

TITLE	Page
Cover Sheet	1
Block Diagram	2
CPU-CLK/Control/MISC/PEG ,CPU-Memory	3,4
CPU-Power/CPU-GND	5,6
SO_DDRIII DIMMA1&SO_DDRIII DIMMB1	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
AUDIO 892	17
LAN-RTL8111G	18
DVI Connector	19
HDMI Connector	20
Display port Connector	21
VGA Connector	22
SATA Connector	23
USB3.0 Connector /USB Charger / USB2.0	24,25,26
SIO-NTC6779D/PS2	27
FAN	28
ATX F_Panel/EMI/TPM	29
ACPI Controller UPI	30
VRM12 .5 - ISL95812	31
ISL6208B 3-Phase+MOS CPU	32
UP1504S - DDR POWER	33
OP+MOS - PCH POWER	34
ME POWER	35
XDP / Manual Parts	36,37
EMI CAP	38

MS-7823

mATX

Ver: 12(243.84x243.84)

Intel -SharkBay platform Z87

CPU:

Haswell LGA1150

System Chipset:

Lynx Point Z87 co-lay H87 & B85

Onboard Chip:

HD Audio Codec:ALC892

LAN-RTL8111G

SIO:Nuvoton 6779D

Flash ROM: SPI 64 MB/128MB

Main Memory:

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

ACPI:

UPI

Expansion Slots:

*PCI Express (X16) Slot * 1*

*PCI Express (X1) Slot * 2*

*PCI Express (X4) Slot * 1*

PWM:

ISL95812 3 Phase

Other:

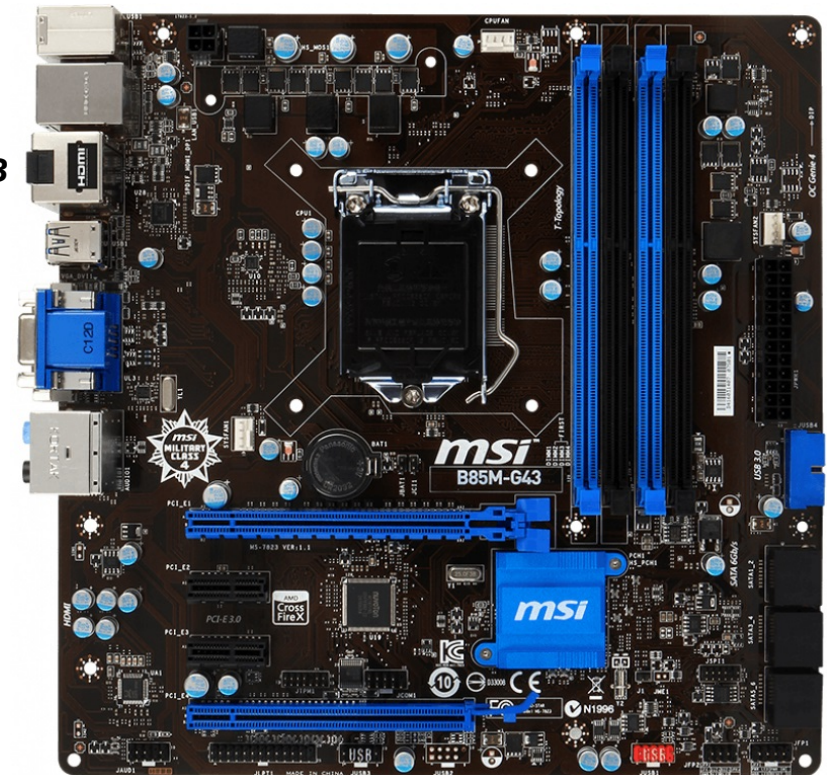
SATA3.0 x6(PCH)

*REAL USB2.0 *4*

*FRONT USB2.0 *6*

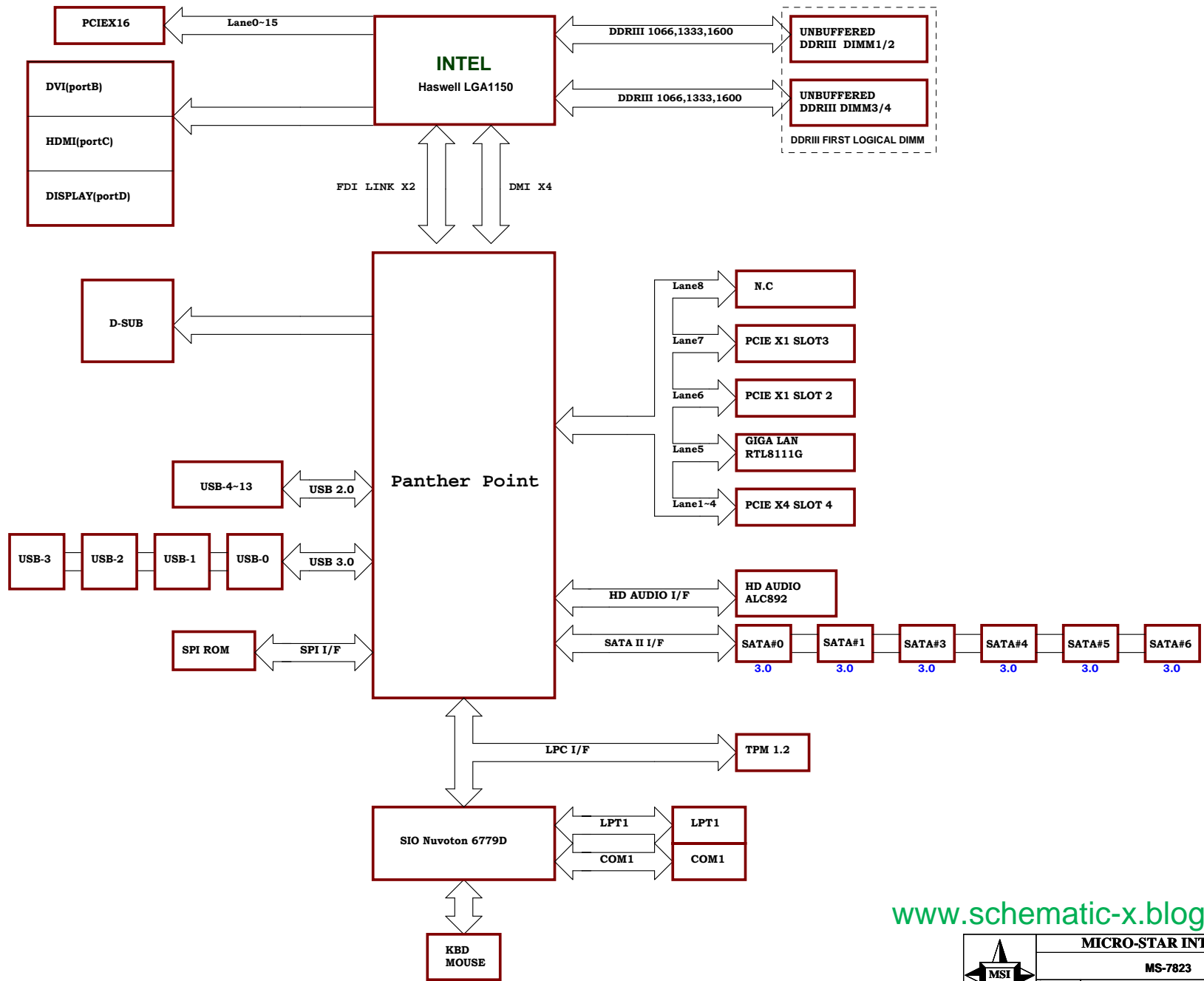
*REAL USB3.0 *2*

*FRONT USB3.0 *2*



MICRO-STAR INT'L CO.,LTD		
MS-7823		
Size	Document Description	Rev
Custom	Cover Sheet	12
Date: Thursday, May 16, 2013		Sheet 1 of 42

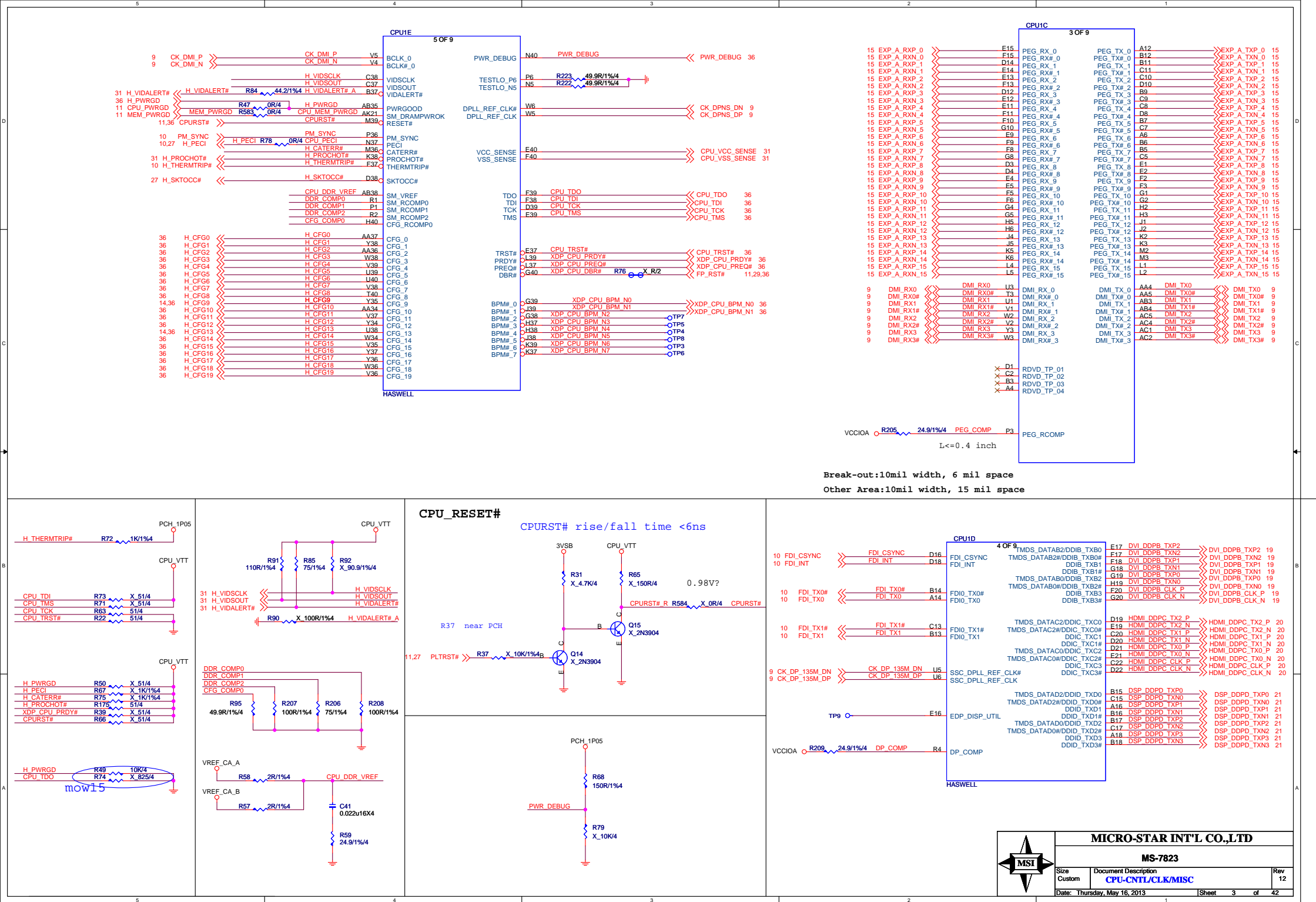
MS-7823 Block Diagram

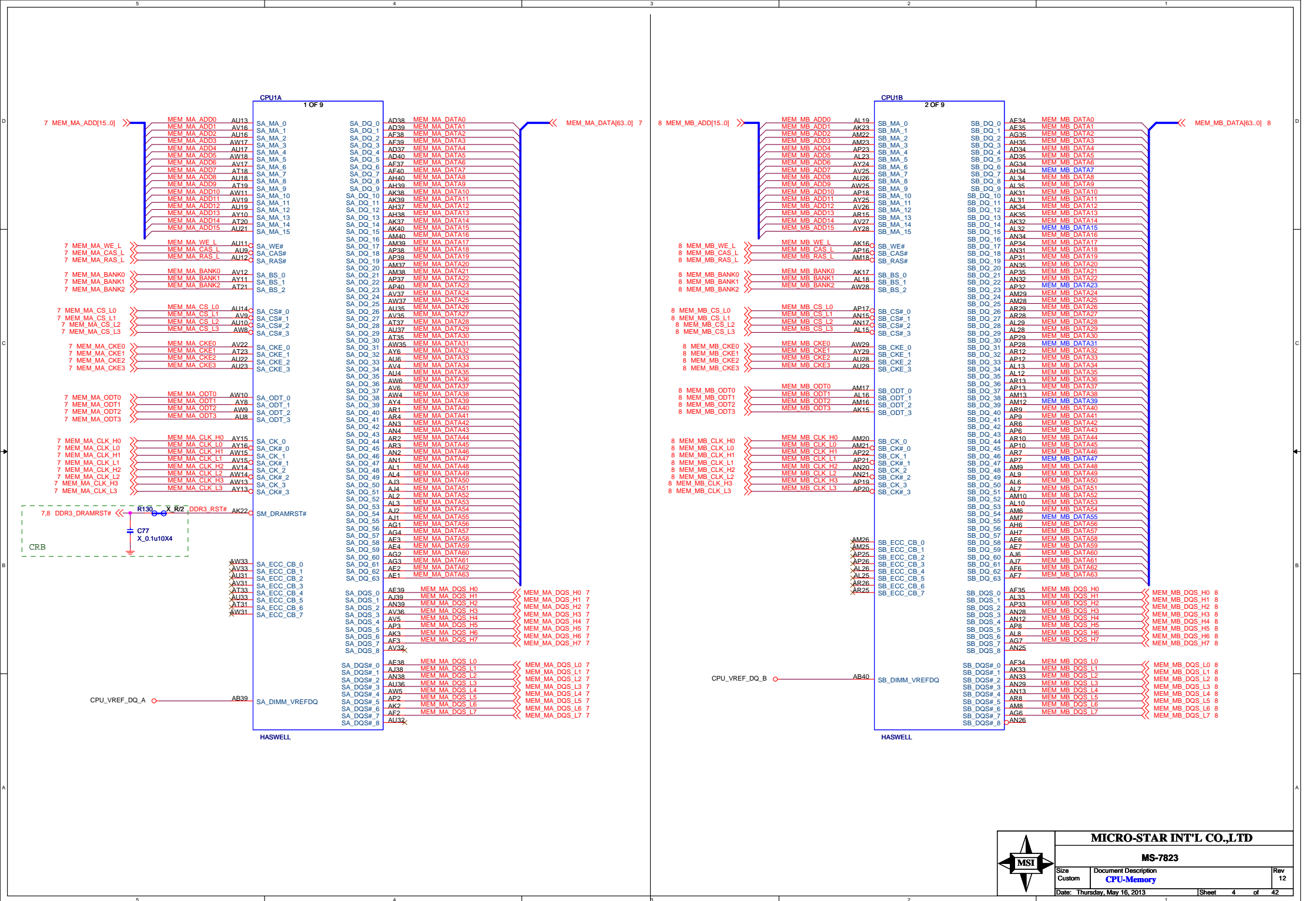


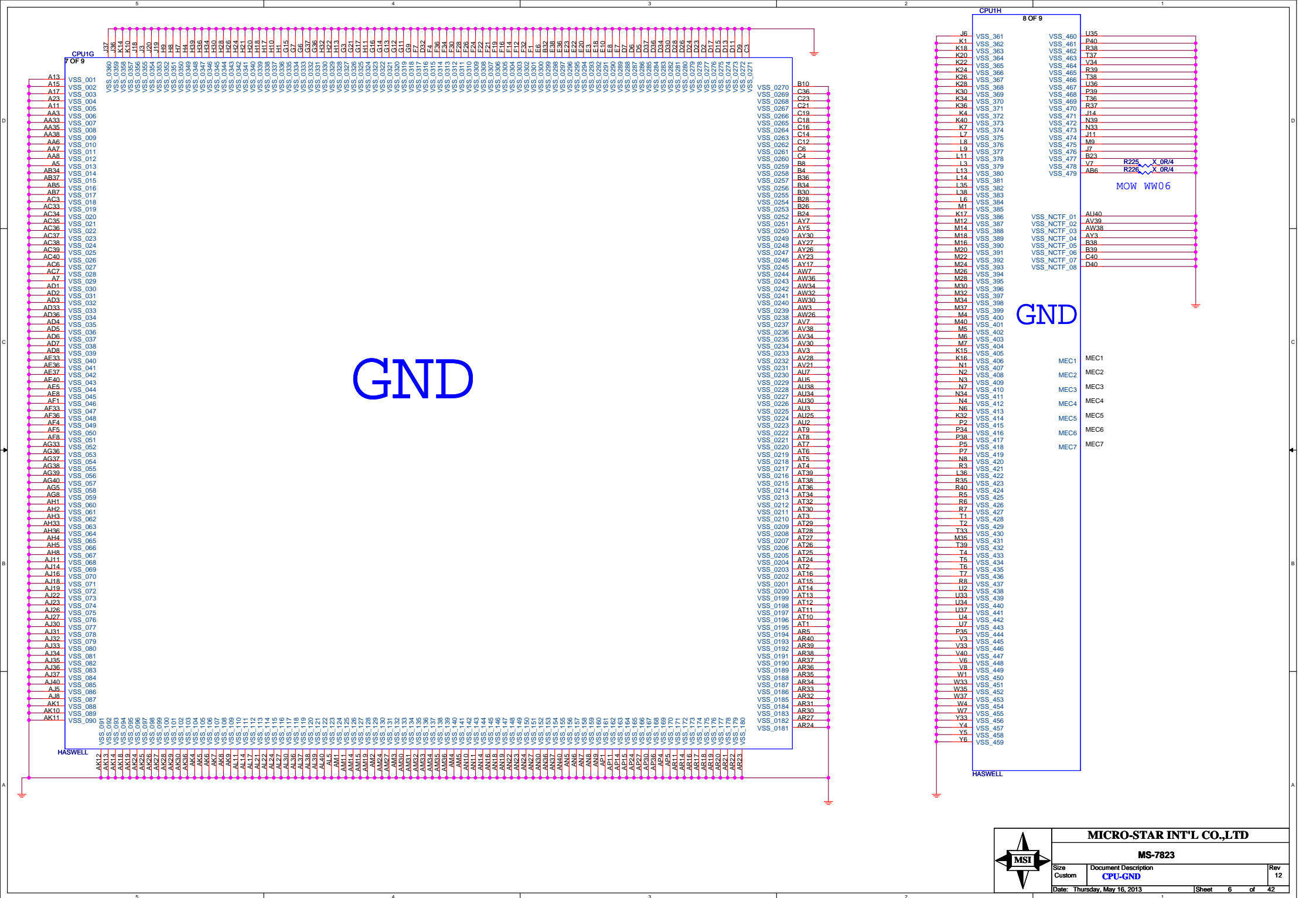
Slot Sequence:

- PCIE X16
- PCIE X1
- PCIE X1
- PCIE X16(X4)

www.schematic-x.blogspot.com







GND

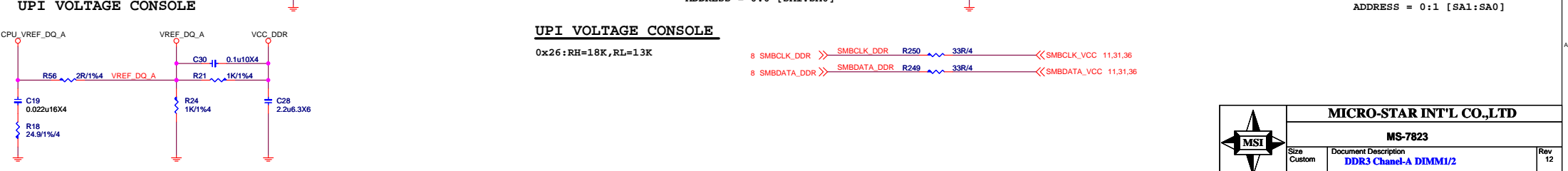
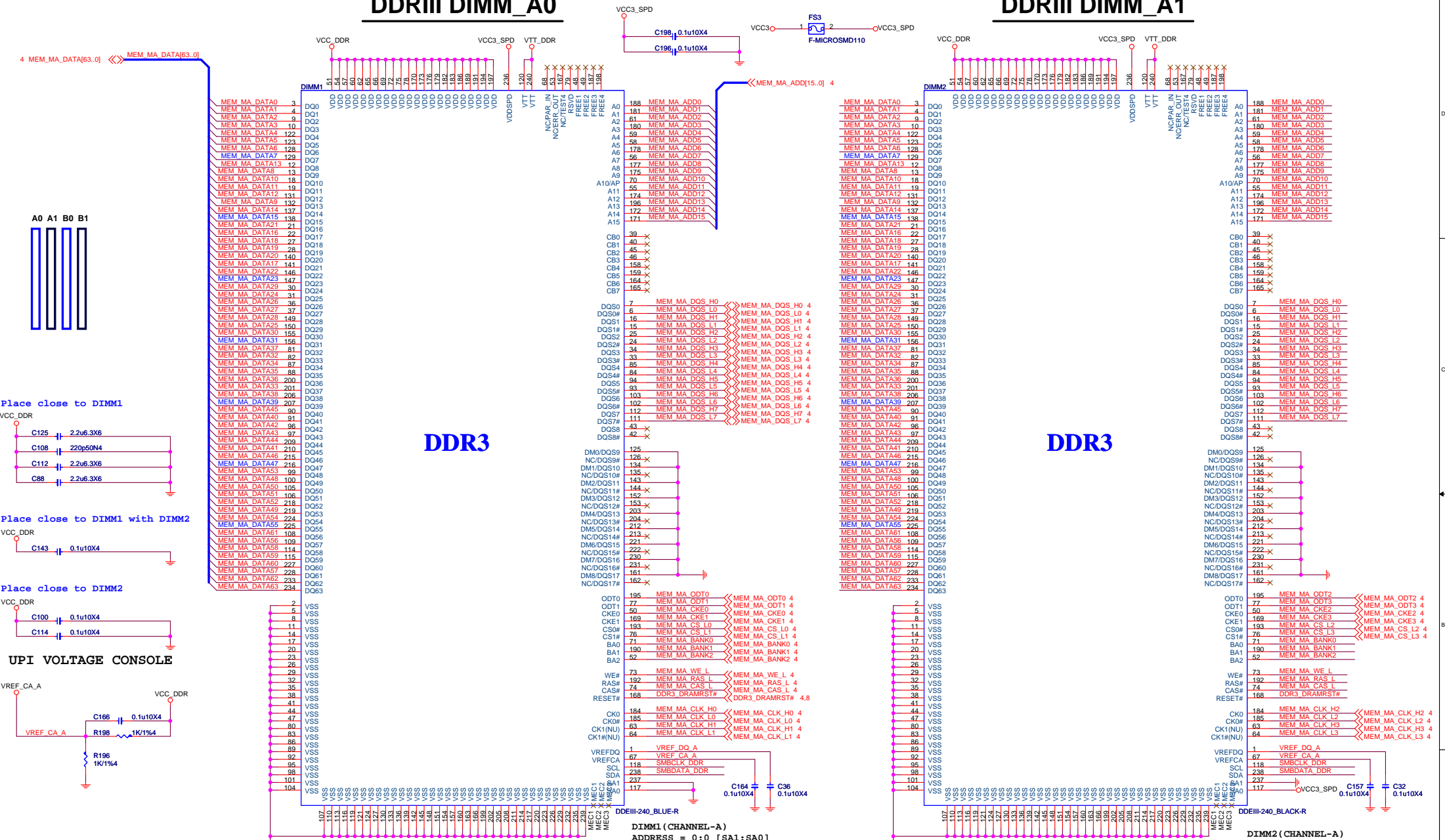
GND



MICRO-STAR INT'L CO.,LTD		
MS-7823		
Size	Document Description	Rev
Custom	CPU-GND	12
Date: Thursday, May 16, 2013		Sheet 6 of 42

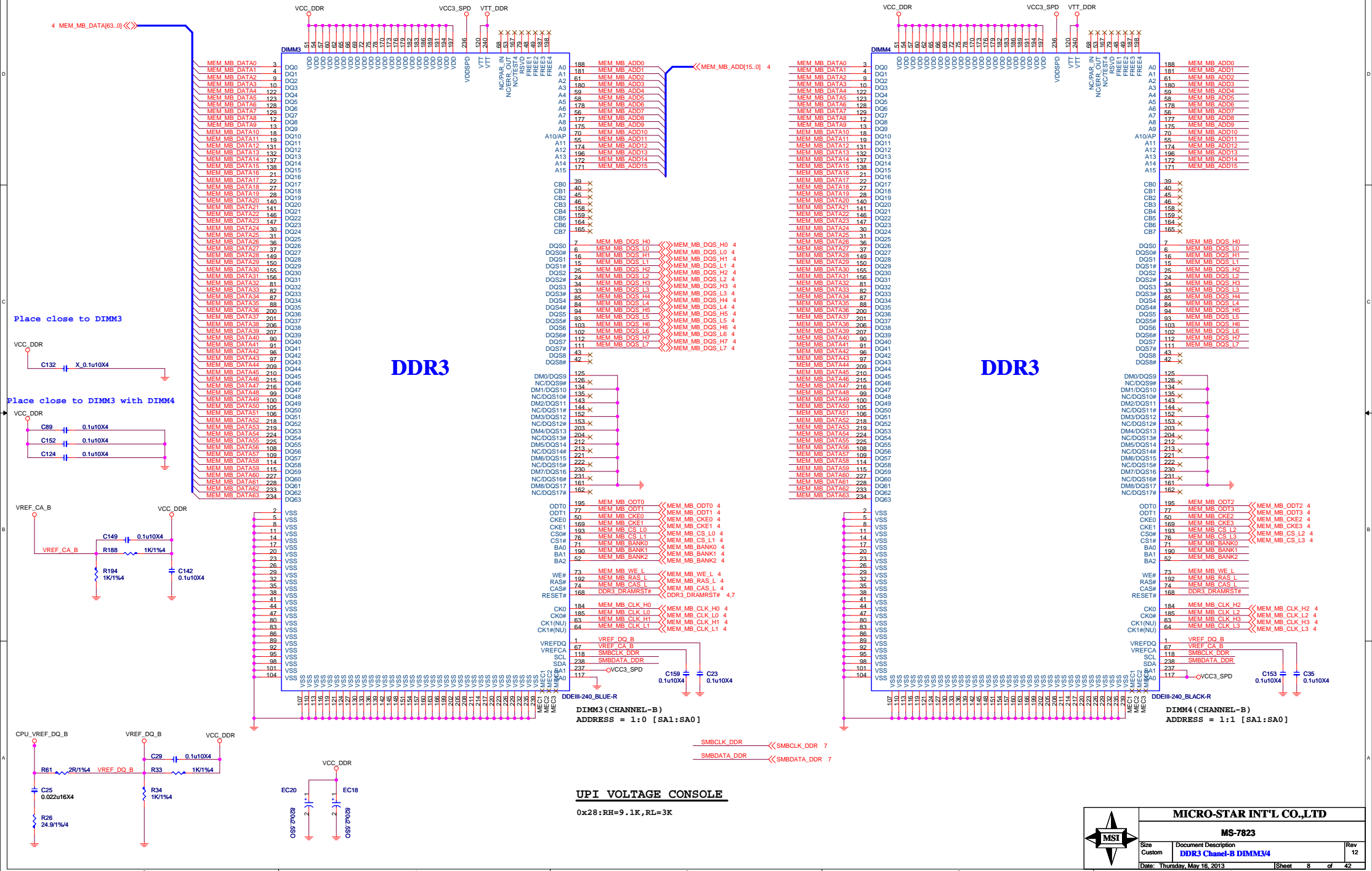
DDRIII DIMM_A0

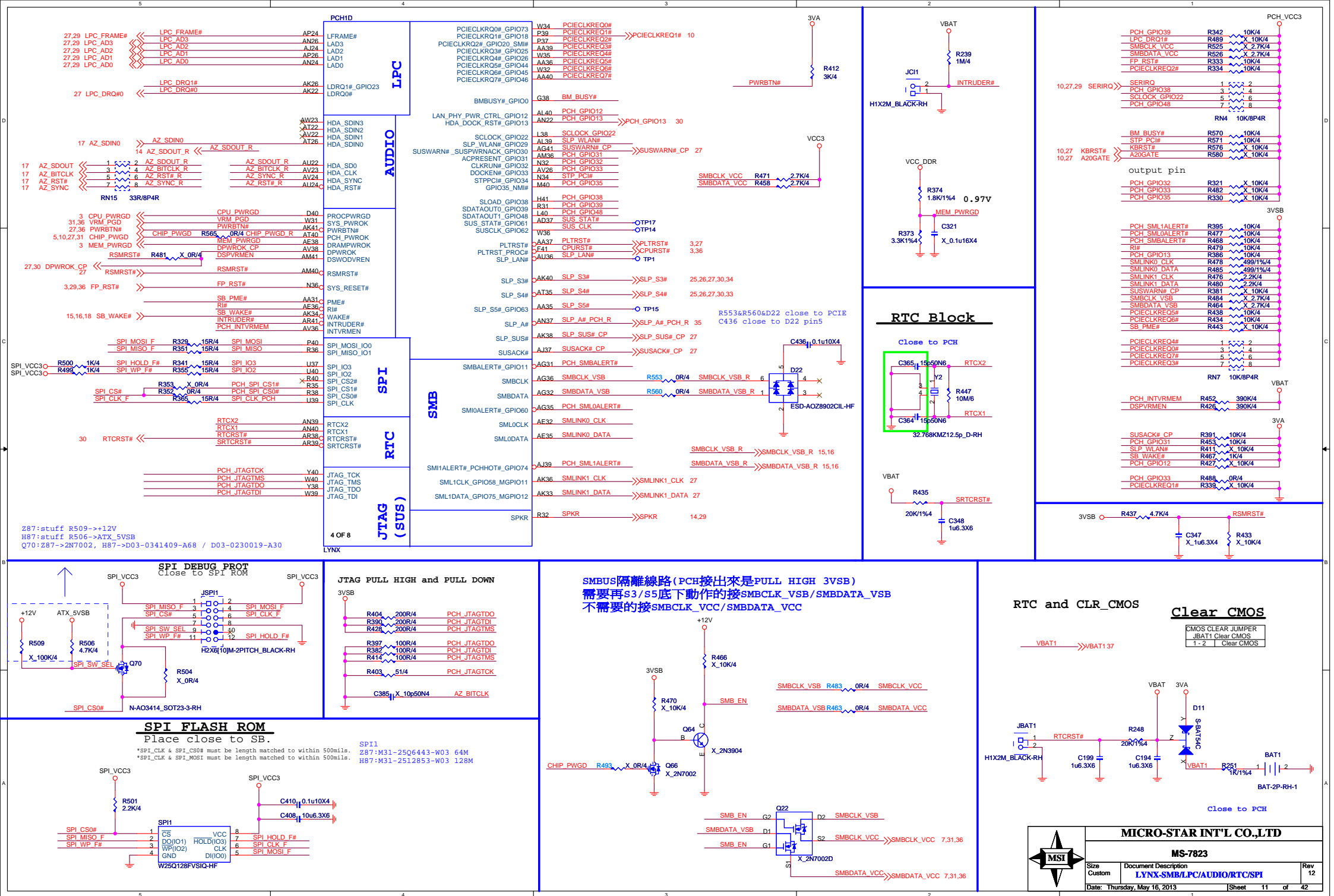
DDRIII DIMM_A1



DDR3 DIMM_B0

DDR3 DIMM_B1



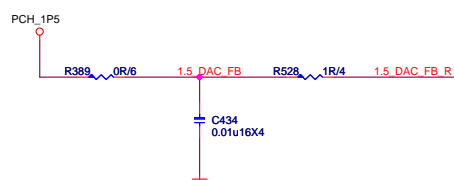
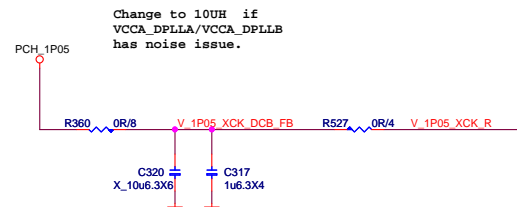


(Internal) 1.312A+(External)1.38A=2.45A

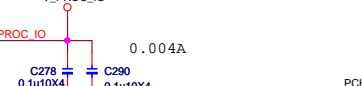
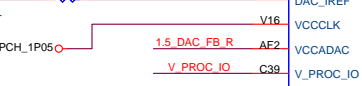
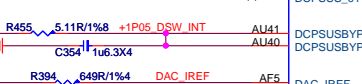
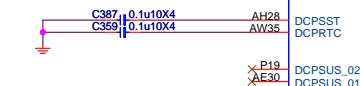
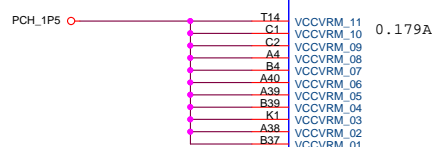
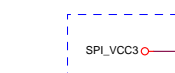
POWER

AG1 DT CRB0.7 VCC3 POWER

(Internal) 0.261A+(External)0.261A=0.522A

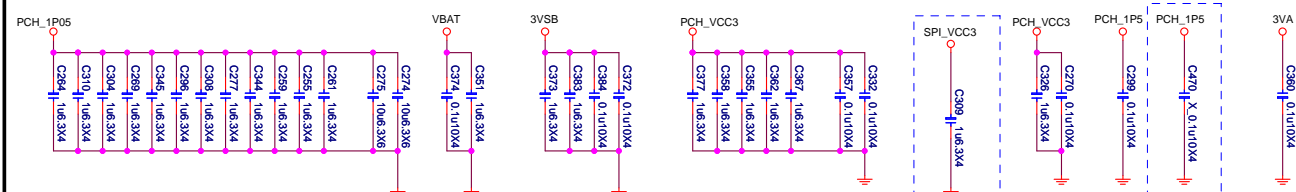


VCC3 0.21A
3VA 0.015A
VBAT 6uA
3VSB 0.261A
VCC1_5 0.249A
PCH_1P05 5.921A

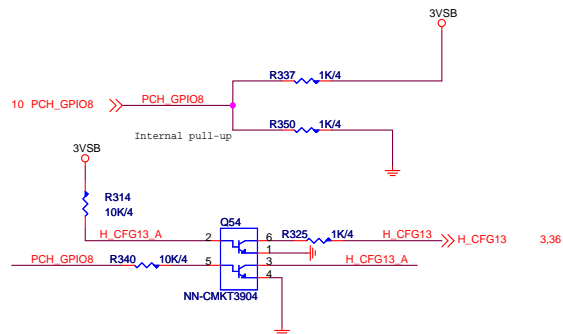
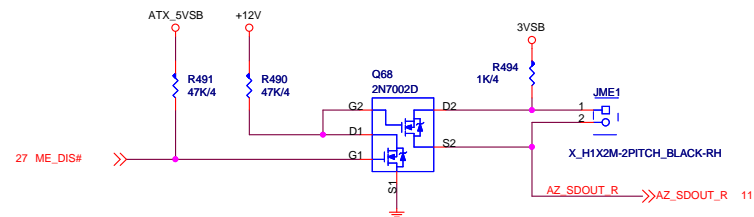
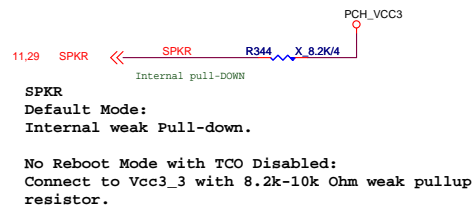


PCH_VCC3 HAVE SEQCING

PCH decoupling cap

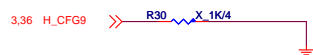


MICRO-STAR INT'L CO.,LTD		
MS-7823		
Size	Document Description	Rev
Custom	LYNX-POWER	12
Date: Thursday, May 16, 2013	Sheet 12 of 42	

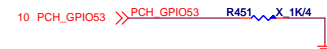


GPIO55
Default Mode:
Internal pull-up.

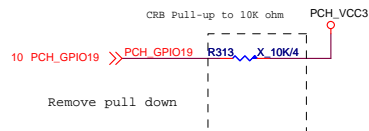
Top Block Swap Mode:
Connect to ground with 4.7k Ohm weak pulldown resistor.



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.



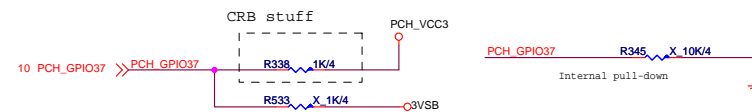
Default (SPI):
Left both SATA1GP/GPIO19 and GPIO51 floating.
No pull up required.

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.

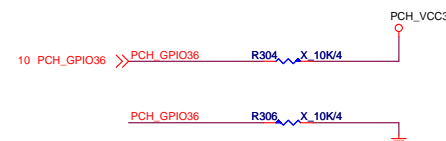
BOOT DEVICE	GPIO51	GPIO19
LPC	0	0
SPI	1	1

Default



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

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

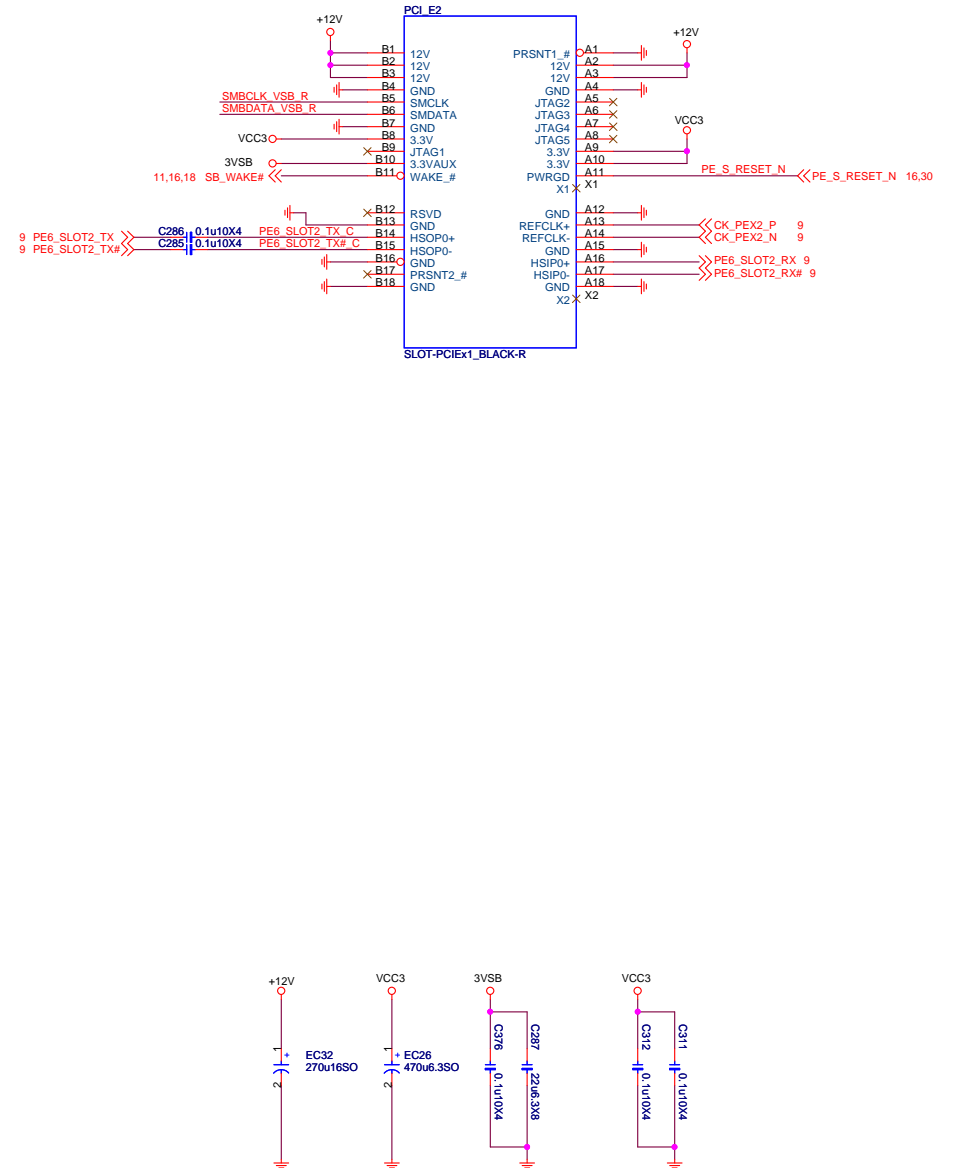


MICRO-STAR INT'L CO.,LTD

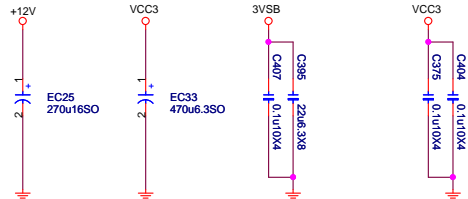
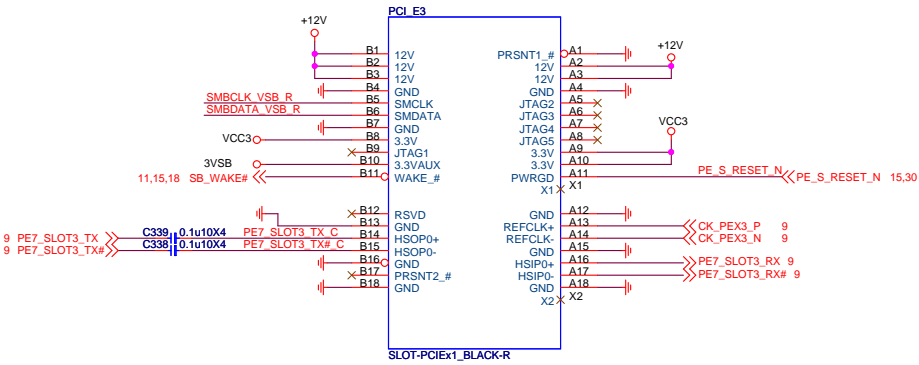
MS-7823

Size Custom	Document Description LYNX-Strap	Rev 12
Date: Thursday, May 16, 2013	Sheet 14 of 42	

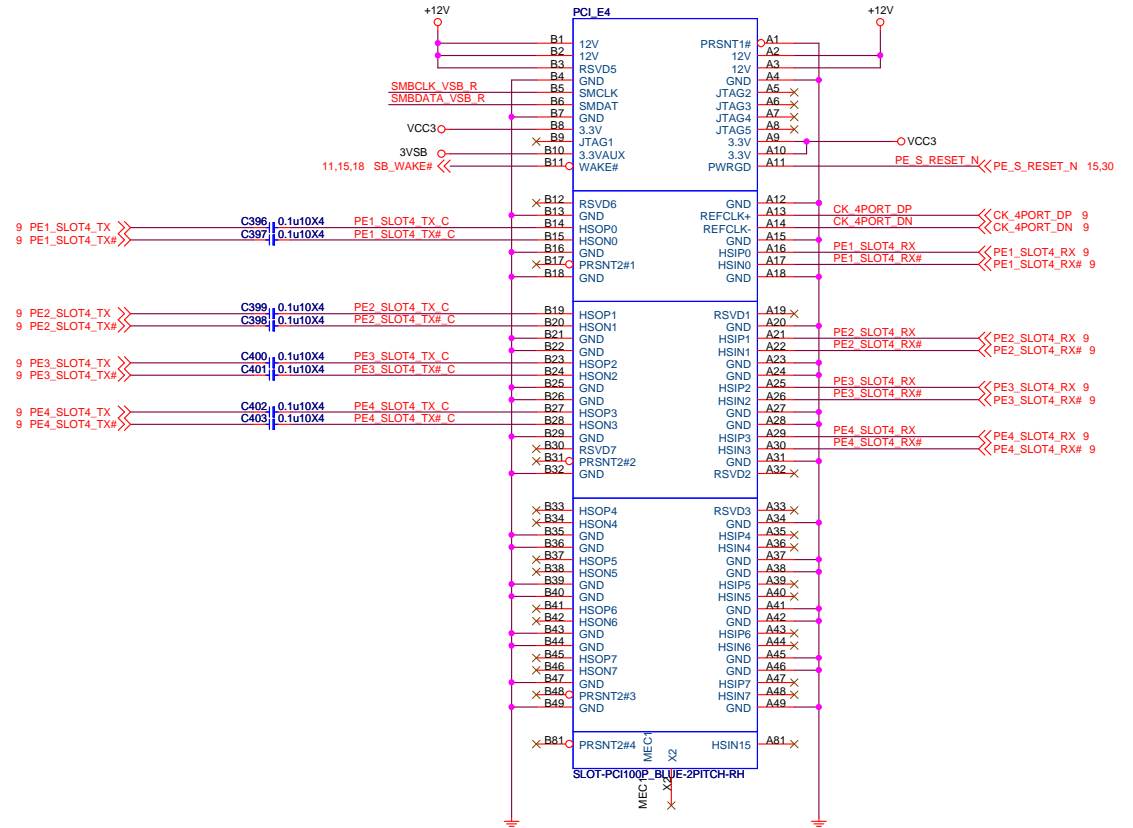
11,16 SMBCLK_VSB_R
11,16 SMBDATA_VSB_R



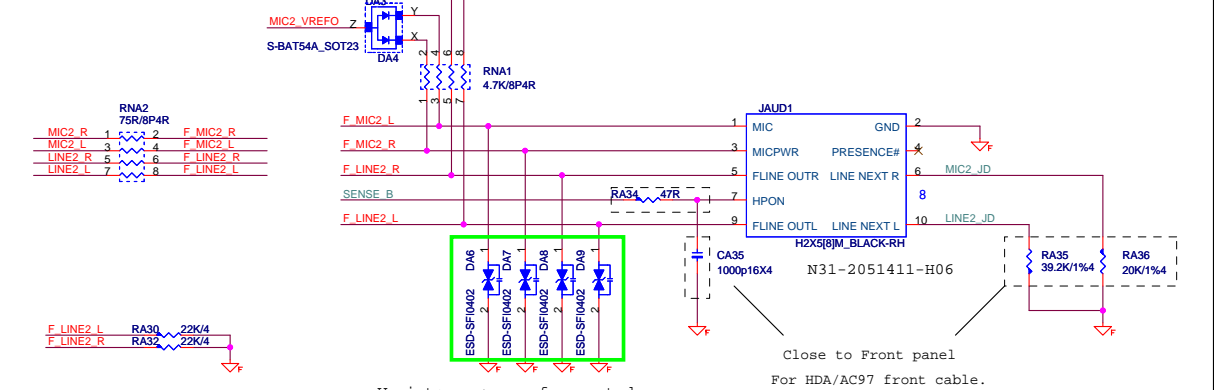
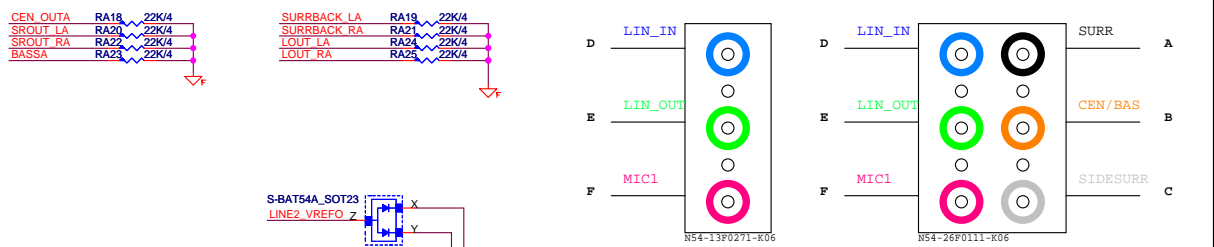
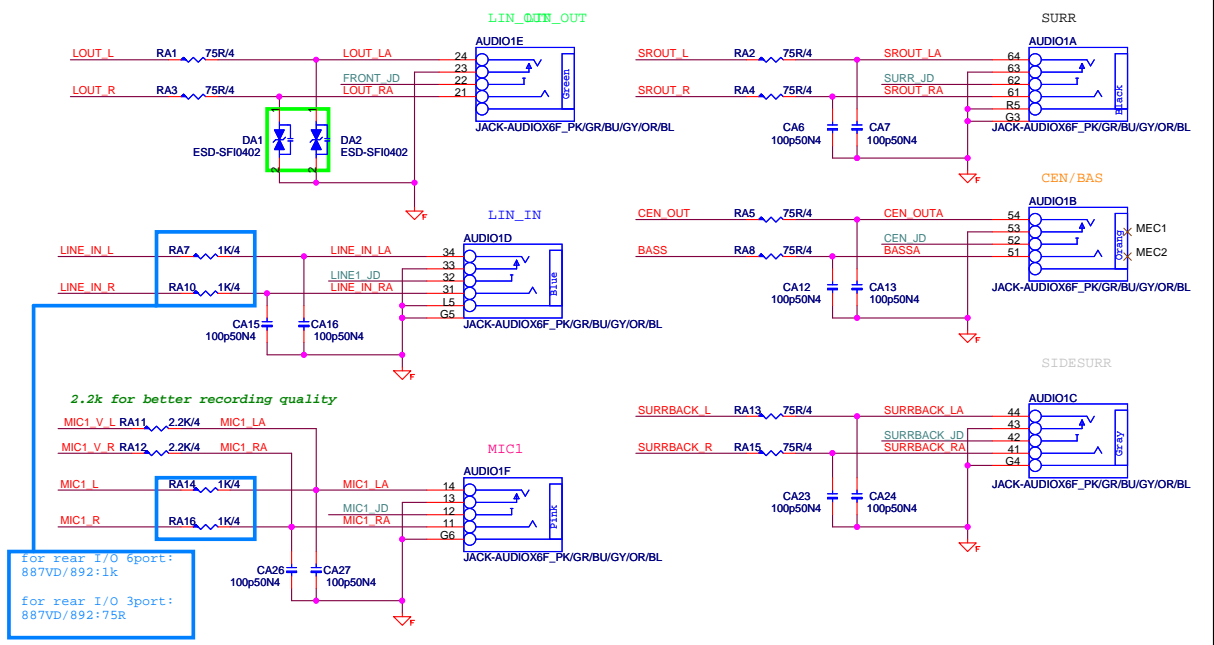
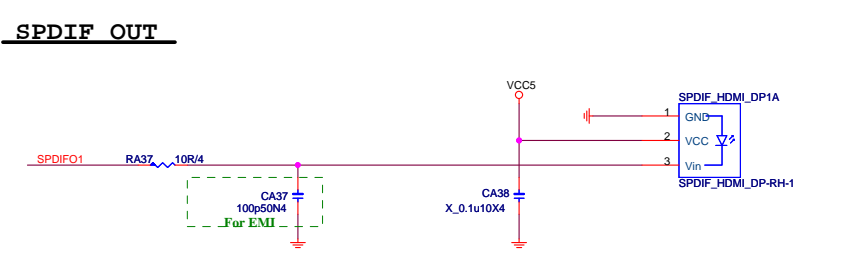
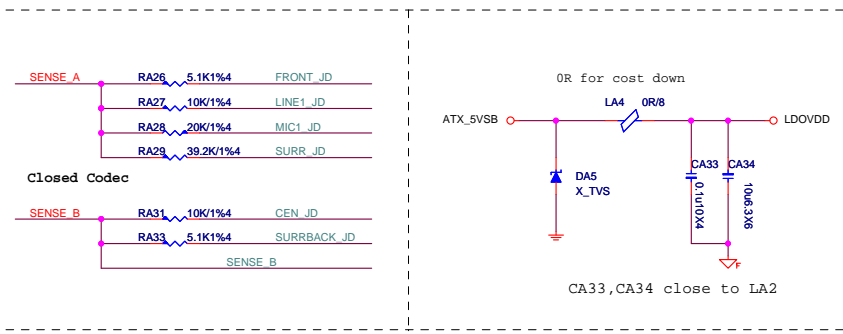
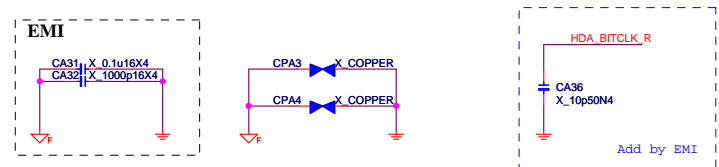
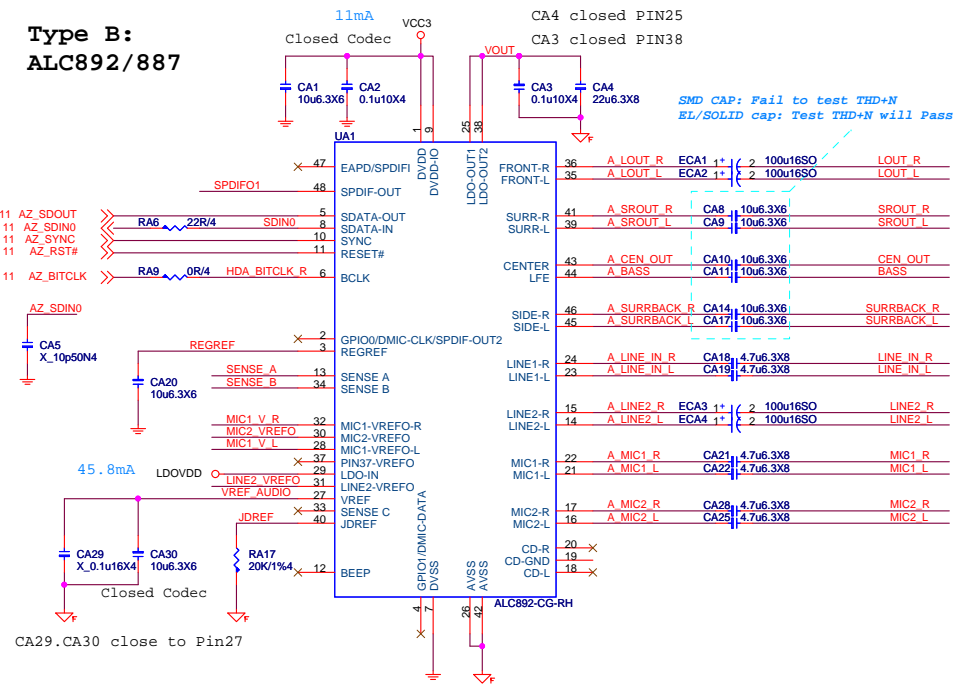
11,15 SMBCLK_VSB_R
11,15 SMBDATA_VSB_R



PCI Express X4 Slot



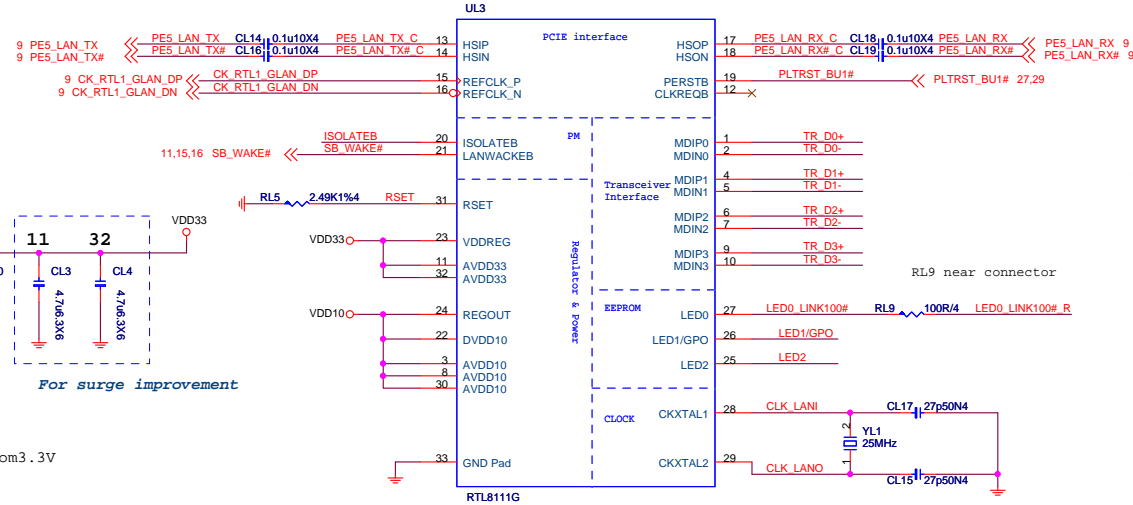
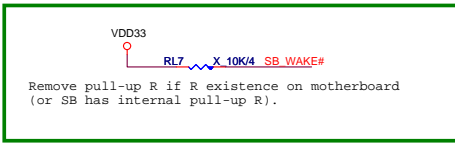
Type B: ALC892/887



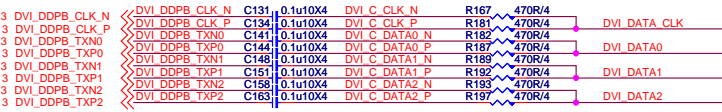
MICRO-STAR INT'L CO.,LTD			
MS-7823			
Size	Document Description	Rev	
Custom	Audio Codec ALC892	12	
Date: Thursday, May 16, 2013	Sheet	17	of 42

RTL8111G Giga LAN

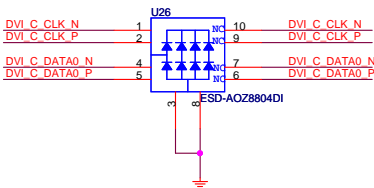
RTL8106E 10/100M LAN



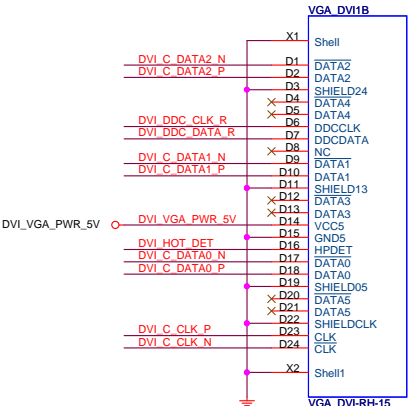
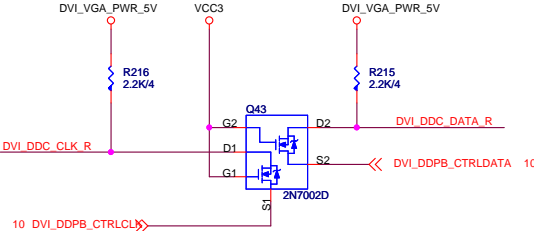
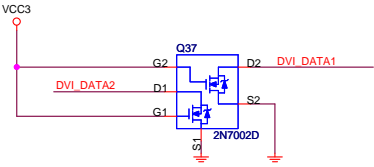
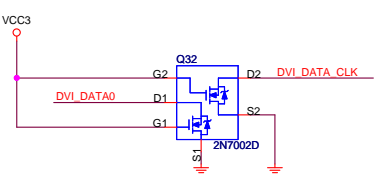
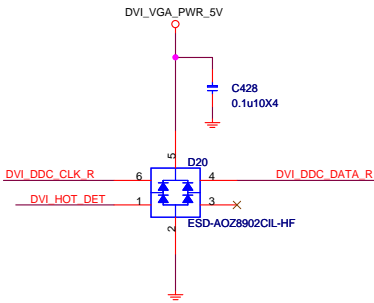
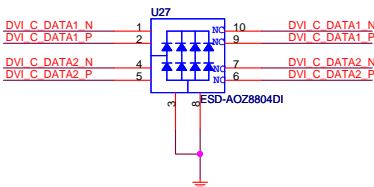
VGA: resolution of 2048x1536 pixels with 32-bit color at 75 Hz (4:3 QXGA)



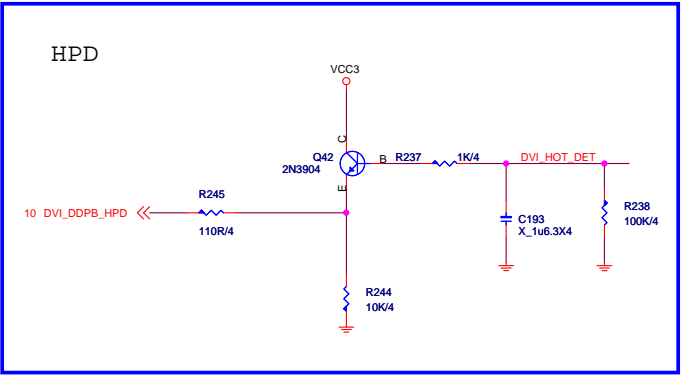
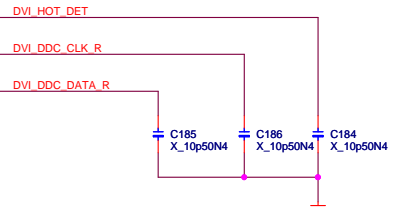
U26 AVL:D0G-05A050C-005
D0G-06A050C-A68



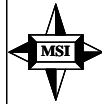
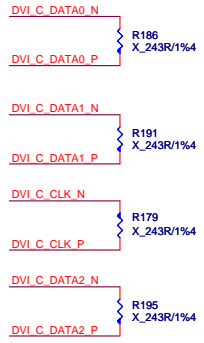
U27 AVL:D0G-05A050C-005
D0G-06A050C-A68



EMI



For EMI

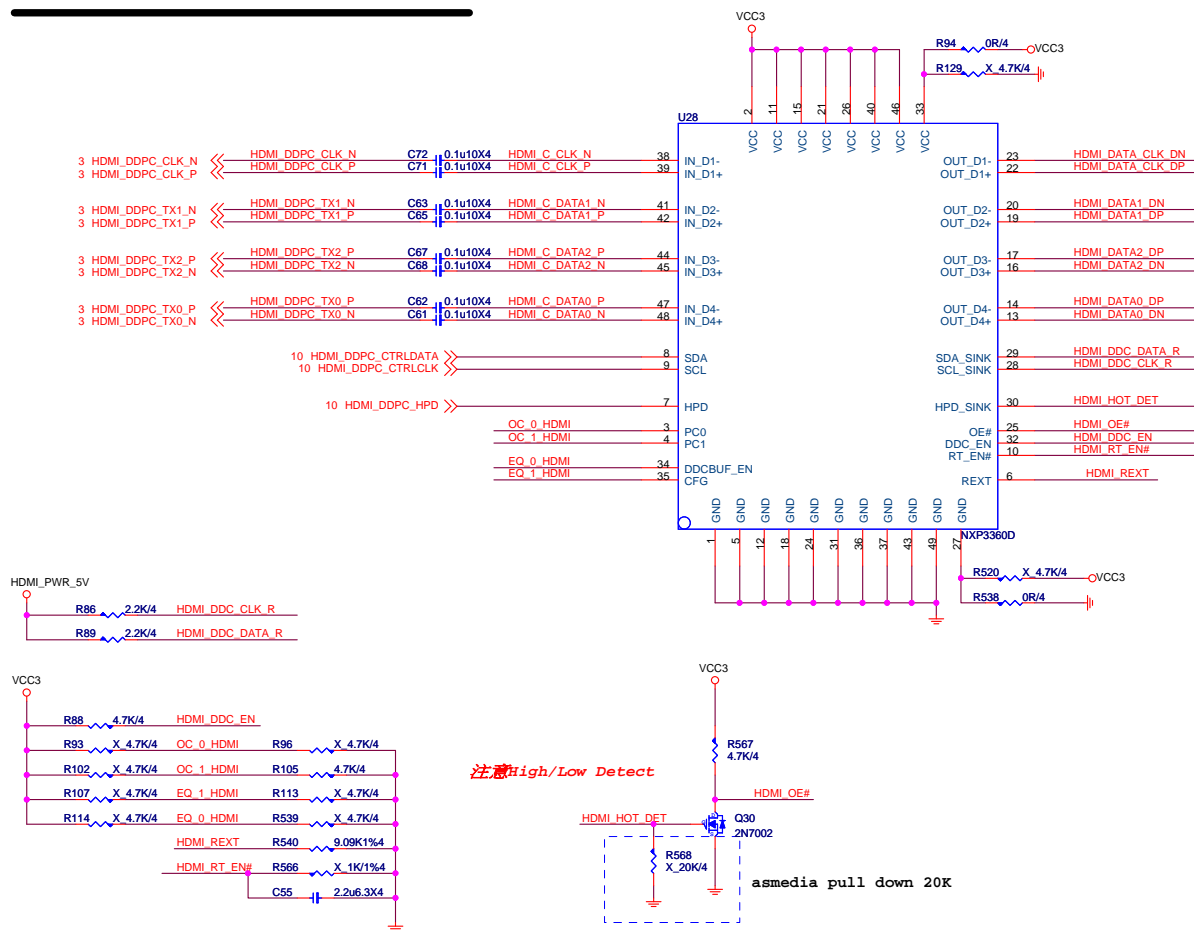


MICRO-STAR INT'L CO.,LTD

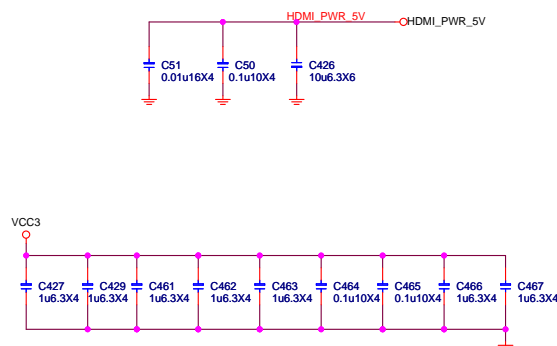
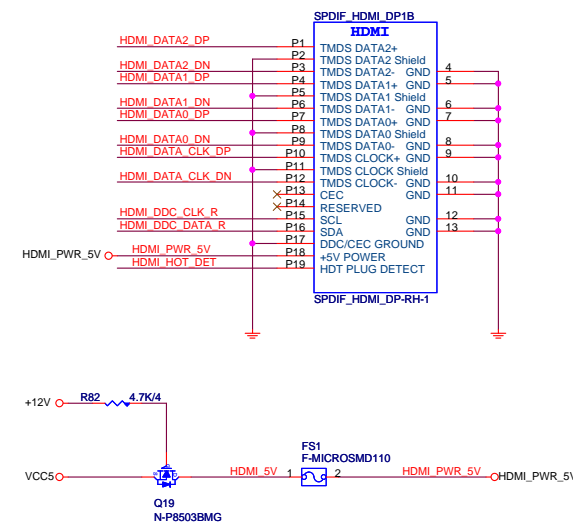
MS-7823

Size	Document Description	Rev
Custom	DVI Connector	12
Date:	Thursday, May 16, 2013	Sheet 19 of 42

HDMI level shifter

Table 8-1. PCH PCI Express Tx/RX - HDMI Signal Mappings

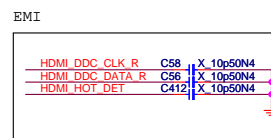
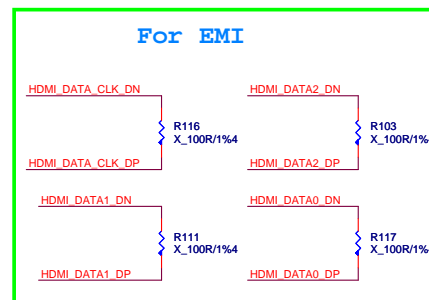
Port	Digital Display Interface Differential Pairs	HDMI Signals	PCH Digital Display Interface Pins
Port B	DDSP_B_TX0_ON	TMDSB_DATA2#	DDPB_0N
	DDSP_B_TX0_DP	TMDSB_DATA2	DDPB_0P
	DDSP_B_TX1_ON	TMDSB_DATA1#	DDPB_1N
	DDSP_B_TX1_DP	TMDSB_DATA1	DDPB_1P
	DDSP_B_TX2_ON	TMDSB_DATA0#	DDPB_2N
	DDSP_B_TX2_DP	TMDSB_DATA0	DDPB_2P
	DDSP_B_TX3_ON	TMDSB_CLK#	DDPB_3N
	DDSP_B_TX3_DP	TMDSB_CLK	DDPB_3P
	DDPB_HPD	DDSP_B_HPD0	Hot plug detect used by HDMI Port B.
	SDVO_CTRLCLK	HDMIB_CTRL_CLK	HDMI DDC lines for Port B
SDVO_CTRLDATA	HDMIB_CTRL_DATA		




	"0"	"1"
DDC_EN	DDC level shifter disable	DDC level shifter enable
RT_EN#	Input 50 ohm termination resistor enable	the input termination ; resistors are set to high impedances
OE#	enable	the chip is power down and input termination resistors will be at high impedance.
HPD_SINK	disable	enable
DDCBUF_EN	For DDC level shifting configuration, please refer to Table.	
REXT		

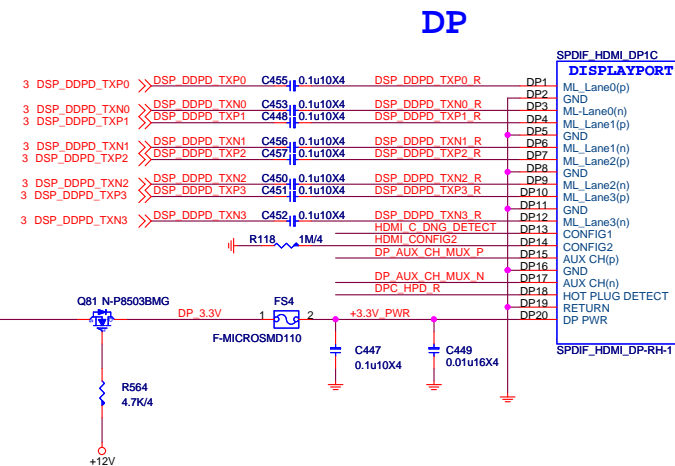
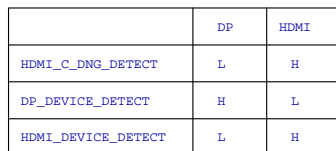
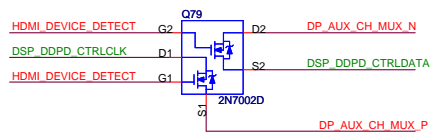
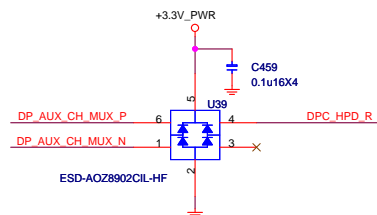
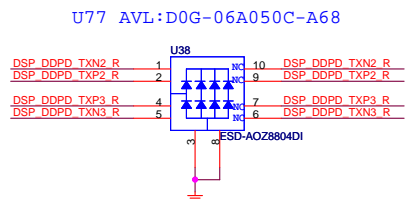
note

- internal pull-up at ~500K ohm.
- internal pull-down at ~500K ohm.
- internal pull-down at ~500K ohm.
- internal pull-down at ~200K ohm;
5V tolerant.
- internal pull-down at ~500K ohm.
- analog current generation.



PC1, PC0		note
00	8 dB	internal pull-down at ~500K ohm.
01	4 dB	
10	12 dB	

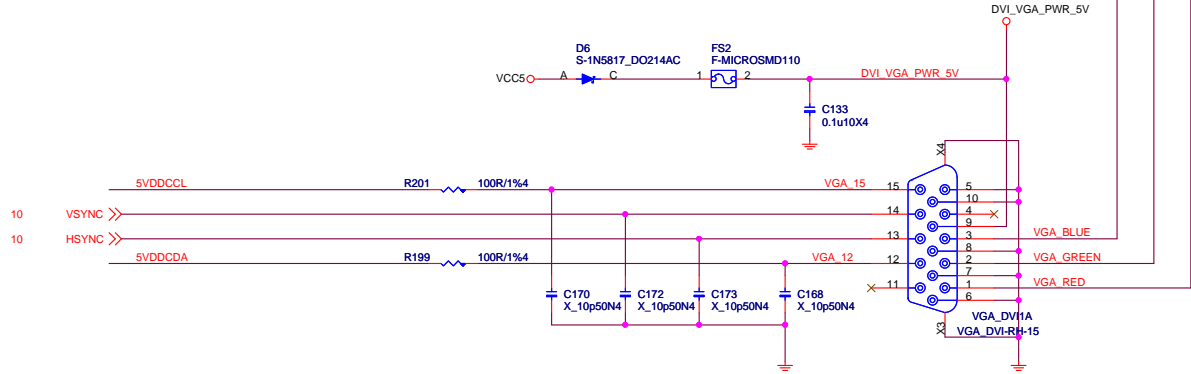
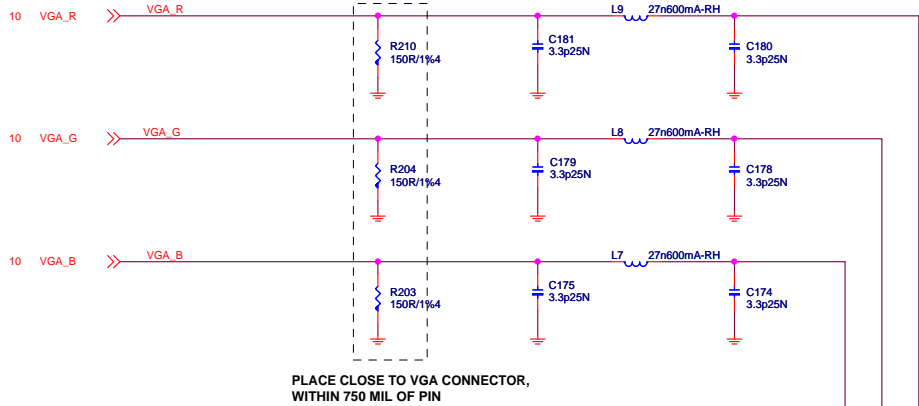
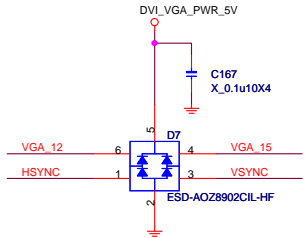
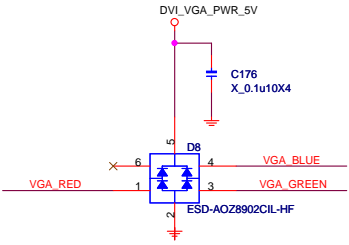
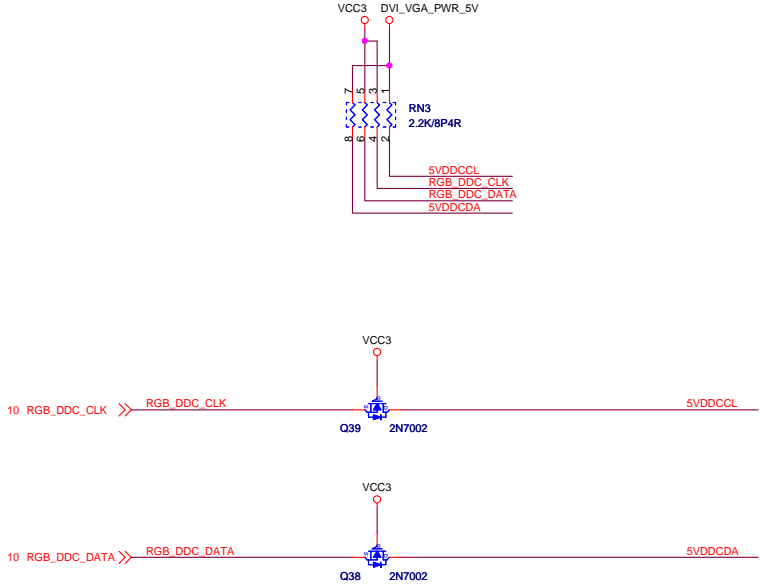
	MICRO-STAR INT'L CO.,LTD			
	MS-7823			
	Size Custom	Document Description HDMI Connector	Rev 12	
	Date: Thursday, May 16, 2013		Sheet	20 of 42



D-Sub

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

Level shift



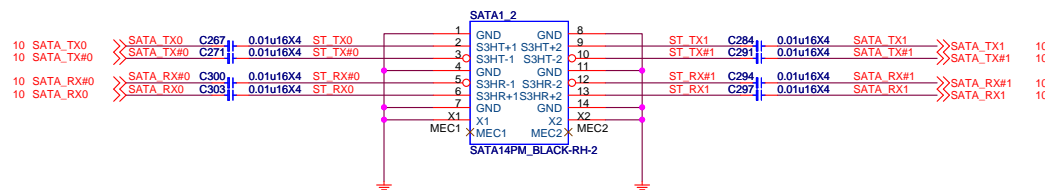
MICRO-STAR INT'L CO.,LTD

MS-7823

Size Custom	Document Description VGA Connector	Rev 12
Date: Thursday, May 16, 2013		Sheet 22 of 42

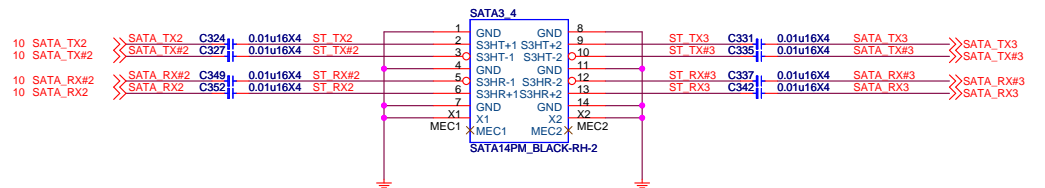
SATA 6G PORT 0,1

3.0 Black



SATA 3G PORT 2,3

3.0 Black

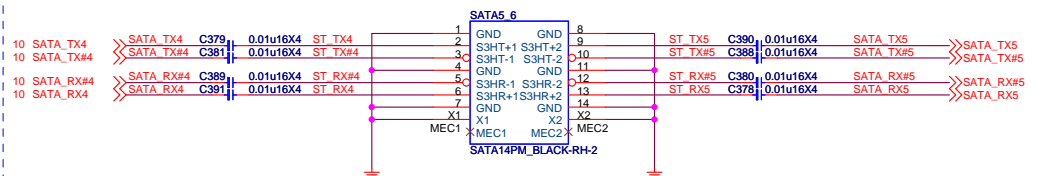


SATA 3G PORT 4,5

Change 90 by PM

3.0 Black

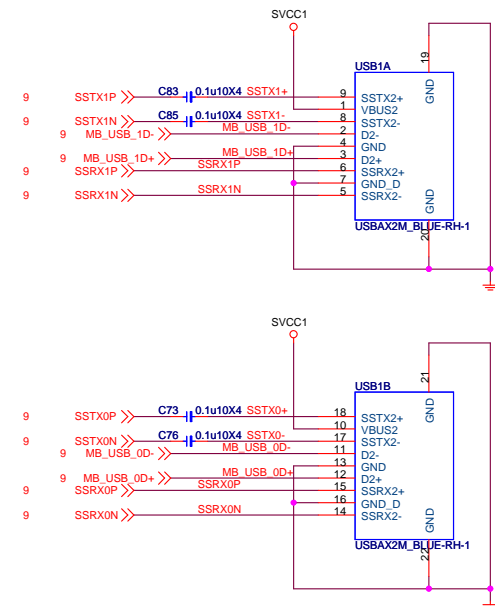
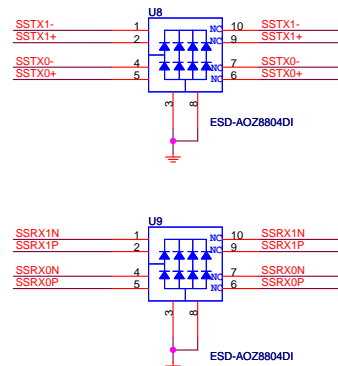
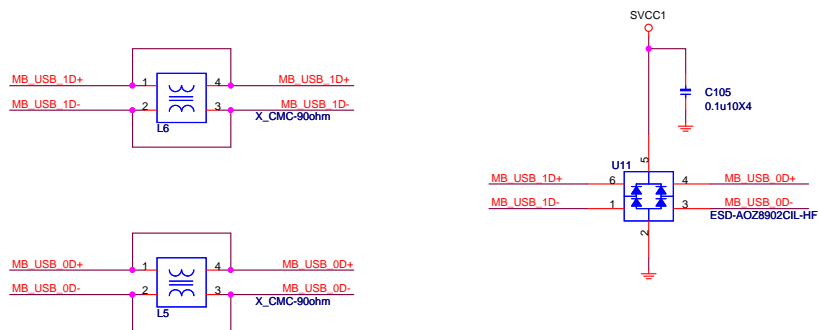
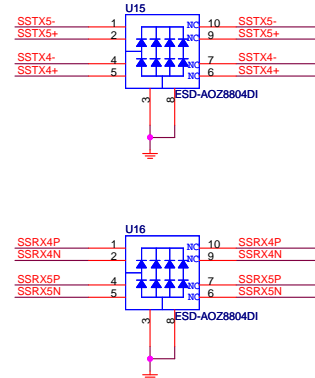
Z87,H87 chip support SATA3.0
B85 chip support SATA2.0



MICRO-STAR INT'L CO.,LTD

MS-7823

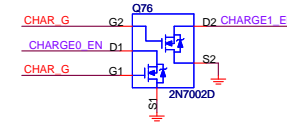
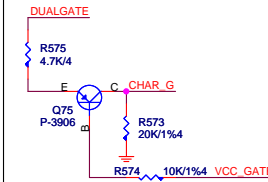
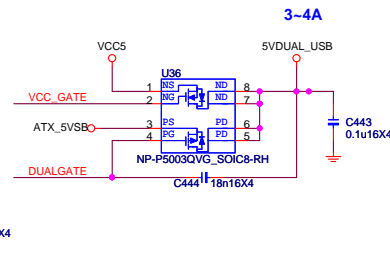
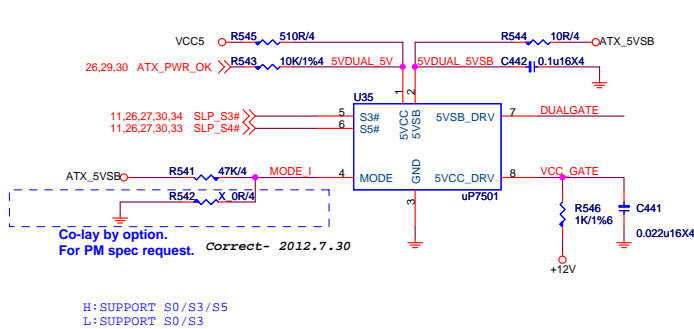
Size	Document Description	Rev
Custom	SATA Connector	12
Date:	Thursday, May 16, 2013	Sheet 23 of 42



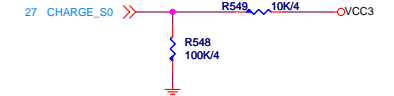
MS-7823

Size Custom	Document Description USB3.0 Connector	Rev 12
Date: Thursday, May 16, 2013		Sheet 24 of 42

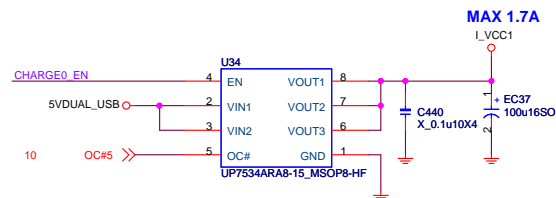
5VDUAL_USB - uP7501



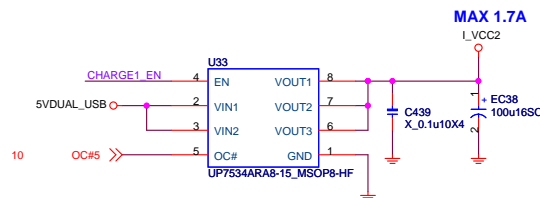
F71868 GPIO12
NCT6779D GPIO24
F71889 GPIO25



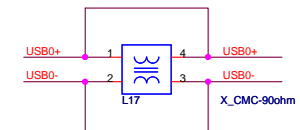
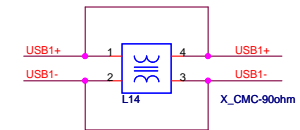
USB POWER PORT 0 For USB Charging



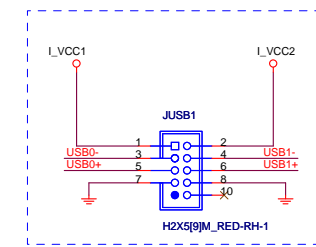
USB POWER PORT 1 For USB Charging



FRONT USB PORT 0,1

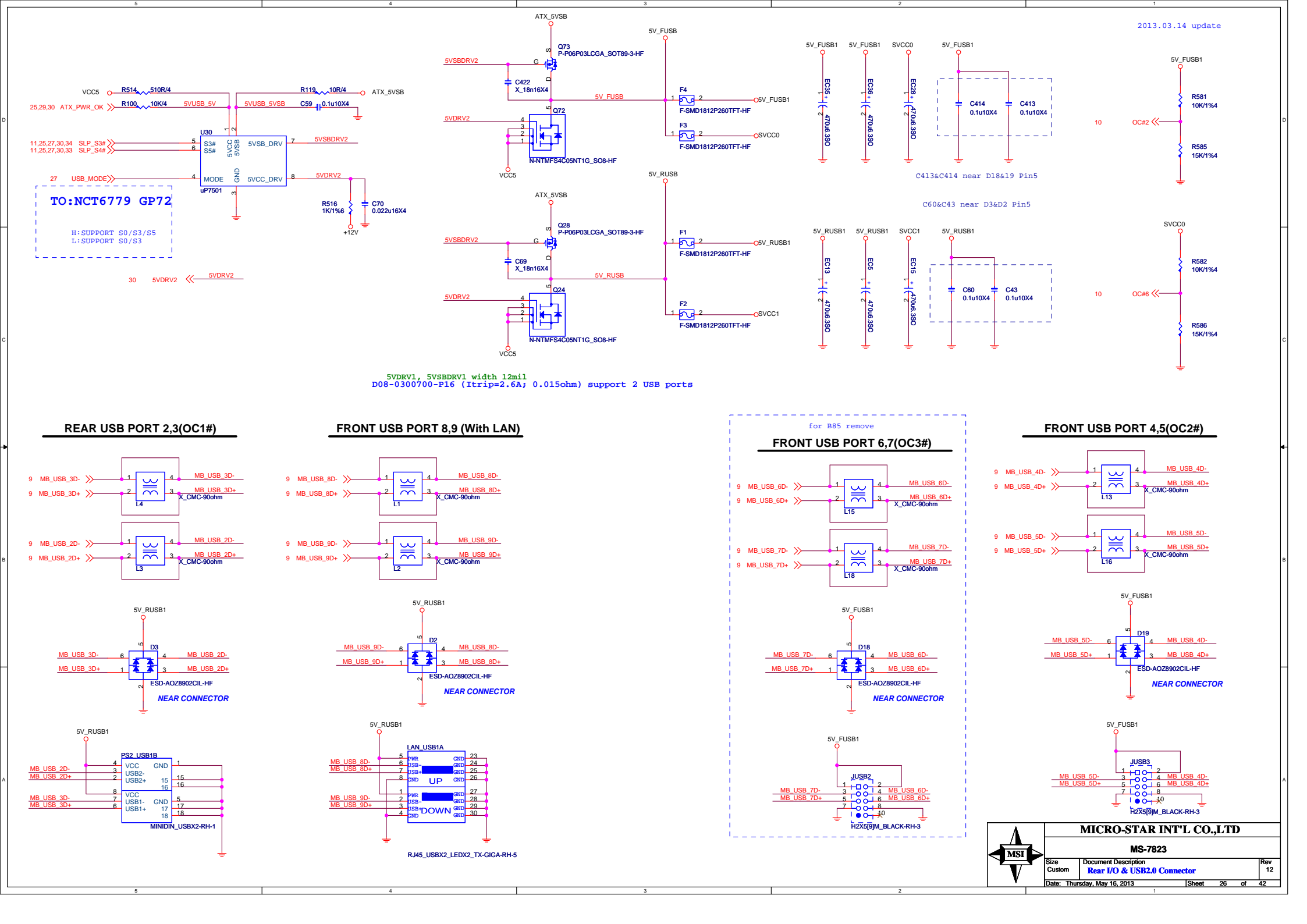
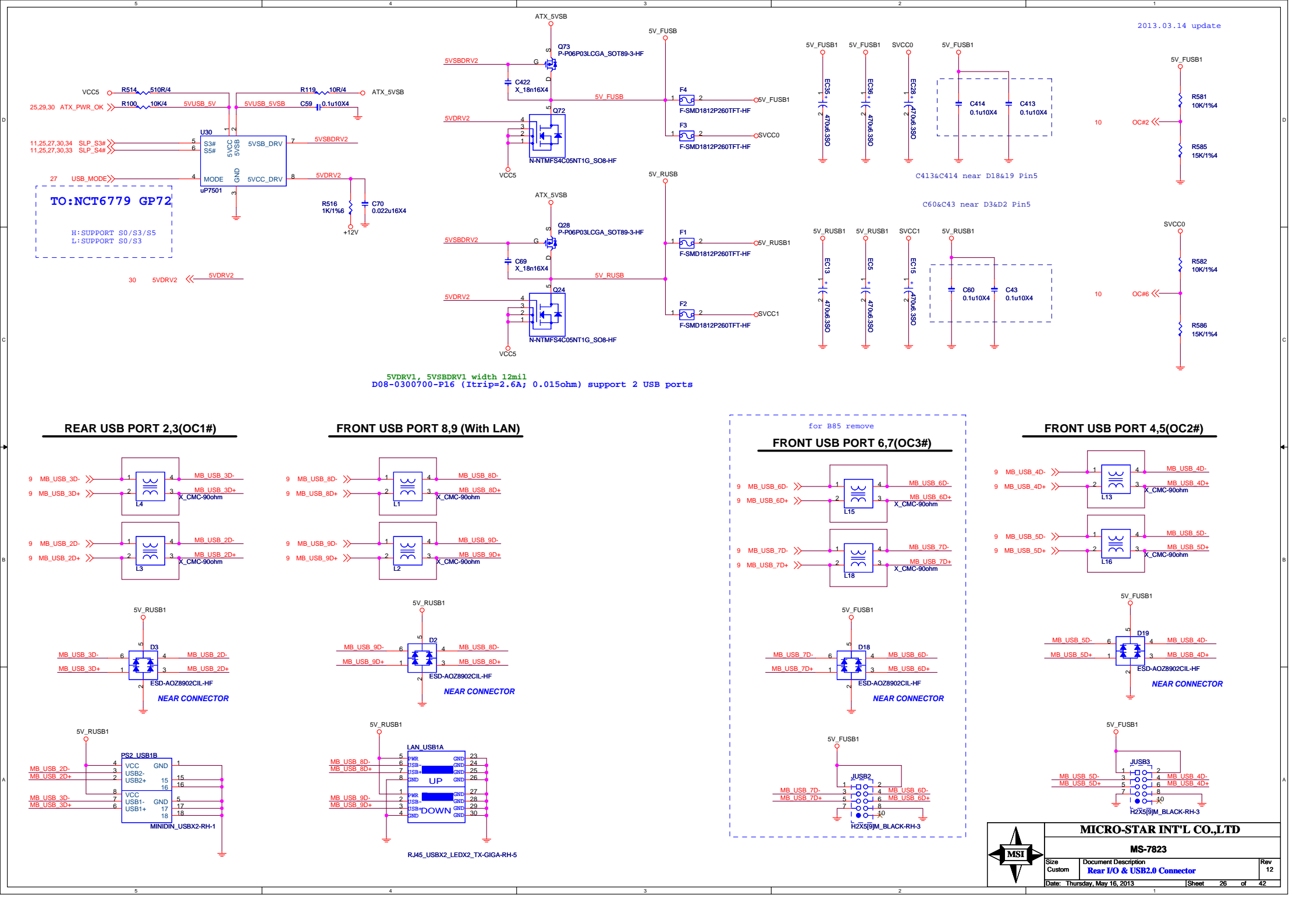
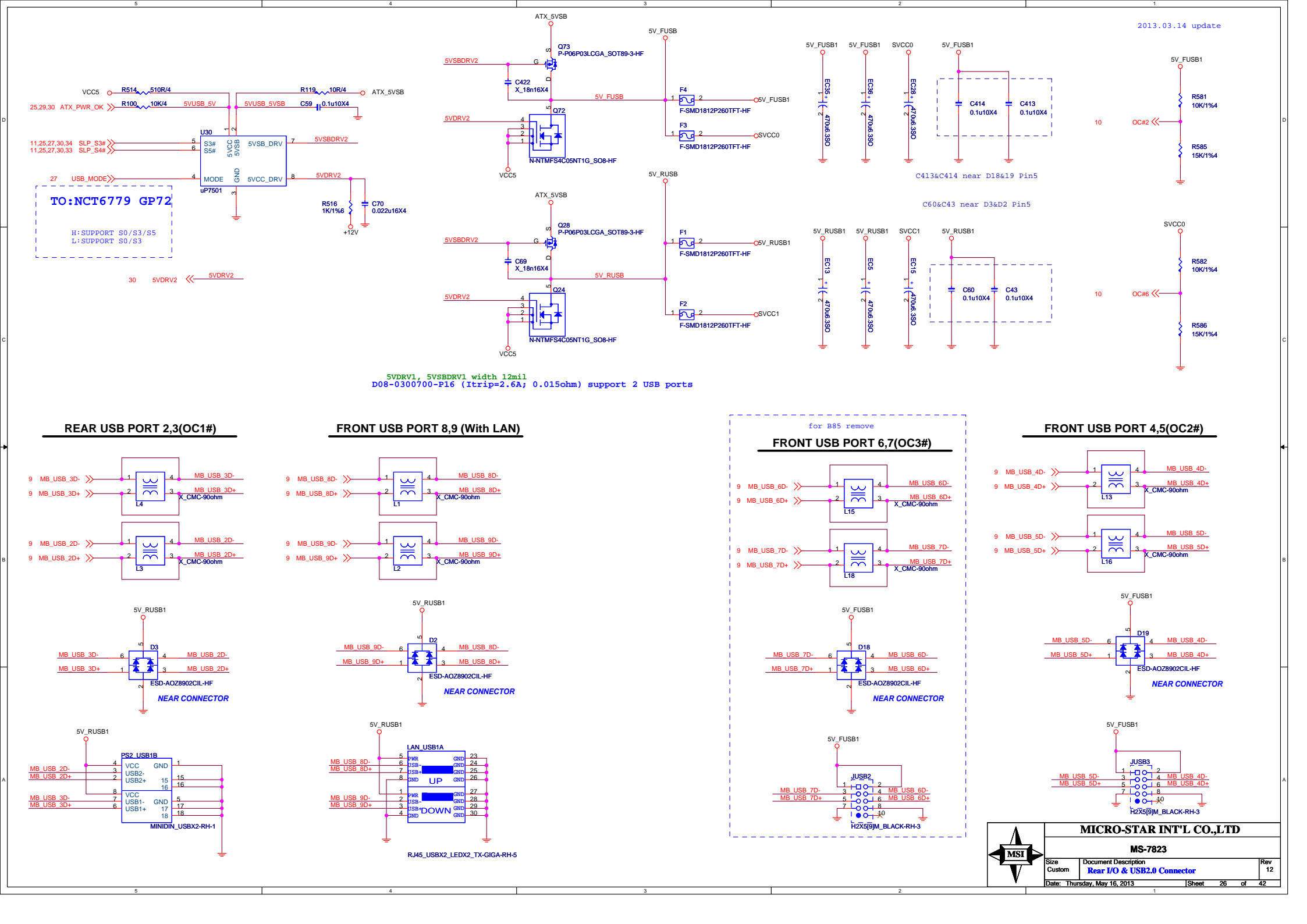


SLG55583A has internal ESD diode.



Please name the pin header JUSB1.

	MICRO-STAR INT'L CO.,LTD		
	MS-7823		
Size	Document Description	Rev	
Custom	2S USB CHARGE_SLG55593A	12	
Date:	Thursday, May 16, 2013	Sheet	25 of 42



2013.03.14 update

REAR USB PORT 2,3(OC1#)

FRONT USB PORT 8,9 (With LAN)

FRONT USB PORT 6,7(OC3#)

FRONT USB PORT 4,5(OC2#)

MSI

MICRO-STAR INT'L CO.,LTD

MS-7823

Size Custom Document Description Rear I/O & USB2.0 Connector Rev 12

Date: Thursday, May 16, 2013 Sheet 26 of 42

2013.03.14 update

REAR USB PORT 2,3(OC1#)

FRONT USB PORT 8,9 (With LAN)

FRONT USB PORT 6,7(OC3#)

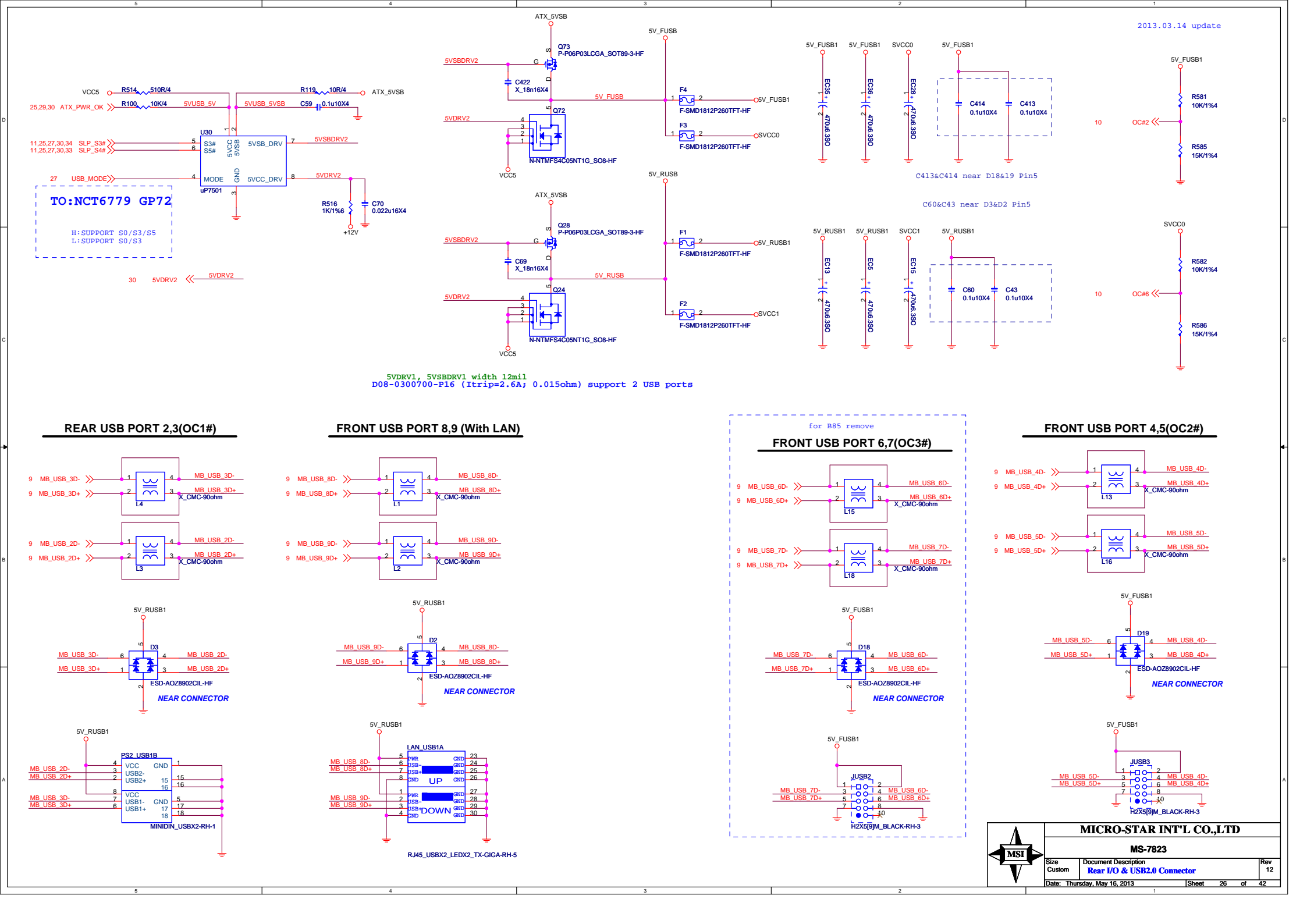
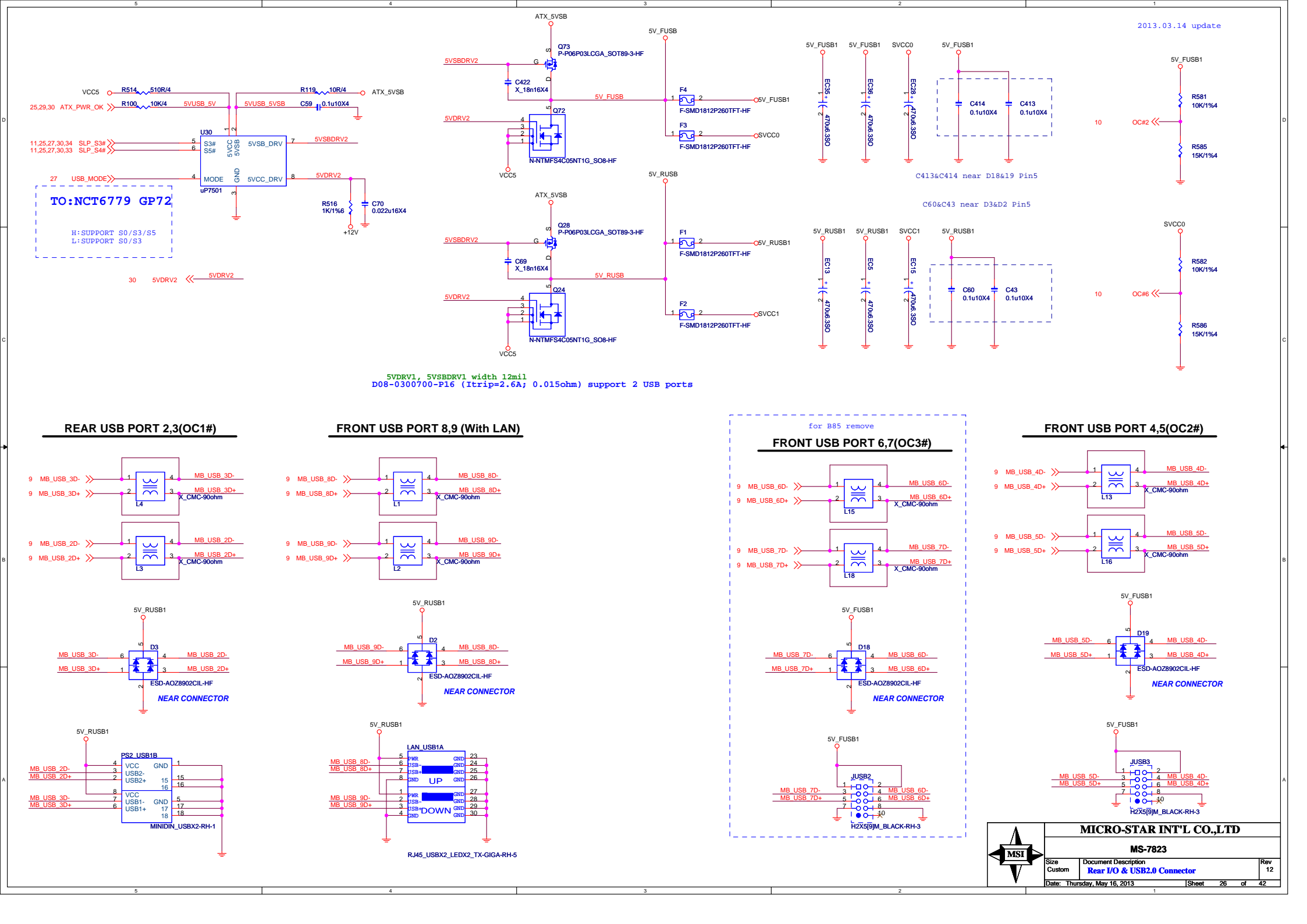
FRONT USB PORT 4,5(OC2#)

MICRO-STAR INT'L CO.,LTD

MS-7823

Size Custom Document Description Rear I/O & USB2.0 Connector Rev 12

Date: Thursday, May 16, 2013 Sheet 26 of 42

[illegible]

2013.03.14 update

REAR USB PORT 2,3(OC1#)

FRONT USB PORT 8,9 (With LAN)

FRONT USB PORT 6,7(OC3#)

FRONT USB PORT 4,5(OC2#)

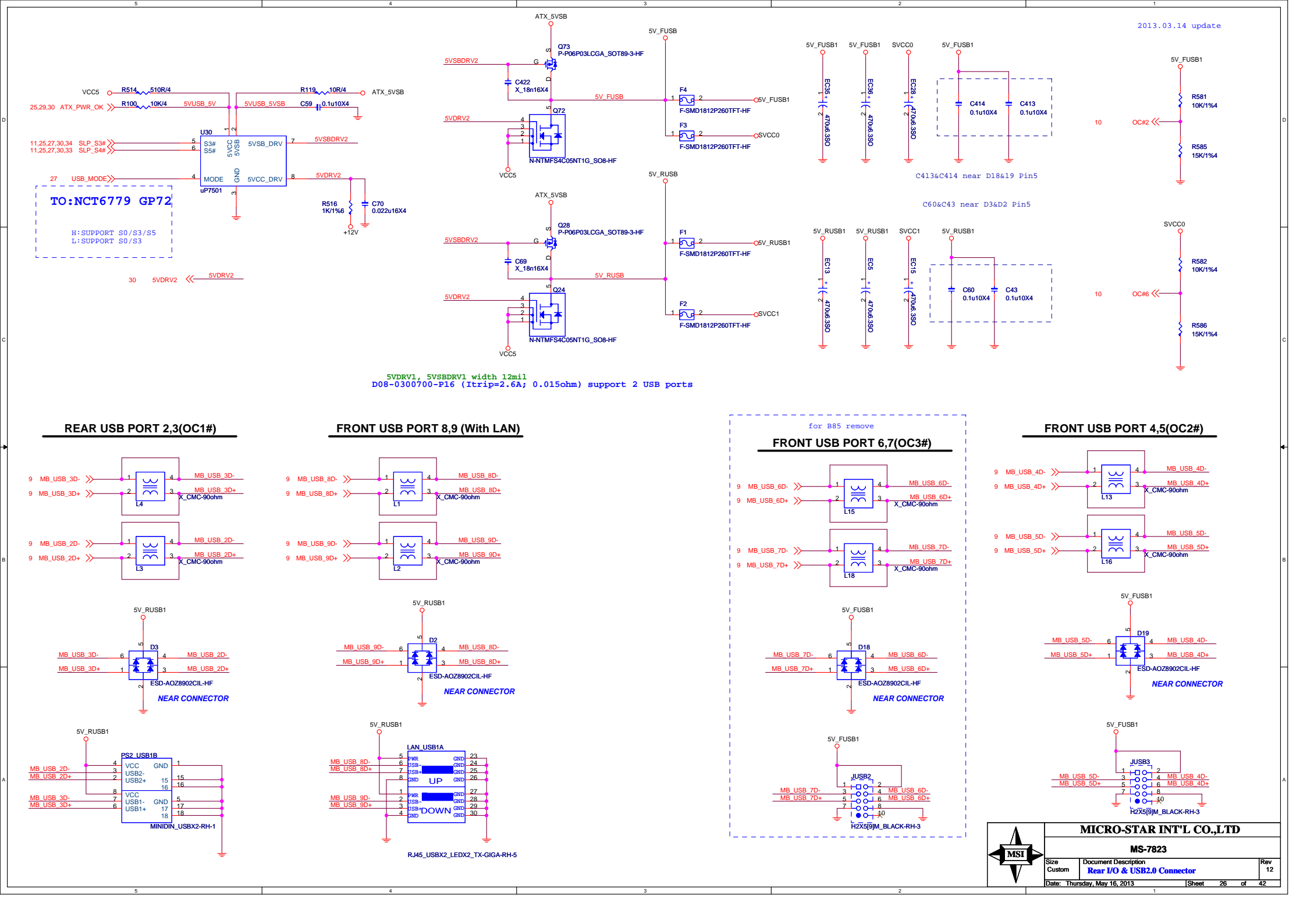
MSI

MICRO-STAR INT'L CO.,LTD

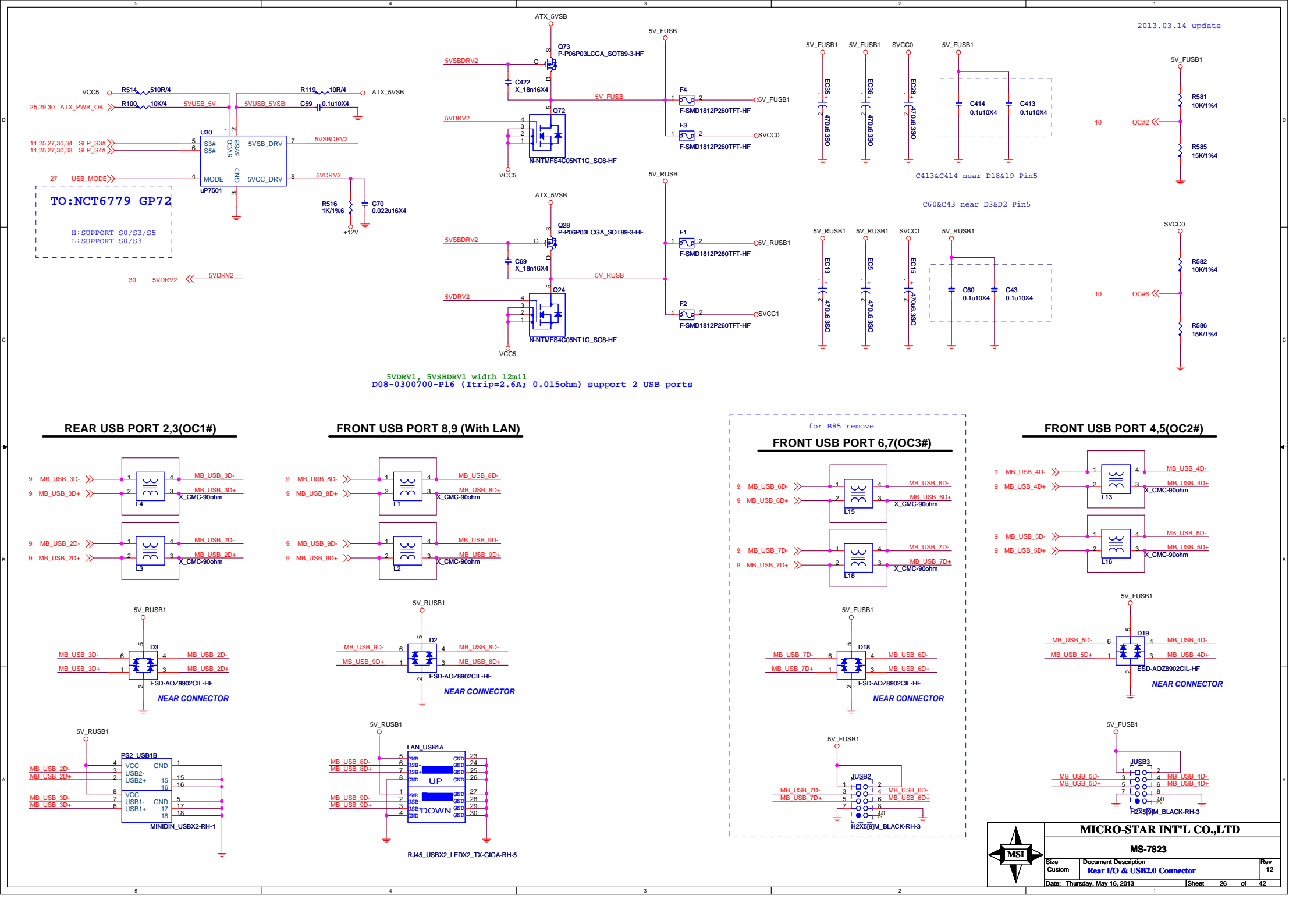
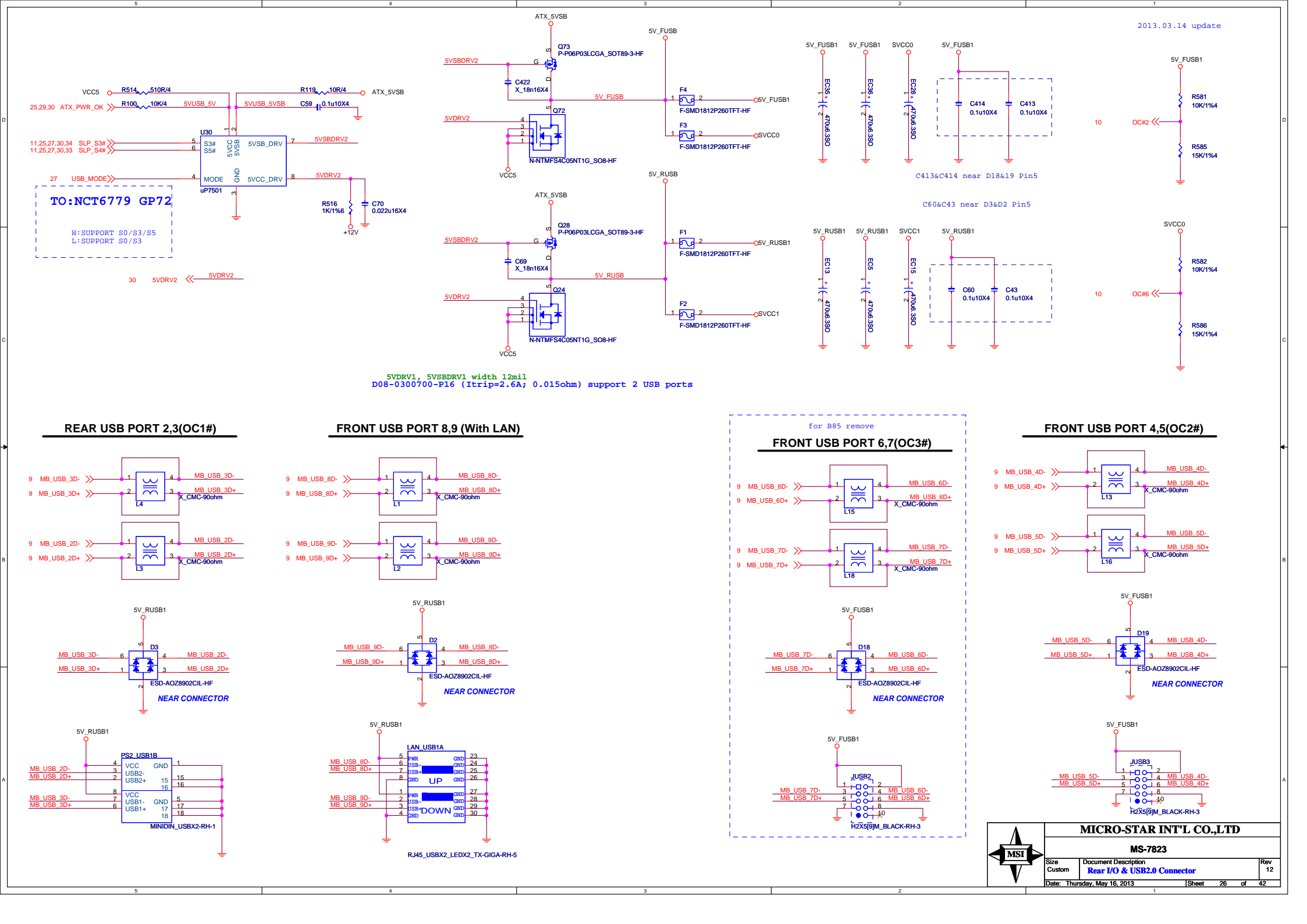
MS-7823

Size Custom Document Description Rear I/O & USB2.0 Connector Rev 12

Date: Thursday, May 16, 2013 Sheet 26 of 42



2013.03.14 update



2013.03.14 update

REAR USB PORT 2,3(OC1#)

FRONT USB PORT 8,9 (With LAN)

FRONT USB PORT 6,7(OC3#)

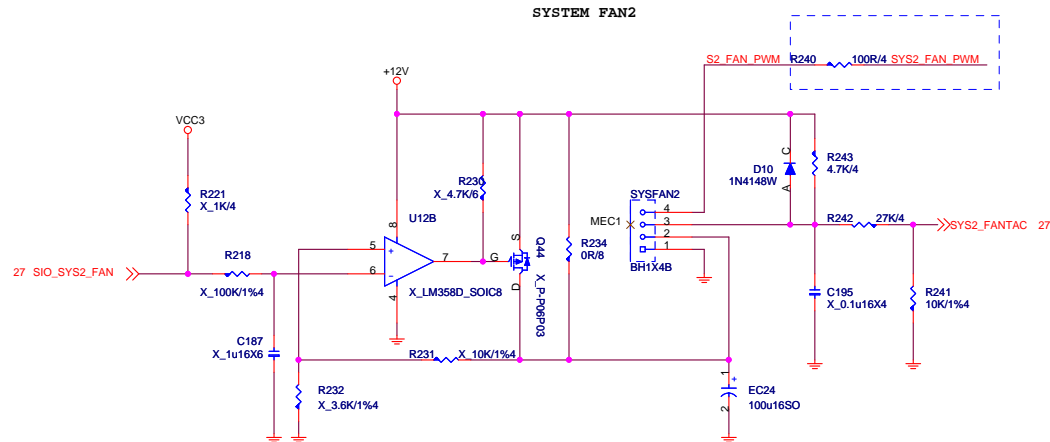
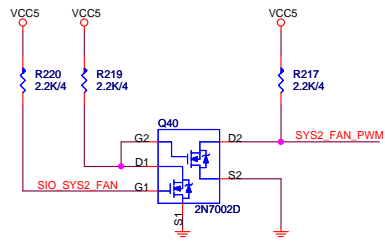
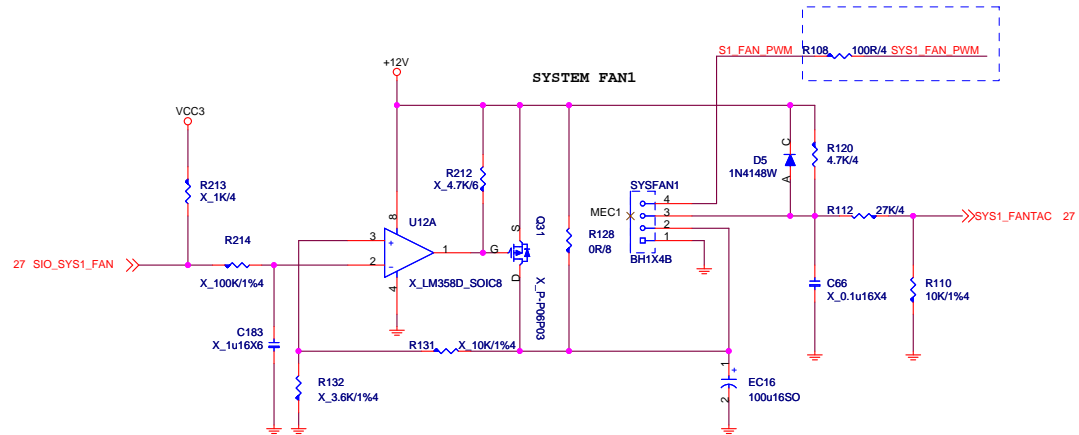
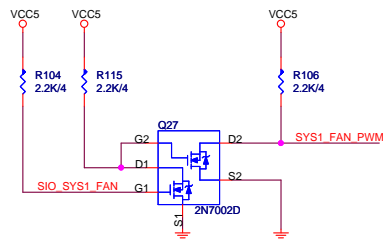
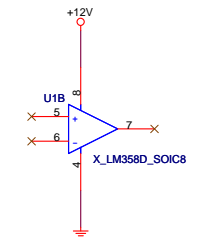
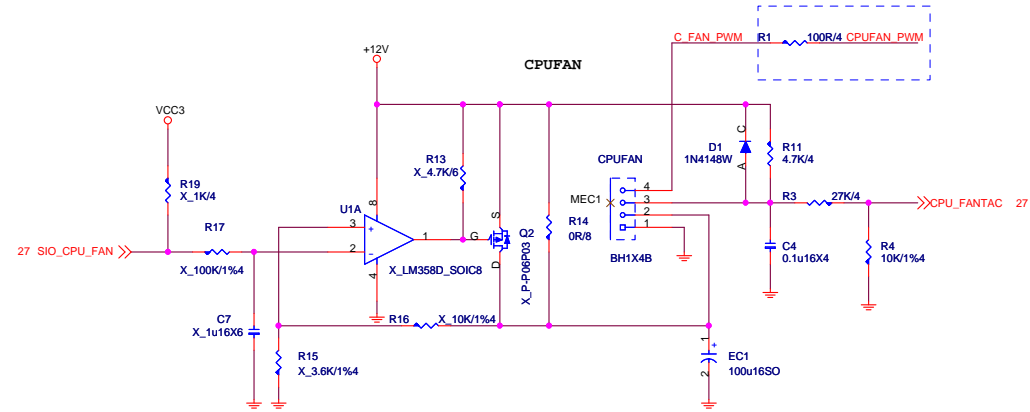
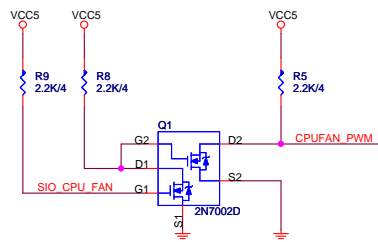
FRONT USB PORT 4,5(OC2#)

MS-7823

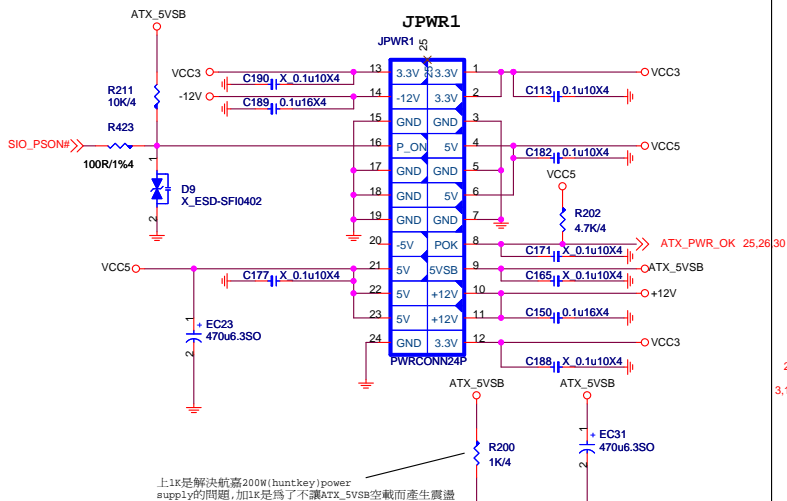
Size Custom Document Description Rear I/O & USB2.0 Connector Rev 12

Date: Thursday, May 16, 2013 Sheet 26 of 42

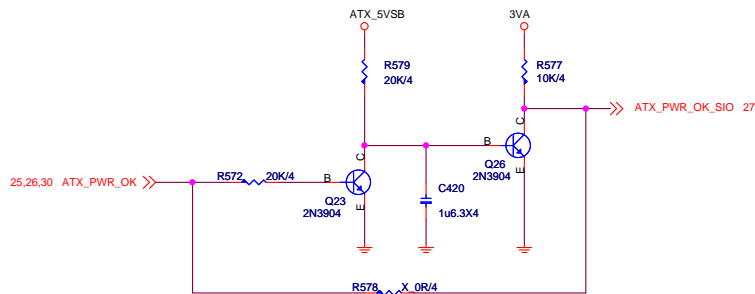
FAN-COUNTROL CIRCUIT



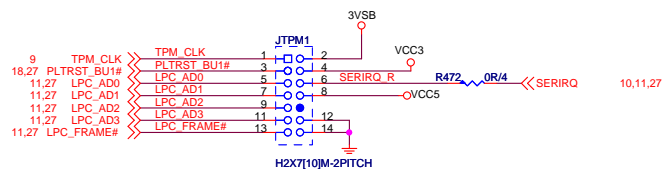
ATX POWER CONNECTOR



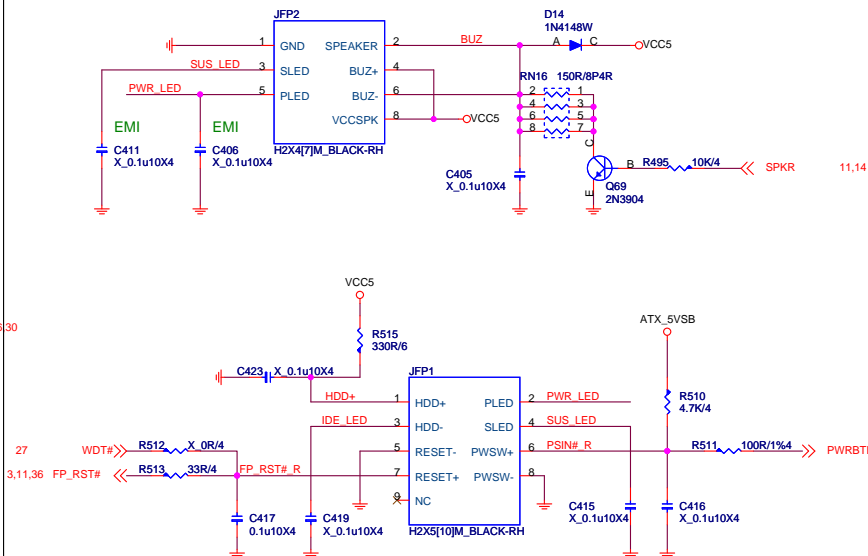
5VCC leakage from ATXPGD. (NCT6779 PIN80)



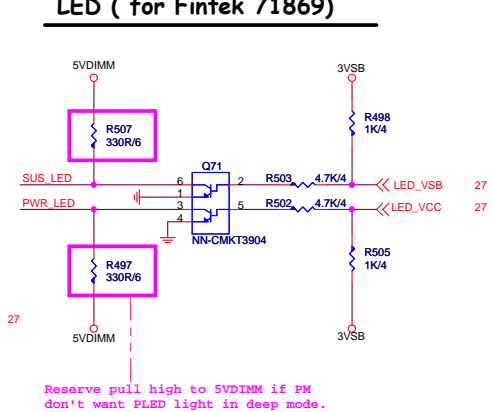
TPM



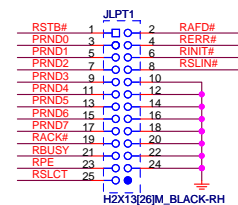
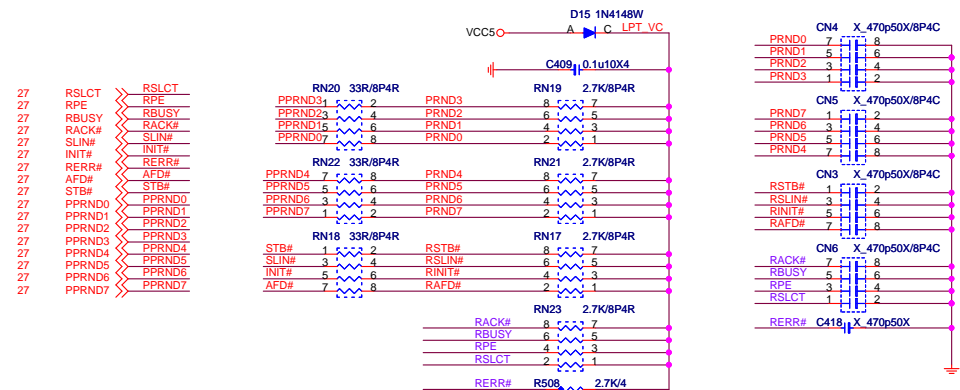
FRONT PANNEL



LED (for Fintek 71869)



PARALLAL PORT



N31-2131151-H06 : 2.0mm

N31-2131131-H06 : 2.54mm

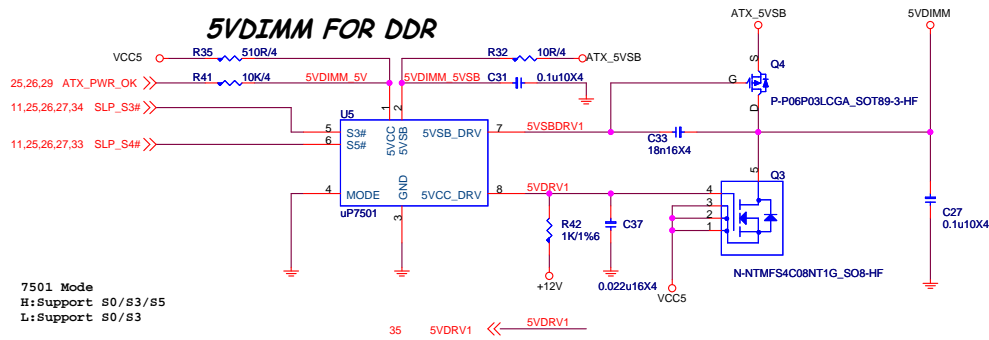


MICRO-STAR INT'L CO.,LTD

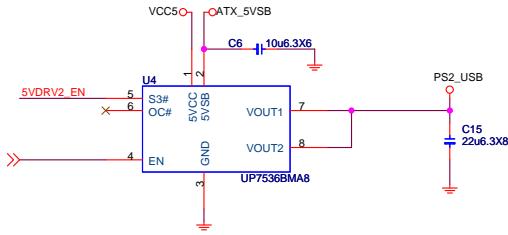
MS-7823

Size	Document Description	Rev
Custom	ATX F_Panel/EMI/TPM	12
Date: Thursday, May 16, 2013	Sheet 29 of 42	

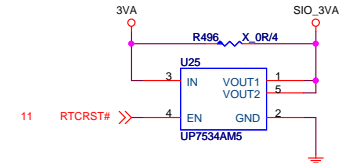
5VDDIMM FOR DDR



PS2 Power

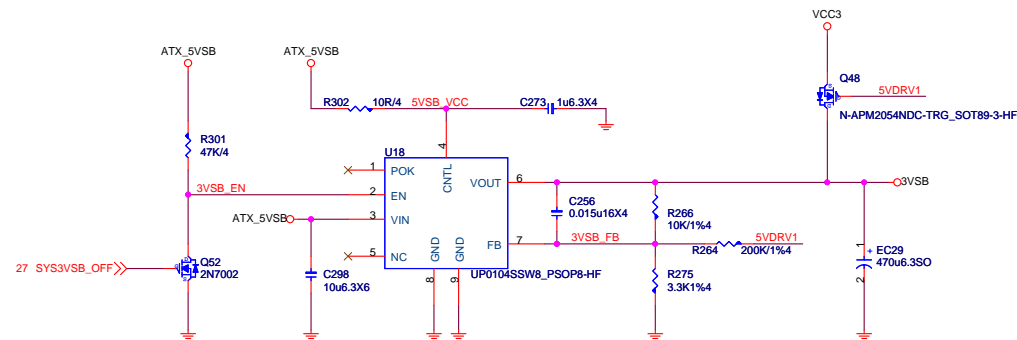


隔離PCH&SIO的3VA

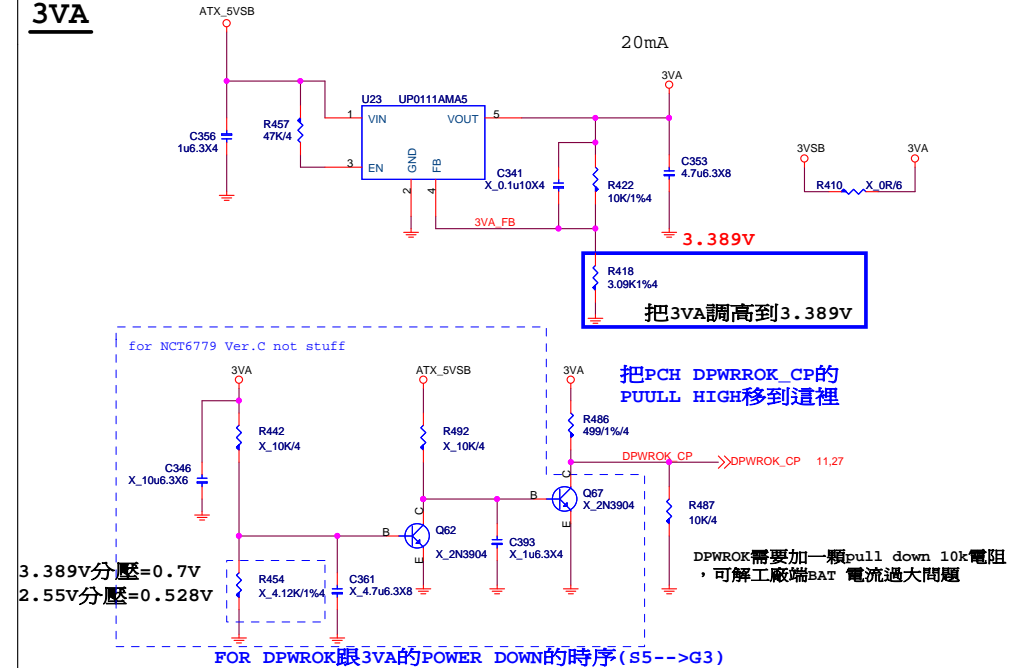


3VSB

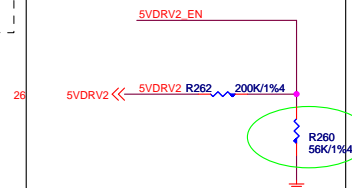
$0.216 + 0.2 + 1.5 + 0.67 = 2.586A$
PCH: 216mA
LAN: 200mA
PCIE slot: 375mA x4
up0104 ME Power: 0.67A



3VA

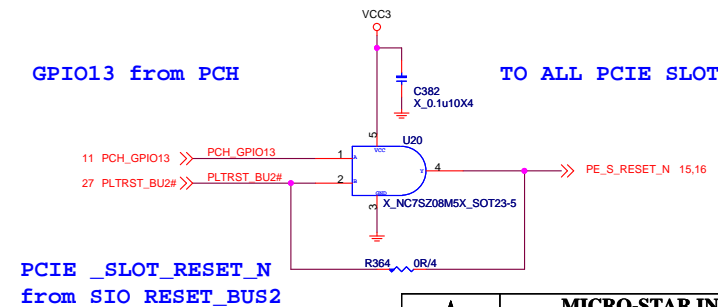


USB MODE



GPIO13 from PCH

TO ALL PCIE SLOT RESET#

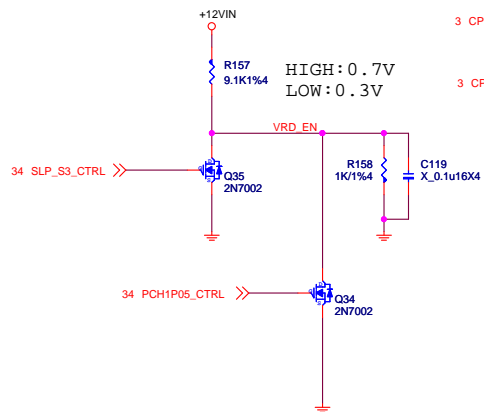


MICRO-STAR INT'L CO.,LTD		
MS-7823		
Size	Document Description	Rev
Custom	ACPI controller UPI	12
Date: Thursday, May 16, 2013	Sheet	30 of 42

ISL95812 for VR12.5 suggest schematic

VCCP: 95W
IccMAX: 95A
TDC: 55A
VID1: 1.8V

VCORE power on by s3 and 12v

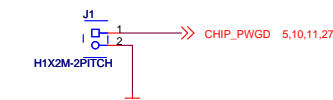
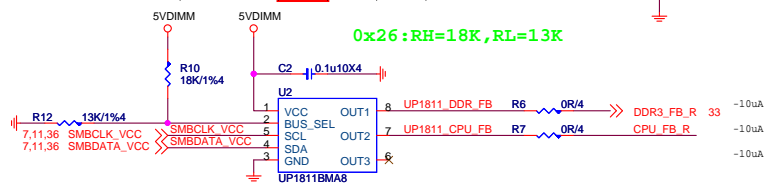


R145 TO 24.9K. ICCMAX:105A FW:LOW 300/500K
R139 TO 73.2K. 300K VBOOT 1.7V
R140 3.24K SLEW RATE 12MV/US PS1 2-PH

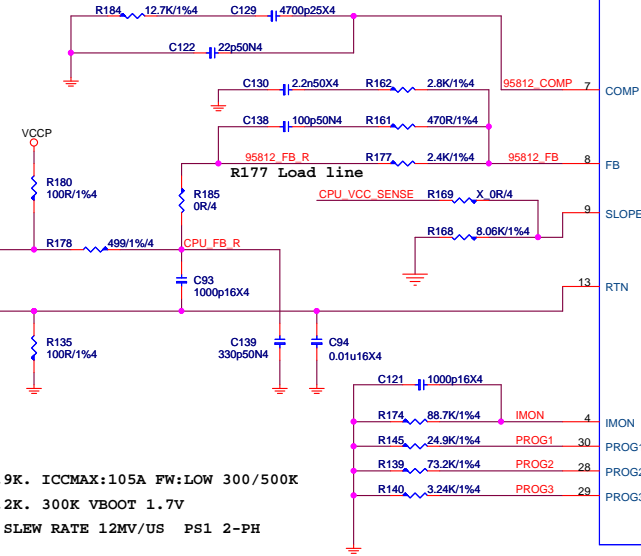
UPI VOLTAGE CONSOLE

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%

0x26:RH=18K,RL=13K

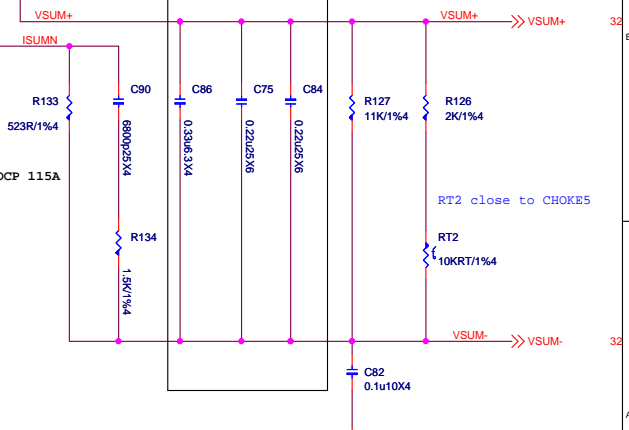
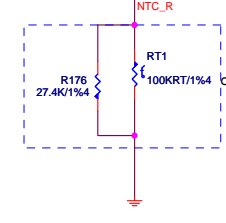


Since Idroop also sets the overcurrent protection level, it is recommended to first scale Idroop based on OCP requirement, then select an appropriate Idroop value to obtain the desired load line slope.

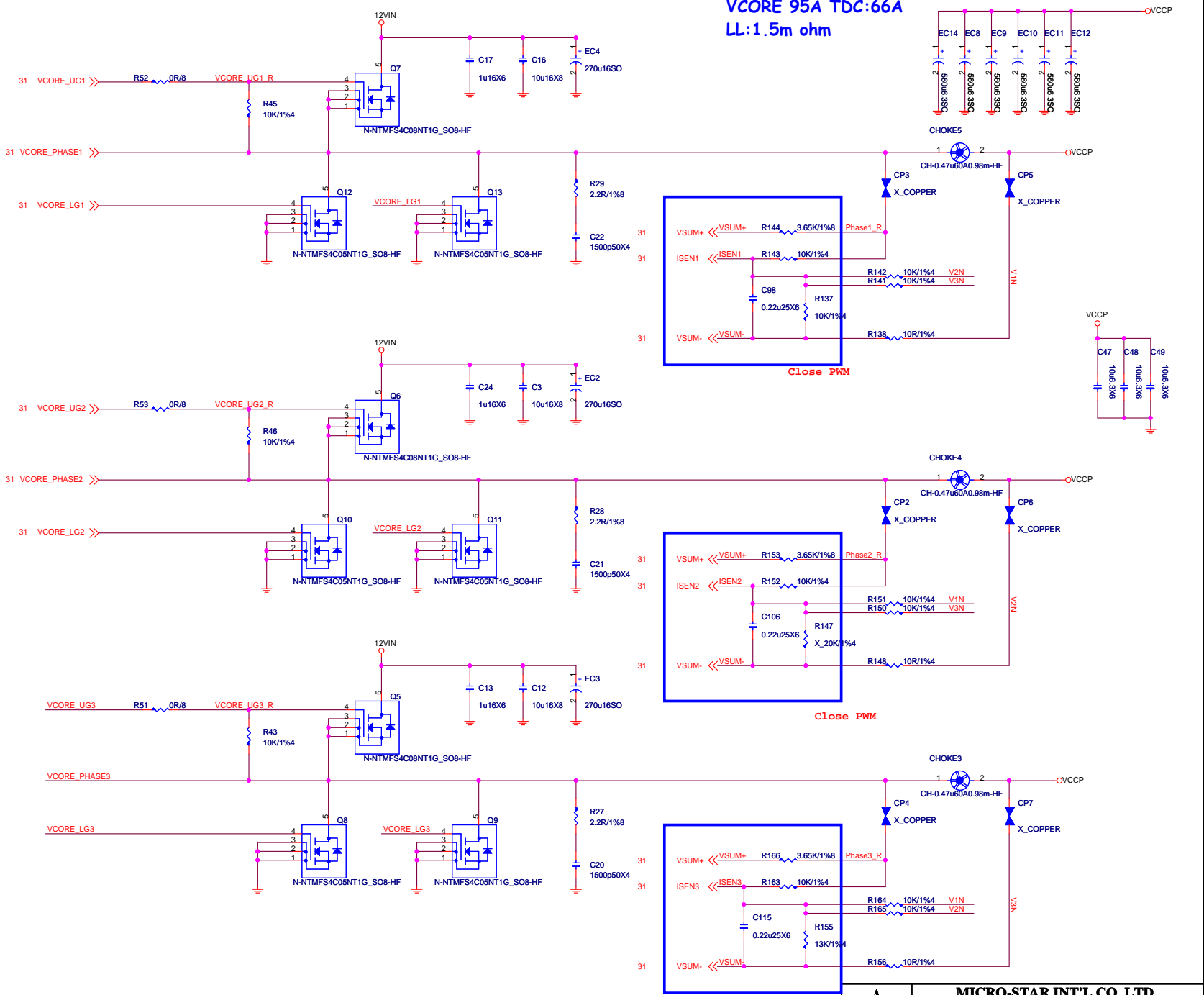
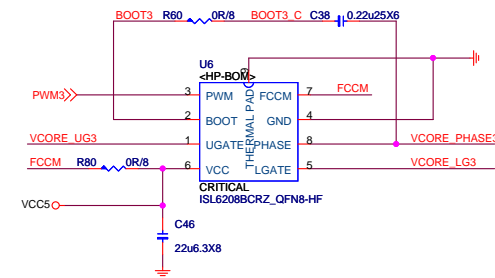
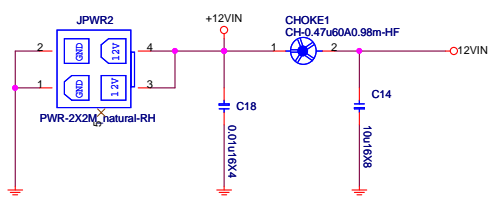


IC thermal pad 8 VIA connect GND layer


THERMAL PAD



OUTPUT CURRENT: ICCMAX 95A
I_{rms} = 15.76A
Input Cap 5.08A*3= 15.24A



VCORE 95A TDC:66A
LL:1.5m ohm



MICRO-STAR INT'L CO.,LTD

MS-7823

Size	Document Description	Rev
Custom	30 ISL6208B 3-Phase+MOS CPU	12
Date:	Thursday, May 16, 2013	Sheet 32 of 42

DDR Power:1.5V

DDR3_1.5V 4.2A+12A+1.115A+5.921A=23.236A

4.2A FOR CPU

12A FOR 4DIMM

1.115A FOR VTT_DDR

5.921A FOR PCH

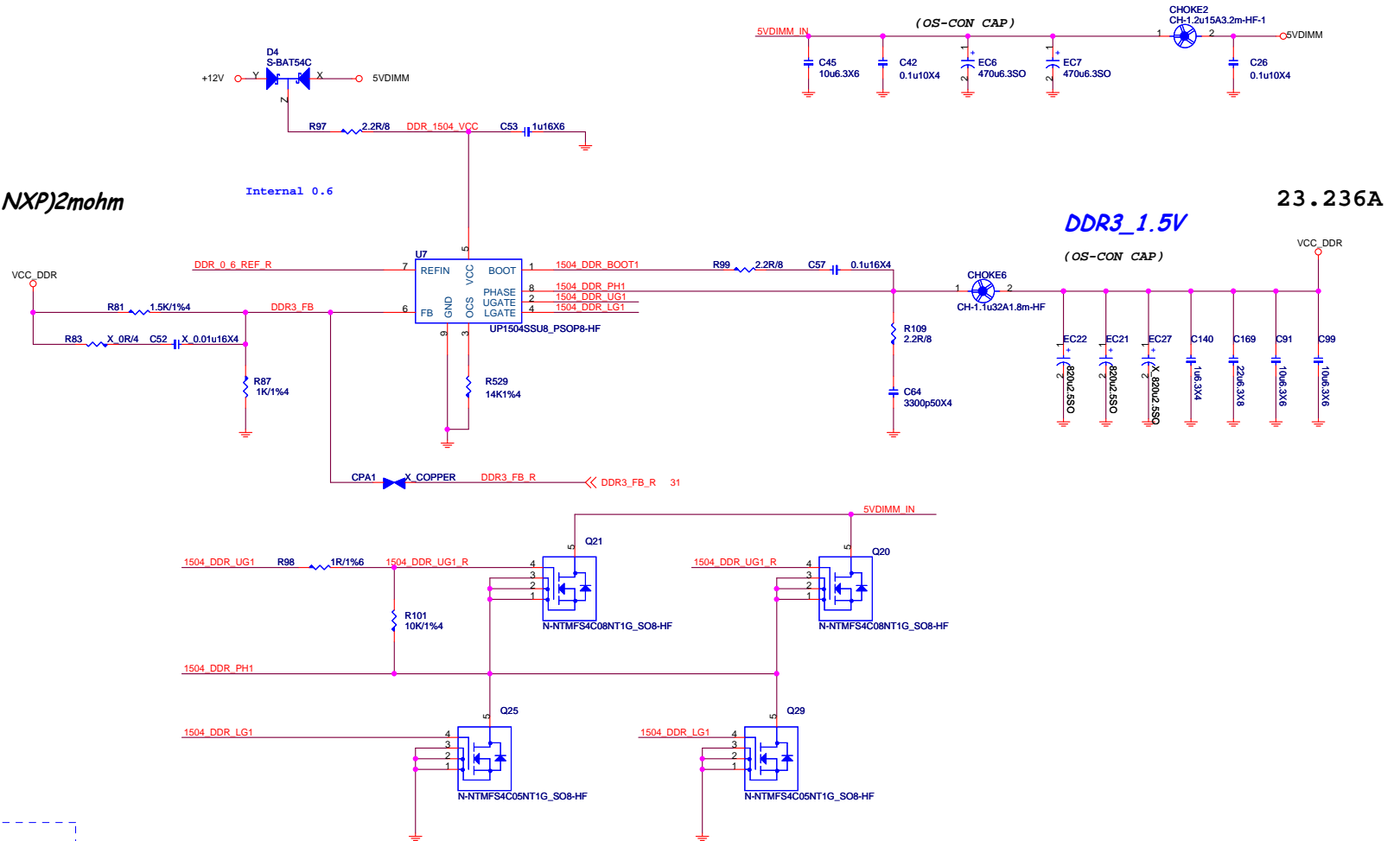
OCP 23.236A*1.5=34.845A

OCP=[20uA*Roccs(R320)]/4*Rdson(Low side NXP)2mohm

R529=14K ohm

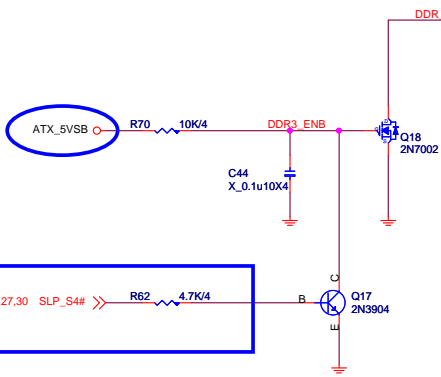
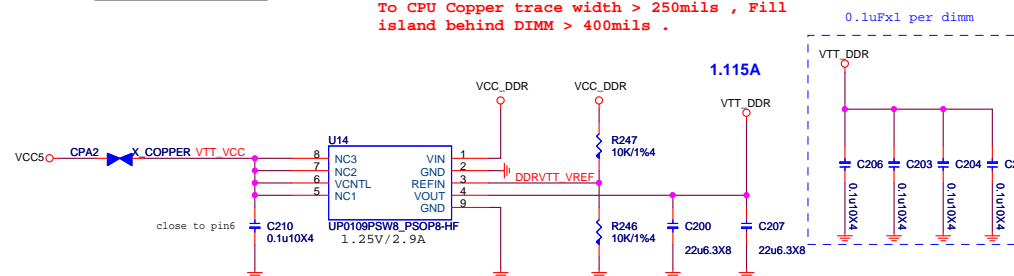
Iripple=10.64807288A

4.7*2*1=9.4A



DDR VTT Power

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



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

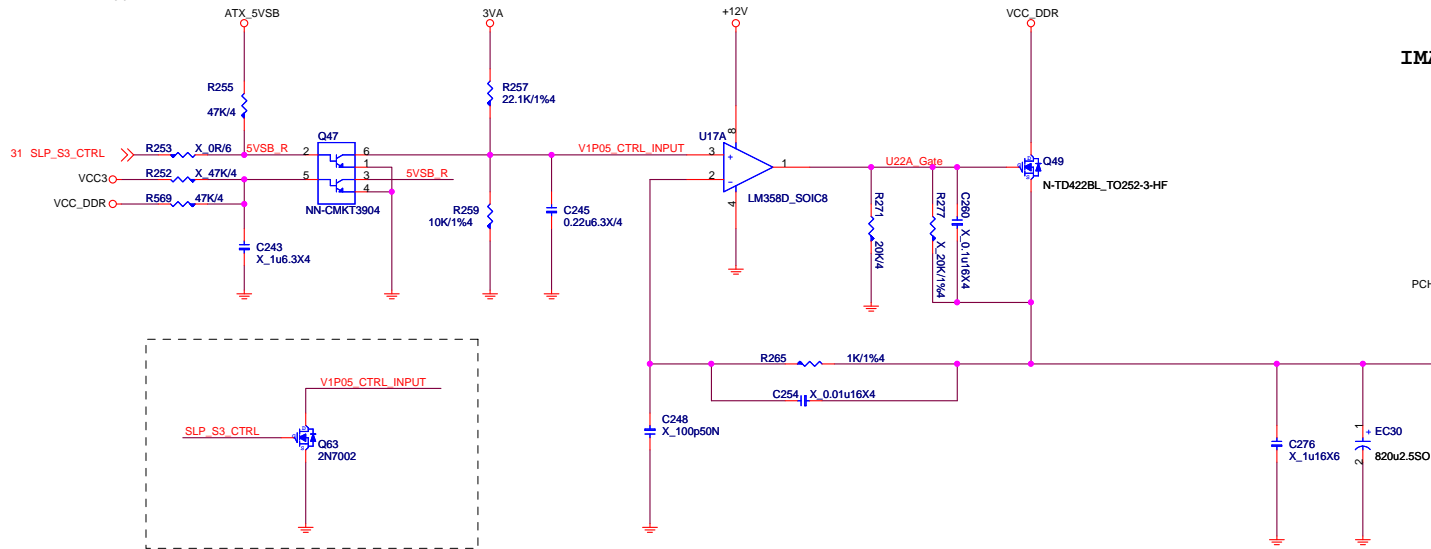


MICRO-STAR INT'L CO.,LTD

MS-7823

Size	Document Description	Rev
Custom	DDR Power - UP1504S 2-Phase MOS	12
Date:	Thursday, May 16, 2013	Sheet 33 of 42

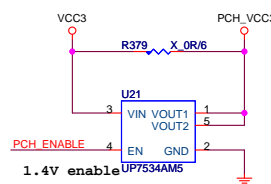
PCH Power:1.05V
PCH Core 5.921A



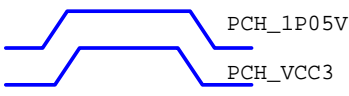
IMAX:5.921A

PCH Power:3.3V

0.133A

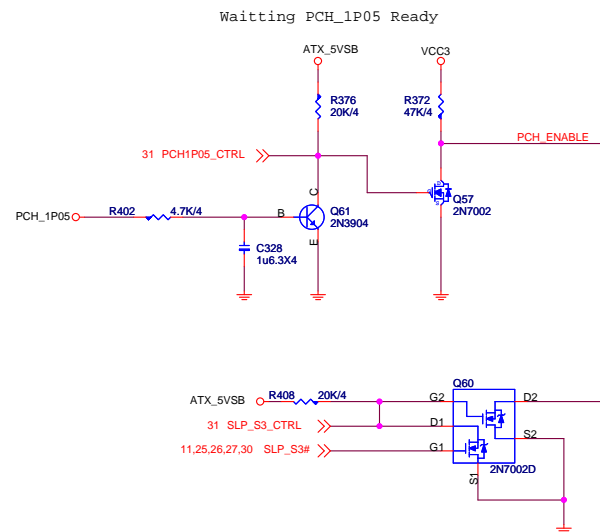


VCC1_5_CTRL_INPUT:
0:1P05V low or S3 low
1:1P05V HIGH and S3 HIGH

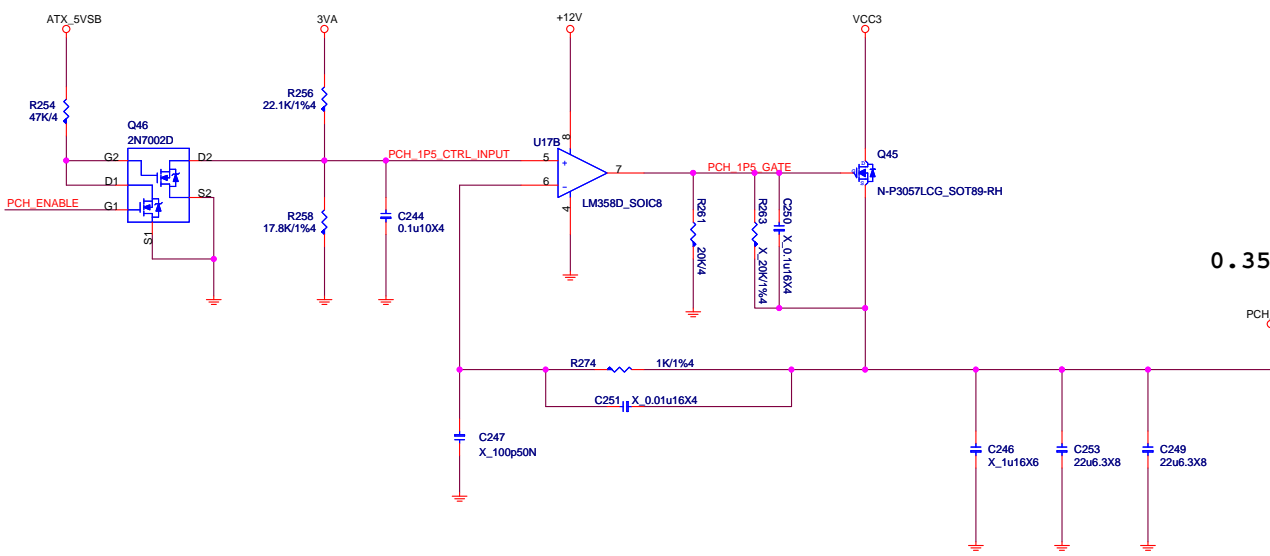


PCH Power:1.5V

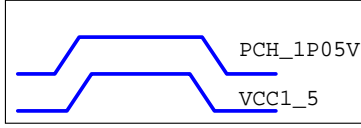
0.35A



Waiting PCH_1P05 Ready

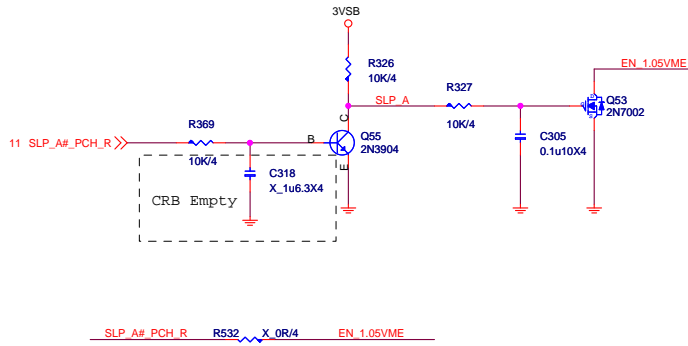


VCC1_5_CTRL_INPUT:
0:1P05V low or S3 low
1:1P05V HIGH and S3 HIGH



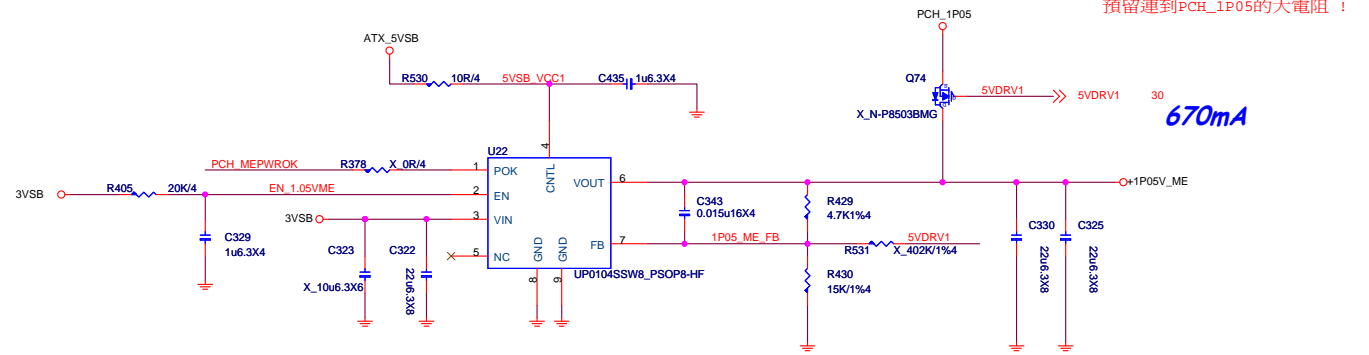
MICRO-STAR INT'L CO.,LTD			
MS-7823			
Size	Document Description	Rev	
Custom	PCH Power - uP1513 1-Phase MOS	12	
Date:	Thursday, May 16, 2013	Sheet	34 of 42

SLP_A

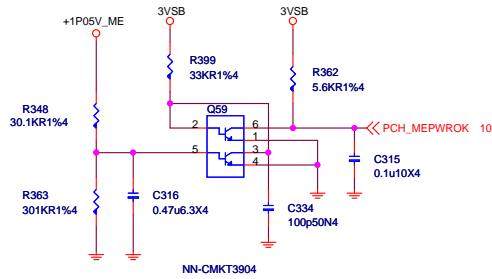


ME Power Control

+1.05V_ME(VCCIO_ME)

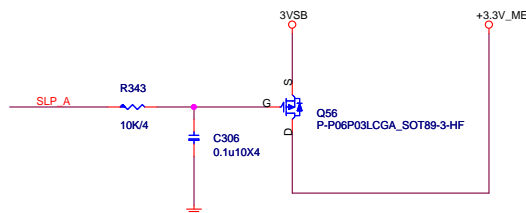


PCH_MEPWROK

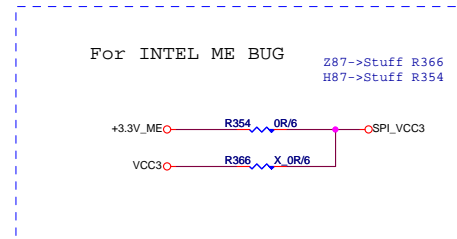


VccASW active to APWROK high 1ms

+3.3V_ME



APWROK falling to VccASW falling 40ns

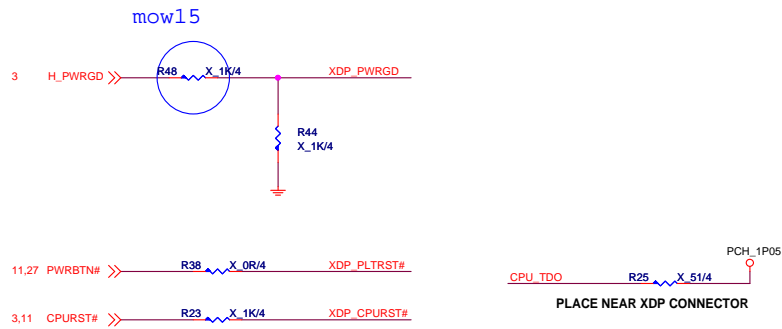
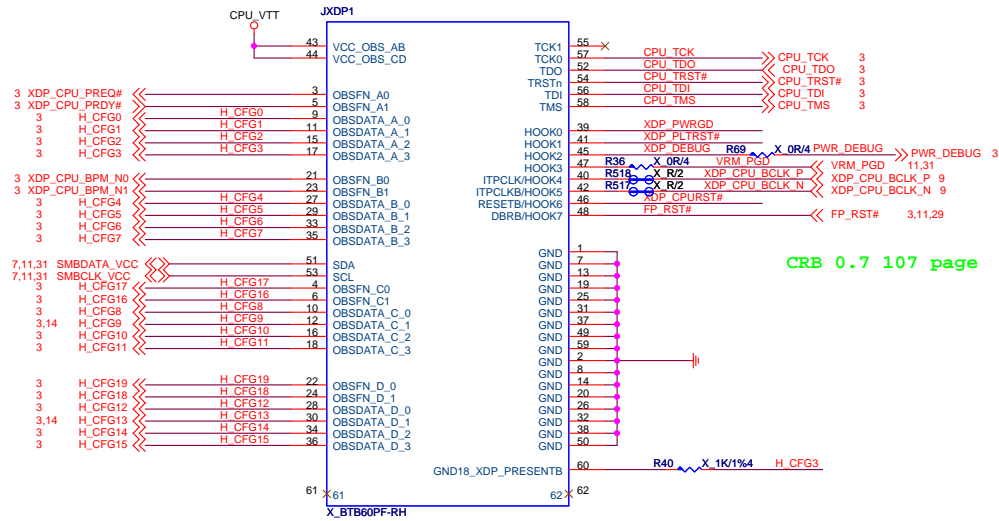


MICRO-STAR INT'L CO.,LTD

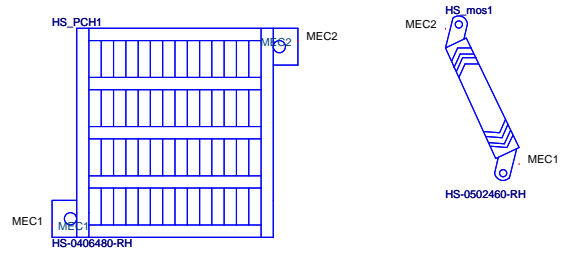
MS-7823

Size Custom	Document Description ME POWER	Rev 12
Date: Thursday, May 16, 2013	Sheet 35 of 42	

Reserve debug port 5020

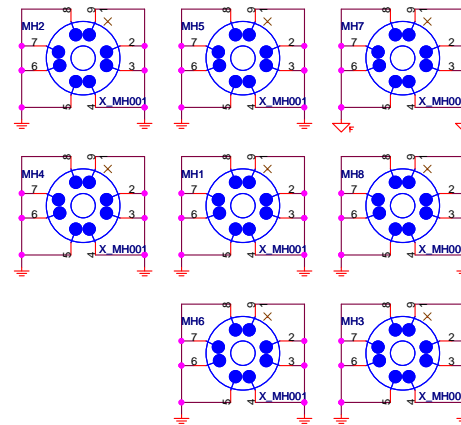


HEATSINK



PK0-0782312-G37, 精成, 23, 寶安恩斯邁廠 (MSIS)
PK0-0782312-E48, 競華, 23, 寶安恩斯邁廠 (MSIS)

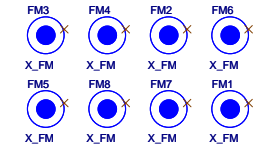
Mounting Holes



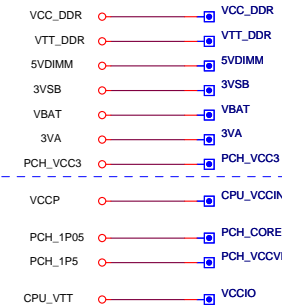
Simulation



Optical Fiducial Marks-120



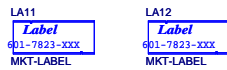
Test point



Change test point name by Ryan suggest



Label OPT.



B85-MCJ

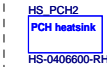
Chip OPT.



Z87 SPI OPT.



MCJ OPT.



MS-7823-1.2 主BOM為H87

OPT	Configure	BOM	Function	GPIO Setting(GP10/GP11/GP12)
	H87M-G43		MS-7823 11 H87 H87M-G43, H87, LGA1150, 4DDR3, 2PCI-Ex16, 2PCI-Ex1 6SATA3, 4USB3, HD Audio, Gb LAN, HDMI, DP, DVI, D-Sub	0, 0, 0
	Z87M-G43		MS-7823 11 OPT:E Z87 Z87M-G43, Z87, LGA1150, 4DDR3, 2PCI-Ex16, 2PCI-Ex1 6SATA3, 4USB3, HD Audio, Gb LAN, HDMI, DP, DVI, D-Sub	0, 0, 0
	H87M-S01 (MCJ)		MS-7823 12 H87 H87M-S01, H87, LGA1150, 4DDR3, 2PCI-Ex16, 2PCI-Ex1 6SATA3, 4USB3, HD Audio, Gb LAN, DP, DVI, D-Sub	1, 0, 0
	B85M-G43		MS-7823 11 OPT:G B85 B85M-G43, B85, LGA1150, 4DDR3, 2PCI-Ex16, 2PCI-Ex1 4SATA3, 4USB3, HD Audio, Gb LAN, HDMI, DP, DVI, D-Sub	0, 0, 0
	B85M-S01 (MCJ)		MS-7823 11 OPT:H B85 B85M-S01, B85, LGA1150, 4DDR3, 2PCI-Ex16, 2PCI-Ex1 4SATA3, 4USB3, HD Audio, Gb LAN, DP, DVI, D-Sub	1, 0, 0



MICRO-STAR INT'L CO.,LTD

MS-7823

Size Custom	Document Description Manual parts	Rev 12
Date: Friday, May 17, 2013	Sheet 37 of 42	

5	4	3	2	1
D				D
C				C
B				B
A				A
5	4	3	2	1



MICRO-STAR INT'L CO.,LTD		
MS-7823		
Size Custom	Document Description EMI CAP	Rev 12
Date: Thursday, May 16, 2013		Sheet 38 of 42