

# MS-7A38 Ver:1.0

## CPU:

AMD AM4

## System Chipset:

Promontory B350/A320

(Value DIY or System Builder)

## Main Memory:

DDR IV \* 4 MAX:64 GB

## VRM

RT8894 4+2

## On Board Chipset:

LPC Super I/O --NCT6795D

LAN RTL8111H

Azalia CODEC - Realtek ALC887

## Expansion Slots:

From CPU

PCI Express X16 Slot \* 1

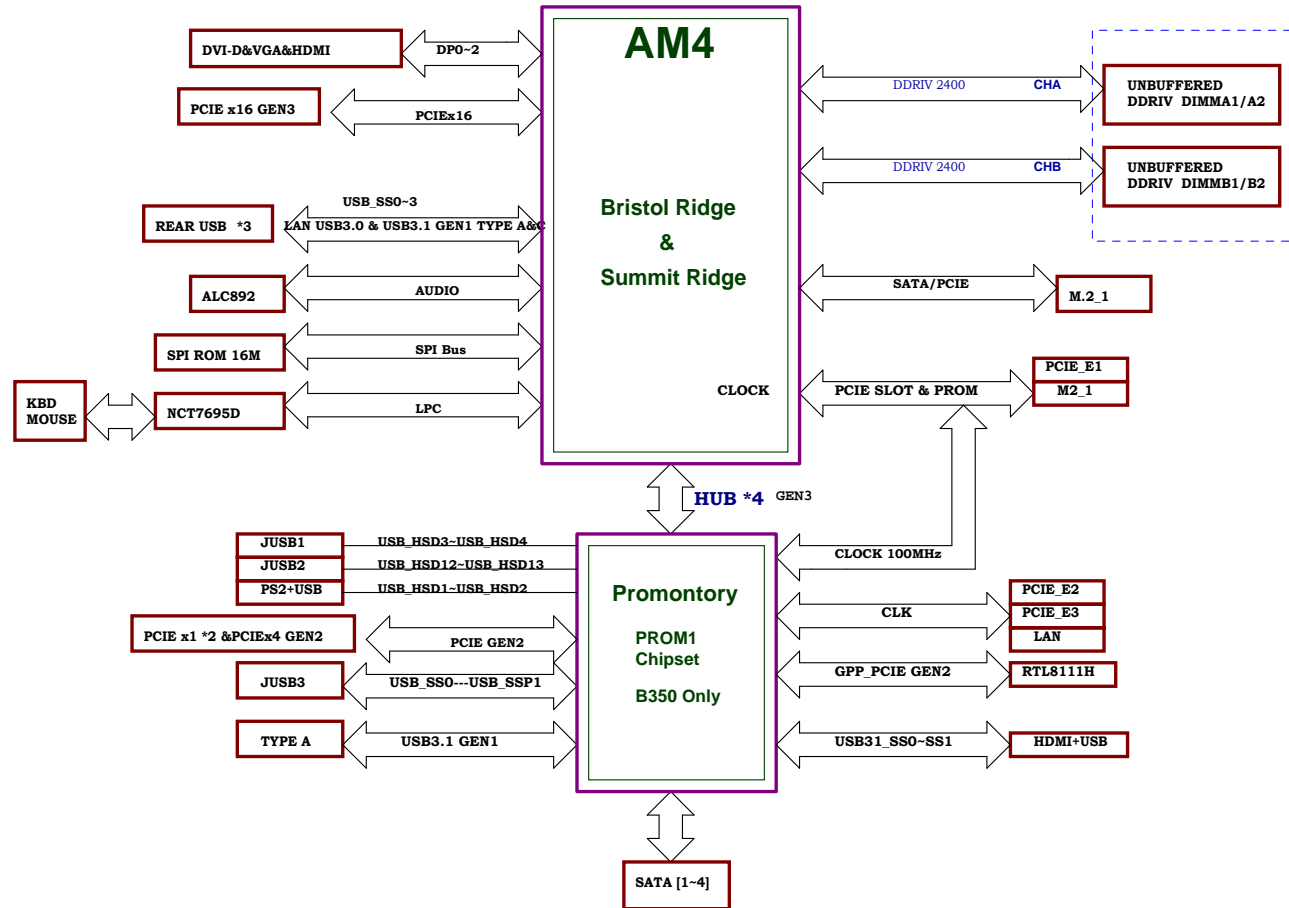
PCI Express X1 Slot \* 1

PCI Express X1 Slot \* 1

## OCF IC:

UP6273

## FUSION BLOCK DIAGRAM



# AMD AM4

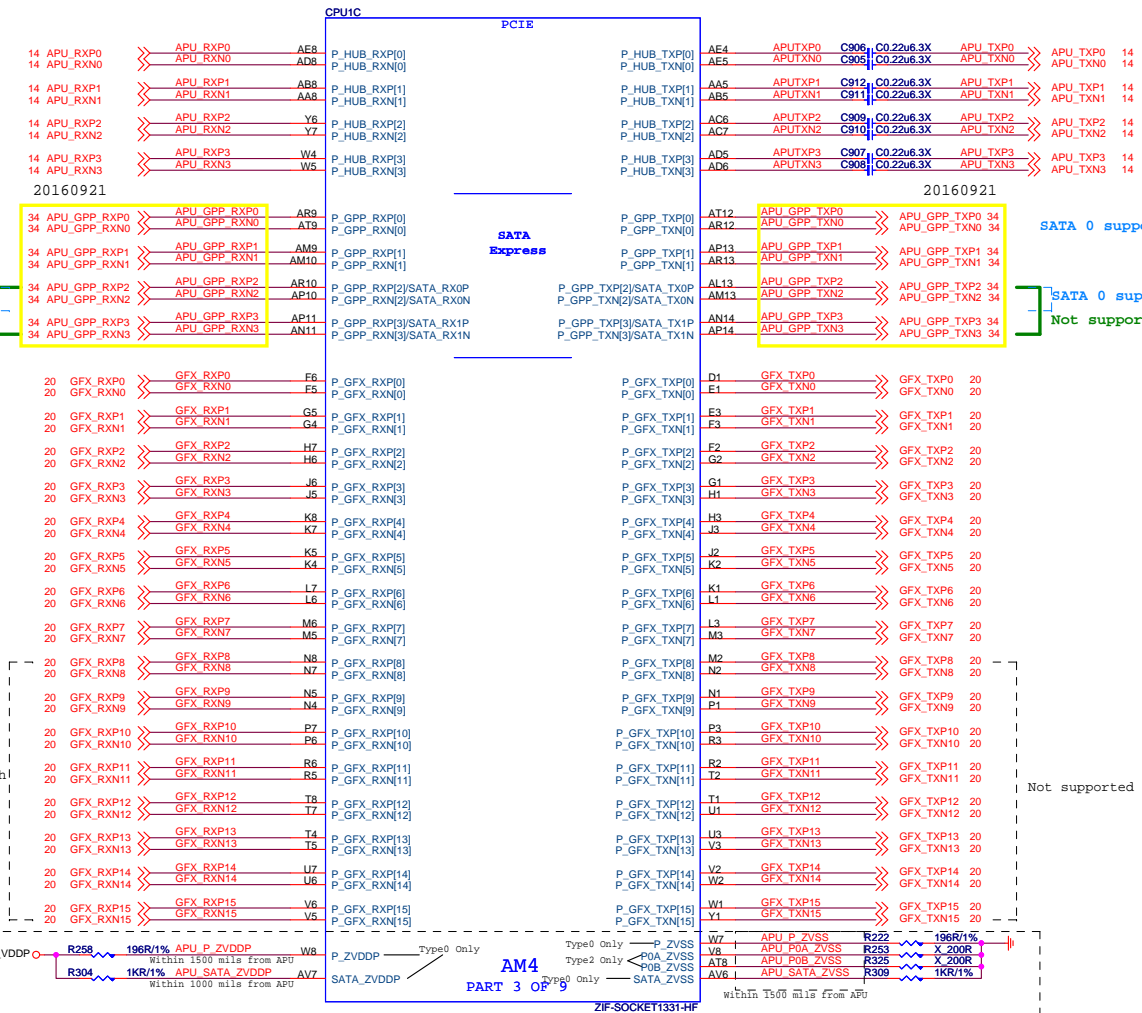
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SATA 0 supported M.2  
SATA 0 supported M.2  
Not supported PCIe on TYPE 0

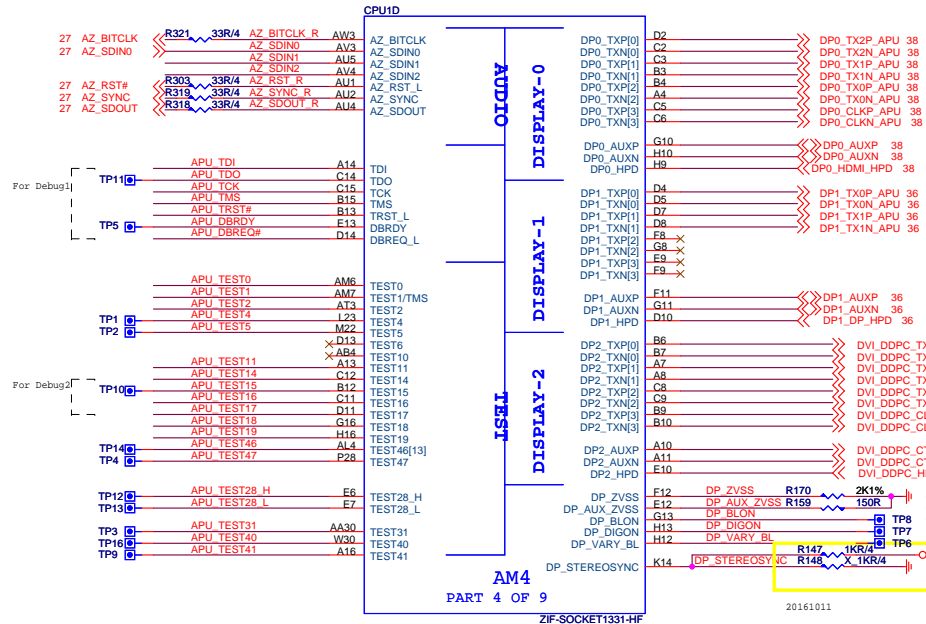
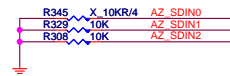
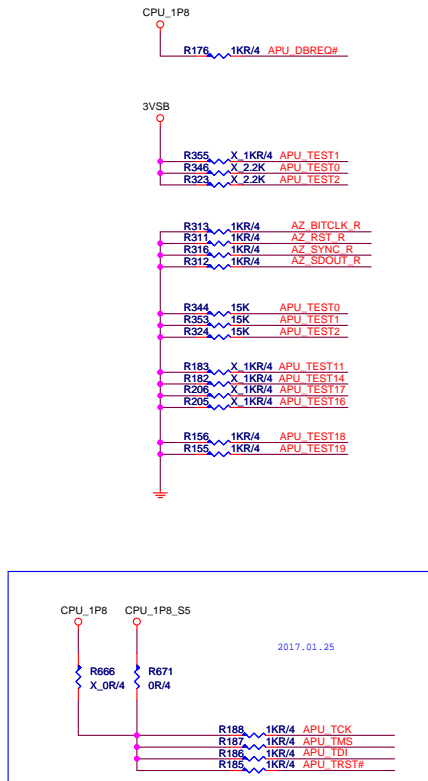
TYPE	PCIe	SATA
TYPE 0	2	2
TYPE 2/3	2 or 4	2 or 0

Only supported on AMD Family 17h/Models 00h-0Fh



SATA 0 supported M.2  
SATA 0 supported M.2  
Not supported PCIe on TYPE 0

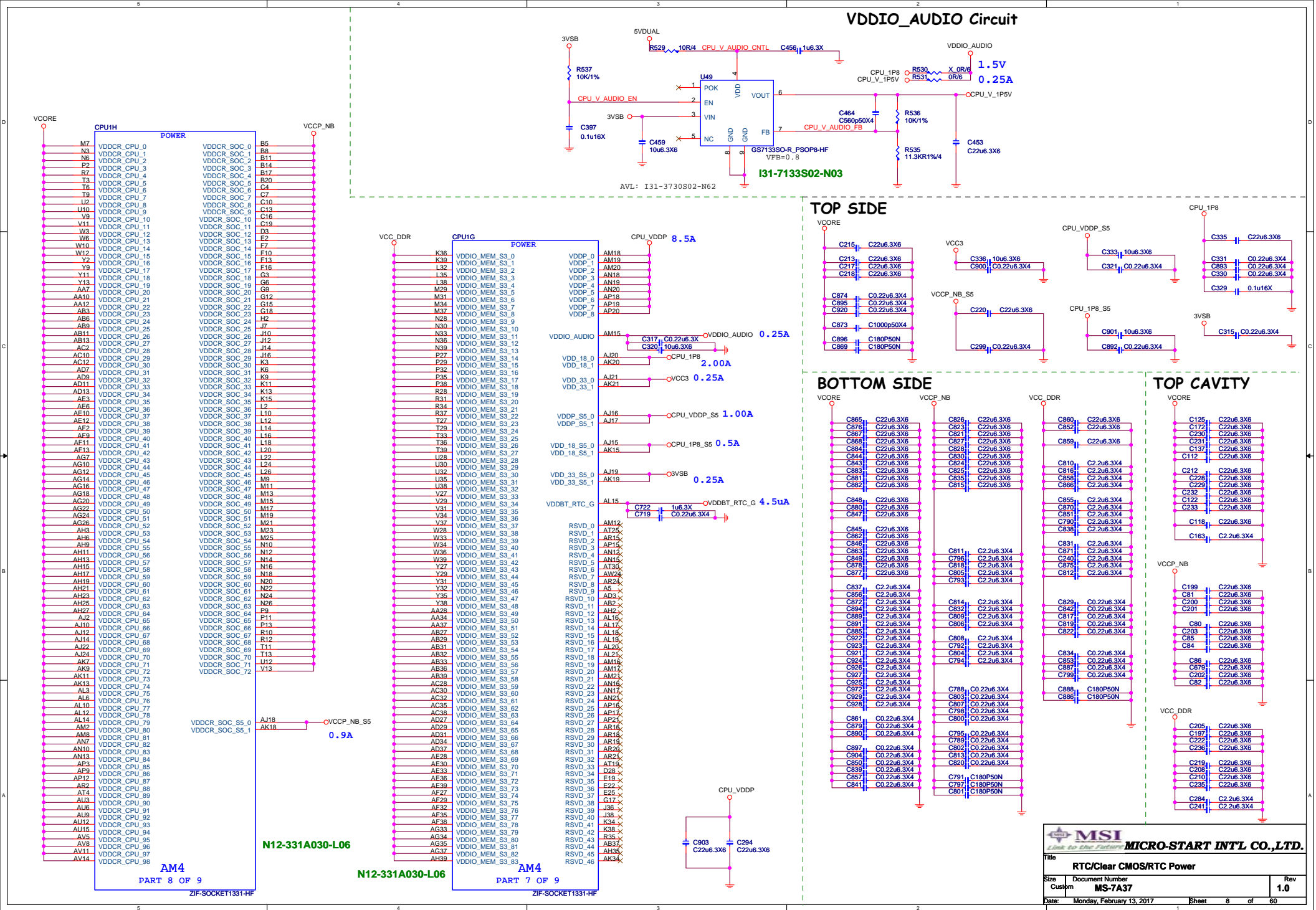
Not supported on AMD Family 15h Models 60h-6Fh



N12-331A030-L06

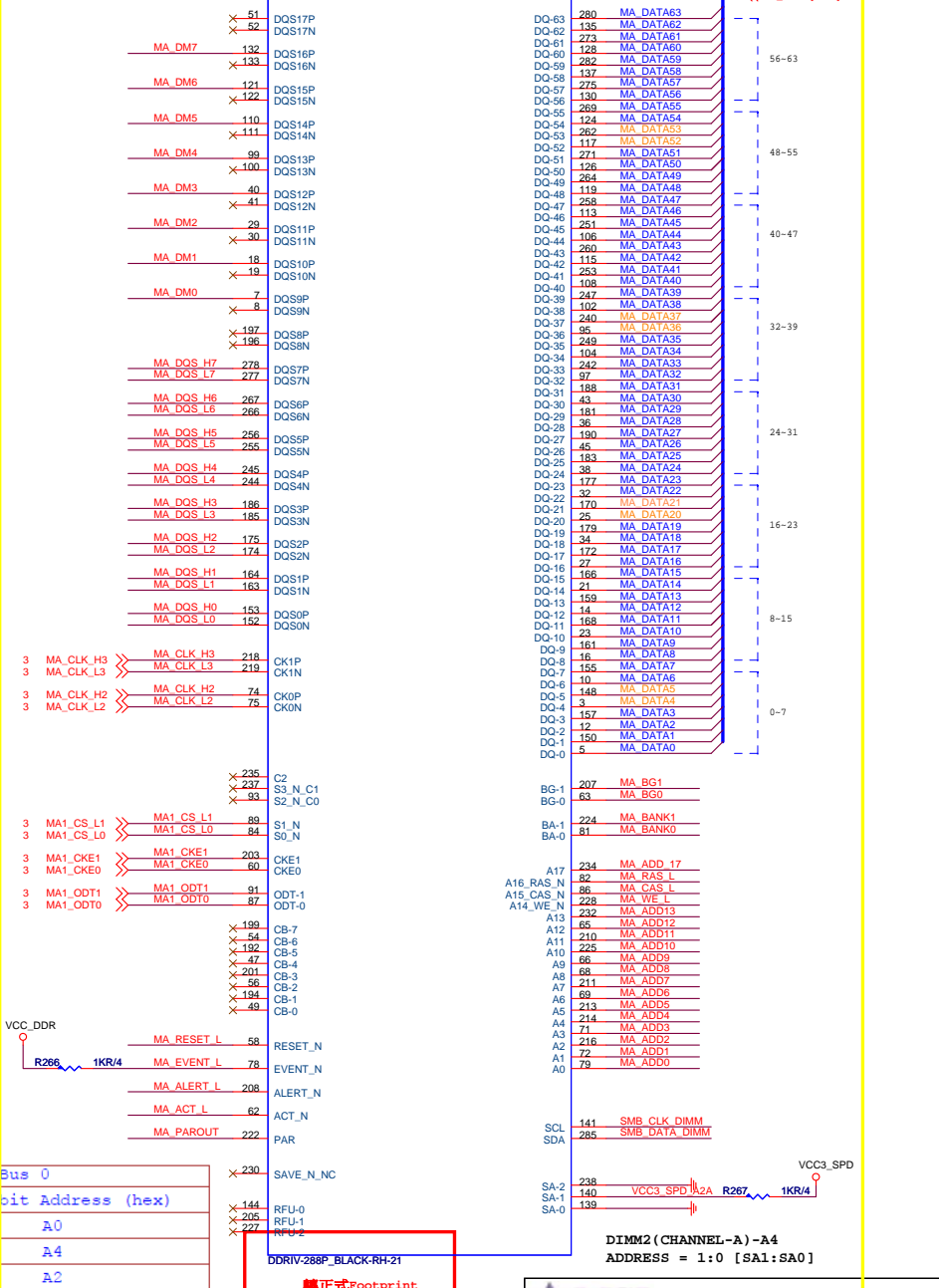
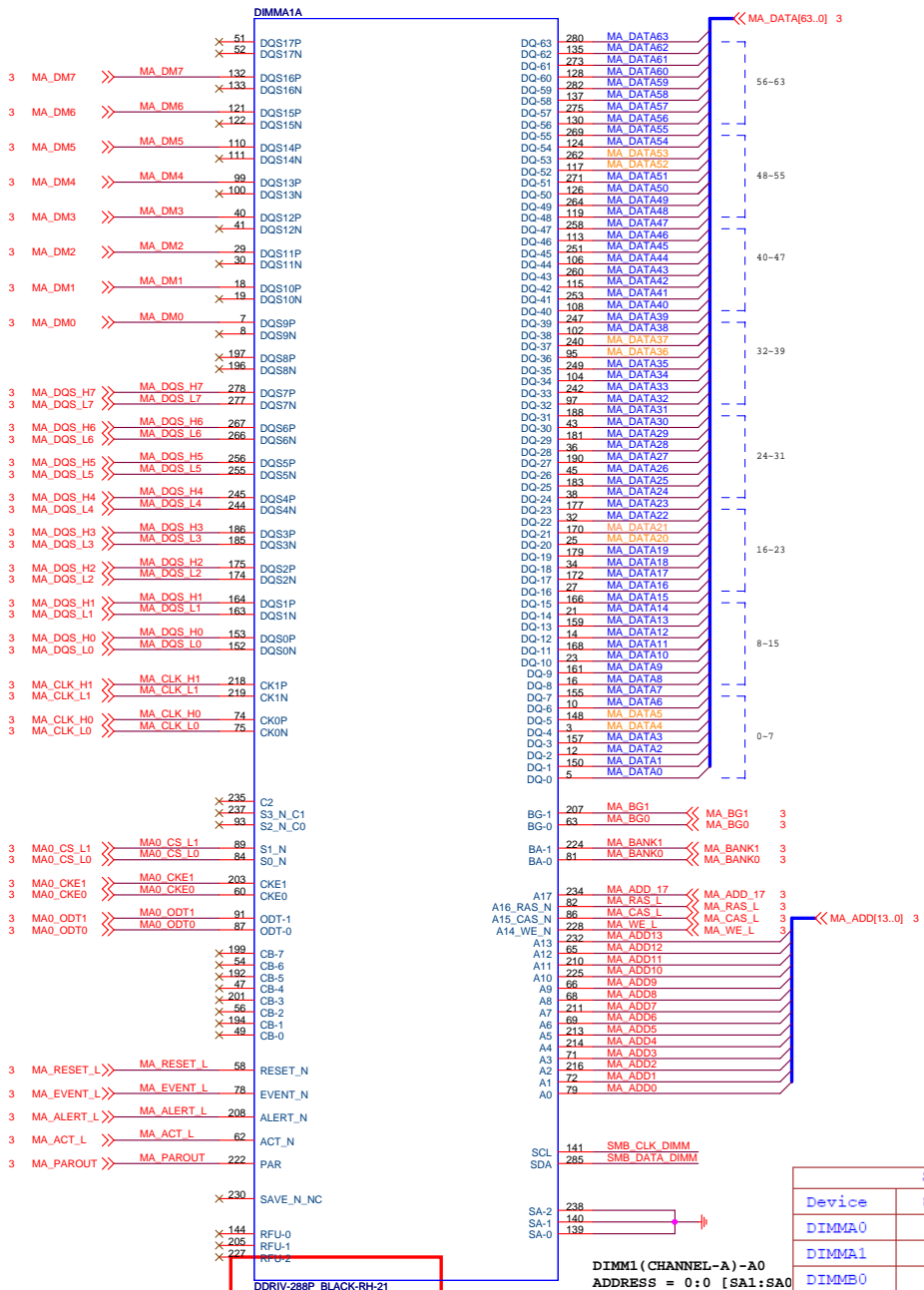
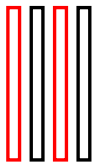








A1 A2 B1 B2



SMBus 0	
Device	8-bit Address (hex)
DIMMA0	A0
DIMMA1	A4
DIMMB0	A2
DIMMB1	A6

MSI Link to the Future

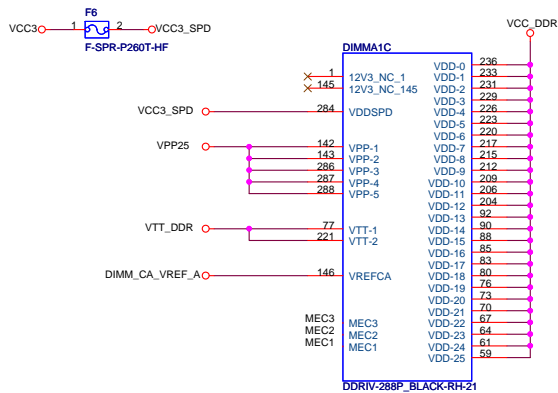
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DDR4 DIMM CH-A

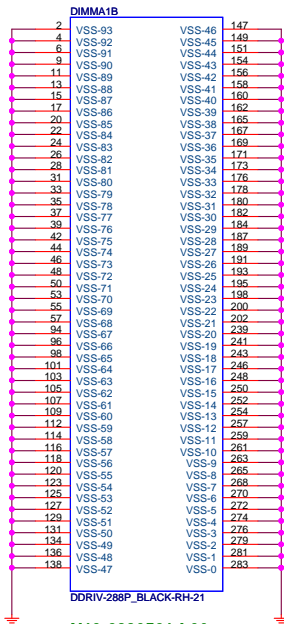
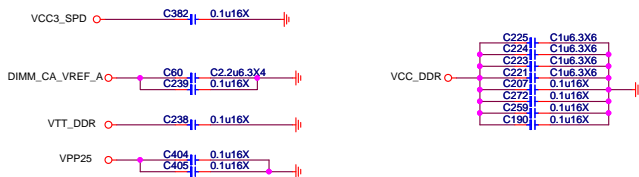
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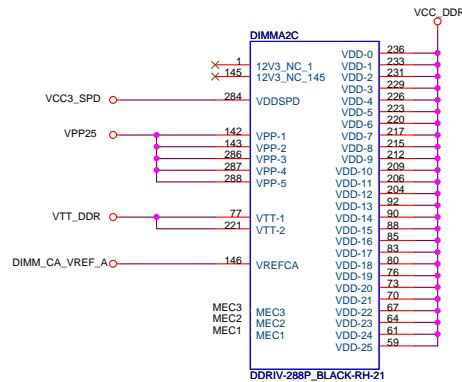


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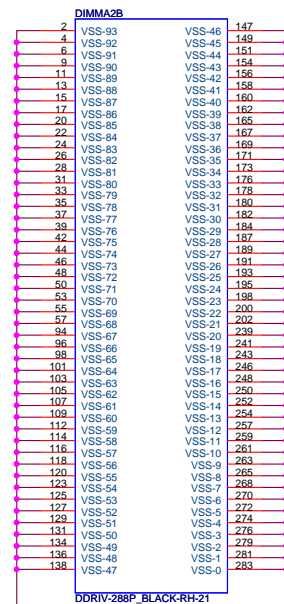
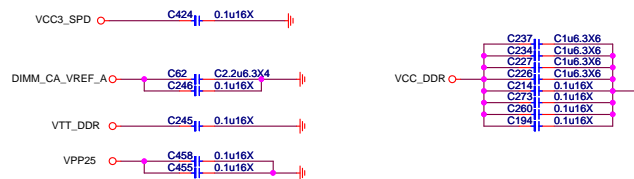


**N13-2880521-L06**

DIMM SLOT PN BY SPEC



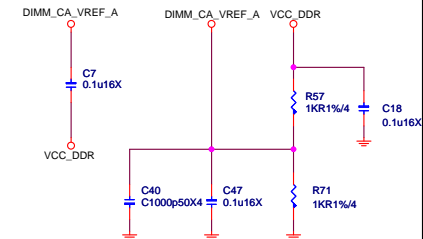
**N13-2880561-L06**



**N13-2880561-L06**

## DDR VREF

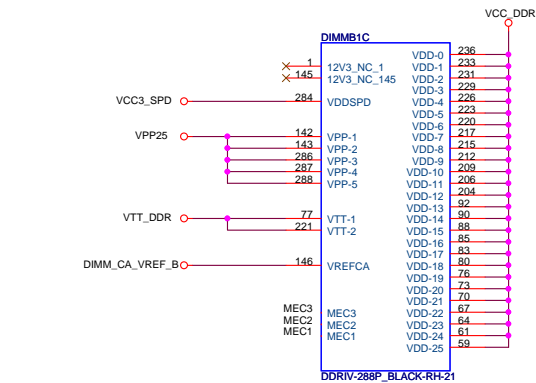
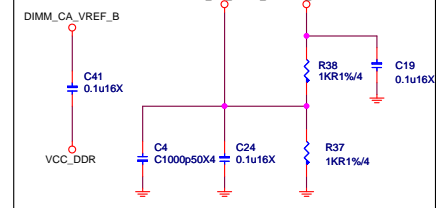
(place resistors close to DIMMs)



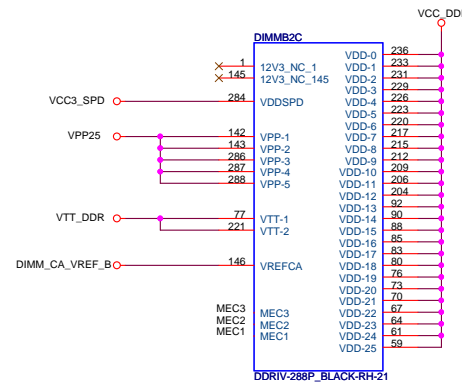
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Size: Custom	Document Number: <b>MS-7A37</b>	Rev: <b>1.0</b>
Date: Monday, February 13, 2017	Sheet: 12	of 60

# DDR VREF

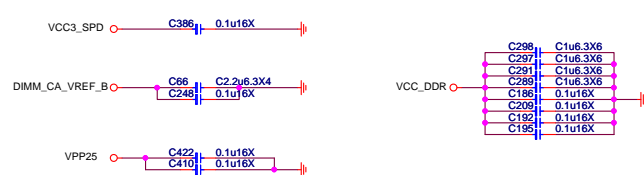
(place resistors close to DIMMs)



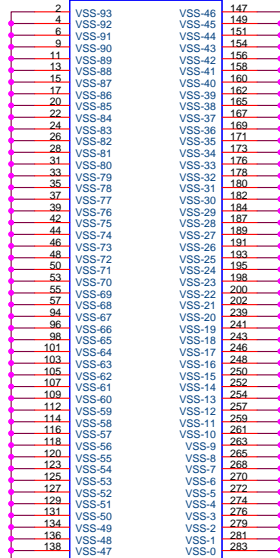
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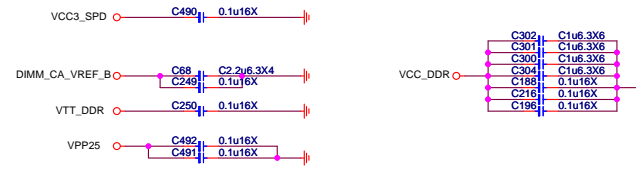
N13-2880561-L06



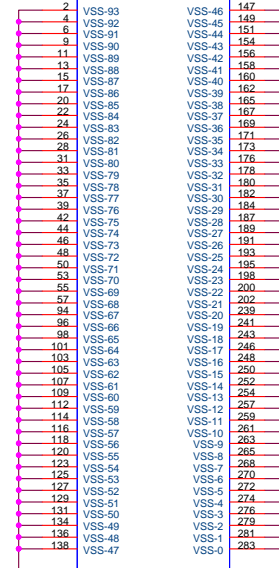
DIMMB1B



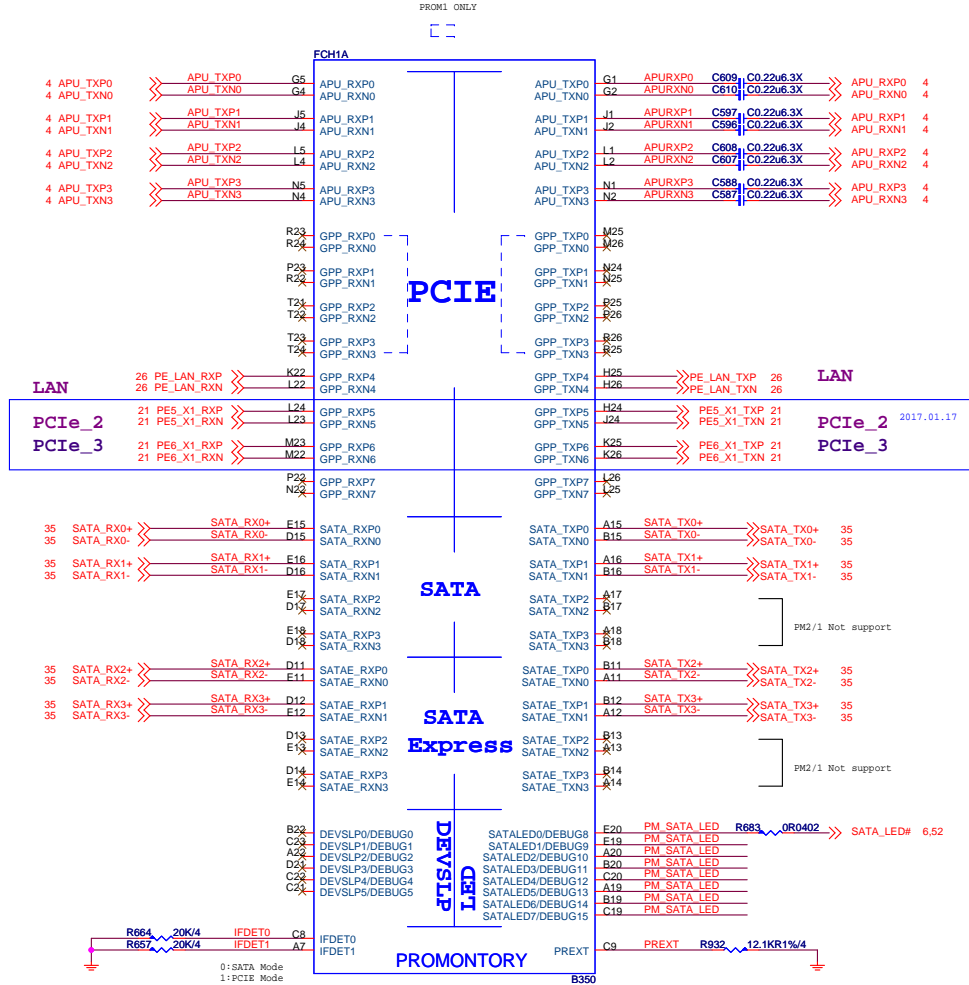
N13-2880521-L06



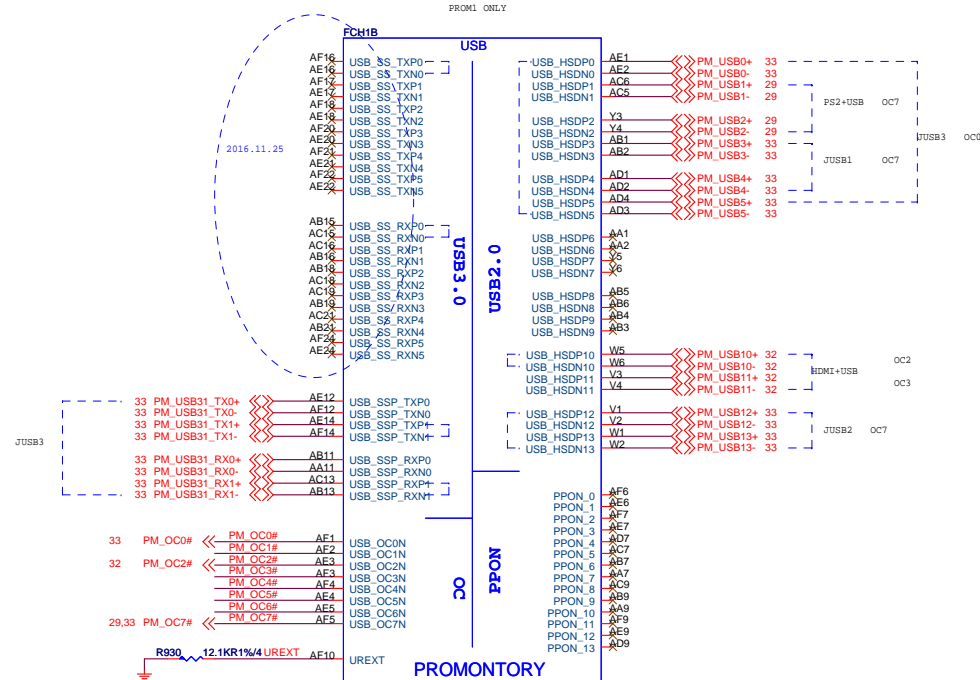
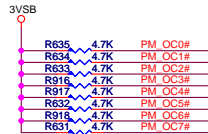
DIMMB2B



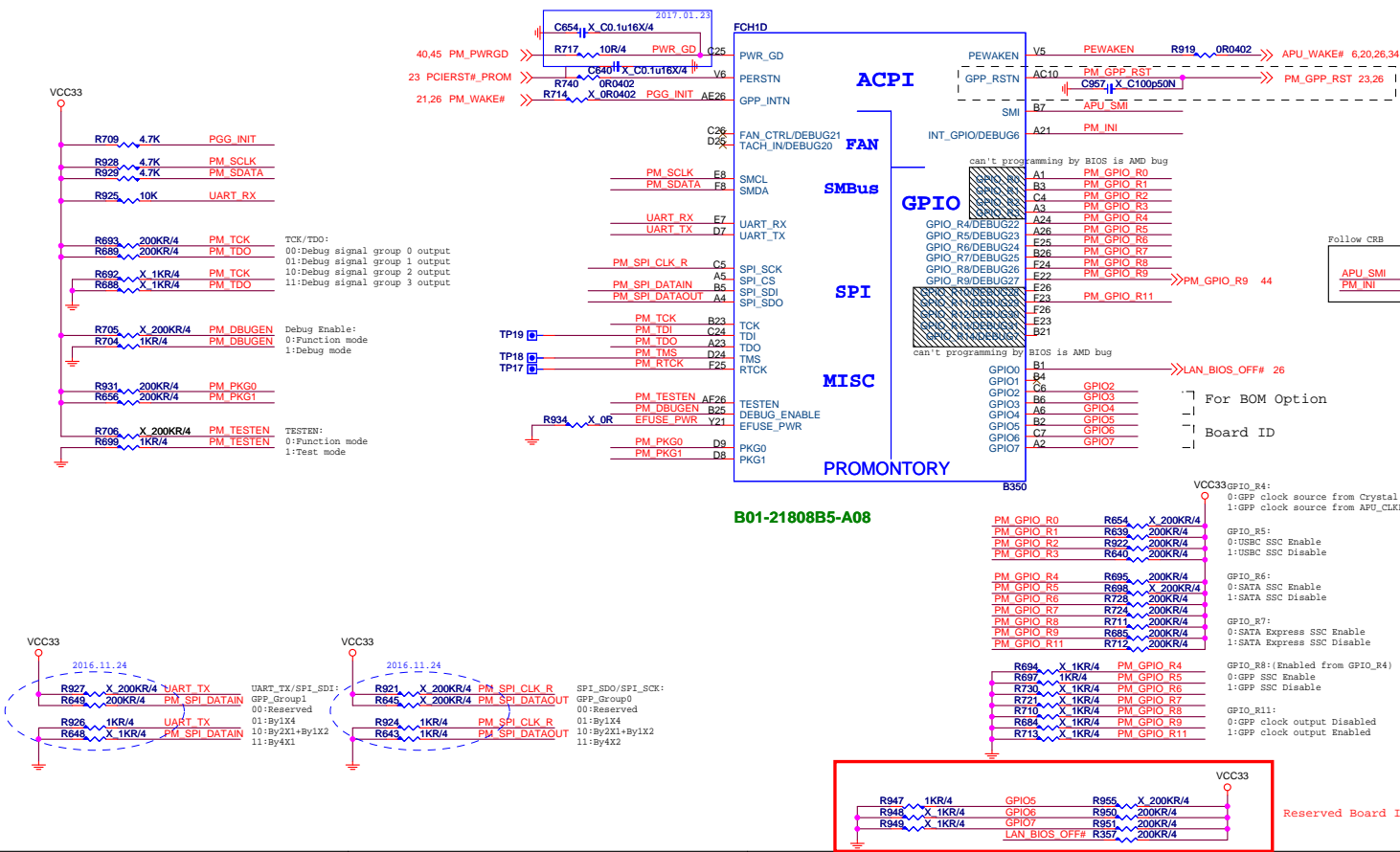
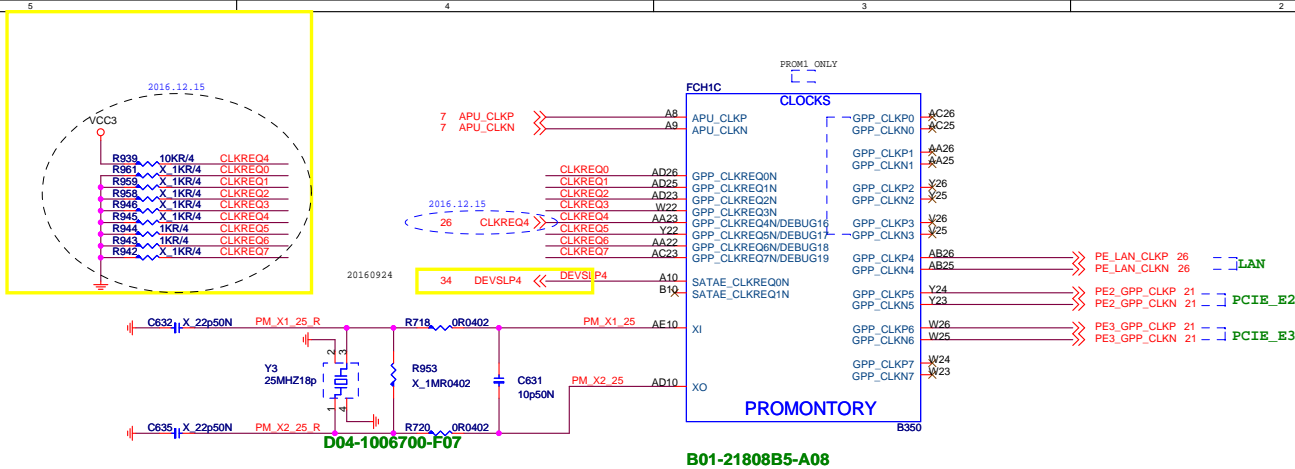
N13-2880561-L06



B01-21808B5-A08



B01-21808B5-A08



Co-layer GPP\_RSTN Reset for meet FCH sequence. See 55553.

## BOM OPTION

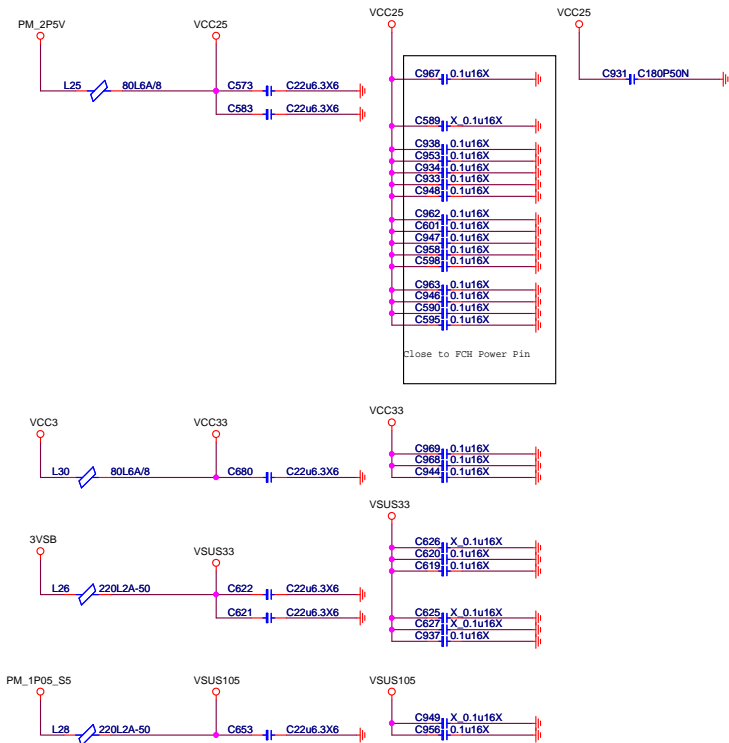
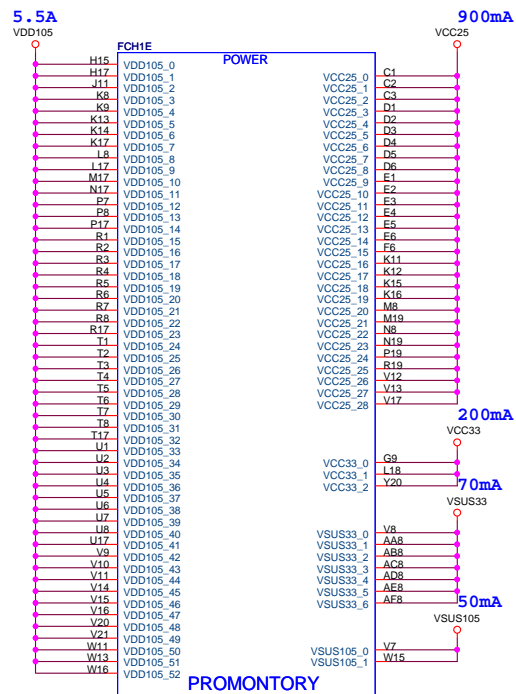
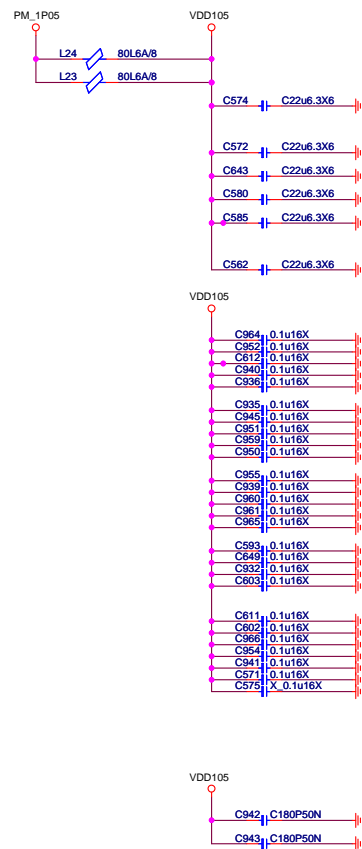
VCC33	R629 X 10K/R4	R630 X 10K
	R642 X 10K/R4	R643 X 10K
	R652 X 10K/R4	R653 X 10K

	A320	B350
GPIO2	0	1
GPIO3	0	1
GPIO4	0	1



Title		
Promontory-CLK/ACPI/GPIO		
Size	Document Number	Rev
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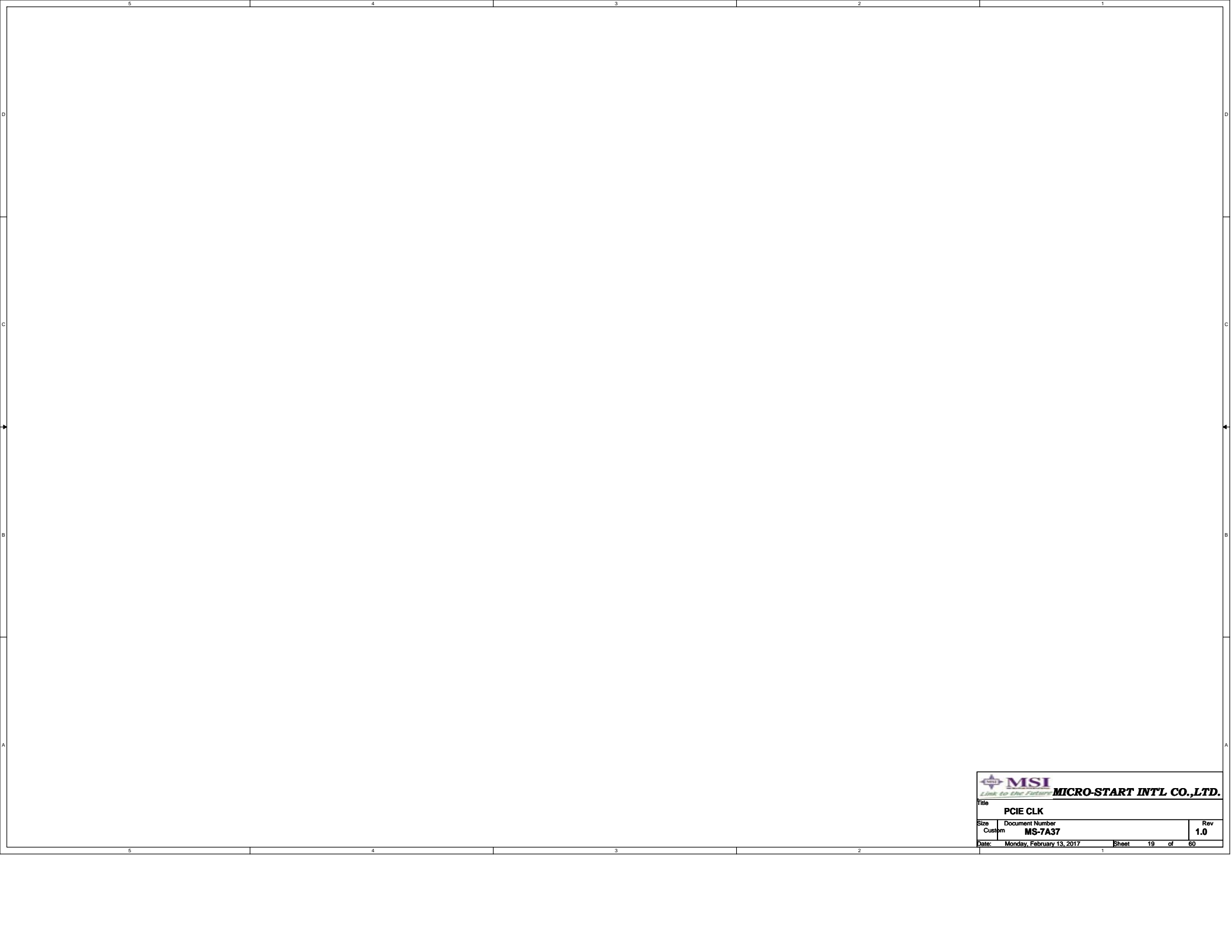



GND

PROMONTORY

B01-21808B5-A08

B350



 <b>MICRO-START INTL CO.,LTD.</b>		
Title <b>PCIE CLK</b>		
Size Custom	Document Number <b>MS-7A37</b>	Rev <b>1.0</b>
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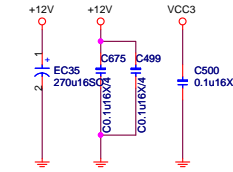
3.3V 3.0A  
12V 5.5A

# PCI EXPRESS x16 Slot

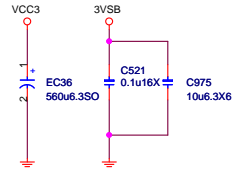
PCIEX1 12V 0.5A  
3.3V weak 375mA



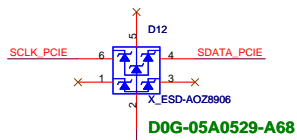
## C71-27117D1-A05



## C71-56106F1-A05

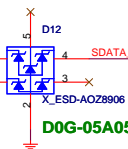



## SMBus separate circuit



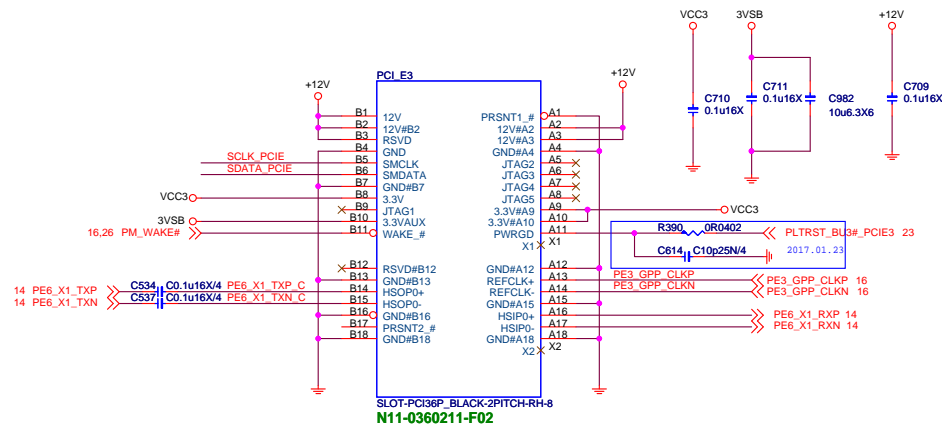
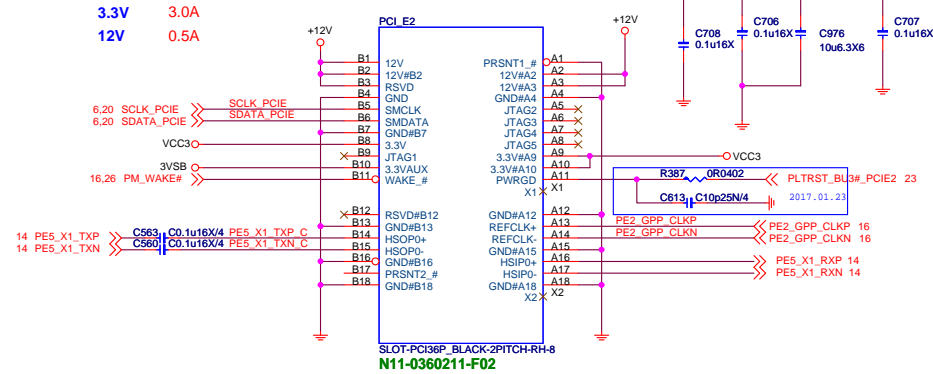
SMB\_SEL  
GPIO Default High

## D0G-05A0529-A68




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Title <b>PCI E X16 SLOT</b>			
Size	Document Number	Rev	
Custom	<b>MS-7A37</b>	<b>1.0</b>	
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PCIEX1 12V 0.5A  
3.3V weak 375mA



## PCI Express x1 Slot \*2

+12V	- 1 A
+VCC3	- 6A
+3V3_S5 (wake)	- 750mA
+3V3_S5 (no wake)	- 40mA

 <b>MICRO-START INT'L CO.,LTD.</b>		
Title <b>PCIE X4(X1*2) SLOT</b>		
Size	Document Number	Rev
Custom	<b>MS-7A37</b>	<b>1.0</b>
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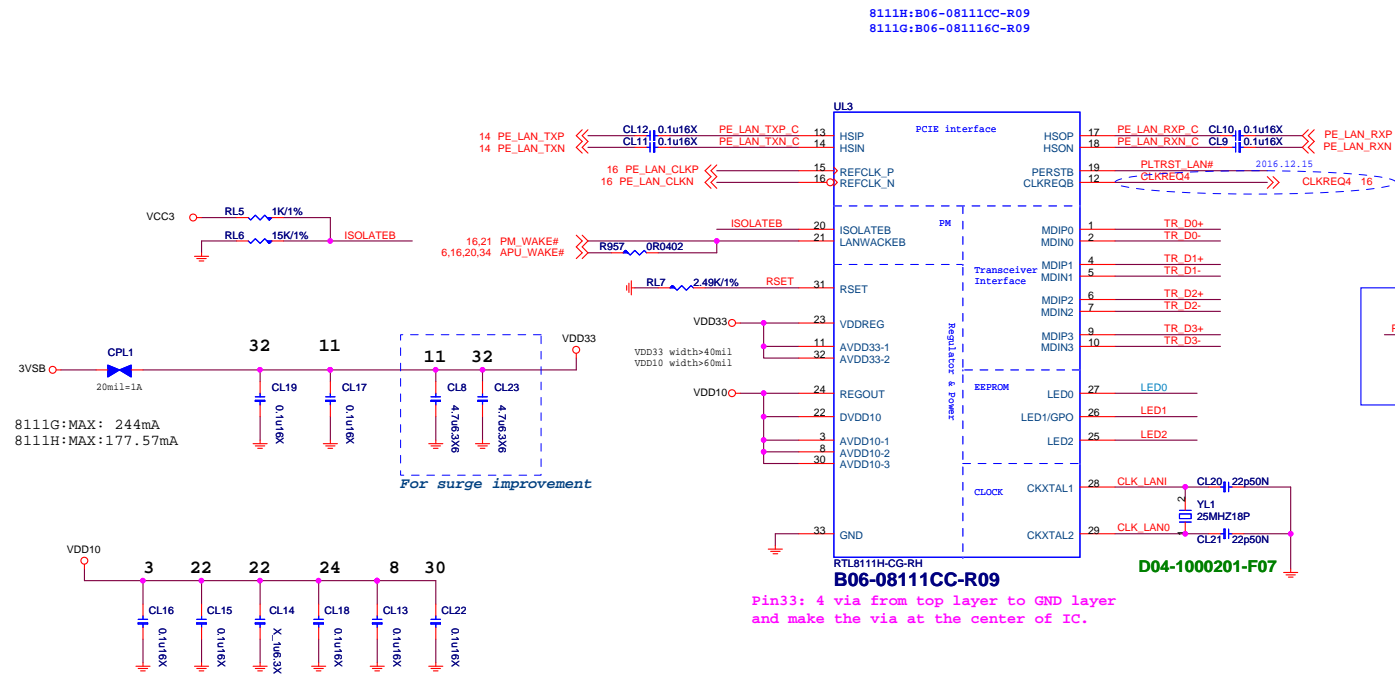








RTL8111G/RTL8111H Giga LAN

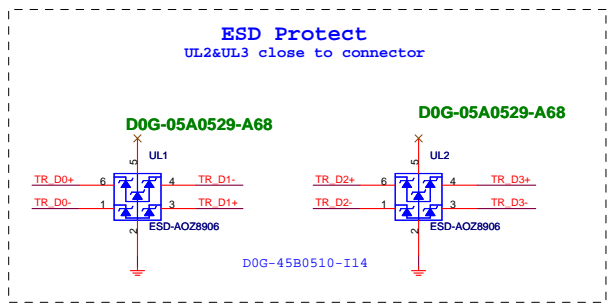
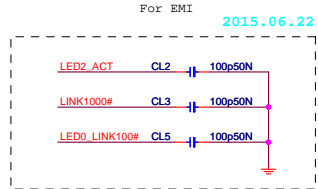
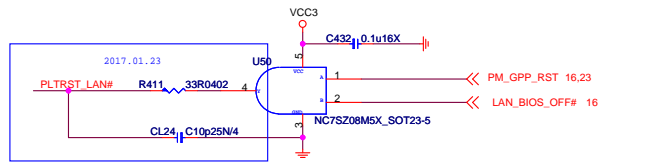
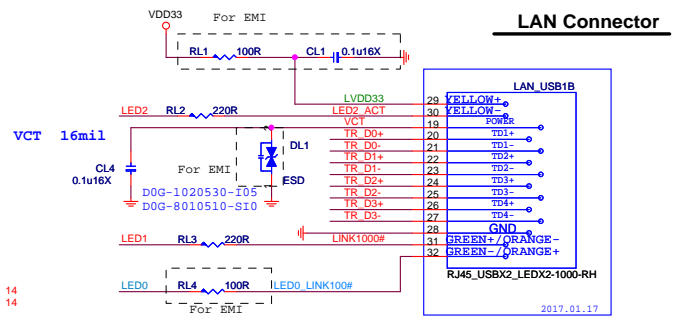



8111G POWER Consumption

	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

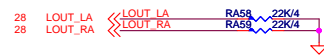
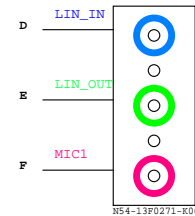
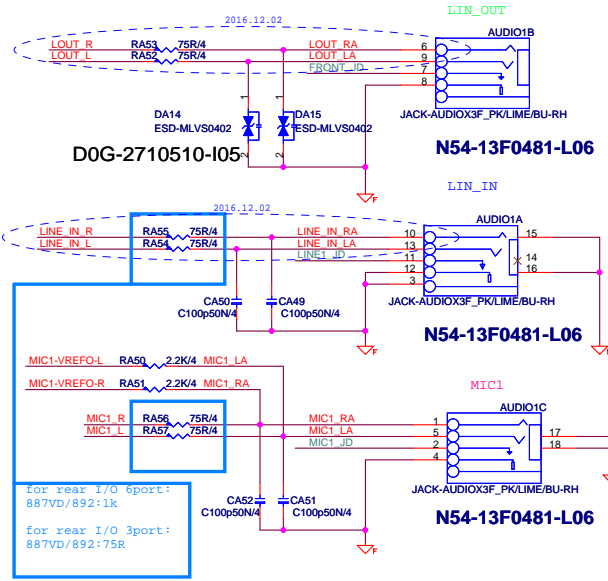
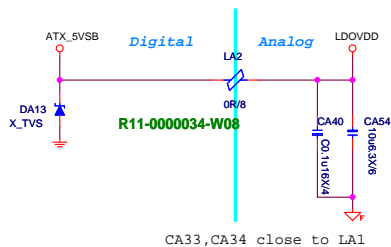
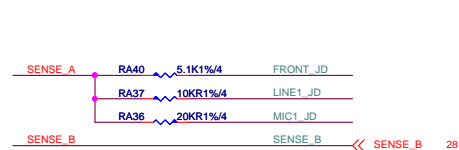
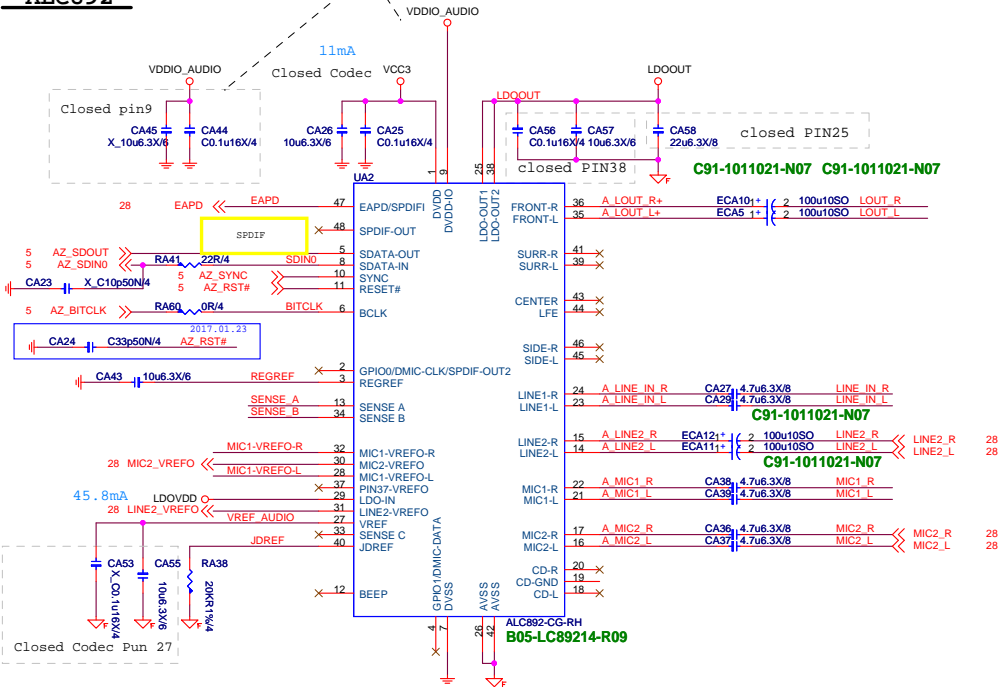
	3.3V @ mA	mW
10 M Idle/TxRx	9.9/84.69	32.67/279.48
100 M Idle/TxRx	48.11/92.44	158.76/305.05
Giga Idle/TxRx	124.5/177.57	410.85/585.98
ALDPS	5.50	18.15



 <i>Link to the Future</i>		<b>MICRO-START INT'L CO.,LTD.</b>			
Title <b>LAN-RTL8111H</b>					
Size Custom	Document Number <b>MS-7A37</b>				Rev <b>1.0</b>
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# ALC892

Follow APU power well

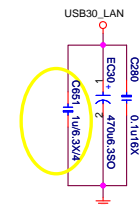
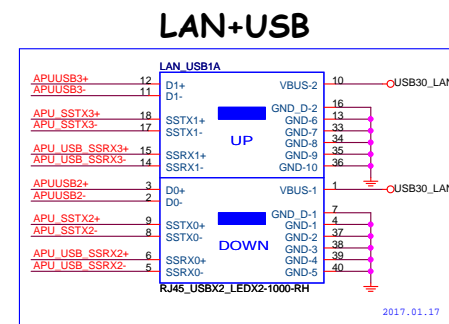
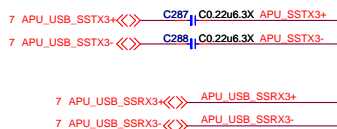


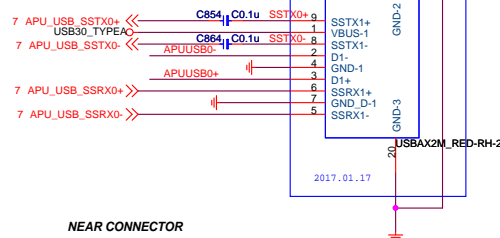
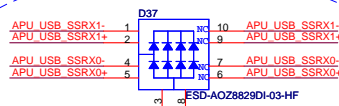
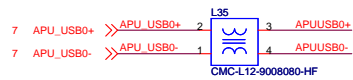
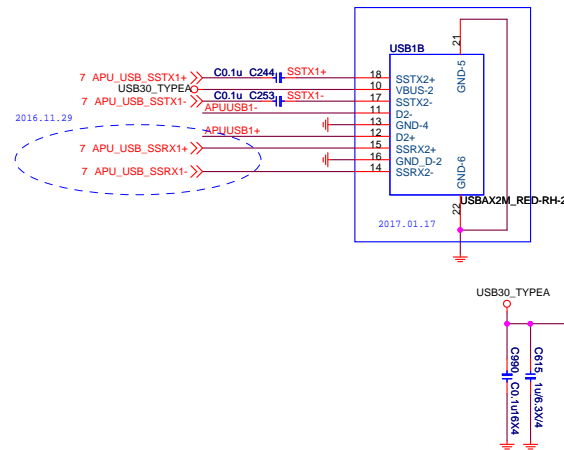
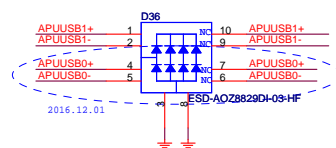
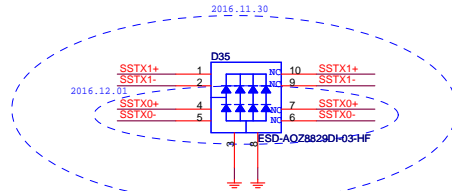
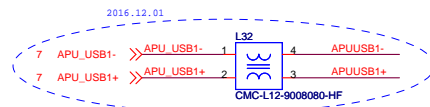
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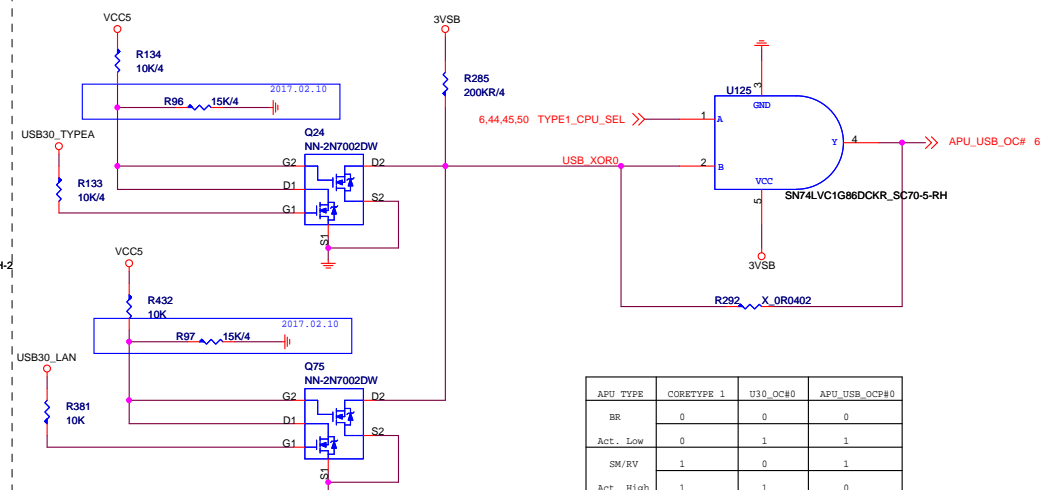


## VR Sloution U2 redriver



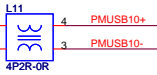


NEAR CONNECTOR

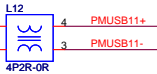


APU TYPE	CORETYPE 1	U30_OC#0	APU_USB_OCP#0
BR	0	0	0
Act. Low	0	1	1
SM/EV	1	0	1
Act. High	1	1	0

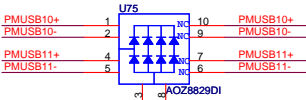
Front USB2.0



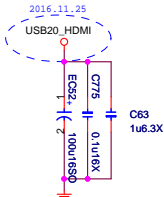
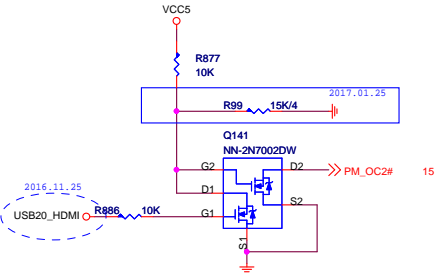
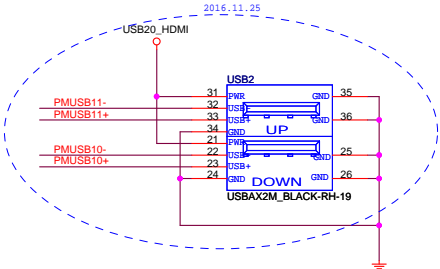
R3C-0000012-W08



R3C-0000012-W08

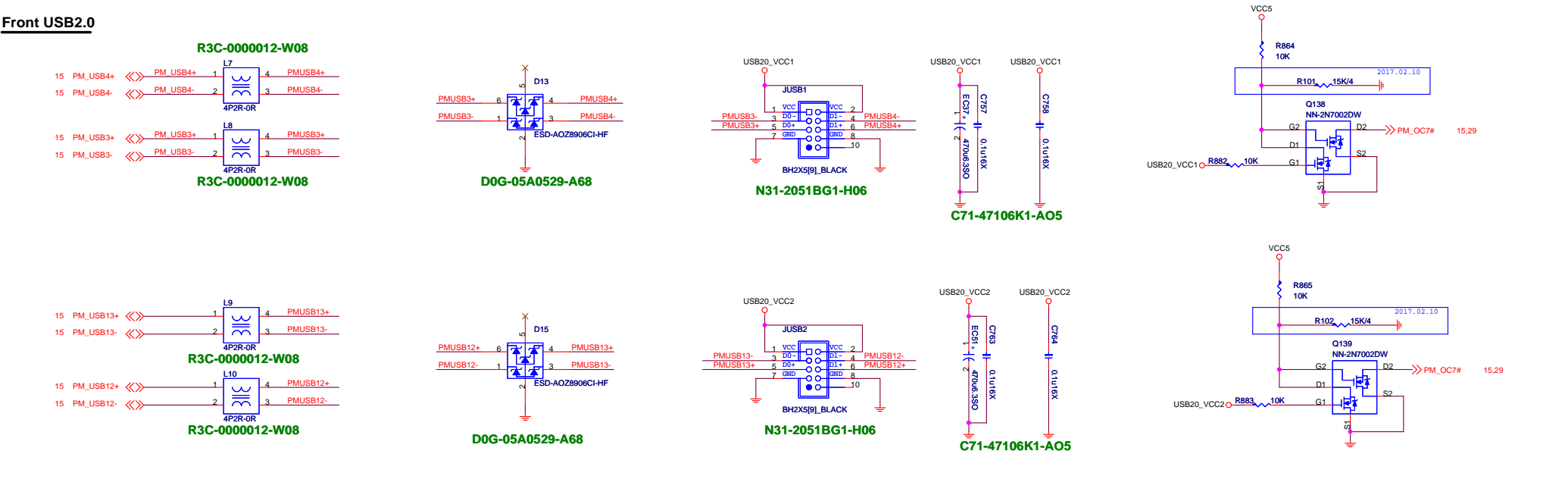


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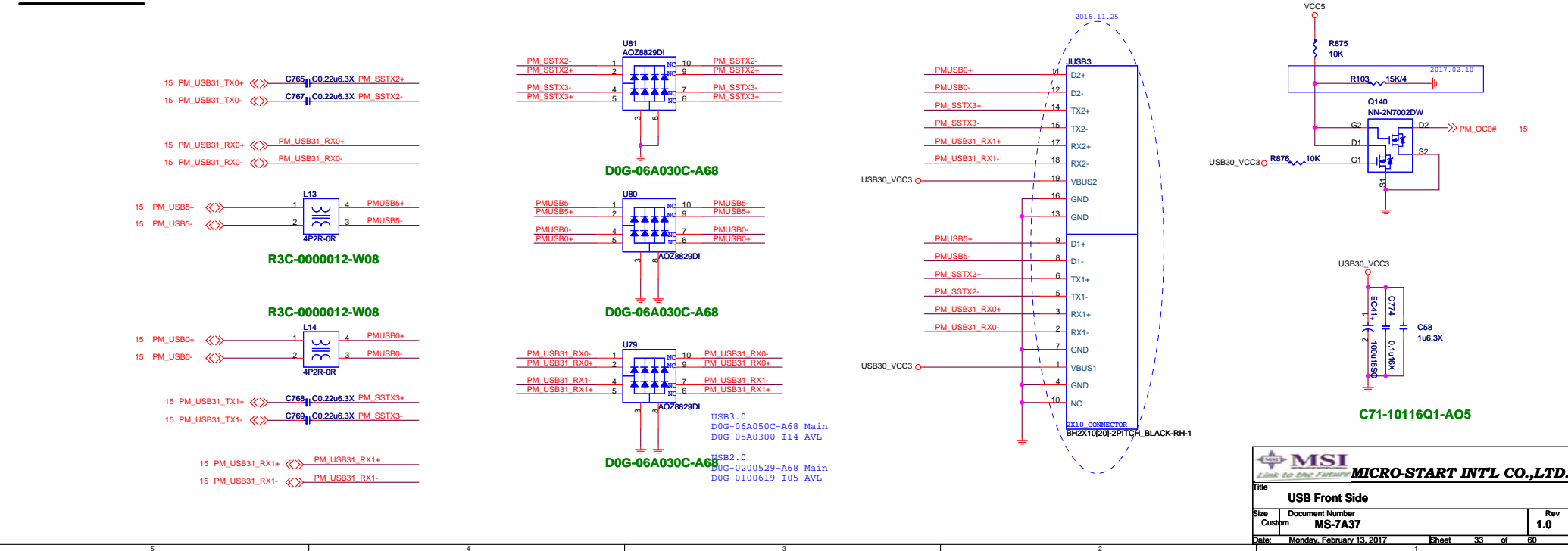


C71-10116Q1-AO5

Front USB2.0

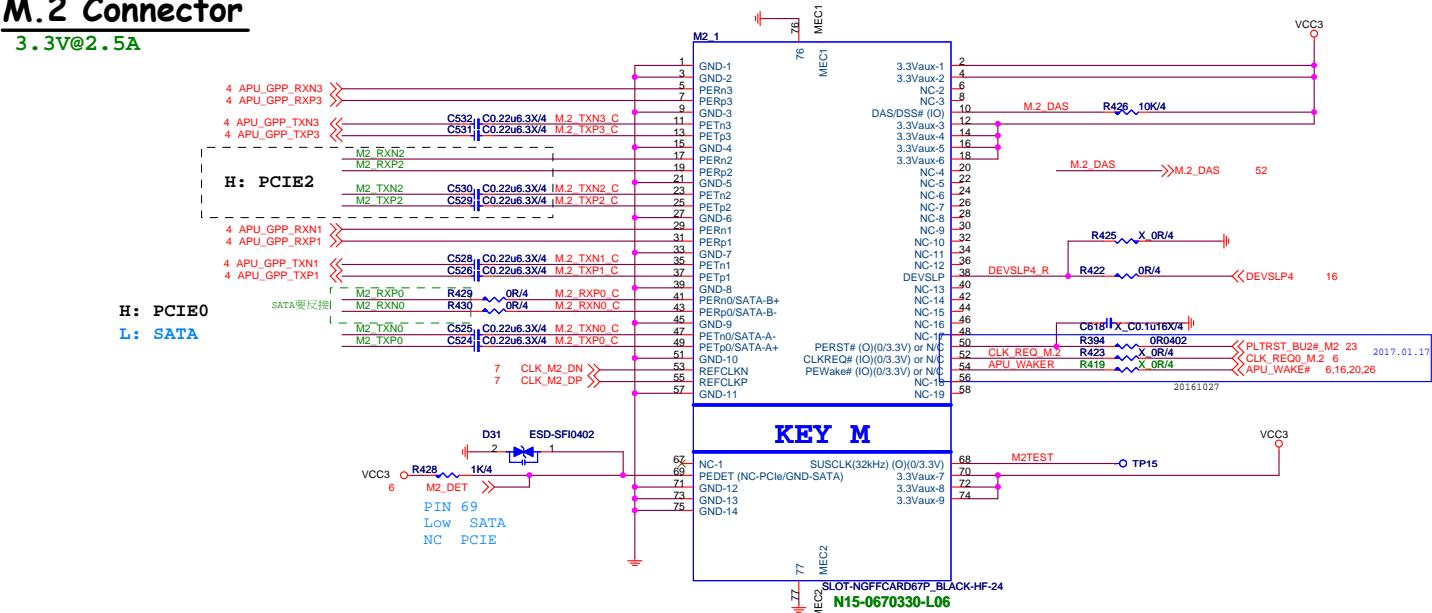


Front USB3.1 GEN1

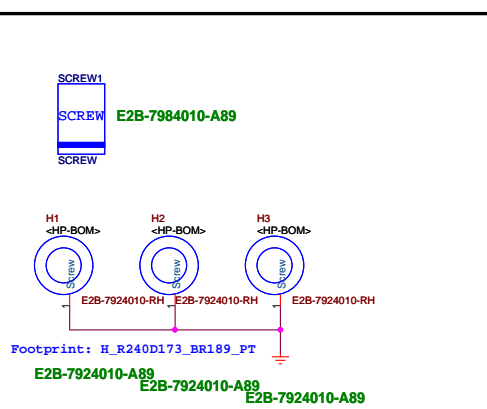
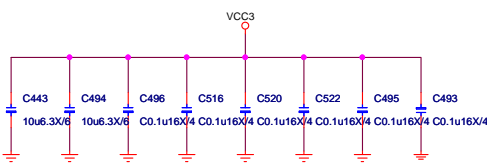


M.2 Connector

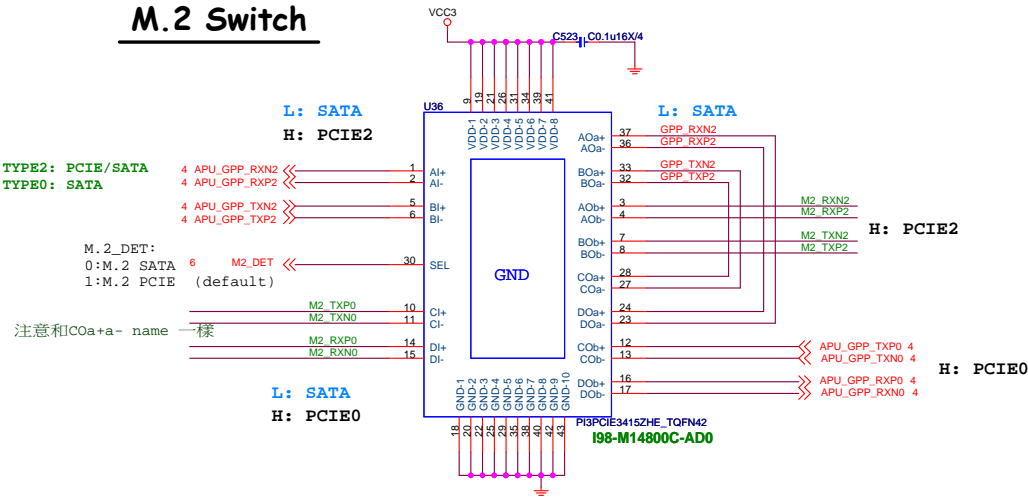
3.3V@2.5A



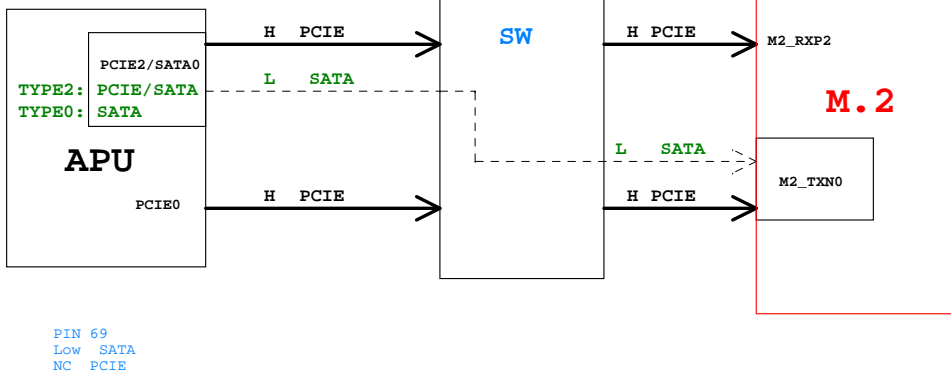
3.3V@2.5A



M.2 Switch

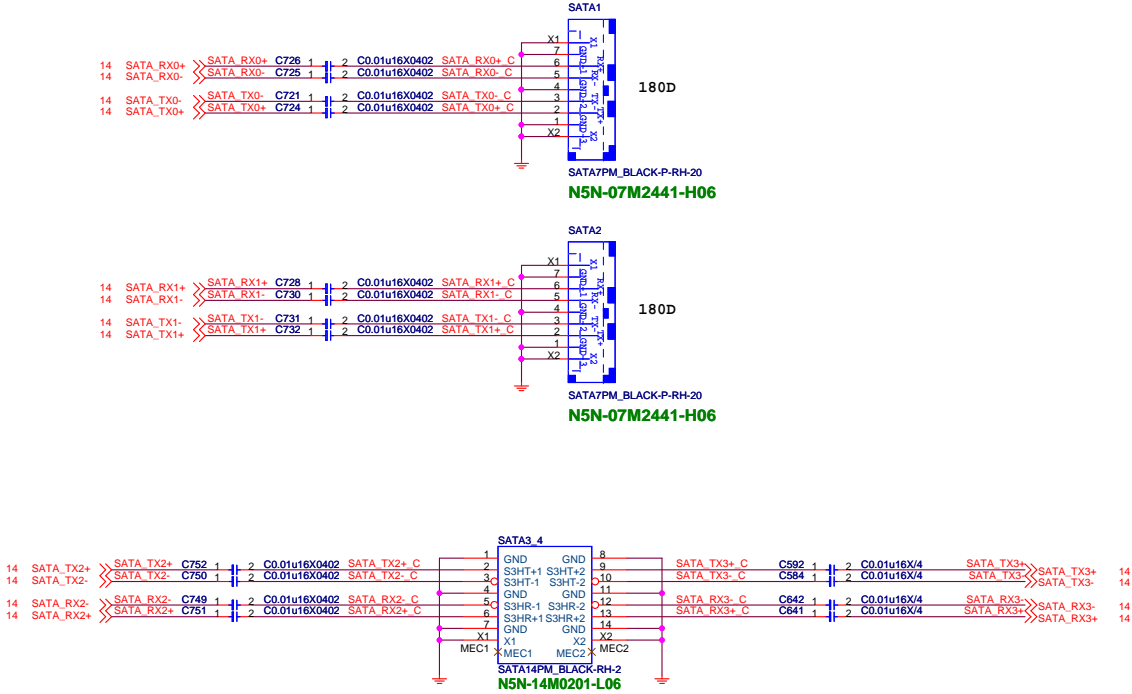


HW Default  
M.2 Insert



MSI Link to the Future MICRO-START INT'L CO.,LTD.			
Title	M.2		
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SATA Connector

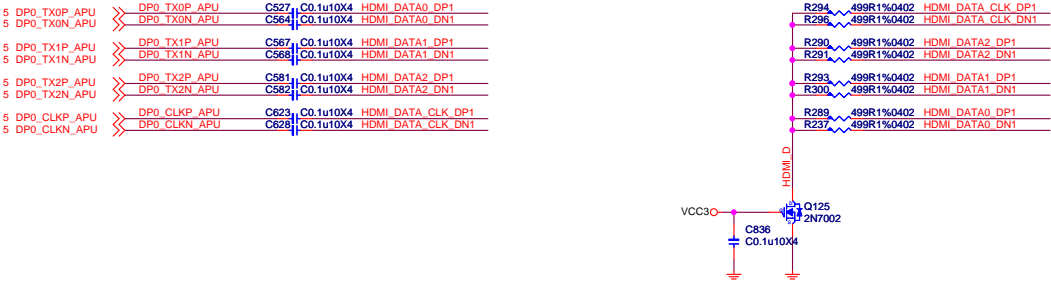




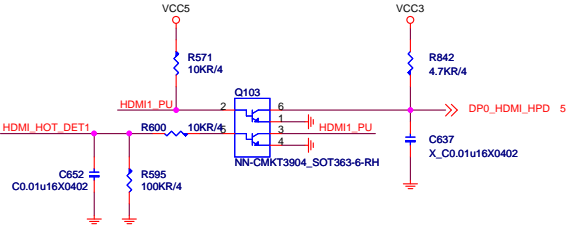


HDMI CONNECTOR

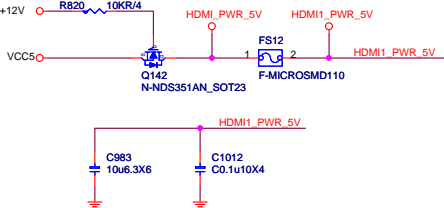
For HDMI 1.4



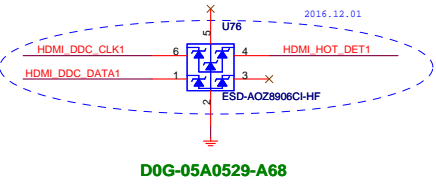
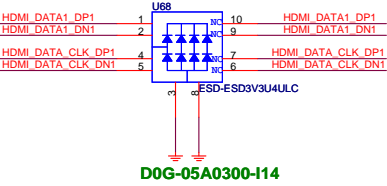
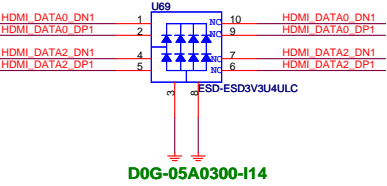
HPD Circuit



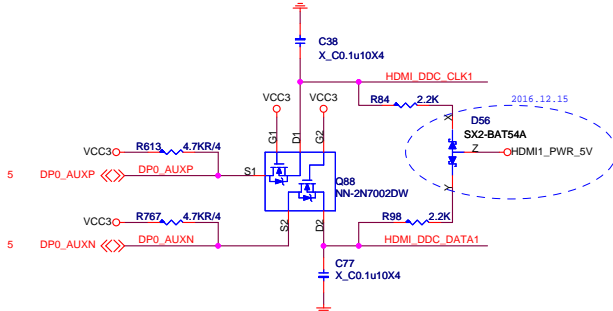
Connector Power



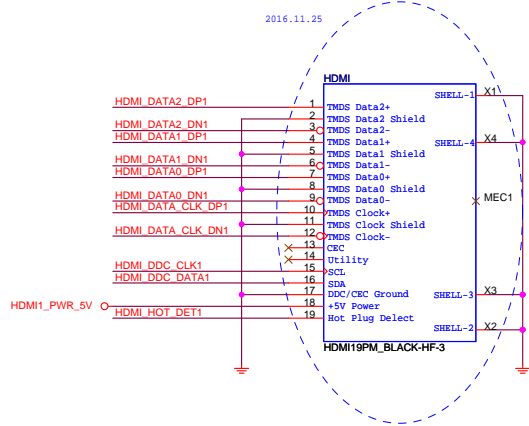
For EMI



AUX Level Shifter



Connector

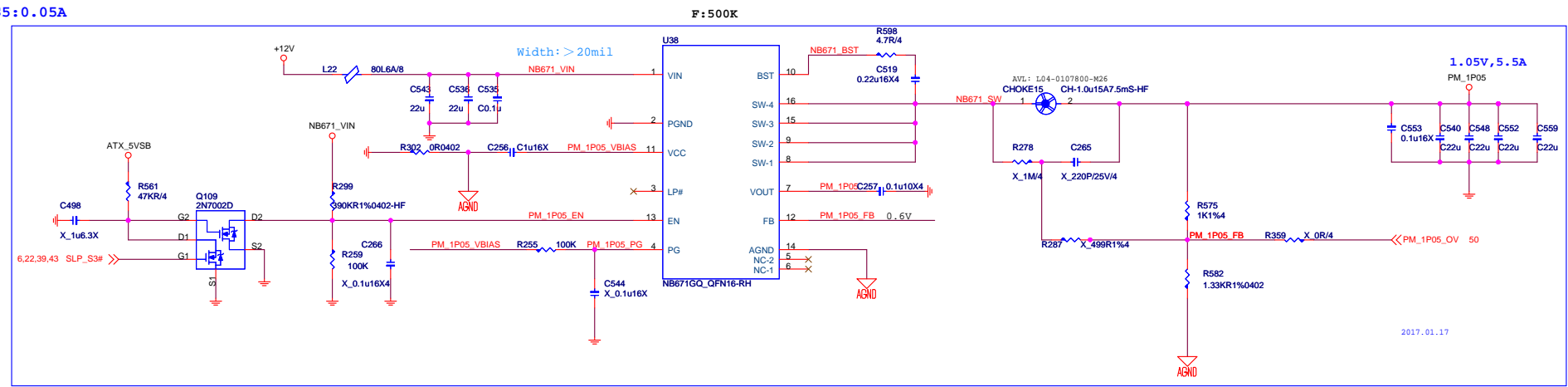




FOR Promontory 1.05V\_S0

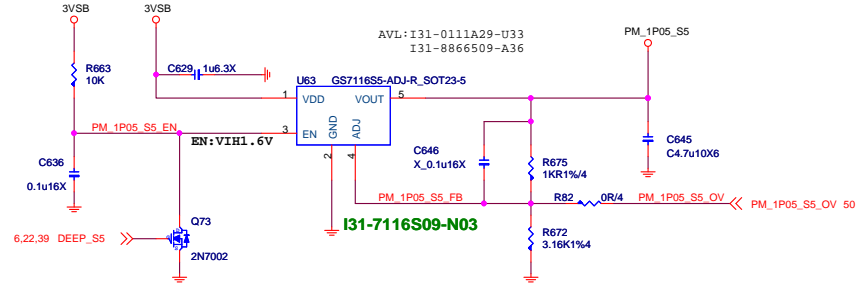
1.05V  
S0:5.5A  
S5:0.05A

support OV=>NB685  
not support OV=> NB681  
IMAX 10A  
ILIMIT=10A~12A  
IOC=ILIMIT+40%\*IMAX/2=12A~14A.  
0.7776uH<L<1.1664uH



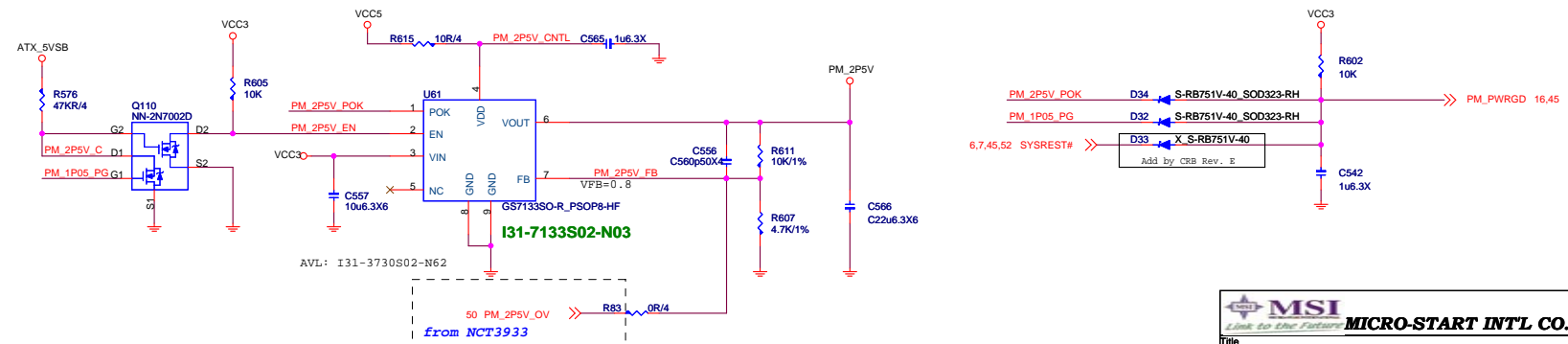
FOR Promontory 1.05V\_S5

0.05A



Promontory-2.5V

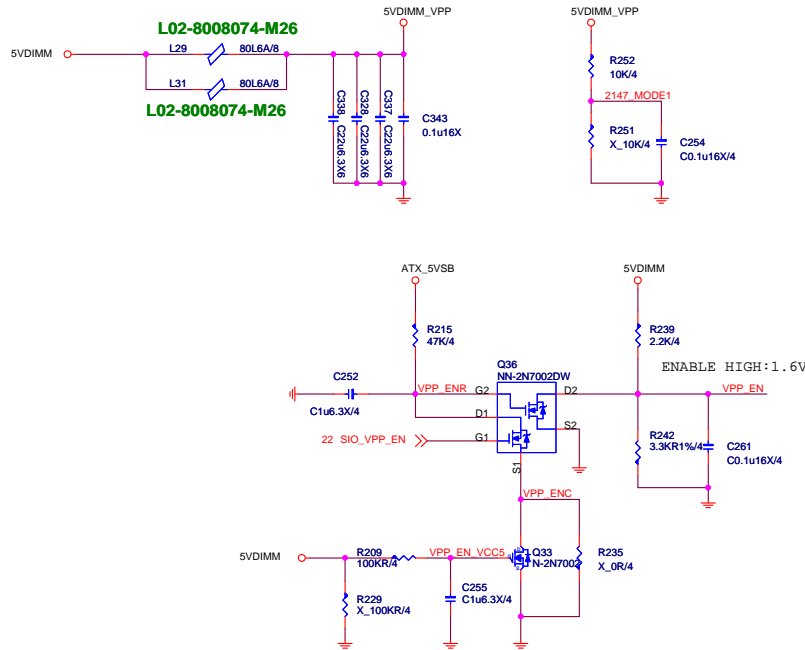
2.5V; 900mA



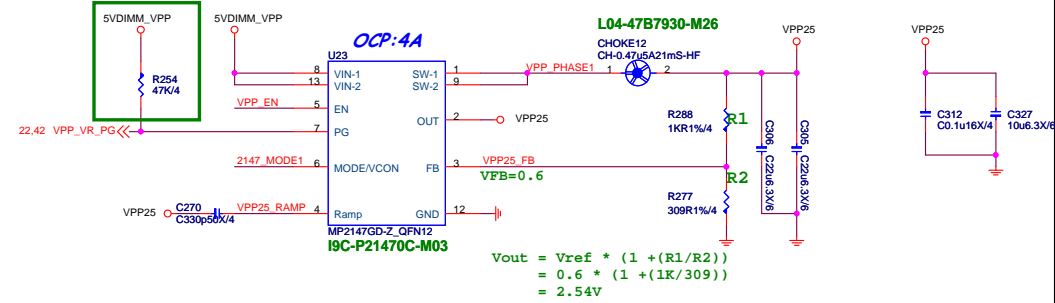
MSI Link up the Future MICRO-START INTL CO.,LTD.		
Title PM-NB681GD-1.05V/GS7133-2.5V		
Size Custom	Document Number MS-7A37	Rev 1.0
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# 4DIMM : VPP25

## 2.5V@2.24A

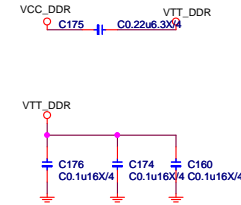
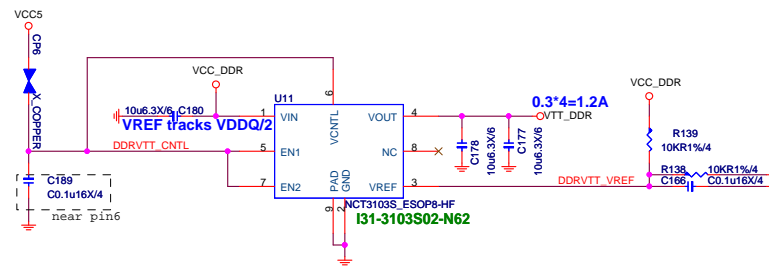



Input Current =  $(2.5 \times 2.24) / 5 / 0.8 = 1.4A$



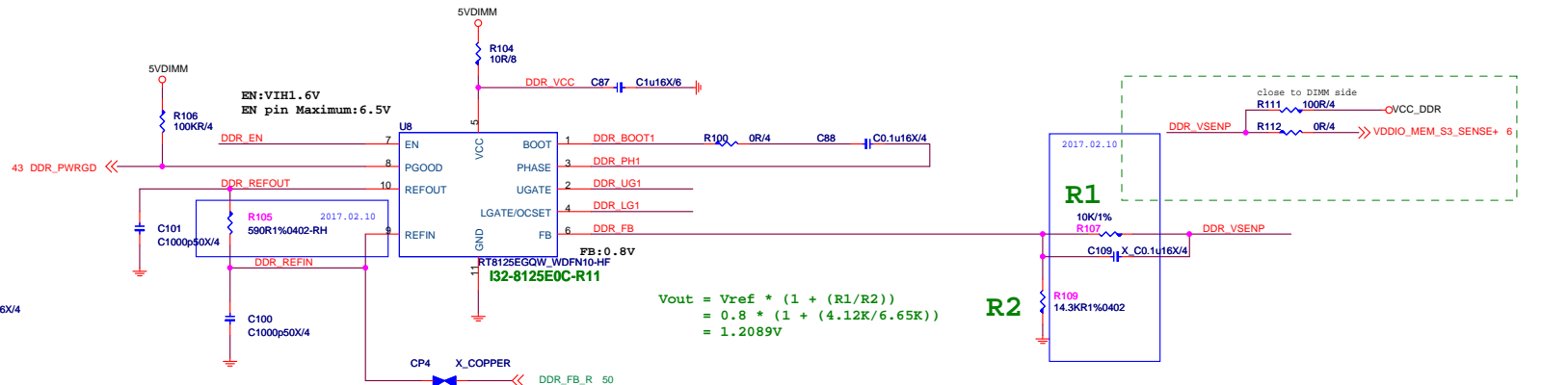
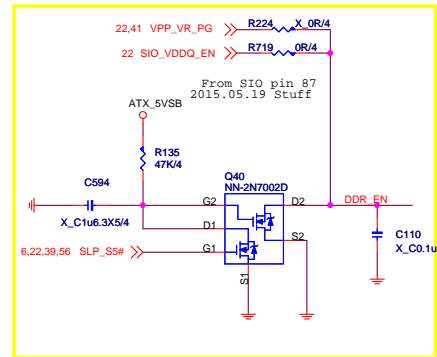
### DDR VTT Power

To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



 <b>MICRO-START INT'L CO.,LTD.</b>		
Title: <b>DDR PWR VPP25/VTT_DDR</b>		
Size: Custom	Document Number: <b>MS-7A37</b>	Rev: <b>1.0</b>
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DDR4\_1.2V@26.2A  
15.5A FOR CPU  
9.5A FOR 4DIMM  
1.2A FOR DDR VTT



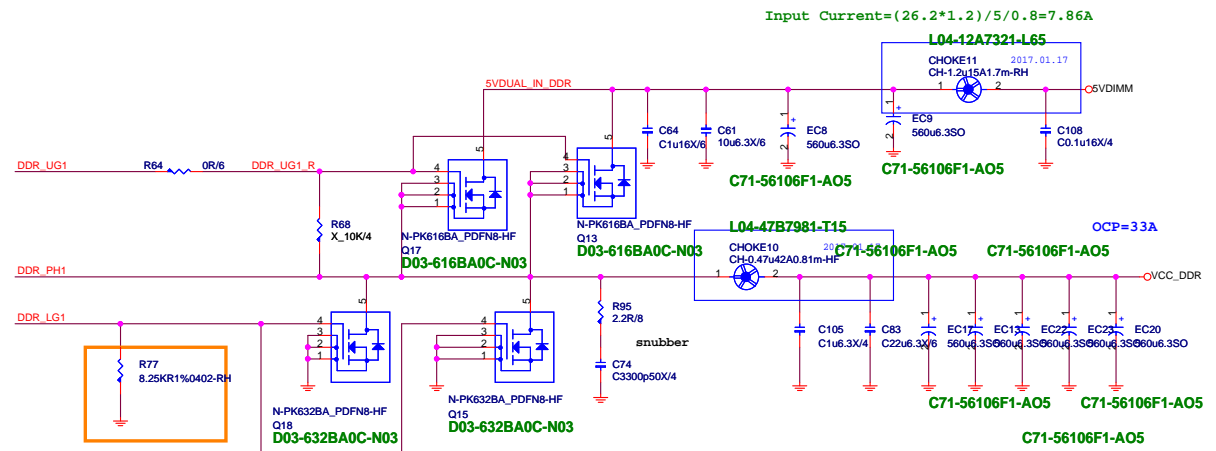
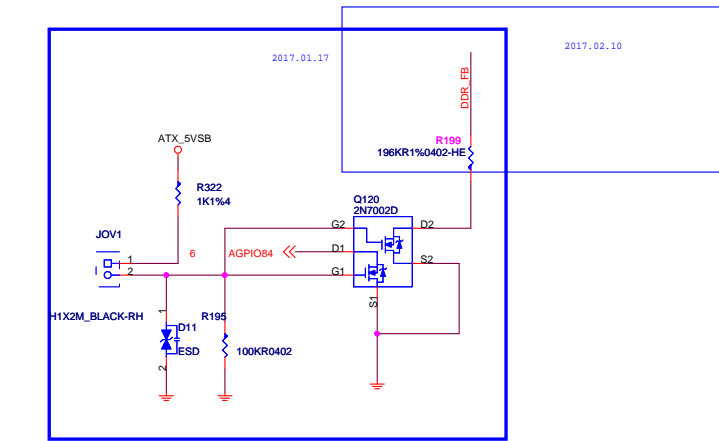
$$V_{out} = V_{ref} * (1 + (R1/R2))$$
$$= 0.8 * (1 + (4.12K/6.65K))$$
$$= 1.2089V$$

6.39,43,44,45 APU\_AM4R1>> D27 S-RB751V-40 DDR\_EN

EN: VIH2V  
EN pin Maximum: 5.5V, RECOMMENDED: 3.6V

EDC:  $I_{rms} = I_{out} / N * \sqrt{ND(1-ND)}$   
CORE:  
 $D = V_{out} / V_{in} = 1.2 / 5 = 0.24$   
 $N = \text{Phase number} = 1$   
 $= 26.2 / 1 * \sqrt{0.24 * [1 - 0.24]}$   
 $= 11.189A$

$OCP = 26.2A * 1.5 = 39.3A$   
 $R_{ocs}(R95) = OCP * R_{dson} [Low\ side] / 10uA$   
 $= 35A * 1.65mohm / 10uA$   
 $= 5.77K$



Input Current =  $(26.2 * 1.2) / 5 / 0.8 = 7.86A$

OCP = 33A

FOR CPU 1.8V S5

0.5A

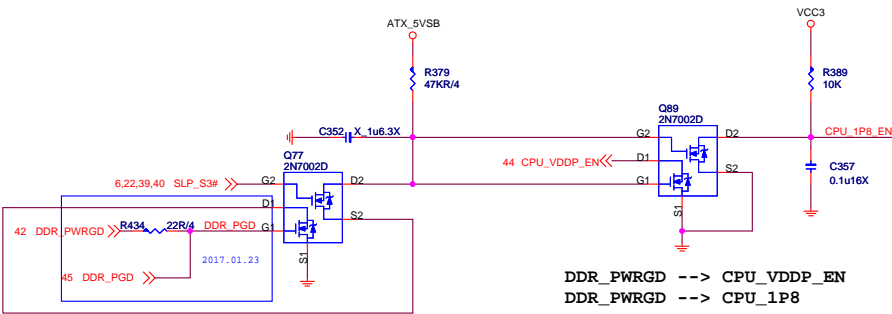
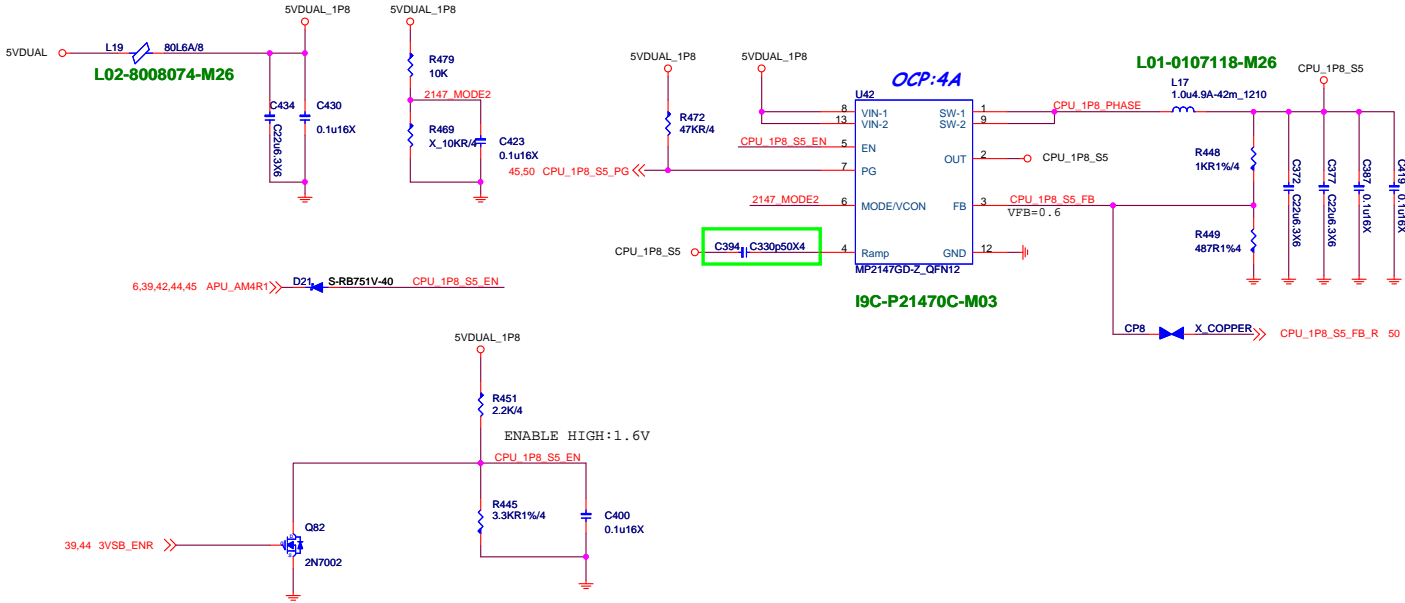
FOR VCCP\_SOC\_S5

0.9A

FOR CPU 1.8V S0

2.0A

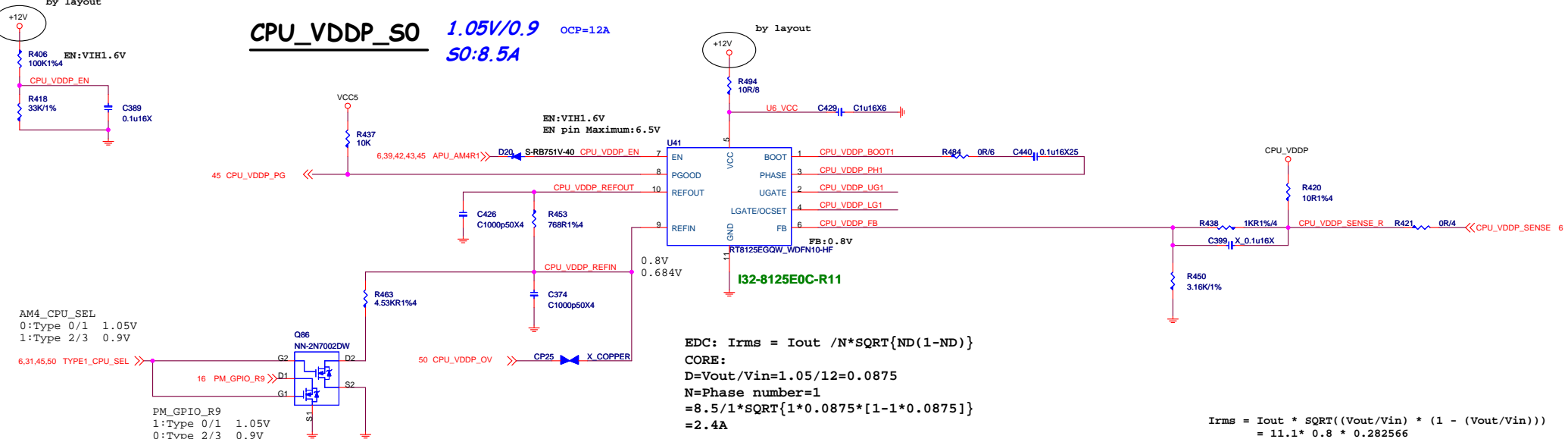
0.5A + 2.0A + 0.9A = 3.4A



DDR\_PWRGD --> CPU\_VDDP\_EN  
DDR\_PWRGD --> CPU\_1P8

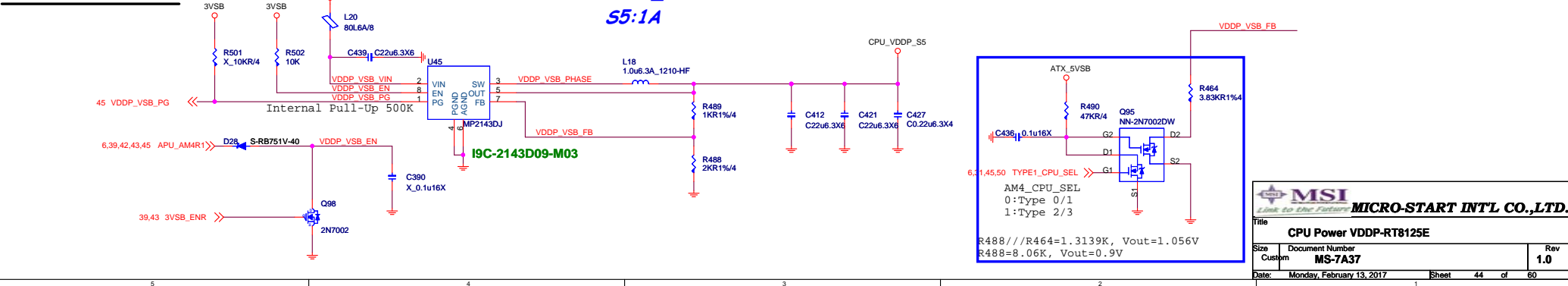
# CPU\_VDDP\_S0

1.05V/0.9  
S0:8.5A



# CPU\_VDDP\_S5

VDDP\_S5 1.05V/0.9  
S5:1A

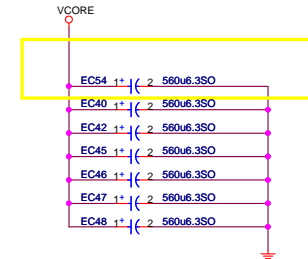
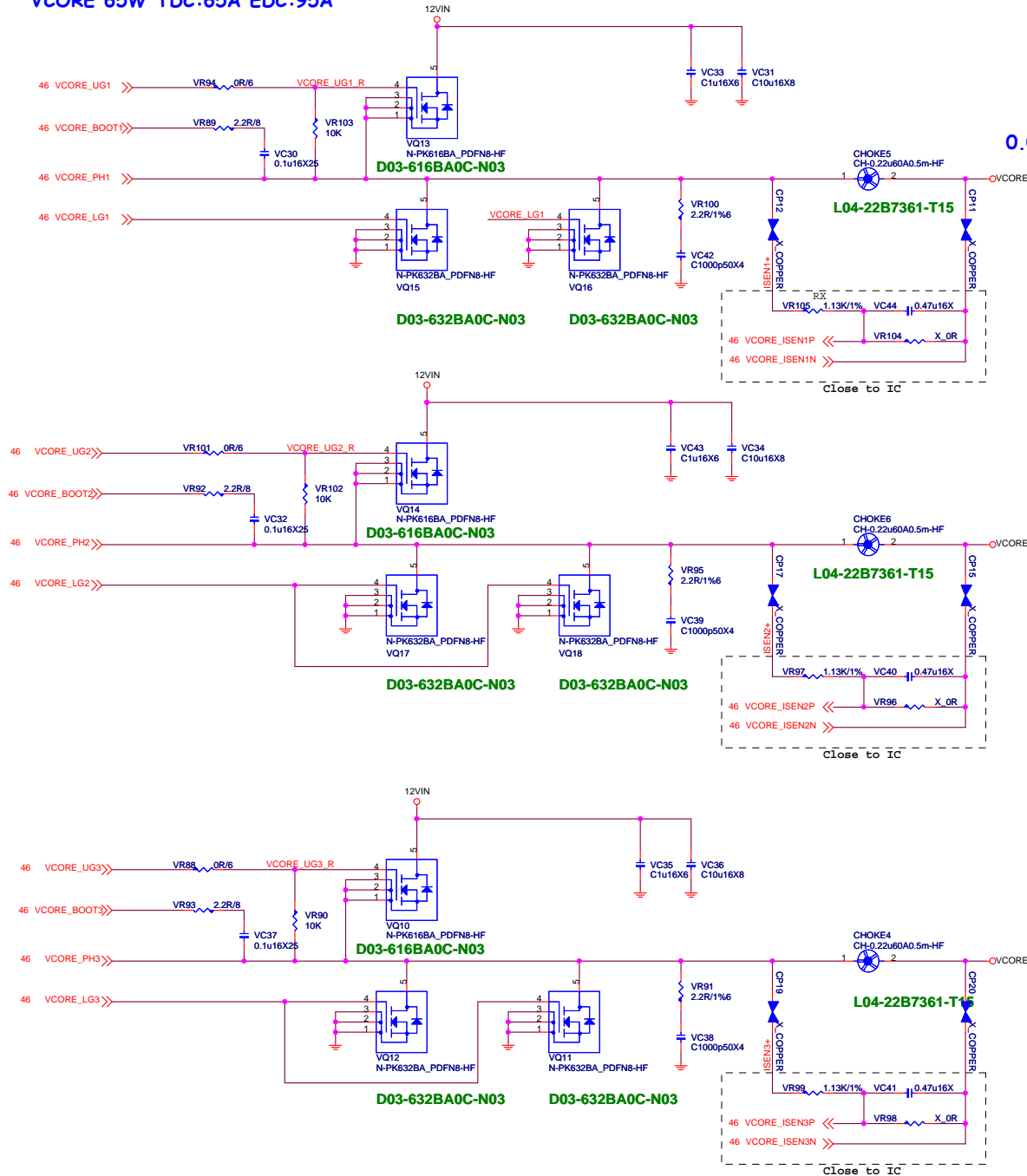






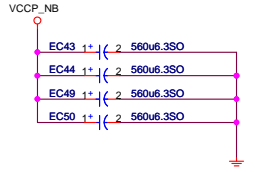
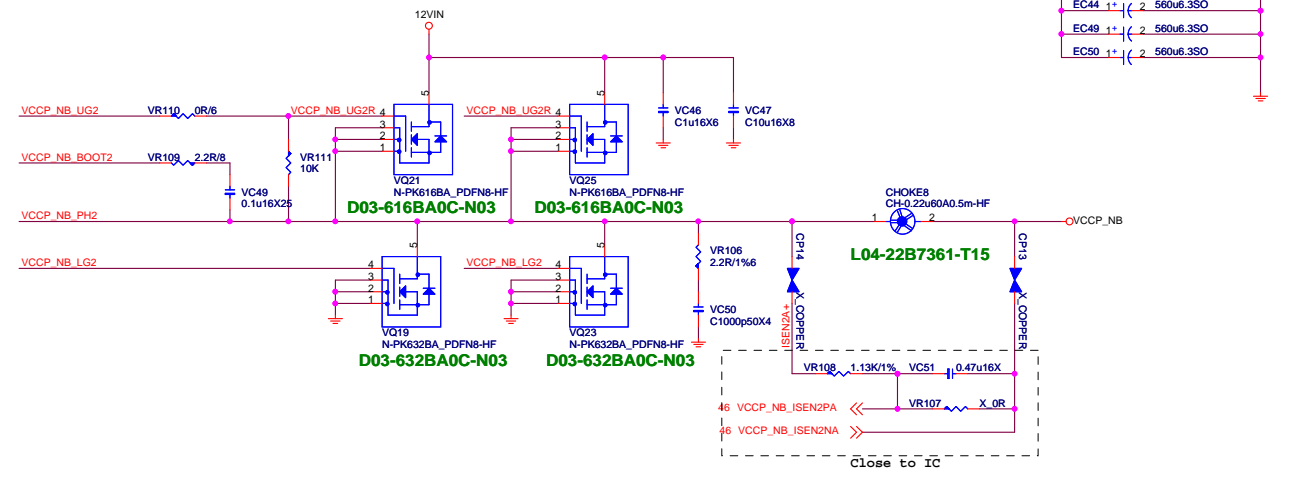
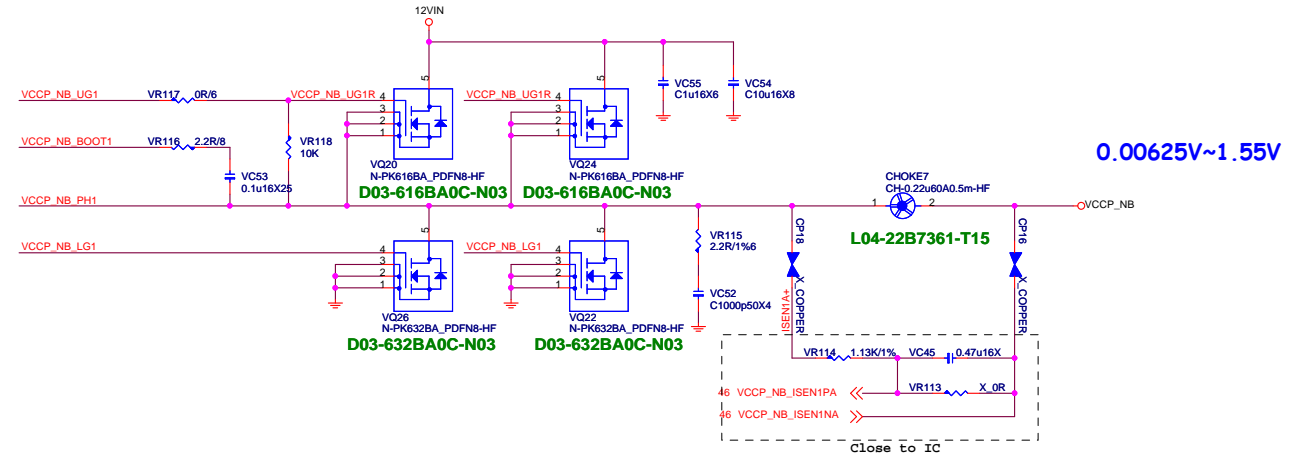
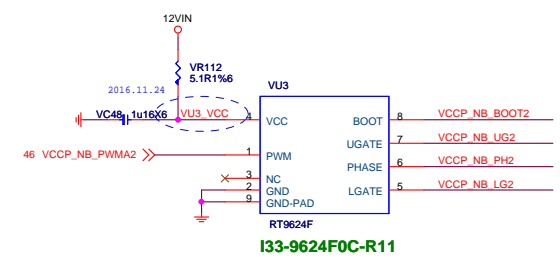
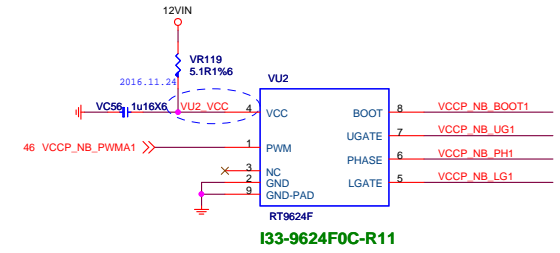
VCORE 95W TDC:80A EDC:125A  
VCORE 65W TDC:65A EDC:95A

0.00625V~1.55V





VCCP\_NB 95W TDC:50A EDC:75A  
VCCP\_NB 65W TDC:50A EDC:75A



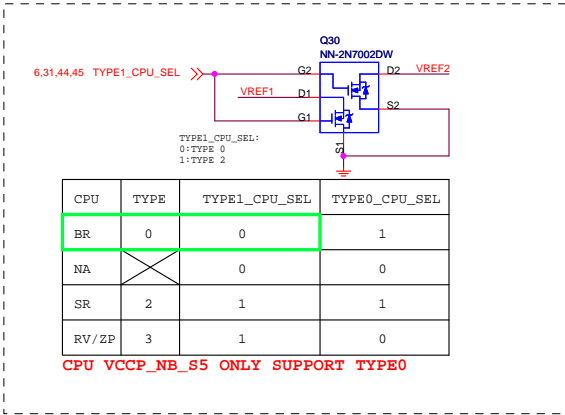
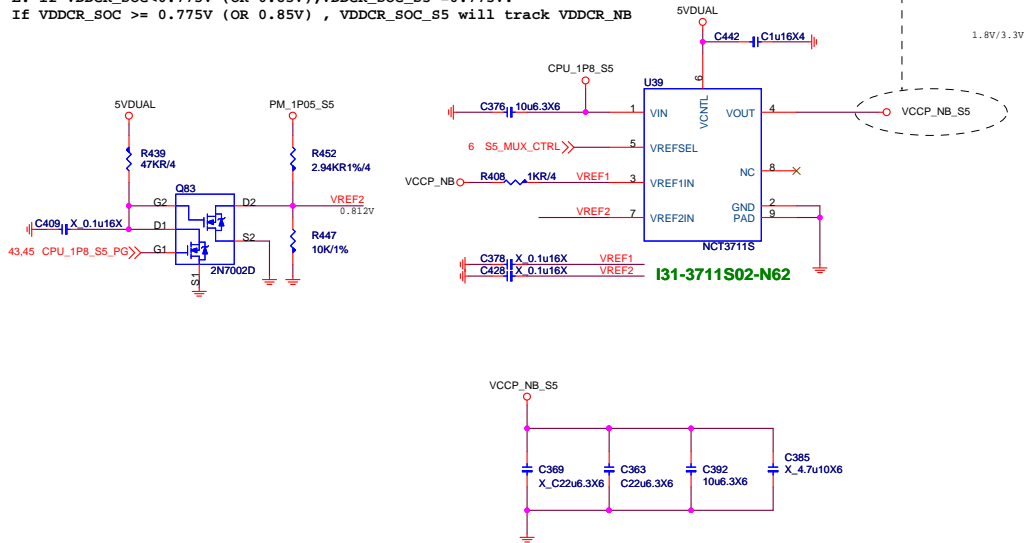
FOR VCCP\_SOC\_s5  
0.9A

TYPE0 Only

S5\_MUX\_CTRL  
HIGH:S0  
LOW: S3/S5

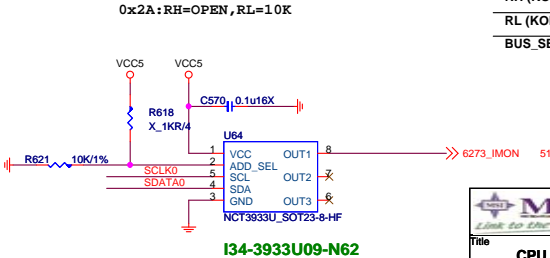
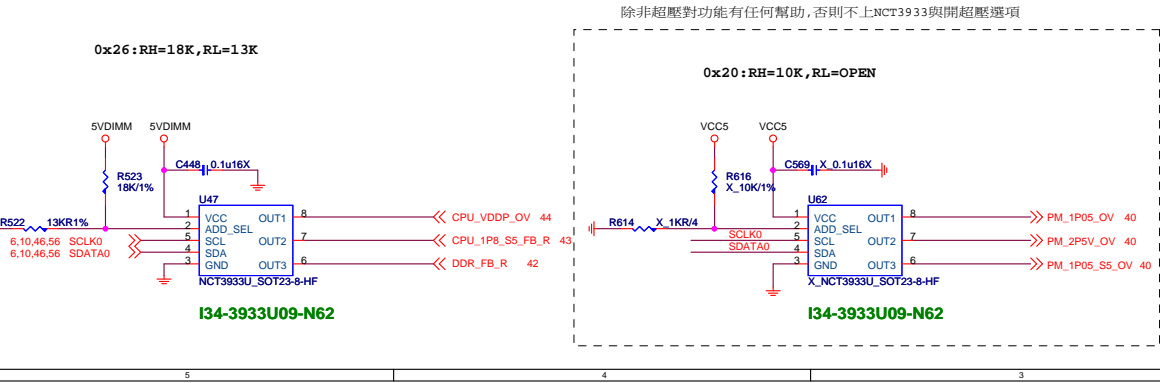
H: +VDDCR\_FCH\_ALW will track VDDNB  
L: If VDDCR\_SOC<0.775V (OR 0.85V),VDDCR\_SOC\_S5 =0.775V.  
If VDDCR\_SOC >= 0.775V (OR 0.85V) , VDDCR\_SOC\_S5 will track VDDCR\_NB

(VDDCR\_SOC\_S5 is only used for AMD Family 15h Models 60h-6Fh processors) Bristol Ridge TYPE0




Over Voltage Control IC

UPI VOLTAGE CONSOLE



ADDRESS	0x2A	0x28	0x26	0x24	0x22	0x20
RH (KOhm)	OPEN	3.9	3	2.2	1.3	10
RL (KOhm)	10	1.3	2.3	3	3.9	OPEN
BUS_SEL	0%	25%	40%	60%	75%	100%

**MICRO-START INTL CO.,LTD.**

Title

CPU Power NB Switch/NCT3933

Size

Custom

Document Number

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Date

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Sheet

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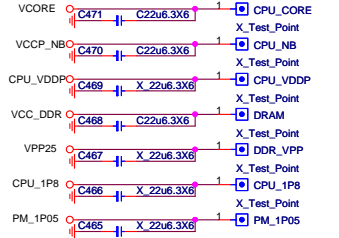
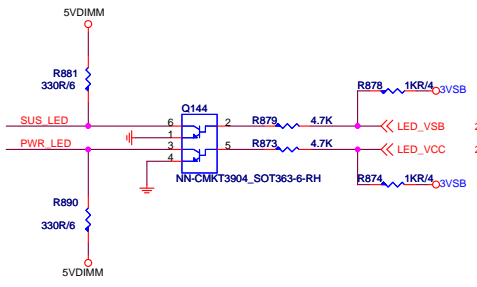
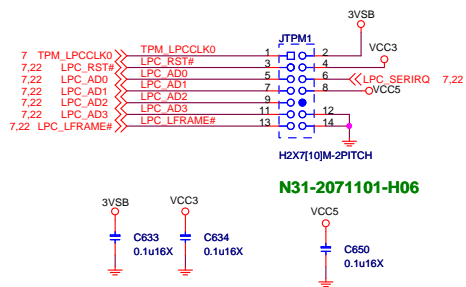
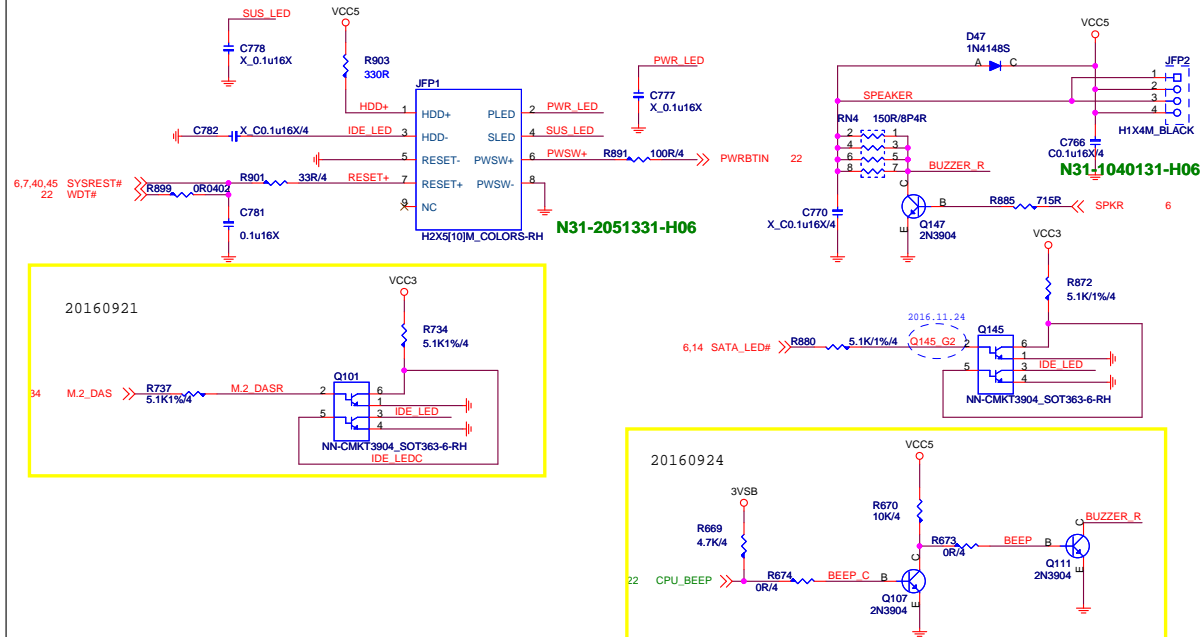
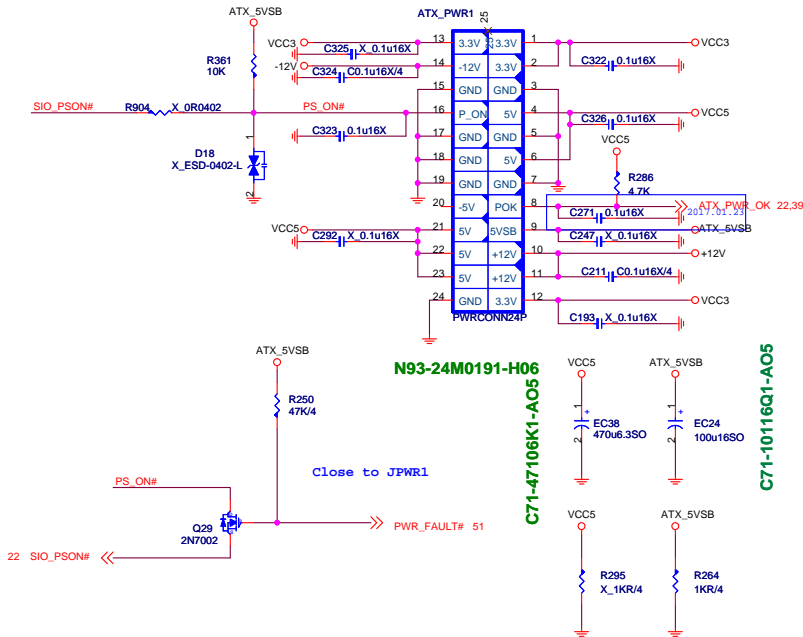
of

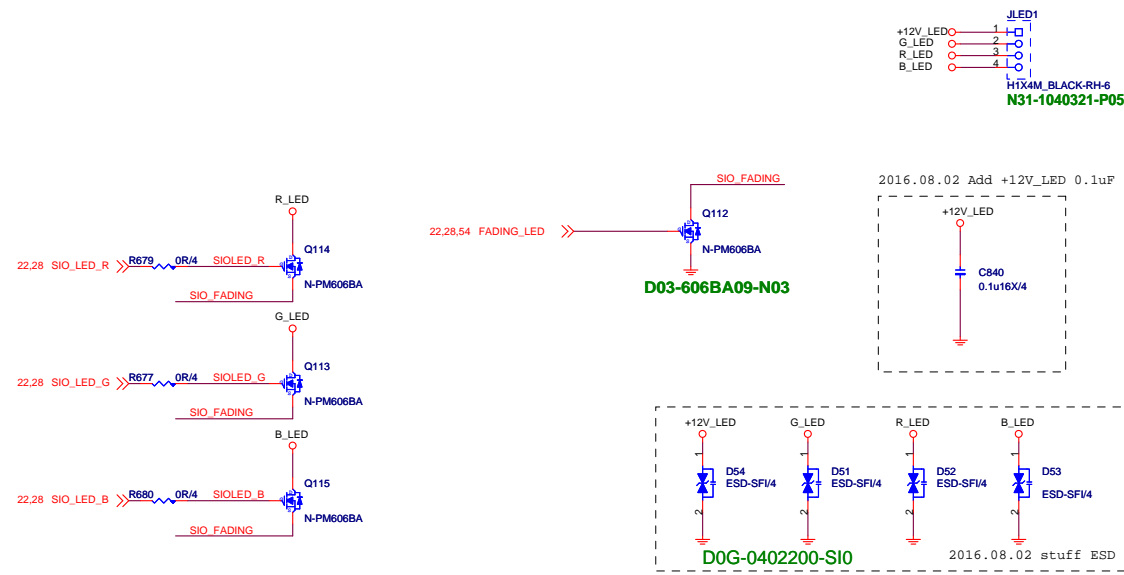
60

Rev

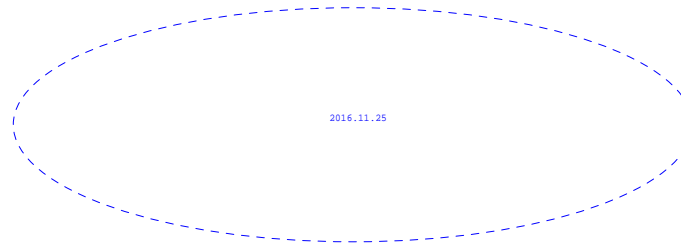
1.0







FCH LED Place under Heat-sink

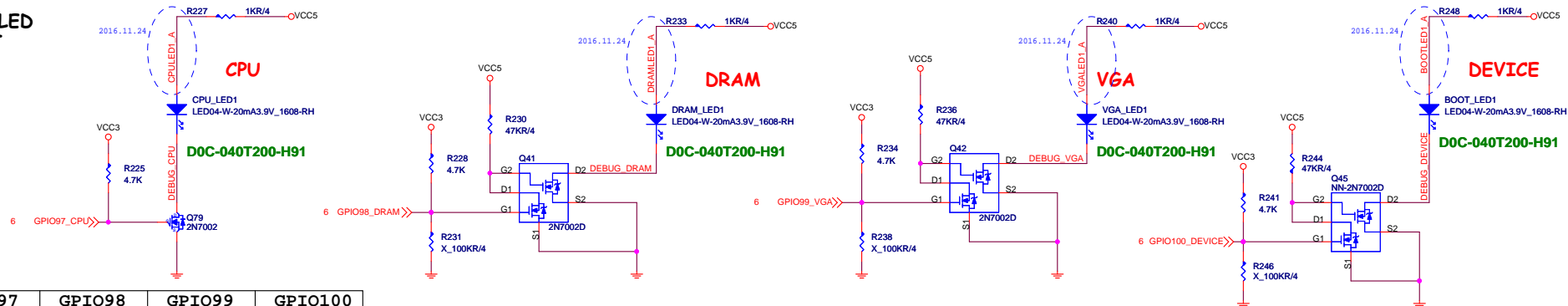


LED

紅 : D0C-040S600-E07

白 : D0C-040S300-E07

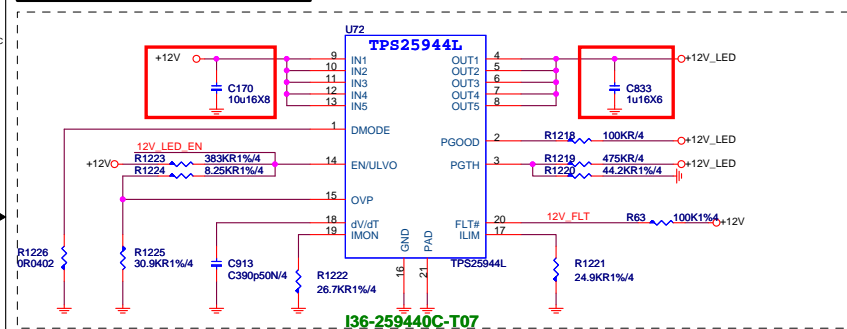
## EZ Debug LED



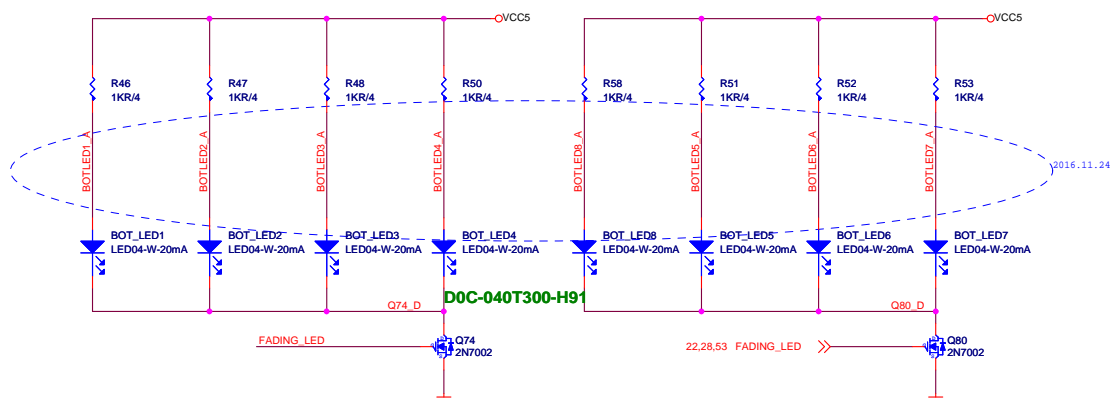
GPIO	GPIO97	GPIO98	GPIO99	GPIO100
亮	GPI PULL HIGH	GPO PO LOW	GPO PO LOW	GPO PO LOW
滅	GPO LOW	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)	GPO HIGH (default HIGH)

## LED Control by SIO

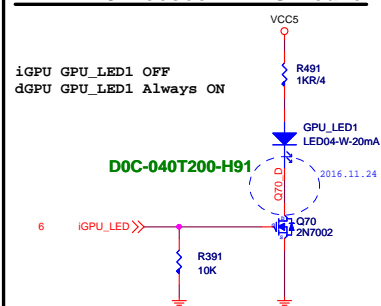
2016.07.06 Use TPS25944L



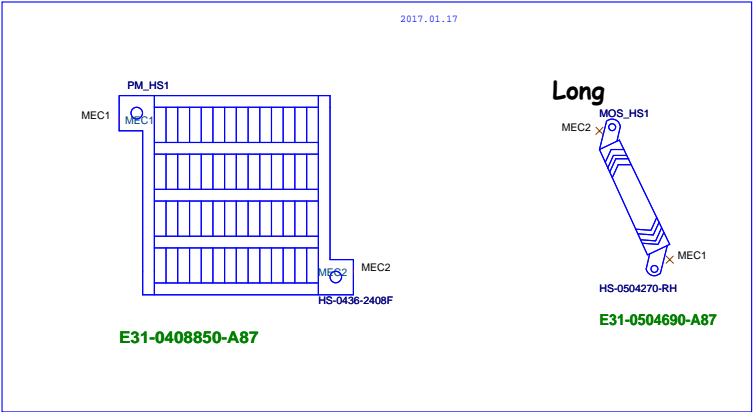
## Bottom LED



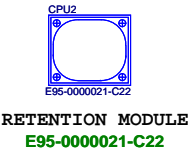
## AM4 APU Detect LED Circuit



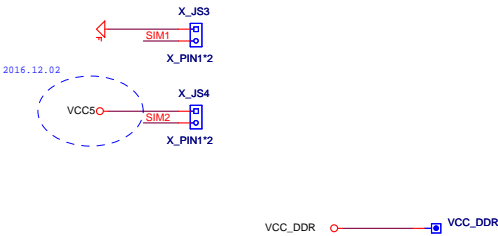
HEAT SINK



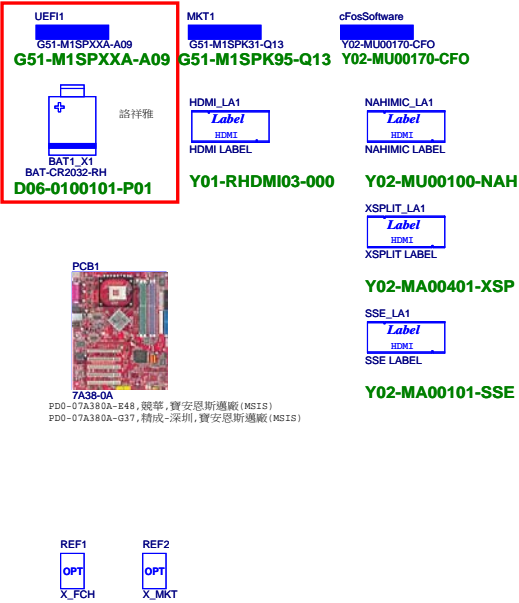
CPU Socket



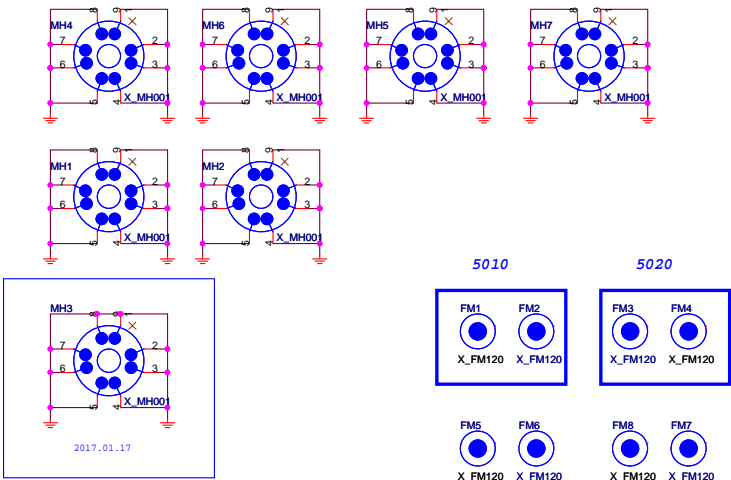
Simulation



MANUAL PART



Optics Orientation Holes



OPT	Configure	BOM	Function
		601-7A38-A01	XXXX

**MSI**  
*Link to the Future*  
**MICRO-START INTL CO.,LTD.**

Title: **BOM Option**

Size: Custom  
Document Number: **MS-7A37**  
Rev: **1.0**

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