PG180-A02

256b GDDR6 x16
TALL DP + DP + DP + HDMI/DP + USB

TABLE OF CONTENTS

Page	Description
1	Table of Contents
2	Block Diagram
3	PCI Express
4	PCI Termination
5	MEMORY: GPU Partition A/B
6	MEMORY: FBA Partition 31..0
7	MEMORY: FBA Partition 63..32
8	MEMORY: FBB Partition 31..0
9	MEMORY: FBB Partition 63..32
10	MEMORY: GPU Partition C/D
11	MEMORY: FBC Partition 31..0
12	MEMORY: FBC Partition 63..32
13	MEMORY: FBD Partition 31..0
14	MEMORY: FBD Partition 63..32
15	GPU PWR and GND
16	GPU Decoupling
17	GPU DECOUPLING
18	IFPAB TALL-DP
19	IFPE DP
20	IFPF USBC
21	IFPC HDMI 2.0/DP
22	IFPD DP
23	NVHS INTERFACE
24	MISC: FAN,THERMAL,JTAG,GPIO,STEREO
25	MISC3: ROM, STRAPS
26	MISC: XTAL, PLL
27	MISC: USB PPC
28	PS: USB VR
29	PS: 5V, 5V BACKUP
30	PS: PEXVDD, 1V8
31	PS: FBVDD CONTROLLER
32	PS: FBVDD CONTROLLER OVR3
33	PS: FBVDD PHASE 1, 2
34	PS: NVVDD CONTROLLER OVR8
35	PS: NVVDD Phase 1, 2
36	PS: NVVDD Phase 3, 4
37	PS: NVVDD Phase 5, 6
38	PS: NVVDD Phase 7, 8
39	PS: INPUT SWITCH RTD3
40	PS: INPUT SWITCH RTD3 USB
41	PS: INPUT SWITCH RAIL BALANCE
42	PS: 12V CURRENT STEERING
43	PS: VR THERMAL PROTECTION
44	PS: INPUTS, FILTERING AND MONITORING
45	PS: CURRENT STEERING,HOT UNPLUG DETECT
46	PS: PRE-FILTER
47	SEQUENCE: 5V, 1V8, NV3V3 ENABLE
48	SEQUENCE: NV, PEX, FB ENABLE
49	SEQUENCE: PCIE VOLTAGE MONITOR
50	SEQUENCE: DISCHARGE
51	SEQUENCE: MISC
52	LED & FAN HEADERS
53	LED 2
54	Mechanical: Bracket/Thermal Solution

V372-3.0 change List

Page	Description
18	Change J4 footprint
19	Change J3 footprint
20	Remove DP co-layout
21	Remove JTAG & unused GPIO
32	Remove 0031_PS_ FBVDD CONTROLLER OVR3
34	NVVDD CONTROLLER change to MP2888A
35	DRMOS change to 10phases
36	DRMOS change to 10phases
37	Add NVVDD Output CAP
41	Remove INPUT SWITCH Rail Balance
44	J8 change to 8pin
	Add Fuse F1~F3
	Change 12V input choke footprint
45	Add Hot Unplug Detect for J8
52	Add Remove LED & Fan Vin_12V option
53	Add MCU IT8295 for RGB LED

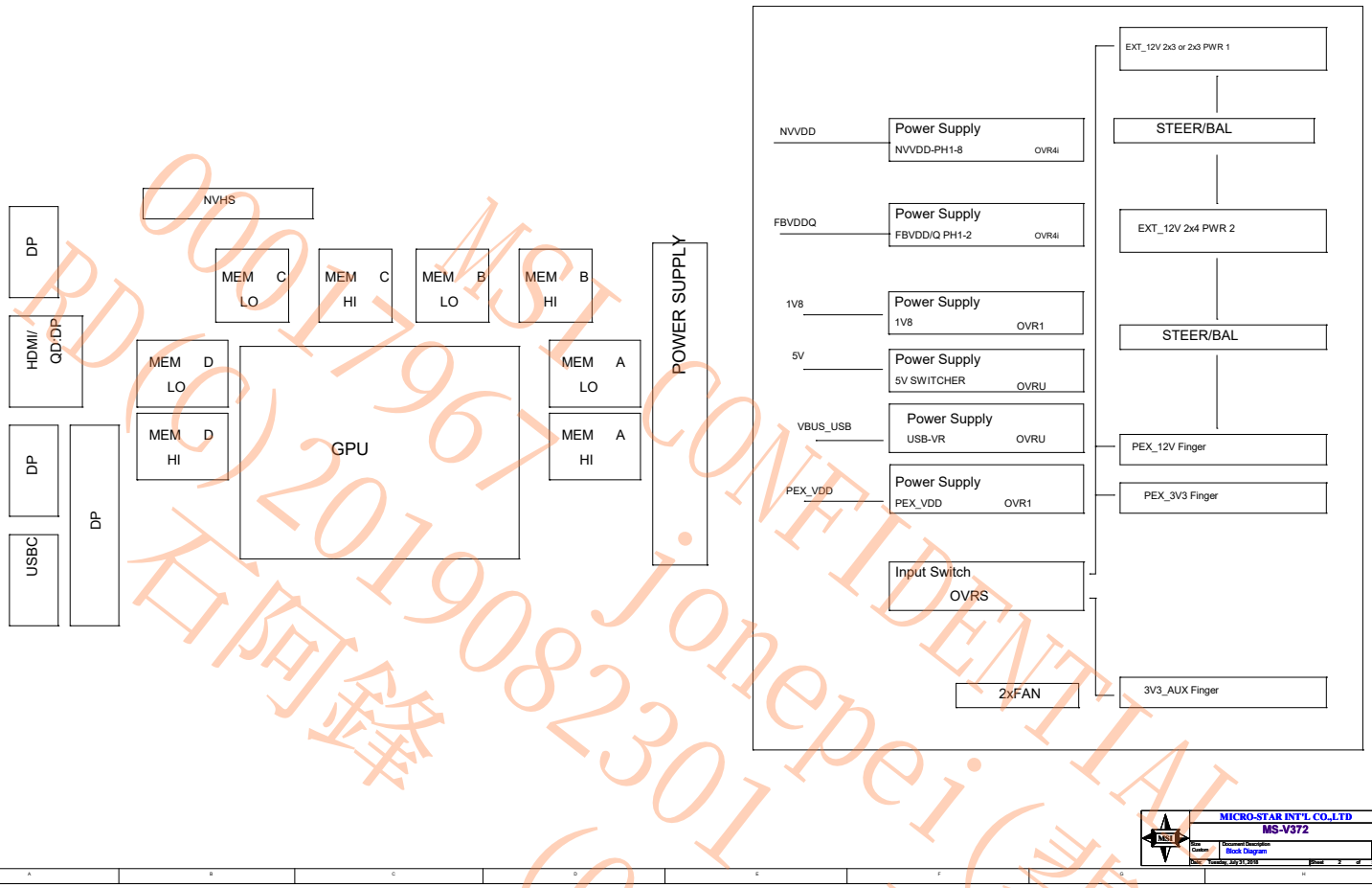
MSI CONFIDENTIAL
(RMA)20190823 01 Jonepei(裴亮樂)
石阿鋒 (00068760) RMA工程課

MICRO-STAR INT'L CO.,LTD
MS-V372

Size	Document Description	Rev
Custom	Table of Contents	3.0

Date: Tuesday, July 31, 2018 Sheet 1 of 54

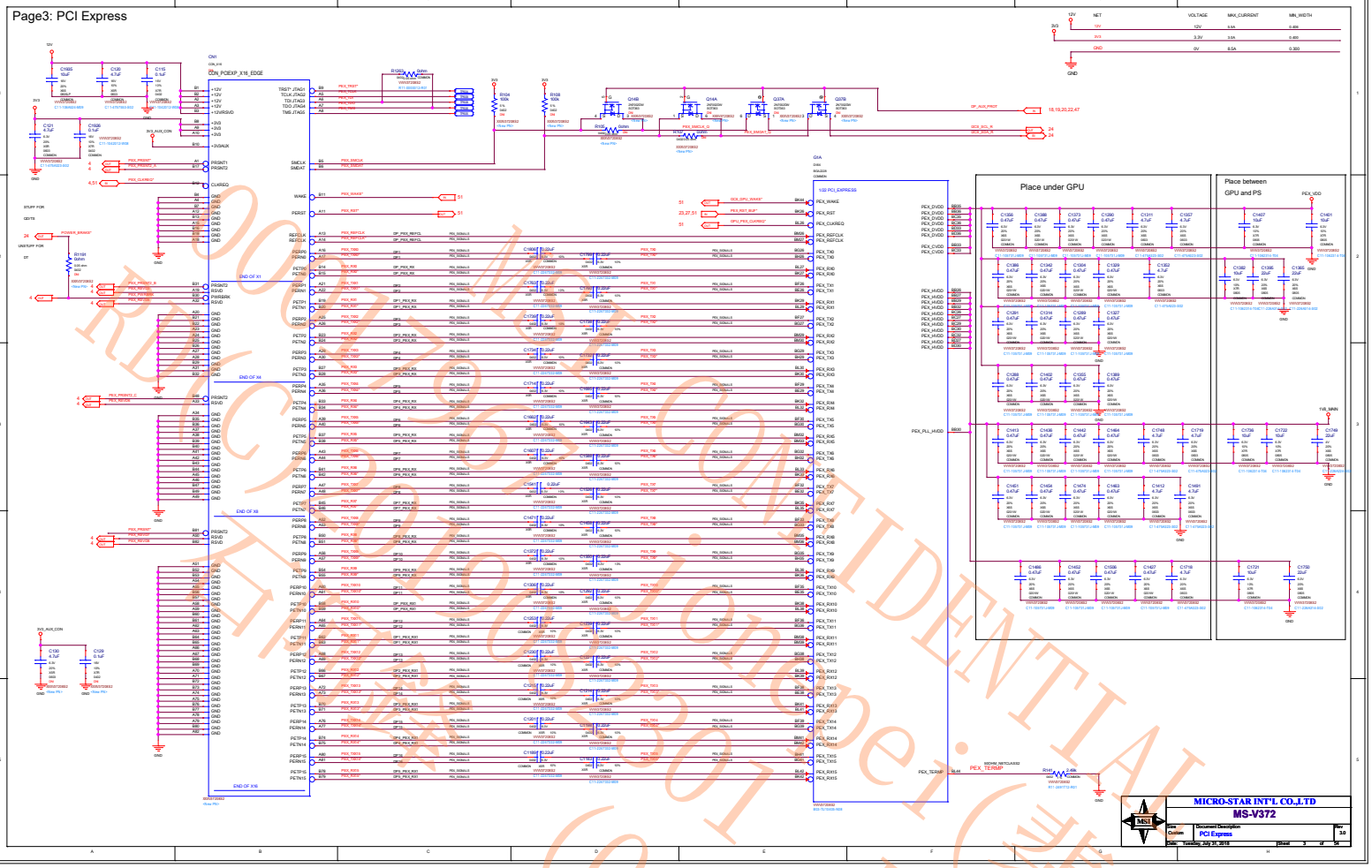
Page2: Block Diagram



MICRO-STAR INT'L CO.,LTD
MS-V372
Size: Custom | Document Description: Block Diagram | Rev: 3.0
Date: Tuesday, July 31, 2018 | Sheet 2 of 34

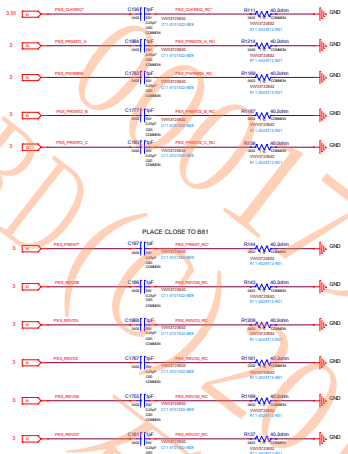
MSI CONFIDENTIAL
0001 7967 Jonepei(裴亮樂)
RD(G)20190823 01
石阿鋒 (00068760)
RMA工程課

Page3: PCI Express



RDC (000068760) RMA工程課 (樂亮樂)

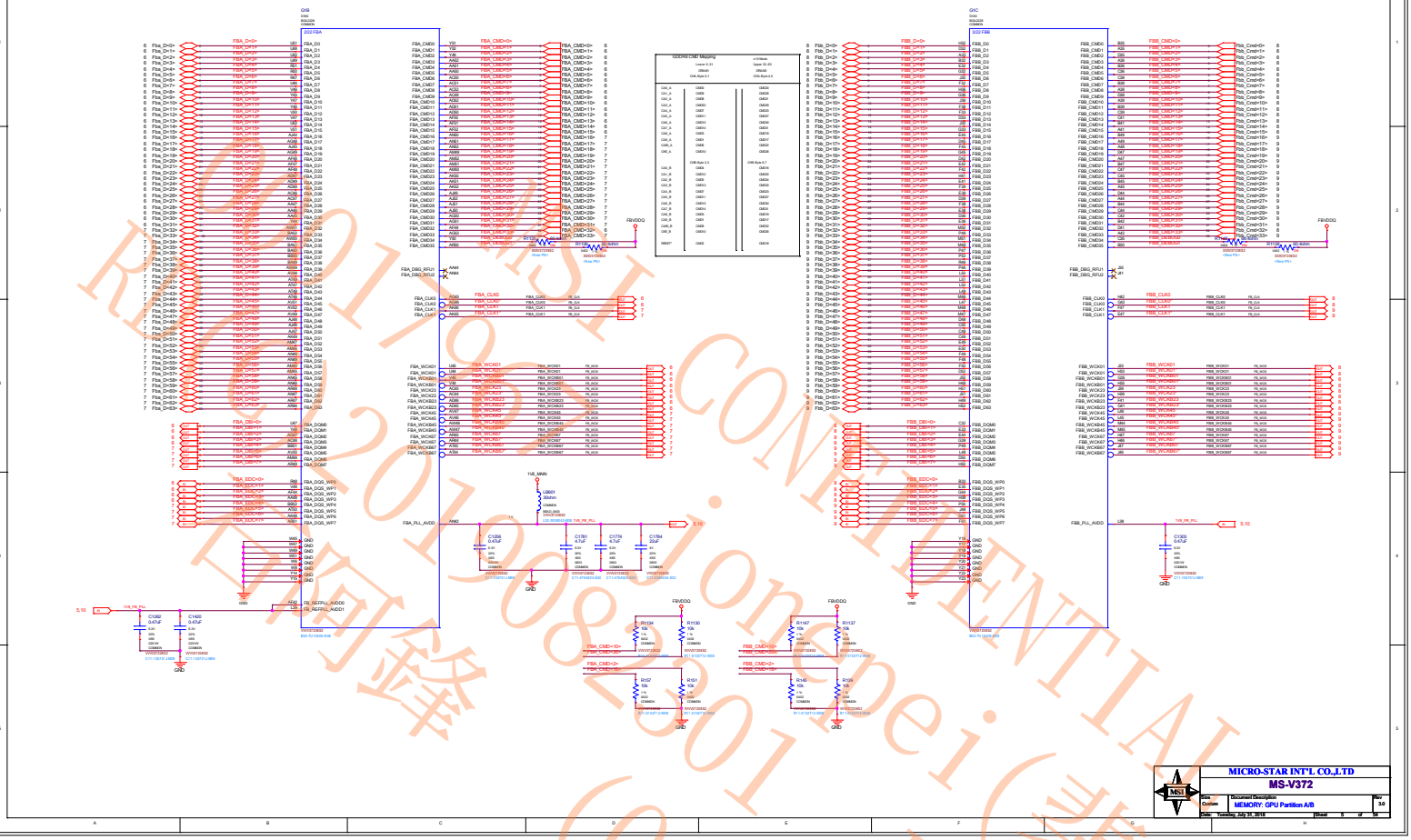
Page4: PCI Termination



MSI CONFIDENTIAL
RD(G)20190082301
Jonepei(裴亮樂)
(00068760)
石阿鋒
RMA工程課

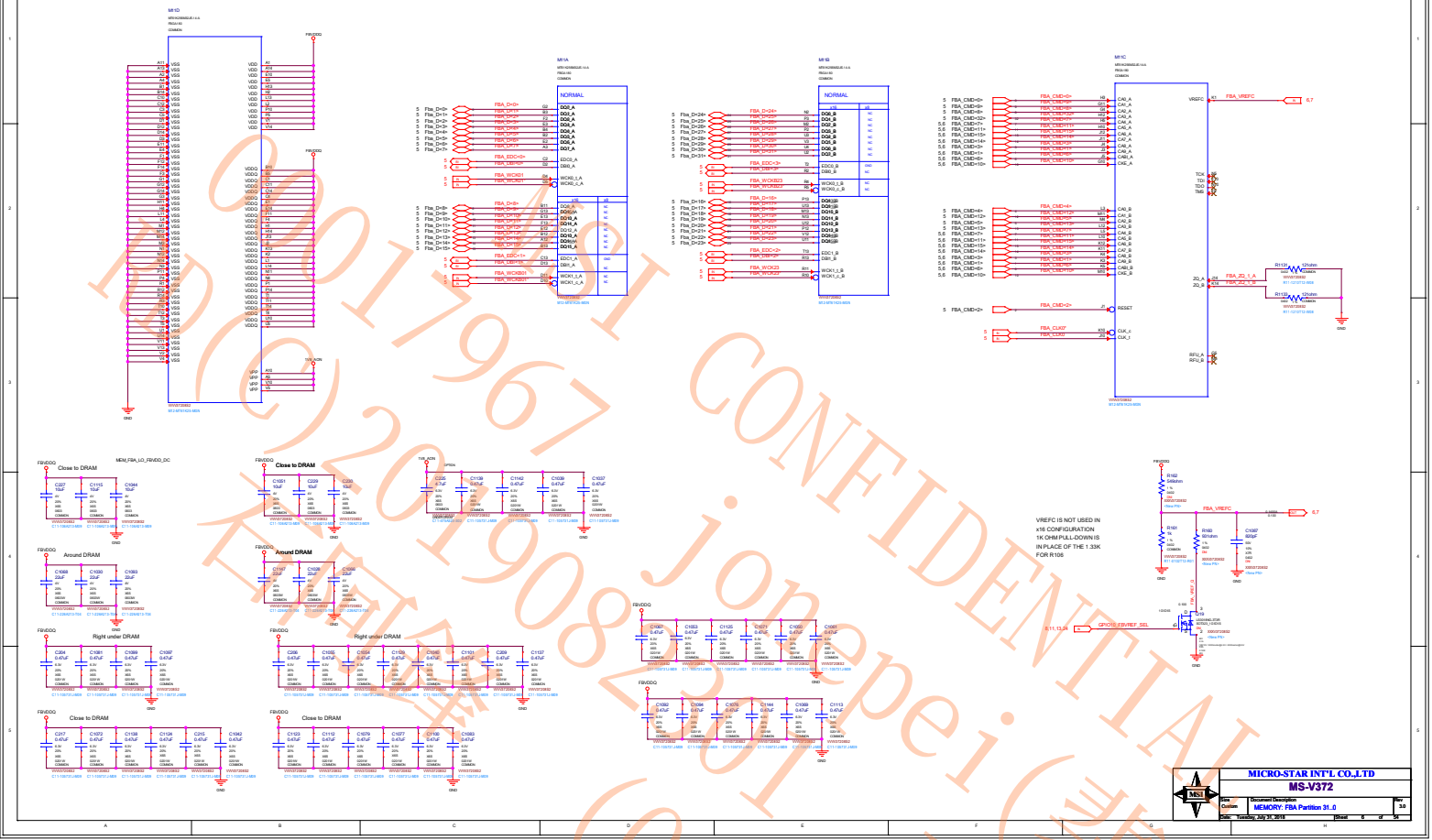
MICRO-STAR INT'L CO.,LTD
MS-V372
Size: Custom
Document Description: PCI Termination
Rev: 3.0
Date: Tuesday, July 31, 2018
Sheet 4 of 54

Page5: MEMORY: GPU Partition A/B



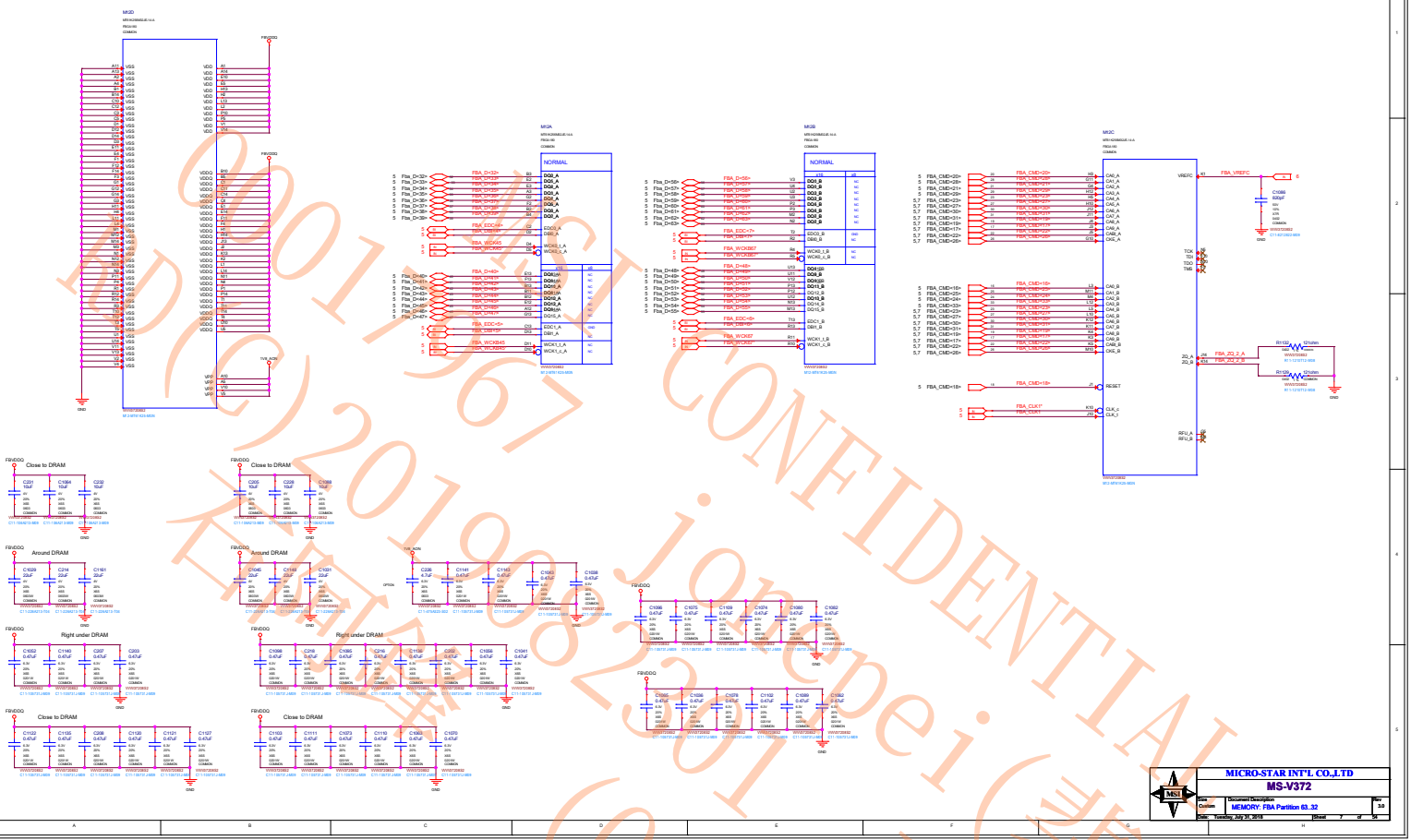
RMA工程課
(000068760)
(黃亮樂)
RMA工程課
(000068760)
CONFIDENTIAL

Page6: MEMORY: FBA Partition 31..0



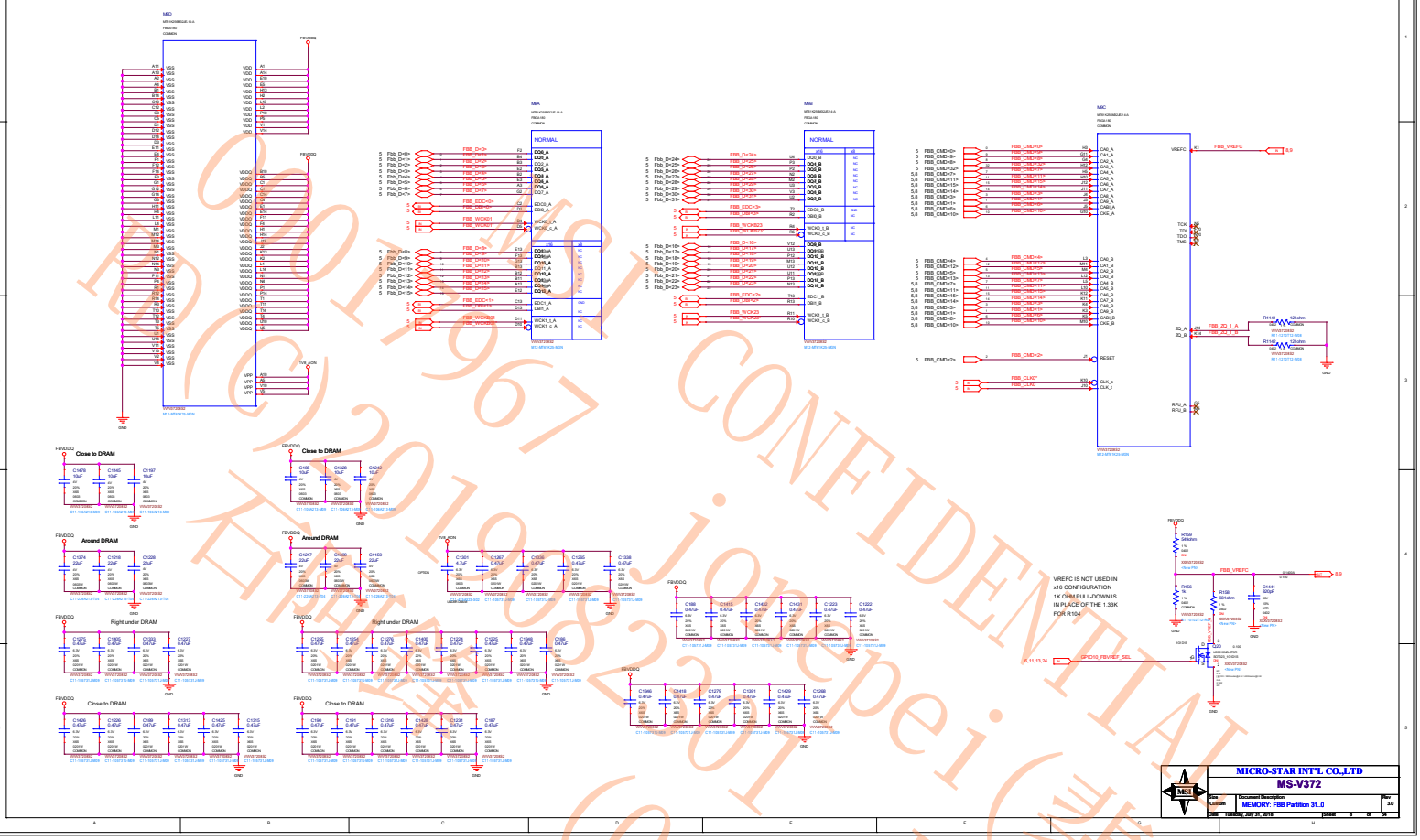
MICRO-STAR INT'L CO.,LTD
MS-V372
Size: Custom
Document Description: MEMORY: FBA Partition 31..0
Rev: 3.0
Date: Tuesday, July 31, 2018
Sheet 6 of 54

(C)2017967 CONFIDENTIAL
(C)2019082301 Jonpei(龔亮樂)
(000068760) RMA工程課



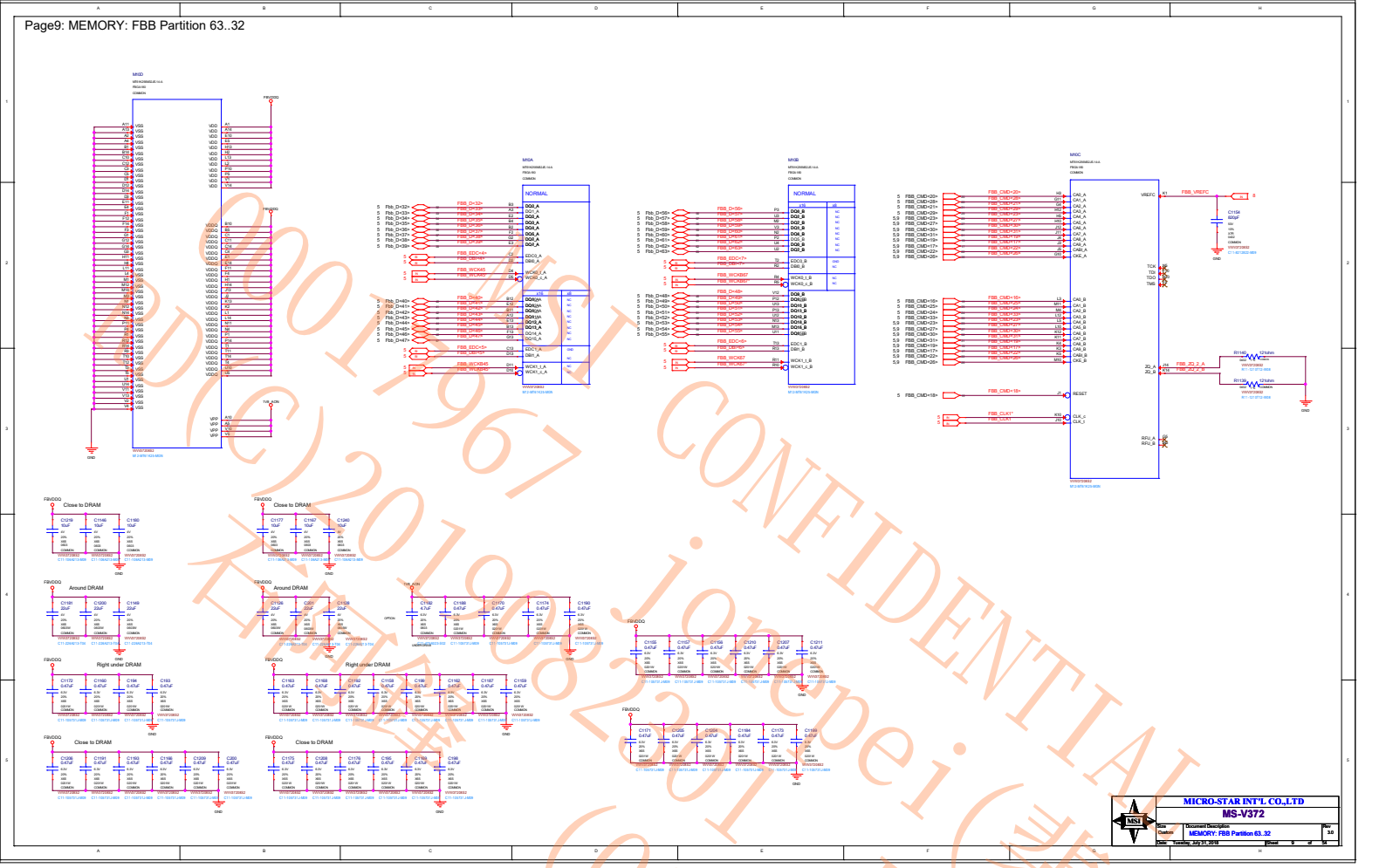
90017967 CONFIDENTIAL
DC(C)2018825 Jonpei(裴亮樂)
RMA工程課
(00068760)

Page8: MEMORY: FBB Partition 31..0



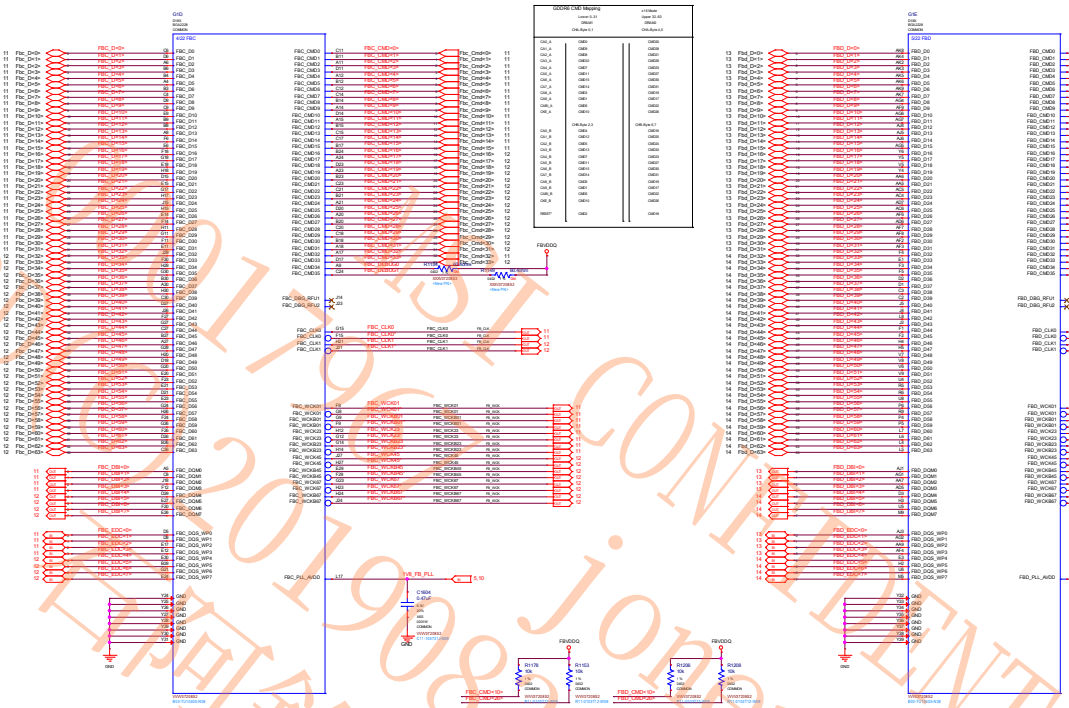
2019 MSI CONFIDENTIAL
RMA工程課
(000068760)

Page9: MEMORY: FBB Partition 63..32



2001 1967 MSI CONFIDENTIAL
(C)2019 8 29 1 Jonepei(裴亮樂)
RMA工程課
(00068760)

Page10: MEMORY: GPU Partition C/D

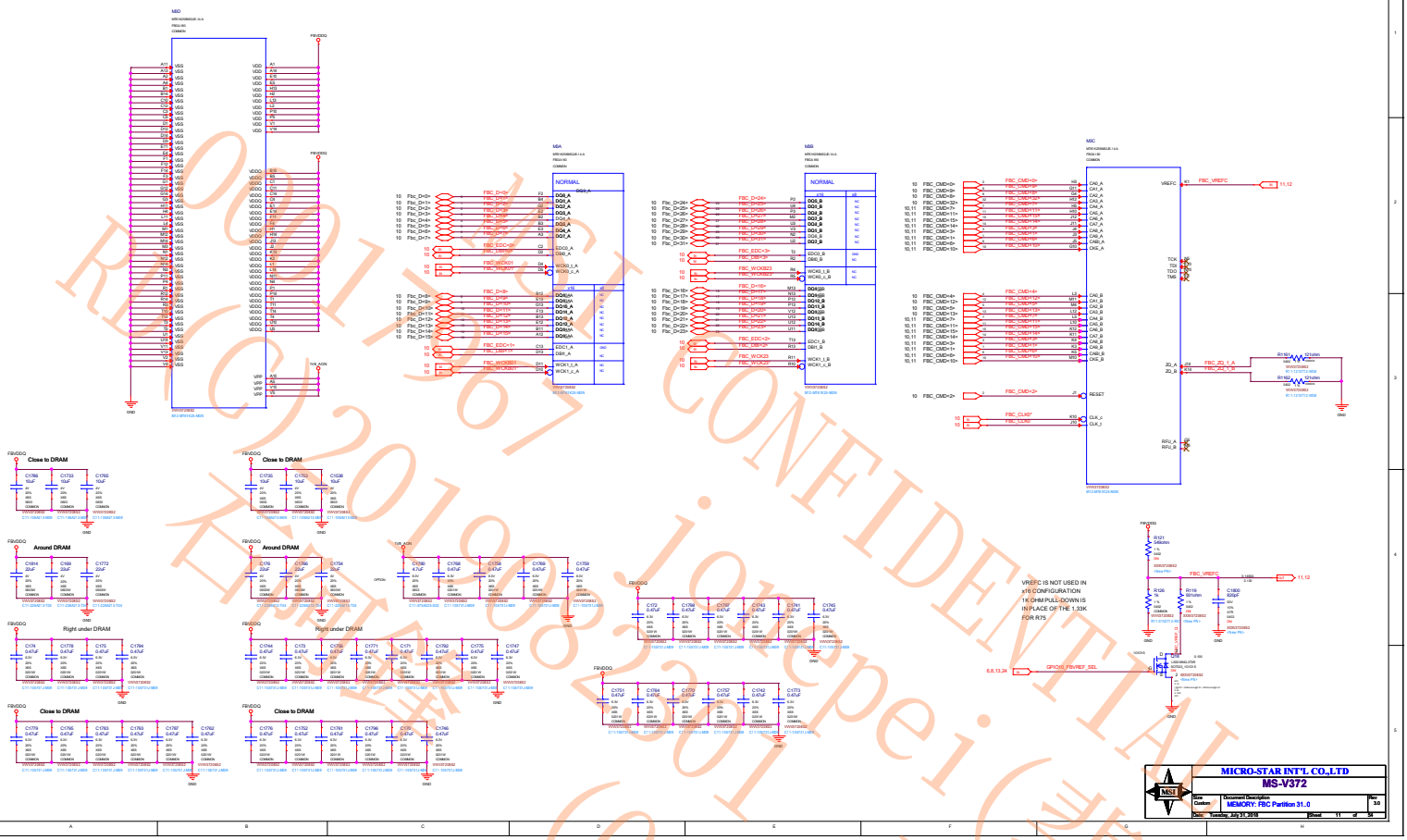


MICRO-STAR INT'L CO.,LTD
MS-V372

Size	Document Description	Rev
Custom	MEMORY: GPU Partition C/D	3.0

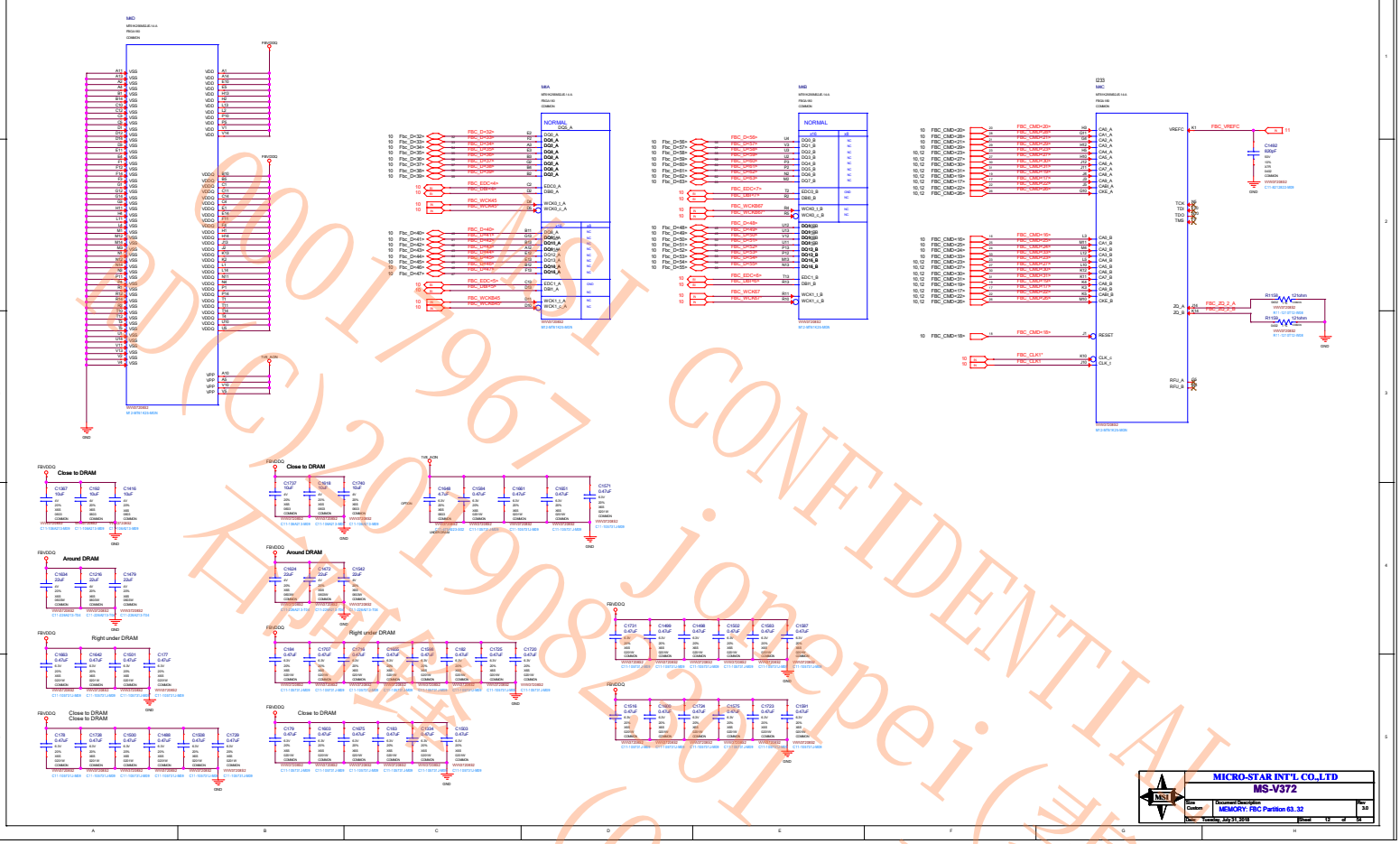
Date: Tuesday, July 31, 2018 Sheet 10 of 54

RMA工程課 (000068760) 2018/08/01 Jonpei(姜亮樂) 台南鋒 MSI CONFIDENTIAL

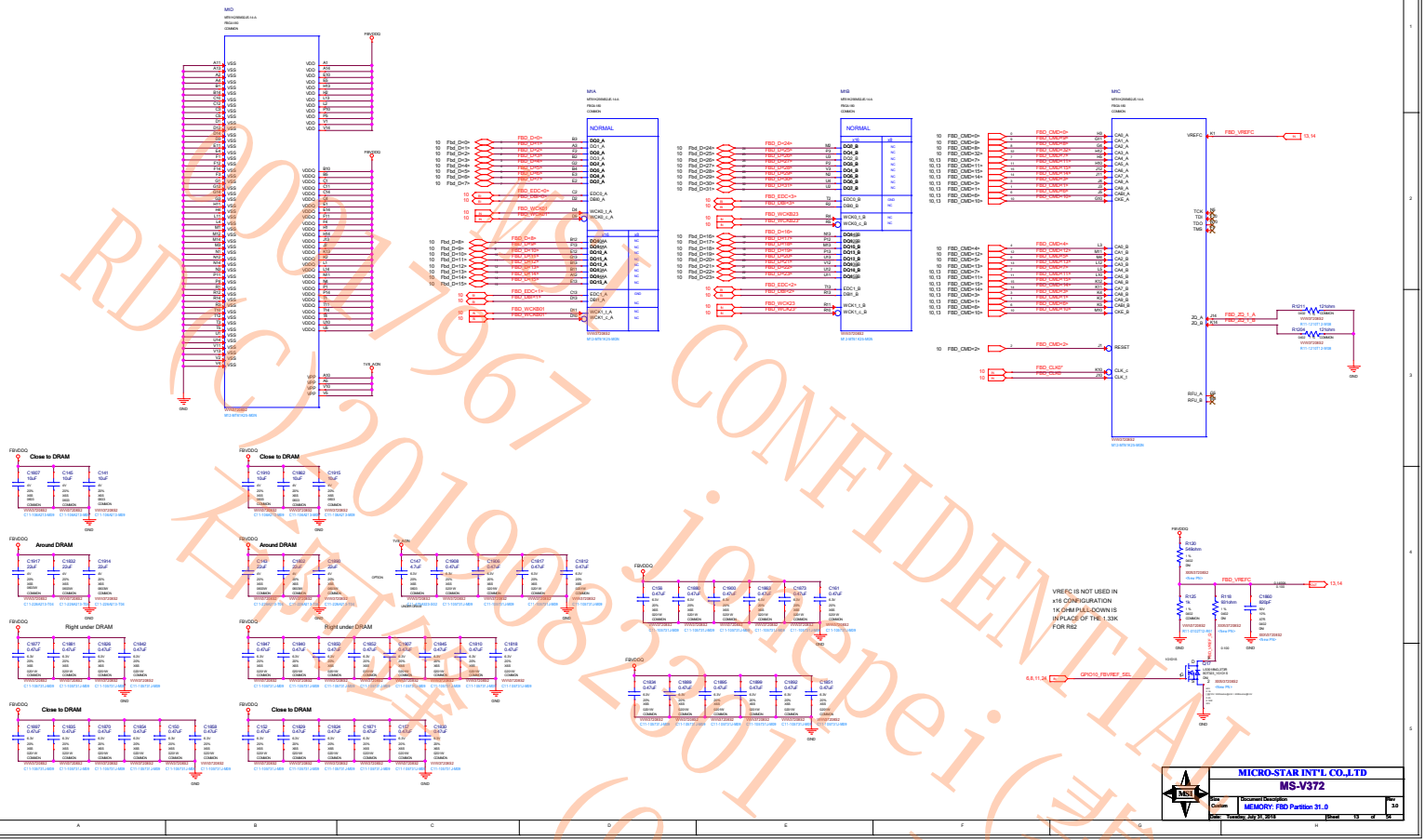


RMA(C)2018 CONFIDENTIAL
不得翻印 (000068760)
RMA工程課

Page12: MEMORY: FBC Partition 63..32

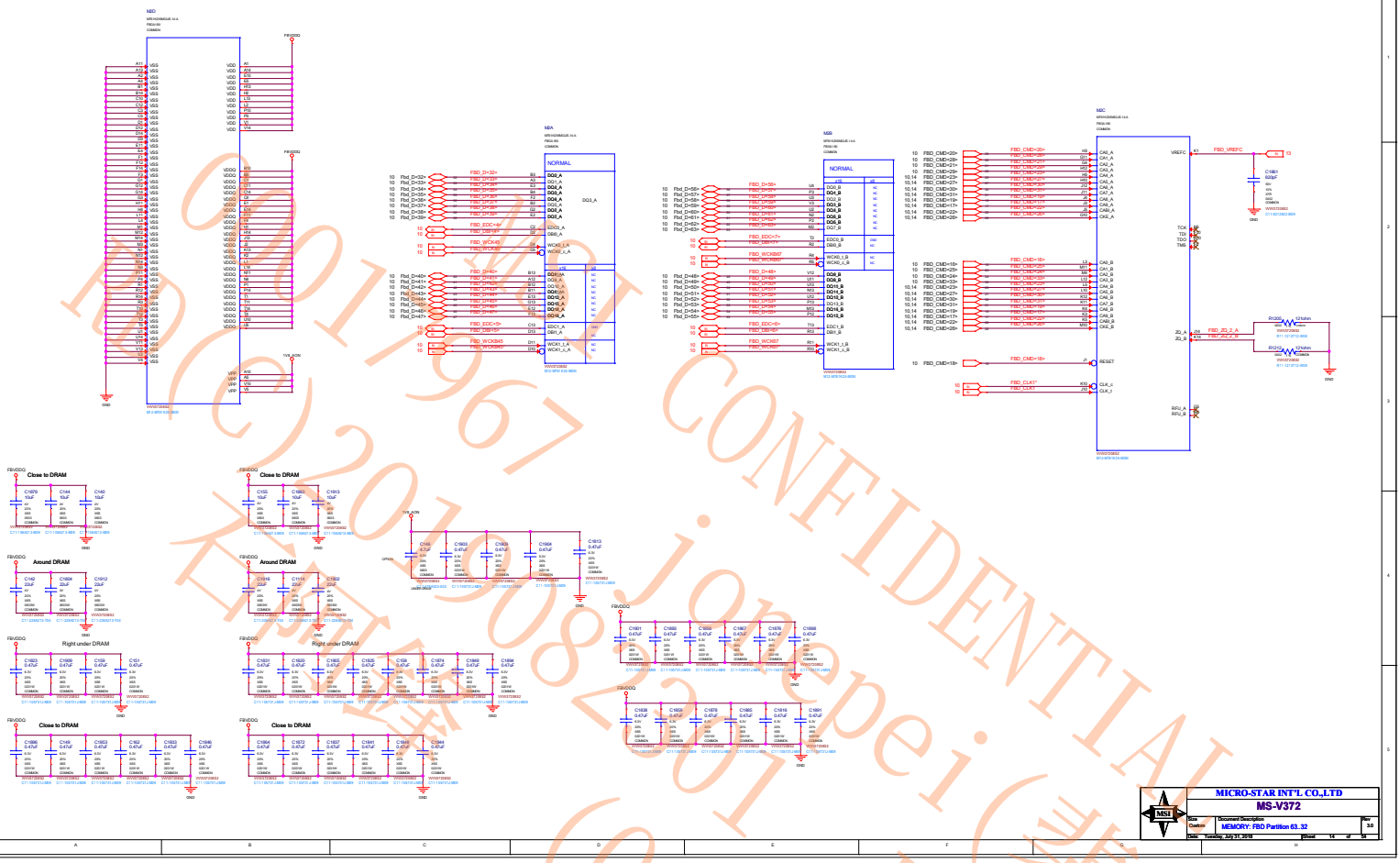


2001/967 CONFIDENTIAL
Jonpei(裴亮樂)
2019082001
(00068760)
RMA工程課
(C)2019 石頭科技



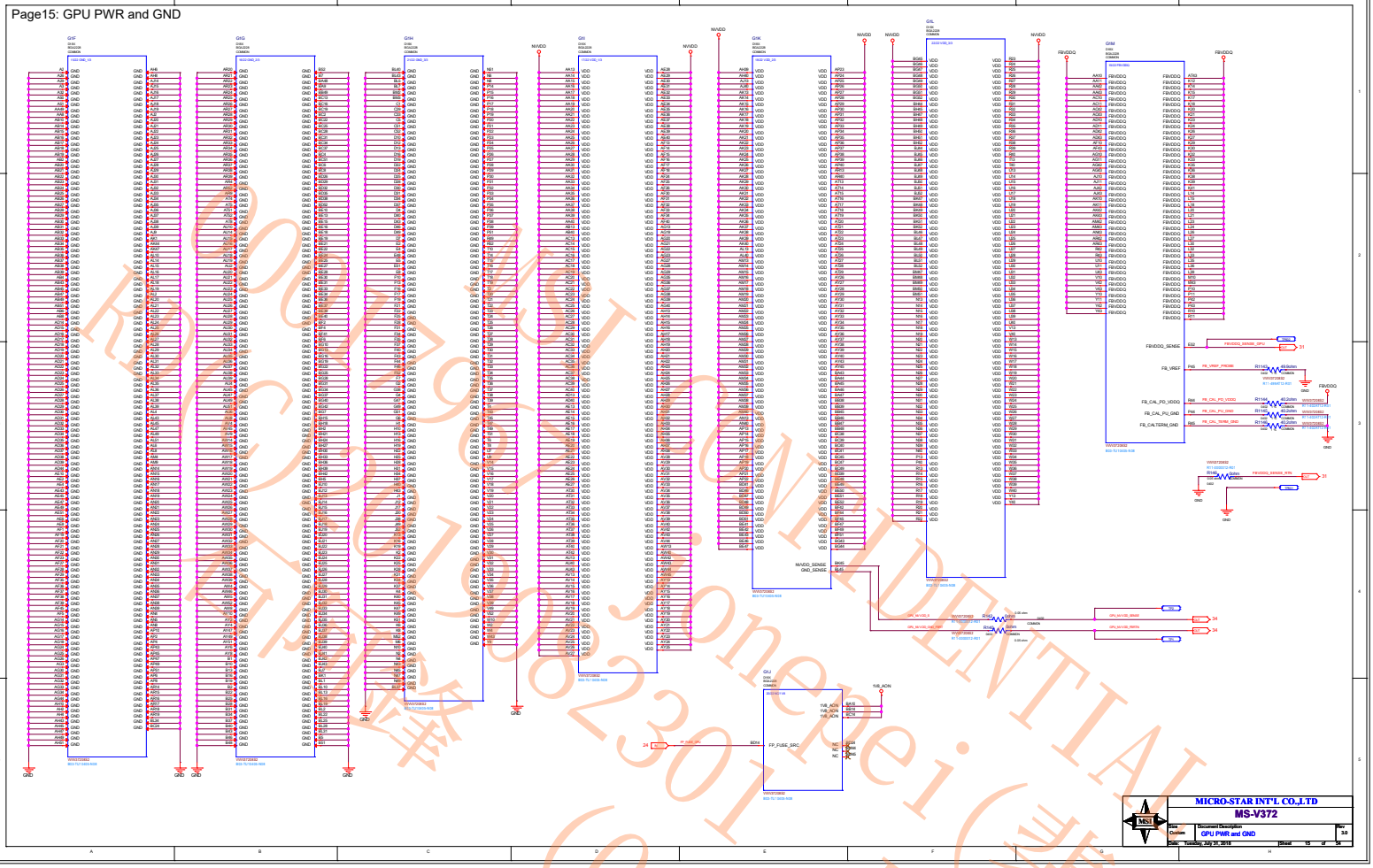
RDC (20196 CONFIDENTIAL
不可外傳 (000068760) RMA工程課

Page14: MEMORY: FBD Partition 63..32



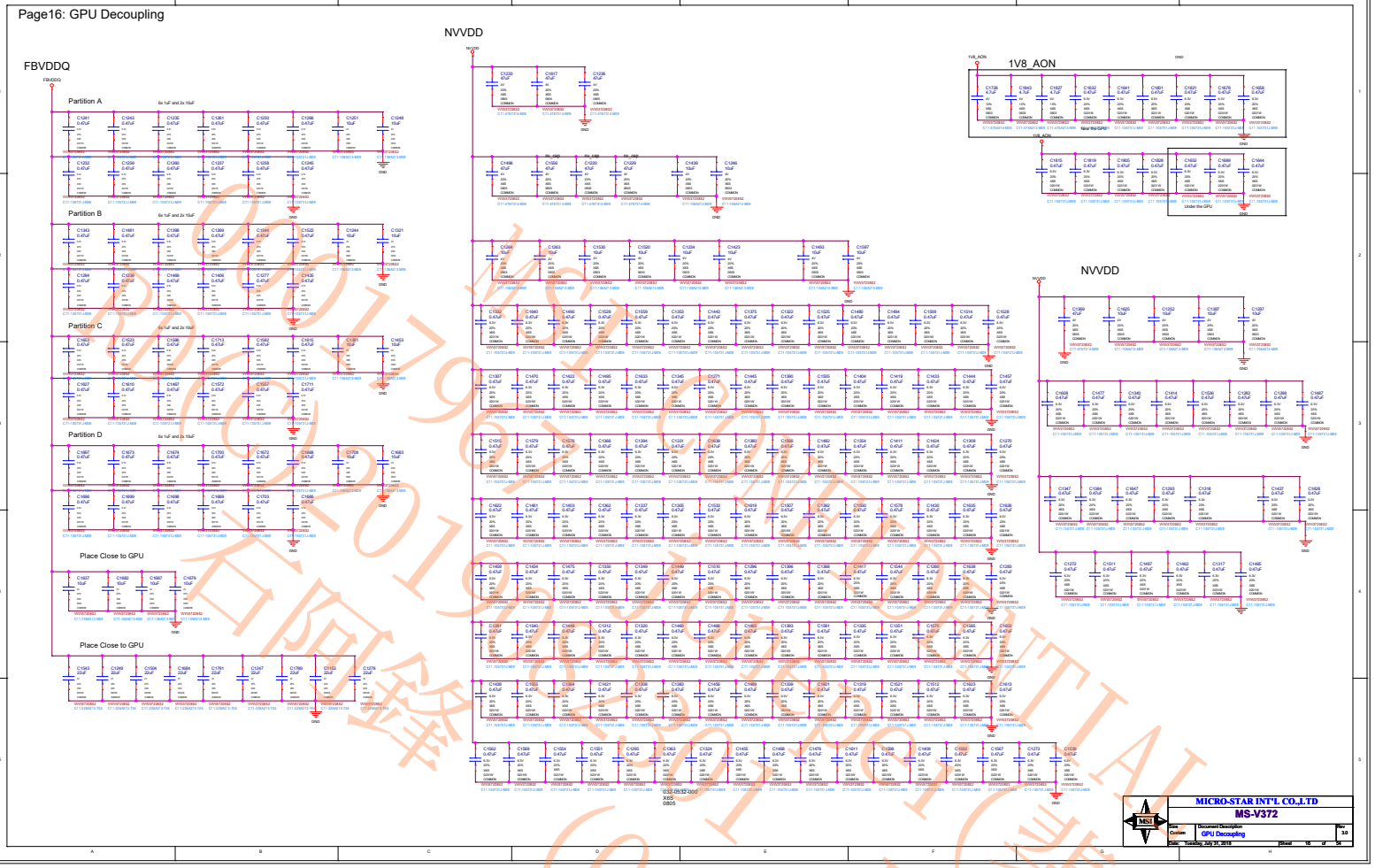
版權所有 (C)2018 微星科技股份有限公司
(000068760)
RMA工程課
CONFIDENTIAL
Jonpei(龔亮樂)

Page15: GPU PWR and GND



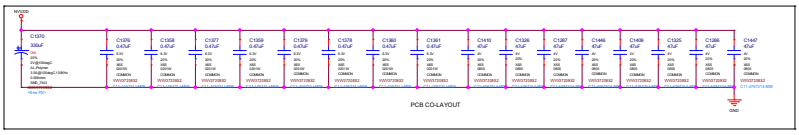
RMA工程課 (000068760)

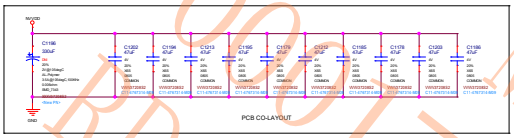
Page16: GPU Decoupling

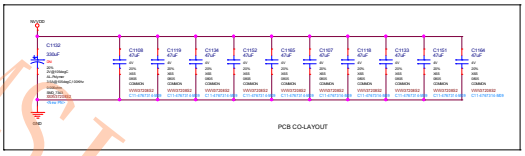


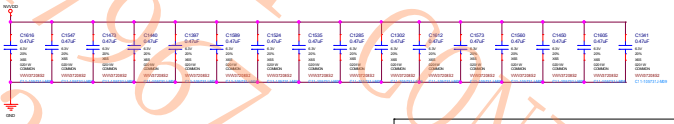
(000068760) RMA工程課

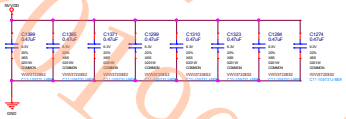
Page17: GPU Decoupling

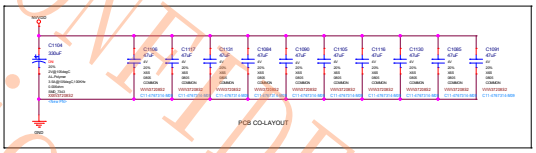


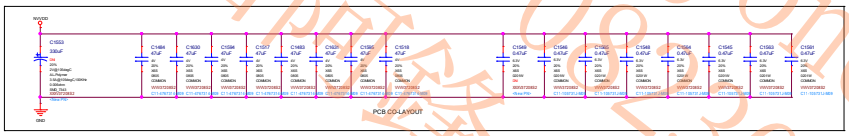






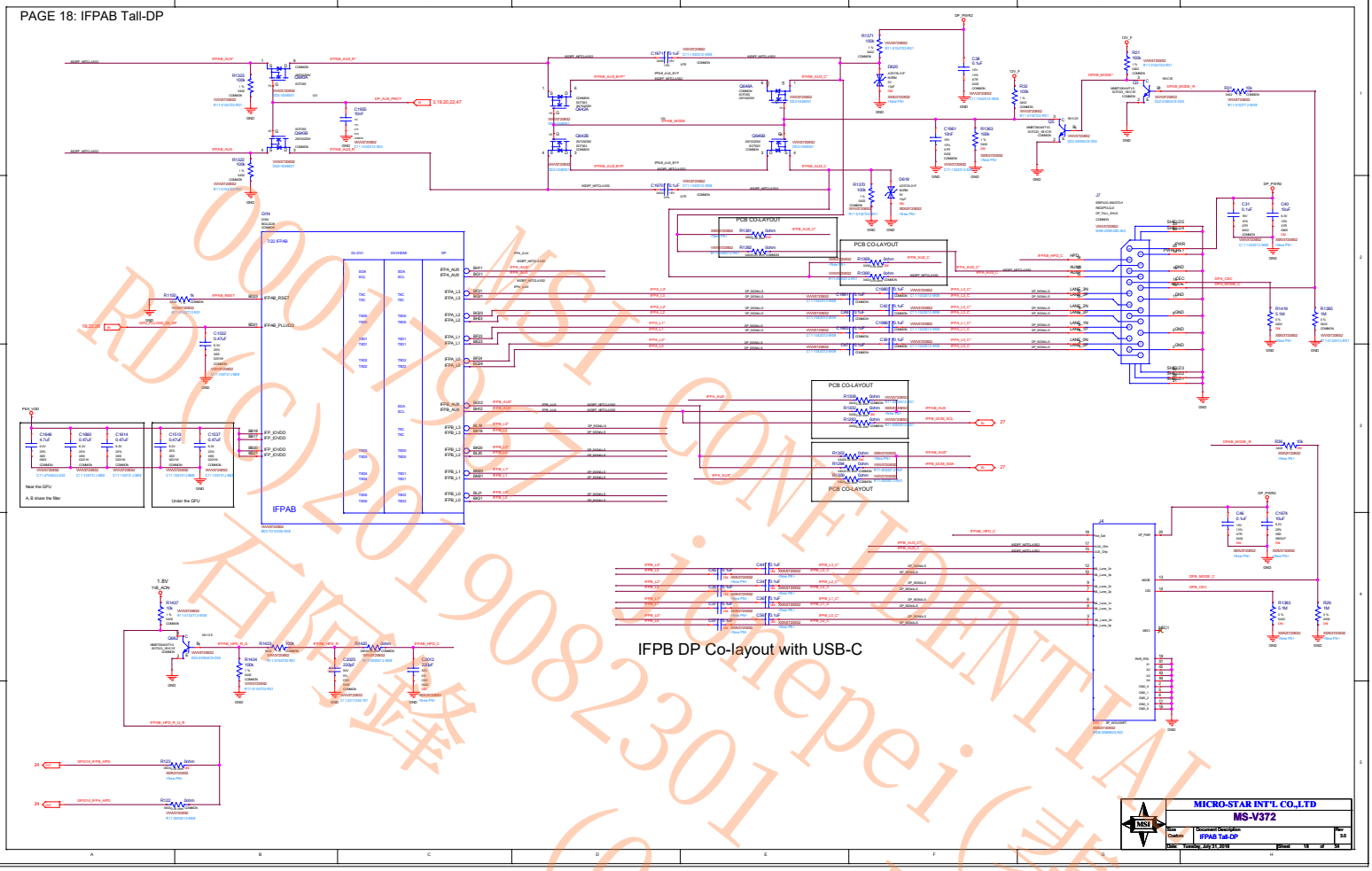






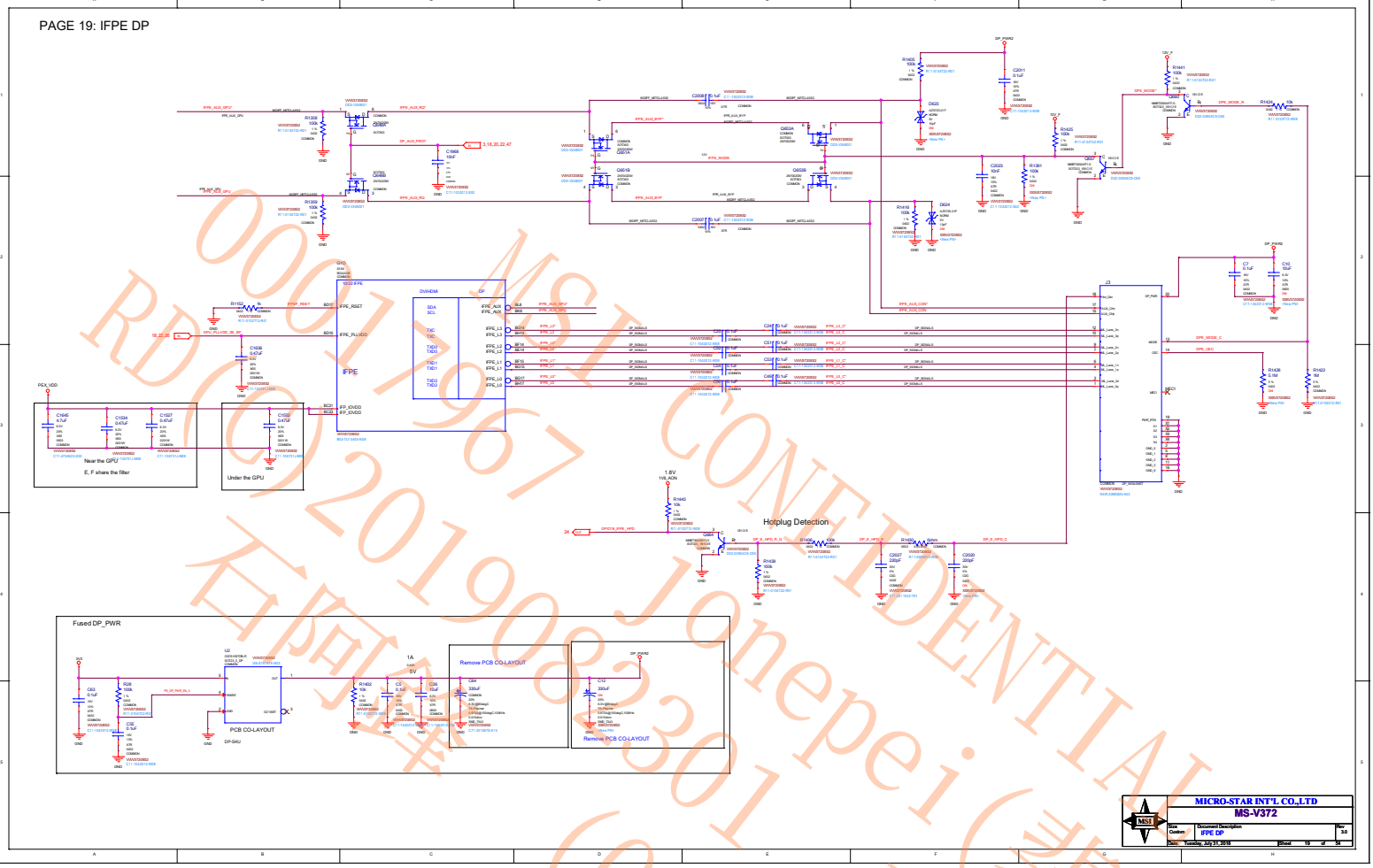
MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size / Custom	Document Description: GPU Decoupling
Rev	3.0
Date: Tuesday, July 31, 2018	Sheet 17 of 54

MSI CONFIDENTIAL
RD(C)2019087 Jonepei(裴亮樂)
石原鋒 0006 8760 RMA工程課



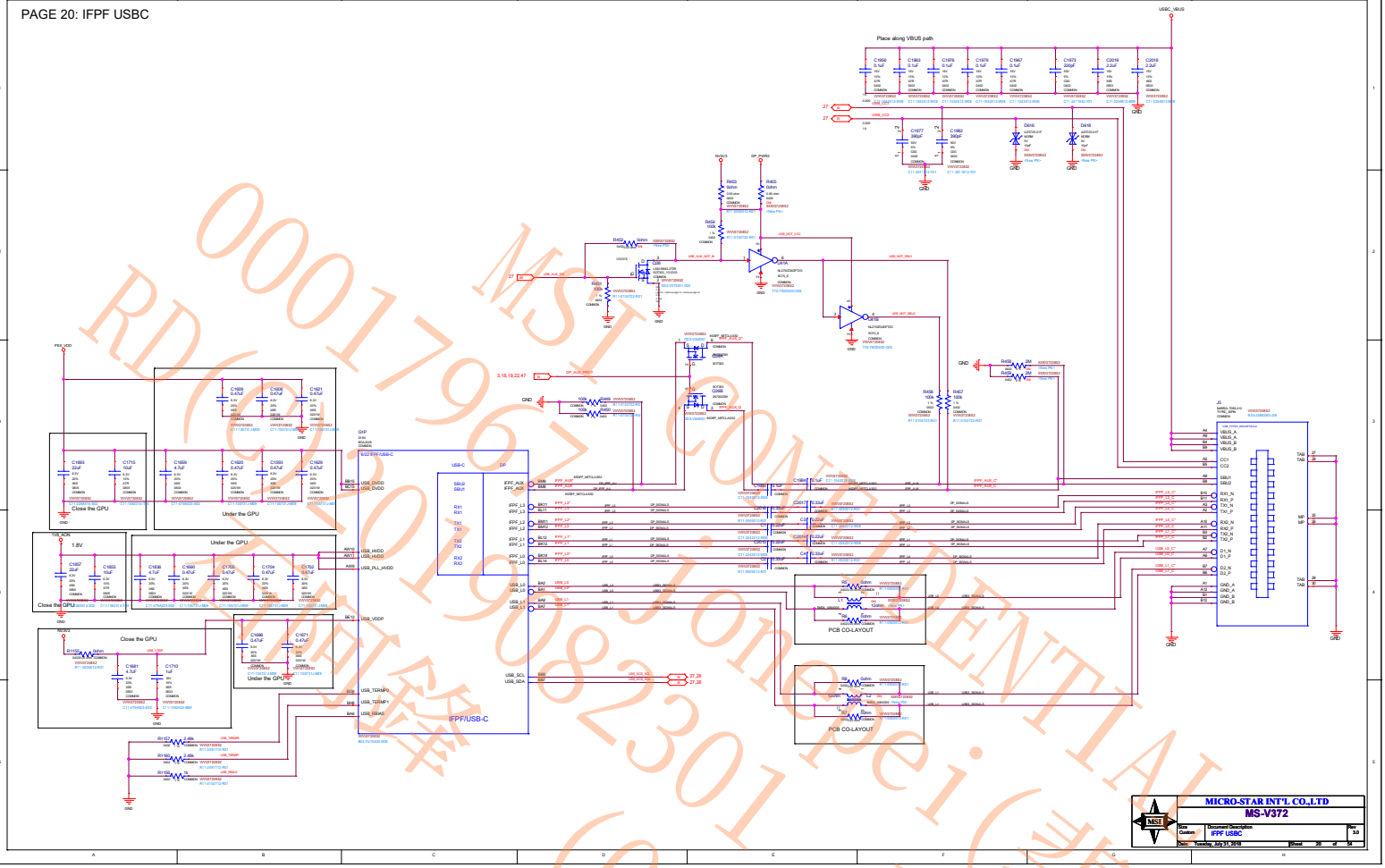
MSI CONFIDENTIAL
RD(C)2019082301 Liuhepei(柳亮樂)
石阿鋒 (00068760) RMA工程課

PAGE 19: IFPE DP



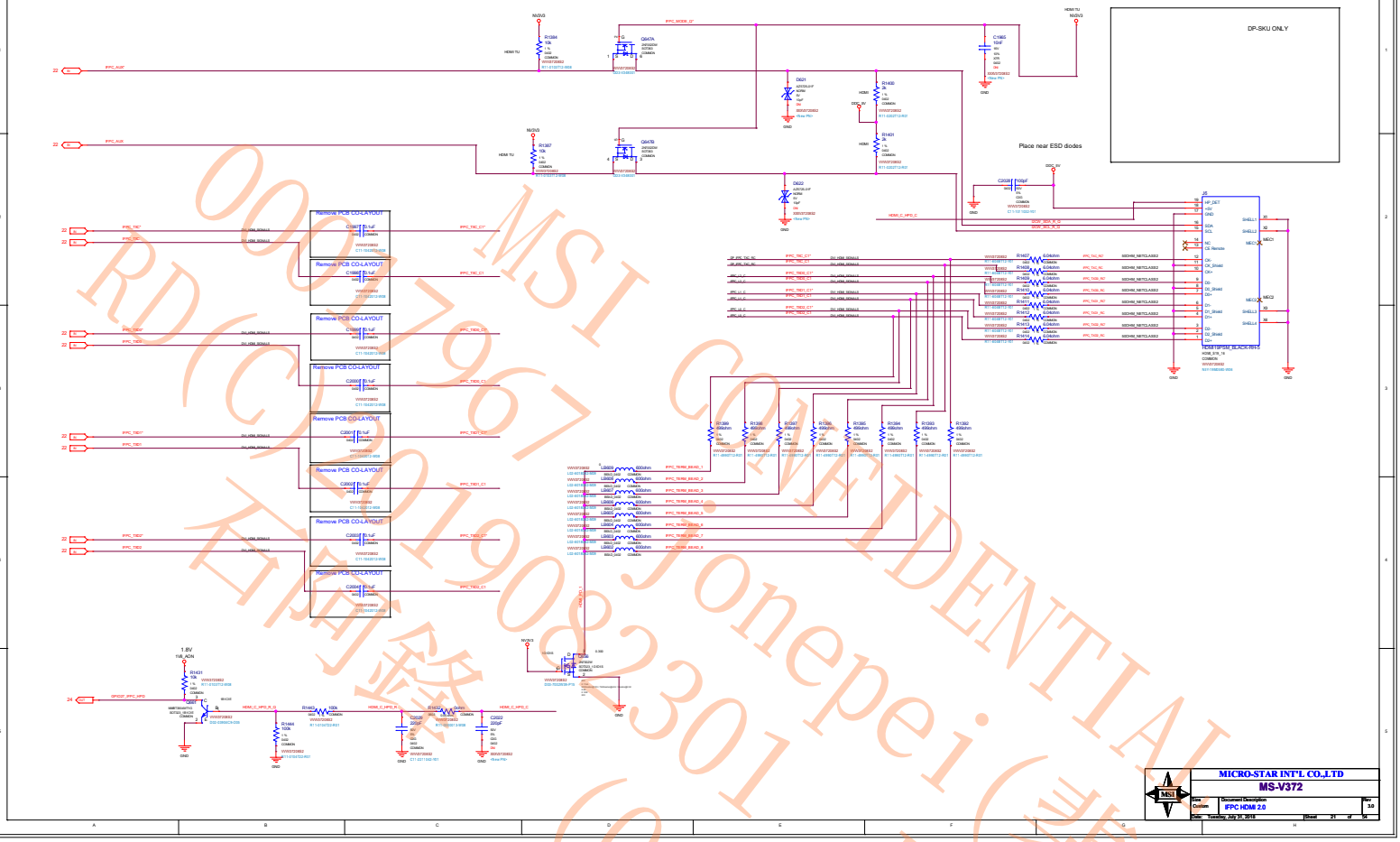
MSI CONFIDENTIAL
RD(0)20190831001
Jonepei(裴亮樂)
石阿裴
RMA工程課
(00068760)

PAGE 20: IFPF USBC

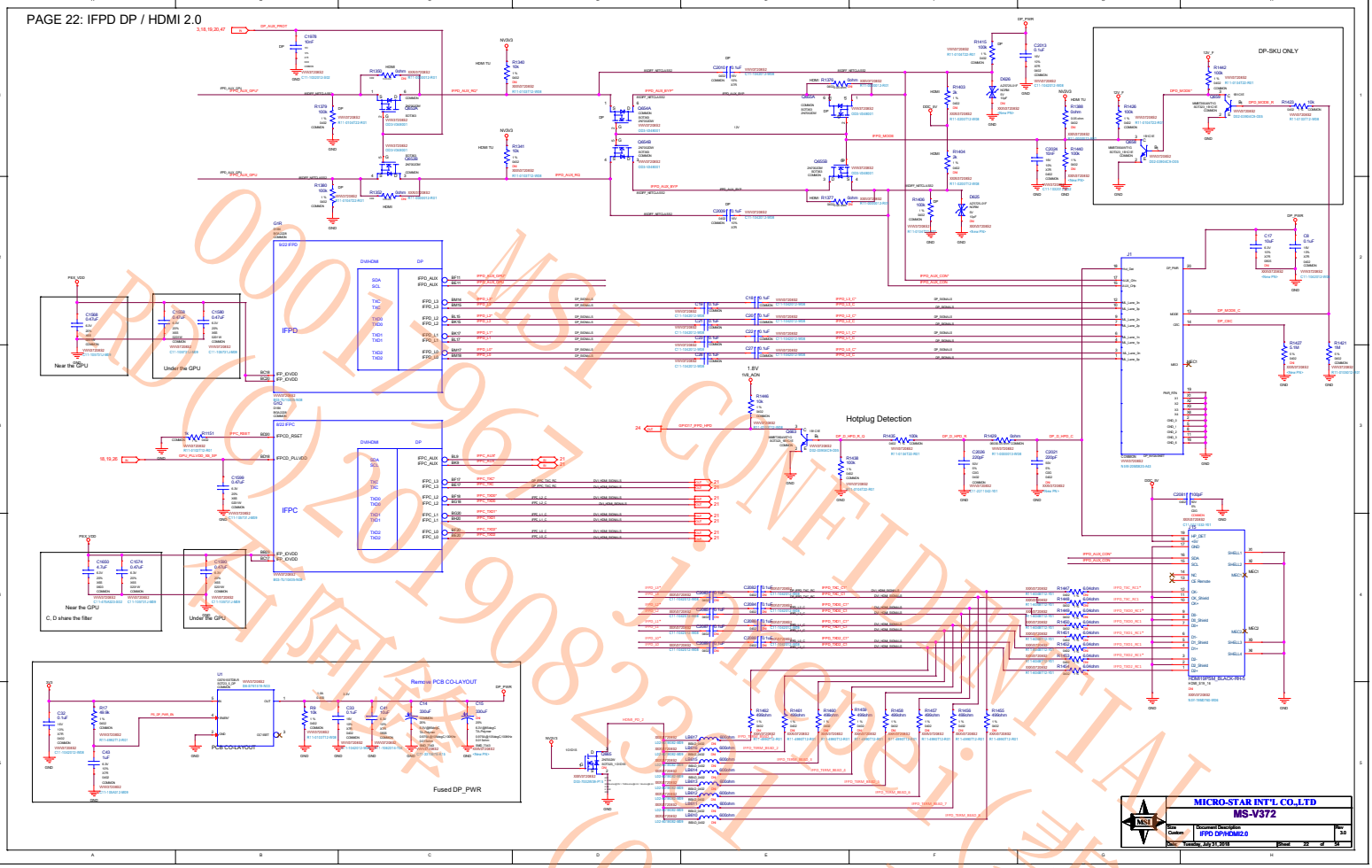


MSI CONFIDENTIAL
0001796720190823 01
RD(王同鋒)
Jiongsei(姜亮樂)
RMA工程課
(00068760)

PAGE 21:IFPC HDMI 2.0

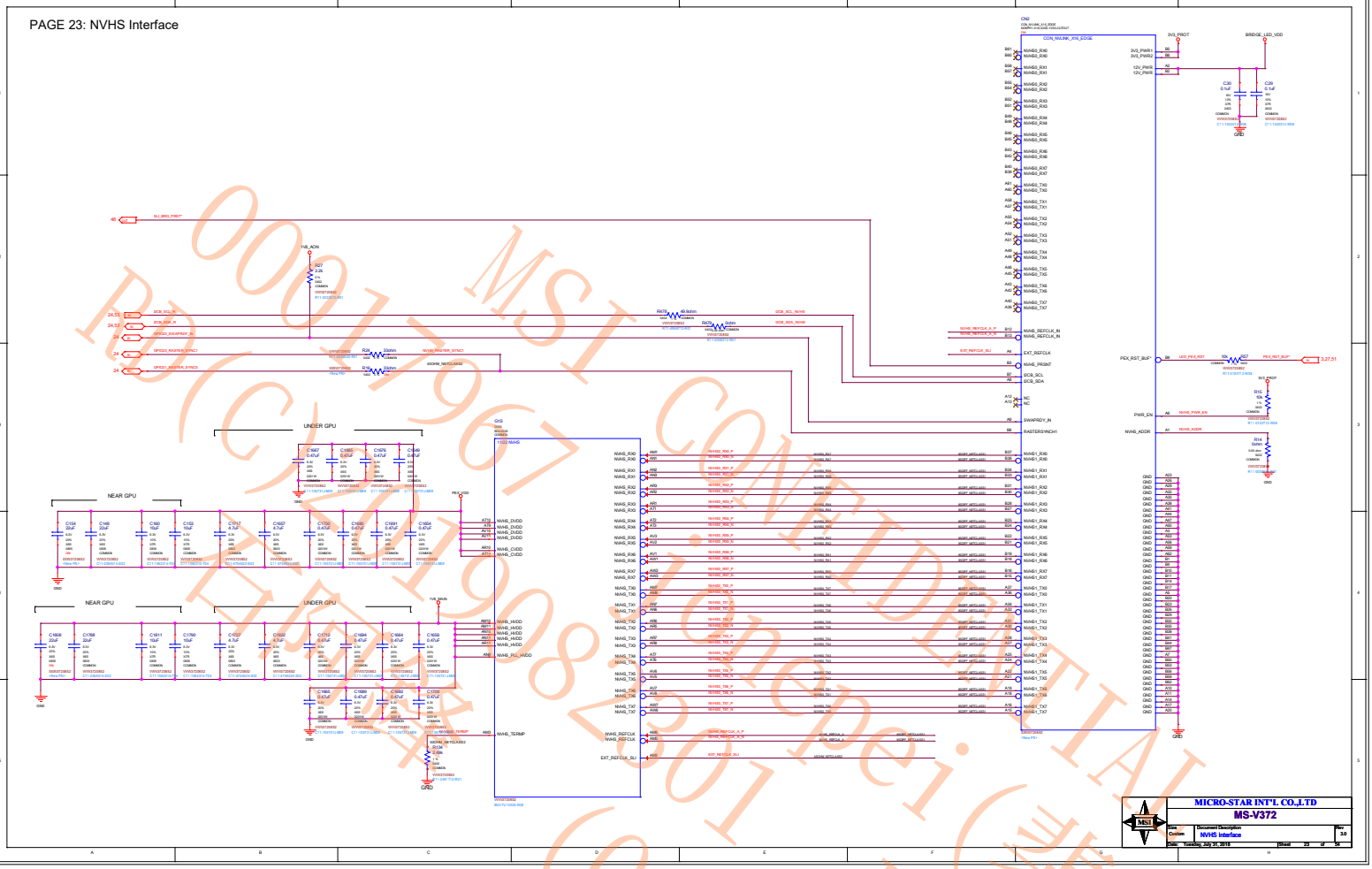


MSI CONFIDENTIAL
RD(C)2019082301 Jonepei(裴亮樂)
石同鋒 (00068760) RMA工程課



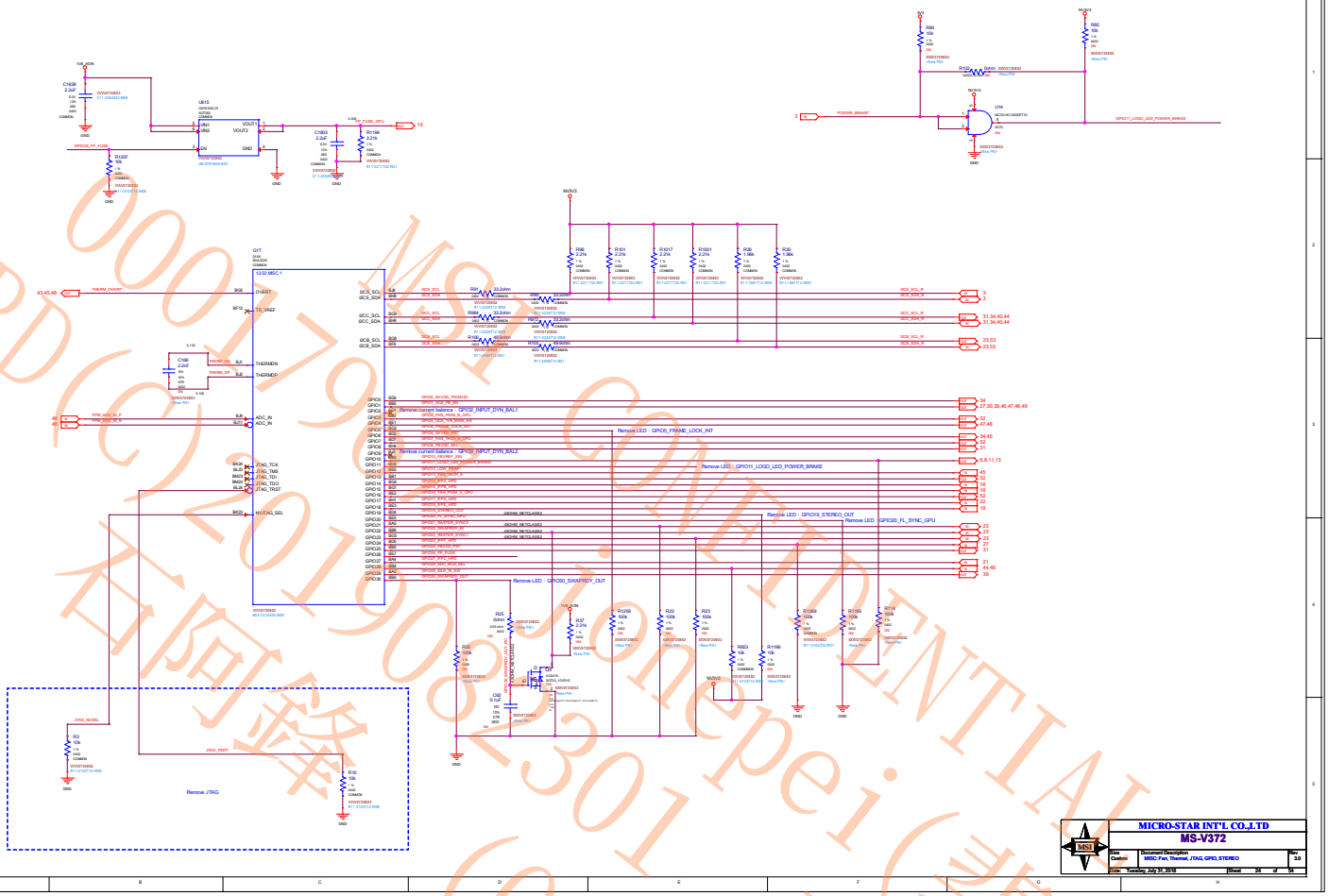
MSI CONFIDENTIAL
RD(C)2019082301(黃亮樂)
(00068760)
RMA工程課

PAGE 23: NVHS Interface



MSI CONFIDENTIAL
B(C)-00017967
RMA工程課
(000068760)

PAGE 24: MISC: Fan, Thermal, JTAG, GPIO, STEREO



0001798 MSI CONFIDENTIAL
RD(C)2019082301 Jiehepei(葉亮樂)
石阿鋒 (00068760) RMA工程課

PAGE 25: MISC: ROM, Straps

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

STRAP2	STRAP1	STRAP0	RAMCFG[4:0]		
L	L	L	00000	RAMCFG TBD	
L	L	H	00001	RAMCFG TBD	DEFAULT
L	H	L	00010	RAMCFG TBD	
L	H	H	00011	RAMCFG TBD	
H	H	L	00110	RAMCFG TBD	
H	H	H	00111	RAMCFG TBD	

RAMCFG[4:0]	DENSITY	WIDTH	VENDOR
00000	8Gb	256-bit	Samsung
00001	8Gb	256-bit	Micron
00010	8Gb	256-bit	Hynix
00110	16Gb	256-bit	Samsung
00111	16Gb	256-bit	Samsung

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	M	XXX0	FS_OVERT DISABLE	

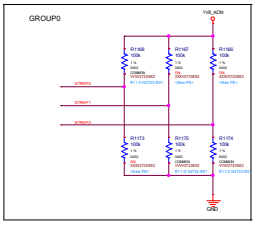
STRAP5	STRAP4	STRAP3	SMB_ALT_ADDR	DEVID_SEL	PCIE_CFG	VGA_DEVICE	
M	H	H	1	1	1	1	
M	H	L	1	1	1	0	
M	L	H	1	1	0	1	
M	L	L	1	1	0	0	
L	H	M	1	0	1	1	
L	M	H	1	0	1	0	
L	M	L	1	0	0	1	
L	L	M	1	0	0	0	
H	H	H	0	1	1	1	
H	H	L	0	1	1	0	
H	L	H	0	1	0	1	
H	L	L	0	1	0	0	
L	H	H	0	0	1	1	
L	H	L	0	0	1	0	
L	L	H	0	0	0	1	Default
L	L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

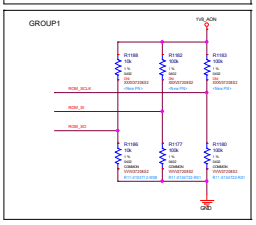
1:SMB_ALT_ADDR ENABLE
0:SMB_ALT_ADDR DISABLE

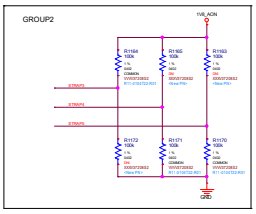
1:DEVID_SEL REBRAND
0:DEVID_SEL ORIGNAL

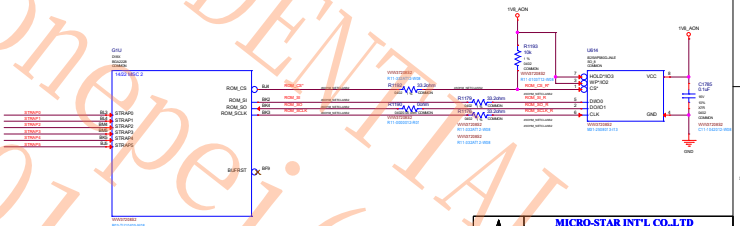
1:PCIE_CFG LOW POWER
0:PCIE_CFG HIGH POWER

1:VGA_DEVICE ENABLE
0:VGA_DEVICE DISABLE





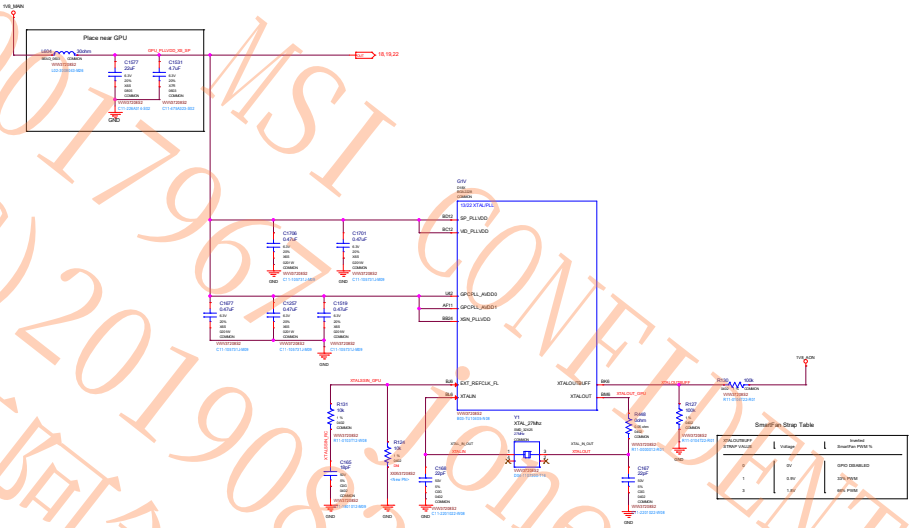




MICRO-STAR INT'L CO.,LTD
MS-V372

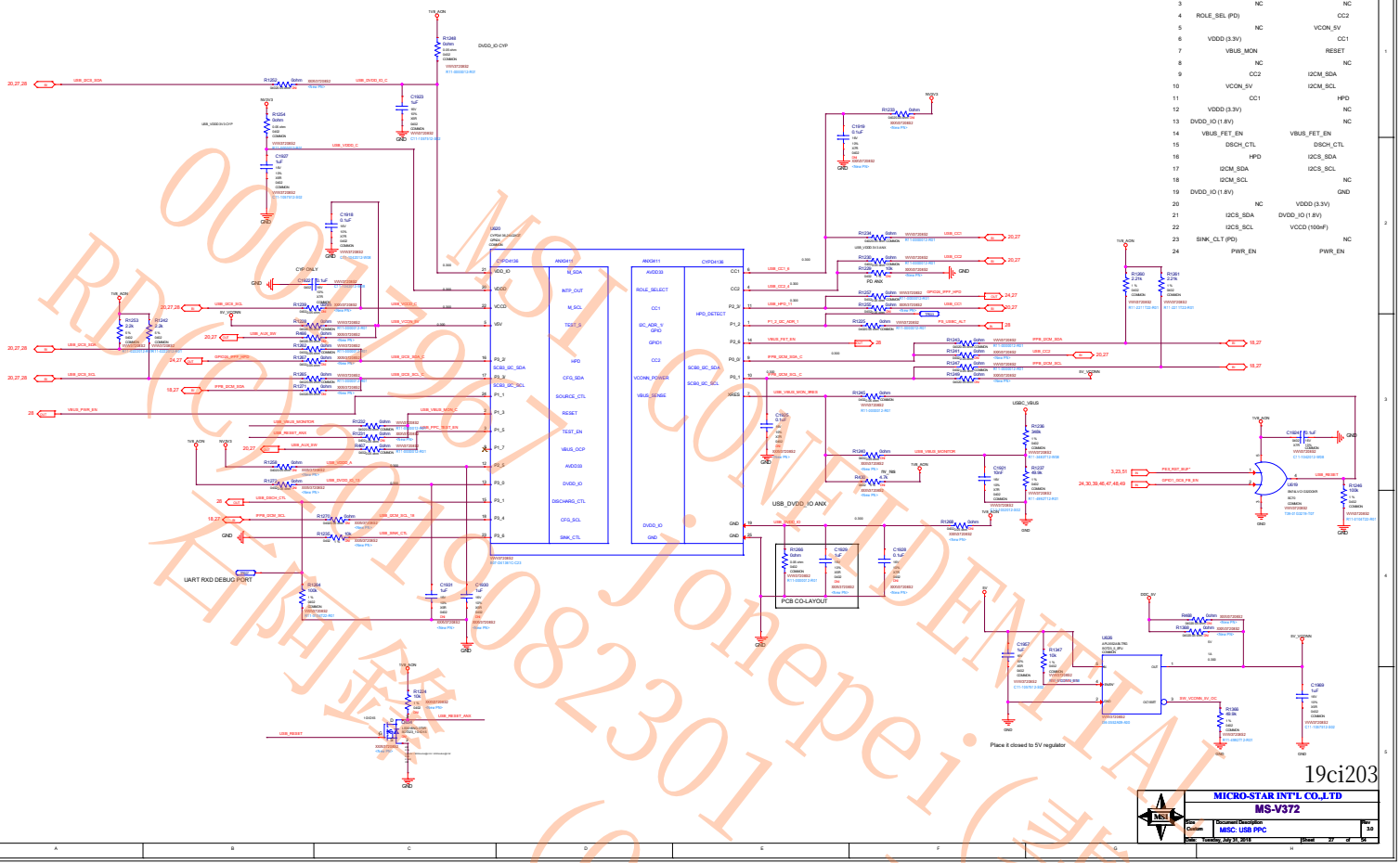
Size	Document Description	Rev
Custom	MISC: ROM, Straps	3.0
Date: Tuesday, July 31, 2018	Sheet 25 of 56	

MSI CONFIDENTIAL
0001796
Jongpei (姜亮樂)
RD(C)2019082301
RMA工程課
行政法務
(00068760)



MSI CONFIDENTIAL
0001796
RD(C)20190823 01
石阿鋒 Jonepei(裴亮樂)
(00068760)
RMA工程課

PAGE 27: 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

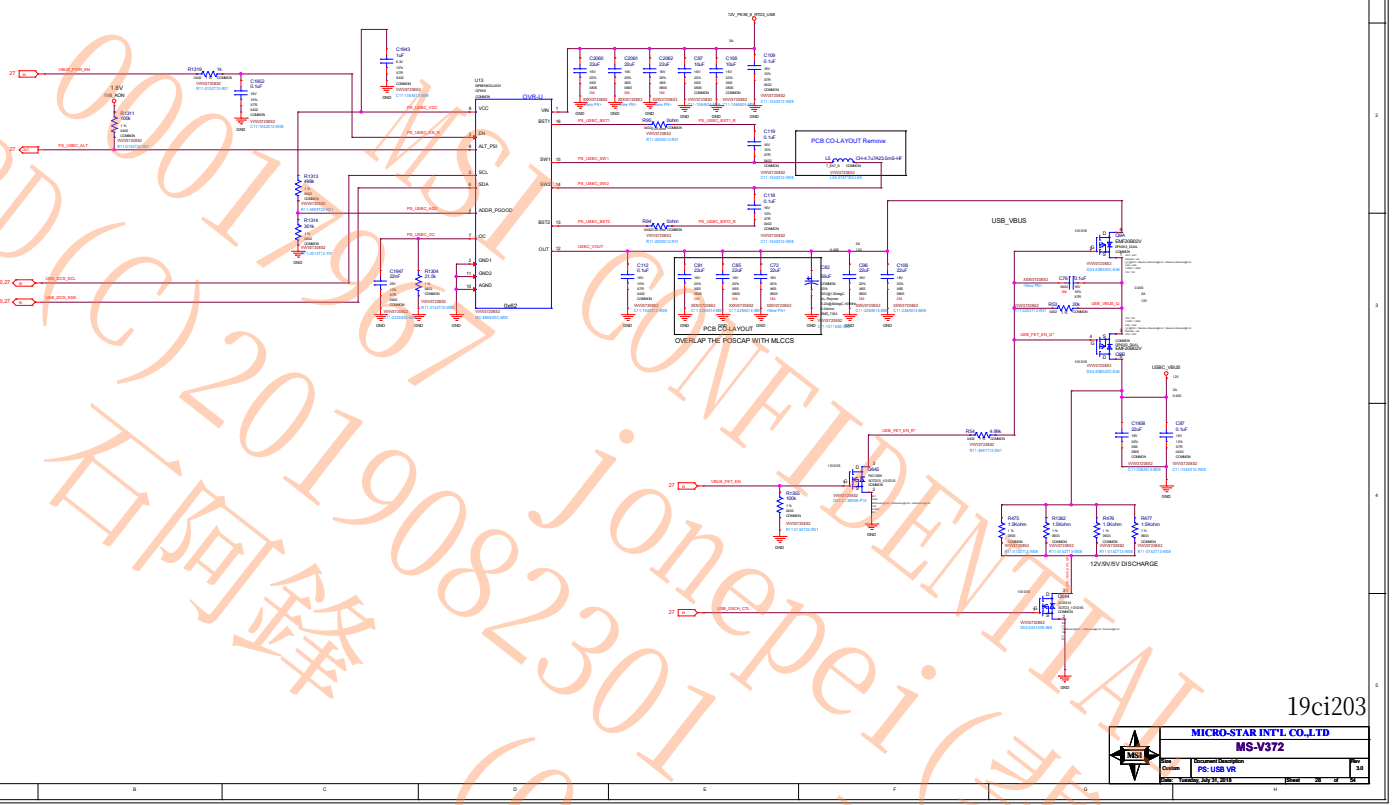
19ci203

MICRO-STAR INT'L CO.,LTD
MS-V372

Size	Document Description	Rev
Custom	MISC: USB PPC	3.0

Date: Tuesday, July 31, 2018 Sheet 27 of 54

MSI CONFIDENTIAL
RD(02)2018082301 Jonepei(裴亮樂)
石岡鎮 (0006768760) RMA工程課



19ci203

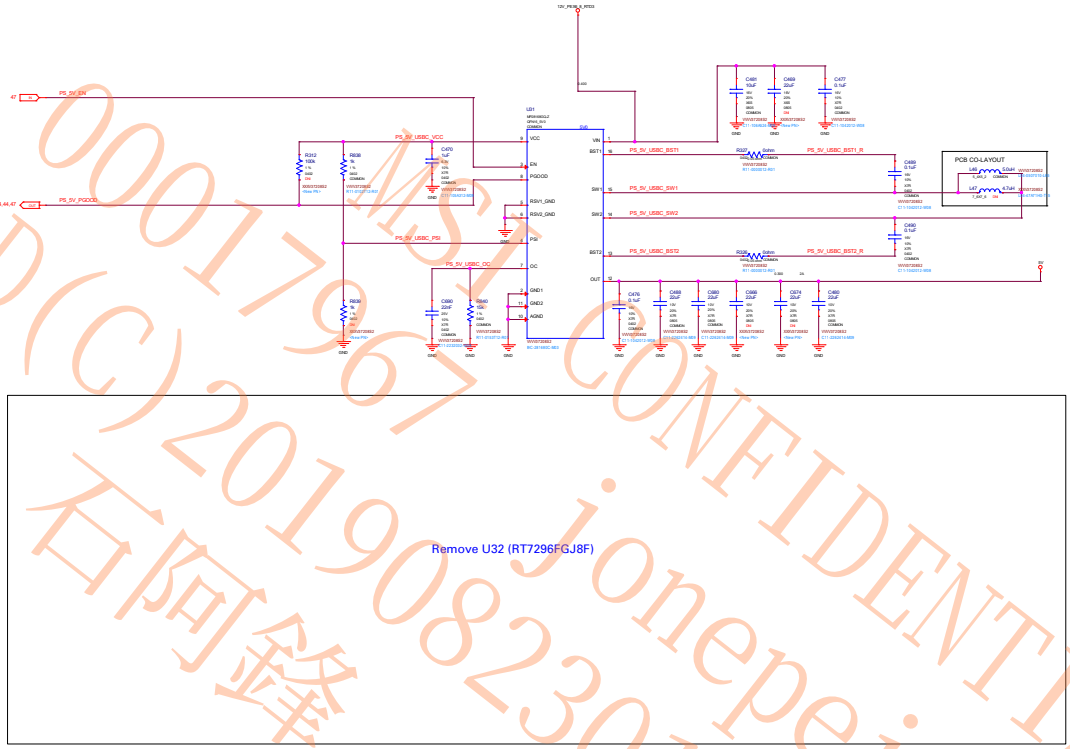
MICRO-STAR INT'L CO.,LTD

MS-V372

Size	Document Description	Rev
Custom	PS: USB VR	3.0

Date: Tuesday, July 31, 2018 Sheet 28 of 54

0001987 MSI CONFIDENTIAL
RD(C)20190823 01 Jonepei(裴亮樂)
石阿鋒 (00068760) RMA工程課



19ci203

MICRO-STAR INT'L CO.,LTD

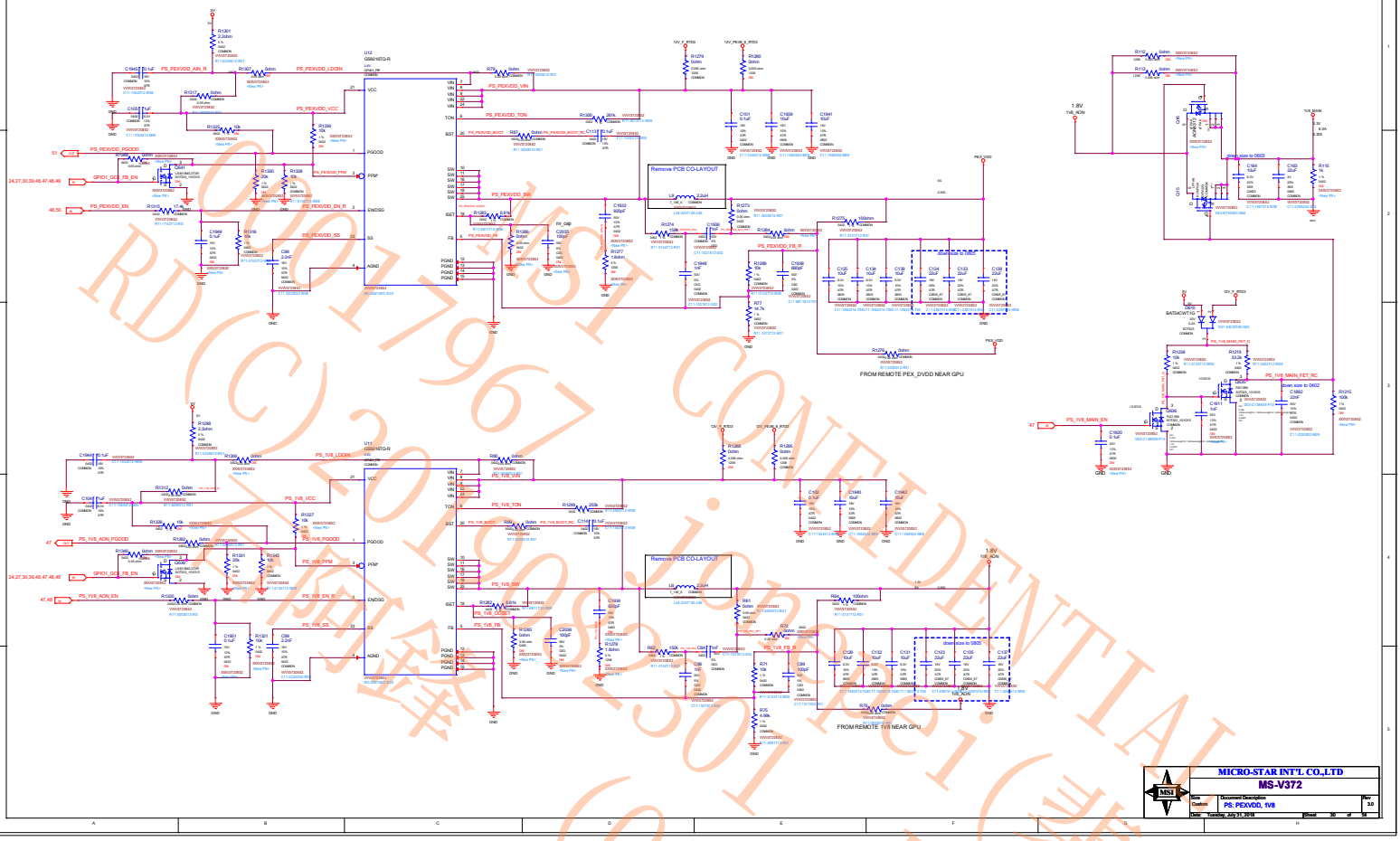
MS-V372

Size: Custom | Document Description: PS: 5V, 5V_BACKUP | Rev: 3.0

Date: Tuesday, July 31, 2018 | Sheet 29 of 54

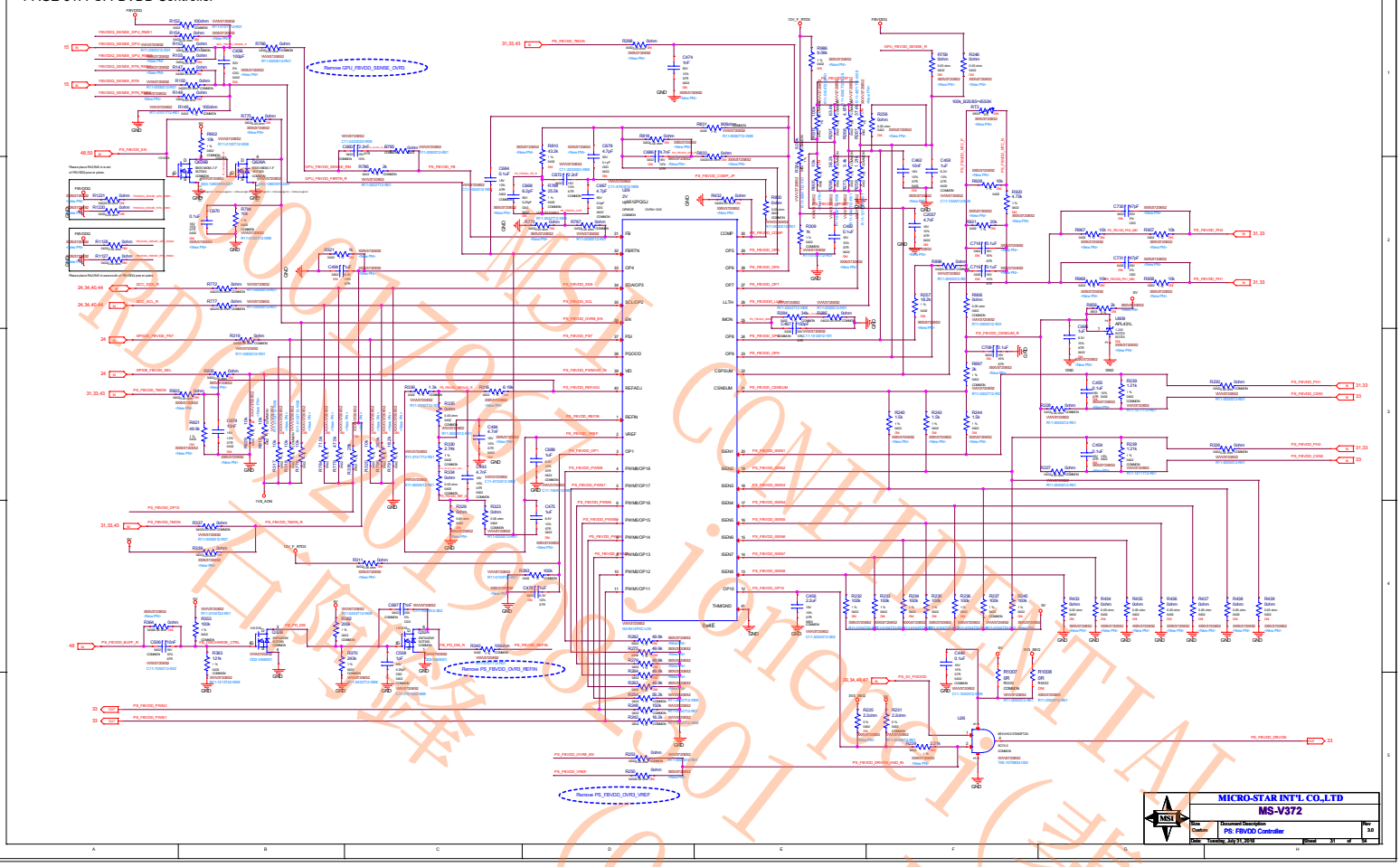
MSI CONFIDENTIAL
0001796 7
RD(C)2019082301
jonepei(裴亮樂)
石阿鋒
(00068760)
RMA工程課

PAGE 30: PS: PEXVDD, 1V8



001796 TEST CONFIDENTIAL
RD(C)2019081301 (黃亮樂)
(000068760) RMA工程課

PAGE 31: PS: FBVDD Controller



MEDIA CONFIDENTIAL
(000068760)
RMA工程課(美亮樂)
Jonathan
2019-09-01
工廠簽名

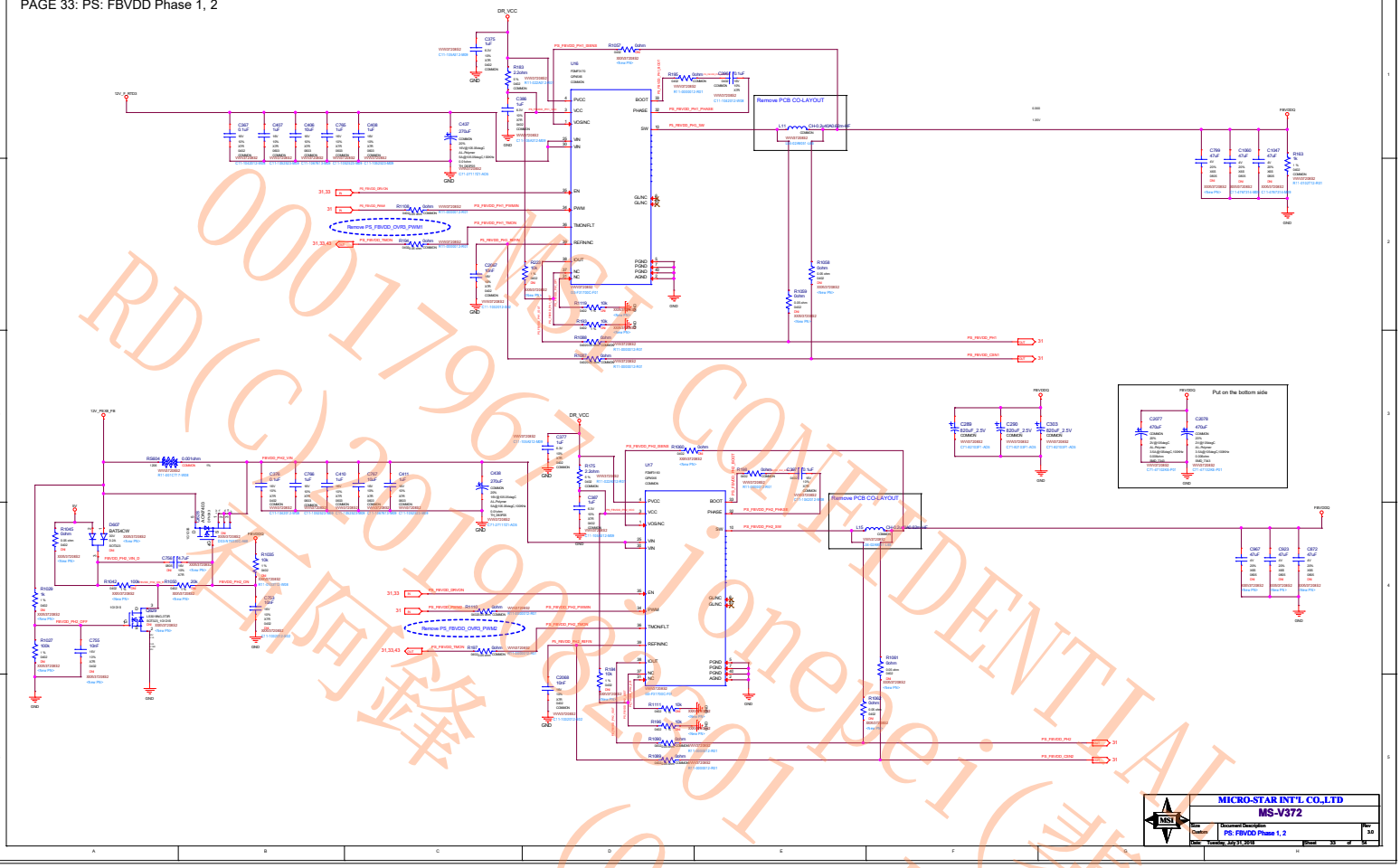
MSI CONFIDENTIAL
00017967 jonepei(裴亮樂)
RD(C)20190823 01 RMA工程課
石阿鋒 (00068760)

MICRO-STAR INT'L CO.,LTD
MS-V372

Size	Document Description	Rev
Custom	PS: FBVDD Controller OVR3 (X)	3.0

Date: Tuesday, July 31, 2018 Sheet 32 of 34

PAGE 33: PS: FBVDD Phase 1, 2



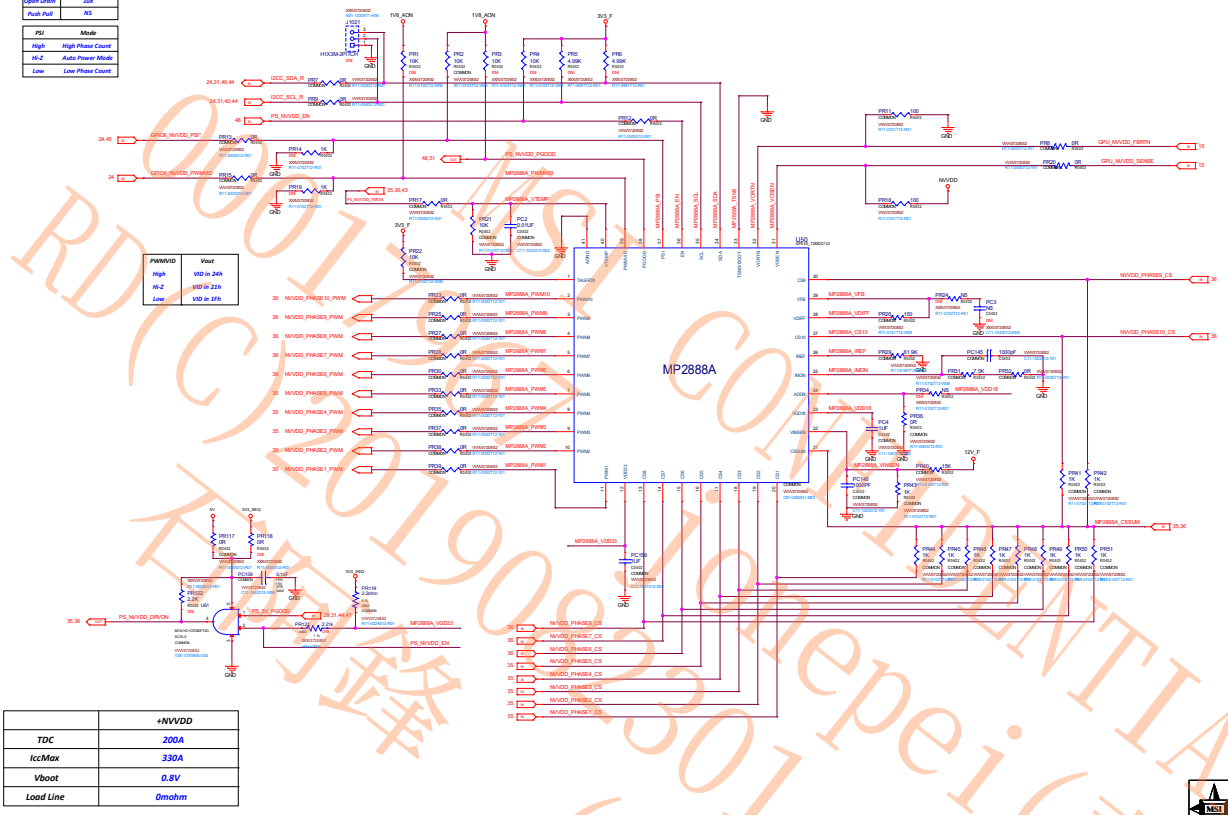
0001796 CONFIDENTIAL
RD(C)2019.02.01 Jonepei(裴亮樂)
不阿鋒 (00068760) RMA工程課

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



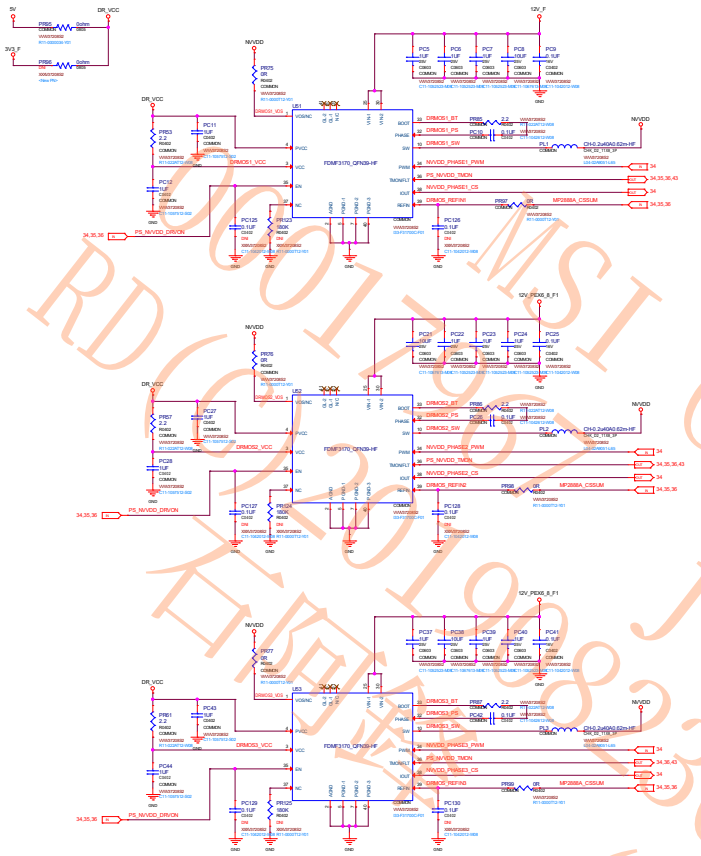
	+NVVDD
TDC	200A
IccMax	330A
Vboot	0.8V
Load Line	0mohm

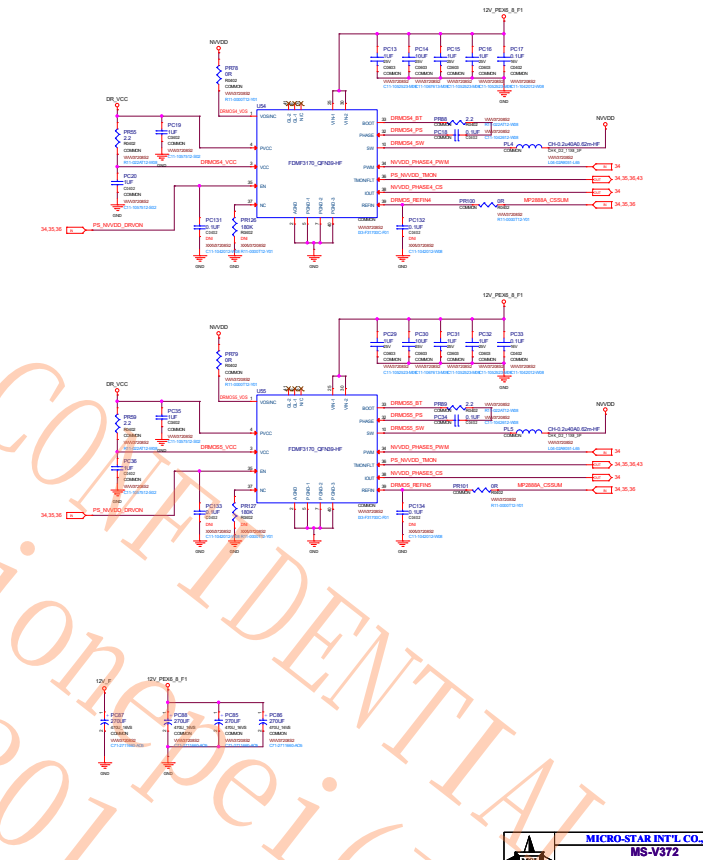
PMBus Address	Setting Point(V)	R_{open} (kΩ) 1%	R_{short} (kΩ) 1%
20h	0	0	0
21h	0.031	3.32	0.059
22h	0.057	3.32	0.11
23h	0.084	3.32	0.162
24h	0.116	3.32	0.226
25h	0.156	3.32	0.316
26h	0.205	3.32	0.43
27h	0.266	3.32	0.576
28h	0.340	3.32	0.768
29h	0.430	3.32	1.05
2Ah	0.540	3.32	1.43
2Bh	0.675	3.32	2
2Ch	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

MICRO-STAR INT'L CO.,LTD
MS-V372
Size: Custom
Document Description: PS: NVVDD - MP2888A
Rev: 3.0
Date: Tuesday, July 31, 2018
Sheet 34 of 34

001 MSI CONFIDENTIAL
RD(C)20190829301 Jonepei(裴亮樂)
不可外傳 (00068760) RMA工程課

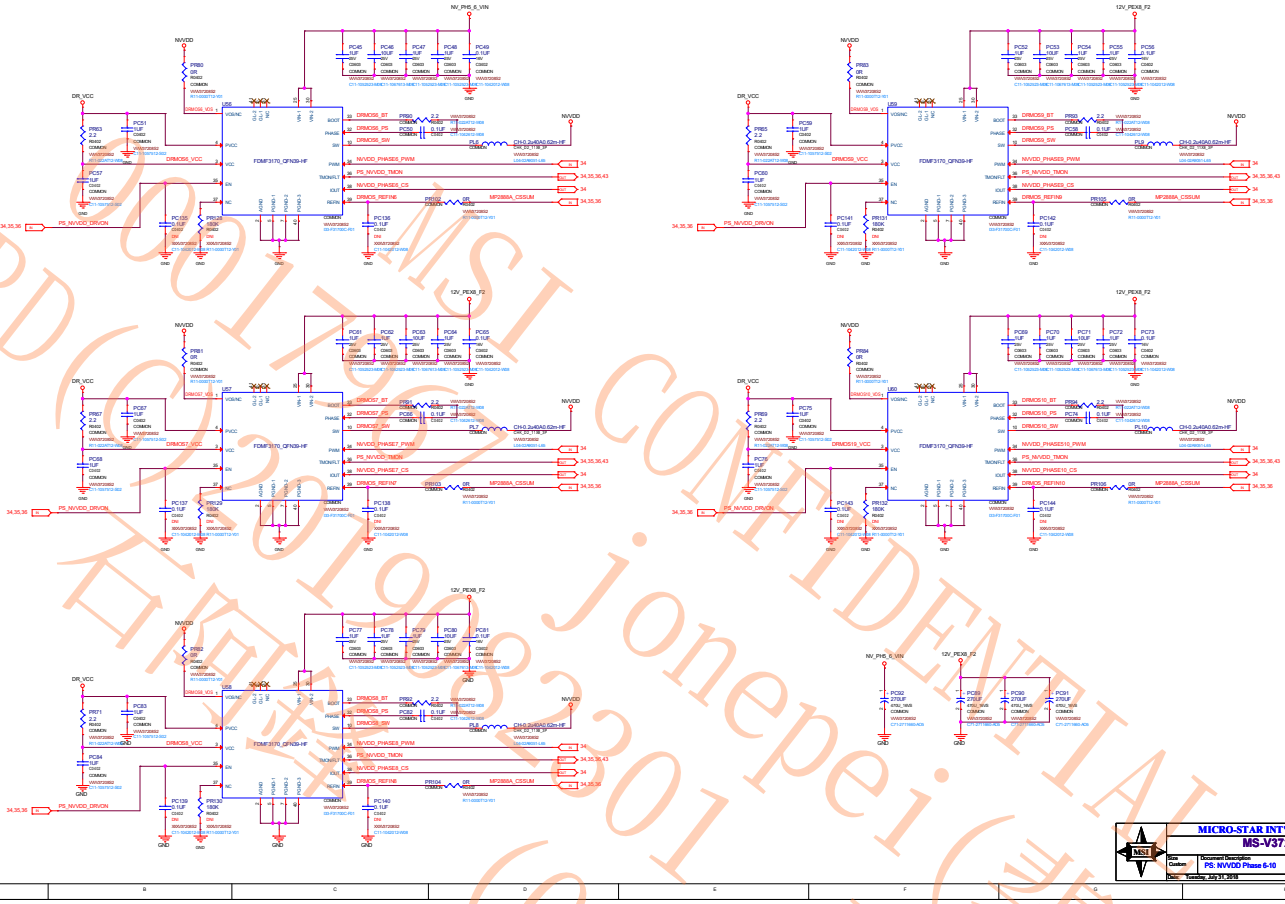
Page35: PS: NVVDD Phase 1-5

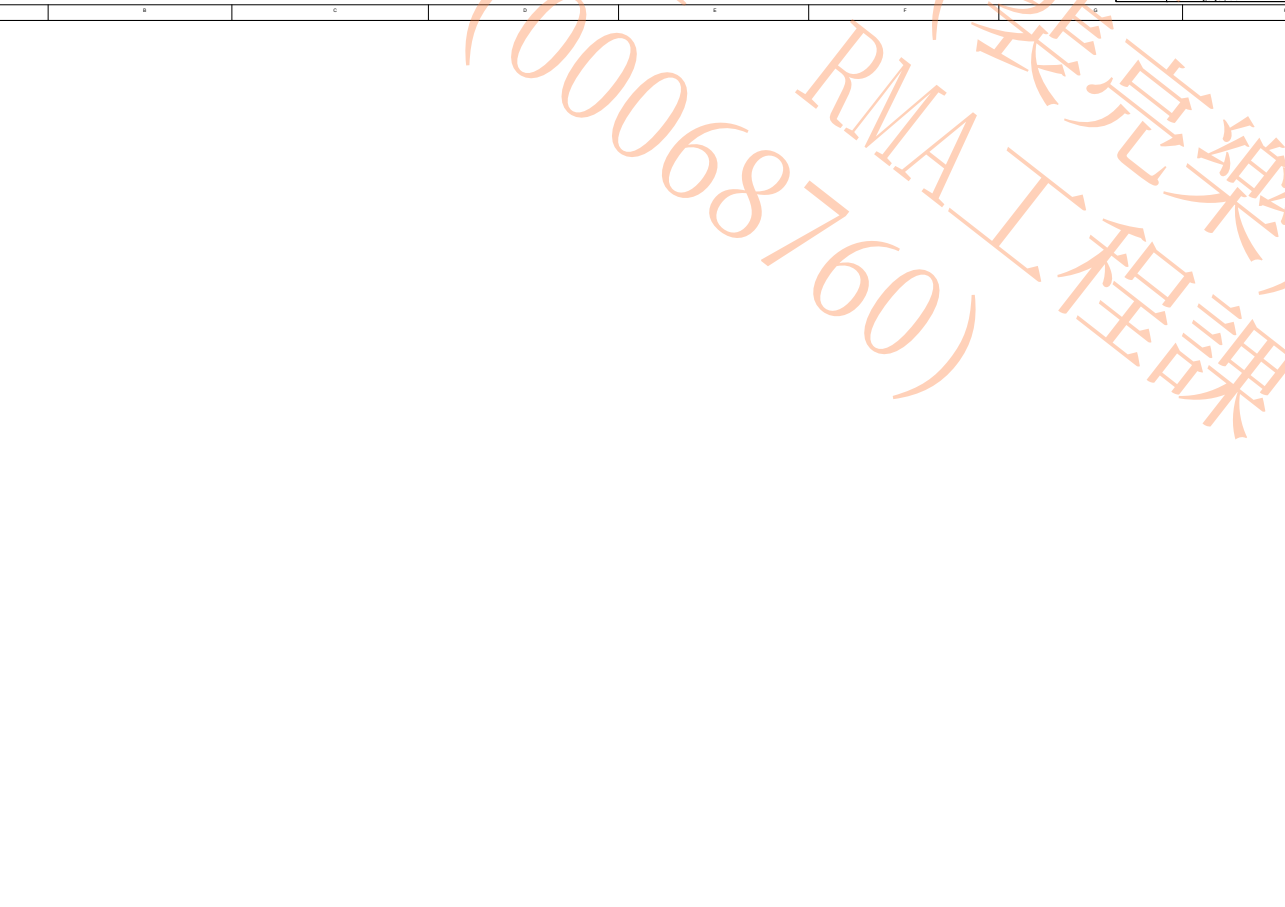




MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size:	Document Description: PS_NVVDD Phase 1-5
Rev: 3.0	
Date: Tuesday, July 31, 2018	Sheet 35 of 54

MSI CONFIDENTIAL
RD(石頂科技) 01/2018 Jonepei(裴亮樂)
(0006 8760) RMA工程課

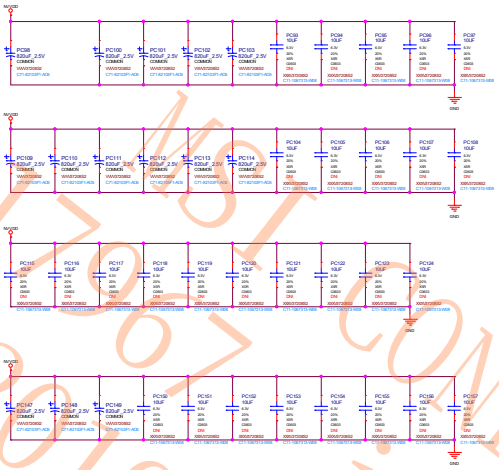




MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size:	Document Description: PS: NVVDD Phase 6-10
Custom	Rev: 3.0
Date: Tuesday, July 31, 2018	Sheet 36 of 54

MSI CONFIDENTIAL
RD(02)19932201 Jonepei(裴亮樂)
石碩(00068760) RMA工程課

NVVDD Output CAP



MSI	MICRO-STAR INT'L CO.,LTD MS-V372	
Size Custom	Document Description PS: NVVDD Output CAP	Rev 3.0
Date: Tuesday, July 31, 2018	Sheet 37 of 54	

MSI CONFIDENTIAL
0001Z9867 Jonepei(裴亮樂)
RD(C)20190823 01
石阿鋒 (00068760)
RMA工程課

PAGE 38: PS:NVVDD (X)

MSI CONFIDENTIAL
00017967 jonepei(裴亮樂)
RD(C)20190823 01 RMA工程課
石阿鋒 (00068760)

MICRO-STAR INT'L CO.,LTD
MS-V372

Size	Document Description	Rev
Custom	PS:NVVDD (X)	3.0

Date: Tuesday, July 31, 2018 Sheet 38 of 54

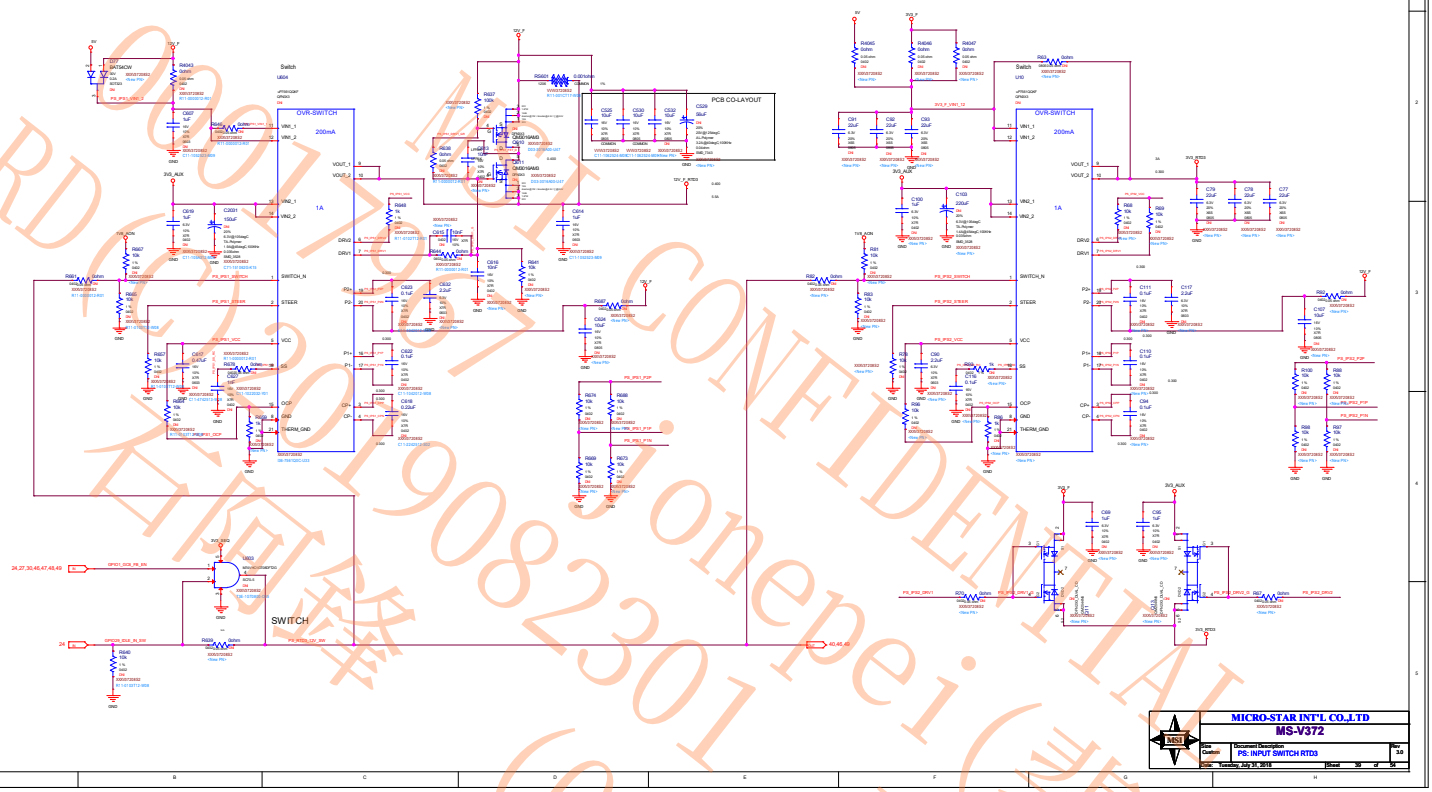
PAGE 39: PS: INPUT SWITCH RTD3

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

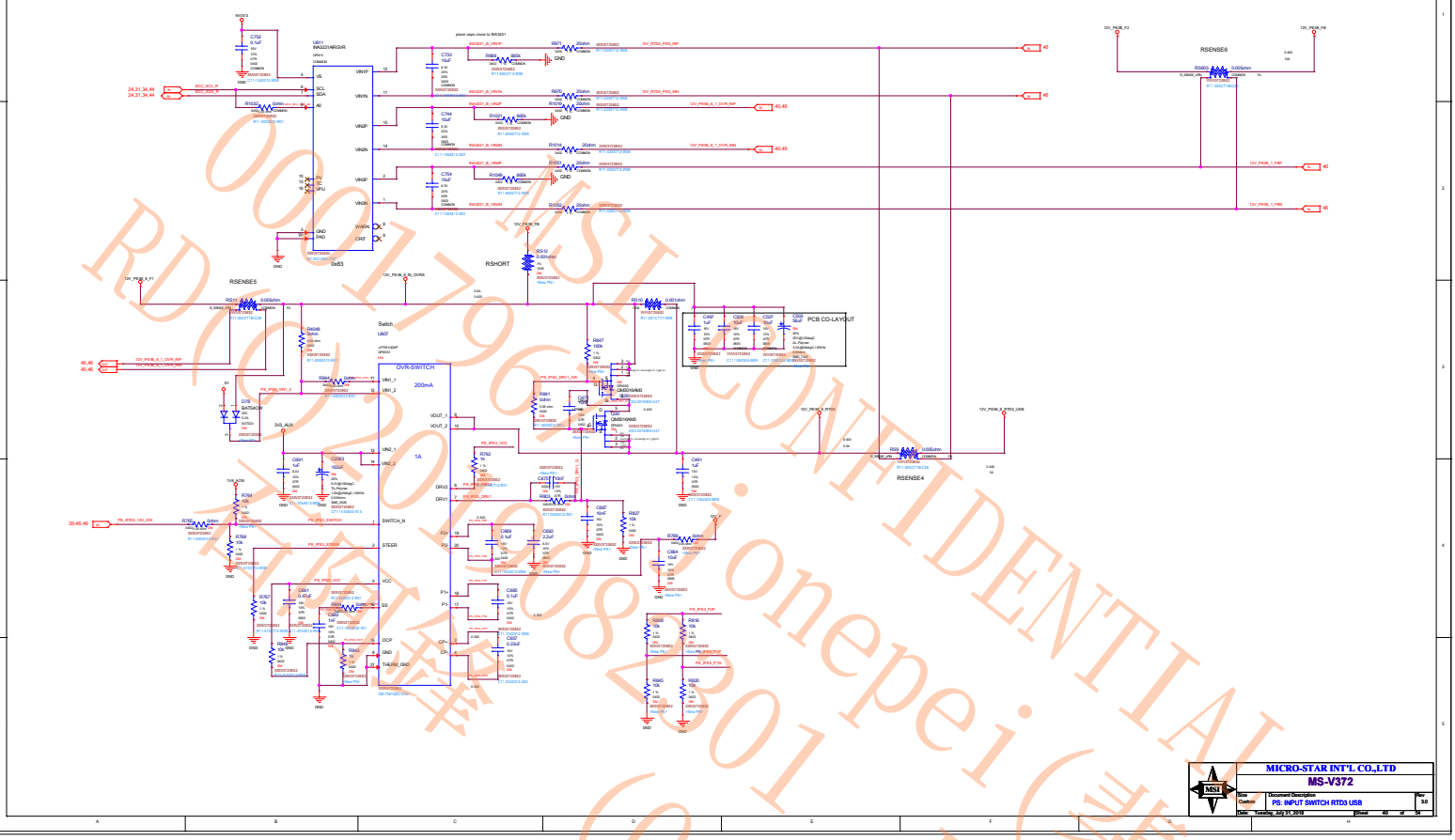
AND GATE LOGIC FOR P-BOARD

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



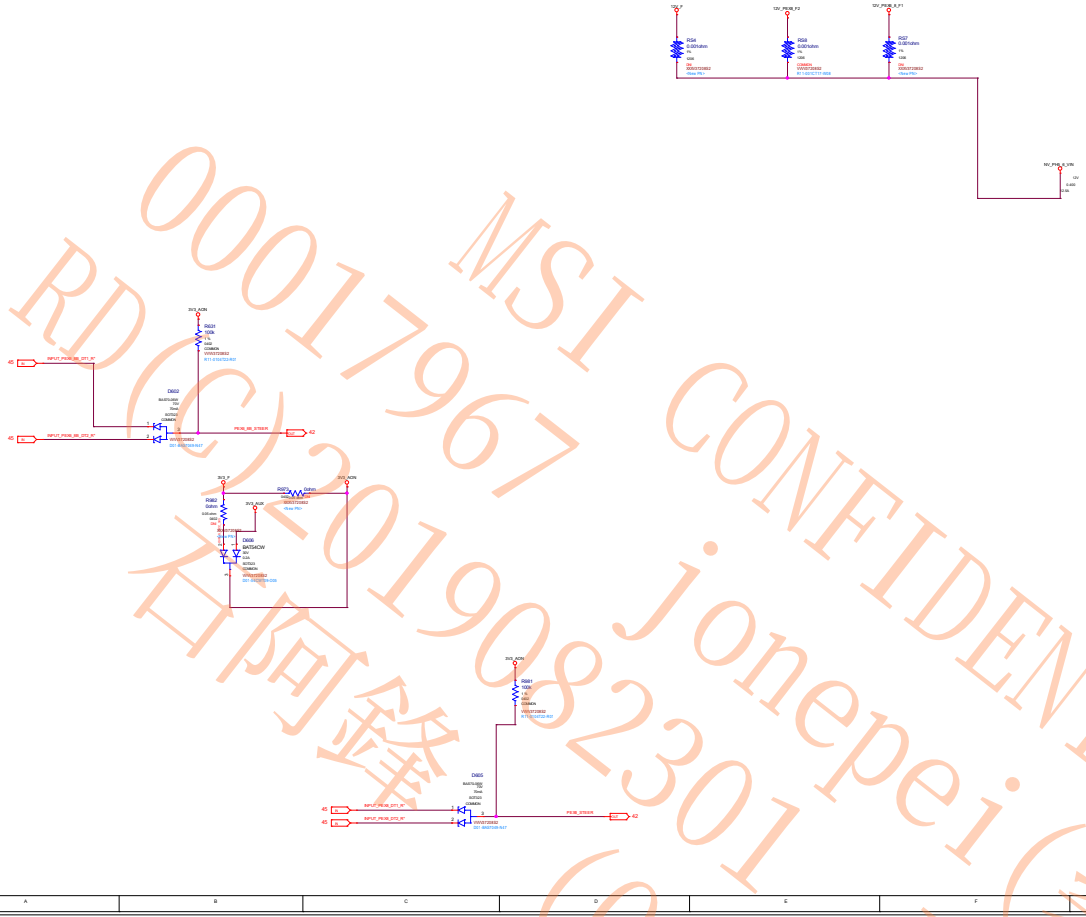
000172987 CONFIDENTIAL
RD(02)23019082301 jonepei(裴亮樂)
台灣鋒 (00068760) RMA工程課

PAGE 40: PS: INPUT SWITCH RTD3 USB



MSI CONFIDENTIAL
RD(C)2019.08.01
0001796 onepei(裴亮樂)
(00068760)
RMA工程課

PAGE 41: PS: INPUT SWITCH Rail Balance



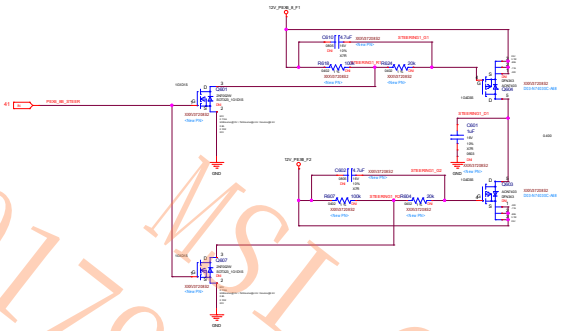
MSI CONFIDENTIAL
000179 67 Jonepei(裴亮樂)
RD(C)20190823 01
石阿鋒 RMA工程課
(00068760)

MSI	MICRO-STAR INT'L CO.,LTD MS-V372	
Size Custom	Document Description PS: INPUT SWITCH Rail Balance	Rev 3.0
Date: Tuesday, July 31, 2018	Sheet 41 of 54	

PAGE 42: PS: 12V CURRENT STEERING

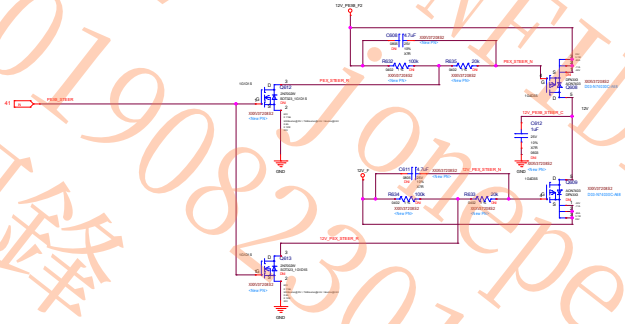
12V CURRENT STEERING (UNDER POWER BOOT):

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



12V CURRENT STEERING (UNDER POWER BOOT):

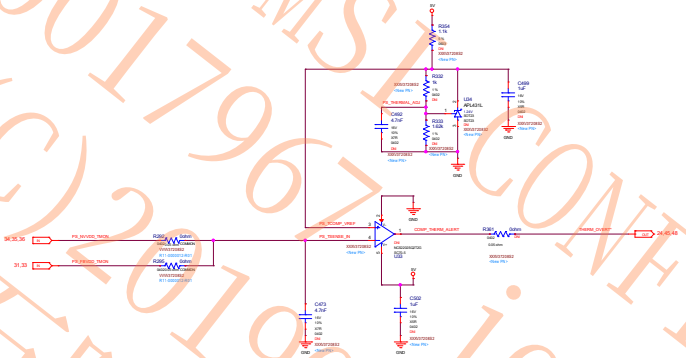
GUIDES CURRENT FROM PEX EDGE TO PEX 8 PIN INPUT AREA



MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size: Custom	Document Description: PS: 12V CURRENT STEERING
Rev: 3.0	
Date: Tuesday, July 31, 2018	Sheet 42 of 56

MSI CONFIDENTIAL
0001796
RD(C)20190823 01
Jonepei(裴亮樂)
石阿鋒
RMA工程課
(00068760)

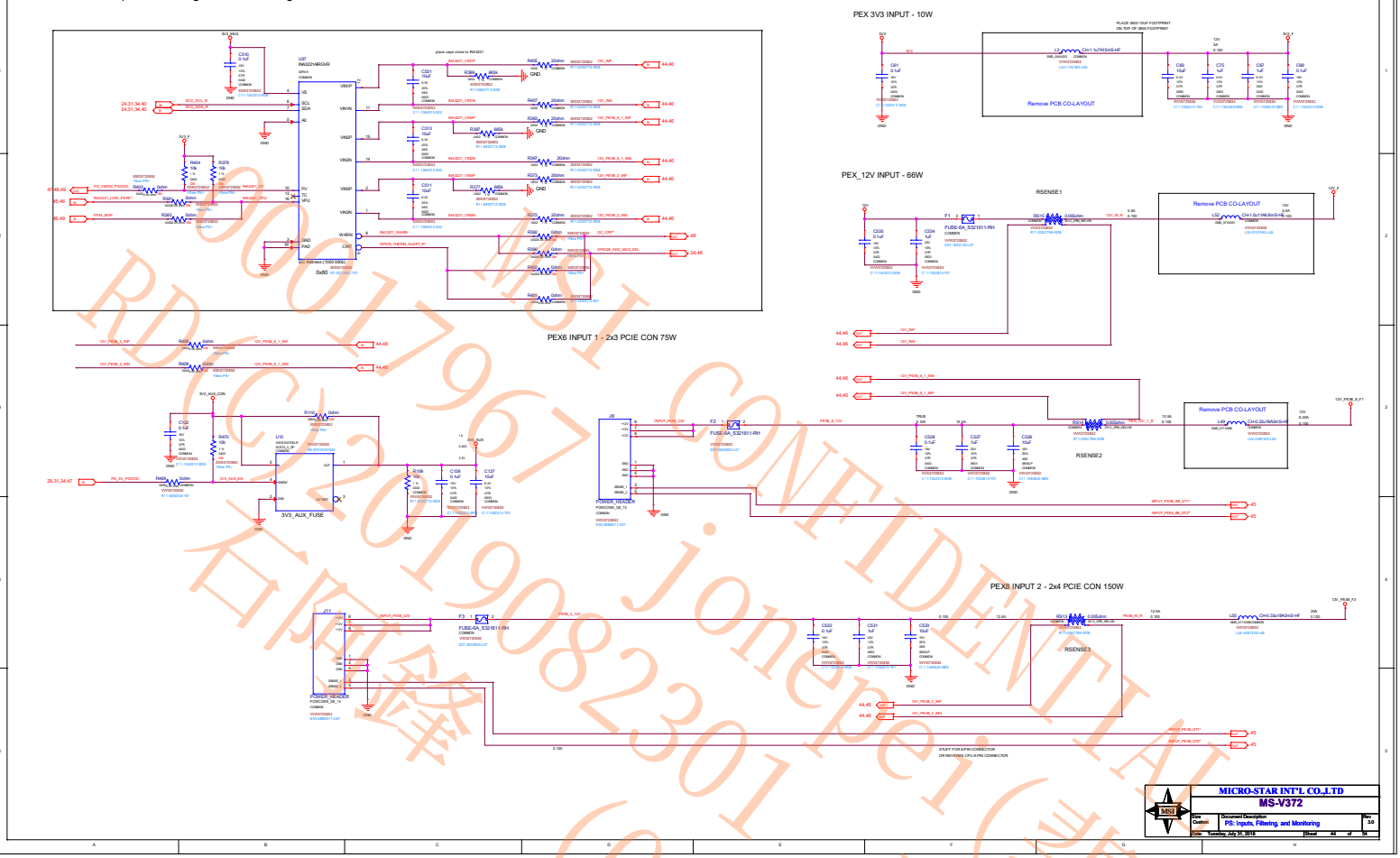
PAGE 43: PS: VR THERMAL PROTECTION



MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size: Custom	Document Description: PS: VR THERMAL PROTECTION	Rev: 3.0
Date: Tuesday, July 31, 2018	Sheet 43 of 54

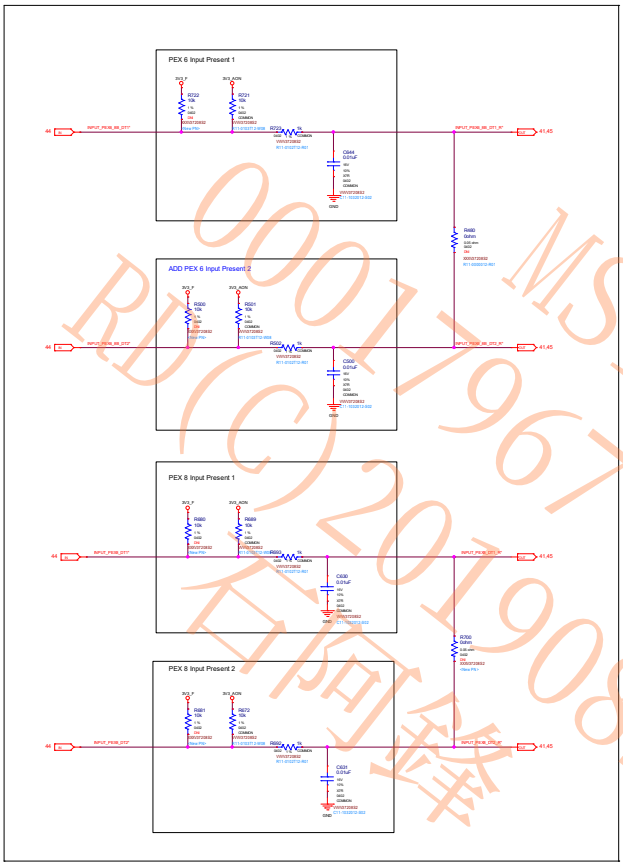
MSI CONFIDENTIAL
0001796 7 Jonepei(裴亮樂)
RD(C)20190823 01
石阿鋒 (00068760)
RMA工程課

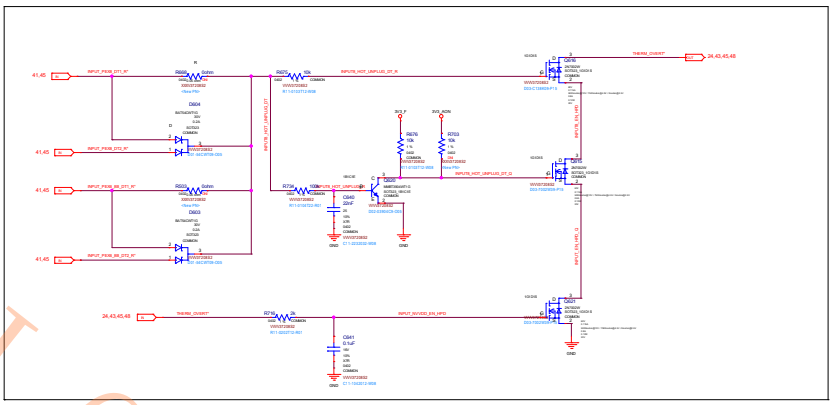
PAGE 44: PS: Inputs, Filtering, and Monitoring

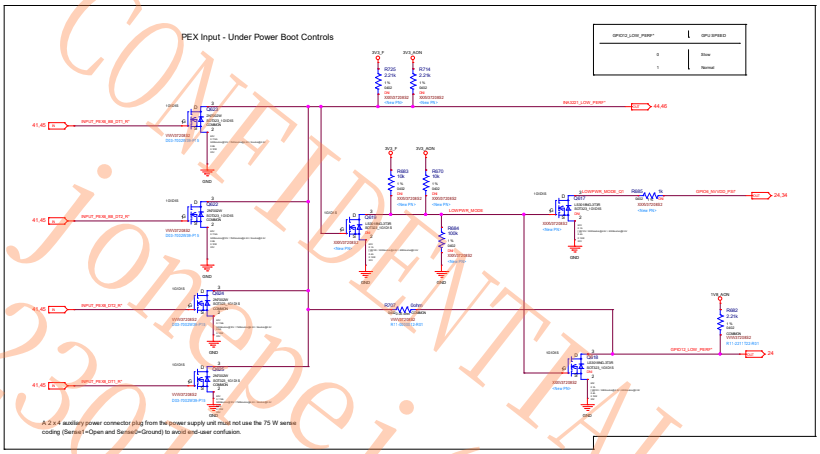


RDC(C)2019082301 MSI CONFIDENTIAL 000179671 Jonepei(裴亮樂) 石所鋒 (00068760) RMA工程課

PAGE 45: PS: Current Steering, Hot Unplug Detect



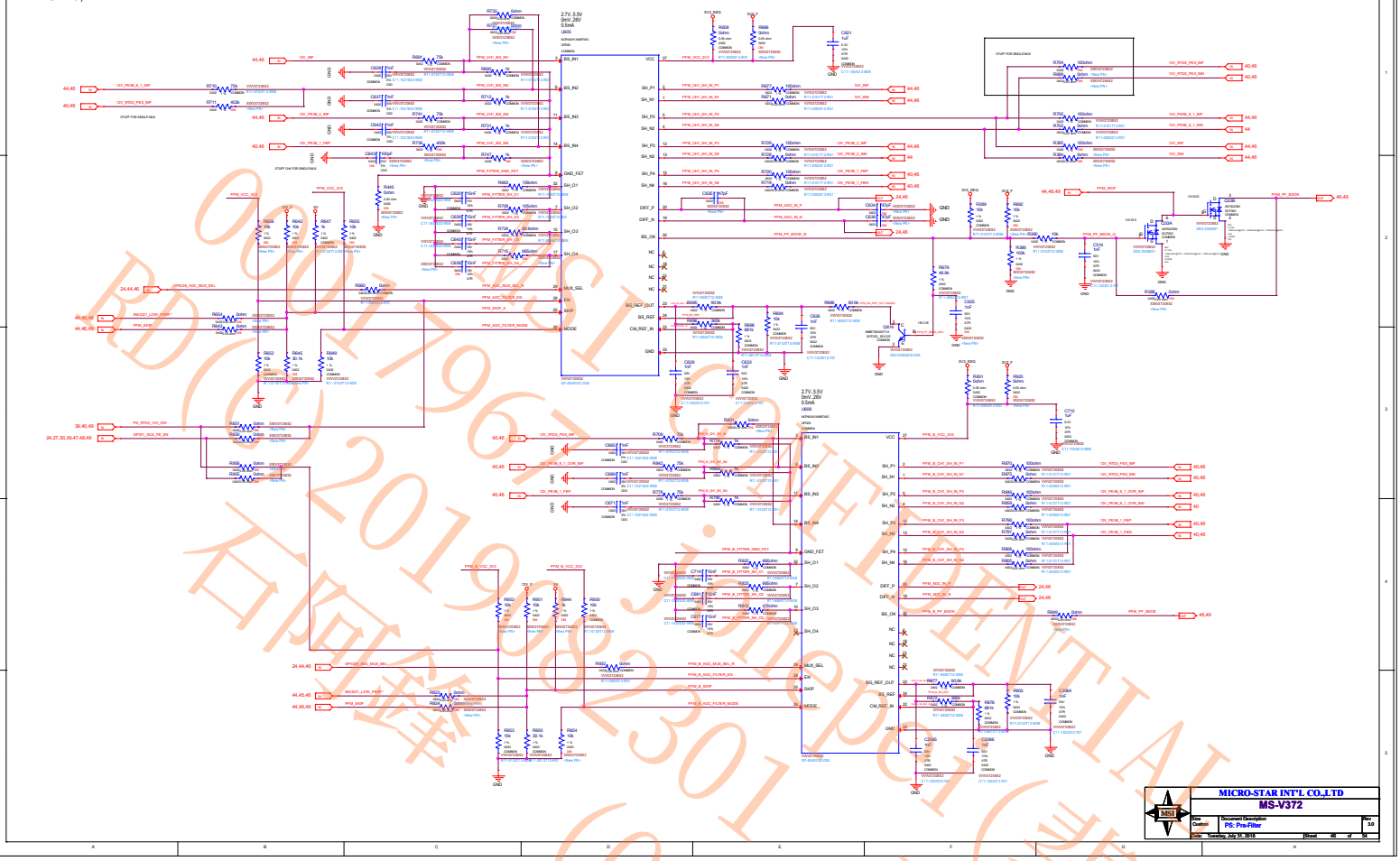




MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size / Custom	Document Description: PS: Current Steering, Hot Unplug Detect
Rev	3.0
Date: Tuesday, July 31, 2018	Sheet 45 of 54

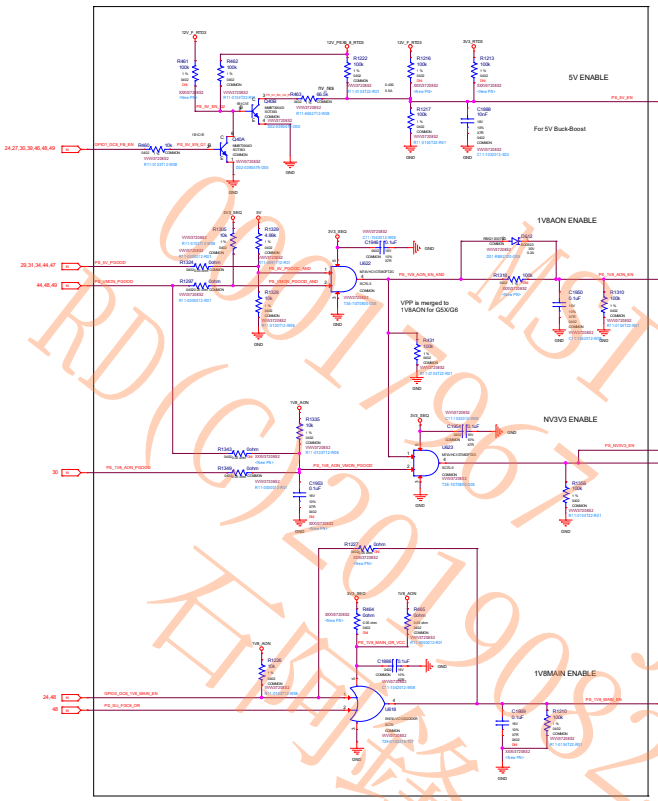
MSI CONFIDENTIAL
0001/967
RD(C)2019082301
石阿鋒
Jonpei(姜亮樂)
RMA工程課
(000068760)

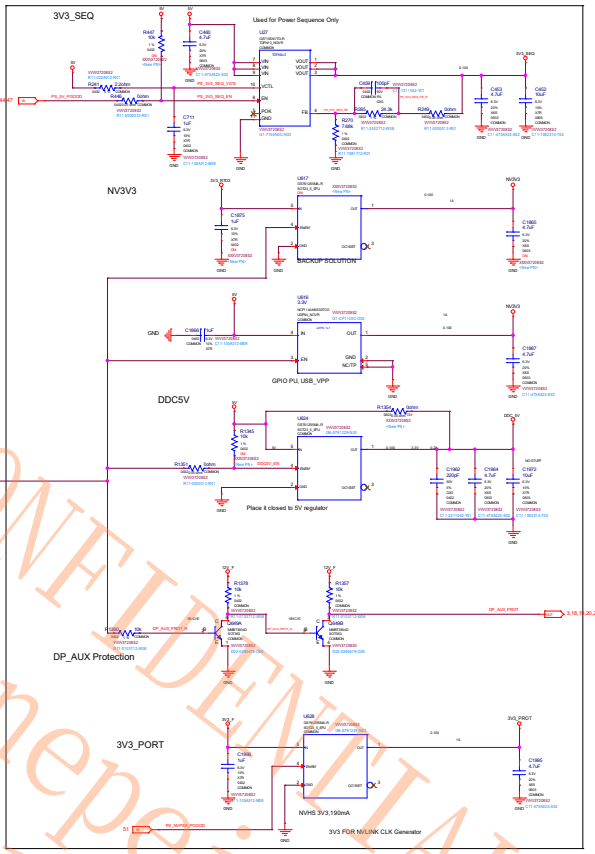
PAGE46; PS: Pre-Filter



00117961 MSI CONFIDENTIAL
BD(C)2019-982301 Jane Pan
石向鑫 (000068760) (黃亮樂)
RMA工程課

PAGE 47: SEQUENCE:5V,1V8,NV3V3 ENABLE





MICRO-STAR INT'L CO.,LTD

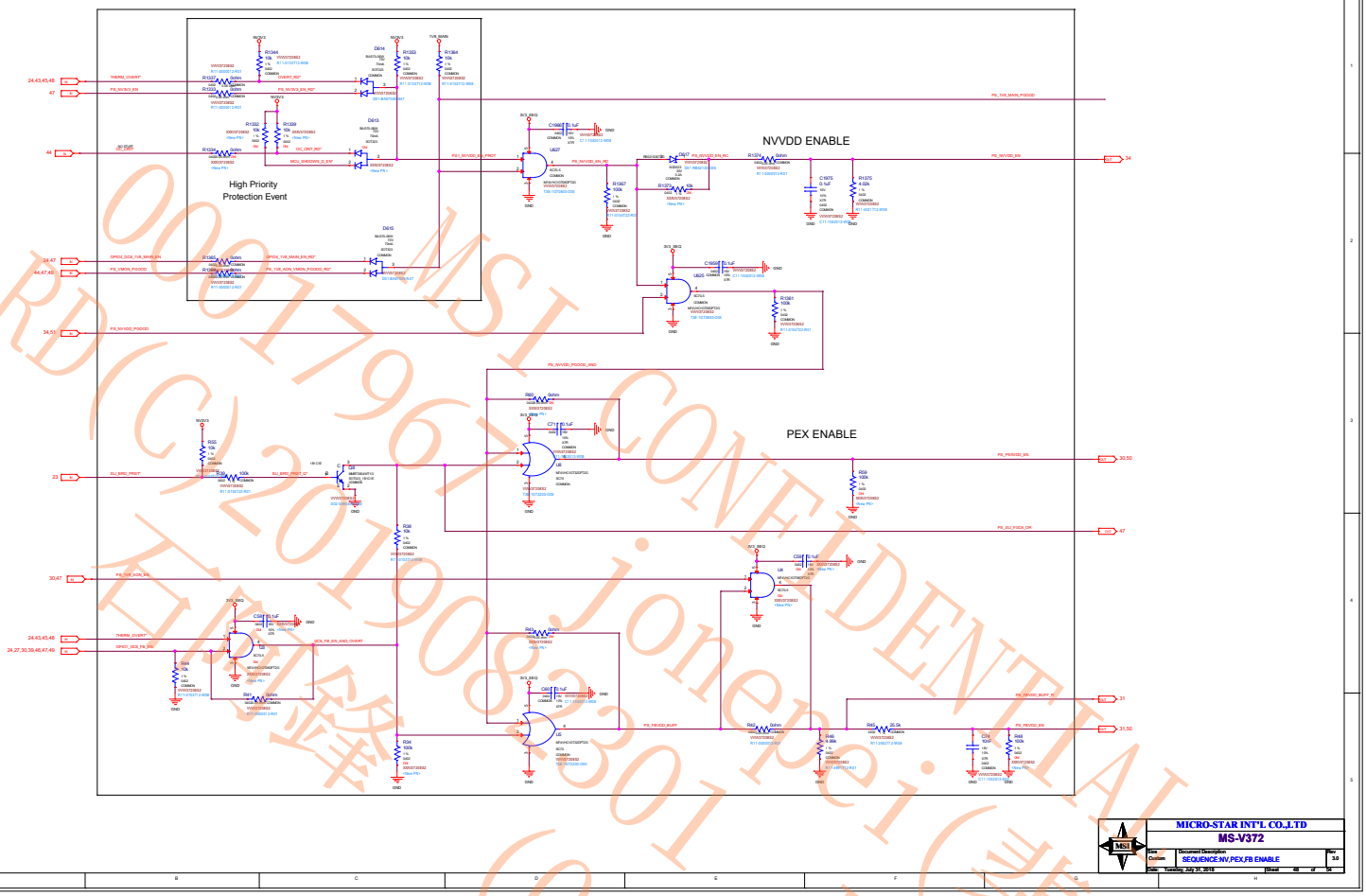
MS-V372

Size: Custom | Document Description: SEQUENCE:5V,1V8,NV3V3 ENABLE | Rev: 3.0

Date: Tuesday, July 31, 2018 | Sheet 47 of 55

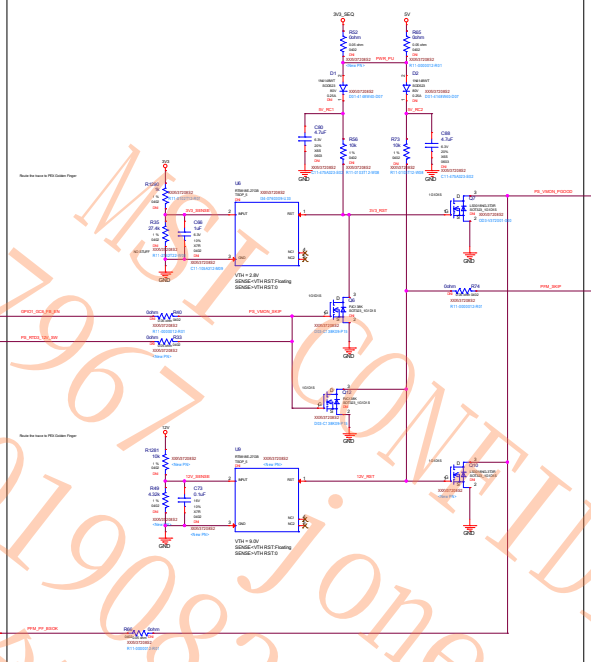
001196 MSI CONFIDENTIAL
RD(G)2019082301 Jonepei(裴亮樂)
石向峰 (00068760) RMA工程課

PAGE 48: SEQUENCE:NV,PEX,FB ENABLE



MSI CONFIDENTIAL
0017967
RD(C)20190830301
Jonepci(姜亮樂)
石俊鋒
RMA工程課
(00068760)

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(VIPU) 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

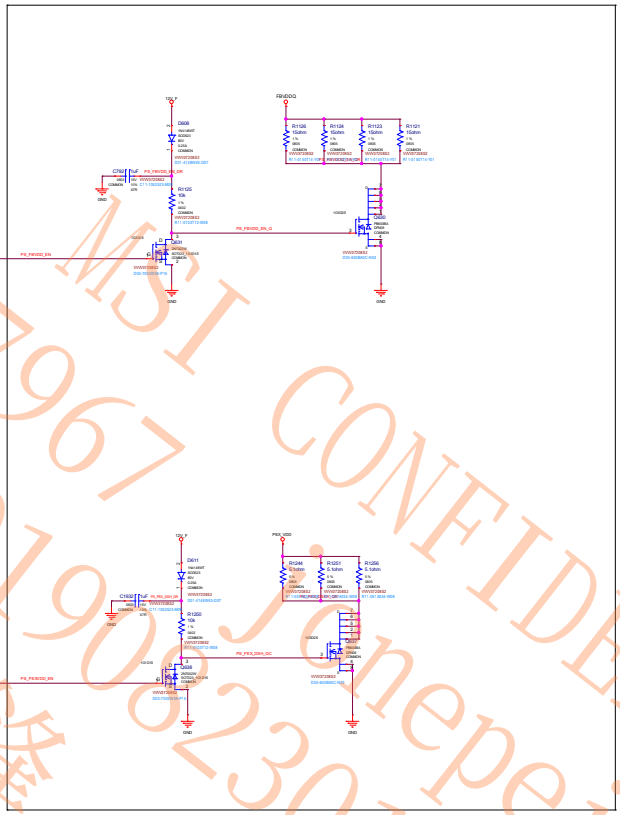
MICRO-STAR INT'L CO.,LTD
MS-V372

Size: Custom | Document Description: SEQUENCE:PCIE VOLTAGE MONITOR | Rev: 3.0

Date: Tuesday, July 31, 2018 | Sheet 49 of 54

MSI CONFIDENTIAL
0001796 7
RD(C)2019082201
石阿姨 Jonepei(裴亮樂)
(00068760)
RMA工程課

PAGE 50: SEQUENCE:DISCHARGE

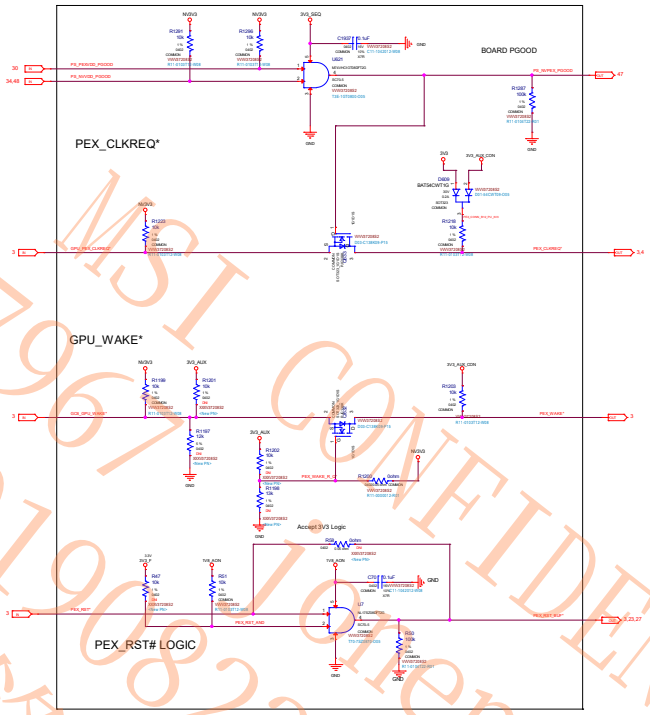


MICRO-STAR INT'L CO.,LTD

MS-V372

Size	Document Description	Rev
Custom	SEQUENCE:DISCHARGE	3.0
Date: Tuesday, July 31, 2018	Sheet 50 of 50	

MSI CONFIDENTIAL
00017967
RD(C)20190823001
石阿鋒 Jonepei(裴亮樂)
(00068760)
RMA工程課

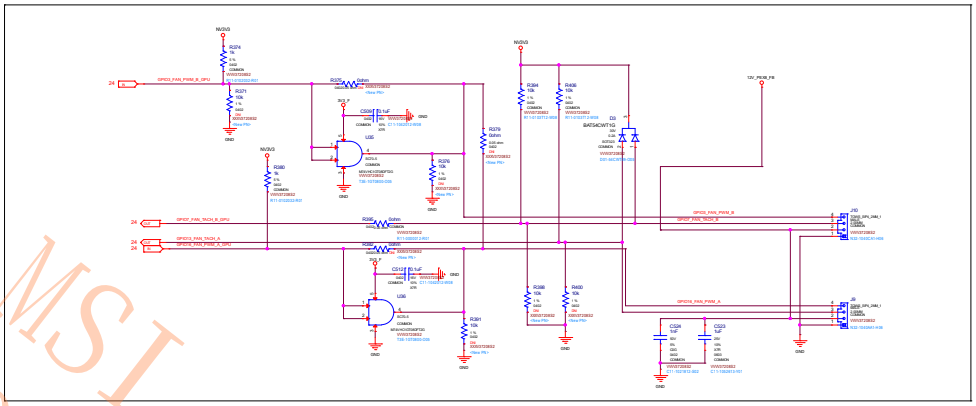


MICRO-STAR INT'L CO.,LTD	
MS-V372	
Size:	Document Description: SEQUENCE:MISC
Custom	Rev: 3.0
Date: Tuesday, July 31, 2018	Sheet 51 of 54

MSI CONFIDENTIAL
0001796782301
RD(C)2019082301 Jonepei(裴亮樂)
石阿鋒 (00068760) RMA工程課

PAGE 52: LED & FAN HEADERS

Remove LED

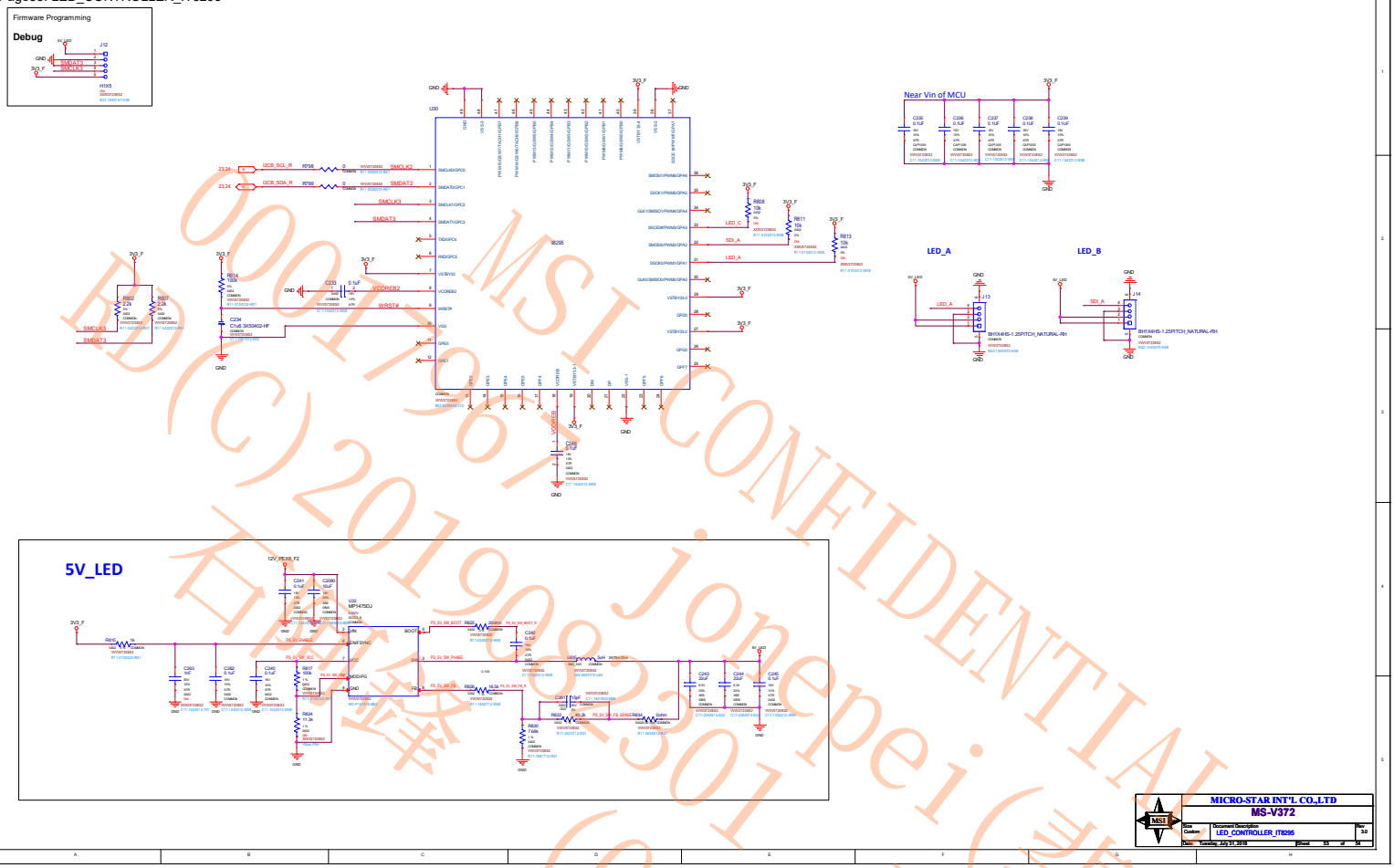


Remove LED BOOST

MSI	MICRO-STAR INT'L CO.,LTD
	MS-V372
Size:	Document Description: LED & FAN HEADERS — Rev: 3.0
Custom	
Date: Tuesday, July 31, 2018	Sheet 52 of 54

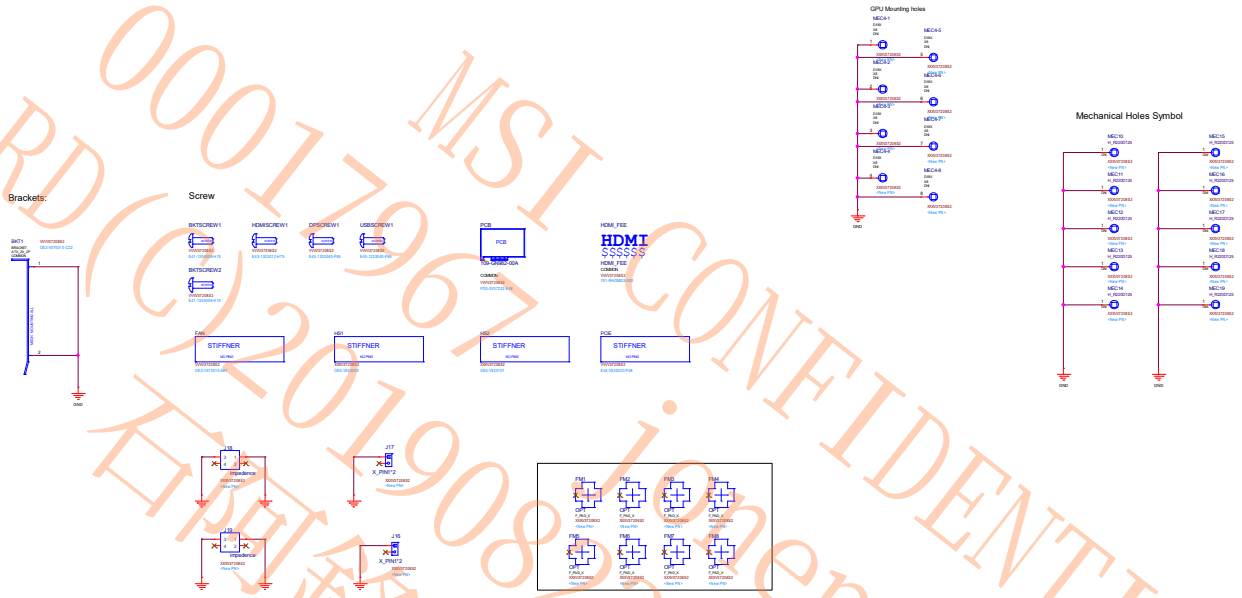
MSI CONFIDENTIAL
0001796 7
RD(C)20190823 01
jonepei(裴亮樂)
石阿鋒
(00068760)
RMA工程課

Page53: LED_CONTROLLER_IT8295



MSI CONFIDENTIAL
000179871
Jonepei(裴亮樂)
RMA工程課
(00068760)
石頭峰
(C)2019 MSI

MICRO-STAR INT'L CO.,LTD
MS-V372
Size: Document Description: LED_CONTROLLER_IT8295 Rev: 3.0
Date: Tuesday, July 31, 2018 Sheet 53 of 54



MICRO-STAR INT'L CO.,LTD
MS-V372
Size: Document Description: MECHANICAL_BRACKET/THERMAL SOLUTION Rev: 3.0
Date: Tuesday, July 31, 2018 Sheet 54 of 54

MSI CONFIDENTIAL
0001796 7
RD(C)2019082301
石阿鋒
lomepei(裴亮樂)
RMA工程課
(00068760)