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MS-6571 Version 20A

INTEL (R) Brookdale-GE Chipset
Willamette/Northwood 478pin mPGA-B Processor Schematics

CPU:
Willamette/Northwood mPGA-478B Processor

INTEL (R) Brookdale-GE Chipset
INTEL GMCH (North Bridge) +
INTEL ICH4 (South Bridge)

On Board Chipset:

BIOS -- FWH
AC'97 Codec -- ALC201A/650
LPC Super I/O -- W83627HF
LAN -- INTEL 82562EZ
82540EM

Expansion Slots:

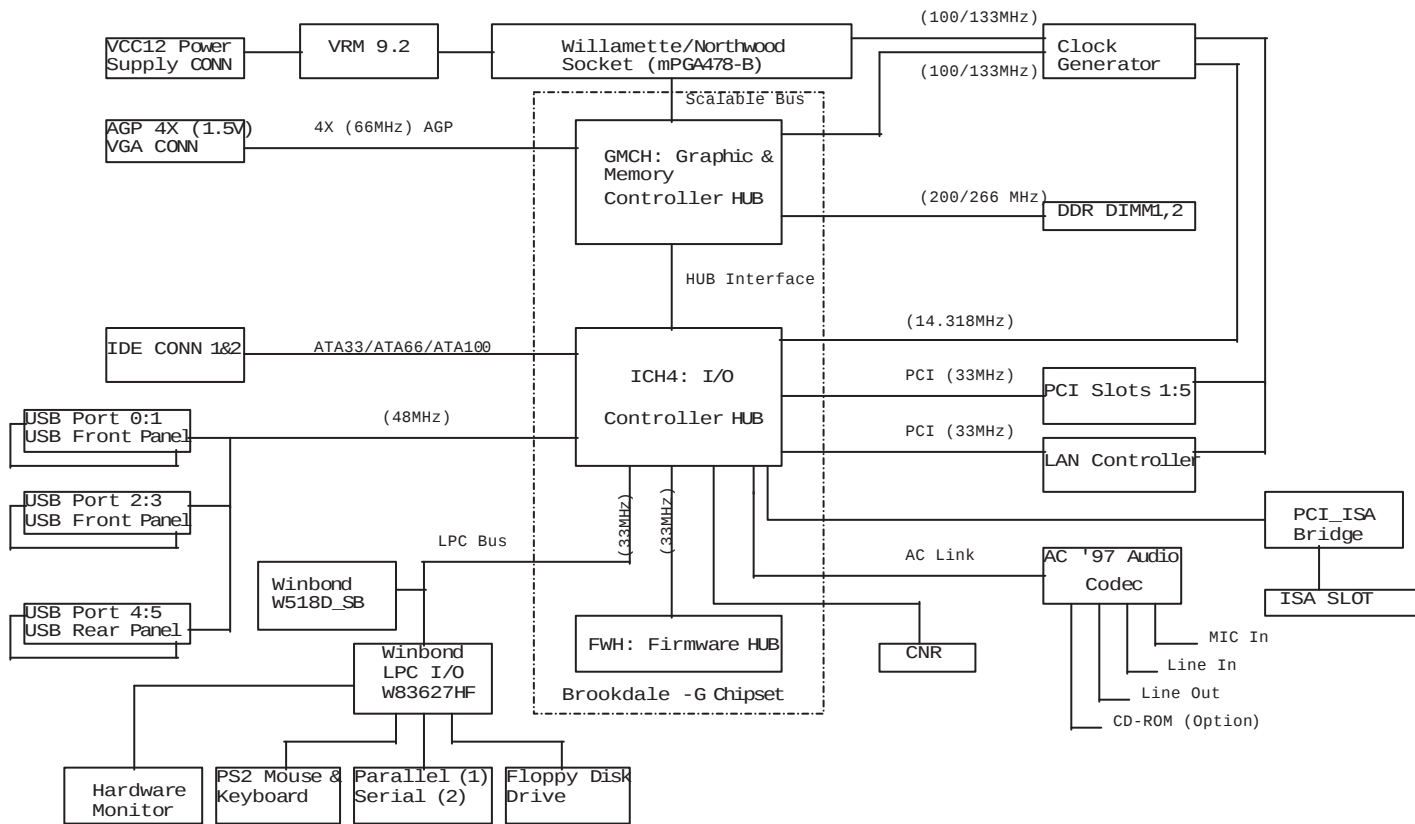
AGP2.0 SLOT * 1
PCI2.2 SLOT * 5
ISA SLOT * 1
CNR SLOT * 1

Bluetooth header supported

Last Schematic Update Date:
Friday, July 12, 2002

Micro Star Restricted Secret

Title	COVER SHEET	Rev
Document Number	MS-6571	20A
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Model option table

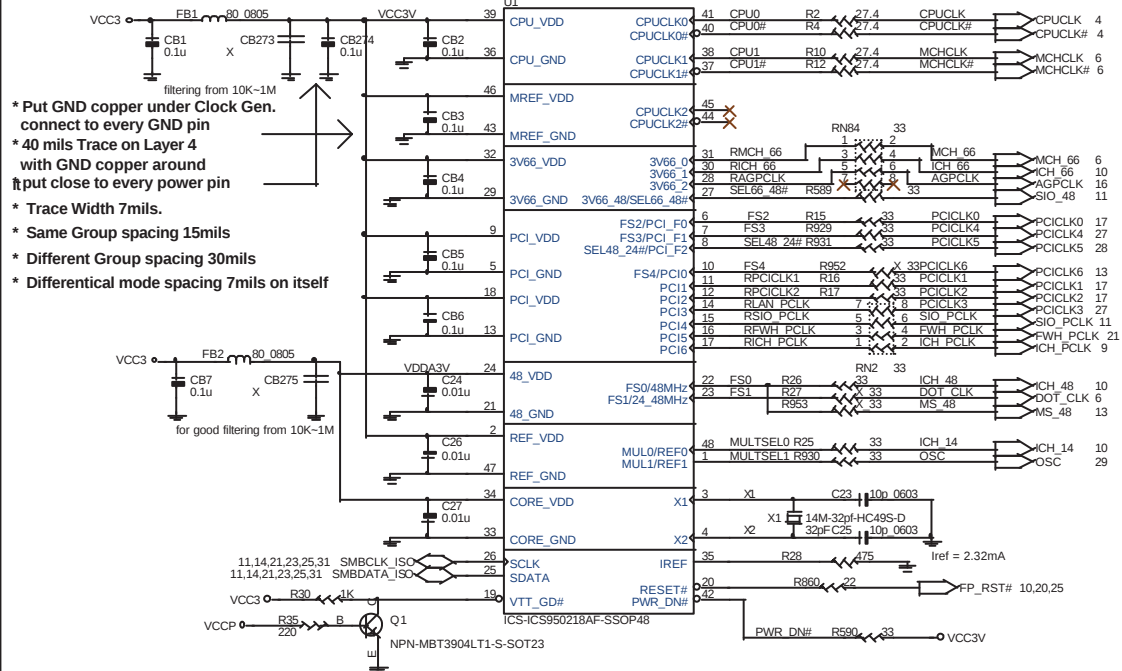
Model type	Function	BOM Config	ERP BOM No.
MS6571	For Legend		

Micro Star Restricted Secret

Title	BLOCK DIAGRAM	Rev
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 11, 2002
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CLOCK GENERATOR BLOCK

*Trace < 0.5"



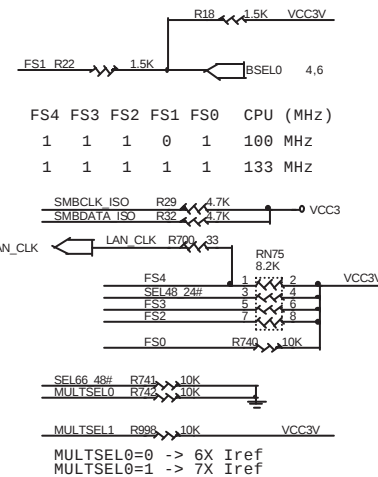
Shut Source Termination Resistors



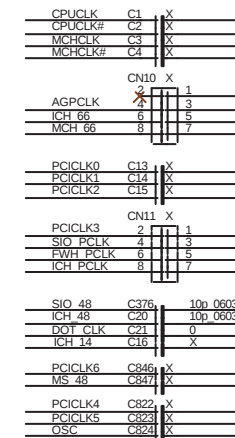
Trace less 0.2"

49.9ohm for 50ohm M/B impedance

CLOCK STRAPPING RESISTORS



Pull-Down Capacitors



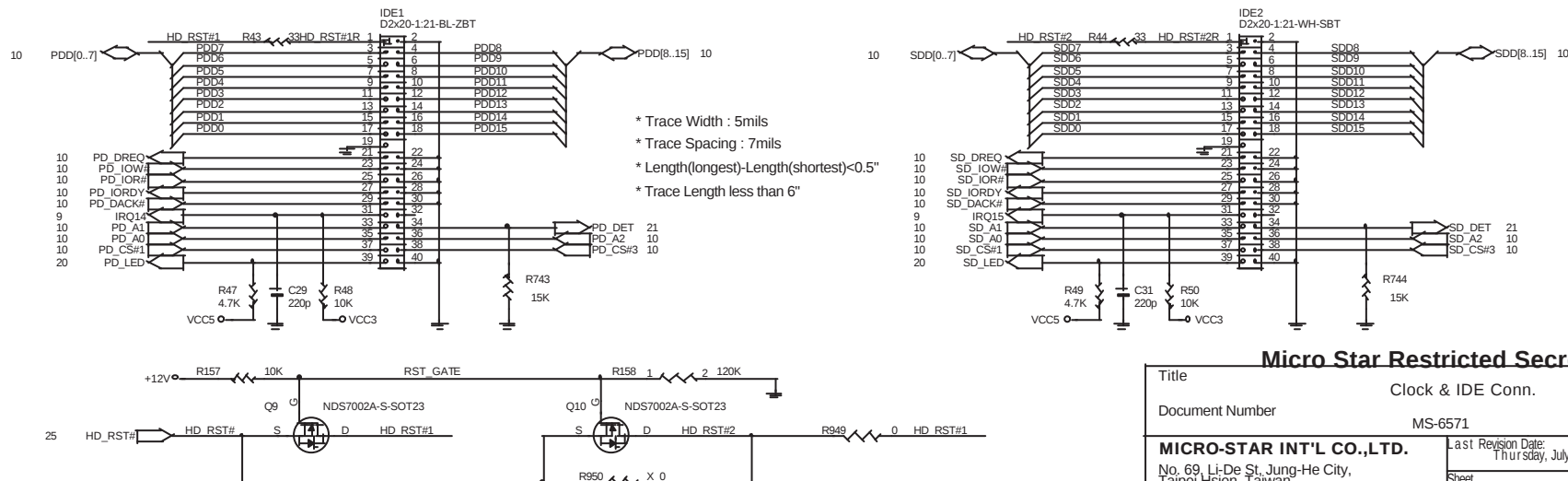
used only for EMI issue

Trace less 0.2"

PRIMARY IDE BLOCK

ATA100 IDE CONNECTORS

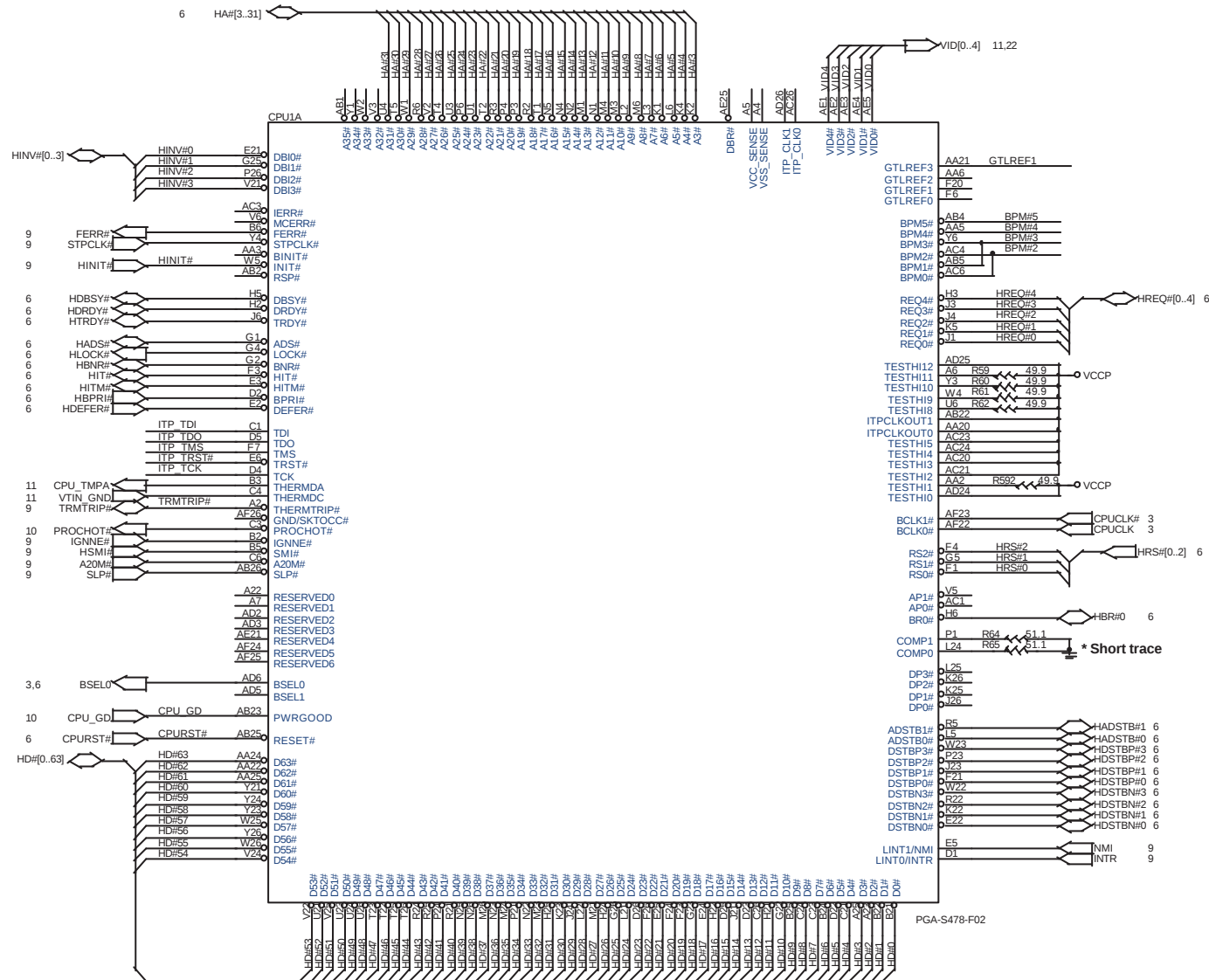
SECONDARY IDE BLOCK



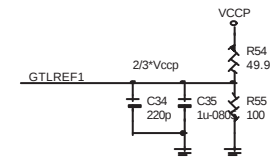
~~Micro Star Restricted Secret~~

Title		Rev
Clock & IDE Conn.		
Document Number	20A	
MS-6571		
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 18, 2002
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CPU SIGNAL BLOCK

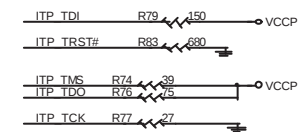


CPU GTL REFERENCE VOLTAGE BLOCK



Every pin put one 220pF cap near it.
Trace Width 7mils, Space 10mils.
Keep the voltage divider within
1.5" of the GETREF pin.

CPU ITP BLOCK



CPU STRAPPING RESISTORS

ALL COMPONENTS CLOSE TO CPU

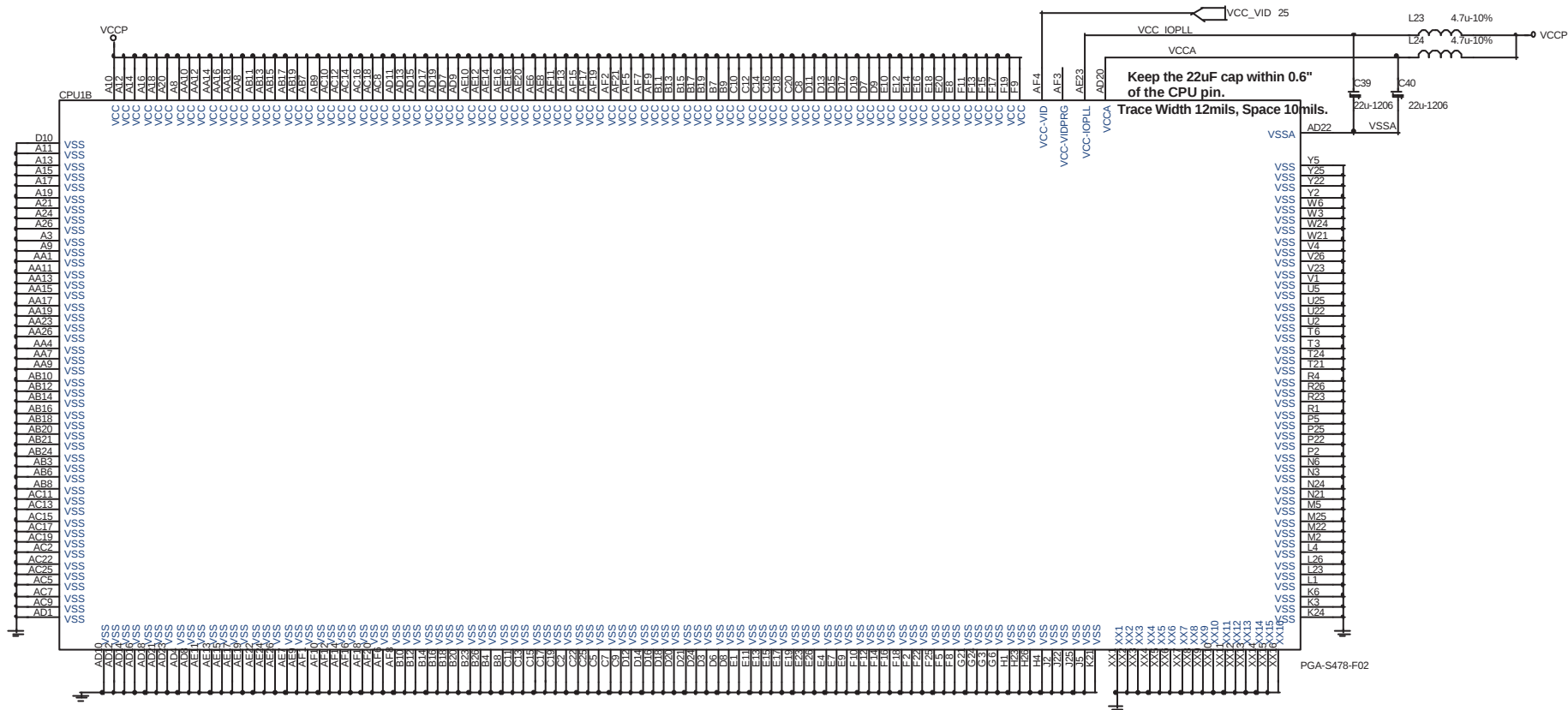


ALL COMPONENTS CLOSE TO CPU

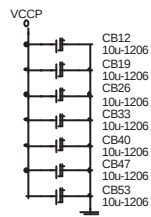
~~Micro Star Restricted Secret~~

Title mPGA478-B Intel CPU Socket Part 1		Rev 20A
Document Number MS-6571		
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 11, 2002
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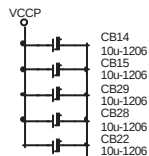
CPU VOLTAGE BLOCK



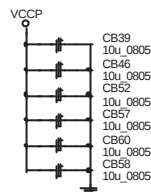
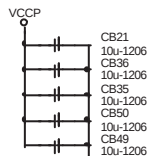
CPU DECOUPLING CAPACITORS



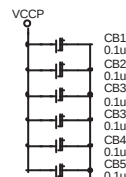
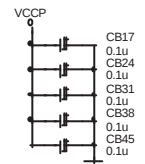
Place 14 pcs 1206 size cap
north side of processor



PLACE CAPS WITHIN CPU CAVITY



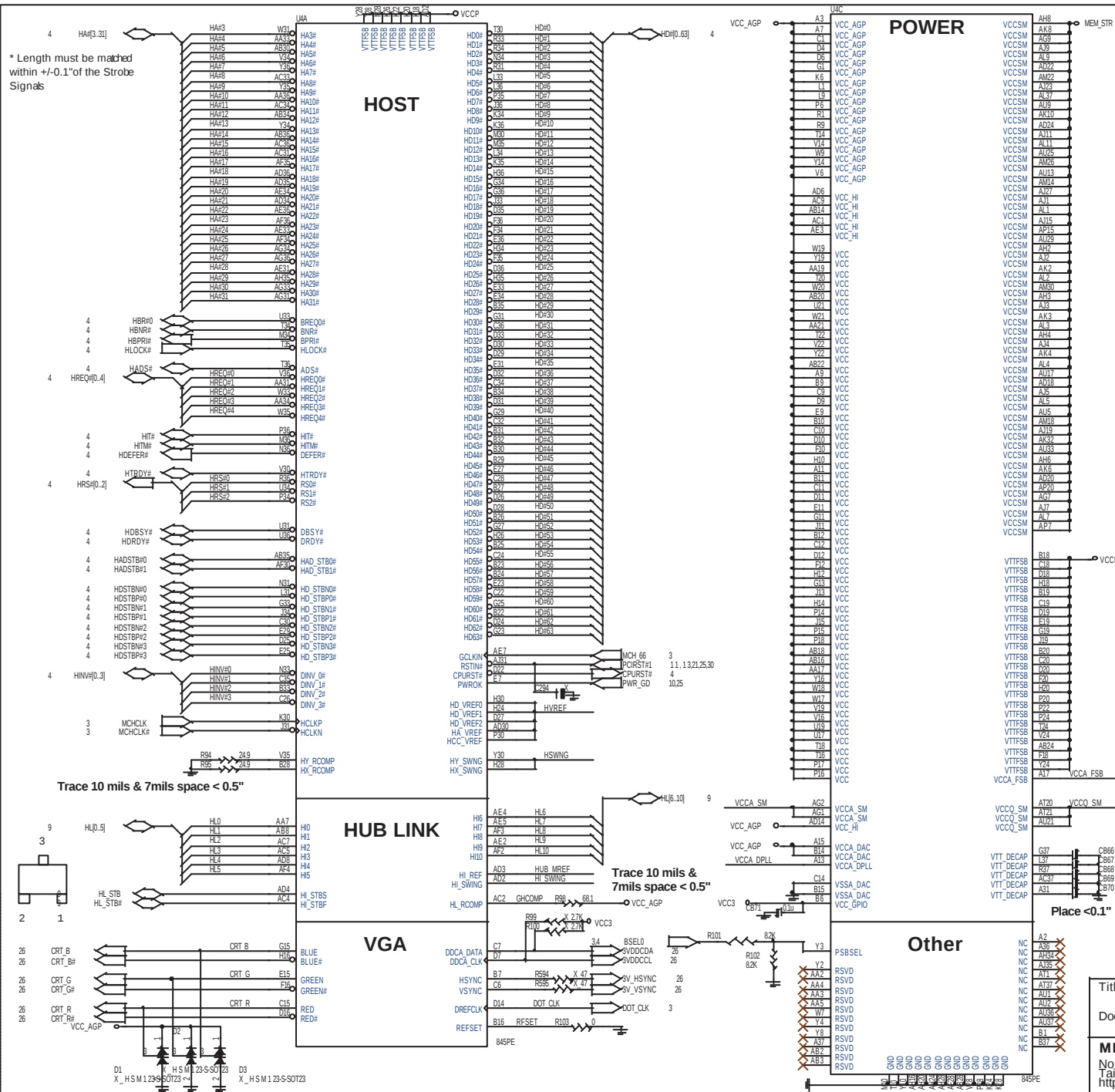
Place these caps on south side of processor



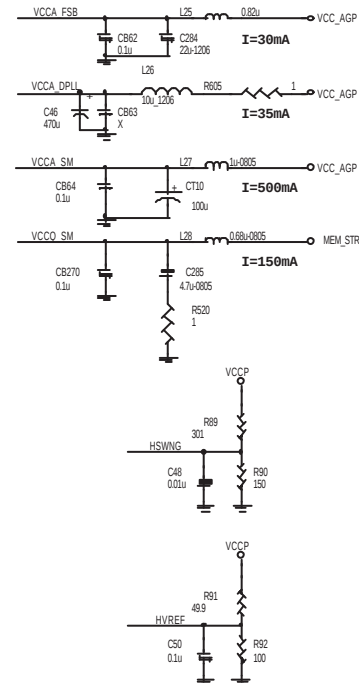
~~Micro Star Restricted Secret~~

Title mPGA478-B Intel CPU Socket Part 2		Rev 20A
Document Number MS-671		
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 11, 2002
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* Length must be matched within +/-0.1" of the Strobe Signals

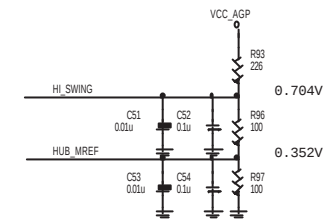


GMCH REFERENCE BLOCK



Place Cap. as Close as possible to GMCH , Trace width 12 mils & 10mils space

Keep the voltage divider within 3" of the GMCH pin.



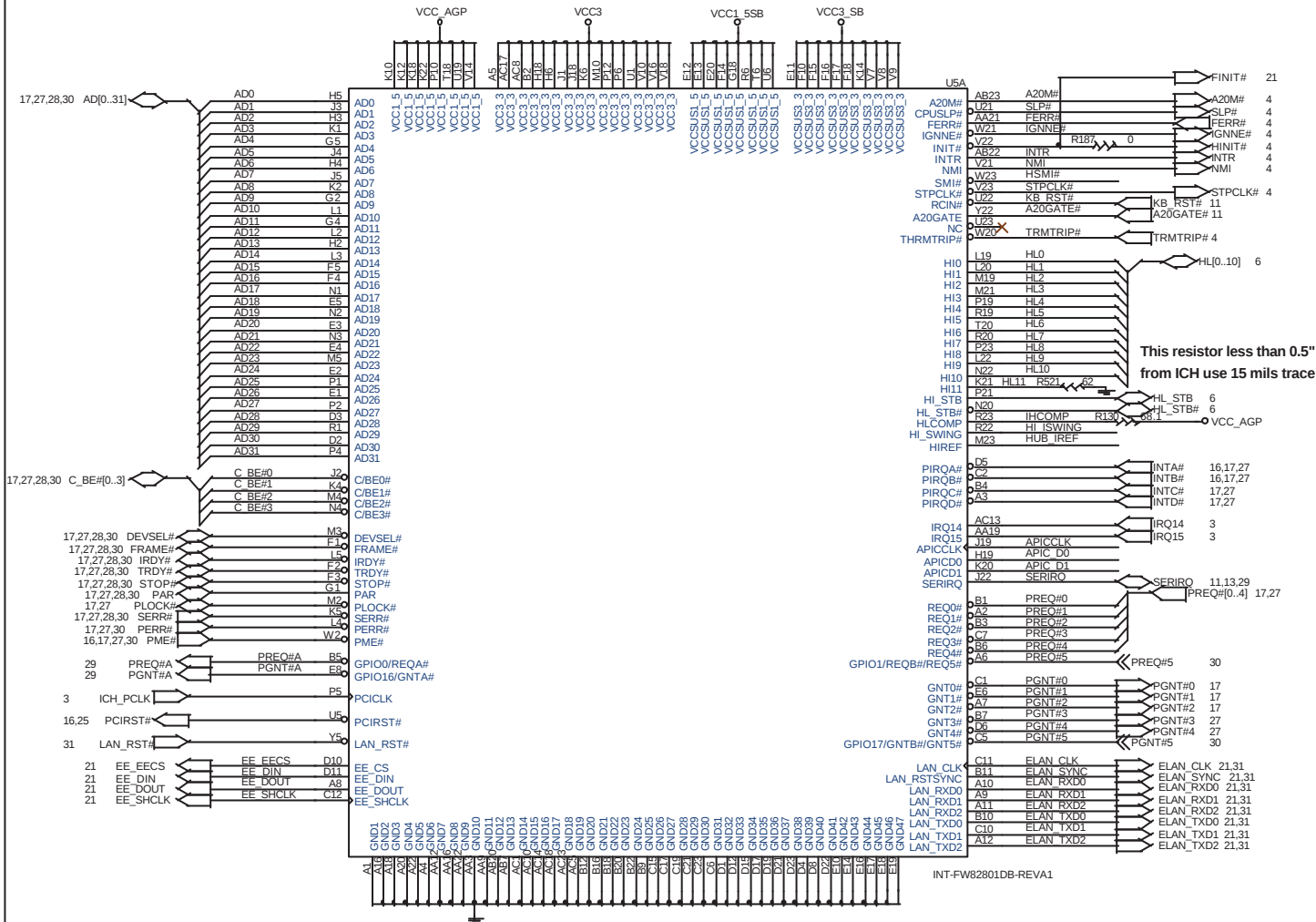
Place 0.01uF Cap. as Close as possible to GMCH< 0.25"

Trace width 12 mils & 10mils space

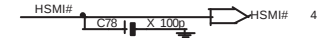
Micro Star Restricted Secret

Title	Brookdale-G GMCH Part 1 (Power,Host ,VGA & HUB)	Rev	20A
Document Number	MS-6571		
MICRO-STAR INT'L CO.,LTD.		Last Revision Date:	
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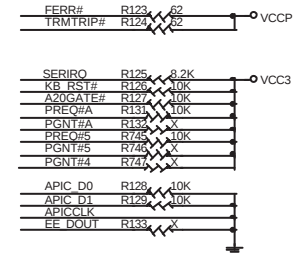
ICH4 PCI / HUB LINK / CPU / LAN / INTERRUPT SIGNALS



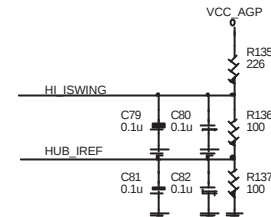
ICH4 SMI# SIGNAL



ICH4 STRAPPING RESISTORS



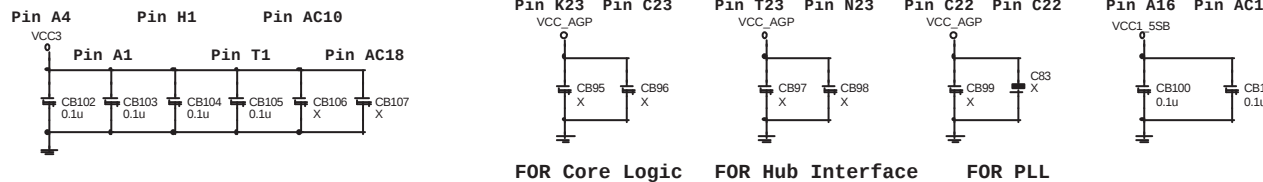
ICH4 REFERENCE VOLTAGE



Place Cap. as Close as possible to ICH4 < 0.25"
Trace width use 12 mils and 10mils space

ICH4 DECOUPLING CAPACITORS

Place one 0.1u close to ICH4 <100 mil



FOR Core Logic

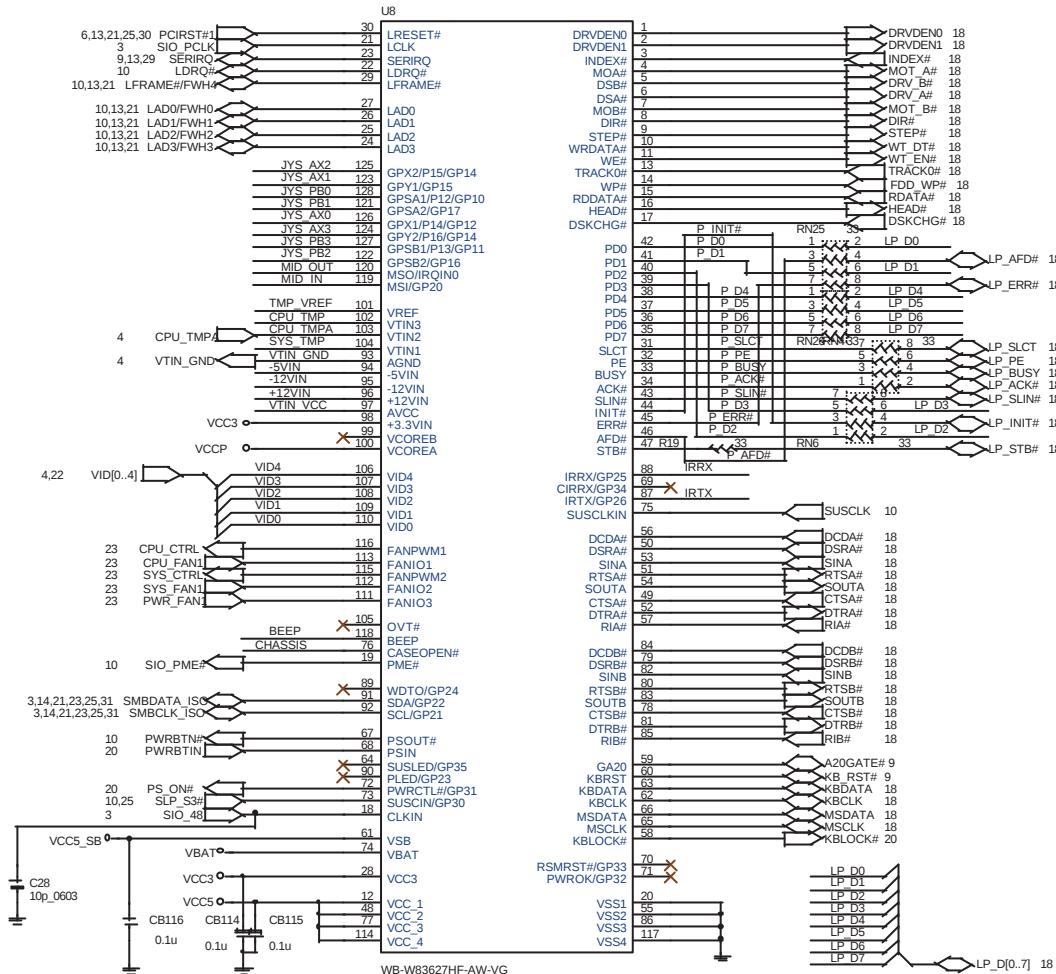
FOR Hub Interface

FOR PLL

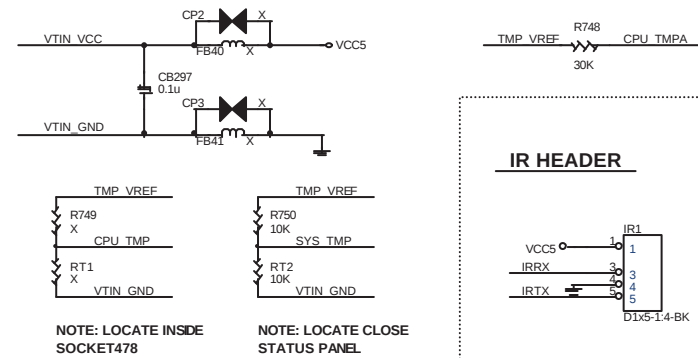
Micro Star Restricted Secret

Title	ICH4 Part 1 (Power,HUB,PCI & CPU I/F)	Rev	20A
Document Number	MS-6571		
MICRO-STAR INT'L CO.,LTD.		Last Revision Date: Thursday, July 11, 2002	
No. 69 Li-De St, Jung-He City, Taipei Hsien, Taiwan		Sheet 9 of 33	
http://www.msi.com.tw			

LPC SUPER I/O W83627HF

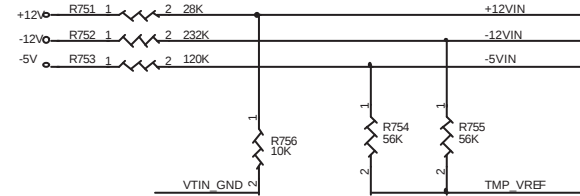


THERMAL RESISTOR BLOCK

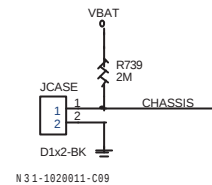


NOTE: LOCATE INSIDE SOCKET478

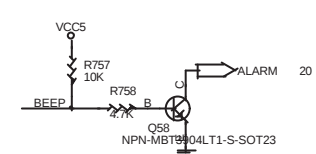
NOTE: LOCATE CLOSE STATUS PANEL



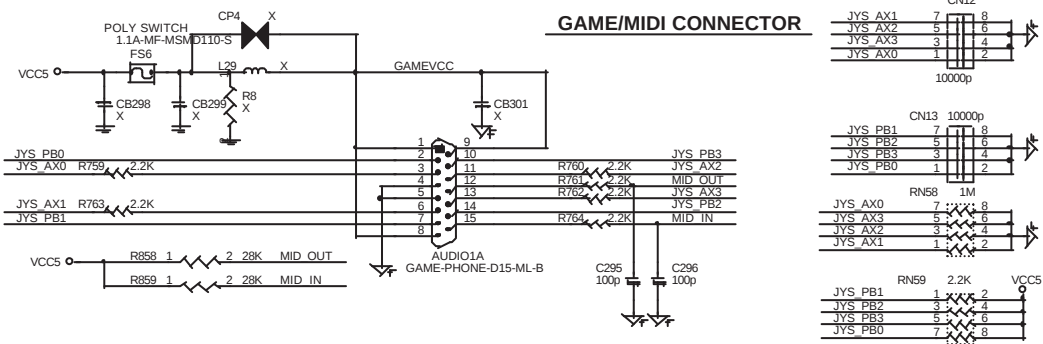
Chassis Intrusion Header



SPEAKER BLOCK



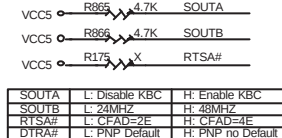
GAME/MIDI CONNECTOR



LPC I/O DECOUPLING CAPACITORS



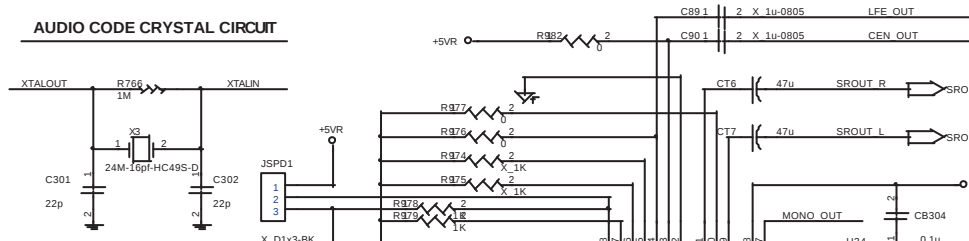
SUPER I/O STRAPPING RESISTOR



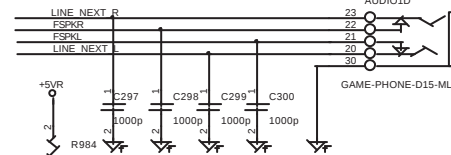
Micro Star Restricted Secret

Title	LPC I/O & GAME PORT	Rev
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD.		Last Revision Date:
No. 69 Li-De St, Jung-He City, Taipei, Hsien, Taiwan		Thursday, July 11, 2002
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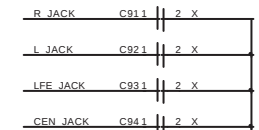
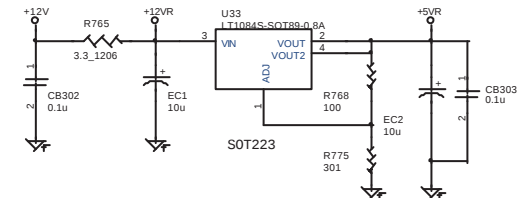
AUDIO CODE CRYSTAL CIRCUIT



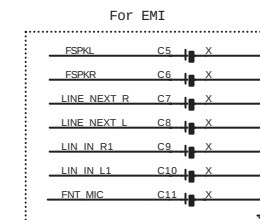
SPEAKER OUT JACK



AUDIO CODEC REGULATORS



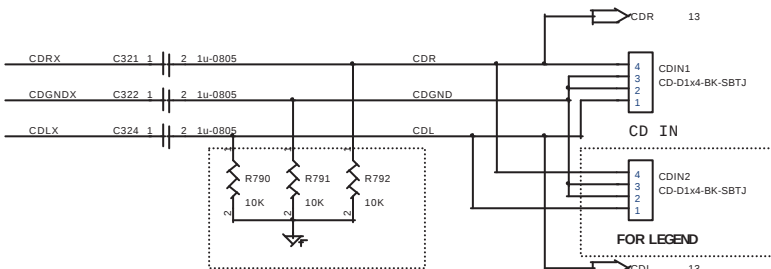
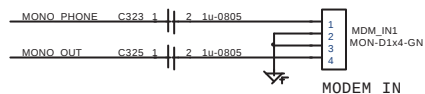
FOR MSI INTERNAL HEADER



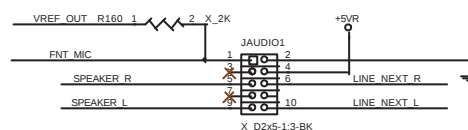
AD1881A AC97 CODEC



AUDIO CODE CD / AUX / MODEM IN HEADERS



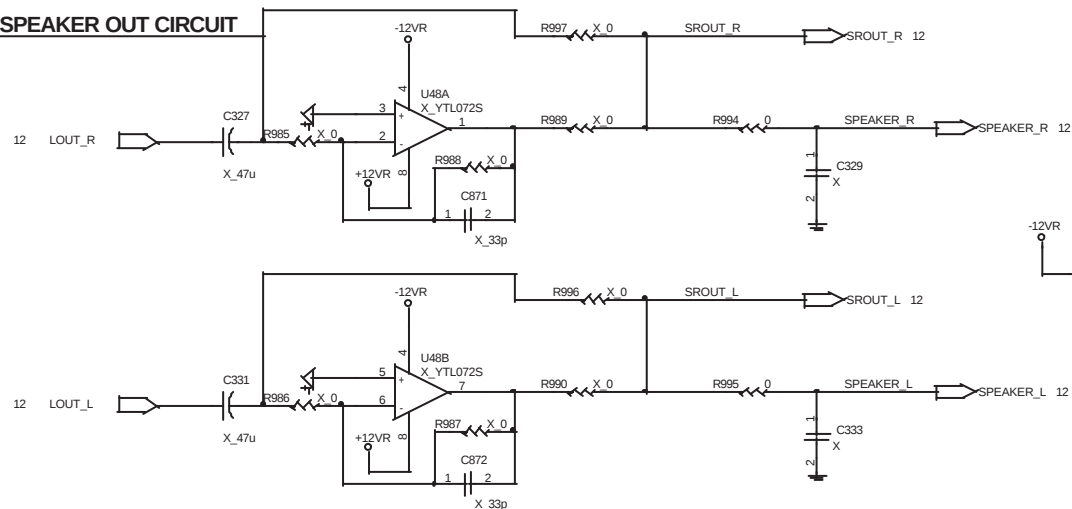
FOR LEGEND



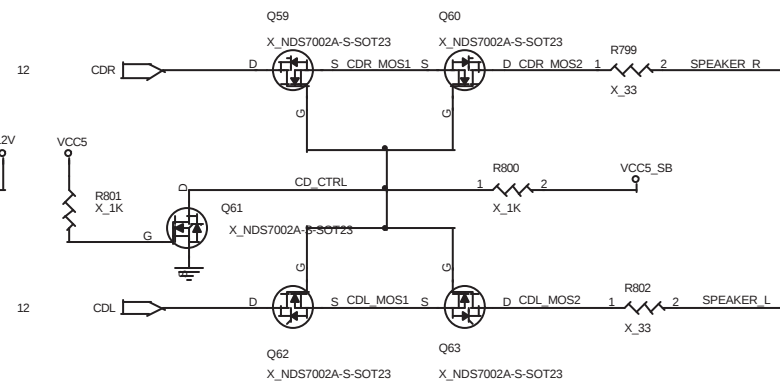
FOR LEGEND Micro Star Restricted Secret

Title	AC'97 CODEC	Rev
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 18, 2002
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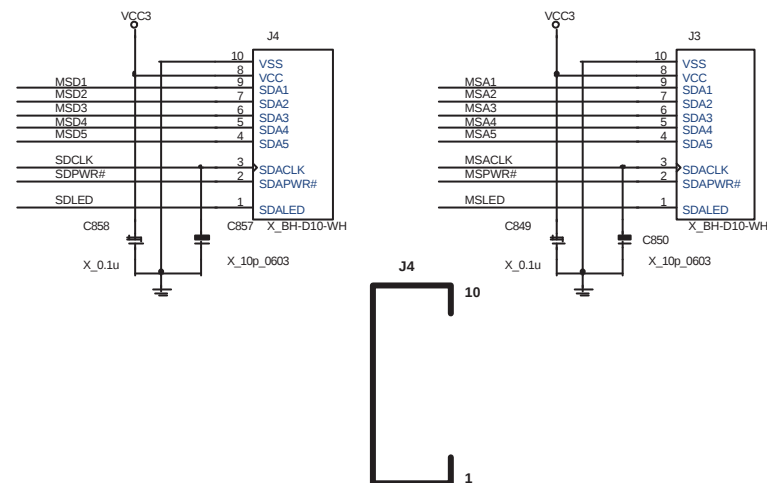
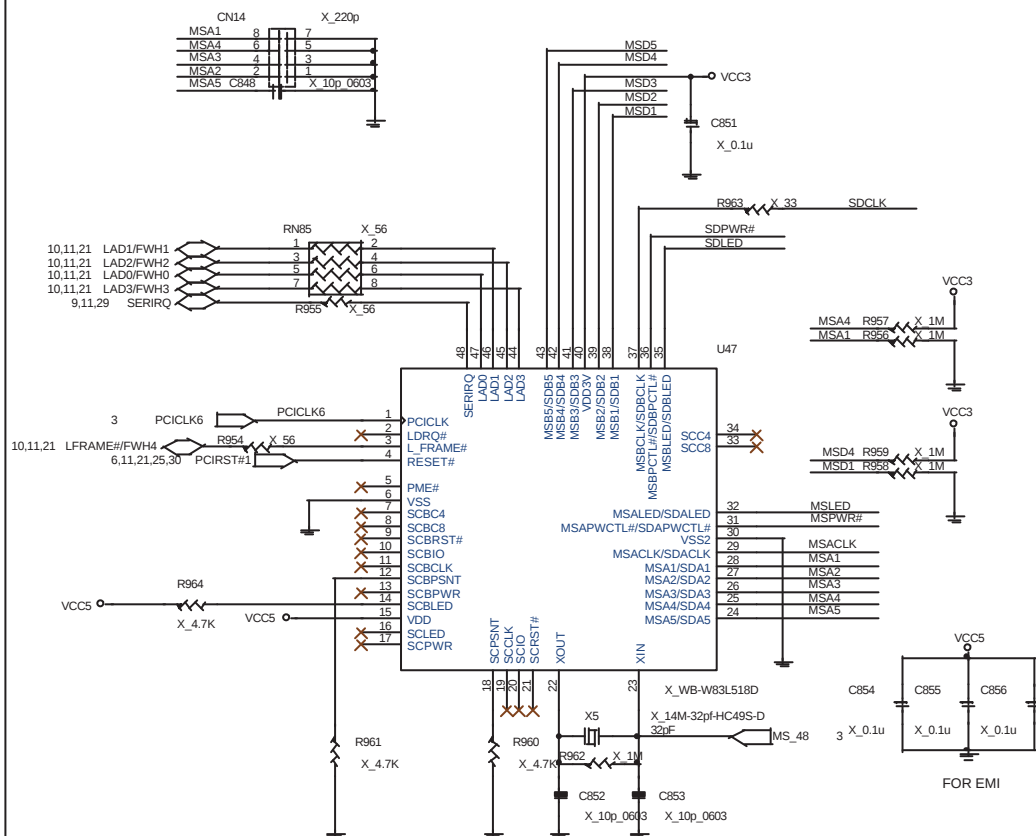
SPEAKER OUT CIRCUIT



CD PANEL PLAY WITHOUT PC POWER ON



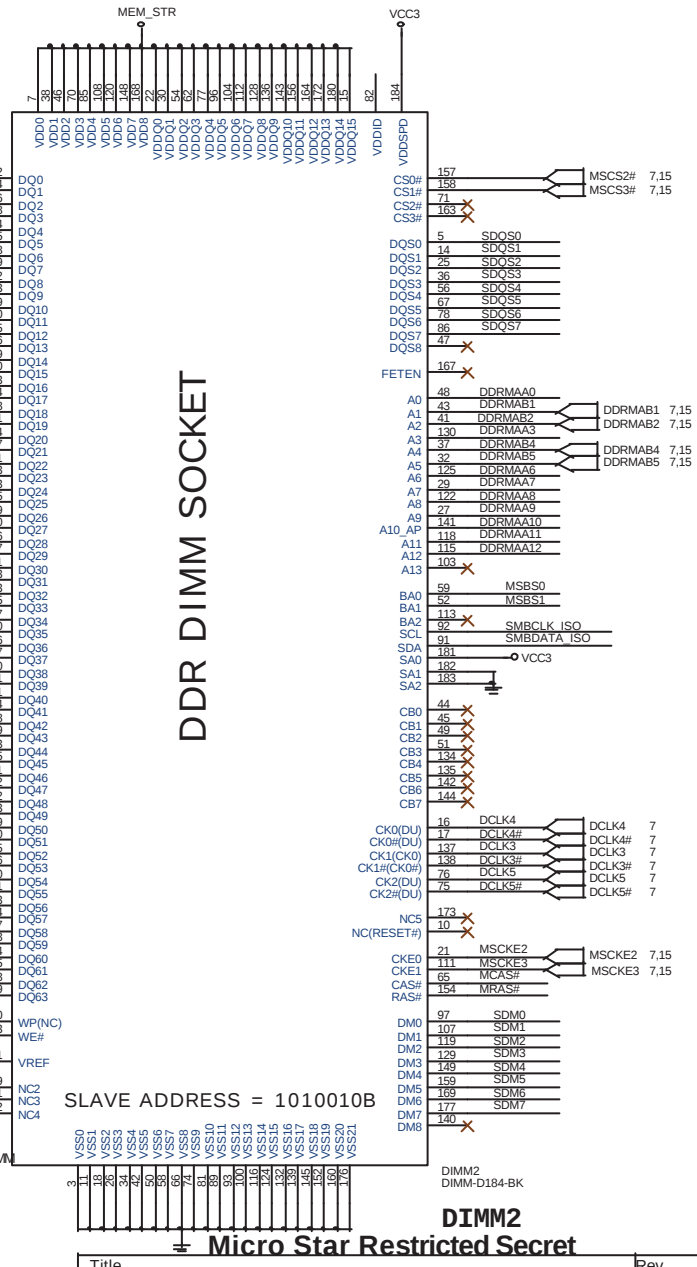
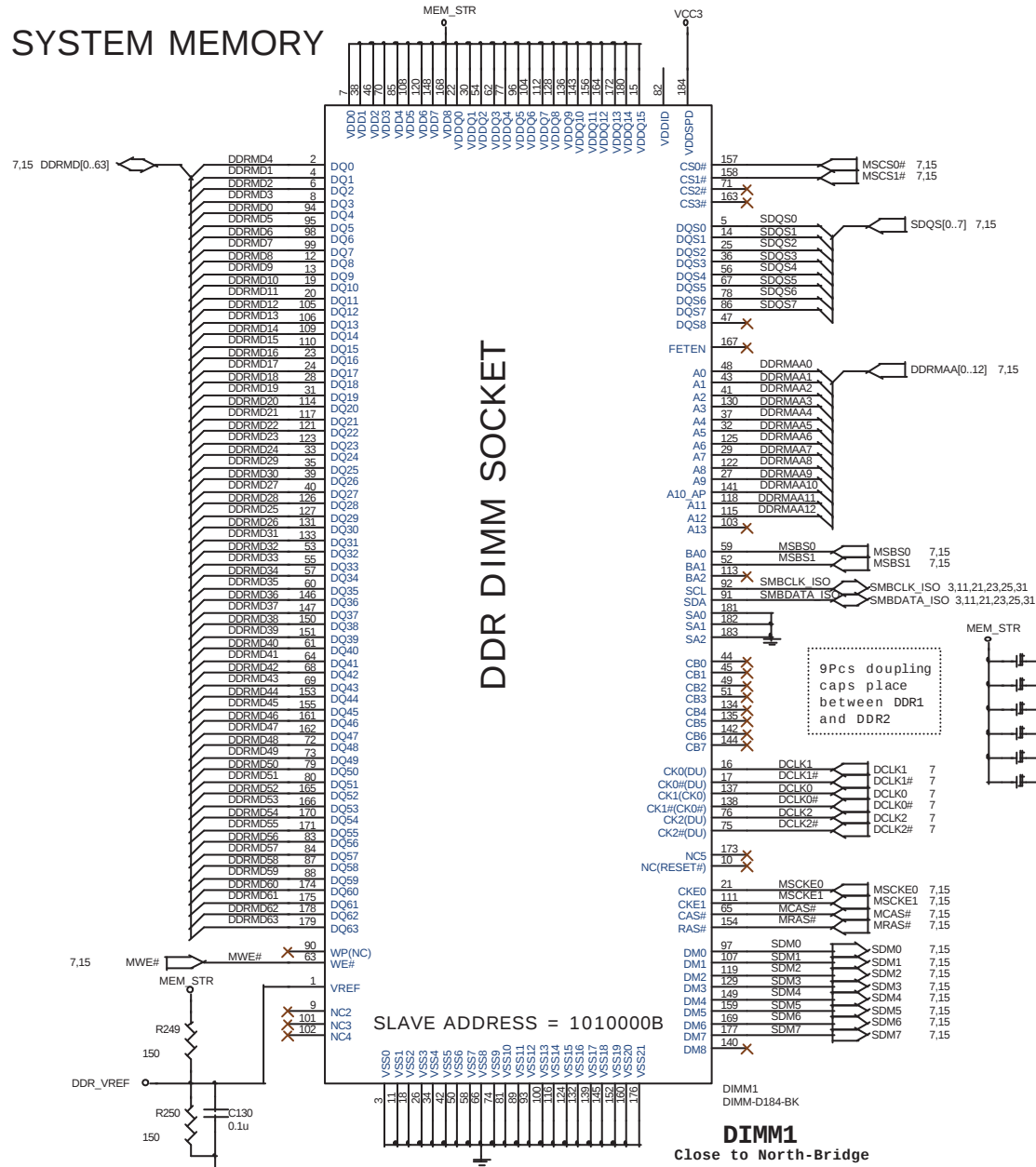
..... MEMORY STICK CONTROLLER



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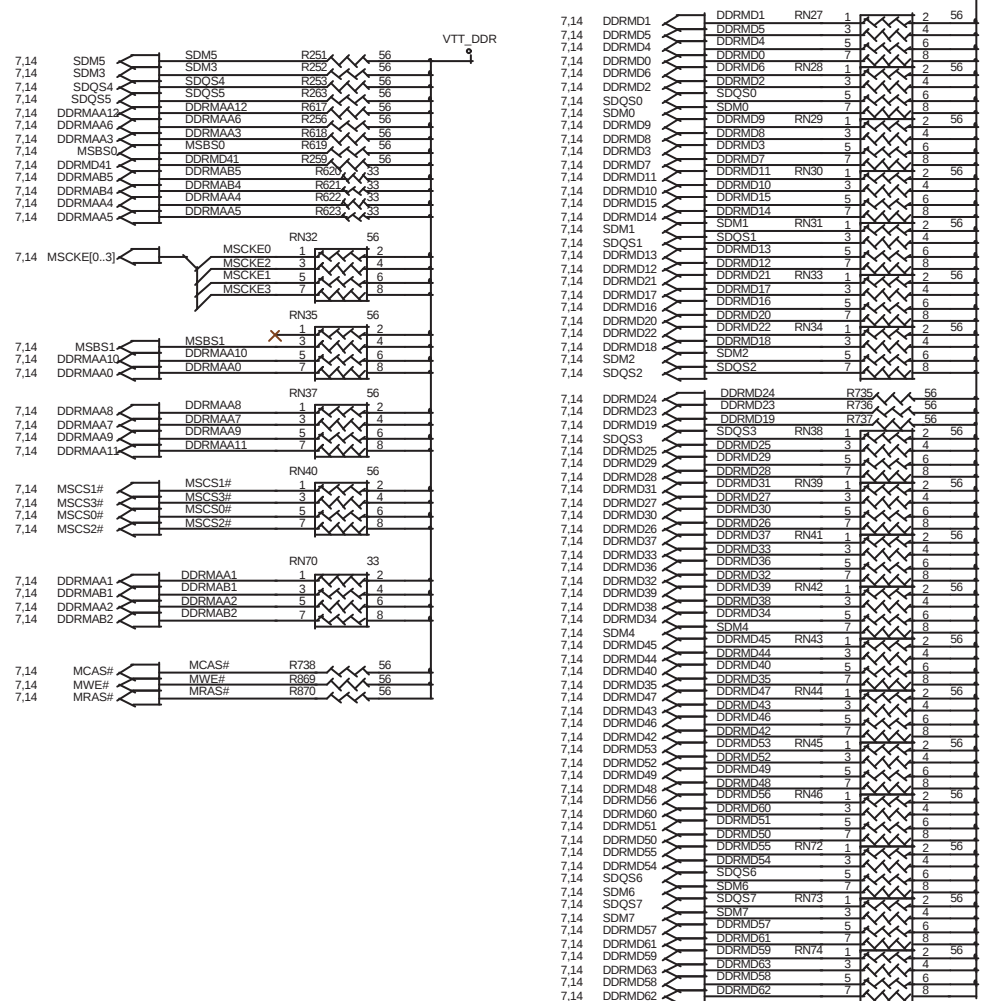
Title Audio Amplifier & CD Panel Play		Rev 20A
Document Number MS-6571		
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 18, 2002 Sheet 13 of 33

SYSTEM MEMORY

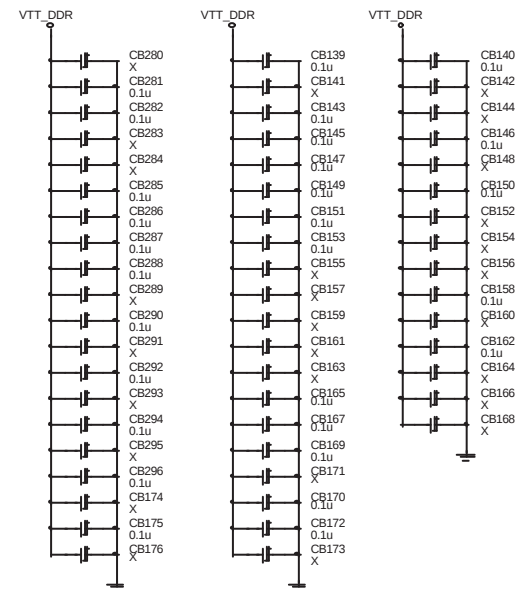


Title		Rev
DDR DIMM1&2		20A
Document Number	MS-6571	
MICRO-STAR INT'L CO.,LTD.		Last Revision Date:
No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Thursday, July 18, 2002
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DDR TERMINATORS

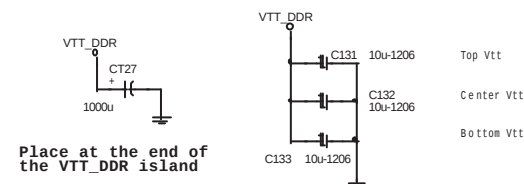


DDR Decoupling Caps



Total 110 signal, need 55 pcs decoupling.

Place for VTT_DDR island



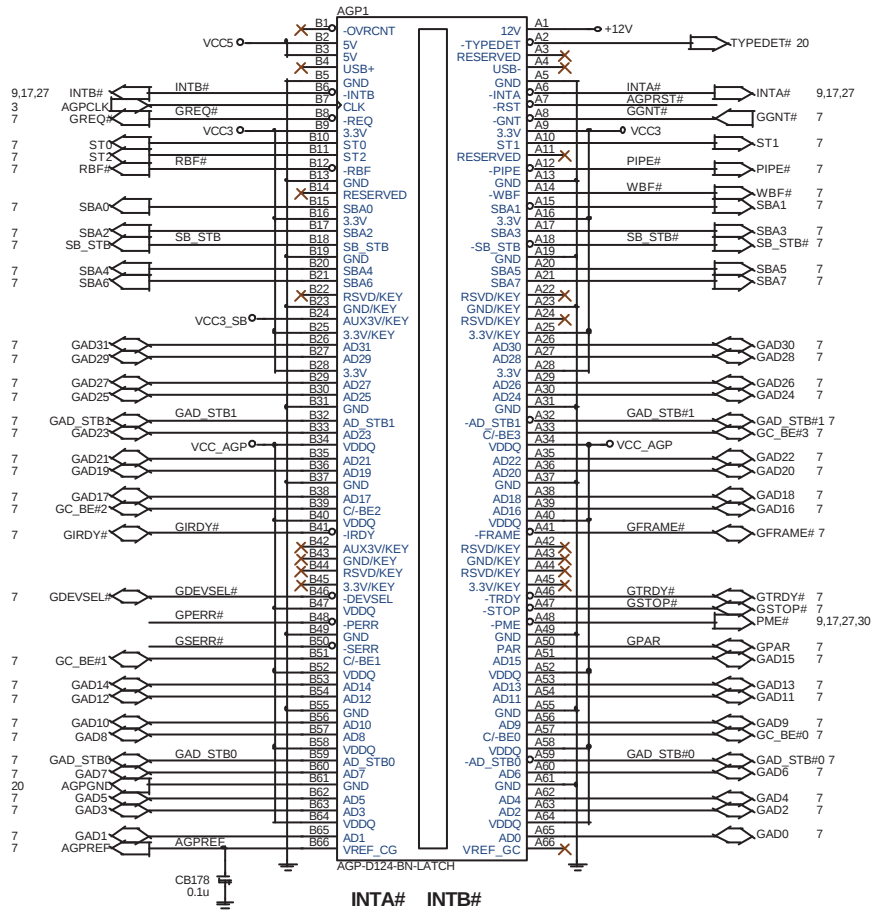
~~Micro Star Restricted Secret~~

Title		Rev
DDR Terminator Resistor		
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 11, 2002
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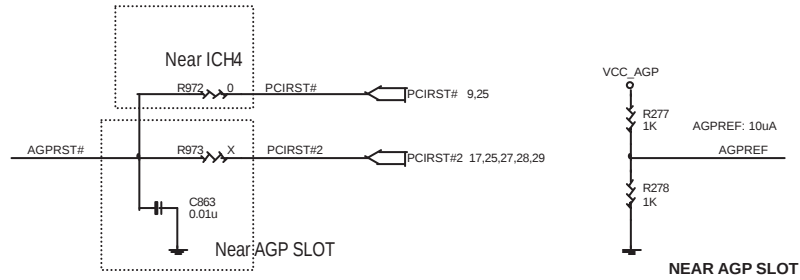
AGP 1.5V 2X/4X SLOT(AGP VER:2.0 COMPLY)

VCC5 = 60mils trace / 15 mils space

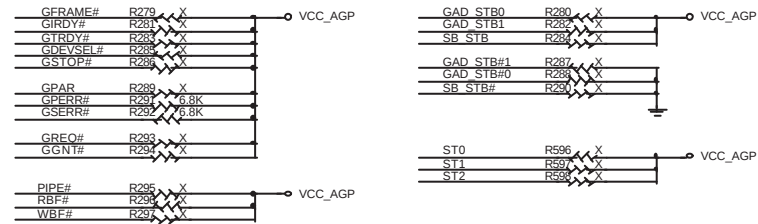
AGP Slot I_{max}
VCC_{AGP} 2.0A
VCC₃ 6.0A
VCC₁₂ 1.0A
VCC₅ 2.0A
VCC_{3_SB} 0.375A



AGP SIGNAL REFERENCE CIRCUIT

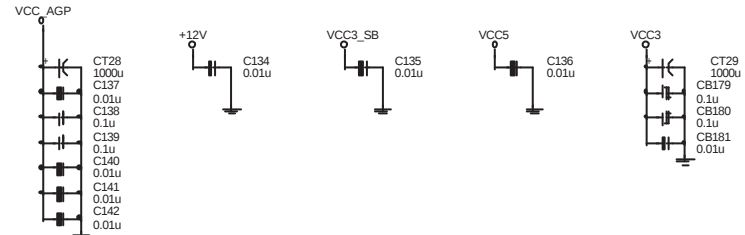


AGP TERMINATION RESISTORS



LESS 100MILS STUB TRACE LENGTH FOR 2X
LESS 500MIL FOR 1X MUST BE FOLLOWING
Place these resistors between AGP slot & GMCH

AGP SLOT DECOUPLING CAPACITORS



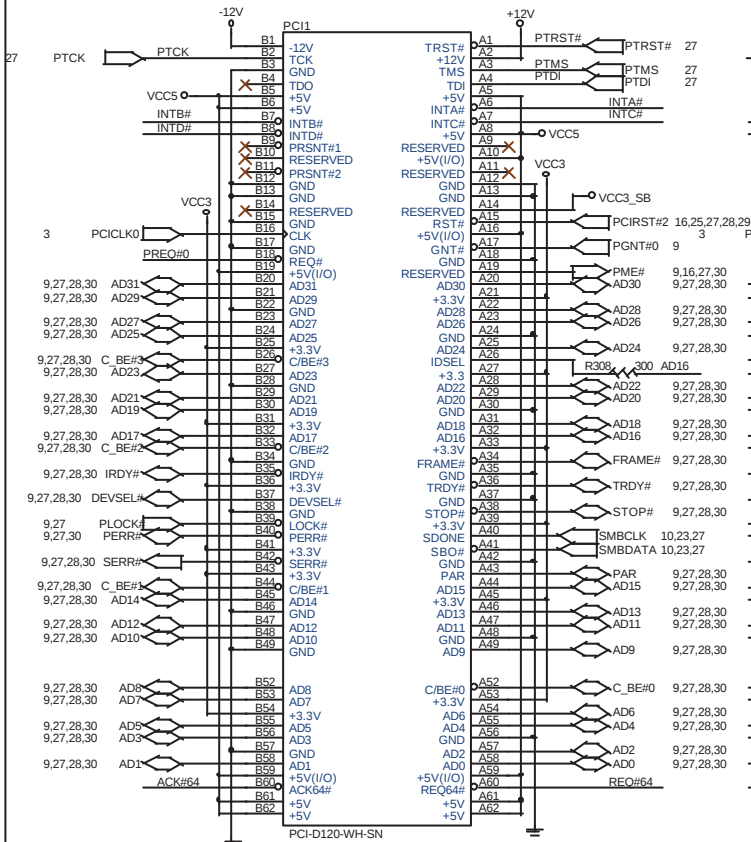
Micro Star Restricted Secret

Title	AGP 2.0	Rev
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD.		Last Revision Date:
No. 69 Li-De St, Jung-He City, Taipei, Hsien, Taiwan		Thursday, July 11, 2002
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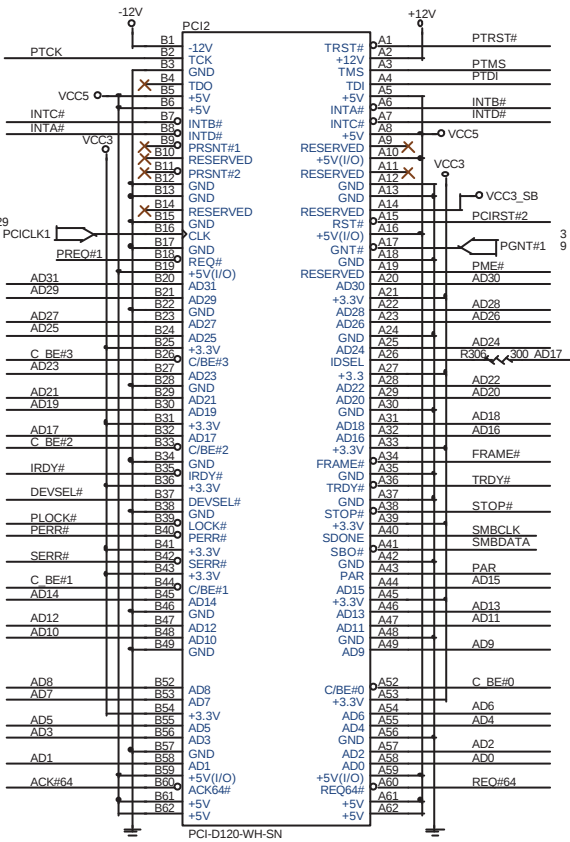
PCI SLOT 1 (PCI VER: 2.2 COMPLY)

PCI SLOT 2 (PCI VER: 2.2 COMPLY)

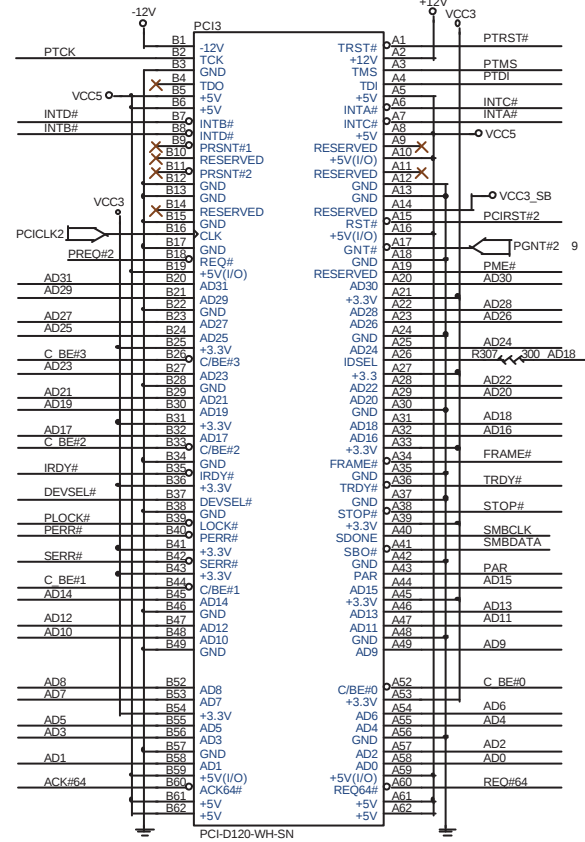
PCI SLOT 3 (PCI VER: 2.2 COMPLY)



IDSEL = AD16
MASTER = PREQ0
INTA#

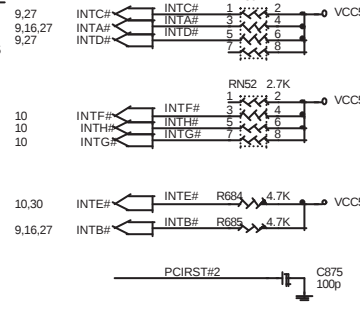
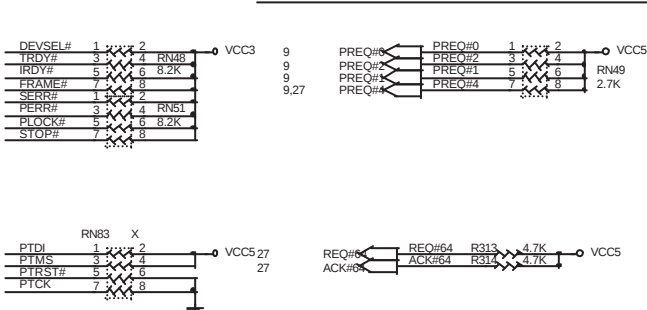


IDSEL = AD17
MASTER = PREQ1
INTB#

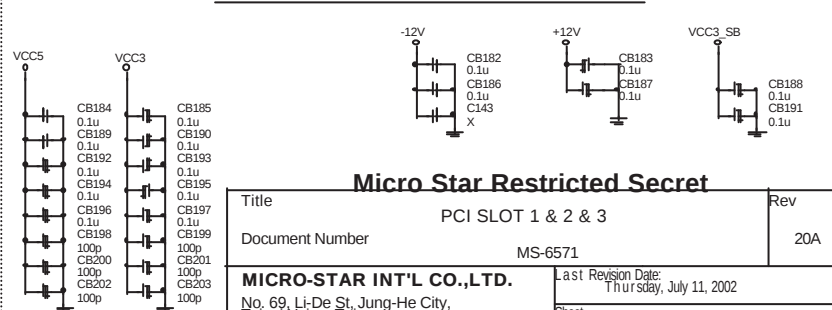


IDSEL = AD18
MASTER = PREQ2
INTC#

PCI PULL-UP / DOWN RESISTORS



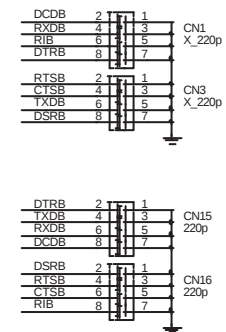
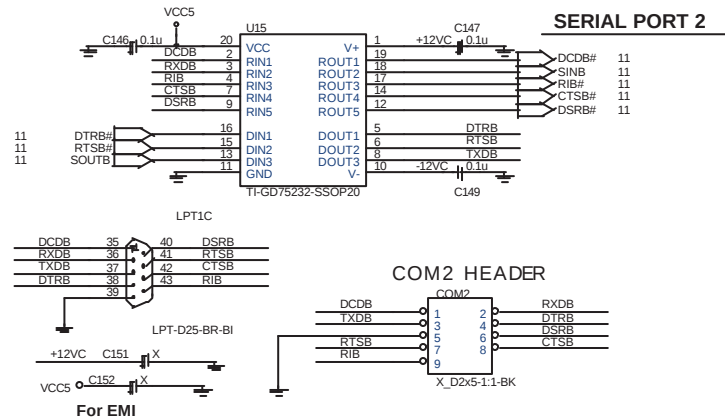
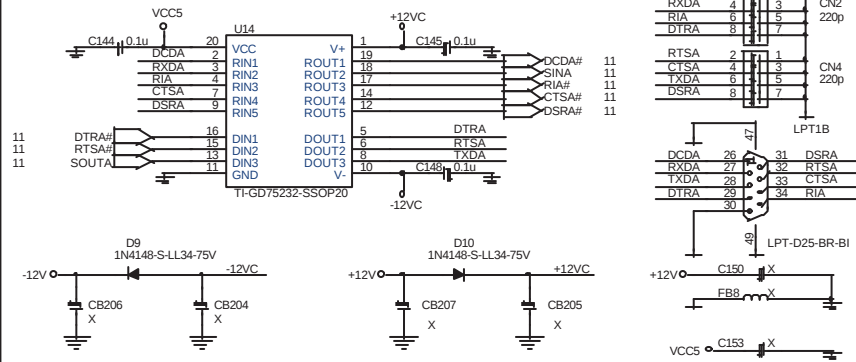
PCI SLOT DECOUPLING CAPACITORS



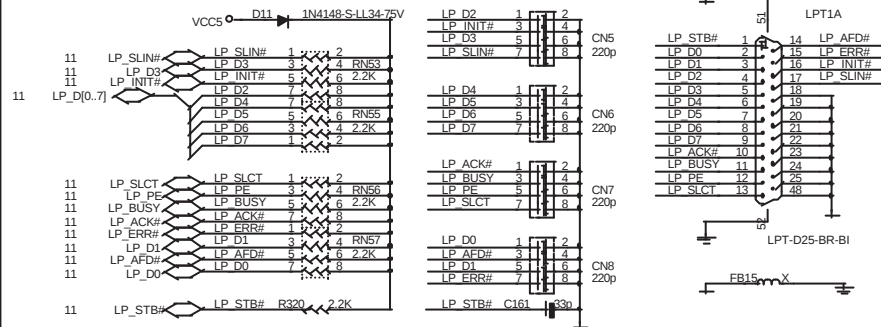
Micro Star Restricted Secret

Title	PCI SLOT 1 & 2 & 3	Rev	20A
Document Number	MS-6571		
MICRO-STAR INT'L CO.,LTD.		Last Revision Date: Thursday, July 11, 2002	
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http://www.msi.com.tw			

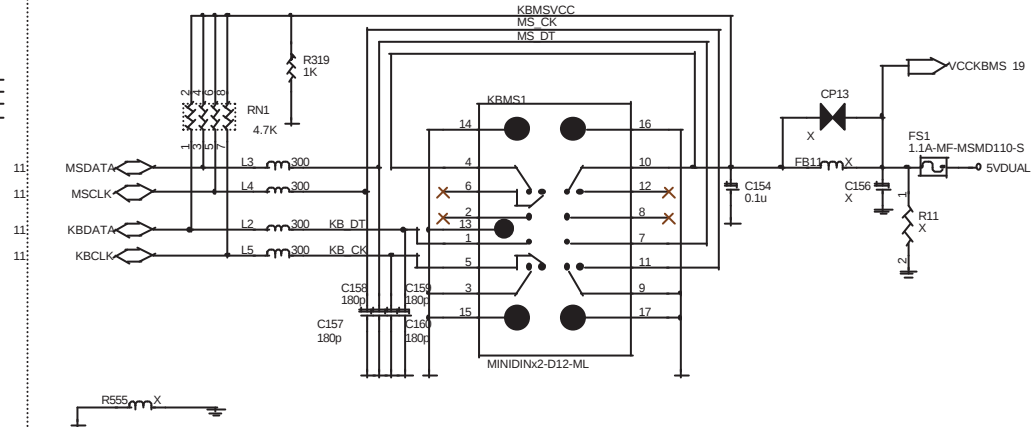
SERIAL PORT 1



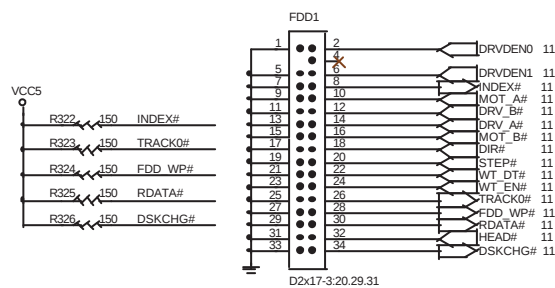
PARALLEL PORT



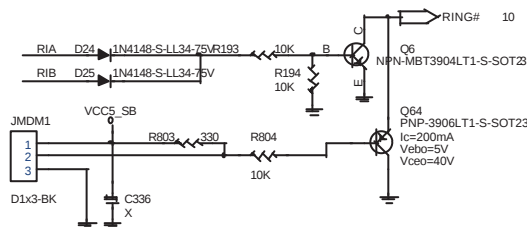
PS2 KEYBOARD & MOUSE CONNECTOR



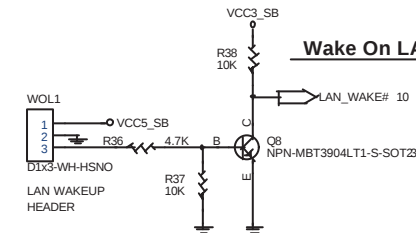
FLOPPY CONNECTOR



Wake On Modem Header



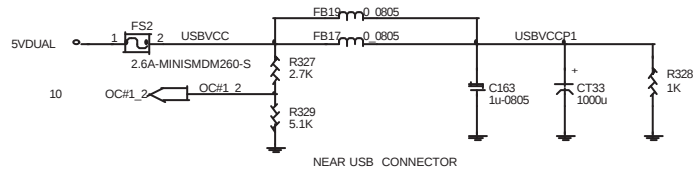
Wake On LAN Header



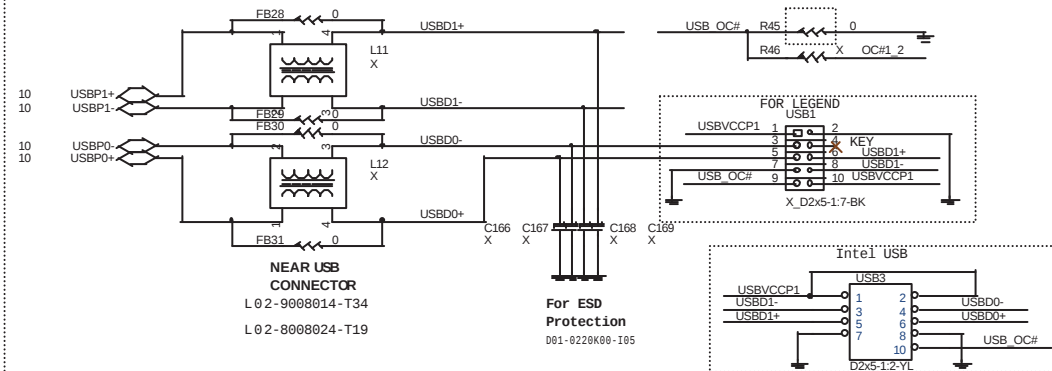
Micro Star Restricted Secret

Title	KB,MS,SERIAL,PARALLEL & FLOPPY	Rev	20A
Document Number	MS-6571		
MICRO-STAR INT'L CO.,LTD.		Last Revision Date:	
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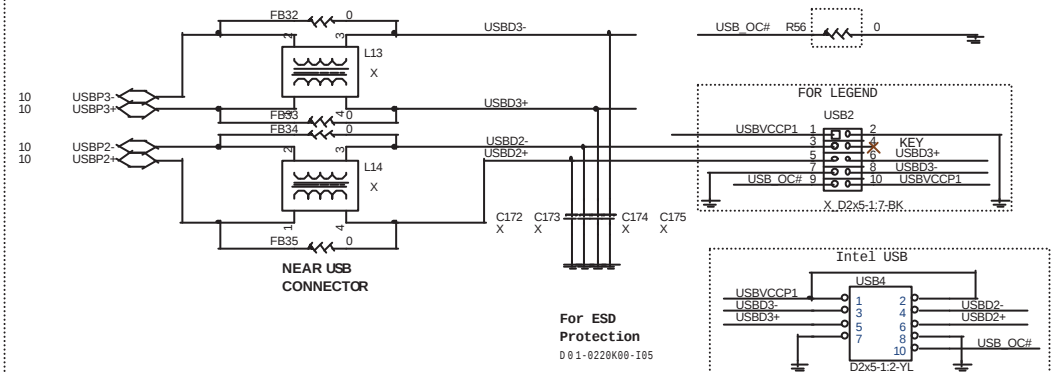
POWER CIRCUIT FOR USB PORT 0,1



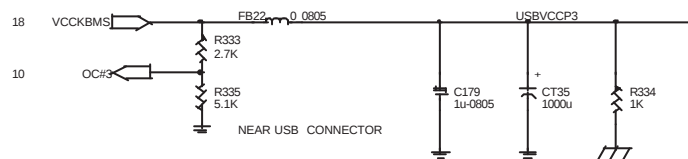
FRONT PANEL USB CONNECTOR FOR USB PORT 0,1



REAR PANEL USB CONNECTOR FOR USB PORT 2,3

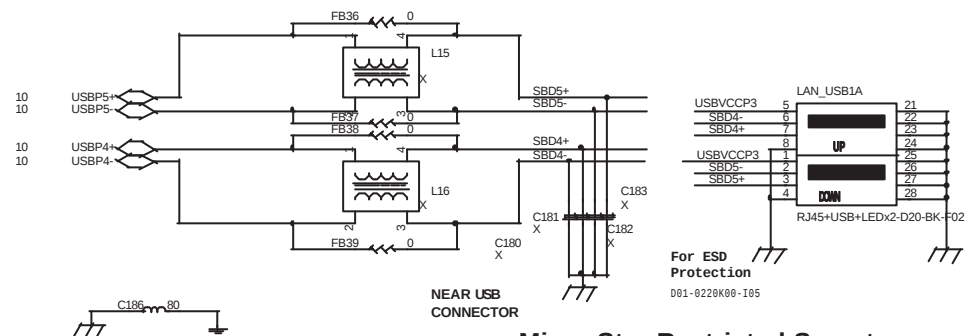


POWER CIRCUIT FOR USB PORT 4,5



- * USB Trace width : 7.5 mils
- * USB Trace Spacing : Low speed 20 mils, High speed 50 mils
- * Differential USB Signals Trace, Spacing : 7.5 mils
- * USB Power Trace must be 40mils width
- * Length(longest)-Length(shortest)<150mils
- * Maximum trace length <16"

REAR PANEL USB CONNECTOR FOR USB PORT 4,5



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REGULATORS OUTPUT DECOUPLING CAPACITORS

The diagrams illustrate the output decoupling capacitor configurations for various regulators:

- VCC5_SB:** Two parallel capacitors, CB233 (0.1u) and CB237 (1u*0805), connected to ground.
- MEM_STR:** A single capacitor, CB227 (0.1u), connected to ground.
- VCC5:** Two capacitors, CB228 (0.1u) and CB229 (0.1u), connected to ground.
- 5VDDUAL:** Three parallel capacitors, CB235 (0.1u), CB238 (0.1u), and CB240 (0.1u), connected to ground.
- VCC3_SB:** Three parallel capacitors, CB232 (0.1u), CB239 (0.1u), and CB241 (0.1u), connected to ground.

MSI/Legend Front Panel

MSI

Legend

PIN4: YELLOW S0: GREEN
 PIN5: GREEN S1: GREEN BLINKING
 PIN6: + S3: YELLOW

Pin	Signal	Pin	Signal
1	HDD+	2	PWR LED
3	IDE LED	4	SUS LED
5	HDD-	6	PWSW
7	RESET+	8	PWSW-
9	NC		

LEGEND POWER SWITCH

PWRSW

VCC5_SB

C378 0.1u

PWRSW1 DLX3-RD

LEGEND DUAL

+ GREEN

- YELLOW

S0:STEADY GREEN

S1:GREEN BLINKING

S3:STEADY YELLOW

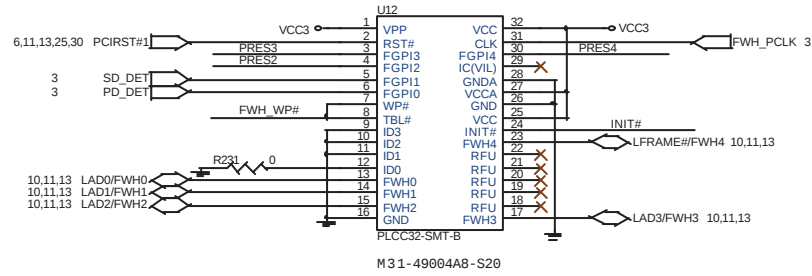
S4/S5:OFF

The schematic diagram shows two sections of the PCB layout:

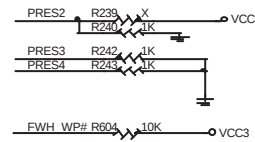
- SPEAKER Section:**
 - Input **ALARM** (pin 11) connects to the base of transistor **Q68** (NPN-MBT3904LT1-S-SOT23) through resistor **R821** (2.2kΩ).
 - Input **SPKR** (pin 10) connects to the base of **Q68** through resistor **R819** (220Ω).
 - The emitter of **Q68** is connected to ground.
 - The collector of **Q68** connects to the positive terminal of the speaker **SPEAKER1** (BUZZER-SAT1205-85dB-D) through resistor **R820** (220Ω).
 - The negative terminal of the speaker is connected to ground through resistor **D26** (1N4148-S-LL34-75V).
 - A decoupling capacitor **C339** (0.1uF) is connected between the speaker's negative terminal and ground.
 - The speaker is also connected to **VCC5** through a diode **D66** (1N4148-S-LL34-75V).
- POWER BUTTON Section:**
 - Input **PWRSW** (pin 22) connects to the base of transistor **Q67** (NPN-MBT3904LT1-S-SOT23) through resistor **R817** (22Ω).
 - The emitter of **Q67** is connected to ground through capacitor **C338** (1uF).
 - The collector of **Q67** connects to the **PWRBTN** signal line through resistor **R816** (4.7kΩ).
 - The **PWRBTN** signal line also passes through resistor **R815** (1kΩ) to **VCC5_SB**.
 - The **PWRBTN** signal line is connected to the positive terminal of the power button **PWRBTN** (BUZZER-SAT1205-85dB-D) through resistor **R818** (10kΩ).
 - The negative terminal of the power button is connected to ground through capacitor **C197** (SOT23).
 - The power button is also connected to **VCC5_SB** through a diode **D67** (1N4148-S-LL34-75V).

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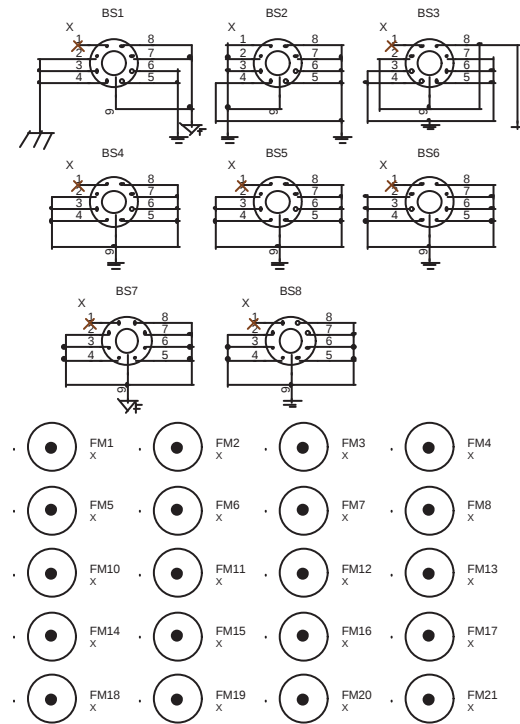
Firware Hub (FWH)



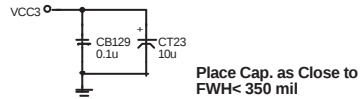
FWH RESISTORS



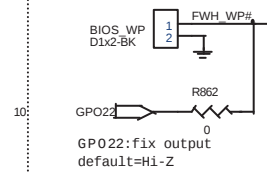
PCB OTHER COMPONENT



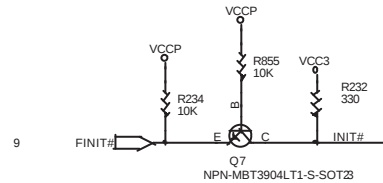
FWH DECOUPLING CAPACITORS



FWH write protect

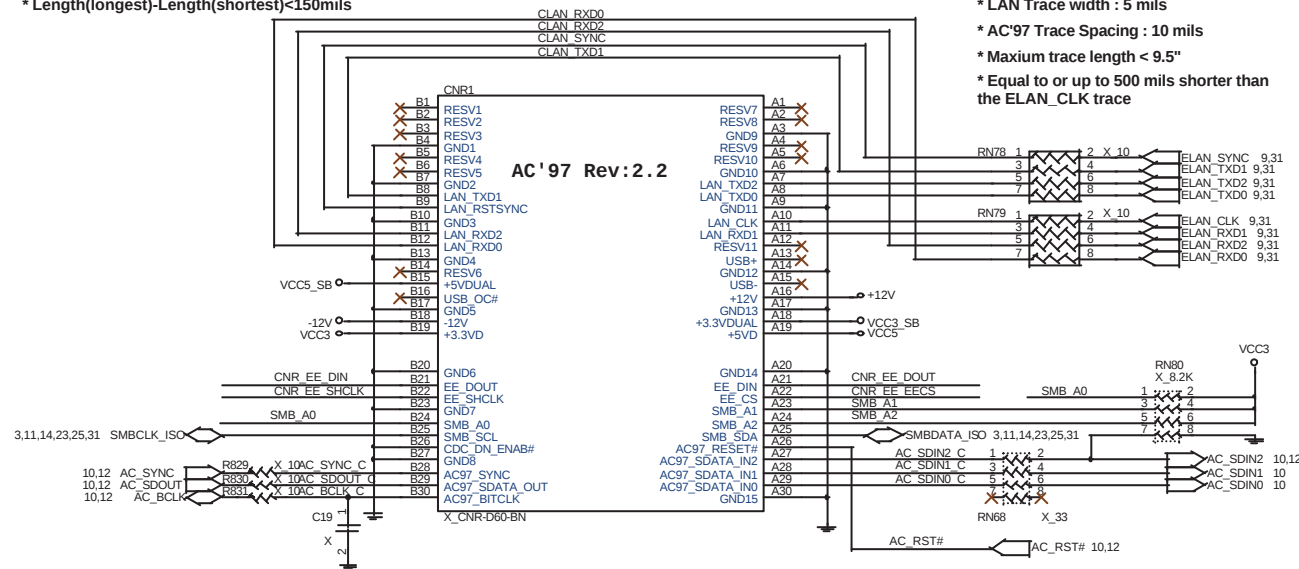


FWH INIT Signal Voltage Translation Block



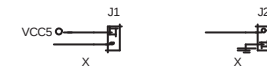
- * AC'97 Trace width : 5 mils
- * AC'97 Trace Spacing : 5 mils
- * Maximum trace length <8"
- * Length(longest)-Length(shortest)<150mils

CNR RISER

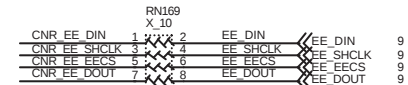


- * LAN Trace width : 5 mils
- * AC'97 Trace Spacing : 10 mils
- * Maximum trace length < 9.5"
- * Equal to or up to 500 mils shorter than the ELAN_CLK trace

SIMULATION TRACE

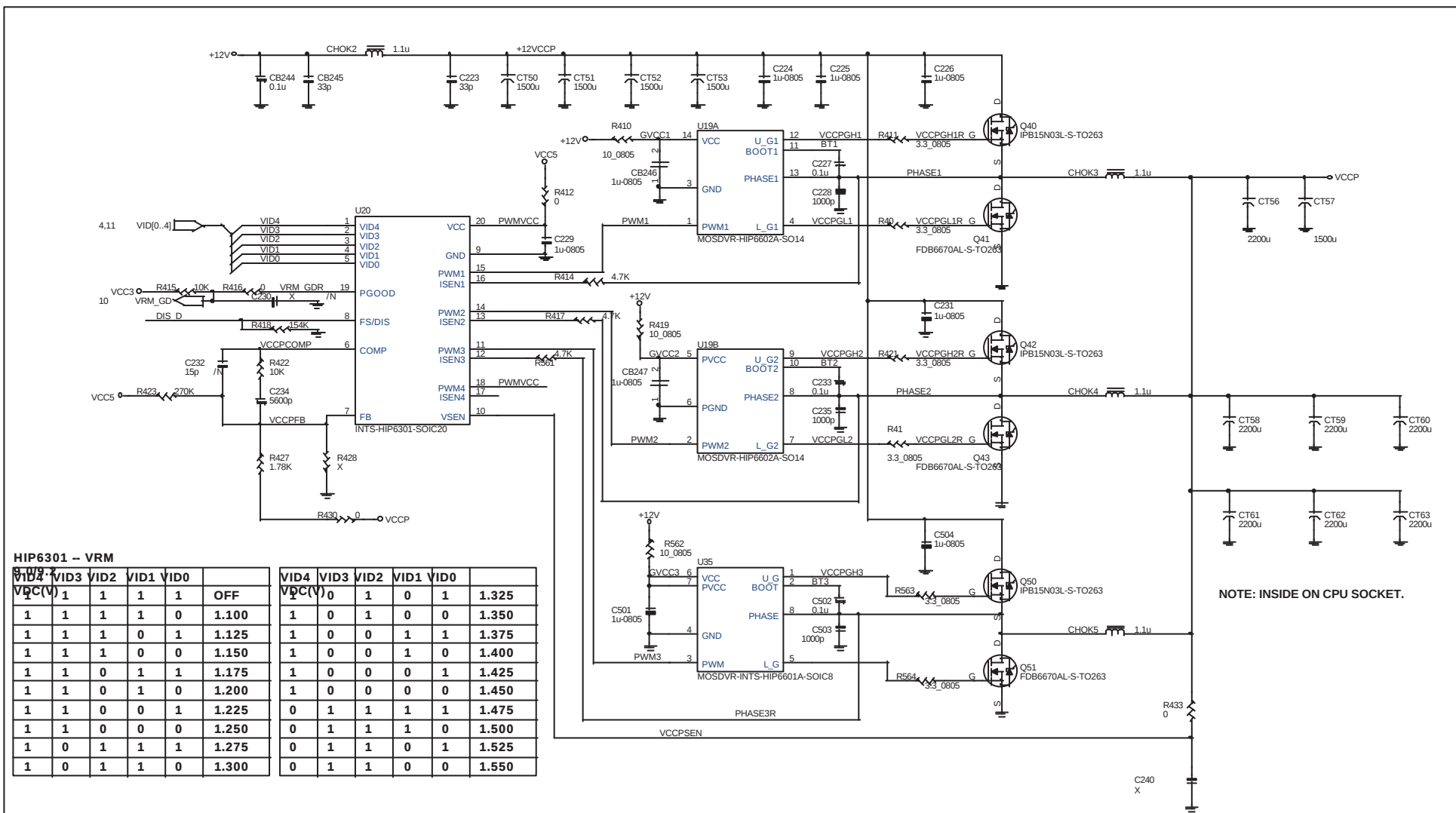


Very close to ICH4

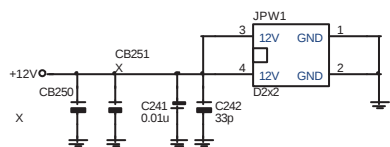


Micro Star Restricted Secret

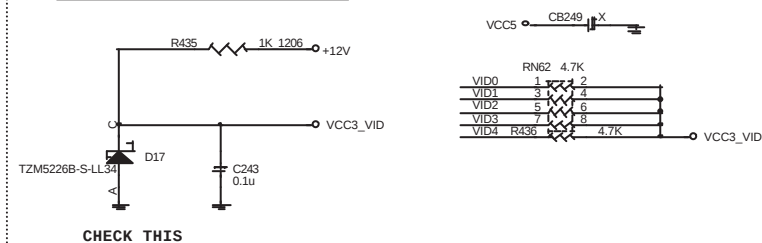
Title	FWH	Rev
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD.		Last Revision Date:
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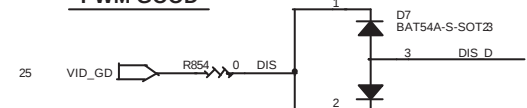
ATX12V POWER CONNECTOR



VID PULL-UP RESISTORS

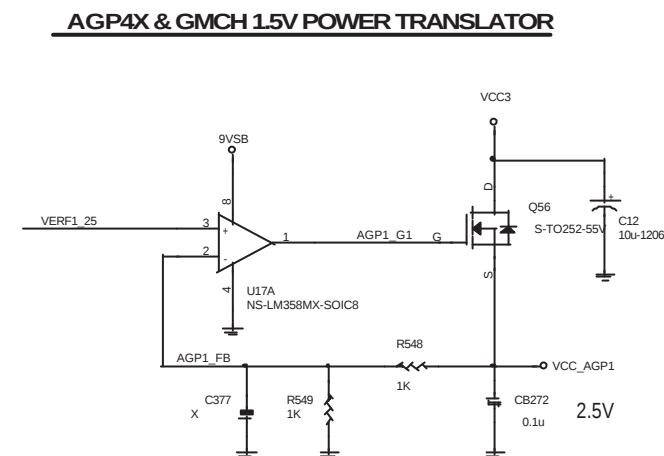
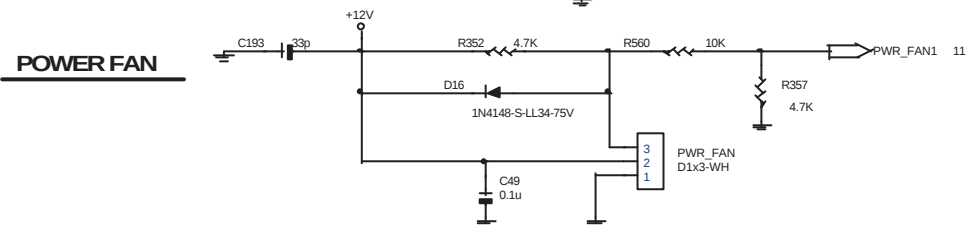
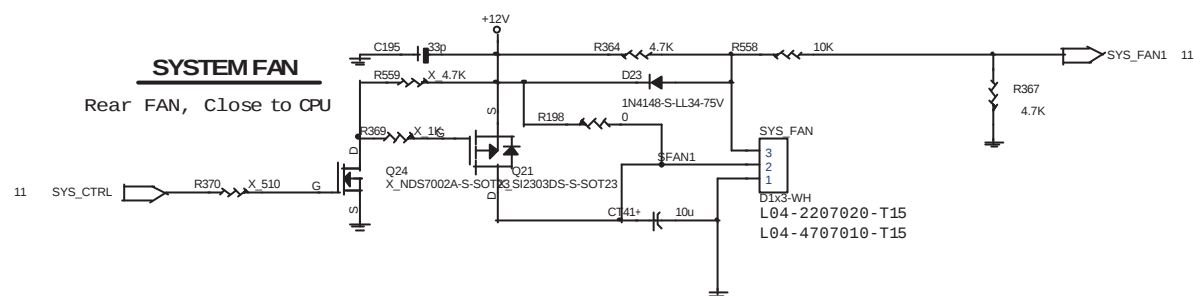
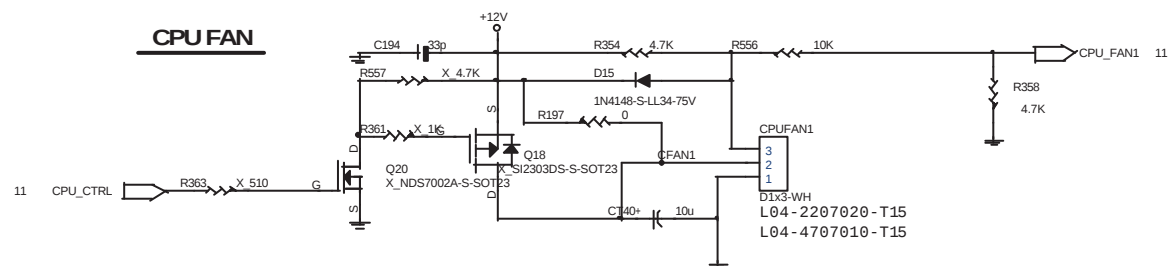
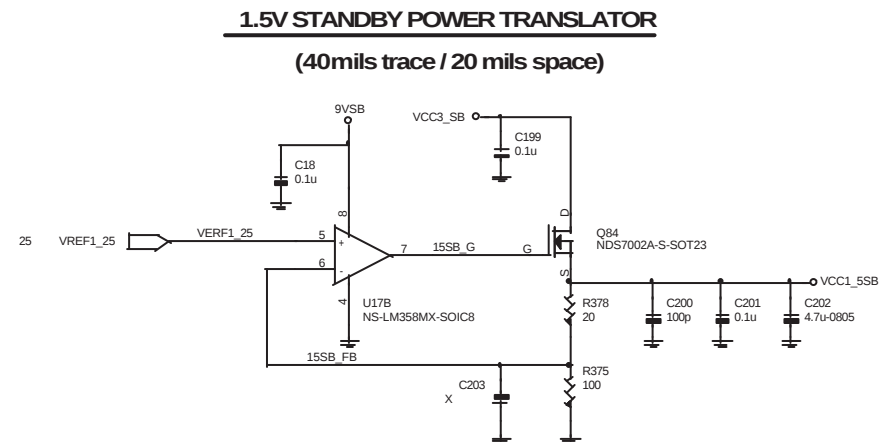
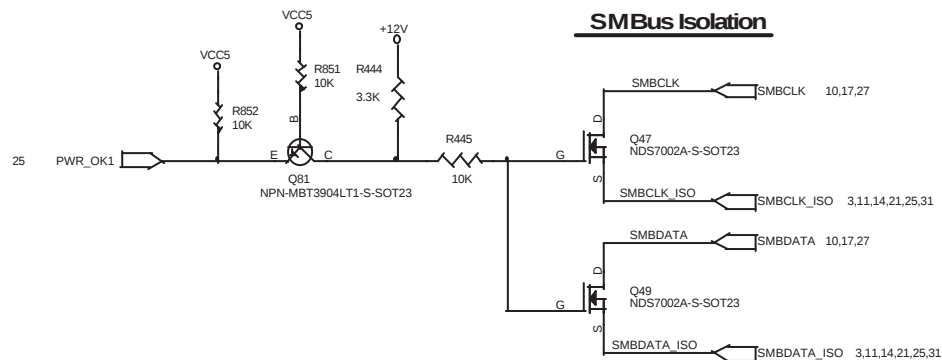


PWM GOOD



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Title	VRM 9.0	Rev	20A
Document Number	MS-6571	Last Revision Date: Thursday, July 18, 2002	
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Document Number	MS-6571	20A
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<i>Micro-Star</i>	Title	<i>MS-6571</i>	Rev	<i>20A</i>
Document Number		LAN INTEL 82562EM/ET		
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Power	S0	S3	S5
VCC3_SB	Main	Standby	Standby
VCC5_STR	Main	Standby	0V
MEM_STR	Main	Standby	0V

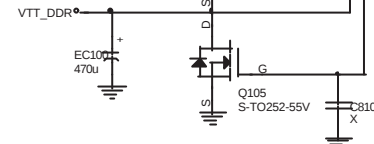
T0 845G & ICH4 10,11
T0 SMBUS Ctrl 6,10

**INPUT 2 AND 3 MUST BE HI LEVEL WHEN USE
OUTPUT 1 AND 2 FOR GPIO FUNCTION

Near
302D

DDR VTT Power

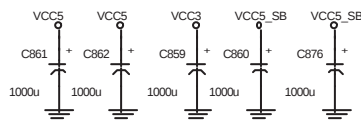
1.25V/2.1A



SEL1	VRAM	VRAM_2.5
H	3.3VDUAL	2.5V
TRI-STATE	3.3VSB	2.5V
L	3.3VSTR	1.25V

FOR 3VSB OR 3VSTR
SETTING BY SEL1

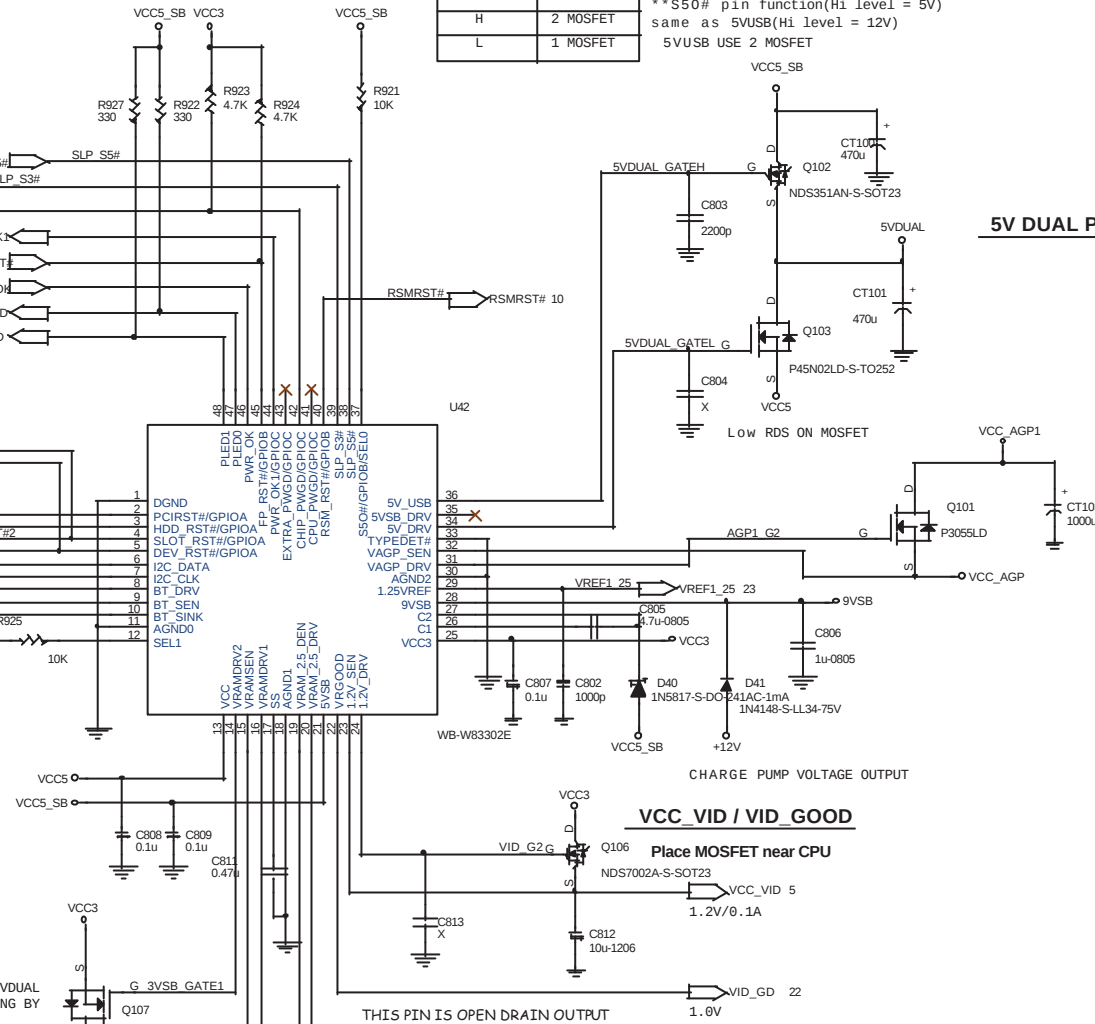
Pin 15,19,22,32 Must
reserve capacitor.



** SETTING 3VSTR THEN VRAM_2.5
BECOME TO 1.25 VREF

SEL0	5VUSB
H	2 MOSFET
L	1 MOSFET

**S50# pin function(Hi level = 5V)
same as 5VUSB(Hi level = 12V)
5VUSB USE 2 MOSFET



5V DUAL Power

VCC_VID / VID_GOOD

Place MOSFET near CPU

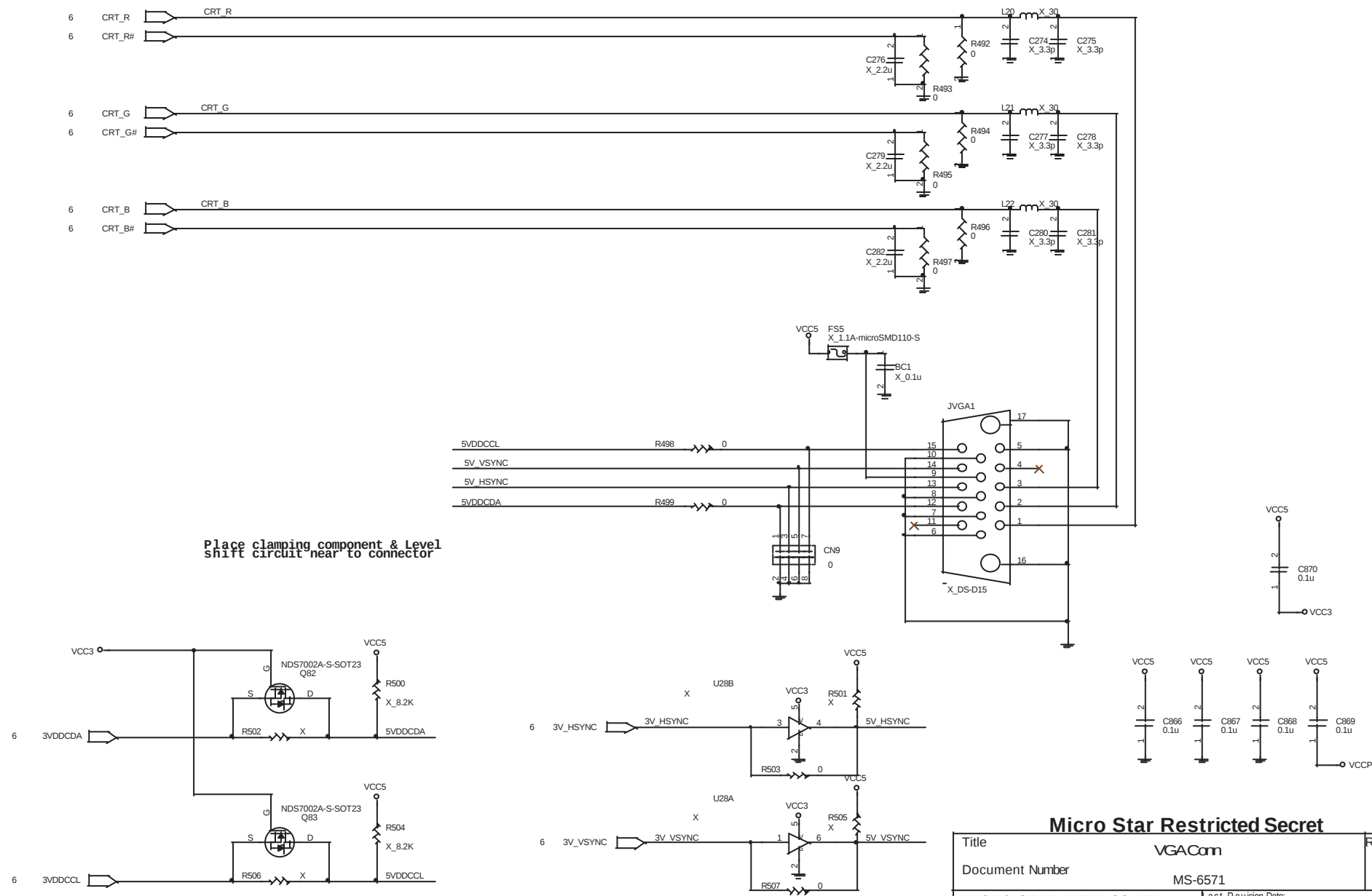
DDR 2.5V Power

2.5V/2.8A+5.92A

Micro Star Restricted Secret

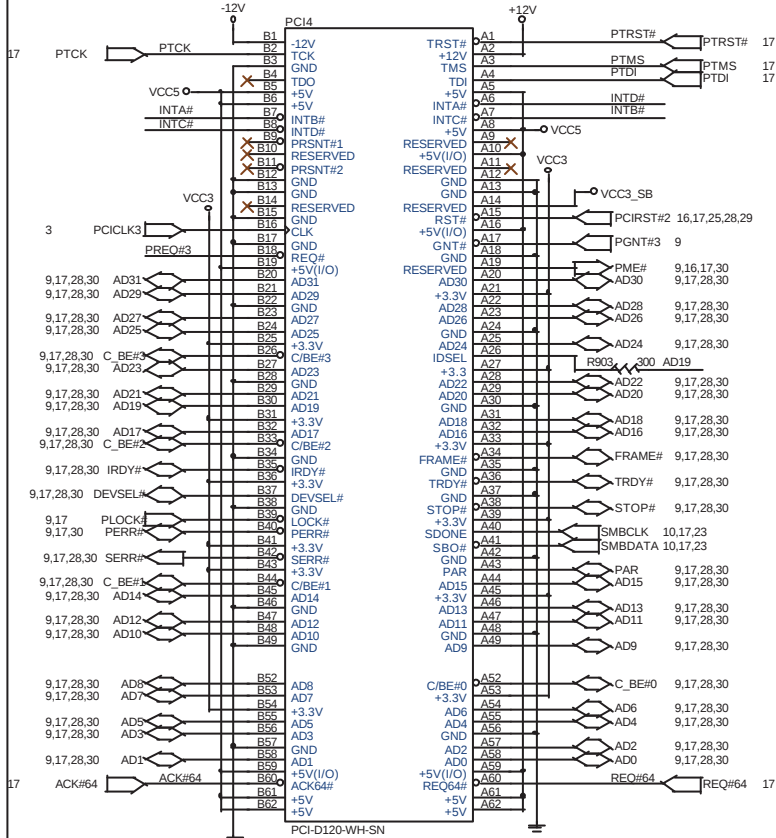
Title	W83302D(MS-5) ACPI Controller	Rev	20A
Document Number	MS-6571		
MICRO-STAR INT'L CO.,LTD.		Last Revision Date: Thursday, July 11, 2002	
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Video Connector



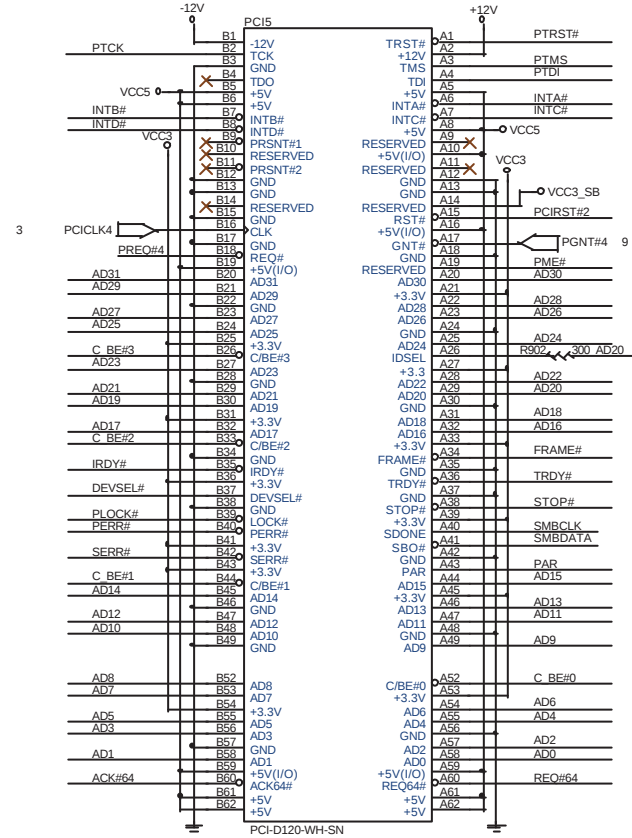
Micro Star Restricted Secret		
Title	VGACom	Rev
Document Number	MS-6571	20A
MICRO-STAR INT'L CO.,LTD. No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan http://www.msi.com.tw		Last Revision Date: Thursday, July 18, 2002
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PCI SLOT 1 (PCI VER: 2.2 COMPLY)



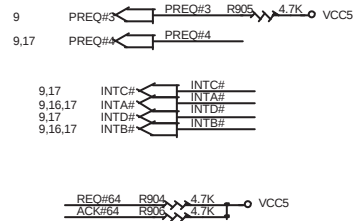
IDSEL = AD19
MASTER = PREQ3
INTD#

PCI SLOT 2 (PCI VER: 2.2 COMPLY)

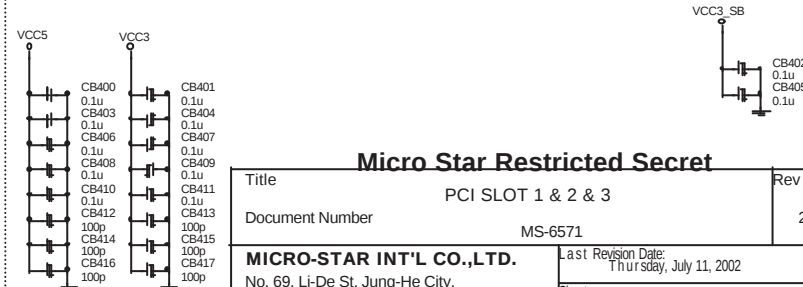


IDSEL = AD20
MASTER = PREQ4
INTA#

PCI PULL-UP / DOWN RESISTORS



PCI SLOT DECOUPLING CAPACITORS

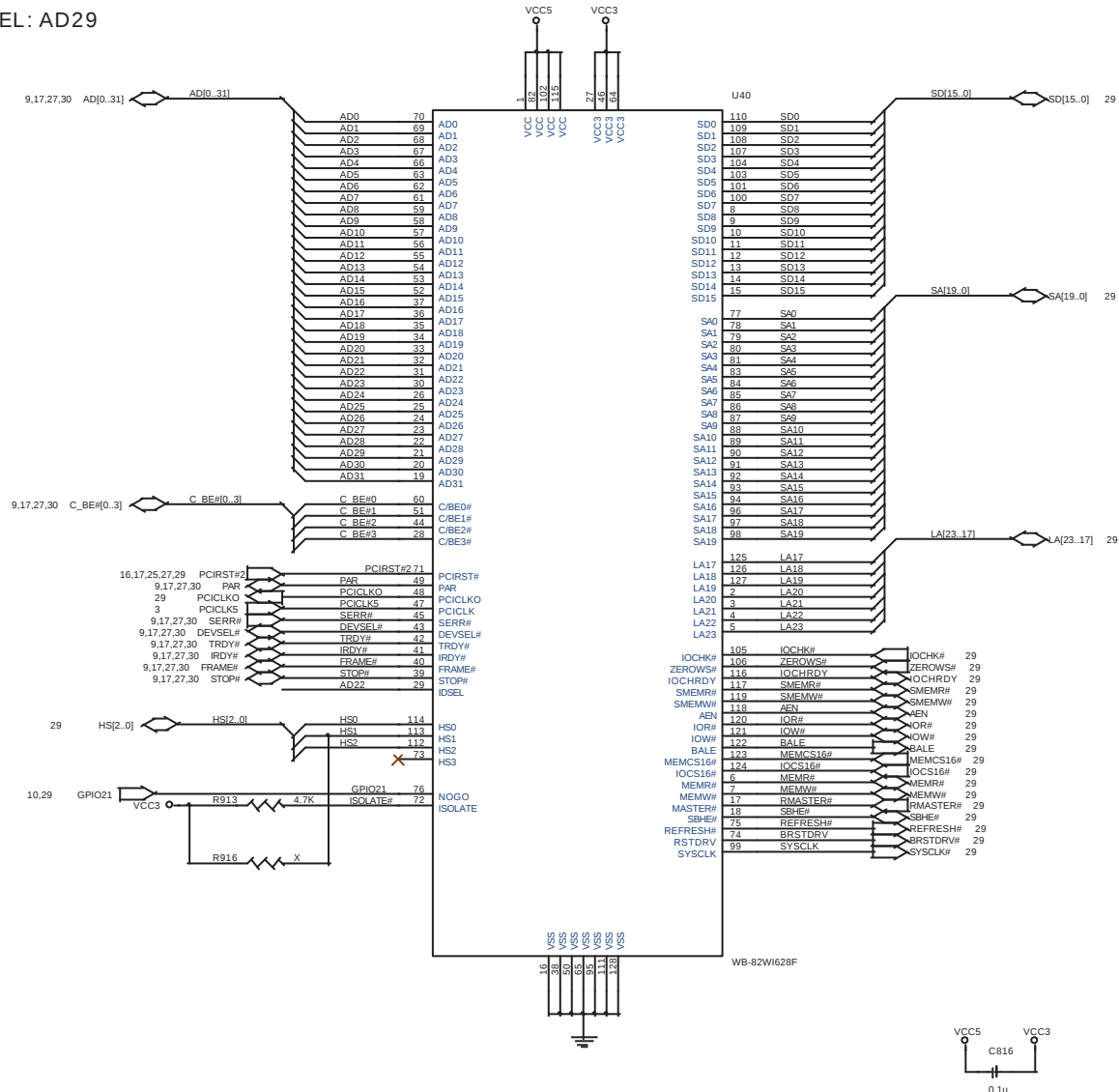


Micro Star Restricted Secret

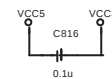
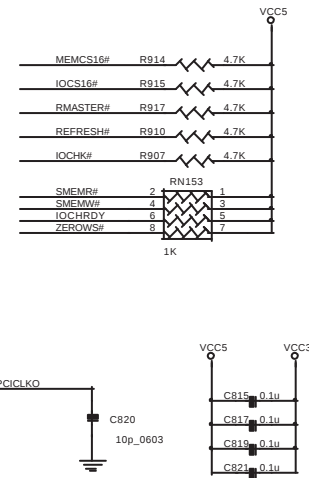
Title	PCI SLOT 1 & 2 & 3	Rev
Document Number	MS-6571	20A
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PCI To ISA Bridge, Part 1

IDSEL: AD29

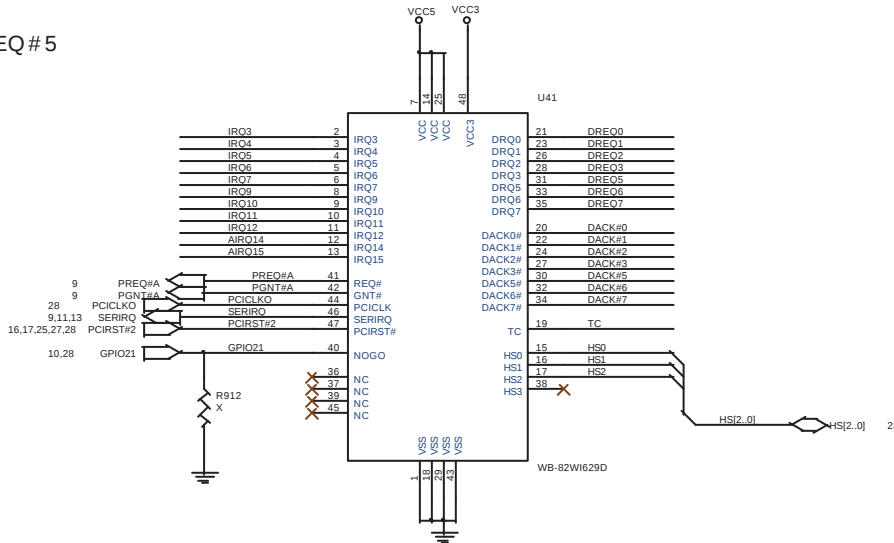


PCI to ISA Bridge Pull Up / Low

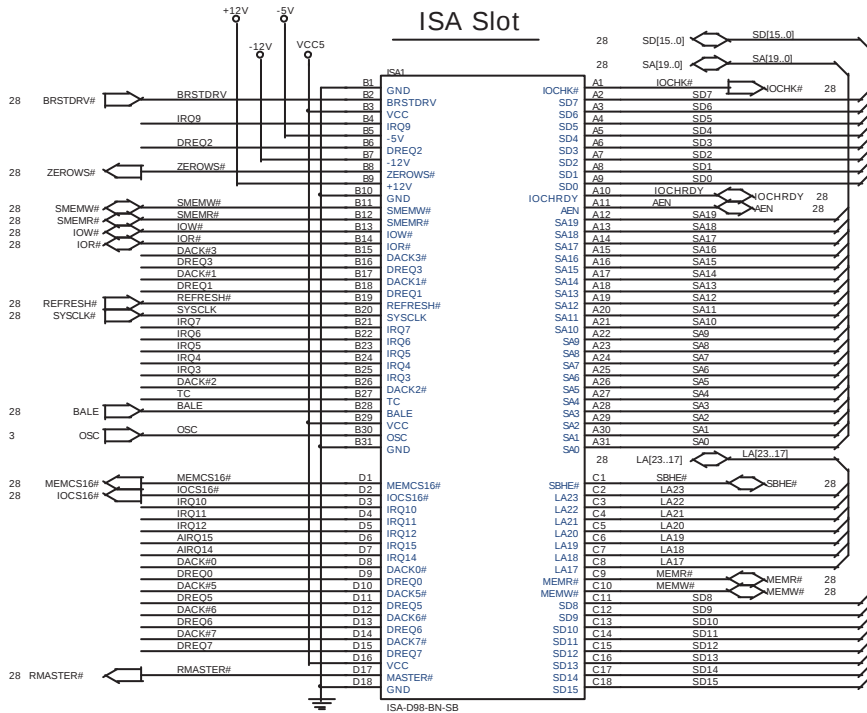


PCI To ISA Bridge, Part 2

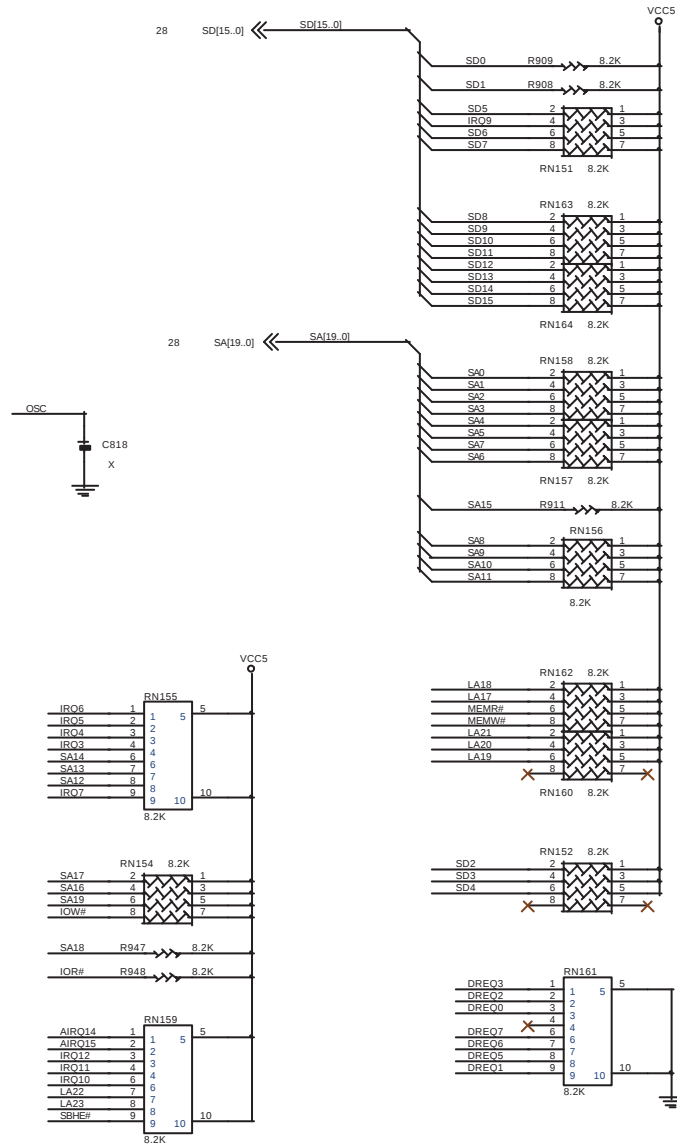
PREQ#5



ISA Slot

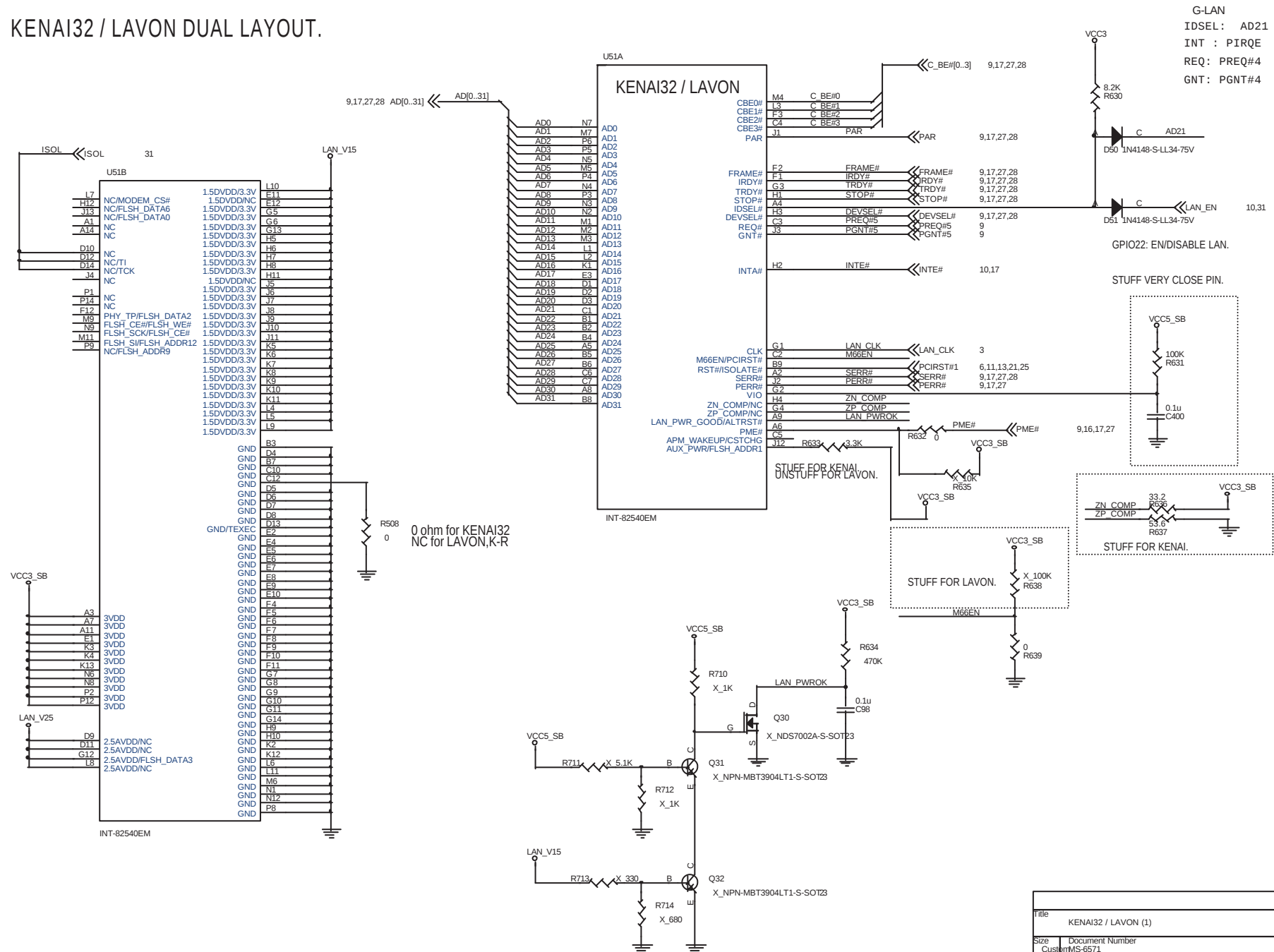


PCI to ISA Bridge Pull Up / Low

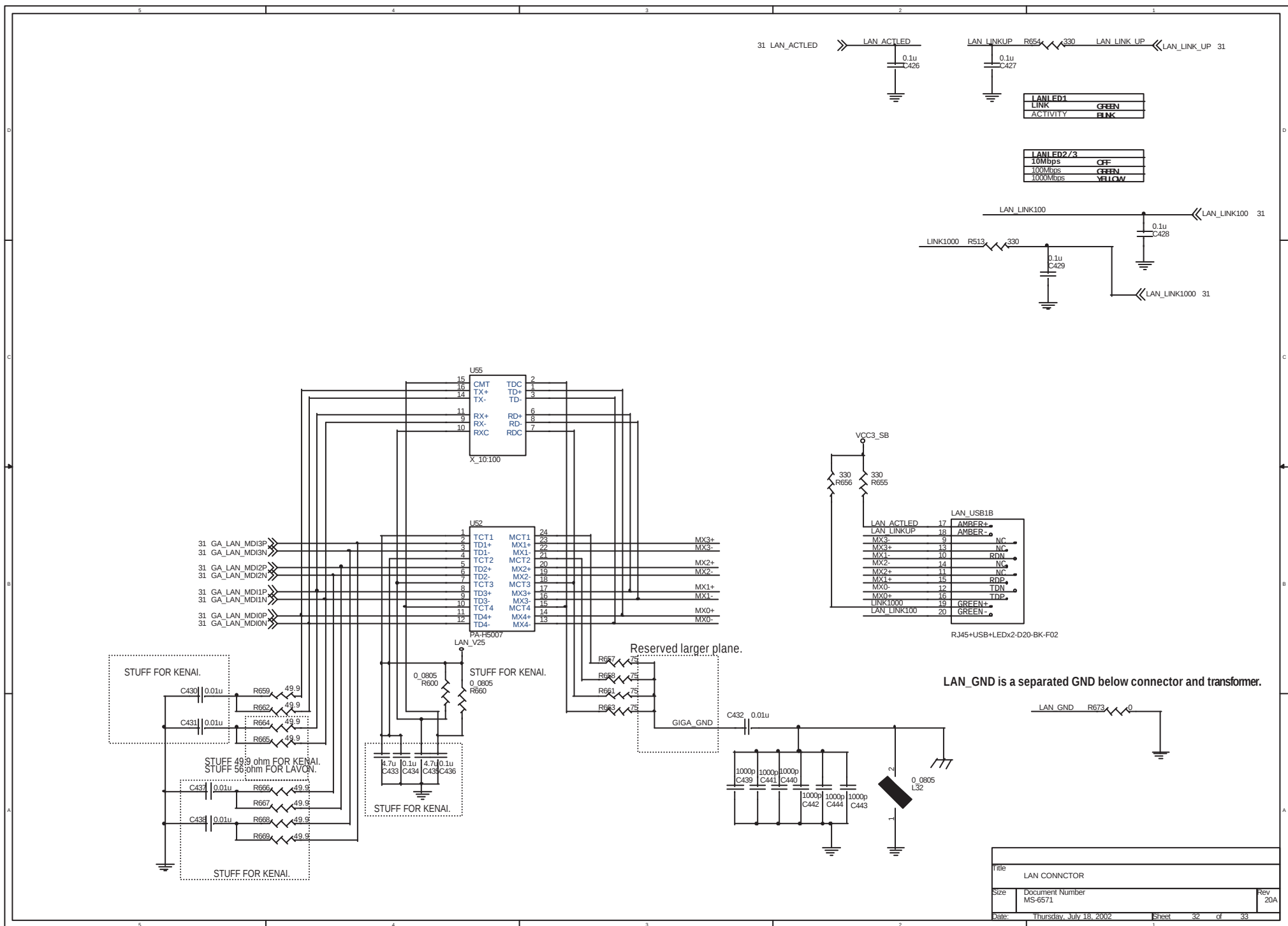


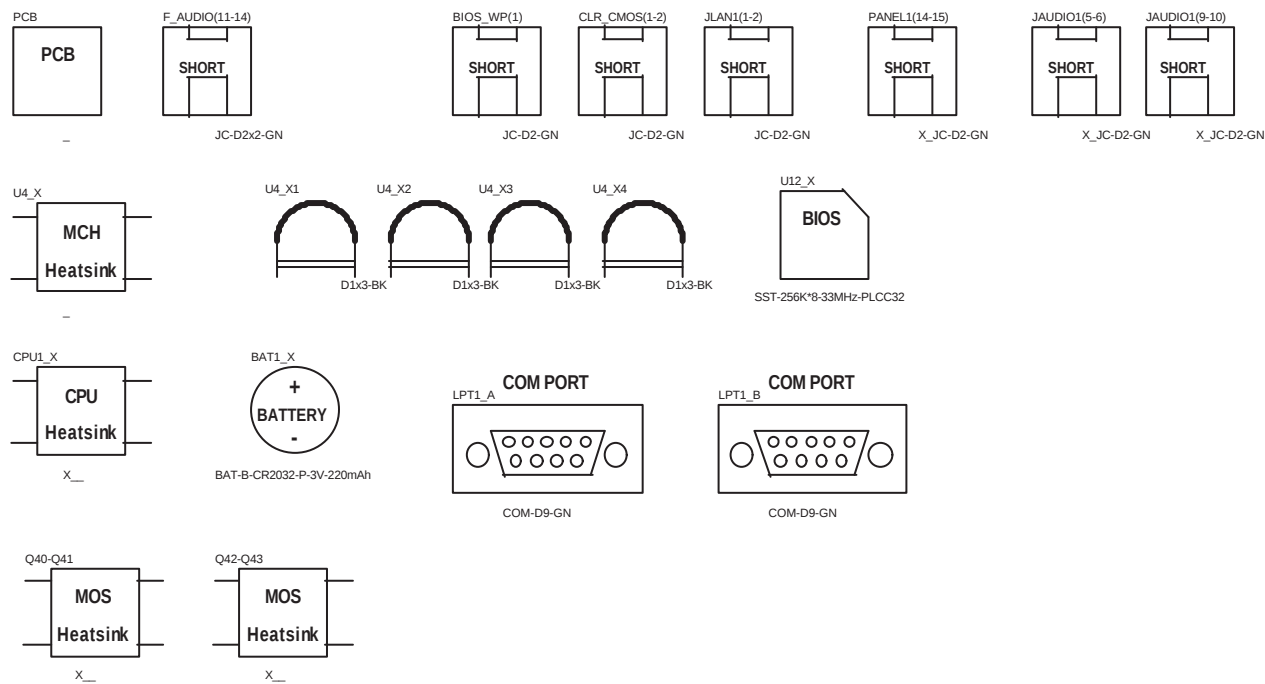
Title			
PCI ISA BRIDGE(2)			
Size	Document Number		Rev
Custom	MS-6571		20.
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KENAI32 / LAVON DUAL LAYOUT.



Title			
KENAI32 / LAVON (1)			
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Pin Header Key Protect
F_AUDIO Pin 8,16
USB1 Pin 4
USB2 Pin 4
USB3 Pin 9
USB4 Pin 9
IR1 Pin 2
COM2 Pin 10

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