MS-7392

Version: 1.2

CPU:

Intel Core2 Duo, Wolfdale, Kentsfield and Yorkfield processors in LGA775 Package.

System Chipset:

Intel - MCH (North Bridge) P31/G31
Intel ICH7 (South Bridge)

On Board Chipset:

BIOS -- SPI EEPROM
HD Codec -- ALC888
LPC Super I/O -- F81182
LAN-- REALTEK RTL8111C
CLOCK -- ICS9LPRS906CGLF

Main Memory:

DDR II * 4 (Max 4GB)

Expansion Slots:

PCI2.3 SLOT * 3
PCI EXPRESS X1 SLOT
PCI EXPRESS X16 SLOT

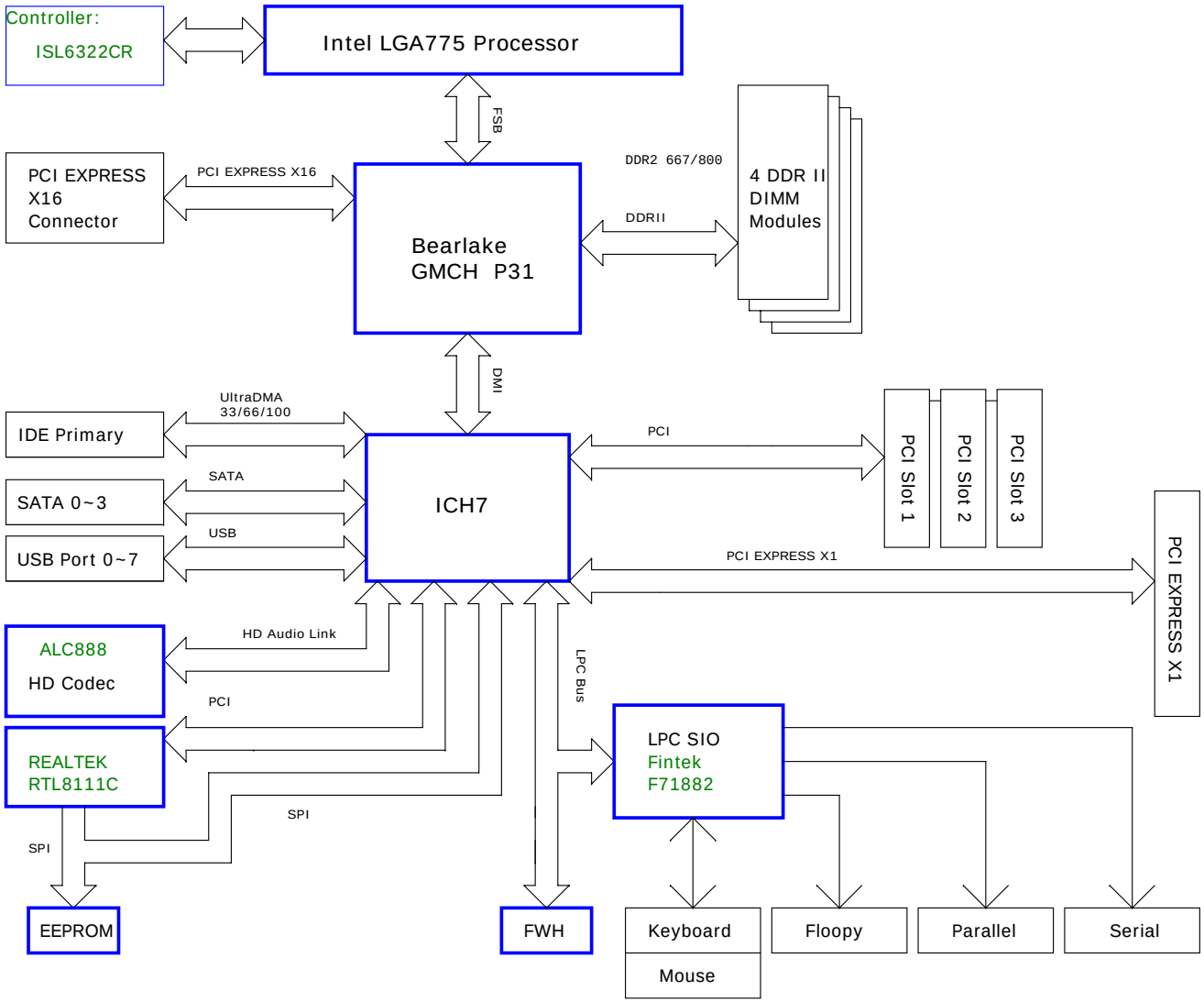
INTELSIL PWM:

Controller: INTELSIL - ISL6322CR

MICRO-STAR INt'L CO., LTD.

Title: COVER SHEET		
Size	Document Number: MS-7392	Rev: 1.2
Date: Tuesday, May 06, 2008	Sheet 1 of 35	

Block Diagram



MSI	MICRO-STAR INt'L CO., LTD.	
Title	BLOCK DIAGRAM	
Size	Document Number: MS-7392	Rev: 1.2
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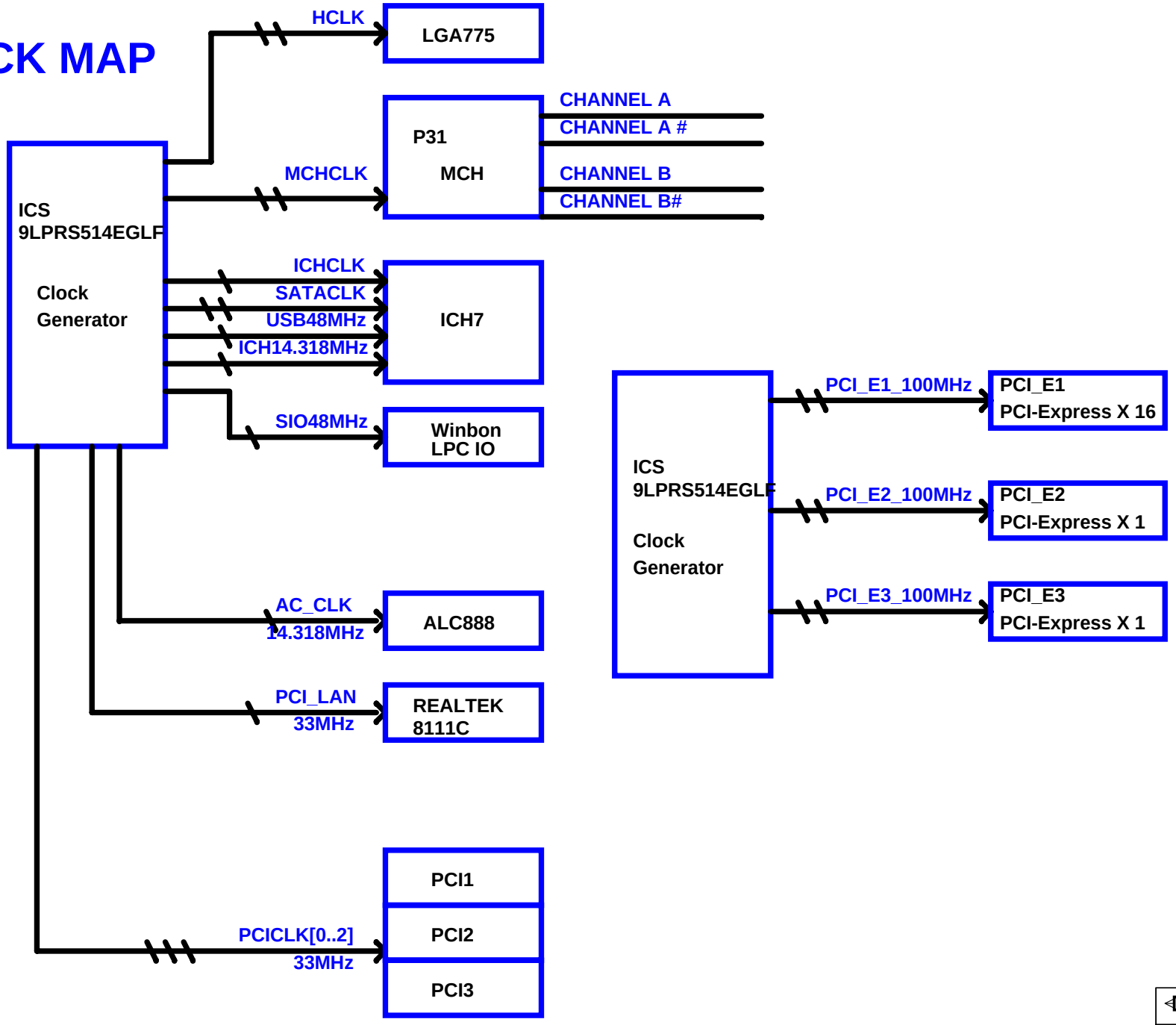
CLOCK MAP



MSI	MICRO-STAR INt'L CO., LTD.	
Title	CLOCK MAP	
Size	Document Number: MS-7392	Rev: 1.2
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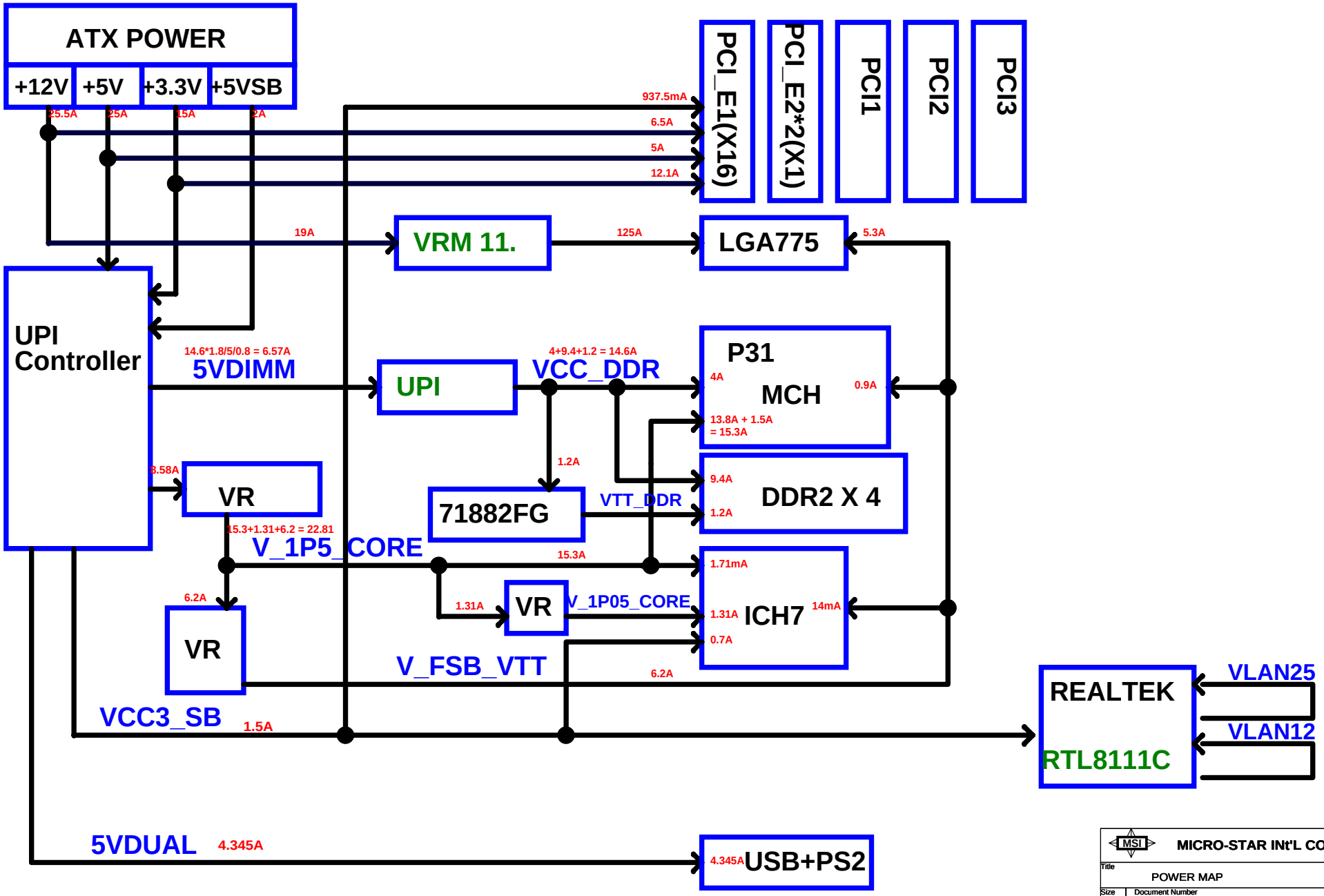
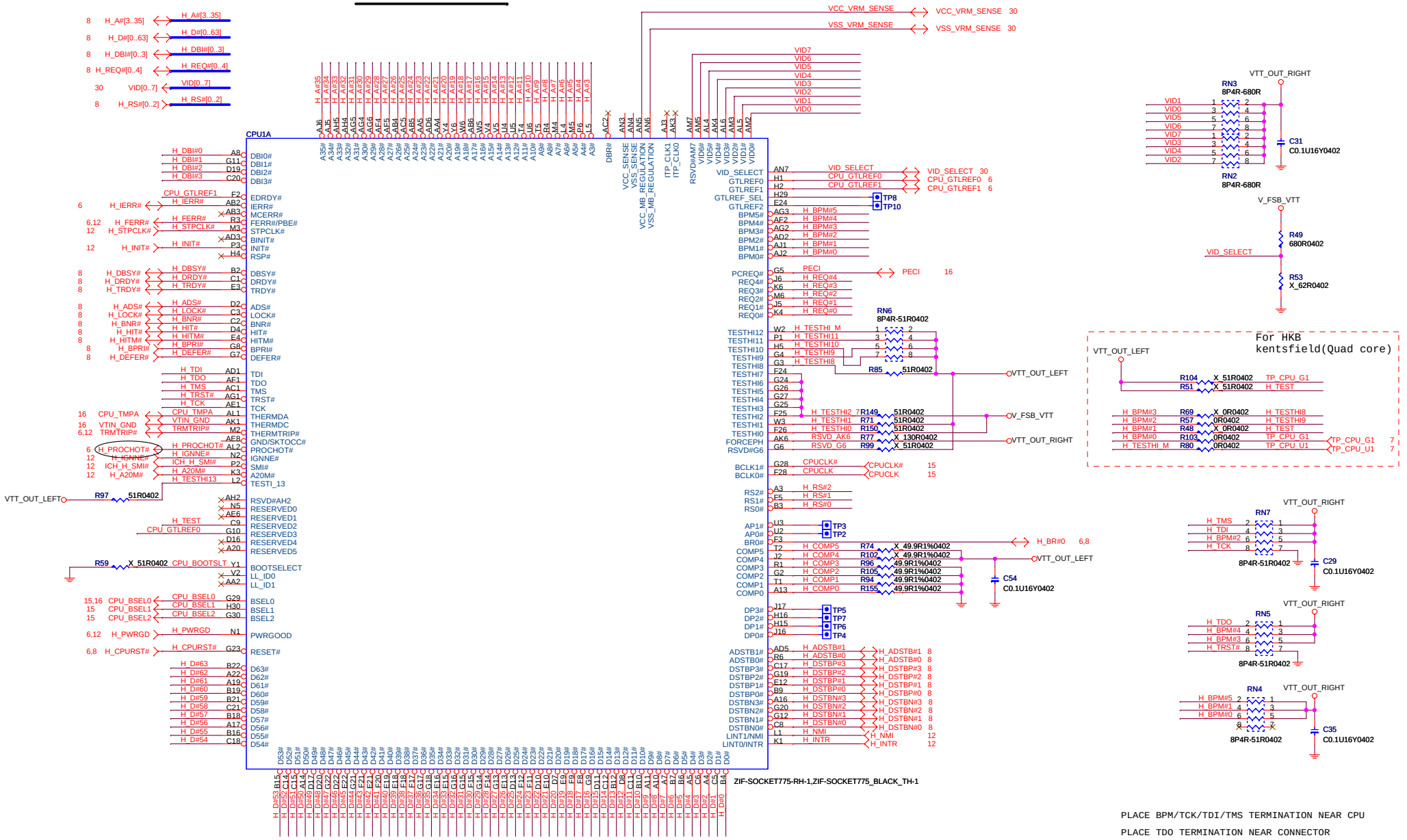
POWER MAP



MICRO-STAR INt'L CO., LTD.		
Title: POWER MAP		
Size	Document Number: MS-7392	Rev: 1.2
Date: Tuesday, May 06, 2008	Sheet 4 of 35	

CPU SIGNAL BLOCK



MSI	MICRO-STAR INt'L CO., LTD.
Title	Intel LGA775 CPU - Signals
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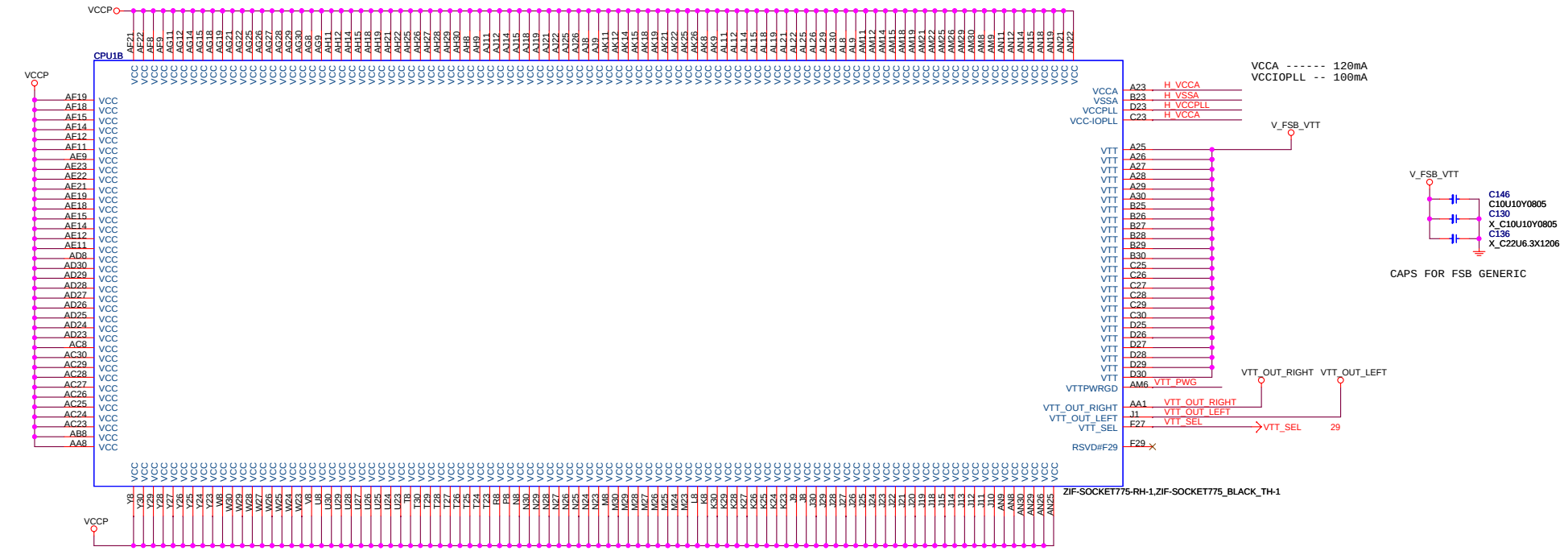
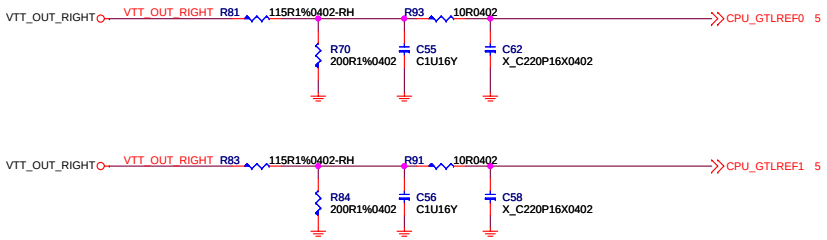
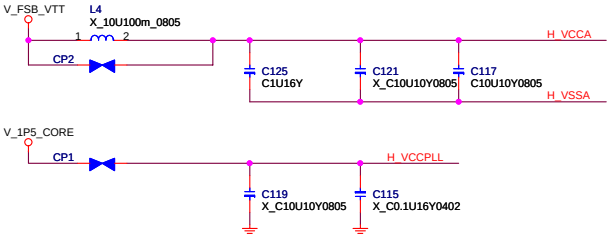


GTLREF VOLTAGE SHOULD BE0.635*VTT

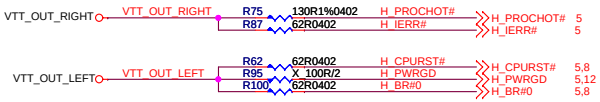
57.6ohm and 100ohm divider



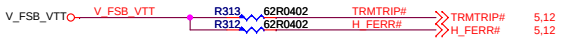
PLACE COMPONENTS AS CLOSE AS POSSIBLE TO PROCESSOR SOCKET
TRACE WIDTH TO CAPS MUST BE NO SMALLER THAN 12MILS

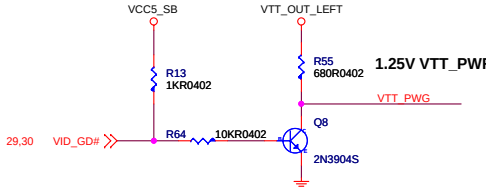


PLACE AT CPU END OF ROUTE



PLACE AT ICH END OF ROUTE





VTT_PWG SPEC :
High > 0.9V
Low < 0.3V
Trise < 150ns

MICRO-STAR INt'L CO., LTD.

Title	Intel LGA775 CPU - Power	
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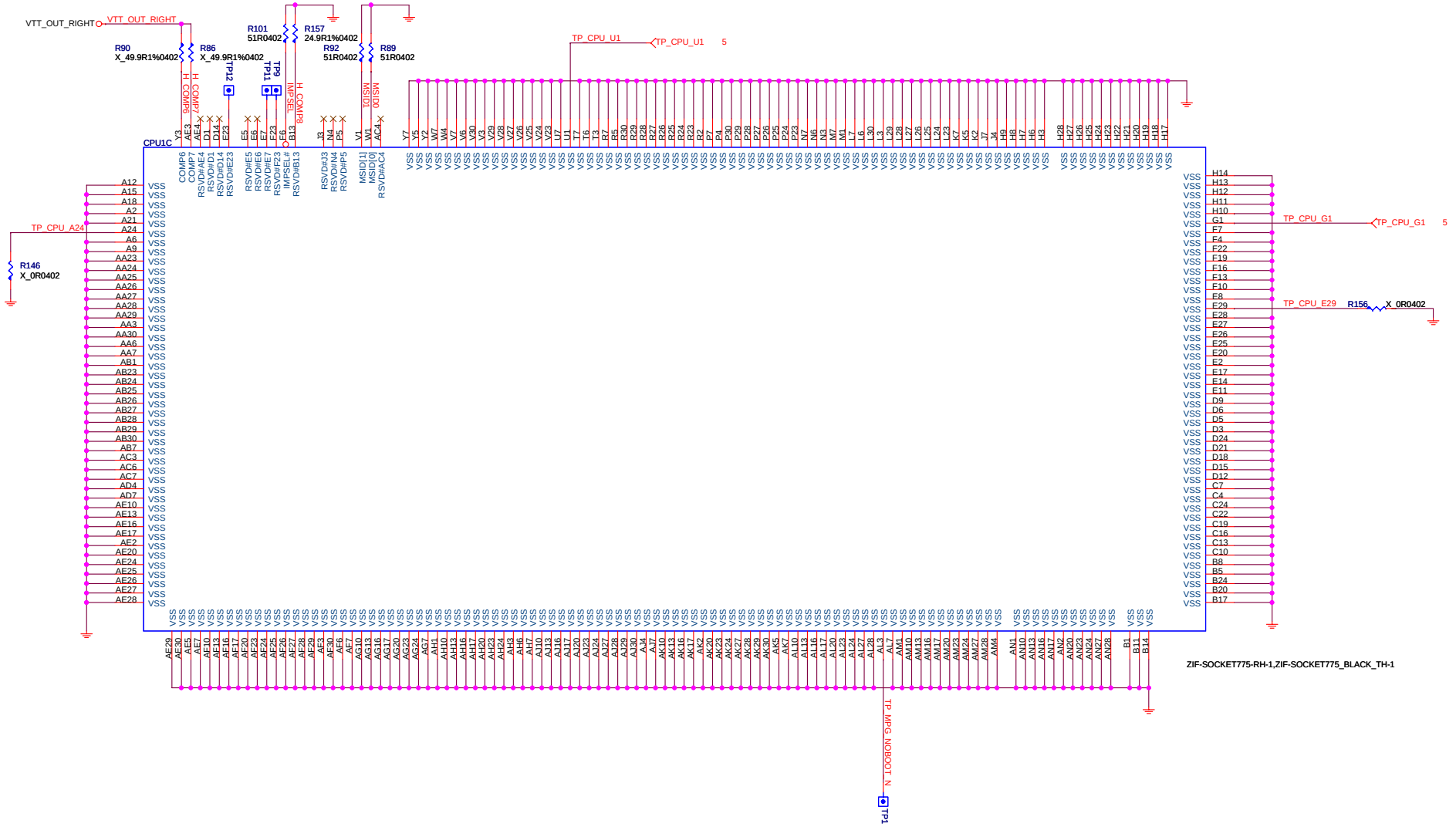
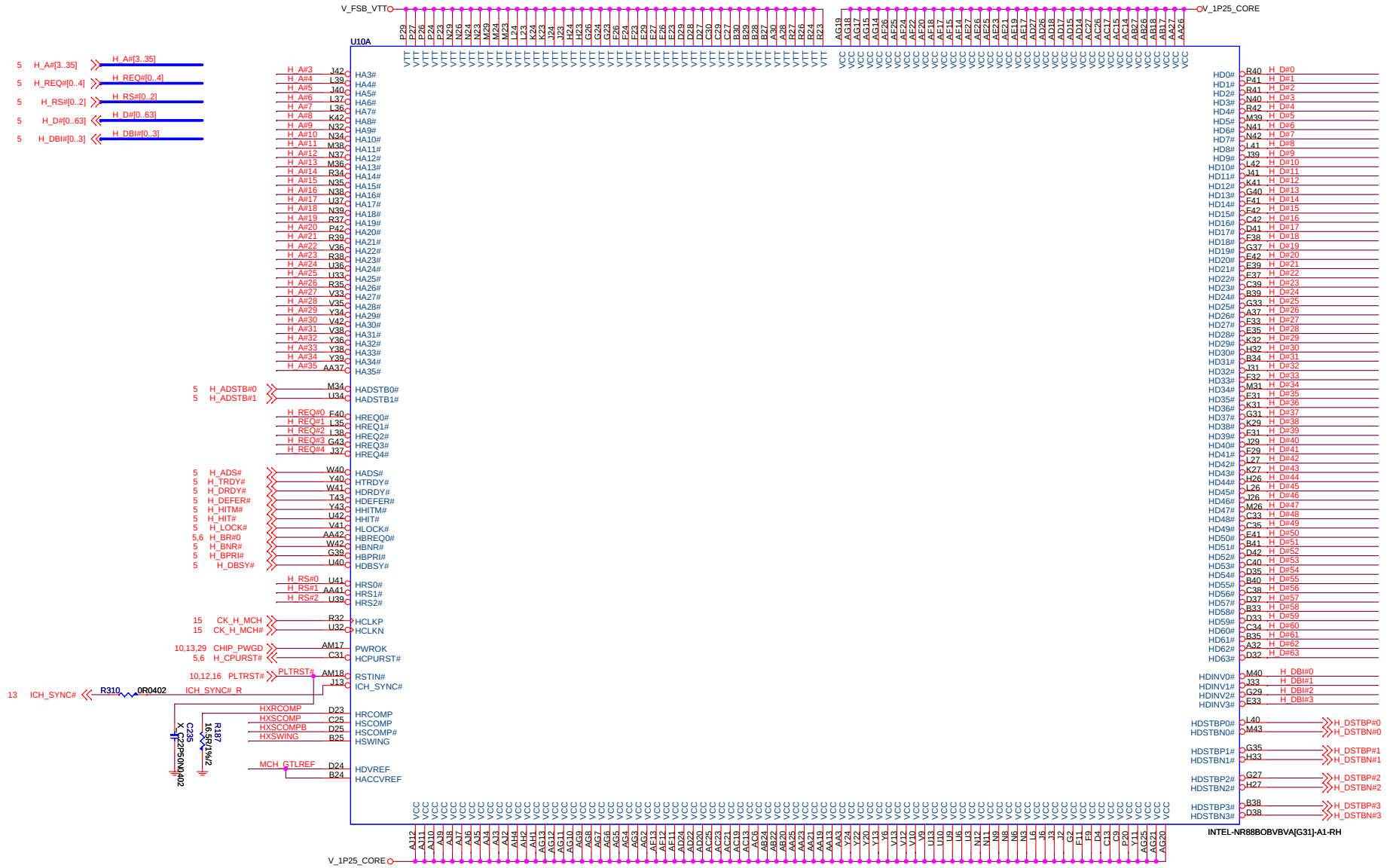
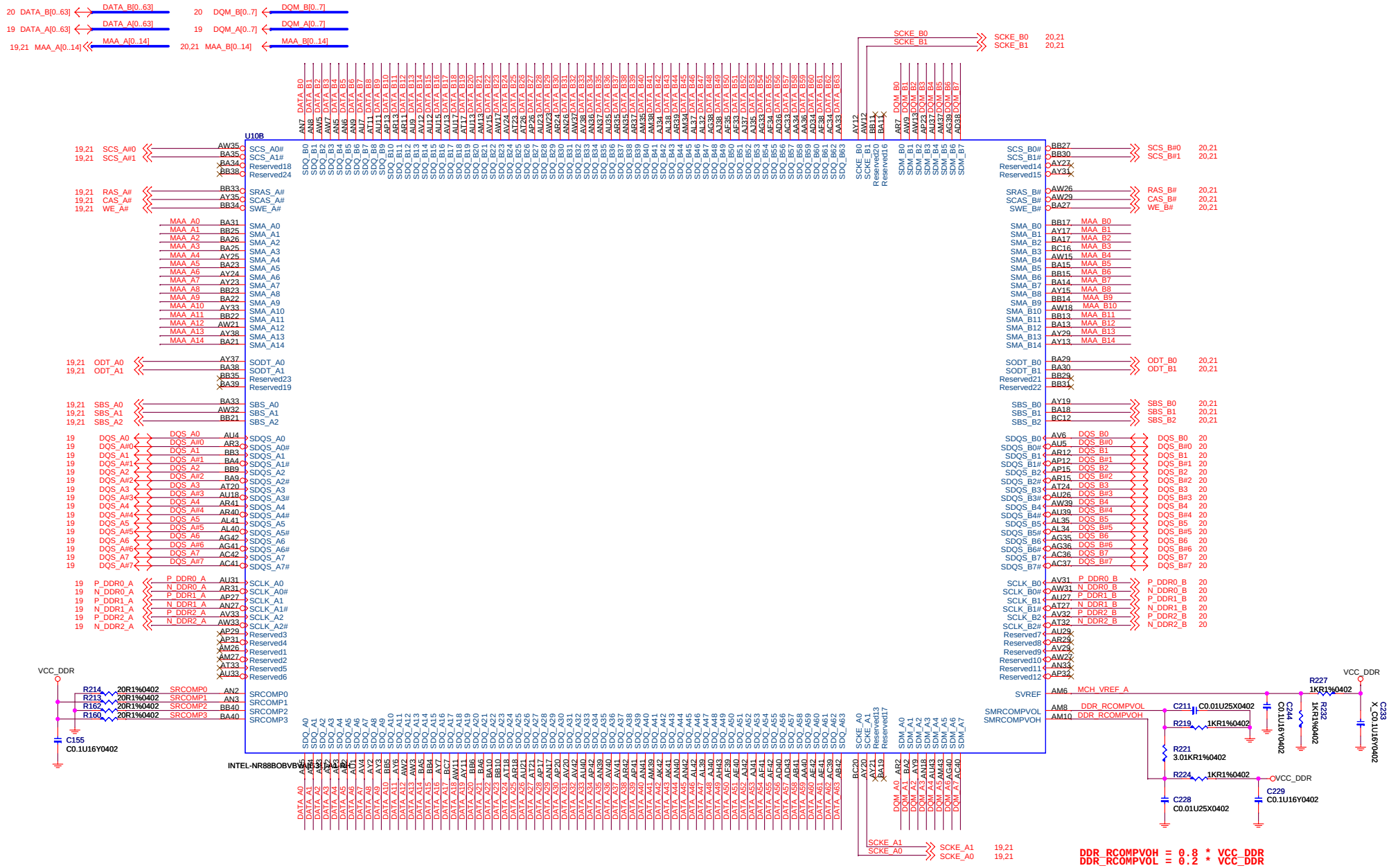
	2005 Performance FMB platform 1	2005 Mainstream/Value FMB platform 2	2006 65W FMB platform 3
MSID1	0	0	0
MSID0	0	NC	NC



MICRO-STAR INt'L CO., LTD.

Title	Intel LGA775 CPU - GND	
Size	Document Number: MS-7392	Rev: 1.2
Date: Tuesday, May 06, 2008	Sheet 7 of 35	


V_FSB_VTT
V_1P25_CORE
U10A
INTEL-NR88BOBVBVA[G31]-A1-RH
HXSWING S/B 1/4*VTT +/- 2%
GTLREF VOLTAGE SHOULD BE 0.67*VTT=0.804V
MICRO-STAR INt'L CO., LTD.
Intel Bearlake G31 - CPU Signals
MS-7392
Rev 1.2
Monday, May 12, 2008
Sheet 8 of 35


DDR_RCOMPVOH = 0.8 * VCC_DDR
DDR_RCOMPVOL = 0.2 * VCC_DDR
PLACE 0.1UF CAP CLOSE TO MCH
MICRO-STAR INt'L CO., LTD.
Intel Bearlake G31 - CPU Signals
MS-7392
1.2
Monday, May 12, 2008
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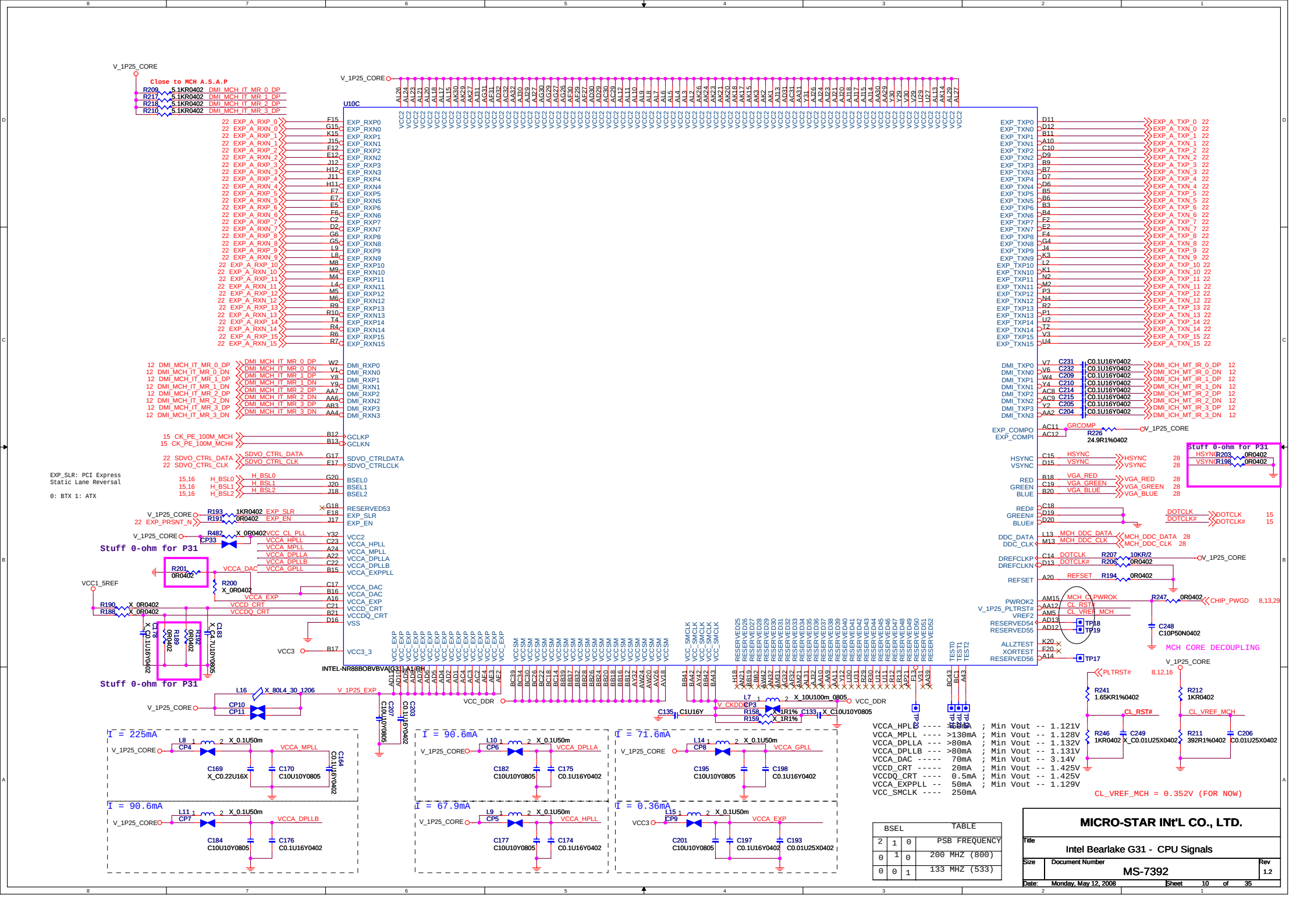
V_1P25_CORE
Close to MCH A.S.A.P
R209 5.1KR0402 DMI_MCH_IT_MR_0_DP
R217 5.1KR0402 DMI_MCH_IT_MR_1_DP
R218 5.1KR0402 DMI_MCH_IT_MR_2_DP
R210 5.1KR0402 DMI_MCH_IT_MR_3_DP
U10C
INTEL-NR88BOBVBVA(G31/A1)PB
EXP_SLR: PCI Express Static Lane Reversal
0: BTX 1: ATX
Stuff 0-ohm for P31
R201 0R0402
R200 X_0R0402
R482 X_0R0402
CP33
R190 X_0R0402
R188 X_0R0402
L16 X_80L4_30_1206
CP10
CP11
C178 X_C10U16Y0402
R189 0R0402
R192 0R0402
C183 X_C4.7U16Y0805
C207 C10U16Y0805
C208 C1U16Y0402
C209 C0.1U16Y0402
C135 C1U16Y
L7 X_10U100m_0805
CP3
R158 X_1R1%
R159 X_1R1%
C133 X_C10U10Y0805
VCC_DDR
I = 225mA
L8 X_0.1U50m
CP4
VCCA_MPLL
C169 X_C0.22U16X
C170 C10U10Y0805
C164 C0.1U16Y0402
I = 90.6mA
L11 X_0.1U50m
CP7
VCCA_DPLLB
C184 C10U10Y0805
C176 C0.1U16Y0402
I = 90.6mA
L10 X_0.1U50m
CP6
VCCA_DPLLA
C182 C10U10Y0805
C175 C0.1U16Y0402
I = 67.9mA
L9 X_0.1U50m
CP5
VCCA_HPLL
C177 C10U10Y0805
C174 C0.1U16Y0402
I = 71.6mA
L14 X_0.1U50m
CP8
VCCA_GPLL
C195 C10U10Y0805
C198 C0.1U16Y0402
I = 0.36mA
L15 X_0.1U50m
CP9
VCCA_EXP
C201 C10U10Y0805
C197 C0.1U16Y0402
C193 C0.01U25X0402
VCCA_HPLL ---- 121mA ; Min Vout -- 1.121V
VCCA_MPLL ---- >130mA ; Min Vout -- 1.128V
VCCA_DPLLA --- >80mA ; Min Vout -- 1.132V
VCCA_DPLLB --- >80mA ; Min Vout -- 1.131V
VCCA_DAC ----- 70mA ; Min Vout -- 3.14V
VCCD_CRT ----- 20mA ; Min Vout -- 1.425V
VCCDQ_CRT ---- 0.5mA ; Min Vout -- 1.425V
VCCA_EXPPLL -- 50mA ; Min Vout -- 1.129V
VCC_SMCLK ---- 250mA
BSEL TABLE
2 1 0 PSB FREQUENCY
0 1 0 200 MHZ (800)
0 0 1 133 MHZ (533)
Stuff 0-ohm for P31
R203 0R0402
R198 0R0402
GRCOMP
R226 24.9R1%0402
R207 10KR/2
R206 0R0402
R194 0R0402
R247 0R0402
CHIP_PWGD
C248 C10P50N0402
MCH CORE DECOUPLING
R241 1.65KR1%0402
R246 1KR0402
C249 X_C0.01U25X0402
R212 1KR0402
R211 392R1%0402
C206 C0.01U25X0402
CL_RST#
CL_VREF_MCH
CL_VREF_MCH = 0.352V (FOR NOW)
MICRO-STAR INt'L CO., LTD.
Title: Intel Bearlake G31 - CPU Signals
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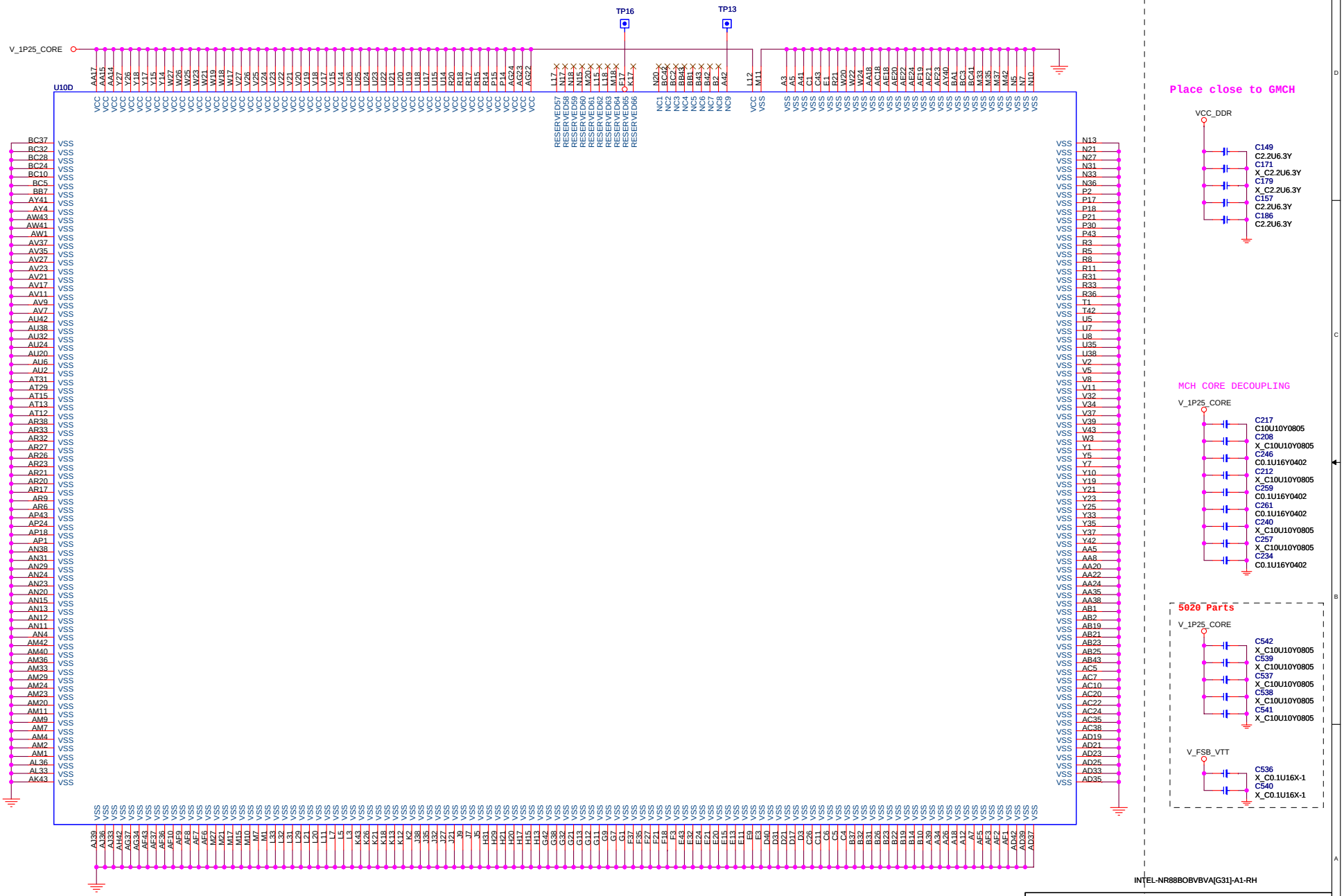

INTEL-NR88BOBVBVA[G31]-A1-RH

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Title	Intel Bearlake G31 - CPU Signals	
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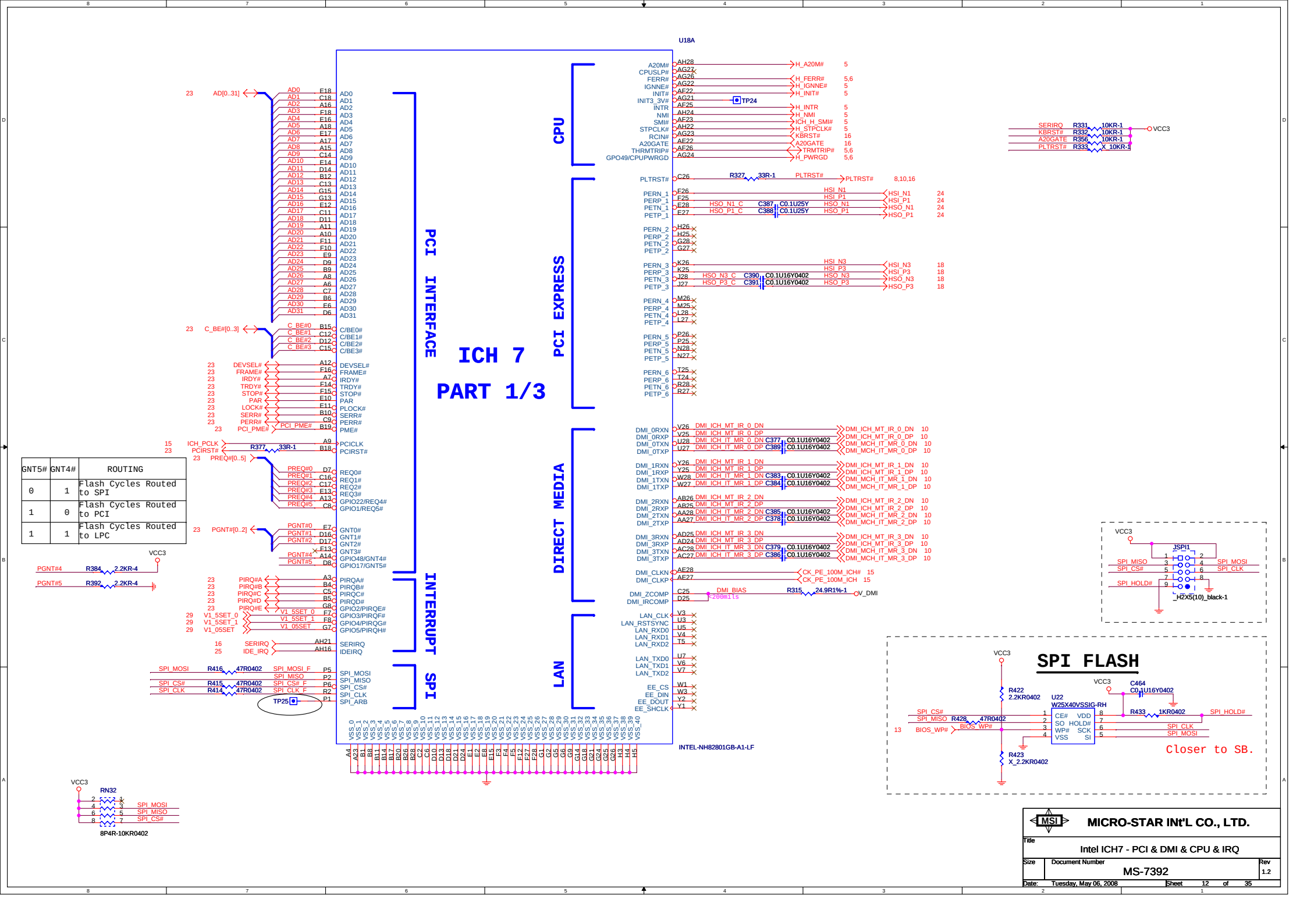
Date: Monday, May 12, 2008	Sheet 11 of 35	


U18A
ICH 7
PART 1/3
PCI INTERFACE
CPU
PCI EXPRESS
DIRECT MEDIA
INTERRUPT
SPI
LAN
INTEL-NH82801GB-A1-LF
GNT5# GNT4# ROUTING
0 1 Flash Cycles Routed to SPI
1 0 Flash Cycles Routed to PCI
1 1 Flash Cycles Routed to LPC
SPI FLASH
W25X40VSSIG-RH
Closer to SB.
MICRO-STAR INt'L CO., LTD.
Intel ICH7 - PCI & DMI & CPU & IRQ
MS-7392
Tuesday, May 06, 2008

ICH 7
PART 2/3

LPC
AC-LINK
USB
SM BUS
POWER MGNT
MISC
P-ATA
S-ATA
GPIO
RTC

U18B
INTEL-NH82801GB-A1-LF

Following are the GPIOs that need to be terminated properly if not used:
GPIO[39:36,23:21,19,7:0]: default as inputs and should be pulled up to Vcc3_3 if unused.
GPIO[31:29,15:8]: default as inputs and should be pulled up to VccSus3_3 if unused.

Resistor length less than 500mil

* Put a GND Plane under X'TAL
* Please put this block close ICH7

RTC BLOCK

CLR_CMOS	
1 - 2	Normal *
2 - 3	Clear CMOS

Title	Intel ICH7 - LPC & ATA & USB & GPIO
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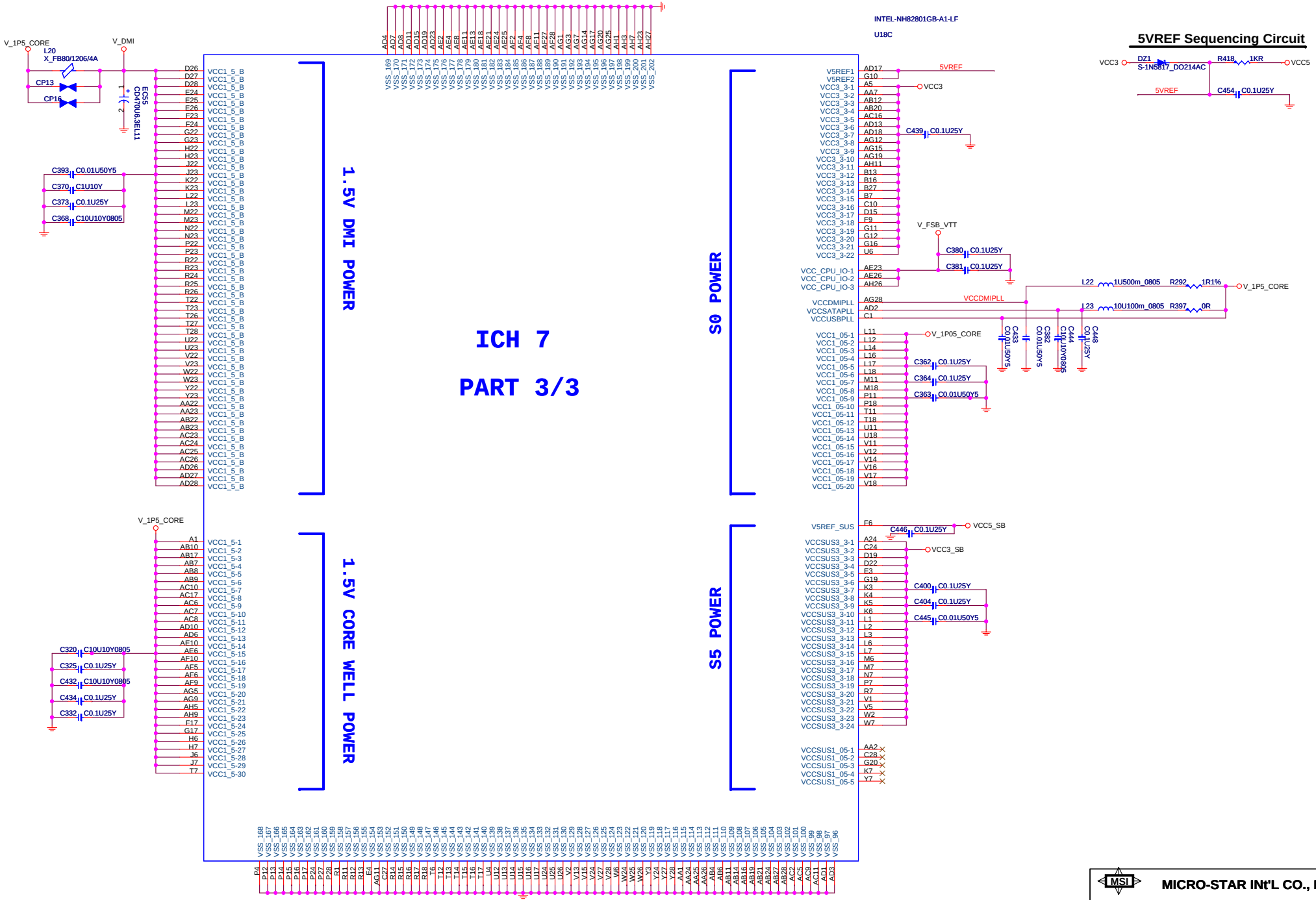
MICRO-STAR INt'L CO., LTD.



MSI	MICRO-STAR INt'L CO., LTD.
Title	Intel ICH7 - POWER
Size	Document Number: MS-7392
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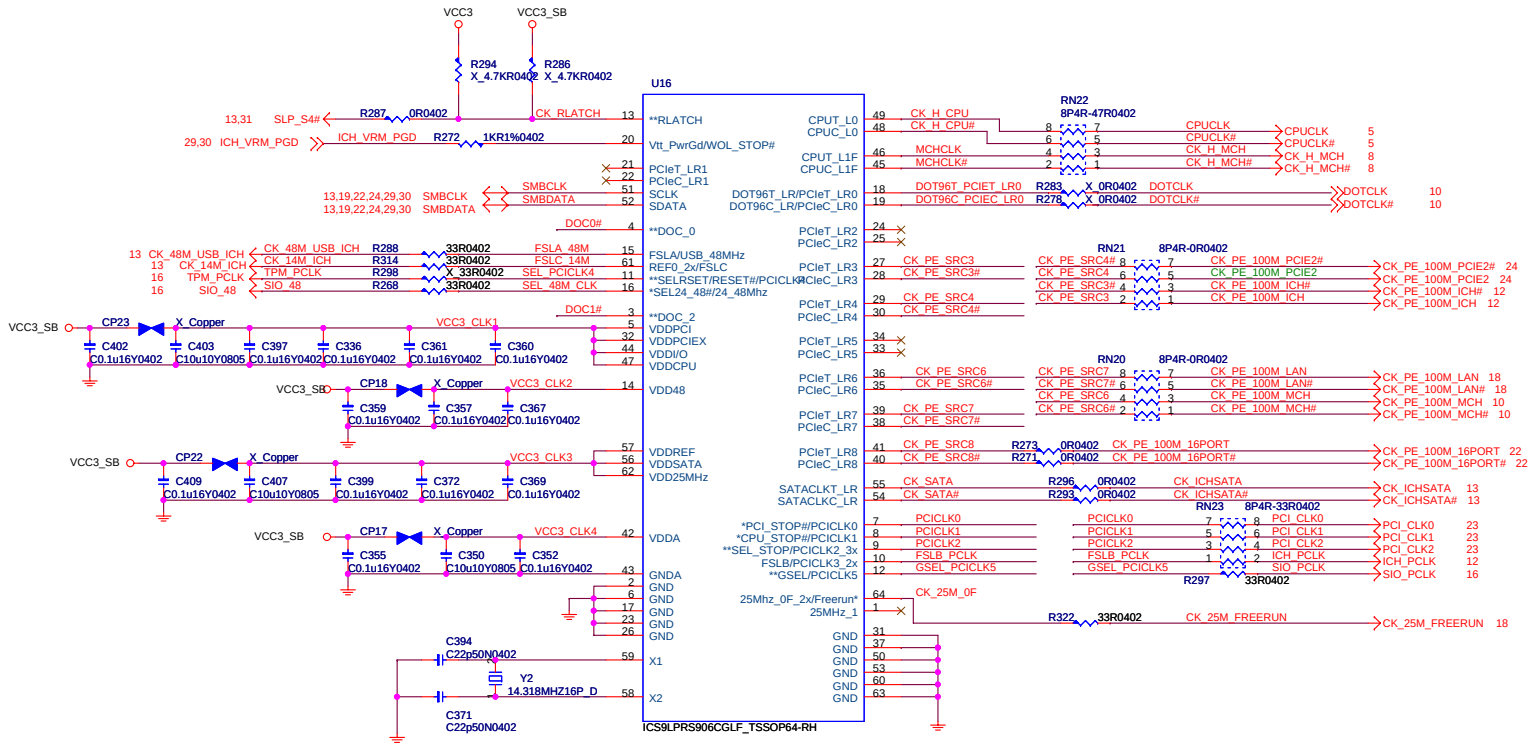
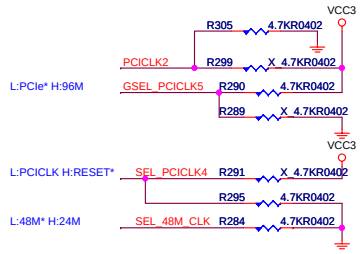
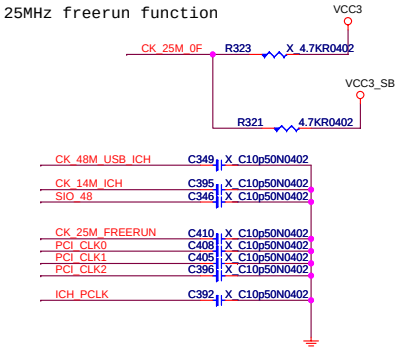
Clock Generator - ICS9LPRS906CGLF

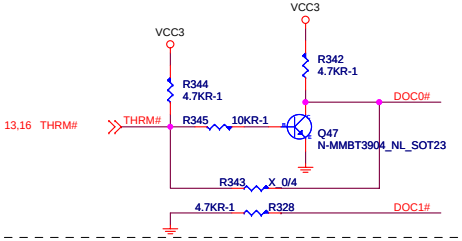


CLOCK GEN STRAPING



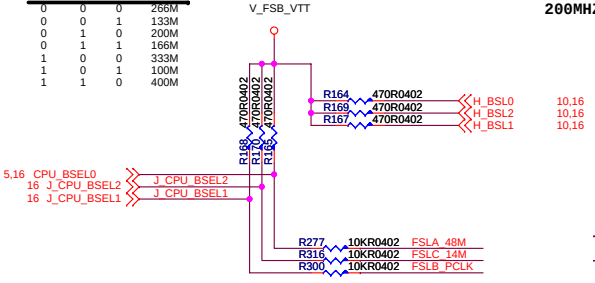
25MHz freerun function





CPU Frequency Selection

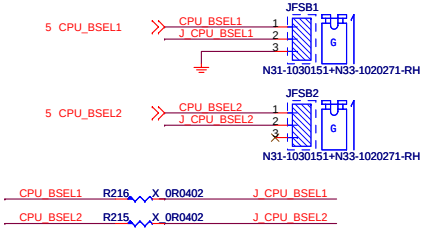
FS_C	FS_B	FS_A	CPU
0	0	0	266M
0	0	1	133M
0	1	0	200M
0	1	1	166M
1	0	0	333M
1	0	1	100M
1	1	0	400M

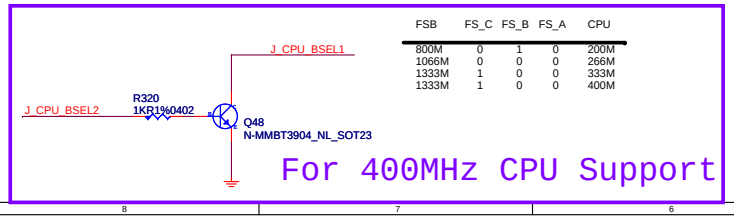


JFSB1
Plug 1--2
200MHZ-->200MHZ
Plug 2--3
200MHZ-->266MHZ

JFSB2
Plug 1--2
266MHZ-->266MHZ
Plug 2--3
266MHZ-->333MHZ

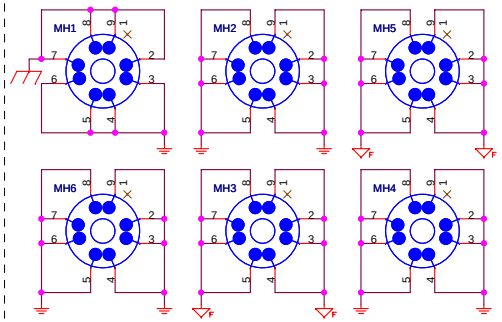
JFSB1
Open
JFSB2
Plug 1--2 or 2--3 or Open
333MHZ-->400MHZ



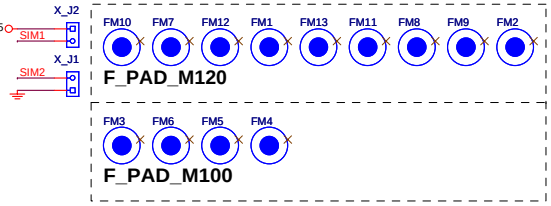


FSB	FS_C	FS_B	FS_A	CPU
800M	0	1	0	200M
1066M	0	0	0	266M
1333M	1	0	0	333M
1333M	1	0	0	400M

Mounting Holes



Optics Orientation Holes



MSI **MICRO-STAR INt'L CO., LTD.**

Title	Clock - ICS9LPRS514EGLF	
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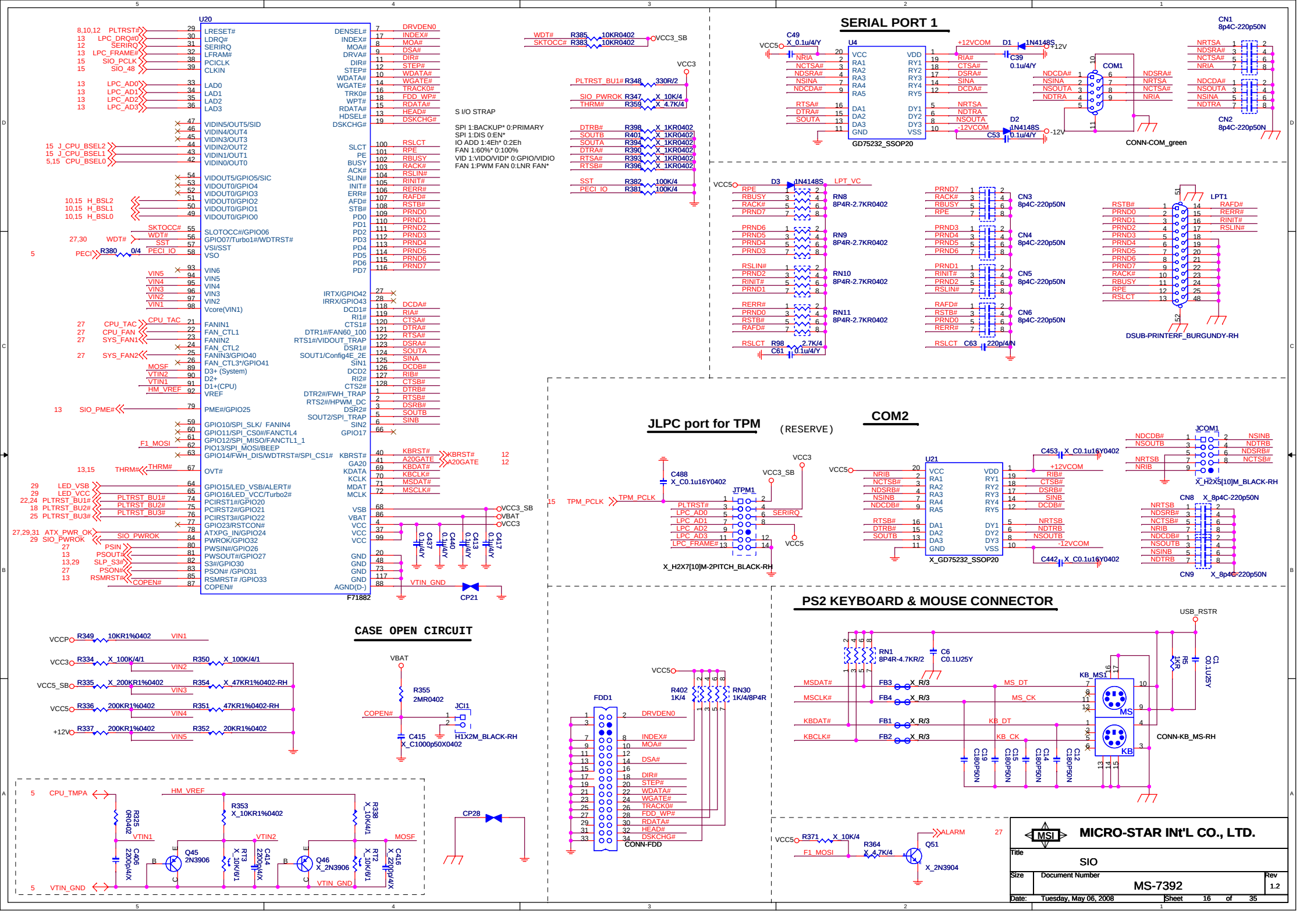
SERIAL PORT 1
JLPC port for TPM
(RESERVE)
COM2
CASE OPEN CIRCUIT
PS2 KEYBOARD & MOUSE CONNECTOR
U20
F71882
U4
GD75232_SSOP20
U21
X_GD75232_SSOP20
COM1
CONN-COM_green
CN1
CN2
CN3
CN4
CN5
CN6
LPT1
DSUB-PRINTERF_BURGUNDY-RH
JTPM1
X_H2X7[10]M-2PITCH_BLACK-RH
JCOM1
X_H2X5[10]M_BLACK-RH
CN8
CN9
FDD1
CONN-FDD
KB_MS1
CONN-KB_MS-RH
JCI1
H1X2M_BLACK-RH
CP21
CP28
S I/O STRAP
SPI 1:BACKUP* 0:PRIMARY
SPI 1:DIS 0:EN*
IO ADD 1:4Eh* 0:2Eh
FAN 1:60%* 0:100%
VID 1:VIDO/VIDI* 0:GPIO/VIDIO
FAN 1:PWM FAN 0:LNR FAN*
MICRO-STAR INt'L CO., LTD.
Title
SIO
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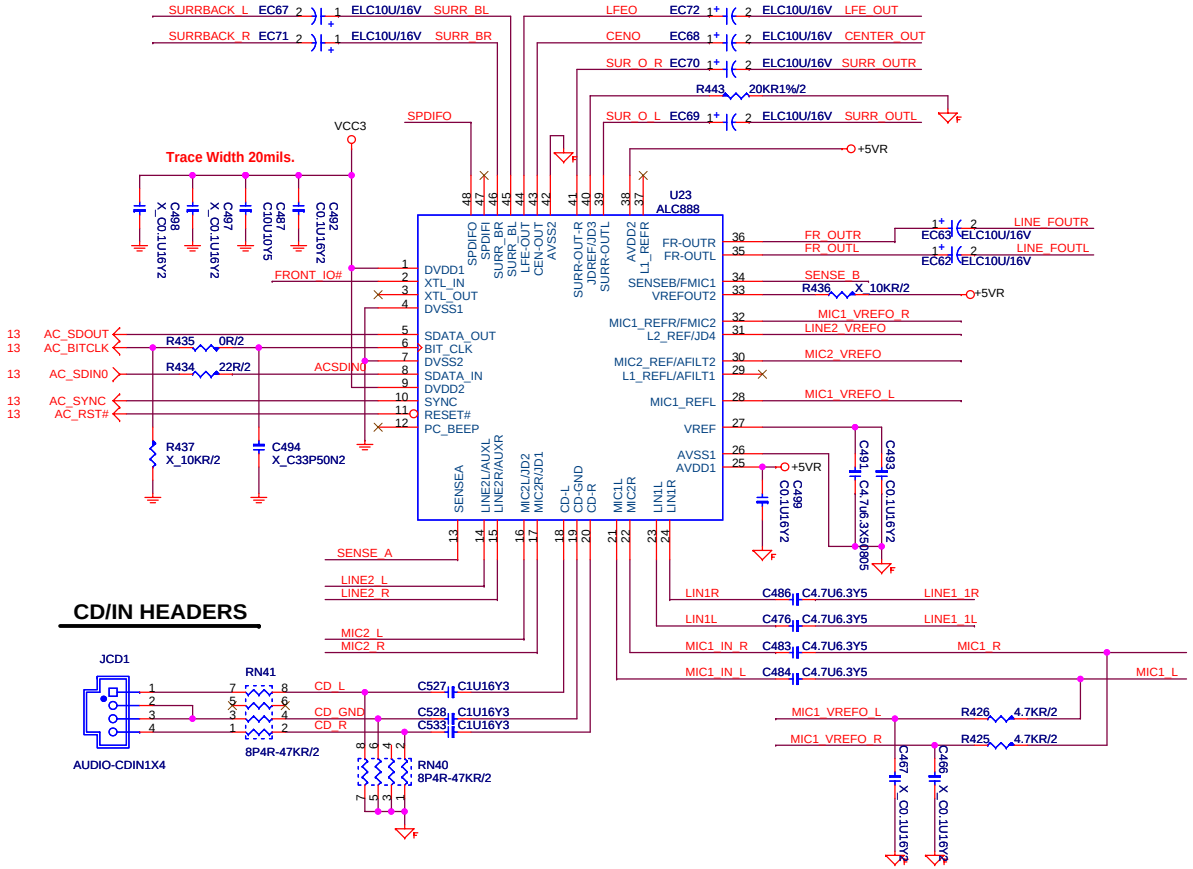
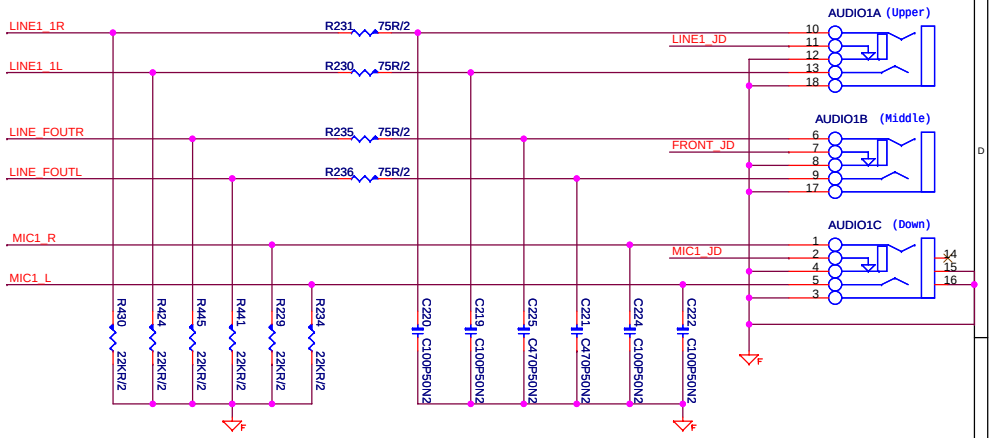
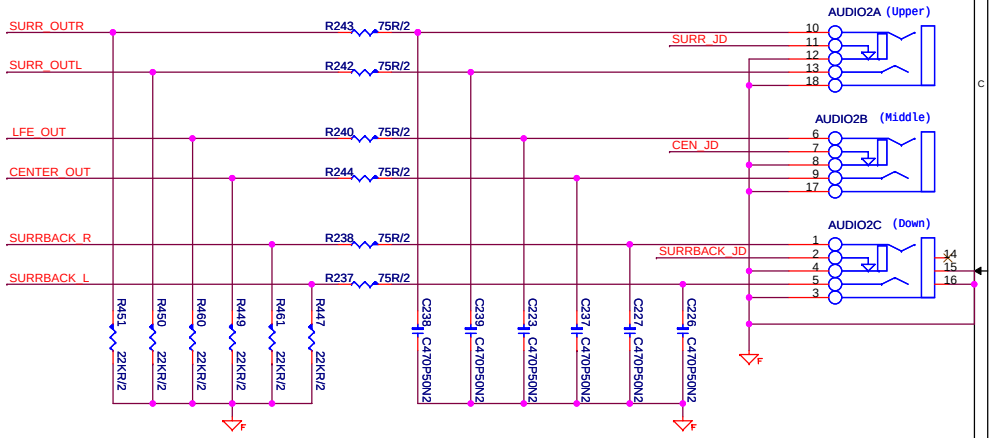
ALC888 CODEC



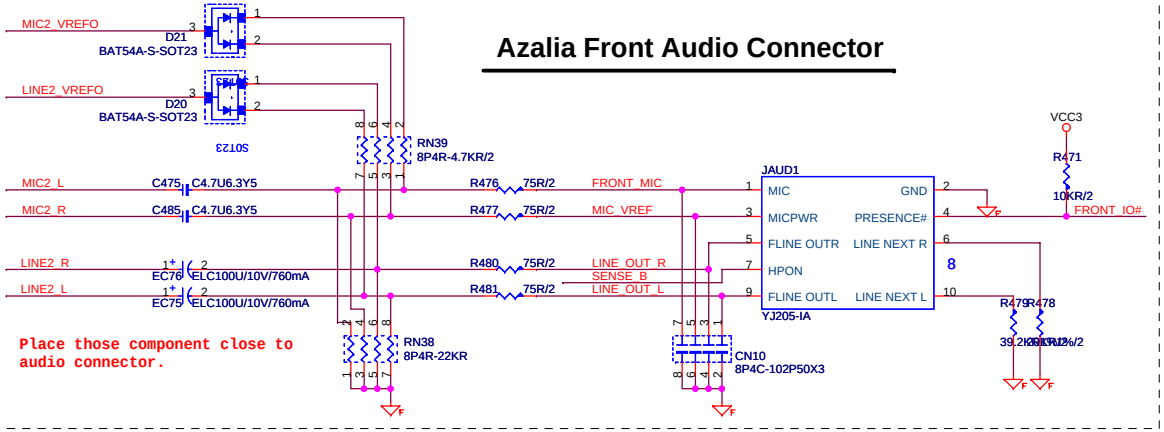
CD/IN HEADERS

ALC888 JACK

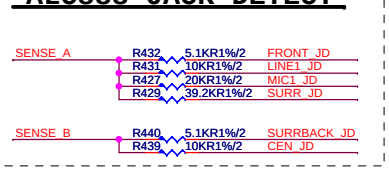




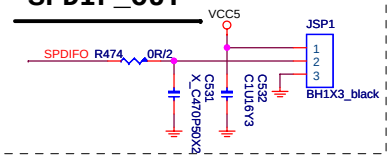
Azalia Front Audio Connector



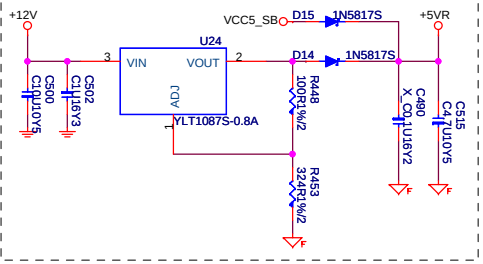
ALC888 JACK DETECT



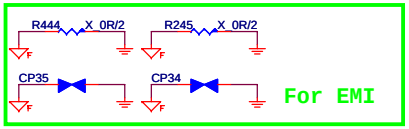
SPDIF_OUT



AUDIO CODE REGULATORS



For EMI



MSI	MICRO-STAR INt'L CO., LTD.	
Title	LPC SUPER I/O & CONNECTORS	
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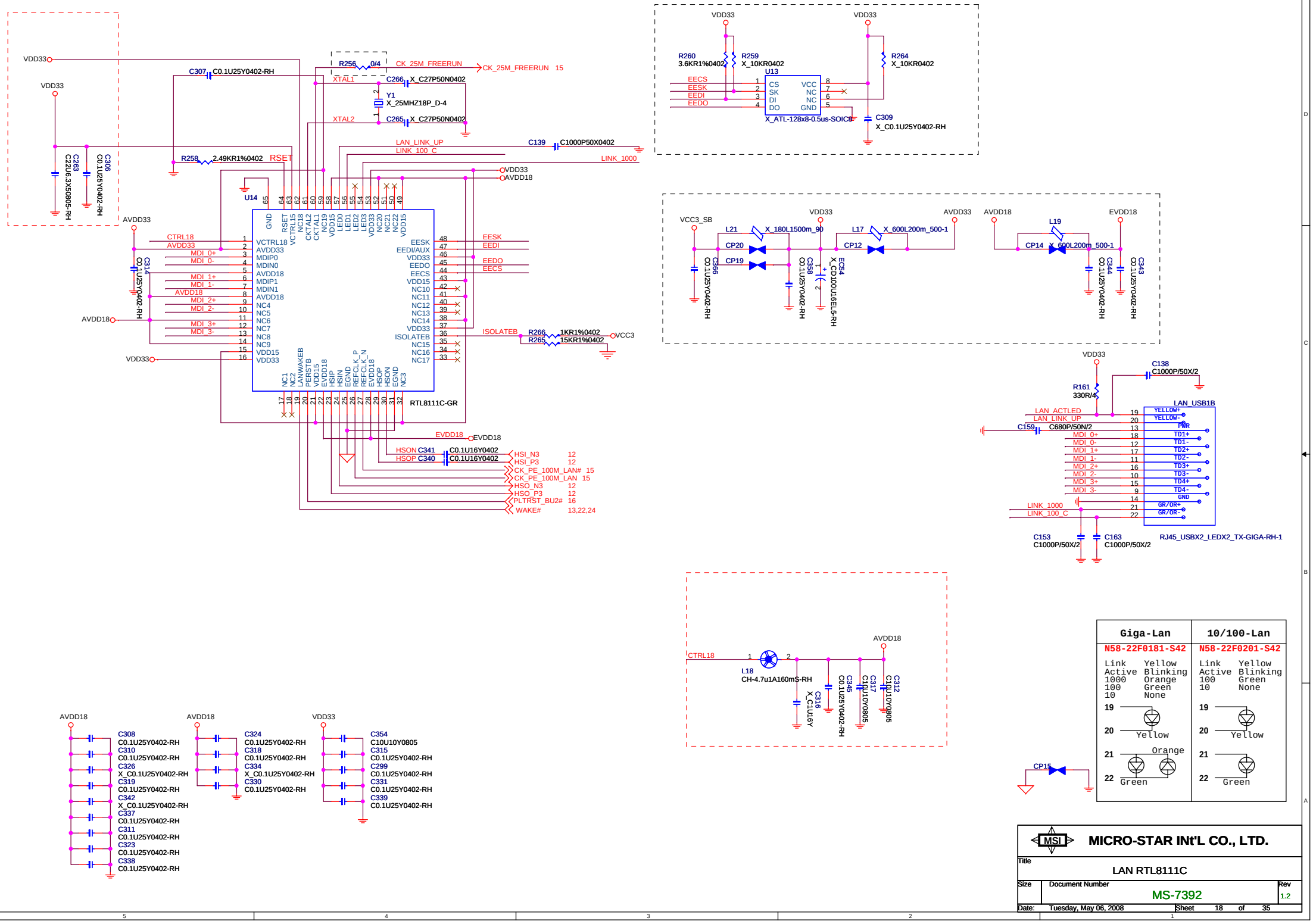
VDD33
C307 C0.1U25Y0402-RH
R256 0/4
CK_25M_FREERUN
CK_25M_FREERUN 15
XTAL1
C266 X_C27P50N0402
Y1
X_25MHZ18P_D-4
XTAL2
C265 X_C27P50N0402
C263 C22U6.3X5508-5-RH
C306 C0.1U25Y0402-RH
LAN_LINK_UP
LINK_100_C
C139 C1000P50X0402
LINK_1000
R258 2.49KR1%0402
RSET
VDD33
AVDD18
U14
AVDD33
CTRL18
MDI_0+
MDI_0-
MDI_1+
MDI_1-
MDI_2+
MDI_2-
MDI_3+
MDI_3-
C314 C0.1U25Y0402-RH
VCTRL18
AVDD33
MDIP0
MDIN0
AVDD18
MDIP1
MDIN1
AVDD18
NC4
NC5
NC6
NC7
NC8
NC9
VDD15
VDD33
EESK
EEDI/AUX
VDD33
EEDO
EECS
VDD15
NC10
NC11
NC12
NC13
NC14
VDD33
ISOLATEB
NC15
NC16
NC17
EESK
EEDI
EEDO
EECS
ISOLATEB
R266 1KR1%0402
R265 15KR1%0402
VCC3
RTL8111C-GR
EVDD18
HSON C341 C0.1U16Y0402
HSOP C340 C0.1U16Y0402
HSI_N3 12
HSI_P3 12
CK_PE_100M_LAN# 15
CK_PE_100M_LAN 15
HSO_N3 12
HSO_P3 12
PLTRST_BU2# 16
WAKE# 13,22,24
R260 3.6KR1%0402
R259 X_10KR0402
R264 X_10KR0402
U13
EECS
EESK
EEDI
EEDO
CS
SK
DI
DO
VCC
NC
NC
GND
X_ATL-128x8-0.5us-SOIC8
C309 X_C0.1U25Y0402-RH
VCC3_SB
L21 X_180L1500m_90
CP20
CP19
C366 C0.1U25Y0402-RH
C358 C0.1U25Y0402-RH
EC54 X_CD100U16EL5-RH
L17 X_600L200m_500-1
CP12
AVDD33
AVDD18
L19
CP14 X_600L200m_500-1
EVDD18
C344 C0.1U25Y0402-RH
C343 C0.1U25Y0402-RH
R161 330R/4
C138 C1000P50X/2
LAN_ACTLED
LAN_LINK_UP
C159 C680P/50N/2
MDI_0+
MDI_0-
MDI_1+
MDI_1-
MDI_2+
MDI_2-
MDI_3+
MDI_3-
LINK_1000
LINK_100_C
LAN_USB1B
YELLOW+
YELLOW-
PWR
TD1+
TD1-
TD2+
TD2-
TD3+
TD3-
TD4+
TD4-
GND
GR/OR+
GR/OR-
C153 C1000P/50X/2
C163 C1000P/50X/2
RJ45_USBX2_LEDX2_TX-GIGA-RH-1
CTRL18
L18 CH-4.7u1A160mS-RH
C316 X_C1U16Y
C345 C0.1U25Y0402-RH
C317 C10U10Y0805
C312 C10U10Y0805
AVDD18
CP15
AVDD18
C308 C0.1U25Y0402-RH
C310 C0.1U25Y0402-RH
C326 X_C0.1U25Y0402-RH
C319 C0.1U25Y0402-RH
C342 X_C0.1U25Y0402-RH
C337 C0.1U25Y0402-RH
C311 C0.1U25Y0402-RH
C323 C0.1U25Y0402-RH
C338 C0.1U25Y0402-RH
AVDD18
C324 C0.1U25Y0402-RH
C318 C0.1U25Y0402-RH
C334 X_C0.1U25Y0402-RH
C330 C0.1U25Y0402-RH
VDD33
C354 C10U10Y0805
C315 C0.1U25Y0402-RH
C299 C0.1U25Y0402-RH
C331 C0.1U25Y0402-RH
C339 C0.1U25Y0402-RH
Giga-Lan
N58-22F0181-S42
Link Yellow
Active Blinking
1000 Orange
100 Green
10 None
19
20 Yellow
21 Orange
22 Green
10/100-Lan
N58-22F0201-S42
Link Yellow
Active Blinking
100 Green
10 None
19
20 Yellow
21
22 Green
MSI
MICRO-STAR INt'L CO., LTD.
Title
LAN RTL8111C
Size
Document Number
MS-7392
Rev
1.2
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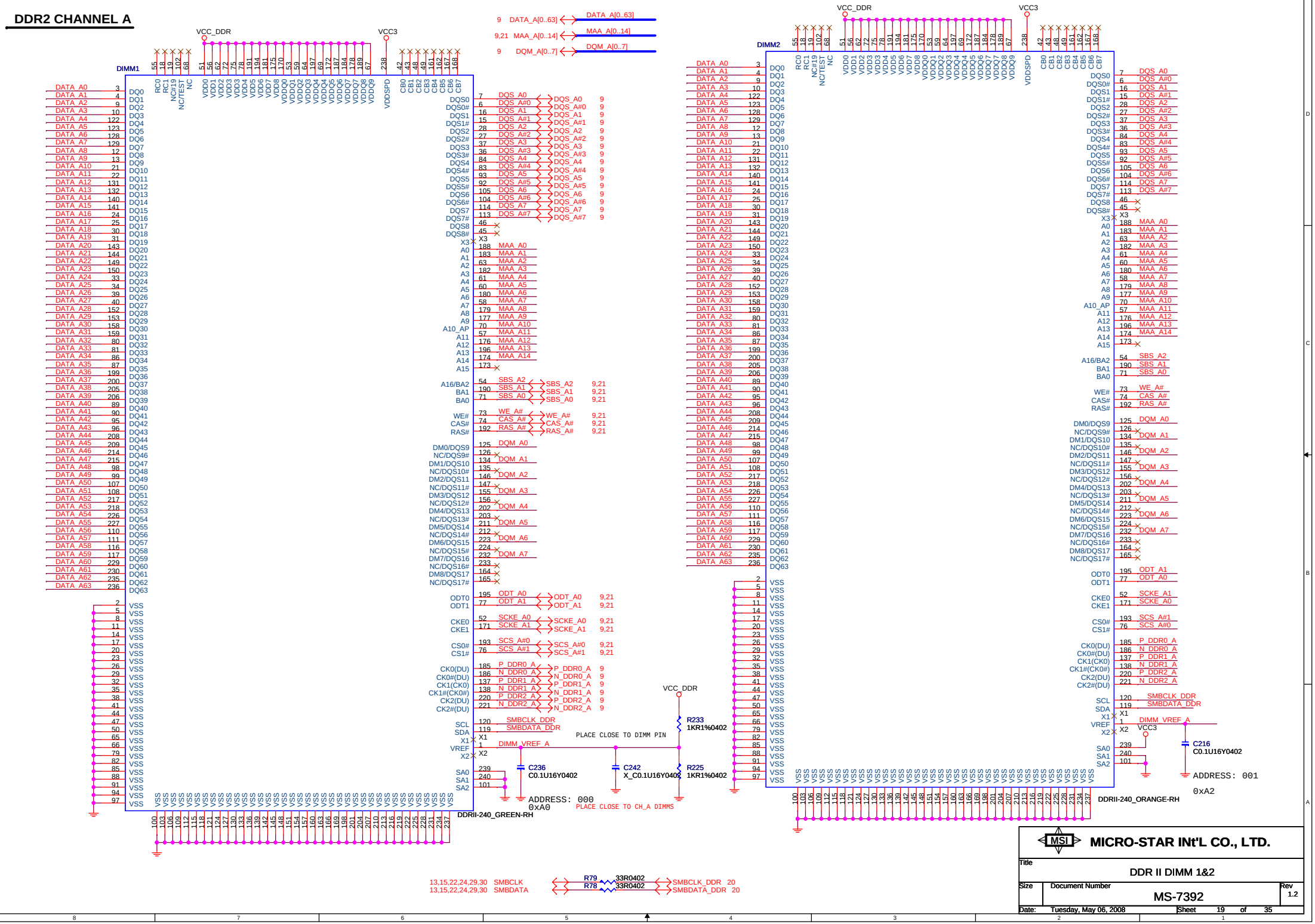
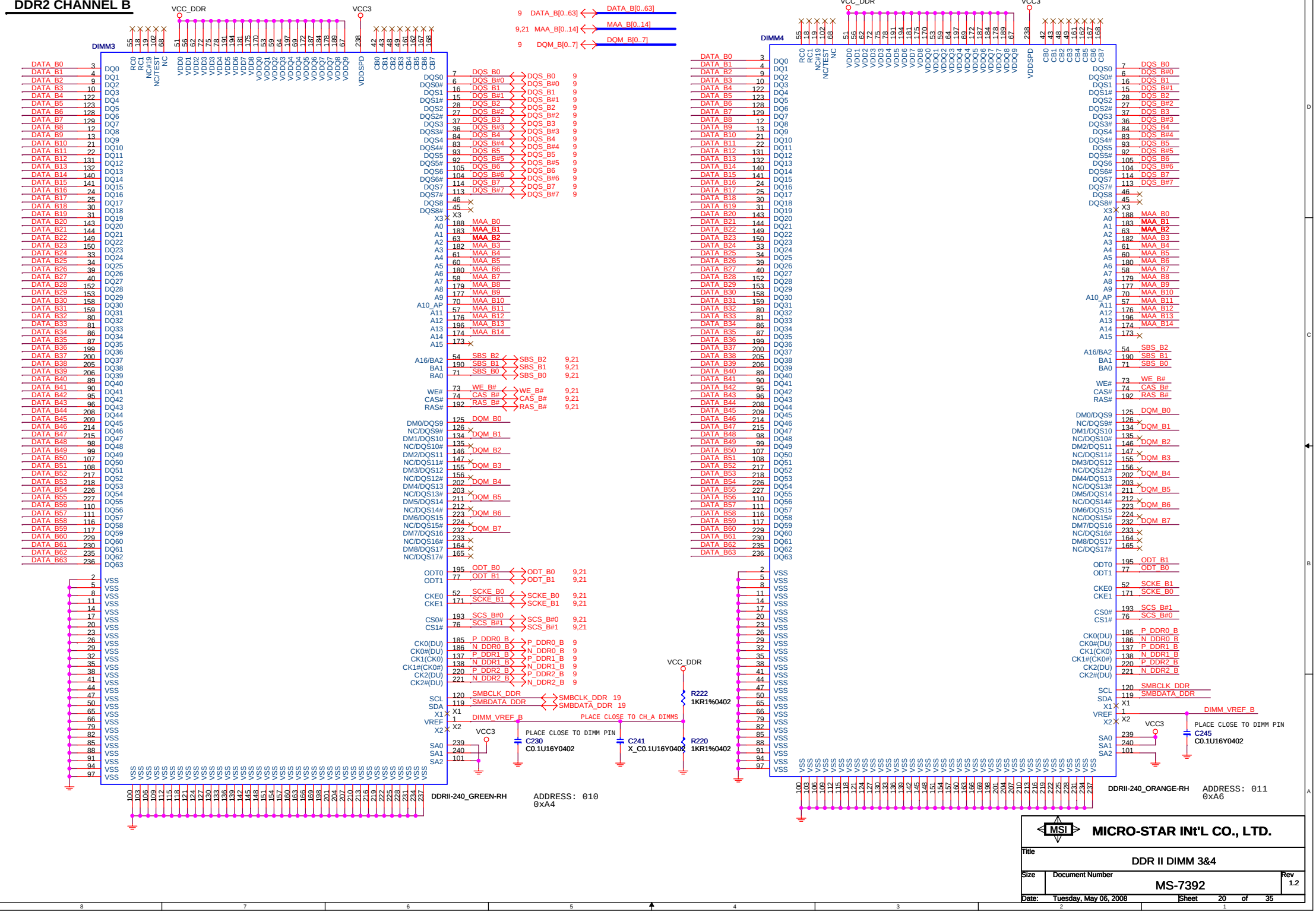
DDR2 CHANNEL A



MICRO-STAR INt'L CO., LTD.

Title	DDR II DIMM 1&2	
Size	Document Number MS-7392	Rev 1.2
Date: Tuesday, May 06, 2008	Sheet 19 of 35	

DDR2 CHANNEL B



MSI **MICRO-STAR INt'L CO., LTD.**

Title	DDR II DIMM 3&4	
Size	Document Number MS-7392	Rev 1.2
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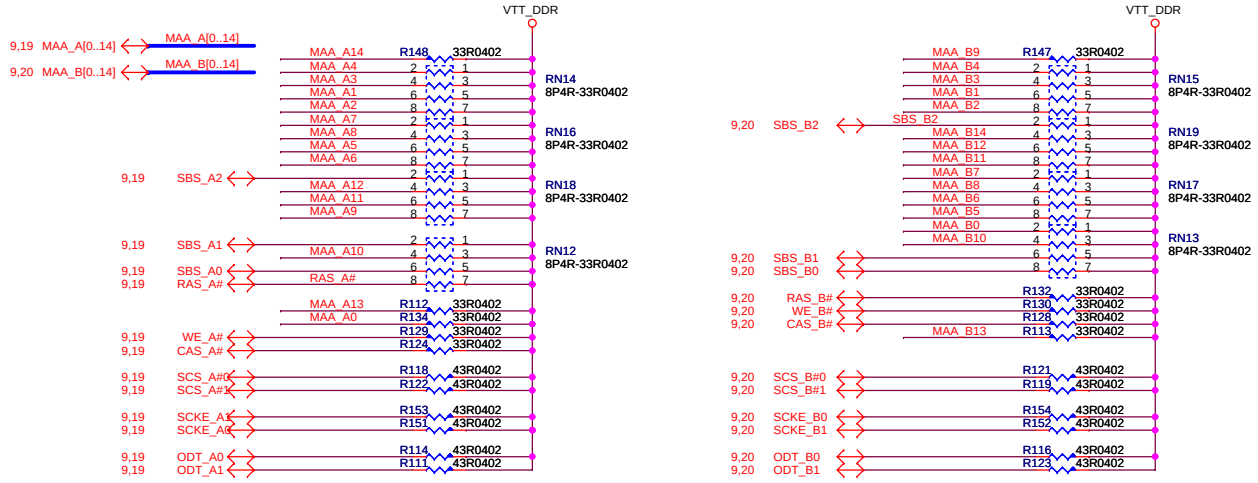
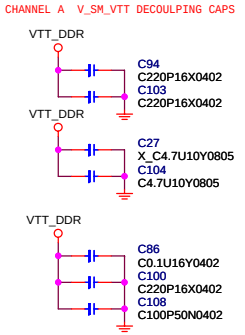
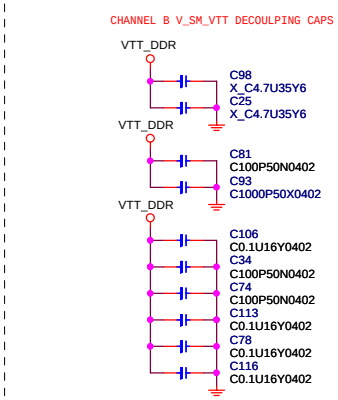
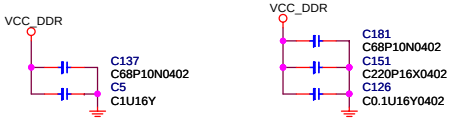
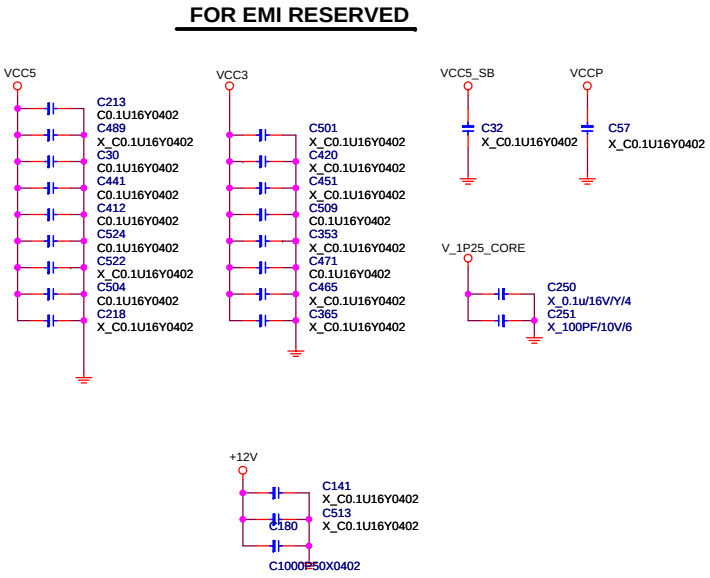
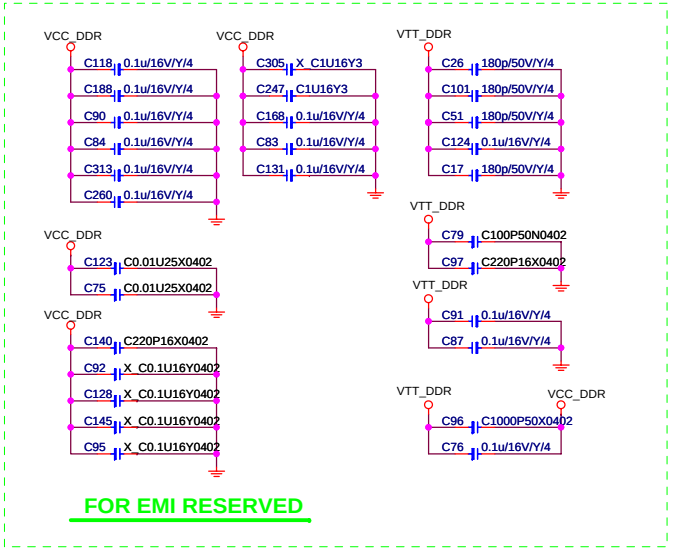




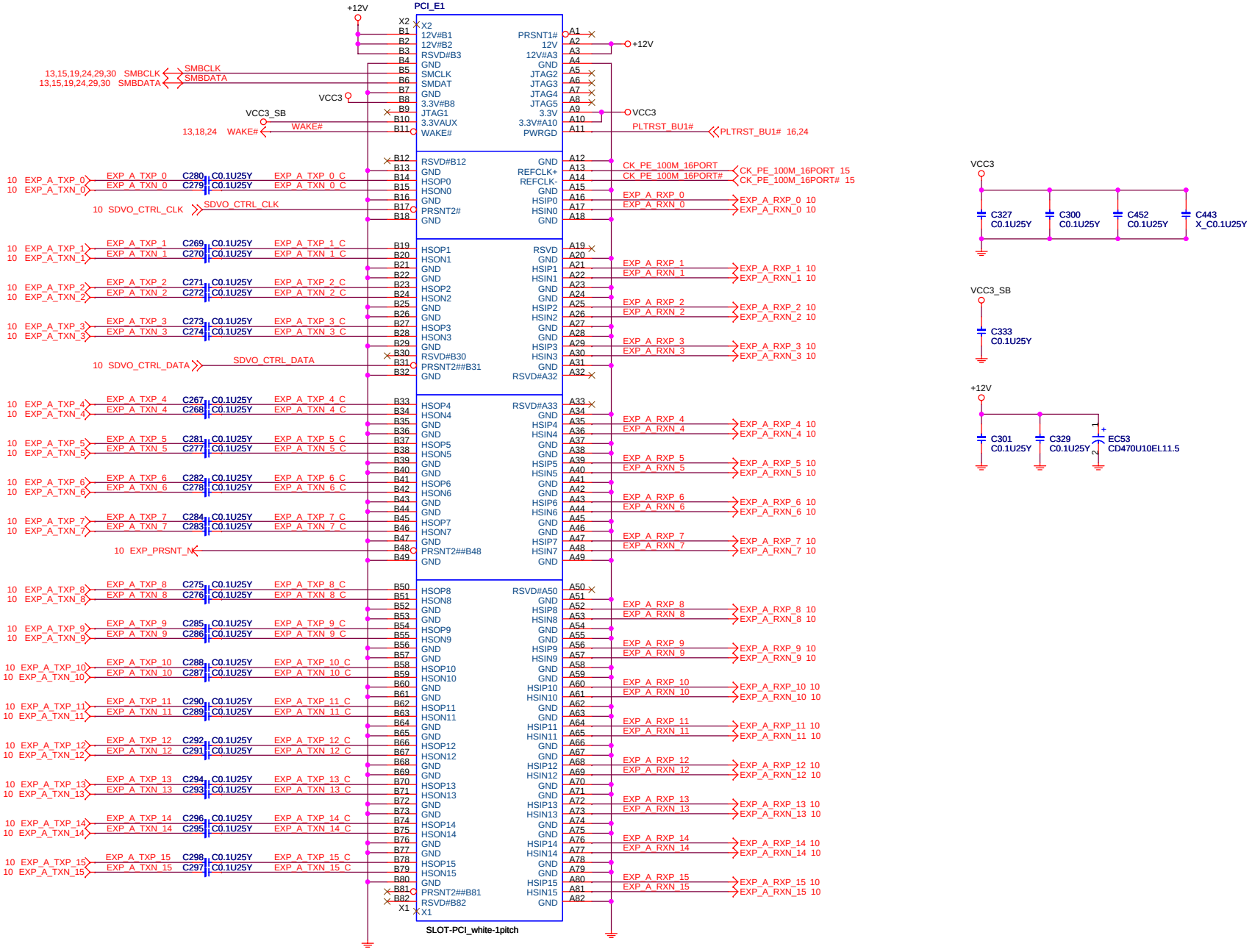








<OrgAddr1>	MICRO-STAR INt'L CO., LTD.	
Title	DDR II VTT DECOUPLING	
Size	Document Number MS-V302	Rev 1.2
Date: Tuesday, May 06, 2008	Sheet 21 of 35	



MICRO-STAR INt'L CO., LTD.			
Title: PCI EXPRESS 16 PORT			
Size	Document Number: MS-7392		Rev: 1.2
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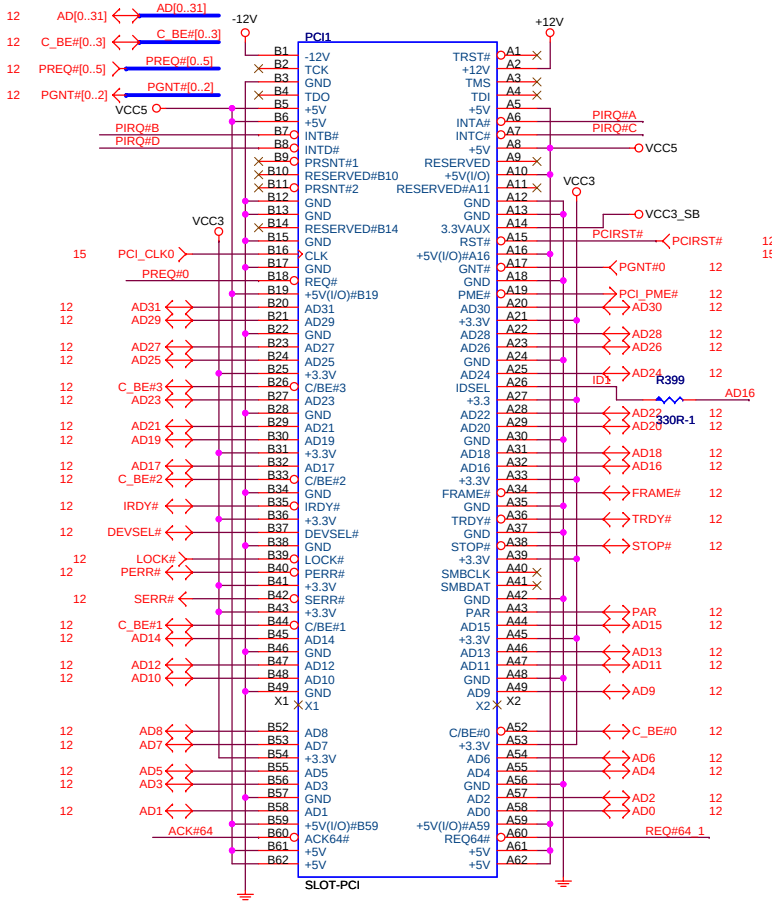
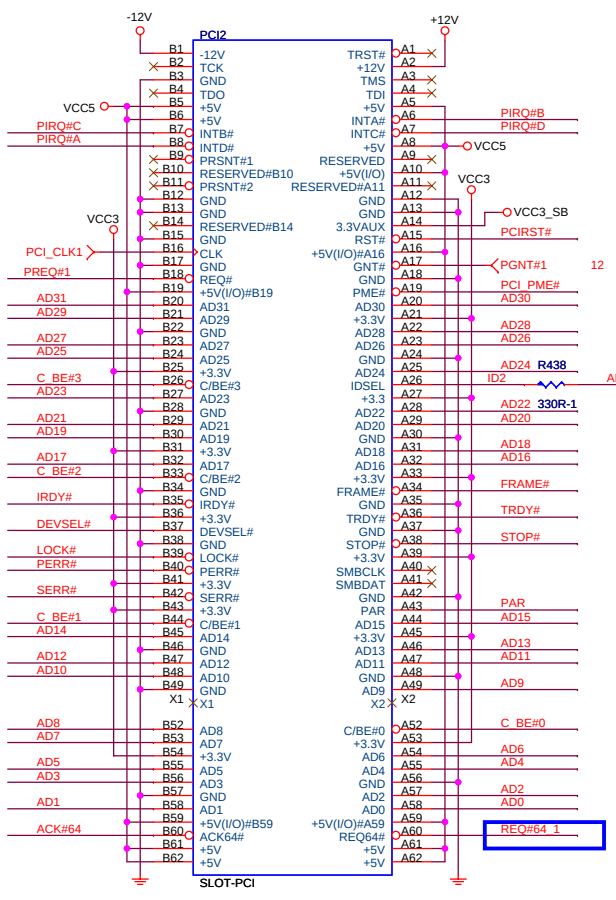
PCI SLOT 1 (PCI VER: 2.2 COMPLY)



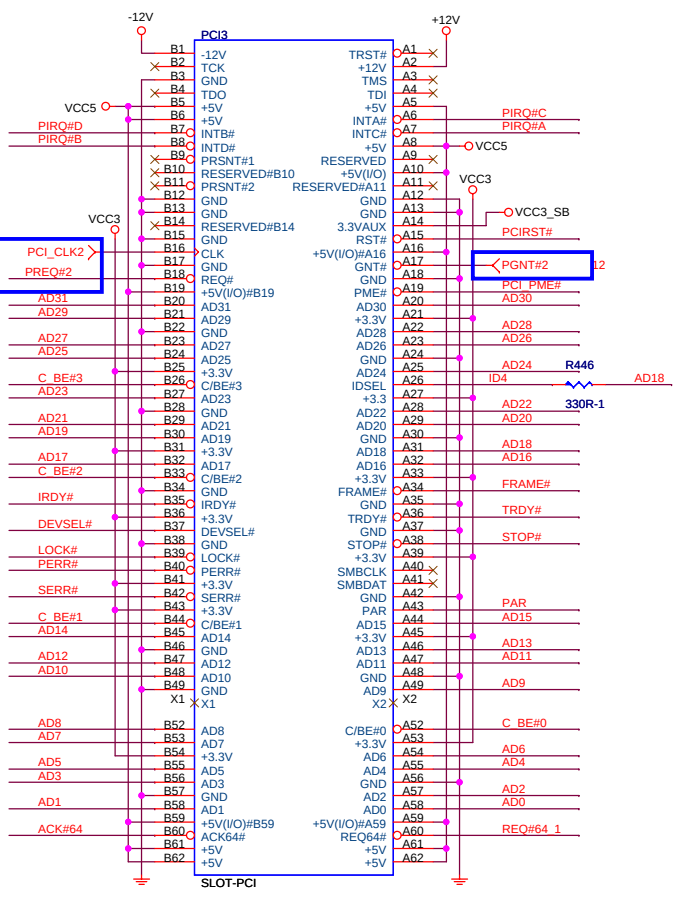
IDSEL = AD16
MASTER = PREQ#0
PIRQ#A

PCI SLOT 2 (PCI VER: 2.2 COMPLY)



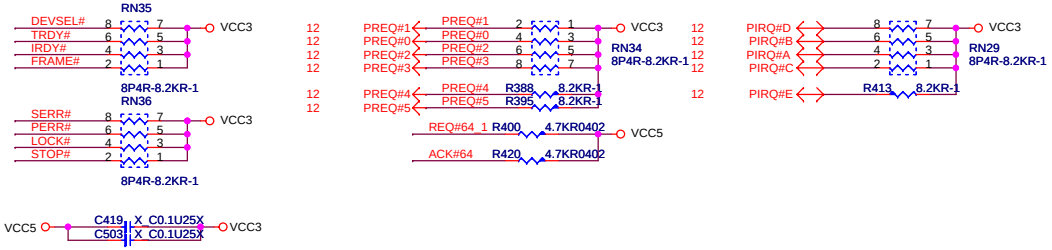
IDSEL = AD17
MASTER = PREQ#1
PIRQ#B

PCI SLOT 3 (PCI VER: 2.2 COMPLY)

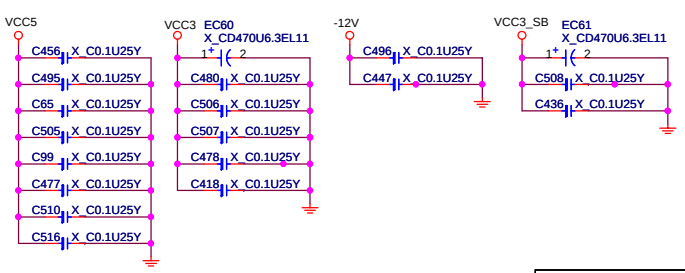


IDSEL = AD18
MASTER = PREQ#2
PIRQ#C

PCI PULL-UP / DOWN RESISTORS



PCI SLOT DECOUPLING CAPACITORS



MSI **MICRO-STAR INt'L CO., LTD.**

Title	PCI 1~ 4 Slots	
Size	Document Number MS-7392	Rev 1.2
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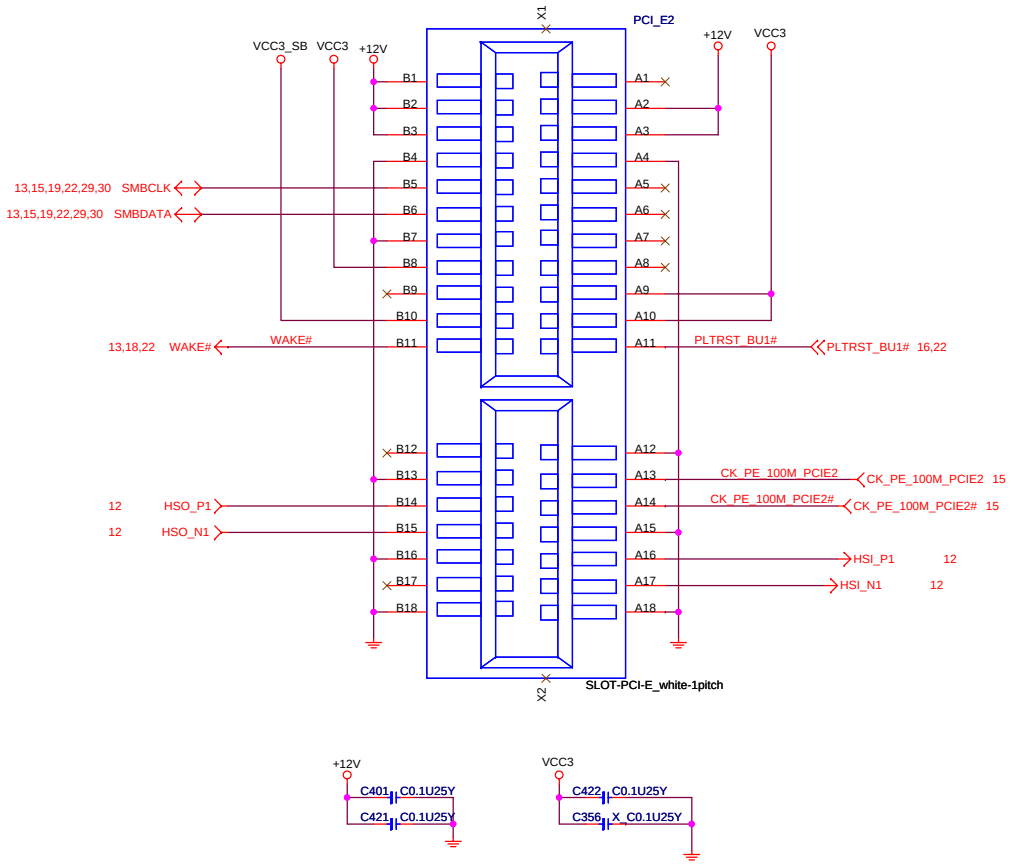
PCI EXPRESS 1-PORT



MSI **MICRO-STAR INt'L CO., LTD.**

Title	PCI EXPRESS X1	
Size	Document Number MS-7392	Rev 1.2
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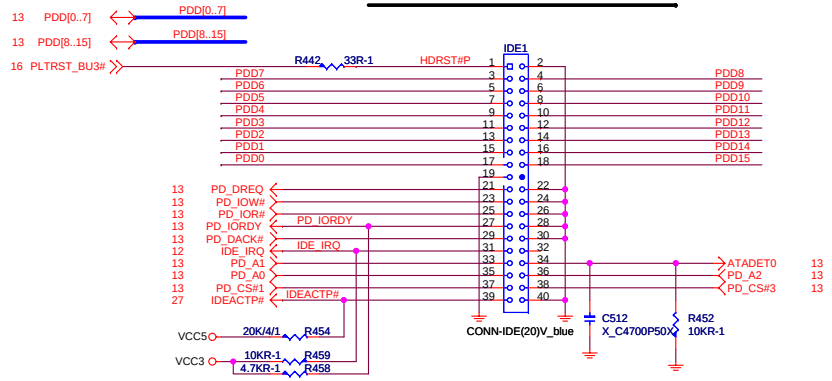
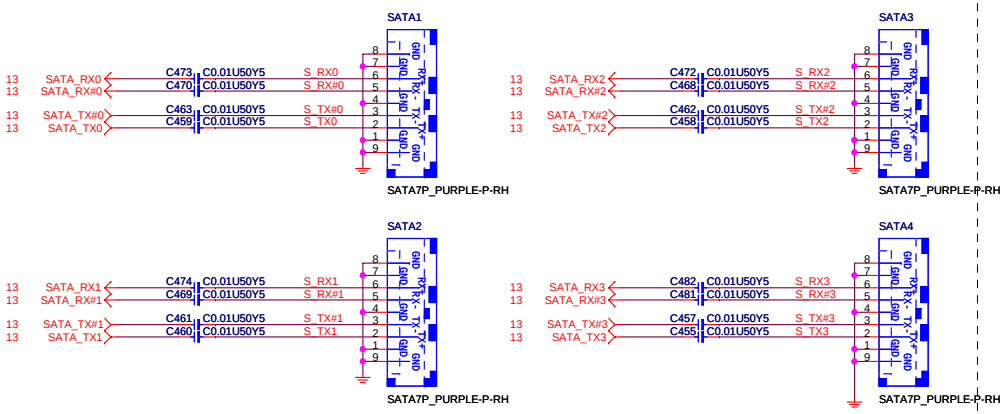
ATA 33/66/100 IDE Connectors



SERIAL ATA CONNECTOR BLOCK



MICRO-STAR INt'L CO., LTD.

Title	ATA33/66/100 IDE & SATA Connectors	
Size	Document Number: MS-7392	Rev: 1.2
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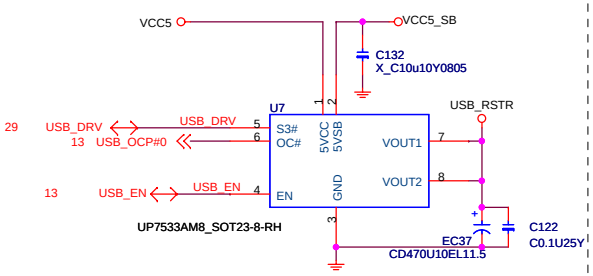
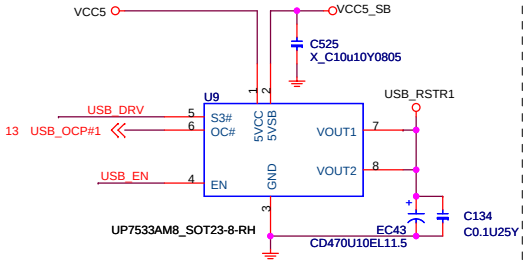
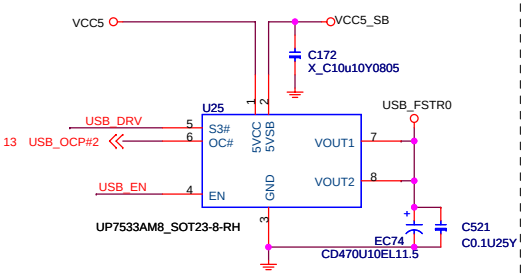
POWER CIRCUIT FOR USB PORT 0,1



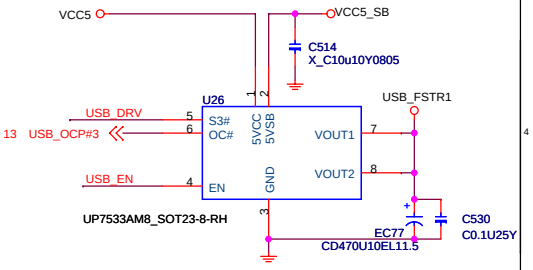
POWER CIRCUIT FOR USB PORT 2,3



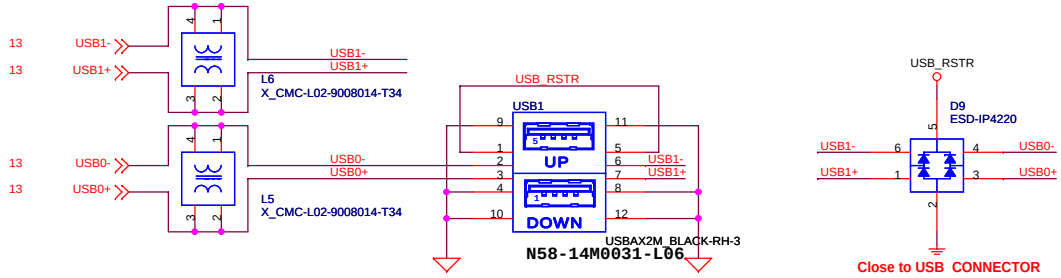
POWER CIRCUIT FOR USB PORT 4,5



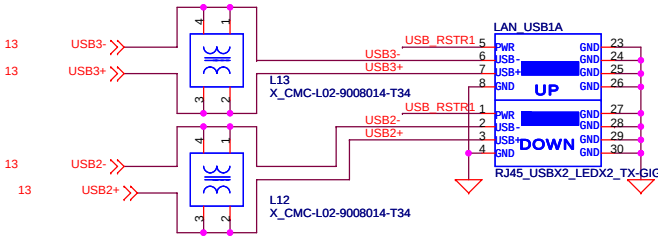
POWER CIRCUIT FOR USB PORT 6,7

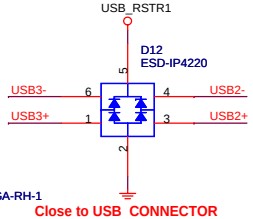


REAR PANEL USB CONNECTOR FOR USB PORT 0,1

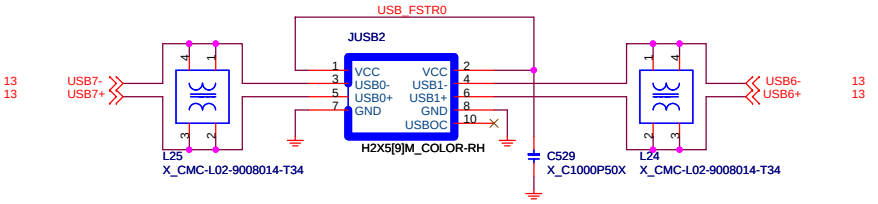


REAR PANEL USB CONNECTOR FOR USB PORT 2,3

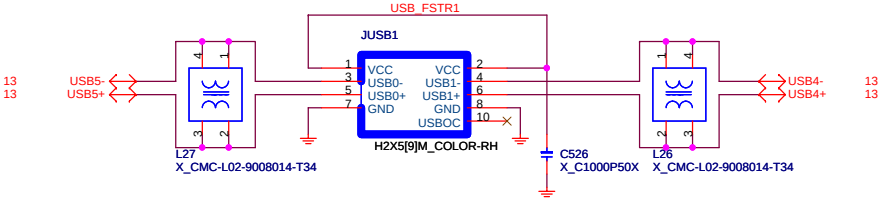


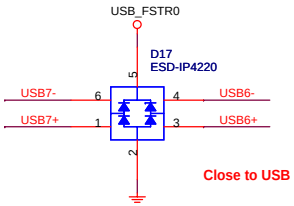


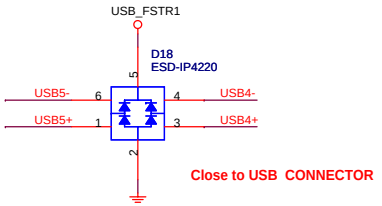
FRONT PANEL USB CONNECTOR FOR USB PORT 6,7

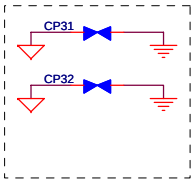


FRONT PANEL USB CONNECTOR FOR USB PORT 4,5









MICRO-STAR INt'L CO., LTD.		
Title: USB Connectors		
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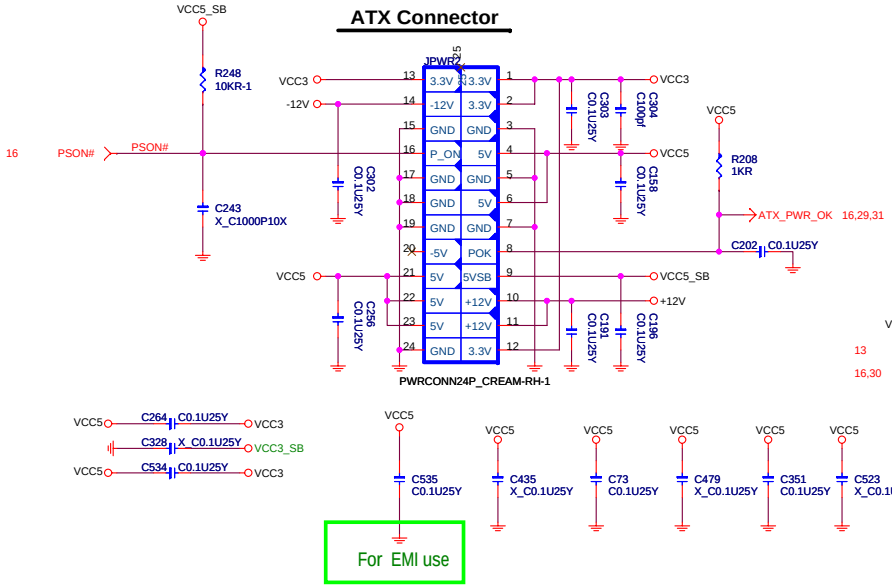
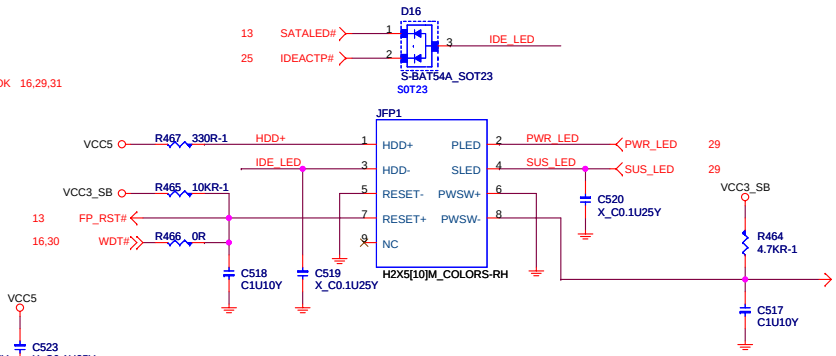
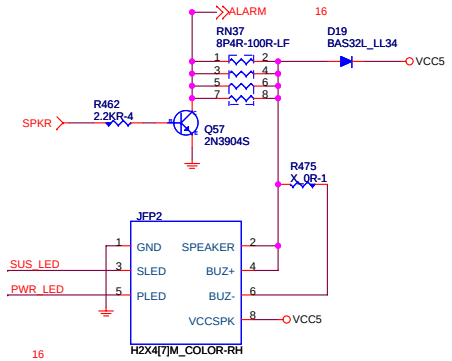
ATX Connector



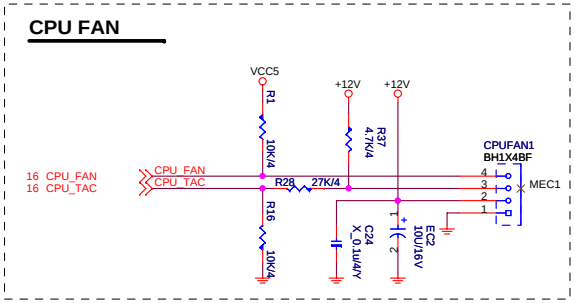
INTEL/PB Front Panel Connector



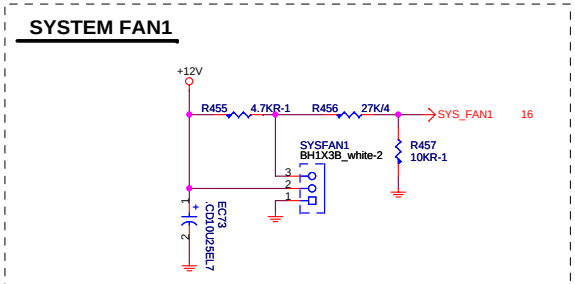
MSI Front Panel Connector



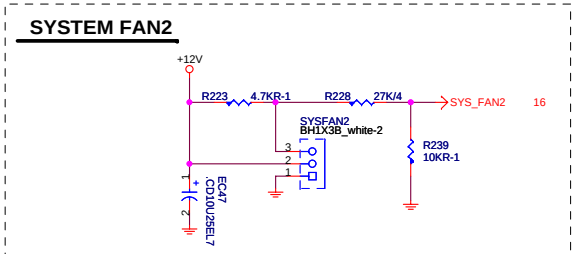
CPU FAN



SYSTEM FAN1



SYSTEM FAN2



Company	MICRO-STAR INt'L CO., LTD.
Title	ATX Connector & Front Pane & FANI
Size	
Document Number	MS-7392
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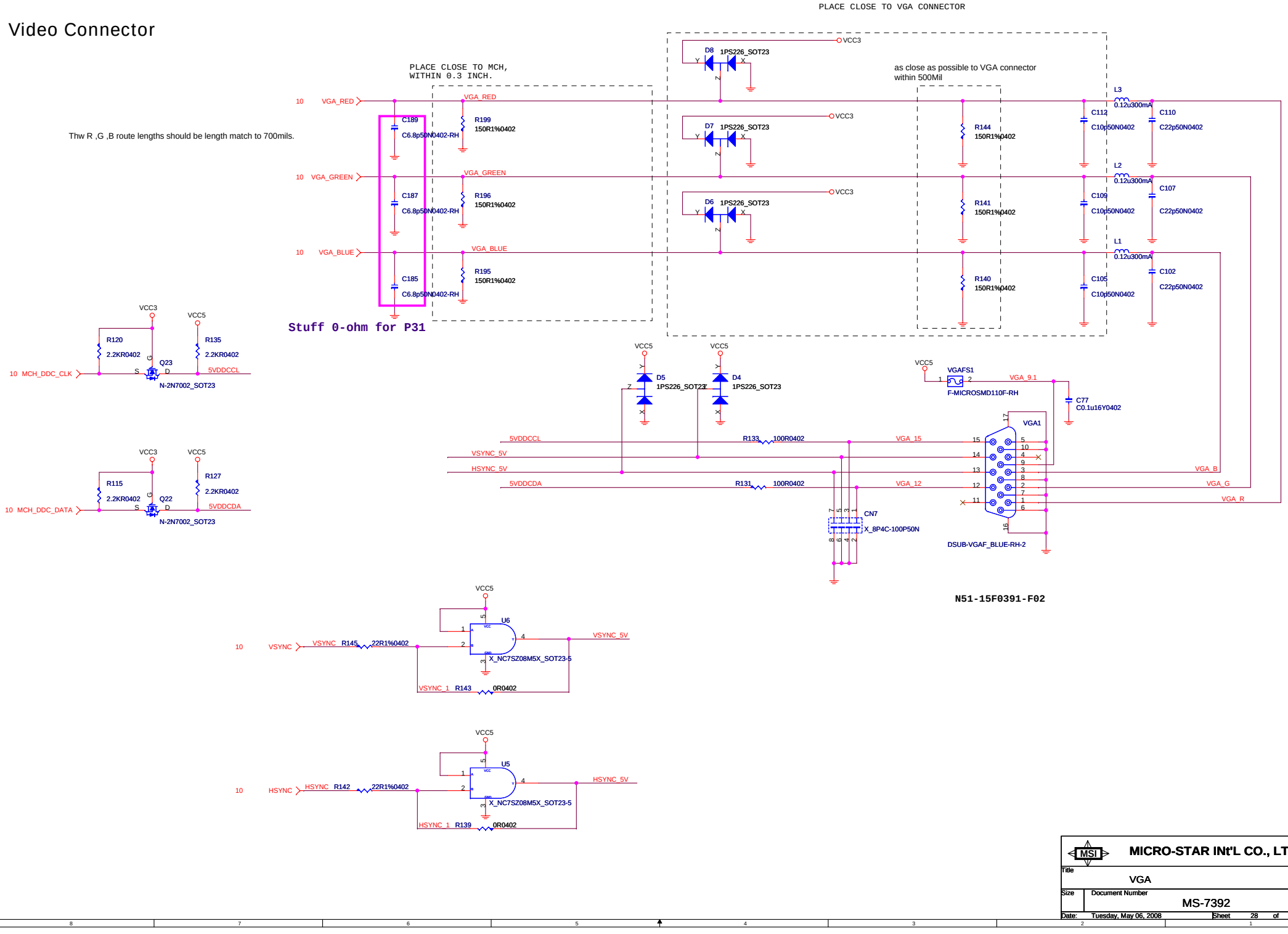
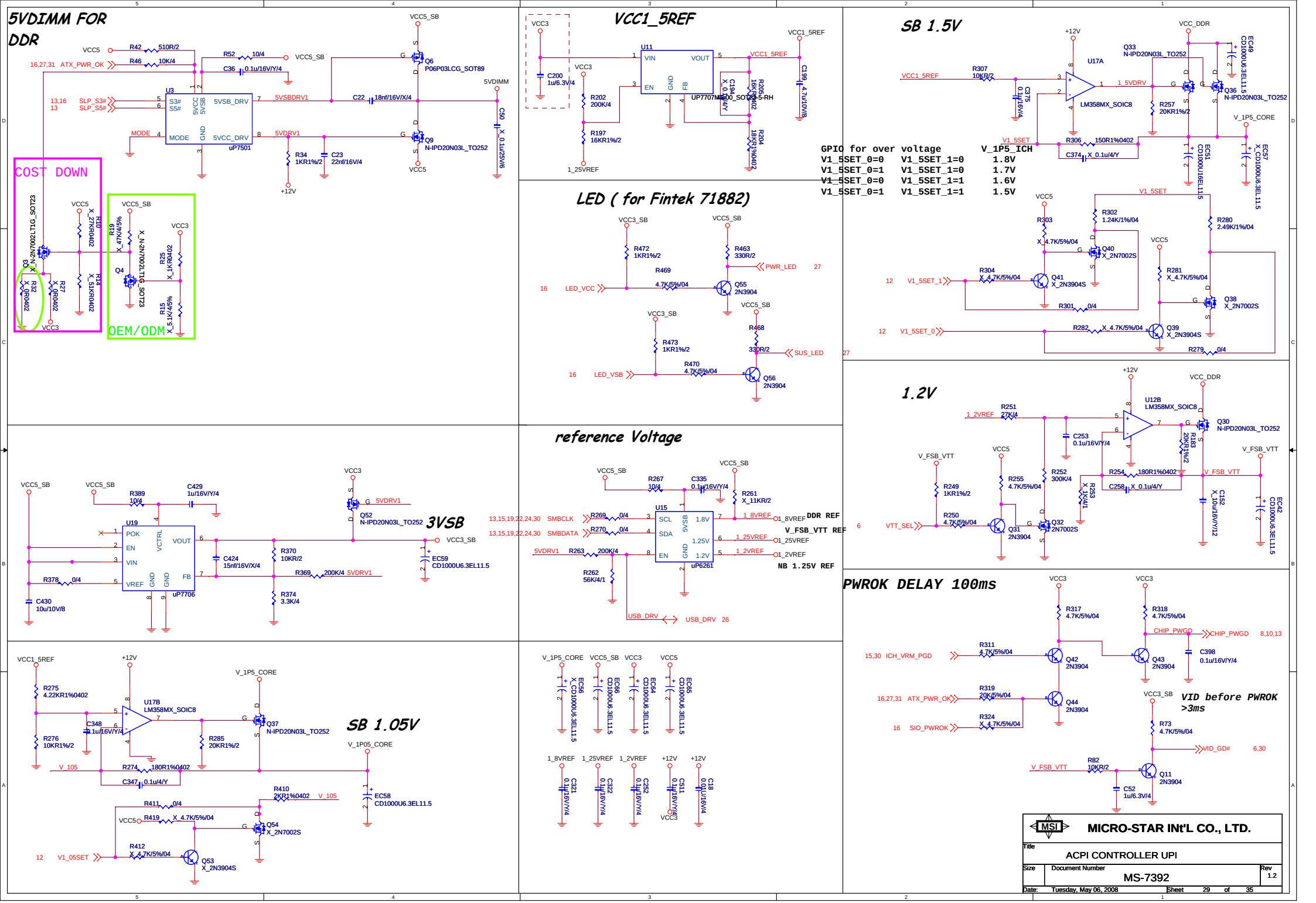
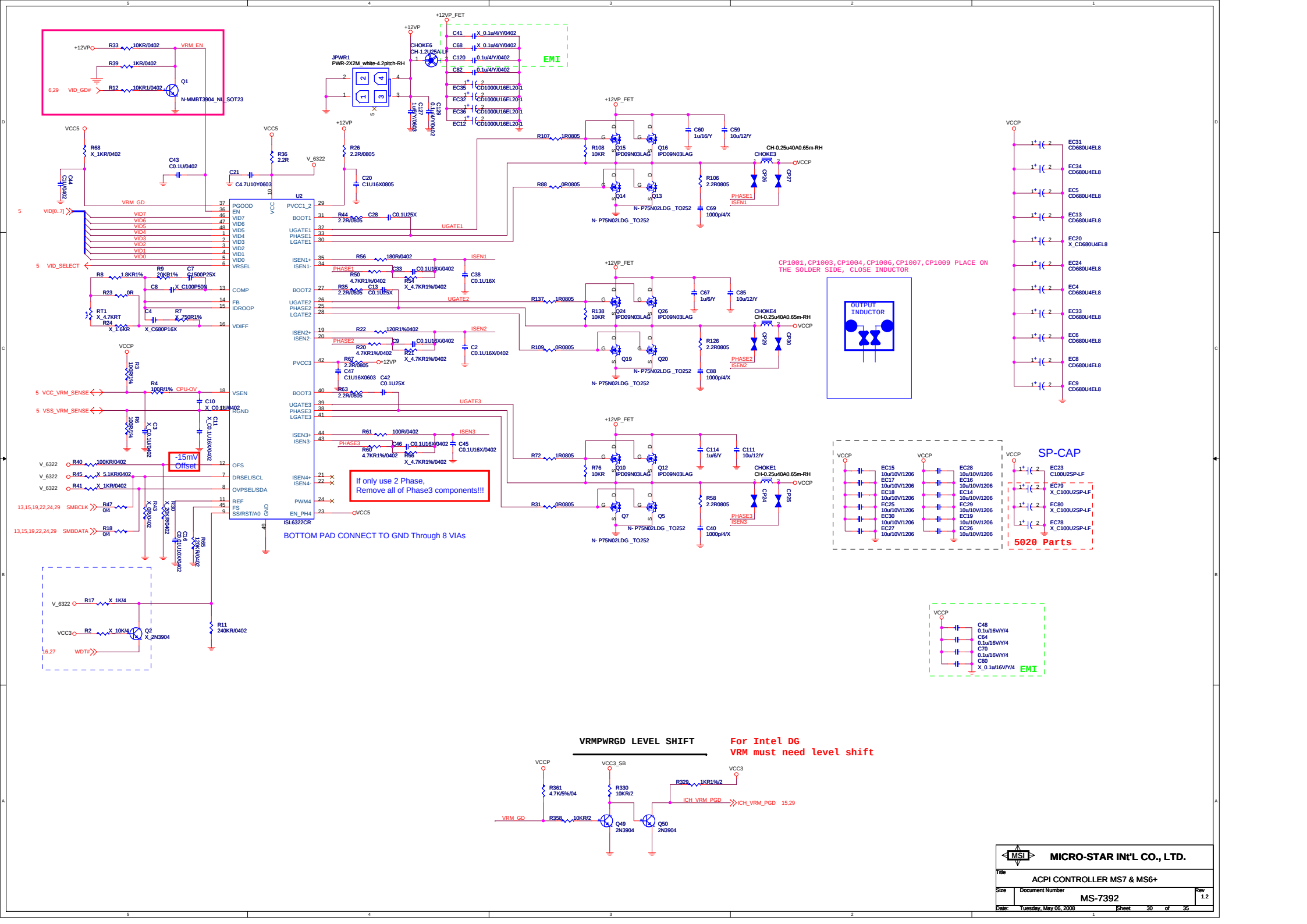
Video Connector



MSI	MICRO-STAR INt'L CO., LTD.	
Title	VGA	
Size	Document Number MS-7392	Rev 1.2
Date: Tuesday, May 06, 2008	Sheet 28 of 35	


5VDIMM FOR DDR
COST DOWN
OEM/ODM
uP7501
VCC1_5REF
UP7707MSOP_SOT23-RH
LED (for Fintek 71882)
SB 1.5V
LM358MX_SOIC8
GPIO for over voltage V_1P5_ICH
V1_5SET_0=0 V1_5SET_1=0 1.8V
V1_5SET_0=1 V1_5SET_1=0 1.7V
V1_5SET_0=0 V1_5SET_1=1 1.6V
V1_5SET_0=1 V1_5SET_1=1 1.5V
1.2V
3VSB
uP7706
reference Voltage
uP6261
DDR REF
V_FSB_VTT REF
NB 1.25V REF
SB 1.05V
PWROK DELAY 100ms
VID before PWROK >3ms
MICRO-STAR INt'L CO., LTD.
ACPI CONTROLLER UPI
MS-7392
Tuesday, May 06, 2008


+12VP_FET
+12VP
VCC5
VCCP
VCC3
VCC3_SB
EMI
SP-CAP
5020 Parts
OUTPUT INDUCTOR
CP1001,CP1003,CP1004,CP1006,CP1007,CP1009 PLACE ON THE SOLDER SIDE, CLOSE INDUCTOR
-15mV Offset
If only use 2 Phase, Remove all of Phase3 components!!!
BOTTOM PAD CONNECT TO GND Through 8 VIAs
ISL6322CR
VRMPWRGD LEVEL SHIFT
For Intel DG
VRM must need level shift
MICRO-STAR INt'L CO., LTD.
ACPI CONTROLLER MS7 & MS6+
MS-7392
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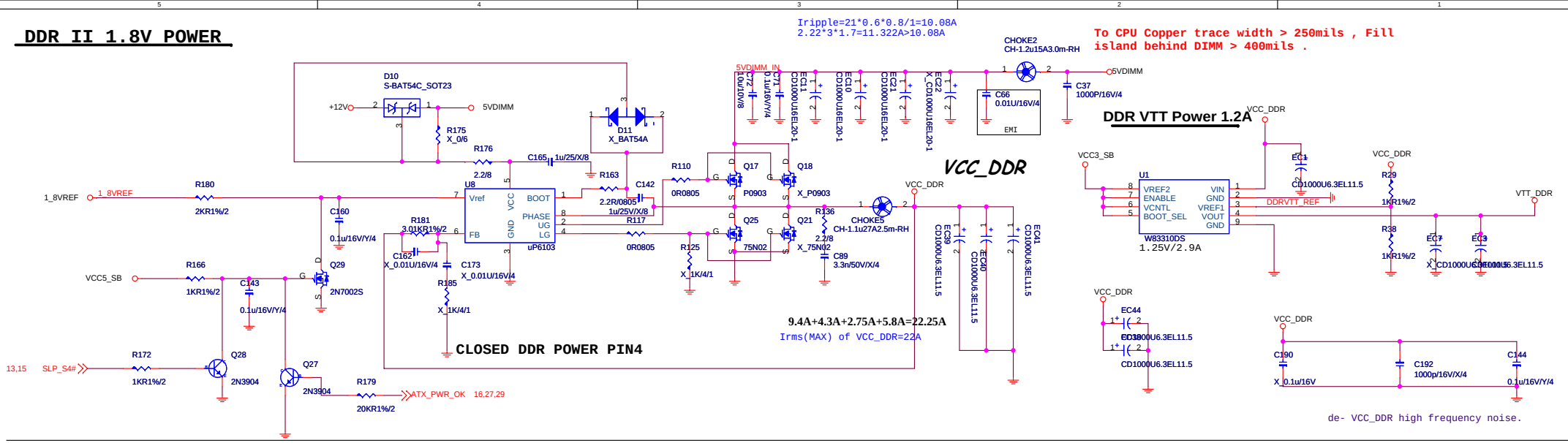
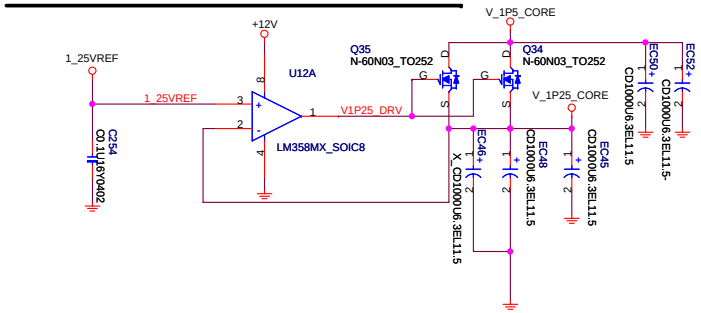
DDR II 1.8V POWER



NB 1.25V POWER

V_1P25_CORE 18.1A+2.47A+2.94A



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Auto-BOM Manual Parts

PCB1

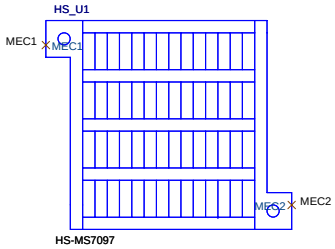
PCB

PCB-7392

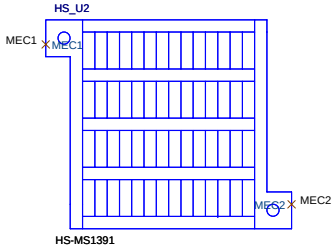
BATTERY1

BATTERY-CR2032

P31 HEATSINK



ICH7 HEATSINK



Auto-BOM Option Parts

ICH7

OPT

X_ICH7

G31

OPT

X_G31

P31-R1

OPT

X_0R0402

OnVGA1.3

OPT

X_1.3KR1%/2

G31-C1

OPT

X_C0.1U16Y0402

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1.0 Change 1.1 list:

1. Co-lay G31 add COM2,change LTP to Connect
2. change USB power to UPI 7533
3. change LAN only to 8111C
4. change CLKGEN to 906
5. Add OC Jumper
6. change clk netname,swapVGA_ 12/VGA_ 15 and HSYNC/VSYNC
7. remove CP5,CP6,CP21
8. Change TestPIN footprint to TPC20B
9. Remove SMBus for PCI.
10. Rename,and add OC Jump

1.1 Change 1.2 list:

1. change CHOKE 2/5/6 to 方形CHOKE

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