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# MS-7A63

## Intel -Kabylake plamform Z270

ATX

Ver: 11

CPU:

System Chipset:

*kabylake-S*

*Z270*

Onboard Chip:

*HD Audio Codec:ALC1220*

*LAN:INTEL I219*

*SIO:Nuvoton 6795*

*Flash ROM: SPI 128MB*

Main Memory:

*DDRIV (800/1066/1333/1600/2133MHz) \* 4 (Dual Channel)*

ACPI:

PWM:

*NIKO/UPI*

*UPI9508*

Expansion Slots:

Other:

*PCI Express (X16) Slot \*1*

*PCI Express (X8) Slot \*1*

*PCI Express (X4) Slot \* 1*

*PCI Express (X1 ) Slot \* 3*

*M2 \* 2*

*SATA3.0 x6 (PCH)*

*FRONT USB2.0 \*4*

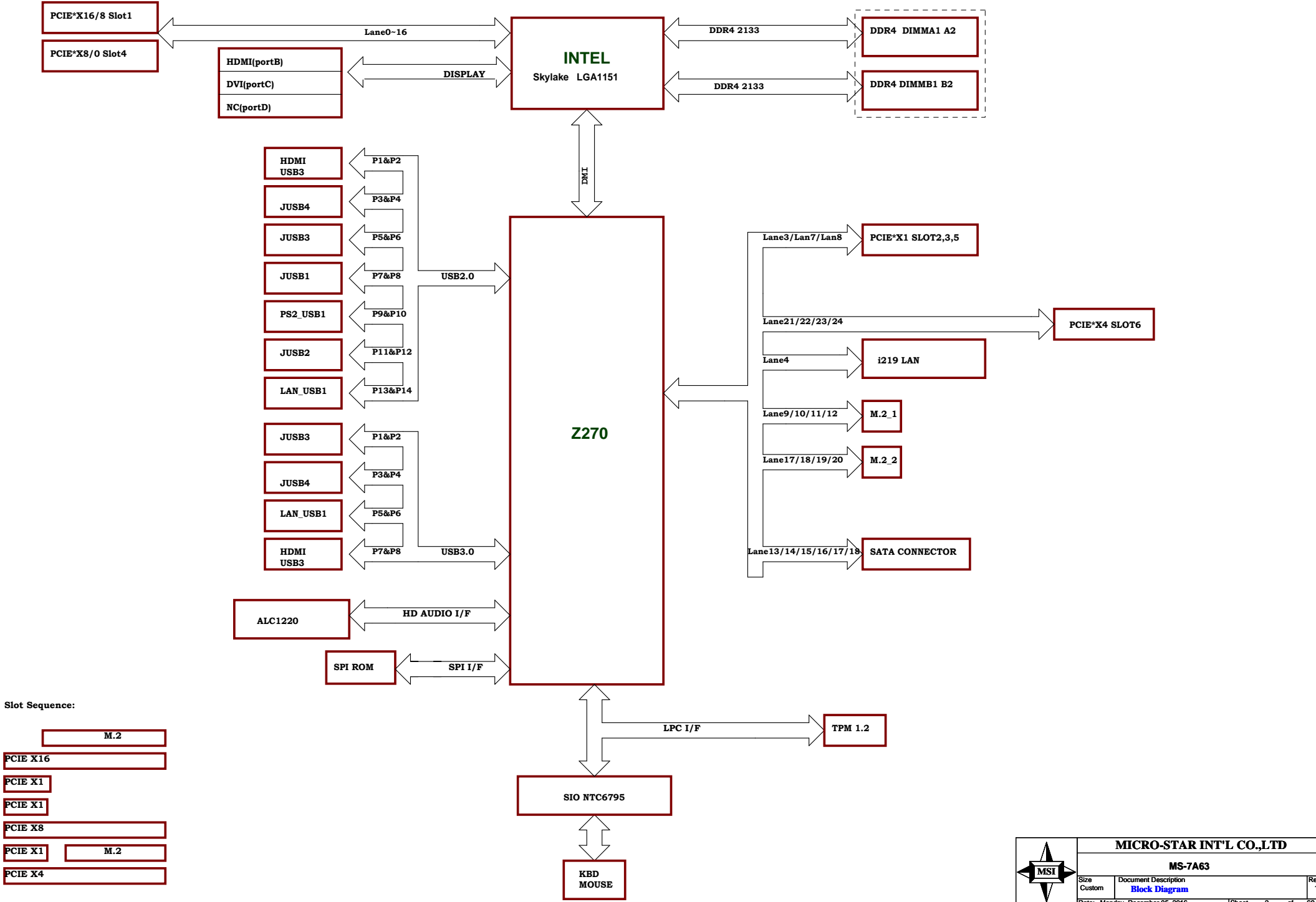
*FRONTUSB3.0 \*4*

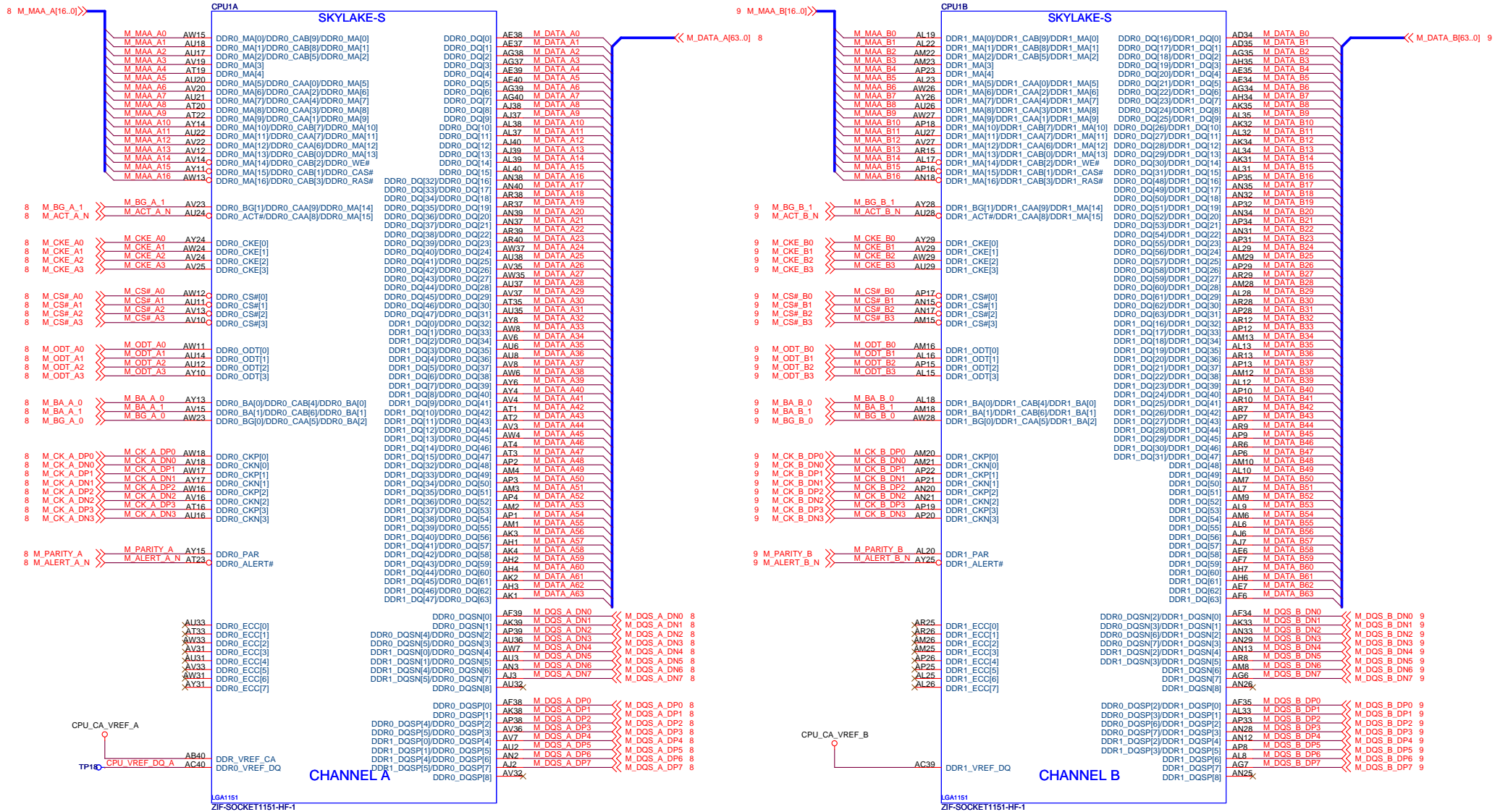
*REAR USB3.0 \*4*

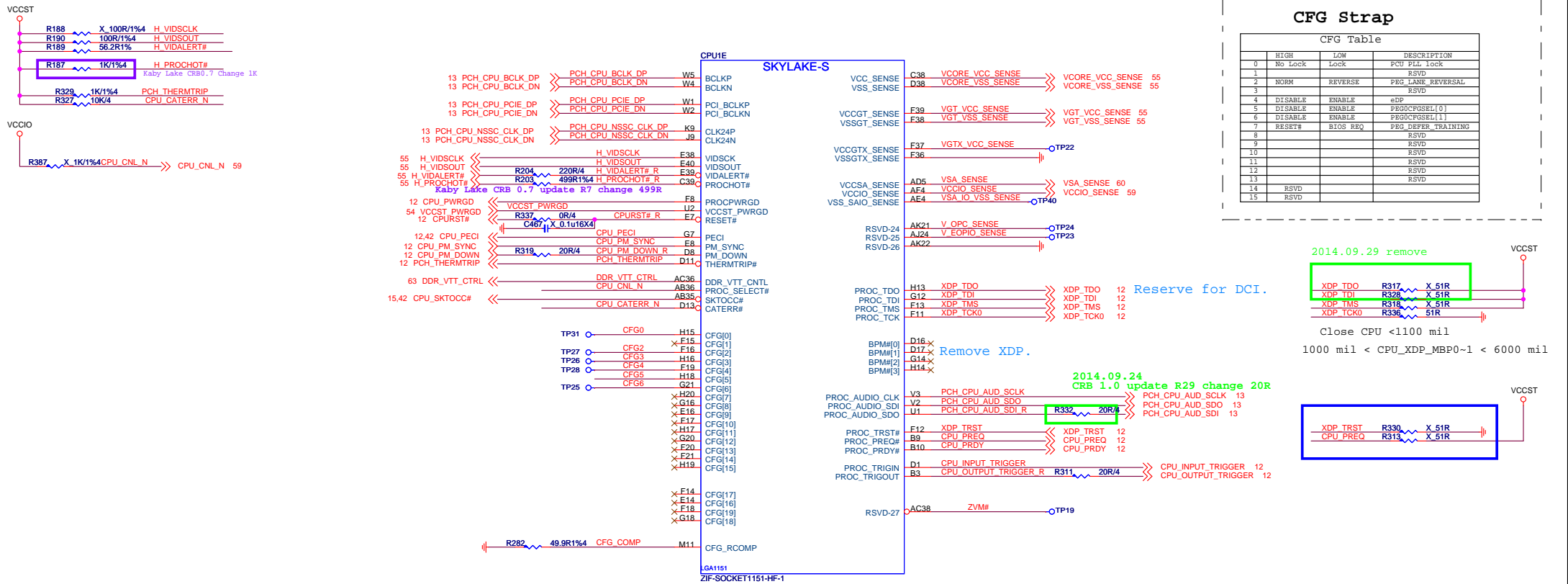
*REAR USB2.0 \*2*

*REAR USB TYPE A+C*

# MS-7A63 Block Diagram

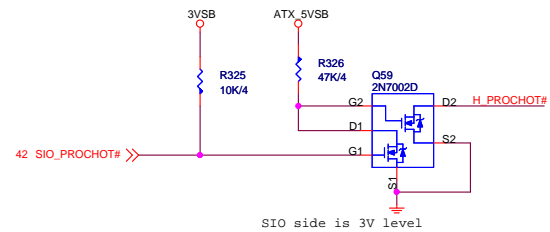
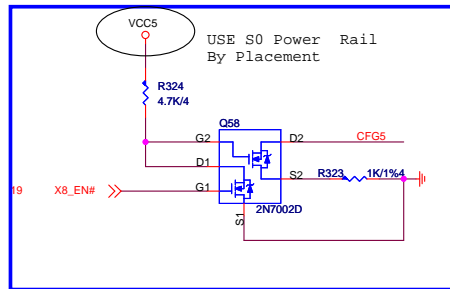






X8 Ctrl

ENABLE#	SLOT1	SLOT4
X8		
0	X8	X8
1	X16	X0



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### CFG Strap

CFG Table

	HIGH	LOW	DESCRIPTION
0	No Lock	Lock	PCU PLL lock
1			RSVD
2	NORM	REVERSE	PEG_LANE_REVERSAL
3			RSVD
4	DISABLE	ENABLE	eDP
5	DISABLE	ENABLE	PEG0CFGSEL[0]
6	DISABLE	ENABLE	PEG0CFGSEL[1]
7	RESET#	BIOS REQ	PEG_DEFER_TRAINING
8			RSVD
9	PRESENT	NO PRESENT	SVID PRESENT
10			RSVD
11			RSVD
12			RSVD
13			RSVD
14	RSVD		
15	RSVD		

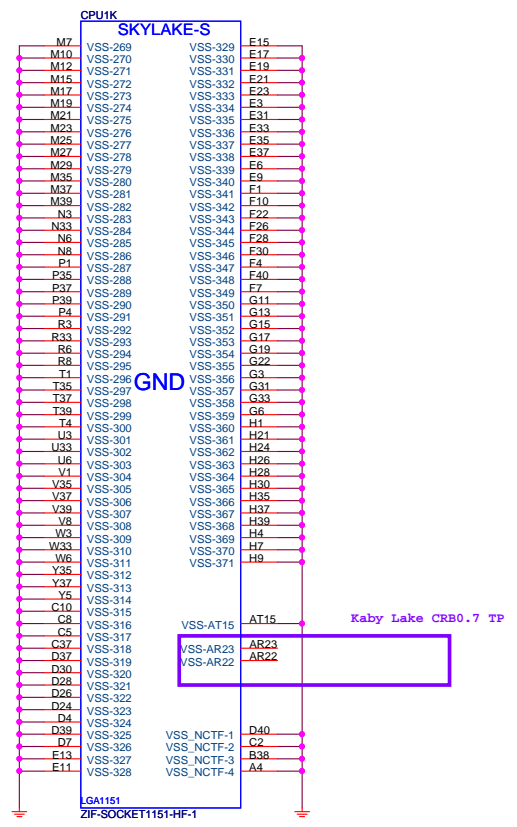
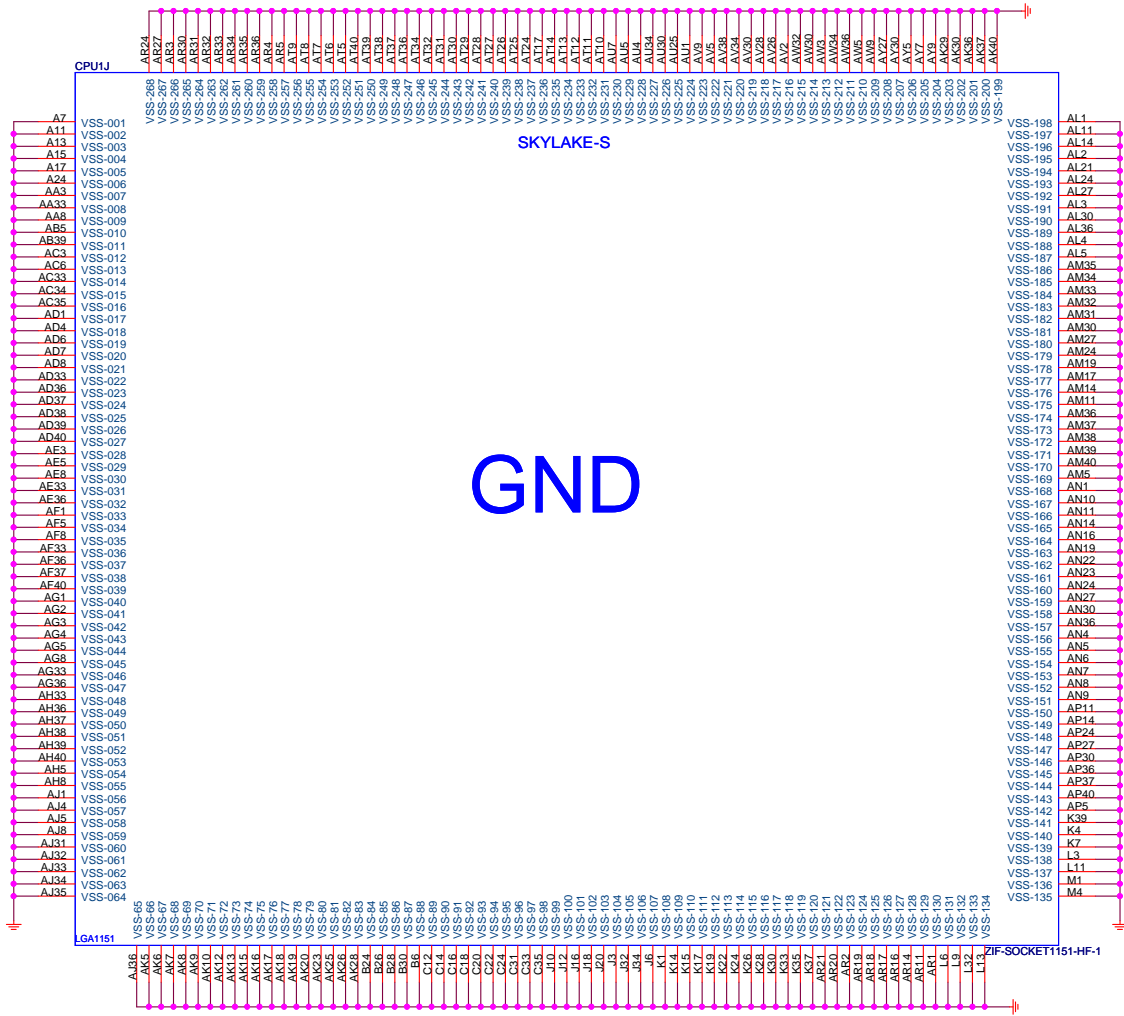


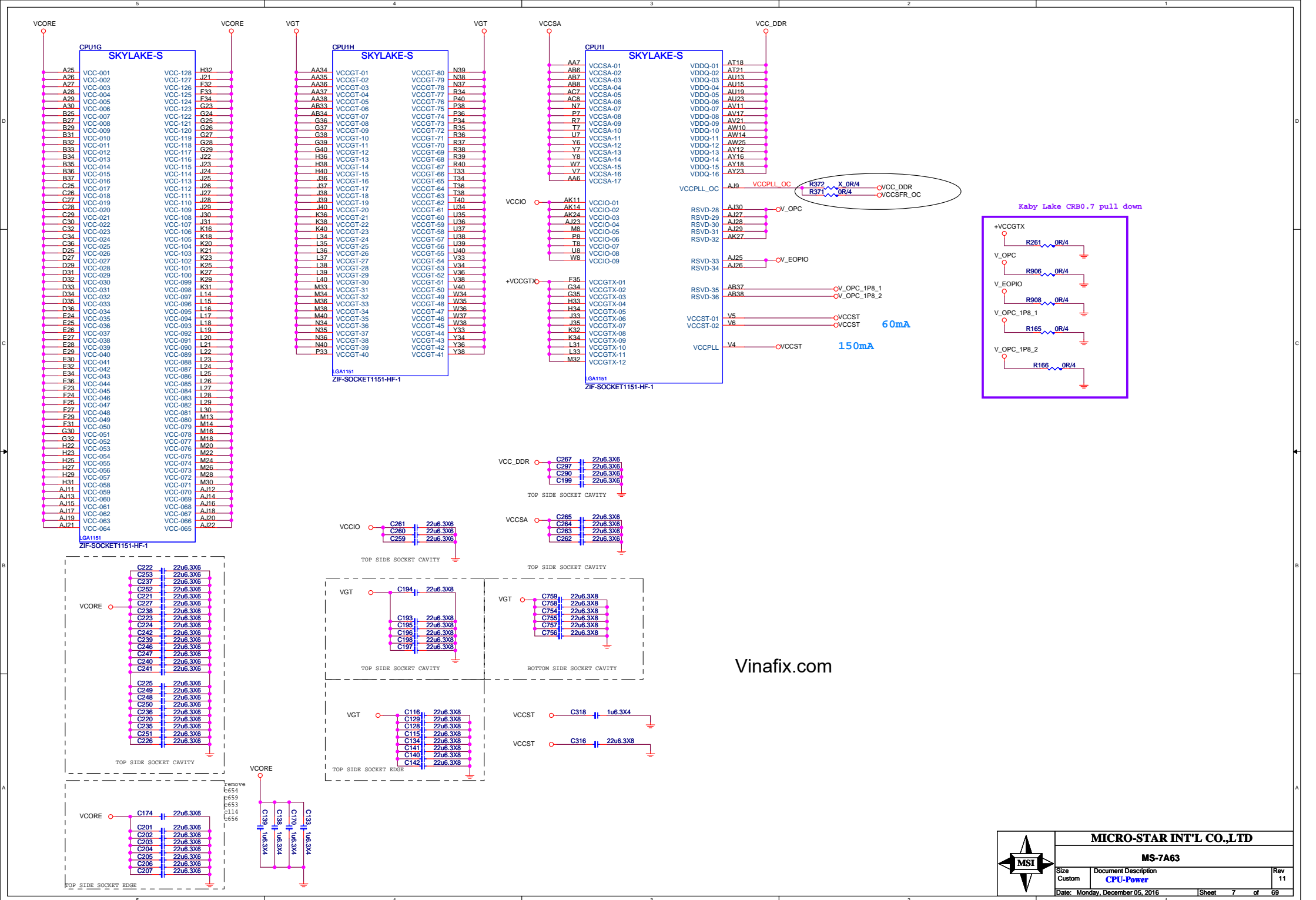
MICRO-STAR INT'L CO.,LTD

MS-7A63

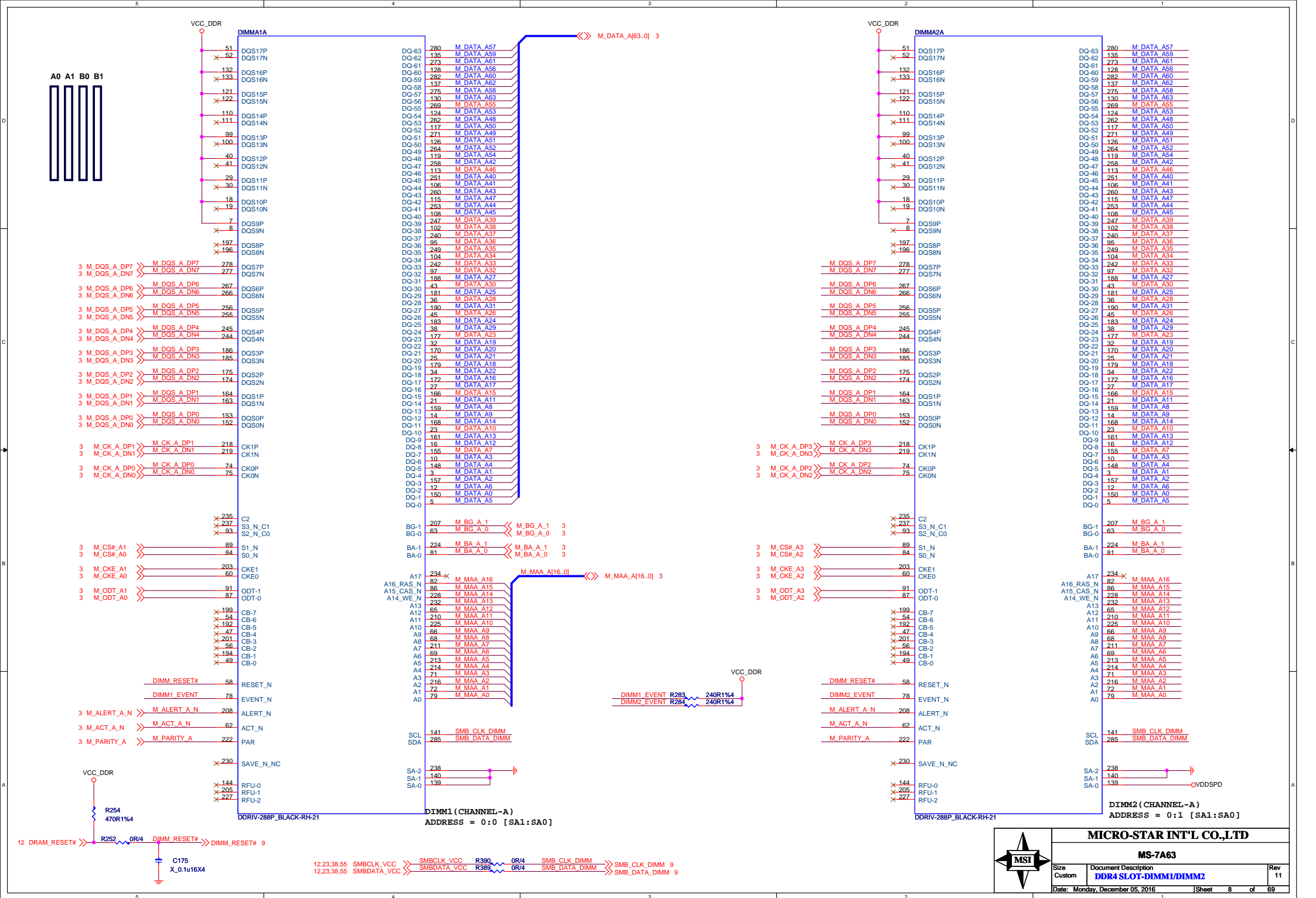
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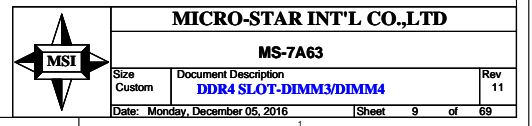


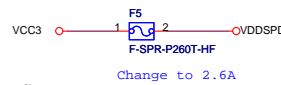




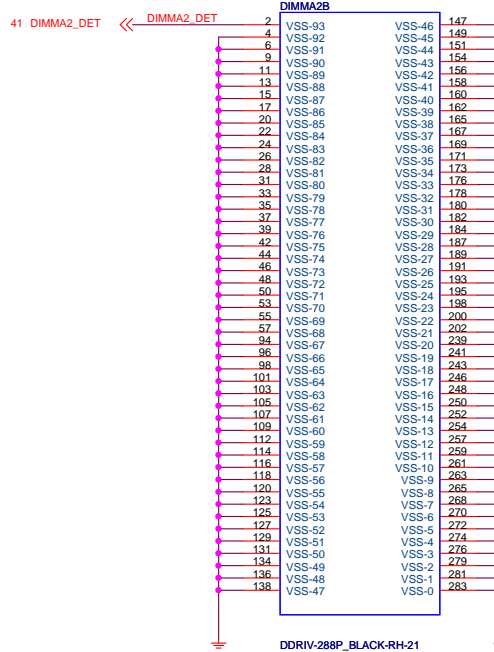
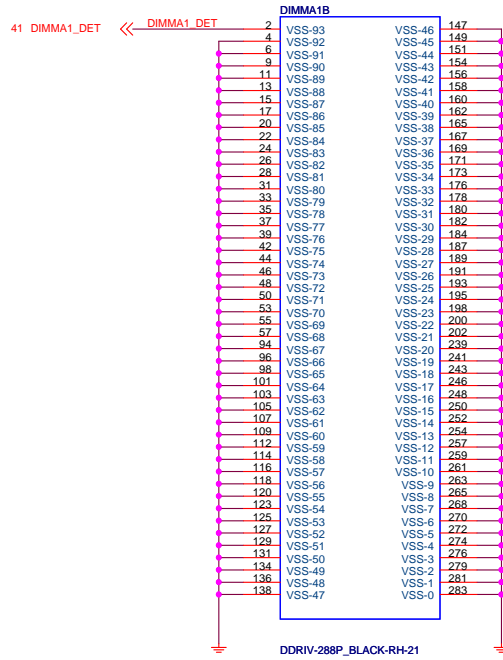
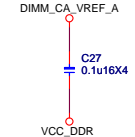
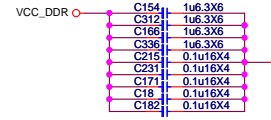
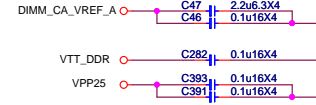
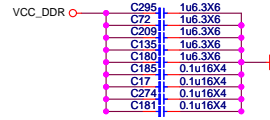
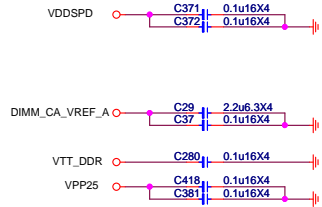
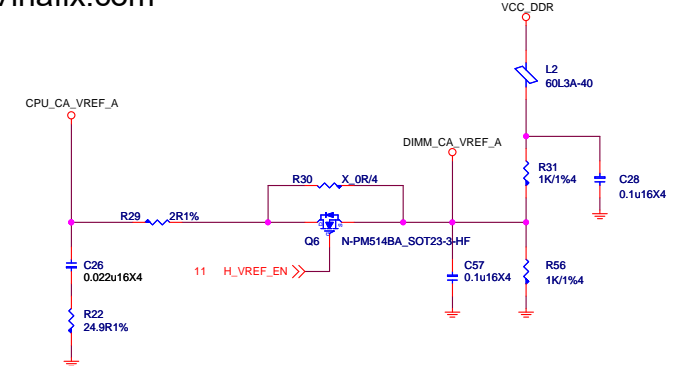
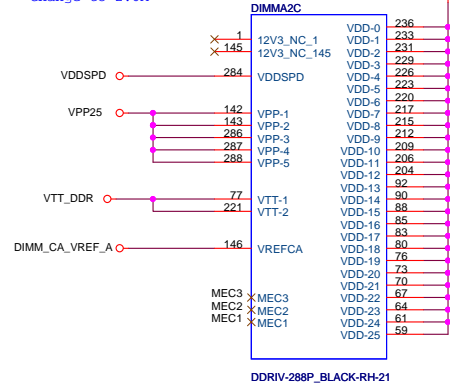
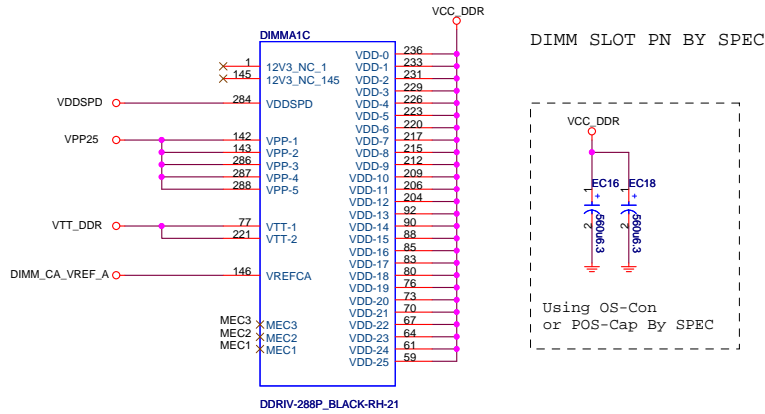








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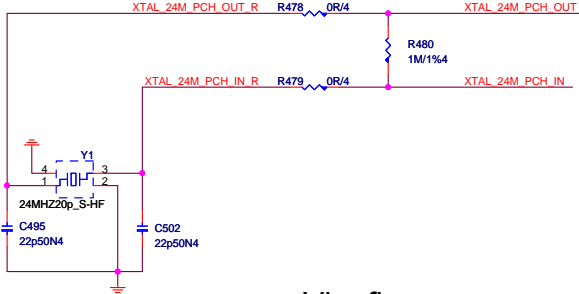
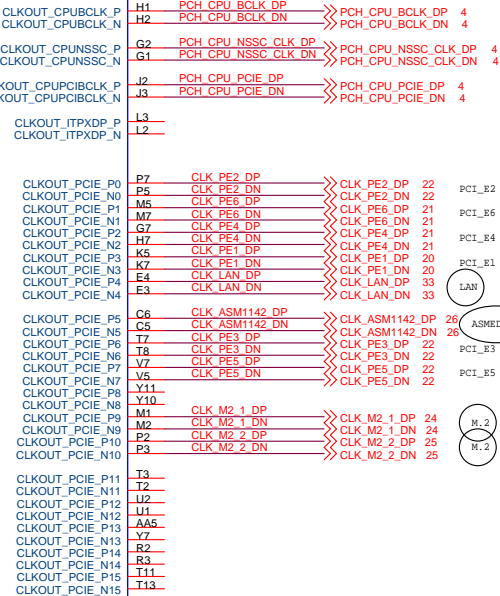
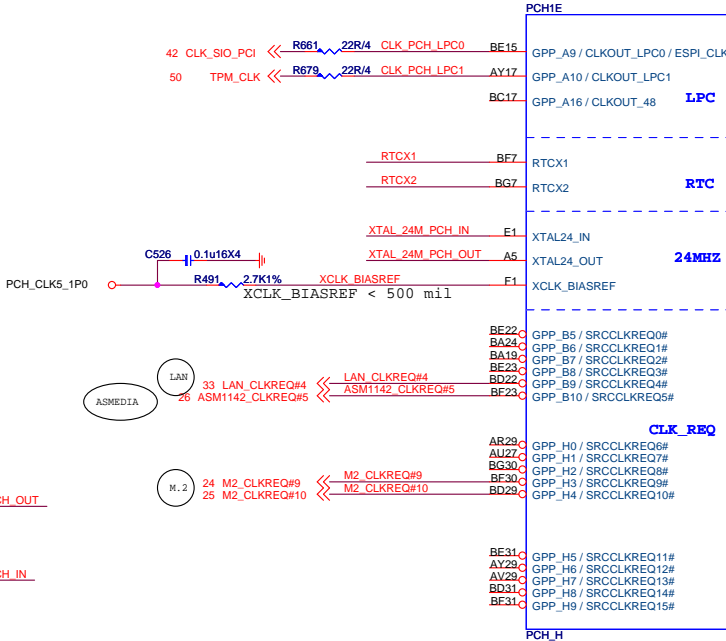
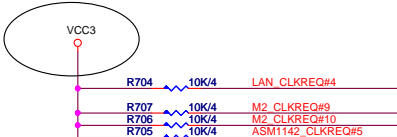
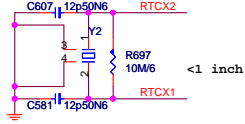


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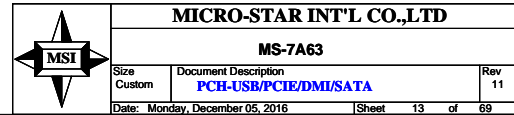
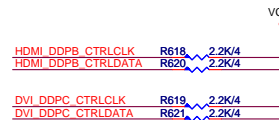
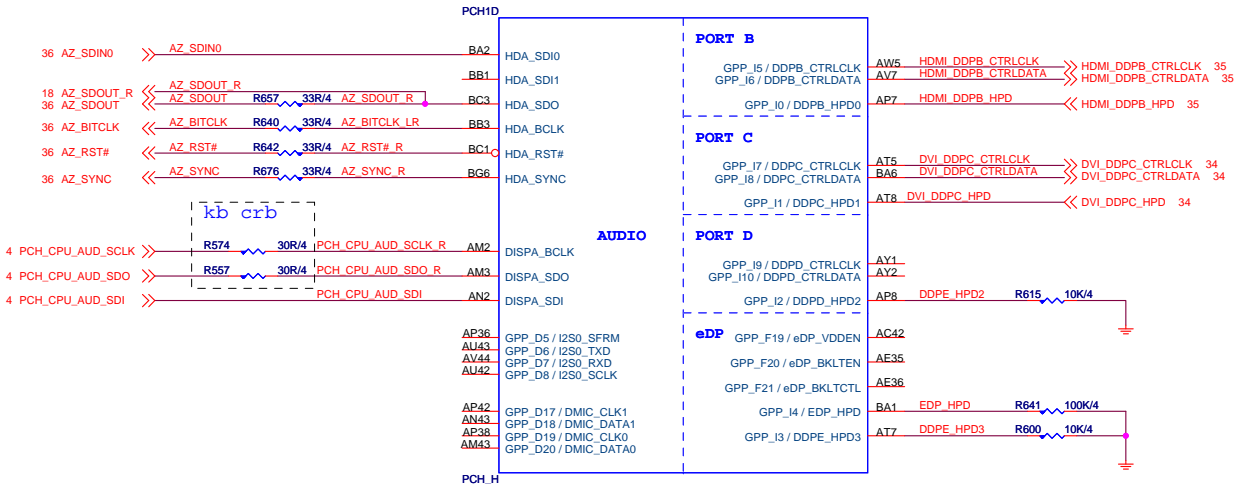
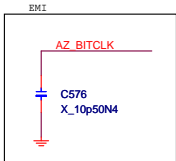
## PCH\_CLK

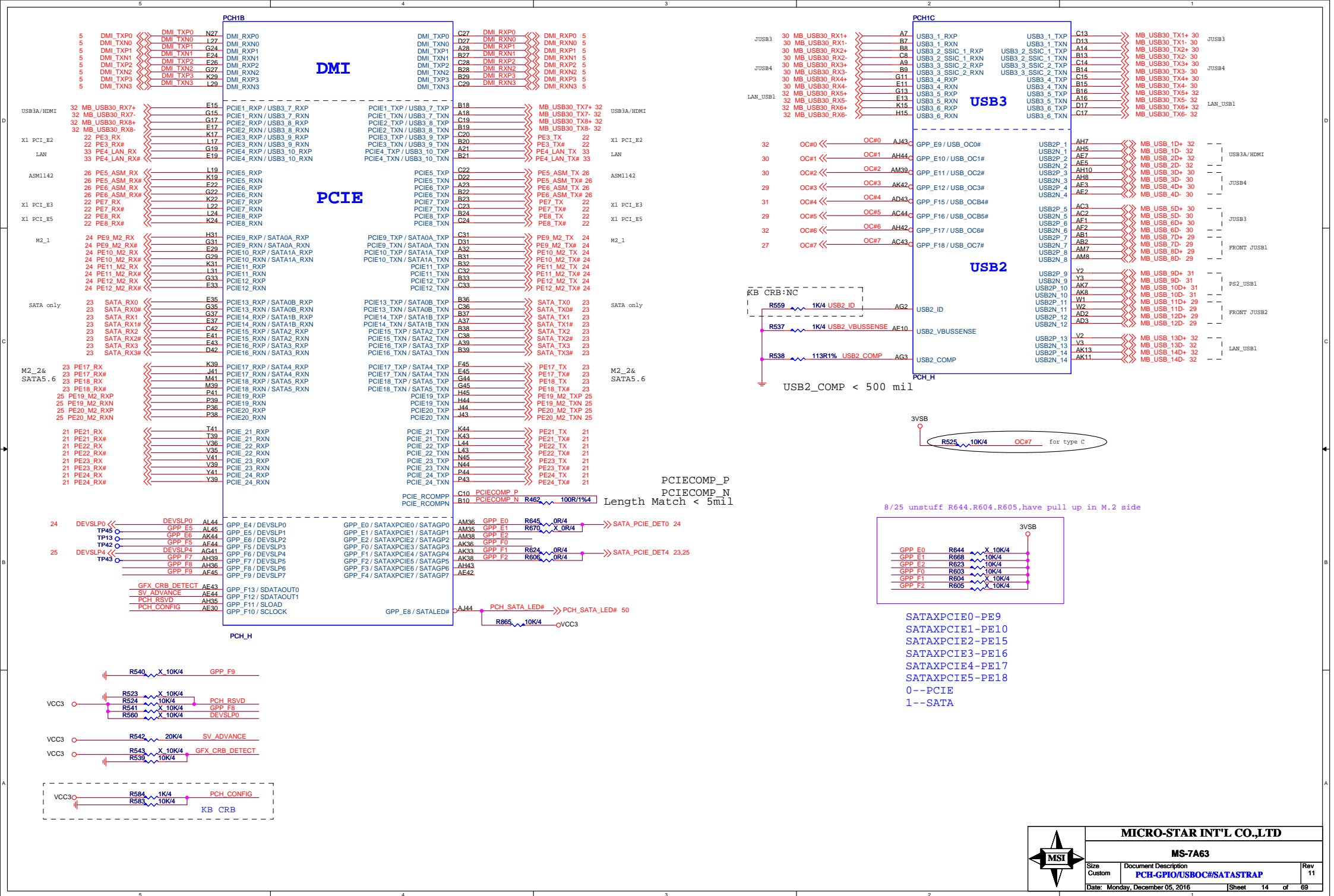
### RTC Block

Close to PCH



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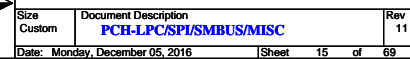
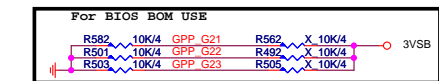


D

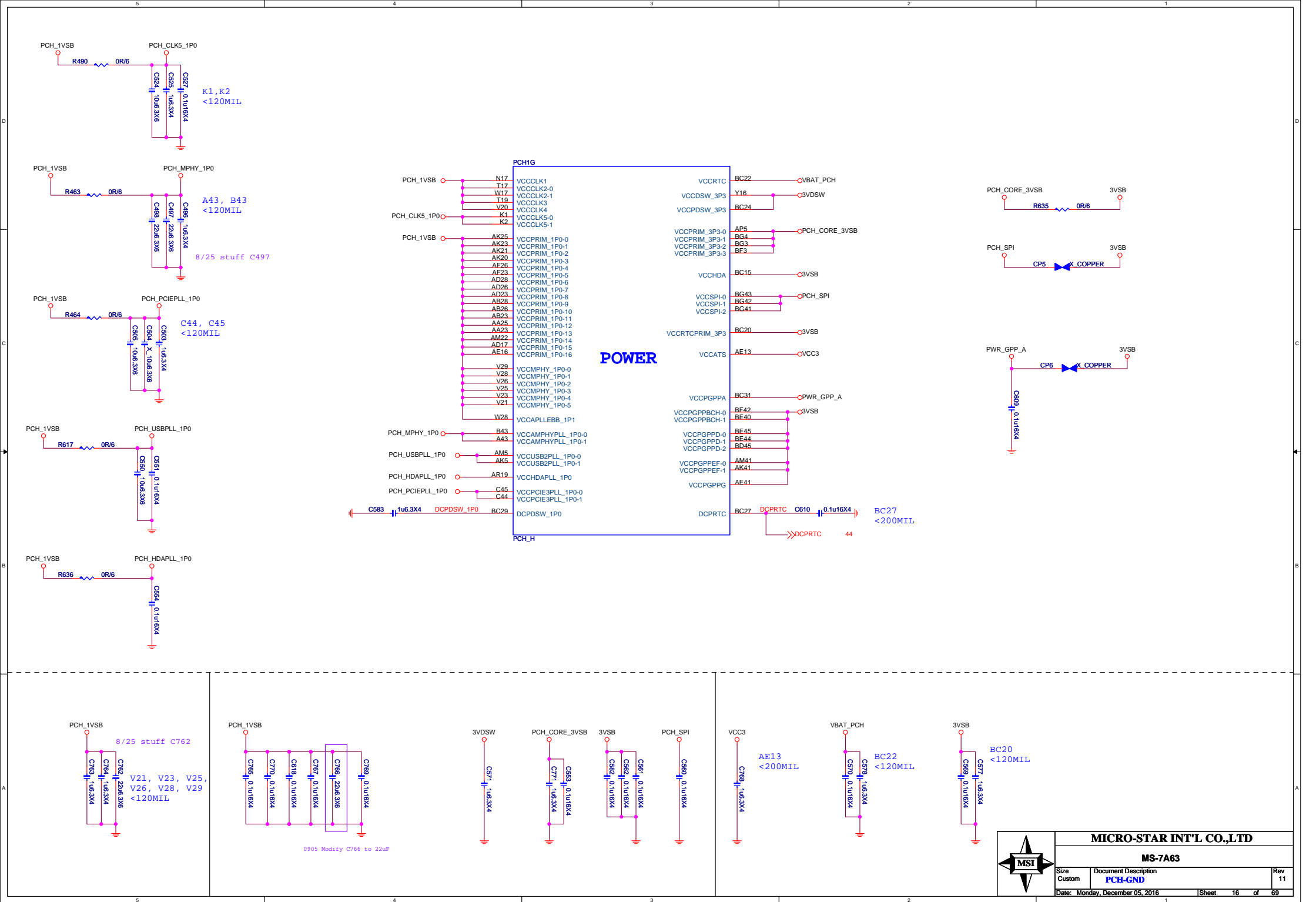
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A

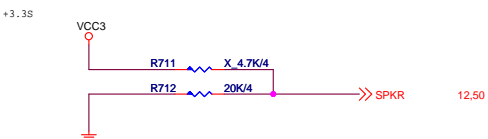






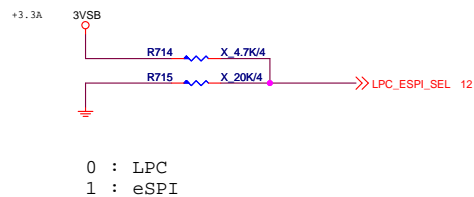
# VSS

TOP Swap



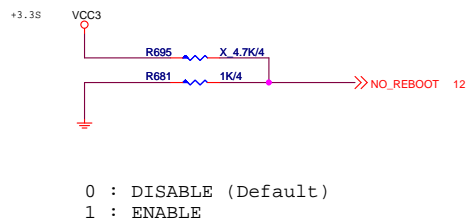
Internal pull-down is disabled after PLTRST#

LPC eSPI Mode



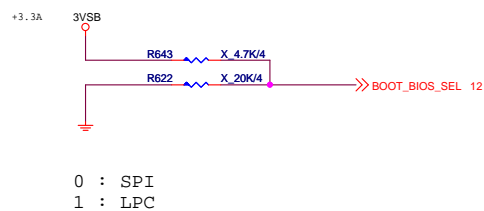
Internal pull-down is disabled after RSMRST

No Reboot



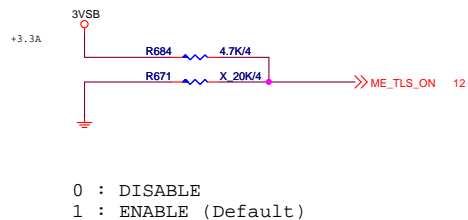
Internal pull-down is disabled after PLTRST#

Boot BIOS



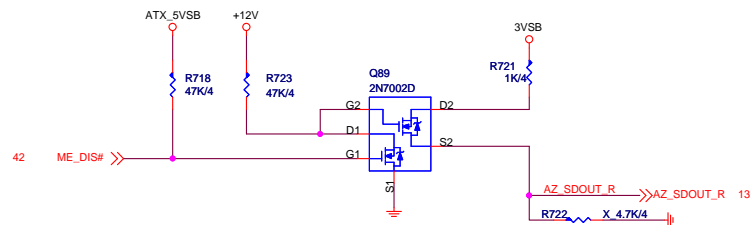
Internal pull-down is disabled after PLTRST

AMT and SBA with confidentiality

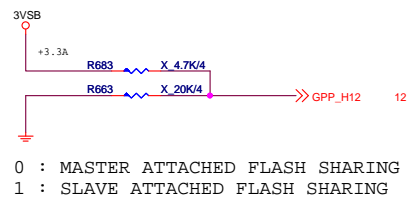


Internal pull-down is disabled after RSMRST

HDA\_SDO



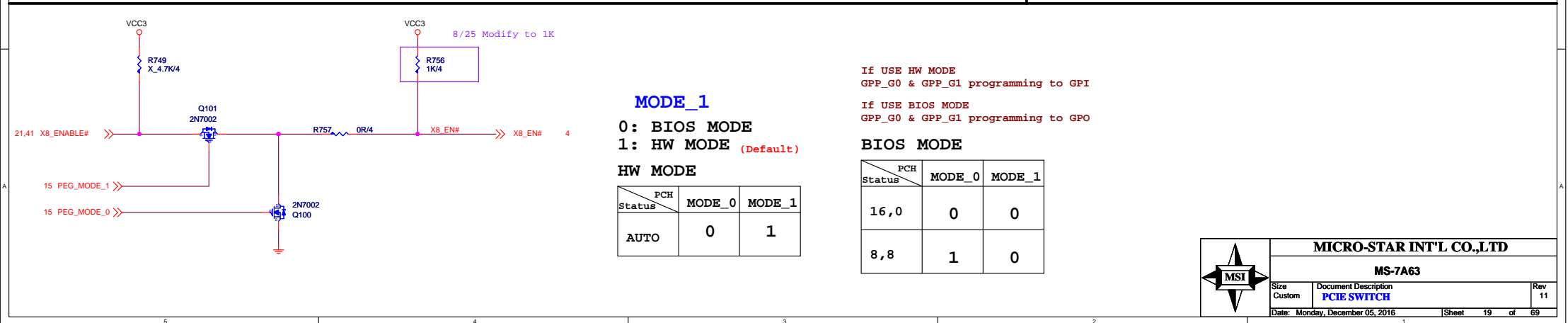
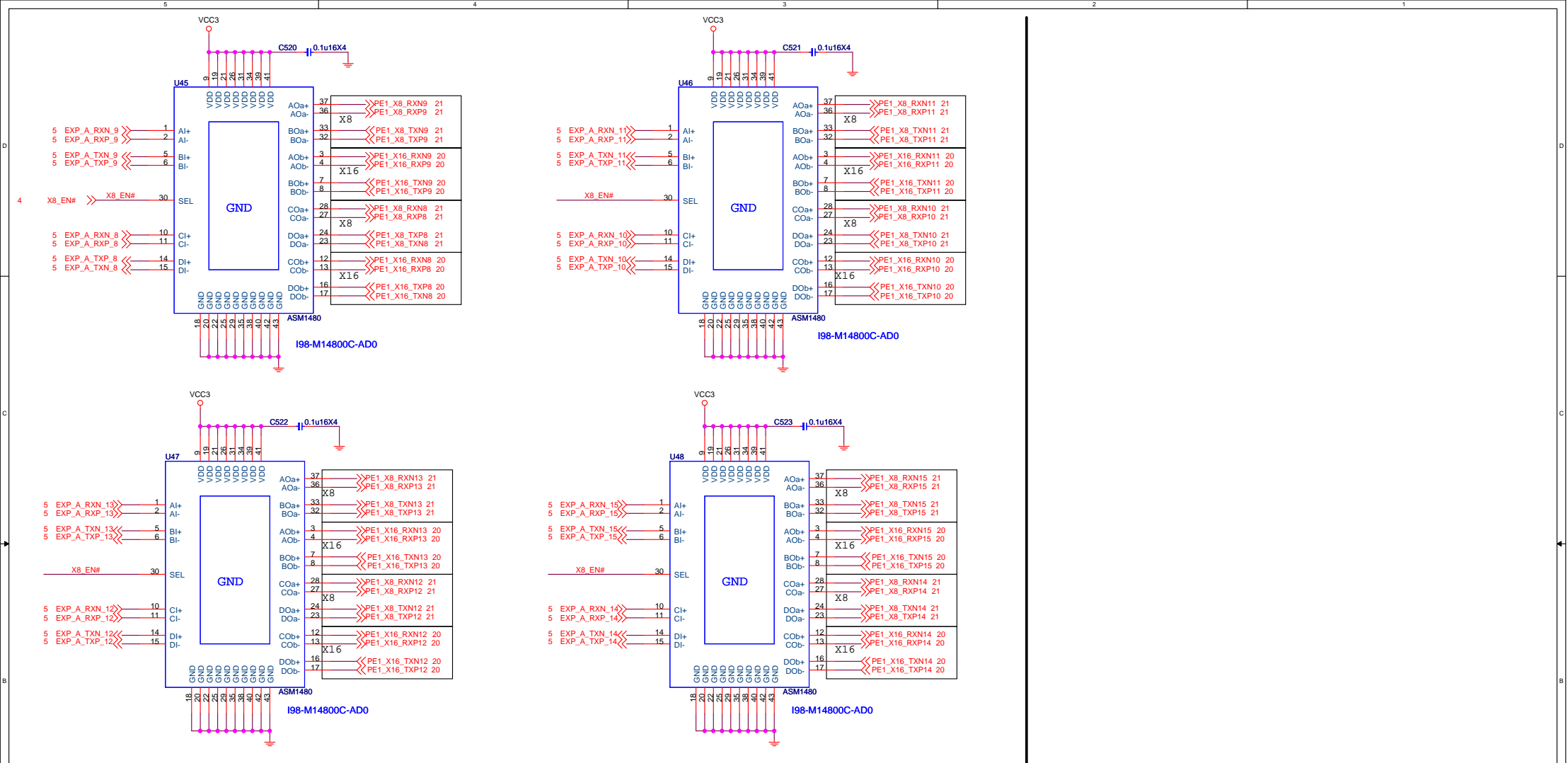
ESPI FLASH SHARING MODE

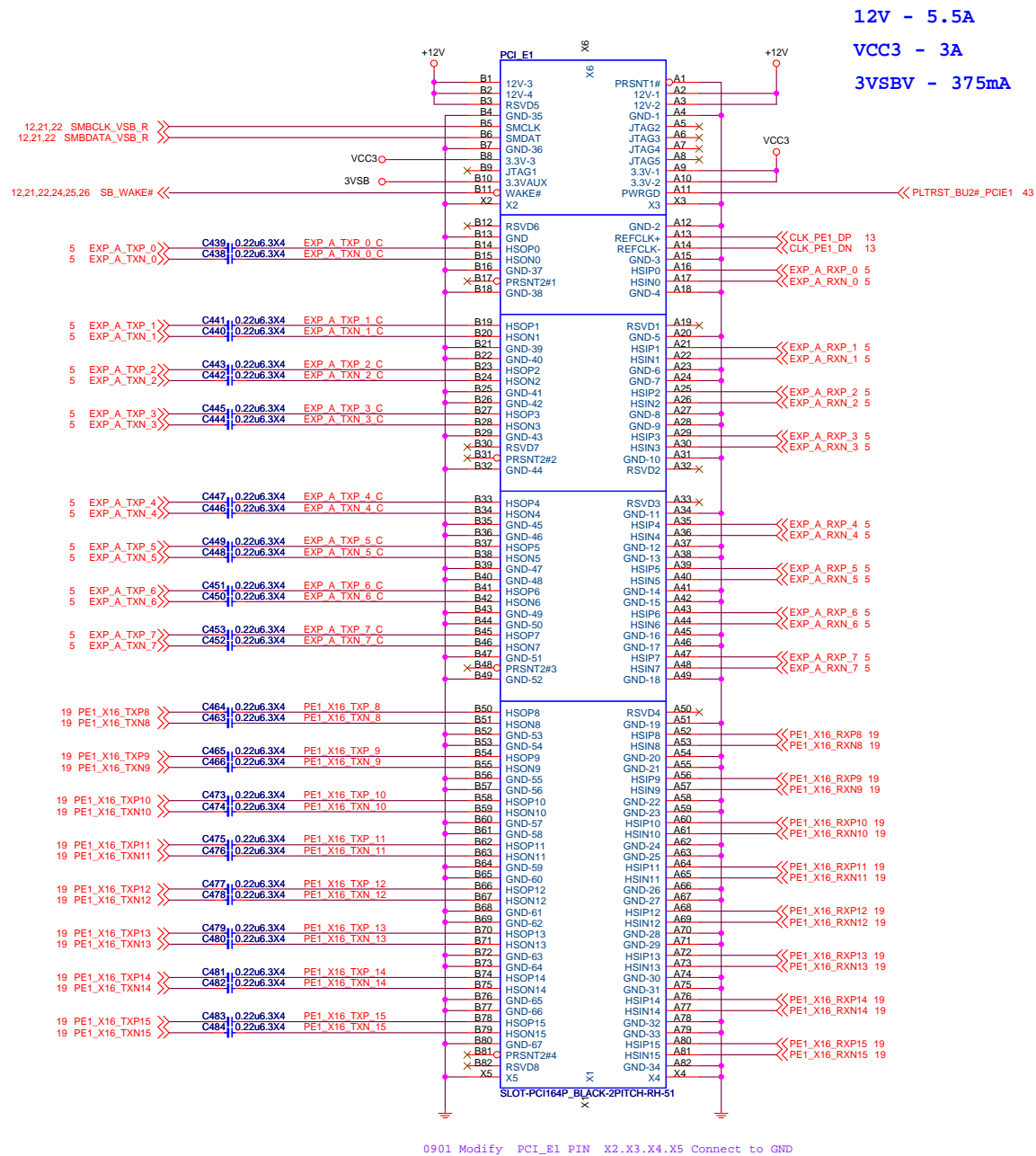


Internal pull-down is disabled after RSMRST

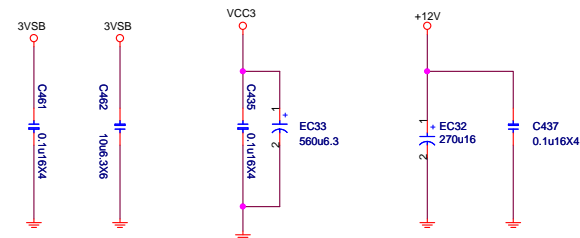
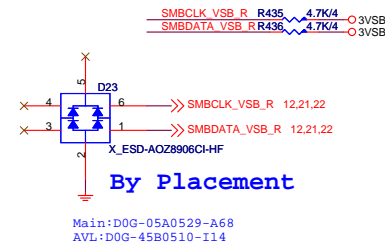


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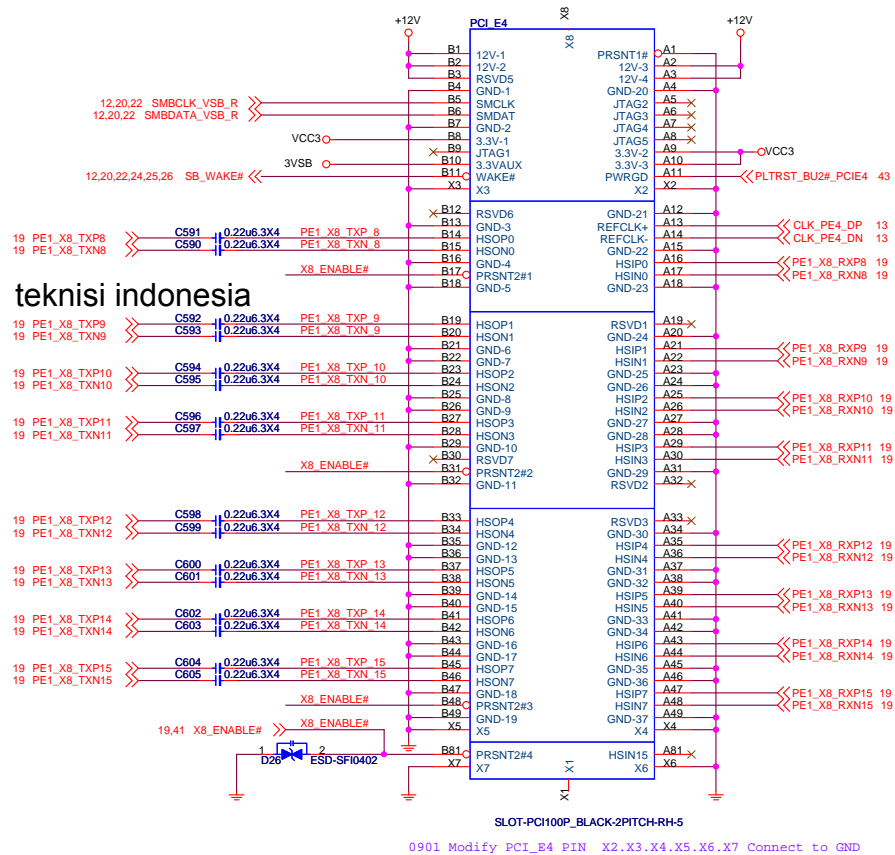


## SMBUS ESD

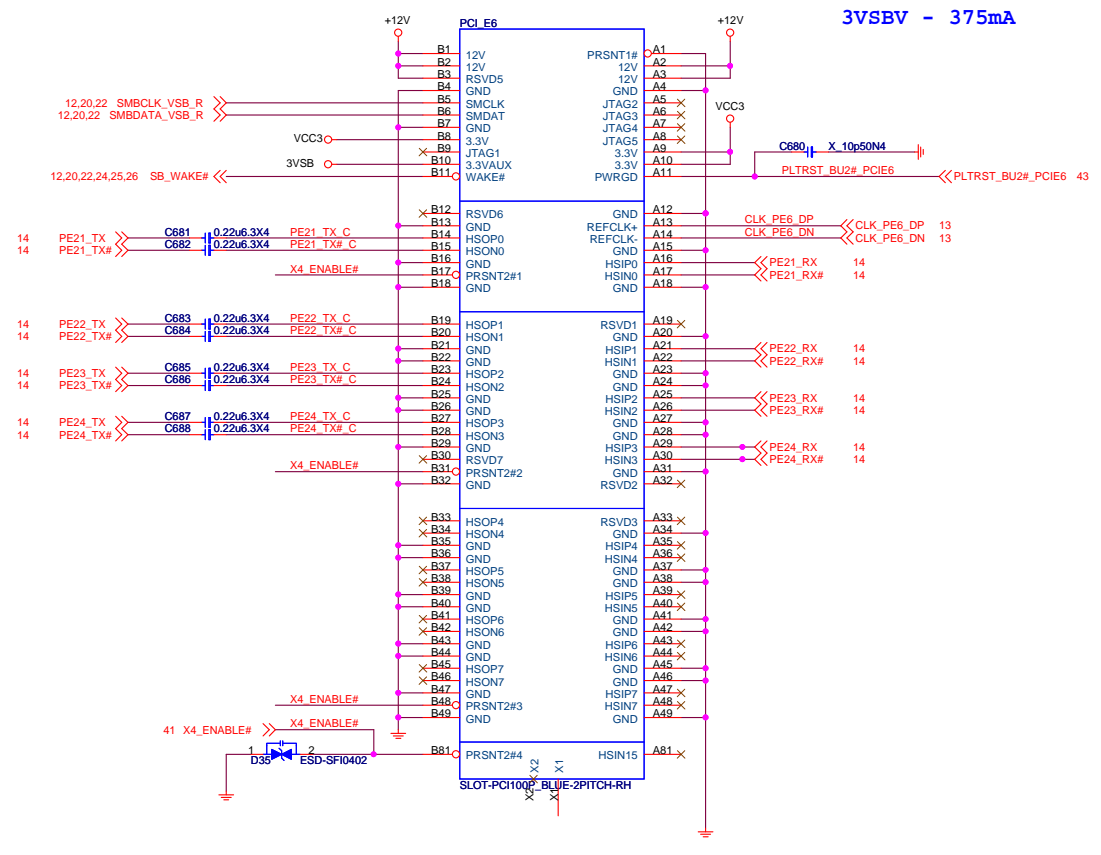


# PCI\_Express X4 Slot

12V - 2.1A  
VCC3 - 3A  
3VSBV - 375mA



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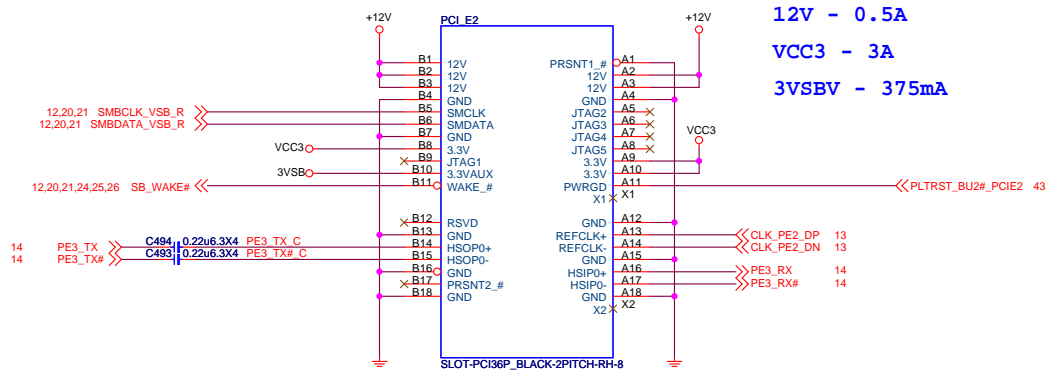
SLOT-PCI100P\_BLACK-2PITCH-RH-5  
0901 Modify PCI\_E4 PIN X2.X3.X4.X5.X6.X7 Connect to GND

0906 Modify C676 to 22uF

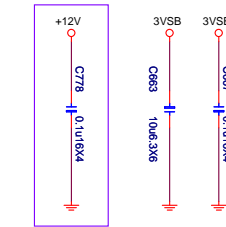
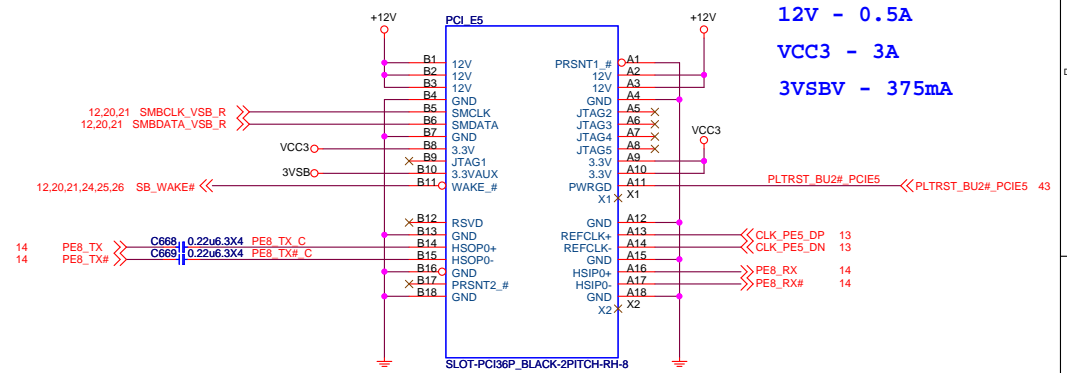
0906 Add C423 for PCI\_E6

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MS-7A63		
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Custom	PCIE SLOT (X4)	11
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2016.08.25 Modify to N11-0360211-F02

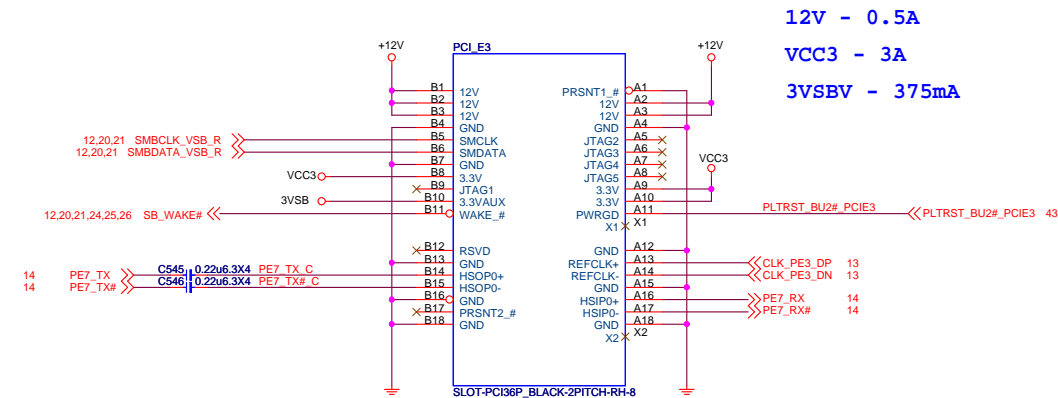


2016.08.25 Modify to N11-0360211-F02



0905 Add C778

2016.08.25 Modify to N11-0360211-F02



MICRO-STAR INT'L CO.,LTD

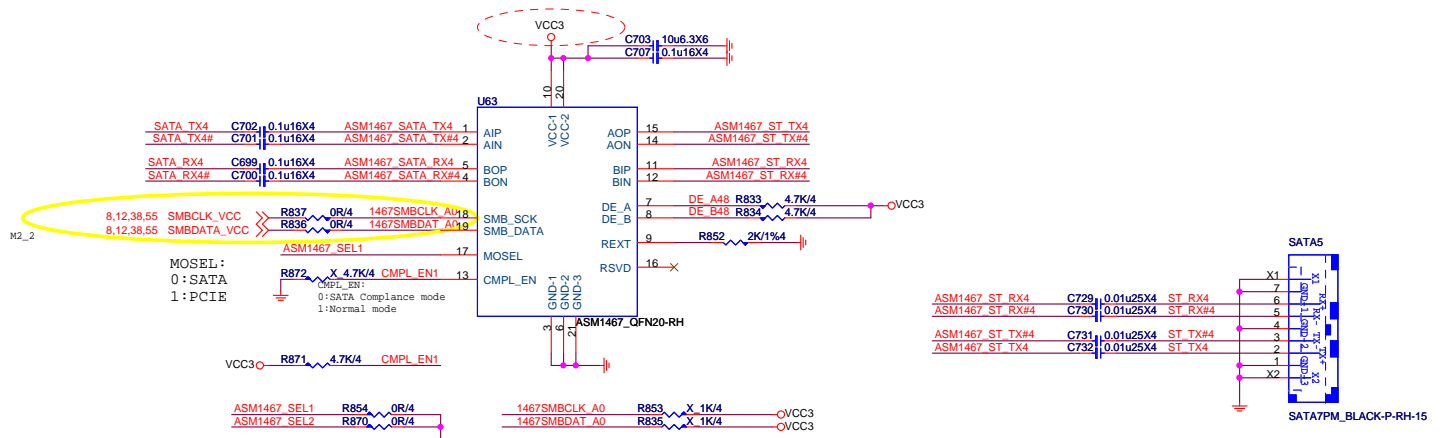
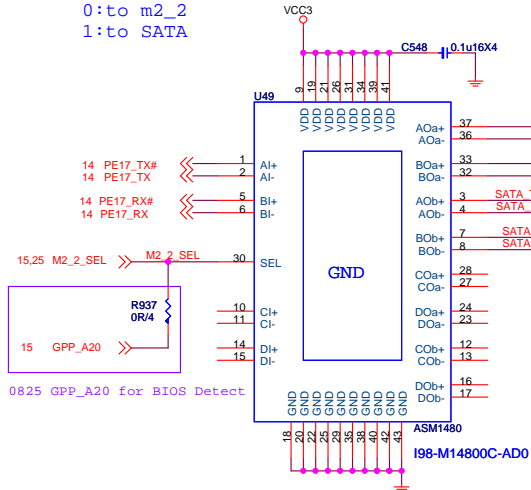
MS-7A63

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Custom	PCIE SLOT (X1)	11
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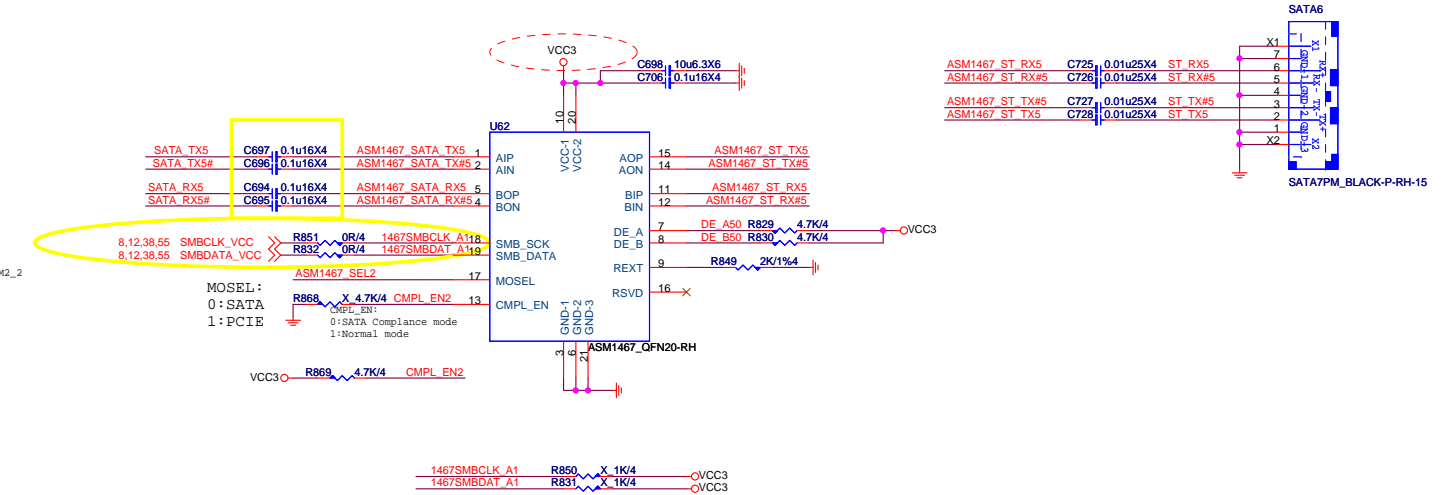
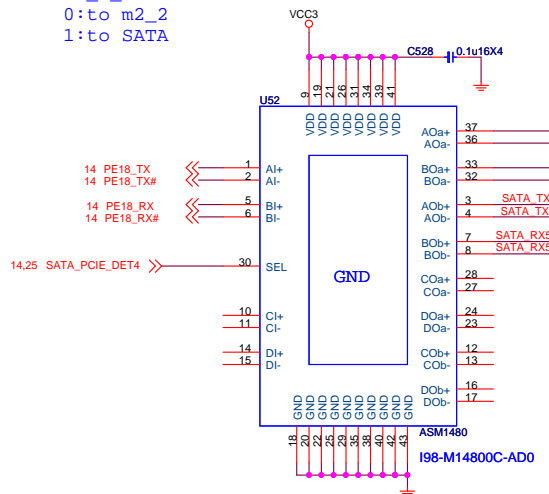




M2\_2\_SEL  
0:to m2\_2  
1:to SATA



M2\_2\_SEL  
0:to m2\_2  
1:to SATA



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SATA 要反接

2.5A

KEY M

Footprint: H\_R240D173\_BR189\_PT

BIOS\_MODE

GPP\_H15

GPP\_H13

BIOS_DIS_SW1	BIOS_SEL_PCIESATA1	Mode
0	1	M2-SATA
0	0	M2-PCIE
GPI	GPI	AUTO



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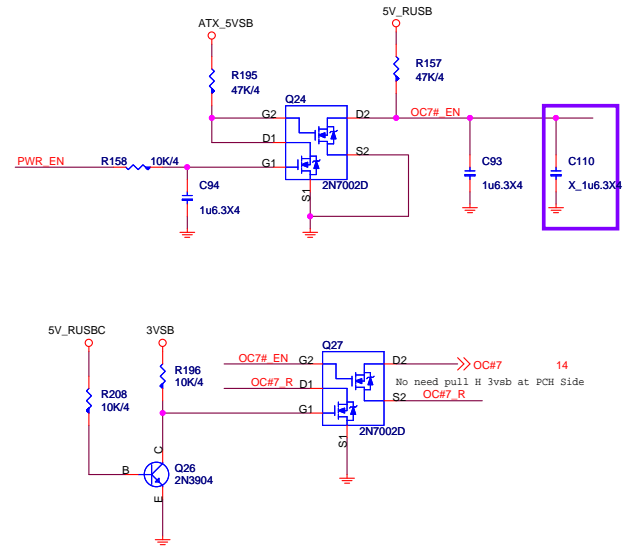
MS-7A63

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Custom	M2-SLOT1	11
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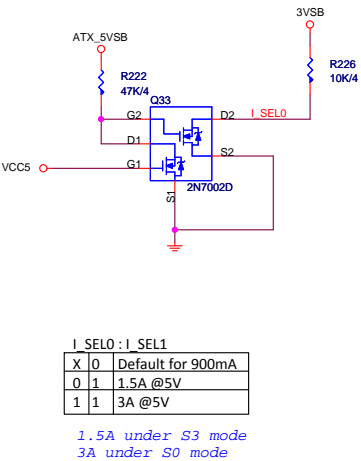




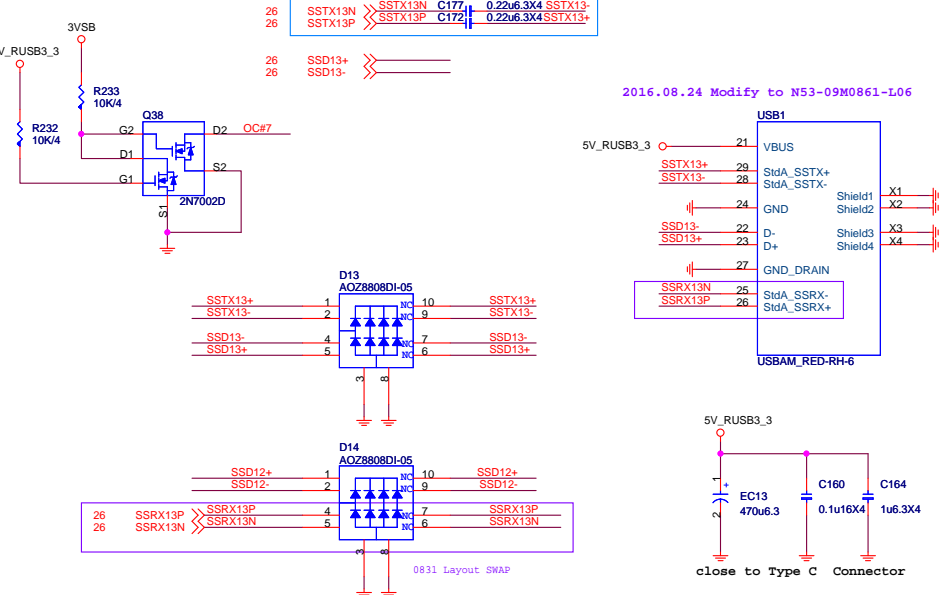
VBUS OC#



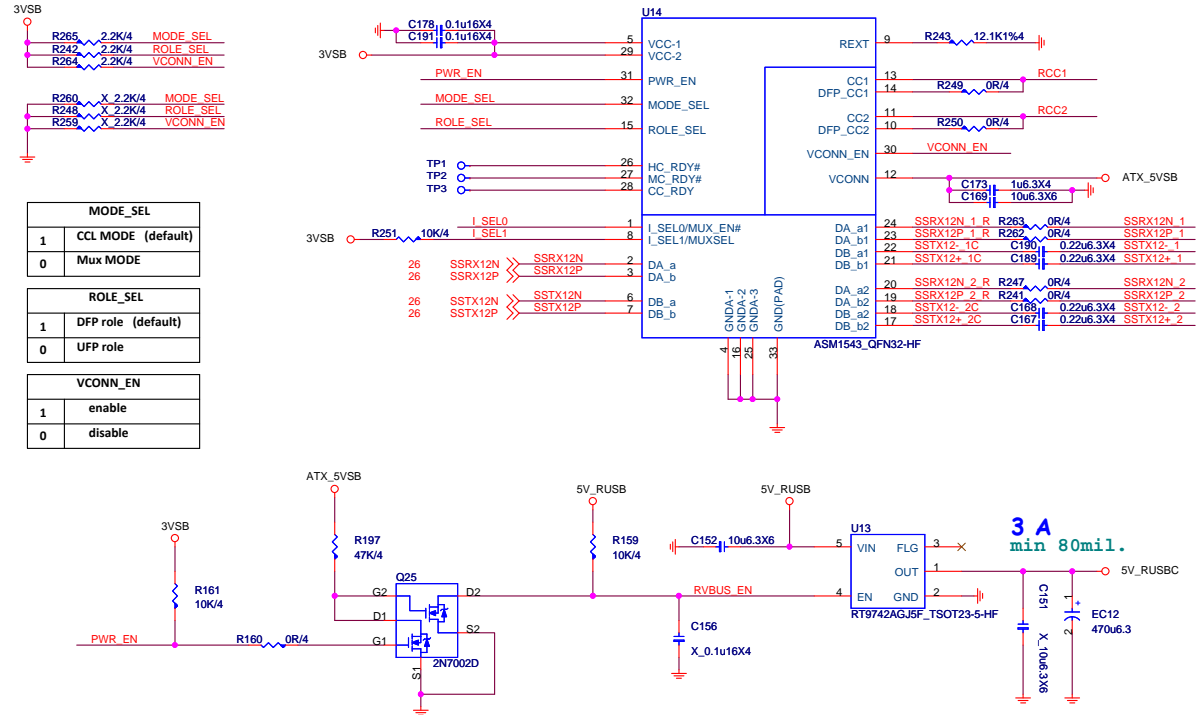
Current Mode



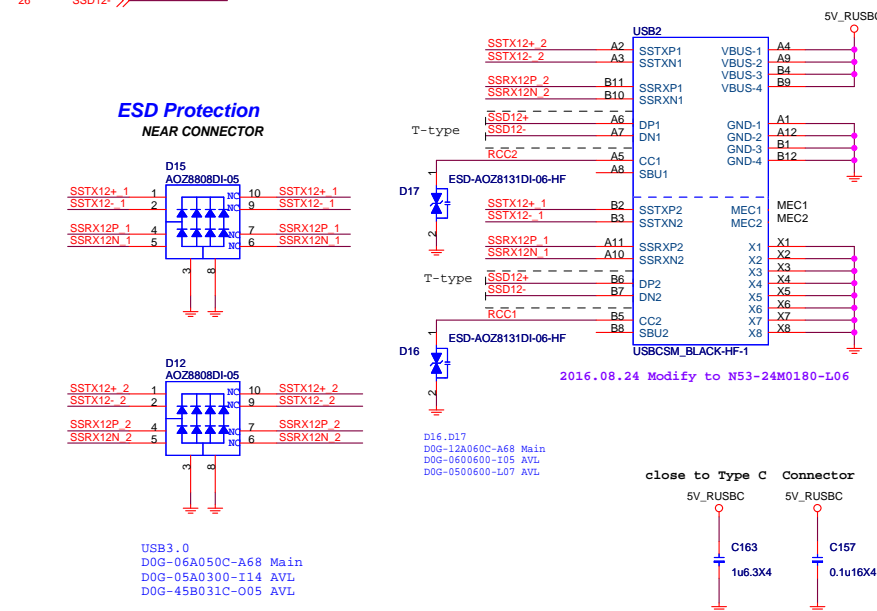
TYPE-A



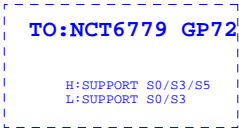
USB Type-C MUX with Configuration Channel (CC)



TYPE-C



## USB PORT POWER



## REAR USB PORT POWER

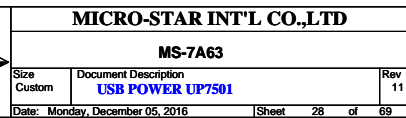


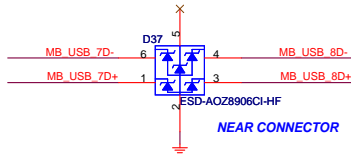
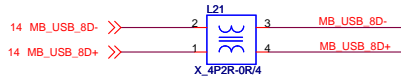
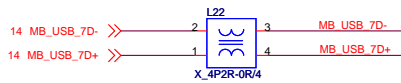
### FRONT USB PORT POWER



N-MOS  
D03-510BA0C-N03  
D03-3056M00-U47  
D03-4C05N03-O05  
D03-3830D09-N47  
D03-632BA0C-N03

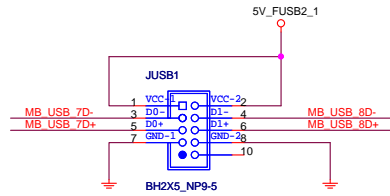
VR 1.5A\*2



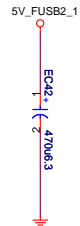
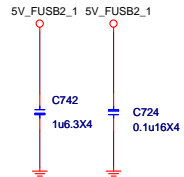


Main:D0G-05A0529-A68  
AVL:D0G-45B0510-I14

1.0A



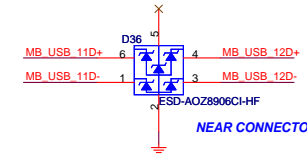
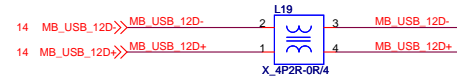
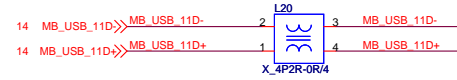
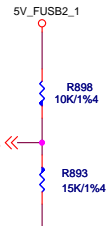
EMI Cap near Connector.



PORT7.8

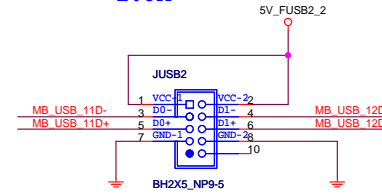
14

OC#3

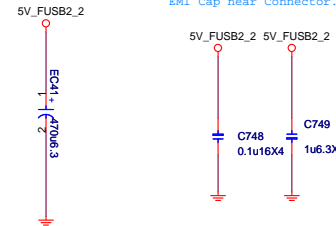


Main:D0G-05A0529-A68  
AVL:D0G-45B0510-I14

1.0A



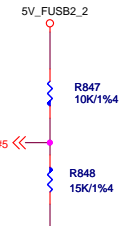
EMI Cap near Connector.



PORT11.12

14

OC#5



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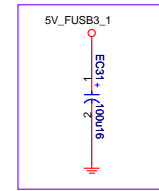
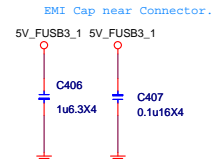
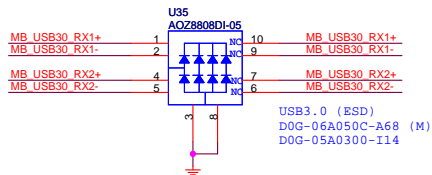
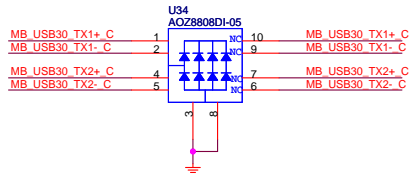
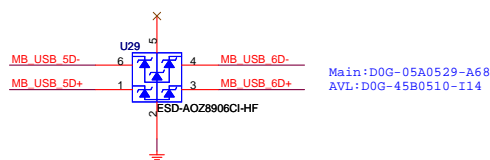
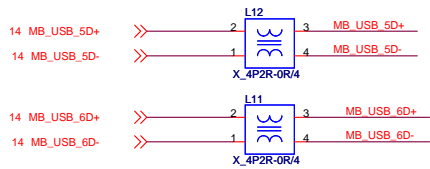
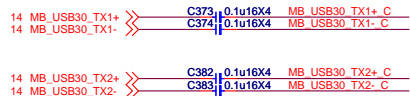


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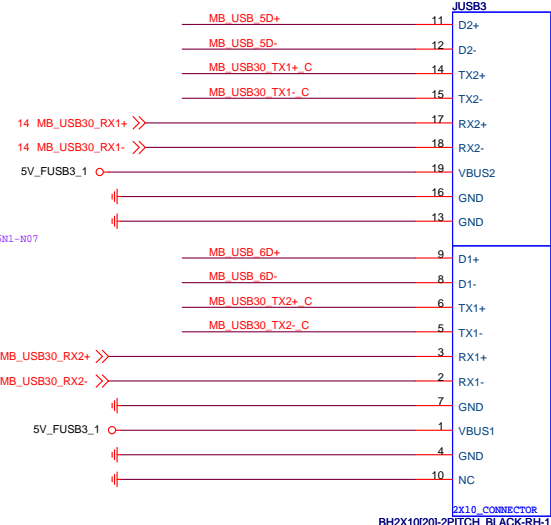
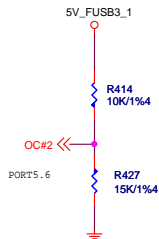
MS-7A63

Size	Document Description	Rev
Custom	Front USB20	11
Date:	Monday, December 05, 2016	Sheet 29 of 69

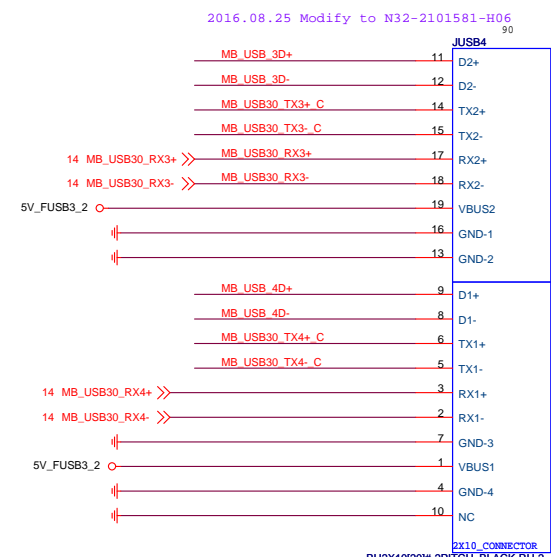
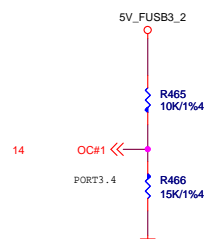
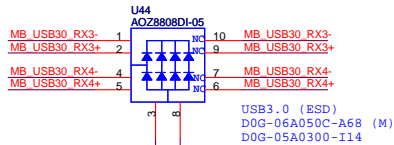
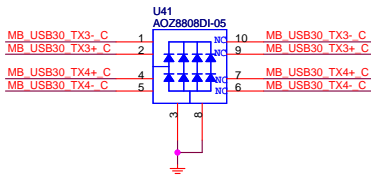
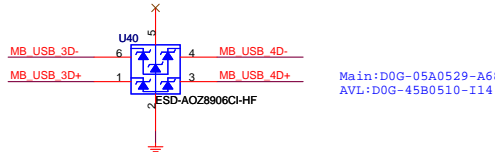




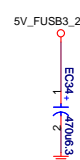
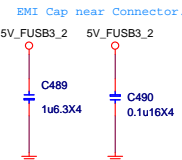
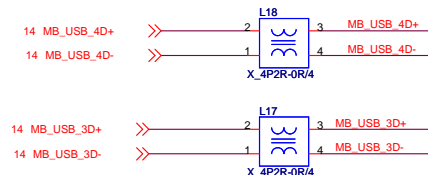
0830 Modify RC31 to C71-10116N1-N07



2016.08.25 Modify to N32-2101091-H06



2016.08.25 Modify to N32-2101581-H06



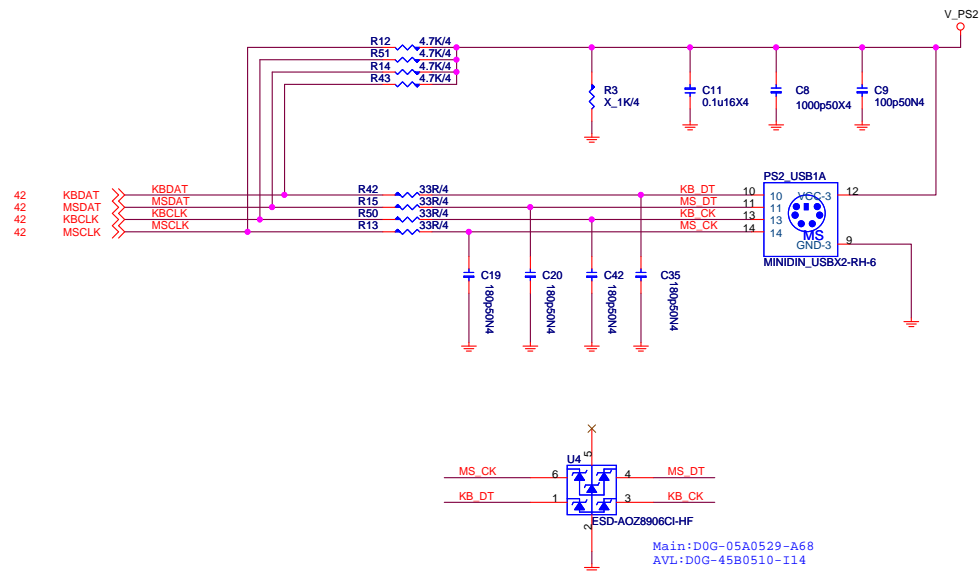
MSI

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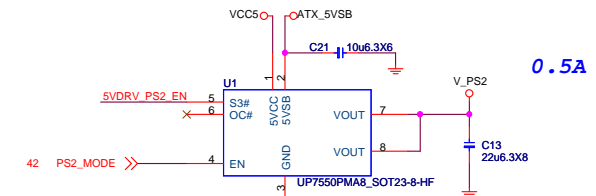
MS-7A63

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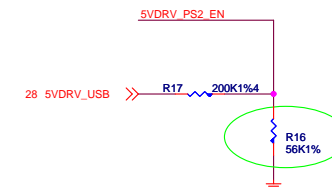
### PS2 Connector



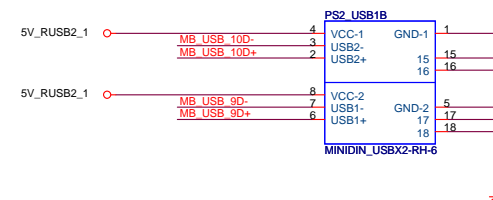
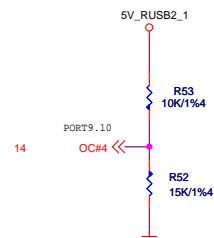
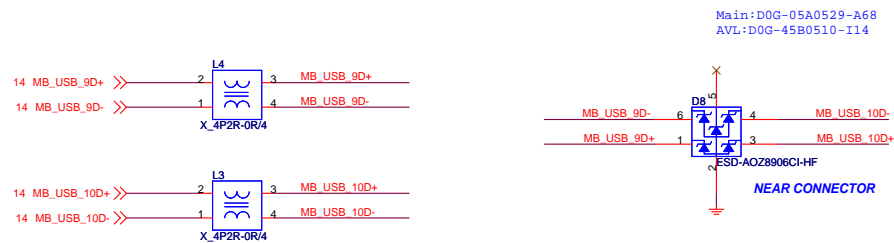
## PS2 Power



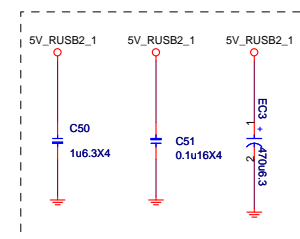
**USB MODE**



## PS2 \_USB



Close to Connector



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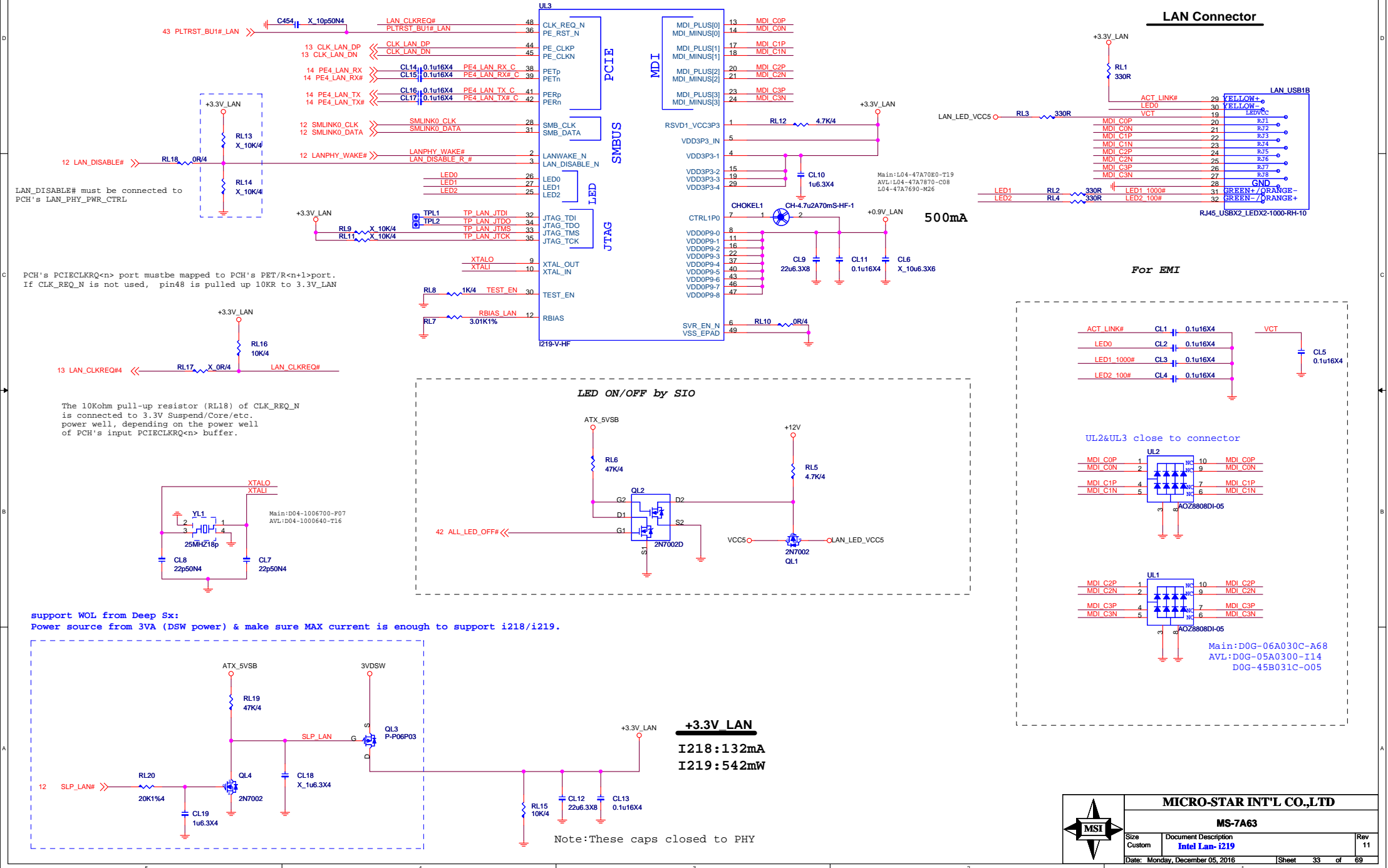
MS-7A63

Size Custom	Document Description <b>Real USB2&amp;PS2 CONNECTOR</b>	Rev 11
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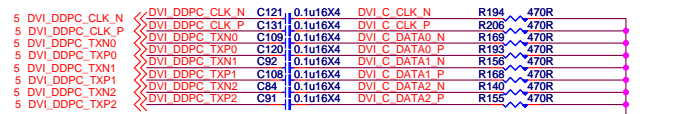


Intel Lan- i219

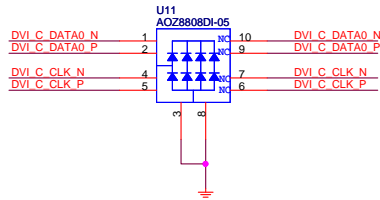
8111H:B06-08111CC-R09  
8111G:B06-081116C-R09



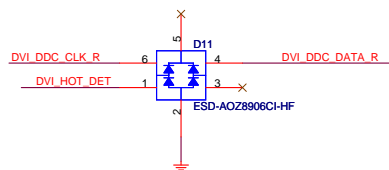
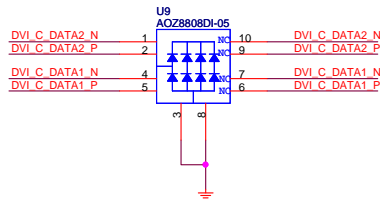
VGA: resolution of 2048x1536 pixels with 32-bit color at 75 Hz (4:3 QXGA)



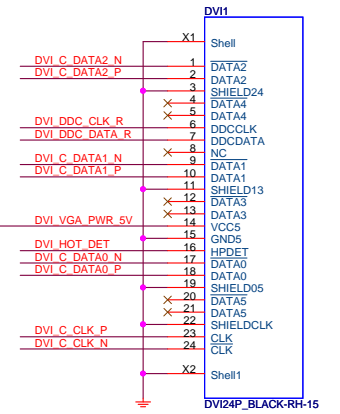
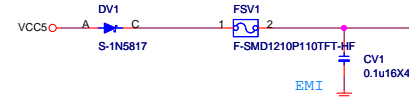
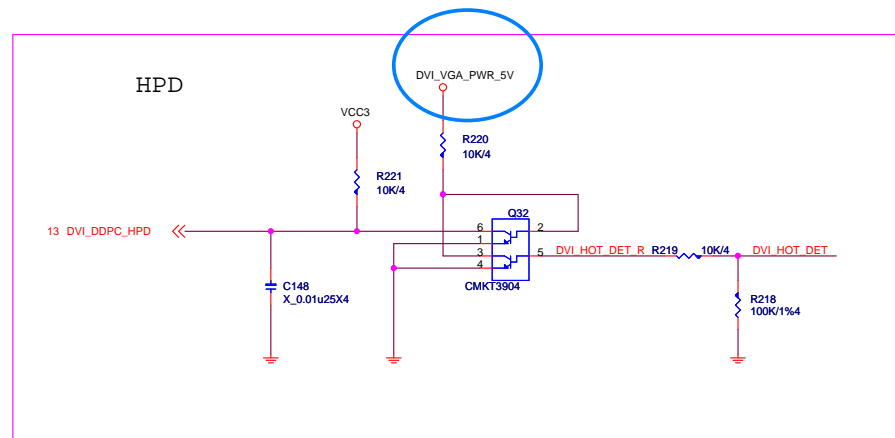
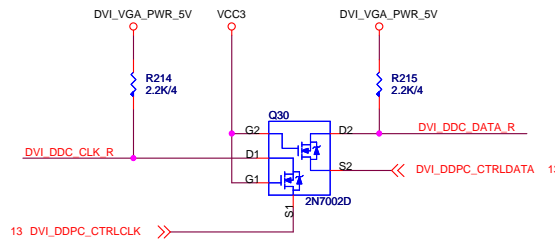
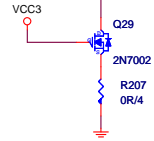
U26 AVL:D0G-05A050C-005  
 D0G-06A050C-A68



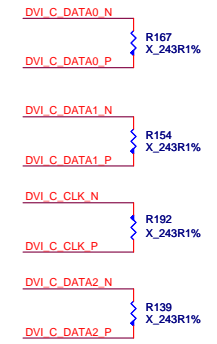
U27 AVL:D0G-05A050C-005  
 D0G-06A050C-A68



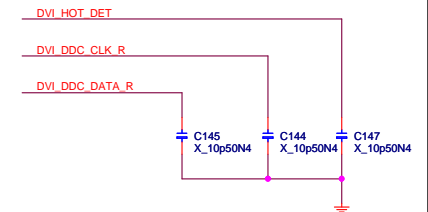
Main:D0G-05A0529-A68  
 AVL:D0G-45B0510-I14



For EMI



EMI

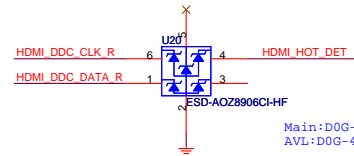
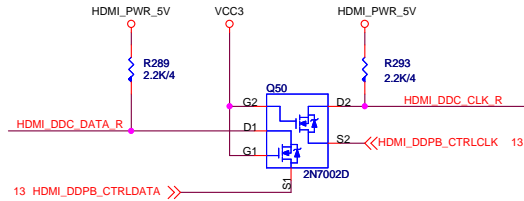
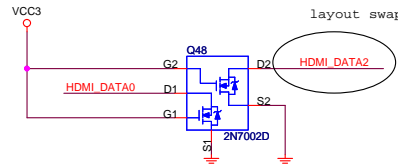
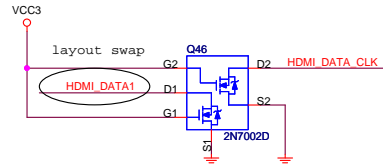
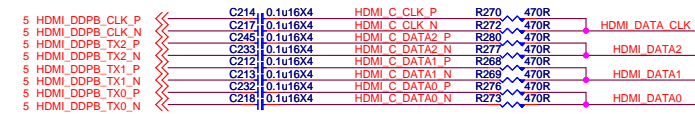


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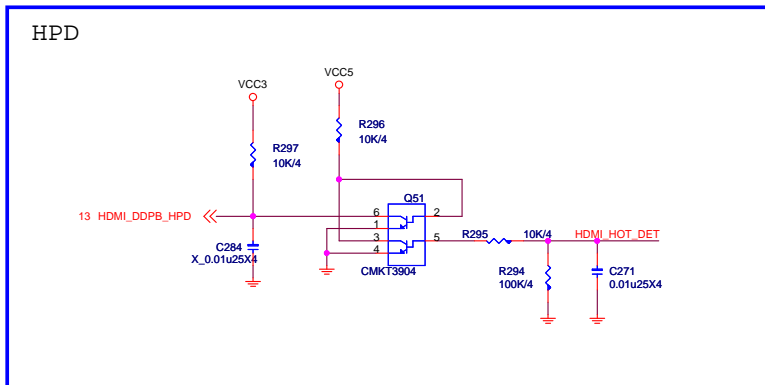
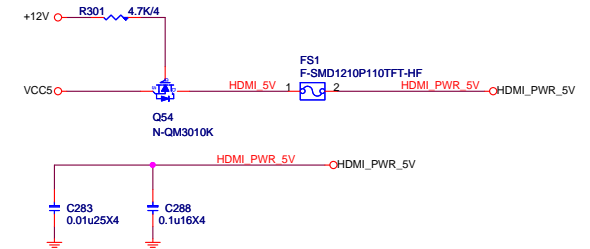
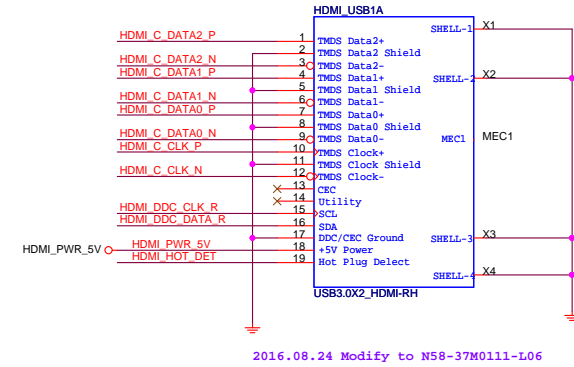
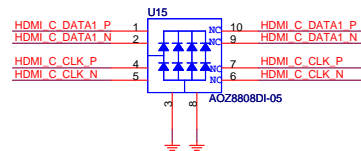
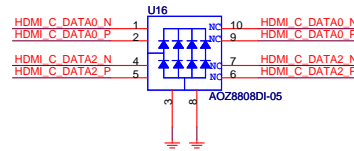
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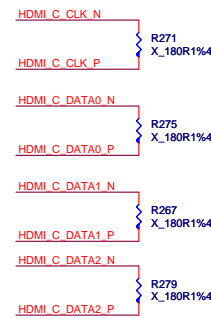
HDMI, DVI : 1920x1200 at 60 Hz (16:10 WUXGA)



Main:D0G-05A0529-A68  
AVL:D0G-45B0510-I14

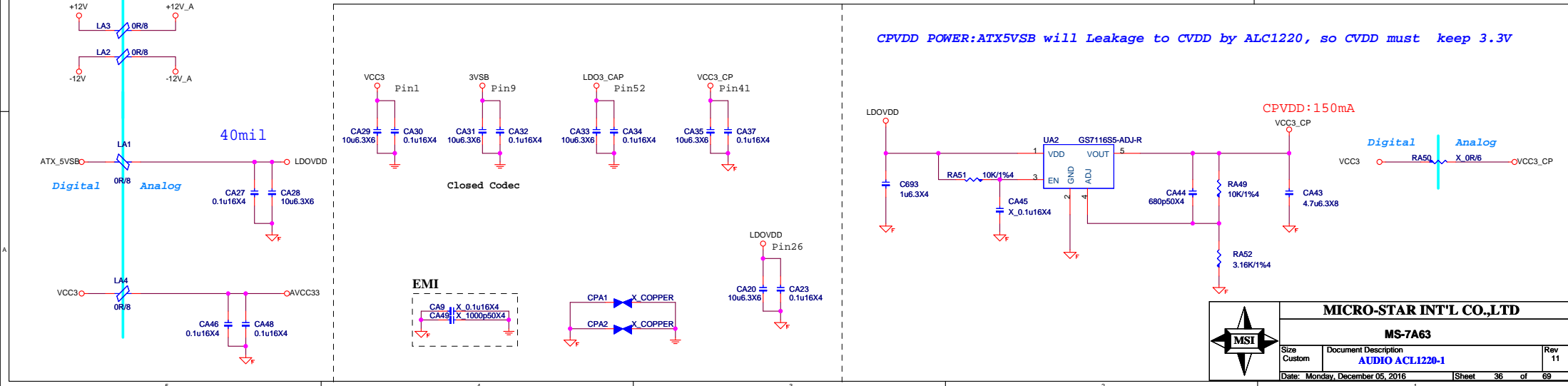
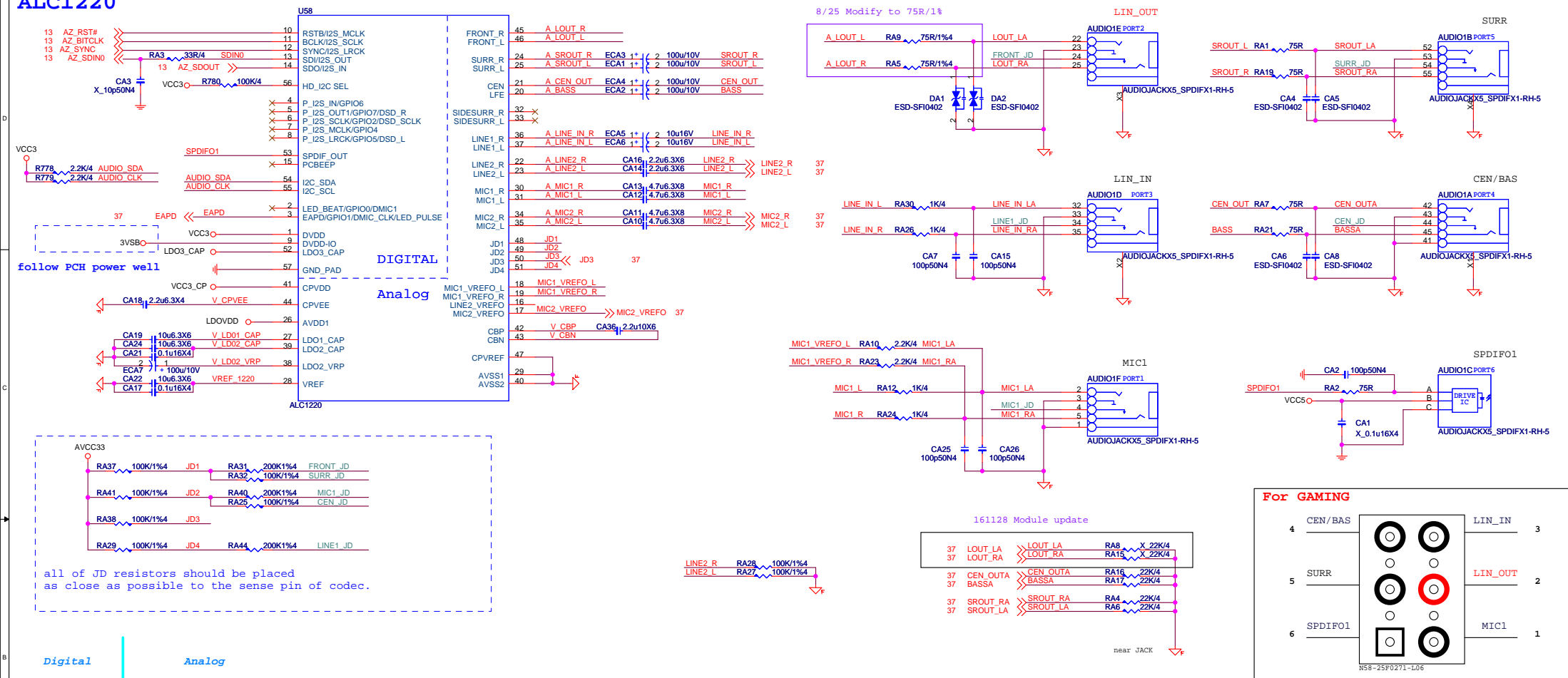


For EMI



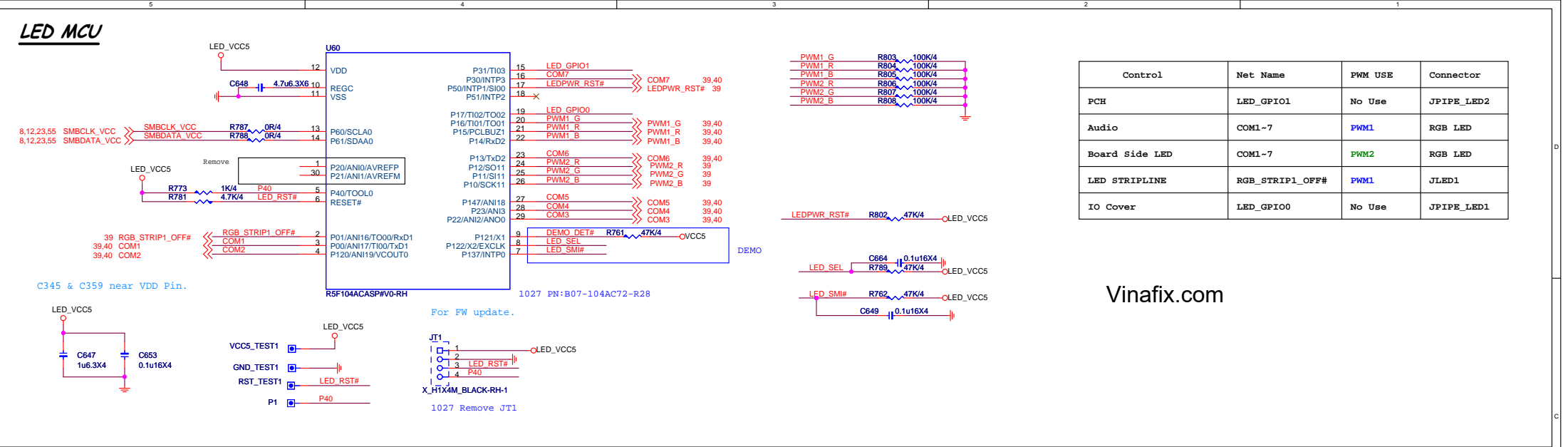
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# ALC1220





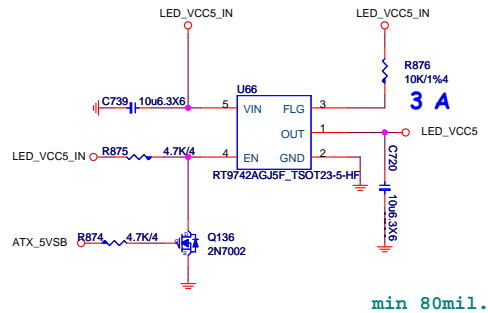




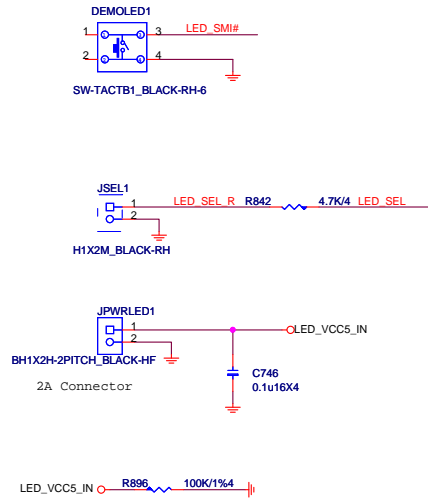
Control	Net Name	PWM USE	Connector
PCH	LED_GPIO1	No Use	JPIPE_LED2
Audio	COM1-7	PWM1	RGB LED
Board Side LED	COM1-7	PWM2	RGB LED
LED STRIPLINE	RGB_STRIP1_OFF#	PWM1	JLED1
IO Cover	LED_GPIO0	No Use	JPIPE_LED1

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## EXTERNAL POWER INPUT

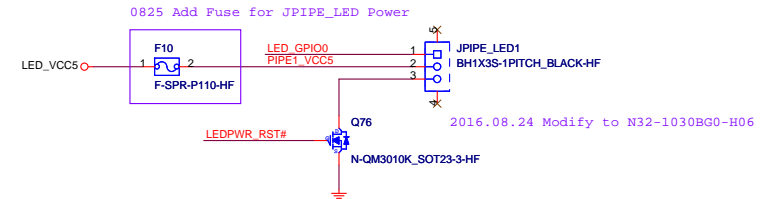


## LED Demo Button



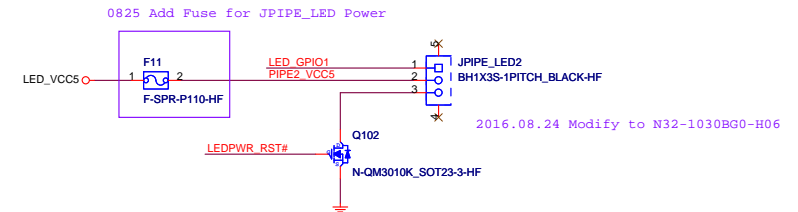
**Cover LED**

**6PCS LED\*0.16W=0.96W**



### HEATSINK LED

**9PCS LED\*0.16W=1.44W**

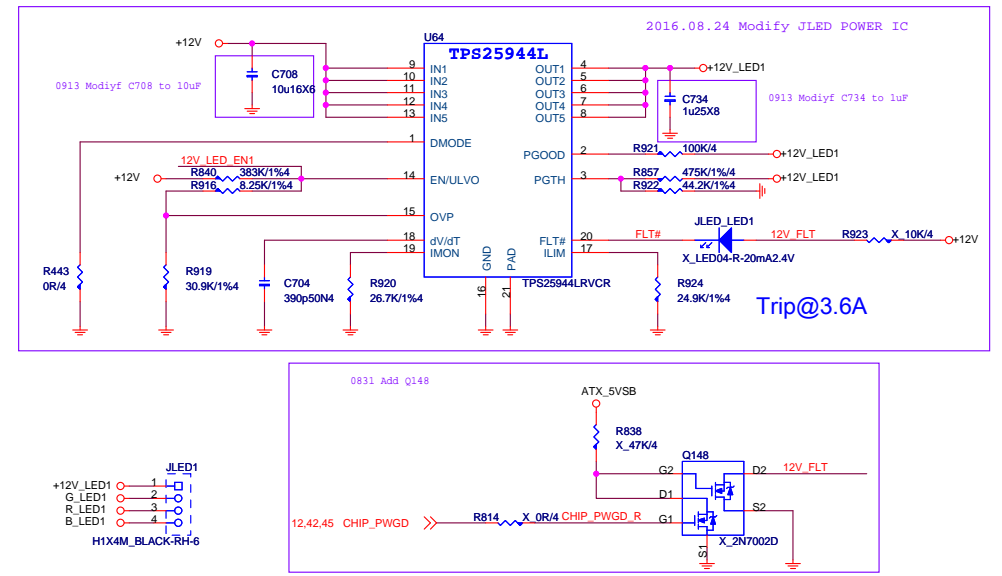
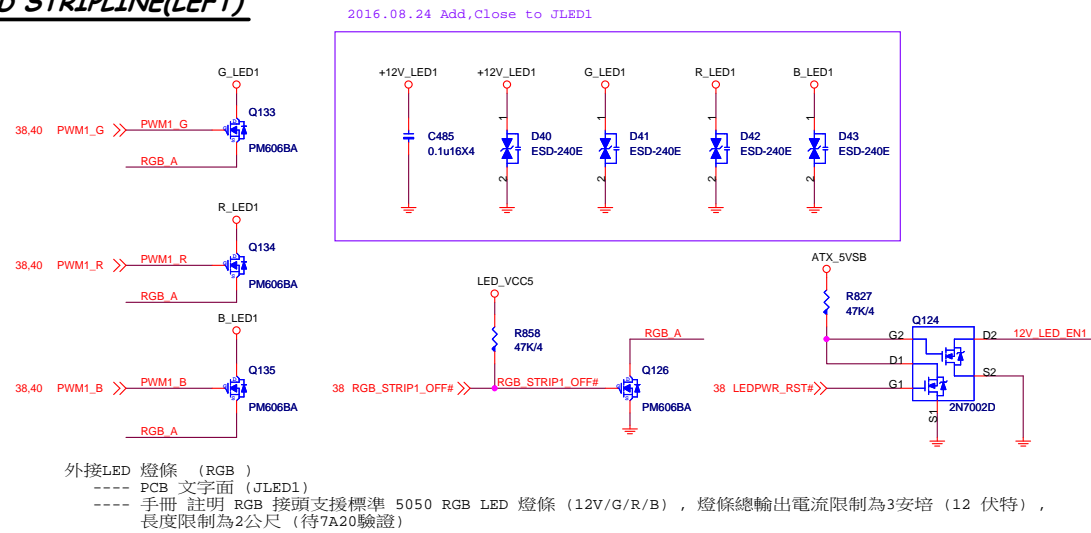


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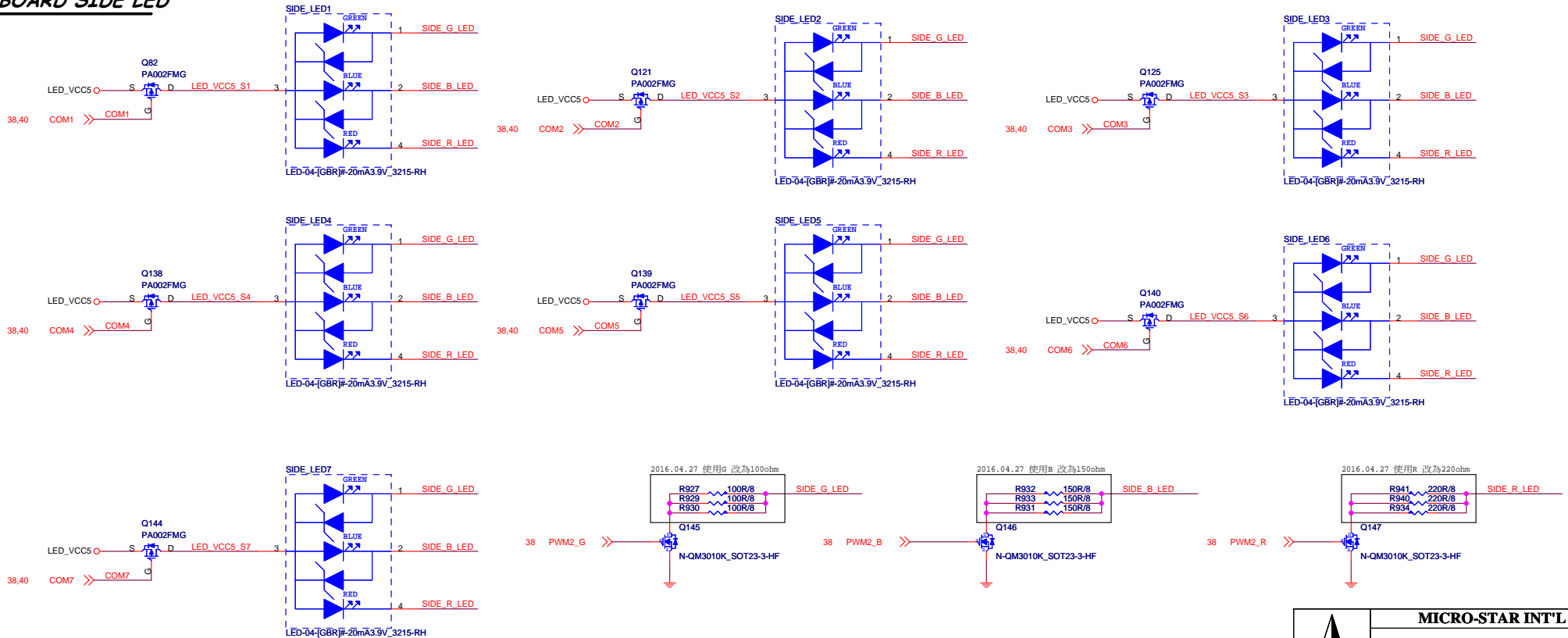
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## LED STRIPLINE(LEFT)

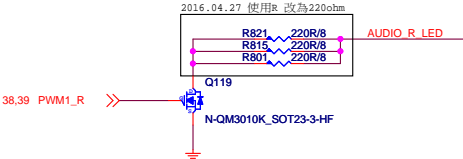
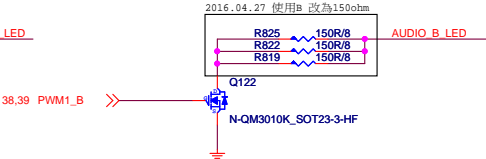
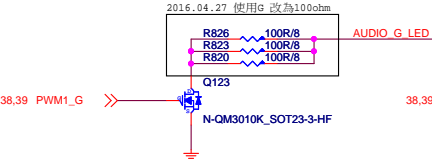
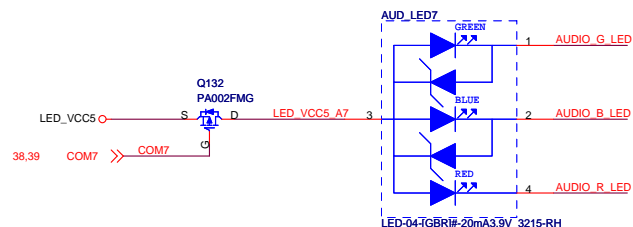
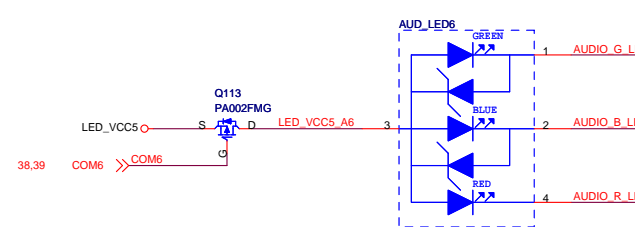
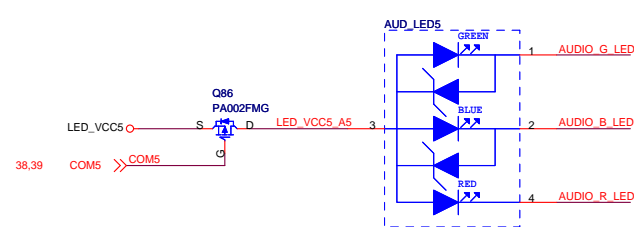
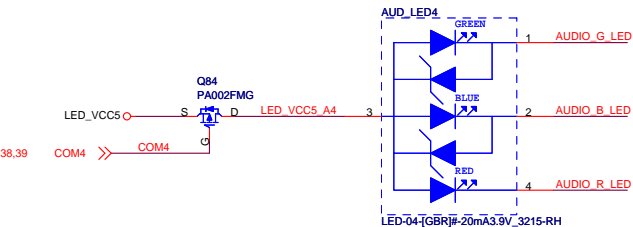
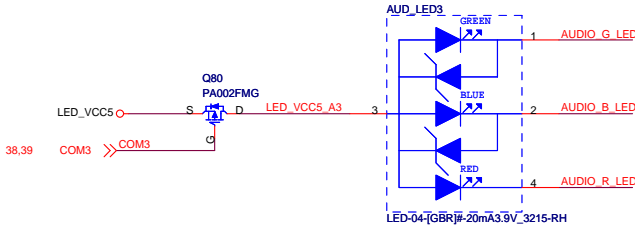
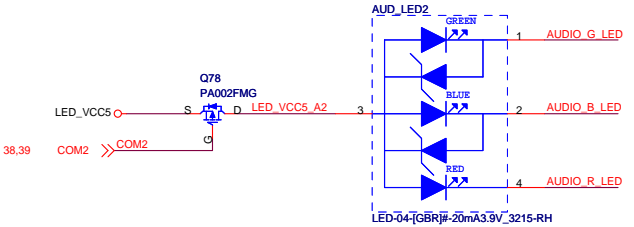
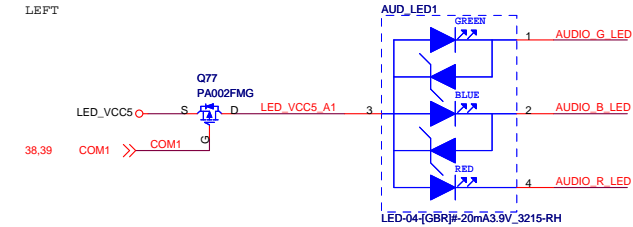


## BOARD SIDE LED



AUDIO\_MOAT LED

LEFT

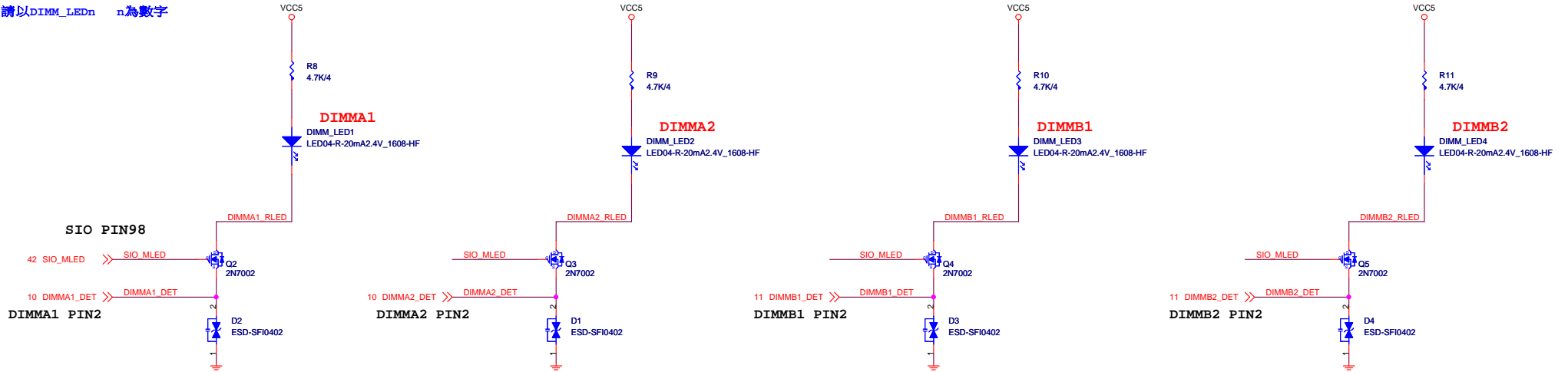


MICRO-STAR INT'L CO.,LTD			
MS-7A63			
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Custom	LED AUDIO		11
Date: Monday, December 05, 2016		Sheet	40 of 69

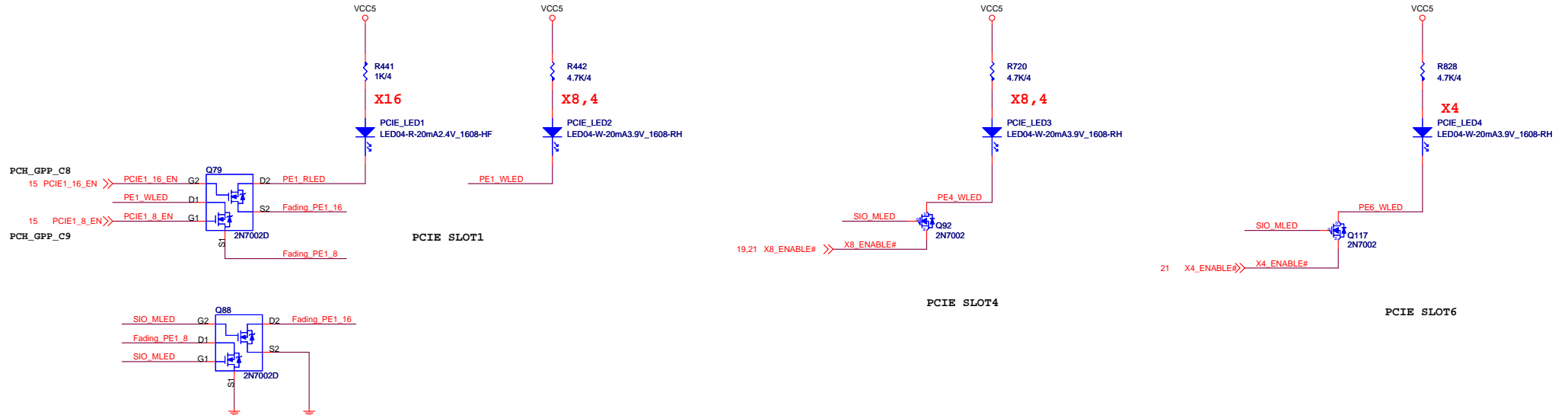
## DIMM\_SLOT

紅 : D0C-040S500-E07

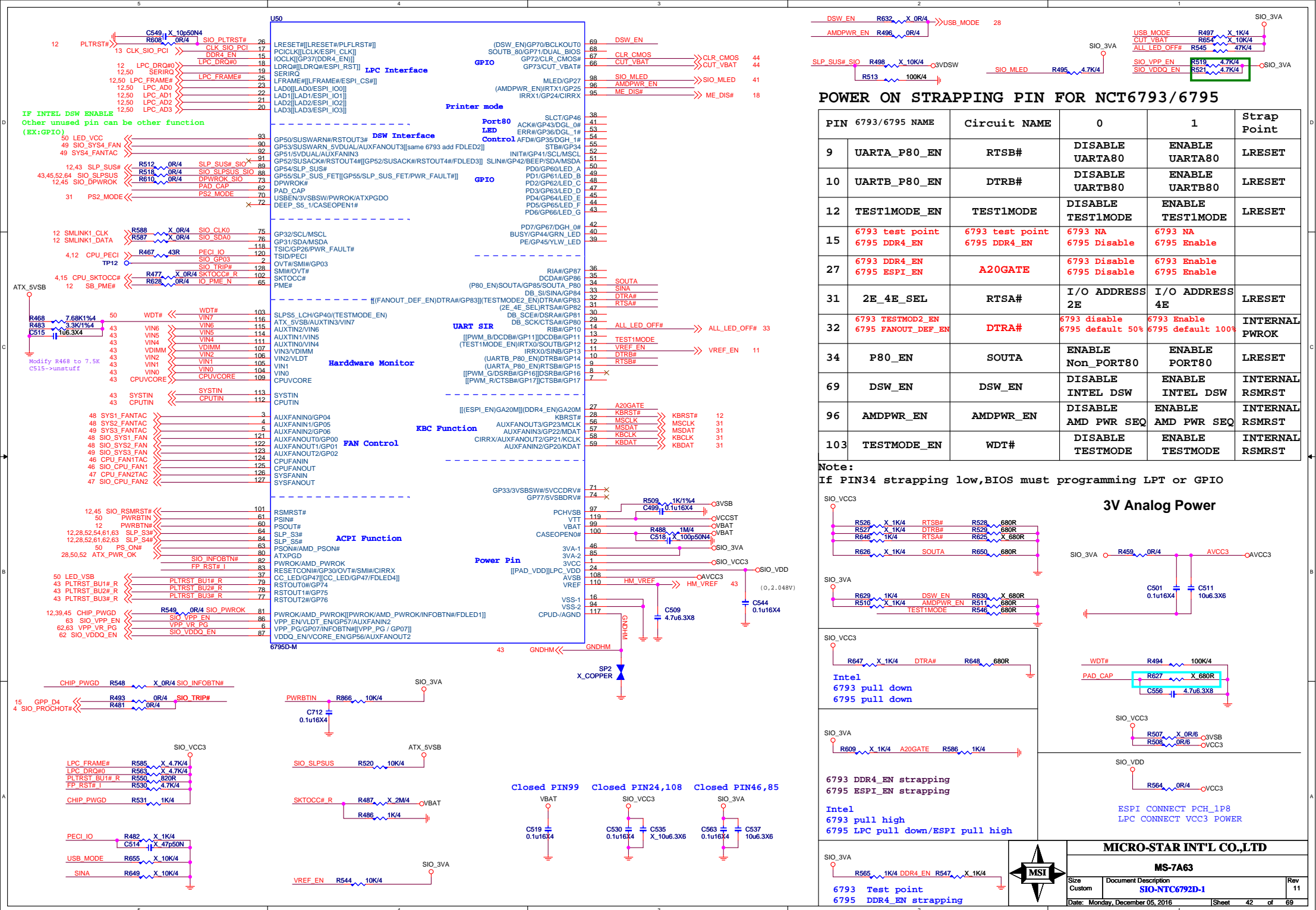
LED 命名請以DIMM\_LEDn n為數字



## PCIE\_SLOT\_LED

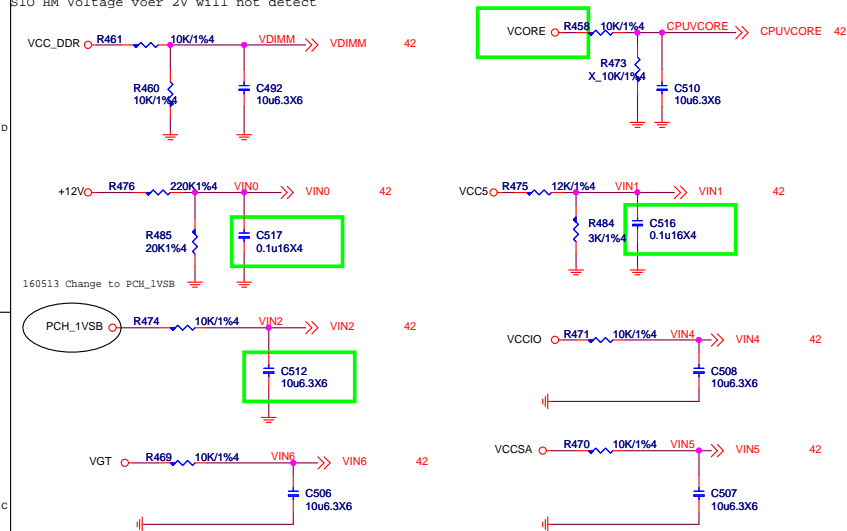


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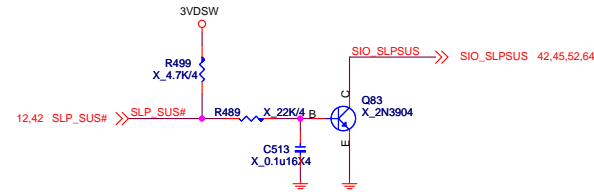


## HW Monitor - Voltage

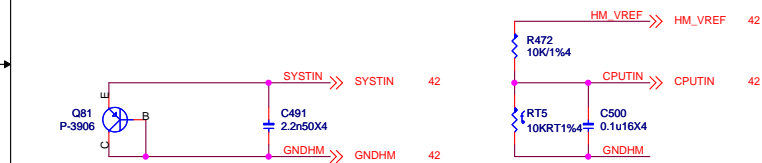
SIO HM Voltage voer 2V will not detect



## SLP\_SUS Co-lay circuit



## Thermal Monitor

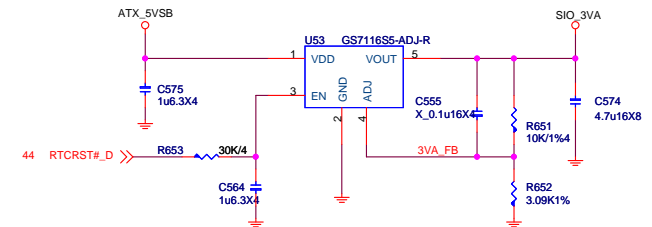
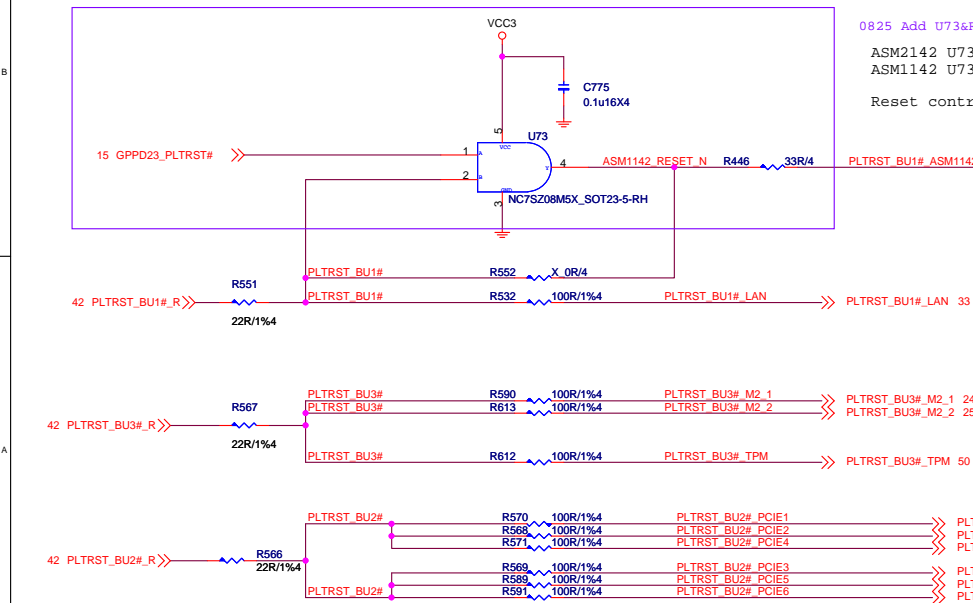


0825 Add U73&R446 for ASM2142 PLTRST#

ASM2142 U73 stuff R552 unstuff

ASM1142 U73 unstuff R552 stuff

Reset control for ASM2142 only.



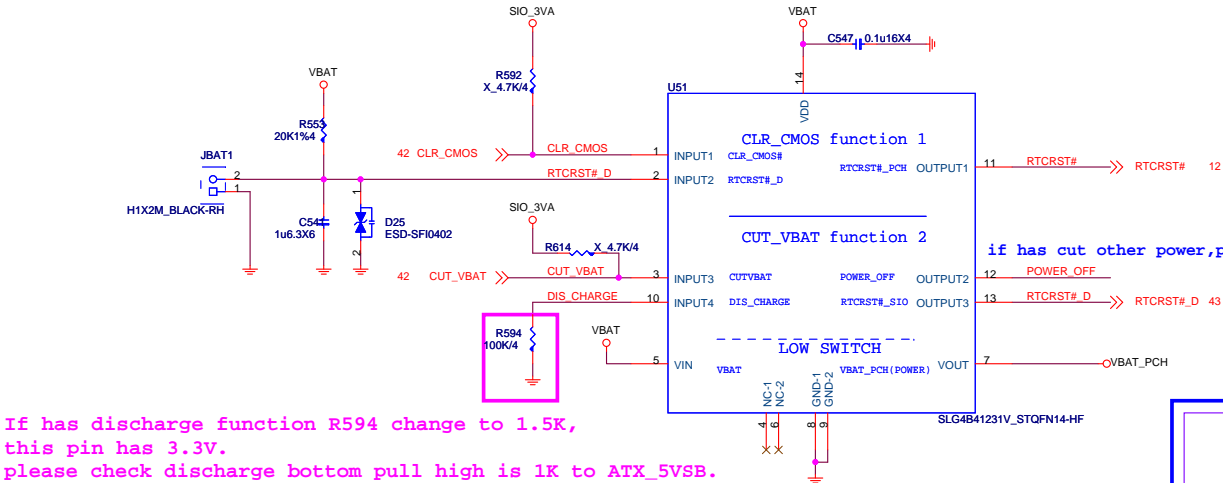
MICRO-STAR INT'L CO.,LTD

MS-7A63

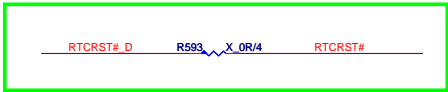
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CLR\_CMOS

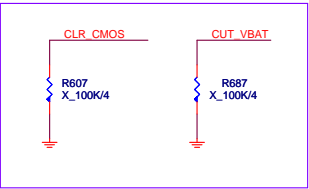
VBAT



If has discharge function R594 change to 1.5K, this pin has 3.3V. please check discharge bottom pull high is 1K to ATX\_5VSB.

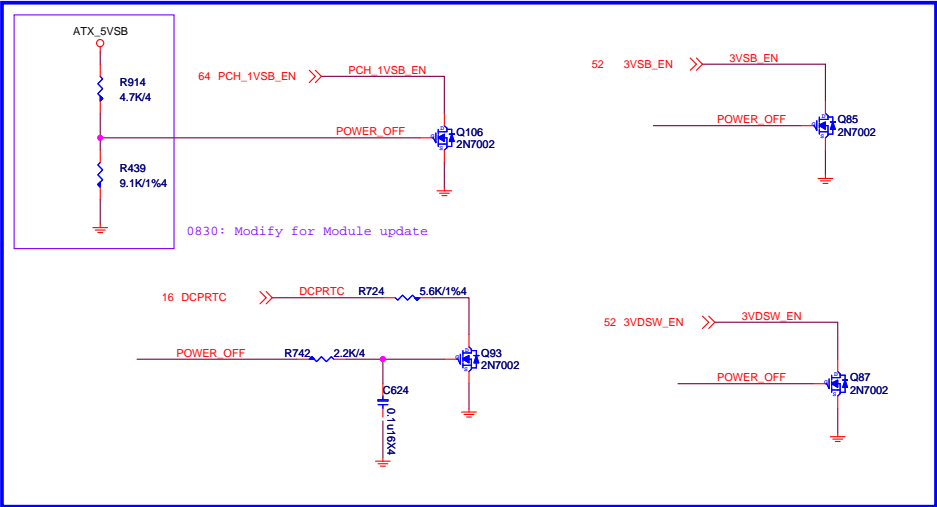


Co-Lay NOT USE U12 , R139 STUFF  
If STUFF R139 Please Check RTCRST# Double Pull High



0830: Add R607.R687 for Module update

Vinafix.com



Function 2				
IN		OUT		
INPUT3 & lowswitch EN	INPUT4	OUTPUT2	OUTPUT3	VOUT
0	0	0	1	1
1	0	1	1	0 (discharge)
0	1	1	0	0 (discharge)
1	1	1	0	0 (discharge)

Default

Function 1		
IN		OUT
INPUT1	INPUT2	OUTPUT1
0	1	1
1	0	0
1	1	0
0	0	0

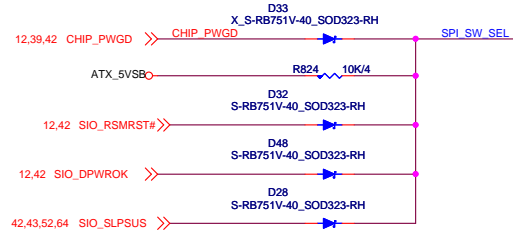
Default



Module Stuff CHIP\_PWGD,  
But PCH\_PWROK may ramp up before CHIP\_PWGD.

0825 Add D48, unstuff D33

For TL624 1.1

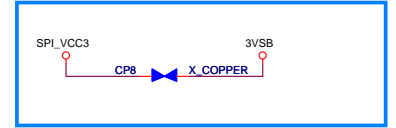
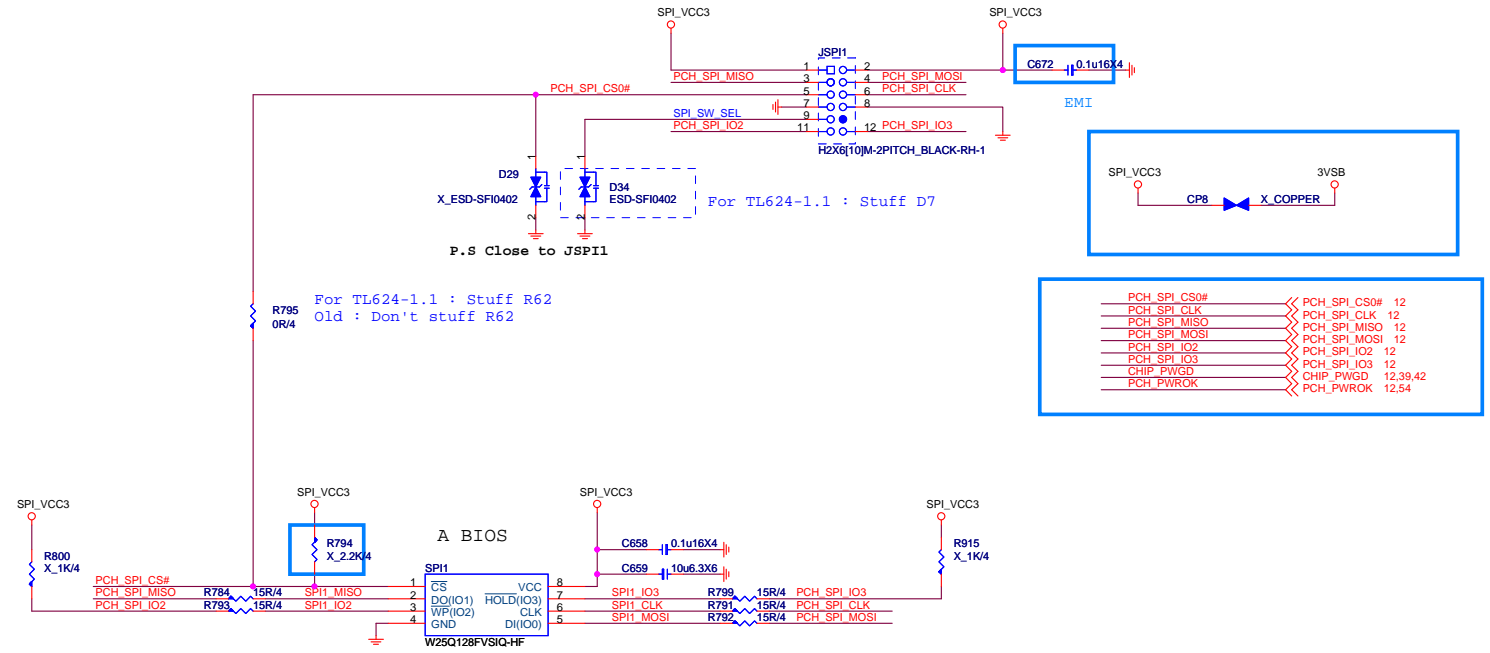


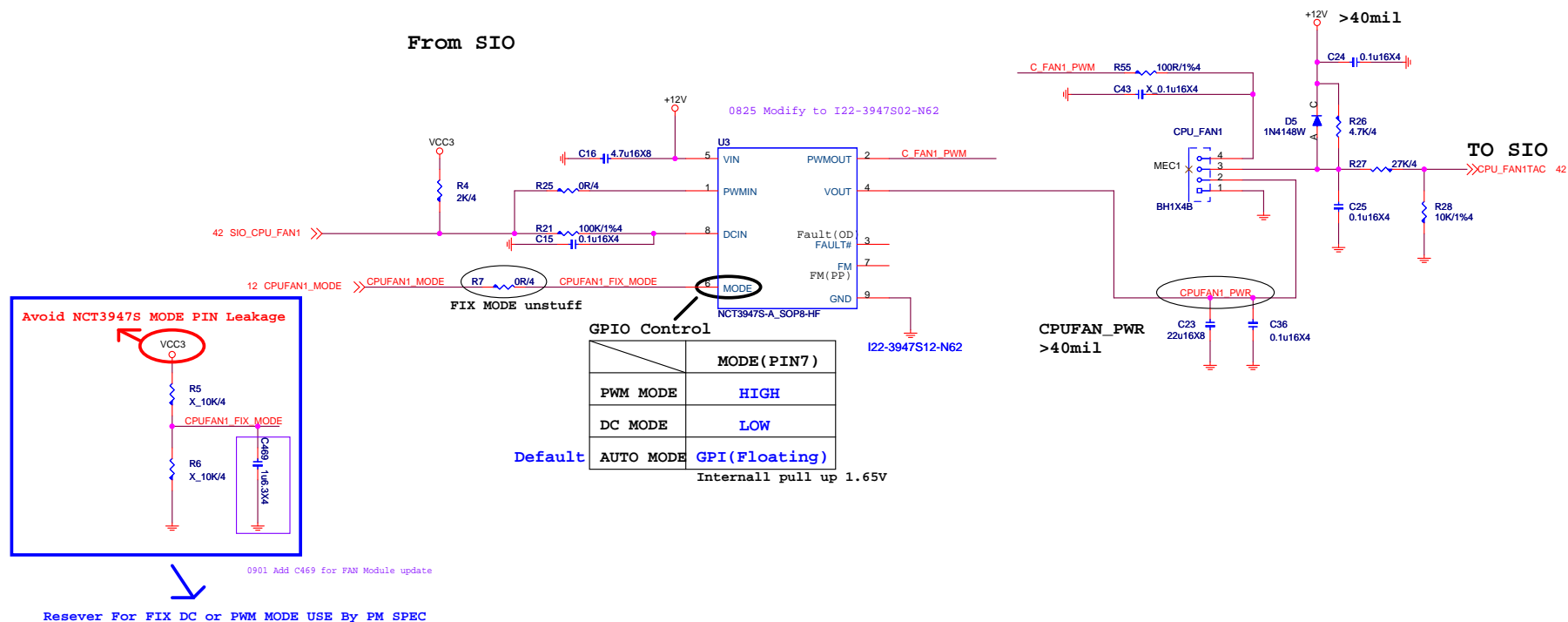
For TL624-1.1

SKYLAKE : Stuff D10/D17/R353

B85/H87 : Stuff D8/D9/R353

Others : Stuff R272





- 1.MODE : USE MODE PIN change FAN MODE(PWM or DC FAN)
- 2.FAULT : USE FAULT PIN Triger OVT/OCV 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)



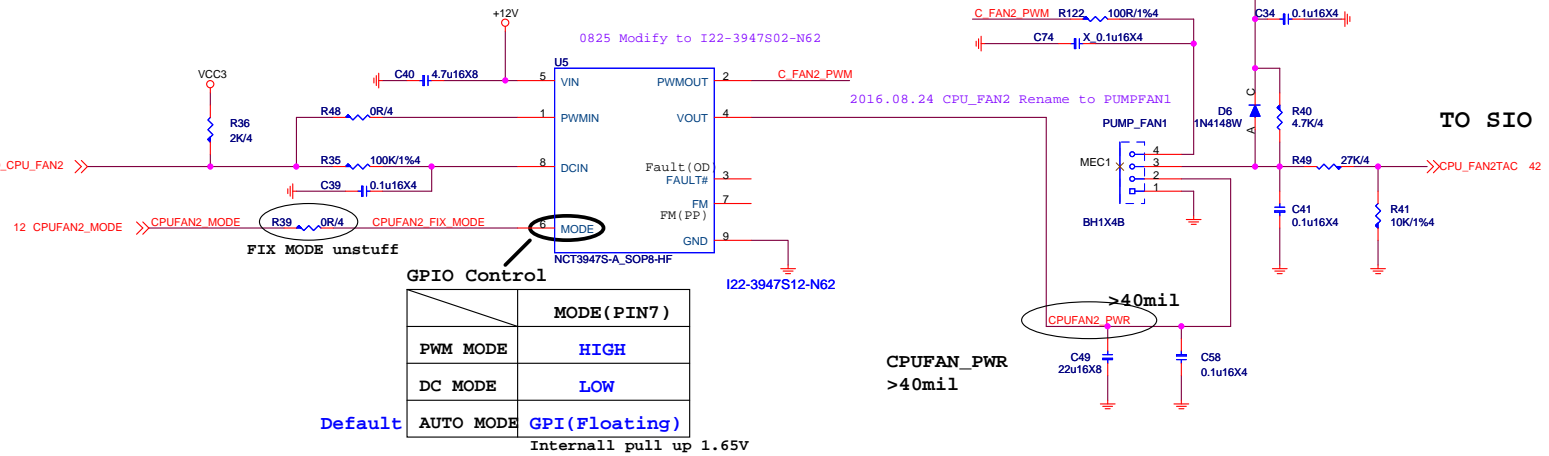
MICRO-STAR INT'L CO.,LTD

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Size Custom	Document Description CPU FAN1	Rev 11
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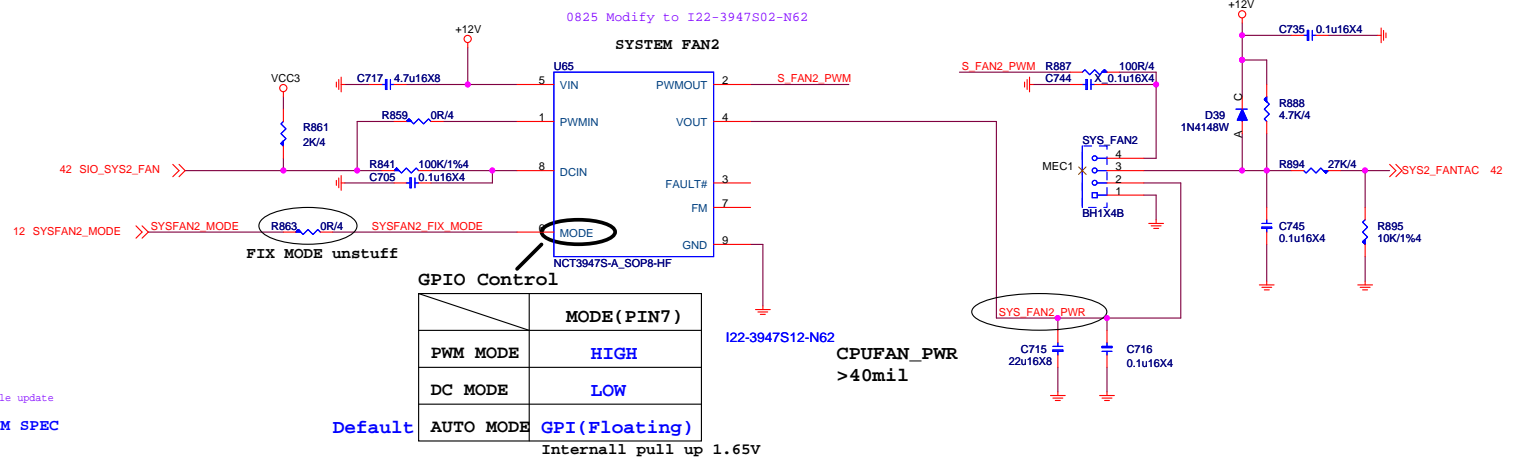
# TYPE J : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO

From SIO



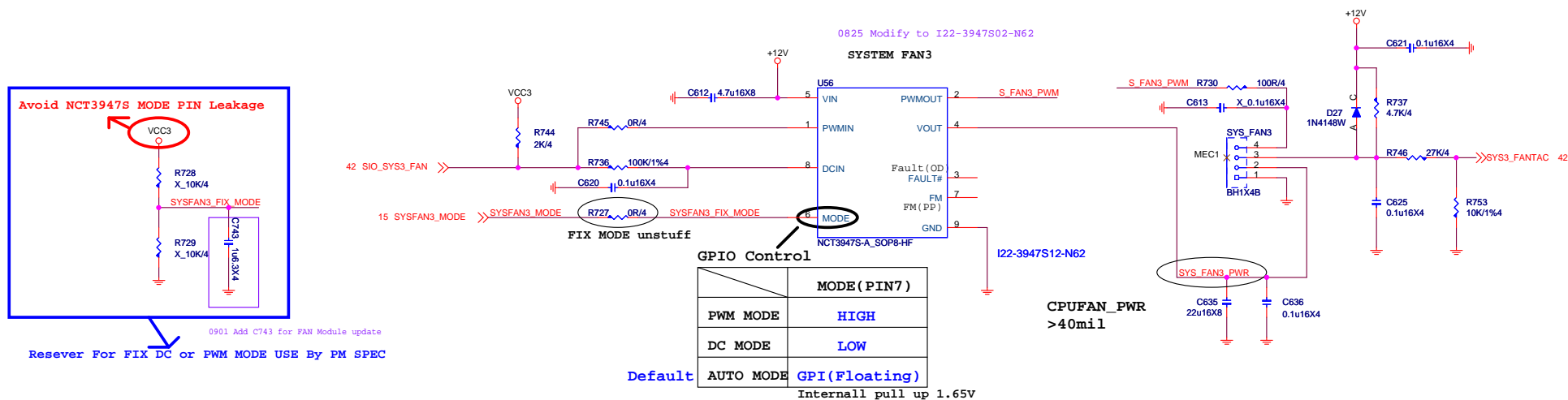
- 1.MODE : USE MODE PIN change FAN MODE(PWM or DC FAN)
- 2.FAULT : USE FAULT PIN Triger OVT/OC Protection,LOW Atcive (Reserve NEW IC)
- 3.FM : USE FM PIN For BIOS USE to Detect PWM or DC FAN & Show information(Reserve NEW IC)

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

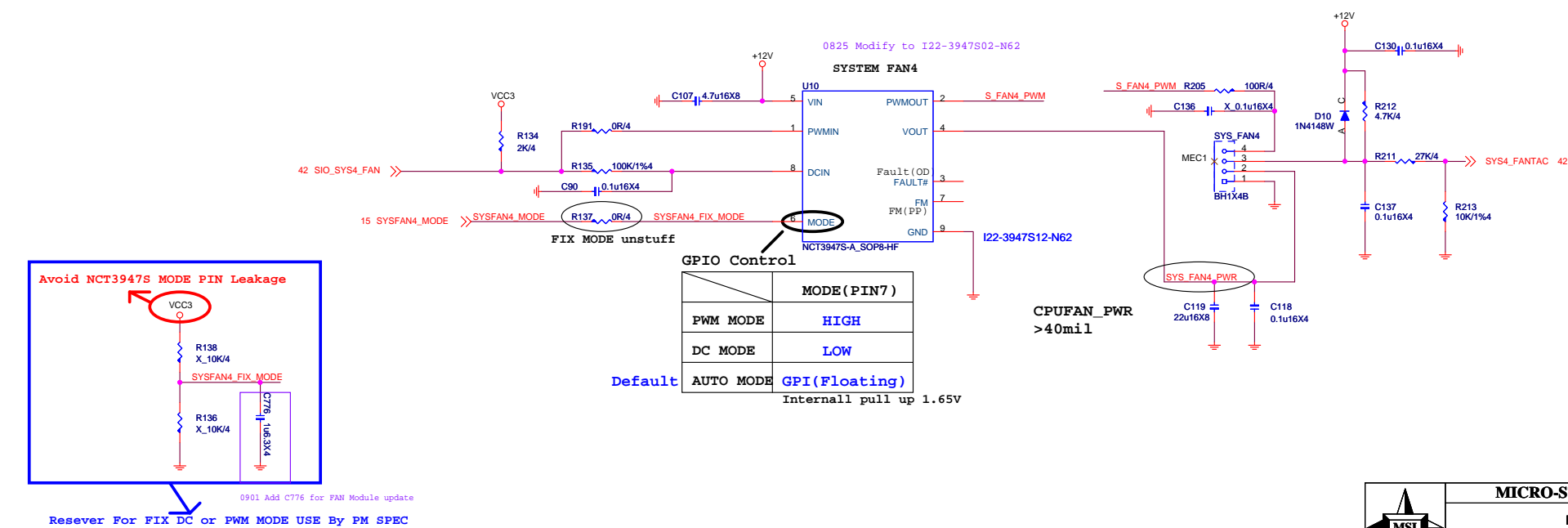
**MS-7A63**

Size Custom	Document Description <b>SYSTEM FAN1&amp;2</b>	Rev 11
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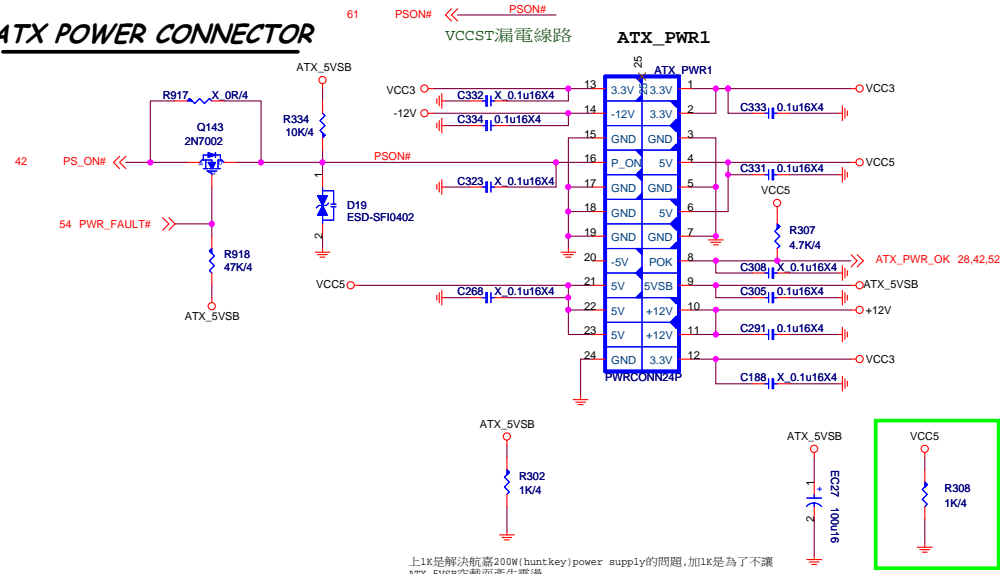
TYPE J : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO



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

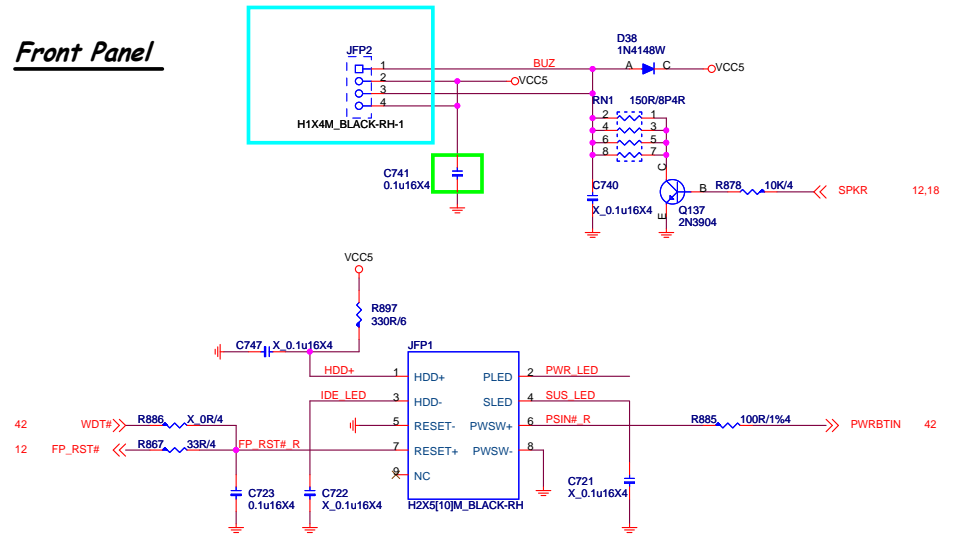


## ATX POWER CONNECTOR

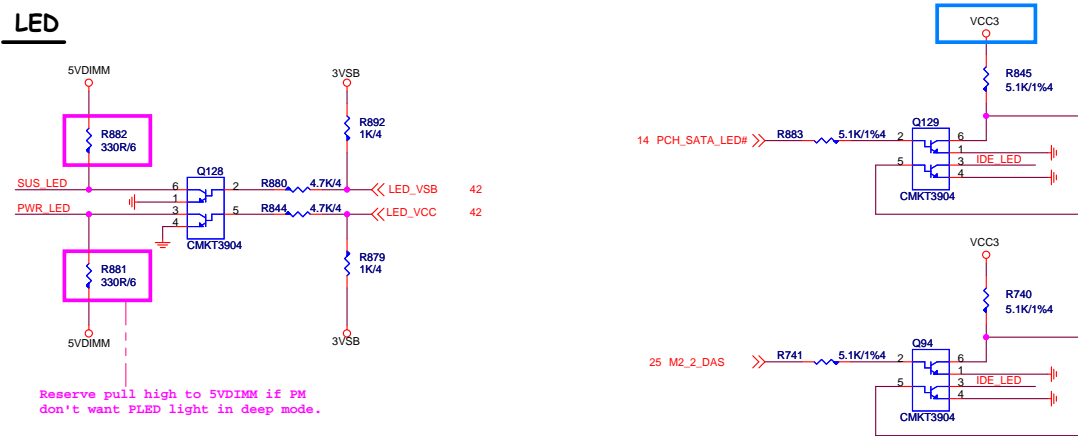


上1K是解決航嘉200W(huntkey)power supply的問題,加1K是為了不讓ATX\_5VSB空載而產生震盪

### Front Panel

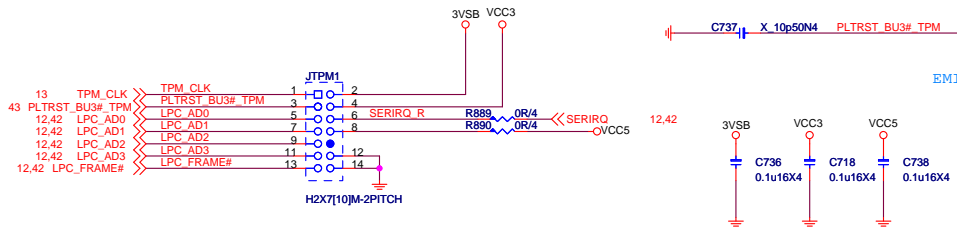


LED

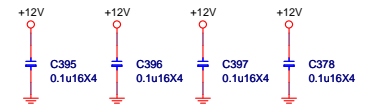
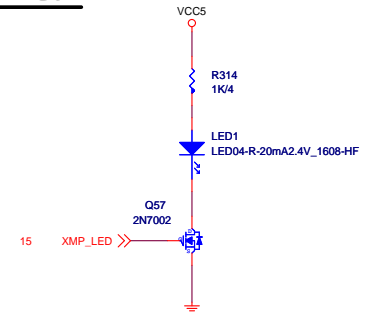


Reserve pull high to 5VDIMM if PM  
don't want PLED light in deep mode.

TPM Confirm ESPI TPM card and TPM card pin define  
(Not ready)



**XMP LED**

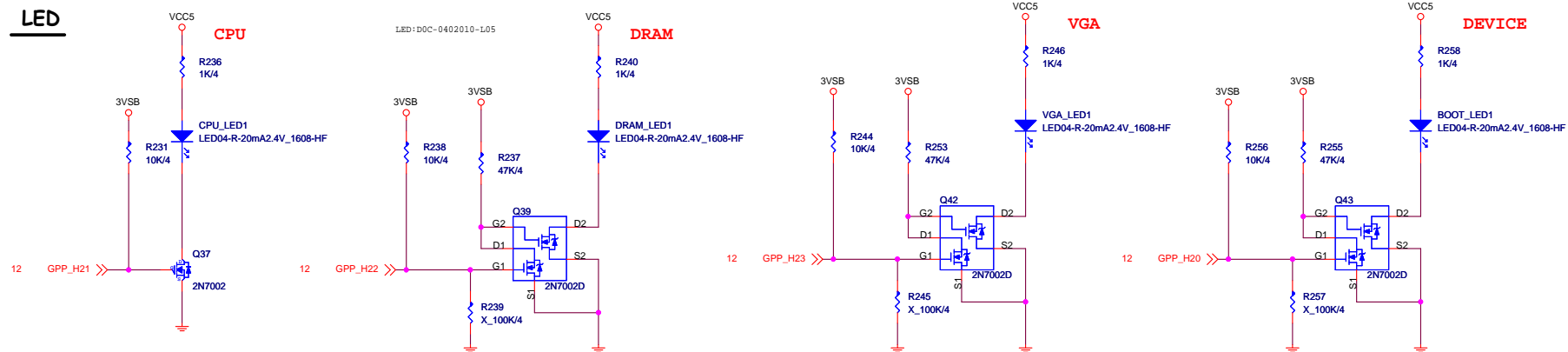


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Size Custom	Document Description <b>ATX Power/F_Panel</b>	Rev 11
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## LED



開機斷電狀態下，4個LED先維持default全暗，開機通電後：

1. 首先進行CPU check CPU LED 亮，check PASS後則CPU LED減掉。
2. 接著依序進行Memory /memory LED亮check PASS後則memory LED減掉。
3. VGA的check/VGA LED亮，check PASS後則VGA LED減掉。
4. 因此最後正常順利開機後，三個LED燈都是減掉的。  
(系統重啟或其他原因造成系統重開機，則LED仍按上述行為動作)

LED	PCH_GP20	PCH_GP21	PCH_GP22	PCH_GP23
亮	NATIVE PULL HIGH	GPO PULL HIGH	GPO PULL HIGH	NATIVE PULL HIGH
滅	NATIVE LOW	GPO LOW (default LOW)	GPO LOW (default LOW)	GPO LOW (default LOW)

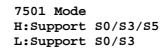


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5.45A



5VDUAL is power source of 1P0SB

NP-P5003QVG\_SOIC8-RH

ATX\_5VSB

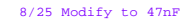
PCH\_VCCDRV

PCH\_SBDV

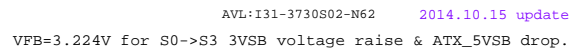
C655 47n16X4

C675 0.1u16X4

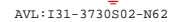
8/25 Modify to 47nF



4.04A



0.422A



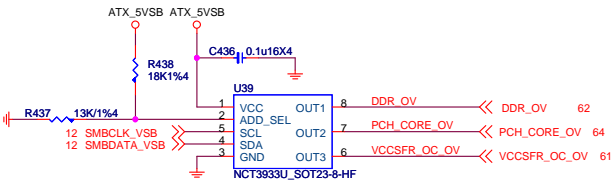
MS-7A63

Size Custom	Document Description <b>ACPI UPI</b>	Rev 11
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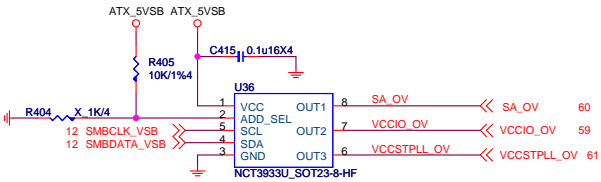


UPI VOLTAGE CONSOLE

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



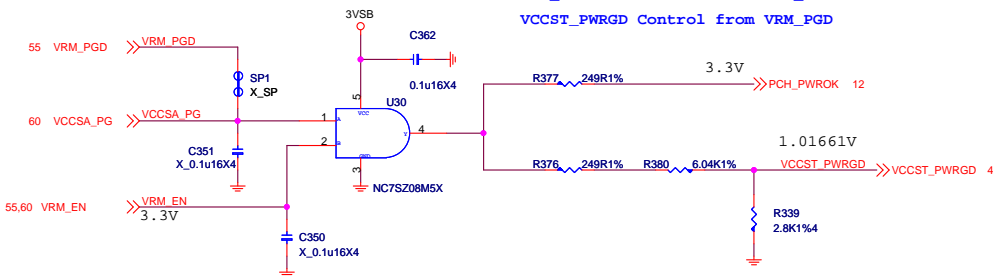
0x20:RH=10K,RL=OPEN



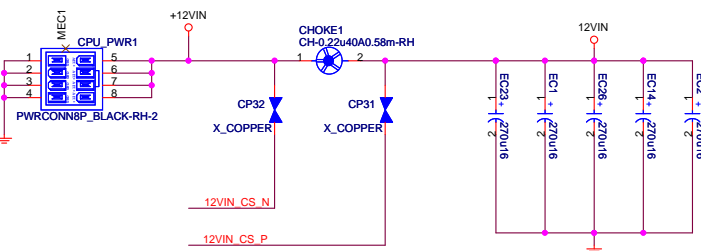
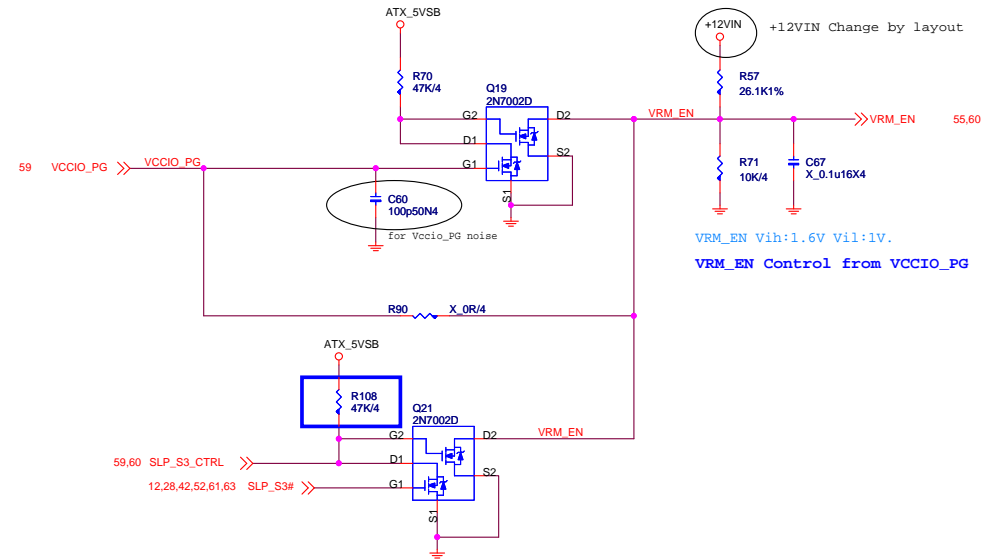
ADDRESS	0x2A	0X28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

VCCSA&Vcore use same PWM IC, pull up VCC3  
VCCSA&Vcore use different PWM IC,pull up VCCSA  
VCCST\_PWRGD can assert before or equal to PCH\_PWROK, but must never lag it.

PCH\_PWROK Control from VCCIO\_PG&VCCSA  
VCCST\_PWRGD Control from VRM\_PG

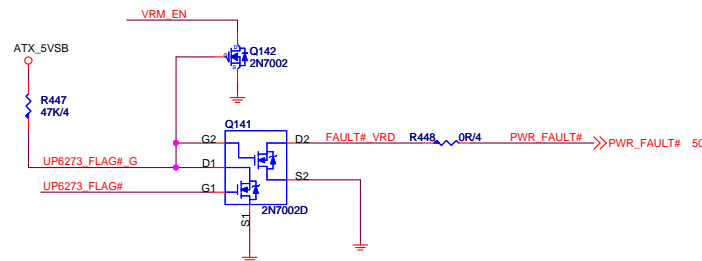
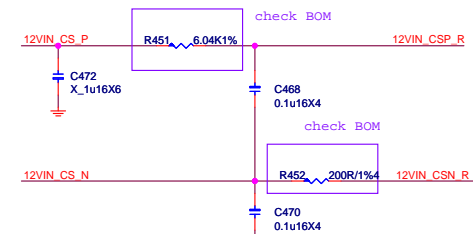
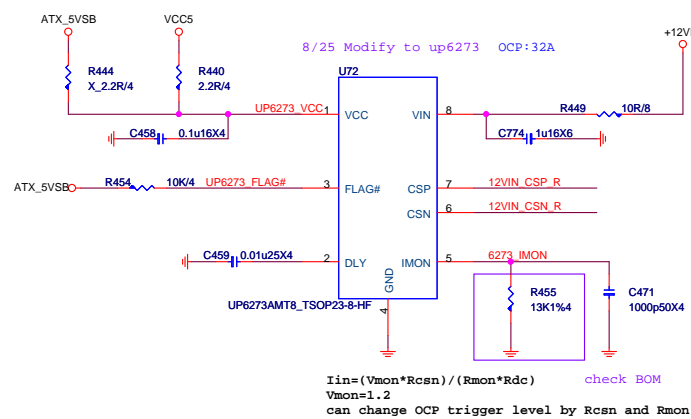
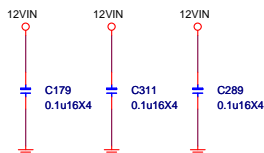


VRM\_EN Control from VCCIO\_PG

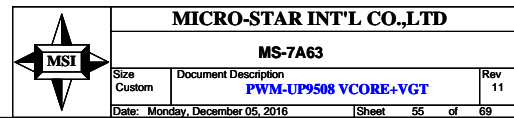
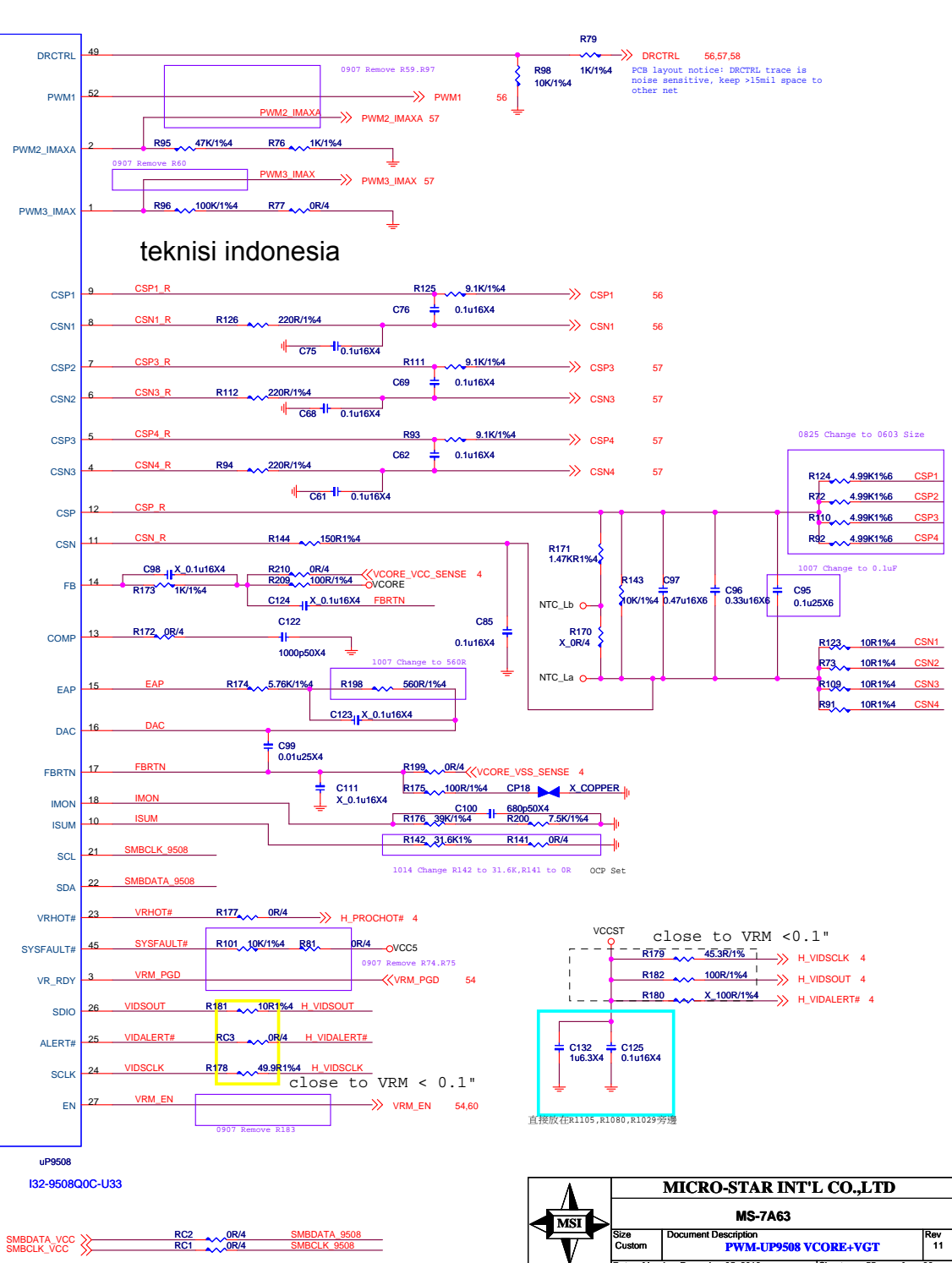
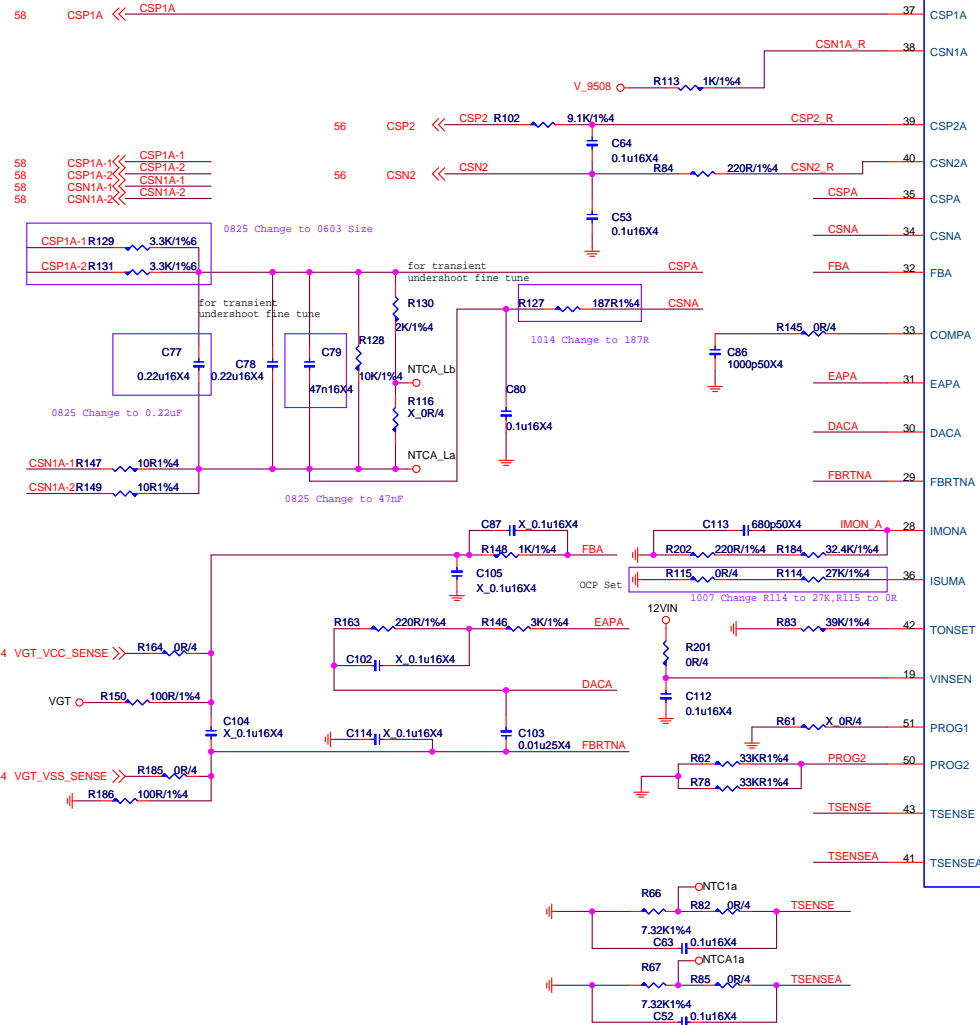
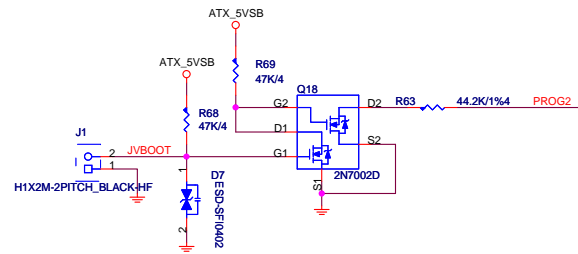


Iripple=30.95A  
Vcore 18.101A  
VGT 8.457A  
VCCSA 4.392A

Close to JPWR2

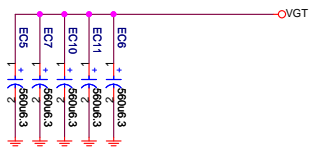


Vcore: ICC Max 100A      VGT: ICC Max 48A  
LL: 2.1 mohm              LL: 3.1 mohm  
OCP: 200A                OCP: 75A









Size Custom	Document Description <b>VGT MOS-PHASE 1~2</b>	Rev 11
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# VCCIO

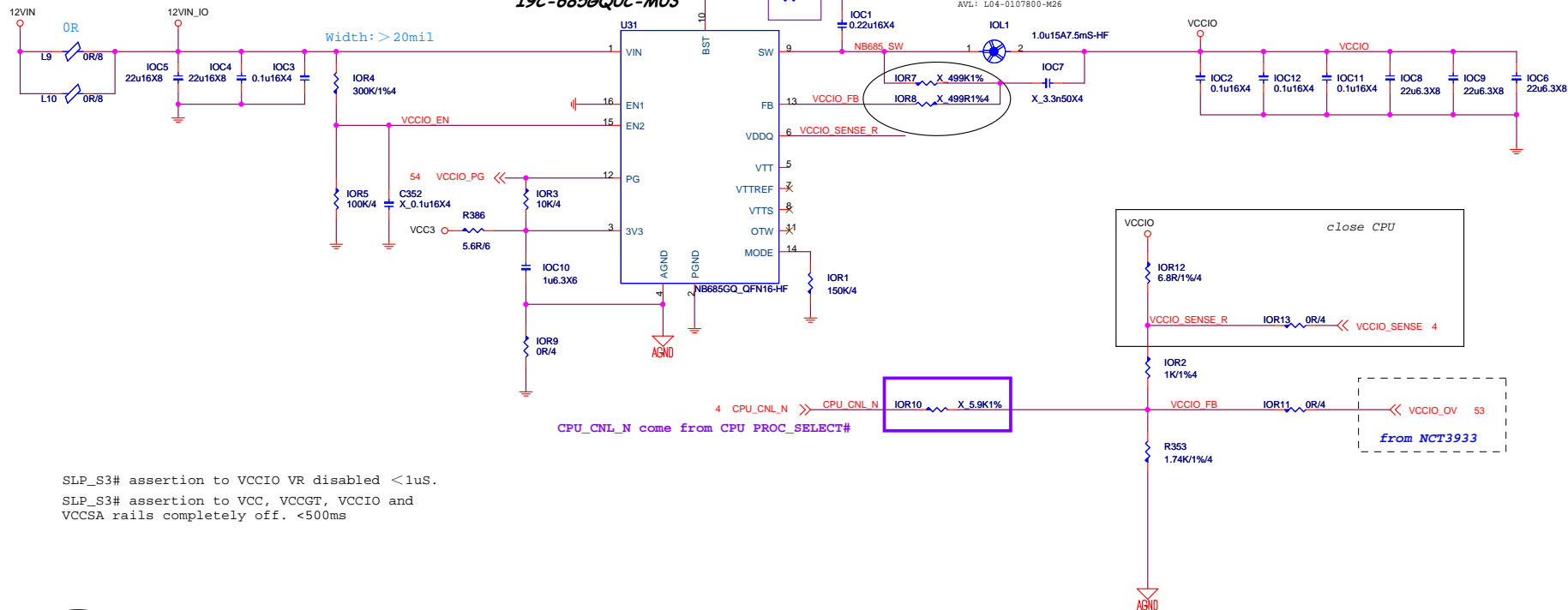
0.95V; 5.5A

support OV=>NB685

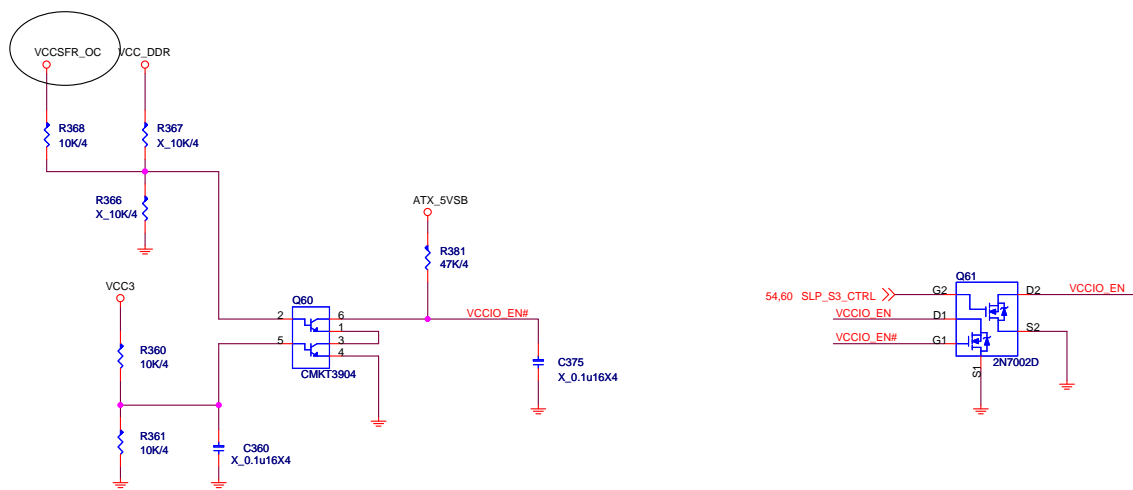
IMAX 10A  
ILIMIT=10A~12A  
IOC=ILIMIT+40%\*IMAX/2=12A~14A.

0902 Modify IOR6 to 0603 Size

0.7776uH<L<1.1664uH



SLP\_S3# assertion to VCCIO VR disabled <1uS.  
SLP\_S3# assertion to VCC, VCCGT, VCCIO and VCCSA rails completely off. <500ms



SLP\_S3# assertion to VR disabled max:1us

# SA Power:1.05V,11.1A

$$OCP = 11.1A * 1.4 = 15.54A$$

$$Rocs(R417) = OCP * R_{dson}(Low\ side) [3.4mohm] / 10uA$$

$$= 15.54 * (3.4)mohm / 10uA$$

$$= 5.2836Kohm$$

Rocs: 5.2836K, OCP:

D03-4C05N03-005 : 15.76A

D03-632BA0C-N03 : 16.24A

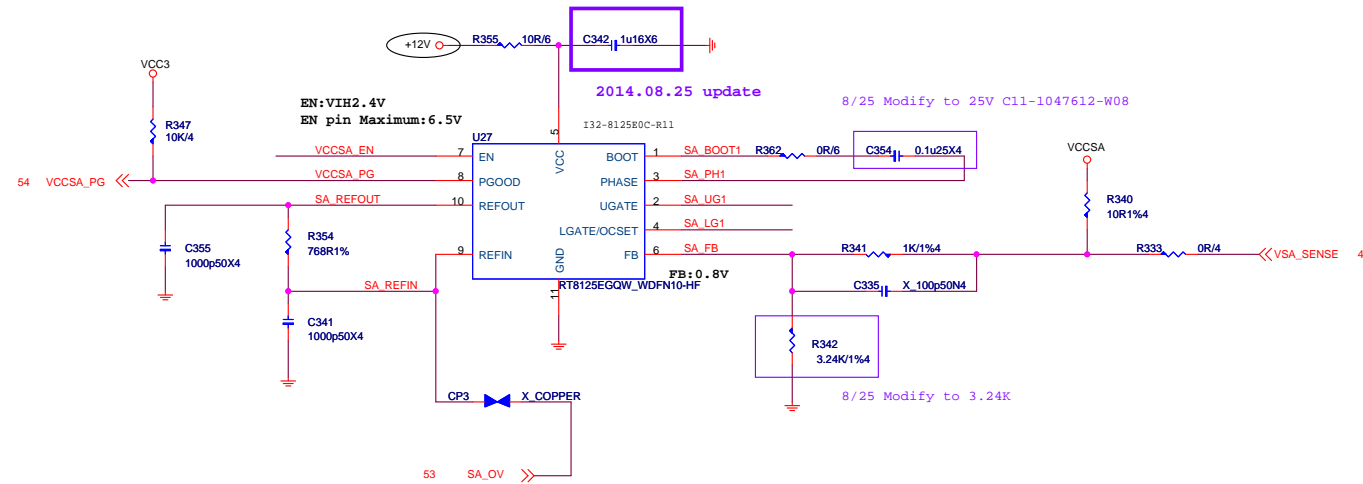
use UBIQ MOS need Check

Rdson(Low) 10V

D03-4C05N03-005 : 3.4mohm

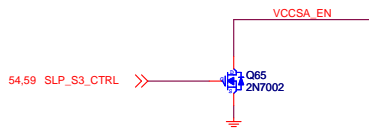
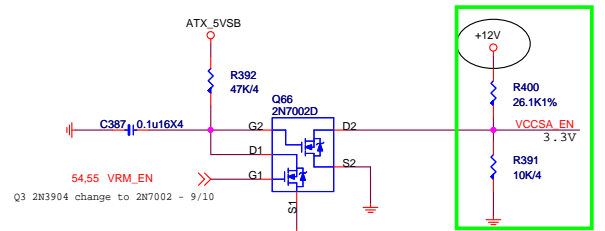
D03-632BA0C-N03 : 3.3mohm

D03-3056M00-U47 : 4.2mohm



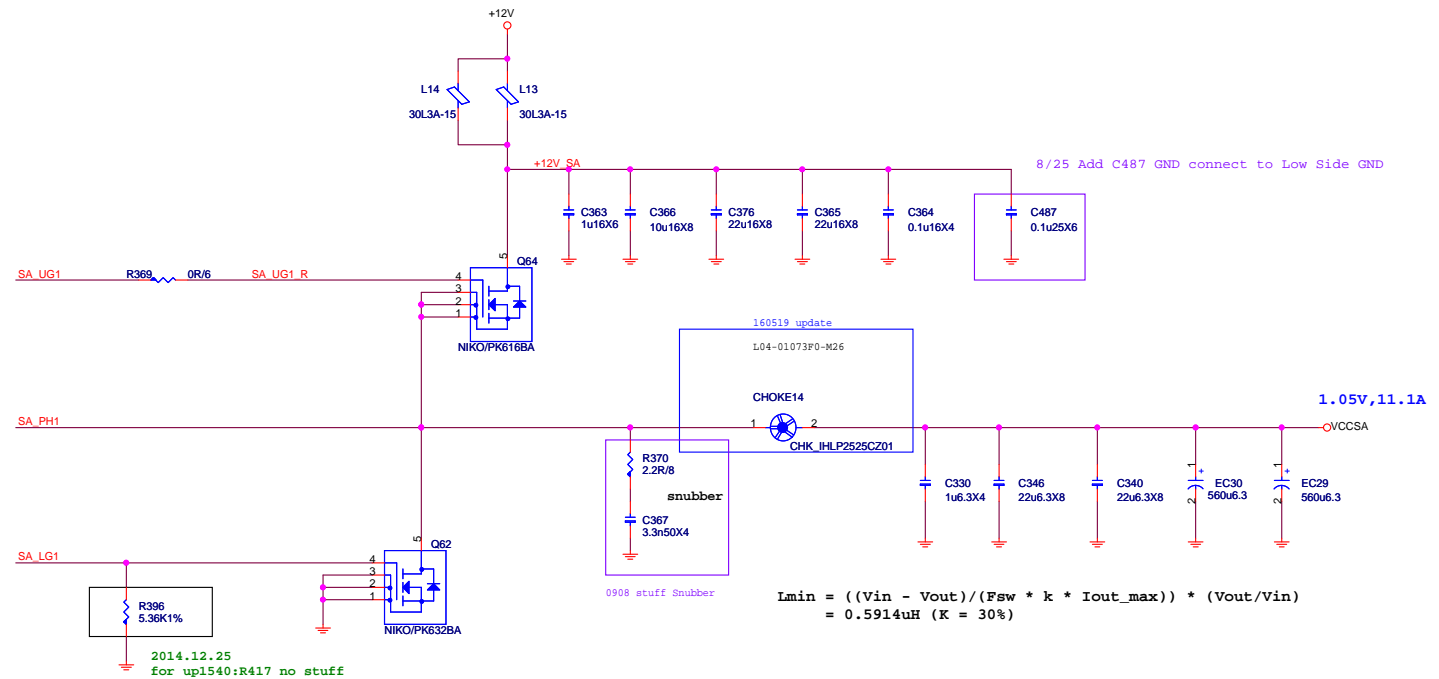
VRM\_EN線路update

Pull up by layout&Check level



SLP\_S3# assertion to VCC, VCCGT, VCCIO and VCCSA rails completely off.

SLP\_S3# assertion to VR disabled max:1us



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Vinafix.com

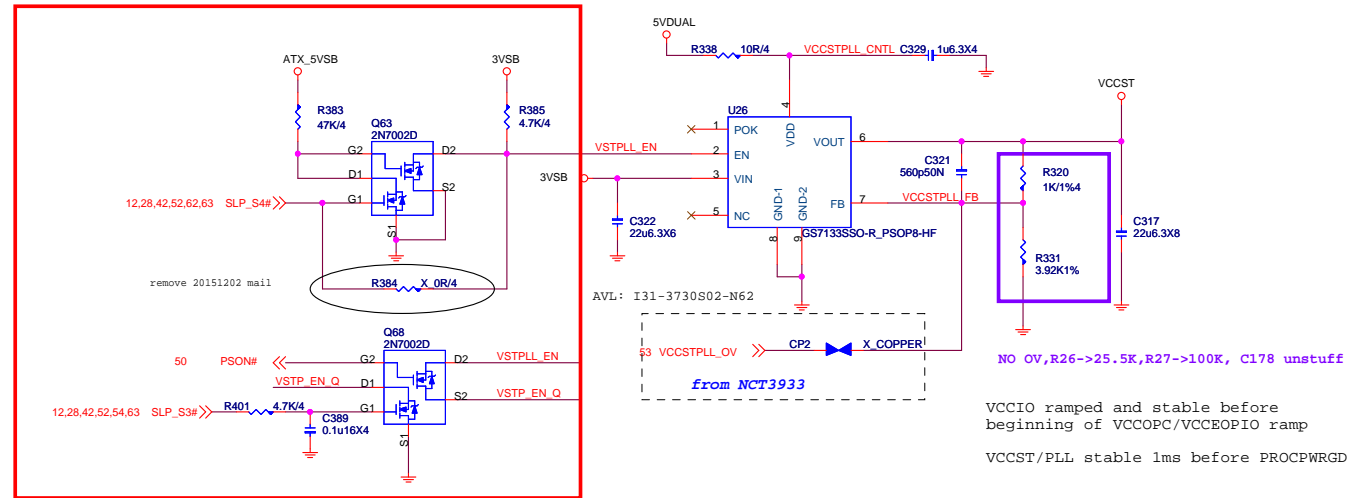
## VCCST

VCCST:60mA  
VCCPLL:150mA

1.0V; 210mA

For Cost down VCCST&VCCPLL merge

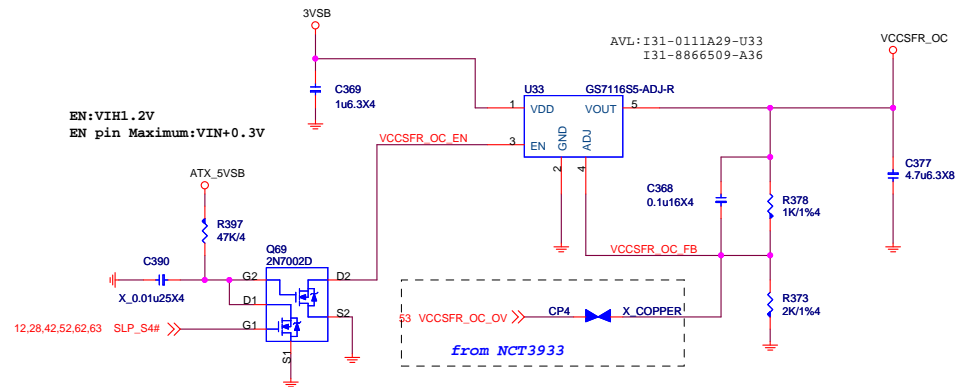
for Gaming3/5, Classic, ECO  
and H110



## VCCPLL\_OC

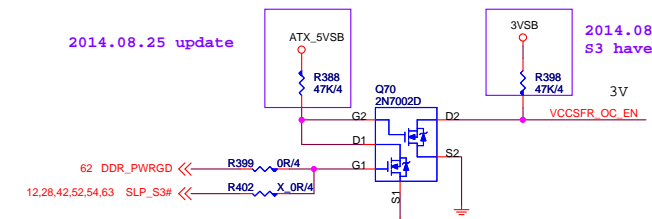
2014.08.21 update

1.2V; 130mA



2014.08.25 update

2014.08.25 update  
S3 have power



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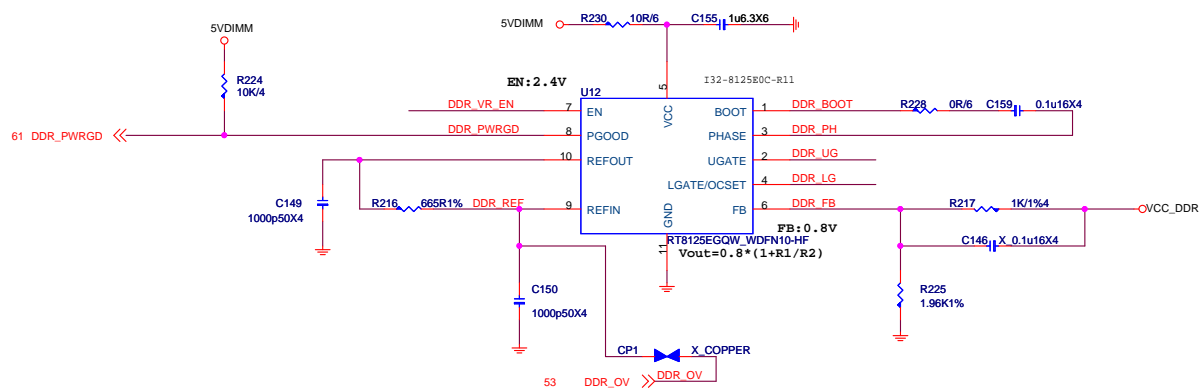
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DDR4\_1.2V 2.5A+9.5A+1.2A=13.5A  
 2.8A FOR CPU  
 9.5A FOR 4DIMM  
 1.2A FOR DDR VTT

$OCP = 13.2A * 1.5 = 20.25A$   
 $Rocs(R95) = OCP * Rdson[(Low\ side)] / 10uA$   
 $= 20.25A * (4.6)mohm / 10uA$   
 $= 9.315Kohm$

Rocpset:5.1K  
 $OCP = Rocset * Rdson[(Low\ side)] / 10uA$   
 $= 9.31K * (4.6)mohm / 10uA$   
 $= 20.23A$   
 use UBIQ MOS need Check

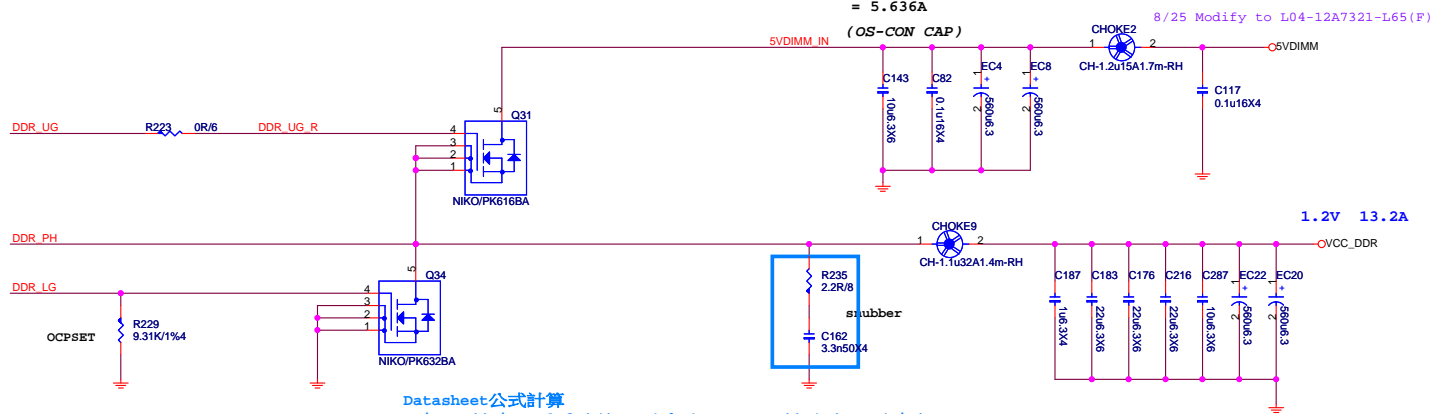
Rdson(low)4.5V
D03-4C05N03-005 : 5 mohm
D03-632BA0C-N03 : 4.6mohm
D03-3056M00-U47 : 6.2mohm



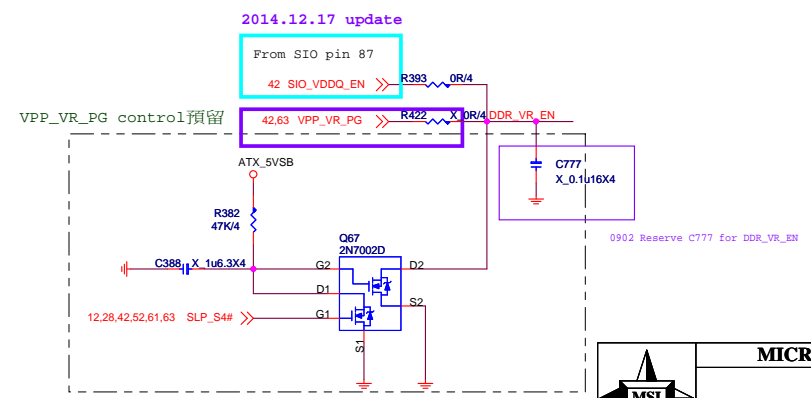
$$I_{rms} = I_{out} * \sqrt{((V_{out}/V_{in}) * [1 - (V_{out}/V_{in})])}$$

$$= 13.2 * 0.427$$

$$= 5.636A$$

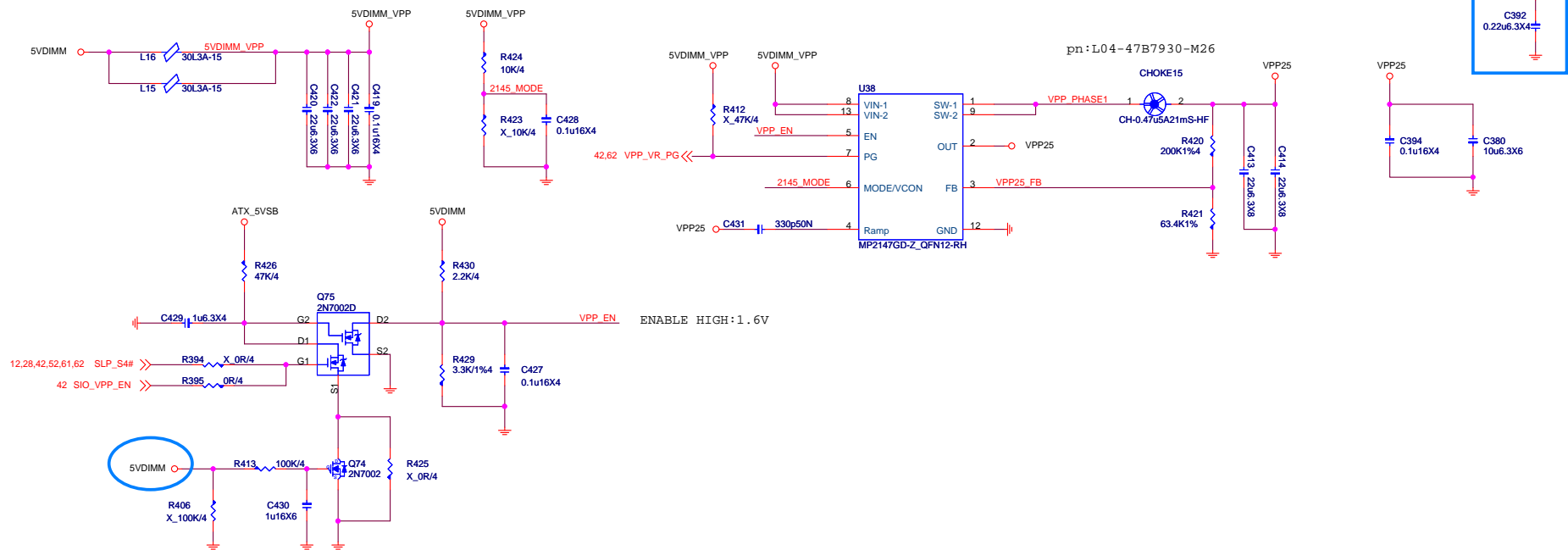


Datasheet公式計算  
 $L_{min} = ((V_{in} - 1.2V) / (F_{sw} * k * I_{out\_max})) * (V_{out}/V_{in})$   
 $= 0.7677uH (K = 30\%)$   
 若帶入CAP ESR計算,  $0.2432uH < L < 1.2897uH$



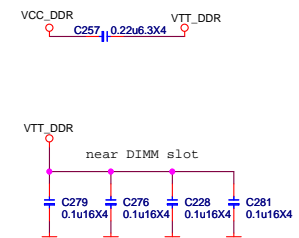
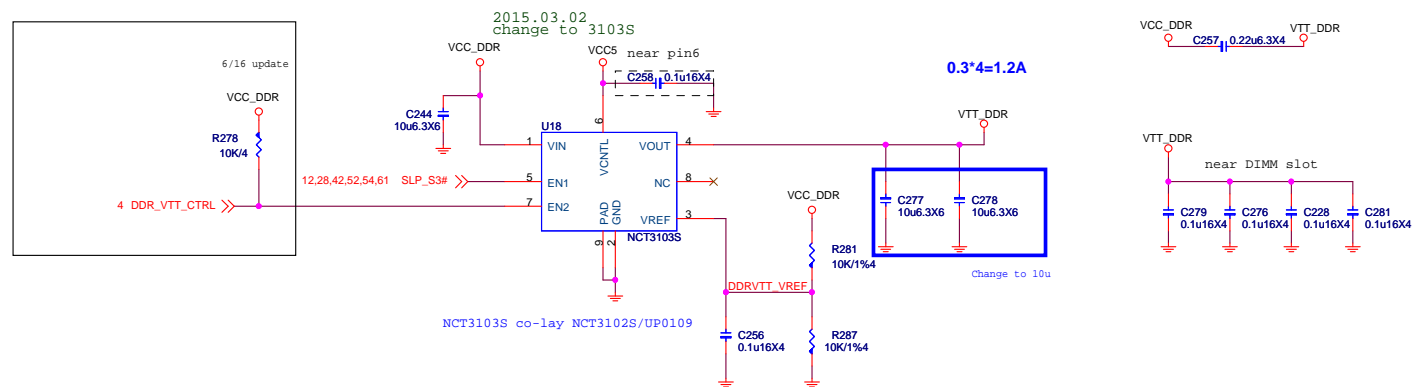
4DIMM :2.24A FOR DDR VPP2.5V

**VPP25 Power**  
**2.5V; 2.24A**



To make sure VPP EN after 5VDIMM stable

### DDR VTT Power



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

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# PCH\_1VSB

1.0V; 11.83A

OCP = 17.745A

Rocset =  $1.5 * I_{max} * R_{dson}(low) / I_{ocset}$   
 =  $1.5 * 11.83 * 4.6mohm / 10uA$   
 = 8.16K

Rocs: 7.87K, OCP:

D03-4C05N03-O05 : 15.74A

D03-632BA0C-N03 : 17.1A

use UBIQ MOS need Check

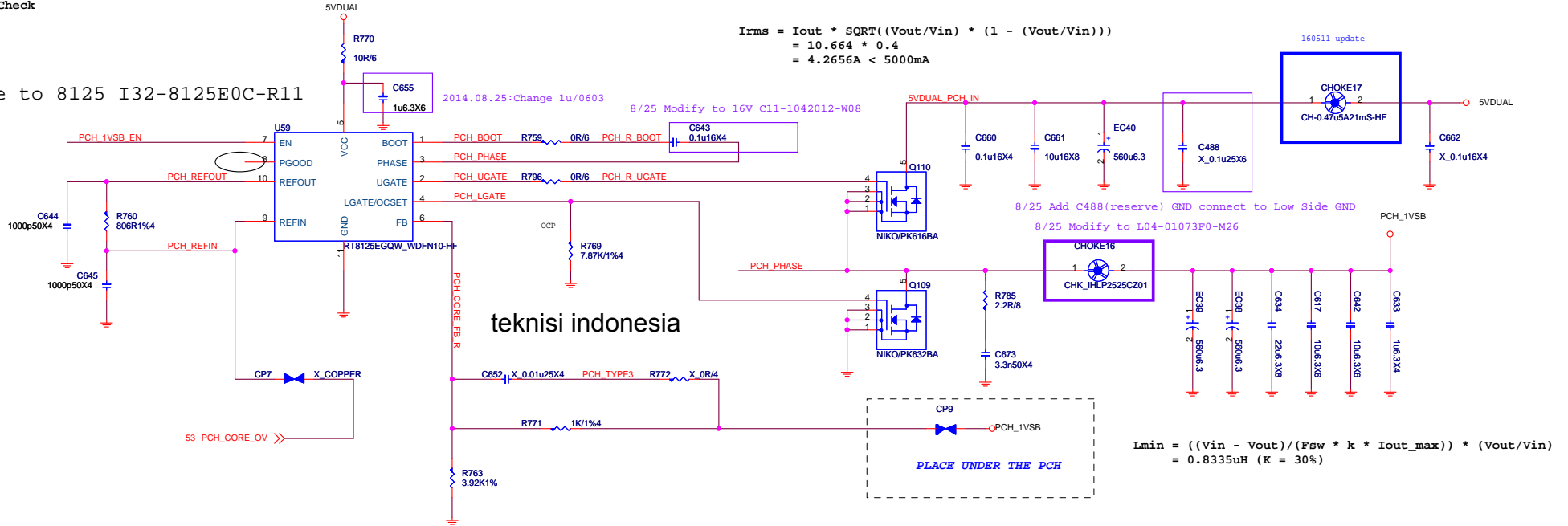
Rdson(low) 4.5V

D03-3116M00-U47 : 3.6 mohm

D03-632BA0C-N03 : 4.6mohm

D03-3056M00-U47 : 6.2mohm

1504 change to 8125 I32-8125E0C-R11



teknisi indonesia

$$V_{out} = V_{ref} * (1 + R_{821}/R_{822})$$

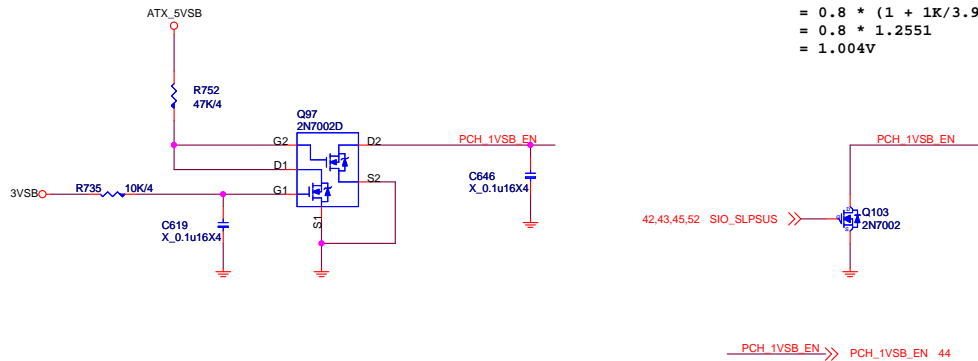
$$= 0.8 * (1 + 1K/3.92K)$$

$$= 0.8 * 1.2551$$

$$= 1.004V$$

$$L_{min} = ((V_{in} - V_{out}) / (F_{sw} * k * I_{out\_max})) * (V_{out}/V_{in})$$

$$= 0.8335uH (K = 30\%)$$



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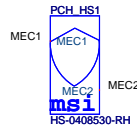
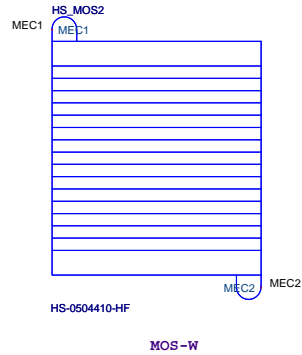
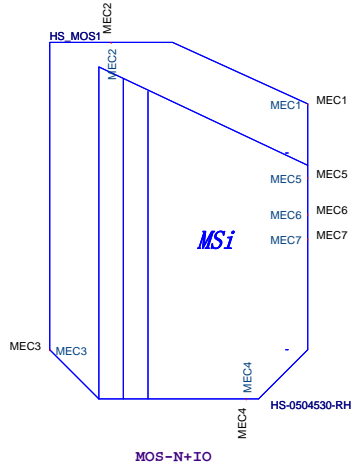
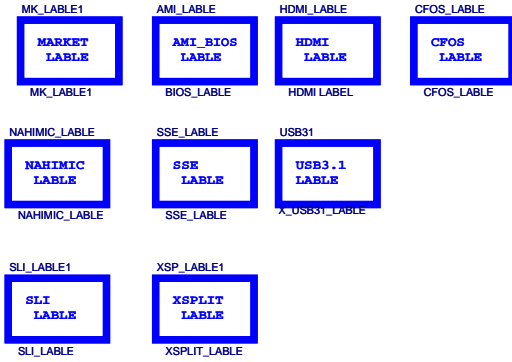
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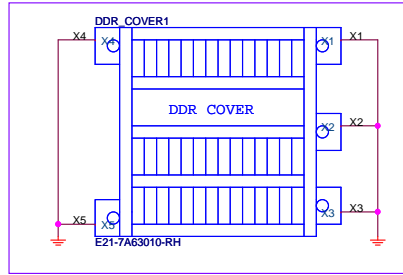
PCB



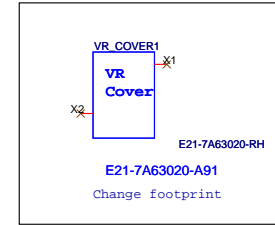
7A63\_11  
PD0-07A6311-G37  
PD0-07A6311-E48



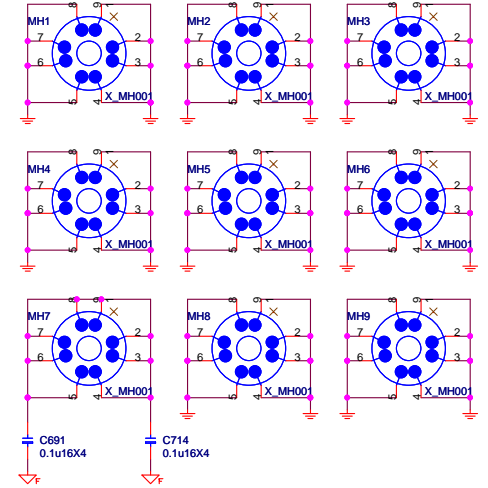
Audio Small Cover



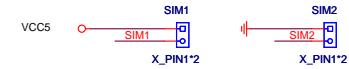
0901 Modify DDR\_COVER1 PIN X1.X2.X3.X4.X5 Connect to GND



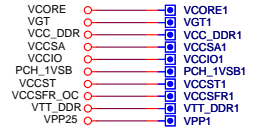
Mounting Holes



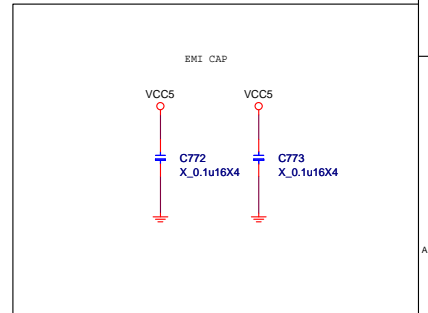
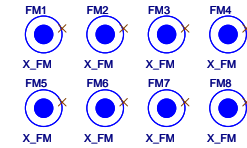
Simulation



Test point



Optical Fiducial Marks-120



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