AMD TR4(X399)

Promontry X370

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Title: COVER SHEET

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CPU:
AMD TR4

System Chipset:
Promontory X399
(XPOWER Enthusiast GAMING/SLI PLUS)

Main Memory:
DDR IV * 8 MAX:256 GB

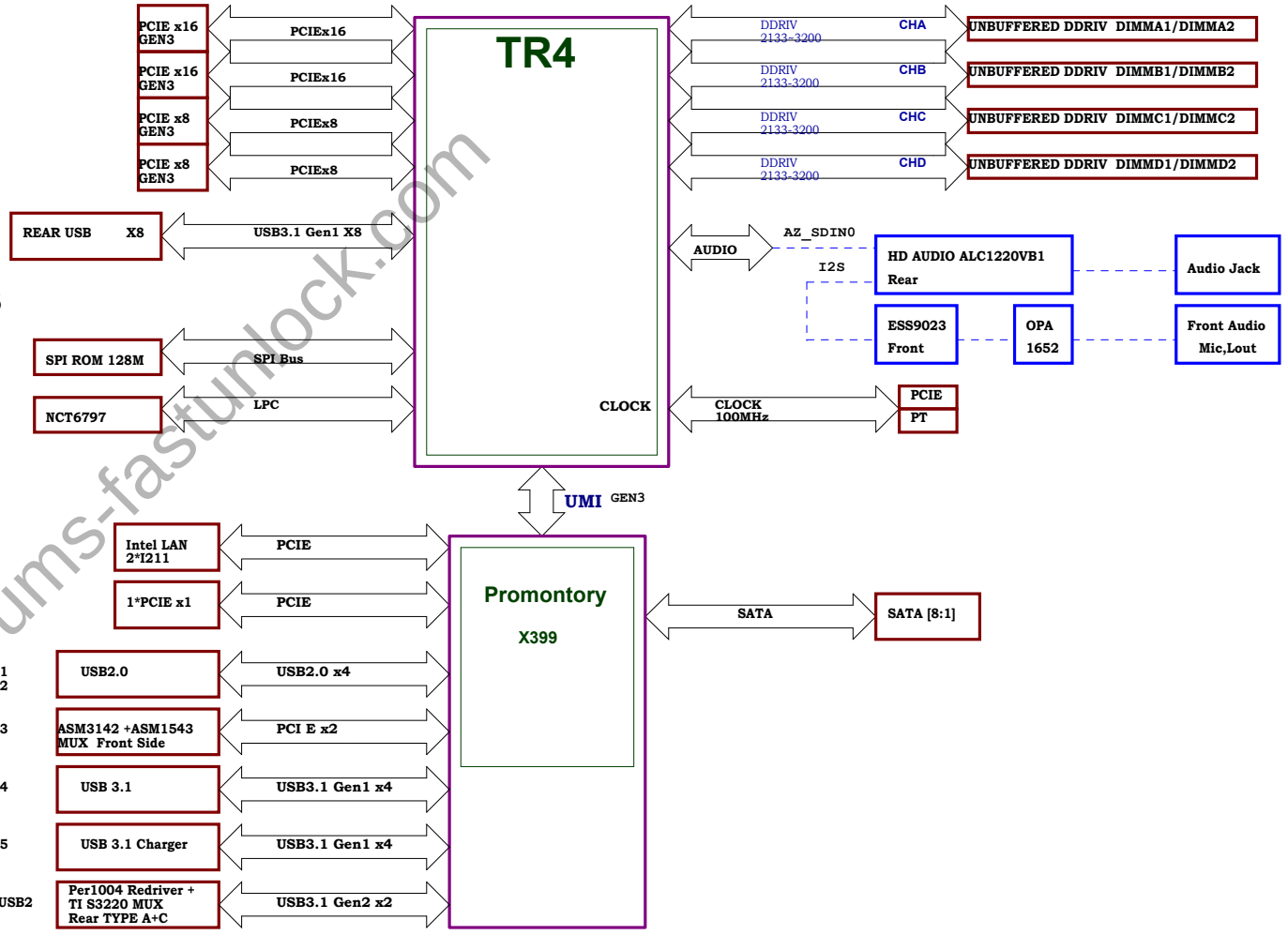
VRM
IR35201-16Phase
IR35204-3Phase

On Board Chipset:
LPC Super I/O --NCT6797
LAN Intel 211AT*2
Azalia CODEC - Realtek ALC1220P-VB + ESS 9023
ASM3142 +ASM1543 MUX Front Side

Expansion Slots:
From CPU
PCI Express X16 Slot * 2
PCI Express X8 Slot * 2

From FCH
PCI Express X1 Slot * 1

X499 BLOCK DIAGRAM



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Title: Block Diagram		
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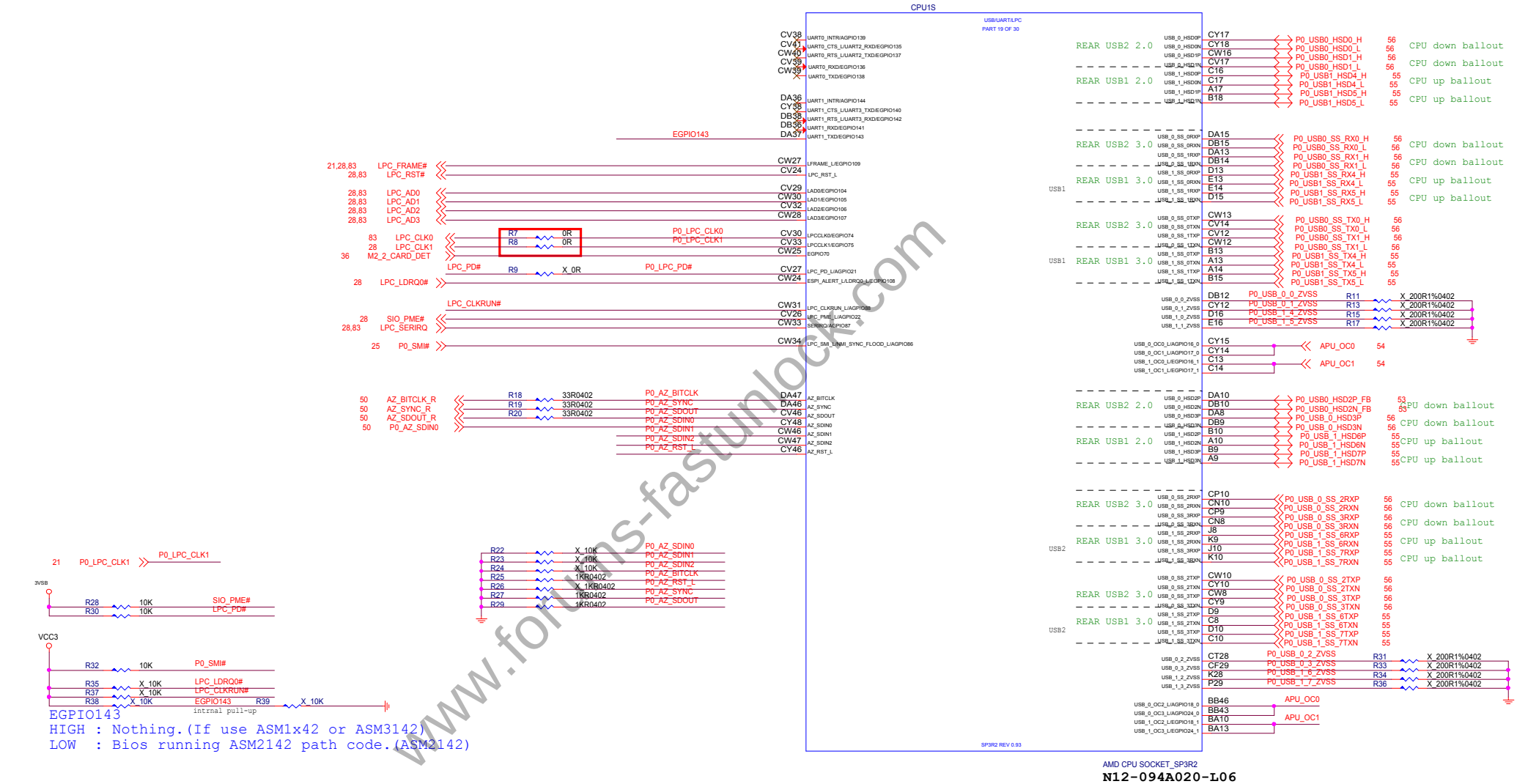
USB/LPC/UART/HDA



MSI MICRO-STAR INT'L CO.,LTD.			
Title: TR USB/LPC/UART/HDA			
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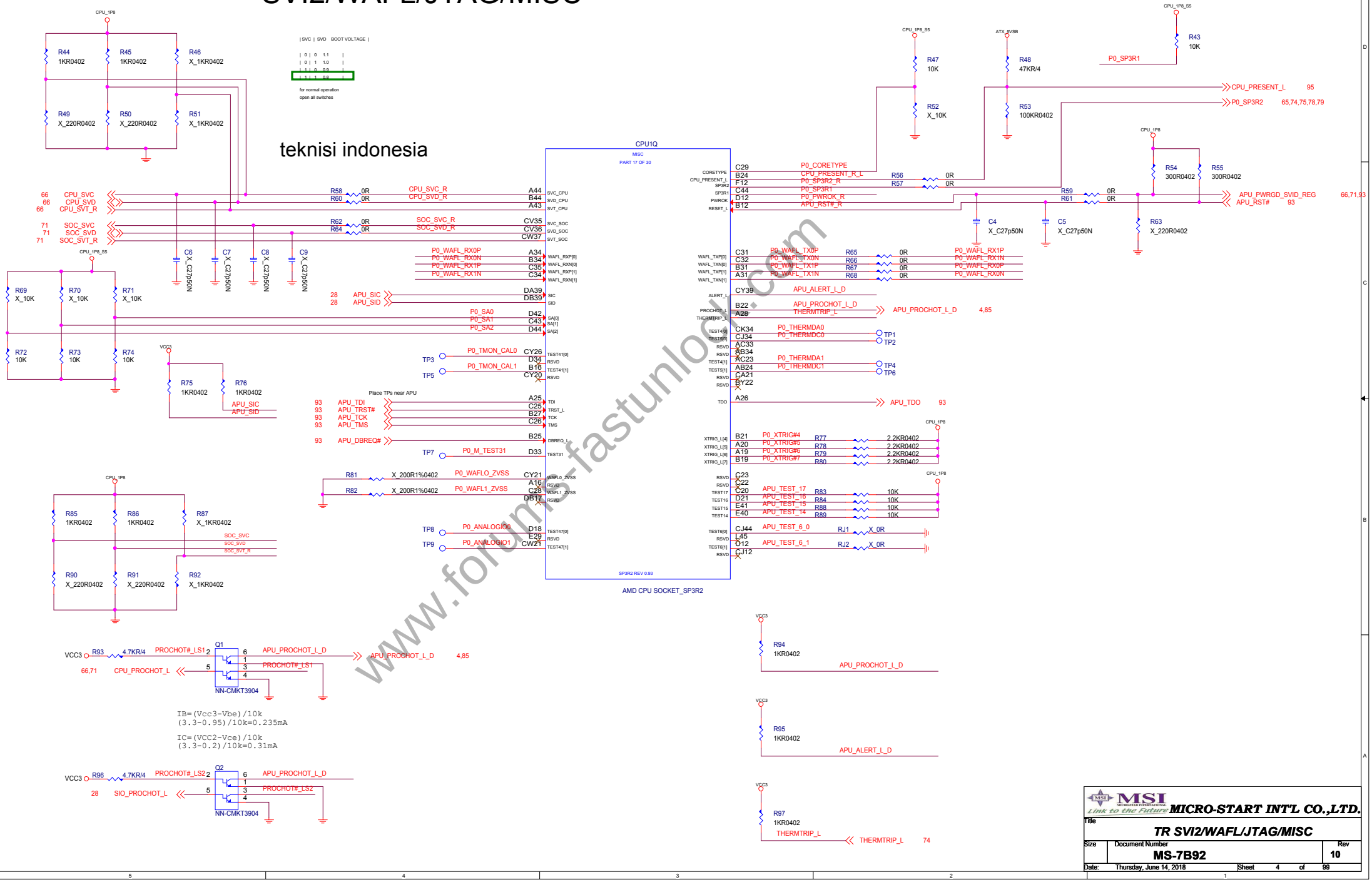
SVI2/WAFL/JTAG/MISC



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Title: TR SVI2/WAFL/JTAG/MISC
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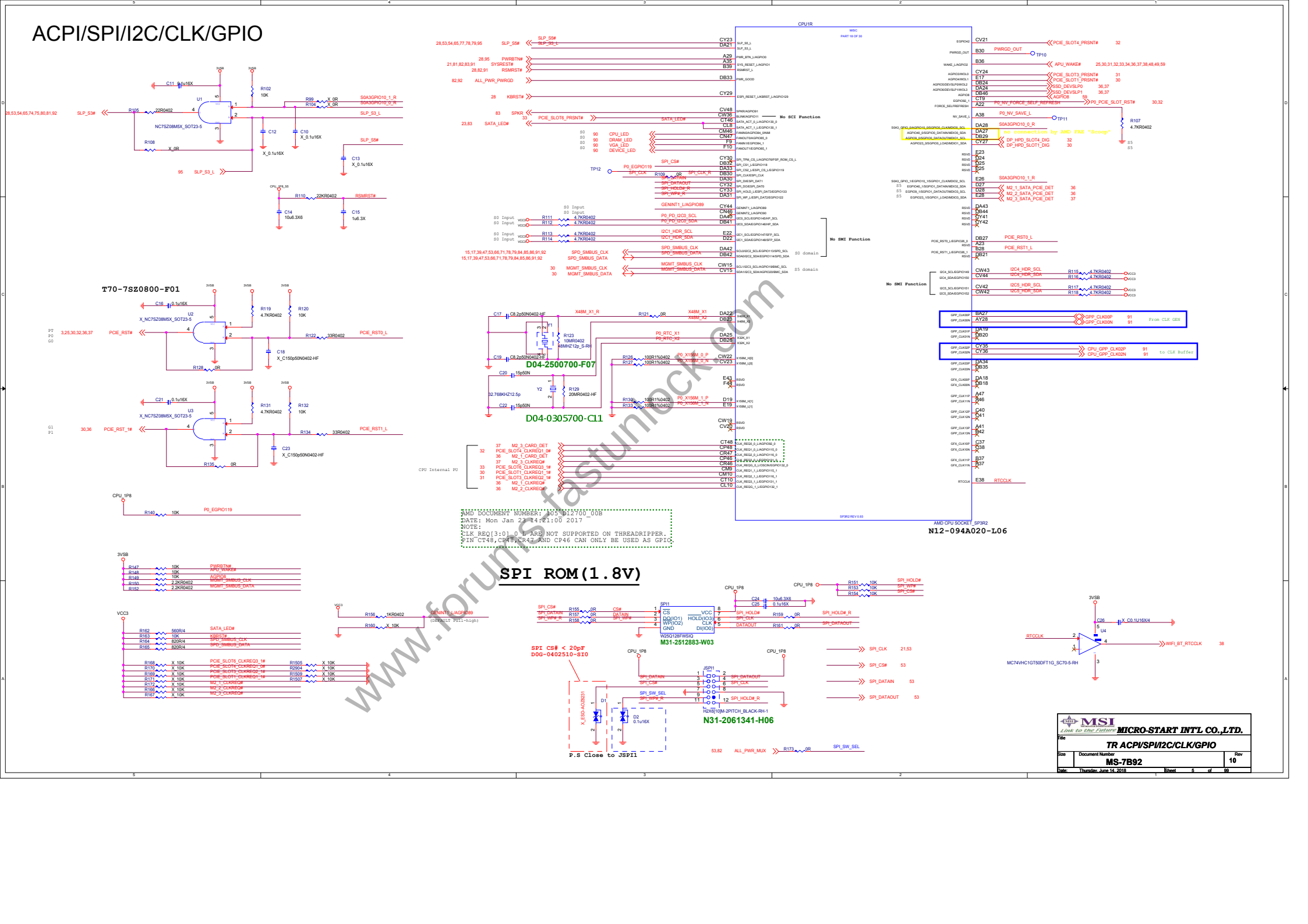
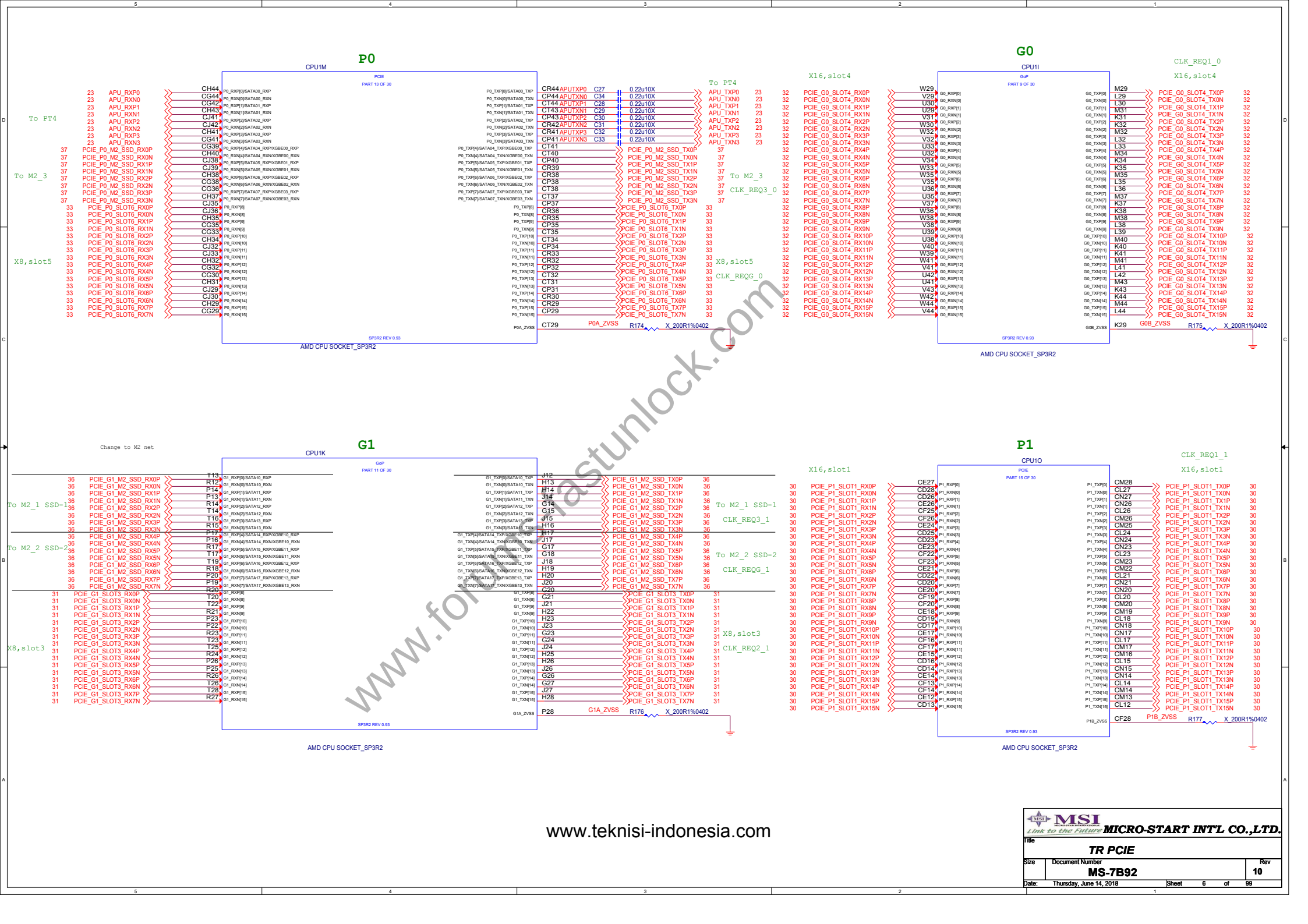
ACPI/SPI/I2C/CLK/GPIO





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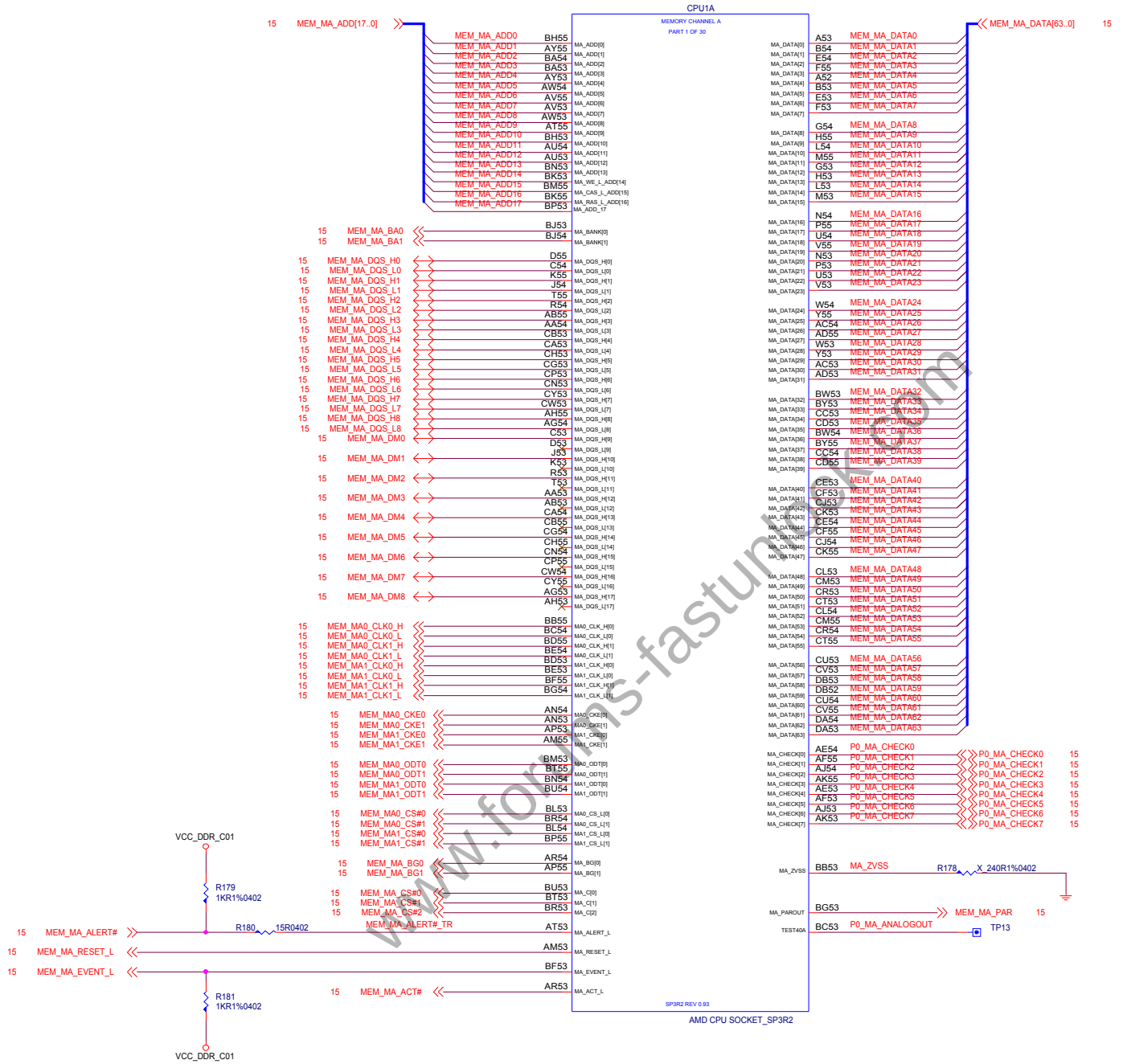

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Title	TR MEMORY A	
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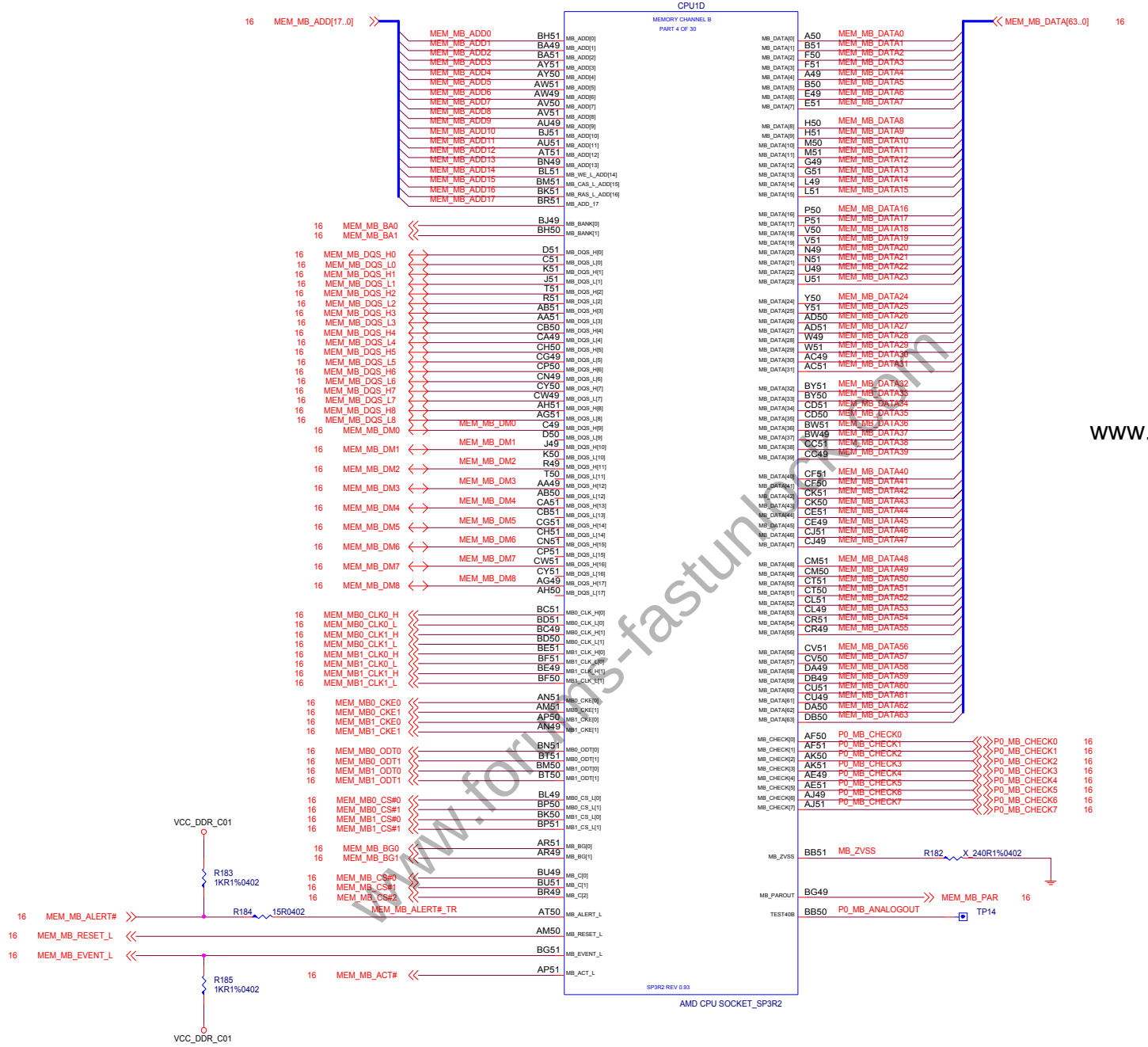

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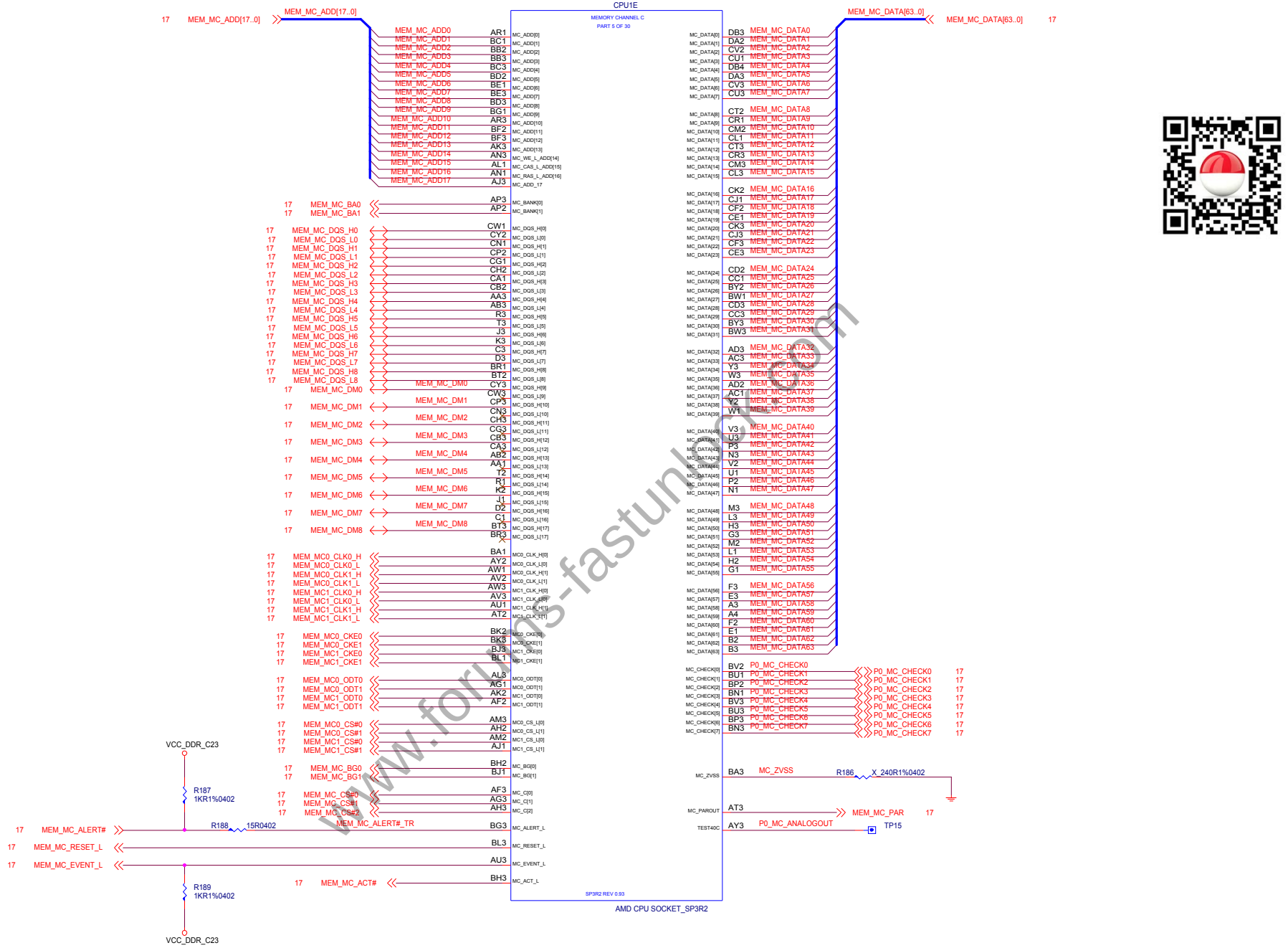

MICRO-START INT'L CO.,LTD.		
Title: TR MEMORY C		
Size	Document Number: MS-7B92	Rev: 10
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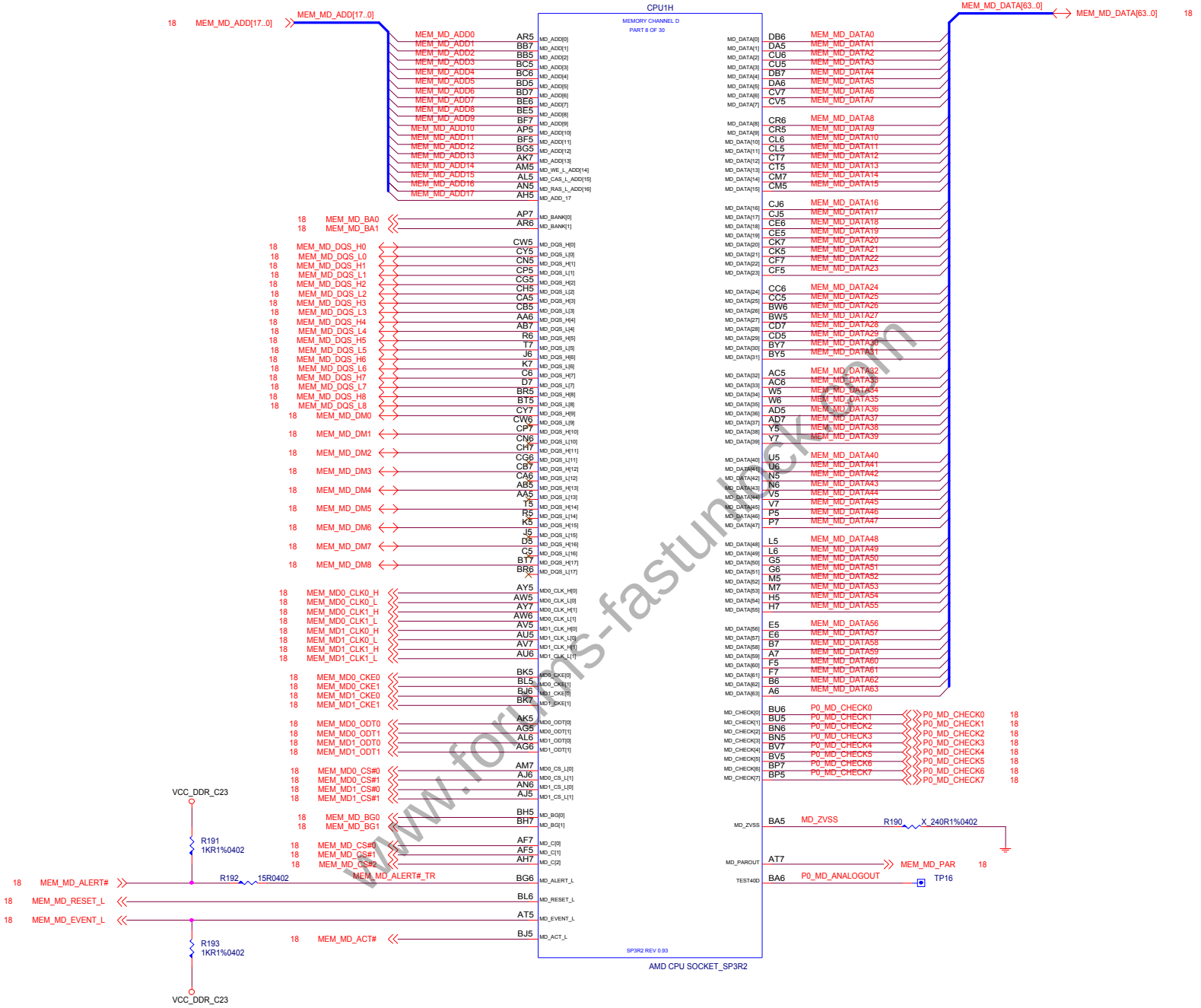

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Title	TR MEMORY D	
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POWER

VDD: 180A(TDC)/240A(EDC);OC:200A(TDC)/264A(EDC)
VDDSOC: 60A(TDC)/80A(EDC)
VDDCR_SOC_S5: 2A(TDC/EDC)
VDDIO_MEM_AB: 15A(TDC/EDC)(CPU)+45A(TDC/EDC)(MEMORY)--EXCEPTED THIS INCLUDES OC
VDDIO_MEM_CD: 15A(TDC/EDC)(CPU)+45A(TDC/EDC)(MEMORY)--EXCEPTED THIS INCLUDES OC
VDD_1.8V: 3A(TDC)/3A(EDC)
VDD_1.8V_S5: 1A(TDC)/1A(EDC)

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Title: TR POWER

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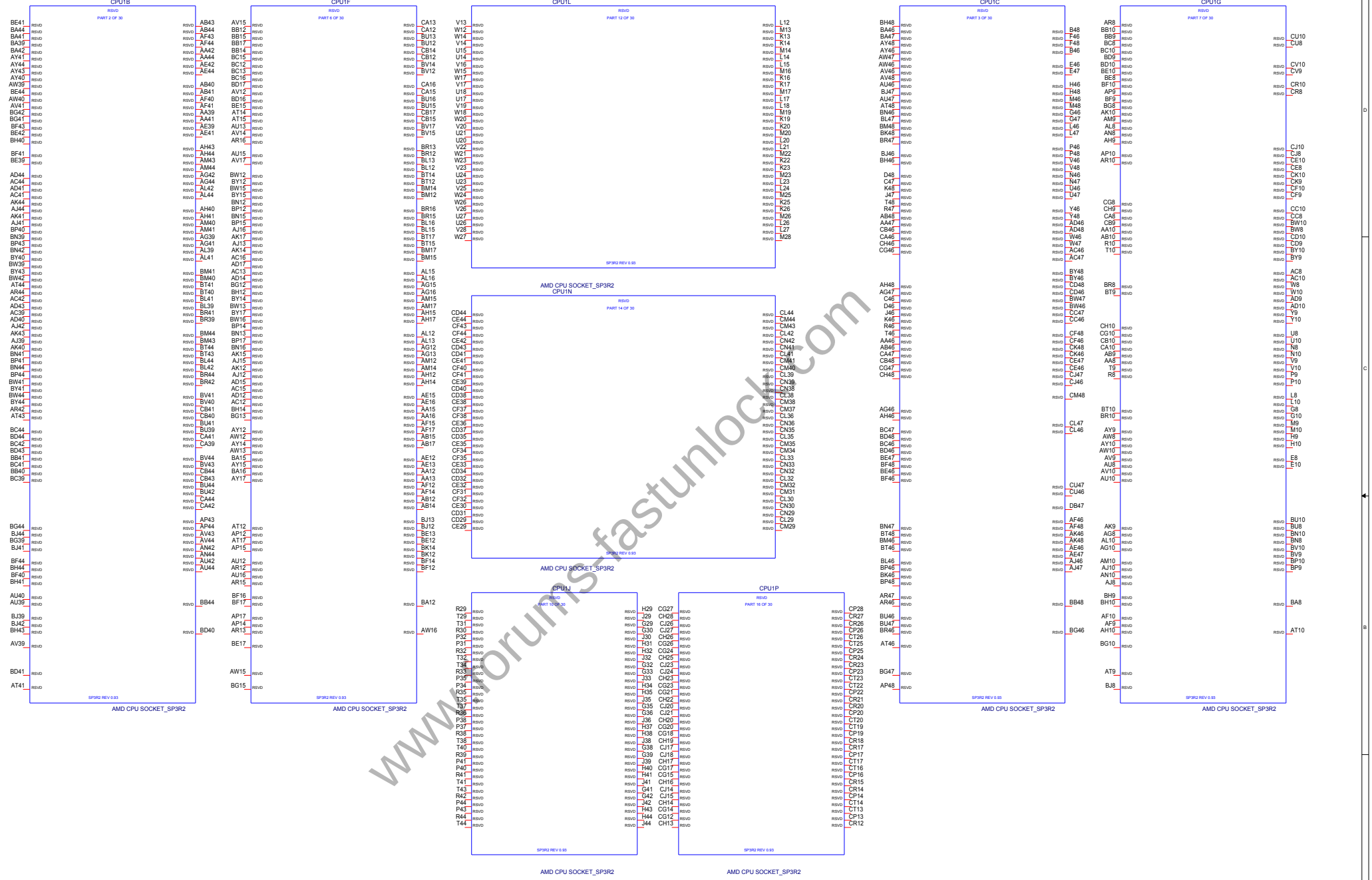

MICRO-START INT'L CO.,LTD.		
Title: TR Reserved		
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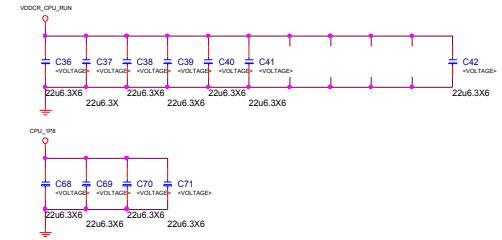
Decoupling Grouped by Placement Location

VDDCR_CPU Bottom Side Decoupling:

Top Side Decoupling:

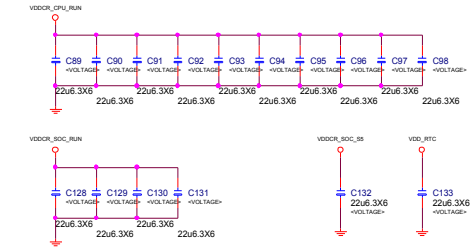
Bottom Side - Mirrored with Top Cavity - North

OEM Skt: 15; SLT Skt: 13



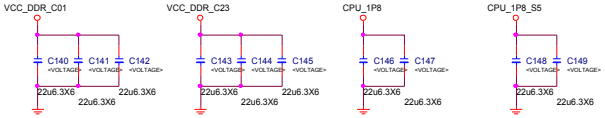
Bottom Side - Mirrored with Top Cavity - South

OEM Skt: 15; SLT Skt: 13



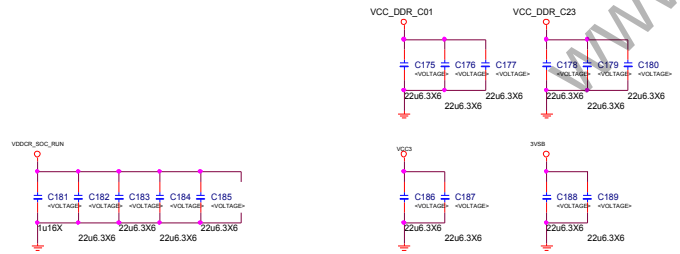
Bottom Side - North

OEM Skt: 24; SLT Skt: 24



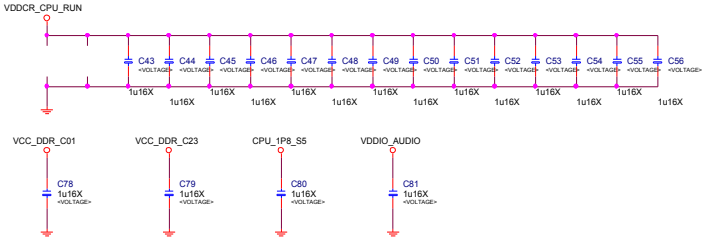
Bottom Side - South

OEM Skt: 24; SLT Skt: 24



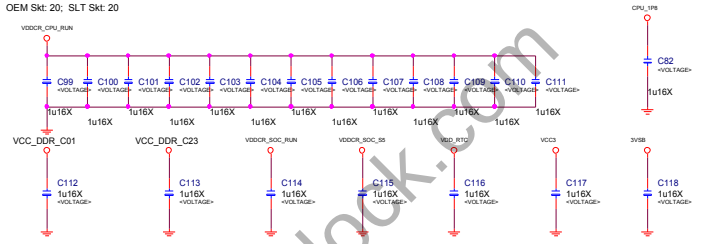
Bottom Side - North

OEM Skt: 20; SLT Skt: 20



Bottom Side - South

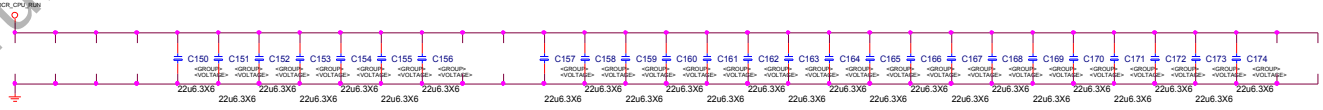
OEM Skt: 20; SLT Skt: 20



Bottom Side - In the socket split regions

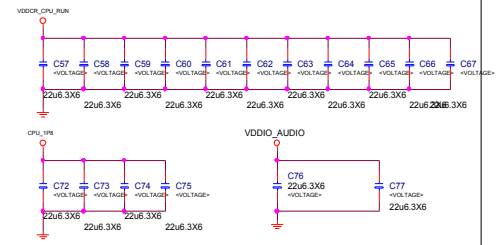
OEM SKT ONLY; NOT AVAILABLE IN SLT; CAN BE USED FOR RESISTORS

RSVD FOR OVER CLOCKING



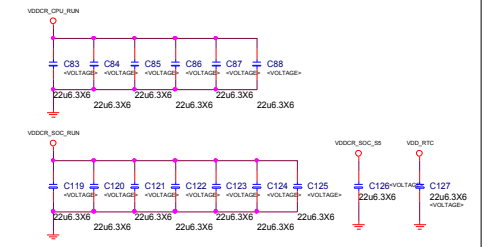
Top Cavity - North Decoupling

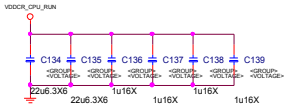
OEM Skt: 15; SLT Skt: 13



Top Cavity South Decoupling

OEM Skt: 15; SLT Skt: 13





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Title: TR DECOUPLING Cap

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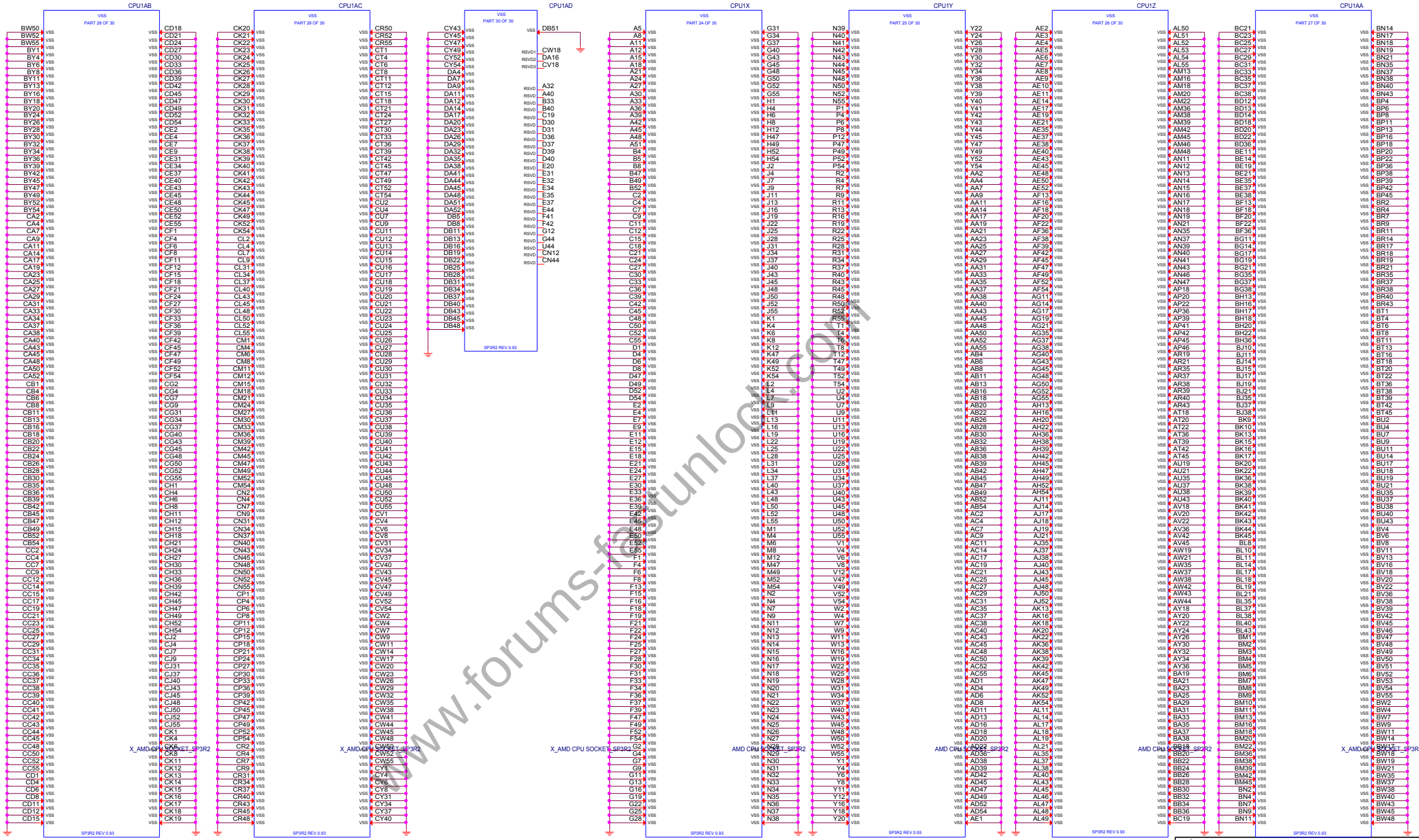

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Title: TR GND

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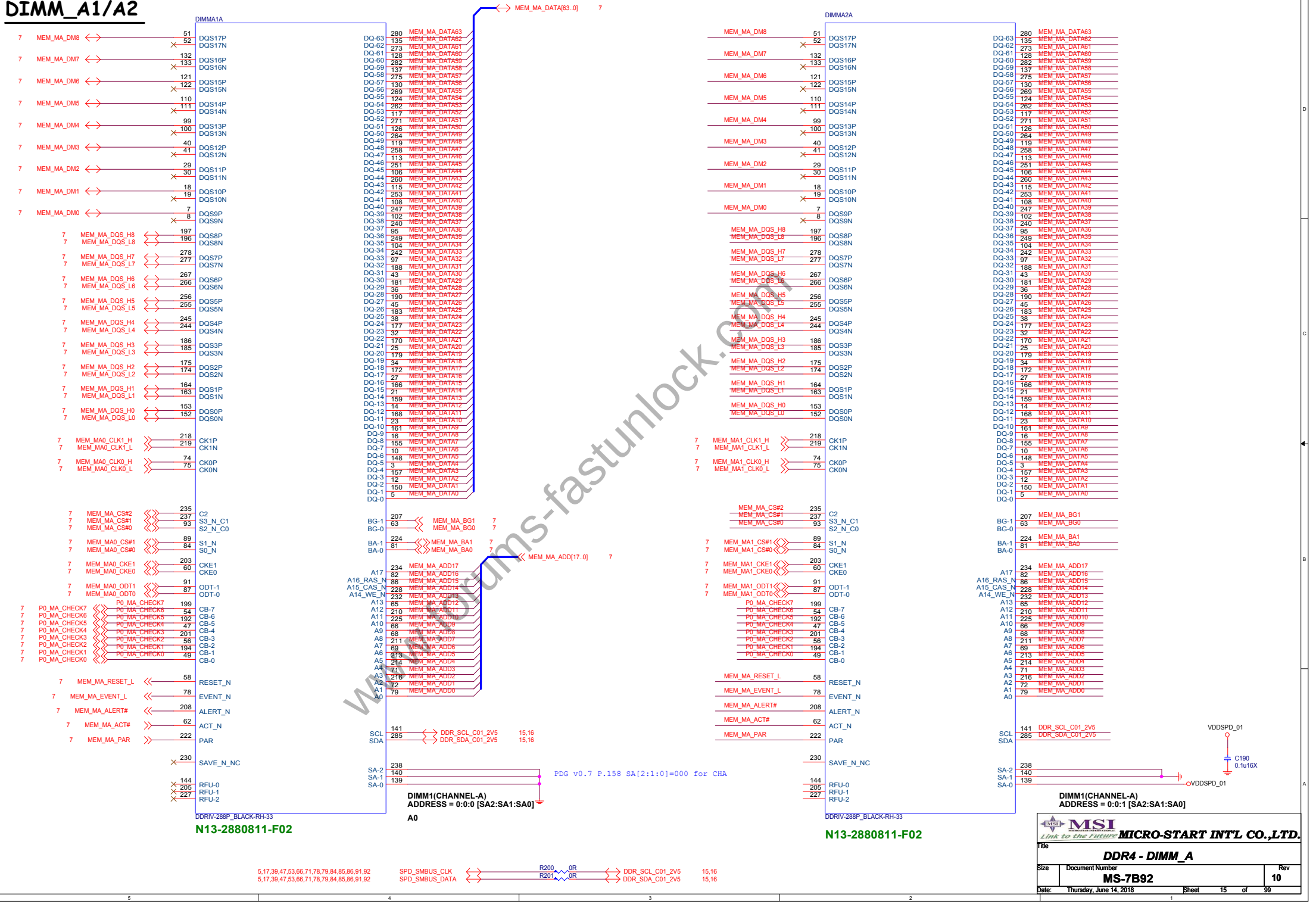
DIMM_A1/A2



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Title	DDR4 - DIMM_A	
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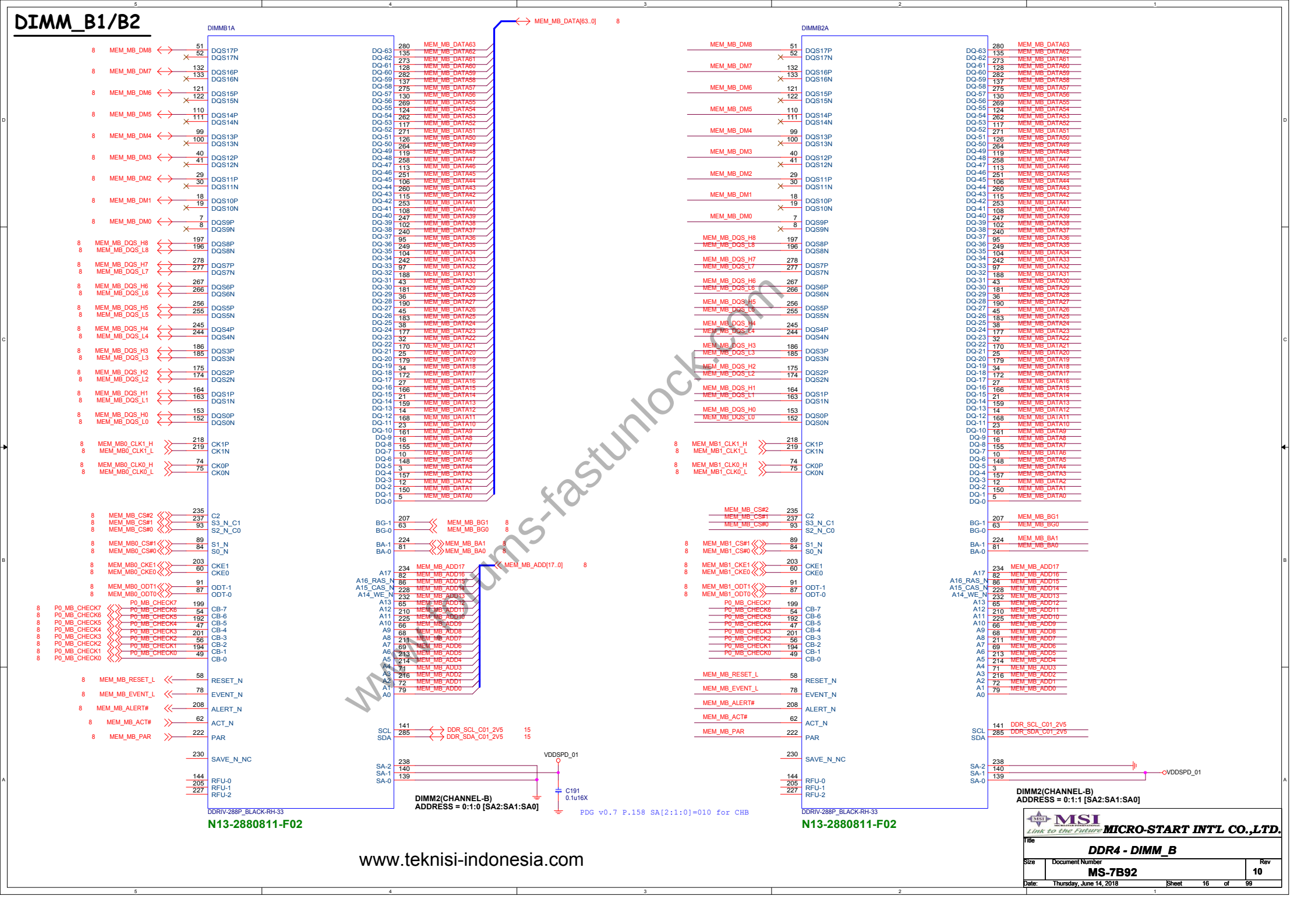
DIMM_B1/B2



MICRO-START INT'L CO.,LTD.

Title	DDR4 - DIMM_B	
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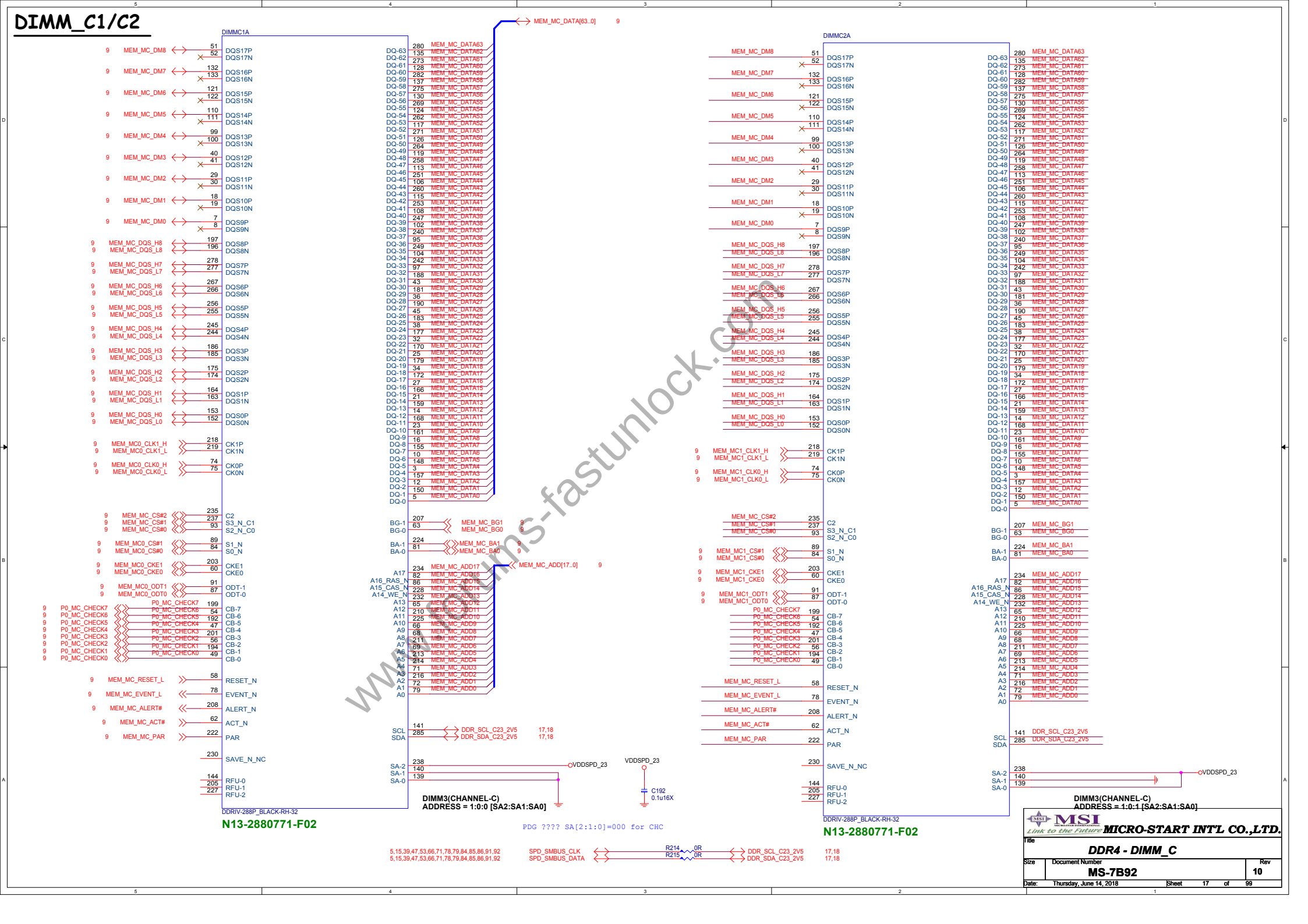
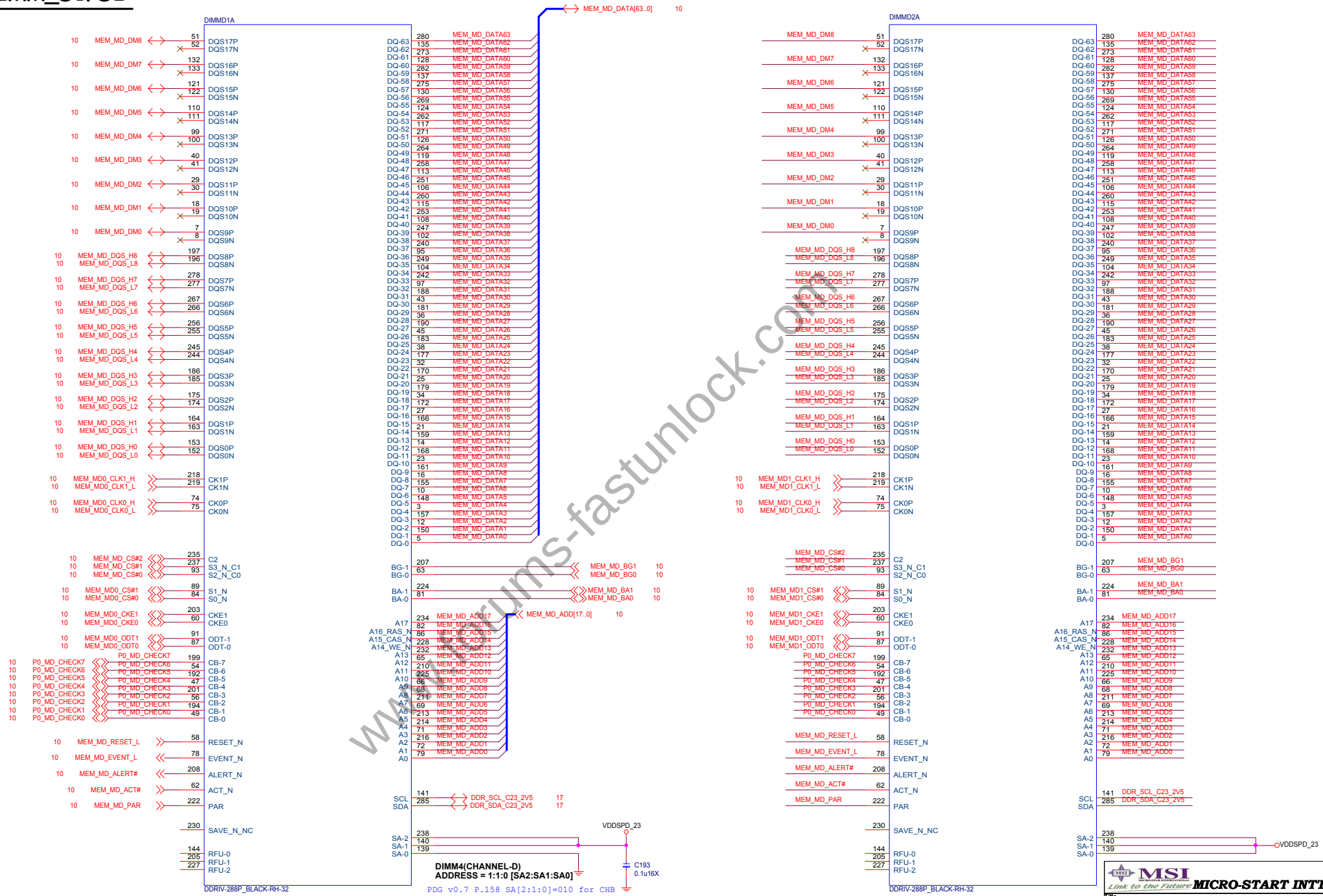
DIMM_C1/C2



DIMM_D1/D2



N13-2880771-F02

N13-2880771-F02

MICRO-START INT'L CO.,LTD.

Title	DDR4 - DIMM_D	
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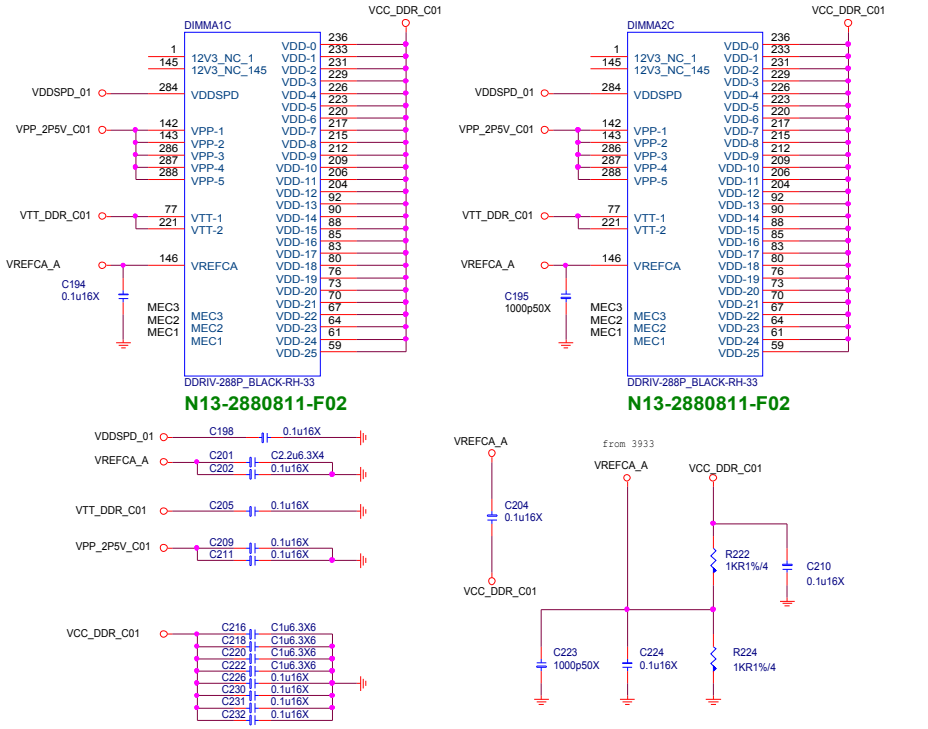
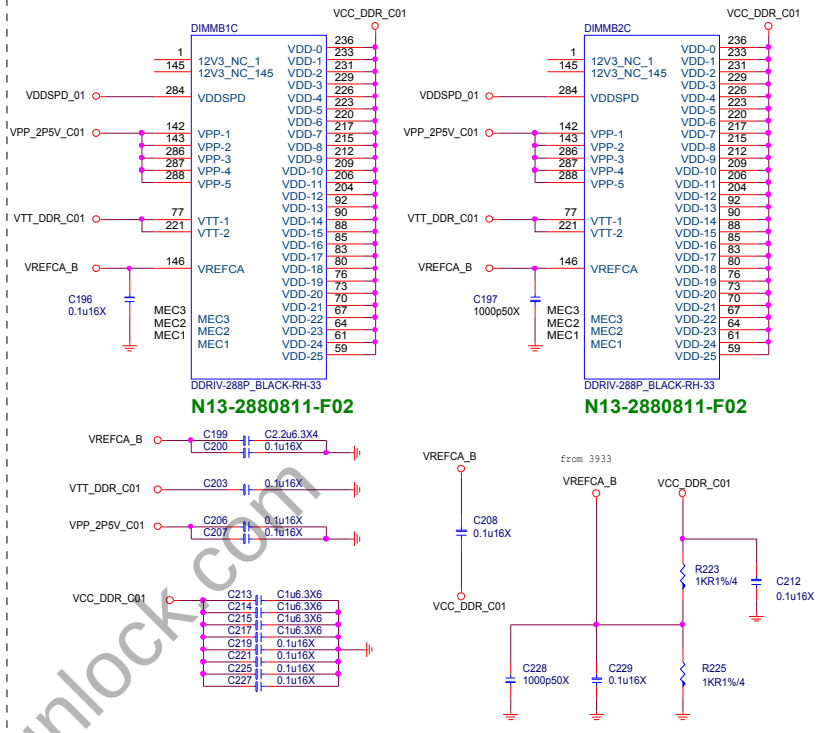
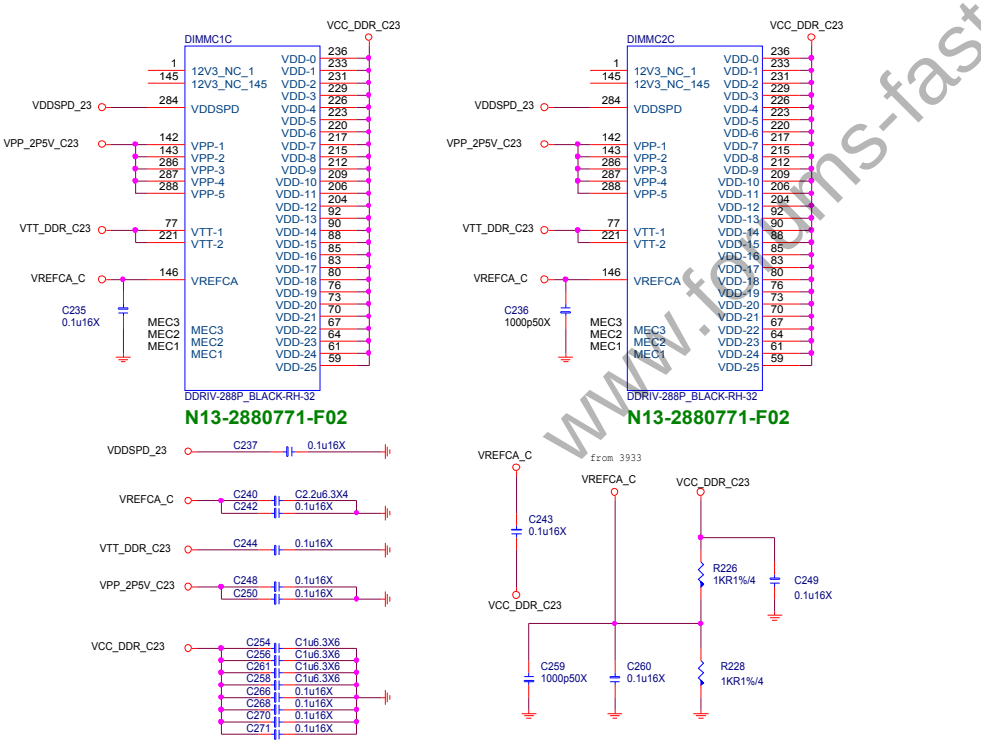
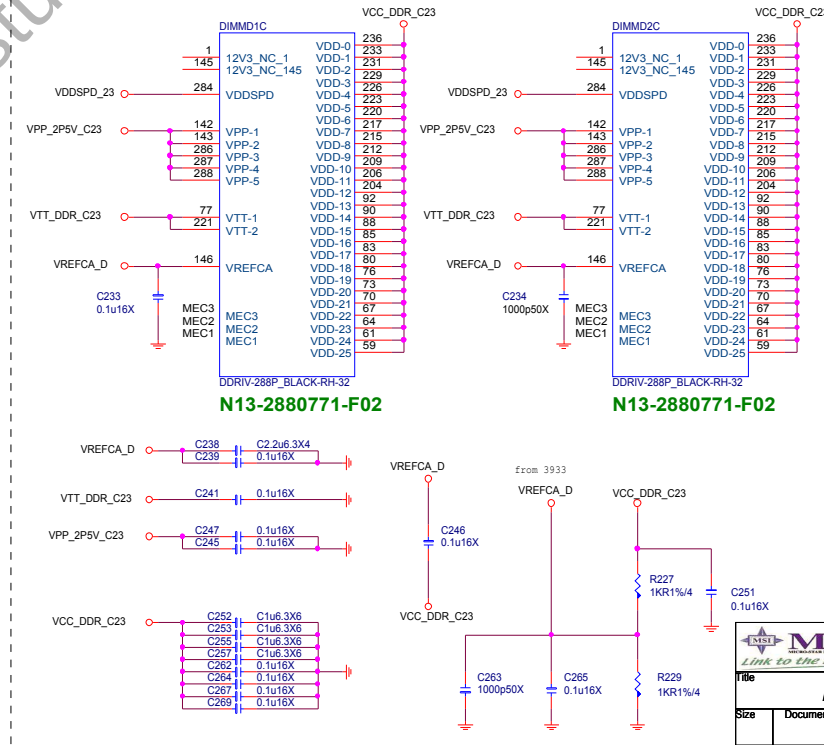




DDR VREF

(place resistors close to DIMMs)





DDR VREF

(place resistors close to DIMMs)

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Link to the Future

Title	DDR4 CA VREF	
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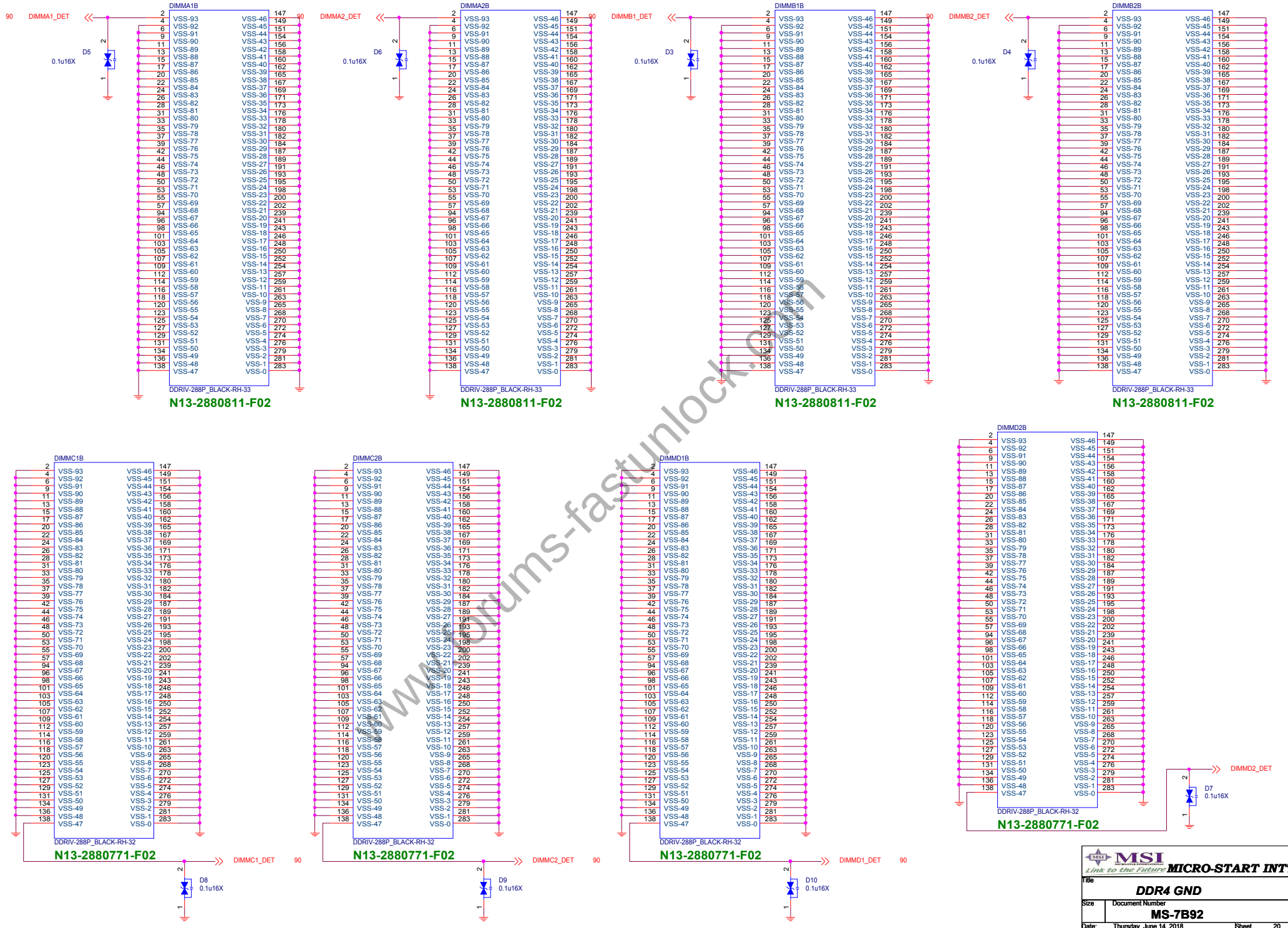

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Title: DDR4 GND

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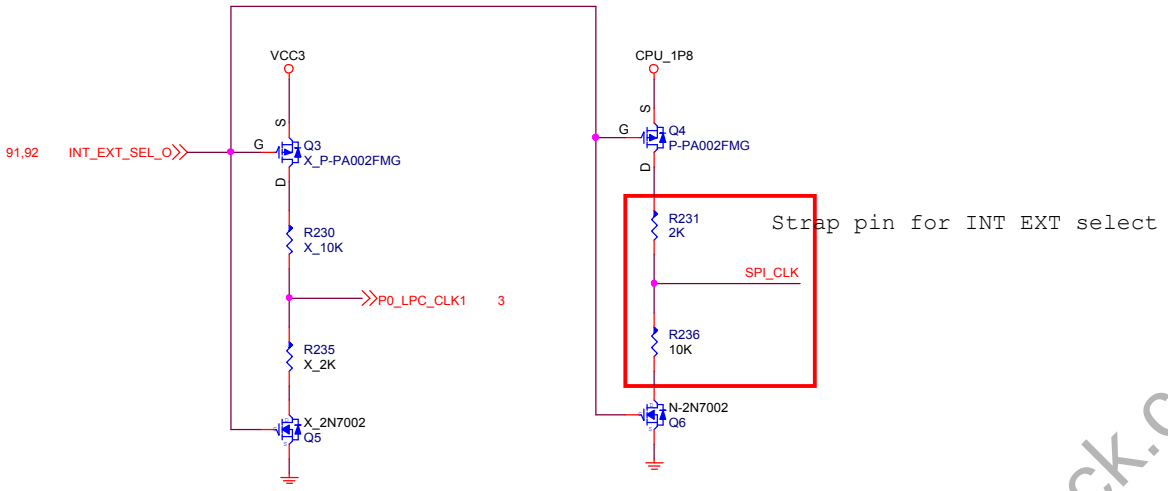
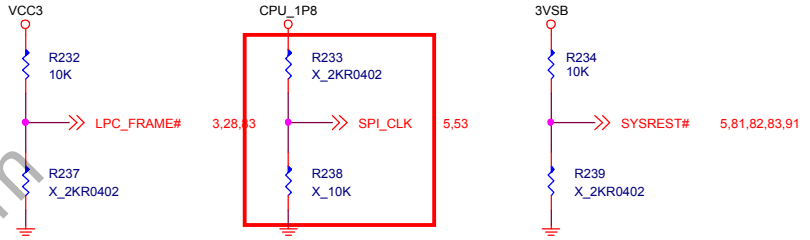


CPU STRAPS

STRAP	DEFINITION
SPI_CLK	1:USE 48MHZ CRYSTAL CLOCK AND GENERATE BOTH INTERNAL AND EXTERNAL CLOCKS(DEFAULT) 0:USE 100MHZ PCIE CLOCK AS REFERENCE CLOCK AND GENERATE INTERNAL CLOCKS ONLY
SYS_RST#	1:NORMAL RESET MODE(DEFAULT) 0:SHORT RESET MODE
LPC_FRAME_L	ROM TYPE SELECT 1:BOOT FROM SPI ROM(DEFAULT) 0:BOOT FROM LPC ROM



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Link to the Future

Title: CPU STRAPS		
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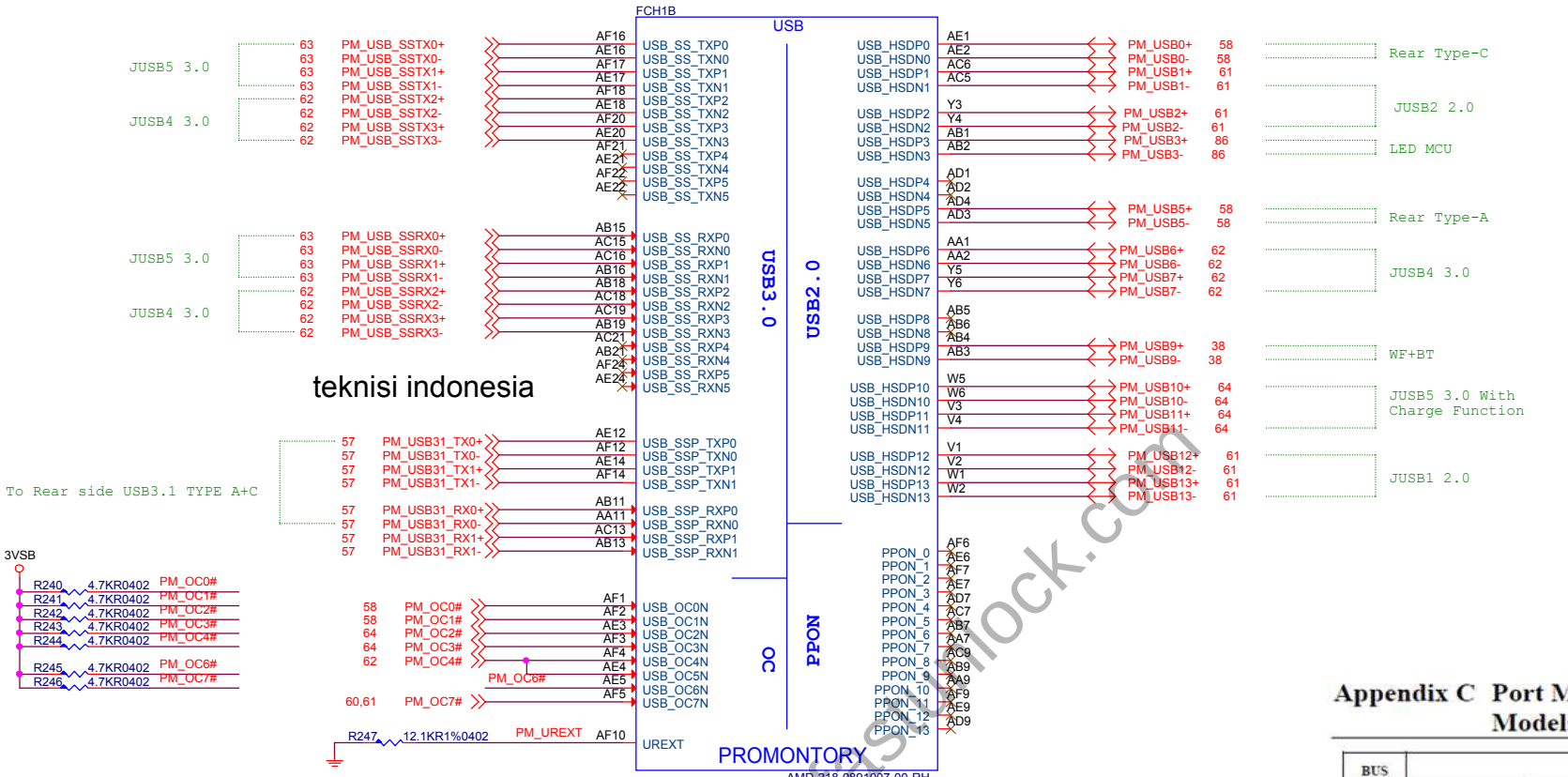

teknisi indonesia

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 0~3	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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Title	Promontory USB	
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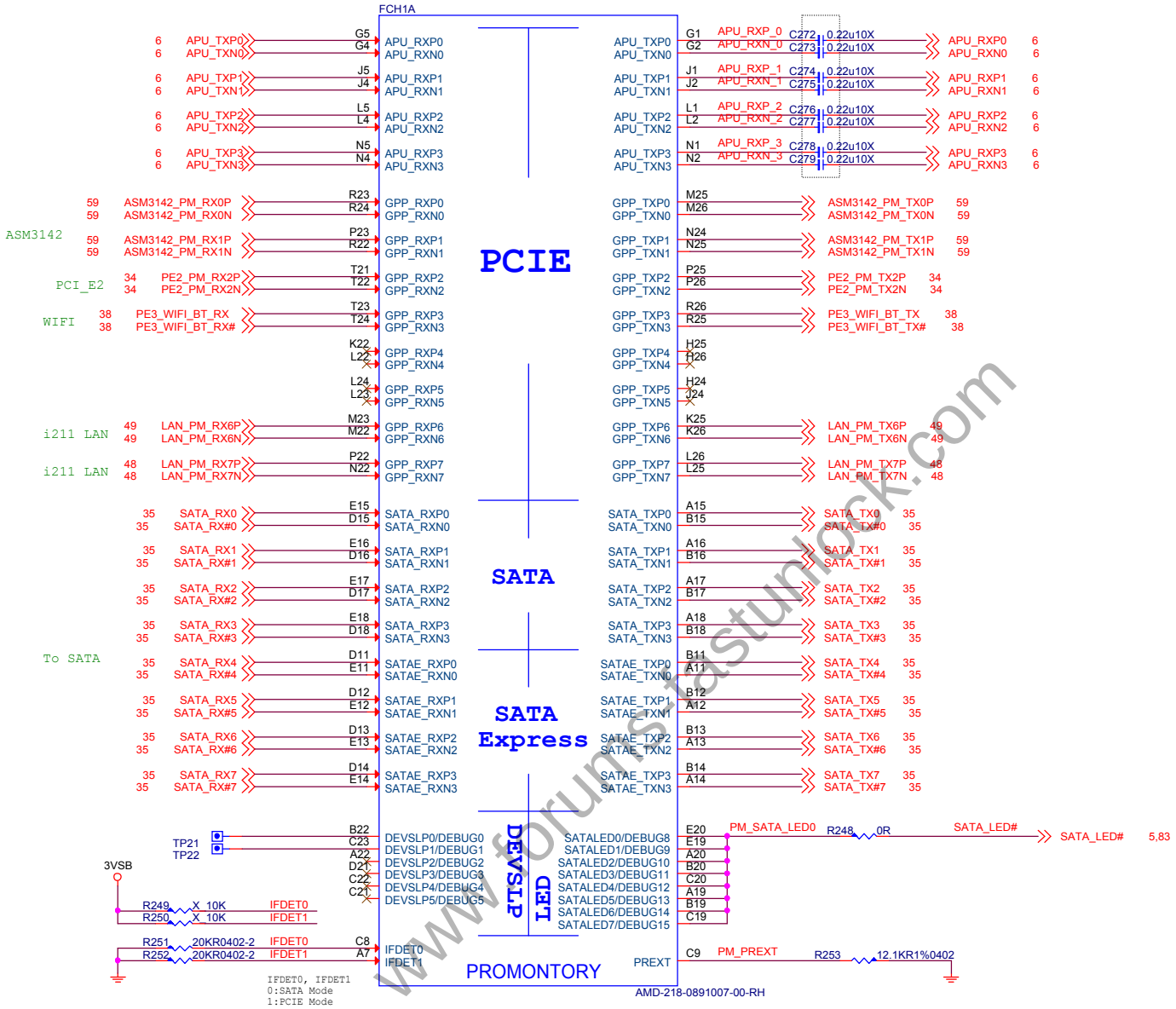

SATA port	DEVSLP signal
SATA_TX/RXP/N[0]	DEVSLP0
SATA_TX/RXP/N[1]	DEVSLP1
SATA_TX/RXP/N[2]	DEVSLP2
SATA_TX/RXP/N[3]	DEVSLP3
SATAE_TX/RXP/N[0]	SATAE_CLKREQ0N
SATAE_TX/RXP/N[1]	DEVSLP4
SATAE_TX/RXP/N[2]	SATAE_CLKREQ1N
SATAE_TX/RXP/N[3]	DEVSLP5

MICRO-STAR INT'L CO.,LTD.

Title: Promontory PCIE/SATA

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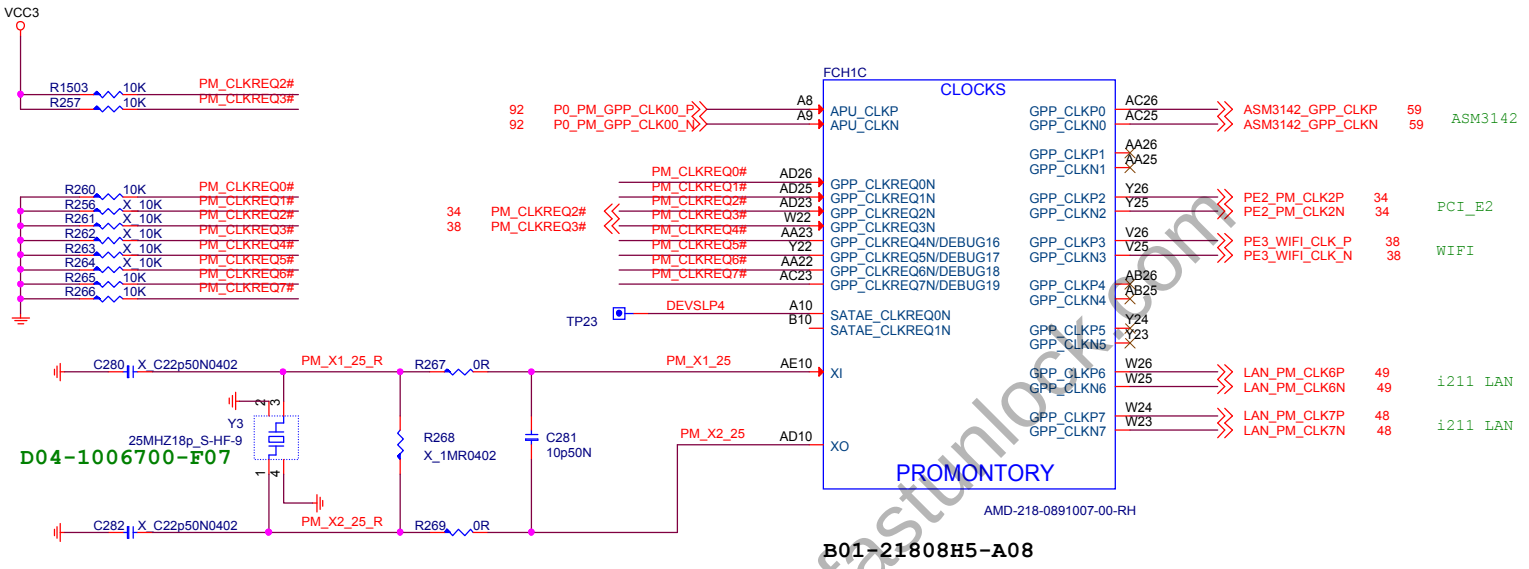
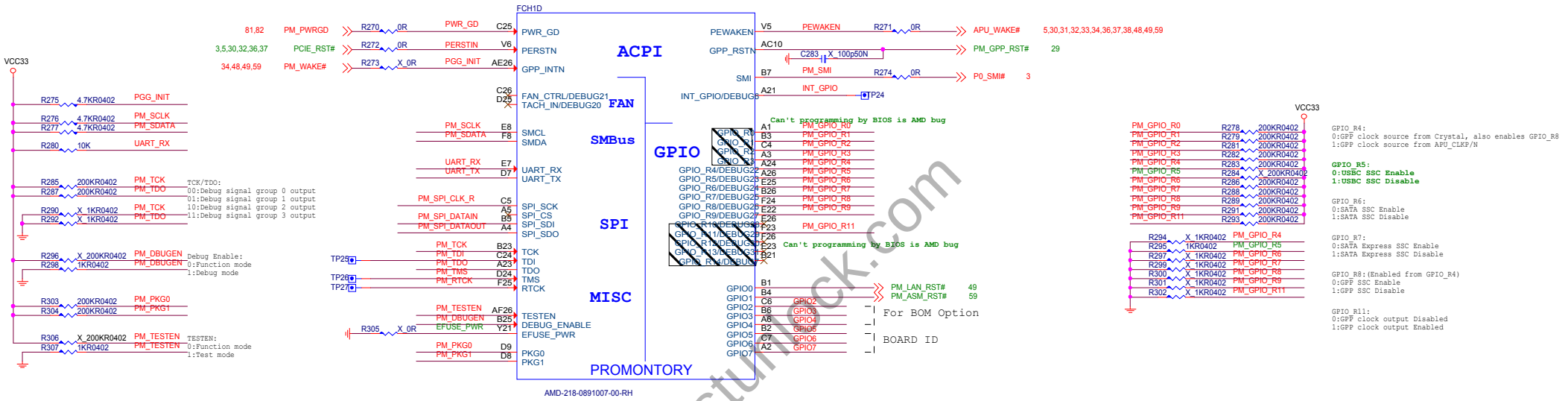
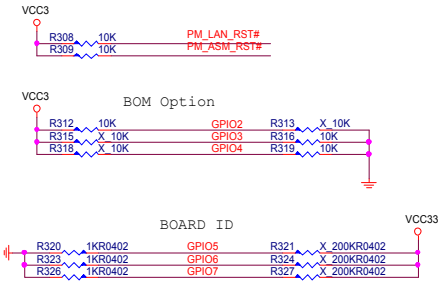


MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title	Promontory CLOCK	
Size	Document Number MS-7B92	Rev 10
Date: Thursday, June 14, 2018	Sheet 24 of 99	





GPIO2=0 --> SLG41837
Slave Address:PCB1.0 version
00110000 , Wite , 30
00110001 , Read , 31

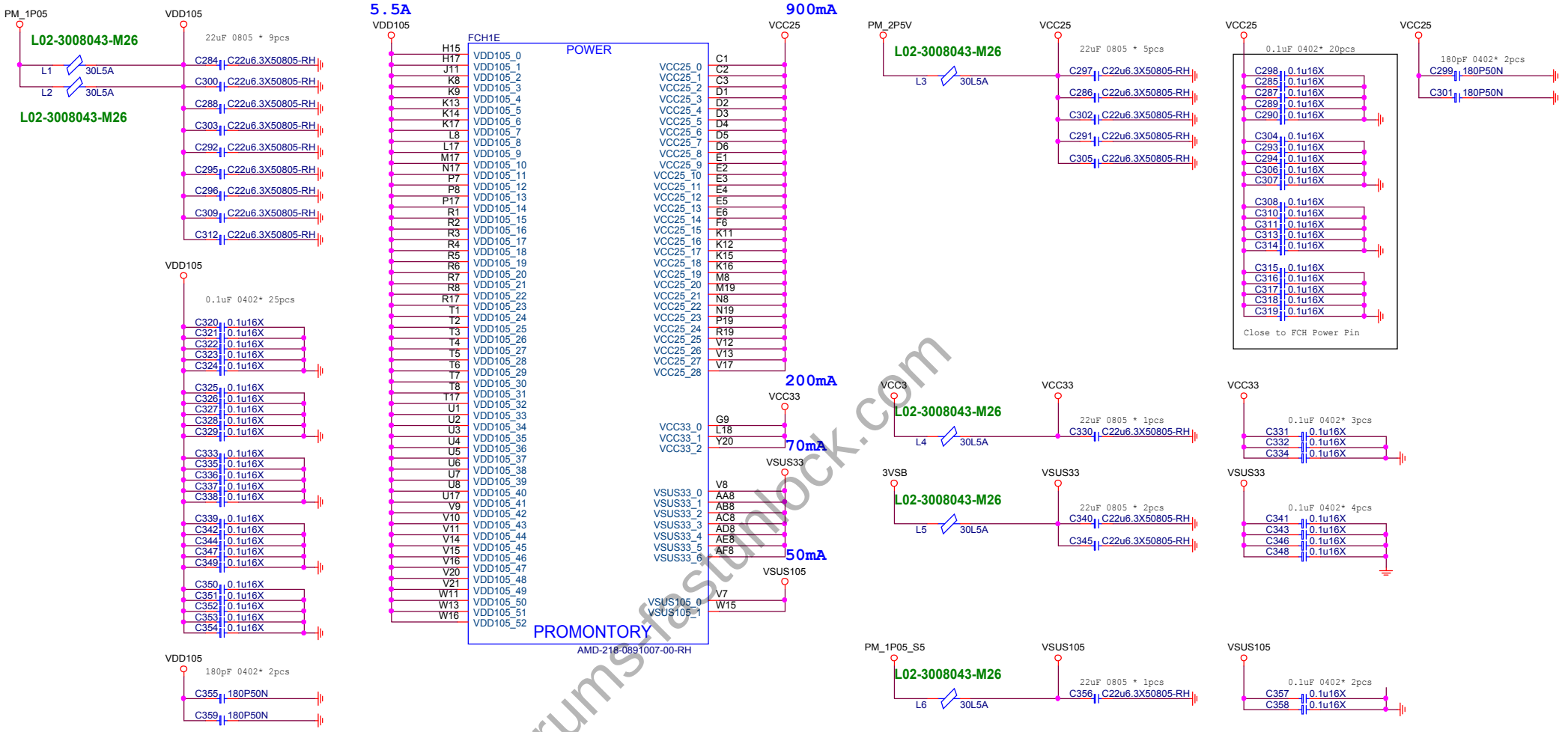
GPIO2=1 --> SLG41837
Slave Address:PCB1.1 version
01010000 , Wite , 50
01010001 , Read , 51

MICRO-START INT'L CO.,LTD.

Title: Promontory GPIO/SMB/SPI

Size | Document Number: MS-7B92 | Rev: 10

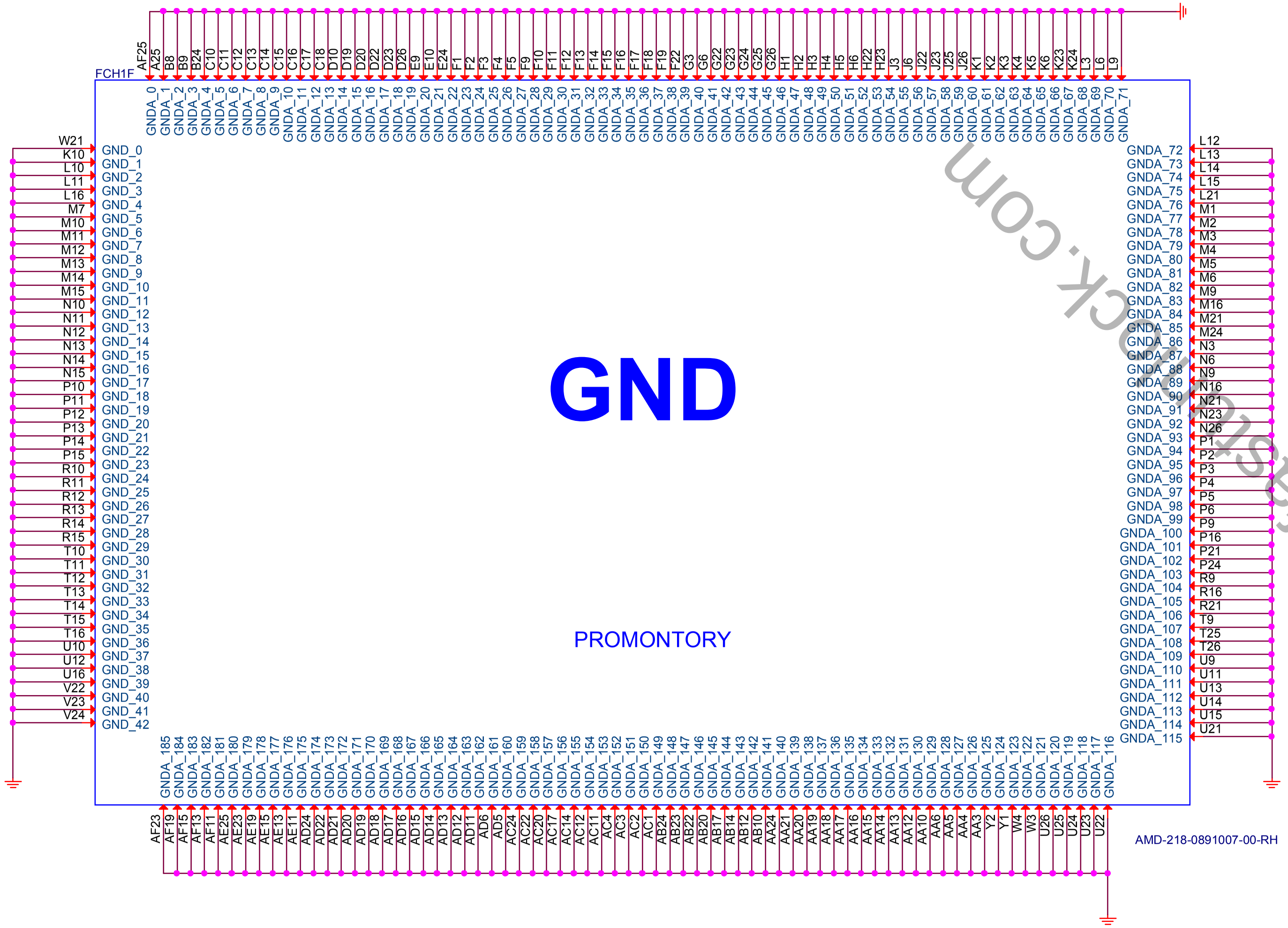
Date: Thursday, June 14, 2018 | Sheet 25 of 99



MSI MICRO-STAR INT'L CO.,LTD.

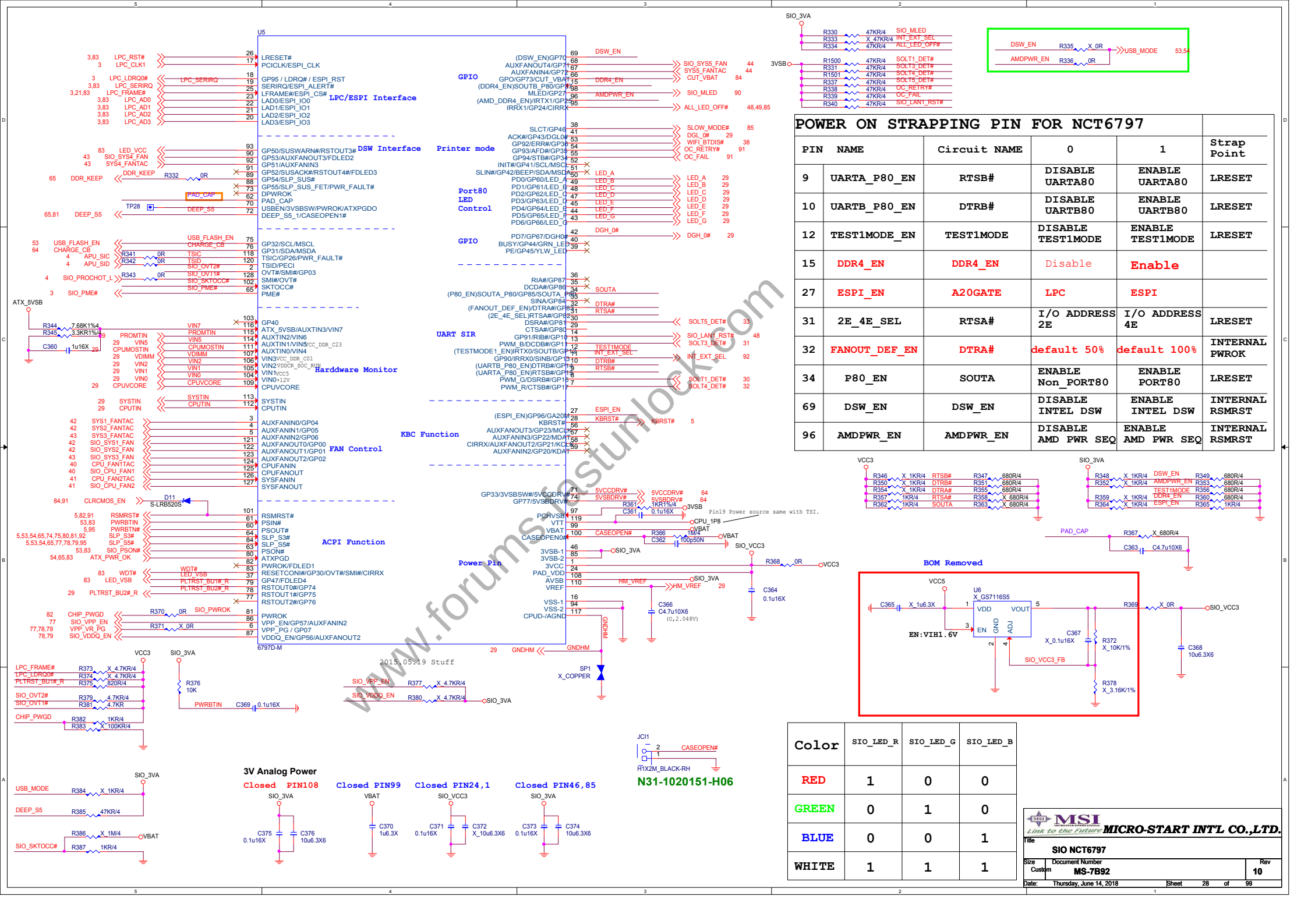
Link to the Future

Title	Promontory POWER	
Size	Document Number MS-7B92	Rev 10
Date: Thursday, June 14, 2018	Sheet 26 of 99	



MSI Link to the Future **MICRO-START INT'L CO.,LTD.**

Title		
Promontory GND		
Size	Document Number: **MS-7B92**	Rev: **10**
Date: Thursday, June 14, 2018	Sheet 27 of 99	



POWER ON STRAPPING PIN FOR NCT6797

PIN	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	TEST1MODE_EN	TEST1MODE	DISABLE TEST1MODE	ENABLE TEST1MODE	LRESET
15	DDR4_EN	DDR4_EN	Disable	Enable	
27	ESPI_EN	A20GATE	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	AMDPWR_EN	AMDPWR_EN	DISABLE AMD PWR SEQ	ENABLE AMD PWR SEQ	INTERNAL RSMRST

Color	SIO_LED_R	SIO_LED_G	SIO_LED_B
RED	1	0	0
GREEN	0	1	0
BLUE	0	0	1
WHITE	1	1	1

MICRO-START INT'L CO.,LTD.

Title	SIO NCT6797		
Size: Custom	Document Number: MS-7B92		Rev: 10
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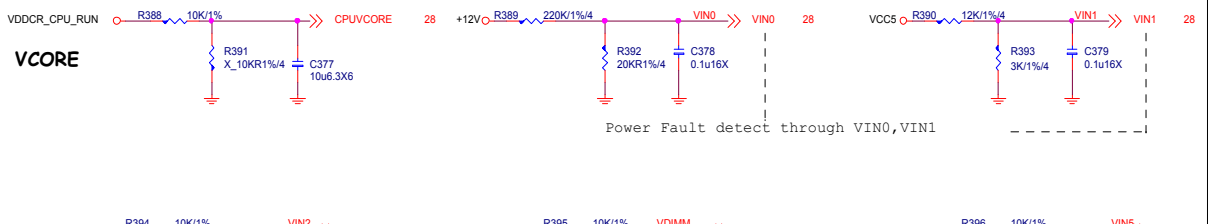
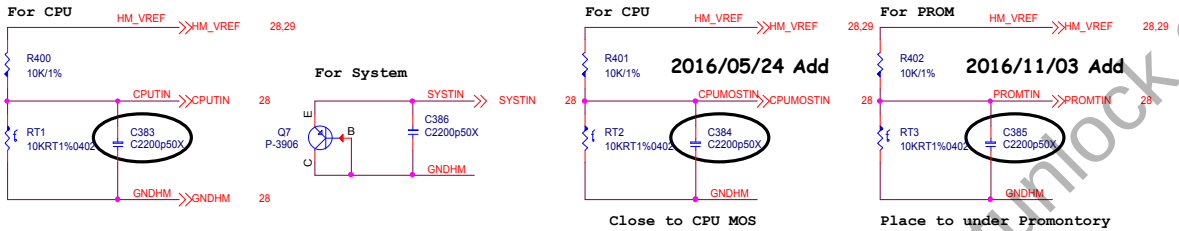
HW Monitor - Voltage

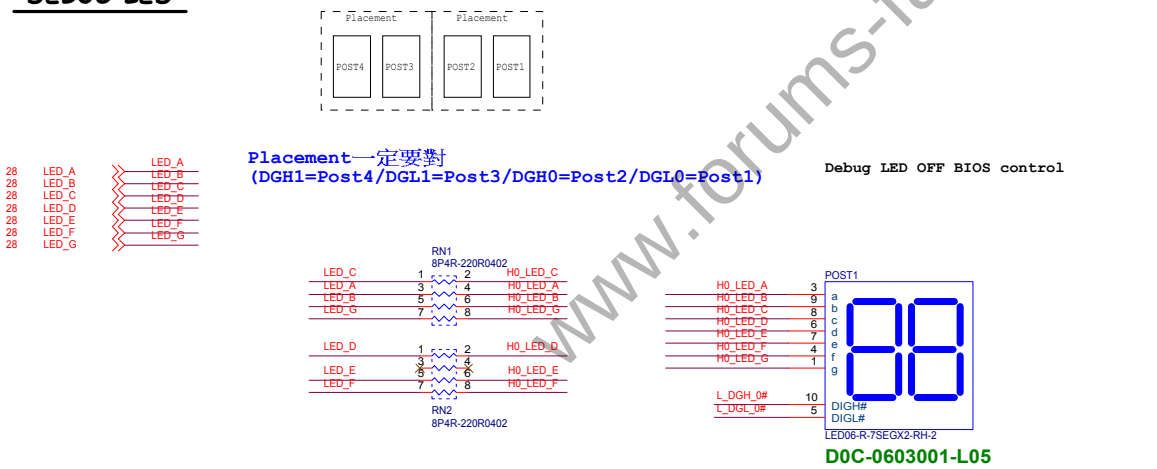
SIO HM Voltage over 2.048V will not detect



TEMP SENSOR

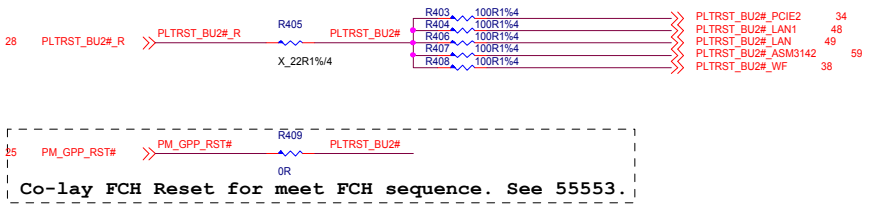


DEBUG LED

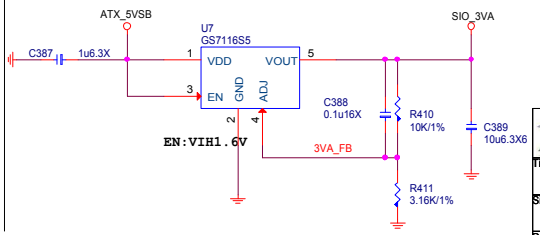


COM PORT

RESET



SIO_3VA



MSI MICRO-START INT'L CO.,LTD.
Link to the Future

Title	HWM/PS2/Debug LED	
Size: Custom	Document Number: MS-7B92	Rev: 10
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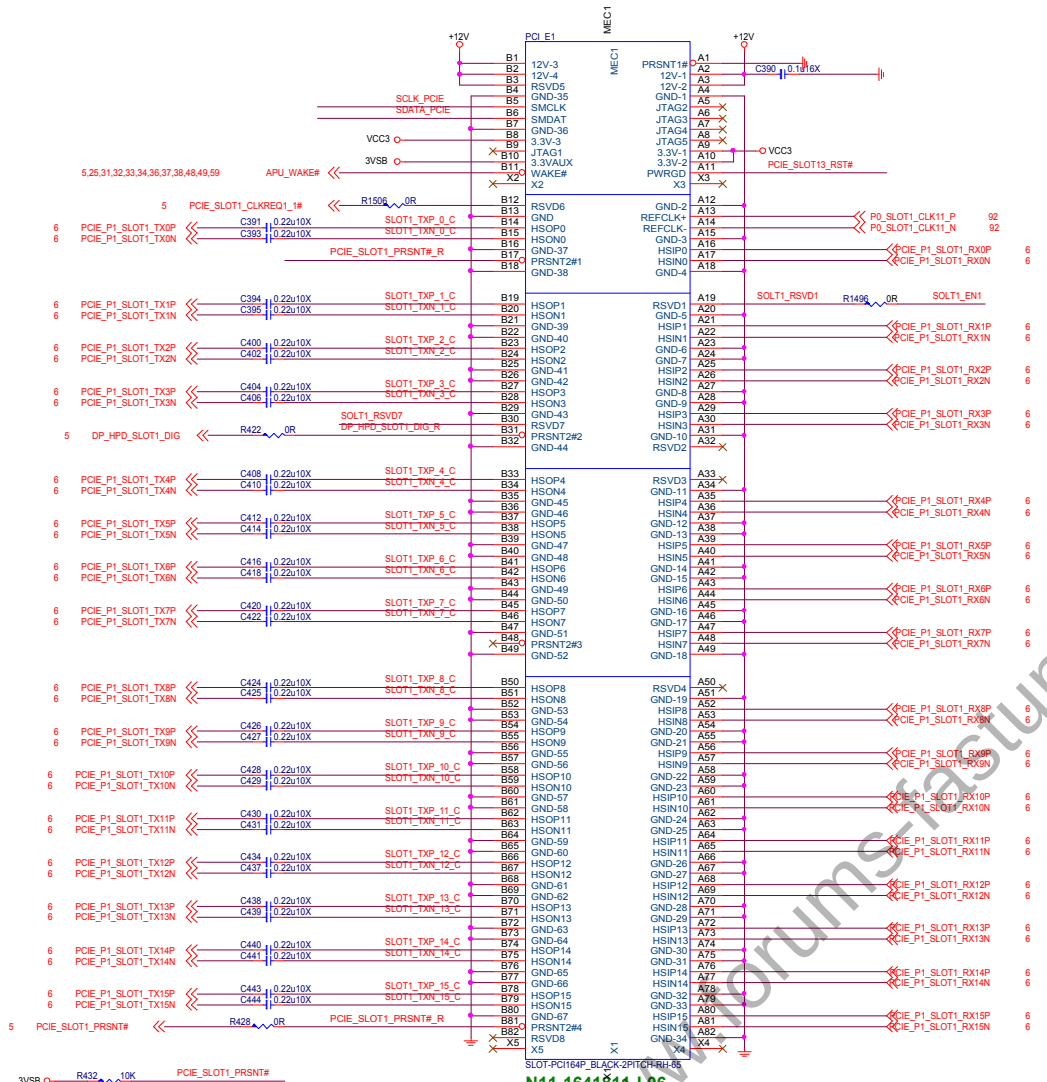
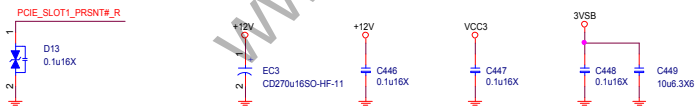
PCI_E1

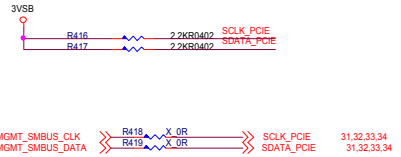
PCI EXPRESS X16 SLOT

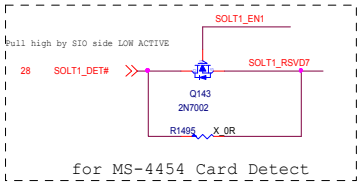


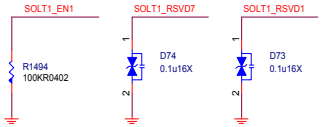
N11-1641811-L06

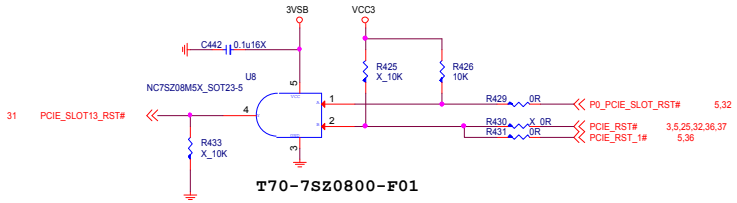


C71-27117P1-N07

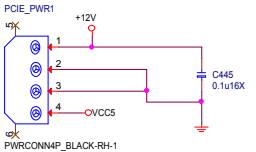








T70-7SZ0800-F01



N93-04M0321-H06

MICRO-START INT'L CO.,LTD.

Title: PCIE X16 Slot1

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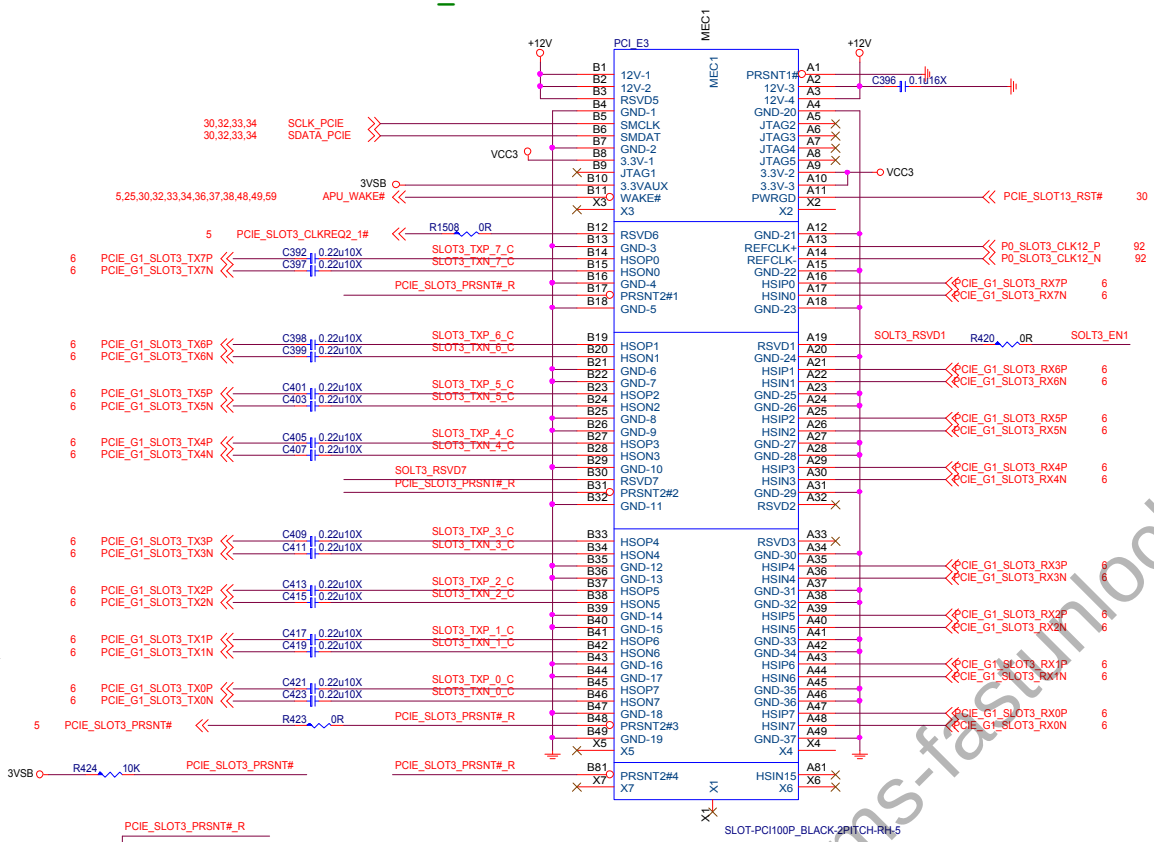
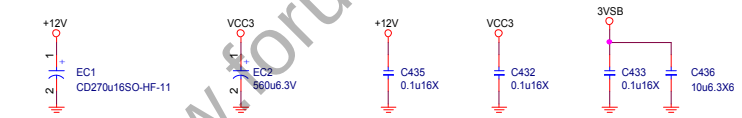
PCI_E3

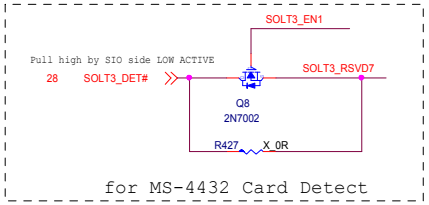
PCI EXPRESS X8 SLOT

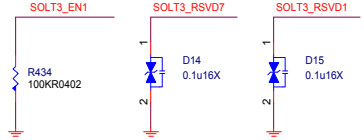


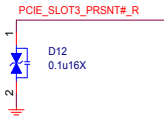
N11-1000221-L06



C71-27117P1-N07 C71-56106J1-N07







MSI MICRO-STAR INT'L CO.,LTD.			
Title: PCIE X8 Slot3			
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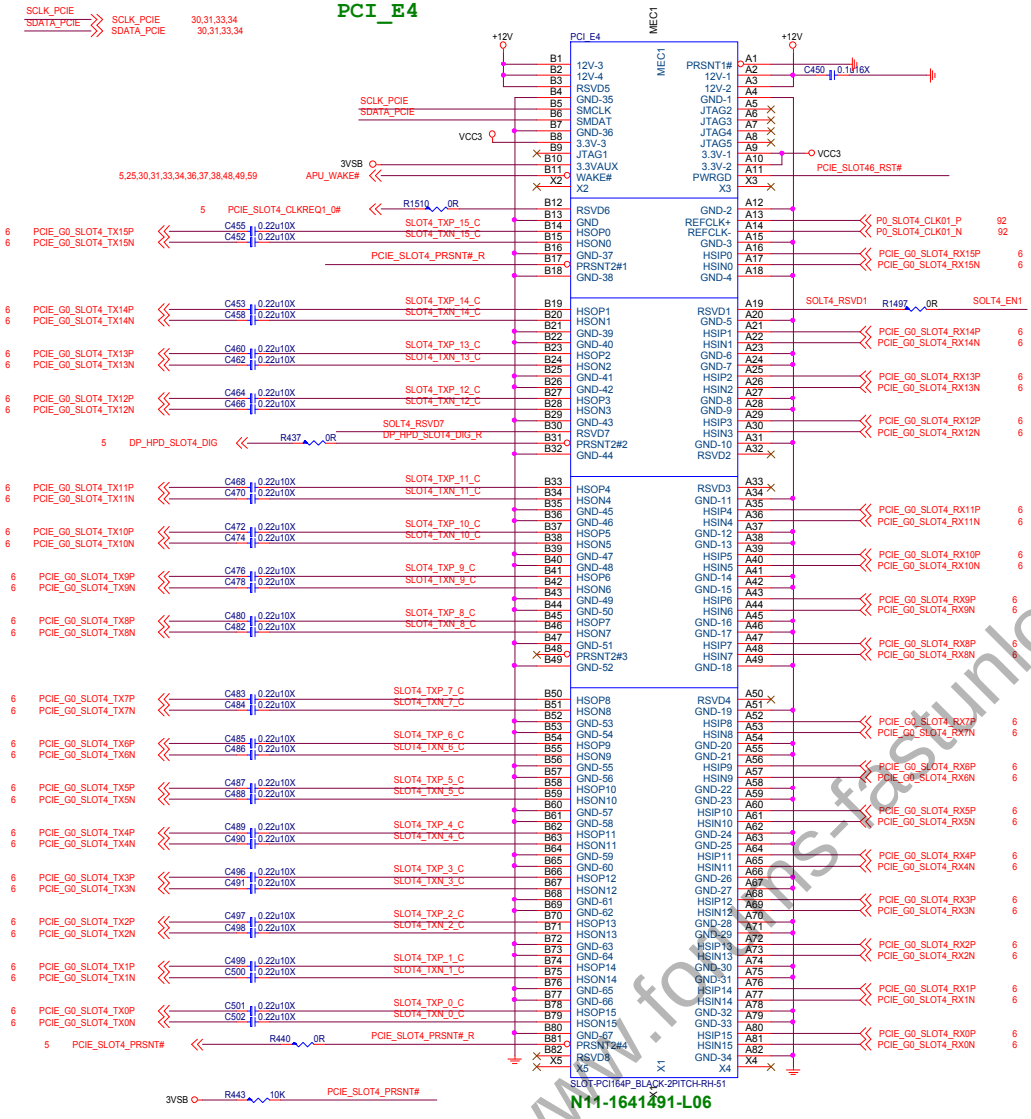
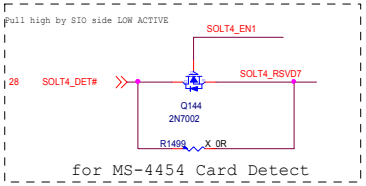
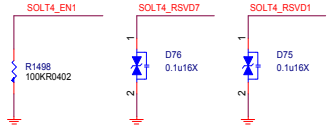
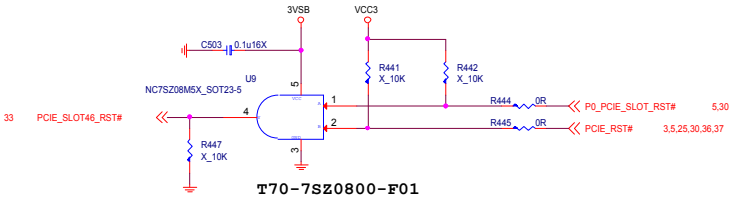
PCI EXPRESS X16 SLOT

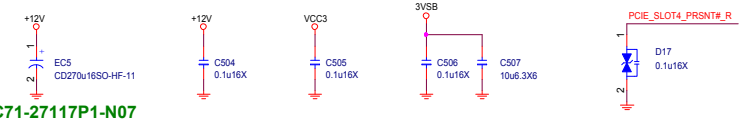
PCI_E4











MSI MICRO-STAR INT'L CO.,LTD.			
Title: PCIE X16 Slot4			
Size	Document Number: MS-7B92		Rev: 10
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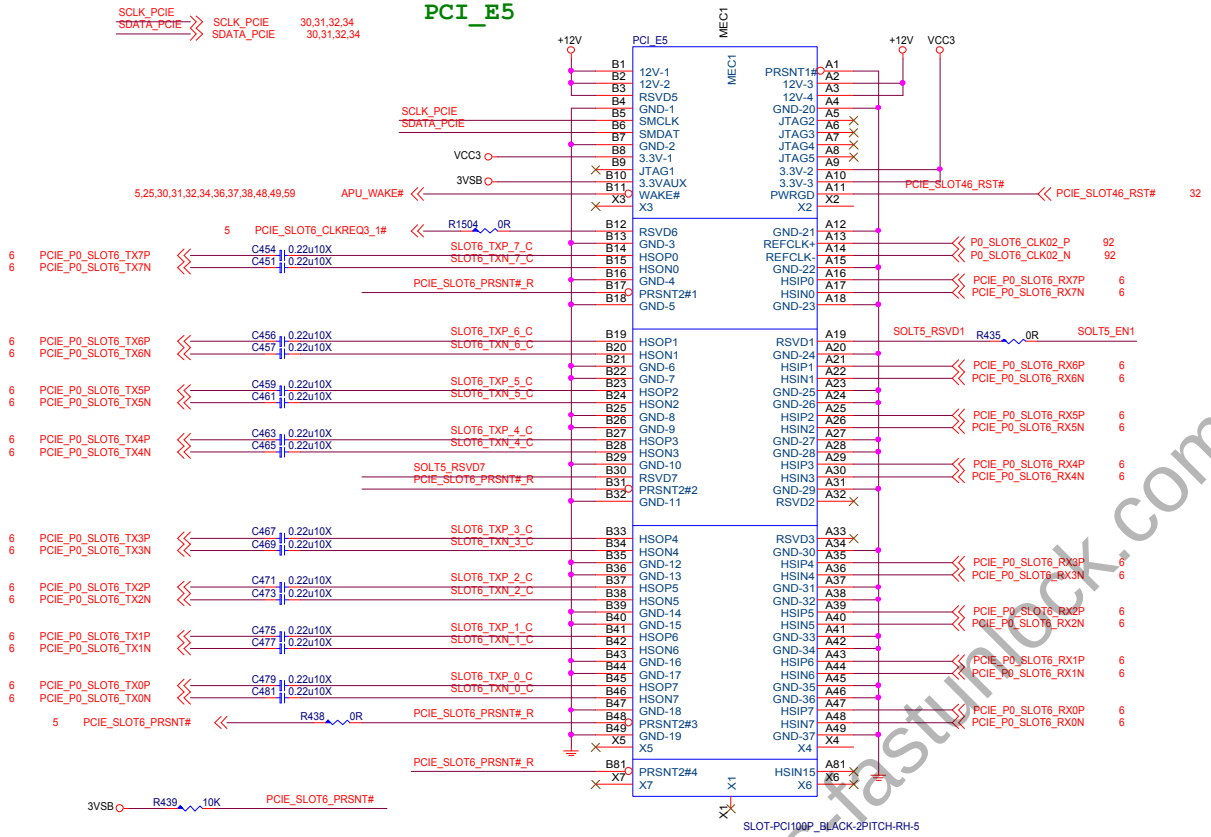
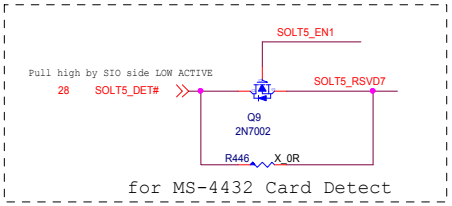
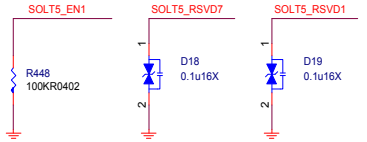
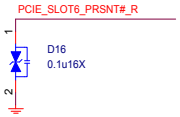
PCI EXPRESS X8 SLOT

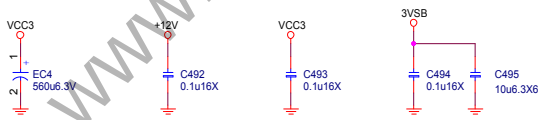


N11-1000221-L06









C71-56106J1-N07

MICRO-START INT'L CO.,LTD.

Title	PCIE X8 Slot5	
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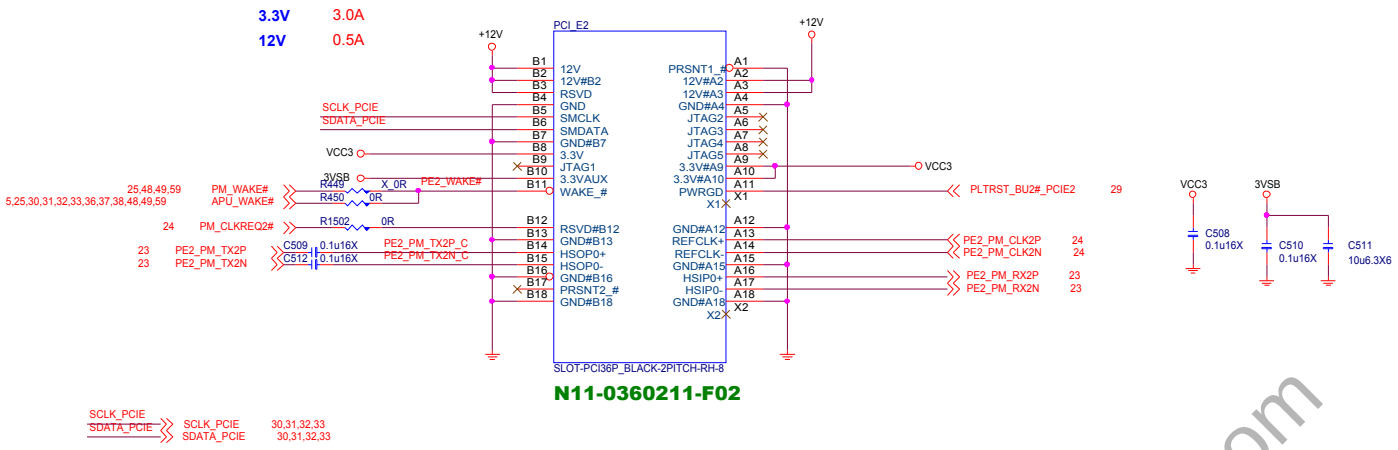
PCIEX1 12V 0.5A
3.3V weak 375mA

PCI_E2



N11-0360211-F02

SCLK_PCIE
SDATA_PCIE
SCLK_PCIE 30,31,32,33
SDATA_PCIE 30,31,32,33

PCI Express X1 slot	
+12V	- 1 A
+3.3Vaux (wake)	- 750mA
+3.3Vaux (no wake)	- 40mA
+3.3V	- 6.0A

MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title: PCIE X1 & PCI_E2		
Size: Custom	Document Number: MS-7B92	Rev: 10
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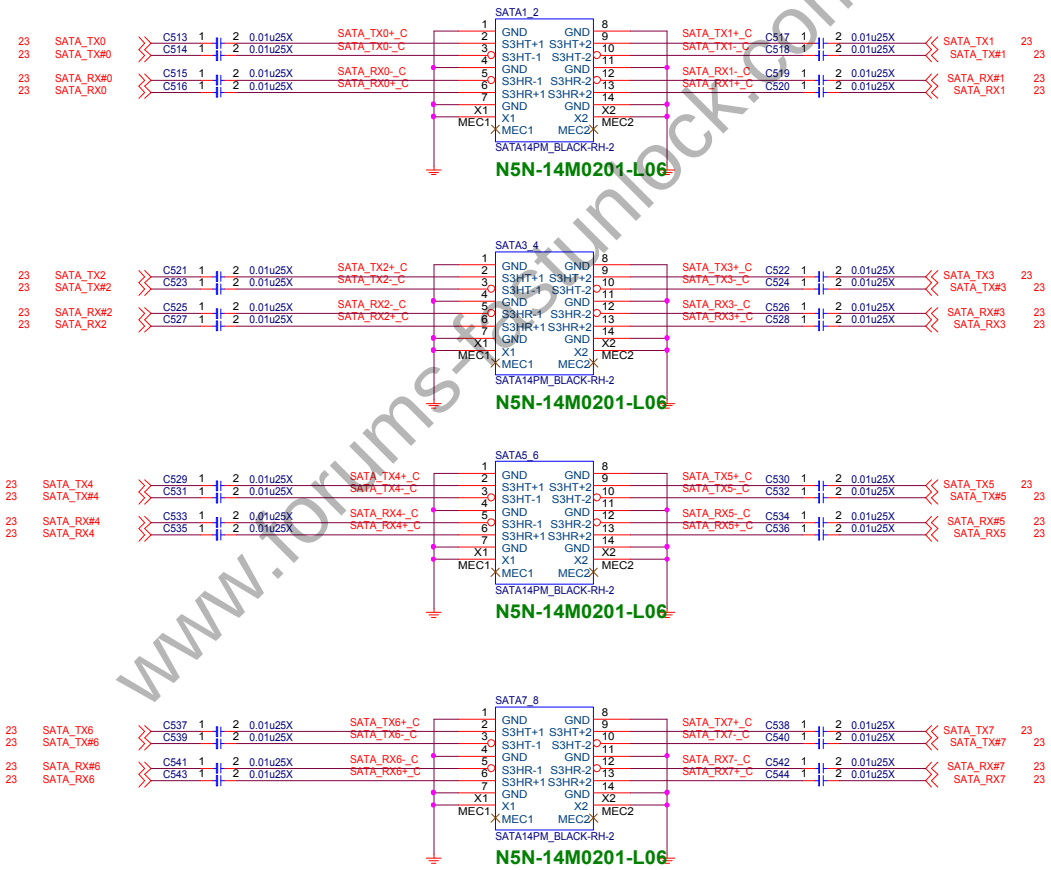
SATA Connector



MICRO-STAR INT'L CO.,LTD.

Title: SATA Connector		
Size: Custom	Document Number: MS-7B92	Rev: 10
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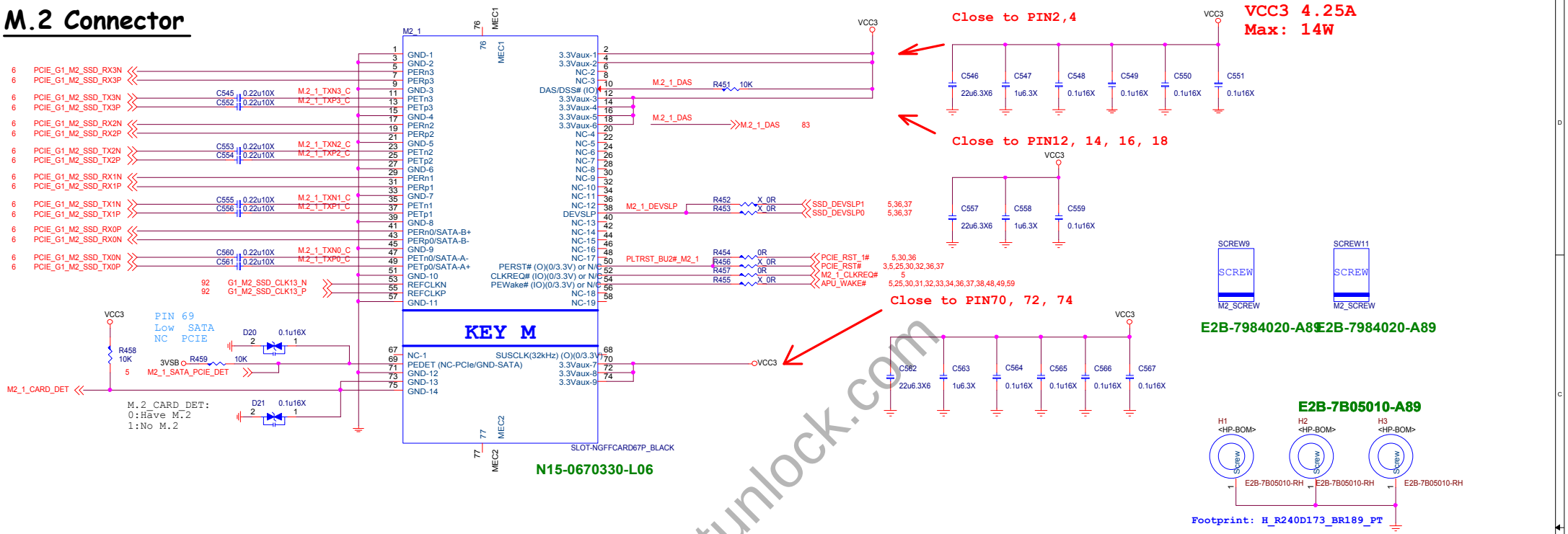
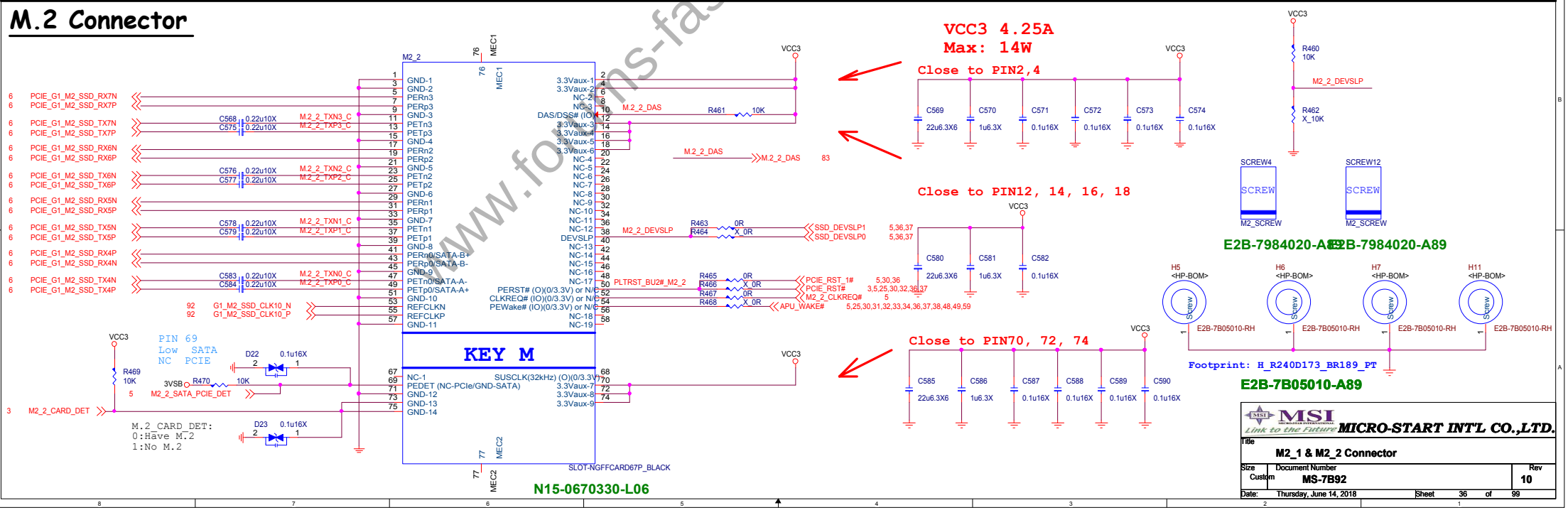
M.2 Connector



M.2 Connector



MSI MICRO-STAR INT'L CO.,LTD.	
Title	M2_1 & M2_2 Connector
Size: Custom	Document Number: MS-7B92
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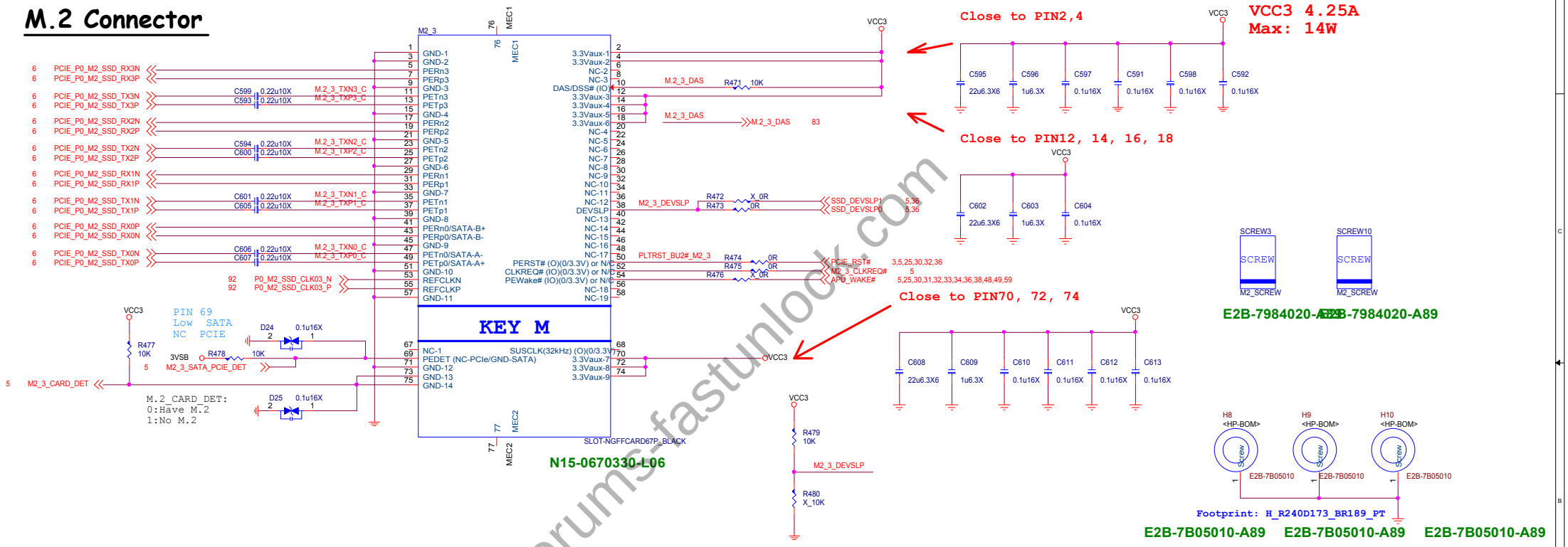
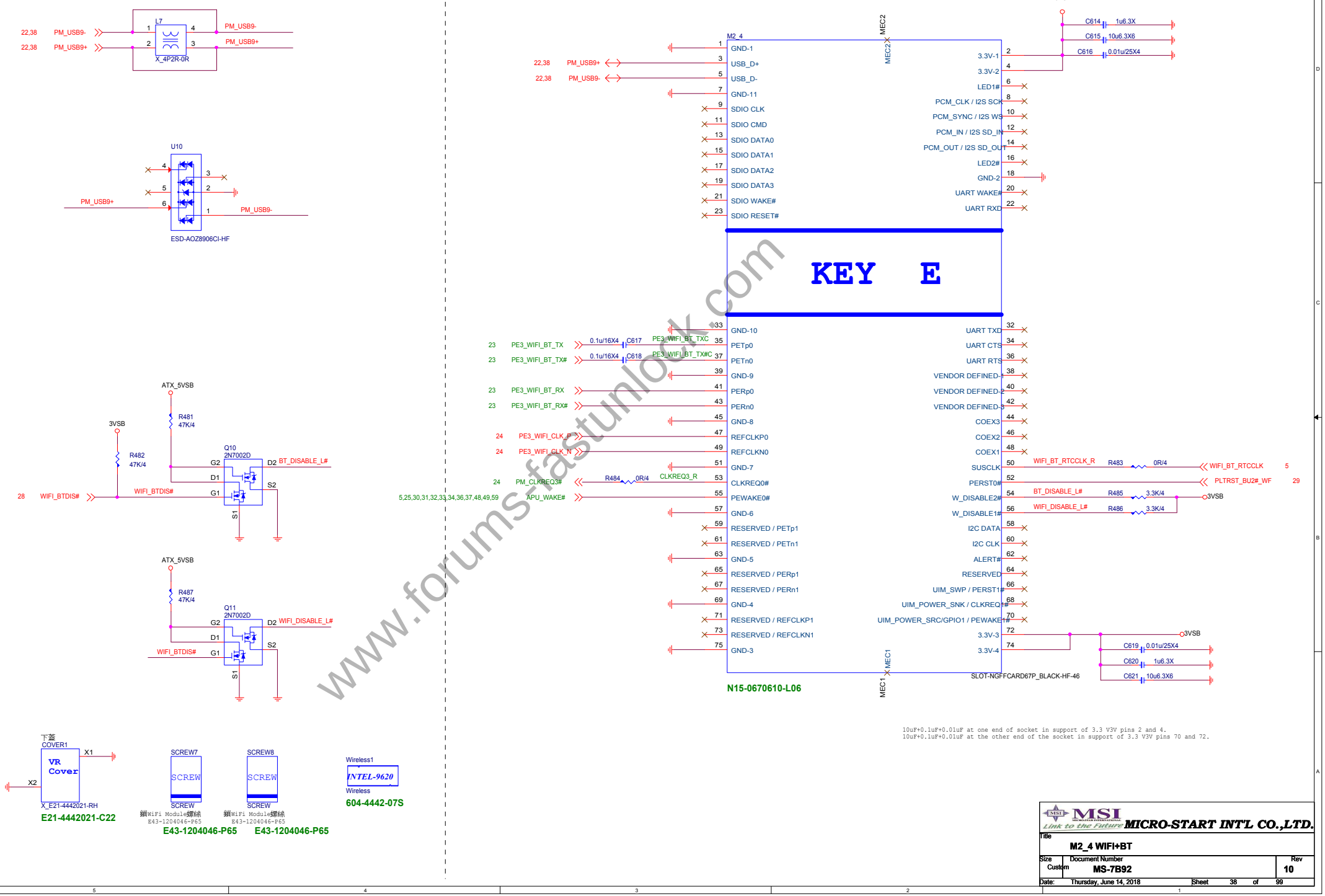
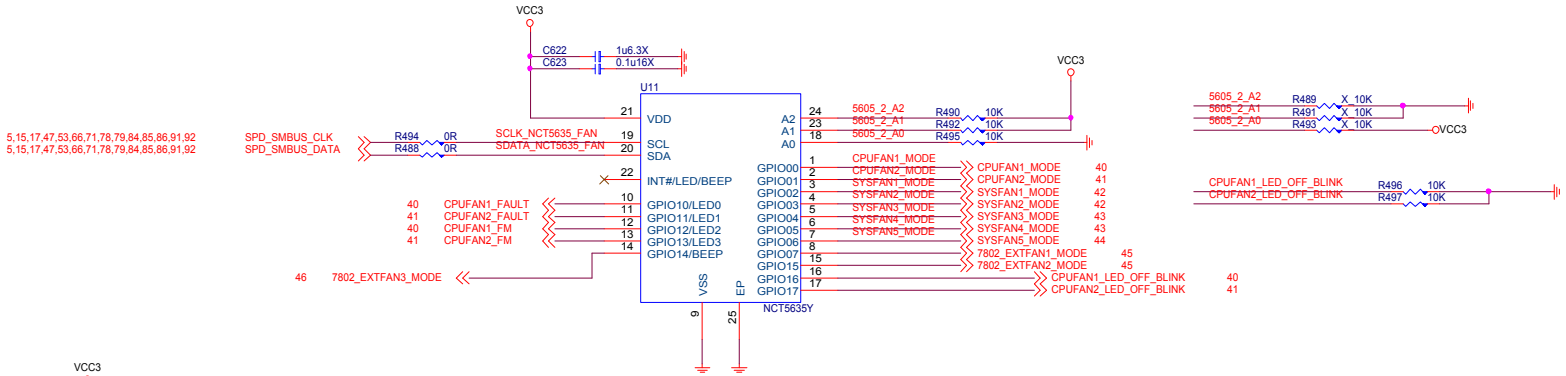
M.2 Connector



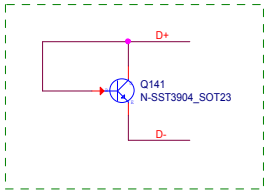
MICRO-START INT'L CO.,LTD.			
Title: M2_3 Connector			
Size: Custom	Document Number: MS-7B92		Rev: 10
Date: Thursday, June 14, 2018	Sheet 37 of 99		





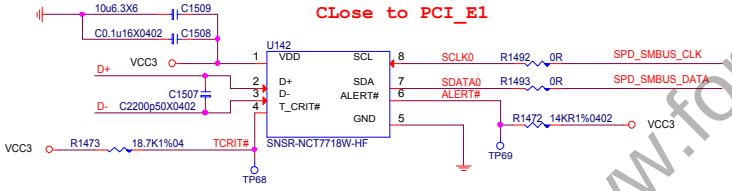
use avoid S5 leakage

slave address :
Write 4CH
Read 4DH



CLose to PCI_E4

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

MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title: CPU FAN Control NCT5635Y

Size: Custom | Document Number: MS-7B92 | Rev: 10

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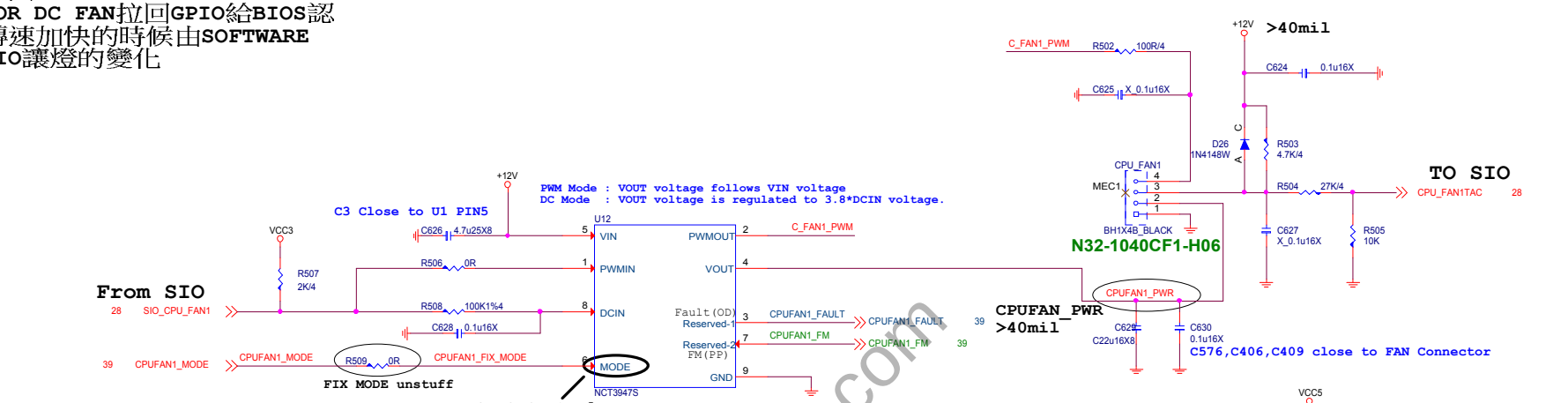
TYPE J : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO

1. PWM/DC/OCP LED(現在是改成R/G/B3色LED)
2. GPIO可以由BIOS切換 PWM/DC MODE
3. OCP拉回GPIO給BIOS認
4. PWM OR DC FAN拉回GPIO給BIOS認
5. FAN轉速加快的時候由SOFTWARE
控制GPIO讓燈的變化



RGB
D0C-040S400-H91

20161024 Update
DC_FAN_LED(綠)
PWM_FAN_LED(藍)
FAN_OCP_LED(紅)

1. MODE : USE MODE PIN change FAN MODE(PWM or DC FAN)
2. FAULT : USE FAULT PIN Triger OVT/OCP Protection,LOW Atcive (Reserve NEW IC)
3. FM : USE FM PIN For BIOS USE to Detect PWM or DC FAN & Show information(Reserve NEW IC)

MSI MICRO-START INT'L CO.,LTD.
Link to the Future

Title	CPU FAN1-TYPE J	
Size: Custom	Document Number: MS-7B92	Rev: 10
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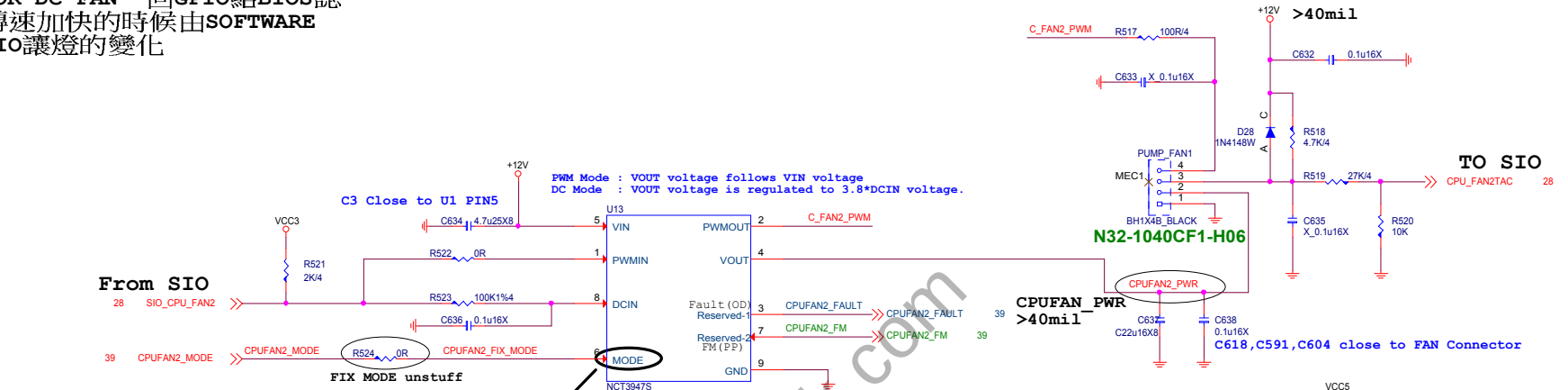
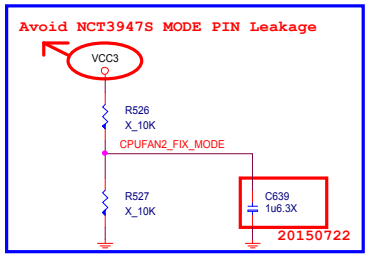
TYPE J : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO

1.PWM/DC/OCP LED(現在是改成R/G/B3色LED)
2.GPIO可以由BIOS切換 PWM/DC MODE
3.OCP 回GPIO給BIOS認
4.PWM OR DC FAN 回GPIO給BIOS認
5.FAN轉速加快的時候由SOFTWARE
控制GPIO讓燈的變化

PM SPEC更新成TYPE-K , 只改BOM





Resever For FIX DC or PWM MODE USE By PM SPEC

GPIO Control I22-3947S12-N62

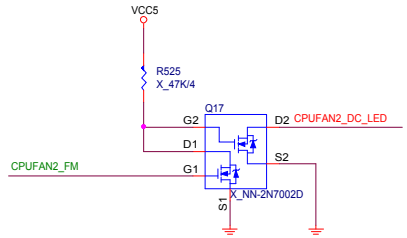
	PCH GPIO
PWM MODE	HIGH
DC MODE	LOW
Default AUTO MODE	GPI(Floating)

NCT3947S Internall pull up 1.65V

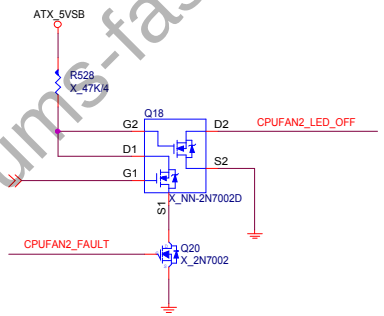
colay NCT3961

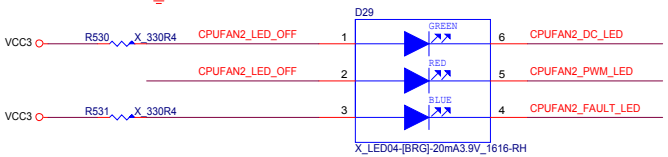
OCSET	R1	
1.2~1.8A	100K	default
2.2~2.8A	49.9K	OC SET By PM SPEC
3.2~3.8A	10K	

CPUFANX_FAULT



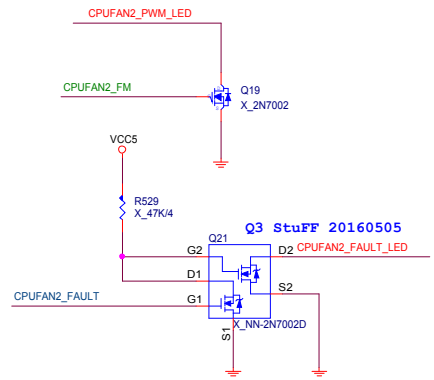
CHECK NCT3947S Sink Current





RGB
D0C-040S400-H91

20161024 Update
DC_FAN_LED(綠)
PWM_FAN_LED(藍)
FAN_OCP_LED(紅)



CHECK NCT3947S Sink Current

1.MODE : USE MODE PIN change FAN MODE(PWM or DC FAN)
2.FAULT : USE FAULT PIN Triger OVT/OCP Protection,LOW Atcive (Reserve NEW IC)
3.FM : USE FM PIN For BIOS USE to Detect PWM or DC FAN & Show information(Reserve NEW IC)

MICRO-START INT'L CO.,LTD.

Title	CPU FAN2-TYPE J(PUMP)	
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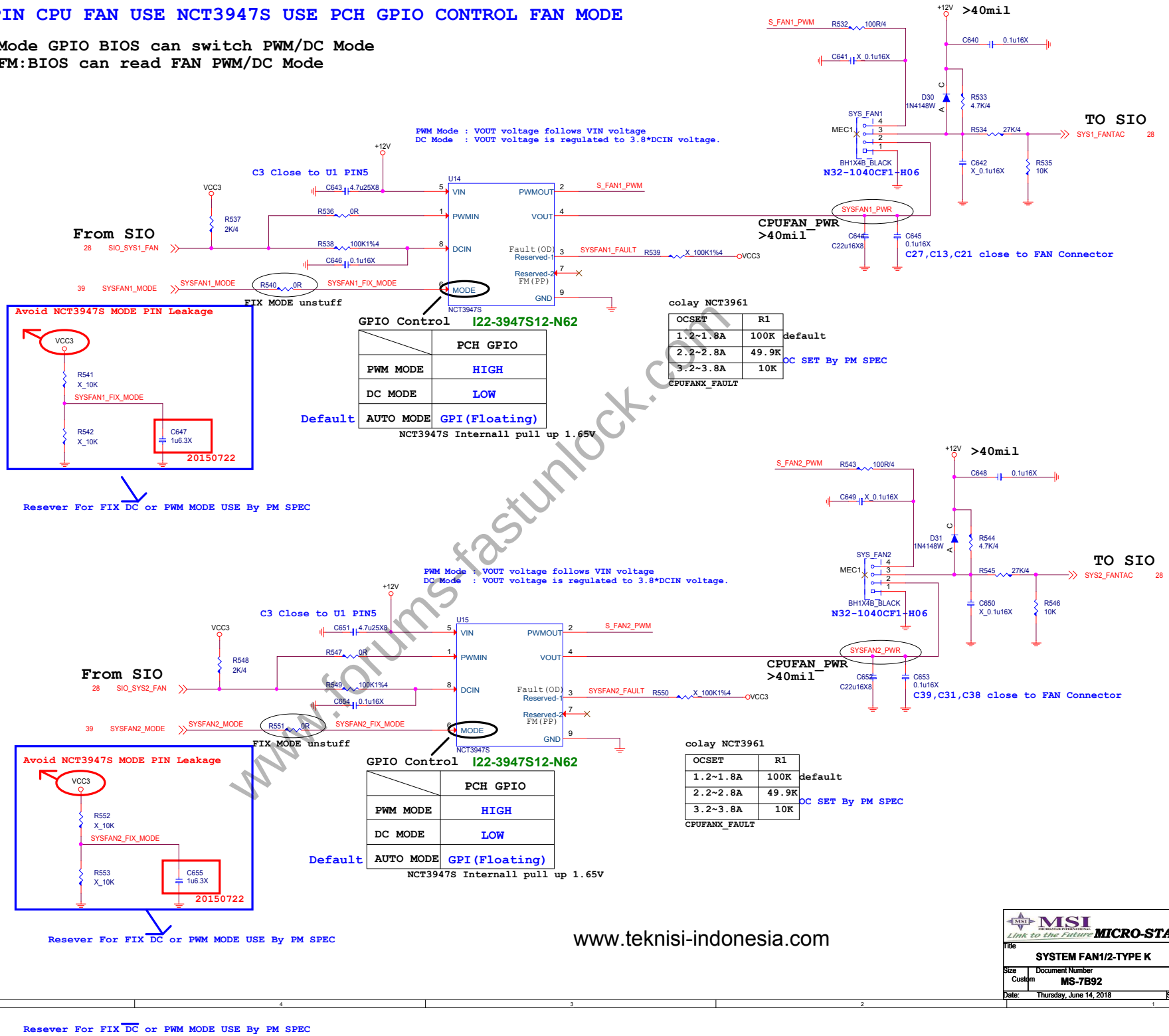
TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

1. Mode GPIO BIOS can switch PWM/DC Mode
2. FM:BIOS can read FAN PWM/DC Mode



Resever For FIX DC or PWM MODE USE By PM SPEC

MICRO-START INT'L CO.,LTD.

Title: SYSTEM FAN1/2-TYPE K

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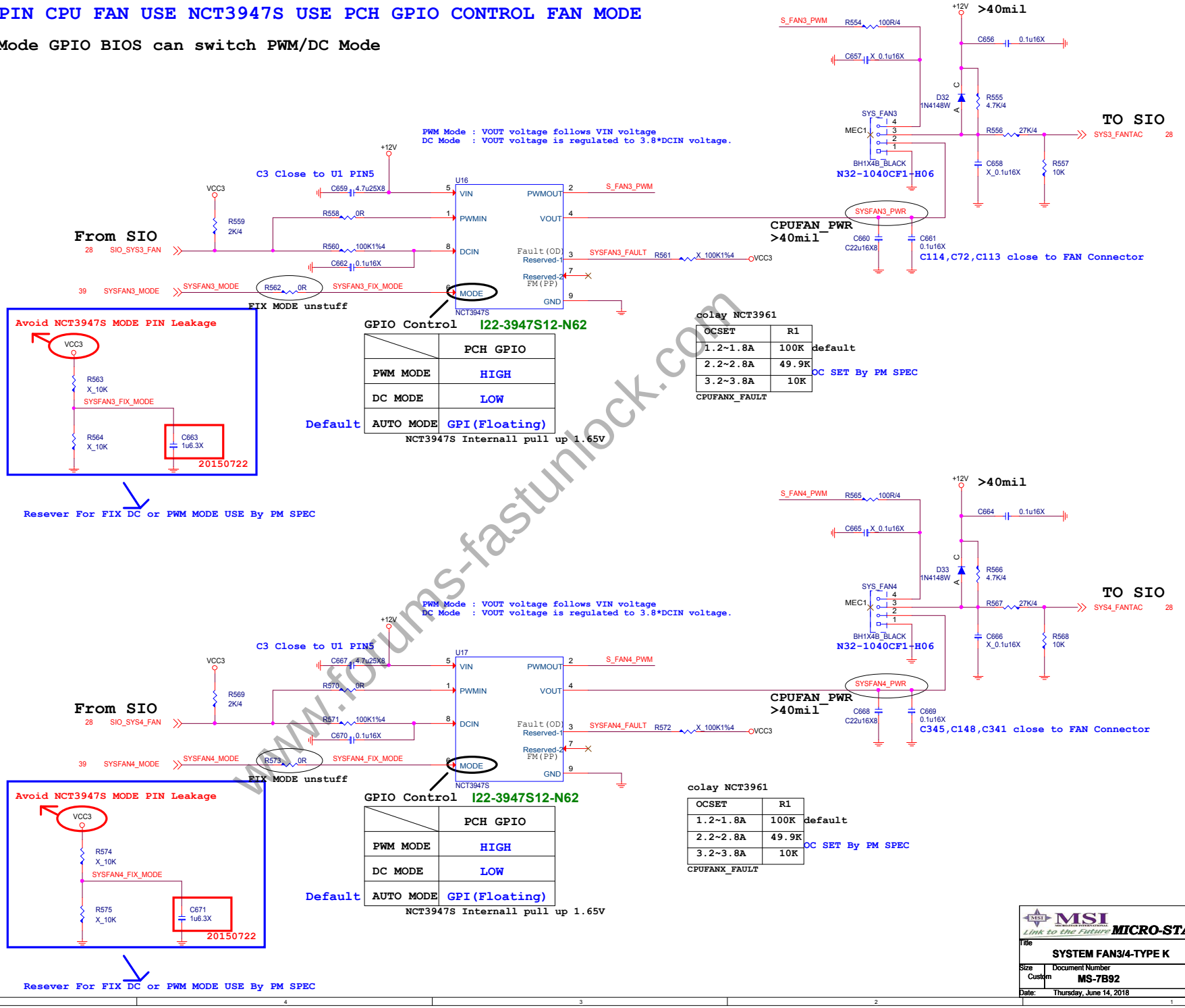
Date: Thursday, June 14, 2018 | Sheet 42 of 99

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

1. Mode GPIO BIOS can switch PWM/DC Mode



MICRO-START INT'L CO.,LTD.

Title: SYSTEM FAN3/4-TYPE K

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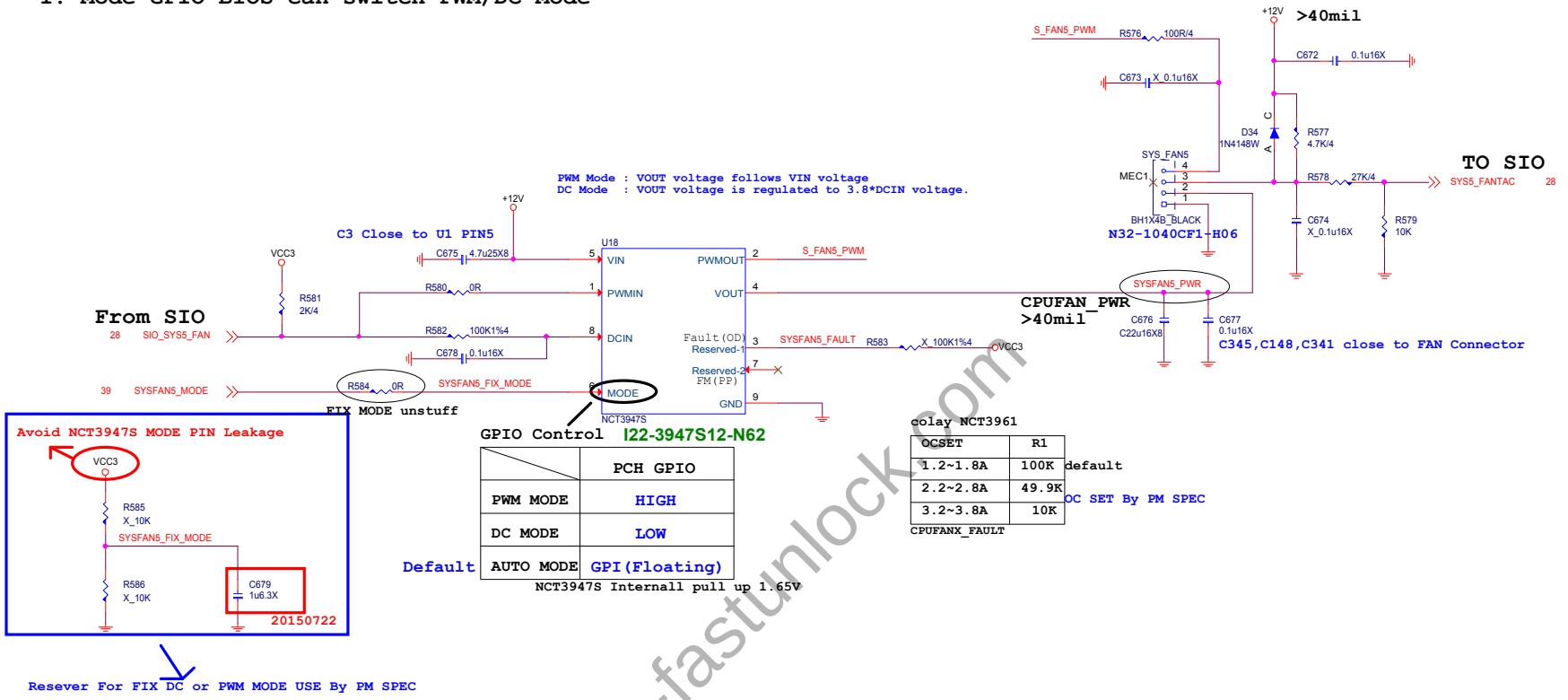
Date: Thursday, June 14, 2018 | Sheet 43 of 99

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

1. Mode GPIO BIOS can switch PWM/DC Mode



GPIO Control I22-3947S12-N62

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

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	

CPUFANX_FAULT

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Link to the Future

Title	SYSTEM FAN5-TYPE K	
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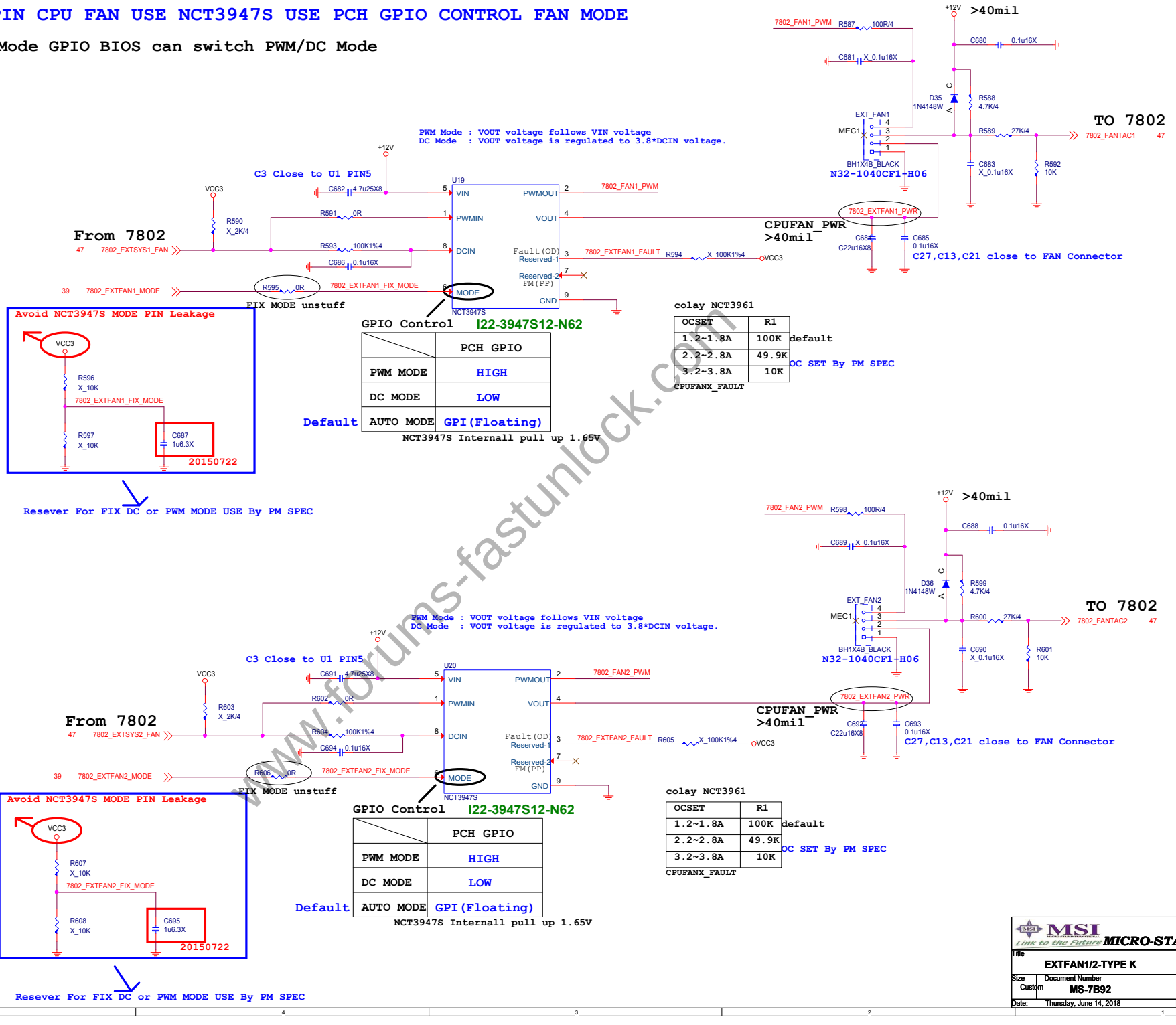
Date: Thursday, June 14, 2018	Sheet 44 of 99	

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

1. Mode GPIO BIOS can switch PWM/DC Mode



Resever For FIX DC or PWM MODE USE By PM SPEC

MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title	EXTFAN1/2-TYPE K	
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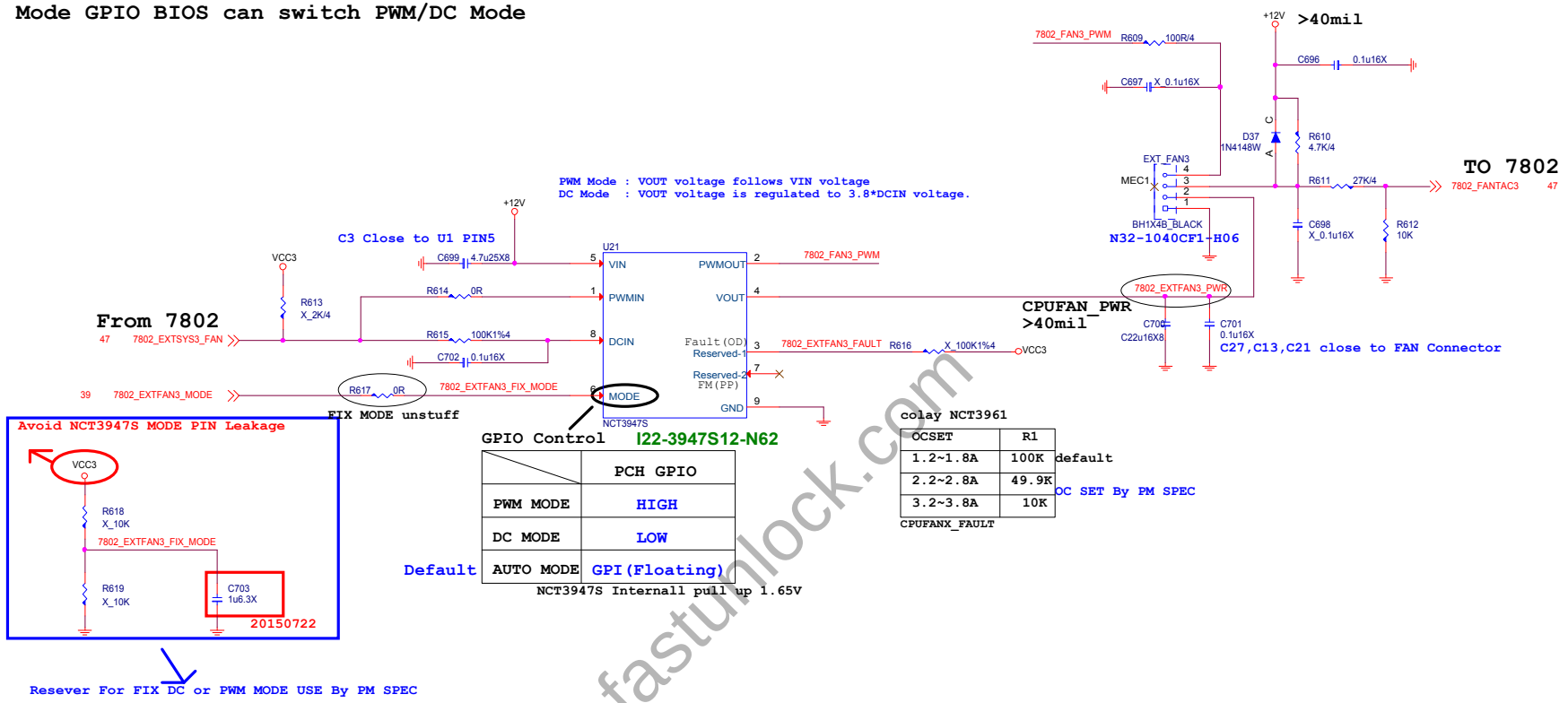
Date: Thursday, June 14, 2018	Sheet 45 of 99	

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

1. Mode GPIO BIOS can switch PWM/DC Mode



MICRO-START INT'L CO.,LTD.

Title	EX FAN3-TYPE K	
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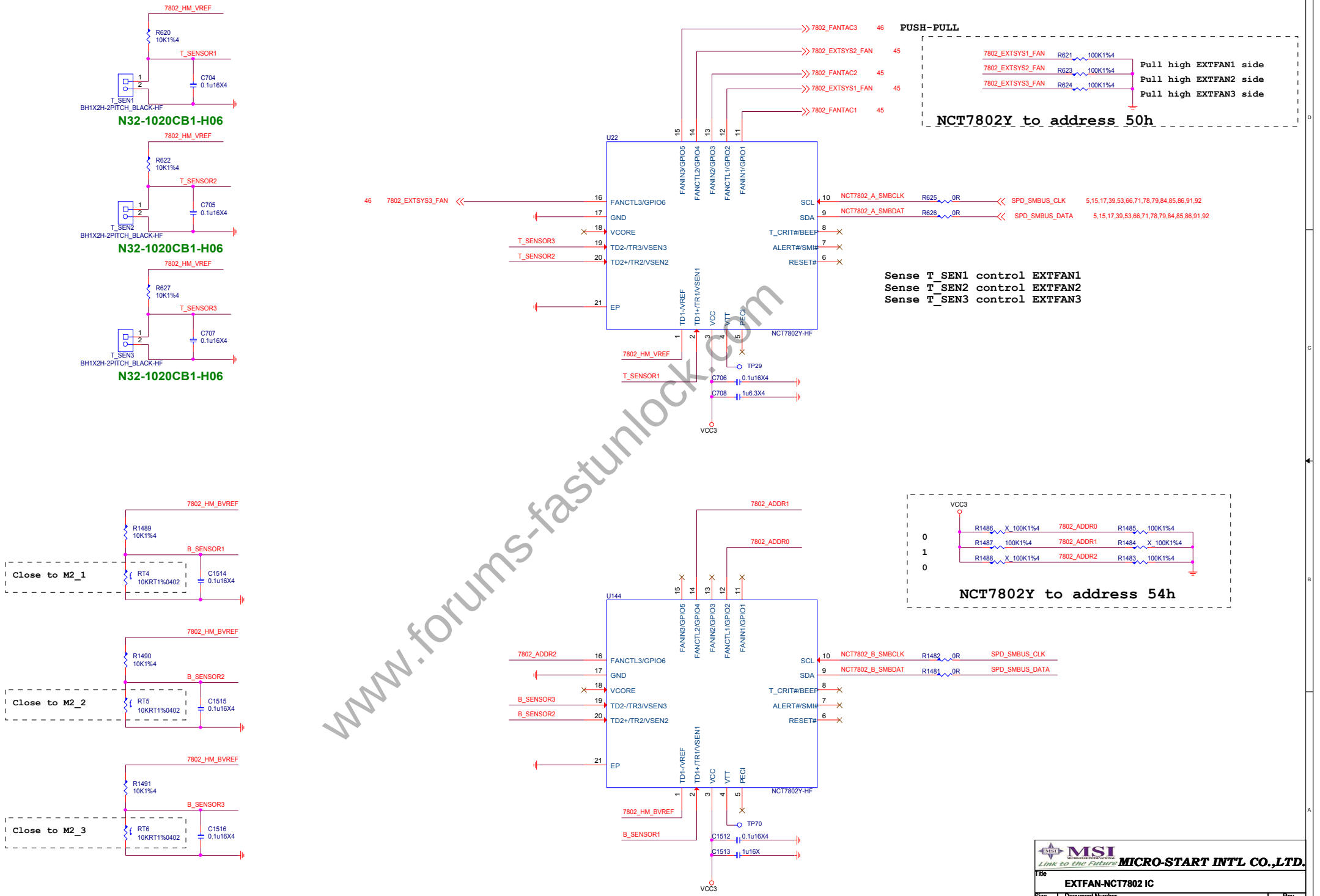

MICRO-STAR INT'L CO.,LTD.

Title	EXTFAN-NCT7802 IC	
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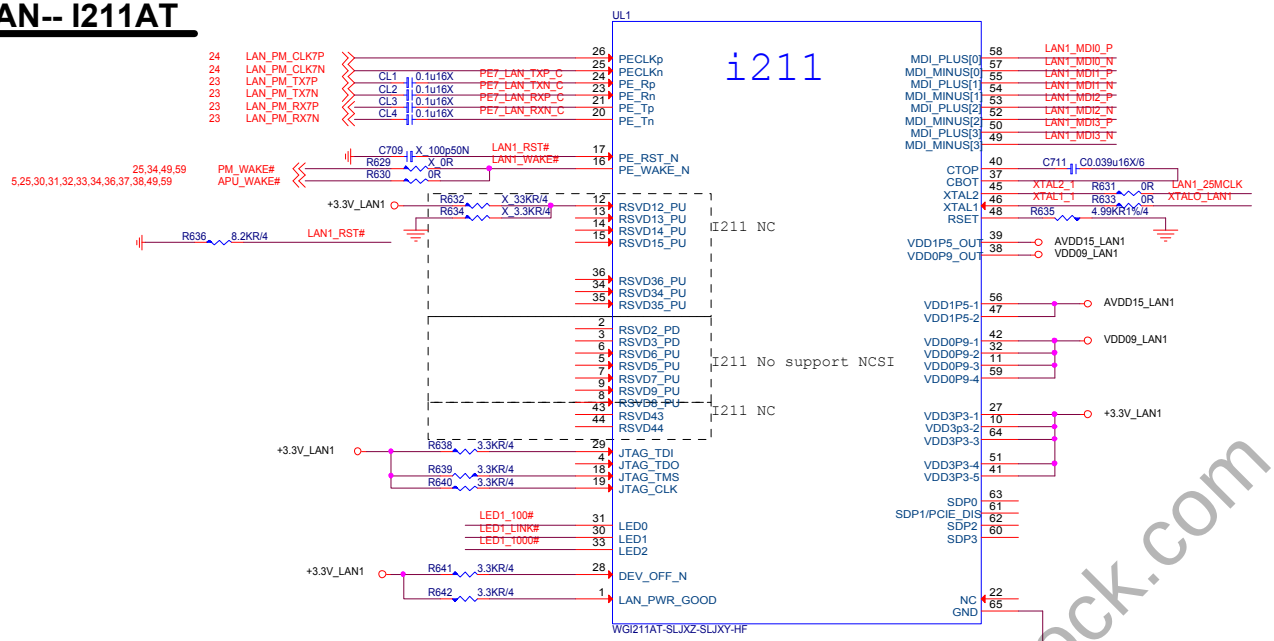
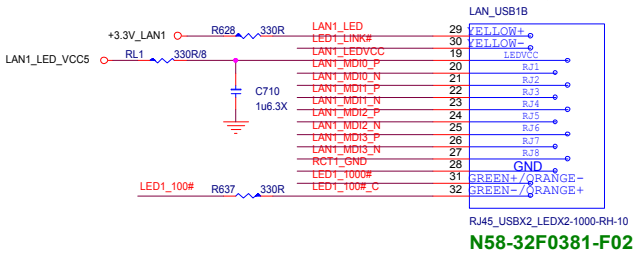
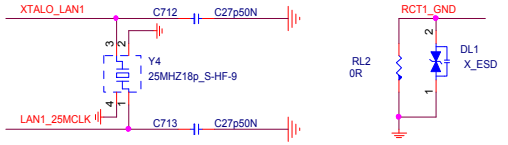
LAN-- I211AT

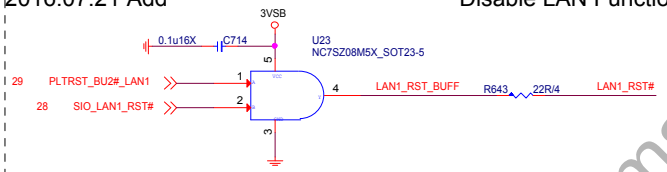


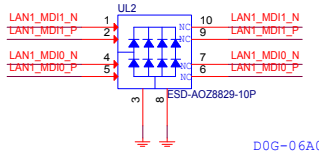
LAN+USB1

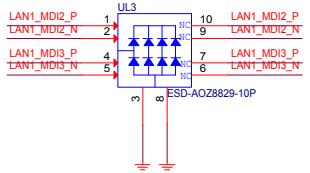


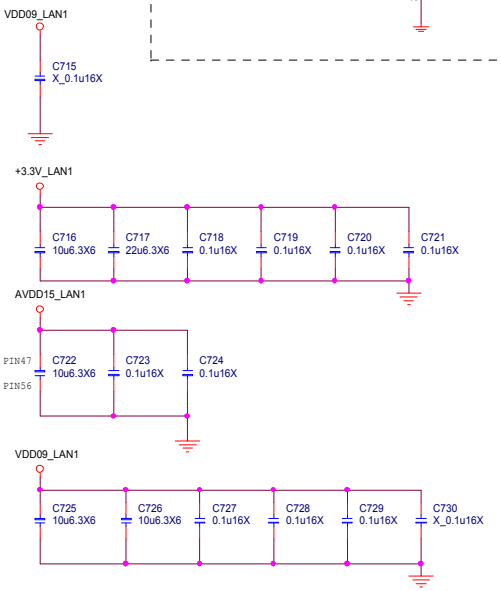


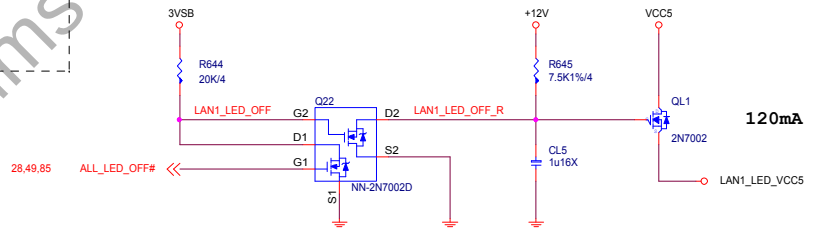
2016.07.21 Add Disable LAN Function

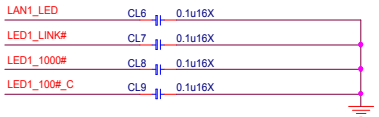












Title	LAN1-Intel I211AT
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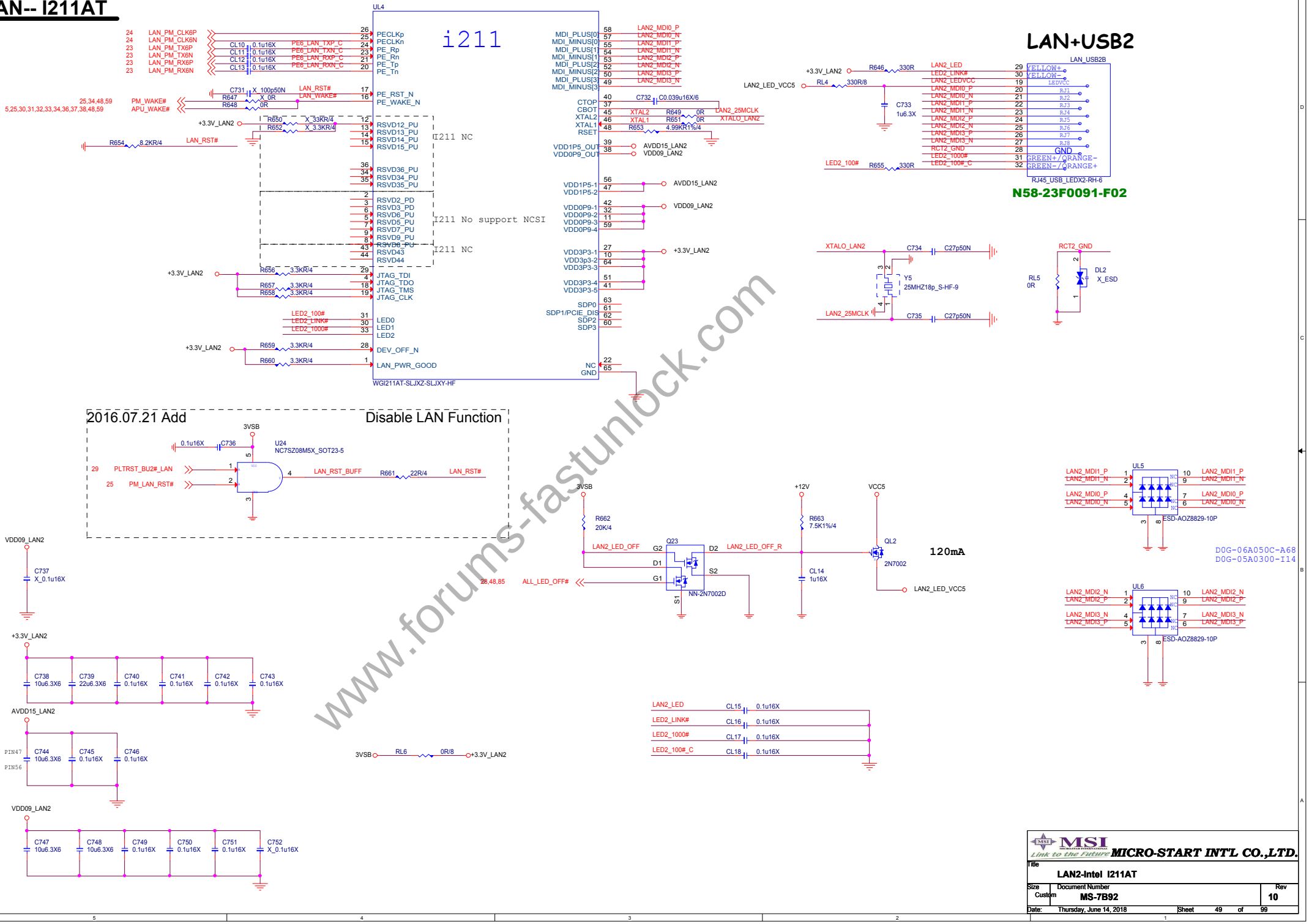
LAN-- I211AT



Title	LAN2-Intel I211AT
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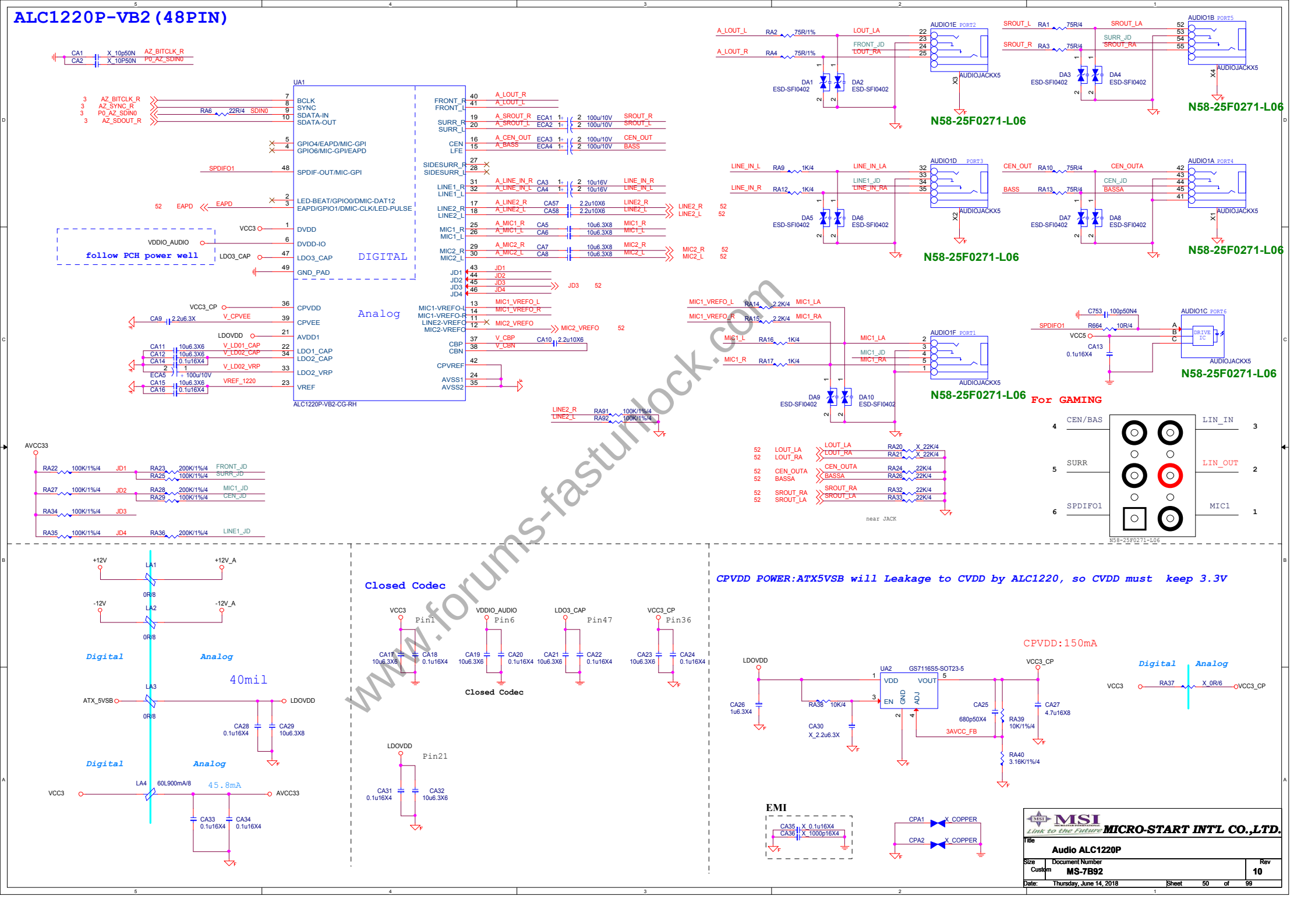
MICRO-STAR INT'L CO.,LTD.

ALC1220P-VB2(48PIN)



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Link to the Future

Ess9023

Removed Ess9023

Analong SW1

Analong SW2

MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title: Audio ALC1220-2		
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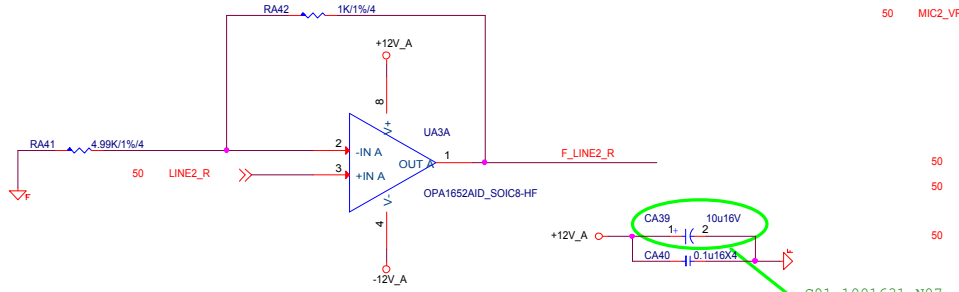
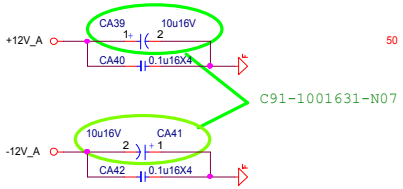
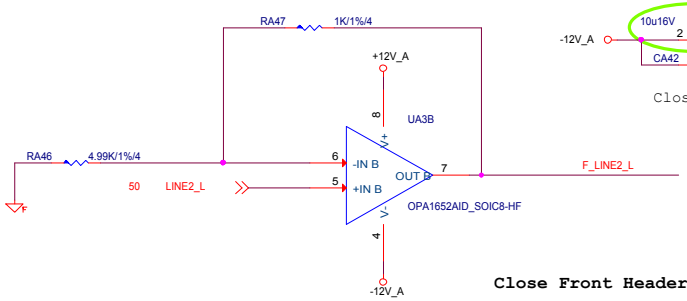
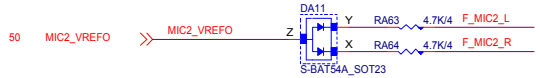


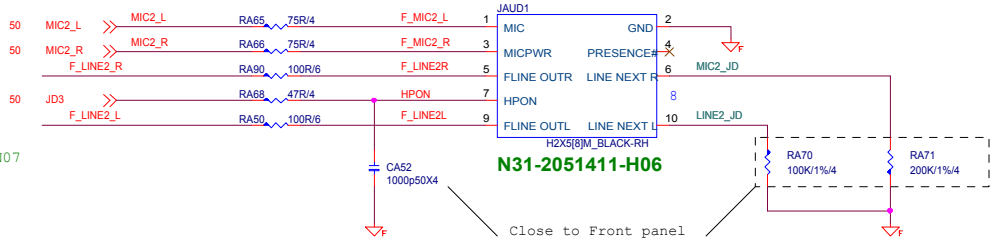


Close to UA3



Close Front Header, JAUD1



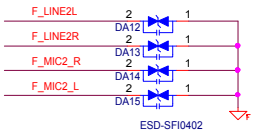


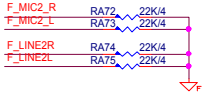
N31-2051411-H06

Close to Front panel
For HDA/AC97 front cable.

Close to Jack

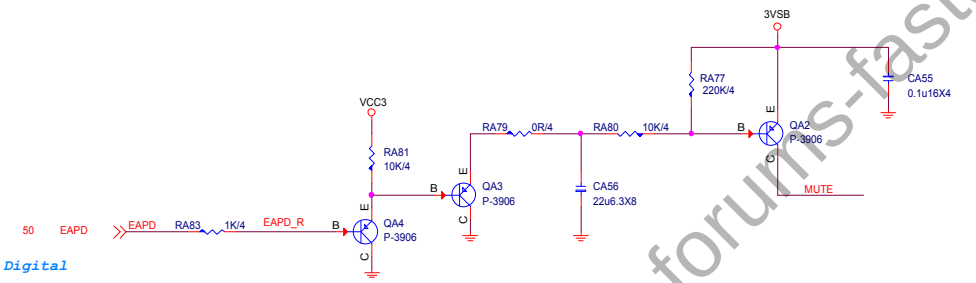
ESD protect
D0G-2950500-SI0
D0G-3010510-I05





Rear Line OUT De-POP circuit

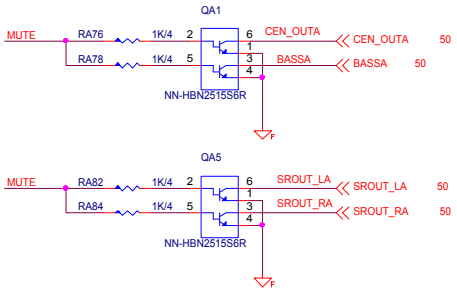
(De-pop circuit for Rear Line out)

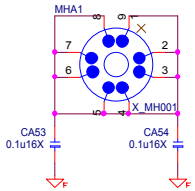


Digital

Analog

(add de-pop circuit by PM spec or customer request,
NOTE: add de-pop circuit need to change CA6,CA7, CA12, CA13, CA23, CA24 to TVS)





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Link to the Future

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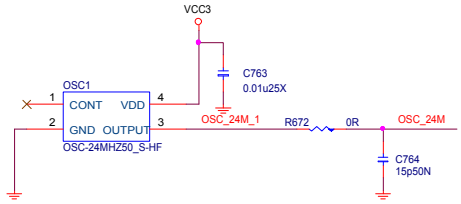
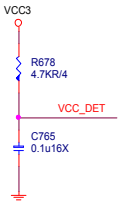
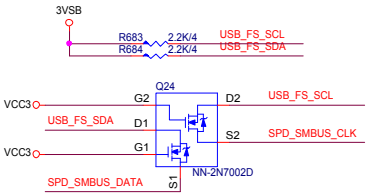
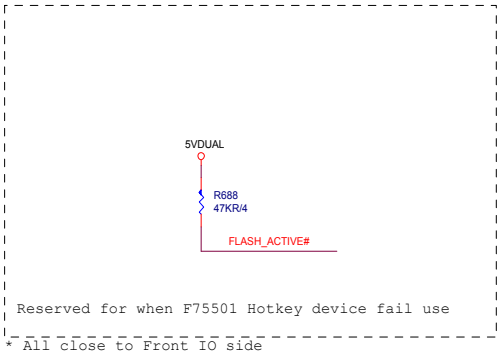
USB Flash BIOS

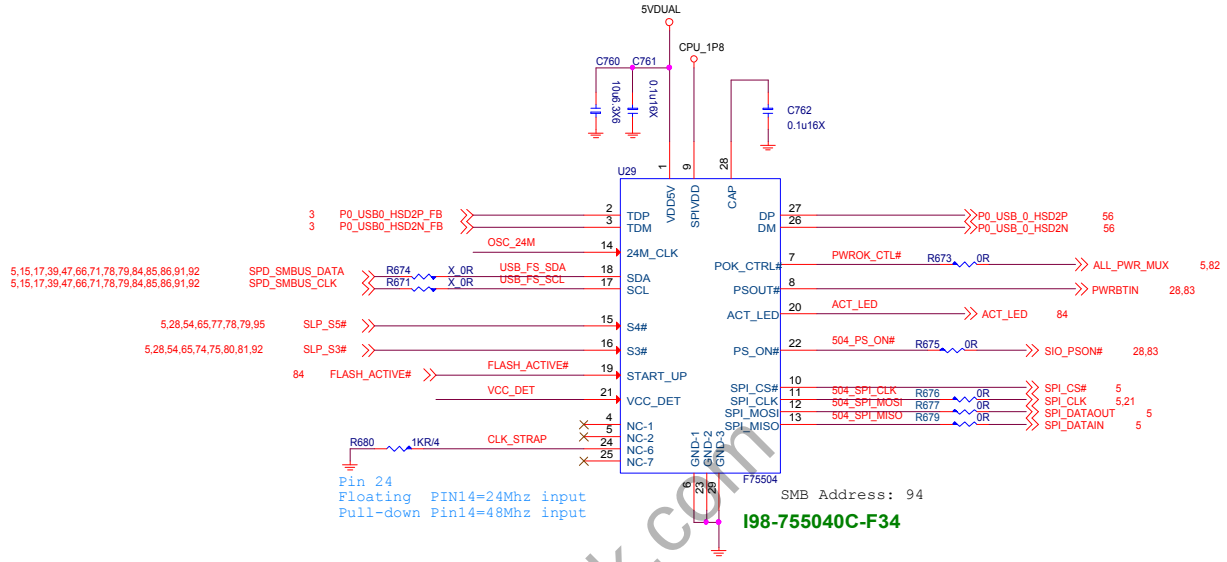
Host USB connector



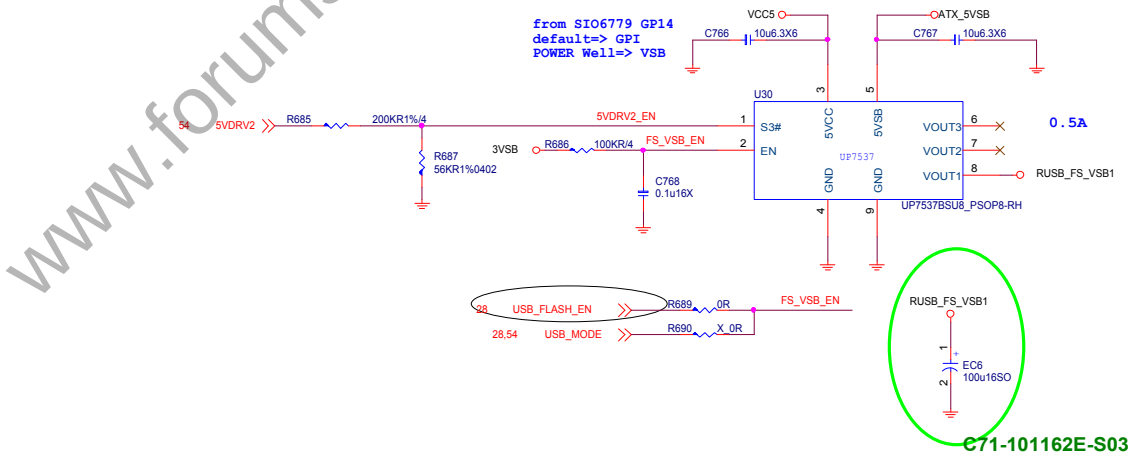








REAR Flash BIOS USB PORT



MICRO-START INT'L CO.,LTD.

Title	USB Flash BIOS F75504	
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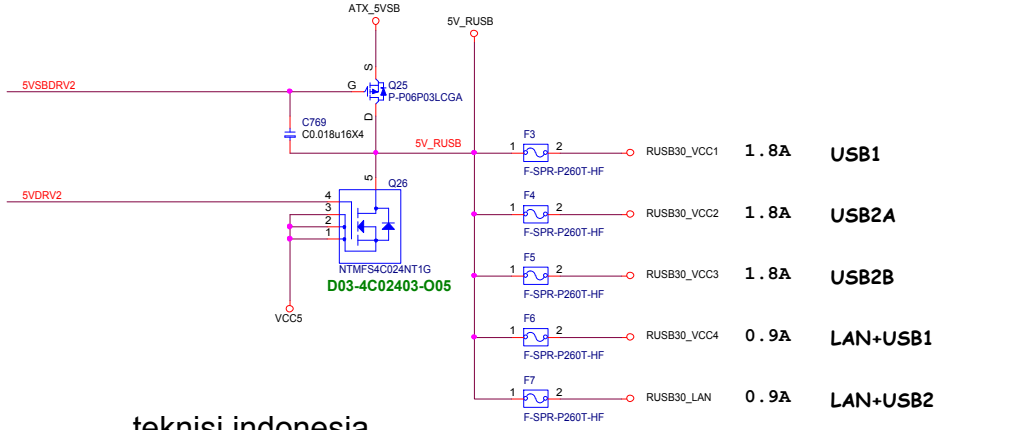
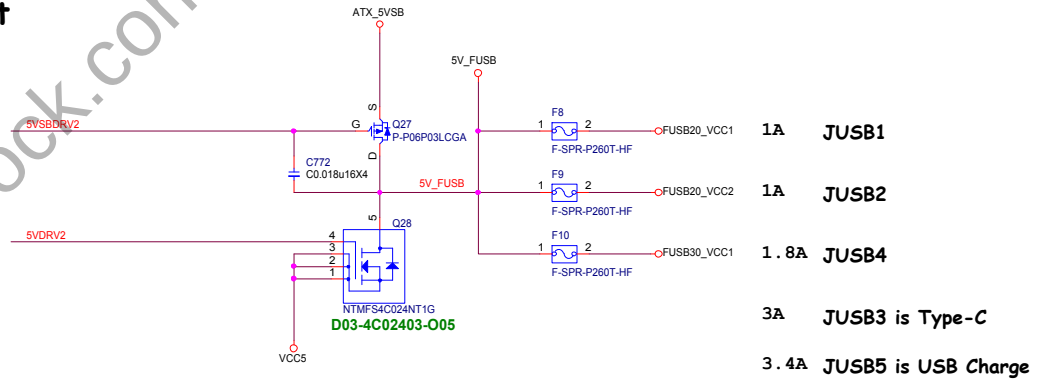
USB Power

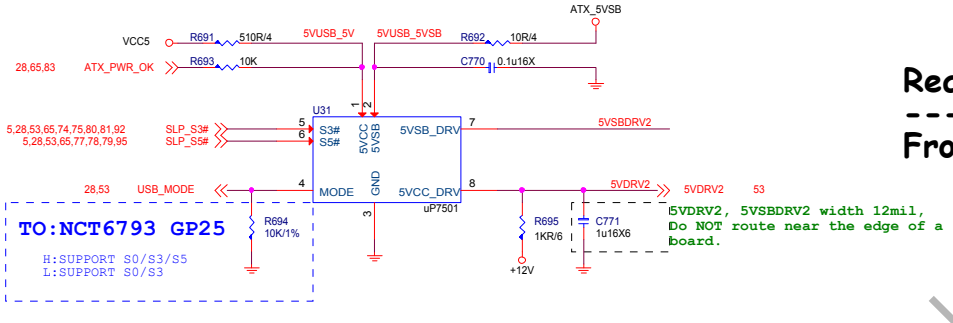


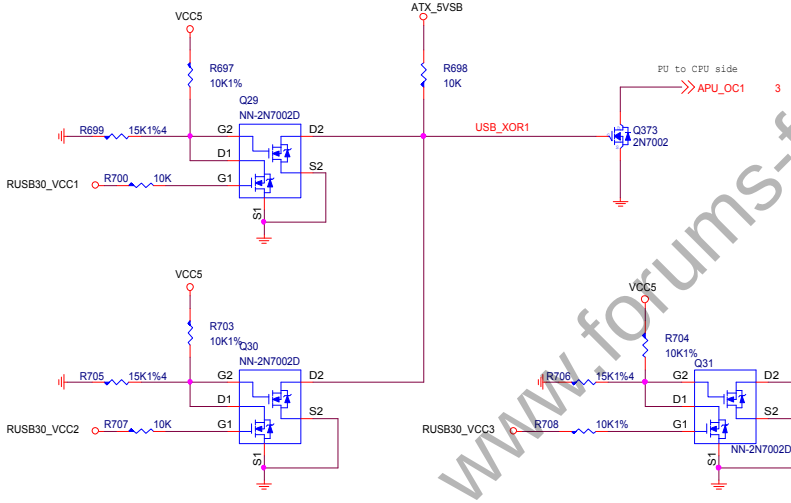
Rear

teknisi indonesia

Front







	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

OC# signal connect to
SB OC pin.

MICRO-START INT'L CO.,LTD.

Title: USB Power

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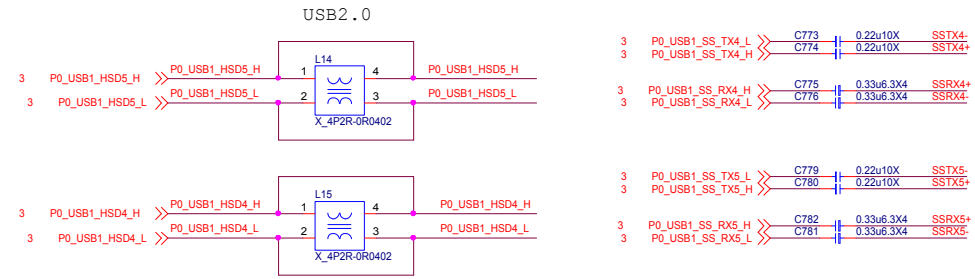
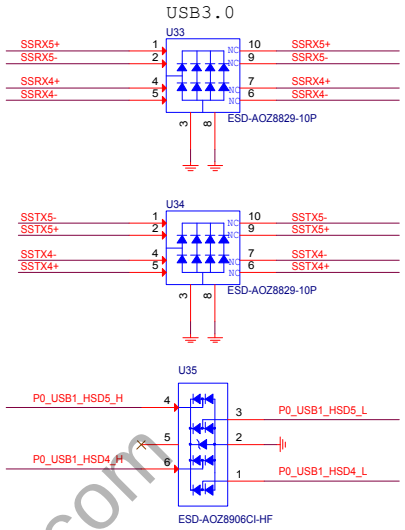
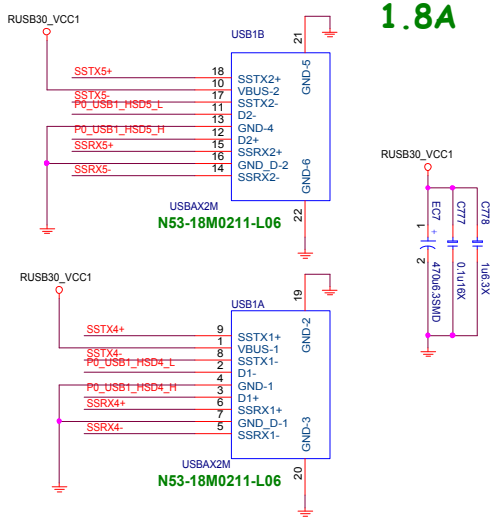
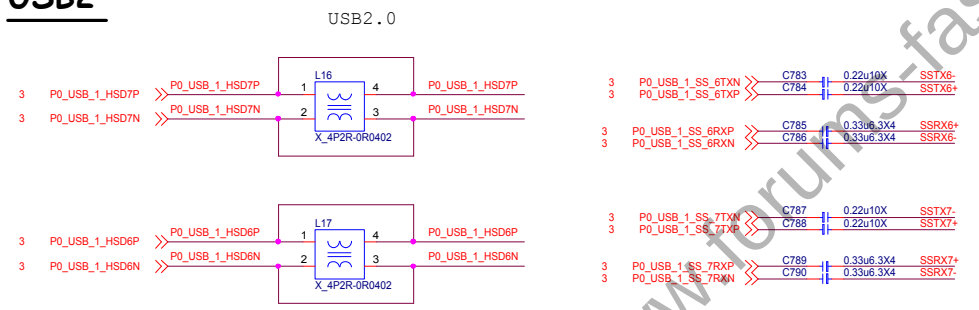
USB1

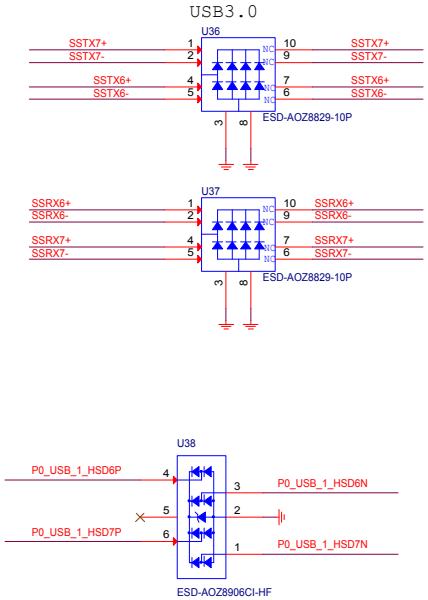


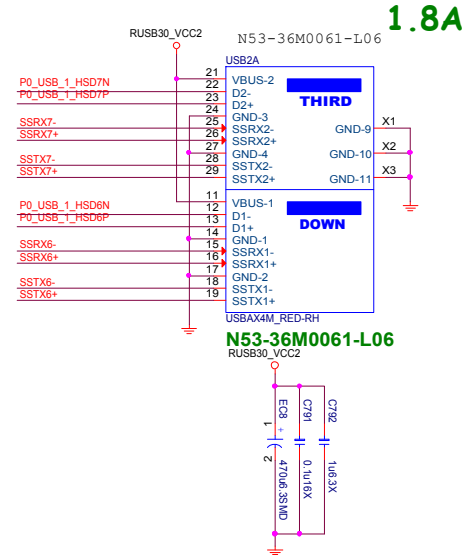




USB2







MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

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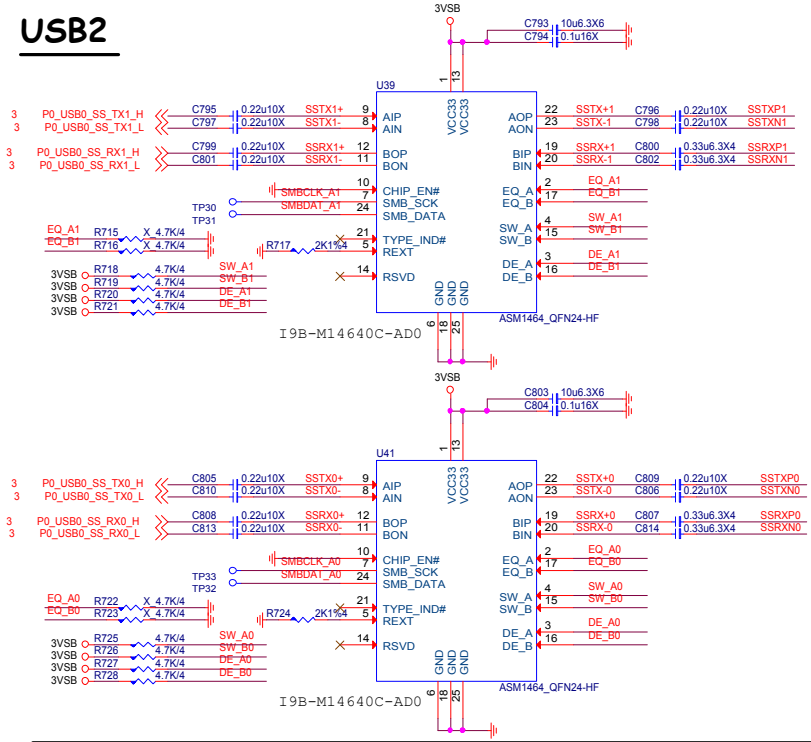
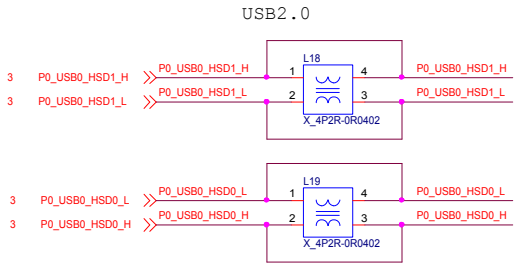
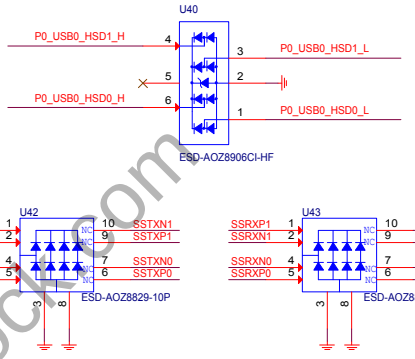
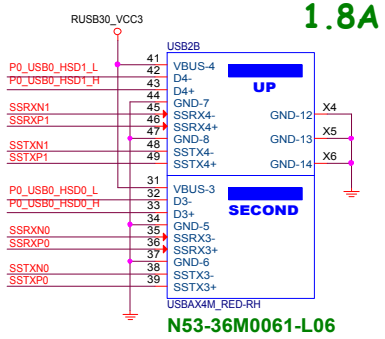
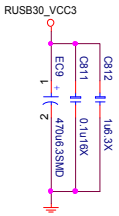
USB2



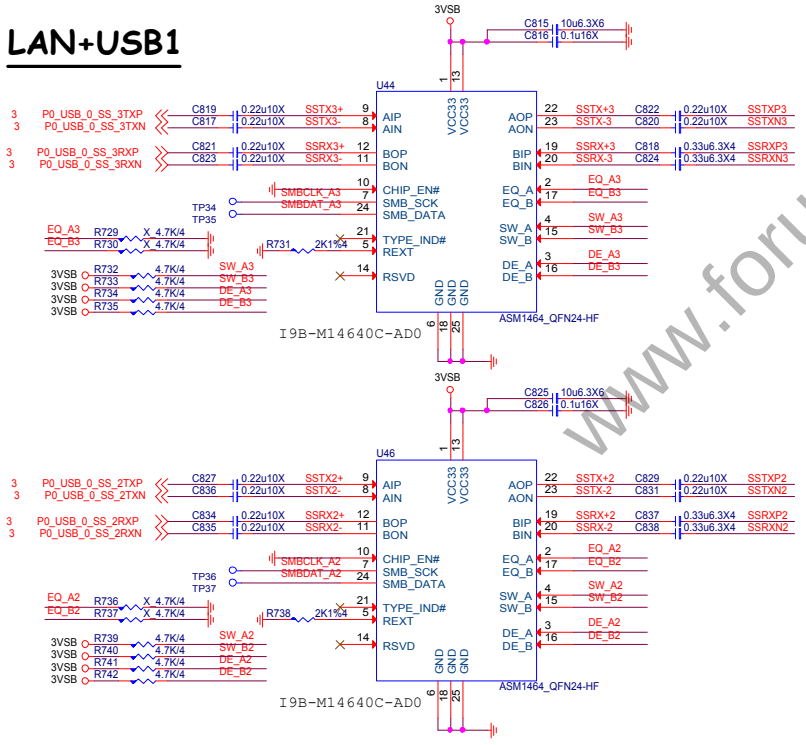


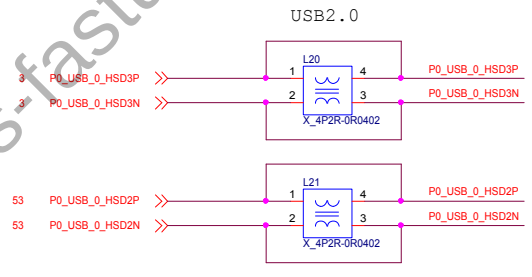


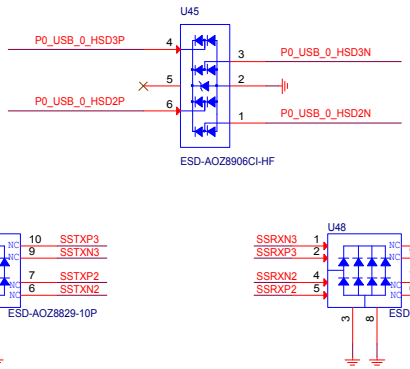


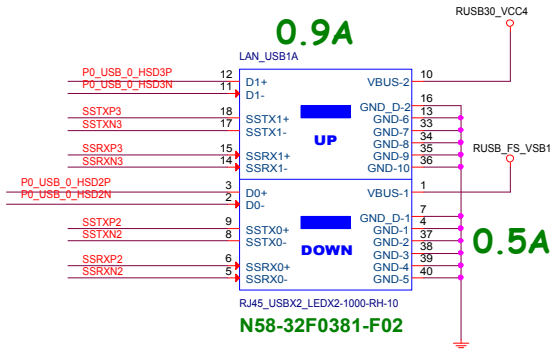


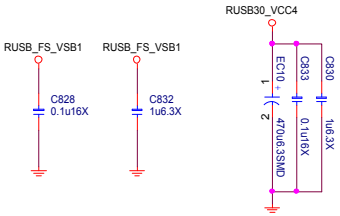
LAN+USB1











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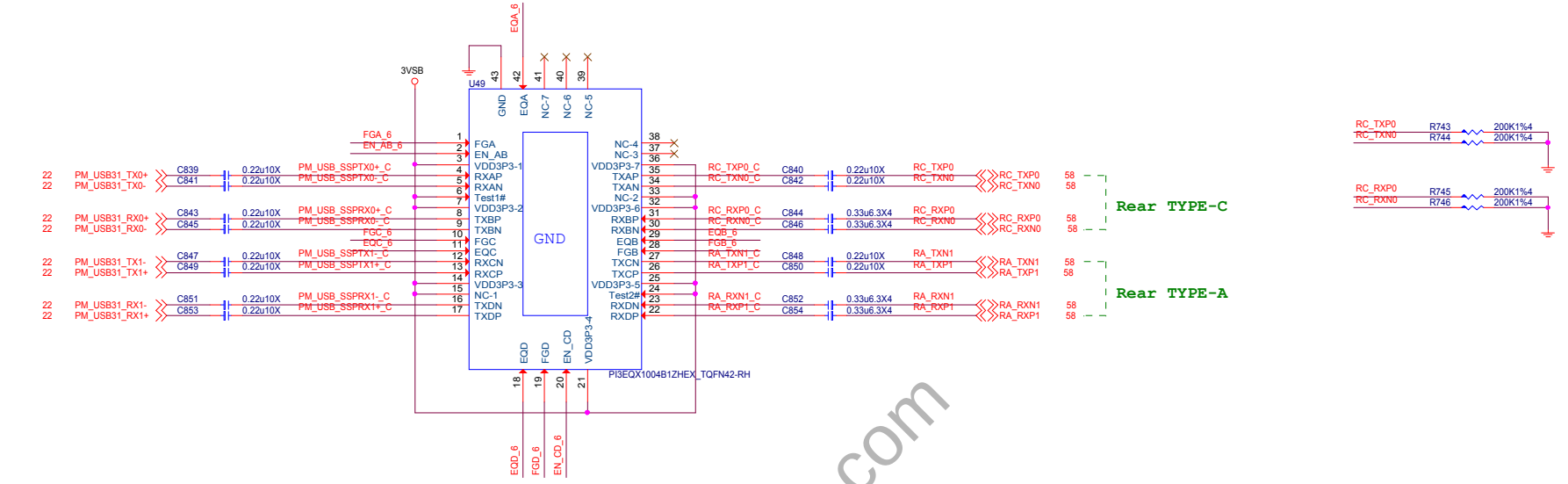

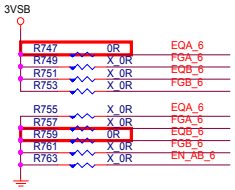

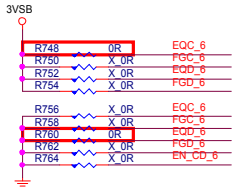

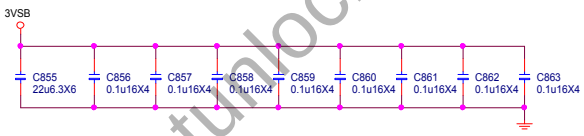

EQ	dB	
0	12.4	0 to GND
R	8	68K to GND
F	10.6	NC
1	14.6	0 to VDD

FG	dB	
0	-1.6	0 to GND
R	-0.5	68K to GND
F	1.0	NC
1	2.7	0 to VDD

Title: Pericom 1004 Redriver

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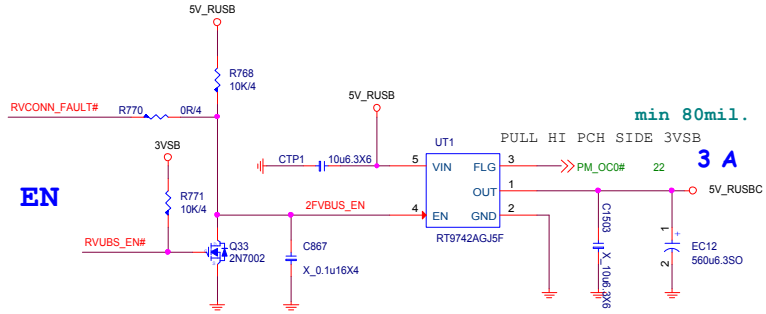

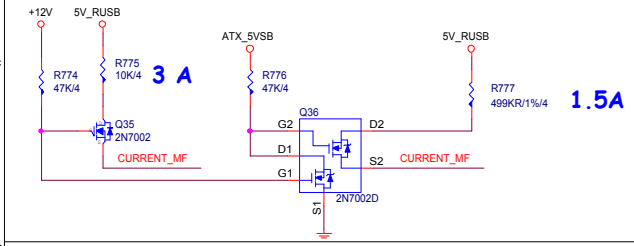

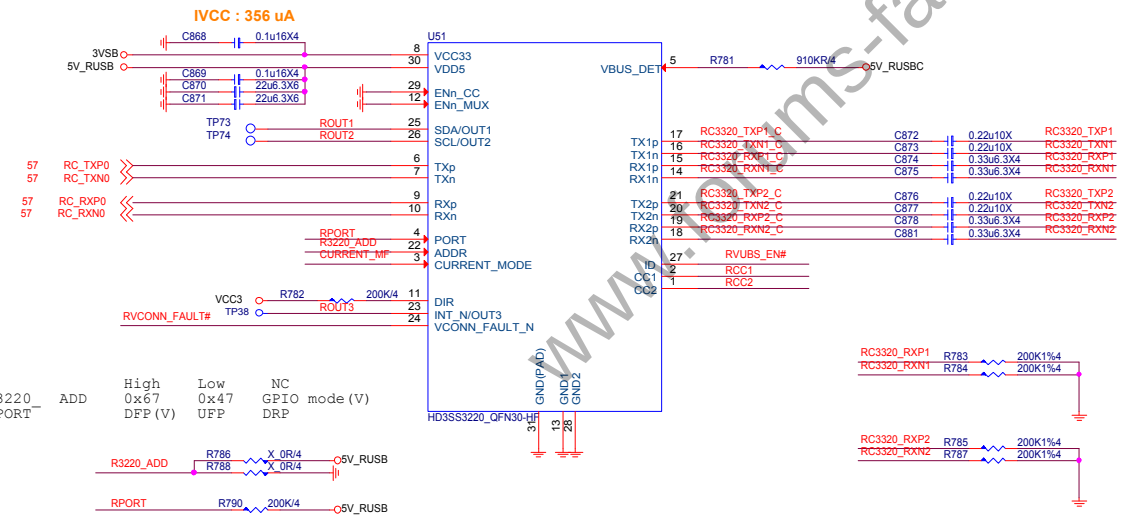

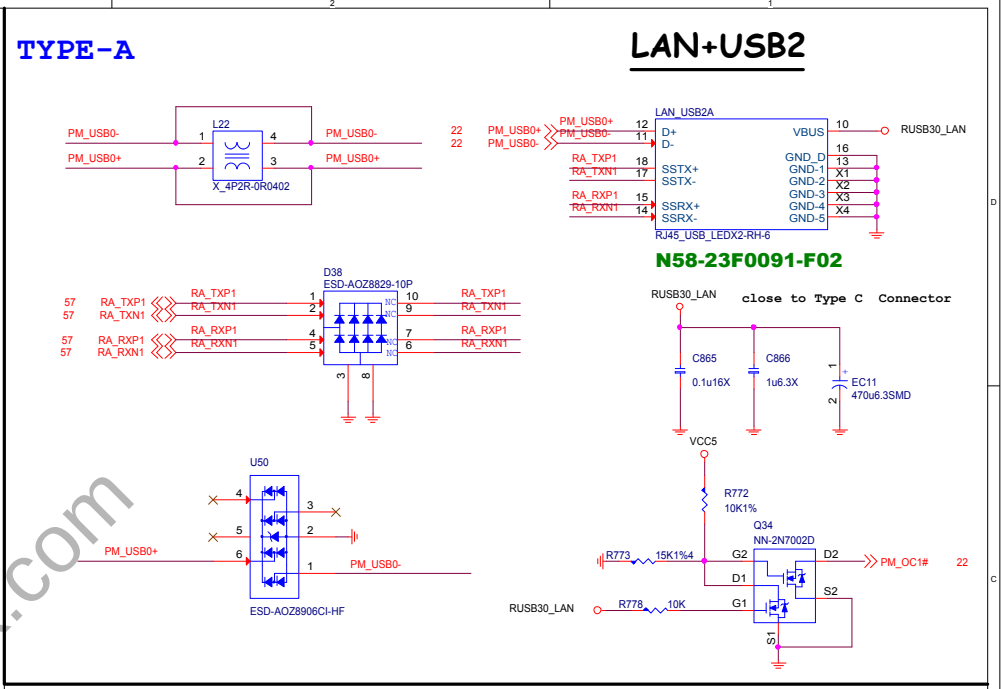

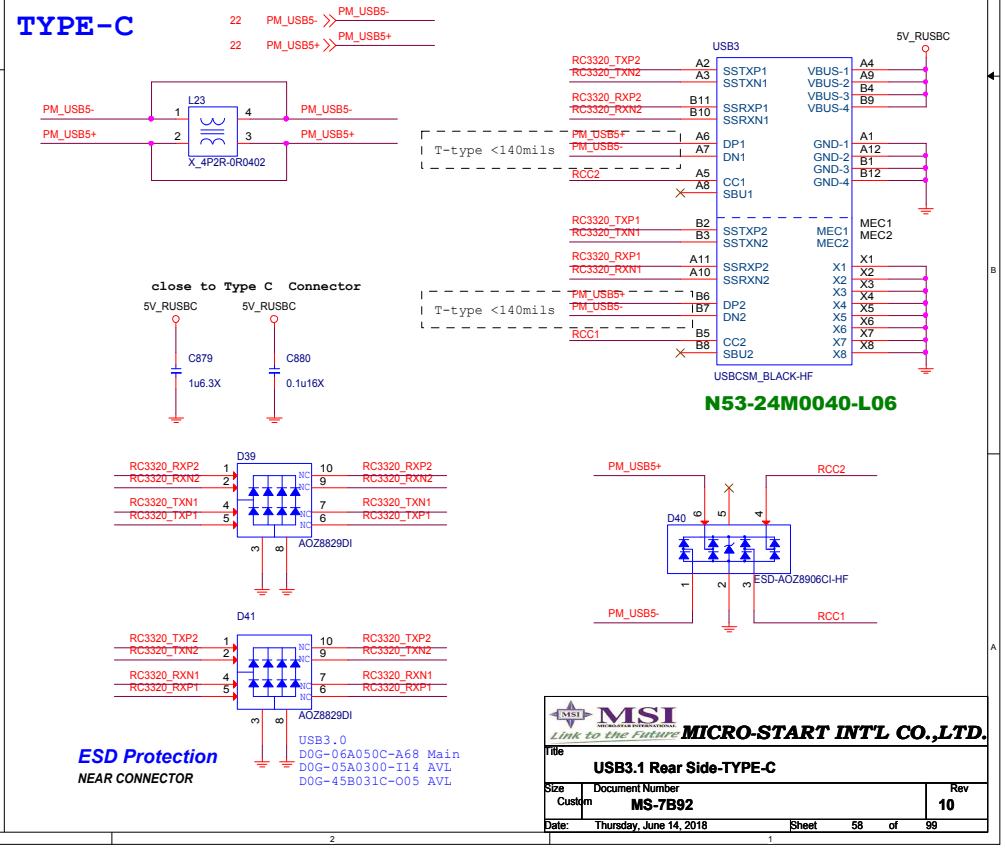

MICRO-START INT'L CO.,LTD.

Title: USB3.1 Rear Side-TYPE-C

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Use pure PCIE must provide CLK

Minimun gap should be greater of >15mil with other signal.

USB HS (90Ohm-Diff)

Chip to Connector ~1.5 inch.

Front side USB3.1 TYPE C

USB SS (80Ohm-Diff)

USB HS (90Ohm-Diff)

PCIE Rule (Follow PM PDG)

Layout Guide:

1.) USB3.1 to Connector Total Length < 1.5"
2.) VIA hole <2

Power Consumption

	3.3V	3.3VSUS	2.5V	1.1V	1.1VSUS	Unit
ASM3142	TBD	TBD	TBD	TBD	TBD	mA
ASM2142	4	9	220	470	10	mA

ASM3142

B02-031420C-AD0

SMI connect to GPI which support smi function.
SB side pull high 10K ohm to 3VSB.
(Intel 8X & 9X series use GPIO10)
(Intel SKL use GPP_C23)

PPON_X Internal Pull-up to VCC3

OCI_X Internal Pull-up to SUS

RX/TX Internal Pull-up

X0/XI (95hm-Diff,Spacing 30mil)
UREXT,PEUREXT(W/S) : 10/7
OCIA,OCIB,PPONA,PPONB(W/S) : 5/8

SMD Crystal use 3225 size
M:D04-0900900-SC6
S:D04-0901100-T16
S:D04-0901200-F07

B02-031420C-AD0

2016.07.21 Add

Disable ASM1142 Function

atx5vsb change to vcc5

ASM_SMI has internal Pull-up to VCC
ASM_WAKE has internal Pull-up to VCCSUS

ASM3142 1.1v Core Power

SN:L01-0107108-C08

MP2143DJ_TSOT23-8-RH

ASM3142 1.1v Suspend Power

ASM3142 2.5v Analog Power

EEPROM

M31-25L1022-M24

M:M31-25L1022-M24 (1M)
S:M31-25X2023-W03 (2M)

MICRO-START INT'L CO.,LTD.

Title: USB3.1 ASM1142-1

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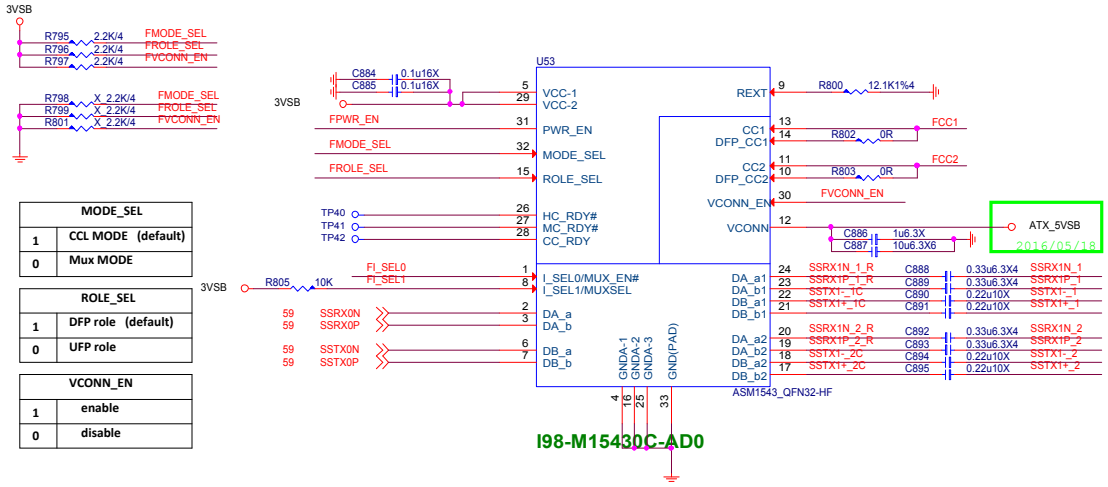
ASM3142 USB 3.1-Front Type-C

USB Type-C MUX with Configuration Channel (CC)



I98-M15430C-AD0

MODE_SEL	
1	CCL MODE (default)
0	Mux MODE

ROLE_SEL	
1	DFP role (default)
0	UFP role

VCONN_EN	
1	enable
0	disable

EQA/B are the selection pins for the equalization selection

	Equalizer setting (dB)	
EQA/B	*@2.5GHz*	*@5GHz*
0	5.1	10.9
R	1.9	6.7
F	3.5	8.9 (Default)
1	6.8	13.1

Flat Gain Setting:

FGA/B are the selection bits for the DC gain

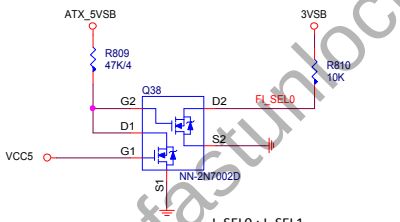
	Flat Gain Settings
FGA/B	*dB*
0	-3
R	-1.5
F	0 (Default)
1	+2

-1dB compression point linear Swing Setting:

SWA/B are the selection bits for the output linear swing setting

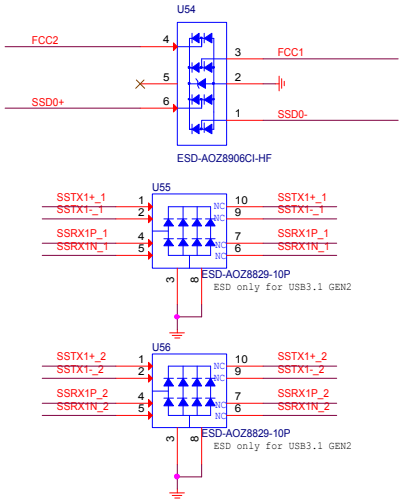
	Output Linear Swing Settings
SWA/B	*mVppd*
0	800
R	1200
F	1000 (Default)
1	1100

Current Mode

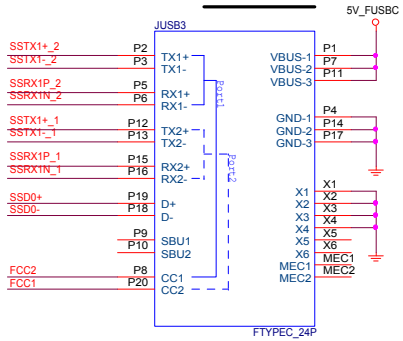


I_SEL0 : I_SEL1	
X 0	Default for 900mA
0 1	1.5A @5V
1 1	3A @5V

1.5A under S3 mode
3A under S0 mode



JUSB3

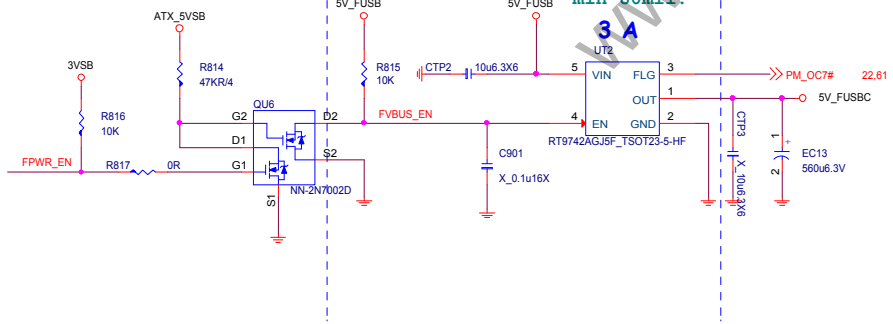


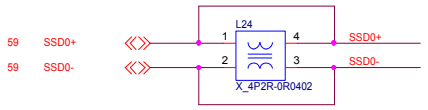
N53-20M0010-804

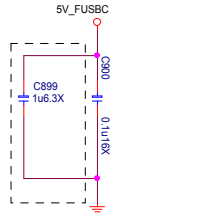
VCOM OC#

VBUS EN

VBUS OC#







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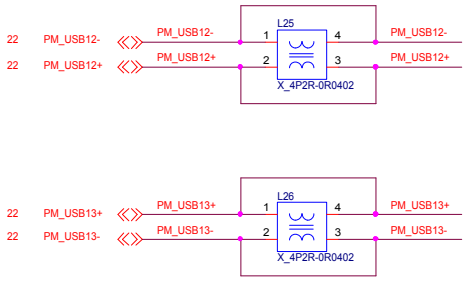
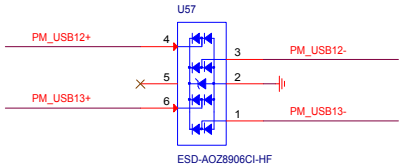
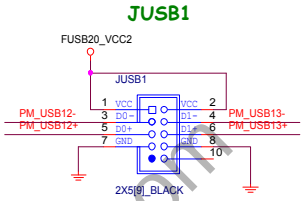
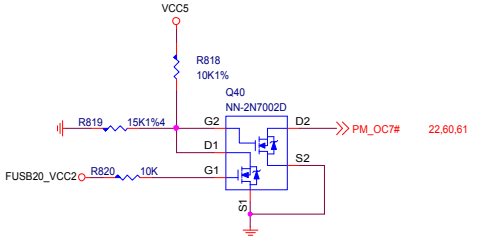
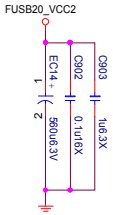
JUSB1+JUAB2

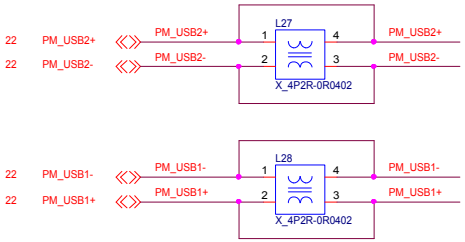


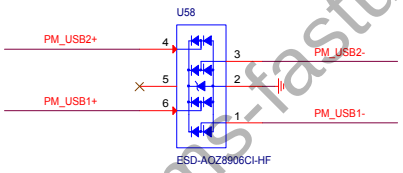


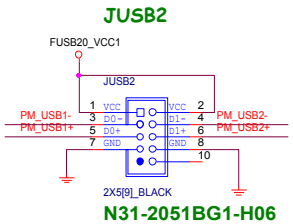


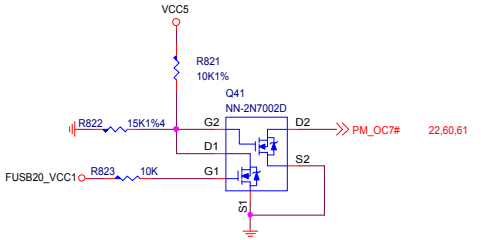


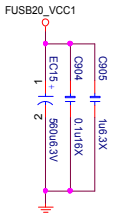












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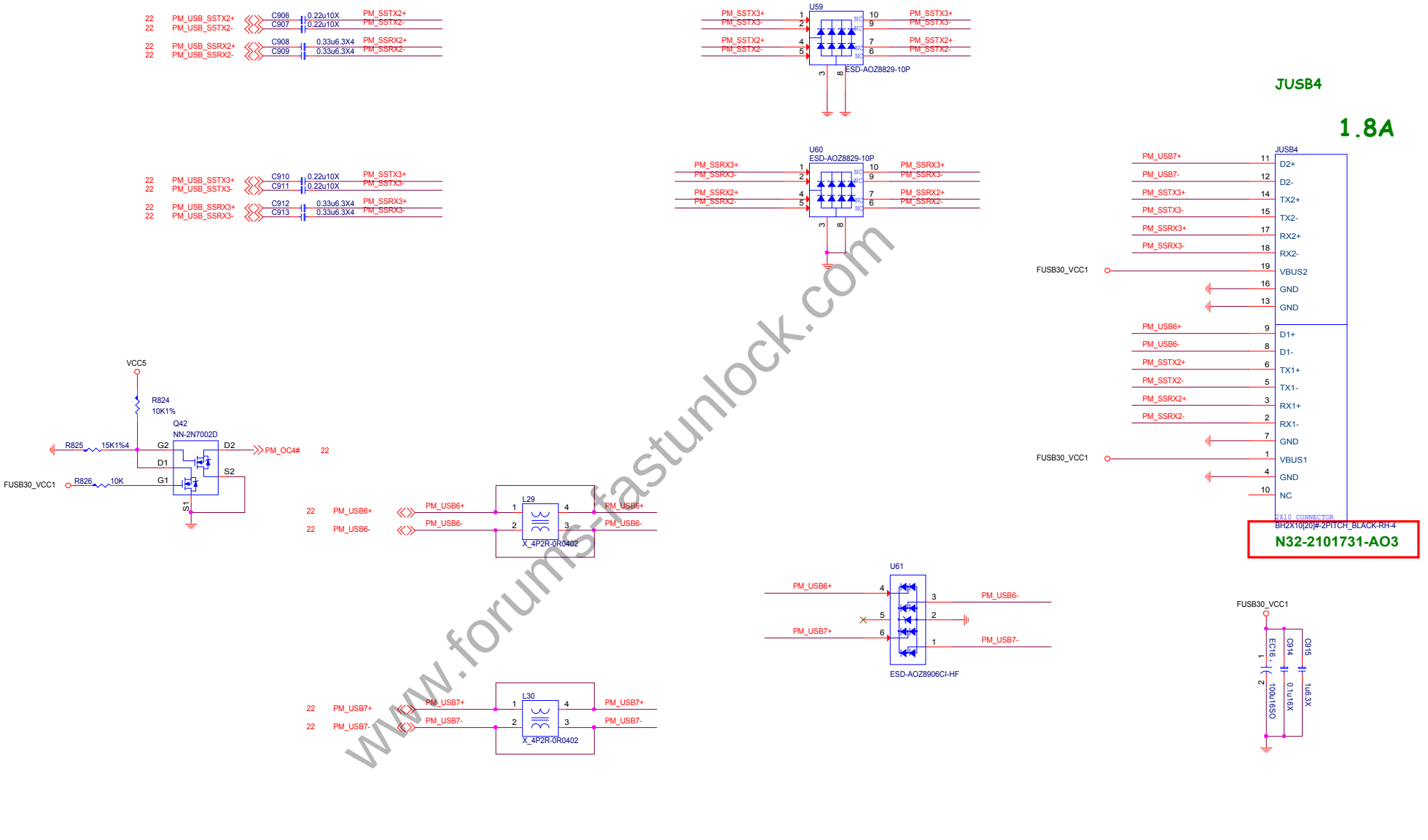
USB 3.0-JUSB4



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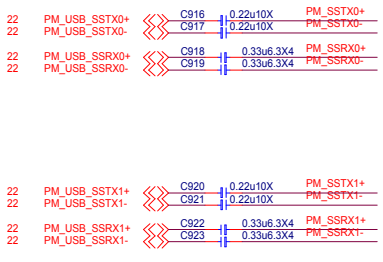
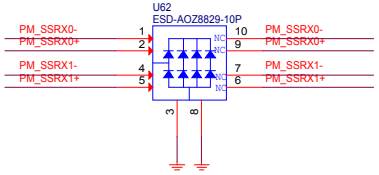
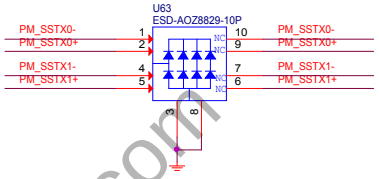
USB 3.0-JUSB5 With Charge(BC1.2)

JUSB5

1.7A+1.7A

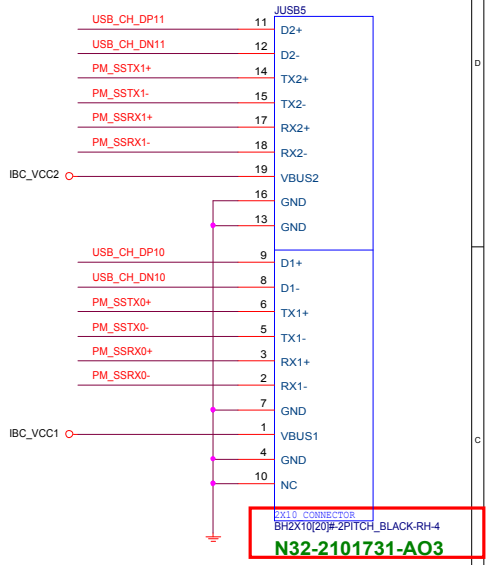


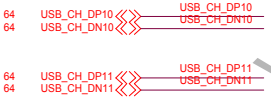


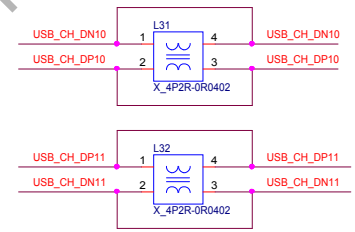


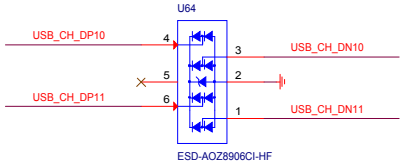
USB3.0
D0G-06A050C-A68 Main
D0G-05A0300-I14 AVL

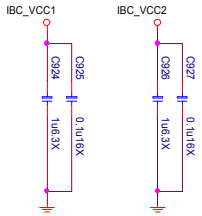
USB2.0
D0G-0200529-A68 Main
D0G-0100619-I05 AVL











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Link to the Future

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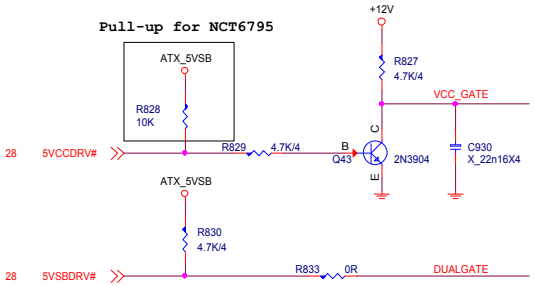
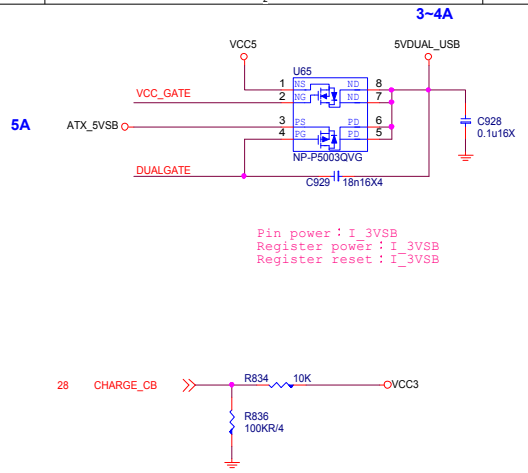
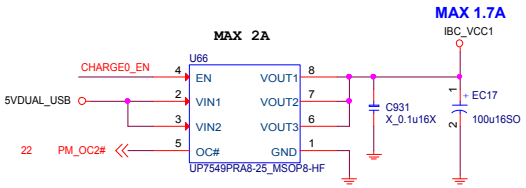
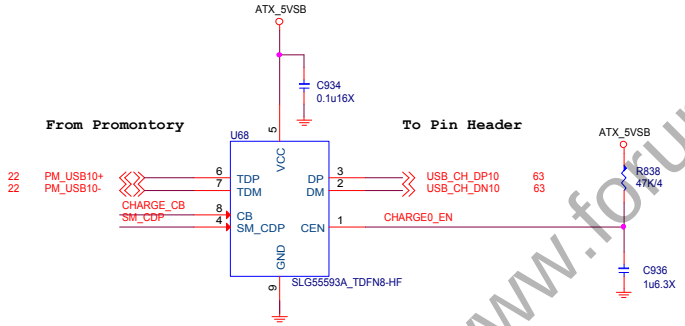
5VDUAL_USB





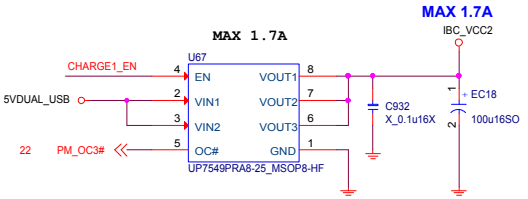
USB POWER PORT 0 For USB Charging

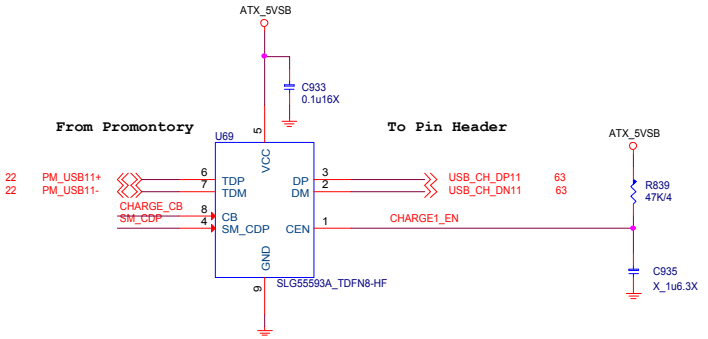




I98-555930C-SF9

USB POWER PORT 1 For USB Charging





I98-555930C-SF9

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Link to the Future

Title: USB Charger(JUSB5)		
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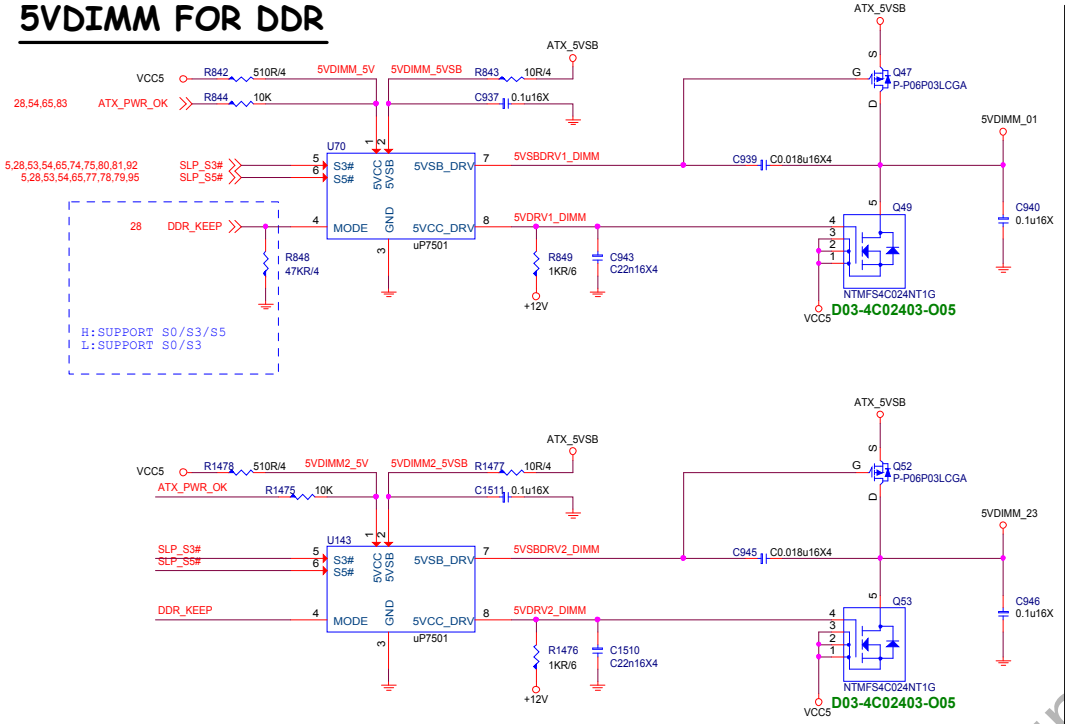
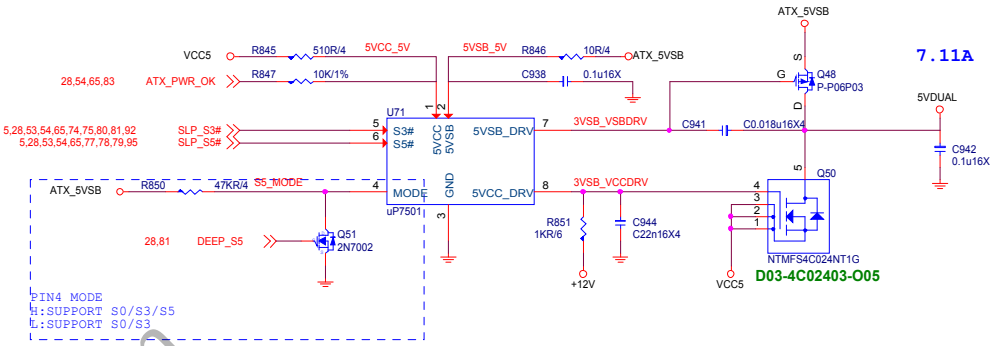
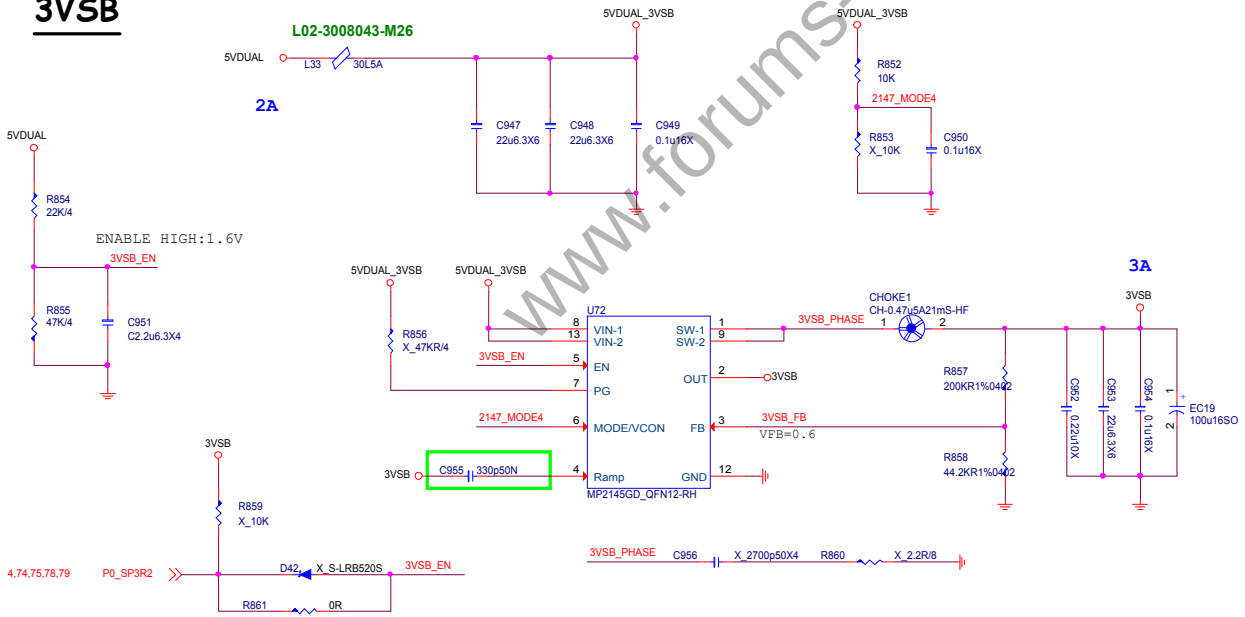
5VDIMM FOR DDR



5VDUAL For 3VSB、CPU 1.8V



3VSB



MSI MICRO-STAR INT'L CO.,LTD.
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Title	ACPI uPI-5VDIMM&3VSB	
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Note: VID Override Circuit

SVC	SVD	BOOT VOLTAGE Pre_PWROK Metal VID
0	0	1.1
0	1	1.0
1	0	0.9
1	1	0.8

Vcore: ICC Max 255A(Group-C EDC 300A)
LL: 0.3 mohm
Total OCP: 640A(Per Phase OCP=40A)
Vcore 8+0 (Extender 16-Phase)

Phase 1 close to CPU power pin.

VR_HOT = 125D
VR_Shutdown = 135D

SMB Address: 0X70

N31-2021041-H06

Title	CPU Power-IR35201 16-Phase
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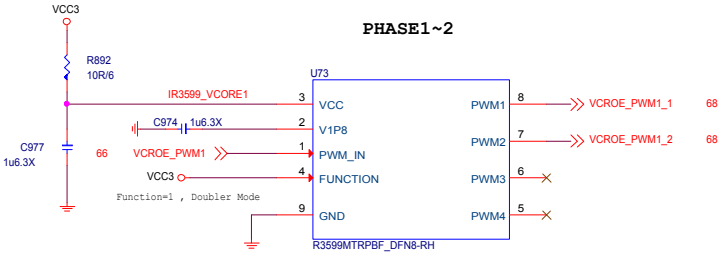
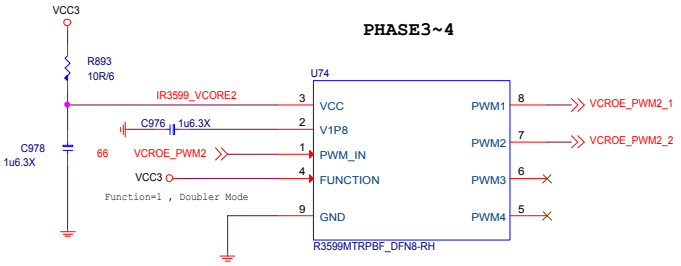
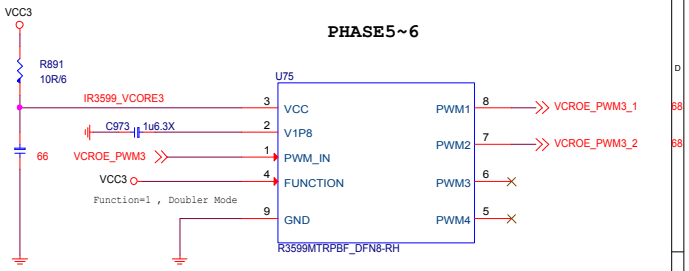
MICRO-START INT'L CO.,LTD.

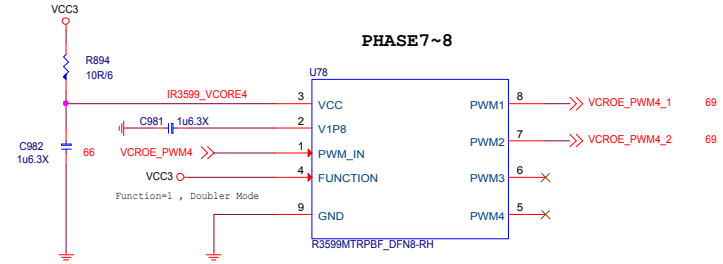
CPU_CORE Driver IC

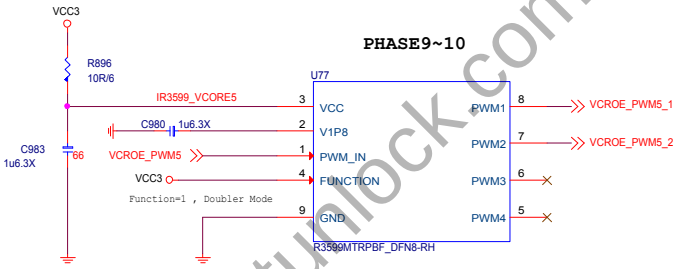
VCORE Double 16-PHASE

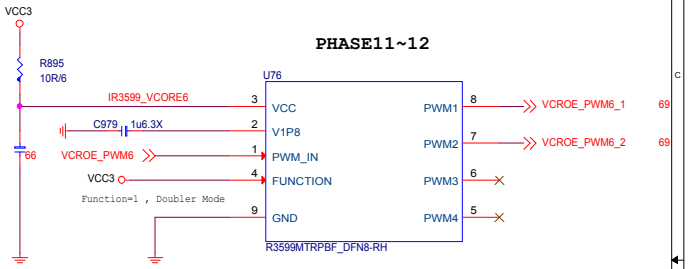


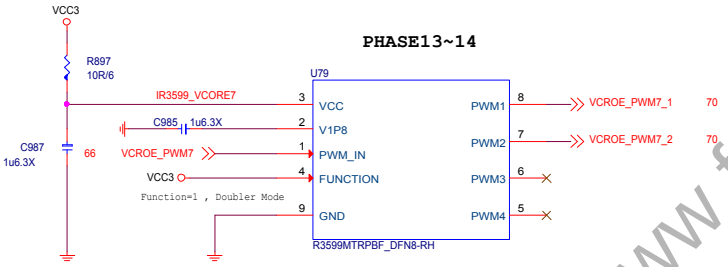


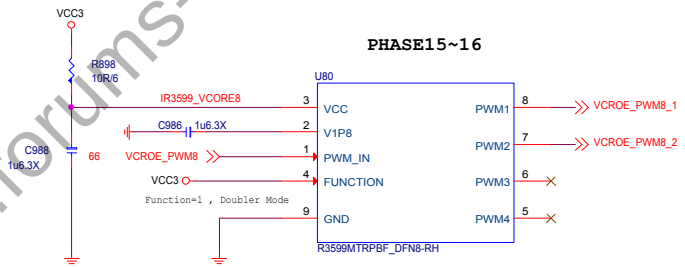












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Title: CPU Power IR3599		
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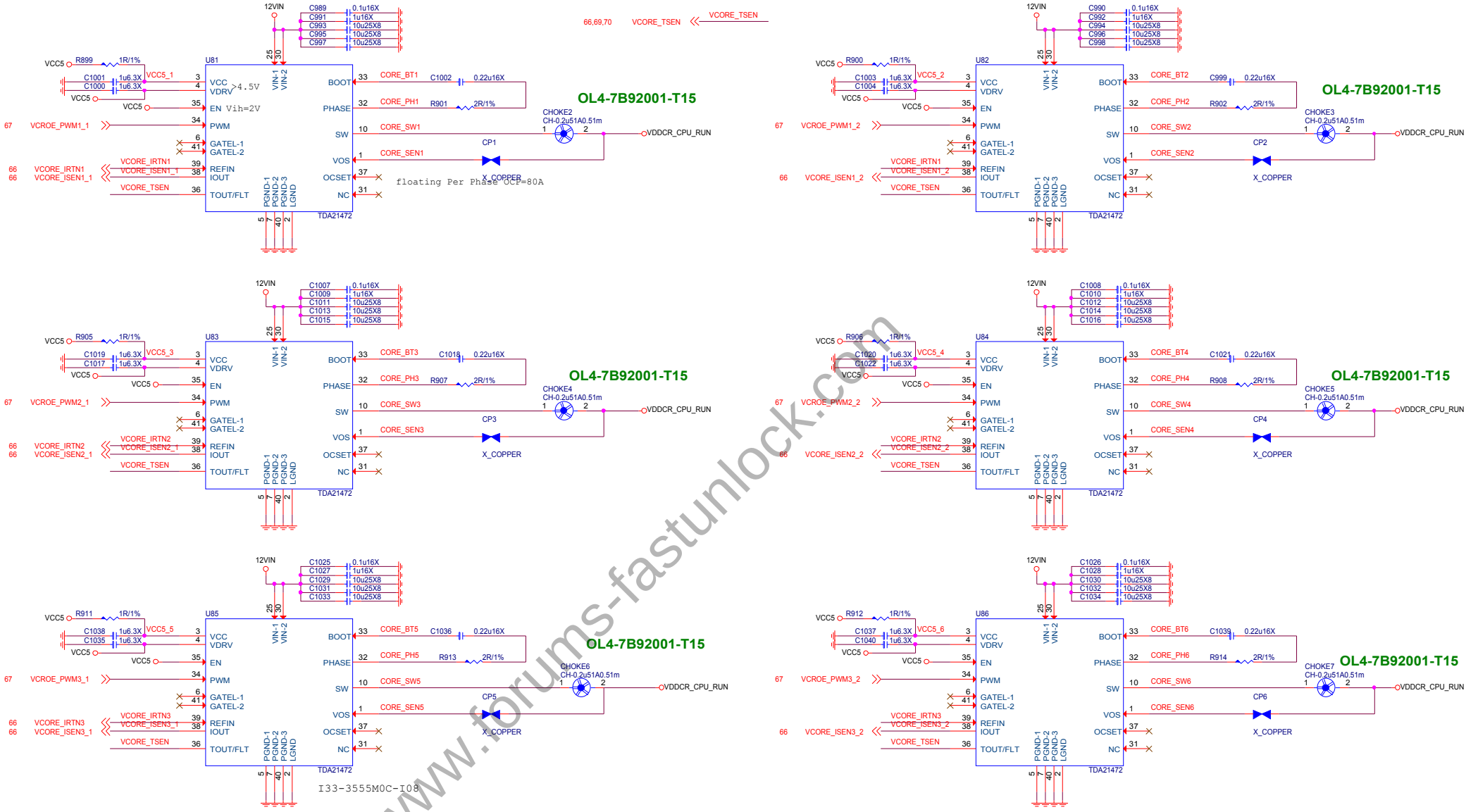

MICRO-START INT'L CO.,LTD.

Title	CPU Power Phase 1-6	
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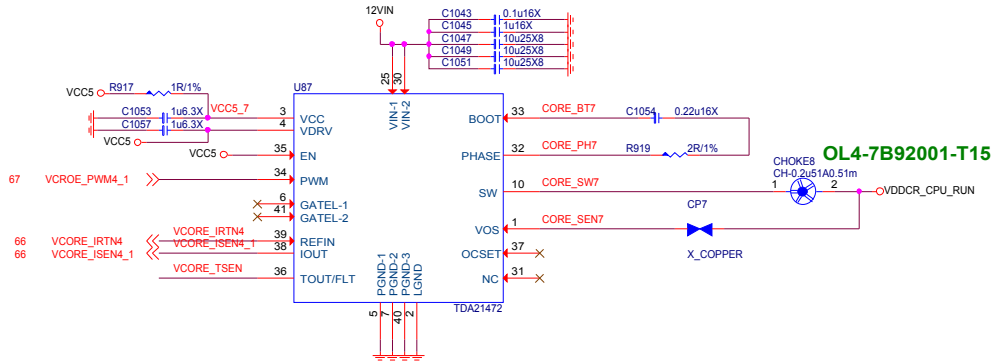

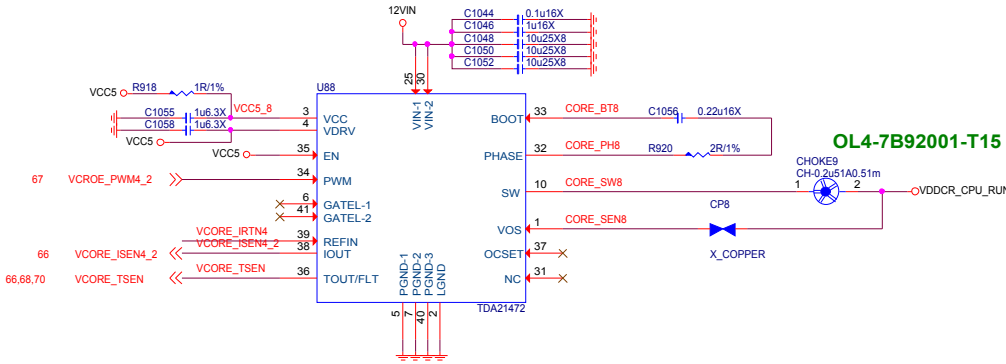

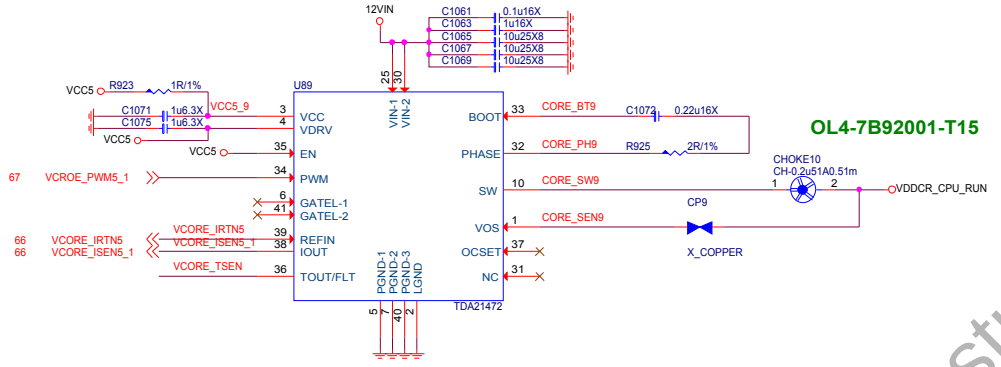

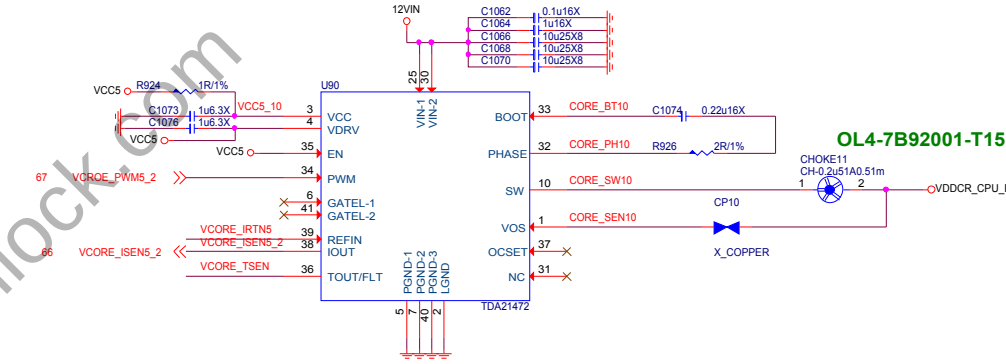

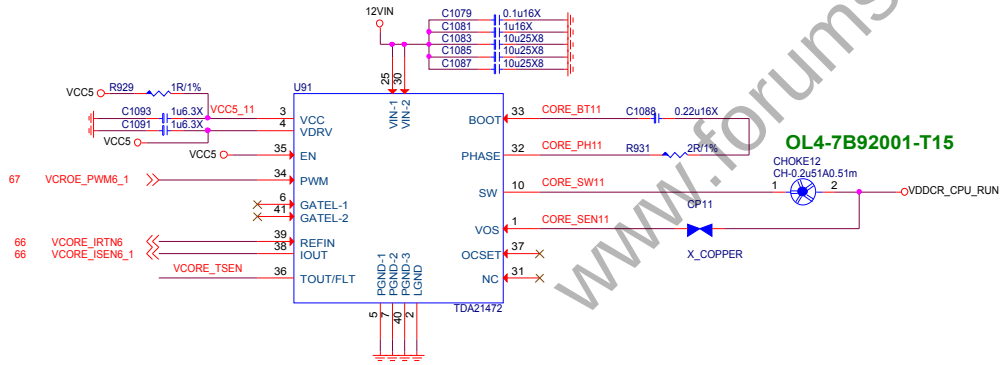

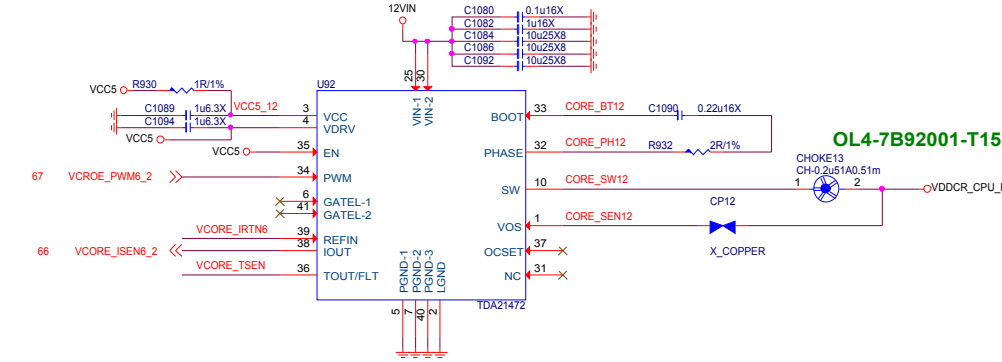

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Link to the Future

Title	CPU Power Phase 7-12	
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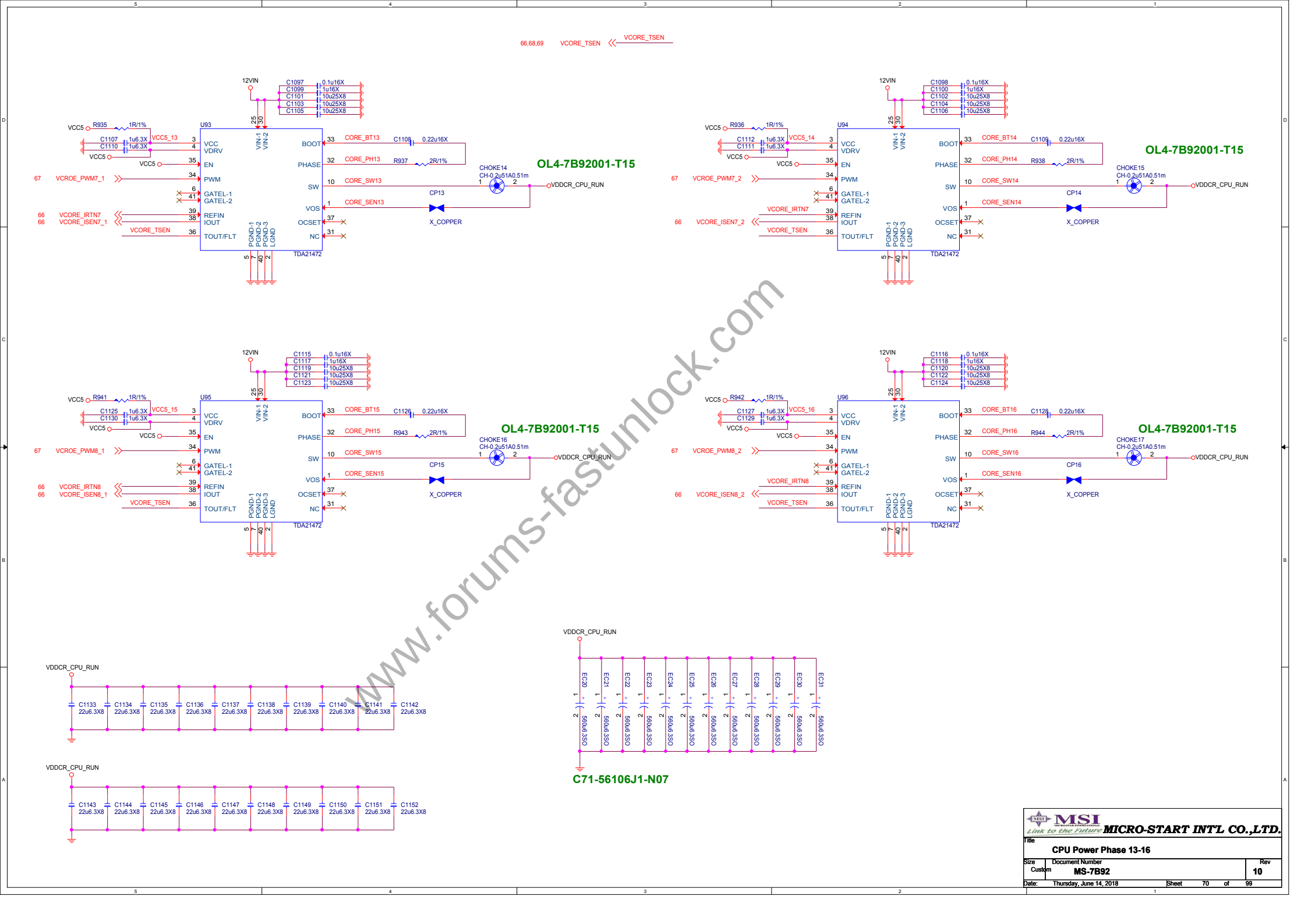

Title	CPU Power Phase 13-16
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MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

VDDCR_SOC_RUN CONTROLLER

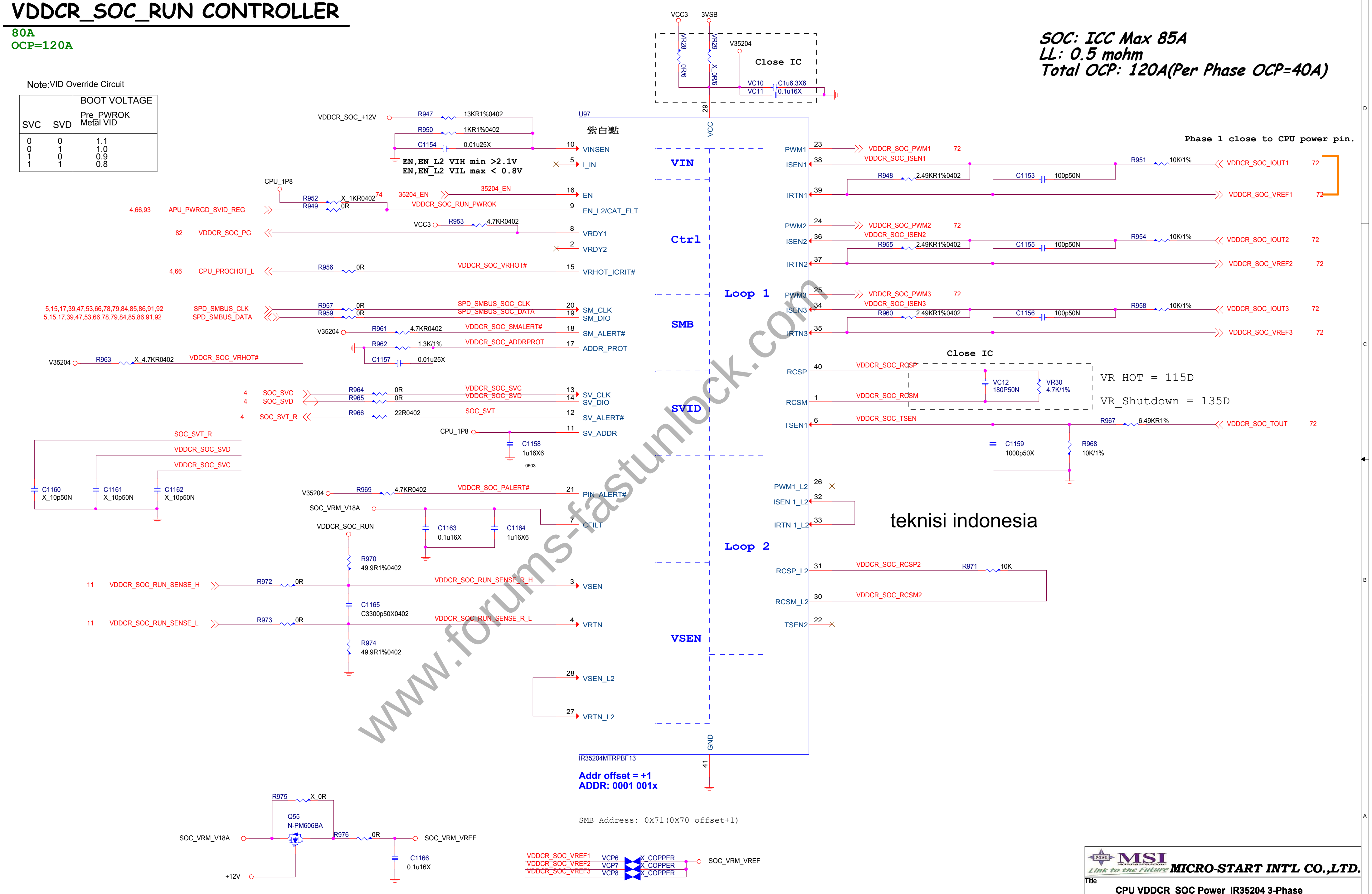
80A
OCP=120A

Note:VID Override Circuit

SVC	SVD	BOOT VOLTAGE Pre_PWROK Metal VID
0	0	1.1
0	1	1.0
1	0	0.9
1	1	0.8

SOC: ICC Max 85A
LL: 0.5 mohm
Total OCP: 120A(Per Phase OCP=40A)

Phase 1 close to CPU power pin.



MSI Link to the Future — MICRO-START INT'L CO.,LTD.

Title		
CPU VDDCR_SOC Power IR35204 3-Phase		
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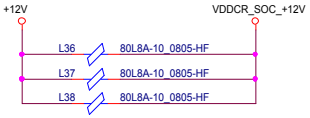
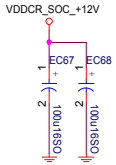
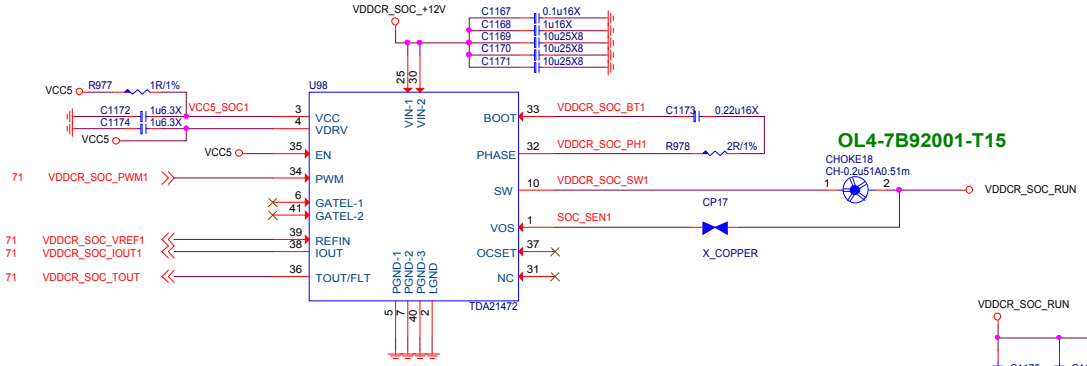
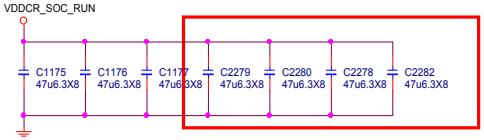
CPU_SOC Driver+MOS IC

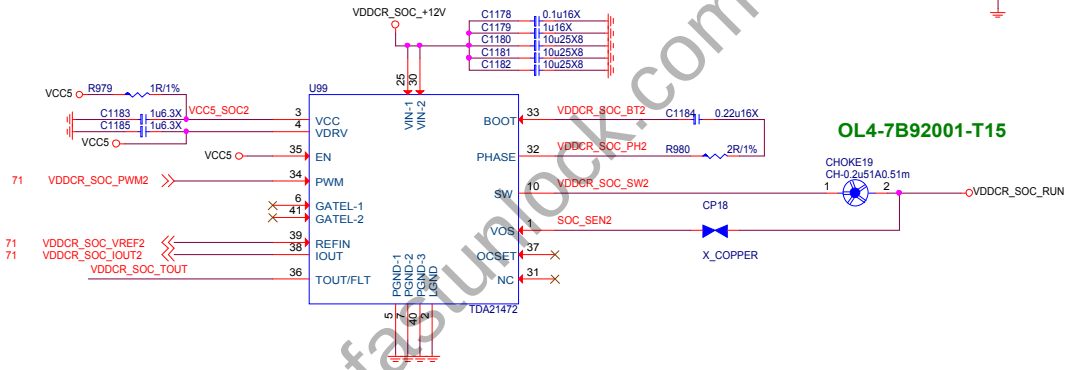
3-PHASE

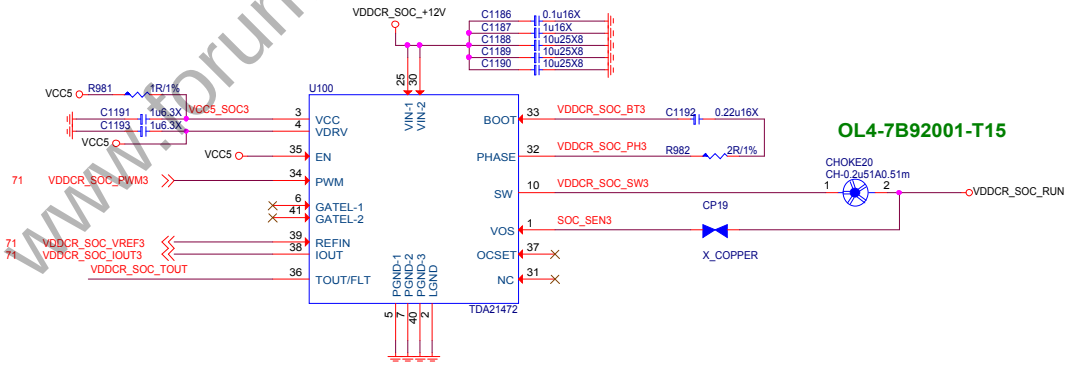


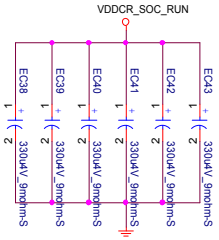


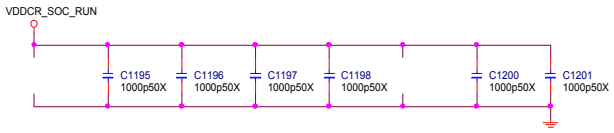












MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title	CPU VDDCR_SOC Power TDA21472 PS1-3	
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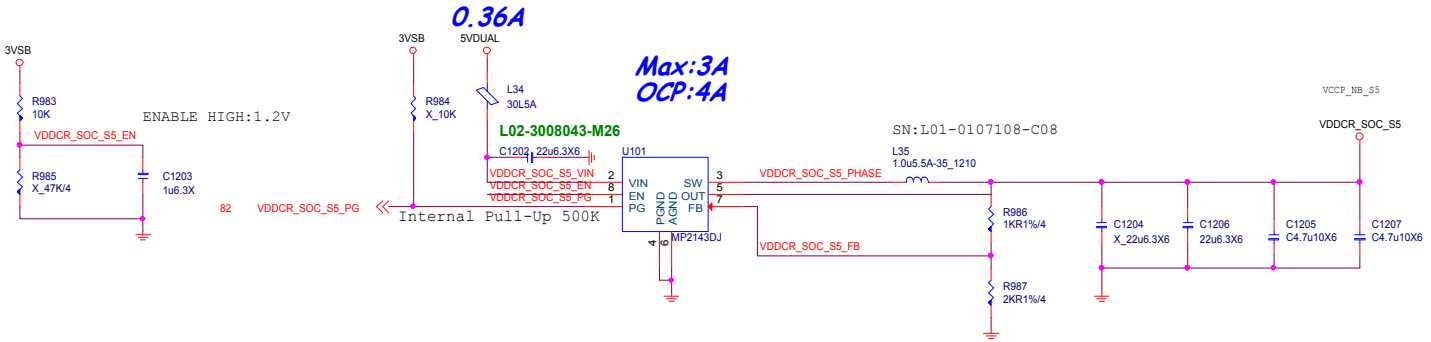
VDDCR_SOC_S5 0.9V

2A



MICRO-START INT'L CO.,LTD.

Title: CPU Power VDDCR_SOC_S5

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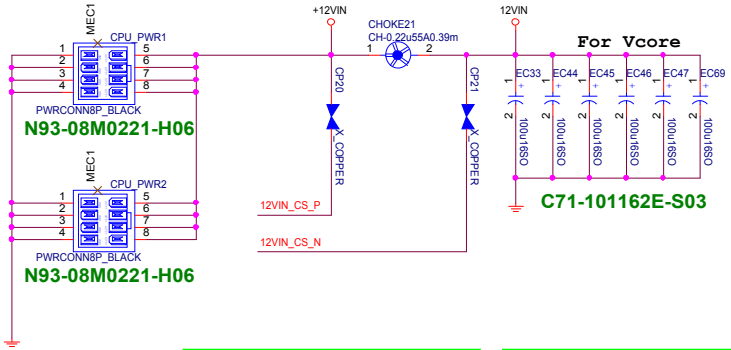
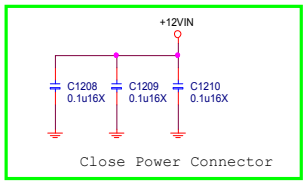
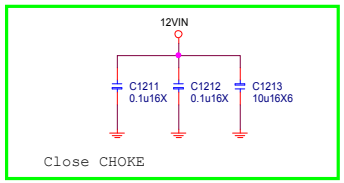
CPU POWER CONNECTOR

Iripple = 5.6A



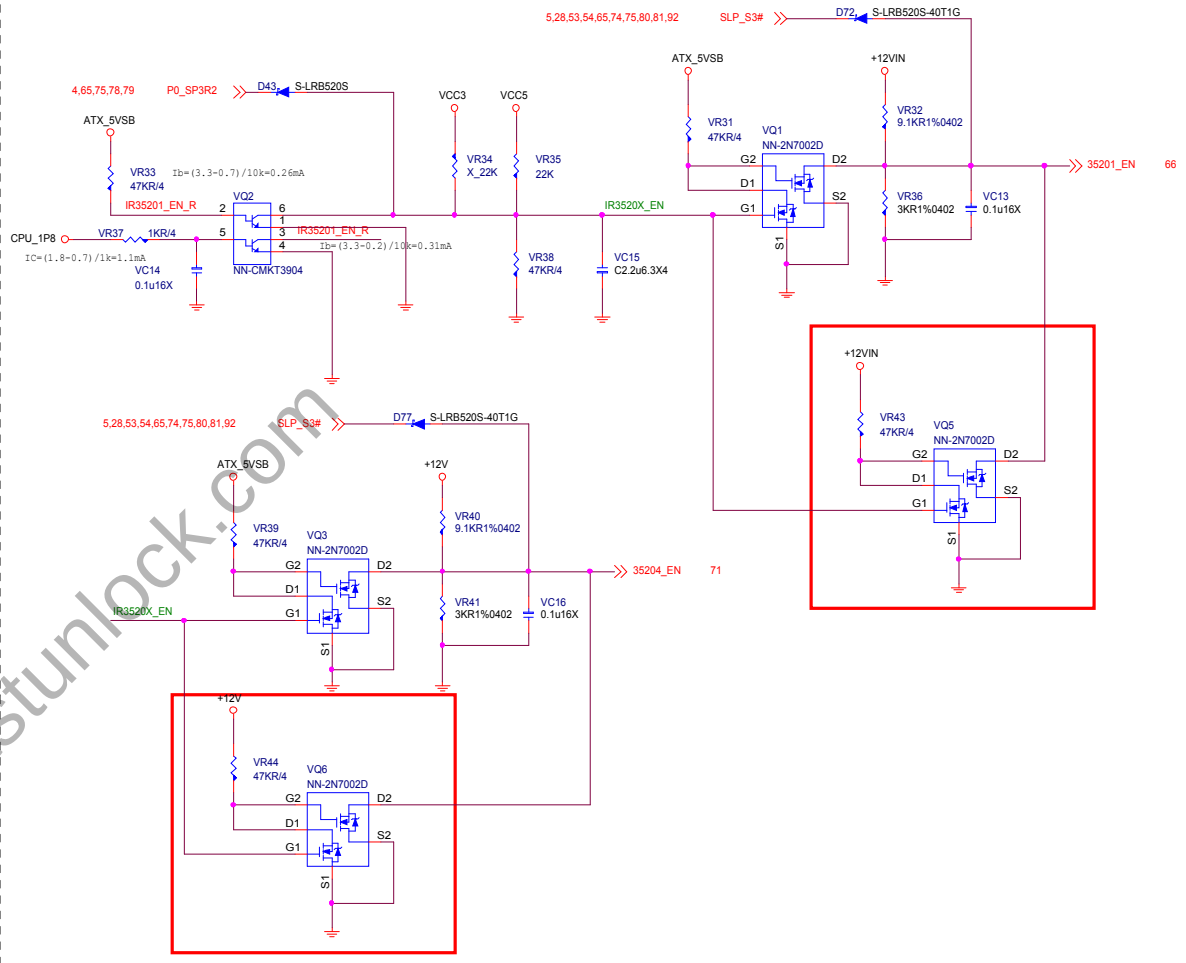




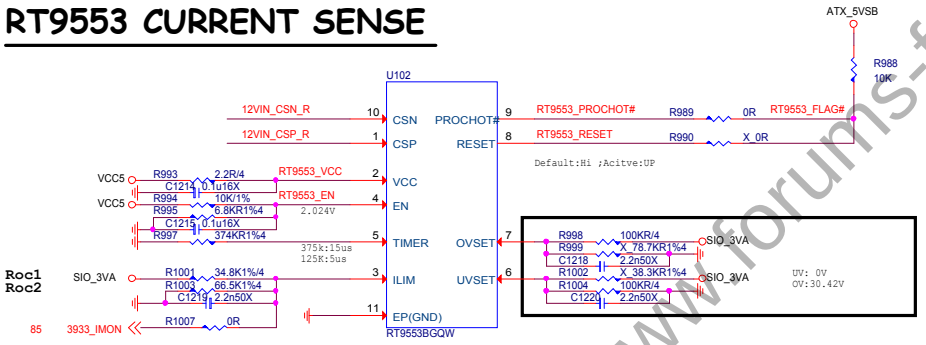
VRM_Enable circuit

12*(3/12.1)=2.975V >1V

Make sure +12VIN connector plug in



RT9553 CURRENT SENSE

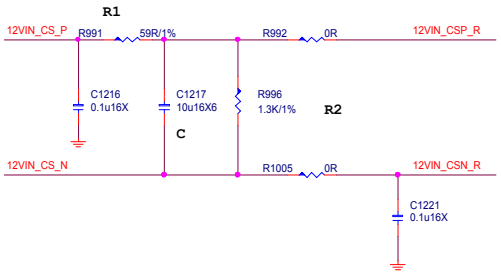


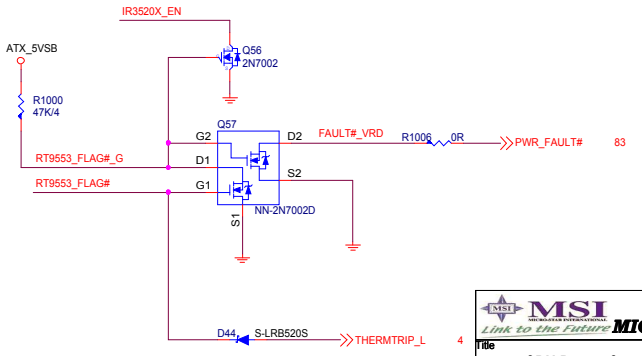
OCP:57A (Without CPU_SOC PWR)
Real OCP:57A~73A

ΔVILIM=10uA*[(34.8K*66.5K)/(34.8K+66.5K)]
=228mV

Isense = VILIM / 100*Rsense

ΔIsense=228mV/100*0.39m=5.846A





MSI MICRO-START INT'L CO.,LTD.
Link to the Future

Title	CPU Power Connector/RT9553B	
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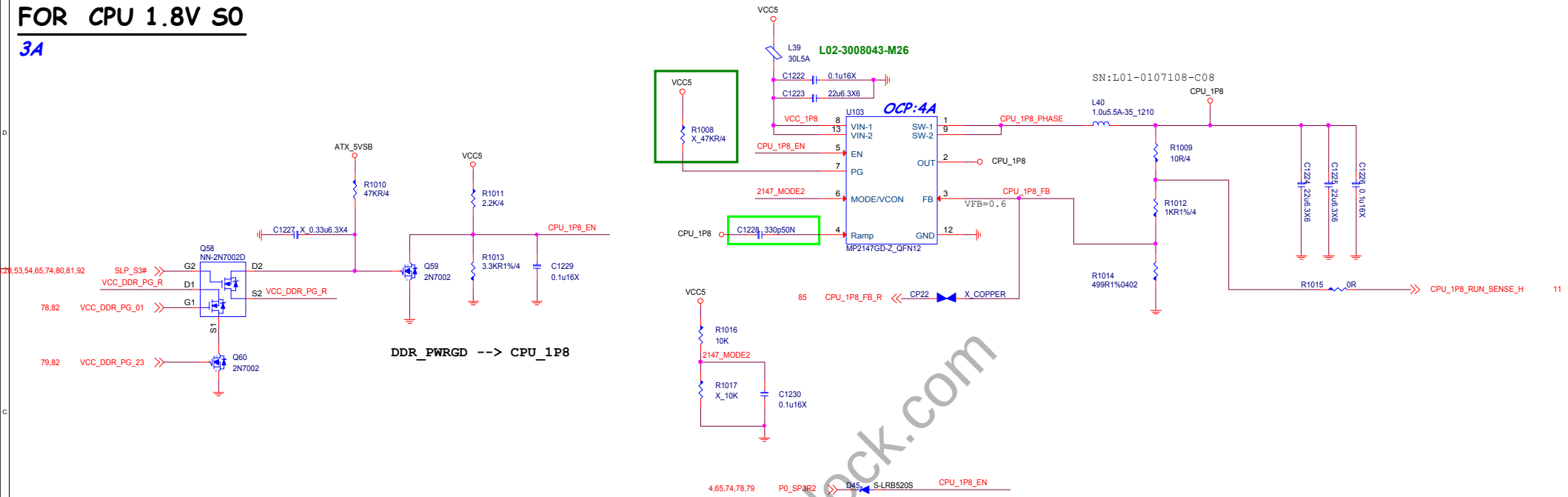
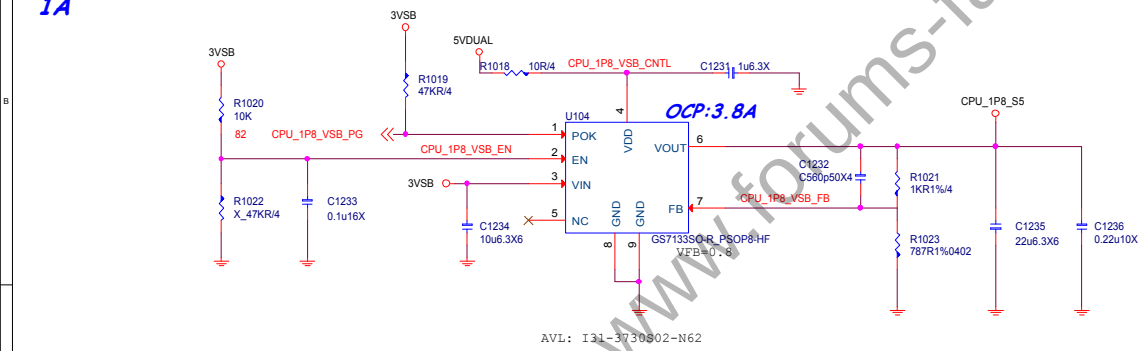
FOR CPU 1.8V S0

3A



FOR CPU 1.8V S5

1A



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Link to the Future

Title	CPU Power 1P8V-MP2147	
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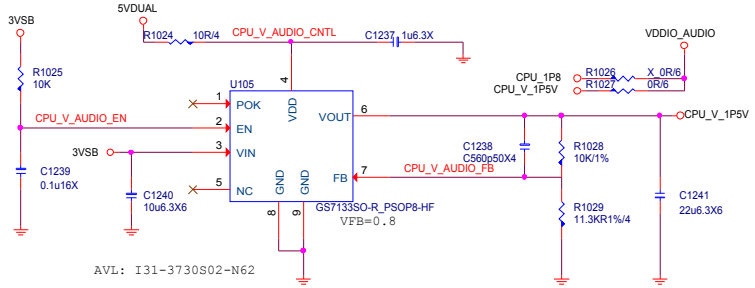
VDDIO_AUDIO Circuit

1.5V
0.25A



AVL: I31-3730S02-N62

MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title: CPU Power Audio-GS7133		
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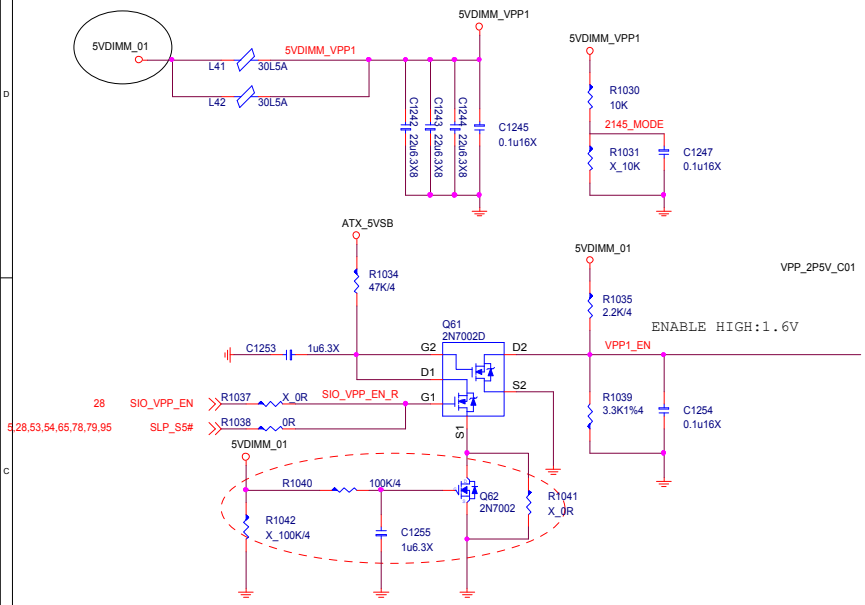
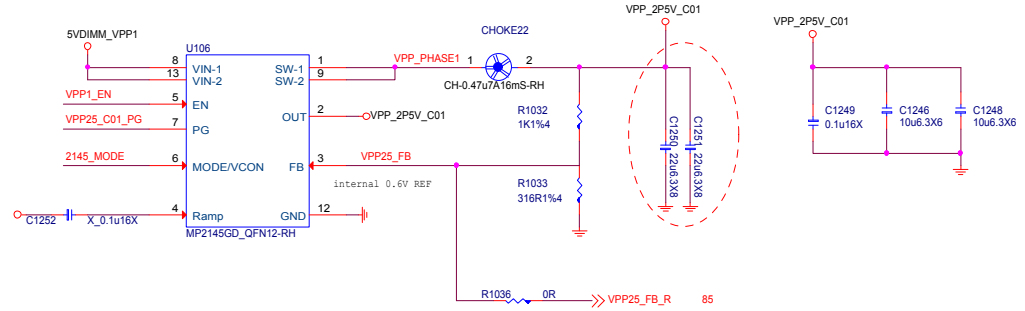
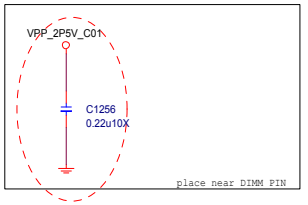
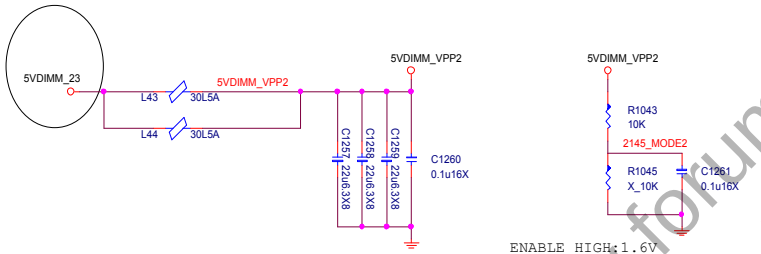
4DIMM :2.24A FOR DDR VPP2.5V

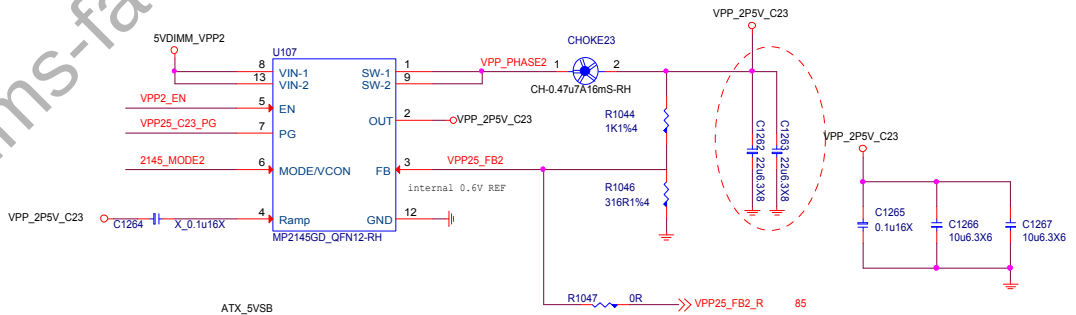
2.5+0.25/-0.125V
JESD79 DDR4 max 3V

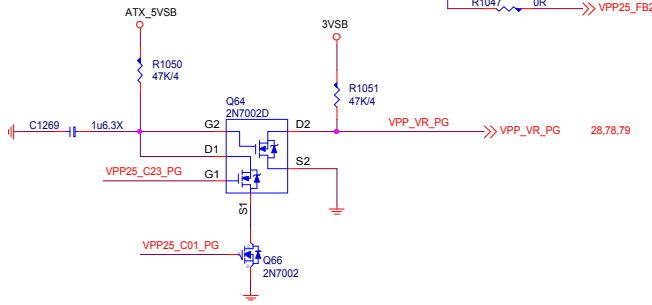


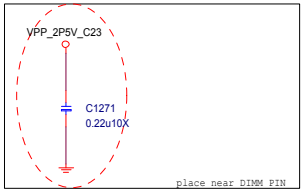












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Link to the Future

Title	DDR PWR VPP25/VTT-MP2145	
Size: Custom	Document Number: MS-7B92	Rev: 10
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DDR Power1-PV4210-2-Phase

DDR4_1.2V 15A+9.5A+1.2A=26A

15A FOR CPU

9.5A FOR 4DIMM

1.2A FOR DDR VTT

OCP: 50A

Iin ripple =5.2A

C71-56106J1-N07

C71-56106J1-N07

I32-421000C-R06

Address=0X42

MSI MICRO-STAR INT'L CO.,LTD.	
Title	DDR01 Power-PV4201 2-Phase
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DDR Power1-PV4210-2-Phase

DDR4_1.2V 15A+9.5A+1.2A=26A

15A FOR CPU

9.5A FOR 4DIMM

1.2A FOR DDR VTT

OCP: 50A

Iin ripple =5.2A

Table6#=1.21V

I32-421000C-R06

Address=0X44

PROC_ID1	Config	CPU TYPE
1	133K	SKX-X (VR13) (SVID)
0	110K	KBL-X(IMVP8) (non SVID)

Title	DDR23 Power-PV4201 2-Phase
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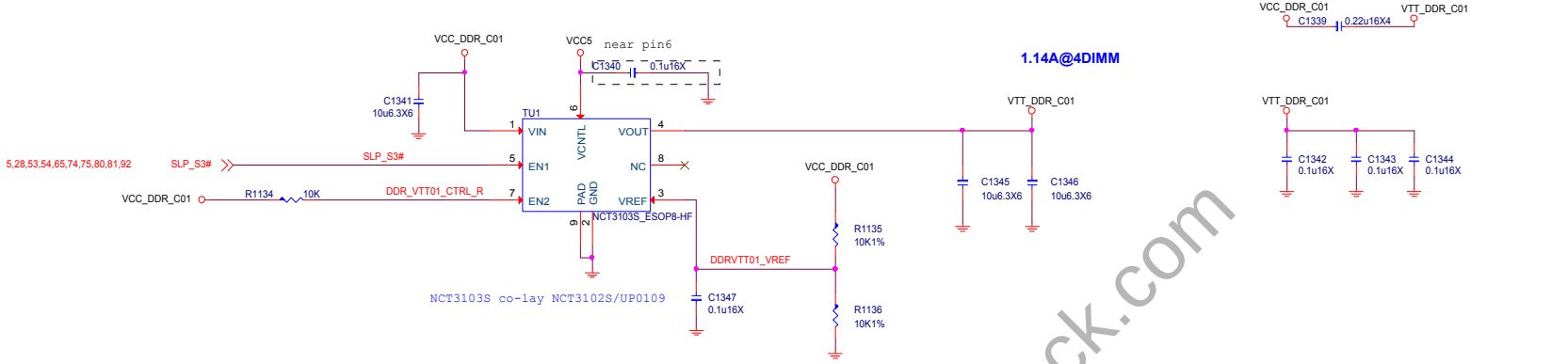
MICRO-START INT'L CO.,LTD.

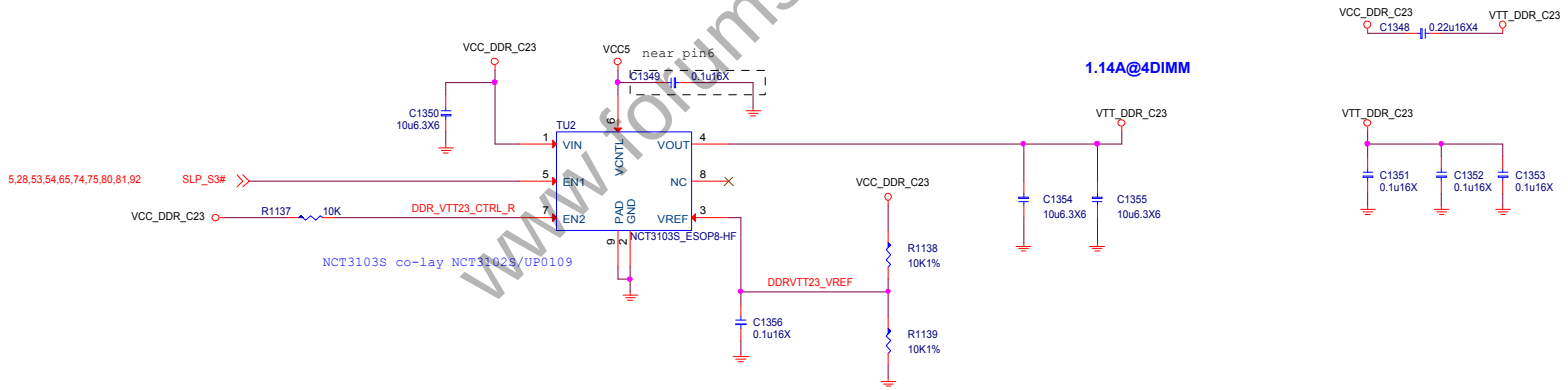
DDR VTT Power

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



DDR VTT Power

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



MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title: VTTDDR		
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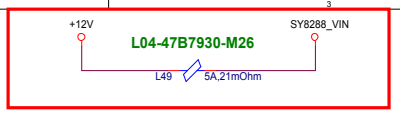
FOR Promontory 1.05V_S0

1.05V
S0:5.5A
S5:0.05A



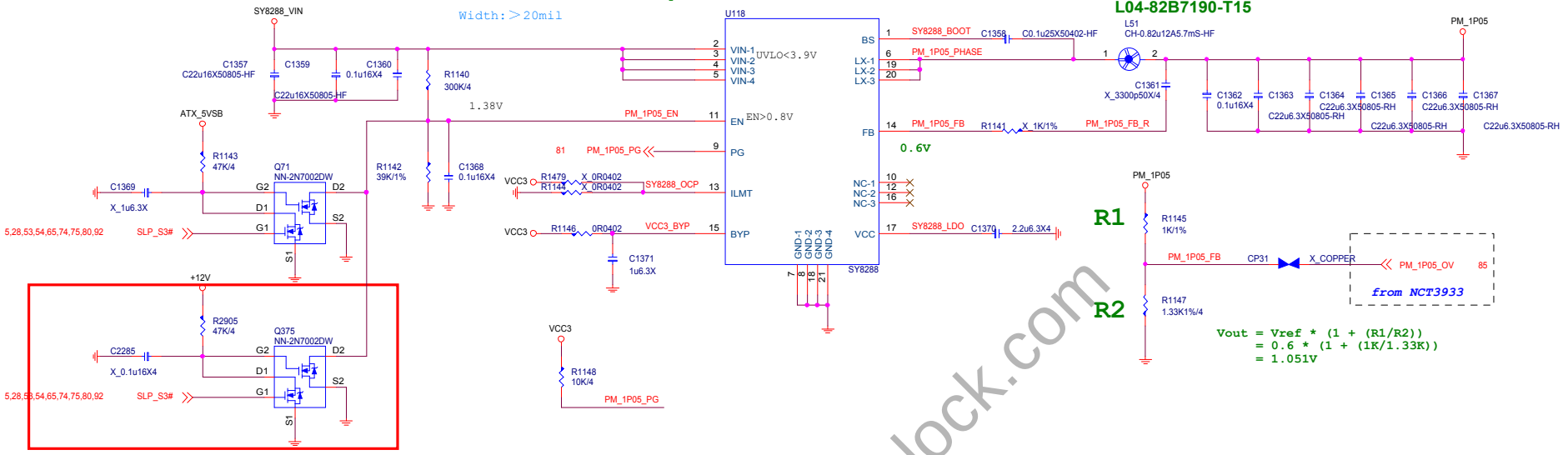
SY8288_OCP	OCP
0	8A
floating	12A
1	16A

OCP=12A

1.05V@5.5A

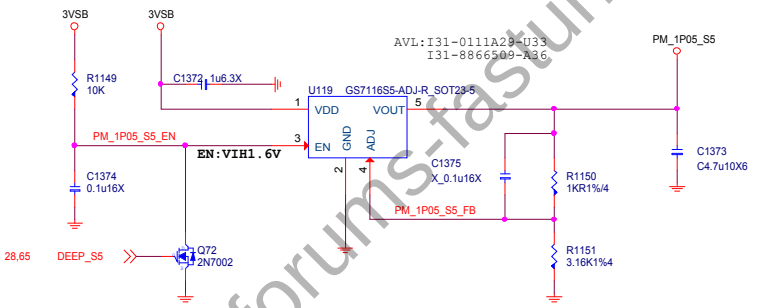
Input Current= (5.5A*1.05V)/12V/0.8=0.6A

L04-82B7190-T15



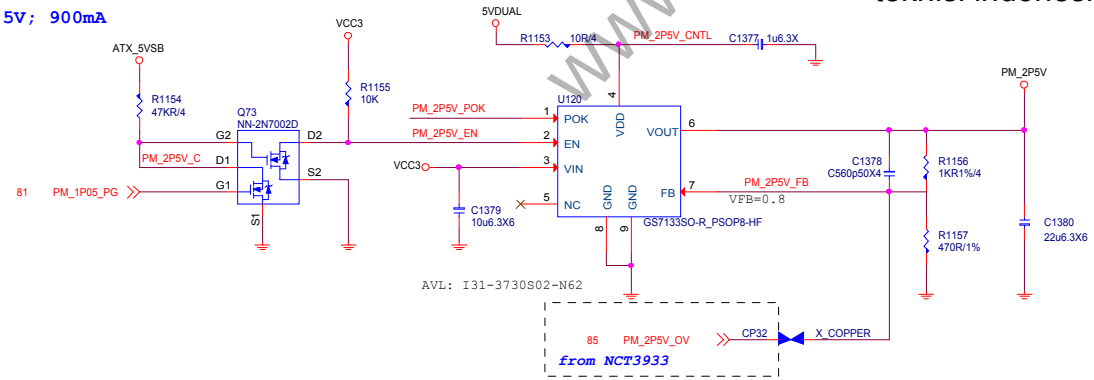
FOR Promontory 1.05V_S5

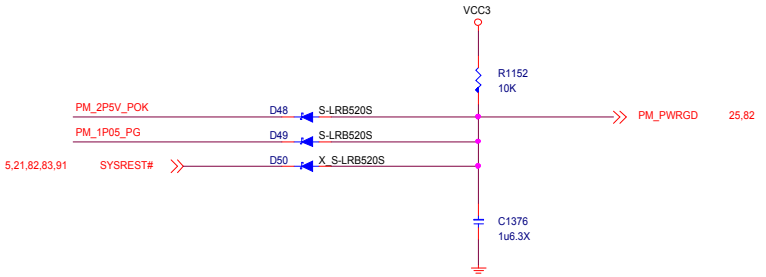
0.05A



Promontory-2.5V

2.5V; 900mA





MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title: Promontory-SY8288RAC-1.05V / GS7133-2.5V		
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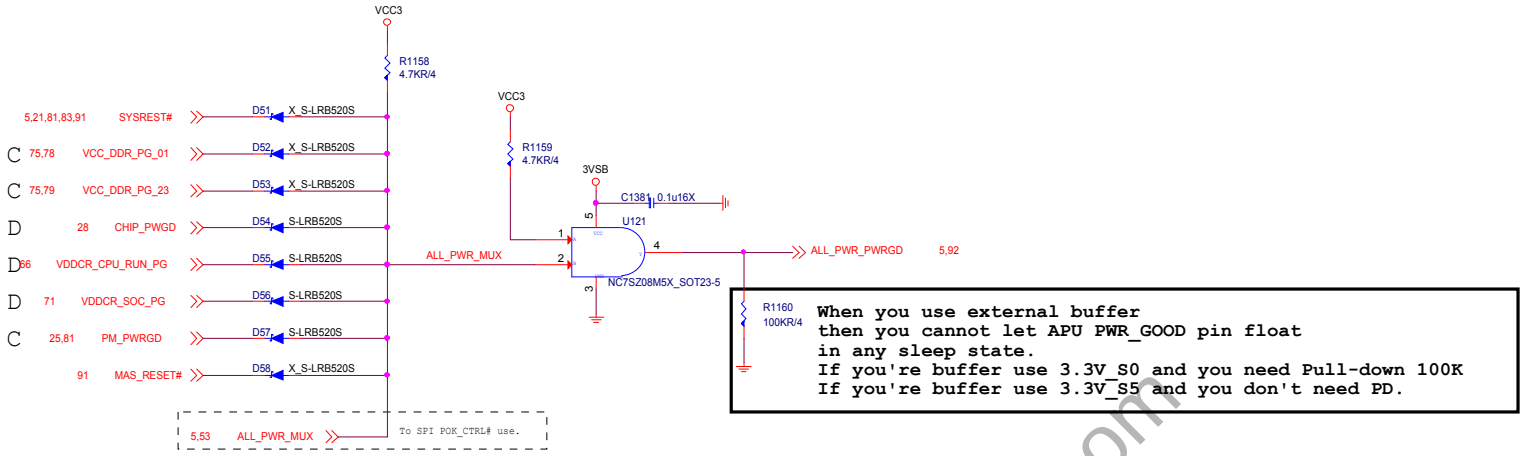
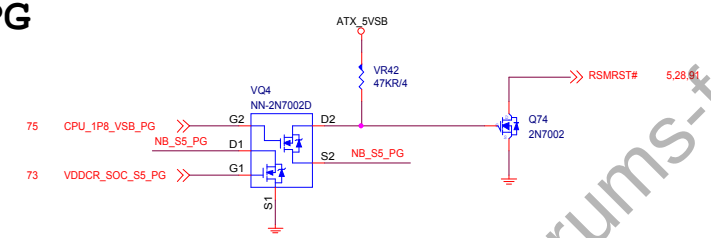
ALL POWER GOOD MUX



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.

S0 PG

S5 PG



MSI MICRO-START INT'L CO.,LTD.
Link to the Future

Title: CPU Power Good		
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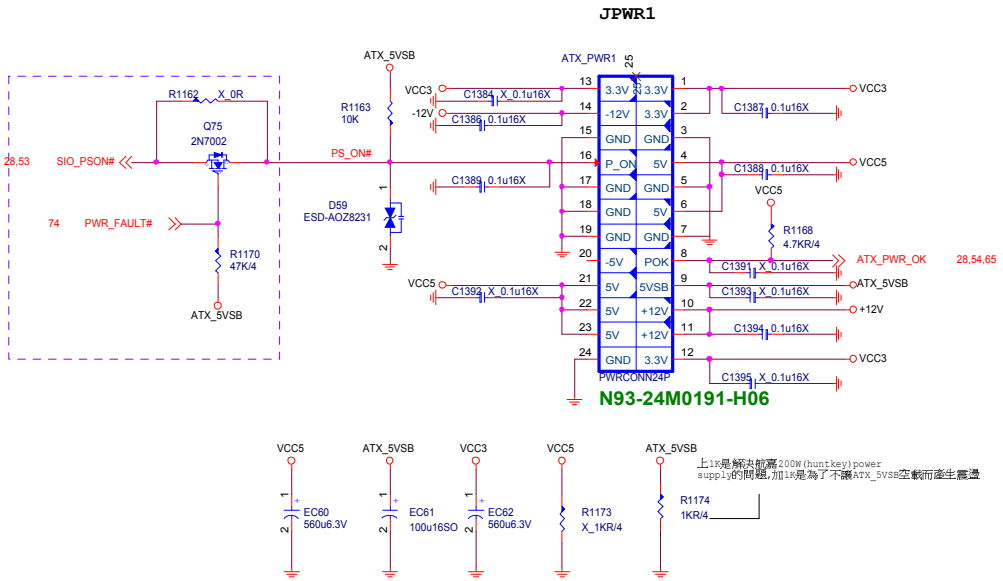
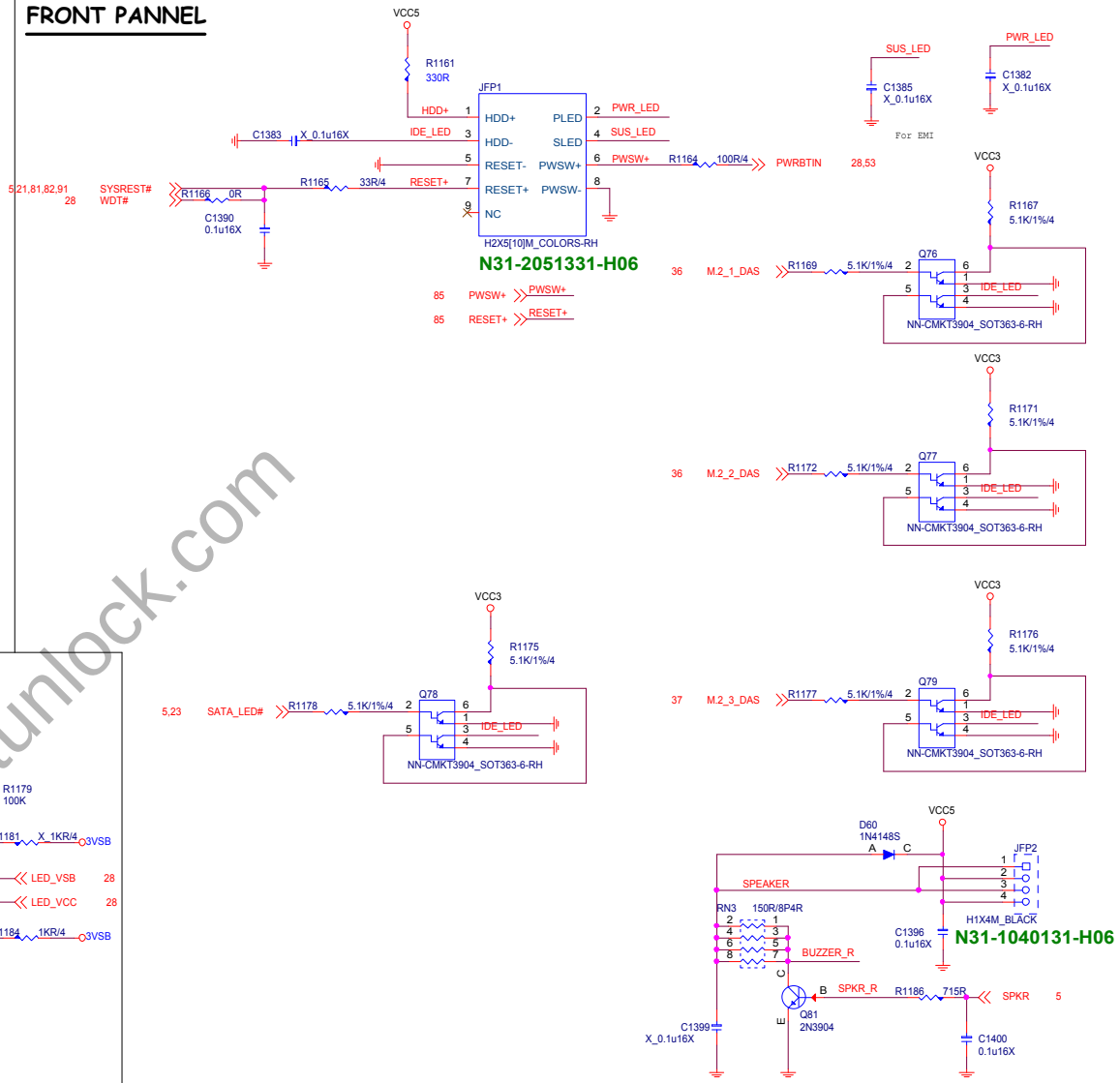
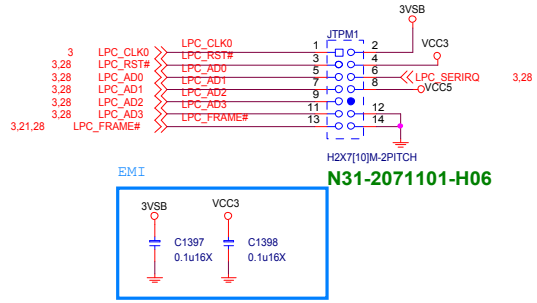
ATX POWER CONNECTOR



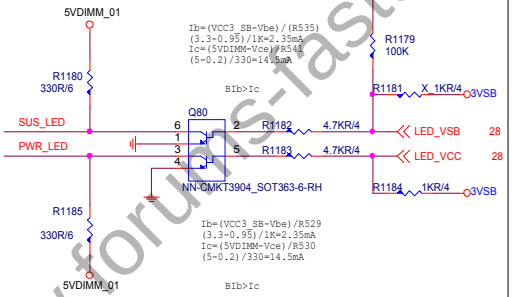
FRONT PANNEL



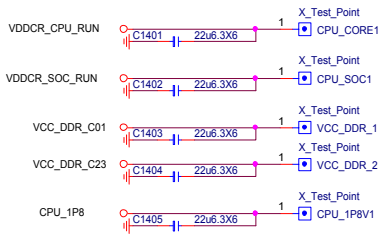
TPM



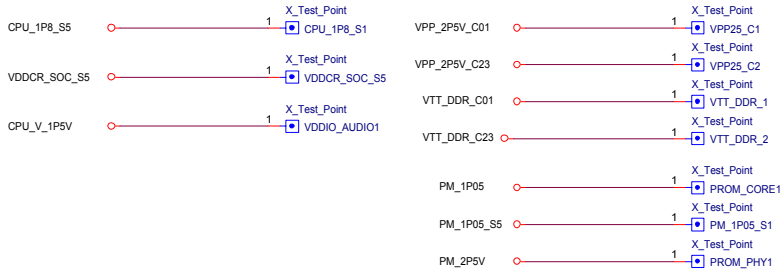
LED (for NCT6795D)



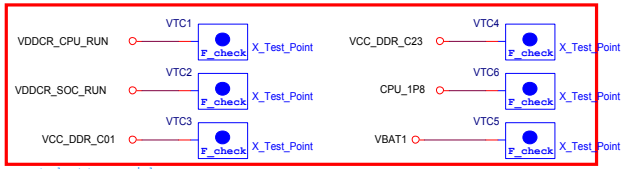
Voltage Mearsure Point



Close to output of IC



Factory check point



MSI MICRO-STAR INT'L CO.,LTD.

Title	ATX/Front Panel	
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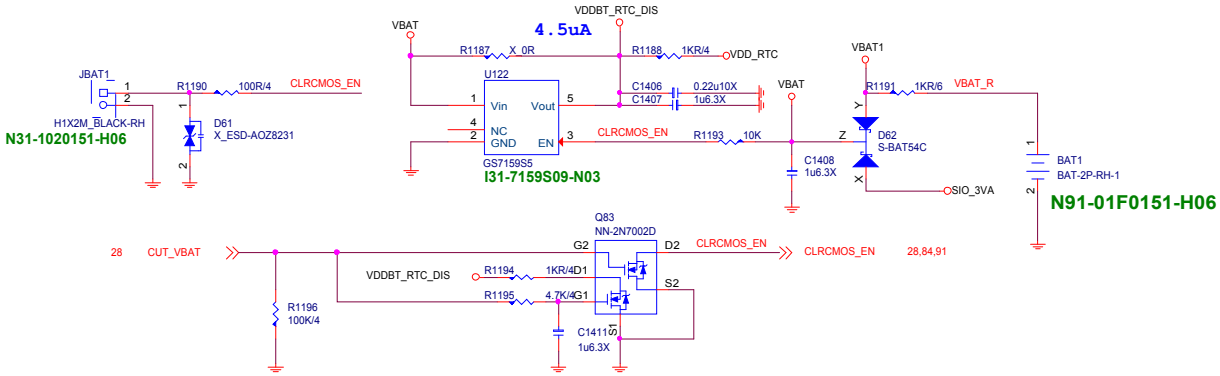
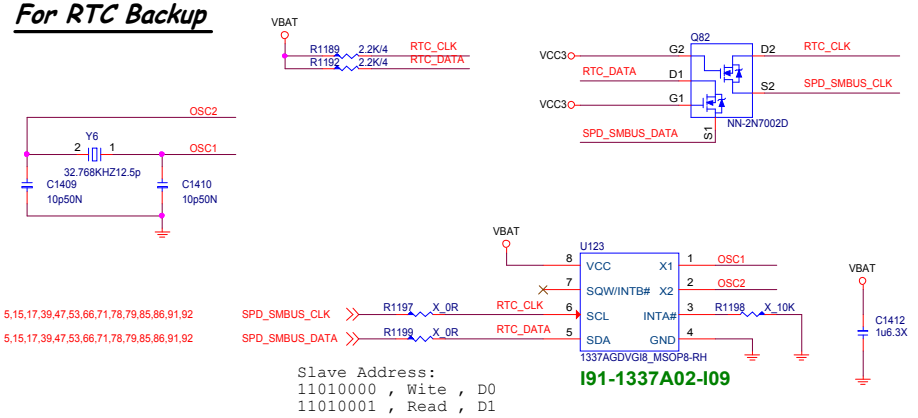
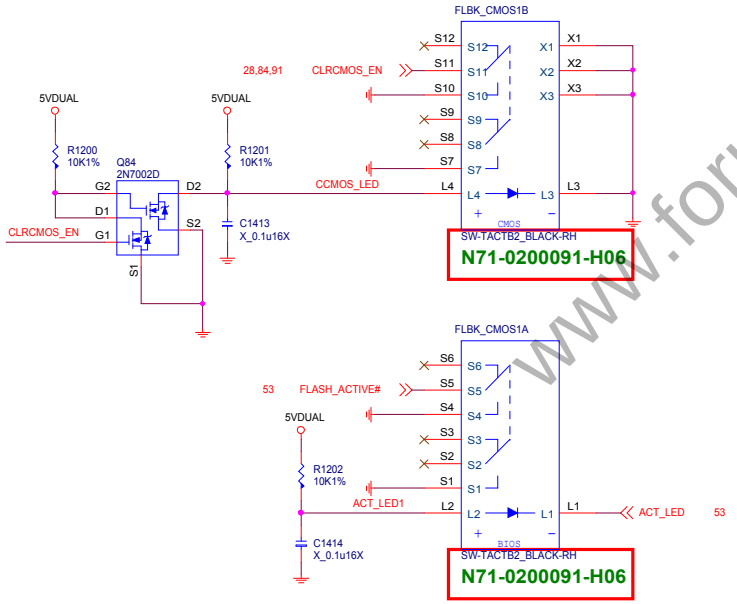
RTC & Clear CMOS Circuit



For RTC Backup



Clear CMOS&Flash Back button



MICRO-START INT'L CO.,LTD.

Title: RTC/Clear CMOS Circuit		
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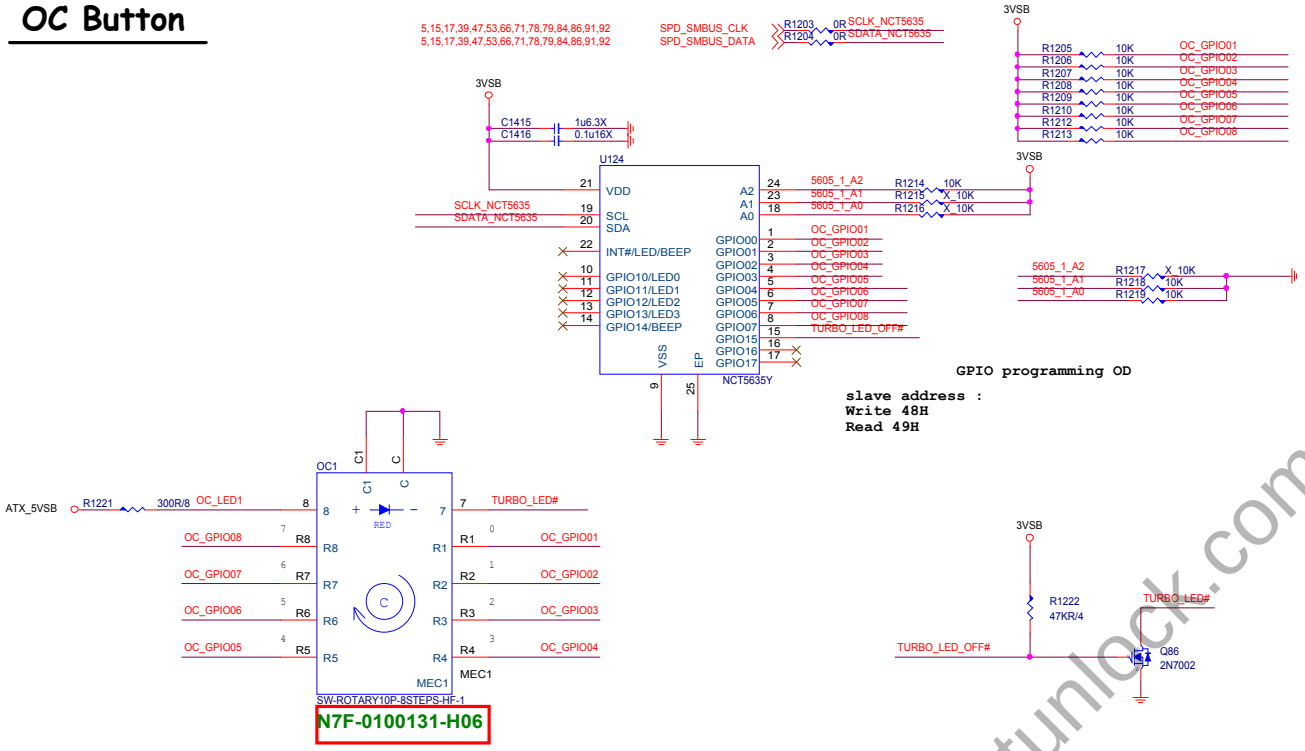
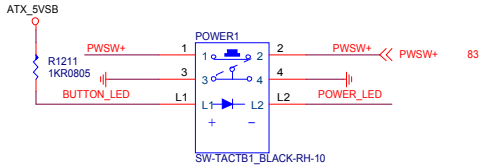
OC Button



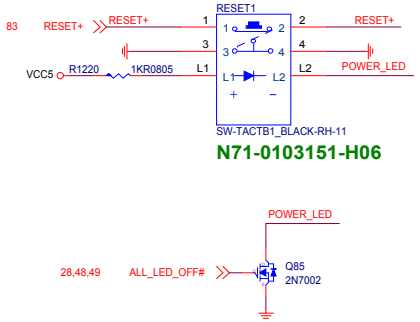
N7F-0100131-H06

Power ON Button



N71-0103161-H06

Reset Button



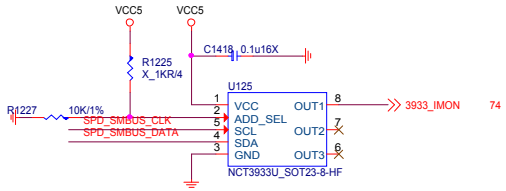
N71-0103151-H06

Over Voltage Control IC

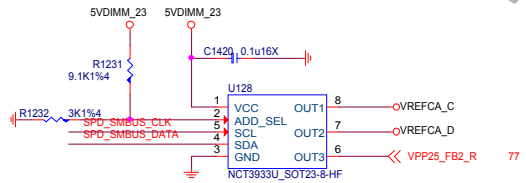
UPI VOLTAGE CONSOLE

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%

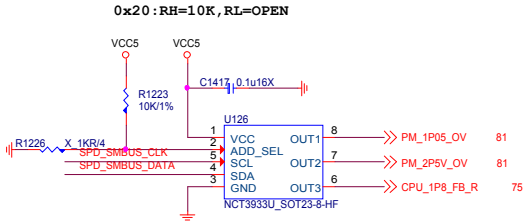
0x2A:RH=OPEN,RL=10K



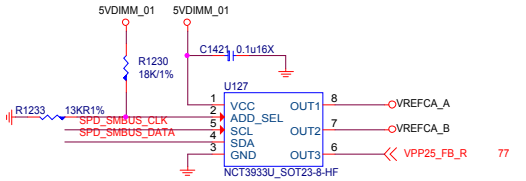
0x28:RH=9.1K,RL=3K



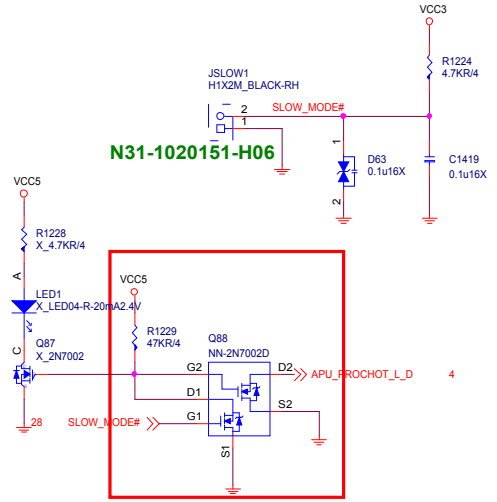
0x20:RH=10K,RL=OPEN



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



Slow Mode



N31-1020151-H06

MSI MICRO-STAR INT'L CO.,LTD.
Link to the Future

Title	Button/OV Control/NCT3933		
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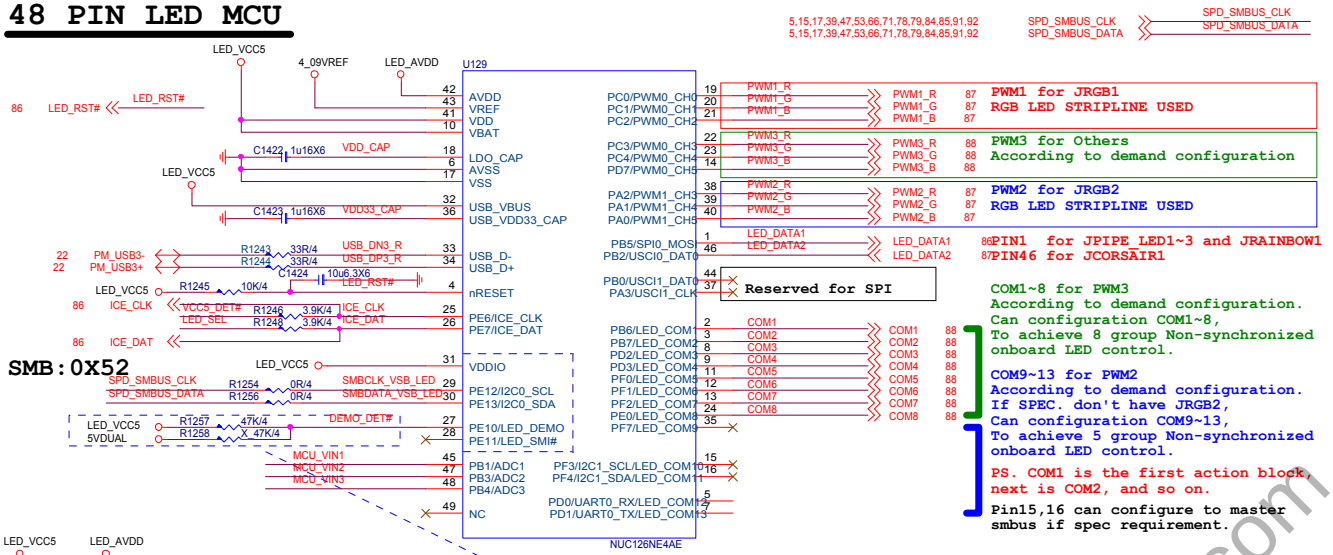
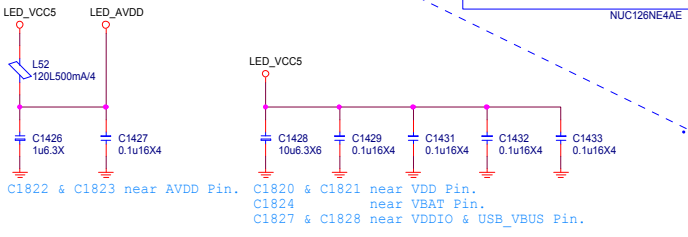
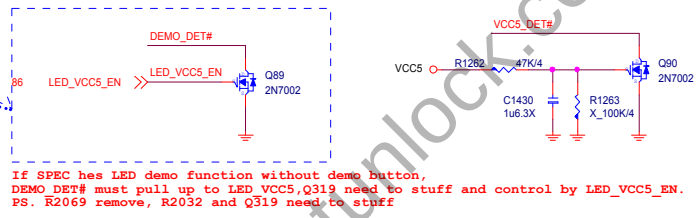
48 PIN LED MCU

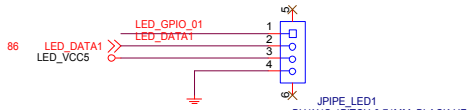


Control	Net Name	PWM USE
PCH	LED_DATA1	No Use
AUDIO Cover	LED_GPIO_01	No Use
MOS/IO cover	LED_GPIO_02	No Use
JRAINBOW1	LED_GPIO_03	No Use
JCORSAIR1	LED_DATA2	No Use
JRGB1/JRGB2	PWM1/ PWM2	PWM1/ PWM2
Board Side LED	COM 1~8	PWM3
Board Side LED	COM 9~13	PWM2

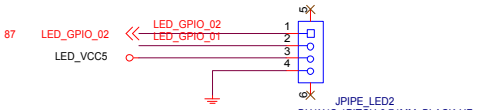




1 PCH HEATSINK LED
PCS LED*0.16W=W

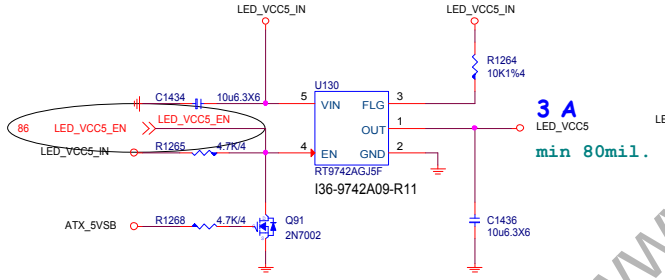


2 AUDIO/IO Cover LED
PCS LED*0.16W=W

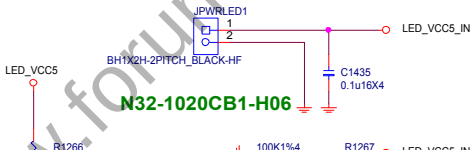


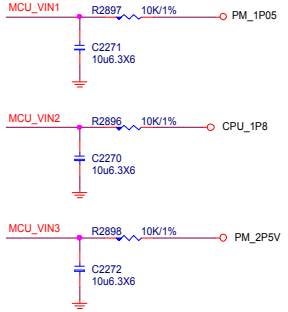
3 MOS HEATSINK LED
PCS LED*0.16W=W

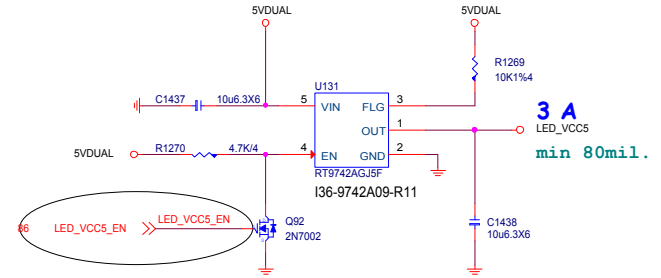
EXTERNAL POWER INPUT



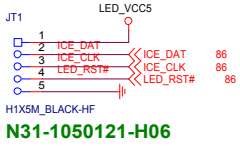
External Power

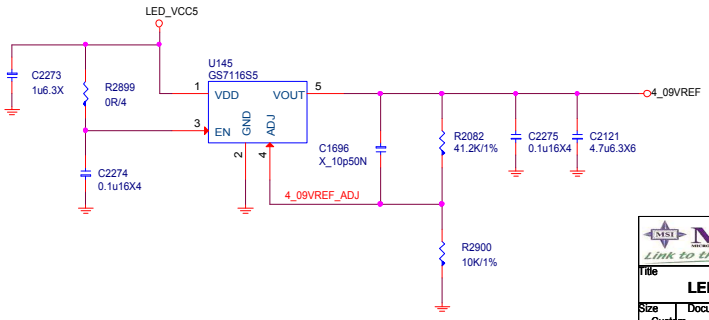






JT1 for FW update





JPIPE:PIN1:output ,PIN2:input
PIN2:MCU IN
PIN1:HEATSINK OUT

MICRO-START INT'L CO.,LTD.

Title: LED MCU Control		
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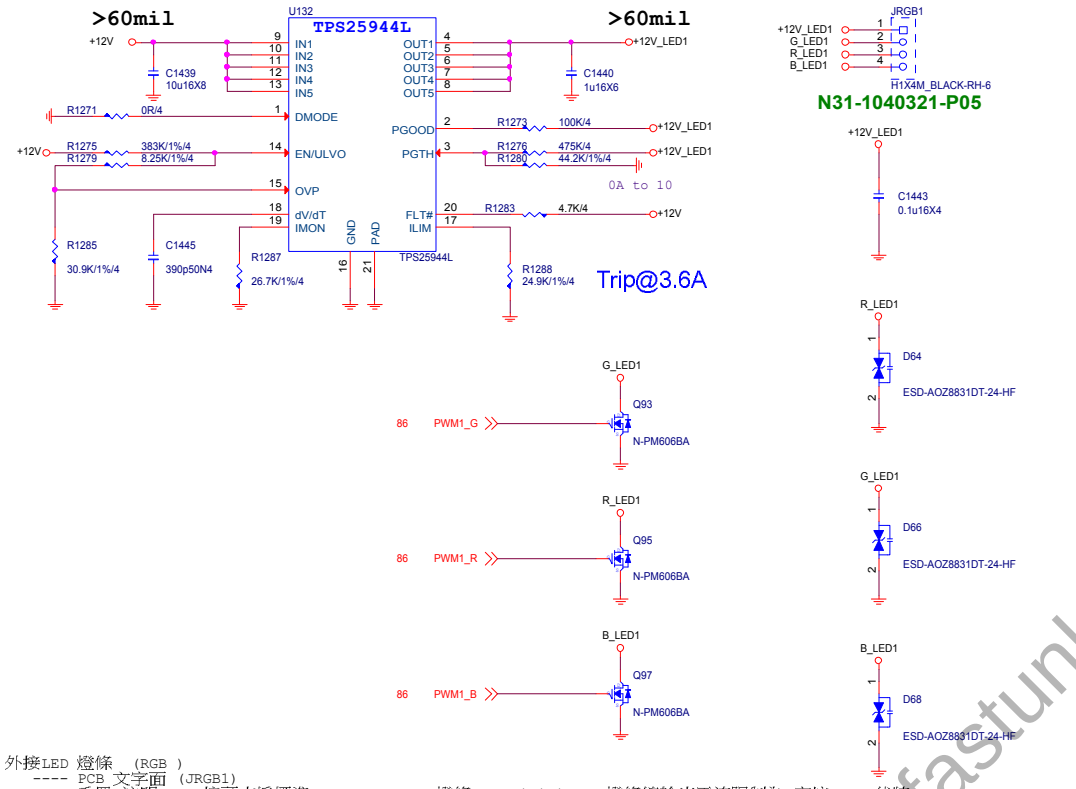
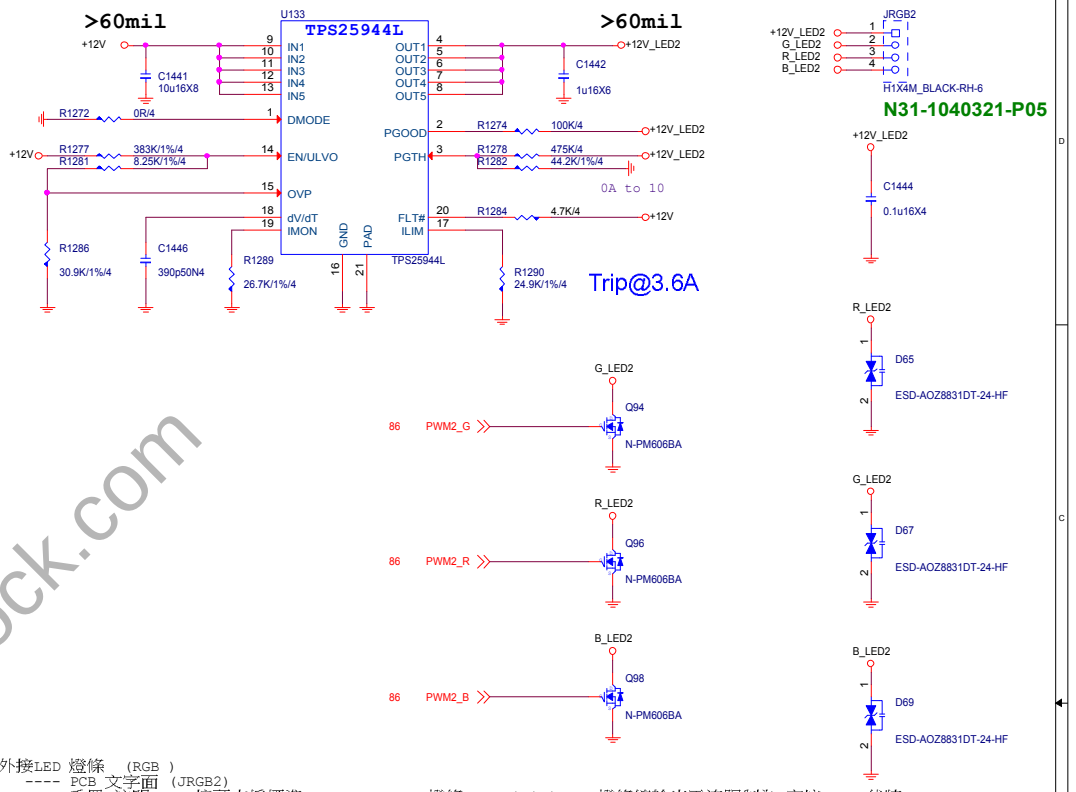
JRGB1



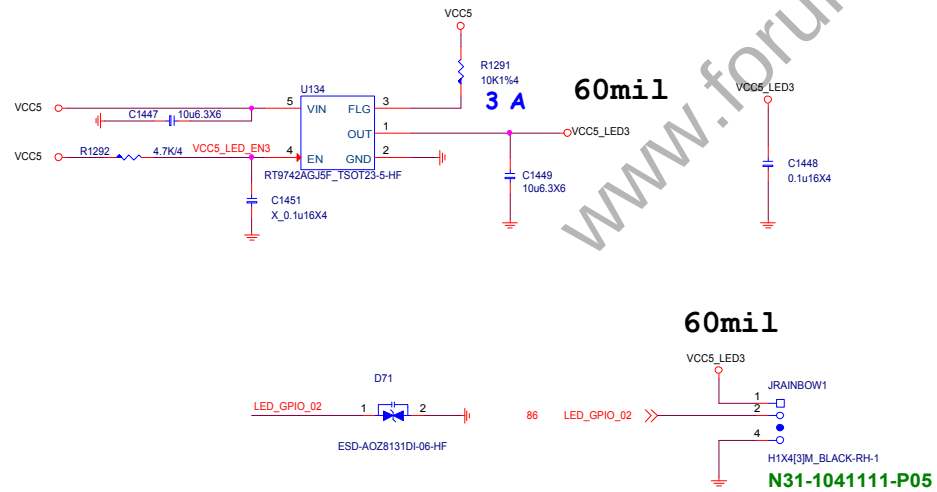
外接LED 燈條 (RGB)
---- PCB 文字面 (JRGB1)
---- 手冊 註明 RGB 接頭支援標準 5050 RGB LED 燈條 (12V/G/R/B) , 燈條總輸出電流限制為3安培 (12 伏特) , 長度限制為2公尺

JRGB2

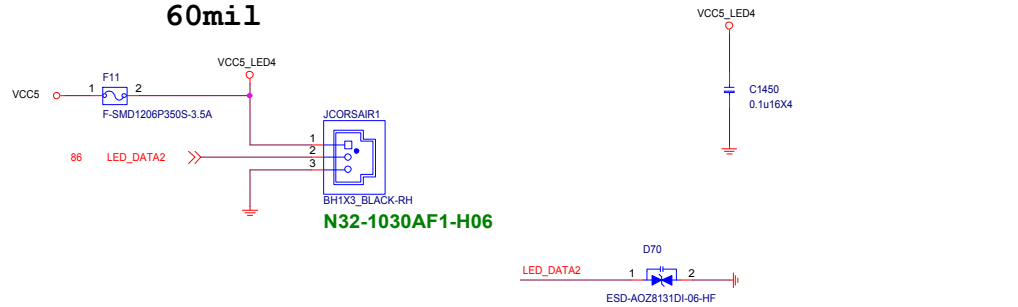


外接LED 燈條 (RGB)
---- PCB 文字面 (JRGB2)
---- 手冊 註明 RGB 接頭支援標準 5050 RGB LED 燈條 (12V/G/R/B) , 燈條總輸出電流限制為3安培 (12 伏特) , 長度限制為2公尺

JRAINBOW1



JCORSAIR1



MICRO-STAR INT'L CO.,LTD		
MS-7B92		
Size: Custom	Document Description: LED JRGB/JCORSAIR/JRAINBOW	Rev: 10
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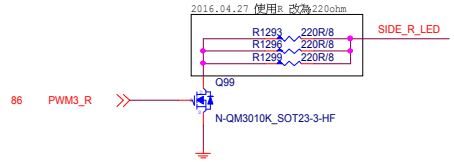
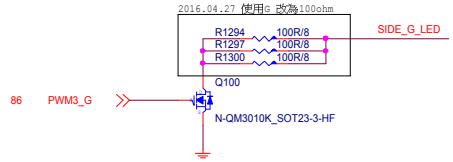
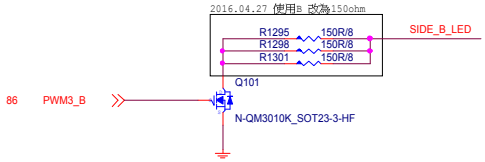
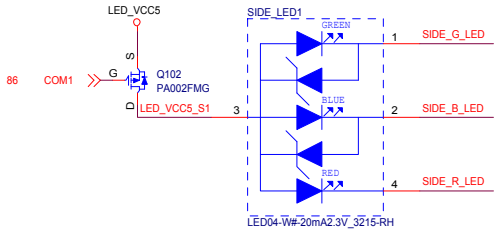
BOARD SIDE LED*8 SET FORM MCU

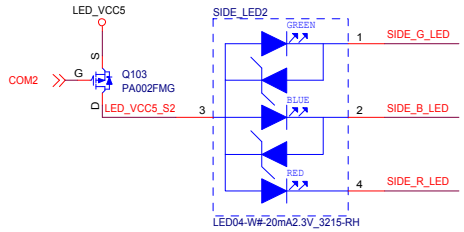




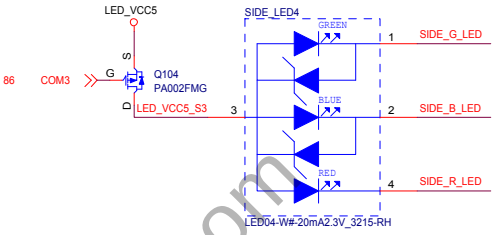




D0C-040U700-H91



D0C-040U700-H91



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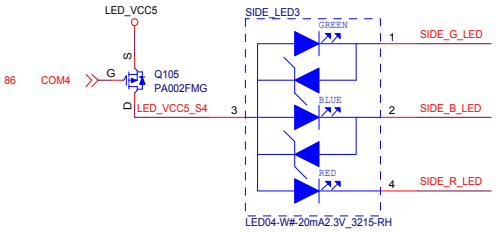

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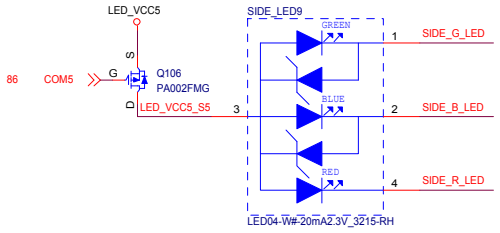

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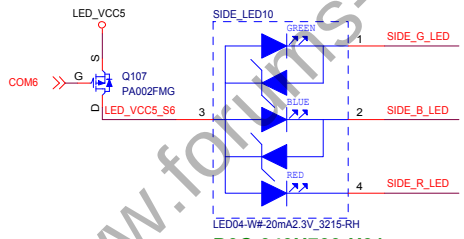

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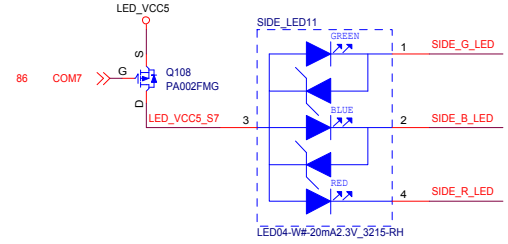

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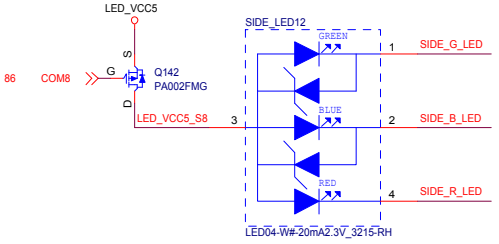

D0C-040U700-H91

MICRO-STAR INT'L CO.,LTD

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PCIE_SLOT LED*4

FORM SIO

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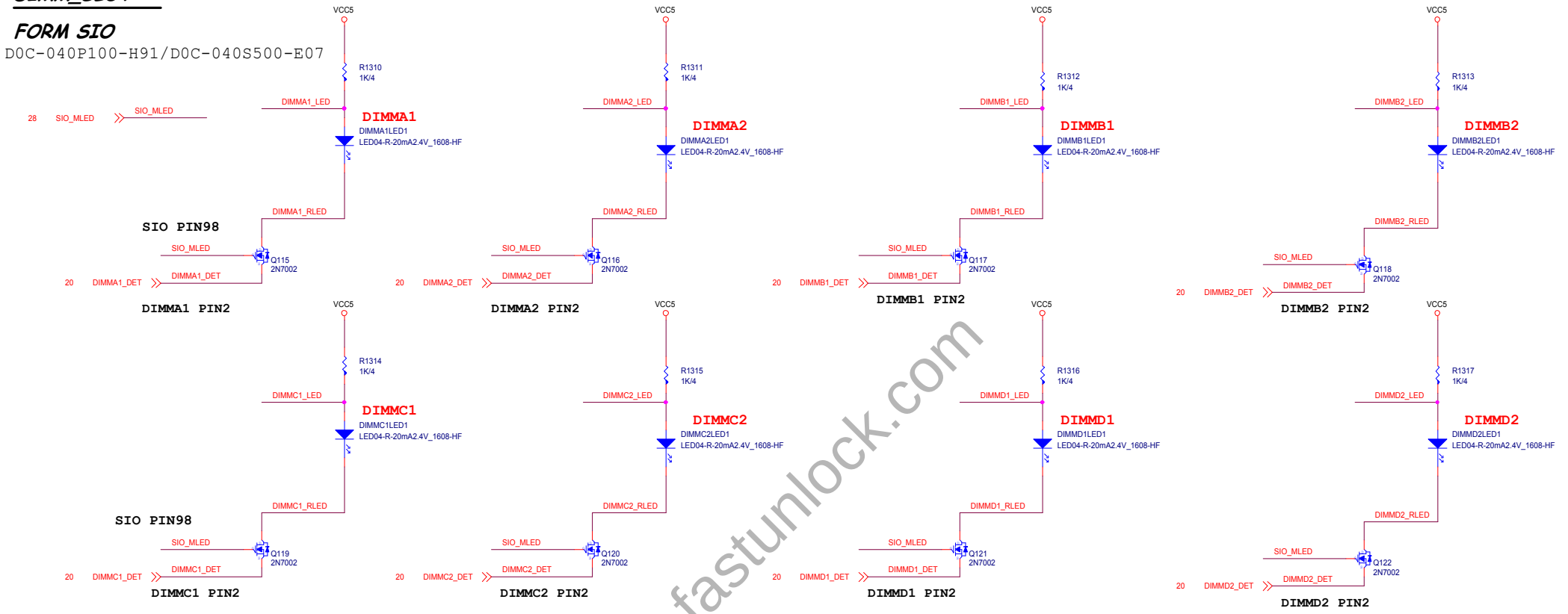
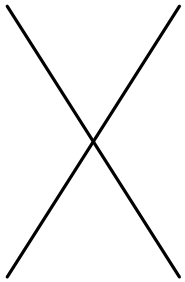
DIMM_SLOT

FORM SIO

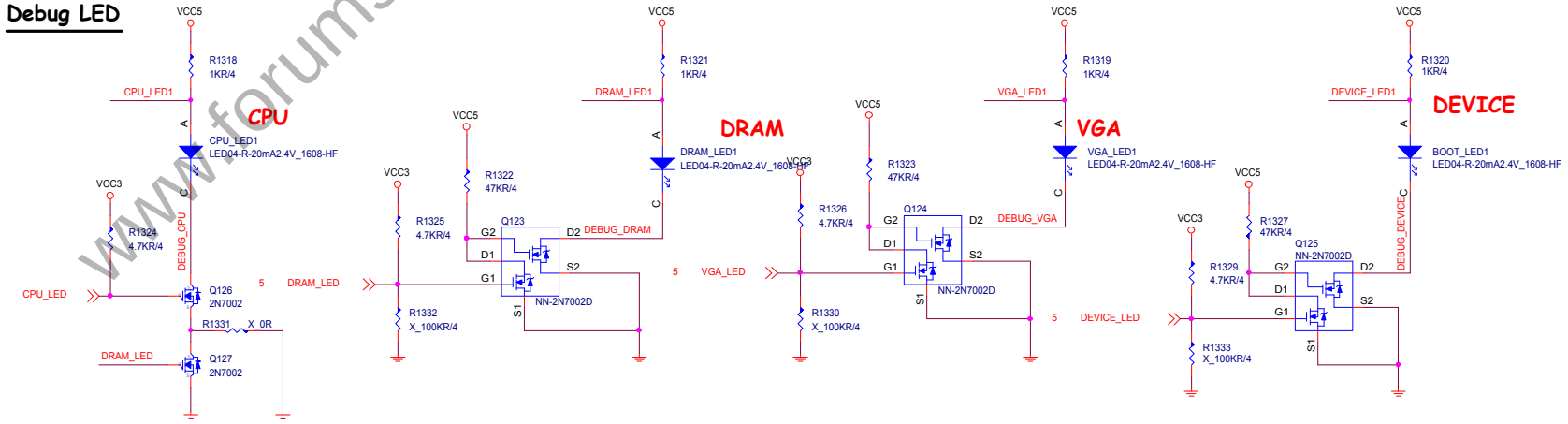
D0C-040P100-H91/D0C-040S500-E07



AMD AMP Detect LED



Debug LED



LED \ GPIO	AGPIO84_0	AGPIO85_0	EGPIO84_1	EGPIO85_1
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)

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Link to the Future

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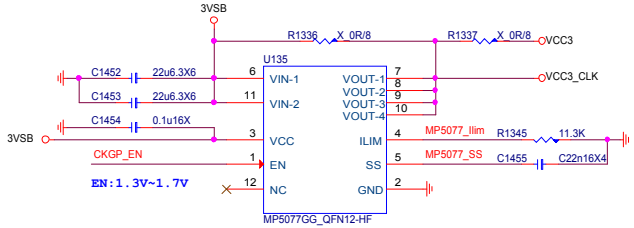
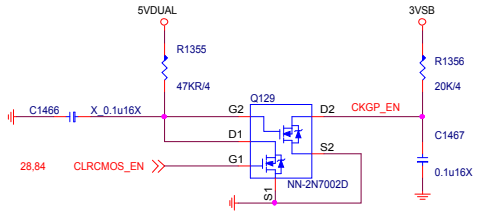
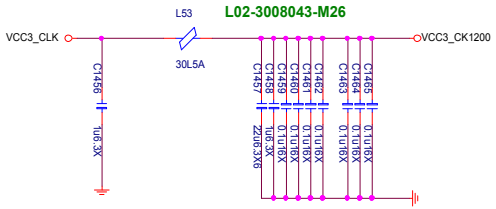
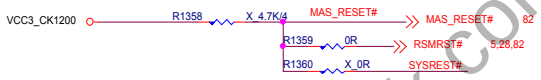
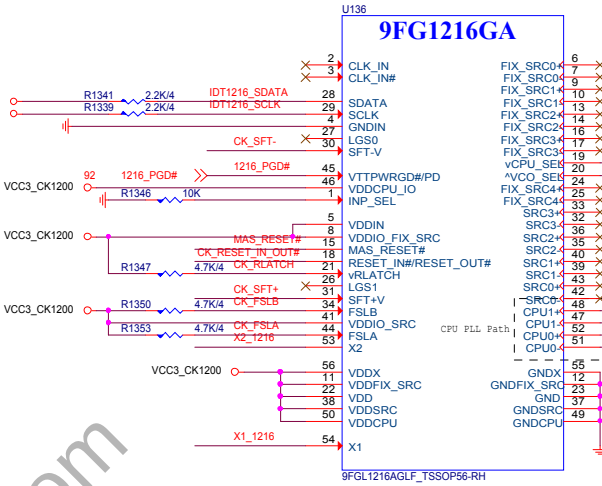
CLOCK GEN

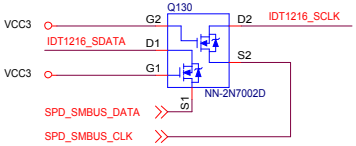




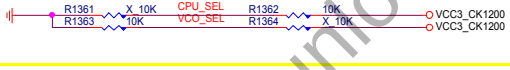


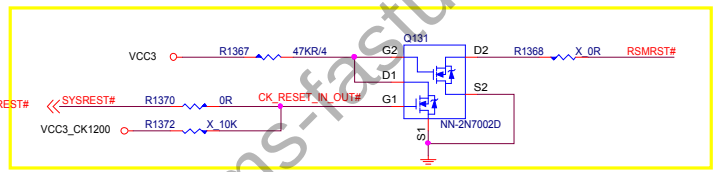


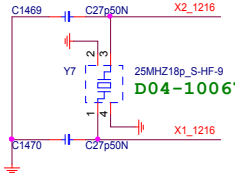


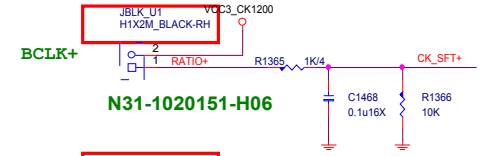


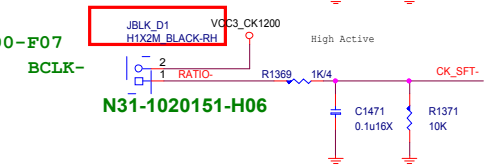
Input latch pin to select CPUCLK PLL source.
0 = SRC PLL (default), 1 = CPU PLL



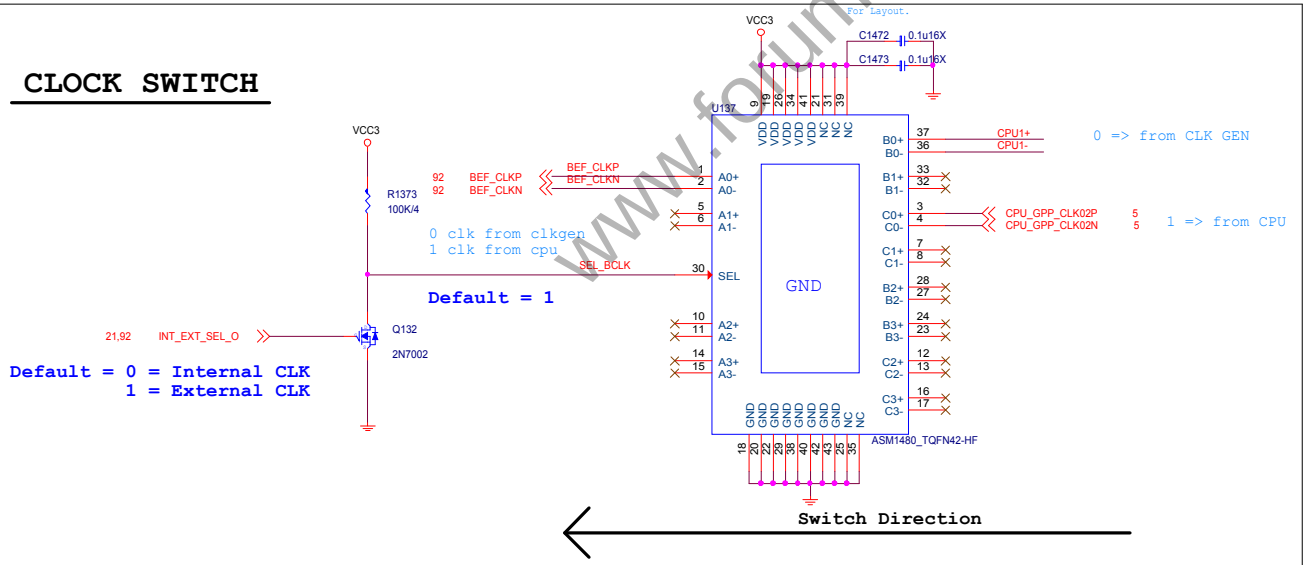




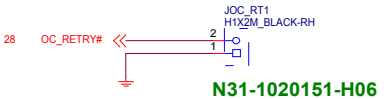




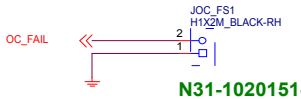
CLOCK SWITCH



OC Retry Botton



OC Fail Setting Botton



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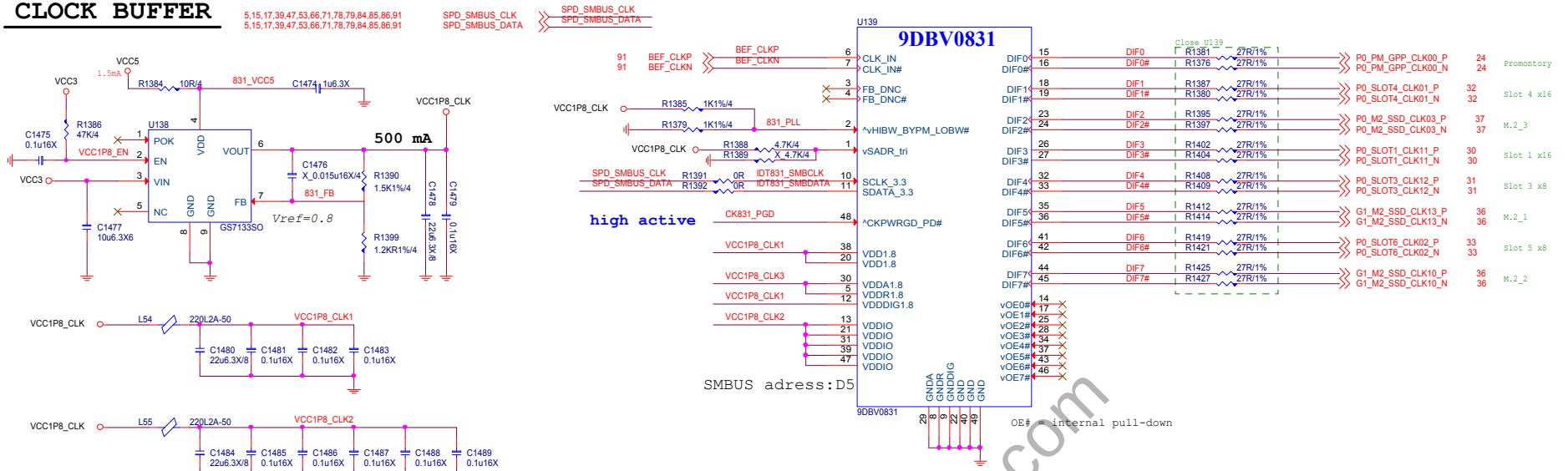
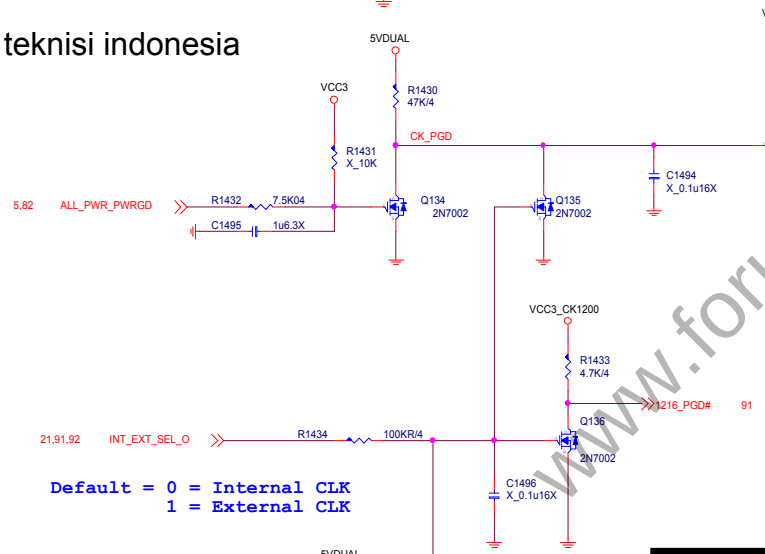
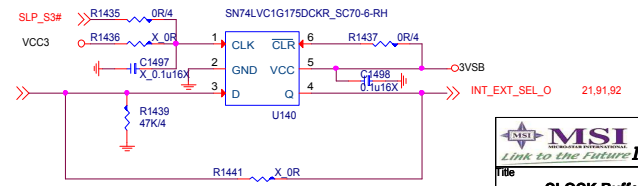
CLOCK BUFFER



teknisi indonesia



INPUTS			OUTPUTS
CLR	CLK	D	Q
H	↑	L	L
H	↑	H	H
H	H or L	X	Qo
L	X	X	L



MICRO-START INT'L CO.,LTD.

Title	CLOCK Buffer0831	
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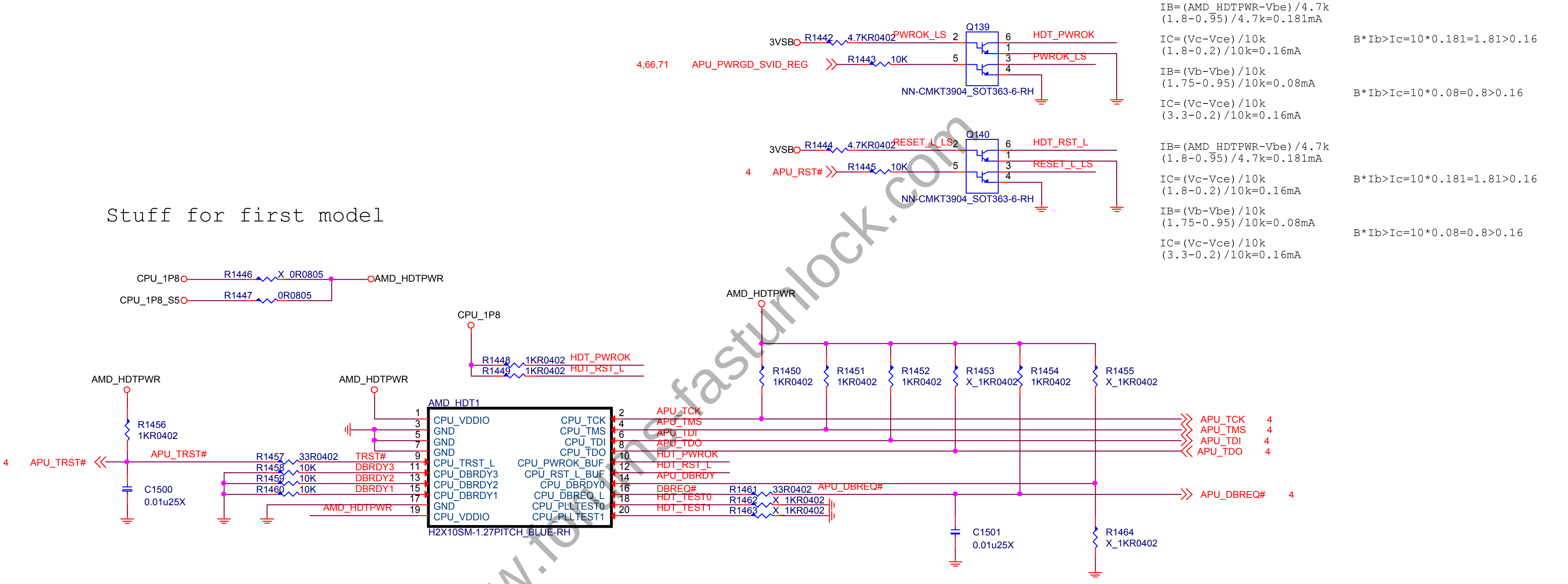

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Title: **APU HDT DEBUG**

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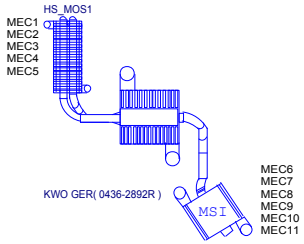
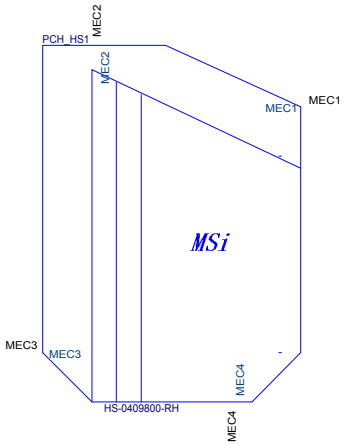
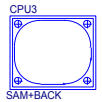
HEAT SINK

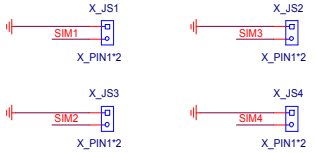




CPU Socket



Simulation



MANUAL PART

AMI1
AMI LABEL
G51-M1SPXXA-A09

CFOS1
Label
VIRTUAL
CFOS
Y02-MU00170-CFO

NAHIMIC1
Label
BUNDLE
NAHIMIC
Y02-MU00100-NAH

SLI1
Label
VIRTUAL
SLI
Y01-RNVIDIN-000

MKT1
Label
BUNDLE
X_MKT
G51-M1SPL82-Q13

XSPLIT1
Label
BUNDLE
X_XSPLIT
Y02-MA00401-XSP

SSE1
Label
VIRTUAL
X_SSE
Y02-MA00101-SSE

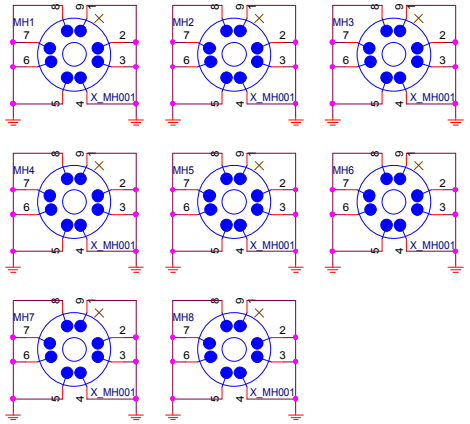

BAT1_X1
BAT-CR2032-RH
D06-0100101-P01

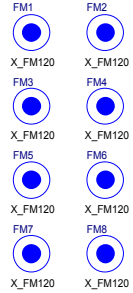

PCB1
7B92-1.1

PD0-07B9211-G37,精成-深圳,204,寶安恩斯邁廠(MSIS)

PD0-07B9211-G37,精成-深圳,1,台北微星廠(MSI)

Optics Orientation Holes





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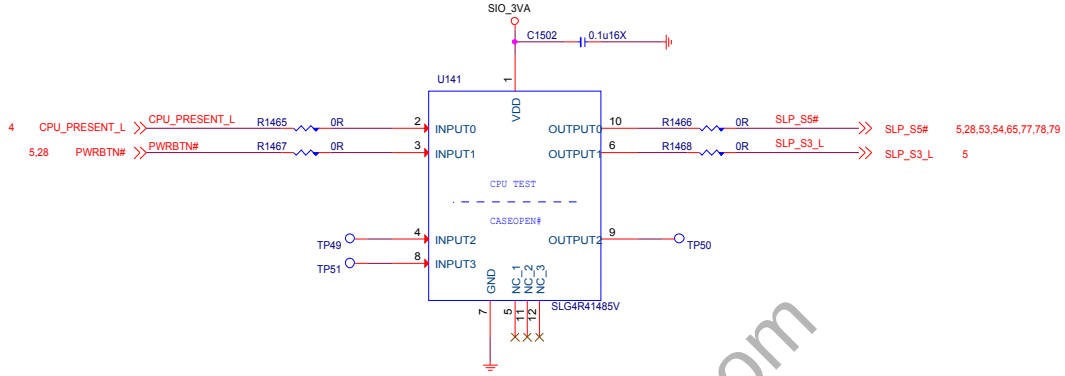
Add for EMI



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