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MS-7C39

mATX
Ver: 1.2

PRO VDH

Coffeelake Platform

CPU: Kabylake S

PCH: B365

SPI ROM : 128 MB

Memory: DDR4 * 4 (Dual Channel)

Power Solution:

CPU : RT3607

VCCSA : OP+MOS

VCCIO : OP+MOS

DDR : RT8125E

PCH : RT8125E

ACPI: GS7133

Onboard Chip:

LAN RTL8111H

Dual Codec:ALC887

SIO:NTC6797/6795D

Expansion Slots:

PCI Express (X16) Slot * 1

PCI Express (X1) Slot * 2

M.2 Slot (Socket 1) * 1

LED

EZ Debug LED

Rear I/O Connectors

PS2

USB2.0x2

USB3.1 Gen1x2

RJ45 + USB3.1 (Type C+ A)

Audio Jack 3 Port

HDMI+(DVI/DVI+VGA)

Internal Connectors

Dual SATA * 1

SINGLE SATA * 4

FUSB3.0 Header * 4

FUSB2.0 Header * 2

Front Audio Header * 1

Front Panel Header * 2

SPI Header * 1

TPM Header * 1

CPU Fan * 1

System Fan * 2

Internal Pin Header

JRGB1

JSPI1


JCI1

JBAT1

JCOM1

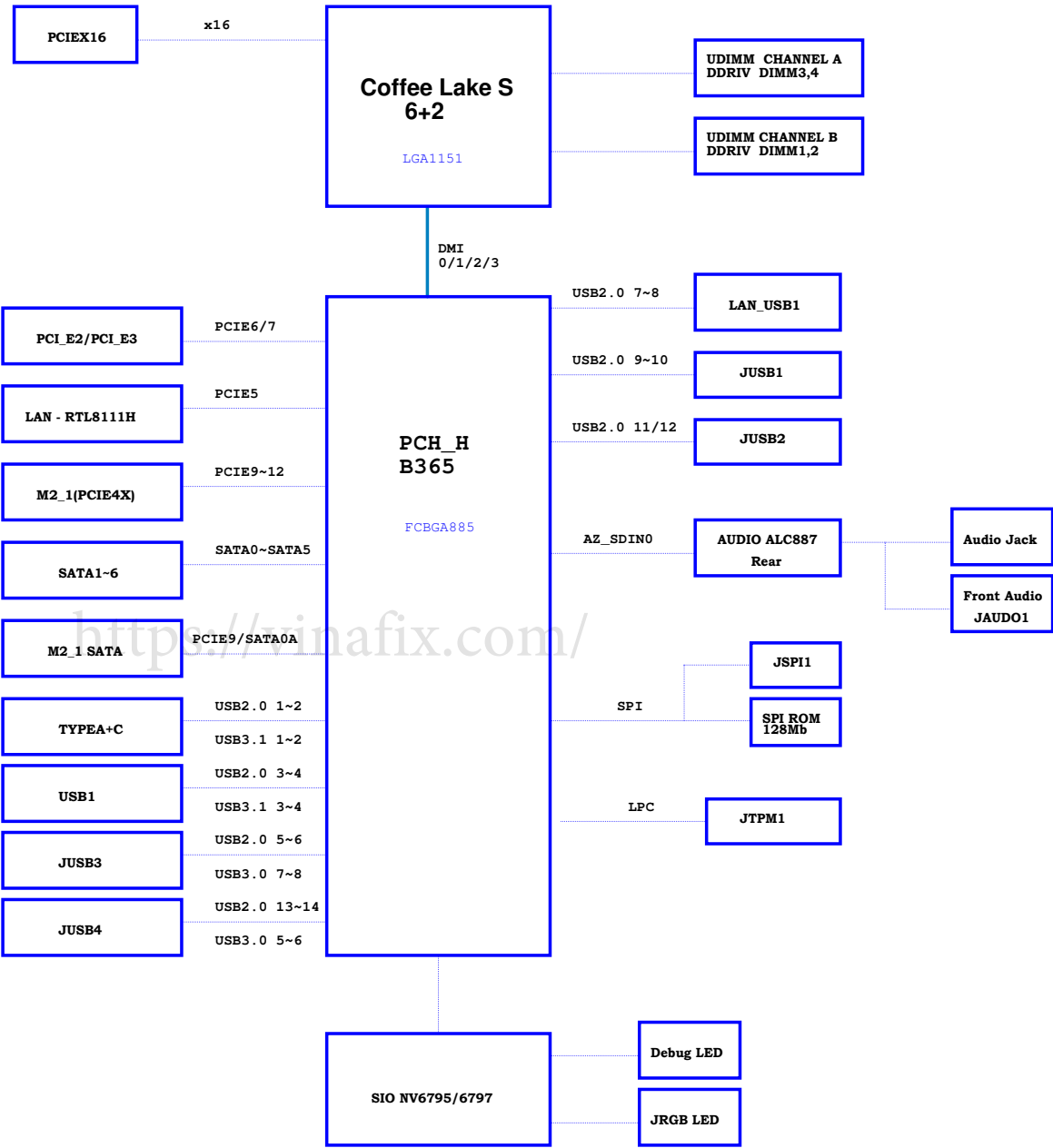
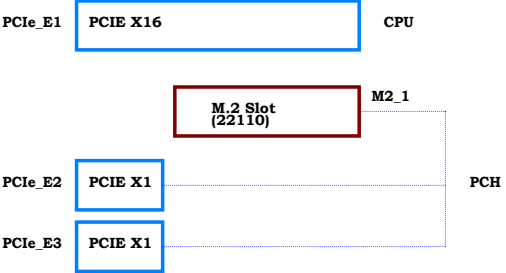
JTPM1

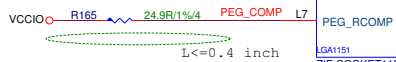
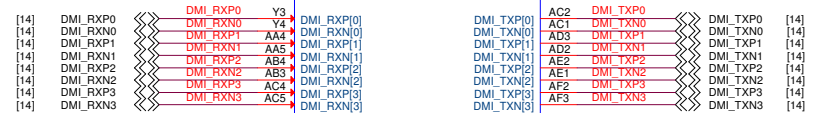
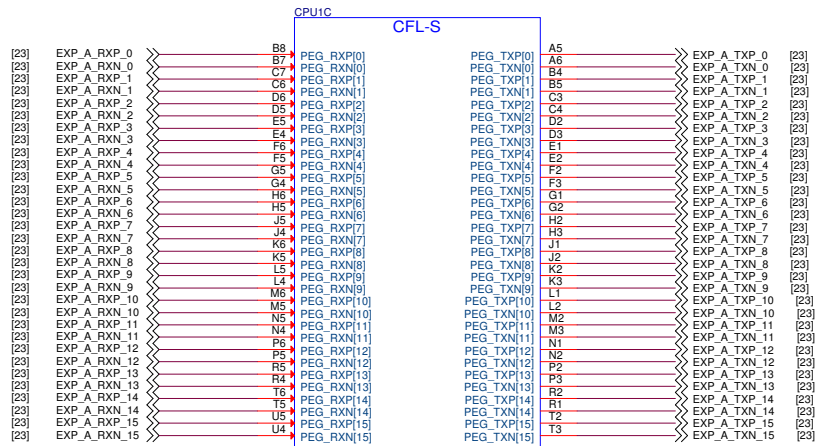
JLPT1

 MICRO-STAR INT'L CO.,LTD.			
Title Cover Sheet			
Size	Document Number	Rev	
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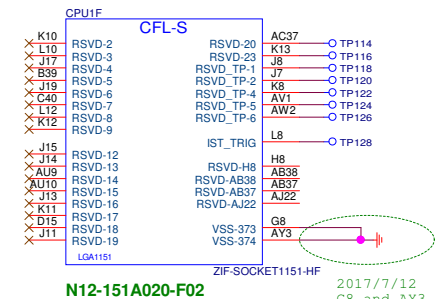
MS-7C39 Block Diagram

Slot Sequence:



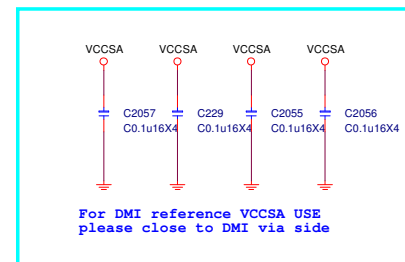


LGA1151
ZIF-SOCKET1151-HF
N12-151A020-F02



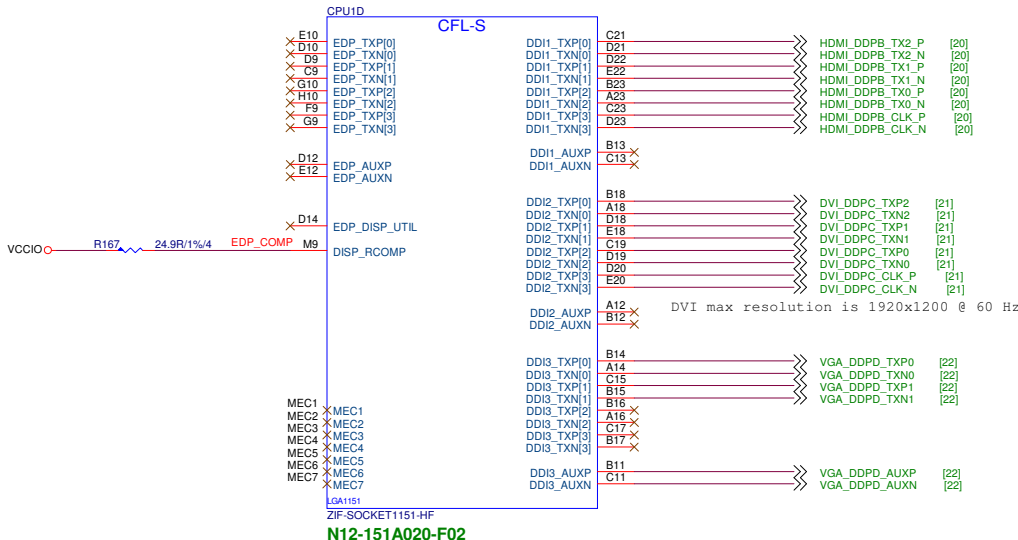
N12-151A020-F02

2017/7/12
G8 and AY3 can connect directly by CRB 1.0

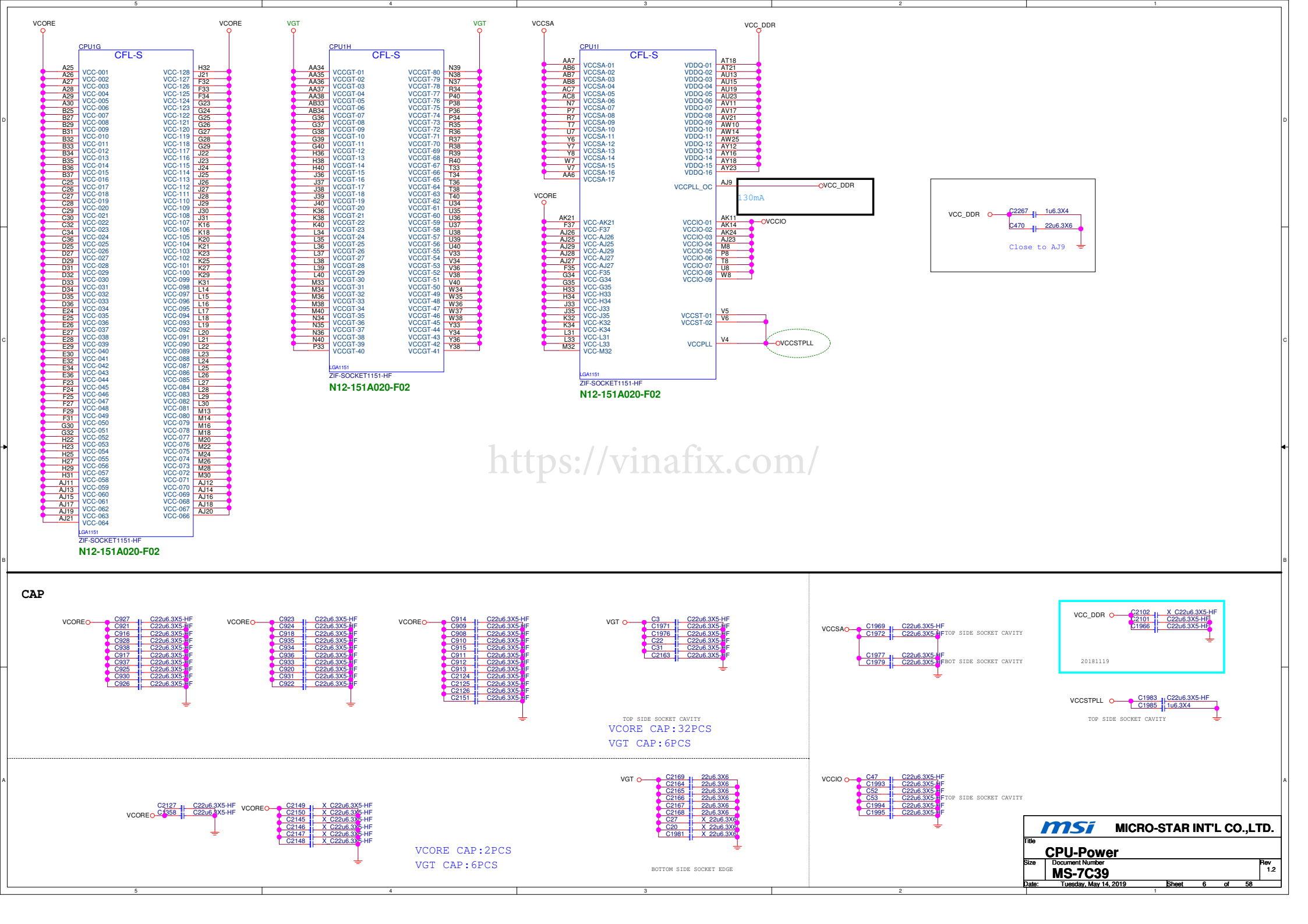


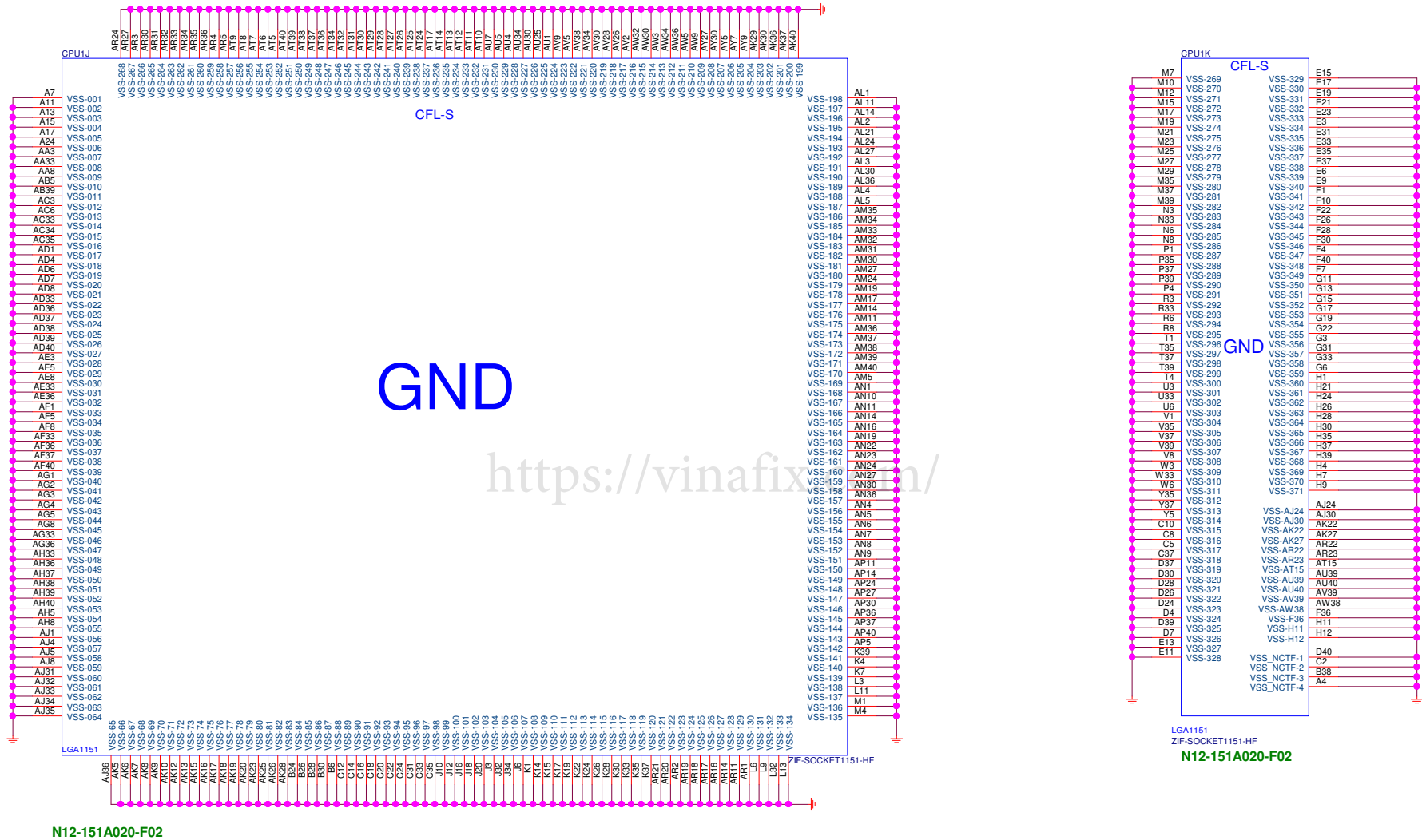
20171013 Review ADD

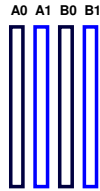
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N13-2880521-L06

N13-2880561-L06

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Title

DDR4 DIMMA1/DIMMA2

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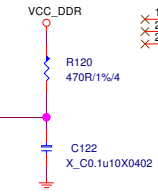
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Rev

1.2

[9,12]

[9,12,22]
[9,12,22]



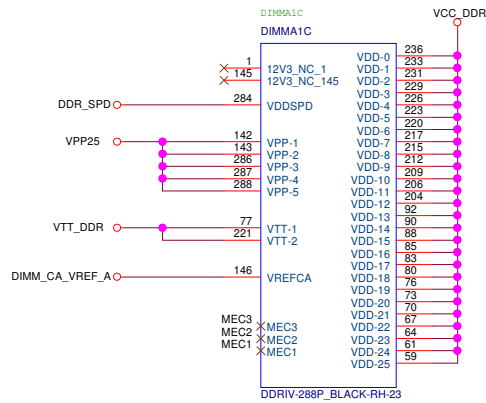
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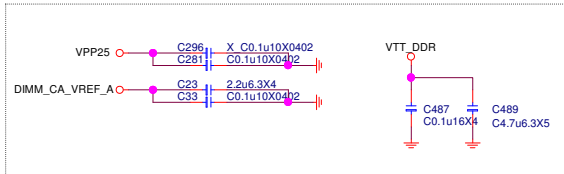
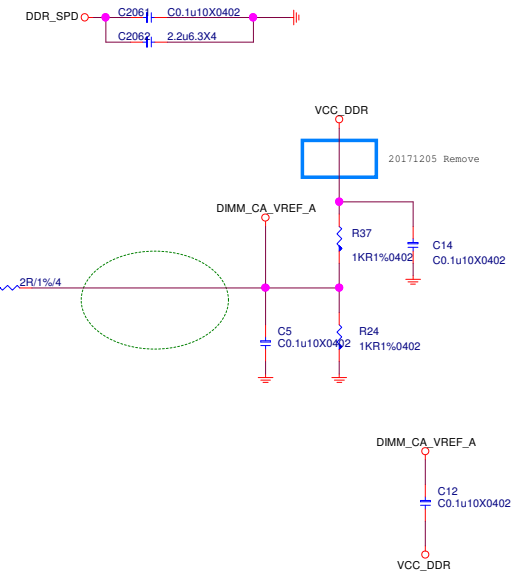
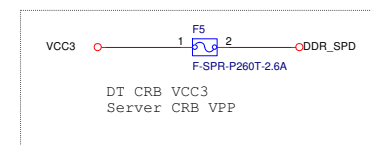
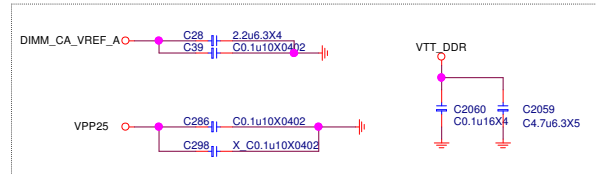
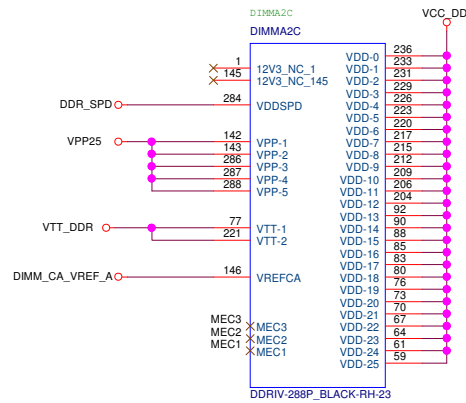
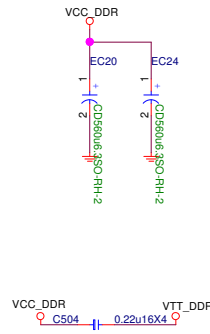
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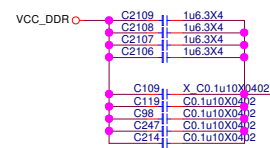
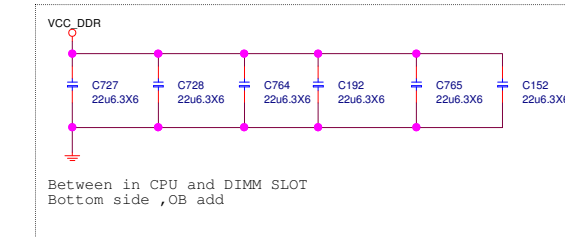
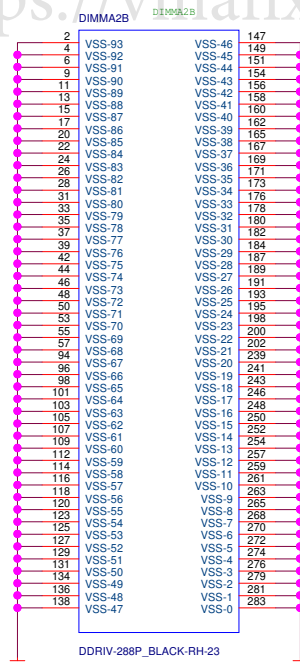
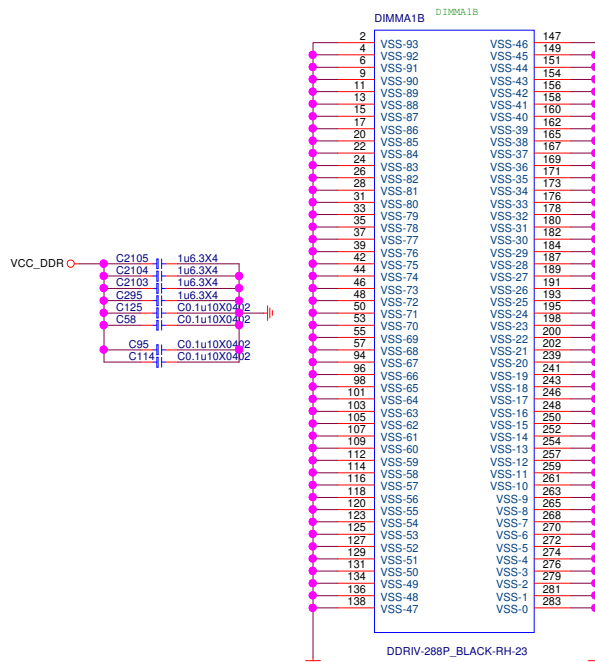
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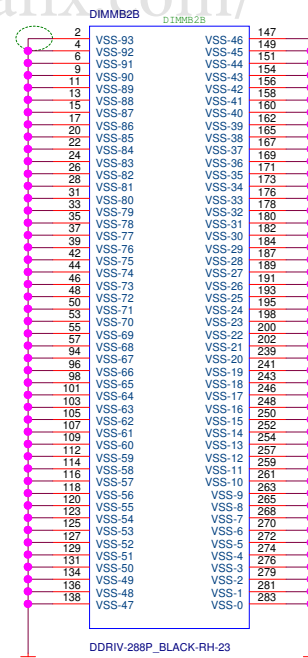
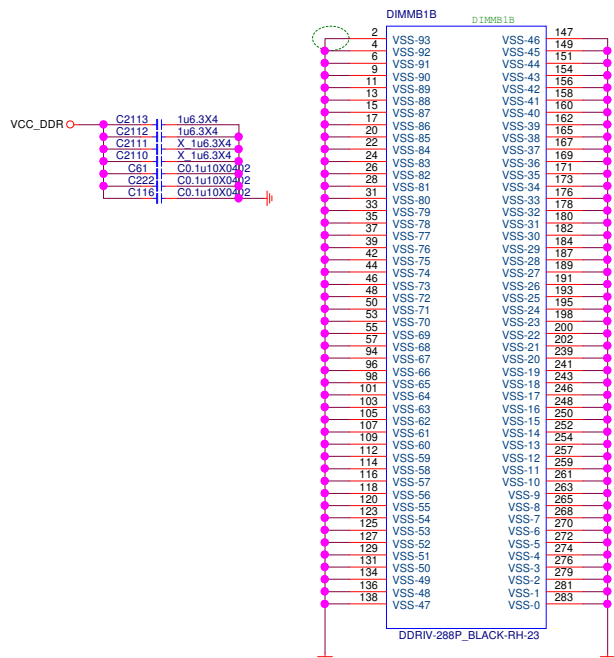
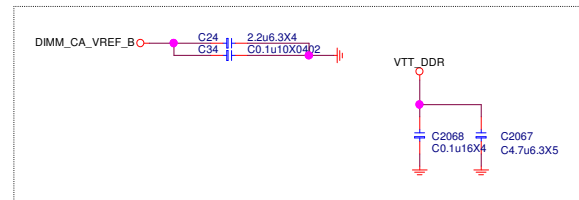
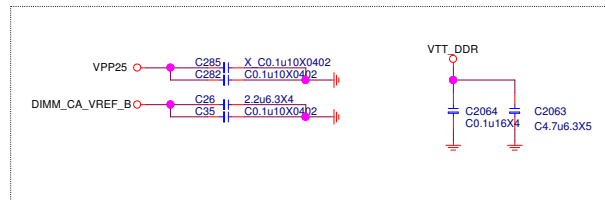
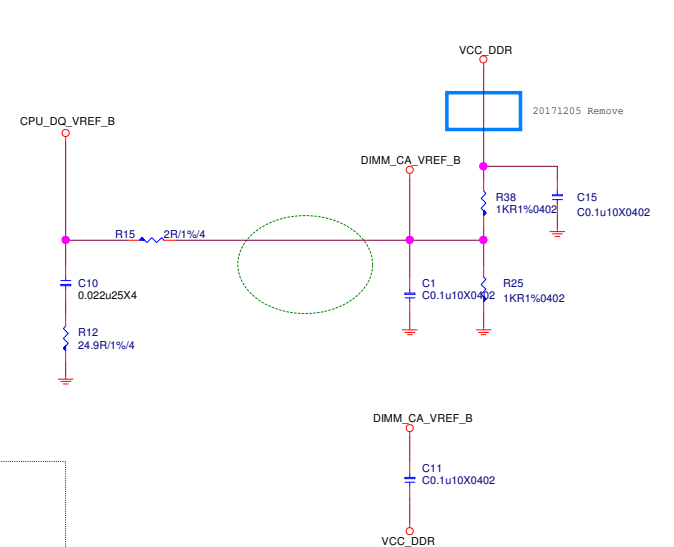
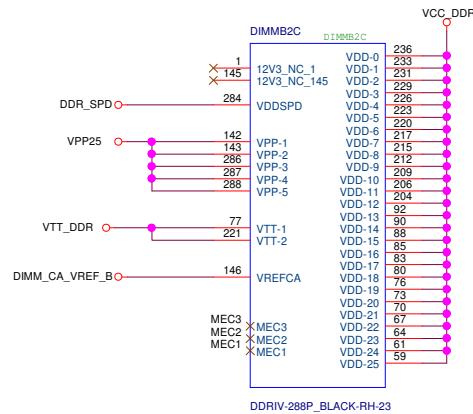
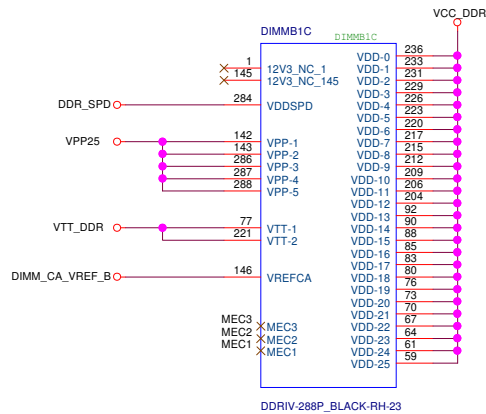


DIMM SLOT PN BY SPEC



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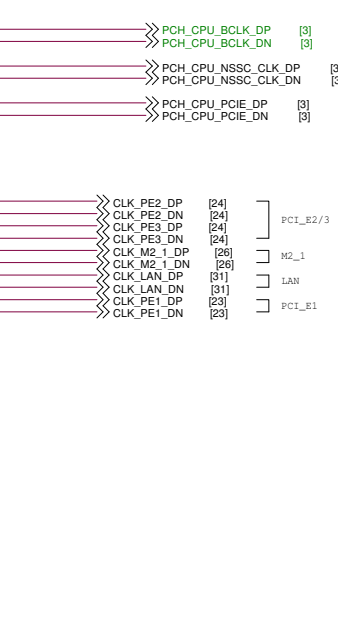
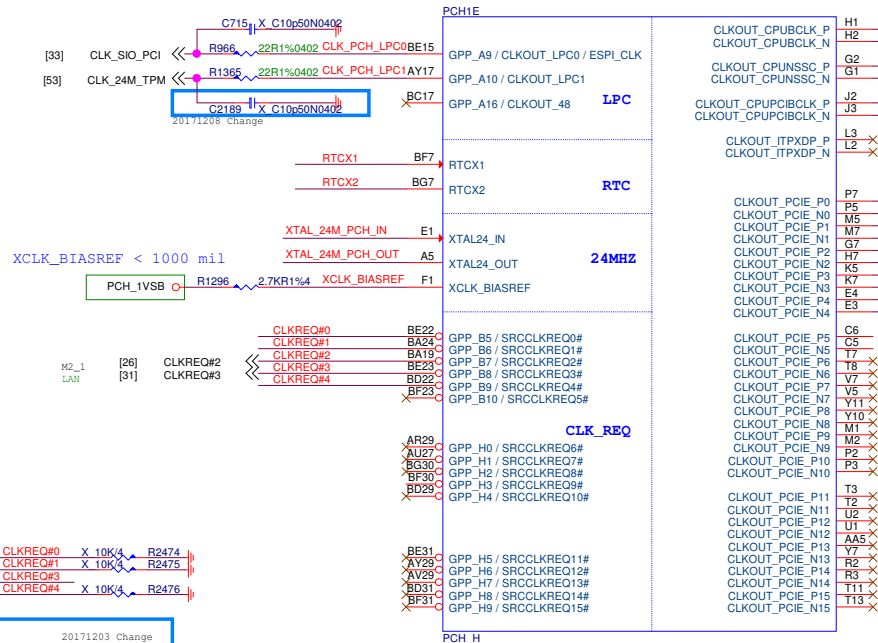
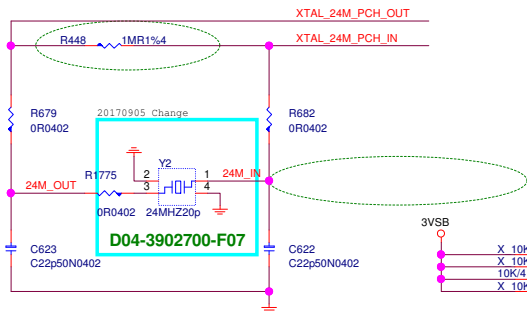
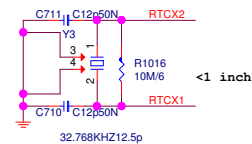




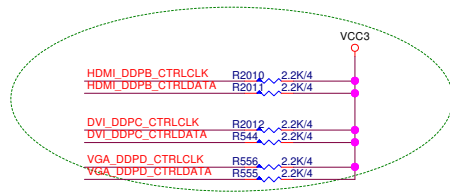
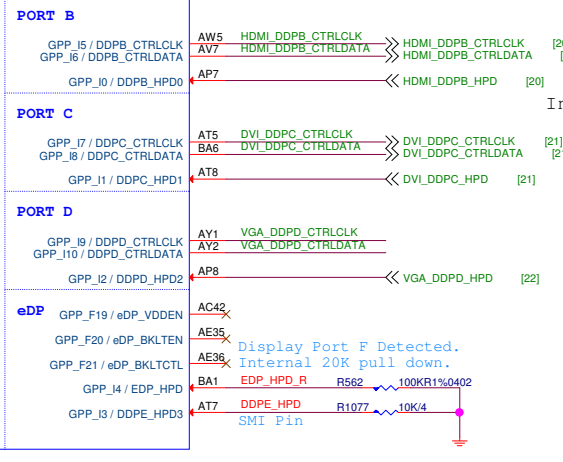
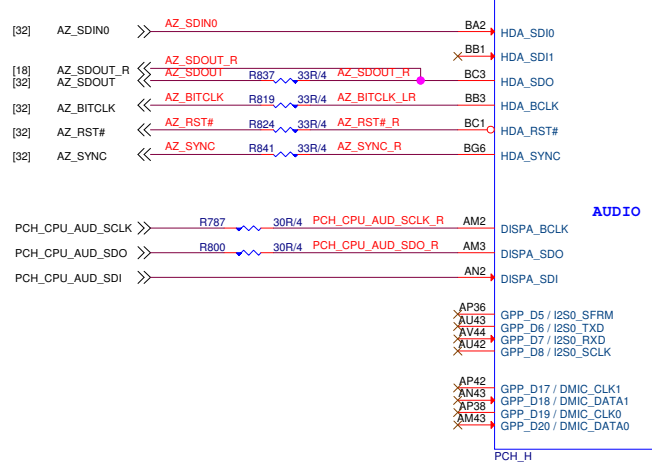
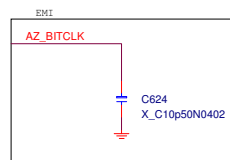
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PCH_CLK

Close to PCH



PCH_AUDIO

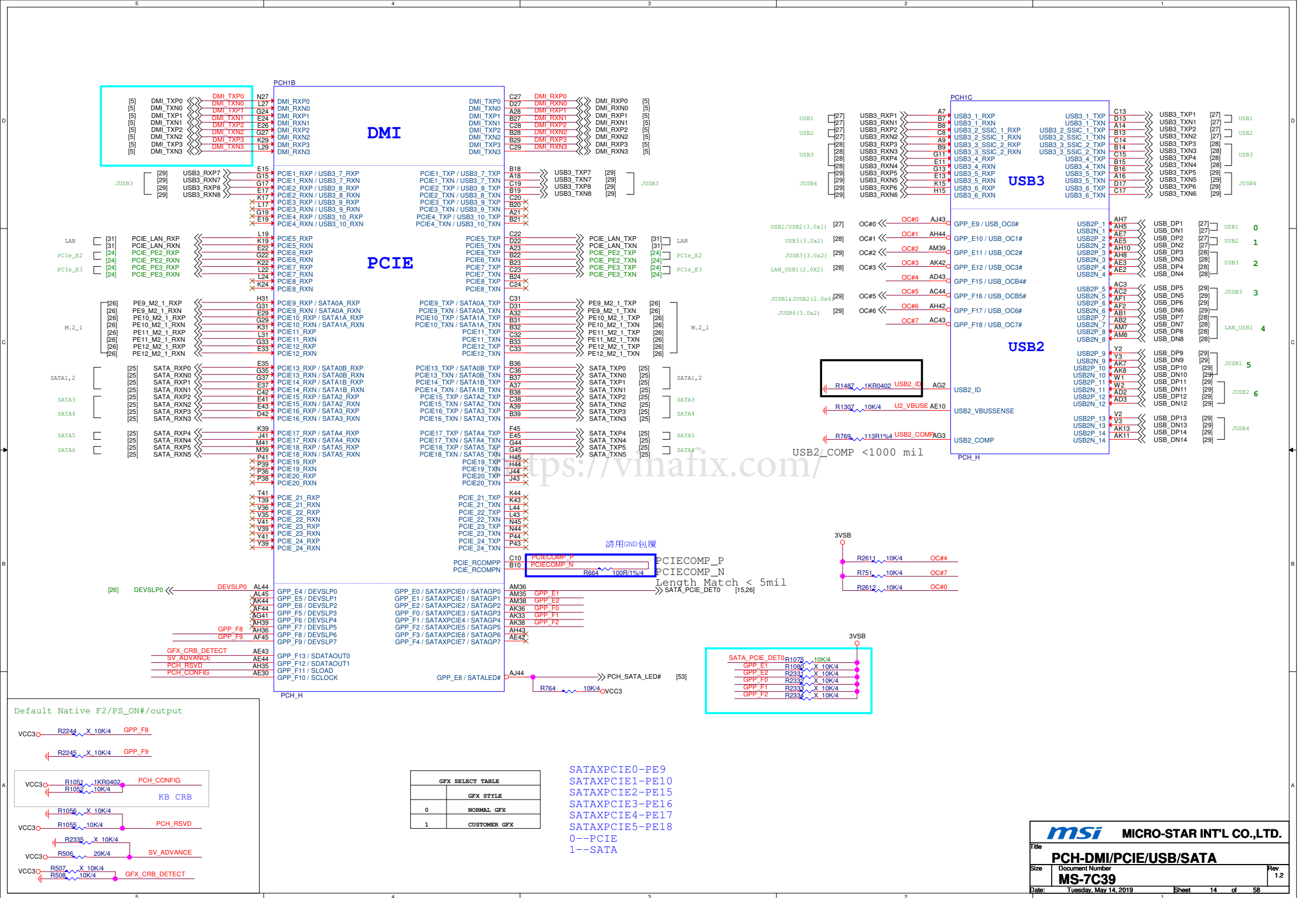


Internal pull-down is disabled after PCH_PWROK is high.

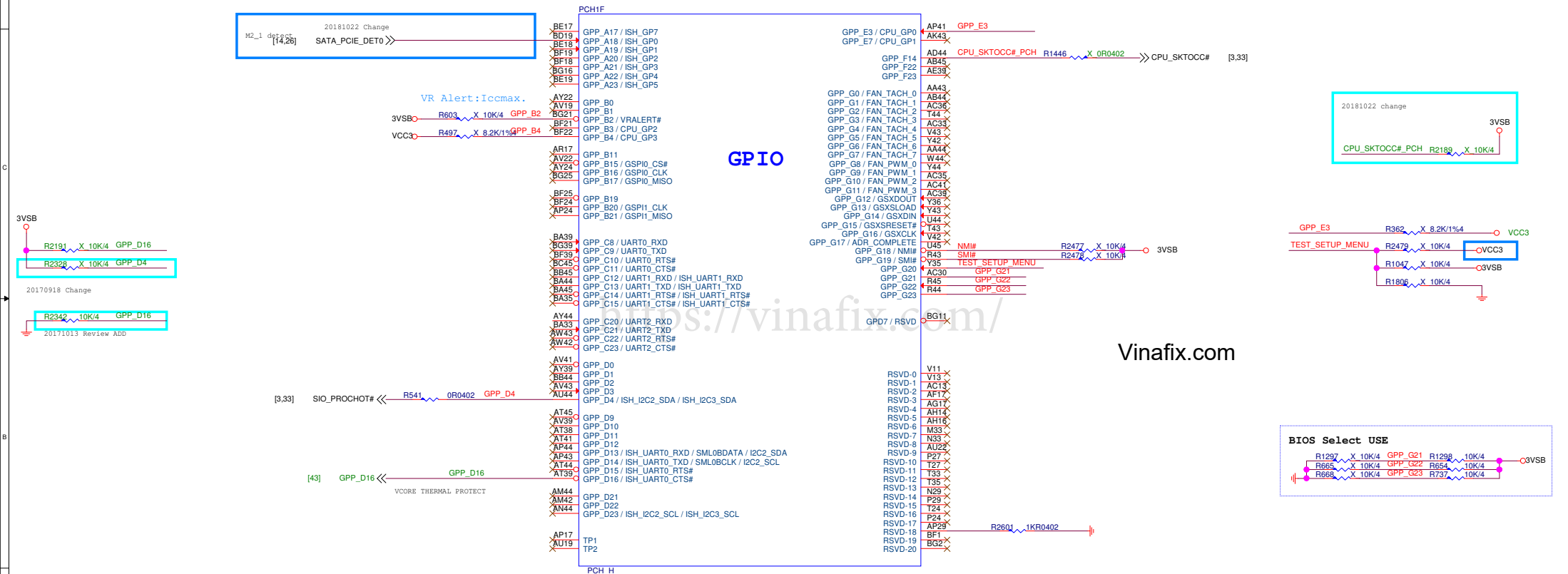
0 : Port B is not detected.(Default)
1 : Port B is detected.

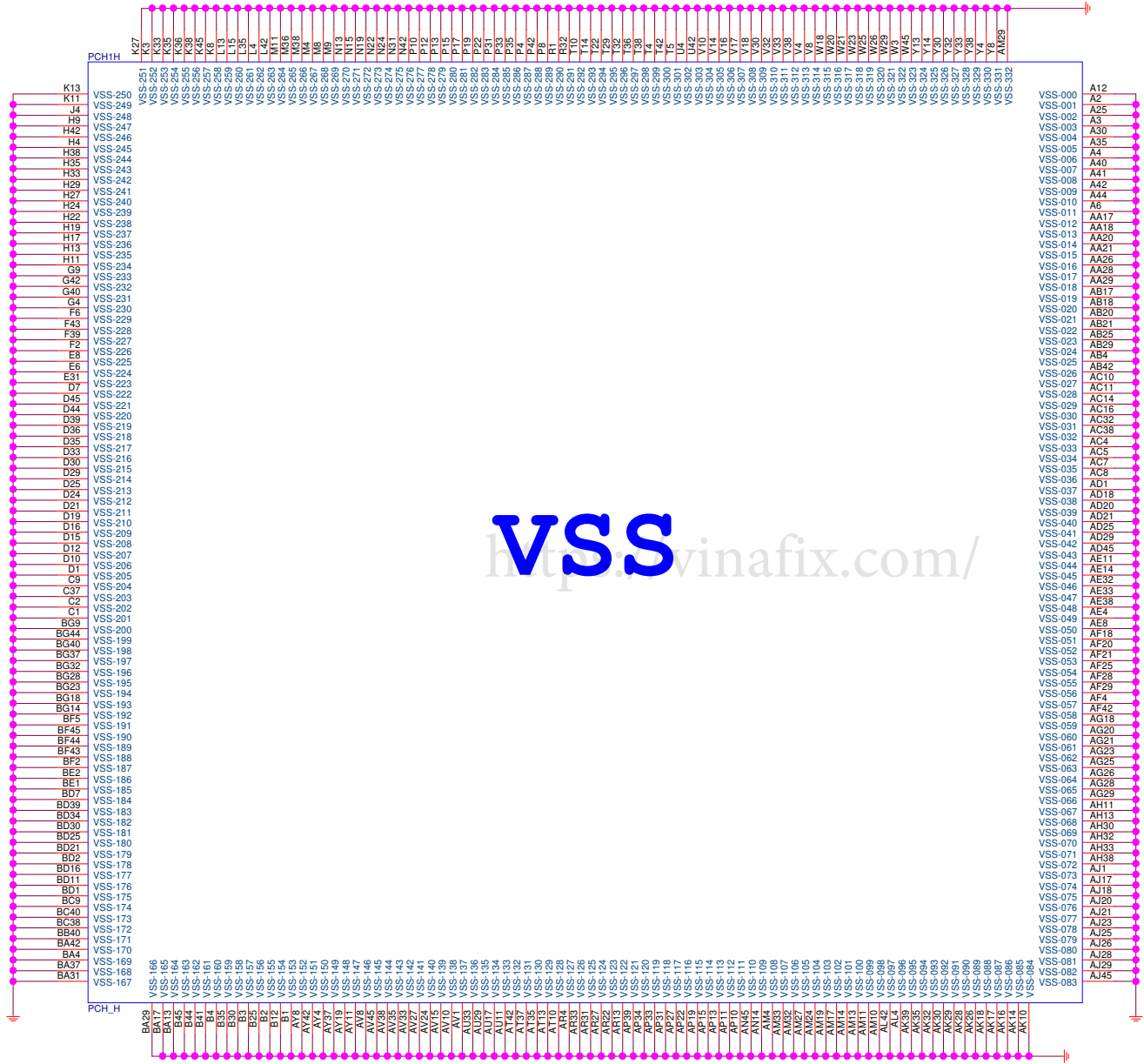
0 : Port C is not detected.(Default)
1 : Port C is detected.

0 : Port D is not detected.(Default)
1 : Port D is detected.

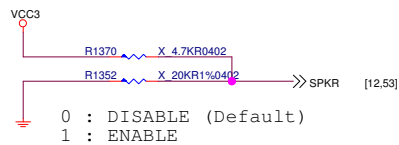


GPIO (SMI/NMI) :
GPP_B14, GPP_B20, GPP_B23
GPP_C[23:22]
GPP_D[4:0]
GPP_E[8:0]
GPP_I[3:0]
GPP_G[7:0] (Support SMI# only)



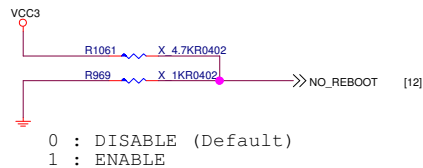


TOP Swap



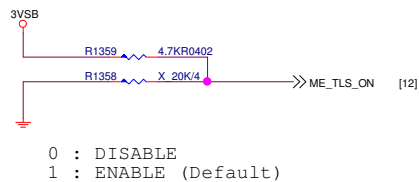
Internal pull-down 20K is disabled after PLTRST#

No Reboot



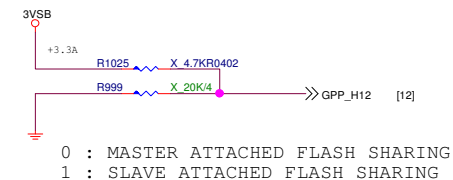
Internal pull-down 20K is disabled after PLTRST#

TLS confidentiality



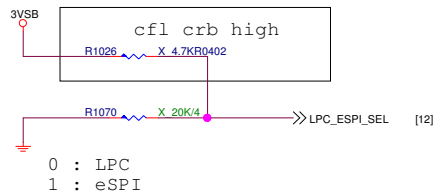
Internal pull-down is disabled after RSMRST# de-assert.

ESPI FLASH SHARING MODE



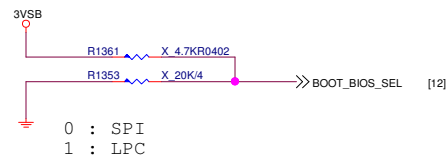
Internal pull-down is disabled after RSMRST# de-assert.

LPC eSPI Mode



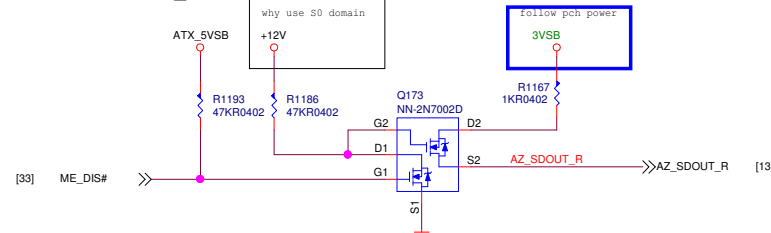
Internal pull-down is disabled after RSMRST# de-assert.

Boot BIOS



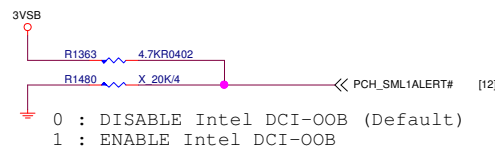
Internal pull-down is disabled after PCH_PWROK is high.

HDA_SDO



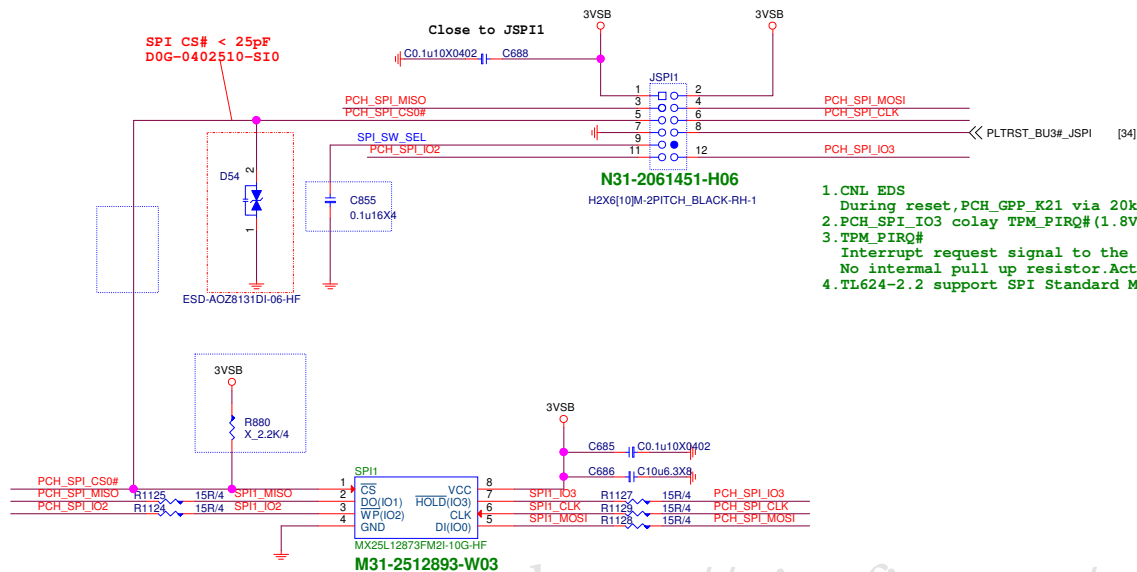
0 : Enable security measures defined in the Flash Descriptor.
(Default)
1 : DISABLE:Flash Descritior Decurity(Override).
Internal pull-down is disabled after PCH_PWROK is high.

DCI ENABLE

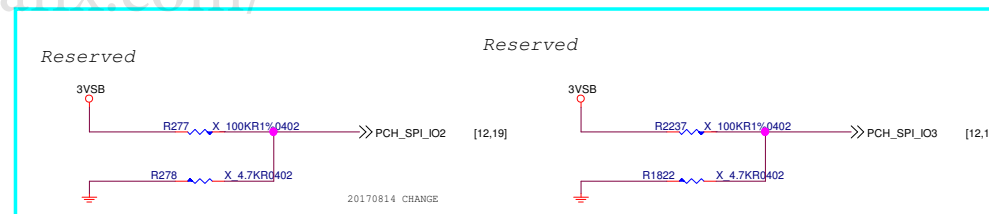
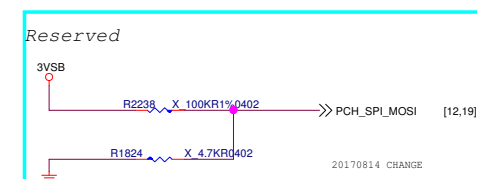


Internal pull-down is disabled after RSMRST# de-assert.

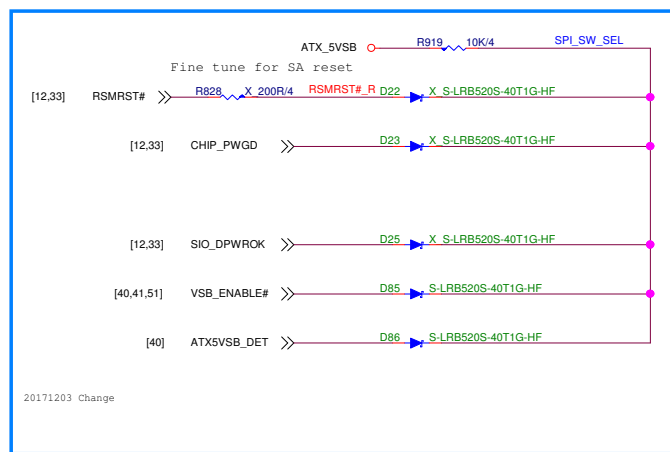
[12] PCH_SPI_CS0# << PCH_SPI_CS0#
 [12,19] PCH_SPI_MOSI << PCH_SPI_MOSI
 [12] PCH_SPI_MISO << PCH_SPI_MISO
 [12] PCH_SPI_CLK << PCH_SPI_CLK
 [12,19] PCH_SPI_IO2 << PCH_SPI_IO2
 [12,19] PCH_SPI_IO3 << PCH_SPI_IO3



- 1.CNL EDS
During reset,PCH_GPP_K21 via 20k pull up to 3.3V.
- 2.PCH_SPI_IO3 colay TPM_PIRQ#(1.8V or 3.3V,OD)
- 3.TPM_PIRQ#
Interrupt request signal to the host.
No internal pull up resistor.Active low.
- 4.TL624-2.2 support SPI Standard Mode.

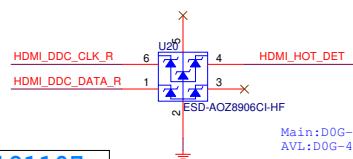
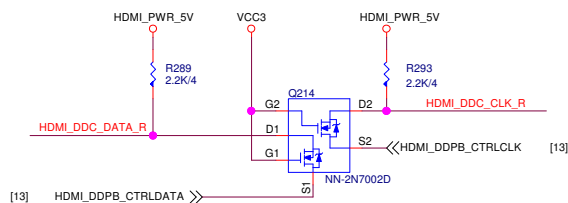
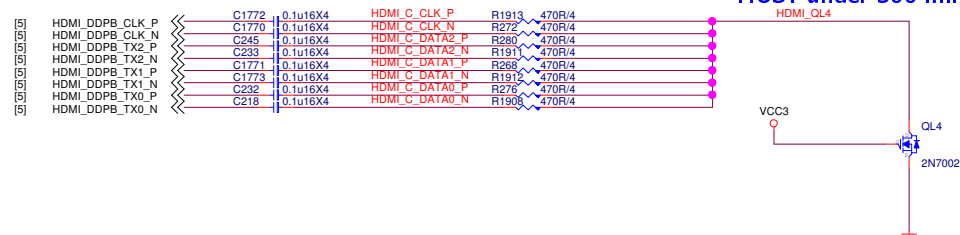


Internal pull-down is disabled after RSMRST# de-assert.



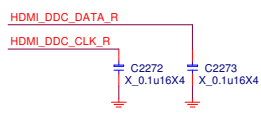
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Layout Note: HDMI_QL4 trace Length
MOST under 500 mil

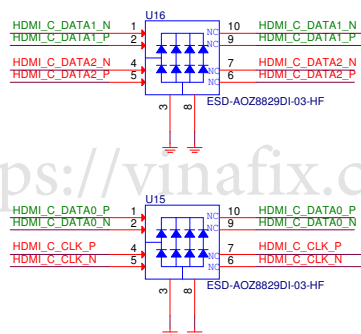
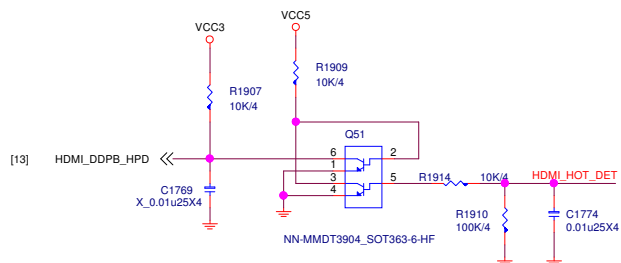


Main: D0G-05A0529-A68
AVL: D0G-45B0510-T14

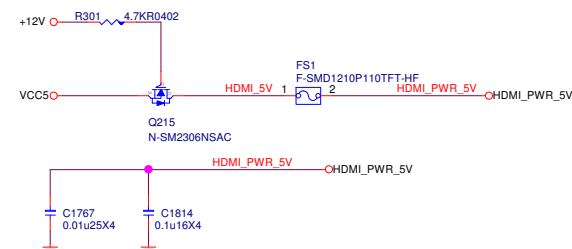
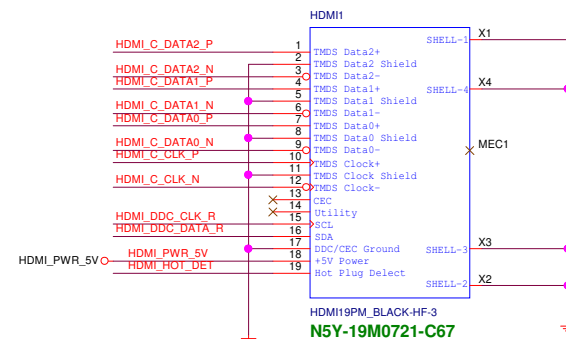
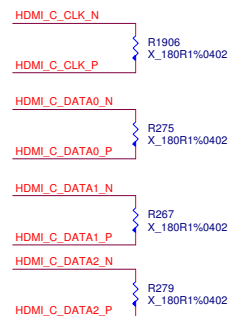
For EMI 20181107



HPD



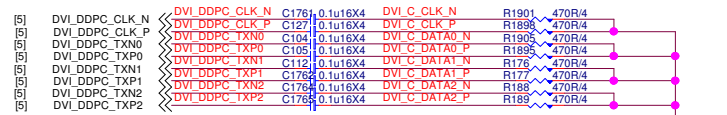
For EMI



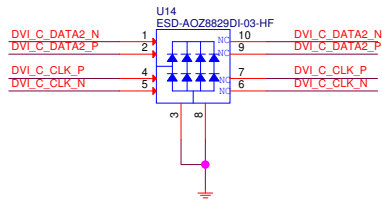
msi MICRO-STAR INT'L CO.,LTD.

Title		HDMI Connector	
Size	Document Number	MS-7C39	
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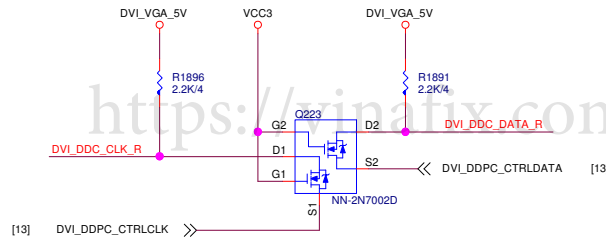
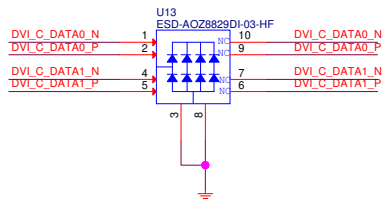
VGA: resolution of 2048x1536 pixels with 32-bit color at 75 Hz (4:3 QXGA)



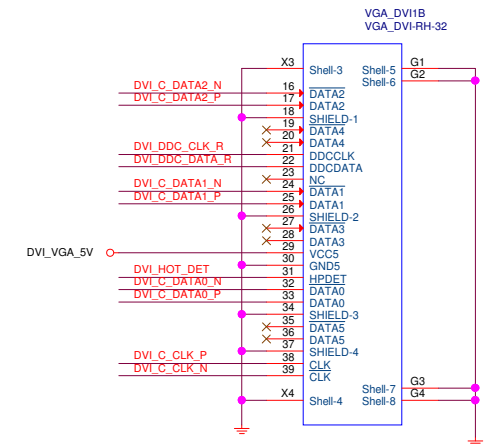
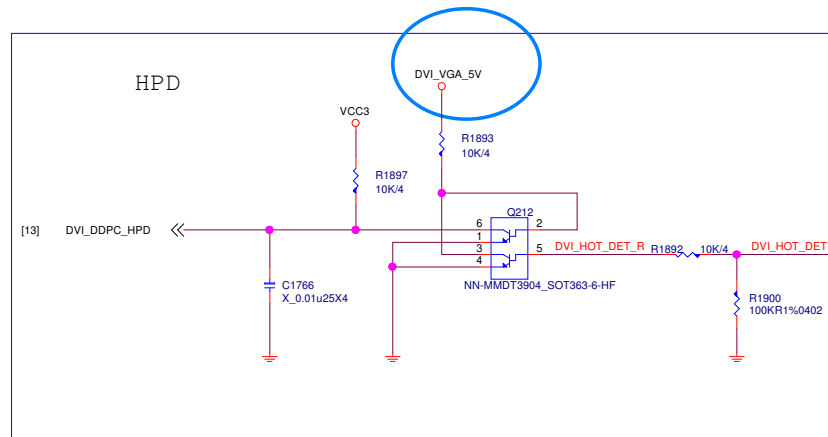
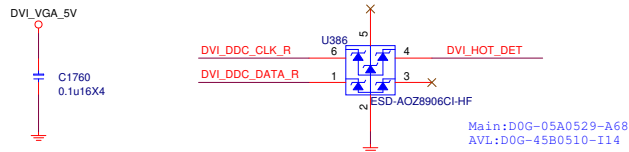
U26 AVL:D0G-05A050C-005
D0G-06A050C-A68



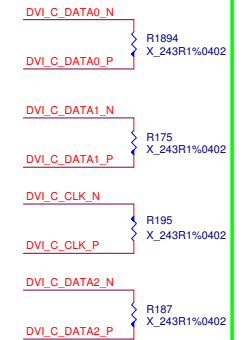
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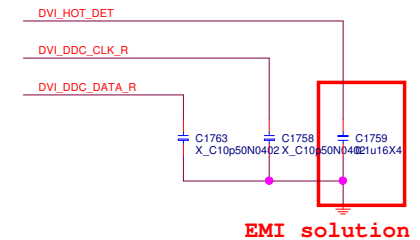
EMI Cap near connector DV11



For EMI



EMI



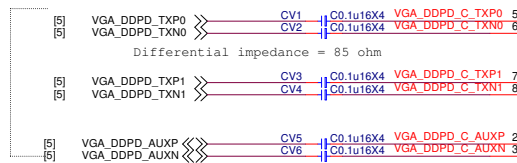
EMI solution

Note:

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

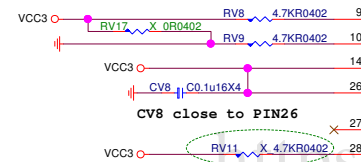
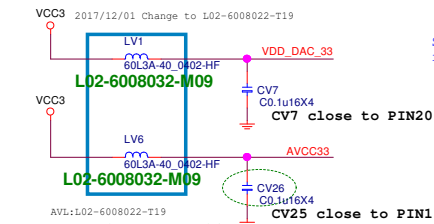
MAX Resolution:1920x1440@60Hz, RB

UV3



[8,9,12] SMBCLK_VCC >> RV5 X 0R0402 VGA SMBCLK 30
[8,9,12] SMBDATA_VCC >> RV7 X 0R0402 VGA SMBDATA 29
SMB had added pull-up resistor on other page

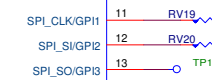
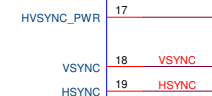
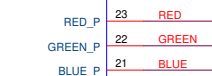
VCC3 Full Screen current 165mA



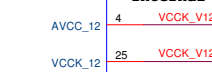
2017/7/20
Realtek prefer to unstuff RV11

B0B-021661C-R09

RTD2166



EXT1.2V_CTRL 31 X



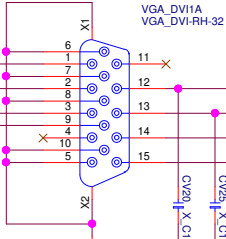
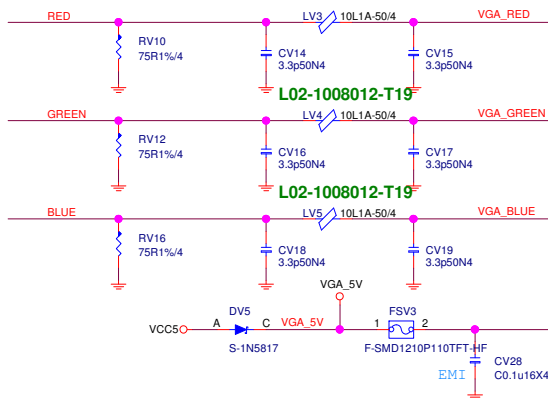
RTD2166-CG-RH

CV9, CV10 close to PIN25

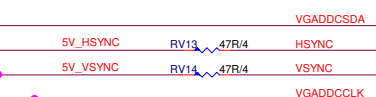
L02-1008012-T19

L02-1008012-T19

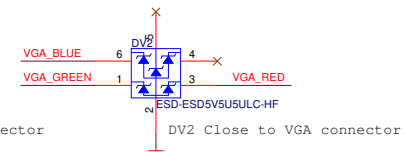
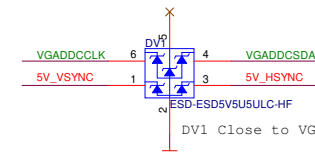
L02-1008012-T19

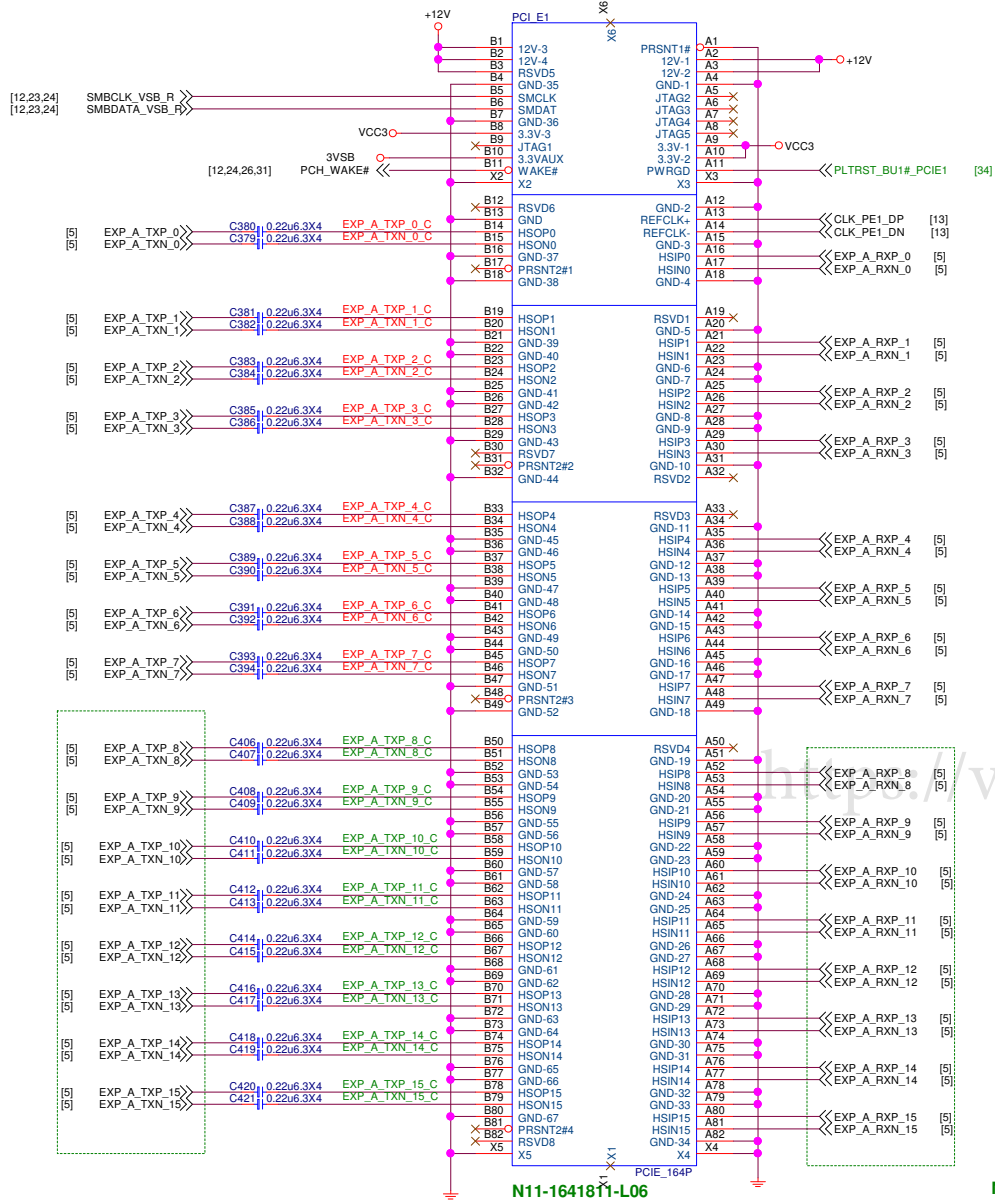


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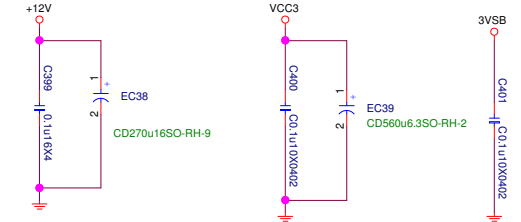
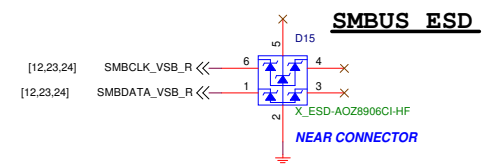


DVI Only
N5B-24F0821-EB6





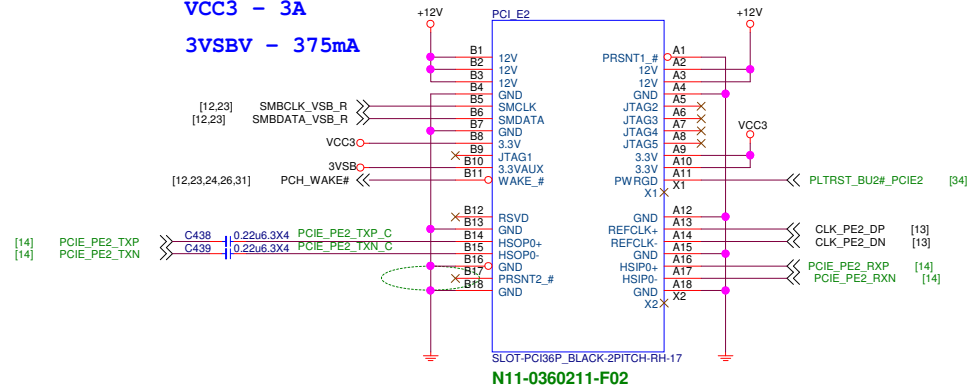
5.5A at +12V
 3A at VCC3
 375mA at 3VSB



REF3
 EC
 PCIE16X

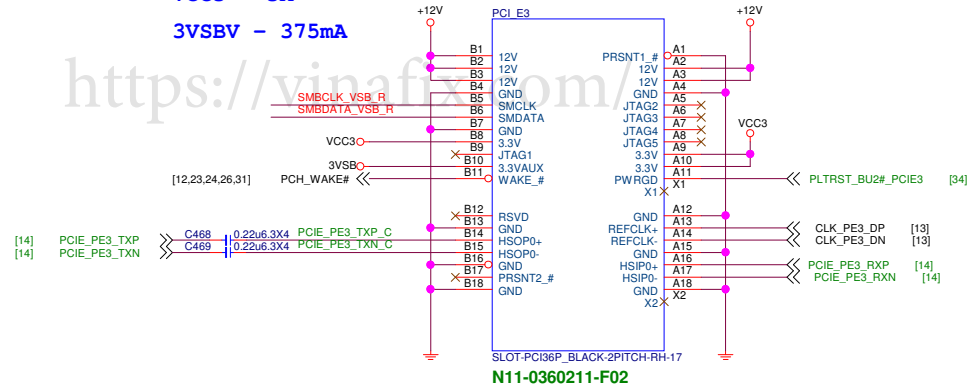
PCH PCIE X1 Slot

12V - 0.5A
VCC3 - 3A
3VSBV - 375mA

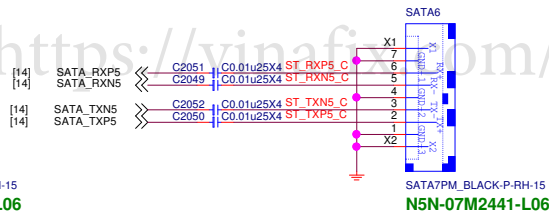
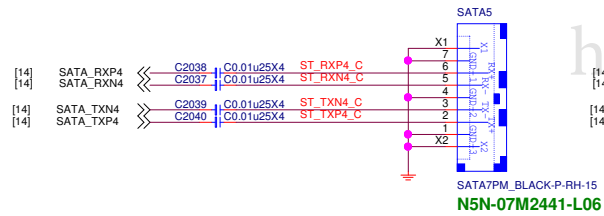
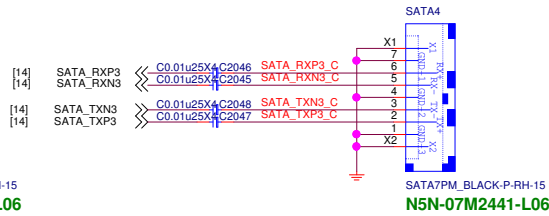
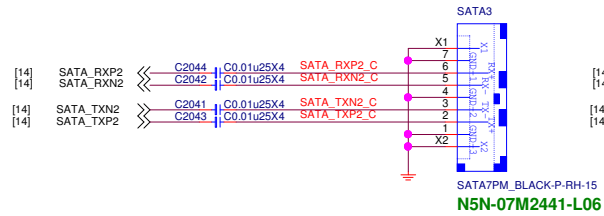
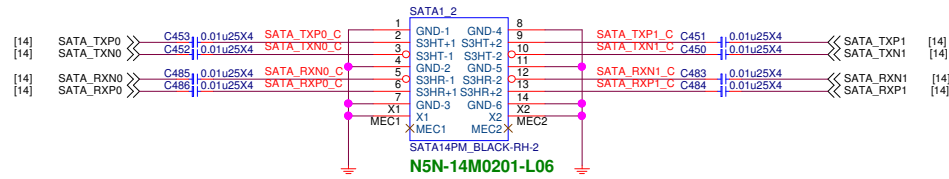


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12V - 0.5A
VCC3 - 3A
3VSBV - 375mA

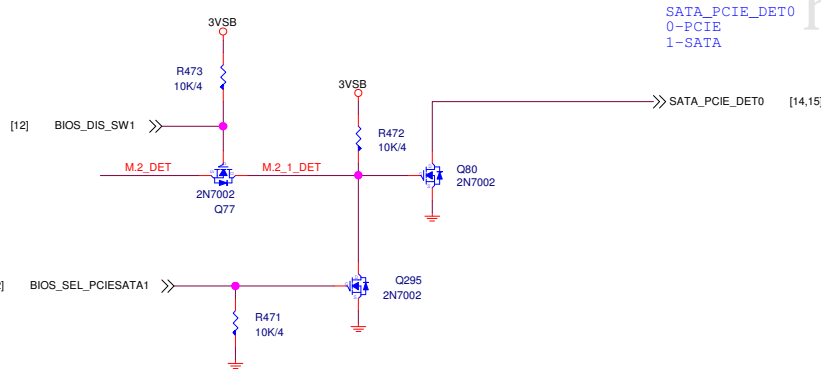
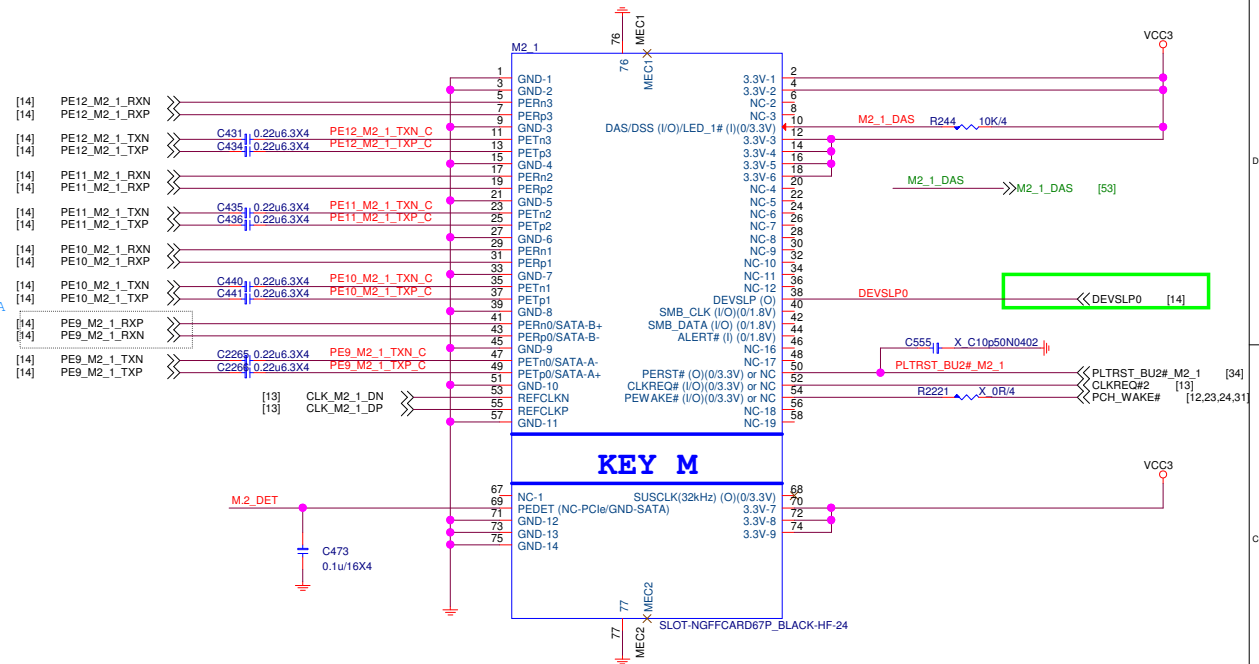


SATA 6G PORT 0.1

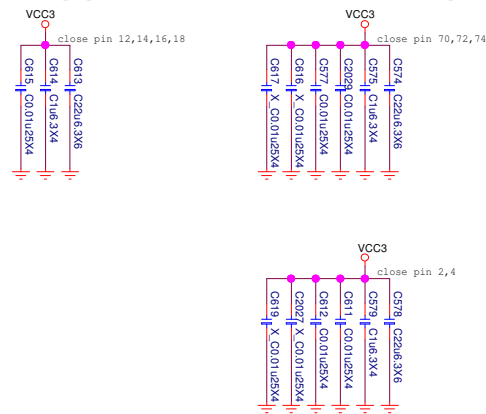


要以M.2 SATA為主
純SATA要正接，PCIE/SATA要反接

PCIE/SATA

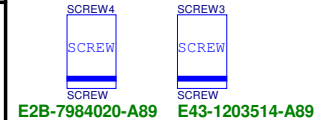
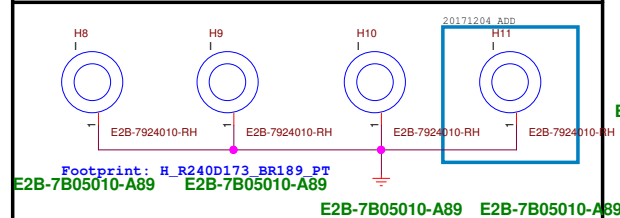


<https://vinafix.com/>



BIOS_MODE

DIS_SW	M1_SEL_PCIESATA	Mode
0	1	M2-SATA
0	0	M2-PCIE
GPI	GPI	AUTO



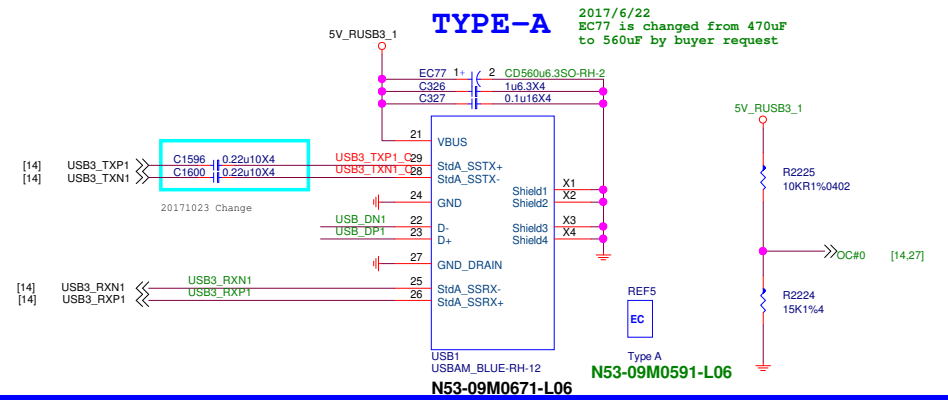
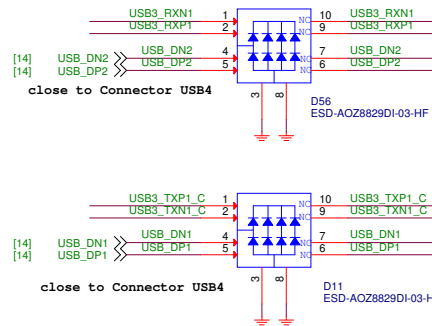
MICRO-STAR INT'L CO.,LTD.

Title
M.2-SLOT1

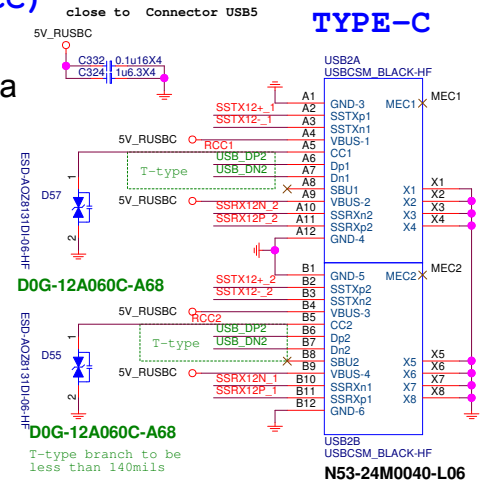
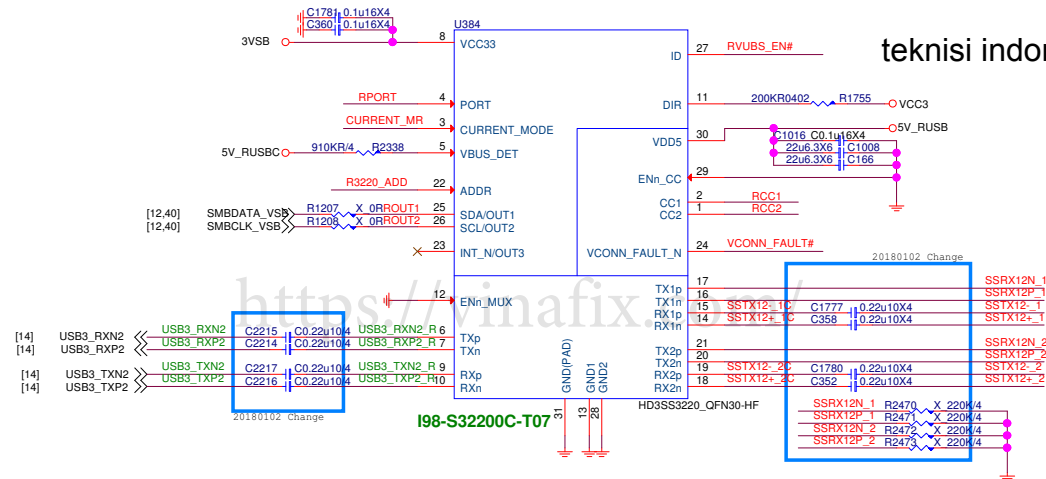
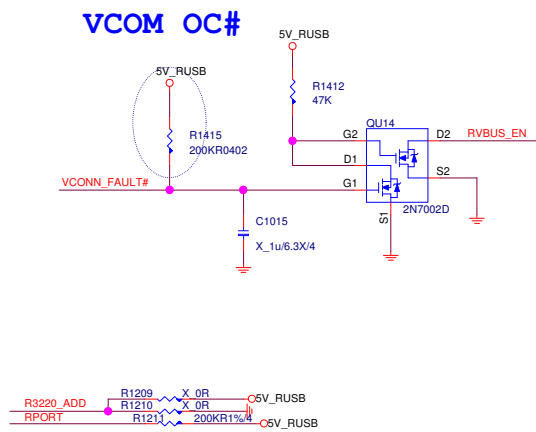
Size
Document Number
MS-7C39

Date: Tuesday, May 14, 2019
Sheet 26 **of** 58

Rev
1.2

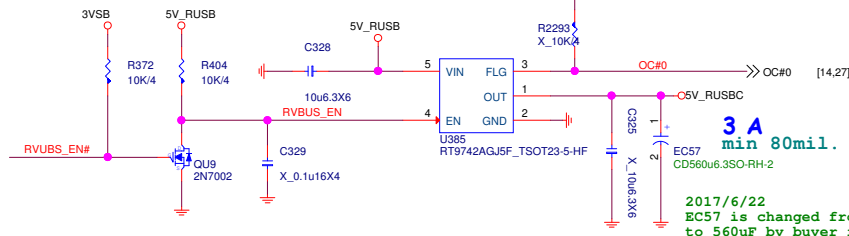
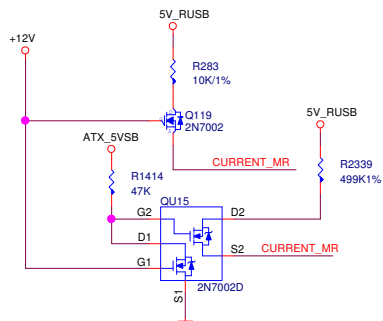


USB Type-C MUX with Configuration Channel (CC)

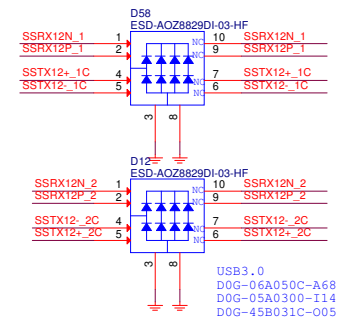


Current Mode

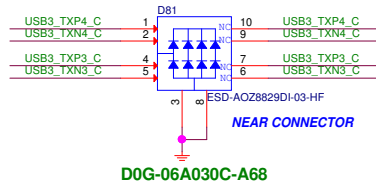
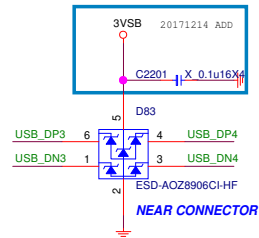
L - Default for 900mA
M - Mid (500K) for 1.5A
H - High (10K) for 3A



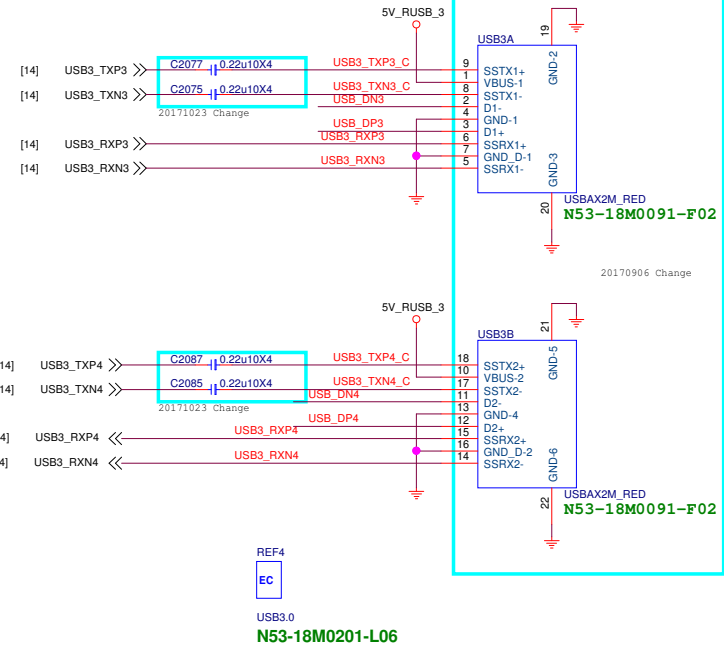
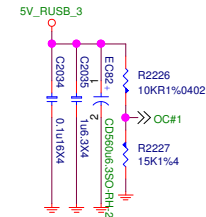
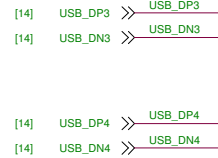
ESD Protection NEAR CONNECTOR



D0G-06A030C-A68

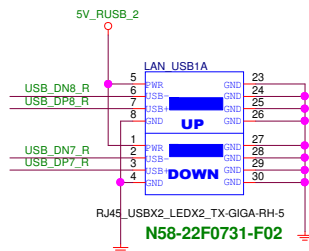
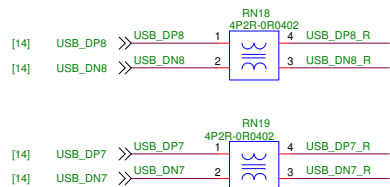


D0G-06A030C-A68

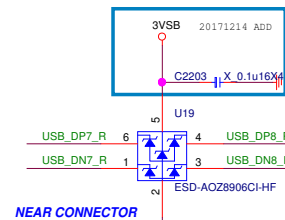
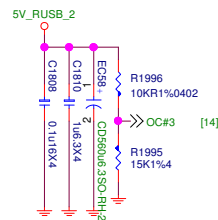


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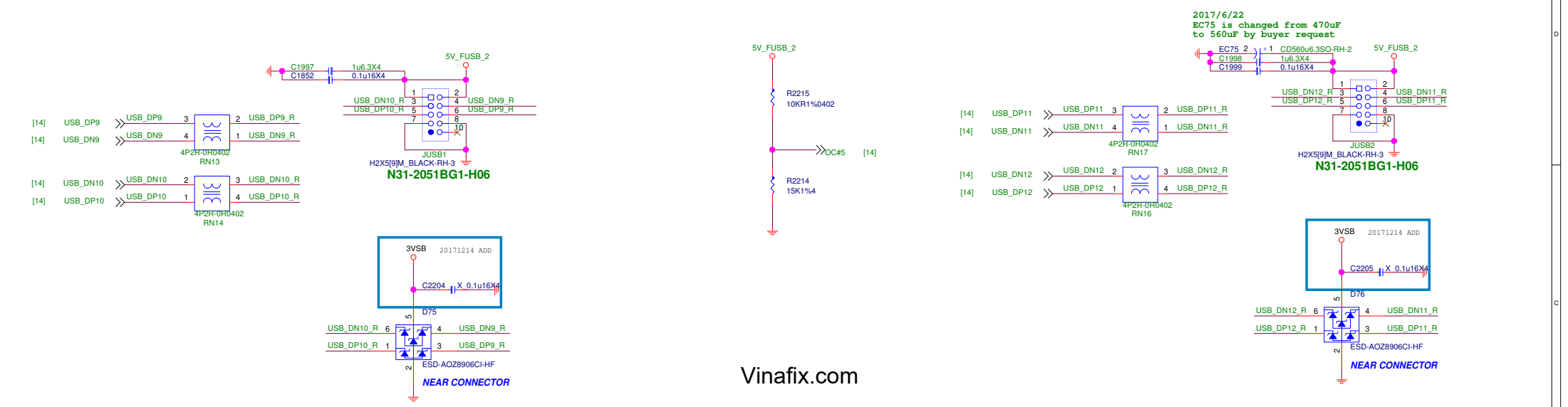
LAN_USB1



2017/6/22
EC58 is changed from 470uF
to 560uF by buyer request

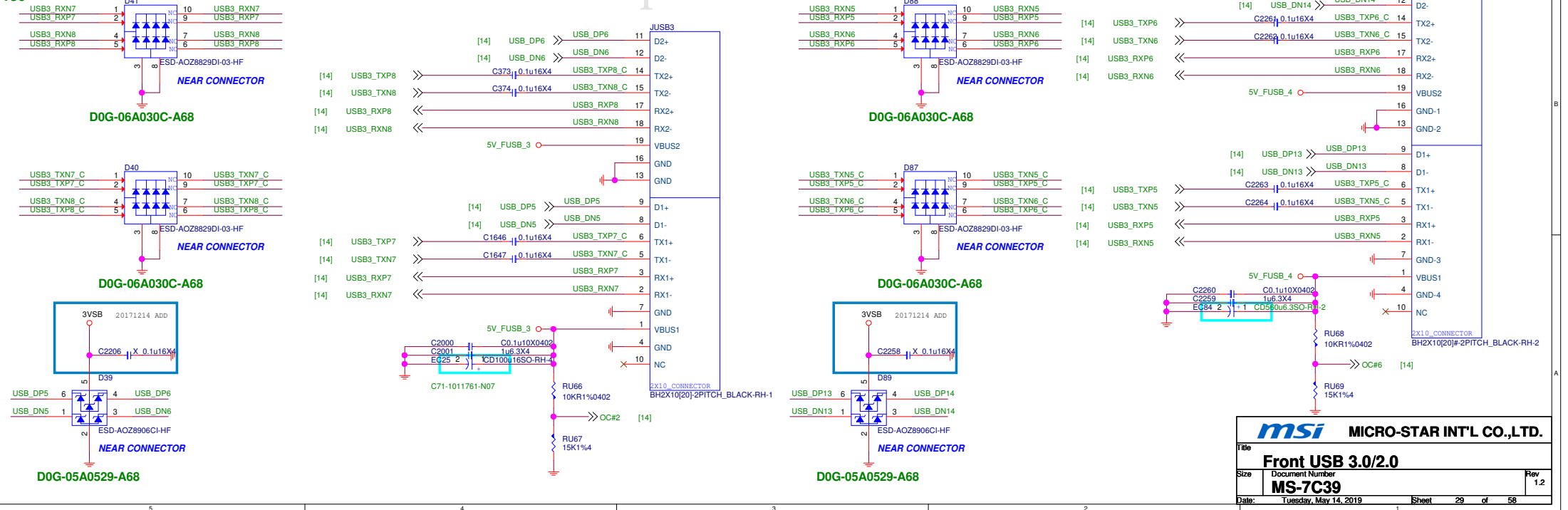


FRONT USB2.0

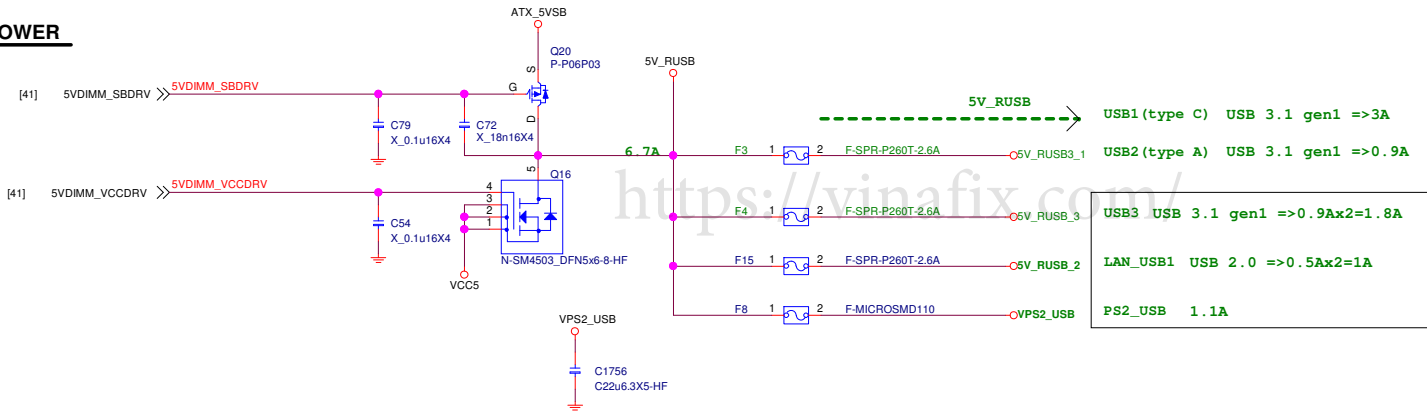


FRONT USB3.0

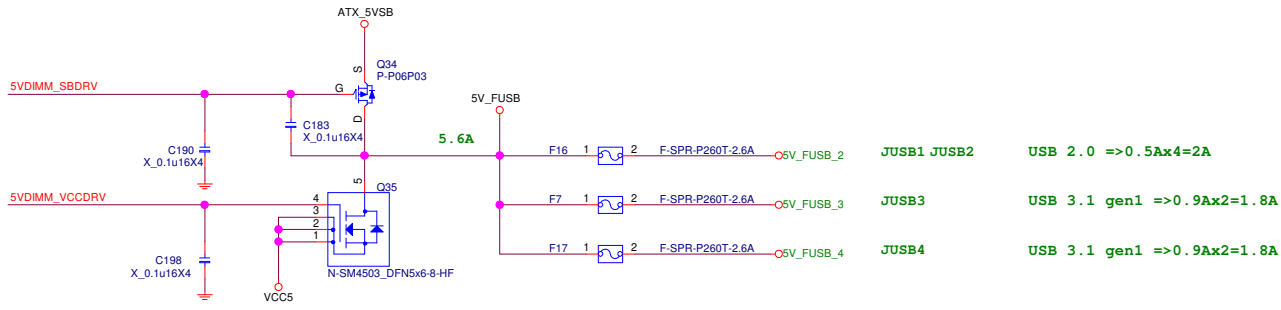
180



REAR USB PORT POWER

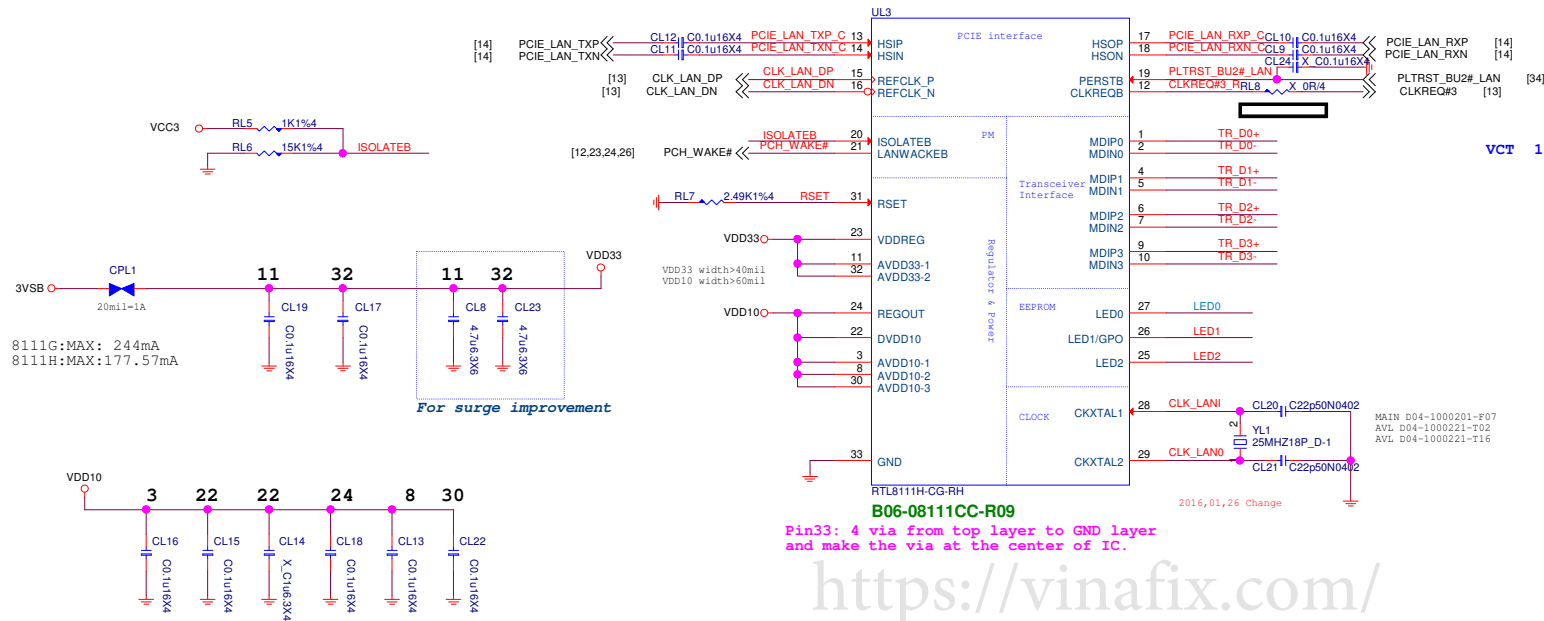


FRONT USB PORT POWER

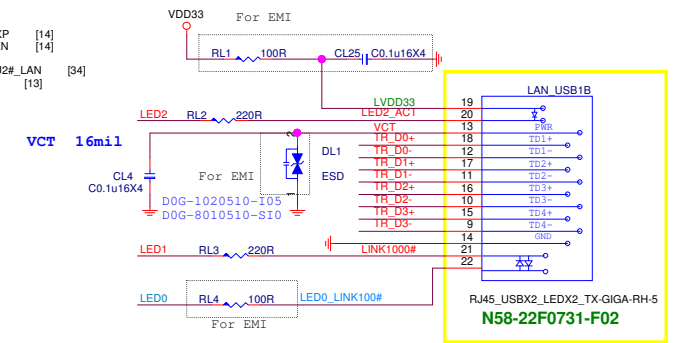


RTL8111G/RTL8111H Giga LAN

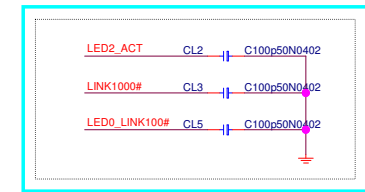
8111H:B06-08111CC-R09
8111G:B06-081116C-R09



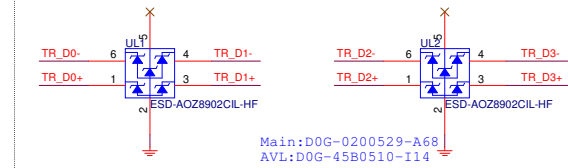
LAN Connector



For EMI 2015.04.23



ESD Protect
UL2&UL3 close to connector



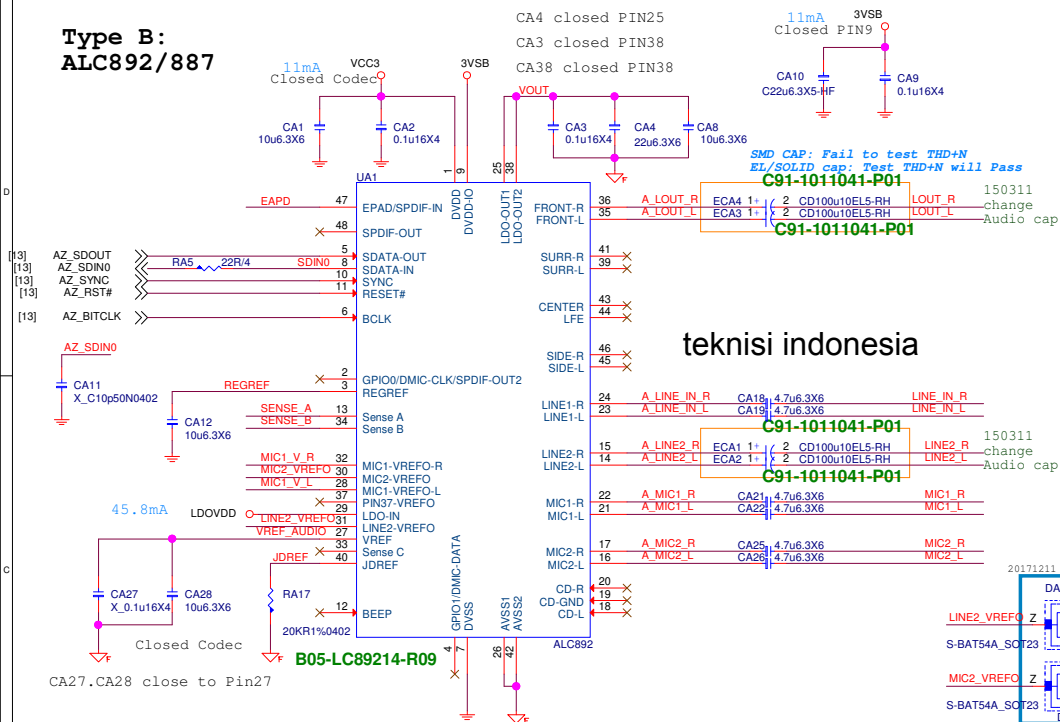
8111G POWER Consumption

	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

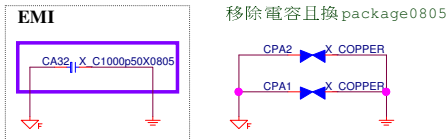
8111H POWER Consumption

	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

Type B: ALC892/887

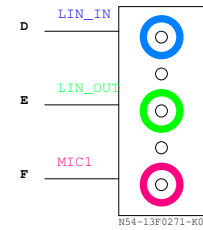
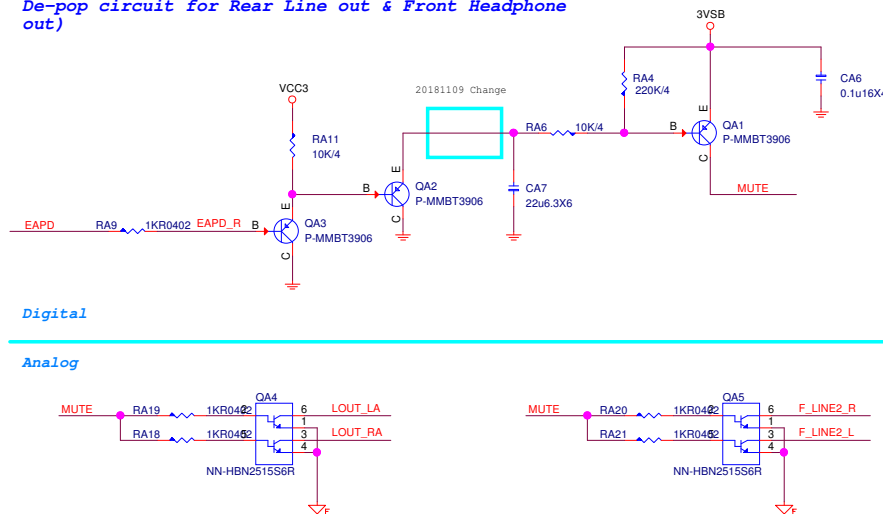
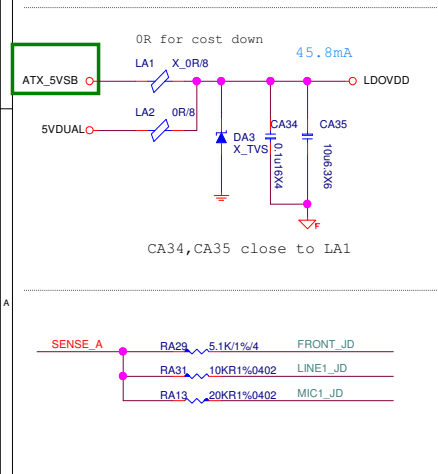


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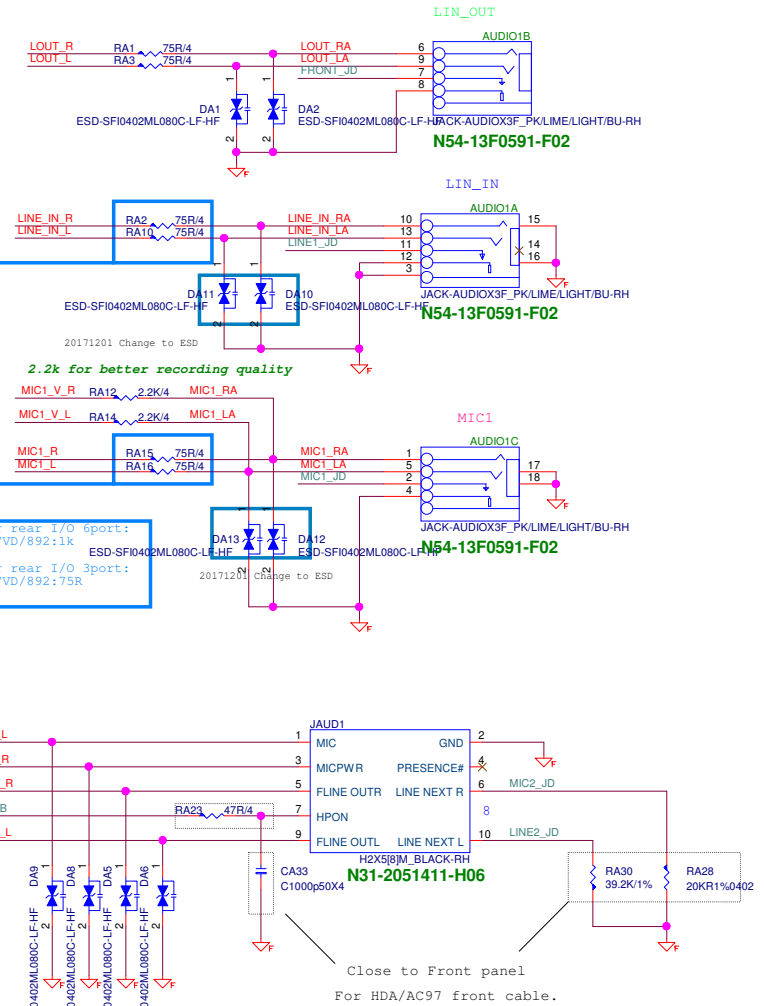


Rear Line OUT De-POP circuit

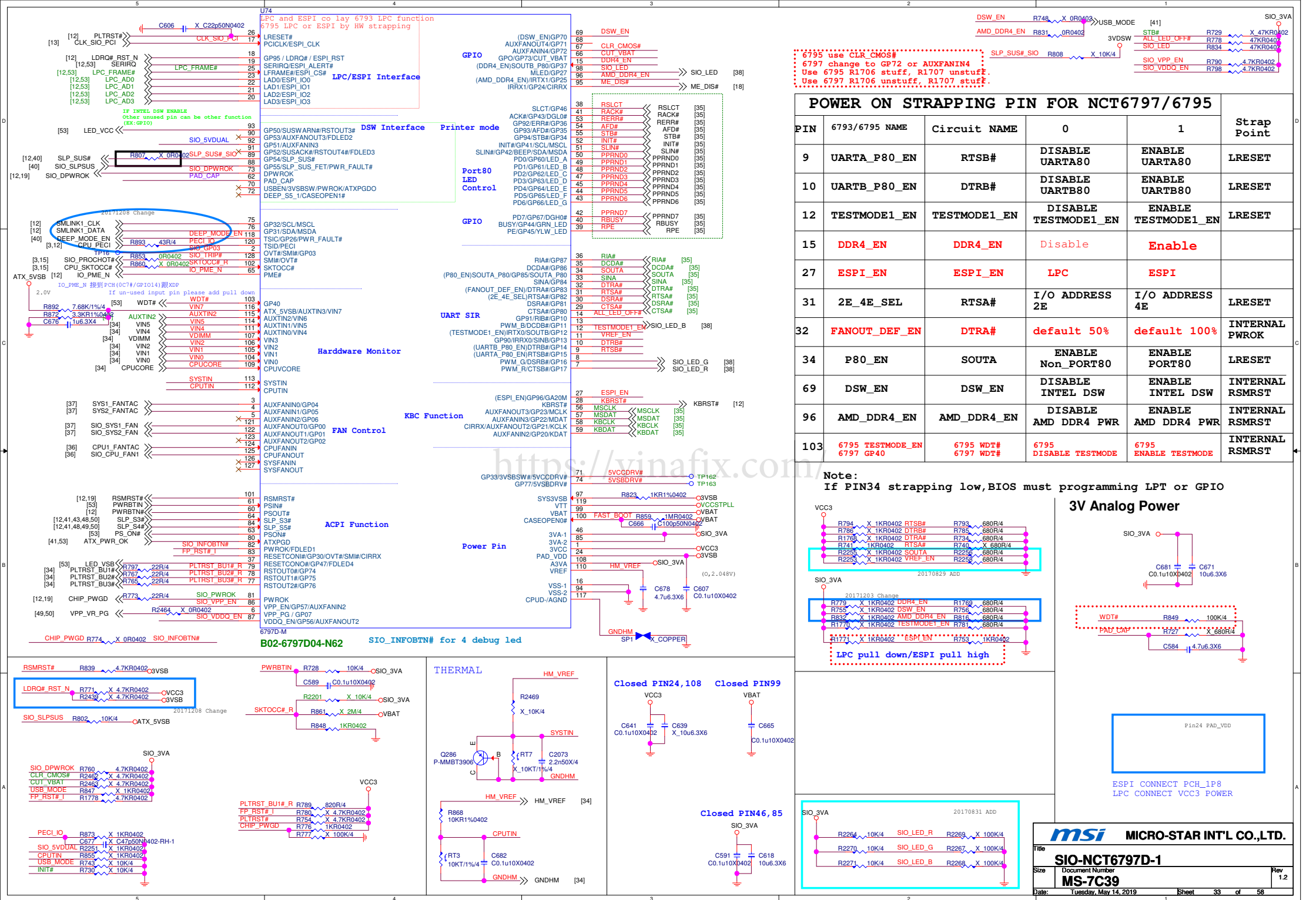
De-pop circuit for Rear Line out & Front Headphone out)

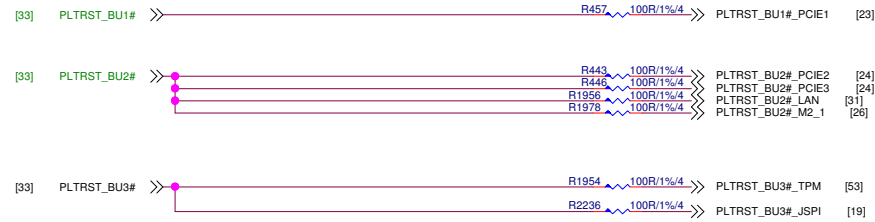


150311 6
port
change to
3 port



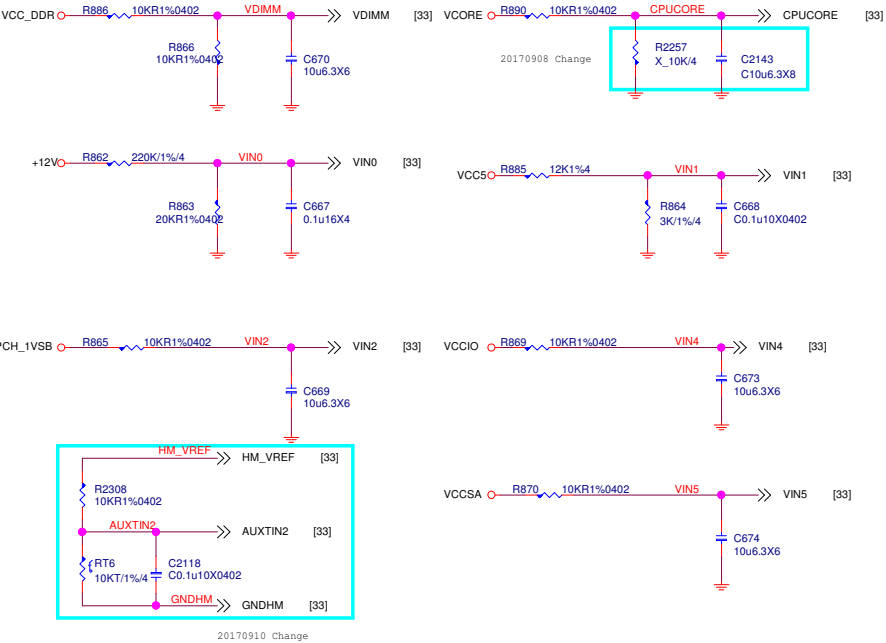
Varister --> cap for cost down
D0G-2950500-S10
D0G-3010510-I05
Close to Jack





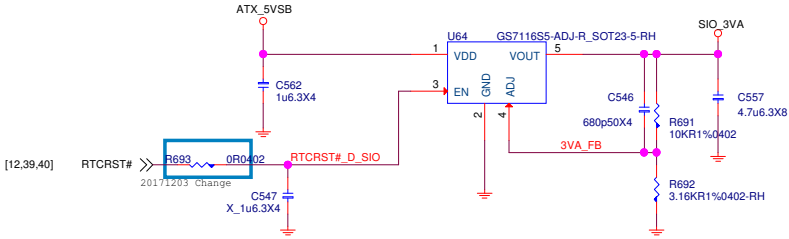
HW Monitor - Voltage

SIO HM Voltage voer 2V will not detect

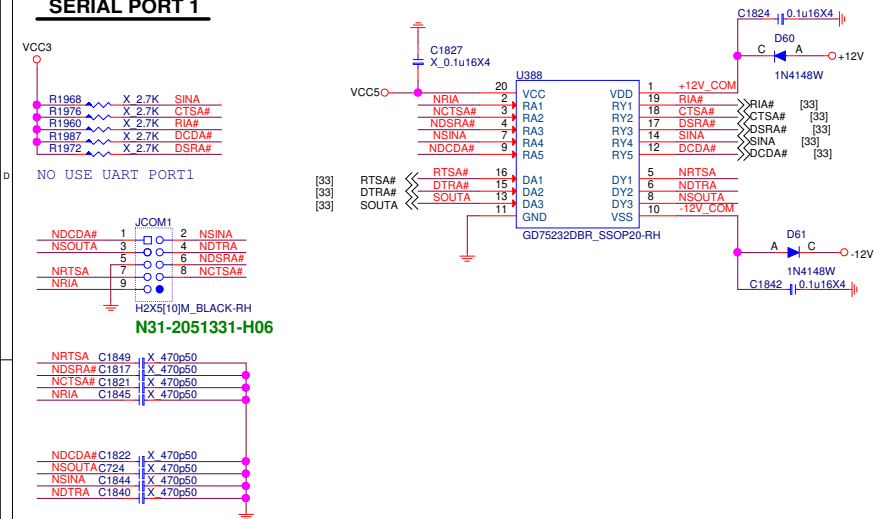


<https://vinafix.com/>

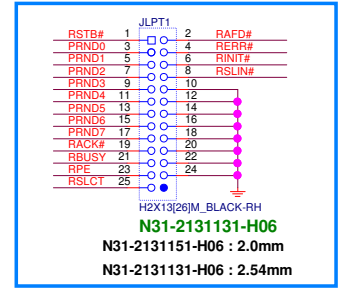
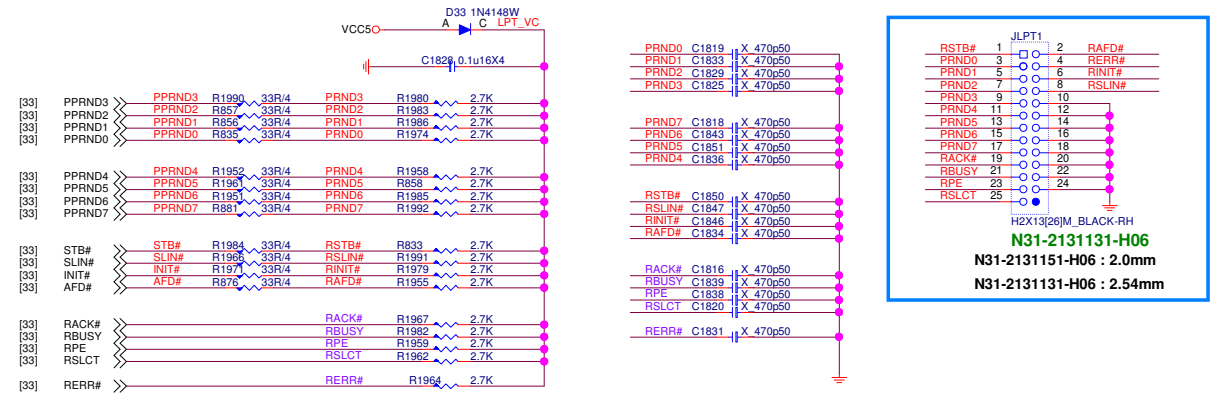
Vinafix.com



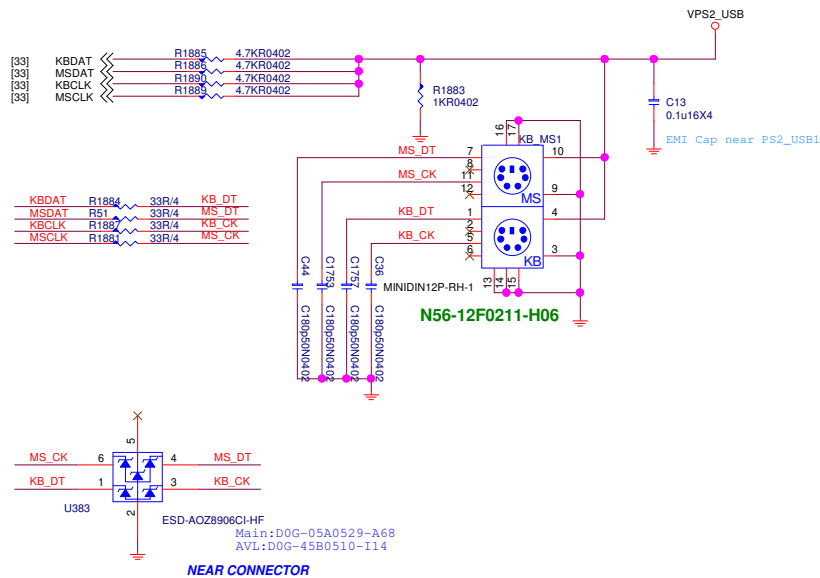
SERIAL PORT 1



PARALLAL PORT



PS2 Connector

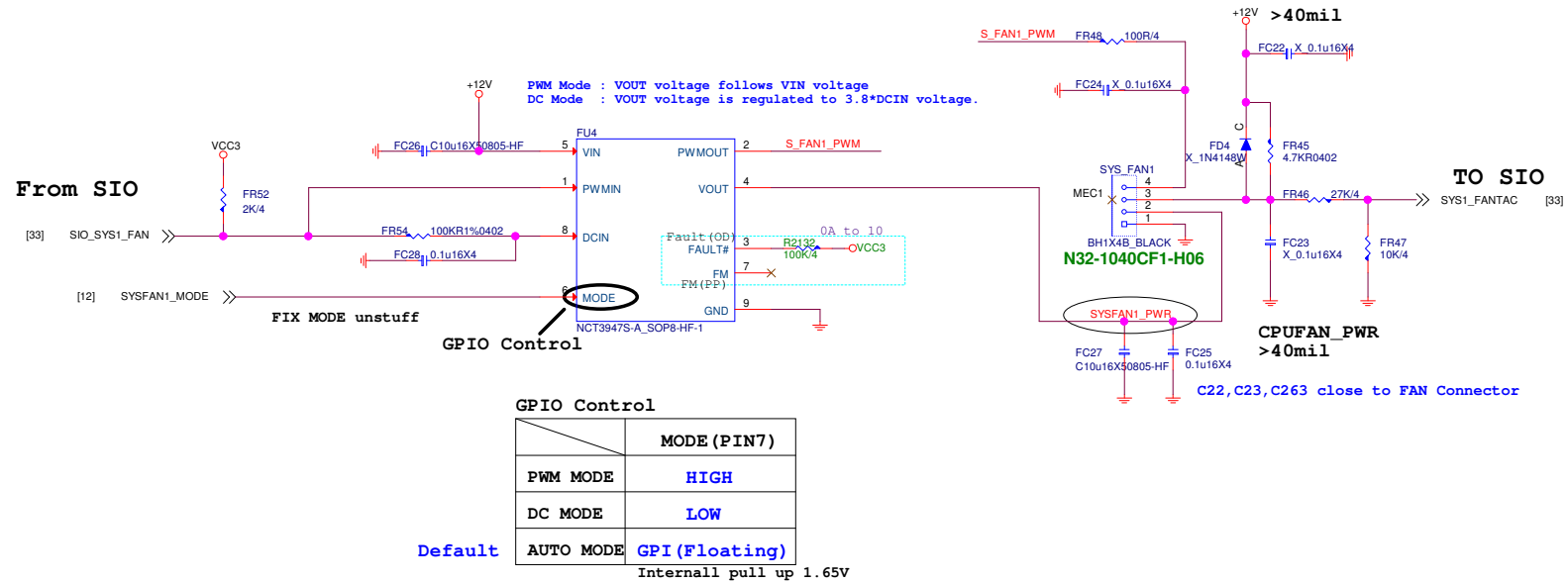


1. PWM/DC/OCF LED (現在是改成R/G/B3色LED)
2. GPIO可以由BIOS切換 PWM/DC MODE
3. OCF拉回GPIO給BIOS認
4. PWM OR DC FAN拉回GPIO給BIOS認
5. FAN轉速加快的時候由SOFTWARE控制GPIO讓燈的變化

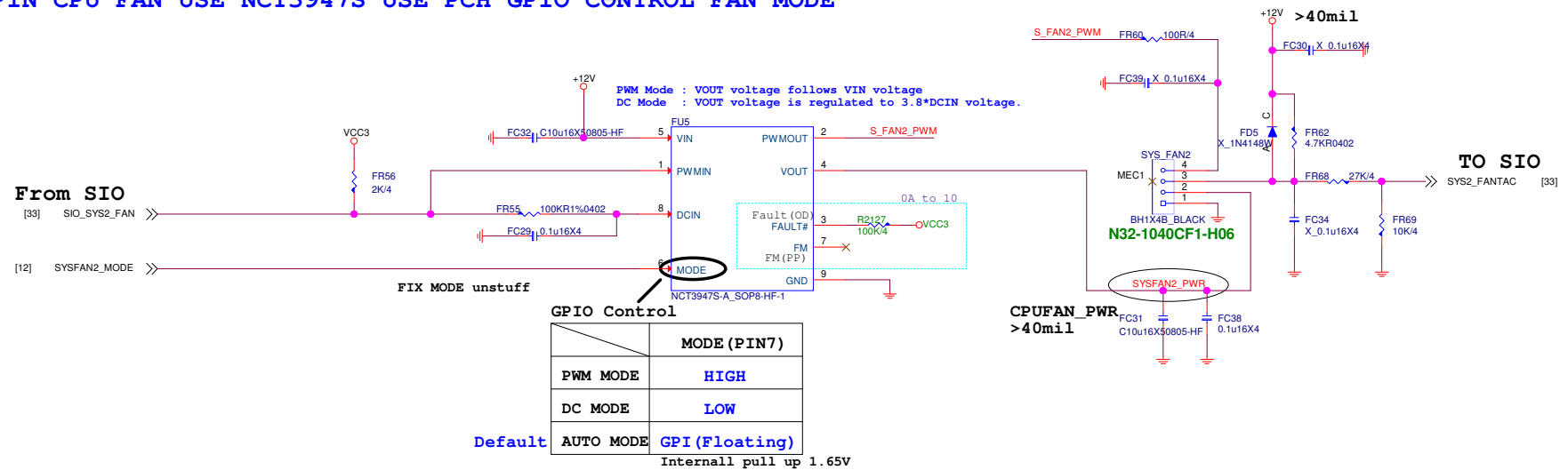


TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

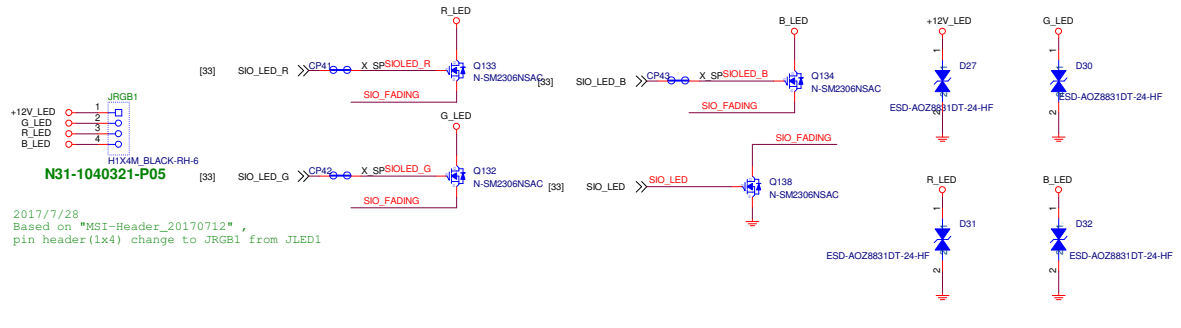
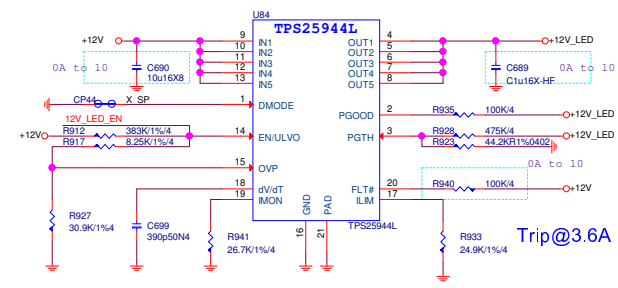
2.GPIO可以由BIOS切换 PWM/DC MODE



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



JLED



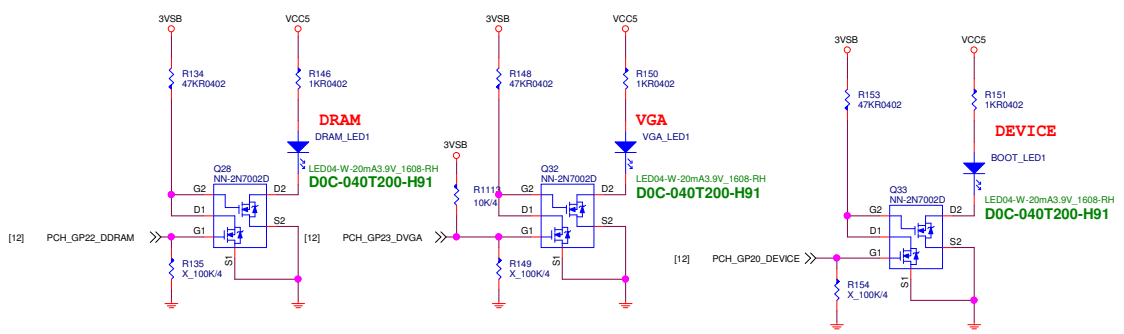
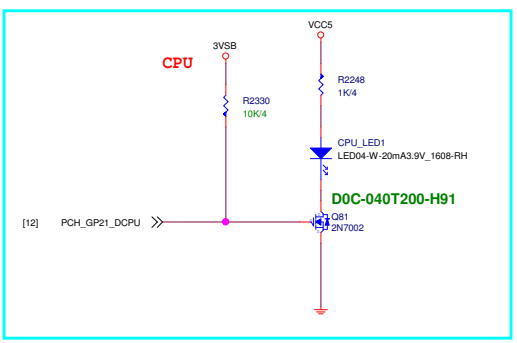
AUDIO LED

2018.10.24 7C39 1.0 remove Audio LED

BOTTOM LED

EZ DEBUG

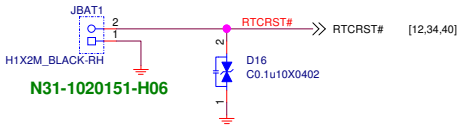
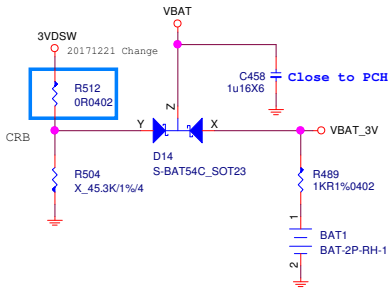
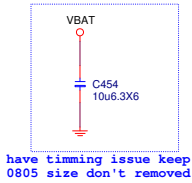
白 : M:D0C-040T200-H91/ S:D0C-040S200-E07*4



GPIO 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)

關機斷電狀態下，4個LED先維持default全暗，開機通電後：
1.首先進行CPU check CPU LED 亮，check PASS後則CPU LED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)

VBAT



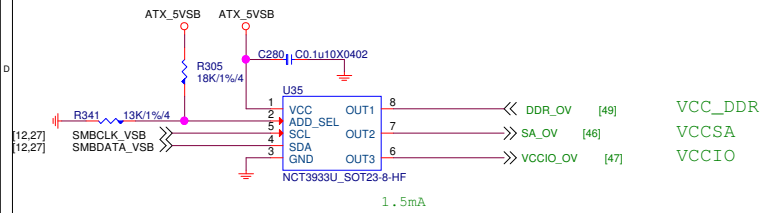
<https://vinafix.com/>

Vinafix.com

UPI VOLTAGE CONSOLE

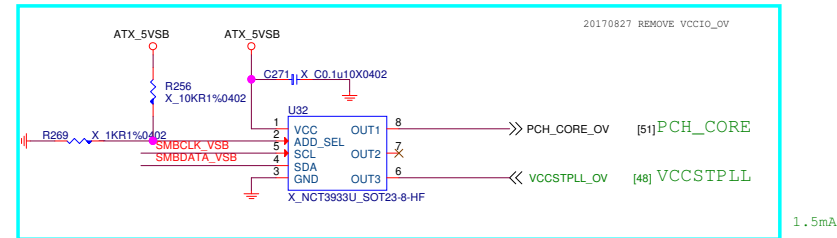
0x26:RH=18K,RL=13K

should combine to one 3933 IC ?

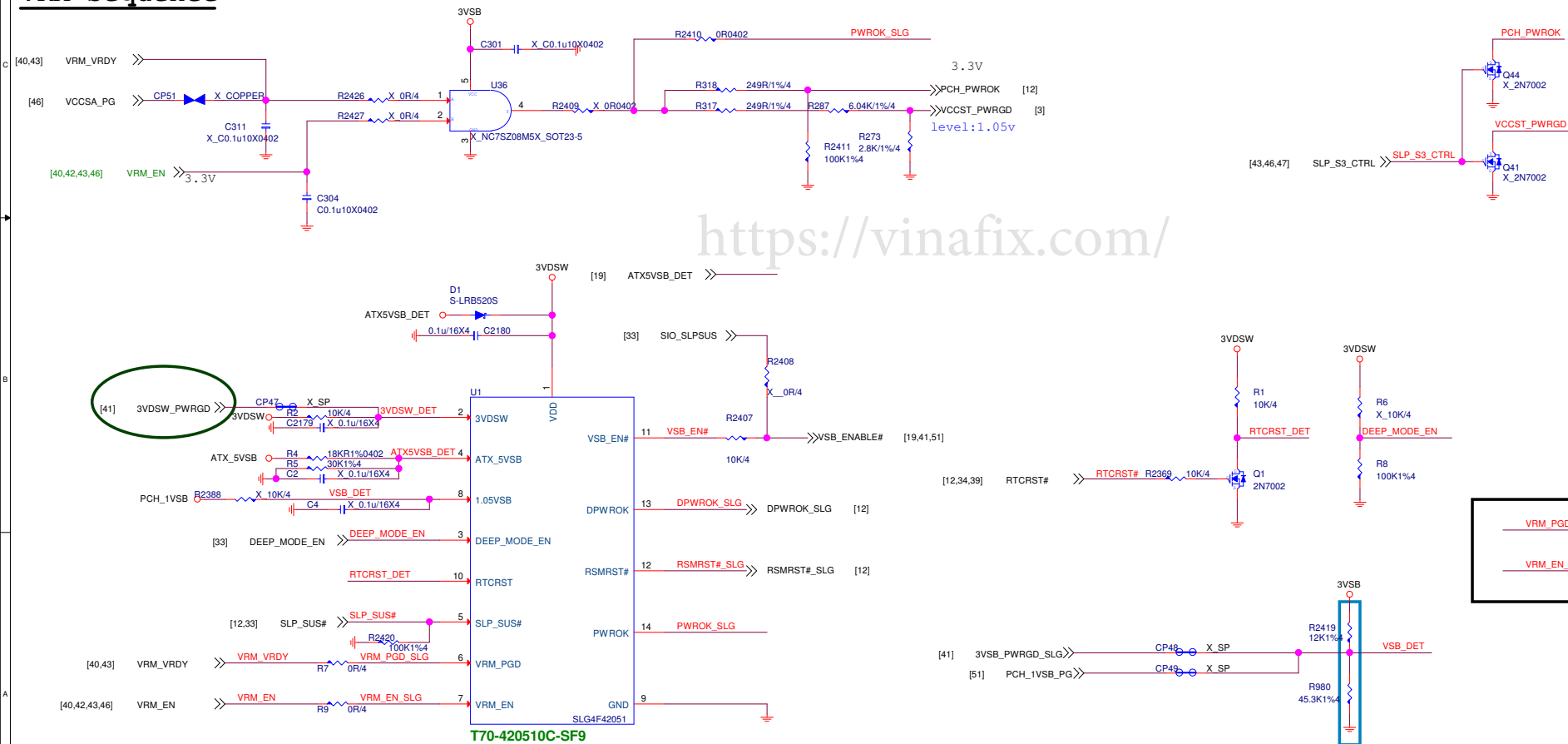


UPI VOLTAGE CONSOLE

0x20:RH=10K,RL=OPEN



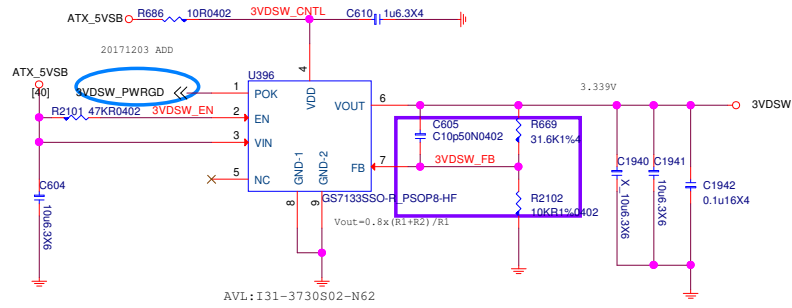
VRM Sequence



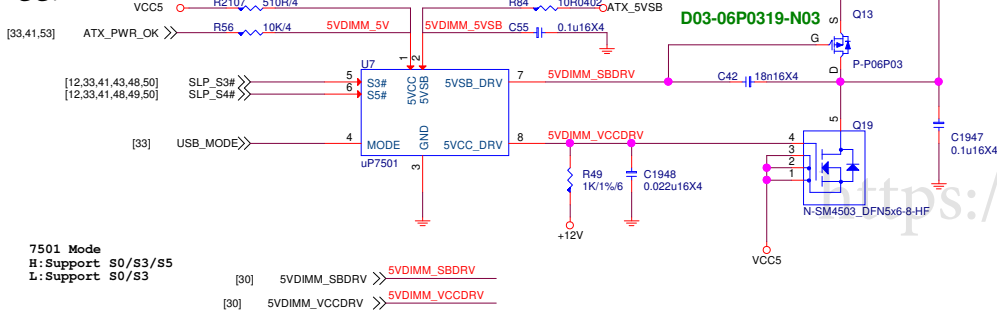
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Title			
OV-NCT3933/Sequence			
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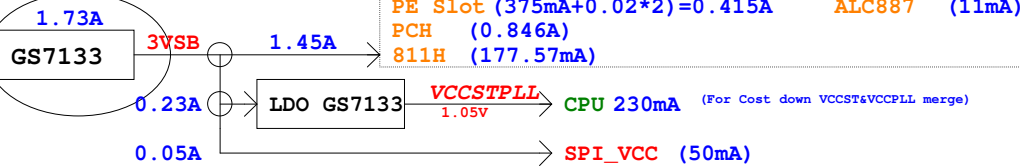
3VDSW



5VDIMM FOR DDR

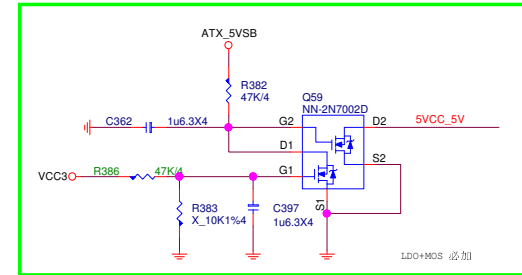
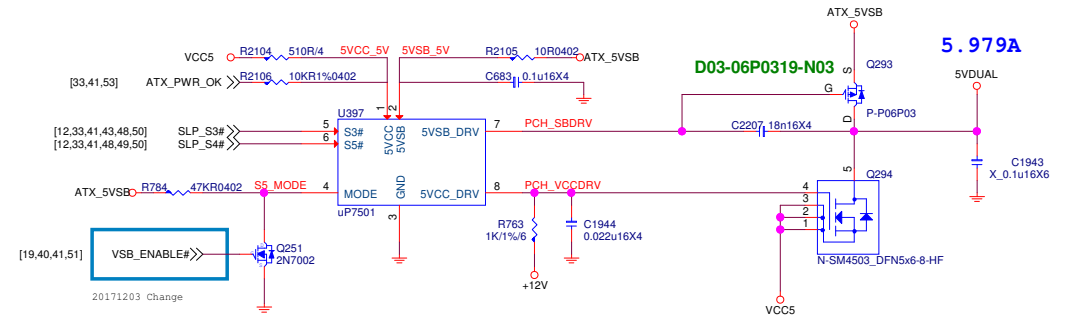


7.022A

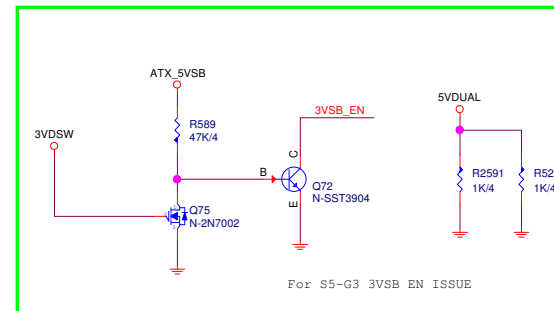
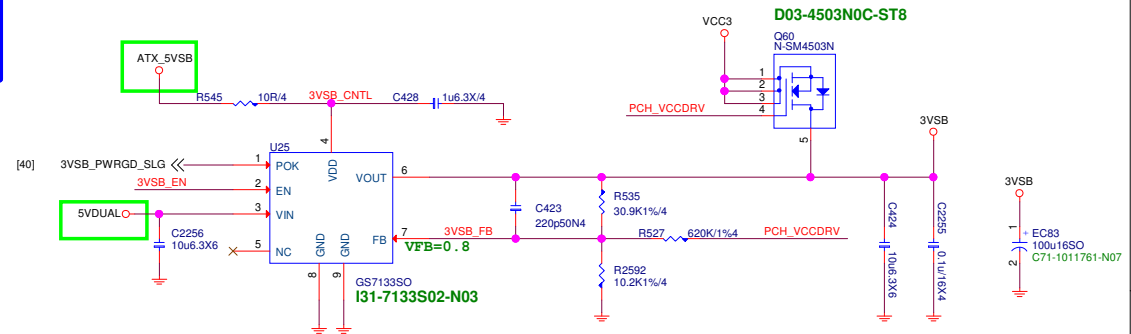


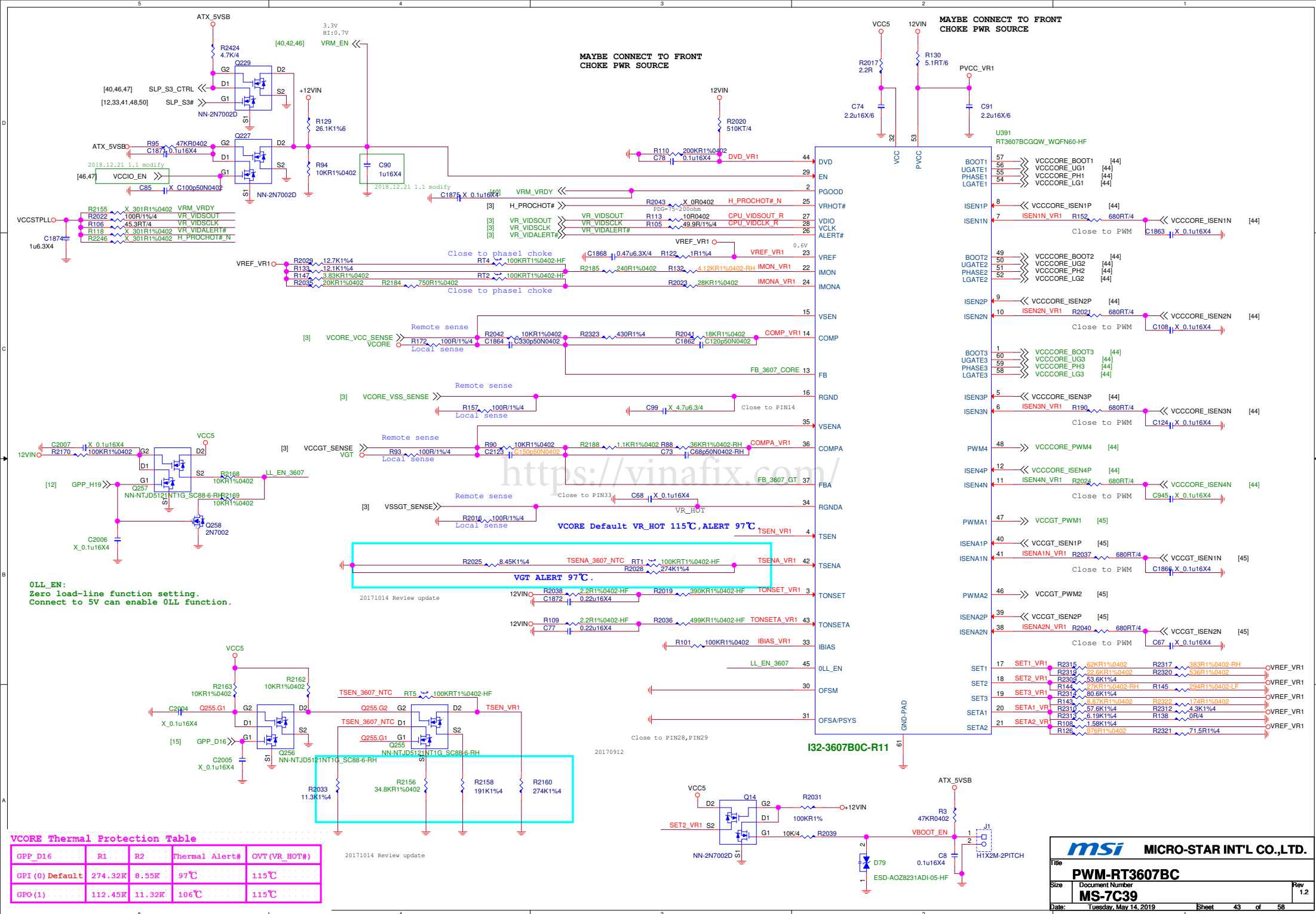
5VDUAL

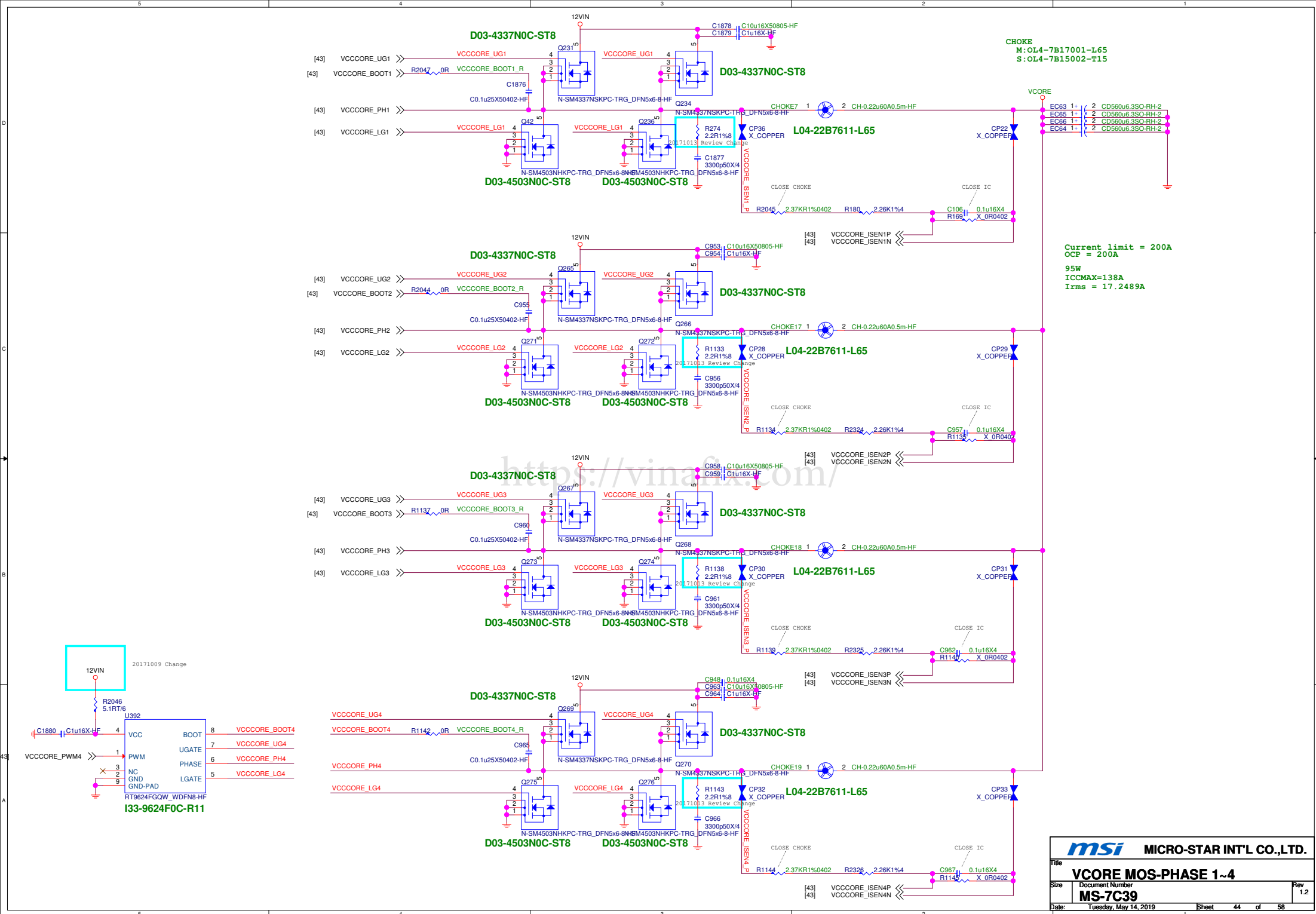
5VDUAL is power source of 1P0SB

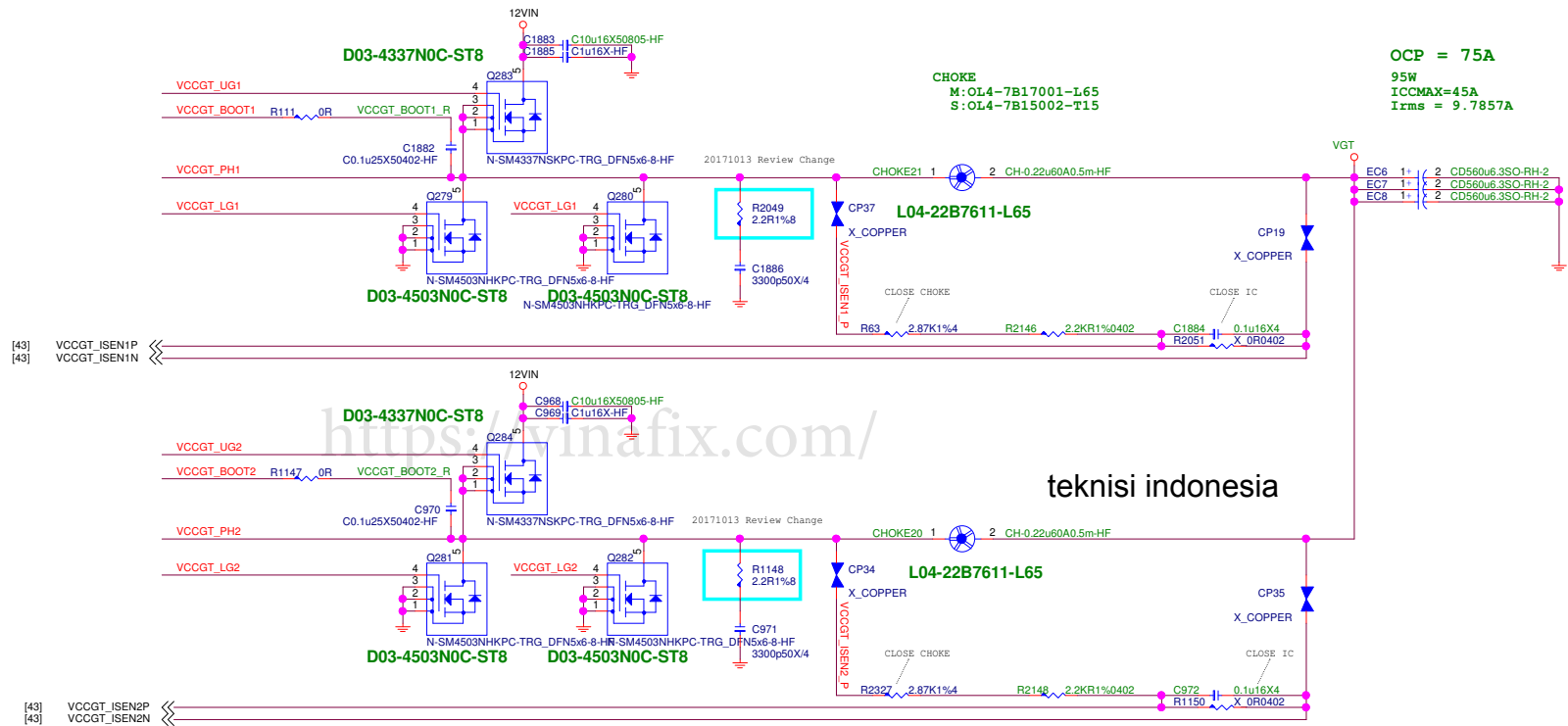
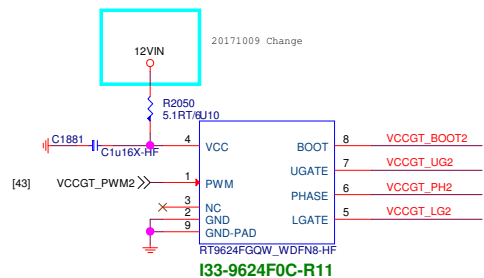
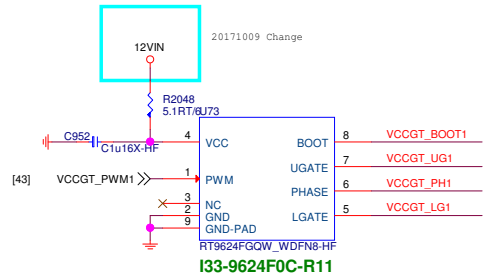


3VSB cost down@3.3V



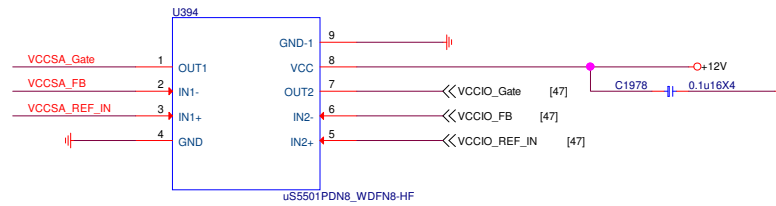




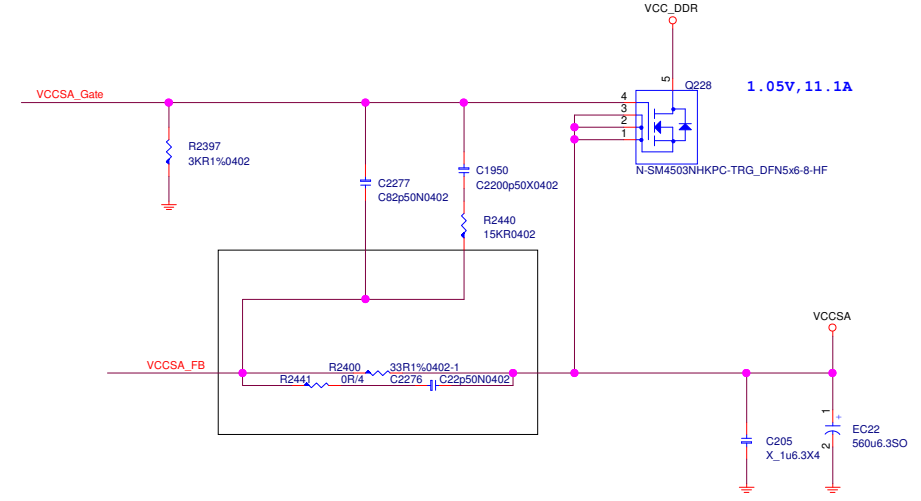
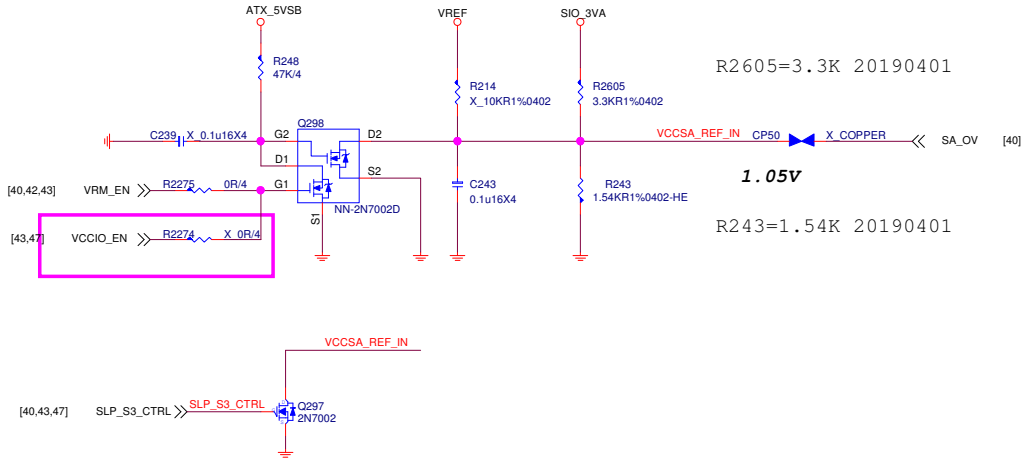


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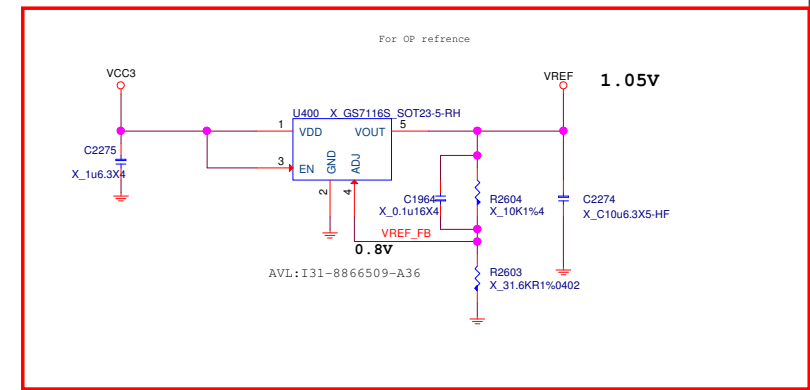
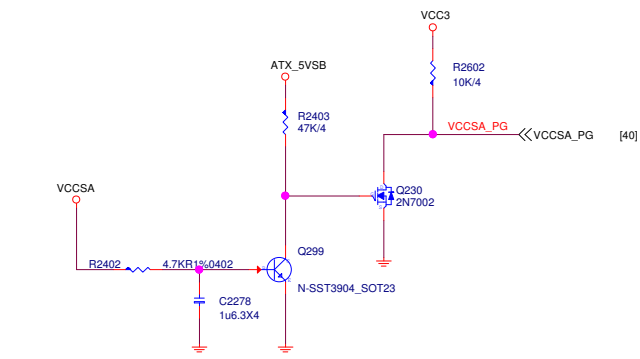
SA Power:1.05V,11.1A



MOS RDS(on) = 3mohm @ MAX 4V
VCCDDR @ 1.2V-1.4V 4V
MOS power loss
(1.2-1.05)*11.1=1.665W
(1.4-1.05)*11.1=3.885W

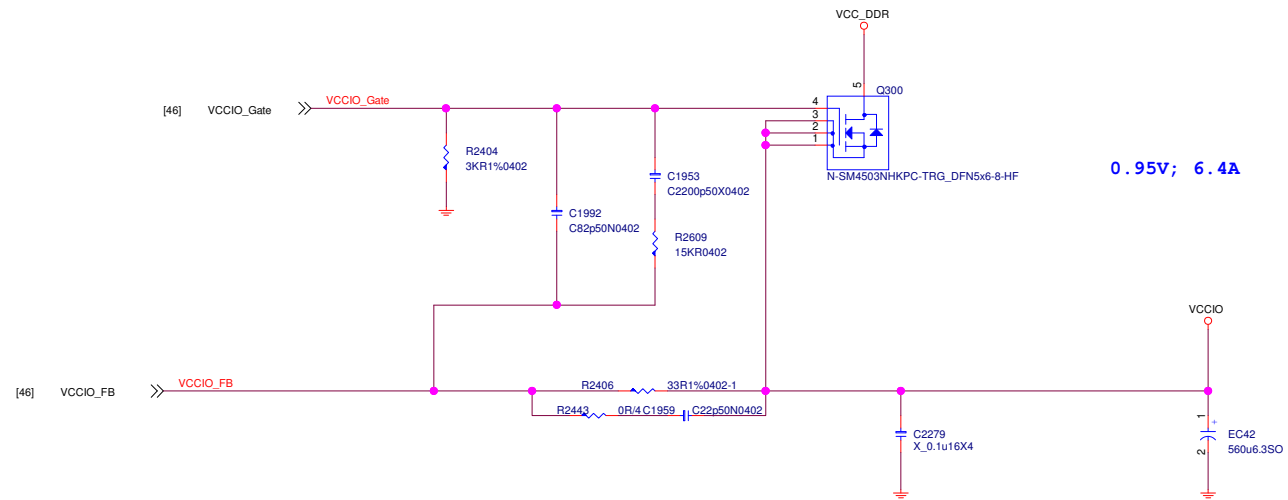


<https://vinafix.com/>

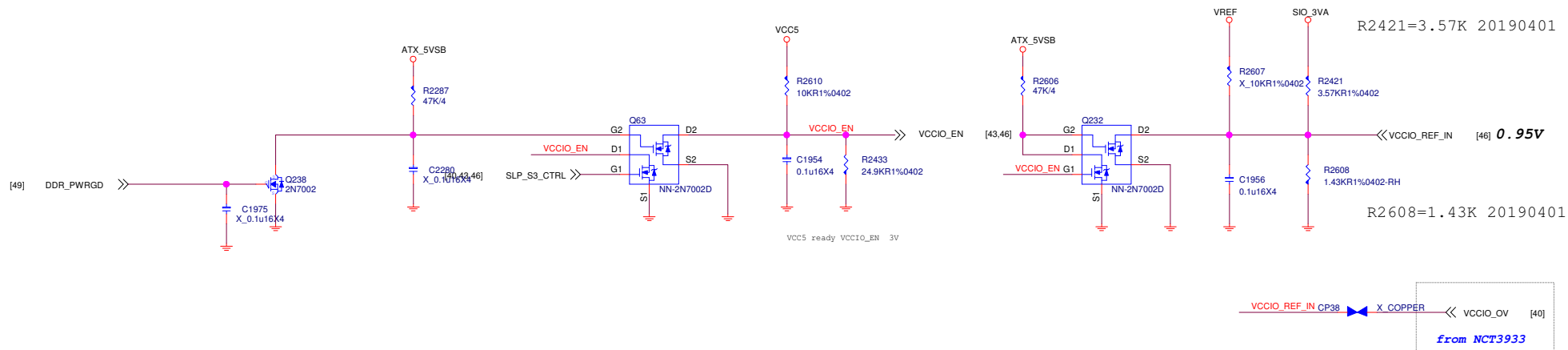


VCCIO

0.95V; 6.4A



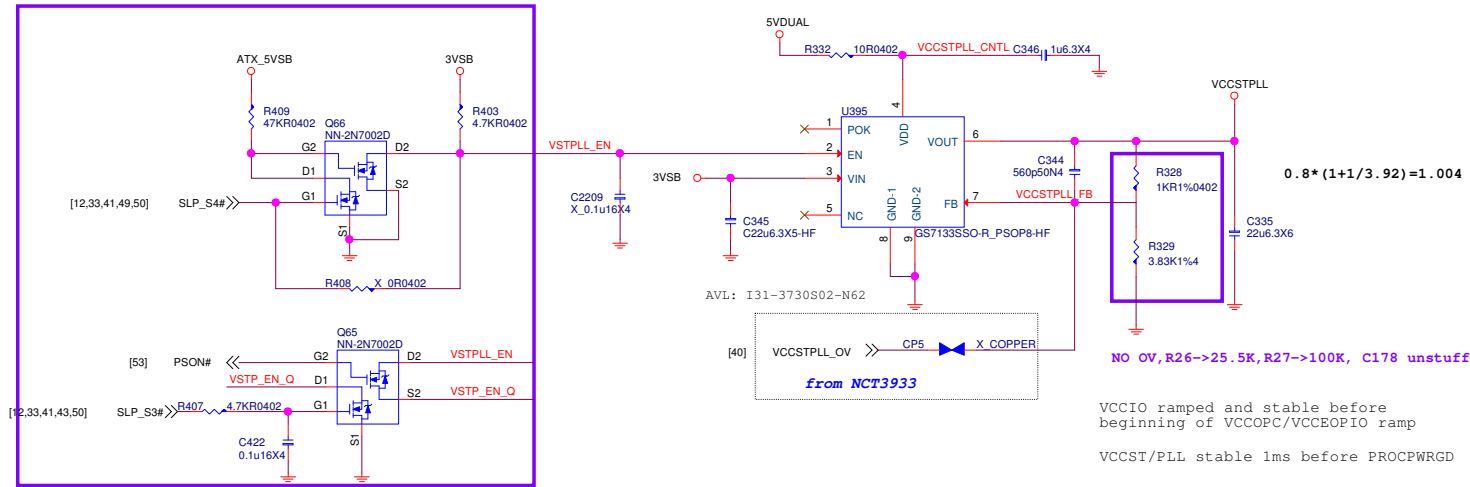
<https://vinafix.com/>



VCCSTPLL

1.05V; 230mA

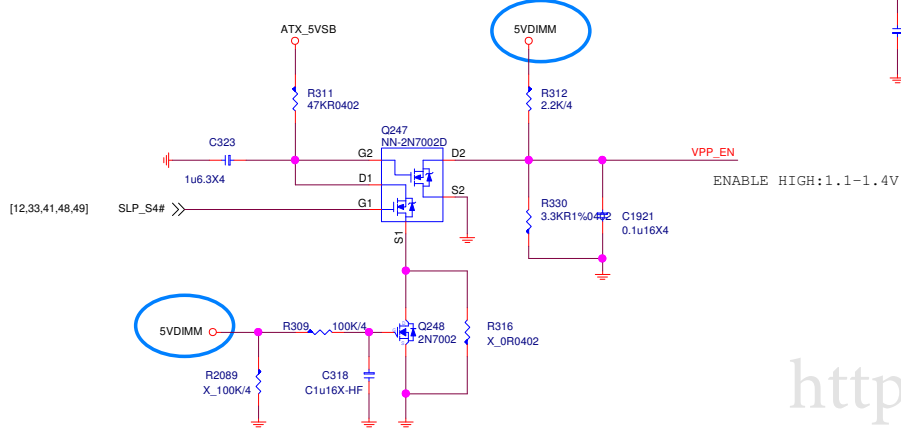
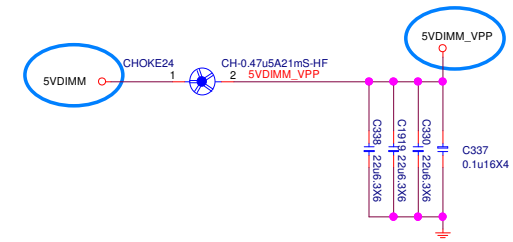
For Cost down VCCST&VCCPLL merge



<https://vinafix.com/>

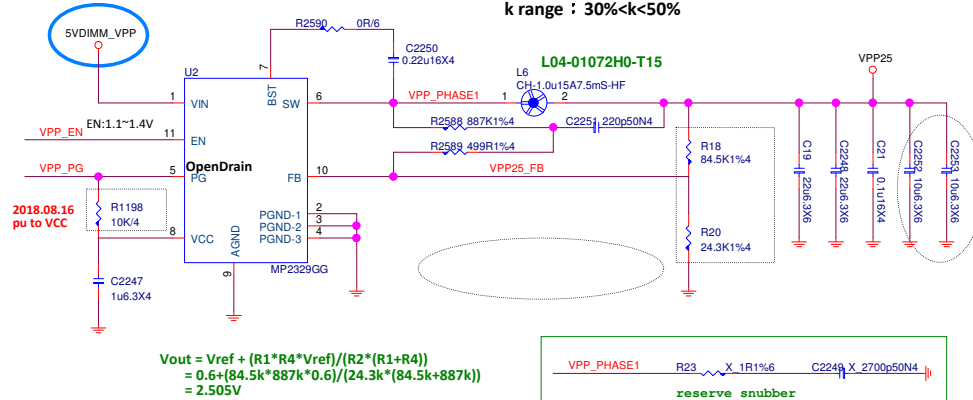
Vinafix.com

4DIMM :2.24A FOR DDR VPP2.5V



To make sure VPP EN after 5VDIMM stable

VPP25 Power 2.5V; 2.24A



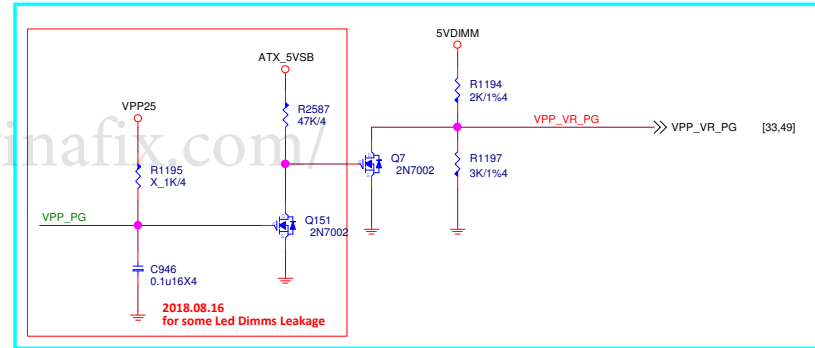
$$L = ((V_{in} - V_{out}) / (F_{sw} * k * I_{out_max})) * (V_{out} / V_{in})$$

$$= 0.9259 \mu H \text{ (K = 30\%)}$$

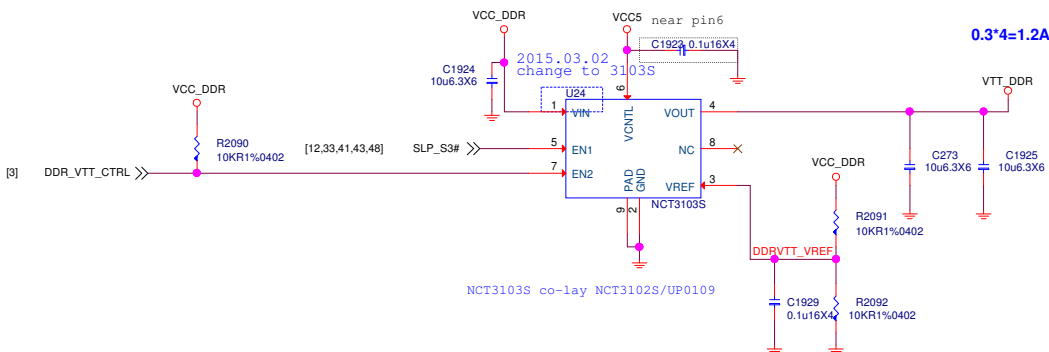
$$L = ((V_{in} - V_{out}) / (F_{sw} * k * I_{out_max})) * (V_{out} / V_{in})$$

$$= 0.5556 \mu H \text{ (K = 50\%)}$$

$$k \text{ range : } 30\% < k < 50\%$$



DDR VTT Power



$$V_{TT_DDR} = V_{CC_DDR} - I_{DDR_VTT_CTRL} * R_{2090}$$

$$= 2.5V - 1.2A * 0.22 \Omega = 2.24V$$

PCH_1VSB

1.0V; 11.626A

Current limit= $6.65K \cdot 10uA / 3.9mohm = 17.05A$
 Current limit= $6.65K \cdot 10uA / 5.1mohm = 13.04A$
 CHOKE Isat=18A
 From CHOKE I-L Curve, when I=25A, L=0.6uH.

Rdson (low) 4.5V
 D03-632BA0C-N03 :
 MAX:4.6mohm TYPE:3mohm

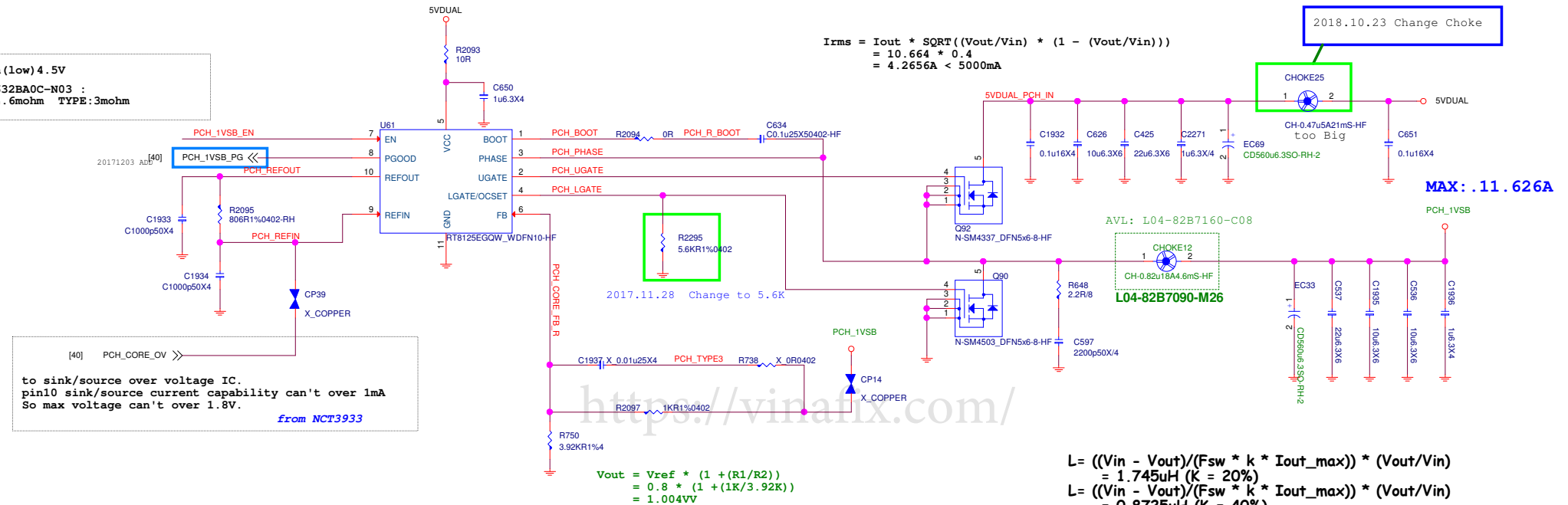
$$I_{in} = I_{OCP} \cdot V_{out} / 0.8 / V_{in} = 17.05A \cdot 1.0V / 0.8 / 5V = 4.2625A$$

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

$$= 10.664 \cdot 0.4$$

$$= 4.2656A < 5000mA$$

2018.10.23 Change Choke



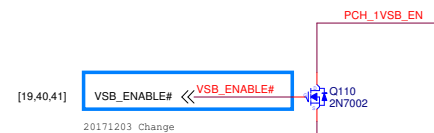
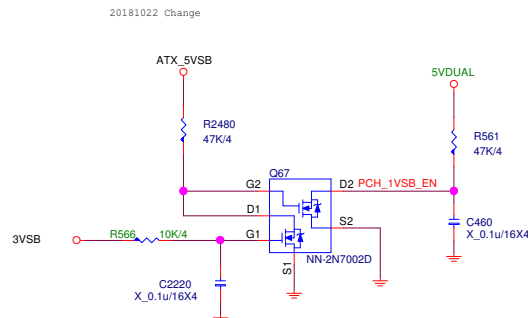
$$L = ((V_{in} - V_{out}) / (F_{sw} \cdot k \cdot I_{out_max})) \cdot (V_{out} / V_{in})$$

$$= 1.745uH (K = 20\%)$$

$$L = ((V_{in} - V_{out}) / (F_{sw} \cdot k \cdot I_{out_max})) \cdot (V_{out} / V_{in})$$

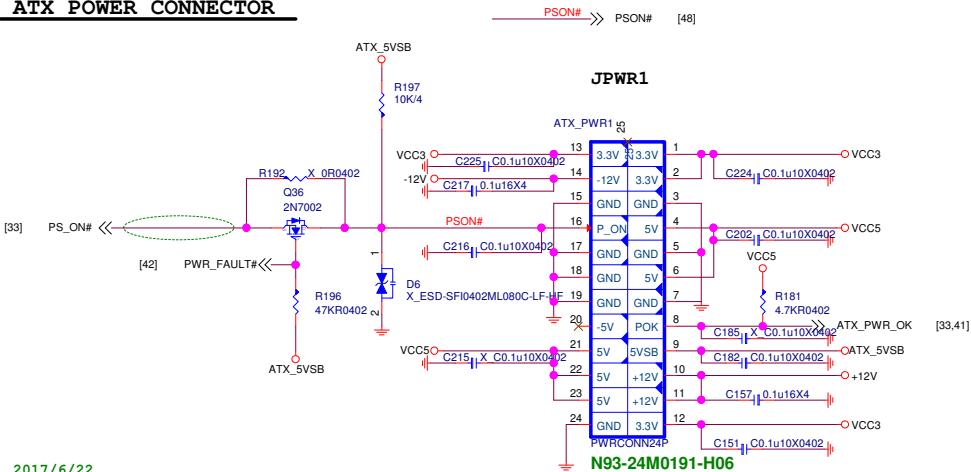
$$= 0.8725uH (K = 40\%)$$

K is the ratio between inductor ripple current and rated output current.
 $20\% < k < 40\%$



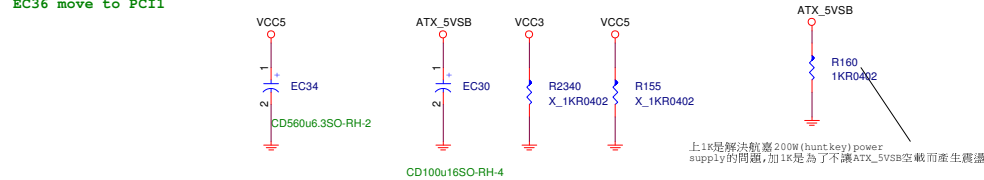
<https://vinafix.com/>

ATX POWER CONNECTOR

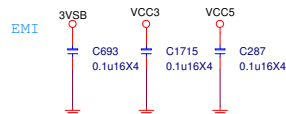
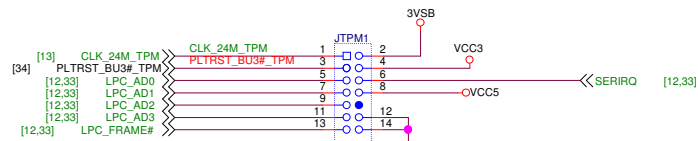


2017/6/22
EC34, EC36 are changed from 470uF to 560uF by buyer request

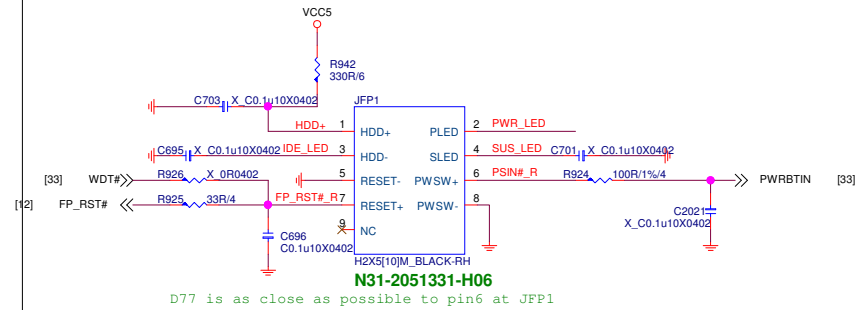
2017/7/6
EC36 move to PCII



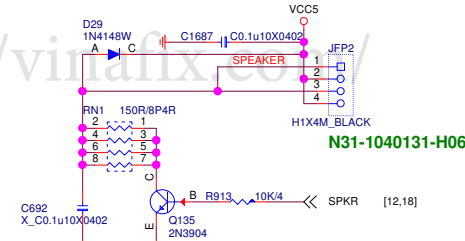
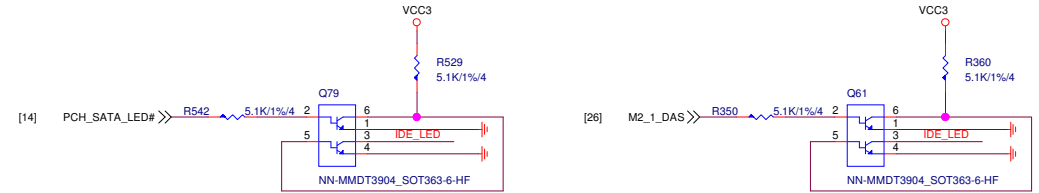
TPM Pin Header



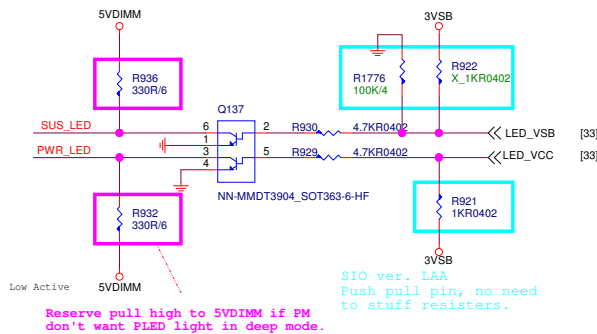
FRONT PANNEL



D77 is as close as possible to pin6 at JFP1

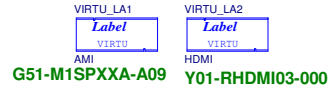
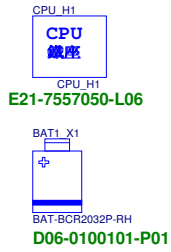


Front Panel LED



7C39 remove JTBT1

msi MICRO-STAR INT'L CO.,LTD.	
Title ATX Connector/F_Panel	
Size Document Number MS-7C39	Rev 1.2
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FOR PRO

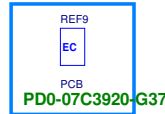


FOR BAZOOKA B360

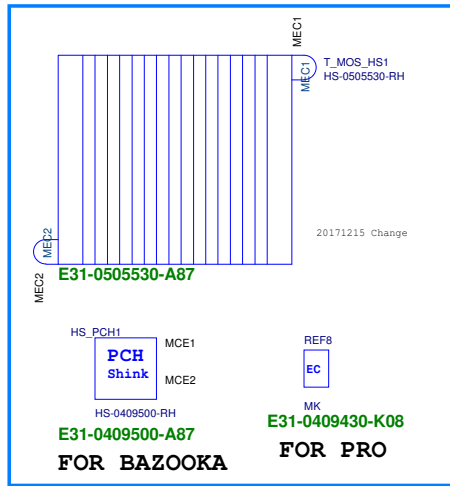
FOR PRO



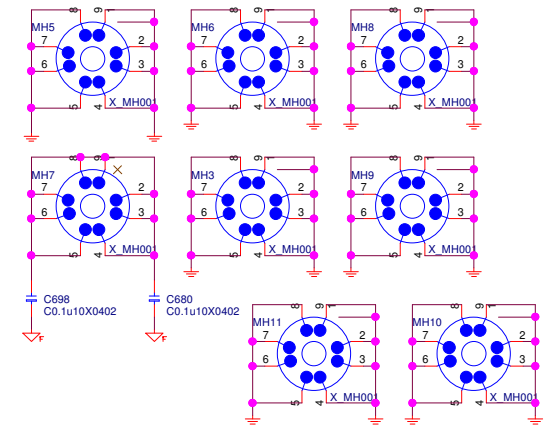
PD0-07C3912-G37
PD0-07C3912-E48



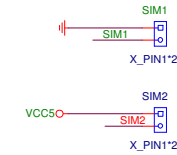
FOR BAZOOKA



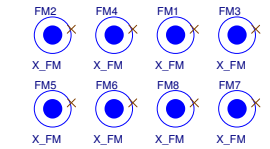
Mounting Holes



Simulation



Optical Fiducial Marks-120



Vcheck

BOTTOM Side

