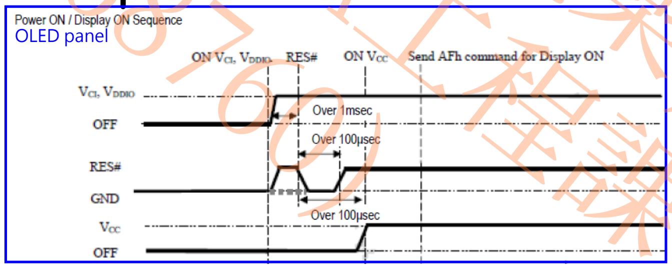
+3.3V power up sequence





1. after OLED panel +3.3V boot up , delay 1ms sending a low signal OLED_RESET# and holding 100us to reset OLED panel, keeping OLED_RESET# at stable high level in the end.

2. when OLED reset procedure is done, delay 2us let VCC_PWR_CTRL go stable high level.



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PS: NVVDD PH 13,14

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PS: INPUT SWITCH RTD3

AND GATE LOGIC FOR P-BOARD

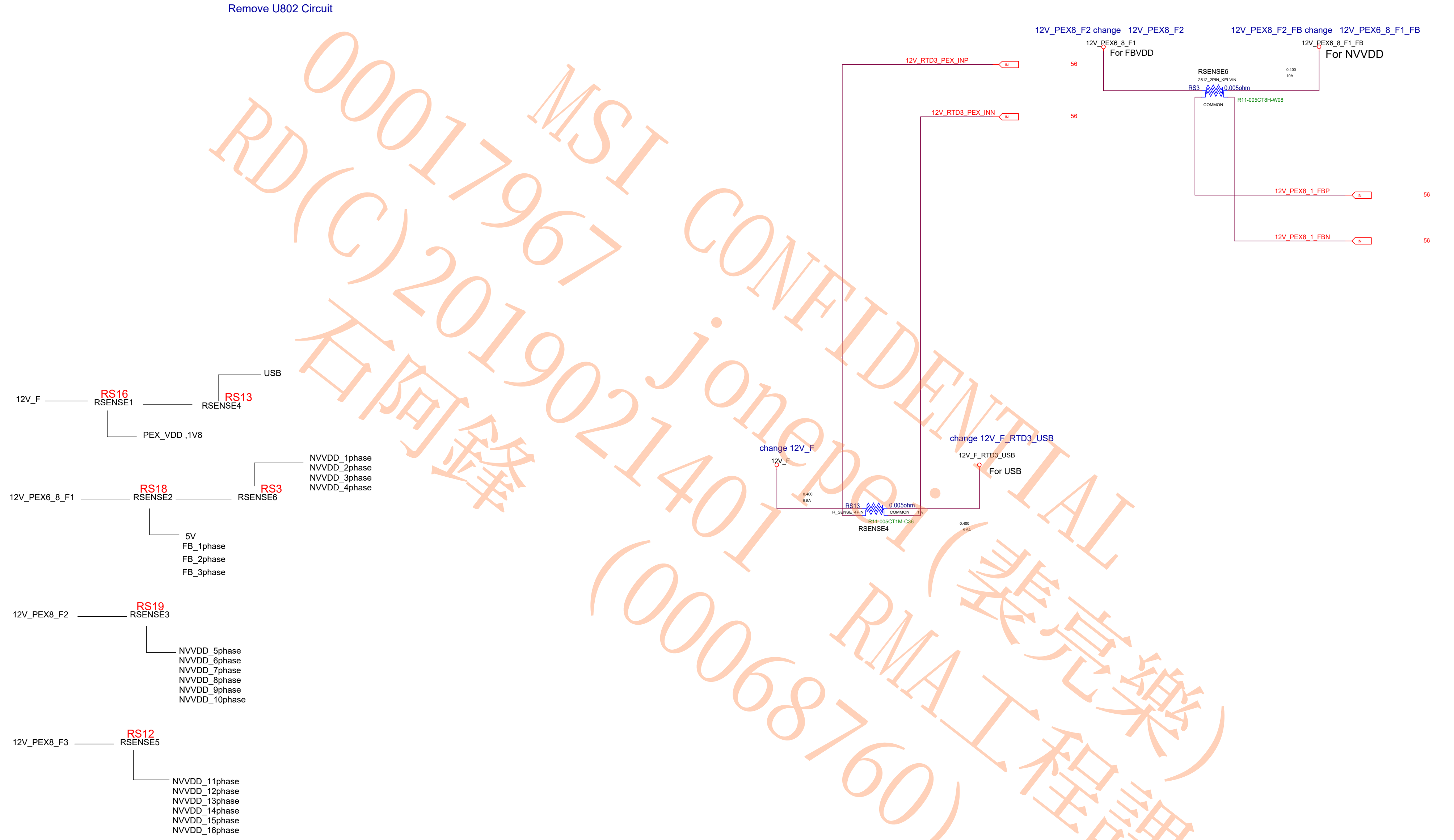
GPIO1	GPIO29	SWITCH	VOUT
0	0	0	12V_F
0	1	0	12V_F
1	0	0	12V_F
1	1	1	3V3A

Remove 12V_F_RTD3 circuit

AND GATE LOGIC FOR P-BOARD

GPIO1	GPIO29	SWITCH	VOUT
0	0	0	3V3
0	1	0	3V3
1	0	0	3V3
1	1	1	3V3A

Remove 3V3_RTD3 circuit



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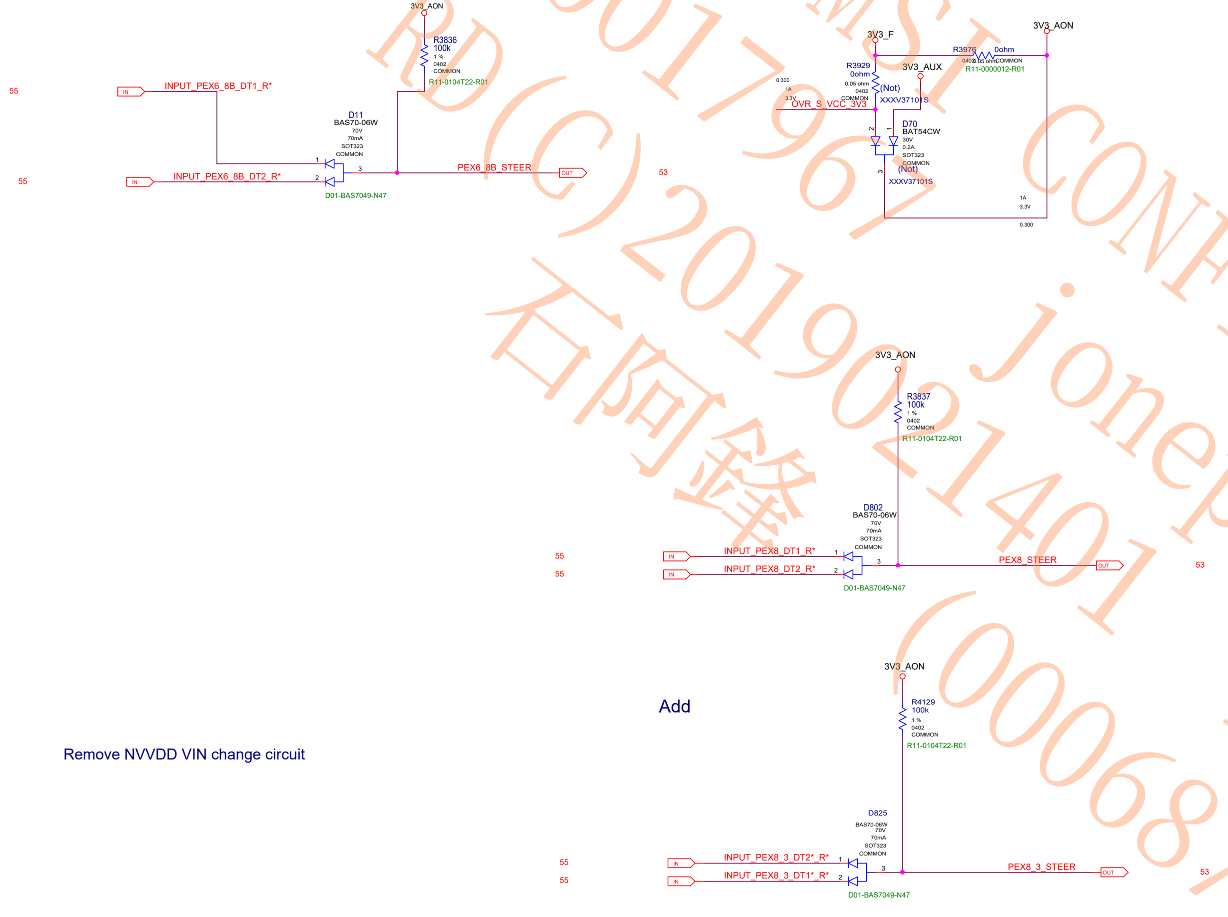
PS: Input Switch Rail Balance



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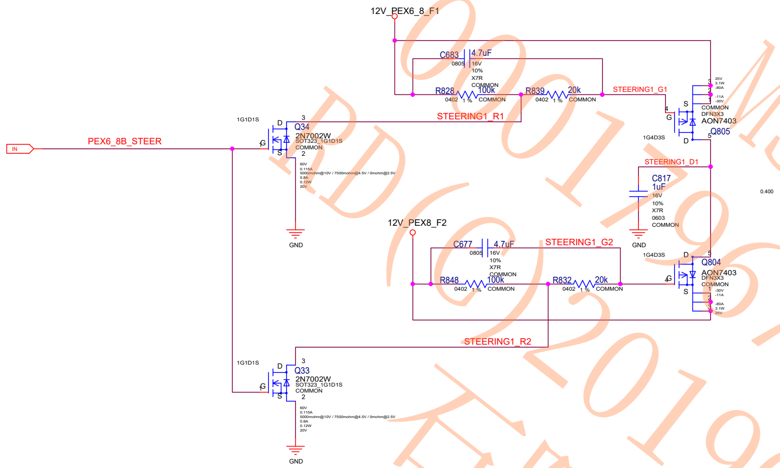
12V CURRENT STEERING (UNDER POWER BOOT):

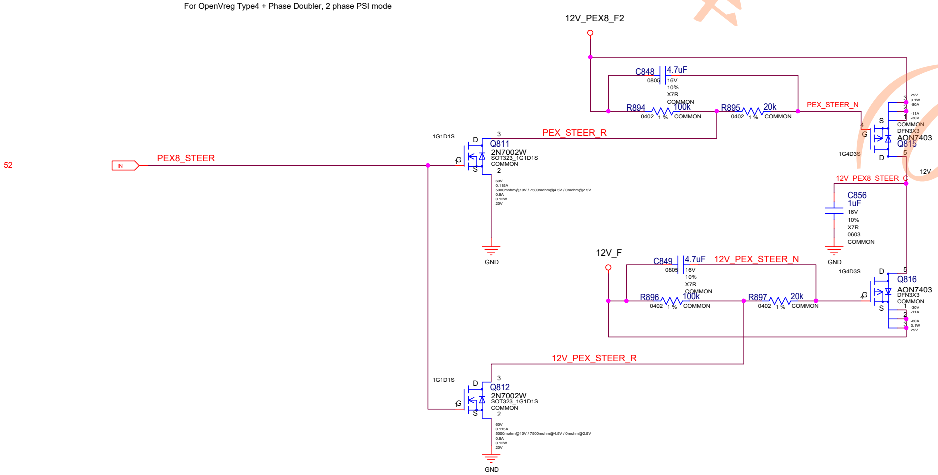
GUIDES CURRENT FROM PEX EDGE TO PEX 6/8 PIN INPUT AREA

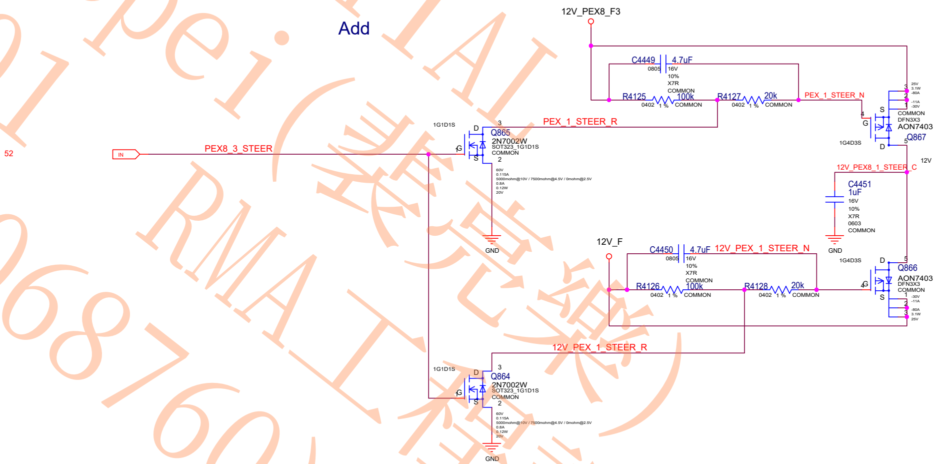


12V CURRENT STEERING (UNDER POWER BOOT):

GUIDES CURRENT FROM PEX EDGE TO PEX 8 PIN INPUT AREA

For OpenVreg Type4 + Phase Doubler, 2 phase PSI mode





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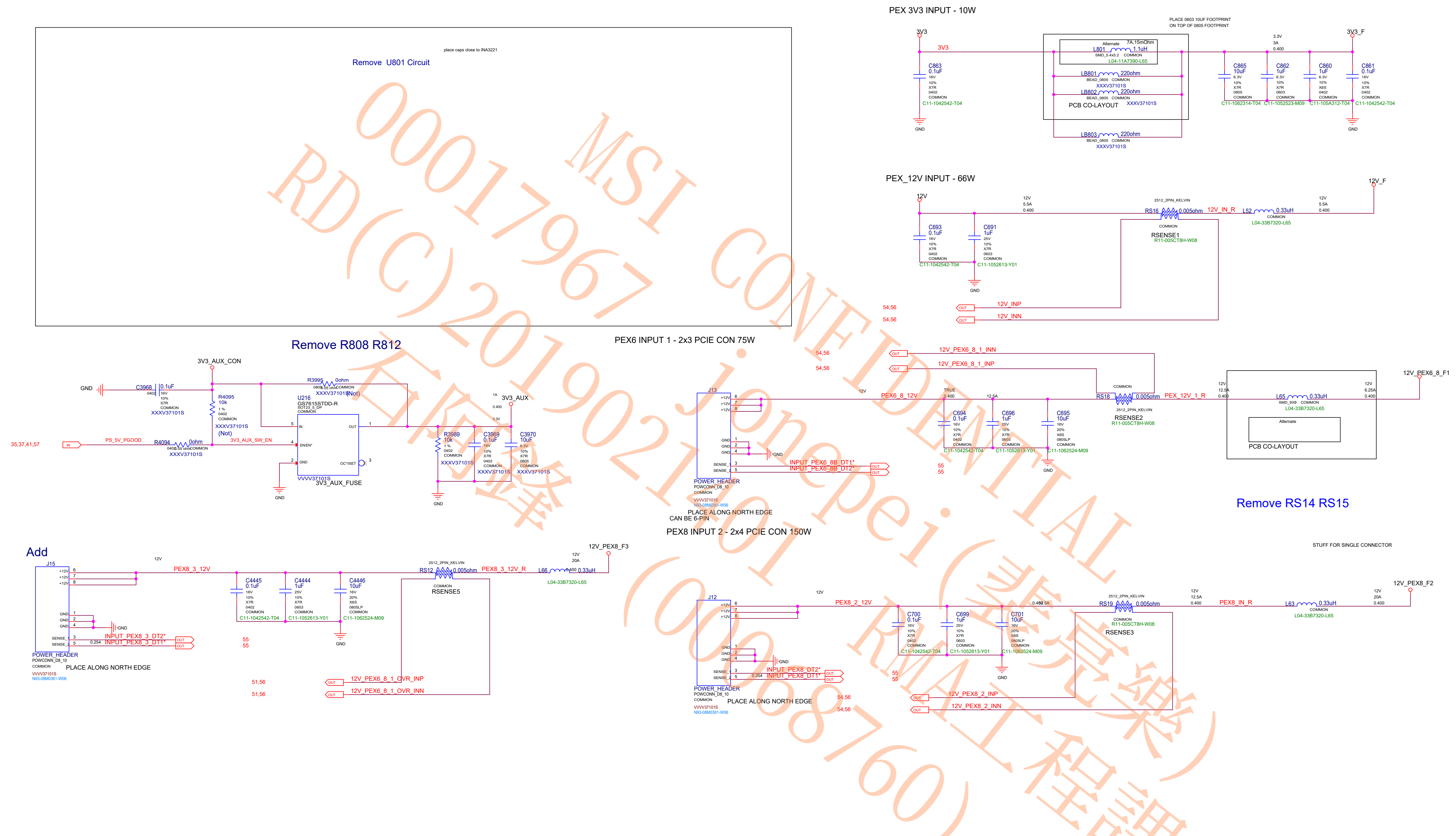
PS: Inputs, Filtering, and Monitoring



Remove U801 Circuit
place caps close to INA3221
PEX 3V3 INPUT - 10W
3V3
3V3_F
PLACE 0603 10UF FOOTPRINT ON TOP OF 0805 FOOTPRINT
L801 1.1uH 7A,15mOhm Alternate
L04-11A7390-L65
LB801 220ohm
LB802 220ohm
LB803 220ohm
PCB CO-LAYOUT
C863 0.1uF
C865 10uF
C862 1uF
C860 1uF
C861 0.1uF
GND
PEX_12V INPUT - 66W
12V
12V_F
RS16 0.005ohm
12V_IN_R
L52 0.33uH
L04-33B7320-L65
RSENSE1
R11-005CT8H-W08
C693 0.1uF
C691 1uF
12V_INP
12V_INN
54,56
Remove R808 R812
3V3_AUX_CON
C3968 0.1uF
R4095 10k (Not)
R3995 0ohm (Not)
U216 GS7615STDD-R
3V3_AUX
3V3_AUX_FUSE
R4094 0ohm
PS_5V_PGOOD
3V3_AUX_SW_EN
35,37,41,57
R3989 10k
C3969 0.1uF
C3970 10uF
PEX6 INPUT 1 - 2x3 PCIE CON 75W
J13
PEX6_8_12V
12V_PEX6_8_1_INN
12V_PEX6_8_1_INP
RS18 0.005ohm
PEX_12V_1_R
L65 0.33uH
12V_PEX6_8_F1
RSENSE2
C694 0.1uF
C696 1uF
C695 10uF
INPUT_PEX6_8B_DT1*
INPUT_PEX6_8B_DT2*
POWER_HEADER
PLACE ALONG NORTH EDGE
CAN BE 6-PIN
PCB CO-LAYOUT
Remove RS14 RS15
STUFF FOR SINGLE CONNECTOR
PEX8 INPUT 2 - 2x4 PCIE CON 150W
J12
PEX8_2_12V
RS19 0.005ohm
PEX8_IN_R
L63 0.33uH
12V_PEX8_F2
RSENSE3
C700 0.1uF
C699 1uF
C701 10uF
INPUT_PEX8_DT2*
INPUT_PEX8_DT1*
12V_PEX8_2_INP
12V_PEX8_2_INN
Add
J15
PEX8_3_12V
C4445 0.1uF
C4444 1uF
C4446 10uF
RS12 0.005ohm
PEX8_3_12V_R
L66 0.33uH
12V_PEX8_F3
RSENSE5
INPUT_PEX8_3_DT2*
INPUT_PEX8_3_DT1*
12V_PEX6_8_1_OVR_INP
12V_PEX6_8_1_OVR_INN
51,56
PLACE ALONG NORTH EDGE

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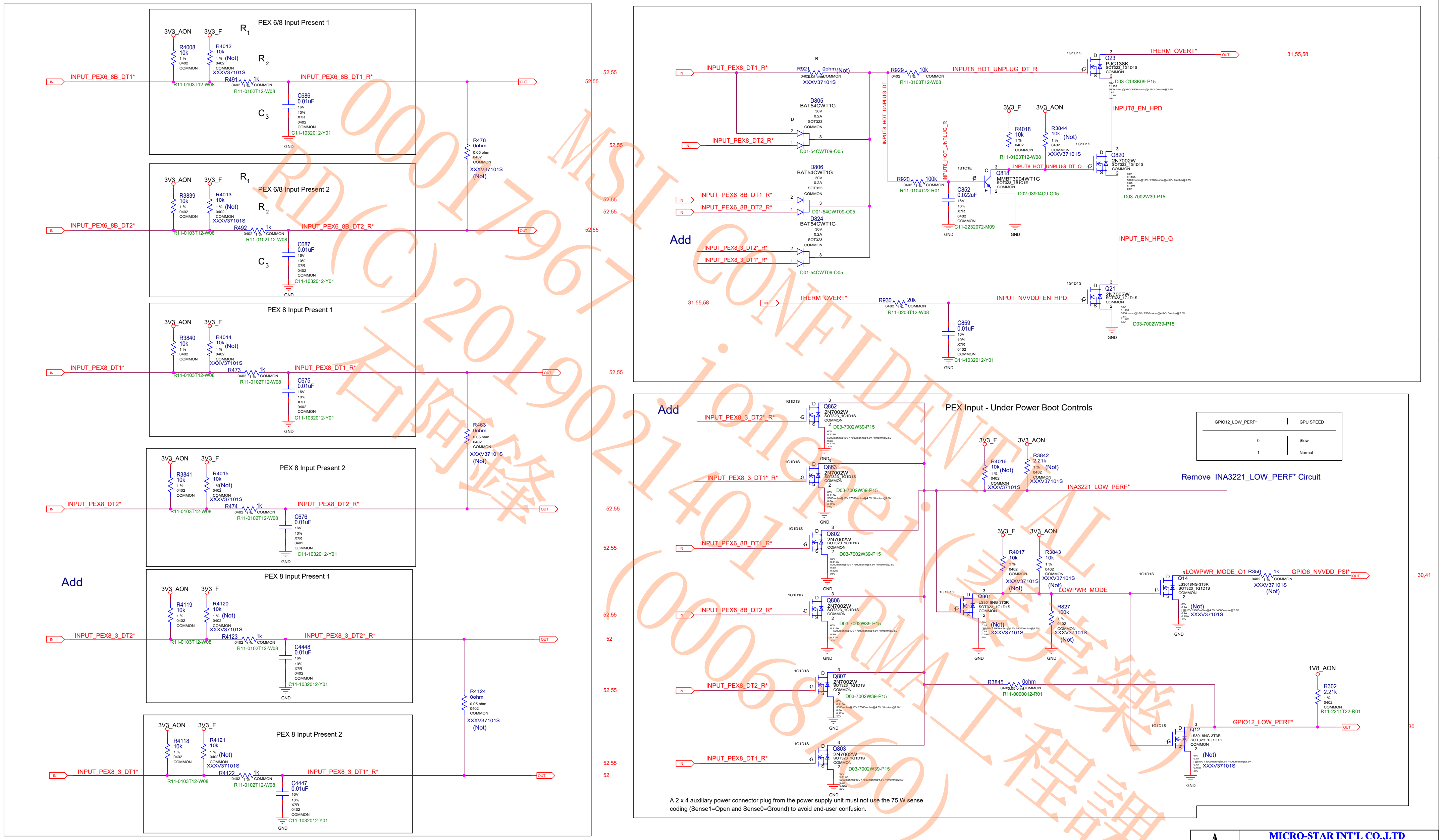
PS: 12V Current Steering & Hot Unplug Detect



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Custom	12V Current Steering & Hot Unplug Detect	1.0

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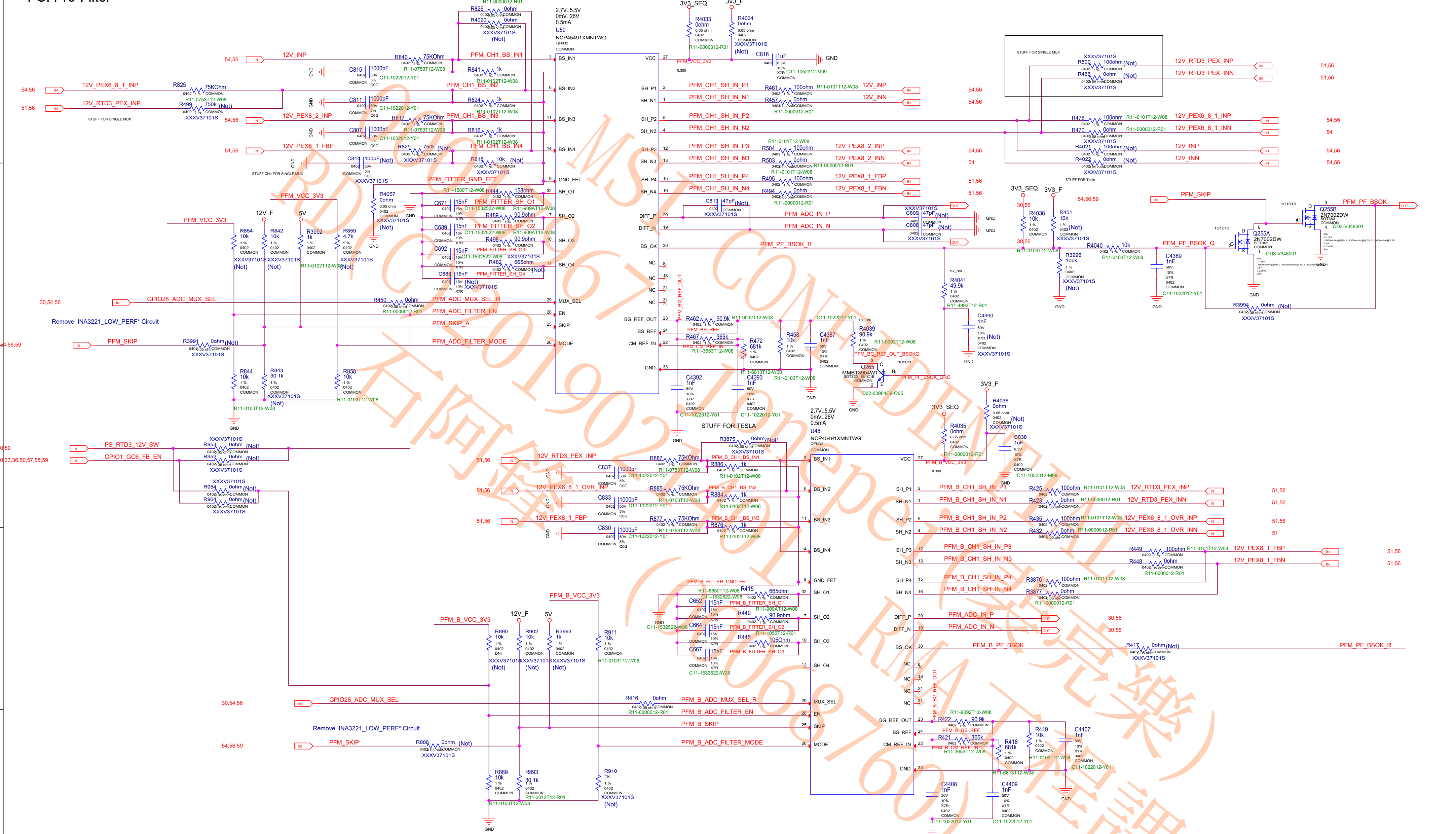
PS: Pre-Filter



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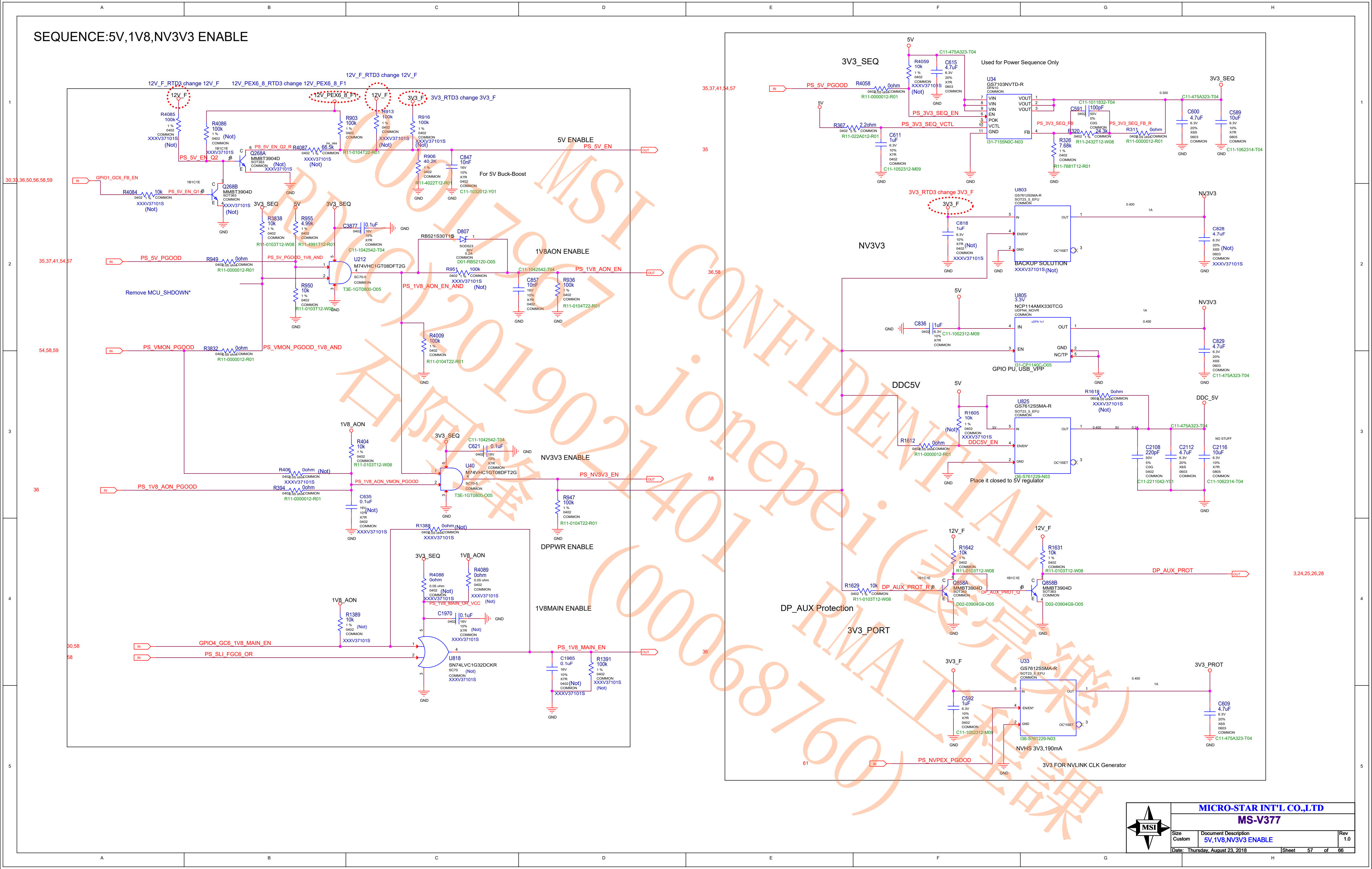

SEQUENCE:5V,1V8,NV3V3 ENABLE
12V_F_RTD3 change 12V_F
12V_PEX6_8_RTD3 change 12V_PEX6_8_F1
12V_F_RTD3 change 12V_F
3V3_RTD3 change 3V3_F
5V ENABLE
PS_5V_EN
For 5V Buck-Boost
1V8AON ENABLE
PS_1V8_AON_EN
PS_5V_PGOOD
Remove MCU_SHDOWN*
PS_VMON_PGOOD
PS_VMON_PGOOD_1V8_AND
NV3V3 ENABLE
PS_NV3V3_EN
PS_1V8_AON_PGOOD
DPPWR ENABLE
1V8MAIN ENABLE
GPIO4_GC6_1V8_MAIN_EN
PS_SLI_FGC6_OR
PS_1V8_MAIN_EN
3V3_SEQ
Used for Power Sequence Only
PS_3V3_SEQ_EN
PS_3V3_SEQ_VCTL
NV3V3
3V3_RTD3 change 3V3_F
BACKUP SOLUTION
GPIO PU, USB_VPP
DDC5V
DDC5V_EN
DDC_5V
Place it closed to 5V regulator
DP_AUX Protection
DP_AUX_PROT
3V3_PORT
3V3_PROT
NVHS 3V3,190mA
3V3 FOR NVLINK CLK Generator
PS_NVPEX_PGOOD
MICRO-STAR INT'L CO.,LTD
MS-V377
Document Description
5V,1V8,NV3V3 ENABLE
Date: Thursday, August 23, 2018
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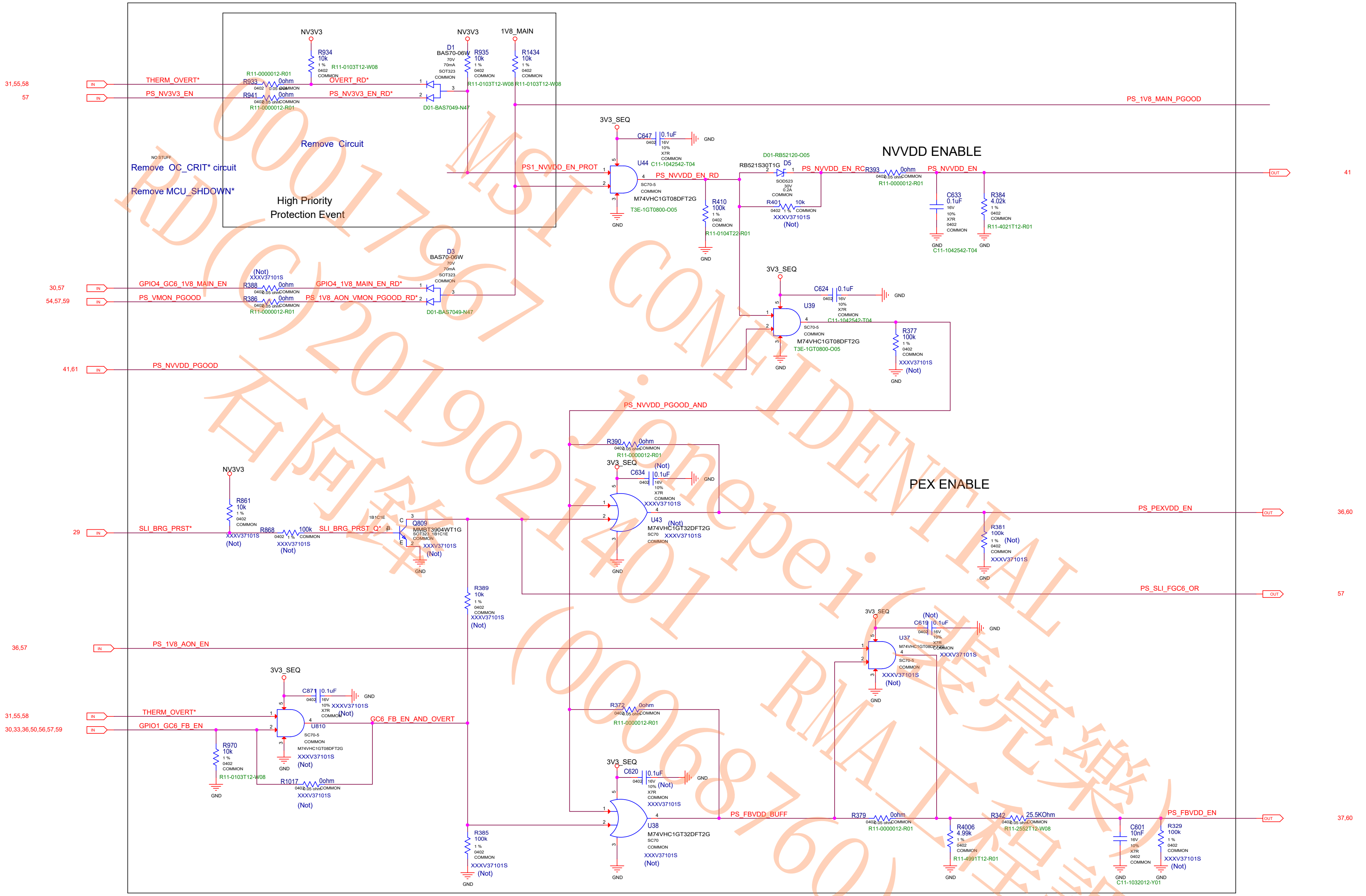
Rev 1.0

SEQUENCE:NV,PEX,FB ENABLE



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Size: Custom	Document Description: NV,PEX,FB ENABLE	Rev: 1.0
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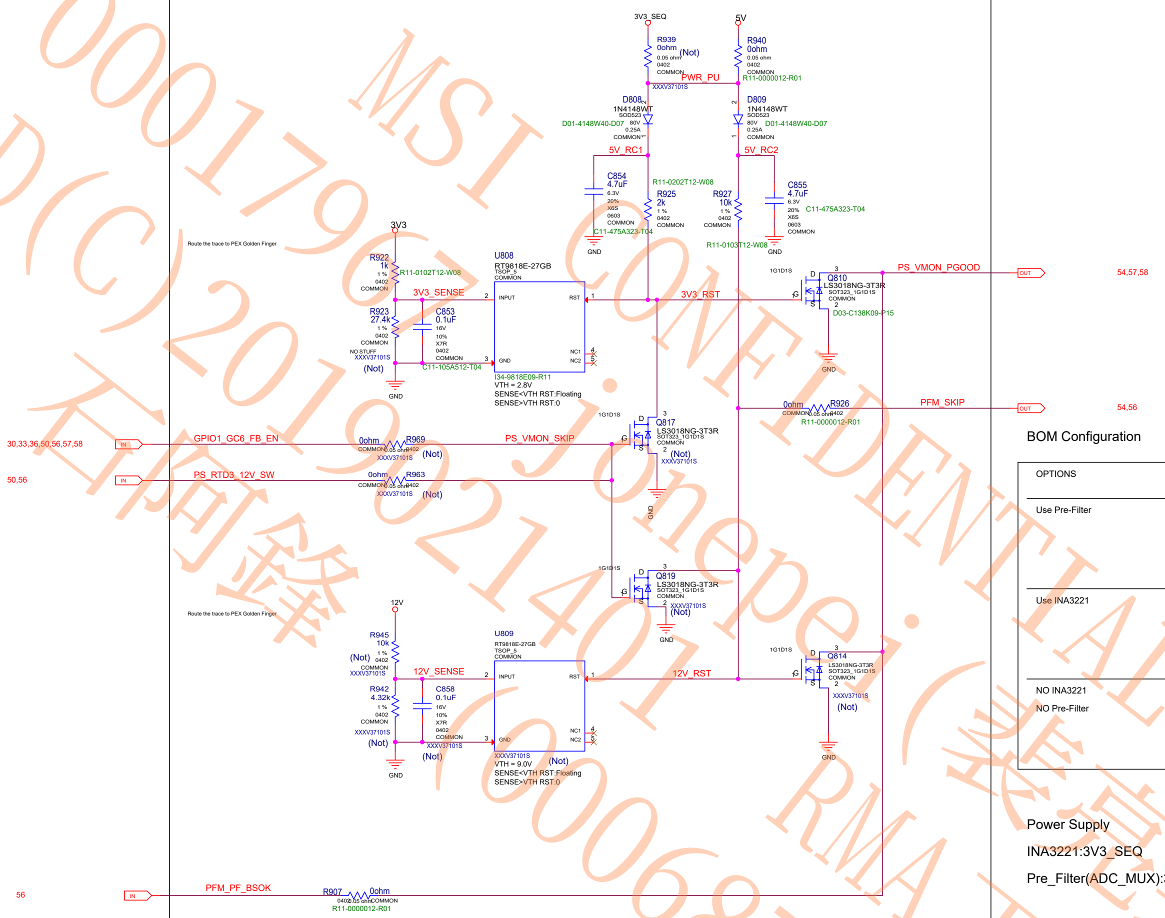
SEQUENCE:PCIE Voltage Monitor

PCIE Voltage Monitor



Signal	Direction	Function
3V3	INPUT	Sense the 3V3 Voltage from PCIE golden finger
12V	INPUT	Sense the 12V Voltage from PCIE golden finger
PS_VMON_PGOOD	OPEN-DRAIN	Floating(H) once both 3V3 and 12V reach Vth
GC6_FB_EN	INPUT	Indicator for RTD3/GC6 residence,Use to Mask the VMON_PGOOD
PS_PF_SKIP	INPUT	From INA3221(VPU) or Pre-filter(SKIP)
PS_PF_BSOK	INPUT	From INA3221(PV) or Pre-filter(BS_OK)
PS_RTD3_12V_SW	INPUT	GC6_FB_EN && IDLE_IN_SW

BOM Configuration

OPTIONS	PEX3V3_SENSE	PEX12V_SENSE	OTHER_12V_SENSE
Use Pre-Filter	Pre-Filter NO STUFF U12 NO STUFF Q3,Q5 NO STUFF D15	Pre-Filter NO STUFF U13 NO STUFF Q4	Pre-Filter
Use INA3221	Voltage_Monitor	INA3221 NO STUFF U12 NO STUFF Q4	INA3221
NO INA3221 NO Pre-Filter	Voltage_Monitor	Voltage_Monitor	N/A

Power Supply

INA3221:3V3_SEQ

Pre_Filter(ADC_MUX):3V3(PEX)

Dual Pre-Filter case:

Only use the Primary Pre-Filter to sense 3V3PEX

and All Input 12Vs

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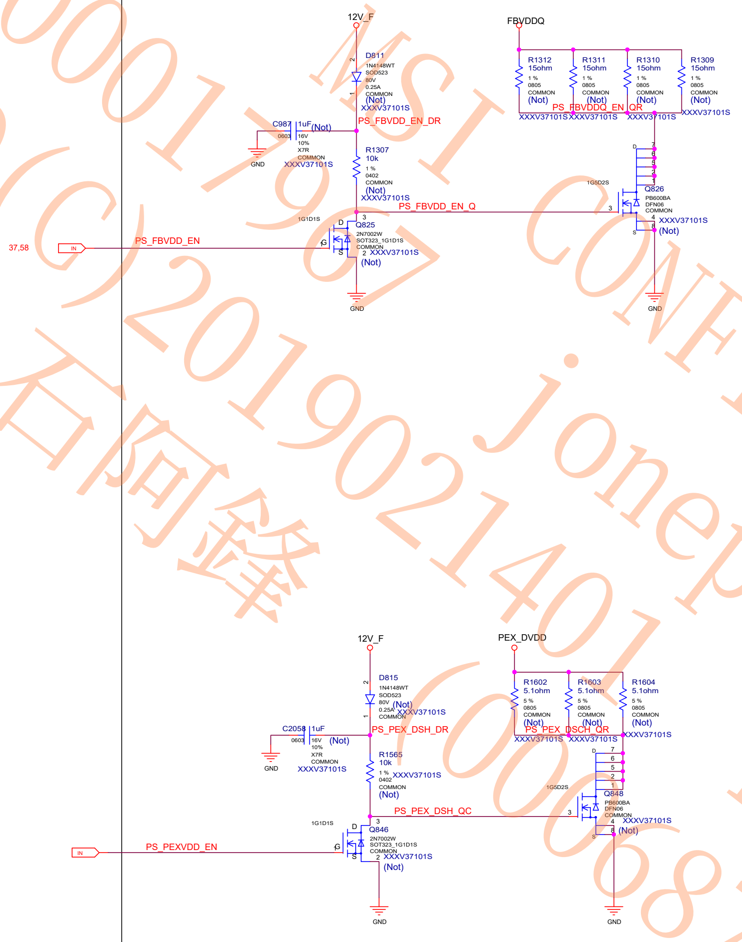
SEQUENCE:Discharge



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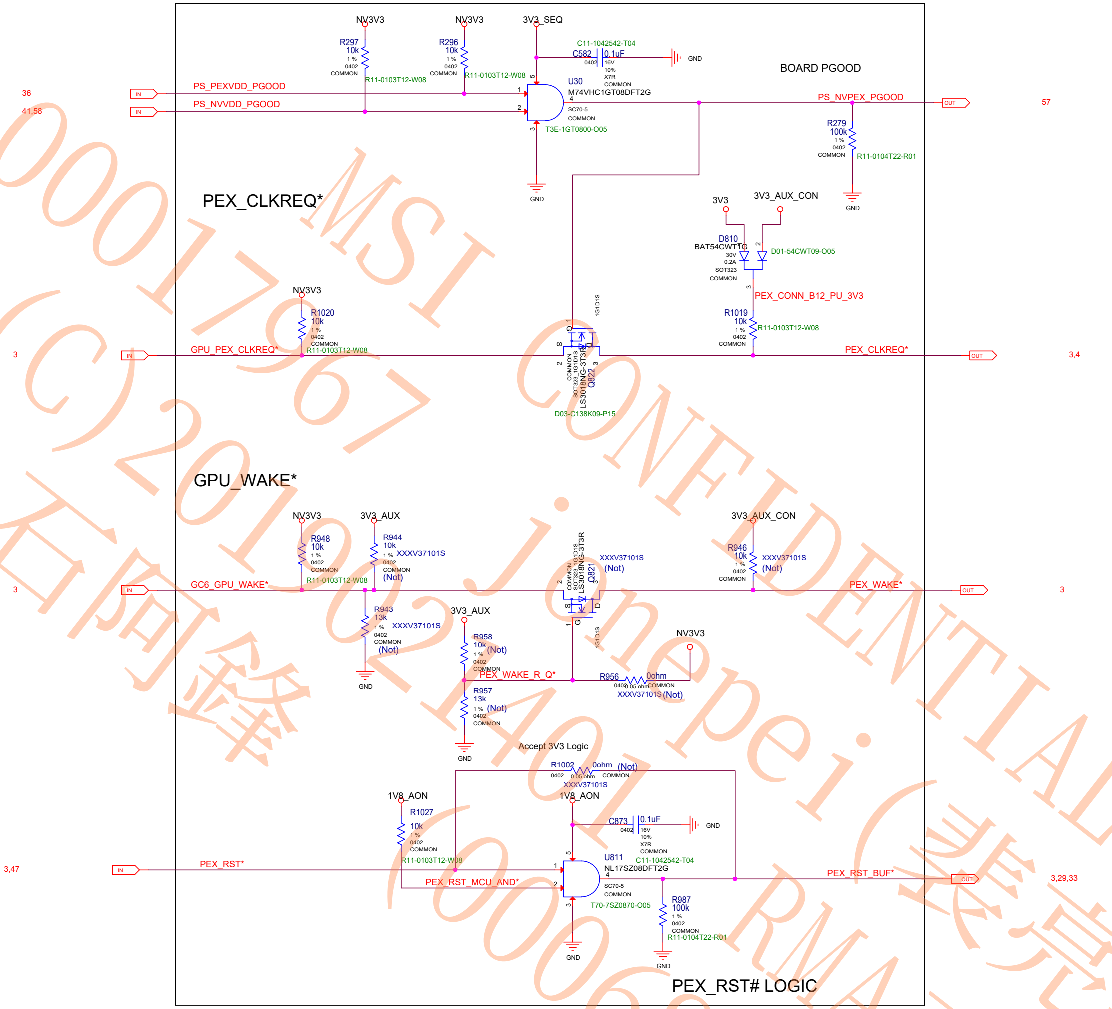
SEQUENCE:MISC



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Size: Custom	Document Description: MISC	Rev: 1.0
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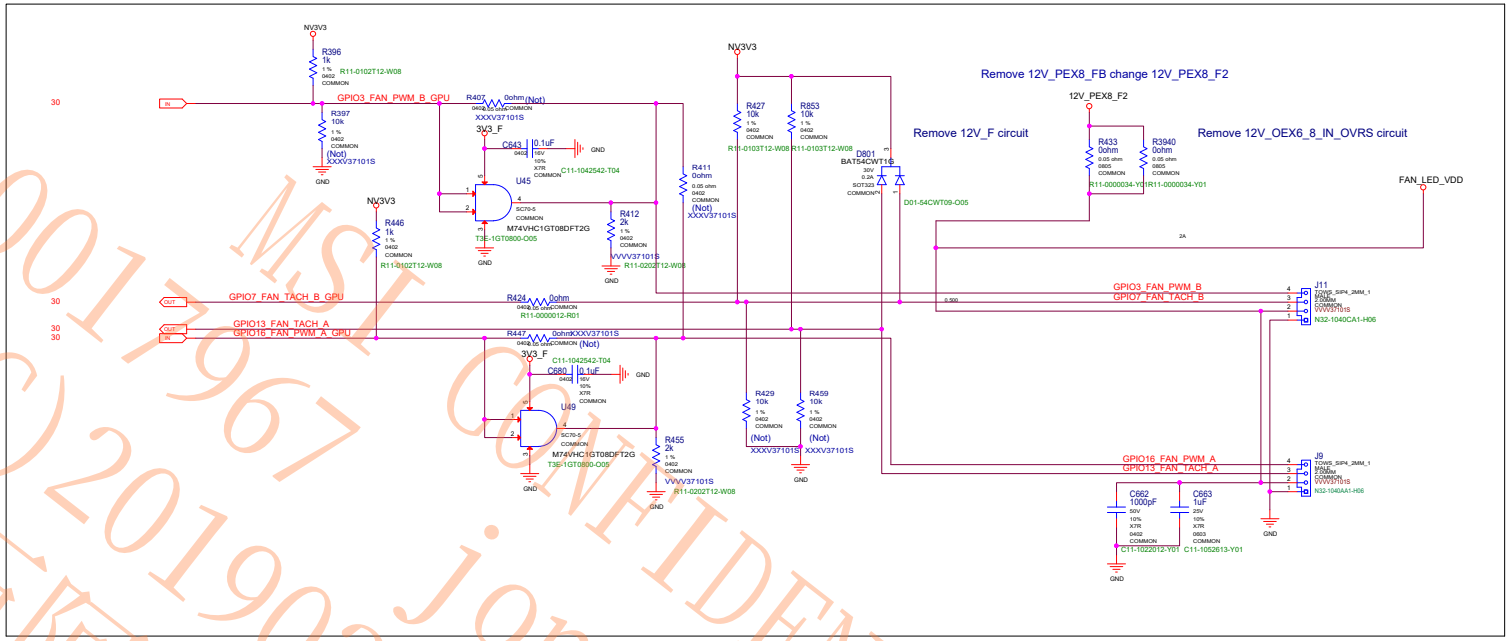
MISC: FAN



LED BOOST

Remove LED BOOST

MSI	MICRO-STAR INT'L CO.,LTD		
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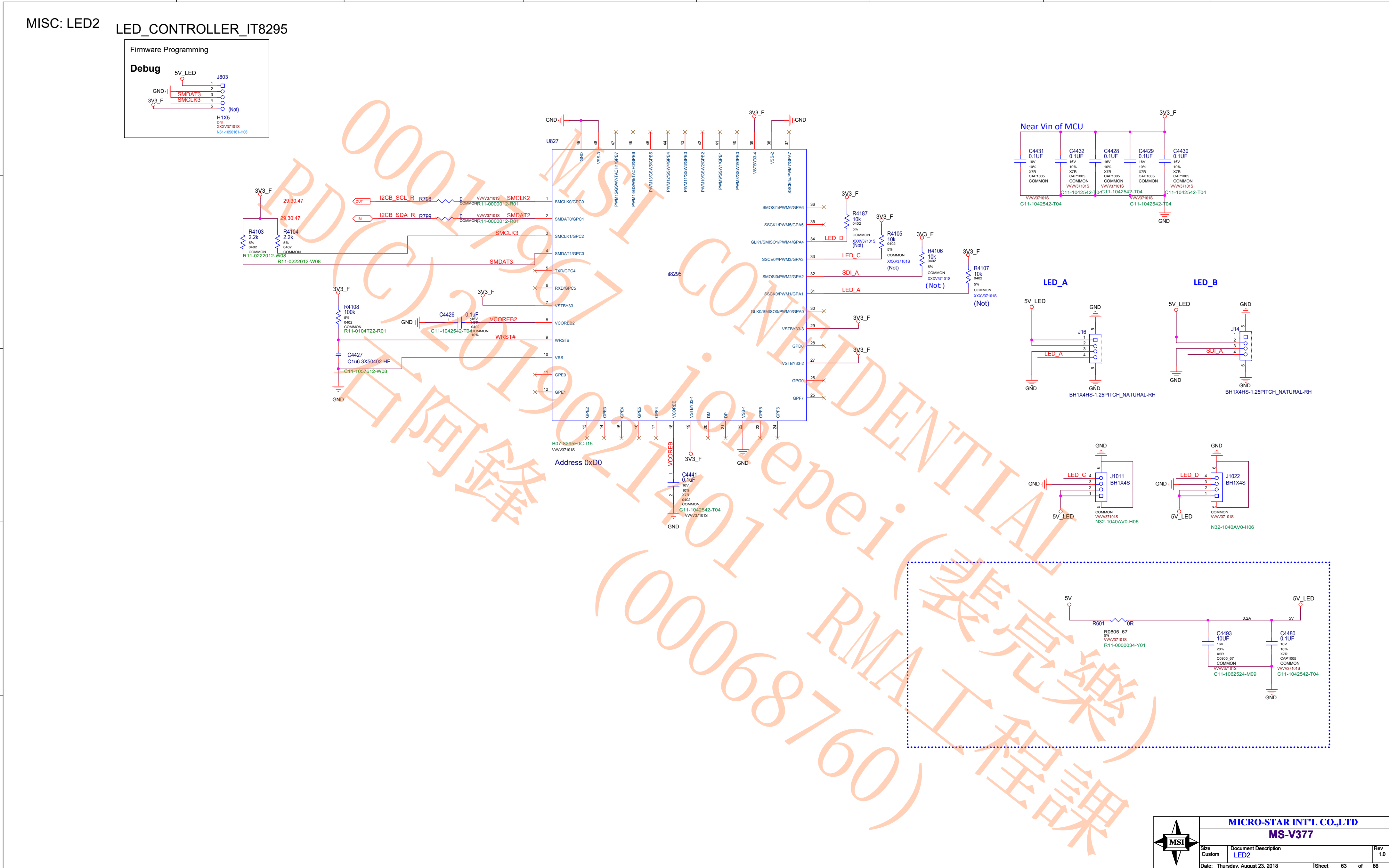
MISC: LED2
LED_CONTROLLER_IT8295
Firmware Programming
Debug
5V_LED
J803
GND
SMDAT3
SMCLK3
3V3_F
(Not)
H1X5
U827
IT8295
I2CB_SCL_R
I2CB_SDA_R
R798
R799
SMCLK2
SMDAT2
SMCLK3
SMDAT3
R4103 2.2k
R4104 2.2k
R4108 100k
C4426 0.1uF
VCOREB2
WRST#
C4427 C1u6.3X50402-HF
LED_D
LED_C
SDI_A
LED_A
R4187 10k
R4105 10k
R4106 10k
R4107 10k
(Not)
Address 0xD0
VCOREB
C4441 0.1uF
B07-8295F0C-I15
Near Vin of MCU
C4431 0.1UF
C4432 0.1UF
C4428 0.1UF
C4429 0.1UF
C4430 0.1UF
LED_A
LED_B
J16
J14
BH1X4HS-1.25PITCH_NATURAL-RH
J1011 BH1X4S
J1022 BH1X4S
N32-1040AV0-H06
5V
5V_LED
R601 0R
R0805_67
C4493 10UF
C4480 0.1UF
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ZERO IDLE POWER MCU

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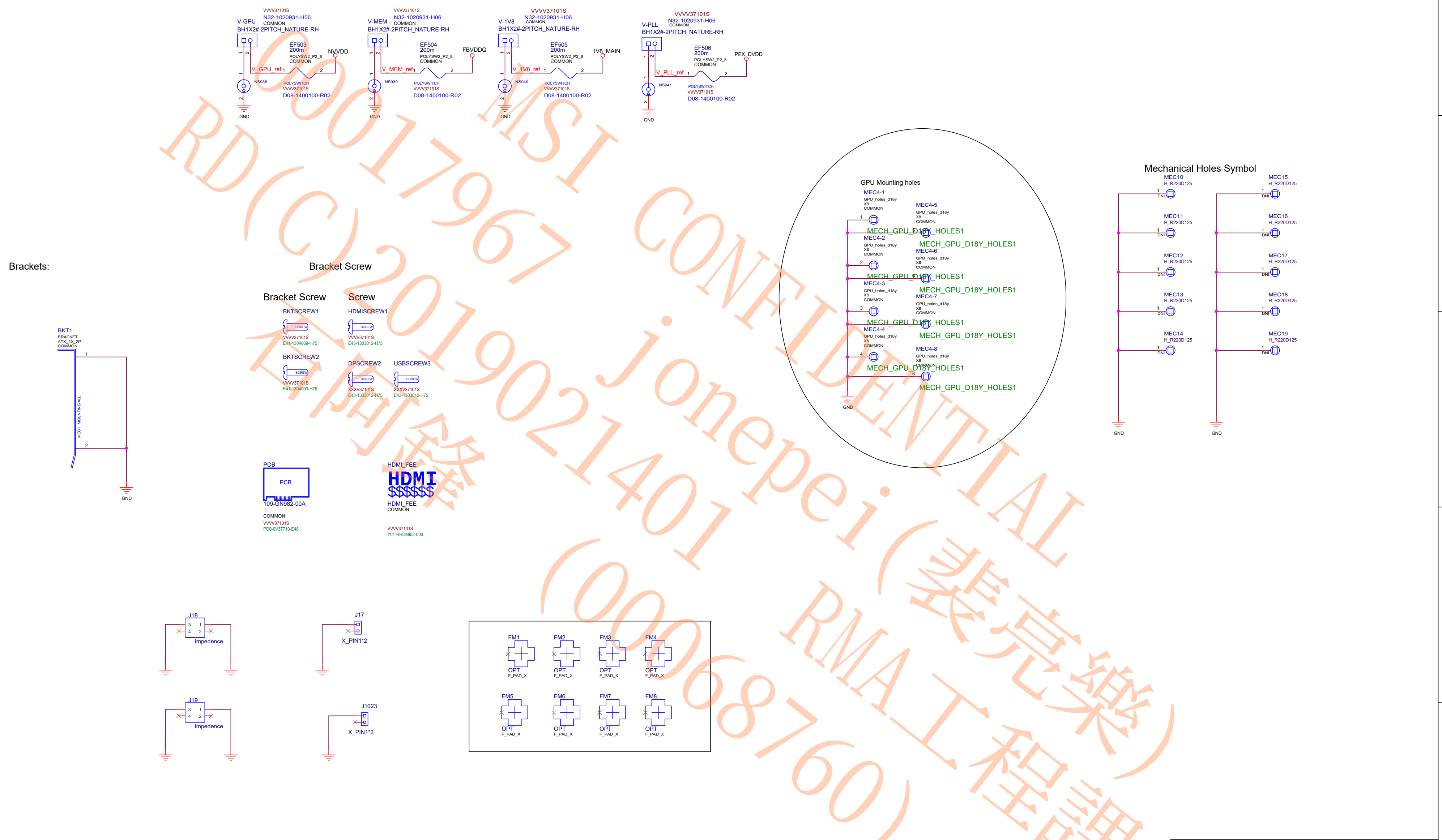
Mechanical: Bracket/Thermal Solution



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MS-V377		
Size: Custom	Document Description: Bracket/Thermal Solution	Rev: 1.0
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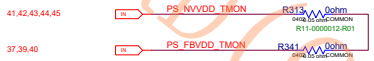
VR THERMAL PROTECTION



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Size	Document Description	Rev
Custom	VR THERMAL PROTECTION	1.0

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