

# MS-7788 Ver: 4.0 m-ATX : 243.84 X 189.9mm

## CPU:

INTEL - Sandy Bridge LGA 1155

## System Chipset:

INTEL - Cougar Point PCH(H61)

## OnBoard Chipset:

HD Audio Codec:RTL887 Co-lay VT1708S

LAN:8111E Co-lay 8105E

SIO:FIN71878AD

Flash ROM: 64Mb SPI (PCH)

## Main Memory:

DDRIII (1066/1333MHz) \* 2 (Dual Channel)

## Expansion Slots:

PCI Express (X16) Slot \* 1

PCI Express (X1) Slot \* 1

PCI Slot \*1 by ASM1083

## PWM:

Controller:VRD12 UT501 3Phase

CPU+GPU: UP6282 MOSFET Driver

CPU VTT, CPU SA, PCH 1V05: UP1504T

DDR: UP1504T

## ACPI:

UPI

## Other:

SATA2.0 \*4

USB2.0 Rear\*4 Front\*6

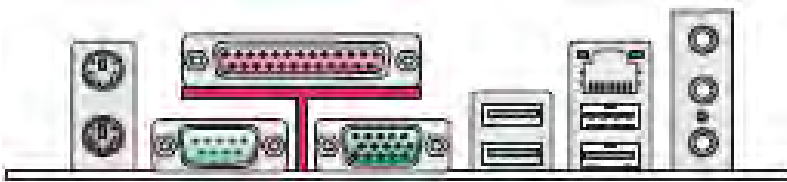
D-SUB \*1

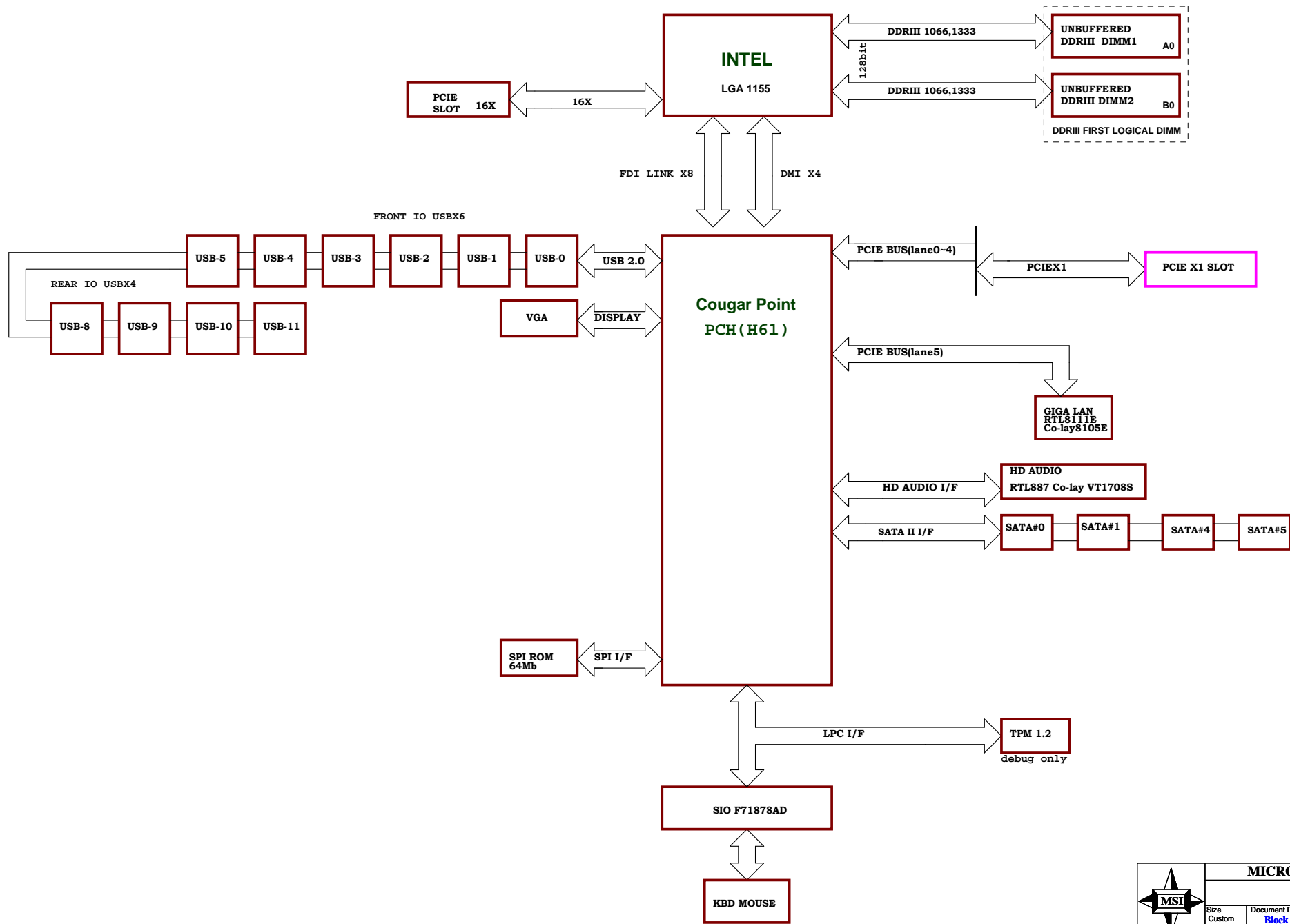
Print port Rear\*1

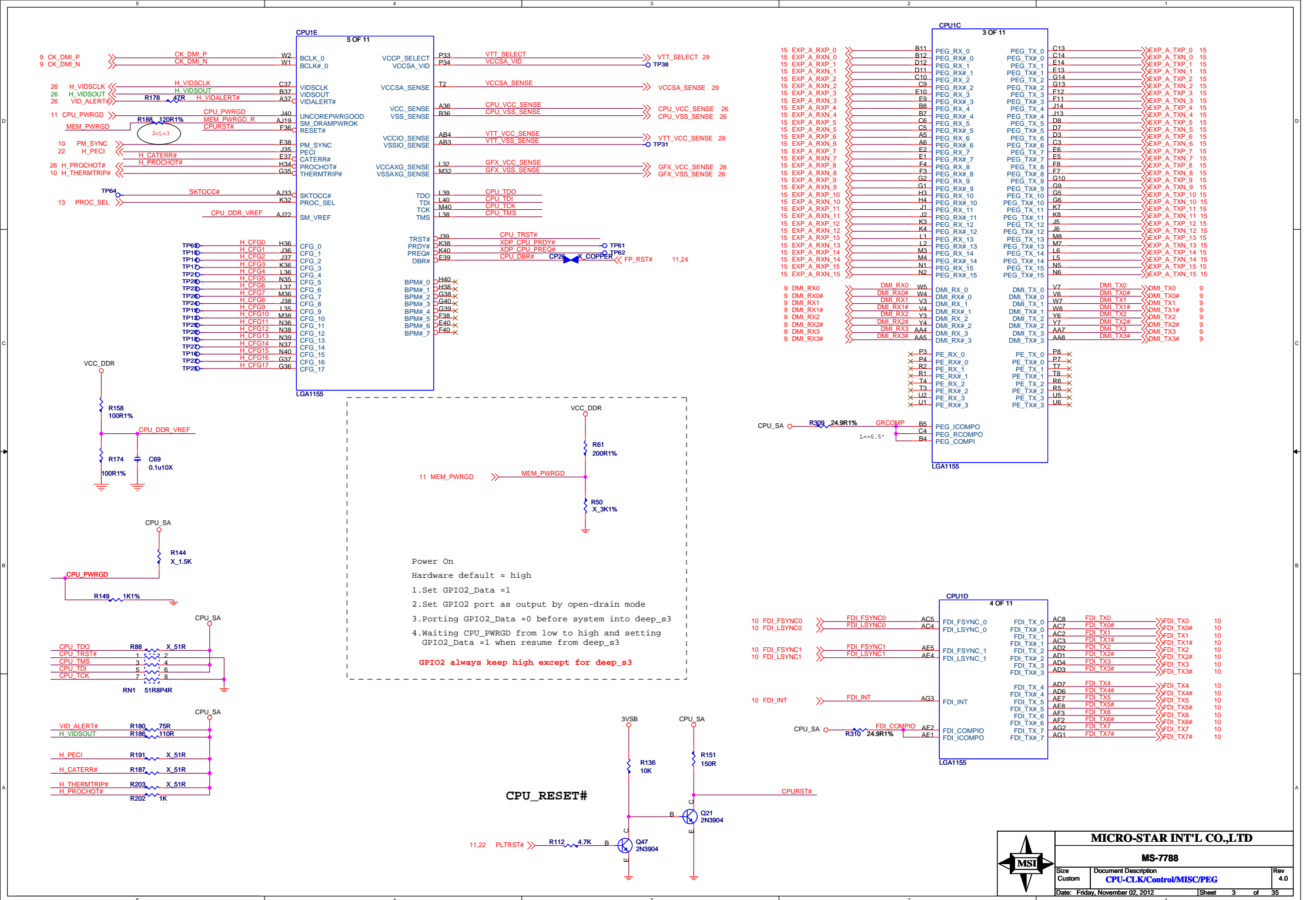
COM port Rear\*1 Front\*1

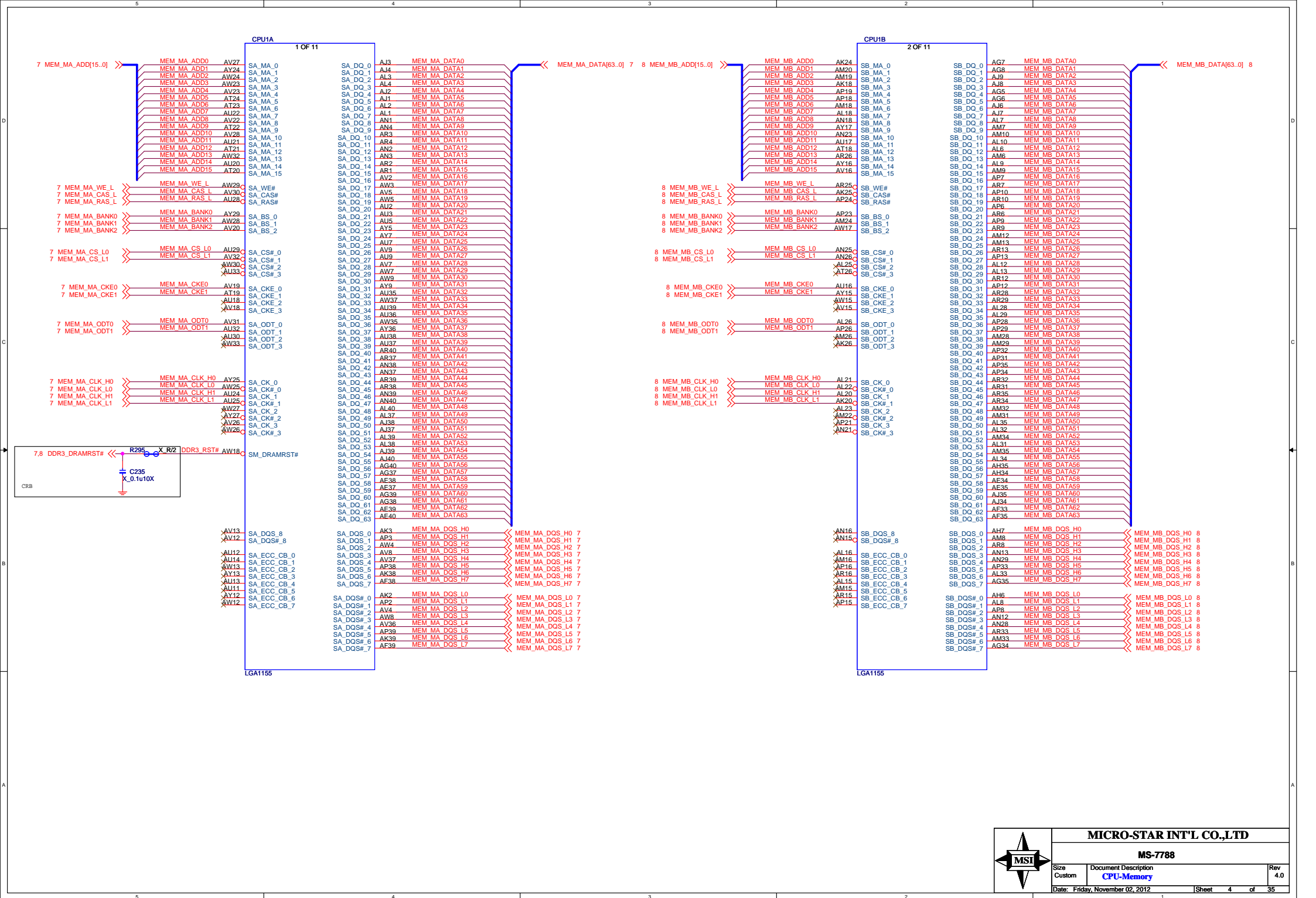
TPM Header \*1(debug only)

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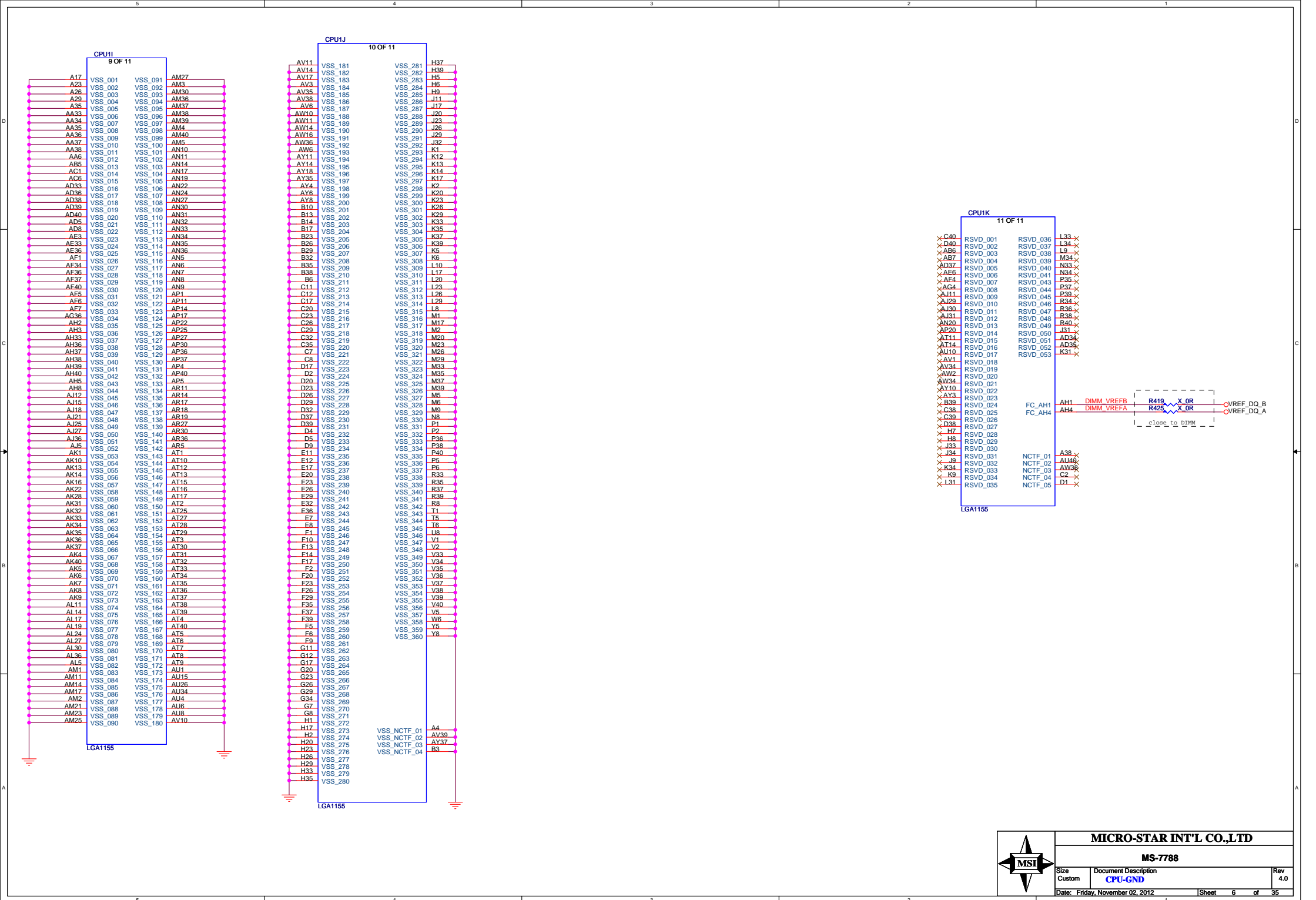




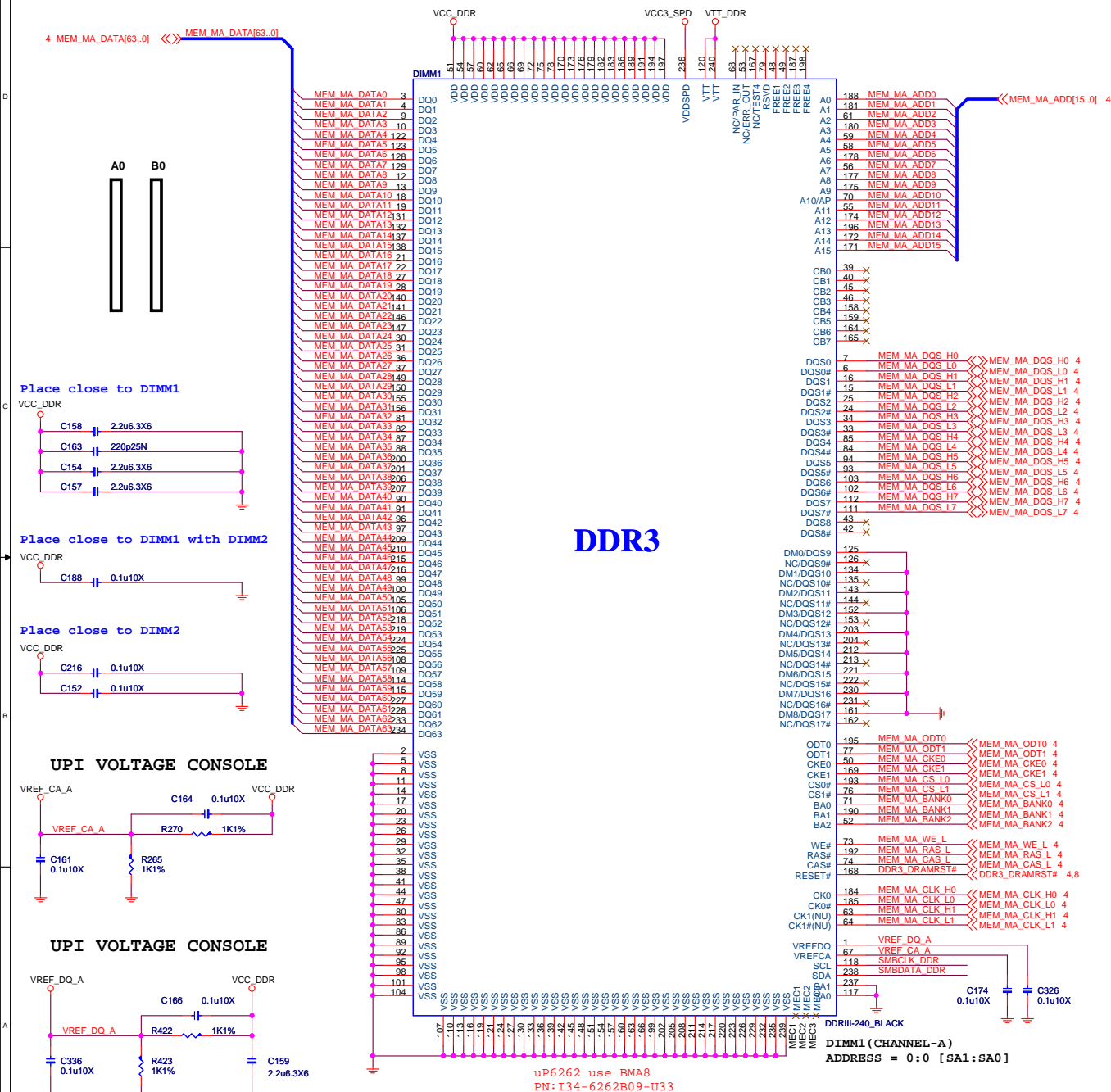




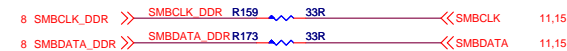
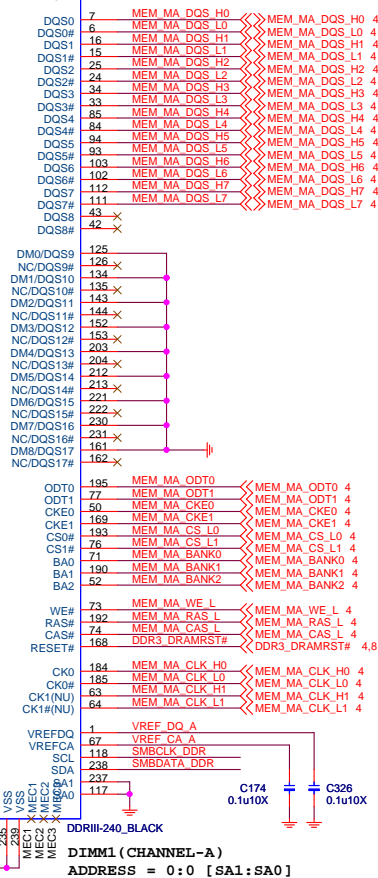
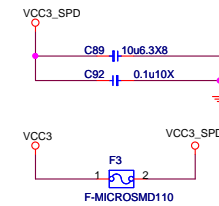




## DDRIII DIMM\_A0



## DDRIII DIMM\_A1



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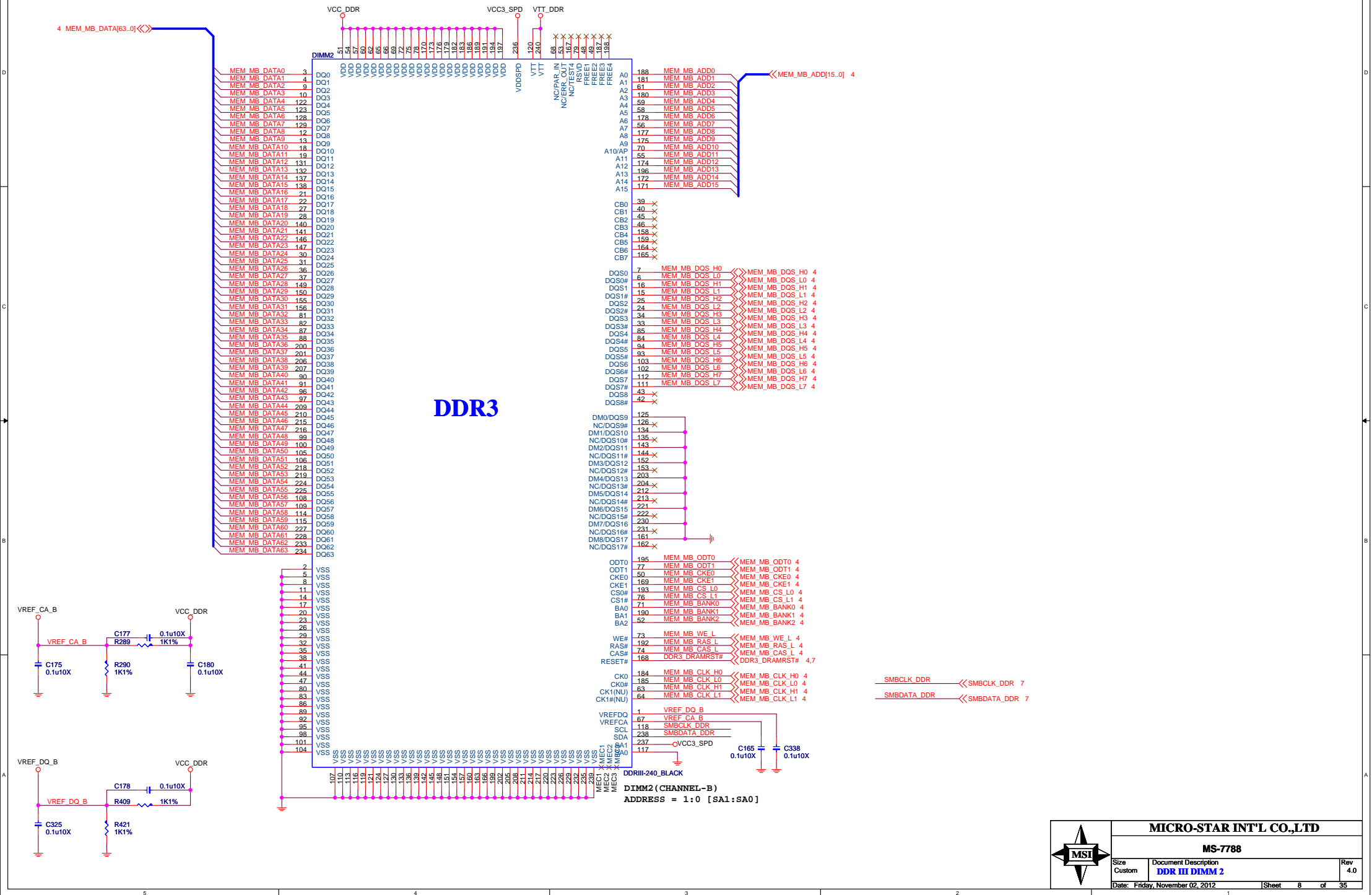
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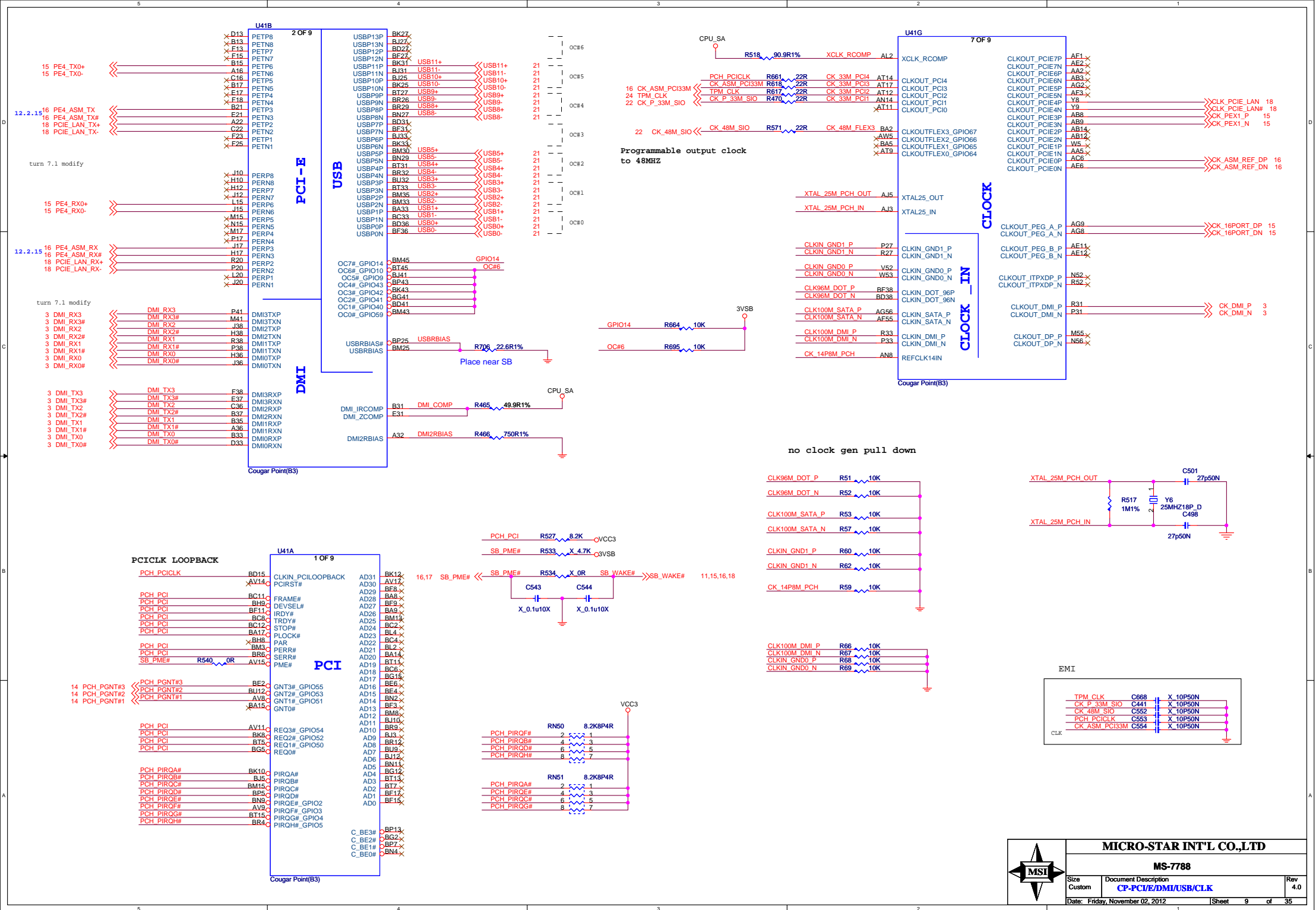
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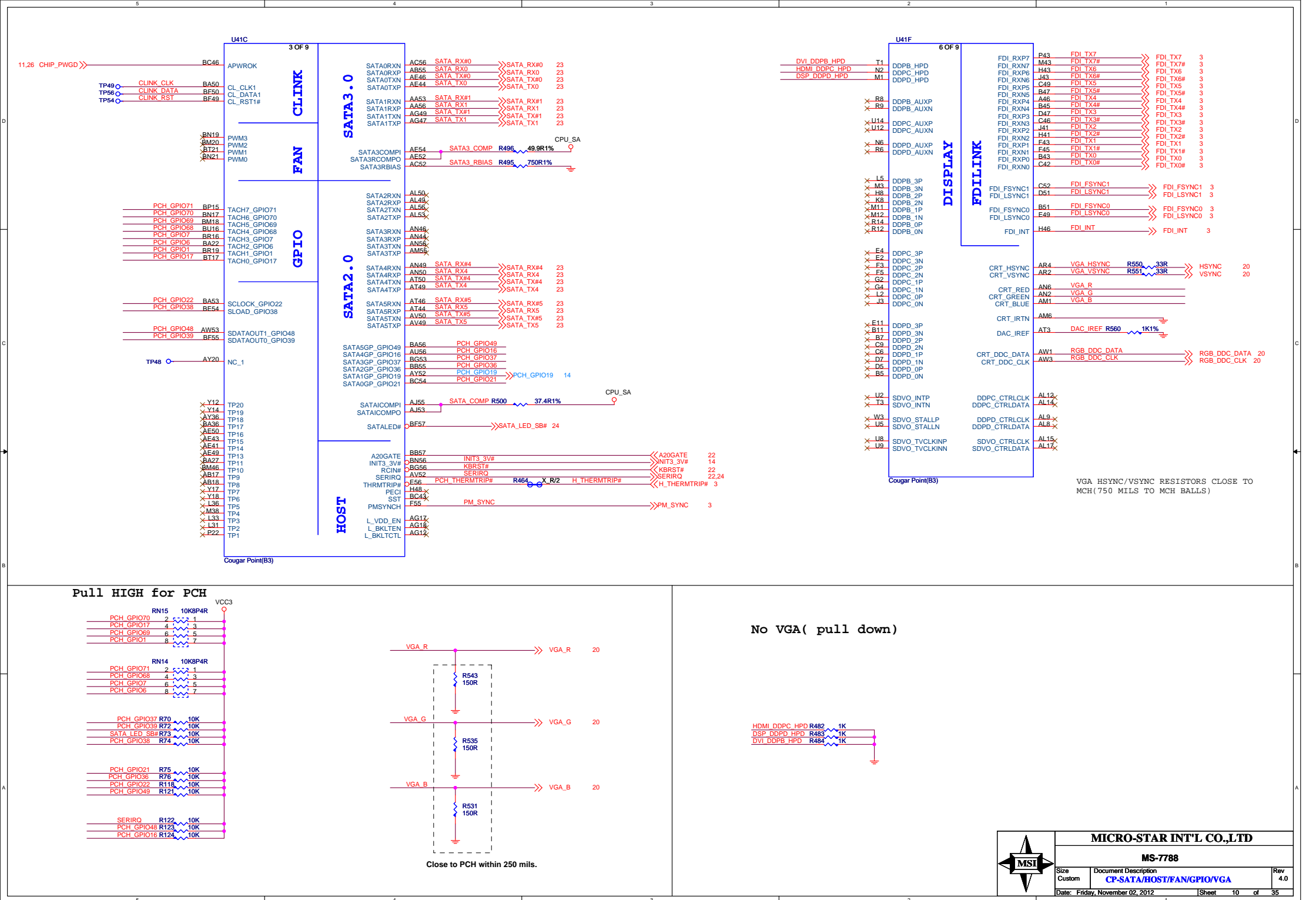


# DDRIII DIMM\_B0



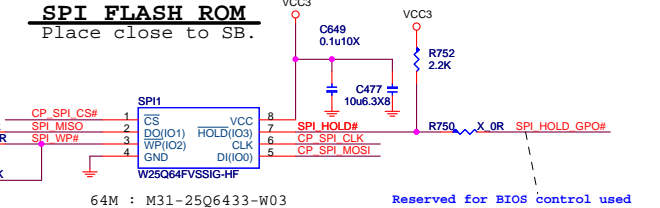
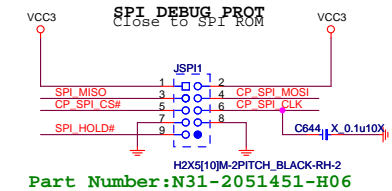
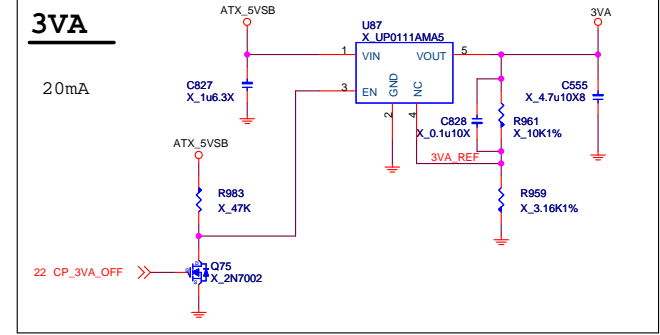
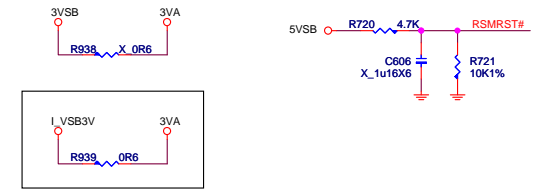
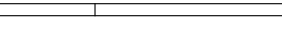
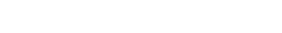
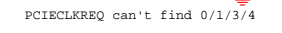
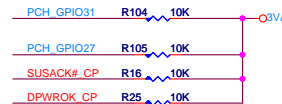
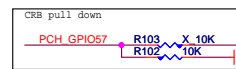
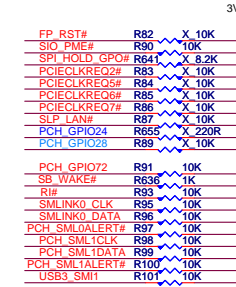




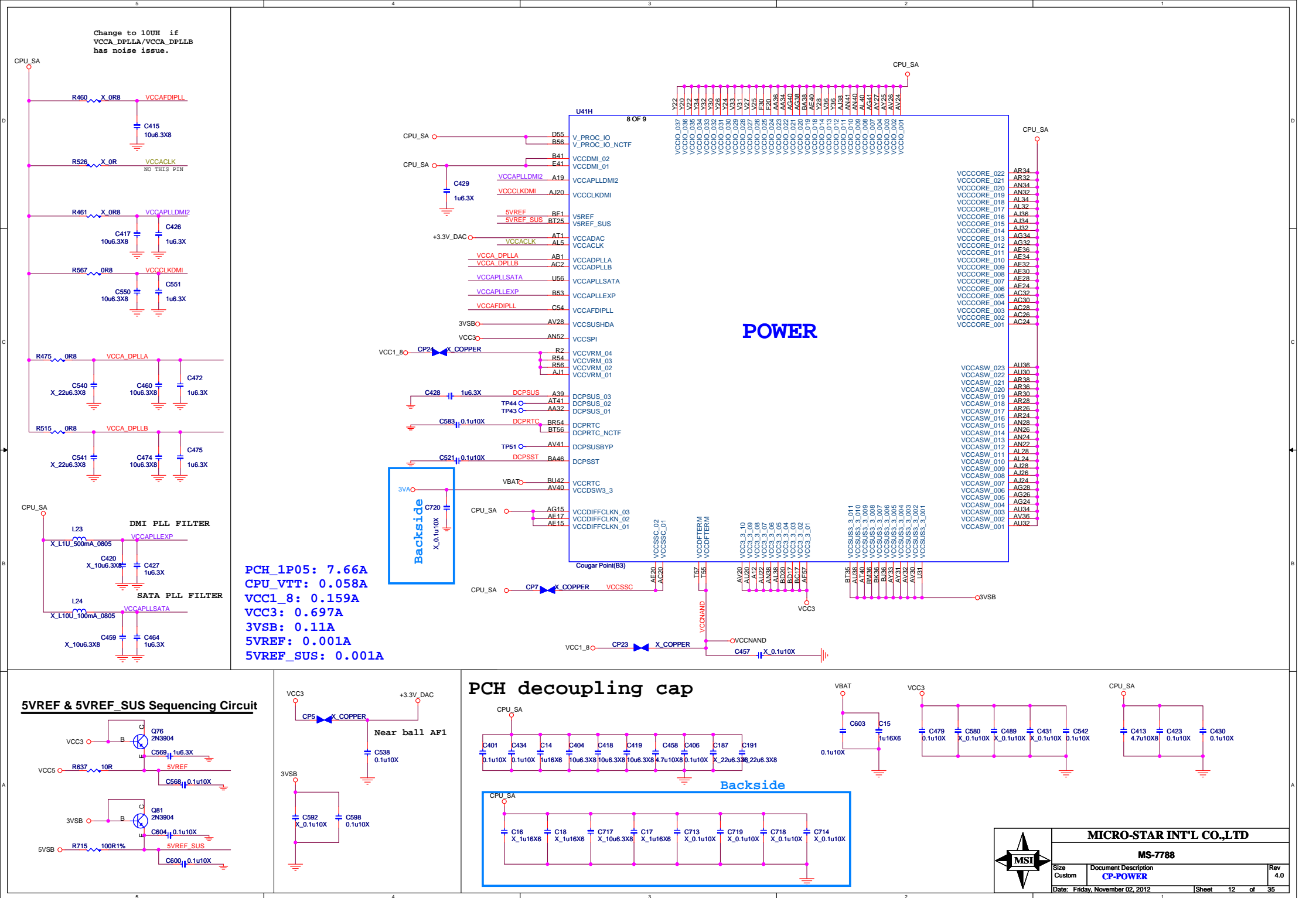


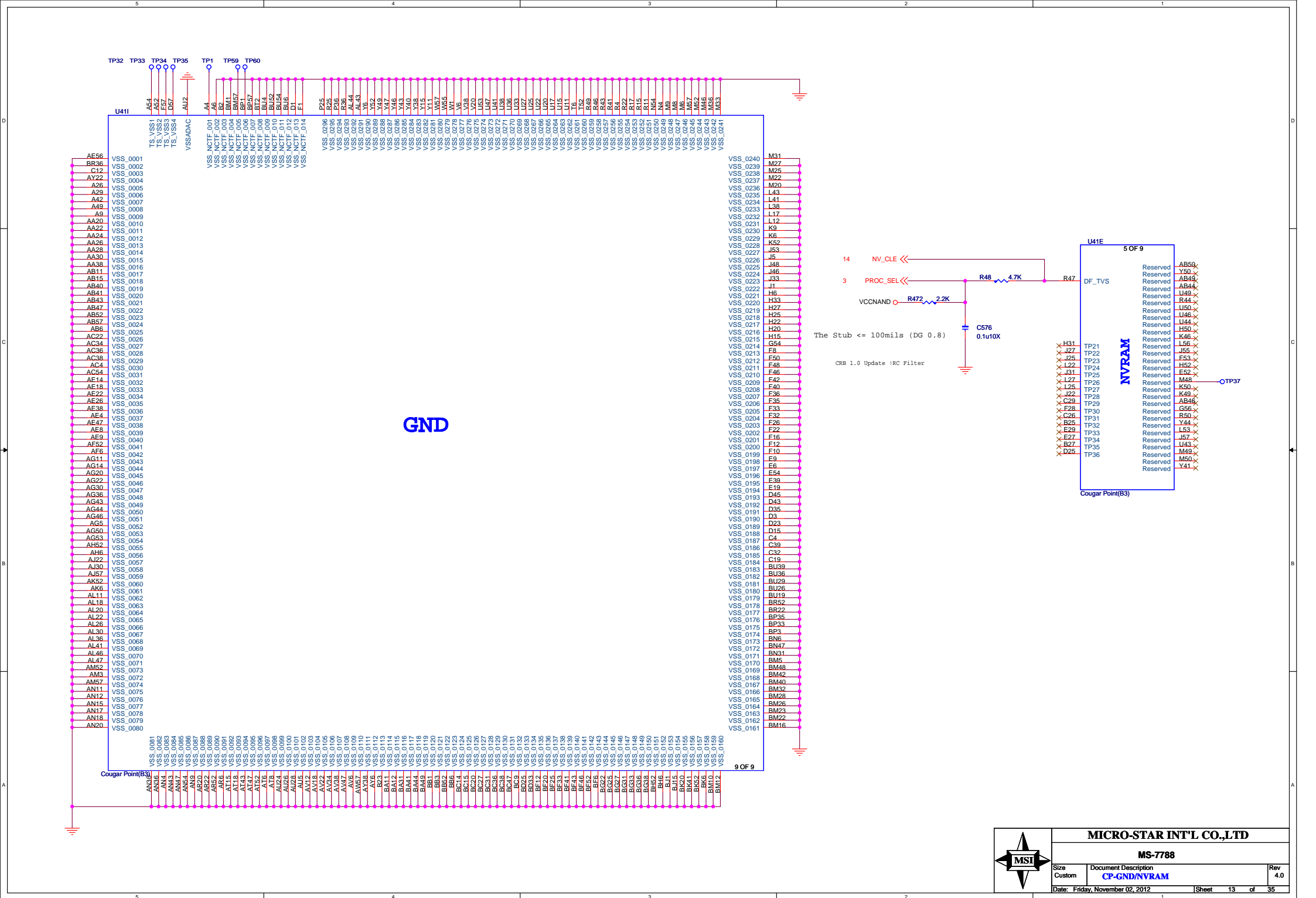
# REQUIRED STRAPS

Internal pull-up  
Internal pull-up



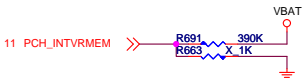
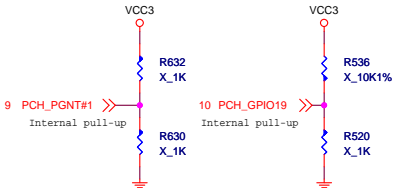
Reserved for BIOS control used





PCH Straps

BOOT DEVICE	GNT1	SATA1GP/GPIO19
LPC	0	0
PCI	1	0
SPI	1	1



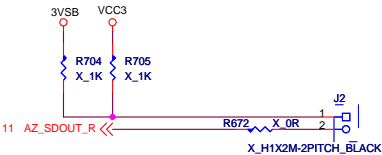
INTVRMEN  
0: DISABLE INTERNAL VRM  
1: ENABLE INTERNAL VRM \*

When these voltage regulators are enabled, the integrated GbE only operates at 10/100 Mbps during S3-S5.



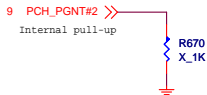
DSWVRMEN  
0 : Disable Internal Deep Sleep 1.05 V regulators.  
1 : Enable Internal Deep Sleep 1.05 V regulators.

This signal enables the internal Deep Sleep 1.05 V regulators. Must be reconnected even when not supporting DSW.

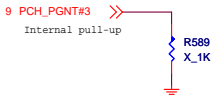


HDA\_SDO  
Disable ME in Manufacturing Mode when pull LOW ????

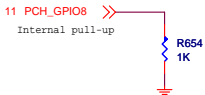
HDA\_SDO has internal pull down.  
Default should be connected to SDIN of codec, no pull up/down.  
To Disable ME need to have a jumper to pull high



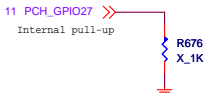
DMI AC/DC MODE  
0 : AC  
1 : DC \*



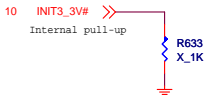
Topblock swap override when pull-low  
Signal has a weak internal pull-up



GPIO8  
0 : Integrated Clocking Enable (FCIM)\*  
1 : Buffer Through Mode Enable (BTM)

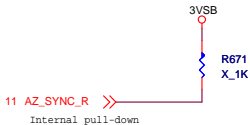


GPIO28  
0 : OD PLL VR disabled  
1 : OD PLL VR enabled \*  
Signal has a weak internal pull-up



INT3\_3V#

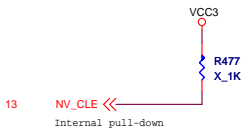
1: INIT3\_3V to asserted for 16 PCI clock to reset the processor by some evens occur.  
0: Can not to reset the processor.



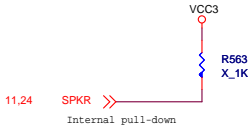
HDA\_SYNC  
OD PLL VR SUPPLY SEL  
0: 1.8V SUPPLY \*  
1: 1.5V SUPPLY



GPIO15  
0 : TLS CIPHER SUITE WITH NO CONFIDENTIALITY \*  
1 : TLS CIPHER SUITE WITH CONFIDENTIALITY



DMI/FDI TERMINATION VOLTAGE  
DC COUPLED: TX/RX TO VCC ISF SAMPLED HIGH  
DC COUPLED: TX/RX TO VSS IF SAMPLED LOW \*?  
AC COUPLED: TX SET TO VCC/2, RX SET TO VSS REGARDLESS OF THIS STRAP

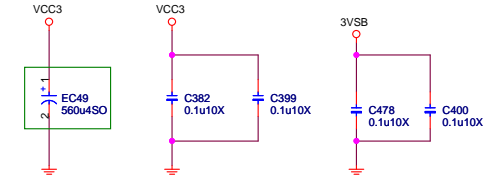
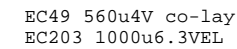
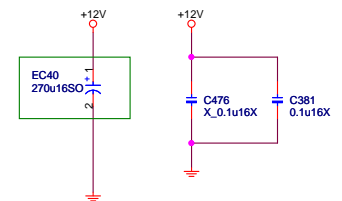
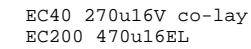
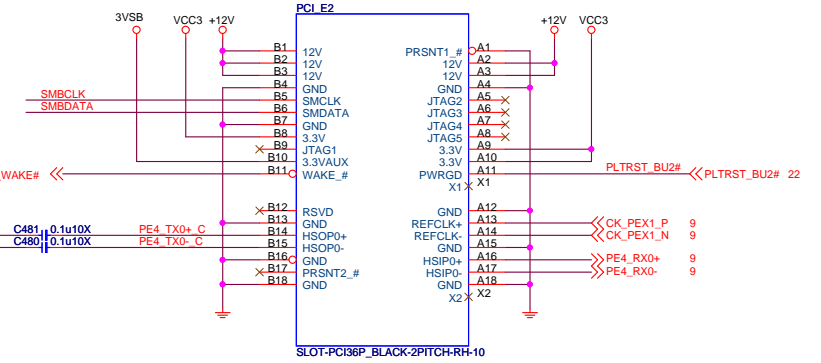


SPKR  
0 : EN TCO REBOOT \*  
1 : DIS TCO REBOOT



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PCI\_Express X16 Slot

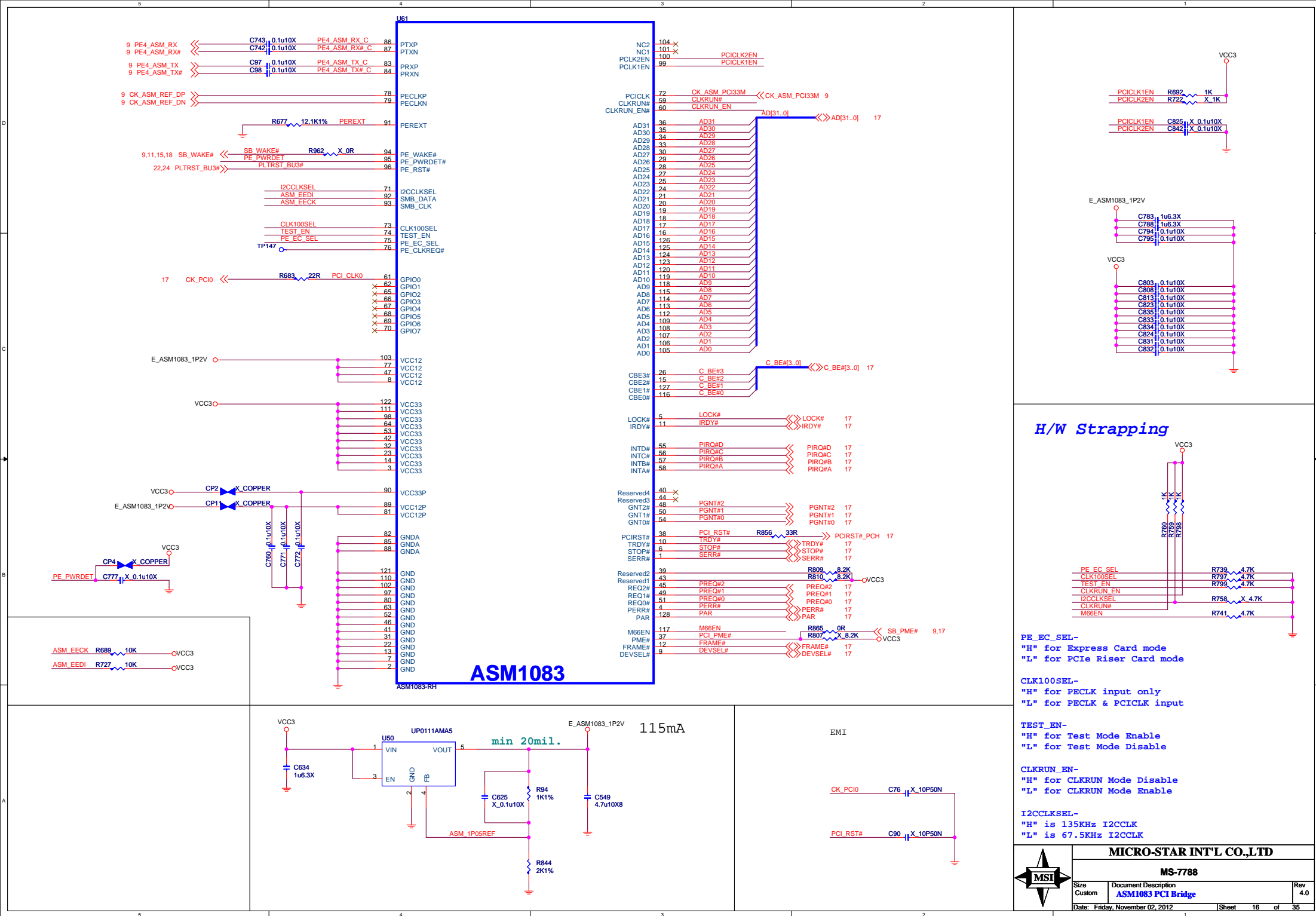


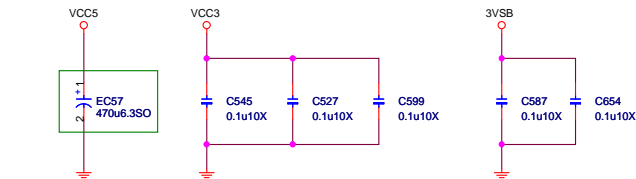
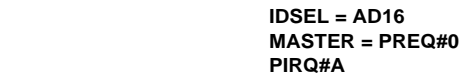
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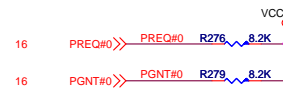
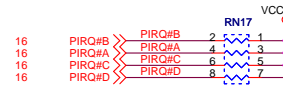
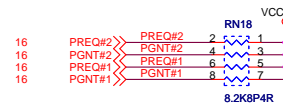
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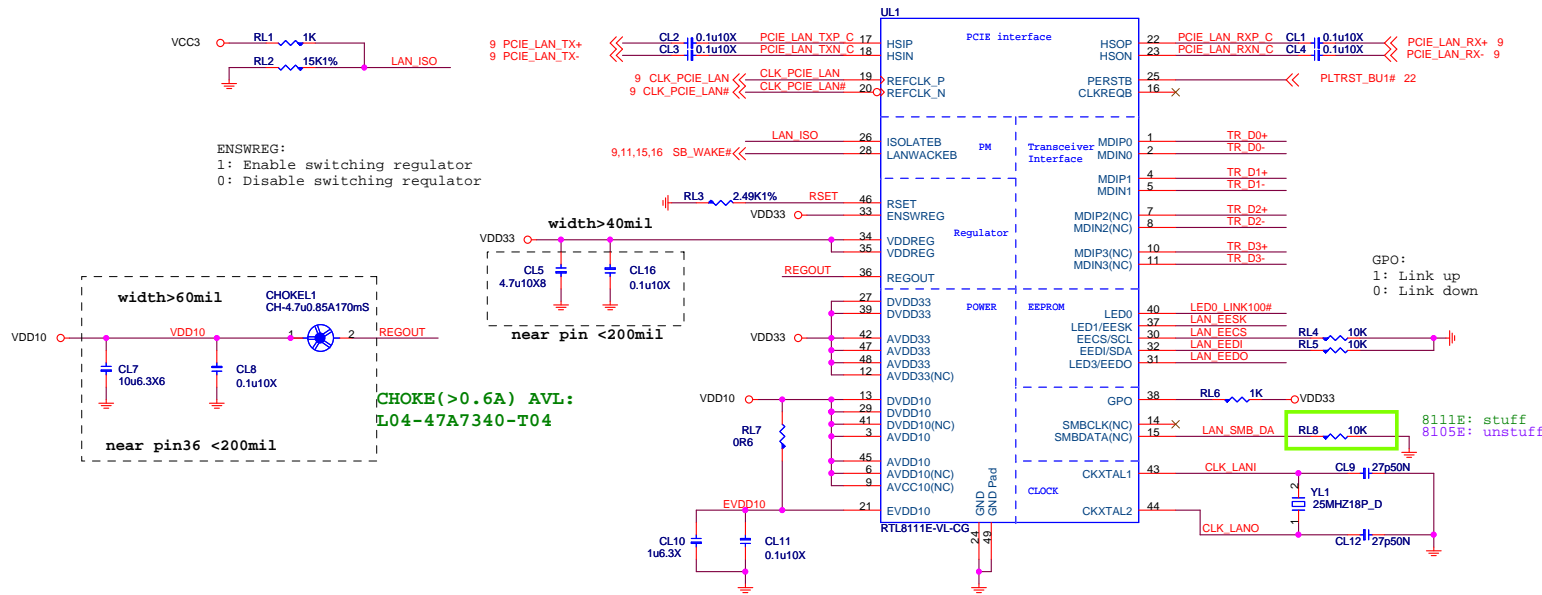
## PCI PULL-UP / DOWN RESISTORS



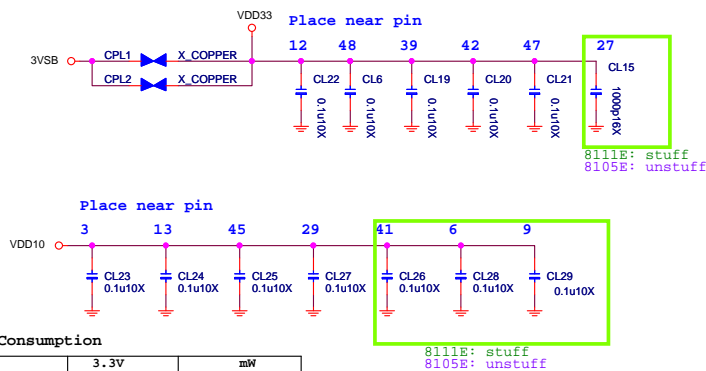
	<b>MICRO-STAR INT'L CO.,LTD</b>		
	<b>MS-7788</b>		
	Size Custom	Document Description <b>PCI x1 Slots</b>	Rev 4.0
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# RTL8111E Giga LAN

## RTL8105E 10/100M LAN



3.3v Power on rise time : 1~100ms. MAX: 163mA

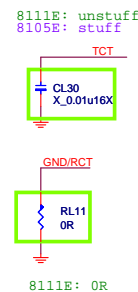


8105E POWER Consumption

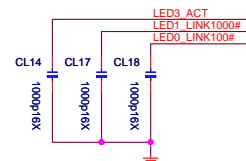
	3.3V	mW
10 M Idle/TxRx	14/75	46/248
100 M Idle/TxRx	43/66	142/218
S0 ALDPS	3.2	11

8111E POWER Consumption

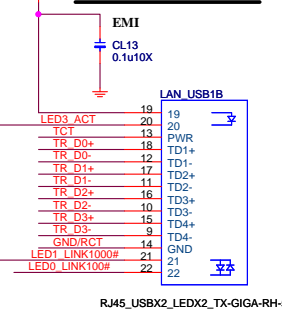
	3.3V	mW
10 M Idle/TxRx	12/66	40/218
100 M Idle/TxRx	31/44	102/145
Giga Idle/TxRx	135/163	452/538
ALDPS	4	13



only support LED0+LED1/LED1+LED3 dual color LED combinations when using EEPROM

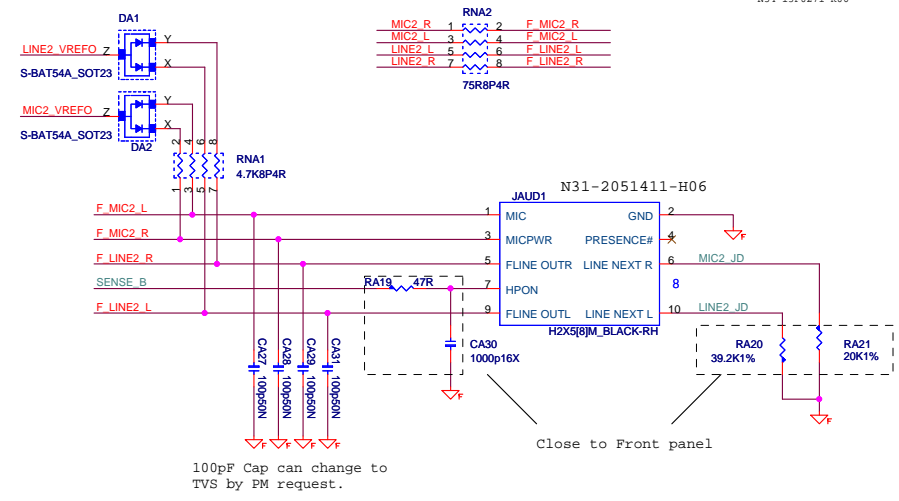
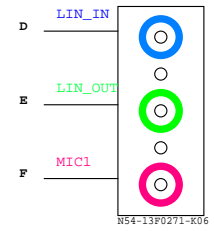
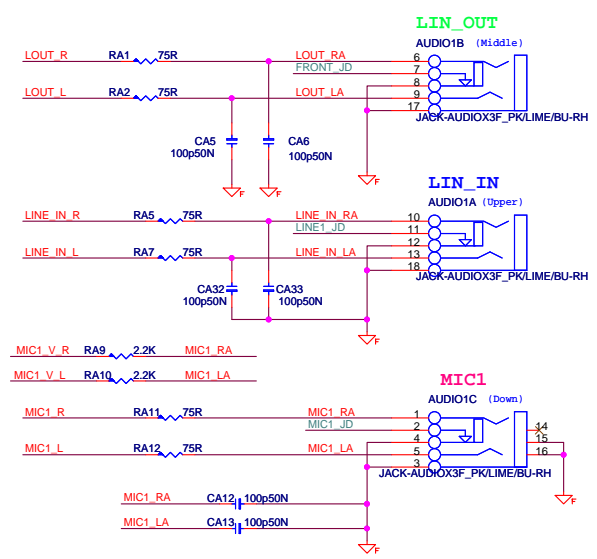
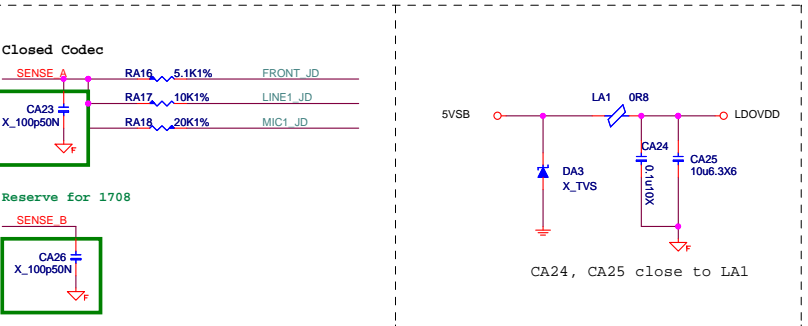
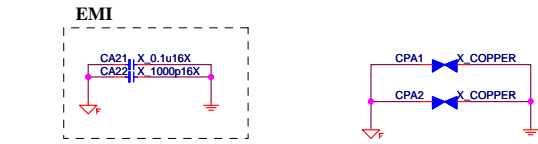
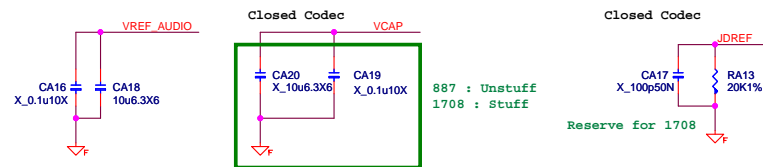
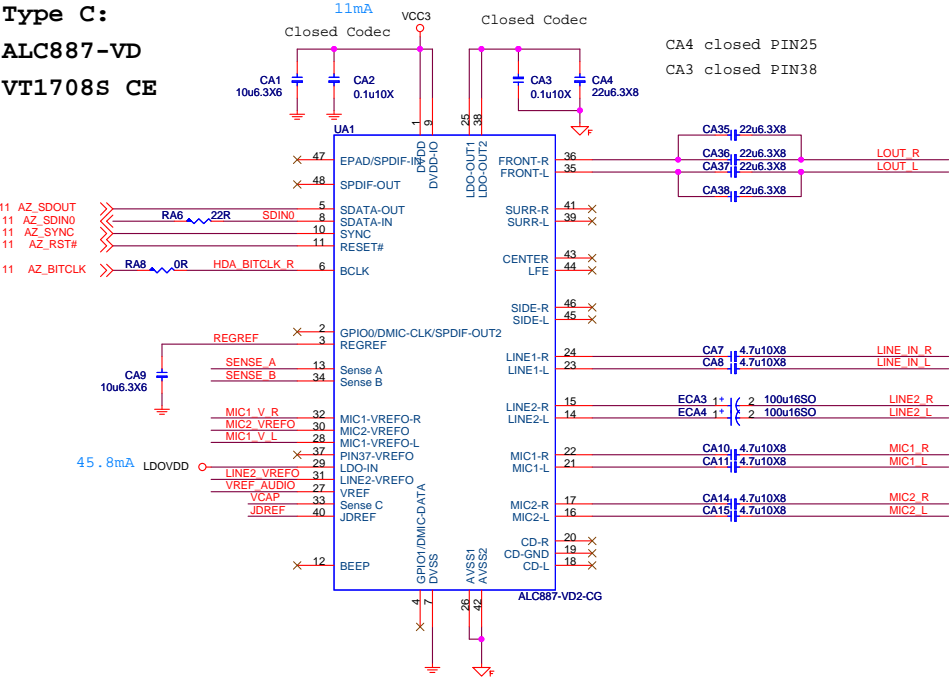


### LAN Connector



Giga-Lan	10/100-Lan
<b>N58-22F0731</b>	<b>N58-22F0771</b>
Link Yellow	Link Yellow
Active Blinking	Active Blinking
1000 Orange	100 Green
100 Green	10 None
10 None	10 None
19	19
20	20
21	21
22	22

Type C:  
ALC887-VD  
VT1708S CE

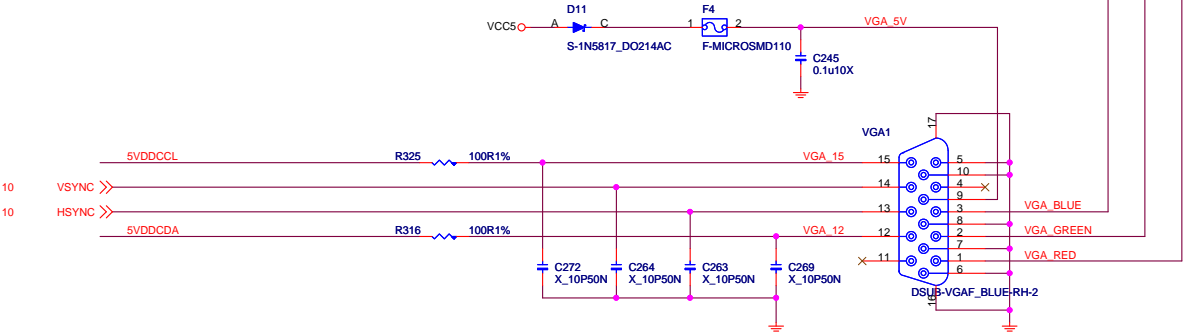
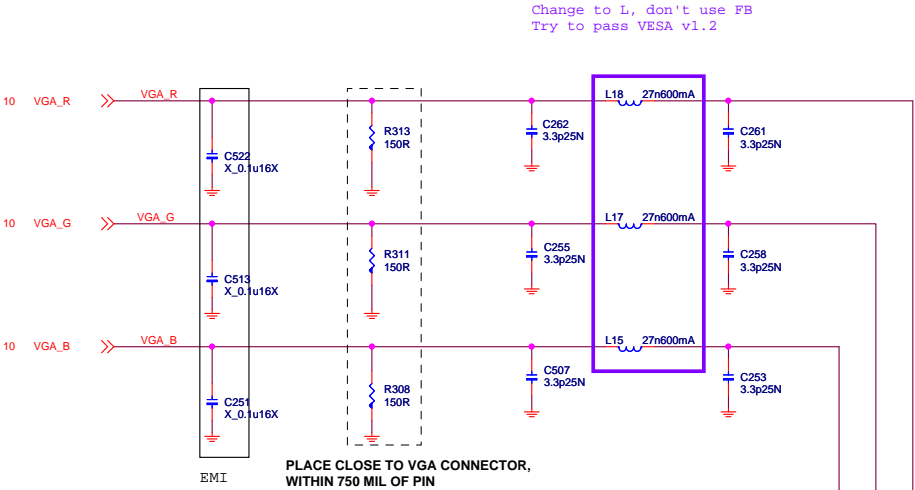
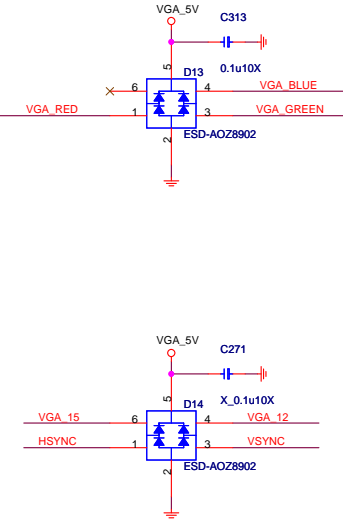
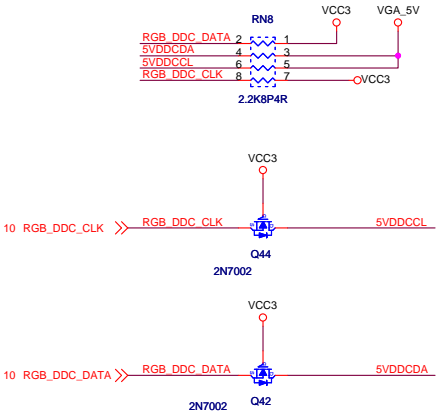


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D-Sub

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

Level shift

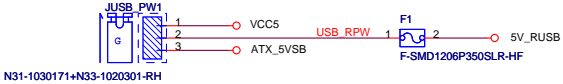


5V\_RUSB Switch

Default VCC5 (PIN1-2)

JUSB_PW	BIOS Menu	Wake up support
1-2	EUP Enable	Not support
	EUP Disable	
2-3	EUP Enable	Not support
	EUP Disable	support

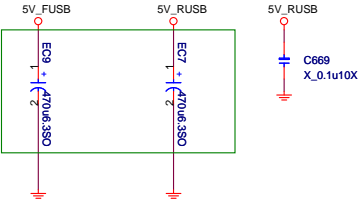
Near Rear ==>



Near Front ==>



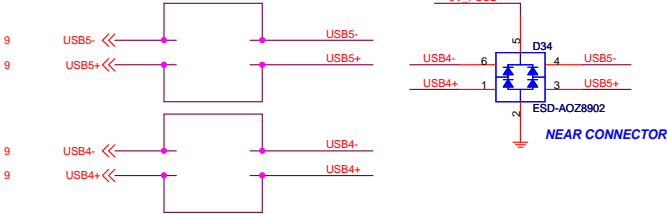
NEAR USB REAR CONNECTOR



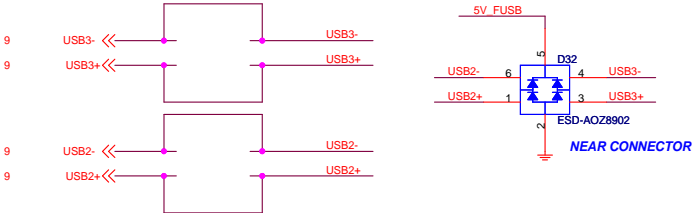
EC7, EC9 470u6.3V co-lay EC202 470u10EL

Front USB Connector

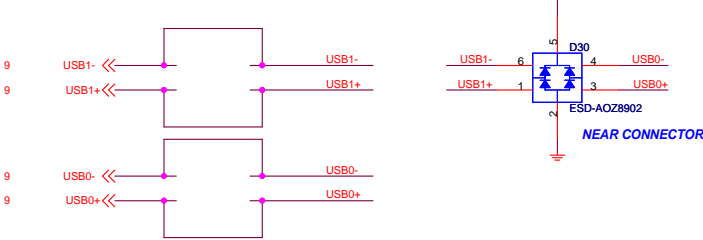
FRONT USB PORT 4,5



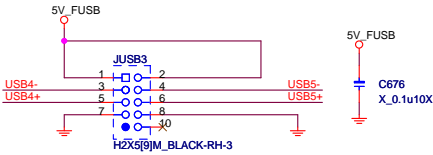
FRONT USB PORT 2,3



FRONT USB PORT 0,1

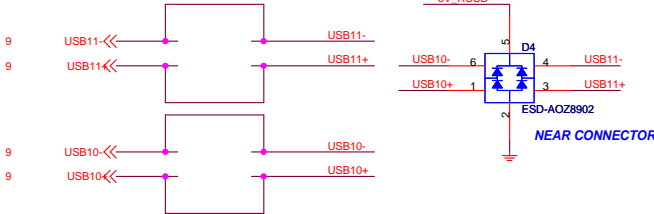


NEAR USB Front CONNECTOR

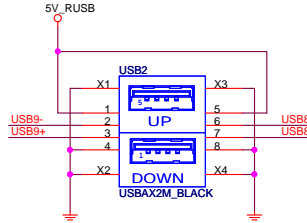
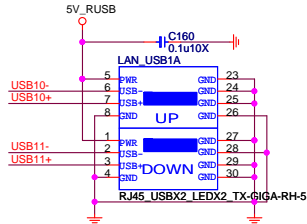
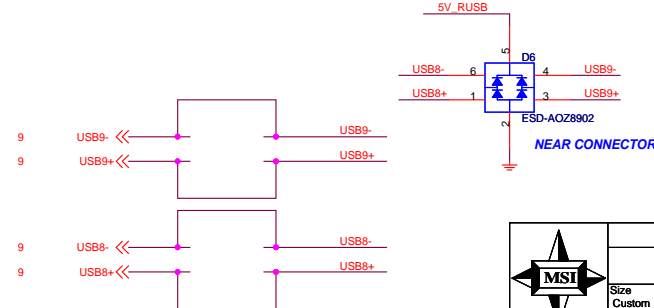


Rear USB Connector

REAR USB PORT 10,11 (With LAN)



REAR USB PORT 8,9



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# SATA 6G PORT 0,1

H61 PORT 0/1 Support 3G  
H67 PORT 0/1 Support 6G

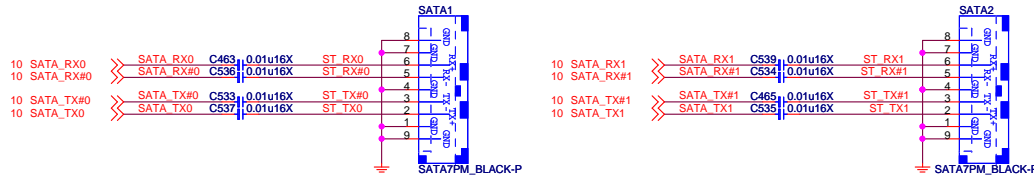
Table 1-3. Desktop Intel® 6 Series Chipset SKUs

Feature Set	SKU Name(s)					
	Q67	Q65	B65	H67	P67	H61
Total number of SATA ports	6	6	6	6	6	4
• SATA Ports (6 Gb/s, 3 Gb/s, and 1.5 Gb/s)	2 <sup>4</sup>	1 <sup>5</sup>	1 <sup>5</sup>	2 <sup>4</sup>	2 <sup>4</sup>	0
• SATA Ports (3 Gb/s and 1.5 Gb/s only)	4	5	5	4	4	4 <sup>8</sup>

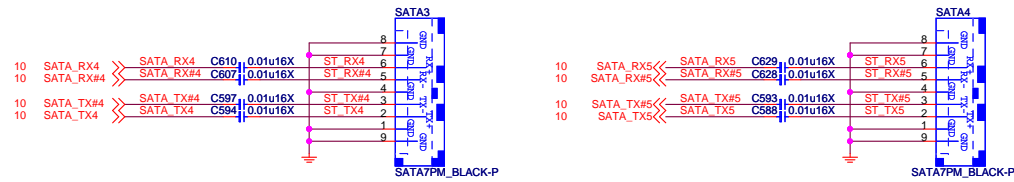
## NOTES:

8. SATA ports 2 and 3 are disabled.

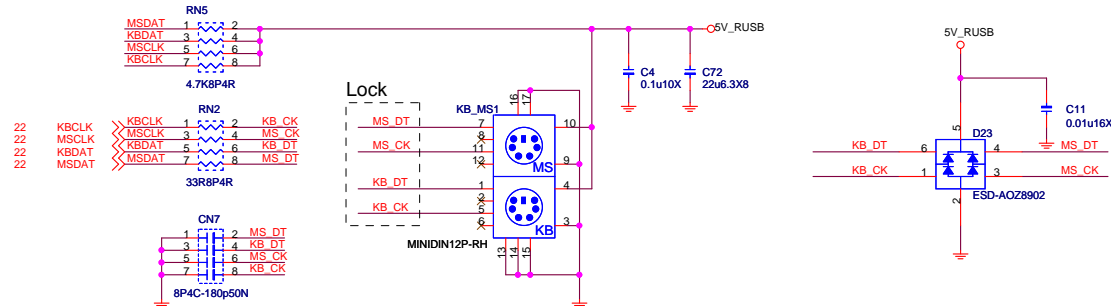
## SATA 3G PORT 0,1



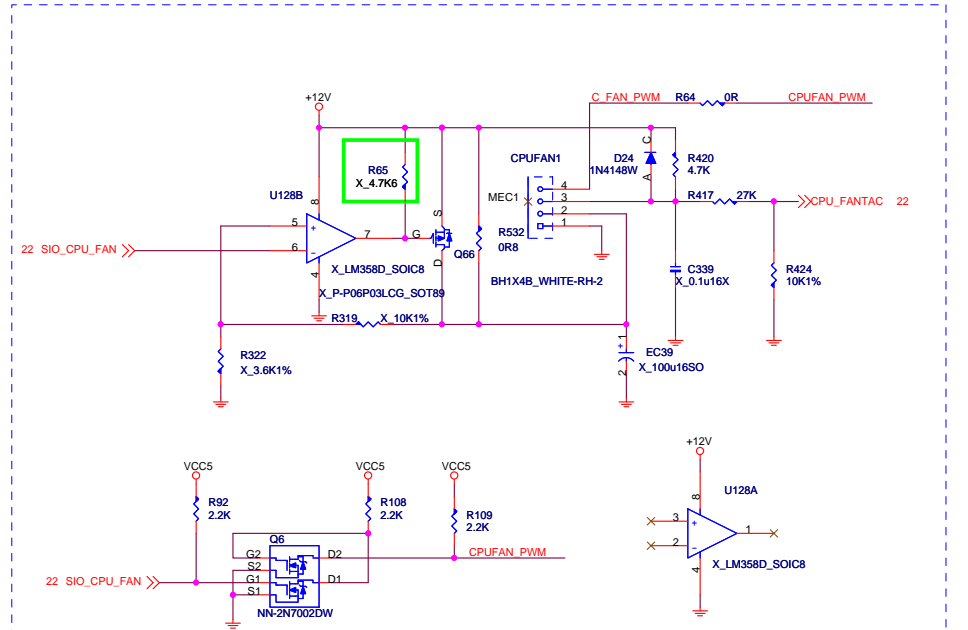
## SATA 3G PORT 4,5



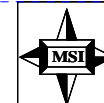
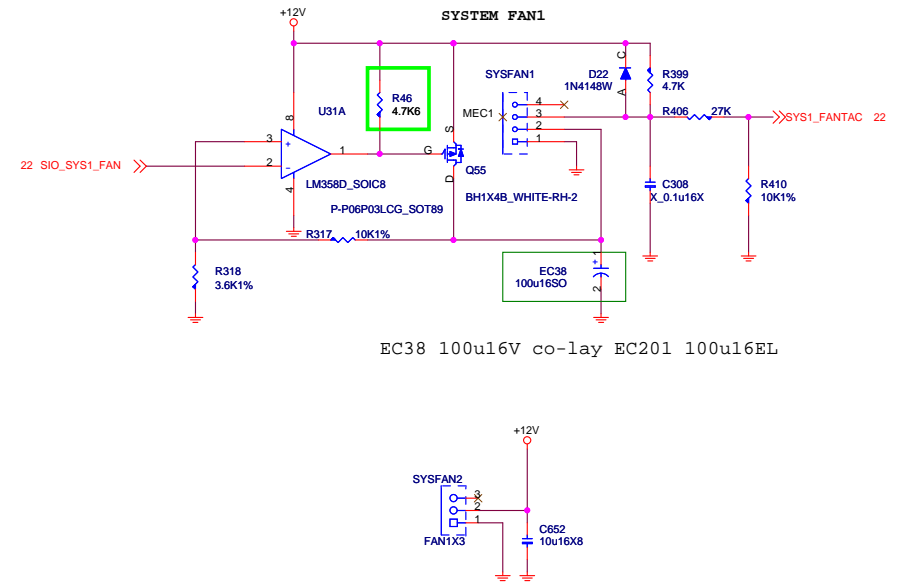
## PS2



## CPU FAN-CONTROL CIRCUIT



## SYSTEM FAN-CONTROL CIRCUIT

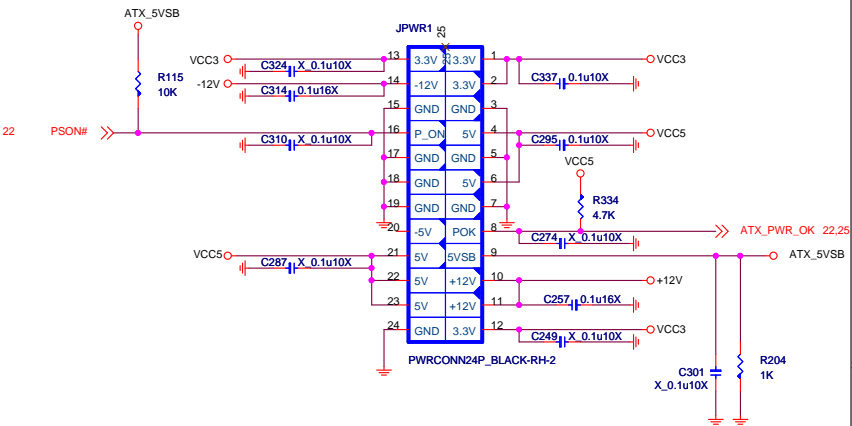


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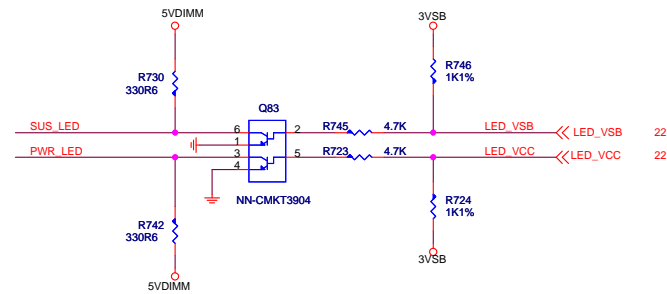
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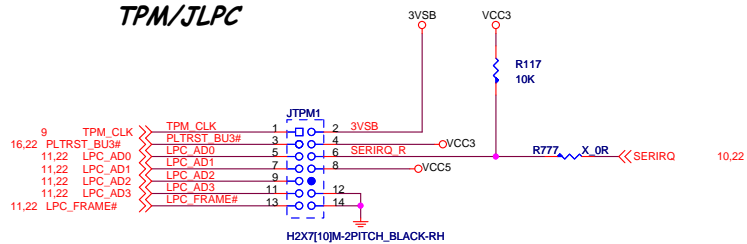
## ATX POWER CONNECTOR



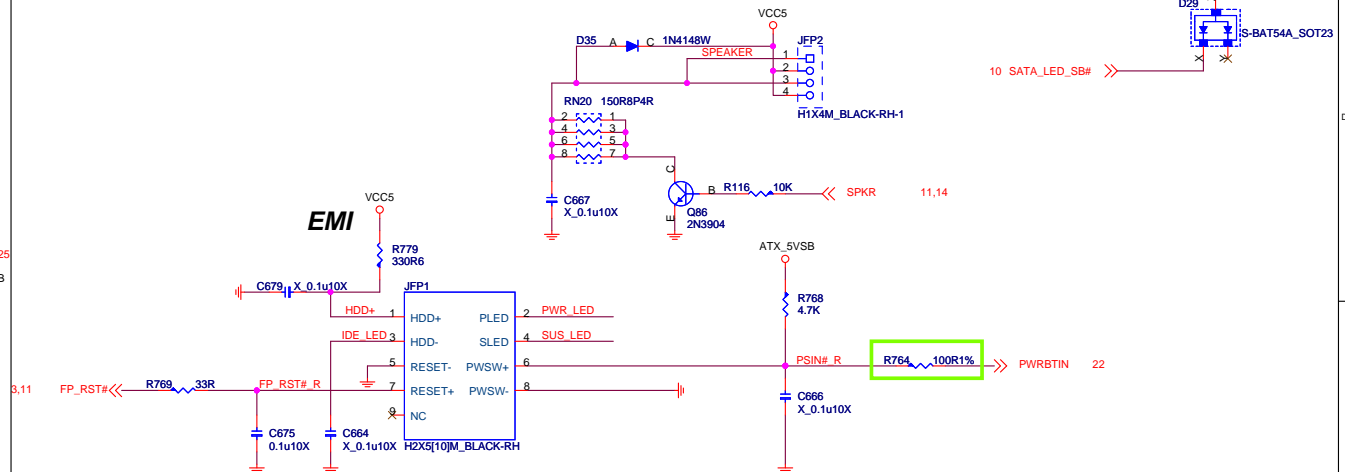
LED ( for Fintek 71868)



## TPM/JLPC

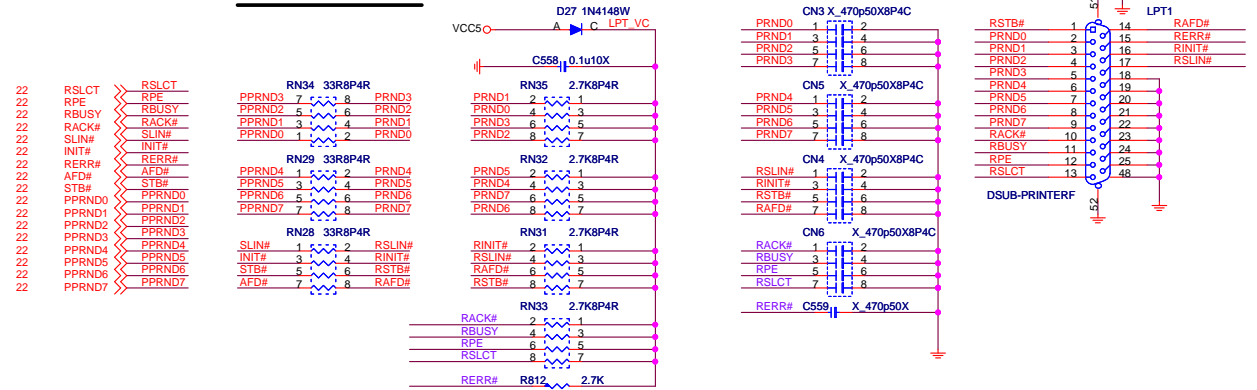


FRONT PANNEL



## Rear I/O

## PARALLAL PORT

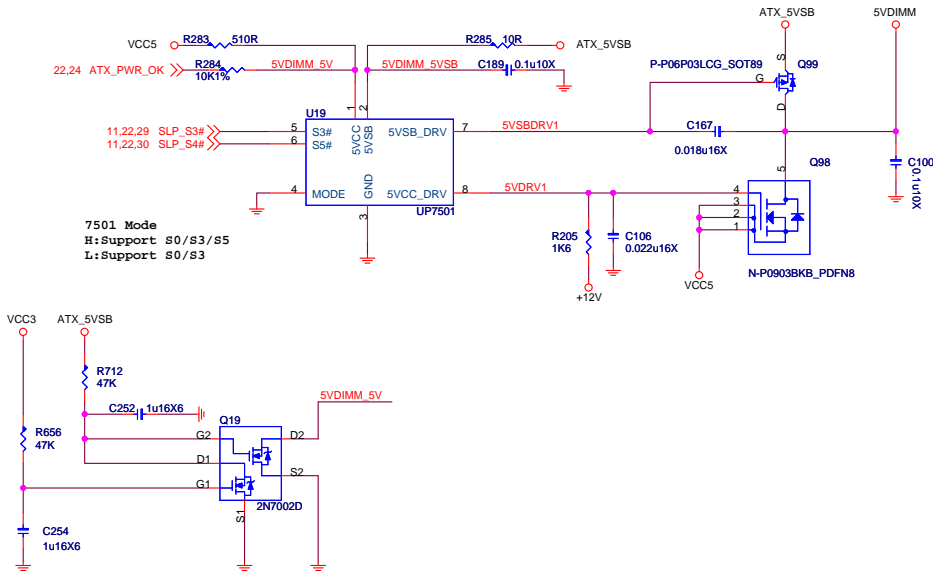


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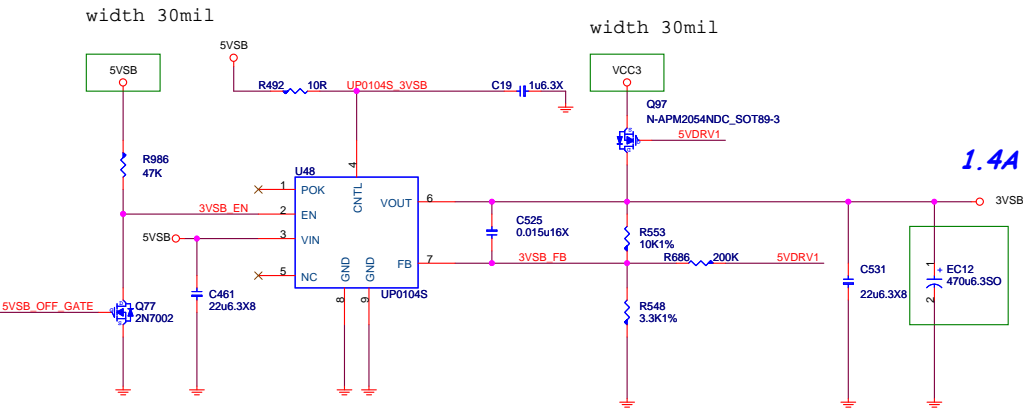
5VDIMM FOR DDR



Patch power supply (PUQ550V-B 550W) V-drop

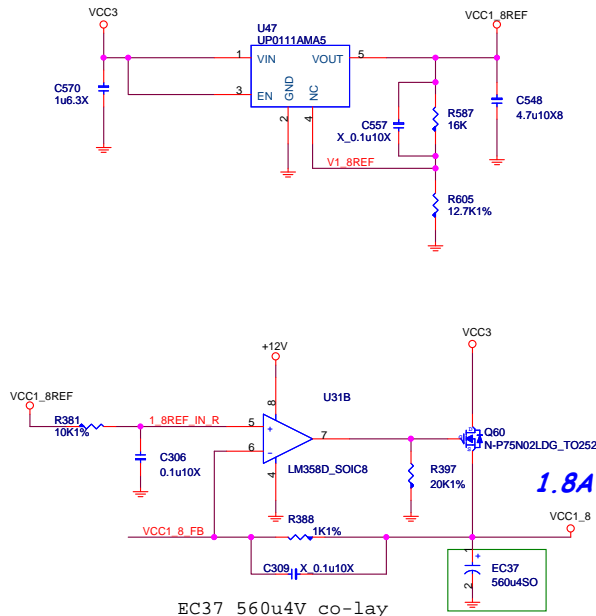
3VSB

3VSB supply to PCH and other device.  
Turn off when Deep S3/S5 by 5VSB off.



EC12 470u6.3V co-lay EC202 470u10EL

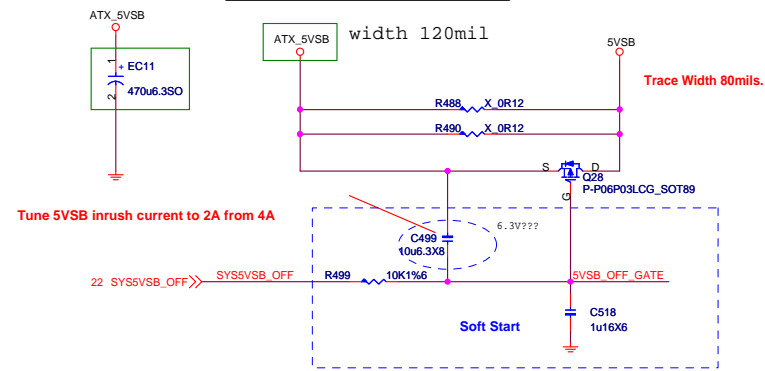
VCC1\_8REF



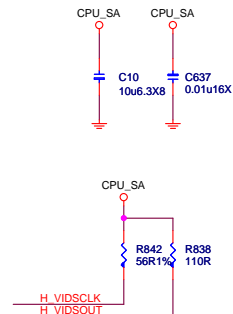
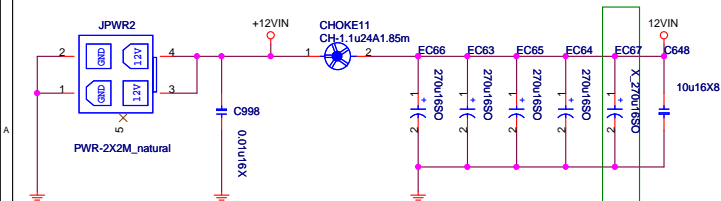
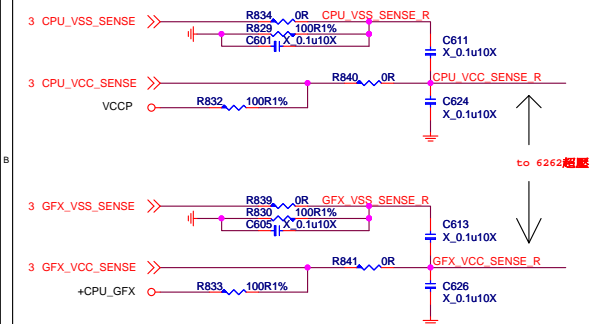
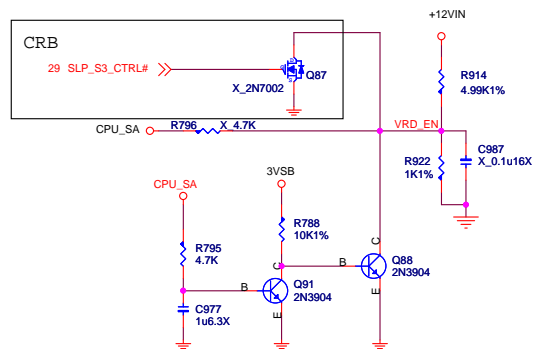
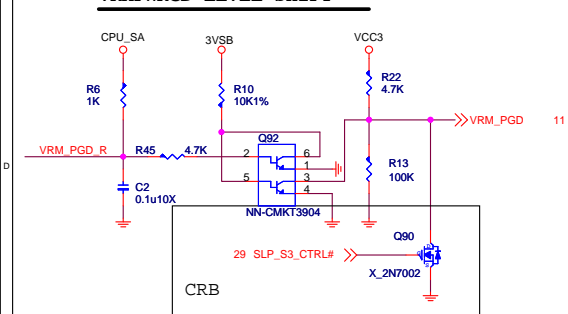
EC37 560u4V co-lay  
EC203 1000u6.3VEL

EC11 470u6.3V co-lay EC202 470u10EL

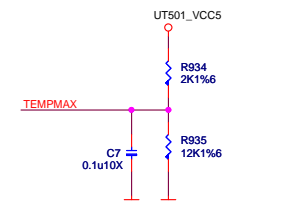
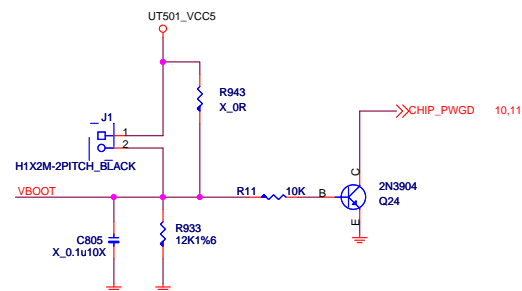
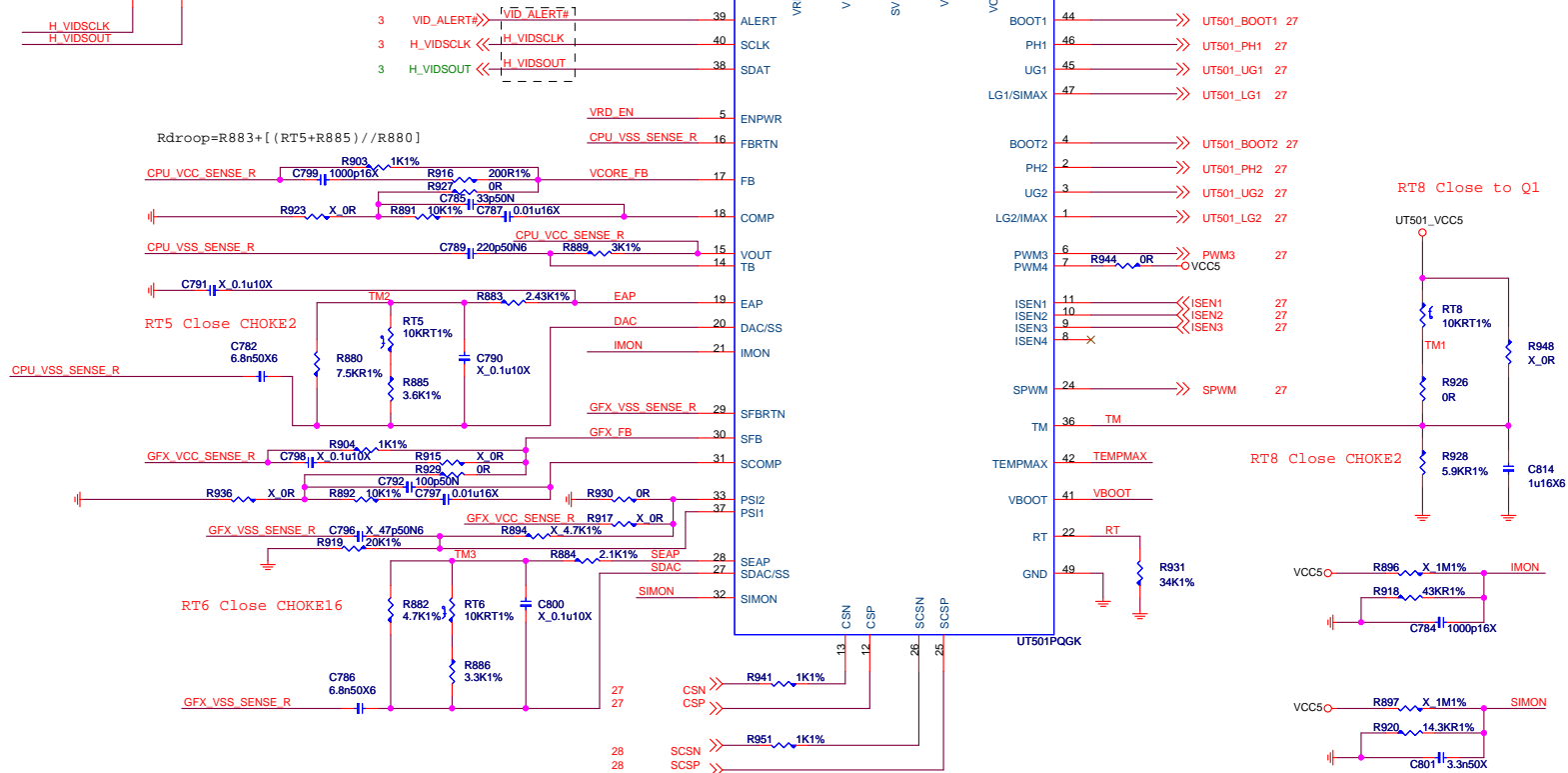
5VSB Power Switch



## VRMPWRGD LEVEL SHIFT



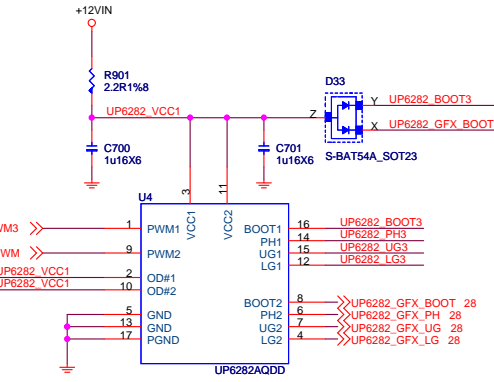
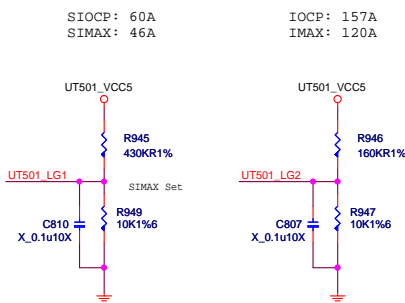
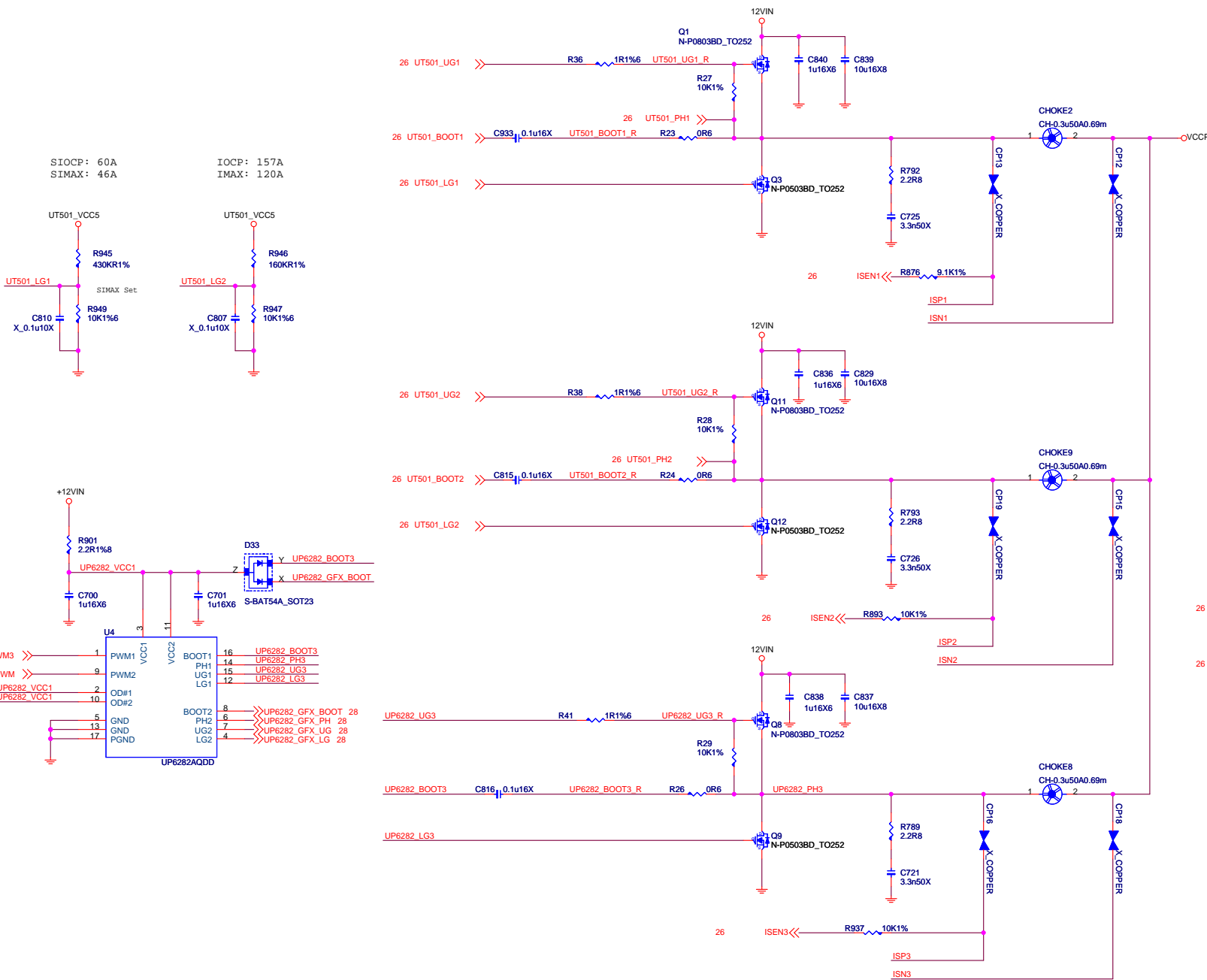
3000mil < L < 6000mil  
4mil / 20mil  
55 ohm Impedence  
must be Referenced GND



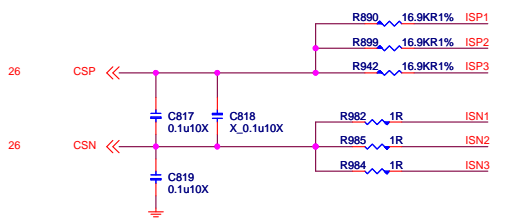
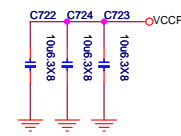
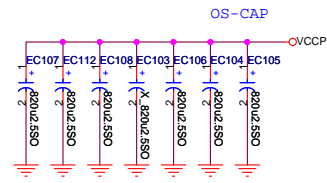
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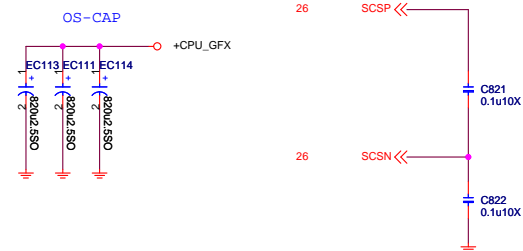
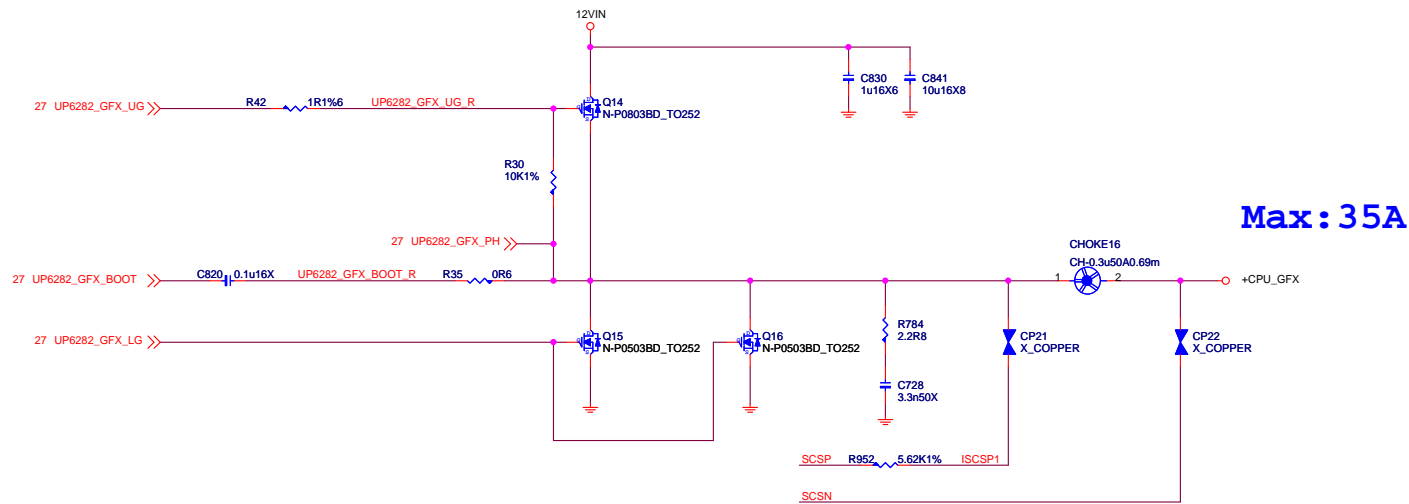
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0.5V~1.6V/110A  
**VCORE 75A TDC:55A**  
**LL:1.7m ohm**

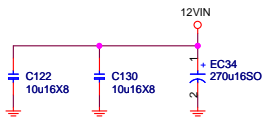




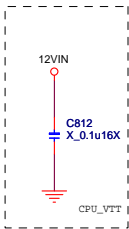
CPU\_VTT:1.05/1.00

CPU VTT = 8.5A

Iripple=1.92(vtt)+1.88(sa)  
5.08\*2=10.16A>3.8A

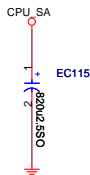


EMI



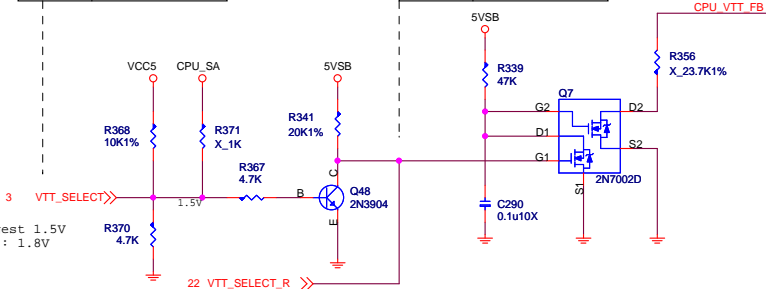
PCH Power:1.05V

PCH Core 6.2A+1.8A=8A



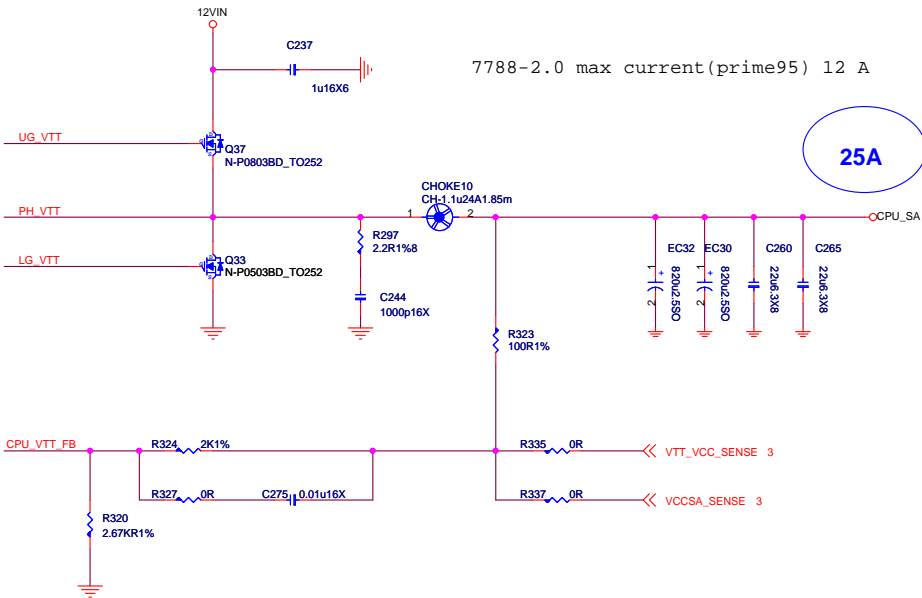
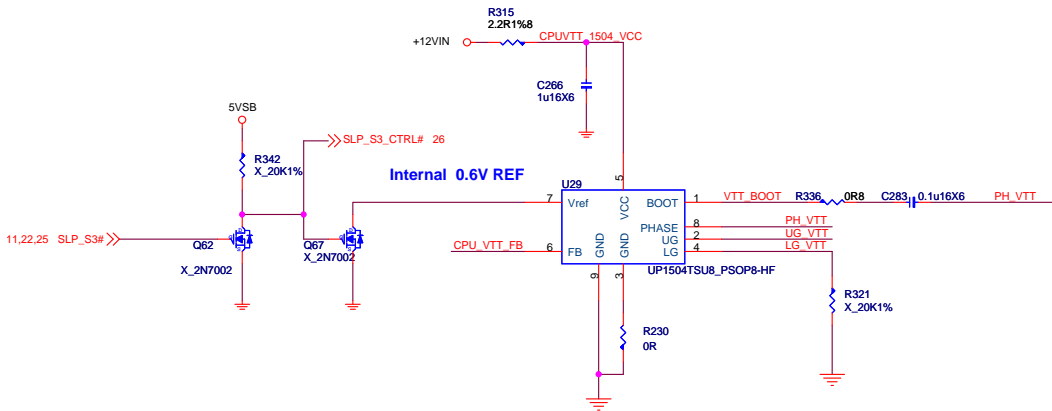
VTT_SELECT	
Low	1.0V
High	1.05V

VTT_SELECT Table	
Low	1.05V
High	1.0V



CPU\_SA:0.925/0.85

SA Core = 8.8A



7788-2.0 max current(prime95) 12 A

25A



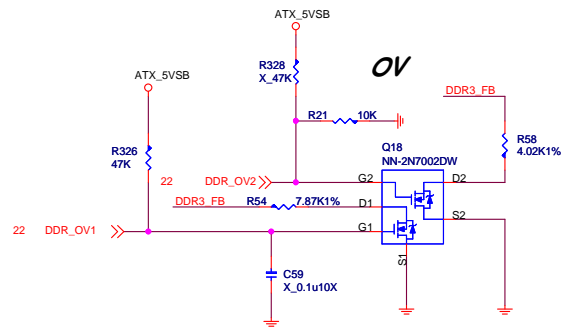
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Custom	VTT / SA / PCH - uP1504T	4.0
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4.5A FOR CPU  
7.5A FOR 2DIMM  
1A FOR DDR VTT



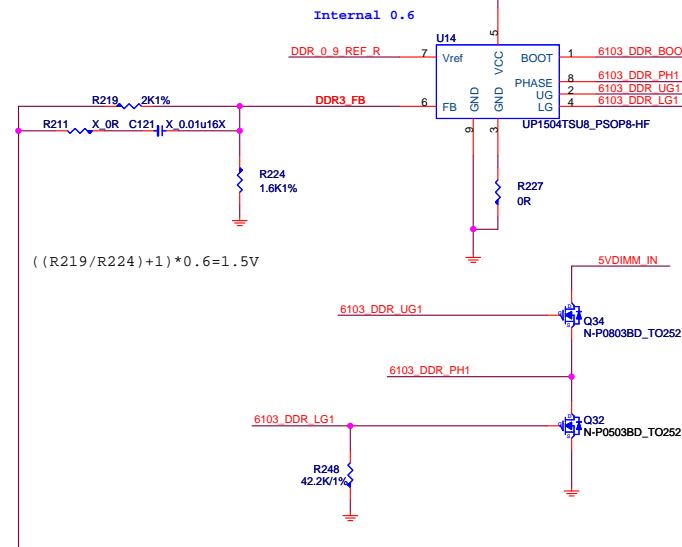
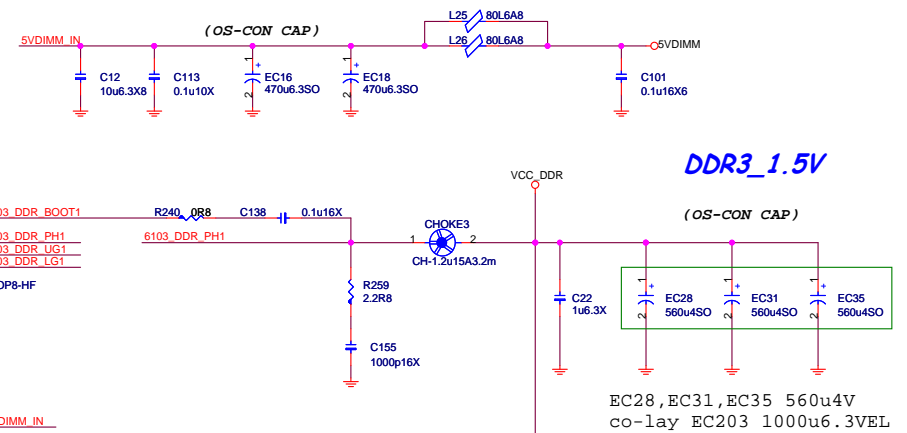
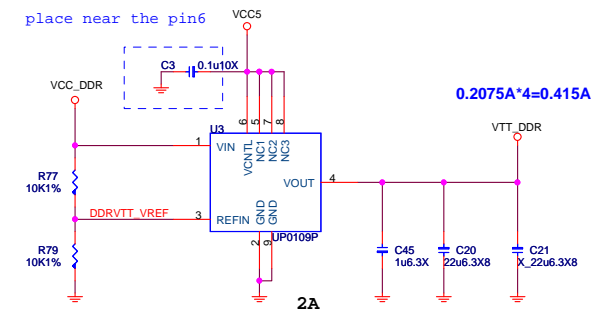
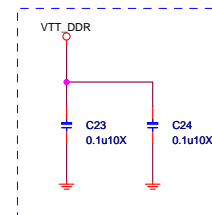
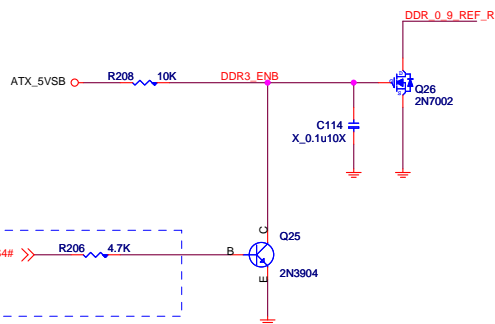
DDR_OV	1.35V	1.5V	1.65V	1.8V
DDR_OV1	Low	High	Low	High
DDR_OV2	Low	Low	High	High

D5  
S-BAT54C\_SOT23

+12V Y X 5VDIMM

Tripple=9.6243A  
5.7\*2\*1=11.4A>9.6243A

$I_{ripple} = 10.08A$   
 $5.7 * 2 * 1 = 11.4A > 10.08A$


$$(1.5 - 0.75) * 0.5 = 0.375W$$


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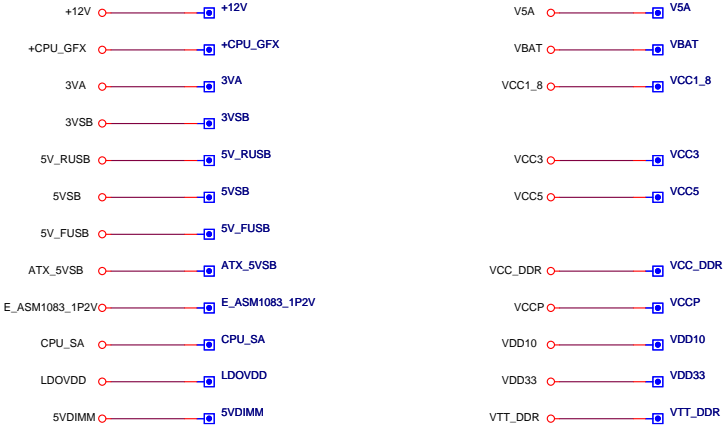
Size Custom	Document Description <b>DDR Power - uP1504T 1-Phase</b>	Rev 4.0
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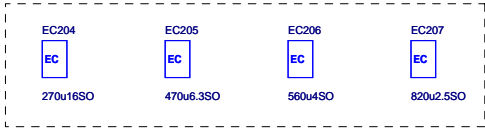
OPT	Configure	BOM		Function	

EC40	270u16V	C71-27116T1-X19	co-lay EC200	
EC200	470u16V	C94-4711641-N07		
EC38	100u16V	C71-1011651-X19	co-lay EC201	use ECA3, ECA4
EC201	100u25V	C94-1012511-N07		
EC7, EC9, EC11, EC12, EC57			co-lay EC202	
	470u6.3V	C71-4710671-X19		use EC16, EC18, EC205
EC202	470u10V	C93-4711031-N07		
EC28, EC31, EC35, EC37, EC49			co-lay EC203	
	560u4V	C71-56104R1-X19		
EC203	1000u6.3V	C94-10206A1-P01		
EC204	270u16V	C71-27116K1-X19		
EC206	560u4V	C71-56104T1-X19		
EC207	820u2.5V	C71-8210281-X19		

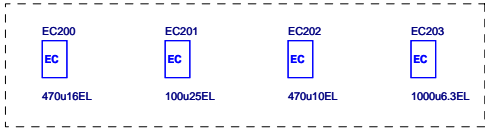
Voltage test point



TAIWAN OSC OPT



EL OPT.



LABEL



PK0-0778840-G37, 精成, 23, 寶安恩斯通廠 (MSIS)  
PK0-0778840-G37, 精成, 12, 寶安恩斯通廠 (MSIS)  
PK0-0778840-E48, 競華, 23, 寶安恩斯通廠 (MSIS)  
PK0-0778840-E48, 競華, 12, 寶安恩斯通廠 (MSIS)



BAT-BCR2032P-RH



USB



USB



E21-7557050-L06

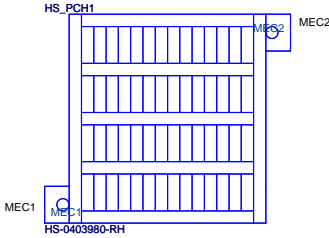


X\_THX LABEL

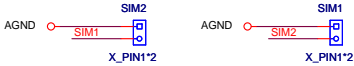


BIOS\_LABEL

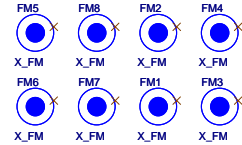
PCH XDP PWRGD/RESET



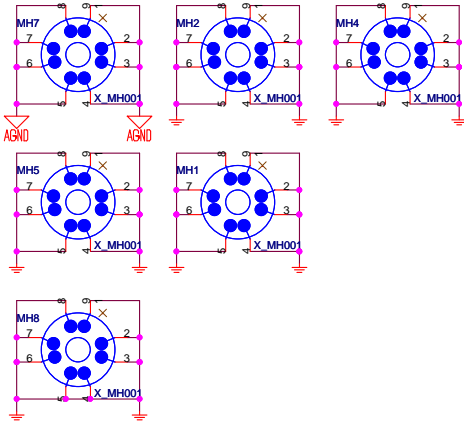
Simulation




Optical Fiducial Marks-120



Mounting Holes





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