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# MS-7C89

## CML Platform

ATX  
Ver: 1.3

### CPU:

*Comet lake S 65W*

### Onboard Chip:

*HD Audio Codec : ALC892/ALC897*

*LAN : INTEL I219*

*SIO : NTC5887*

*Flash ROM: SPI 128 MB X1*

### System Chipset:

*H410 PCH\_V*

### VGA Output:

*HDMI Port*

*DVI Port*

*VGA Port*

### Main Memory:

*DDRIV (2666MHz) \* 2*

### PWM:

*IMVP8 -RT3607BC*

### ACPI:

*LDO*

### Expansion Slots:

*PCI Express (X16) Slot \* 1*

*PCI Express (X1) Slot \* 1*

*M.2 Slot \* 1*

*Intel WIFI \* 1*

### Other:

*SATA3.0 \*4*

*PS2 \* 1*

*REAL USB3.1 \*2*

*REAL USB2.0 LAN\_USB*

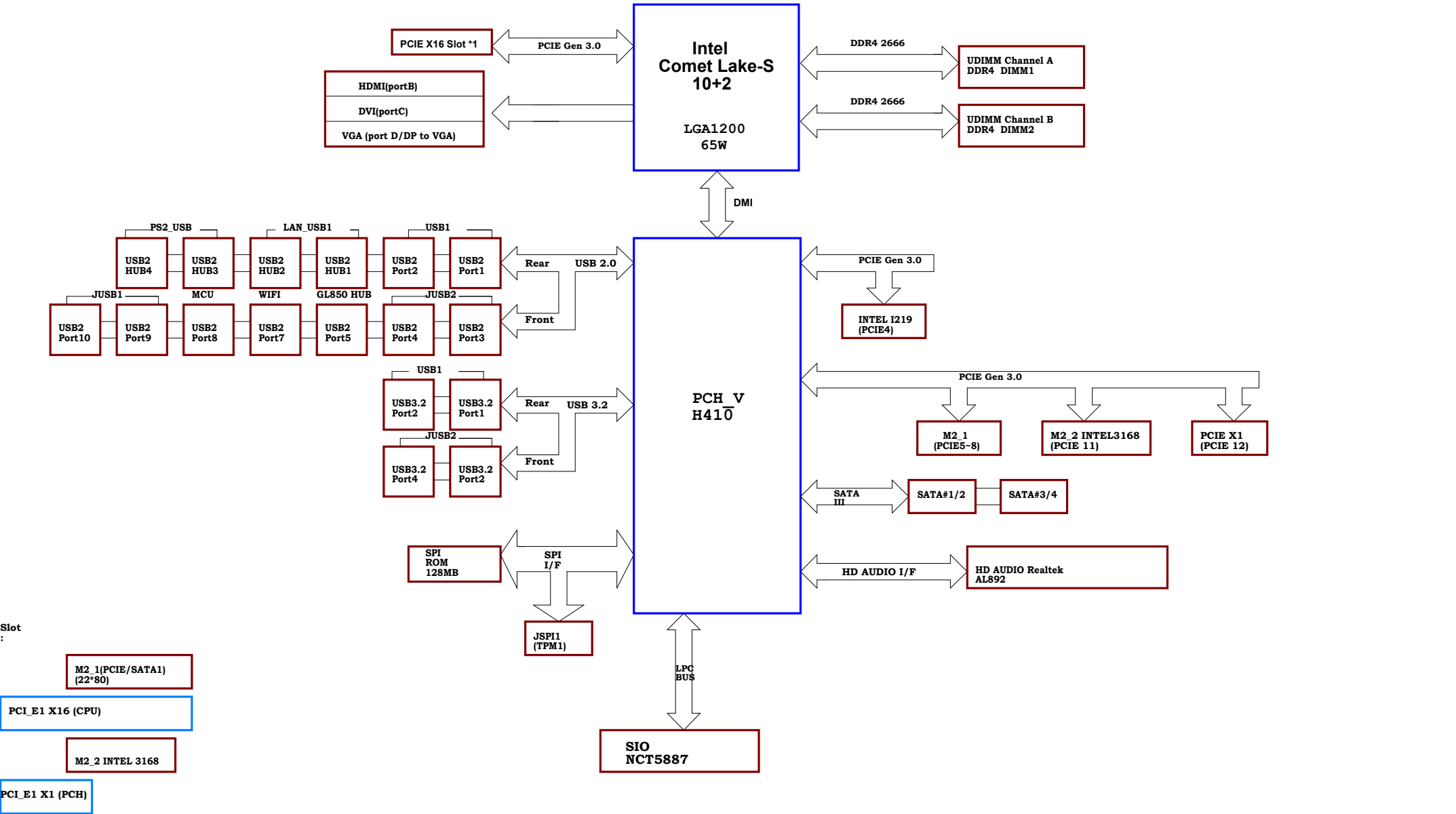
*FRONT USB3.1 \*2*

*FRONT USB2.0 \*4*



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MS-7C89		
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# MS-7C86 Block Diagram

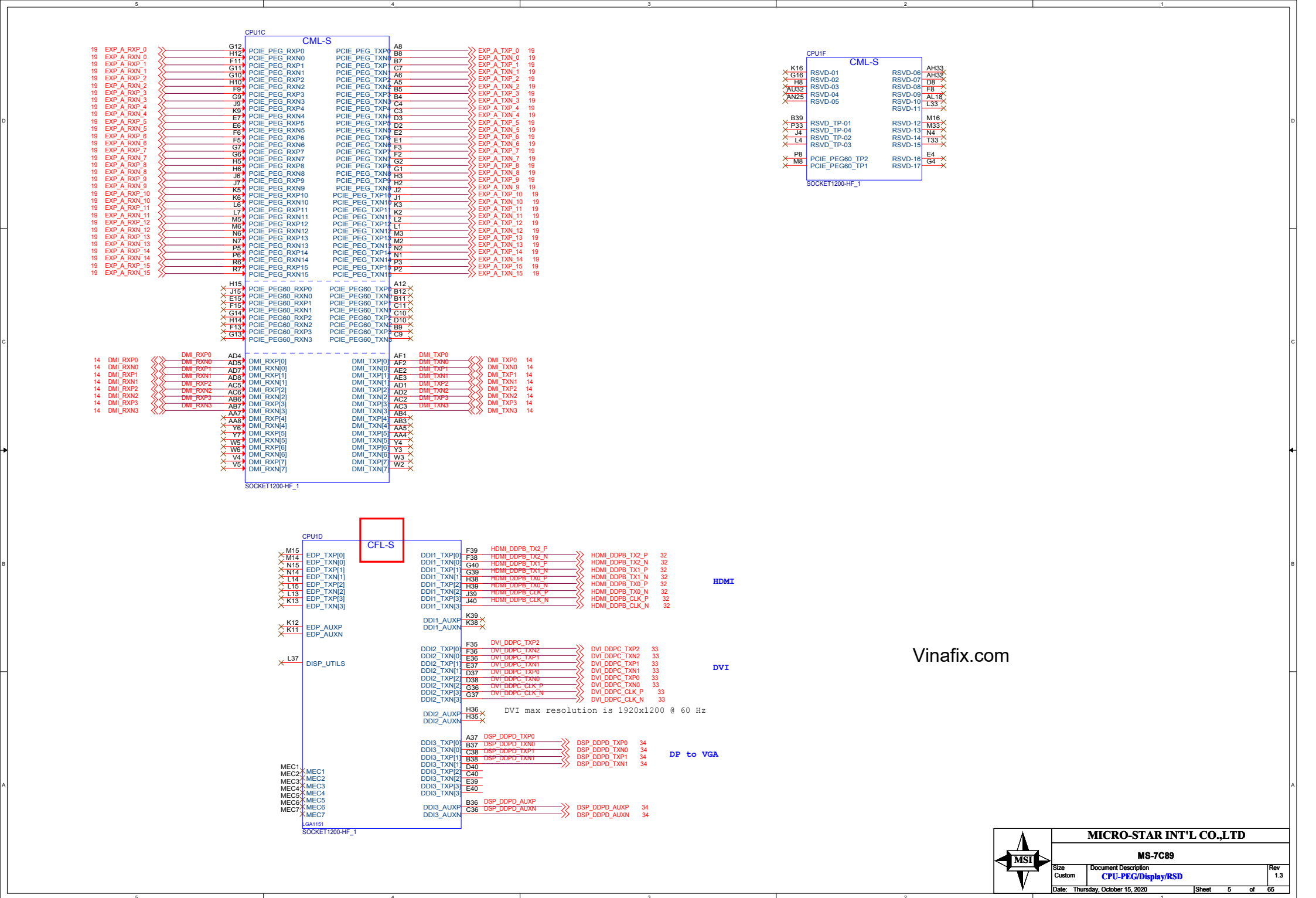


Slot :

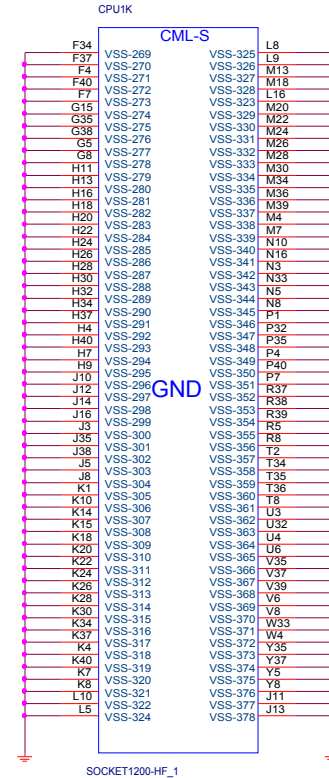
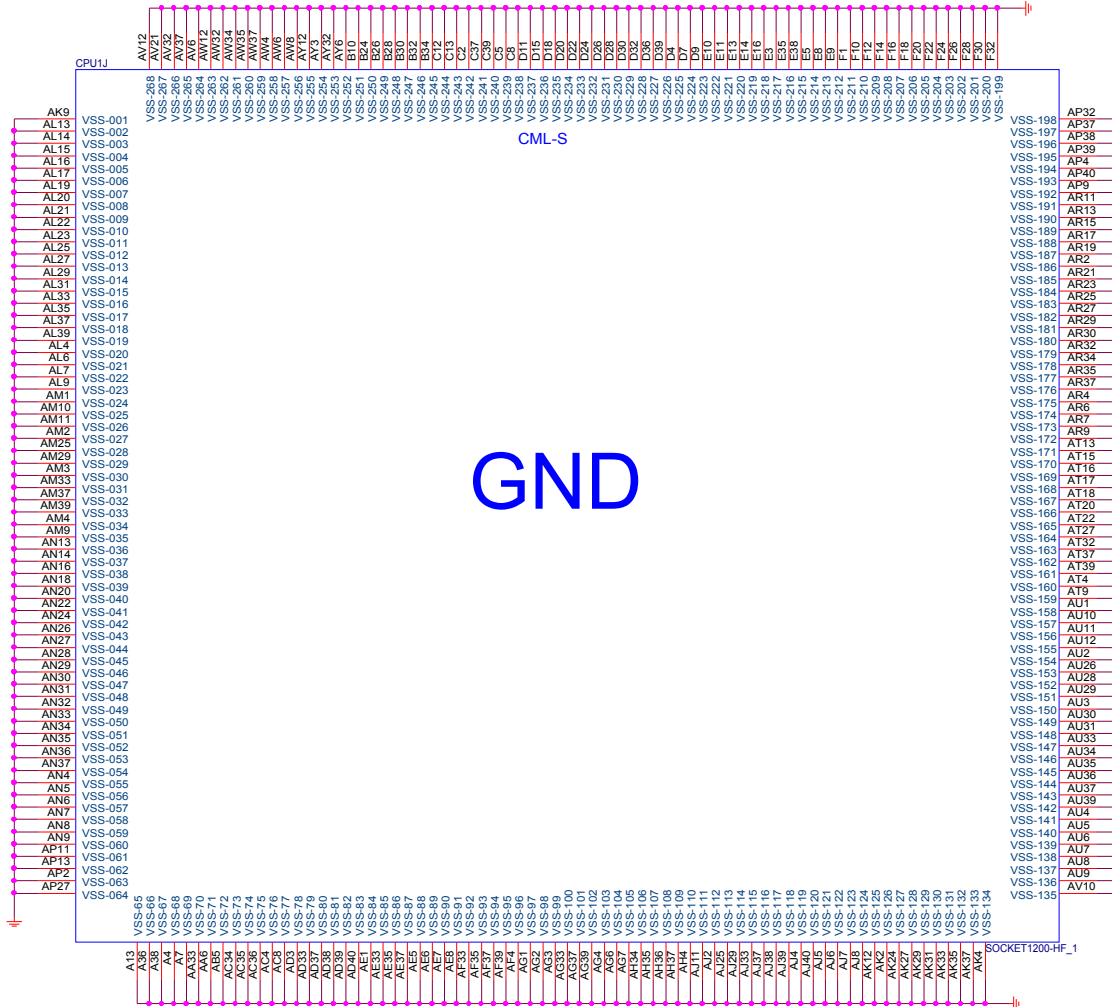
- M2 1(PCIE/SATA1) (22\*80)
- PCI\_E1 X16 (CPU)
- M2 2 INTEL 3168
- PCI\_E1 X1 (PCH)

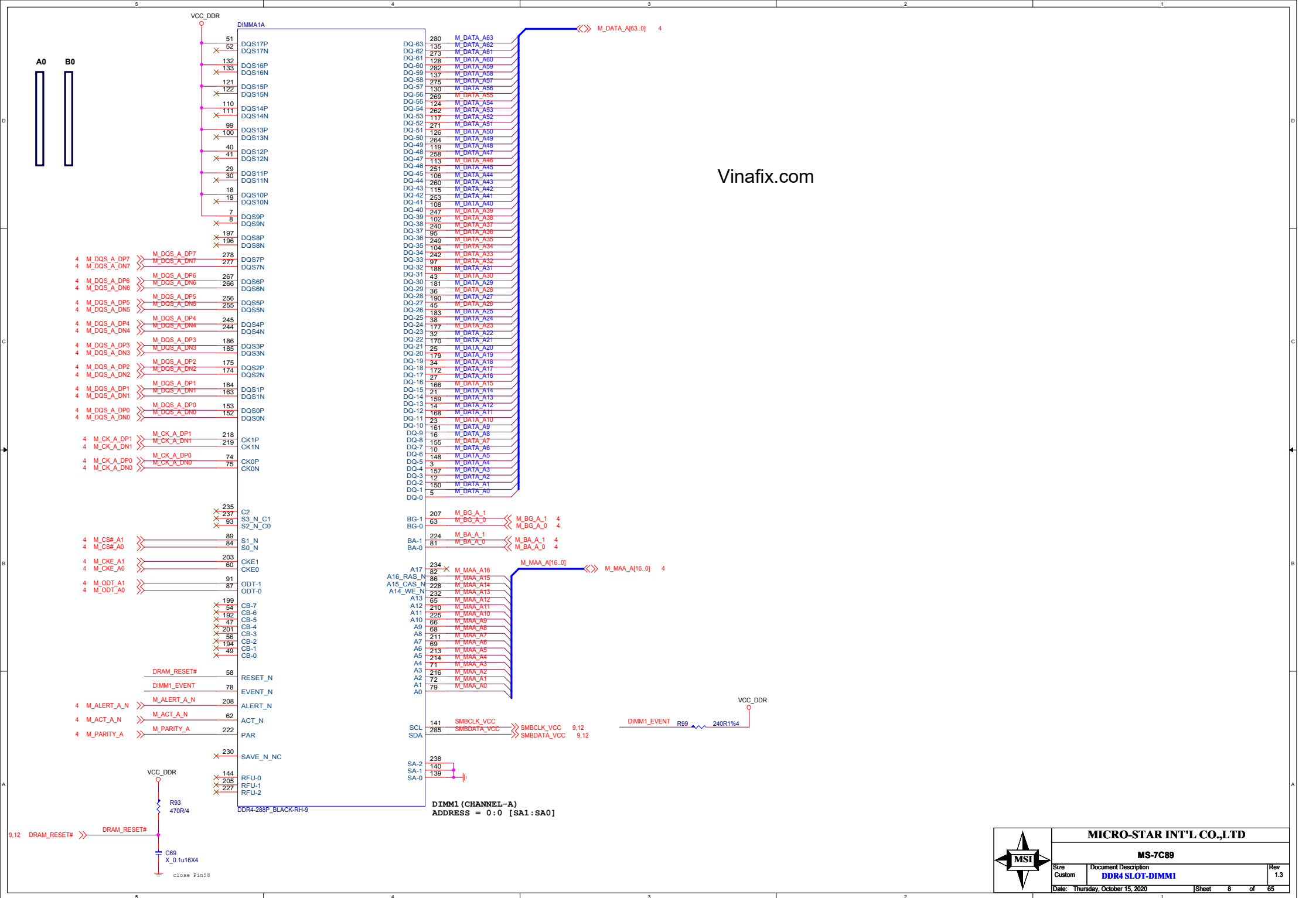




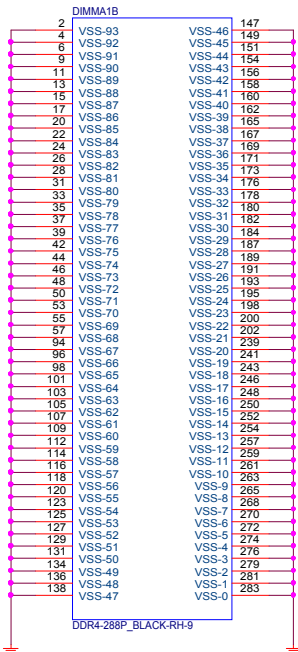
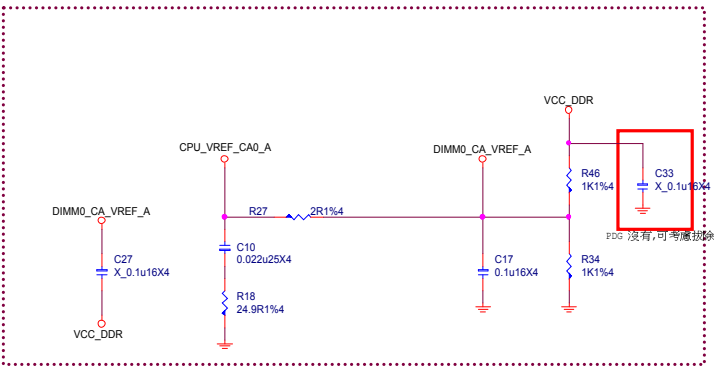
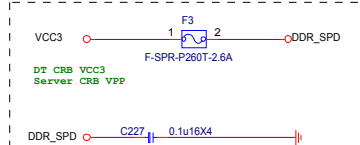
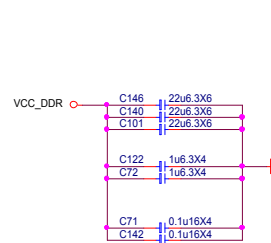
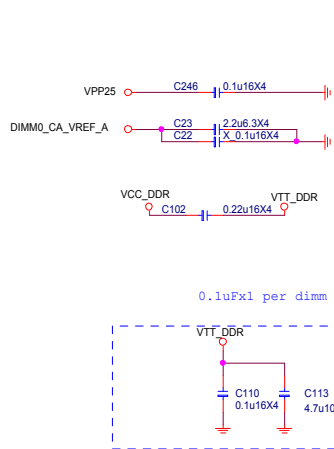
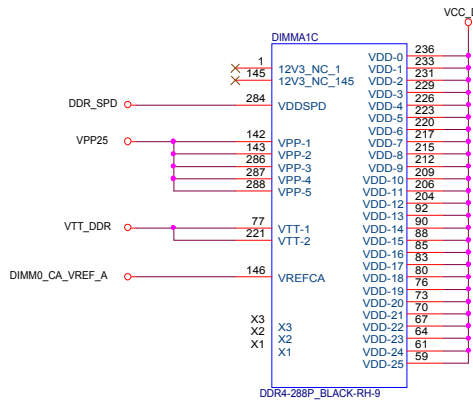




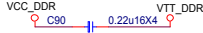
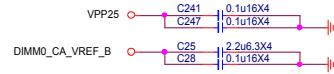
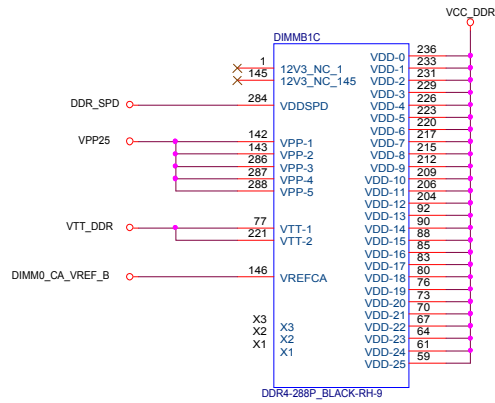




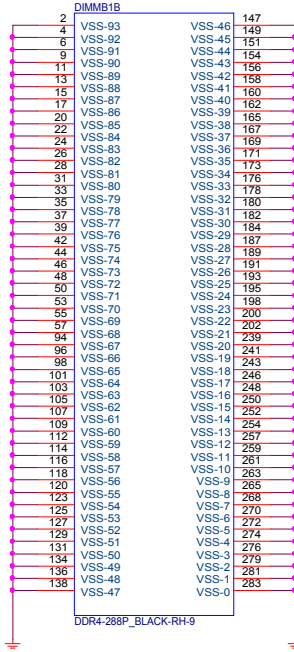
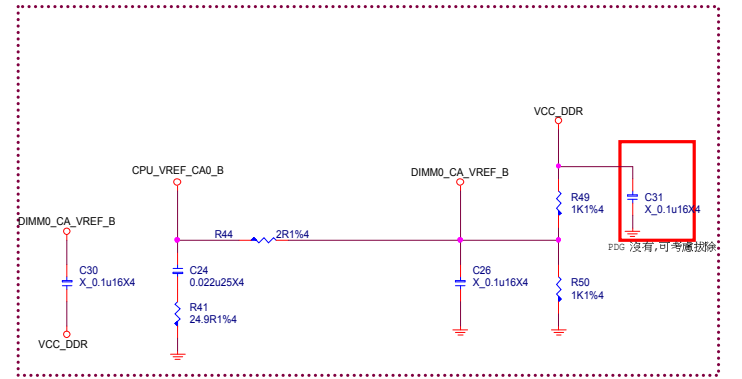
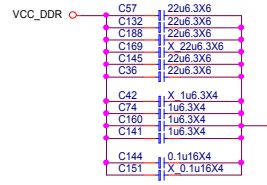
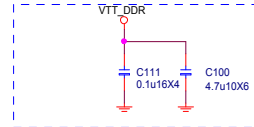




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MS-7C89			
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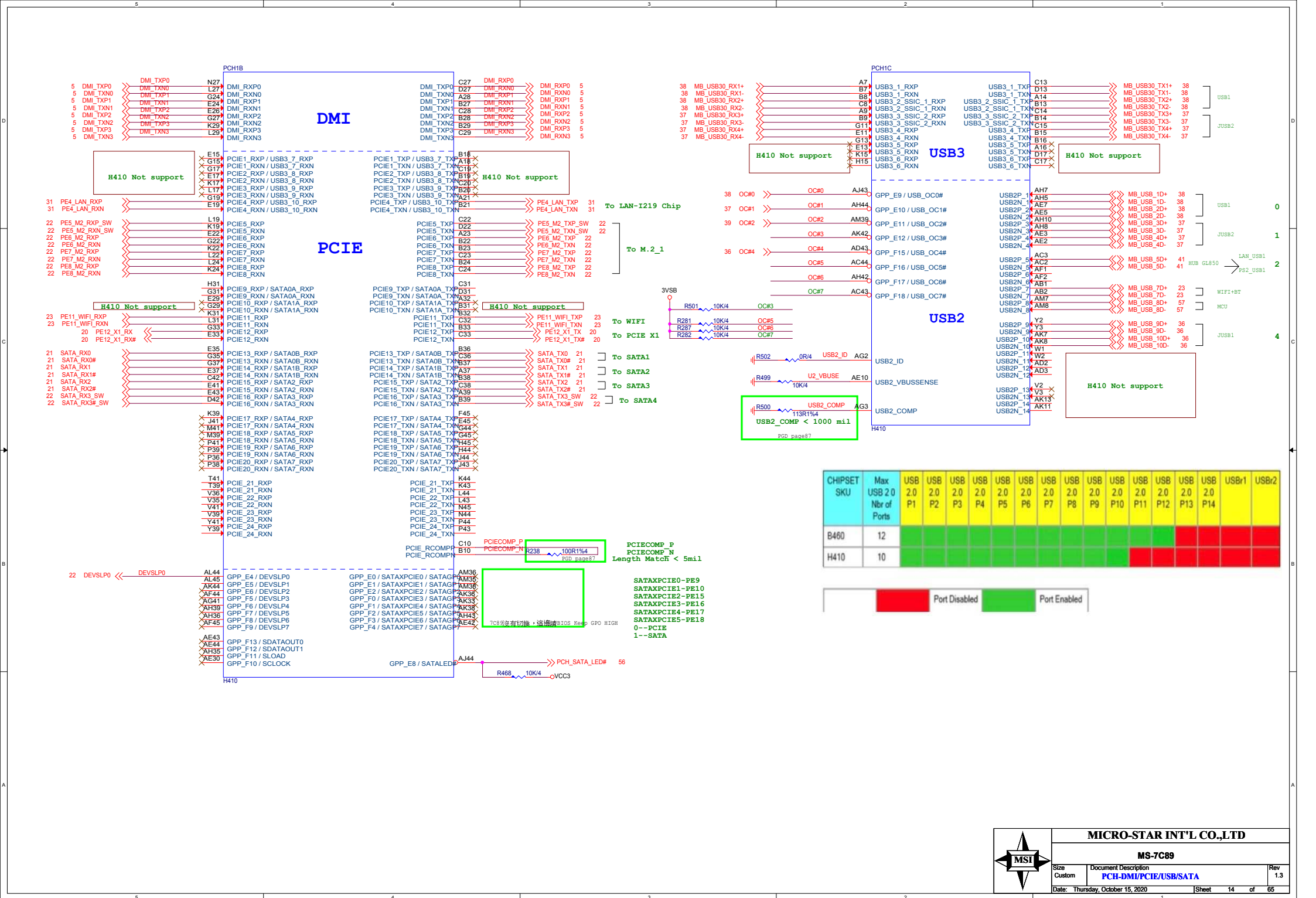


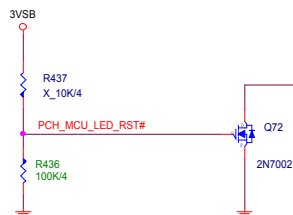
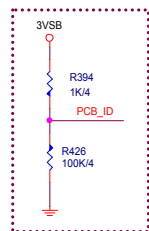
0.1uFxl per dimm











23 WIFI\_BTDIS# << WIFI\_BTDIS#

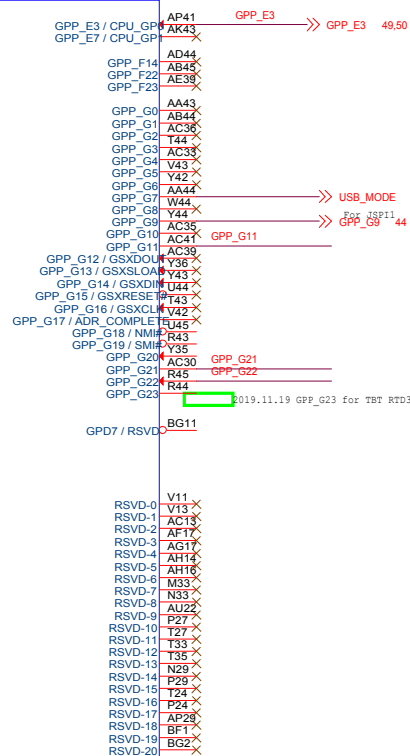
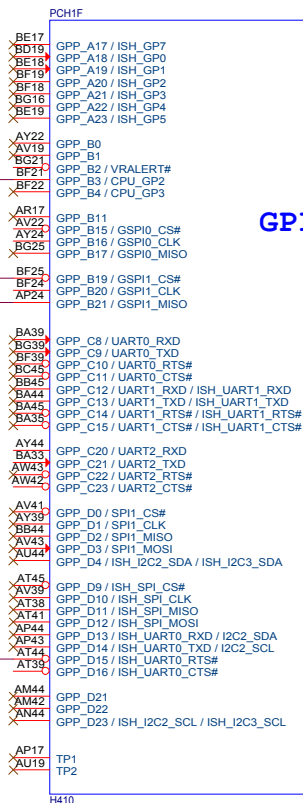
PCB\_ID  
PCH\_MCU\_LED\_RST#

2020/02/26 Remove GPP\_B20 ,7C89 no use for p-code disable function

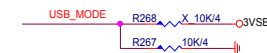
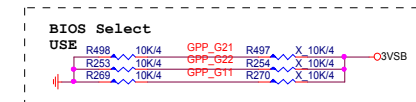
LED\_RST# >> LED\_RST# 57

22 PLN\_EN <<

## GPIO



	GPP_G21	GPP_G22	GPP_G11
H410M PRO	0	0	0
H410M-A PRO	0	0	1
H410M BOMBER	0	1	1
H410M PRO-VH	0	1	0





VSS

## TOP Swap

### GPP\_B14

2020/02/26 Follow 7C82 remove

0 : DISABLE (Default)  
1 : ENABLE

Internal Pull-down is disabled after PCH\_PWROK is high.

## No Reboot

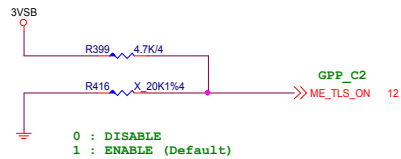
### GPP\_B18

2020/02/26 Follow 7C82 remove

0 : DISABLE (Default)  
1 : ENABLE

Internal Pull-down is disabled after PCH\_PWROK is high.

## TLS confidentiality



0 : DISABLE  
1 : ENABLE (Default)

Internal Pull-down is disabled after RSMRST# de-assert.

## Boot BIOS

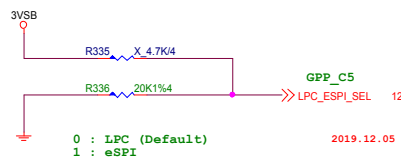
### GPP\_B22

2020/02/26 Follow 7C82 remove

0 : SPI (Default)  
1 : LPC

Internal Pull-down is disabled after PCH\_PWROK is high.

## LPC eSPI Mode

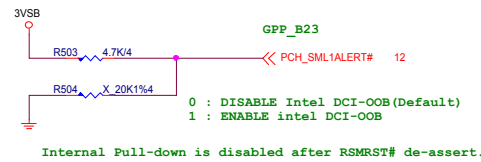


0 : LPC (Default)  
1 : eSPI

2019.12.05 改回LPC Mode internal pull-down

Internal Pull-down is disabled after RSMRST# de-assert.

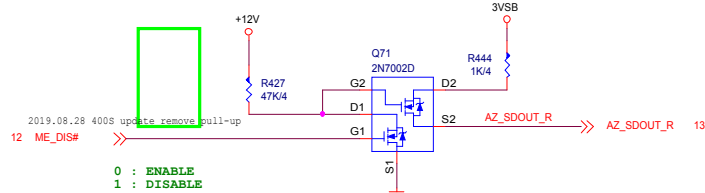
## DCI Enable



0 : DISABLE Intel DCI-OOB(Default)  
1 : ENABLE intel DCI-OOB

Internal Pull-down is disabled after RSMRST# de-assert.

## Flash Descriptor Security Override

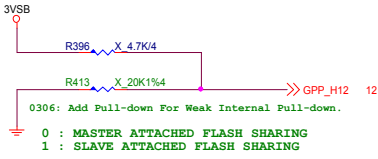


0 : ENABLE  
1 : DISABLE

0 : Enable security measures defined in the Flash Descriptor. (Default)  
1 : DISABLE:Flash Descritior Decurity(Override).

Internal Pull-down is disabled after PCH\_PWROK is high.

## ESPI FLASH SHARING MODE

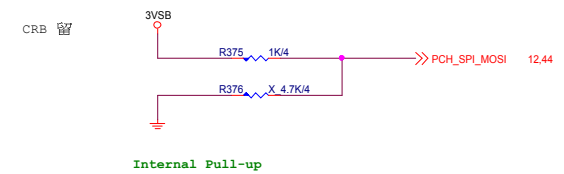


0306: Add Pull-down For Weak Internal Pull-down.

0 : MASTER ATTACHED FLASH SHARING  
1 : SLAVE ATTACHED FLASH SHARING

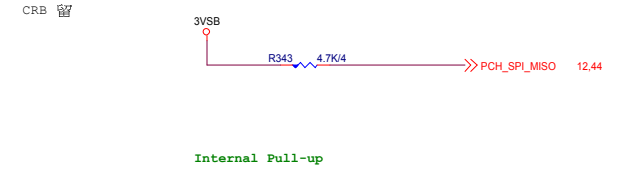
Internal Pull-down is disabled after RSMRST# de-assert.

## Reserved



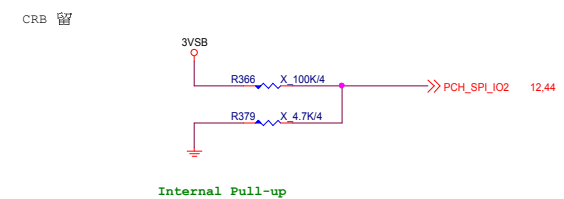
Internal Pull-up

## Reserved



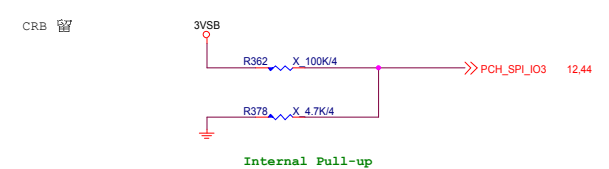
Internal Pull-up

## Reserved



Internal Pull-up

## Reserved



Internal Pull-up



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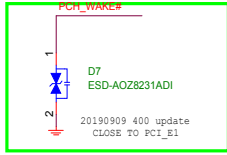
MS-7C89

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# PCI Express X16 Slot

12V - 5.5A  
VCC3 - 3A  
3VSB- 375mA

## SMBus ESD



12,19,20,57 SMBCLK\_VSB\_R  
12,19,20,57 SMBDATA\_VSB\_R

12,20,22,23,55 PCH\_WAKE#

13 CLKREQ#

5 EXP\_A\_TXP\_0

5 EXP\_A\_TXN\_0

5 EXP\_A\_TXP\_1

5 EXP\_A\_TXN\_1

5 EXP\_A\_TXP\_2

5 EXP\_A\_TXN\_2

5 EXP\_A\_TXP\_3

5 EXP\_A\_TXN\_3

5 EXP\_A\_TXP\_4

5 EXP\_A\_TXN\_4

5 EXP\_A\_TXP\_5

5 EXP\_A\_TXN\_5

5 EXP\_A\_TXP\_6

5 EXP\_A\_TXN\_6

5 EXP\_A\_TXP\_7

5 EXP\_A\_TXN\_7

5 EXP\_A\_TXP\_8

5 EXP\_A\_TXN\_8

5 EXP\_A\_TXP\_9

5 EXP\_A\_TXN\_9

5 EXP\_A\_TXP\_10

5 EXP\_A\_TXN\_10

5 EXP\_A\_TXP\_11

5 EXP\_A\_TXN\_11

5 EXP\_A\_TXP\_12

5 EXP\_A\_TXN\_12

5 EXP\_A\_TXP\_13

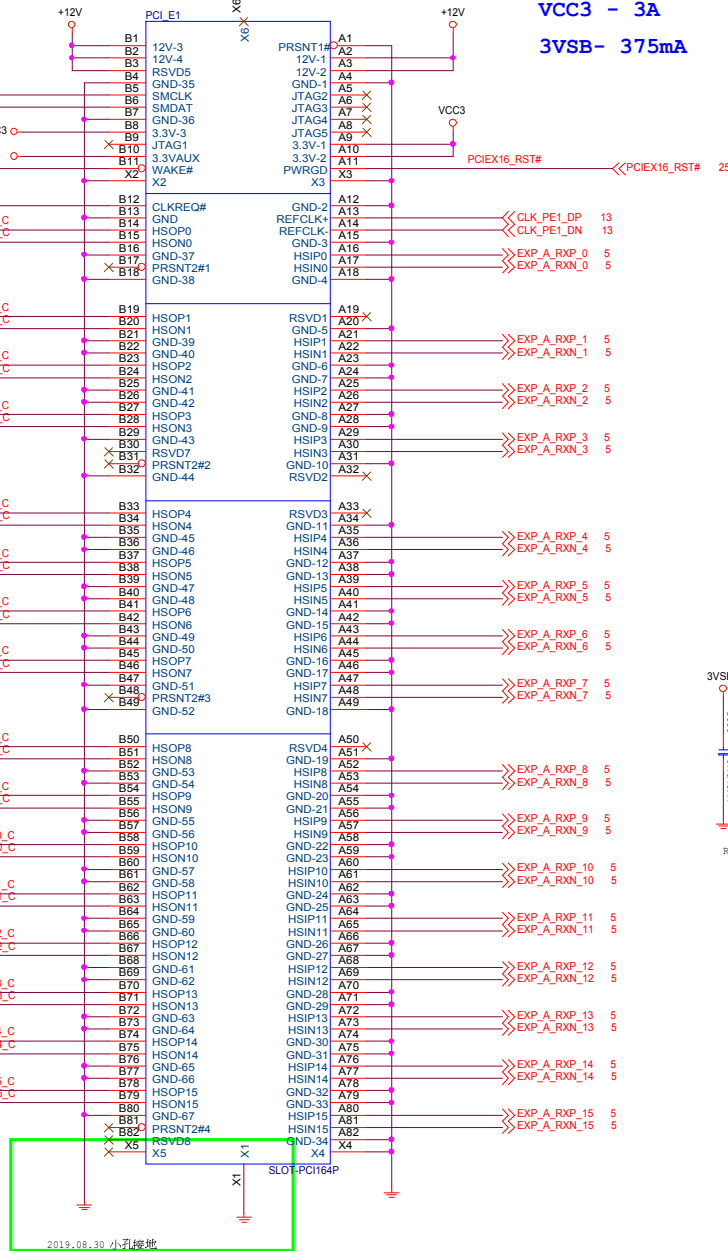
5 EXP\_A\_TXN\_13

5 EXP\_A\_TXP\_14

5 EXP\_A\_TXN\_14

5 EXP\_A\_TXP\_15

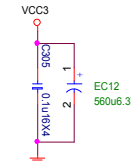
5 EXP\_A\_TXN\_15



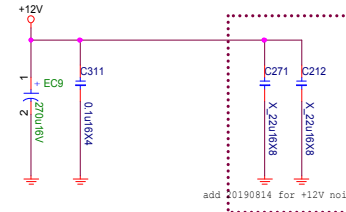
2019.08.30 小孔接地

3VSB  
C309 0.1u16X4

Remove 3VSB 10uF because dip cap near slot

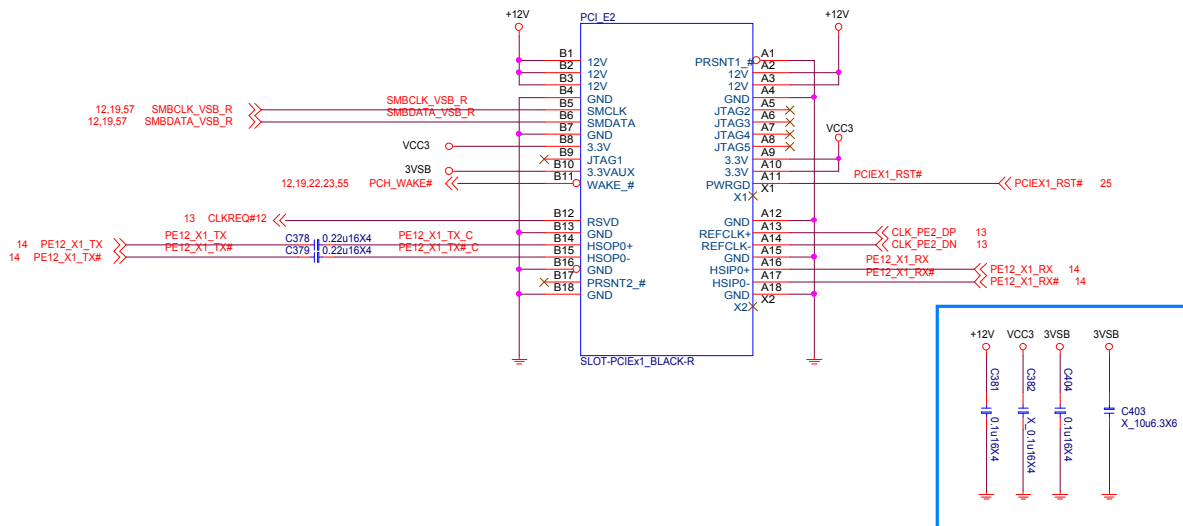


EC12 560u6.3V

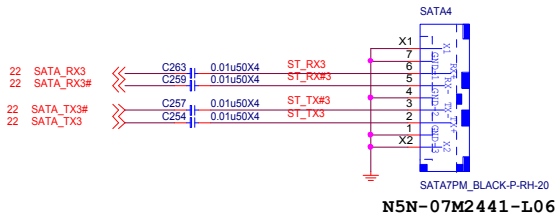
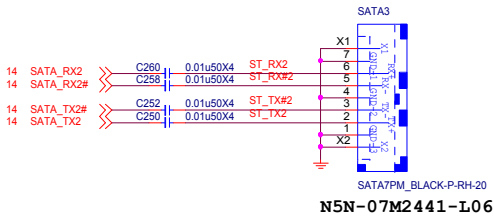
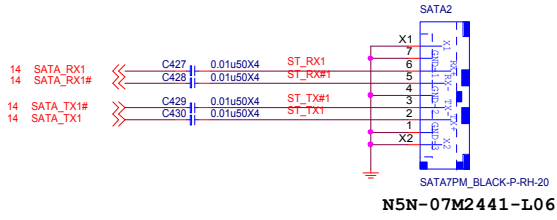
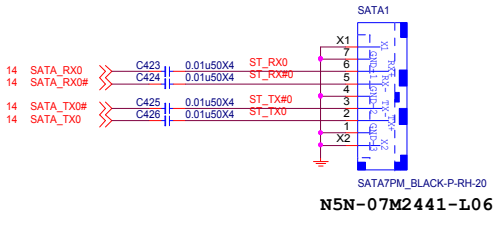


add 20190814 for +12V noise

# PCIE X1

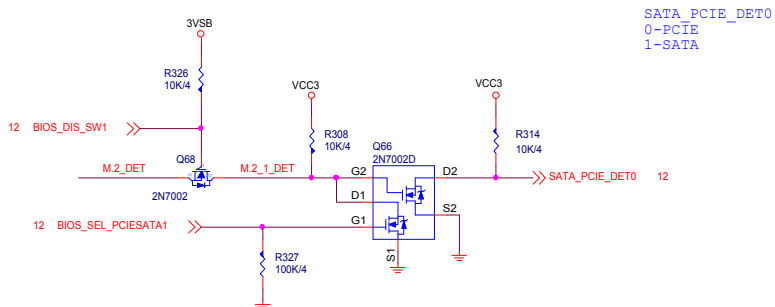
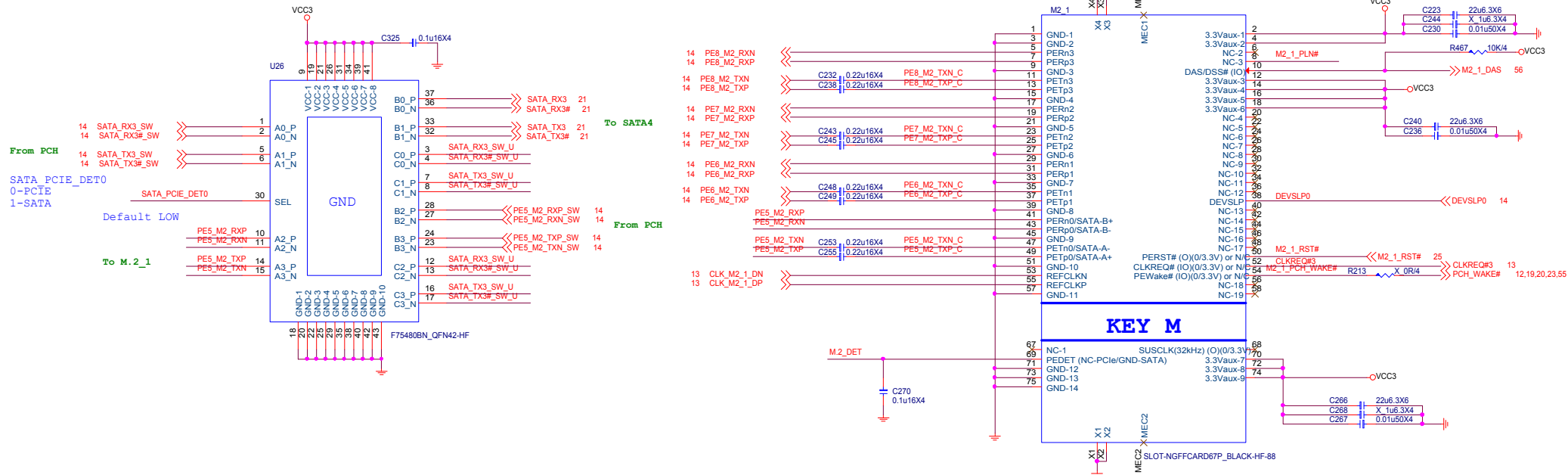


SATA Connector



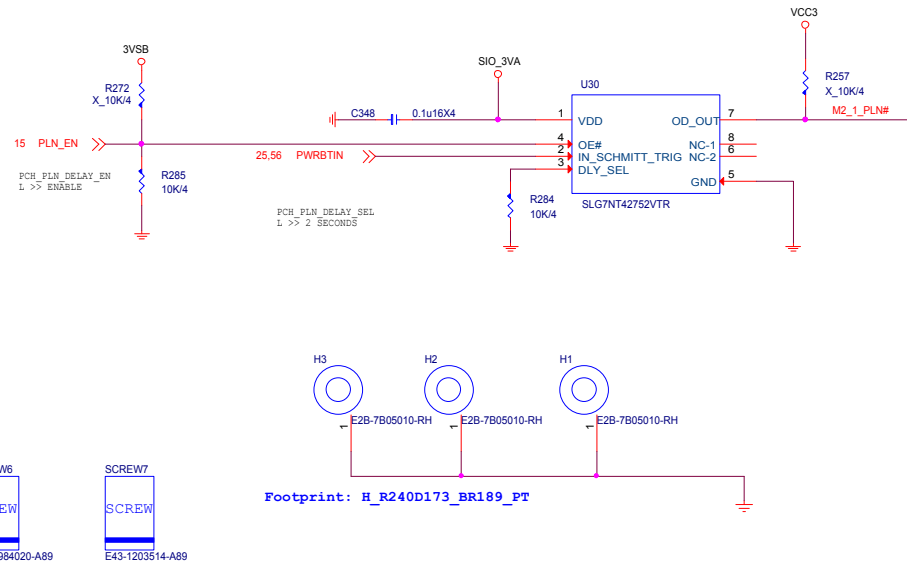
Vinafix.com

# M2 1



## BIOS\_MODE

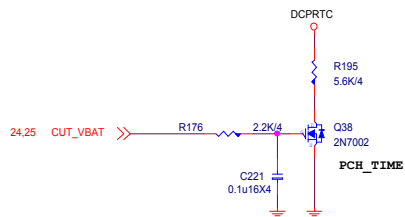
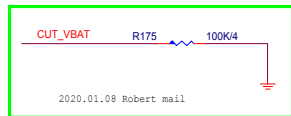
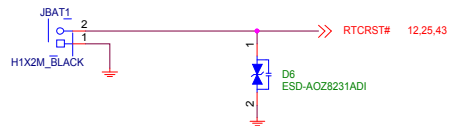
BIOS_DIS_SW1	BIOS_SEL_PCIESATA1	Mode	SATA_PCIE_DET0
0	1	M2-SATA	1
0	0	M2-PCIE	0
GPI (1)	GPI (0)	AUTO	



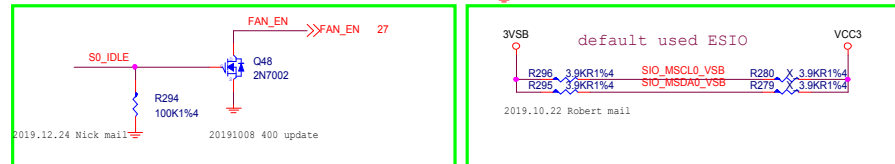
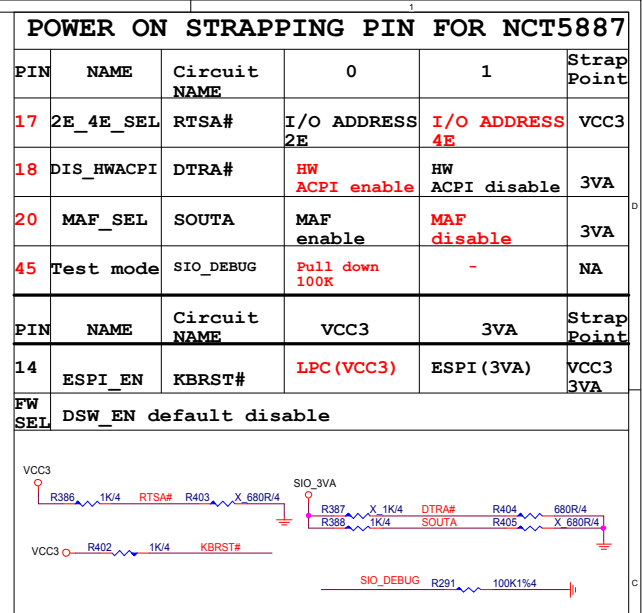
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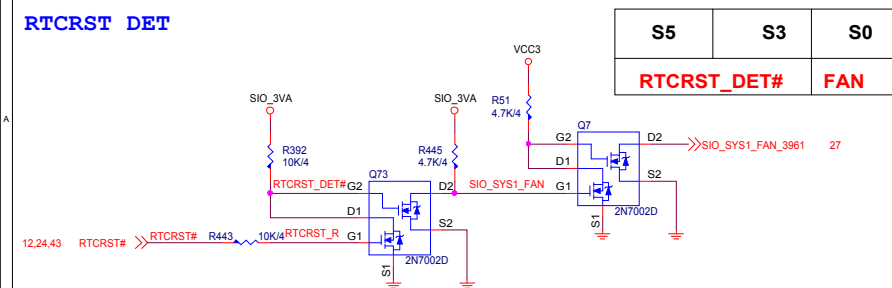
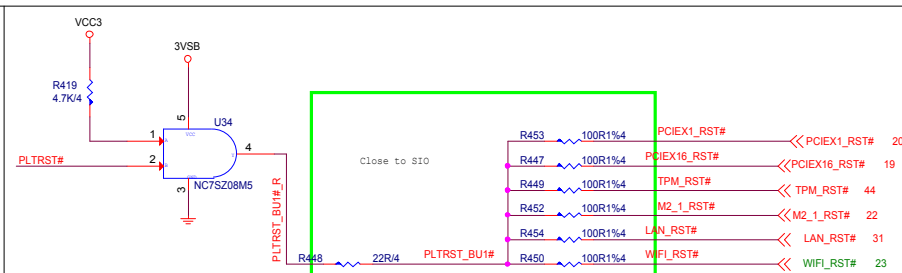
VBAT



MICRO-STAR INT'L CO.,LTD		
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Size Custom	Document Description VBAT Circuit	Rev 1.3
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The diagram illustrates the SIO\_WAKE pin driver circuit. It features a 2N7002D MOSFET (Q4) configured as a common-source amplifier. The gate (G2) is pulled up to VCC3 by a 4.7K/4 resistor (R32). The drain (D2) is connected to the CPU\_FAN1\_3961 signal line. The source (S2) is connected to ground. The input signal SIO\_CPU\_FAN1 is connected to the gate (G1) of the MOSFET.



**7D DSW SUPPORT**

**lay DSW mode**

**fault DEEP mode**

43,44,54 VSB\_ENABLE#

SIO\_3VA R250 X 10K/4

R263 X 100K1%4

5687\_VSB\_ENABLE R251 X OR/4 VSB\_ENABLE#

SLP\_SUS#\_SIO R277 OR/4

12 SLP\_SUS# R252 X 22K/4

C334 X\_0.1u16X4

Q61 X\_2N3904

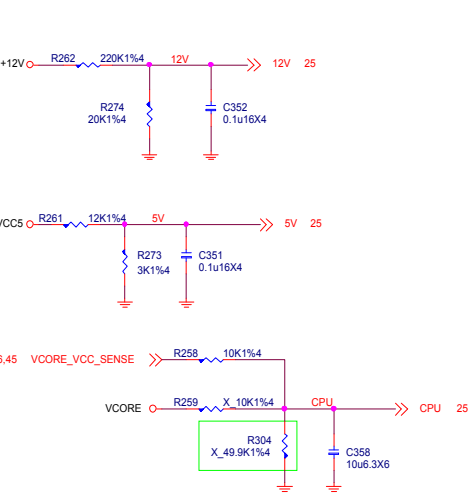
R292 100K1%4



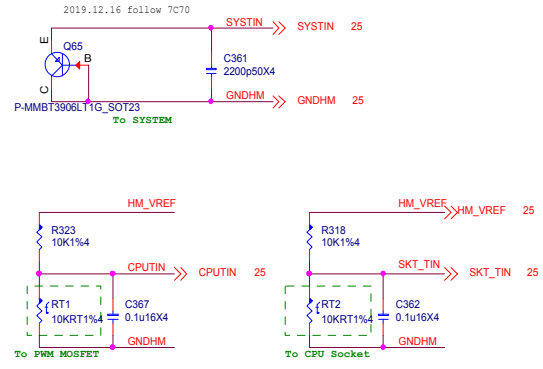
<b>MICRO-STAR INT'L CO.,LTD</b>			
<b>MS-7C89</b>			
Size Custom	Document Description <b>SIO-NCT5687-1</b>		Rev 1.3
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HW Monitor - Voltage

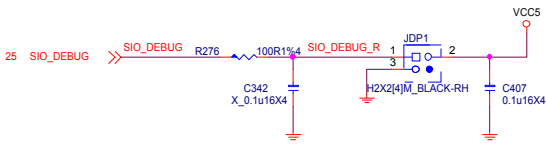
SIO HM Voltage Over 2V will Not Detect



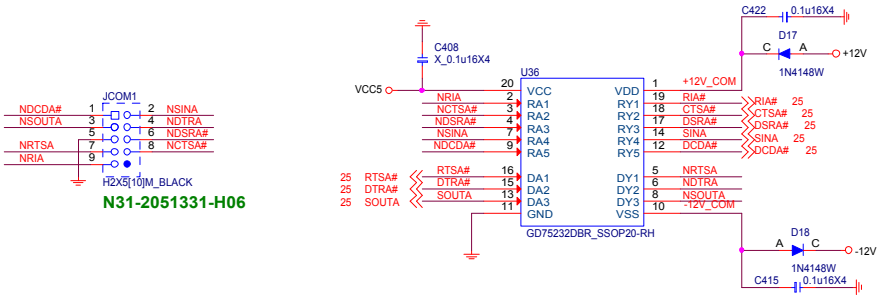
Thermal



DEBUG PORT

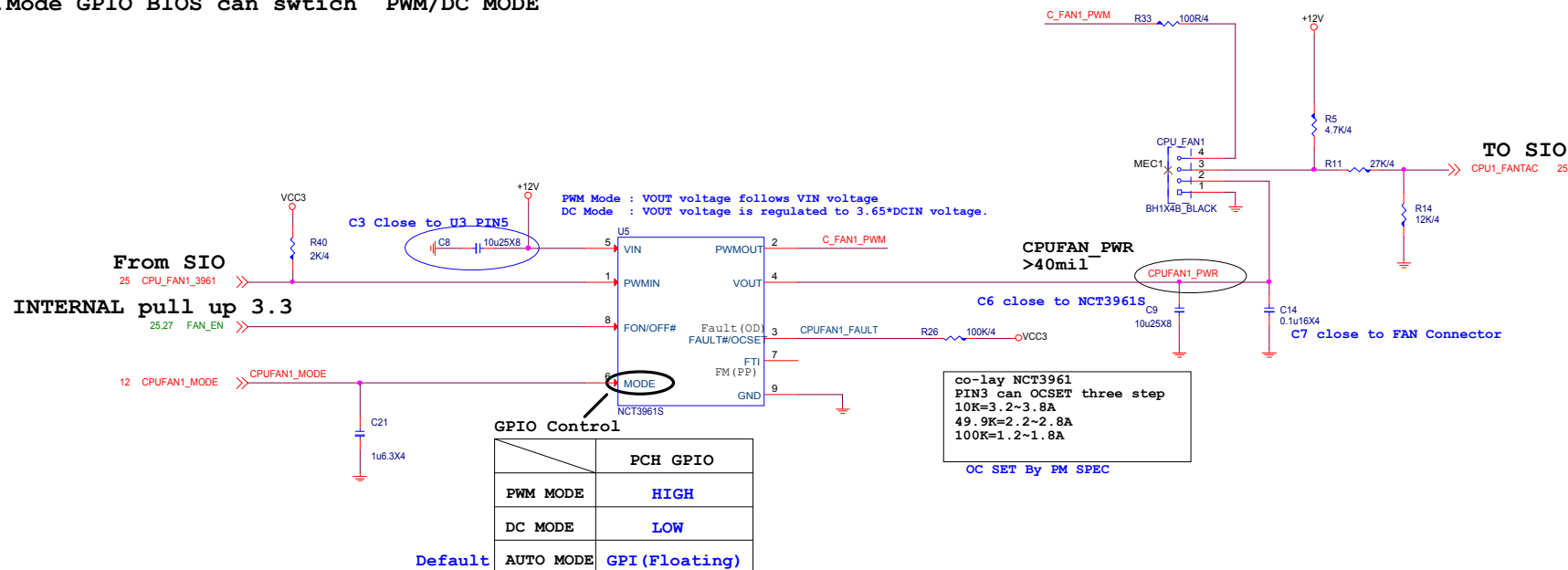


COM Port



# TYPE M : 4 PIN CPU FAN USE NCT3961S USE PCH GPIO CONTROL FAN MODE

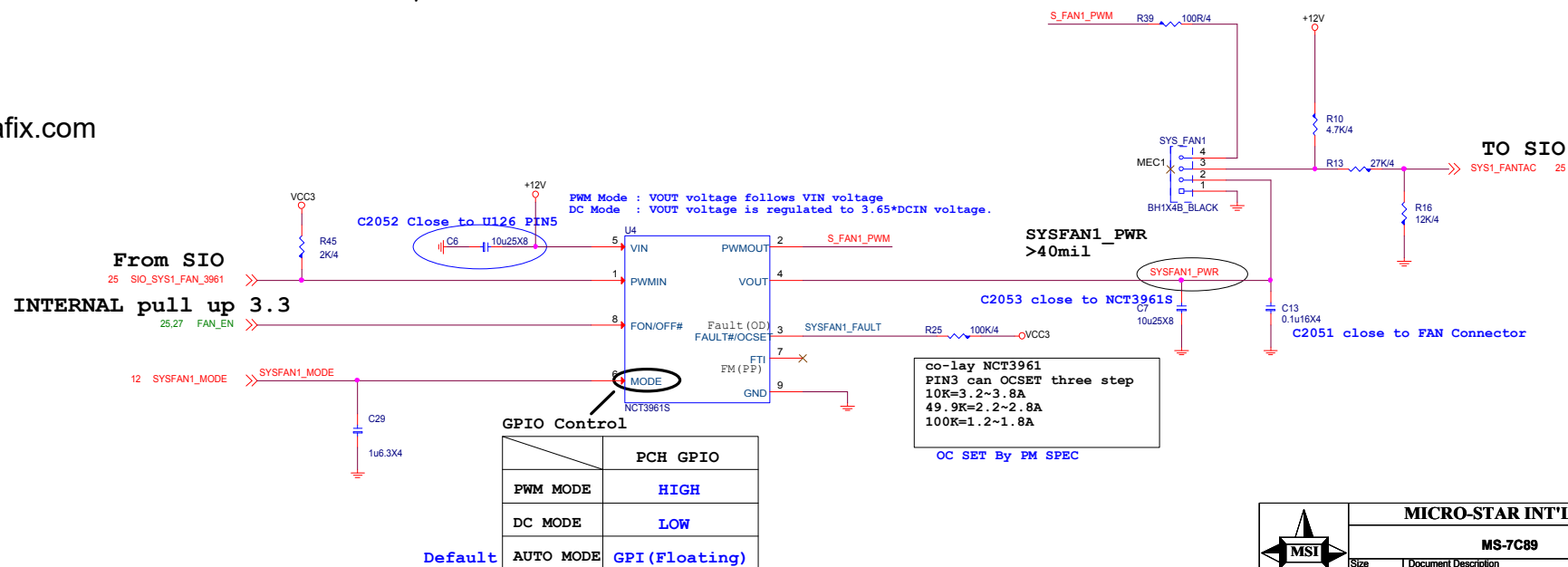
1.Mode GPIO BIOS can switch PWM/DC MODE



# TYPE M : 4 PIN CPU FAN USE NCT3961S USE PCH GPIO CONTROL FAN MODE

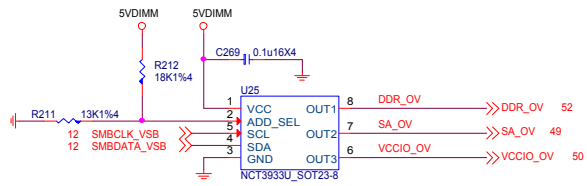
1.Mode GPIO BIOS can switch PWM/DC MODE

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### VOLTAGE CONSOLE

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

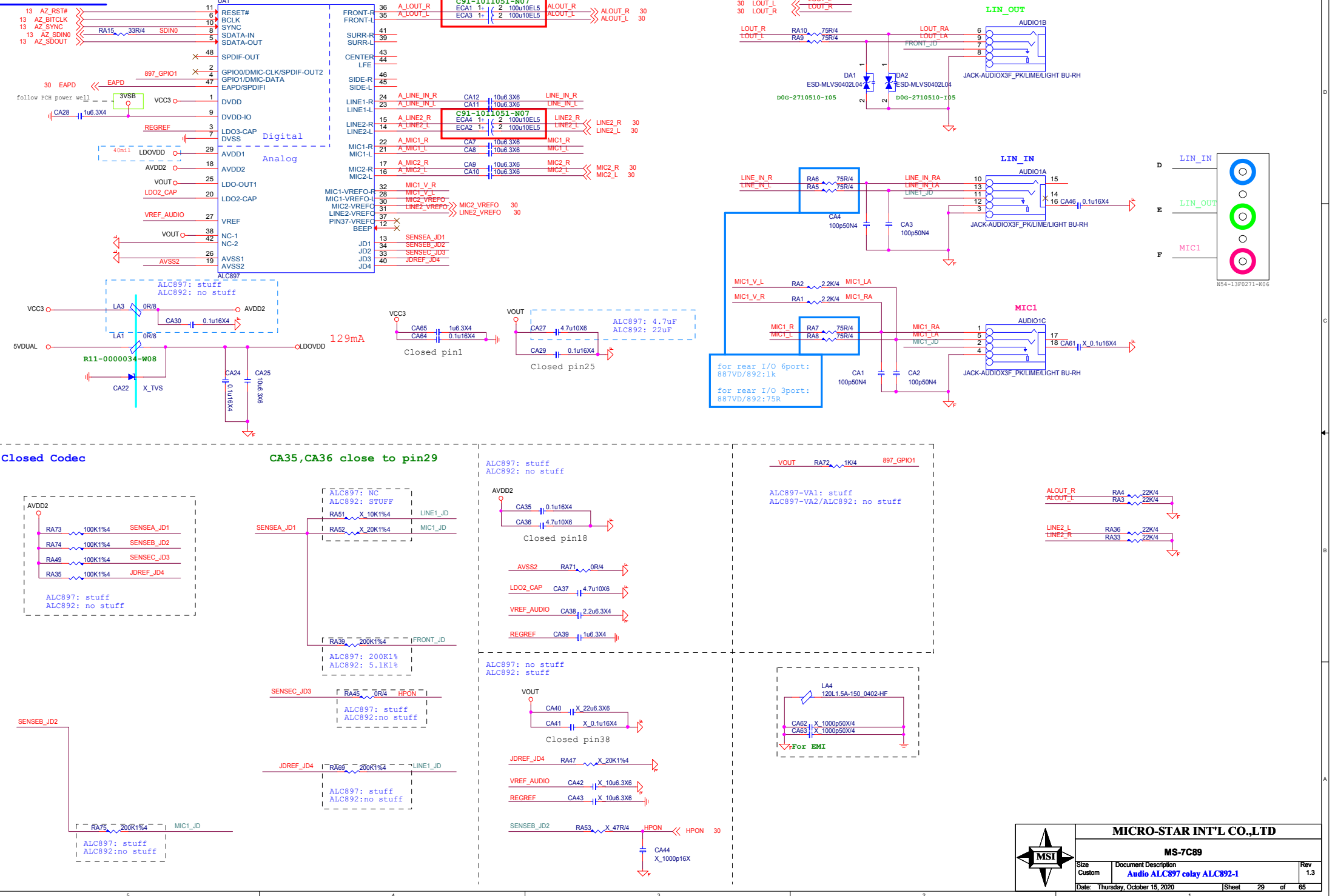


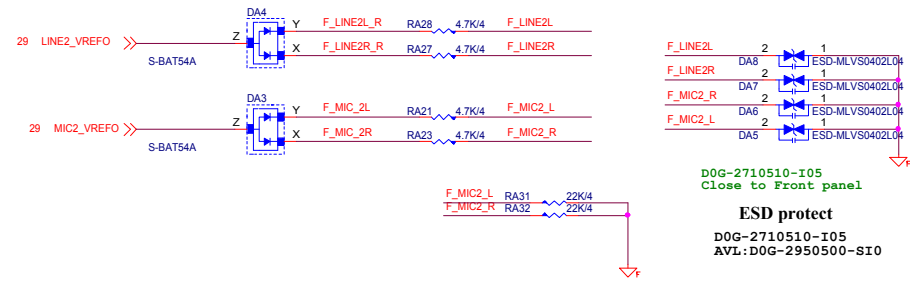
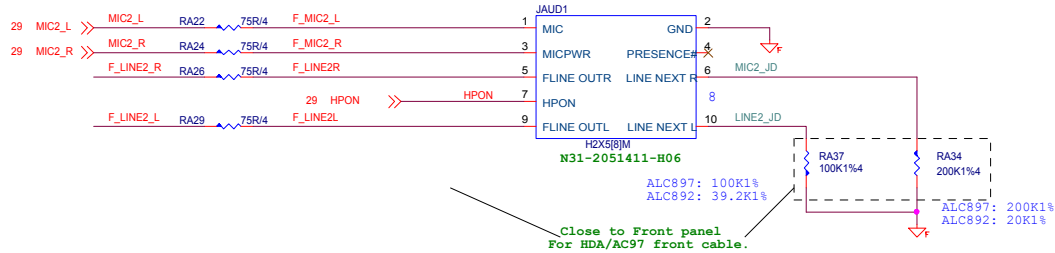
**MICRO-STAR INT'L CO.,LTD**

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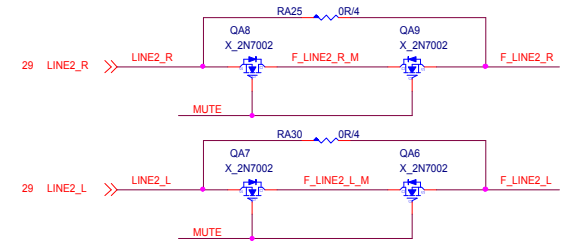
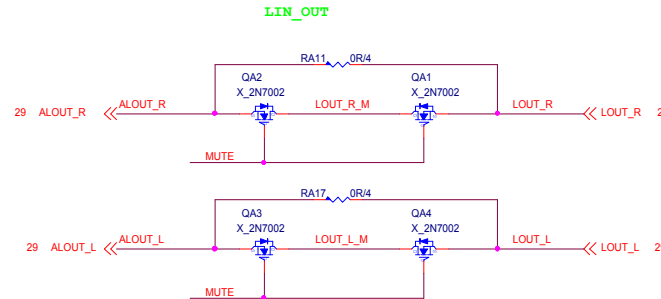
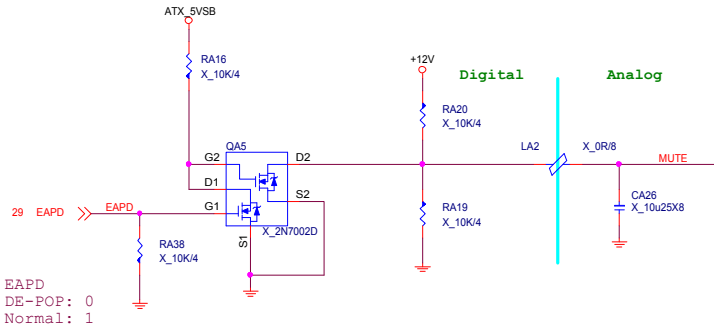
Size Custom	Document Description <b>NCT3933</b>	Rev 1.3
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ALC892

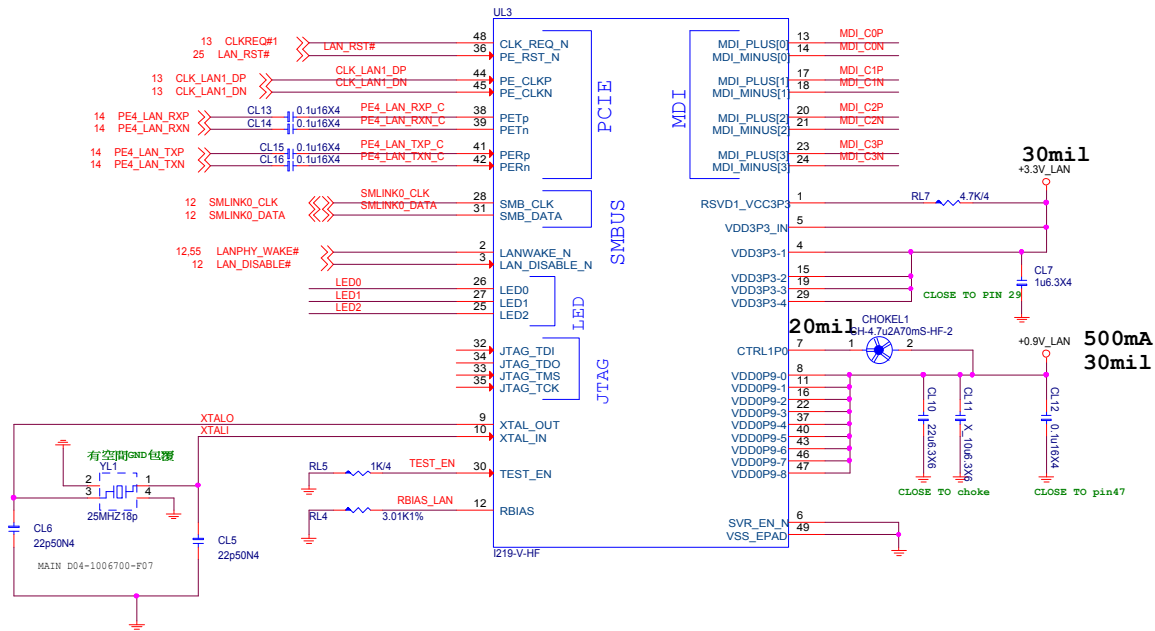




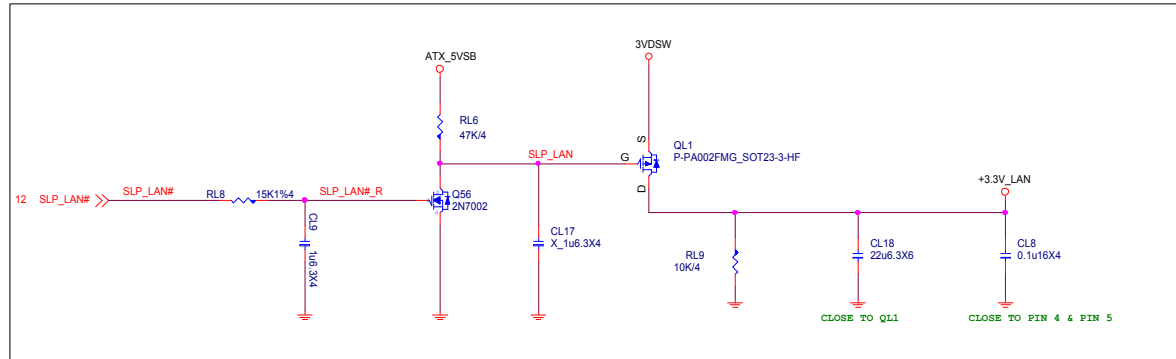
### De-POP circuit



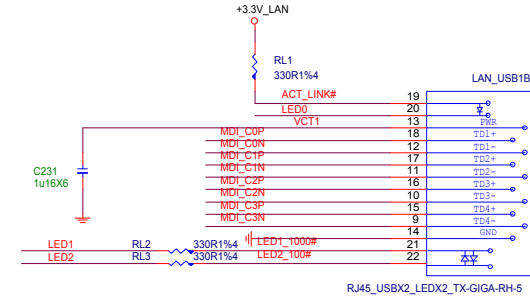
# INTEL LAN - I219



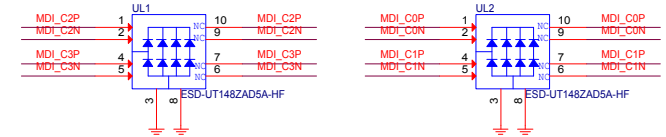
support WOL from Deep Sx:  
Power source from 3VA (DSW power) & make sure MAX current is enough to support i218/i219.



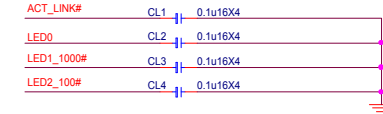
## LAN Connector



## ESD Protect UL1 & UL2 close to connector



For EMI



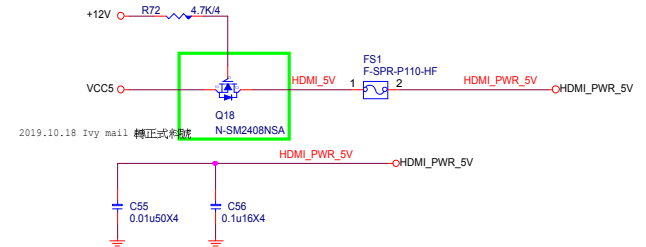
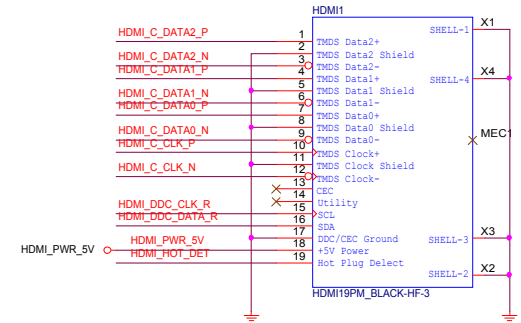
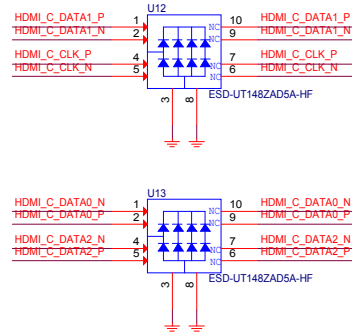
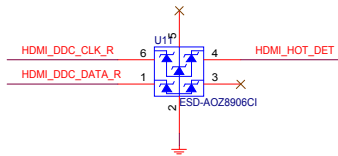
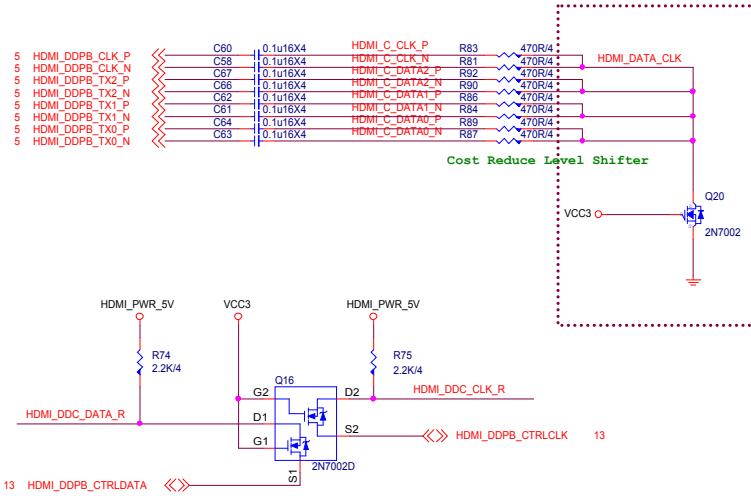
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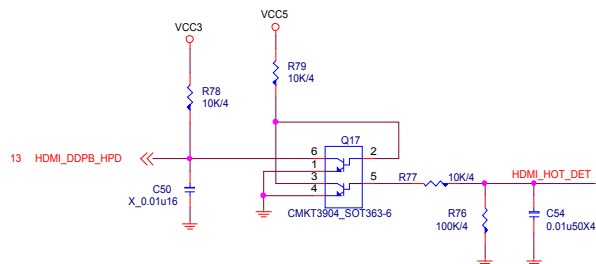
Size	Document Description	Rev
Custom	INTEL I219 teknisi indonesia	1.3
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# HDMI 1.4b

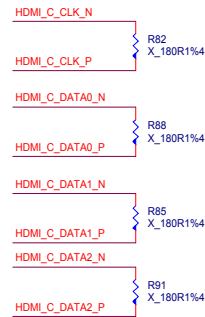
HDMI, DVI : 1920x1200 at 60 Hz (16:10 WUXGA)



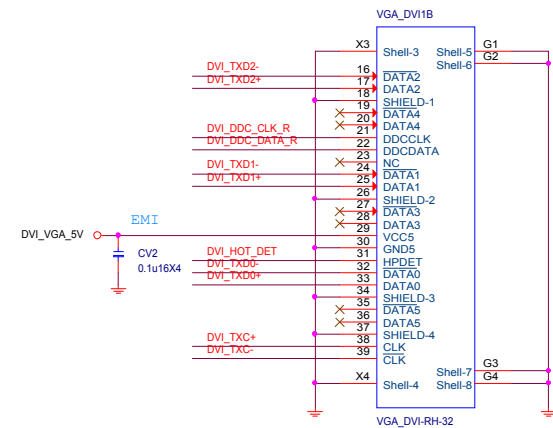
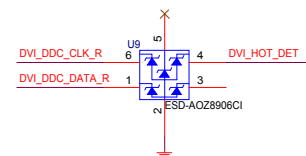
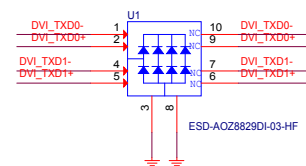
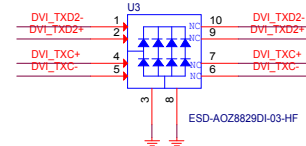
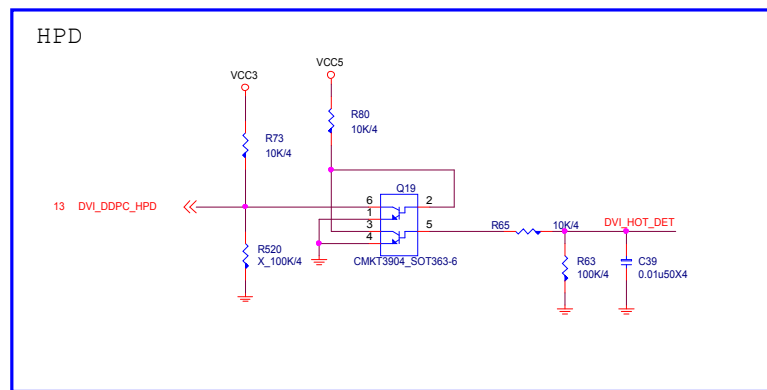
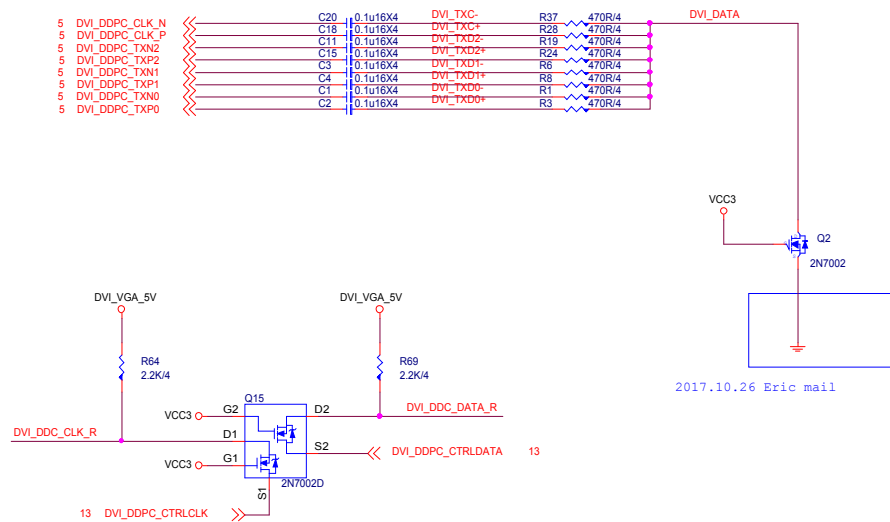
## Hot Plug



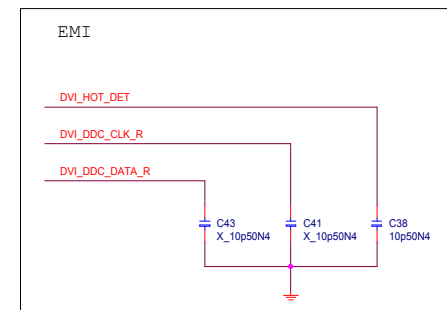
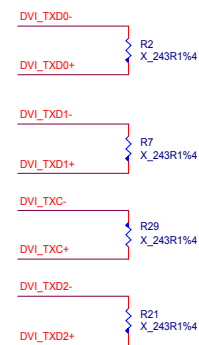
## For EMI



## DVI



For EMI

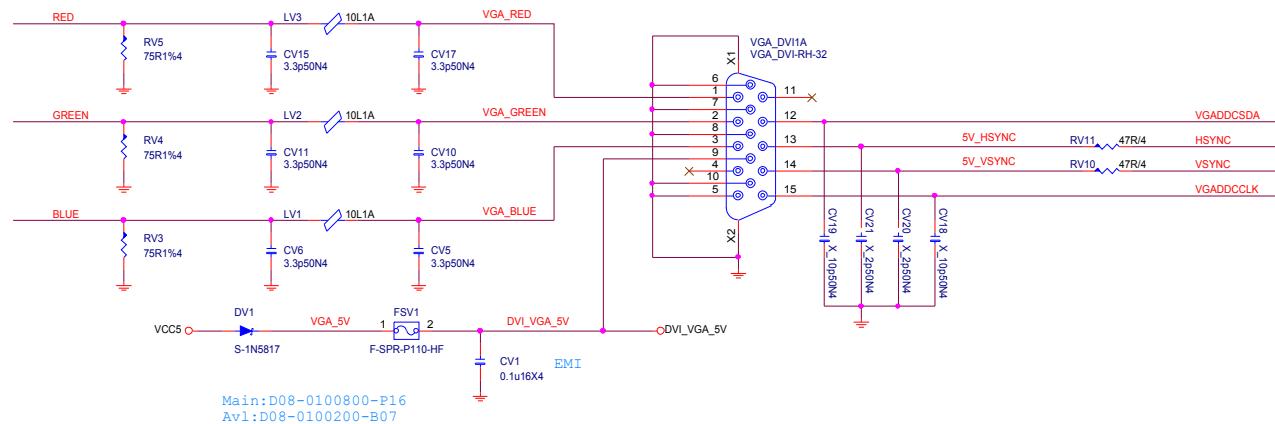
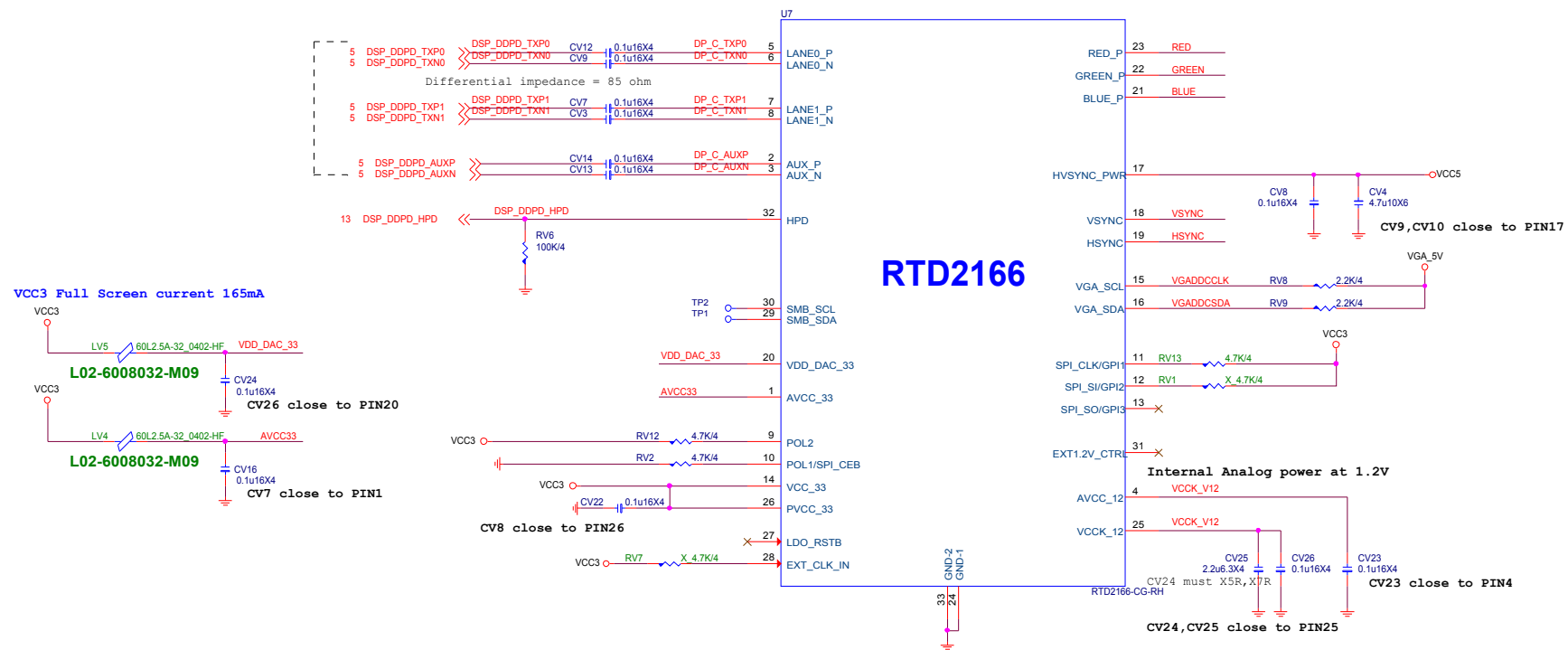


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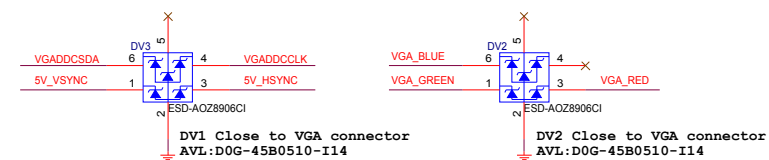
MS-7C89

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**Note:** If connect to eDP port,must confirm whether it support hot plug detection HPD and re-auxtraining



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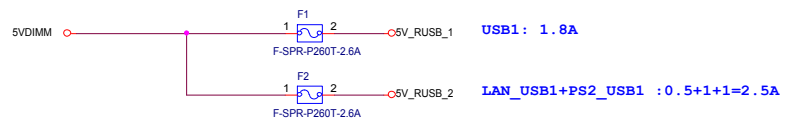
MS-7C89

Size Custom	Document Description <b>DP Connector</b>	Rev 1.3
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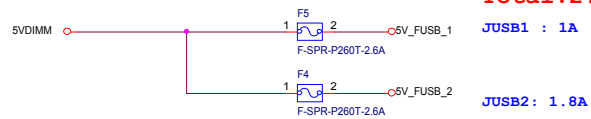
USB Port Power

Total:7.1A

Total:4.3A



Total:2.8A



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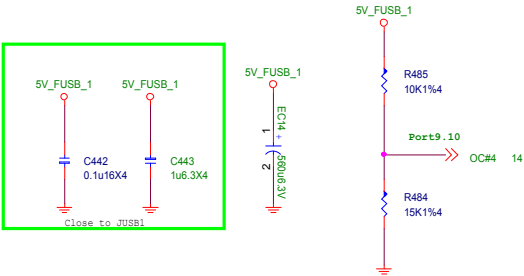
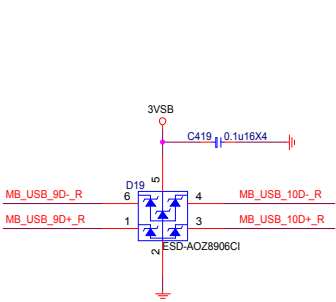
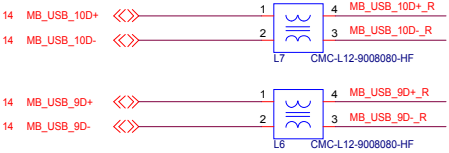
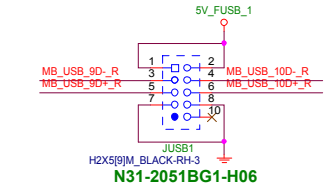
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Size Custom	Document Description USB Power	Rev 1.3
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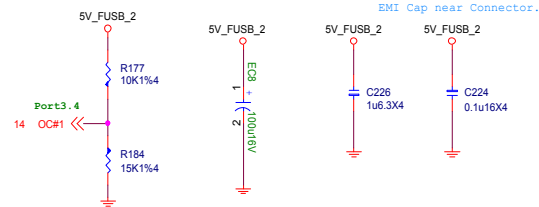
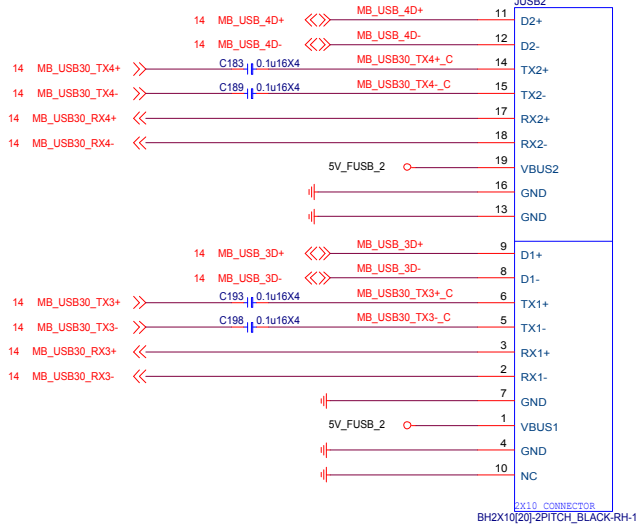
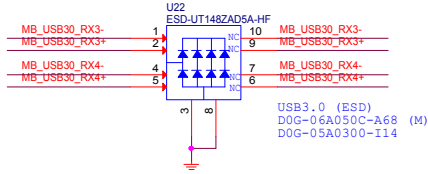
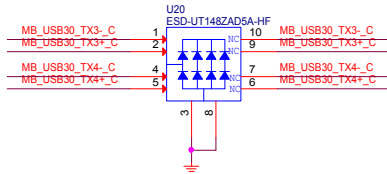
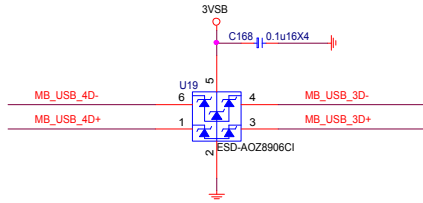
Front USB2.0

USB2.0 Port9.10

2A



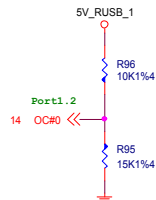
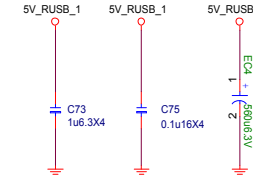
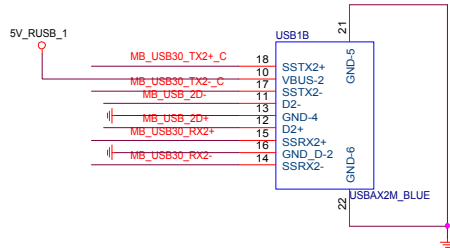
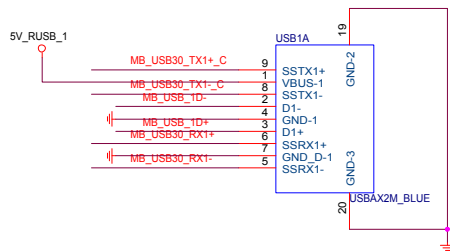
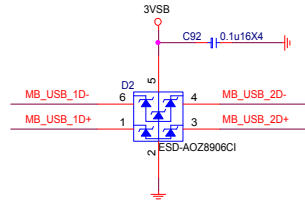
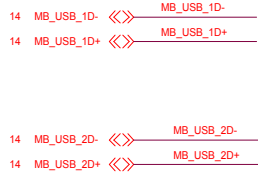
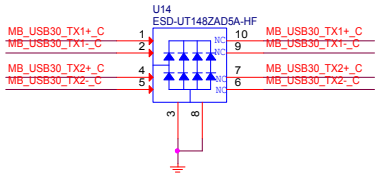
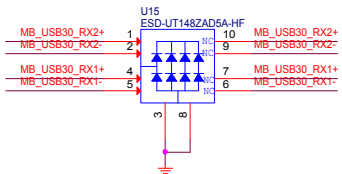
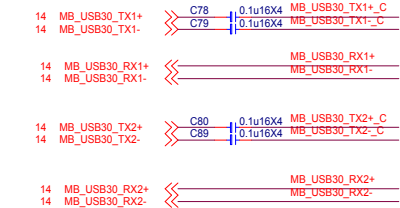
# Front USB3.1 Gen1



# Rear USB3.0

USB3.0 Port1.2  
USB2.0 Port1.2

## 1.8A



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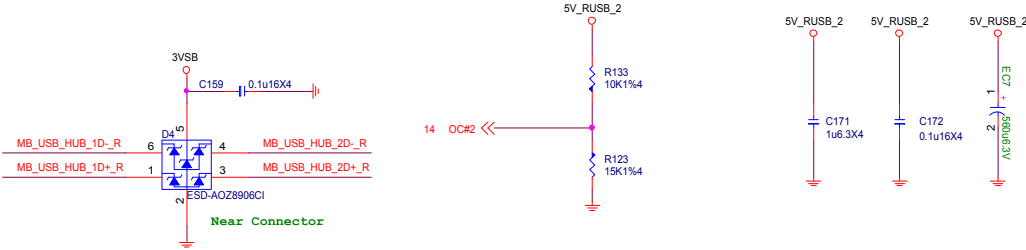
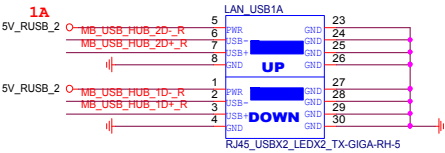
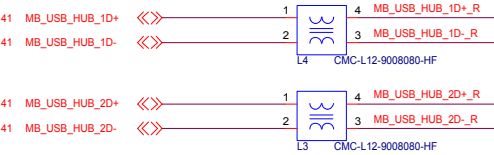
MS-7C89

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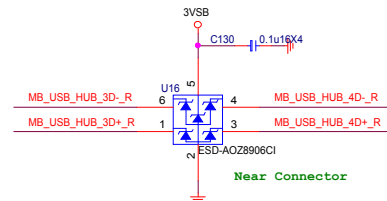
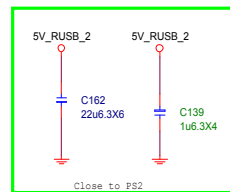
Rear LAN USB2.0

1A

JUSB1 HUB 1 . 2



### ***PS2 USB Connector***



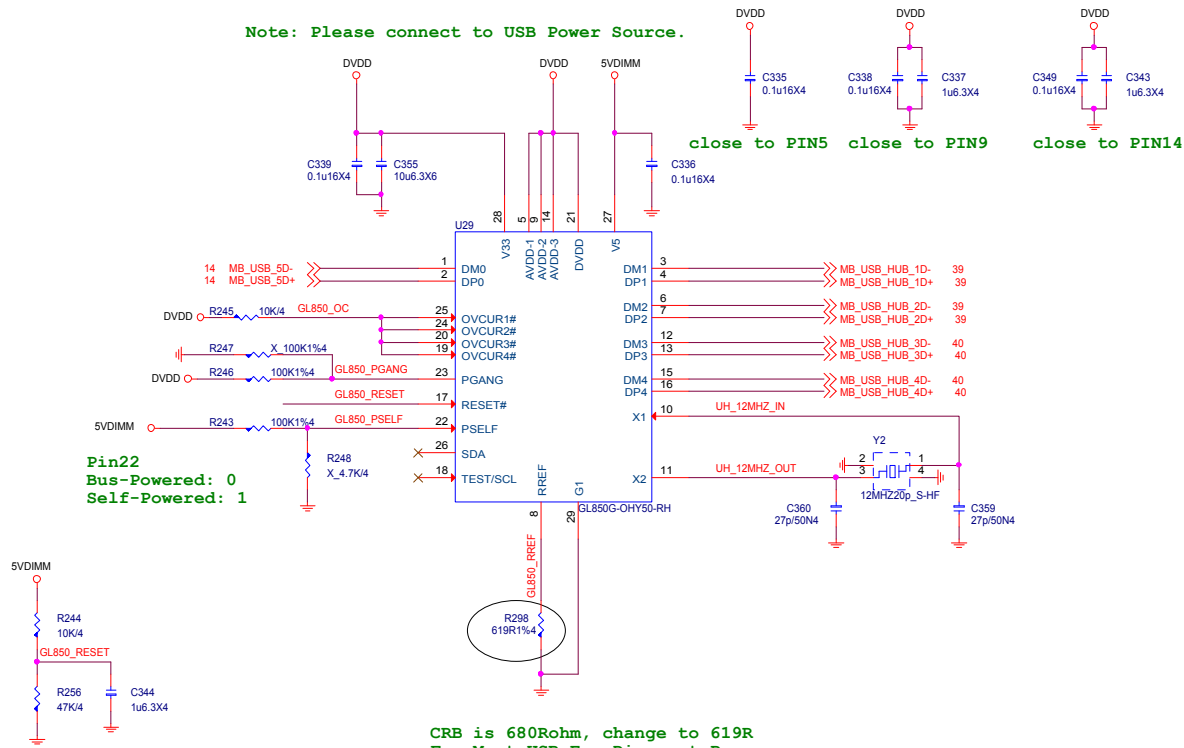
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Size Custom	Document Description <b>Rear PS2+USB</b>	Rev 1.3
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# Rear USB2.0 HUB

Note: Please connect to USB Power Source.

Pin23  
Gang input:1  
Individual input:0



CRB is 680Rohm, change to 619R  
For Meet USB Eye Diagramt Pass.

Note: USB2.0 Hub no need mapping OC# to PCH, Hub can report to PCH by Self.



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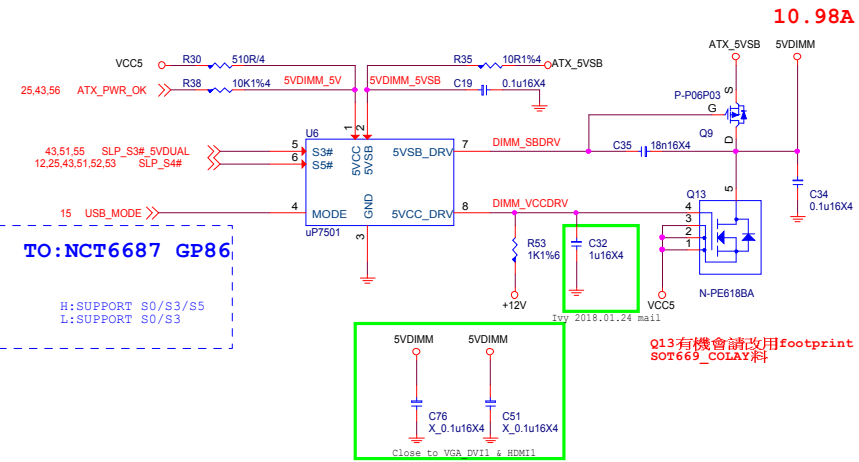
Size Custom	Document Description GL850	Rev 1.3
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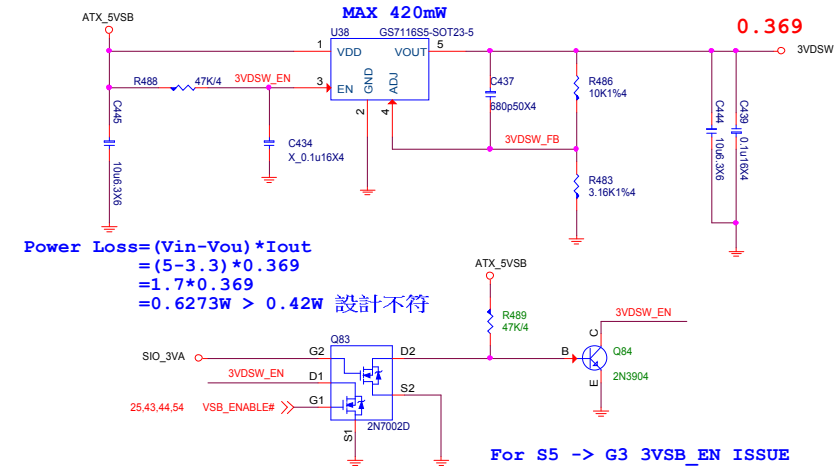


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MS-7C89		
Size Custom	Document Description <a href="#">XXX</a>	Rev 1.3
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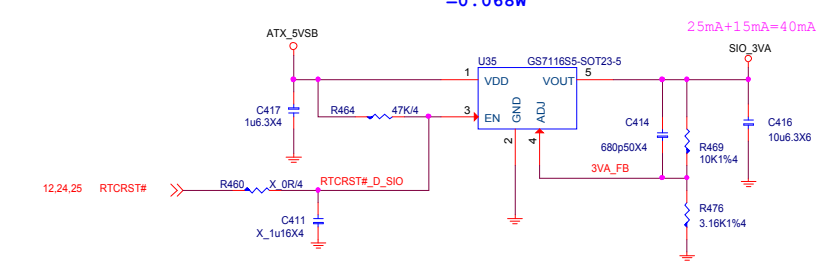
## 5VDIMM FOR DDR



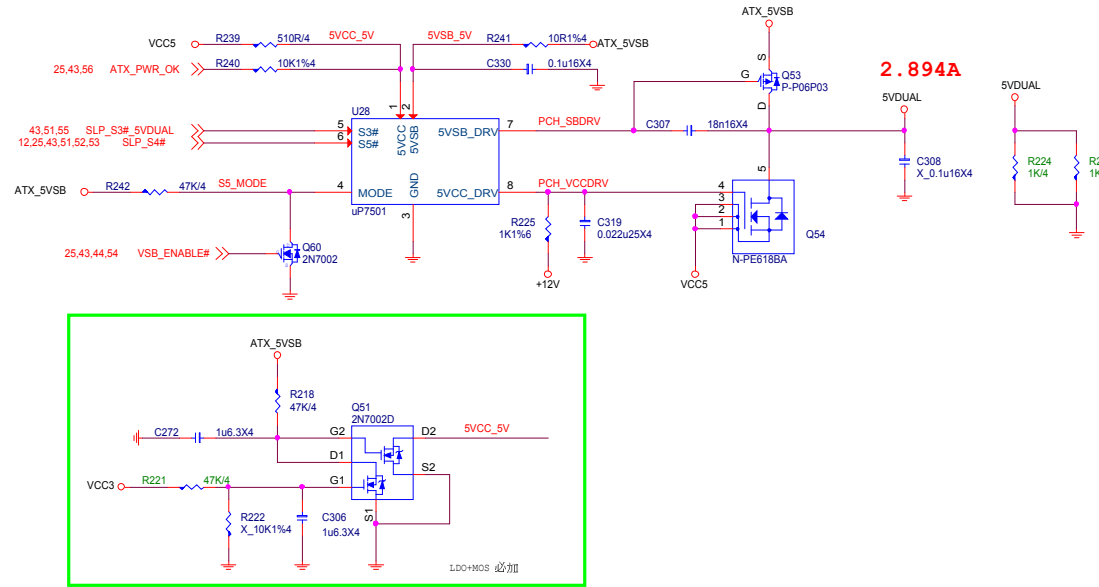
## 3VDSW



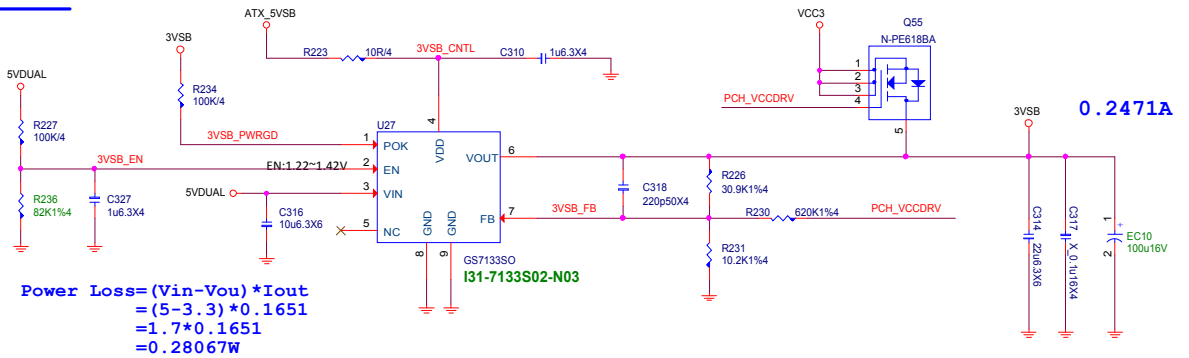
## SIO 3VA



## 5VDUAL



## 3VSB

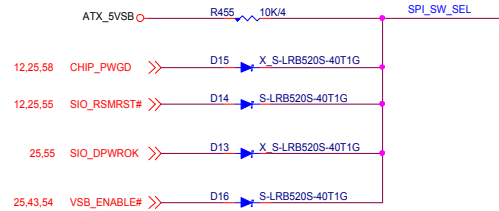


MICRO-STAR INT'L CO.,LTD

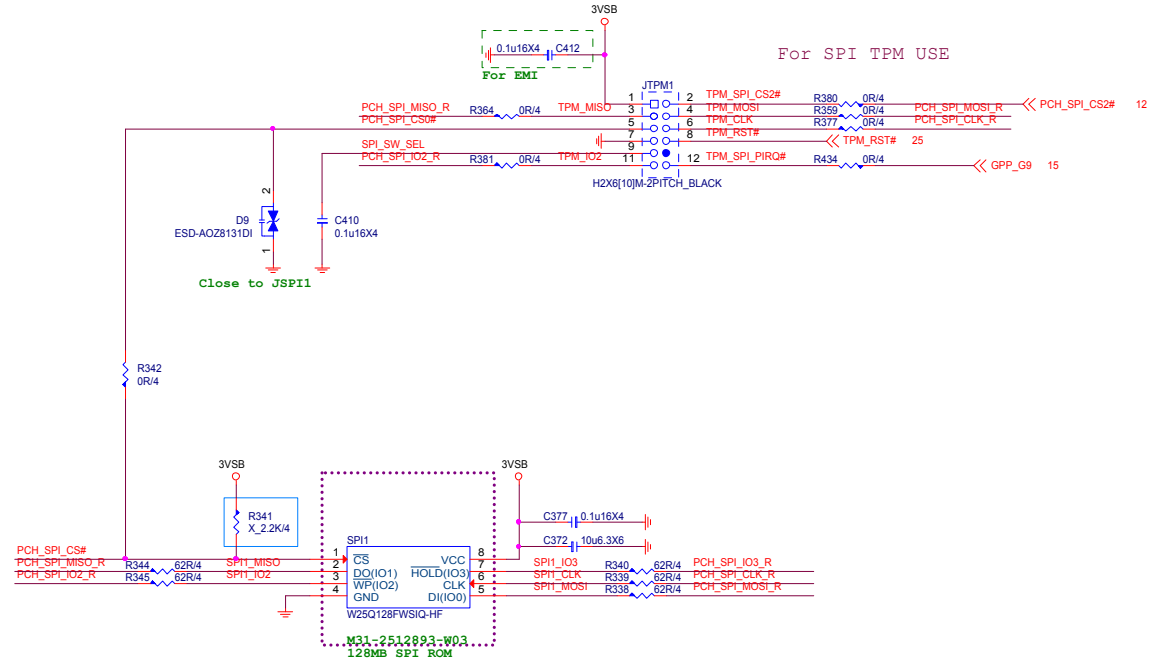
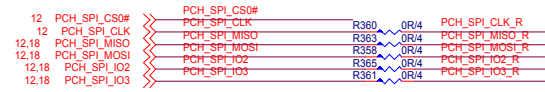
MS-7C89

Size	Document Description	Rev
Custom	ACPI	1.3
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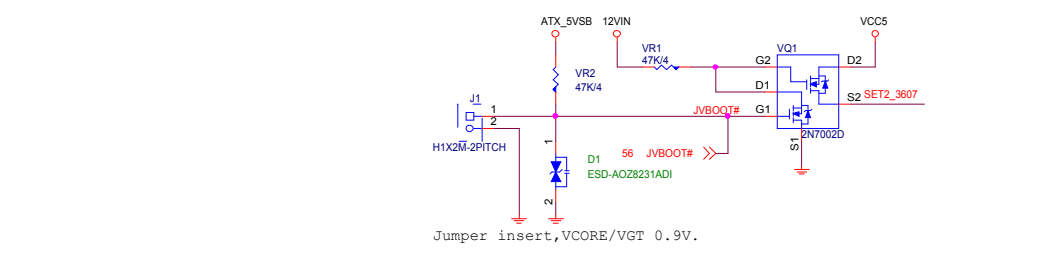
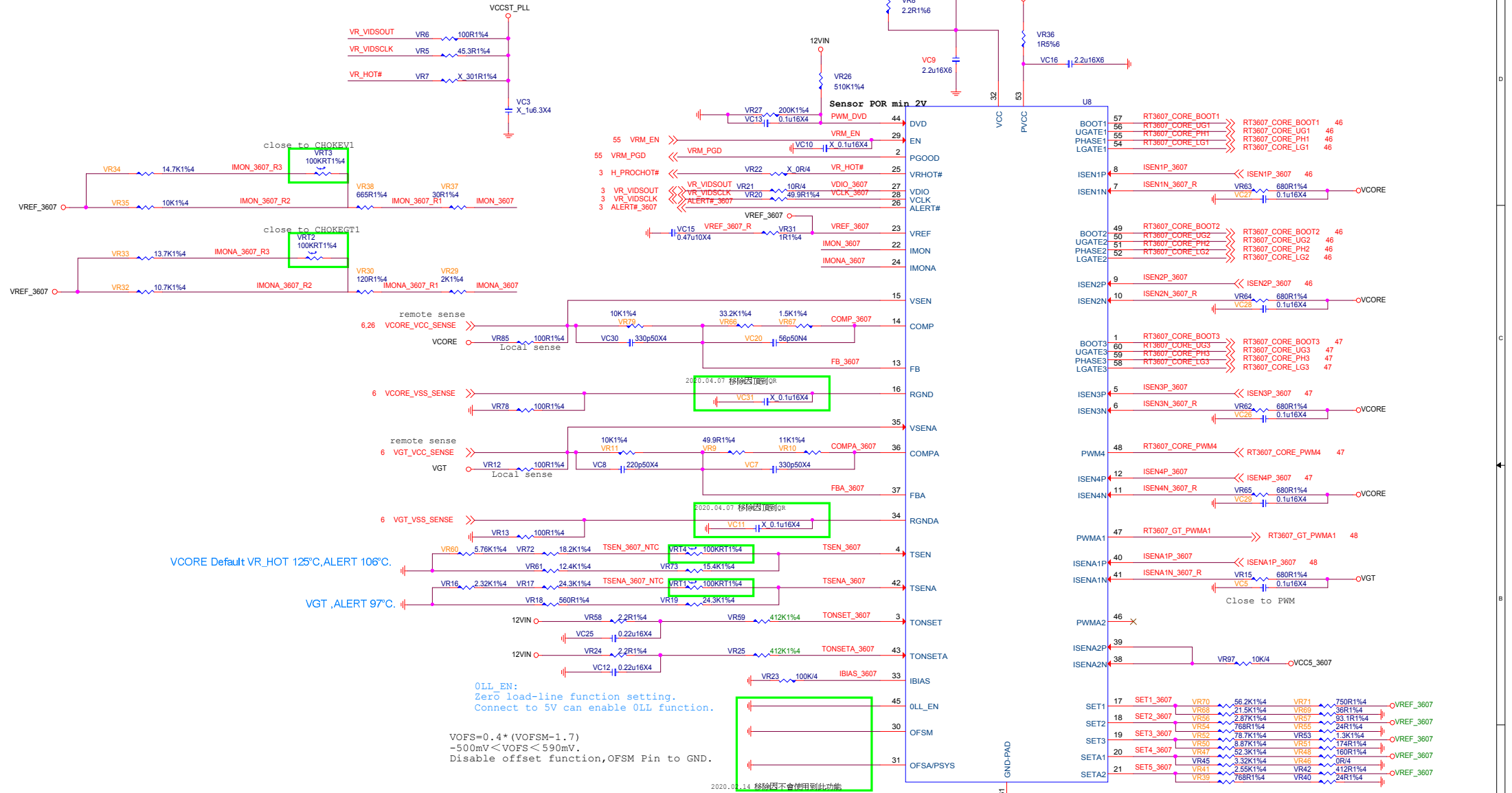
Module Stuff CHIP\_FWGD,  
But PCH\_FWROK may ramp up before CHIP\_FWGD.



For TL624-1.  
DEEP Mode : Stuff D48/R2517  
DSW Mode : Stuff D48/D49/R2517



VCORE Iccmax 140A,TDC 132A, OCP182A.  
VGT Iccmax 30A,TDC 28A, OCP39A.



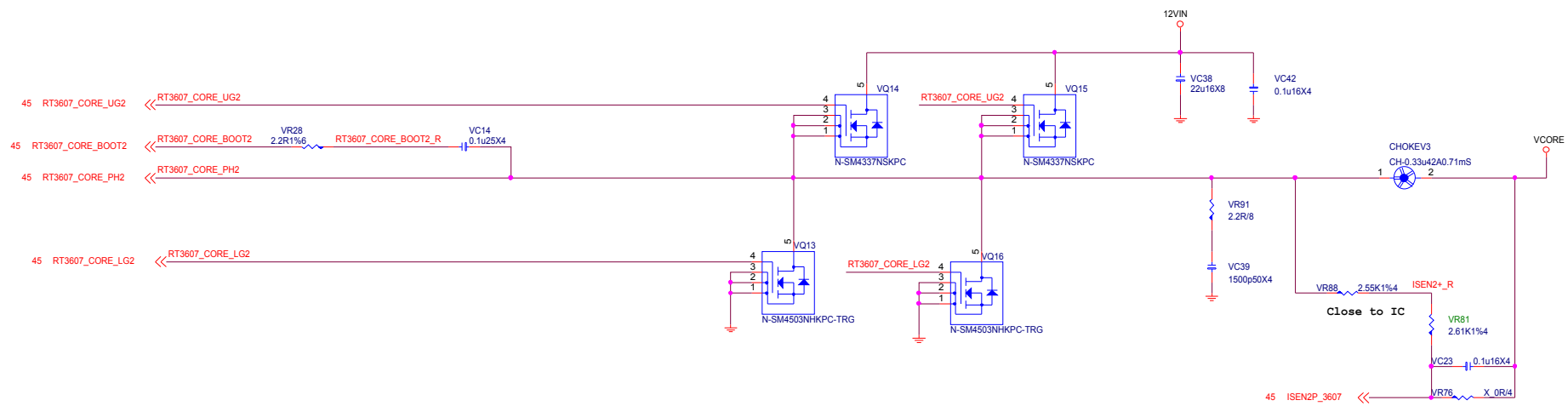
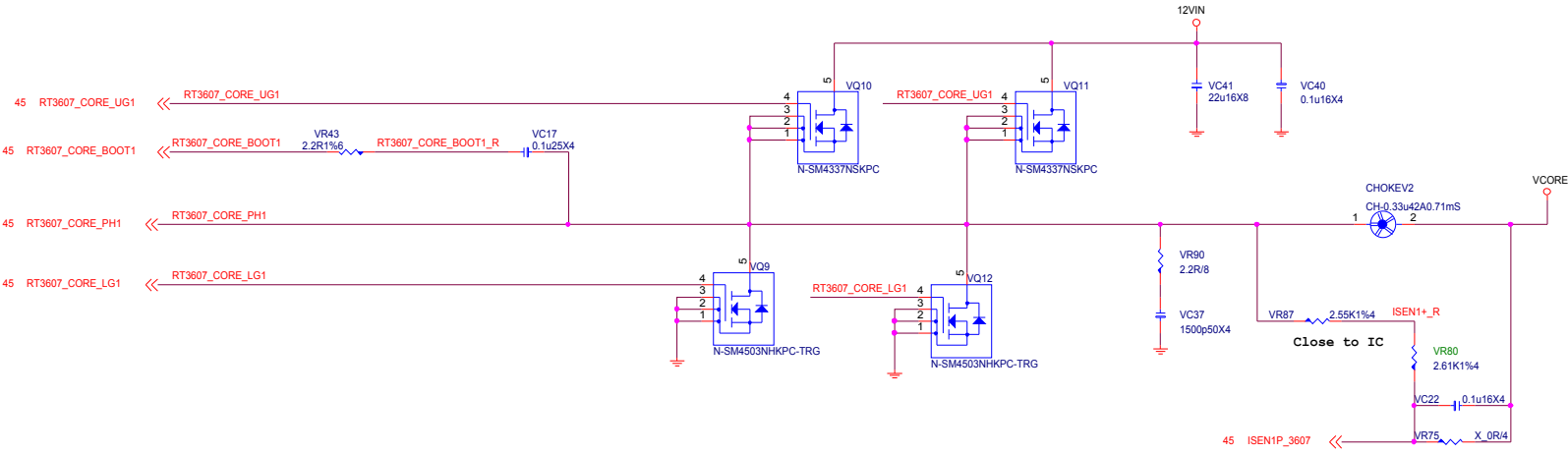
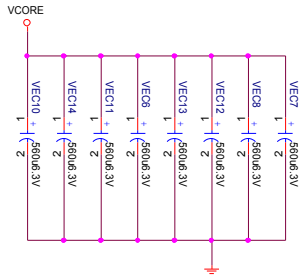
SET1:Iccmax:140A, OCP:130%\*Iccmax, DVID mV  
SET5:Iccmax:30A, OCP:130%\*Iccmax, DVID mV

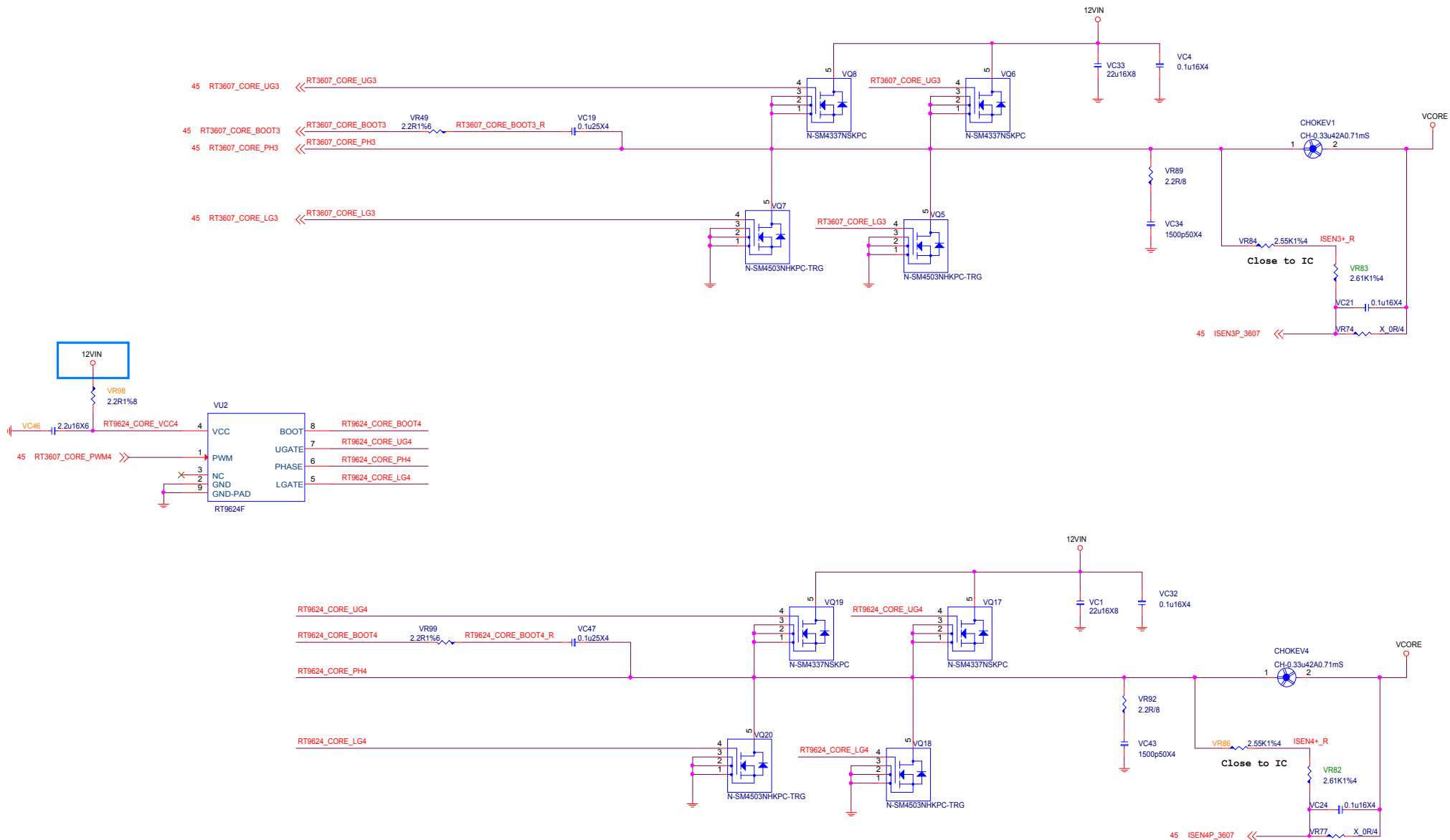
SET1 V  
SET2 V  
SET3 V  
SET4 V  
SET5 V

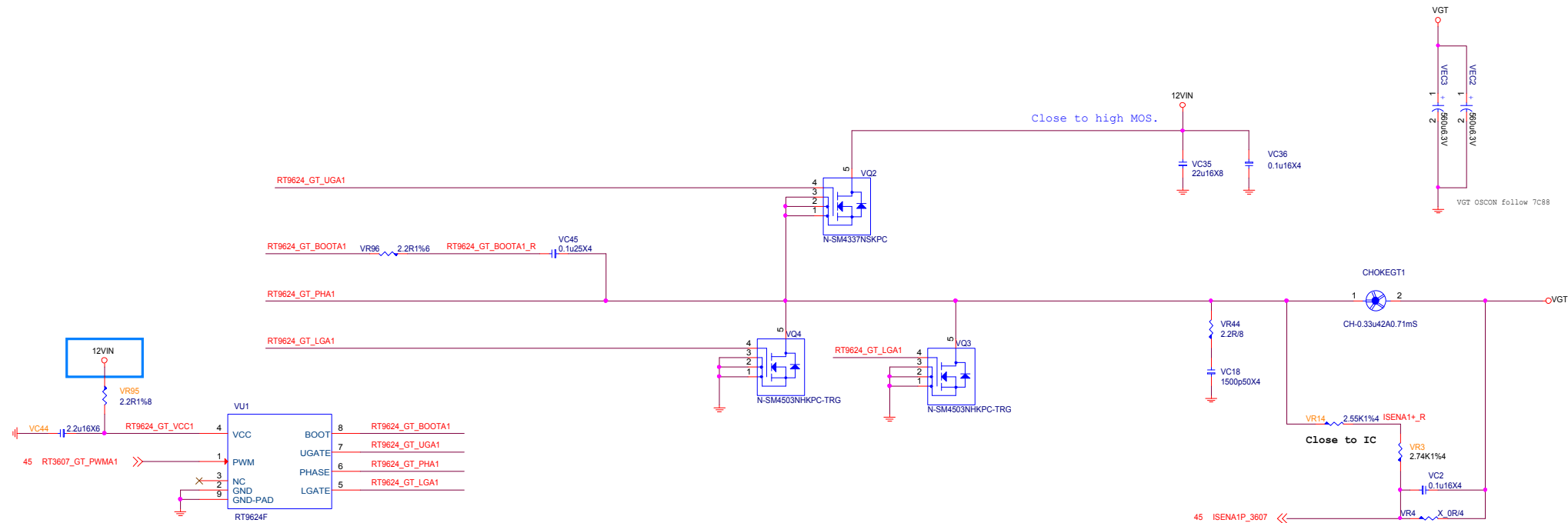
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**MS-7C89**

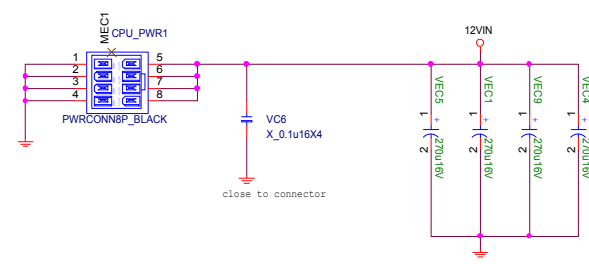
Size	Document Description	Rev
Custom	PWM Solution	1.3
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# 12VIN CONNECTOR



# SA Power:1.05V,11.1A

Current limit: 13A~18A, TYP=15A

OCP real 16A

$$\begin{aligned} I_{rms1} &= I_{out} * \sqrt{(V_{out}/V_{in}) * (1 - (V_{out}/V_{in}))} \\ &= 11.1 * 0.2825 \\ &= 3.136A \end{aligned}$$

1.05V  
I<sub>CC</sub>:11.1A

$$\begin{aligned} V_{out} &= 0.6 * (1 + 1K/1.33K) \\ &= 1.051V \end{aligned}$$

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

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

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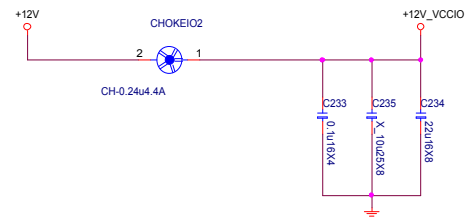
MS-7C89

Size	Document Description	Rev
Custom	CPU PWR-VCCSA	1.3
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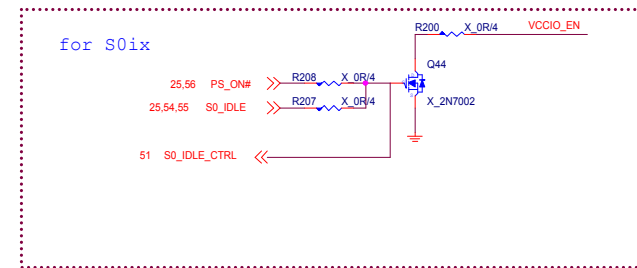
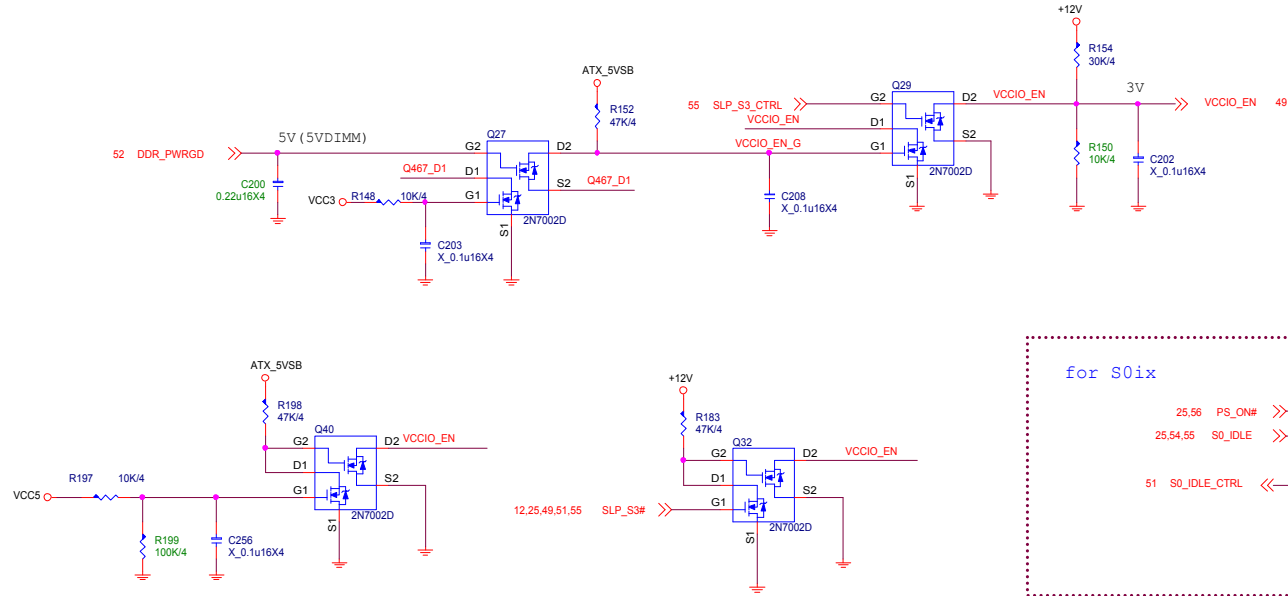
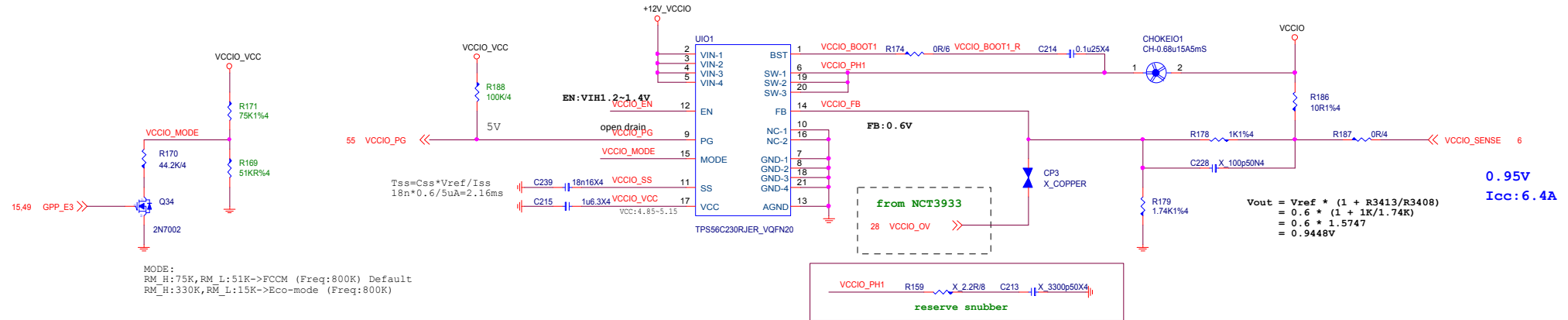
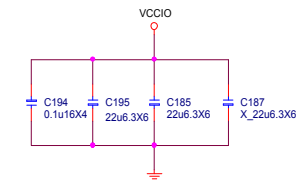
# VCCIO Power 0.95,6.4A

0.95V Icc:6.4A

OCP real 10.5A

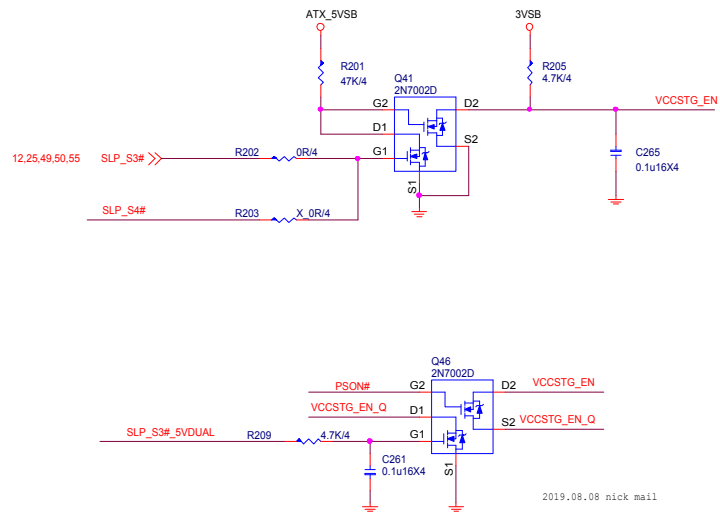
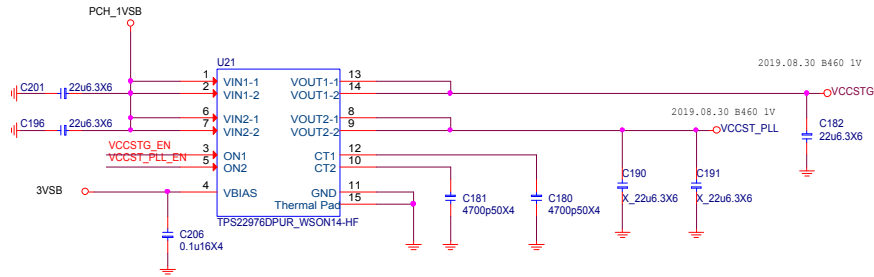


$$\begin{aligned} I_{rms1} &= I_{out} * \sqrt{(V_{out}/V_{in}) * (1 - (V_{out}/V_{in}))} \\ &= 6.4 * 0.27 \\ &= 1.728A \end{aligned}$$

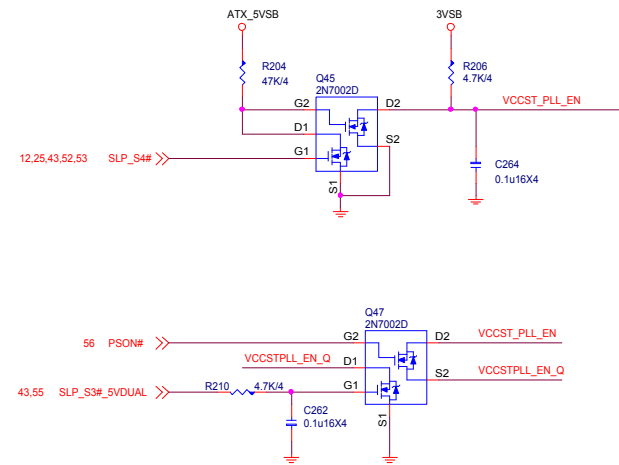
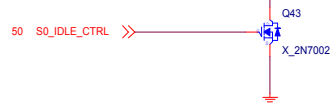


VCCST PLL 1.0V; 0.45A  
VCCSTG 1.0V; 0.2A

$$\begin{aligned}\text{Power Loss1} &= (I \cdot I) \cdot R_{ds(on)} \\ &= (0.45 \cdot 0.45) \cdot 0.022 \\ &= 0.2025 \cdot 0.022 \\ &= 4.455 \text{mW} \\ \text{Power Loss2} &= (I \cdot I) \cdot R_{ds(on)} \\ &= (0.2 \cdot 0.2) \cdot 0.022 \\ &= 0.04 \cdot 0.022 \\ &= 0.88 \text{mW}\end{aligned}$$



for S0ix



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3.7A For CPU  
0.225A For CPU(VCCSTPLL)  
4.6A For 2DIMM  
0.375A For DDR VTT

OCP = 12.5~16.6A; Choke Isat=32A

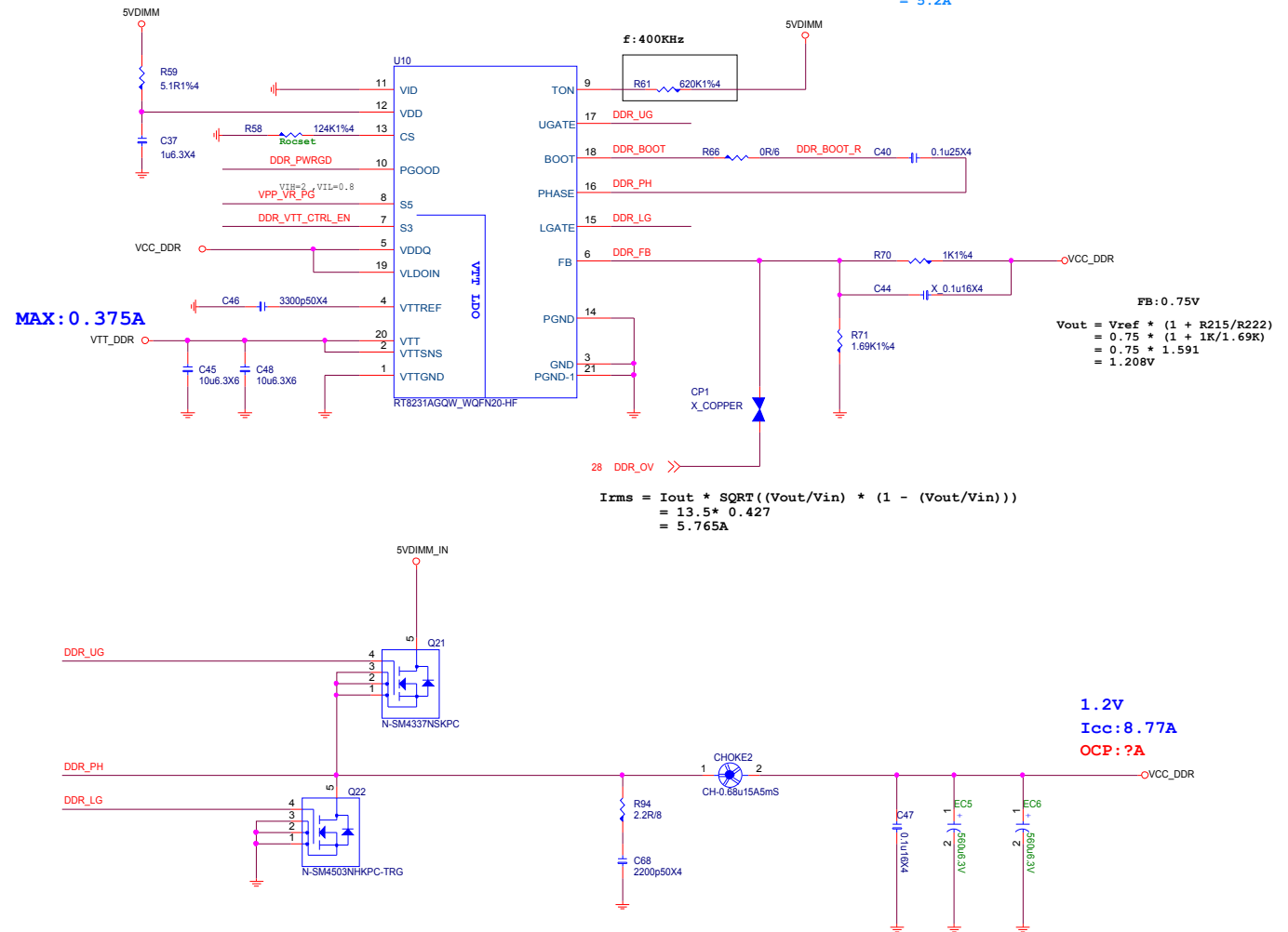
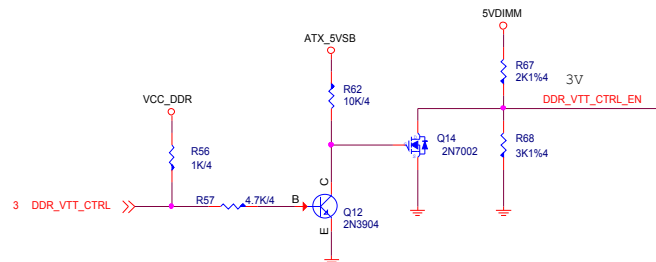
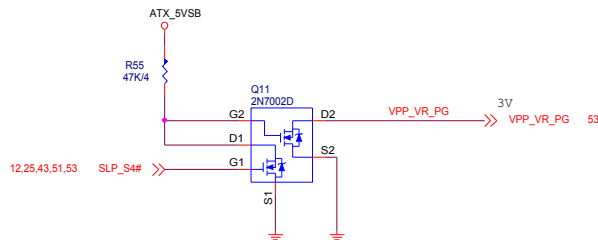
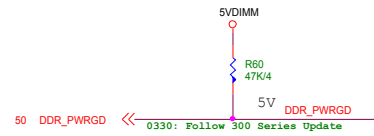
$$R_{limit} = L_{limit} * R_{ds} * 10 / 5\mu A$$

$$= 15.8 * 3.9 * 10 / 5 = 123.24K$$

$$0.4V \leq R_{limit} * 5\mu A \leq 3V$$
$$123.24 * 0.005 = 0.6162$$

D03-4503NOC-ST8

Current limit=  $124K \cdot 5\mu A / 10 / 5.1mohm = 12.16A$   
Current limit=  $124K \cdot 5\mu A / 10 / 3.9mohm = 15.9A$



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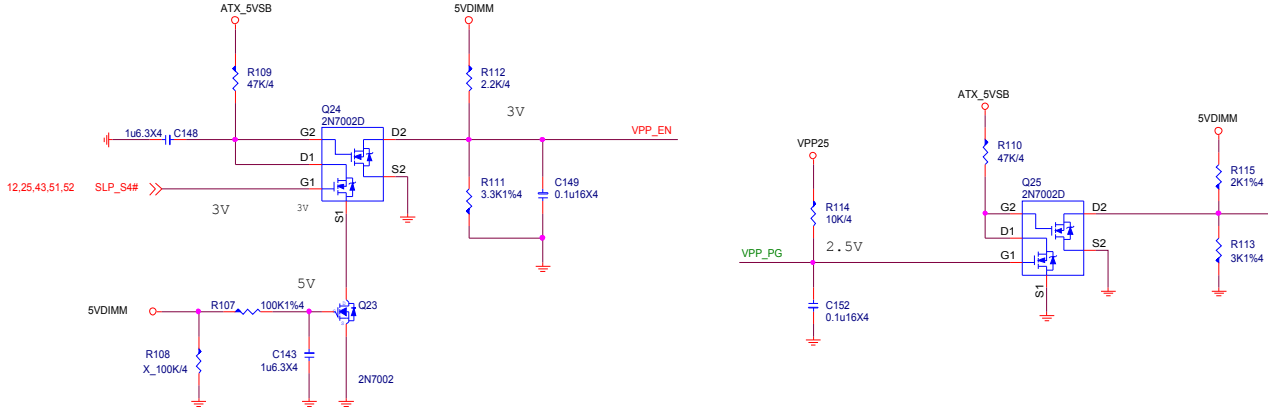
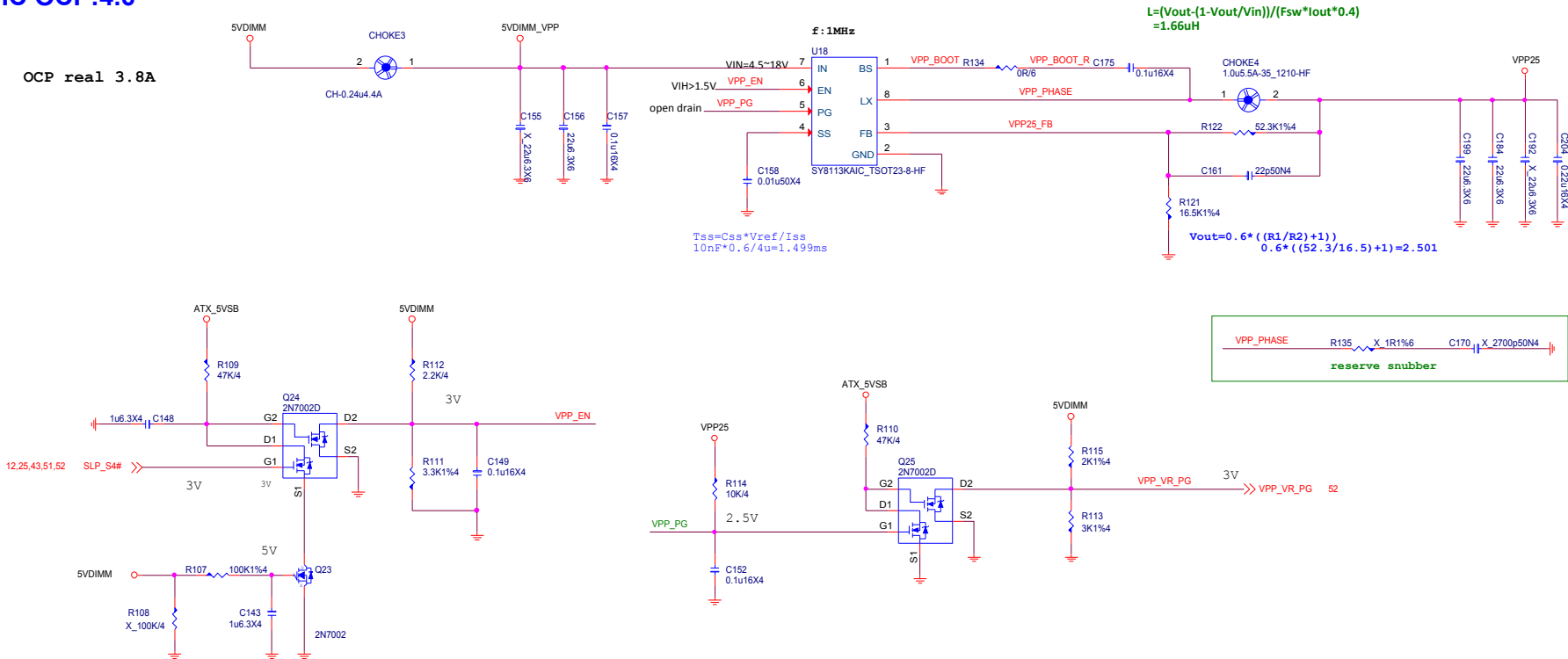
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VPP2.5V Power:2.5V,3A  
IC OCP:4.6

$$I_{rms} = I_{out} * \sqrt{((V_{out}/V_{in}) * (1 - (V_{out}/V_{in})))}$$
$$= 3 * 0.5$$
$$= 1.5A$$

OCP real 3.8A



PCH\_1VSB Power:1V,9.208+0.65=9.858A

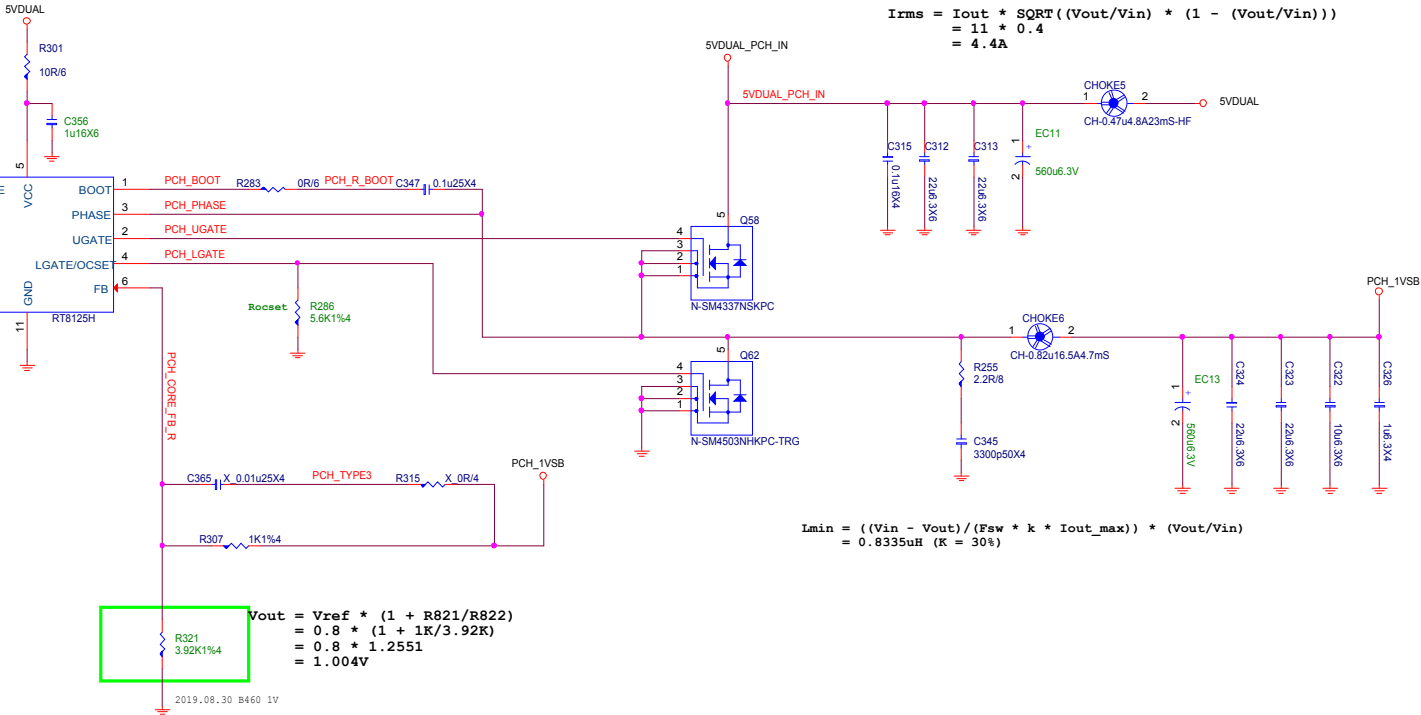
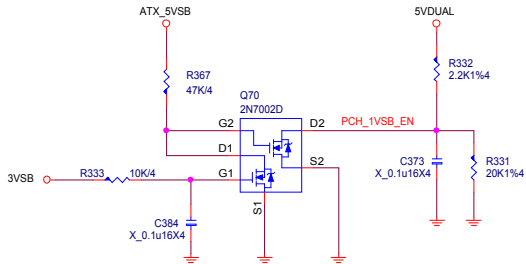
OCP = 11.66~15.55A

$I_{ocp} = R_{ocset} * I_{ocset} / R_{dson}(low)$   
= 5.6K\*10uA/3.9m  
= 14.36A  
 $I_{ocp} = R_{ocset} * I_{ocset} / R_{dson}(max)$   
= 5.6K\*10uA/5.1m  
= 10.98A

Rdson(Low Side) 5V  
D03-4503N0C-ST8:3.9 ~5.1 mohm

Note: Rocset(min)=5K

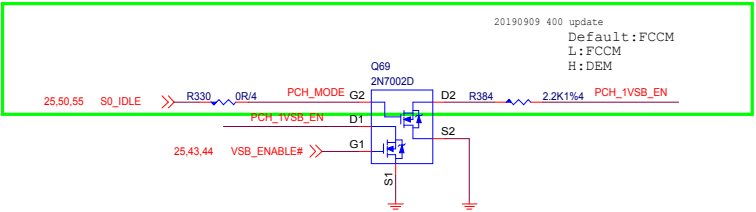
EN_MODE Pin Voltage	IC Operate Mode
<0.4V	shut down
2.1~2.7V	DEM
4.3~5V	FCCM



$$I_{rms} = I_{out} * \sqrt{(V_{out}/V_{in}) * (1 - (V_{out}/V_{in}))}$$
$$= 11 * 0.4$$
$$= 4.4A$$

$$I_{min} = ((V_{in} - V_{out}) / (F_{sw} * k * I_{out\_max})) * (V_{out}/V_{in})$$
$$= 0.8335uH \text{ (K = 30\%)}$$

$$V_{out} = V_{ref} * (1 + R_{821}/R_{822})$$
$$= 0.8 * (1 + 1K/3.92K)$$
$$= 0.8 * 1.2551$$
$$= 1.004V$$

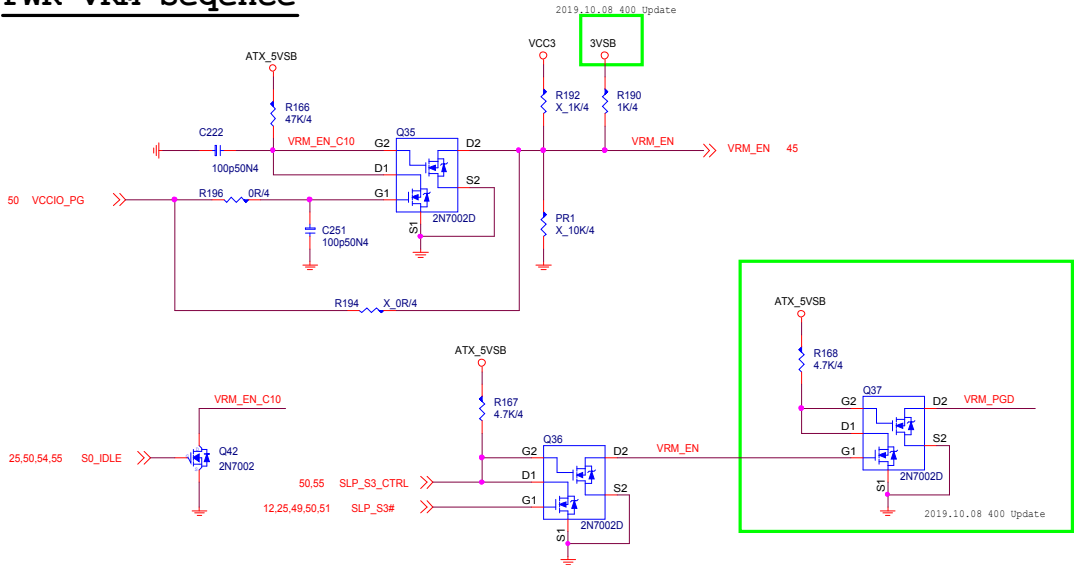


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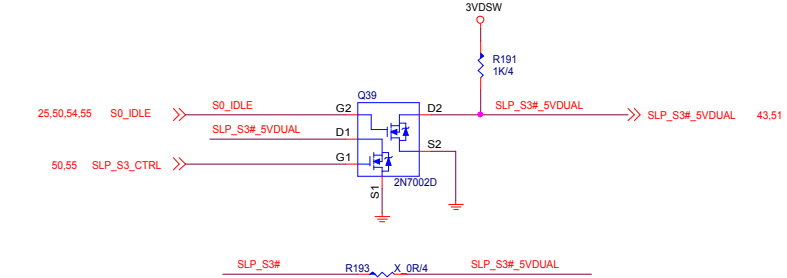
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PWR-VRM-Sequence

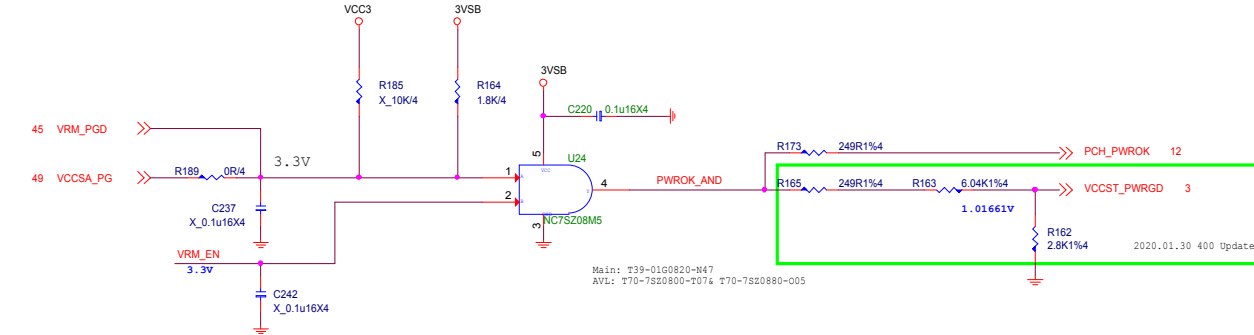
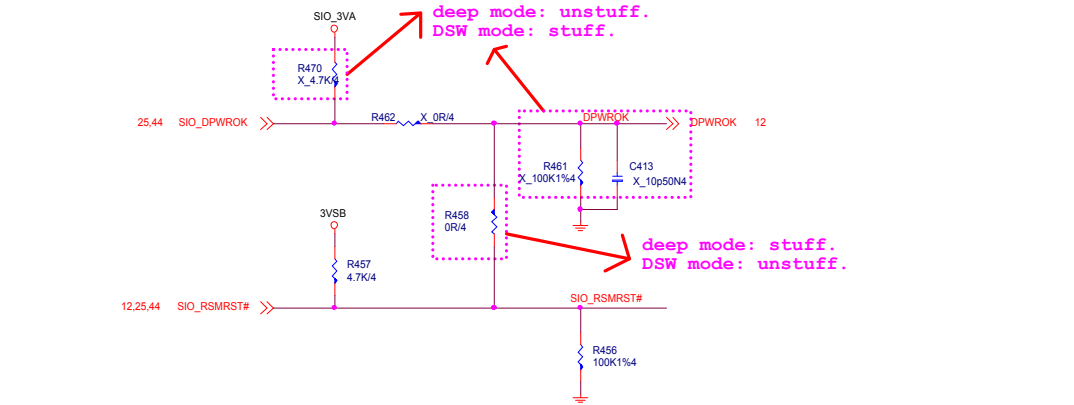
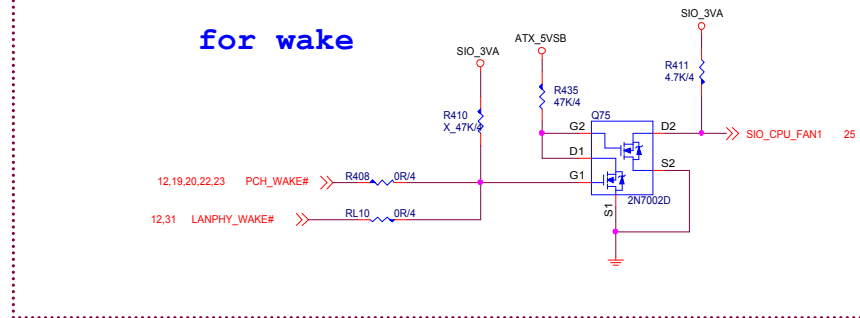


for 5VDIMM and 5VDUAL

for S0ix

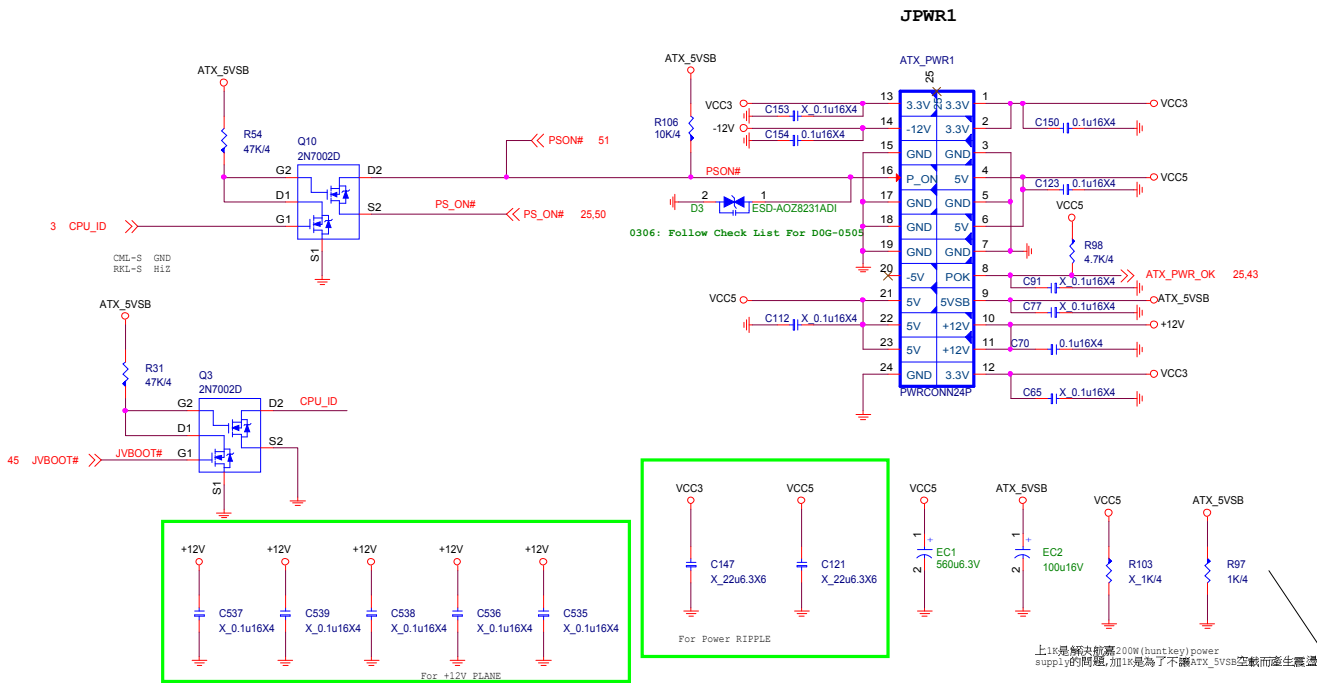


for wake

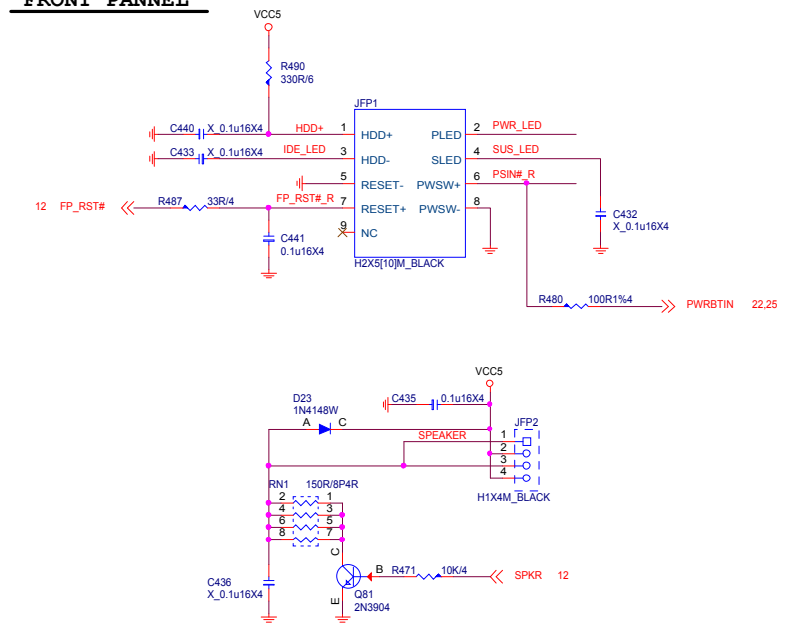


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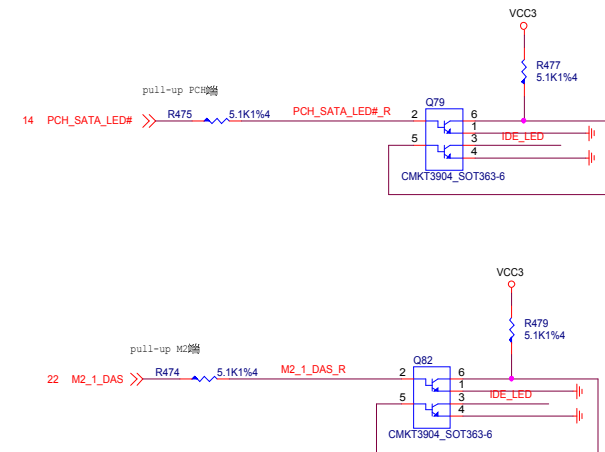
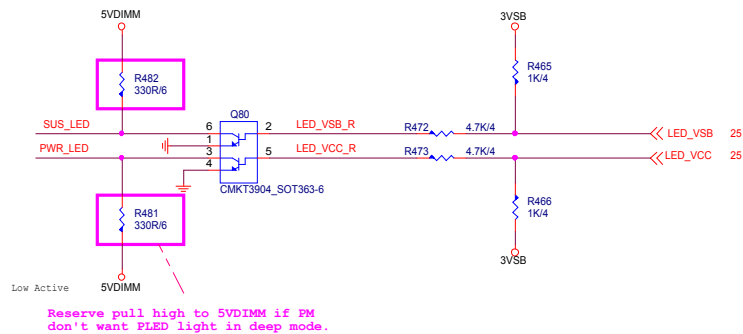
## ATX POWER CONNECTOR



## FRONT PANNEL



## Front Panel LED



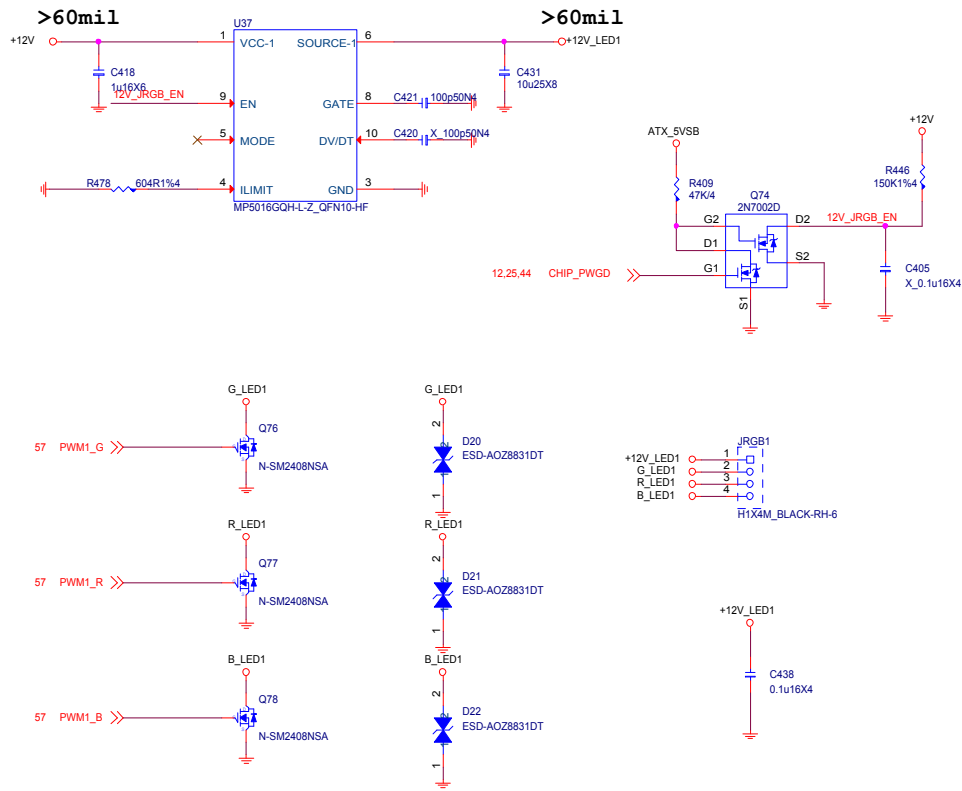
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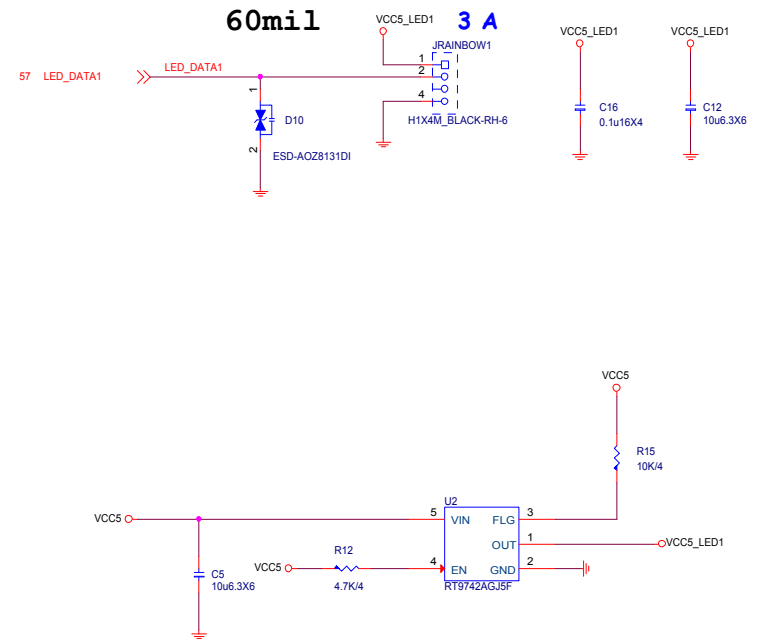
Size	Document Description	Rev
Custom	ATX Connector/F_Panel	1.3
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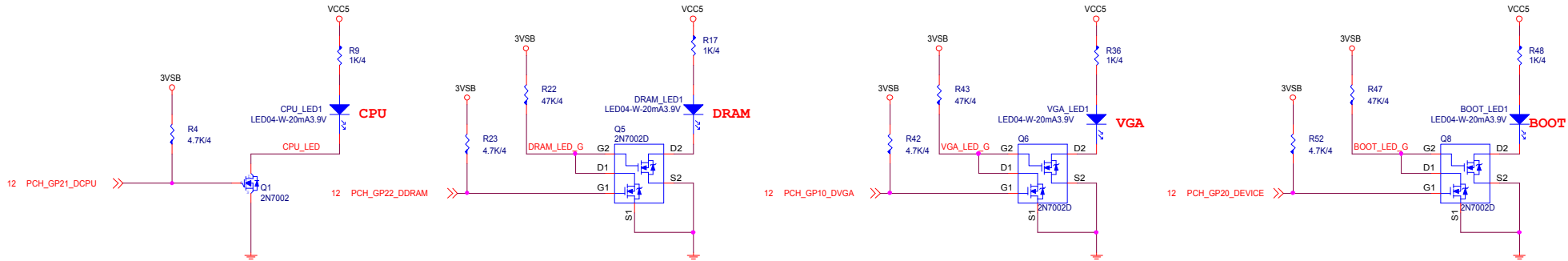
# JRGB1



# JRAINBOW1 LED

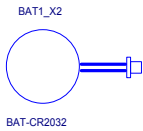


EZ Debug LED

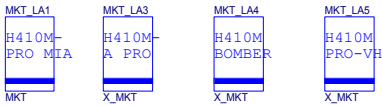
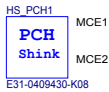




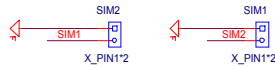
7C89-1.3  
PK0-07C8913-G37  
PK0-07C8913-E48



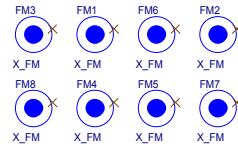
## Heat Sink



## Simulation



## Optical Fiducial Marks-120



## Mounting Holes

