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# MS-7B29

ATX:226mm\*185mm

Ver: 1.0

## Intel -CoffeeLake-S plamform

### CPU:

LGA1151

CPU POWER PAK \*4 Phase

GT POWER PAK \*2 Phase

### Onboard Chip:

SIO: NCT5567D

HD Audio Codec: ALC887

LAN: RTL8111H

Flash ROM: SPI 128 MB

DP to VGA: RTD2166

CUT VBAT: SLG4B41231

### Main Memory:

DDR4 \* 2 (Dual Channel)

### ACPI:

5VDAUL: uP7501

5VDIMM: uP7501

3VSB: GS7133+N MOS

1P8\_VSB: GS7133

3VDSW: GS7116

VCCSTPLL: GS7133

### Expansion Slots:

PCI Express (X16) Slot \* 1

PCI Express (X1 ) Slot \* 2

### System Chipset:

Cannon Lake H310

### PWM:

VCORE - RT3607

DDR - RT8231

DDR VPP25 - MP2143

PCH(1.05V) - RT8125E

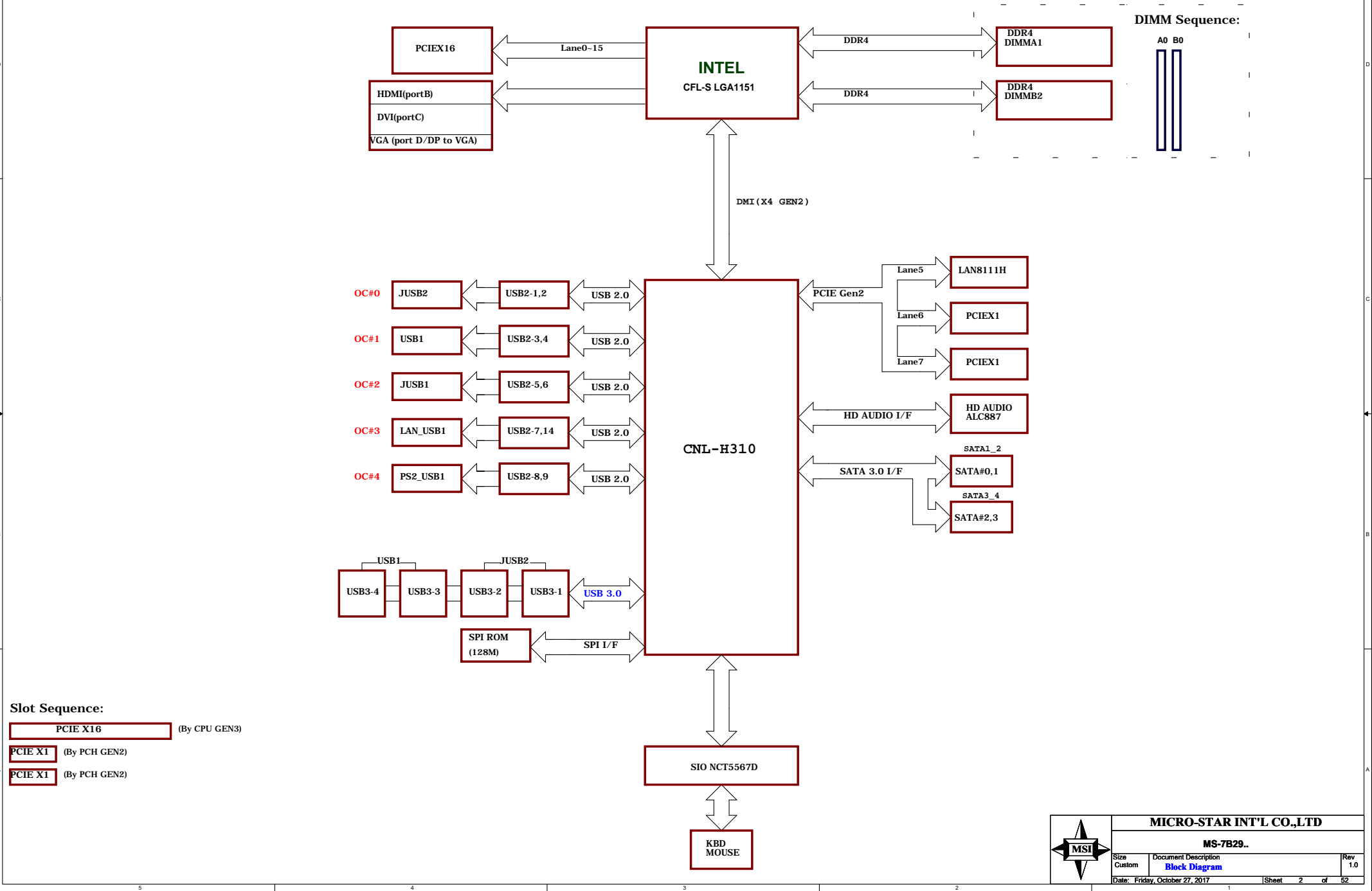
VCCSA - NB685

VCCIO - SY8288

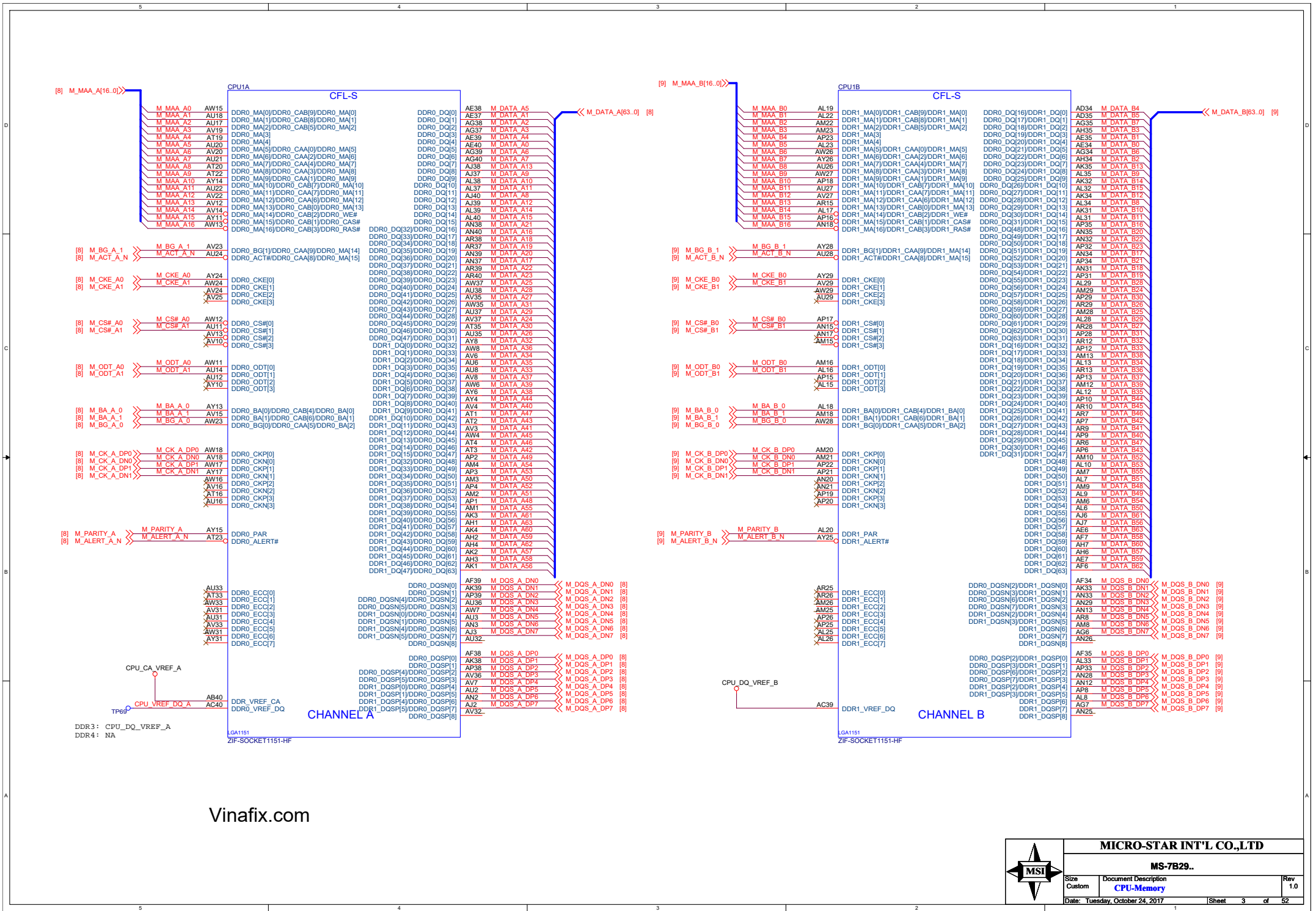
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MS-7B29 Block Diagram

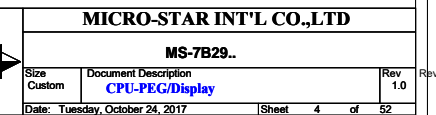
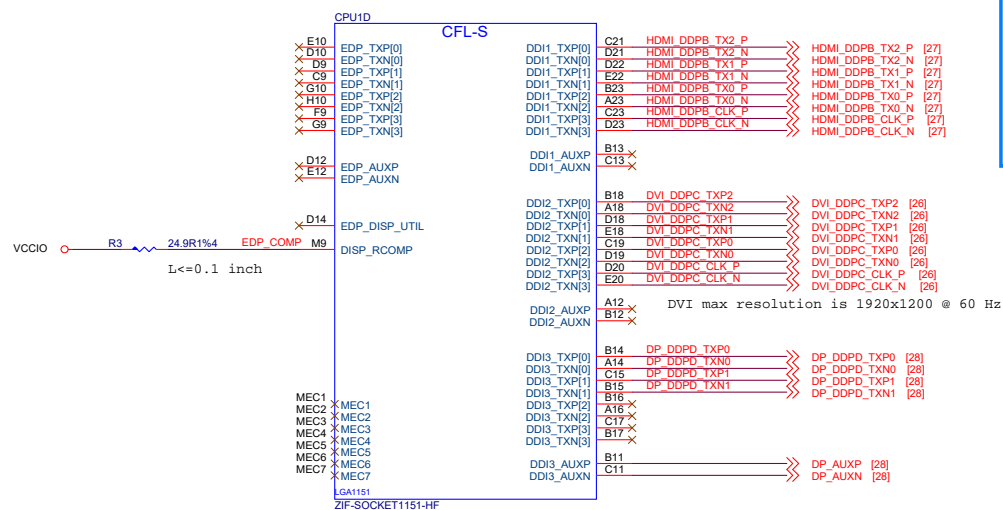
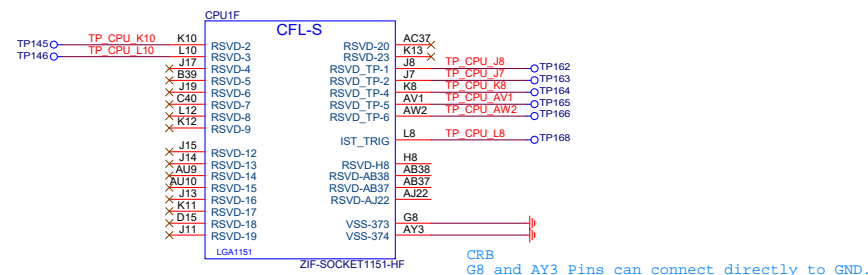






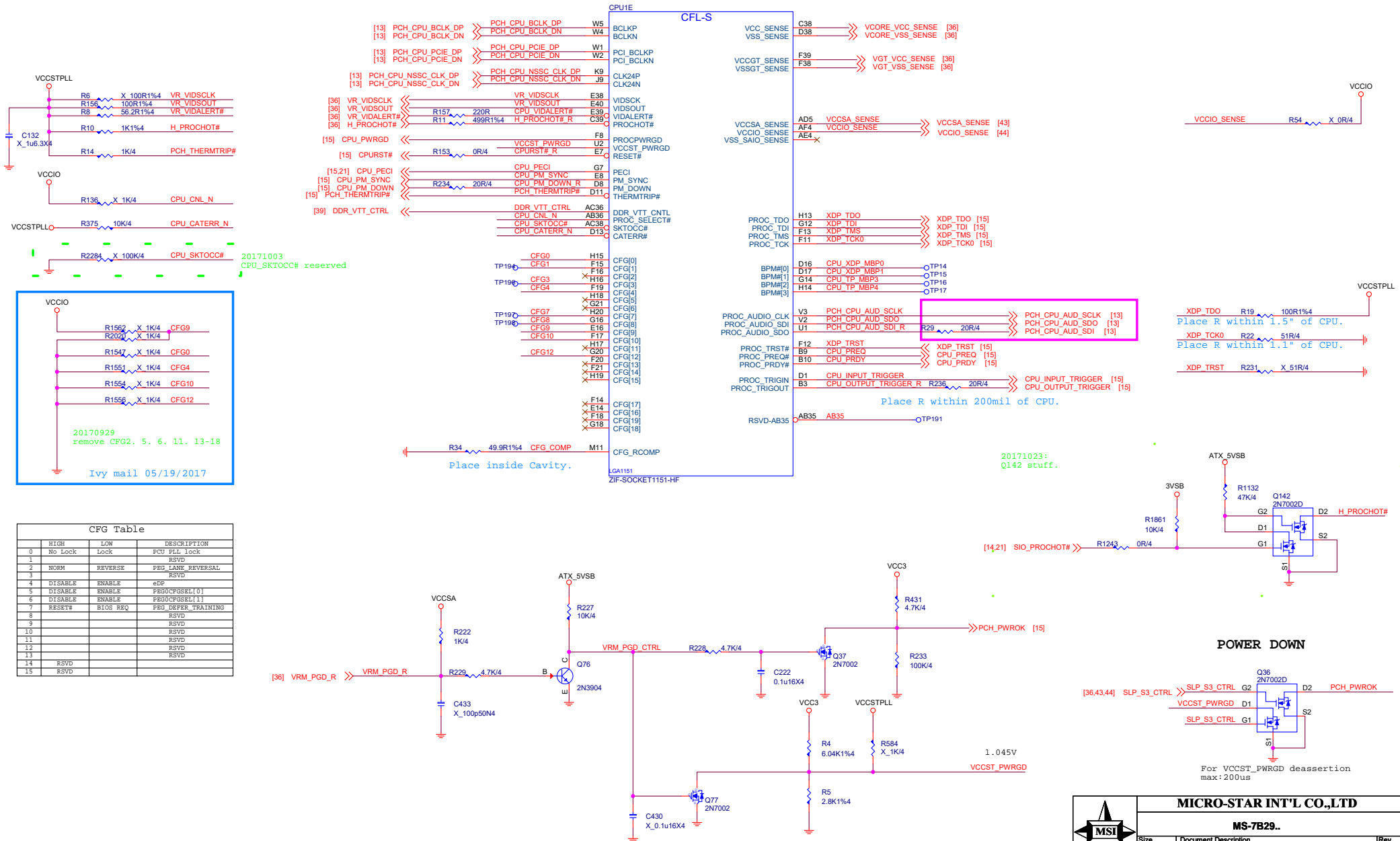
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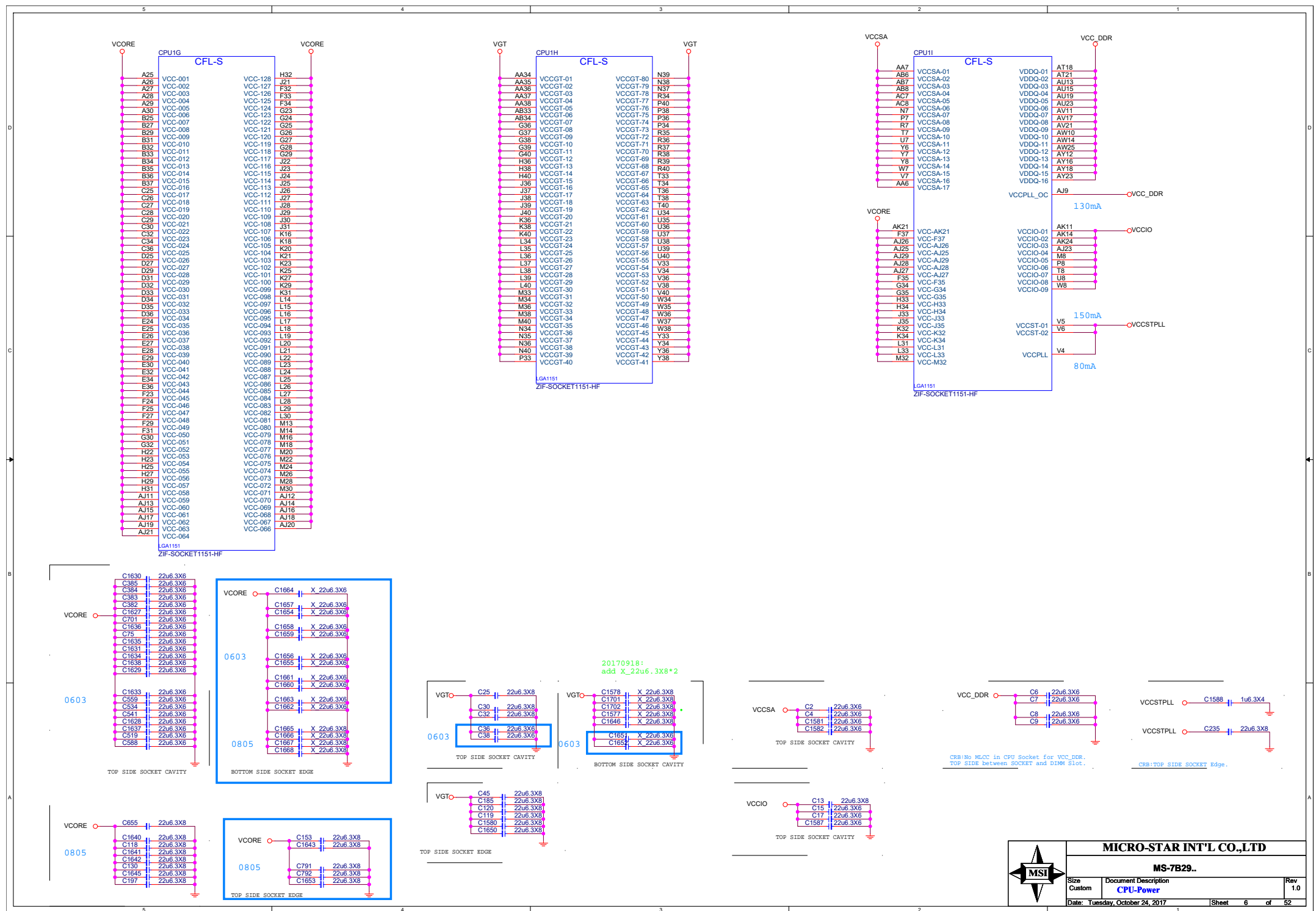




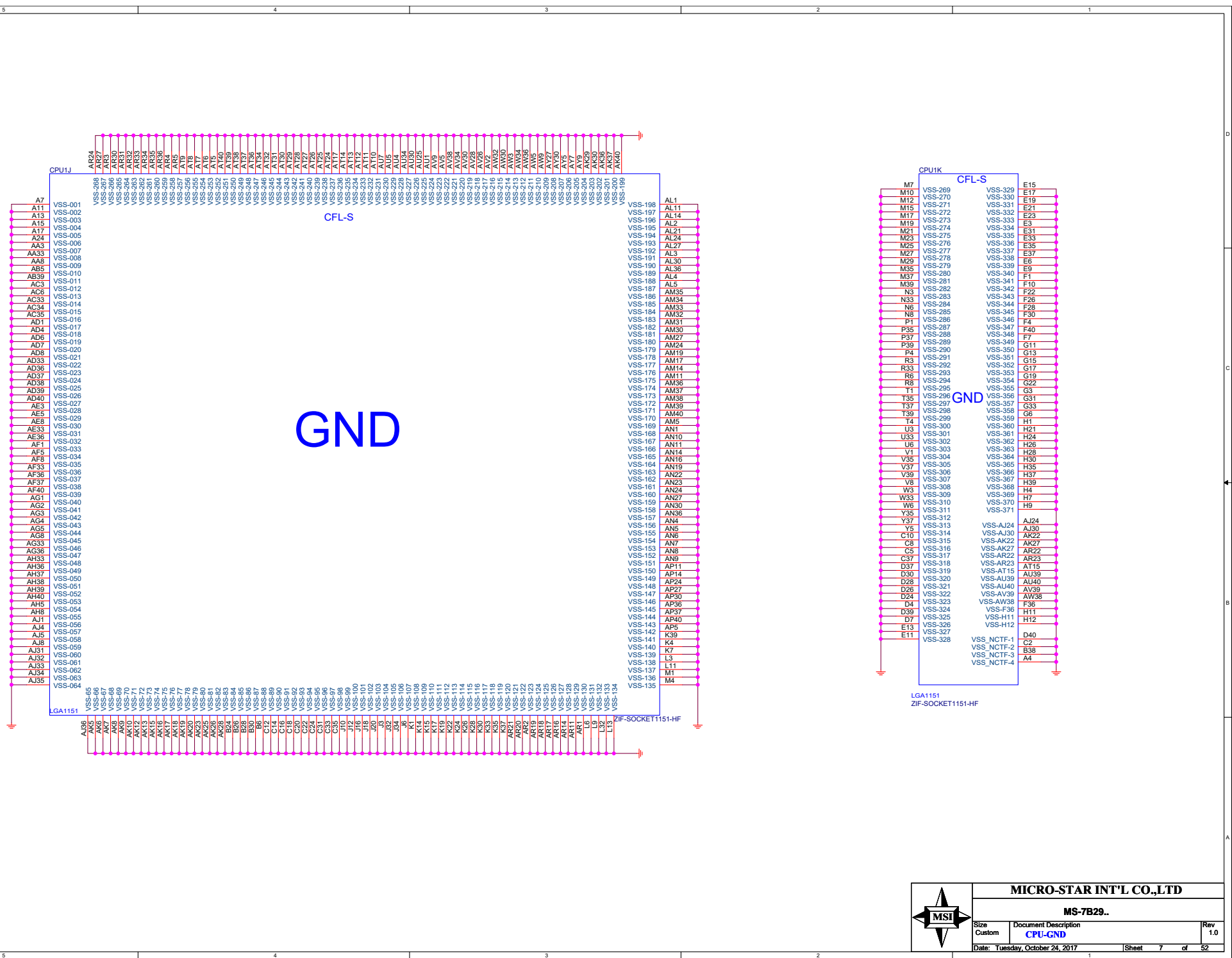
CFG Table			
	HIGH	LOW	DESCRIPTION
0	NO LOCK	LOCK	PCI PLU LOCK
1			RSVD
2	NORM	REVERSE	PEG LANE REVERSAL
3			RSVD
4	DISABLE	ENABLE	eDP
5	DISABLE	ENABLE	PEG0CFGSEL[0]
6	DISABLE	ENABLE	PEG0CFGSEL[1]
7	RESET#	BIOS REQ	PEG ASPER TRAINING
8			RSVD
9			RSVD
10			RSVD
11			RSVD
12			RSVD
13			RSVD
14	RSVD		
15	RSVD		



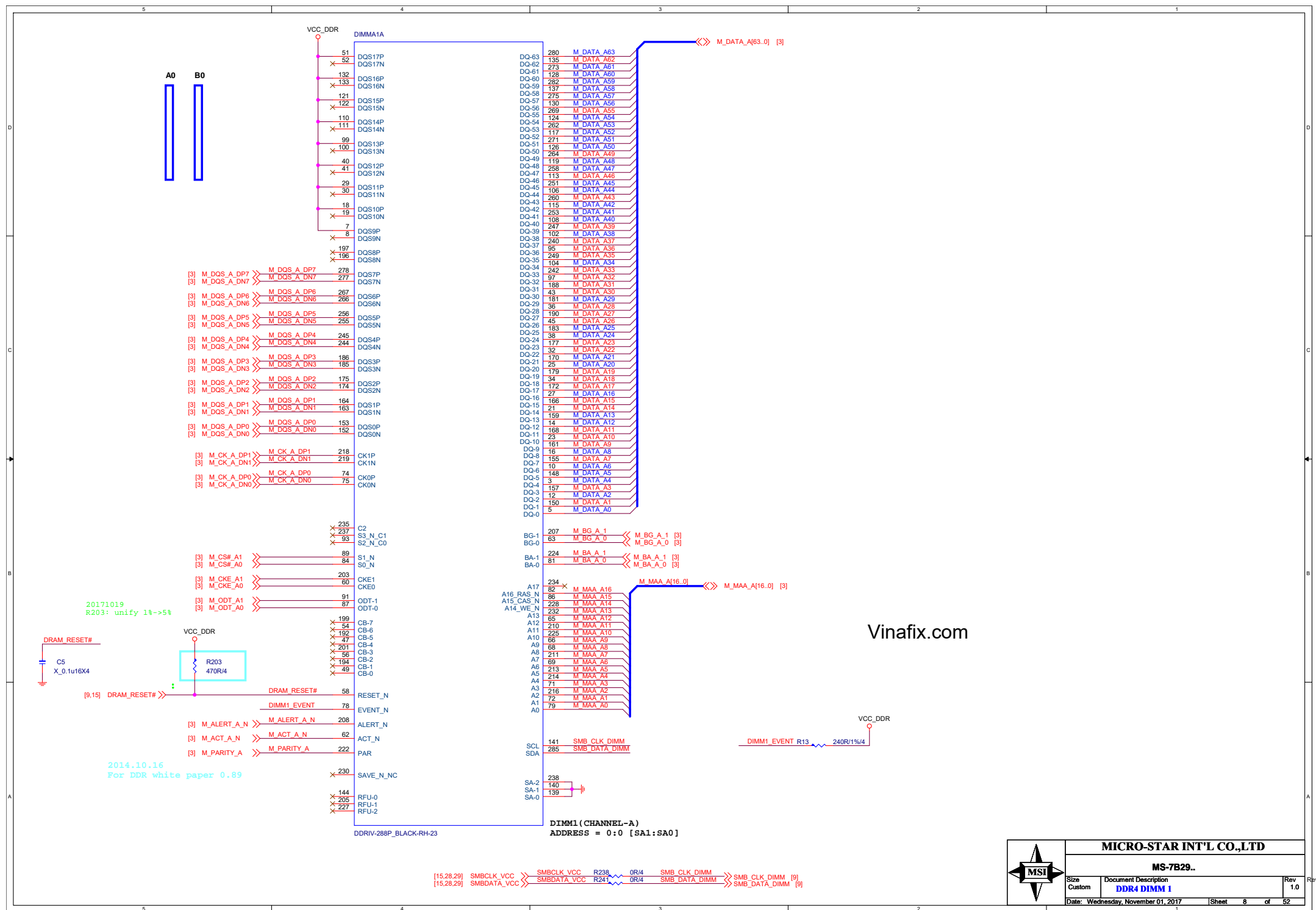




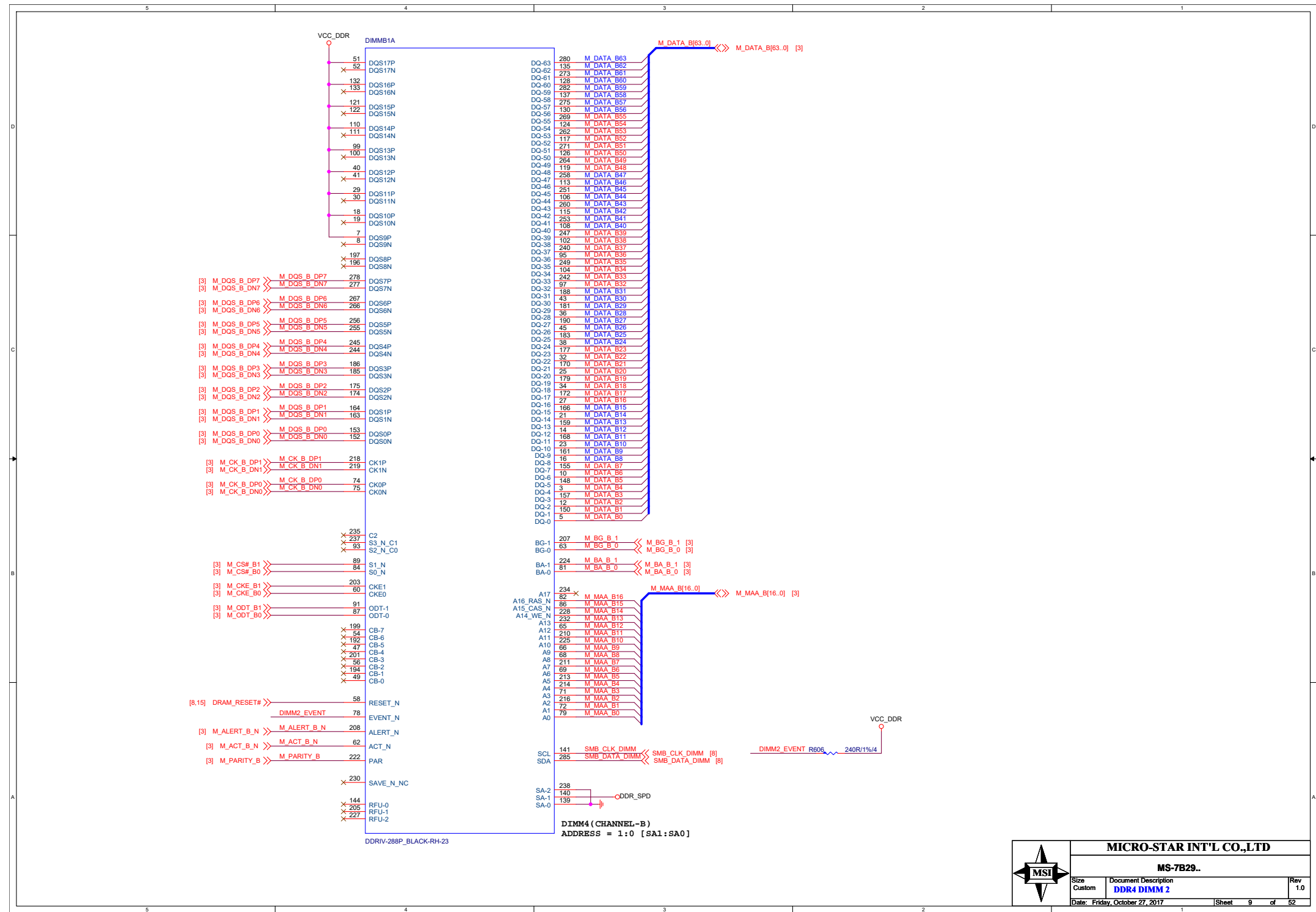




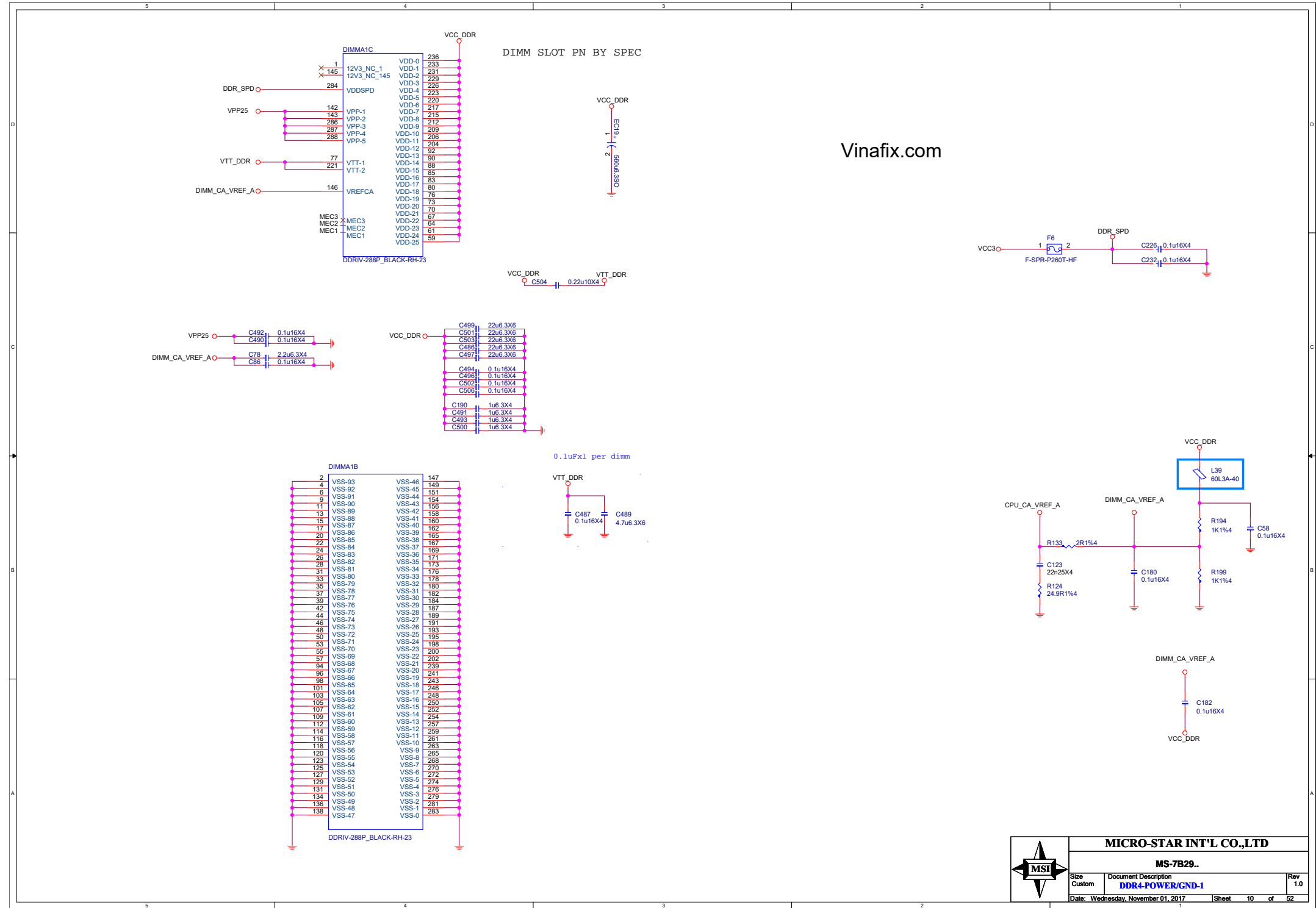






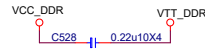
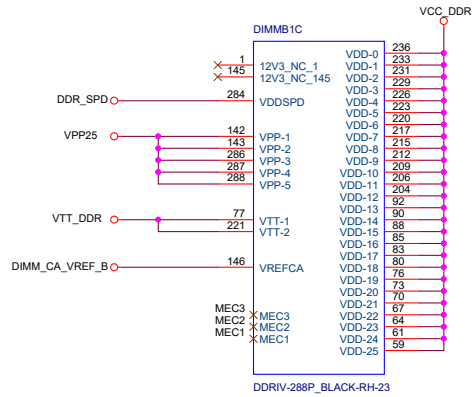




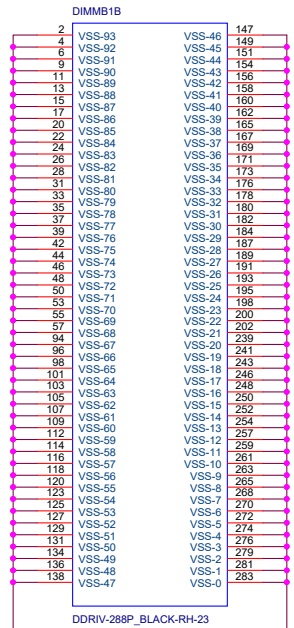
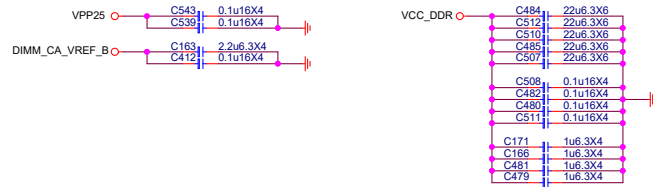


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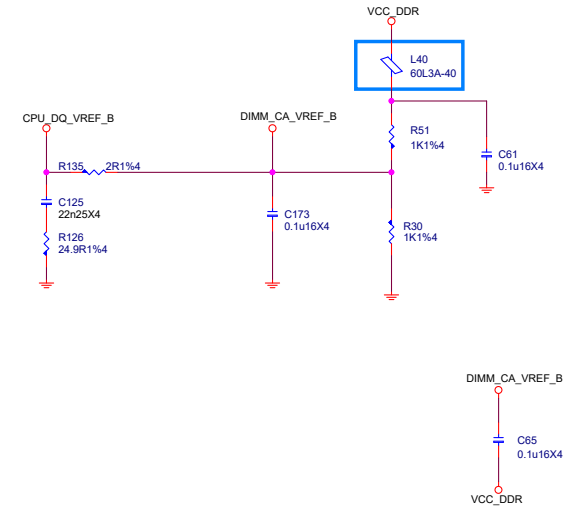
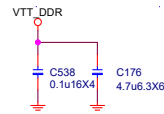




Place close to DIMM2



0.1uF x1 per dimm

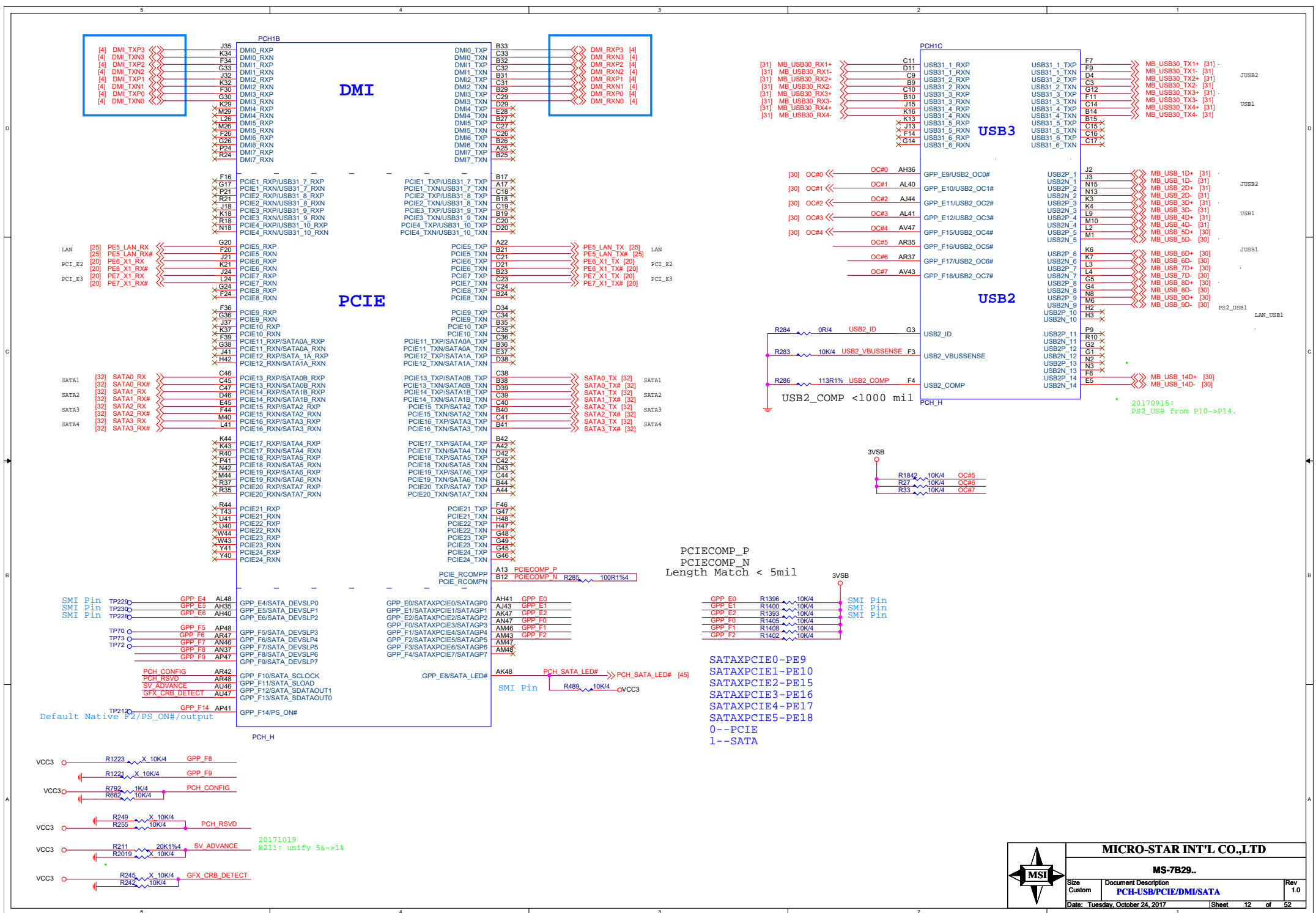


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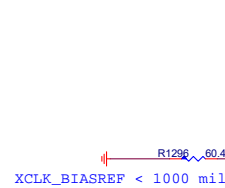
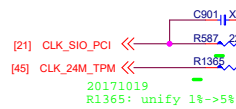
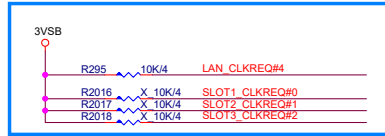
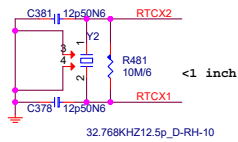






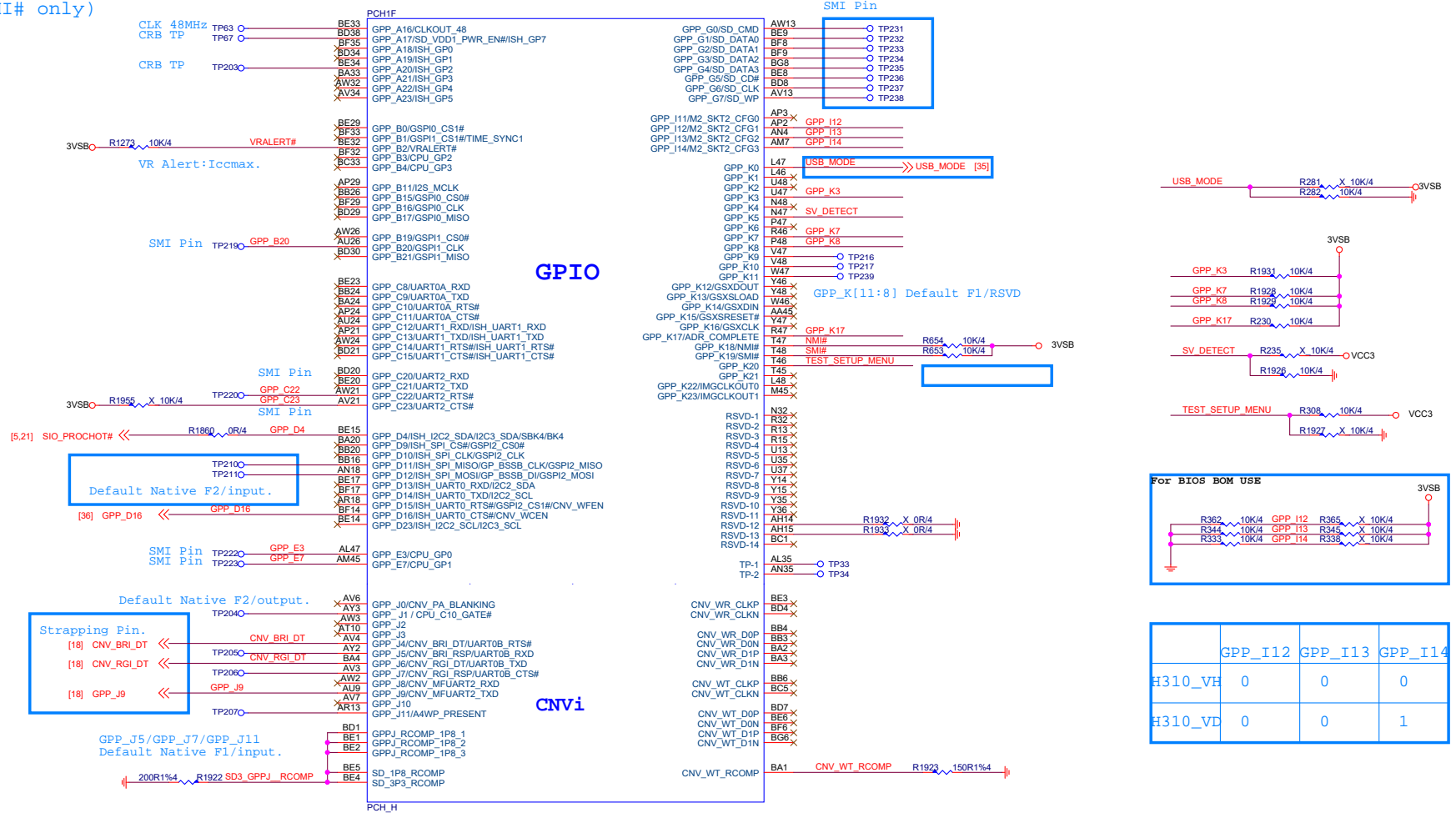
## RTC Block

Close to PCH





```
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)
```



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Size Custom	Document Description <b>PCH-GPIO/USBOC#/SATASTRAP</b>	Rev 1.0
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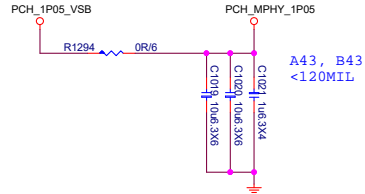




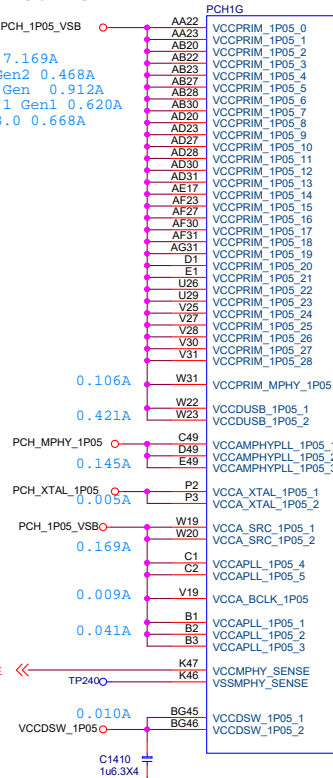
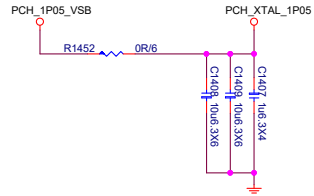


**PCH\_1P05\_VSB**  
Total 10.743A

Base 7.169A  
DMI Gen2 0.468A  
PCIe Gen 0.912A  
USB3.1 Gen1 0.620A  
SATA3.0 0.668A

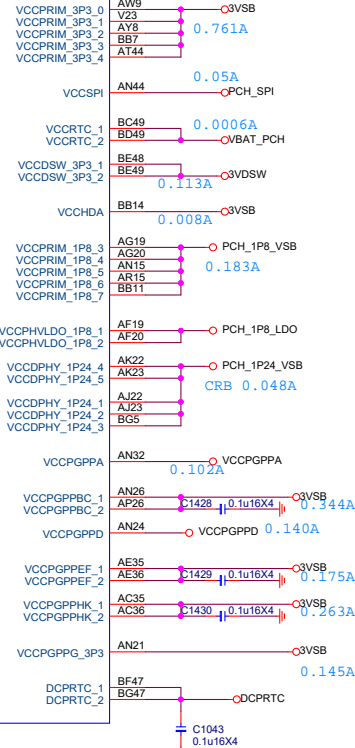


A43, B43  
<120MIL

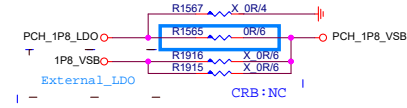


**POWER**

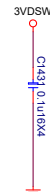
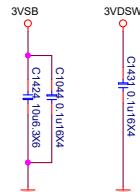
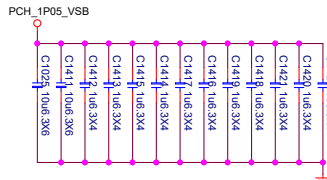
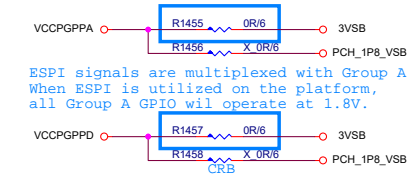
**3VSB**  
Total 1.988A



**PCH\_1P8\_VSB**  
Total 0.483A



ESPI signals are multiplexed with Group A GPIOs. When ESPI is utilized on the platform, all Group A GPIO will operate at 1.8V.



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VSS

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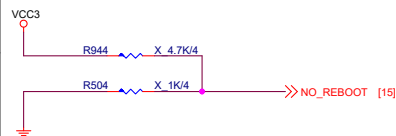
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MS-7B29..

Size Custom	Document Description PCH-GND	Rev 1.0
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No Reboot



<sup>c</sup>Internal pull-down 20K is disabled after PLTRST#

Internal pull-down 20K is disabled after RSMRST

3VSB

R456 X 4.7K/4

R457 X 20K/4

GPP\_H12 [15]

Internal pull-down 20K is disabled after RSMRST

CNL EDS pull-up 100k.

3VDSW

R1912 1K/4

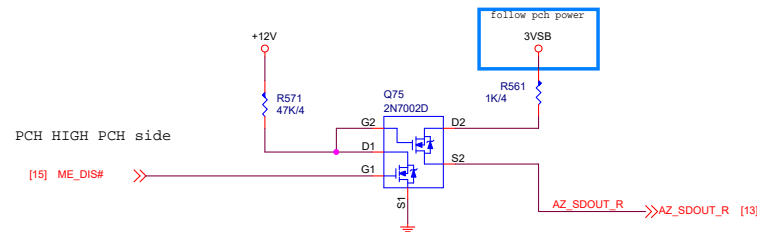
R1913 X 1K/4

GPD2 [15]

Internal pull-down 20K is disabled after RSMRST

Internal pull-down 20K is disabled after PLTRST

## ME flash by GPIO



3VSB

CNL EDS pull-up 100k.

R1477 100K1%

R1479 X 20K/4

GPP\_H15 [15]

20170929:  
pull high change to PCH\_IP8\_VSB.

The diagram shows a signal path for PCH\_IP8\_VSB. It starts with a pull-up resistor R154 (10K/4) connected to the signal line. The signal line then passes through a resistor R157 (10K/4) to a bus labeled GPP\_I9 [14].

VCCSPI 3.3V, Internal pull-down.

```

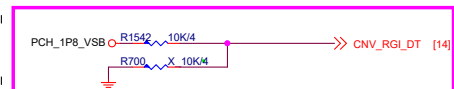
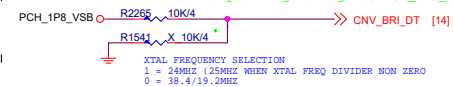
20170915: pull high to PCH_IP8_LDO
20170921: remove IP8_VSB
20170927: 1. pull high change to PCH_IP8_VSB.

```

$R_{226k}$   $10K/4$   
 $R_{154k}$   $X_{10K/4}$

PCH\_IP8\_VSB  $\gg$  CNV\_BRV\_DT [14]

XTAL FREQUENCY SELECTION  
 = 24MHz (15MHz WHEN XTAL FREQ DIVIDER NON ZERO  
 = 38.4/19.2MHz



```
20170915:
1. pull high to PCH_1P8_LDO
2. CNVi disable
20170921:
remove 1P8_VSB
20170927:
1. pull high change to PCH_1P8_VSB.
```

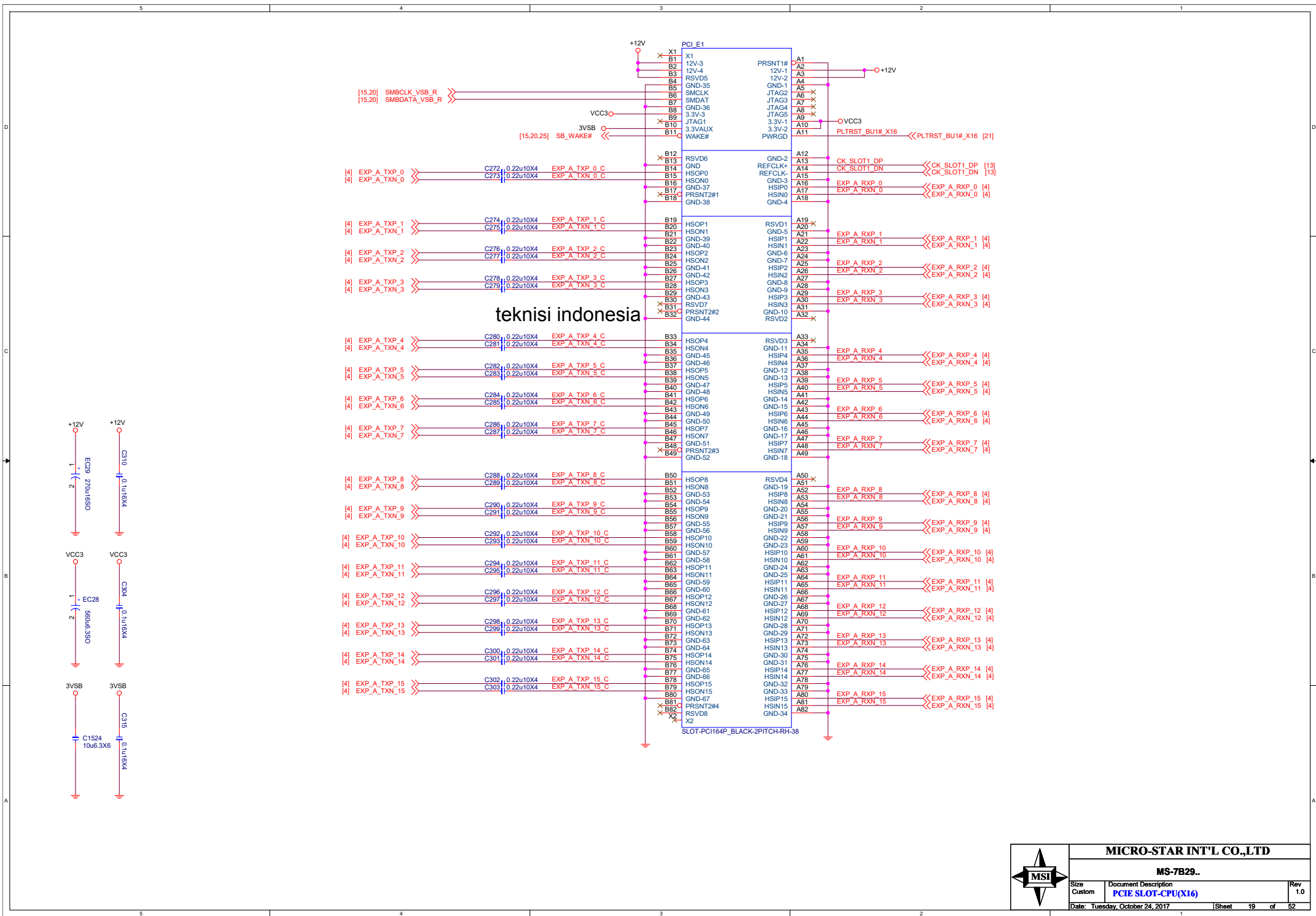
CNL EDS  
0= Integrated CNVi enable  
1 = Integrated CNVi disable



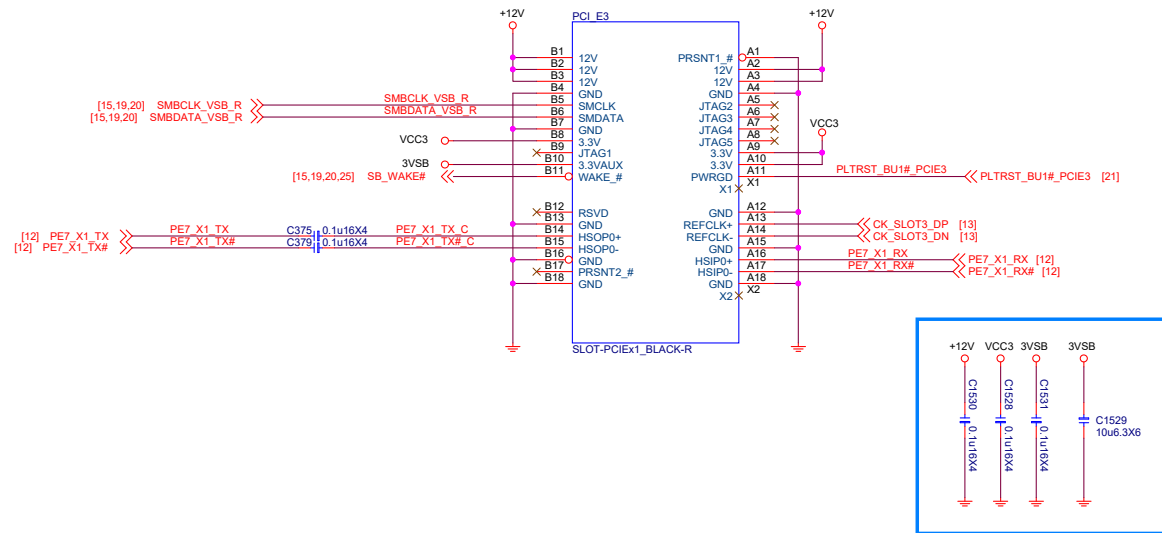
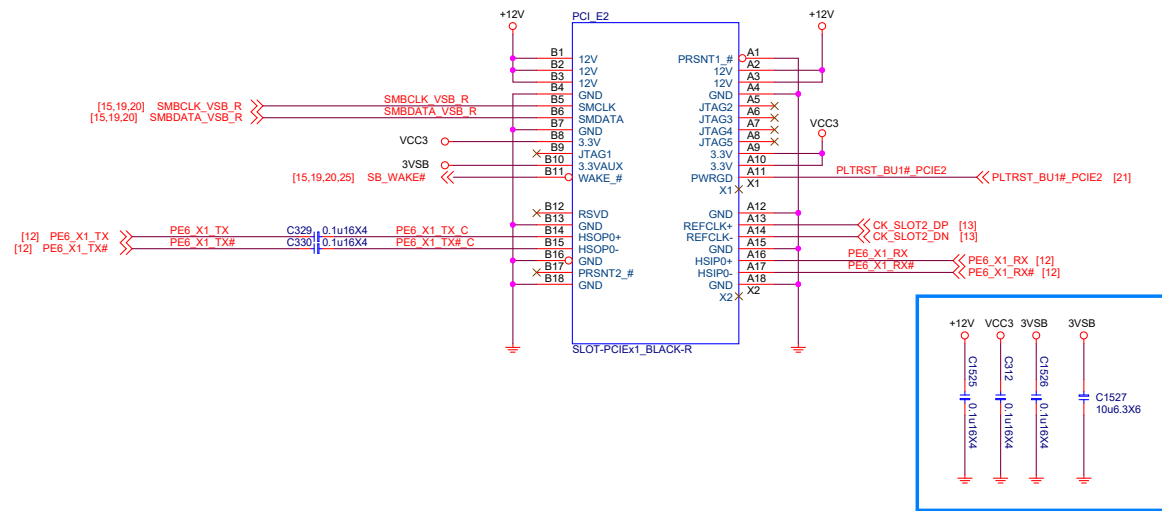
MS-7B29..

Size Custom	Document Description <b>PCH-Strap</b>	Rev 1.0
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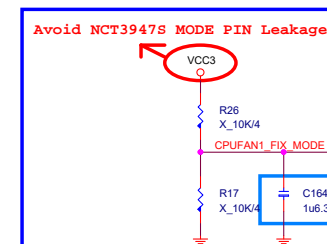
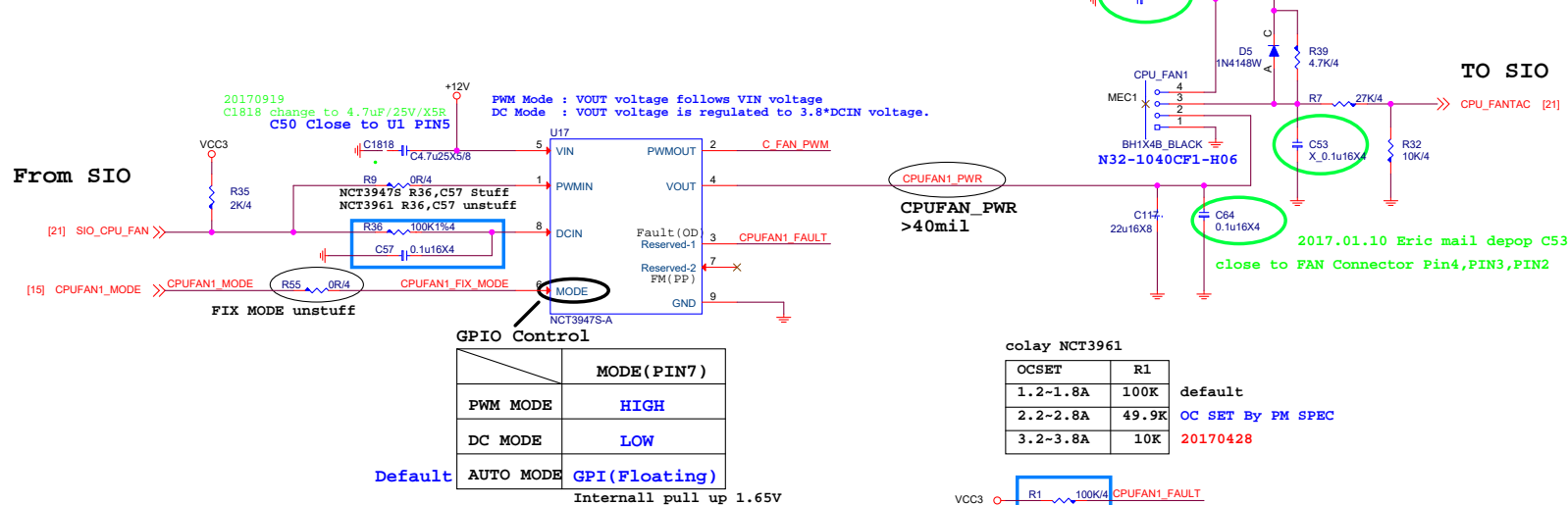






# TYPE K : 4 PIN CPU FAN USE NCT3947S USE PCH GPIO CONTROL FAN MODE

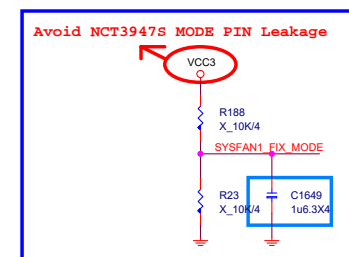
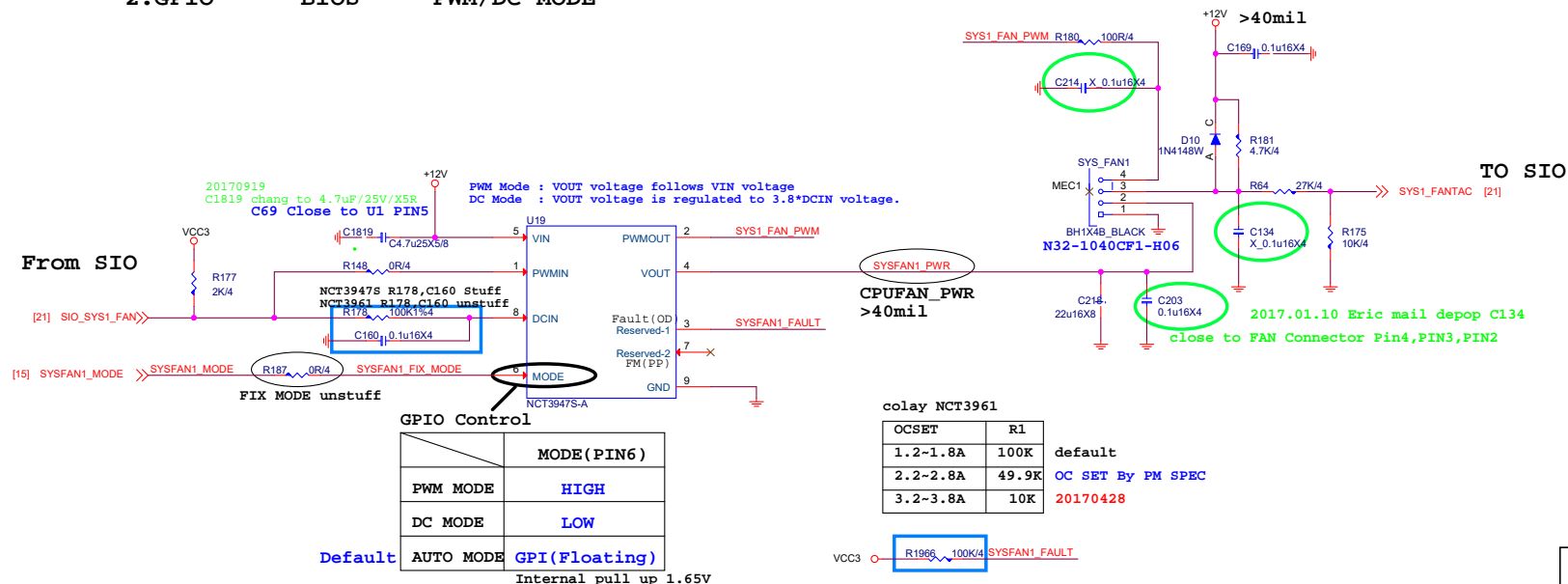
2.GPIO BIOS PWM/DC MODE



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

2.GPIO BIOS PWM/DC MODE



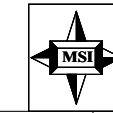
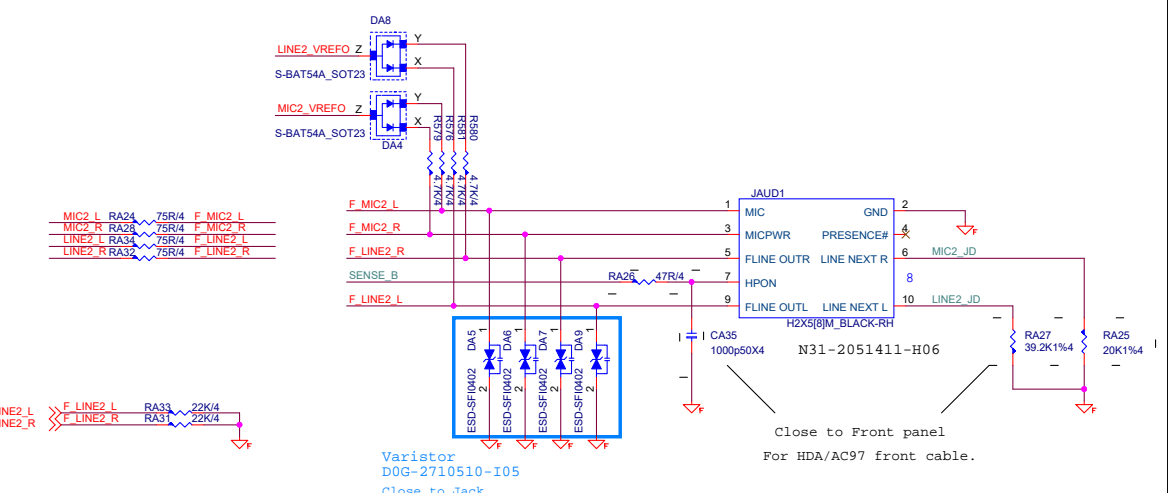
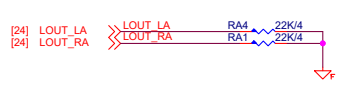
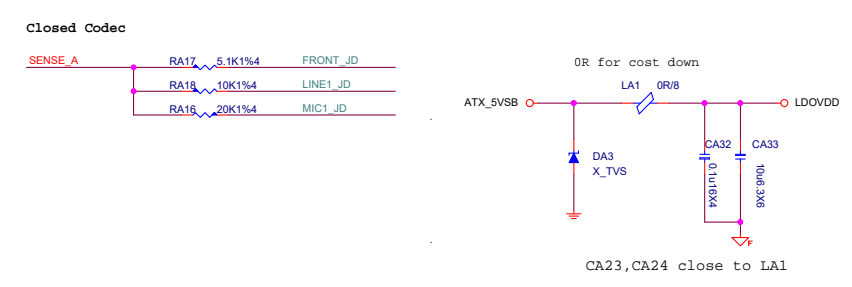
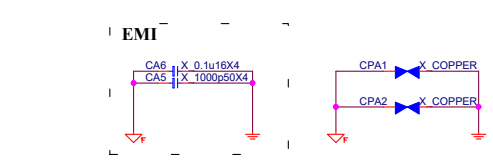
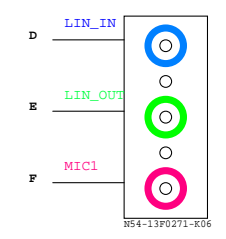
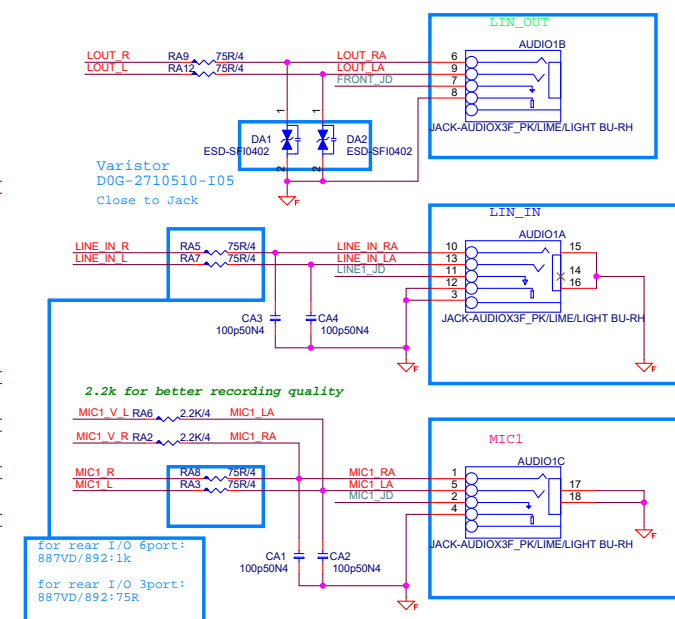
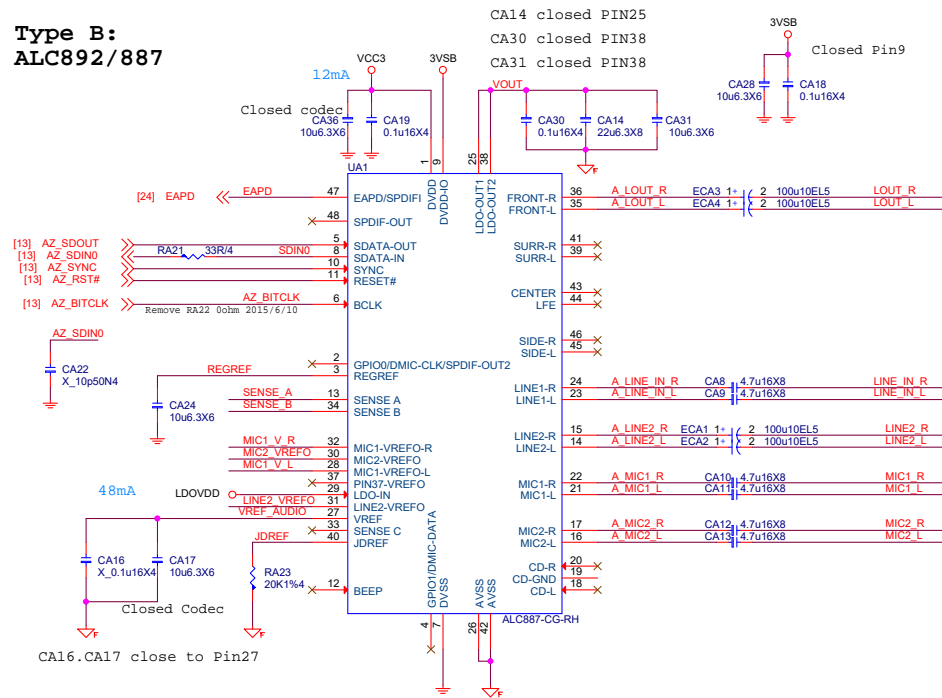
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Type B:  
ALC892/887



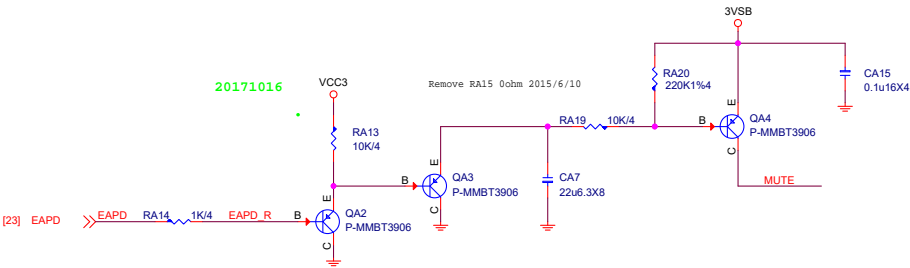
<b>MICRO-STAR INT'L CO.,LTD</b>			
<b>MS-7B29..</b>			
Size Custom	Document Description <b>AUDIO - ALC892/887</b>		Rev 1.0
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Rear Line OUT De-POP circuit

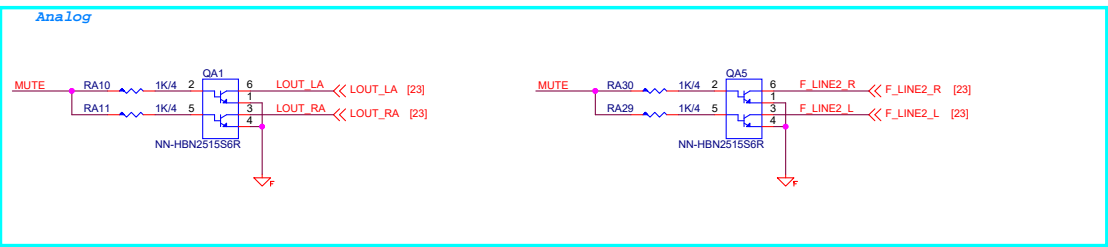
History:  
2014/02/13: stuff de-pop circuit of Line out & HP out.

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



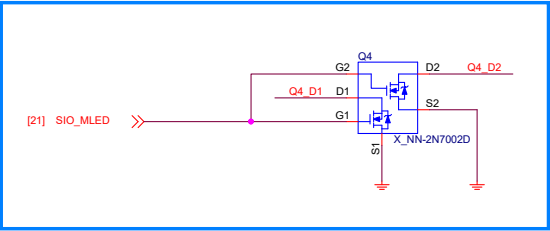
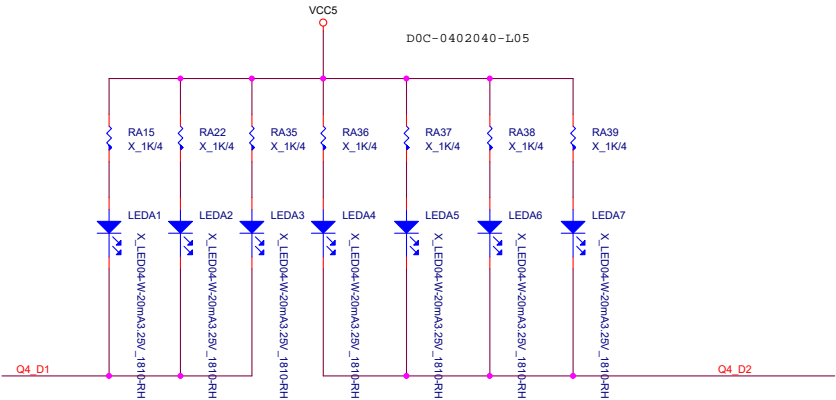
Digital

Analog



Audio LED

20170915:  
Cancel Audio LED

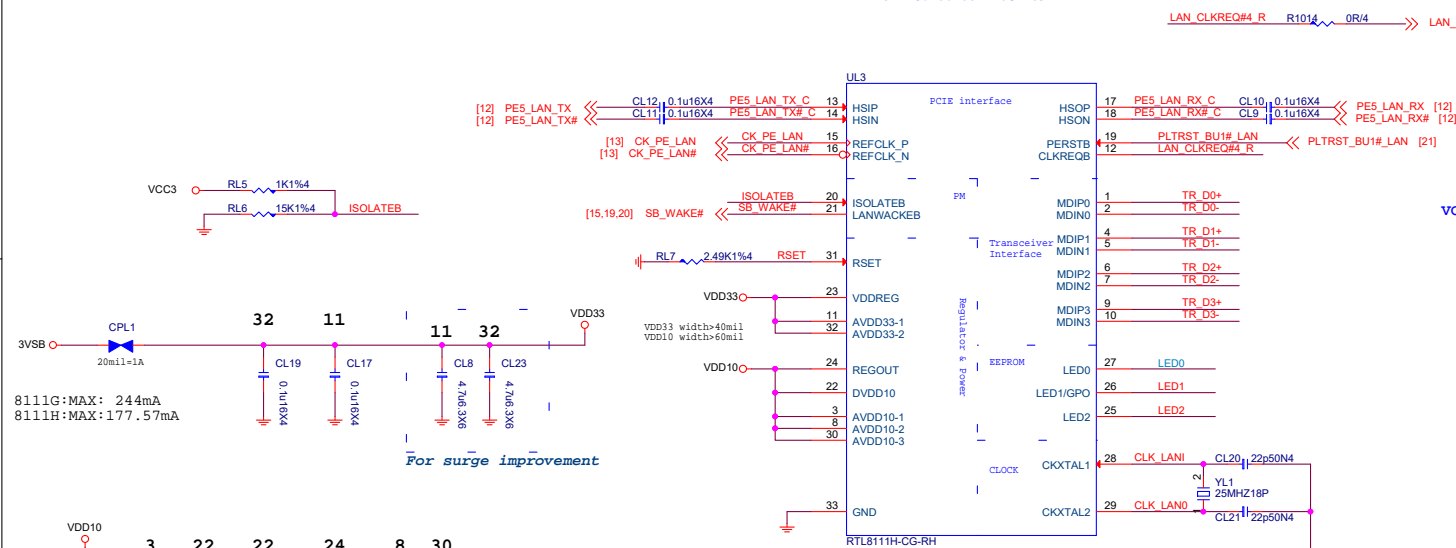


2016.01.12:Modify Q4 to Dual 7002 & Remove OR



# RTL8111G/RTL8111H Giga LAN

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

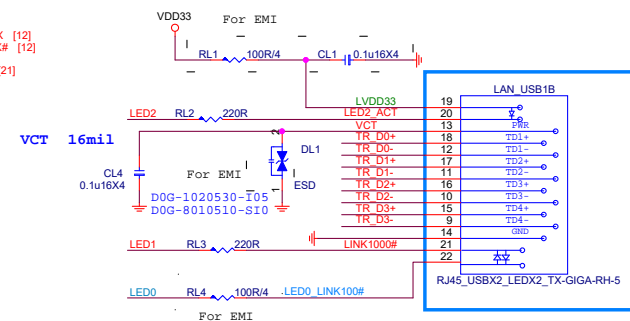


8111G:MAX: 244mA  
8111H:MAX:177.57mA

For surge improvement

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

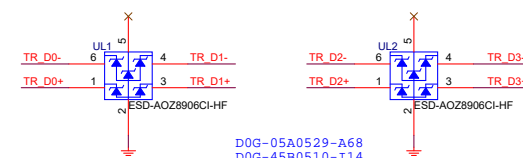
## LAN Connector



For EMI

## ESD Protect

UL1 & UL2 close to connector



D0G-05A0529-A68  
D0G-45B0510-I14

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### 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



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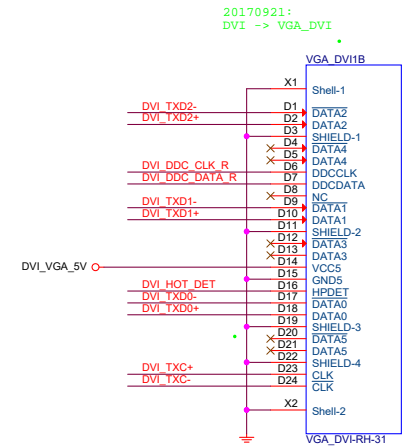
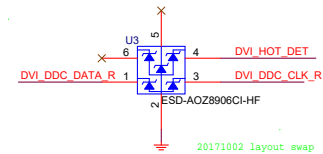
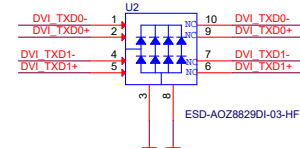
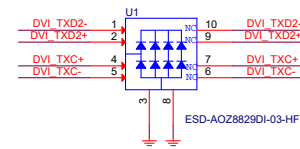
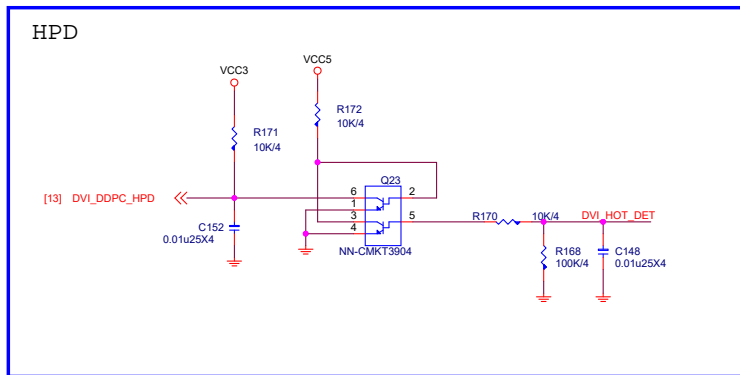
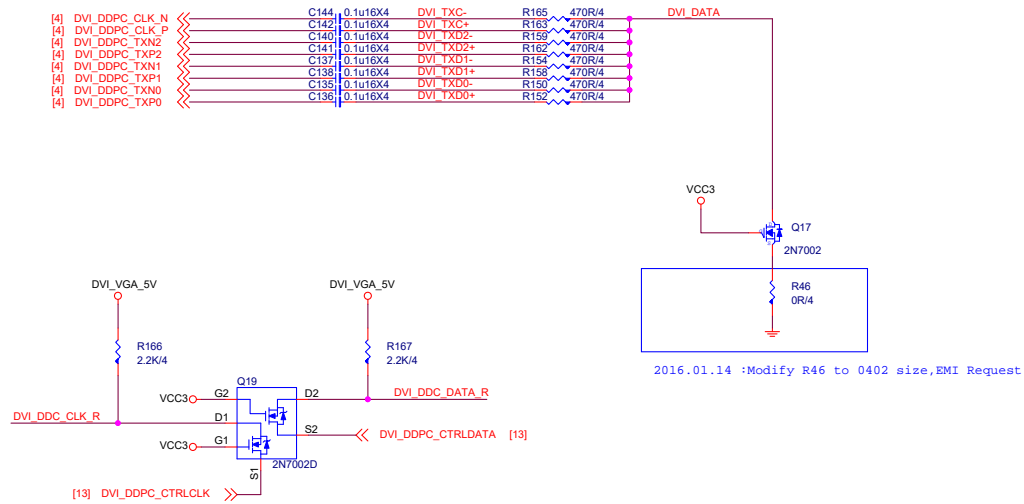
MS-7B29..

Size	Document Description	Rev
Custom	LAN - RTL8111H	1.0
Date:	Tuesday, October 24, 2017	Sheet 25 of 52

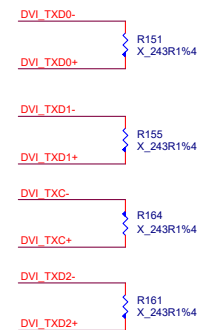


# DVI level shifter

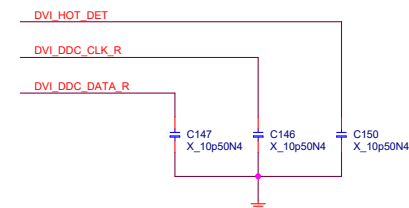
VGA: resolution of 2048x1536 pixels with 32-bit color at 75 Hz (4:3 QXGA)



## For EMI



## EMI



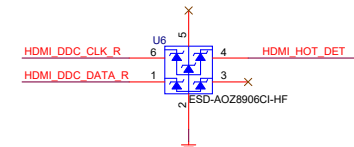
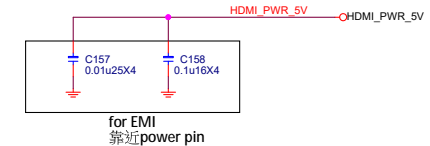
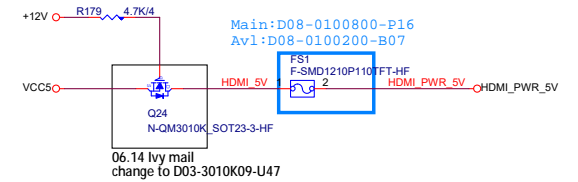
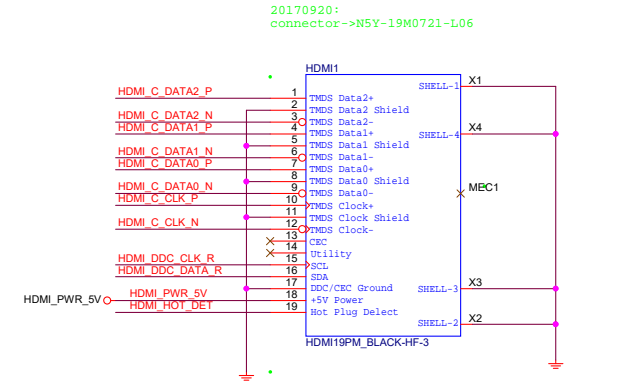
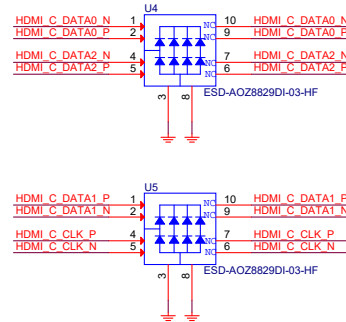
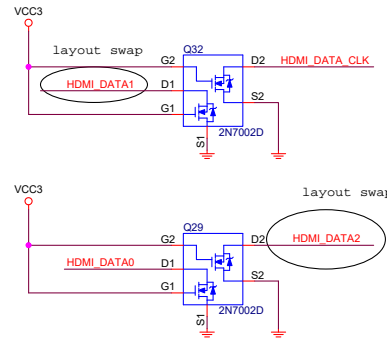
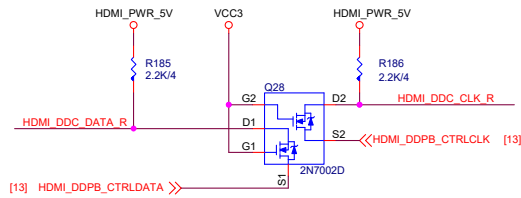
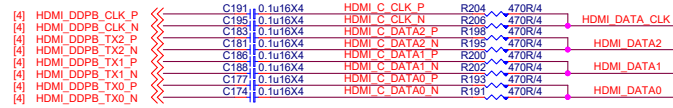
MICRO-STAR INT'L CO.,LTD

MS-7B29..

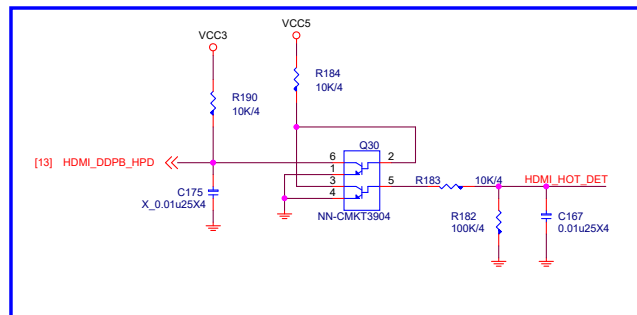
Size	Document Description	Rev
Custom	DVI	1.0
Date:	Tuesday, October 24, 2017	Sheet 26 of 52



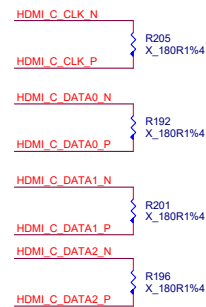
HDMI, DVI : 1920x1200 at 60 Hz (16:10 WUXGA)



HPD

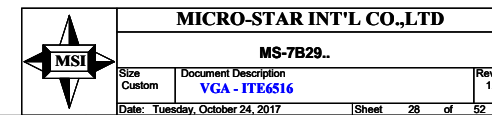


For EMI





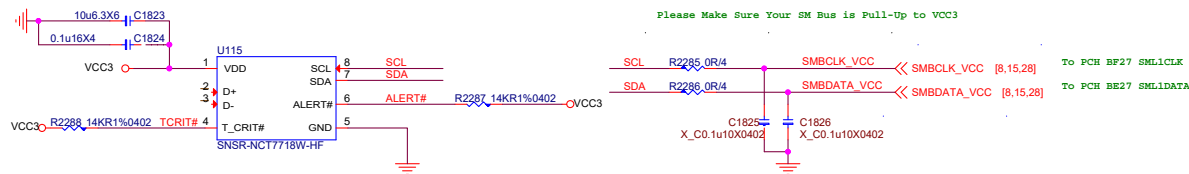
If connect to eDP port,must confirm whether it support hot plug detection HPD and re-auxtraining





## NCT7718W

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



NCT7718W SM Bus address is 98h ( 1001100xb)

Default: ALERT# Output Comparator Mode

TEMPERATURE (°C)		T_CRIT#				
		2KΩ	7.5KΩ	10.5KΩ	14KΩ	18.7KΩ
ALERT#	2KΩ	77	87	97	107	117
	7.5KΩ	79	89	99	109	119
	10.5KΩ	81	91	101	111	121
	14KΩ	83	93	103	113	123
	18.7KΩ	85	95	105	115	125

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MS-7B29..

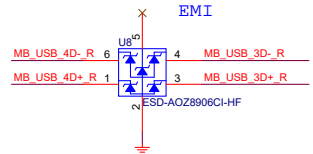
Size	Document Description	Rev
Custom	M.2-SLOT1	1.0
Date: Wednesday, November 01, 2017		Sheet 29 of 52







## Rear USB1 port 9,10

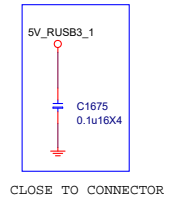
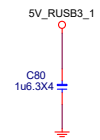
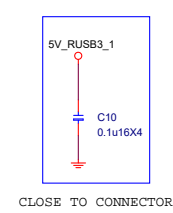
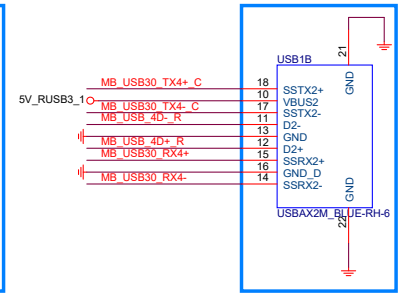
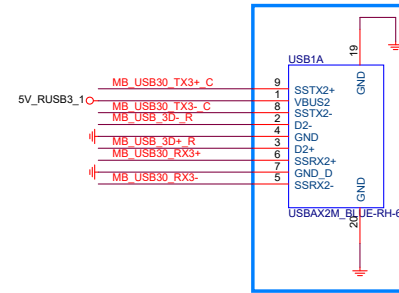
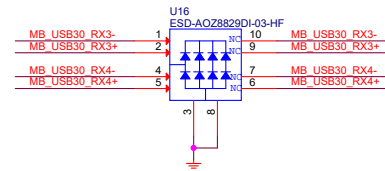
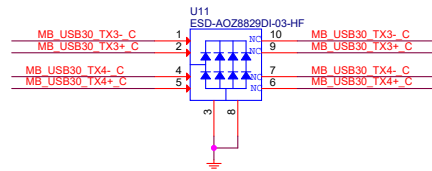


[12] MB\_USB30\_TX3+ >> C108 0.1u16X4 MB\_USB30\_TX3+ C  
[12] MB\_USB30\_TX3- >> C105 0.1u16X4 MB\_USB30\_TX3- C

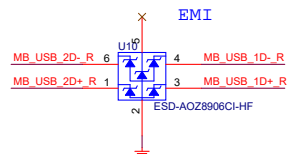
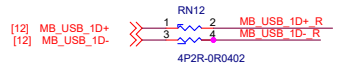
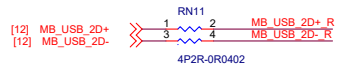
[12] MB\_USB30\_TX4+ >> C103 0.1u16X4 MB\_USB30\_TX4+ C  
[12] MB\_USB30\_TX4- >> C99 0.1u16X4 MB\_USB30\_TX4- C

[12] MB\_USB30\_RX3+ << \_\_\_\_\_  
[12] MB\_USB30\_RX3- << \_\_\_\_\_

[12] MB\_USB30\_RX4+ << \_\_\_\_\_  
[12] MB\_USB30\_RX4- << \_\_\_\_\_



## Front JUSB3 port 1,2

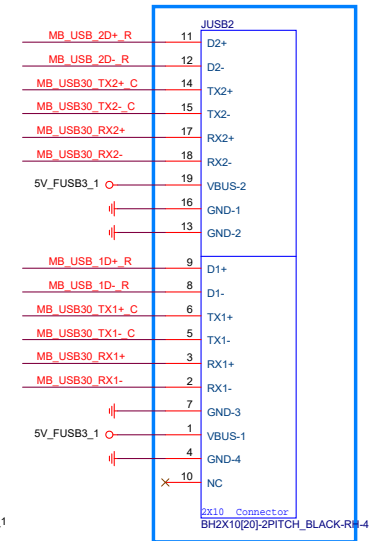
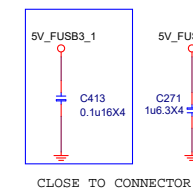
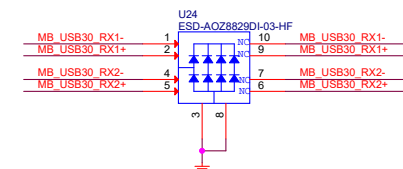
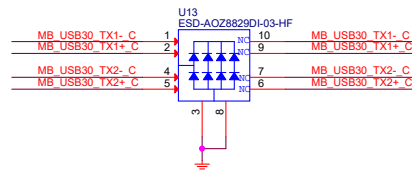


[12] MB\_USB30\_TX1+ >> C213 0.1u16X4 MB\_USB30\_TX1+ C  
[12] MB\_USB30\_TX1- >> C237 0.1u16X4 MB\_USB30\_TX1- C

[12] MB\_USB30\_TX2+ >> C211 0.1u16X4 MB\_USB30\_TX2+ C  
[12] MB\_USB30\_TX2- >> C256 0.1u16X4 MB\_USB30\_TX2- C

[12] MB\_USB30\_RX1+ << \_\_\_\_\_  
[12] MB\_USB30\_RX1- << \_\_\_\_\_

[12] MB\_USB30\_RX2+ << \_\_\_\_\_  
[12] MB\_USB30\_RX2- << \_\_\_\_\_

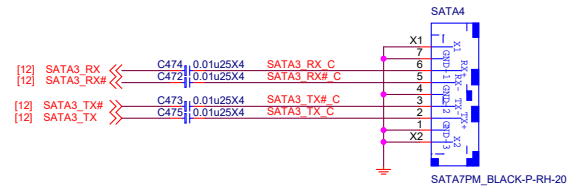
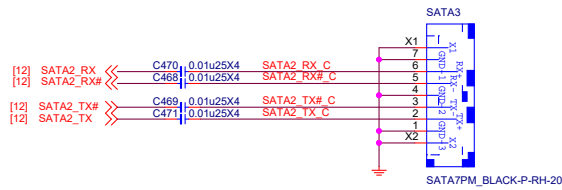
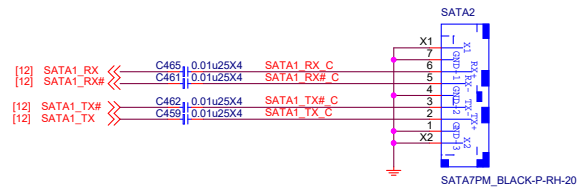
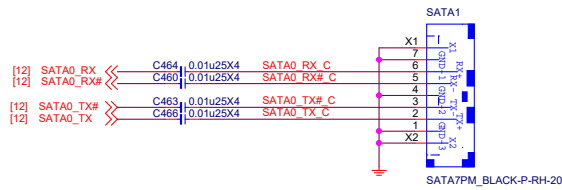


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Size	Document Description	Rev
Custom	Rear USB3 & Front Connector	1.0
Date: Tuesday, October 24, 2017	Sheet 31 of 52	





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**MS-7B29..**

Size	Document Description	Rev
Custom	SATA connector	1.0
Date:	Tuesday, October 24, 2017	Sheet 32 of 52

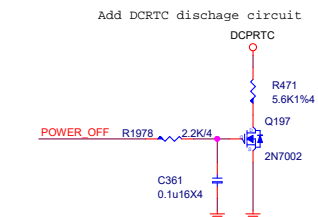
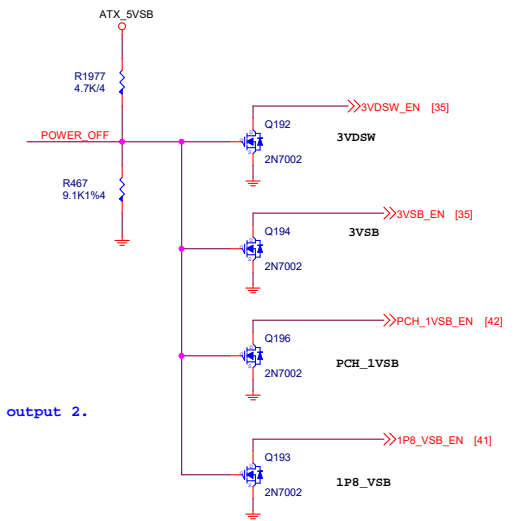
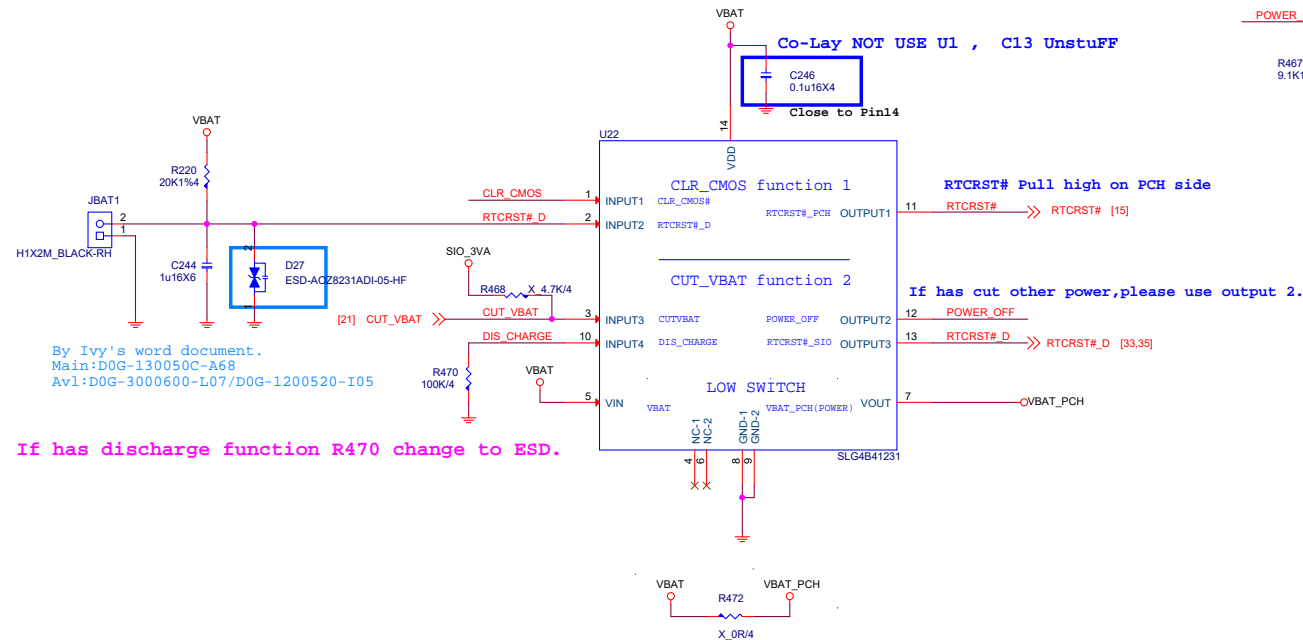
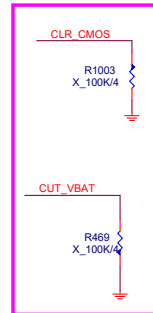


## Cut VBAT

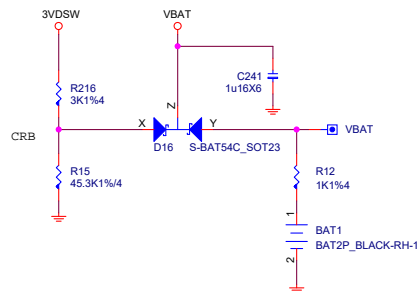
If STUFF R20 Please Check RTCRST# Double Pull High

RTCRST# R223 X\_0R/4 RTCRST#\_D >>> RTCRST#\_D [33,35]

20160629



## VBAT



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

Default

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

Default

Co-Lay NOT USE U1, R20 STUFF



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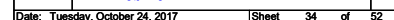
MS-7B29..

Size	Document Description	Rev
Custom	CUT VBAT circuit	1.0
Date: Tuesday, October 24, 2017	Sheet 33 of 52	



```
20170915:
remove SPI TPM co-lay.
```

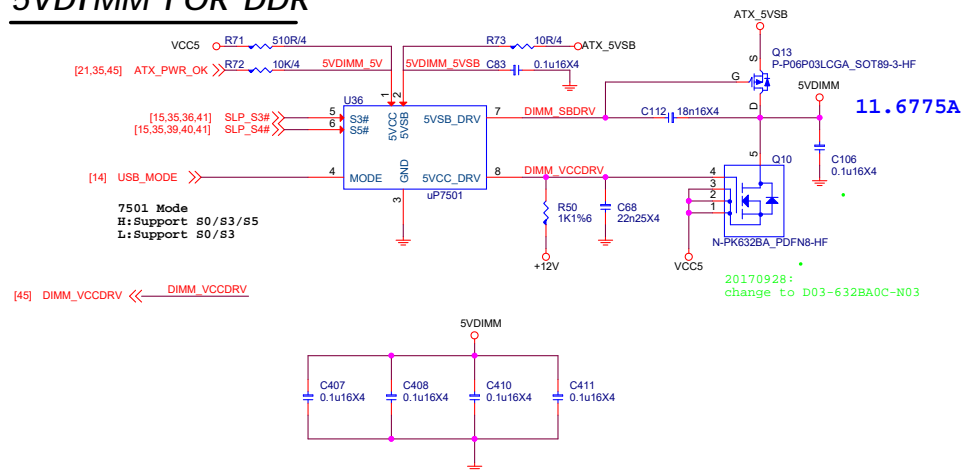
```
20170915:
remove SPI TPM co-lay.
```





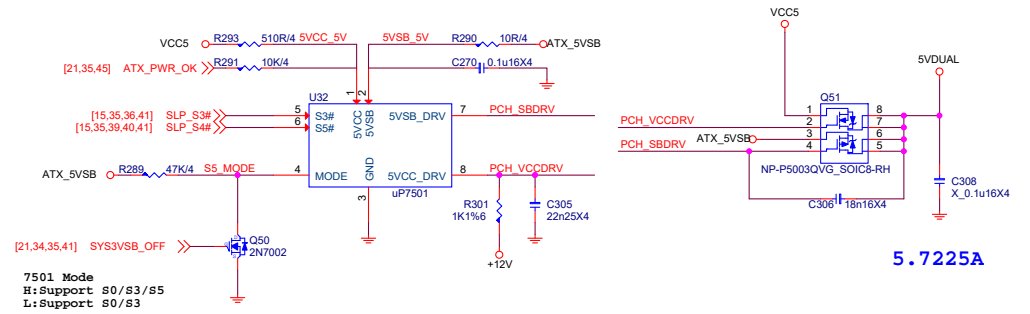
## 5VDIMM FOR DDR

(3A for DDR, 6.6A for USB)



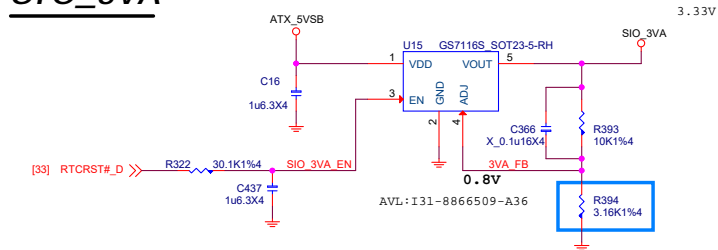
## 5VDUAL

5VDUAL is power source of 1P0SB, 1.8PSB & 3VSB



## SIO\_3VA

20mA





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VCORE Thermal Protection Table

GPP_D16	R1	R2	Thermal Alert#	VR_HOT#	Thermal Alert#/VR_HOT#
GPI(1) Default	190.57K	11.32K	97℃	115℃	84.35%
GPI(0)	274.32K	34.94K	106℃	115℃	92.17%

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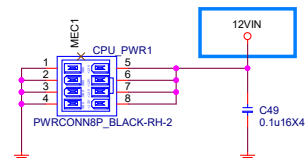
MS-7B29..

Size	Document Description	Rev
Custom	PWM-RT3607BC	1.0
Date: Tuesday, October 24, 2017		Sheet 30 of 52

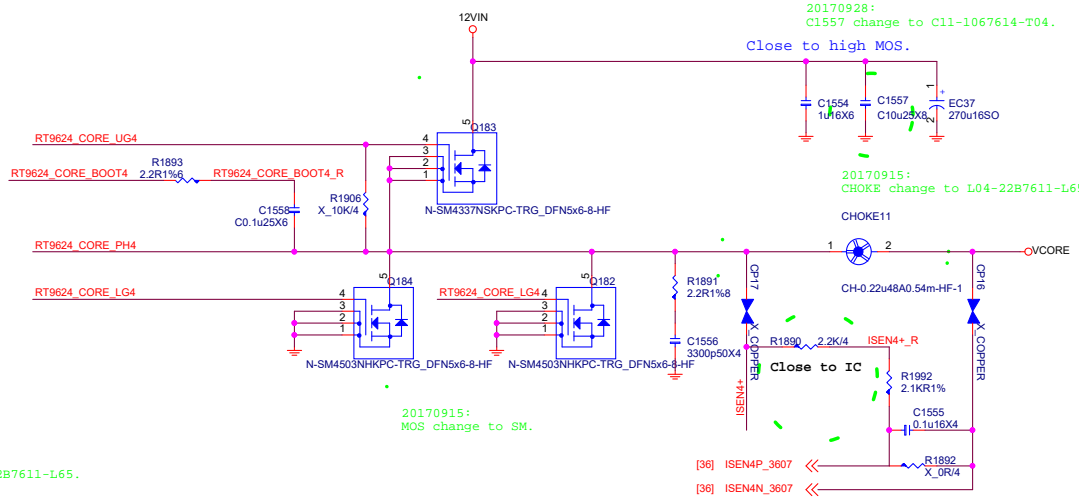
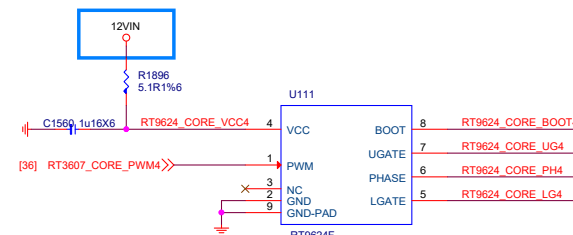


teknisi indonesia

ICCMAX:133A  
LL:2.1m ohm



Calculated by ICCMAX,VOUT 0.9V.  
Ripple Current Vcore 15.2371A,VGT 8.03411A.  
OS-CON Amount (15.2371A+8.03411A)/5A=4.65PCS

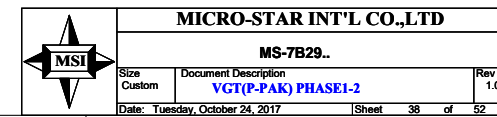


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MS-7B29..

Size	Document Description	Rev
Custom	Vcore(P-PAK) PHASE1-4	1.0
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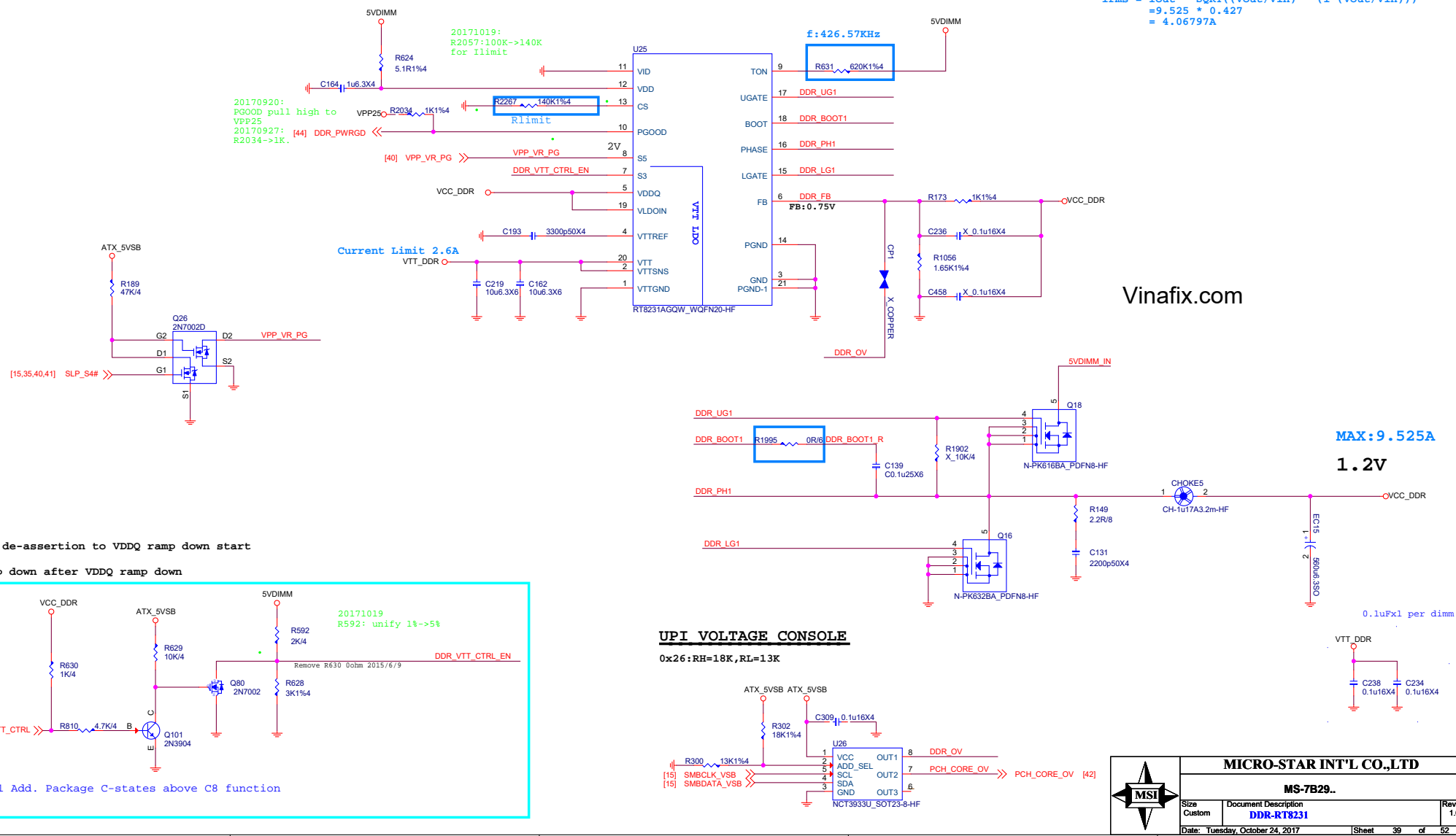




$$1.2V, 3.3A + 5.85A + 0.375A = 9.525A$$
$$\begin{aligned} V_{gs}: 5V \rightarrow R_{ds(on)}: 4.6m\Omega \\ I_{limit} &= (R_{limit}/R_{ds(on)}) * 5\mu A/10 \\ &= (140K\Omega/4.6m\Omega) * 5\mu A/10 \\ &= 15.21A \end{aligned}$$
$$0.4V \leq R_{limit} * 5\mu A \leq 3V$$

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

VID	Reference Voltage (V)
H	0.675
L	0.75





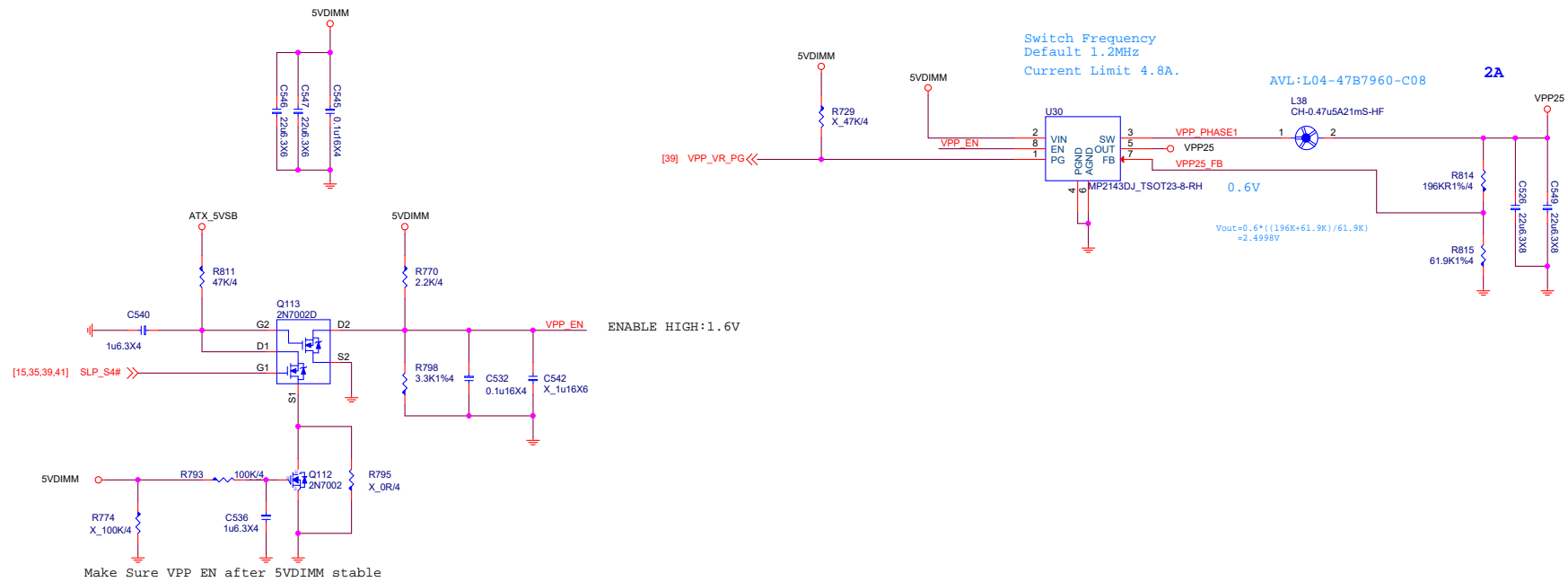
2DIMM :1.12A FOR DDR VPP2.5V

# VPP25 Power 2.5V; 2A

Switch Frequency  
Default 1.2MHz  
Current Limit 4.8A.

AVL:L04-47B7960-C08

2A

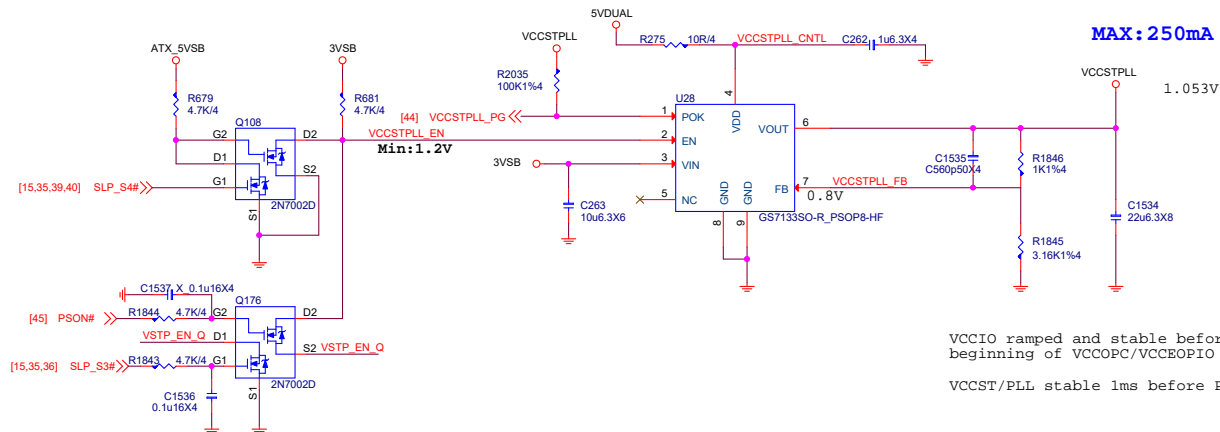


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# VCCSTPLL

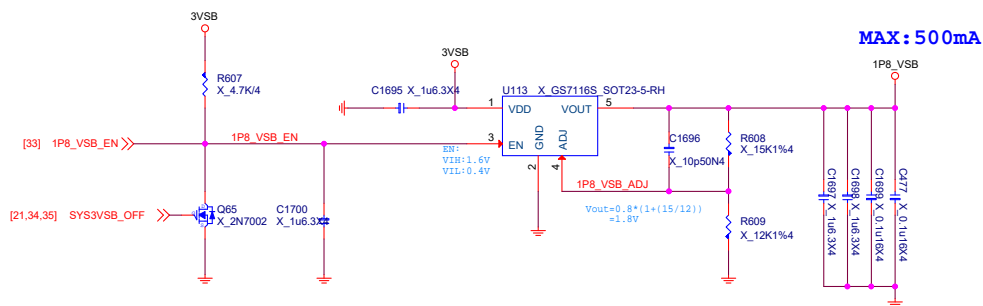
1.05V; 250mA



# 1P8\_VSB

1.8V; 500mA

20170913:  
1P8\_VSB IC change to GS7133.  
20170919:  
1P8\_VSB unstuff.



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MS-7B29..

Size  
Custom

Document Description

CPU PWR\_ST/PLL

Rev  
1.0

Date: Tuesday, October 24, 2017

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# PCH\_1VSB

1.05V; 10.285A

OC:

$$I_{valley} = (I_{ocset} * R_{ocset}) / R_{lgs(on)}$$

$$= (10\mu A * 7.15K\Omega) / 4.6m\Omega$$

$$= 15.54A$$

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

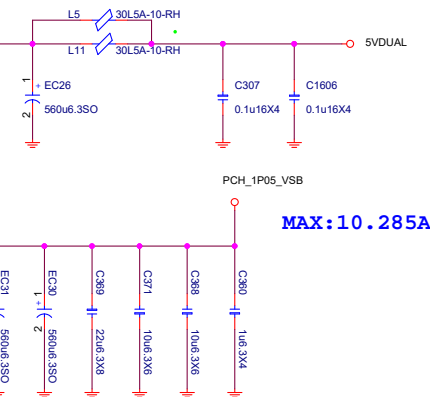
$$= 16.685 * 0.407$$

$$= 6.79A$$

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

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

20170921:  
input bead 3顆->2顆.



MAX:10.285A

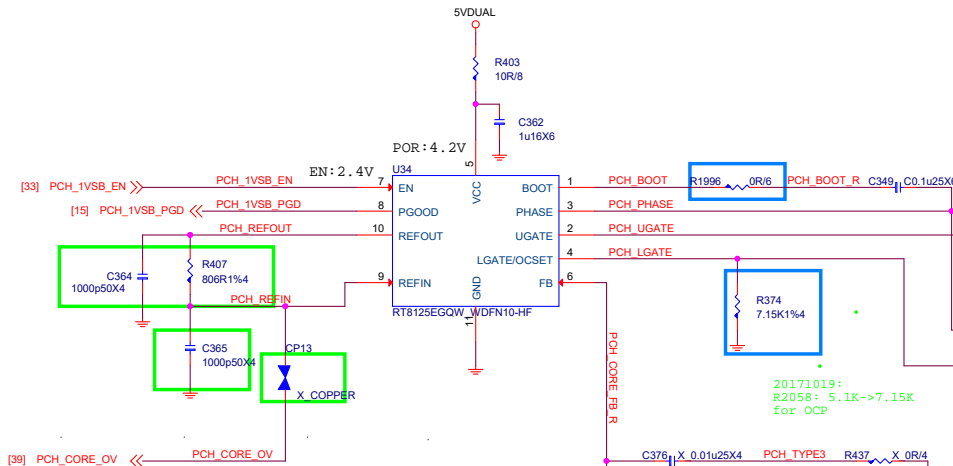
$$L_{min} = ((V_{in} - V_{out}) / (F_{sw} * k * I_{out\_max})) * (V_{out}/V_{in})$$

$$= 0.5376\mu H \quad (K = 30\%)$$

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

$$= 0.8 * (1 + 1K/3.16K)$$

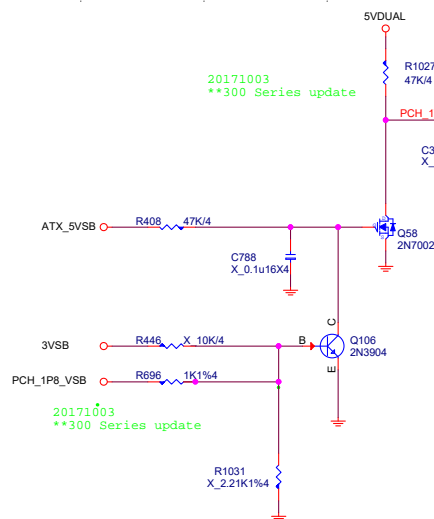
$$= 1.053V$$



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

20171003  
\*\*300 Series update



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MS-7B29..

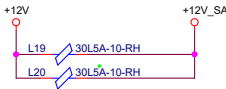
Size	Document Description	Rev
Custom	PCH Core power	1.0
Date: Tuesday, October 24, 2017	Sheet 42 of 52	



# SA Power:1.05V,11.1A

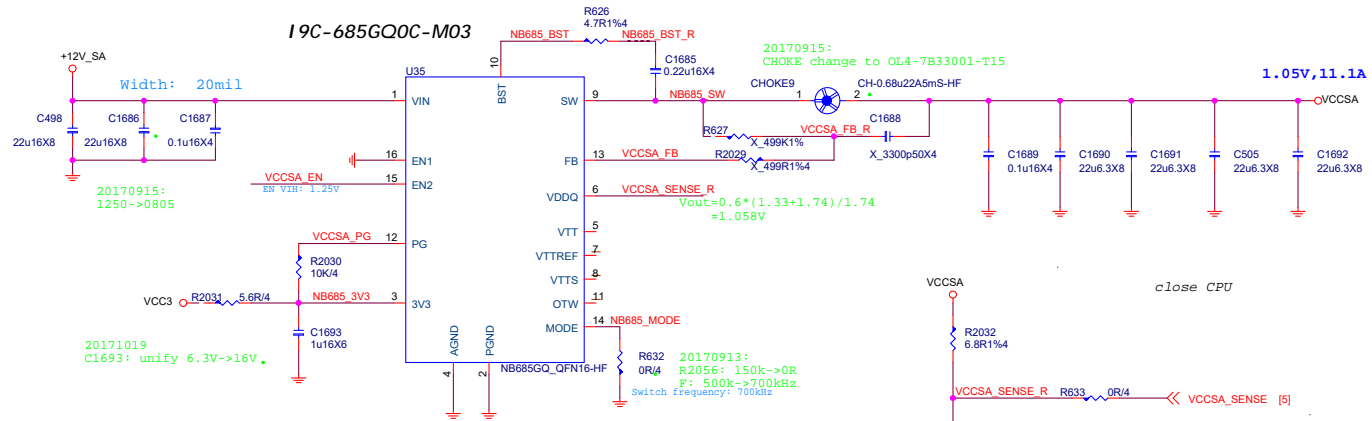
Current Limit: 12-14A

$I_{in}=11.1A \times 1.05V / 0.8 / 12V = 1.21A$   
L02-3008043-M26  
Over 85 , Rated Current 1.5A.



20170915:  
L19 ~ L20 size -> 0603

## I9C-685GQ0C-M03

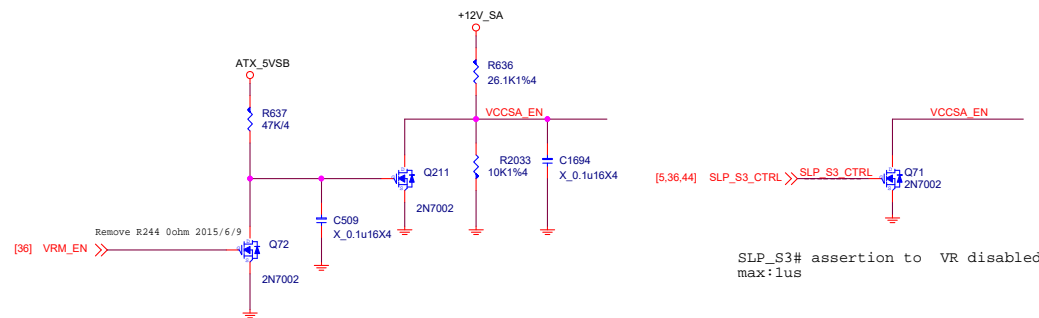


20171019  
C1693: unify 6.3V->16V.

20170913:  
R2056: 150k->0R  
F: 500k->700kHz  
Switch frequency: 700kHz

close CPU

20170913:  
R2046: 1.1K->1.33K



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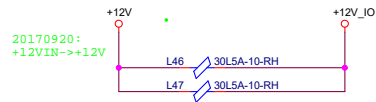
# VCCIO

0.95V; 6.4A

OCP: 12A (floating)

20170919

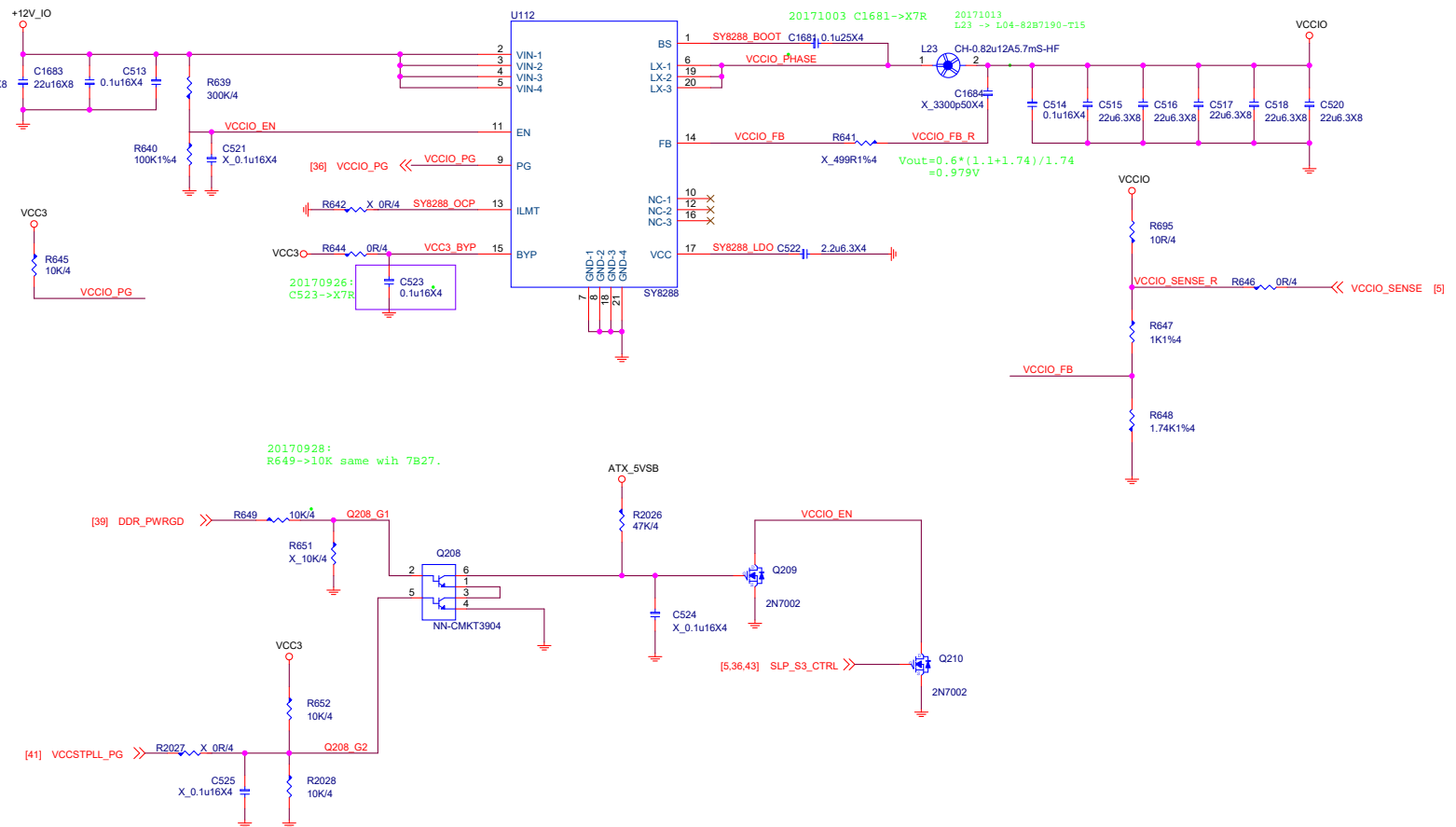
TPS22976 -> SY8288 by Ivy mail (20170918).



$$I_{in} = 6.4A * 0.95V / 0.8 / 12V = 0.63A$$

L02-3008043-M26

Over 85°C ,Rated Current 1.5A.

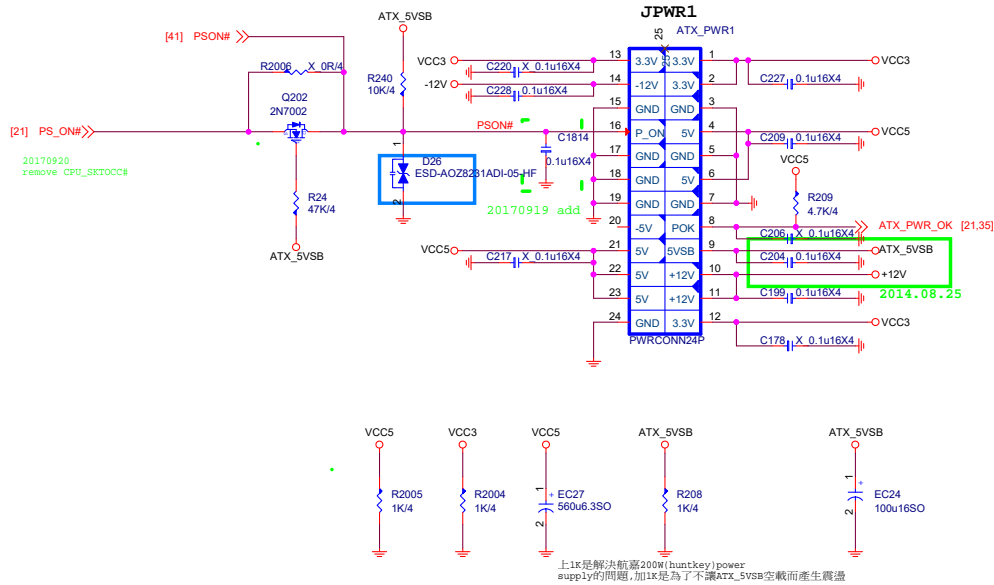


SY8288_OCP	OCP
0	8A
floating	12A
1	16A

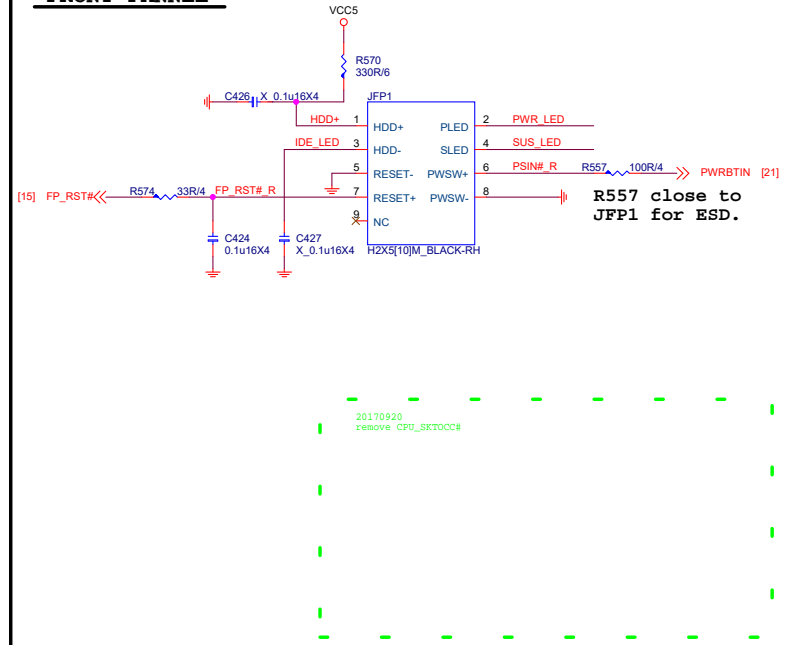


## ATX POWER CONNECTOR

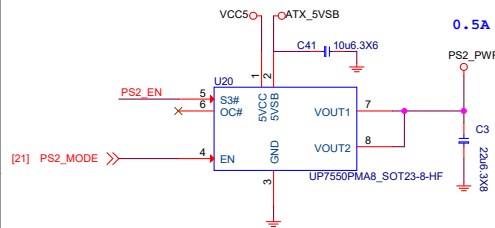
D26:By Ivy's word document.  
Main:D0G-130050C-A68  
Avl:D0G-3000600-L07/D0G-1200520-I05



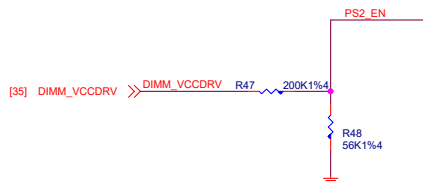
## FRONT PANNEL



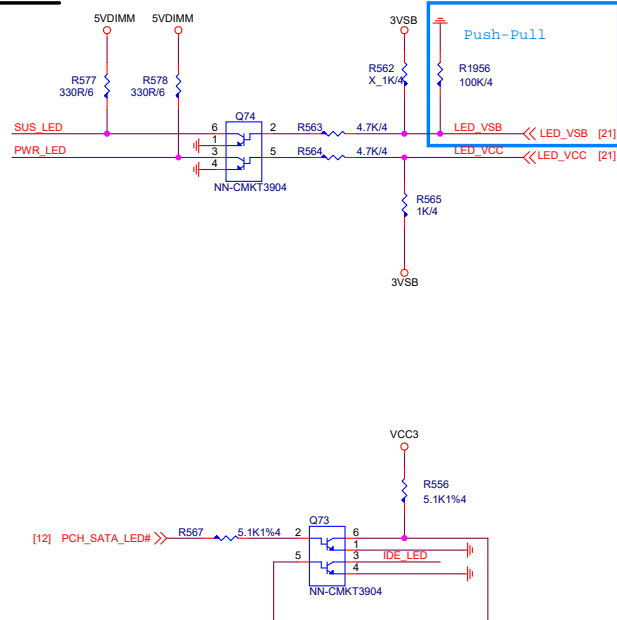
## PS2 POWER



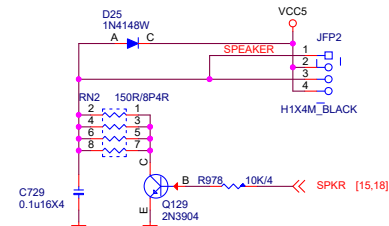
## USB MODE



## LED

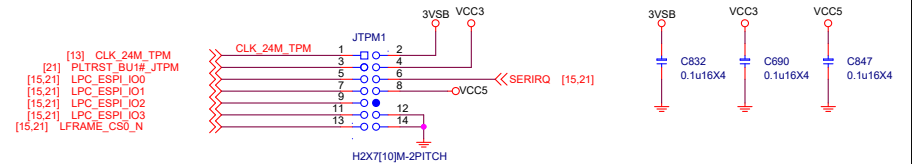


## Speaker Pin Header



## TPM

Don't colay espi debug.



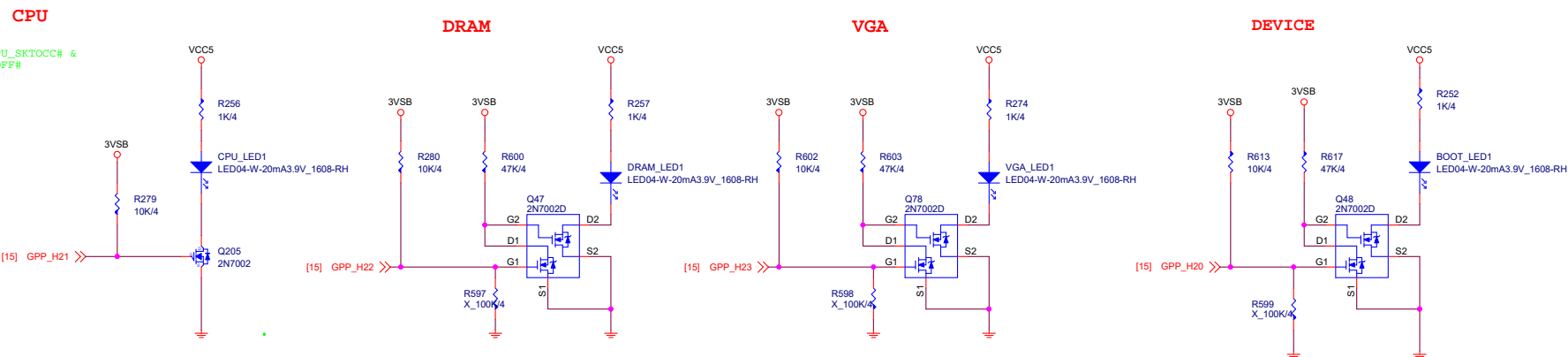
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# DEBUG LED




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

LED  
 RED:D0C-040P100-H91  
 AVL:D0C-040S500-E07  
 WHI:D0C-040T200-H91  
 AVL:D0C-040S200-E07

- 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

	<b>MICRO-STAR INT'L CO.,LTD</b>				
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