AMD AM4

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29	SIO NCT6797D-M	59	PROM - GS7133 / 2.5V		
30	SIO HW Monitor / NCT7718W	60	OV Control - NCT3933		
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33	FAN TYPE-K SYSFAN1/2	63	ATX Power - FrpntPanel / EMI		
34	FAN TYPE-K SYSFAN3/4	64	LED - EZDEBUG / AMP		
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Size	Document Description	Rev
Custom	Cover Sheet	10

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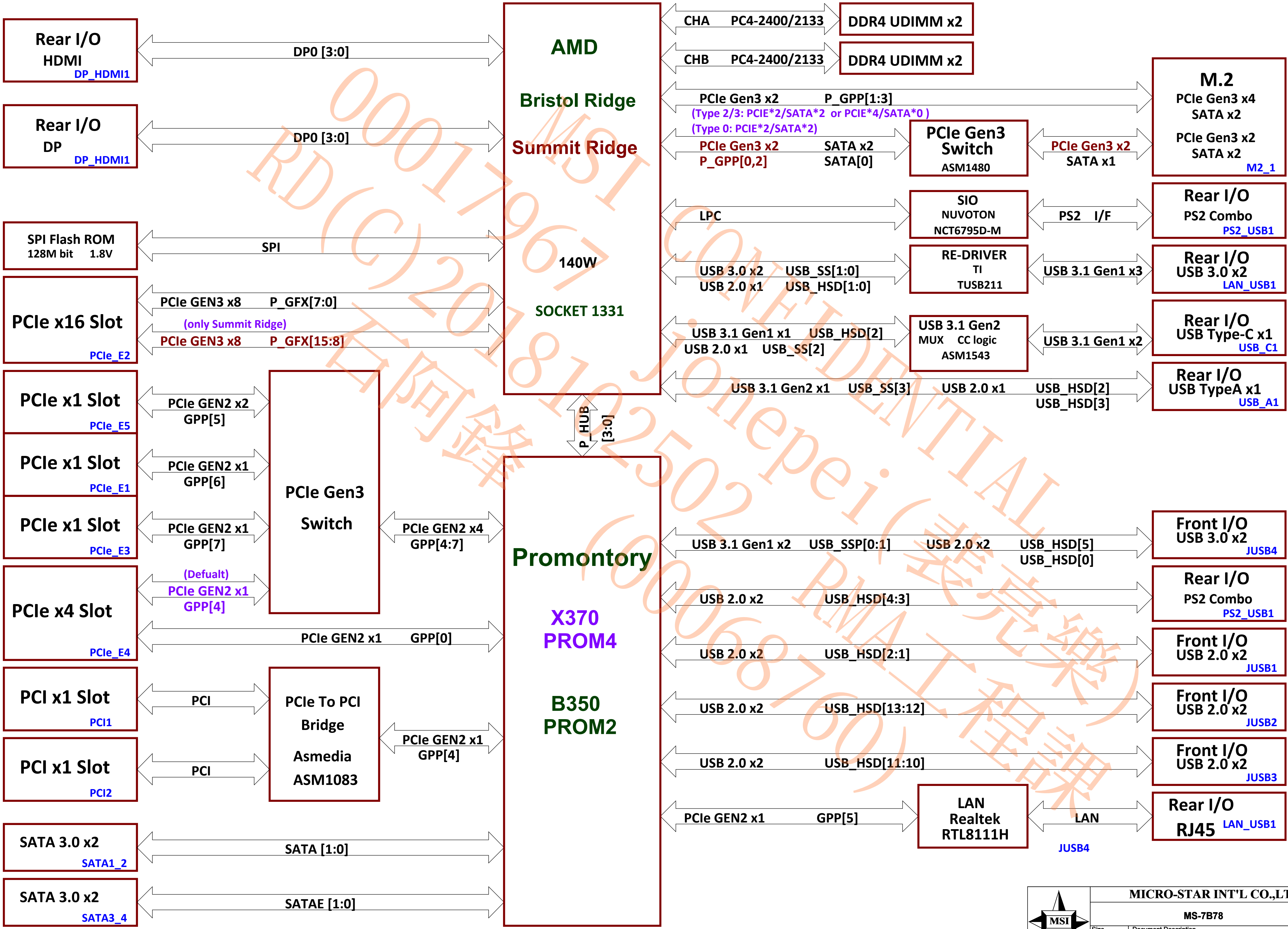

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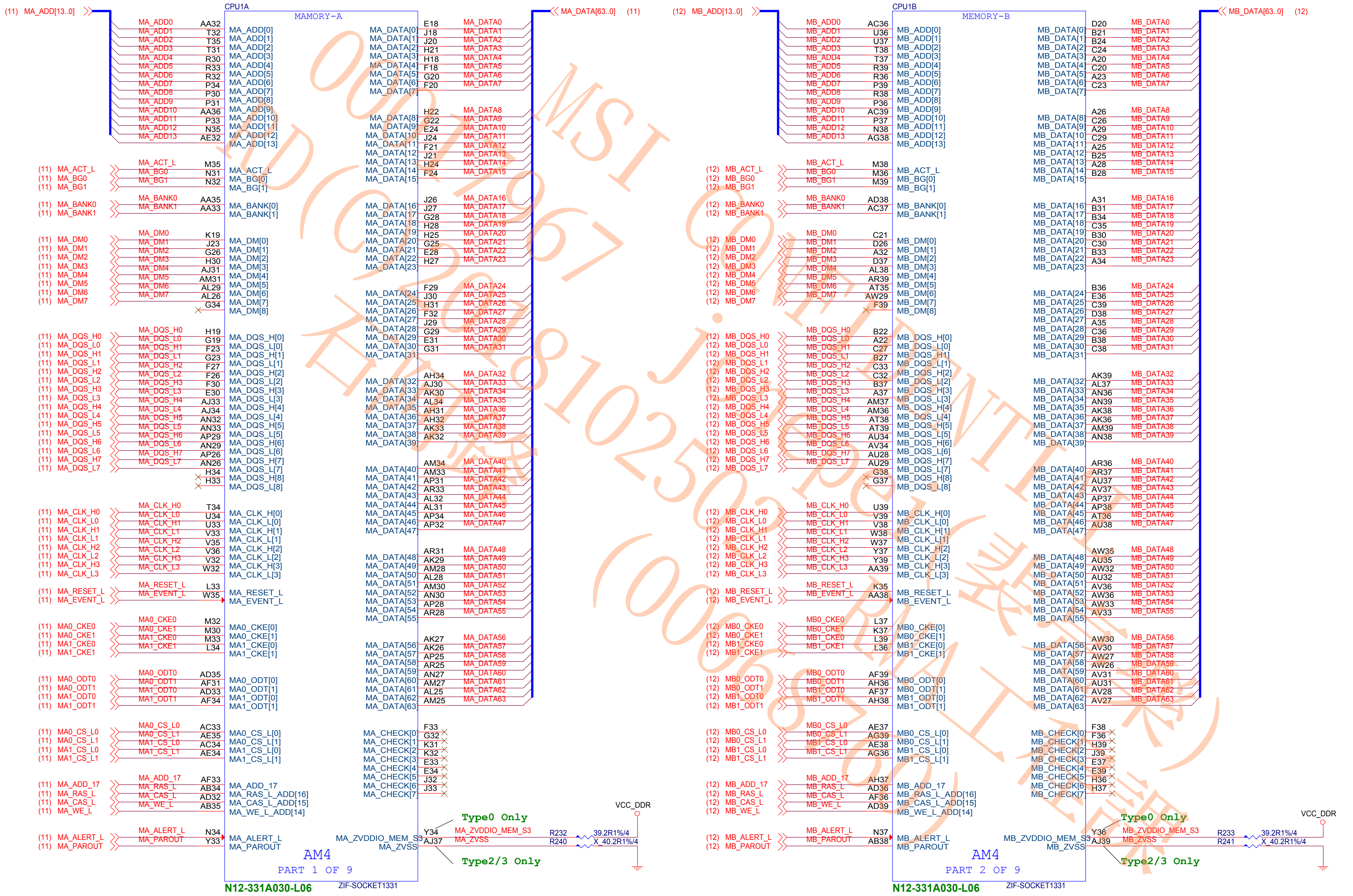
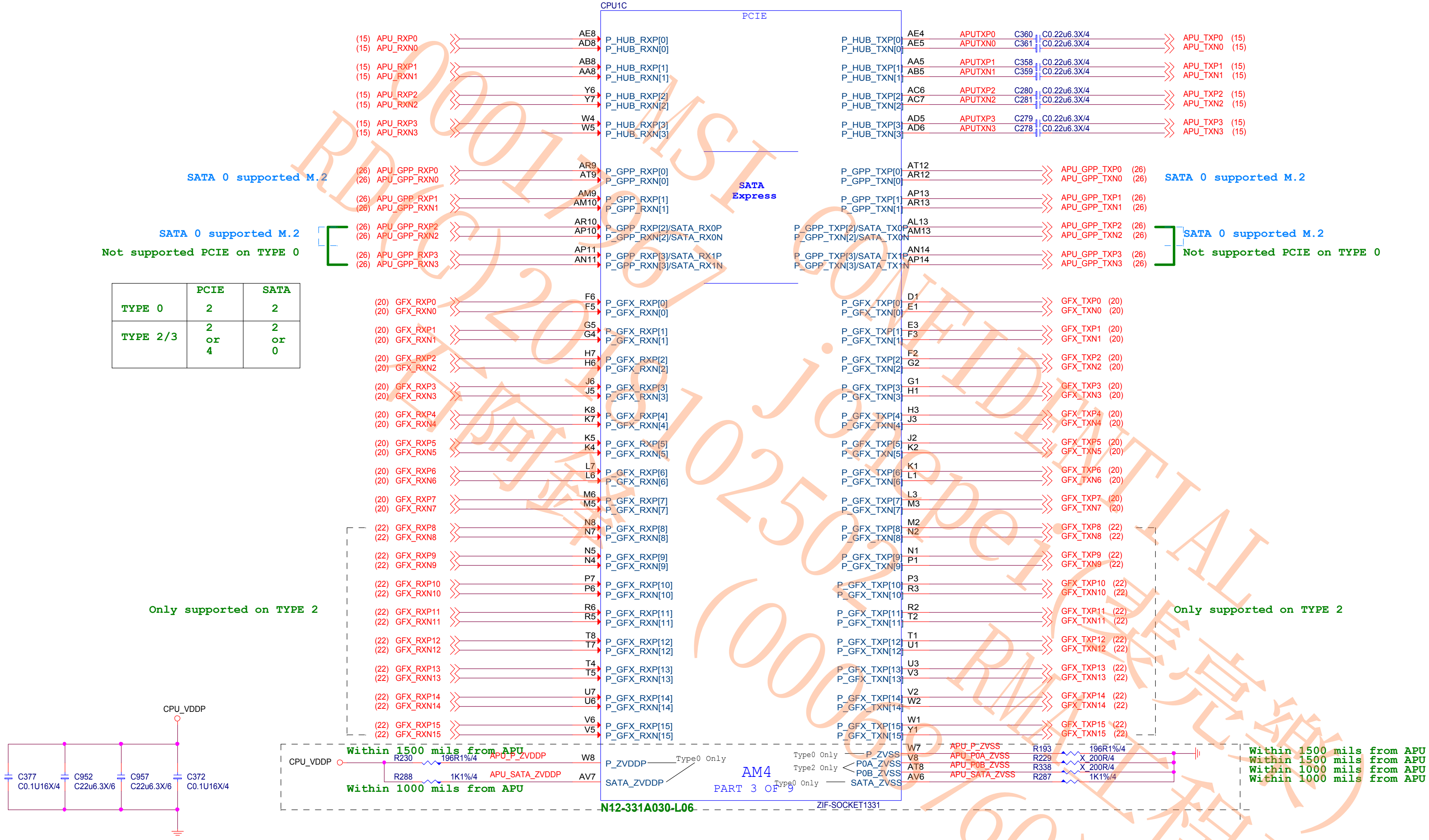
Size	Document Description	Rev
Custom	Block Diagram	10

Date: Monday, January 08, 2018 Sheet 2 of 77



MICRO-STAR INT'L CO.,LTD			
MS-7B78			
Size: Custom	Document Description: AM4 DDR4 I/F		Rev: 10
Date: Tuesday, January 09, 2018		Sheet 3 of 77	



	PCIE	SATA
TYPE 0	2	2
TYPE 2/3	2 or 4	2 or 0

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Size: Custom | Document Description: AM4 PCIE / SATAE | Rev 10

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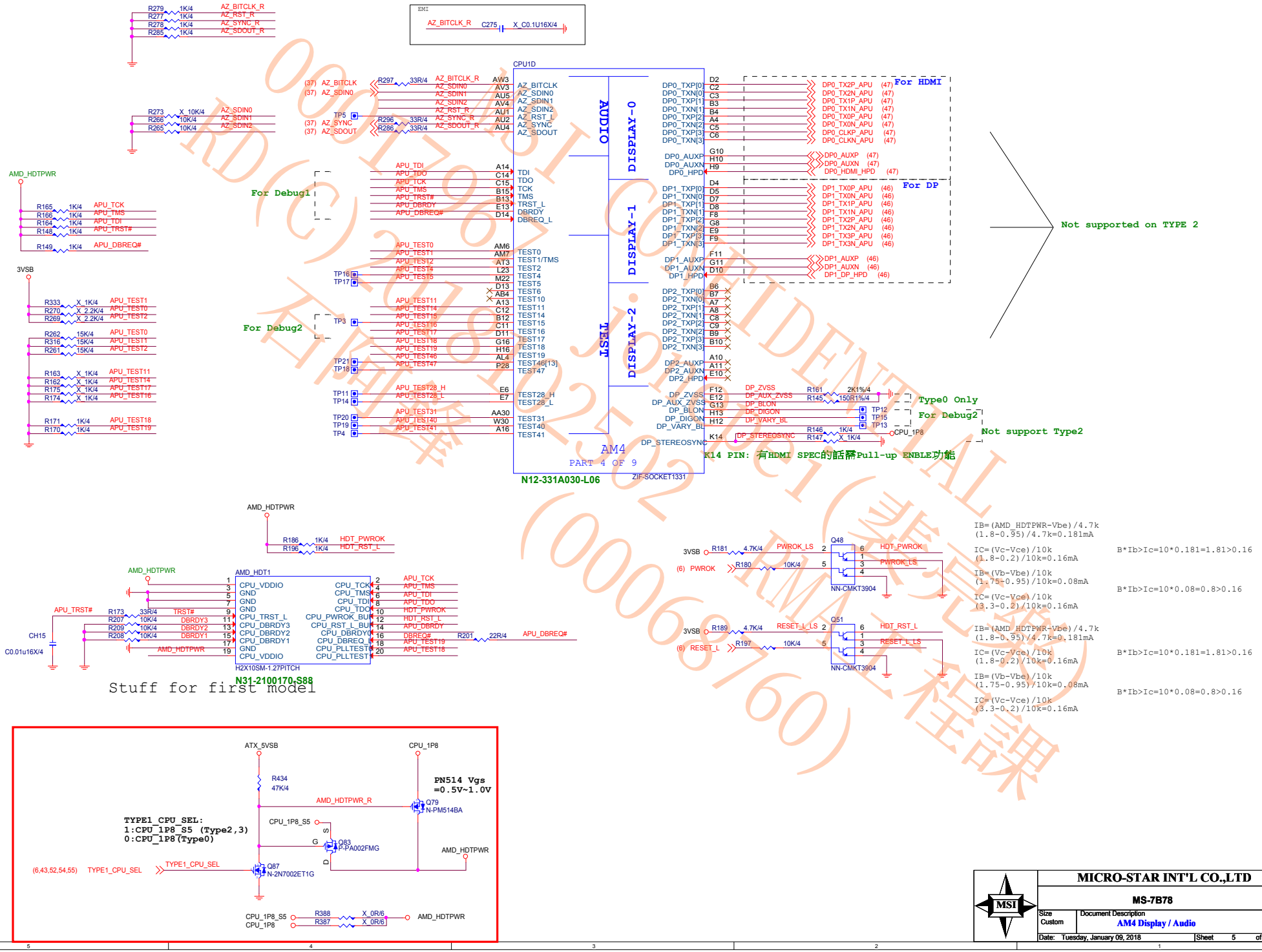
CPU1D
AM4
PART 4 OF 9
N12-331A030-L06
ZIF-SOCKET1331
AUDIO
DISPLAY-0
DISPLAY-1
DISPLAY-2
TEST
For HDMI
For DP
For Debug1
For Debug2
Not supported on TYPE 2
Type0 Only
For Debug2
Not support Type2
K14 PIN: 有HDMI SPEC的話需Pull-up ENBLE功能
AMD_HDTPWR
3VSB
AMD_HDT1
H2X10SM-1.27PITCH
N31-2100170-S88
Stuff for first model
Q48
Q51
NN-CMKT3904
IB=(AMD_HDTPWR-Vbe)/4.7k
(1.8-0.95)/4.7k=0.181mA
IC=(Vc-Vce)/10k
(1.8-0.2)/10k=0.16mA
B*Ib>Ic=10*0.181=1.81>0.16
IB=(Vb-Vbe)/10k
(1.75-0.95)/10k=0.08mA
IC=(Vc-Vce)/10k
(3.3-0.2)/10k=0.16mA
B*Ib>Ic=10*0.08=0.8>0.16
TYPE1_CPU_SEL:
1:CPU_1P8_S5 (Type2,3)
0:CPU_1P8(Type0)
PN514 Vgs
=0.5V~1.0V
Q79
N-PM514BA
Q83
P-PA002FMG
Q87
N-2N7002ET1G
ATX_5VSB
CPU_1P8
AMD_HDTPWR_R
CPU_1P8_S5
TYPE1_CPU_SEL
(6,43,52,54,55)
MICRO-STAR INT'L CO.,LTD
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Custom
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10
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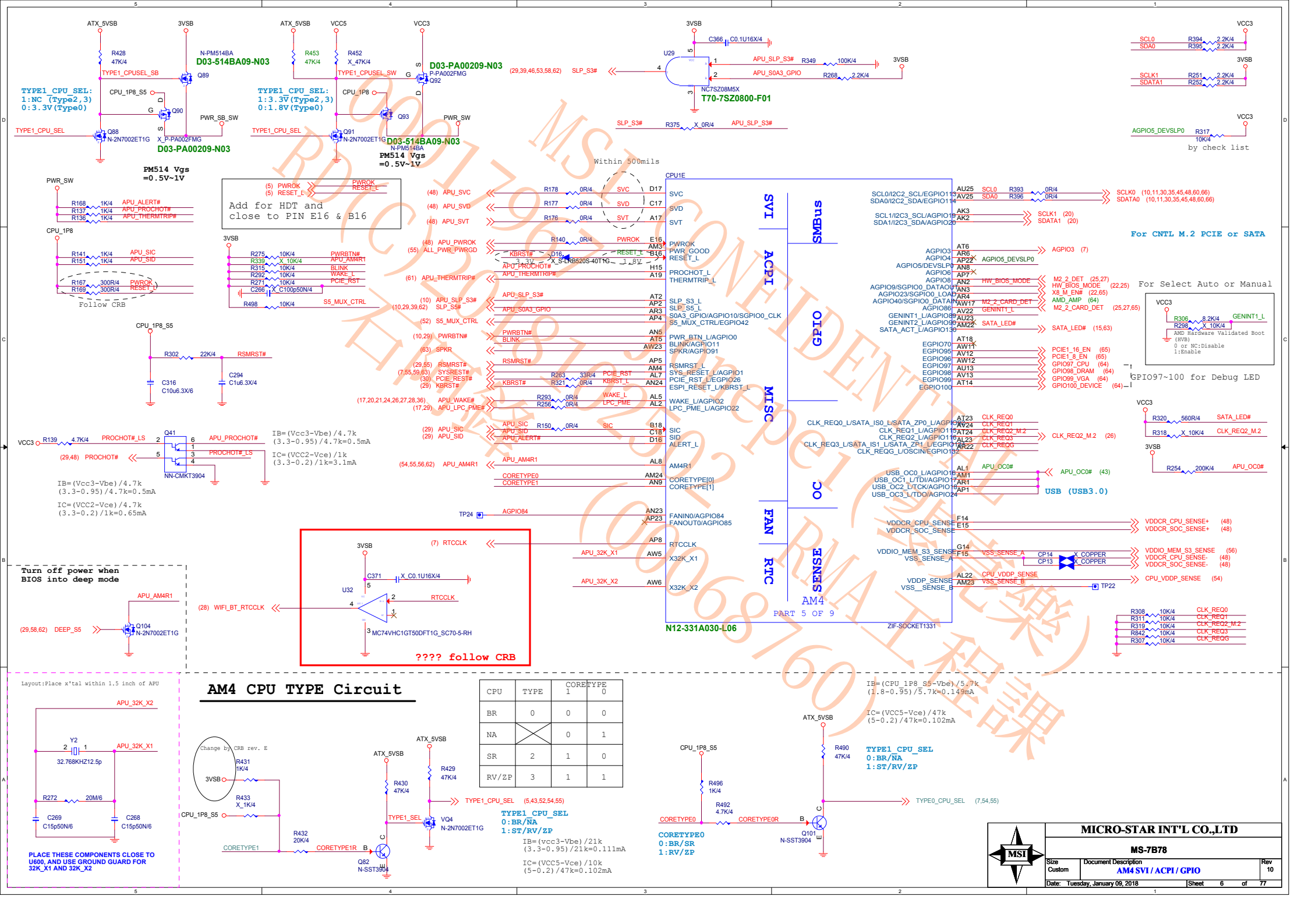
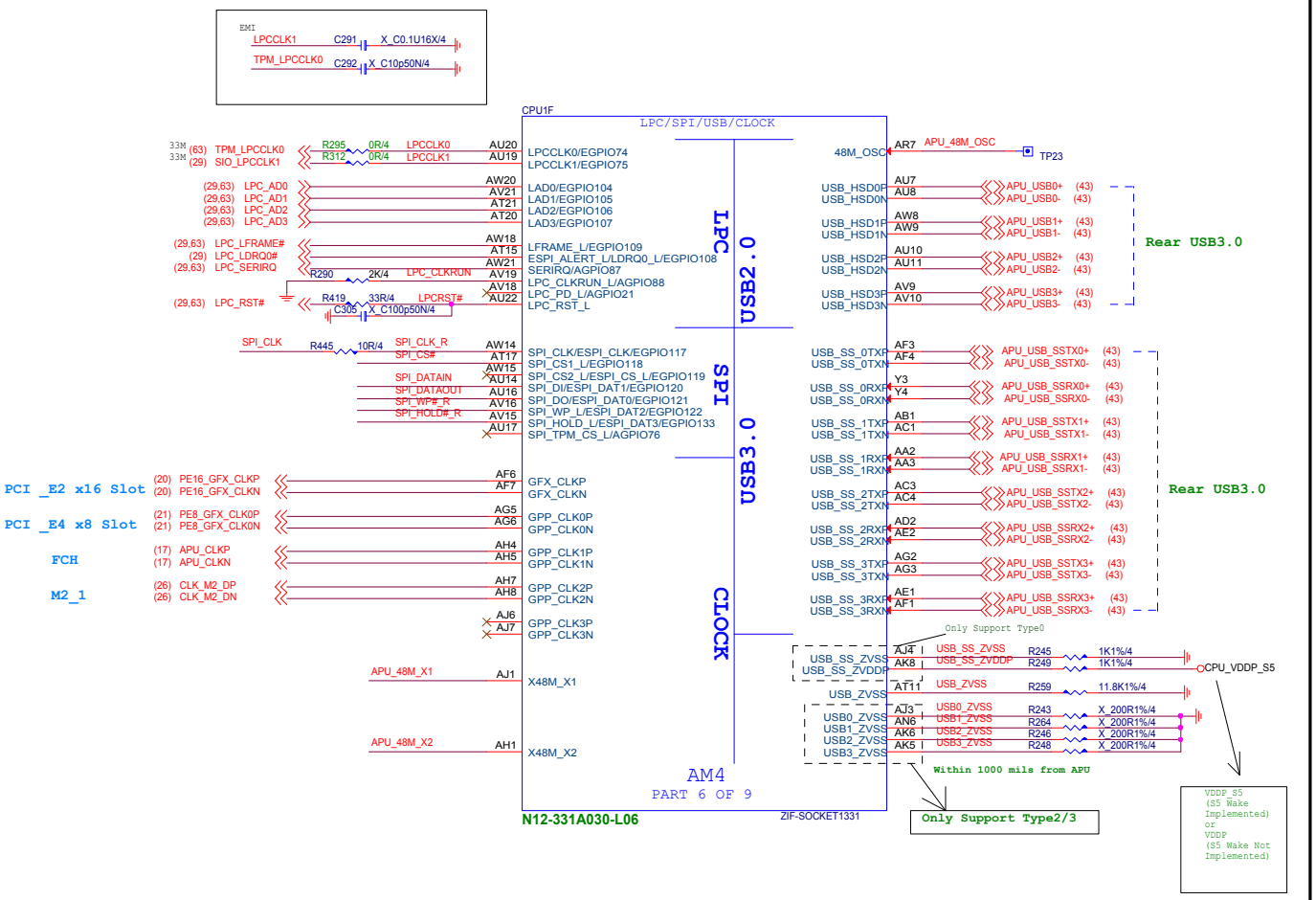
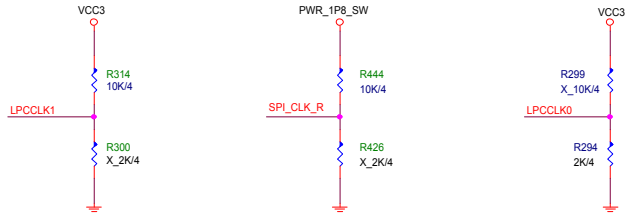


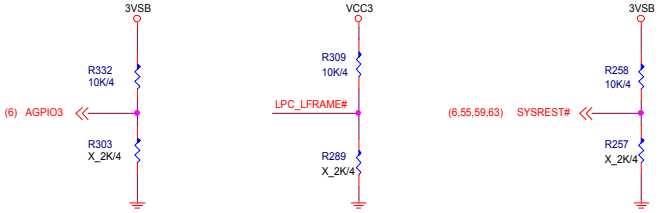
CPU	TYPE	CORETYPE 1	CORETYPE 0
BR	0	0	0
NA	X	0	1
SR	2	1	0
RV/ZP	3	1	1



Strapping Options

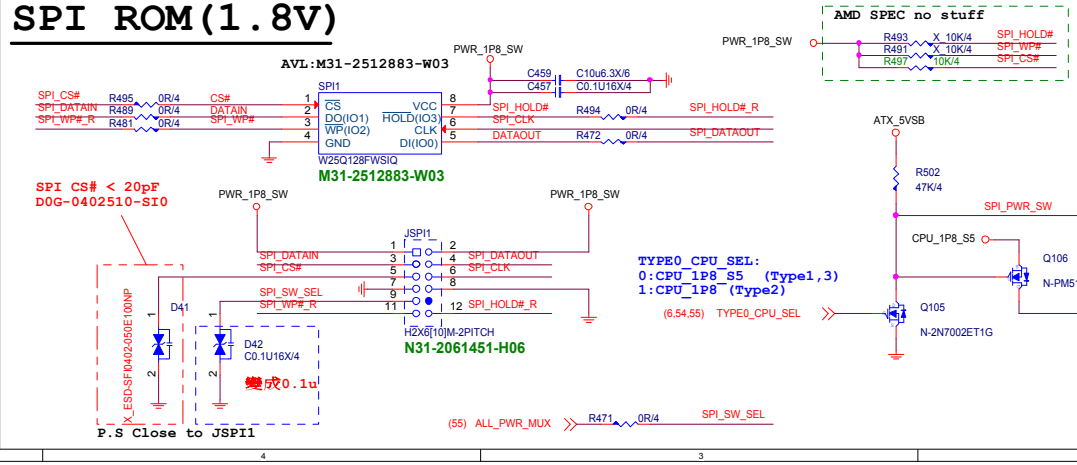


	LPCCLK1	SPI_CLK	LPCCLK0
PULL HIGH	Configured for Internal clock generator (Default)	Use 48Mhz crystal clock and generate both internal and external clocks (Default)	LPC device Boot Fail Timer Enabled
PULL LOW	Configured for External clock generator ?????	Use 100Mhz PCIE clock as reference clock and generate internal clocks only	LPC device Boot Fail Timer Disabled (Default)

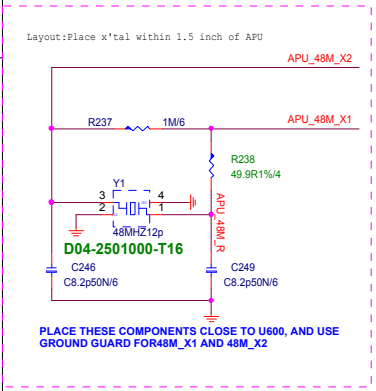


	AGPIO3	SIO_LFRAME	SYSREST#
PULL HIGH	Enhanced Reset logic (Default)	SPI ROM (Default)	Normal reset mode (Default)
PULL LOW	Traditional Reset logic	LPC ROM	short reset mode

SPI ROM(1.8V)



	RTCCLK
PULL HIGH	RTC Coin Battery is on board (Default)
PULL LOW	RTC Coin Battery is not on board



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MS-7B78
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Document Description: AM4 LPC / SPI / USB / CLK / STRAP
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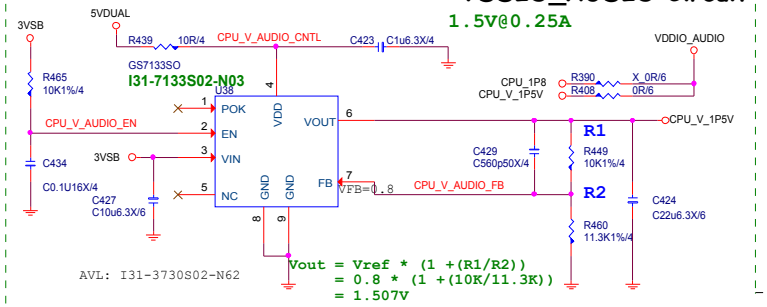
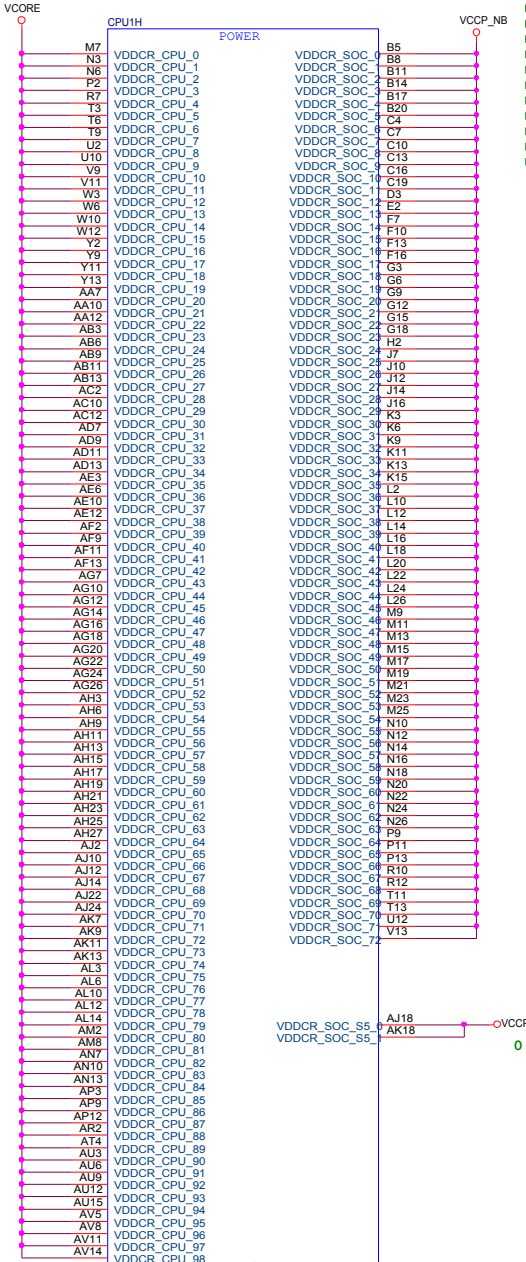
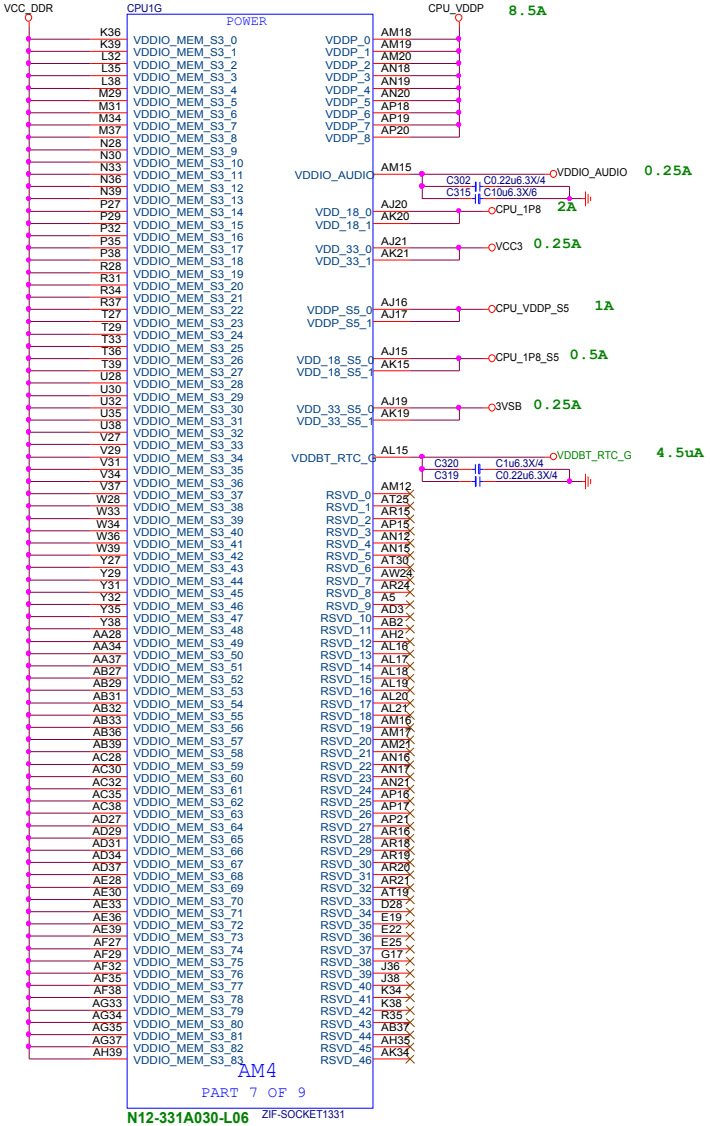
VDDIO_AUDIO Circuit

1.5V@0.25A



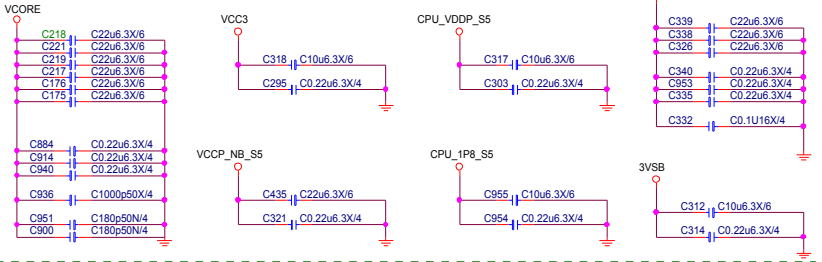




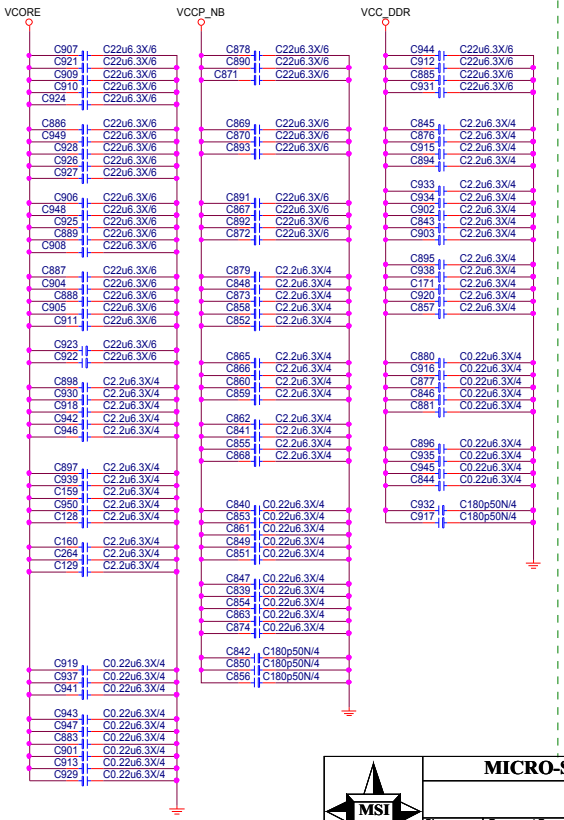
N12-331A030-L06

N12-331A030-L06

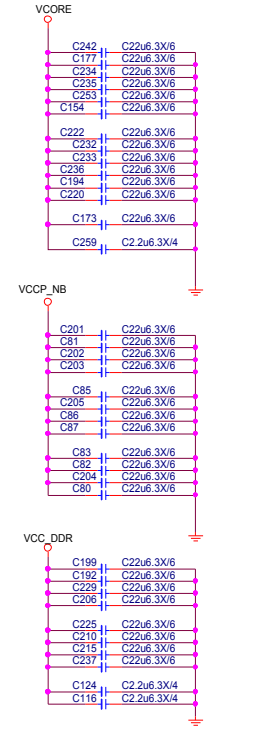
TOP SIDE



BOTTOM SIDE



TOP CAVITY



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MS-7B78		
Size: Custom	Document Description: AM4 Power / VDDIO_AUDIO	Rev: 10
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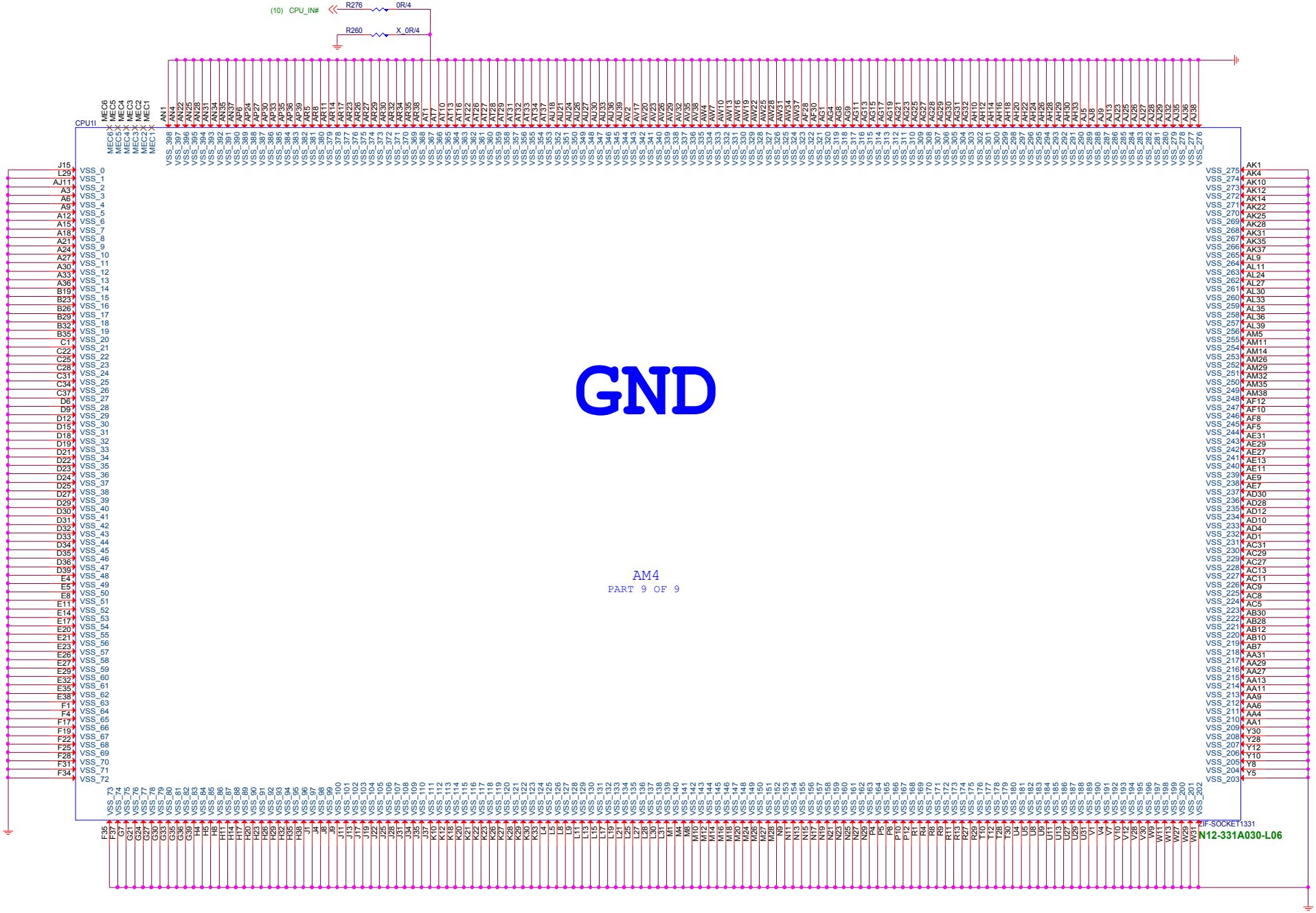

MICRO-STAR INT'L CO.,LTD		
MS-7B78		
Size: Custom	Document Description: AM4 GND	Rev: 10
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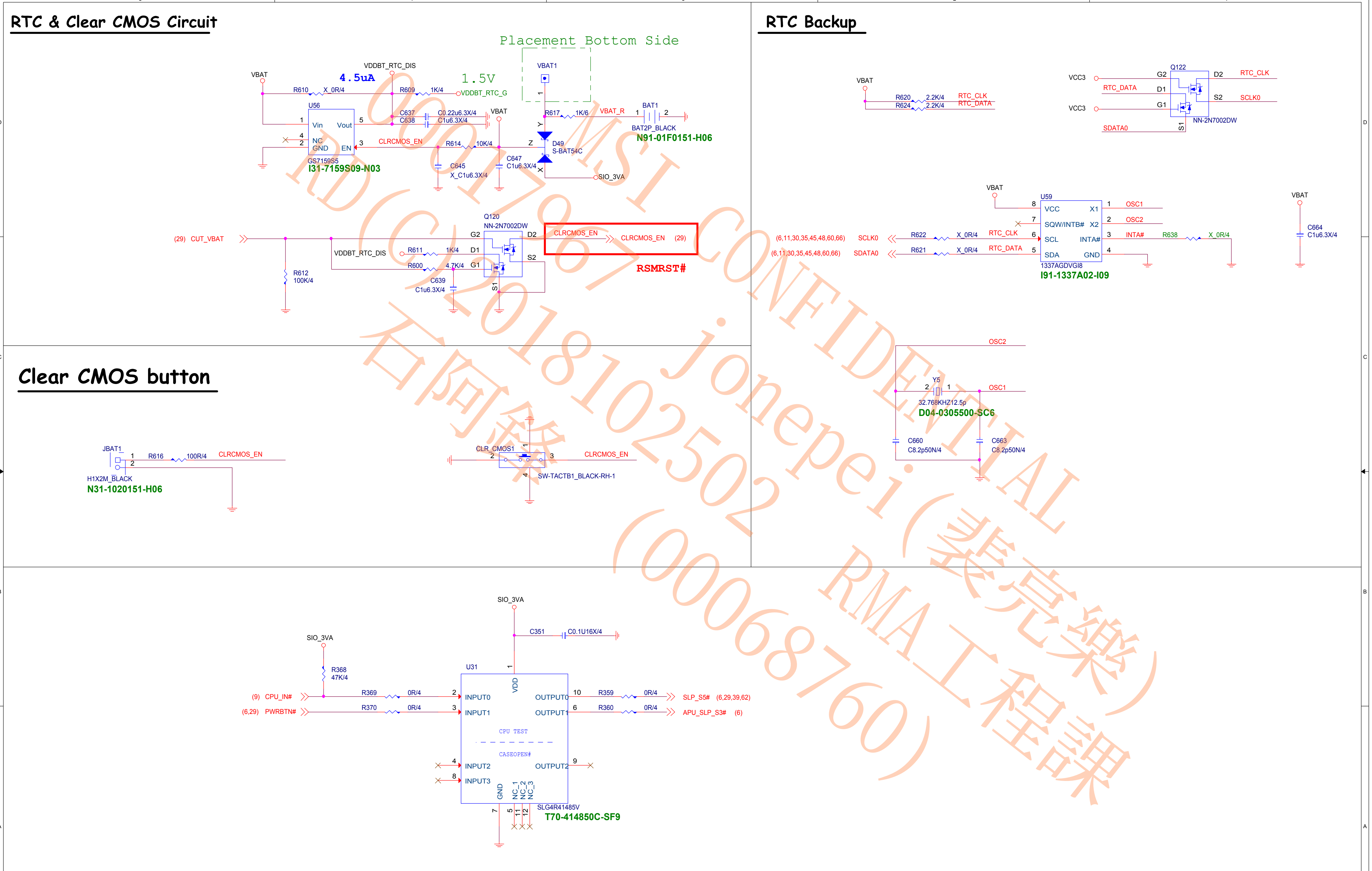

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	RTC / CMOS	10

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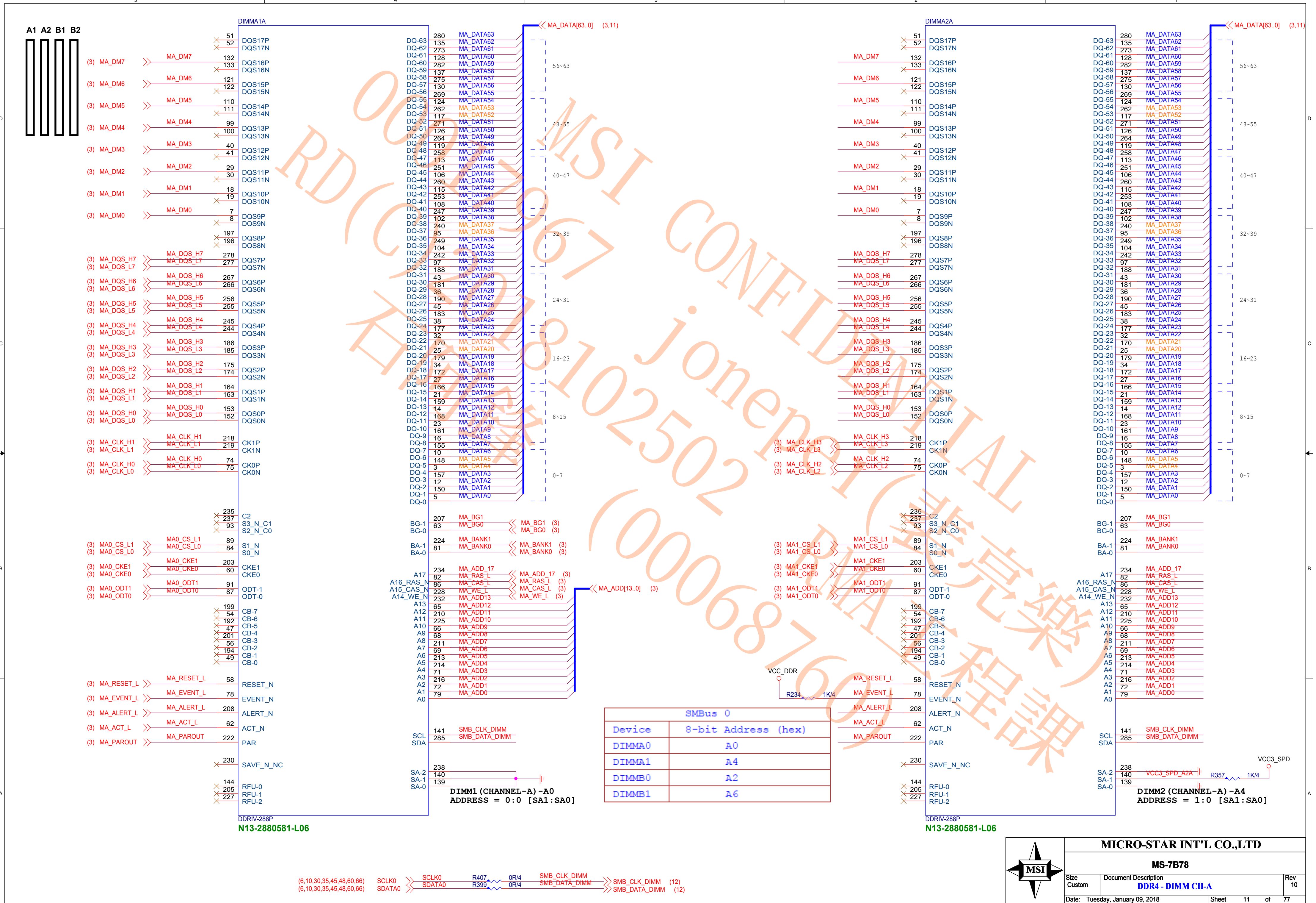

SMBus 0	
Device	8-bit Address (hex)
DIMMA0	A0
DIMMA1	A4
DIMMB0	A2
DIMMB1	A6

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Custom	DDR4 - DIMM CH-A	10

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MICRO-STAR INT'L CO.,LTD

MS-7B78

Size	Document Description	Rev
Custom	DDR4 - DIMM CH-B	10

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avl:D08-0301100-B07

F6
VCC3 1 2 VCC3_SPD
F-SPR-P260T
D08-0301000-P16

DIMM SLOT PN BY SPEC

DIMMA1C
VCC_DDR
1 12V3_NC_1
145 12V3_NC_145
VCC3_SPD 284 VDDSPD
VPP25 142 143 286 287 288 VPP-1 VPP-2 VPP-3 VPP-4 VPP-5
VTT_DDR 77 221 VTT-1 VTT-2
DIMM_CA_VREF_A 146 VREFCA
MEC3 MEC2 MEC1 MEC3 MEC2 MEC1
VDD-0 236, VDD-1 233, VDD-2 231, VDD-3 229, VDD-4 226, VDD-5 223, VDD-6 220, VDD-7 217, VDD-8 215, VDD-9 212, VDD-10 209, VDD-11 206, VDD-12 204, VDD-13 92, VDD-14 90, VDD-15 88, VDD-16 85, VDD-17 83, VDD-18 80, VDD-19 76, VDD-20 73, VDD-21 70, VDD-22 67, VDD-23 64, VDD-24 61, VDD-25 59
DDRIV-288P
N13-2880581-L06

DIMMA2C
VCC_DDR
1 12V3_NC_1
145 12V3_NC_145
VCC3_SPD 284 VDDSPD
VPP25 142 143 286 287 288 VPP-1 VPP-2 VPP-3 VPP-4 VPP-5
VTT_DDR 77 221 VTT-1 VTT-2
DIMM_CA_VREF_A 146 VREFCA
MEC3 MEC2 MEC1 MEC3 MEC2 MEC1
VDD-0 236, VDD-1 233, VDD-2 231, VDD-3 229, VDD-4 226, VDD-5 223, VDD-6 220, VDD-7 217, VDD-8 215, VDD-9 212, VDD-10 209, VDD-11 206, VDD-12 204, VDD-13 92, VDD-14 90, VDD-15 88, VDD-16 85, VDD-17 83, VDD-18 80, VDD-19 76, VDD-20 73, VDD-21 70, VDD-22 67, VDD-23 64, VDD-24 61, VDD-25 59
DDRIV-288P
N13-2880581-L06

DDR VREF

(place resistors close to DIMMs)

DIMM_CA_VREF_A
C33 C0.1U16X/4
VCC_DDR

DIMM_CA_VREF_A
VCC_DDR
R62 1K1%/4
C31 C0.1U16X/4
C38 C1000p50X/4
C50 C0.1U16X/4
R70 1K1%/4

VCC3_SPD C380 C0.1U16X/4
DIMM_CA_VREF_A C60 C72 C2.2u6.3X/4 C0.1U16X/4
VTT_DDR C185 C0.1U16X/4
VPP25 C386 C388 C0.1U16X/4

VCC_DDR C158 C245 C145 C261 C167 C250 C256 C244 C1u6.3X/6 C0.1U16X/4

VCC3_SPD C373 C0.1U16X/4
DIMM_CA_VREF_A C71 C59 C2.2u6.3X/4 C0.1U16X/4
VTT_DDR C227 C0.1U16X/4
VPP25 C405 C418 C0.1U16X/4

VCC_DDR C144 C130 C131 C146 C1u6.3X/6
C165 C138 C157 C148 C0.1U16X/4

(65) DIMMA1_DET
D4
0.1u16X

DIMMA1B
VSS-93 2, VSS-92 4, VSS-91 6, VSS-90 9, VSS-89 11, VSS-88 13, VSS-87 15, VSS-86 17, VSS-85 20, VSS-84 22, VSS-83 24, VSS-82 26, VSS-81 28, VSS-80 31, VSS-79 33, VSS-78 35, VSS-77 37, VSS-76 39, VSS-75 42, VSS-74 44, VSS-73 46, VSS-72 48, VSS-71 50, VSS-70 53, VSS-69 55, VSS-68 57, VSS-67 94, VSS-66 96, VSS-65 98, VSS-64 101, VSS-63 103, VSS-62 105, VSS-61 107, VSS-60 109, VSS-59 112, VSS-58 114, VSS-57 116, VSS-56 118, VSS-55 120, VSS-54 123, VSS-53 125, VSS-52 127, VSS-51 129, VSS-50 131, VSS-49 134, VSS-48 136, VSS-47 138
VSS-46 147, VSS-45 149, VSS-44 151, VSS-43 154, VSS-42 156, VSS-41 158, VSS-40 160, VSS-39 162, VSS-38 165, VSS-37 167, VSS-36 169, VSS-35 171, VSS-34 173, VSS-33 176, VSS-32 178, VSS-31 180, VSS-30 182, VSS-29 184, VSS-28 187, VSS-27 189, VSS-26 191, VSS-25 193, VSS-24 195, VSS-23 198, VSS-22 200, VSS-21 202, VSS-20 239, VSS-19 241, VSS-18 243, VSS-17 246, VSS-16 248, VSS-15 250, VSS-14 252, VSS-13 254, VSS-12 257, VSS-11 259, VSS-10 261, VSS-9 263, VSS-8 265, VSS-7 268, VSS-6 270, VSS-5 272, VSS-4 274, VSS-3 276, VSS-2 279, VSS-1 281, VSS-0 283
DDRIV-288P
N13-2880581-L06

(65) DIMMA2_DET
D5
0.1u16X

DIMMA2B
VSS-93 2, VSS-92 4, VSS-91 6, VSS-90 9, VSS-89 11, VSS-88 13, VSS-87 15, VSS-86 17, VSS-85 20, VSS-84 22, VSS-83 24, VSS-82 26, VSS-81 28, VSS-80 31, VSS-79 33, VSS-78 35, VSS-77 37, VSS-76 39, VSS-75 42, VSS-74 44, VSS-73 46, VSS-72 48, VSS-71 50, VSS-70 53, VSS-69 55, VSS-68 57, VSS-67 94, VSS-66 96, VSS-65 98, VSS-64 101, VSS-63 103, VSS-62 105, VSS-61 107, VSS-60 109, VSS-59 112, VSS-58 114, VSS-57 116, VSS-56 118, VSS-55 120, VSS-54 123, VSS-53 125, VSS-52 127, VSS-51 129, VSS-50 131, VSS-49 134, VSS-48 136, VSS-47 138
VSS-46 147, VSS-45 149, VSS-44 151, VSS-43 154, VSS-42 156, VSS-41 158, VSS-40 160, VSS-39 162, VSS-38 165, VSS-37 167, VSS-36 169, VSS-35 171, VSS-34 173, VSS-33 176, VSS-32 178, VSS-31 180, VSS-30 182, VSS-29 184, VSS-28 187, VSS-27 189, VSS-26 191, VSS-25 193, VSS-24 195, VSS-23 198, VSS-22 200, VSS-21 202, VSS-20 239, VSS-19 241, VSS-18 243, VSS-17 246, VSS-16 248, VSS-15 250, VSS-14 252, VSS-13 254, VSS-12 257, VSS-11 259, VSS-10 261, VSS-9 263, VSS-8 265, VSS-7 268, VSS-6 270, VSS-5 272, VSS-4 274, VSS-3 276, VSS-2 279, VSS-1 281, VSS-0 283
DDRIV-288P
N13-2880581-L06

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DDR VREF

(place resistors close to DIMMs)

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Custom	DDR4 - POWER/GND-2	10

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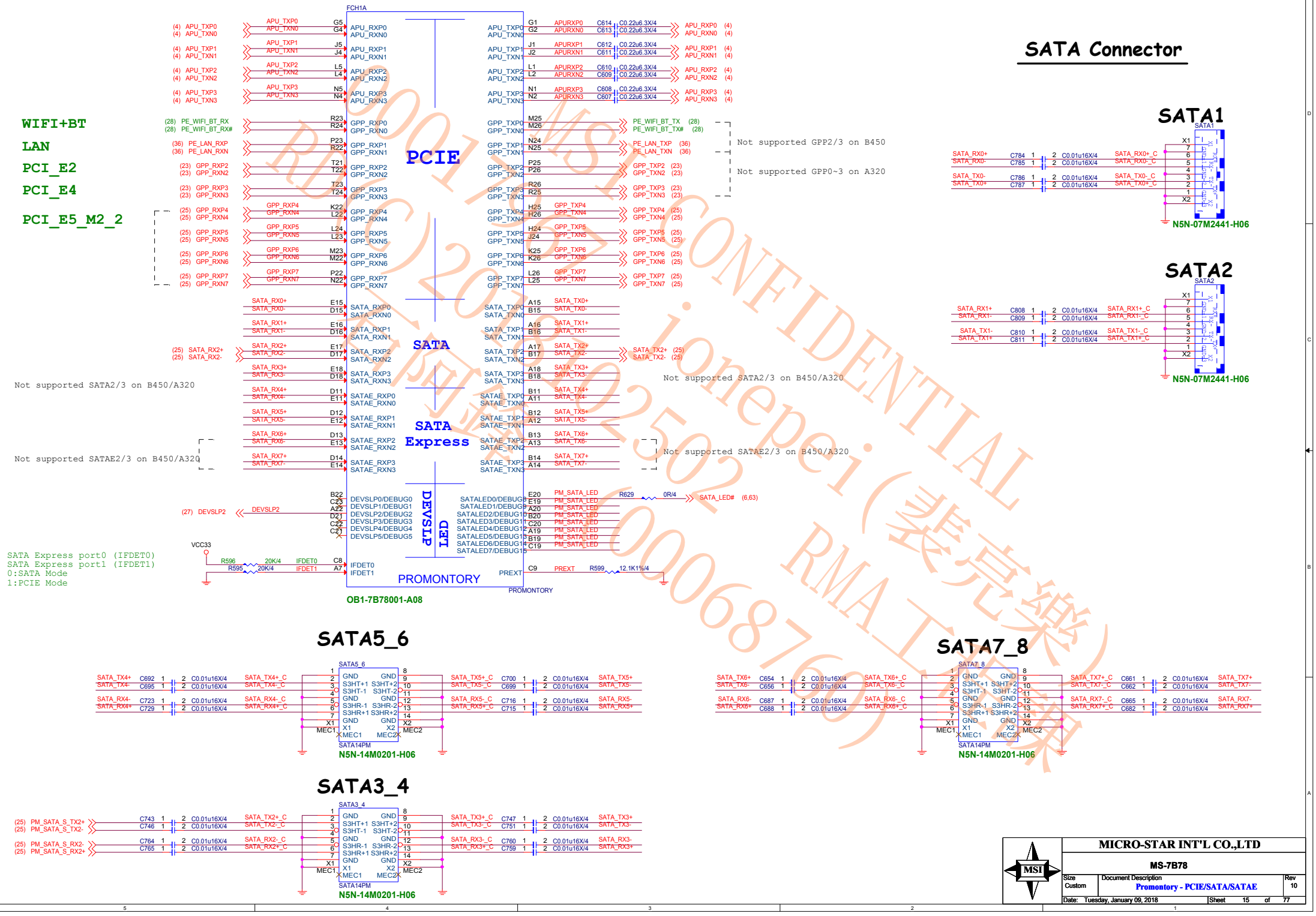
SATA Connector
WIFI+BT
LAN
PCI_E2
PCI_E4
PCI_E5_M2_2
FCH1A
PCIE
SATA
SATA Express
DEVSLP
LED
PROMONTORY
Not supported GPP2/3 on B450
Not supported GPP0~3 on A320
Not supported SATA2/3 on B450/A320
Not supported SATAE2/3 on B450/A320
SATA Express port0 (IFDET0)
SATA Express port1 (IFDET1)
0:SATA Mode
1:PCIE Mode
OB1-7B78001-A08
SATA1
SATA2
SATA5_6
SATA7_8
SATA3_4
N5N-07M2441-H06
N5N-14M0201-H06
MICRO-STAR INT'L CO.,LTD
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Promontory - PCIE/SATA/SATAE
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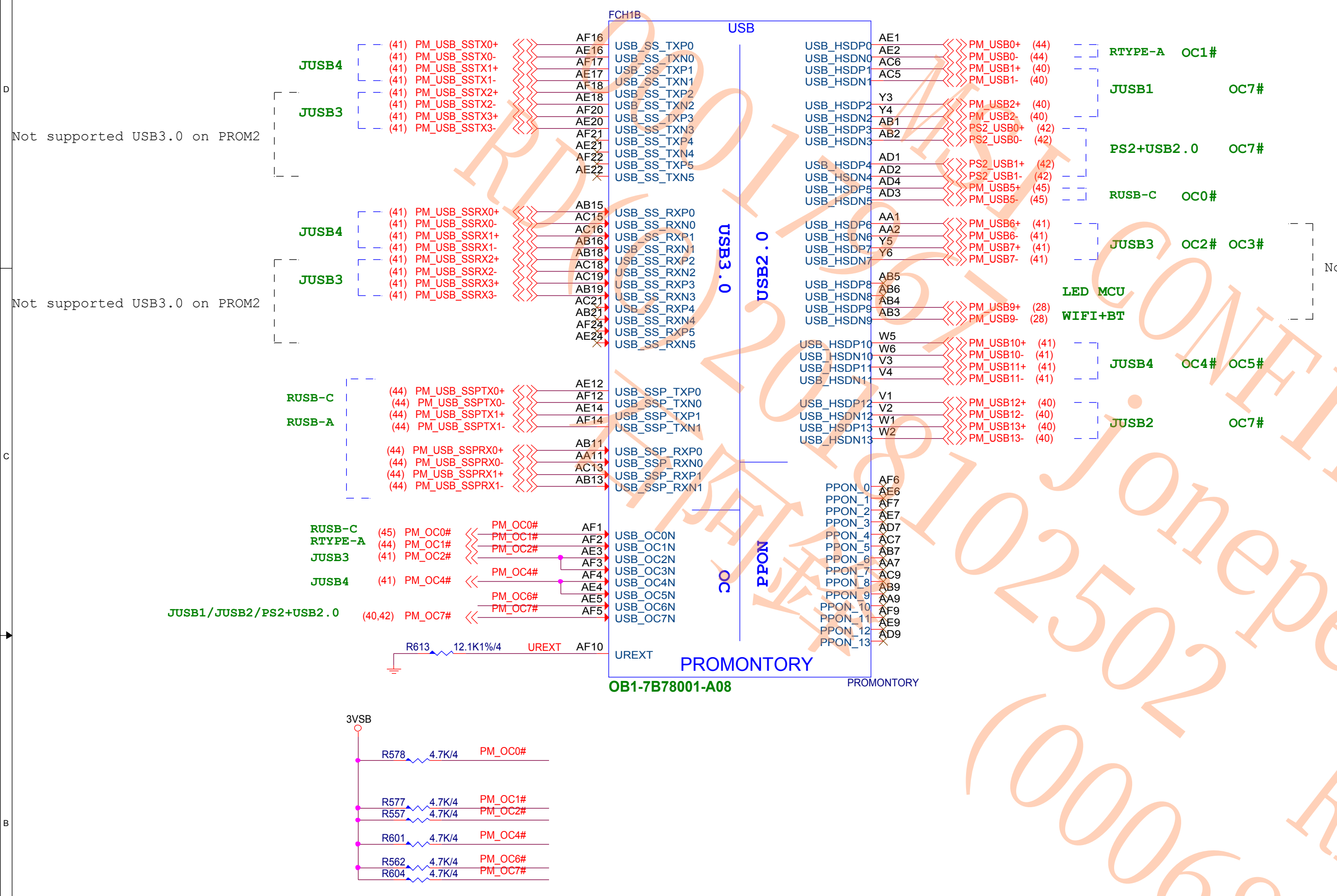

Appendix D USB Port to OC Pin Mapping

USB3.1	USB2.0	USB_OC
USB_SSP_TX/RXP/N[0]	USB_HSDP/N[5]	USB_OC0N
USB_SSP_TX/RXP/N[1]	USB_HSDP/N[0]	USB_OC1N
USB3.0	**USB2.0**	**USB_OC**
USB_SS_TX/RXP/N[0]	USB_HSDP/N[10]	USB_OC2N
USB_SS_TX/RXP/N[1]	USB_HSDP/N[11]	USB_OC3N
USB_SS_TX/RXP/N[2]	USB_HSDP/N[6]	USB_OC4N
USB_SS_TX/RXP/N[3]	USB_HSDP/N[7]	USB_OC5N
USB_SS_TX/RXP/N[4]	USB_HSDP/N[8]	USB_OC6N
USB_SS_TX/RXP/N[5]	USB_HSDP/N[9]	USB_OC7N
	USB_HSDP/N[1]	USB_OC7N
	USB_HSDP/N[2]	USB_OC7N
	USB_HSDP/N[3]	USB_OC7N
	USB_HSDP/N[4]	USB_OC7N
	USB_HSDP/N[12]	USB_OC7N
	USB_HSDP/N[13]	USB_OC7N

Appendix C Port Mapping for Different Bus Models

BUS Model	USB			
	3.1 Gen2 10 Gbps	3.1 Gen1 5 Gbps	2.0	Debug Port
PROM4	USB_SSP Port0~1	USB_SS Port 0~5	USB_HSD Port0~13	USB_SSP Port0
PROM2	USB_SSP Port0~1	USB_SS Port 0~1	USB_HSD Port0~5 USB_HSD Port10~13	USB_SSP Port0
PROM1	USB_SSP Port0	USB_SS Port0 USB_SSP Port1	USB_HSD Port0~5 USB_HSD Port10, 12~13	USB_SSP Port0

BUS Model	SATA 3.0	SATA Express	PCI Express® Gen2 GPP	PCI Express® CLK
PROM4	SATA port0~3	SATAE port0~3	GPP lane0~7	CLK0~7
PROM2	SATA port0~1	SATAE port0~1	GPP lane0~1 GPP lane4~7	CLK0~1 CLK4~7
PROM1	SATA port0~1	SATAE port0~1	GPP lane4~7	CLK4~7

CLK2.3不能用
CLK1-3不能用

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Size: Custom | Document Description: Promontory - USB/OC | Rev: 10

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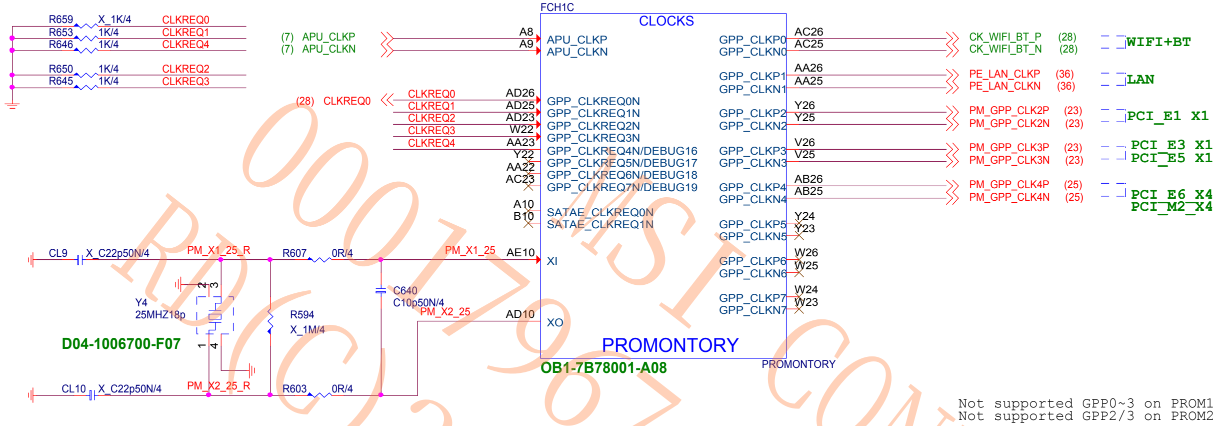
GPP Clock	CLKREQ#
GPP_CLKP/N[0]	GPP_CLKREQ0N
GPP_CLKP/N[1]	GPP_CLKREQ1N
GPP_CLKP/N[2]	GPP_CLKREQ2N
GPP_CLKP/N[3]	GPP_CLKREQ3N
GPP_CLKP/N[4]	GPP_CLKREQ4N
GPP_CLKP/N[5]	GPP_CLKREQ5N
GPP_CLKP/N[6]	GPP_CLKREQ6N
GPP_CLKP/N[7]	GPP_CLKREQ7N

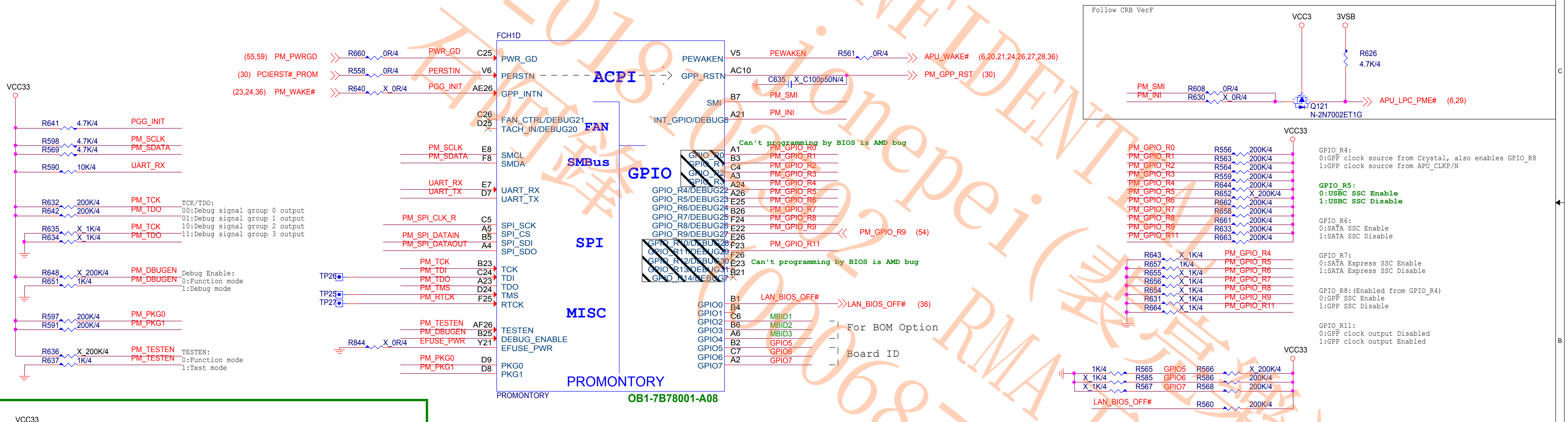


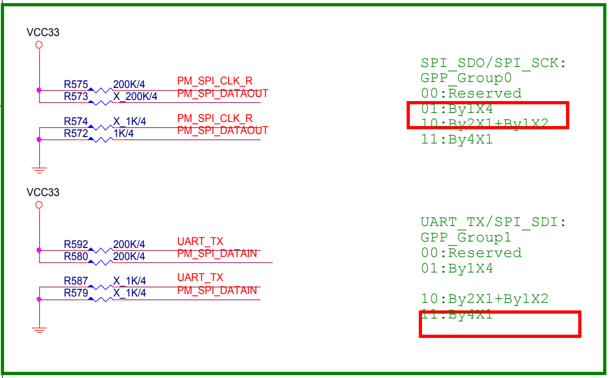
Appendix C Port Mapping for Different Bus Models

BUS Model	USB 3.1 Gen2 10 Gbps	3.1 Gen1 5 Gbps	2.0	Debug Port
PROM4	USB_SSP Port0~1	USB_SS Port 0~5	USB_HSD Port0~13	USB_SSP Port0
PROM2	USB_SSP Port0~1	USB_SS Port 0~1	USB_HSD Port0~5 USB_HSD Port10~13	USB_SSP Port0
PROM1	USB_SSP Port0	USB_SS Port0 USB_SSP Port1	USB_HSD Port0~5 USB_HSD Port10, 12~13	USB_SSP Port0

BUS Model	SATA 3.0	SATA Express	PCI Express® Gen2 GPP	PCI Express® CLK
PROM4	SATA port0~3	SATAE port0~3	GPP lane0~7	CLK0~7
PROM2	SATA port0~1	SATAE port0~1	GPP lane0~1 GPP lane4~7	CLK0~1 CLK4~7
PROM1	SATA port0~1	SATAE port0~1	GPP lane4~7	CLK4~7

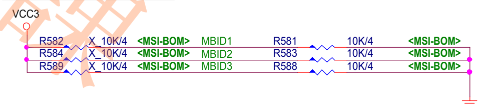
CLK2.3不能用
CLK1-3不能用





	MBID3	MBID2	MBID1
Z470	0	0	0

BOM OPTION



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Size	Document Description	Rev
Custom	Promontory - CLK/ACPI/GPIO	10

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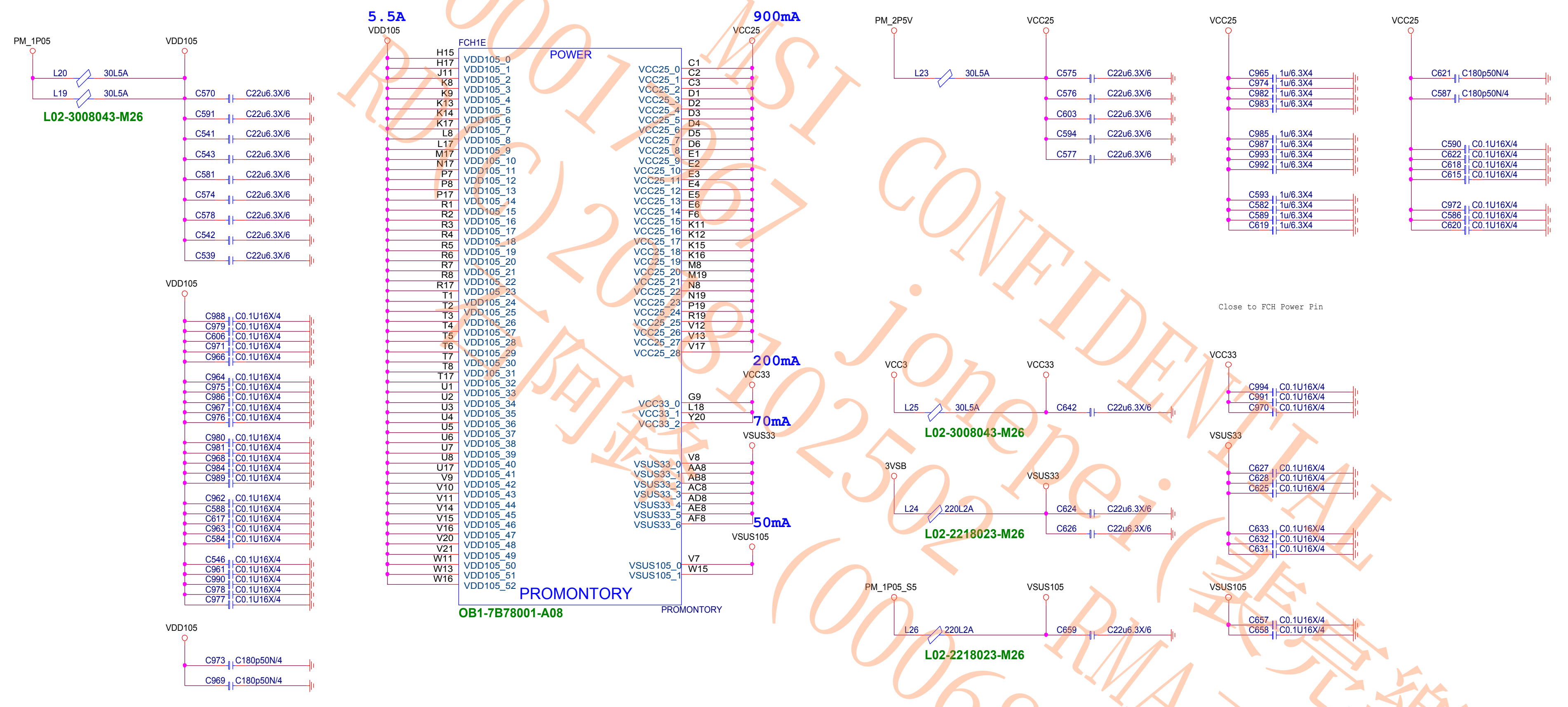

MICRO-STAR INT'L CO.,LTD		
MS-7B78		
Size: Custom	Document Description: Promontory - Power	Rev: 10
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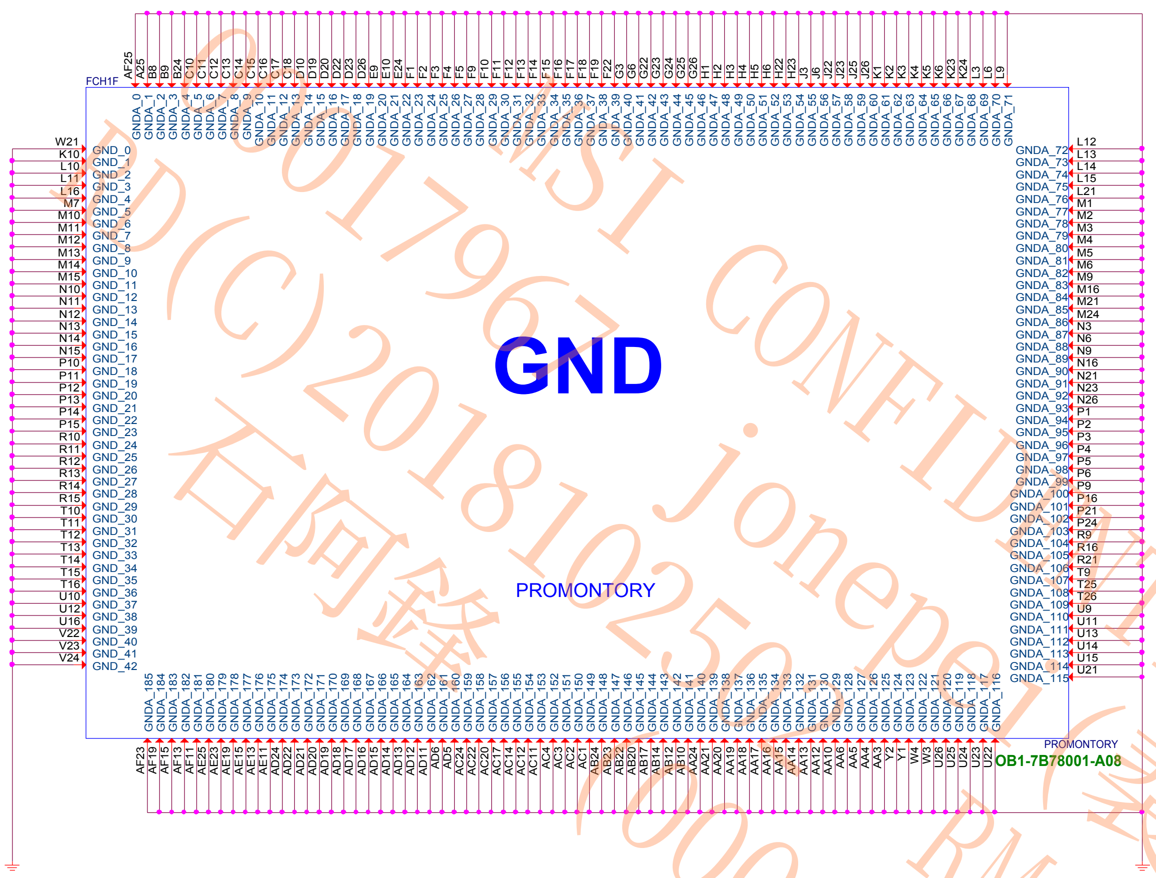

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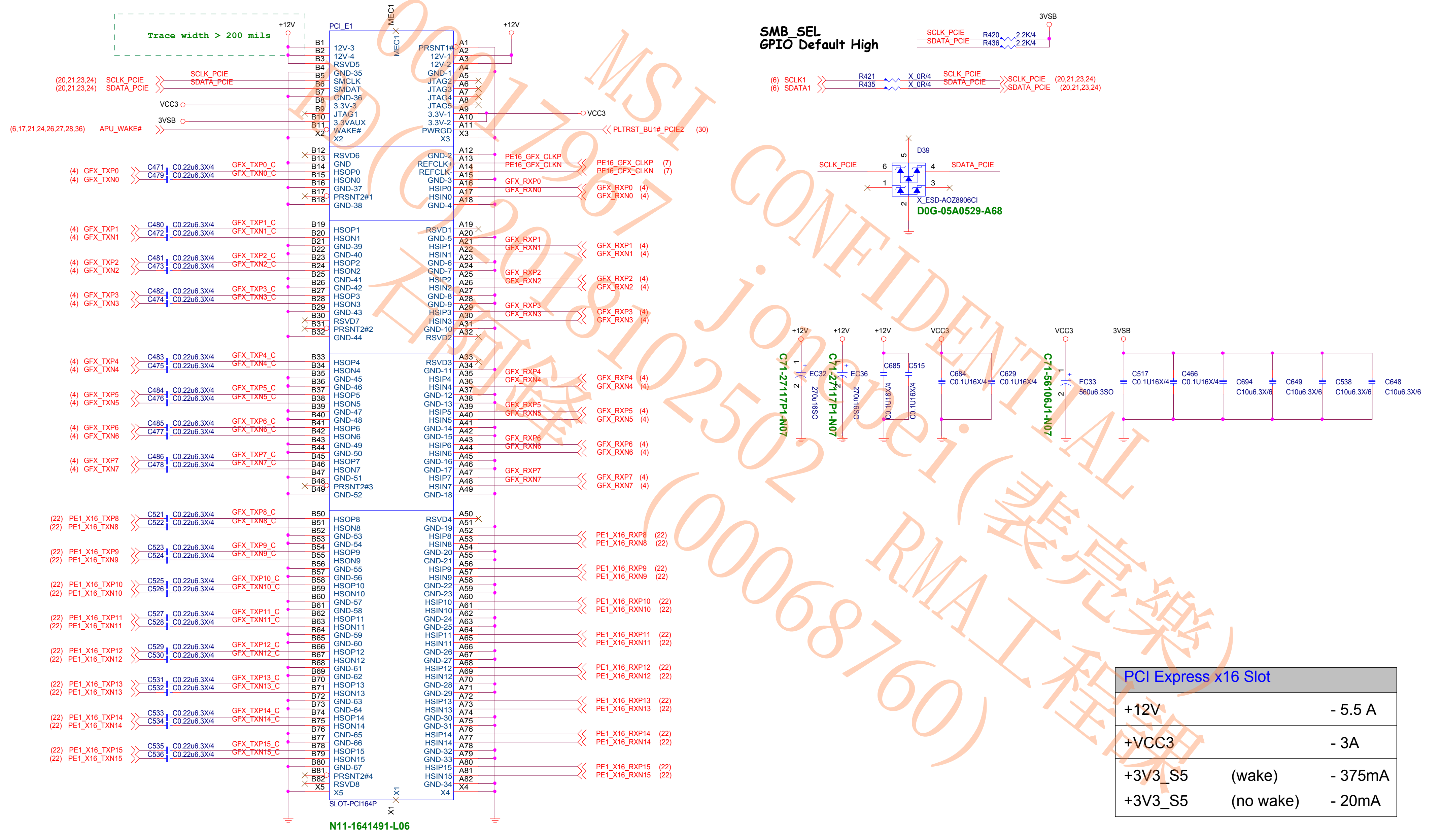
MS-7B78		
Size: Custom	Document Description: Promontory - GND	Rev: 10
Date: Tuesday, January 09, 2018	Sheet 19 of 77	

PCI EXPRESS x16 Slot



PCI Express x16 Slot		
+12V		- 5.5 A
+VCC3		- 3A
+3V3_S5	(wake)	- 375mA
+3V3_S5	(no wake)	- 20mA

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Size	Document Description	Rev
Custom	PCI_E2 (X16)	10

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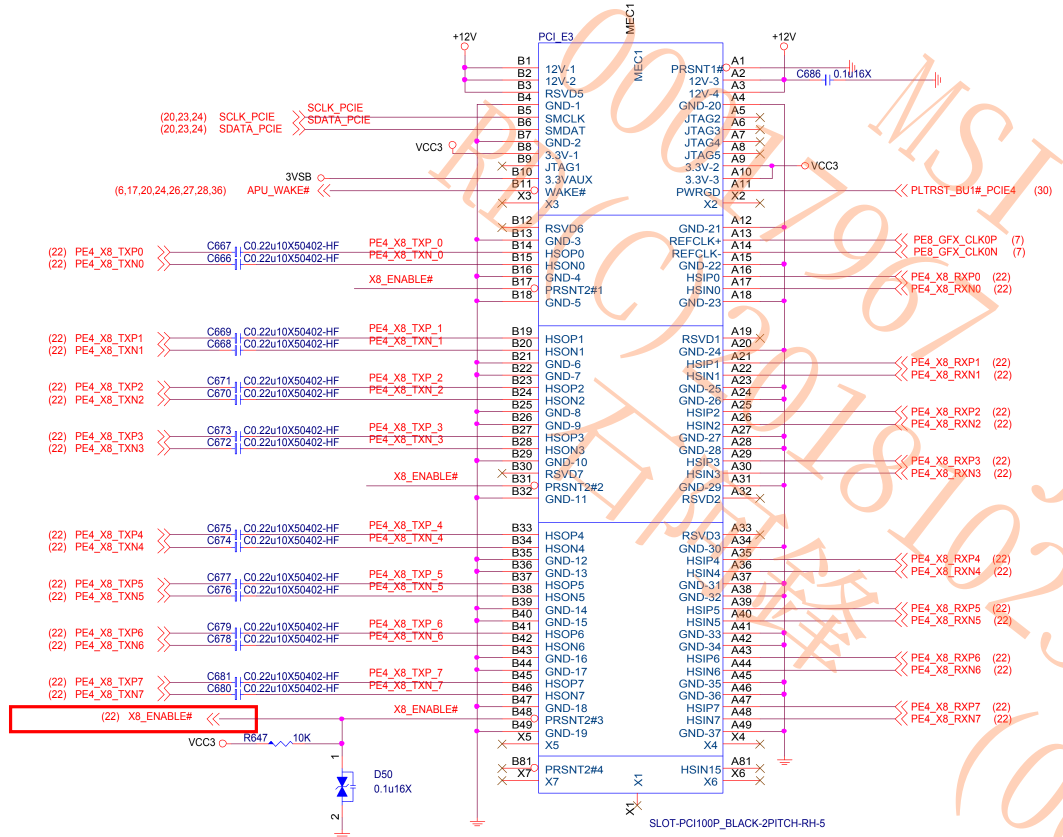
PCI EXPRESS x8 SLOT

PCI_E3



N11-1000221-L06

PCI Express x8 Slot		
+12V		- A
+VCC3		- 3A
+3V3_S5	(wake)	- 375mA
+3V3_S5	(no wake)	- 20mA

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Size	Document Description	Rev
Custom	PCI_E4 (X8)	10

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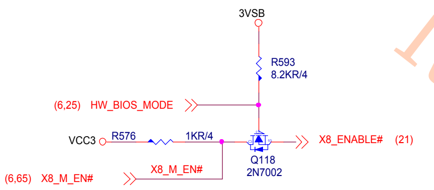
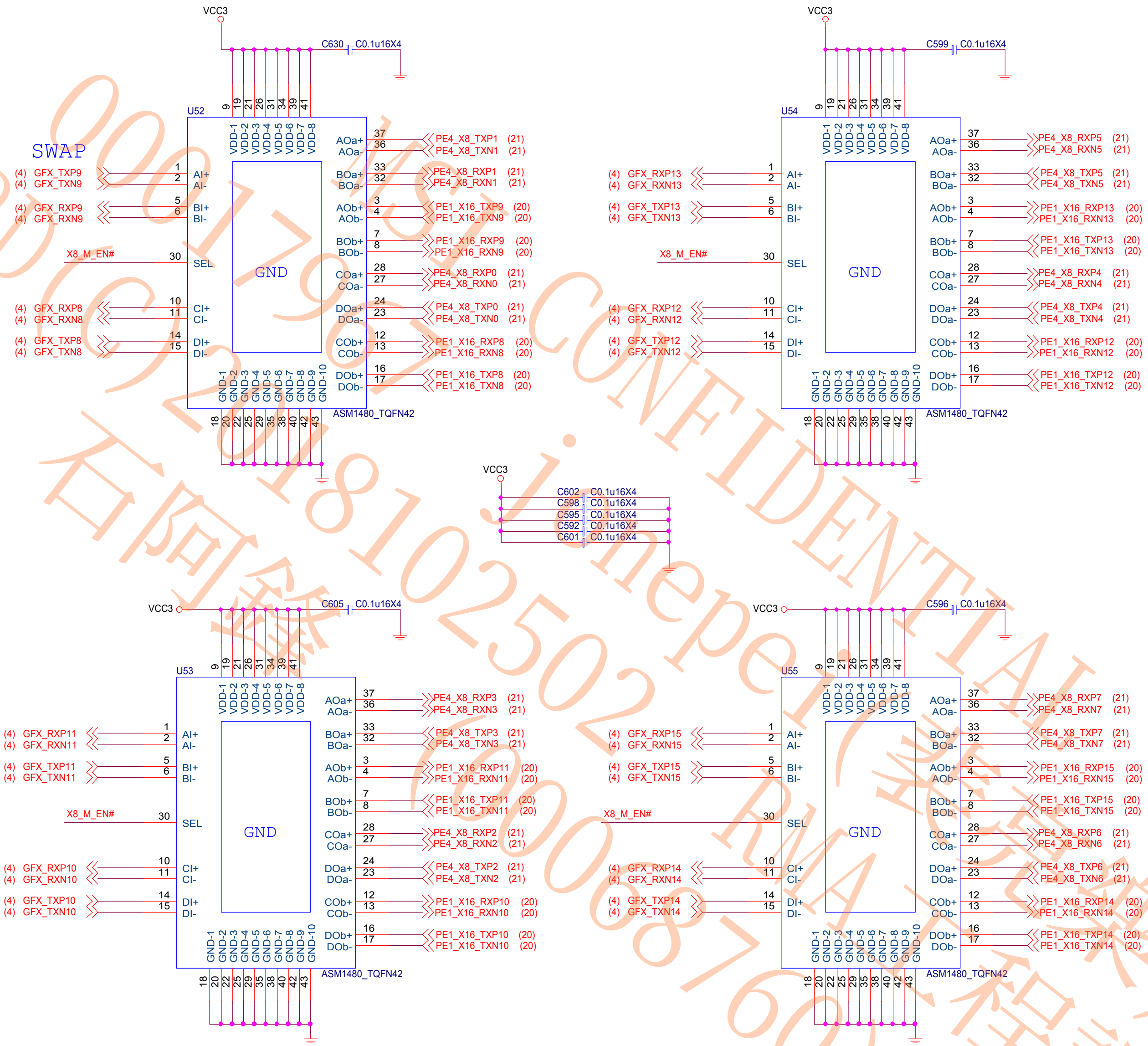
PCI EXPRESS Switch

For PCIE1 & PCIE3

PCIE Lanes control circuit



	HW_BIOS_MODE	X8_M_EN#
Auto	1	1
Manual x16	0	1
Manual x8, x8	0	0



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MS-7B78		
Size: Custom	Document Description: PCIE Switch PE2 / PE4	Rev: 10
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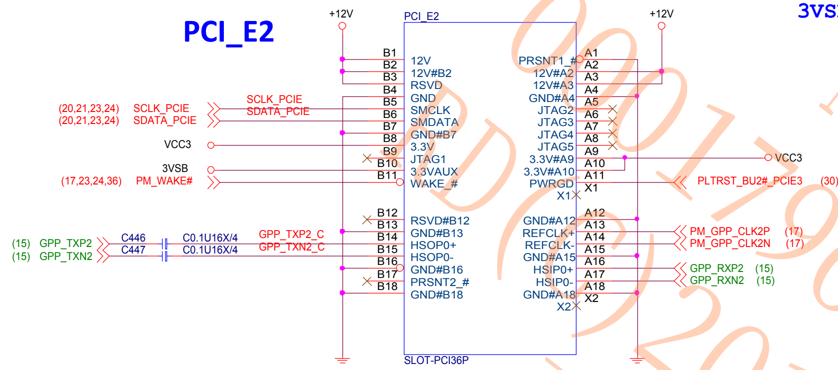
PCI EXPRESS X1 SLOT

12V - 0.5A

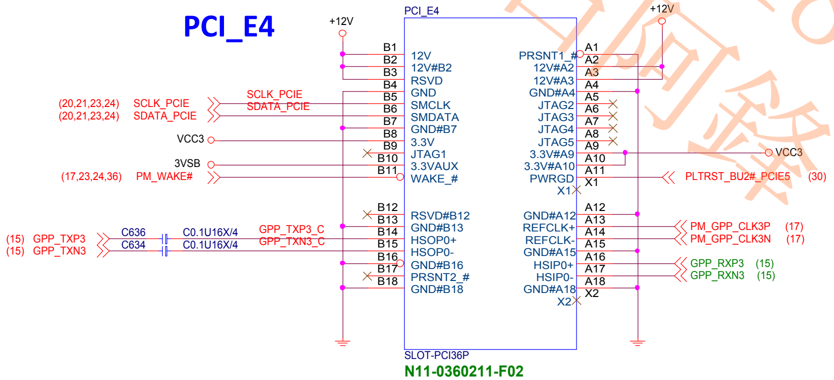
VCC3 - 3A

3VSBV - 375mA

PCI_E2



PCI_E4



PCI Express x1 Slot *3		
+12V		- 1.5 A
+VCC3		- 9A
+3V3_S5	(wake)	- 1125mA
+3V3_S5	(no wake)	- 60mA

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Size	Document Description	Rev
Custom	PCI_E1_E3_E5 (X1)	10

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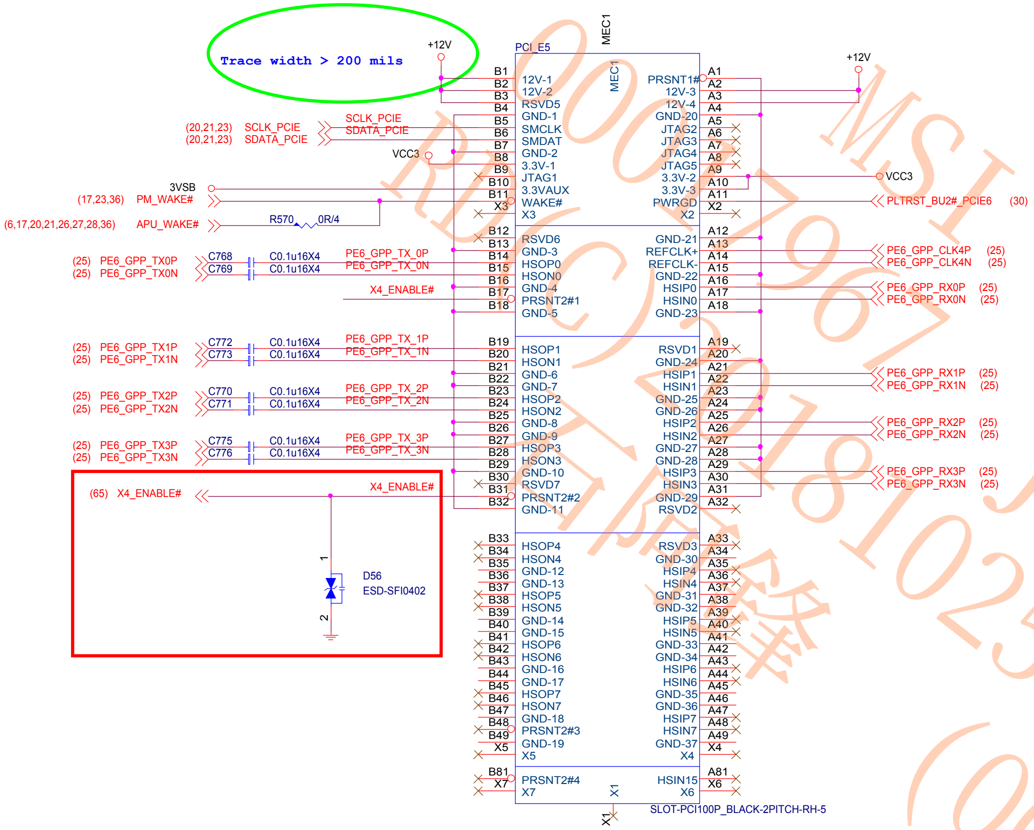
PCI EXPRESS X4 SLOT

PCI_E6



PCI Express x4 Slot *1		
+12V		- 2.1A
+VCC3		- 3A
+3V3_S5	(wake)	- 375mA
+3V3_S5	(no wake)	- 20mA

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Size: Custom
Document Description: PCI_E6 (X4)
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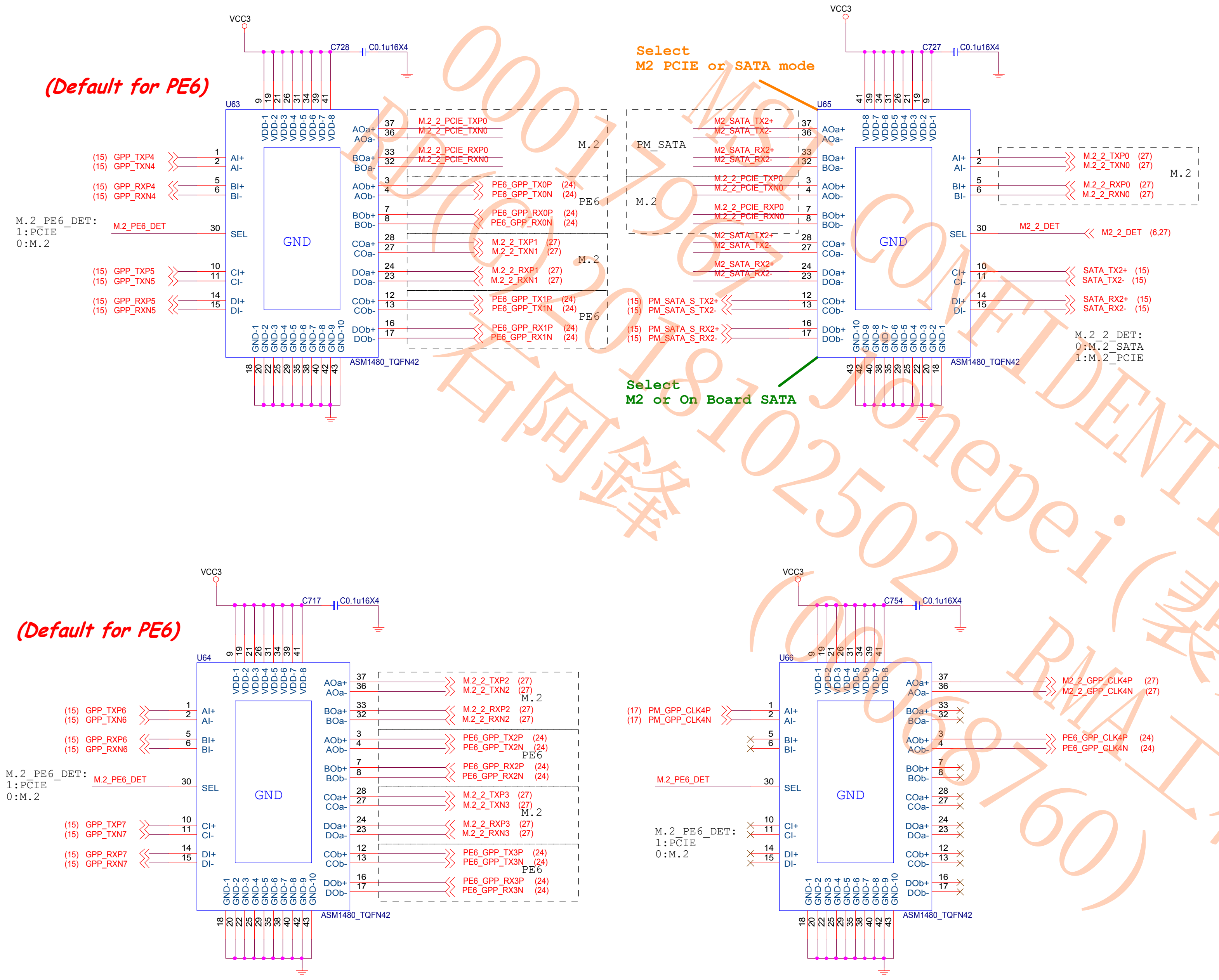
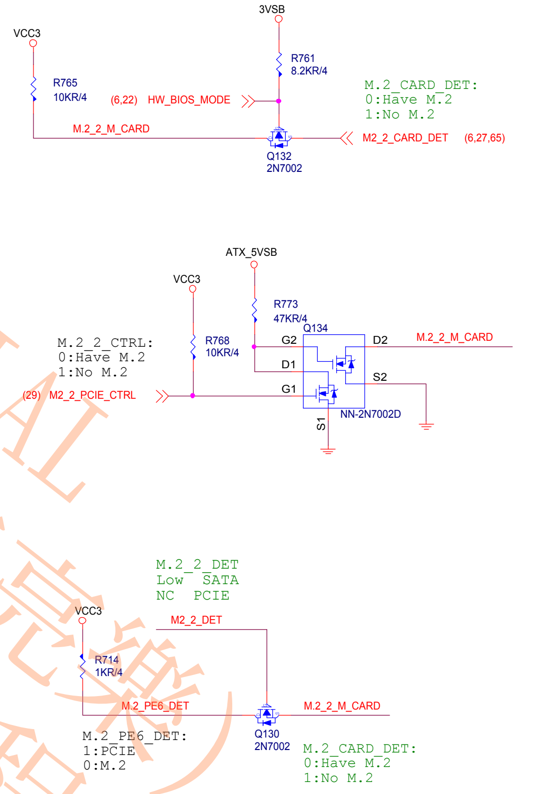
PCI_E6 and M2_2 and SATA1 Switch



Manufature Control					
	AUTO Mode	PCIE X4	M.2 X4	M.2 SATA	SATA5
HW_BIOS_MODE	1	0	0	1	
M2_2_PCIE_CTRL	0	1	0	0	
Device Detect					
M2_2_CARD_DET		1 0	0	0	1 0
M2_2_DET		1 0	1	0	1

紅色數字為判抓到PCIE或SATA device時所要判斷的訊號



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Size	Document Description	Rev
Custom	PCIE Switch PE6 / M2_2	10

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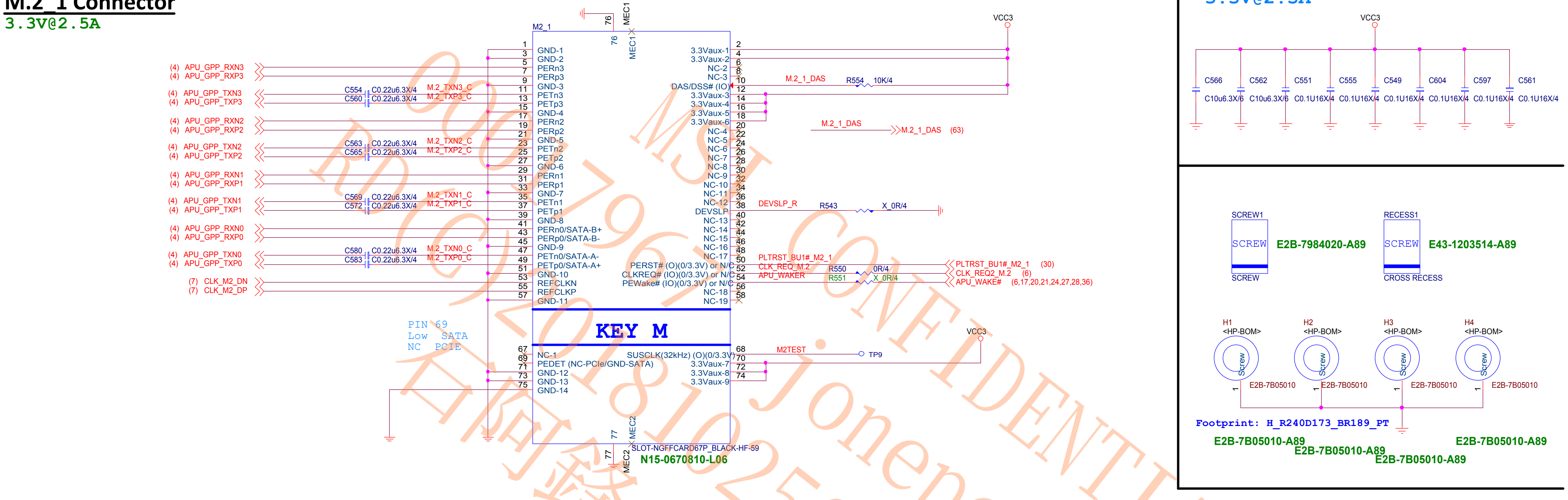
M.2_1 Connector

3.3V@2.5A



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Size: Custom	Document Description: M2_1		Rev: 10
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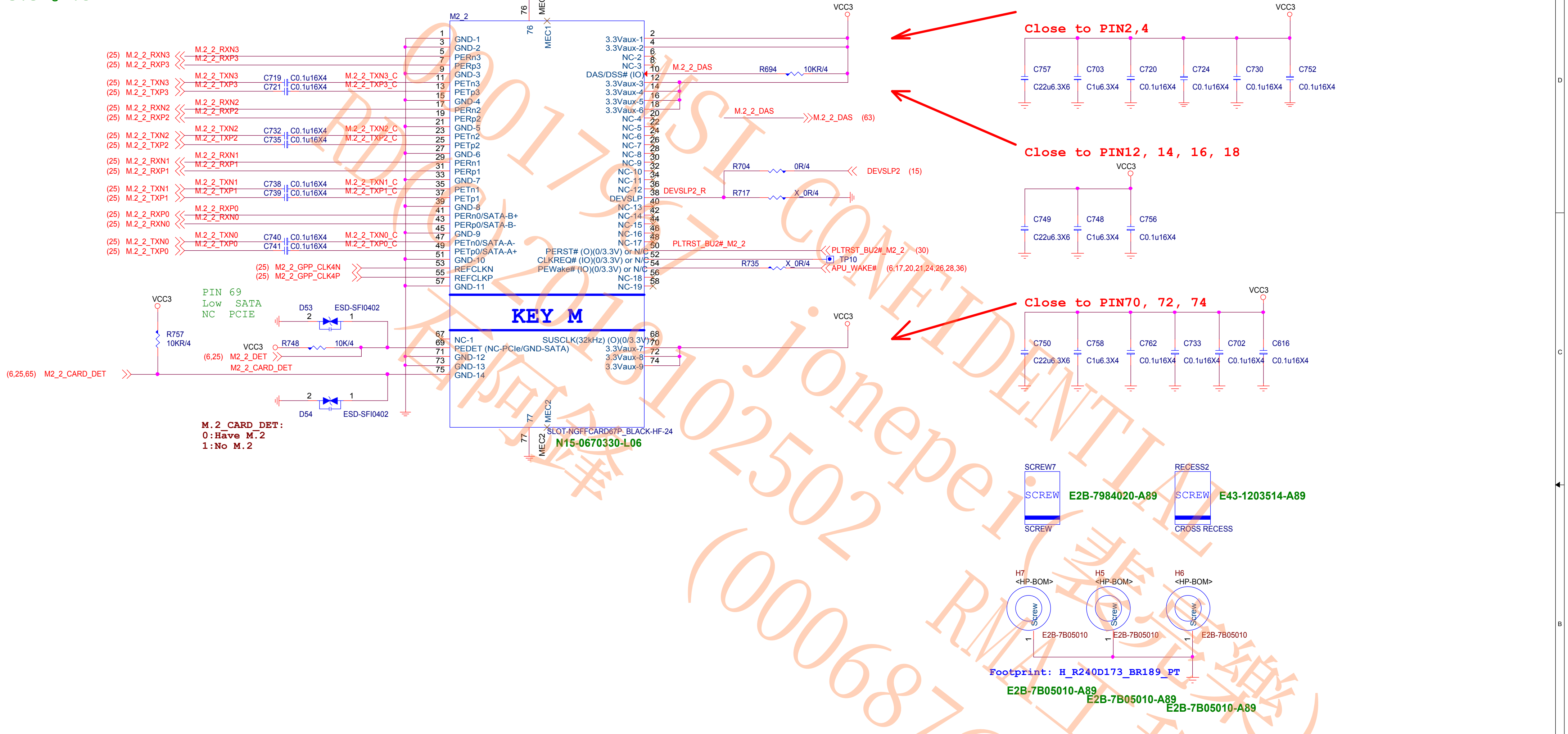
M.2_2 Connector

3.3V@2.5A



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Size	Document Description	Rev
Custom	M2_2	10

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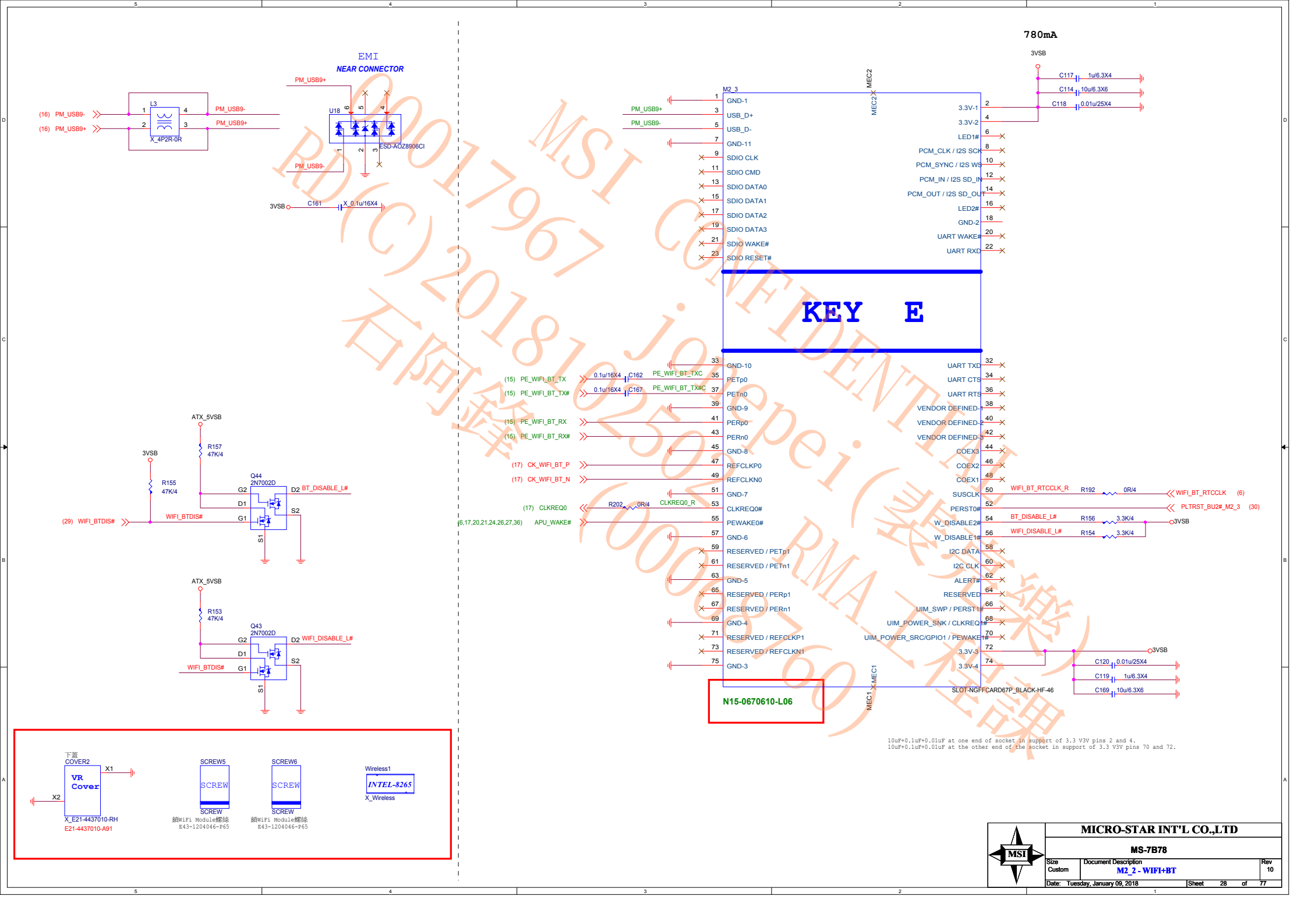
EMI
NEAR CONNECTOR
PM_USB9+
PM_USB9-
(16) PM_USB9-
(16) PM_USB9+
L3
X_4P2R-0R
U18
ESD-AOZ8906CI
3VSB
C161
X_0.1u/16X4
780mA
M2_3
MEC2
GND-1
USB_D+
USB_D-
GND-11
SDIO CLK
SDIO CMD
SDIO DATA0
SDIO DATA1
SDIO DATA2
SDIO DATA3
SDIO WAKE#
SDIO RESET#
3.3V-1
3.3V-2
LED1#
PCM_CLK / I2S SCK
PCM_SYNC / I2S WS
PCM_IN / I2S SD_IN
PCM_OUT / I2S SD_OUT
LED2#
GND-2
UART WAKE#
UART RXD
C117 1u/6.3X4
C114 10u/6.3X6
C118 0.01u/25X4
KEY E
GND-10
PETp0
PETn0
GND-9
PERp0
PERn0
GND-8
REFCLKP0
REFCLKN0
GND-7
CLKREQ0#
PEWAKE0#
GND-6
RESERVED / PETp1
RESERVED / PETn1
GND-5
RESERVED / PERp1
RESERVED / PERn1
GND-4
RESERVED / REFCLKP1
RESERVED / REFCLKN1
GND-3
UART TXD
UART CTS
UART RTS
VENDOR DEFINED-1
VENDOR DEFINED-2
VENDOR DEFINED-3
COEX3
COEX2
COEX1
SUSCLK
PERST0#
W_DISABLE2#
W_DISABLE1#
I2C DATA
I2C CLK
ALERT#
RESERVED
UIM_SWP / PERST1#
UIM_POWER_SNK / CLKREQ1#
UIM_POWER_SRC/GPIO1 / PEWAKE1#
3.3V-3
3.3V-4
SLOT-NGFFCARD67P_BLACK-HF-46
MEC1
N15-0670610-L06
(15) PE_WIFI_BT_TX
(15) PE_WIFI_BT_TX#
(15) PE_WIFI_BT_RX
(15) PE_WIFI_BT_RX#
(17) CK_WIFI_BT_P
(17) CK_WIFI_BT_N
(17) CLKREQ0
(6,17,20,21,24,26,27,36) APU_WAKE#
0.1u/16X4 C162 PE_WIFI_BT_TXC
0.1u/16X4 C167 PE_WIFI_BT_TX#C
R202 0R/4 CLKREQ0_R
WIFI_BT_RTCCLK_R R192 0R/4 WIFI_BT_RTCCLK (6)
PLTRST_BU2#_M2_3 (30)
BT_DISABLE_L# R156 3.3K/4
WIFI_DISABLE_L# R154 3.3K/4
C120 0.01u/25X4
C119 1u/6.3X4
C169 10u/6.3X6
10uF+0.1uF+0.01uF at one end of socket in support of 3.3 V3V pins 2 and 4.
10uF+0.1uF+0.01uF at the other end of the socket in support of 3.3 V3V pins 70 and 72.
ATX_5VSB
R157 47K/4
R155 47K/4
Q44 2N7002D
BT_DISABLE_L#
(29) WIFI_BTDIS#
WIFI_BTDIS#
R153 47K/4
Q43 2N7002D
WIFI_DISABLE_L#
下蓋
COVER2
VR Cover
X1
X2
X_E21-4437010-RH
E21-4437010-A91
SCREW5
SCREW6
SCREW
鎖WiFi Module螺絲
E43-1204046-P65
Wireless1
INTEL-8265
X_Wireless
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Size Custom
Document Description
M2_2 - WIFI+BT
Rev 10
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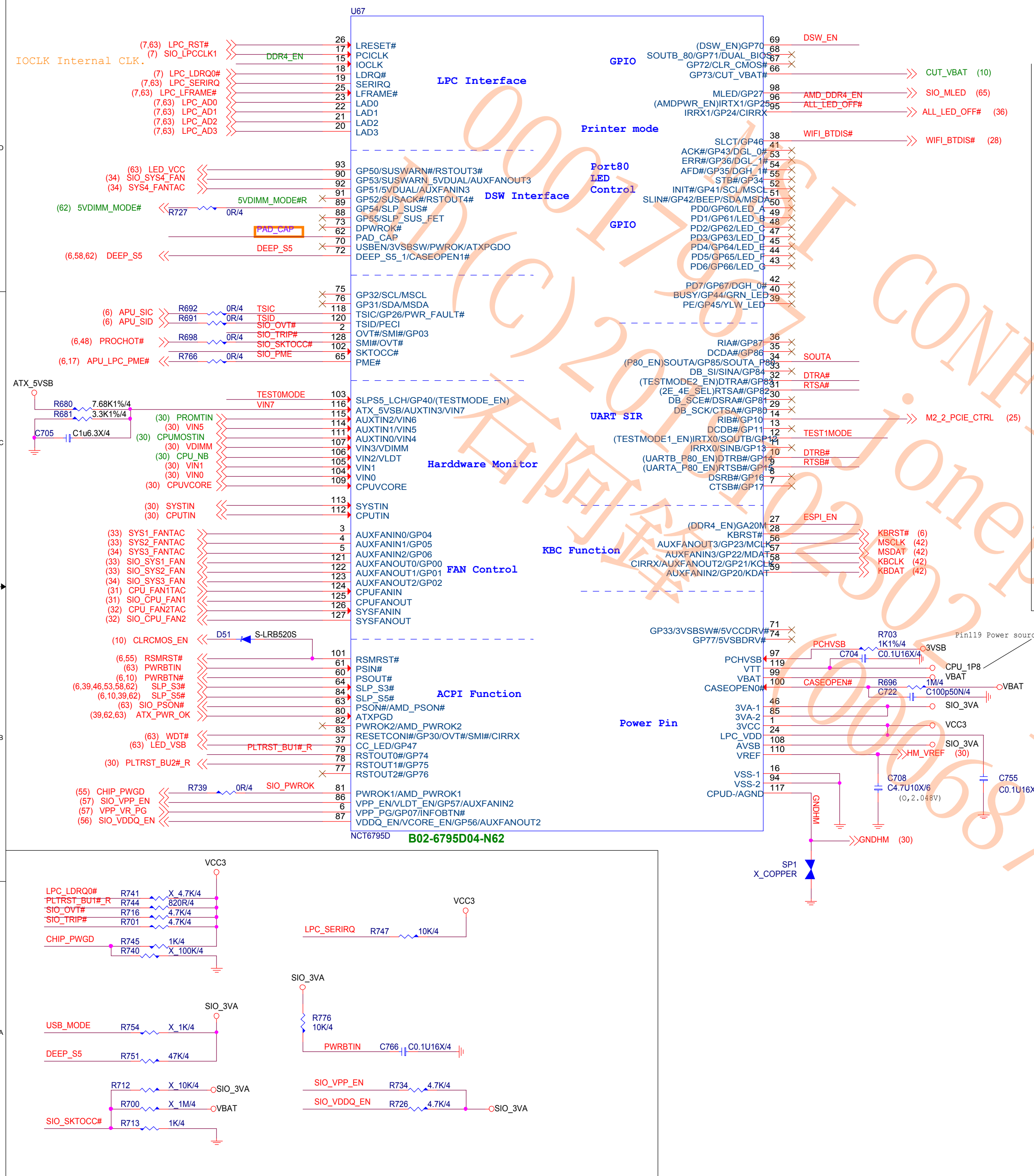
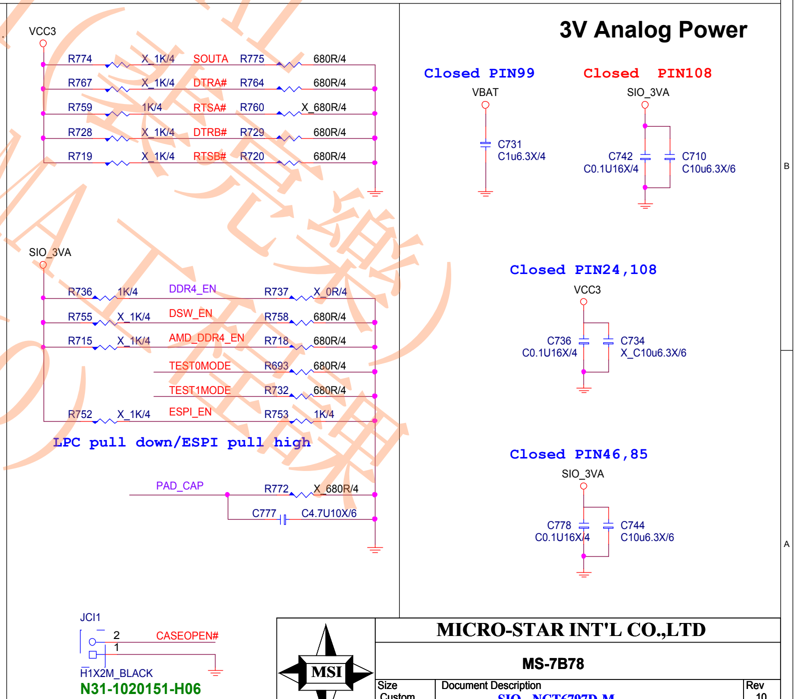


POWER ON STRAPPING PIN FOR NCT6797/6795

PIN	6793/6795 NAME	Circuit NAME	0	1	Strap Point
9	UARTA_P80_EN	RTSB#	DISABLE UARTA80	ENABLE UARTA80	LRESET
10	UARTB_P80_EN	DTRB#	DISABLE UARTB80	ENABLE UARTB80	LRESET
12	TESTMODE1_EN	TESTMODE1_EN	DISABLE TESTMODE1_EN	ENABLE TESTMODE1_EN	LRESET
15	DDR4_EN	DDR4_EN	Disable	Enable	
27	ESPI_EN	ESPI_EN	LPC	ESPI	
31	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E	LRESET
32	FANOUT_DEF_EN	DTRA#	default 50%	default 100%	INTERNAL PWROK
34	P80_EN	SOUTA	ENABLE Non_PORT80	ENABLE PORT80	LRESET
69	DSW_EN	DSW_EN	DISABLE INTEL DSW	ENABLE INTEL DSW	INTERNAL RSMRST
96	AMD_DDR4_EN	AMD_DDR4_EN	DISABLE AMD DDR4 PWR	ENABLE AMD DDR4 PWR	INTERNAL RSMRST
103	6795 TESTMODE_EN 6797 GP40	6795 WDT# 6797 WDT#	6795 DISABLE TESTMODE	6795 ENABLE TESTMODE	INTERNAL RSMRST

Note:
If PIN34 strapping low,BIOS must programming LPT or GPIO



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Custom	SIO - NCT6797D-M	10

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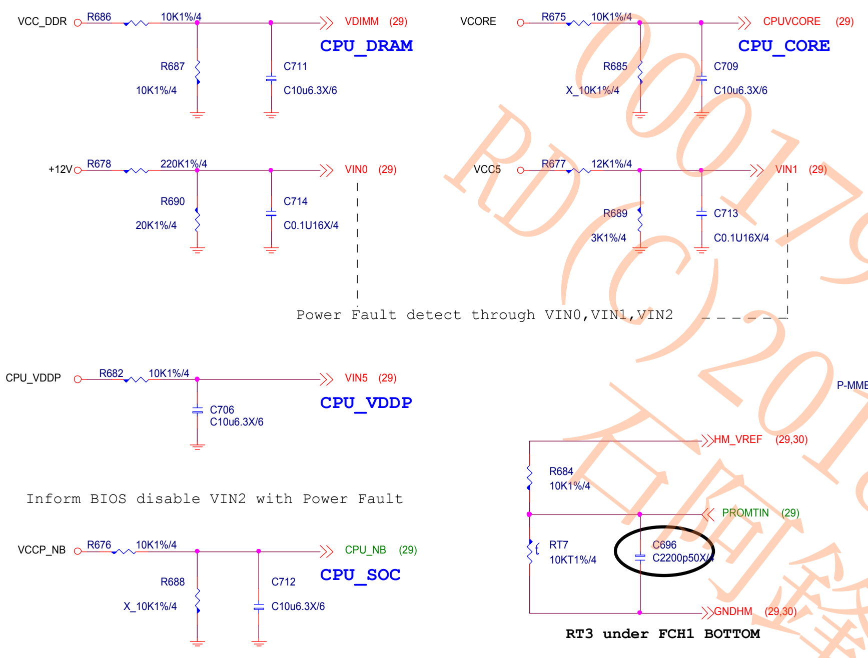
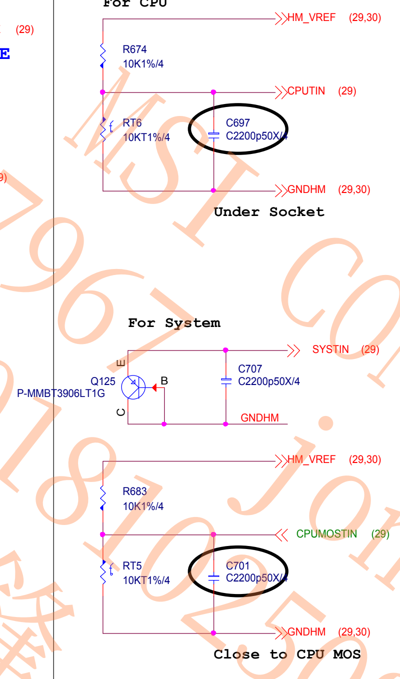
HW Monitor - Voltage

SIO HM Voltage over 2.048V will not detect

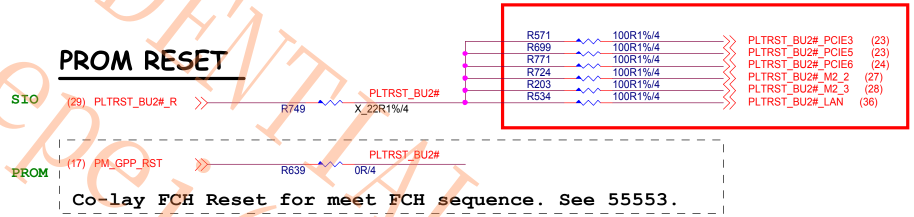


TEMP SENSOR

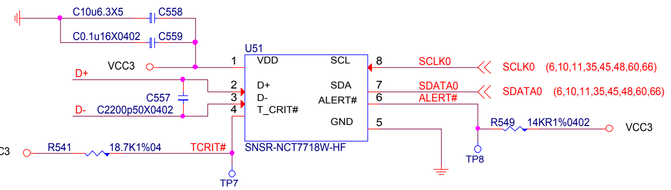


COM PORT

PROM RESET

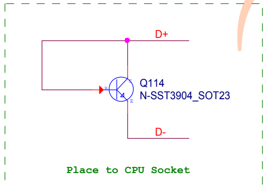


NCT7718W



NCT7718W SM Bus address is 98h (1001100xb)

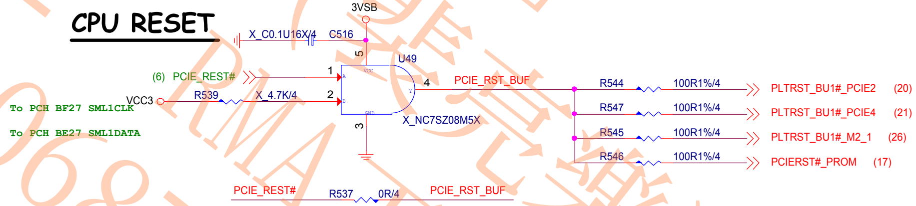
Default: ALERT# Output Comparator Mode



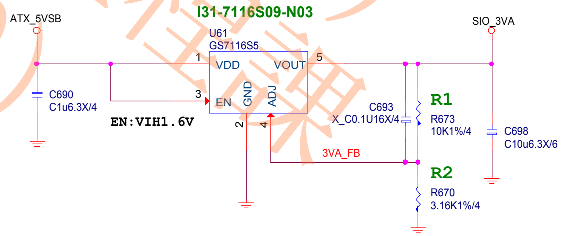
Layout notice:
1. Put the C1 2200pF to close the NCT7718W.
2. Add Ground Shielding For D+ and D- Traces.
3. D+/D- Route Has to be Away From the High Noise Area.
4. The Recommended Traces Width and Ground Shielding Spacing are 10mils.

TEMPERATURE (℃)		T_CRIT#				
		2KΩ	7.5KΩ	10.5KΩ	14KΩ	18.7KΩ
ALERT#	2KΩ	77	87	97	107	117
	7.5KΩ	79	89	99	109	119
	10.5KΩ	81	91	101	111	121
	14KΩ	83	93	103	113	123
	18.7KΩ	85	95	105	115	125

CPU RESET



SIO_3VA



Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(10K/3.16K))
= 3.33V

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Custom	SIO - HW Monitor / NCT7718W	10

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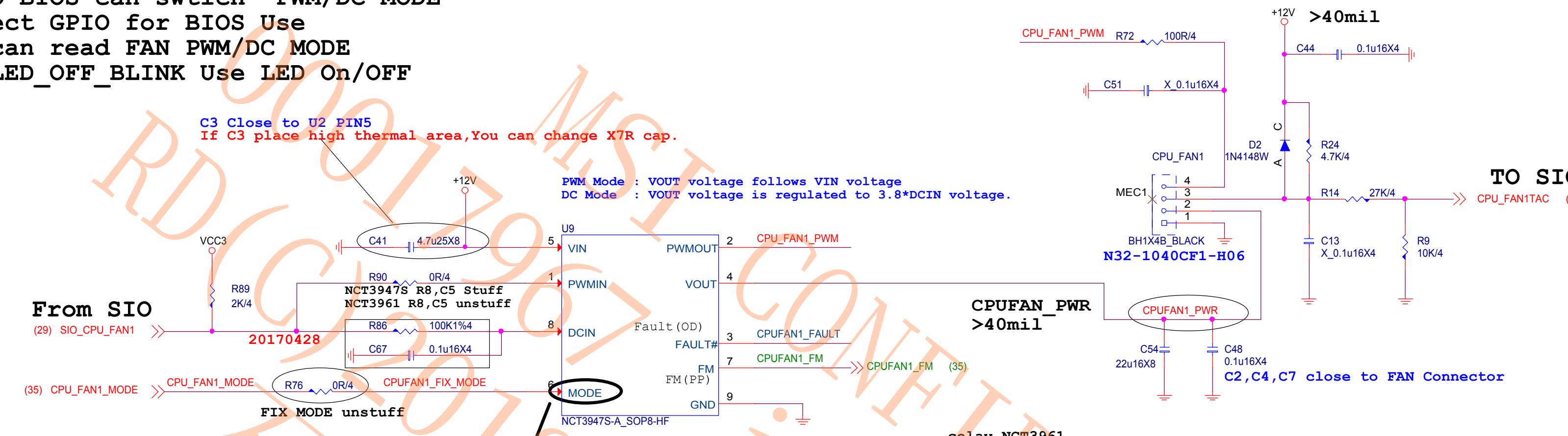
TYPE J : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO

1.PWM/DC/OCP LED
2.Mode GPIO BIOS can swtich PWM/DC MODE
3.OCP connect GPIO for BIOS Use
4.FM:BIOS can read FAN PWM/DC MODE
5.CPUFAN1_LED_OFF_BLINK Use LED On/OFF

CPUFAN1

C3 Close to U2 PIN5
If C3 place high thermal area,You can change X7R cap.

PWM Mode : VOUT voltage follows VIN voltage
DC Mode : VOUT voltage is regulated to 3.8*DCIN voltage.



GPIO Control

	PCH GPIO	
PWM MODE	HIGH	
DC MODE	LOW	
AUTO MODE	GPI(Floating)	Default

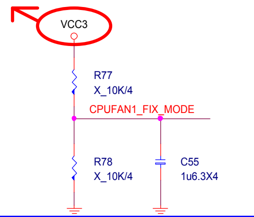
NCT3947S Internall pull up 1.65V

colay NCT3961

OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	20170428

VCC3 R84 100K/4 CPUFAN1_FAULT

Avoid NCT3947S MODE PIN Leakage



Resever For FIX DC or PWM MODE USE By PM SPEC

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MS-7B78		
Size: Custom	Document Description: FAN TYPE-J CPUDAN1	Rev: 10
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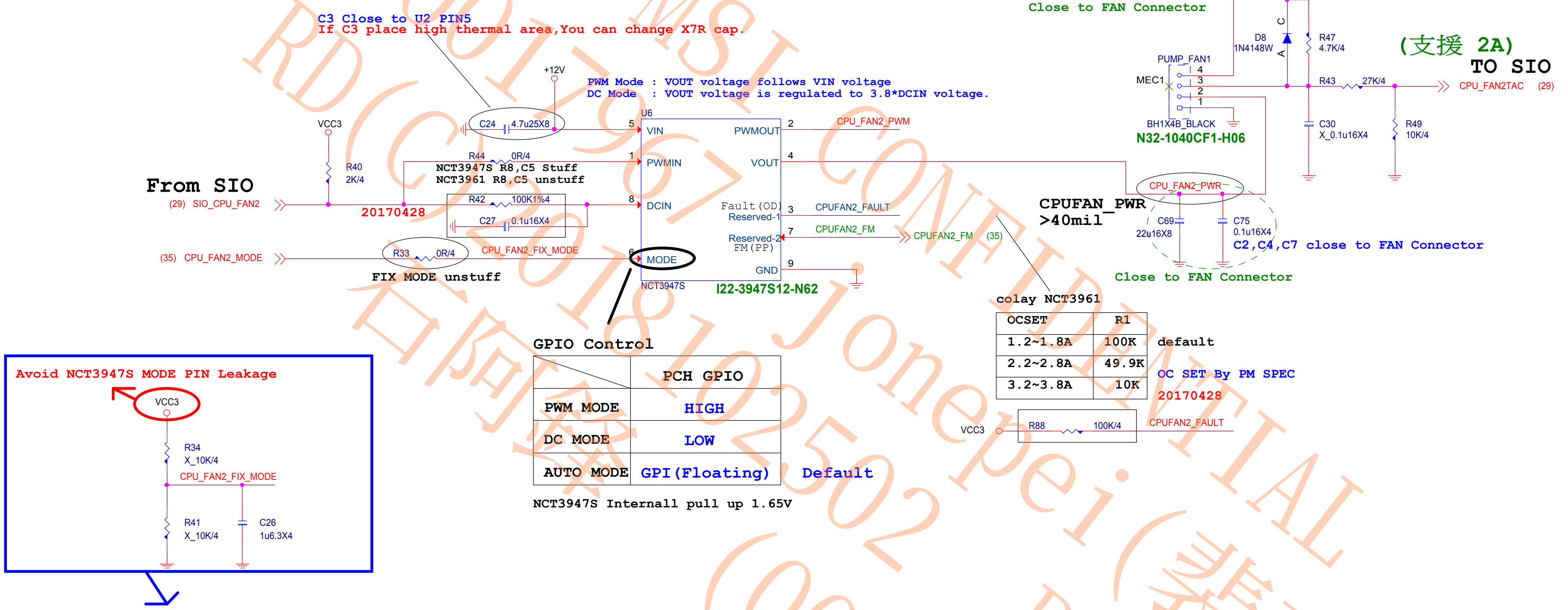
TYPE J : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO

PUMPFAN1

1. PWM/DC/OCP LED
2. Mode GPIO BIOS can swtich PWM/DC MODE
3. OCP connect GPIO for BIOS Use
4. FM:BIOS can read FAN PWM/DC MODE
5. CPUFAN1_LED_OFF_BLINK Use LED On/OFF



Reserver For FIX DC or PWM MODE USE By PM SPEC

GPIO Control

	PCH GPIO	
PWM MODE	HIGH	
DC MODE	LOW	
AUTO MODE	GPI(Floating)	Default

NCT3947S Internall pull up 1.65V

OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	20170428

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Custom	FAN TYPE-J PUMPFAN1	10

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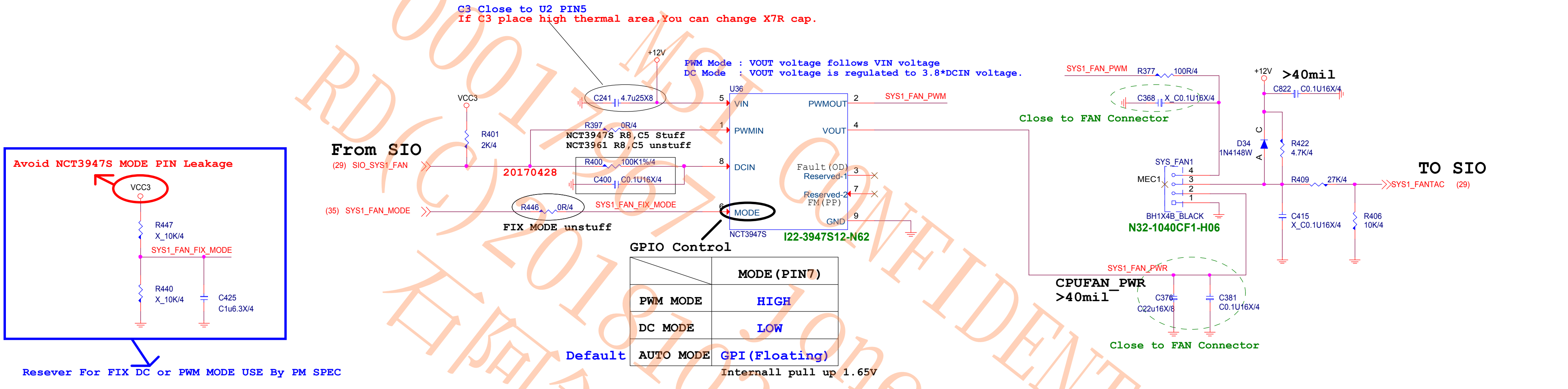
SYSFAN1

TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can swtich PWM/DC MODE



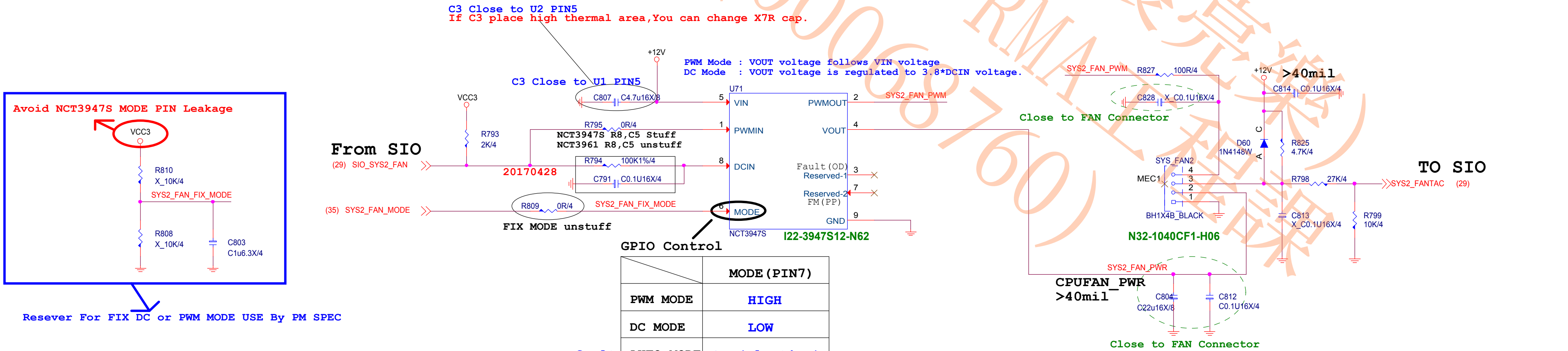
	MODE(PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI(Floating)

Default: AUTO MODE
Internall pull up 1.65V

SYSFAN2

TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

1.Mode GPIO BIOS can swtich PWM/DC MODE



	MODE(PIN7)
PWM MODE	HIGH
DC MODE	LOW
AUTO MODE	GPI(Floating)

Default: AUTO MODE
Internall pull up 1.65V

MICRO-STAR INT'L CO.,LTD
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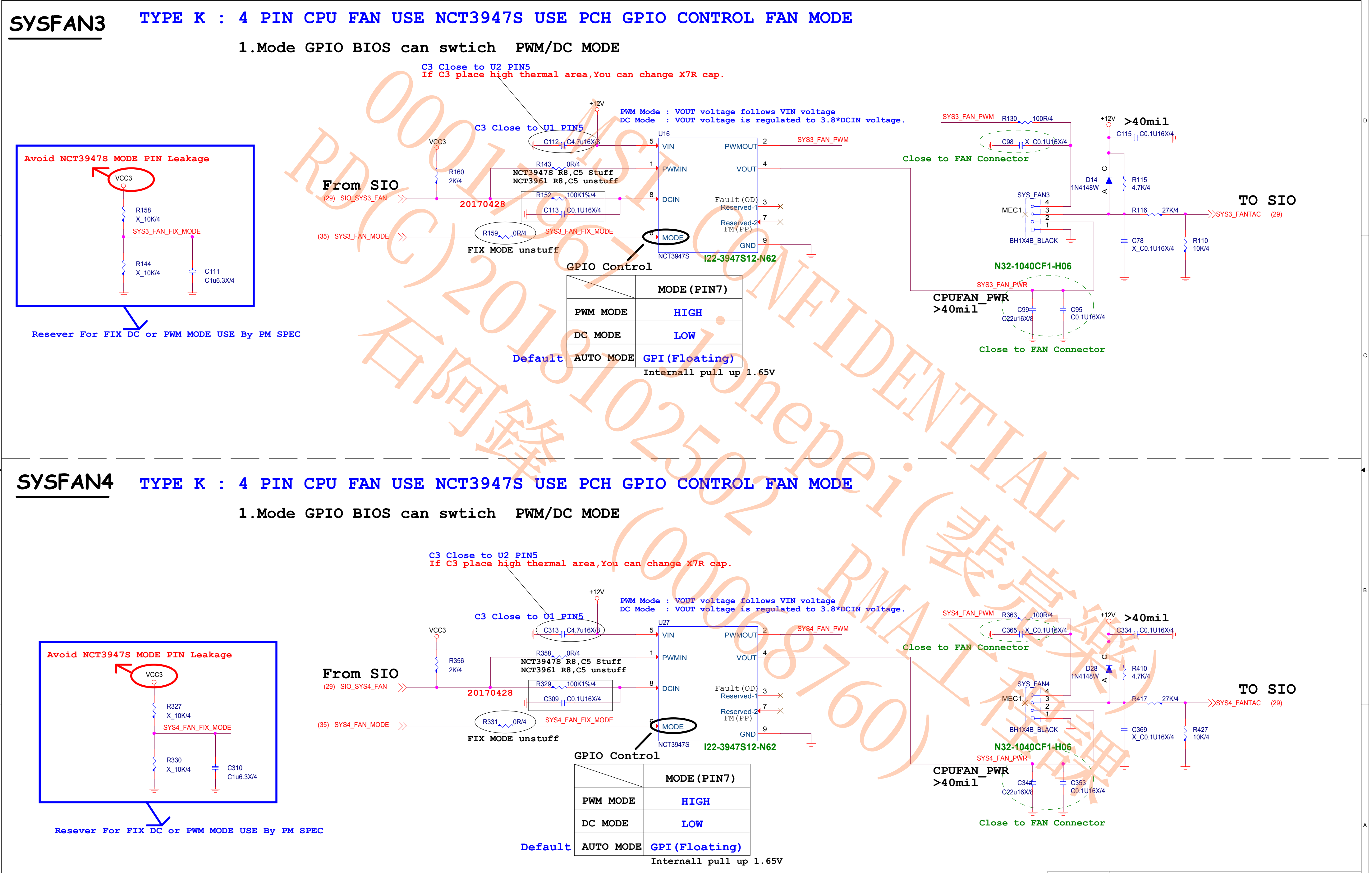
Size: Custom | Document Description: FAN TYPE-K SYSFAN1/2 | Rev: 10
Date: Tuesday, January 09, 2018 | Sheet 33 of 77



SYSFAN3
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE
1.Mode GPIO BIOS can swtich PWM/DC MODE
C3 Close to U2 PIN5
If C3 place high thermal area,You can change X7R cap.
PWM Mode : VOUT voltage follows VIN voltage
DC Mode : VOUT voltage is regulated to 3.8*DCIN voltage.
C3 Close to U1 PIN5
Avoid NCT3947S MODE PIN Leakage
VCC3
R158
X_10K/4
SYS3_FAN_FIX_MODE
R144
X_10K/4
C111
C1u6.3X/4
Resever For FIX DC or PWM MODE USE By PM SPEC
+12V
VCC3
C112
C4.7u16X/8
R160
2K/4
R143
0R/4
NCT3947S R8,C5 Stuff
NCT3961 R8,C5 unstuff
R152
100K1%/4
C113
C0.1U16X/4
From SIO
(29) SIO_SYS3_FAN
20170428
(35) SYS3_FAN_MODE
R159
0R/4
SYS3_FAN_FIX_MODE
FIX MODE unstuff
U16
VIN
PWMIN
DCIN
MODE
NCT3947S
PWMOUT
VOUT
Fault(OD)
Reserved-1
Reserved-2
FM(PP)
GND
I22-3947S12-N62
SYS3_FAN_PWM
GPIO Control
MODE(PIN7)
PWM MODE HIGH
DC MODE LOW
Default AUTO MODE GPI(Floating)
Internall pull up 1.65V
SYS3_FAN_PWM
R130
100R/4
C98
X_C0.1U16X/4
Close to FAN Connector
+12V
>40mil
C115
C0.1U16X/4
D14
1N4148W
R115
4.7K/4
SYS_FAN3
MEC1
BH1X4B_BLACK
N32-1040CF1-H06
R116
27K/4
TO SIO
SYS3_FANTAC (29)
C78
X_C0.1U16X/4
R110
10K/4
SYS3_FAN_PWR
CPUFAN_PWR
>40mil
C99
C22u16X/8
C95
C0.1U16X/4
Close to FAN Connector
SYSFAN4
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE
1.Mode GPIO BIOS can swtich PWM/DC MODE
C3 Close to U2 PIN5
If C3 place high thermal area,You can change X7R cap.
PWM Mode : VOUT voltage follows VIN voltage
DC Mode : VOUT voltage is regulated to 3.8*DCIN voltage.
C3 Close to U1 PIN5
Avoid NCT3947S MODE PIN Leakage
VCC3
R327
X_10K/4
SYS4_FAN_FIX_MODE
R330
X_10K/4
C310
C1u6.3X/4
Resever For FIX DC or PWM MODE USE By PM SPEC
+12V
VCC3
C313
C4.7u16X/8
R356
2K/4
R358
0R/4
NCT3947S R8,C5 Stuff
NCT3961 R8,C5 unstuff
R329
100K1%/4
C309
C0.1U16X/4
From SIO
(29) SIO_SYS4_FAN
20170428
(35) SYS4_FAN_MODE
R331
0R/4
SYS4_FAN_FIX_MODE
FIX MODE unstuff
U27
VIN
PWMIN
DCIN
MODE
NCT3947S
PWMOUT
VOUT
Fault(OD)
Reserved-1
Reserved-2
FM(PP)
GND
I22-3947S12-N62
SYS4_FAN_PWM
GPIO Control
MODE(PIN7)
PWM MODE HIGH
DC MODE LOW
Default AUTO MODE GPI(Floating)
Internall pull up 1.65V
SYS4_FAN_PWM
R363
100R/4
C365
X_C0.1U16X/4
Close to FAN Connector
+12V
>40mil
C334
C0.1U16X/4
D28
1N4148W
R410
4.7K/4
SYS_FAN4
MEC1
BH1X4B_BLACK
N32-1040CF1-H06
R417
27K/4
TO SIO
SYS4_FANTAC (29)
C369
X_C0.1U16X/4
R427
10K/4
SYS4_FAN_PWR
CPUFAN_PWR
>40mil
C344
C22u16X/8
C353
C0.1U16X/4
Close to FAN Connector

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Size	Document Description	Rev
Custom	FAN TYPE-K SYSFAN3/4	10

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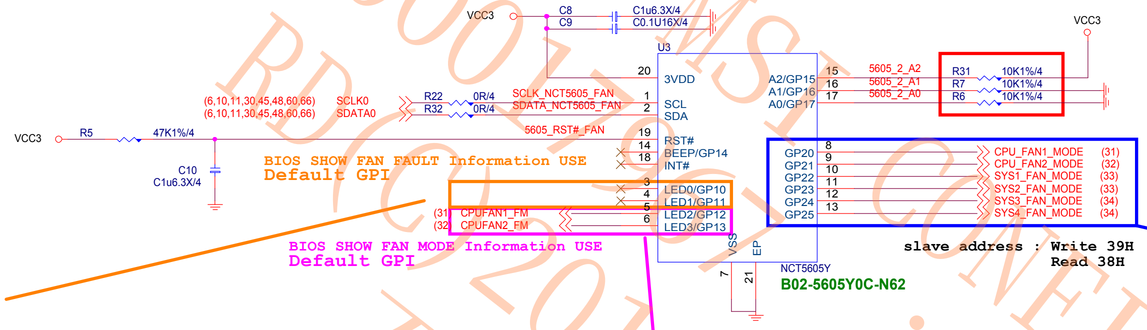
By PM Define FAN name

LED OFF BLINK	FAN
GP16	CPUFAN1
GP17	CPUFAN2 PUMPFAN

USE LED OFF & LED BLINK

Default GPI



By PM Define FAN name

SHOW FAN FAULT USE	FAN
GP10	CPUFAN1
GP11	CPUFAN2 PUMPFAN

By PM Define FAN name

FAN MODE USE	FAN
GP20	CPUFAN1
GP21	CPUFAN2 PUMPFAN
GP22	SYSFAN1
GP23	SYSFAN2
GP24	SYSFAN3
GP25	SYSFAN4

Use Avoid S5 leakage

CPUFAN1_FM R38 1K/4
CPUFAN2_FM R45 1K/4

20150722

By PM Define FAN name

SHOW FAN MODE USE	FAN
GP12	CPUFAN1
GP13	CPUFAN2 PUMPFAN

1. GENERAL DESCRIPTION

The NCT5605Y is a general purpose input/output IC with SMBus™ which provides 14 GPI/O pins. It also can provide SMBus™ address setting pins to set the address during power- on reset or from external reset.

NCT5605Y SMBus™ Address is:

0	0	1	1	A2	A1	A0	R/W

R/W: 0 / 1

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MS-7B78		
Size: Custom	Document Description: FAN GPIO NCT5605	Rev: 10
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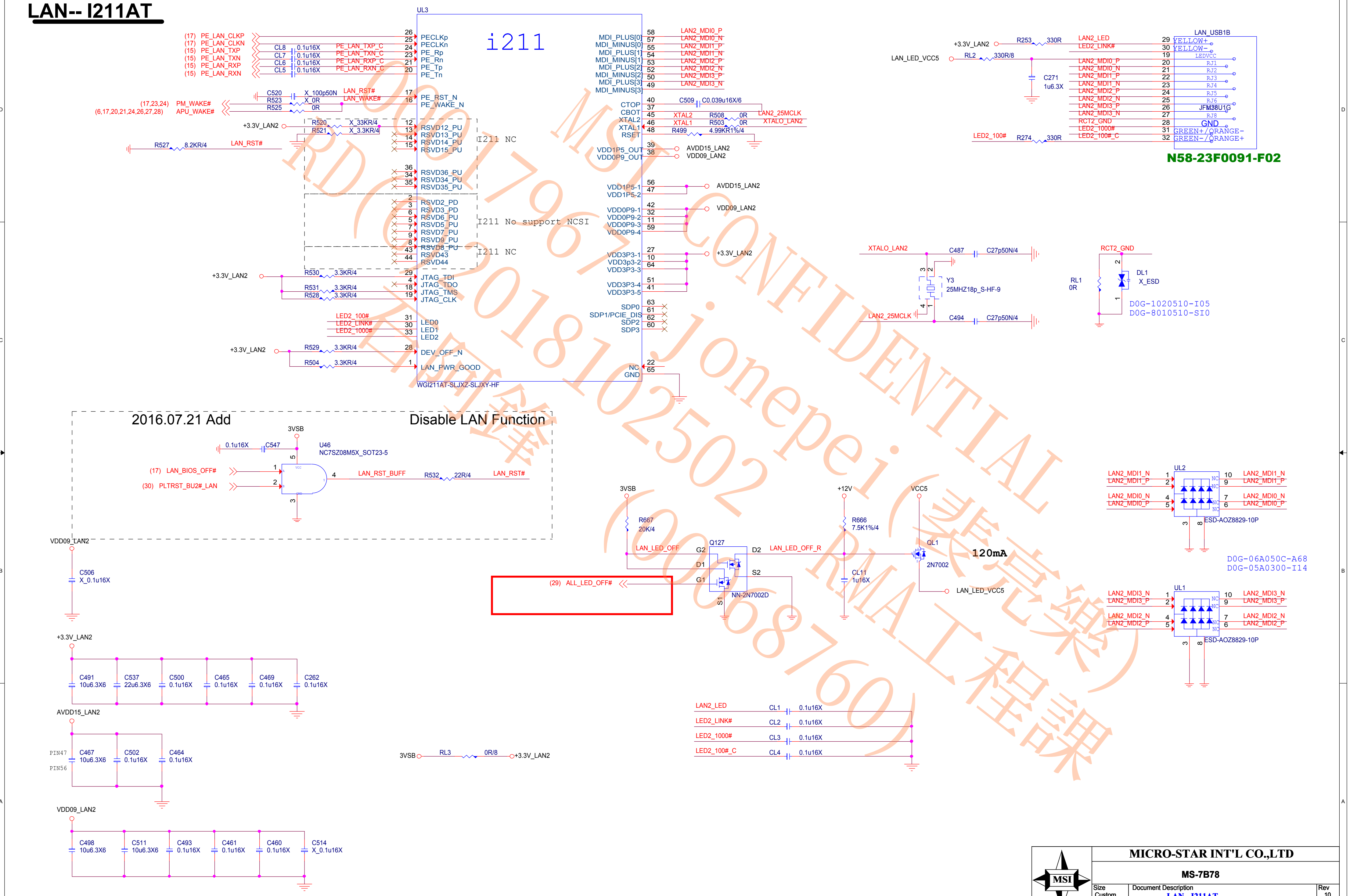
LAN-- I211AT



MICRO-STAR INT'L CO.,LTD	
MS-7B78	
Size: Custom	Document Description: LAN - I211AT — Rev 10
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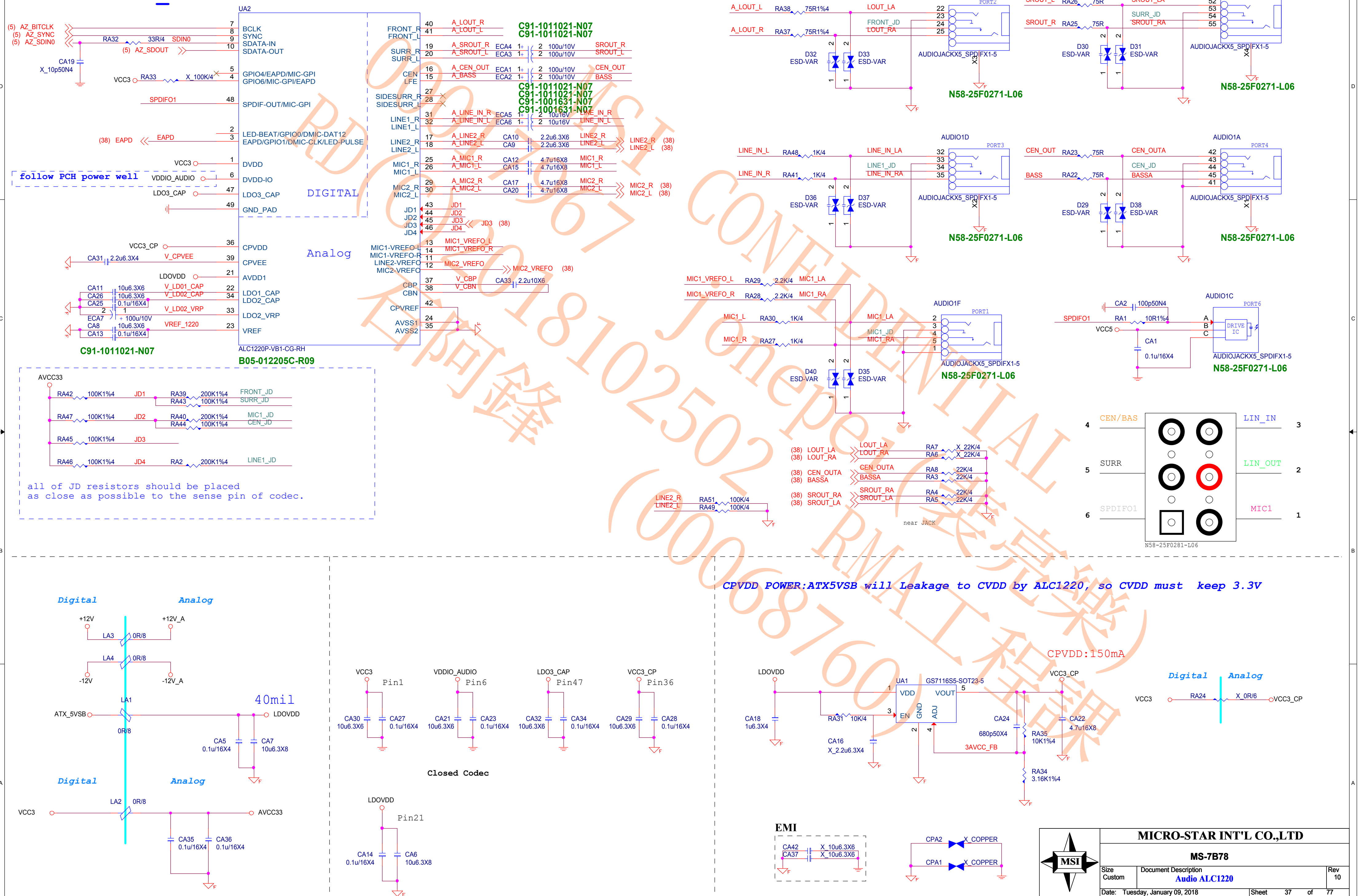
ALC1220P-VB1_48PIN



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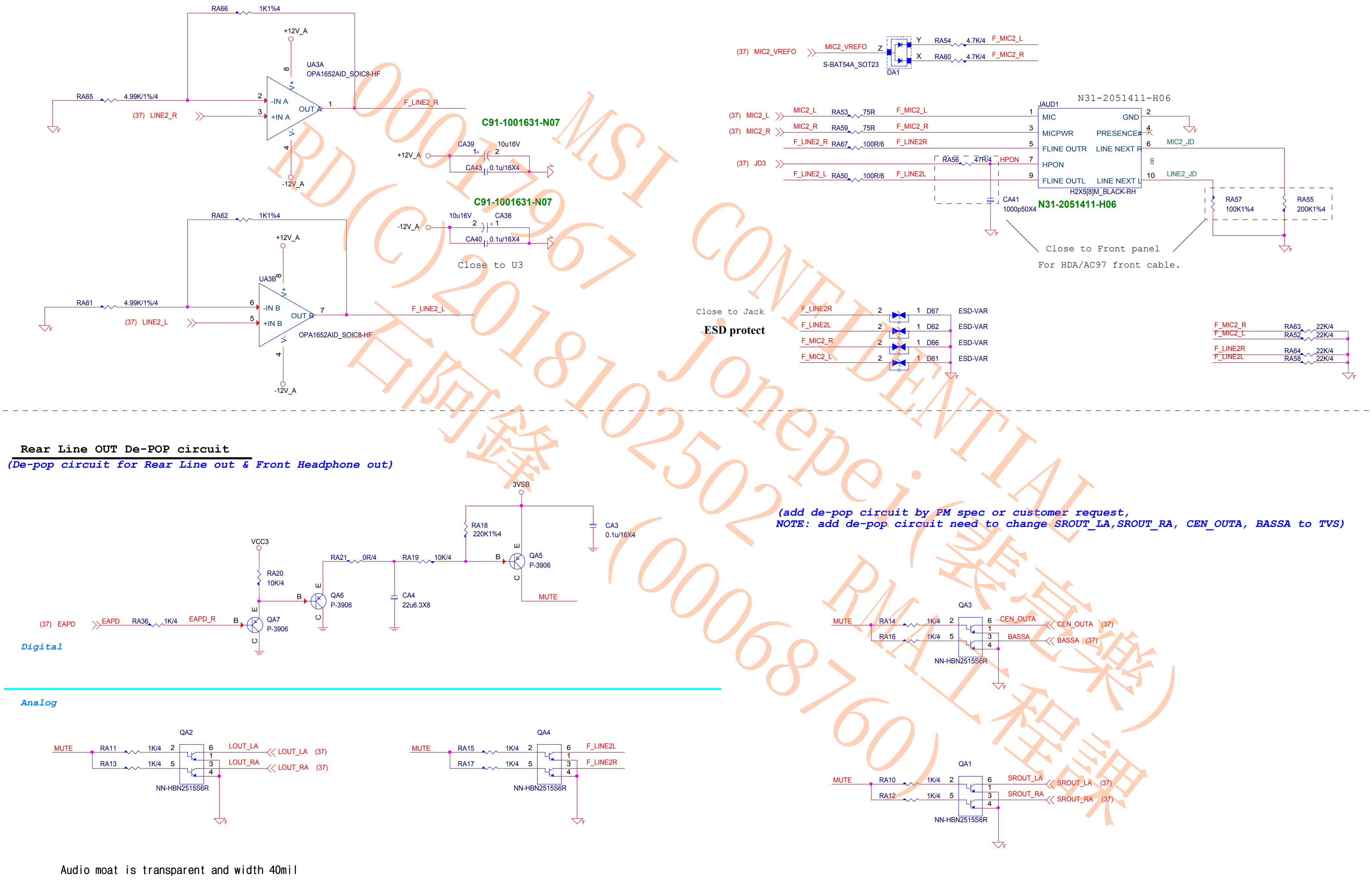
MS-7B78			
Size: Custom	Document Description: Audio ALC1220		Rev: 10
Date: Tuesday, January 09, 2018	Sheet 37	of 77	



RA66 1K1%4
+12V_A
UA3A
OPA1652AID_SOIC8-HF
RA65 4.99K/1%/4
(37) LINE2_R
-IN A
+IN A
OUT A
F_LINE2_R
-12V_A
C91-1001631-N07
CA39 10u16V
+12V_A
CA43 0.1u/16X4
C91-1001631-N07
RA62 1K1%4
+12V_A
-12V_A
CA38 10u16V
CA40 0.1u/16X4
Close to U3
UA3B
RA61 4.99K/1%/4
(37) LINE2_L
-IN B
+IN B
OUT B
F_LINE2_L
OPA1652AID_SOIC8-HF
-12V_A
(37) MIC2_VREFO
MIC2_VREFO
S-BAT54A_SOT23
DA1
RA54 4.7K/4 F_MIC2_L
RA60 4.7K/4 F_MIC2_R
N31-2051411-H06
JAUD1
(37) MIC2_L
MIC2_L RA53 75R F_MIC2_L
(37) MIC2_R
MIC2_R RA59 75R F_MIC2_R
F_LINE2_R RA67 100R/6 F_LINE2R
(37) JD3
RA56 47R/4 HPON
F_LINE2_L RA50 100R/6 F_LINE2L
MIC
MICPWR
FLINE OUTR
HPON
FLINE OUTL
GND
PRESENCE#
LINE NEXT R
LINE NEXT L
H2X5[8]M_BLACK-RH
N31-2051411-H06
CA41 1000p50X4
MIC2_JD
LINE2_JD
RA57 100K1%4
RA55 200K1%4
Close to Front panel
For HDA/AC97 front cable.
Close to Jack
ESD protect
F_LINE2R D67 ESD-VAR
F_LINE2L D62 ESD-VAR
F_MIC2_R D66 ESD-VAR
F_MIC2_L D61 ESD-VAR
F_MIC2_R RA63 22K/4
F_MIC2_L RA52 22K/4
F_LINE2R RA64 22K/4
F_LINE2L RA58 22K/4
Rear Line OUT De-POP circuit
(De-pop circuit for Rear Line out & Front Headphone out)
3VSB
RA18 220K1%4
CA3 0.1u/16X4
VCC3
RA20 10K/4
RA21 0R/4
RA19 10K/4
QA5 P-3906
MUTE
QA6 P-3906
CA4 22u6.3X8
(37) EAPD
EAPD RA36 1K/4 EAPD_R
QA7 P-3906
Digital
(add de-pop circuit by PM spec or customer request,
NOTE: add de-pop circuit need to change SROUT_LA,SROUT_RA, CEN_OUTA, BASSA to TVS)
QA3
MUTE RA14 1K/4 CEN_OUTA CEN_OUTA (37)
RA16 1K/4 BASSA BASSA (37)
NN-HBN2515S6R
Analog
QA2
MUTE RA11 1K/4 LOUT_LA LOUT_LA (37)
RA13 1K/4 LOUT_RA LOUT_RA (37)
NN-HBN2515S6R
QA4
MUTE RA15 1K/4 F_LINE2L
RA17 1K/4 F_LINE2R
NN-HBN2515S6R
QA1
MUTE RA10 1K/4 SROUT_LA SROUT_LA (37)
RA12 1K/4 SROUT_RA SROUT_RA (37)
NN-HBN2515S6R
Audio moat is transparent and width 40mil

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Size	Document Description	Rev
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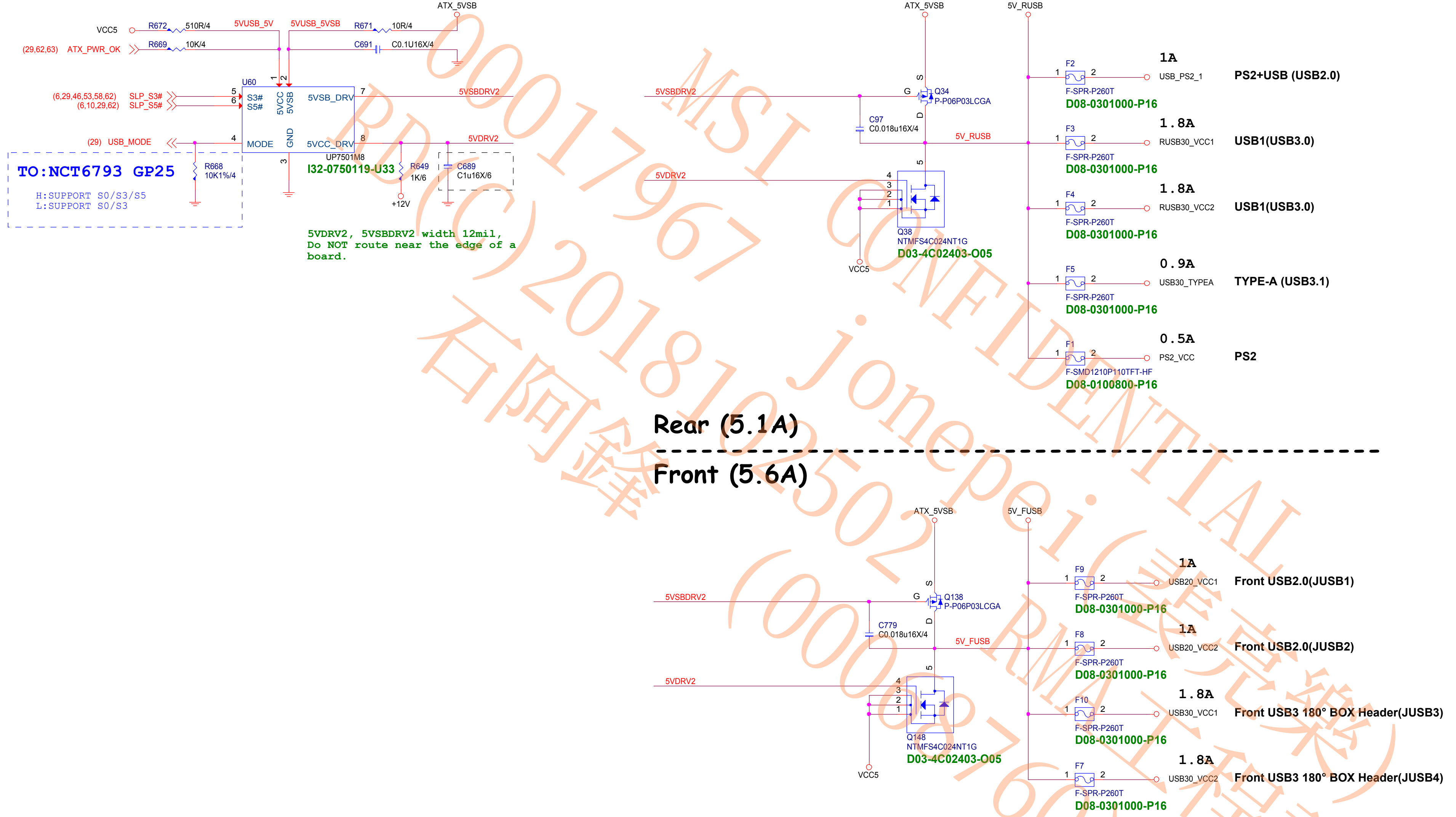
USB Power



MICRO-STAR INT'L CO.,LTD

MS-7B78

Size	Document Description	Rev
Custom	USB Power - UP7501	10

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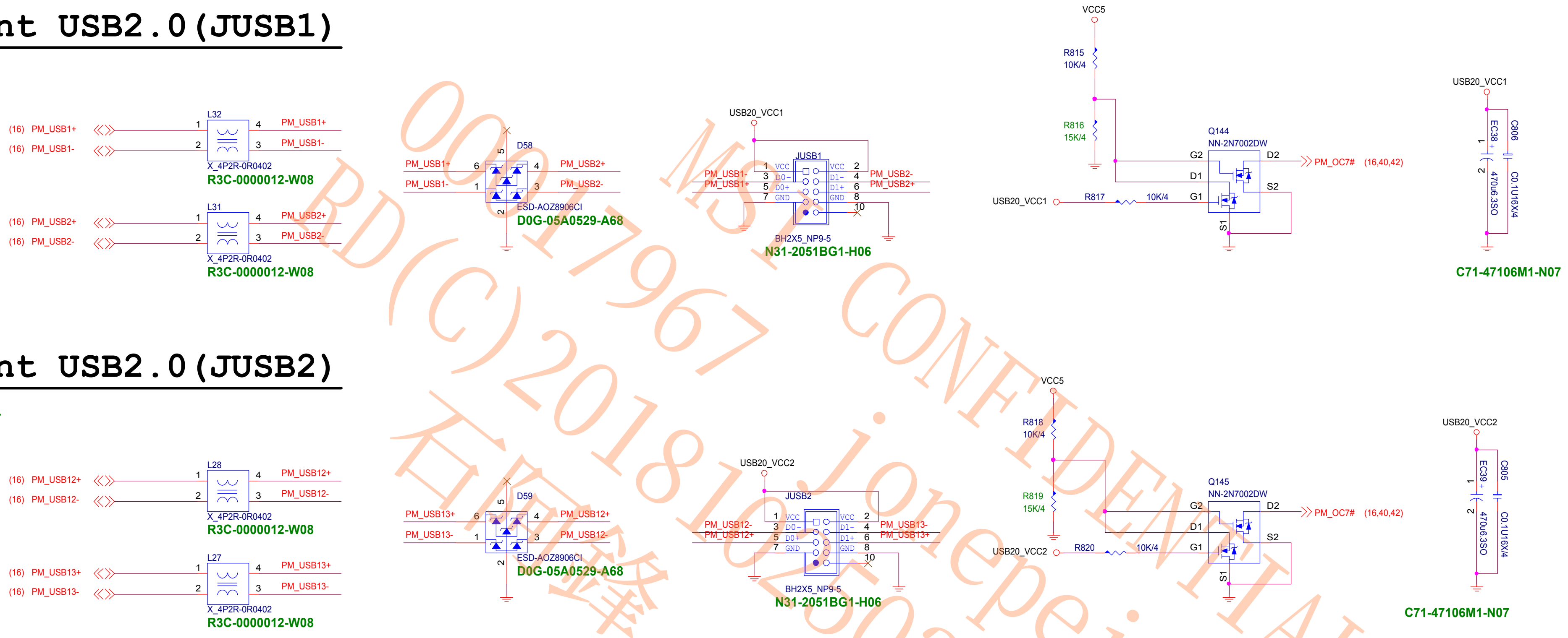
Front USB2.0(JUSB1)

5V@1A

Front USB2.0(JUSB2)

5V@1A



MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	Front USB2.0 Header	10

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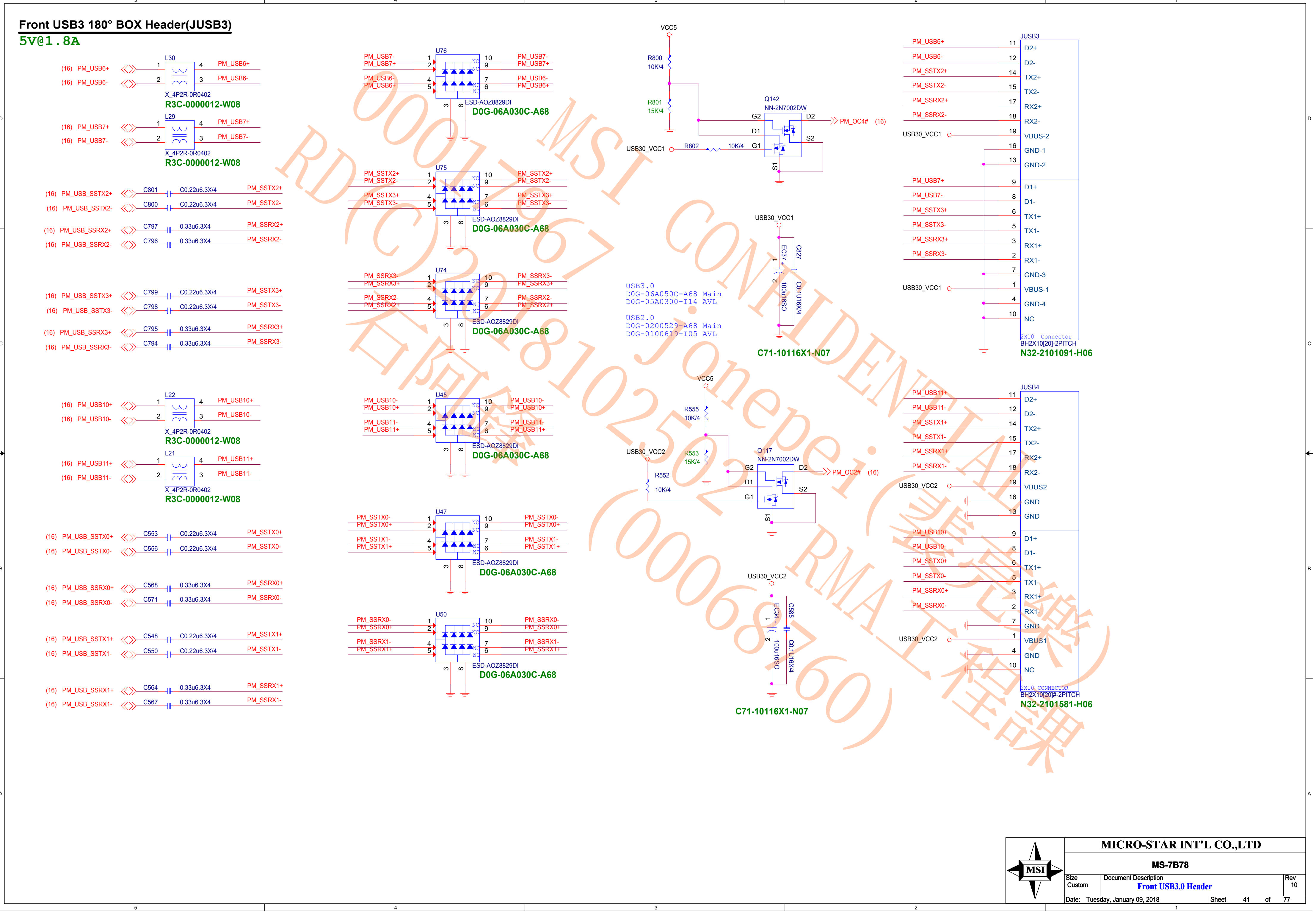

Front USB3 180° BOX Header(JUSB3)
5V@1.8A
L30 X_4P2R-0R0402 R3C-0000012-W08
L29 X_4P2R-0R0402 R3C-0000012-W08
L22 X_4P2R-0R0402 R3C-0000012-W08
L21 X_4P2R-0R0402 R3C-0000012-W08
(16) PM_USB6+
(16) PM_USB6-
(16) PM_USB7+
(16) PM_USB7-
(16) PM_USB10+
(16) PM_USB10-
(16) PM_USB11+
(16) PM_USB11-
(16) PM_USB_SSTX2+ C801 C0.22u6.3X/4 PM_SSTX2+
(16) PM_USB_SSTX2- C800 C0.22u6.3X/4 PM_SSTX2-
(16) PM_USB_SSRX2+ C797 0.33u6.3X4 PM_SSRX2+
(16) PM_USB_SSRX2- C796 0.33u6.3X4 PM_SSRX2-
(16) PM_USB_SSTX3+ C799 C0.22u6.3X/4 PM_SSTX3+
(16) PM_USB_SSTX3- C798 C0.22u6.3X/4 PM_SSTX3-
(16) PM_USB_SSRX3+ C795 0.33u6.3X4 PM_SSRX3+
(16) PM_USB_SSRX3- C794 0.33u6.3X4 PM_SSRX3-
(16) PM_USB_SSTX0+ C553 C0.22u6.3X/4 PM_SSTX0+
(16) PM_USB_SSTX0- C556 C0.22u6.3X/4 PM_SSTX0-
(16) PM_USB_SSRX0+ C568 0.33u6.3X4 PM_SSRX0+
(16) PM_USB_SSRX0- C571 0.33u6.3X4 PM_SSRX0-
(16) PM_USB_SSTX1+ C548 C0.22u6.3X/4 PM_SSTX1+
(16) PM_USB_SSTX1- C550 C0.22u6.3X/4 PM_SSTX1-
(16) PM_USB_SSRX1+ C564 0.33u6.3X4 PM_SSRX1+
(16) PM_USB_SSRX1- C567 0.33u6.3X4 PM_SSRX1-
U76 ESD-AOZ8829DI D0G-06A030C-A68
U75 ESD-AOZ8829DI D0G-06A030C-A68
U74 ESD-AOZ8829DI D0G-06A030C-A68
U45 ESD-AOZ8829DI D0G-06A030C-A68
U47 ESD-AOZ8829DI D0G-06A030C-A68
U50 ESD-AOZ8829DI D0G-06A030C-A68
VCC5
R800 10K/4
R801 15K/4
R802 10K/4
Q142 NN-2N7002DW
PM_OC4# (16)
USB30_VCC1
EC37 100u16SO
C827 C0.1U16X/4
C71-10116X1-N07
USB3.0
D0G-06A050C-A68 Main
D0G-05A0300-I14 AVL
USB2.0
D0G-0200529-A68 Main
D0G-0100619-I05 AVL
R555 10K/4
R553 15K/4
R552 10K/4
Q117 NN-2N7002DW
PM_OC2# (16)
USB30_VCC2
EC34 100u16SO
C585 C0.1U16X/4
C71-10116X1-N07
JUSB3
D2+ D2- TX2+ TX2- RX2+ RX2- VBUS-2 GND-1 GND-2 D1+ D1- TX1+ TX1- RX1+ RX1- GND-3 VBUS-1 GND-4 NC
2X10 Connector
BH2X10[20]-2PITCH
N32-2101091-H06
JUSB4
D2+ D2- TX2+ TX2- RX2+ RX2- VBUS2 GND GND D1+ D1- TX1+ TX1- RX1+ RX1- GND VBUS1 GND NC
2X10 CONNECTOR
BH2X10[20]#-2PITCH
N32-2101581-H06
MICRO-STAR INT'L CO.,LTD
MS-7B78
Size Custom
Document Description Front USB3.0 Header
Rev 10
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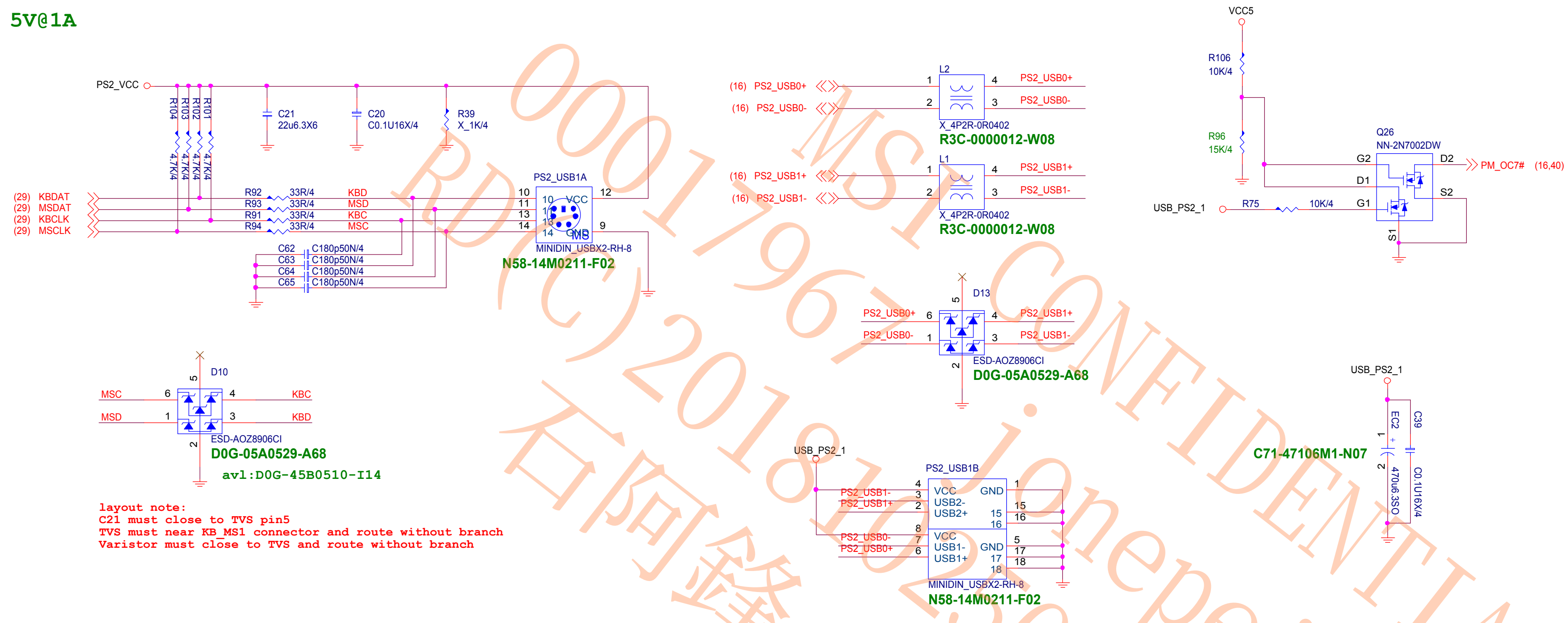
PS2+USB (USB2.0)

5V@1A



layout note:
C21 must close to TVS pin5
TVS must near KB_MS1 connector and route without branch
Varistor must close to TVS and route without branch

MICRO-STAR INT'L CO.,LTD

MS-7B78

Size	Document Description	Rev
Custom	Rear USB2.0 + PS2	10

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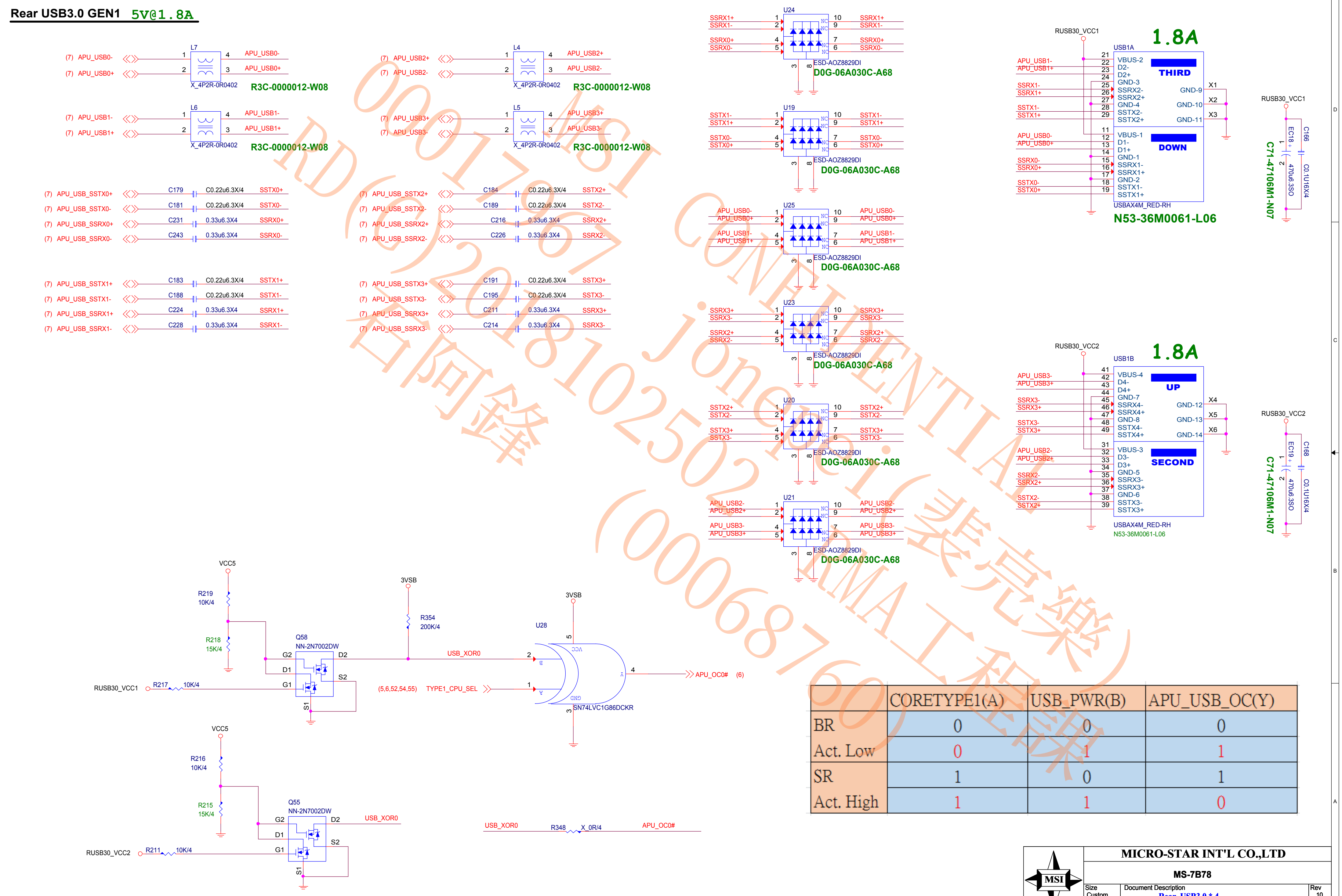

	CORETYPE1(A)	USB_PWR(B)	APU_USB_OC(Y)
BR	0	0	0
Act. Low	0	1	1
SR	1	0	1
Act. High	1	1	0

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Size: Custom | Document Description: Rear_USB3.0 * 4 | Rev: 10

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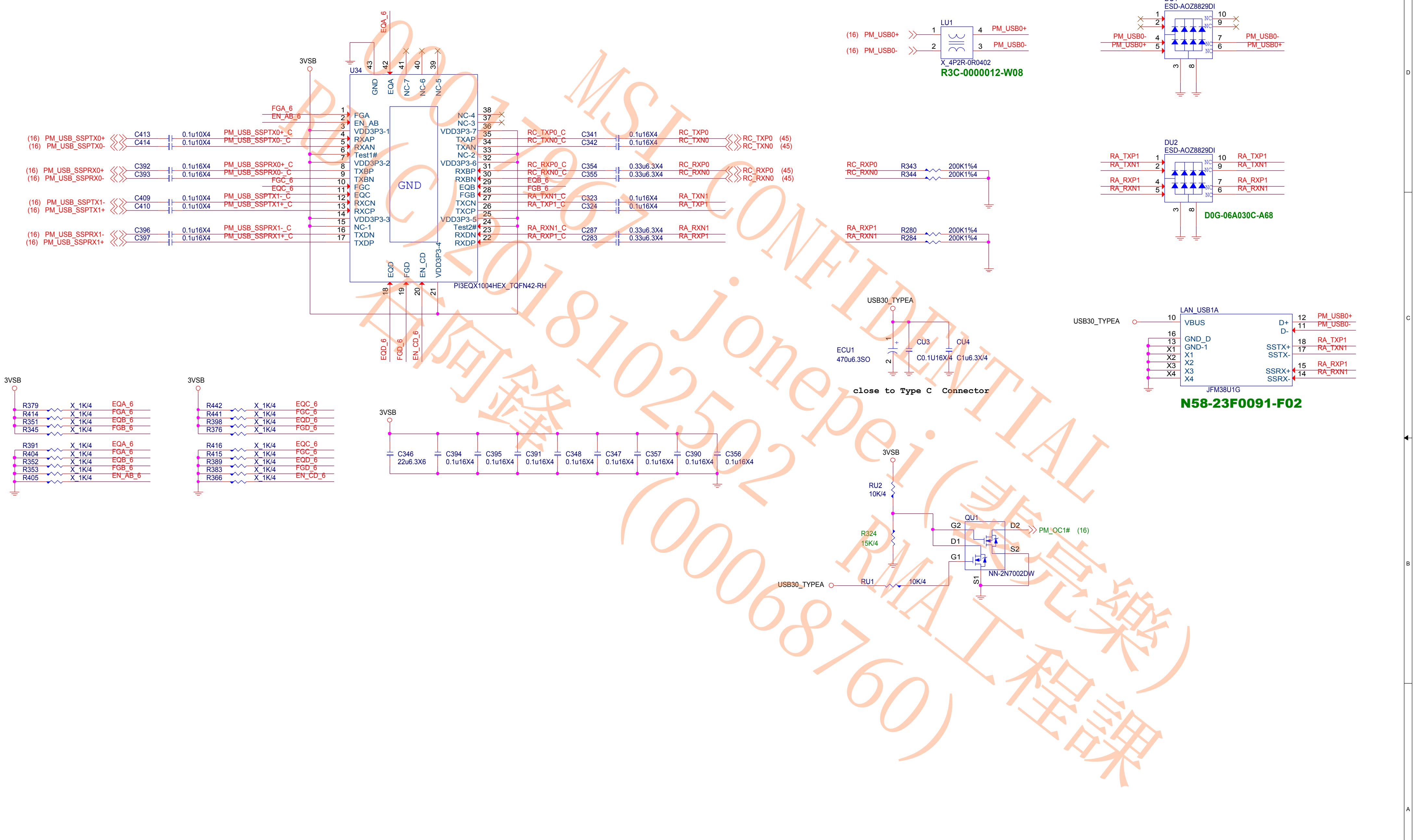
TYPE-A PI3EQX1004 Redriver



MICRO-STAR INT'L CO.,LTD	
MS-7B78	
Size: Custom	Document Description: Rear USB3.1 Type A / redrive	Rev: 10
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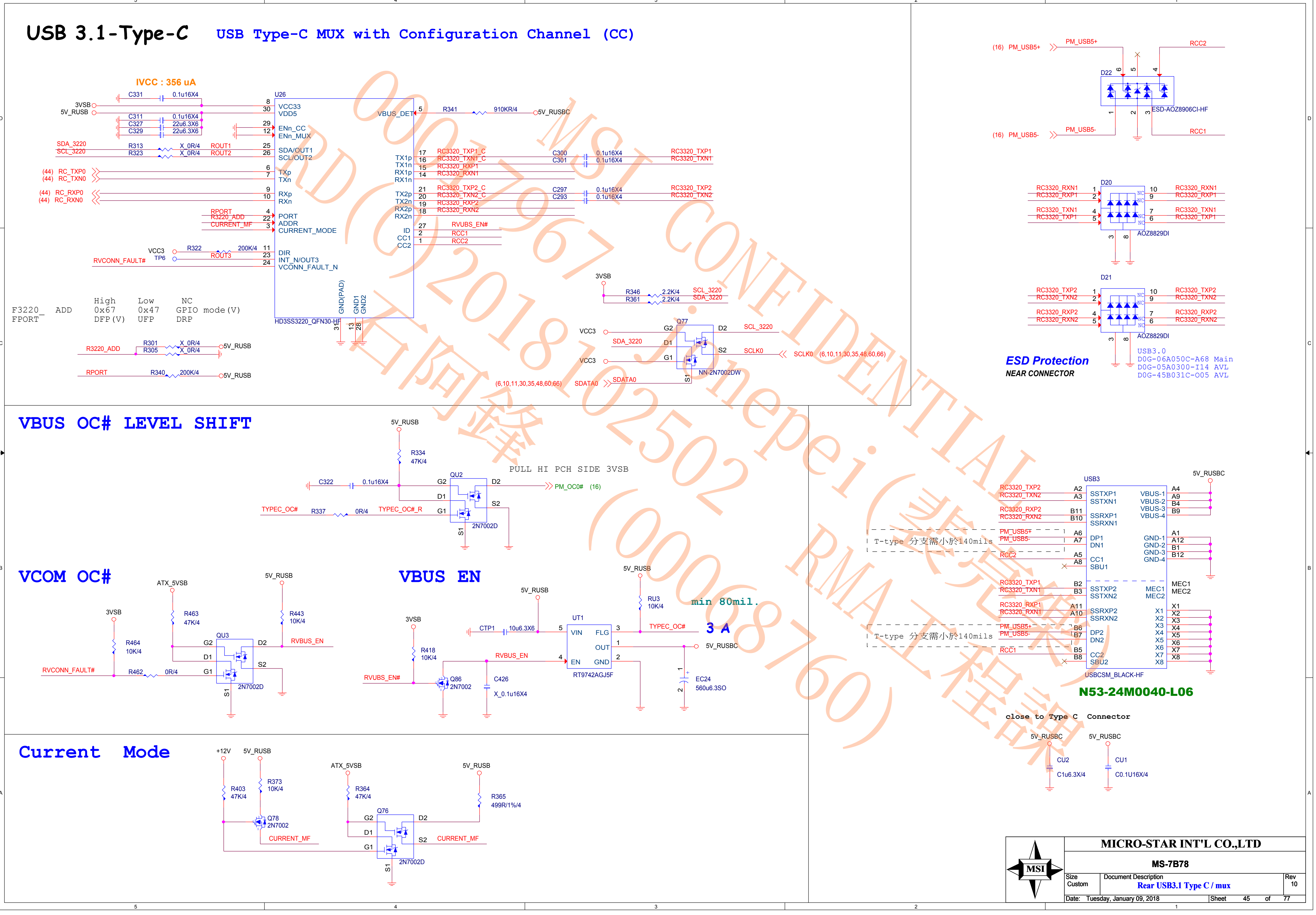
USB 3.1-Type-C
USB Type-C MUX with Configuration Channel (CC)
IVCC : 356 uA
U26
HD3SS3220_QFN30-HF
VCC33
VDD5
ENn_CC
ENn_MUX
SDA/OUT1
SCL/OUT2
TXp
TXn
RXp
RXn
PORT
ADDR
CURRENT_MODE
DIR
INT_N/OUT3
VCONN_FAULT_N
VBUS_DET
TX1p
TX1n
RX1p
RX1n
TX2p
TX2n
RX2p
RX2n
ID
CC1
CC2
GND(PAD)
GND1
GND2
3VSB
5V_RUSB
5V_RUSBC
C331 0.1u16X4
C311 0.1u16X4
C327 22u6.3X6
C329 22u6.3X6
R341 910KR/4
R313 X_0R/4 ROUT1
R323 X_0R/4 ROUT2
SDA_3220
SCL_3220
(44) RC_TXP0
(44) RC_TXN0
(44) RC_RXP0
(44) RC_RXN0
RPORT
R3220_ADD
CURRENT_MF
VCC3
R322 200K/4
ROUT3
RVCONN_FAULT#
TP6
RC3320_TXP1_C
RC3320_TXN1_C
RC3320_RXP1
RC3320_RXN1
RC3320_TXP2_C
RC3320_TXN2_C
RC3320_RXP2
RC3320_RXN2
C300 0.1u16X4
C301 0.1u16X4
C297 0.1u16X4
C293 0.1u16X4
RC3320_TXP1
RC3320_TXN1
RC3320_TXP2
RC3320_TXN2
RVUBS_EN#
RCC1
RCC2
F3220_ FPORT ADD High 0x67 DFP(V) Low 0x47 UFP NC GPIO mode(V) DRP
R301 X_0R/4
R305 X_0R/4
R3220_ADD
RPORT R340 200K/4
R346 2.2K/4 SCL_3220
R361 2.2K/4 SDA_3220
Q77 NN-2N7002DW
SCL_3220
SCLK0
SCLK0 (6,10,11,30,35,48,60,66)
SDATA0
(6,10,11,30,35,48,60,66) SDATA0
(16) PM_USB5+
(16) PM_USB5-
D22 ESD-AOZ8906CI-HF
D20 AOZ8829DI
D21 AOZ8829DI
ESD Protection
NEAR CONNECTOR
USB3.0
D0G-06A050C-A68 Main
D0G-05A0300-I14 AVL
D0G-45B031C-005 AVL
VBUS OC# LEVEL SHIFT
R334 47K/4
C322 0.1u16X4
QU2 2N7002D
PM_OC0# (16)
PULL HI PCH SIDE 3VSB
TYPEC_OC#
R337 0R/4
TYPEC_OC#_R
VCOM OC#
ATX_5VSB
R463 47K/4
R443 10K/4
R464 10K/4
QU3 2N7002D
RVBUS_EN
RVCONN_FAULT#
R462 0R/4
VBUS EN
RU3 10K/4
min 80mil.
3 A
UT1 RT9742AGJ5F
VIN FLG OUT EN GND
CTP1 10u6.3X6
TYPEC_OC#
R418 10K/4
RVBUS_EN
RVUBS_EN#
Q86 2N7002
C426 X_0.1u16X4
EC24 560u6.3SO
USB3
USBCSM_BLACK-HF
SSTXP1
SSTXN1
SSRXP1
SSRXN1
DP1
DN1
CC1
SBU1
SSTXP2
SSTXN2
SSRXP2
SSRXN2
DP2
DN2
CC2
SBU2
VBUS-1
VBUS-2
VBUS-3
VBUS-4
GND-1
GND-2
GND-3
GND-4
MEC1
MEC2
T-type 分支需小於140mils
N53-24M0040-L06
close to Type C Connector
CU2 C1u6.3X/4
CU1 C0.1U16X/4
Current Mode
+12V
R403 47K/4
R373 10K/4
Q78 2N7002
CURRENT_MF
R364 47K/4
R365 499R/1%/4
Q76 2N7002D
CURRENT_MF
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MS-7B78
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Document Description
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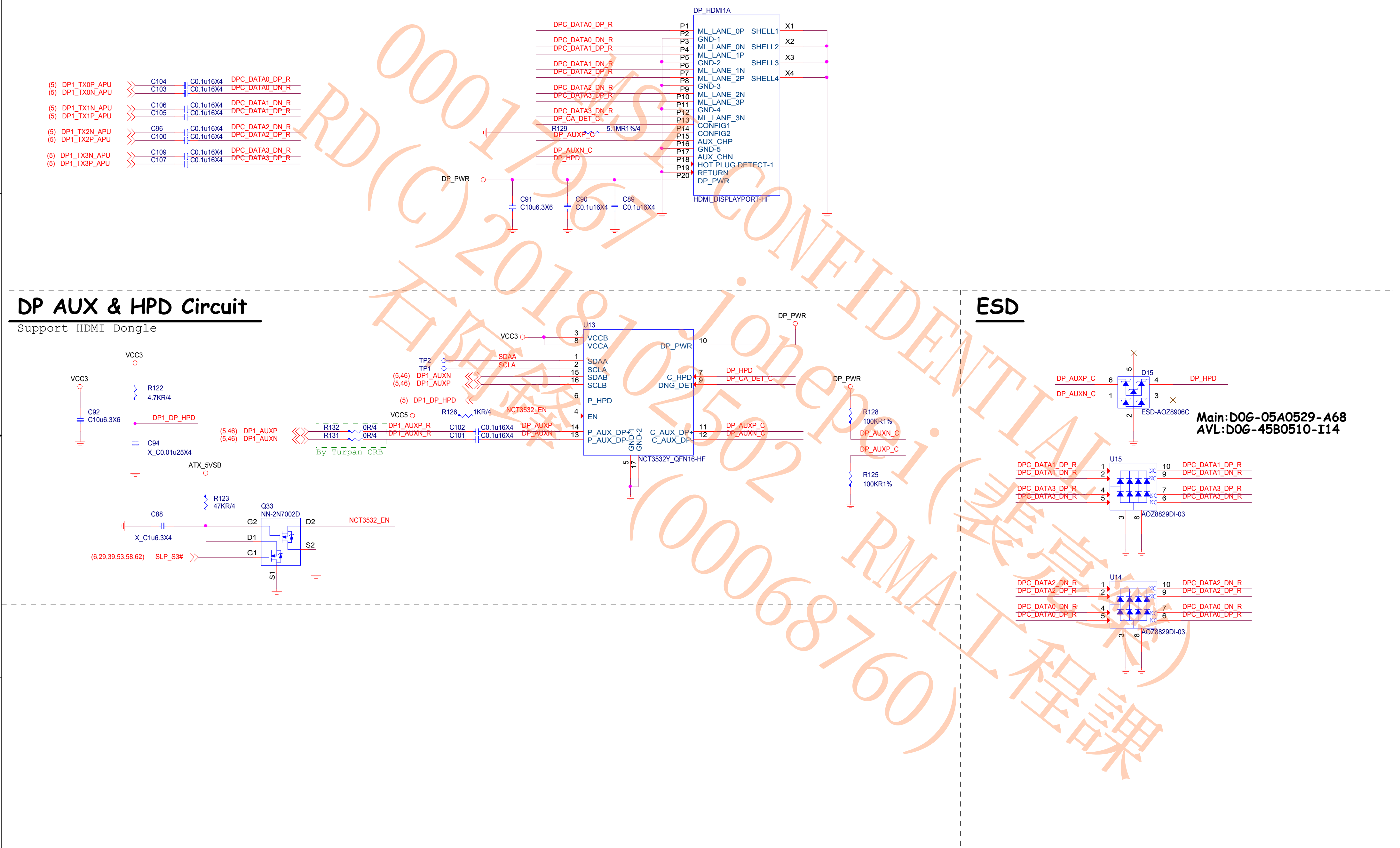
DP CONNECTOR

DP AUX & HPD Circuit

Support HDMI Dongle

ESD



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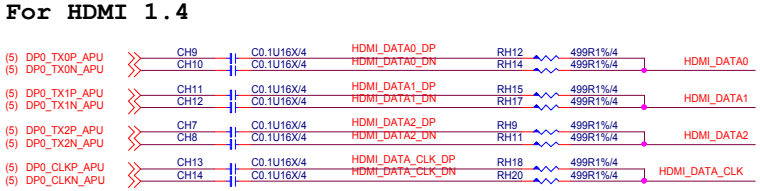
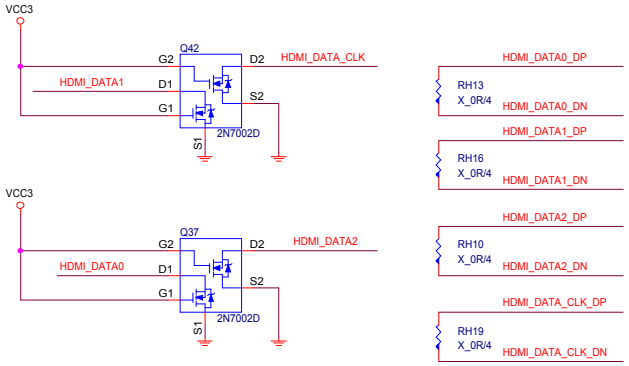
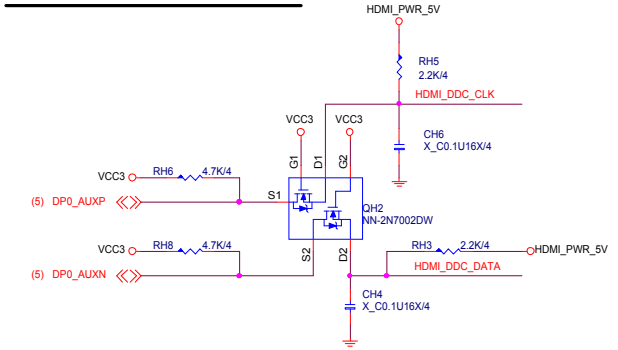
HDMI CONNECTOR

For HDMI 1.4

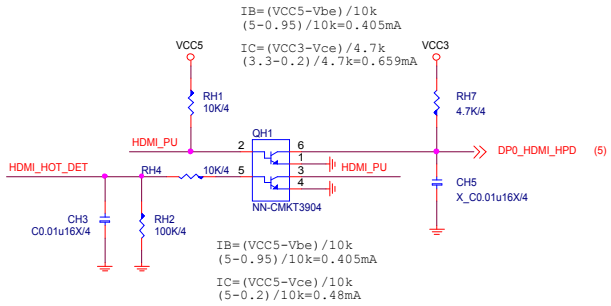




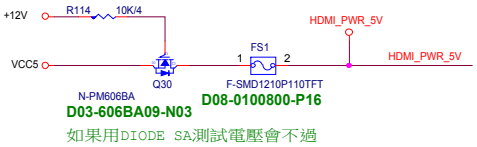
AUX Level Shifter



HPD Circuit

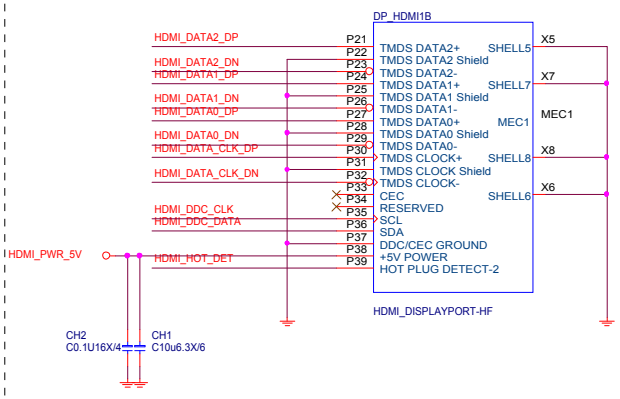


Connector Power

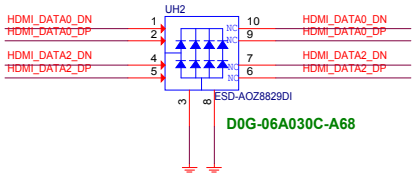


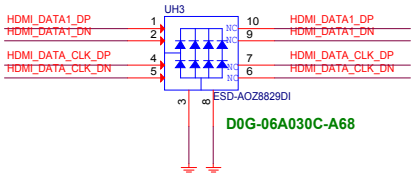
如果用DIODE SA測試電壓會不過

Connector

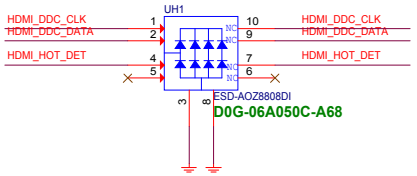


For EMI





注意:耐壓5v零件



MICRO-STAR INT'L CO.,LTD

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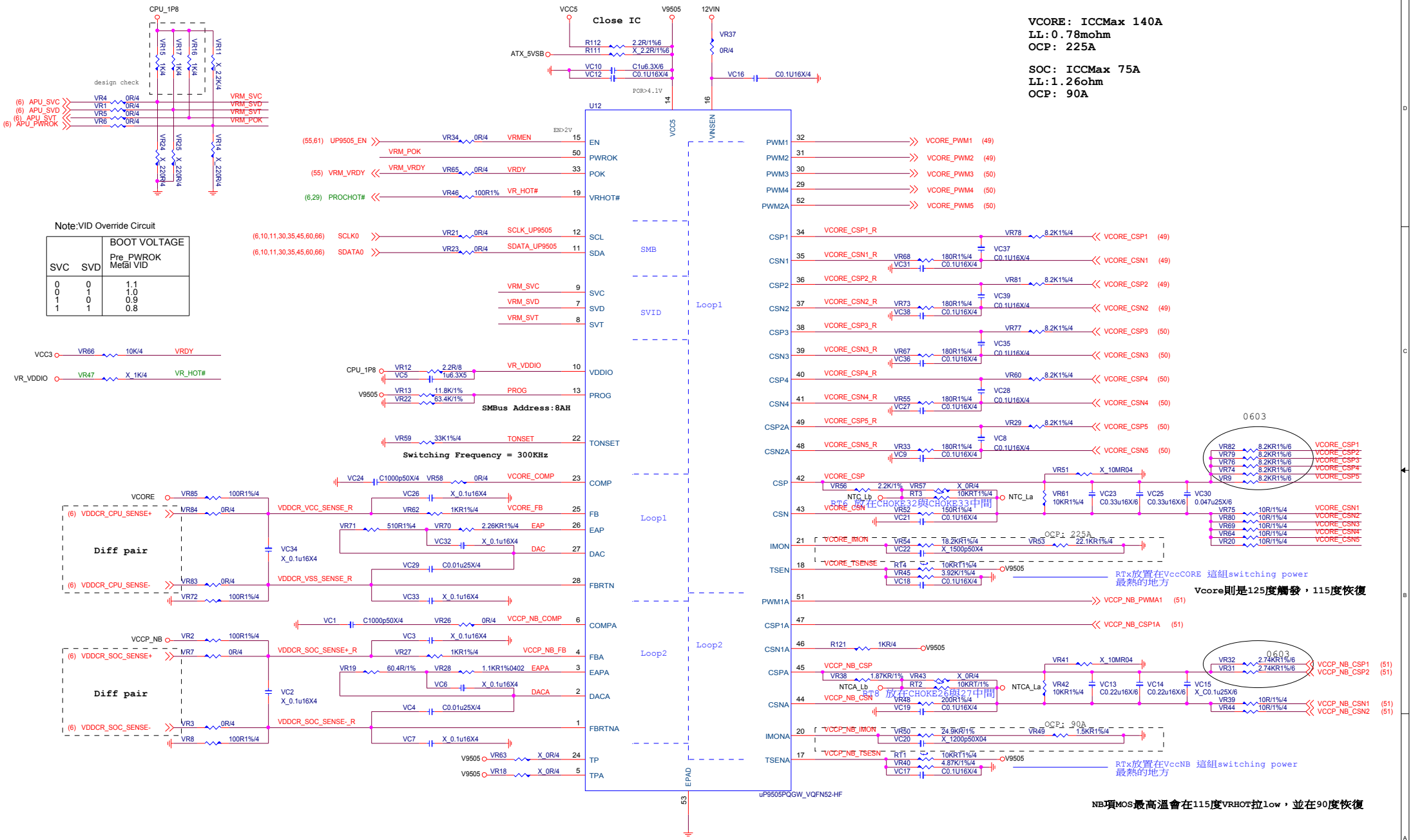
VCORE: ICCMax 140A
LL:0.78mohm
OCP: 225A
SOC: ICCMax 75A
LL:1.26ohm
OCP: 90A
Close IC
U12
uP9505PQGW_VQFN52-HF
Note:VID Override Circuit
BOOT VOLTAGE
Pre_PWROK Metal VID
SVC SVD
0 0 1.1
0 1 1.0
1 0 0.9
1 1 0.8
SMBus Address:8AH
Switching Frequency = 300KHz
Diff pair
Diff pair
Loop1
Loop2
SMB
SVID
OCP: 225A
OCP: 90A
0603
RT6 放在CHOKE32與CHOKE33中間
RT8 放在CHOKE26與27中間
RTx放置在VccCORE 這組switching power 最熱的地方
RTx放置在VccNB 這組switching power 最熱的地方
Vcore則是125度觸發，115度恢復
NB項MOS最高溫會在115度VRHOT拉low，並在90度恢復
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MS-7B78
CPU Power UP9505 10+2
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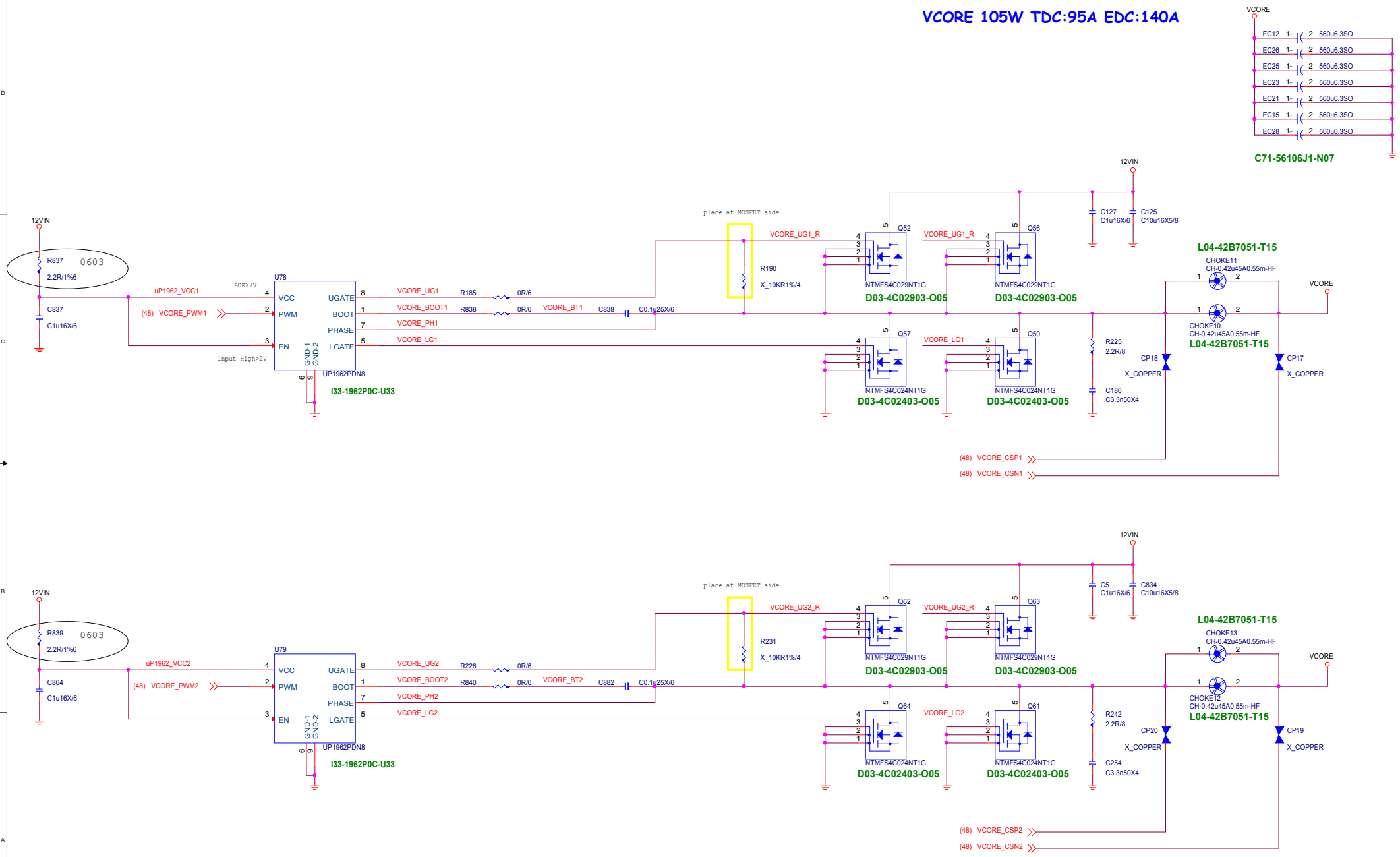
VCORE 105W TDC:95A EDC:140A



MICRO-STAR INT'L CO.,LTD		
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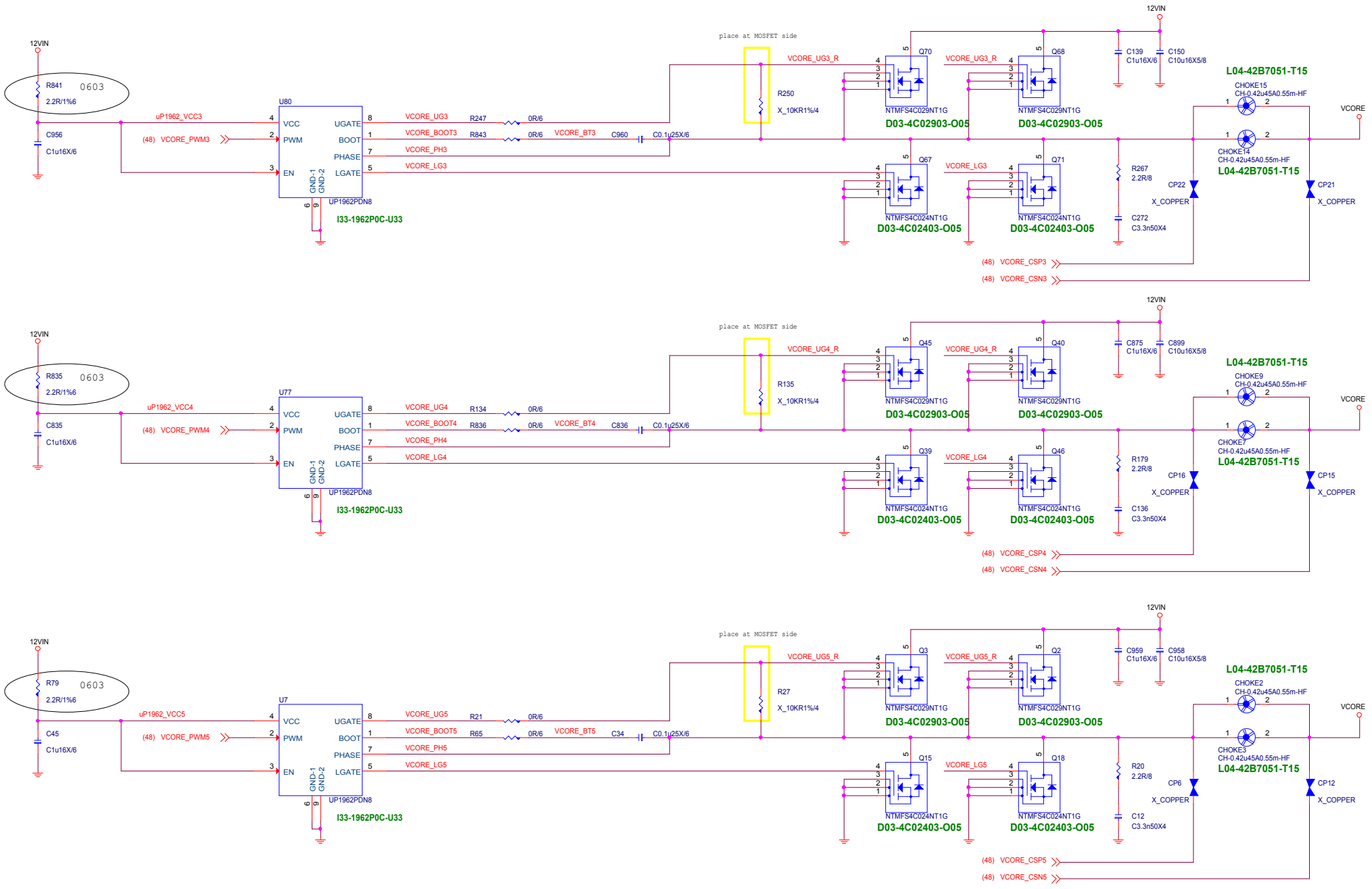

MICRO-STAR INT'L CO.,LTD		
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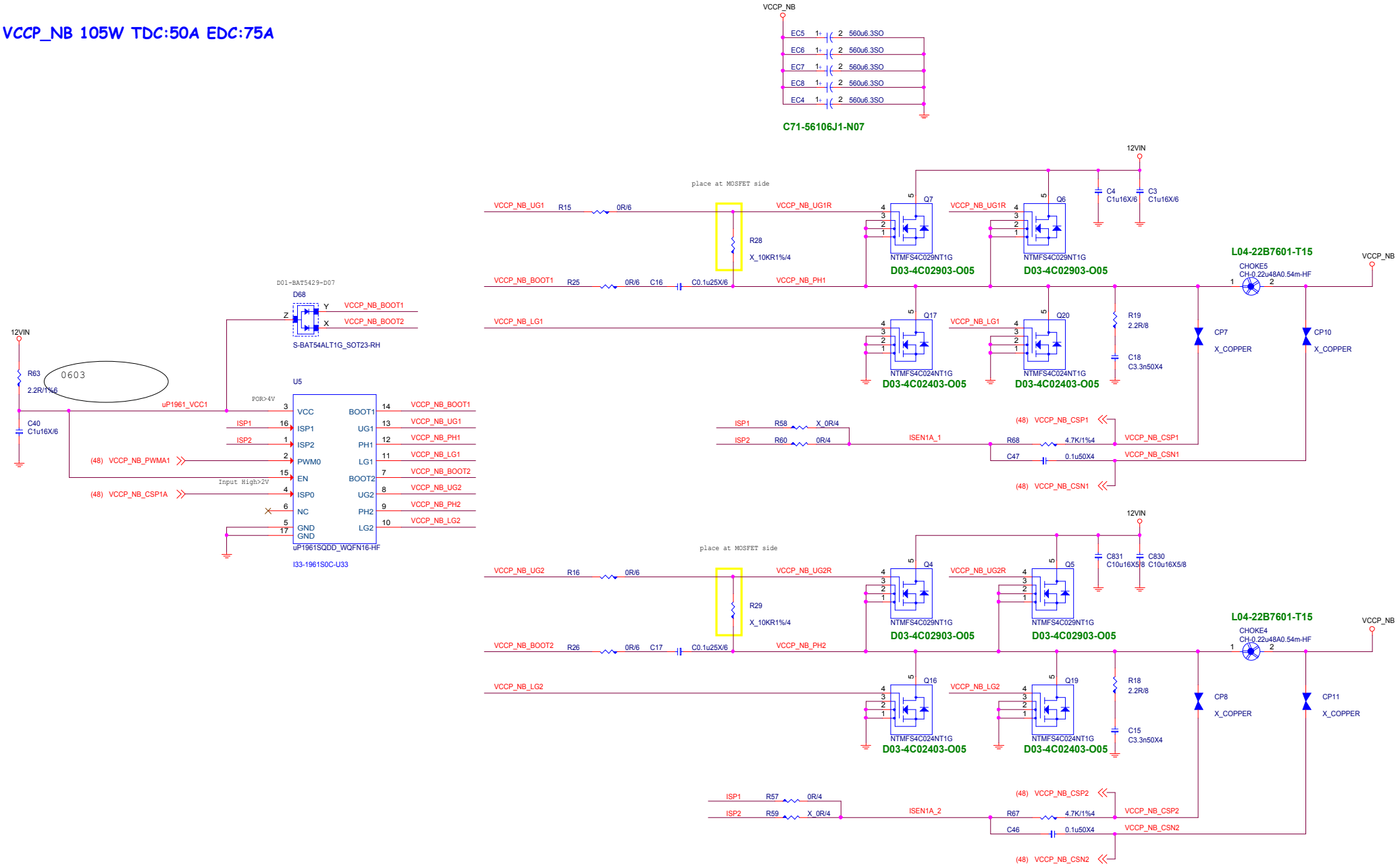
VCCP_NB 105W TDC:50A EDC:75A



MICRO-STAR INT'L CO.,LTD	
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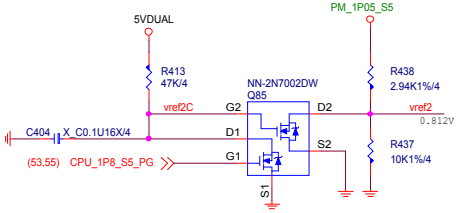
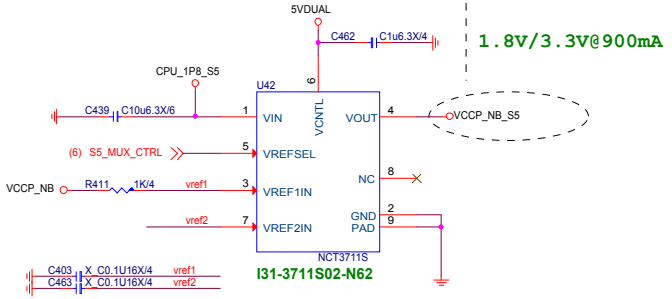
FOR
VCCP_SOC_S5
0.9A

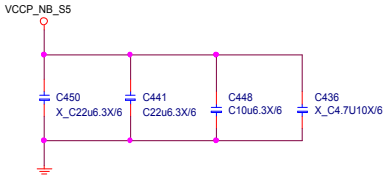
S5_MUX_CTRL
HIGH:S0
LOW: S3/S5

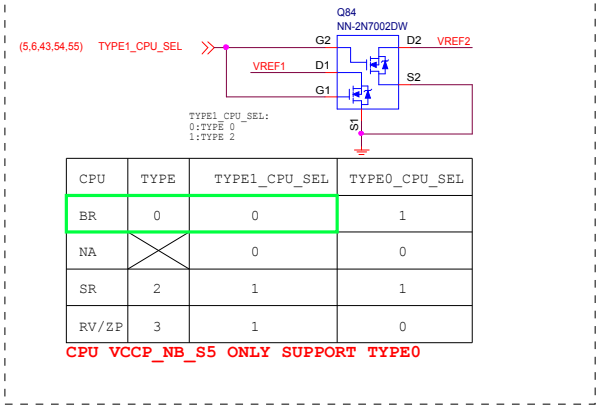
H: +VDDCR_FCH_ALW will track VDDNB
L: If VDDCR_SOC<0.775V (OR 0.85V),VDDCR_SOC_S5 =0.775V.
If VDDCR_SOC >= 0.775V (OR 0.85V) , VDDCR_SOC_S5 will track VDDCR_NB

(VDDCR_SOC_S5 is only used for AMD Family 15h Models 60h-6Fh processors)









CPU	TYPE	TYPE1_CPU_SEL	TYPE0_CPU_SEL
BR	0	0	1
NA		0	0
SR	2	1	1
RV/ZP	3	1	0

CPU VCCP_NB_S5 ONLY SUPPORT TYPE0

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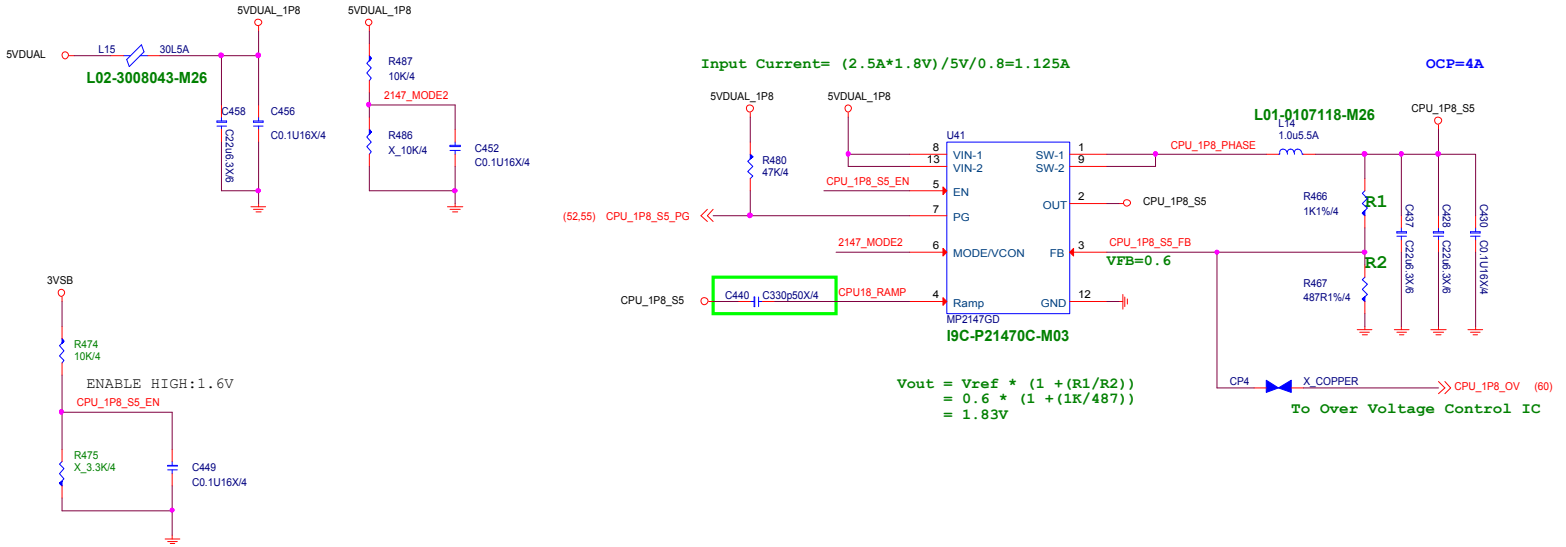
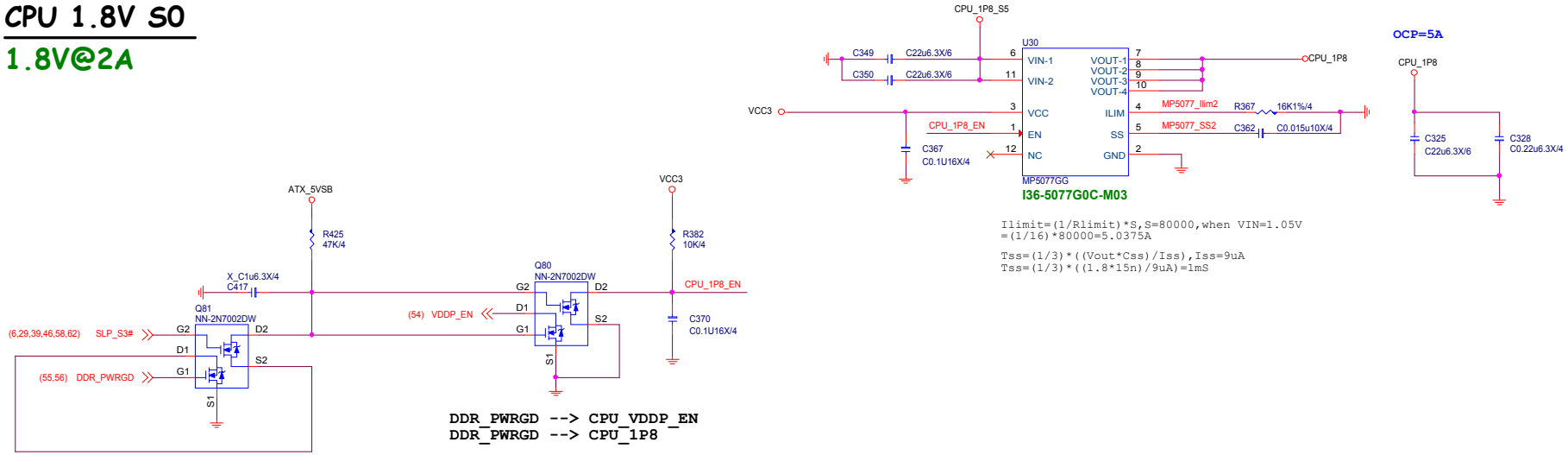
CPU 1.8V S5 @0.5A

1.8V S5@0.5A



CPU 1.8V S0

1.8V@2A



MICRO-STAR INT'L CO.,LTD		
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CPU_VDDP_S0

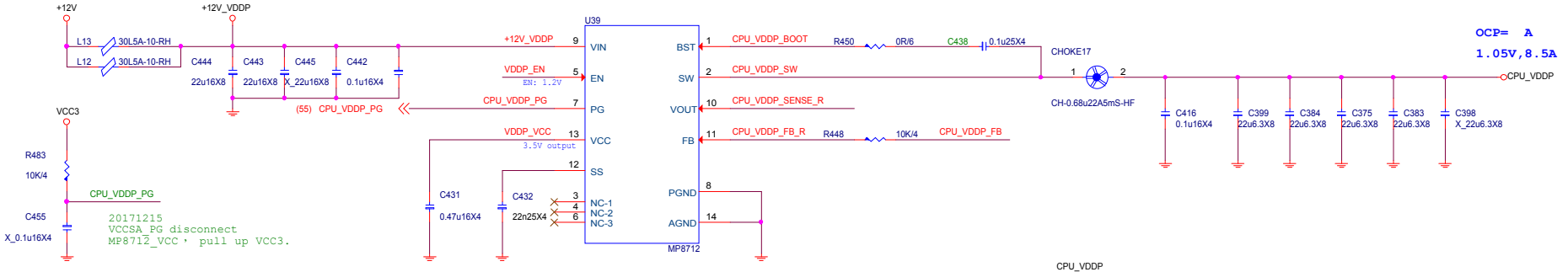
1.05V/0.9V@S0:8.5A

Input Current= (8.5A*1.05V)/12V/0.8=2.23A

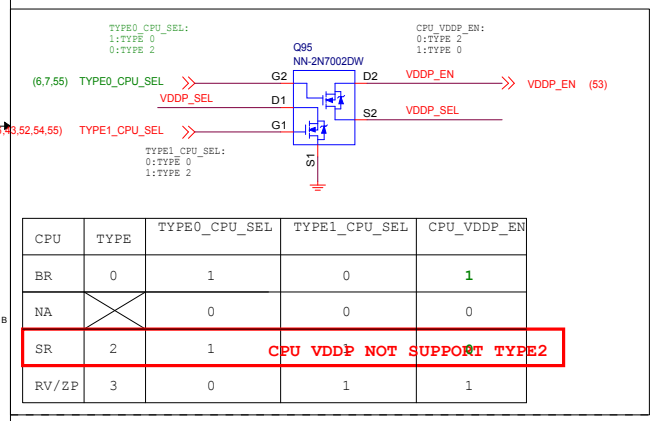
S0:8.5A
S5:1A

OCP=14A

Iin=11.1A*1.05V/0.8/12V=1.21A
L02-3008043-M26
Over 85℃ ,Rated Current
1.5A.

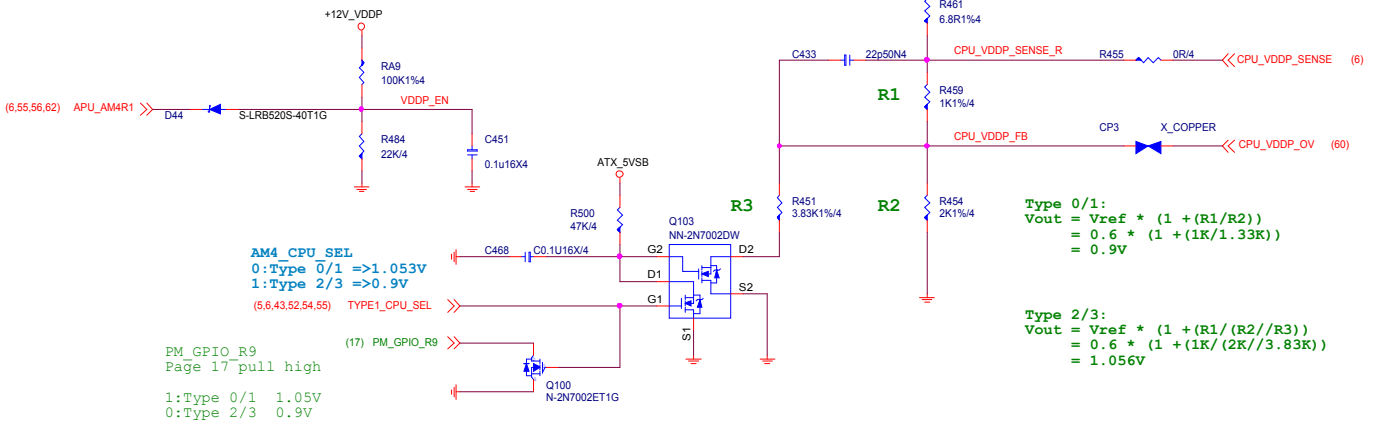


OCP= A
1.05V,8.5A



CPU	TYPE	TYPE0_CPU_SEL	TYPE1_CPU_SEL	CPU_VDDP_EN
BR	0	1	0	1
NA	X	0	0	0
SR	2	1	0	0
RV/ZP	3	0	1	1

CPU VDDP NOT SUPPORT TYPE2



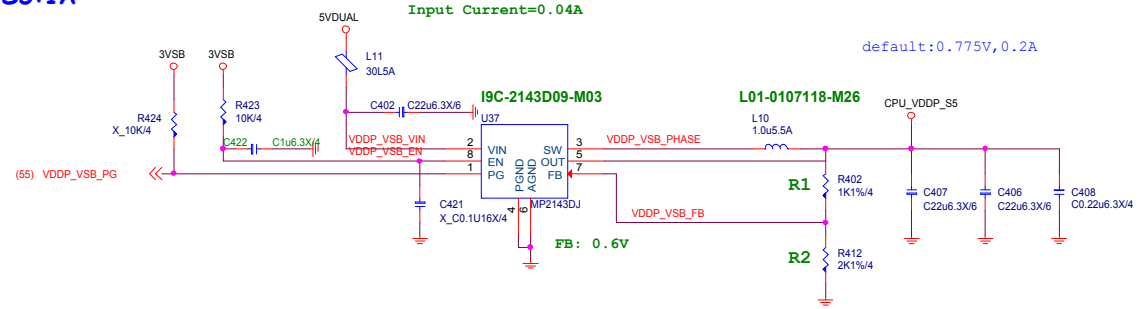
CPU_VDDP_S5

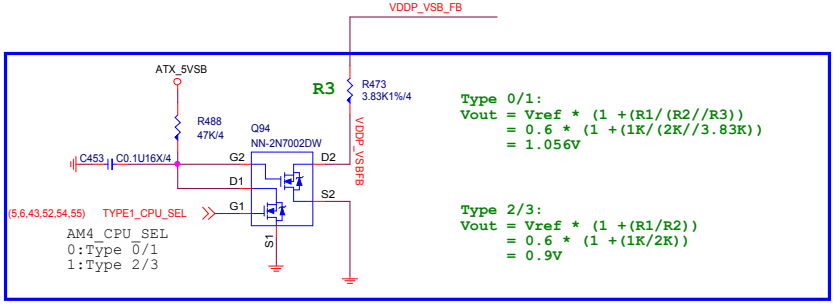
(VDDCR_SOC_S5)

1.05V/0.9V
S5:1A

Input Current=0.04A

default:0.775V,0.2A





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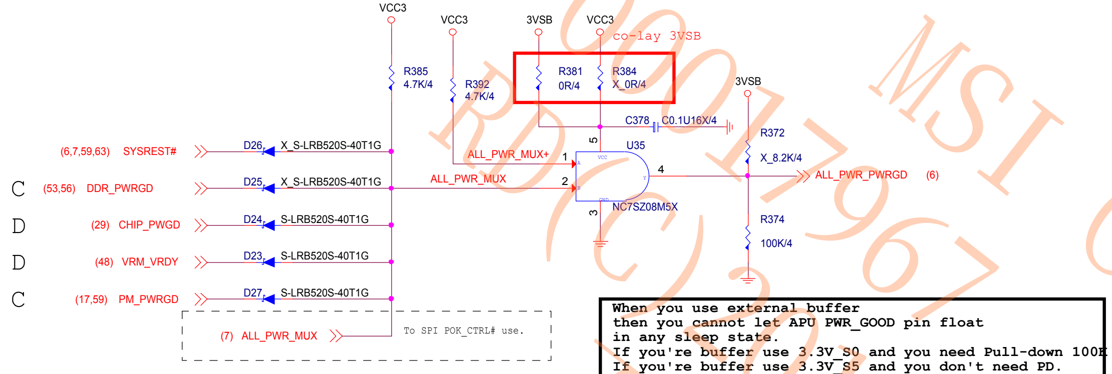
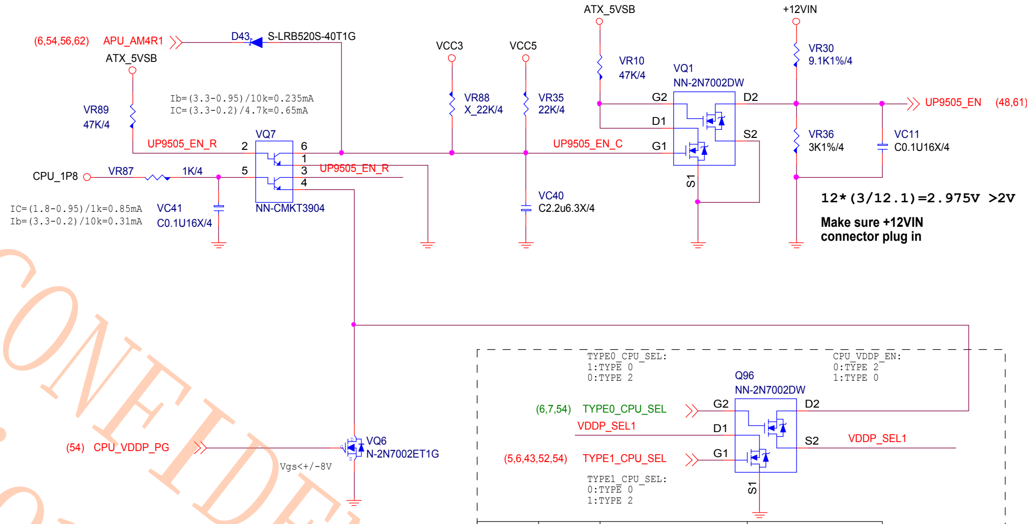
ALL POWER GOOD MUX

S0 PG



When you use external buffer
then you cannot let APU PWR_GOOD pin float
in any sleep state.
If you're buffer use 3.3V_S0 and you need Pull-down 100K
If you're buffer use 3.3V_S5 and you don't need PD.

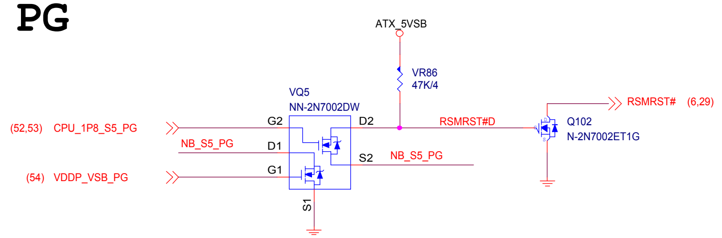
VRM_Enable circuit

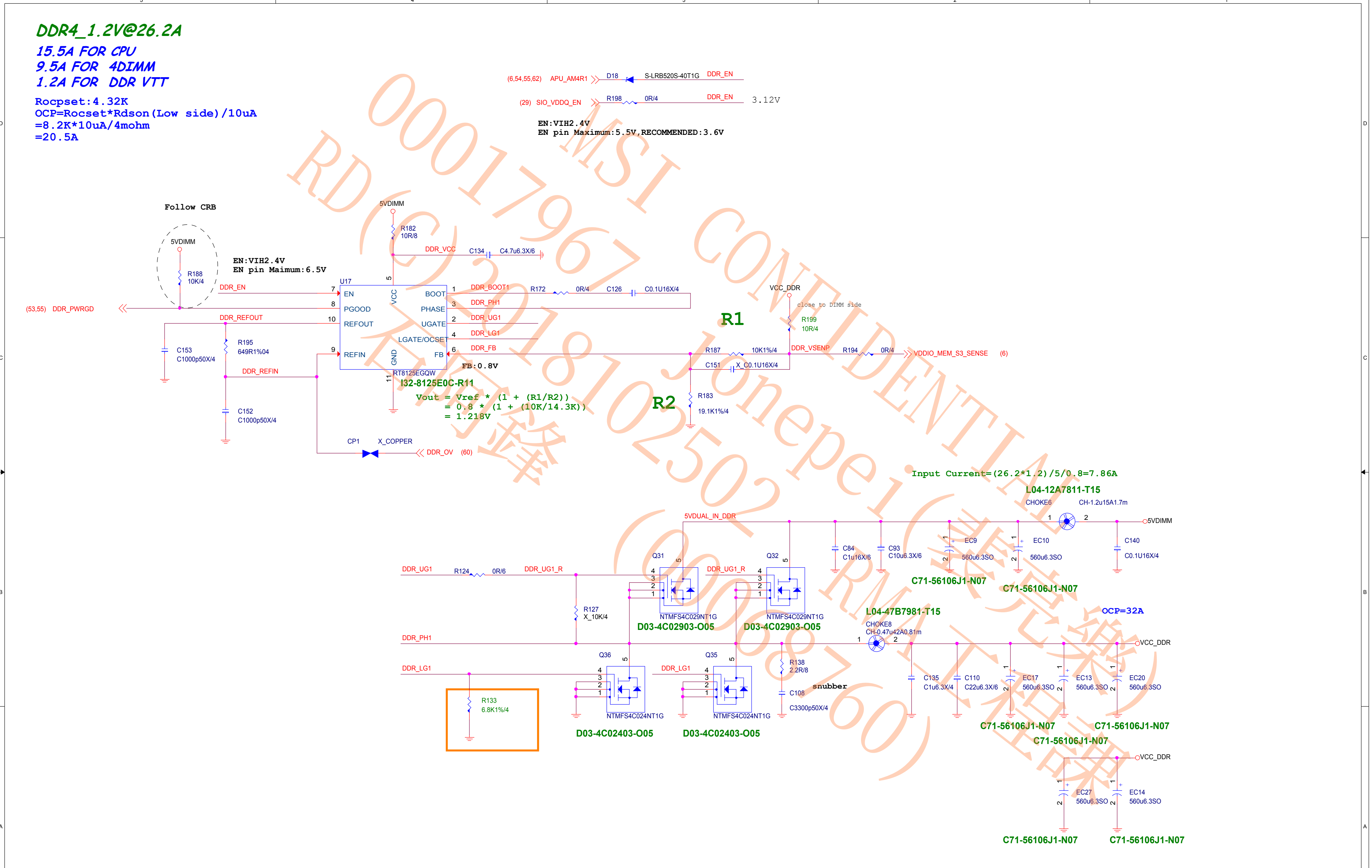


CPU	TYPE	TYPE1_CPU_SEL	TYPE0_CPU_SEL
BR	0	0	1
NA		0	0
SR	2	1	1
RV/ZP	3	1	0

CPU VDDP NOT SUPPORT TYPE2

S5 PG




DDR4_1.2V@26.2A
15.5A FOR CPU
9.5A FOR 4DIMM
1.2A FOR DDR VTT
Rocpset:4.32K
OCP=Rocset*Rdson(Low side)/10uA
=8.2K*10uA/4mohm
=20.5A
(6,54,55,62) APU_AM4R1
D18
S-LRB520S-40T1G
DDR_EN
(29) SIO_VDDQ_EN
R198
0R/4
DDR_EN
3.12V
EN:VIH2.4V
EN pin Maximum:5.5V,RECOMMENDED:3.6V
Follow CRB
5VDIMM
R188
10K/4
EN:VIH2.4V
EN pin Maimum:6.5V
(53,55) DDR_PWRGD
DDR_EN
DDR_REFOUT
C153
C1000p50X/4
R195
649R1%04
DDR_REFIN
C152
C1000p50X/4
5VDIMM
R182
10R/8
DDR_VCC
C134
C4.7u6.3X/6
U17
EN
PGOOD
REFOUT
REFIN
VCC
GND
BOOT
PHASE
UGATE
LGATE/OCSET
FB
RT8125EGQW
I32-8125E0C-R11
DDR_BOOT1
DDR_PH1
DDR_UG1
DDR_LG1
DDR_FB
R172
0R/4
C126
C0.1U16X/4
FB:0.8V
Vout = Vref * (1 + (R1/R2))
= 0.8 * (1 + (10K/14.3K))
= 1.218V
CP1
X_COPPER
DDR_OV (60)
VCC_DDR
close to DIMM side
R1
R199
10R/4
R187
10K1%/4
DDR_VSENP
R194
0R/4
VDDIO_MEM_S3_SENSE (6)
C151
X_C0.1U16X/4
R2
R183
19.1K1%/4
Input Current=(26.2*1.2)/5/0.8=7.86A
L04-12A7811-T15
CHOKE6
CH-1.2u15A1.7m
5VDUAL_IN_DDR
5VDIMM
C84
C1u16X/6
C93
C10u6.3X/6
EC9
560u6.3SO
EC10
560u6.3SO
C140
C0.1U16X/4
C71-56106J1-N07
C71-56106J1-N07
DDR_UG1
R124
0R/6
DDR_UG1_R
Q31
Q32
DDR_UG1_R
R127
X_10K/4
NTMFS4C029NT1G
D03-4C02903-O05
NTMFS4C029NT1G
D03-4C02903-O05
L04-47B7981-T15
CHOKE8
CH-0.47u42A0.81m
OCP=32A
VCC_DDR
DDR_PH1
DDR_LG1
Q36
Q35
DDR_LG1
R138
2.2R/8
C108
C3300p50X/4
snubber
R133
6.8K1%/4
NTMFS4C024NT1G
D03-4C02403-O05
NTMFS4C024NT1G
D03-4C02403-O05
C135
C1u6.3X/4
C110
C22u6.3X/6
EC17
560u6.3SO
EC13
560u6.3SO
EC20
560u6.3SO
C71-56106J1-N07
C71-56106J1-N07
C71-56106J1-N07
VCC_DDR
EC27
560u6.3SO
EC14
560u6.3SO
C71-56106J1-N07
C71-56106J1-N07
MSI

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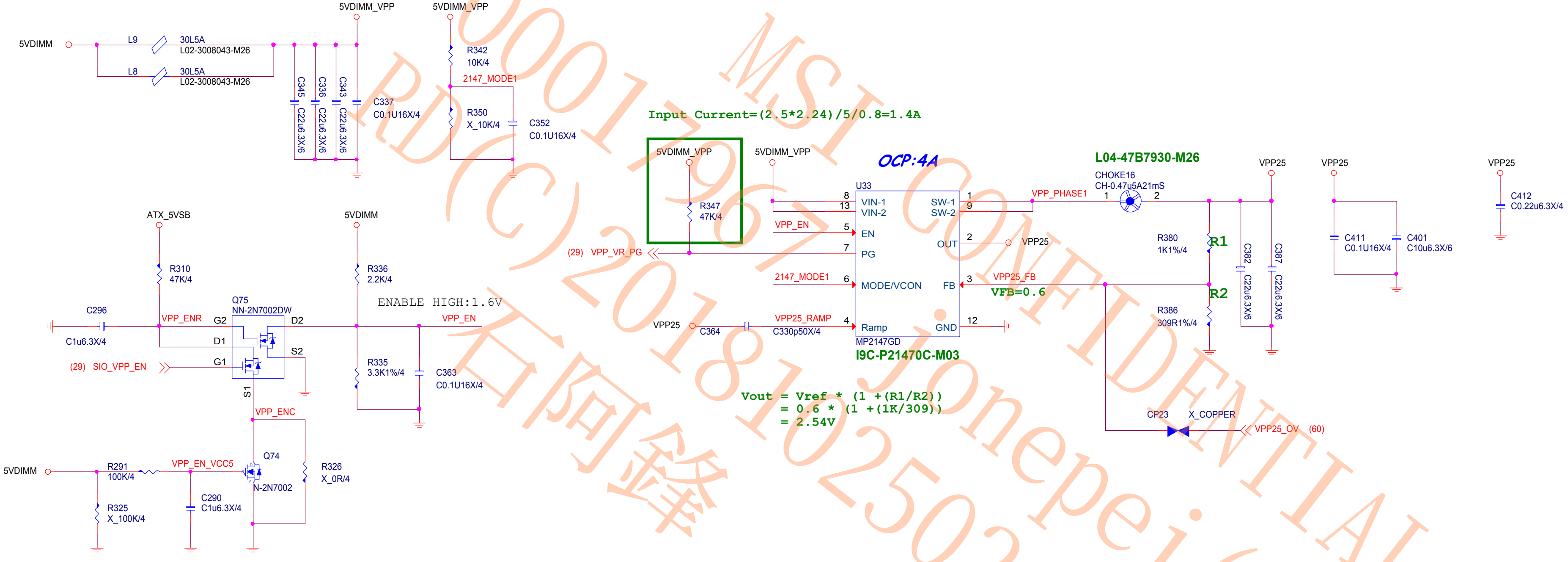
4DIMM : VPP25

2.5V@2.24A

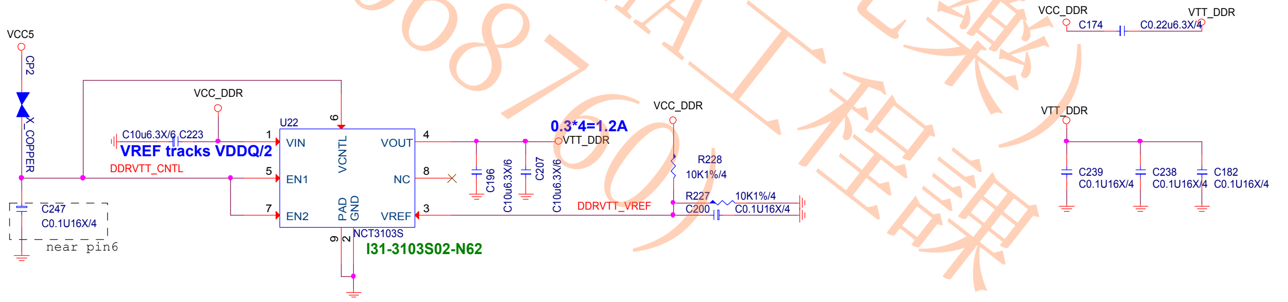
Input Current=(2.5*2.24)/5/0.8=1.4A



Vout = Vref * (1 +(R1/R2))
= 0.6 * (1 +(1K/309))
= 2.54V

DDR VTT Power

To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



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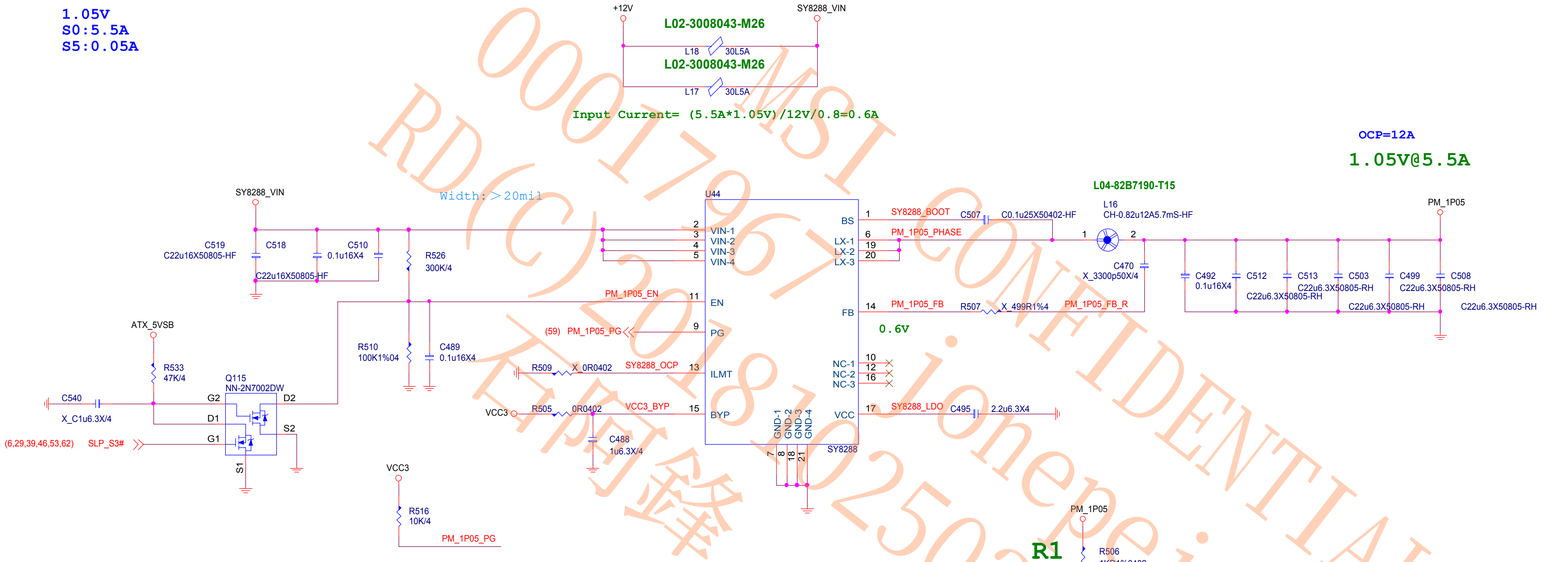
FOR Promontory 1.05V_S0

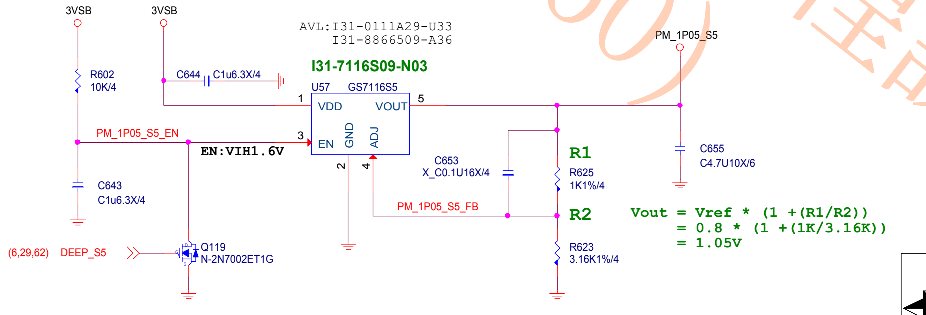
1.05V
S0:5.5A
S5:0.05A



SY8288_OCP	OCP
0	8A
floating	12A
1	16A

FOR Promontory 1.05V_S5

1.05V@0.05A



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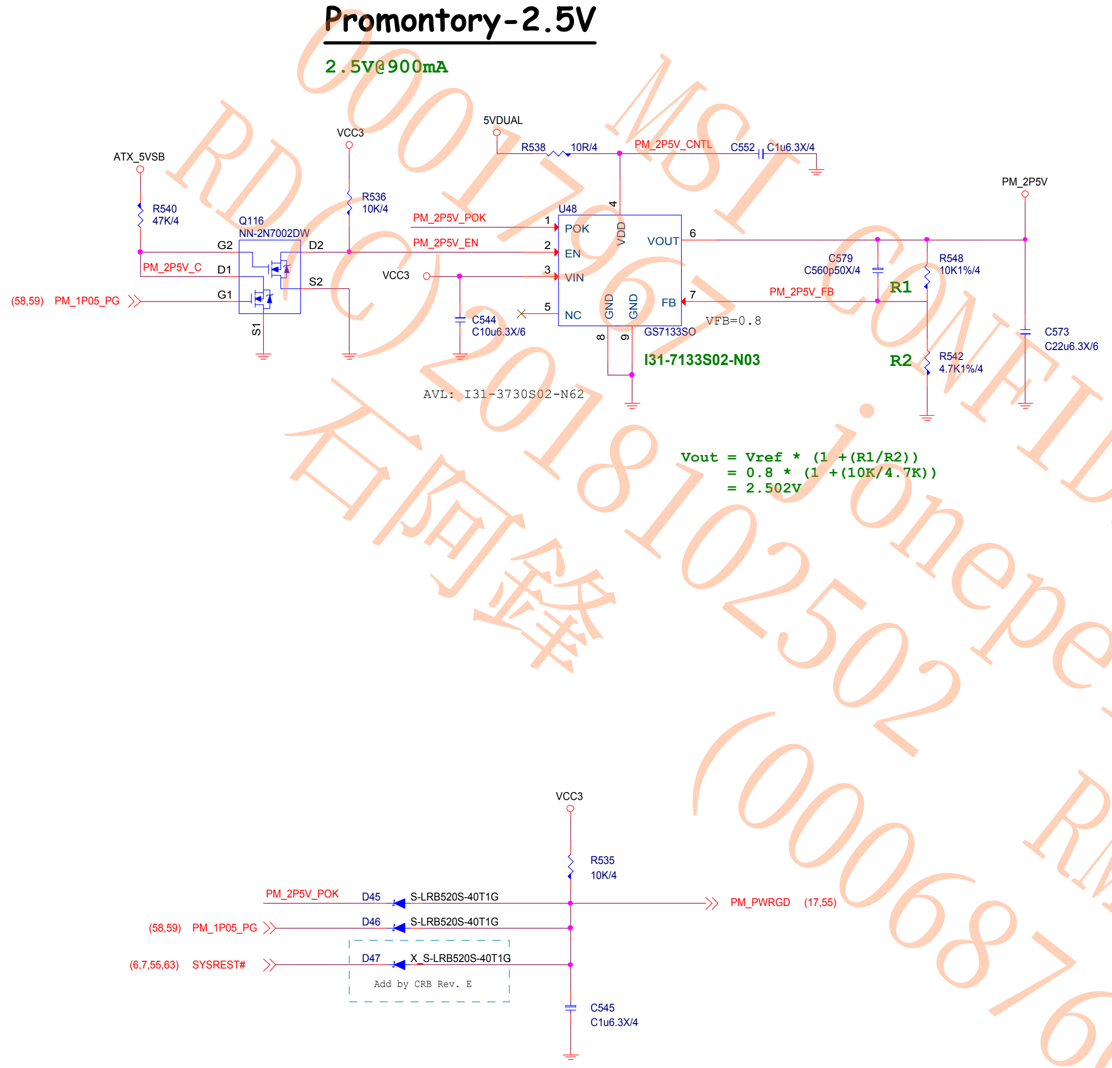

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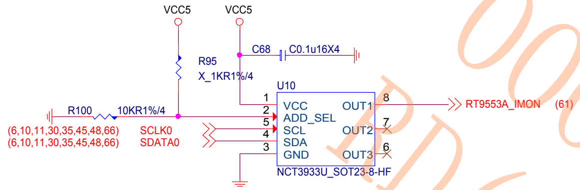
Over Voltage Control IC

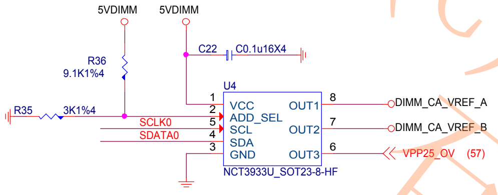
UPI VOLTAGE CONSOLE

ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

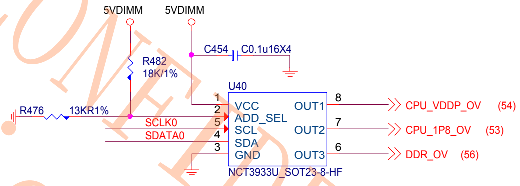
0x2A:RH=OPEN,RL=10K



0x28:RH=9.1K,RL=3K



0x26:RH=18K,RL=13K



UPI VOLTAGE CONSOLE

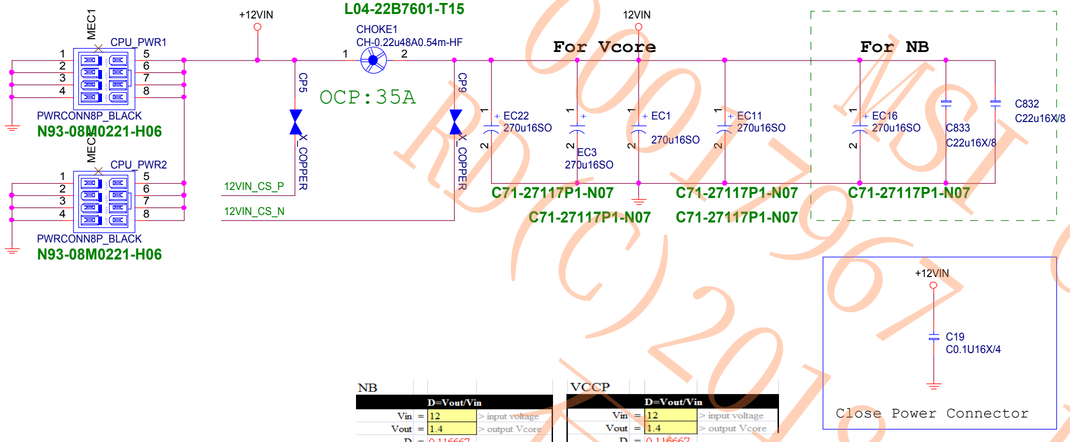
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

MICRO-STAR INT'L CO.,LTD

MS-7B78

Size: Custom | Document Description: OV Control - NCT3933 | Rev: 10

CPU POWER CONNECTOR



NB

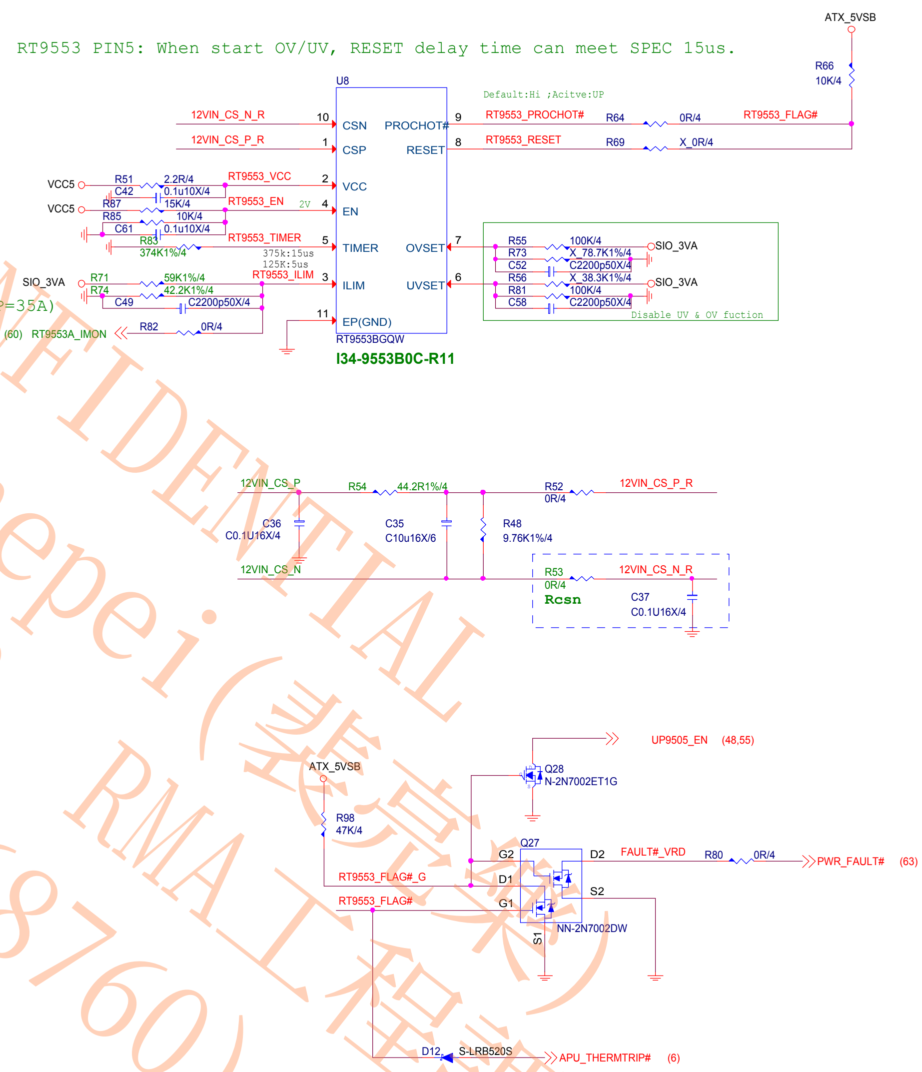
D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.4	> output Vcore
D	=	0.116667	
I o = Icore(max)*0.8			
I core(max)	=	75	> Vcore current
I avg.	=	75	A
I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	2	phase
I ripple	=	12.03835	A
How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COETEMP	=	1	
Input Cap.	=	3	pcs.

VCCP

D=Vout/Vin			
Vin	=	12	> input voltage
Vout	=	1.4	> output Vcore
D	=	0.116667	
I o = Icore(max)*0.8			
I core(max)	=	125	> Vcore current
I avg.	=	125	A
I ripple={ Io*√D*√(1-D)} / Phase			
Phase	=	4	phase
I ripple	=	10.03196	A
How many pcs. Of Cap.			
I ripple(cap)	=	5000	m A
COETEMP	=	1	
Input Cap.	=	3	pcs.

RT9553B CURRENT SENSE

RT9553 PIN5: When start OV/UV, RESET delay time can meet SPEC 15us.



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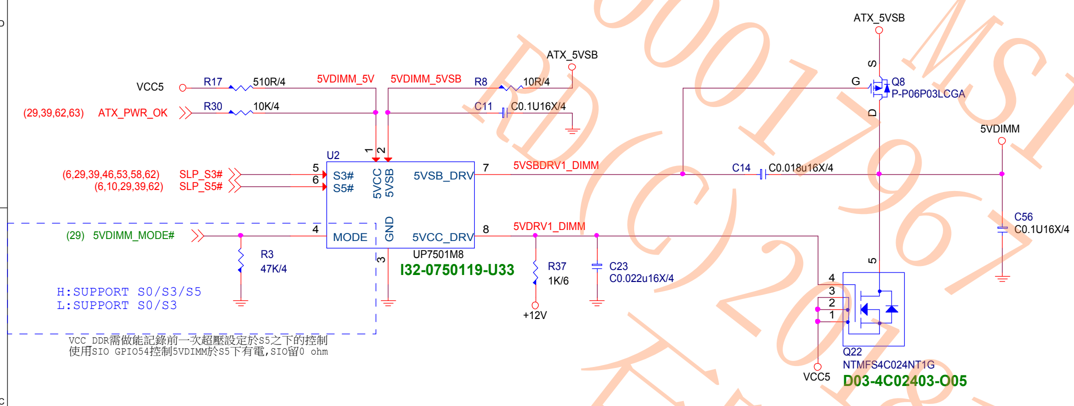
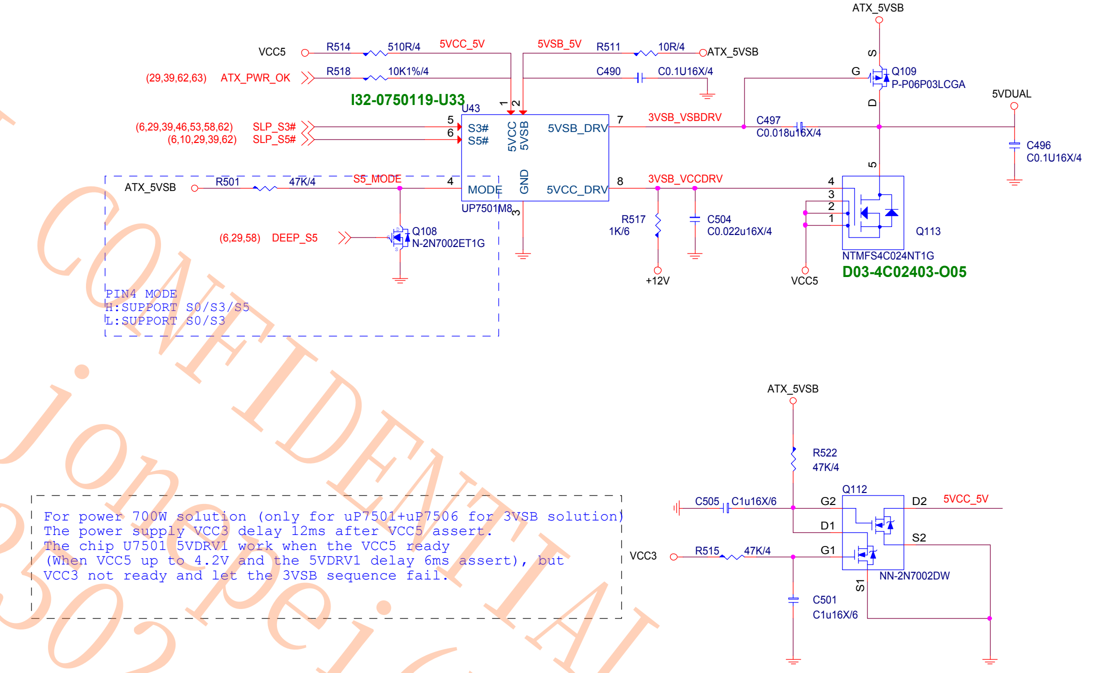
5VDUAL For 3VSB、CPU 1.8V 、 VDDP

5VDIMM FOR DDR

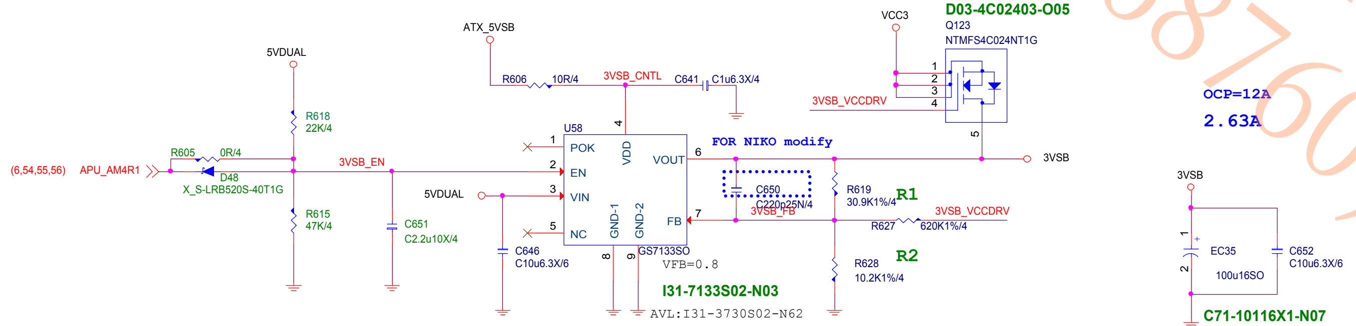




3VSB cost down

3.3V@2.63A

1.05V@0.05A
VDDBT_RTC_G@4.5uA
FCH@0.07A
CPU@0.25A
PCI @0.75A
*PCIE*4 @1.5A*
USB TYPE-C @0.9mA



VFB=3.224V for S0->S3 3VSB voltage raise & ATX_5VSB drop.

Vout = Vref * (1 +(R1/R2))
= 0.8 * (1 +(30.9K/10.2K))
= 3.22V

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Size: Custom	Document Description: ACPI - 5VDIMM / 3VSB	Rev: 10
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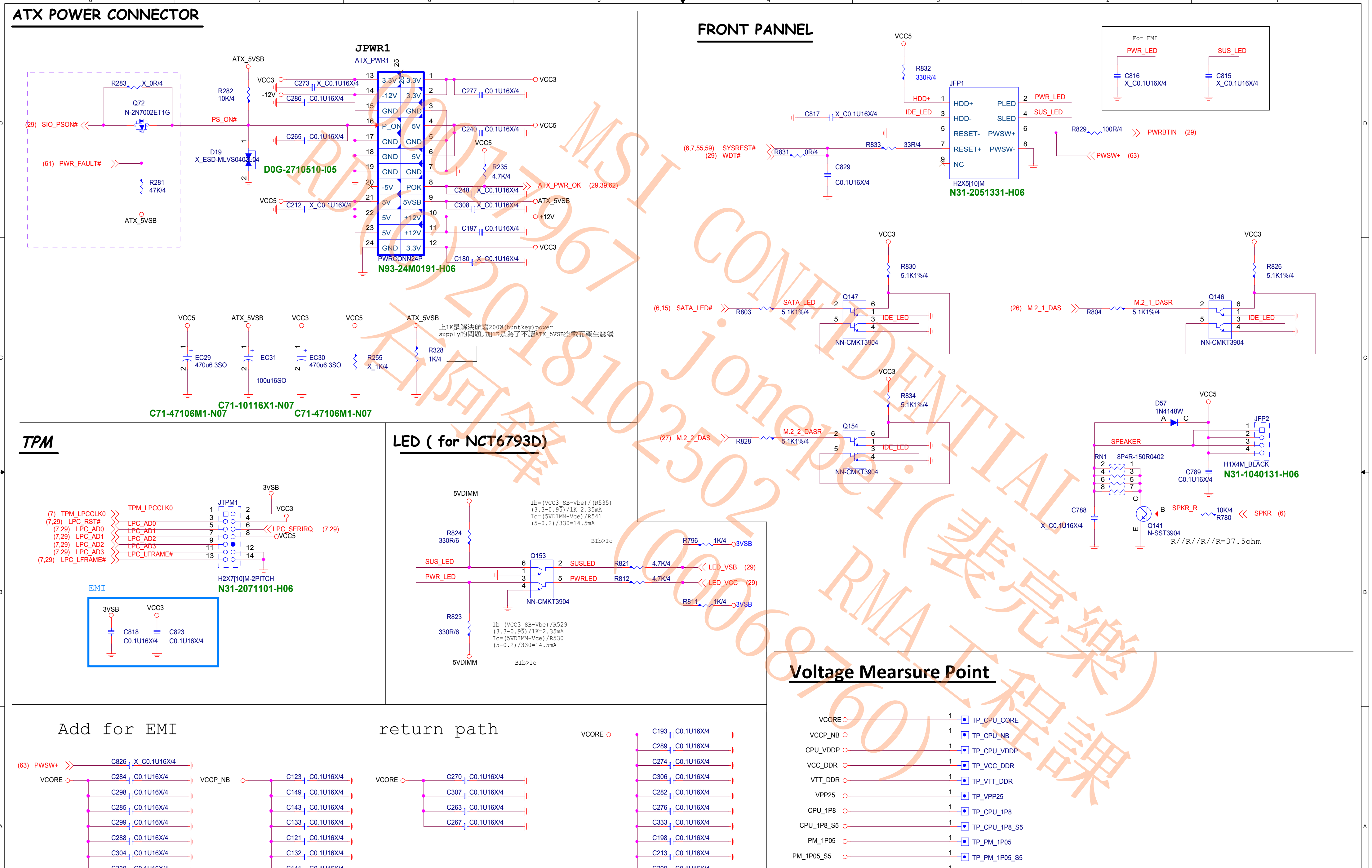

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Custom	ATX power - FrontPanel / EMI	10

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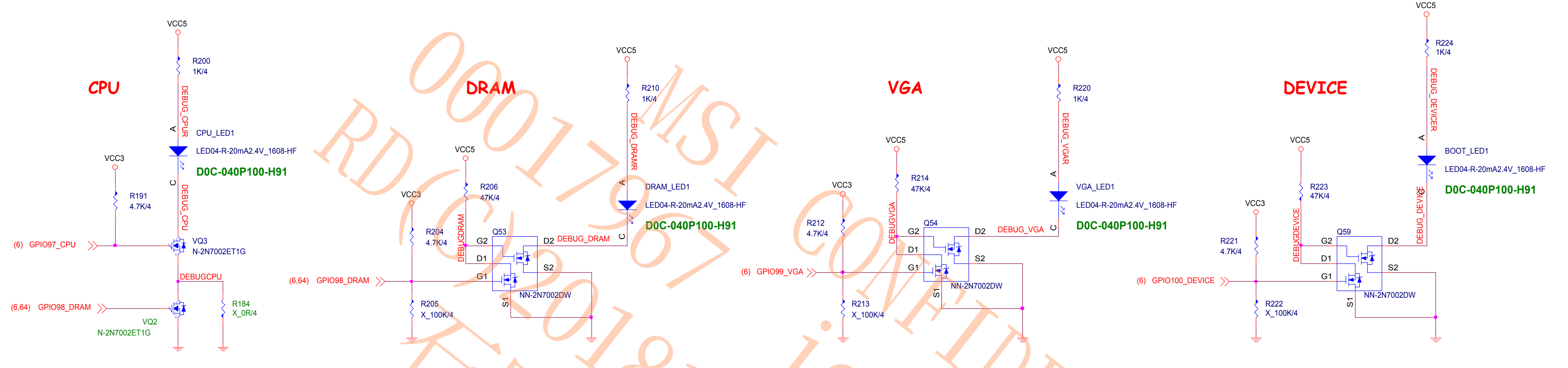
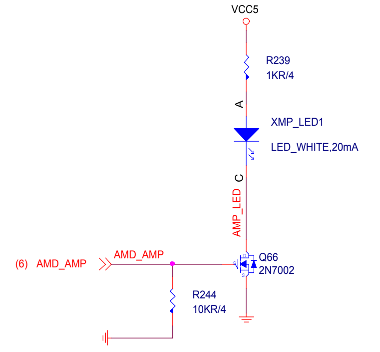
EZ Debug LED

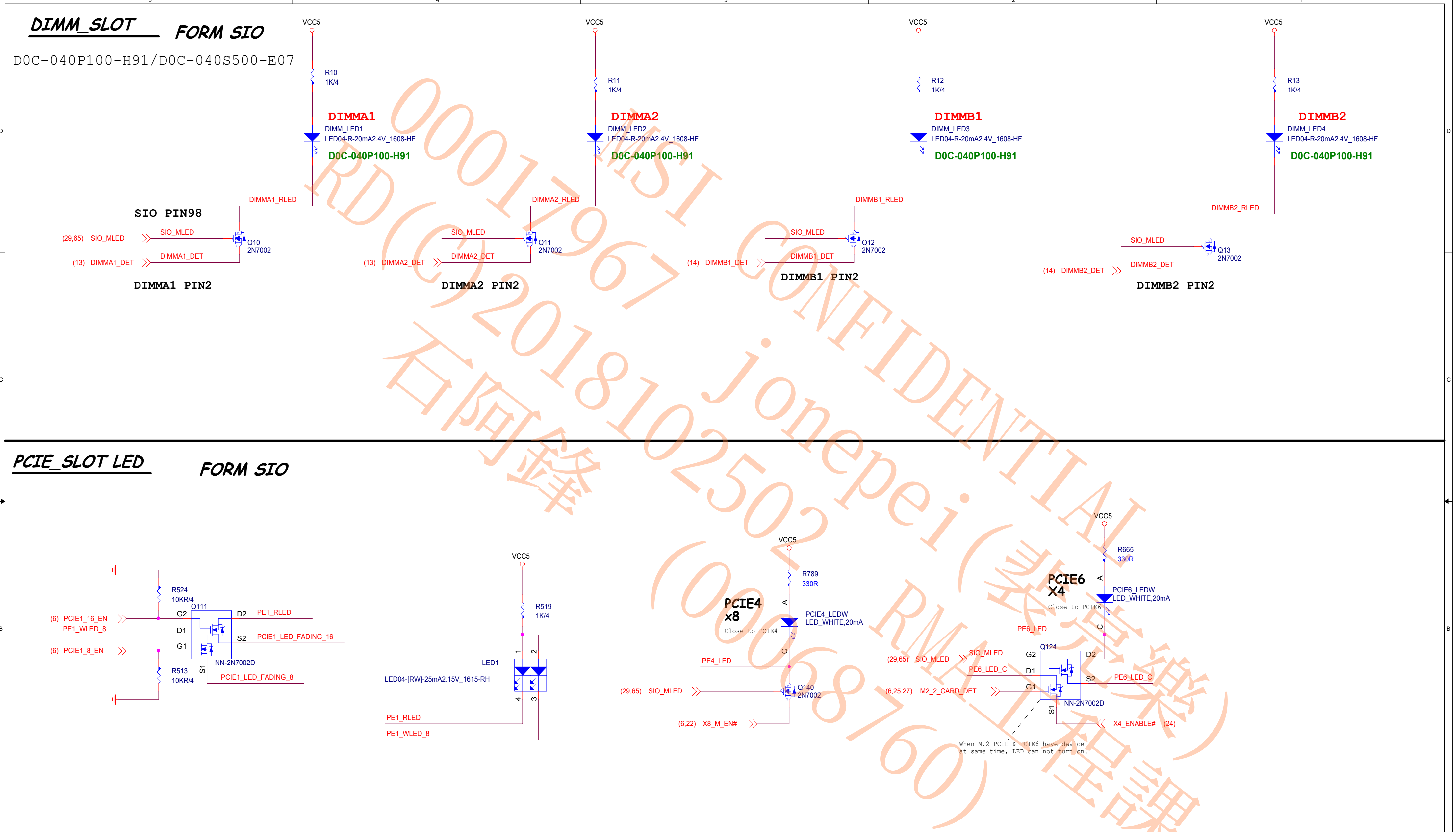


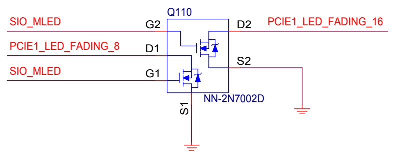
LEDGPIO	GPIO97	GPIO98	GPIO99	GPIO100
亮	GPI PULL HIGH	GPO PO LOW	GPO PO LOW	GPO PO LOW
滅	GPO LOW	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)

LED亮燈時同時將CPU LED關掉

AMD AMP Detect LED







	x16	x8	x4
PCIE1	Red	X	X
PCIE1	X	White	X
PCIE4	X	White	X
PCIE6	X	X	White

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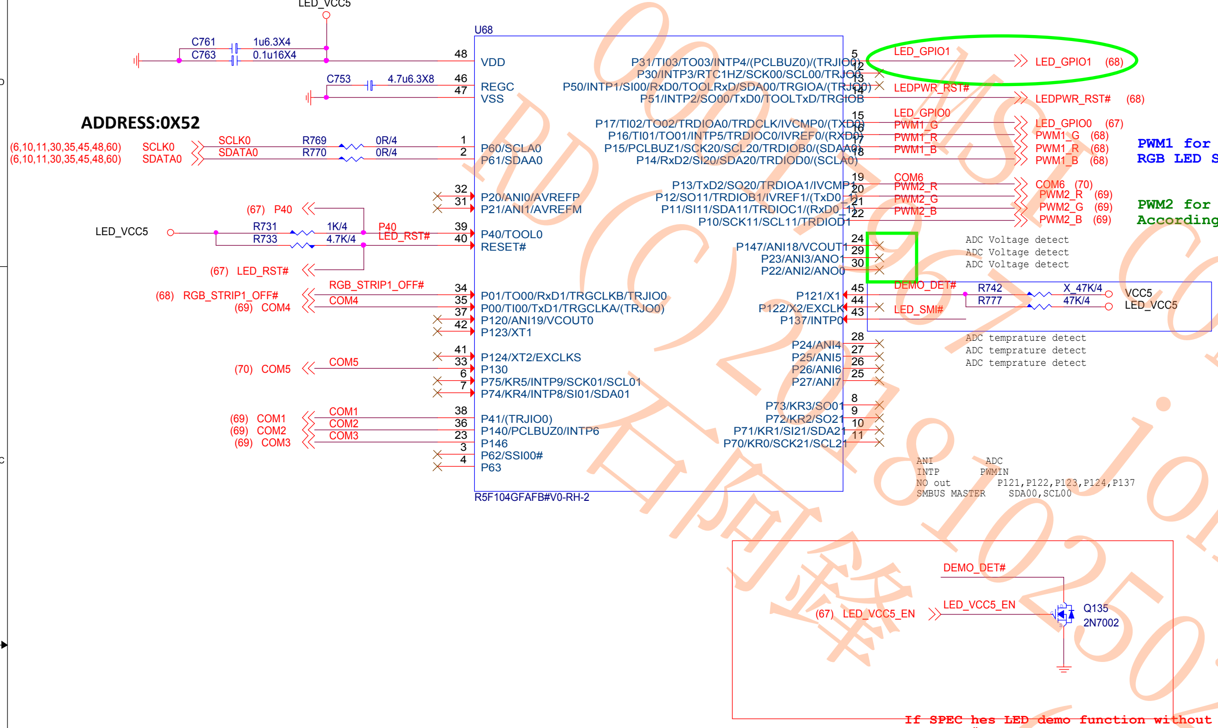
48 PIN LED MCU

C345 & C359 near VDD Pin.

ADDRESS:0X52

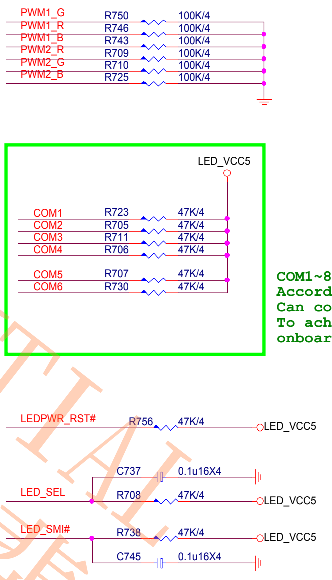


PWM1 for JRGB1 and JRGB2
RGB LED STRIPLINE USED

PWM2 for Others
According to demand configuration

If SPEC hes LED demo function without demo button,
DEMO_DET# must pull up to LED_VCC5 and control by LED_VCC5_EN.
PS. R1000 remove, R1457 and Q296 need to stuff

Control	Net Name	PWM USE	Connector
PCH	LED_GPIO1	No Use	JPIPE_LED2
Audio	COM1~4	PWM2	RGB LED
Board Side LED	COM5~8	PWM2	RGB LED
LED STRIPLINE	RGB_STRIP1_OFF#	PWM1	JLED1
LED STRIPLINE	RGB_STRIP1_OFF#	PWM1	JLED2
IO Cover	LED_GPIO0	No Use	JPIPE_LED1



COM1~8 for PWM2
According to demand configuration.
Can configuration COM1~8,
To achieve 8 group Non-synchronized
onboard LED control.

MICRO-STAR INT'L CO.,LTD			
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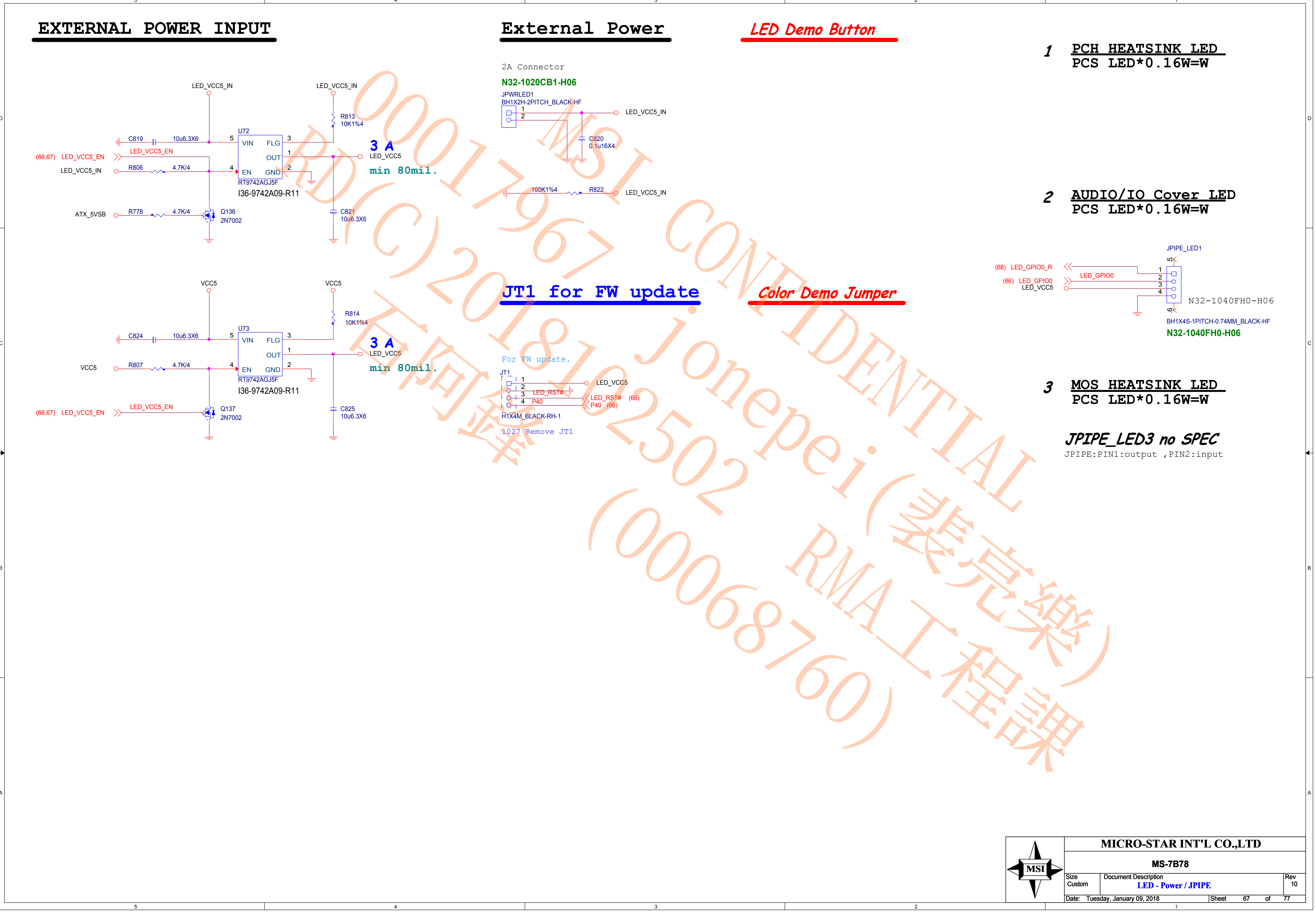
EXTERNAL POWER INPUT
LED_VCC5_IN
LED_VCC5_IN
C819 10u6.3X6
U72
VIN FLG
OUT
EN GND
RT9742AGJ5F
I36-9742A09-R11
R813 10K1%4
3 A
LED_VCC5
min 80mil.
(66,67) LED_VCC5_EN
LED_VCC5_EN
LED_VCC5_IN
R806 4.7K/4
ATX_5VSB
R778 4.7K/4
Q136 2N7002
C821 10u6.3X6
VCC5
VCC5
C824 10u6.3X6
U73
VIN FLG
OUT
EN GND
RT9742AGJ5F
I36-9742A09-R11
R814 10K1%4
3 A
LED_VCC5
min 80mil.
VCC5
R807 4.7K/4
(66,67) LED_VCC5_EN
LED_VCC5_EN
Q137 2N7002
C825 10u6.3X6
External Power
2A Connector
N32-1020CB1-H06
JPWRLED1
BH1X2H-2PITCH_BLACK-HF
LED_VCC5_IN
C820 0.1u16X4
100K1%4
R822
LED_VCC5_IN
LED Demo Button
JT1 for FW update
For FW update.
JT1
LED_VCC5
LED_RST#
P40
LED_RST# (66)
P40 (66)
H1X4M_BLACK-RH-1
1027 Remove JT1
Color Demo Jumper
1 PCH HEATSINK LED
PCS LED*0.16W=W
2 AUDIO/IO Cover LED
PCS LED*0.16W=W
JPIPE_LED1
(68) LED_GPIO0_R
LED_GPIO0
(66) LED_GPIO0
LED_VCC5
N32-1040FH0-H06
BH1X4S-1PITCH-0.74MM_BLACK-HF
N32-1040FH0-H06
3 MOS HEATSINK LED
PCS LED*0.16W=W
JPIPE_LED3 no SPEC
JPIPE:PIN1:output ,PIN2:input
MICRO-STAR INT'L CO.,LTD
MS-7B78
Size Custom
Document Description
LED - Power / JPIPE
Rev 10
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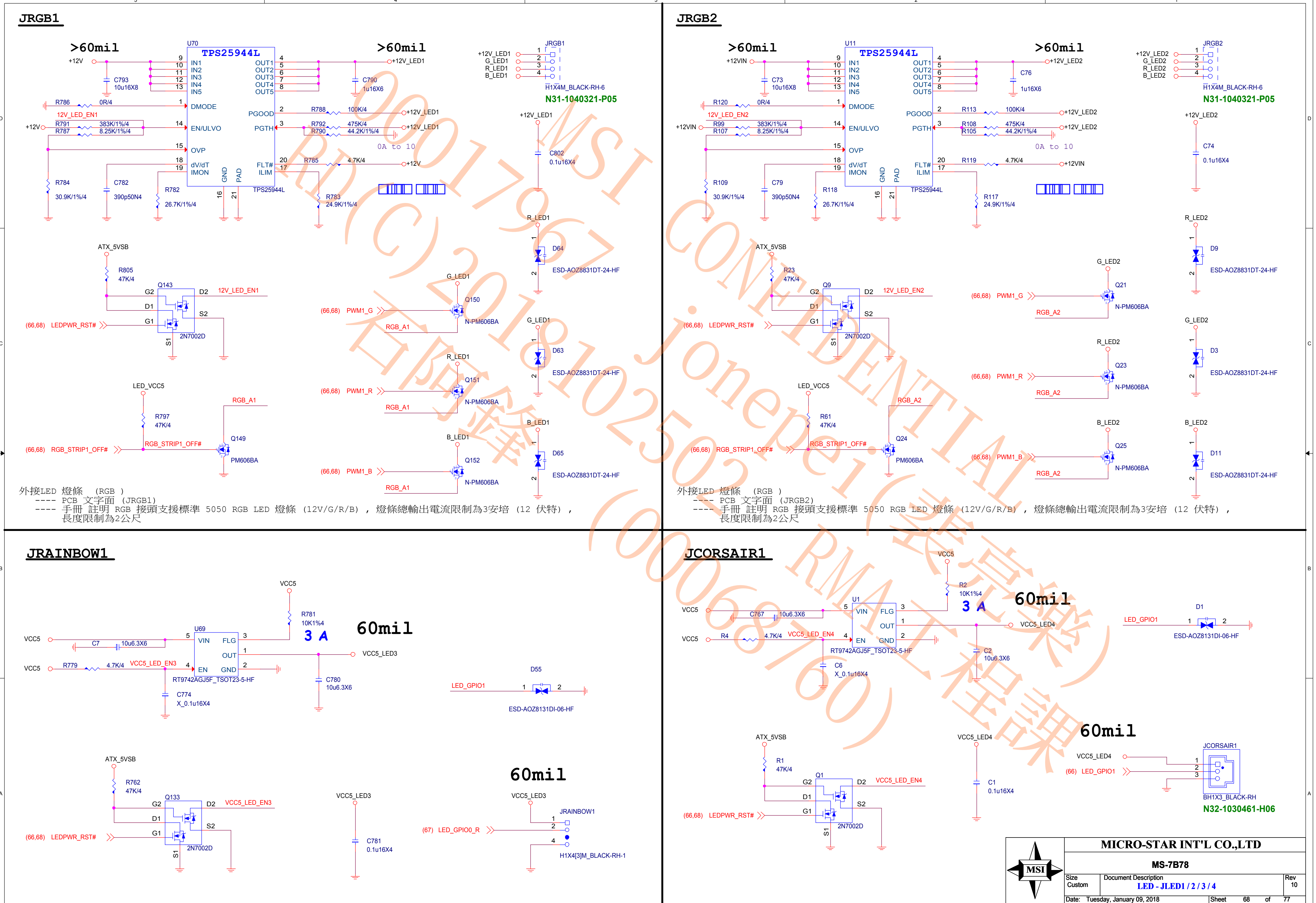

外接LED 燈條 (RGB)
---- PCB 文字面 (JRGB1)
---- 手冊 註明 RGB 接頭支援標準 5050 RGB LED 燈條 (12V/G/R/B) , 燈條總輸出電流限制為3安培 (12 伏特) , 長度限制為2公尺

外接LED 燈條 (RGB)
---- PCB 文字面 (JRGB2)
---- 手冊 註明 RGB 接頭支援標準 5050 RGB LED 燈條 (12V/G/R/B) , 燈條總輸出電流限制為3安培 (12 伏特) , 長度限制為2公尺

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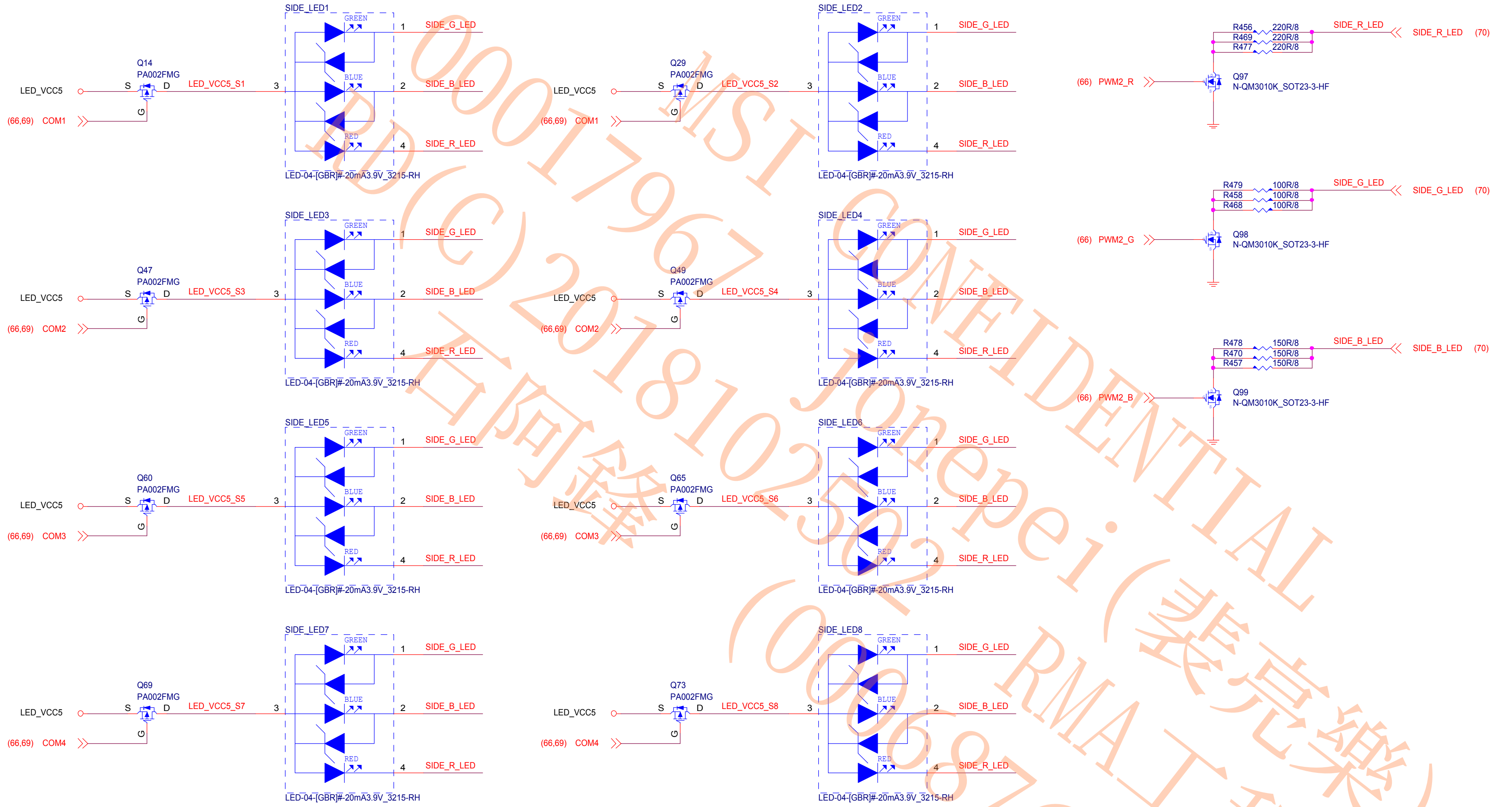
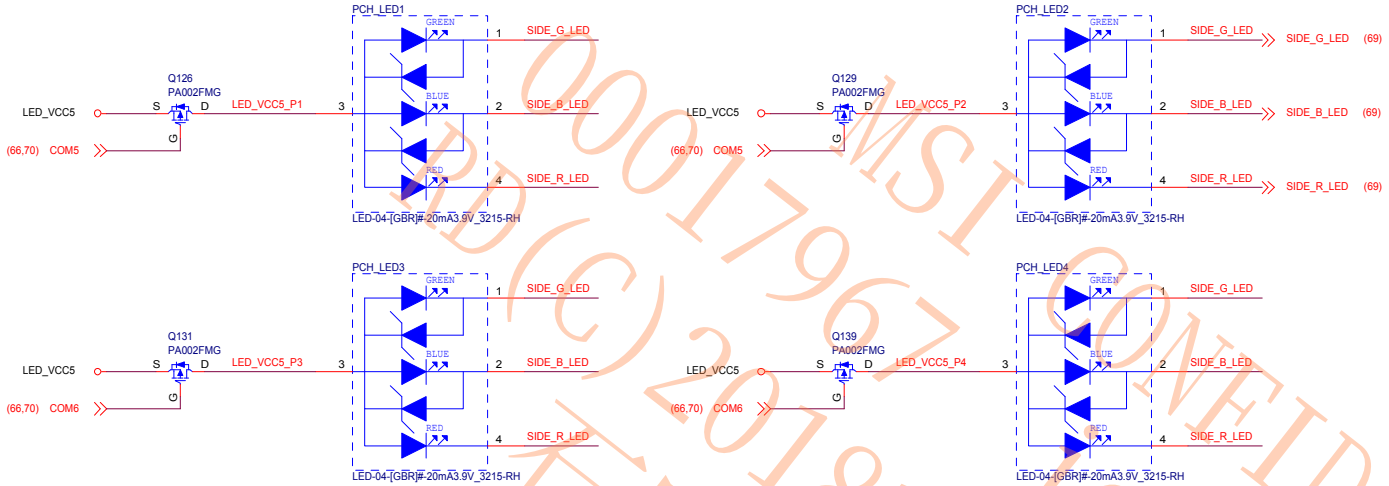
Right Track LED *8



SIDE_LED1
SIDE_LED2
SIDE_LED3
SIDE_LED4
SIDE_LED5
SIDE_LED6
SIDE_LED7
SIDE_LED8
GREEN
BLUE
RED
LED-04-[GBR]#-20mA3.9V_3215-RH
SIDE_G_LED
SIDE_B_LED
SIDE_R_LED
Q14
Q29
Q47
Q49
Q60
Q65
Q69
Q73
PA002FMG
LED_VCC5
LED_VCC5_S1
LED_VCC5_S2
LED_VCC5_S3
LED_VCC5_S4
LED_VCC5_S5
LED_VCC5_S6
LED_VCC5_S7
LED_VCC5_S8
(66,69) COM1
(66,69) COM2
(66,69) COM3
(66,69) COM4
R456 220R/8
R469 220R/8
R477 220R/8
SIDE_R_LED (70)
(66) PWM2_R
Q97
N-QM3010K_SOT23-3-HF
R479 100R/8
R458 100R/8
R468 100R/8
SIDE_G_LED (70)
(66) PWM2_G
Q98
N-QM3010K_SOT23-3-HF
R478 150R/8
R470 150R/8
R457 150R/8
SIDE_B_LED (70)
(66) PWM2_B
Q99
N-QM3010K_SOT23-3-HF

PCH LED *4



MSI	MICRO-STAR INT'L CO.,LTD	
	MS-7B78	
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MSI	MICRO-STAR INT'L CO.,LTD	
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Size: Custom	Document Description: BOM Option	Rev: 10
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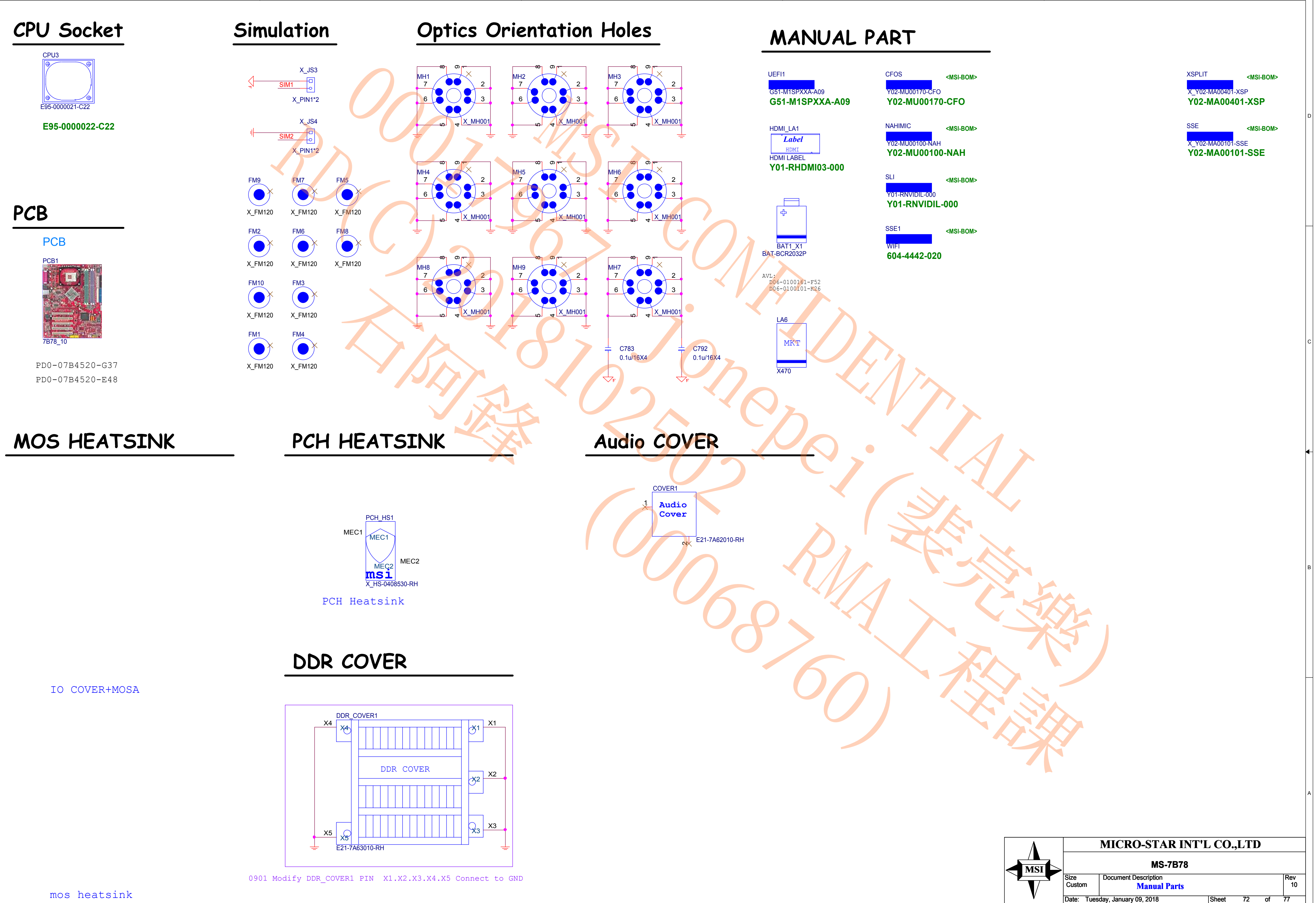
CPU Socket
CPU3
E95-0000021-C22
E95-0000022-C22
PCB
PCB
PCB1
7B78_10
PD0-07B4520-G37
PD0-07B4520-E48
Simulation
X_JS3
SIM1
X_PIN1*2
X_JS4
SIM2
X_PIN1*2
FM9 FM7 FM5 FM2 FM6 FM8 FM10 FM3 FM1 FM4
X_FM120
Optics Orientation Holes
MH1 MH2 MH3 MH4 MH5 MH6 MH8 MH9 MH7
X_MH001
C783
0.1u/16X4
C792
0.1u/16X4
MANUAL PART
UEFI1
G51-M1SPXXA-A09
G51-M1SPXXA-A09
CFOS
<MSI-BOM>
Y02-MU00170-CFO
Y02-MU00170-CFO
XSPLIT
<MSI-BOM>
X_Y02-MA00401-XSP
Y02-MA00401-XSP
HDMI_LA1
Label
HDMI
HDMI LABEL
Y01-RHDMI03-000
NAHIMIC
<MSI-BOM>
Y02-MU00100-NAH
Y02-MU00100-NAH
SSE
<MSI-BOM>
X_Y02-MA00101-SSE
Y02-MA00101-SSE
SLI
<MSI-BOM>
Y01-RNVIDIL-000
Y01-RNVIDIL-000
BAT1_X1
BAT-BCR2032P
SSE1
<MSI-BOM>
WIFI
604-4442-020
AVL:
D06-0100161-F52
D06-0100101-K26
LA6
MKT
X470
MOS HEATSINK
PCH HEATSINK
PCH_HS1
MEC1
MEC1
MEC2
MEC2
msi
X_HS-0408530-RH
PCH Heatsink
Audio COVER
COVER1
Audio Cover
E21-7A62010-RH
IO COVER+MOSA
DDR COVER
DDR_COVER1
X4 X1 X2 X3 X5
DDR COVER
E21-7A63010-RH
0901 Modify DDR_COVER1 PIN X1.X2.X3.X4.X5 Connect to GND
mos heatsink

MICRO-STAR INT'L CO.,LTD

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Size	Document Description	Rev
Custom	Manual Parts	10

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