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# MS-7995

ITX:170\*170

Ver: 10

## Intel -SkyLake-S plamform

### CPU:

LGA1151

CPU POWER PAK \*3 Phase

GT POWER PAK \*2 Phase

### System Chipset:

SPT-H :B150 colay H110 colay H170

### Onboard Chip:

HD Audio Codec: ALC887

SIO: NCT5563D

Flash ROM: SPI 128 MB or 64MB

### PWM:

VCORE - RT3606

DDR - RT8231

PCH(1.0V) - RT8125E

VCCSA - RT8125E

### Main Memory:

DDR4 \* 2 (Dual Channel)

### Load Switch:

VCCIO - APE8939

VCCSTPLL - APE8937

### ACPI:

5VDAUL:uP7501


5VDIMM:uP7501

3VSB:GS7133+PN MOS

3VDSW:GS7133

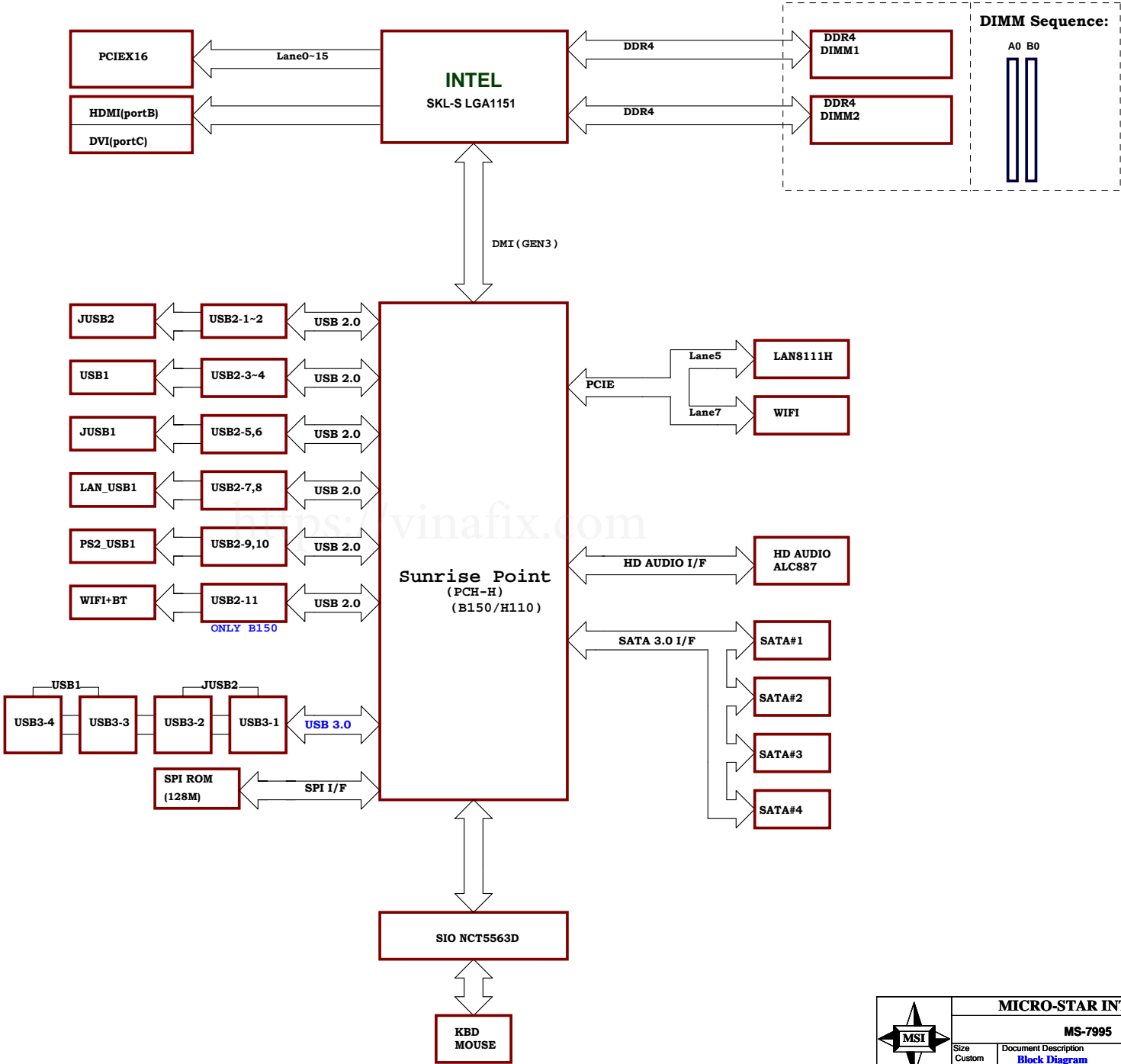
### Expansion Slots:

PCI Express (X16) Slot \* 1

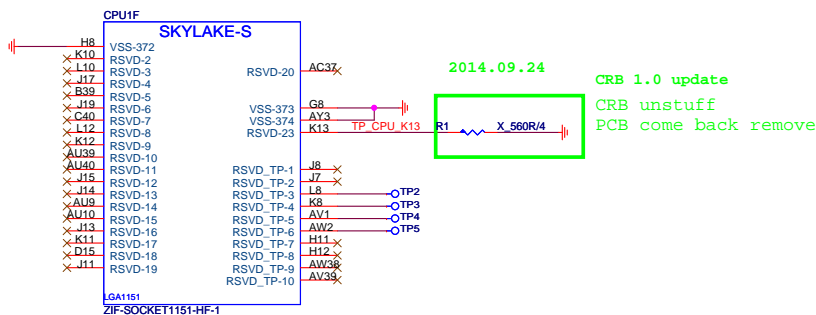
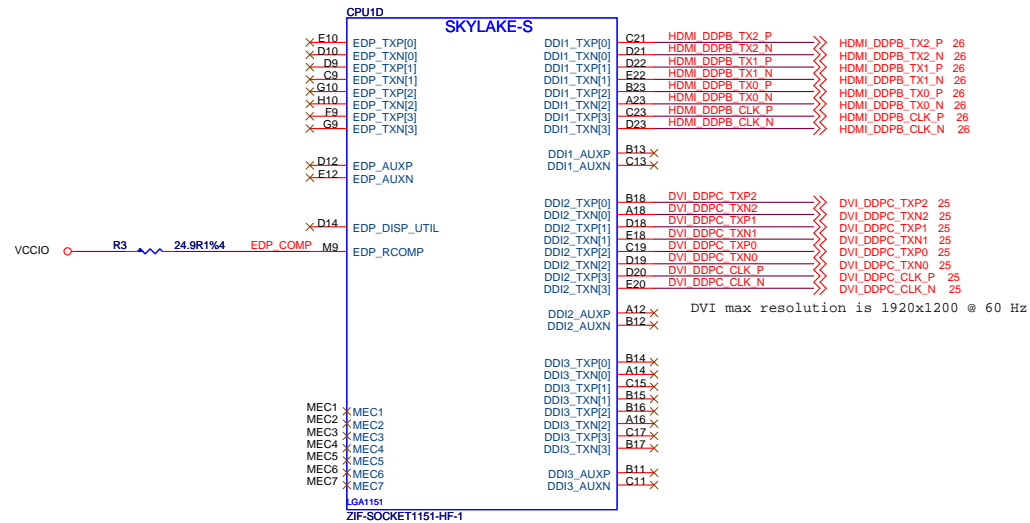
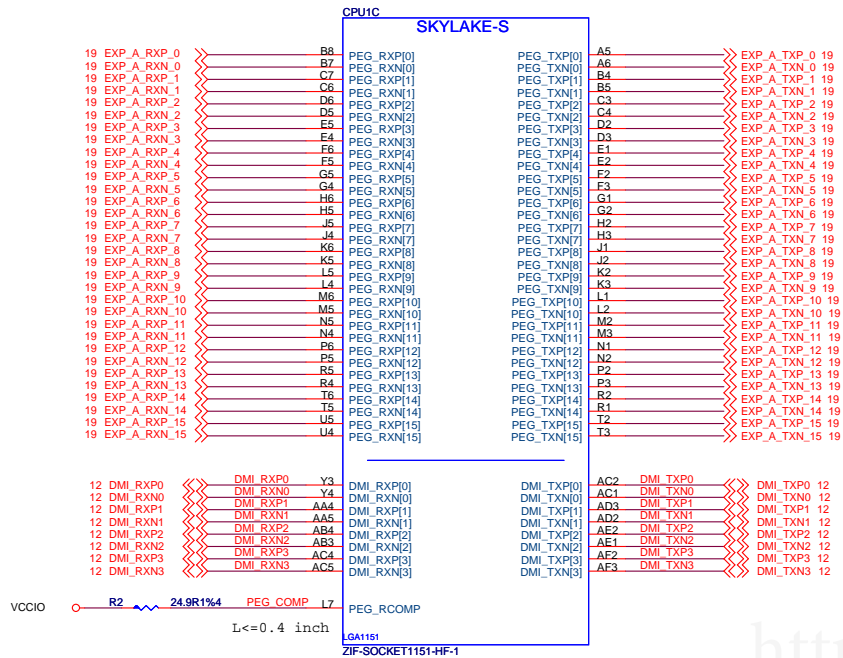


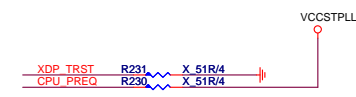
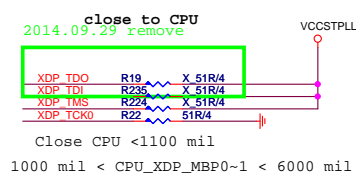
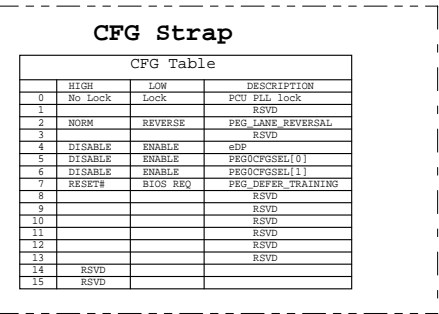
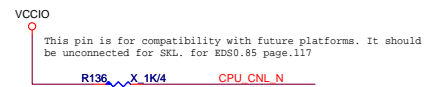
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MS-7995 Block Diagram

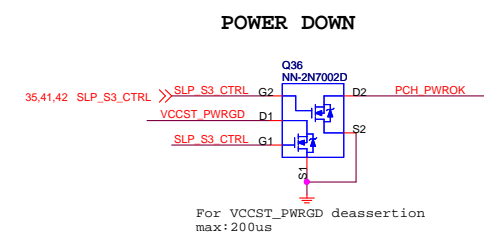
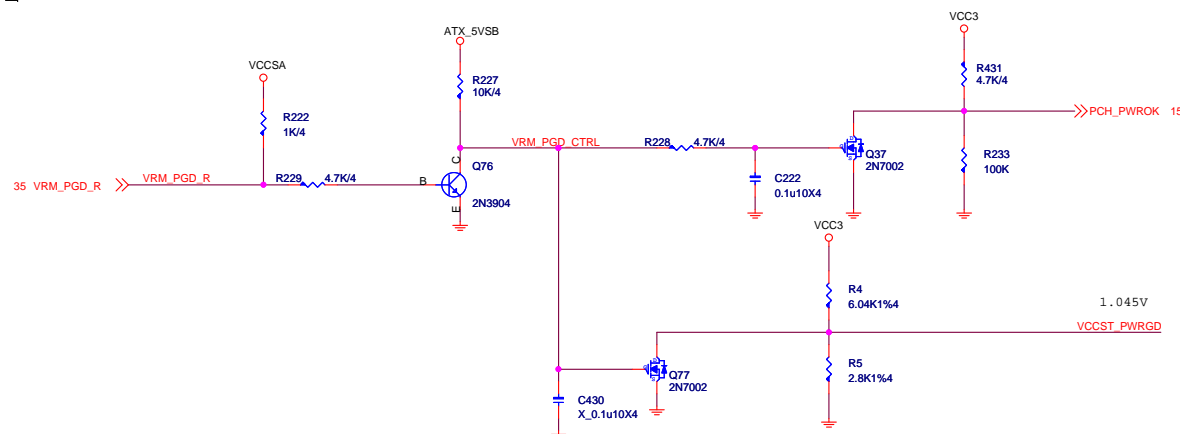




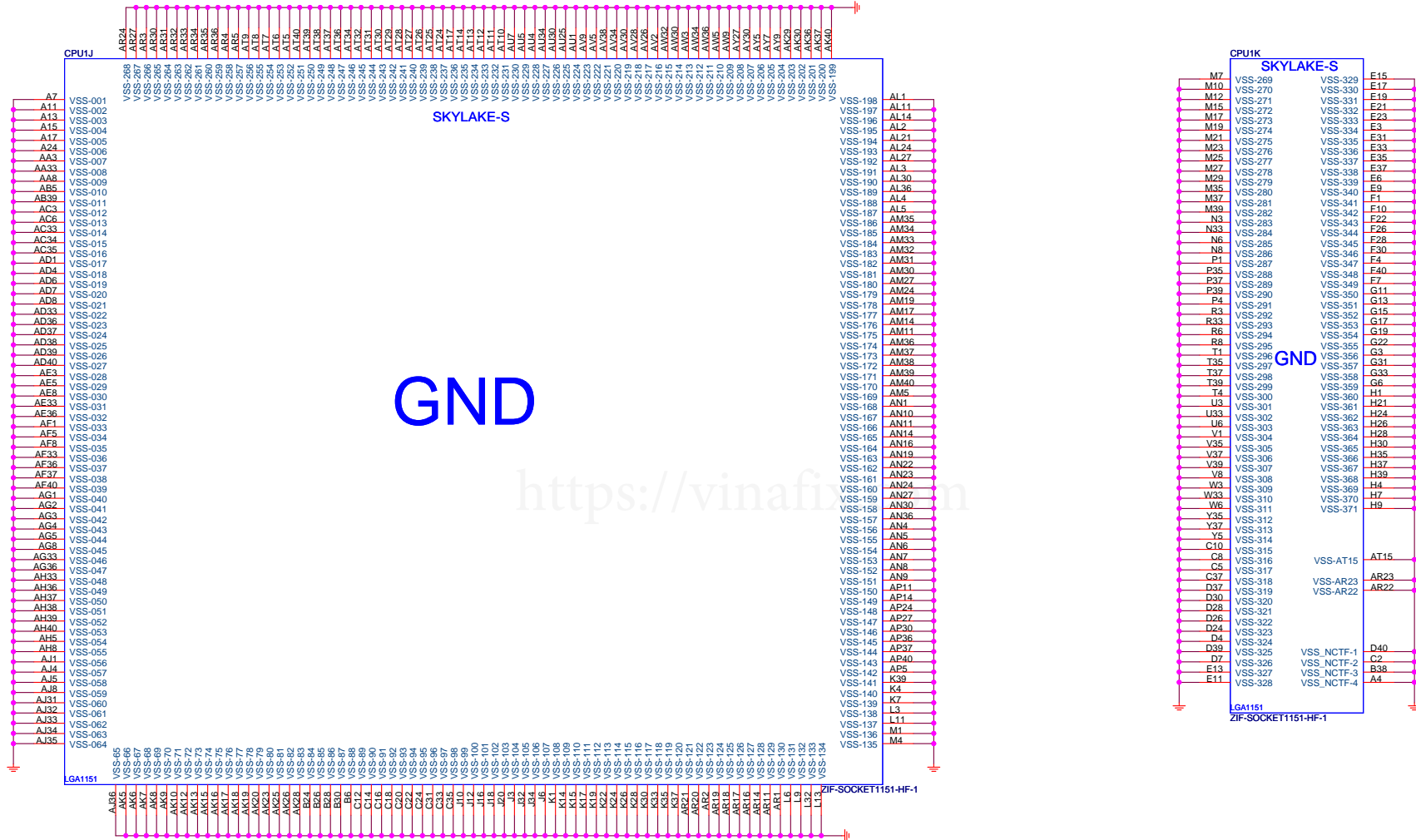




	HIGH	LOW	DESCRIPTION
0	NO LOCK	LOCK	PCI PGD LOCK
2	NORM	REVERSE	PGD LANE REVERSAL
3			RSVD
4	DISABLE	ENABLE	eDP
5	DISABLE	ENABLE	PGDPCFGSEL[0]
6	DISABLE	ENABLE	PGDPCFGSEL[1]
7	RESET#	RSTO REQ	PGD RESET TRAINING
8			RSVD
9			RSVD
10			RSVD
11			RSVD
12			RSVD
13			RSVD
14	RSVD		
15	RSVD		

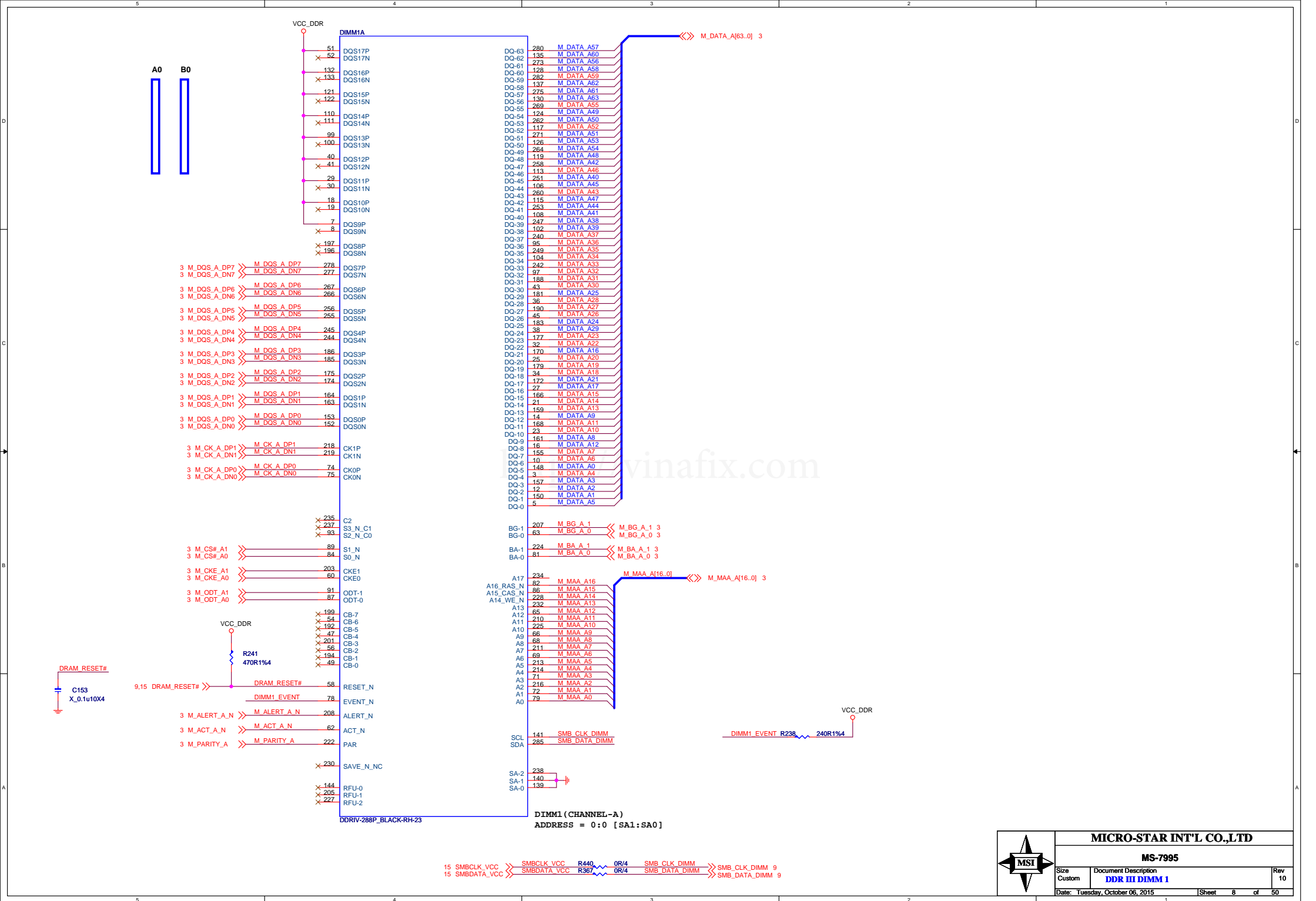




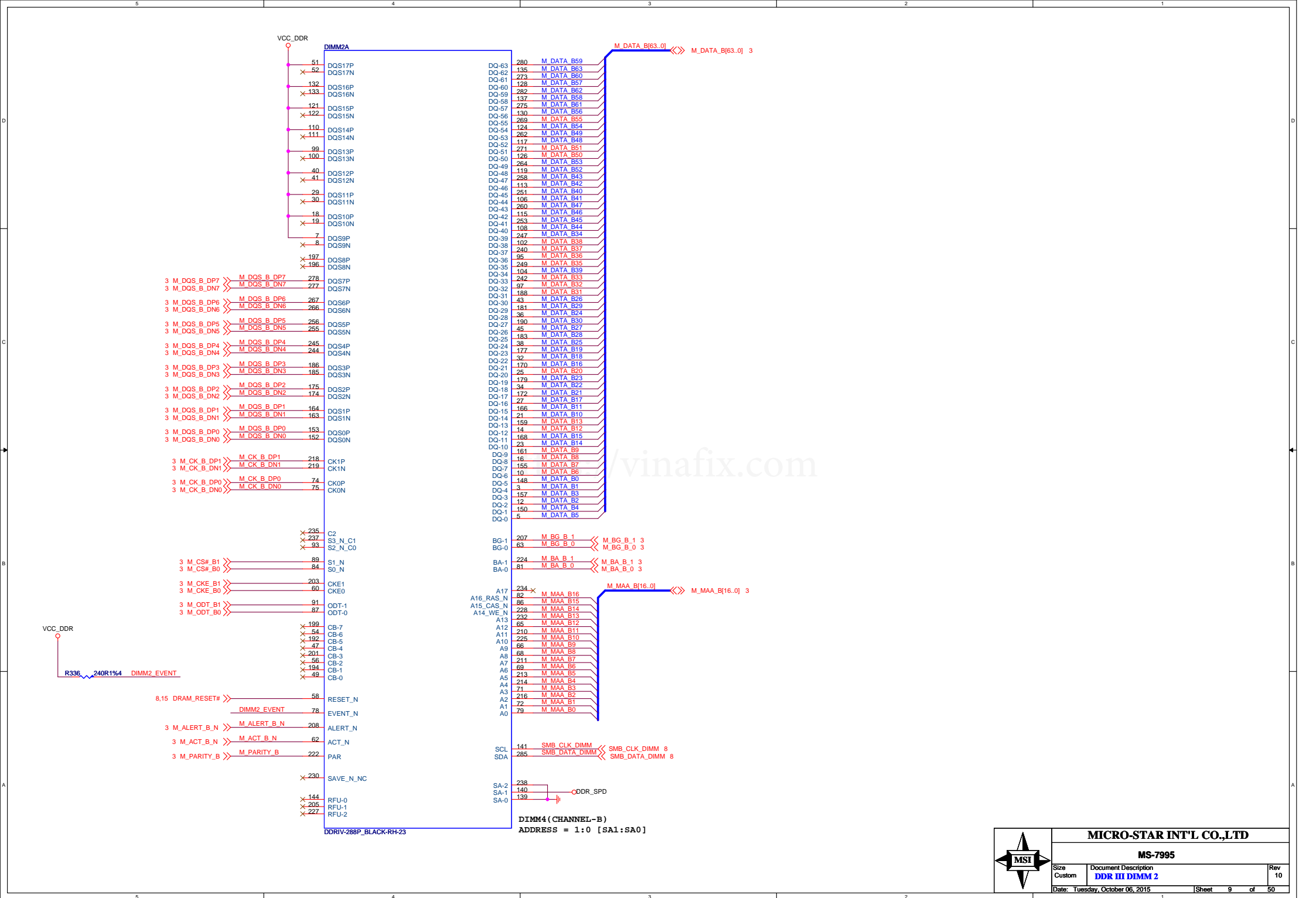


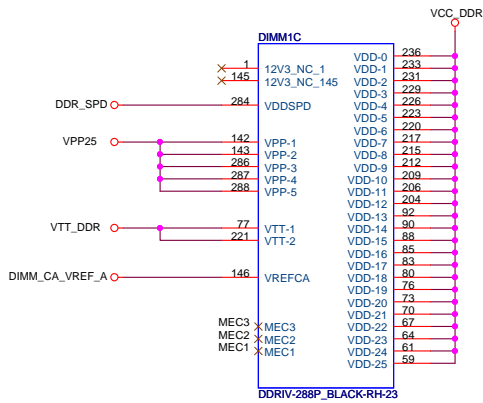
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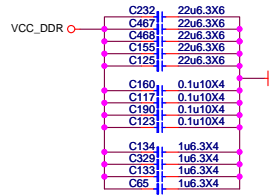
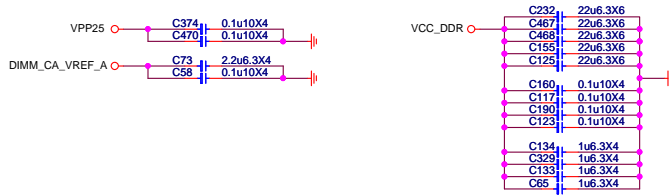
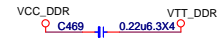
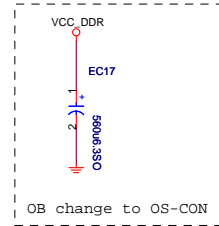




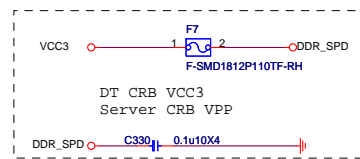
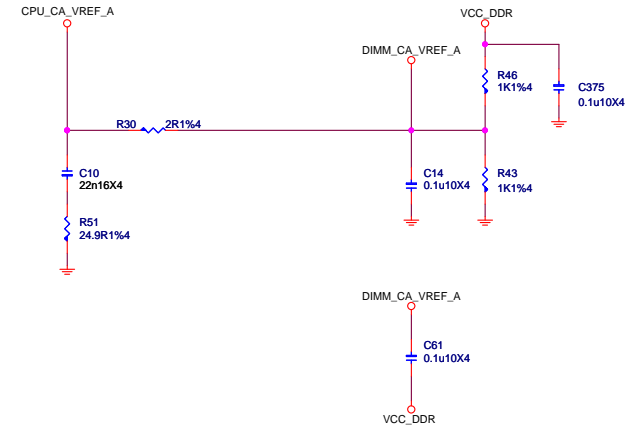
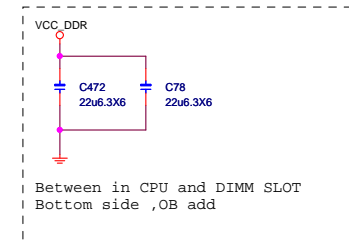
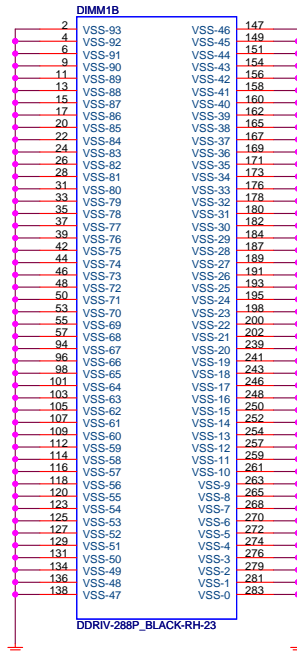
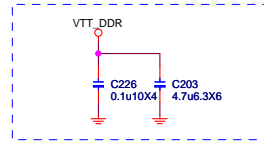




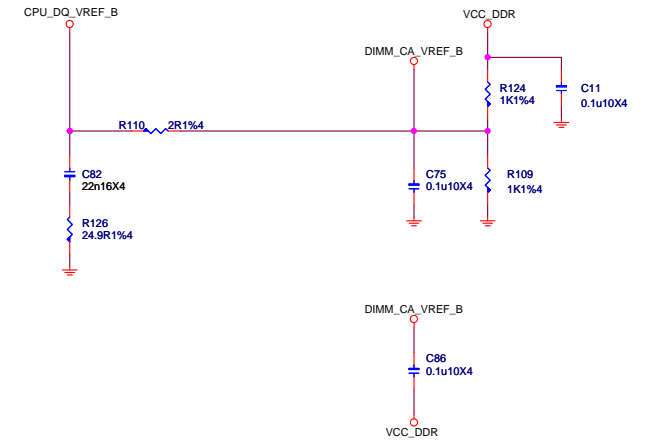
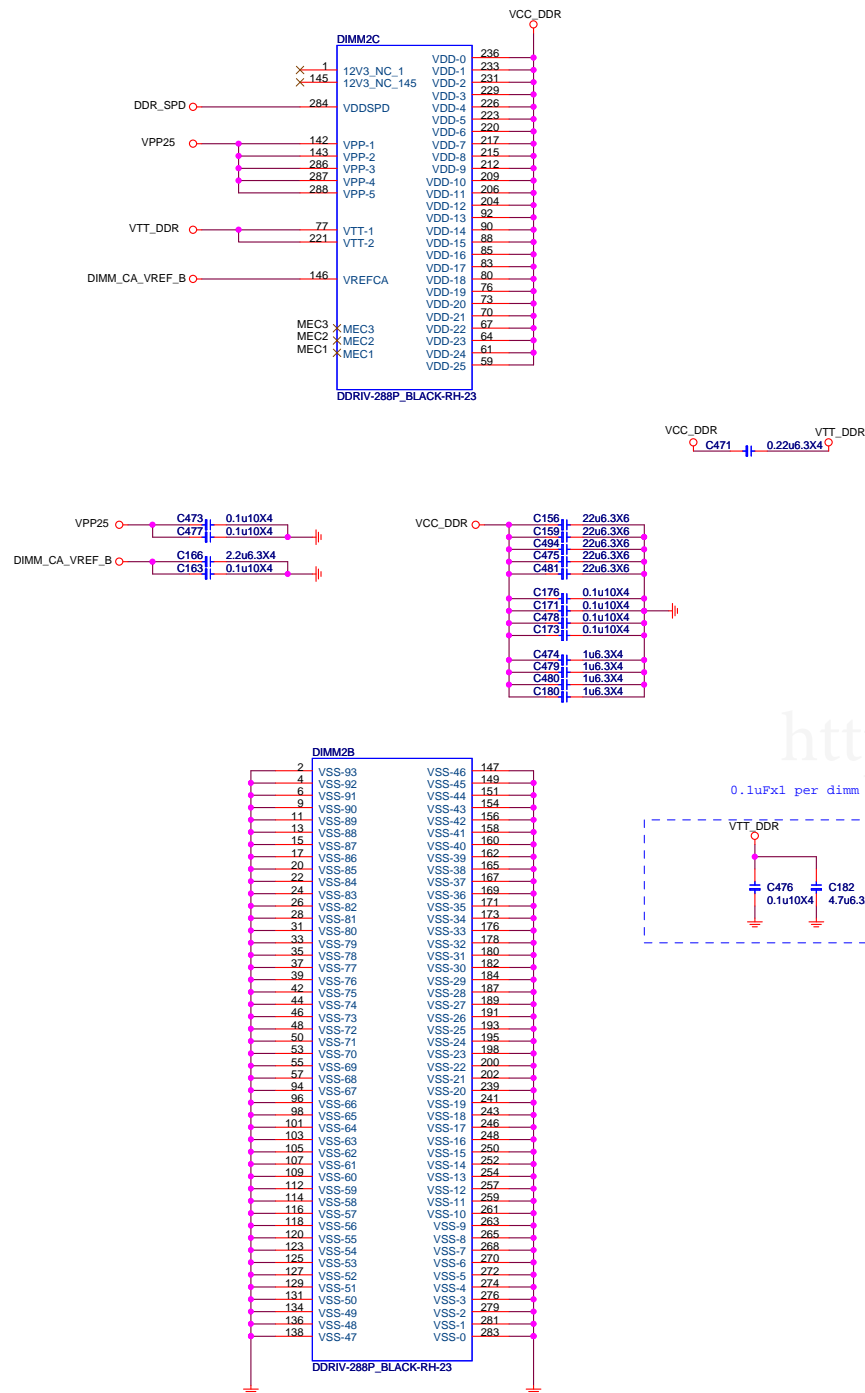
DIMM SLOT PN BY SPEC



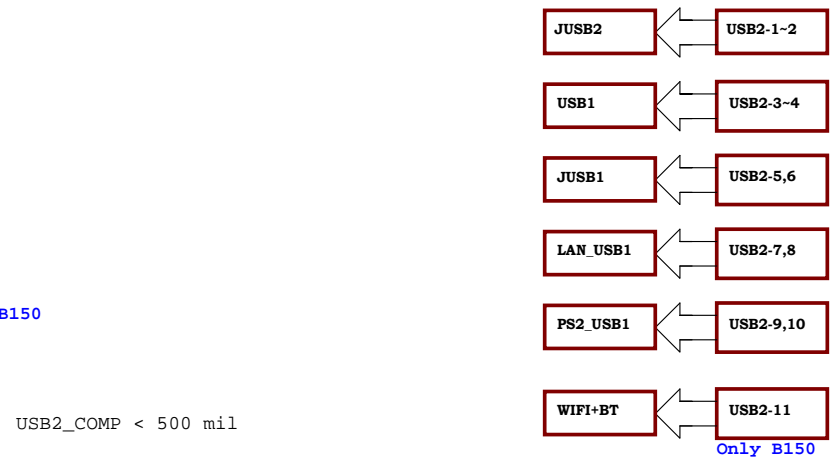
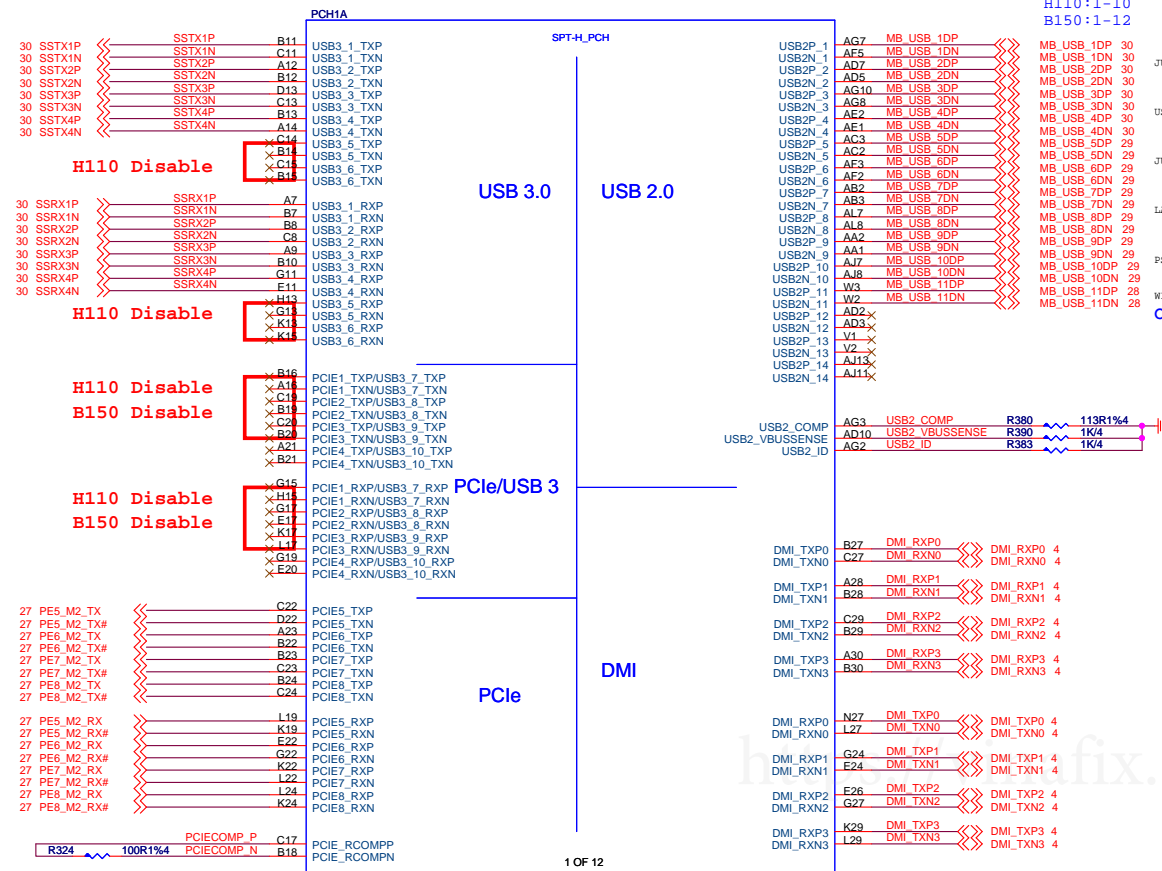
0.1uFx1 per dimm



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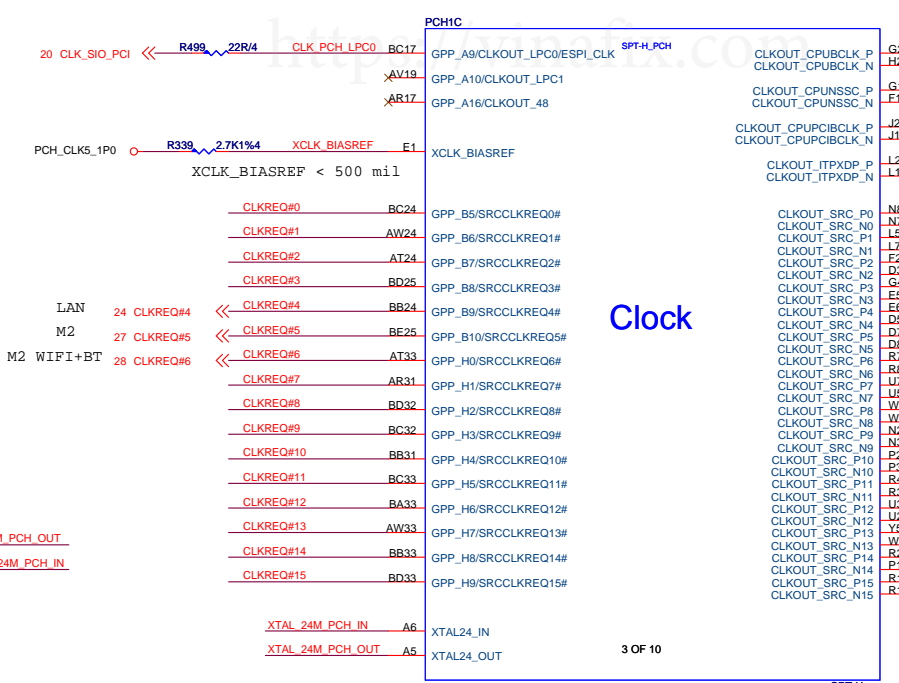
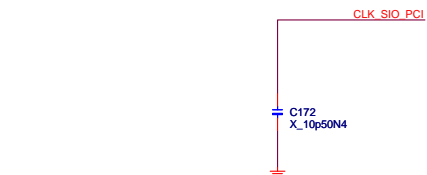
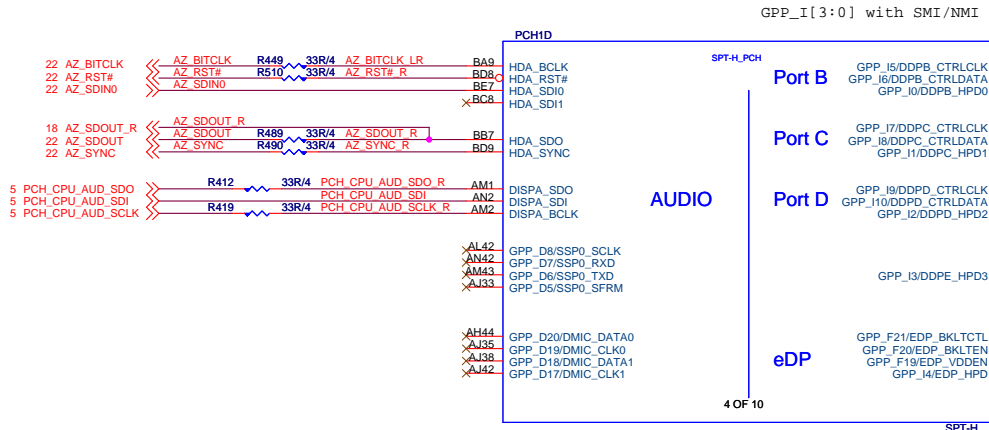
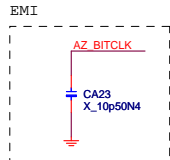
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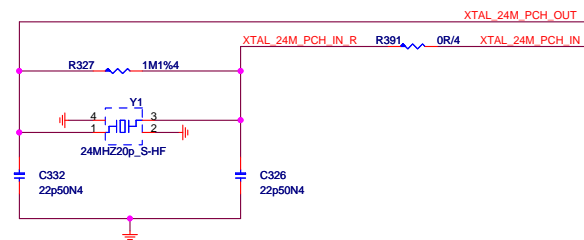
PCIECOMP\_P Length Match < 5mil  
PCIECOMP\_N

sku	1	2	3	4	5	6	7	8	9	10	11	12	13	14
H110	USB3/ OTG	USB3/ SSIC	USB3/ SSIC	USB3	N/A	N/A	N/A	N/A	N/A	LAN Only	PCle/ LAN	PCle	PCle	PCle
B150	USB3/ OTG	USB3/ SSIC	USB3/ SSIC	USB3	USB3	USB3	N/A	N/A	N/A	LAN Only	PCle/ LAN	PCle	PCle	PCle
H170	USB3/ OTG	USB3/ SSIC	USB3/ SSIC	USB3	USB3	USB3	USB3	USB3	PCle	PCle/ LAN	PCle/ LAN	PCle	PCle	PCle
Z170	USB3/ OTG	USB3/ SSIC	USB3/ SSIC	USB3	USB3	USB3	USB3/ PCle	USB3/ PCle	USB3/ PCle	USB3/ PCle/ LAN	PCle/ LAN	PCle	PCle	PCle

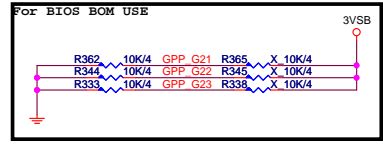
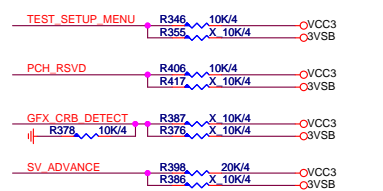
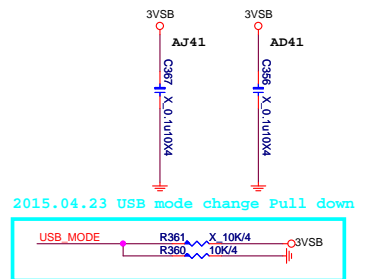
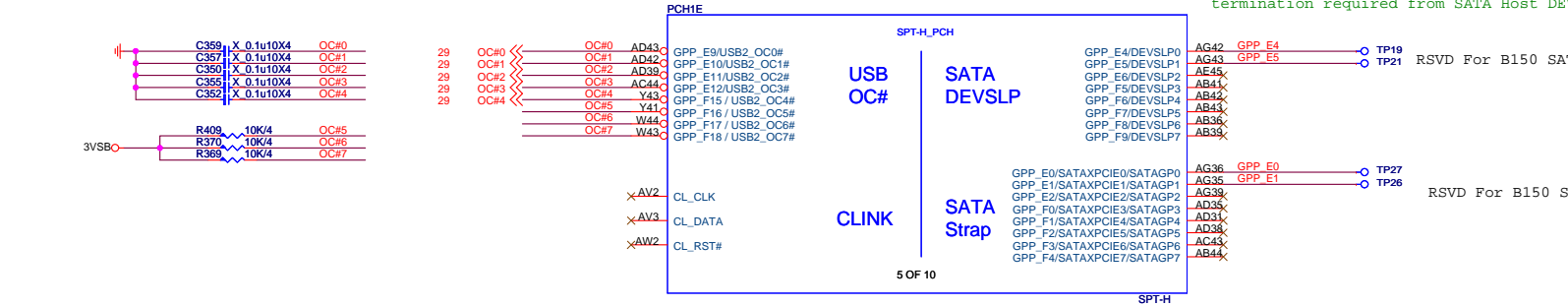
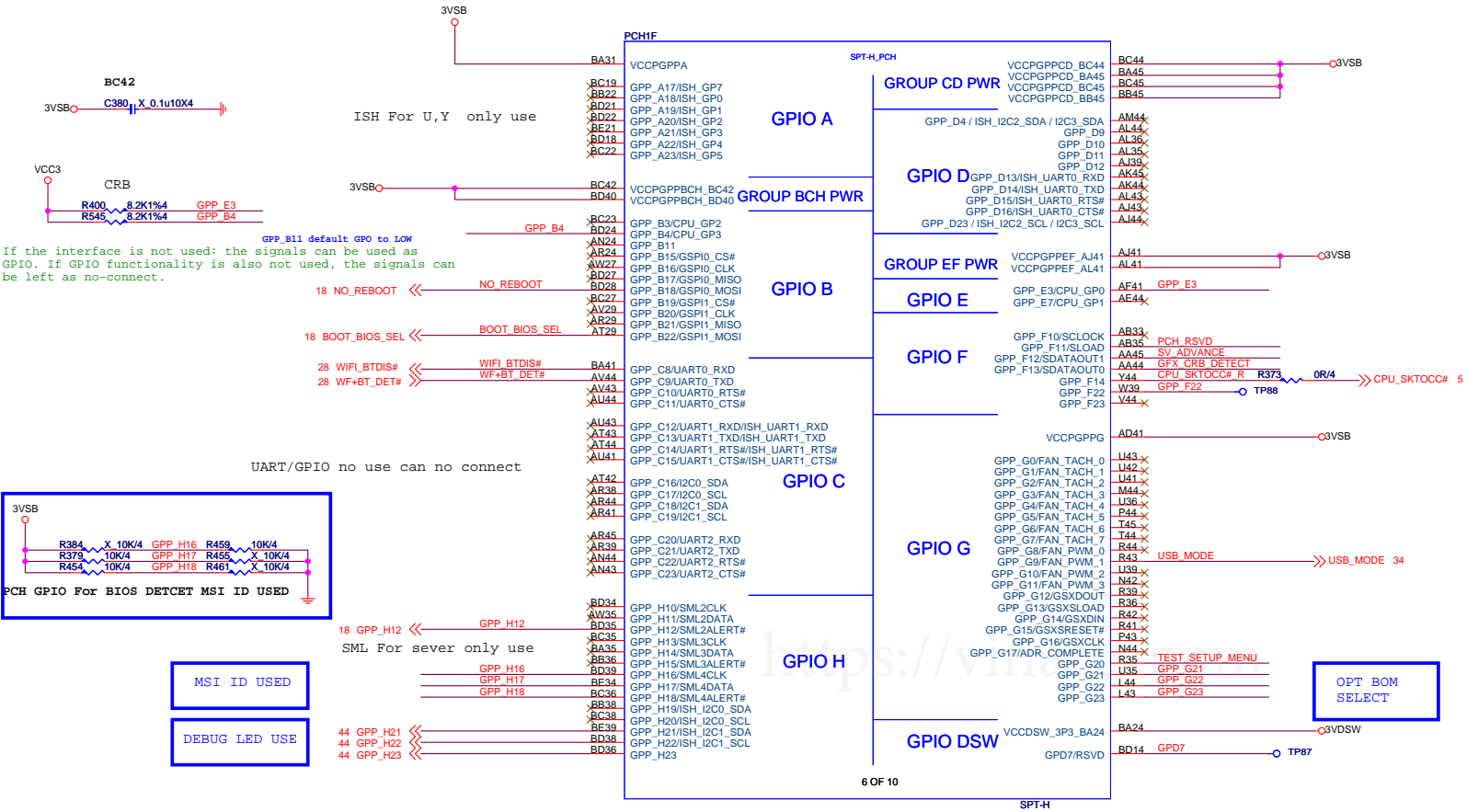
Sku	15	16	17	18	19	20	21	22	23	24	25	26	RST for PCIe Ports
H110	PCle/ LAN	PCle	N/A	LAN	SATA*/ LAN	SATA*	SATA	SATA	N/A	N/A	N/A	N/A	0
B150	PCle/LAN	PCle/ SATA*	PCle	PCle/ LAN	SATA*/ LAN	SATA*	SATA	SATA	SATA	SATA	N/A	N/A	0
H170	SATA	SATA	PCle	LAN	SATA	SATA	SATA	SATA	SATA	SATA	PCle	PCle	2
Z170	SATA	SATA	PCle	LAN	SATA	SATA	SATA	SATA	SATA	SATA	PCle	PCle	3



Comntact to SLOP Pin B12  
for support LI PM Substates  
MS also can disable this funtion.



W/ SMI/NMI Funtion  
GPP\_B[23,20,14]  
GPP\_C[23:22]  
GPP\_D[4:0]  
GPP\_E[8:0]



	GPP_G21	GPP_G22	GPP_G23
B150 Ac	0	0	0
B150	0	0	1
H170	0	1	0
H110	1	0	0

When used as DEVSPL, no external pull-up or pull-down termination required from SATA Host DEVSPL.

RSVD For B150 SATA/PCIE use

RSVD For B150 SATA/PCIE use

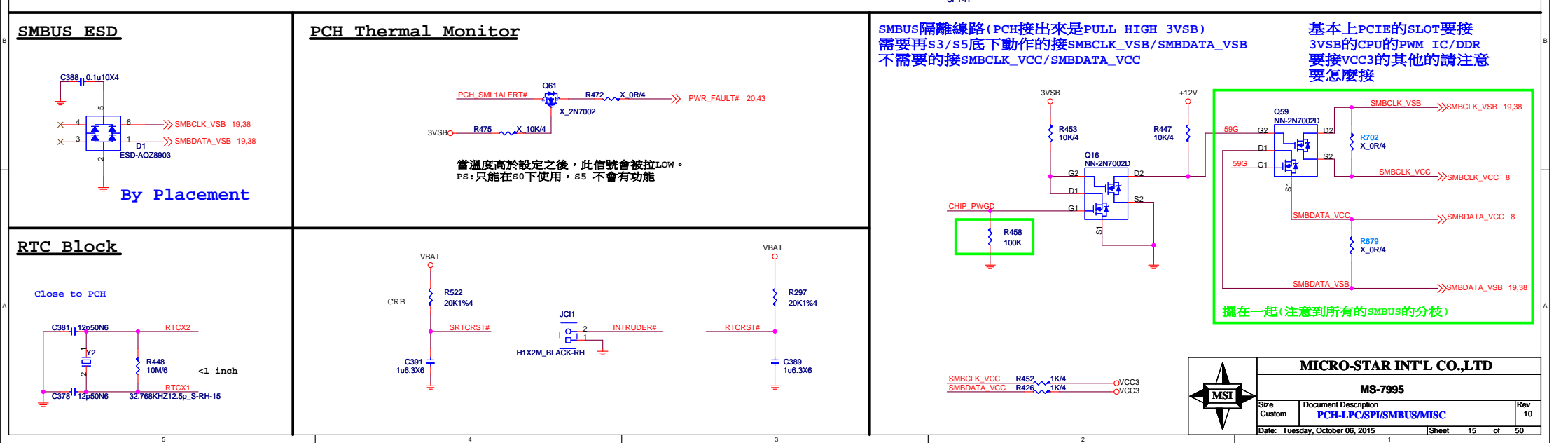
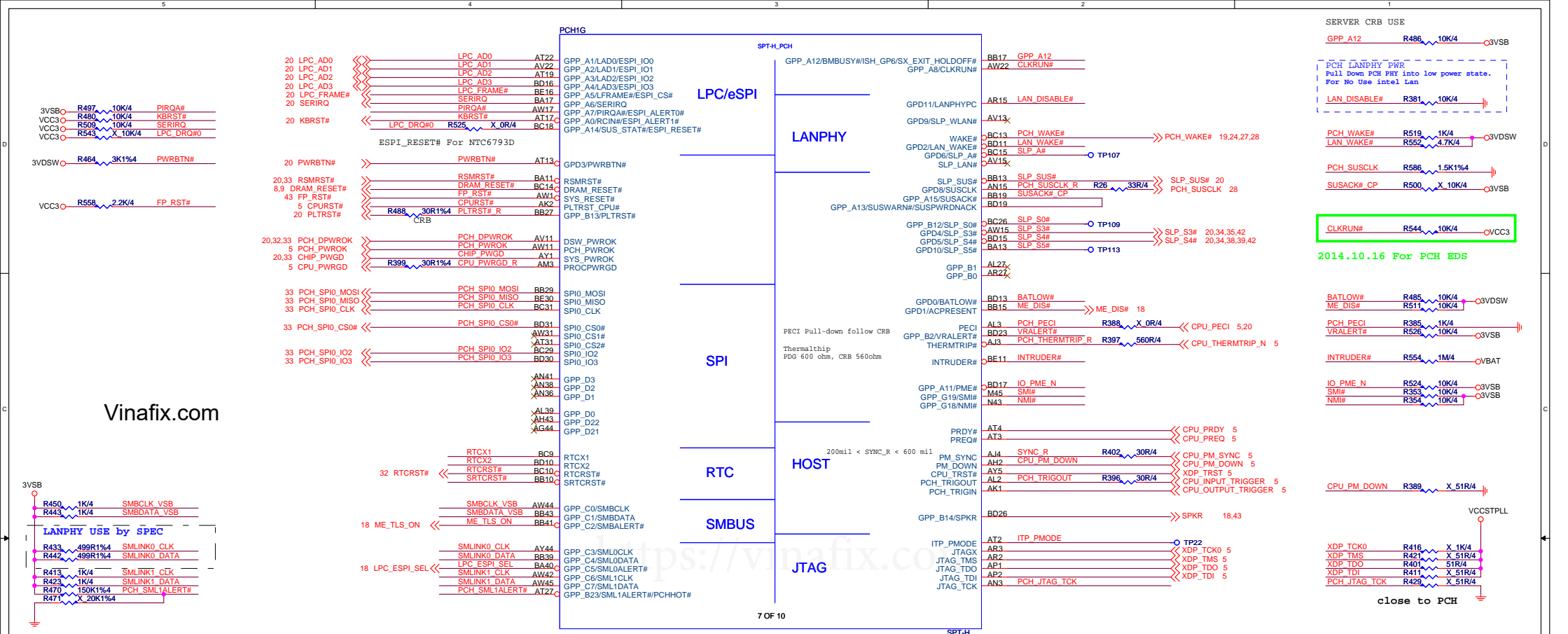
If an AMT capable Intel WLAN device is not implemented then this signal can be left as NO CONNECT (NC).

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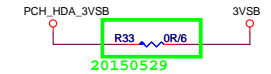
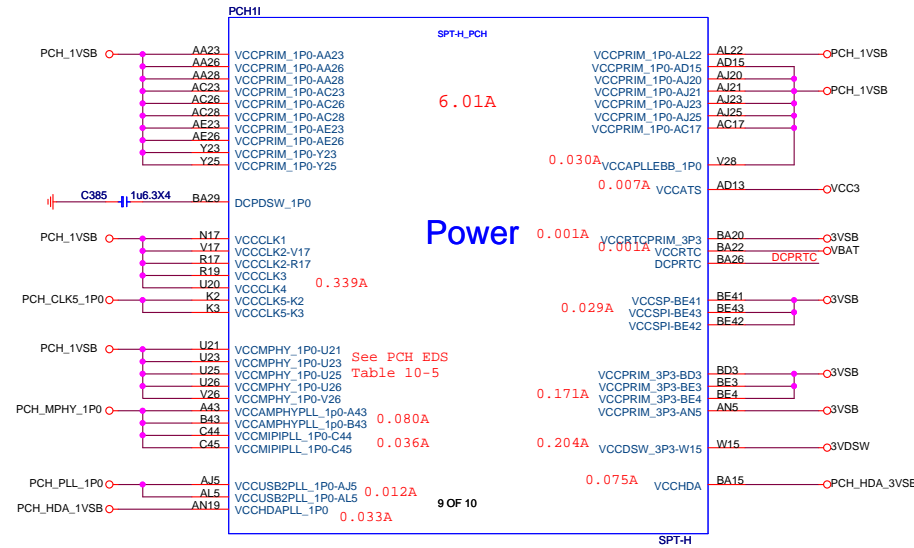
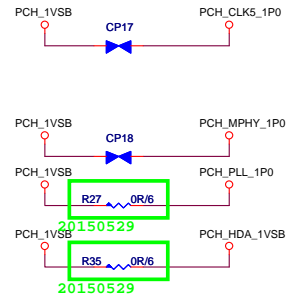
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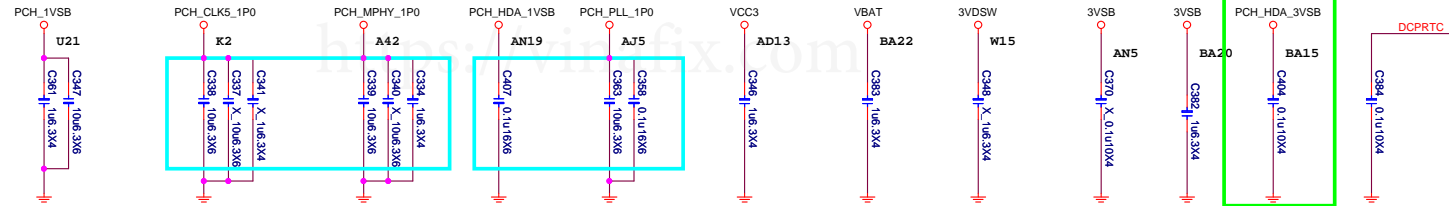




2015.05.18 for SR 44638000

2015.10.05 Add 10u CAP

20150529 for SR SR 44638000

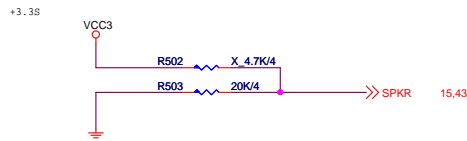


GND

<https://vinafix.com>

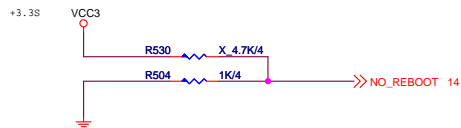
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# TOP Swap



Internal pull-down 20K is disabled after PLTRST#

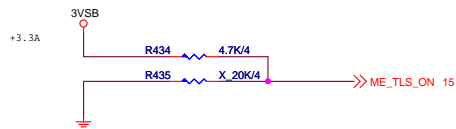
# No Reboot



0 : DISABLE (Default)  
1 : ENABLE

Internal pull-down 20K is disabled after PLTRST#

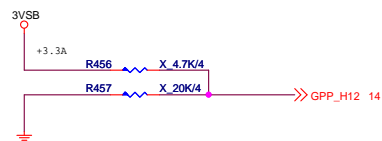
# AMT and SBA with confidentiality



0 : DISABLE  
1 : ENABLE (Default)

Internal pull-down 20K is disabled after RSMRST

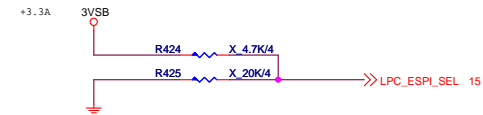
# ESPI FLASH SHARING MODE



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

Internal pull-down 20K is disabled after RSMRST

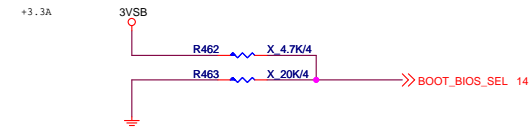
# LPC eSPI Mode



0 : LPC  
1 : eSPI

Internal pull-down 20K is disabled after RSMRST

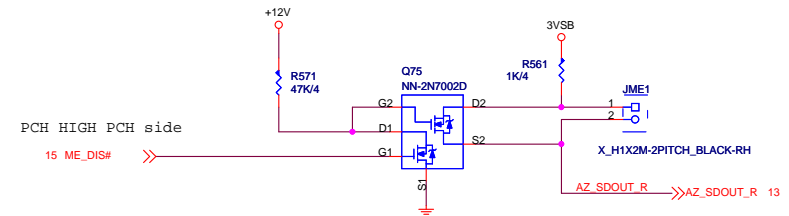
# Boot BIOS



0 : SPI  
1 : LPC

Internal pull-down 20K is disabled after PLTRST

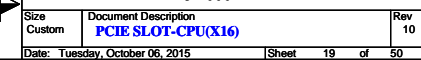
# HDA\_SDO

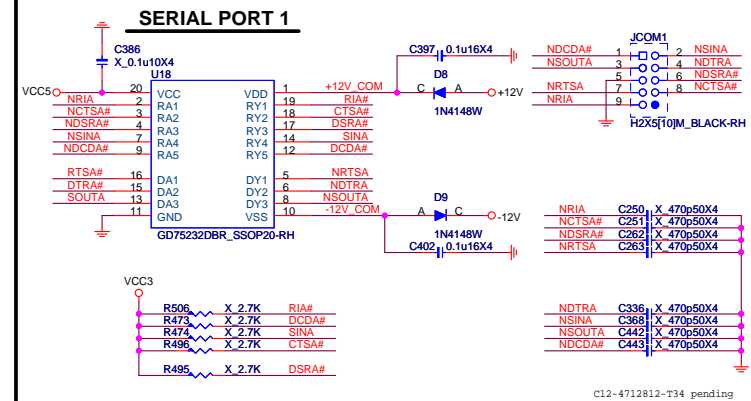
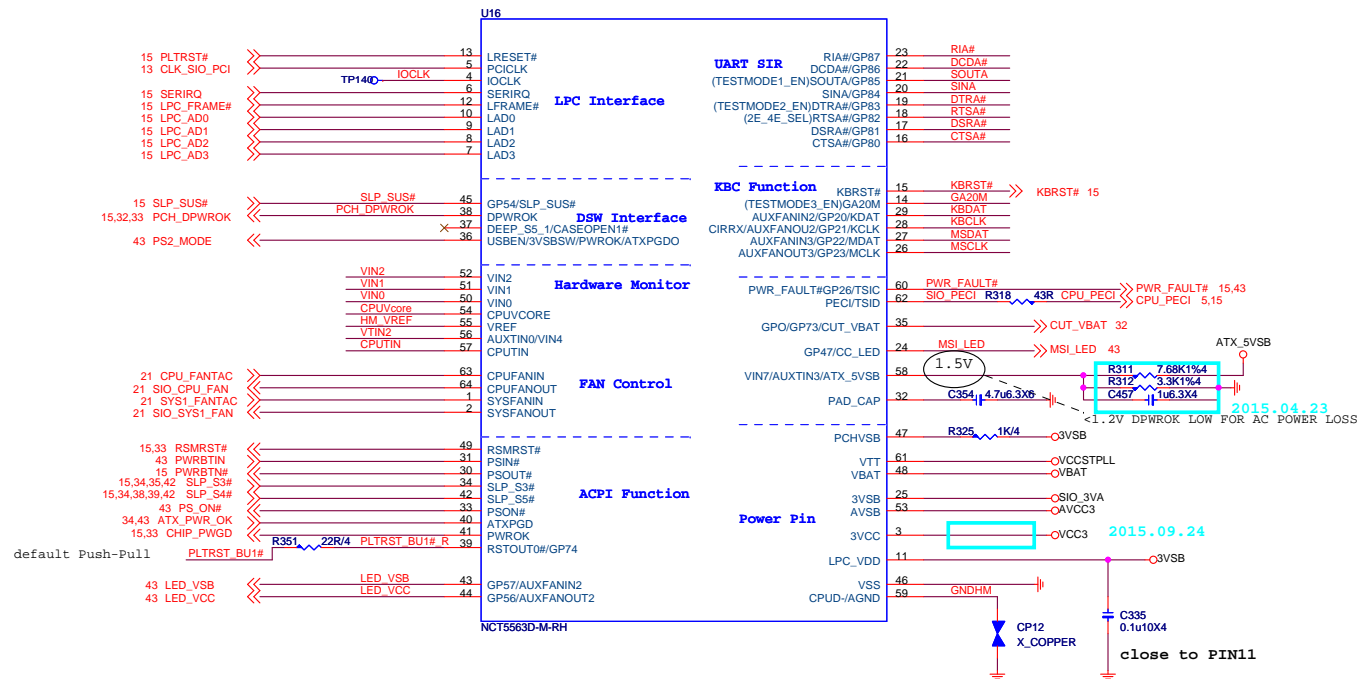


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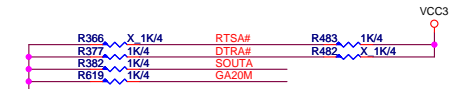
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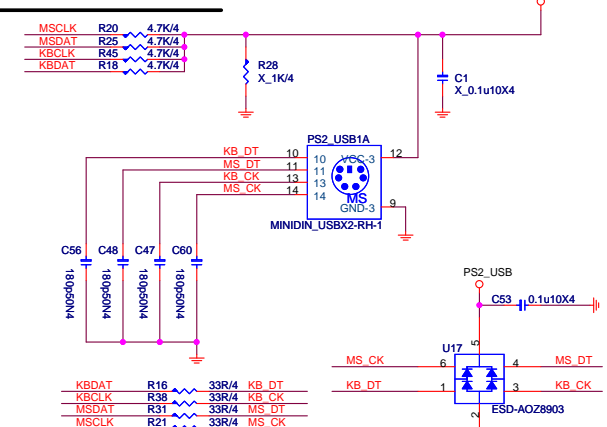


## POWER ON STRAPPING PIN FOR NCT5563D

PIN	5563D NAME	Circuit NAME	0	1
18	2E_4E_SEL	RTSA#	I/O ADDRESS 2E	I/O ADDRESS 4E
19	24M_48M_SEL	DTRA#	24M CLOCK SOURCE	48M CLOCK SOURCE
21	TESTMODE1_EN	SOUTA	DISABLE TESTMODE	ENABLE TESTMODE



## PS2 Connector



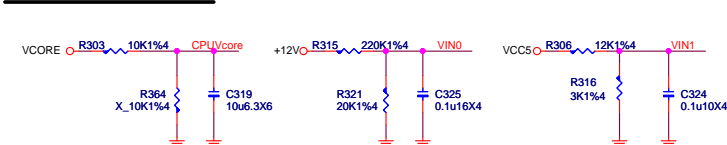
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**MS-7995**

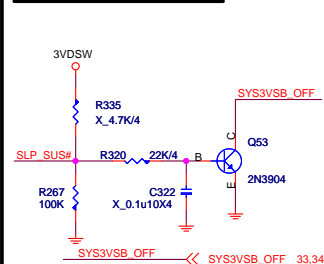
Size Custom Document Description **SIO-NCT5563D-M** Rev 10

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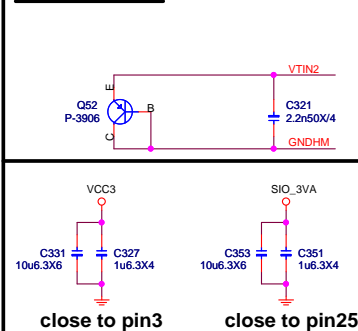
## HW Monitor - Voltage



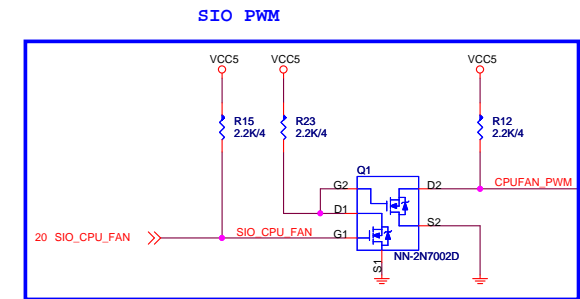
## 5563D DSW SUPPORT



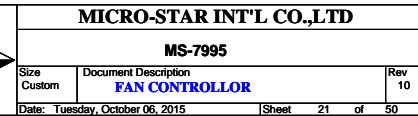
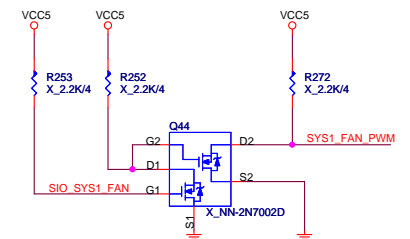
## Thermal Monitor



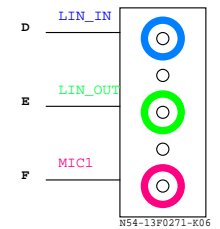
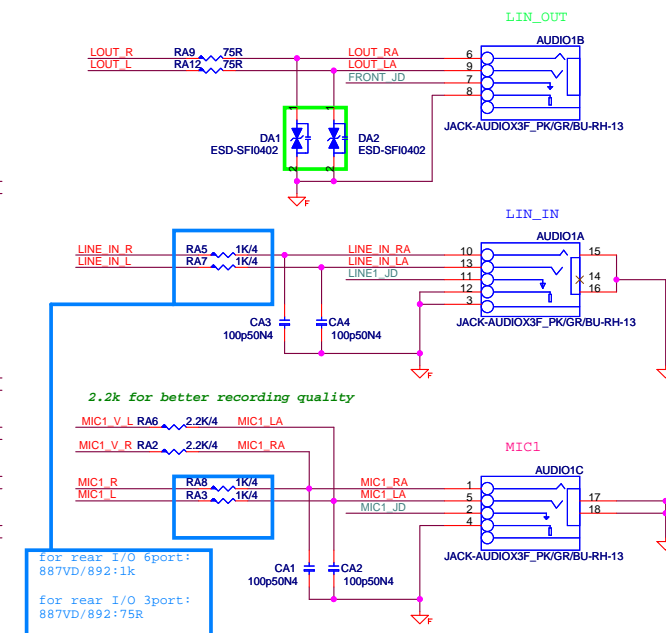
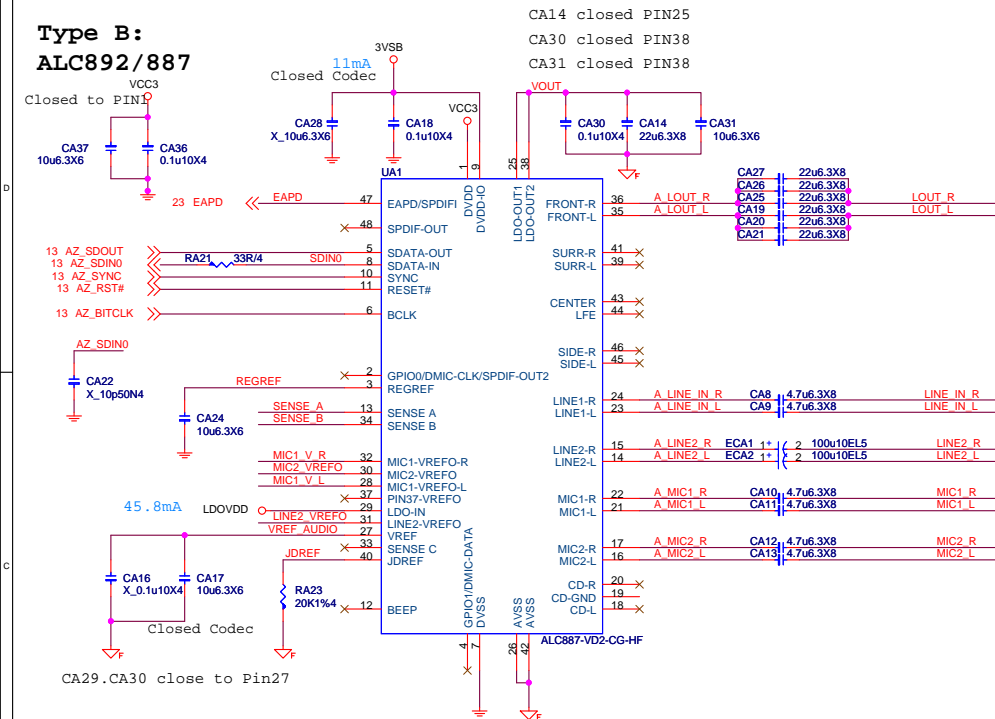
**Type G : 4 PIN CPU FAN FROM SIO**



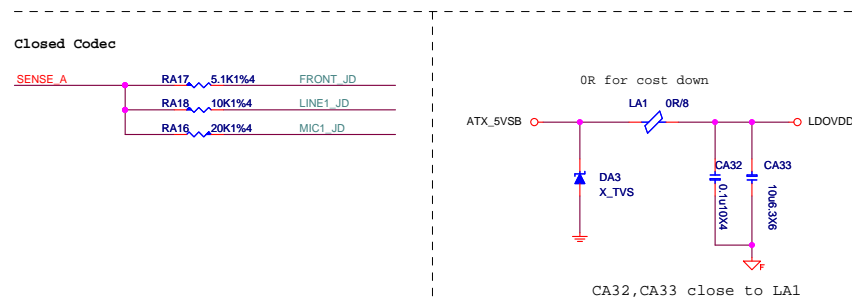
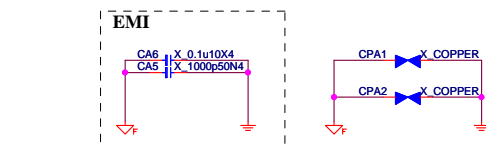
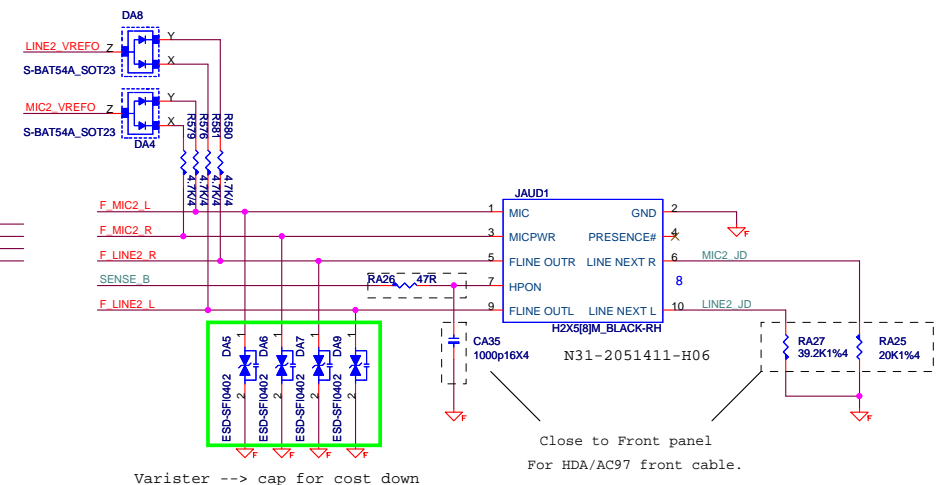
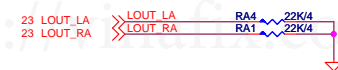
Type H : 4 PIN SYS FAN FROM SIO



Type B:  
ALC892/887



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Varister --> cap for cost down

DOG-2950500-SIO  
DOG-3010510-I05  
Close to Jack



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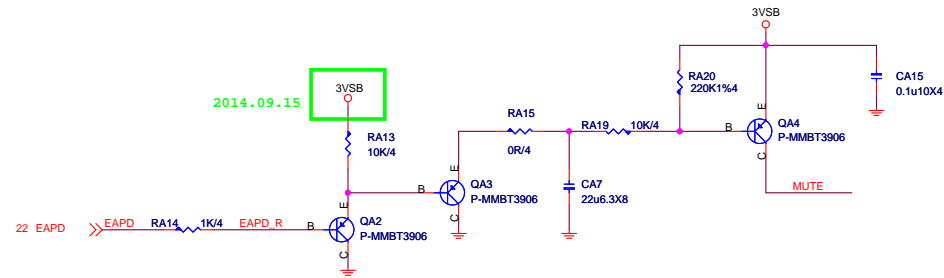
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Size Custom	Document Description <b>AUDIO - ALC892/887</b>	Rev 10
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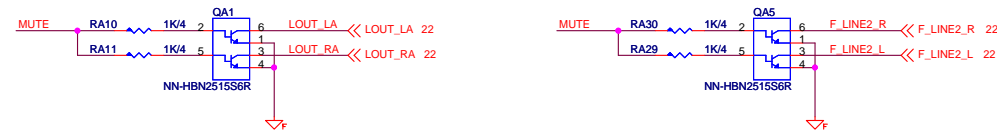
# Rear Line OUT De-POP circuit

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



Digital

Analog



<https://vinafix.com>

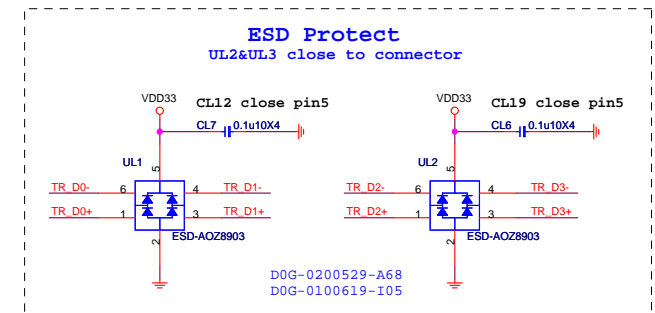
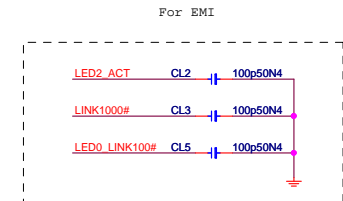
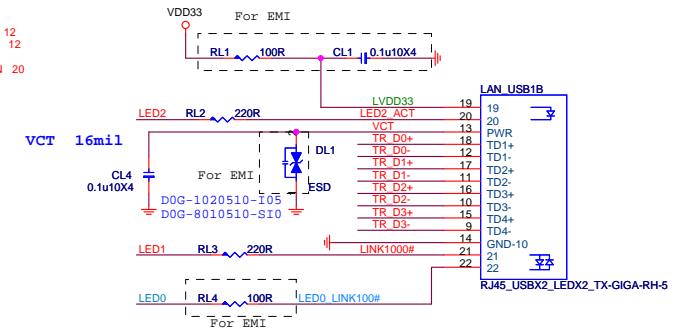
History:

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

# RTL8111G/RTL8111H Giga LAN

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

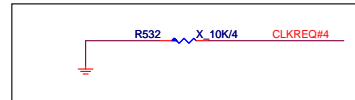
## LAN Connector



Pin33: 4 via from top layer to GND layer and make the via at the center of IC.

<https://vinafix.com>

For module unstuff



## 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

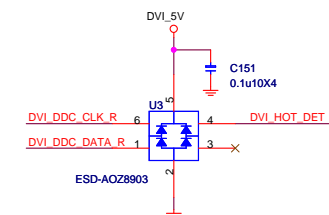
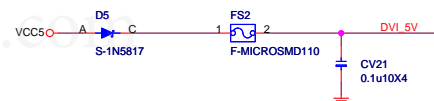
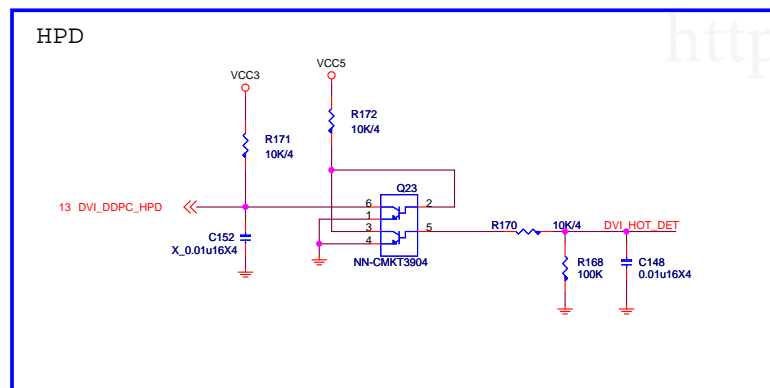
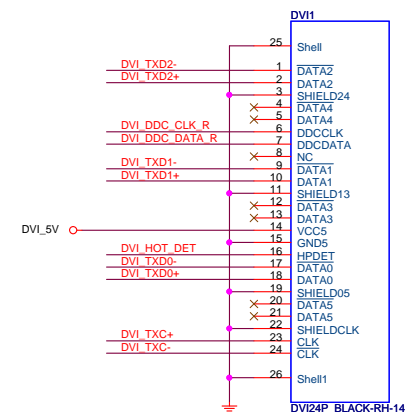
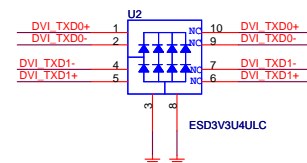
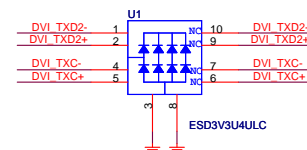
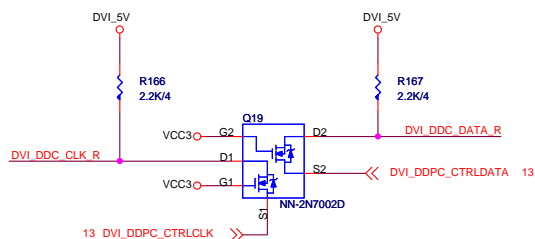
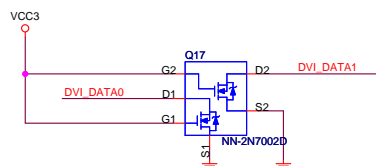
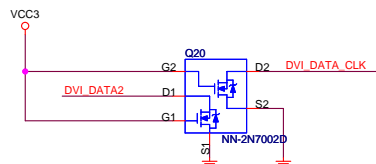
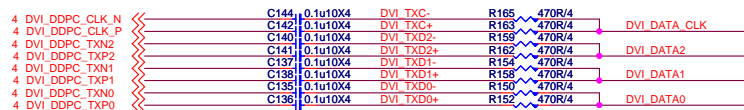
	3.3V @ mA	mW
10 M Idle/TxRx	9.9/84.69	32.67/279.48
100 M Idle/TxRx	48.11/92.44	158.76/305.05
Giga Idle/TxRx	124.5/177.57	410.85/585.98
ALDPS	5.50	18.15



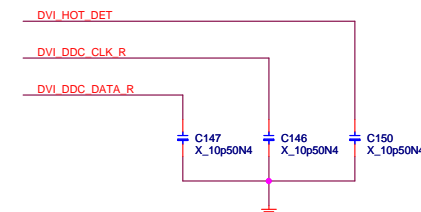
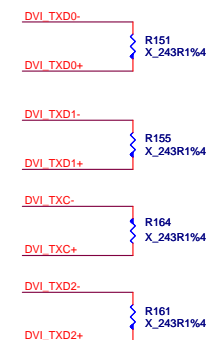
MICRO-STAR INT'L CO.,LTD

MS-7995

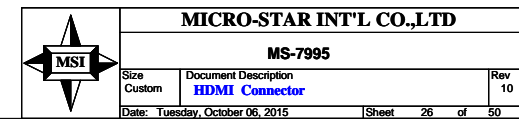
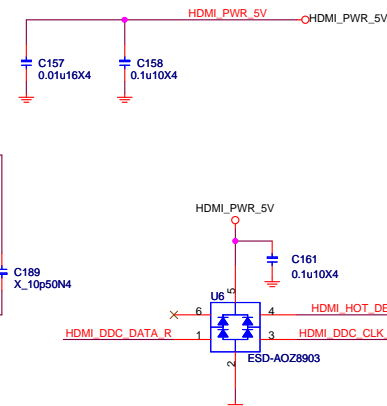
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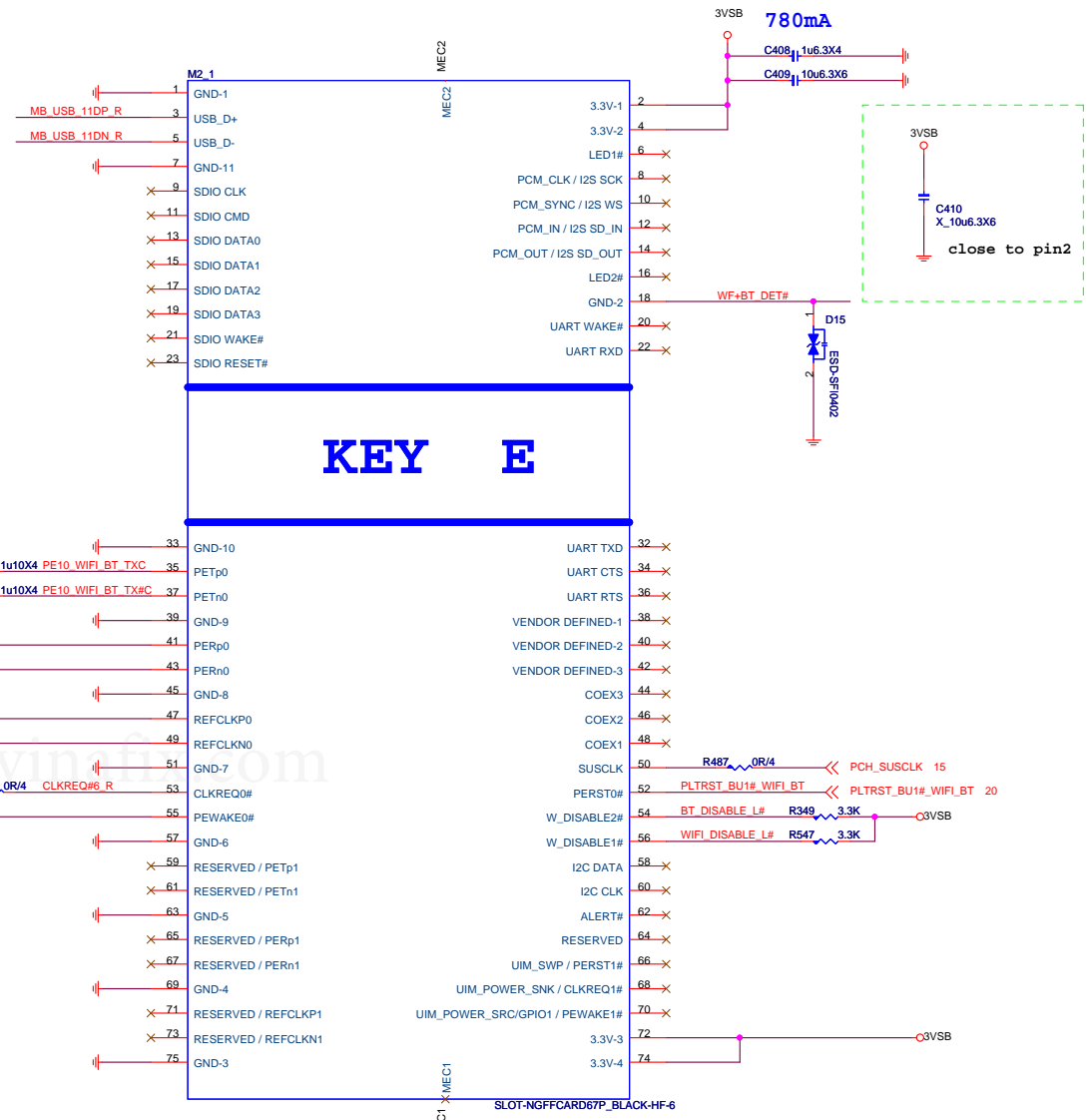
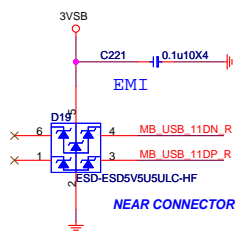
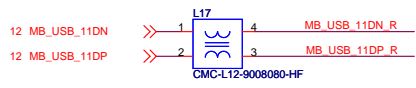
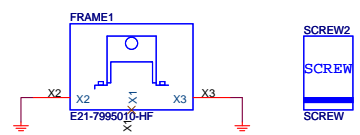
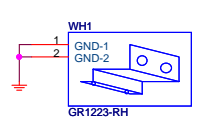
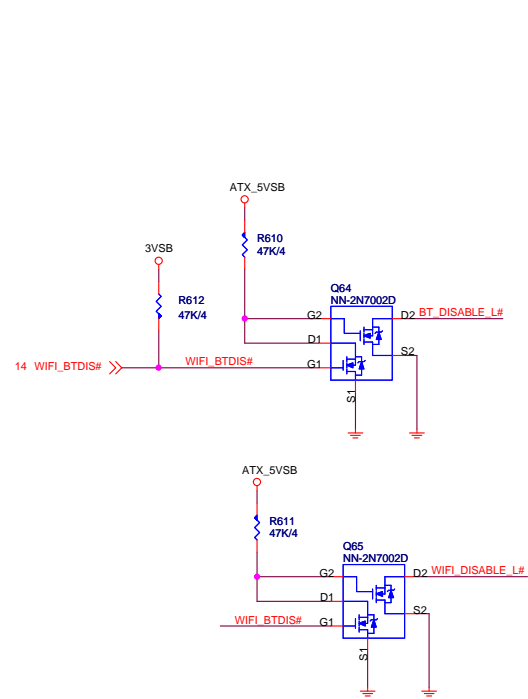
# For EMI



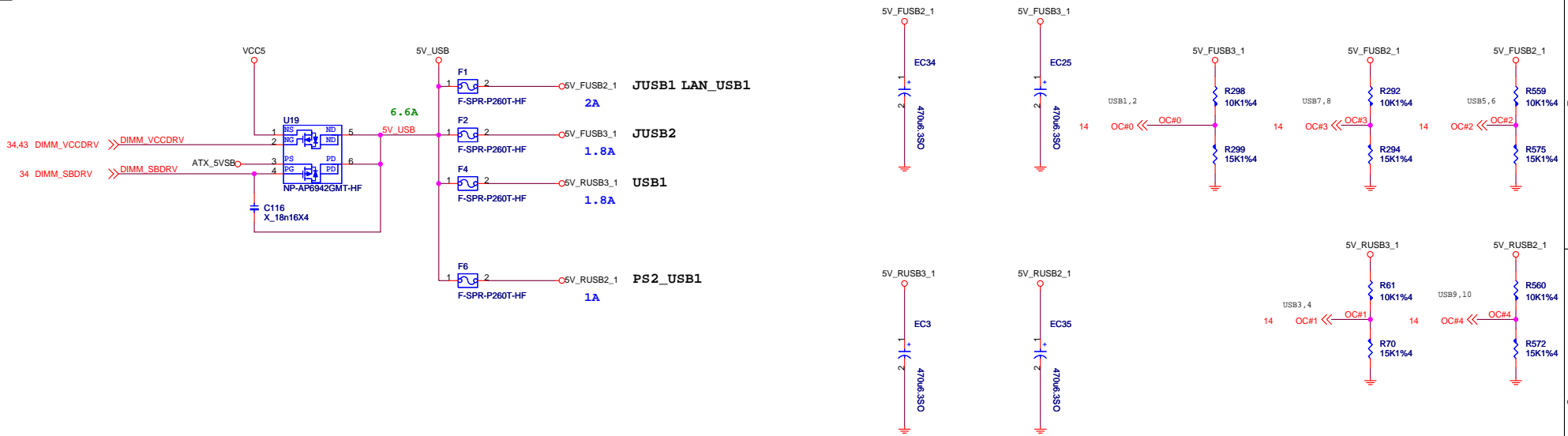
Vinafix.com



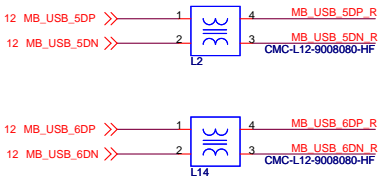




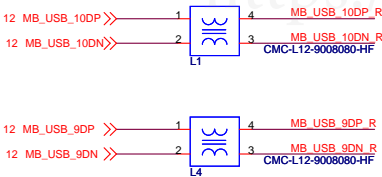
USB POWER



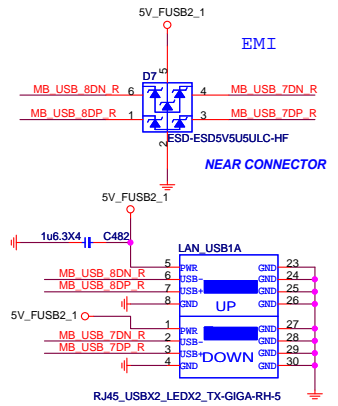
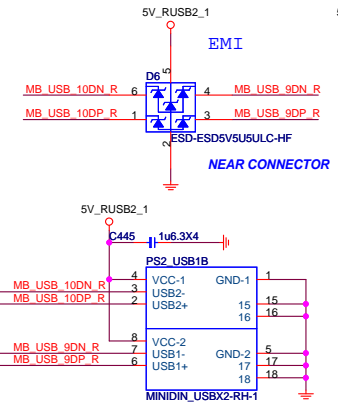
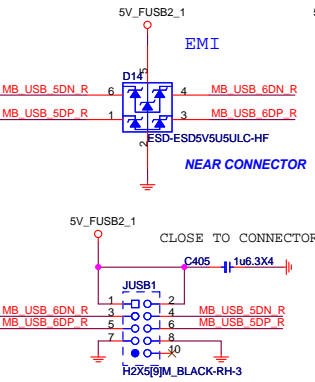
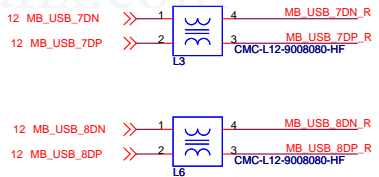
FRONT USB PORT 5,6



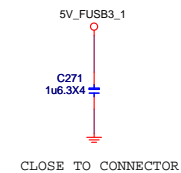
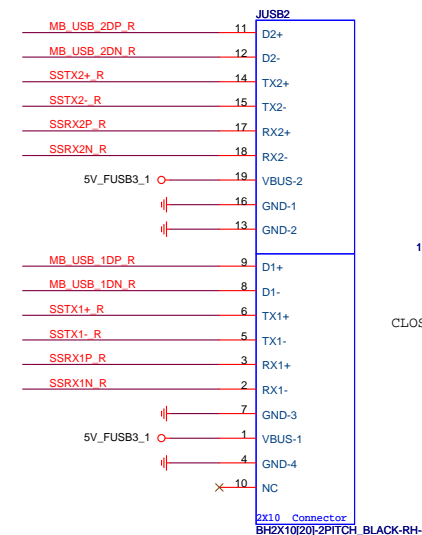
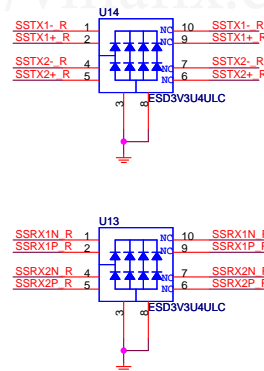
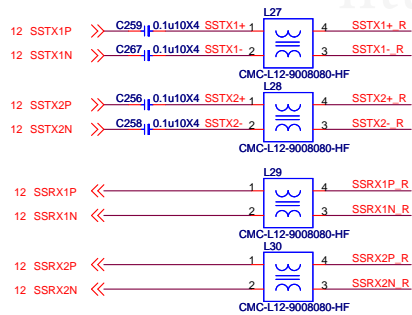
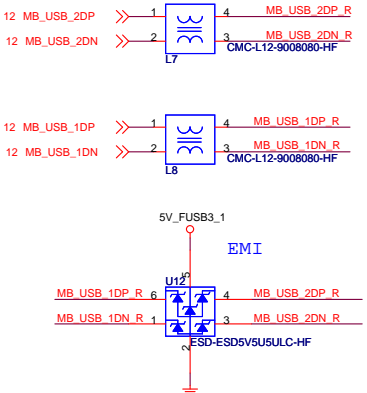
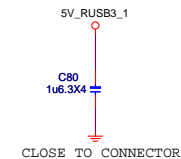
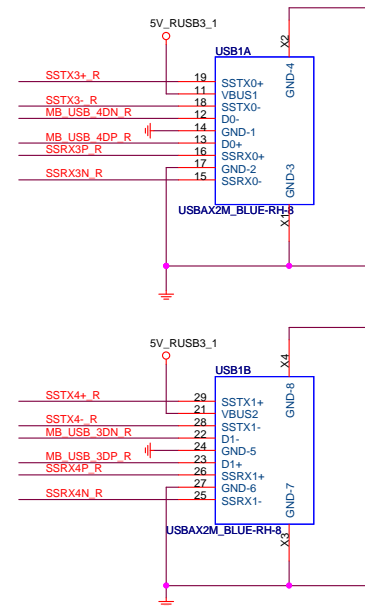
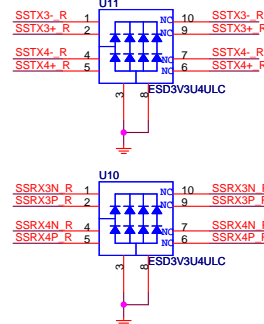
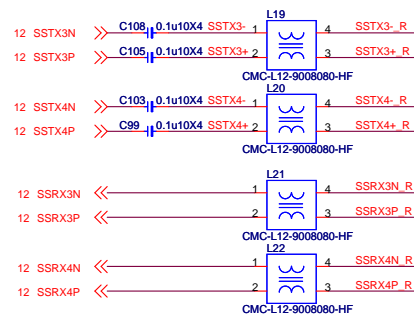
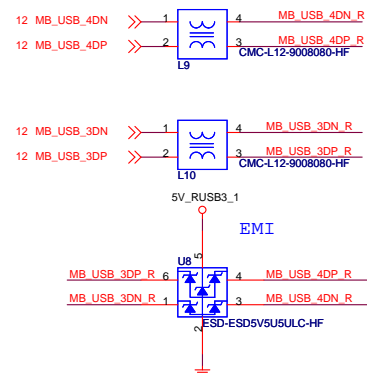
FRONT USB PORT 9,10



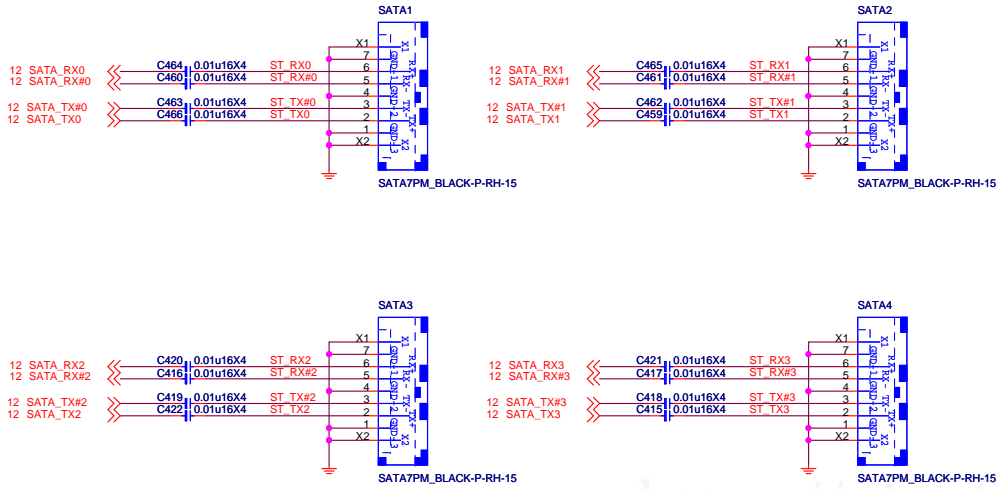
FRONT USB PORT 7,8





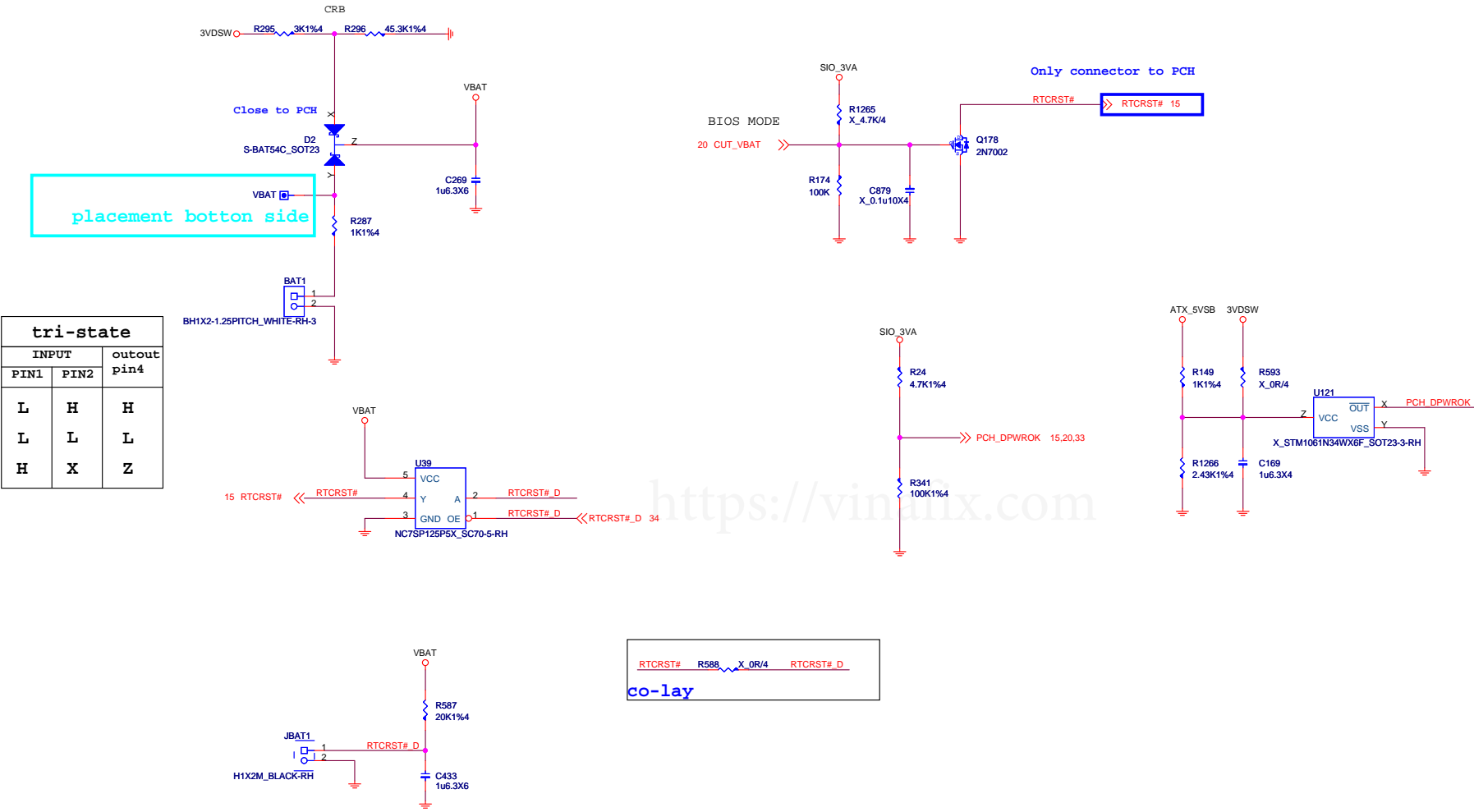


SATA GEN3



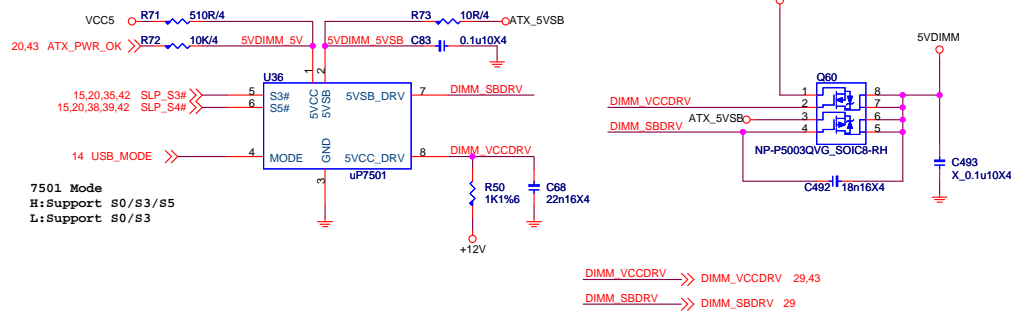
<https://vinafix.com>

Vinafix.com

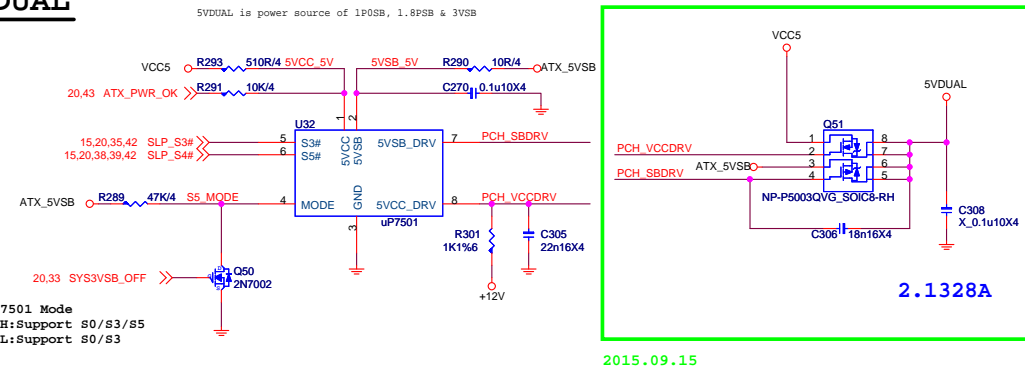




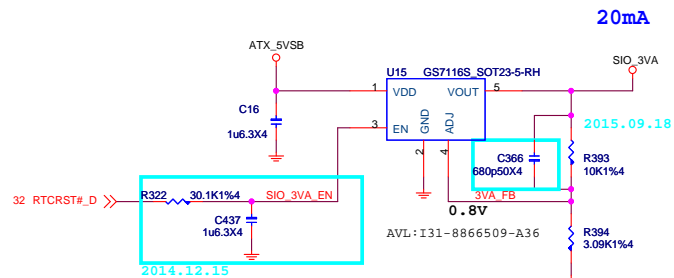
## 5VDIMM FOR DDR



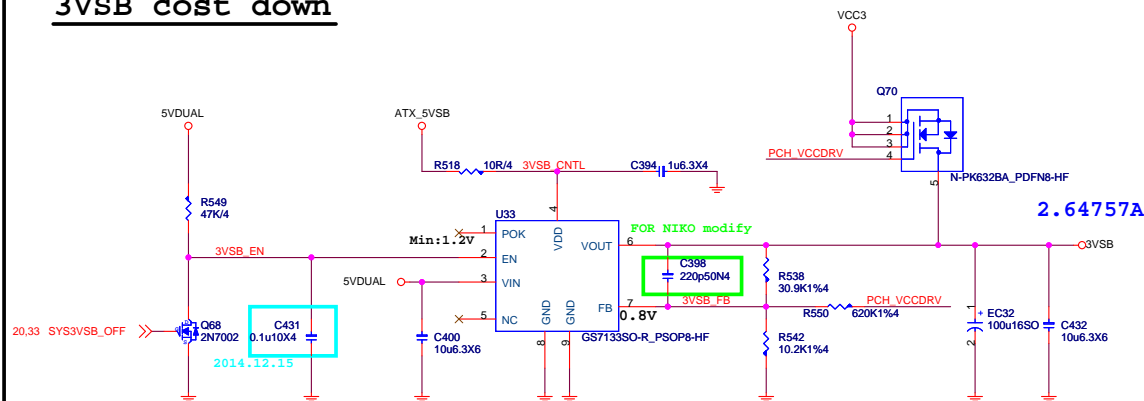
## 5VDUAL



## SIO\_3VA



## 3VSB cost down

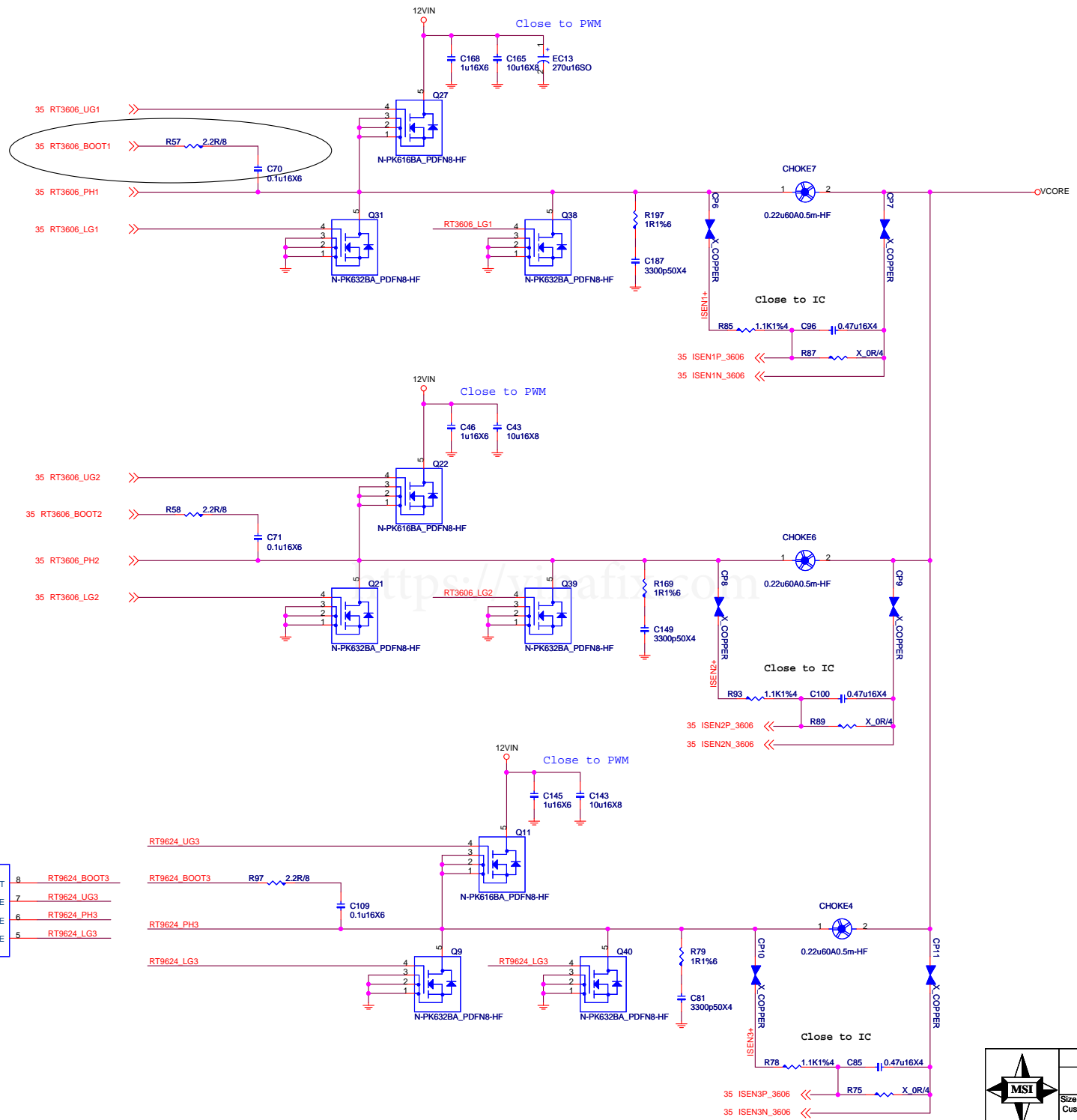


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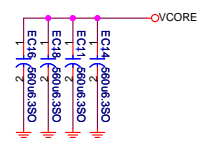
MS-7995

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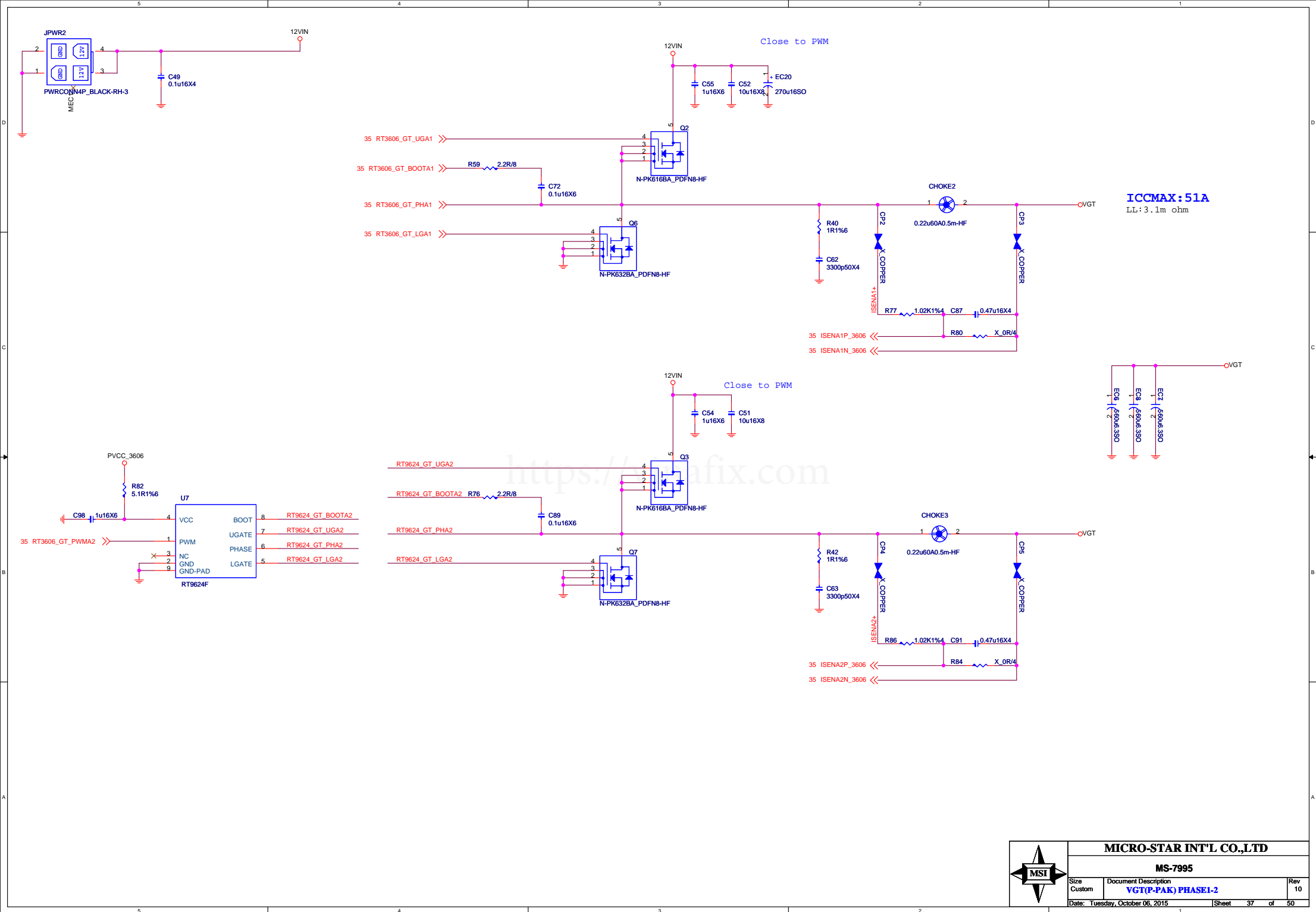


ICCMAX: 79A  
LL: 2.1m ohm



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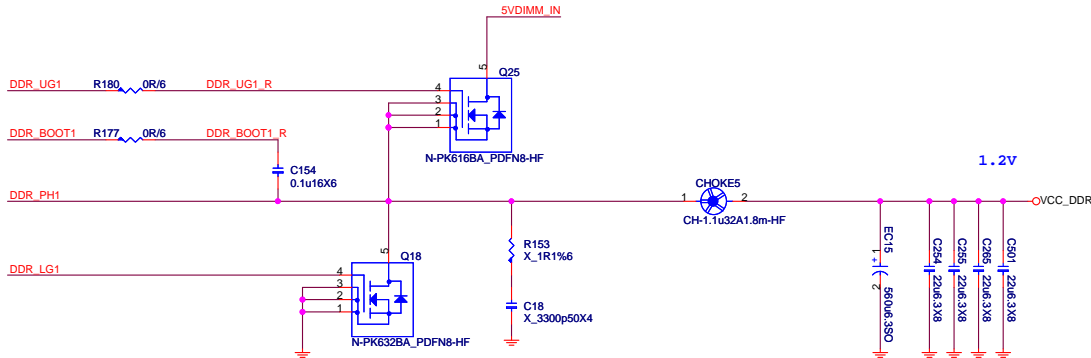
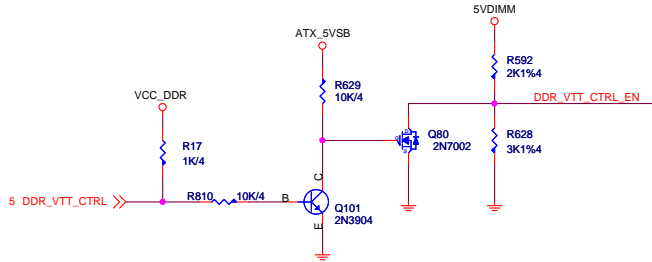
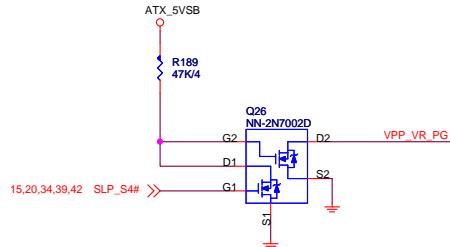
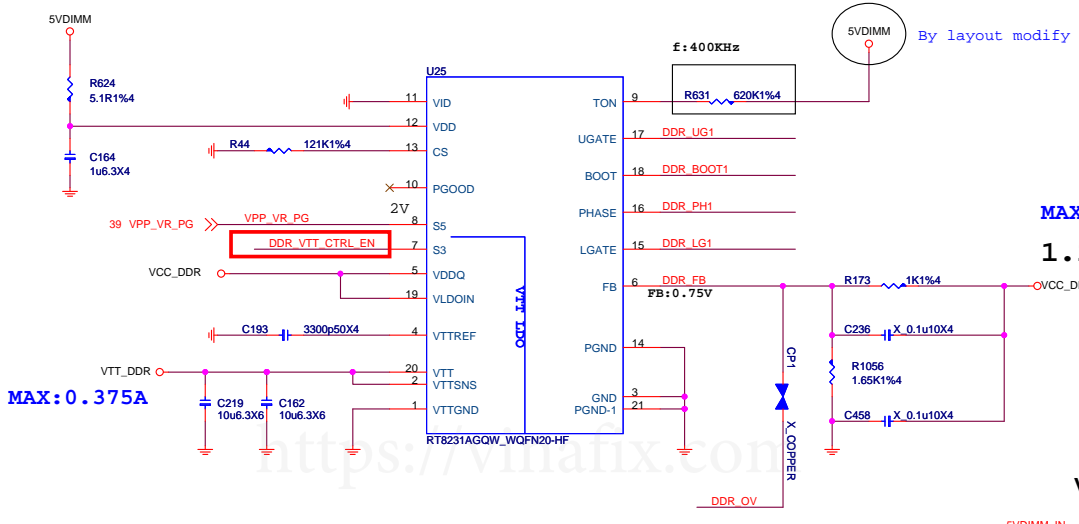
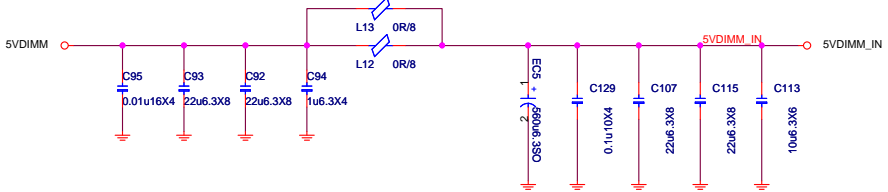


DDR4\_1.2V 2.8A+ 4.75A+0.375A=7.925

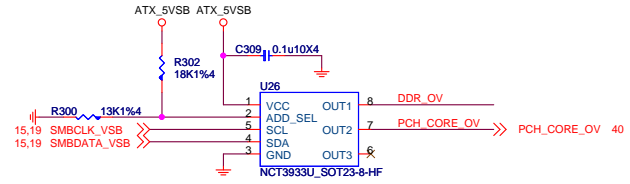
2.8A FOR CPU  
9.5A FOR 4DIMM DDR4  
4.75A FOR 2DIMM DDR4  
0.375A FOR VTT\_DDR

OCP = 7.925A\*1.5=11.8875A  
Rlimit(R44)  
Current Limit =121K\*5uA/10/5mohm  
--> 121Kohm(12.1A)

$I_{rms} = I_{out} * \sqrt{((V_{out}/V_{in}) * (1 - (V_{out}/V_{in})))}$   
 $= 9.357 * 0.44$   
 $= 4.154A$

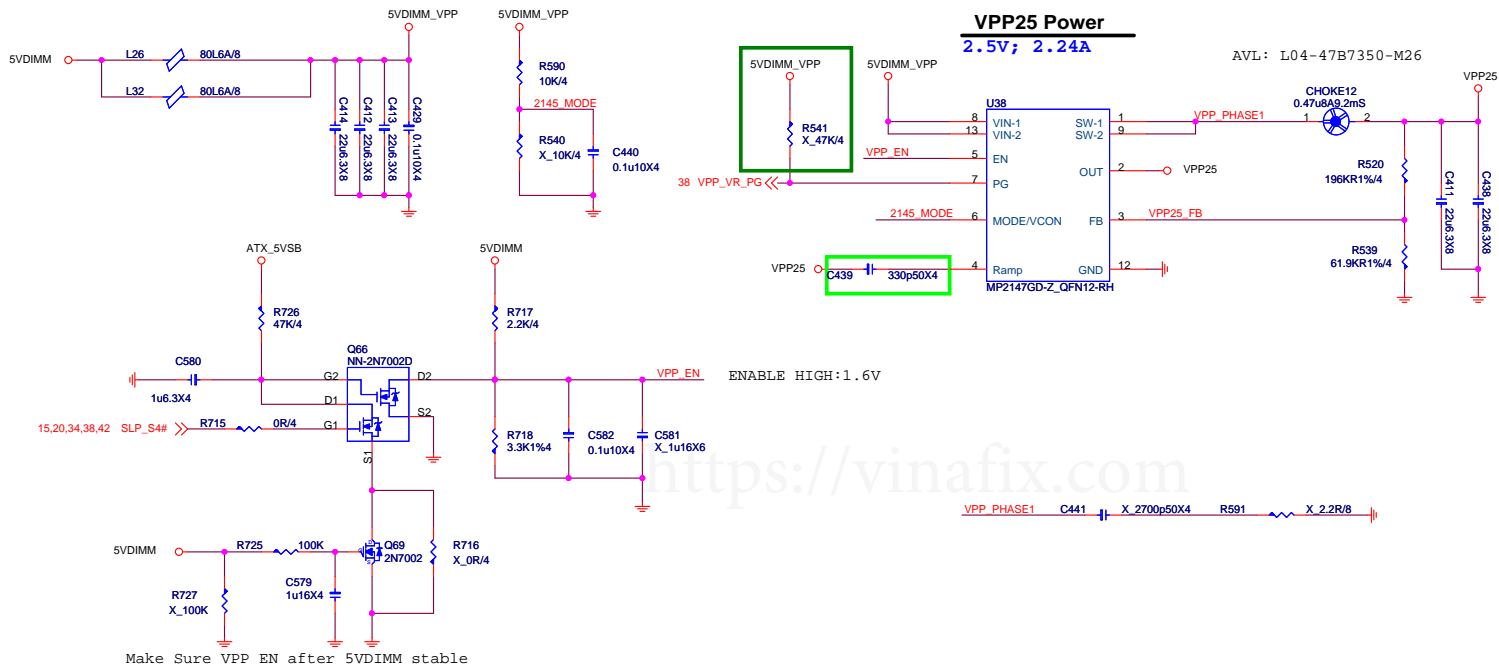


**UPI VOLTAGE CONSOLE**  
0x26 : RH=18K, RL=13K



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**2DIMM :1.12A FOR DDR VPP2.5V**



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# PCH 1VSB

1.0V; 9.142A+5.5A+250mA=14.892A  
(6.54A + 0.132\*4+0.154\*6+0.054+0.132\*3)

OCP = 22.338A

Rocset = 1.5 \* I<sub>max</sub> \* R<sub>sdson(1ow)</sub> / Iocset  
= 1.5 \* 9.142 \* 5mohm / 10uA  
= 11.169K

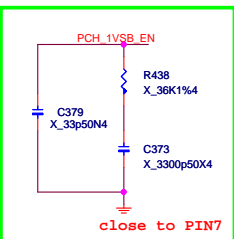
Rocs:11.3K,OCP:

D03-3669S00-F01 : 22.6A

R<sub>sdson(1ow)</sub> 4.5V

D03-4C05N03-005 : 5 mohm  
D03-632BA0C-N03 : 4.6 mohm  
D03-3056M00-U47 : 6.2mohm  
D03-3669S00-F01 : 5.2m ohm

2014.08.22 close to U34



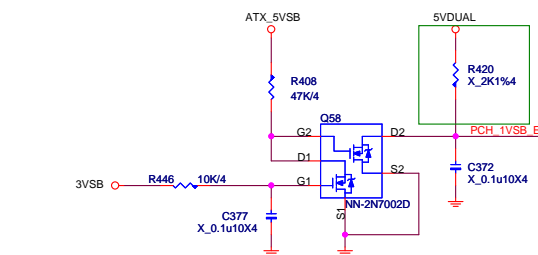
2015.01.22  
for up1540:stuff R438->36K,  
C379->NC,C373->3.3nF  
for RT8125:R438.C379.C373->NC

2015.01.22  
for up1540:R403->2.2R,C362->1uF  
for RT8125:R403->10R,C362->1uF

2014.12.25  
for up1540:C364&R407 ->NC

2014.12.25  
for up1540:C365 is OCP set min:5Kohm  
stuff 7.87K OCP SET:15.74A  
RT8125C stuff C1000P C11-1022032-W08

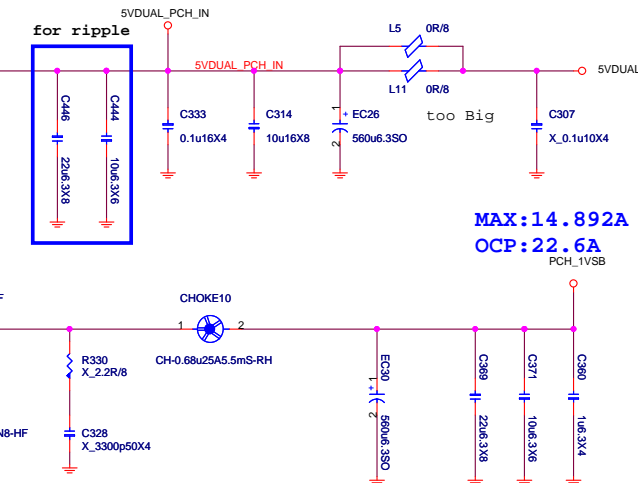
38 PCH\_CORE\_OV << PCH\_CORE\_OV  
to sink/source over voltage IC.  
pin10 sink/source current capability can't over 1mA  
So max voltage can't over 1.8V.  
from NCT3933



2014.12.25  
for up1540:stuff R622->0R

V<sub>out</sub> = V<sub>ref</sub> \* (1 + R821/R822)  
= 0.8 \* (1 + 1K/3.92K)  
= 0.8 \* 1.2551  
= 1.004V

I<sub>rms</sub> = I<sub>out</sub> \* SQRT((V<sub>out</sub>/V<sub>in</sub>) \* (1 - (V<sub>out</sub>/V<sub>in</sub>)))  
= 14.892 \* 0.4  
= 5.95686A

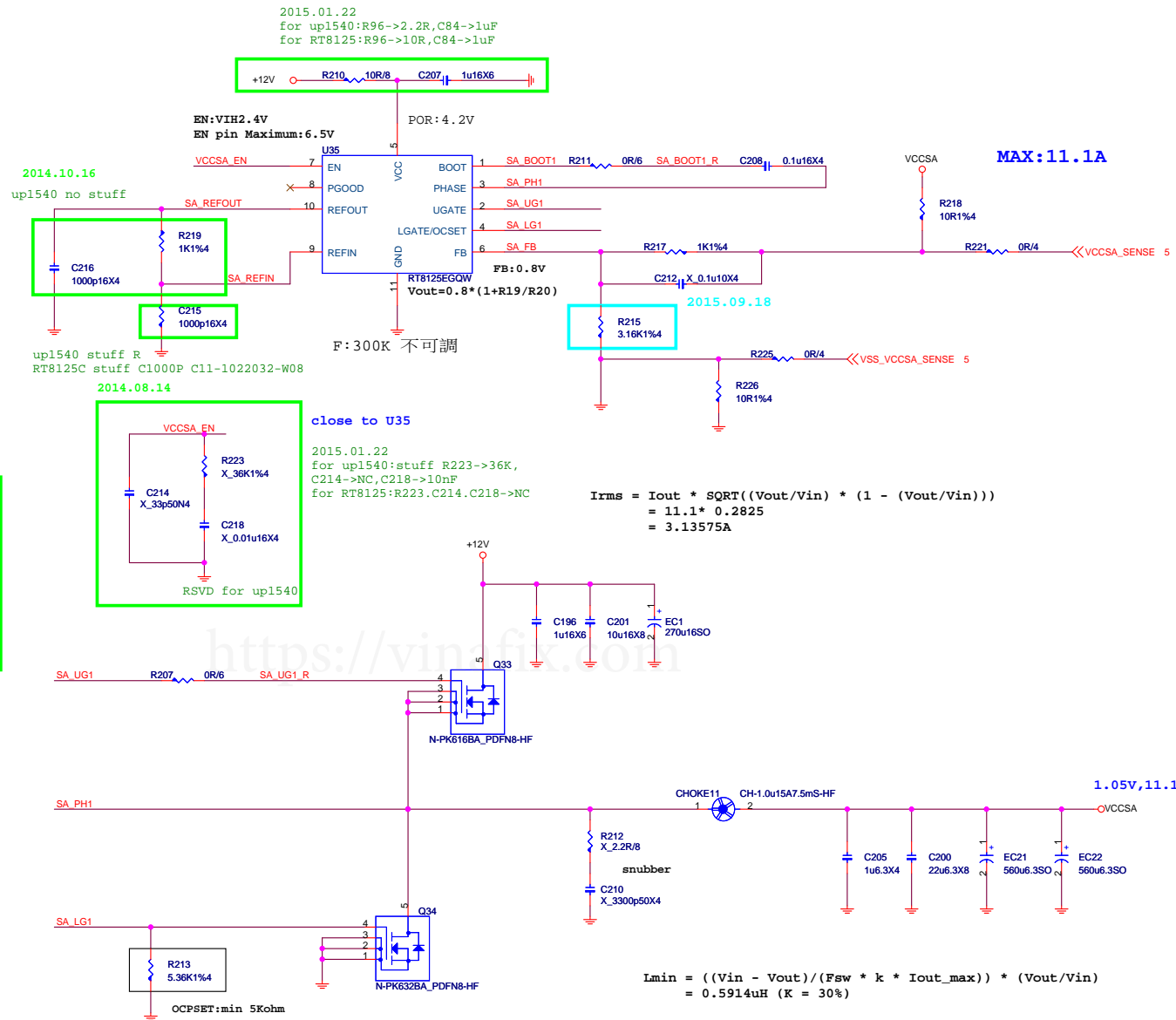
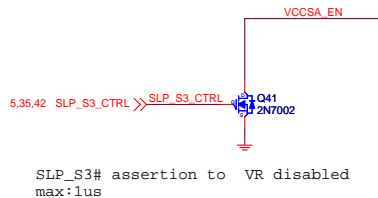
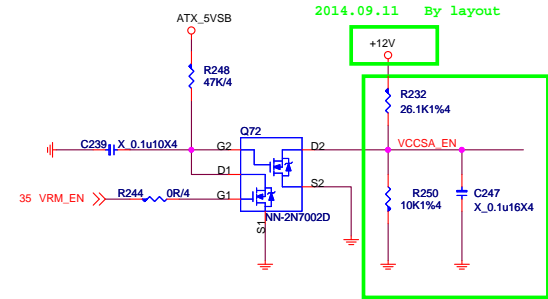


SA Power:1.05V,11.1A

$OCP = 11.1A * 1.4 = 15.54A$   
 $R_{cs}(R15) = OCP * R_{dson}(Low\ side) / 10uA$   
 $= 15.54 * (3.4)mohm / 10uA$   
 $= 5.2836Kohm$

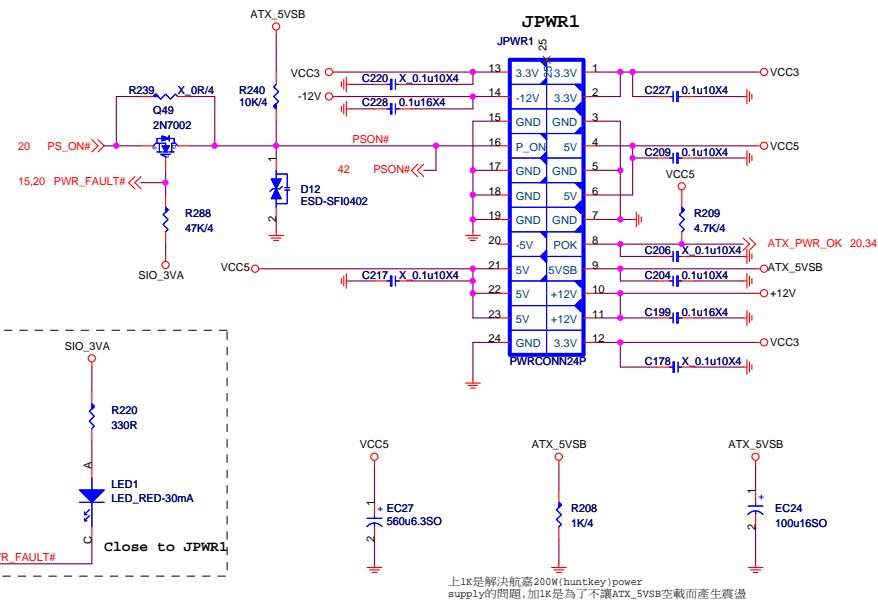
Rcs:5.2836K,OCP:  
D03-4C05N03-O05 : 15.76A  
D03-632BA0C-N03 : 16.24A  
use UBIQ MOS need Check

Rdson(Low)10V  
D03-4C05N03-O05 : 3.4mohm  
D03-632BA0C-N03 : 3.3mohm  
D03-3056M00-U47 : 4.2mohm

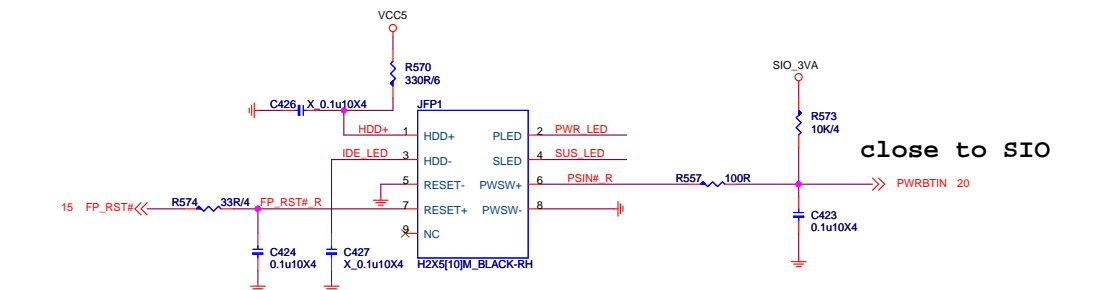




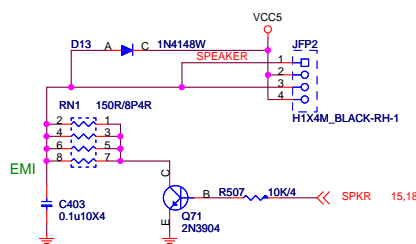
## ATX POWER CONNECTOR



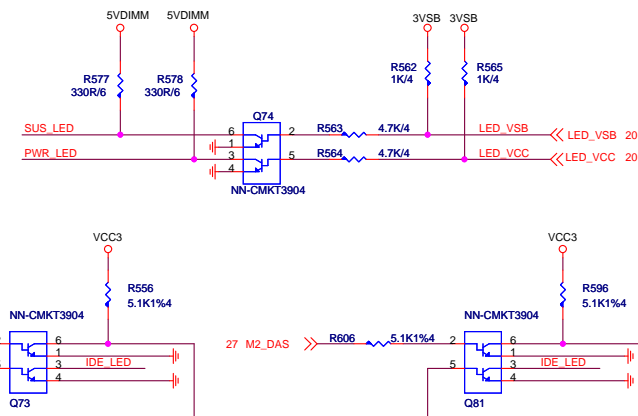
## FRONT PANNEL



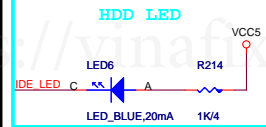
## Speaker Pin Header



## LED ( for NV5533)

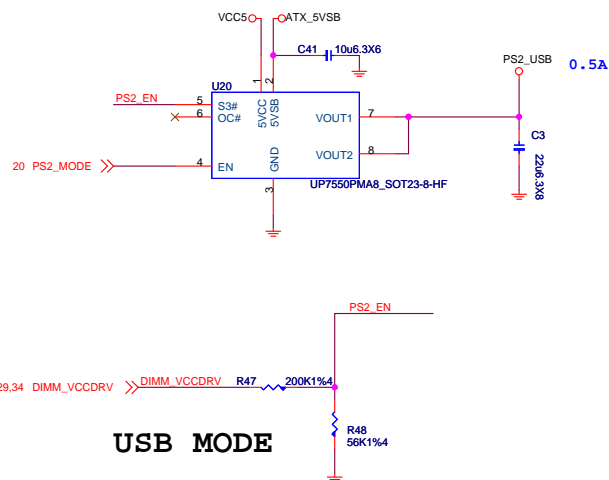


## HDD LED



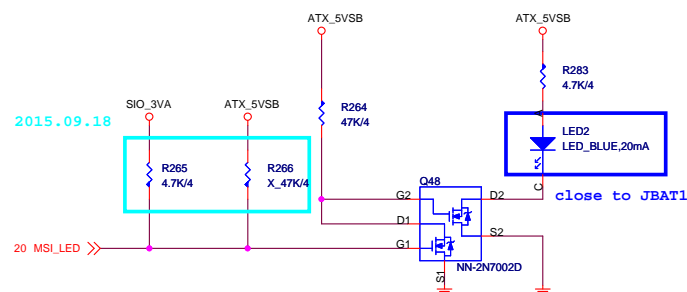
2015.09.21

## PS2 POWER



## USB MODE

## MSI LED

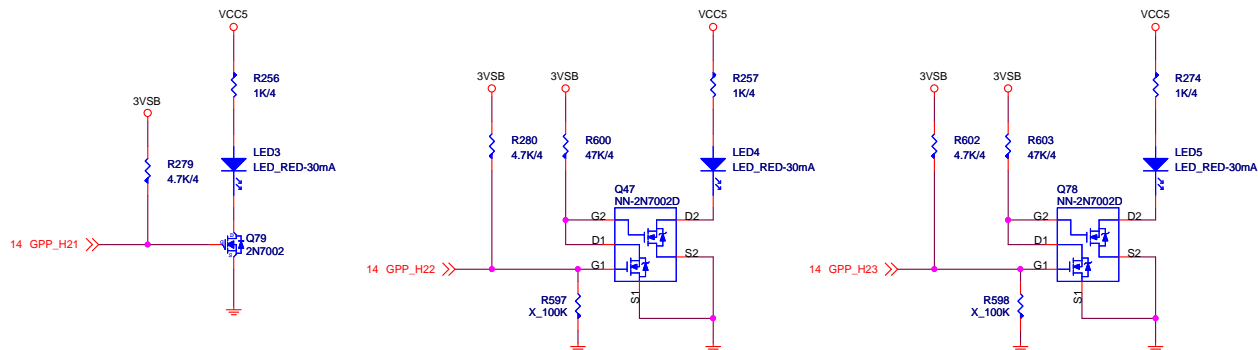


2015.09.18

## TPM

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DEBUG LED



GPIO LED	GPP_H21	GPP_H22	GPP_H23
亮	GPI PULL HIGH	GPO PO LOW	GPO PO LOW
滅	GPO LOW	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)


- 關機斷電狀態下，3個LED先維持default全暗，開機通電後：
1. 首先進行CPU checkCPU 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）

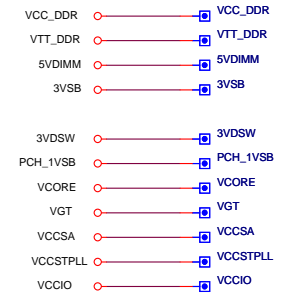
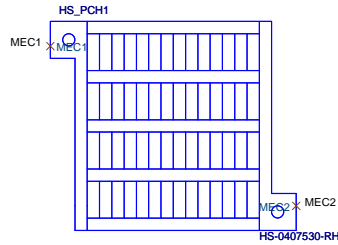


EMI CAP

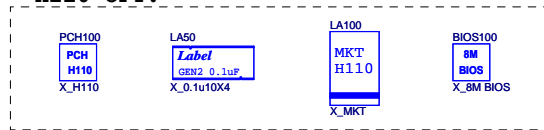


<https://vinafix.com>

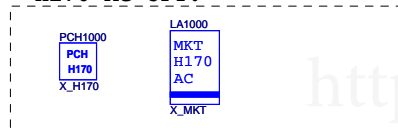
	MICRO-STAR INT'L CO.,LTD	
	MS-7995	
Size Custom	Document Description EMI	Rev 10
Date: Tuesday, October 06, 2015		Sheet 45 of 50



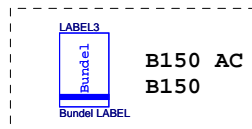
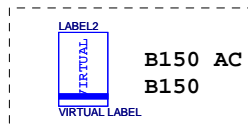
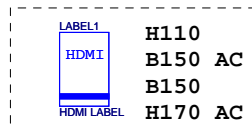
### H110 OPT.



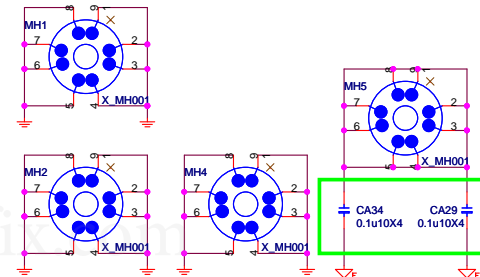
### H170 AC OPT.



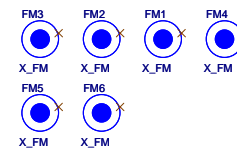
### B150 OPT.



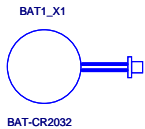
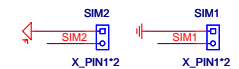
### Mounting Holes



### Optical Fiducial Marks-120



### Simulation



2015/10/52015/10/16PD0-0799510-E48,競華,23,寶安恩斯邁廠(MSIS)6,black  
2015/10/52015/10/16PD0-0799510-E48,競華,29,寶安恩斯邁廠(MSIS)6,black  
2015/10/52015/10/16PD0-0799510-G37,精成-深圳,23,寶安恩斯邁廠(MSIS)6,black  
2015/10/52015/10/16PD0-0799510-G37,精成-深圳,29,寶安恩斯邁廠(MSIS)6,black