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**HP Gwen X4 (HP SCH P/N:718773-000)**  
**HP Mordred X4 (HP SCH P/N:718773-000)**

uATX(244 mm X 244 mm)

(MS-7860 10)

**CPU:** Intel Haswell Processor

HP P/N	Description
718772-001	PCA,GWEN
718773-000	SCH,GWEN
718774-001	PCB,GWEN

**System Chipset:** Intel Lynx Point Chipset

HP P/N	Description
718775-001	PCA,MORDRED
718773-000	SCH,MORDRED
718774-001	PCB,MORDRED

**OnBoard Chipset:** AZALIA Codec: Realtek ALC 221  
LAN: Realtek RTL8151GH-CG 10/100/1000 NIC  
SIO: Nuvoton NPCD379H  
Flash ROM: 64 Mb

**Main Memory:** DDRIII (1333/1600MHz) \* 4 (Dual Channel)

**Expansion Slots:** PCI Express (X16) Slot \* 1  
PCI Express (X1) Slot \* 3  
DDI Port Slot \*1

**PWM:** Controller: ISL95816HRZ  
Controller: NCP1587GDR2G

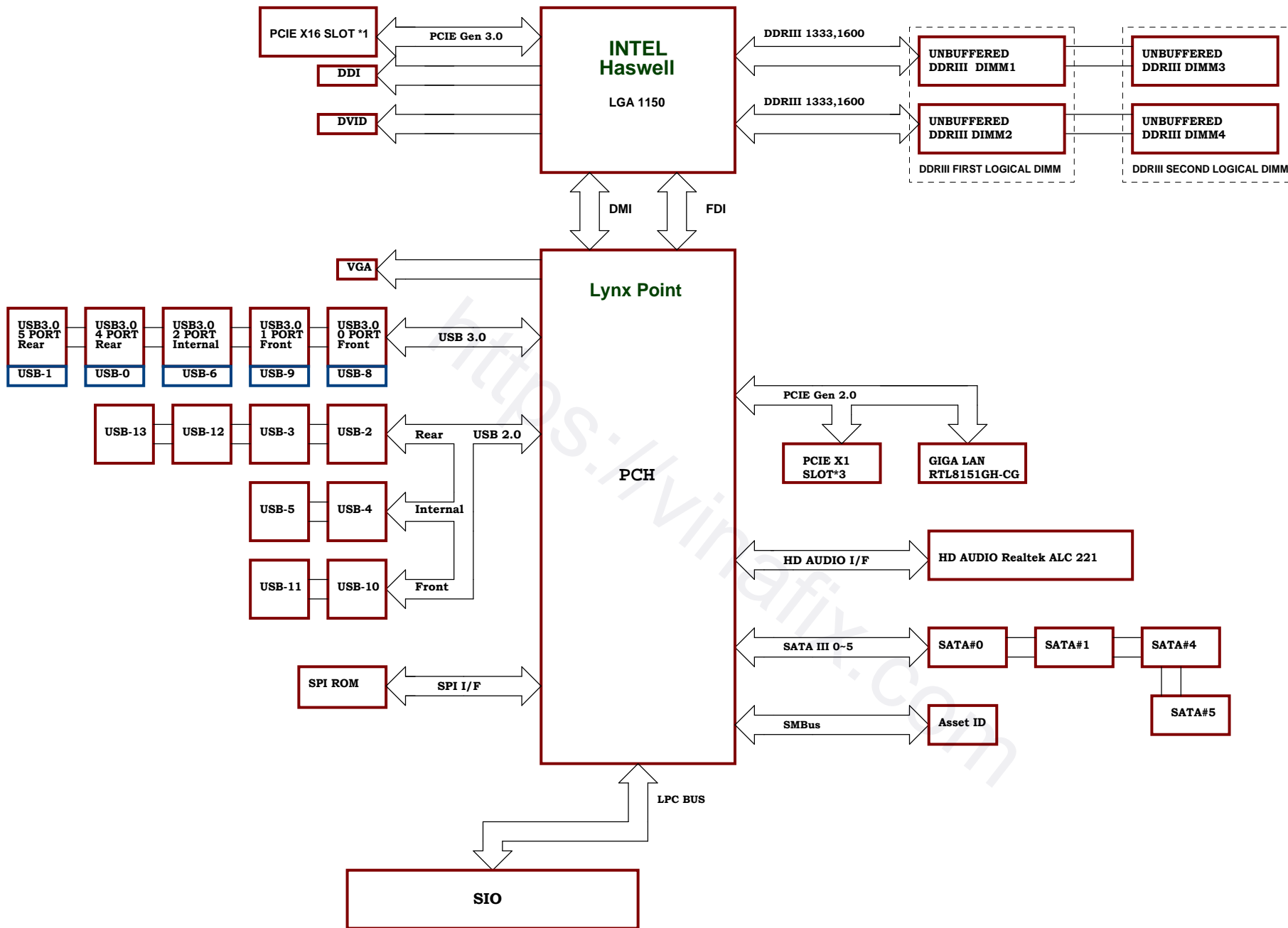
**Other:** SATA \*4  
USB3.0 \*5 (Rear\*2 Front\*2 Internal\*1)  
USB2.0 \*8 (Rear\*4 Front\*2 Internal\*2)  
DVI PORT\*1  
VGA PORT \*1  
PRINT Header \*1  
COM PORT \*1  
COM Header \*1

**BOM DISTRIBUTION RULE**  
Gwen,Mordred  
(BOM,BOM)

Release Date : Wednesday, May 29, 2013

**HP Restricted Secret**

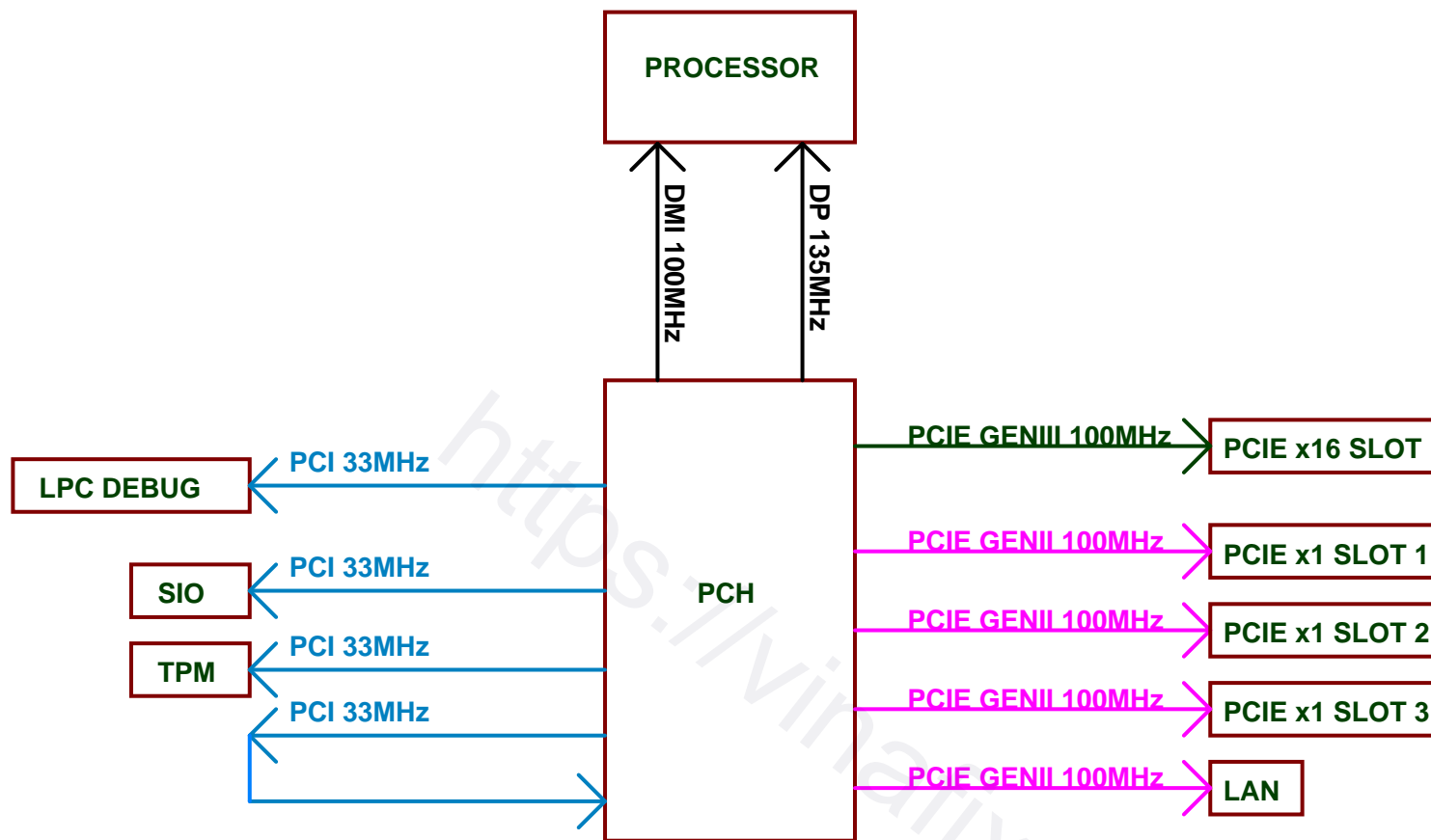
MICRO-STAR INT'L CO.,LTD		
HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description Cover Sheet	Rev X4
Date:	Sheet 1 of 56	



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HP SCH P/N: 718773-000(MSI MS-7860)		Rev X4	
Size Custom	Document Description	Block Diagram	
Date:	Sheet 2 of 56		

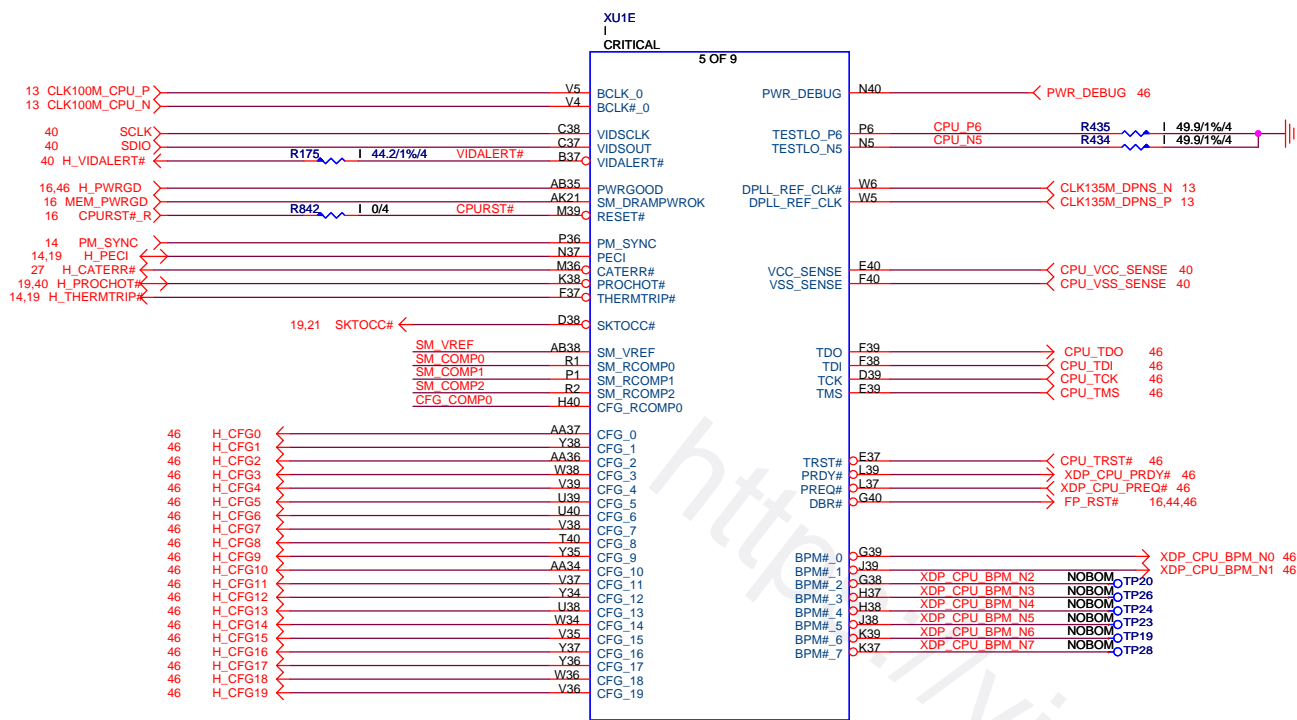


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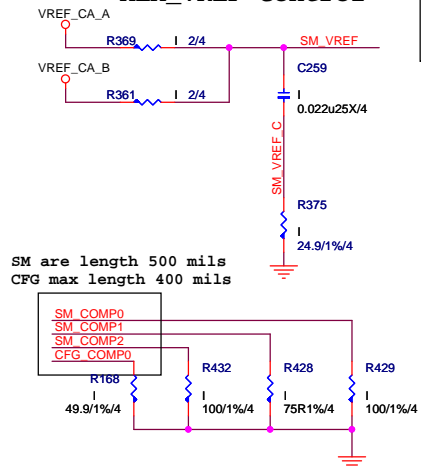
MICRO-STAR INT'L CO.,LTD		
HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description Clock Distribution	Rev X4
Date:	Sheet 3	of 56



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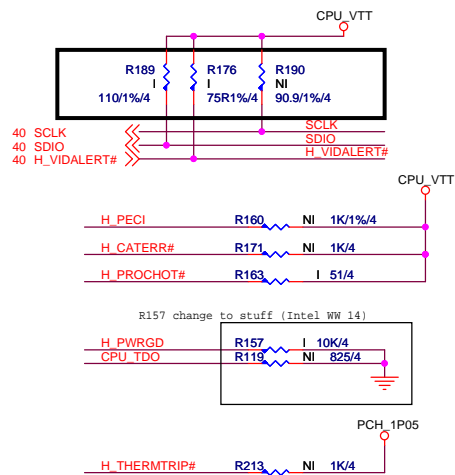
46 H\_CFG[19..0] <-> H\_CFG[19..0]  
CPU2\_2 N12-150A010-L06  
AVL:N12-150A020-F02

### MEM\_VREF Control



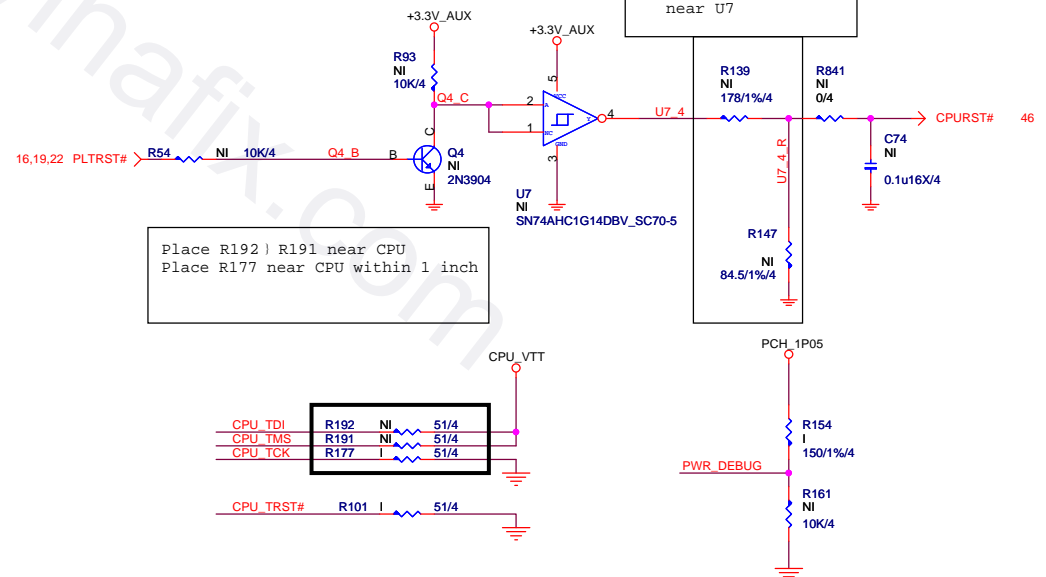
SM are length 500 mils  
CFG max length 400 mils

Place R189 | R176 | R190 near CPU



R157 change to stuff (Intel WW 14)

### CPU\_RESET#



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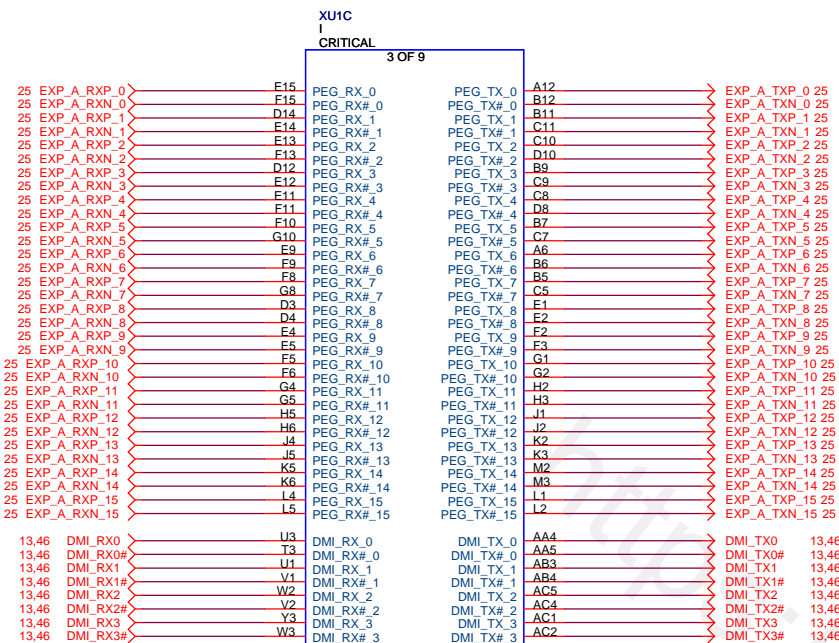
**HP Restricted Secret**



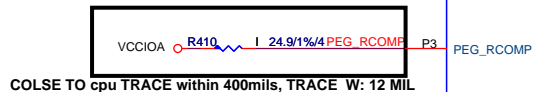
MICRO-STAR INT'L CO.,LTD

HP SCH P/N: 718773-000(MSI MS-7860)

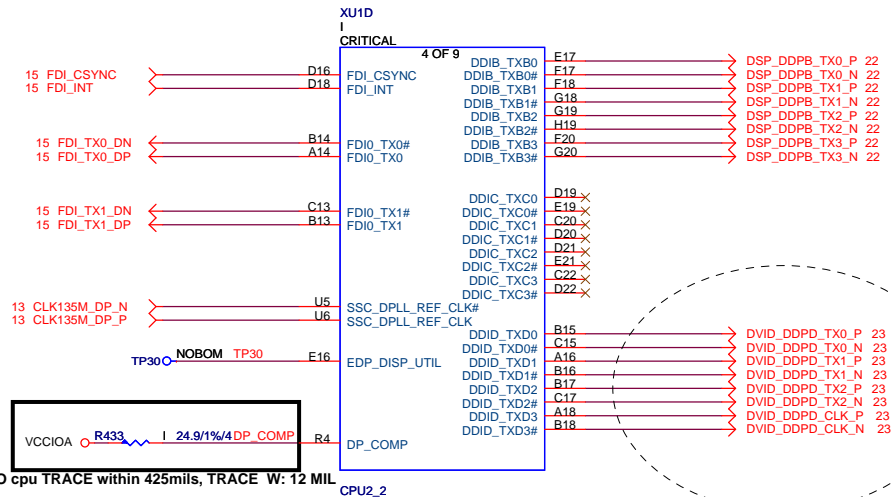
Size	Document Description	Rev
Custom	CPU-CLK/Control	X4
Date:	Sheet 4 of 56	



TP42 NOBOM TP42 D1 RDVD\_TP\_01  
TP41 NOBOM TP41 C2 RDVD\_TP\_02  
TP39 NOBOM TP39 B3 RDVD\_TP\_03  
TP37 NOBOM TP37 A4 RDVD\_TP\_04



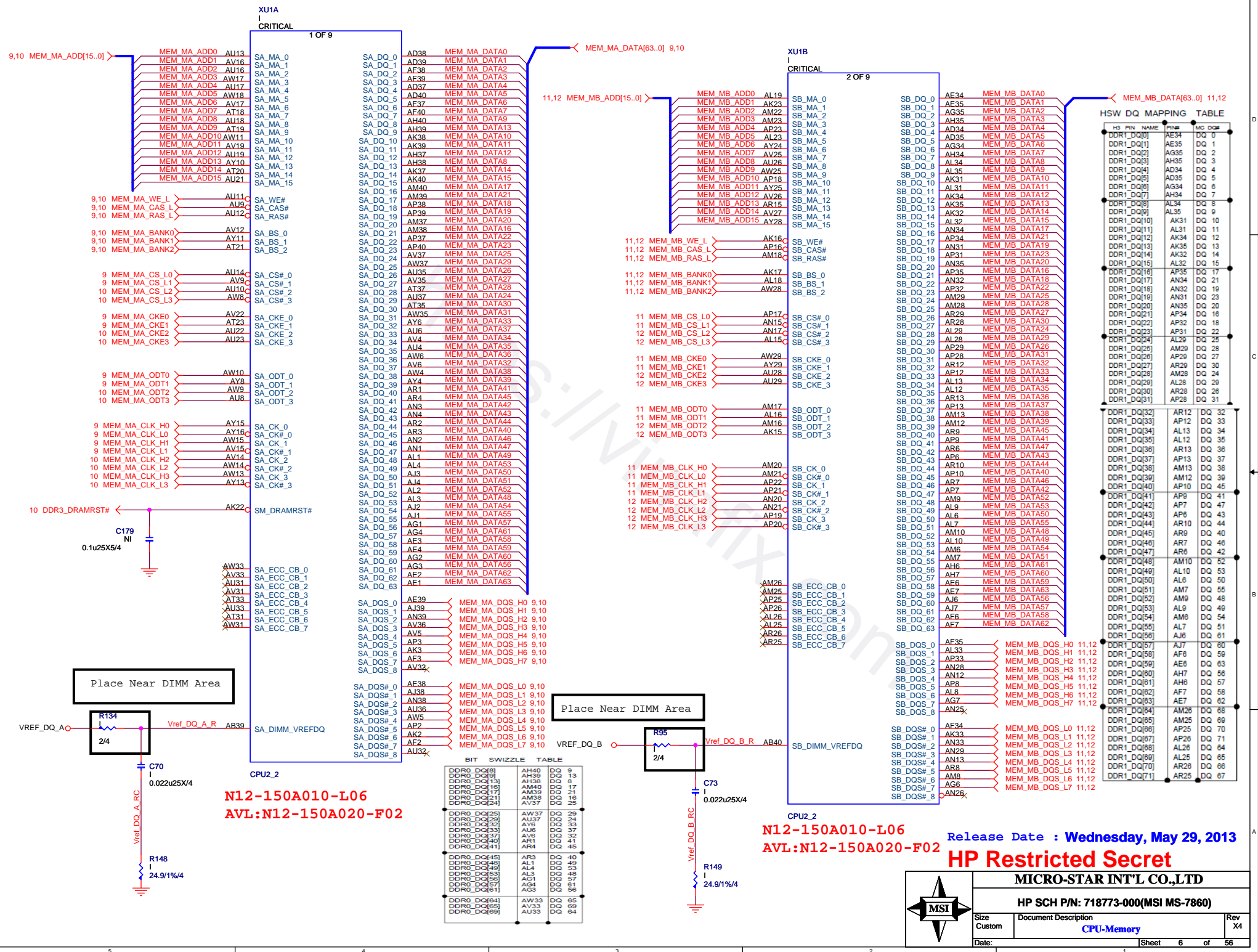
CPU2\_2  
N12-150A010-L06  
AVL:N12-150A020-F02



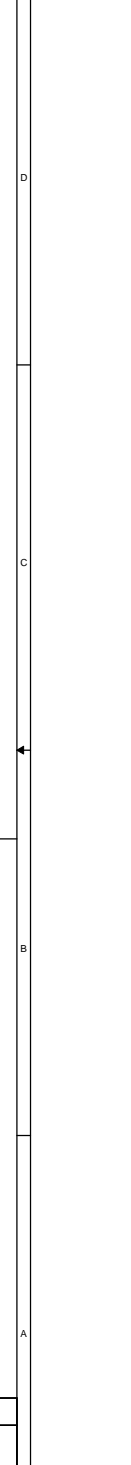
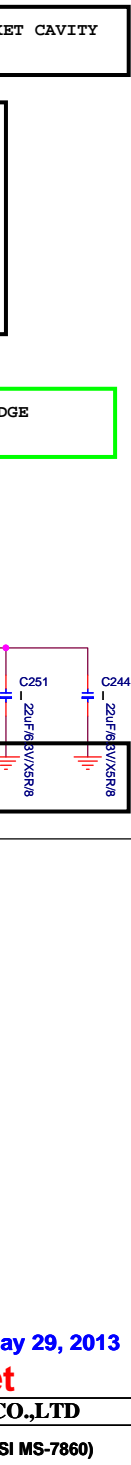
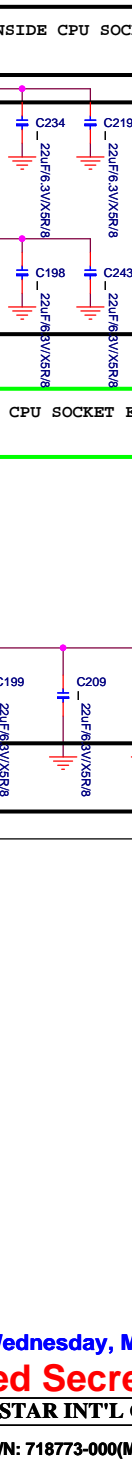
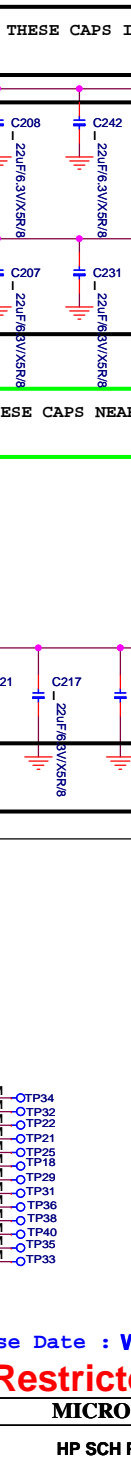
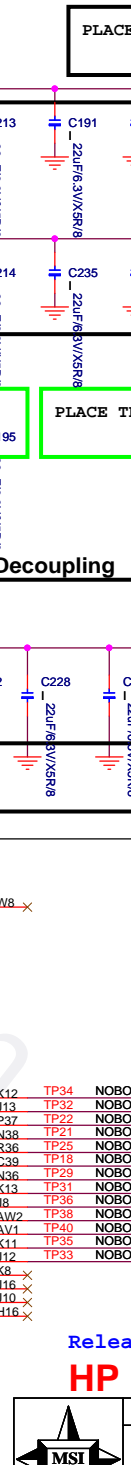
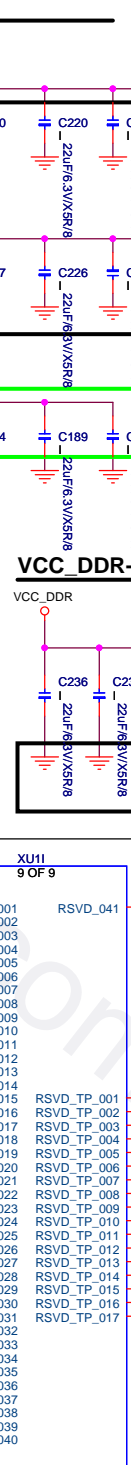
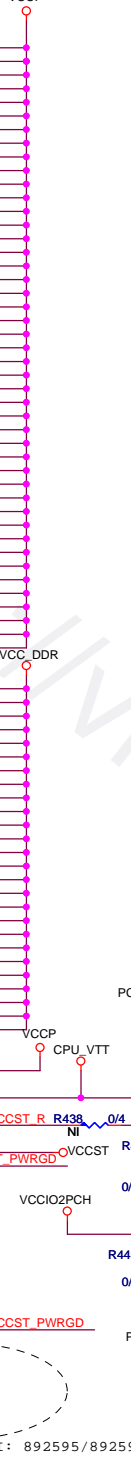
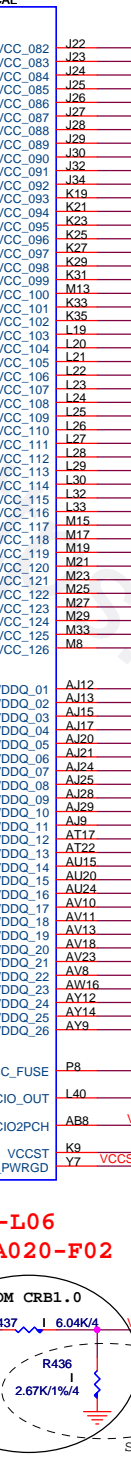
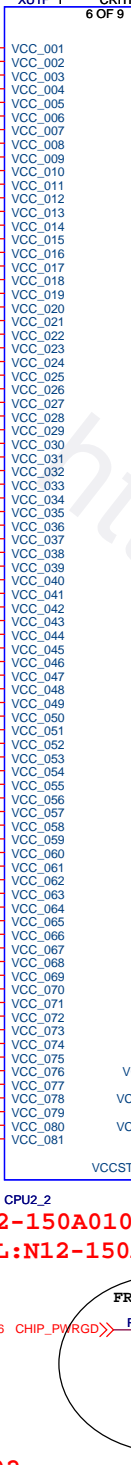
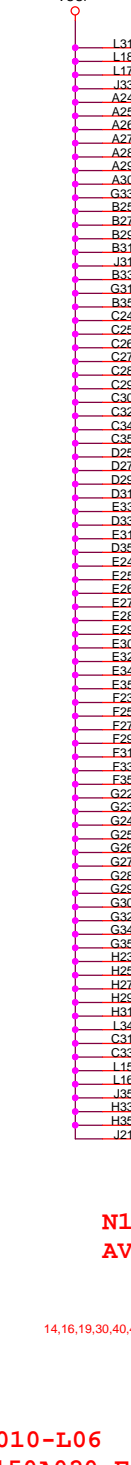
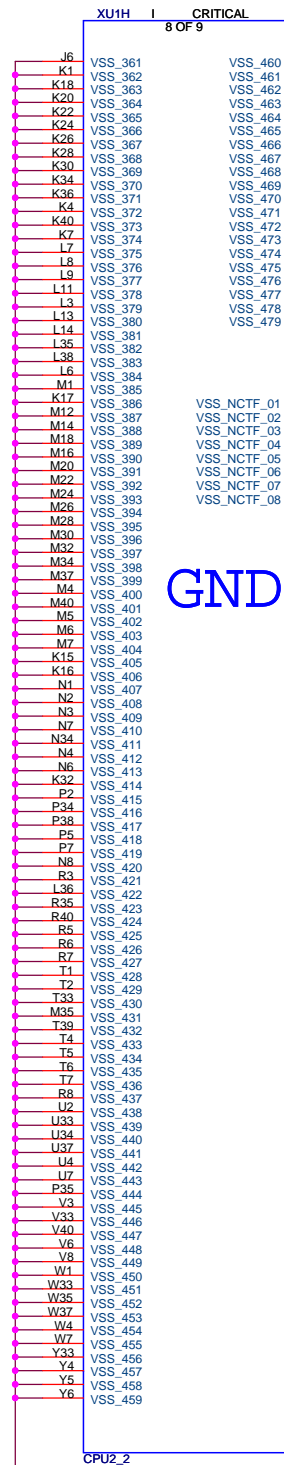
Release Date : Wednesday, May 29, 2013

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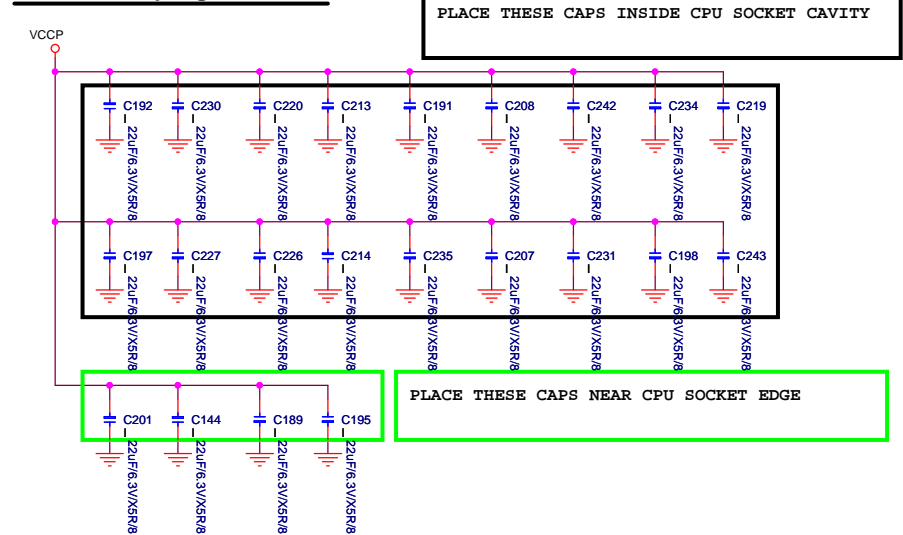
MSI		
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HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description CPU-PEG/MISC	Rev X4
Date:	Sheet 5 of 56	



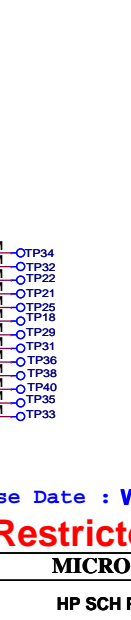
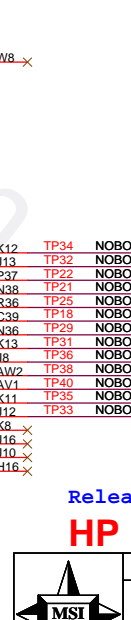
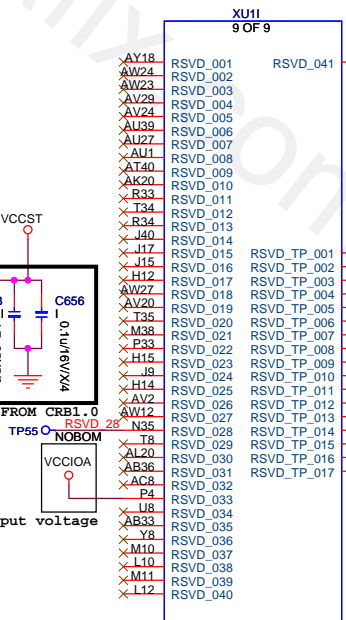
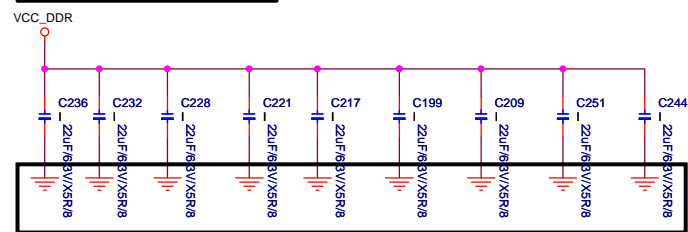




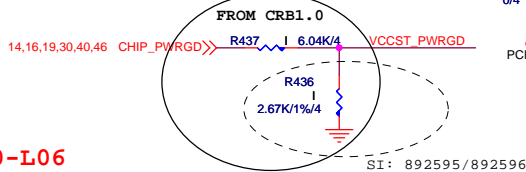
## VCCP-Decoupling



## VCC\_DDR-Decoupling



CPU2\_2  
N12-150A010-L06  
AVL:N12-150A020-F02



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Date:	Sheet 7 of 56	

XU1G  
I  
CRITICAL

7 OF 9

GND

N12-150A010-L06

AVL:N12-150A020-F02

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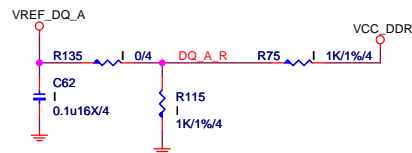
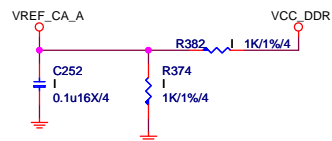
Size	Document Description	Rev
Custom	CPU-GND	X4
Date:	Sheet 8 of 56	



# DDRIII DIMM\_A1

WHITE COLOR  
N13-2401611-F02

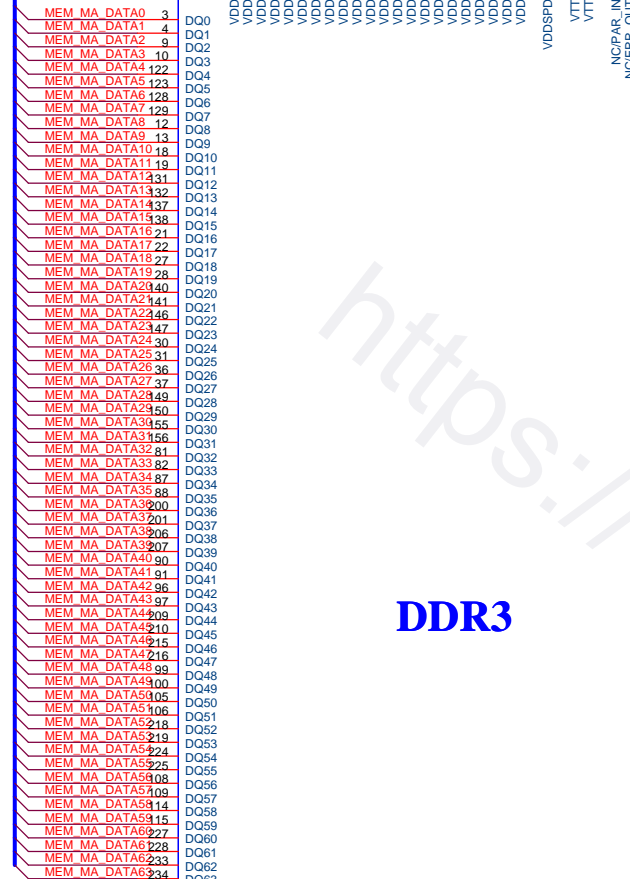
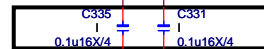
6,10 MEM\_MA\_DATA[63..0] ← MEM\_MA\_DATA[63..0]



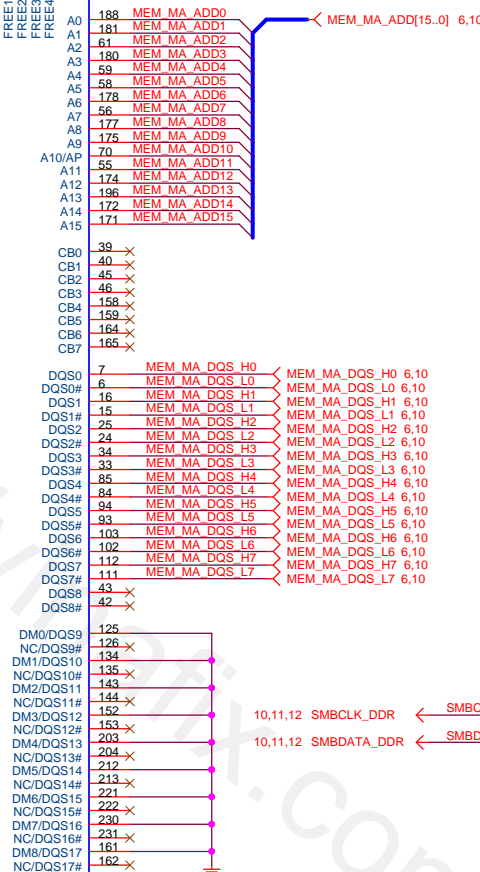
VCC\_DDR  
VTT\_DDR  
VDDSPD

Palce Caps Between CHA And CHB

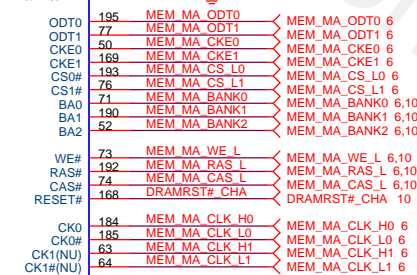
+3.3V



DDR3



10,11,12 SMBCLK\_DDR ← SMBCLK\_DDR R482 33/4 → SMB\_CLK\_MAIN 16,19,46  
10,11,12 SMBDATA\_DDR ← SMBDATA\_DDR R485 33/4 → SMB\_DATA\_MAIN 16,19,46



DDRIII-240P\_WHITE-RH-2

XMM4(CHANNEL-A)  
ADDRESS = 1:1 [SA1:SA0]

Release Date : Wednesday, May 29, 2013

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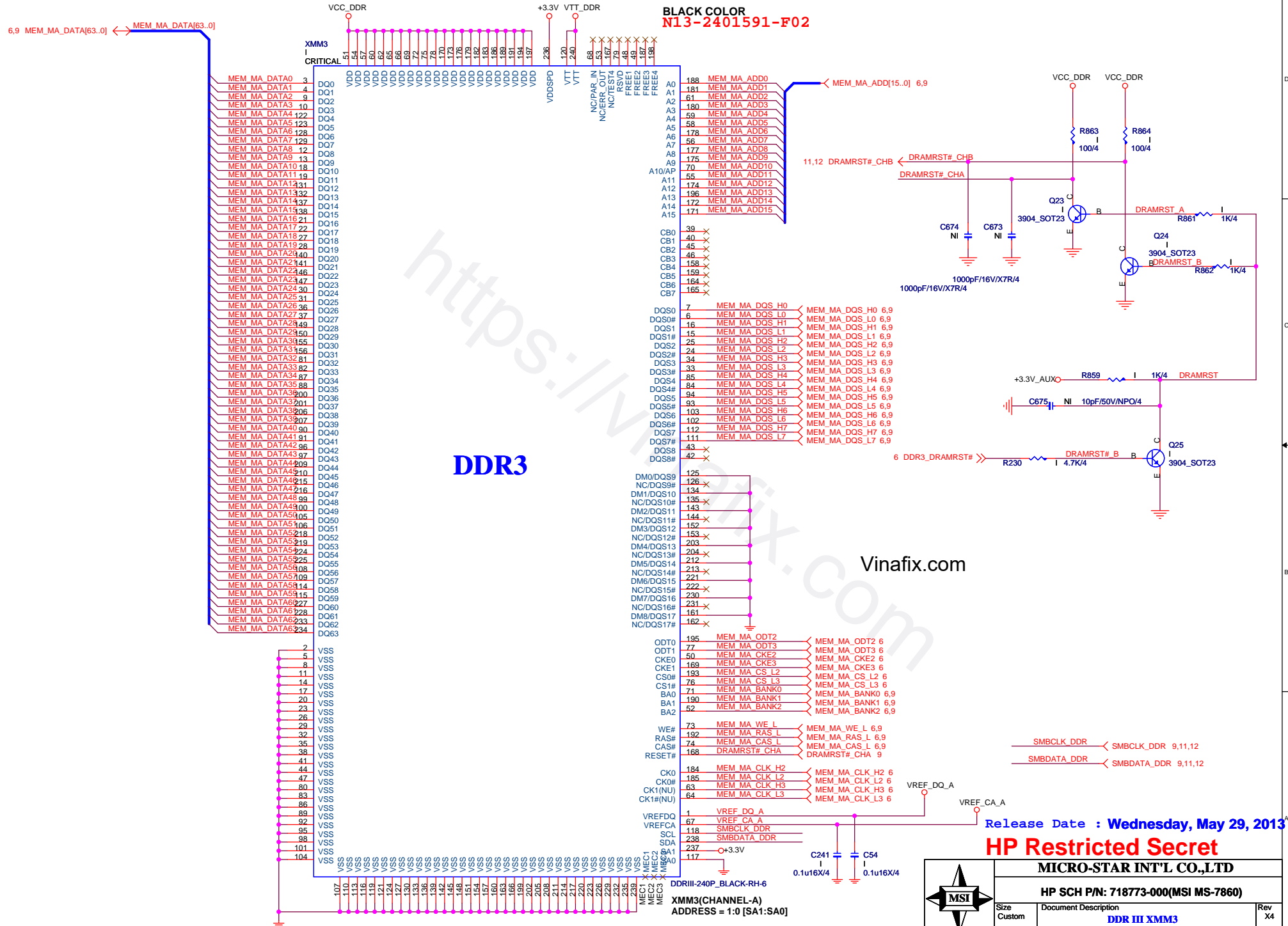


MICRO-STAR INT'L CO.,LTD

HP SCH P/N: 718773-000(MSI MS-7860)

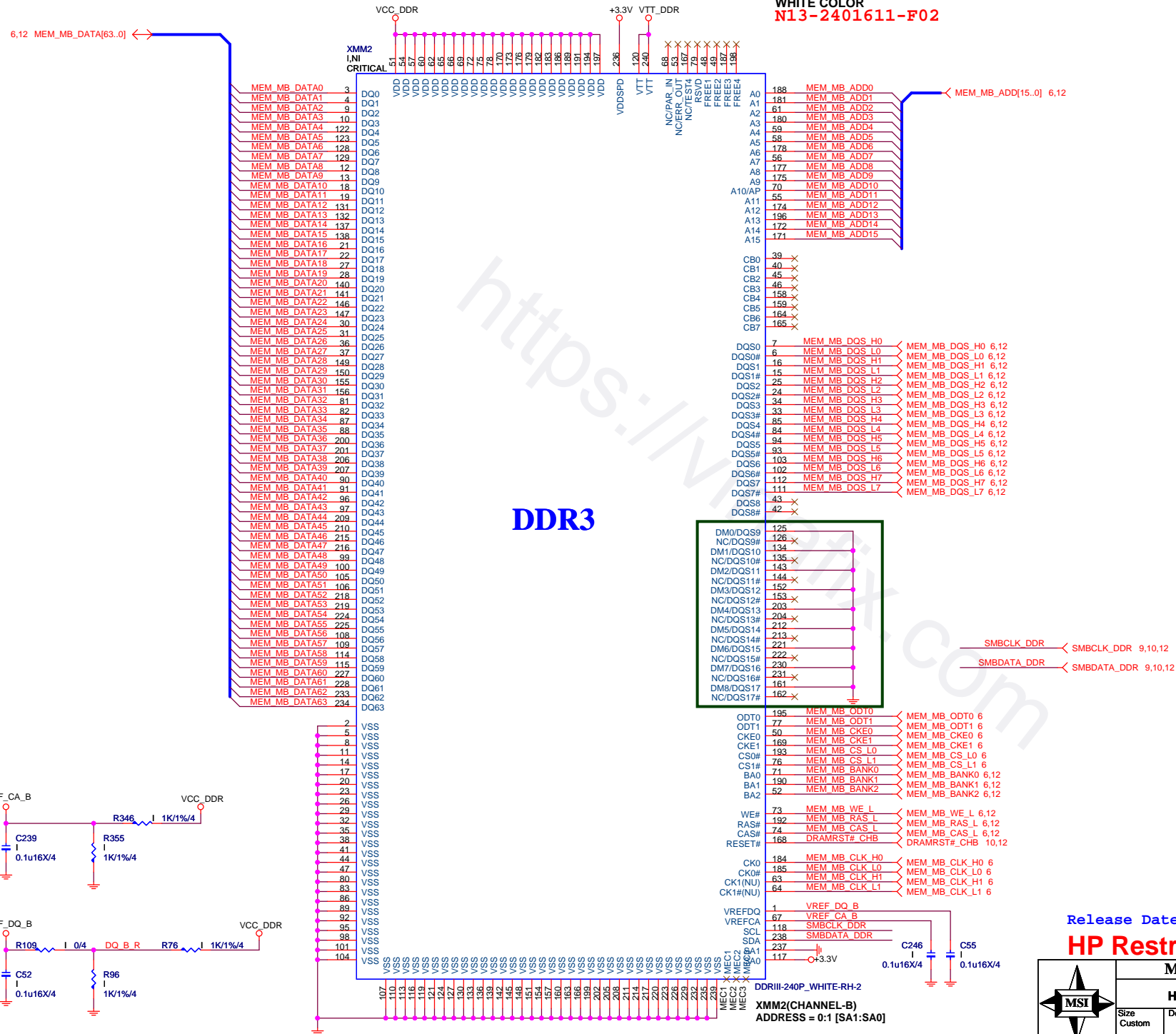
Size	Document Description	Rev
Custom	DDR III XMM4	X4
Date:	Sheet 9 of 56	

# DDR3 DIMM\_A2



## DDRIII DIMM\_B1

WHITE COLOR  
N13-2401611-F02



**Release Date : Wednesday, May 29, 2013**

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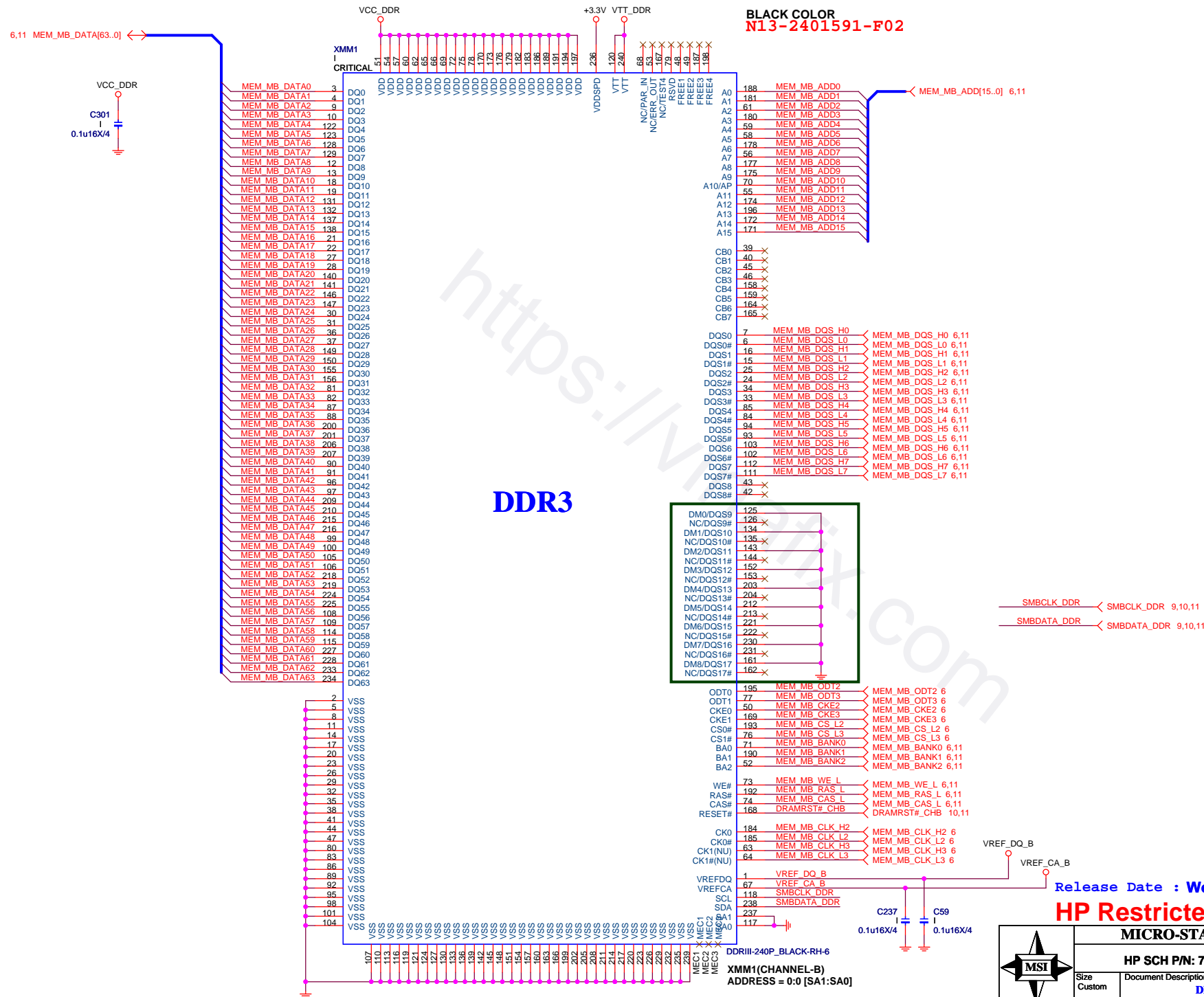


**MICRO-STAR INT'L CO.,LTD**

**HP SCH P/N: 718773-000(MSI MS-7860)**

Size Custom	Document Description <b>DDR III XMM2</b>	Rev X4
Date:	Sheet 11 of 56	

# DDRIII DIMM\_B2

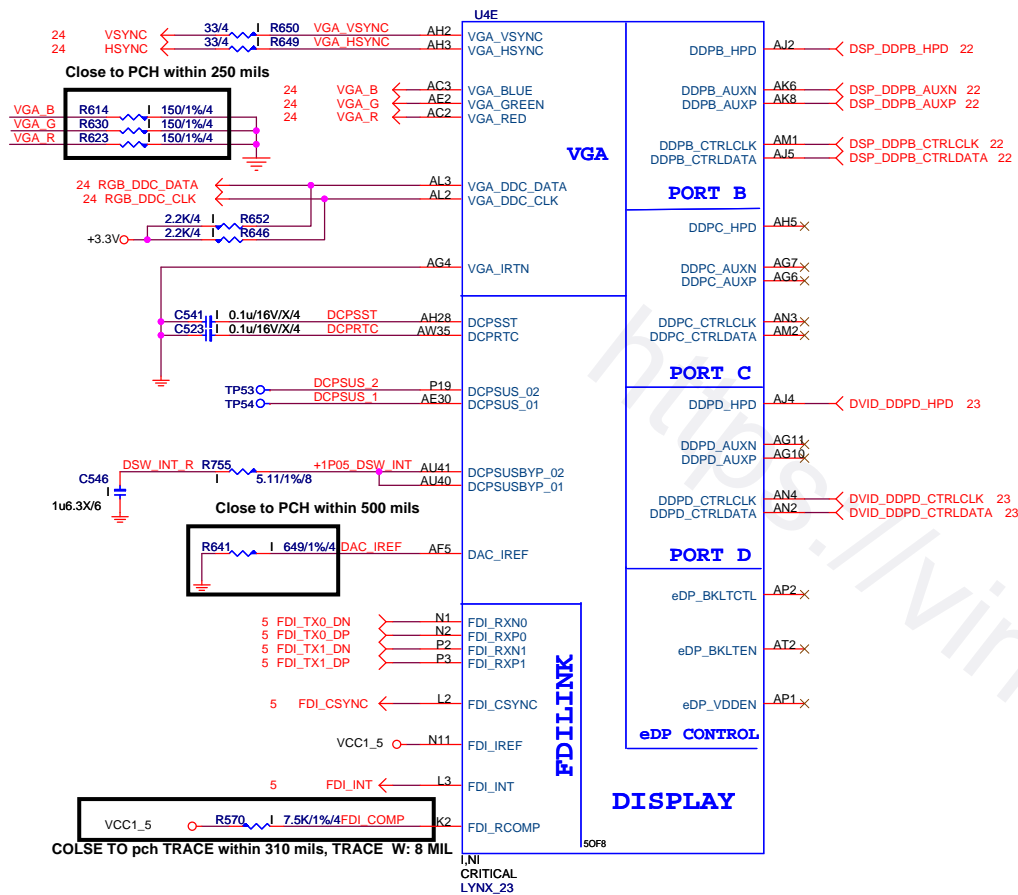


Date:	Sheet 13 of 56
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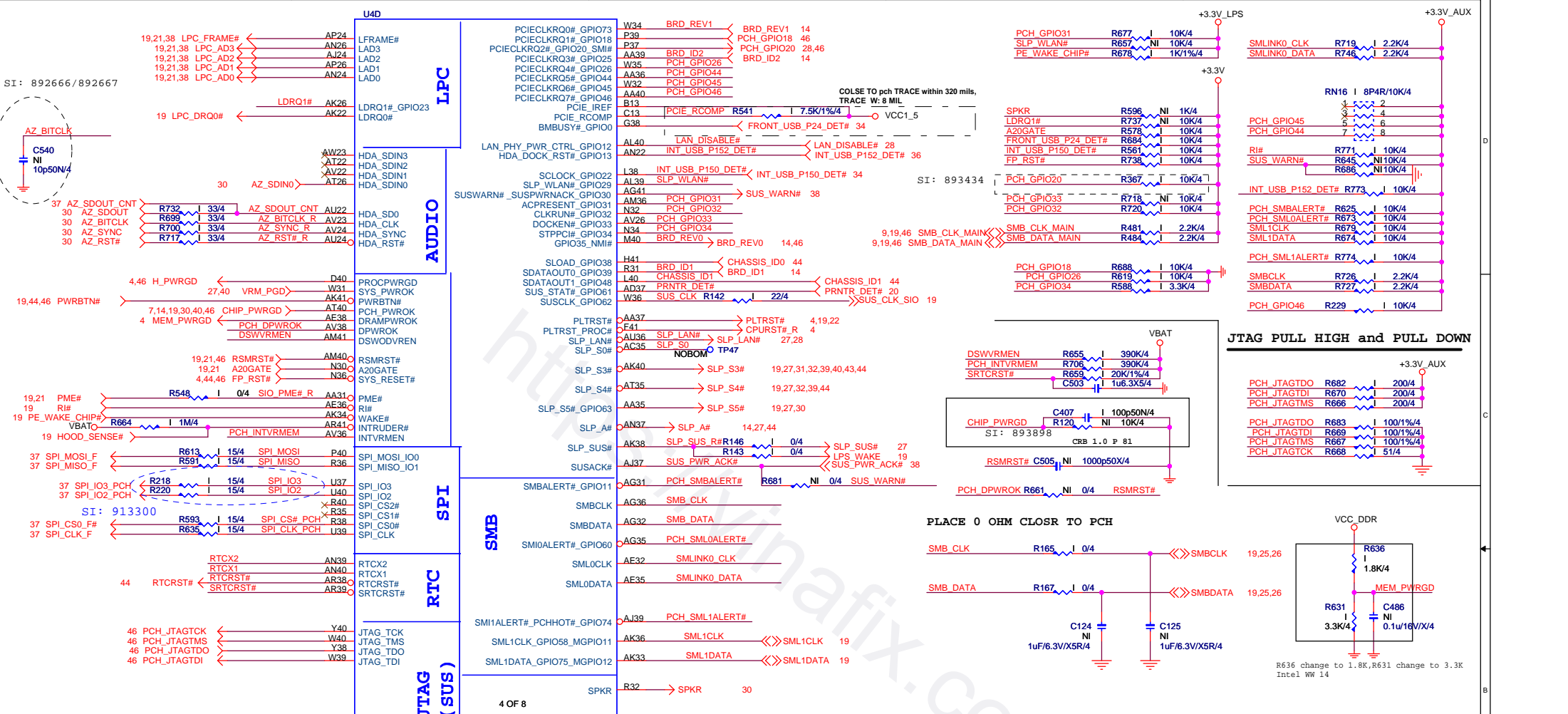




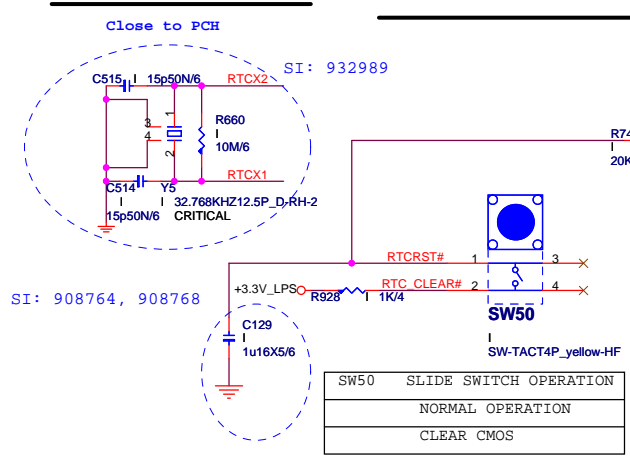
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	<b>MICRO-STAR INT'L CO.,LTD</b>		
	<b>HP SCH P/N: 718773-000(MSI MS-7860)</b>		
	Size Custom	Document Description <b>PCB-DDI/VGA</b>	Rev X4
	Date:	Sheet 15 of 56	

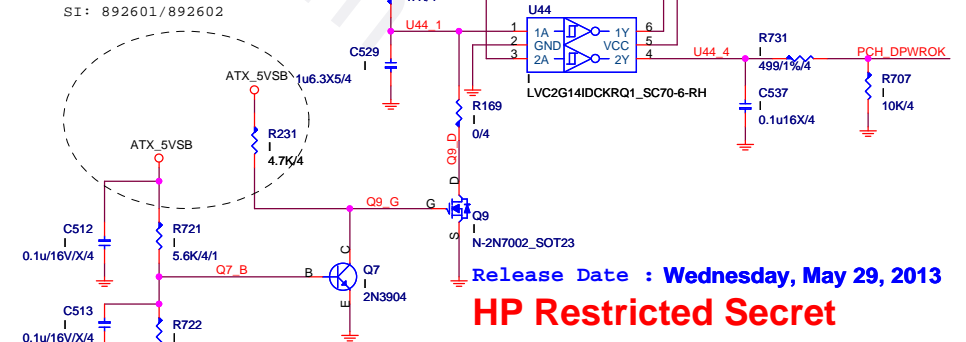


RTC Block



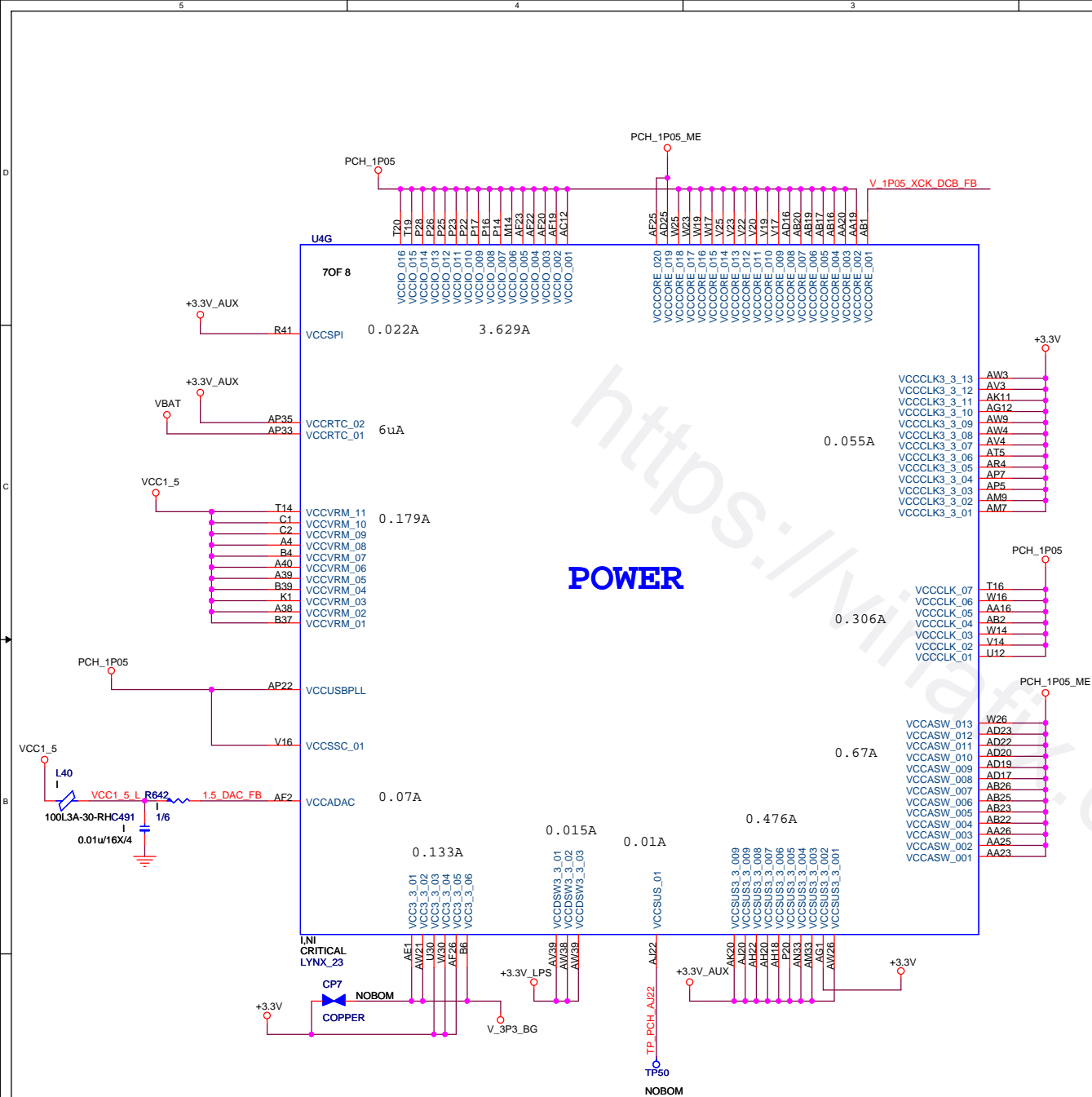
N91-01F0201-L06

PLACE 0 OHM CLOSER TO PCH



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HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description	Rev X4
PCH-SMB/LPC/AUDIO/RTC		
Date:	Sheet 16	of 56



Place C283 | C237 near P14, P16, P17, P26, P28  
C285 near M14 C288 near U12 C289 near W14  
C291 near AB2 C295 near V16 C297 near AA16, W16  
C300 near AP22, AF19

Place C303 near AV4, AR4, AT5, AP5  
C634 near AG1 C633 near W30 C304 near AF26

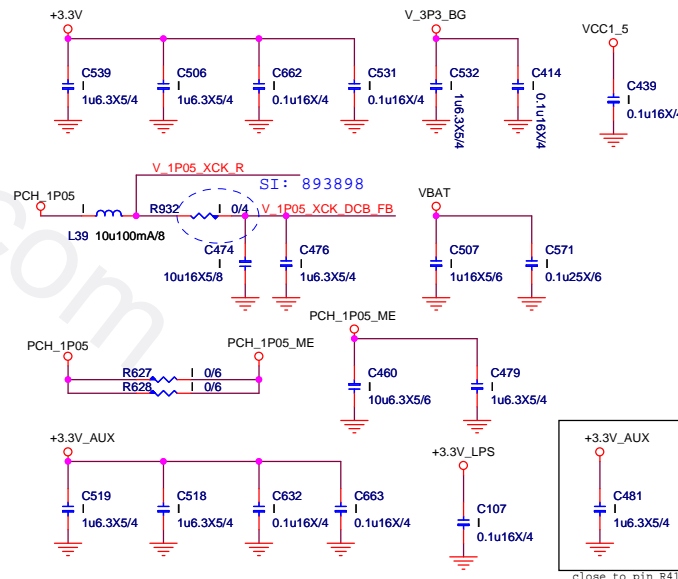
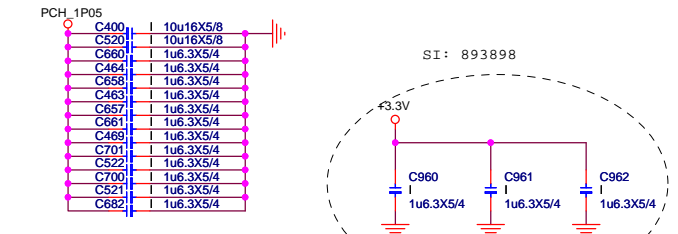
Place C630 near AN33 C301 near AK20  
C631 near AW26 C302 near AP35

Place C635 near T14

Place C636 near AW39


Place C312 | C311 near AD17, AD19

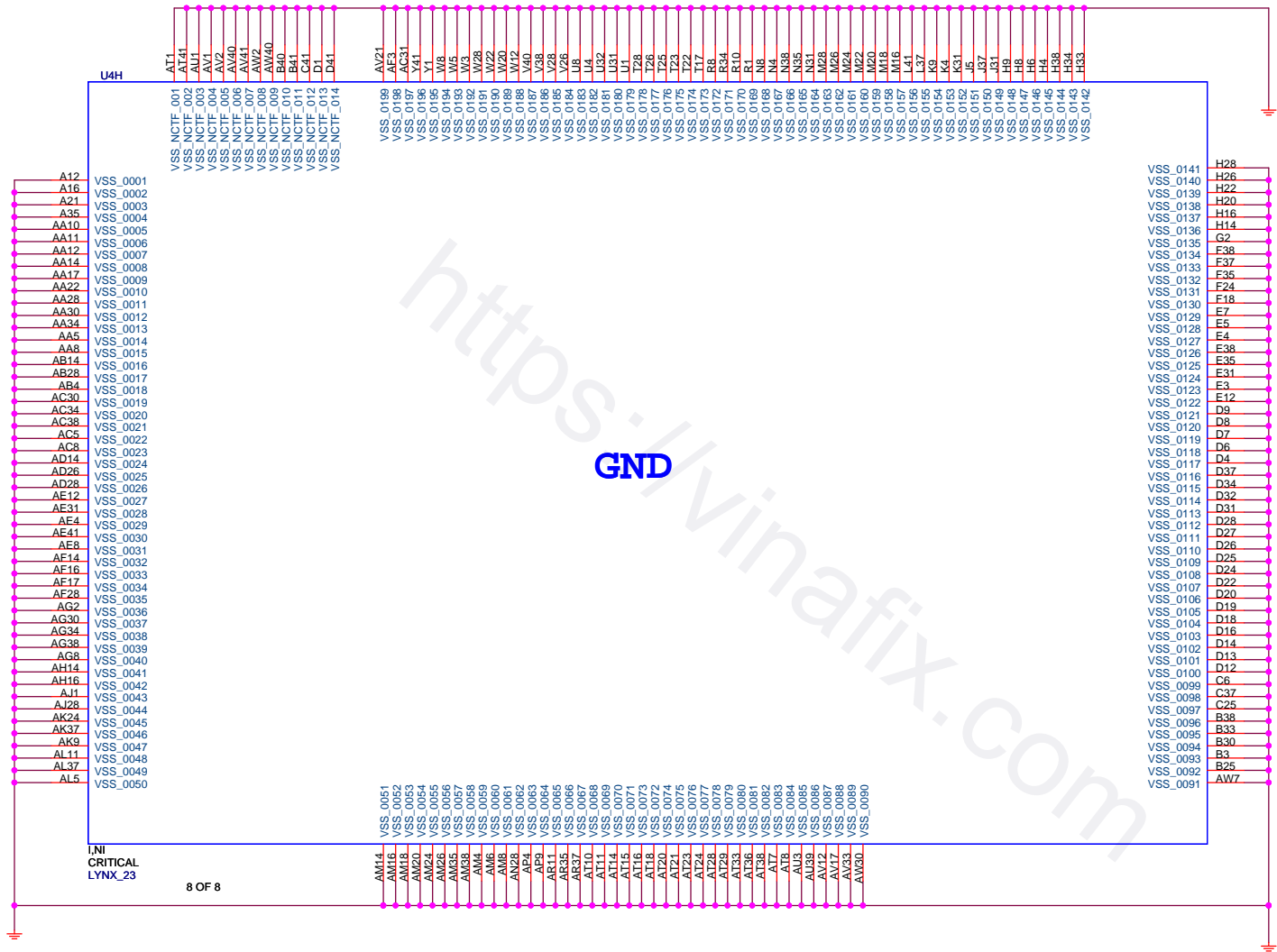
Place C306 near AW21 C632 near B6



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			<b>MICRO-STAR INT'L CO.,LTD</b>	
<b>HP SCH P/N: 718773-000(MSI MS-7860)</b>			<b>Rev X4</b>	
Size Custom	Document Description		<b>PCH-Power</b>	
Date:			Sheet 17 of 56	



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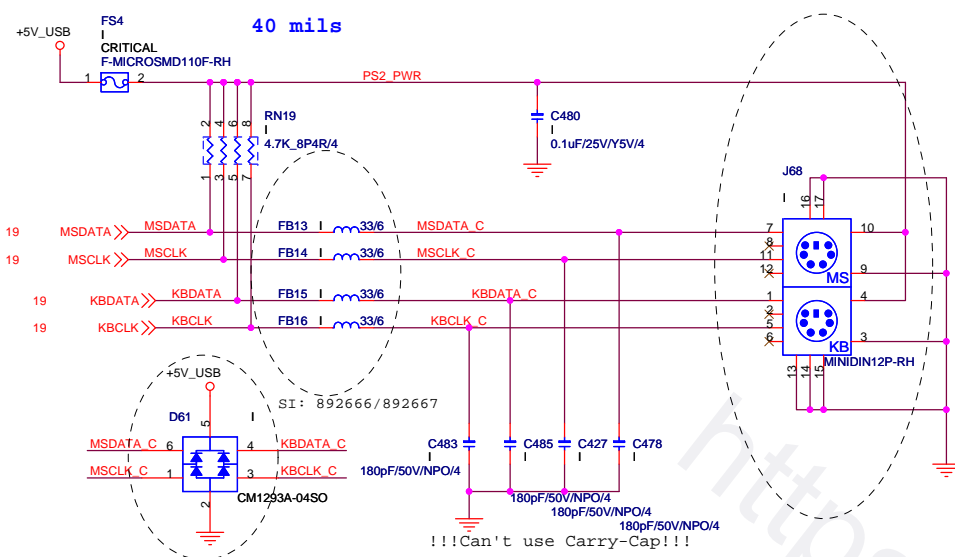
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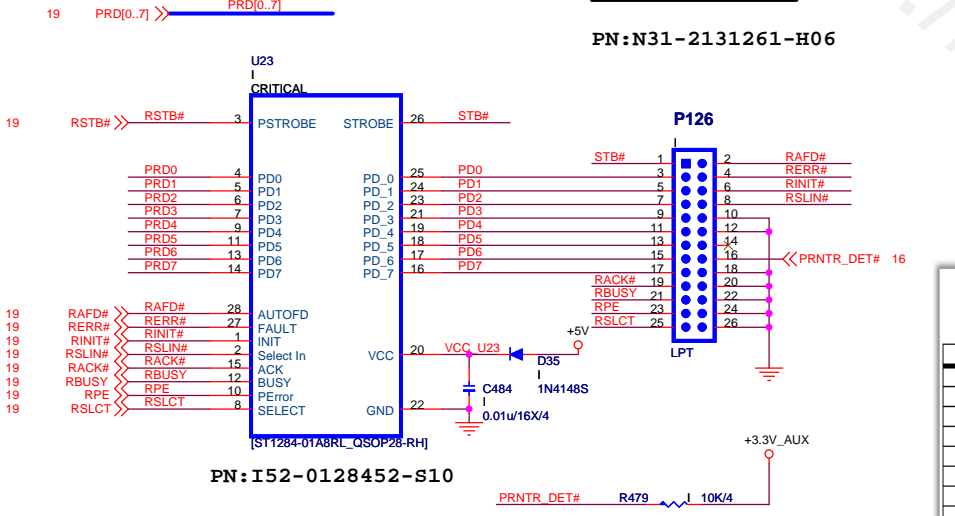
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	<b>HP SCH P/N: 718773-000(MSI MS-7860)</b>	
	Size Custom	Document Description <b>PCH-GND</b>
Date:		Sheet 18 of 56



PS2 KEYBOARD & MOUSE CONNECTOR



PARALLAL PORT

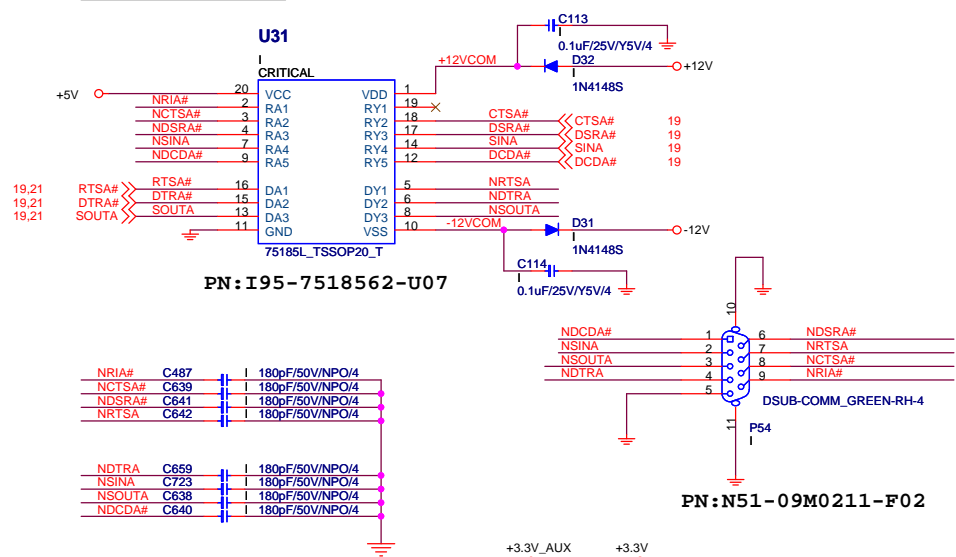


Parallel Port 2x13 header

PIN #	SIGNAL NAME	SIGNAL NAME	PIN #
1	LPT_STB#	XAFD#	2
3	LPT_SPD0	ERROR#	4
5	LPT_SPD1	XINIT#	6
7	LPT_SPD2	XSLIN#	8
9	LPT_SPD3	GND	10
11	LPT_SPD4	GND	12
13	LPT_SPD5	GND	14
15	LPT_SPD6	PRT_DET#	16
17	LPT_SPD7	GND	18
19	ACK#	GND	20
21	BUSY	GND	22
23	PE	LDT_RST#	24
	SLCT	GND	26

- PD0 C721 NI 180pF/50V/NPO/4
- PD1 C668 NI 180pF/50V/NPO/4
- PD2 C718 NI 180pF/50V/NPO/4
- PD3 C719 NI 180pF/50V/NPO/4
- PD4 C720 NI 180pF/50V/NPO/4
- PD5 C722 NI 180pF/50V/NPO/4
- PD6 C664 NI 180pF/50V/NPO/4
- PD7 C717 NI 180pF/50V/NPO/4
- STB# C716 NI 180pF/50V/NPO/4
- RACK# C704 NI 180pF/50V/NPO/4
- RBUSY C712 NI 180pF/50V/NPO/4
- RPE C713 NI 180pF/50V/NPO/4
- RSLCT C714 NI 180pF/50V/NPO/4
- RAFD# C715 NI 180pF/50V/NPO/4
- RERR# C681 NI 180pF/50V/NPO/4
- RSLIN# C708 NI 180pF/50V/NPO/4

SERIAL PORT 1



SERIAL PORT 2

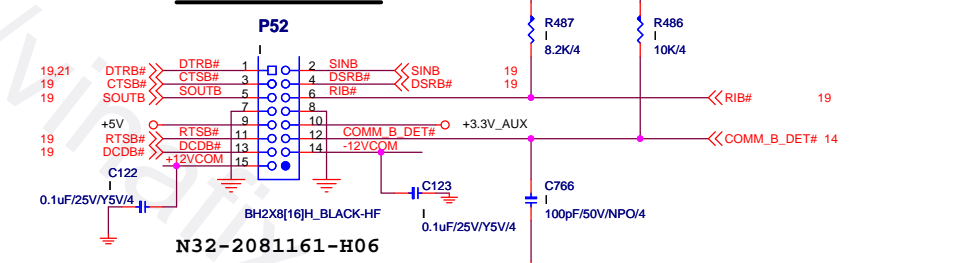
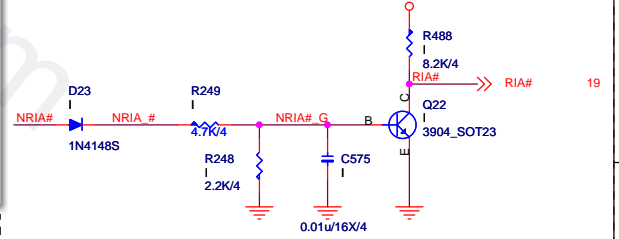


TABLE 12  
FLOATING SERIAL PORT PIN DEFINITION (TOP VIEW)

Pin #	Signal Name	Signal Name	Pin #
1	DTR#	RXD	2
3	CTS#	DSR#	4
5	TXD	RI#	6
7	GND	GND	8
9	+5 V	+3.3 VAUX	10
11	RTS#	COMM B DETECT#	12
13	DCD#	-12 V (THRU DIODE)	14
15	+12 V (THRU DIODE)	KEY	16

Support ring wake up



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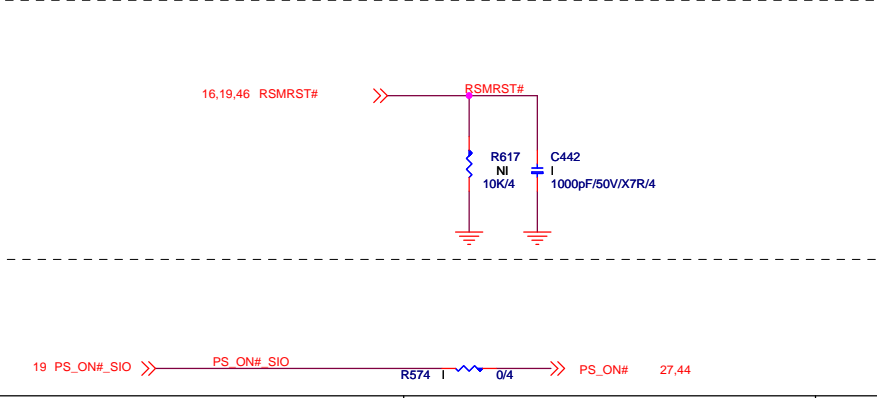
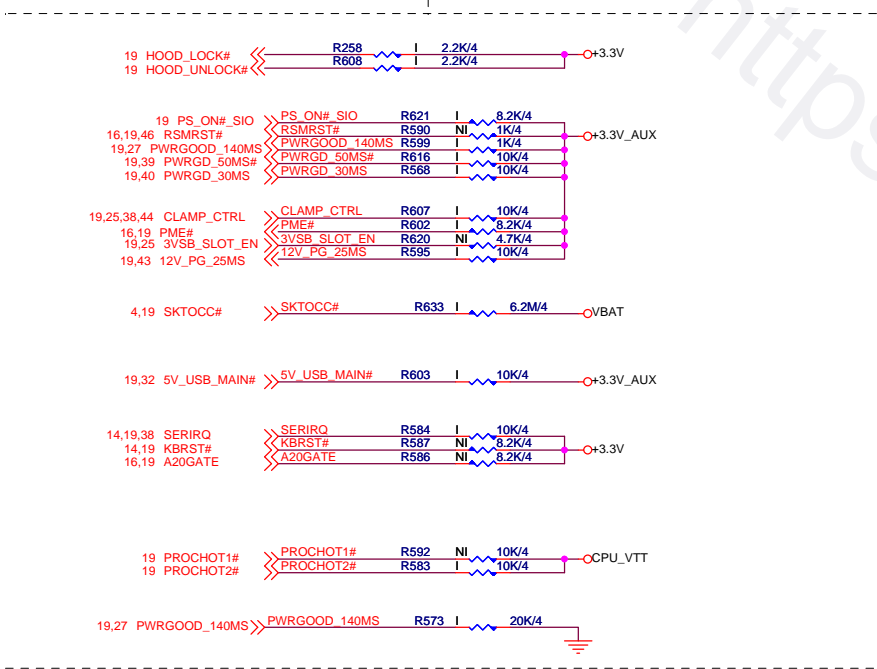
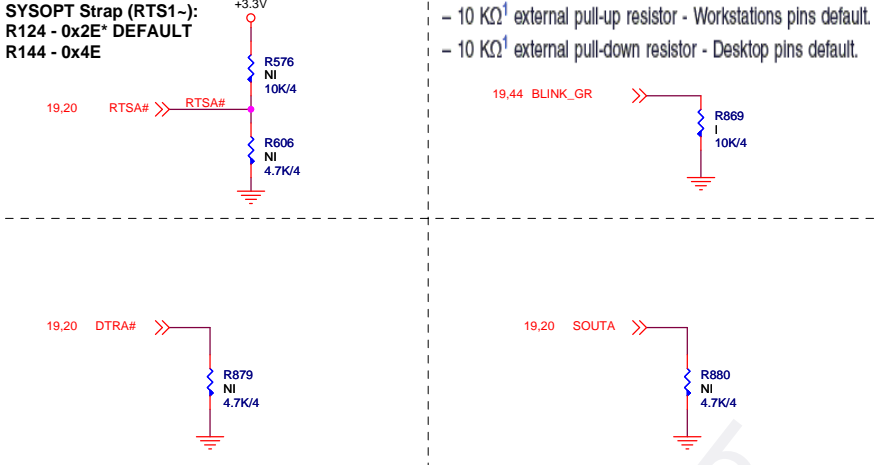
**HP SCH P/N: 718773-000(MSI MS-7860)**

Size Custom Document Description  
**KB / MS / COM / LPT**

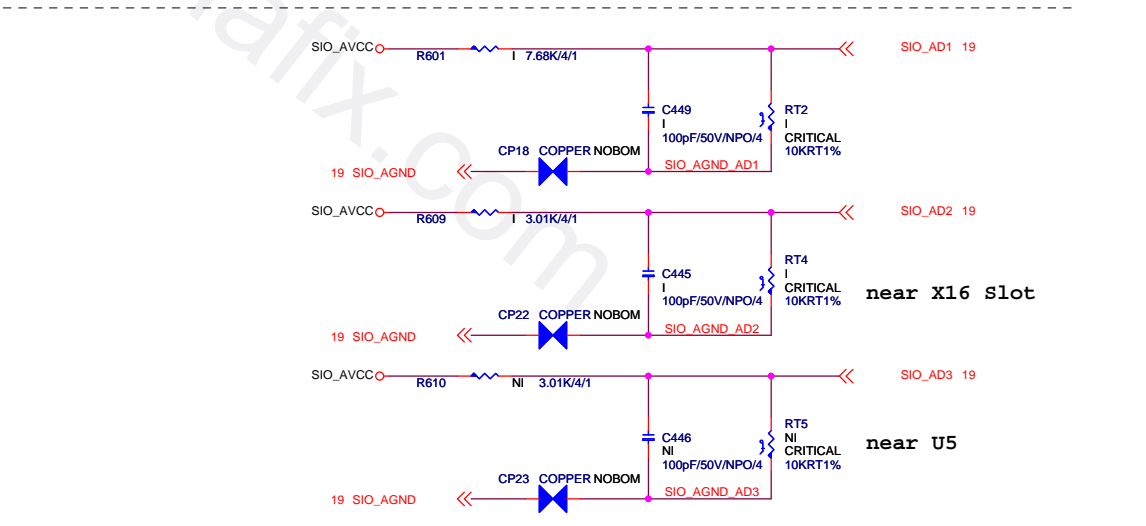
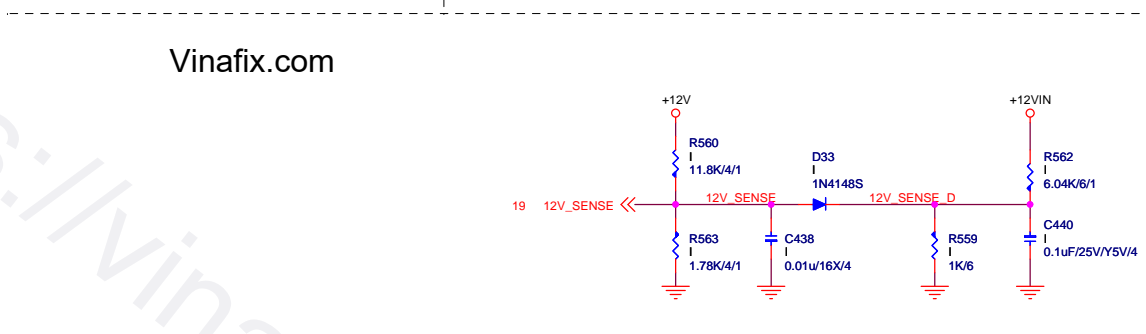
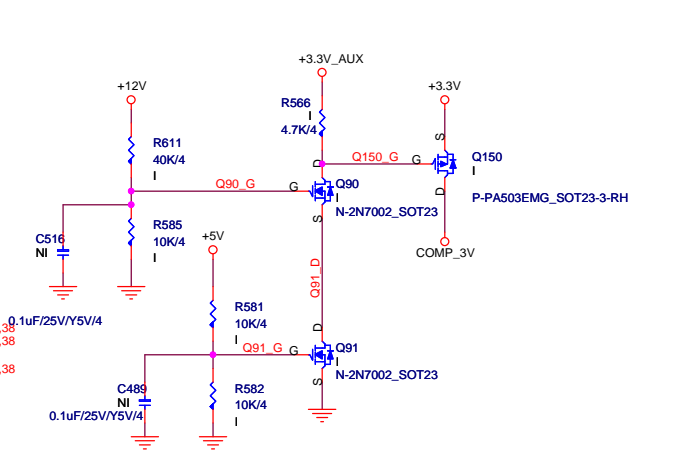
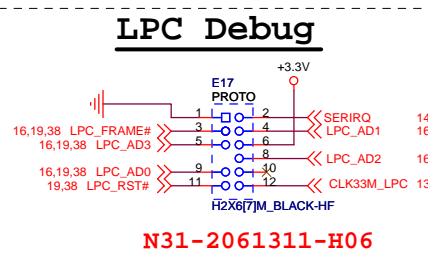
Date: Sheet 20 of 56



SYSOPT Strap (RTS1-):  
R124 - 0x2E\* DEFAULT  
R144 - 0x4E



- 10 K $\Omega$  external pull-up resistor - Workstations pins default.  
- 10 K $\Omega$  external pull-down resistor - Desktop pins default.  
- No pull-down resistor (default) - normal device operation.  
- 4.7 K $\Omega$  external pull-down resistor - JTAG selected.

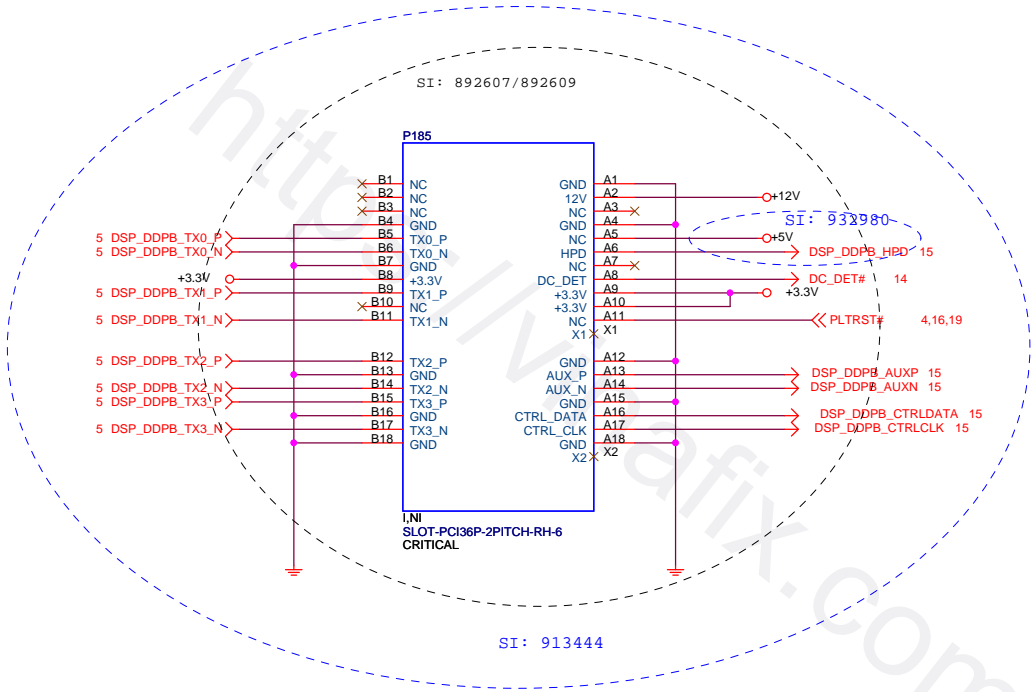


Release Date : Wednesday, May 29, 2013

HP Restricted Secret

MICRO-STAR INT'L CO.,LTD		
HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description SIO- PULL UP/DOWN/PS_ON	Rev X4
Date:	Sheet 21 of 56	

DDI Port Slot



Release Date : Wednesday, May 29, 2013

HP Restricted Secret

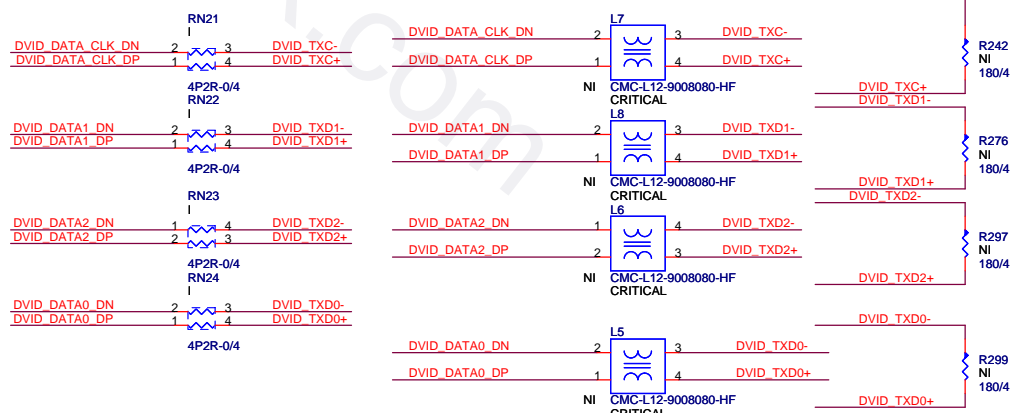
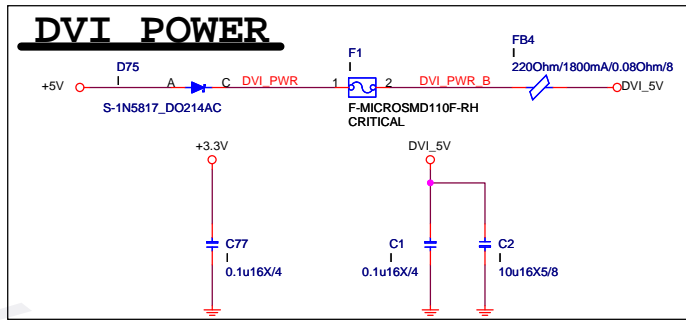
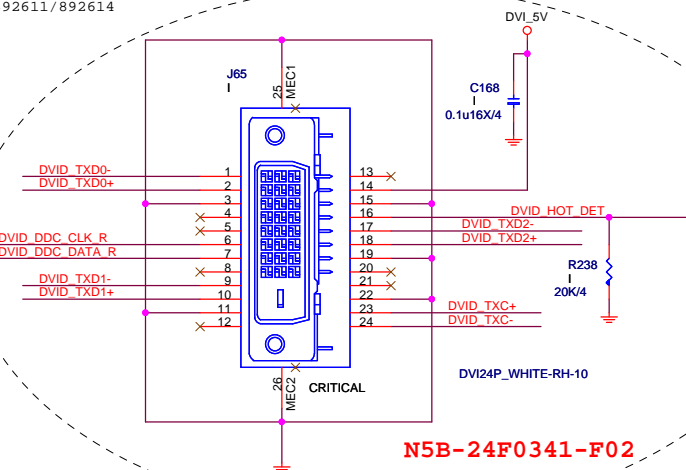
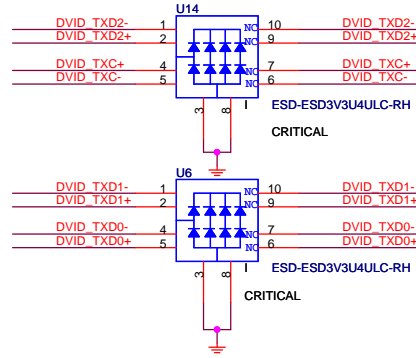
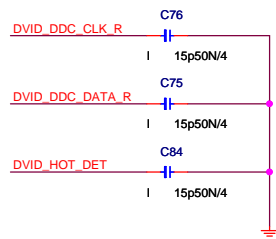
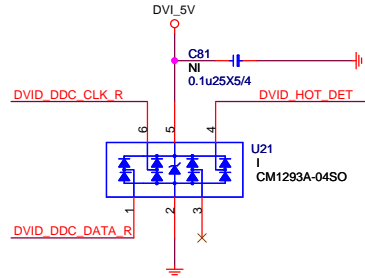
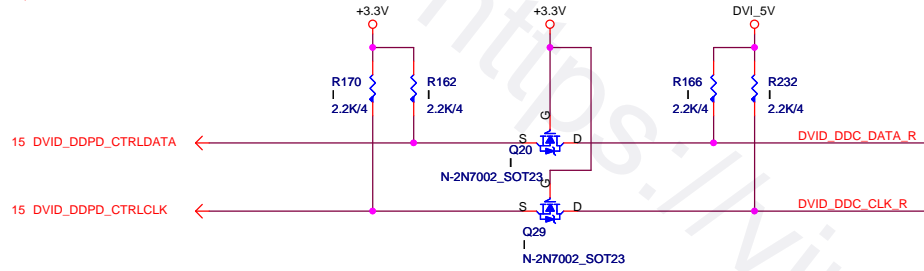
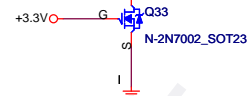
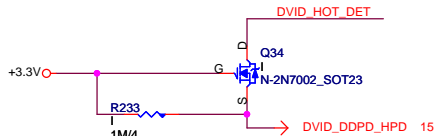
MICRO-STAR INT'L CO.,LTD		
HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description DDI Port Slot	Rev X4
Date:	Sheet 22 of 56	

# DVID level shifter

SI: 892611/892614

5 DVID\_DDPD\_CLK\_P C66 0.1u16X/4 DVID\_DATA\_CLK\_DP  
5 DVID\_DDPD\_CLK\_N C69 0.1u16X/4 DVID\_DATA\_CLK\_DN  
5 DVID\_DDPD\_TX2\_P C56 0.1u16X/4 DVID\_DATA2\_DP  
5 DVID\_DDPD\_TX2\_N C57 0.1u16X/4 DVID\_DATA2\_DN  
5 DVID\_DDPD\_TX1\_P C58 0.1u16X/4 DVID\_DATA1\_DP  
5 DVID\_DDPD\_TX1\_N C61 0.1u16X/4 DVID\_DATA1\_DN  
5 DVID\_DDPD\_TX0\_P C51 0.1u16X/4 DVID\_DATA0\_DP  
5 DVID\_DDPD\_TX0\_N C53 0.1u16X/4 DVID\_DATA0\_DN

Q33\_D R181 680/4 DVID\_DATA\_CLK\_DN  
R164 680/4 DVID\_DATA\_CLK\_DP  
R173 680/4 DVID\_DATA1\_DN  
R138 680/4 DVID\_DATA1\_DP  
R140 680/4 DVID\_DATA2\_DN  
R172 680/4 DVID\_DATA2\_DP  
R103 680/4 DVID\_DATA0\_DN  
R112 680/4 DVID\_DATA0\_DP



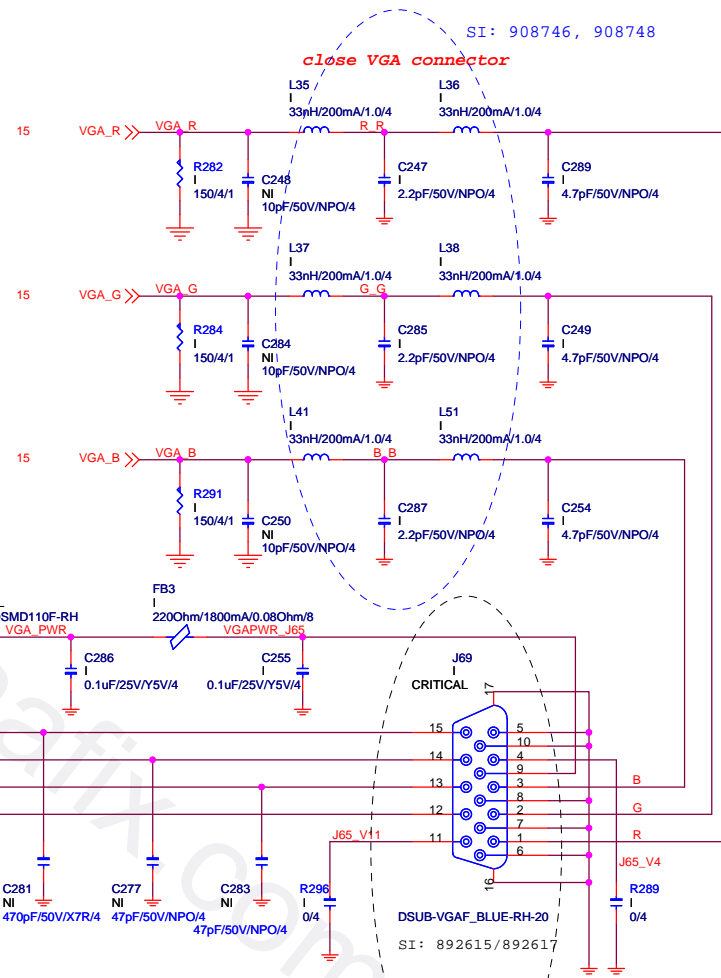
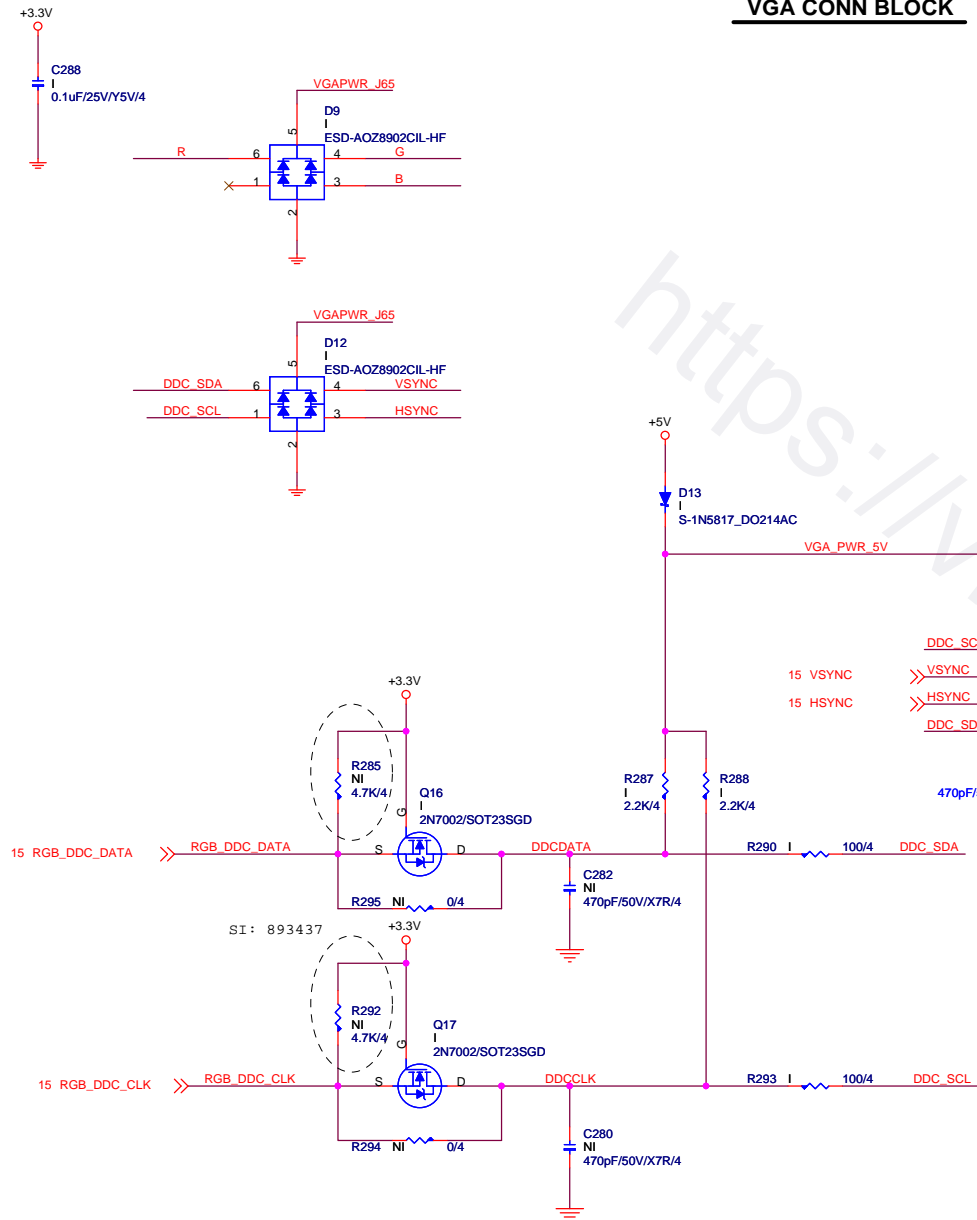
Release Date : Wednesday, May 29, 2013

HP Restricted Secret

MICRO-STAR INT'L CO.,LTD	
HP SCH P/N: 718773-000(MSI MS-7860)	
Size Custom	Document Description DVI Port CONN
Date:	Rev X4



# VGA CONN BLOCK



Release Date : Wednesday, May 29, 2013

**HP Restricted Secret**



**MICRO-STAR INT'L CO.,LTD**

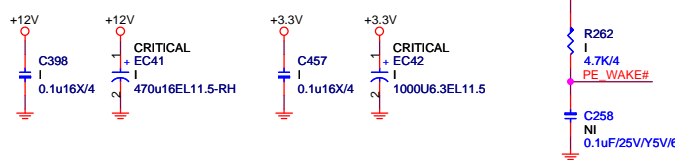
**HP SCH P/N: 718773-000(MSI MS-7860)**

Document Description  
**VGA CONN**

Rev  
X4

Date: Sheet 24 of 56

SLOT-PCI164P\_BLACK-2PITCH-RH-20

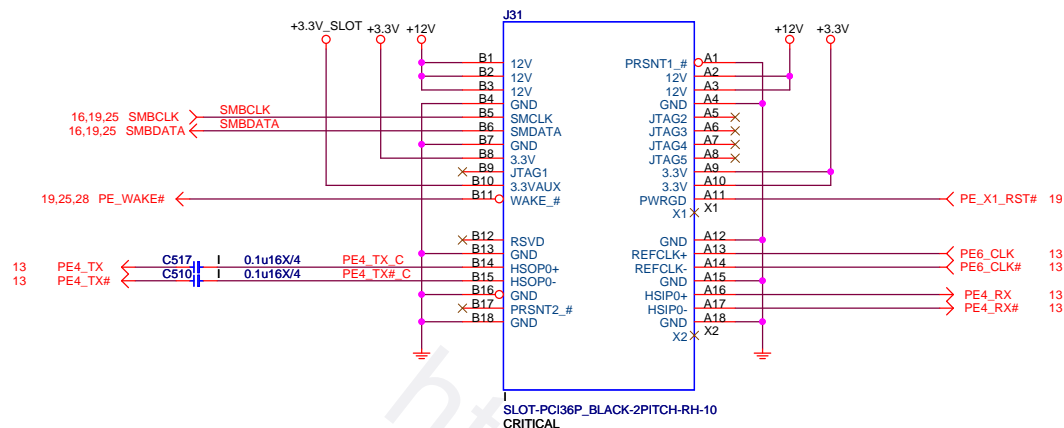


**HP Restricted Secret**

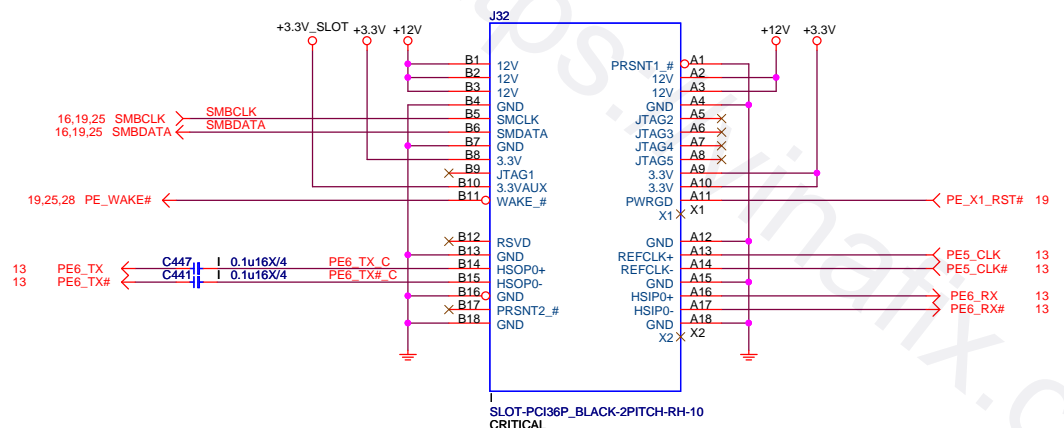
**HP SCH P/N: 718773-000(MSI MS-7860)**

Rev  
v4

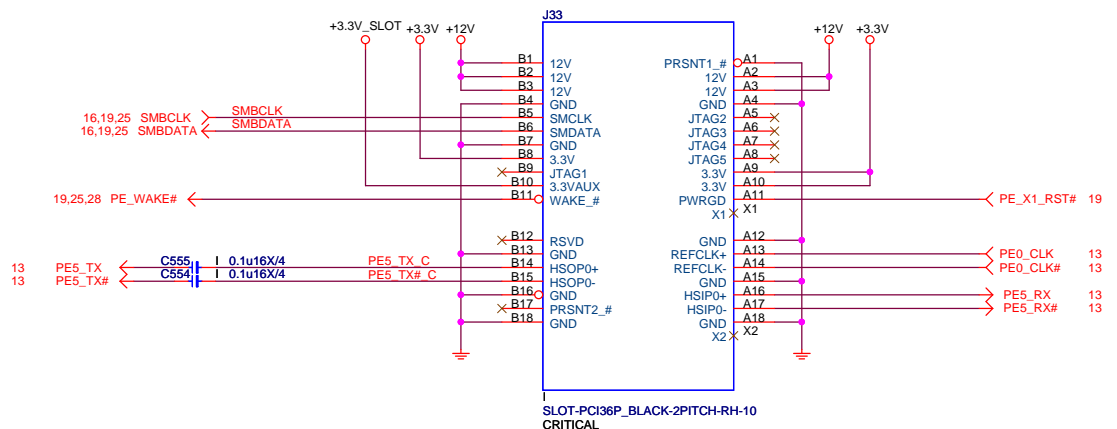
## PCI EXPRESS x1-PORT



## PCI EXPRESS x1-PORT



## PCI EXPRESS x1-PORT



N11-0360381-L06

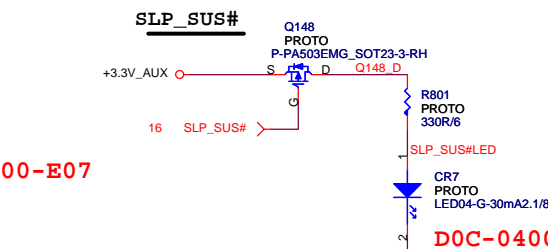
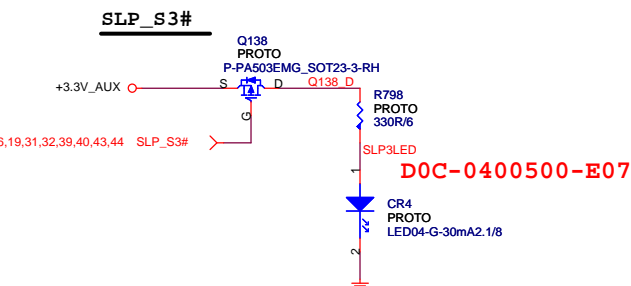
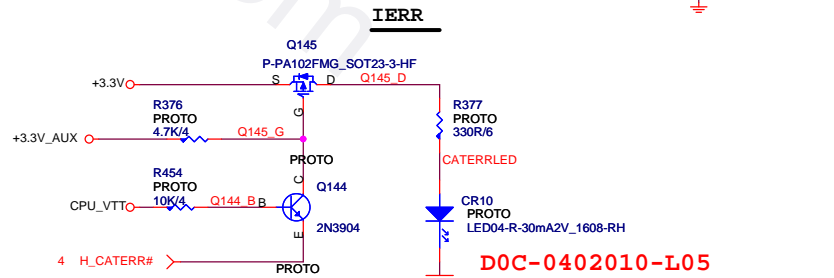
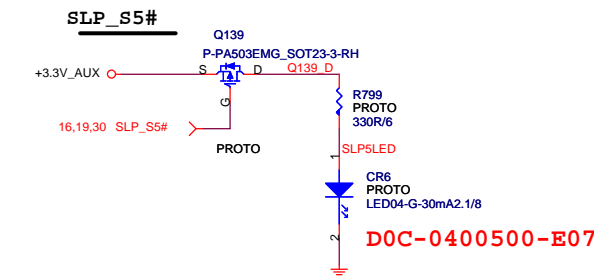
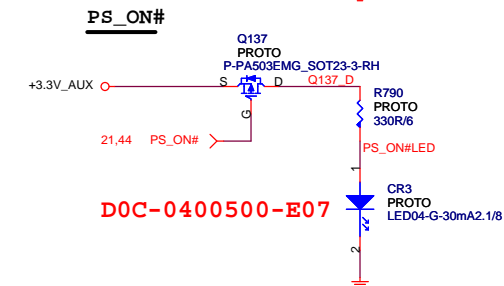
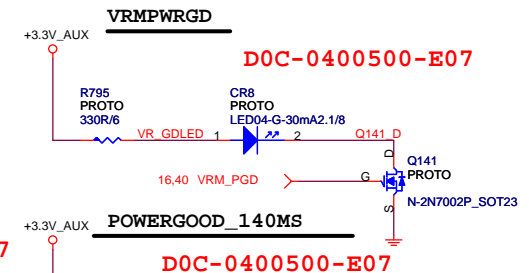
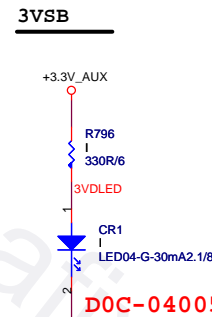
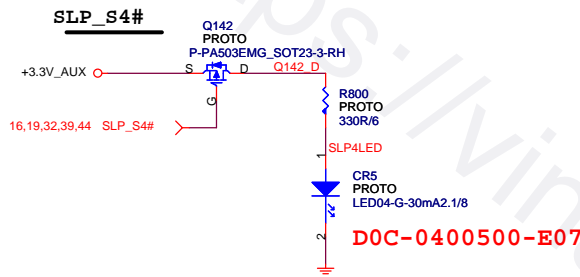
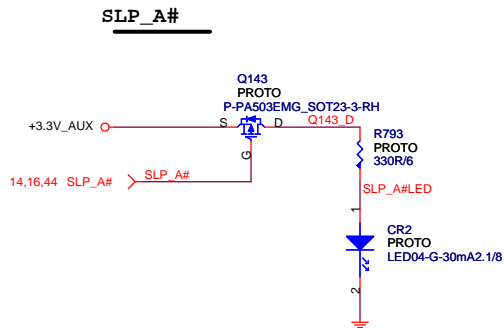
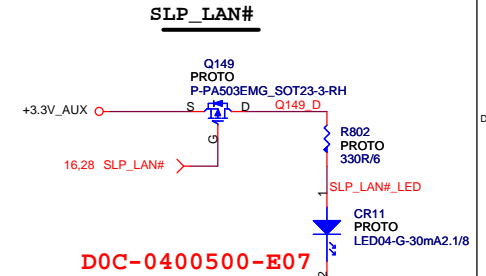
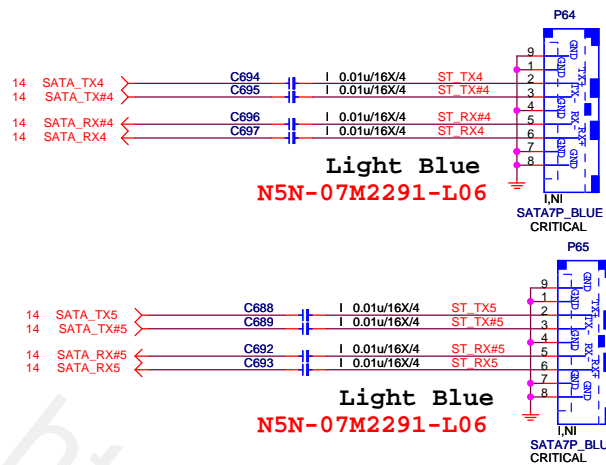
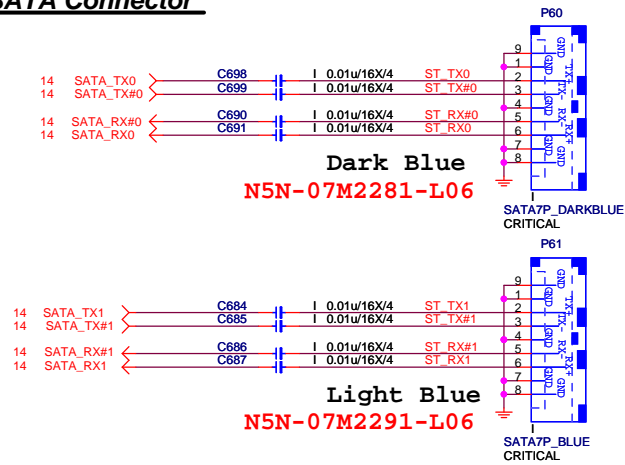
Release Date : Wednesday, May 29, 2013

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MICRO-STAR INT'L CO.,LTD		
HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description PCIE x1 Slots	Rev X4
Date:	Sheet 26 of 56	



# SATA Connector



Release Date : Wednesday, May 29, 2013

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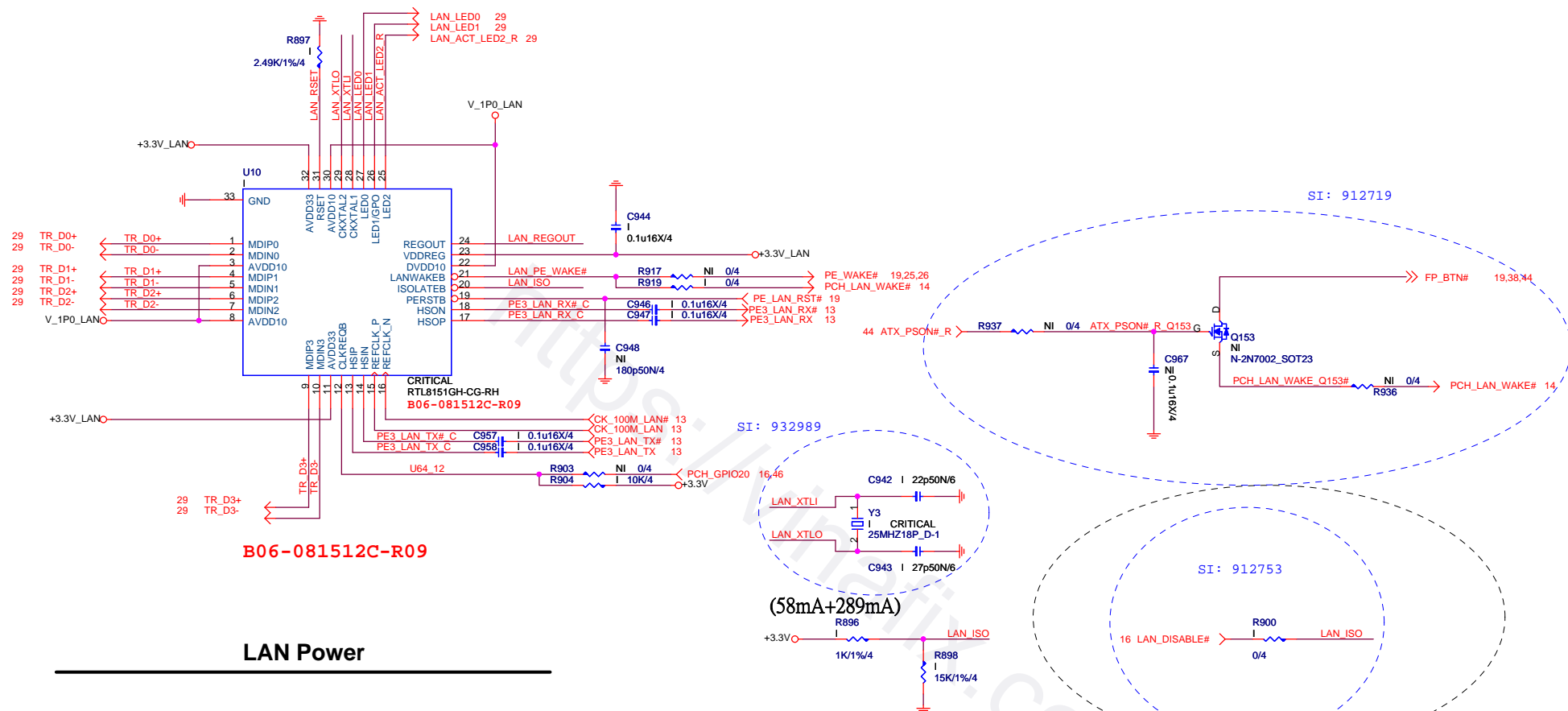


**MICRO-STAR INT'L CO.,LTD**

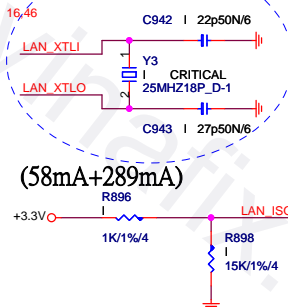
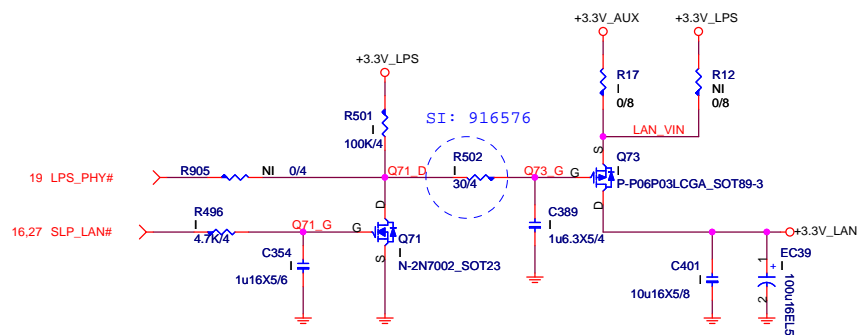
HP SCH P/N: 718773-000(MSI MS-7860)

Size	Document Description	Rev
Custom	SATA/LED	X4
Date:	Sheet 27 of 56	

## Gigabit LAN RTL8151GH-CG

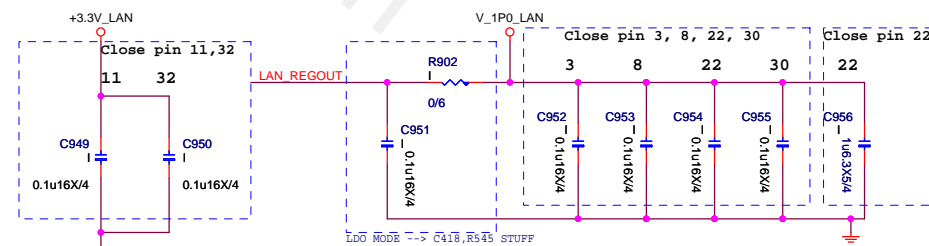


## LAN Power



### Place Near Pin

### Place Near Pin



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**MICRO-STAR INT'L CO.,LTD**

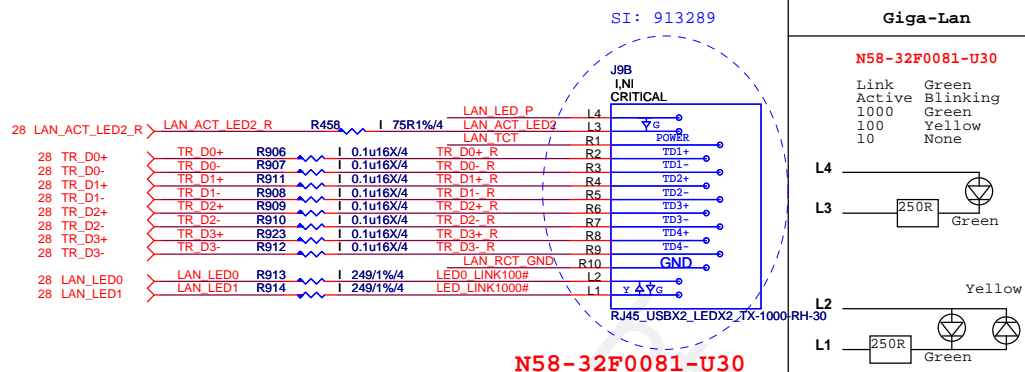
**HP SCH P/N: 718773-000(MSI MS-7860)**

Size Custom	Document Description <b>Gigabit LAN-RTL8151GH-CG</b>
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	Rev
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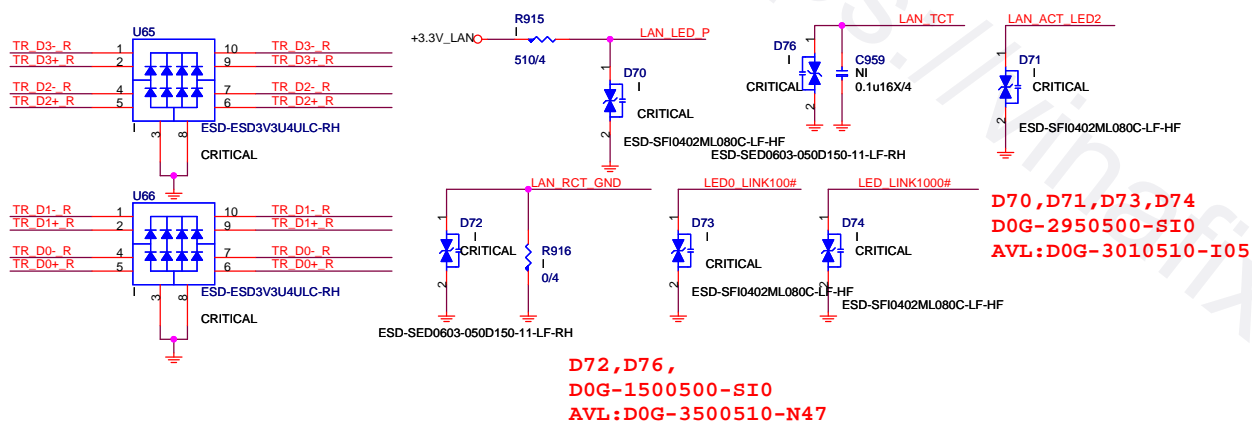
Date:	Sheet 28 of 56
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## LAN Connector

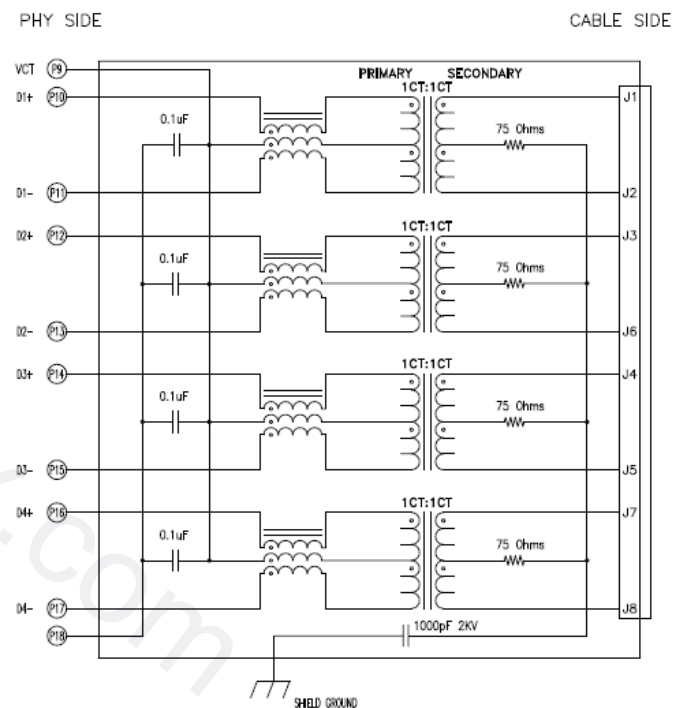


Function	Link LED	Speed LED
10Mb Link	Green (solid)	Off
100Mb Link	Green (solid)	Yellow (solid)
1000Mb Link	Green (solid)	Green (solid)
10Mb Data Transfer	Green (blink)	Off
100Mb Data Transfer	Green (blink)	Yellow (solid)
1000Mb Data Transfer	Green (blink)	Green (solid)

**ESD**



## SCHEMATIC



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**MICRO-STAR INT'L CO.,LTD**

**HP SCH P/N: 718773-000(MSI MS-7860)**

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2500	2500
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6400	6400
6500	6500
6600	6600
6700	6700
6800	6800
6900	6900
7000	7000
7100	7100
7200	7200
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7400	7400
7500	7500
7600	7600
7700	7700
7800	7800
7900	7900
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8600	8600
8700	8700
8800	8800
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9000	9000
9100	9100
9200	9200
9300	9300
9400	9400
9500	9500
9600	9600
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9800	9800
9900	9900
10000	10000

## LAN CONNECTOR

	Rev X4
--	-----------

Date:

Sheet 29 of 56

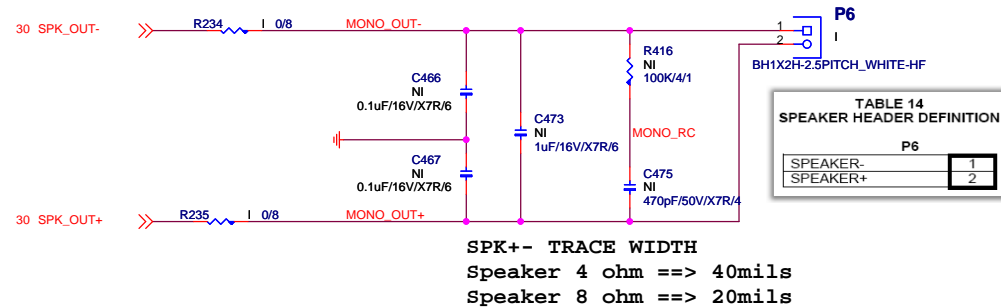
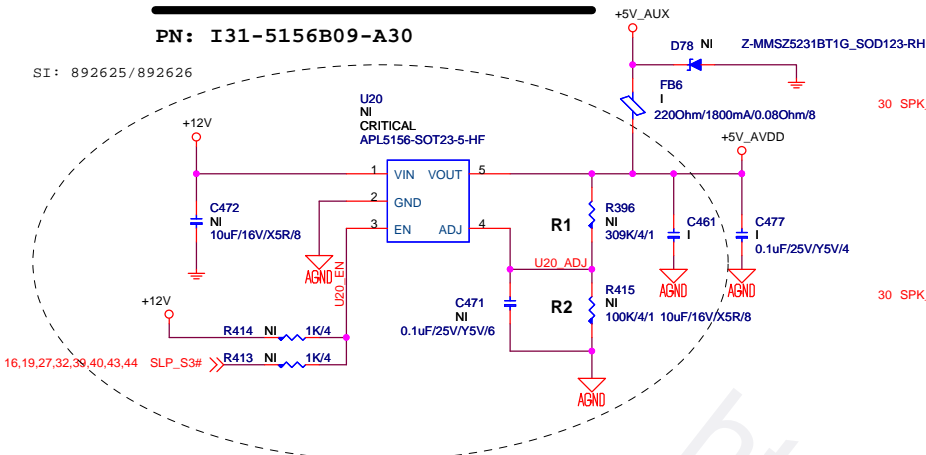
PN:B05-LC2211C-R09



SPEAKER HEADER

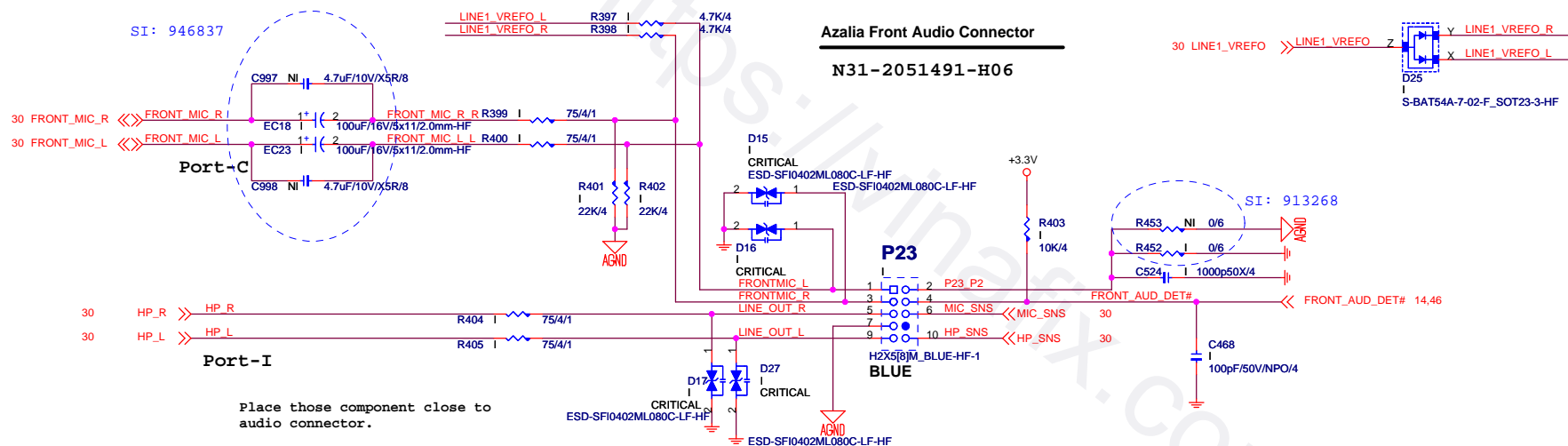
P/N:N32-1020521-H06

+5V\_AUX

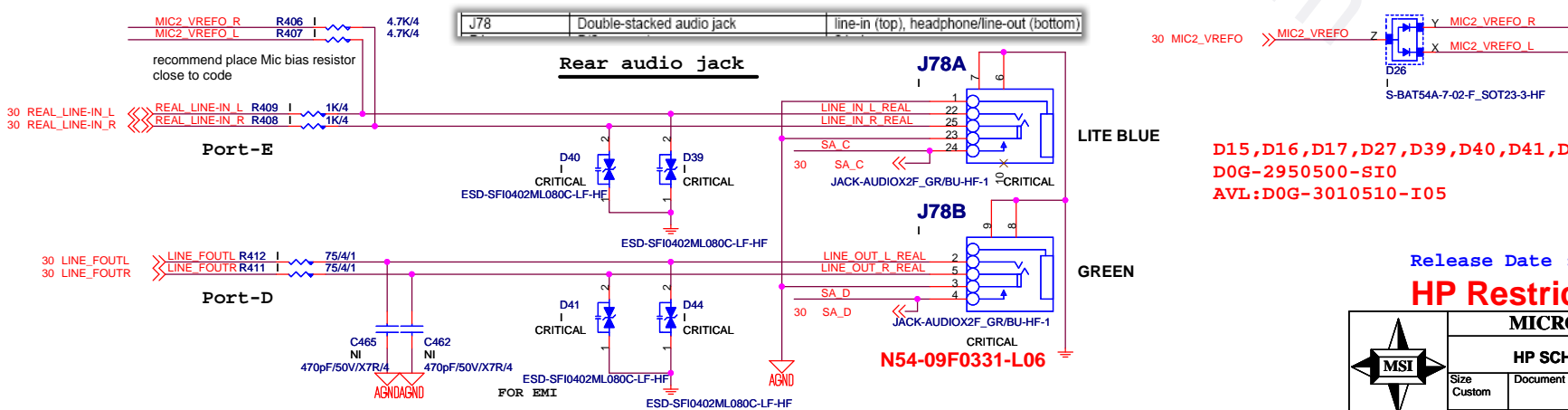


```
SPK+- TRACE WIDTH
Speaker 4 ohm ==> 40mils
Speaker 8 ohm ==> 20mils
```

**Azalia Front Audio Connector**  
**N31-2051491-H06**



Place those component close to  
audio connector.



D15,D16,D17,D27,D39,D40,D41,D44  
D0G-2950500-SI0  
AVL:D0G-3010510-I05

**Release Date : Wednesday, May 29, 2013**

**HP Restricted Secret**



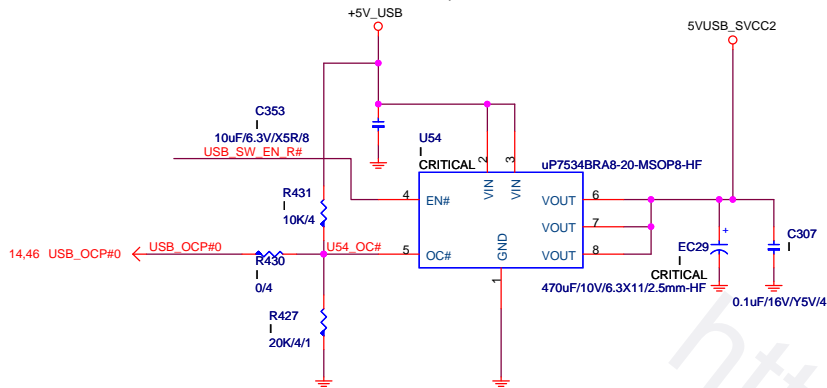
**MICRO-STAR INT'L CO.,LTD**

**HP SCH P/N: 718773-000(MSI MS-7860)**

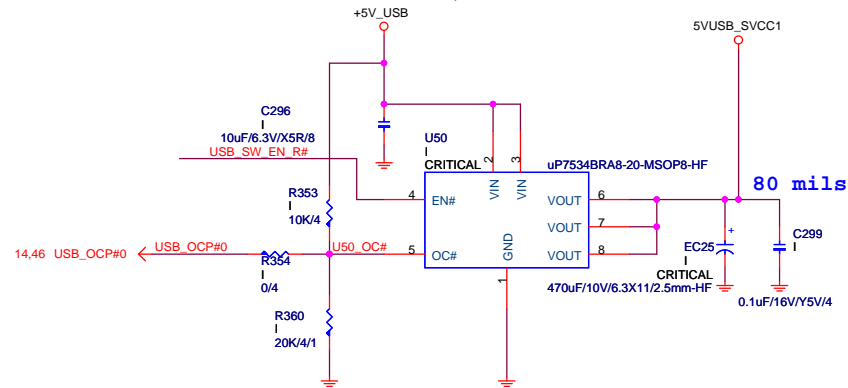
Size	Document Description
Custom	<b>AUDIO CONNECTOR</b>

Rev	
X4	

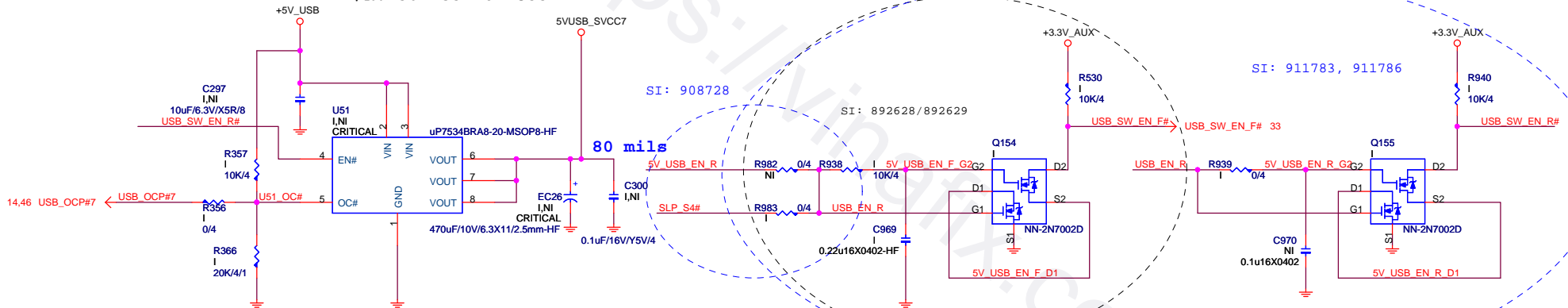
**POWER CIRCUIT FOR USB PORT 2,3**  
P/N: I36-7534B02-U33



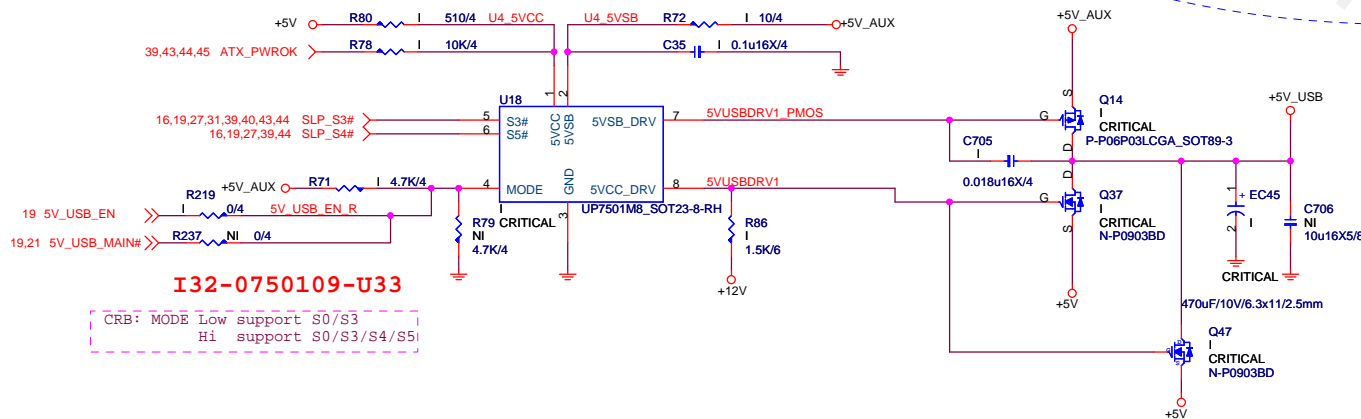
**POWER CIRCUIT FOR USB PORT 0,1**  
P/N: I36-7534B02-U33



**POWER CIRCUIT FOR USB PORT 12,13**  
P/N: I36-7534B02-U33



**USB POWER**



Release Date : Wednesday, May 29, 2013

**HP Restricted Secret**



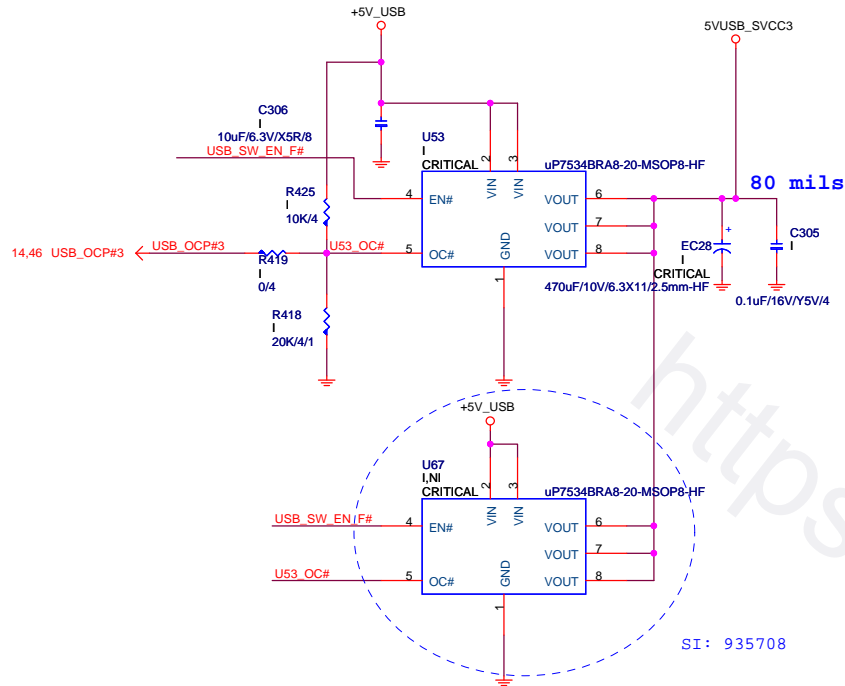
**MICRO-STAR INT'L CO.,LTD**

**HP SCH P/N: 718773-000(MSI MS-7860)**

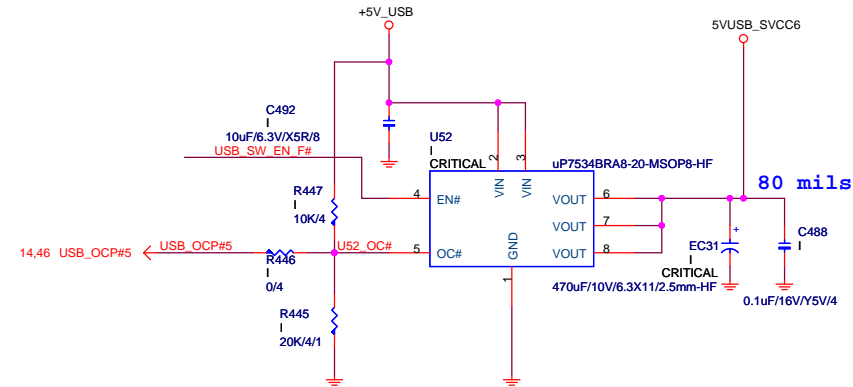
Size	Document Description	Rev
Custom	Rear USB POWER	X4
Date:	Sheet 32 of 56	



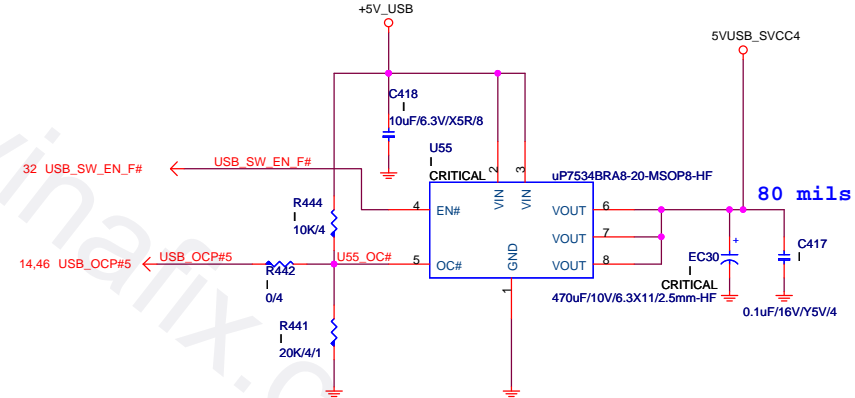
# **POWER CIRCUIT FOR USB PORT 4,5,6** P/N: I36-7534B02-U33



# **POWER CIRCUIT FOR USB PORT 10,11** P/N: I36-7534B02-U33



# **POWER CIRCUIT FOR USB PORT 8,9** P/N: I36-7534B02-U33



Release Date : Wednesday, May 29, 2013

**HP Restricted Secret**

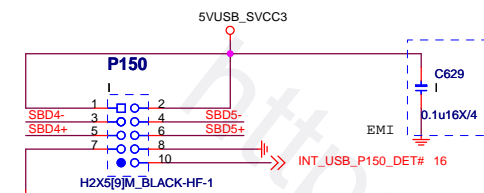
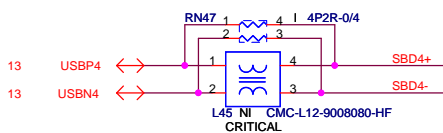
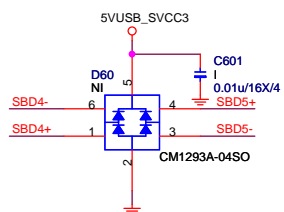


**MICRO-STAR INT'L CO.,LTD**

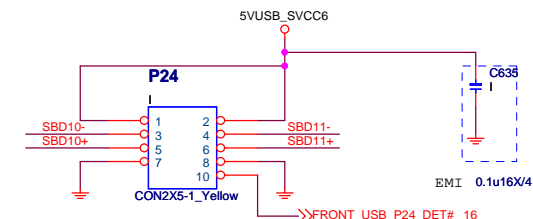
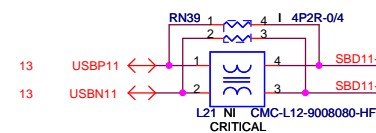
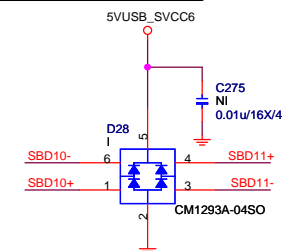
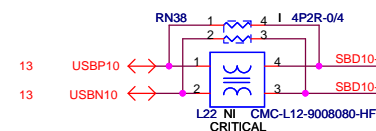
**HP SCH P/N: 718773-000(MSI MS-7860)**

Size Custom	Document Description <b>Front USB POWER</b>	Rev X4
Date:	Sheet 33 of 56	

### Front Panel USB Connector For USB Port 10 / 11



**N31-2051BG1-H06**  
**COLOR BLACK**



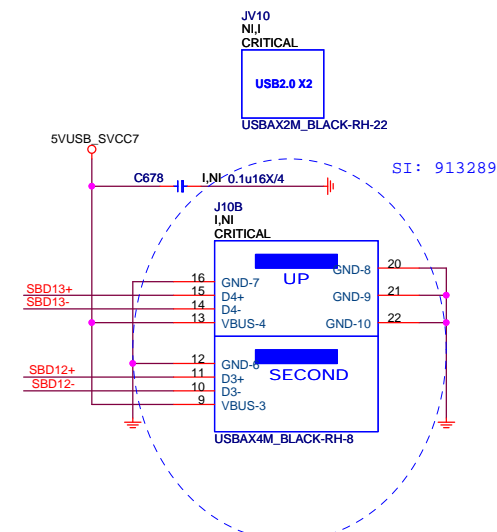
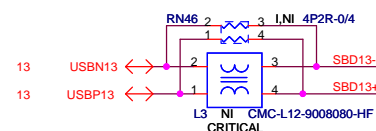
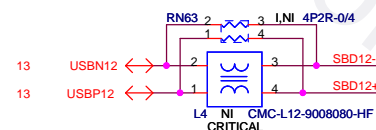
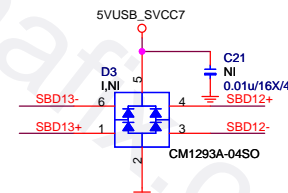
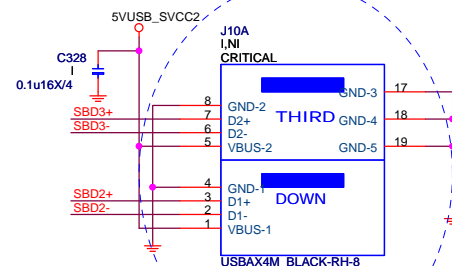
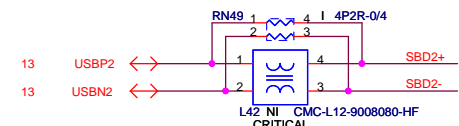
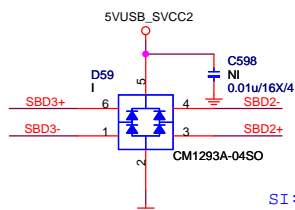
**N31-2051AM1-H06**  
**COLOR YELLOW**

13 USBP3 ↔ 1  
13 USBN3 ↔ 2

1 2 3 4  
RN50

1 2 3 4  
L44 NI CMC-L12-9008080-HF CRITICAL

SBD+  
SBD-



Release Date : Wednesday, May 29, 2013

**HP Restricted Secret**



**MICRO-STAR INT'L CO.,LTD**

**HP SCH P/N: 718773-000(MSI MS-7860)**

Size	Document Description
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3000	3000
3100	3100
3200	3200
3300	3300
3400	3400
3500	3500
3600	3600
3700	3700
3800	3800
3900	3900
4000	4000
4100	4100
4200	4200
4300	4300
4400	4400
4500	4500
4600	4600
4700	4700
4800	4800
4900	4900
5000	5000
5100	5100
5200	5200
5300	5300
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5700	5700
5800	5800
5900	5900
6000	6000
6100	6100
6200	6200
6300	6300
6400	6400
6500	6500
6600	6600
6700	6700
6800	6800
6900	6900
7000	7000
7100	7100
7200	7200
7300	7300
7400	7400
7500	7500
7600	7600
7700	7700
7800	7800
7900	7900
8000	8000
8100	8100
8200	8200
8300	8300
8400	8400
8500	8500
8600	8600
8700	8700
8800	8800
8900	8900
9000	9000
9100	9100
9200	9200
9300	9300
9400	9400
9500	9500
9600	9600
9700	9700
9800	9800
9900	9900
10000	10000

Rev
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Date:

Sheet 34 of 56

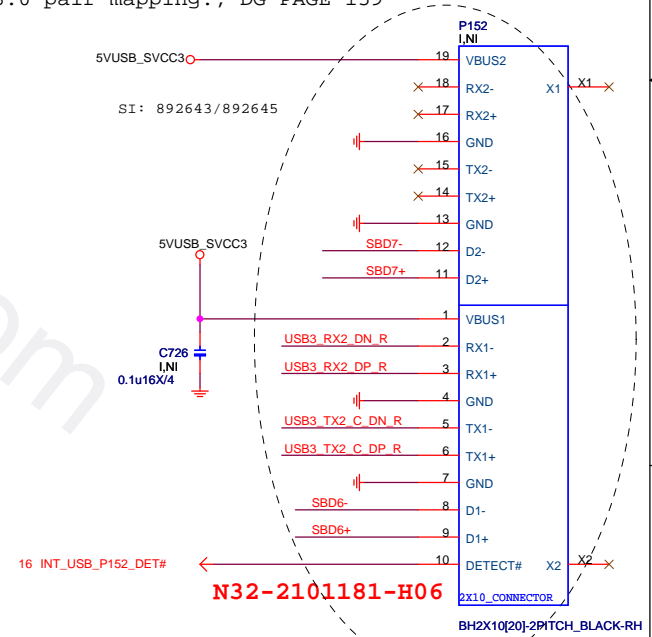
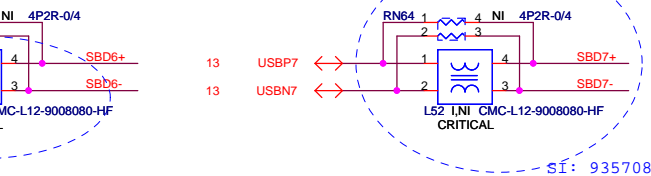
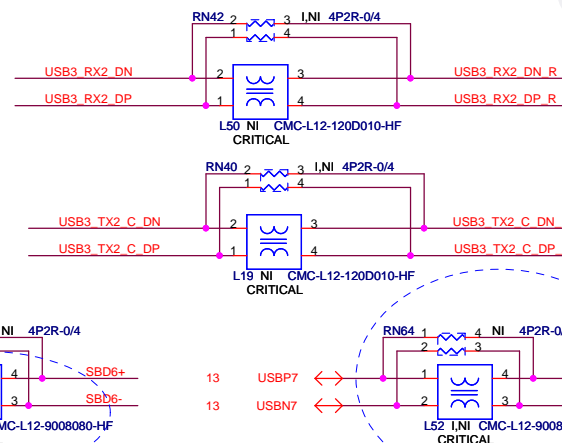
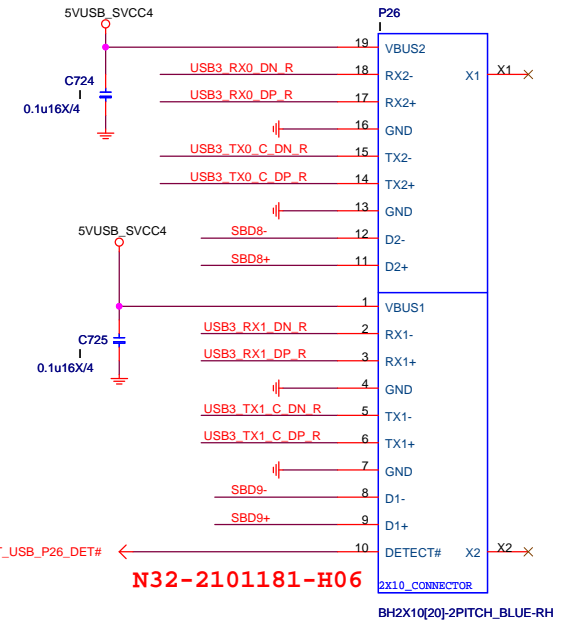
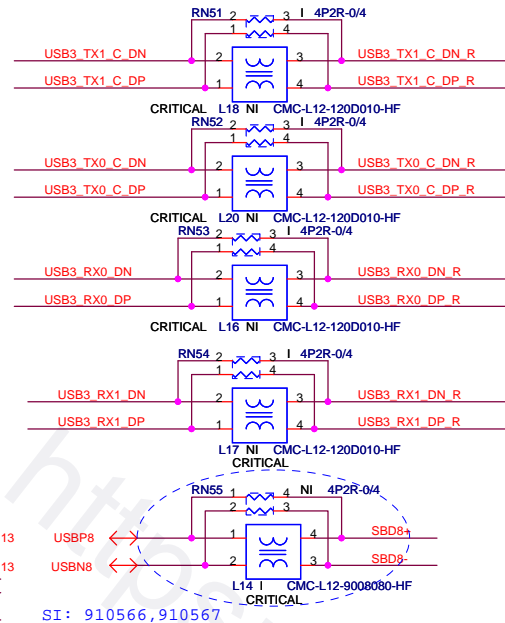


13 USB3\_RX0\_DN ← USB3\_RX0\_DN  
13 USB3\_RX0\_DP ← USB3\_RX0\_DP

13 USB3\_TX0\_DN ← C274 | I 0.1u16X/4 USB3\_TX0\_C DN  
13 USB3\_TX0\_DP ← C269 | I 0.1u16X/4 USB3\_TX0\_C DP

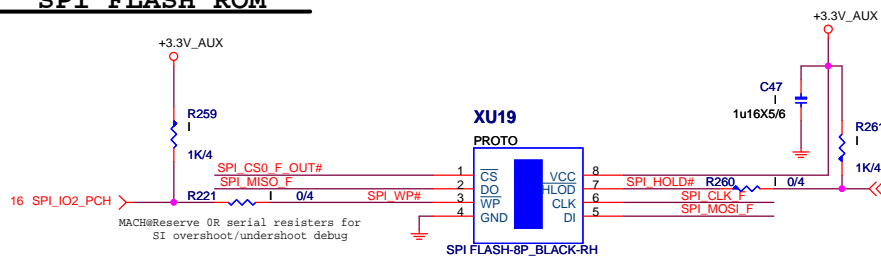
13 USB3\_RX1\_DN ← USB3\_RX1\_DN  
13 USB3\_RX1\_DP ← USB3\_RX1\_DP

13 USB3\_TX1\_DN ← C285 | I 0.1u16X/4 USB3\_TX1\_C DN  
13 USB3\_TX1\_DP ← C262 | I 0.1u16X/4 USB3\_TX1\_C DP

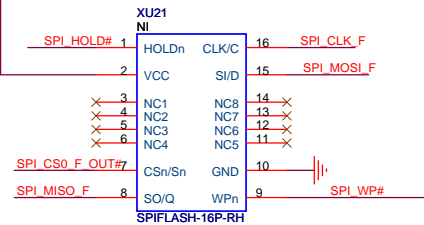


Date:	Sheet 36 of 56
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## SPI FLASH ROM

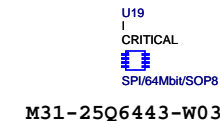


## SPI 64M ROM1

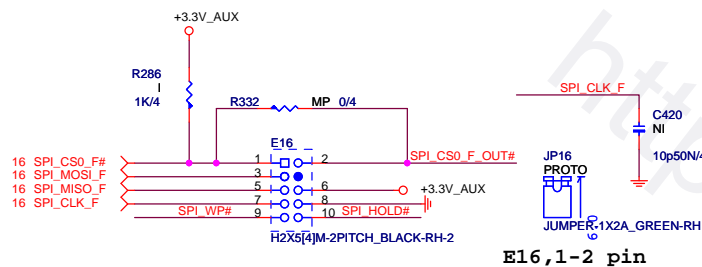


PN:N14-0160010-L06

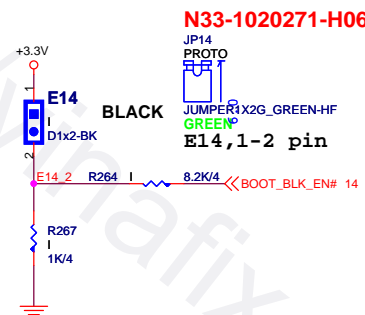
## BIOS



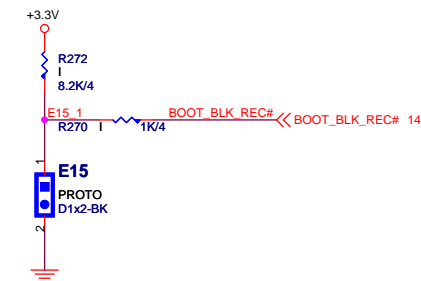
## SPI DEBUG PROT



## BOOT BLOCK WRITE JUMPER

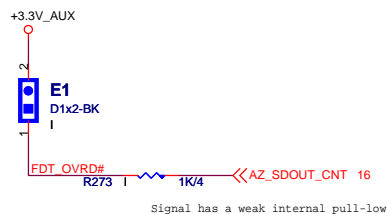


## BOOT BLOCK RECOVERY HEADER



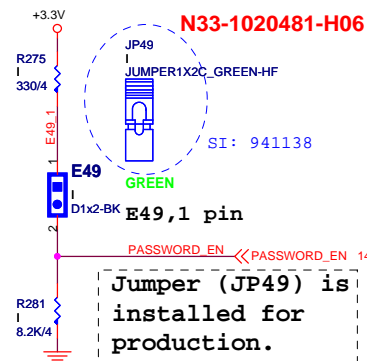
## Flash Descriptor Override Header (ME\_DIS)

### FLASH DESCRIPTOR OVERRIDE



N31-1020151-H06

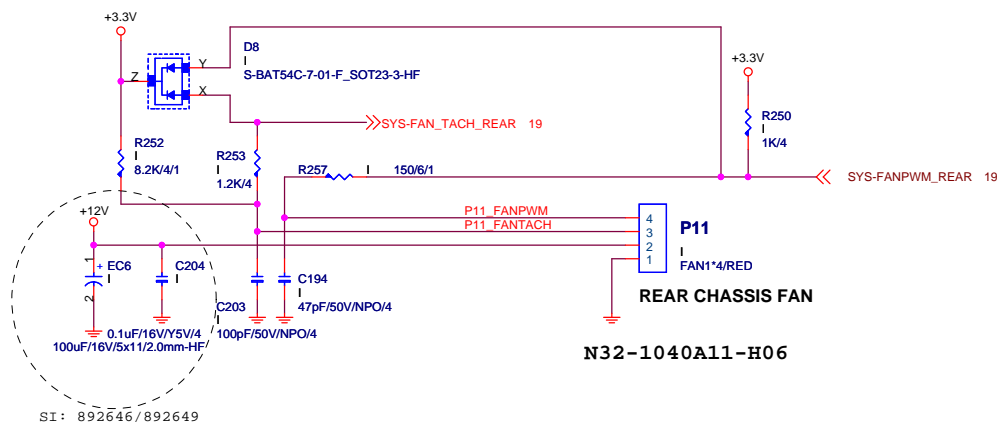
## PASSWORD JUMPER



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Size Custom	Document Description	Rev X4
Date:	Header/ SPI	
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[illegible]

**+5V\_USB\_SUS\_ACK**

16 SUS\_PWR\_ACK# <<< R680 0/4 SUS\_PWRACK#

+3.3V\_AUX +3.3V\_LPS

R549 NI 100K/4 R567 10K/4

SUS\_ACK# GATE Q50 2N7002/SOT23SGD

SUS\_5V\_ACK# SUS\_5V\_ON# GATE Q54 2N7002/SOT23SGD

R571 0/4 R598 NI 10K/4

R528 2.2K/4

SUS\_5V\_ON#

+3.3V\_AUX +3.3V\_LPS

R605 NI 10K/4 R675 10K/4

SUS\_5V\_ON#

Q58 3904\_SOT23

SUS\_5V\_ON B R537 10K/4

C504 NI 0.1uF/10V/X7R/4

R676 2.67K/4/1

C511 NI 0.1uF/10V/X7R/4

+5V\_USB

R615 10K/4

19,21,25,44 CLAMP\_CTRL >>> Q53 2N7002/SOT23SGD

SUS\_WARN# ACK#

SUS\_WARN# R Q57 2N7002/SOT23SGD

R547 0/4

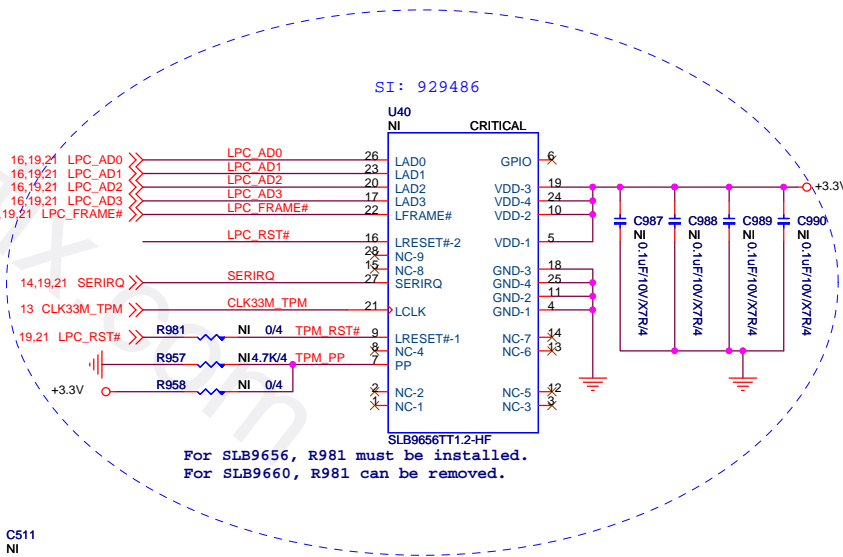
19,28,44 FP\_BTN# >>>

16 SUS\_WARN# >>>

For board bring up, and to insure that the handshake circuit does not prevent the circuit from going into DeepSleep, do the following:

R667 Installed

R509 Non-installed



For SLB9656, R981 must be installed.  
For SLB9660, R981 can be removed.

For board bring up, and to insure that the handshake circuit does not prevent the circuit from going into DeepSleep, do the following:

R667 Installed

R509 Non-installed

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**HP SCH P/N: 718773-000(MSI MS-7860)**

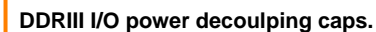
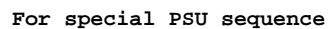
**Description**

Size	
Custom	

Date:	Sheet 38 of 56
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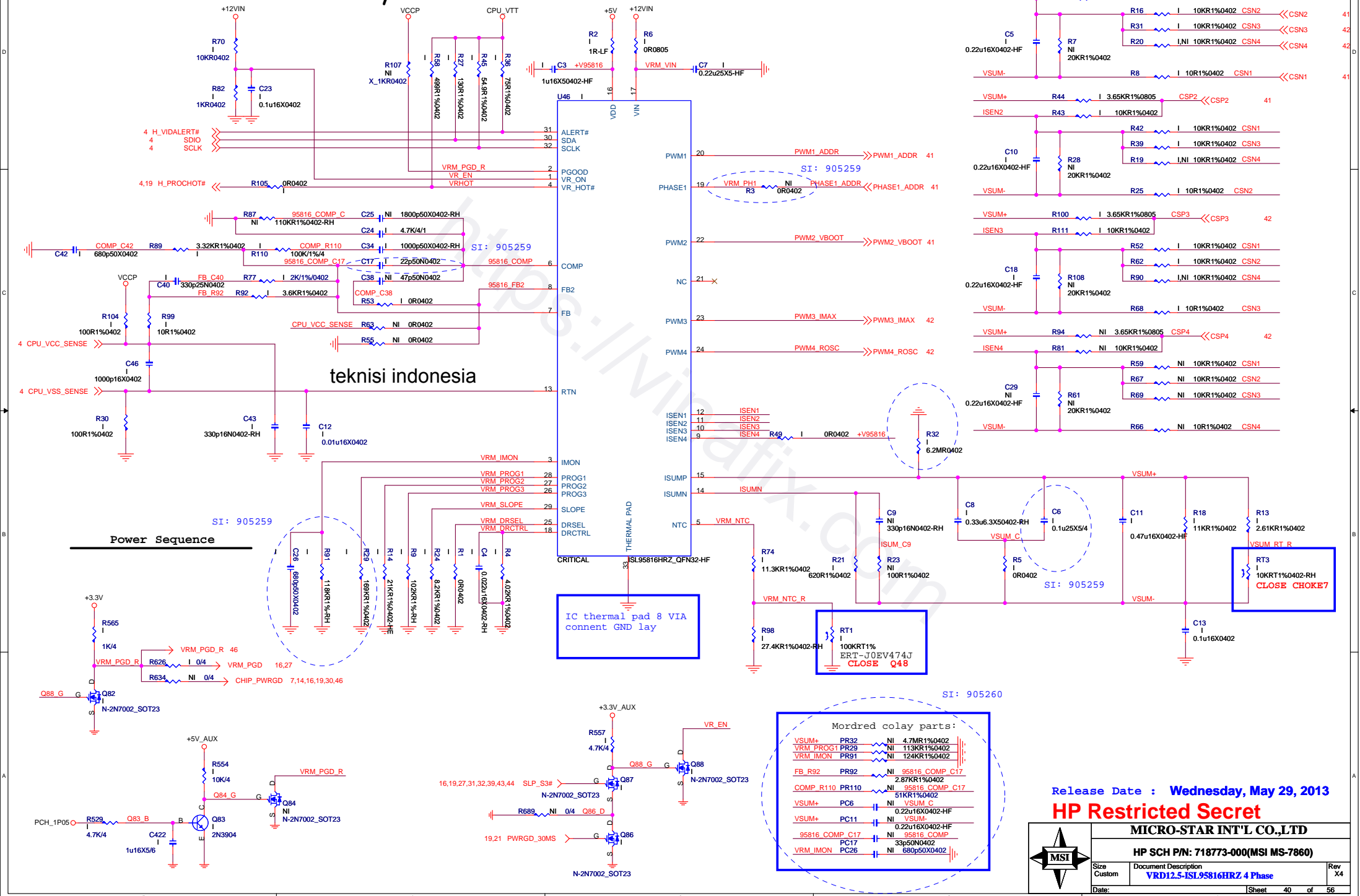




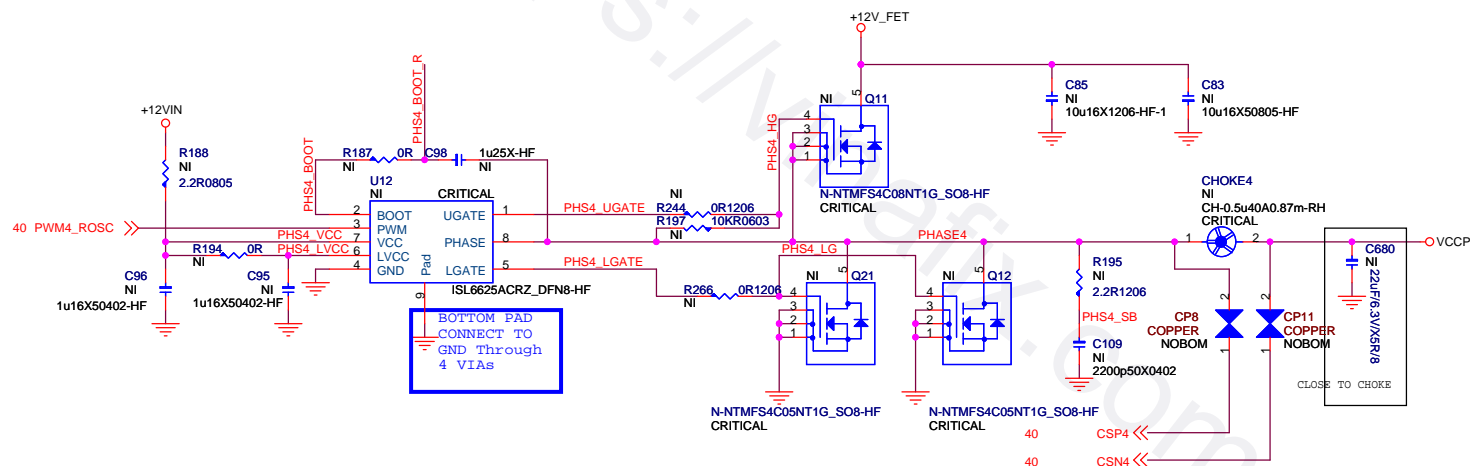
$$V_{out} = 0.8[(R_{251} + R_{246}) / R_{251}]$$


Size Custom	Document Description <b>DDR Power</b>	Revised By
Date:	Sheet 39 of 56	

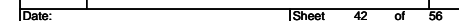
## SharkBay VR12.5 Power Circuit - 4 Phase



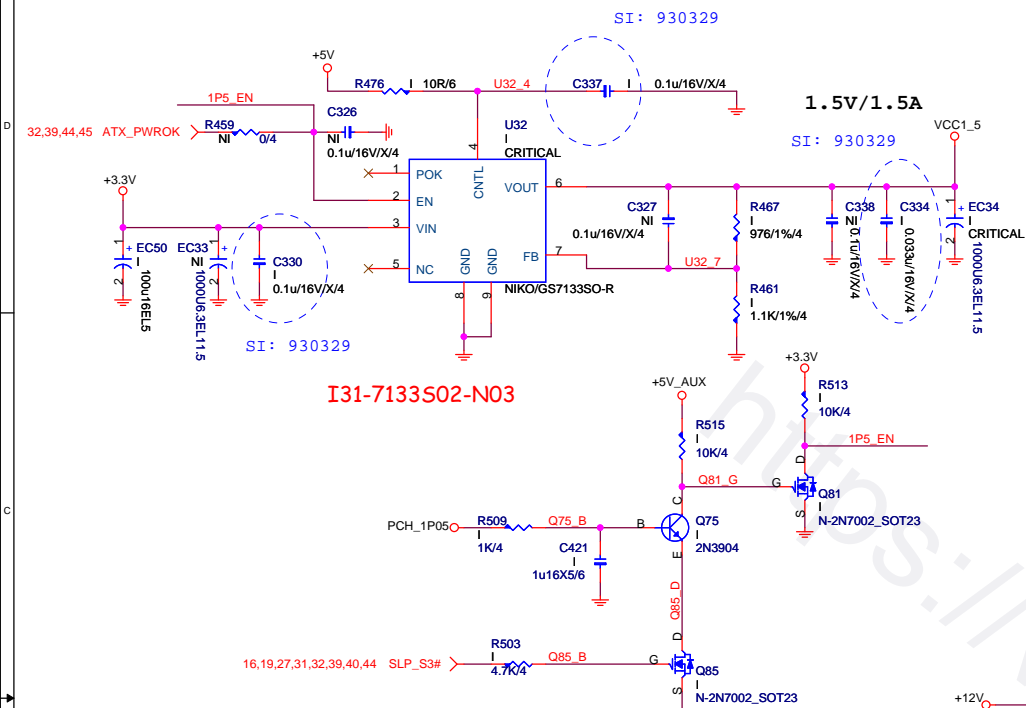




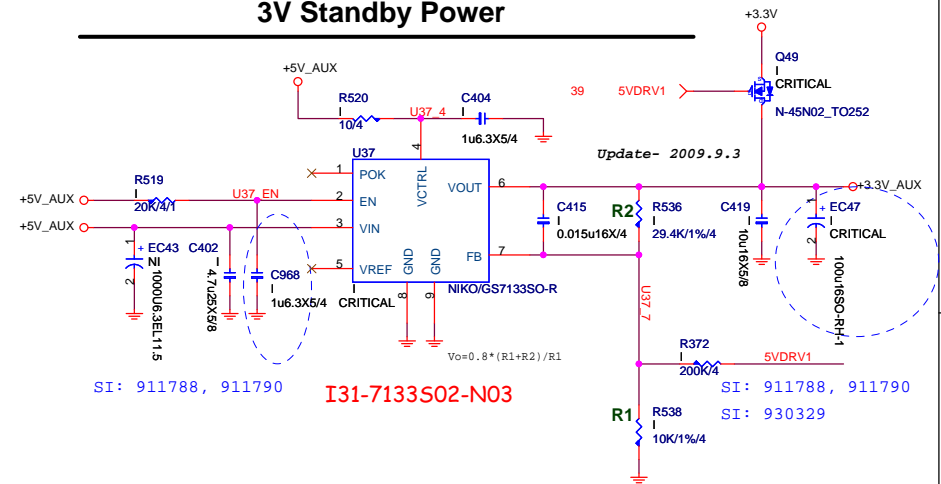
SI: 893441



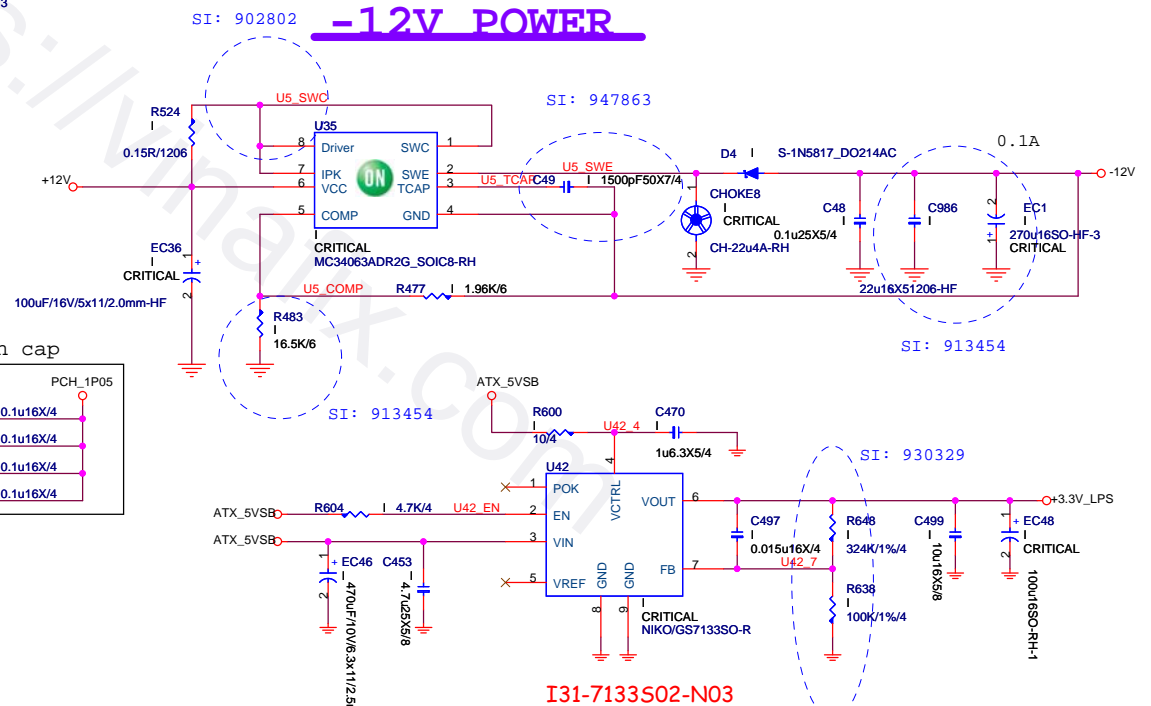
### 1.5V Power



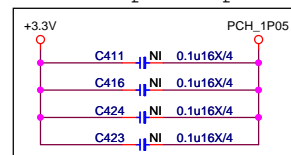
### 3V Standby Power



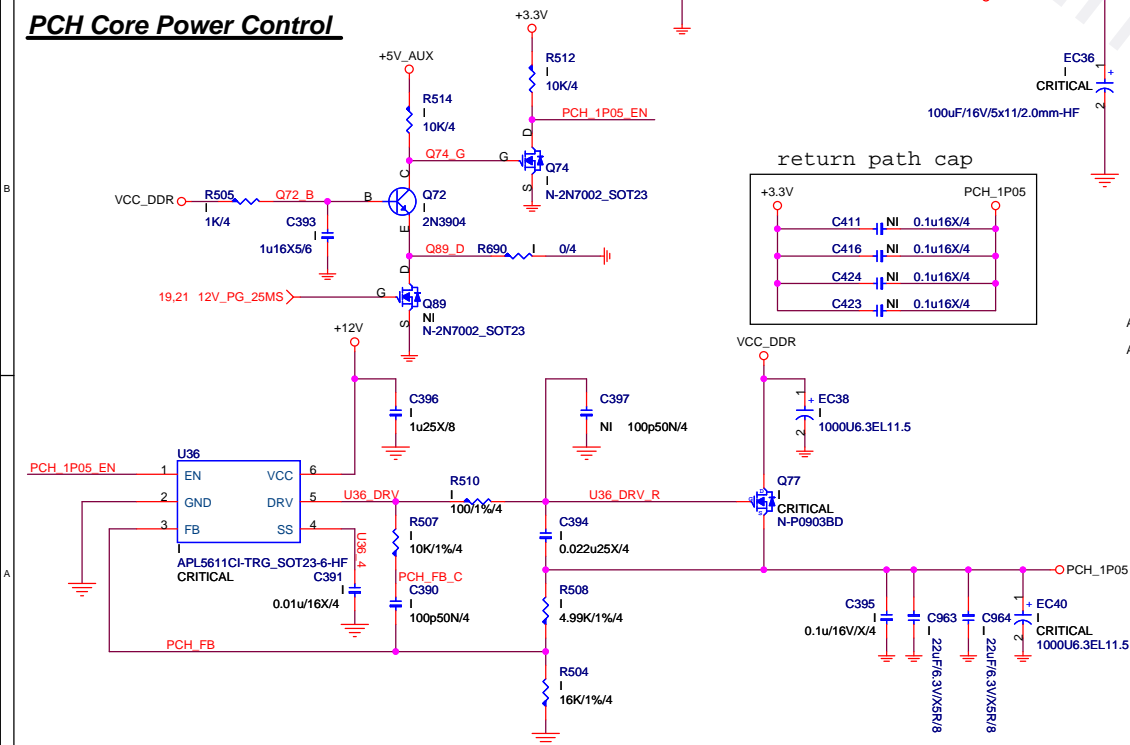
## -12V POWER



```
return path cap
```



## PCH Core Power Control



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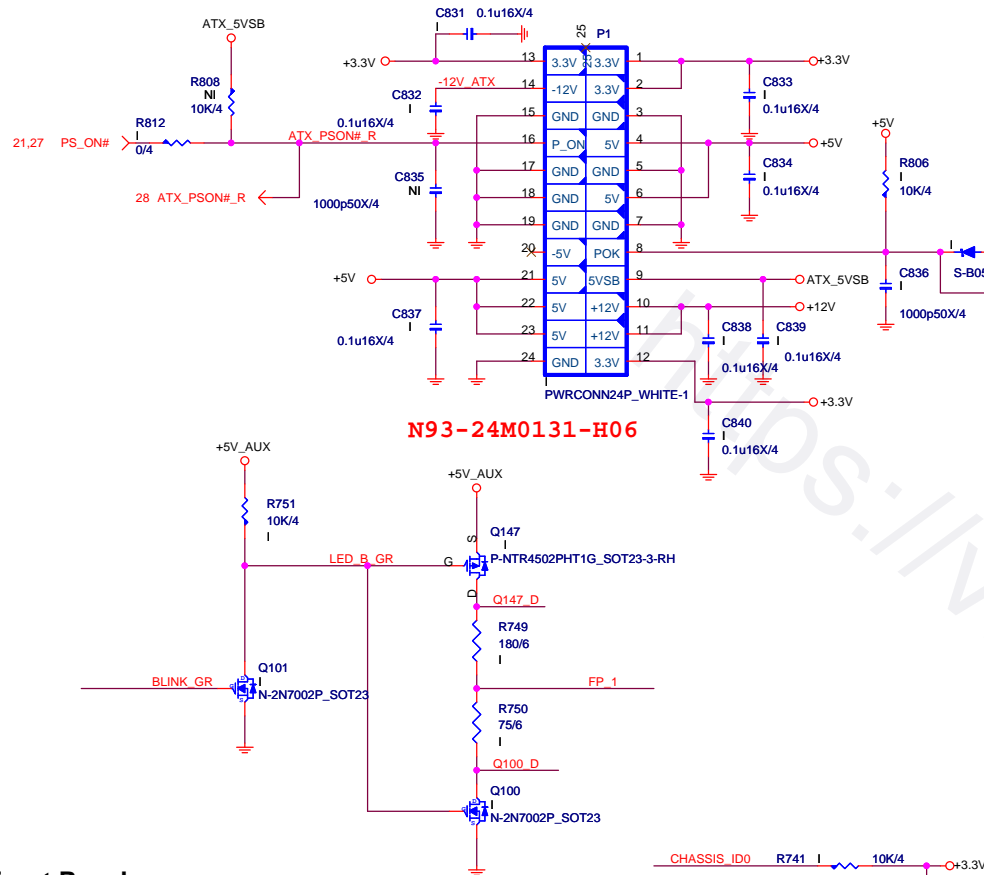
Size	Document Description
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### PCH & ME Core Power

Date:	Sheet 43 of 56
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# ATX Power Connector / Front Panel / LED/DSW

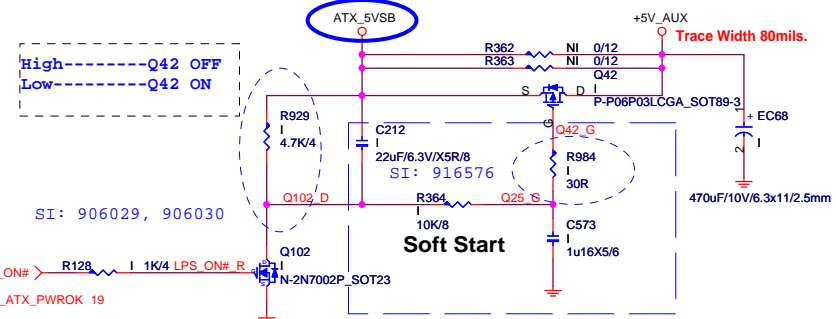
## ATX CONNECTOR



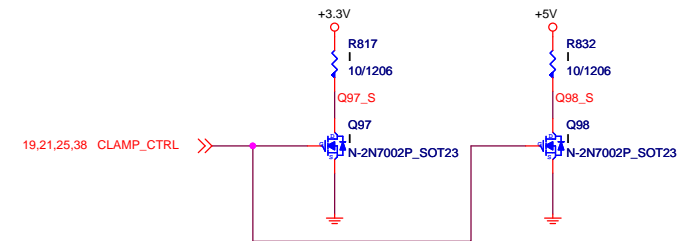
N93-24M0131-H06

## +5V AUX Power Switch

Tune ATX\_5VSB inrush current to 2A from 4A

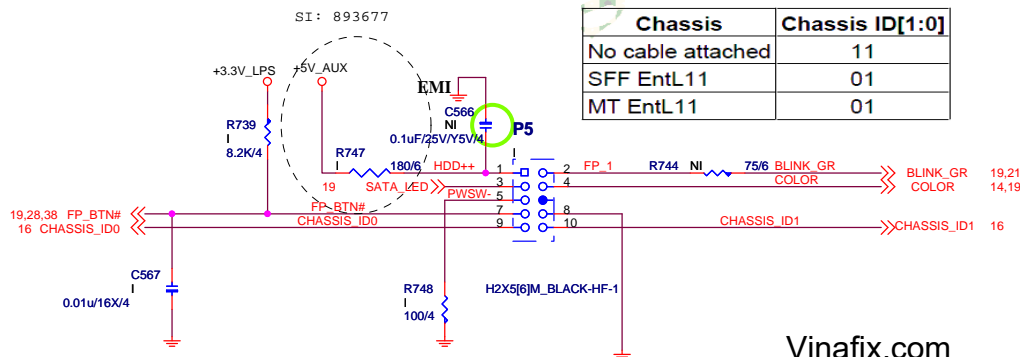


## BLEED-OFF CIRCUIT



## Front Panel

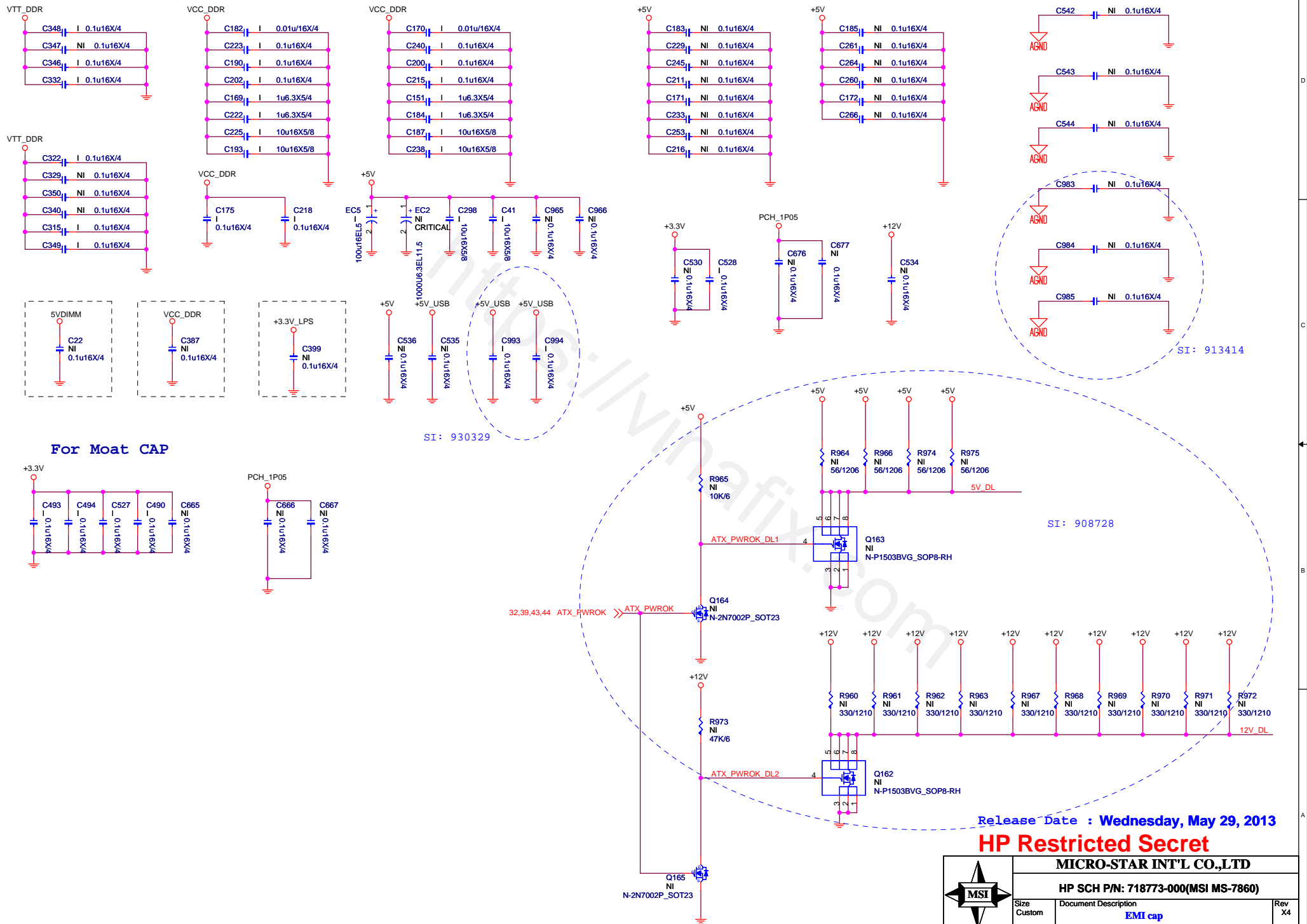
PN:N31-2051641-H06



## CHASSIS ID[1:0]

Chassis	Chassis ID[1:0]
No cable attached	11

# EMI CAPs



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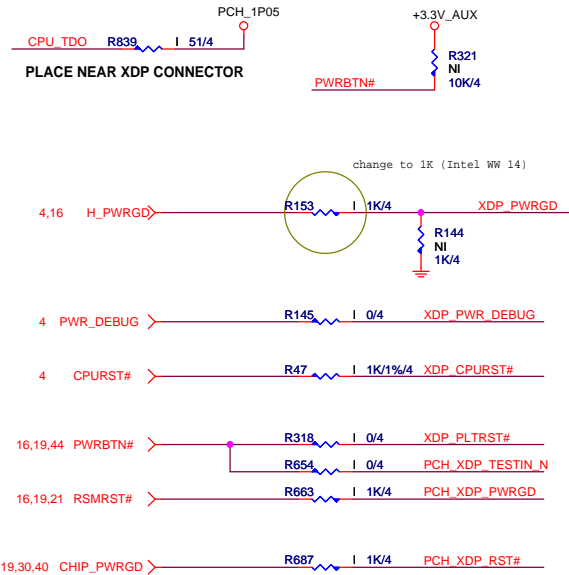
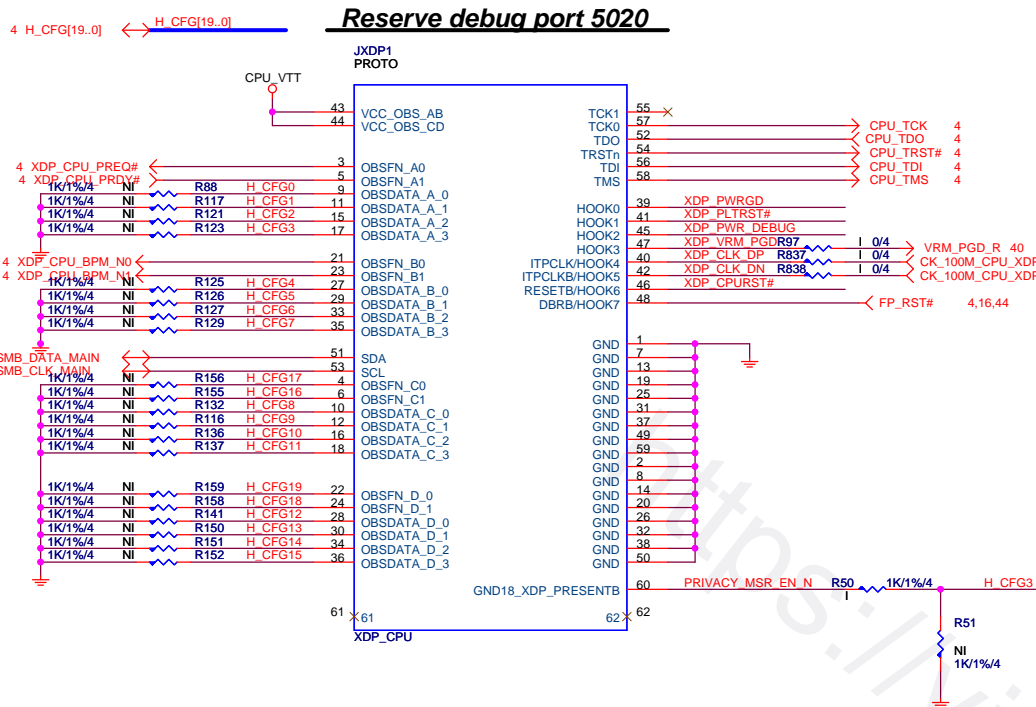


**MICRO-STAR INT'L CO.,LTD**

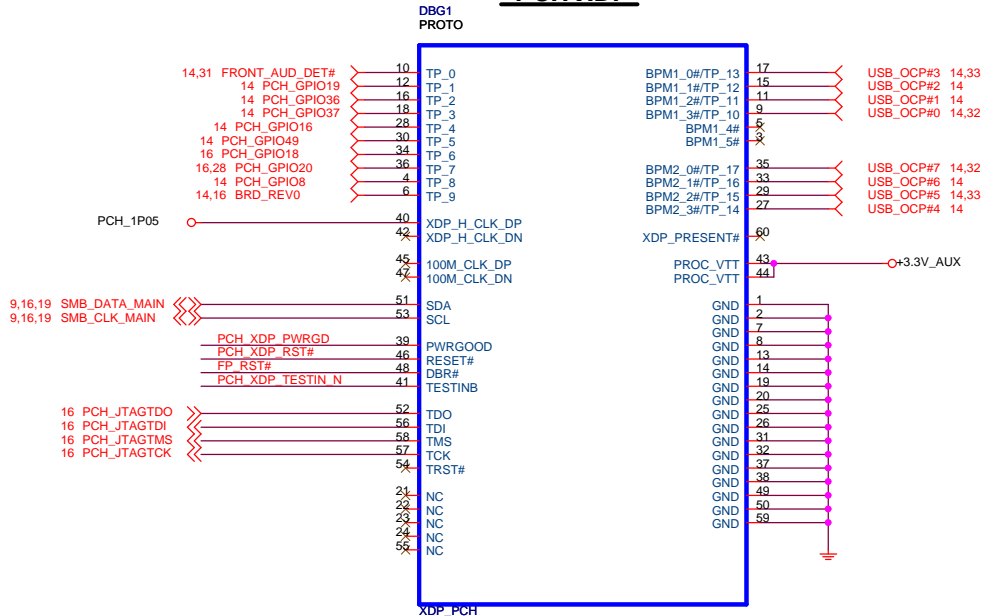
**HP SCH P/N: 718773-000(MSI MS-7860)**

Size	Document Description	Rev
Custom	EMI cap	X4
Date:	Sheet 45 of 56	

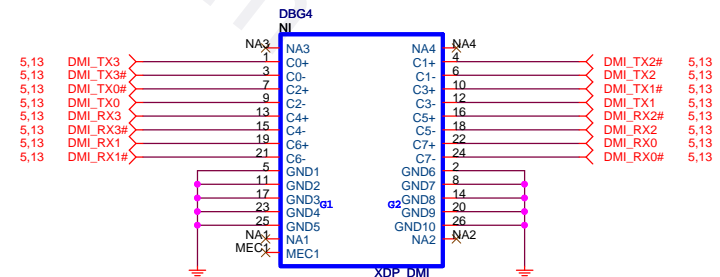




## PCH XDP



## DMI XDP



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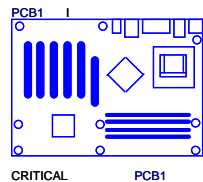


**MICRO-STAR INT'L CO.,LTD**

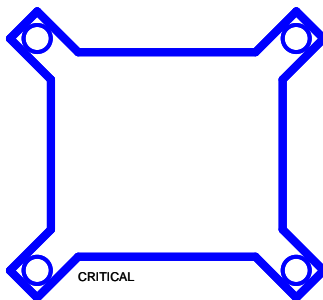
**HP SCH P/N: 718773-000(MSI MS-7860)**

Size	Document Description	Rev
Custom	CPU/PCH/DMI XDP	X4
Date:	Sheet 46 of 56	

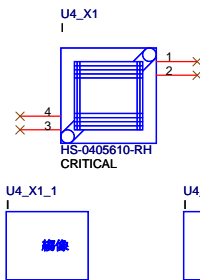
## Manual Parts



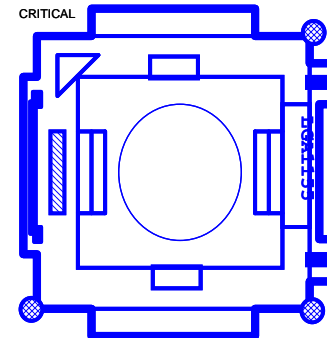
XU1\_X2  
E93-0000099-A21



E93-0000099-A21  
AVL:E22-B009010-C22

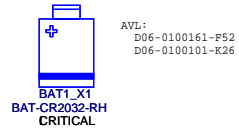


XU1\_X1  
CPU SOCKET  
CRITICAL



E21-AC71010-L06  
AVL:E21-7826010-F02

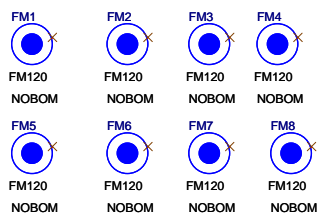
## Simulation



AVL:  
D06-0100161-P52  
D06-0100101-K26

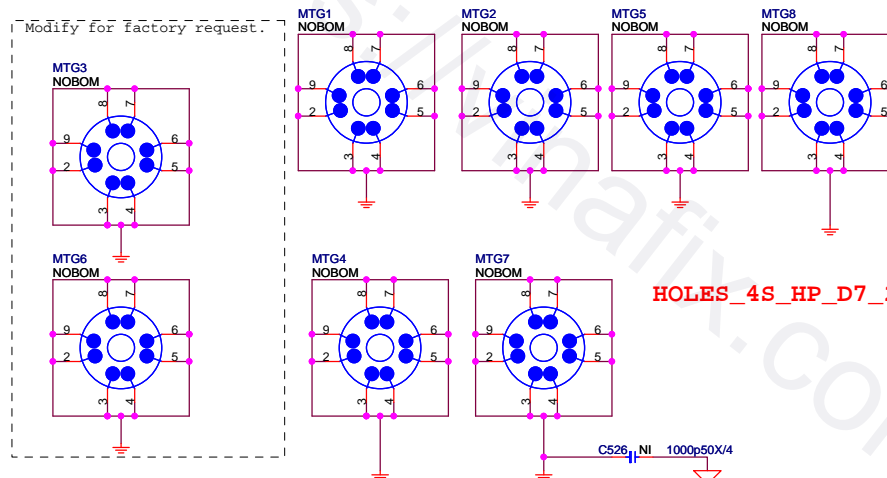
D06-0100101-P01

## Optics Orientation Holes



## Mounting Holes

Modify for factory request.

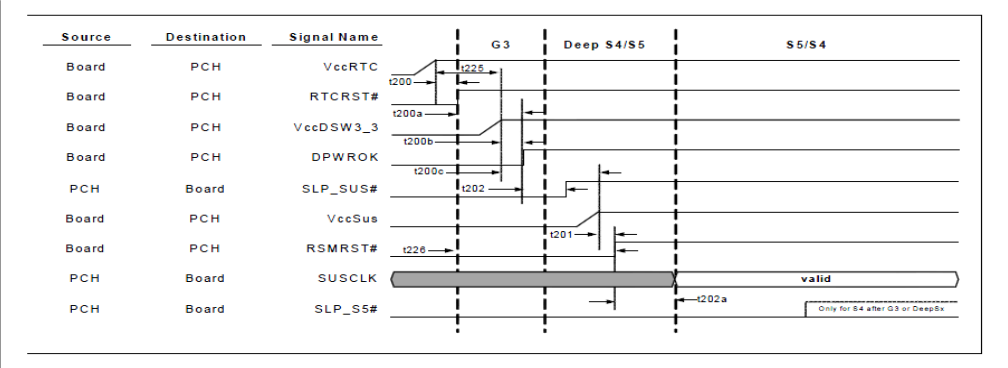


Release Date : Wednesday, May 29, 2013

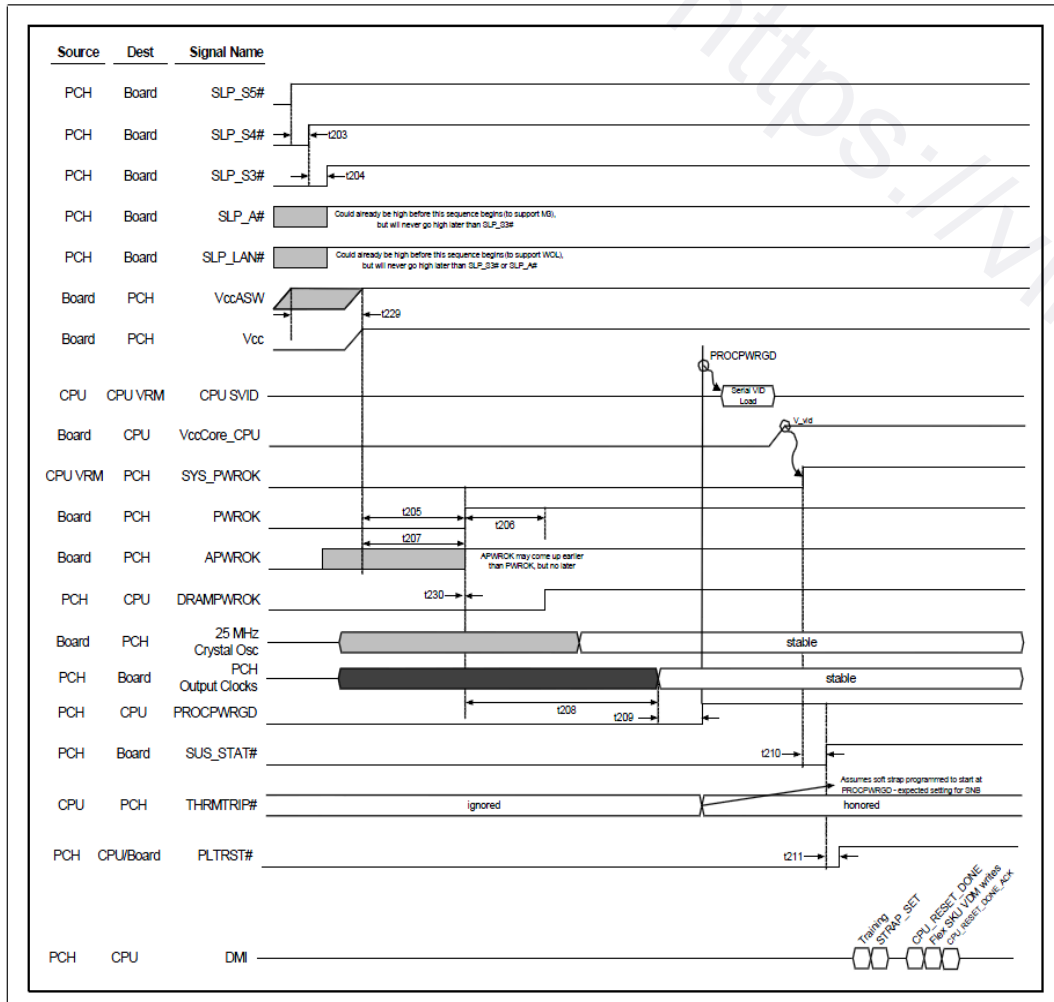
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MICRO-STAR INT'L CO.,LTD		
HP SCH P/N: 718773-000(MSI MS-7860)		
Size Custom	Document Description Manual & Option Parts	Rev X4
Date:	Sheet 47 of 56	

# G3 w/RTC Loss to S4/S5 (With Deep Sx Support) Timing Diagram



## S5 to S0 Timing Diagram



## G3-S5

ATX\_5VSB

+3.3V\_LPS

SLP\_SUS#

LPS\_ON#

+5V\_AUX

+3.3V\_AUX

RSMRST#

## S5-S0

PWBTIN#

PWBTOUT#

SLP\_S5/S4/S3

PSON#

+12V/+5V/+3.3V

VCC1\_5/VCC\_DDR

PCH\_1P05

CHIP\_PWRGD

MEM\_PWRGD

H\_PWRGD

VCCCP

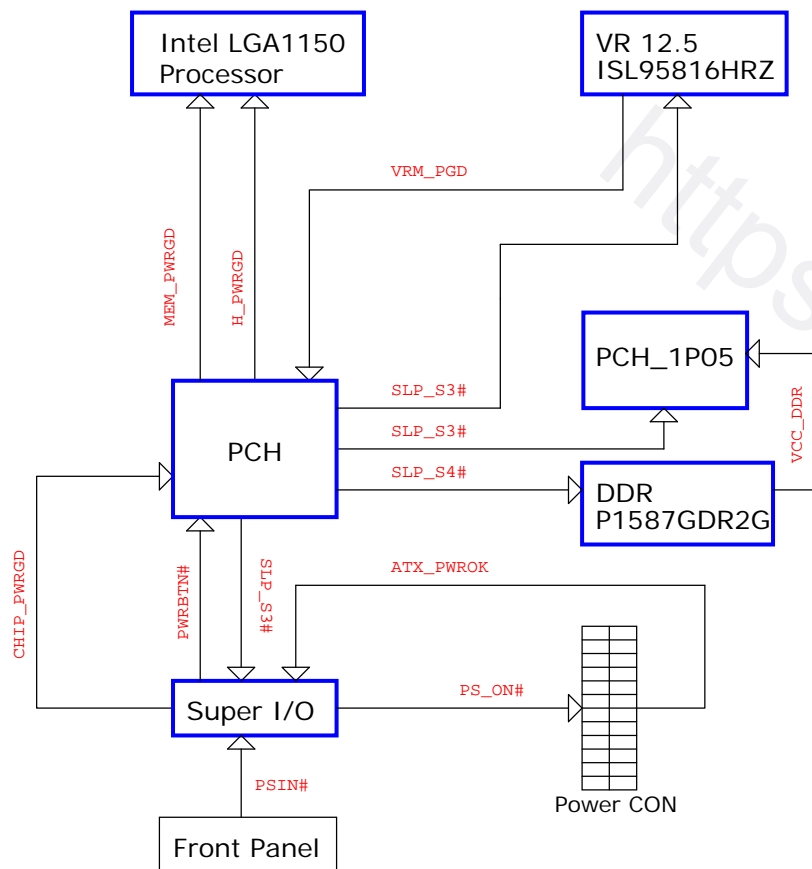
PLTRST#

Release Date : Wednesday, May 29, 2013

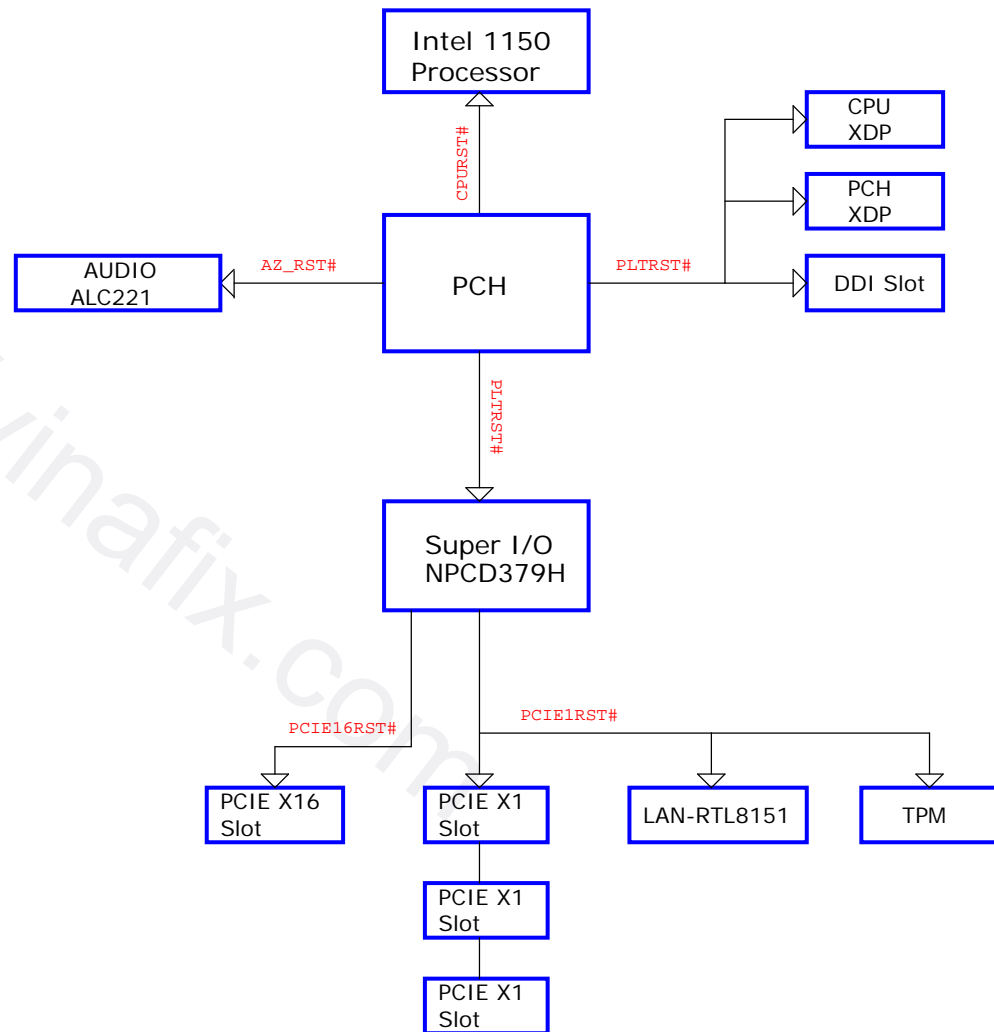
**HP Restricted Secret**

	MICRO-STAR INT'L CO.,LTD		
	HP SCH P/N: 718773-000(MSI MS-7860)		
	Size Custom	Document Description	Rev X4
	Date:		Sheet 48 of 56

## PWROK MAP



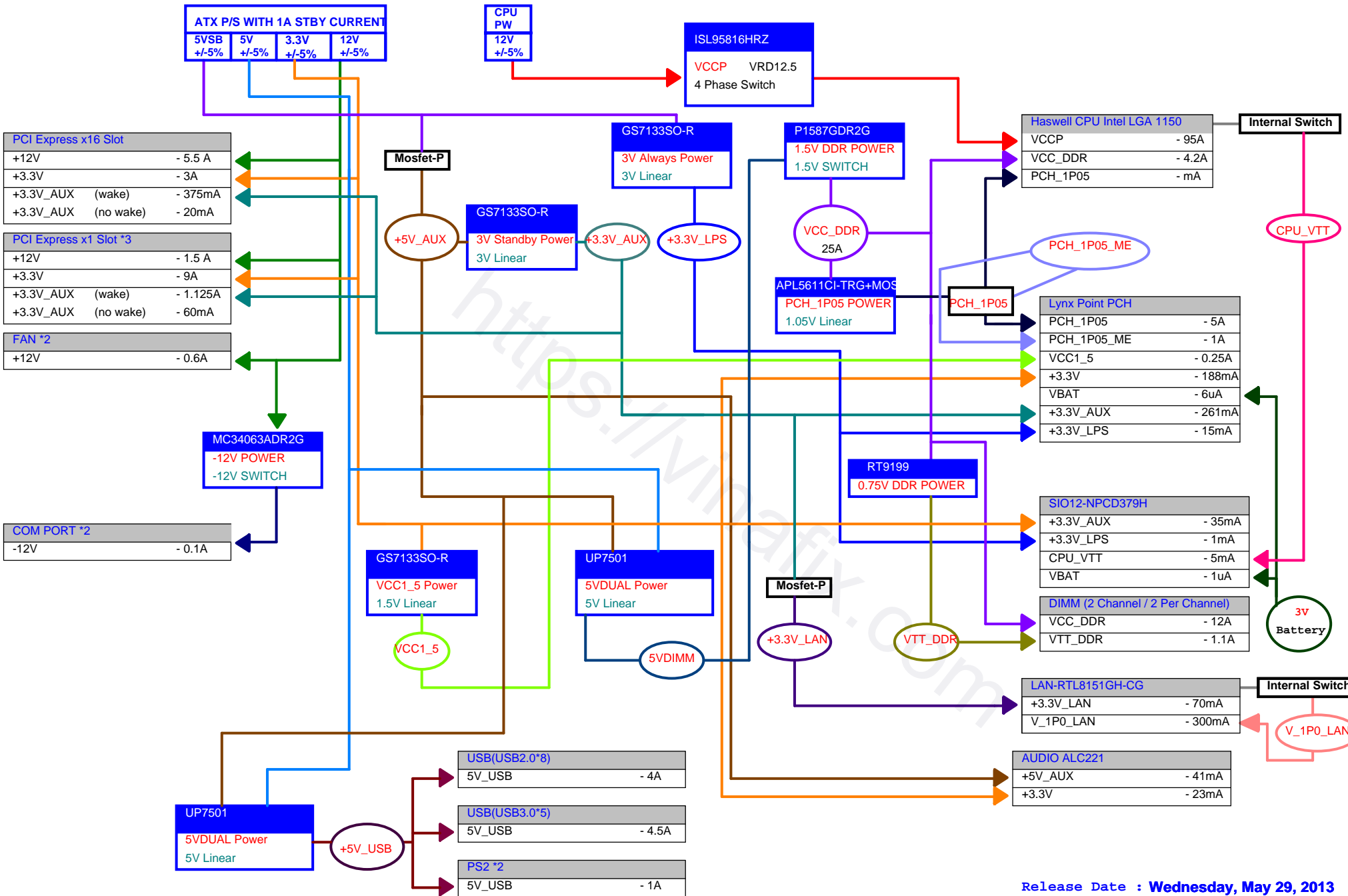
## RESET MAP



Release Date : Wednesday, May 29, 2013

**HP Restricted Secret**

MICRO-STAR INT'L CO.,LTD	
HP SCH P/N: 718773-000(MSI MS-7860)	
Size Custom	Document Description Pwrok/Reset
Date:	Rev X4



Release Date : Wednesday, May 29, 2013

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	<b>MICRO-STAR INT'L CO.,LTD</b>	
	<b>HP SCH P/N: 718773-000(MSI MS-7860)</b>	
	Size Custom	Document Description <b>Power Map</b>
Date:	Sheet 50 of 56	Rev X4


# PCH

GPIO	I/O/NC	Power	Tol	Default	MB Function
GPIO[0]	I/O	Main	3.3V	GPI	FRONT_USB_P24_DET#
GPIO[1]	I/O	Main	3.3V	GPI	PCH_GPIO1
GPIO[2]	I/O	Main	5V	GPI	PCH_GPIO2
GPIO[3]	I/O	Main	5V	GPI	PCH_GPIO3
GPIO[4]	I/O	Main	5V	GPI	PCH_GPIO4
GPIO[5]	I/O	Main	5V	GPI	PCH_GPIO5
GPIO[6]	I/O	Main	3.3V	GPI	IO_SMI#
GPIO[7]	I/O	Main	3.3V	GPI	PCH_GPIO7
GPIO[8]	I/O	Resume	3.3V	GPO	PCH_GPIO8
GPIO[9]	I/O	Resume	3.3V	Native	USB_OCP#5
GPIO[10]	I/O	Resume	3.3V	Native	USB_OCP#6
GPIO[11]	I/O	Resume	3.3V	Native	PCH_SMBALERT#
GPIO[12]	I/O	Resume	3.3V	Native	LAN_DISABLE#
GPIO[13]	I/O	Resume	3.3V	GPI	INT_USB_P151_DET#
GPIO[14]	I/O	Resume	3.3V	Native	GPIO14
GPIO[15]	I/O	Resume	3.3V	GPO	PCH_GPIO15
GPIO[16]	I/O	Main	3.3V	GPI	PCH_GPIO16
GPIO[17]	I/O	Main	3.3V	GPI	PCH_GPIO17
GPIO[18]	I/O	Main	3.3V	Native	PCH_GPIO18
GPIO[19]	I/O	Main	3.3V	GPI	PCH_GPIO19
GPIO[20]	I/O	Main	3.3V	Native	PCIECLKREQ2#
GPIO[21]	I/O	Main	3.3V	GPI	FRONT_AUD_DET#
GPIO[22]	I/O	Main	3.3V	GPI	INT_USB_P150_DET#

GPIO[23]	I/O	Main	3.3V	Native	LDRQ1#
GPIO[24]	I/O	Resume	3.3V	GPO	PCH_GPIO24
GPIO[25]	I/O	Resume	3.3V	Native	BRD_ID2
GPIO[26]	I/O	Resume	3.3V	Native	PCH_GPIO26
GPIO[27]	I/O	DSW	3.3V	GPI	PCH_LAN_WAKE#
GPIO[28]	I/O	Resume	3.3V	GPO	PCH_GPIO28
GPIO[29]	I/O	Resume	3.3V	Native	SLP_WLAN#
GPIO[30]	I/O	Resume	3.3V	GPI	PCH_SUSWARN#
GPIO[31]	I/O	DSW	3.3V	GPI	PCH_GPIO31
GPIO[32]	I/O	Main	3.3V	GPO	PCH_GPIO32
GPIO[33]	I/O	Main	3.3V	GPO	PCH_GPIO33
GPIO[34]	I/O	Main	3.3V	GPI	PCH_GPIO34
GPIO[35]	I/O	Main	3.3V	GPO	BRD_REV0
GPIO[36]	I/O	Main	3.3V	GPI	PCH_GPIO36

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	MICRO-STAR INT'L CO.,LTD	
	HP SCH P/N: 718773-000(MSI MS-7860)	
	Size Custom	Document Description <b>GPIO Table1</b>
Date:	Sheet 51 of 56	


# PCH

GPIO	I/O/NC	Power	Tol	Default	MB Function
GPIO[37]	I/O	Main	3.3V	GPI	PCH_GPIO37
GPIO[38]	I/O	Main	3.3V	GPI	CHASSIS_ID0
GPIO[39]	I/O	Main	3.3V	GPI	BRD_ID1
GPIO[40]	I/O	Resume	3.3V	Native	USB_OCP#1
GPIO[41]	I/O	Resume	3.3V	Native	USB_OCP#2
GPIO[42]	I/O	Resume	3.3V	Native	USB_OCP#3
GPIO[43]	I/O	Resume	3.3V	Native	USB_OCP#4
GPIO[44]	I/O	Resume	3.3V	Native	PCIECLKREQ5#
GPIO[45]	I/O	Resume	3.3V	Native	PCH_GPIO45
GPIO[46]	I/O	Resume	3.3V	Native	PCH_GPIO46
GPIO[48]	I/O	Main	3.3V	GPI	CHASSIS_ID1
GPIO[49]	I/O	Main	3.3V	GPI	PCH_GPIO49
GPIO[50]	I/O	Main	3.3V	GPI	PCH_GPIO50
GPIO[51]	I/O	Main	3.3V	GPO	PCH_GPIO51
GPIO[52]	I/O	Main	3.3V	GPI	PCH_GPIO52
GPIO[53]	I/O	Main	3.3V	GPO	PCH_GPIO53
GPIO[54]	I/O	Main	3.3V	GPI	BOOT_BLK_EN#
GPIO[55]	I/O	Main	3.3V	GPO	PCH_GPIO55
GPIO[57]	I/O	Resume	3.3V	GPI	PCH_GPIO57
GPIO[58]	I/O	Resume	3.3V	Native	SML1CLK
GPIO[59]	I/O	Resume	3.3V	Native	USB_OCP#0
GPIO[60]	I/O	Resume	3.3V	Native	PCH_SML0ALERT#

GPIO[61]	I/O	Resume	3.3V	Native	PRNTER_DET#
GPIO[62]	I/O	Resume	3.3V	Native	SUS_CLK
GPIO[63]	I/O	Resume	3.3V	Native	SLP_S5#
GPIO[64]	I/O	CORE	3.3V	Native	CLKOUTFLEX0
GPIO[65]	I/O	CORE	3.3V	Native	CLKOUTFLEX1
GPIO[66]	I/O	CORE	3.3V	Native	CLKOUTFLEX2
GPIO[67]	I/O	CORE	3.3V	Native	CLKOUTFLEX3
GPIO[68]	I/O	CORE	3.3V	GPI	FRONT_USB_P26_DET#
GPIO[69]	I/O	CORE	3.3V	GPI	COMM_B_DET#
GPIO[70]	I/O	CORE	3.3V	GPI	BOOT_BLK_REC#
GPIO[71]	I/O	CORE	3.3V	GPI	BRD_ID0
GPIO[72]	I/O	DSW	3.3V	Native	PCH_GPIO72
GPIO[73]	I/O	Resume	3.3V	Native	BRD_REV1
GPIO[74]	I/O	Resume	3.3V	Native	PCH_SML1ALERT#
GPIO[75]	I/O	Resume	3.3V	Native	SML1DATA

Release Date : Wednesday, May 29, 2013

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		HP SCH P/N: 718773-000(MSI MS-7860)	
Size Custom	Document Description GPIO Table2		Rev X4
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Pin	Default Function / Alternate Functions	Buffer Type	Buffer Power Wells	Motherboard Function
1	CLAMP_CTRL	OD <sub>S</sub>	VS <sub>B3</sub>	BLEED OFF CIRCUIT
2	SLP_S4#	IN <sub>TD4</sub>	VS <sub>B3</sub>	SLP_S4#
3	SLP_S5#	IN <sub>TD4</sub>	VS <sub>B3</sub>	SLP_S5#
4	SLP_S3#	IN <sub>TD4</sub>	VS <sub>B3</sub>	SLP_S3#
5	SIOPME#	OD <sub>S</sub> O <sub>4B</sub>	VS <sub>B3</sub>	RI#
6	RSMRST#	O <sub>316</sub>	VS <sub>B3</sub>	RSMRST#
7	PME_IN#	IN <sub>TD</sub>	VS <sub>B3</sub>	PME status
8	BLINK_OR	O <sub>2020</sub>	VS <sub>B3</sub>	Power LED driver
9	COLOR	O <sub>2020</sub>	VS <sub>B3</sub>	Power LED driver
10	VSS	I	GND	GND
11	PWRGD_OUT	OD <sub>S</sub>	VS <sub>B3</sub>	PWRGD_140ms
12	PS_ON#	OD <sub>S</sub>	VS <sub>B3</sub>	PS_ON#
13	TACH1	IN <sub>TD</sub>	VDD3	SYS_FAN_TACH
14	CLOCKI32	IN <sub>TD</sub>	VS <sub>B3</sub>	SUS_CLK_IO
15	3V_AUX_SLOT_ON	O <sub>4B</sub>	VS <sub>B3</sub>	3V_AUX_SLOT_ON
16	VS <sub>B3</sub>	I	PWR	VS <sub>B3</sub>
17	VCORF	I	N/A	VCORF
18	LDRG#	O <sub>PC1</sub>	VDD3	LDRG#
19	LAD3	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	LAD3
20	LAD0	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	LAD0
21	LAD2	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	LAD2
22	VSS	I	PWR	GND
23	LAD1	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	LAD1
24	SER_IRQ	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	SERIRQ
25	PCI_RESET#	IN <sub>PC1</sub>	VDD3	PLTRST#
26	PCI_CLK	IN <sub>PC1</sub>	VDD3	33MHz
27	LFRANE#	IN <sub>PC1</sub>	VDD3	LFRANE#
28	VS <sub>B3</sub>	I	PWR	VS <sub>B3</sub>
29	OPRST3#	O <sub>14</sub>	VS <sub>B3</sub>	PCIE_X16 RESET#
30	INTRUDER#	IN <sub>TD</sub>	V <sub>BAT</sub>	HOOD_SENSE#
31	5V_USB_CTRL	O <sub>4B</sub>	VS <sub>B3</sub>	5V_USB_EN
32	HDLOCK#	OD <sub>12</sub>	VDD3	HOOD_LOCK#
33	GPIO01	IN <sub>TD</sub> /OD <sub>9</sub> O <sub>4B</sub>	VS <sub>B3</sub>	
34	HDUNLOCK#	OD <sub>12</sub>	VDD3	HOOD_UNLOCK#
35	HD_LED_IN#	IN <sub>TD</sub>	VDD3	Hard Drive LED Input
36	CPU_PRNT1#	IN <sub>TD1</sub>	V <sub>BAT</sub>	CPU detection
37	VBAT	I	PWR	

38	12V_VSB_COMP	IN <sub>COMP2</sub>	VS <sub>B3</sub>	
39	COMP_IN3	IN <sub>COMP3</sub>	VS <sub>B3</sub>	
40	COMP_IN1	IN <sub>COMP1</sub>	VS <sub>B3</sub>	5V voltage monitor
41	COMP_IN2	IN <sub>COMP2</sub>	VS <sub>B3</sub>	12V voltage monitor
42	AVCC	I	PWR	AVCC
43	AD1	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	AD1
44	AD2	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	AD2
45	AD3	IN <sub>PC</sub> /O <sub>PC1</sub>	VDD3	AD3
46	FSPI_STR	IN <sub>TD</sub>	AVCC	FSPI_STR
47	AGND	I	GND	AGND
48	PWBTOUT#	IN <sub>TD4</sub>	VLPS	PWBTOUT#
49	PWBTIN#	IN <sub>TD4</sub>	VLPS	PWBTIN#
50	LPS_WAKE	IN <sub>TD</sub>	VLPS	LPS_WAKE
51	LPS_PHY#	O <sub>4B</sub>	VLPS	LPS_PHY#
52	LPS_ON#	O <sub>4B</sub>	VLPS	LPS_ON#
53	VLPS	I	PWR	VLPS
54	VTT	I	PWR	VTT
55	THERMTRIP#	IN <sub>AGTL</sub>	VTT	THERMTRIP#
56	TSI_SCL	IN <sub>TD</sub> /O <sub>TD1</sub>	VTT	TSI_SCL
57	PROCHOT1#	IN <sub>AGTL</sub> /OD <sub>AGTL24</sub>	VTT	PROCHOT1#
58	PECI	IN <sub>PEC</sub> /O <sub>PEC1</sub>	VTT	PECI
59	PROCHOT2#	IN <sub>AGTL</sub> /OD <sub>AGTL24</sub>	VTT	PROCHOT2#
60	VSS	I	PWR	GND
61	PWM2	OD <sub>12</sub> O <sub>6/12</sub>	VDD3	SYS-FANPWM_REAR
62	HMSCL	IN <sub>2B</sub> /OD <sub>6</sub>	VS <sub>B3</sub>	HMSCL
63	PWM1	OD <sub>12</sub> O <sub>6/12</sub>	VDD3	SYS-FANPWM_FRONT
64	HMSDA	IN <sub>2B</sub> /OD <sub>6</sub>	VS <sub>B3</sub>	HMSDA
65	HD_LED_OUT	OD <sub>16</sub>	VS <sub>B3</sub>	Hard Drive LED Output
66	WAKE_OUT#	OD <sub>12</sub> O <sub>6/12</sub>	VS <sub>B3</sub>	Wake Disable Output
67	GPIO15(EV6#)	IN <sub>TD</sub>	VS <sub>B3</sub>	PCI_Express_Wake#
68	AMP_ON	O <sub>4B</sub>	VS <sub>B3</sub>	AMP_ON
69	AMP_ON#	O <sub>4B</sub>	VS <sub>B3</sub>	AMP_ON#
70	OPRST2#	O <sub>14/14</sub>	VS <sub>B3</sub>	PE_RST#_OUT
71	12V_PG_25MS	OD <sub>6</sub>	VS <sub>B3</sub>	12V_PG_25MS
72	KBDRST#	IN <sub>TD</sub> /OD <sub>14</sub>	VDD3	KBDRST#
73	AUDIO_BEEP	O <sub>4B</sub>	VS <sub>B3</sub>	DIAG Beep
74	TACH2	IN <sub>TD</sub>	VDD3	TACH2
75	VS <sub>B3</sub>	I	PWR	VS <sub>B3</sub>
76	KBDAT	IN <sub>TD</sub> /OD <sub>14</sub>	VDD3	KBDAT
77	MDAT	IN <sub>TD</sub> /OD <sub>14</sub>	VDD3	MSDATA
78	SLIN_ASTRB#	OD <sub>14</sub> O <sub>14/14</sub>	VDD3	RSLIN#
79	KBCLK	IN <sub>TD</sub> /OD <sub>14</sub>	VDD3	KBCLK
80	MCLK	IN <sub>TD</sub> /OD <sub>14</sub>	VDD3	MCLK
81	PD3	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD3
82	PD4	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD4

83	INIT#	OD <sub>14</sub> O <sub>14/14</sub>	VDD3	INIT#
84	VSS	I	PWR	GND
85	PD1	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD1
86	PD6	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD6
87	PD0	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD0
88	PD2	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD2
89	PD7	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD7
90	PD5	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	PD5
91	STB_VWRITE#	OD <sub>14</sub> O <sub>14/14</sub>	VDD3	RSTB#
92	ERR#	IN <sub>TD</sub>	VDD3	RERR#
93	VS <sub>B3</sub>	I	PWR	VS <sub>B3</sub>
94	AFD_DSTRB#	OD <sub>14</sub> O <sub>14/14</sub>	VDD3	RAFD#
95	PE	IN <sub>TD</sub>	VDD3	RPE
96	GA20	IN <sub>TD</sub> O <sub>14/14</sub>	VDD3	GA20
97	ACK#	IN <sub>TD</sub>	VDD3	RACK#
98	SLCT	IN <sub>TD</sub>	VDD3	RSCT
99	BUST_WAIT#	IN <sub>TD</sub>	VDD3	RBUSY
100	TACH3	INTS	VDD3	TACH3
101	SMB1SDA	SW <sub>2B</sub>	VDD3	SMB_DATA_MAIN
102	PWRGD_PS	IN <sub>TD4</sub>	VS <sub>B3</sub>	PWROK_PS
103	SMB2SDA	SW <sub>2B</sub>	VDD3	SMB_DATA_RESUME
104	PWRGD_O2#	OD <sub>6</sub>	VS <sub>B3</sub>	PWRGD_50MS#
105	PWM3#	OD <sub>12</sub> O <sub>6/12</sub>	VDD3	PSU-FANPWM
106	5V_USB_MAIN#	OD <sub>6</sub>	VS <sub>B3</sub>	5V_USB_MAIN#
107	PWRGD_O1	OD <sub>6</sub>	VS <sub>B3</sub>	PWRGD_30MS
108	VSS	I	PWR	GND
109	SMB1SCL	SW <sub>2B</sub>	VDD3	SMB_CLK_MAIN
110	SMB#	OD <sub>6</sub>	VDD3	IO_SMB#
111	SMB2SDL	SW <sub>2B</sub>	VDD3	SMB_CLK_RESUME
112	DSR1#	IN <sub>TD</sub>	VDD3	DSRA#
113	RI1#	IN <sub>TD</sub>	VDD3	RIA#
114	CTS1#	IN <sub>TD</sub>	VDD3	CTSA#
115	DCD1#	IN <sub>TD</sub>	VDD3	DCDA#
116	SIN1	IN <sub>TD</sub>	VDD3	SINA
117	RTS1#	O <sub>4B</sub>	VDD3	RTSA#
118	DTR#_BOUT1	O <sub>4B</sub>	VDD3	DTRA#
119	SOUT1	O <sub>4B</sub>	VDD3	SOUTA
120	DCD2#	IN <sub>TD</sub>	VDD3	DCDB#
121	SOUT2	O <sub>4B</sub>	VDD3	SOUTB
122	VS <sub>B3</sub>	I	PWR	VS <sub>B3</sub>
123	DTR#_BOUT2	O <sub>4B</sub>	VDD3	DTRB#
124	RI2#	IN <sub>TD</sub>	VDD3	RIB#
125	RTS2#	O <sub>4B</sub>	VDD3	RTSB#
126	SIN2	IN <sub>TD</sub>	VDD3	SINB
127	DSR2#	IN <sub>TD</sub>	VDD3	DSRB#
128	CTS2#	IN <sub>TD</sub>	VDD3	CTSB#

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**MICRO-STAR INT'L CO.,LTD**

**HP SCH P/N: 718773-000(MSI MS-7860)**

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	<b>GPIO Table3</b>	X4
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Gwen/Mordred X1

(SI number: Gwen/Mordred)

2012/10/22

PAGE 7: Changed R436 from 3.16K ohm to 2.67K ohm.(SI number: 892595/892596)

PAGE 16: Modified R721 and R231 pull-up well from +5V\_AUX to ATX\_5VSB.(SI number: 892601/892602)

PAGE 20: Modified J68 to separated connector J66 and J67(HP spec change).(SI number: 892604/892605)

PAGE 22: Modified DP to DDI connector (HP spec change).

Add: J34.  
Remove: C120,C117,C115,C110,C100,C108,C95,C98,C96,C99,C80,Q26,F2,R194,R199,  
RN29,RN30,RN31,RN32,R421,R188,R210,R183,C132,R530,Q30,R196,  
R278,Q28,R201,R206,U16,U45,U30,Q31,Q32,R211,R212,C149,C159,C165,C171,  
C79,C71,R193,J64,L13,L12,L9,L11(SI number: 892607/892609)

PAGE 23: Modified DP header to DVID connector (HP spec change).

Remove: C121,C118,C111,C116,C101,C109,C97,C102,C103,C104,R202,R214,RN33,RN34,  
RN35,RN36,L32,L33,L10,L34,R423,R215,R204,R185,C133,R544,Q51,R205,R279,  
Q55,U17,U15,U39,Q40,R224,Q56,R222,C150,C162,C166,C174,C82,Q52,R217,R216,  
F3,C83,C72,R223,P55

Add: C66,C69,C56,C57,C58,C61,C51,C53,R233,Q34,C81,U21,C76,C75,C84,U14,U6,  
R181,R164,R173,R138,R140,R172,R103,R112,Q33,R170,R162,Q20,Q29,R166,R232,  
RN21,RN22,RN23,RN24,L7,L8,L6,L5,R242,R276,R297,R299,D75,F1,FB4,C77,C1,  
C2,R238,C168,J65(SI number:892611/892614)

PAGE 24: Modified J69 to J65(HP spec change).(SI number: 892615/892617)

PAGE30:Change audio mapping to follow reference circuit. C450  
change to connect from ul3 pin17 to pin15: C451 change to  
connect from ul3 pin16 to pin14 (SI number: 892619/892622)

PAGE30:Modify audio circuit by audio vendor review. FB12  
connect to +3.3V,U19 pin9 connect to R918 and R844 (SI  
number: 892625/892626)

PAGE31:Modify audio circuit by audio vendor review.  
R413,U20,R396,C471,R415 changed to NI; added FB6,D78;  
deleted D24 (SI number: 892625/892626 )

PAGE32:Add USB switch control circuit  
Added R530,Q92 (SI number: 892628/892629)

PAGE33:Deleted USB charging circuit by HP changed specification .  
Deleted C181,C188,Q60,Q59,C186,C196,R725,R740,R112,R103,R299,R87,  
C51,U38,R77,R232,R110,R118,U63,R893,R895,R892,R895,R892,C586,  
R730,R138,R233,Q103,Q104 (SI number: 892633/892634)

PAGE34:Deleted USB P151 Header circuit by HP changed specification .  
Deleted RN63,L4,RN46,L3,D3,C21,P151,C630 (SI number: 892635/892637)

PAGE35:Deleted USB2.0x2 connector and added USB3.0x2+USB2.0x2  
connector circuit by HP changed specification . Deleted  
J891,J82,JV81,RN60,L26,  
RN61,L25,RN40,L19,RN41,L47,RN42,L50,RN43,  
L48,C677,C278,C271,C266,C263,U27,U28,D30,C345; added  
J10,JV10,D3,C21,RN63,L4,RN46,L3 (SI number: 892639/892640)

PAGE36:Added USB P152 Header circuit by HP changed specification . Added  
U27,U28,D30,C345,C278,C271,RN42,L50,RN40,L19,RN60,L26,C726,P152(SI number: 892643/892645)

PAGE38:Modify Fan circuit ;EC6 and C204 changed from NI to I (SI number: 892646/892649)

PAGE39:Added EC cap for DDR power by power team suggestion ;Added EC27(SI number: 892651/892654)

PAGE40:Modify CPU power circuit by power team suggestion ;R104,R67,R96,R49 changed  
from 6.2K to 6.34K ohm (SI number: 892656/892658)

PAGE44:Modify APS header circuit ;E18 pin 4 changed from SLP\_S# to +3.3V\_AUX.  
(SI number: 892659/892663)

2012/10/23

PAGE16:Reserve C540 for EMI.(SI number: 892666/892667)

PAGE20:Change FB13, FB14, FB15,FB16 from 0 ohm to 33 ohm for EMI.(SI number:892666/892667)

PAGE20:Add D61 for EMI.(SI number: 892666/892667)

PAGE24: Delete D10, D11 for EMI.(SI number: 892666/892667)

2012/10/24

PAGE 14: Modify R807 and R371 from 10k ohm to 499 ohm by Intel review.(SI number:893429)

PAGE 16: Rename PCIECLKREQ#5 to PCH\_GPIO44 by Intel review.(SI number:893434)

PAGE 16: Rename PCIECLKREQ#2 to PCH\_GPIO20 and modify R367 to NI by Intel review.(SI number:893434)

PAGE 24: Modify R285 and R292 from I to NI by Intel review.(SI number:893437)

PAGE 28: Add R920, R921,modify R900 to 0ohm, modify Q135 to 2N7002 by Intel review.(SI number:893435)

PAGE 21: Modify C445,C446 and C449 from NI to I by SIO vendor review.(SI number:893439)

PAGE 30: Modify C455 from 0.1uF to 10uF by audio vendor review.(SI number:892625)

2012/10/25

PAGE 42: Power team suggest to modify C647,C649,C644,C646,C648,C650,C652,  
C653,C654,C655 from I to NI.(SI number:893441)

PAGE 17: Delete C683,C524 and add C960,C961,C962 by Intel review.(SI number:893898)

PAGE 43: Add C963,C964 by Intel review.(SI number:893898)

PAGE 16: Modify R738 from 2.2k ohm to 10k ohm,  
modify R120 from 100k ohm to 10k ohm and modify to NI by Intel review.(SI number:893898)

2012/10/26

PAGE 44: Modify R747 from 75 ohm to 180 ohm and connect to +5V\_AUX.(SI number:893677)

2012/10/30

PAGE 38: Delete 3/4 pin system fan colay circuit:  
Delete: R36,C23,R499,R497,U67,R283,Q80,R236(SI number:896536)

PAGE 13: Modified PCIE clock mapping by HP requirement:  
Connect PE6\_CLK to J31, PE5\_CLK to J32, PE0\_CLK to J33.(SI number:894512)

PAGE 43: Modify EC1 from 270uF to 100uF by power team suggestion.(SI number:895385)

2012/11/01

PAGE 05: Modify DVI port mapping port D by HP requirement.(SI number: 894794)

2012/11/02

PAGE 45: Add C965, C966 for EMI.(SI number:896534)

2012/11/09

PAGE 23/24: Separate J65 (DVI+VGA) into J65 (DVI) and J69 (VGA).(SI number:892615/892617)

PAGE 14: Modified net PCH\_GPIO1 to DC\_DET# and connected to J34.(SI number:896525)

PAGE 40: Modified CPU PWM solution from NCP81102MNTXG to ISL95816HRZ.  
Delete: R34,R1,C19,R31,R14,R15,C5,C18,R5,R13,R3,R16,C7,R4,R24,R30,C16,R22,R11,C17,R840,R7,R6,C15,R56,R55,R99,  
R100,R131,RT3,R114,C40,R130,R91,R92,R74,R44,C26,R9,R32,C3,R63,R69,R62,C31,R90,R113,R122,R133,C46,  
R81,R105,R104,C43,C44,R59,R70,R67,C34,C32,R82,R94,R98,C42,C38,R53,C24,C25,R49,R20,R28,R27,R39,RT1,  
C12,C11,R19,R21,R10,C6,R124,R68,R108,R41,R107,R58,R89,R33,C20,R42,R35,R558.  
Add: R70,R82,C23,R107,R58,R27,R45,R36,R105,C25,R87,C24,C34,C17,R110,R89,C42,C38,R53,R63,R55,R77,R92,C40,  
R99,C46,R104,R30,C43,C12,R4,C4,R1,R24,R9,R14,R29,R91,C26,R2,C3,R6,C7,R3,R49,R15,R22,R16,R31R20,R8,  
R44,R43,R42,R39,R19,R25,R28,C10,R100,R111,R108,C18,R52,R62,R90,R68,R94,R81,R61,C29,R59,R67,R69,R66,  
R32,R74,R98,RT1,R21,C9,R23,C8,C6,R5,C11,R18,C13,R13,RT3.(SI number:896517)

2012/11/13

PAGE 31: Add R452, R453 and C524 and connect to pin 2 of P23 by HP suggestion.(SI number:)

PAGE 45: Add C183,C229,C245,C211,C171,C233,C253,C216,C185,C261,C264,C260,C172,C266,C530,C528,C676,C677,C534  
by HP suggestion.(SI number:)

PAGE 47: Add C526 by HP suggestion.(SI number:)

PAGE 47: MH7 connect to GND by HP suggestion.(SI number:)

2012/11/14


PAGE 42: Modified EC24 from I to NI by power team suggestion.(SI number:898665)

PAGE 39: Add C173 by power team suggestion.(SI number:898666)

PAGE 45: Add C535, C536, C542,C543,C544 for EMI.(SI number:898667)

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Gwen X1

2012/11/20

PAGE 35: Separate J10 to J81 and J82 by HP spec change.(SI number:898670)

PAGE 40: Modified C24 to 4.7k ohm and modified NI to I by power team suggestion(SI number: 898673)

PAGE 22: Modify DP header to 2X10 pin by HP spec change.(SI number:898672 )

Gwen/Mordred X2

2013/01/03

PAGE 29/35: The one PCB leverage proposal from MSI had been approved and will implement into EVT-2 phase. Modify J9 from RJ45+USB2.0 to RJ45+USB3.0 connector.(SI:913289)

PAGE 34: The one PCB leverage proposal from MSI had been approved and will implement into EVT-2 phase.Combine J81 and J82 USB 2.0 port to J10 USB2.0 X4 connector.(SI:913289)

PAGE 30:Rear Line in port malfunction. Modify R386 from 20k ohm to 39.2k ohm.(SI:903668,903669)

PAGE 44: UUT can not enter S5 Max Power Saving mode. Add R929 .(SI:906029,906030)

PAGE 43: There is no function for COM port.Connect Pin 8 of U35 to U5\_SWC.(SI:902802)

PAGE 39: DDR power dynamic Load test is fail. Moidy C496 from 1000pf to 470pf; Modify R247 from 2k ohm to 2.74k ohm;Modify R274 from 12k ohm to 7.68k ohm;Modify C324 from NI to I.(SI:910564,910565)

PAGE 17:amelot PCA Mordred/Gwen Schematic review bt Intel schematic review feedback .Add R932 .(SI:893898)

PAGE 31: Change front IO P23 pin2 from AGND to GND, Modify R453 to NI and R452 to I.(SI:913268)

2013/01/08

PAGE 16: A item of power on sequence signal integrity test is fail.Modify C129 from 2.2uf to luf.(SI:908764,908768)

PAGE 40: Modify HP Gwen/Mordred Cpu Power circuit to meet the test of Intel CPU power transient. For Gwen: Modify R32 from 4.7M ohm to 5.6M ohm.Modify R91 from 137K ohm to 110K ohm.Modify R92 from 3.83K ohm to 3.57K ohm.Modify C6 from 0.22uF to 0.47uF. Modify C17 from 100pF to 68pF.Modify C26 from 0.01uF to 820pF(SI:905259) Add Mordred colay parts: PR32, PR91, PR92, PR29, PR110, PC6, PC11, PC17, PC26(SI:905260)

2013/01/14

PAGE 28: Use WAKE # signal can support OBFF function. Modify R919 from I to N;Add Q151, Q152, Q153, R933, R934, R935, R936, R937, R951.(SI:912719)

PAGE 28: Modify Lan disable circuit to ensure same circuit with HP other projects. Delete R900, R920, Q135 (SI:912753)

PAGE 32:+5 V\_USB inrush current will cause the voltage drop.Delete Q92; Add Q154, Q155,R938, R939, R940, C969, C970.(SI:911783,911786)

PAGE 43: +3.3V\_AUX inrush current will cause the voltage drop of +5V\_AUX.Modify R519 from 4.7k ohm to 20k ohm. Add C968 and modify EC47 to NI.(SI:911788,911790)

PAGE 22: Modify DP connector circuit. Modify P185 to PCIE X1 slot. Delete FS2,R930,R931,R193,R174,R196,R183,R752.(SI:913444)

PAGE 16: Support SPI BIOS Quad IO Operation mode in EVT2 PCB.Modify R218, R220 to I.(SI:913300)

PAGE 24: Rise time ,fall time and pk-pk noise of D-Sub signal Integrity Items are fail.Modify L35,L36,L37,L38,L41,L51 to 33 nH.(SI:908746,908748)

2013/01/15

PAGE 36: 3 ports USB2.0 signal integrity test is fail.Modify D42,D30,L14,L15,L26 to I and modify RN55,RN56,RN60 to NI.(SI:910566,910567)

PAGE 30: Reserve this circuit to avoid ALC221 POP noise form CODE. Delete R480,R198,R860,Q128,Q146. Add Q160,Q161,R953,R954,R955,R956C982,D80. Modify R953 from 1Kohm to 4.7Kohm. (SI:912682,912689)

PAGE 45: Add several stitching capacitors (layer change) in EVT2 PCB by MSI EMI engineers suggestion. Add C983, C984 and C985. (SI:913414)

PAGE 43: Modify -12V circuit by MSI power engineer suggestion. Add C986. Modify EC1 to 270uF and R483 to 16.5k ohm. (SI:913414)

2013/01/28

PAGE 28: Modify +3.3V\_LAN circuit to follow power design rule. Modify R502 from 1K ohm to 30 ohm. (SI:916576)

Gwen/Mordred X3

2013/03/19

PAGE 40: Modify HP Gwen/Mordred Cpu Power circuit to meet the test of Intel CPU power transient. Modify R3 from I to NI.

For Gwen: Modify R91 from 110K ohm to 115K ohm.Modify C17 from 68 pF to 39 pF. (SI:905259) For Mordred: Modify PR91 from 113K ohm to 124K ohm. (SI:905260)

PAGE 38: Reserve TPM circuit. Add U40,R959,R981,R957,R958,C850,C987,C988,C989,C990. (SI:929486)

PAGE 45: Reserve Dummy load circuit. Add Q162,Q164,Q165,R960,R961,R962,R963,R964,R965,966,R967,R968,R969,R970,R971, R972,R973,R974,R975. (SI:908728)

PAGE 44: Modify +5V\_AUX circuit to follow power design rule. Add R984. (SI:916576)

PAGE 30: Reserve audio codec ALC221-VA and ALC221-VB colay circuit. Add R976,R977,R978,R979,C991,C992. (SI:930271)

PAGE 28: Remove OBFF circuit. Modify R919 from IN to I and delete Q151,Q152,R933,R934,R935,R951. (SI:912719)

PAGE 32: Use SLP\_S4# to control USB switch IC. Add R982 and R983. (SI:908728)

PAGE 43: Modify LDO Power circuit VCC1\_5, +3.3V\_AUX and +3.3V\_LPS to meet the phase margin and gain margin test. Modify C330 and C337 from NI to I. Modify C334 from 0.1uF to 0.033 uF for VCC1\_5. Modify EC47 from EL cap 1000uF to solid cap 100uF for +3.3V\_AUX. Modify R648 from 32.4K ohm to 324K ohm. Modify R638 from 10K ohm to 100K ohm for +3.3V\_LPS. (SI:930329)

PAGE 45: Add several capacitors at +5V\_USB by MSI EMI engineers suggestion. Add C993 and C994 (SI:930302)


PAGE 21/30: Modify Amplifier Enable circuit to avoid ALC221 POP noise form CODE. Add D81. Modify R953 from 4.7K ohm to 20K ohm. (SI:912682,912689)

PAGE 14: UUT shutdown after 8 error beep sounds if BBR jumper installed. Add C995. Modify R226 from 1K ohm to 390 ohm. (SI: 924414,924417)

PAGE 14: Modify Board Rev to 01. Modify R656 from NI to I and modify R653 from I to NI. (SI: 933025)

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Gwen/Mordred X3

2013/03/26

PAGE 46: Follow PCA spec and rename screw hole.  
Rename MH1,MH2,MH3,MH4,MH5,MH6,MH7,MH8 to MTG1,MTG2,MTG3,MTG4,MTG5,MTG6,MTG7,MTG8. (SI: 932283)

PAGE 39/41/42: Follow PCA spec and modify cap size at PWM regulator high-side MOSFET drain .  
Modify C31,C60,C86,C163,C196 size from 0805 to 1206. (SI: 932283)

2013/03/27

PAGE 22: Modify DP slot circuit.  
Connect +5V to Pin A5 of P185. (SI: 932980)

PAGE 16/28: Modify crystal CL value according to crystal vendor test result.  
Modify C942 from 27pF to 22pF. Modify C514 and C515 from 18pF to 15pF. (SI: 932989)

2013/04/09

PAGE 21: Remove the unused thermal sensor by thermal engineer suggestion.  
Modify RT5,R610,C446 from I to NI. (SI: 935536)

PAGE 4: Modify thermtrip circuit according to Intel design guide.  
Modify R213 from I to NI.(SI: 924414,924417)

Gwen/Mordred X4

2013/05/21

PAGE 30: Internal speaker has pop noise when UUT remove power cord.  
Modify R200 to NI, Modify R733 from 20K ohm to 1K ohm,  
Modify R734 from 20K ohm to 10K ohm and connect to +3.3V\_AUX.  
Add C996 and connect pin X of D80 to GND(SI: 943581)

PAGE 33/36: Follow PCA spec X81 pin definition to add USB2.0 port7 on P152.  
Add RN64, L52 and U67. (SI: 935708)

PAGE 37: Motherboard have no PSWD jumper that makes BIOS password always be reset.  
Modify JP49 from MP to I. (SI: 941138)

PAGE 43: Modify -12V circuit by msi power team engineer suggestion.  
Modify C49 from 2200 pF to 1500 pF. (SI: 947863 )

PAGE 1: Remove "ODM confidential" from schematic. (SI: 948604 )

2013/05/27

PAGE 39: Modify DDR power circuit by msi power team engineer suggestion.  
Modify R274 from 7.68K ohm to 9.53K ohm, modify R247 from 2.74K ohm to 3.74K ohm. (SI: 948994 )

PAGE 40/42: Modify HP Gwen/Mordred CPU Power circuit to 3 phase support 84W.  
Modify C42 and R89 from NI to I, modify R110 from 82K ohm to 100k ohm, modify R92 from 3.57K ohm to 3.6K ohm,  
modify C26 from 820pf to 680pf, modify R91 from 115K ohm to 118K ohm, modify R21 from 487 ohm to 620 ohm,  
modify R32 from 5.6M ohm to 6.2M ohm, Modify C6 from 0.47uF to 0.1uF, modify C11 from 0.33uF to 0.47uF,  
modify C29,R94,R81,R59,R67,R69,R66,PR32,PR29,PR91,PR92,PR110,PC6,PC11,PC17,PC26,R188,C96,R194,C95,R187,C98,  
U12,R244,R197,R266,Q11,Q21,Q12,R195,C109,CHOKE4,C680 to NI. (SI: 947654 )

2013/05/29

PAGE 31: UUT has noise when play media file and plug in/pull out the MIC from front panel.  
Reserve C997 and C998. (SI: 946837)

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