MS-6555 *Version 3.0*

INTEL (R) 845GE/PE Chipset
Willamette/Northwood 478pin mPGA-B Processor Schematics

CPU:
Willamette/Northwood mPGA-478B Processor

System Brookdale-G Chipset:
INTEL 845PE/GE + INTEL ICH4

On Board Chipset:

BIOS -- FWH
AC'97 Codec -- ALC201A
LPC Super I/O -- W83627HF
Clock Generation -- ICS950218AF
LAN -- RealTek 8100BL
ISA -- Winbond 83628 + 83629

Expansion Slots:

AGP2.0 SLOT * 1
PCI2.2 SLOT * 3
ISA SLOT * 1

Last Schematic Update Date:

Monday, August 19, 2002

Title: COVER SHEET		Rev: 3.0
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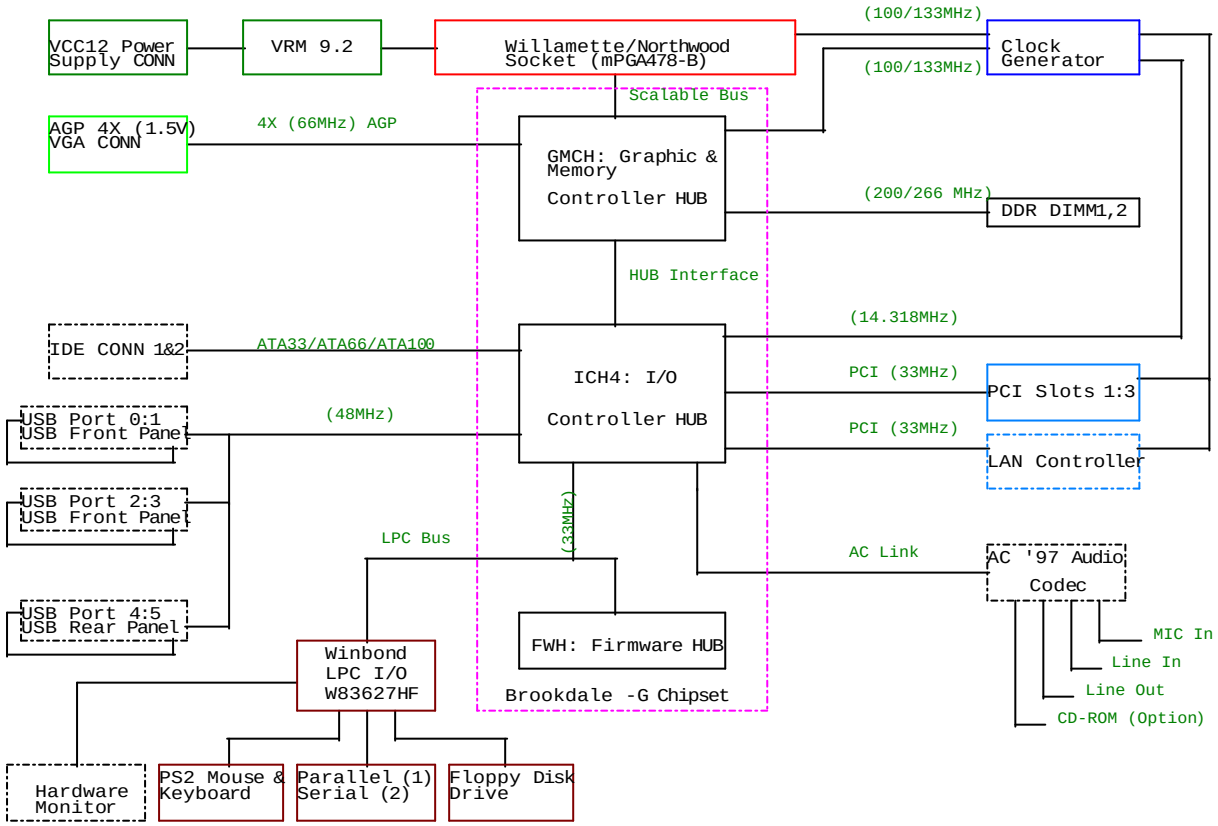

Model option table

Model type	Function	BOM Config	ERP BOM No.
MS6555L2	For Legend (845PE)	Cfg6555L2-30-L	601-6555-04S

Title: BLOCK DIAGRAM		Rev: 3.0
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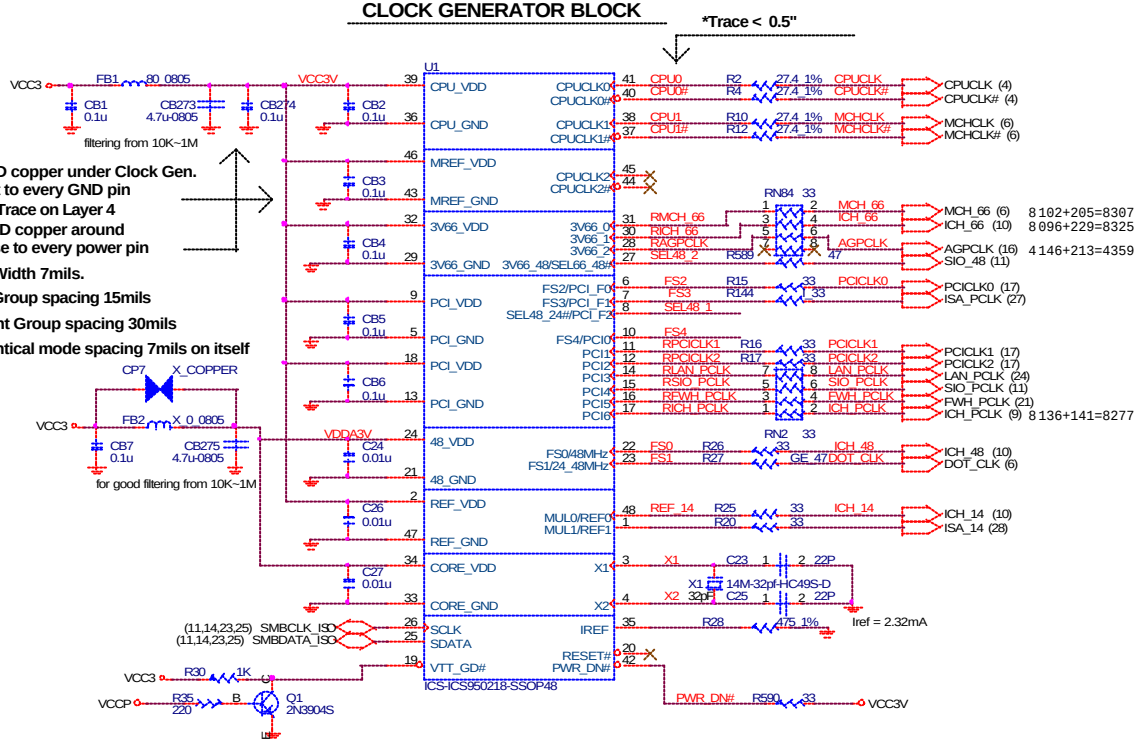
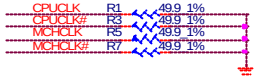
CLOCK GENERATOR BLOCK



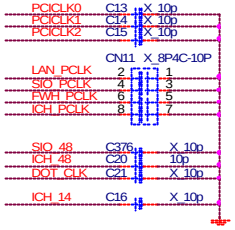
Shut Source Termination Resistors



Trace less 0.2"

49.9ohm for 50ohm M/B impedance

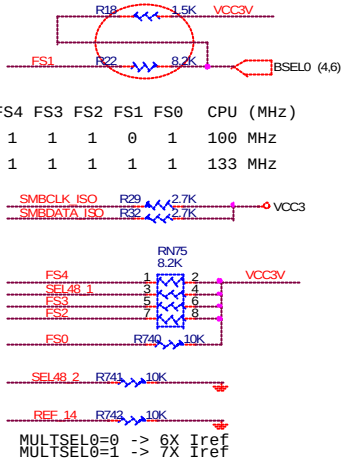
Pull-Down Capacitors



used only for EMI issue

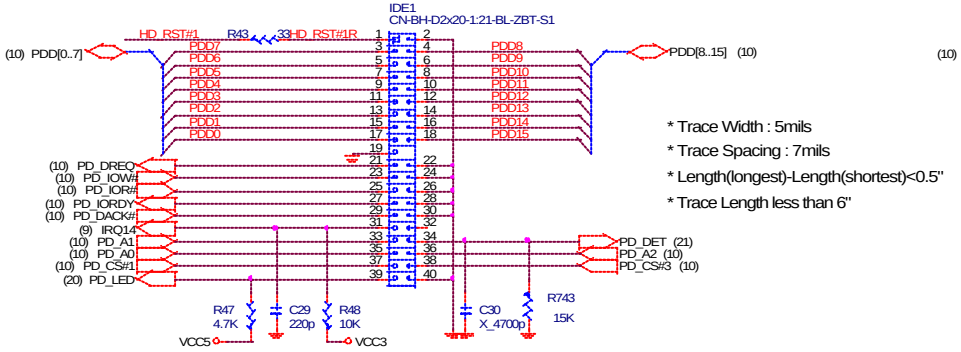
Trace less 0.2"

CLOCK STRAPPING RESISTORS

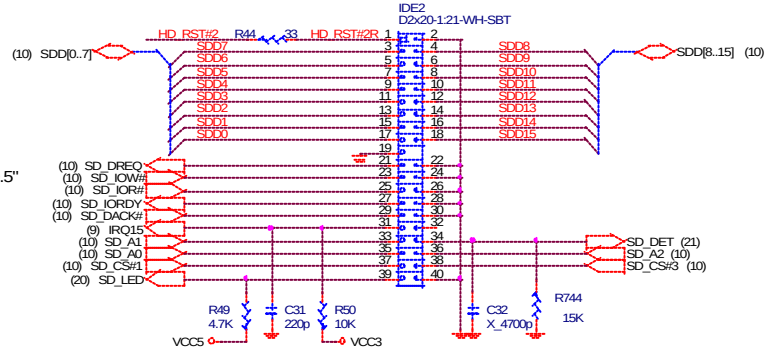


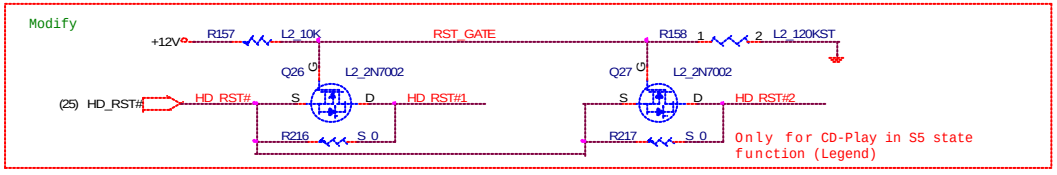
ATA100 IDE CONNECTORS

PRIMARY IDE BLOCK



SECONDARY IDE BLOCK





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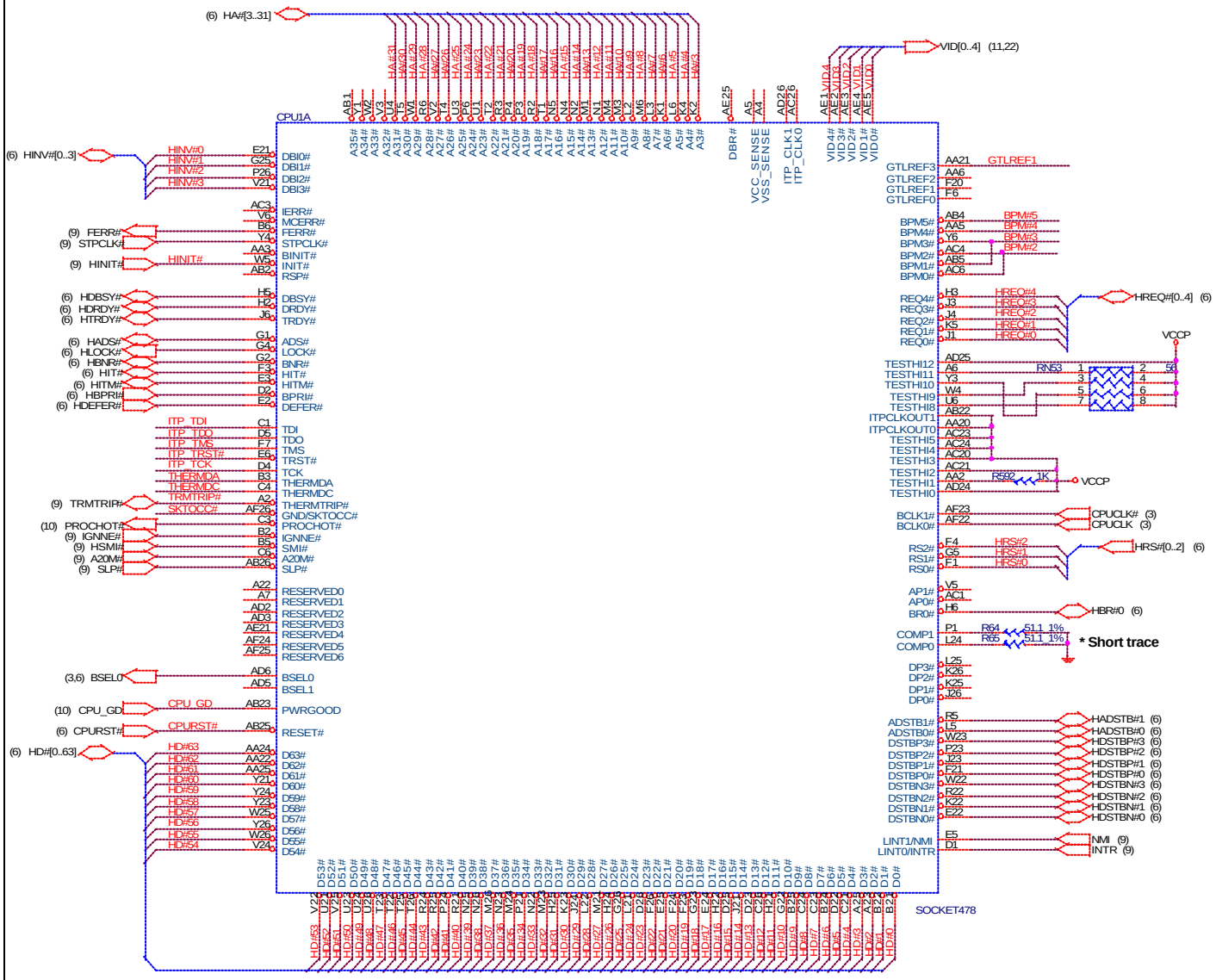
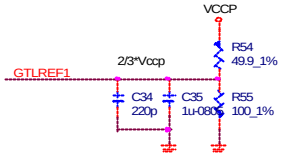
CPU SIGNAL BLOCK



CPU GTL REFERNCE VOLTAGE BLOCK

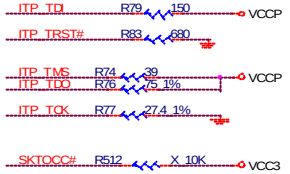


Every pin put one 220pF cap near it.

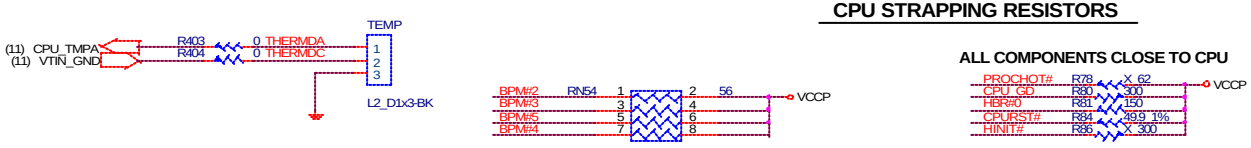
Trace Width 7mils, Space 10mils.

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

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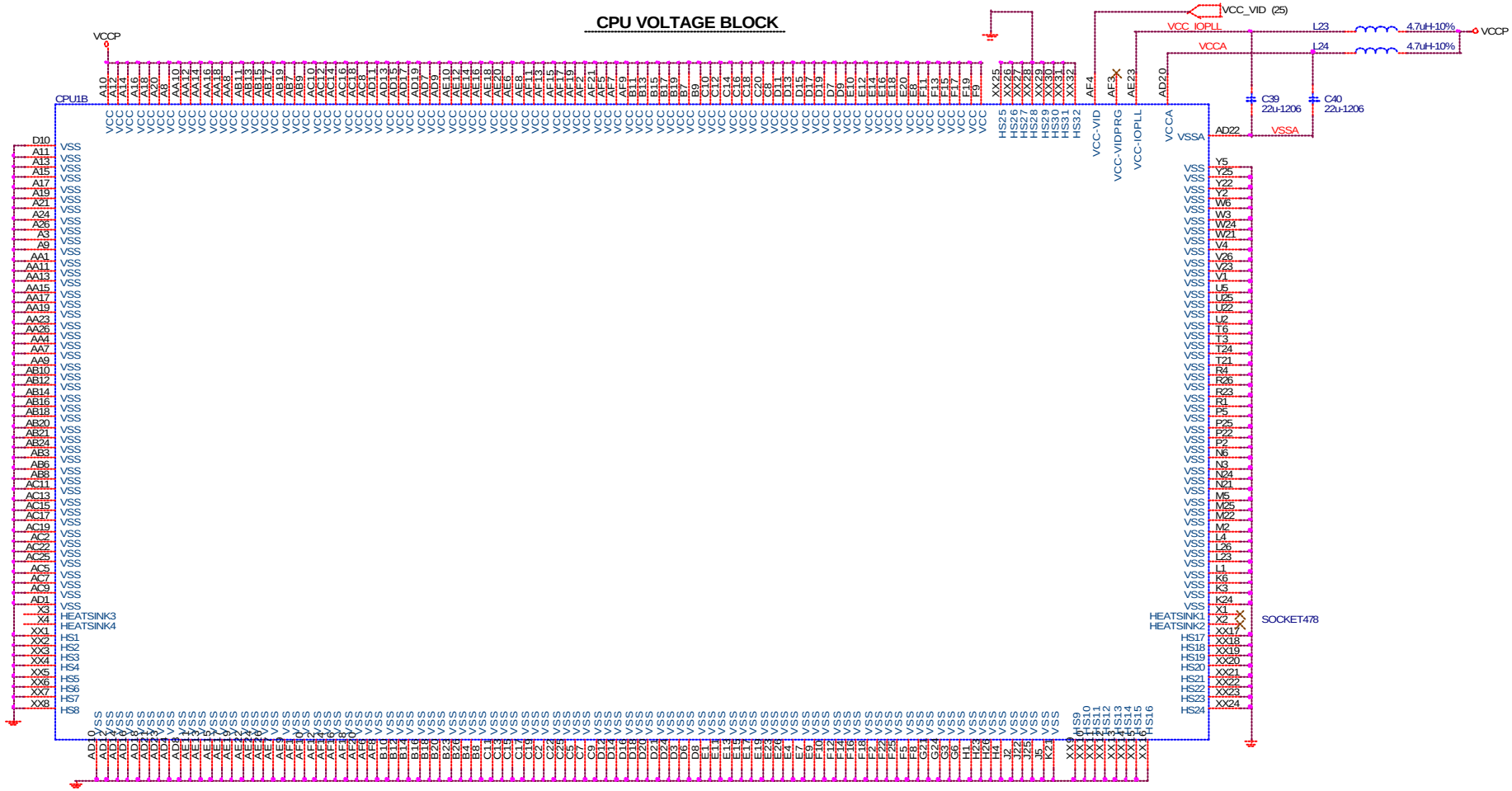
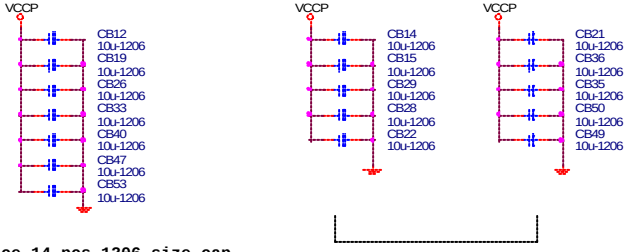
CPU VOLTAGE BLOCK

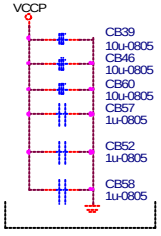


CPU DECOUPLING CAPACITORS



Place 14 pcs 1206 size cap north side of processor

PLACE CAPS WITHIN CPU CAVITY



Place these caps on south side of processor

Keep the 22uF cap within 0.6" of the CPU pin.
Trace Width 12mils, Space 10mils.

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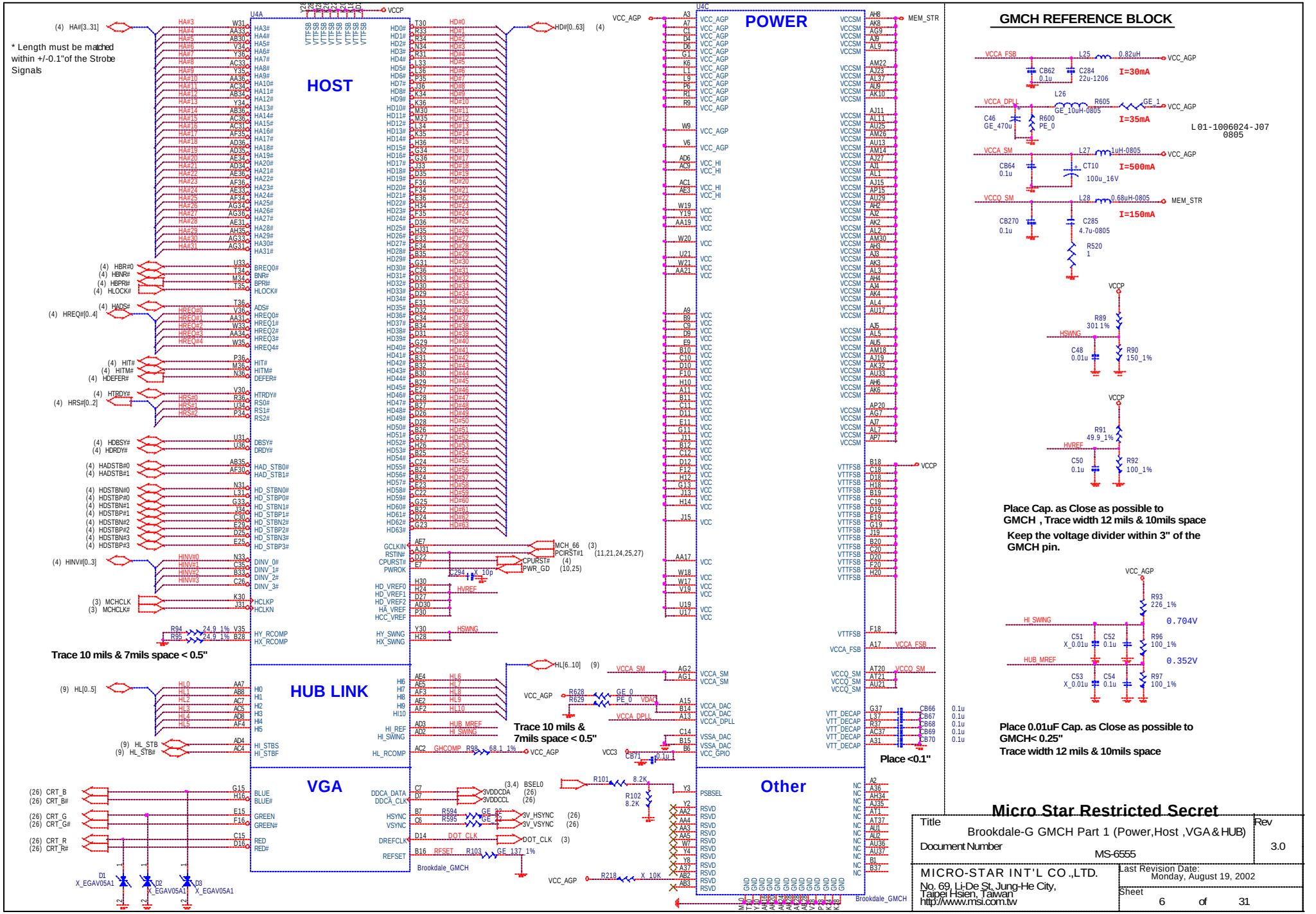
HOST
POWER
HUB LINK
VGA
Other
* Length must be matched within +/-0.1"of the Strobe Signals
Trace 10 mils & 7mils space < 0.5"
Trace 10 mils & 7mils space < 0.5"
Place <0.1"
Brookdale_GMCH
GMCH REFERENCE BLOCK
VCCA_FSB
VCCA_DPLL
VCCA_SM
VCCQ_SM
MEM_STR
I=30mA
I=35mA
I=500mA
I=150mA
L01-1006024-J07
0805
Place Cap. as Close as possible to GMCH , Trace width 12 mils & 10mils space
Keep the voltage divider within 3" of the GMCH pin.
0.704V
0.352V
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
3.0
Document Number
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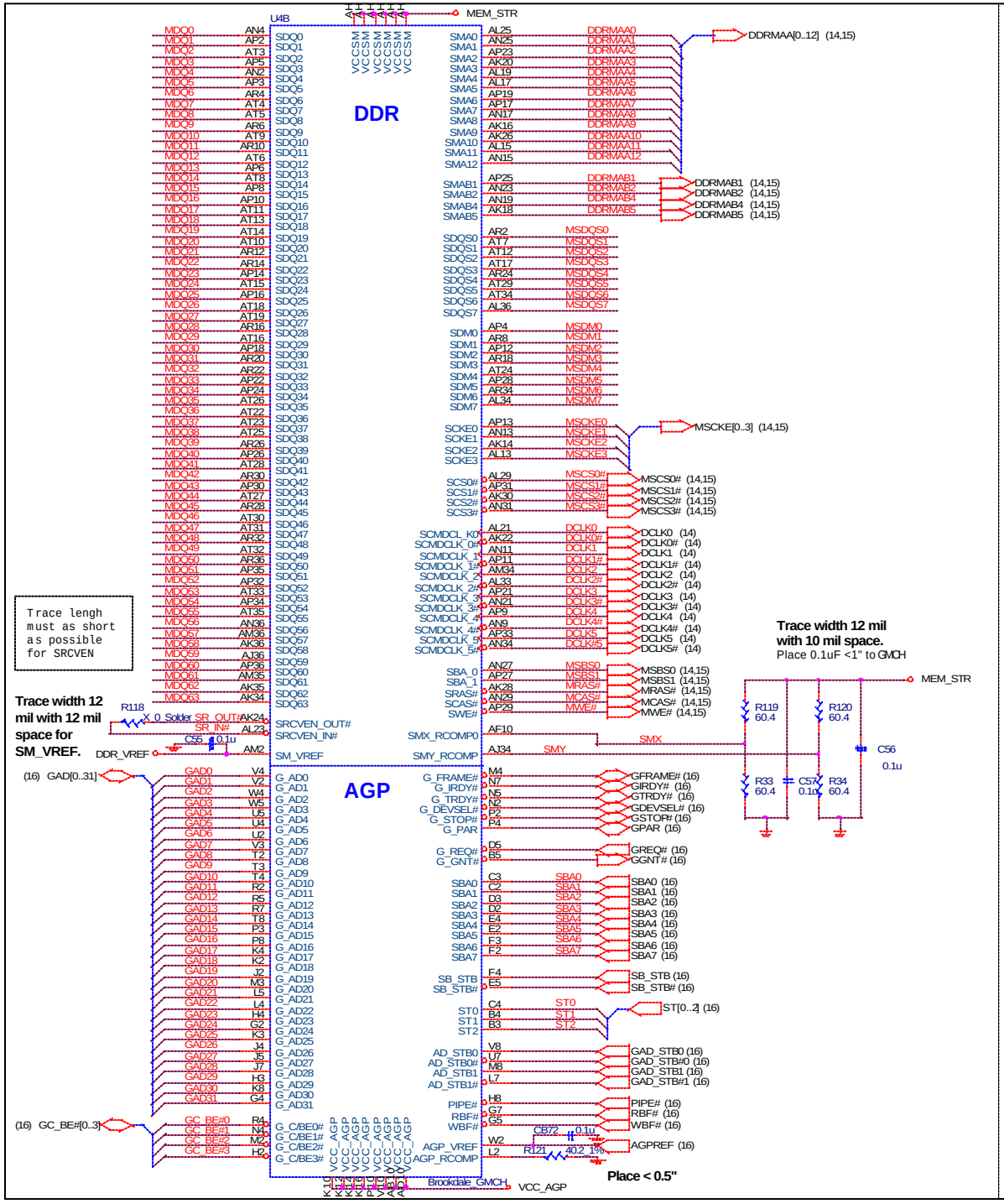

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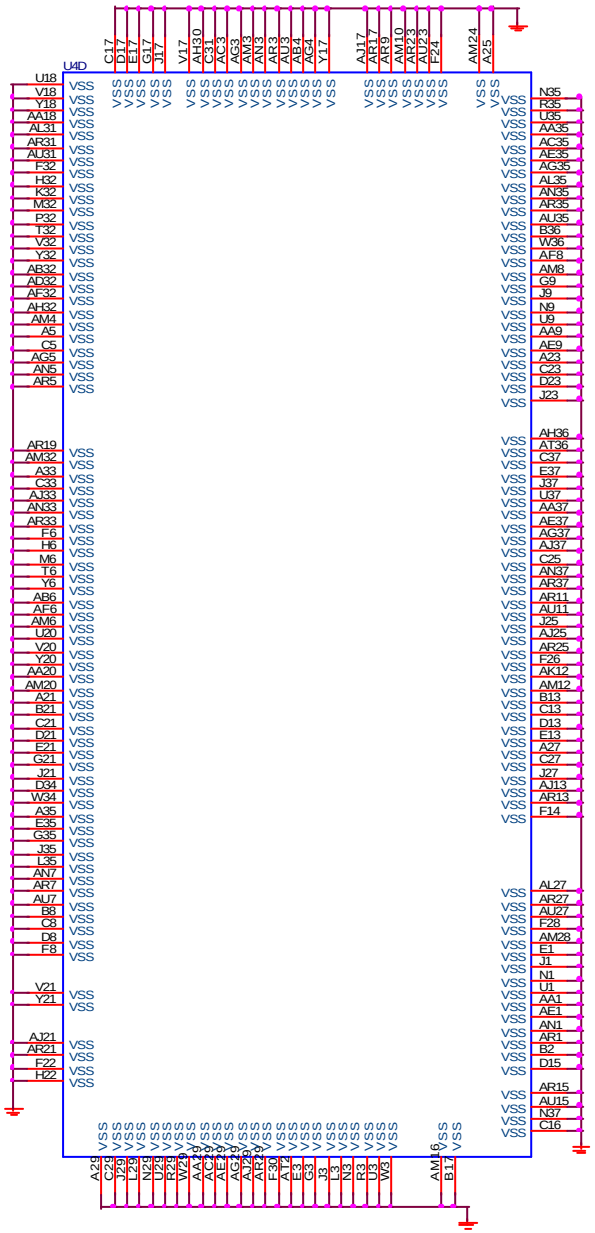
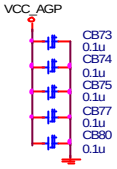
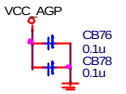


GMCH DECOUPLING CAPACITOR



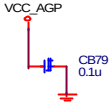
Pin A5
Pin E1
Pin J1
Pin N1
Pin U1

Place decoupling cap close to GMCH AGP Interface < 0.1"



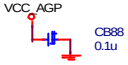
Pin AA1
Pin AE1

Place decoupling cap close to GMCH Hub-Link Interface< 0.1"

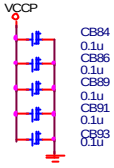


Pin B14
Pin A15

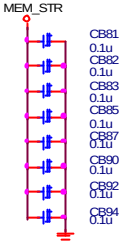
Place decoupling cap close to GMCH DAC Interface< 0.1"



Place decoupling cap close to GMCH Core Logic Interface < 0.1"

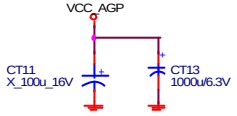


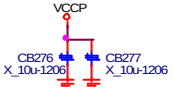
Place decoupling cap close to GMCH CPU Interface < 250mil in the Vtt corridor



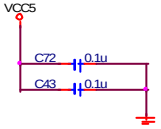
Pin AL37
Pin AU5
Pin AU9
Pin AU13
Pin AU17
Pin AU25
Pin AU29
Pin AU33

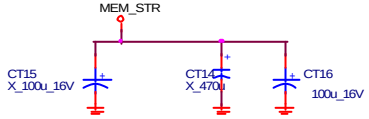
Place decoupling cap close to GMCH Memory Interface < 0.1", with 18 mil trach width





Place Bulk cap for Core Logic, AGP & Hub Link Interface





Place Bulk cap between GMCH & DIMM slot

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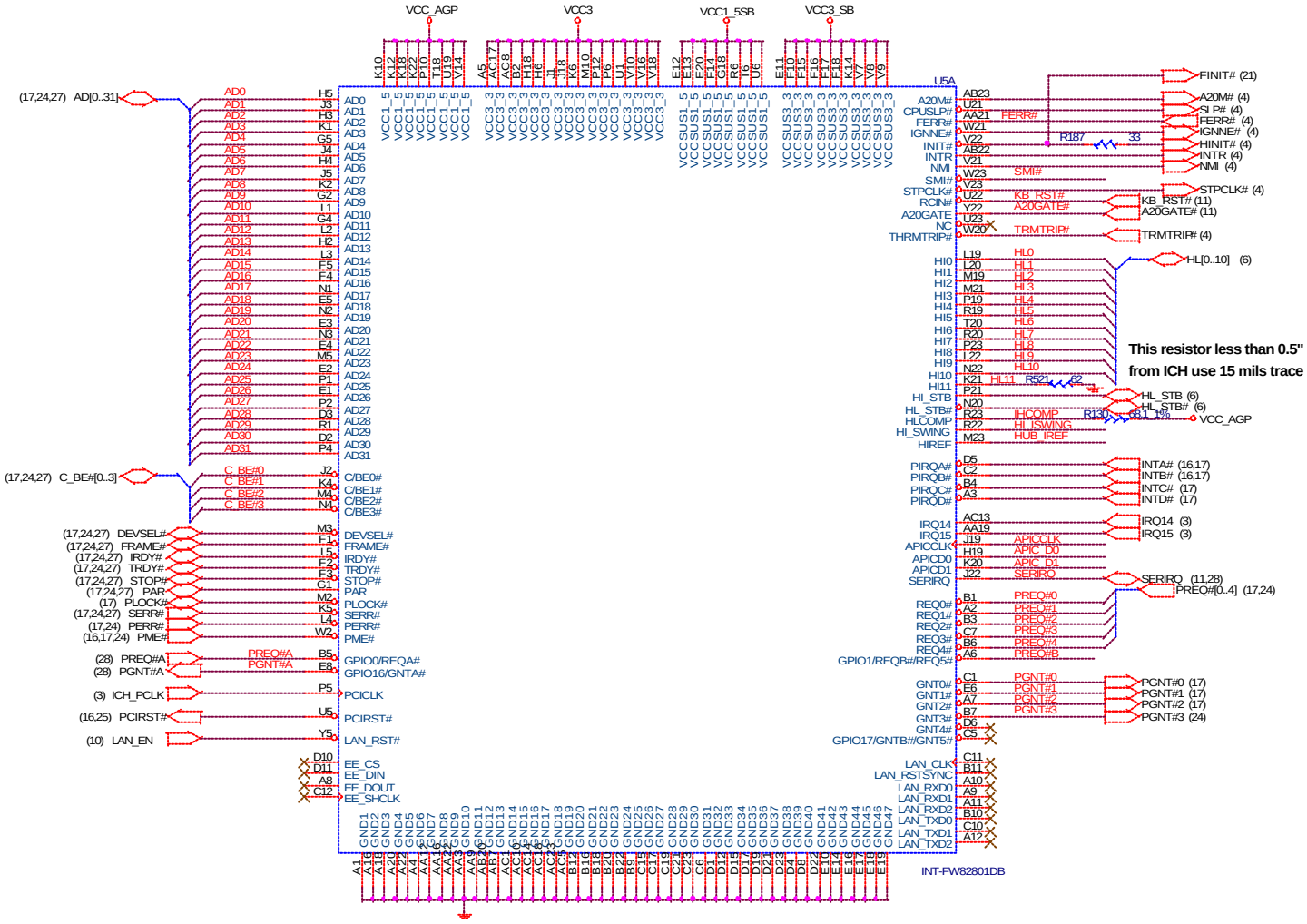
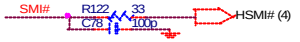
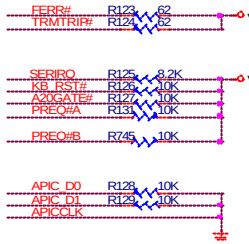
ICH4 PCI / HUB LINK / CPU / LAN / INTERRUPT SIGNALS



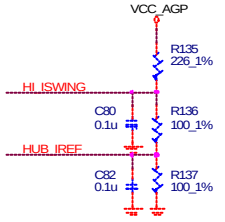
ICH4 SMI# SIGNAL



ICH4 STRAPPING RESISTORS



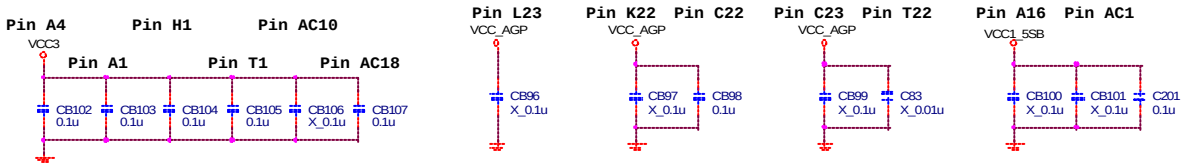
ICH4 REFERENCE VOLTAGE



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



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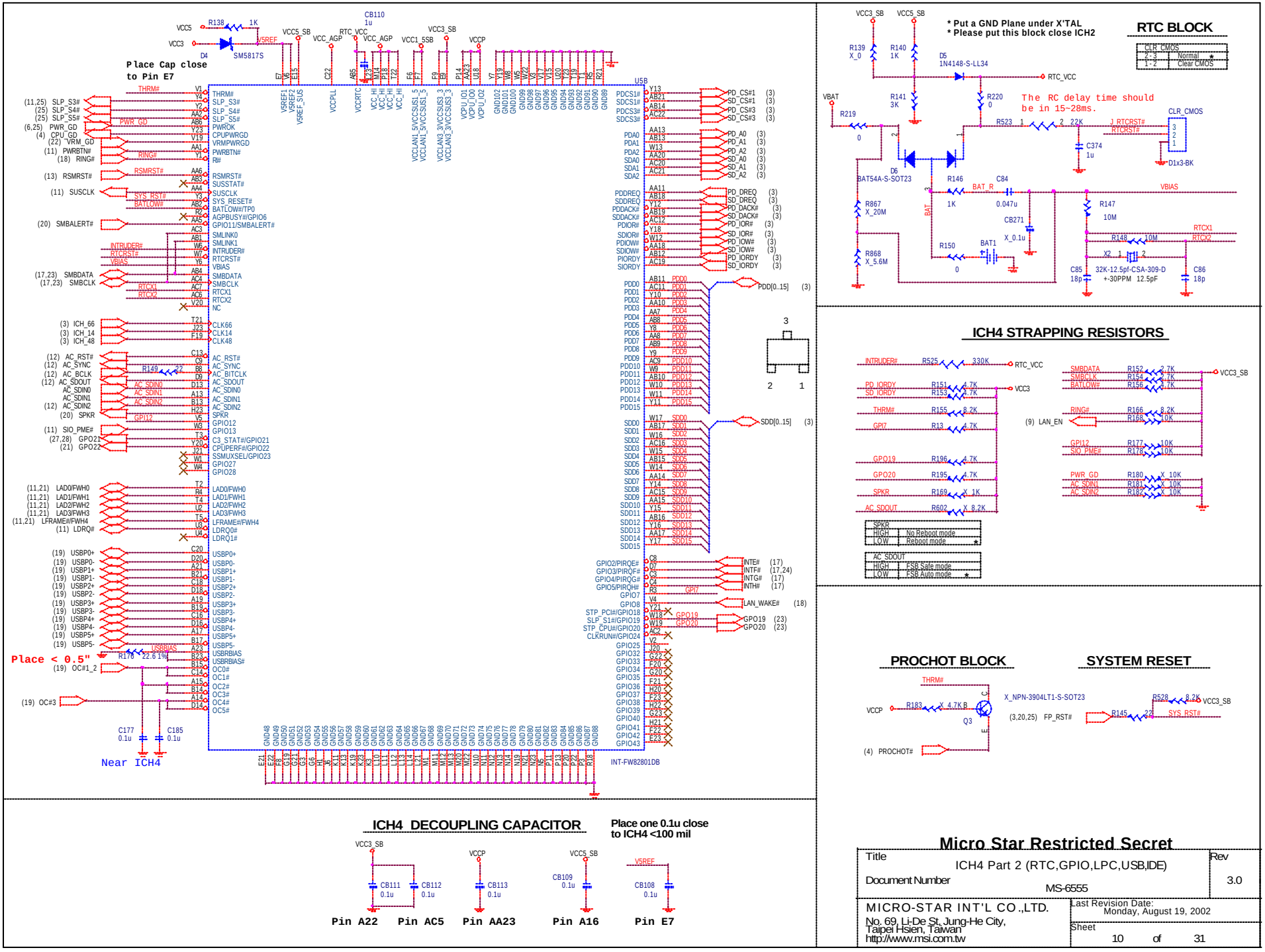

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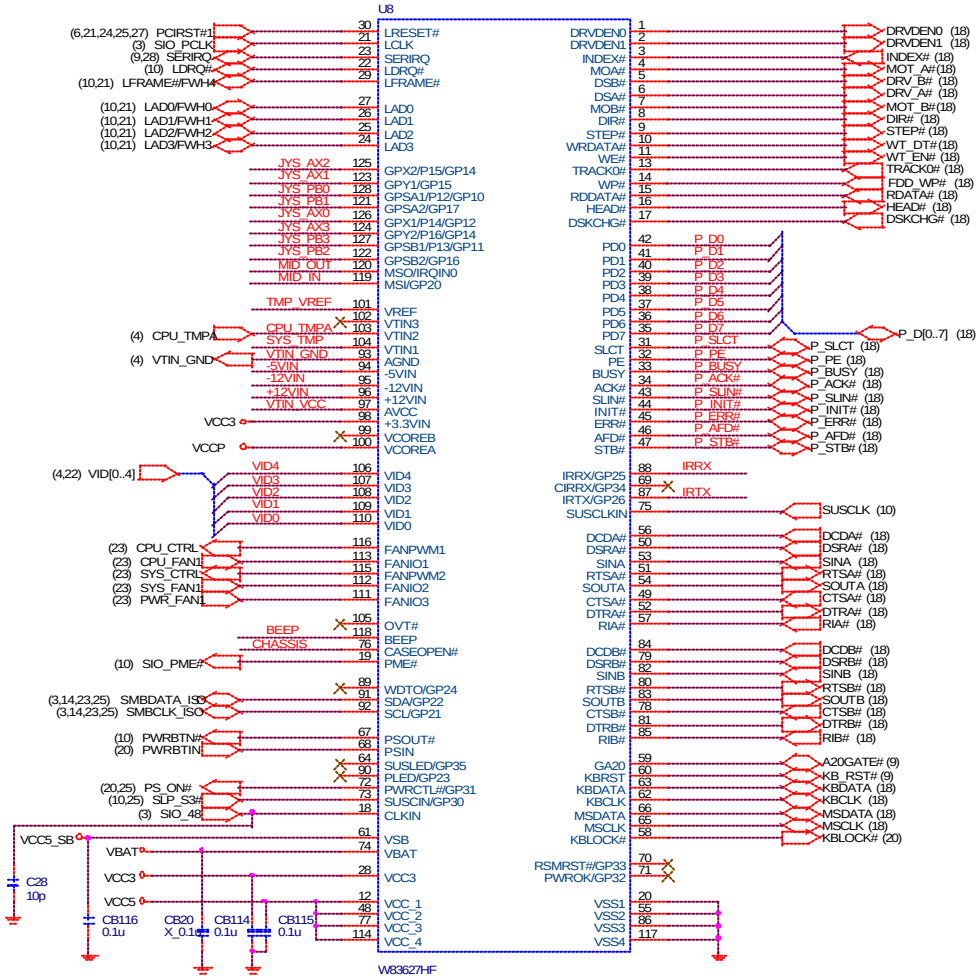
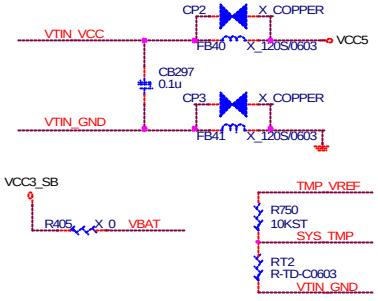
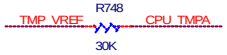
LPC SUPER I/O W83627HF

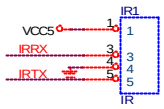


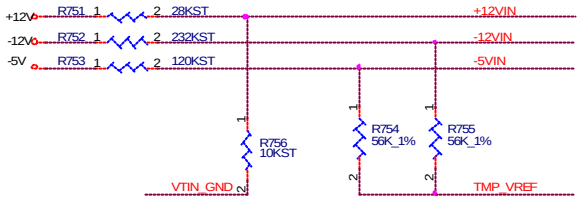
THERMAL RESISTOR BLOCK



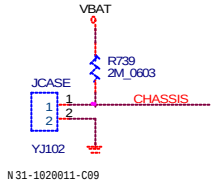


IR HEADER

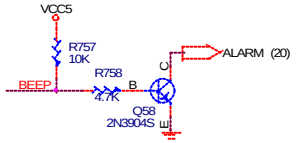




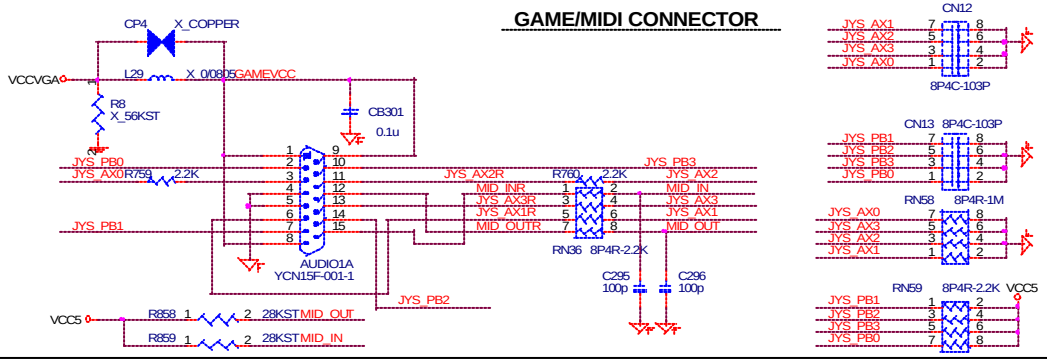
Chasiss Intrusion Header



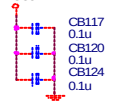
SPEAKER BLOCK



GAME/MIDI CONNECTOR



LPC I/O DECOUPLING CAPACITORS



SUPER I/O STRAPPING RESISTOR

SOUTA	L: Disable KBC	H: Enable KBC
SOUTB	L: 24MHZ	H: 48MHZ
RTSA#	L: CFAD=2E	H: CFAD=4E
DTRA#	L: PNP Default	H: PNP no Default

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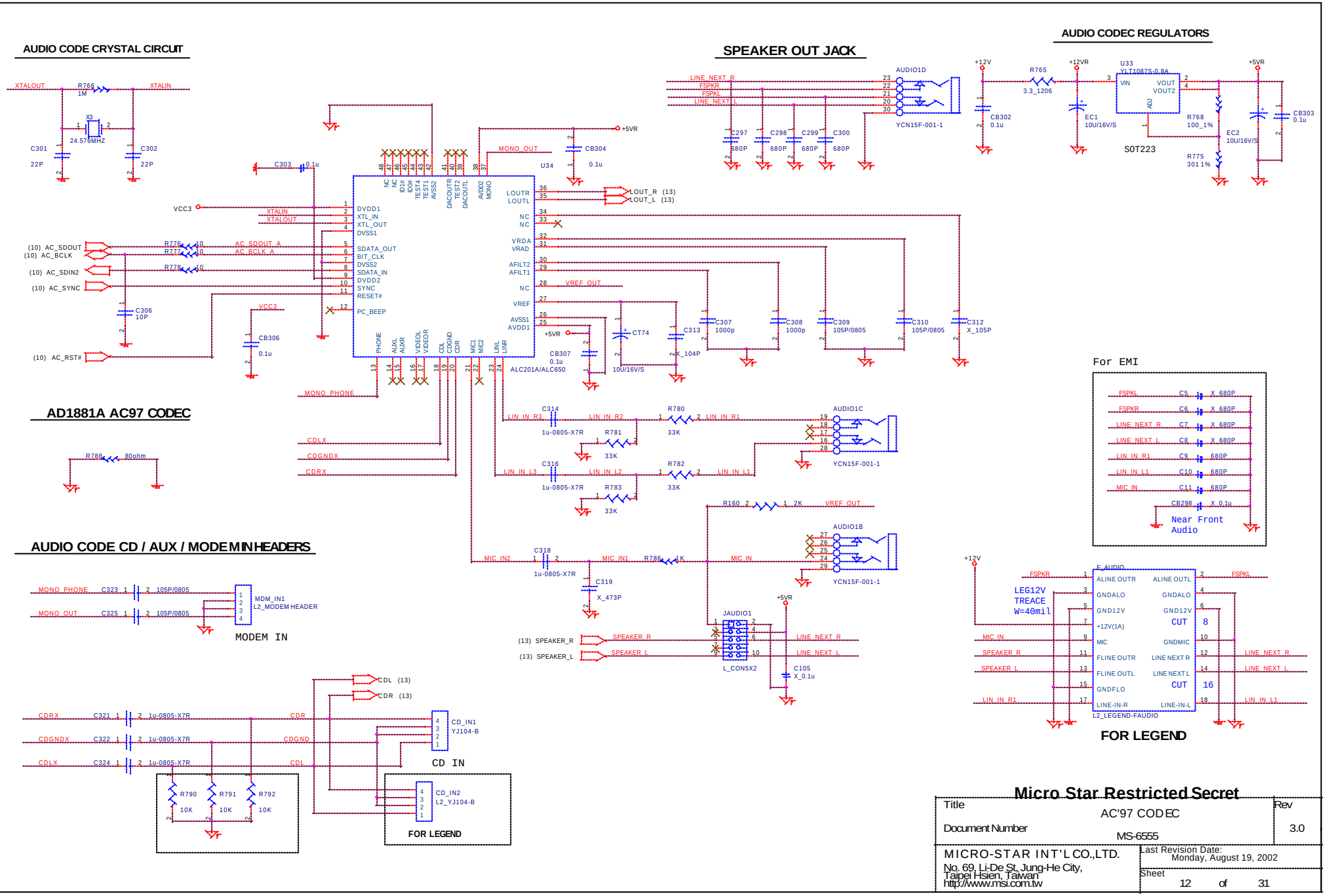
AUDIO CODE CRYSTAL CIRCUIT
SPEAKER OUT JACK
AUDIO CODEC REGULATORS
AD1881A AC97 CODEC
AUDIO CODE CD / AUX / MODEM IN HEADERS
MODEM IN
CD IN
FOR LEGEND
For EMI
Near Front Audio
FOR LEGEND
SOT223
Micro Star Restricted Secret
Title
AC'97 CODEC
Document Number
MS-6555
Rev
3.0
MICRO-STAR INT'L CO.,LTD.
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Taipei Hsien, Taiwan
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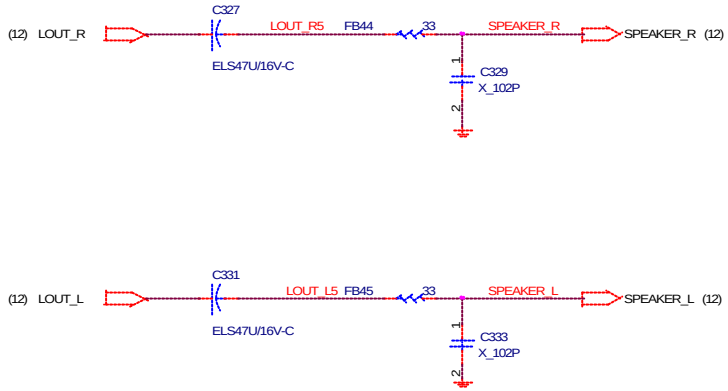
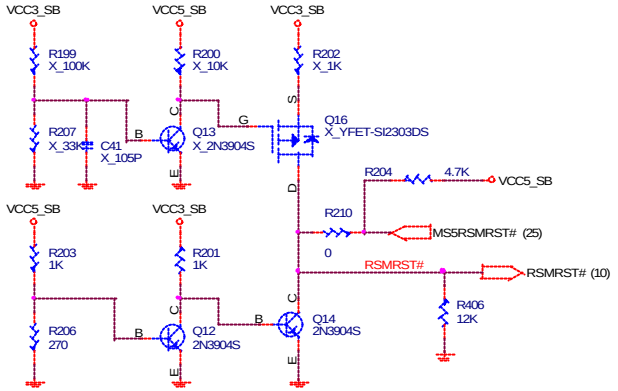
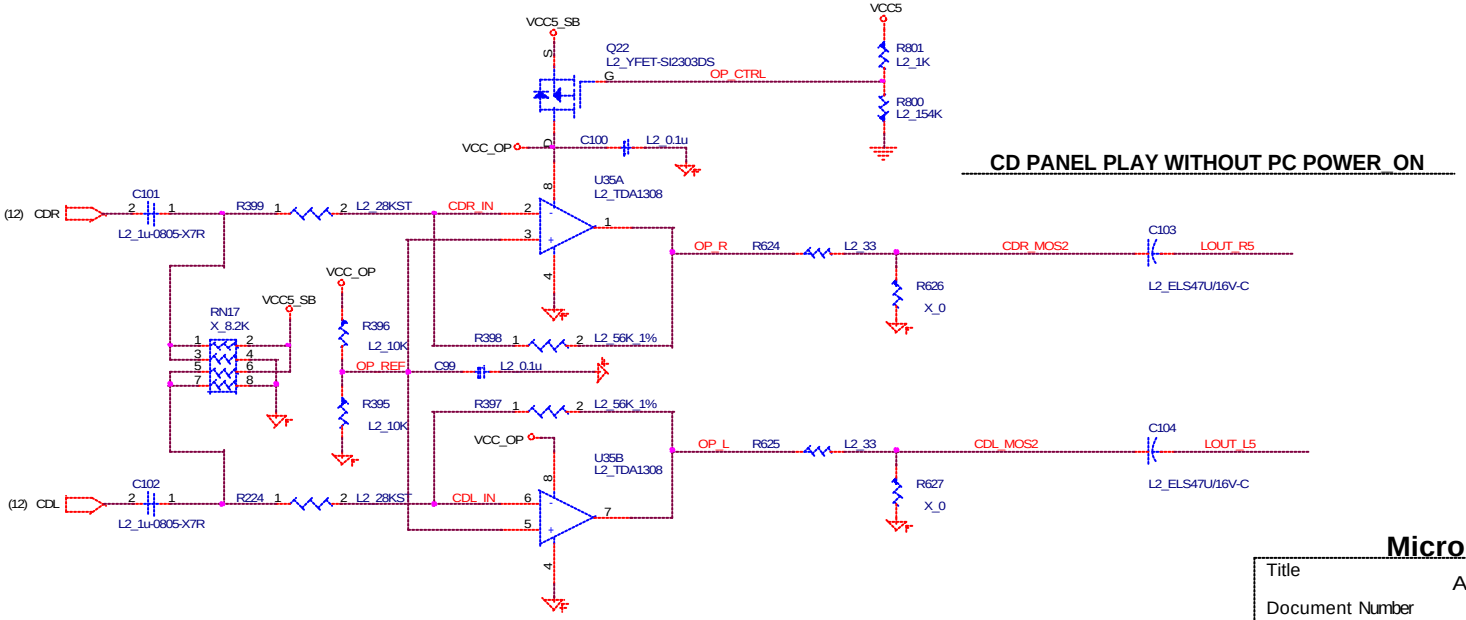
SPEAKER OUT CIRCUIT



Power-Well Isolation Control



CD PANEL PLAY WITHOUT PC POWER_ON



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Title: Audio Amplifier & CD Panel Play		Rev: 3.0
Document Number: MS-6555		
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: Monday, August 19, 2002	
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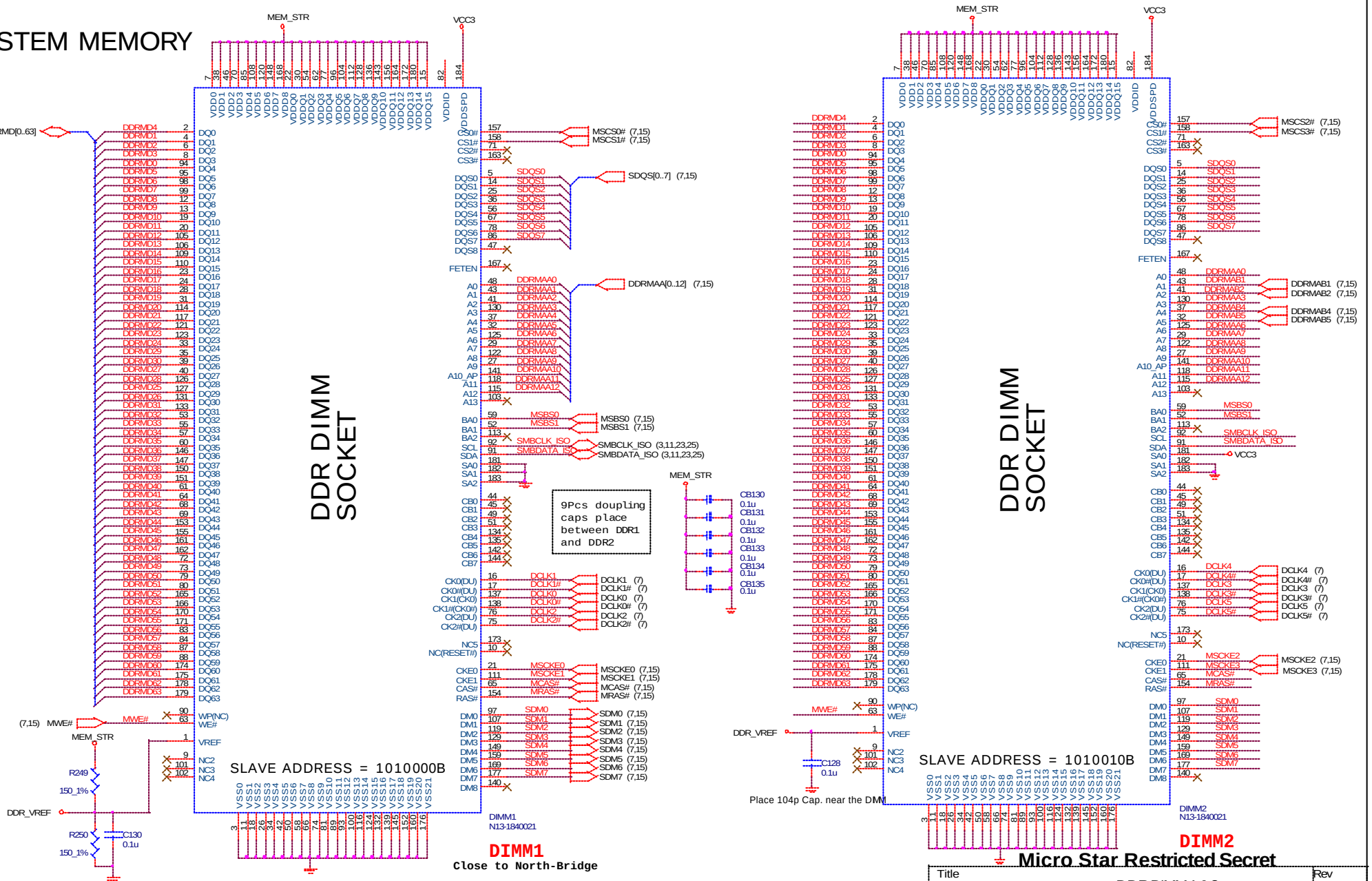
SYSTEM MEMORY



Micro Star Restricted Secret

Title	DDR DIMM 1 & 2	Rev 3.0
Document Number	MS-6555	
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: Monday, August 19, 2002	
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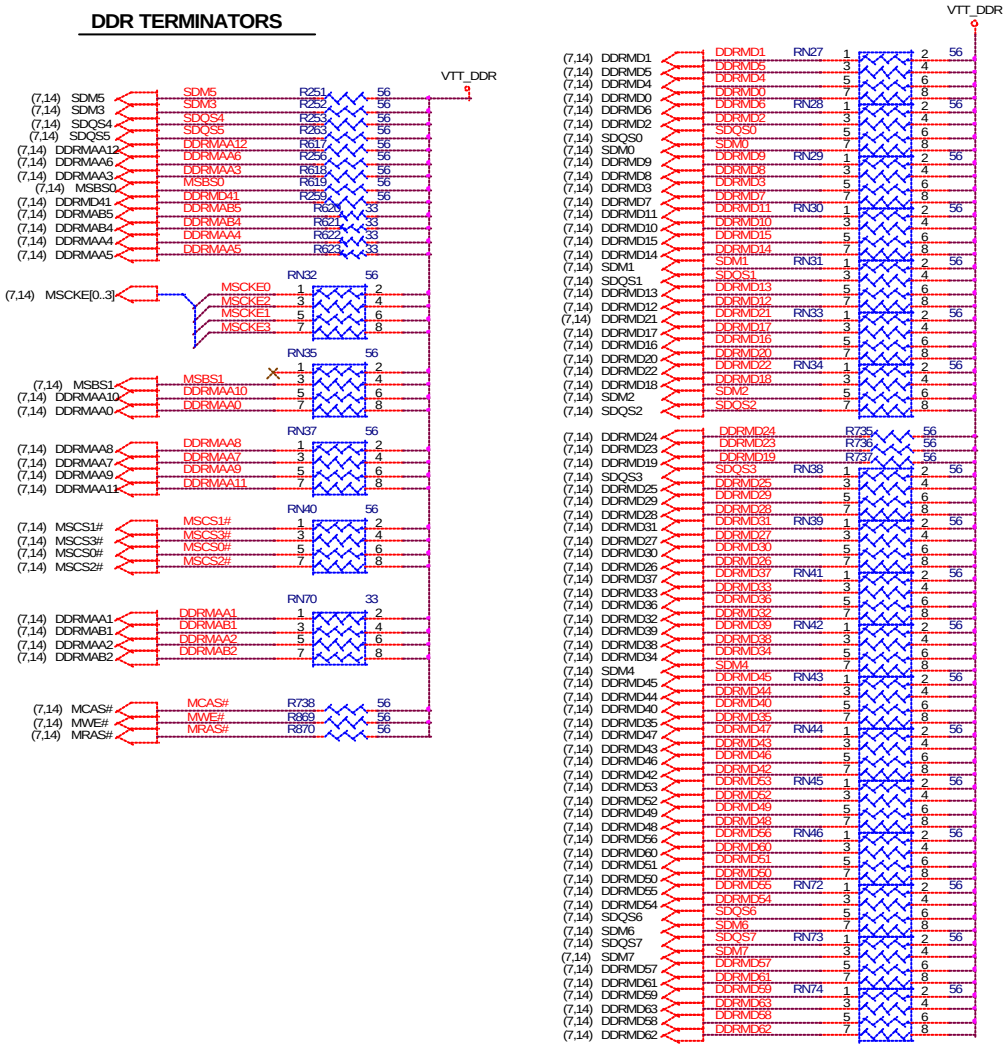
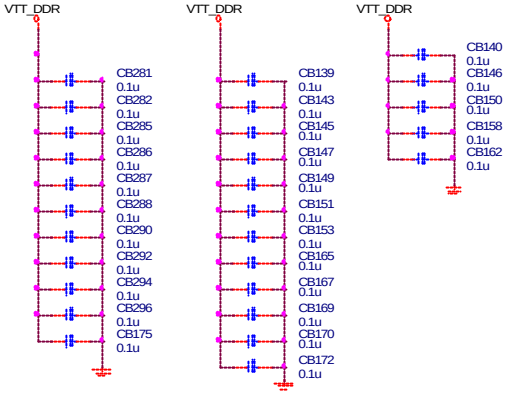
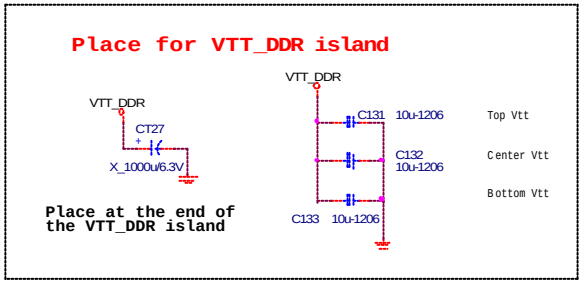
DDR TERMINATORS



DDR Decouping Caps



Total 110 signal, need 55 pcs decoupling.



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Title	DDR Terminator Resistor	Rev 3.0
Document Number	MS-6555	
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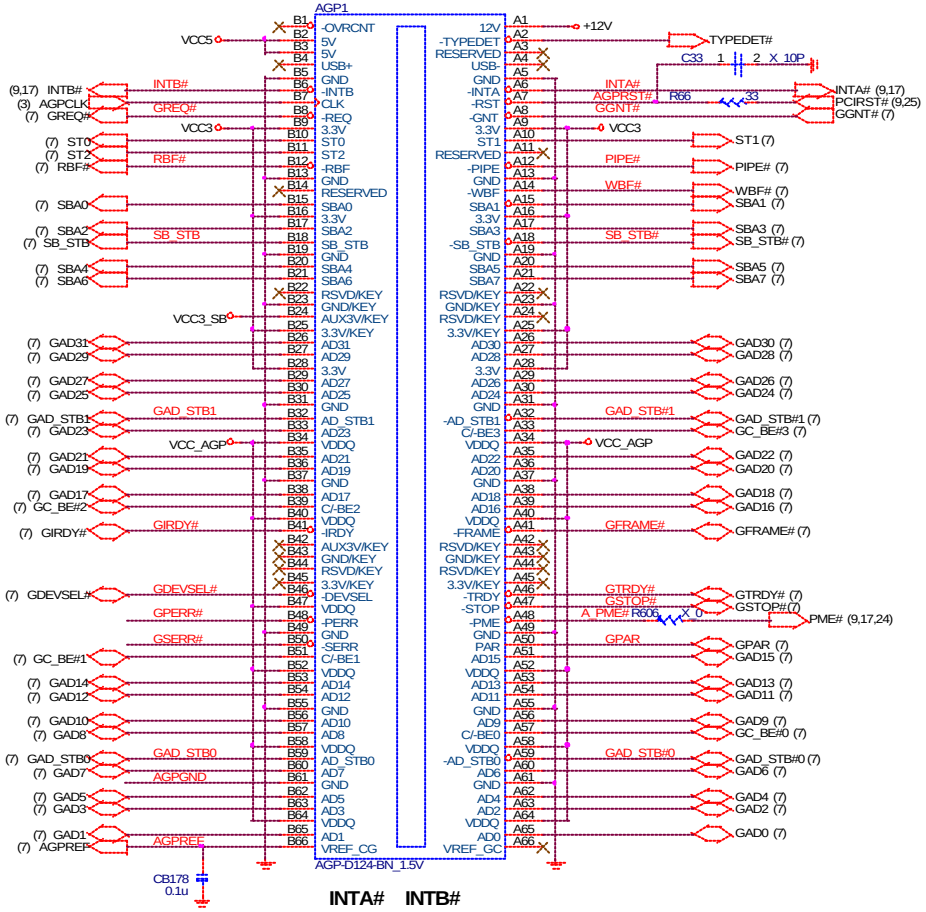
AGP 1.5V 2X/4X SLOT(AGP VER:2.0 COMPLY)

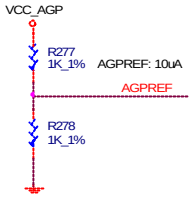
VCC5 = 60mils trace / 15 mils space

AGP Slot Imax

VCC_AGP 2.0A
VCC3 6.0A
VCC12 1.0A
VCC5 2.0A
VCC3_SB 0.375A

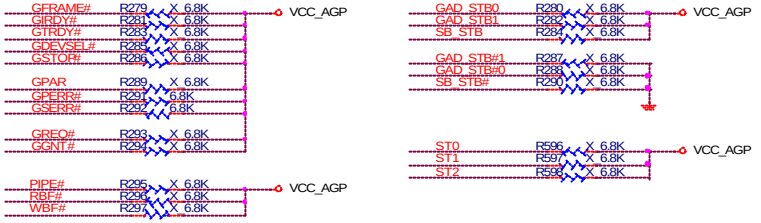


AGP SIGNAL REFERENCE CIRCUIT



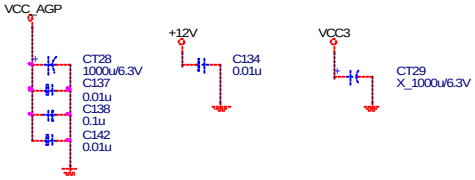
NEAR AGP SLOT

AGP TERMINATION RESISTORS



LESS 100MILS STUB TRACE LENGTH FOR 2/4X
LESS 500MIL FOR 1X MUST BE FOLLOW ING.
Place these resistors between AGP slot & GMCH

AGP SLOT DECOUPLING CAPACITORS



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Title: AGP 2.0	Rev: 3.0
Document Number: MS-6555	
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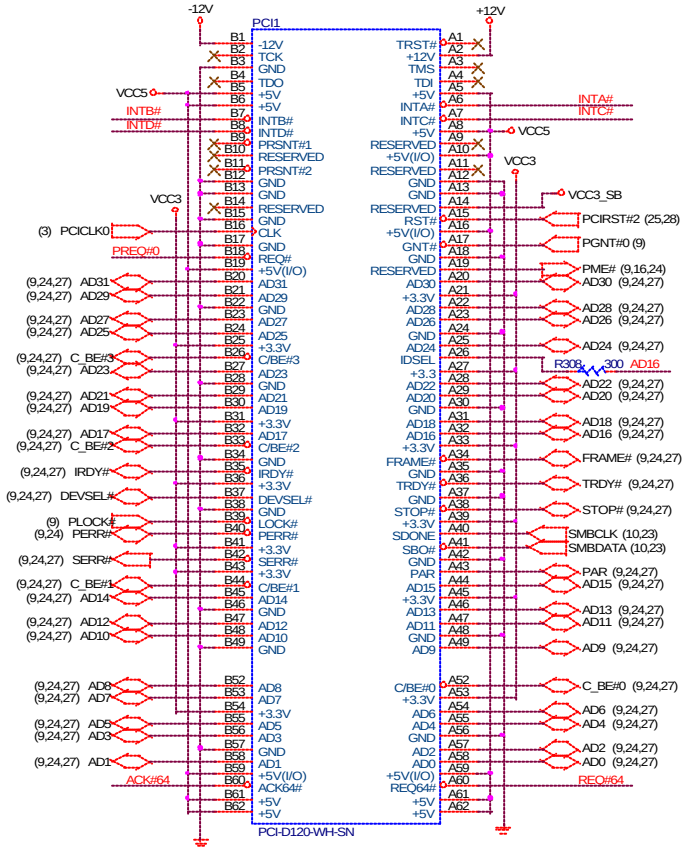
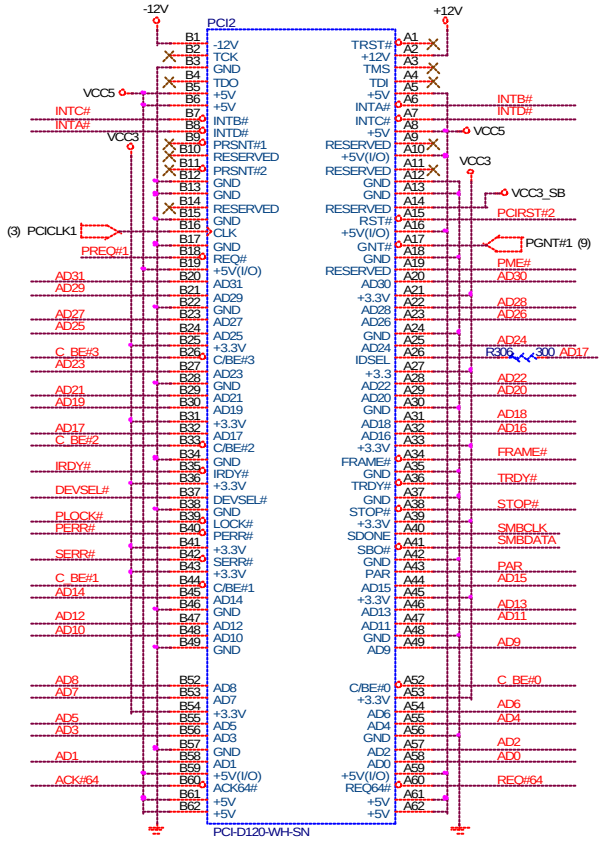
PCI SLOT 1 (PCI VER: 2.2 COMPLY)



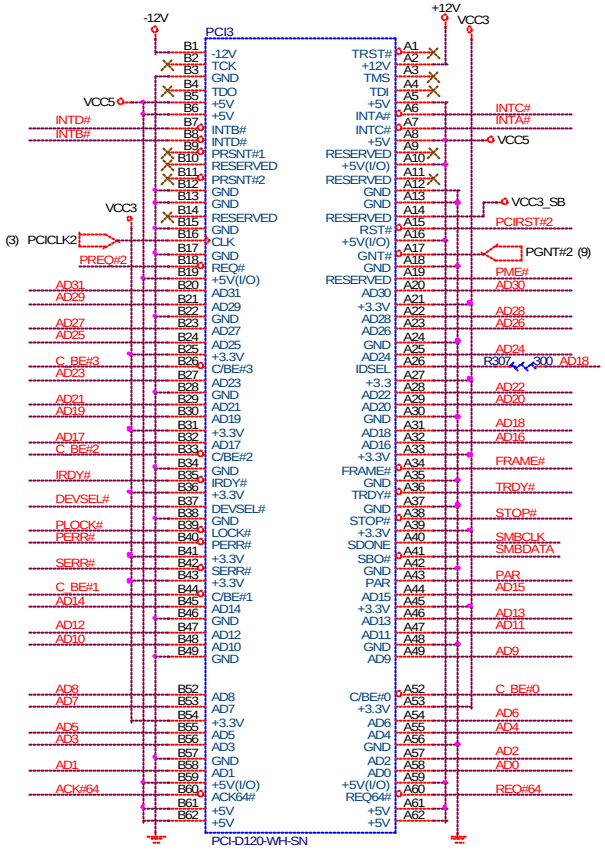
IDSEL = AD16
MASTER = PREQ0
INTA#

PCI SLOT 2 (PCI VER: 2.2 COMPLY)



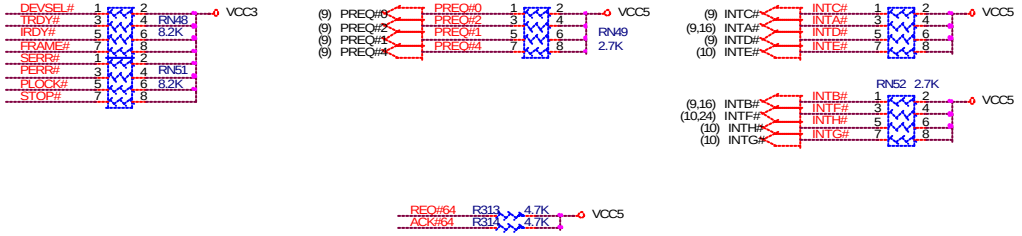
IDSEL = AD17
MASTER = PREQ1
INTB#

PCI SLOT 3 (PCI VER: 2.2 COMPLY)

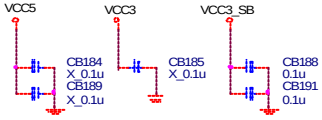


IDSEL = AD18
MASTER = PREQ2
INTC#

PCI PULL-UP / DOWN RESISTORS



PCI SLOT DECOUPLING CAPACITORS



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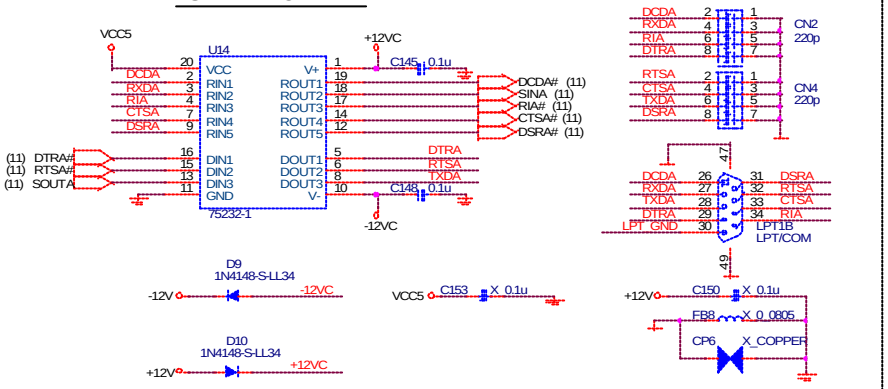
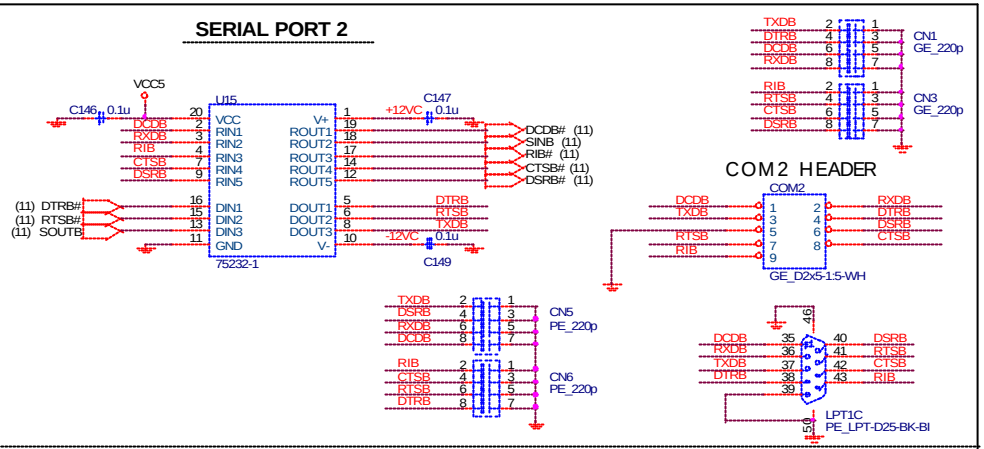
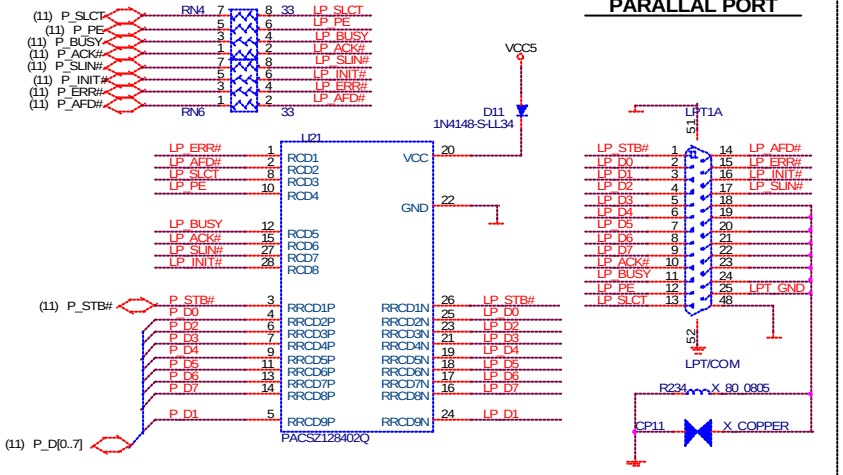
SERIAL PORT 1



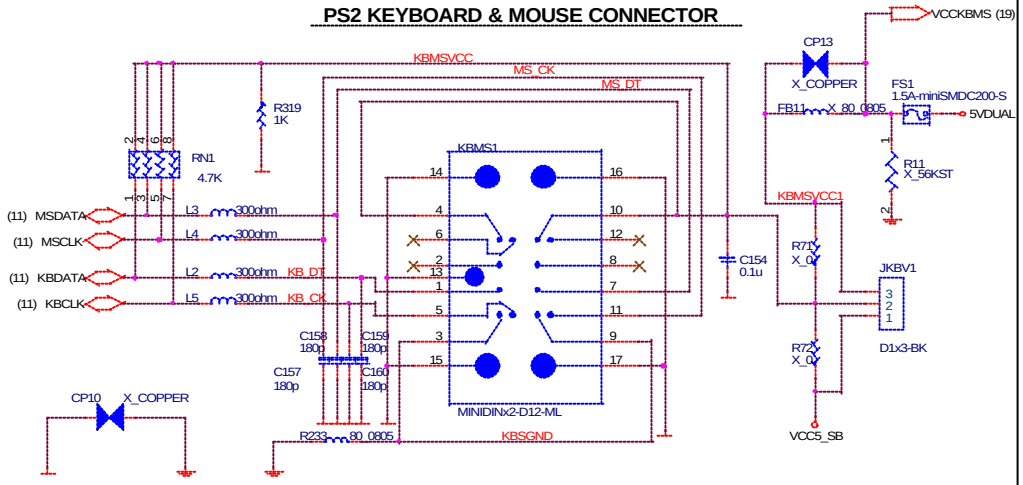
SERIAL PORT 2



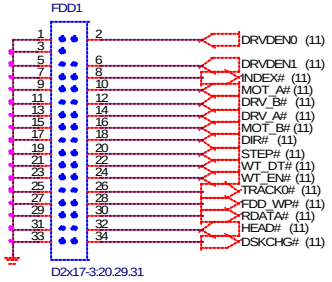
PARALLAL PORT



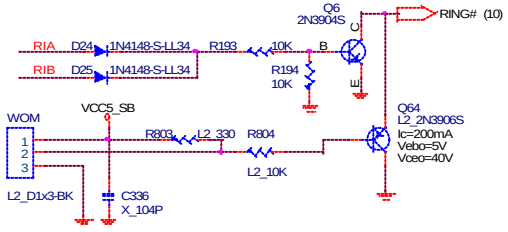
PS2 KEYBOARD & MOUSE CONNECTOR



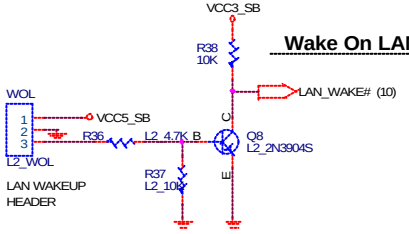
FLOPPY CONNECTOR



Wake On Modem Header



Wake On LAN Header



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Title	KB,MS,SERIAL,PARALLEL & FLOPPY	Rev 3.0
Document Number	MS-6555	
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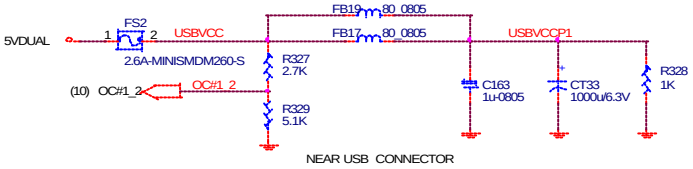
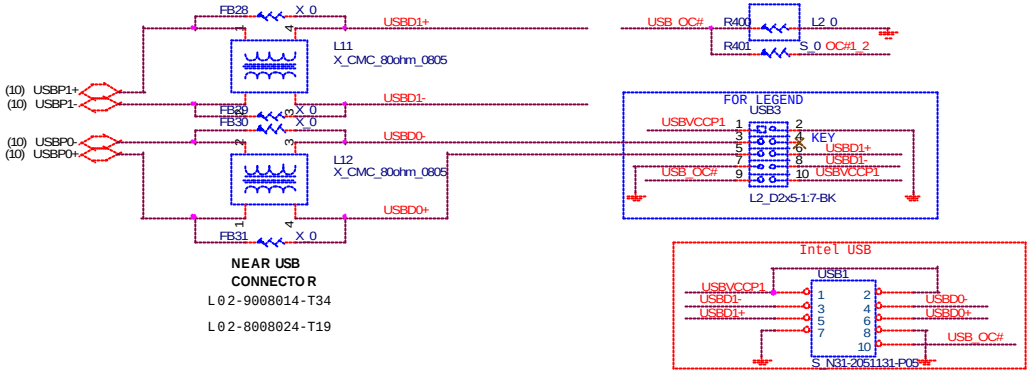
POWER CIRCUIT FOR USB PORT 0,1



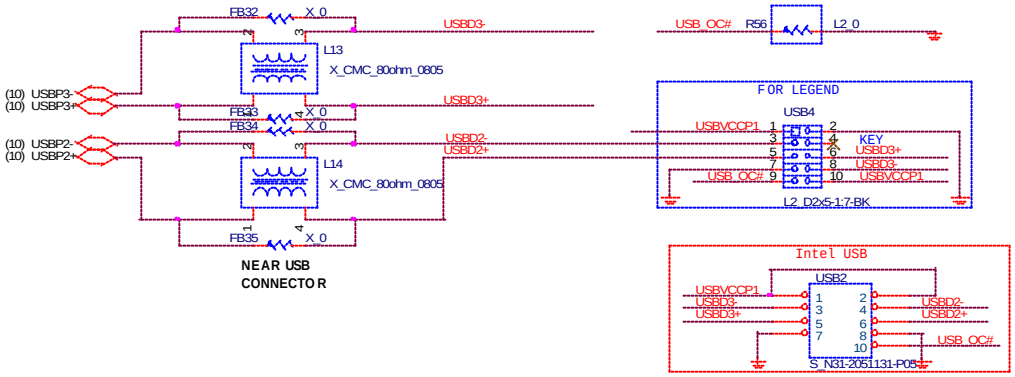
* USB Trace width : 7.5 mils
* USB Trace Spacing : Low speed 20 mils, High speed 50 mils
* Differential USB Signlas Trace, Spacing : 7.5 mils
* USB Power Trace must be 40mils width
* Length(longest)-Length(shortest)<150mils
* Maxium trace length <5"

FRONT PANEL USB CONNECTOR FOR USB PORT 0,1

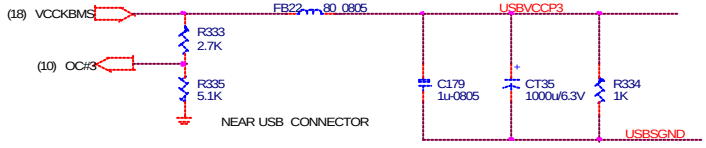


For MSI Bluetooth / Wireless Pin Header

REAR PANEL USB CONNECTOR FOR USB PORT 2,3

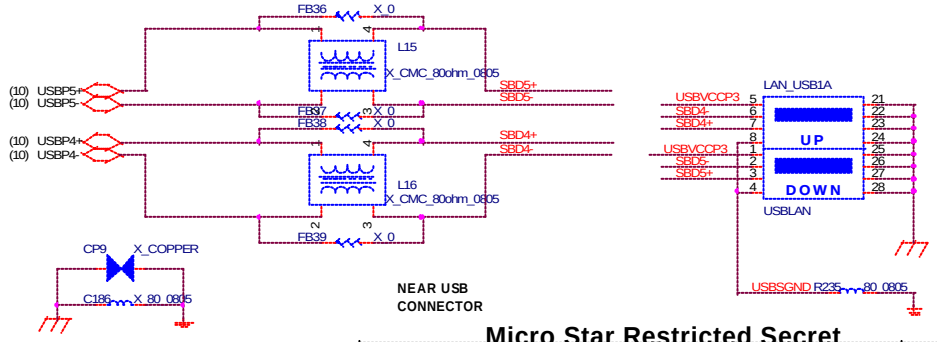


POWER CIRCUIT FOR USB PORT 4,5



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

REAR PANEL USB CONNECTOR FOR USB PORT 4,5



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Title	USB Connectors	Rev
Document Number	MS-6555	3.0
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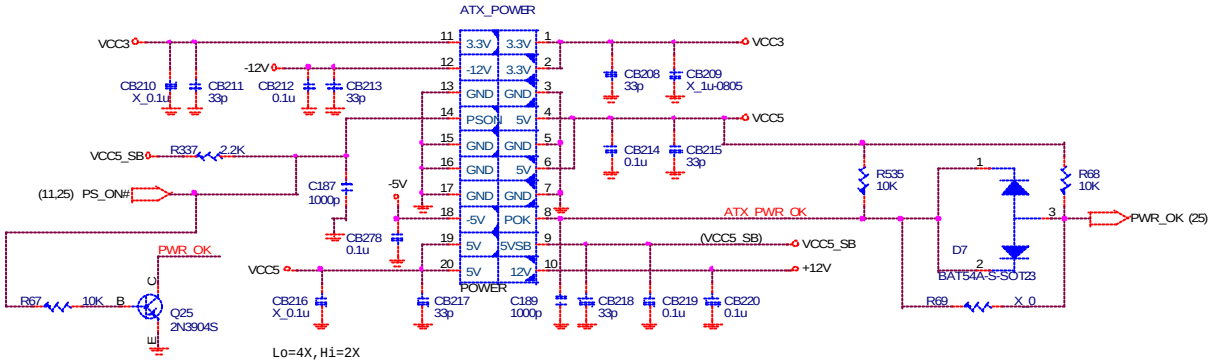
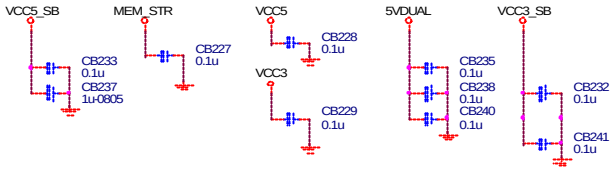
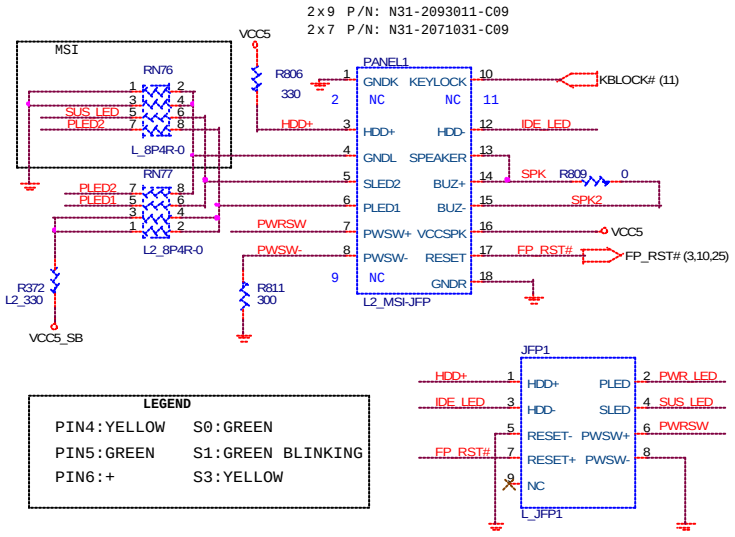
ATX CONNECTOR



REGULATORS OUTPUT DECOUPLING CAPACITORS



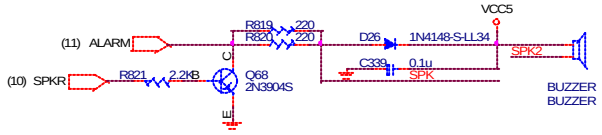
MSI/Legend Front Panel

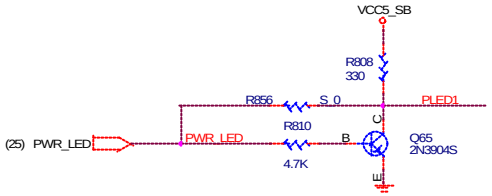


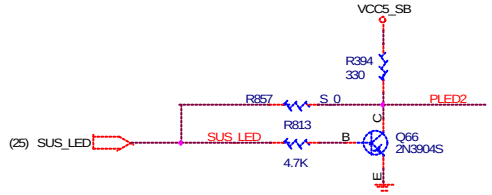
LEGEND

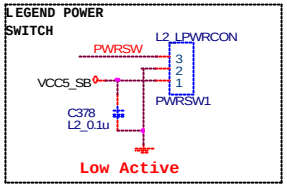
PIN4:YELLOW	S0:GREEN
PIN5:GREEN	S1:GREEN BLINKING
PIN6:+	S3:YELLOW

SPEAKER







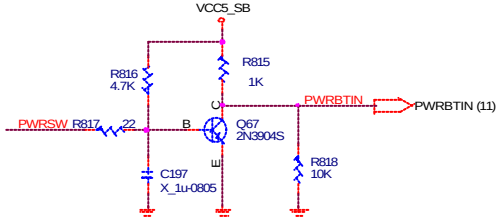


LEGEND DUAL

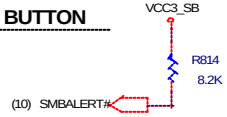
+	GREEN
-	YELLOW
-	

S0:STEADY GREEN
S1:GREEN BLINKING
S3:STEADY YELLOW
S4/S5:OFF

POWER BUTTON



SLEEP BUTTON



Micro Star Restricted Secret

Title	Front Panel,Power Conn. & Speaker	Rev
Document Number	MS-6555	3.0
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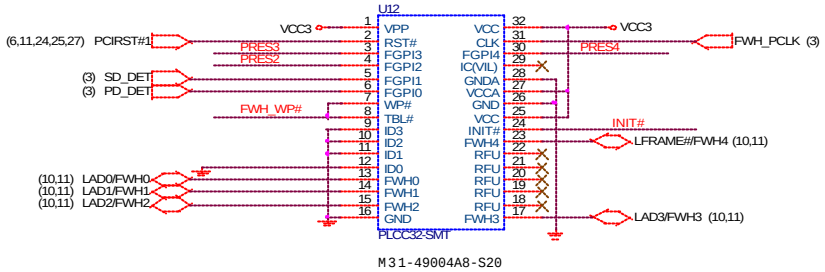
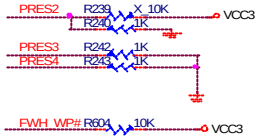
Firware Hub (FWH)

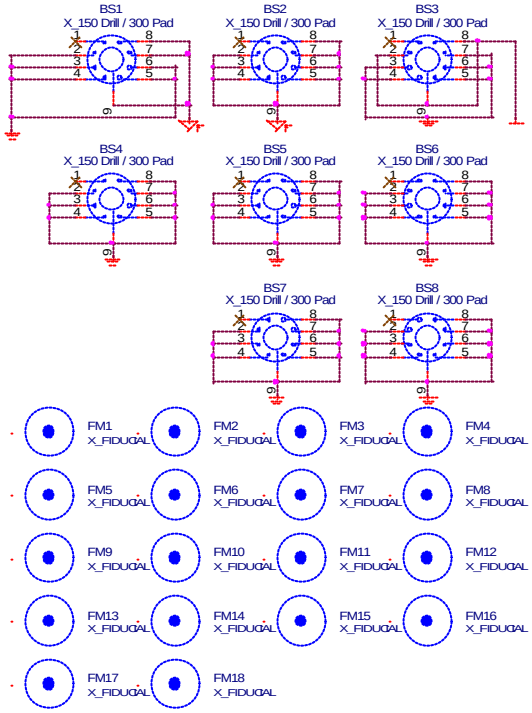


M31-49004A8-S20

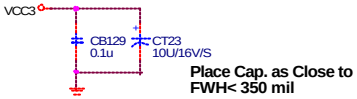
FWH RESISTORS



PCB OTHER COMPONENT



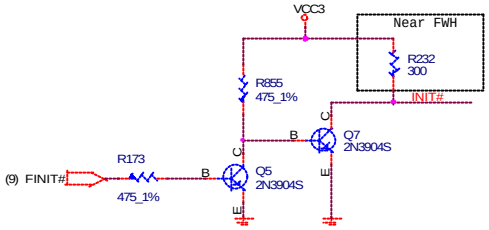
FWH DECOUPLING CAPACITORS



Place Cap. as Close to FWH< 350 mil

SIMULATION TRACE

FWH INIT Signal Voltage Translation Block



CNR RISER

*** LAN Trace width : 5 mils**

*** AC'97 Trace Spacing : 10 mils**

*** Maxium trace length < 9.5"**

*** Equal to or up to 500 mils shorter than the ELAN_CLK trace**

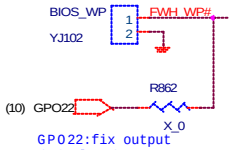
*** AC'97 Trace width : 5 mils**

*** AC'97 Trace Spacing : 5 mils**

*** Maxium trace length <8"**

*** Length(longest)-Length(shortest)<150mils**

FWH write protect



BIOS_WP	
Close	Locked
Open	Unlocked

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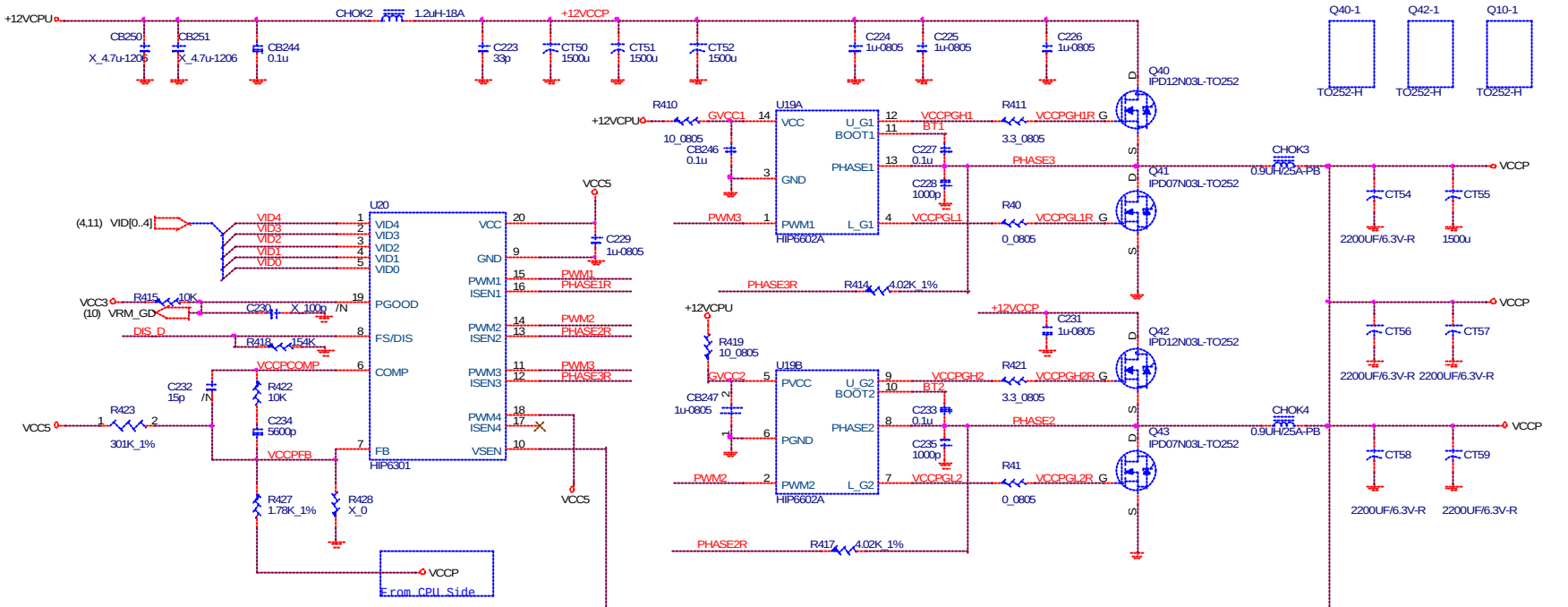


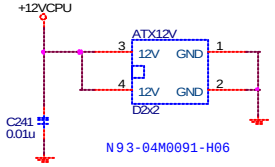
HIP6301 -- VRM 9.0/9.2

VID4	VID3	VID2	VID1	VID0	VDC(V)
1	1	1	1	1	OFF
1	1	1	1	0	1.100
1	1	1	0	1	1.125
1	1	1	0	0	1.150
1	1	0	1	1	1.175
1	1	0	1	0	1.200
1	1	0	0	1	1.225
1	1	0	0	0	1.250
1	0	1	1	1	1.275
1	0	1	1	0	1.300

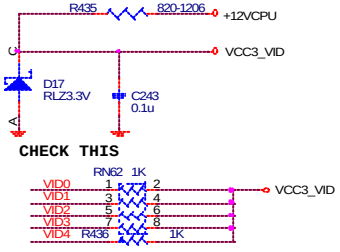
VID4	VID3	VID2	VID1	VID0	VDC(V)
1	0	1	0	1	1.325
1	0	1	0	0	1.350
1	0	0	1	1	1.375
1	0	0	1	0	1.400
1	0	0	0	1	1.425
1	0	0	0	0	1.450
0	1	1	1	1	1.475
0	1	1	1	0	1.500
0	1	1	0	1	1.525
0	1	1	0	0	1.550

VID4	VID3	VID2	VID1	VID0	VDC(V)
0	1	0	1	1	1.575
0	1	0	1	0	1.600
0	1	0	0	1	1.625
0	1	0	0	0	1.650
0	0	1	1	1	1.675
0	0	1	1	0	1.700
0	0	1	0	1	1.725
0	0	1	0	0	1.750
0	0	0	1	1	1.775
0	0	0	1	0	1.800

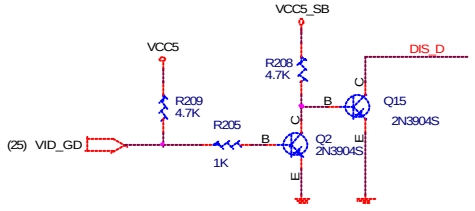
ATX12V POWER CONNECTOR



VID PULL-UP RESISTORS



PWM GOOD



Micro Star Restricted Secret

Title	VRM 9.0	Rev
Document Number	MS-6555	3.0

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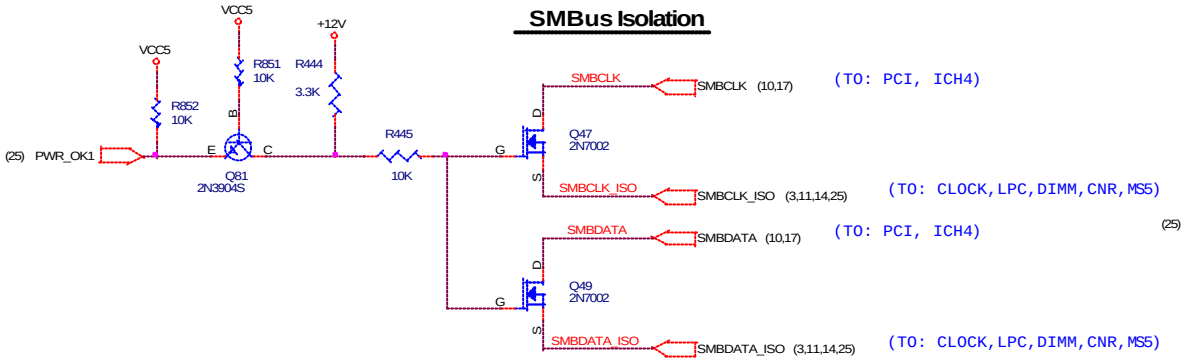
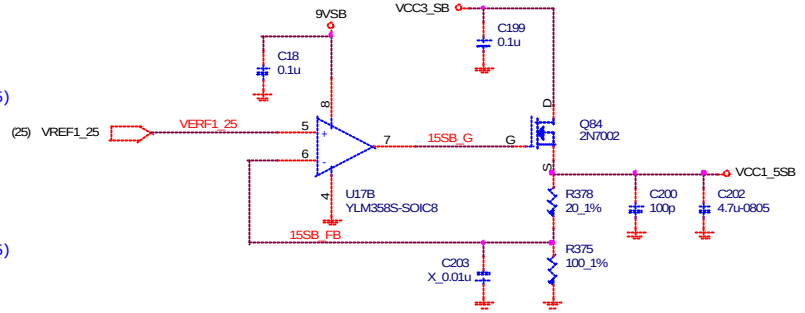
SMBus Isolation

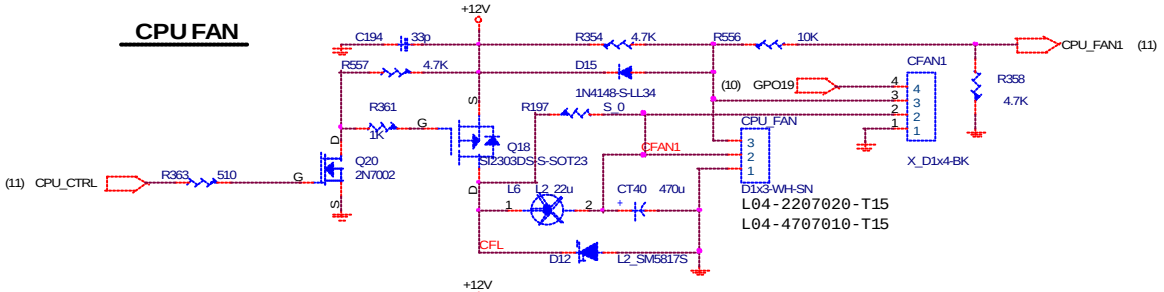


1.5V STANDBY POWER TRANSLATOR

(40mils trace/20 mils space)

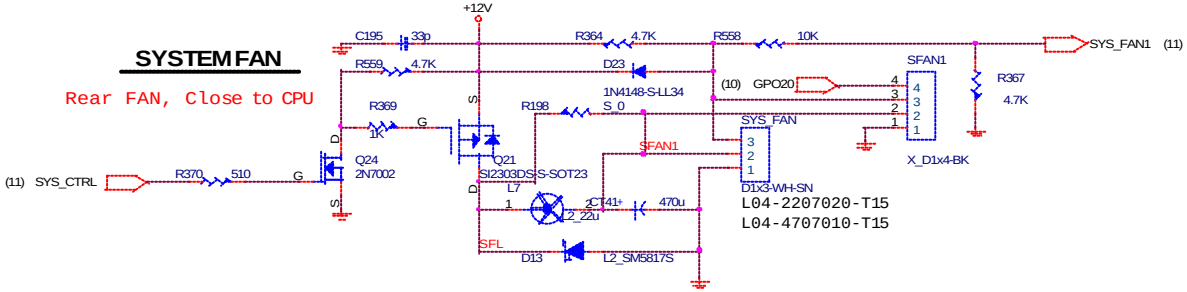


CPU FAN

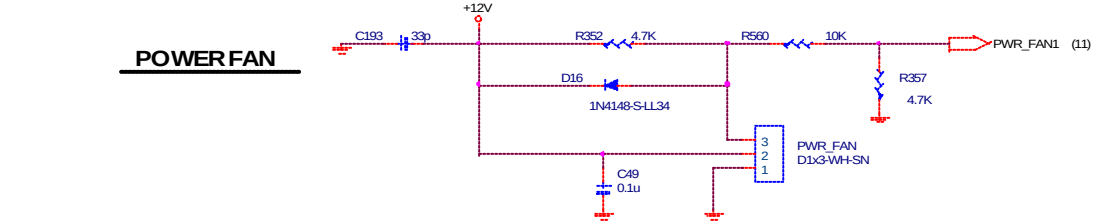


SYSTEM FAN

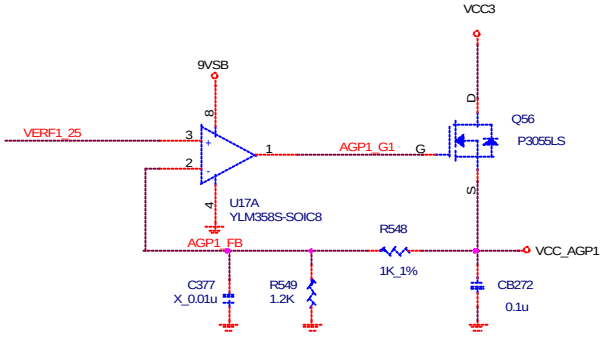
Rear FAN, Close to CPU



POWER FAN

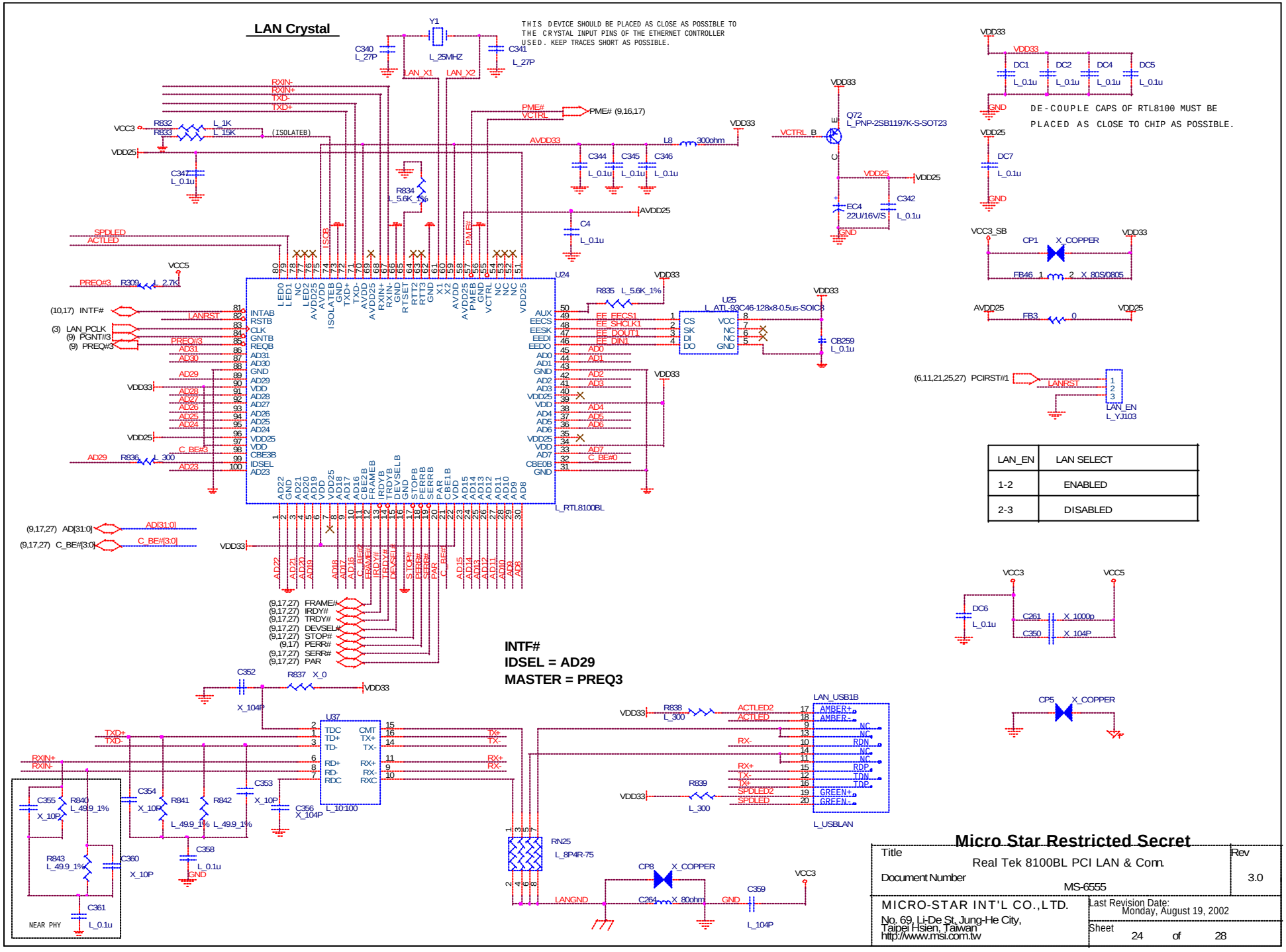


AGP4X & GMCH 1.5V POWER TRANSLATOR



Micro Star Restricted Secret

Title	SMBUS Isolation & FAN Conn.	Rev 3.0
Document Number	MS-6555	
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: Monday, August 19, 2002	Sheet 23 of 31


LAN Crystal
THIS DEVICE SHOULD BE PLACED AS CLOSE AS POSSIBLE TO THE CRYSTAL INPUT PINS OF THE ETHERNET CONTROLLER USED. KEEP TRACES SHORT AS POSSIBLE.
DE-COUPLE CAPS OF RTL8100 MUST BE PLACED AS CLOSE TO CHIP AS POSSIBLE.
L_RTL8100BL
U25 L_ATL-93C46-128x8-0.5us-SOIC8
L_USBLAN
U37 L_10:100
RN25 L_8P4R-75
NEAR PHY
INTF#
IDSEL = AD29
MASTER = PREQ3
LAN_EN | LAN SELECT
1-2 | ENABLED
2-3 | DISABLED
Micro Star Restricted Secret
Title: Real Tek 8100BL PCI LAN & Conn.
Document Number: MS-6555
Rev: 3.0
MICRO-STAR INT'L CO.,LTD.
No. 69, Li-De St, Jung-He City, Taipei Hsien, Taiwan
http://www.msi.com.tw
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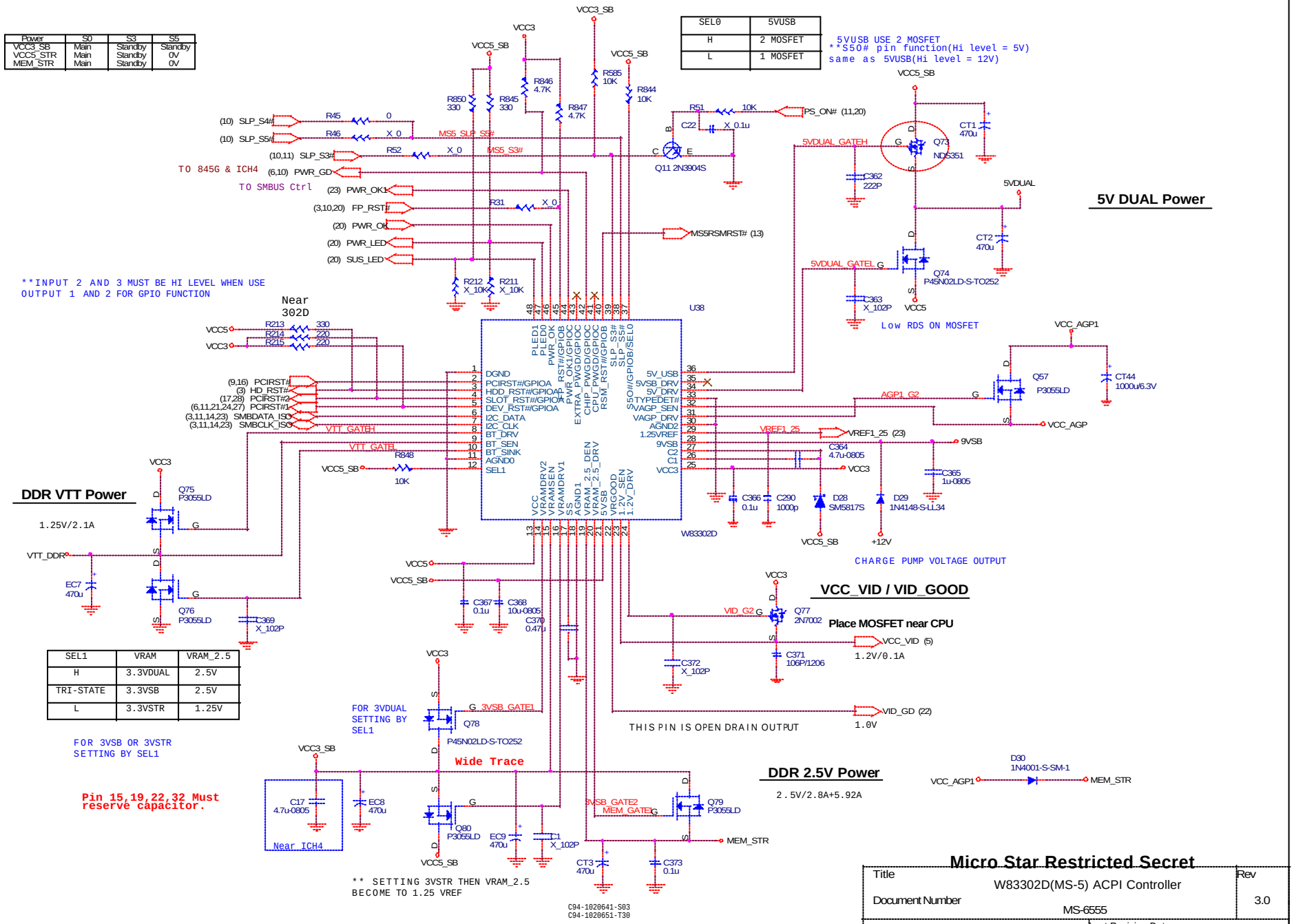
Power | S0 | S3 | S5
VCC3_SB | Main | Standby | Standby
VCC5_STR | Main | Standby | 0V
MEM_STR | Main | Standby | 0V
SEL0 | 5VUSB
H | 2 MOSFET
L | 1 MOSFET
5VUSB USE 2 MOSFET
**S50# pin function(Hi level = 5V)
same as 5VUSB(Hi level = 12V)
TO 845G & ICH4
TO SMBUS Ctrl
**INPUT 2 AND 3 MUST BE HI LEVEL WHEN USE
OUTPUT 1 AND 2 FOR GPIO FUNCTION
Near 302D
5V DUAL Power
Low RDS ON MOSFET
DDR VTT Power
1.25V/2.1A
CHARGE PUMP VOLTAGE OUTPUT
VCC_VID / VID_GOOD
Place MOSFET near CPU
1.2V/0.1A
THIS PIN IS OPEN DRAIN OUTPUT
1.0V
DDR 2.5V Power
2.5V/2.8A+5.92A
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
FOR 3VDUAL
SETTING BY
SEL1
Wide Trace
Pin 15,19,22,32 Must
reserve capacitor.
Near ICH4
** SETTING 3VSTR THEN VRAM_2.5
BECOME TO 1.25 VREF
C94-1020641-S03
C94-1020651-T30
W83302D
U38
Micro Star Restricted Secret
Title
W83302D(MS-5) ACPI Controller
Rev
3.0
Document Number
MS-6555
MICRO-STAR INT'L CO.,LTD.
No. 69, Li-De St, Jung-He City,
Taipei Hsien, Taiwan
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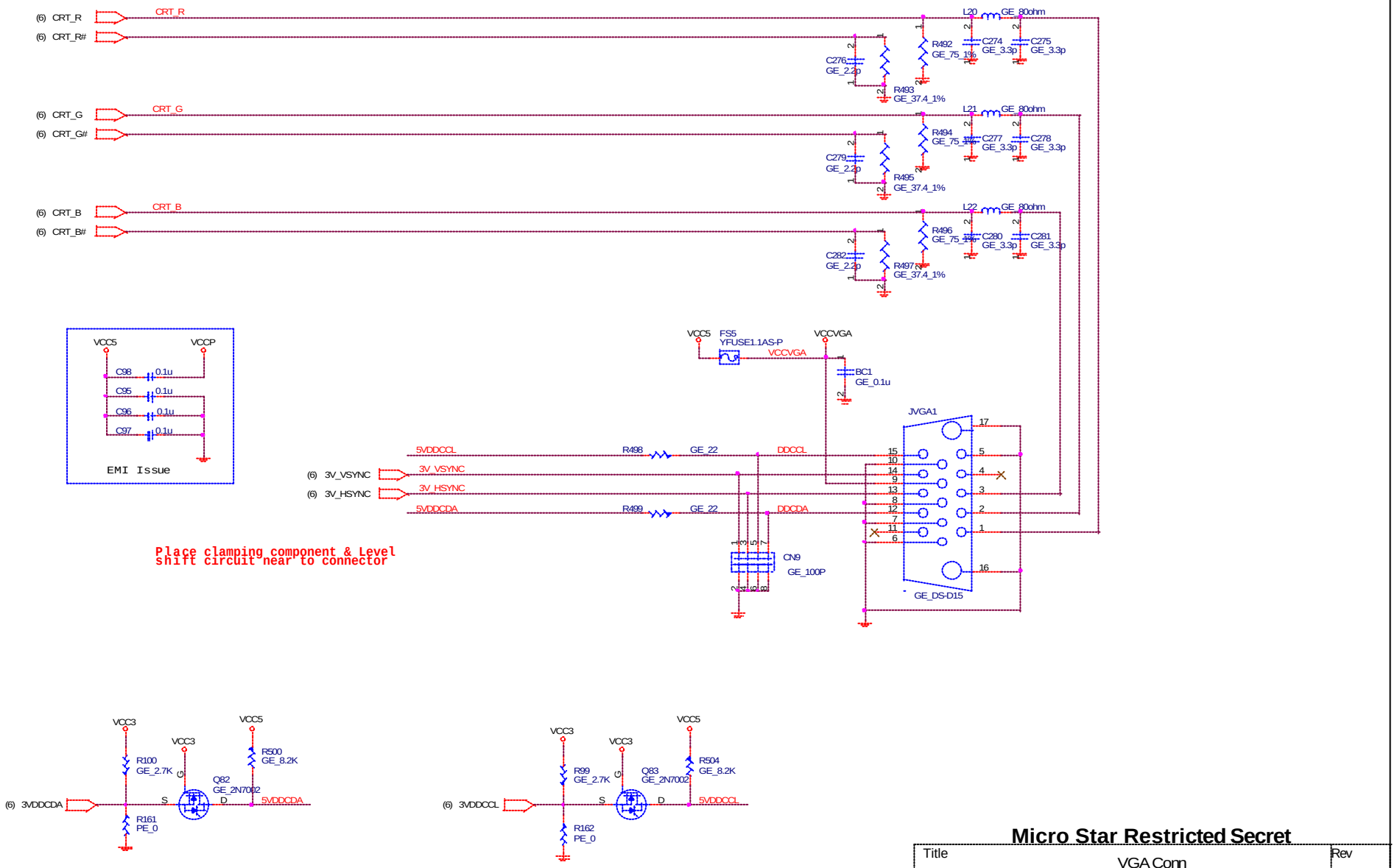
Video Connector



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Title: VGA Conn		Rev: 3.0
Document Number: MS-6555		
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: Monday, August 19, 2002	
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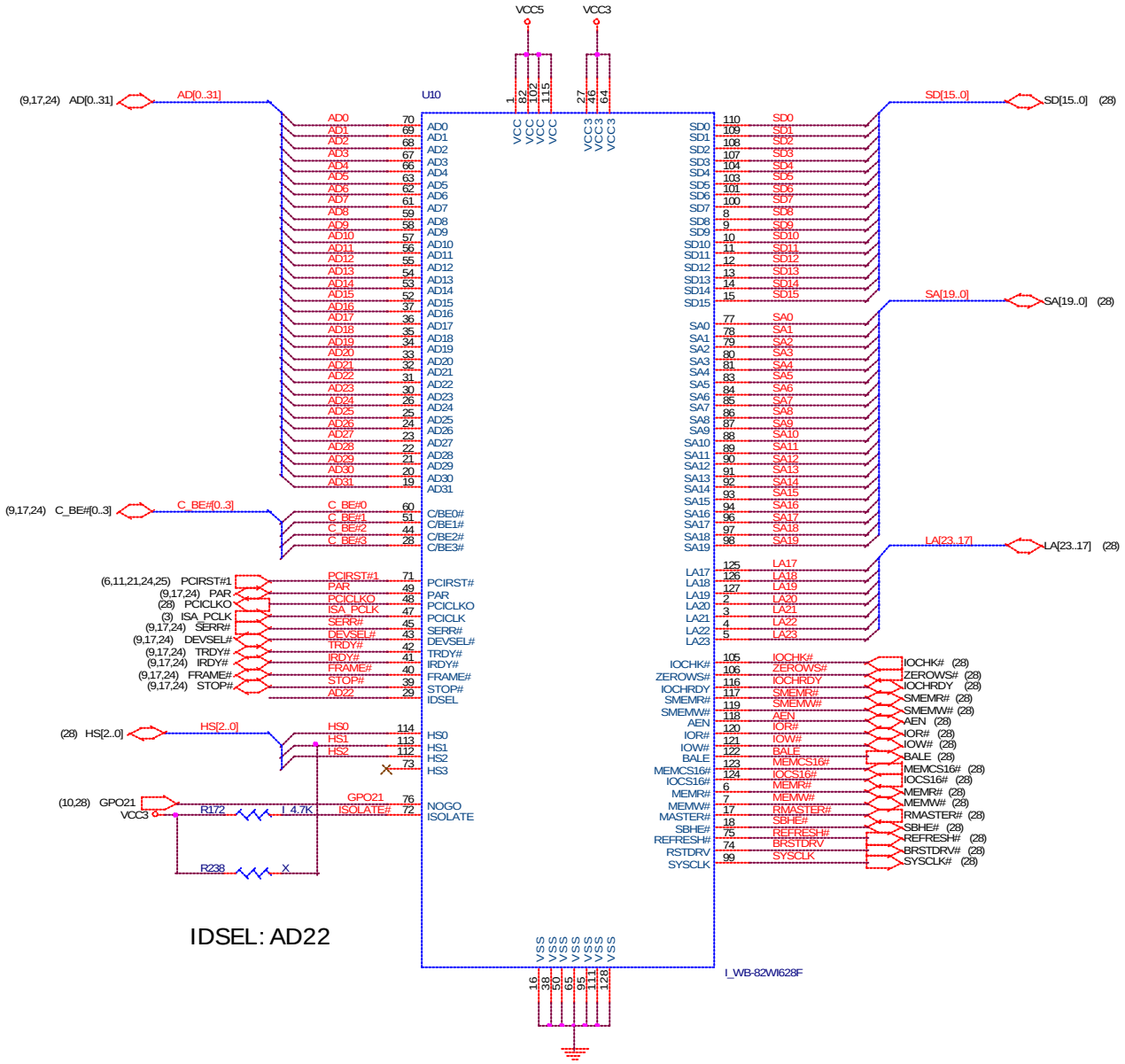
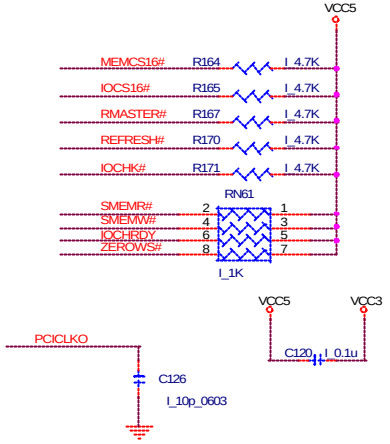
PCI To ISA Bridge, Part 1



IDSEL: AD22

PCI to ISA Bridge Pull Up / Low



Micro Star Restricted Secret

Title	VGA Conn	Rev 3.0
Document Number	MS-6555	
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: Monday, August 19, 2002	
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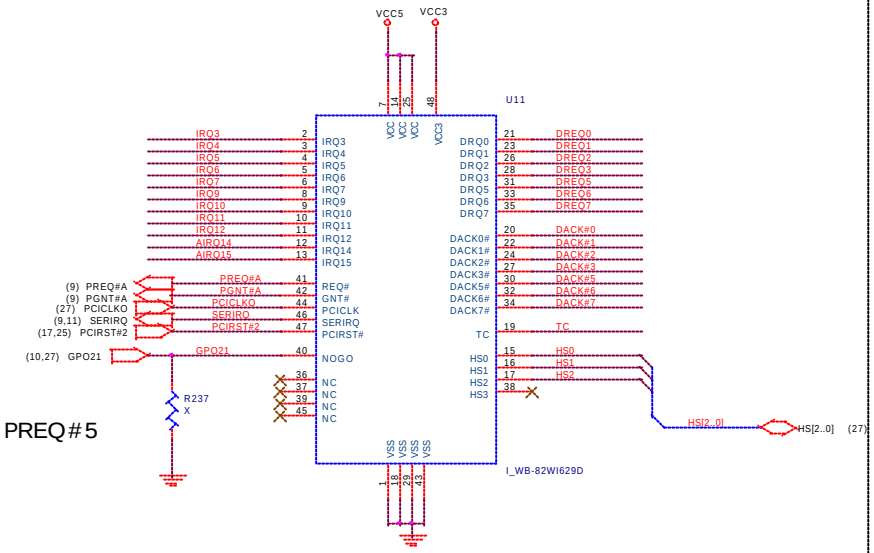
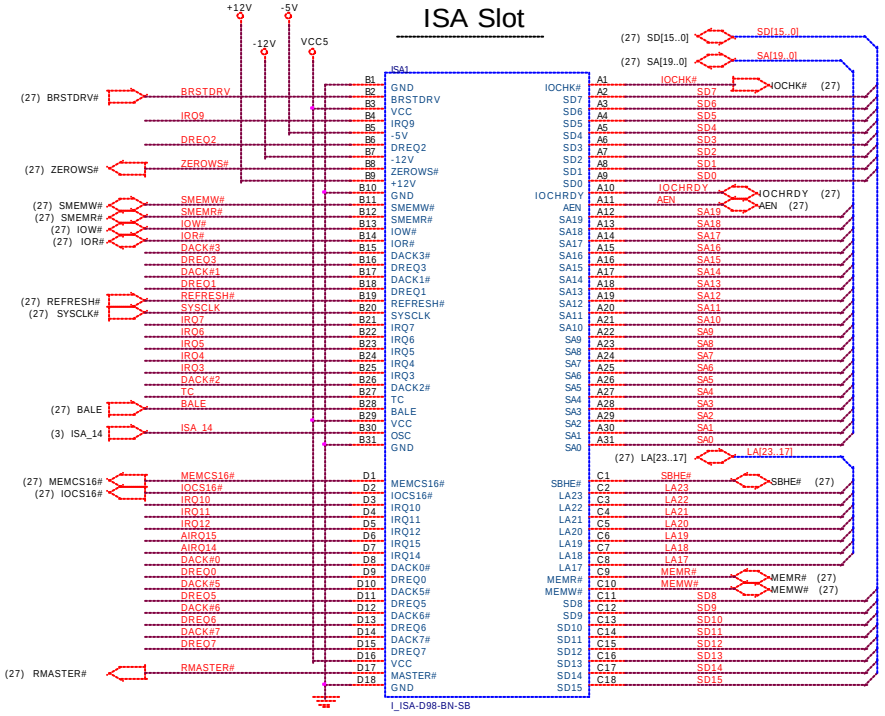
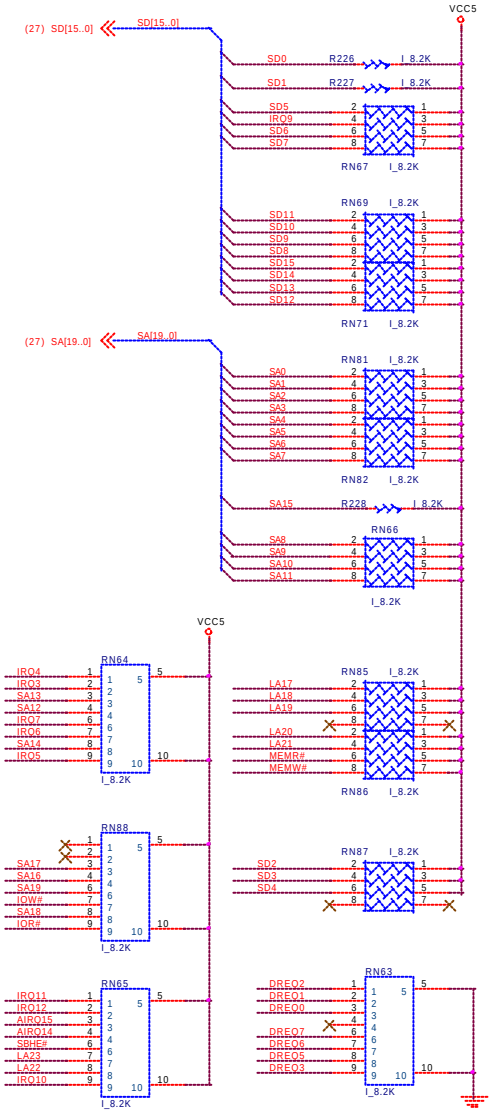
PCI To ISA Bridge, Part 2



ISA Slot

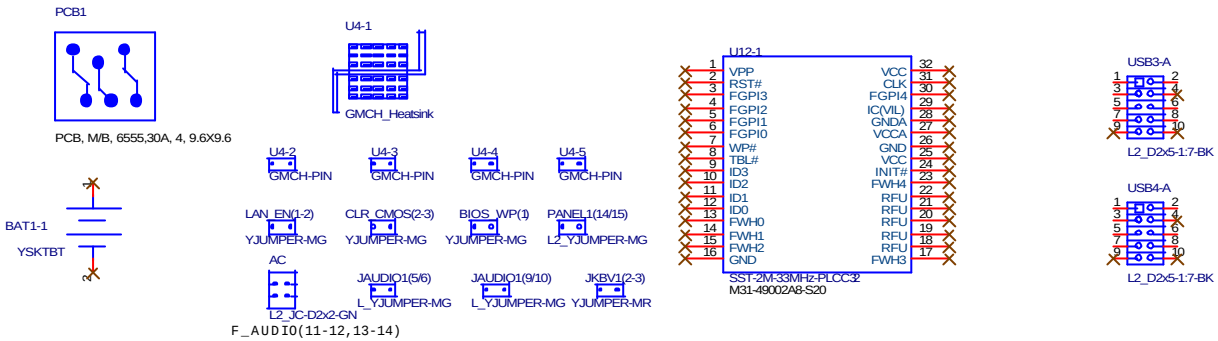


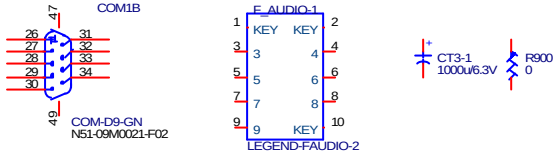
PCI to ISA Bridge Pull Up / Low

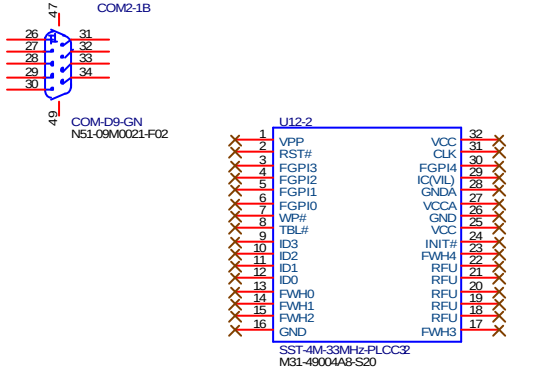


Micro Star Restricted Secret

Title	VGA Conn	Rev 3.0
Document Number	MS-6555	
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: Monday, August 19, 2002	Sheet 28 of 31







I845G: B01-0845G15-I06
I845GL: B01-845GL05-I06
I845GE: B01-845GE05-I06
I845PE: B01-845PE05-I06

Pin Header Key Protect
JFP1 Pin 10
PANEL1 Pin 2,9,11
F_AUDIO Pin 8,16
JAUDIO1 Pin 8
USB3 Pin 4
USB4 Pin 4
USB1 Pin 9
USB2 Pin 9
IR1 Pin 2
COM2 Pin 10

Title: Manual Parts		Rev: 2.0
Document Number: MS-6555		
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: Monday, August 19, 2002	
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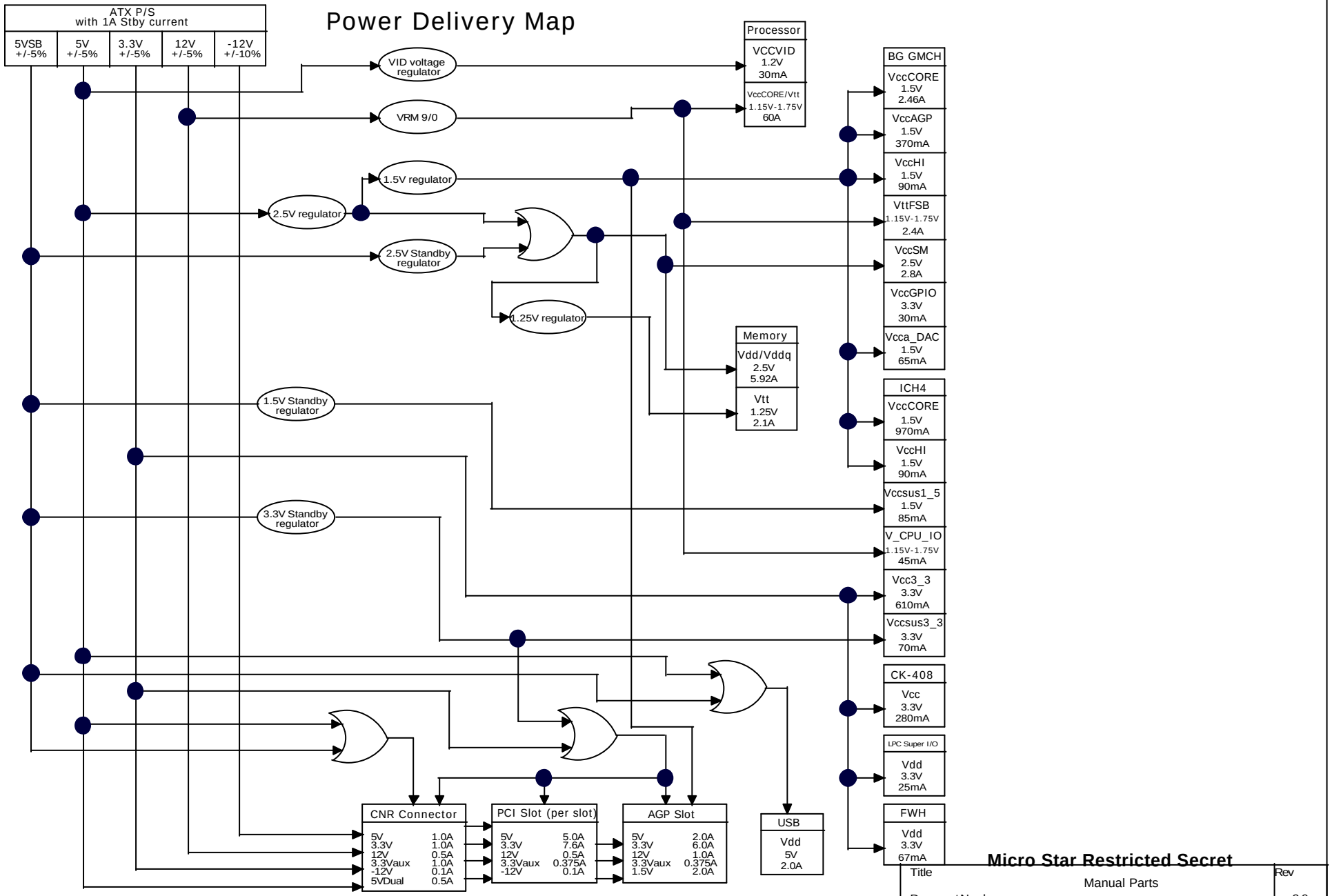
Power Delivery Map



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Title	Manual Parts	Rev
Document Number	MS-6555	2.0
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: Monday, August 19, 2002	
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General SPEC

ICH4

GPIO Pin	Type	Function
GPIO 0	I	REQ#A (multifunction pin)
GPIO 1	I	REQ#B (multifunction pin)
GPIO 2	I	Pull up through 8.2K ohms (PIRQE#)
GPIO 3	I	Pull up through 8.2K ohms (PIRQF#)
GPIO 4	I	Pull up through 8.2K ohms (PIRQG#)
GPIO 5	I	Pull up through 8.2K ohms (PIRQH#)
GPIO 6	I	Pull down through 10K ohms (unused)
GPIO 7	I	Pull down through 10K ohms (unused)
GPIO 8	I	Pull Up to 3.3VSBY through 4.7K ohms (SIO_PME)
GPIO 9	I	Not Implemented
GPIO 10	I	Not Implemented
GPIO 11	I	SMB_ALERT (multifuntion pin)
GPIO 12	I	EXTSMI# with Pull up 10K ohms to VCC3_SB
GPIO 13	I	Pull down through 10K ohms (unused)
GPIO 14~15	I	Not Implemented
GPIO 16	O	GNT#A (multifunction pin)
GPIO 17	O	GNT#B (multifuntion pin)
GPIO 18*	O	No Connected
GPIO 19	O	No Connected
GPIO 20	O	No Connected
GPIO 21	O	No Connected
GPIO 22	OD	No Connected
GPIO 23	O	Pull Up to 3.3V through 8.2K ohms (BIOS protect)
GPIO 24	I/O	No Connected
GPIO 25	I/O	No Connected
GPIO 26	I/O	Not Implemented
GPIO 27	I/O	No Connected
GPIO 28	I/O	No Connected
GPIO 29~31	O	Not Implemented
GPIO 32	I/O	No Connected
GPIO 33	I/O	No Connected
GPIO 34	I/O	Primary IDE ATA66/100 detection (PD_DET)
GPIO 35	I/O	Secondary IDE ATA66/100 detection (SD_DET)
GPIO 36	I/O	No Connected
GPIO 37	I/O	No Connected
GPIO 38	I/O	No Connected
GPIO 39	I/O	No Connected
GPIO 40	I/O	No Connected
GPIO 41	I/O	No Connected
GPIO 42	I/O	No Connected
GPIO 43	I/O	No Connected
GPIO 44~47	I/O	Not Implemented

** GPIO18 will toggle at 1Hz frequency.*

FWH

GPIO Pin	Type	Function
GPI 0	I	Pull down through 8.2K ohms (unused)
GPI 1	I	Pull down through 8.2K ohms (unused)
GPI 2	I	P1 customer defined
GPI 3	I	P1 customer defined
GPI 4	I	Pull down through 8.2K ohms (unused)

PCI Config.

DEVICE	ICH INT Pin	IDSEL	CLOCK	CLK GEN PIN OUT
PCI Slot 1	INTA# INTB# INTC# INTD#	AD16	PCICLK0	10 (PCI3/FS4)
PCI Slot 2	INTB# INTC# INTD# INTA#	AD17	PCICLK1	11 (PCI4)
PCI Slot 3	INTC# INTD# INTA# INTB#	AD18	PCICLK2	12 (PCI5)
PCI LAN	INTG# INTF#	AD29	LAN_PCLK	17 (PCI9)

**ICH4 reserved PCI address line AD22 for the PCI-to-ISA Bridge's IDSEL input.*

DIMM Config.

DEVICE	ADDRESS	CLOCK
DIMM 1	1010000B	DCLK0/DCLK 0# DCLK1/DCLK 1# DCLK2/DCLK 2#
DIMM 2	1010001B	DCLK3/DCLK 3# DCLK4/DCLK 4# DCLK5/DCLK 5#