

TITLE	Page
Cover Sheet	1
Block Diagram	2
CPU-CLK/Control/MISC/PEG ,CPU-Memory	3,4
CPU-Power/CPU-GND	5,6
DDR III DIMM 1,2,3,4	7,8
LYNX-PCIE/DMI/CLK/USB20&30	9
LYNX-SATA/HOST/GPIO/VGA/CMOS	10
LYNX-SMB/LPC/AUDIO/RTC/SPI	11
LYNX-POWER/GND/Strap	12,13,14
PCIE Slot	15,16
ASM PCIE to PCI Bri.	17
PCI Slot	18
AUDIO 892	19
LAN - RTL8111G	20
DVI Connector	21
HDMI Connector	22
VGA Connector	23
SATA Connector	24
USB2.0/3.0 Connector	25,26
SIO-NTC6779D/PS2	27
FAN	28,29
ATX F_Panel/EMI/TPM	30
ACPI Controller UPI	31
VRM12 .5 - UP1649	32
UP6282 1-4-Phase / UP6282 5-6-Phase	33,34
UP1504T - DDR POWER	35
OP+MOS - PCH POWER	36
ME Power / XDP / Manual Parts	37,38,39
EMI CAP	40

MS-7816

Intel -SharkBay plamform Z87

ATX

Ver: 10(243.84x304.8)

CPU:

Haswell LGA1150

System Chipset:

Lynx Point Z87

Onboard Chip:

HD Audio Codec:ALC892

LAN-RTL8111E

SIO:Nuvoton 6779D

Flash ROM: SPI 64 MB & SPI 128 MB (H87&B85)

Main Memory:

DDRIII (1066/1333/1600MHz) * 4 (Dual Channel)

ACPI:

UP1

PWM:

UP1649 6 Phase

Expansion Slots:

PCI Express (X16) Slot * 1

PCI Express (X1) Slot * 2

PCI Express (X4) Slot * 1

PCI Slot * 3

Other:

SATA3.0 x6(PCH)

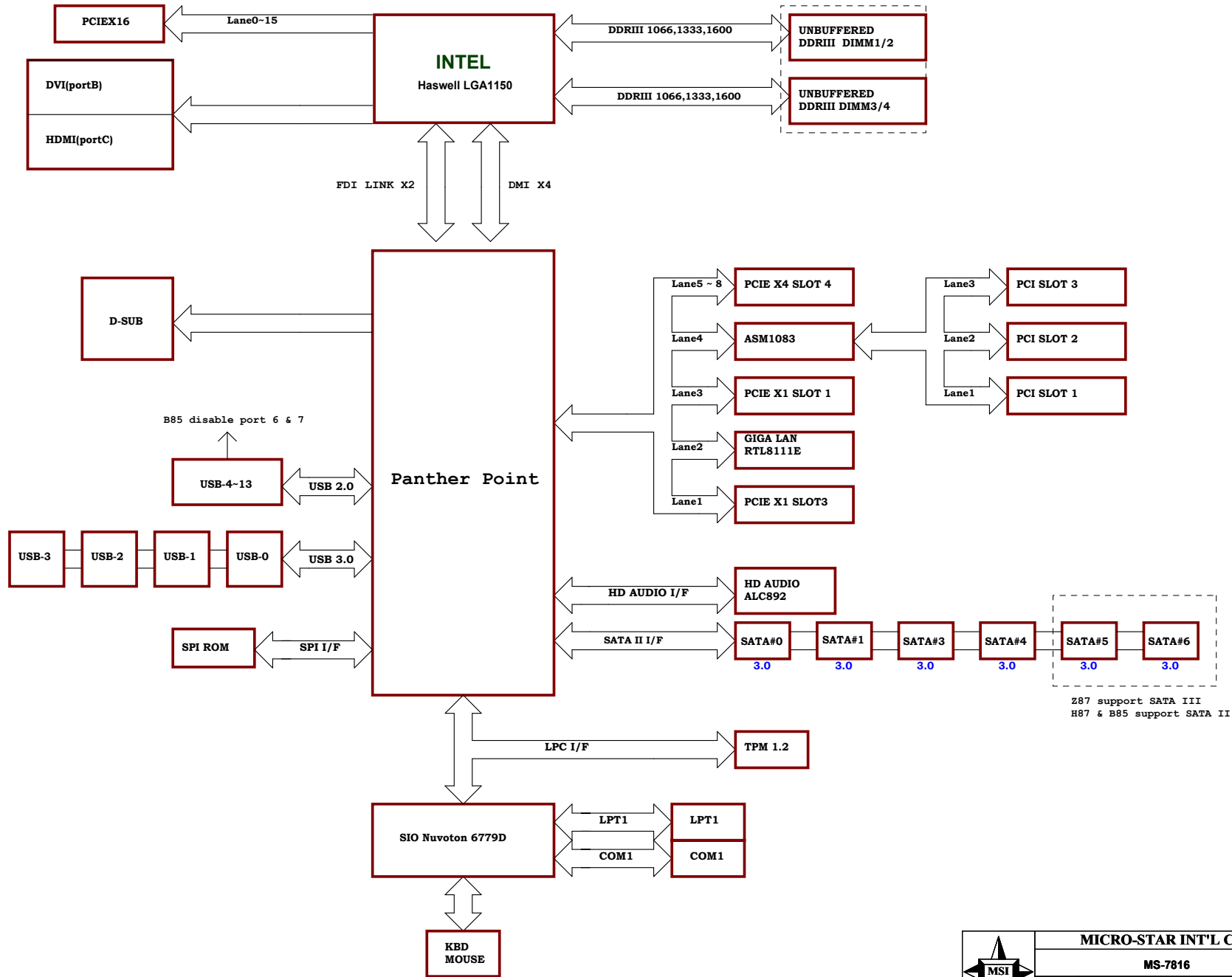
REAL USB2.0 *6

FRONT USB2.0 *4(B85 Disable 2 port)

REAL USB3.0 *2

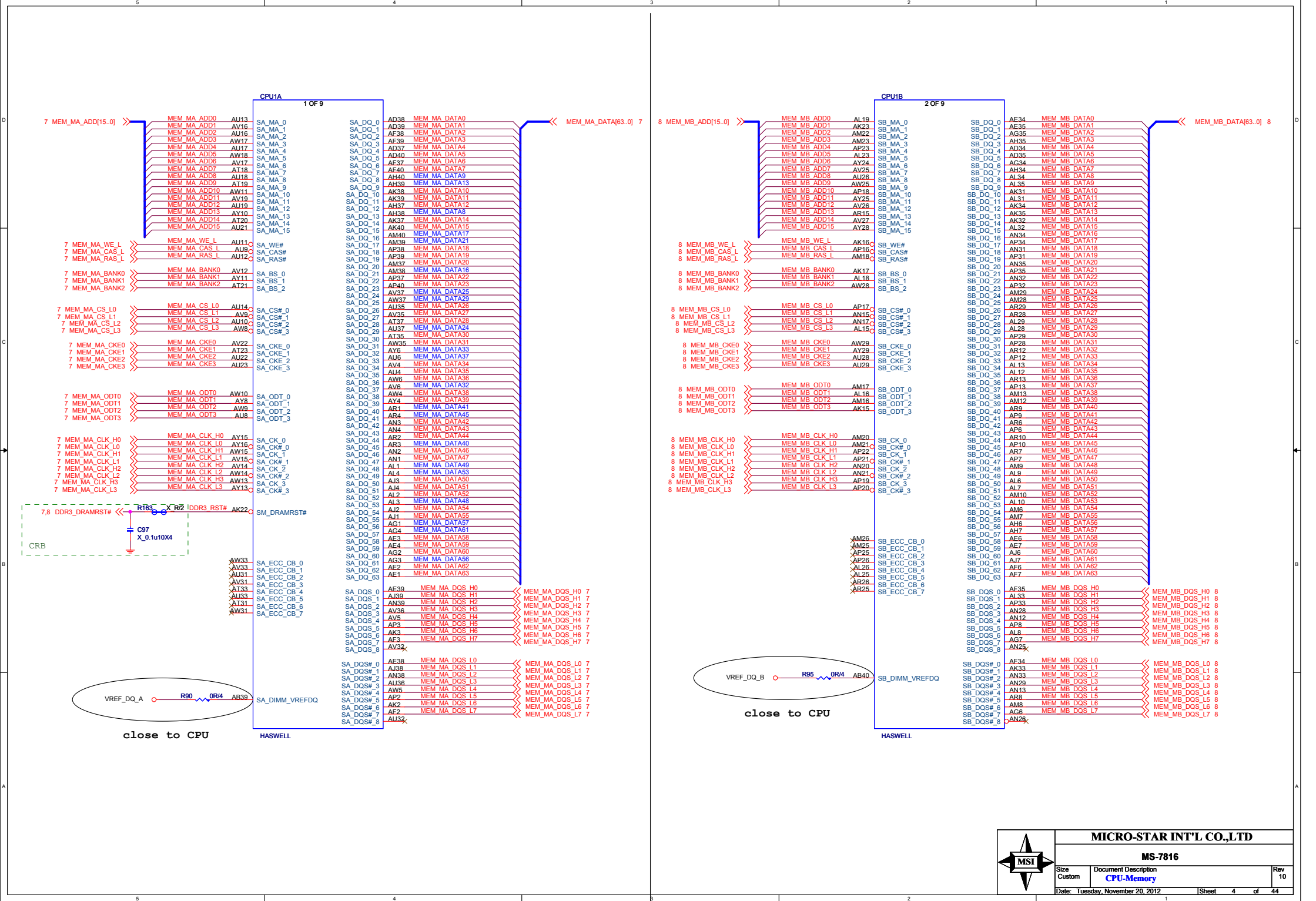
FRONT USB3.0 *2

MS-7816 Block Diagram



Slot Sequence:

- PCIE X1
- PCIE X16
- PCIE X1
- PCI SLOT
- PCIE X16(X4)
- PCI SLOT
- PCI SLOT



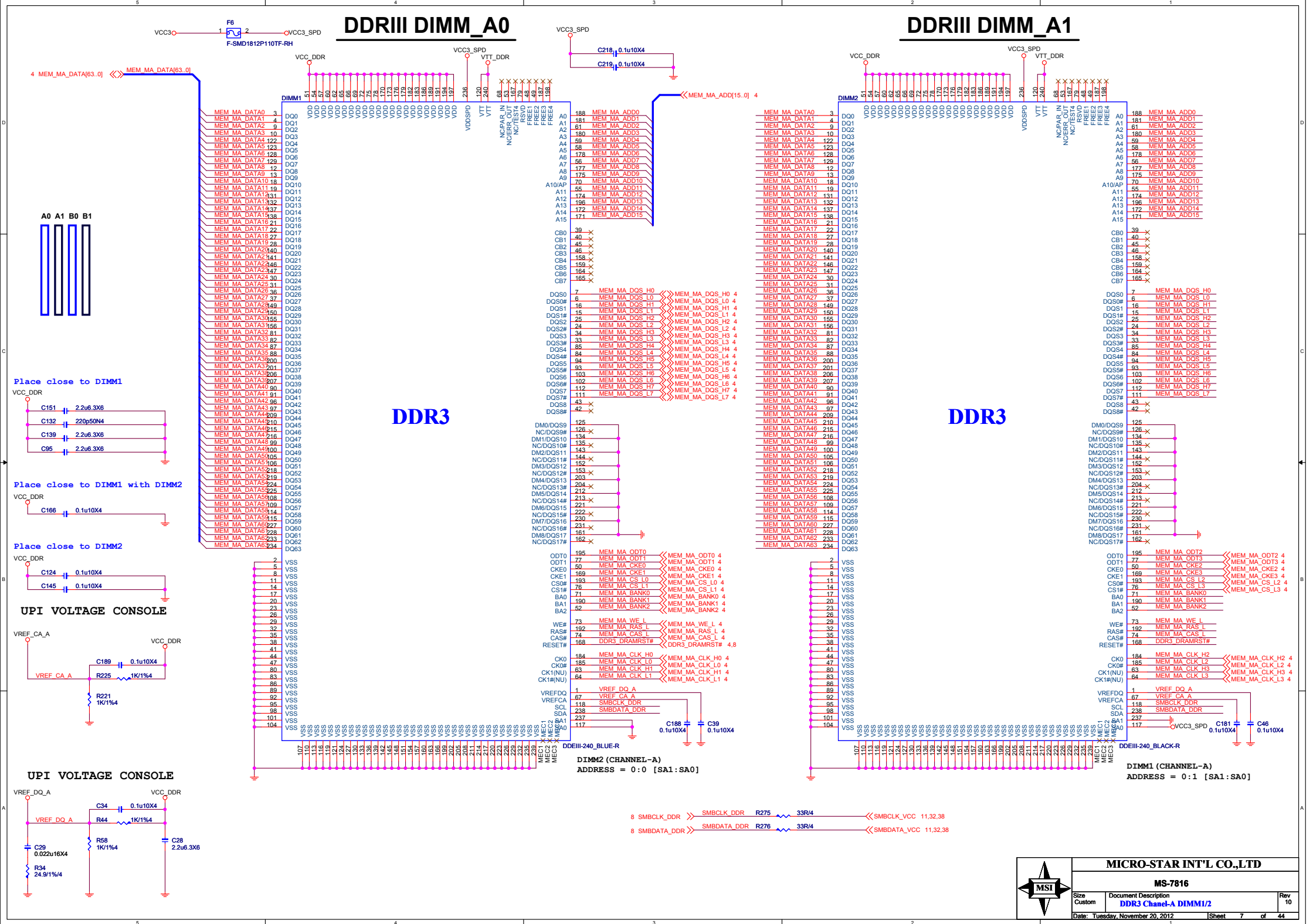
GND

GND

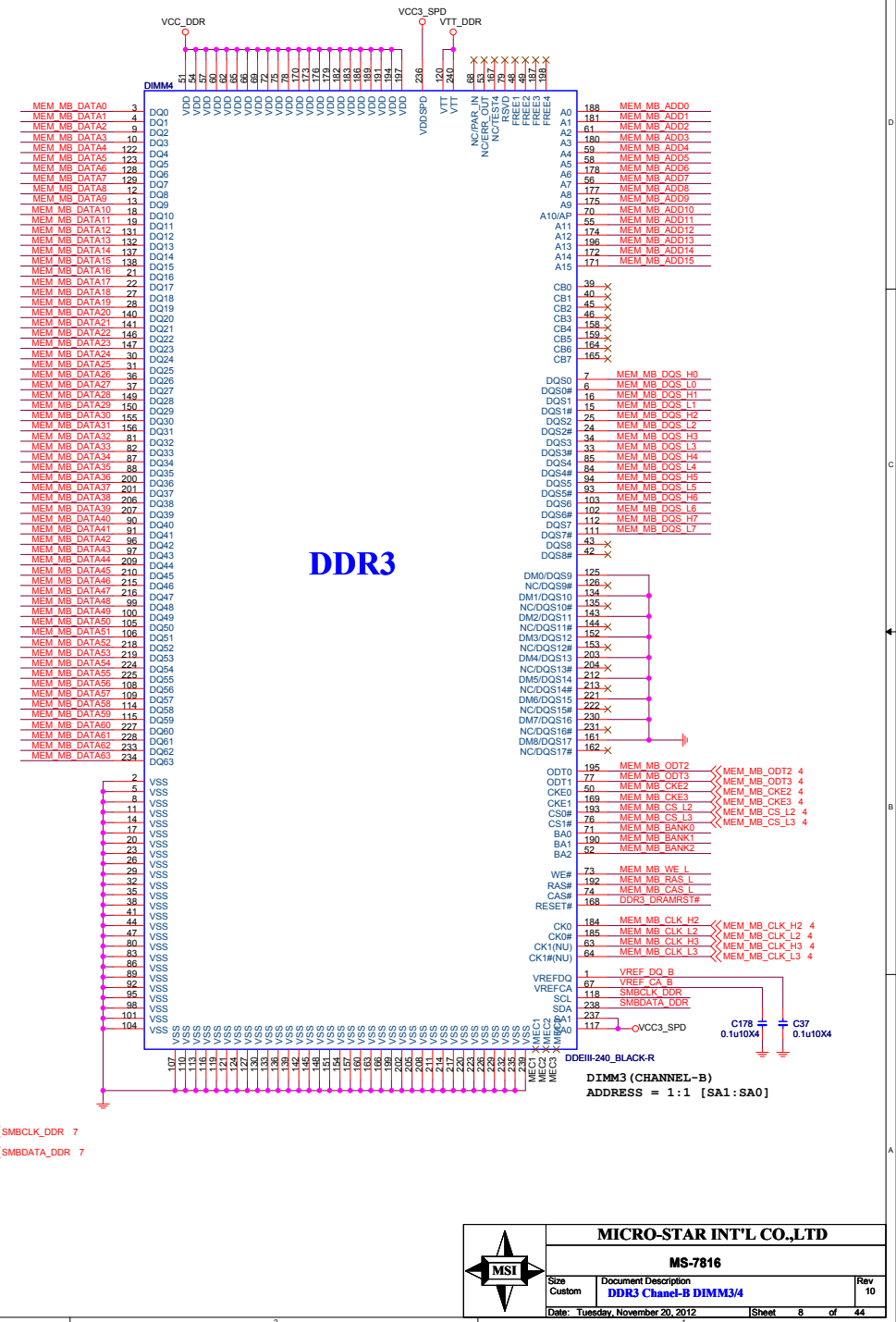
MOW WW06



MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size Custom	Document Description CPU-GND	Rev 10
Date: Tuesday, November 20, 2012		Sheet 6 of 44

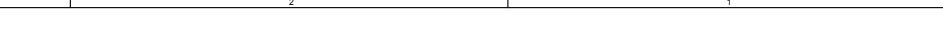


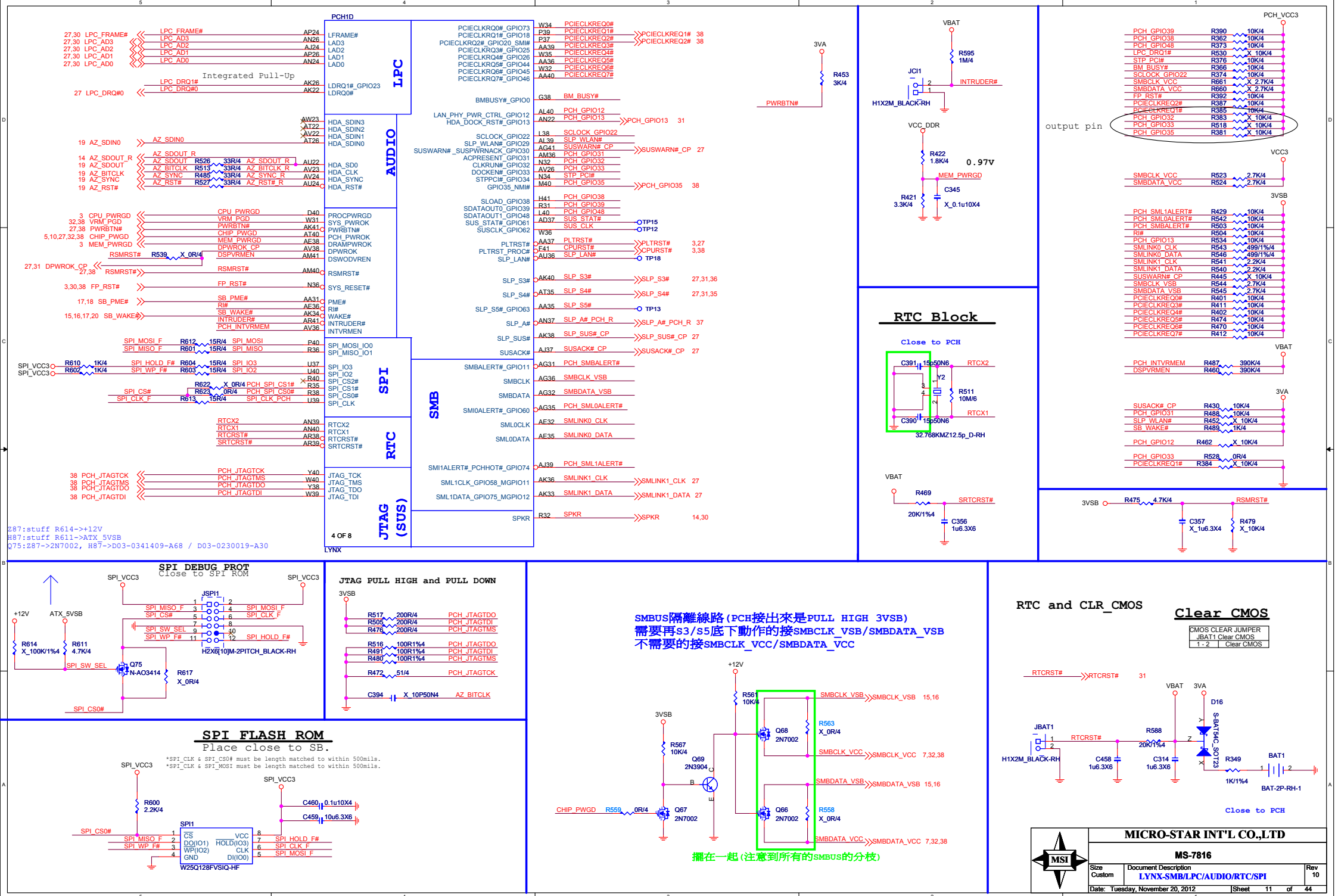
DDRIII DIMM_B1

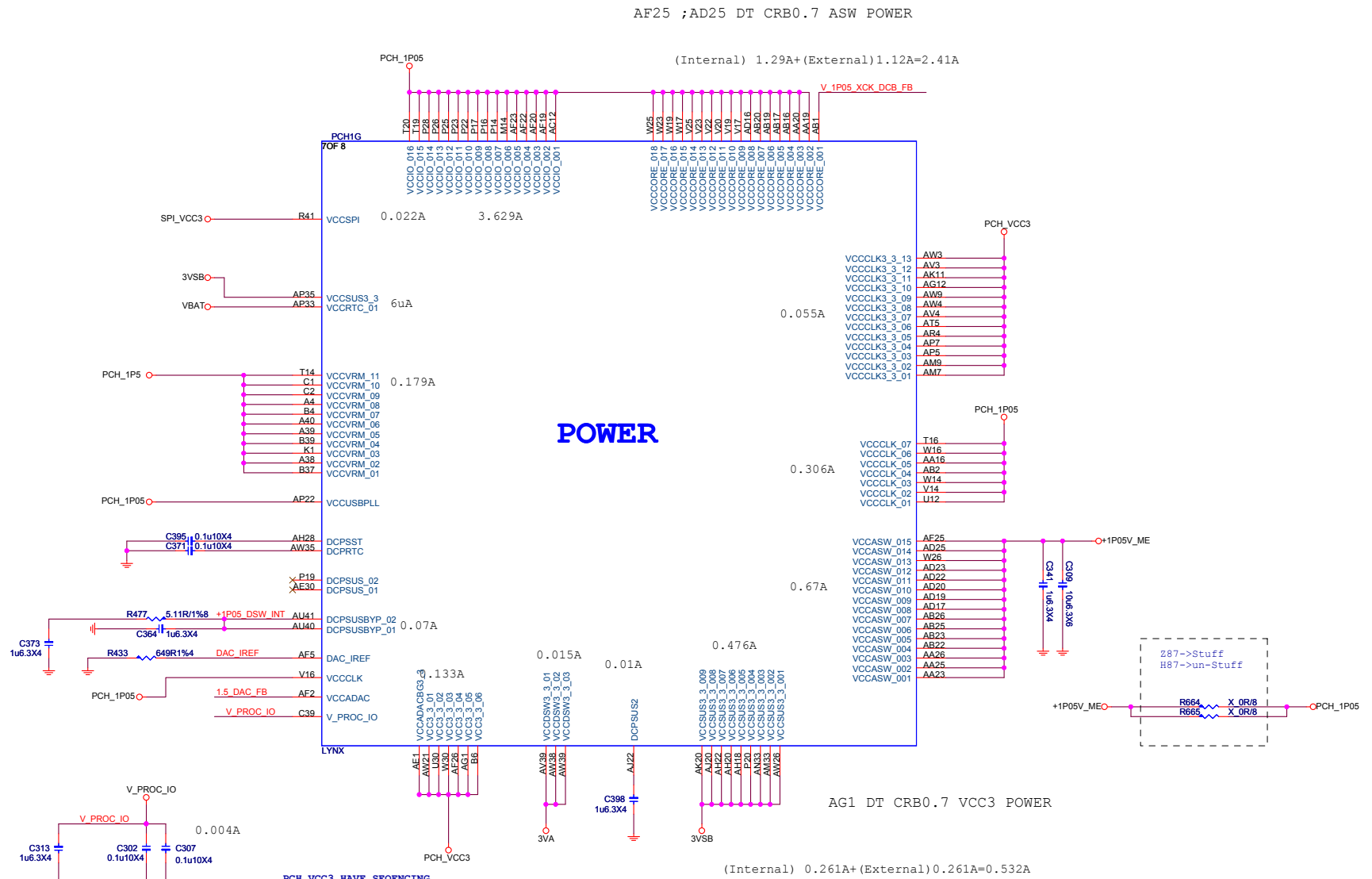


Size Custom	Document Description DDR3 Chanel-B DIMM3/4	Rev 10
Date: Tuesday, November 20, 2012		Sheet 8 of 44

		PCH1B		2 OF 8	
16	PE8_SLOT4_TX	H1	PETP8		US1
16	PE8_SLOT4_TX#	H2	PETN8		US1
16	PE7_SLOT4_TX	G5	PETP7		US1
16	PE7_SLOT4_TX#	G3	PETN7		US1
16	PE6_SLOT4_TX	D2	PETP6		US1
16	PE6_SLOT4_TX#	A7	PETN6		US1
16	PE5_SLOT4_TX	B7	PETP5		US1
16	PE4_ASM_TX	C8	PETN5		US1
17	PE4_ASM_TX#	B8	PETP4		US1
15	PE3_SLOT1_TX	A9	PETN4		US1
15	PE3_SLOT1_TX#	B9	PETP3		US1
15	PE3_SLOT1_TX	C11	PETN3		US1
20	PE2_LAN_TX	D11	PETP2_USB3TP3		US1
20	PE2_LAN_TX#	B11	PETN2_USB3TN3		US1
16	PE1_SLOT3_TX	B12	PETP1_USB3TP2		US1
16	PE1_SLOT3_TX#	B12	PETN1_USB3TN2		US1



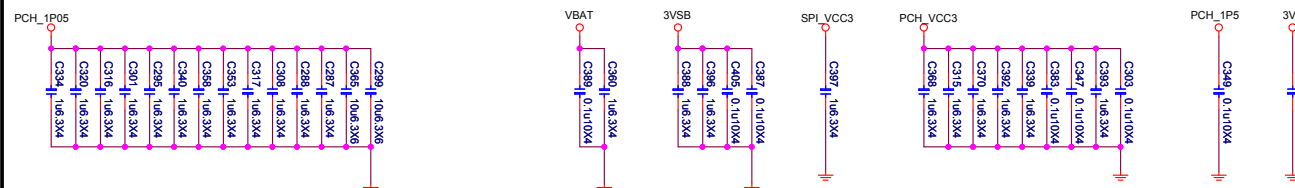
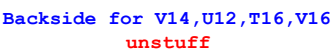


$$(\text{Internal}) \quad 1.29A + (\text{External}) 1.12A = 2.41A$$


AG1 DT CRB0.7 VCC3 POWER

$$(\text{Internal})\ 0.261A + (\text{External})\ 0.261A = 0.532A$$

PCH decoupling cap



MICRO-STAR INT'L CO.,LTD			
MS-7816			
Size Custom	Document Description LYNX-POWER		Rev 10
Date: Tuesday, November 20, 2012		Sheet	12 of 44

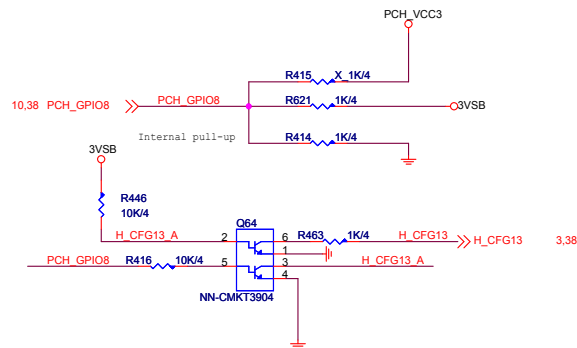
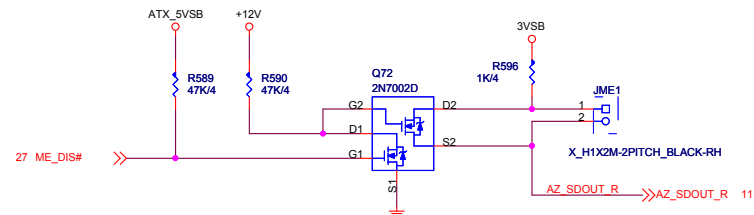


11,30 SPKR << SPKR R391 X 8.2K/4

Internal pull-DOWN

SPKR
Default Mode:
Internal weak Pull-down.

No Reboot Mode with TCO Disabled:
Connect to Vcc3_3 with 8.2k-10k Ohm weak pullup resistor.



10 PCH_GPIO55 >> PCH_GPIO55 R461 X 4.7K/4

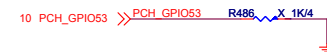
Internal pull-up

GPIO55
Default Mode:
Internal pull-up.

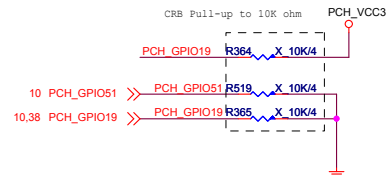
Top Block Swap Mode:
Connect to ground with 4.7k Ohm weak pulldown resistor.



For Sx power Cycling May Fail Due to SVID Logic Race Condition Within the Processor



GPIO53
Connect to ground with 1k Ohm pull-down resistor.



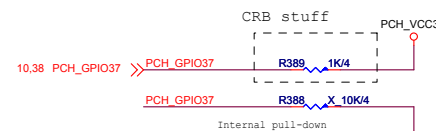
Default (SPI):
Left both SATA1GP/GPIO19 and GPIO51 floating.
No pull up required.

Boot from PCI:
Connect SATA1GP/GPIO19 to ground with 1k Ohm pull-down resistor.
Leave GPIO51 Floating.

Boot from LPC:
Connect both SATA1GP/GPIO19 and GPIO51 to ground with 1k Ohm pull-down resistor.

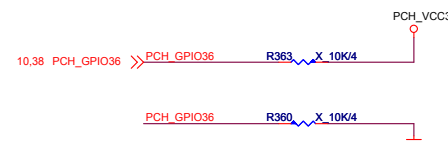
BOOT DEVICE	GPIO51	GPIO19
LPC	0	0
SPI	1	1

Default



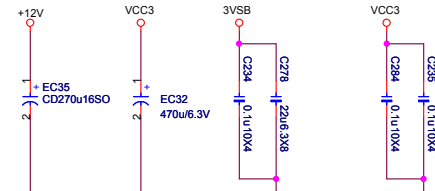
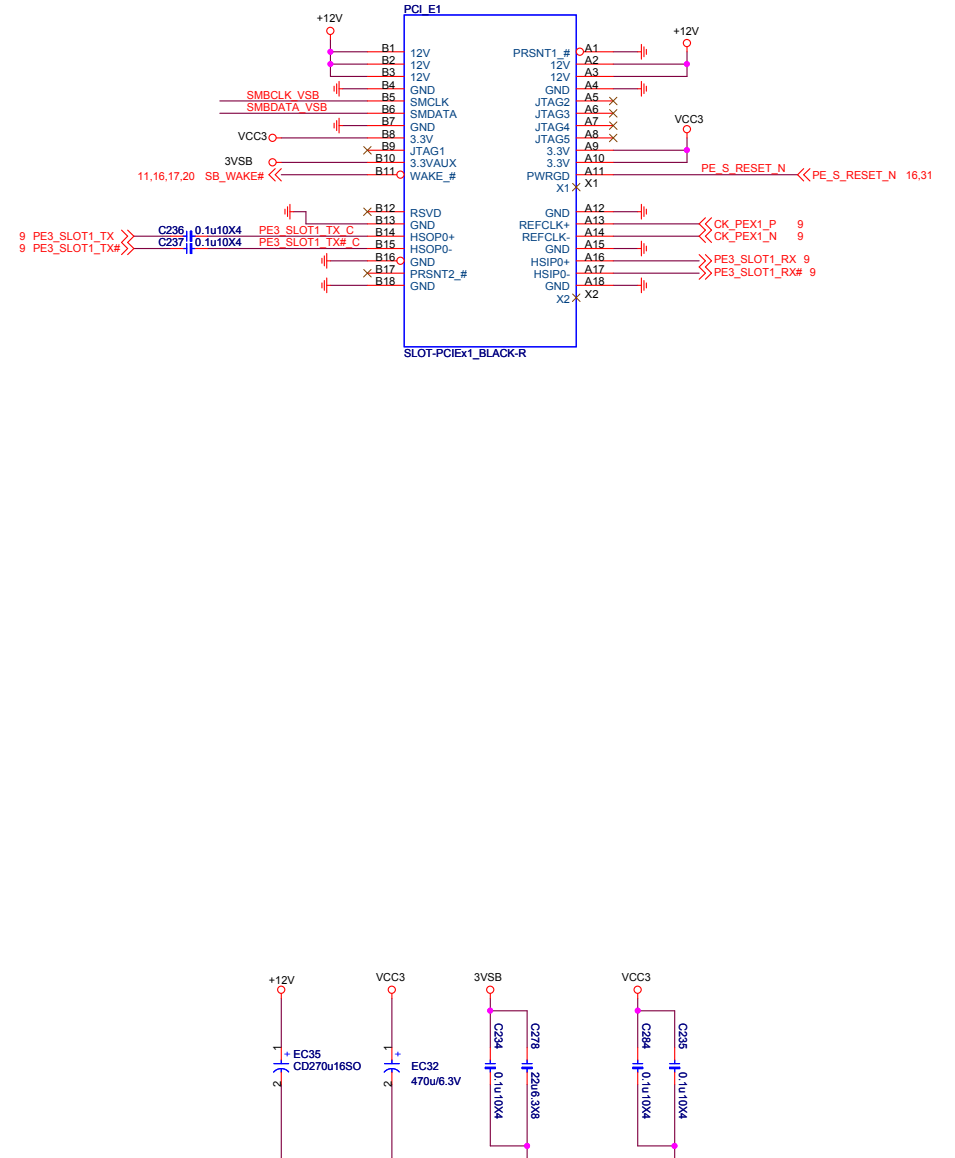
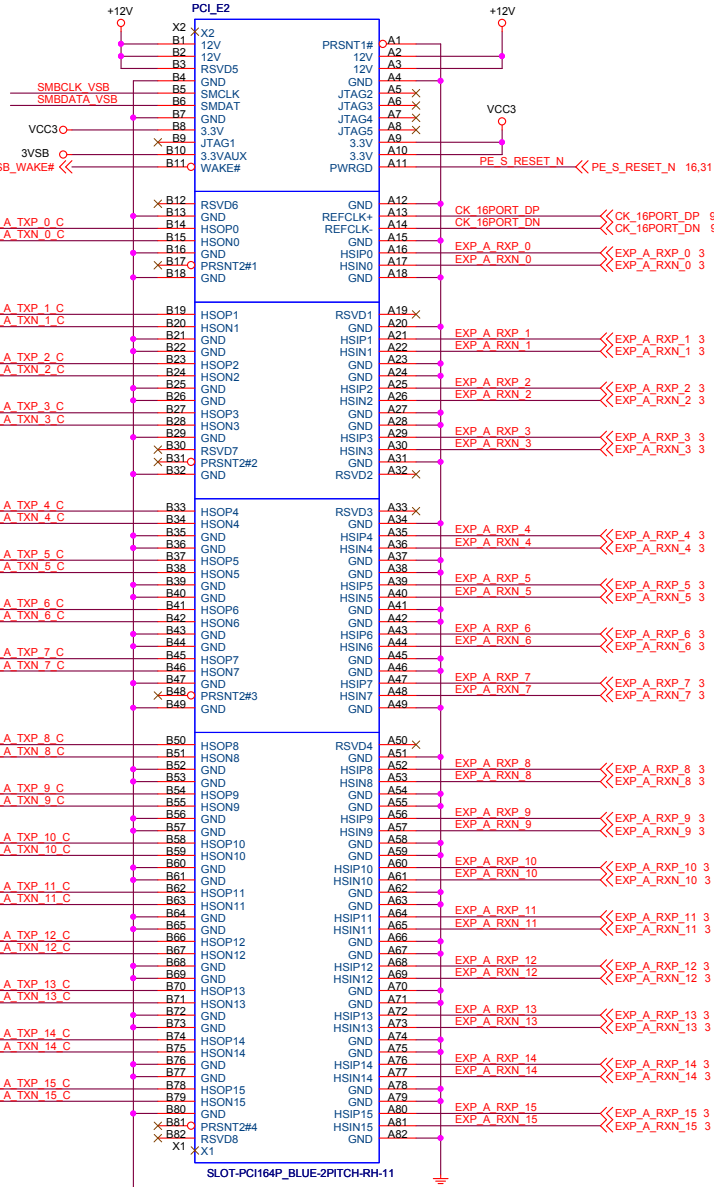
Enable TLS:
Pull up with 1k Ohm to VccSus3.3.

Default (Disable TLS):
Leave NC. Internal pull down.



MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size Custom	Document Description LYNX-Strap	Rev 10
Date: Tuesday, November 20, 2012	Sheet 14 of 44	

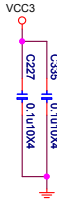
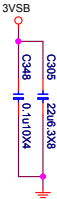
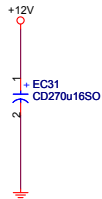
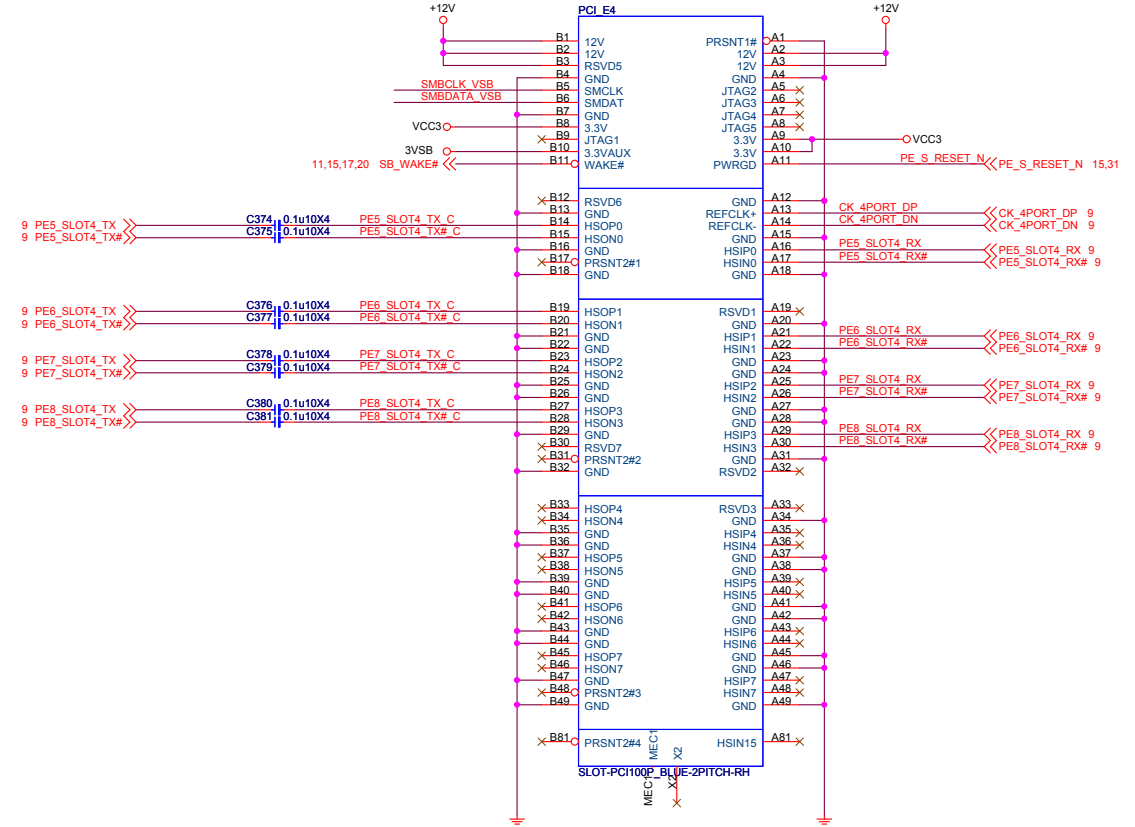
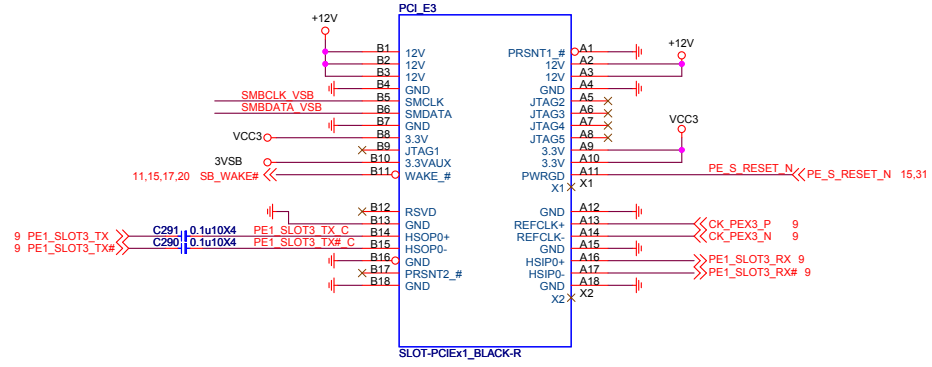
11,16 SMBCLK_VSB
11,16 SMBDATA_VSB

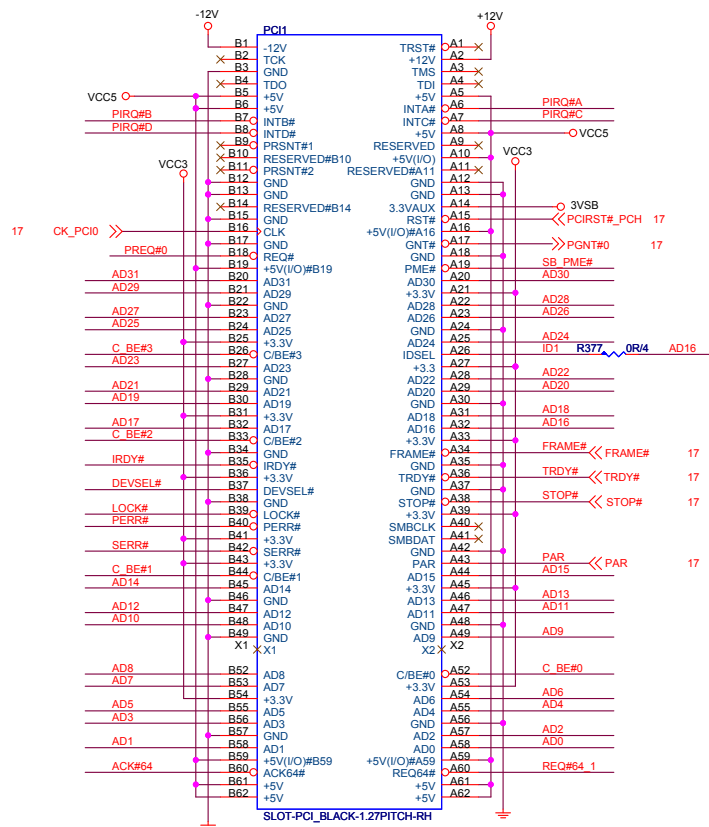


11,15 SMBCLK_VSB
11,15 SMBDATA_VSB

SMBCLK_VSB
SMBDATA_VSB

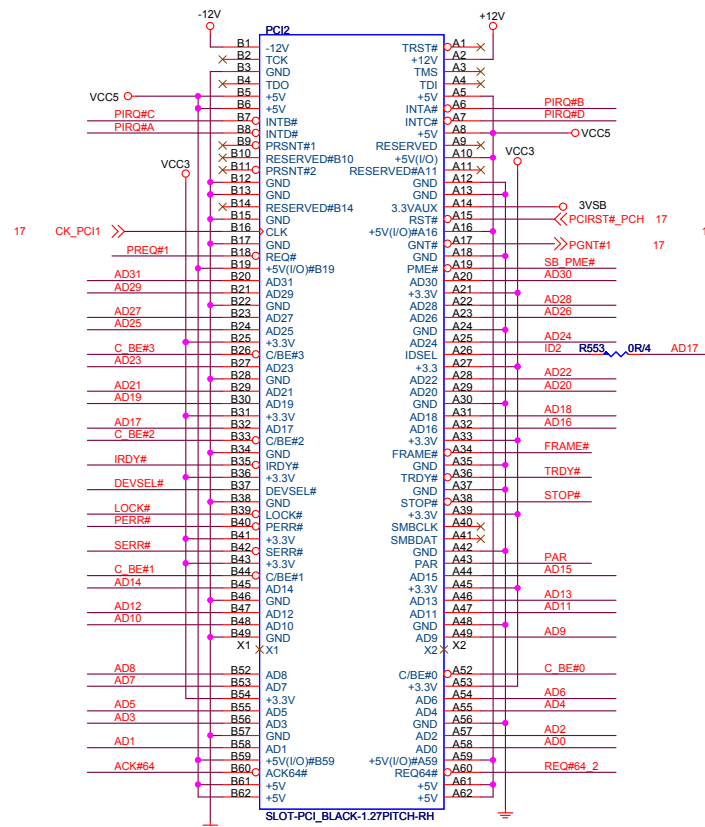
PCI Express X4 Slot



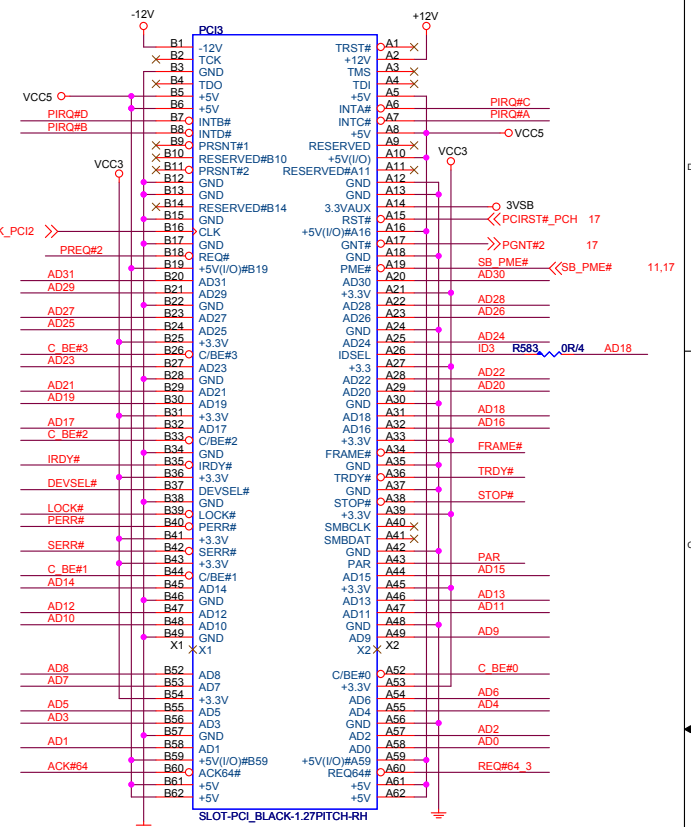


IDSEL = AD16
MASTER = PREQ#0
PIRQ#A

AD[31..0] <<> AD[31..0] 17
C_BE#[3..0] <<> C_BE#[3..0] 17

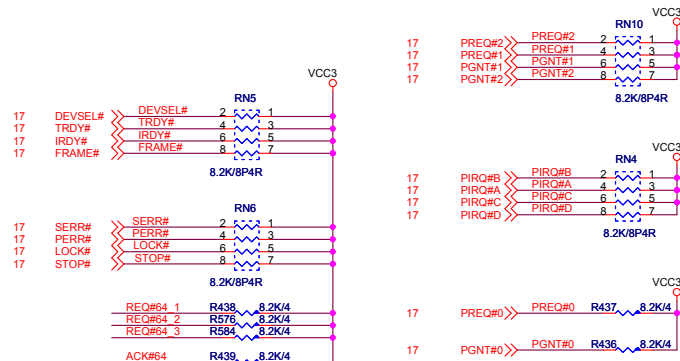
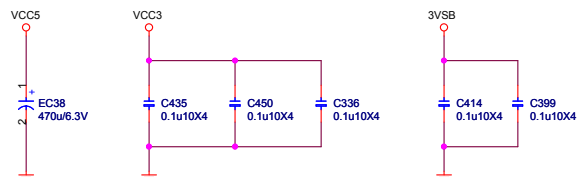


IDSEL = AD17
MASTER = PREQ#1
PIRQ#B



IDSEL = AD18
MASTER = PREQ#2
PIRQ#C

PCI PULL-UP / DOWN RESISTORS

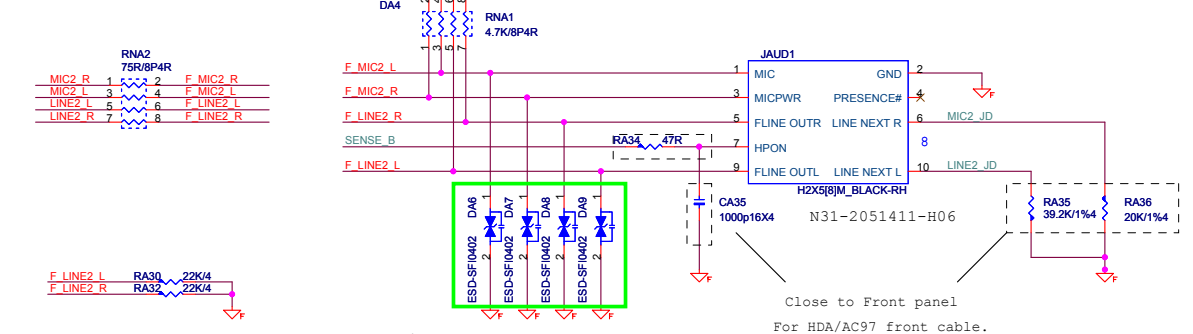
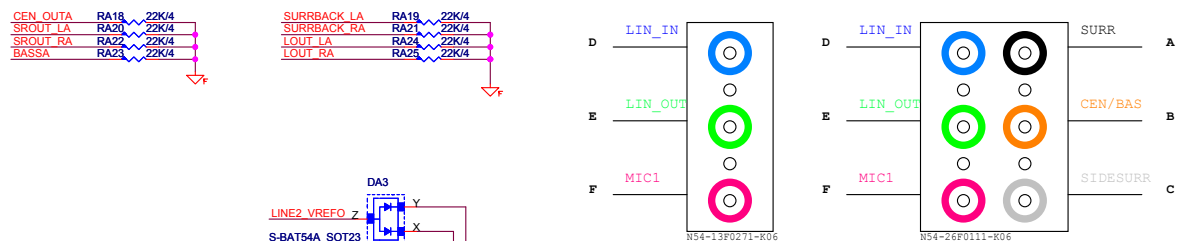
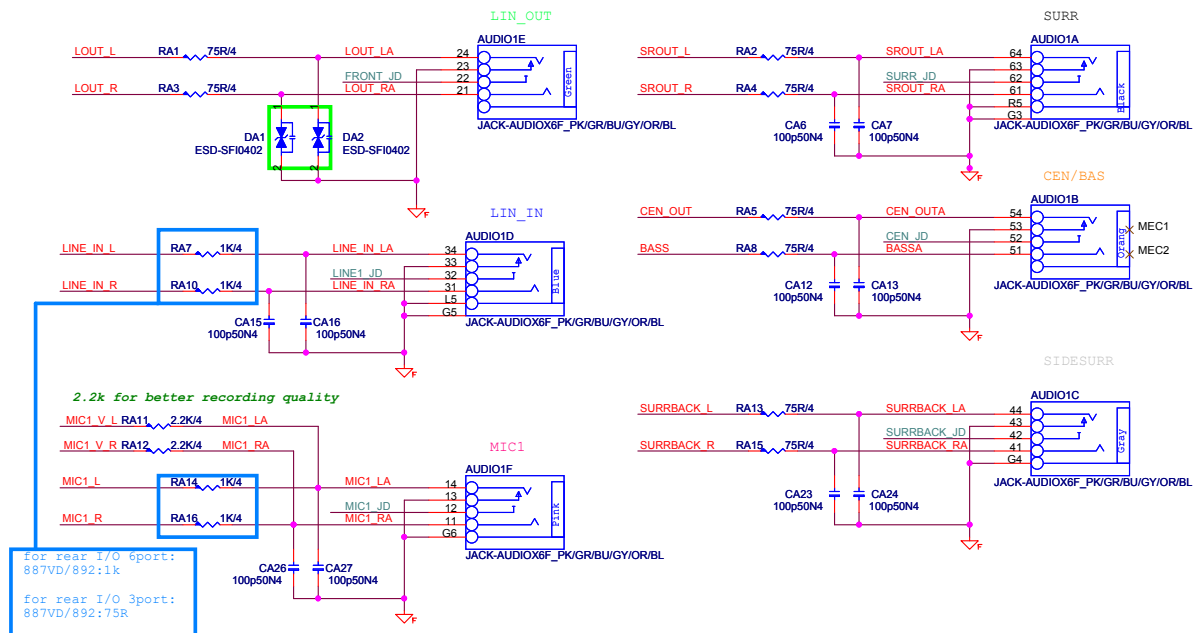
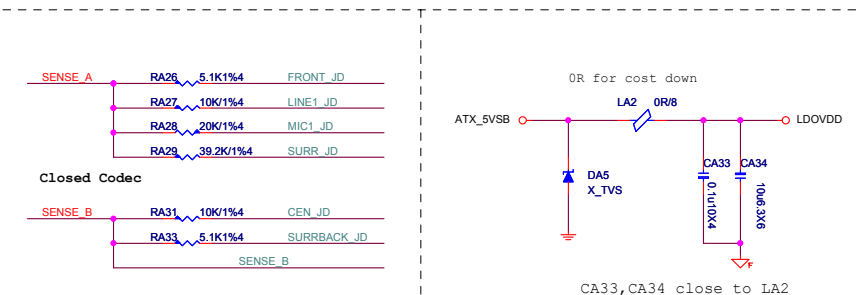
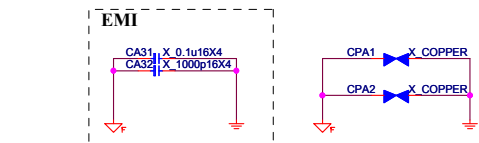
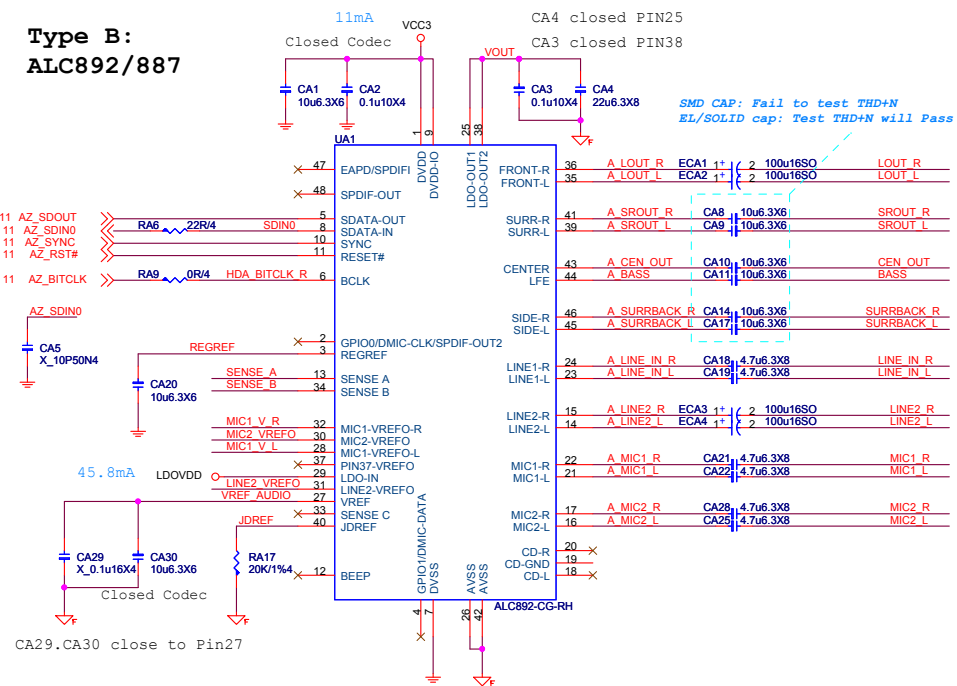


PCI slot (X3)		
+3.3Vaux (wake)	-	1125mA
+3.3Vaux (no wake)	-	60mA
+3.3V	-	7.6A
+5V	-	15A
+12V	-	1.5A



MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size	Document Description	Rev
Custom	PCI slot	10
Date: Tuesday, November 20, 2012	Sheet 18 of 44	

Type B:
ALC892/887



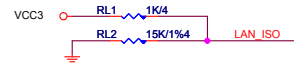
Varister --> cap for cost down
D0G-2950500-SI0
D0G-3010510-I05
Close to Jack



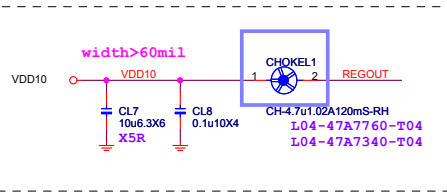
MICRO-STAR INT'L CO.,LTD			
MS-7816			
Size Custom	Document Description Audio Codec ALC892		Rev
Date: Tuesday, November 20, 2012		Sheet 19	of 44

RTL8111E Giga LAN

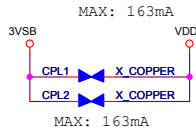
RTL8105E 10/100M LAN



ENSWREG:
1: Enable switching regulator
0: Disable switching regulator



near pin36 <200mil
REFOUT between other signal spacing >15mil

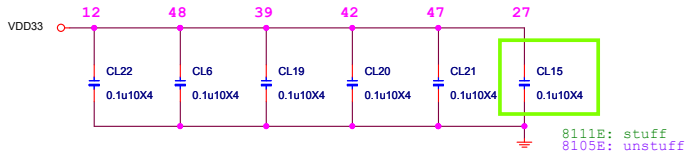


3.3v Power on rise time : 1~100ms.

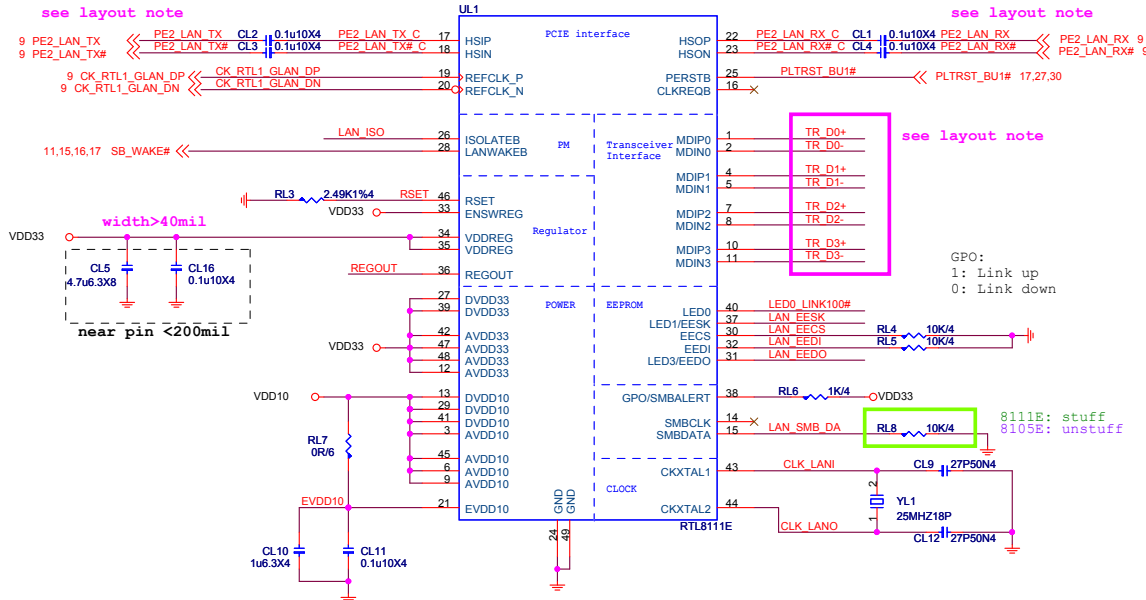
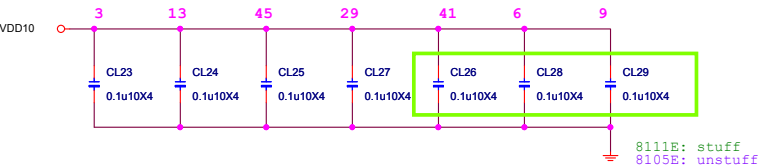
8111E POWER Consumption

	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

Place near pin

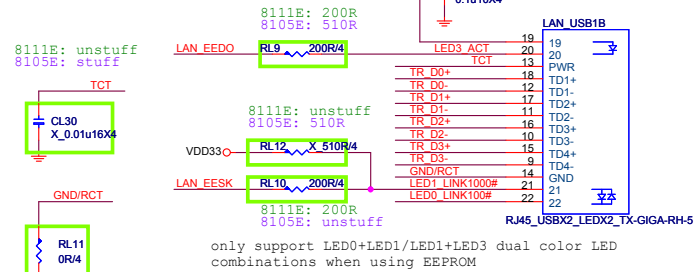


Place near pin



Pin49: 9 via from top layer to GND layer and make the via at the center of IC.

LAN Connector



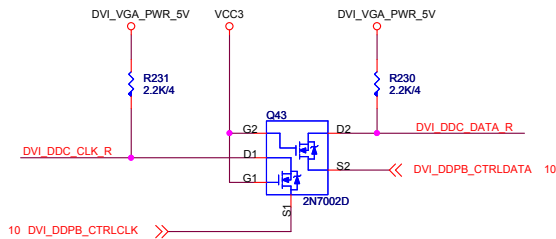
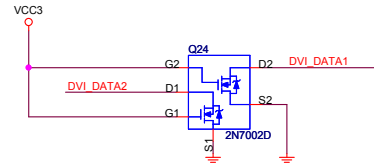
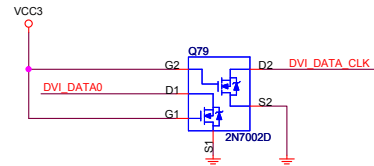
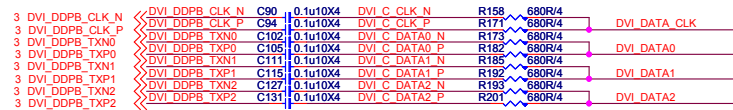
only support LED0+LED1+LED3 dual color LED combinations when using EEPROM

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

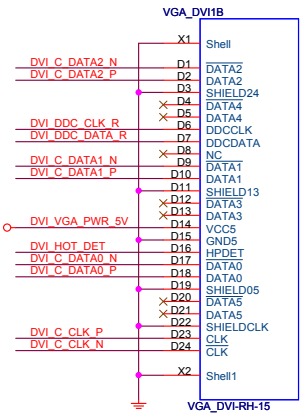
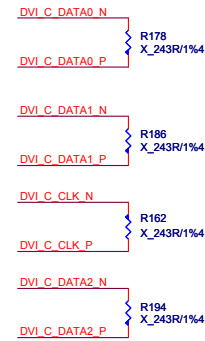


MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size	Document Description	Rev
Custom	LAN-RTL8111E	10
Date: Tuesday, November 20, 2012	Sheet 20 of 44	

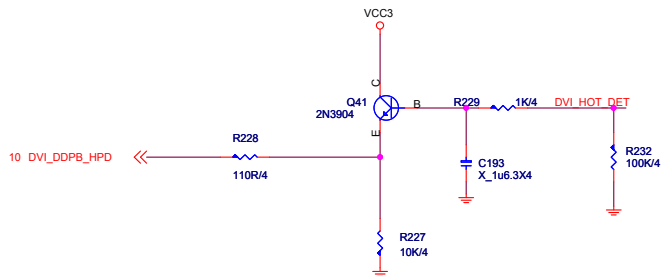
VGA: resolution of 2048x1536 pixels with 32-bit color at 75 Hz (4:3 QXGA)



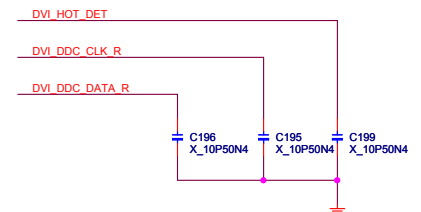
For EMI



HPD



EMI



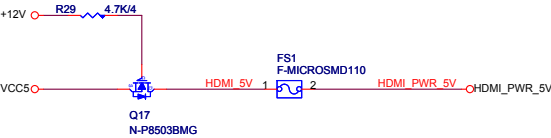
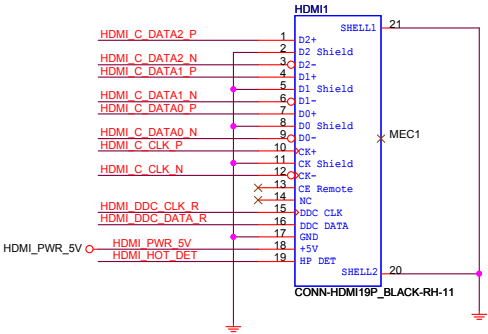
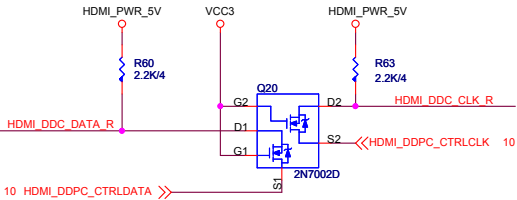
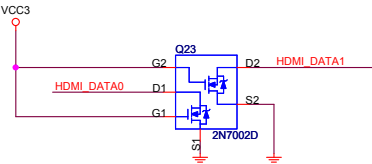
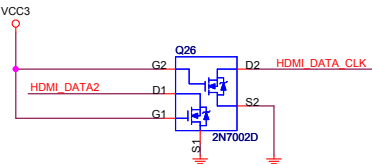
MICRO-STAR INT'L CO.,LTD

MS-7816

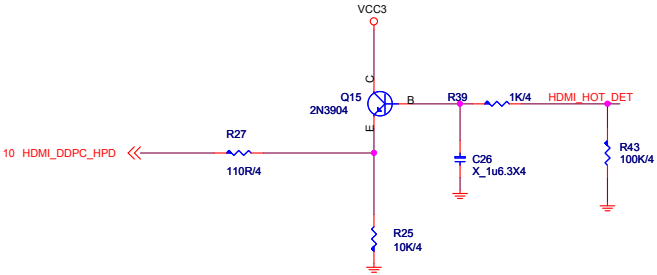
Size	Document Description	Rev
Custom	DVI Connector	10
Date: Tuesday, November 20, 2012	Sheet 21 of 44	

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

3	HDMI_DDPC_CLK_P	HDMI_DDPC_CLK_P	C64	0.1u10X4	HDMI_C_CLK_P	R111	560R/4	HDMI_DATA_CLK
3	HDMI_DDPC_CLK_N	HDMI_DDPC_CLK_N	C66	0.1u10X4	HDMI_C_CLK_N	R115	560R/4	
3	HDMI_DDPC_TX2_P	HDMI_DDPC_TX2_P	C60	0.1u10X4	HDMI_C_DATA2_P	R109	560R/4	HDMI_DATA2
3	HDMI_DDPC_TX2_N	HDMI_DDPC_TX2_N	C58	0.1u10X4	HDMI_C_DATA2_N	R104	560R/4	
3	HDMI_DDPC_TX1_P	HDMI_DDPC_TX1_P	C65	0.1u10X4	HDMI_C_DATA1_P	R112	560R/4	HDMI_DATA1
3	HDMI_DDPC_TX1_N	HDMI_DDPC_TX1_N	C67	0.1u10X4	HDMI_C_DATA1_N	R116	560R/4	
3	HDMI_DDPC_TX0_P	HDMI_DDPC_TX0_P	C61	0.1u10X4	HDMI_C_DATA0_P	R110	560R/4	HDMI_DATA0
3	HDMI_DDPC_TX0_N	HDMI_DDPC_TX0_N	C59	0.1u10X4	HDMI_C_DATA0_N	R105	560R/4	

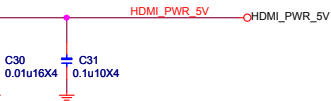


HPD




For EMI

HDMI_C_CLK_N	R113	X_180R/1%4
HDMI_C_CLK_P		
HDMI_C_DATA0_N	R106	X_180R/1%4
HDMI_C_DATA0_P		
HDMI_C_DATA1_N	R114	X_180R/1%4
HDMI_C_DATA1_P		
HDMI_C_DATA2_N	R108	X_180R/1%4
HDMI_C_DATA2_P		



EMI

HDMI_DDC_CLK_R	C47	X 0.1u10X4
HDMI_DDC_DATA_R	C42	X 0.1u10X4
HDMI_HOT_DET	C38	X 0.1u10X4

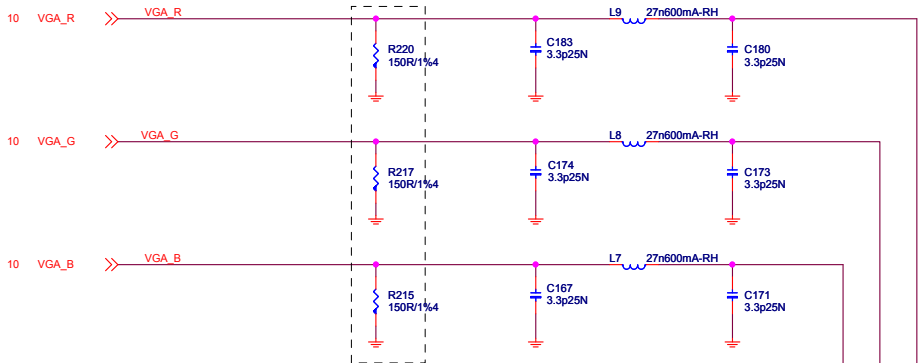
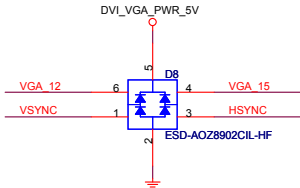
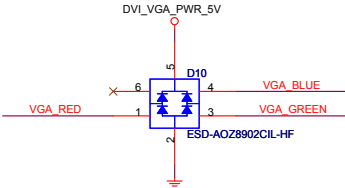
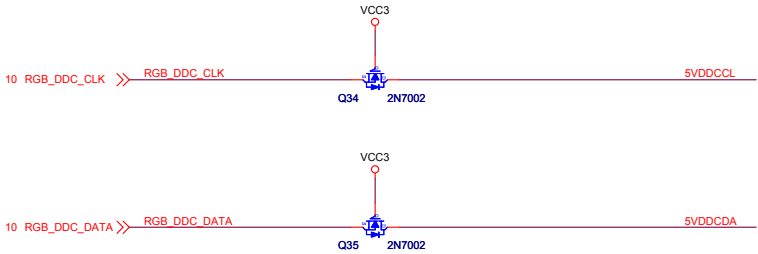
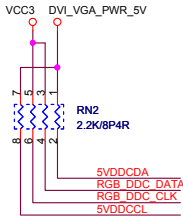


MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size	Document Description	Rev
Custom	HDMI Connector	10
Date: Tuesday, November 20, 2012		Sheet 22 of 44

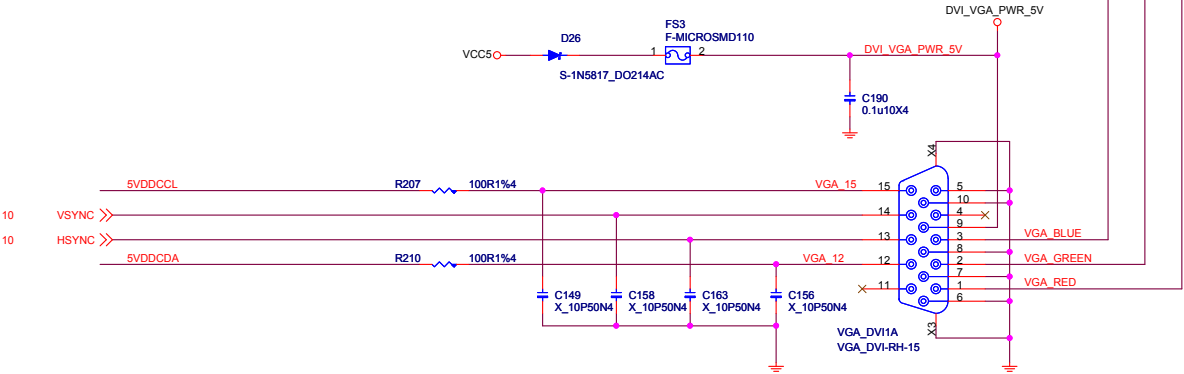
D-Sub

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

Level shift



PLACE CLOSE TO VGA CONNECTOR,
WITHIN 750 MIL OF PIN



MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size Custom	Document Description VGA Connector	Rev 10
Date: Tuesday, November 20, 2012	Sheet 23 of 44	

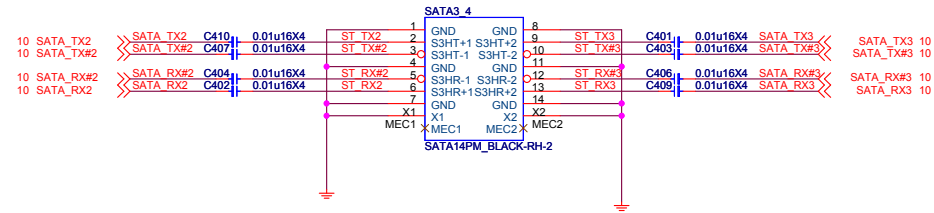
SATA 6G PORT 0,1

3.0



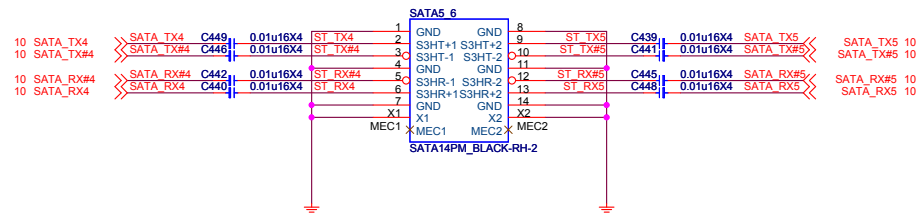
SATA 3G PORT 2,3

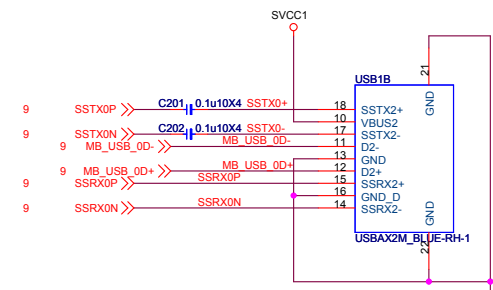
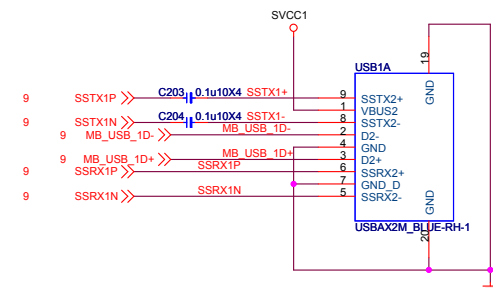
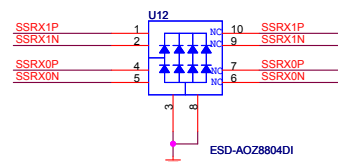
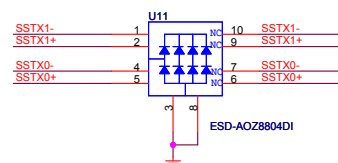
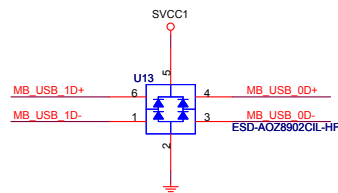
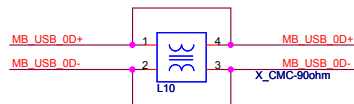
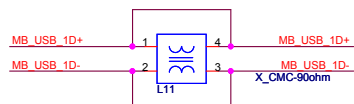
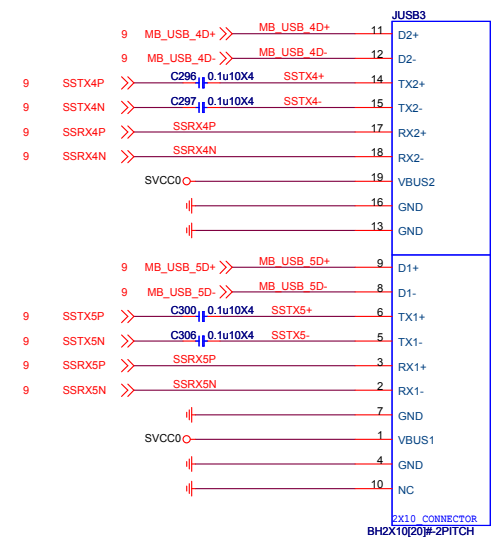
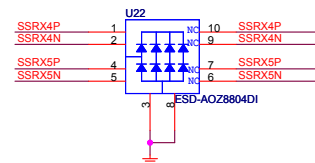
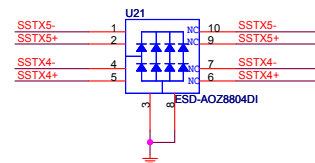
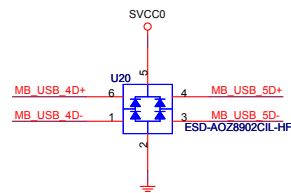
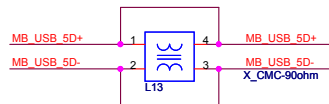
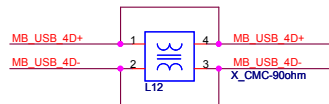
3.0



SATA 3G PORT 4,5

Z87,H87 chip support SATA3.0
B85 chip support SATA2.0

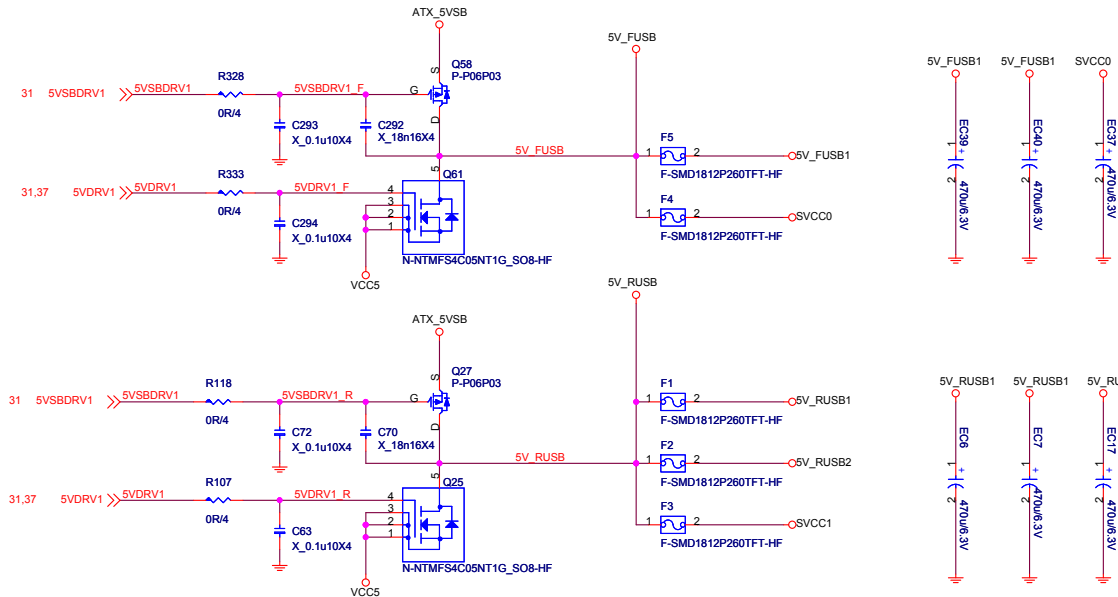




MICRO-STAR INT'L CO.,LTD

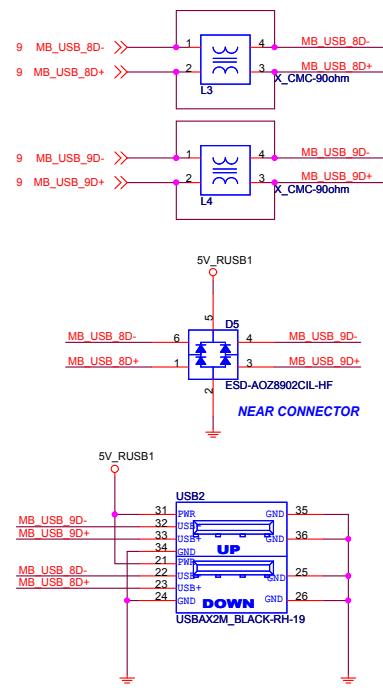
MS-7816

Size	Document Description	Rev
Custom	USB3.0 Connector	10
Date: Tuesday, November 20, 2012	Sheet 25 of 44	

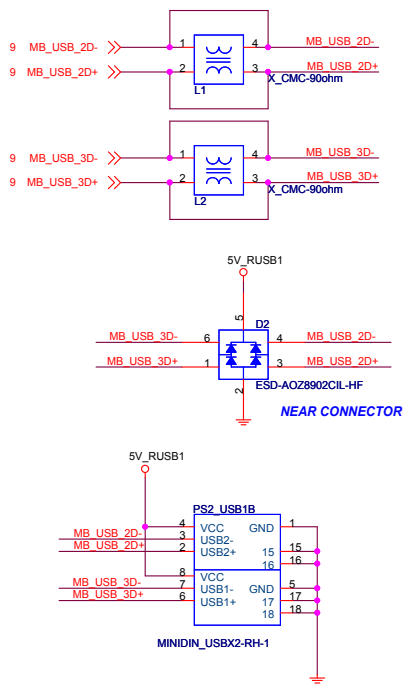


5VSDRV1, 5VSDRV1 width 12mil
D08-0300700-P16 (Itrip=2.6A; 0.015ohm) support 2 USB ports

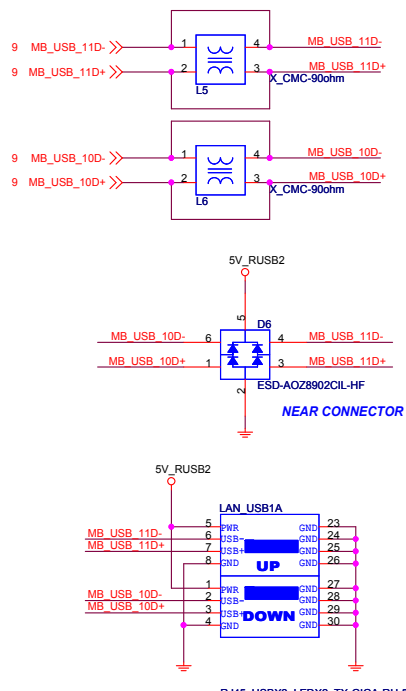
REAR USB PORT 2,3



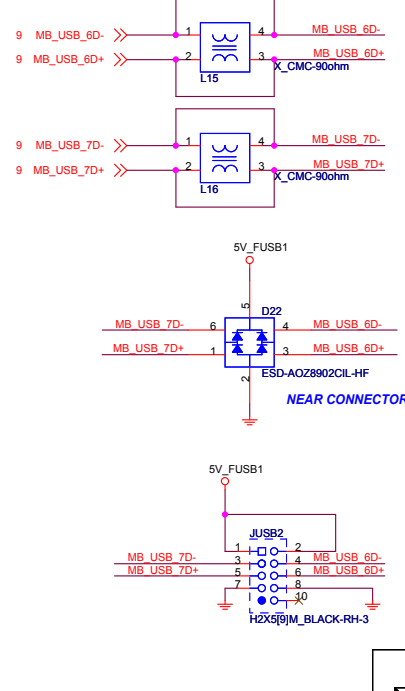
REAR USB PORT 8,9 (With PS2)



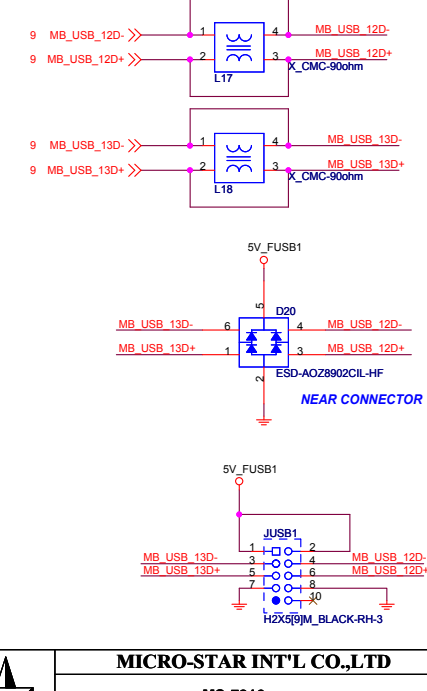
FRONT USB PORT 10,11 (With LAN)



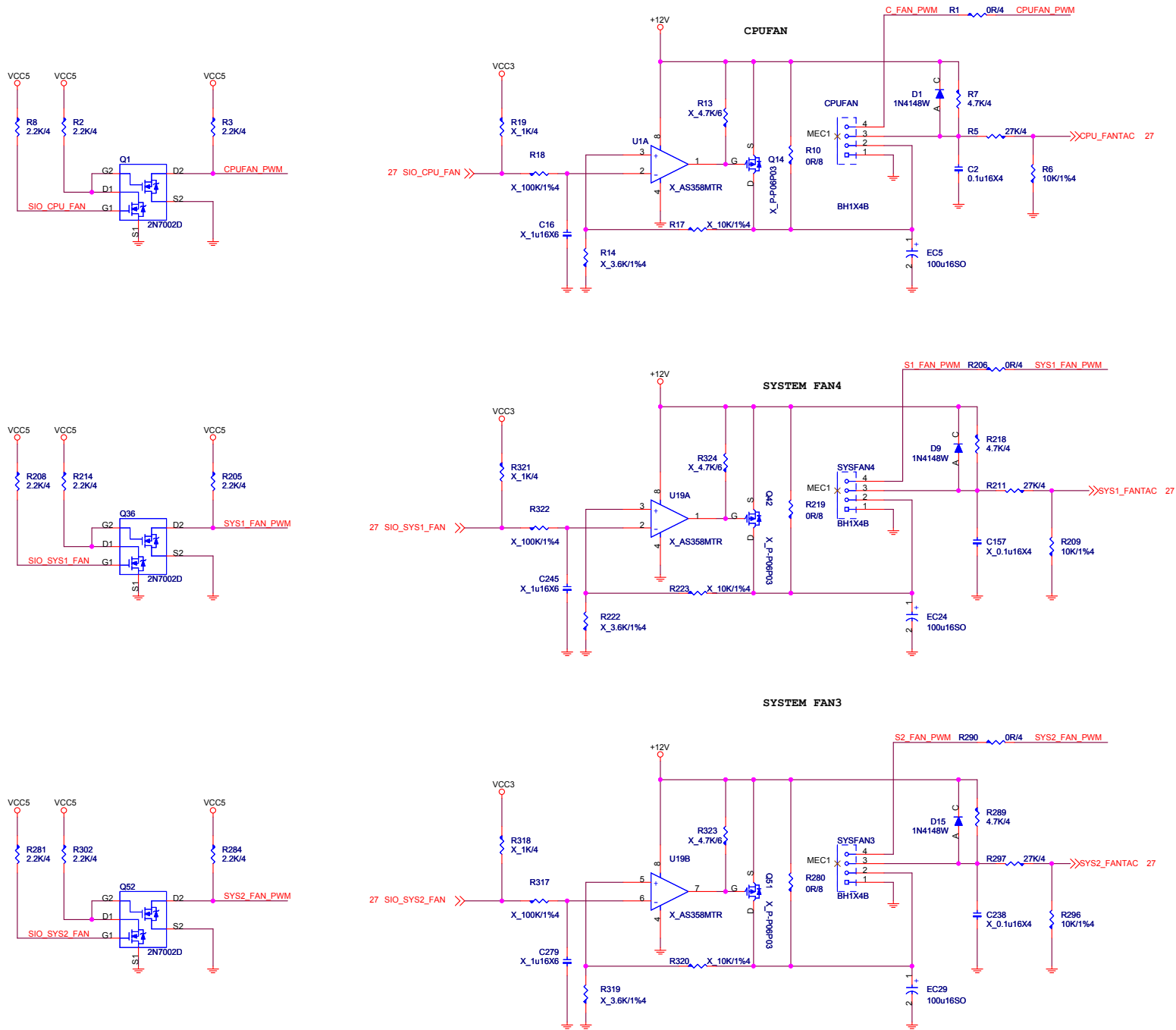
FRONT USB PORT 6,7



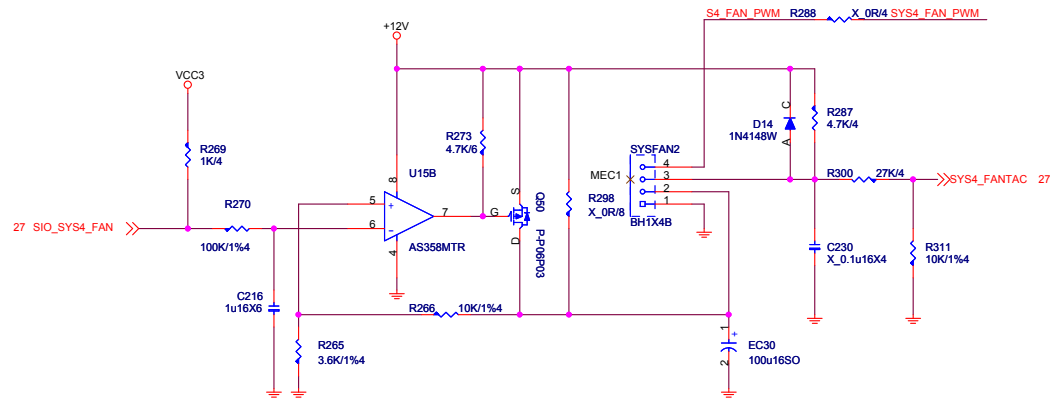
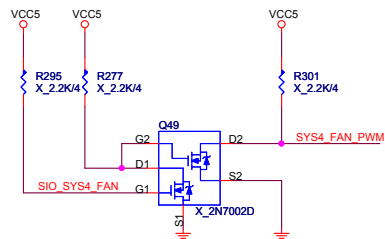
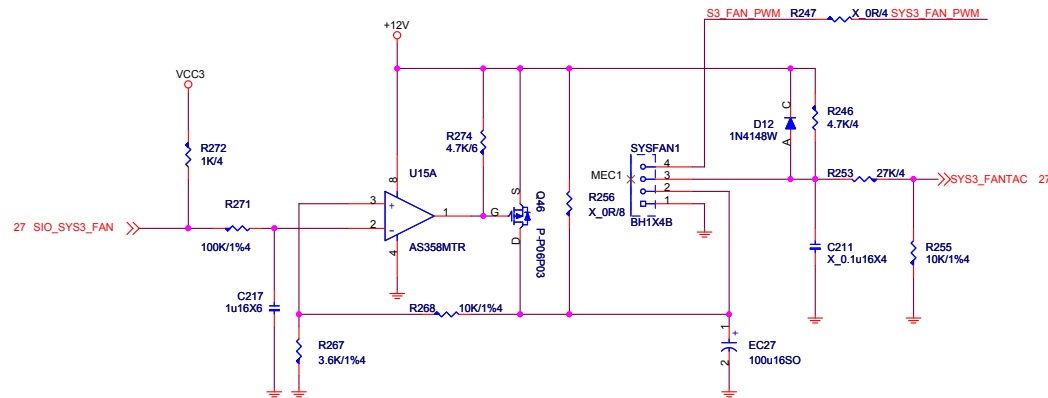
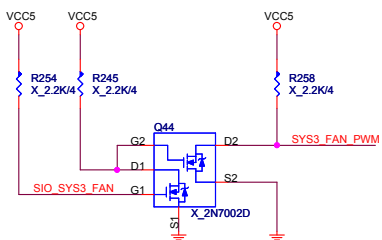
FRONT USB PORT 12,13



FAN-COUNTROL CIRCUIT

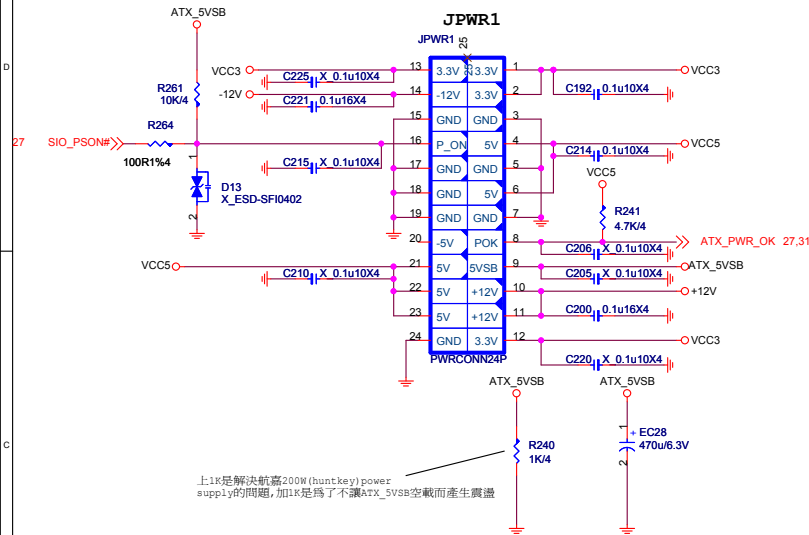


MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size	Document Description	Rev
Custom	FAN Control	10
Date: Tuesday, November 20, 2012	Sheet 28 of 44	

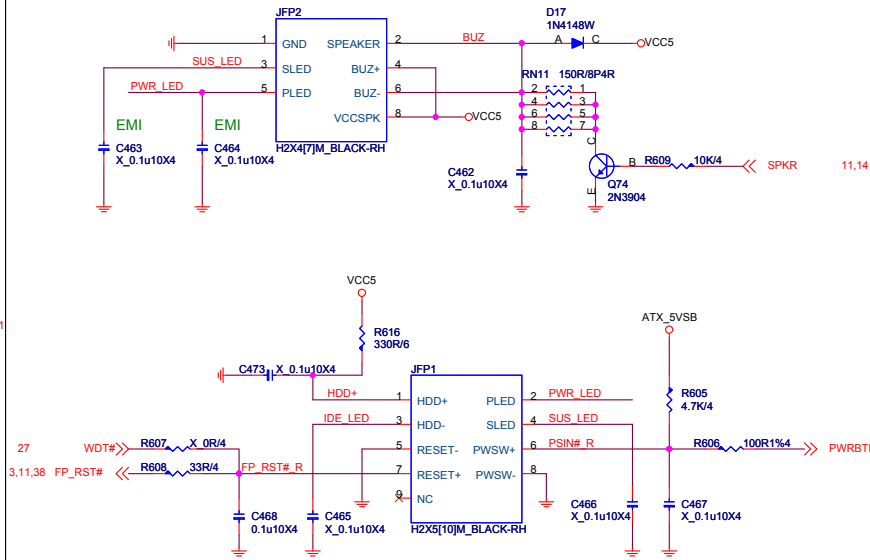


MICRO-STAR INT'L CO.,LTD		
MS-7816		
Size Custom	Document Description FAN Control2	Rev 10
Date: Tuesday, November 20, 2012	Sheet 29 of 44	

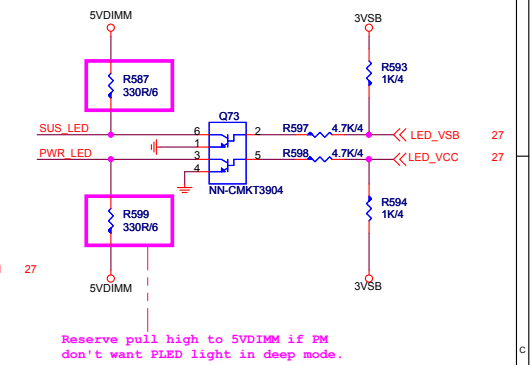
ATX POWER CONNECTOR



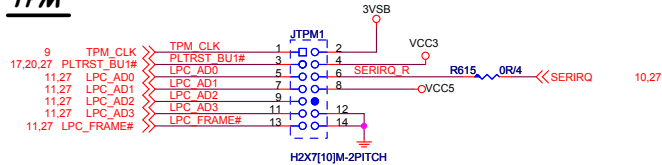
FRONT PANEL



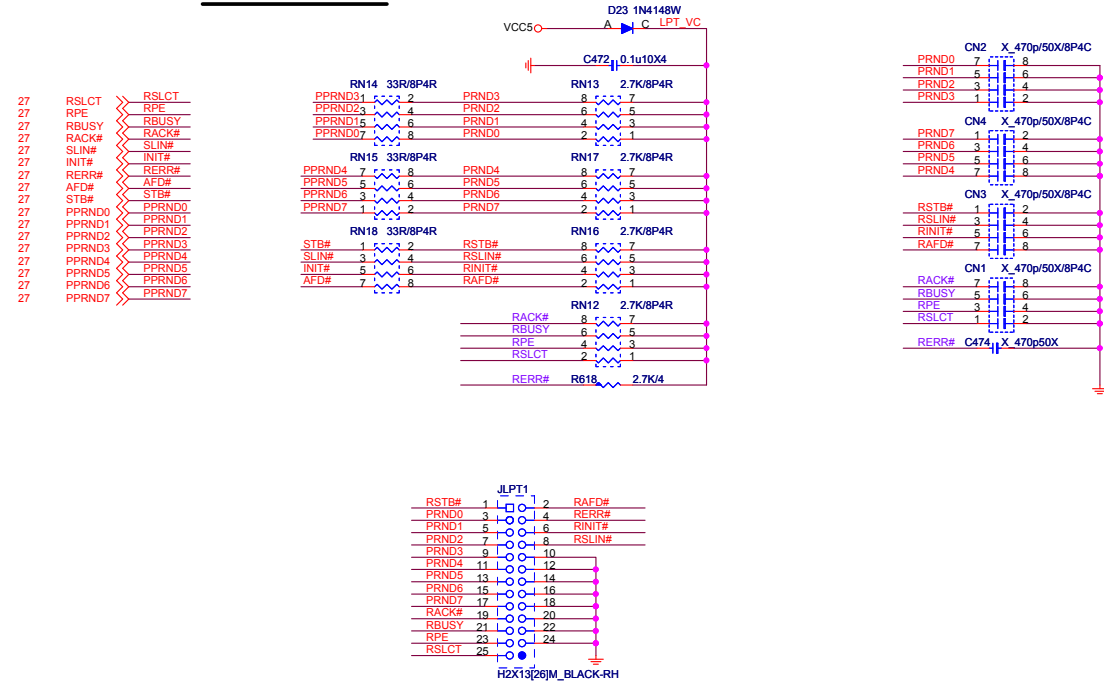
LED (for Fintek 71869)



TPM



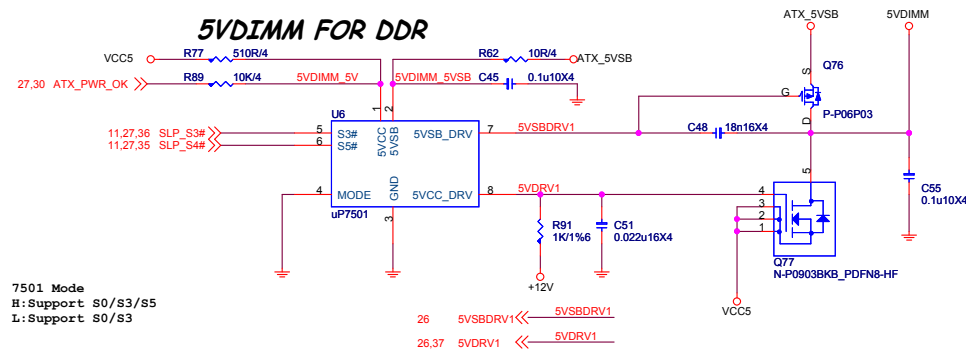
PARALLAL PORT



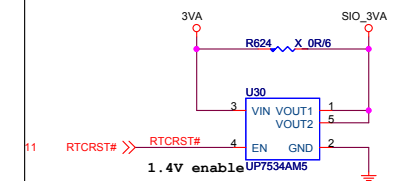
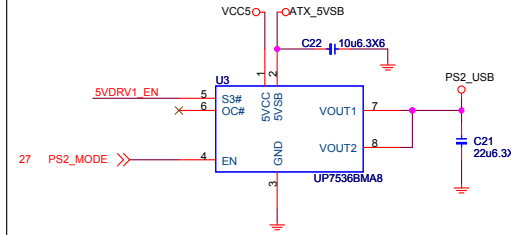
N31-2131151-H06 : 2.0mm
N31-2131131-H06 : 2.54mm

		MICRO-STAR INT'L CO.,LTD	
		MS-7816	
Size Custom	Document Description ATX F_Panel/EMI/TPM	Rev 10	
Date: Tuesday, November 20, 2012	Sheet 30 of 44		

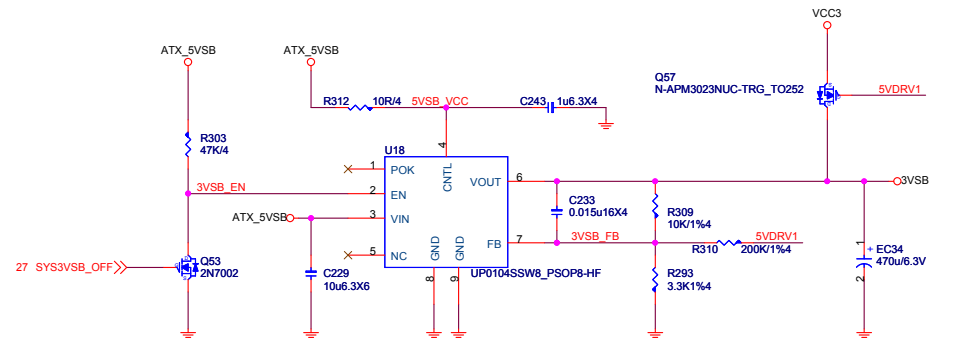
5VDIMM FOR DDR



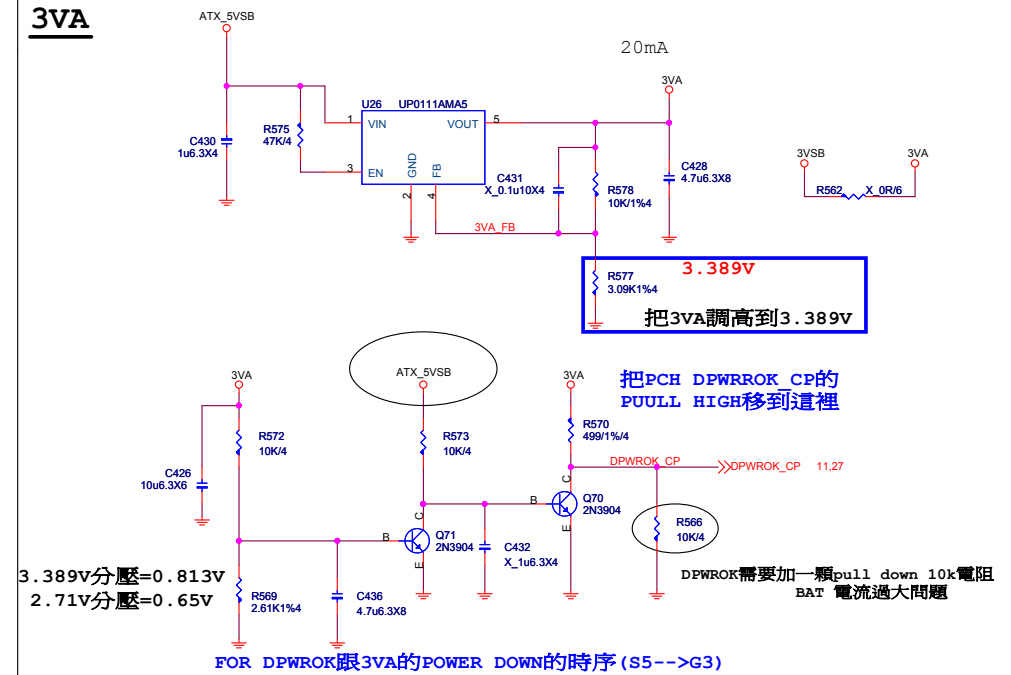
PS2 Power



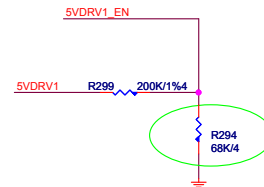
3VSB



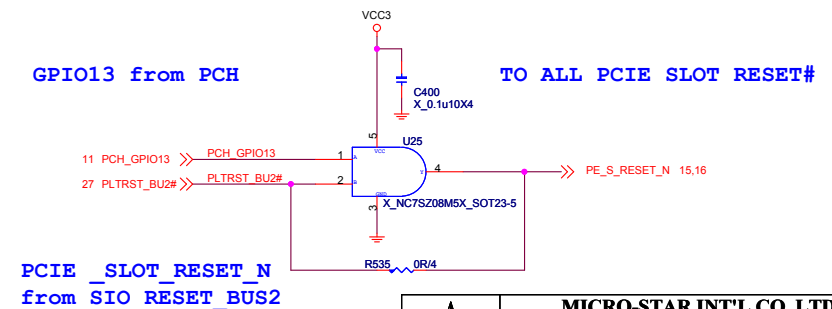
3VA



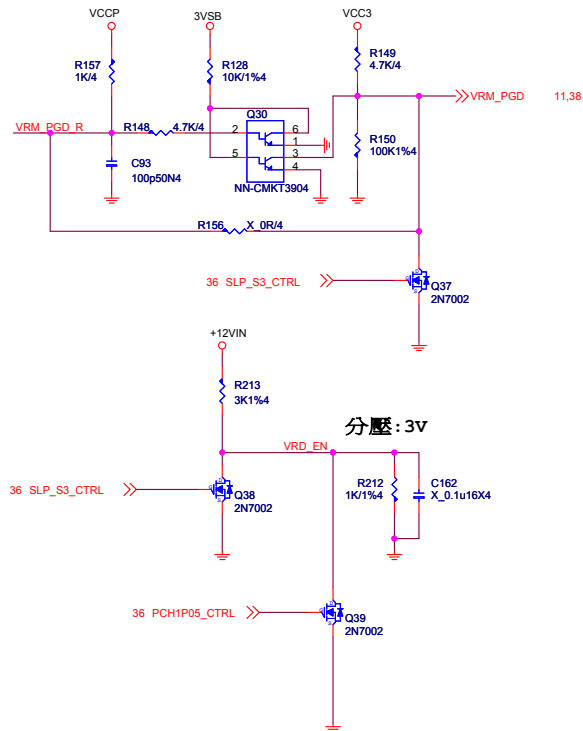
USB MODE



GPIO13 from PCH

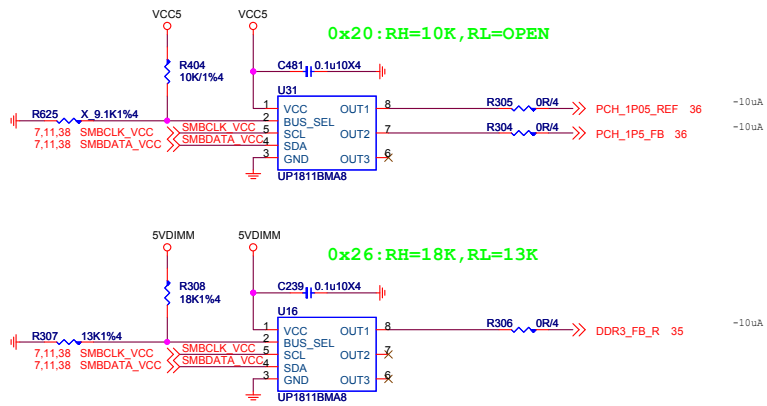
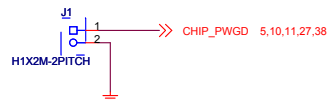


MICRO-STAR INT'L CO.,LTD			
MS-7816			
Size	Document Description	Rev	
Custom	ACPI controller UPI	10	
Date:	Tuesday, November 20, 2012	Sheet	31 of 44



UPI VOLTAGE CONSOLE

	U16					U31	
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%	



0.1~1 inch

H_VIDSOUT R176 110/1%
H_VIDCLK R169 64.9R1%
H_VIDALERT# R177 X 90.9/1%
CPU_VTT C36 0.1u10X4

Internal option : 5/32*VCC

3 CPU_VSS_SENSE << CPU_VSS_SENSE R203 X 0R/4 CPU_VSS_SENSE_R 37

3 CPU_VCC_SENSE << R204 X 0R/4 CPU_VCC_SENSE_R R198 1K/1% FB R202 X 0R/4 C129 X 680p50X4 35

C141 0.01u16X4 R197 0R/4 34

C118 X 33p/50N4 36

R191 1K/1% R188 2K1% C119 X 0.1u16X4 38

CPU_VSS_SENSE_R R199 0R/4 C130 0.01u16X4 38

R190 X 0R/4 38

3 H_PROCHOT# << R180 0R/4 VR_HOT# 3
UP1649_VCC R181 10K/1% VR_SHDN# 40

3 H_VIDALERT# << H_VIDALERT# 5
3 H_VIDCLK << H_VIDCLK 6
3 H_VIDSOUT << H_VIDSOUT 4

VRD_EN 0.8V EN 1

UP1649_VCC R167 27K1% 1

R168 5.1K1% 27

VBOOT: 1.7V 27

FBRTN 37

FB 35

COMP 34

EAP 36

DAC/SS 38

IOUT 32

CSN R184 360R1% CSN_R 30

CSP R179 0R/4 CSP_R 29

NC SET 18

UP1649PGQ_VQFN40-HF 18

UP1649_VCC 2

UP1649_VCC 10

UP1649_VCC 33

UP1649_VCC 34

UP1649_VCC 33

UP1649_VCC 33

UP1649_VCC 33

UP1649_VCC 33

UP1649_VCC 33

UP1649_VCC 33

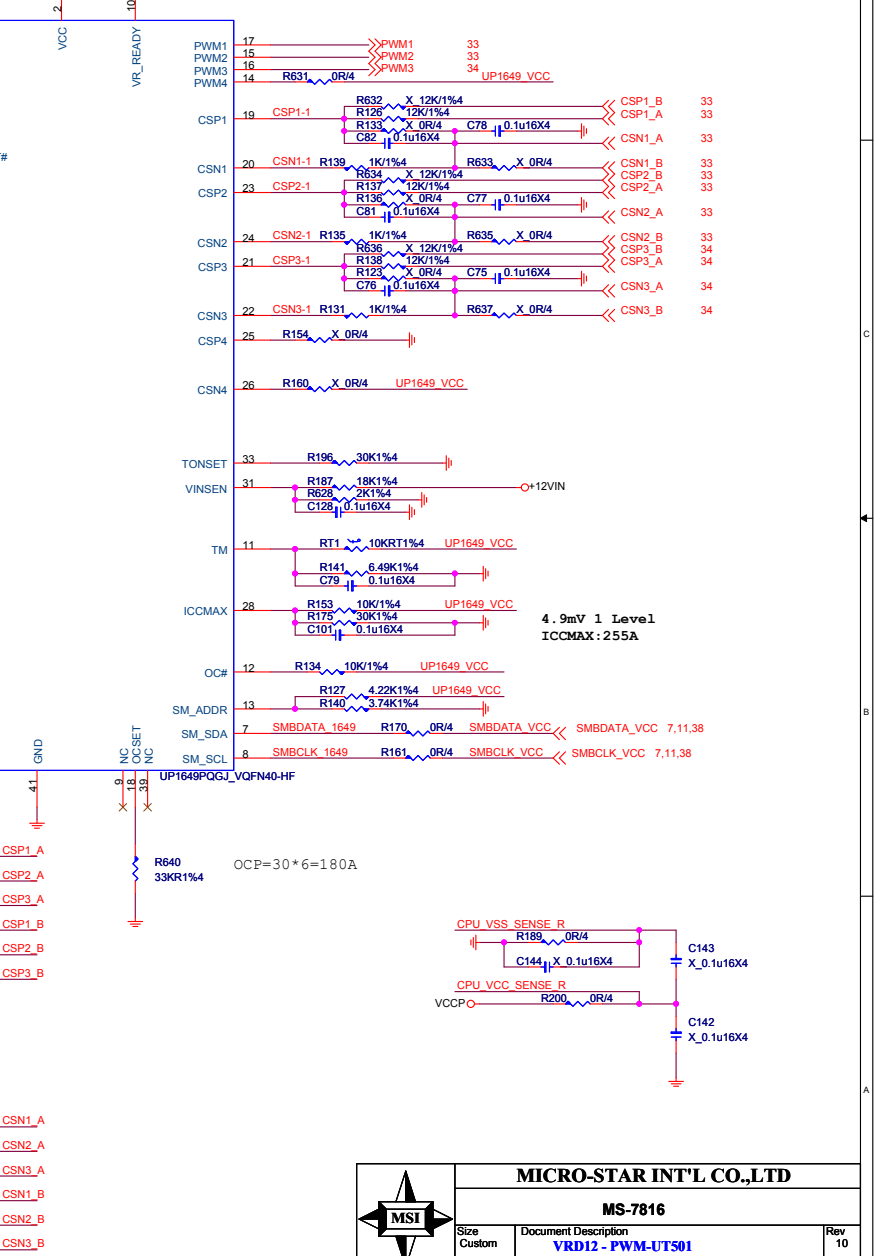
UP1649_VCC 33

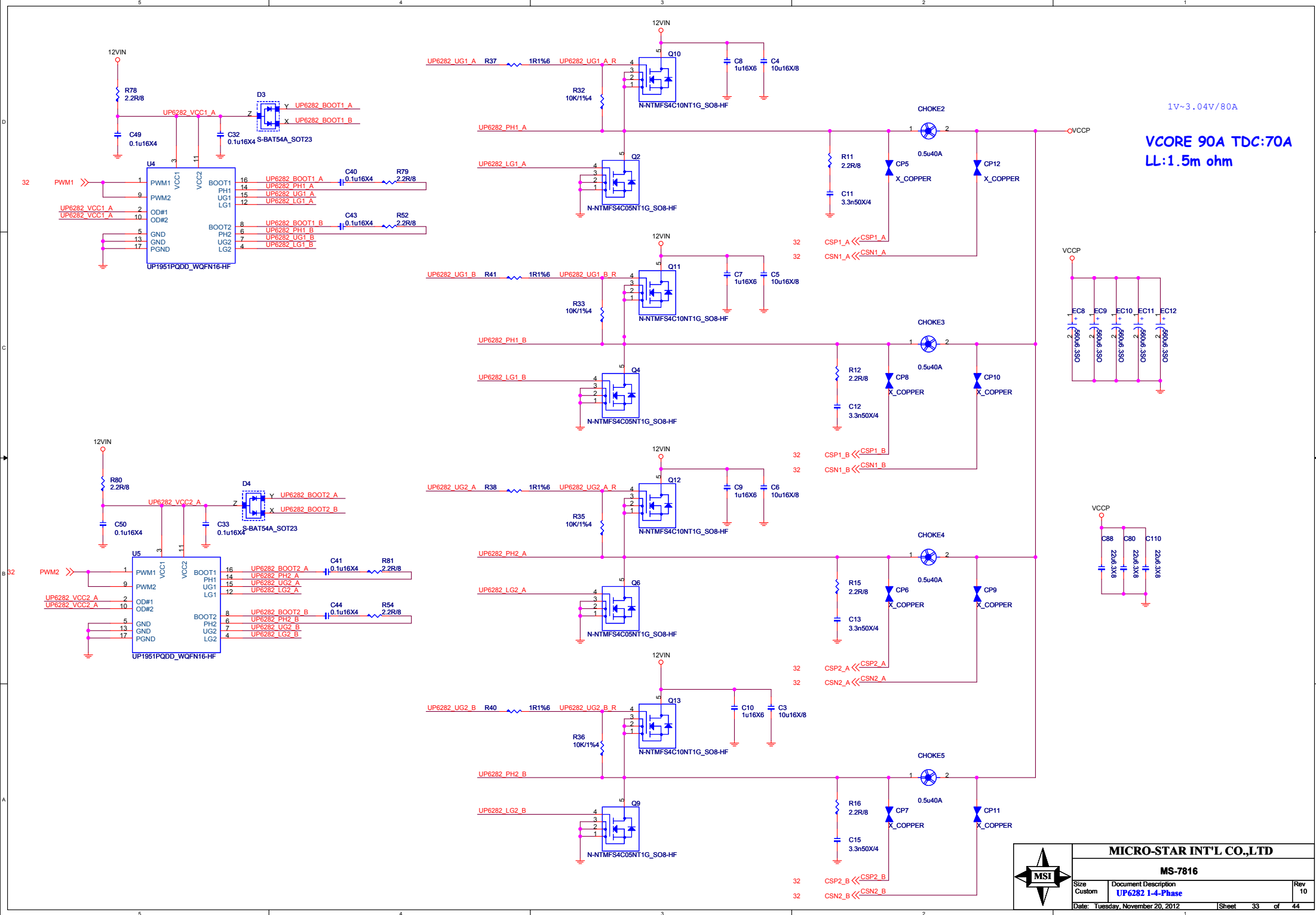
UP1649_VCC 33

UP1649_VCC 33

UP1649_VCC 33

UP1649_VCC 33





DDR Power:1.5V

DDR3_1.5V 4.2A+12A+1.115A+6A=23.315A

4.2A FOR CPU

12A FOR 4DIMM

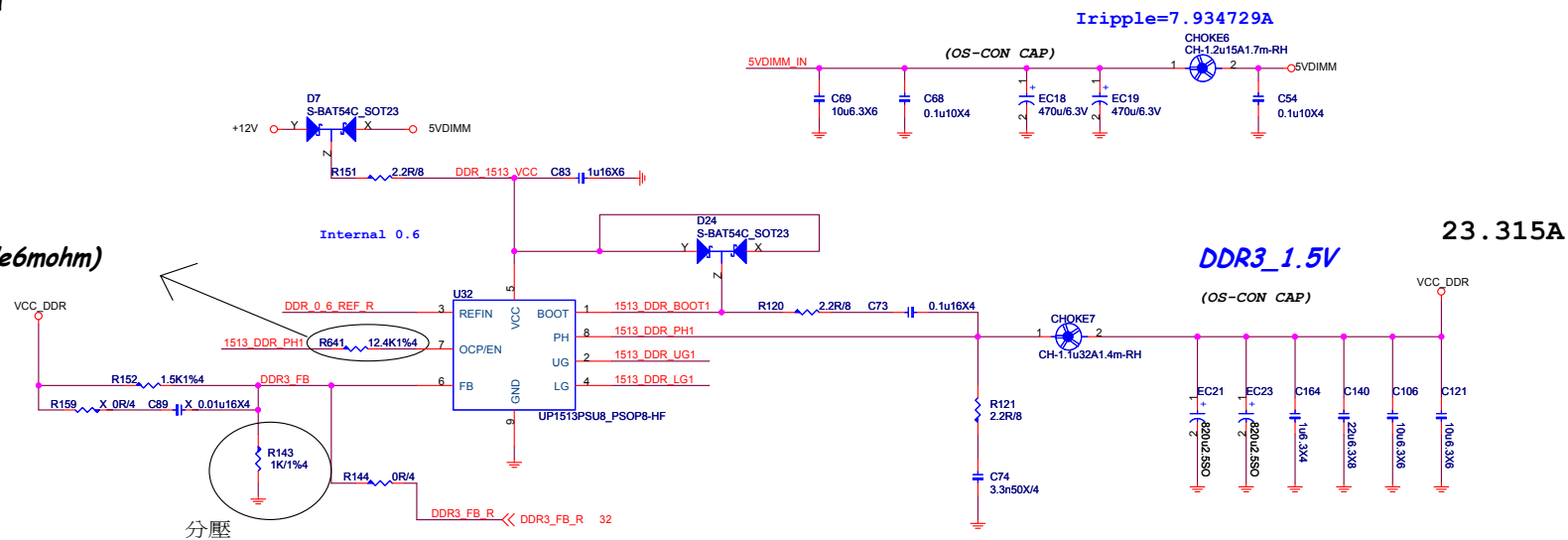
1.115A FOR VTT_DDR

PCH Core 6A

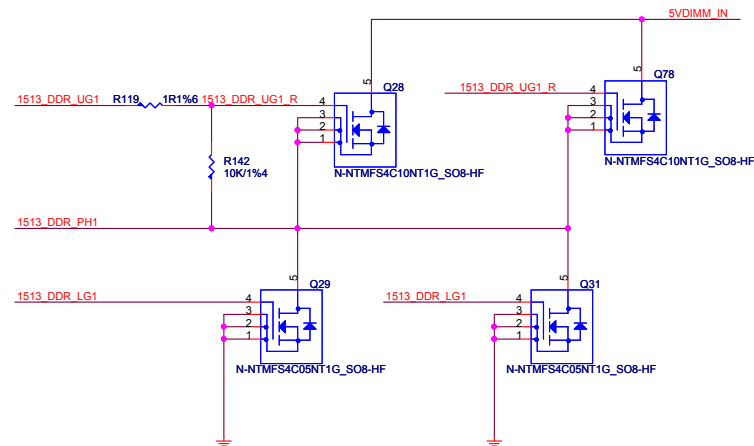
OCP 23.315*1.5=35A

35A=(40uA*Roccs(R641)-0.4V)/Rdson(Low side6mohm)

R641=12.4K ohm

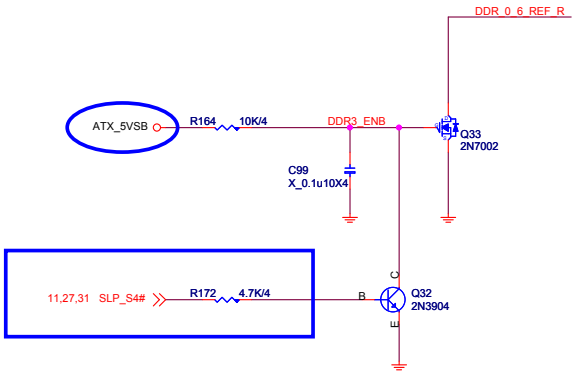
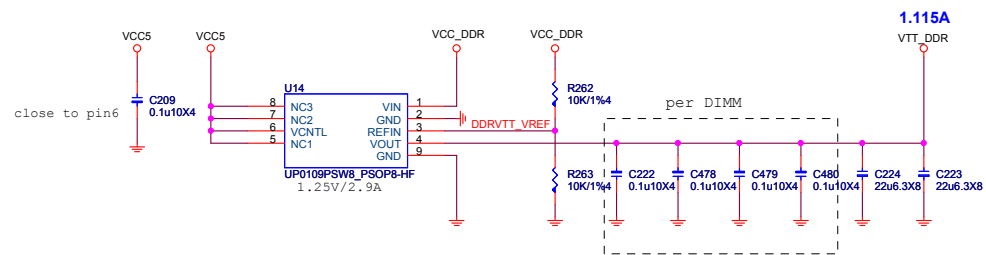


分壓



DDR VTT Power

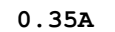
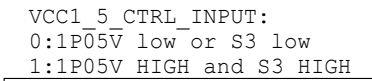
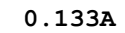
To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



P.S. Only for meet Intel power down sequence.

MICRO-STAR INT'L CO.,LTD			
MS-7816			
Size	Document Description	Rev	
Custom	DDR Power -UPI513 - DDR POWER	10	
Date: Tuesday, November 20, 2012	Sheet	35	of 44

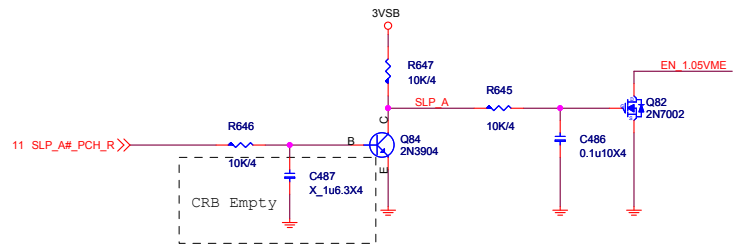
PCH Core 6A



MICRO-STAR INT'L CO.,LTD			
MS-7816			
Size Custom	Document Description PCI Power - uP1513 1-Phase MOS		Rev 10
Date: Tuesday, November 20, 2012		Sheet 36	of 44

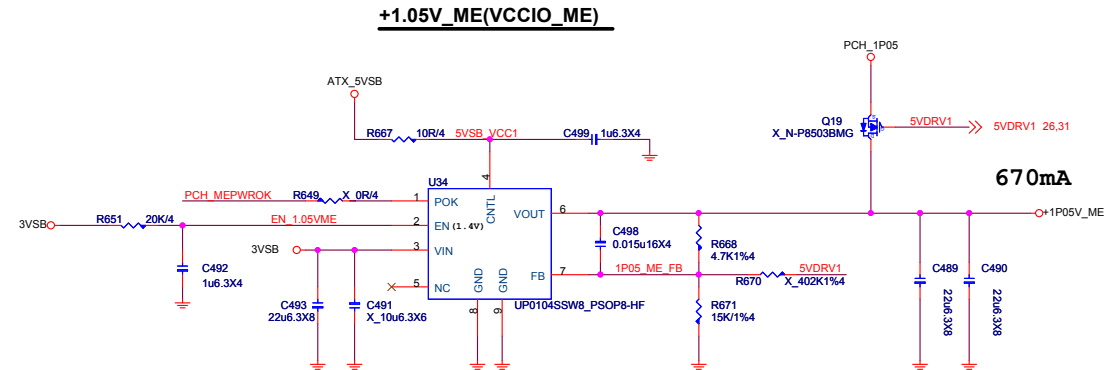
C318,C323,R378,C313,C314,C333,R366 for H87 un stuff
Z87 only stuff R354

SLP_A

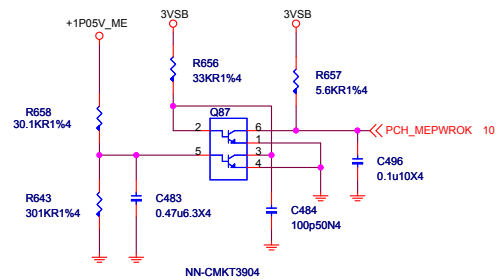


SLP A# PCH R R666 X 0R/4 EN 1.05VME

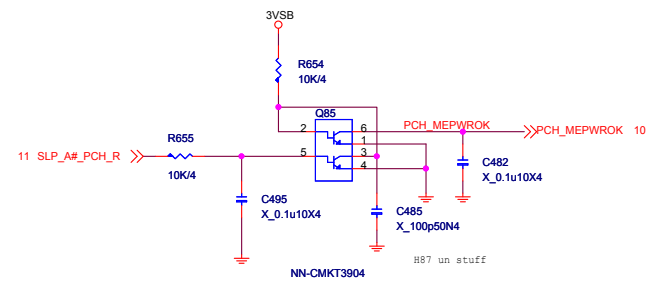
ME Power Control



PCH_MEPWROK

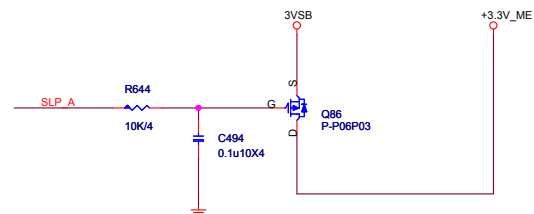


VccASW active to APWROK high 1ms



APWROK falling to VccASW falling 40ns

+3.3V_ME

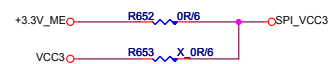


For INTEL ME BUG

```

287->Stuff R366
H87->Stuff R354

```



MICRO-STAR INT'L CO.,LTD

MS-7816

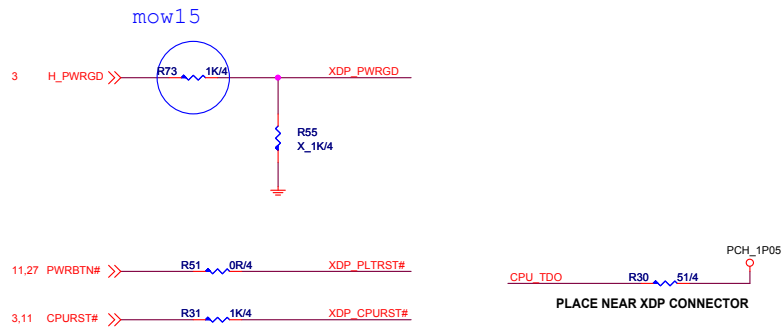
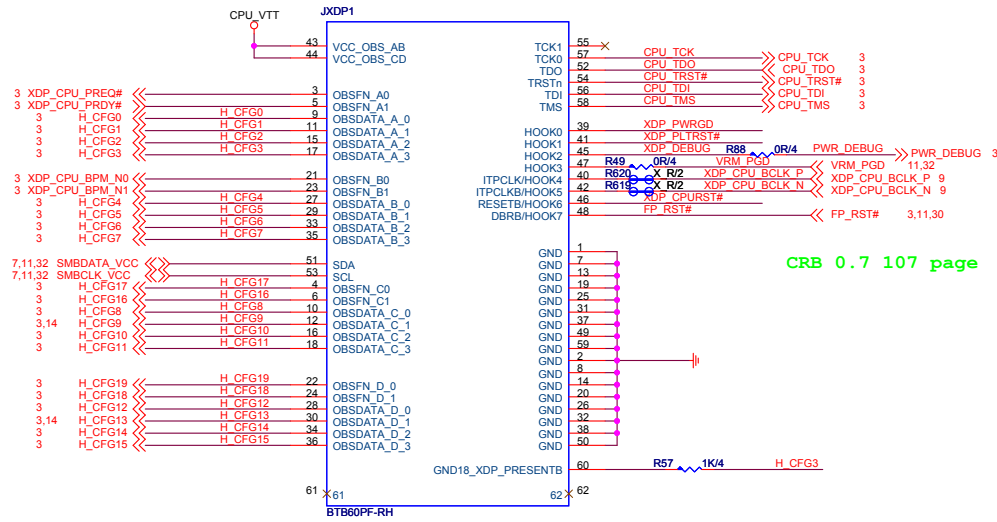
Size	Custom
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	Document Description ME POWER
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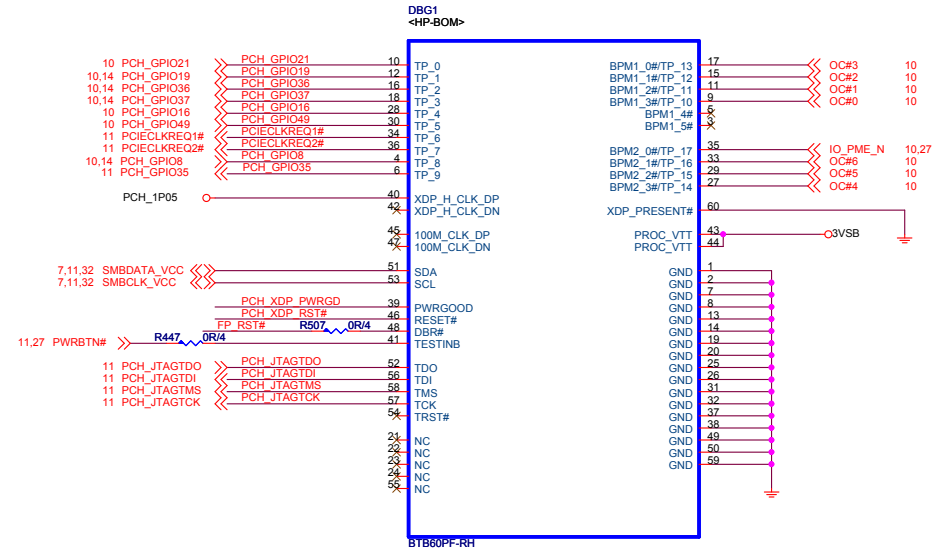
10

Date: Tuesday, November 20, 2012	Sheet 37 of 44
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Reserve debug port 5020



PCH XDP



PCH XDP PWRGD/RESET





7816_10

2012/11/162012/11/23PK0-0781610-G37, 精成, 23, 寶安恩斯邁廠 (MSIS) 4, Coffee
2012/11/162012/11/23PK0-0781610-G37, 精成, 27, 寶安恩斯邁廠 (MSIS) 4, Coffee
2012/11/162012/11/23PK0-0781610-E48, 競華, 23, 寶安恩斯邁廠 (MSIS) 4, Coffee
2012/11/162012/11/23PK0-0781610-E48, 競華, 27, 寶安恩斯邁廠 (MSIS) 4, Coffee



HDMI_RLA



HDMI LABEL



BIOS_LABEL

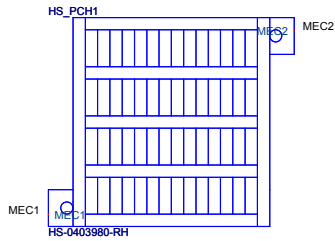


CPU_H1



BAT-BCR2032P-RH

HEATSINK

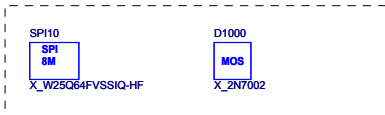


H87 OPT.



601-7823-XXX
X_MKT-LABEL

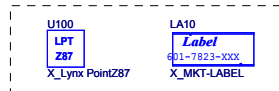
SPI OPT.



X_W25Q64FVSSIQ-HF

X_2N7002

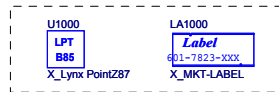
Z87 OPT.



X_Lynx PointZ87

601-7823-XXX
X_MKT-LABEL

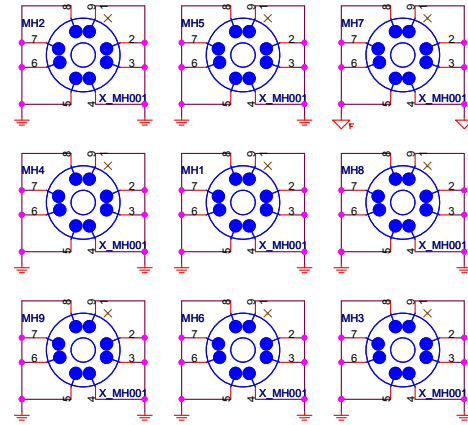
B85 OPT.



X_Lynx PointZ87

601-7823-XXX
X_MKT-LABEL

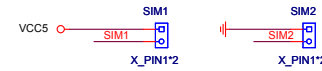
Mounting Holes



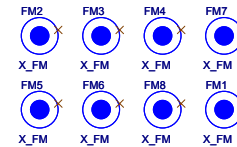
Test point

VCCP		VCCP
VCC_DDR		VCC_DDR
VTT_DDR		VTT_DDR
PCH_1P05		PCH_1P05
PCH_1P5		PCH_1P5
5VDIMM		5VDIMM
3VSB		3VSB
VBAT		VBAT
3VA		3VA
PCH_VCC3		PCH_VCC3
CPU_VTT		CPU_VTT

Simulation



Optical Fiducial Marks-120



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MS-7816

Size Custom	Document Description Manual parts	Rev 10
Date: Tuesday, November 20, 2012	Sheet 39 of 44	

