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MS-7C09

ATX:226mm*185mm

Ver: 1.2

intel -CoffeeLake-S plamform

CPU:

LGA1151

CPU POWER PAK *4 Phase

GT POWER PAK *2 Phase

System Chipset:

Cannon Lake H310C

Onboard Chip:

SIO: NCT5567D

HD Audio Codec: ALC887

LAN: RTL8111H

Flash ROM: SPI 128 MB

DP to VGA: RTD2166

CUT VBAT: SLG4B41231

PWM:

VCORE - RT3607

DDR - RT8231

DDR VPP25 - MP2333

PCH(1.0V) - RT8125E

VCCSA - RT8125E

VCCIO - SY8288

Main Memory:

DDR4 * 2 (Dual Channel)

ACPI:

5VDAUL: uP7501

5VDIMM: uP7501

3VSB: GS7133+N MOS

3VDSW: GS7133

VCCSTPLL: GS7133

Expansion Slots:

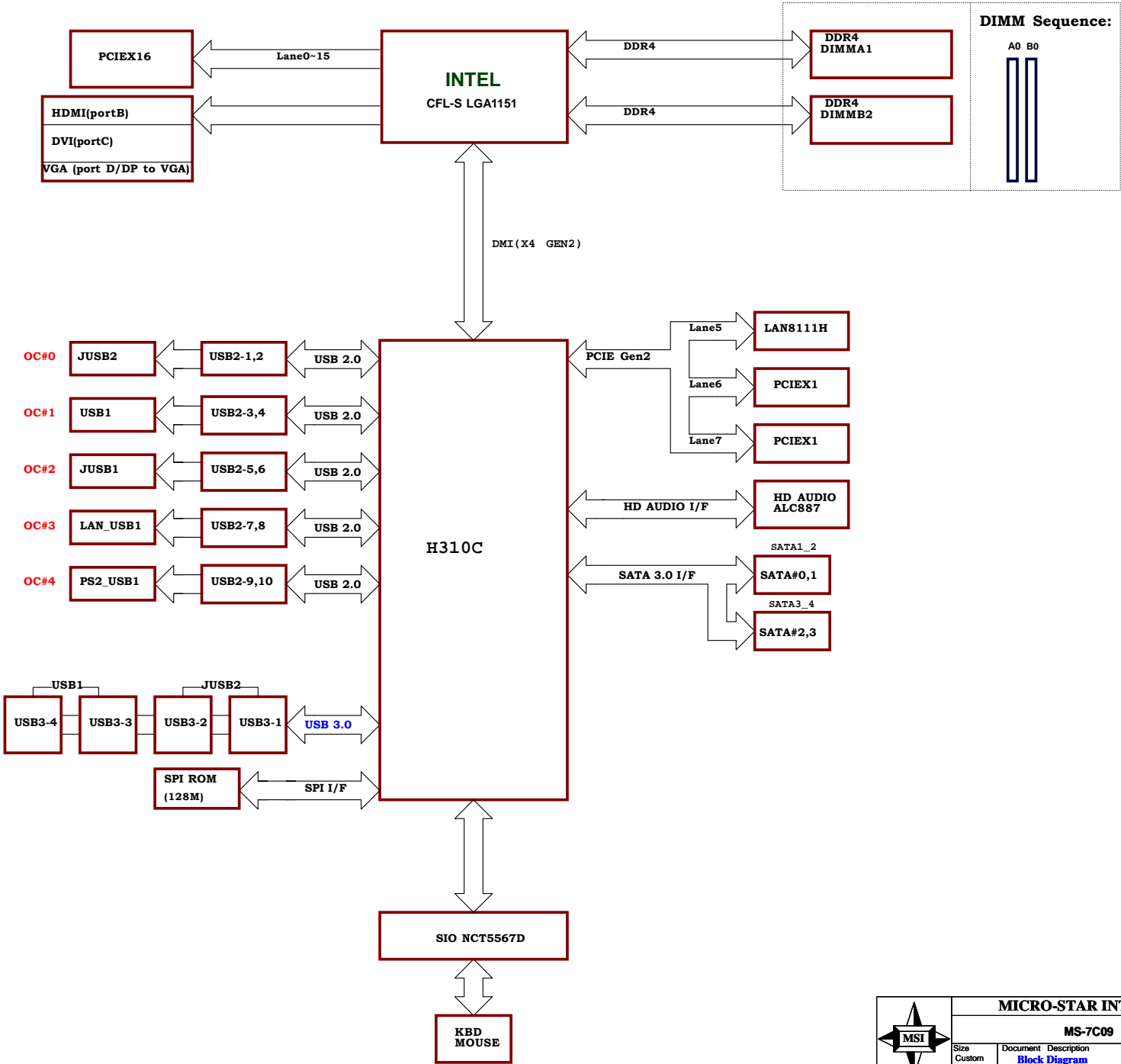
PCI Express (X16) Slot * 1

PCI Express (X1) Slot * 2

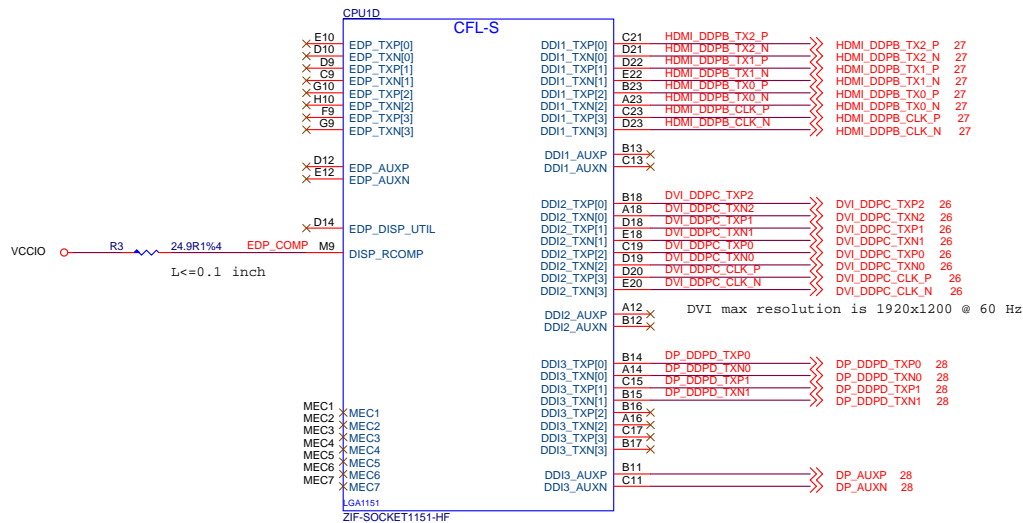
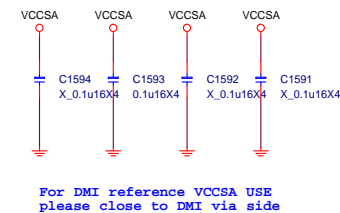
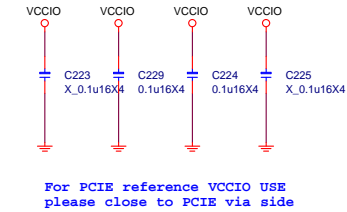
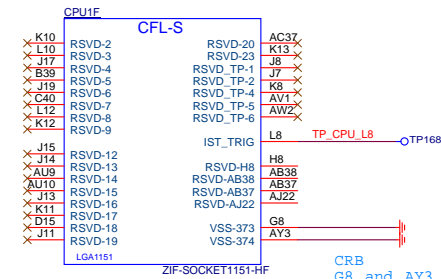
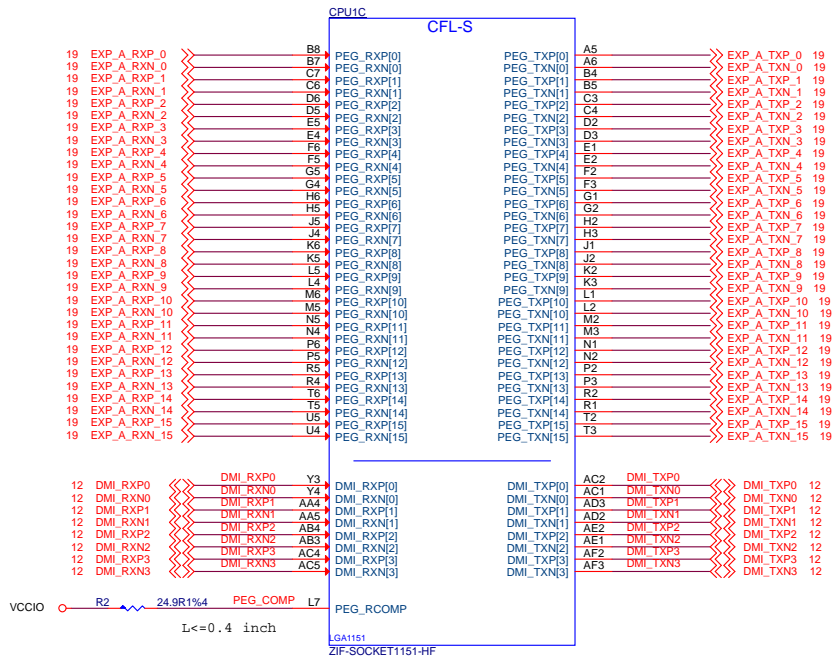


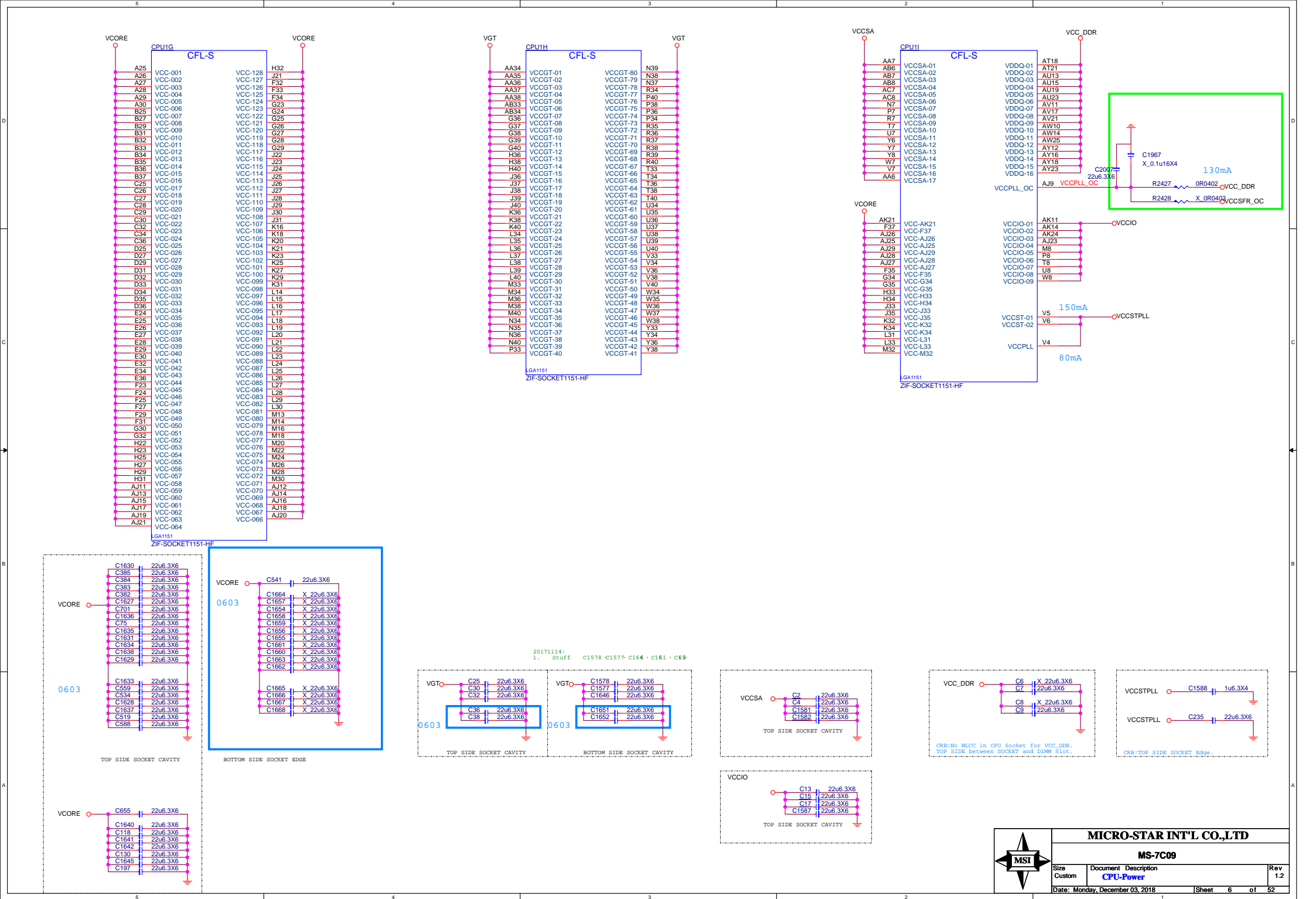
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MS-7C09		
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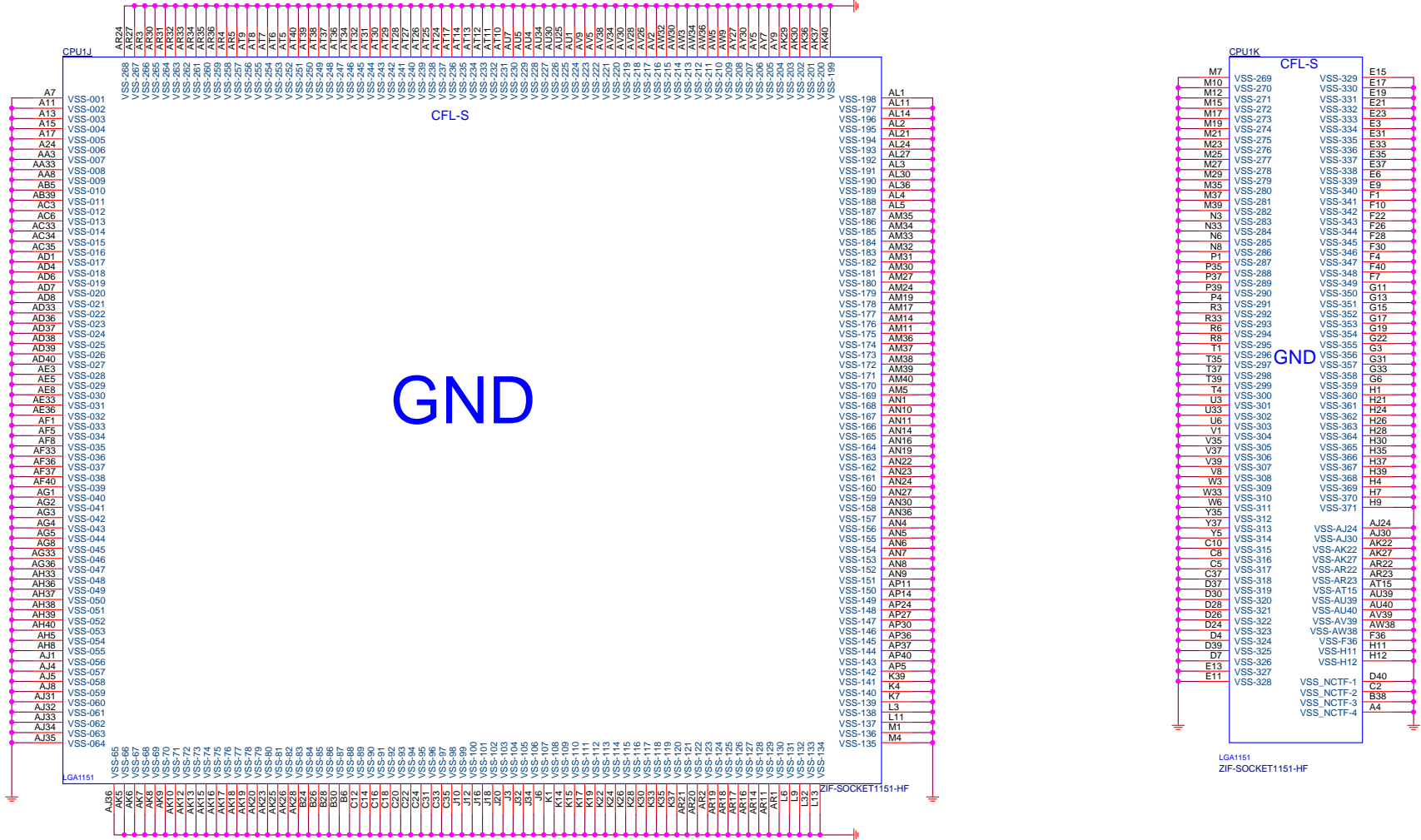
MS-7B33 Block Diagram

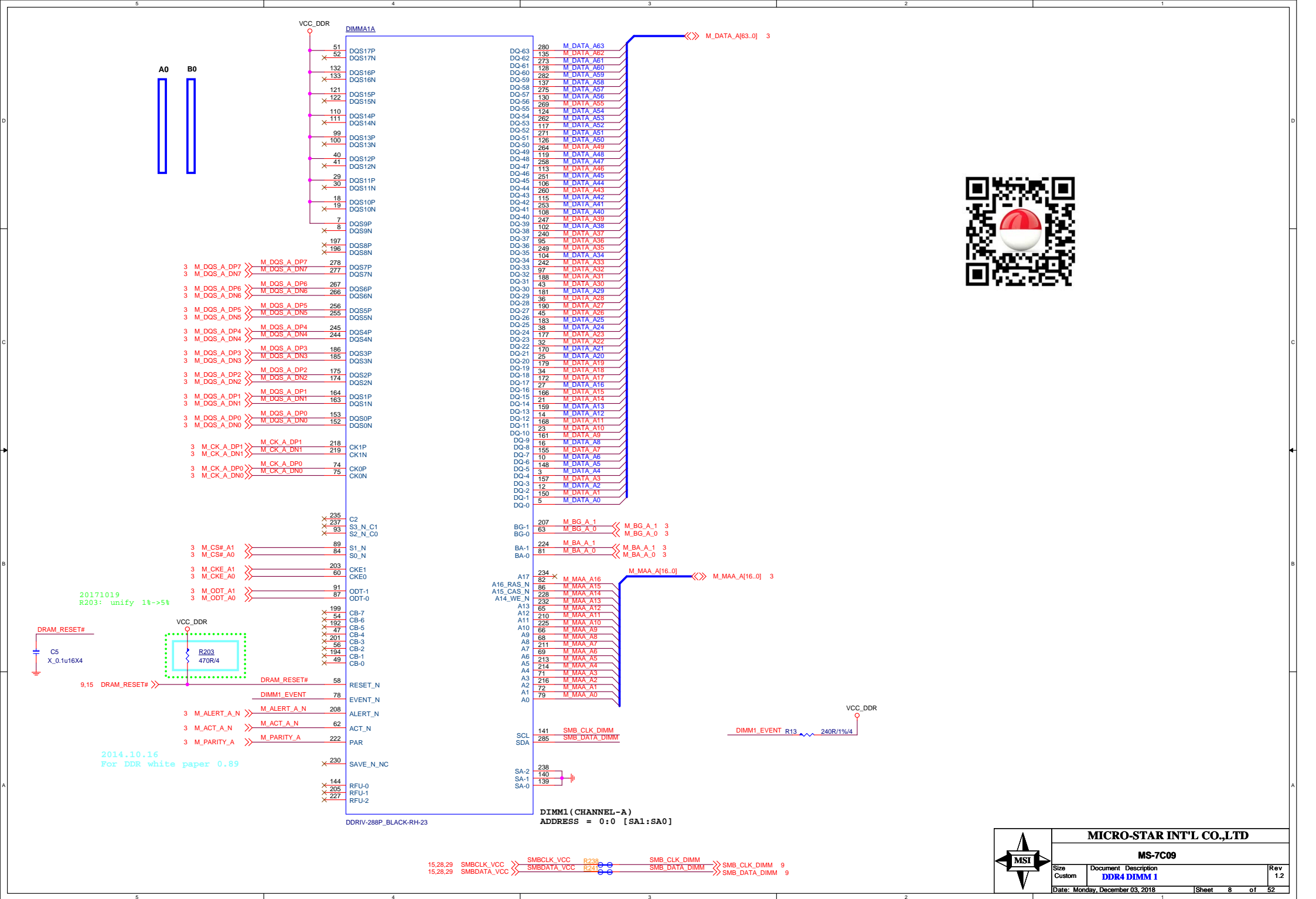


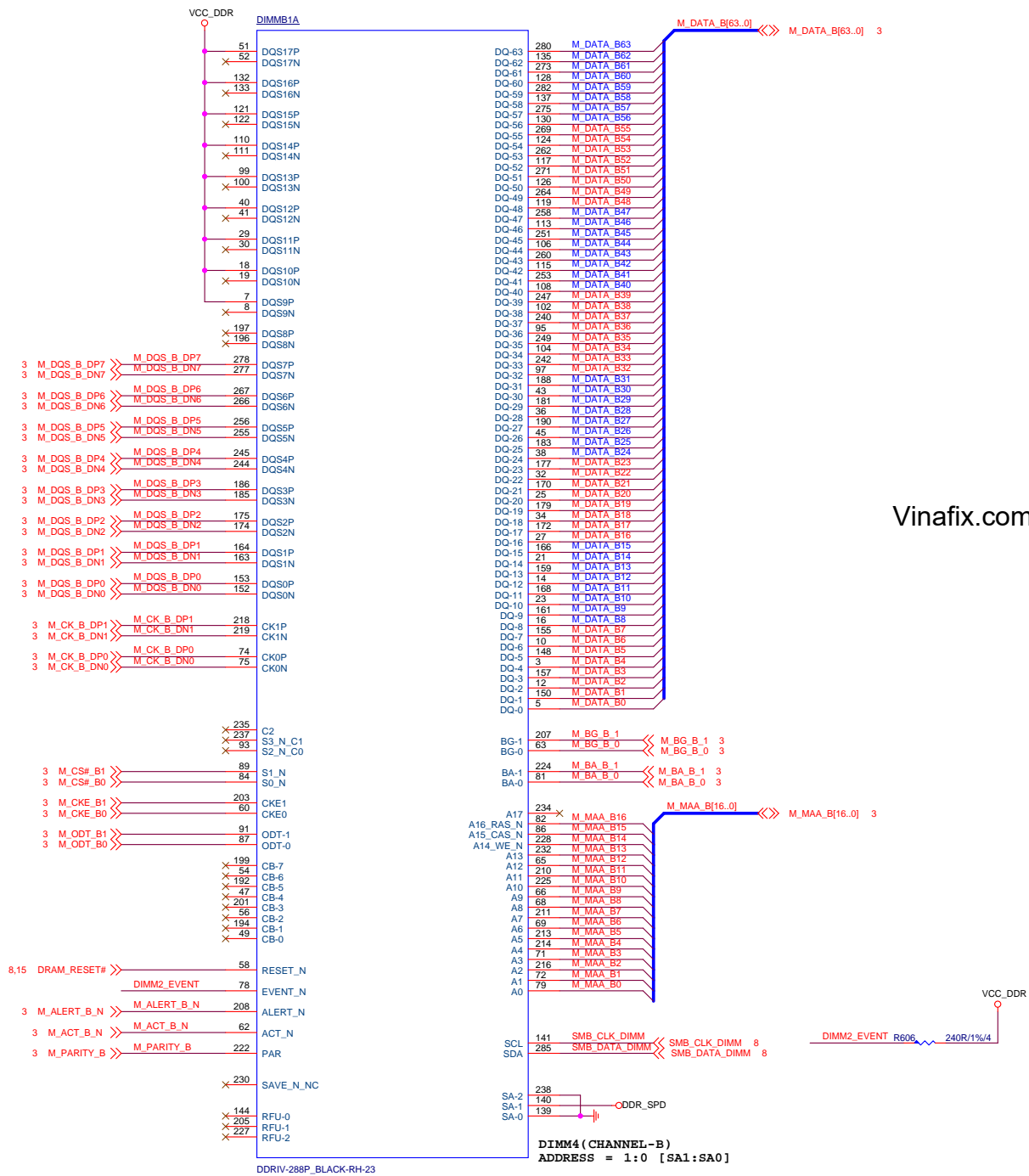


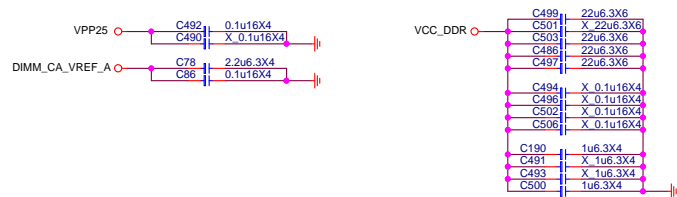
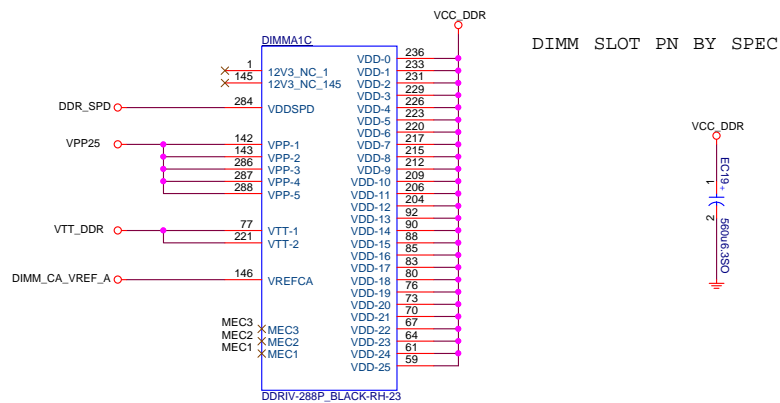




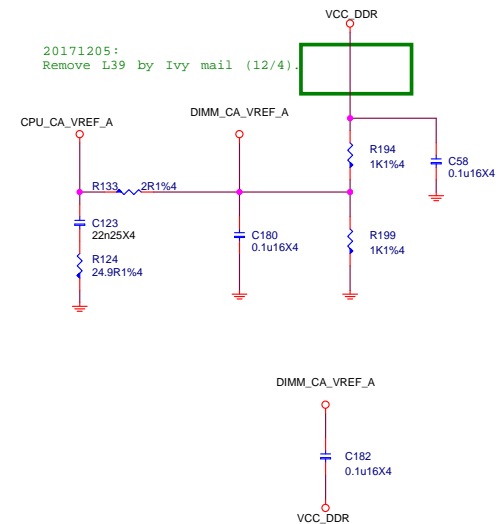
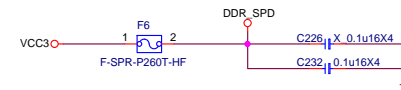
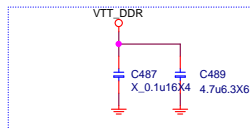








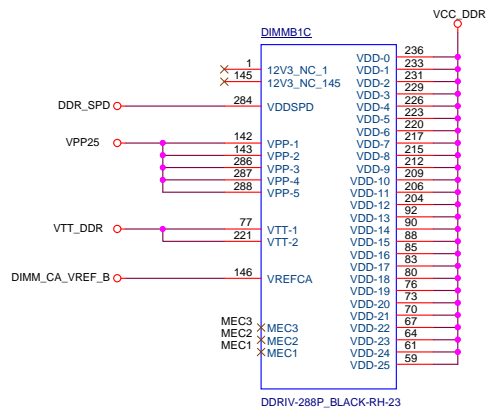
0.1uF x1 per dimm



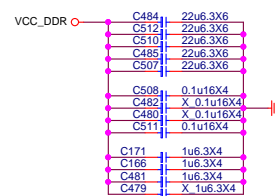
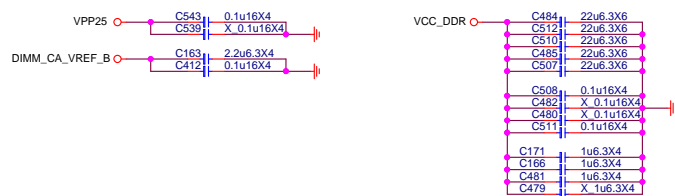
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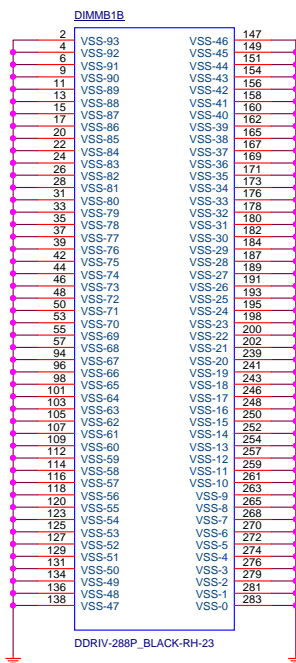
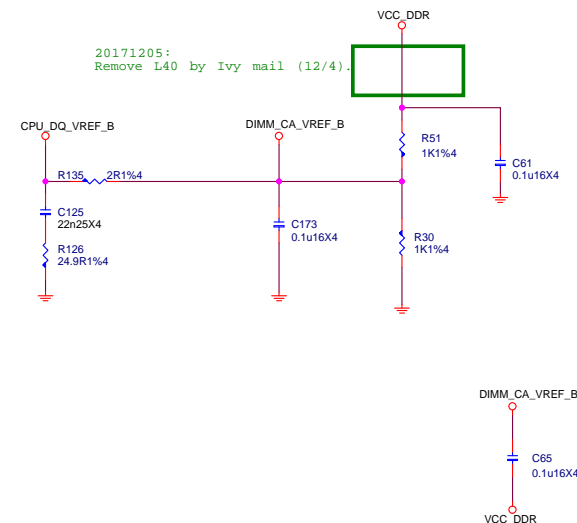
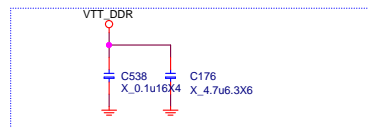
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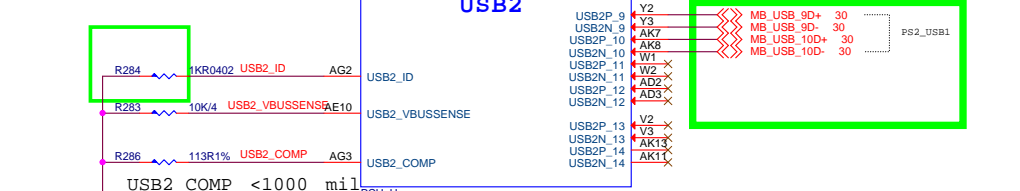
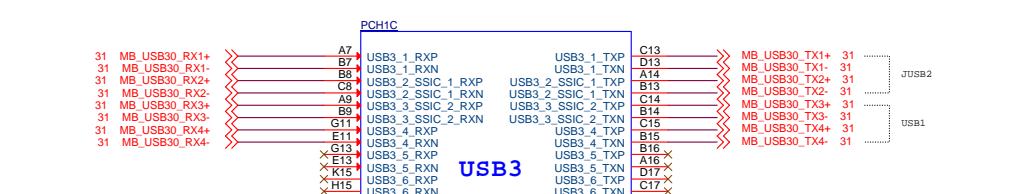
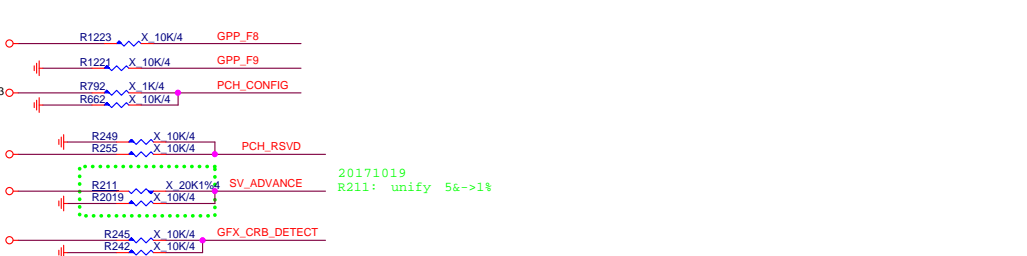
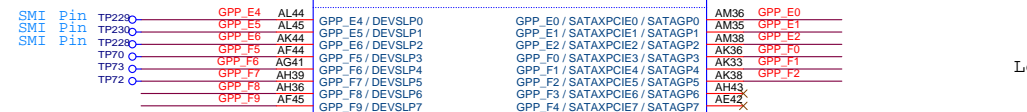
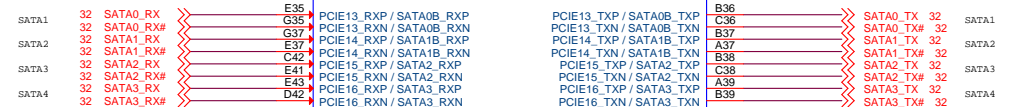
Place close to DIMM2



0.1uFxl per dimm

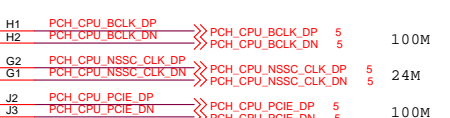
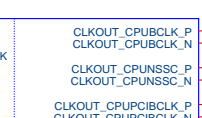
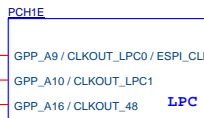
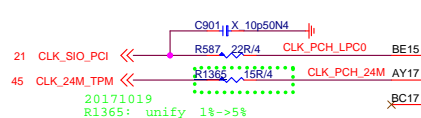
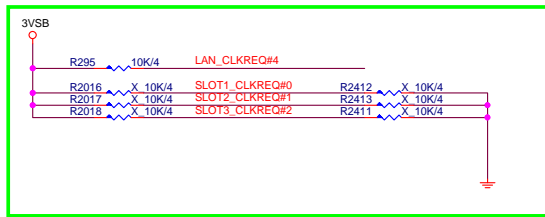
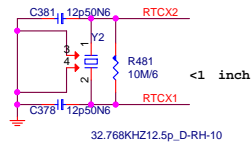


Vinafix.com

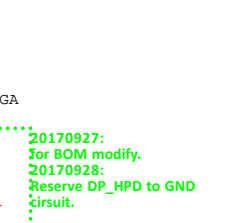
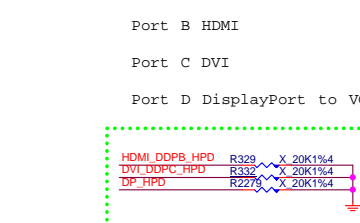
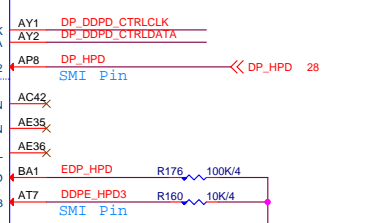
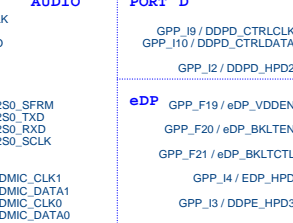
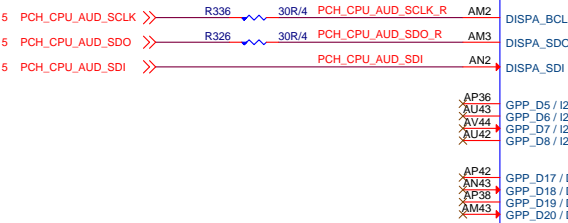
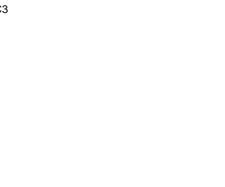
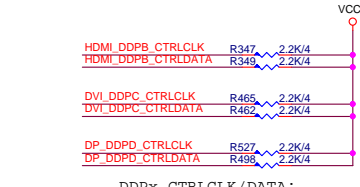
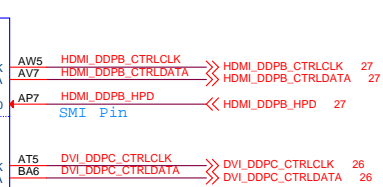
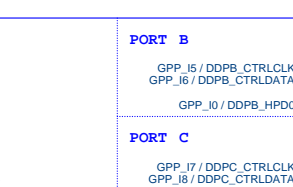
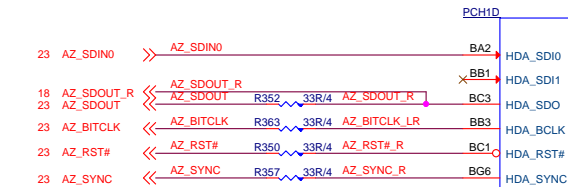
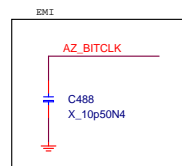
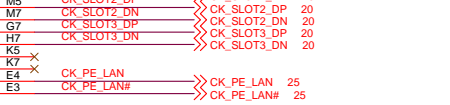
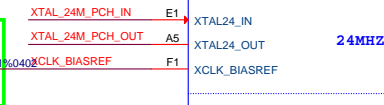
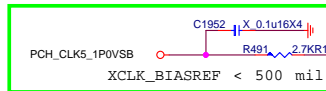
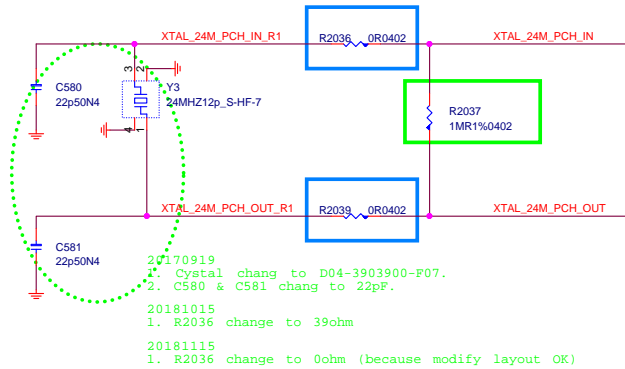


RTC Block

Close to PCH



tekniisi indonesia



Add DDI_HPD pull down

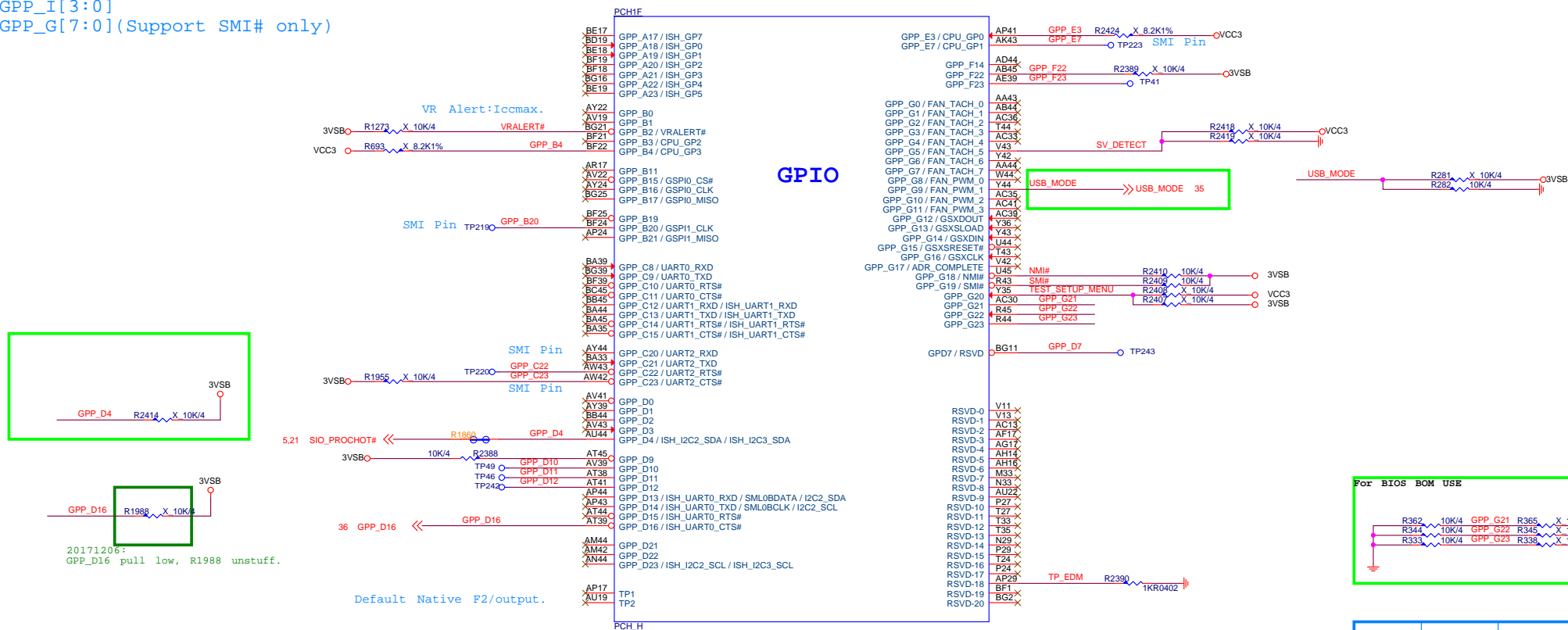


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```
GPIO(SMI/NMI):
GPP_B14,GPP_B20,GPP_B23
GPP_C[23:22]
GPP_D[4:0]
GPP_E[8:0]
GPP_I[3:0]
GPP_G[7:0](Support SMI# only)
```



For BIOS BOM USE

R362 10K/4 GPP G21 R365 X 10K/4
R344 10K/4 GPP G22 R345 X 10K/4
R333 10K/4 GPP G23 R336 X 10K/4

3VSB

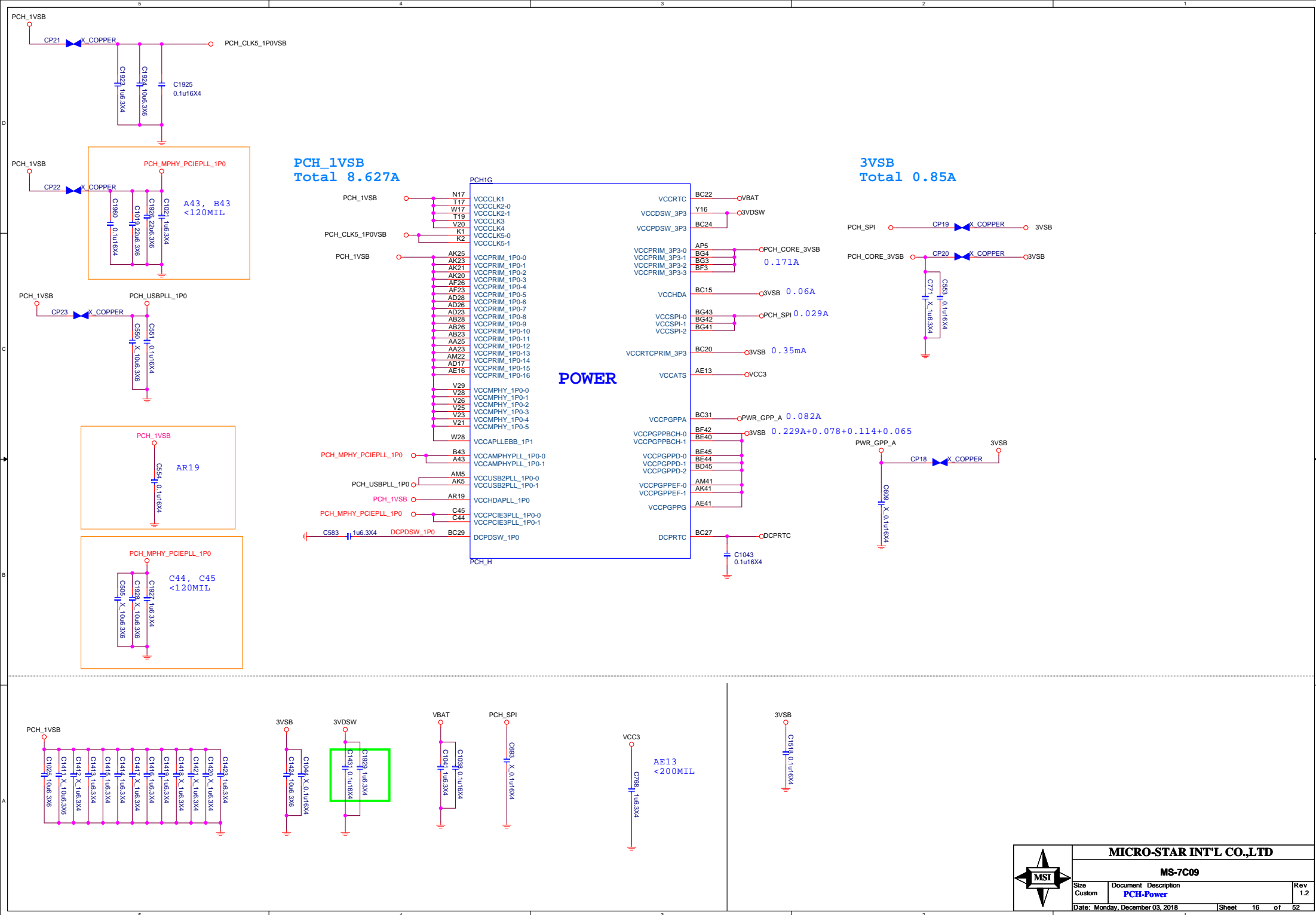
	GPP_I12	GPP_I13	GPP_I14
H310_VH	0	0	0
H310_VD	0	0	1

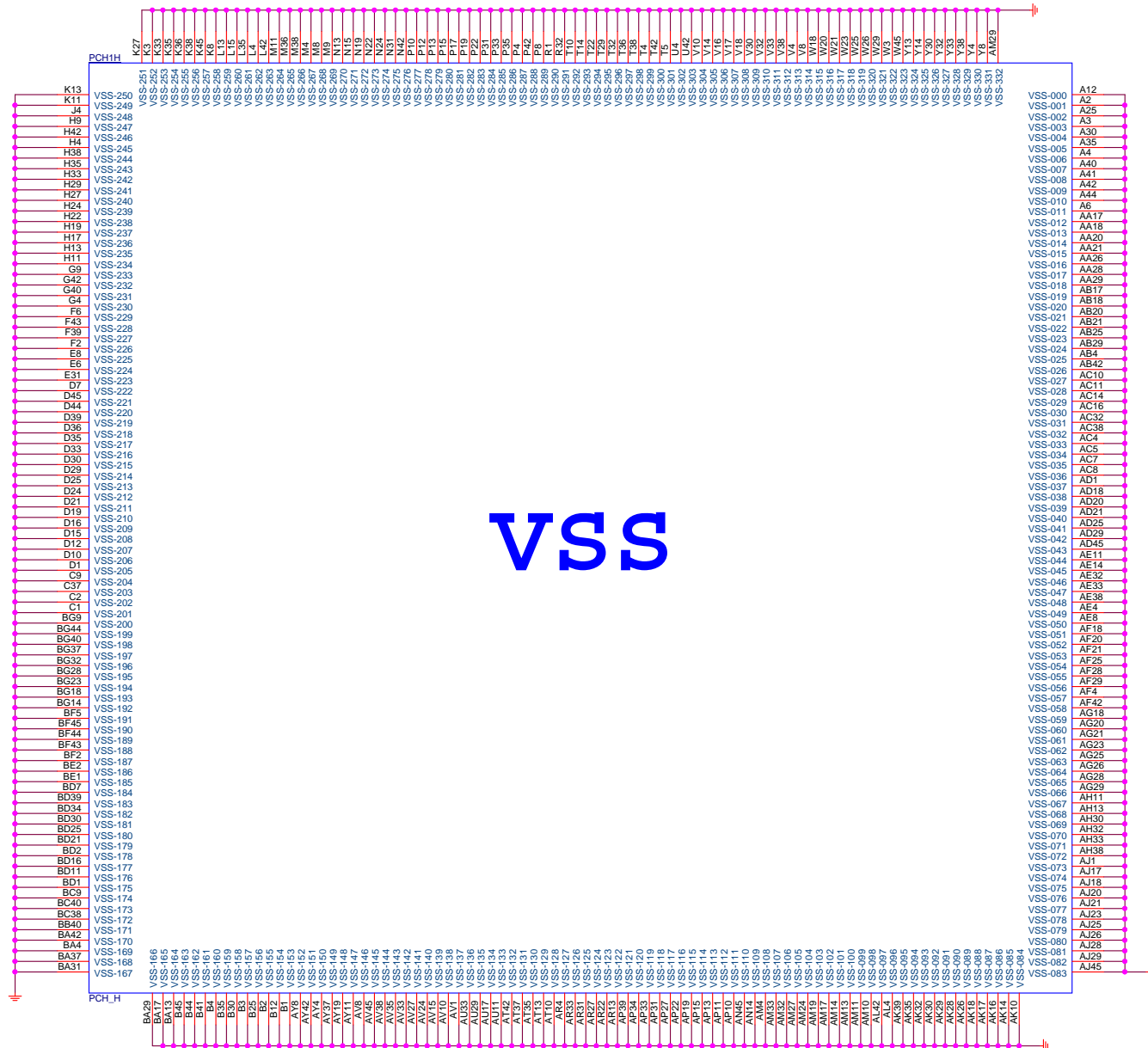


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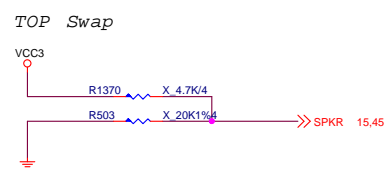
MS-7C09

Size Custom	Document Description PCH-GPIO/USBOC#/SATASTRAP	Rev 1.2
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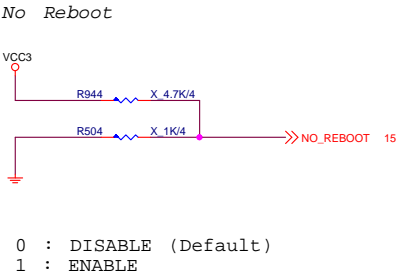




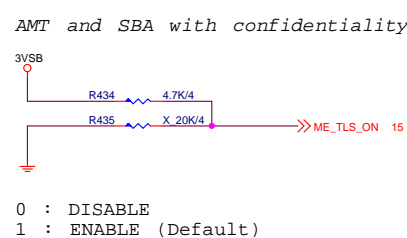
Vinafix.com



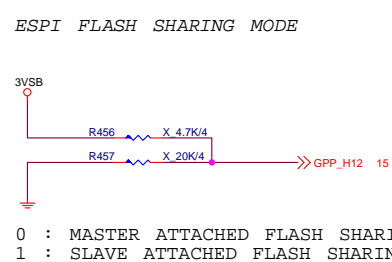
Internal pull-down 20K is disabled after PLTRST#



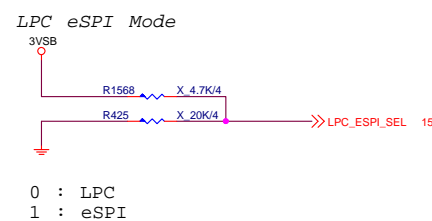
Internal pull-down 20K is disabled after PLTRST#



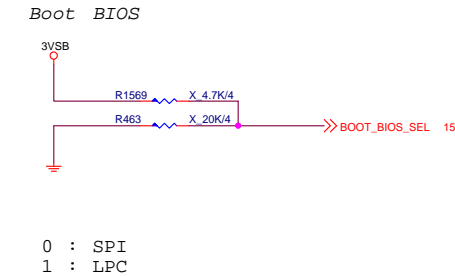
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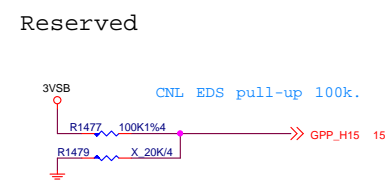
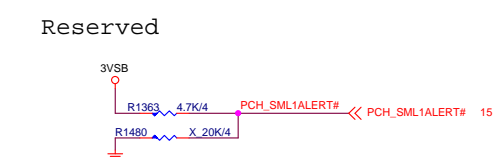
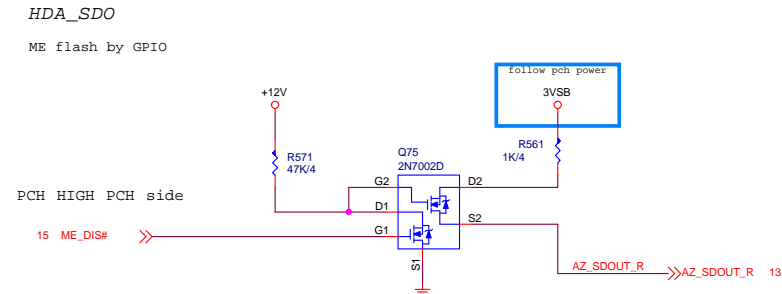
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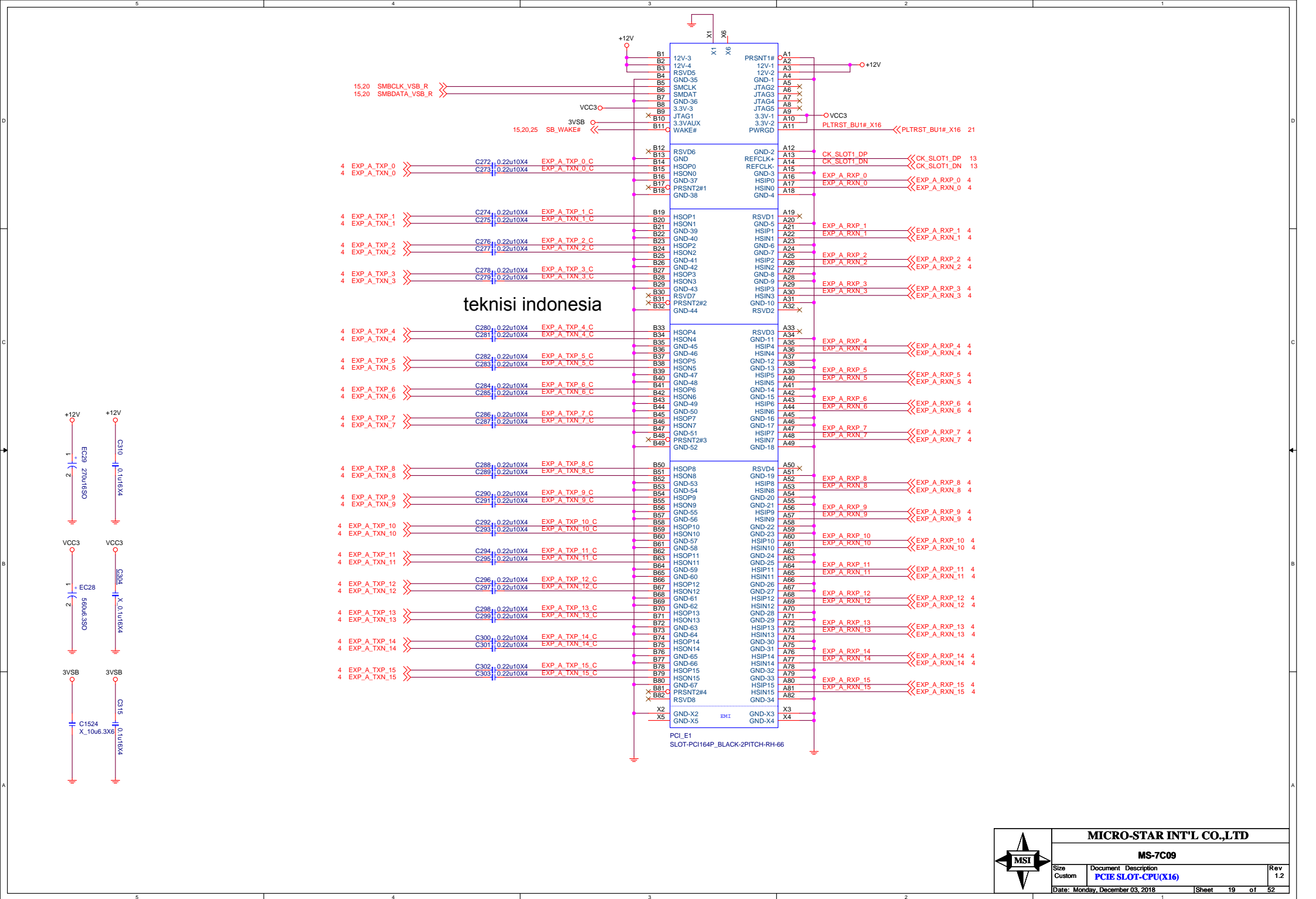


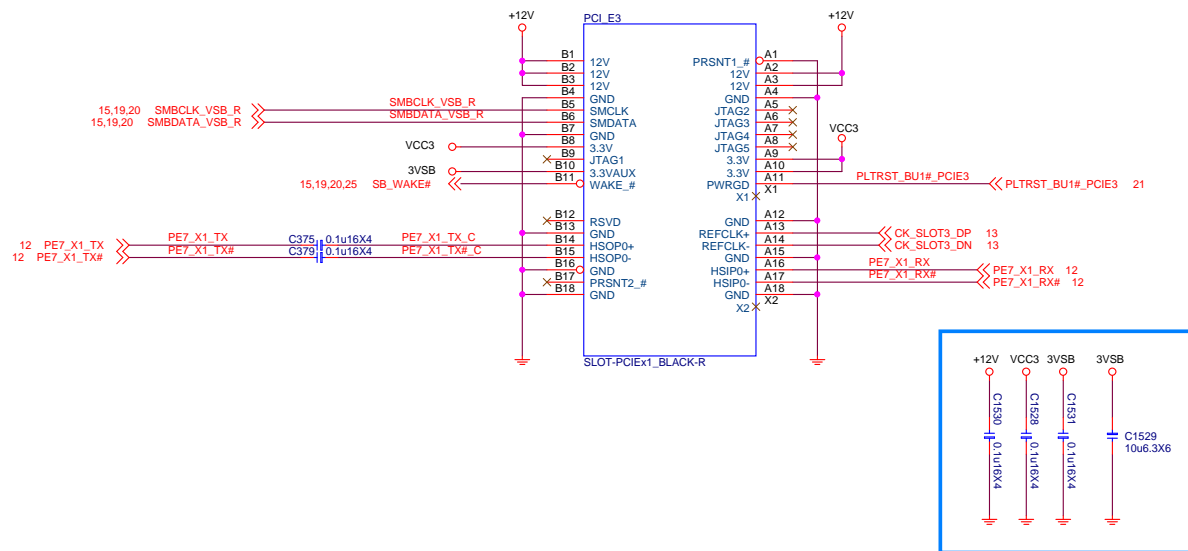
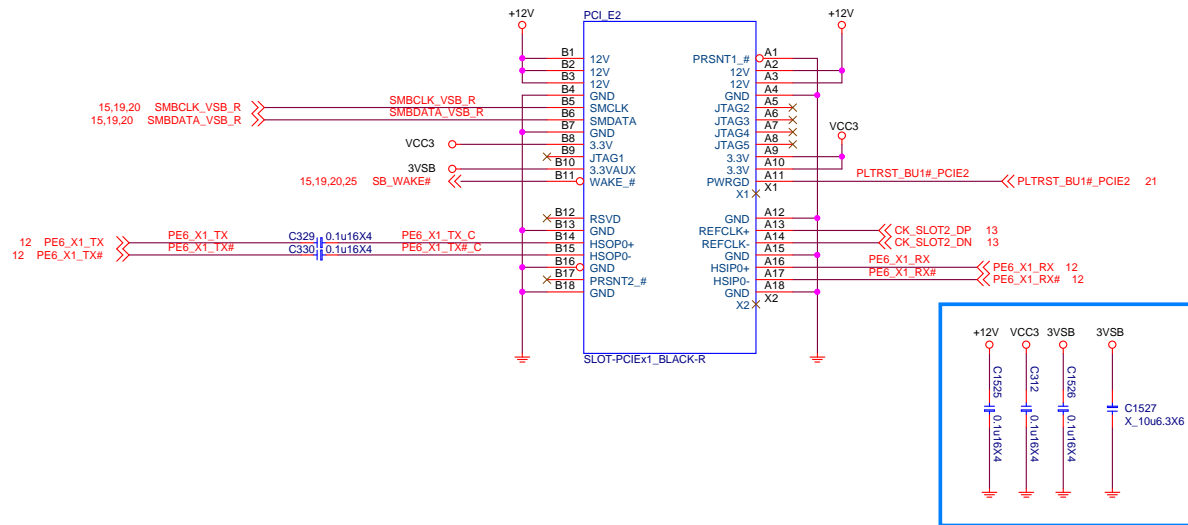
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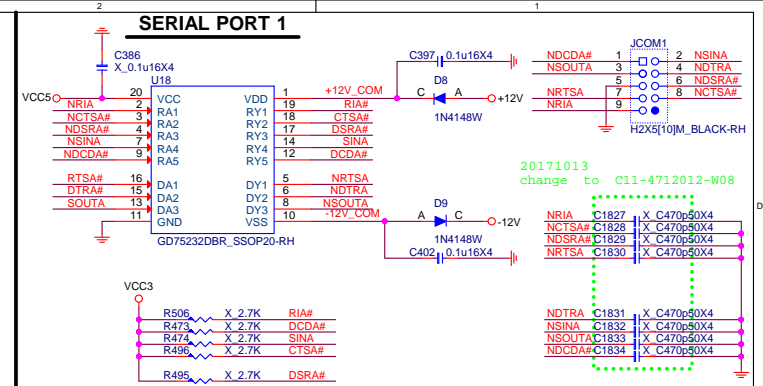
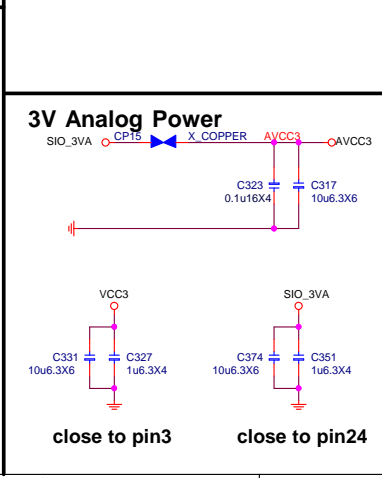
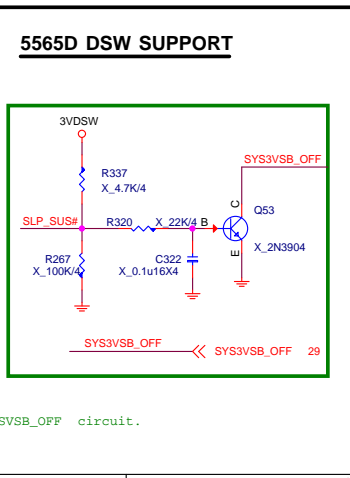
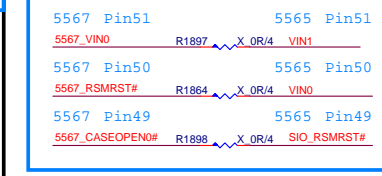
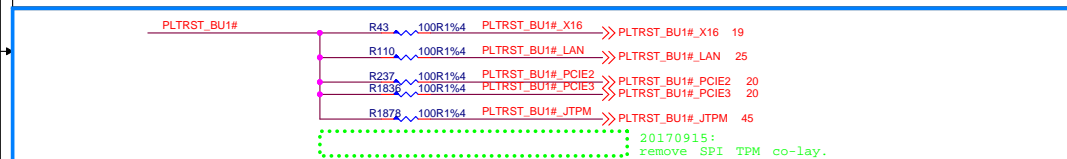


Internal pull-down 20K is disabled after PLTRST

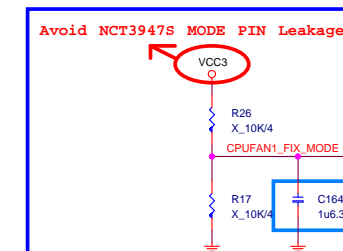




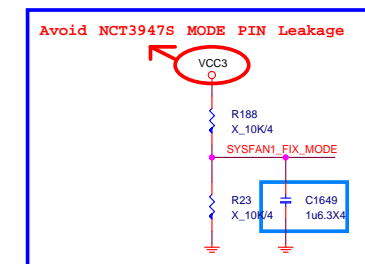


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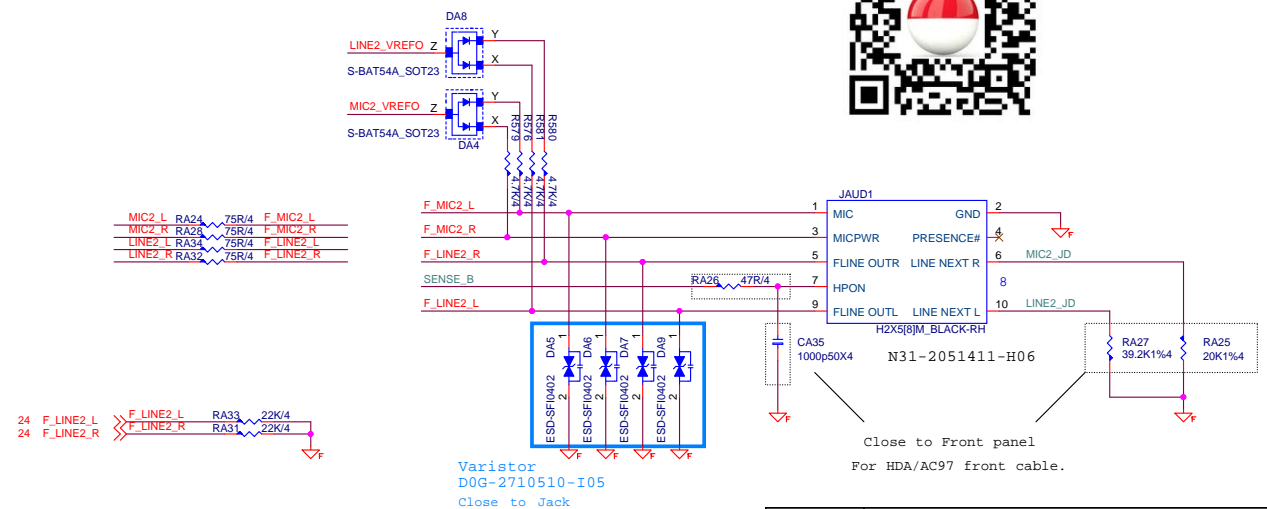
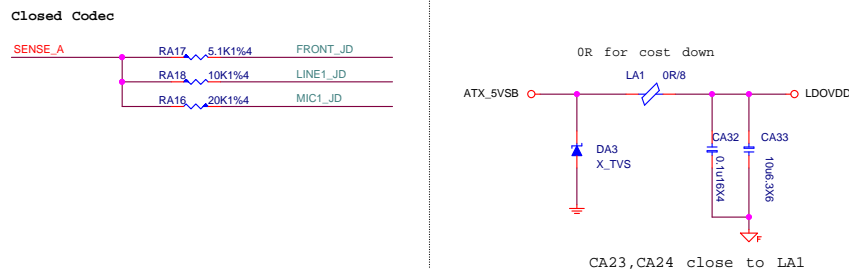
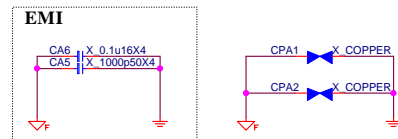
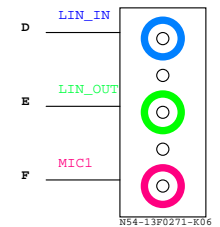
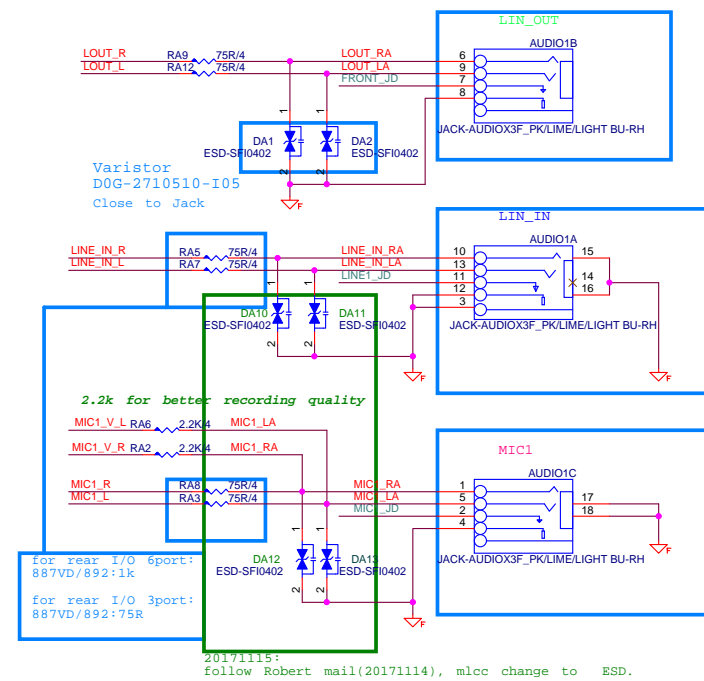
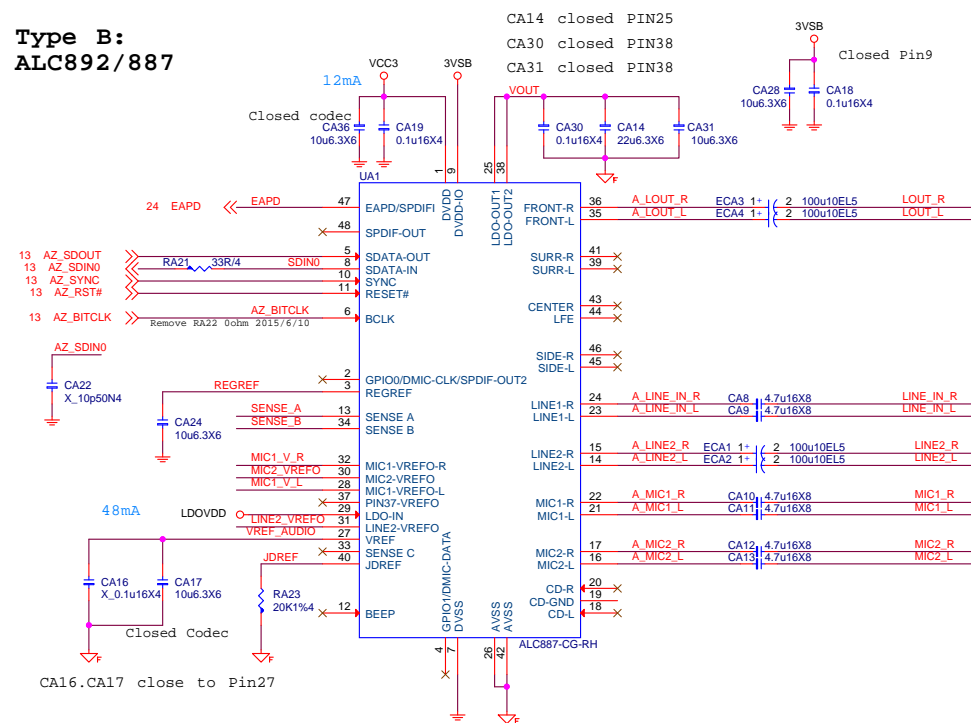
2. GPIO 驱动 B5 切换 PW M/DC M O D E



2. GPIO 由 B5 切換 PW M/DC M O D E



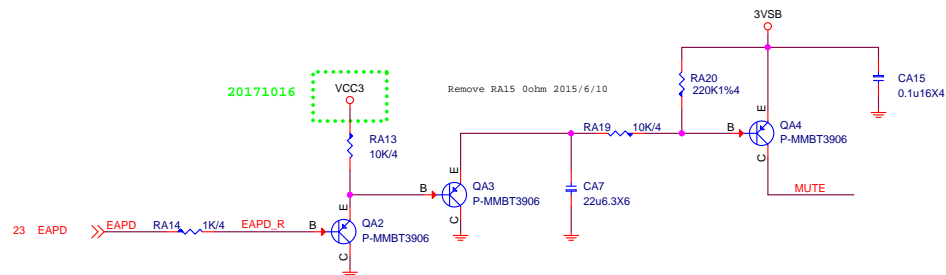
Type B:
ALC892/887



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De-pop circuit for Rear Line out & Front Headphone out)

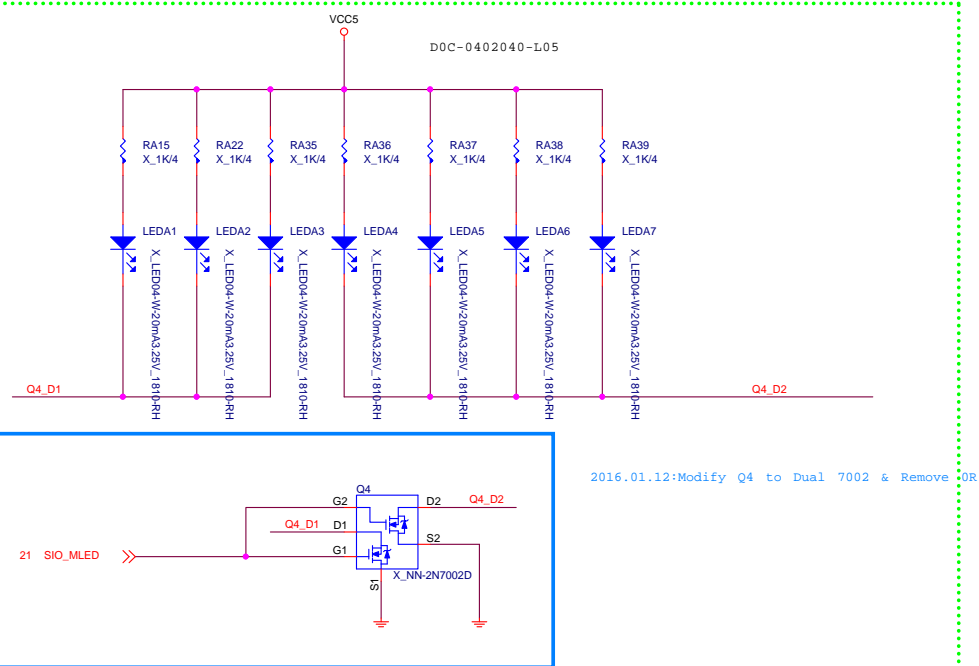
2014/02/13: stuff de-pop circuit of Line out & HP out.



Analog



```
20170915:      :
Cancel Audio LED
```



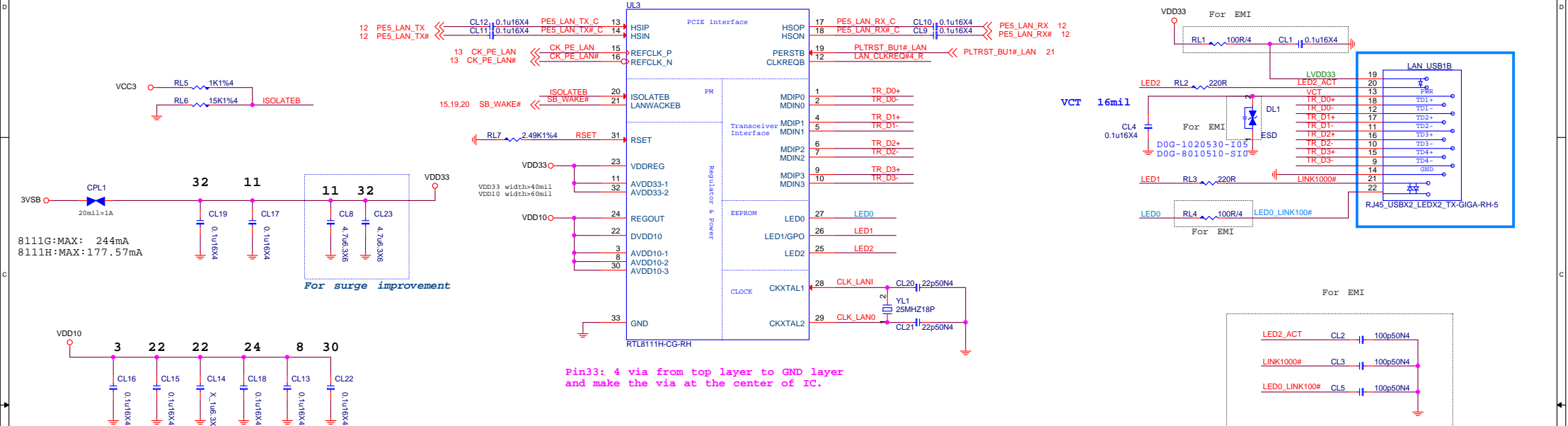
MICRO-STAR INT'L CO.,LTD			
MS-7C09			
Size Custom	Document Description AUDIO - depop circuit		Rev 1.2
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RTL8111G/RTL8111H Giga LAN

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

LAN_CLKREQ#4_R R1014 >>> LAN_CLKREQ#4 13

LAN Connector



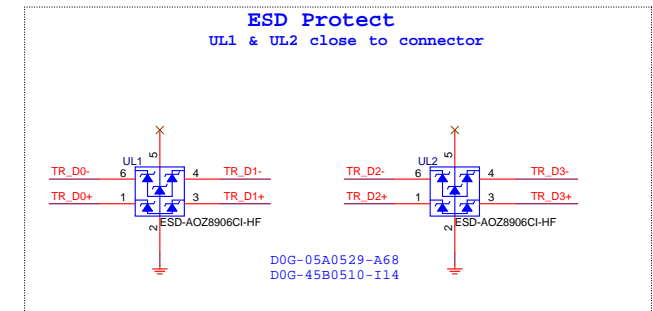
Vinafix.com

8111G POWER Consumption

	3.3V @ mA	mW
10 M Idle/TxRx	17.15/116.7	56.6/385.1
100 M Idle/TxRx	71.45/129.5	235.8/427.4
Giga Idle/TxRx	179.1/243.9	591/804.9
ALDPS	6.41	21.15

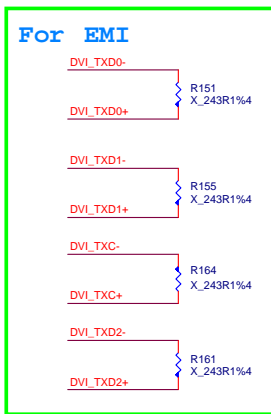
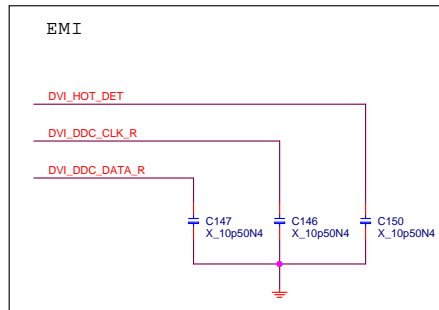
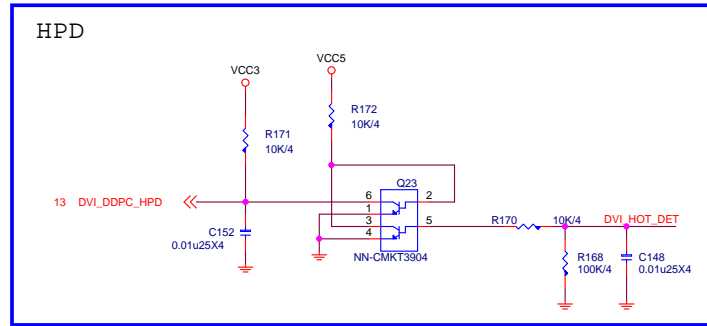
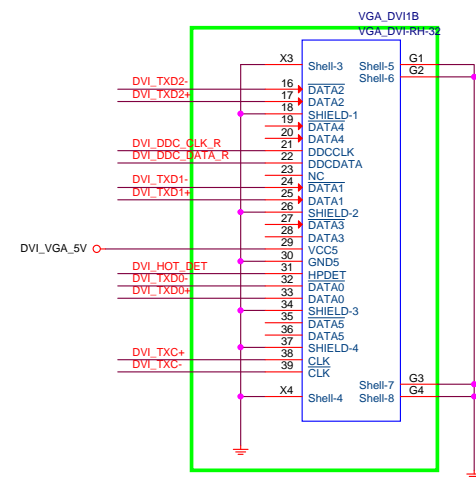
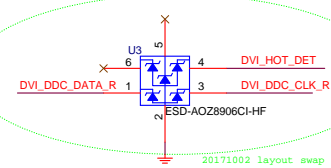
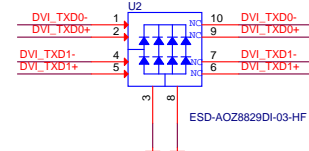
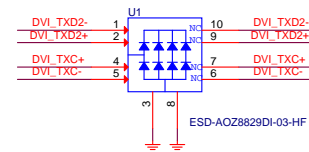
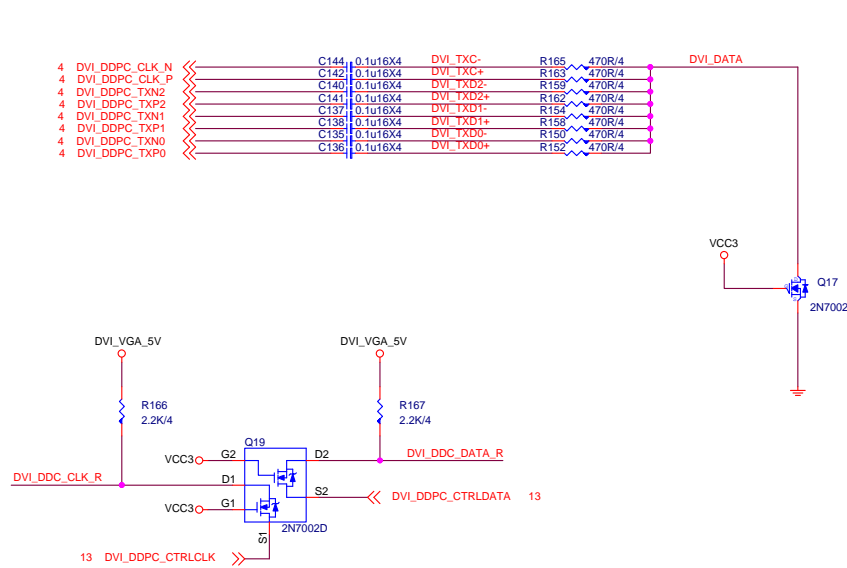
8111H POWER Consumption

	3.3V @ mA	mW
10 M Idle/TxRx	9.9/84.69	32.67/279.48
100 M Idle/TxRx	48.11/92.44	158.76/305.05
Giga Idle/TxRx	124.5/177.57	410.85/585.98
ALDPS	5.50	18.15

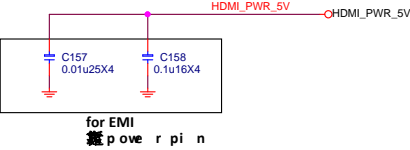
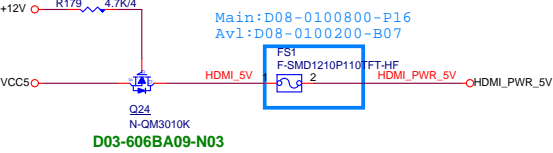
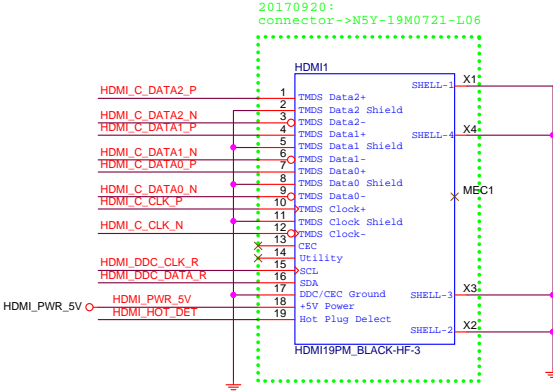
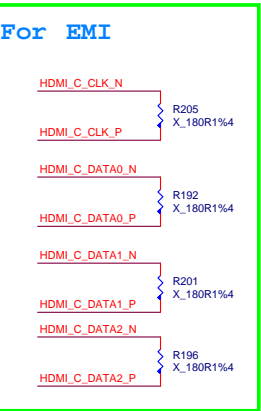
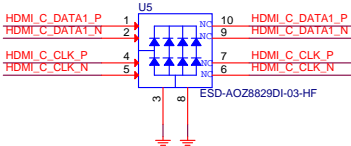
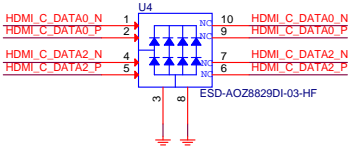
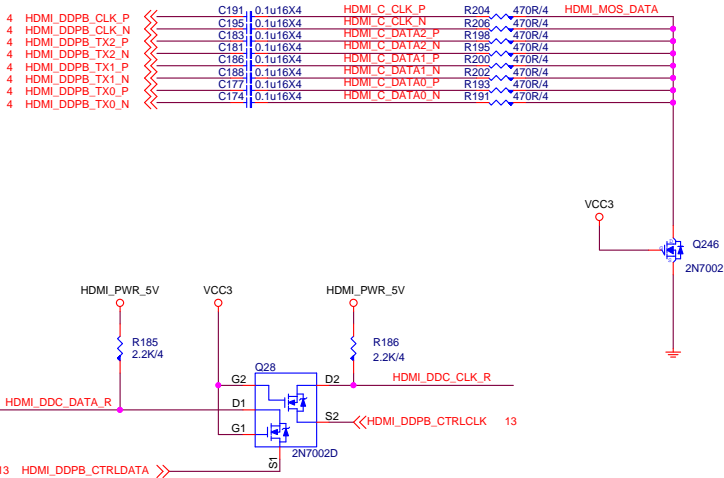


DVI level shifter

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



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

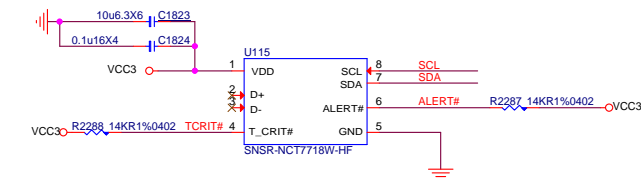


MSI			
MICRO-STAR INT'L CO.,LTD			
MS-7C09			
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NCT7718W

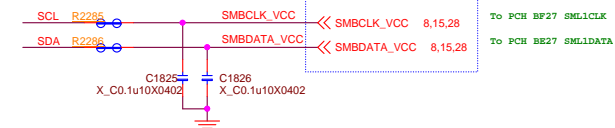
20171006
follow ** 300 update mail(2017100), Add
for monitored system thermal monitor.

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



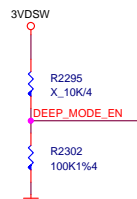
NCT7718W SM Bus address is 98h (1001100xb)
Default: ALERT# Output Comparator Mode

Please Make Sure Your SM Bus is Pull-Up to VCC3



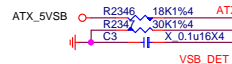
To PCH BF27 SML1CLK
To PCH BE27 SML1DATA

	DEEP_MODE_EN
DEEP_MODE	1
S5_MODE	0



34 ATX5VSB_DET >>>

ATX5VSB_DET:
high:2.7v/low:2.55v



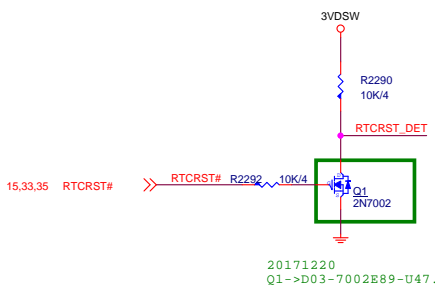
21 DEEP_MODE_EN >>> DEEP_MODE_EN

RTCRST_DET >>> RTCRST

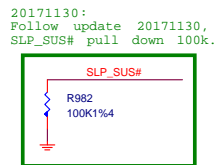
15,21 SLP_SUS# >>> SLP_SUS#

5,36 VRM_PGD_R >>> VRM_PGD

36,43 VRM_EN >>> VRM_EN

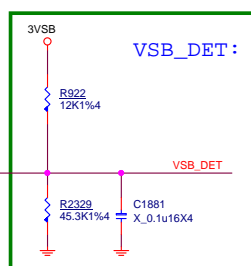


20171220
Q1->D03-7002E89-U47.



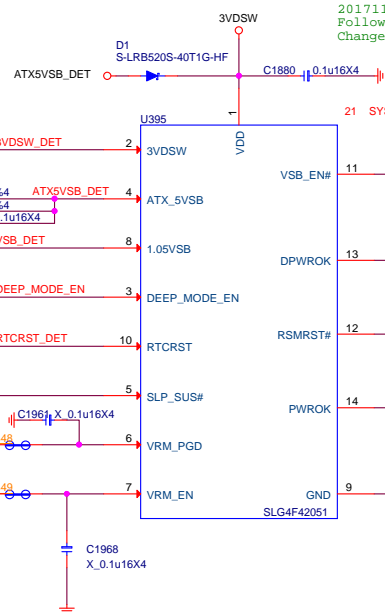
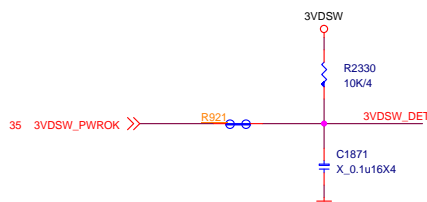
20171130:
Follow update 20171130,
SLP_SUS# pull down 100k.

20171130:
Follow update 20171130,
R922 -> 12K/ R2329 -> 45.3K



VSB_DET:

35 3VSB_PWRGD >>> R917
15,42 PCH_1VSB_PGD >>> R918



20171130:
Follow update 20171130,
Change U395 PN to OT7-7B17002-SF9.

21 SYS3VSB_OFF >>> R2332 >>> VSB_ENABLE# 34,35,42

VSB_EN# >>> R2331 >>> 10K/4

DPWROK >>> DPWROK_SLG 15

RSMRST# >>> RSMRST#_SLG 15

PWROK >>> PWROK_SLG >>> R2344 >>> R2342 >>> 249R1%4 >>> R2343 >>> 249R1%4 >>> R2344 >>> 6.04K1%4 >>> R2345 >>> 2.8K1%4 >>> 1.01661V

3.3V

PCH_PWROK 5,15

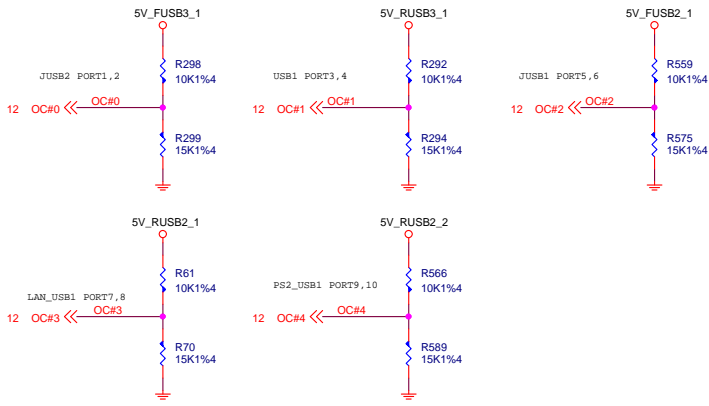
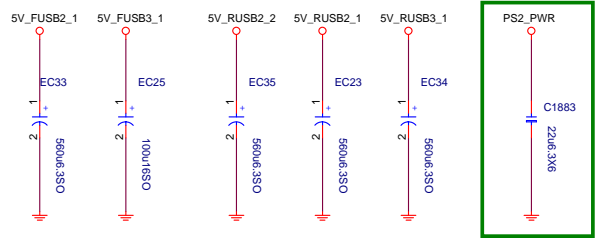
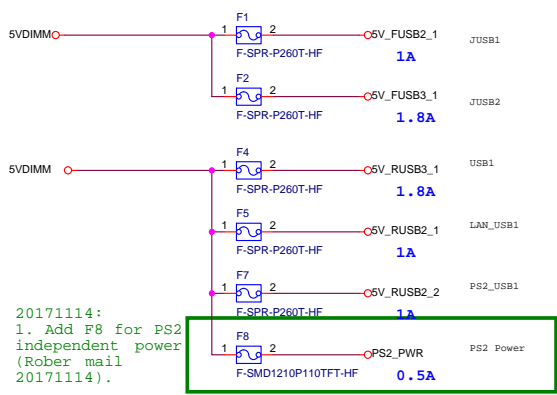
VCCST_PWRGD 5



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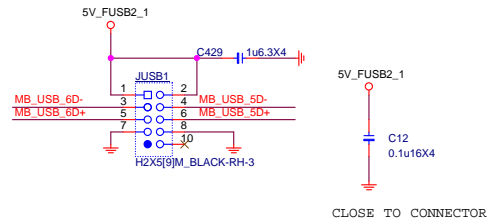
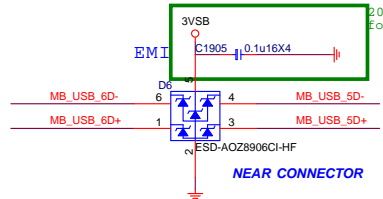
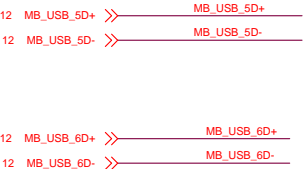
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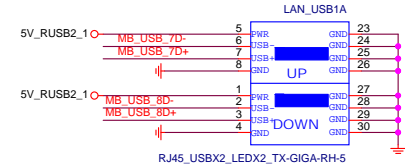
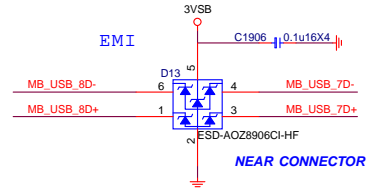
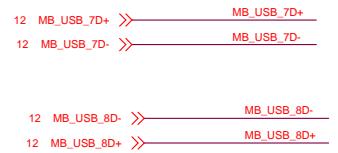
20171128:
Add PS2_PWR cap C1883.

USB CONN	USB POWER	PCB PORT	OC# SIGNAL
JUSB2	5V_FUSB3_1	Port1,2	OC#0
USB1	5V_RUSB3_1	Port3,4	OC#1
JUSB1	5V_FUSB2_1	Port5,6	OC#2
LAN_USB1	5V_RUSB2_1	Port7,14	OC#3
PS2_USB1	5V_RUSB2_2	Port8,9	OC#4

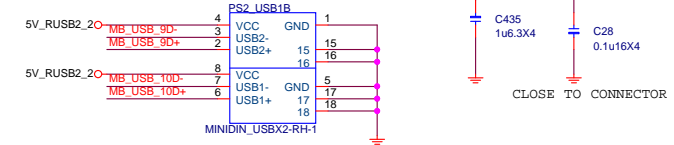
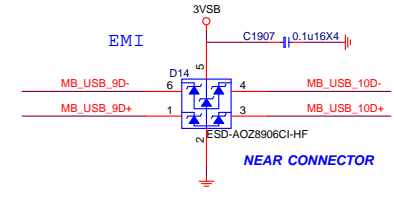
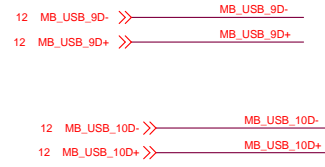
JUSB2 PORT 5,6




LAN_USB1 PORT 7, 8



PS2_USB1 PORT 8, 9





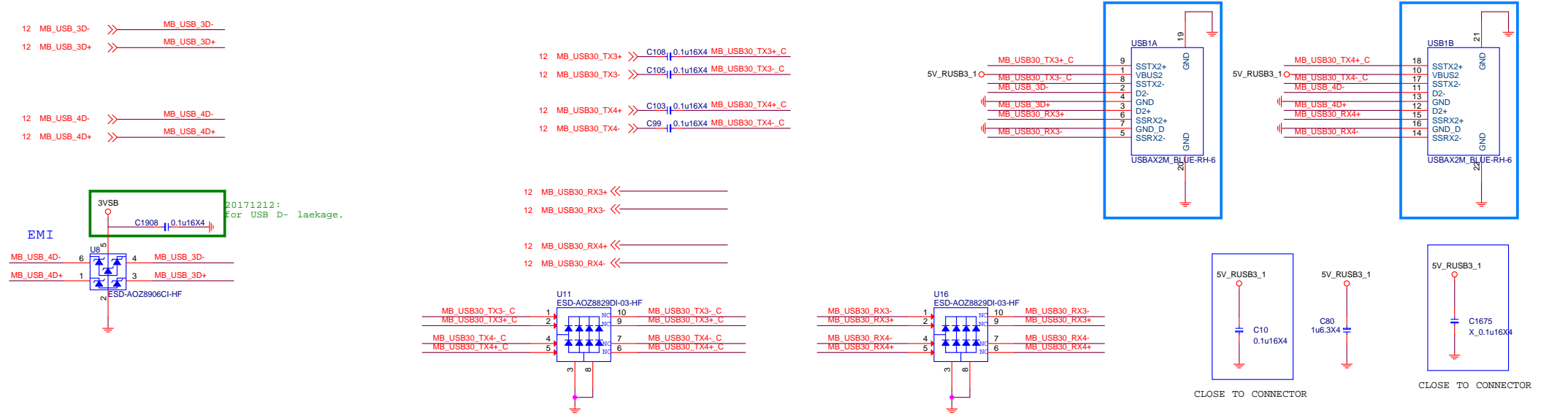
MICRO-STAR INT'L CO.,LTD

MS-7C09

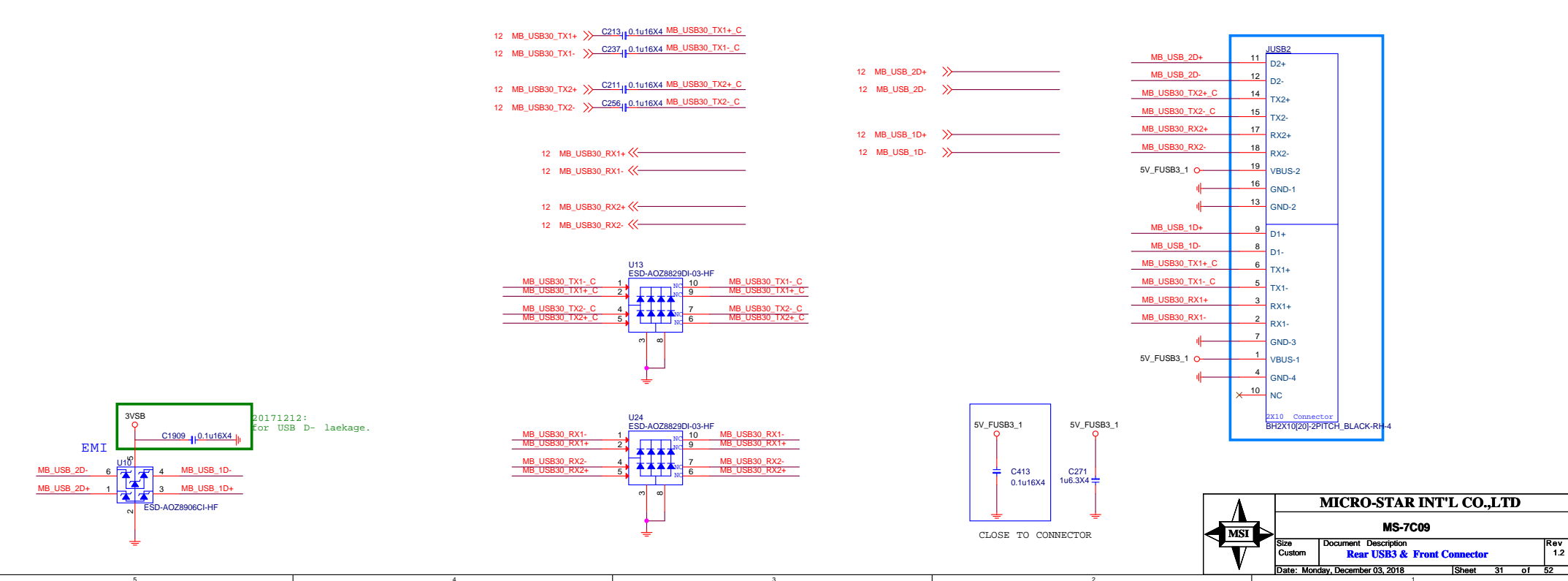
Size Custom Document Description USB2.0 Connector Rev 1.2

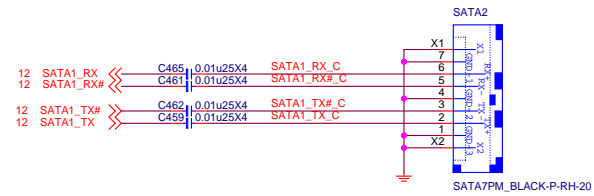
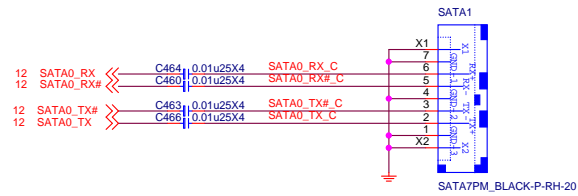
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Rear USB1 port 9,10

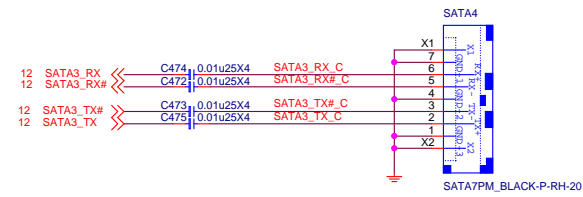
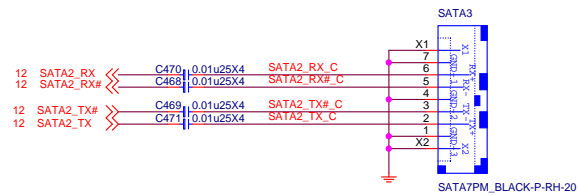


Front JUSB3 port 1,2

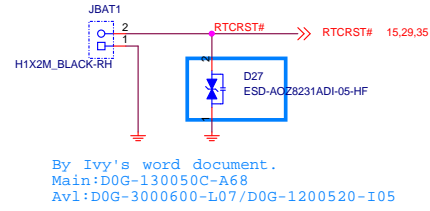
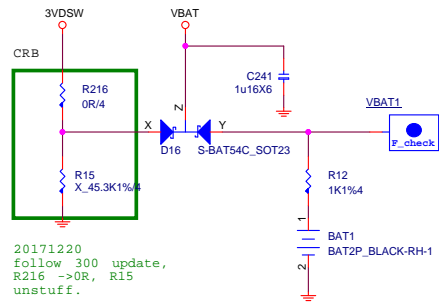


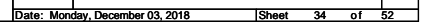


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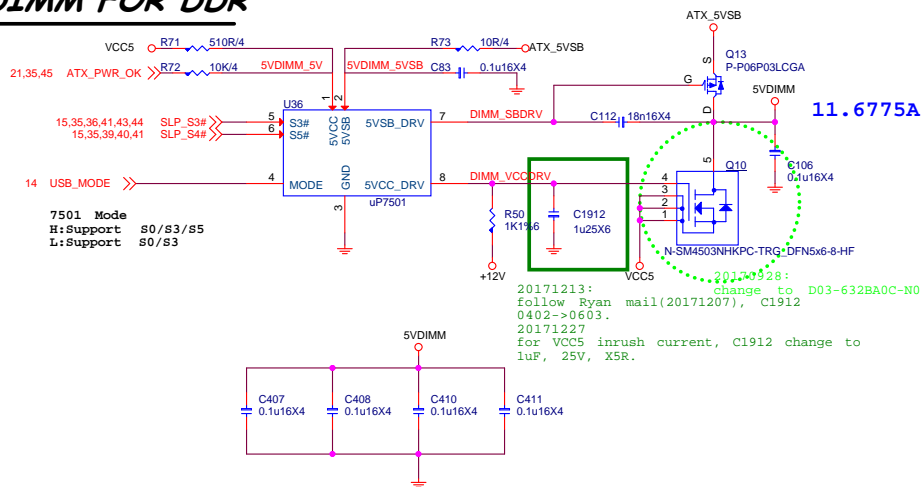
VBAT



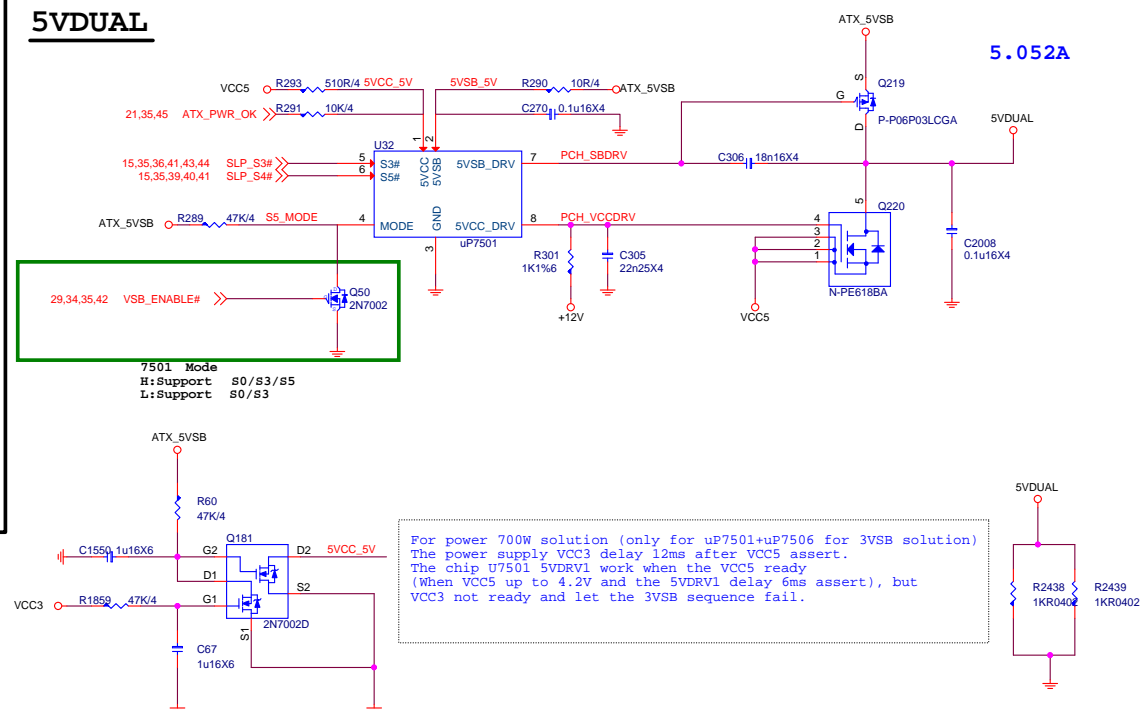


5VDIMM FOR DDR

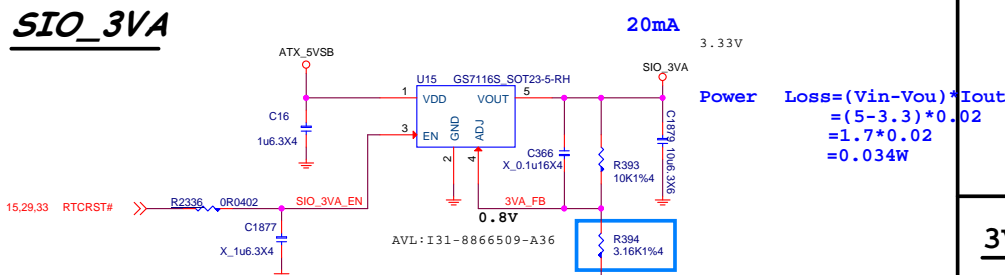
(3A for DDR,6.6A for USB)



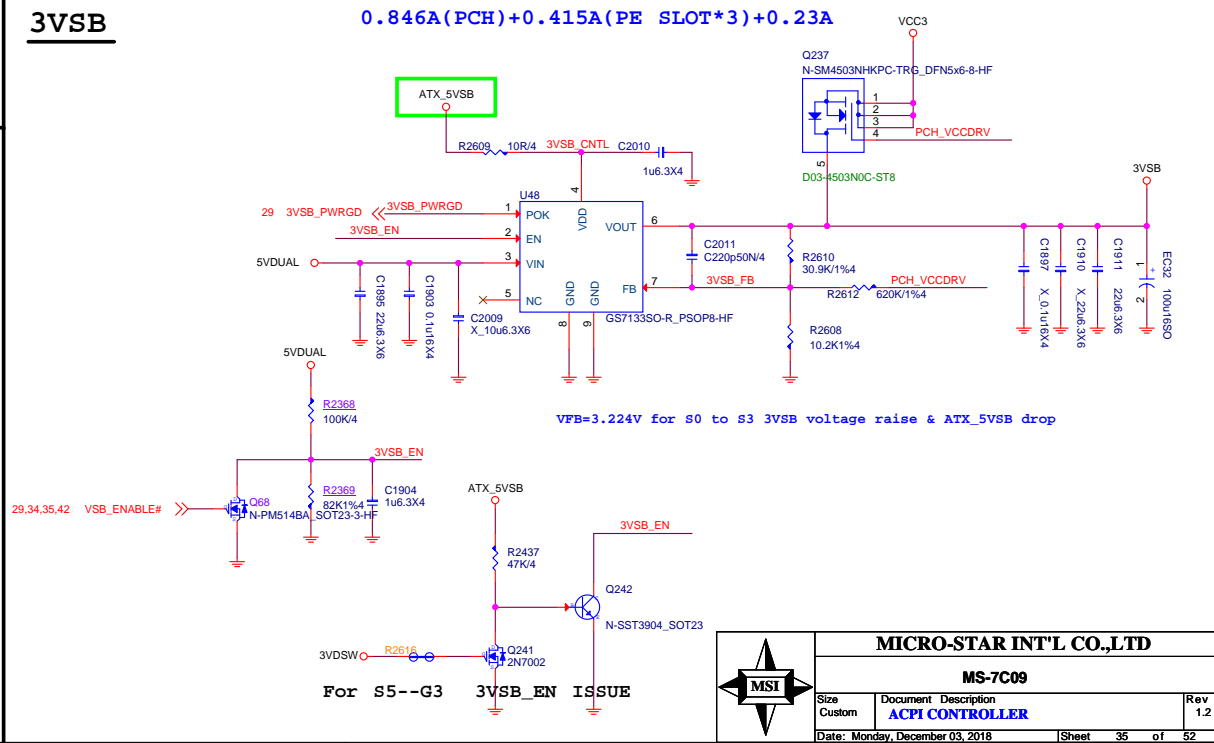
5VDUAL



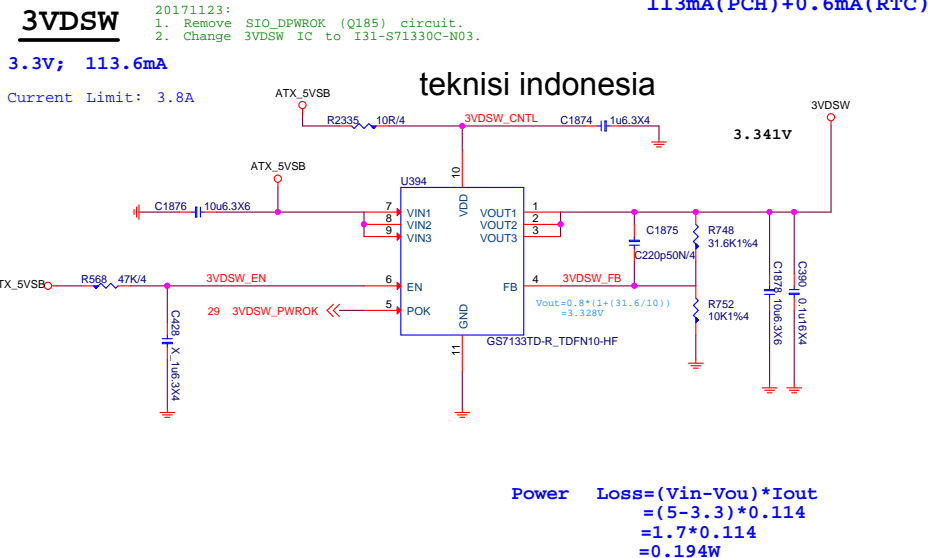
SIO_3VA

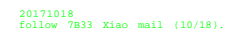
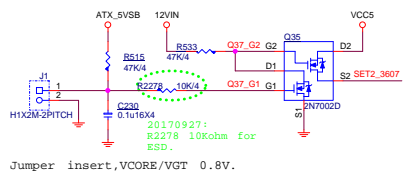
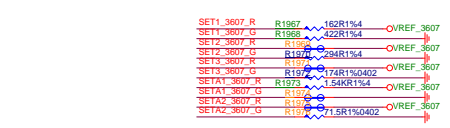
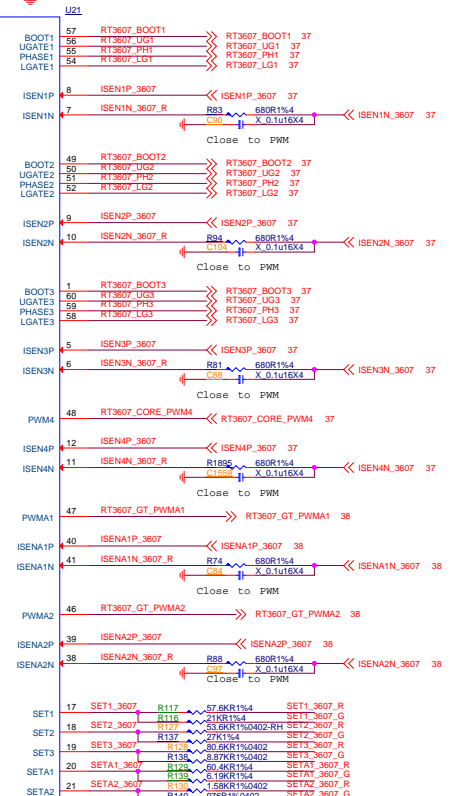
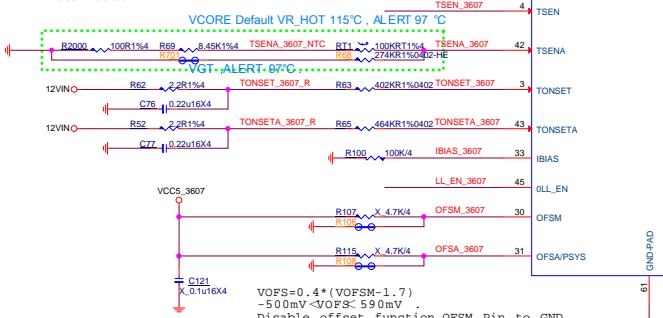
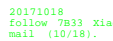
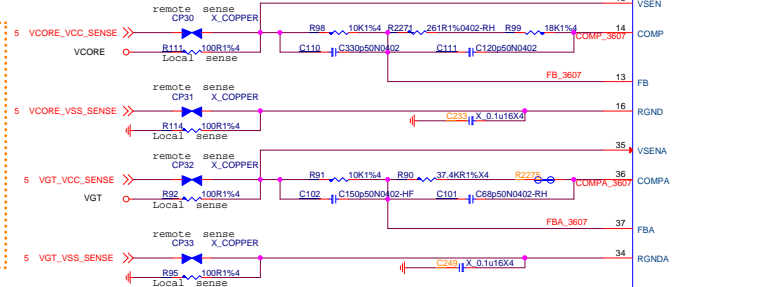
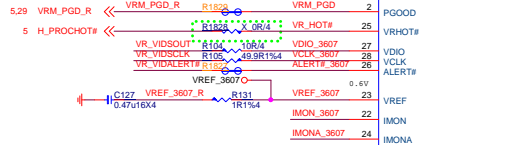
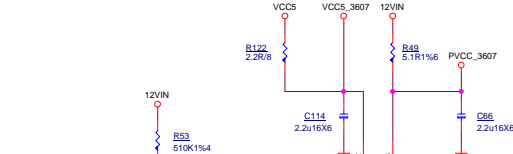


3VSB



3VDSW





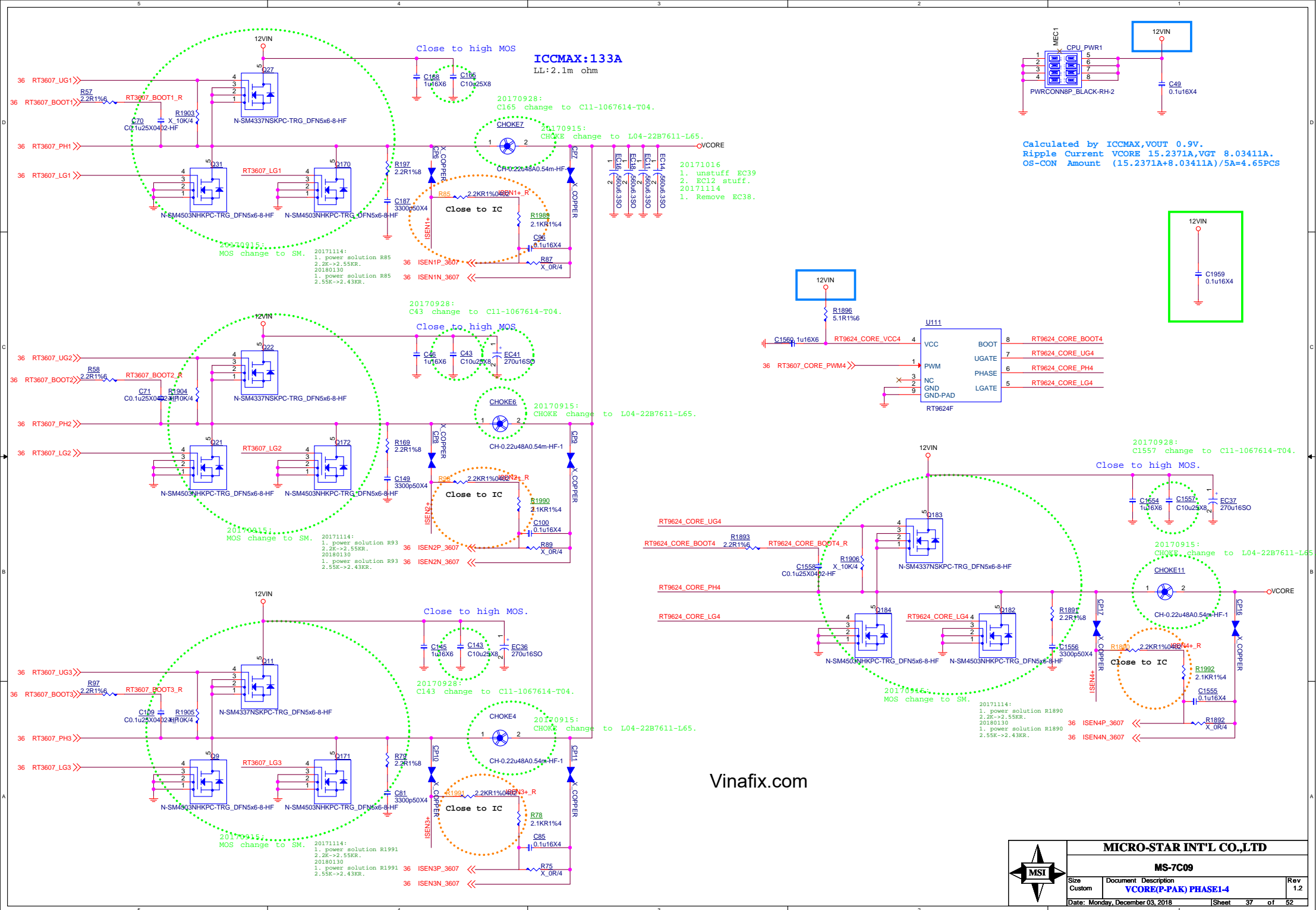
GPP_D16	R1	R2	Thermal Alert#	VR_HOT#	Thermal Alert#/VR_HOT#
GPI(0) Default	274.32K	8.55K	9 7 ℃	1 1 5 ℃	84.35%
GPI(1)	112.45K	11.32K	1 0 6 ℃	1 1 5 ℃	92.17%

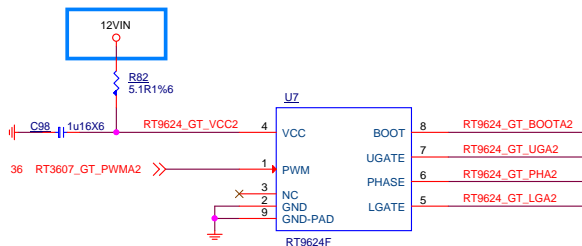


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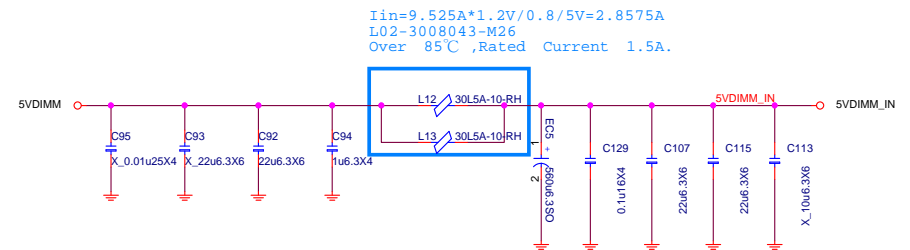
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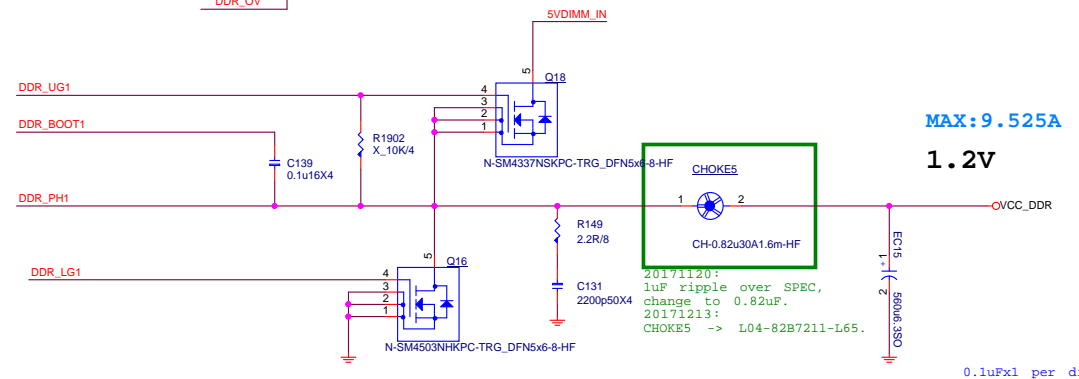
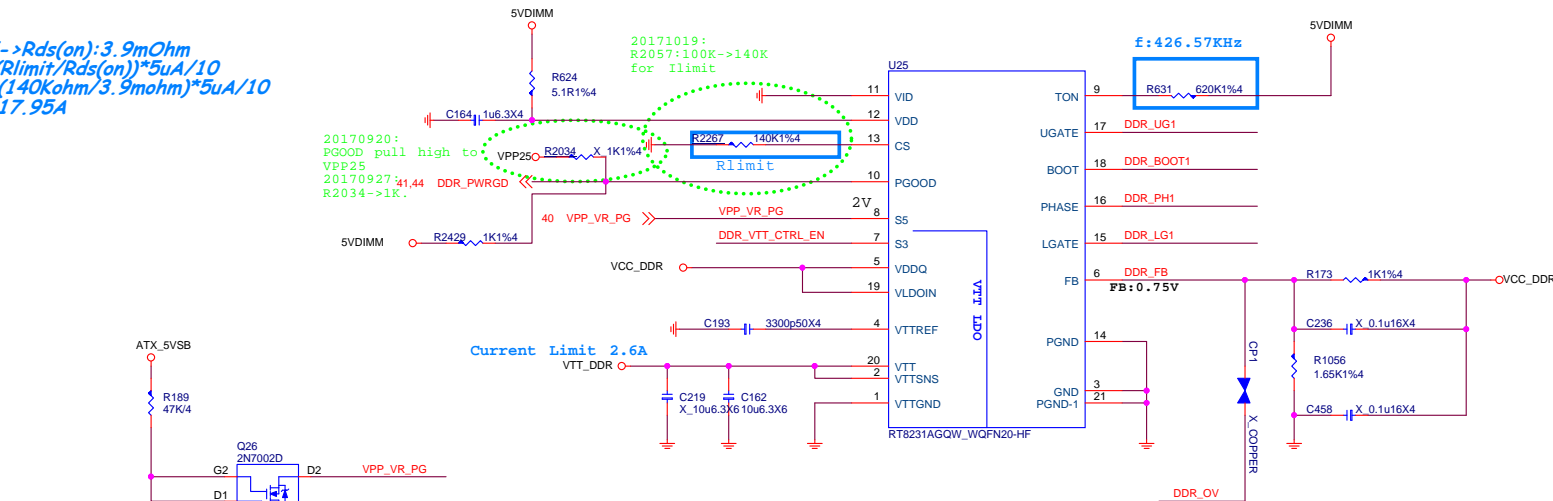


$$\begin{aligned} V_{gs} &= 5V \rightarrow R_{ds(on)}: 3.9m\Omega \\ I_{limit} &= (R_{limit}/R_{ds(on)}) * 5\mu A / 10 \\ &= (140K\Omega / 3.9m\Omega) * 5\mu A / 10 \\ &= 17.95A \end{aligned}$$

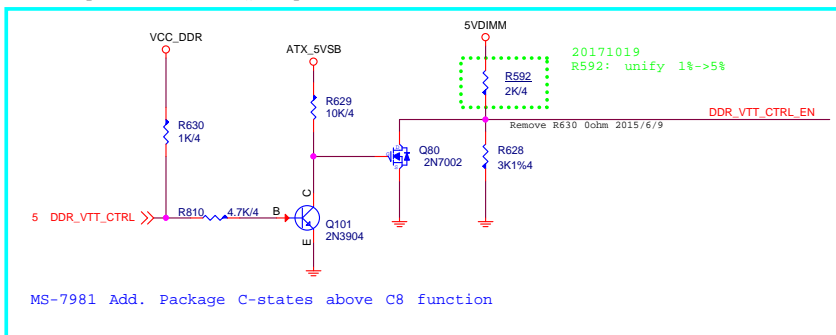
VID	Reference Voltage (V)
H	0.675
L	0.75



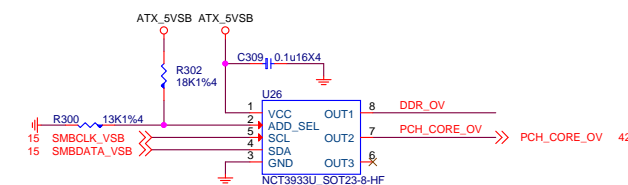
```
Irms = Iout * SQRT((Vout/Vin) * (1-(Vout/Vin)))
      = 9.525 * 0.427
      = 4.06797A
```



VPP ramp down after VDDQ ramp down



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



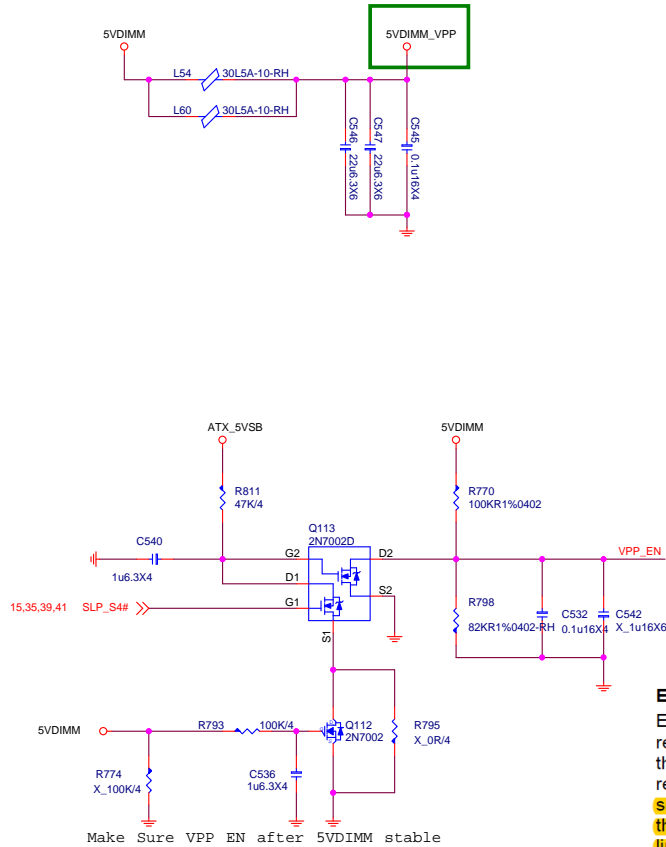
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2DIMM :1.12A FOR
DDR VPP2.5V

VPP25 Power
2.5V; 2A



Enable (EN) Control

EN is a digital control pin that turns the regulator on and off. Drive EN high to turn on the regulator. Drive EN low to turn off the regulator. EN is clamped internally using a 2.8V series Zener diode (see Figure 2). Connecting the EN input through a pull-up resistor to V_{IN} limits the EN input current below 40µA to prevent damage to the Zener diode. For example, when connecting a 604kΩ pull-up resistor to 12V V_{IN} , $I_{zener} = (12V - 2.8V) / (604kΩ + 35kΩ) = 1μA$.

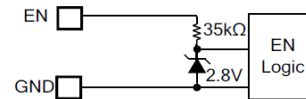
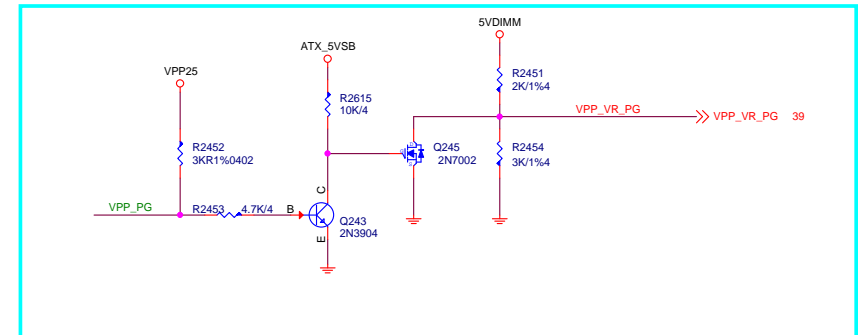
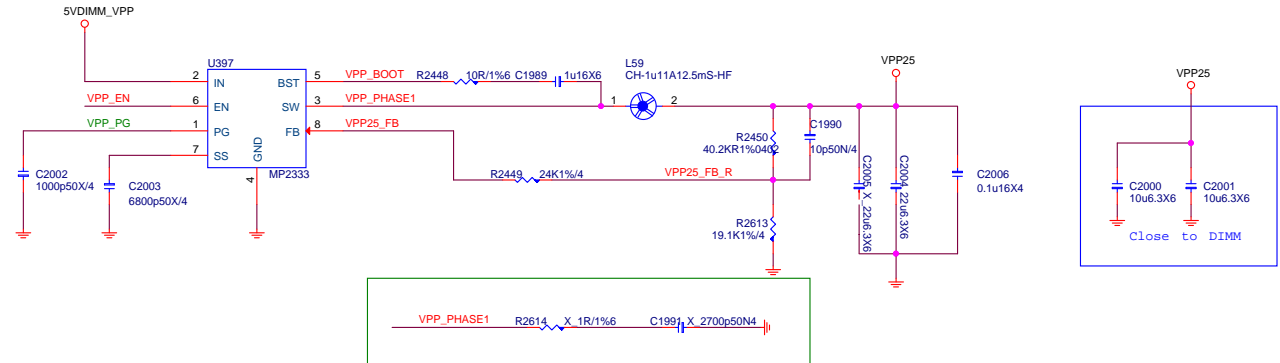


Figure 2: Zener Diode between EN and GND



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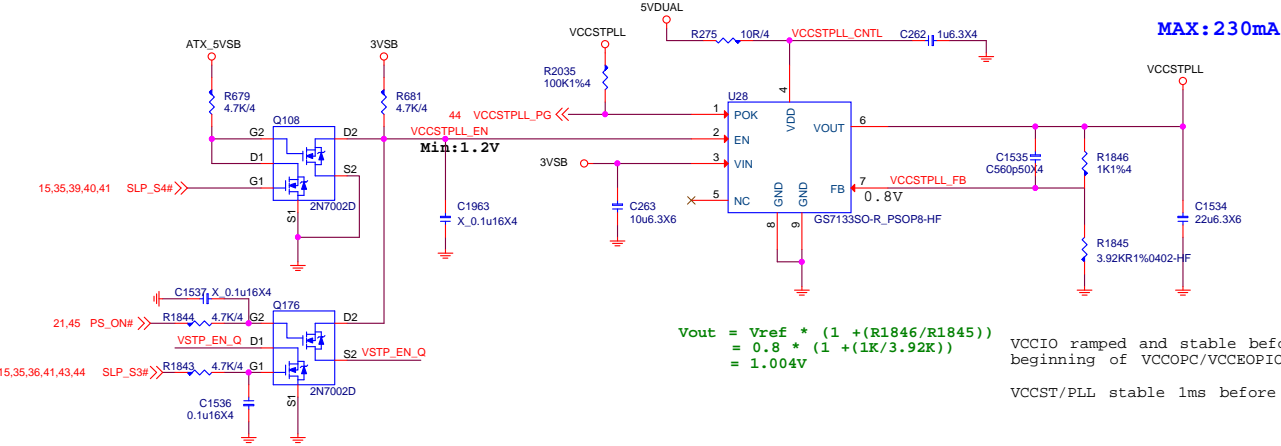
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VCCSTPLL

1.0V; 230mA



Power Loss=(Vin-Vou)*Iout
=(3.3-1.0)*0.23
=2.3*0.23
=0.529W

Vout = Vref * (1 +(R1846/R1845))
= 0.8 * (1 +(1K/3.92K))
= 1.004V

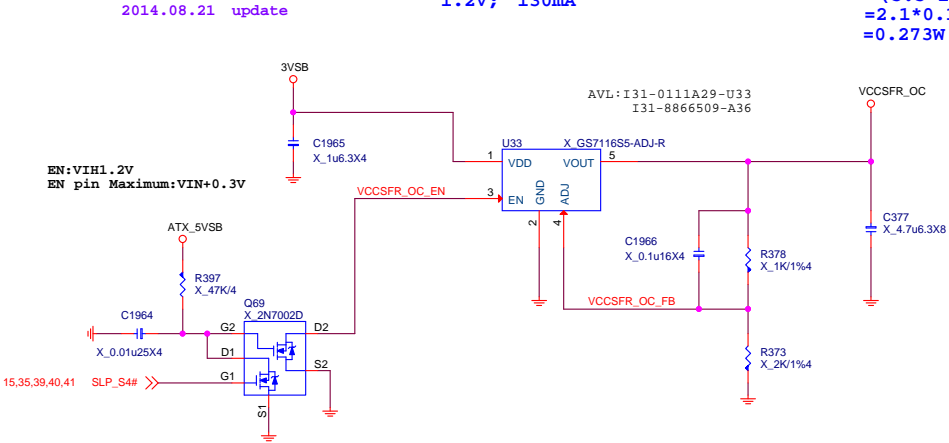
VCCIO ramped and stable before
beginning of VCCOPC/VCCOPIO ramp

VCCST/PLL stable 1ms before PROCPWRGD

VCCPLL_OC

1.2V; 130mA

Power Loss=(Vin-Vou)*Iout
=(3.3-1.2)*0.13
=2.1*0.13
=0.273W

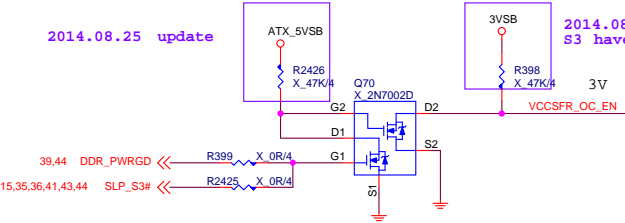


2014.08.21 update

EN:VIH1.2V
EN pin Maximum:VIN+0.3V

2014.08.25 update

2014.08.25 update
S3 have power



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PCH_1VSB

1.05V; 10.285A

Vinafix.com

Rocpset:5.6K
 OCP(min)=Rocpset*Iocset/Rdson(Low side)
 =6.2K*10uA/5.1mohm
 =12.16A

OCP(max)=Rocpset*Iocset/Rdson(Low side)
 =6.2K*10uA/3.9mohm
 =15.90A

Rdson(low)5V
 D03-4503N0C-ST8
 Max:5.1mohm Min:3.9mohm

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

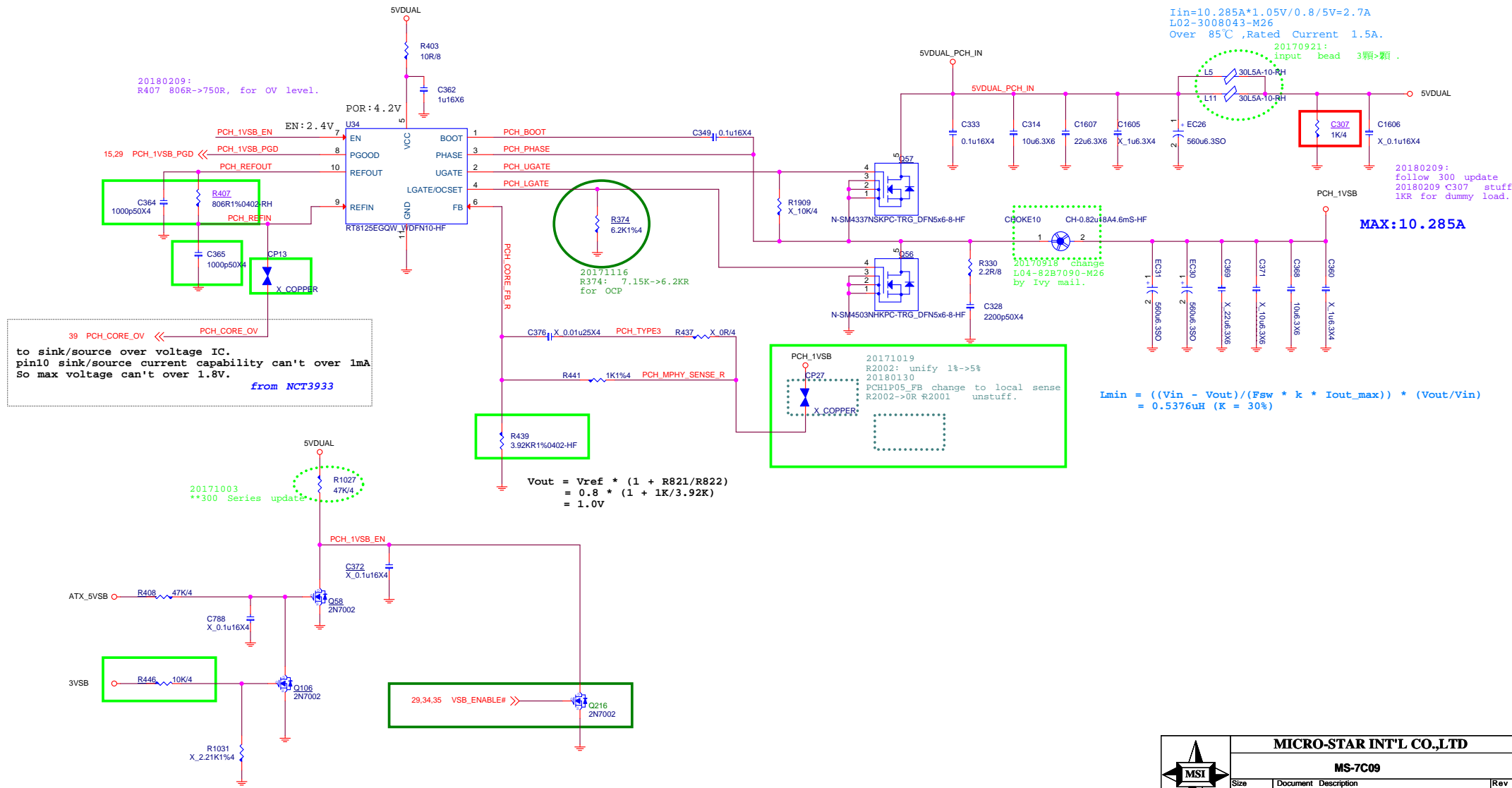
$$= 16.685 * 0.407$$

$$= 6.79A$$

$$I_{in} = 10.285A * 1.05V / 0.8 / 5V = 2.7A$$

L02-3008043-M26
 Over 85°C, Rated Current 1.5A.

20170921:
 input bead 3顆>類.



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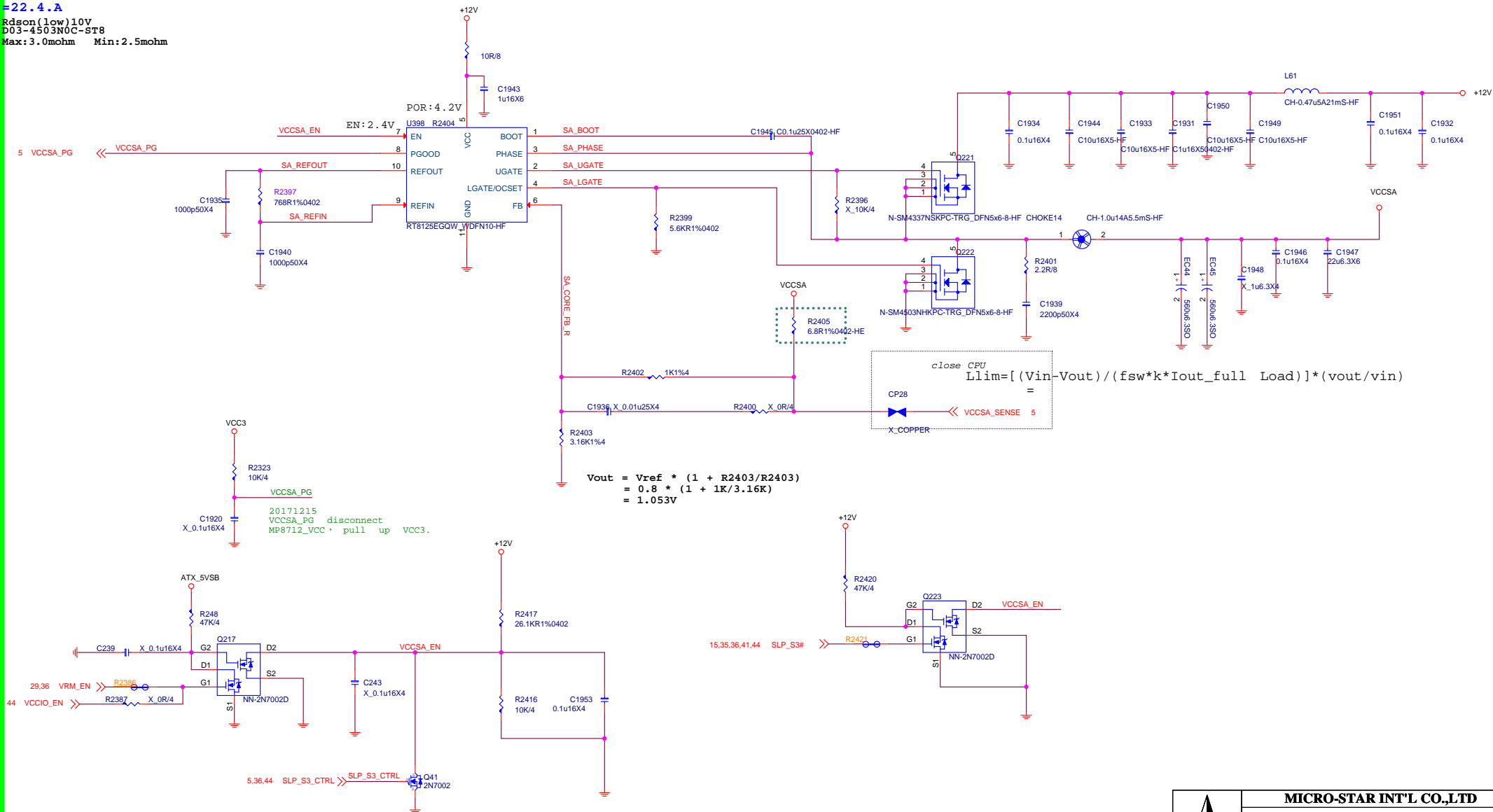
Size	Document	Description	Rev
Custom		PCH Core power	1.2
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SA Power:1.05V,11.1A

```
Irms = Iout/N * SQRT[ND*(1-DN)]
      =12.3 *SQRT[ 0.0875*0.9125]
      = 3.47A <5000ma
```

$$\begin{aligned} \text{Rocpset} &= 5.6\text{K} \\ \text{OCP(min)} &= \text{Rocset} * \text{Iocset} / \text{Rdson(Low side)} \\ &= 5.6\text{K} * 10\text{uA} / 3.0\text{mohm} \\ &= 18.67\text{A} \end{aligned}$$
$$\begin{aligned} \text{OCP(max)} &= \text{Rocset} * \text{Iocset} / \text{Rdson (Low side)} \\ &= 5.6\text{K} * 10\text{uA} / 2.5\text{mohm} \\ &= 22.4.\text{A} \end{aligned}$$

Rdson(low) 10V
D03-4503N0C-ST8
Max: 3.0mohm Min: 2.5mohm



```
SLP_S3# assertion to VR disabled
max:1us
```



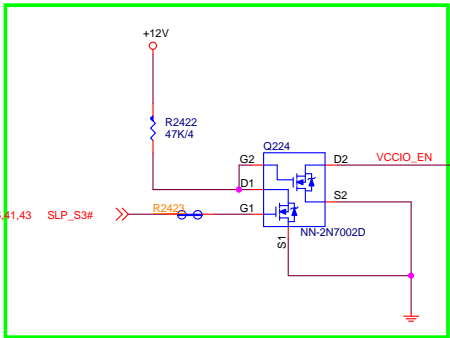
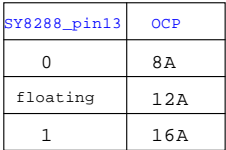
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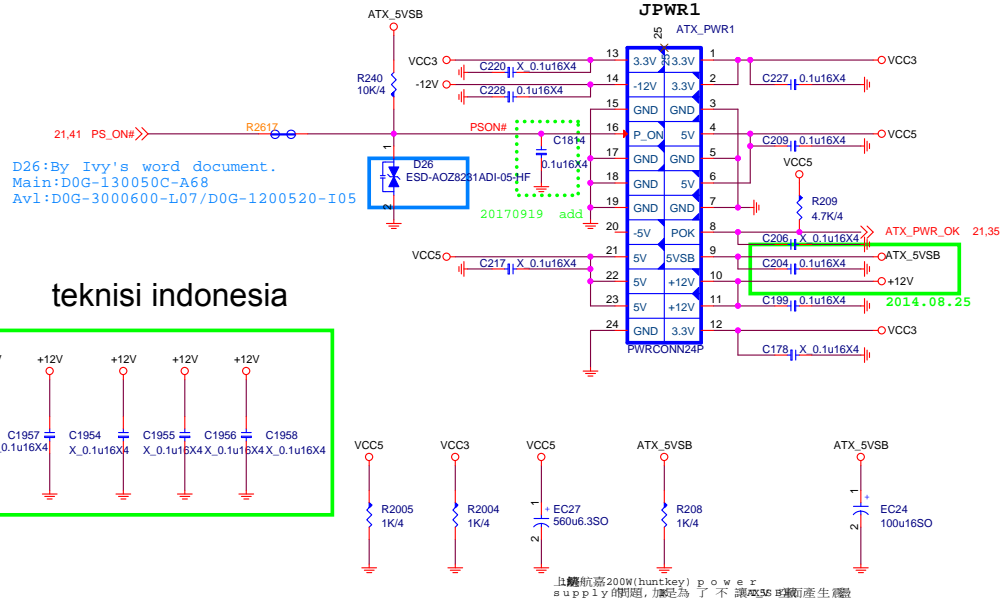
Size	Document Description	Rev
Custom	VCCSA - POWER RT8125E	1.2
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```
20170919
TPS22976 -> SY8288 by Ivy mail (20170918).
```

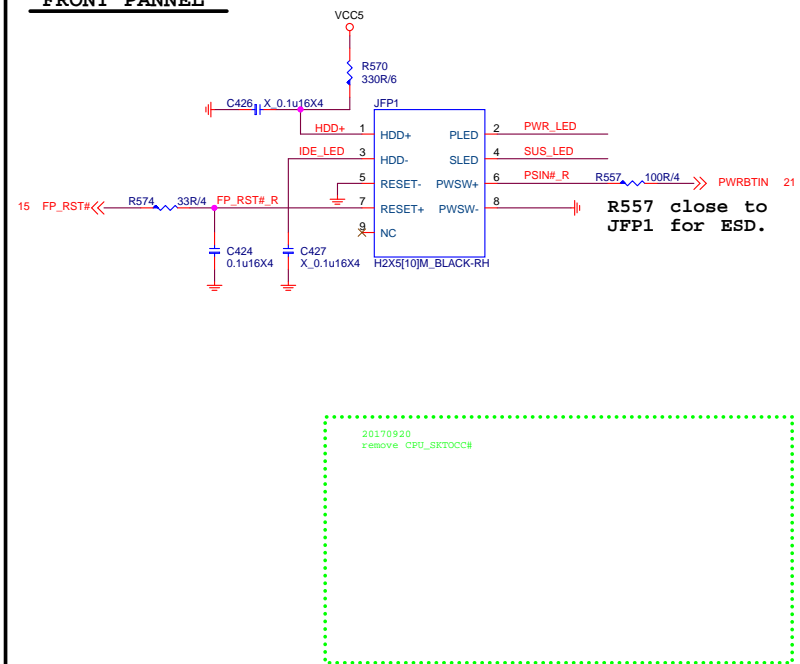
Vinafix.com



ATX POWER CONNECTOR



FRONT PANNEL

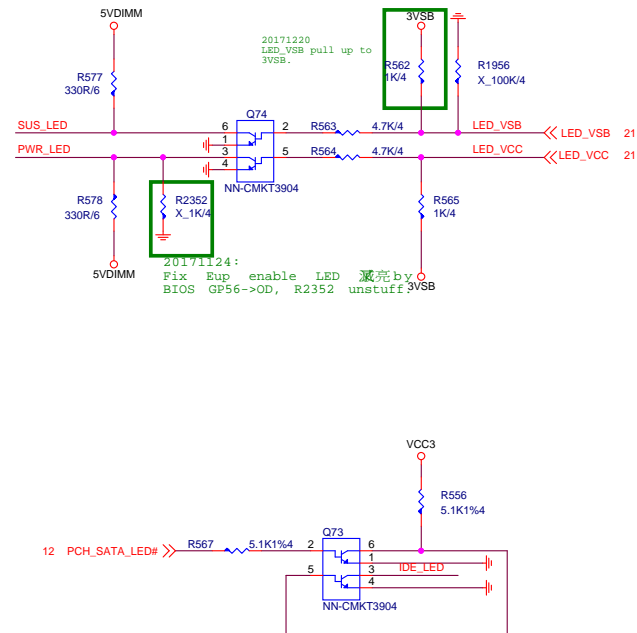


20171114:
1. Remove PS2 independent power
(Rober mail 20171114).

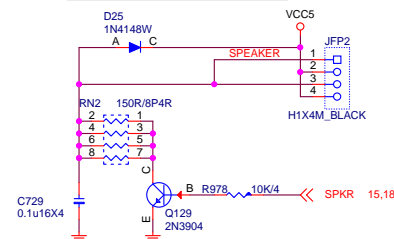
PS2 POWER



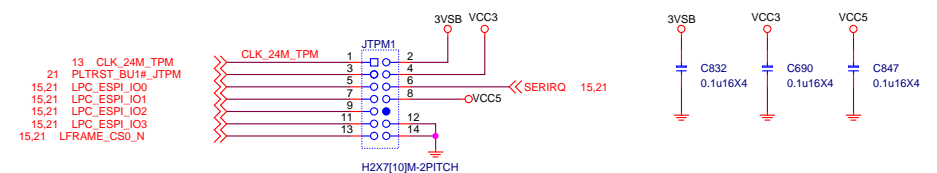
LED



Speaker Pin Header

TPM

Don't colay espi debug.

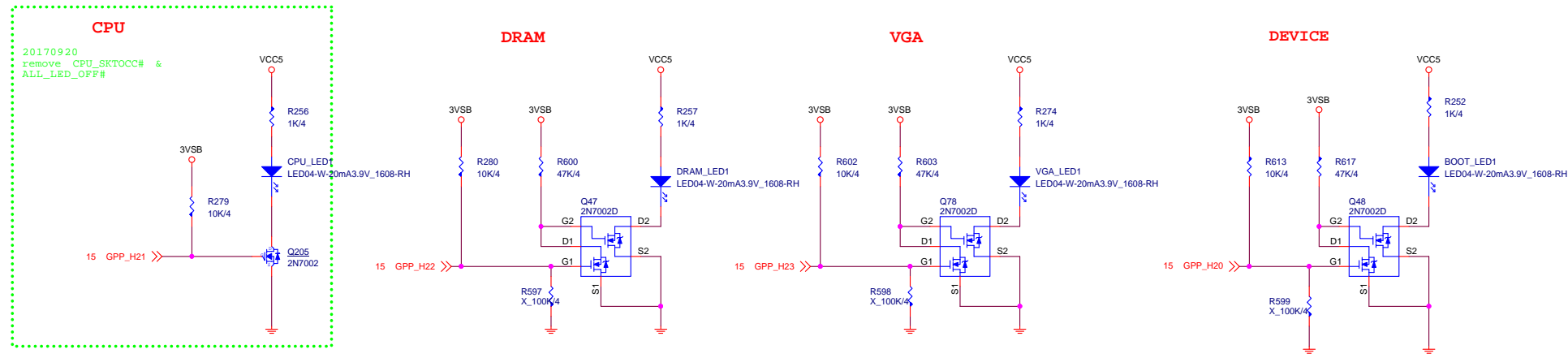


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DEBUG LED




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)

LED
RED:D0C-040P100-H91
AVL:D0C-040S500-E07

WHI:D0C-040T200-H91
AVL:D0C-040S200-E07

- 開機斷電狀態下，3個LED先維持 default 暗開機後
1. 首先進行 CPU check CPU LED 亮，check PASS 後則 CPU LED 滅掉
 2. 接著依序進行 Memory / memory LED 亮 check PASS 後則 memory LED 滅掉
 3. VGA 的 check/VGA LED 亮，check PASS 後則 VGA LED 滅掉
 4. 因此最後正常順利開機後，三個 LED 燈都是滅掉的。(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)

EMI CAP

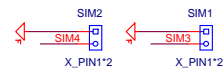


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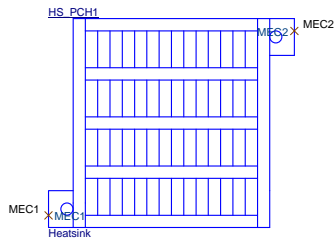
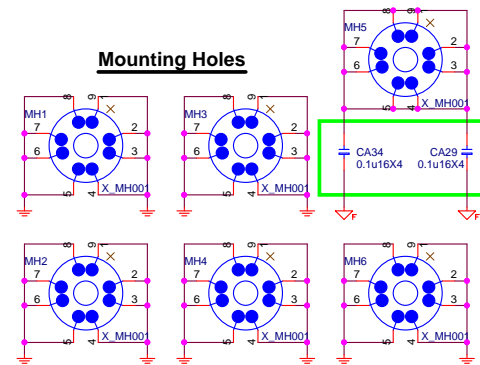
Optical Fiducial Marks-120



Simulation



Mounting Holes



G51-M1SPN22-Q13

