

Cover Sheet	1
Block Diagram/Clock Map/Power Map	2-4
Intel LGA775 CPU	5-7
Intel Bearlake- MCH -P31/G31	8-11
Intel ICH7 - PCI & DMI & CPU & IRQ	12
Intel ICH7 - LPC & ATA & USB & GPIO	13
Intel ICH7 - POWER	14
Clock - ICS9LPRS906CGLF	15
LPC I/O - F81182	16
HD- ALC888	17
LAN REALTEK RTL8111C	18
DDR II System Memory 1 & 2	19
DDR II System Memory 3 & 4	20
DDR II VTT Decoupling	21
PCI EXPRESS X16 Slot	22
PCI Slot 1 & 2 & 3 & PCI Express X1Slot	23-24
ATA33/66/100 IDE & SATA Connectors	25
USB Connectors	26
ATX Connetcor & Front Panel & FAN	27
VGA Connectors	28
ACPI CONTROLLER UPI	29
VRM 11.0 - INTELSIL - ISL6322CR	30
SYSTEM POWER	31
AutoBOM parts	32

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)

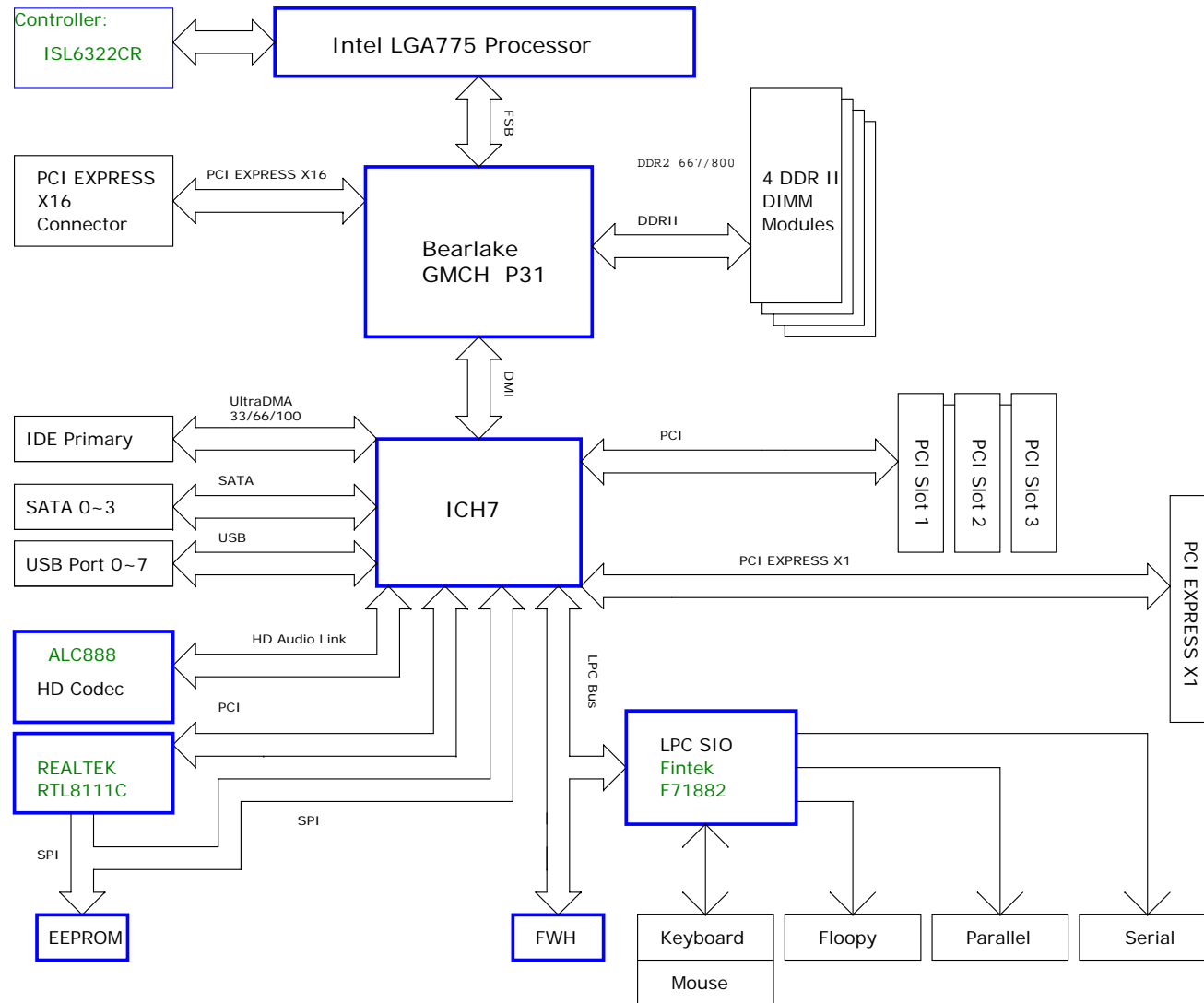
Expansion Slots:

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

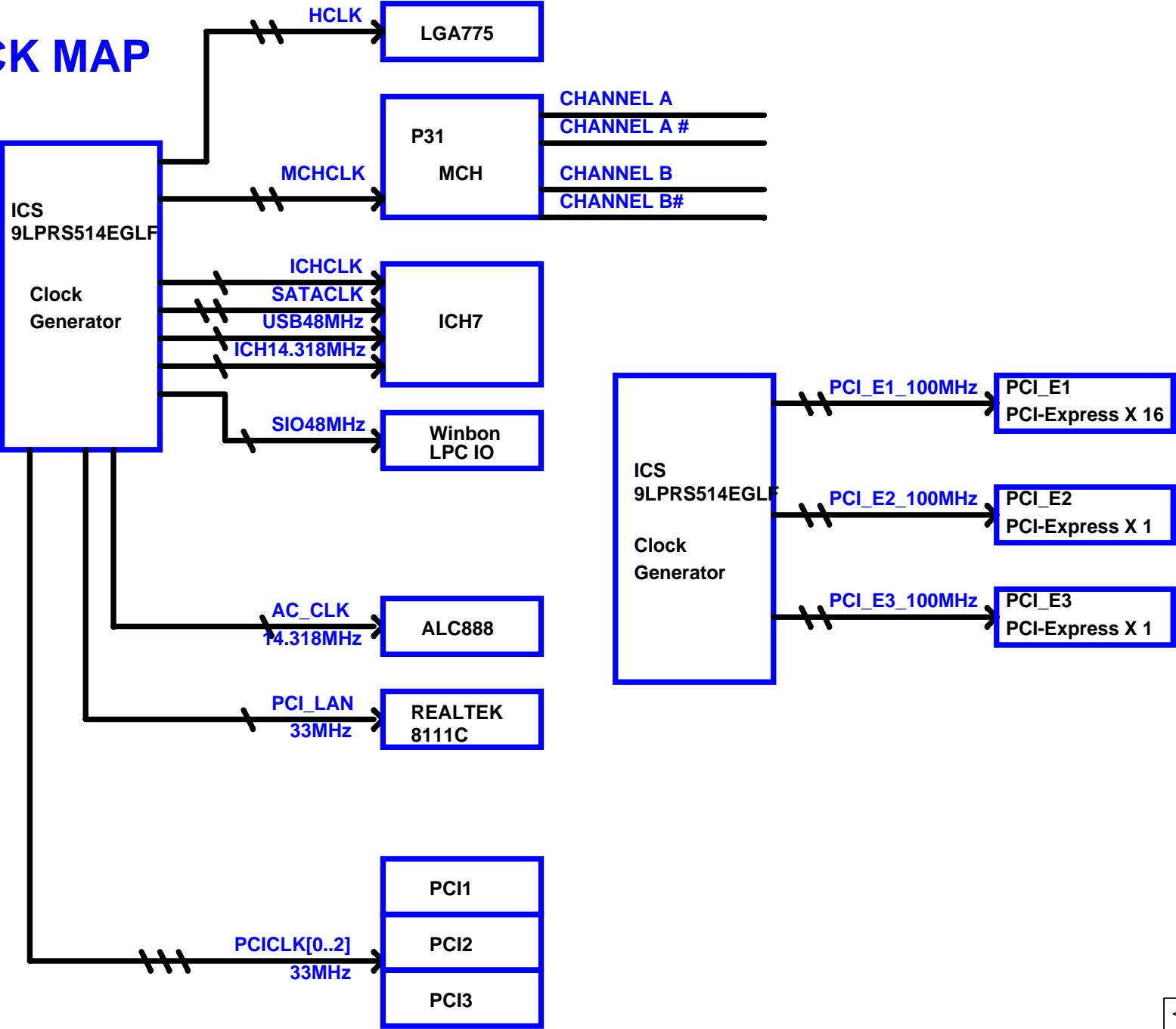
INTELSIL PWM:

Controller: INTELSIL - ISL6322CR

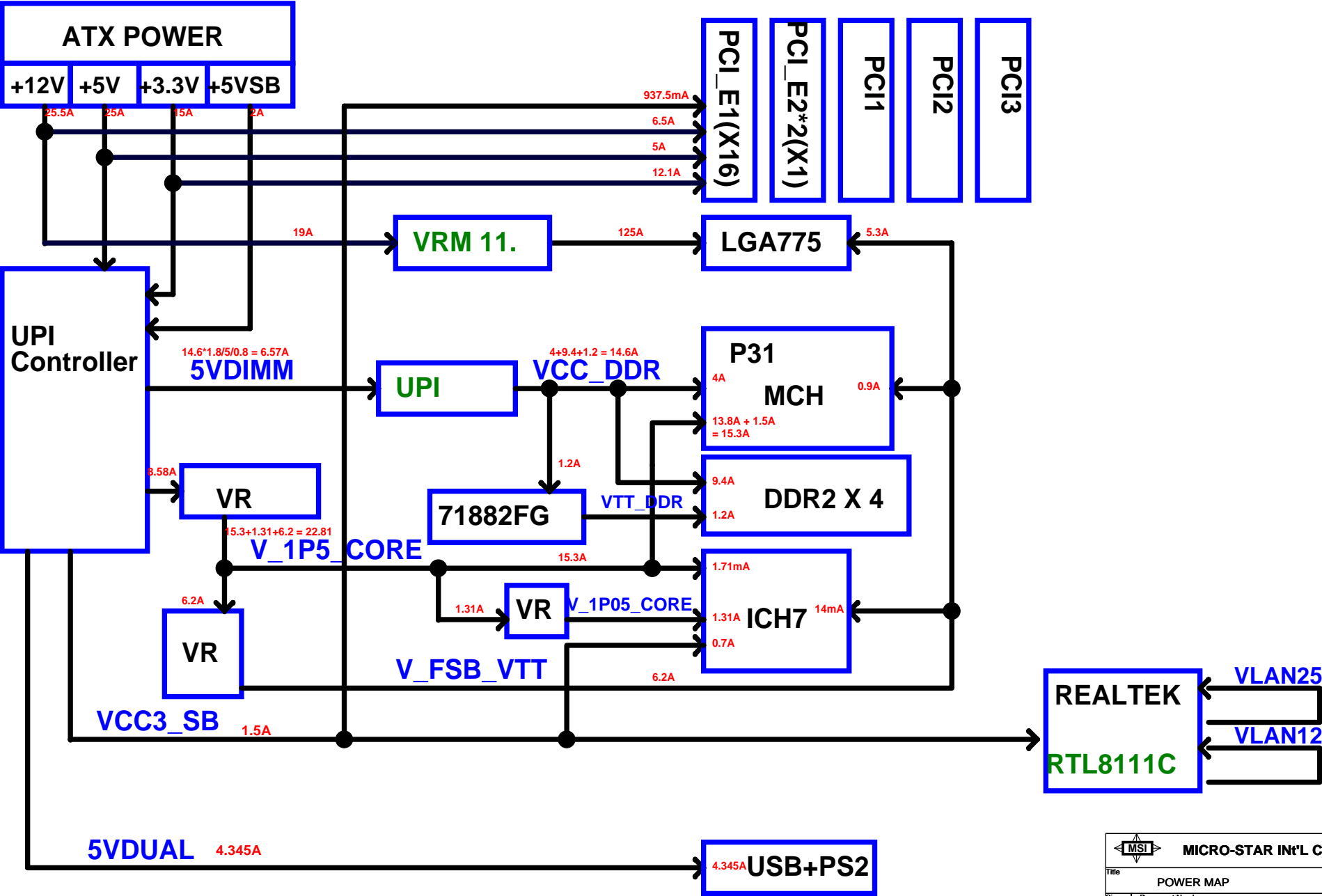
Block Diagram



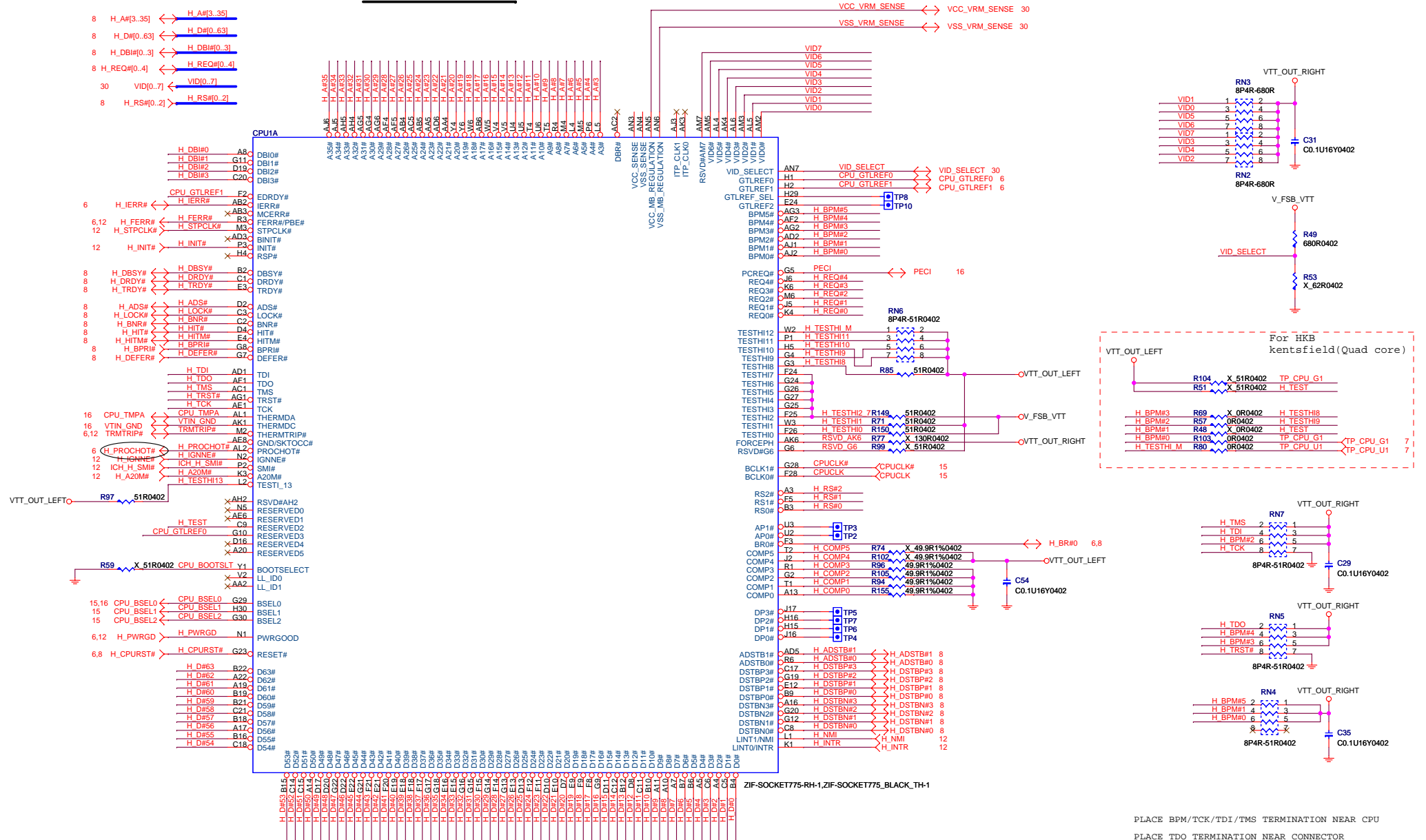
CLOCK MAP



POWER MAP



CPU SIGNAL BLOCK




PLACE BPM/TCK/TDI/TMS TERMINATION NEAR CPU
PLACE TDO TERMINATION NEAR CONNECTOR

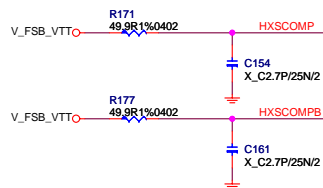
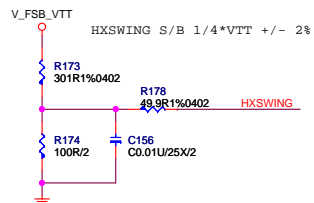
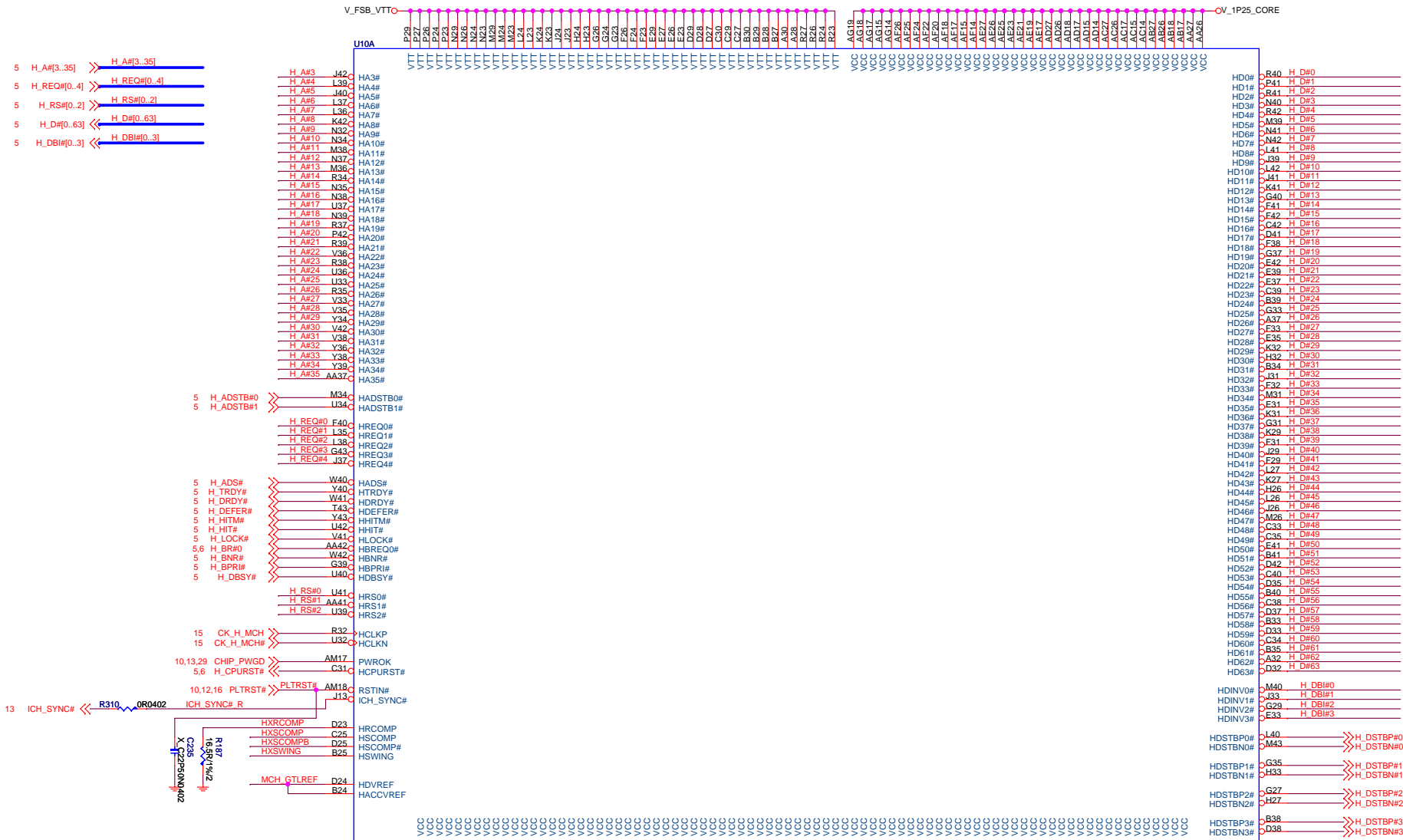


MICRO-STAR INT'L CO., LTD.

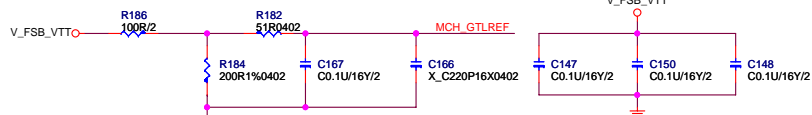
Title	Intel LGA775 CPU - Signals
-------	----------------------------

Size	Document Number	Rev
	MS-7392	1.2
Date:	Tuesday, May 06, 2008	Sheet 5 of 35

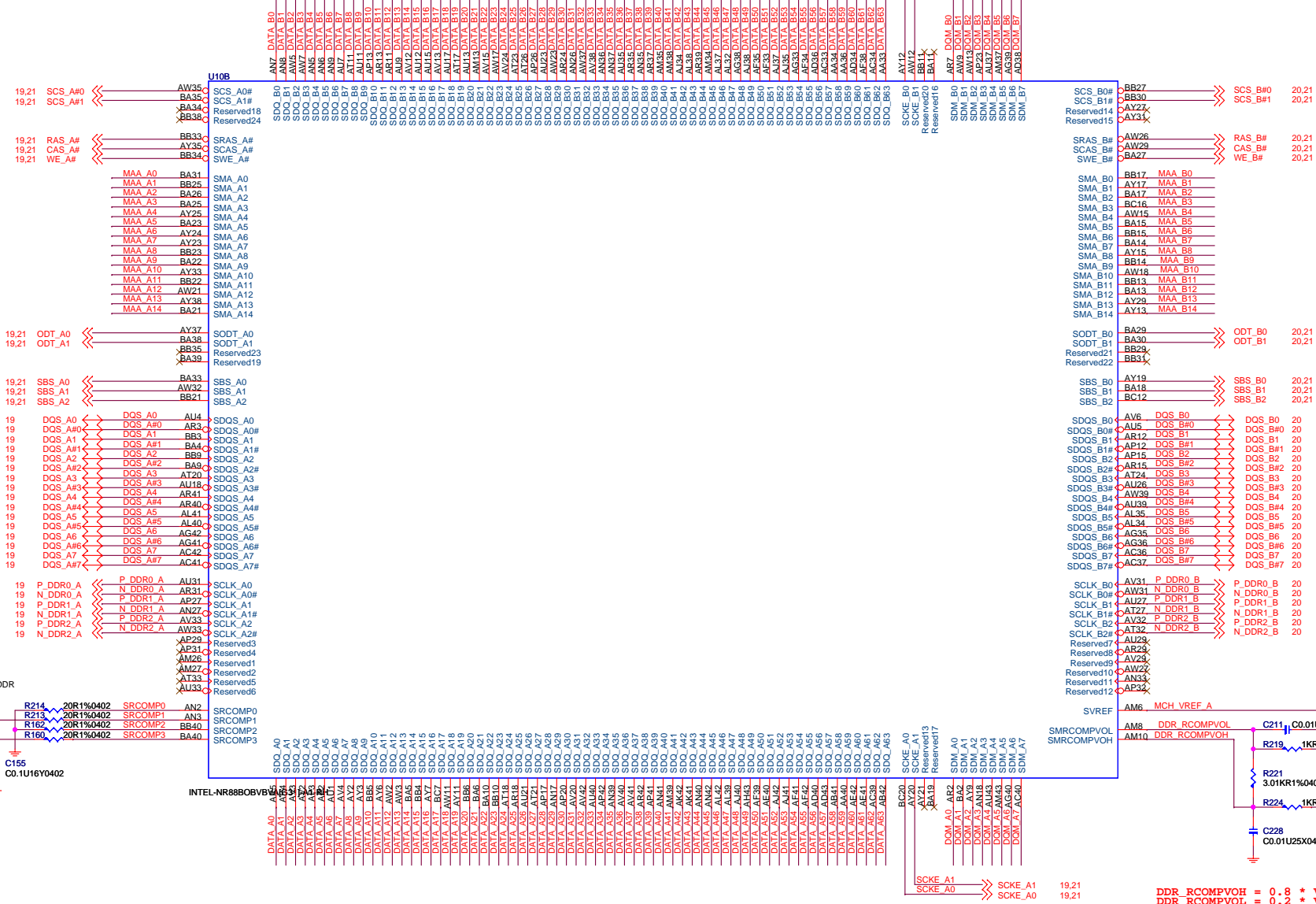
 MICRO-STAR INT'L CO., LTD.	
Title Intel LGA775 CPU - GND	
Size	Document Number MS-7392
Date: Tuesday, May 06, 2008	Sheet 7 of 35
Rev 1.2	



GTLREF VOLTAGE SHOULD BE $0.67 \times V_{TT} = 0.804V$



20 DATA_B[0..63] <-> DATA_B[0..63] 20 DOM_B[0..7] <-> DOM_B[0..7]
19 DATA_A[0..63] <-> DATA_A[0..63] 19 DOM_A[0..7] <-> DOM_A[0..7]
19,21 MAA_A[0..14] <-> MAA_A[0..14] 20,21 MAA_B[0..14] <-> MAA_B[0..14]



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

V_1P25_CORE

U10C

12 DMI_MCH_IT_MR_0_DP
12 DMI_MCH_IT_MR_0_DN
12 DMI_MCH_IT_MR_1_DP
12 DMI_MCH_IT_MR_1_DN
12 DMI_MCH_IT_MR_2_DP
12 DMI_MCH_IT_MR_2_DN
12 DMI_MCH_IT_MR_3_DP
12 DMI_MCH_IT_MR_3_DN

DMI_MCH_IT_MR_0_DP
DMI_MCH_IT_MR_0_DN
DMI_MCH_IT_MR_1_DP
DMI_MCH_IT_MR_1_DN
DMI_MCH_IT_MR_2_DP
DMI_MCH_IT_MR_2_DN
DMI_MCH_IT_MR_3_DP
DMI_MCH_IT_MR_3_DN

W2
V2
Y8
Y9
AA7
AA8
AA3
AA4

DMI_RXP0
DMI_RXN0
DMI_RXP1
DMI_RXN1
DMI_RXP2
DMI_RXN2
DMI_RXP3
DMI_RXN3

15 CK_PE_100M_MCH
15 CK_PE_100M_MCH#

SDVO_CTRL_DATA
SDVO_CTRL_CLK

SDVO_CTRL_DATA
SDVO_CTRL_CLK

G17
E17

SDVO_CTRL_DATA
SDVO_CTRL_CLK

15,16 H_BSL0
15,16 H_BSL1
15,16 H_BSL2

H_BSL0
H_BSL1
H_BSL2

G20
J20
J18

BSEL0
BSEL1
BSEL2

V_1P25_CORE
22 EXP_PRSNT_N

R193 1KR0402 EXP_SLR
R191 0R0402 EXP_EN

G18
E18
J17

RESERVED53
EXP_SLR
EXP_EN

Stuff 0-ohm for P31

VCC1_5REF

V_1P25_CORE
V_1P25_CORE

R482 X 0R0402 VCC_CL_PLL
CP33

Y32
C23
A24
A22
C22
B15

VCCA_HPLL
VCCA_MPLL
VCCA_DPLLA
VCCA_DPLLB
VCCA_GPLL
VCCA_EXPPLL

Stuff 0-ohm for P31

V_1P25_CORE
V_1P25_CORE

CP10
CP11

L16
X 80L4 30_1206

I = 22.5mA

V_1P25_CORE

L8 1
CP4 2 X 0.1U50m

VCCA_MPLL

C169 X_C0.22U16X
C170 C0.1U16Y0402

I = 90.6mA

V_1P25_CORE

L11 1
CP7 2 X 0.1U50m

VCCA_DPLLB

C184 C0.1U10Y0805
C176 C0.1U16Y0402

I = 90.6mA

V_1P25_CORE

L10 1
CP6 2 X 0.1U50m

VCCA_DPLLA

C182 C0.1U10Y0805
C175 C0.1U16Y0402

I = 67.9mA

V_1P25_CORE

L9 1
CP5 2 X 0.1U50m

VCCA_HPLL

C177 C0.1U10Y0805
C174 C0.1U16Y0402

I = 71.6mA

V_1P25_CORE

L14 1
CP8 2 X 0.1U50m

VCCA_GPLL

C195 C0.1U10Y0805
C198 C0.1U16Y0402

I = 0.36mA

VCC3

L5 1
CP9 2 X 0.1U50m

VCCA_EXP

C201 C0.1U10Y0805
C197 C0.1U16Y0402
C193 C0.01U25X0402

VCCA_HPLL
VCCA_MPLL
VCCA_DPLLA
VCCA_DPLLB
VCCA_DAC
VCCD_CRT
VCCDQ_CRT
VCCA_EXPPLL
VCC_SMCLK

Min Vout -- 1.121V
Min Vout -- 1.128V
Min Vout -- 1.132V
Min Vout -- 1.131V
Min Vout -- 3.14V
Min Vout -- 1.425V
Min Vout -- 1.425V
Min Vout -- 1.129V

BSEL			TABLE
			PSB FREQUENCY
2	1	0	200 MHZ (800)
0	1	0	133 MHZ (533)
0	0	1	

EXP_TXP0
EXP_TXN0
EXP_TXP1
EXP_TXN1
EXP_TXP2
EXP_TXN2
EXP_TXP3
EXP_TXN3
EXP_TXP4
EXP_TXN4
EXP_TXP5
EXP_TXN5
EXP_TXP6
EXP_TXN6
EXP_TXP7
EXP_TXN7
EXP_TXP8
EXP_TXN8
EXP_TXP9
EXP_TXN9
EXP_TXP10
EXP_TXN10
EXP_TXP11
EXP_TXN11
EXP_TXP12
EXP_TXN12
EXP_TXP13
EXP_TXN13
EXP_TXP14
EXP_TXN14
EXP_TXP15
EXP_TXN15

D11
D12
B11
A10
C10
D9
B9
B7
D7
D6
B5
B6
B3
B4
F2
F2
F2
F4
C4
J4
K3
L2
K1
N2
M2
P3
M4
B2
S1
U2
T2
V3
U4

EXP_A_TXP_0_22
EXP_A_TXN_0_22
EXP_A_TXP_1_22
EXP_A_TXN_1_22
EXP_A_TXP_2_22
EXP_A_TXN_2_22
EXP_A_TXP_3_22
EXP_A_TXN_3_22
EXP_A_TXP_4_22
EXP_A_TXN_4_22
EXP_A_TXP_5_22
EXP_A_TXN_5_22
EXP_A_TXP_6_22
EXP_A_TXN_6_22
EXP_A_TXP_7_22
EXP_A_TXN_7_22
EXP_A_TXP_8_22
EXP_A_TXN_8_22
EXP_A_TXP_9_22
EXP_A_TXN_9_22
EXP_A_TXP_10_22
EXP_A_TXN_10_22
EXP_A_TXP_11_22
EXP_A_TXN_11_22
EXP_A_TXP_12_22
EXP_A_TXN_12_22
EXP_A_TXP_13_22
EXP_A_TXN_13_22
EXP_A_TXP_14_22
EXP_A_TXN_14_22
EXP_A_TXP_15_22
EXP_A_TXN_15_22

DMI_TXP0
DMI_TXN0
DMI_TXP1
DMI_TXN1
DMI_TXP2
DMI_TXN2
DMI_TXP3
DMI_TXN3

C231
C232
C209
C210
C214
C215
C205
C204

C0.1U16Y0402
C0.1U16Y0402
C0.1U16Y0402
C0.1U16Y0402
C0.1U16Y0402
C0.1U16Y0402
C0.1U16Y0402
C0.1U16Y0402

DMI_ICH_MT_IR_0_DP
DMI_ICH_MT_IR_0_DN
DMI_ICH_MT_IR_1_DP
DMI_ICH_MT_IR_1_DN
DMI_ICH_MT_IR_2_DP
DMI_ICH_MT_IR_2_DN
DMI_ICH_MT_IR_3_DP
DMI_ICH_MT_IR_3_DN

EXP_COMP0
EXP_COMP1

AC11
AC12

GRCOMP
R226
24.9R1%0402

OV_1P25_CORE

HSYNC
VSYNC
RED
GREEN
BLUE

C15
D15
C18
D18
C19
D19
B20

HSYNC
VSYNC
VGA_RED
VGA_GREEN
VGA_BLUE

28
28
28
28
28
28

DDC_DATA
DDC_CLK
DREFCLKP
DREFCLKN
REFSET

L13
M13
C14
D13
A20

MCH_DDC_DATA
MCH_DDC_CLK
DOTCLK
DOTCLK#
REFSET

28
28
28
28
28

PWROK2
V_1P25_PLTRST#
VREF2
RESERVED54
RESERVED55
ALLZTEST
XORTEST
RESERVED56

AM15
AM5
AD12
AD12
K20
E20
A14

MCH_C_PWROK
CL_RST#
CL_RST#
CL_RST#
TP#8
TP#19
TP#17

8.13,29
8.12,16

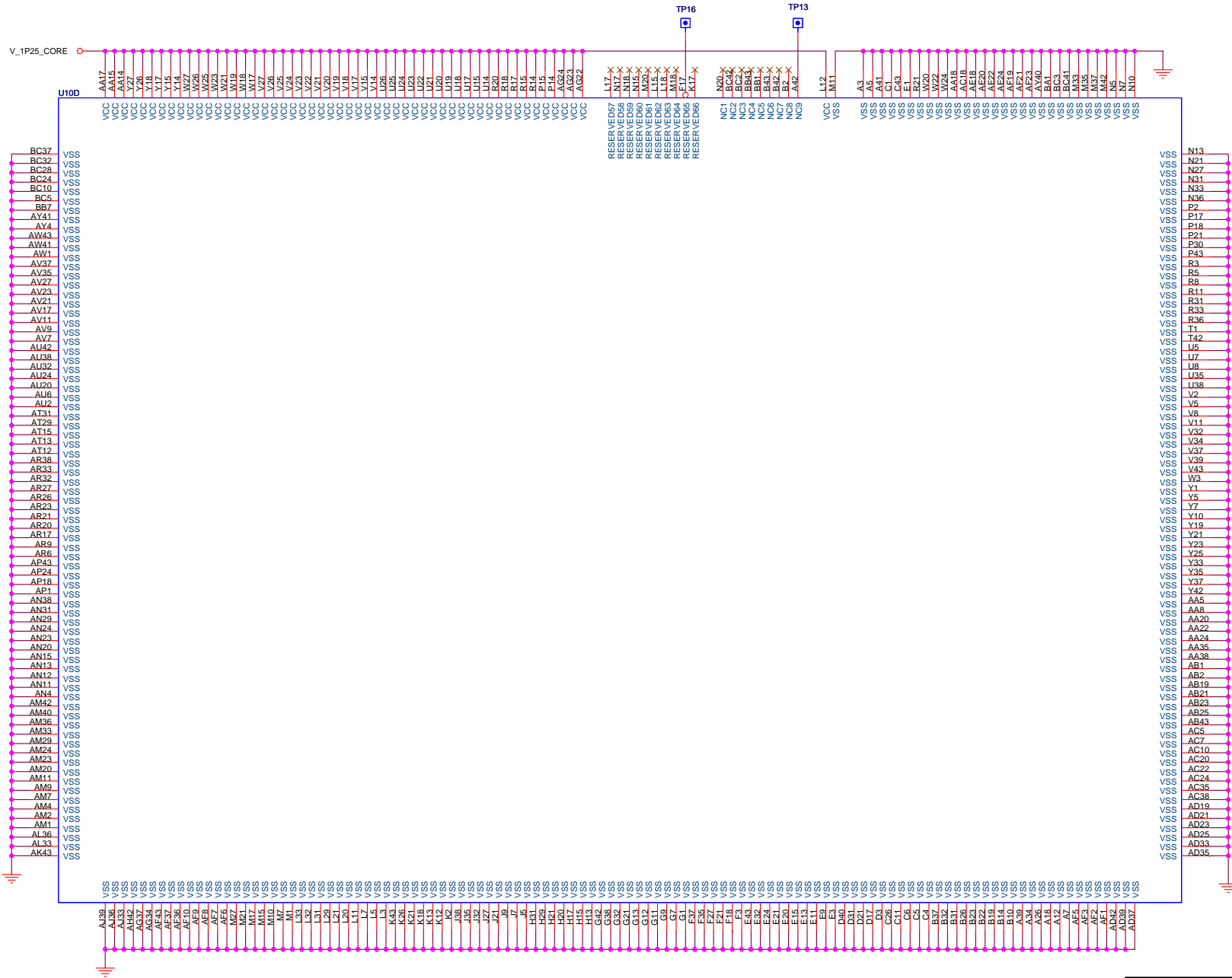
R241
R246
C249
R211
C206

1.65KR1%0402
1KR0402
C0.01U25X0402
392R1%0402
C0.01U25X0402

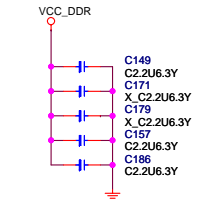
CL_VREF_MCH = 0.352V (FOR NOW)

MICRO-STAR INT'L CO., LTD.

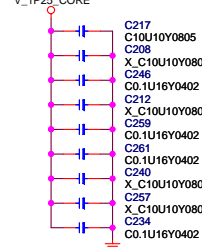
Title Intel Bearlake G31 - CPU Signals
Size Document Number MS-7392
Date: Monday, May 12, 2008 Sheet 10 of 35



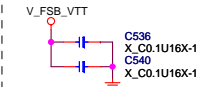
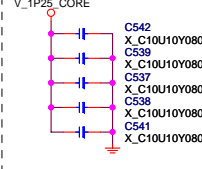
Place close to GMCH




MCH CORE DECOUPLING



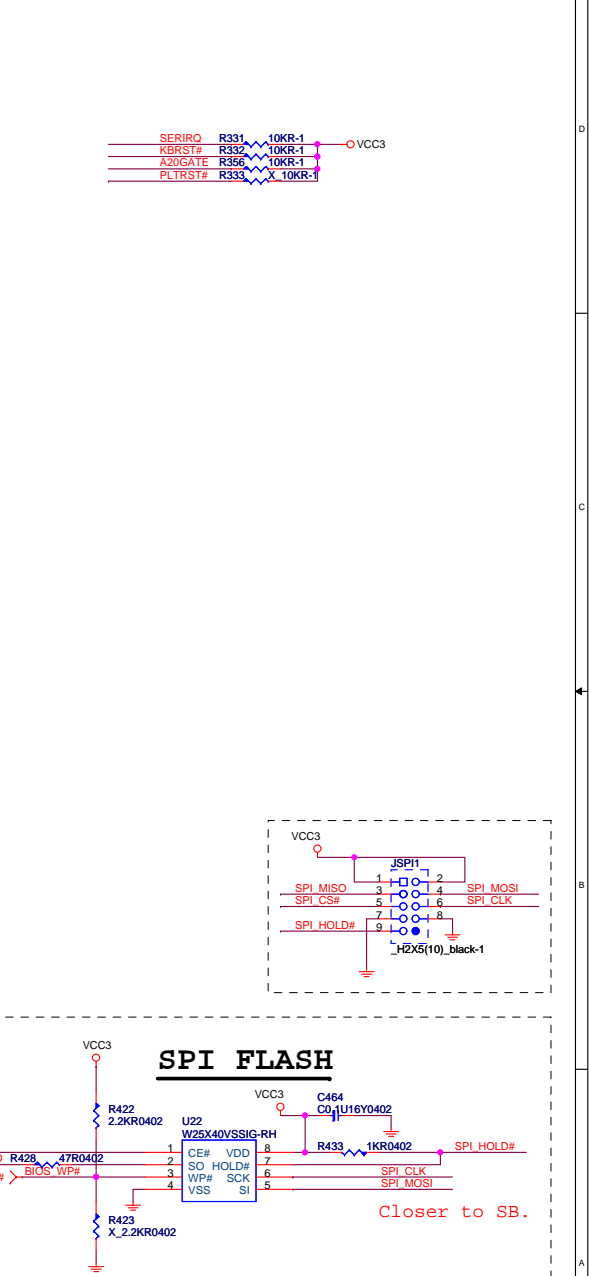
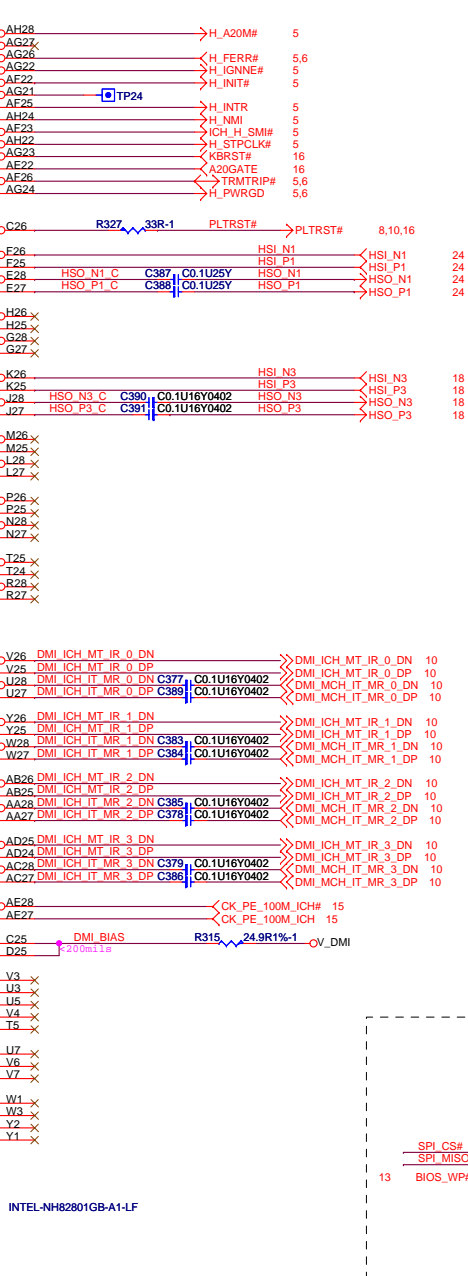
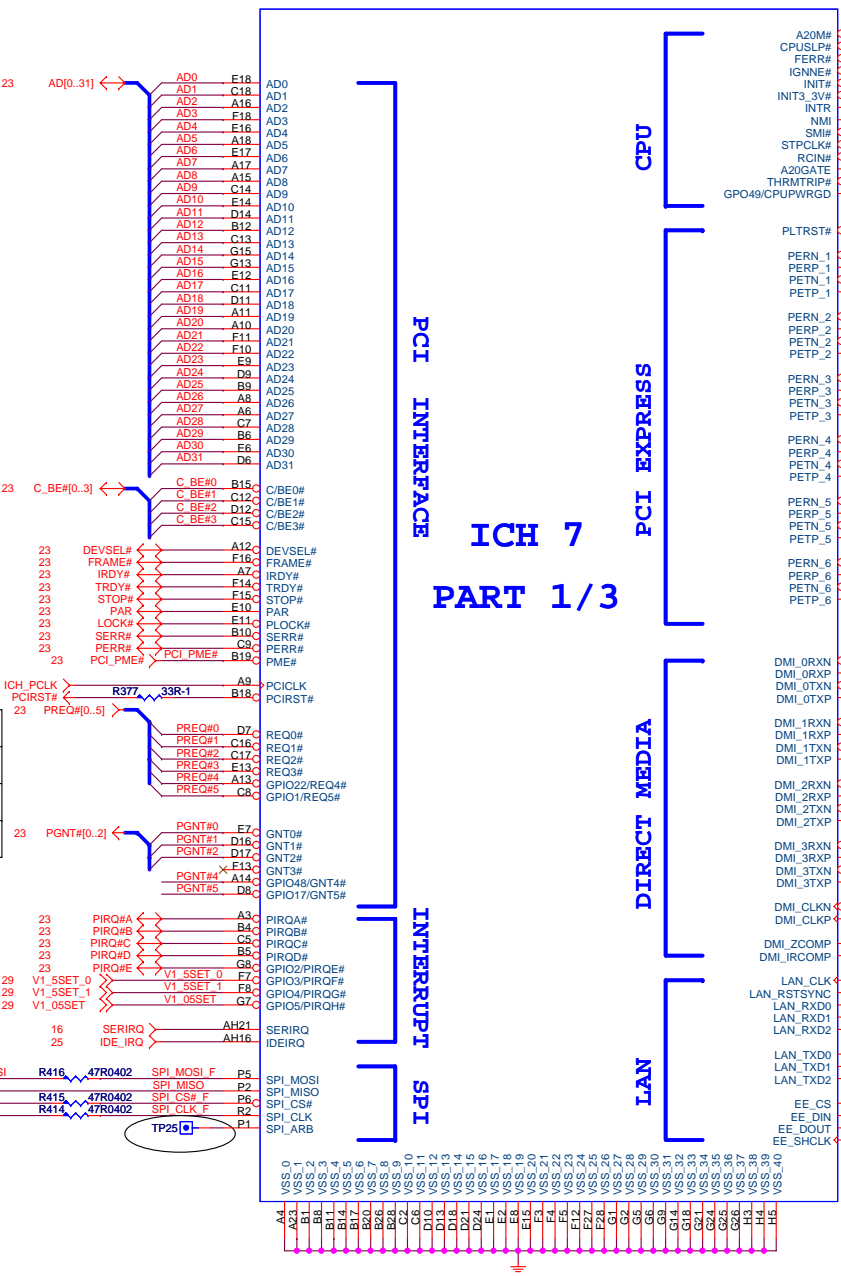
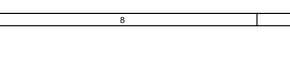
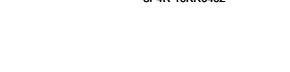
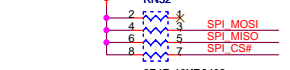
5020 Parts

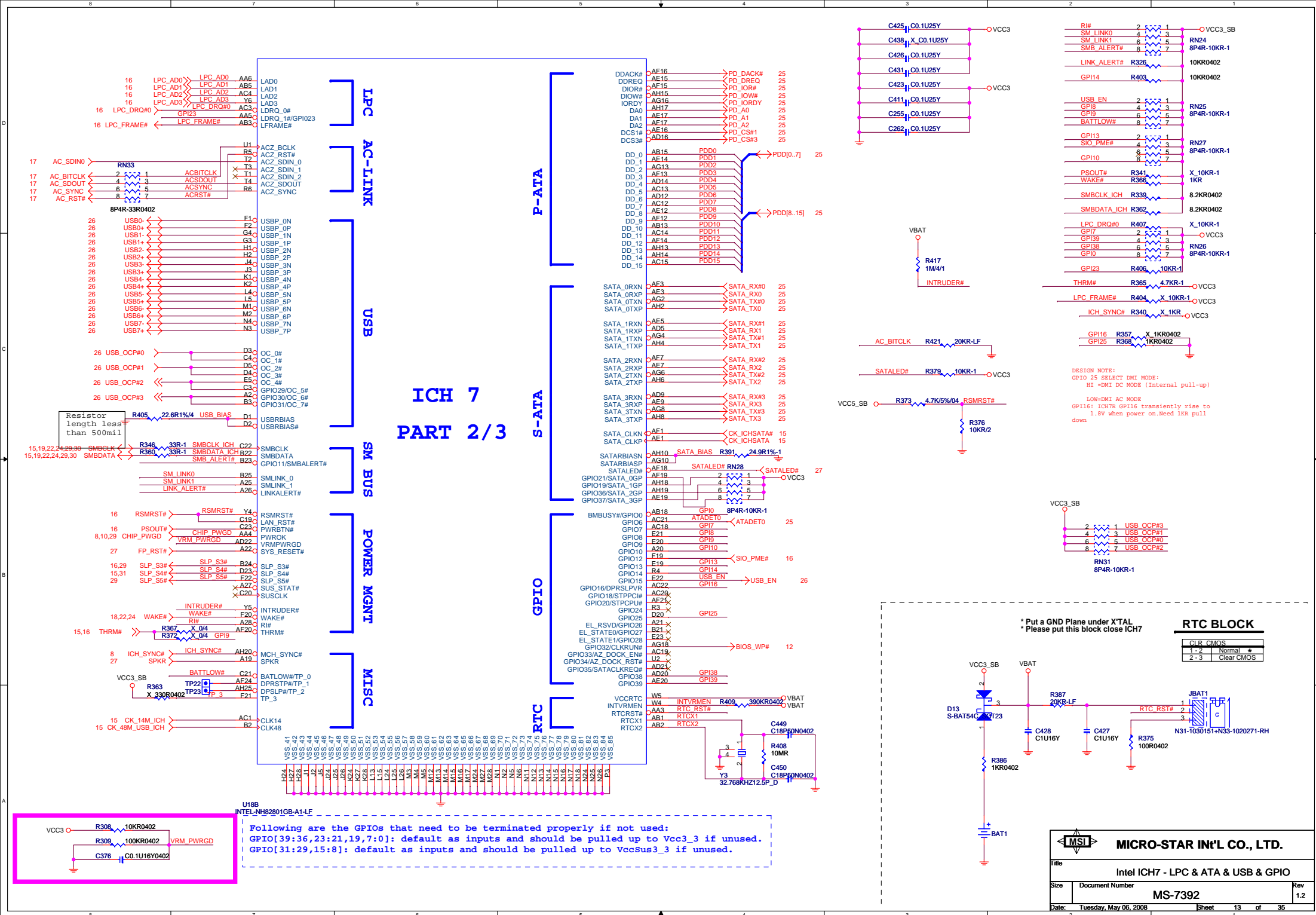


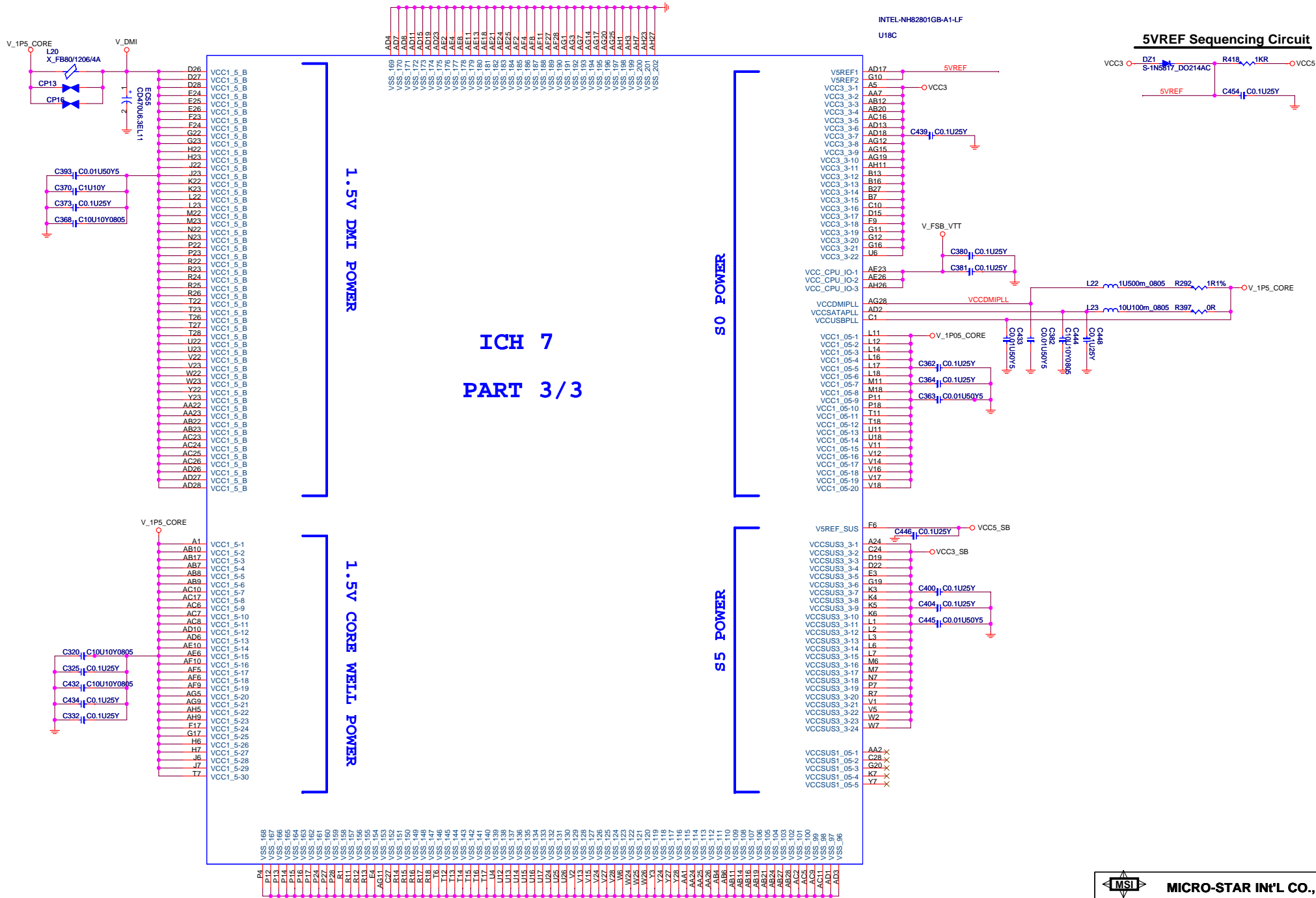
INTEL-NR88BOVBVA[G31]-A1-RH

 MICRO-STAR INT'L CO., LTD.		
Title Intel Bearlake G31 - CPU Signals		
Size	Document Number	Rev 1.2
MS-7392		
Date: Monday, May 12, 2008	Sheet 11	of 35

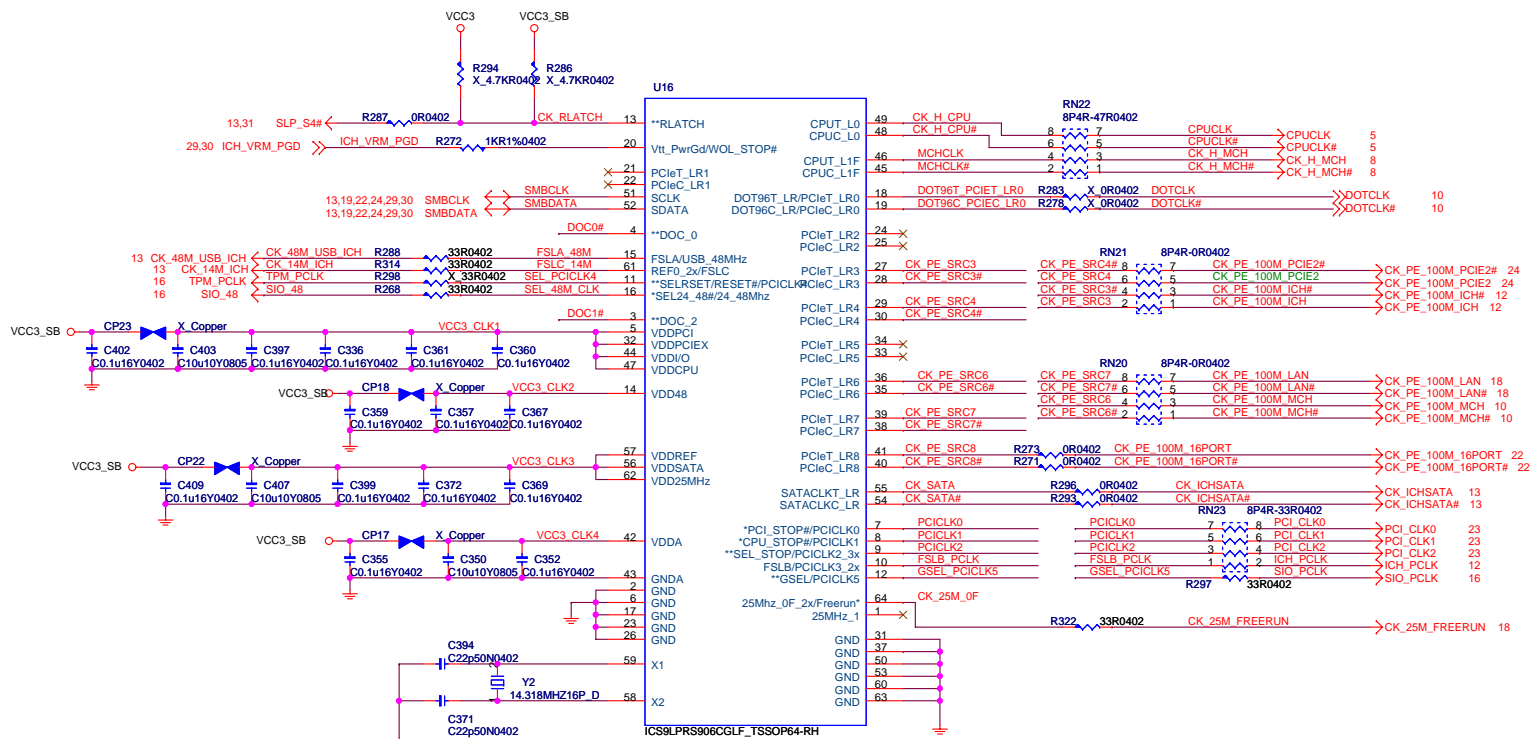
GNT5#	GNT4#	ROUTING
0	1	Flash Cycles Routed to SPI
1	0	Flash Cycles Routed to PCI
1	1	Flash Cycles Routed to LPC



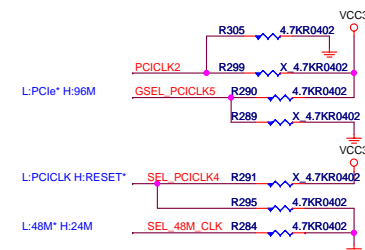




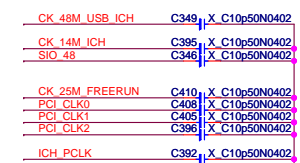
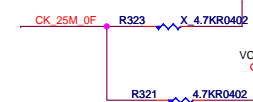
Clock Generator - ICS9LPRS906CGLF



CLOCK GEN STRAPING



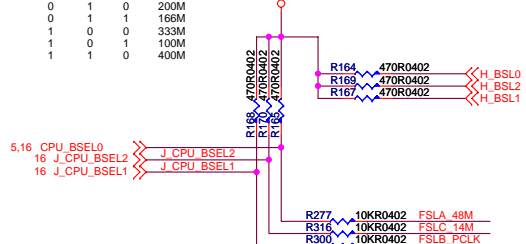
25MHz freerun function



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

V_FSB_VTT



JFSB1

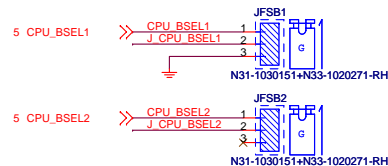
```
Plug 1--2
200MHZ-->200MHZ
Plug 2--3
200MHZ-->266MHZ
```

JFSB2

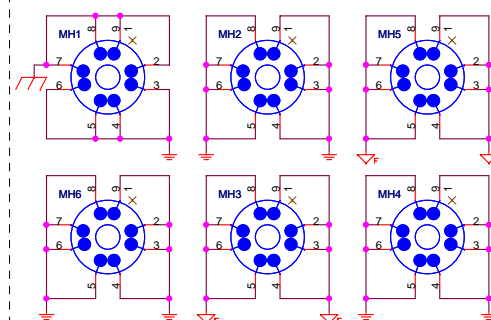
```
Plug 1--2
266MHZ-->266MHZ
Plug 2--3
266MHZ-->333MHZ
```

JFSB1

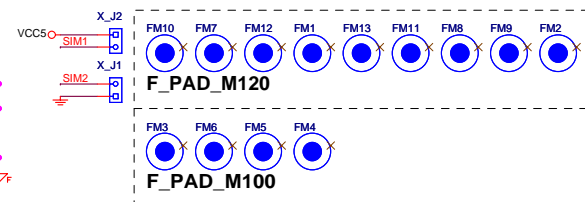
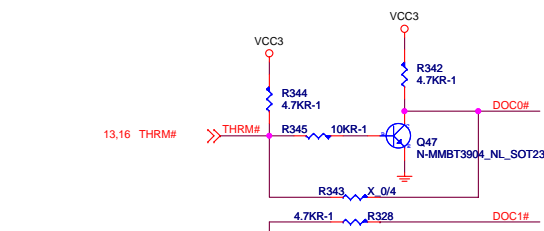
Open
JFSB2
2 or 2--3 or Open
MHZ-->400MHZ




Mounting Holes

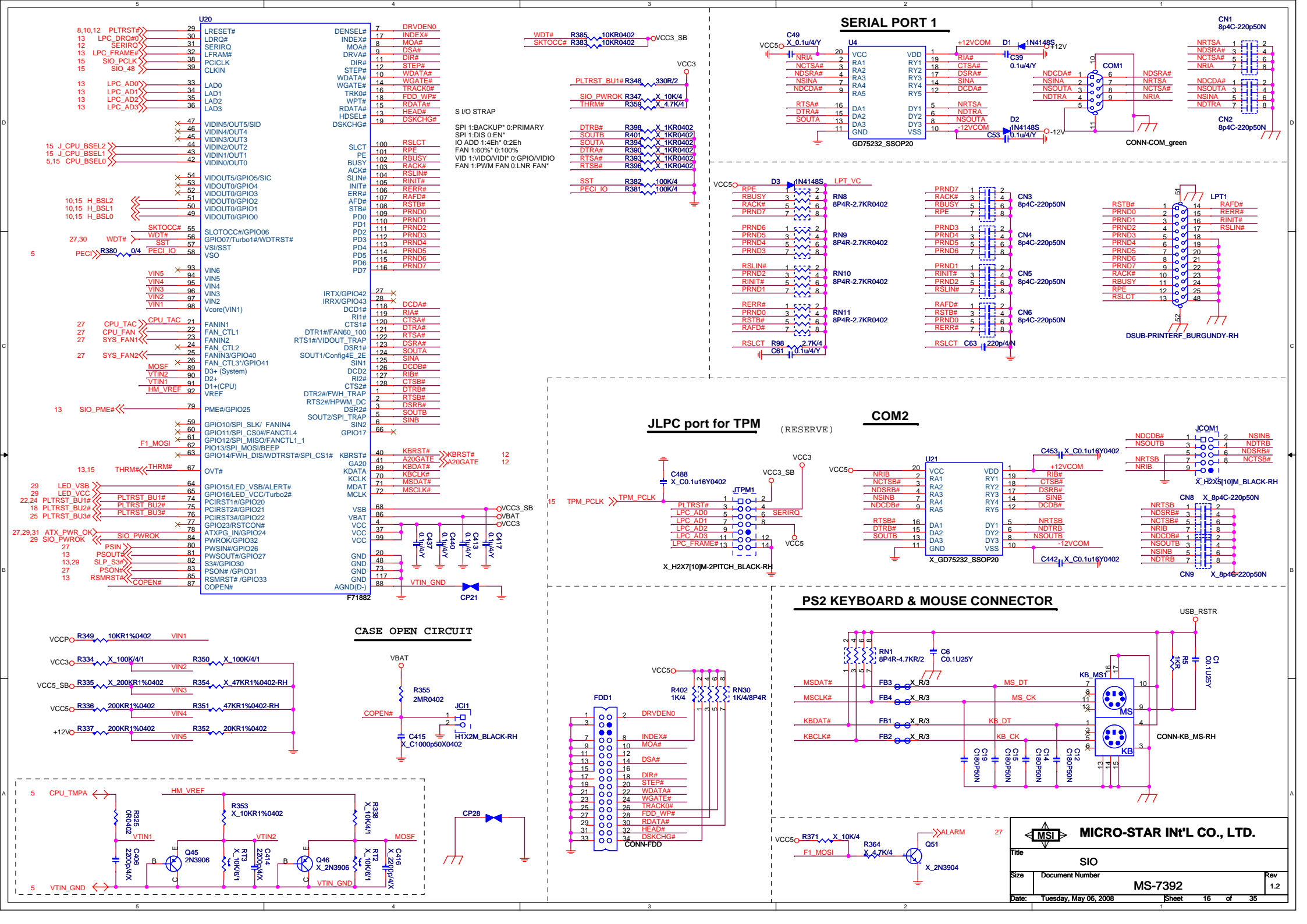


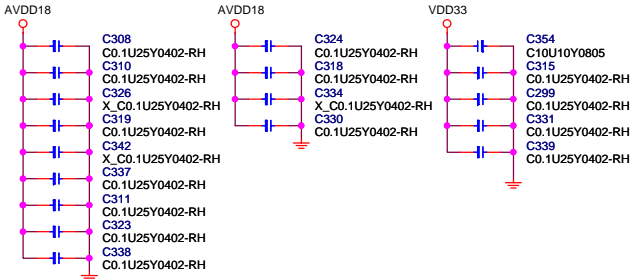
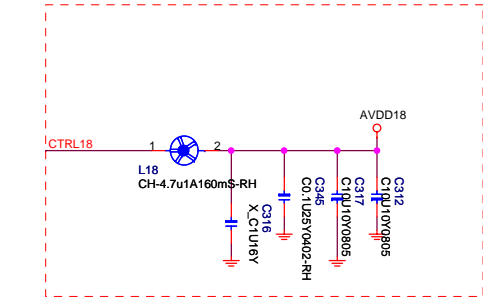
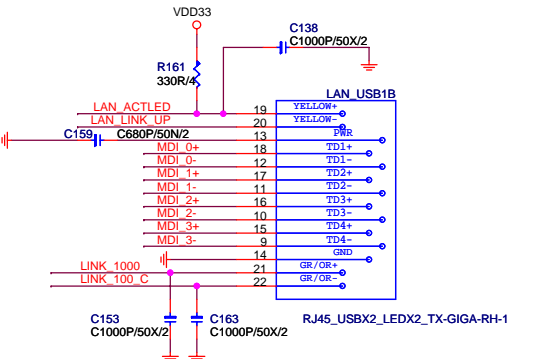
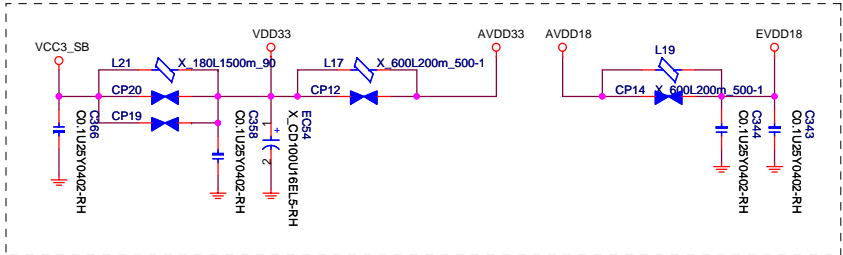
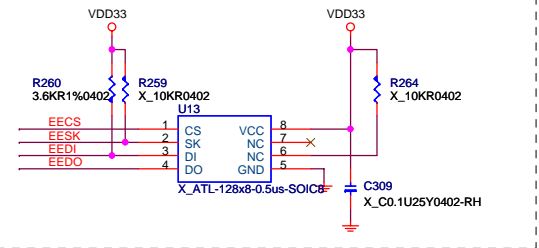
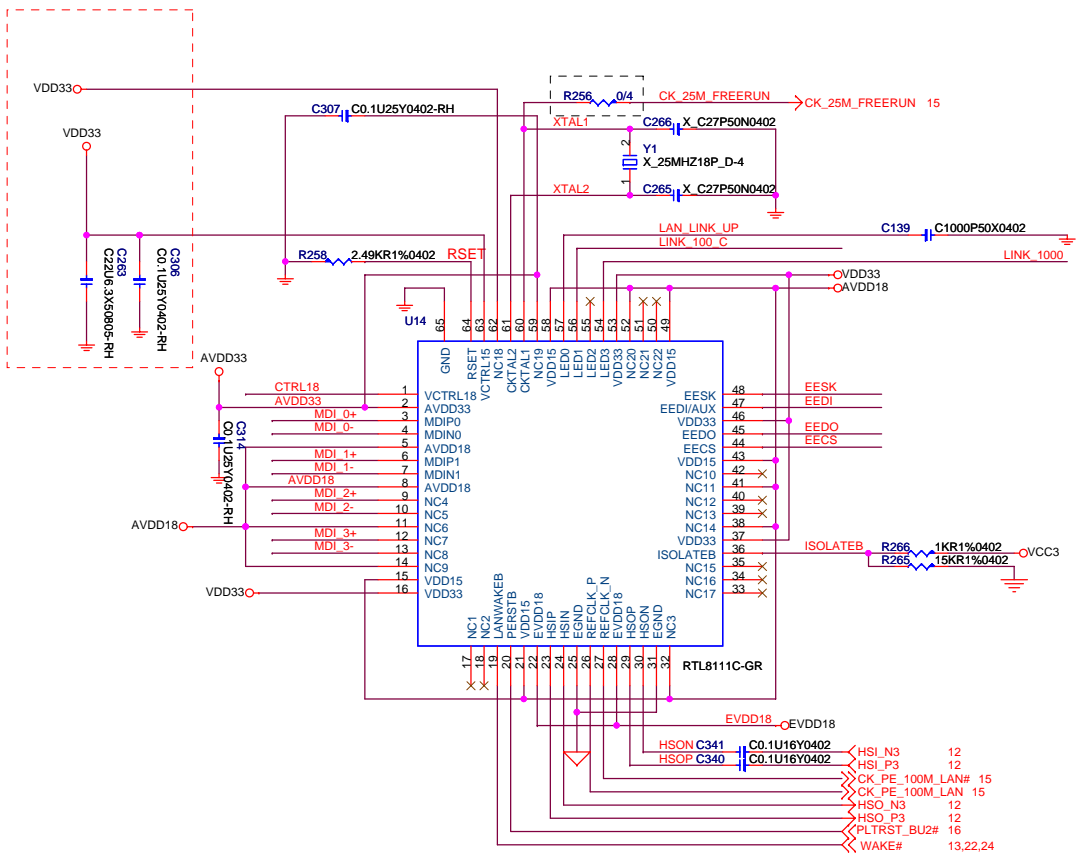
Optics Orientation Holes



For 400MHz CPU Support

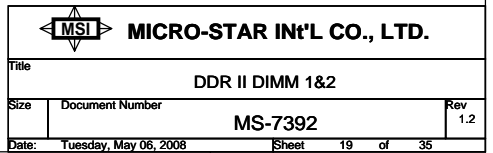
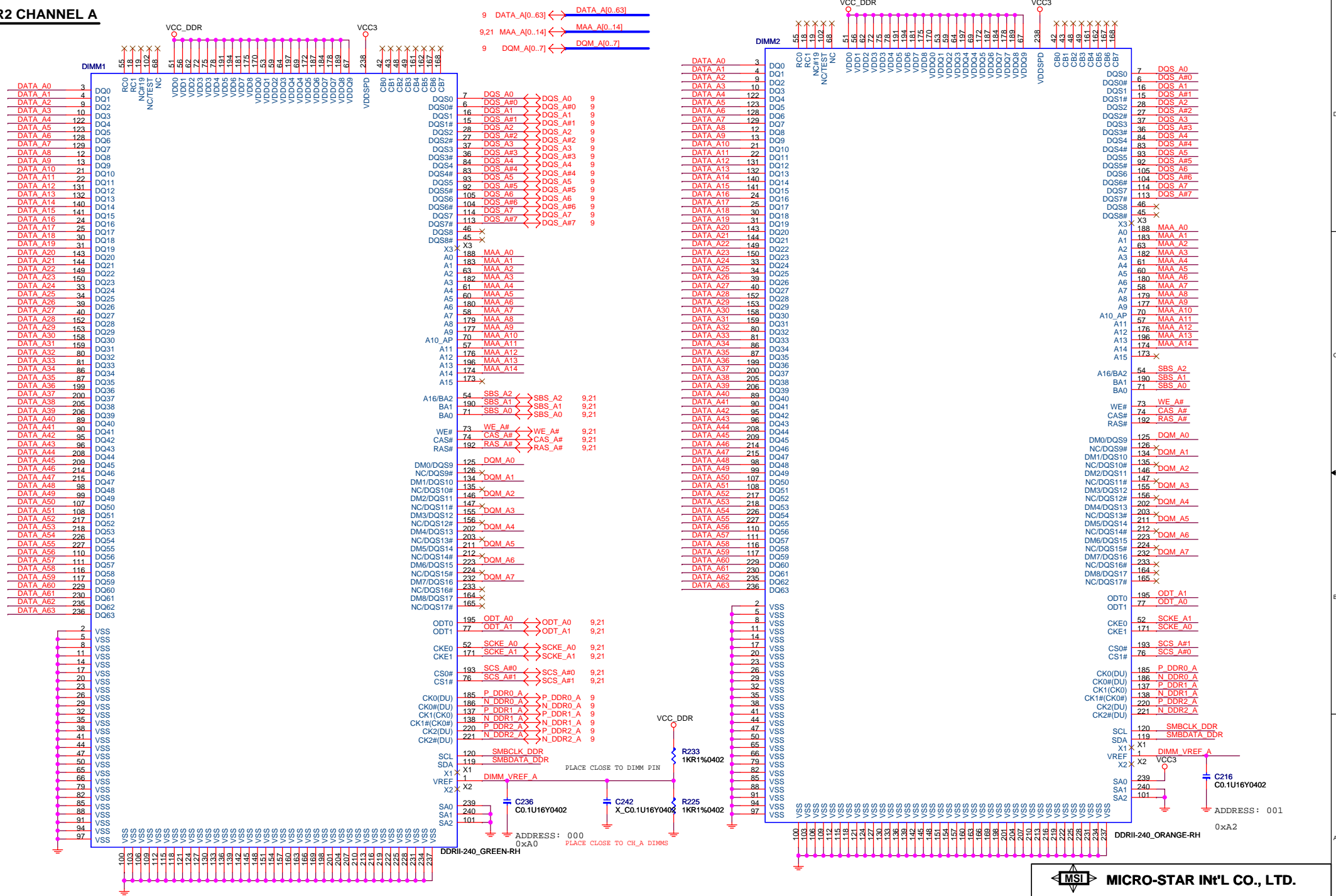
 MICRO-STAR INT'L CO., LTD.	
Title	
Clock - ICS9LPRS514EGLF	
Size	Document Number
	MS-7392
Date:	Tuesday, May 06, 2008
Sheet	15 of 35



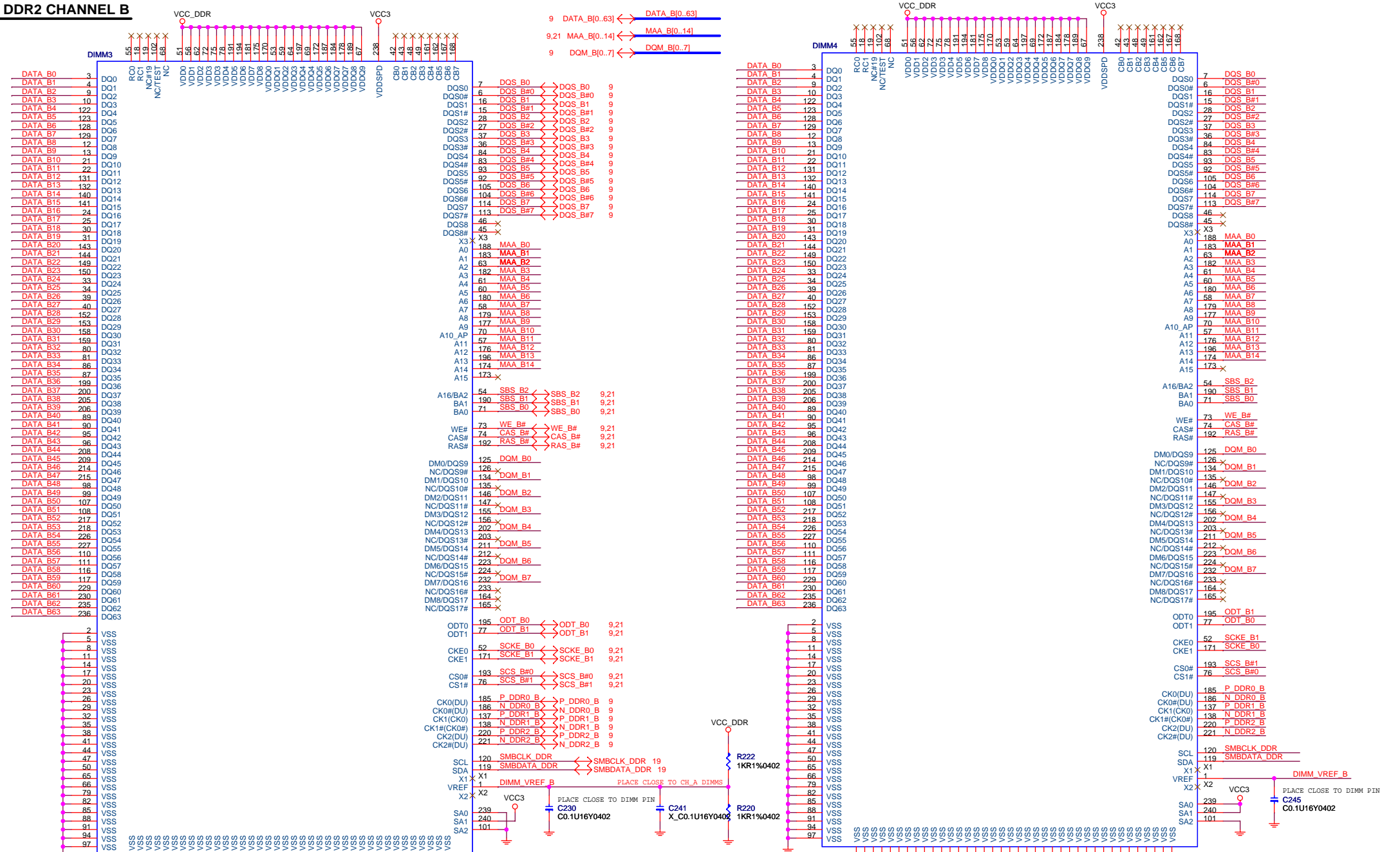


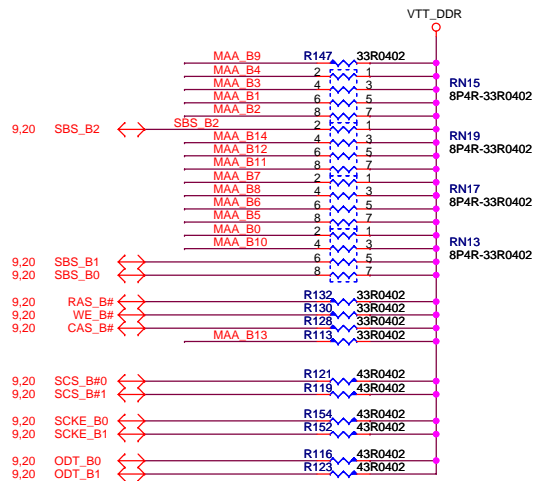
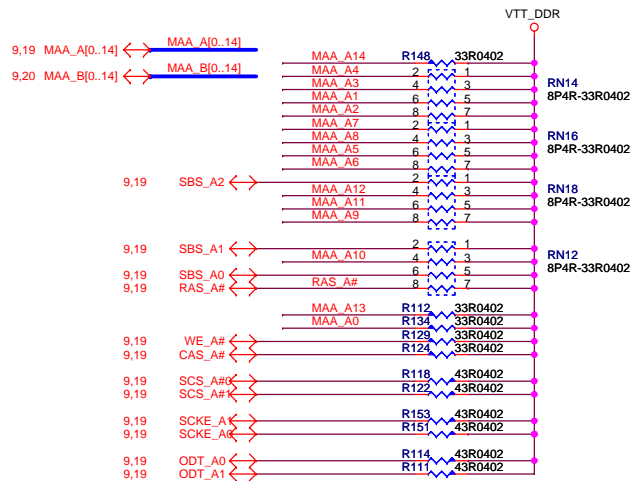
Giga-Lan		10/100-Lan	
N58-22P0181-S42		N58-22P0201-S42	
Link	Yellow	Link	Yellow
Active	Blinking	Active	Blinking
1000	Orange	100	Green
100	Green	10	None
10	None		
19		19	
20	Yellow	20	Yellow
21	Orange	21	
22	Green	22	Green

DDR2 CHANNEL A

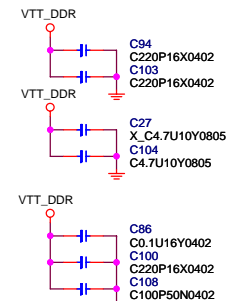


DDR2 CHANNEL B

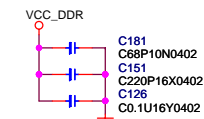
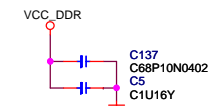
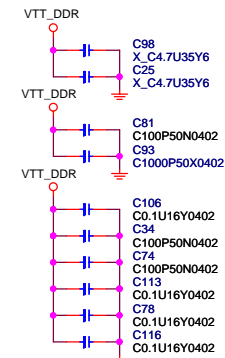




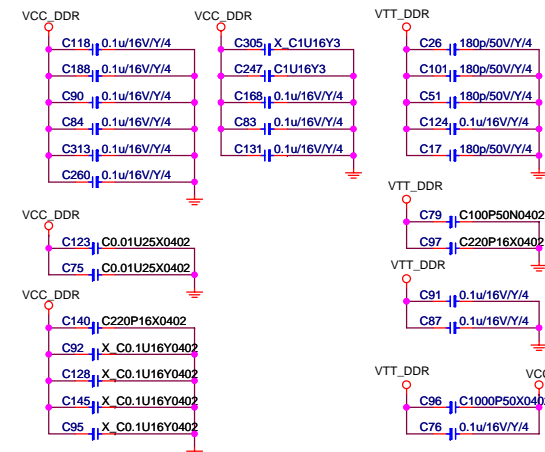
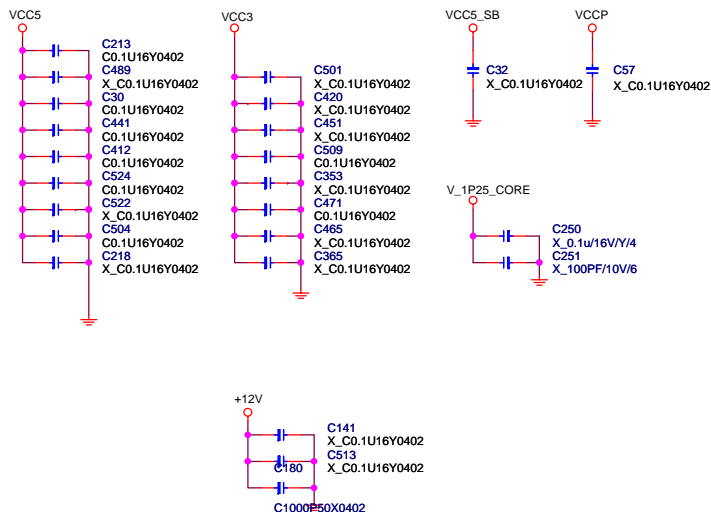
CHANNEL A V_SM_VTT DECOUPLING CAPS



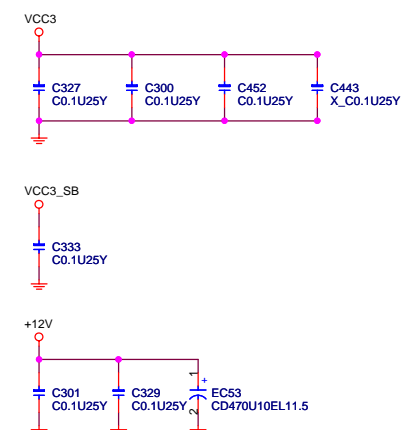
CHANNEL B V_SM_VTT DECOUPLING CAPS



FOR EMI RESERVED



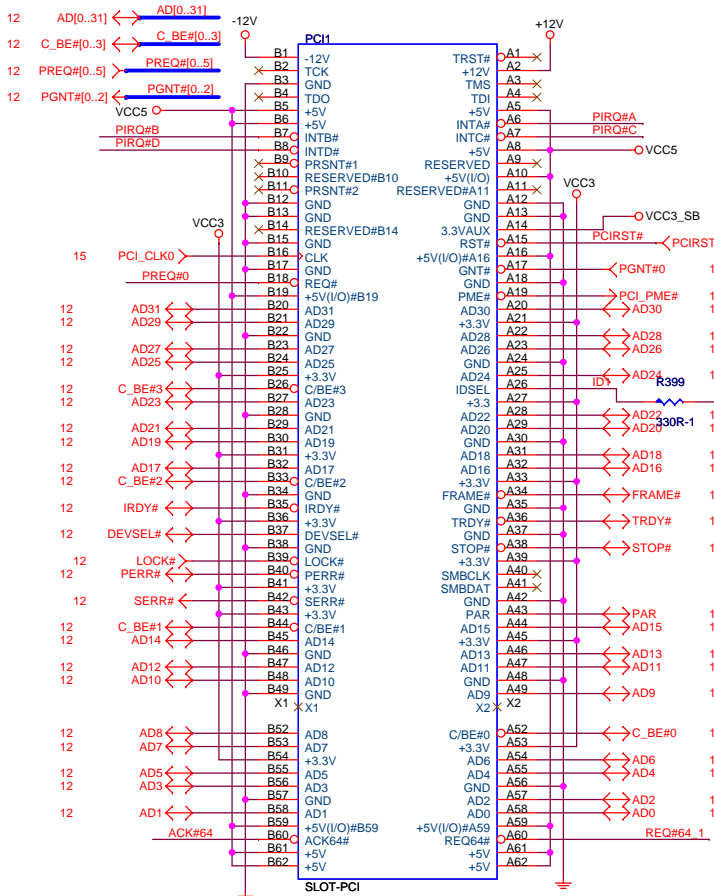
FOR EMI RESERVED



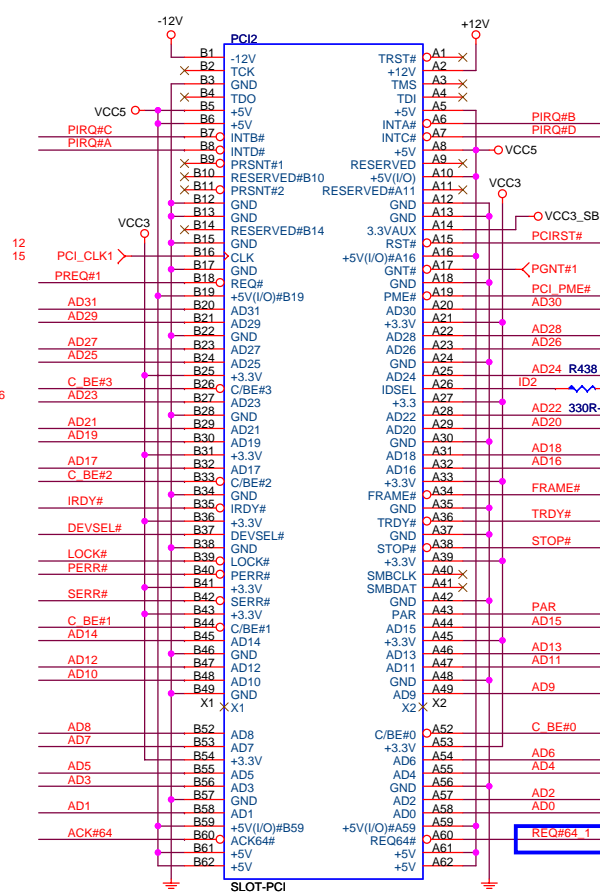
PCI SLOT 1 (PCI VER: 2.2 COMPLY)

PCI SLOT 2 (PCI VER: 2.2 COMPLY)

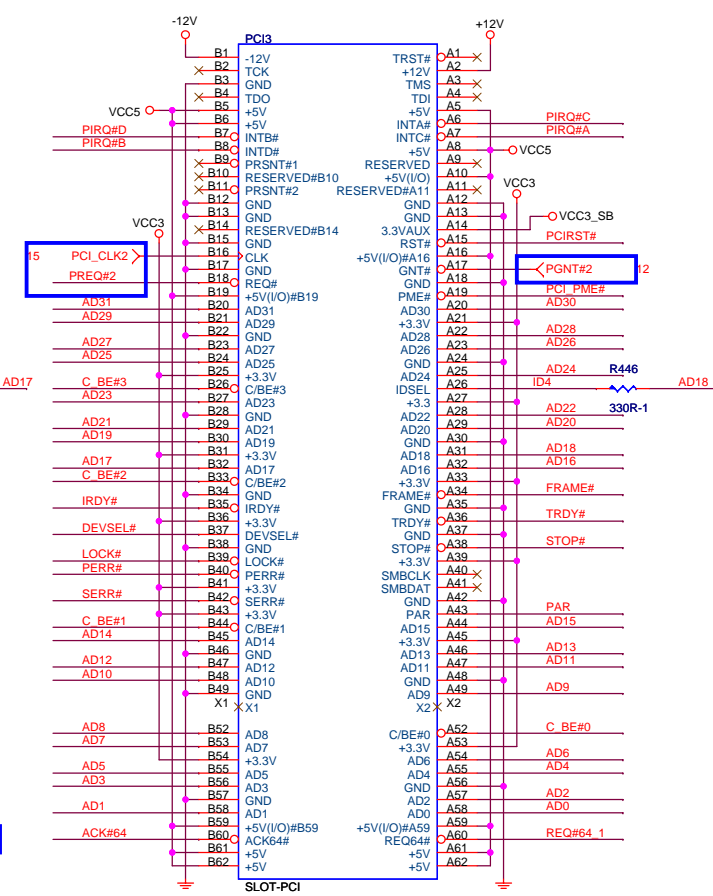
PCI SLOT 3 (PCI VER: 2.2 COMPLY)



IDSEL = AD16
MASTER = PREQ#0
PIRQ#A

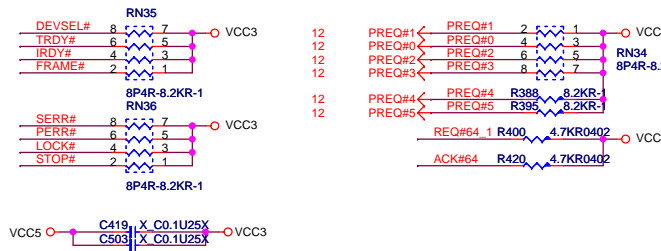


IDSEL = AD17
MASTER = PREQ#1
PIRQ#B

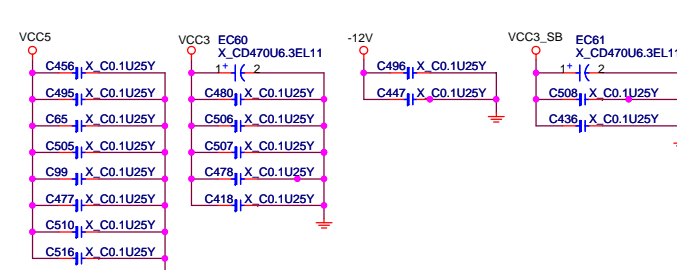


IDSEL = AD18
MASTER = PREQ#2
PIRQ#C

PCI PULL-UP / DOWN RESISTORS



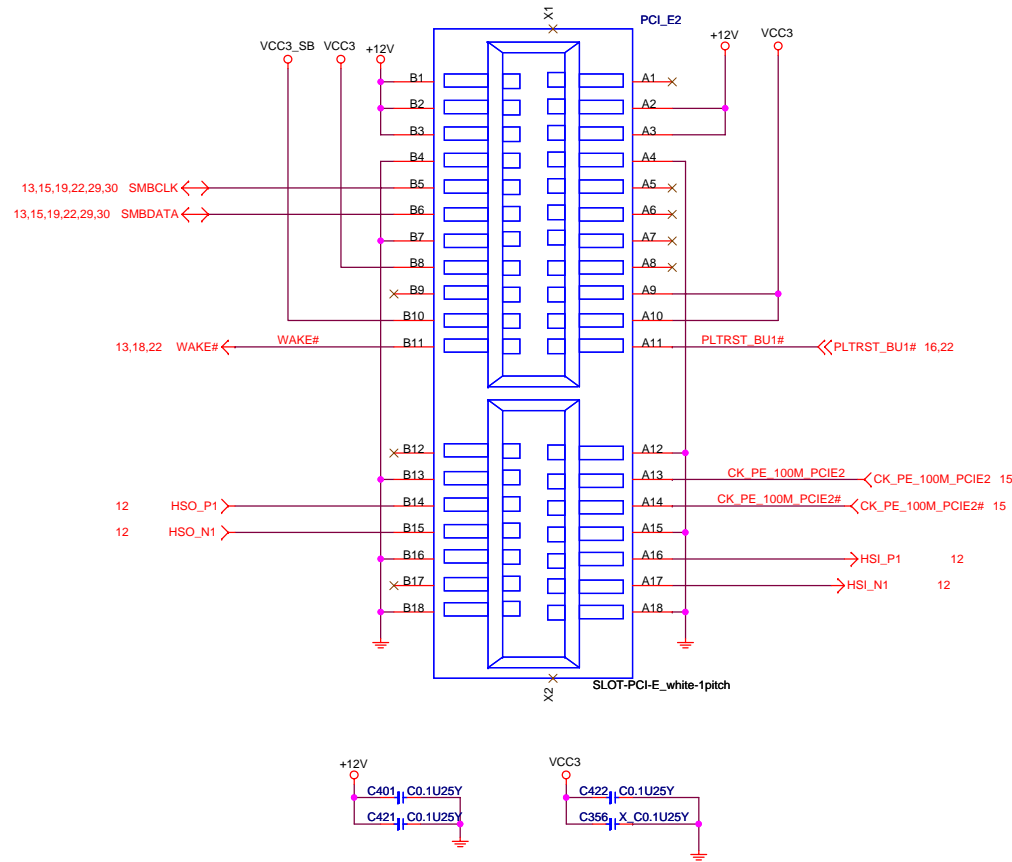
PCI SLOT DECOUPLING CAPACITORS



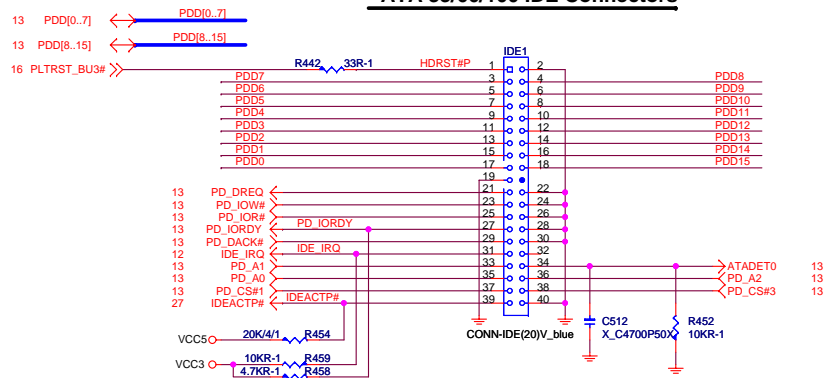
MSI MICRO-STAR INT'L CO., LTD.

Title: PCI 1~4 Slots
Size: Document Number: MS-7392
Date: Tuesday, May 06, 2008 Sheet: 23 of 35

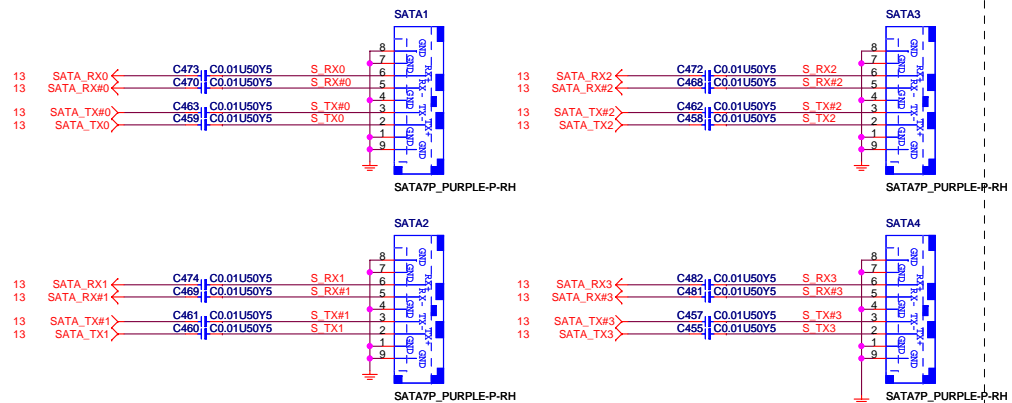
PCI EXPRESS 1-PORT



ATA 33/66/100 IDE Connectors



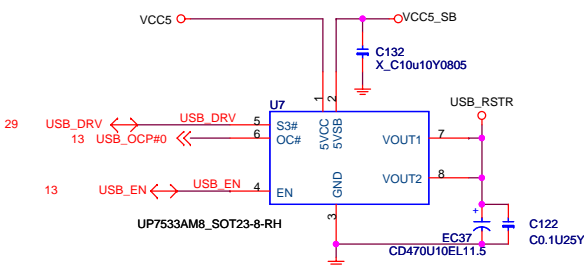
SERIAL ATA CONNECTOR BLOCK



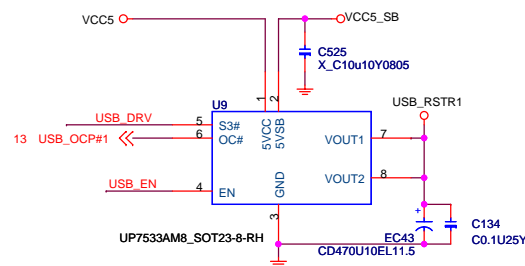
MICRO-STAR INT'L CO., LTD.

Title			ATA33/66/100 IDE & SATA Connectors
Size	Document Number	MS-7392	
Date:	Tuesday, May 06, 2008	Sheet	25 of 35
			Rev 1.2

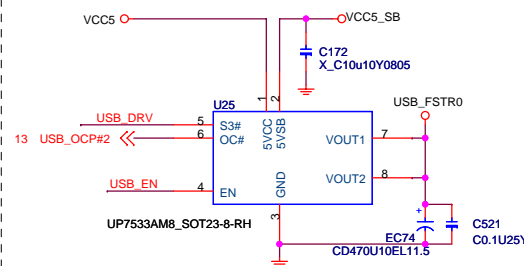
POWER CIRCUIT FOR USB PORT 0,1



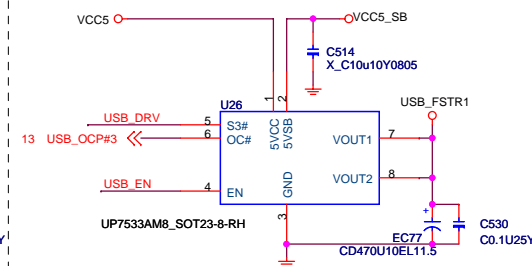
POWER CIRCUIT FOR USB PORT 2,3



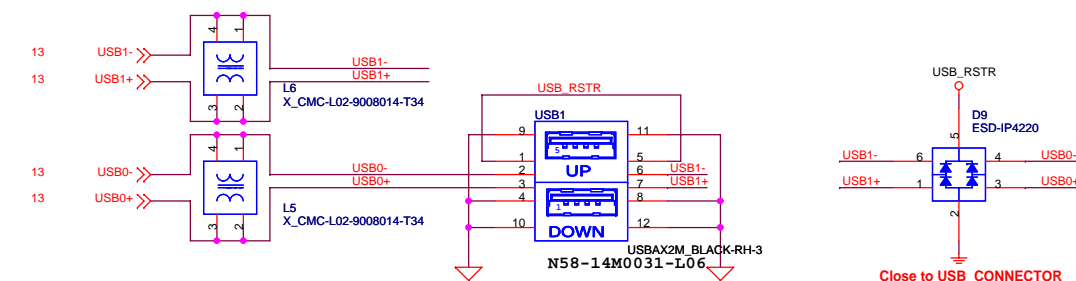
POWER CIRCUIT FOR USB PORT 4,5



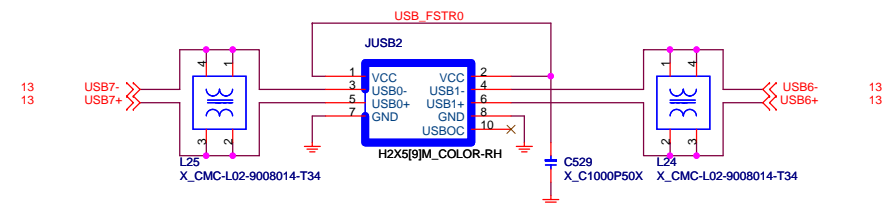
POWER CIRCUIT FOR USB PORT 6,7



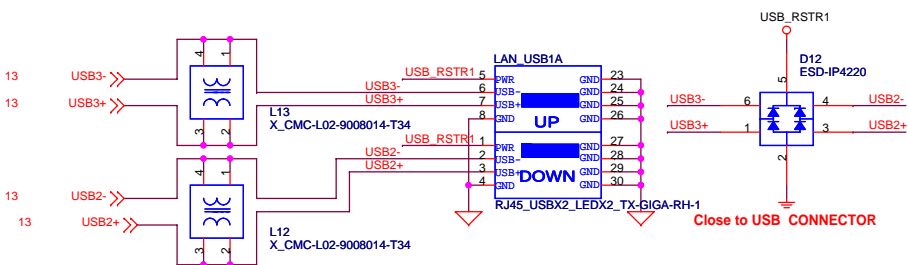
REAR PANEL USB CONNECTOR FOR USB PORT 0,1



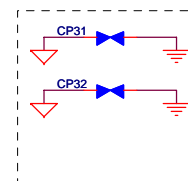
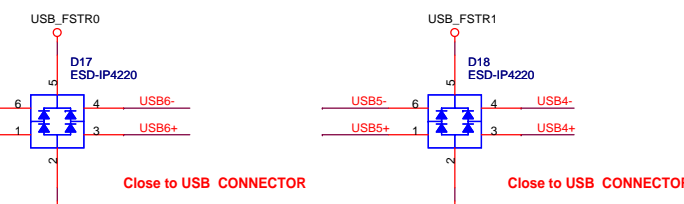
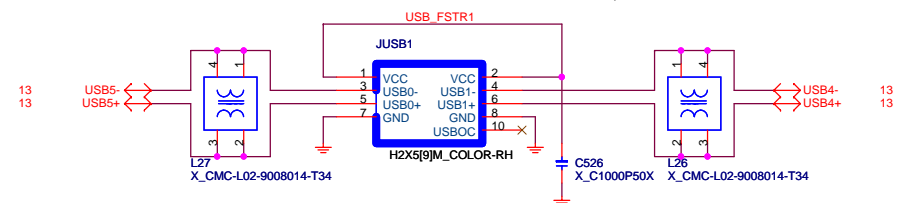
FRONT PANEL USB CONNECTOR FOR USB PORT 6,7



REAR PANEL USB CONNECTOR FOR USB PORT 2,3

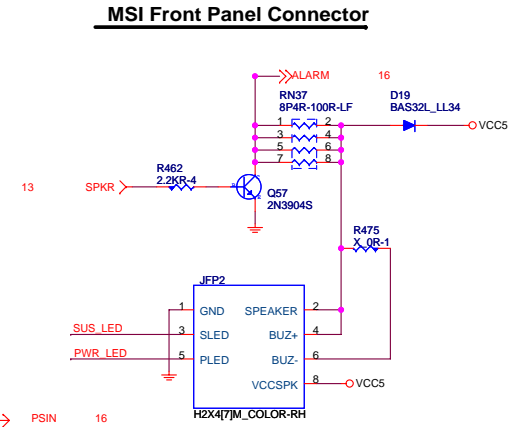
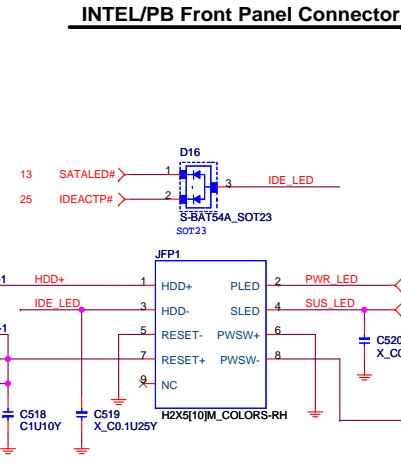
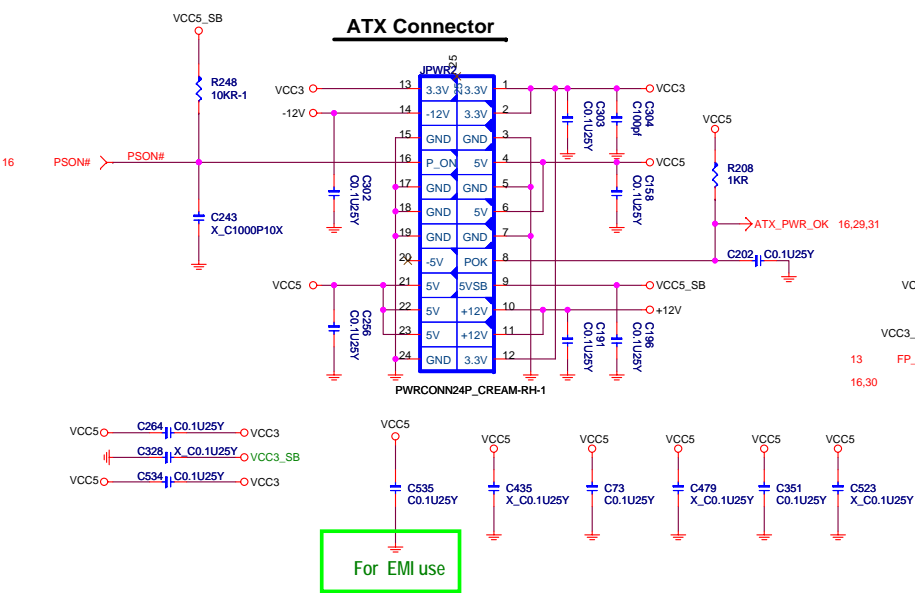


FRONT PANEL USB CONNECTOR FOR USB PORT 4,5

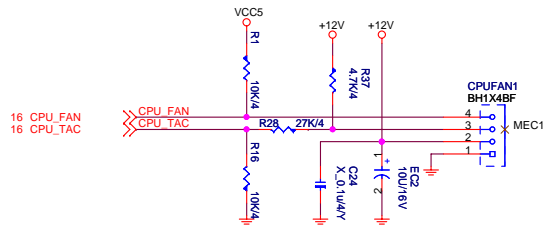


MICRO-STAR INT'L CO., LTD.

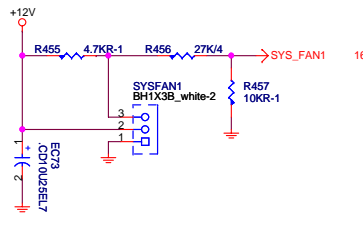
Title			
USB Connectors			
Size	Document Number	Rev	
	MS-7392	1.2	
Date:	Tuesday, May 06, 2008	Sheet	26 of 35



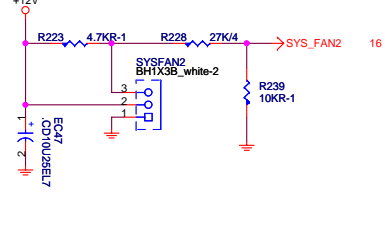
CPU FAN



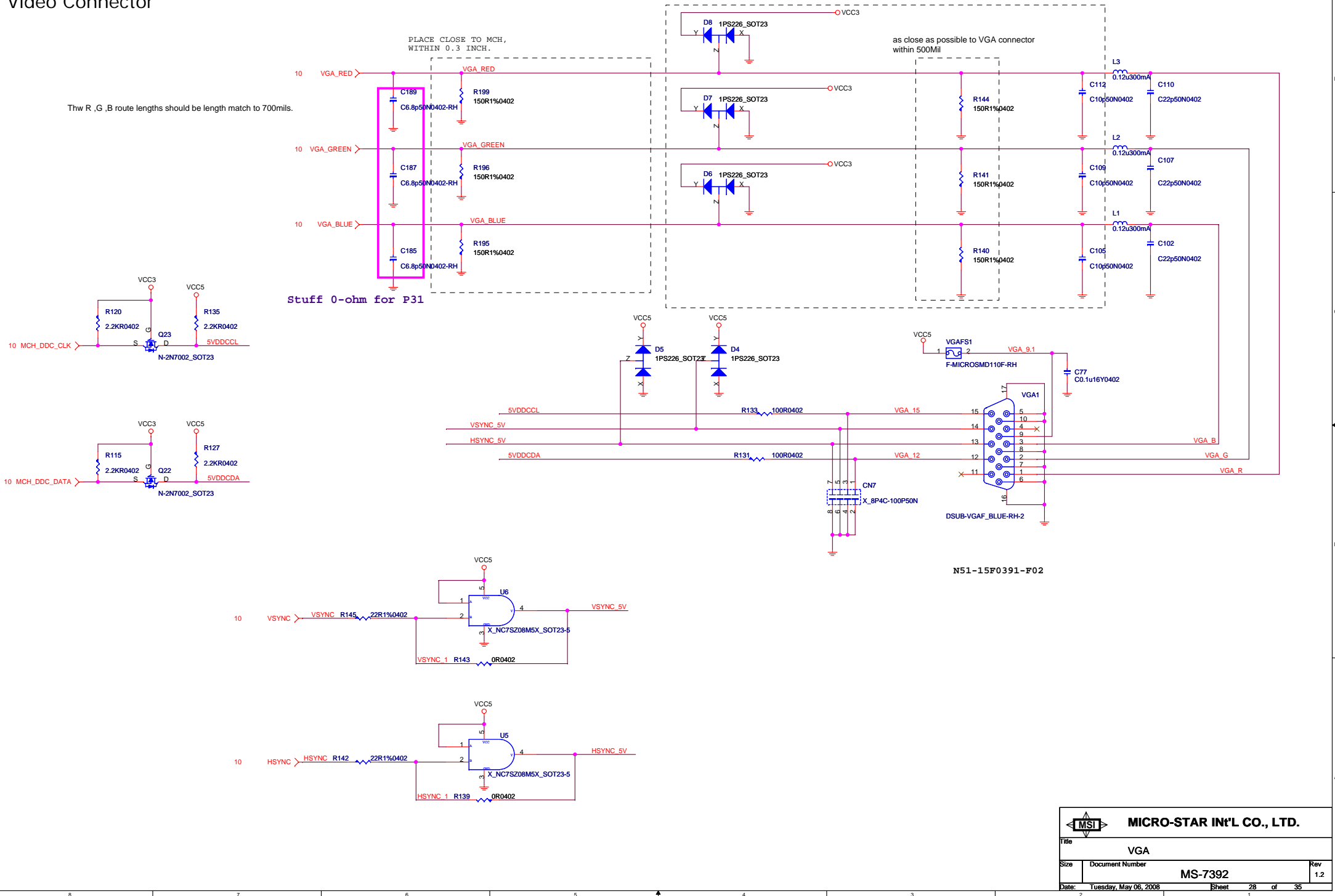
SYSTEM FAN1



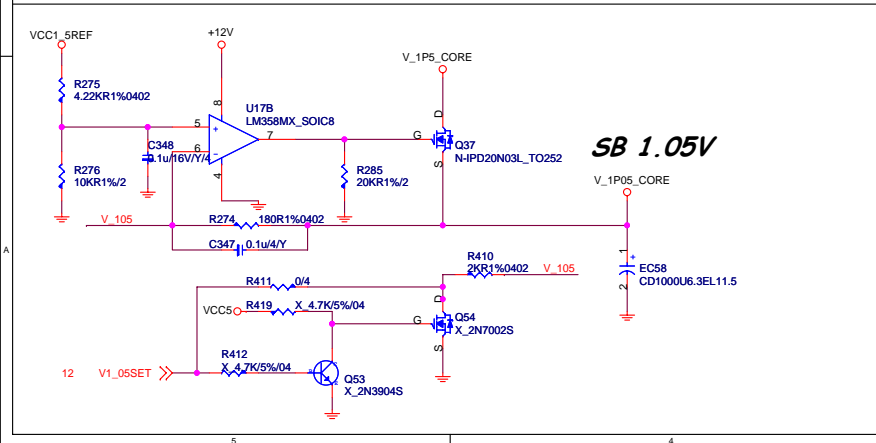
SYSTEM FAN2



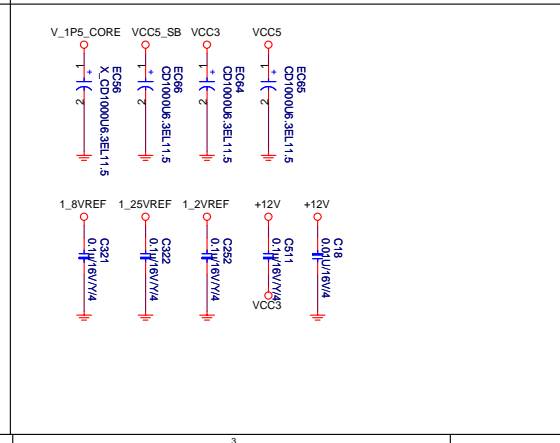
Video Connector



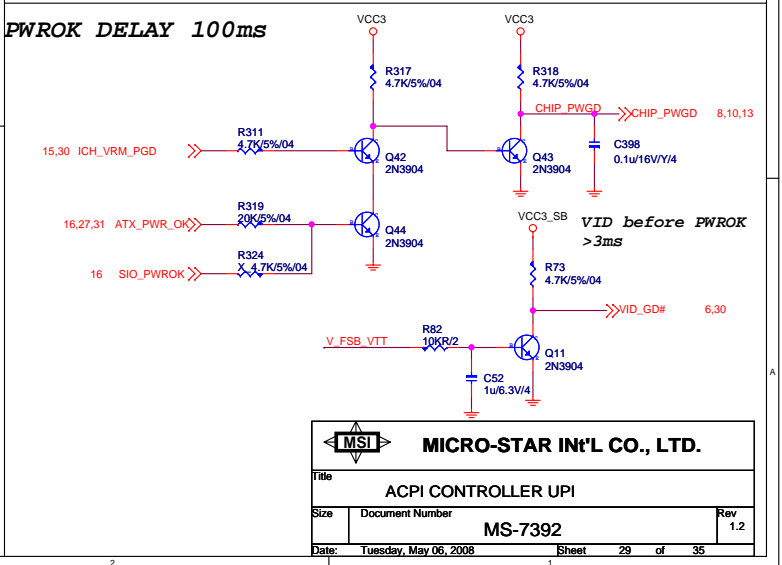
COST DOWN



LED (for Fintek 71882)

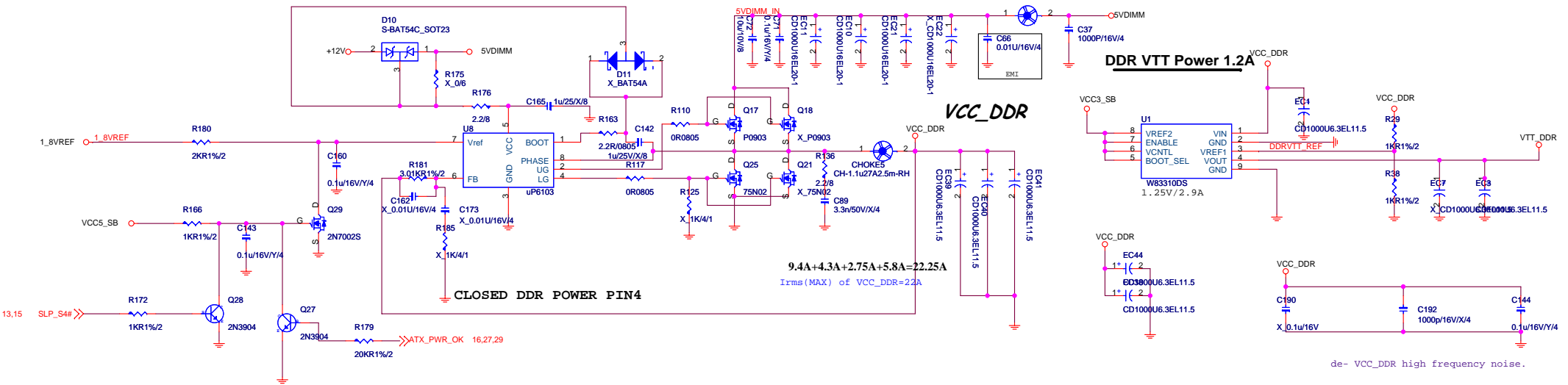


1.2V





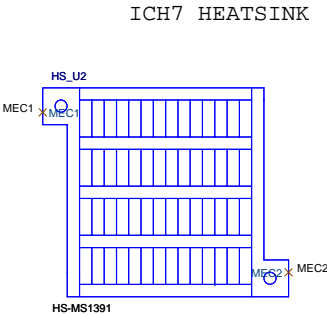
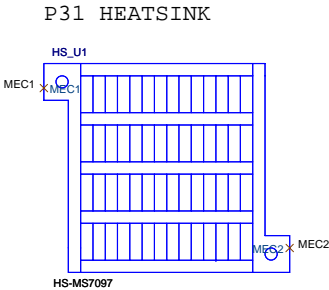
DDR II 1.8V POWER



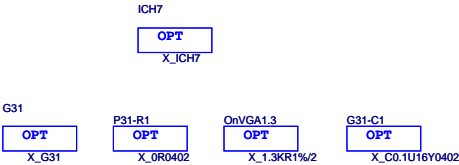
Auto-BOM Manual Parts

PCB1
PCB
PCB-7392

BATTERY1
BATTERY-CR2032



Auto-BOM Option Parts



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

Title			
<Title>			
Size	Document Number		Rev
A	MS-7392		1.2
Date:	Tuesday, May 06, 2008	Sheet	33 of 35