

# MS-7037

Version 100  
01/09/2004 Update

Intel (R) Springdale (GMCH) + ICH5 Chipset  
Intel Northwood & Prescott mPGA478B Processor

## CPU:

Intel Northwood/Prescott - 3.6G & Above

## System Chipset:

Intel Springdale - GMCH (North Bridge)  
Intel ICH5 (South Bridge)

## On Board Chipset:

CLOCK -- Cypress CY28405

## On Board Chipset:

BIOS -- FWH EEPROM 4M  
AC'97 Codec -- REALTEK / ALC655  
LPC Super I/O -- W83627THF-AW  
LAN - REALTEK RTL8110S/8100C

## Main Memory:

DDR \* 2 (Max 2GB)

## Expansion Slots:

PCI2.3 SLOT \* 3  
AGP4X/8X SLOT \* 1

## ST PWM:

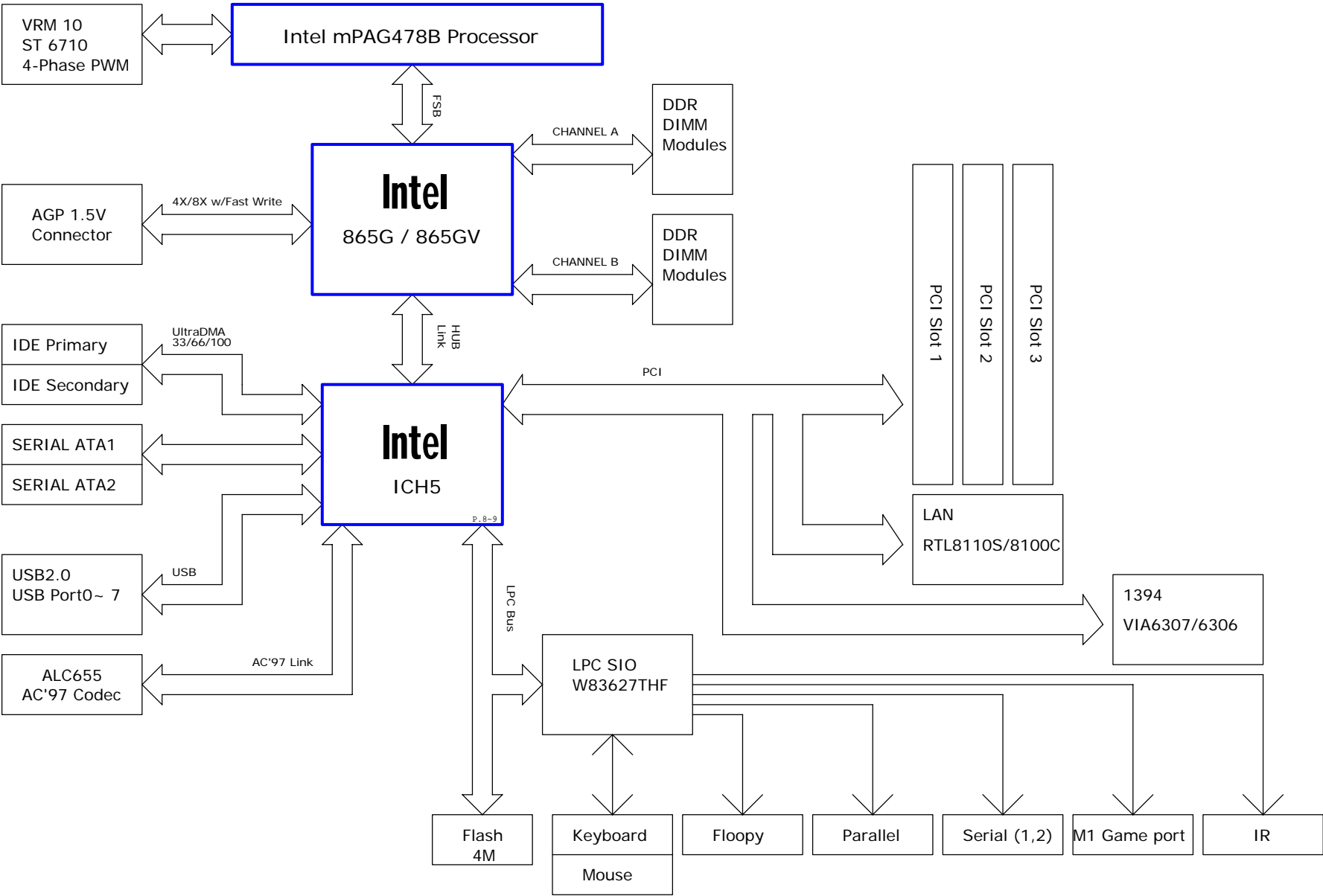
Controller: ST6710

ERP BOM	Function Description	
501/601-7037	Opt : IL	865G-A2+ICH5,W/LAN-8100,W/655,W/1394-6307
01S---		WO/Game port
501/601-7037	Opt : A	865G-A2+ICH5,W/LAN-8100,W/655,W/1394-6307
02S---		W/internal Amplifier SSM2211S
501/601-7037	Opt : VL	865GV+ICH5,W/LAN-8100,W/655,WO/1394
03S---		WO/Game port
501/601-7037	Opt :PIL	865PE-A2+ICH5,W/LAN-8100,W/655,W/1394-6307
		WO/Game port, WO/VGA port

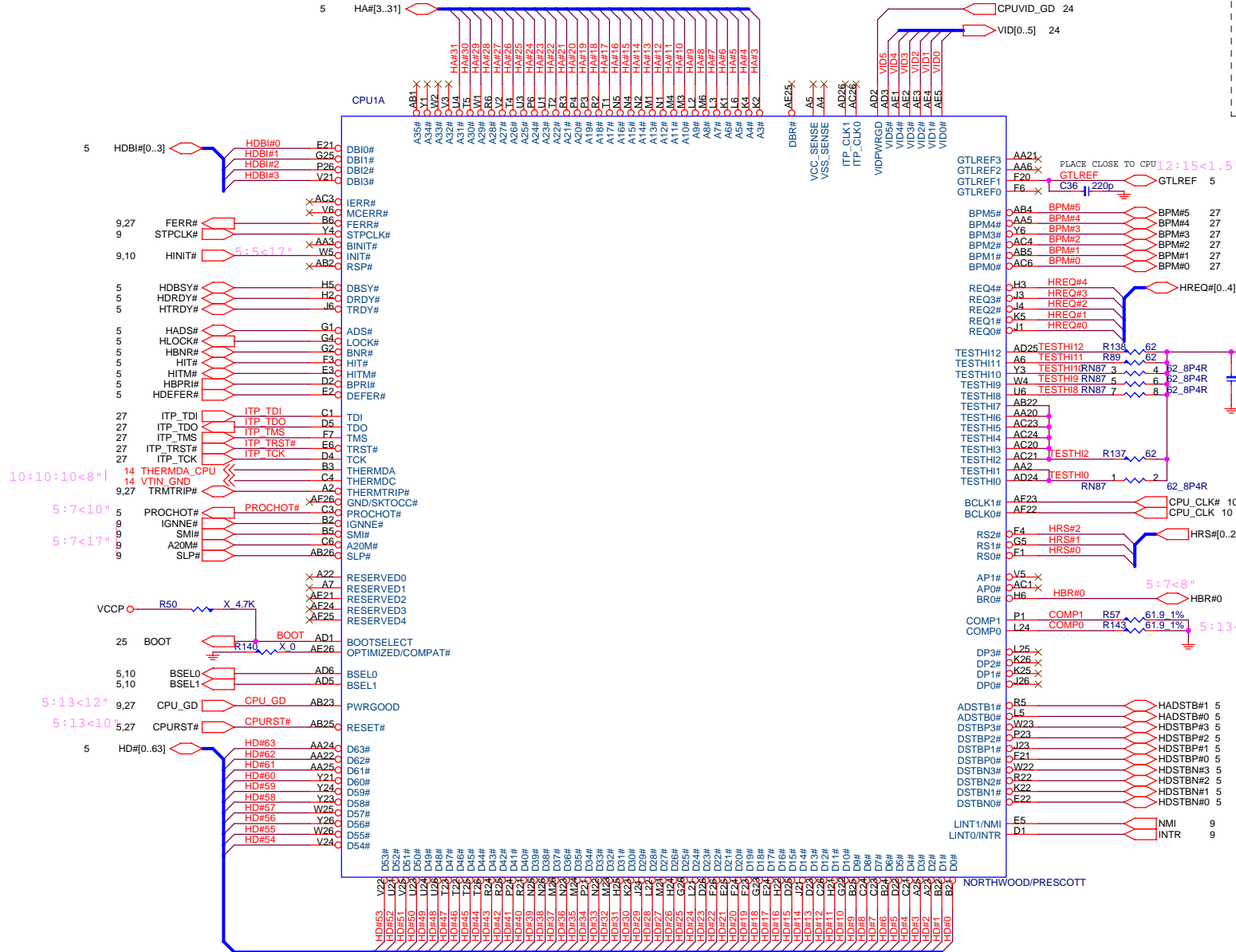
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# Block Diagram



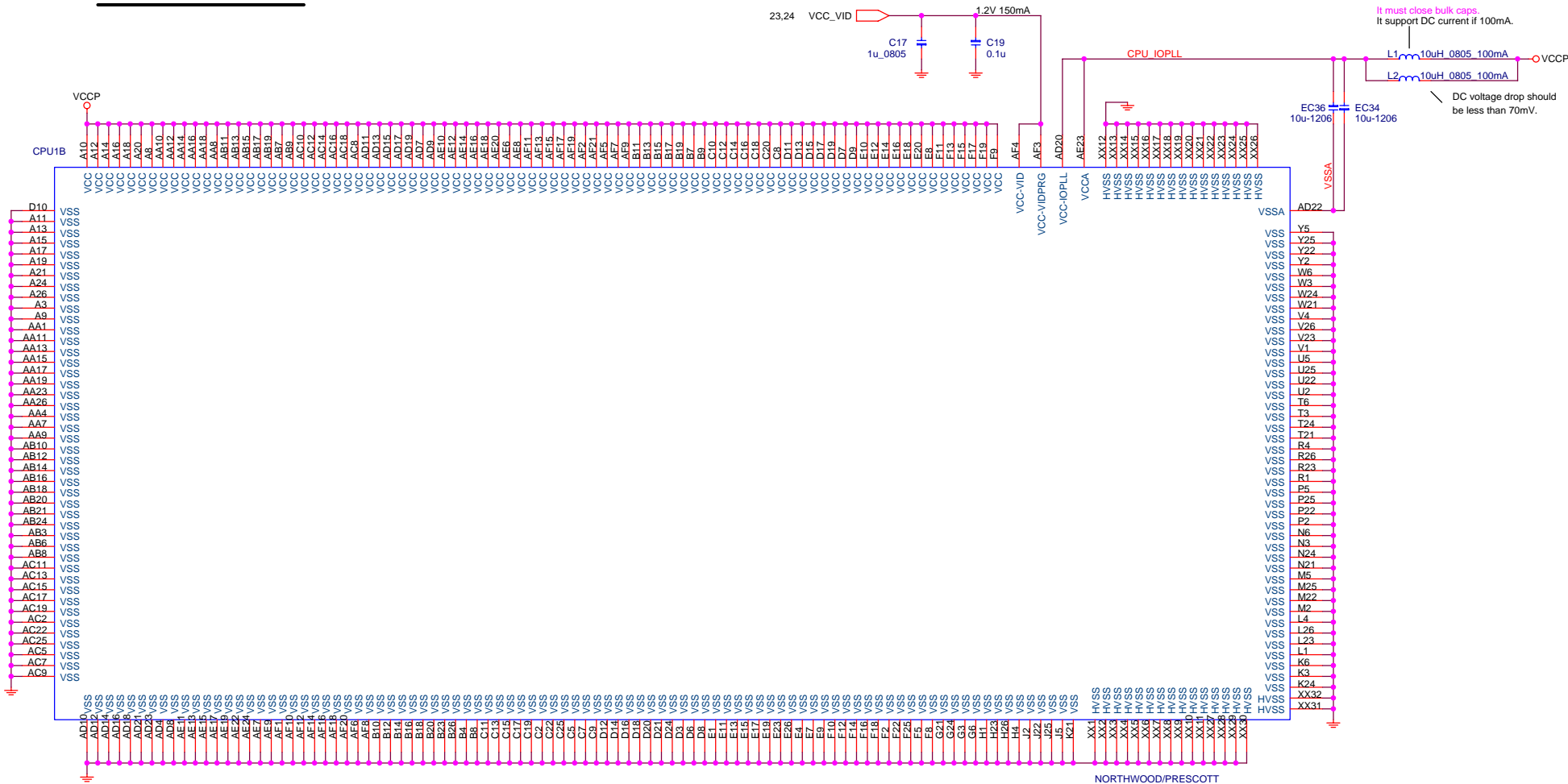
### CPU GTL REFERENCE VOLTAGE BLOCK



NORTHWOOD/PRESCOTT

<b>Micro-Star</b>	Title <b>MS-7037</b>	Rev <b>0B</b>
Document Number <b>Intel mPGA478B - Signals</b>		
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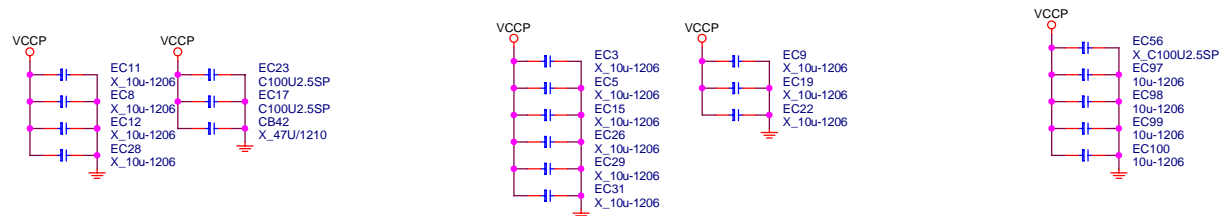
# CPU VOLTAGE BLOCK



It must close bulk caps.  
It support DC current if 100mA.

DC voltage drop should  
be less than 70mV.

## CPU DECOUPLING CAPACITORS



7pcs

9pcs

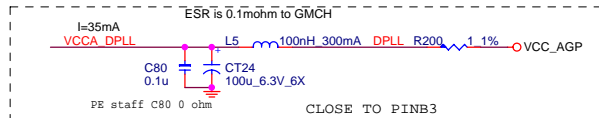
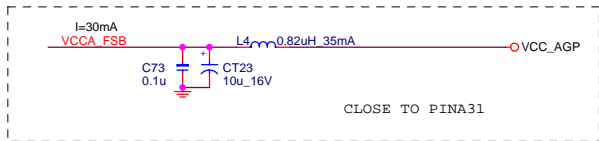
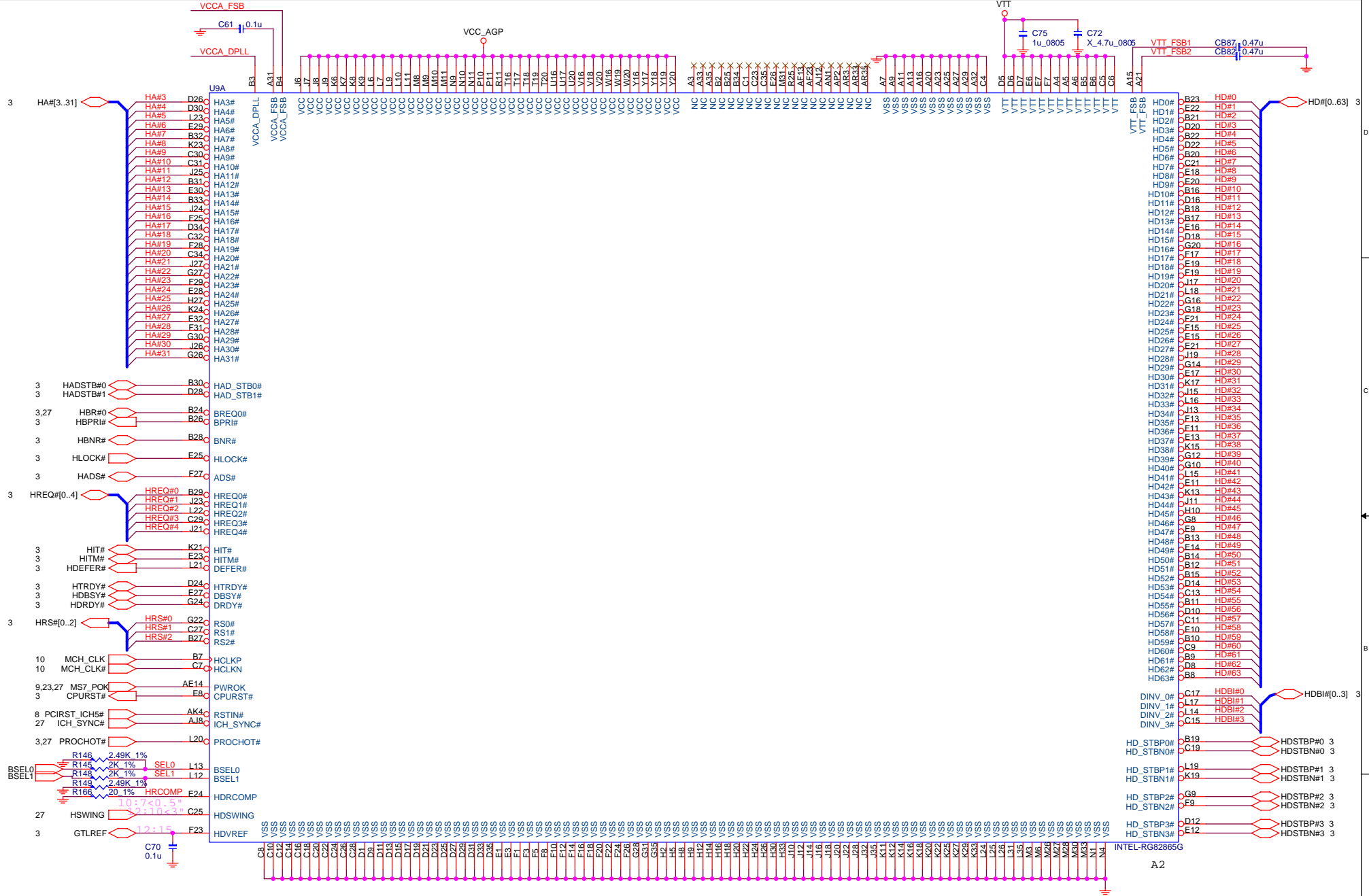
5pcs

Place these caps within socket cavity

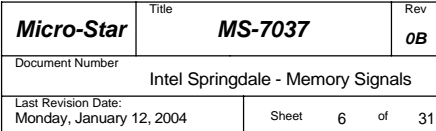
Place these caps within north side of processor

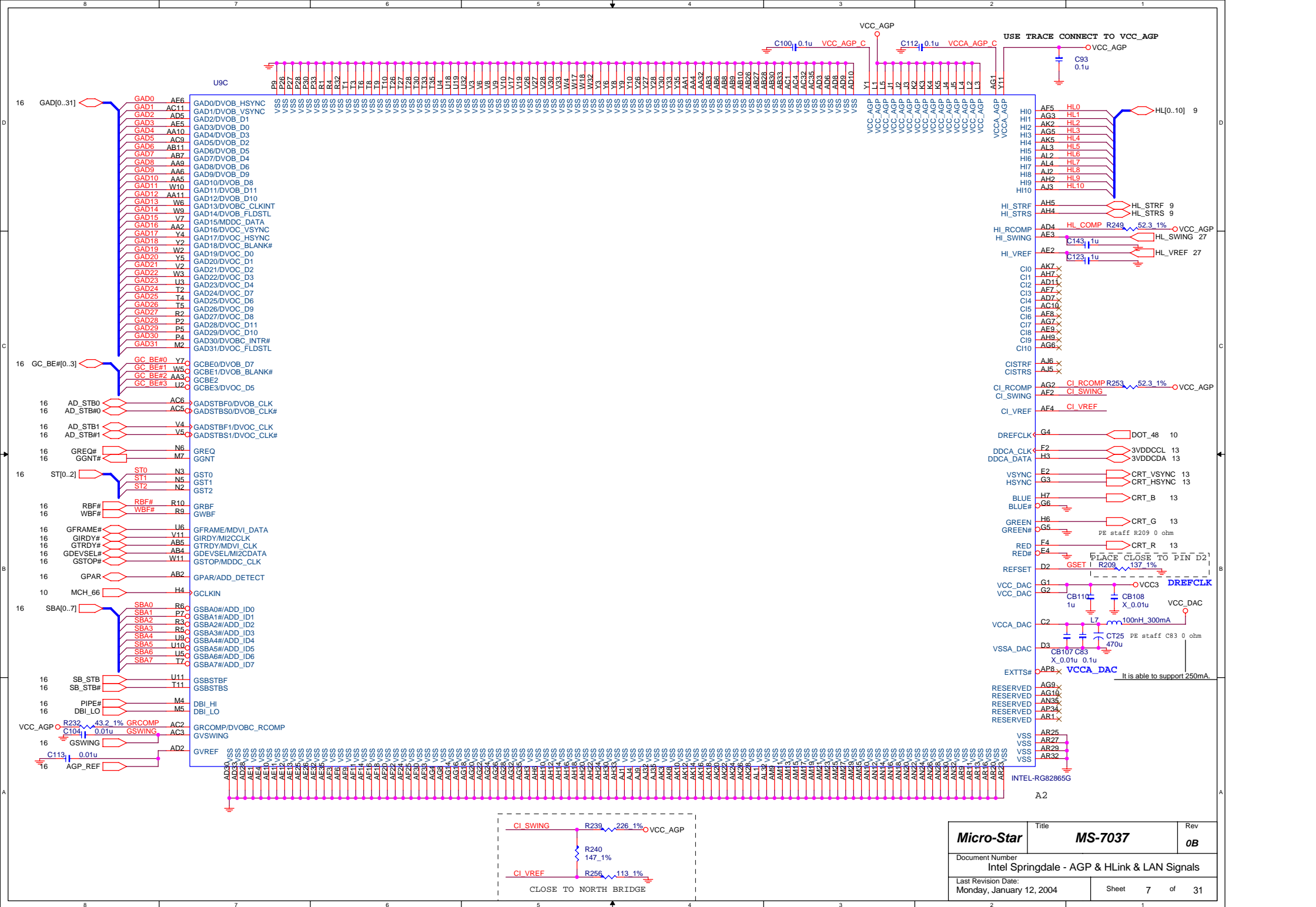
Place these caps within south side of processor

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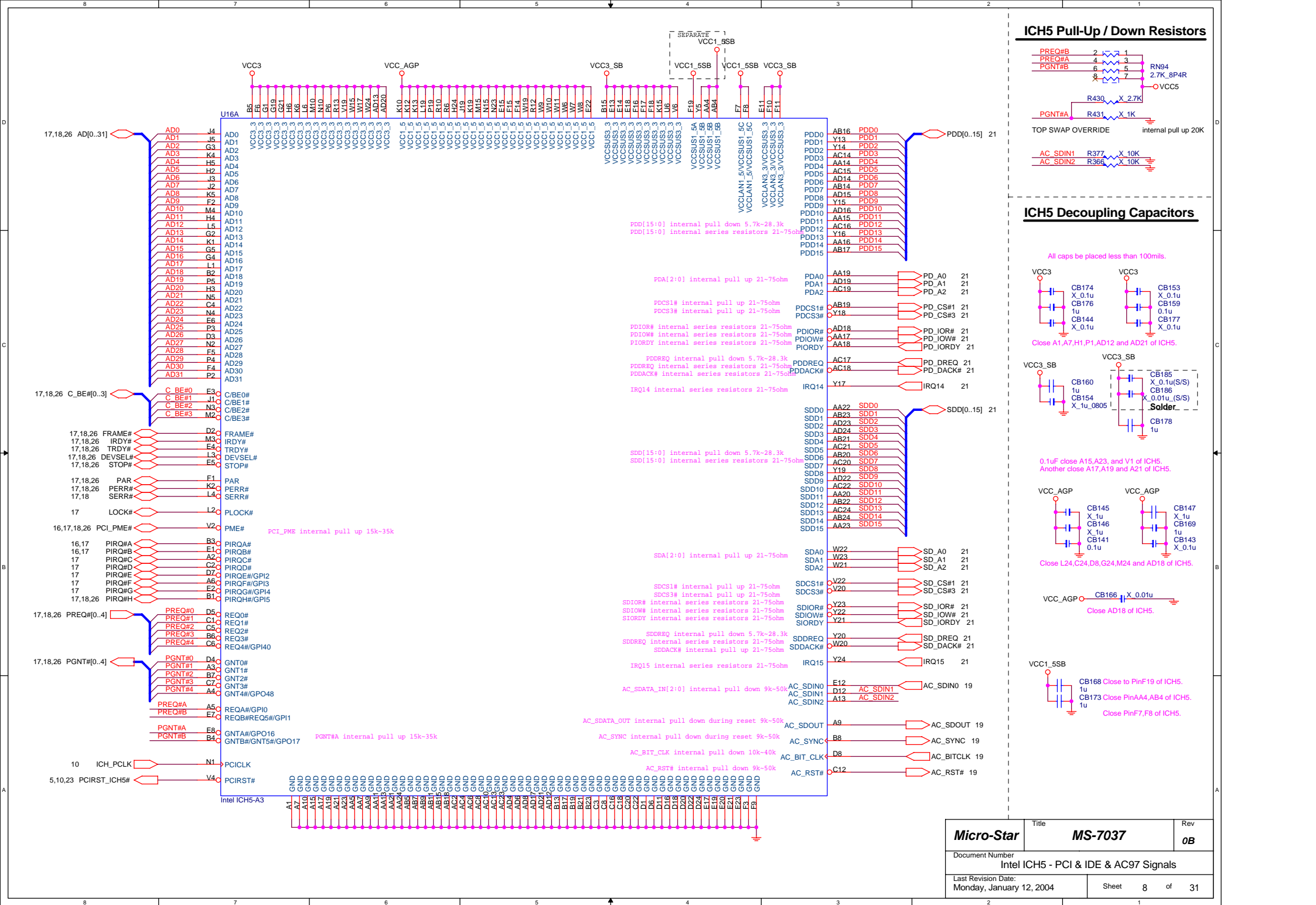


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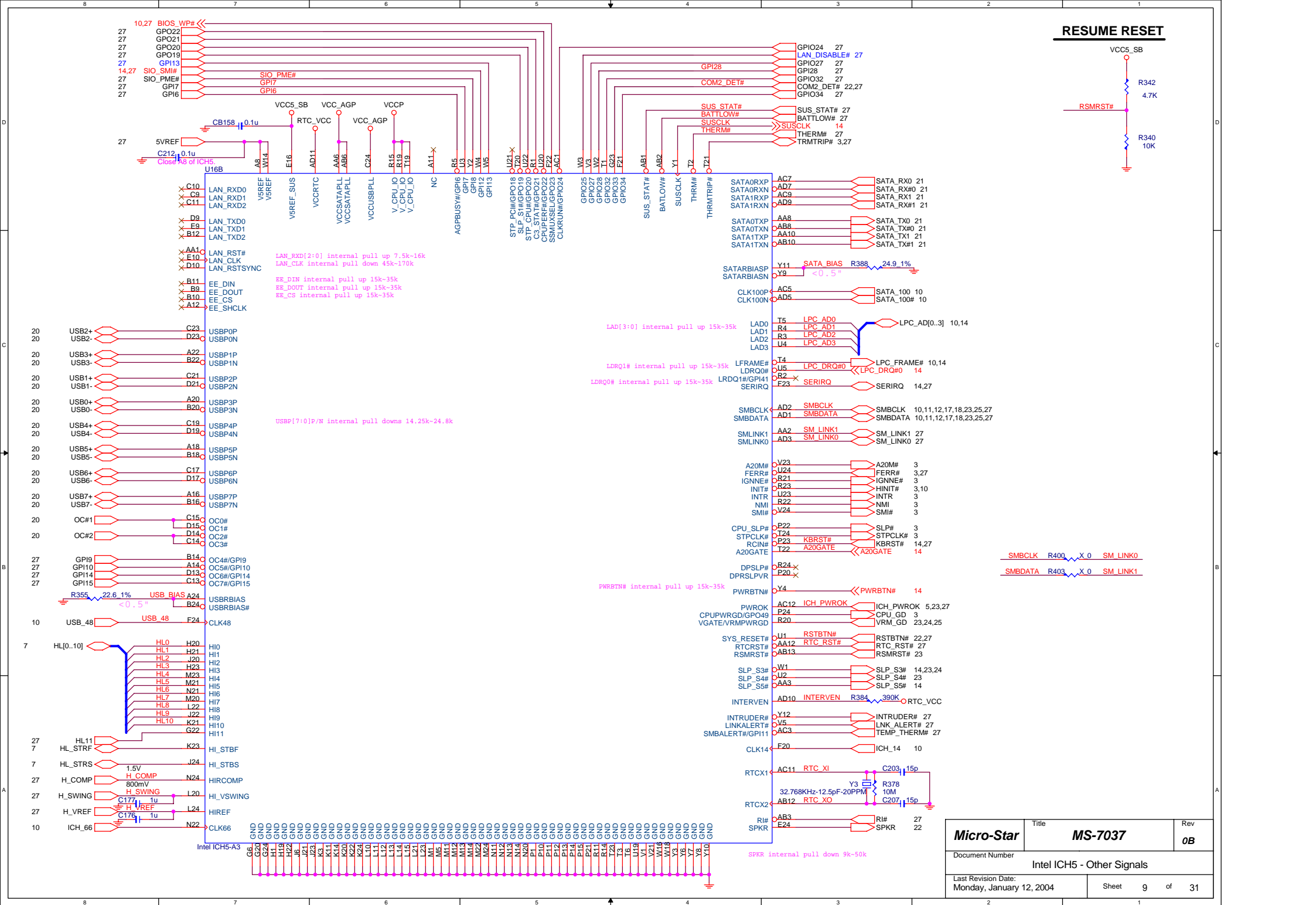


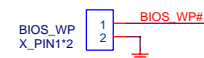
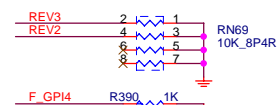
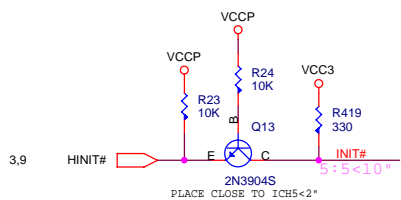
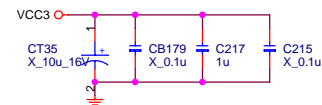
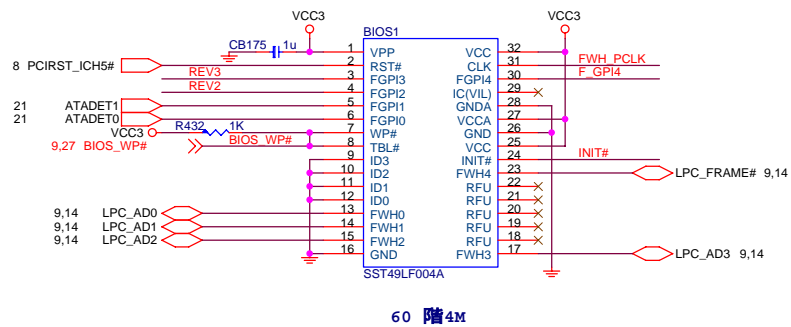
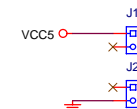
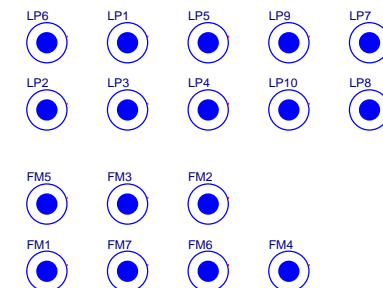
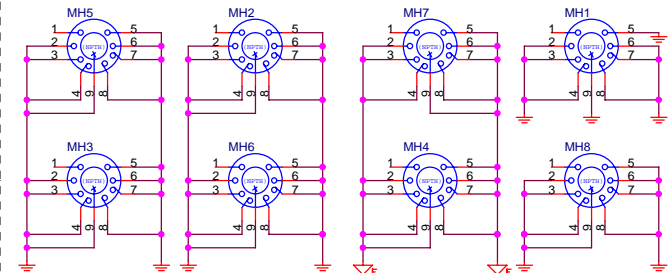
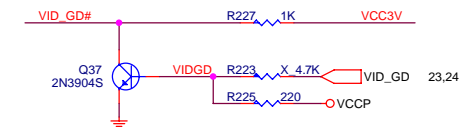
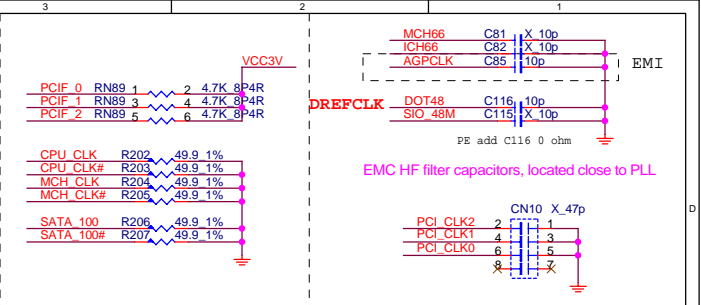






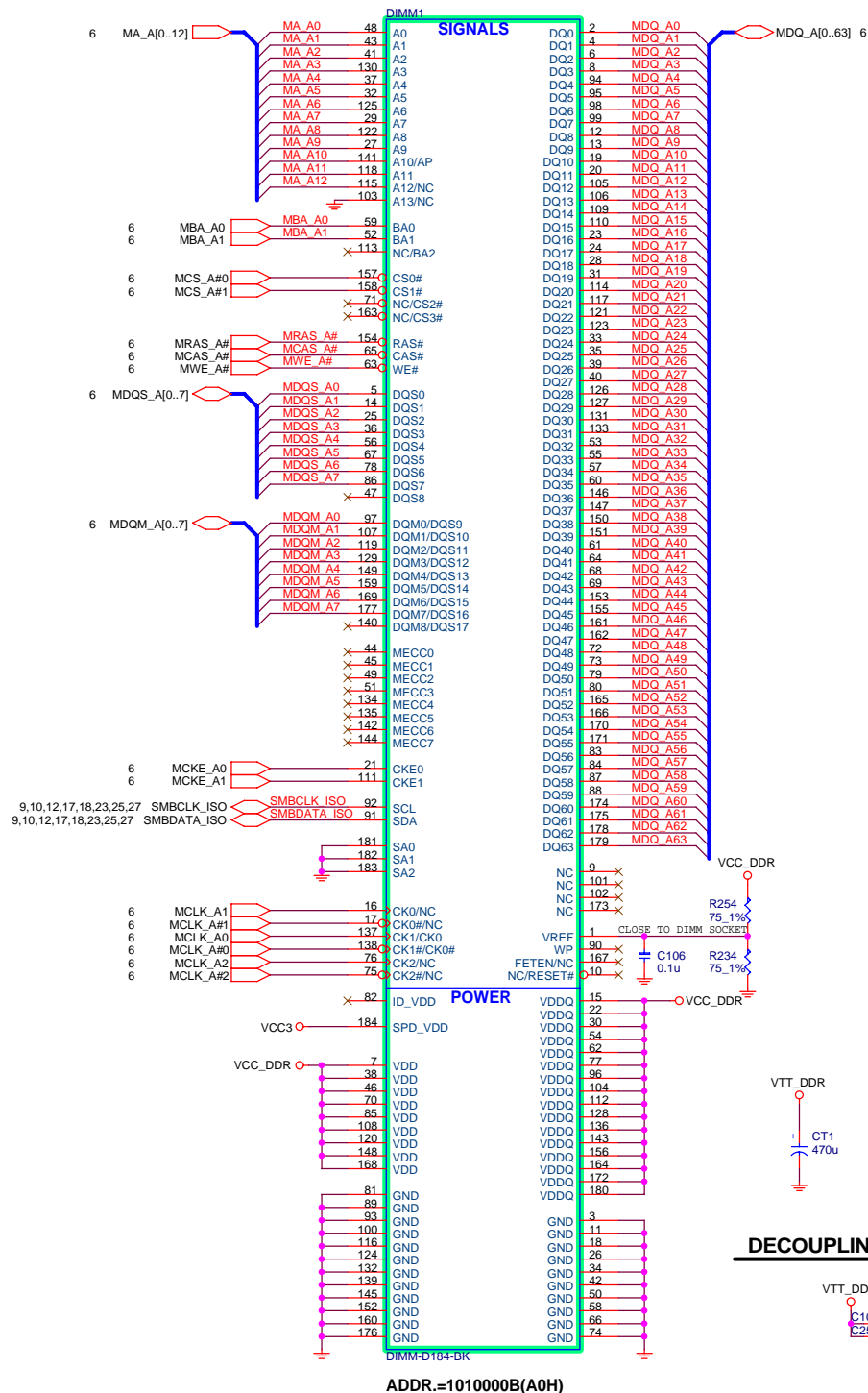




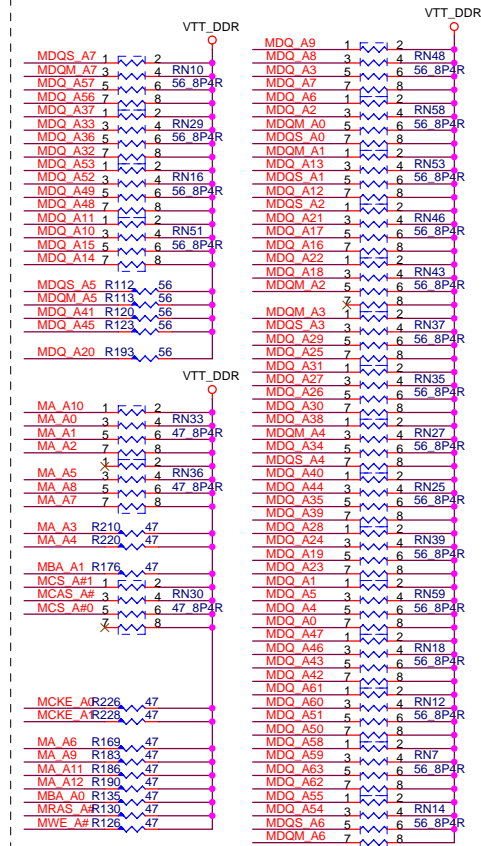


BIOS_WP	BIOS Update
SHORT	Write Disable
OPEN	Write Enable

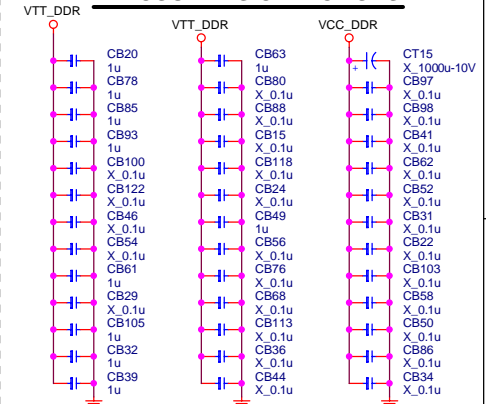
## DDR DIMM1



## DDR Terminational Resisitors



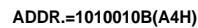
## DECOUPLING CAPACITORS



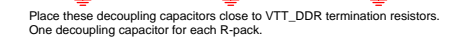
Place these decoupling capacitors close to VTT\_DDR termination resistors.  
One decoupling capacitor for each R-pack.

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DDR DIMM 1				
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## SIGNALS



MDQ\_B63 MDQ\_B59

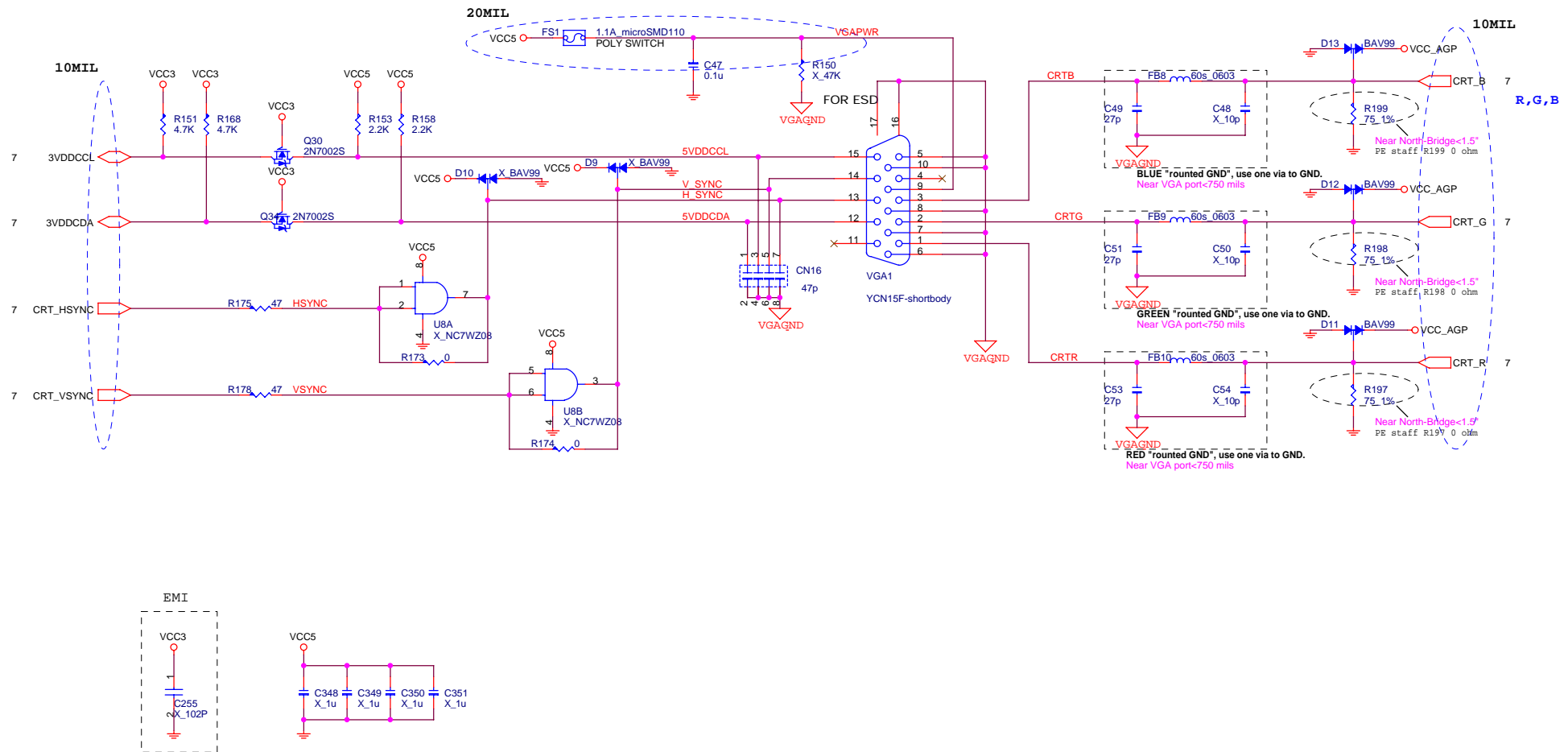


VTT\_DDR

C24 10u 0805  
C107 10u 0805

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## VGA CONNECTOR

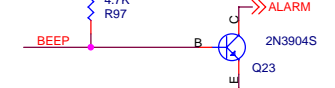
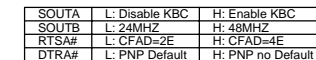


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Document Number <b>VGA CONNECTOR</b>		
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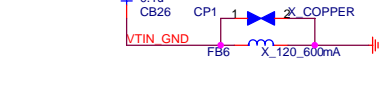
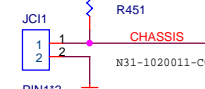
## U20



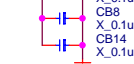
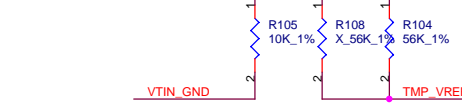
4.7K SOLITA



## VBAT

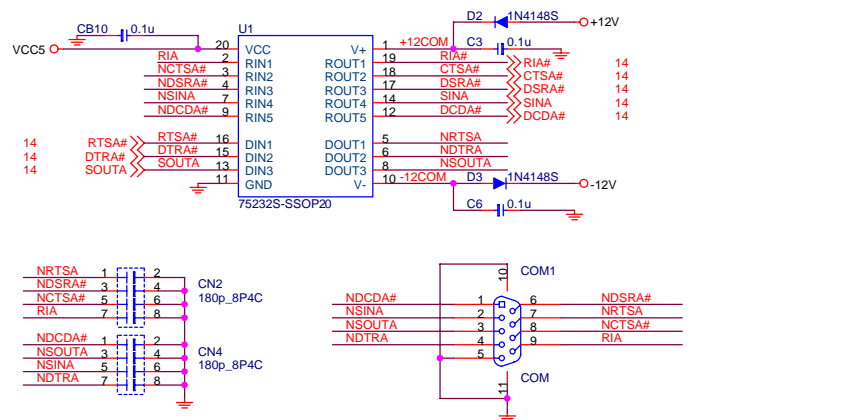


**NOTE: LOCATE CLOSE  
STATUS PANEL**

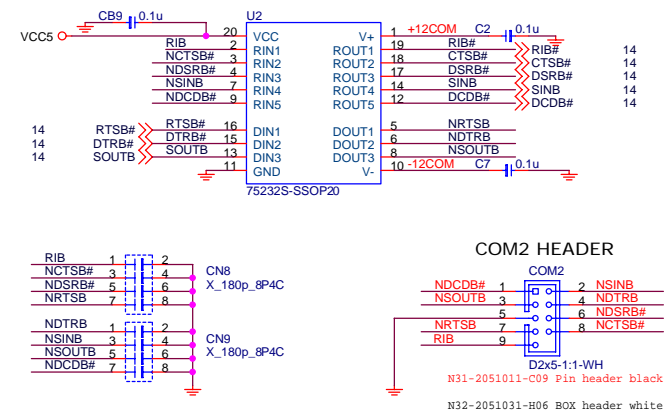




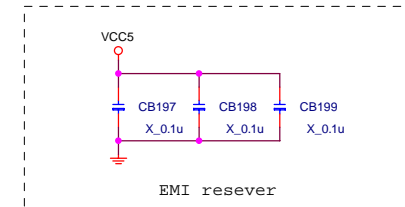
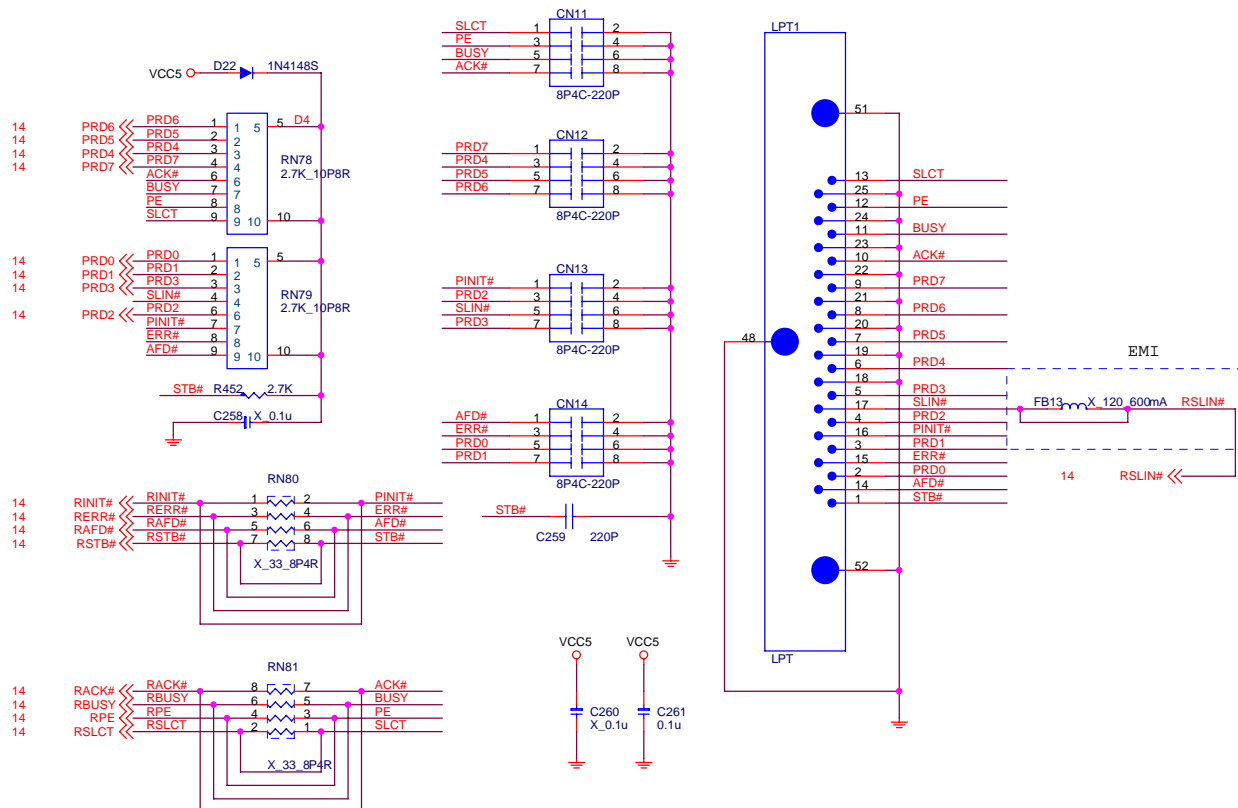
## SERIAL PORT 1



## SERIAL PORT 2



## PARALLAL PORT



<b>Micro-Star</b>	Title <b>MS-7037</b>	Rev <b>0B</b>
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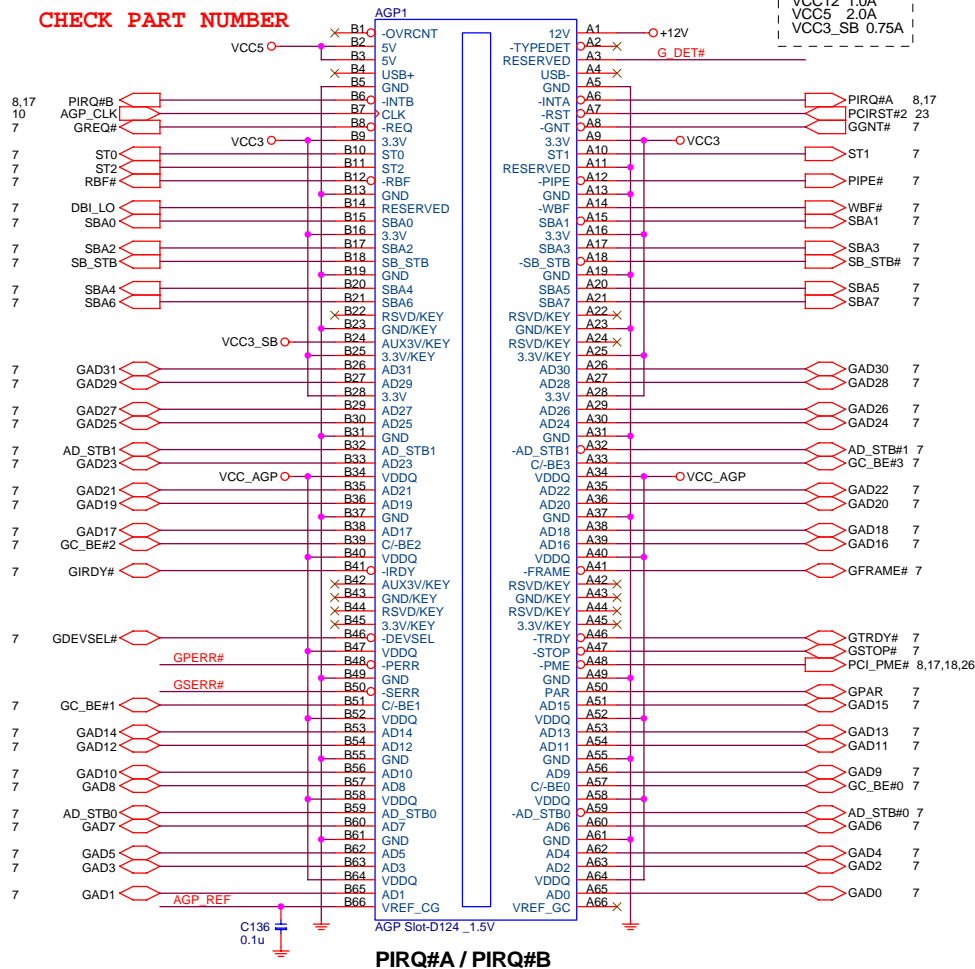


# AGP 1.5V 1X/2X/4X/8X SLOT(AGP VER:3.0)

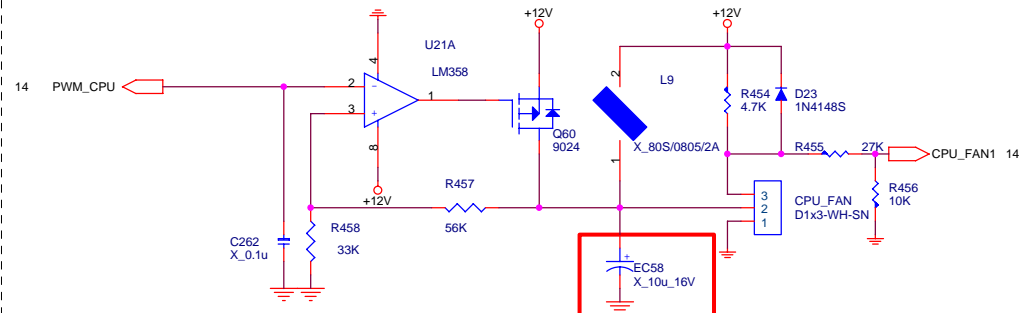
VCC5 = 60mils trace / 15 mils space

AGP Slot Imax  
VCCg 8.0A  
VCC3 6.0A  
VCC12 1.0A  
VCC5 2.0A  
VCC3\_SB 0.75A

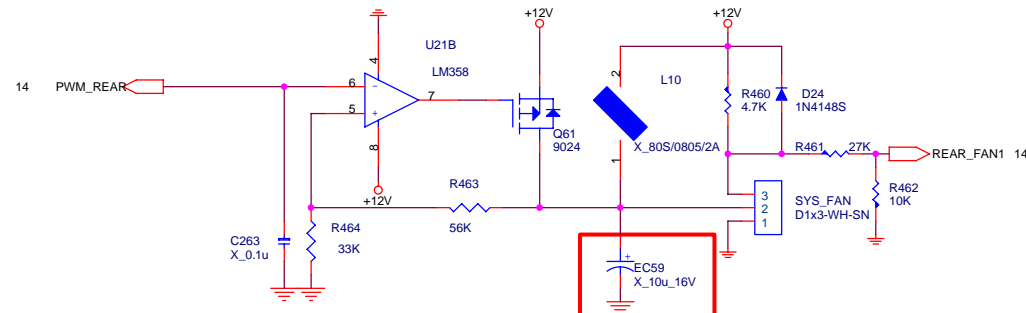
## CHECK PART NUMBER



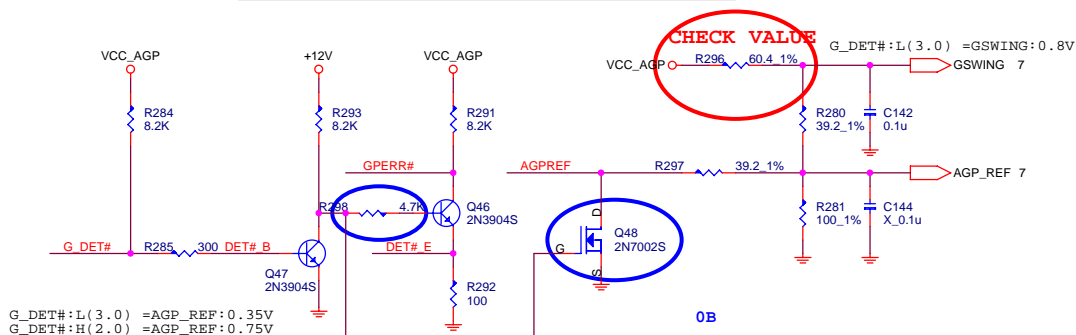
## CPU FAN



## SYSTEM FAN



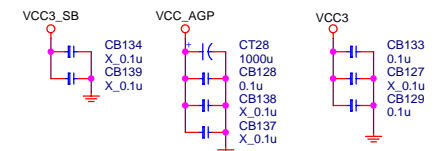
## Springdale Reference & Swing Voltage Circuit



## AGP TERMINATION RESISTORS

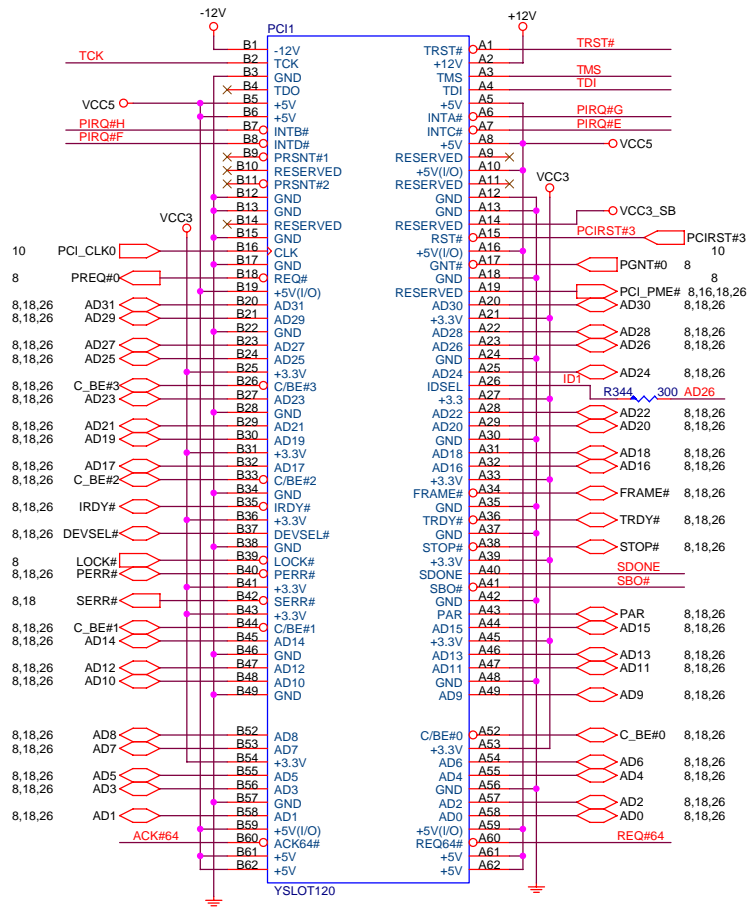
LESS 10MILS STUB TRACE LENGTH MUST BE FOLLOWING.  
Place these resistors between PCI and AGP slot

## AGP SLOT DECOUPLING CAPACITORS



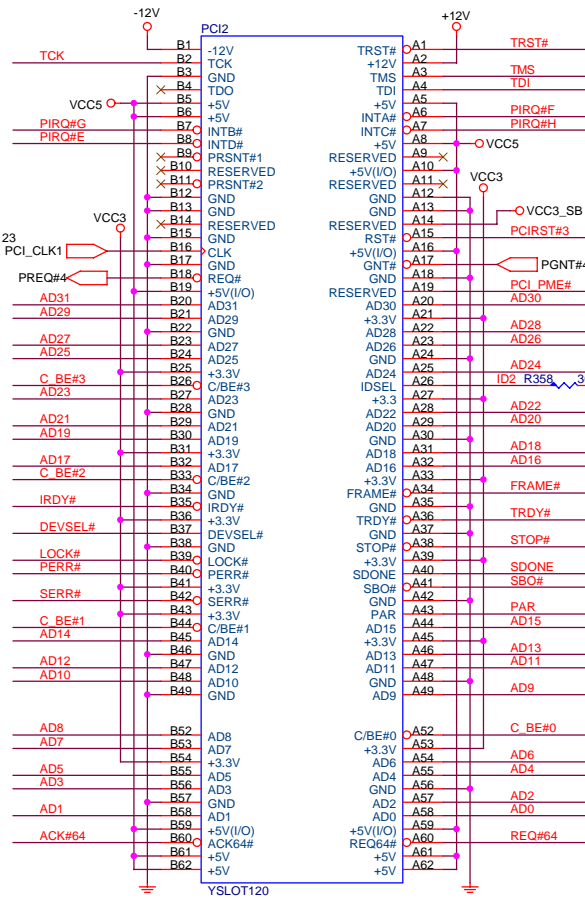
Micro-Star	Title	MS-7037	Rev	0B
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# PCI SLOT 1 (PCI VER: 2.2 COMPLY)



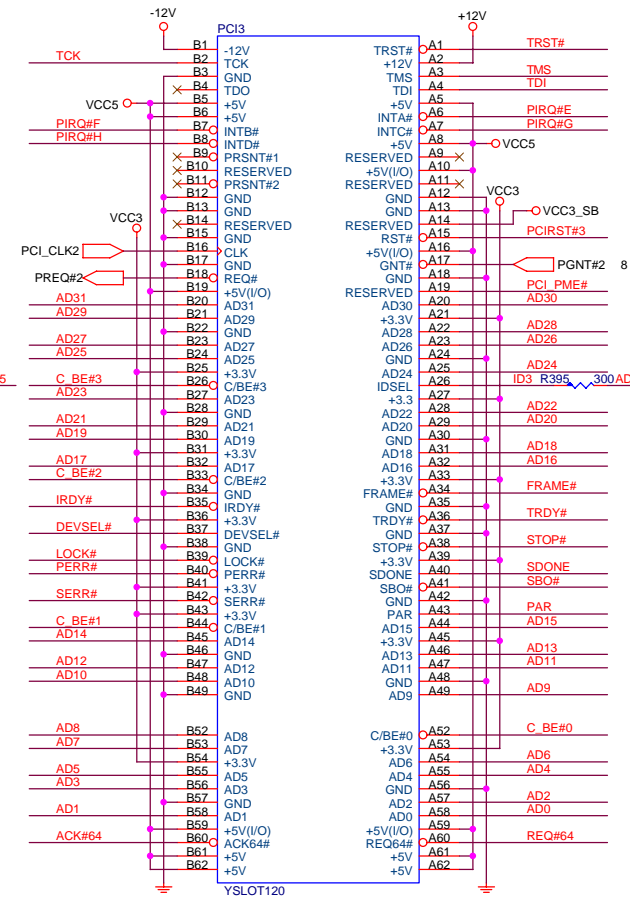
IDSEL = AD26  
MASTER = PREQ#0  
PIRQ#G

# PCI SLOT 2 (PCI VER: 2.2 COMPLY)



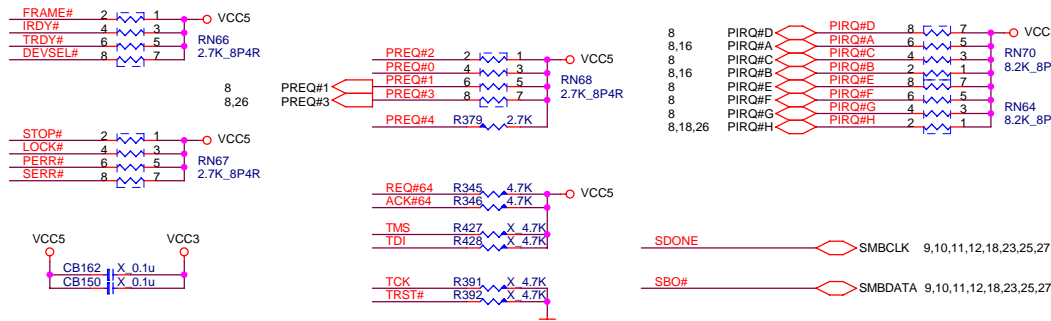
IDSEL = AD25  
MASTER = PREQ#4  
PIRQ#F

# PCI SLOT 3 (PCI VER: 2.2 COMPLY)

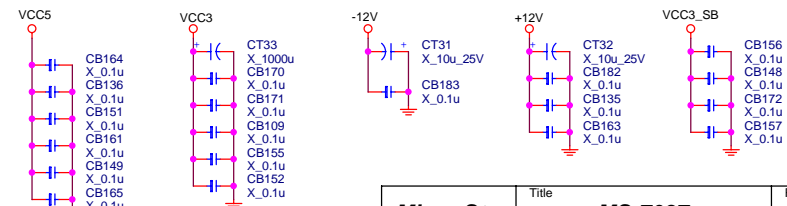


IDSEL = AD28  
MASTER = PREQ#2  
PIRQ#E

## PCI PULL-UP / DOWN RESISTORS

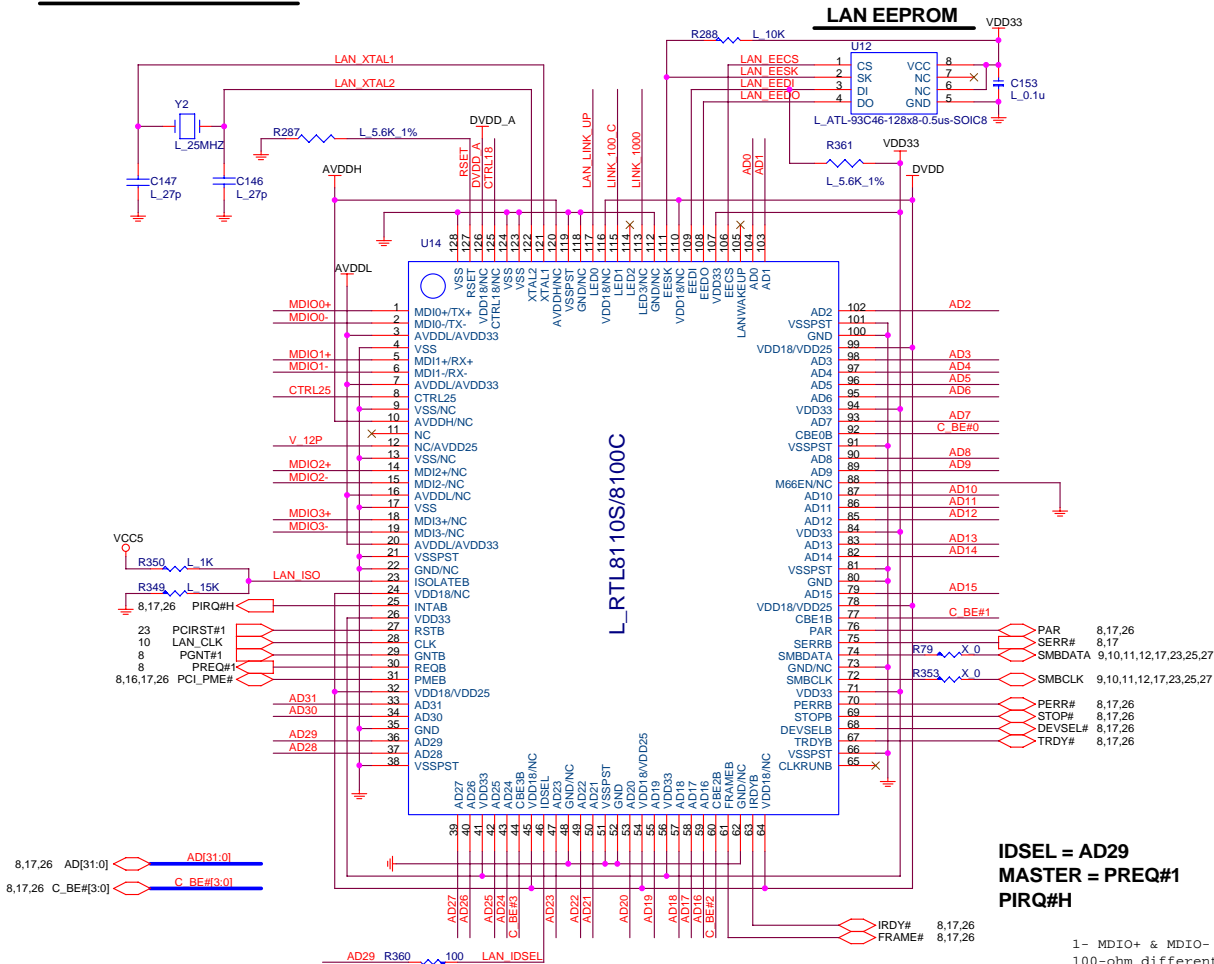


## PCI SLOT DECOUPLING CAPACITORS



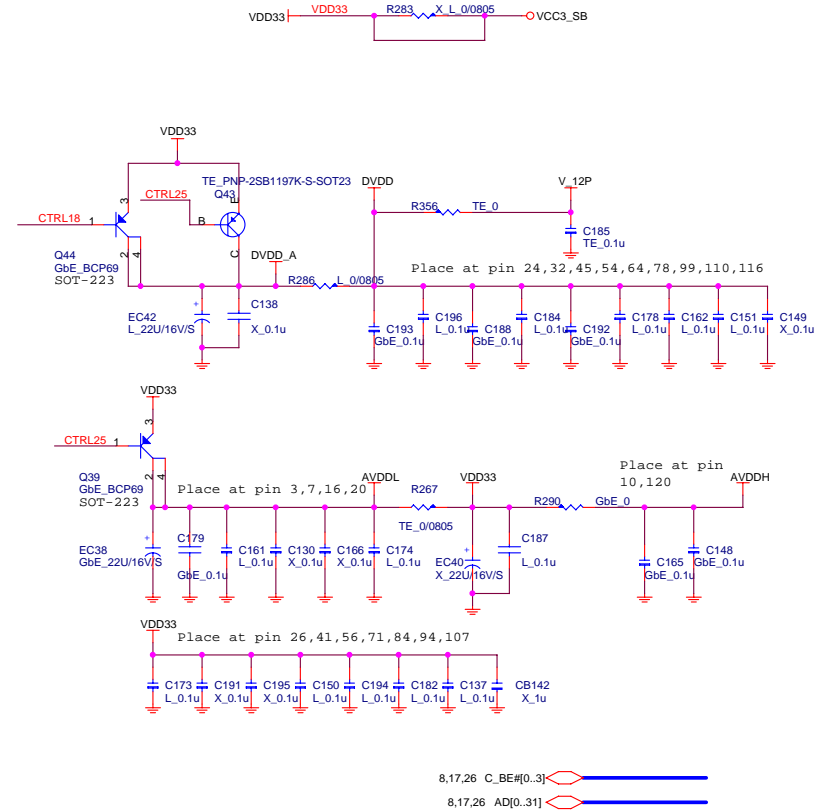
Micro-Star	Title	MS-7037	Rev	0B
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# PCI LAN RTL8110S/8100C



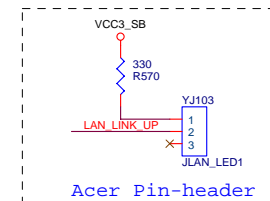
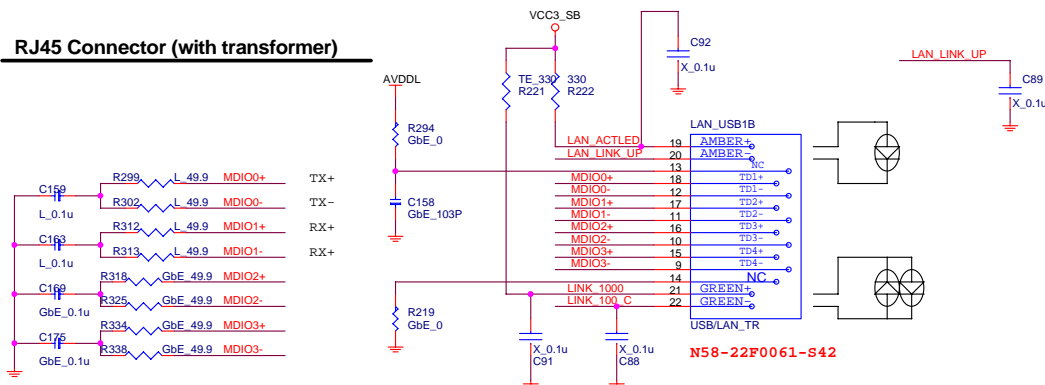
**IDESEL = AD29**  
**MASTER = PREQ#1**  
**PIRQ#H**

1- MDIO+ & MDIO- pairs should be 100-ohm differential impedance. Route equal length and symmetrically. Separate every pairs.



	DVDD	DVDDA	AVDDL	AVDDH	V-12P
8100C	2.5V	2.5V	3.3V	X	2.5V
8110S	1.8V	1.8V	2.5V	3.3V	X

## RJ45 Connector (with transformer)

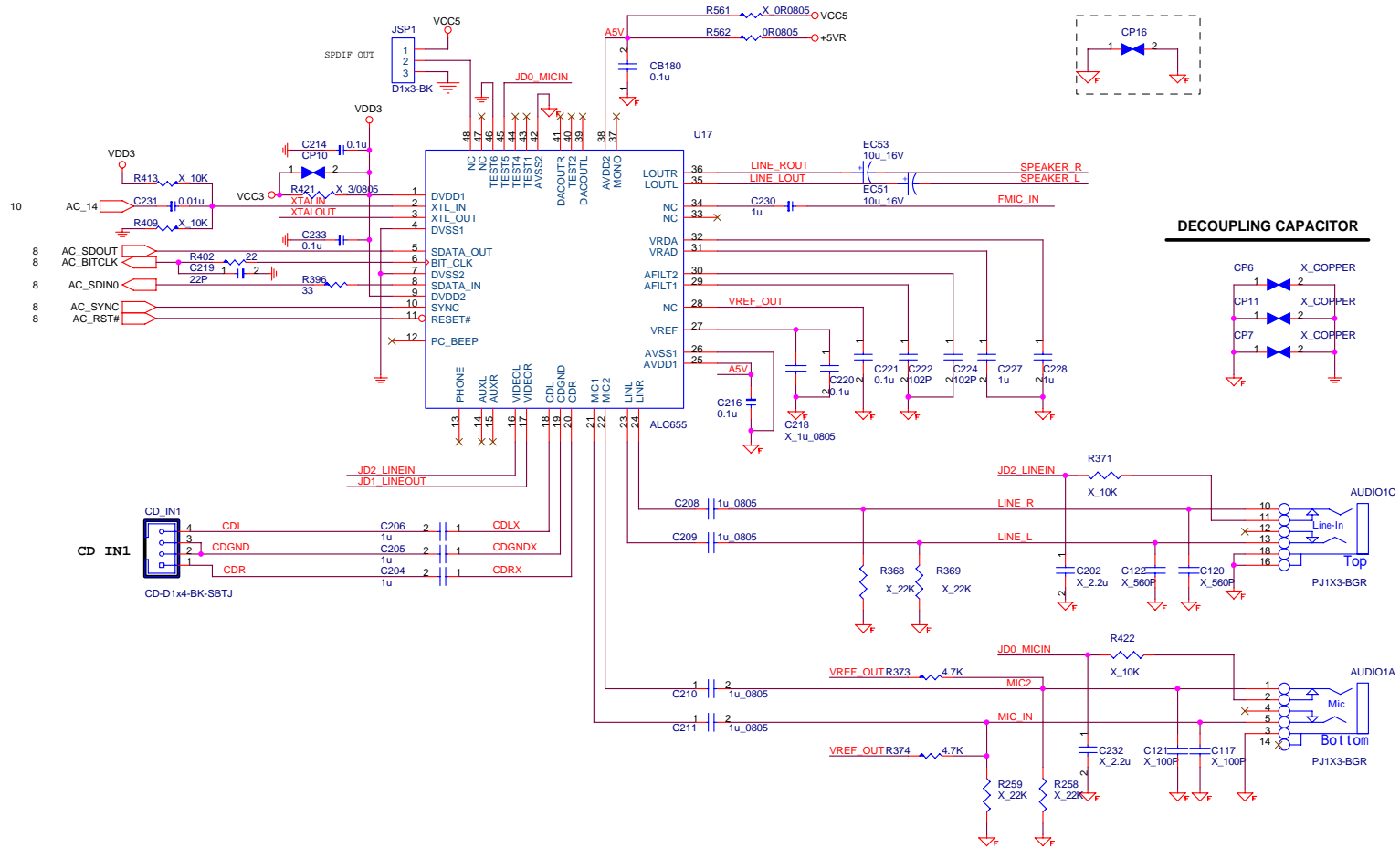


## Part Value Selection:

GbE: 8110S LAN(1000M)  
TE: 8100C LAN(10/100M)  
L: With LAN option  
X: No Stuff

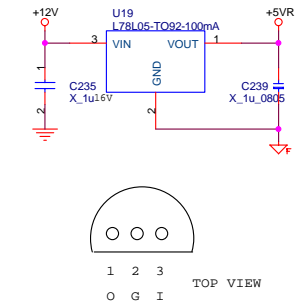
Micro-Star	Title	Rev
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## ALC655 AC97 CODEC

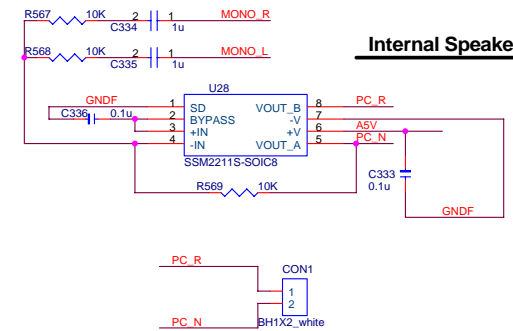


## AUDIO CODE REGULATORS

**Trace Width 30mils.**

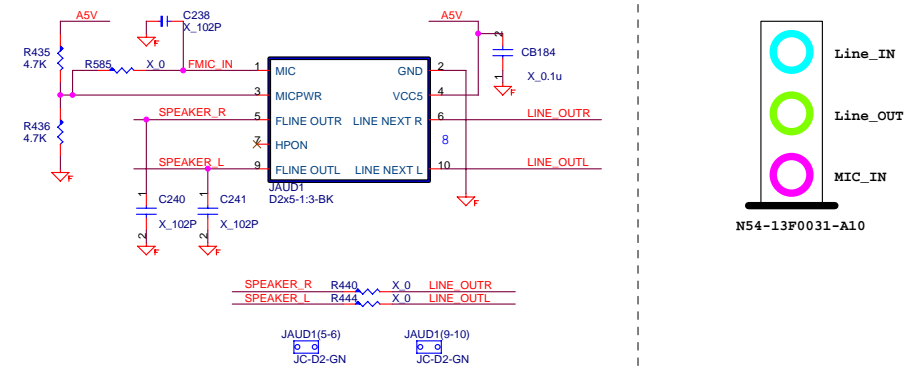


### Internal Speaker

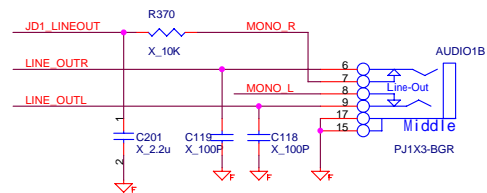


Channel Barebone Internal Speaker amplifier

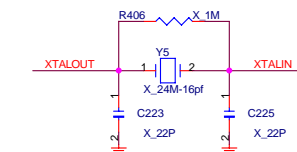
## Intel Front Audio Connector



**SPEAKER OUT JACK**

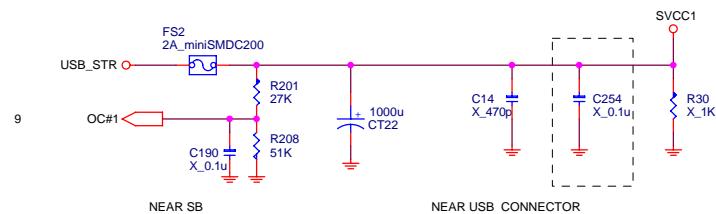


### AUDIO CODE CRYSTAL CIRCUIT

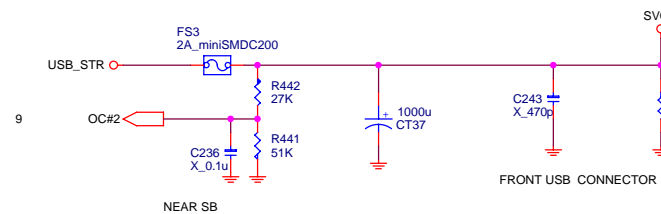


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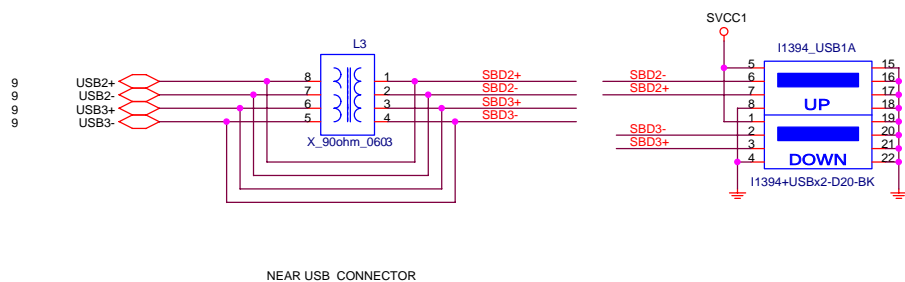
### POWER CIRCUIT FOR USB PORT 0,1,2,3



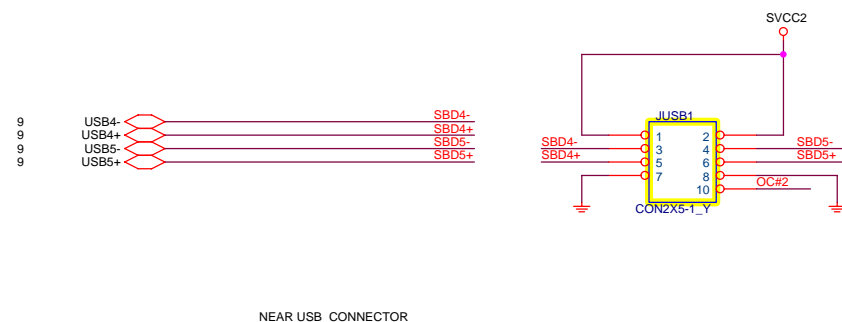
### POWER CIRCUIT FOR USB PORT 4,5,6,7



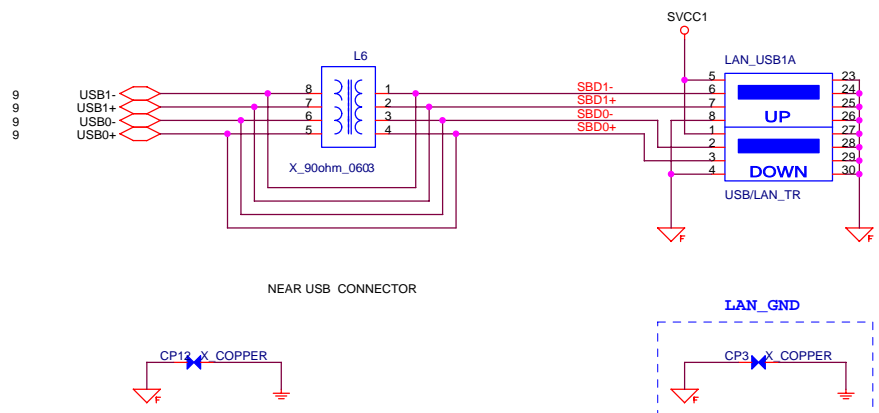
### REAR PANEL USB CONNECTOR FOR USB PORT 0,1



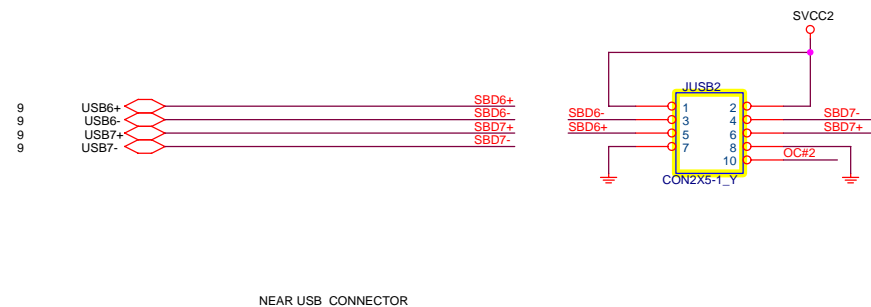
### FRONT PANEL USB CONNECTOR FOR USB PORT 4,5



### REAR PANEL USB CONNECTOR FOR USB PORT 2,3

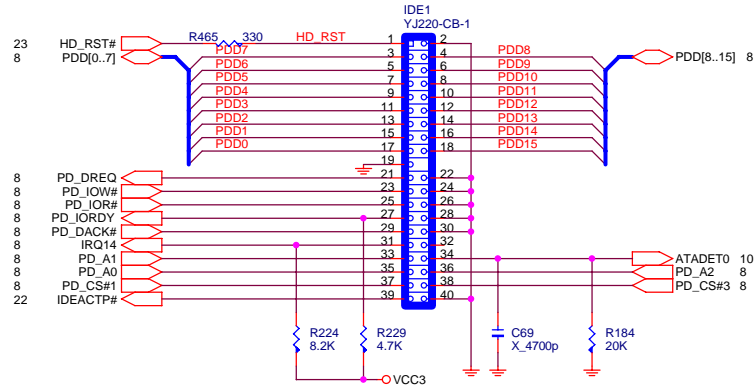


### FRONT PANEL USB CONNECTOR FOR USB PORT 6,7

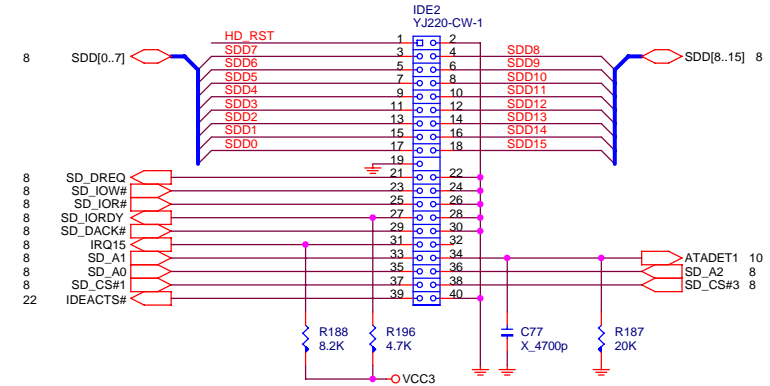


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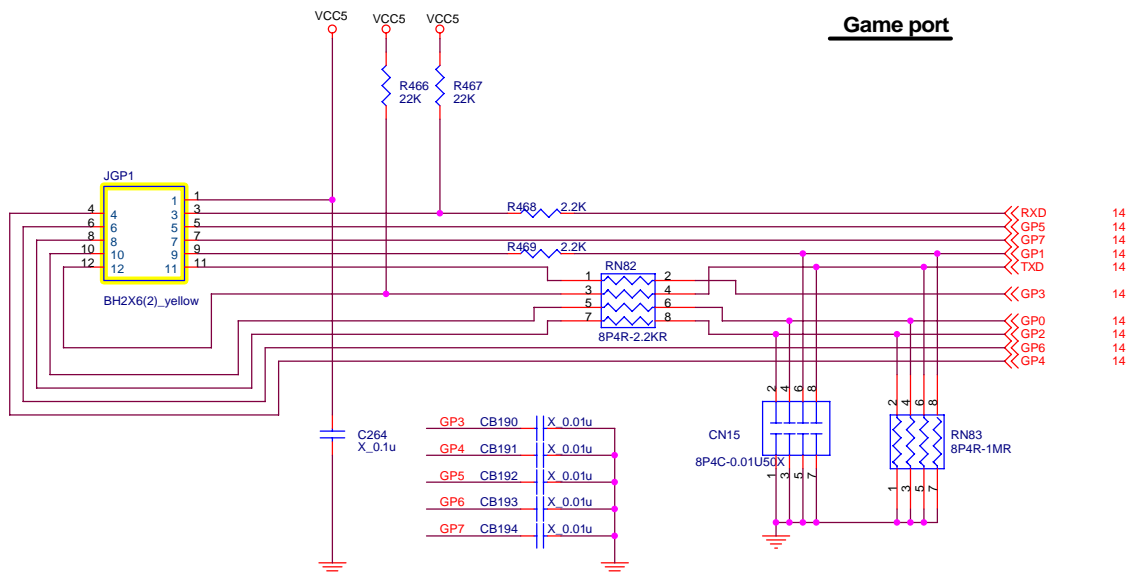
## PRIMARY IDE BLOCK



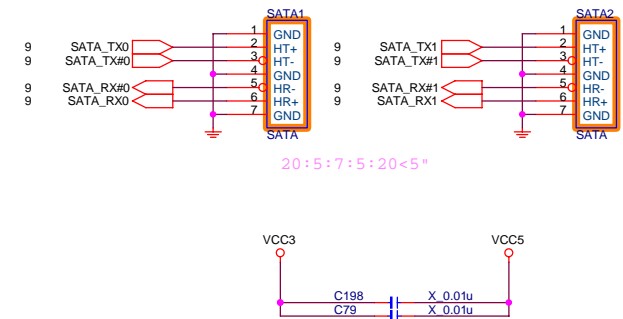
## SECONDARY IDE BLOCK



## Game port

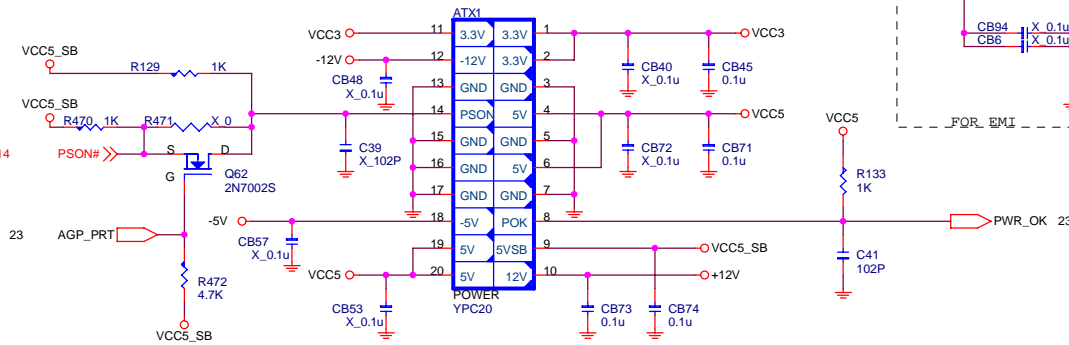


## SERIAL ATA CONNECTOR BLOCK

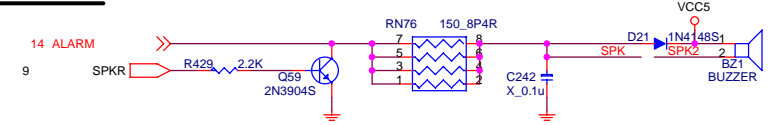


Micro-Star	Title	MS-7037	Rev	0B
	Document Number	IDE & SATA & Game port		
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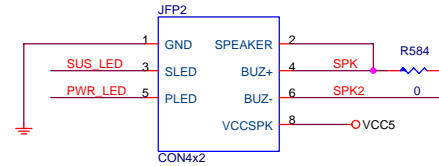
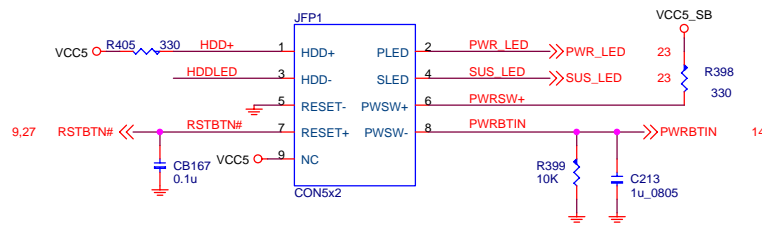
## ATX CONNECTOR



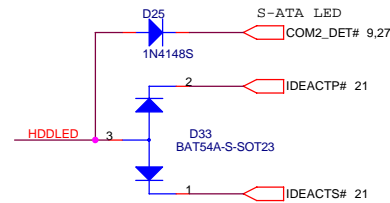
## BUZZER



## Intel Front Panel



## IDE LED



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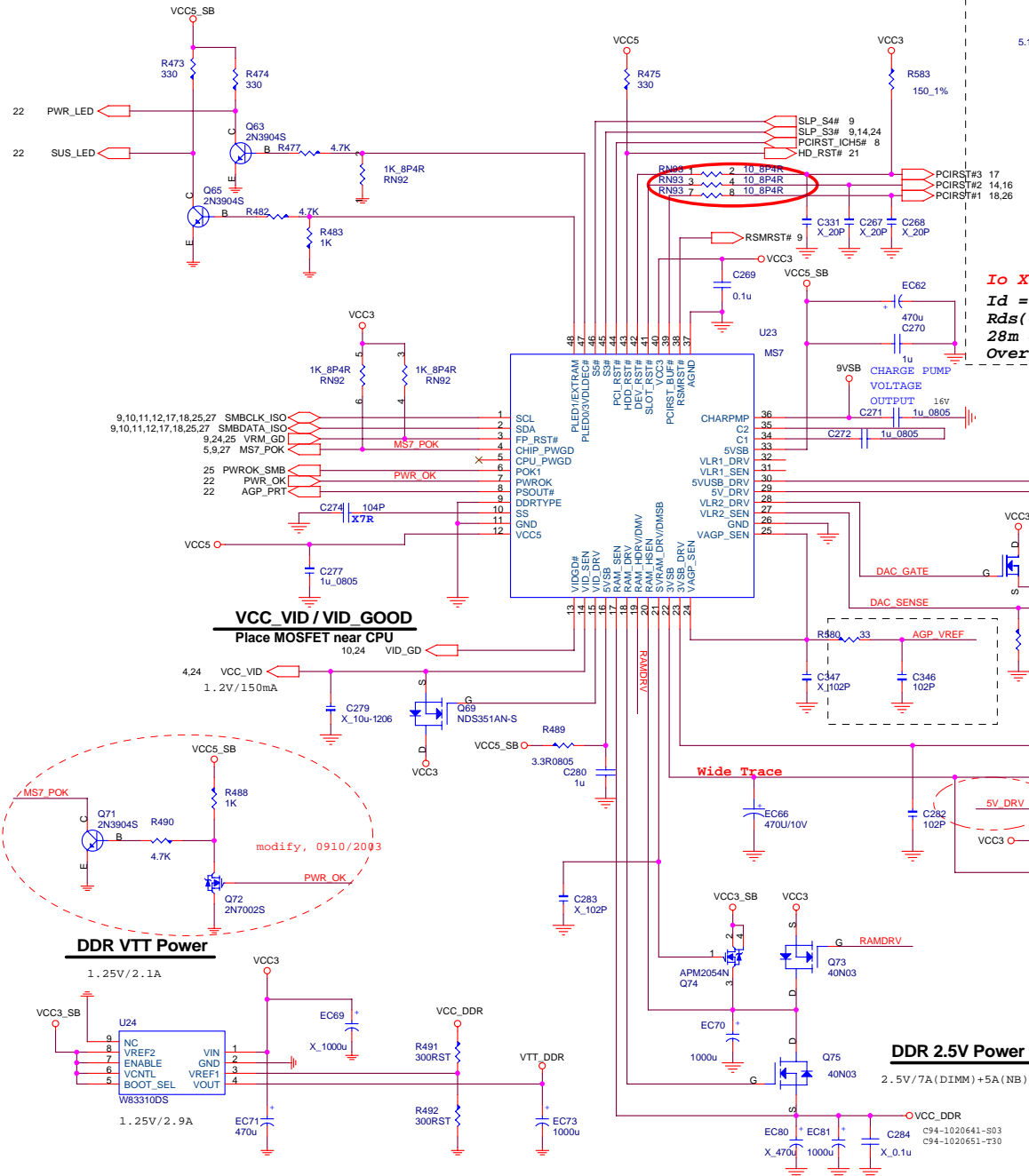


## ACPI Controller

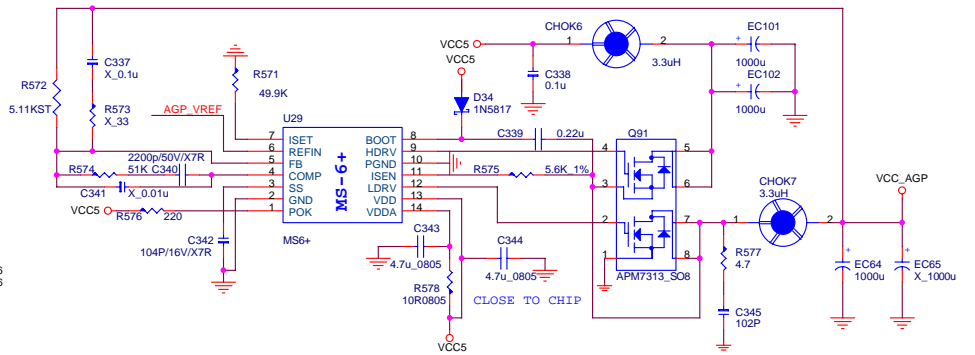
	ICH5 300mA
PCI 375+20+20=	415mA
<hr/>	
VCC3_SB	715mA

**1.7V @250mA**

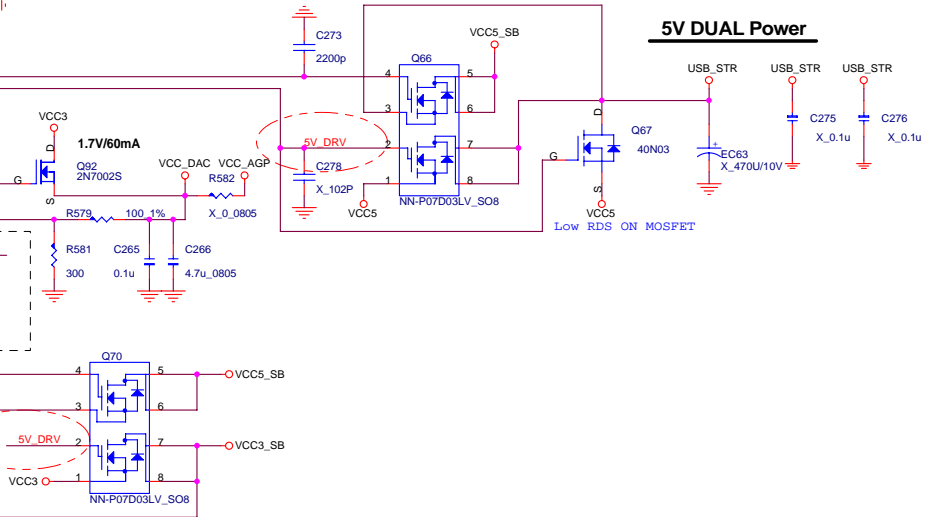
Power	S0	S3	S5
VCC3_SB	Main	Standby	Standby
VCC5_STR	Main	Standby	0V
MEM_STR	Main	Standby	0V



AGP POWER



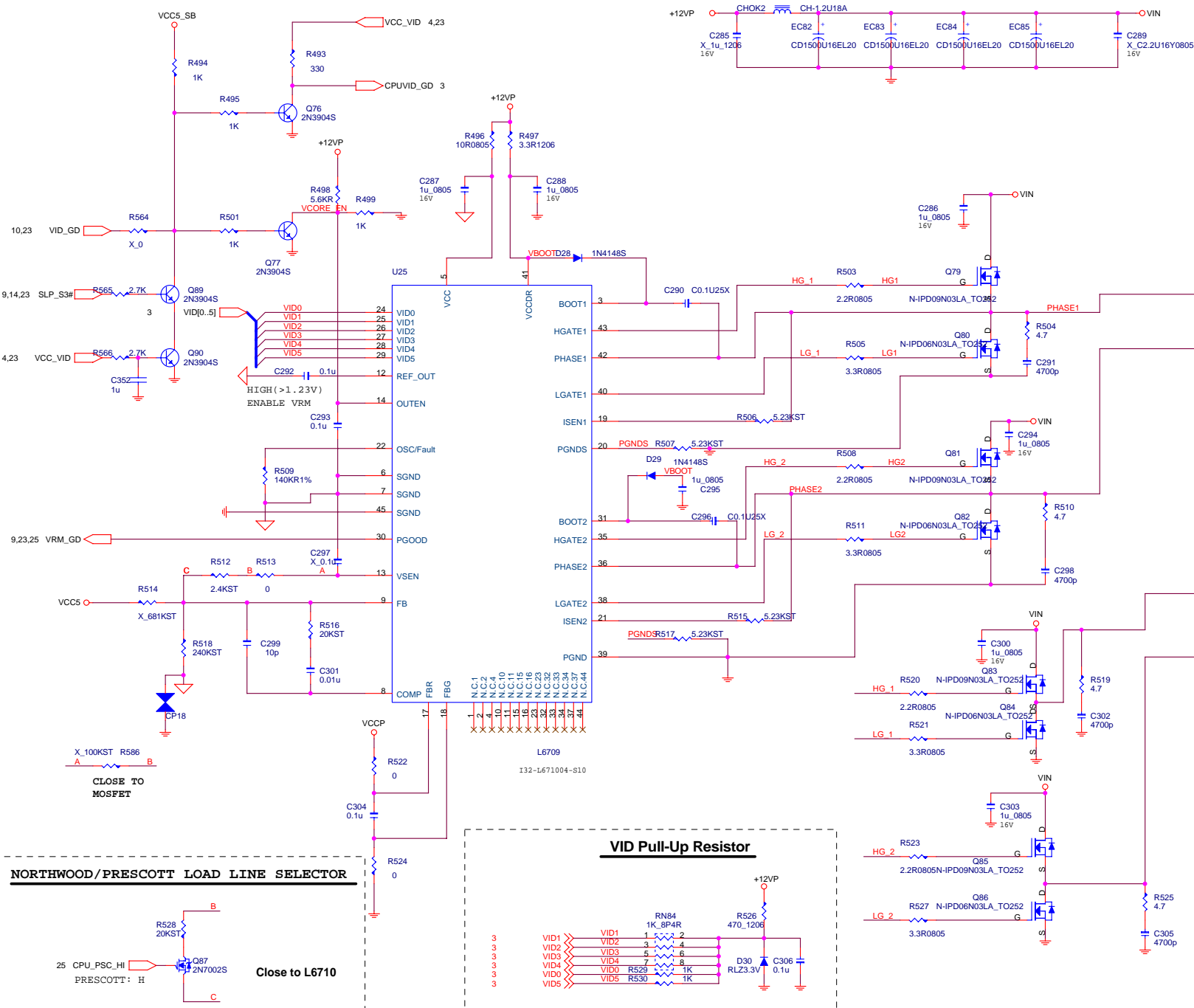
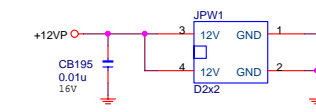
$I_o \times R_{ds(on)} = I_{sen}(72\mu A) \times R_{sen}$   
 $I_d = 6A, I_d(max) = 24A$   
 $R_{ds(on)}/10V = 21m\ \Omega \sim 28m\ \Omega$   
 $Overcurrent\ (4.7K\ \Omega) = 12A \sim 16A$



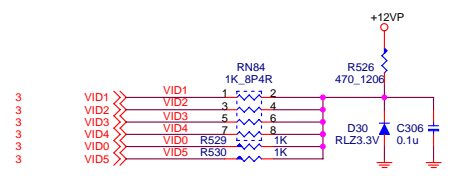
### 5V DUAL Power

<b>Micro-Star</b>	Title <b>MS-7037</b>	Rev <b>0B</b>
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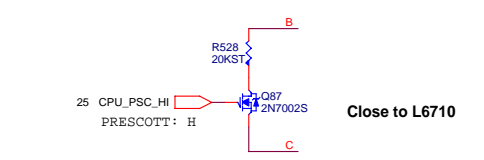
# ATX12V Power Connector



## VID Pull-Up Resistor

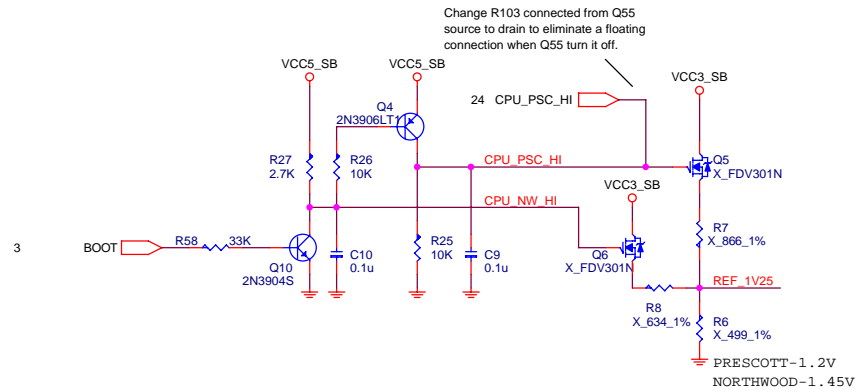


## NORTHWOOD/PRESCOTT LOAD LINE SELECTOR

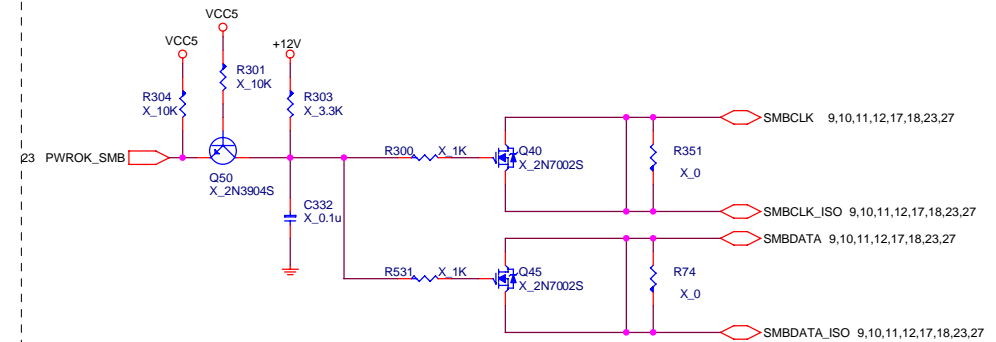
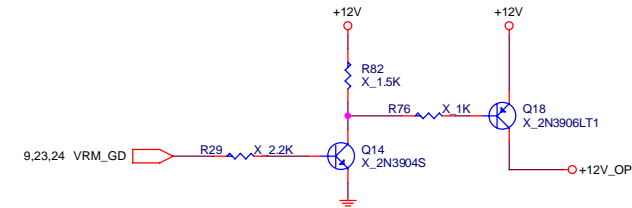


Micro-Star	Title	MS-7037	Rev	0B
Document Number	VRM 10 - L6710TR			
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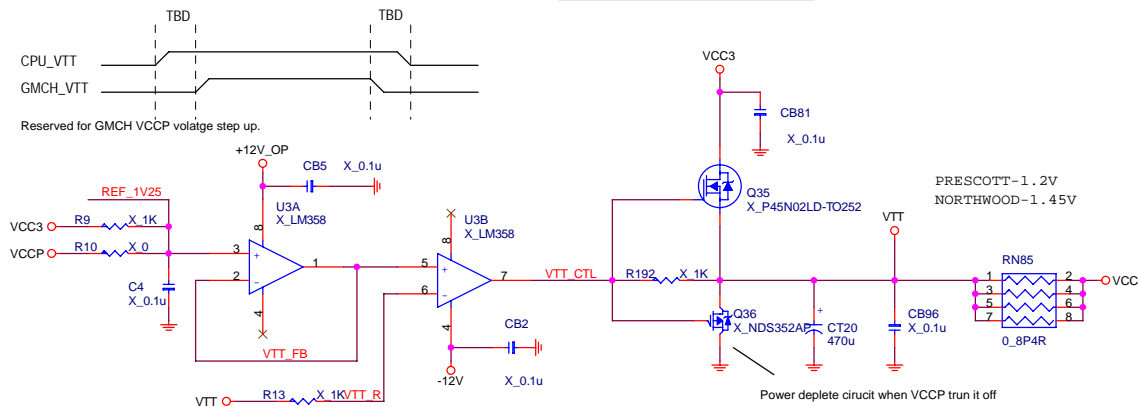
### Intel reference GMCH VTT power cirucit



### GMCH\_VTT ON/OFF CIRCUIT



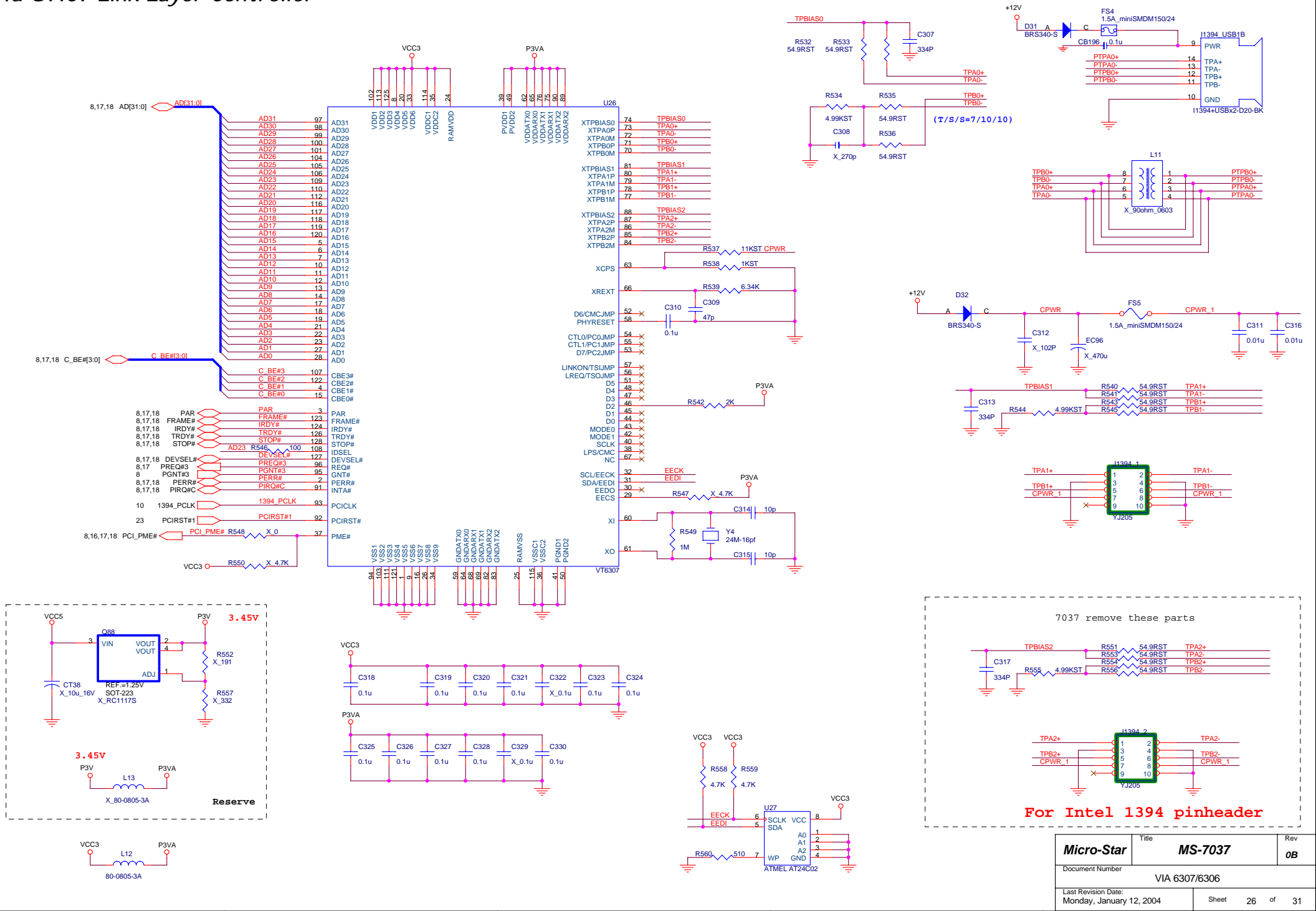
### GMCH VTT Generator



Bootstrip pin are input rather then output on Intel Prescott processor, either it's internal weak pull-up but still need to identify it can be sufficient driving capability for out side circuit. And the bootstrip pin power by core voltage so the outside circuit need to adjust the turn off voltage.

Micro-Star	Title <b>MS-7037</b>	Rev <b>0B</b>
Document Number <b>MEM,VCC_DAC &amp; VTT Controller</b>		
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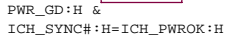
# 1394a OHCI Link Layer Controller



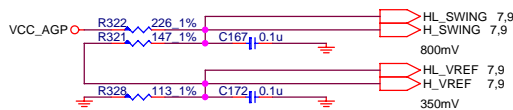
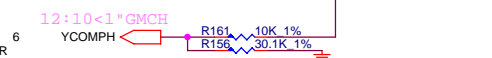
## ALL COMPONENTS CLOSE TO ICH5

Trace length is less than 3inchs to ICH5.

Trace length is less than 3inchs to ICH5.



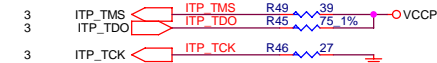
## VTT



CLR CMOS	
1 - 2	Normal *
2 - 3	Clear CMOS



ALL COMPONENTS CLOSE TO CPU



<b>Micro-Star</b>	Title <b>MS-7037</b>	Rev <b>0B</b>
Document Number		
<b>PULL HIGH RESISTORS &amp; RTC</b>		
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ICH5

GPIO Pin	Type	Function	Power well
GPIO 0	I	PREQ#A	MAIN
GPIO 1	I	PREQ#B	MAIN
GPIO 2	I	PIRQ#E	MAIN
GPIO 3	I	PIRQ#F	MAIN
GPIO 4	I	PIRQ#G	MAIN
GPIO 5	I	PIRQ#H	MAIN
GPIO 6	I	GPI6	MAIN
GPIO 7	I	GPI7	MAIN
GPIO 8	I	SIO_PME#	RESUME
GPIO 9	I	OC4#	RESUME
GPIO 10	I	OC5#	RESUME
GPIO 11	I	TEMP_THERM#	RESUME
GPIO 12	I	SIO_SMI#	RESUME
GPIO 13	I	GPI13	RESUME
GPIO 14	I	OC#6	RESUME
GPIO 15	I	OC#7	RESUME
GPIO 16	O	PGNT#A	MAIN
GPIO 17	O	PGNT#B	MAIN
GPIO 18	O	GPO18	MAIN
GPIO 19	O	GPO19	MAIN
GPIO 20	O	GPO20	MAIN
GPIO 21	O	GPO21	MAIN
GPIO 22	OD	GPO22	MAIN
GPIO 23	O	BIOS_WP#	MAIN
GPIO 24	I/O	GPIQ24	RESUME
GPIO 25	I/O	LAN_DISABLE#	RESUME
GPIO 27	I/O	GPIQ27	RESUME
GPIO 28	I/O	GPIQ28	RESUME
GPIO 32	I/O	GPIQ32	MAIN
GPIO 33	I/O	COM2_DET#	MAIN
GPIO 34	I/O	GPIQ34	MAIN
GPIO 40	I	PREQ#4	MAIN
GPIO 41	I	GPI41	MAIN
GPIO 48	O	PGNT#4	MAIN
GPIO 49	OD	CPU_GD	MAIN

default output  
default output  
default output  
default output  
default output  
default output

PCI RESET DEVICE

Signals	Target
PCIRST#1	LAN,1394
PCIRST#2	Super I/O,AGP slot
PCIRST#3	PC11~3
PCIRST_ICH5#	Northbridge , FWH
HDDRST#	Primary, Scondary IDE

PCI Config.

DEVICE	MCP1 INT Pin	REQ#/GNT#	IDSEL	CLOCK
PCI Slot 1	PIRQ#G PIRQ#H PIRQ#E PIRQ#F	PCI_REQ#0 PCI_GNT#0	AD26	PCICLK0
PCI Slot 2	PIRQ#F PIRQ#G PIRQ#H PIRQ#E	PCI_REQ#4 PCI_GNT#4	AD25	PCICLK1
PCI Slot 3	PIRQ#E PIRQ#F PIRQ#G PIRQ#H	PCI_REQ#2 PCI_GNT#2	AD28	PCICLK2
LAN	PIRQH	PCI_REQ#1 PCI_GNT#1	AD29	LAN_PCLK
1394	PIRQC	PCI_REQ#3 PCI_GNT#3	AD23	1394_PCLK

DDR DIMM Config.

DEVICE	ADDRESS	CLOCK
DIMM 1	AOH	MCLK_A0/MCLK_A#0 MCLK_A1/MCLK_A#1 MCLK_A2/MCLK_A#2
DIMM 2	A4H	MCLK_B0/MCLK_B#0 MCLK_B1/MCLK_B#1 MCLK_B2/MCLK_B#2

JUMPER SETTING

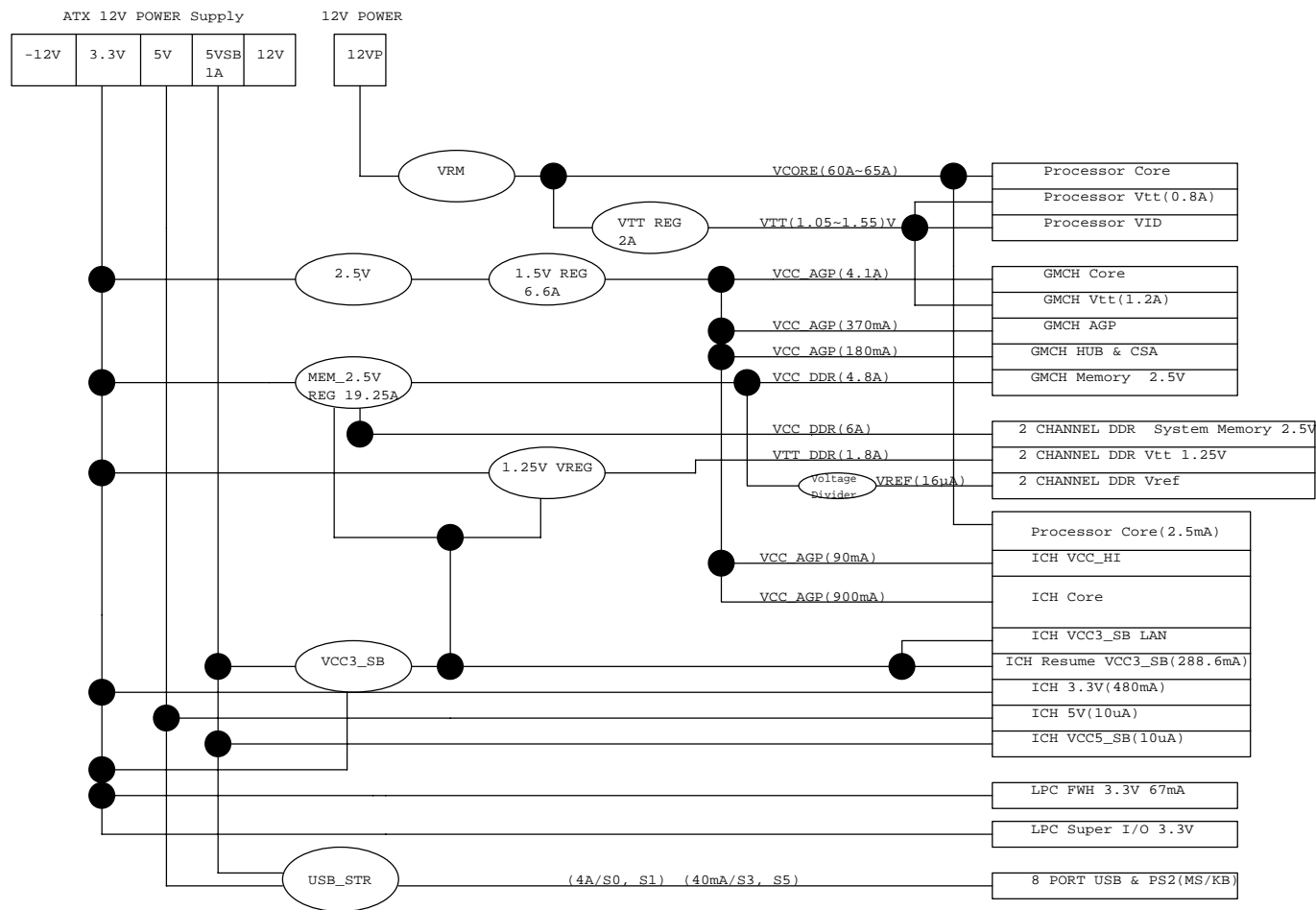
<b>JBAT1</b>	( 1-2 ) NORMAL	( 2-3 ) CLEAR
<b>JAUD1</b>	( 5-6 ) W/O FRONT AUDIO ( 9-10 )	WITH FRONT AUDIO

SIO

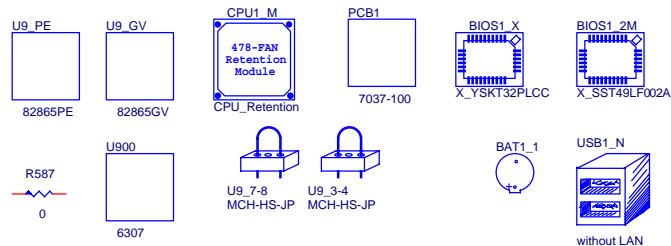
PIN NAME	USAGE	Input/Output	NOTES
GPIO10	UNUSED	INPUT	
GPIO11	UNUSED	INPUT	
GPIO12	UNUSED	INPUT	
GPIO13	UNUSED	INPUT	
GPIO14	UNUSED	OUTPUT	
GPIO15	VID5	INPUT	Low: VID add 0.0125V , High :by pass
GPIO16	UNUSED	OUTPUT	
GPIO17	UNUSED	OUTPUT	
GPIO20	UNUSED	OUTPUT	
GPIO21	SMBCLK_ISO	INPUT	SMBUS CLOCK
GPIO22	SMBDATA_ISO	INPUT / OUTPUT	SMBUS DATA
GPIO23	POWER_LED	OUTPUT	Default used MS-5
GPIO24	UNUSED	OUTPUT	
GPIO25	UNUSED	OUTPUT	IRRXX
GPIO26	UNUSED	OUTPUT	
GPIO27	UNUSED	OUTPUT	
GPIO30	SLP_S3#	INPUT	S3 state indicator signal
GPIO31	PS_ON#	OUTPUT	Connector to Power Supply to turn on Power.
GPIO32	UNUSED	OUTPUT	
GPIO33	UNUSED	OUTPUT	
GPIO34	UNUSED	OUTPUT	
GPIO35	UNUSED	OUTPUT	

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# POWER DELIVERY MAP



## 7037 PART



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	Document Number	POWER DELIVERY MAP & MANUAL PART		
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Revision History (Changes from Rev 0A)

Sheet	Description