

Last Schematic Update Date:
10/03/2001

MS-6547

VERSION: 0B

SIS 645/650 CHIPSET

Willamette/Northwood 478pin mPGA-B Processor Schematics

CPU:

Willamette/Northwood mPGA-478B Processor

System Brookdale Chipset:

**SIS 645/650 (North Bridge)
+961A (South Bridge)**

On Board Chipset:

LPC Super I/O -- W83697HF

Expansion Slots:

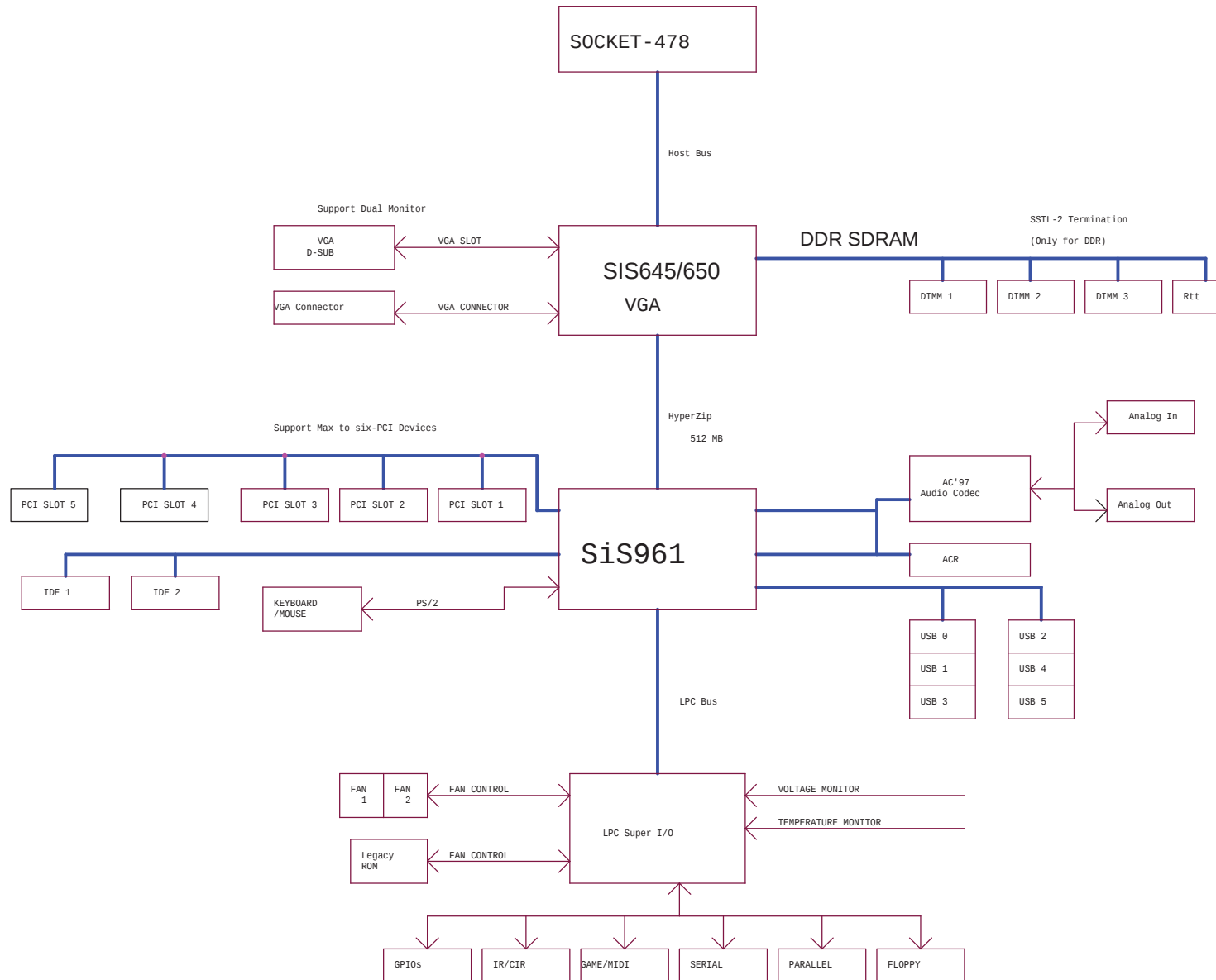
AGP2.0 SLOT * 1

PCI2.2 SLOT* 5

CNR SLOT * 1

Cover Sheet	1
Block Diagram	2
MAIN CLOCK GEN	3
DDR CLOCK BUFFER	4
mPGA478-B INTEL CPU Sockets	5 - 6
SIS 645/650 NORTH BRIDGE	7- 10
DDR SLOT	11-12
DDR TERMINATOR	13
SIS 961A SOUTH BRIDGE	14-17
AGP SLOT	18
PCI SLOTS	19-21
IDE CONNECTOR	22
USB CONNECTOR	23
KB/MS CONNECTOR	24
AC'97 CODEC	25
AUDIO CONNECTOR	26
CNR CONNECTOR	27
LPC I/O(W83697HF)	28
HARDWARE MONITOR	29
PARALLEL PORT	30
SERIAL PORT	31
FLASH MEMORY	32
VRM 9.X	33
VOLTAGE REGULATOR	34-35
ATX POWER CON & VGA CON	36
FRONT PANEL	37
Decoupling Capacitor	38
MS-3 (D-LED)	39

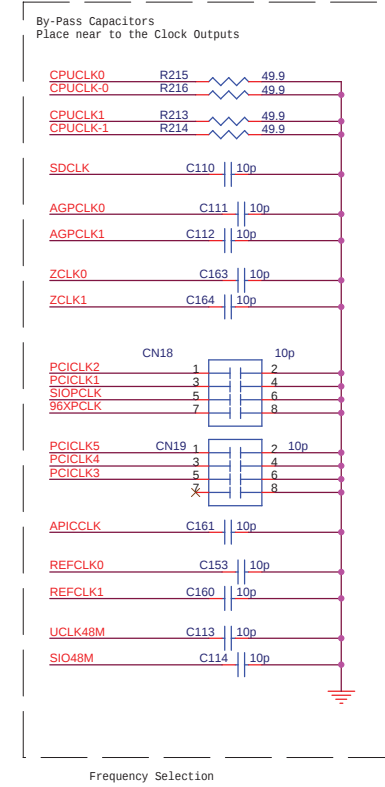
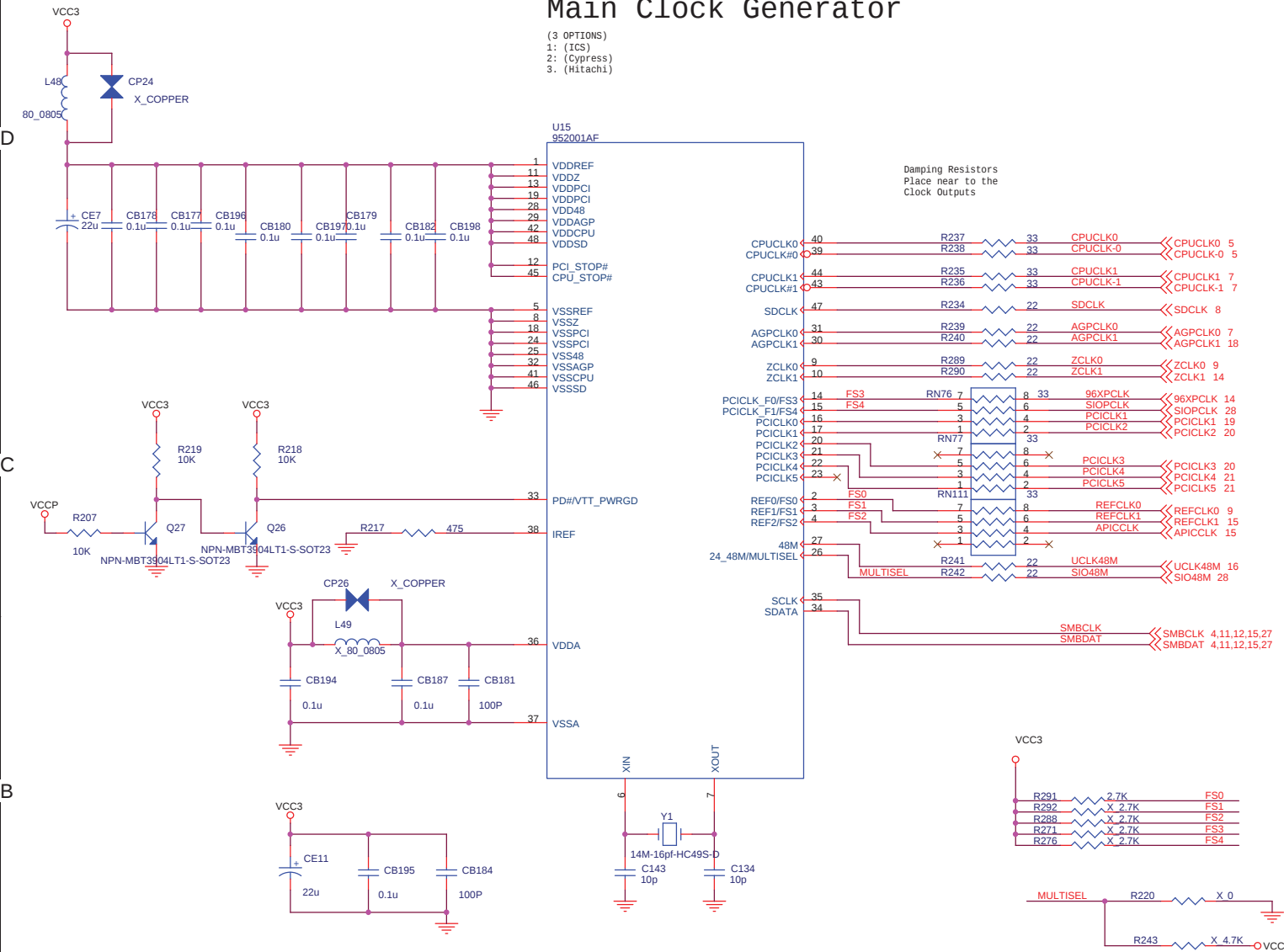
System Block Diagram



MICRO-STAR INT'L CO.,LTD.		
Title System Block Diagram		
Size B	Document Number MS-6547	Rev 1.0A
Date: 星期一, 十一月 13, 2001	Sheet 2 of 39	

Main Clock Generator

(3 OPTIONS)
1: (ICS)
2: (Cypress)
3: (Hitachi)

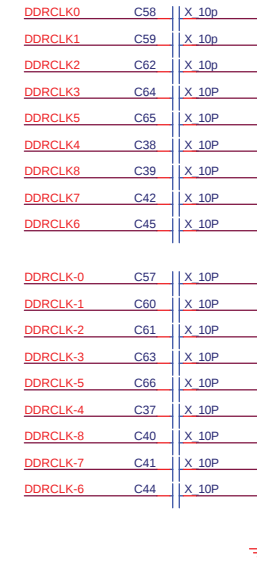
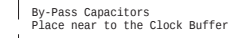
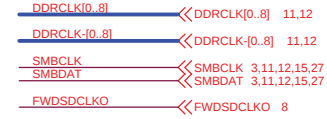


SIS650 CLOCK									
FS4	FS3	FS2	FS1	FS0	CPU (MHz)	SDRAM (MHz)	ZCLK (MHz)	AGPCLK (MHz)	PCI (MHz)
0	0	0	0	0					
0	0	0	1	0					
0	0	0	1	0					
0	0	1	0	0					
0	0	1	0	1					
0	0	1	1	0					
0	0	1	1	1					
0	1	0	0	0					
0	1	0	1	0					
0	1	0	1	1					
0	1	1	0	0					
0	1	1	0	1					
0	1	1	1	0					
0	1	1	1	1					

SIS650 CLOCK									
FS4	FS3	FS2	FS1	FS0	CPU (MHz)	SDRAM (MHz)	ZCLK (MHz)	AGPCLK (MHz)	PCI (MHz)
1	0	0	0	0					
1	0	0	1	0					
1	0	0	1	0					
1	0	1	0	0					
1	0	1	0	1					
1	0	1	1	0					
1	0	1	1	1					
1	1	0	0	0					
1	1	0	1	0					
1	1	0	1	1					
1	1	1	0	0					
1	1	1	0	1					
1	1	1	1	0					
1	1	1	1	1					

MICRO-STAR INT'L CO.,LTD.		
Title		
MAIN CLOCK GEN		
Size	Document Number	Rev
B	MS-6547	1.0A
Date:	星期二, 十一月 13, 2001	Sheet 3 of 39

(OPTIONS)
1: (ICS-93705)



CPU SIGNAL BLOCK

Trace : 10 mil width
10mil space

Differential Host Data Strobes

* Short trace

PGA-S478-F02

CPU GTL REFERENCE VOLTAGE BLOCK

Length < 1.5inch.

Length < 1.5inch.

Every pin put one 220pF cap near it.

Trace Width 15mils, Space 15mils.

Keep the voltage dividers within 1.5 inches of the first GTLREF Pin

CPU ITP BLOCK

ITP_TMS R28 39

ITP_TDO R29 75

ITP_TCK R31 27

VCCP

Ground

CPU STRAPPING RESISTORS

ALL COMPONENTS CLOSE TO CPU

PROCHOT# R14 62

CPU_GD R64 300

HBR#0 R48 49.9

CPURST# R65 49.9

THERMTRIP# R50 62

BPM#0 R22 49.9

BPM#1 R23 49.9

BPM#4 R25 49.9

BPM#5 R24 49.9

ITP_TDI R49 150

ITP_TRST# R30 680

CPU_GD C33 X 1000p

CPURST# C34 X 1000p

CPUSLP# C3 X 0.022u

VCCP

VCCP

VCCP

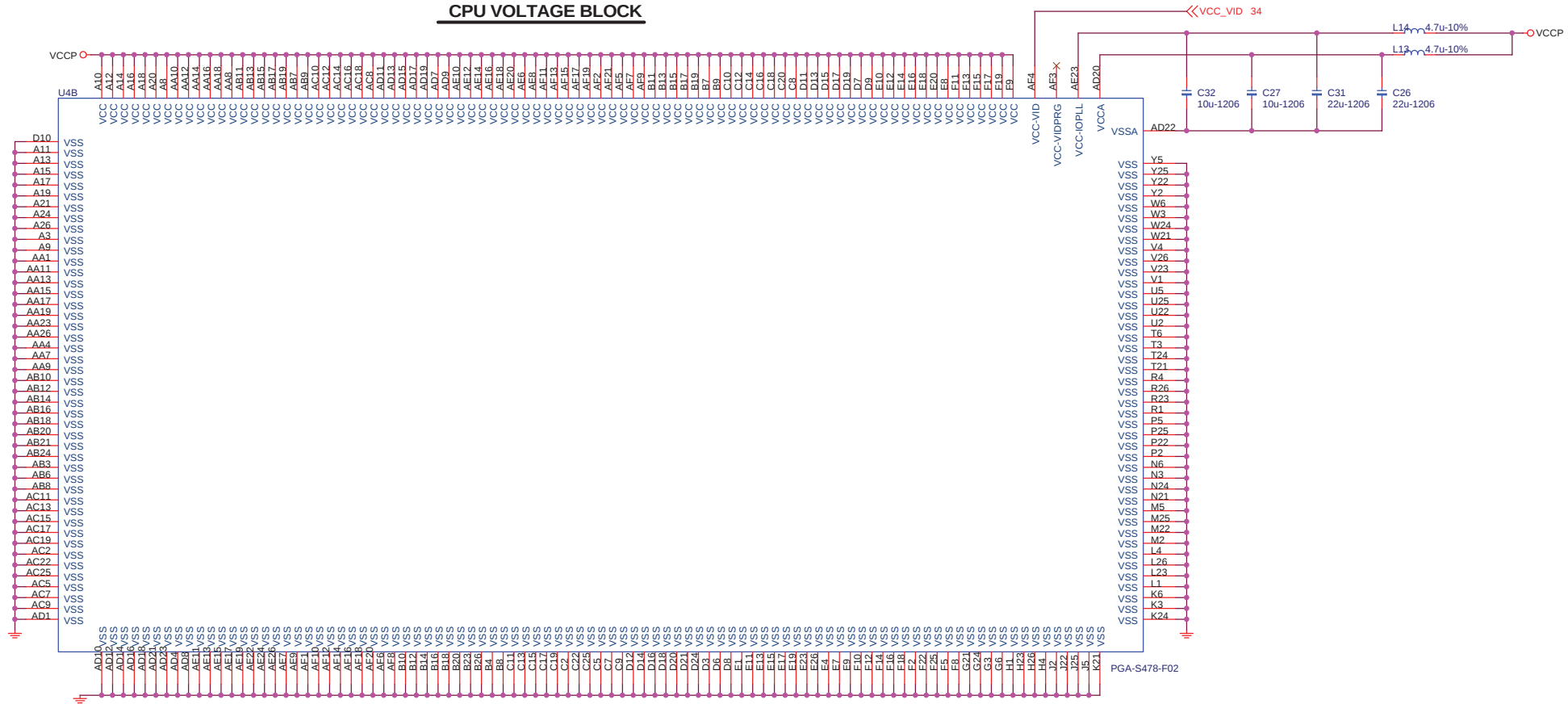
Ground

Ground

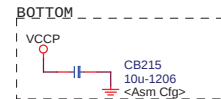
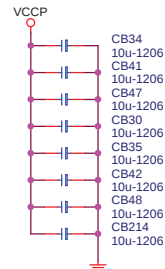
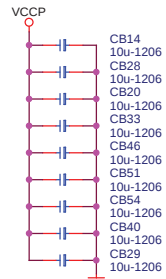
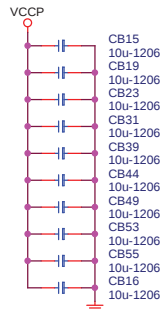
Ground

MICRO-STAR INT'L CO.,LTD.			
Title mPGA478 CPU-1			
Size	Document Number MS-6547		Rev 1.0A
Custom			
Date:	星期二, 十一月 13, 2001	Sheet	5 of 39

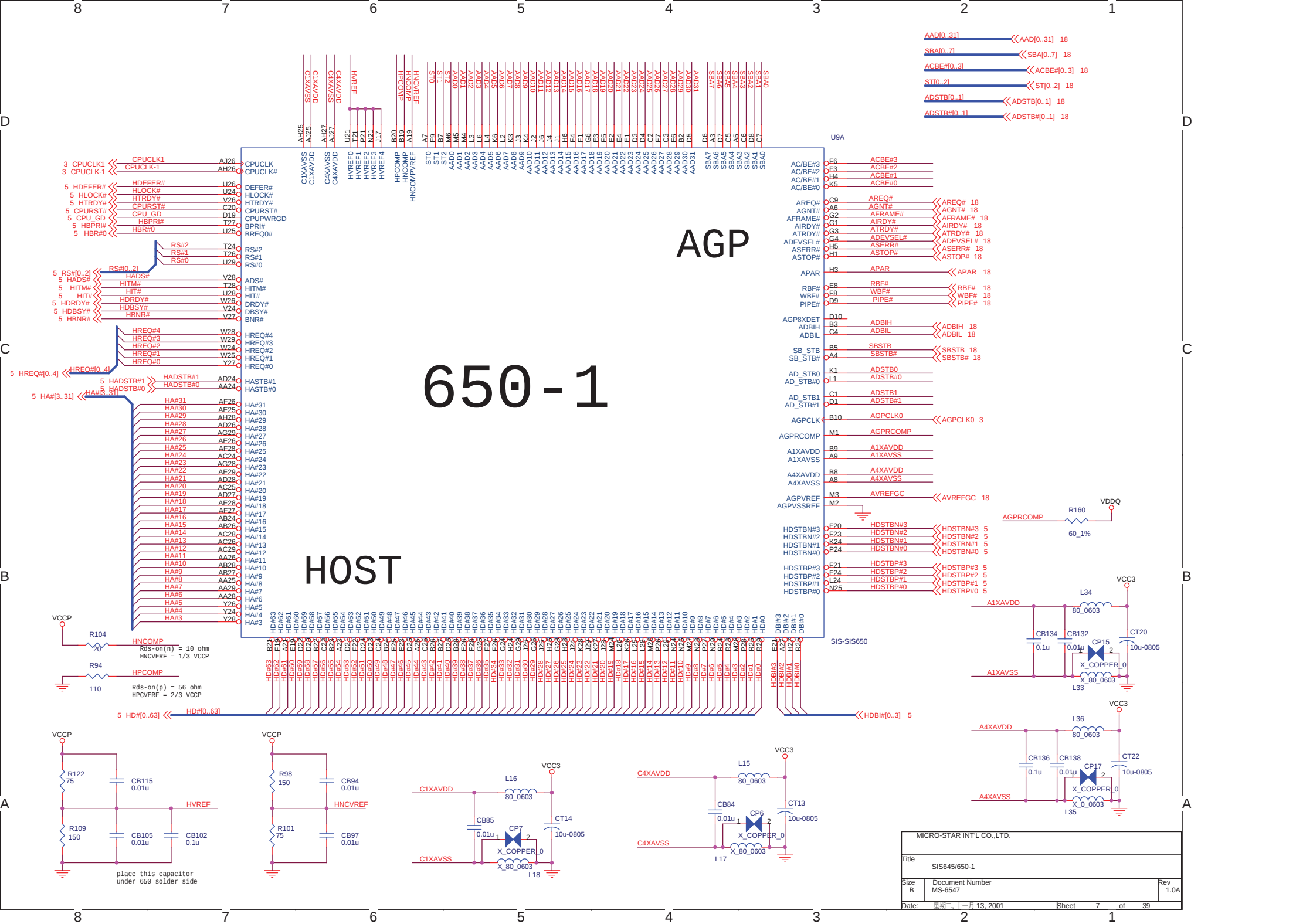
CPU VOLTAGE BLOCK

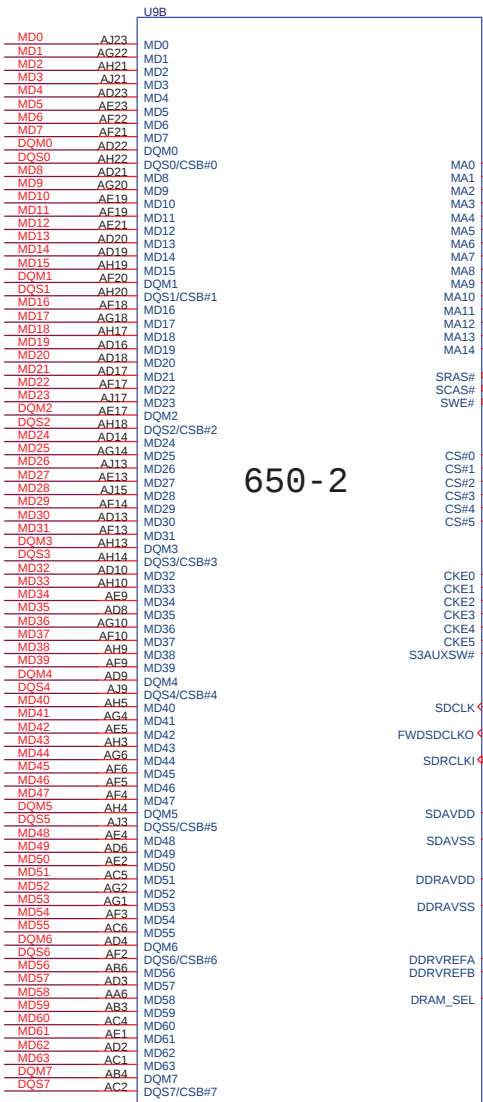
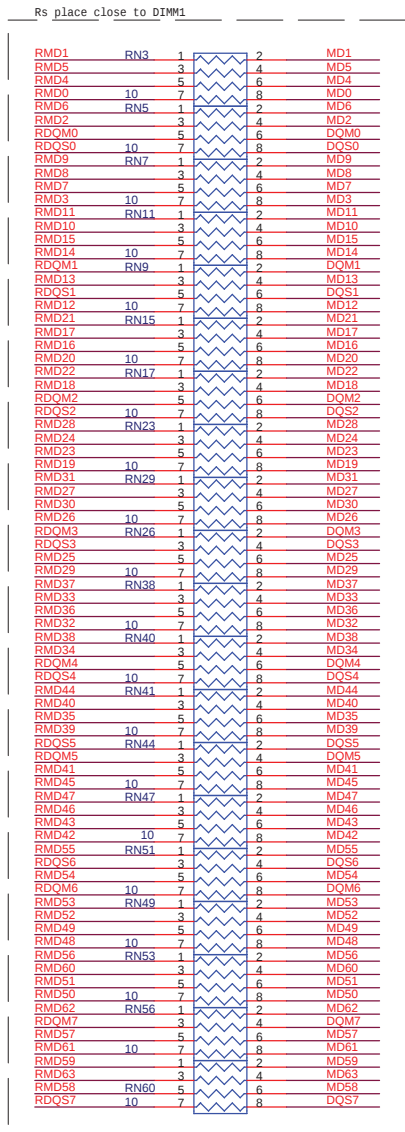


CPU DECOUPLING CAPACITORS

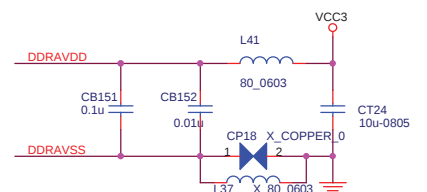
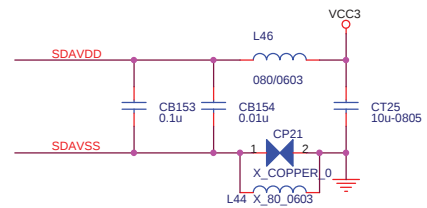
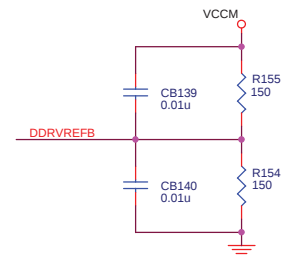
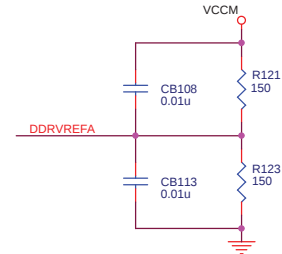
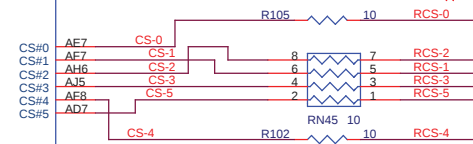
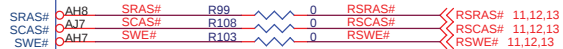
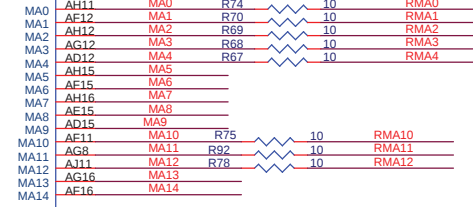
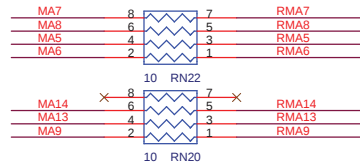


PLACE CAPS WITHIN CPU CAVITY





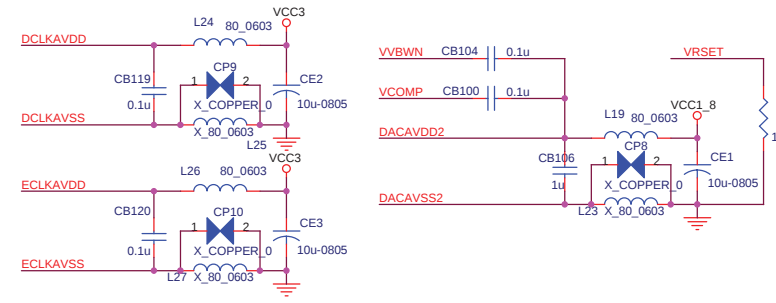
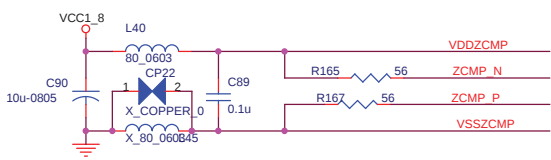
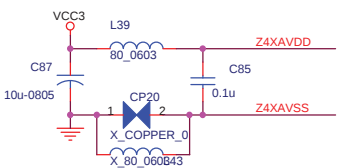
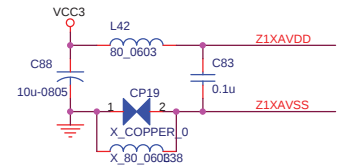
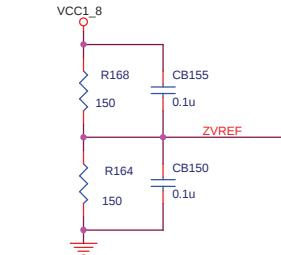
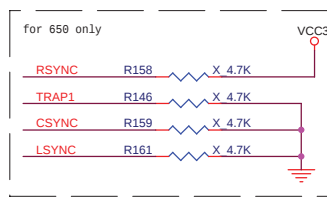
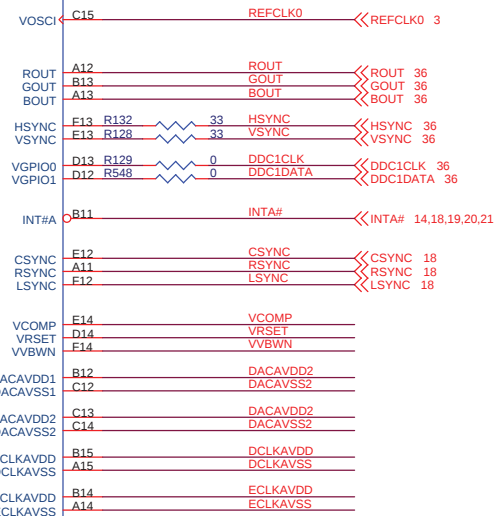
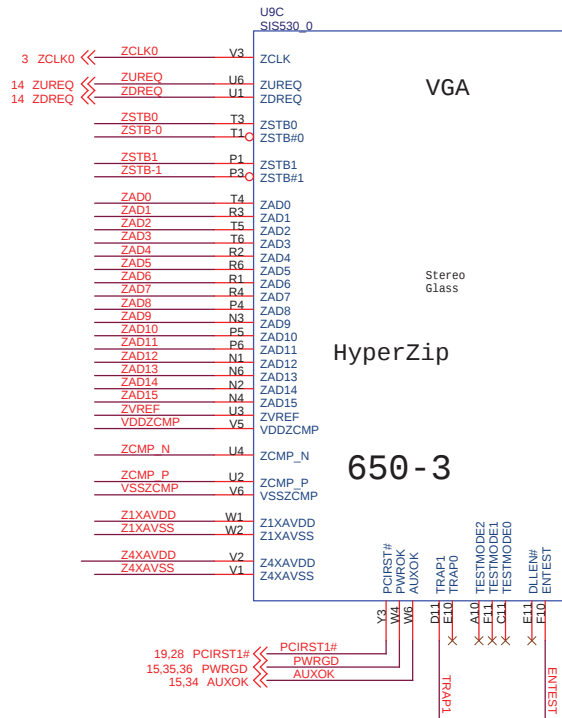
SIS530_0

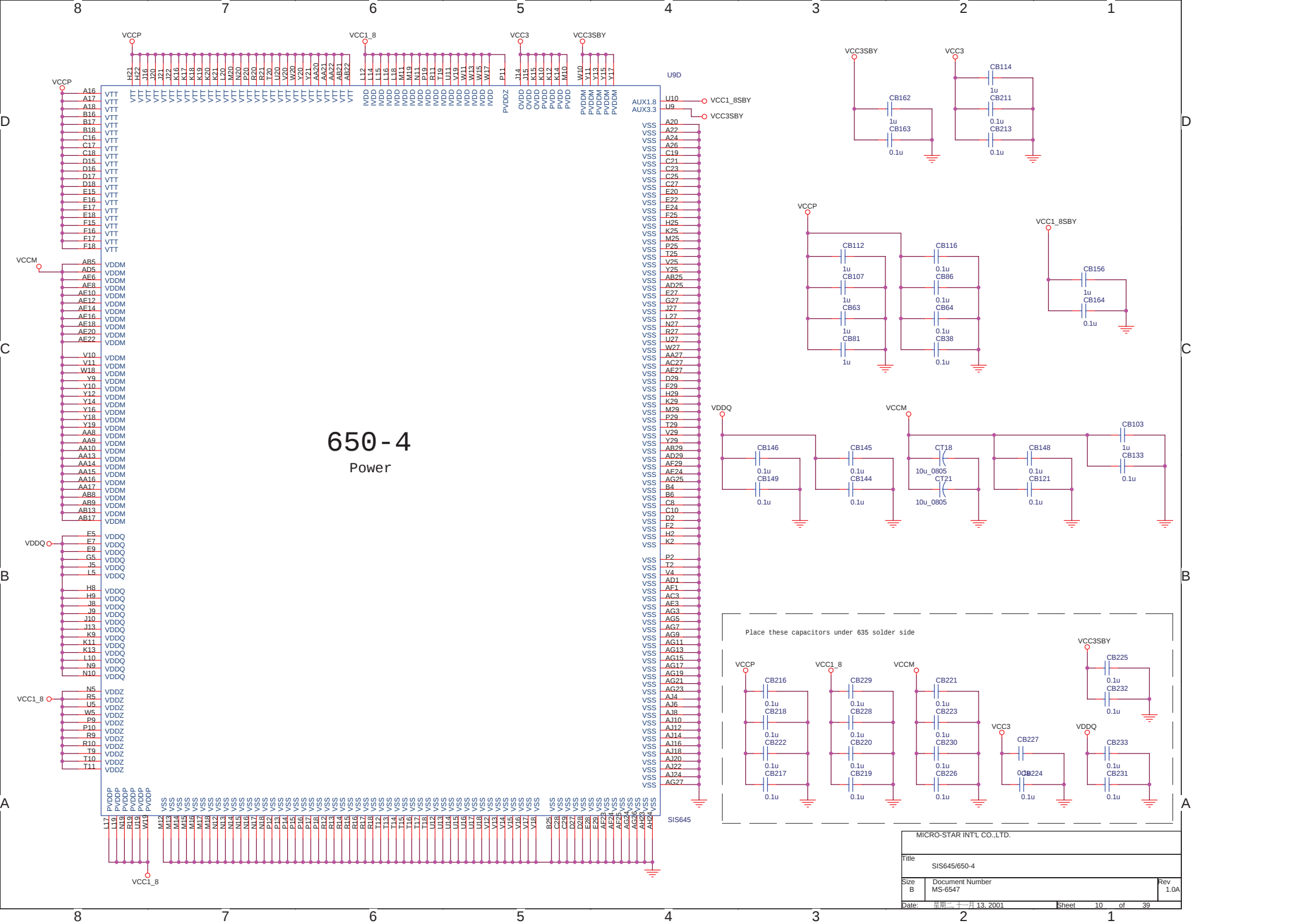


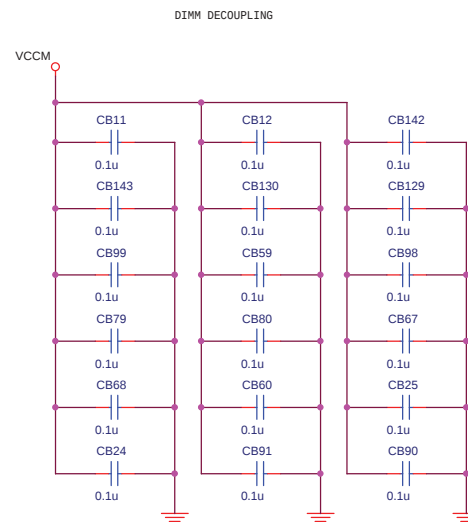
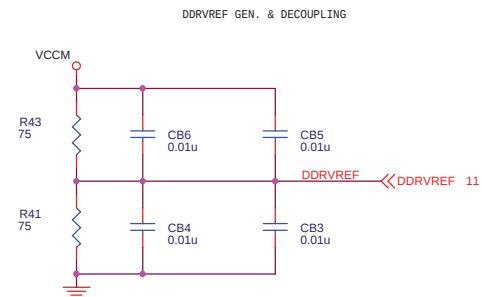
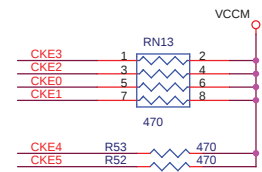
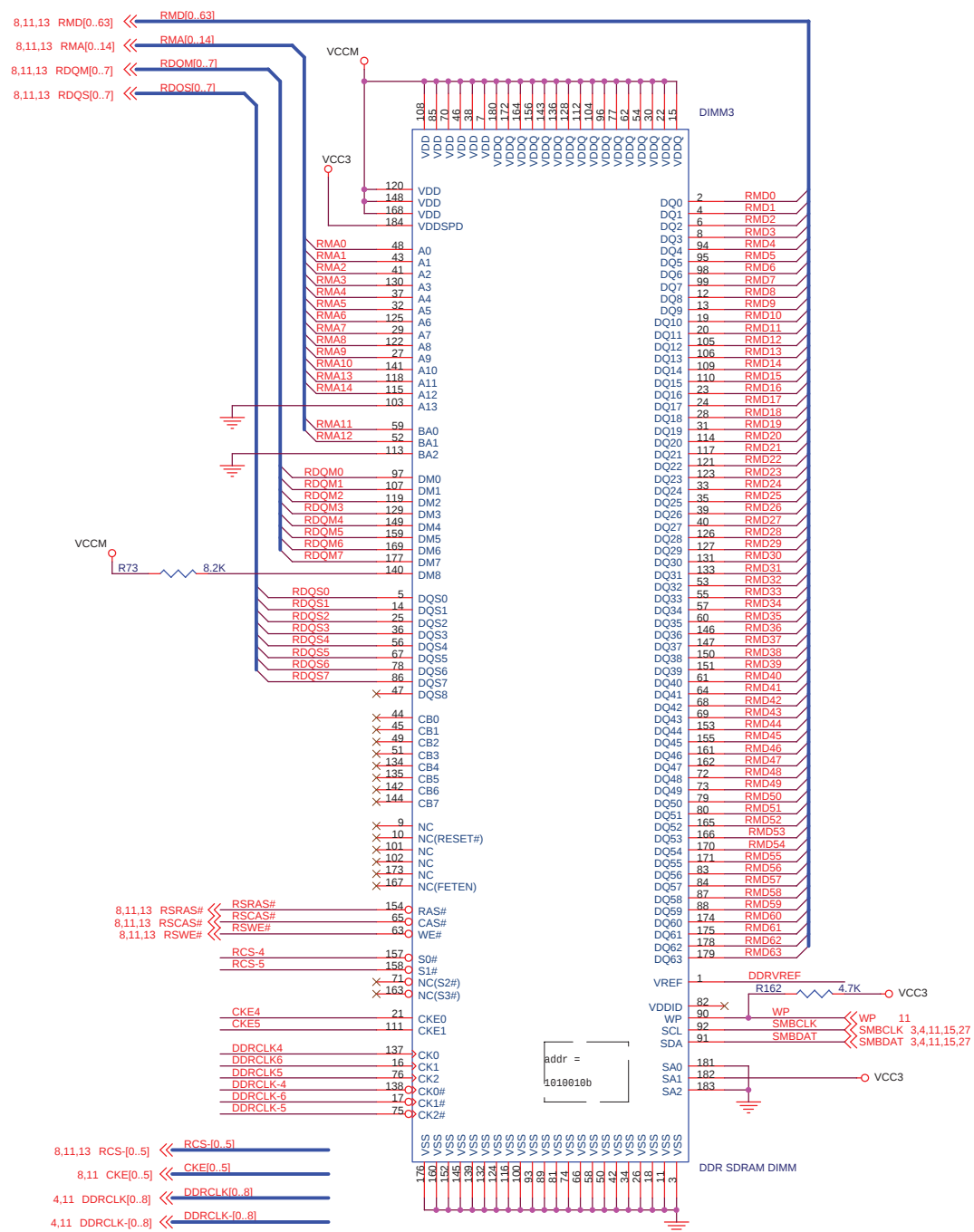
NOTE: This page is for universal PCB design(suitable for both 645 or 650)

NB Hardware Trap Table

	0	1	Default	embedded pull-low (30-50K Ohm)
DLEN#	enable PLL	disable PLL	0	yes
DRAM_SEL	SDR	DDR	1(DDR)	yes
TRAP0	normal	NB debug mode	0	yes
TRAP1	TV selection, NTSC/PAL(0/1)			0
CSYNC	enable VB		0	
RSYNC	enable VGA interface		1	
LSYNC	enable panel link		0	





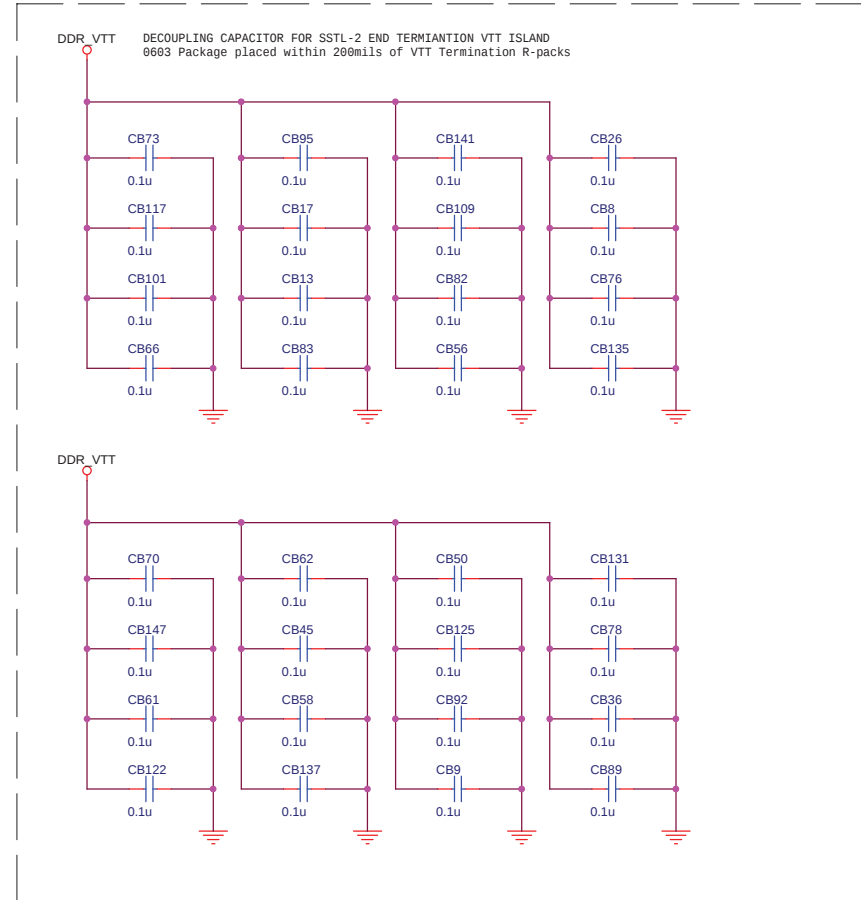
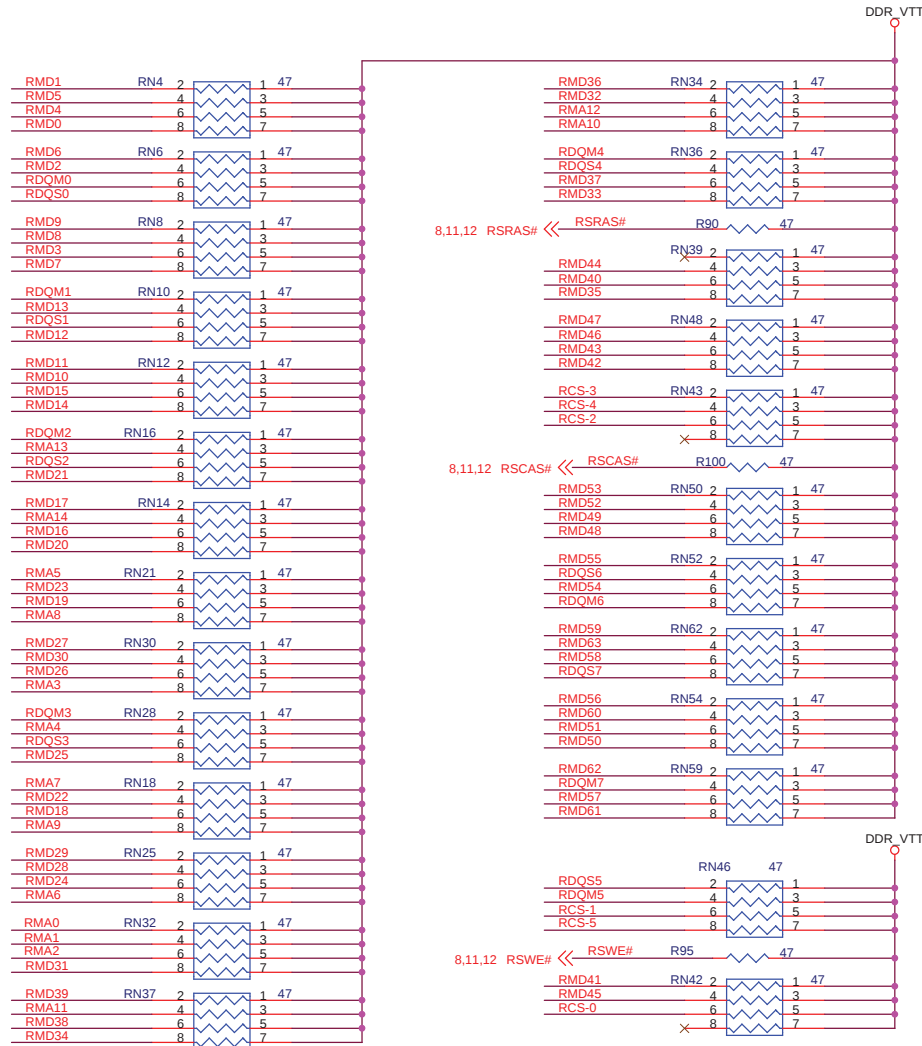


MICRO-STAR INT'L CO.,LTD.			
Title DDR3			
Size B	Document Number MS-6547		Rev 1.0A
Date:	星期二, 十一月 13, 2001	Sheet	12 of 39

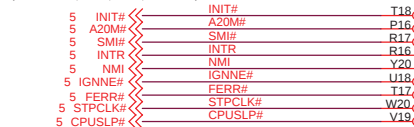
SSTL-2 Termination Resistors

RMD[0..63]	<<RMD[0..63]	8,11,12
RDOM[0..7]	<<RDOM[0..7]	8,11,12
RDO5[0..7]	<<RDO5[0..7]	8,11,12
RMA[0..14]	<<RMA[0..14]	8,11,12
RCS[0..5]	<<RCS[0..5]	8,11,12

	SDR		DDR		
MD/DQM(/DQS)	LV-CMOS	RS	SSTL-2	RS	RTT
MA/Control	LV-CMOS	10/10/-	SSTL-2	10	47
CS	LV-CMOS	10	SSTL-2	10	47
CKE	DD 3.3V		DD 2.5V		



Programable on-die pull-high strength for CPU_S:
(Infinite, 150, 110, 56 Ohm)



CPU_S

APIC

LPC

RTC

961A-2

GPIO

AC97

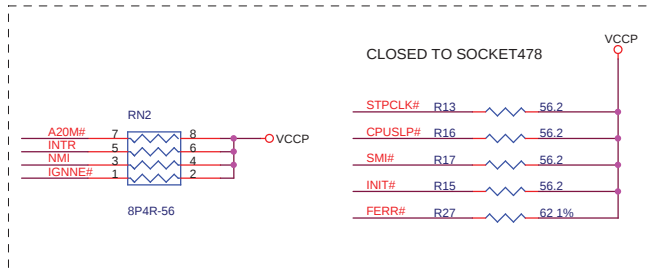
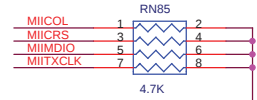
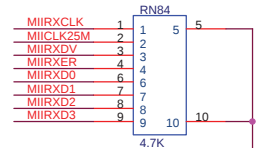
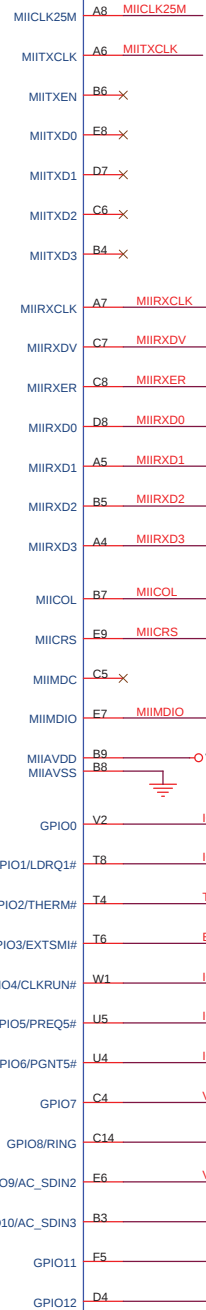
ACPI
/others

KBC
/geyserville

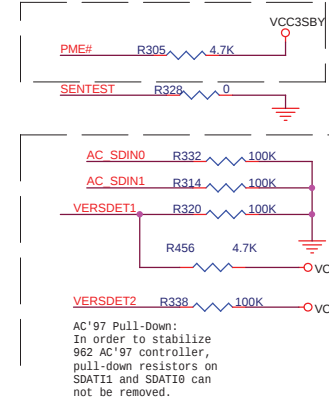
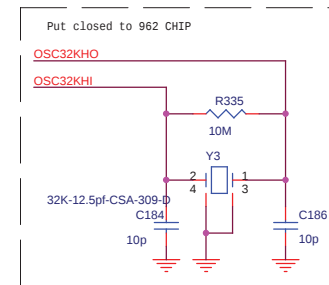
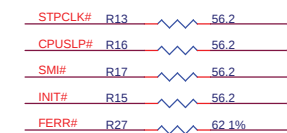
SIS-SIS961

MII

GPIO



CLOSED TO SOCKET478

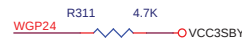


AC'97 Pull-Down:
In order to stabilize
962 AC'97 controller,
pull-down resistors on
SDAT11 and SDAT10 can
not be removed.

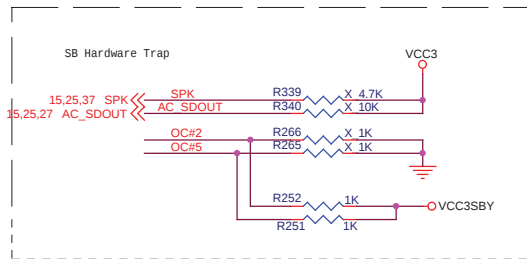
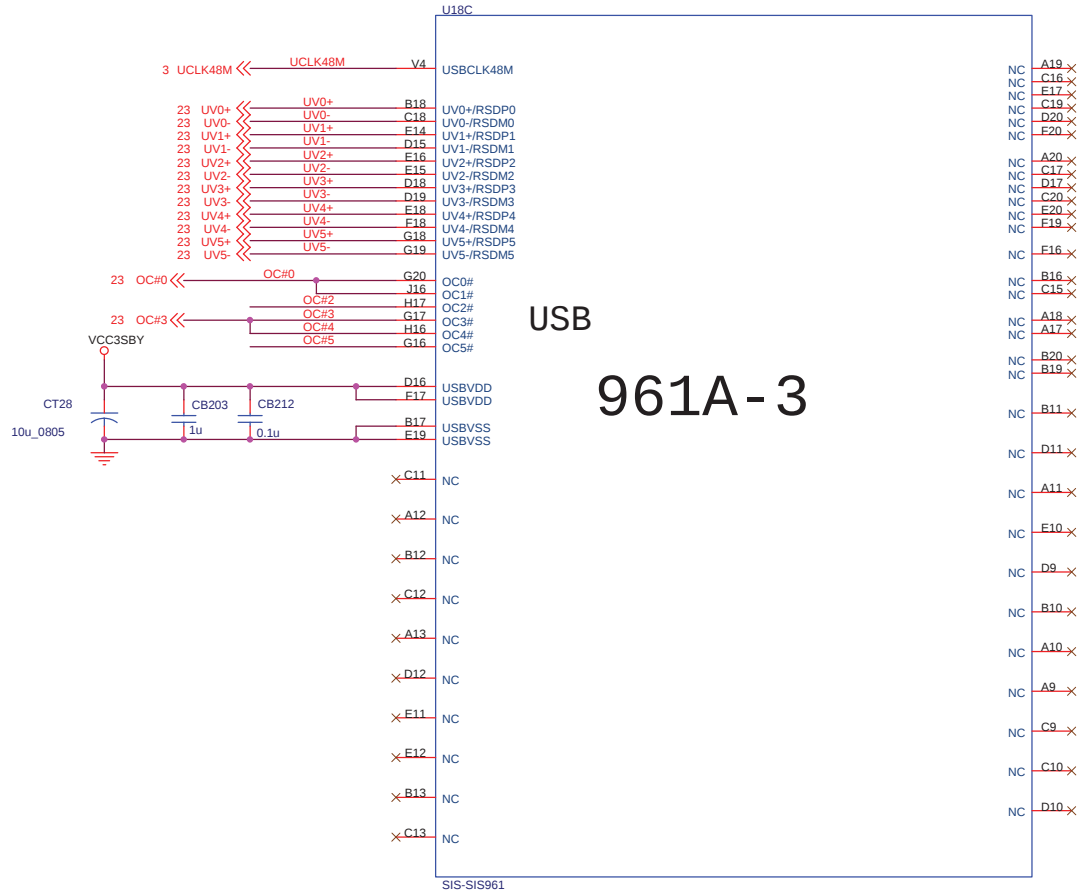
GPIO pins pull down
NEED NOT to place
close to 962



Place near to 962



MICRO-STAR INT'L CO.,LTD.		
Title		
SIS961A-2		
Size	Document Number	Rev
B	MS-6547	1.0A
Date:	星期一, 十一月 13, 2001	Sheet 15 of 39

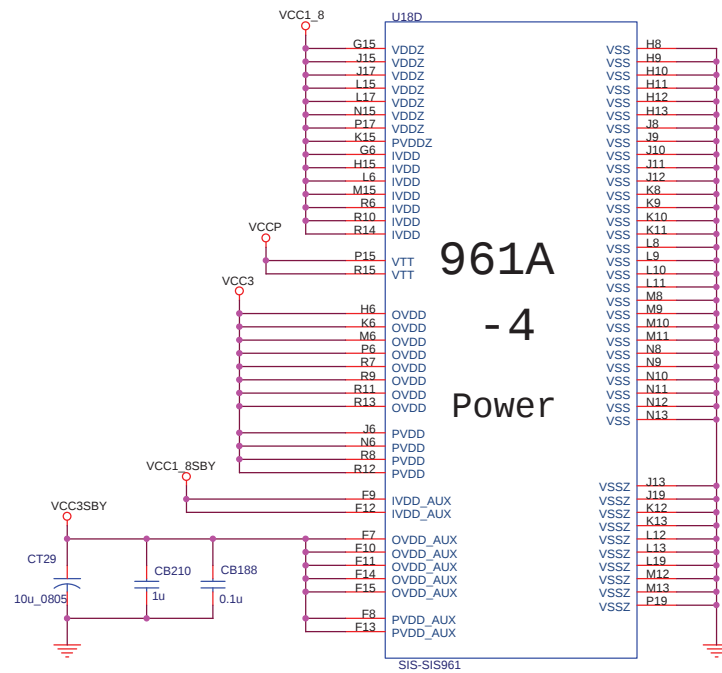
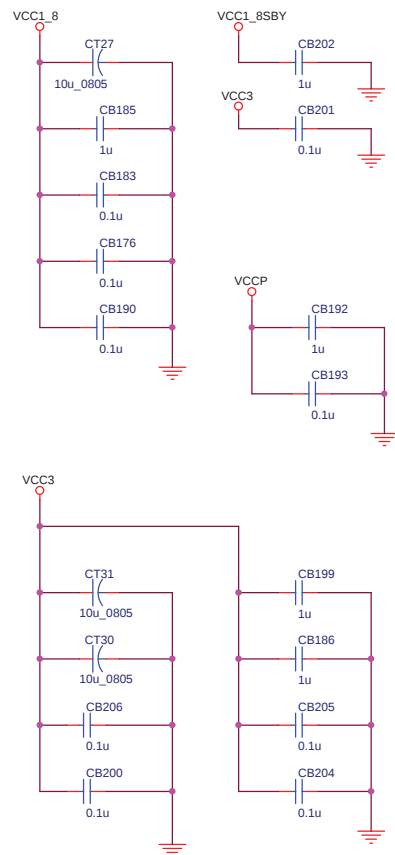


	0	1	Default
SPKR(LPC addr mapping)	disable	enable	0
SDAT0(PCICLK PLL)	enable	disable	0
OC2-(SB debug mode)	enable	disable	1
OC5-(Trap mode)	PCI AD	ROM	1

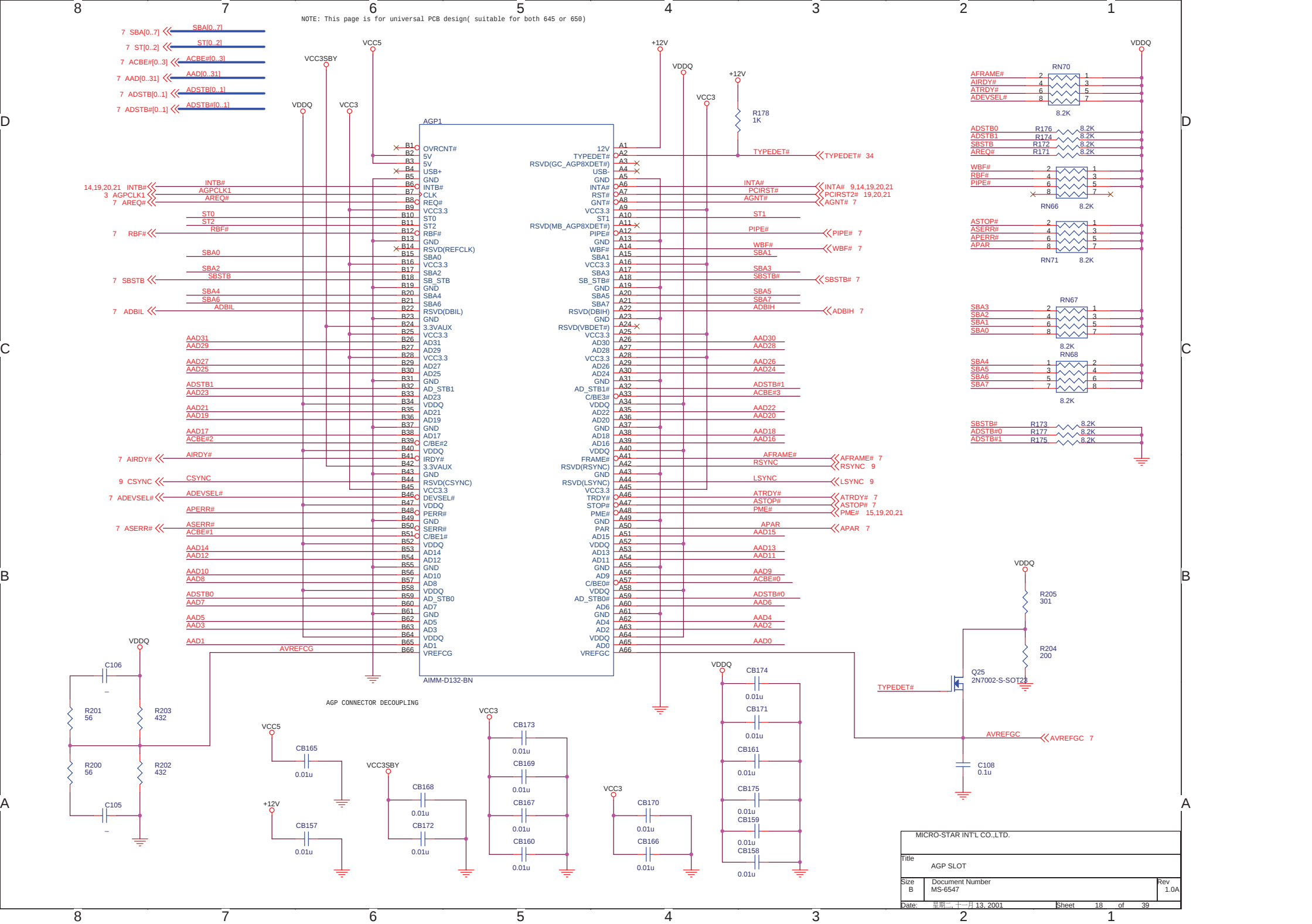
embedded pull-low
(30-50K Ohm)

yes
yes
yes
yes

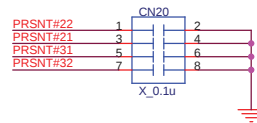
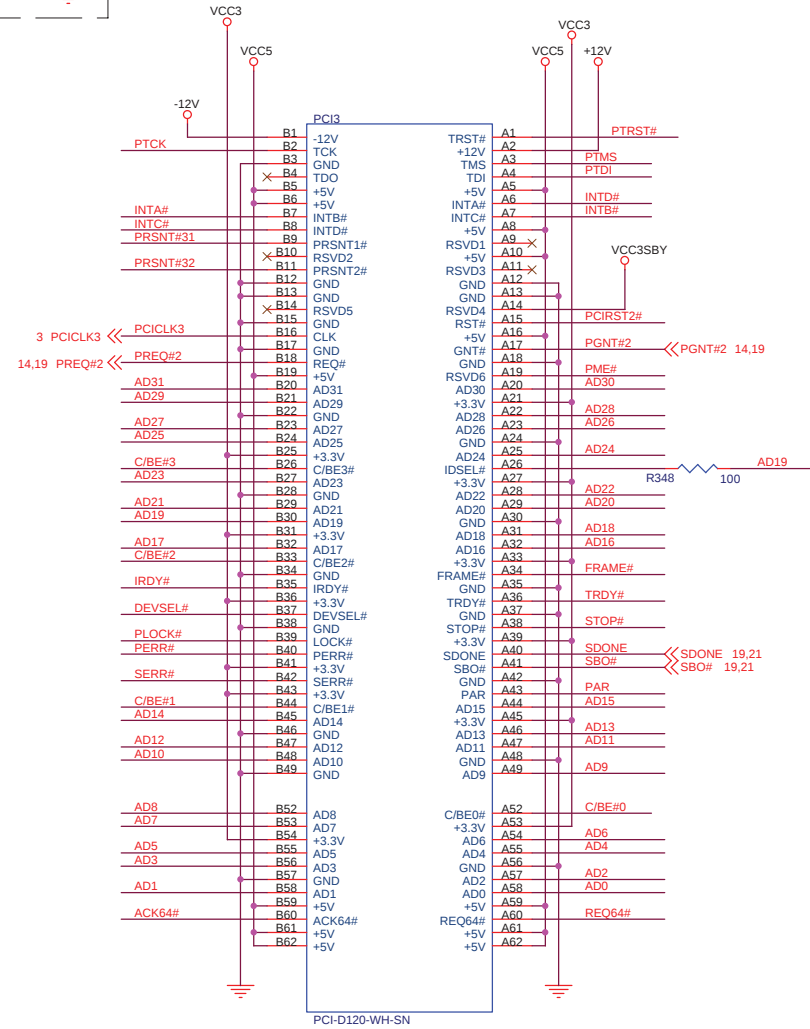
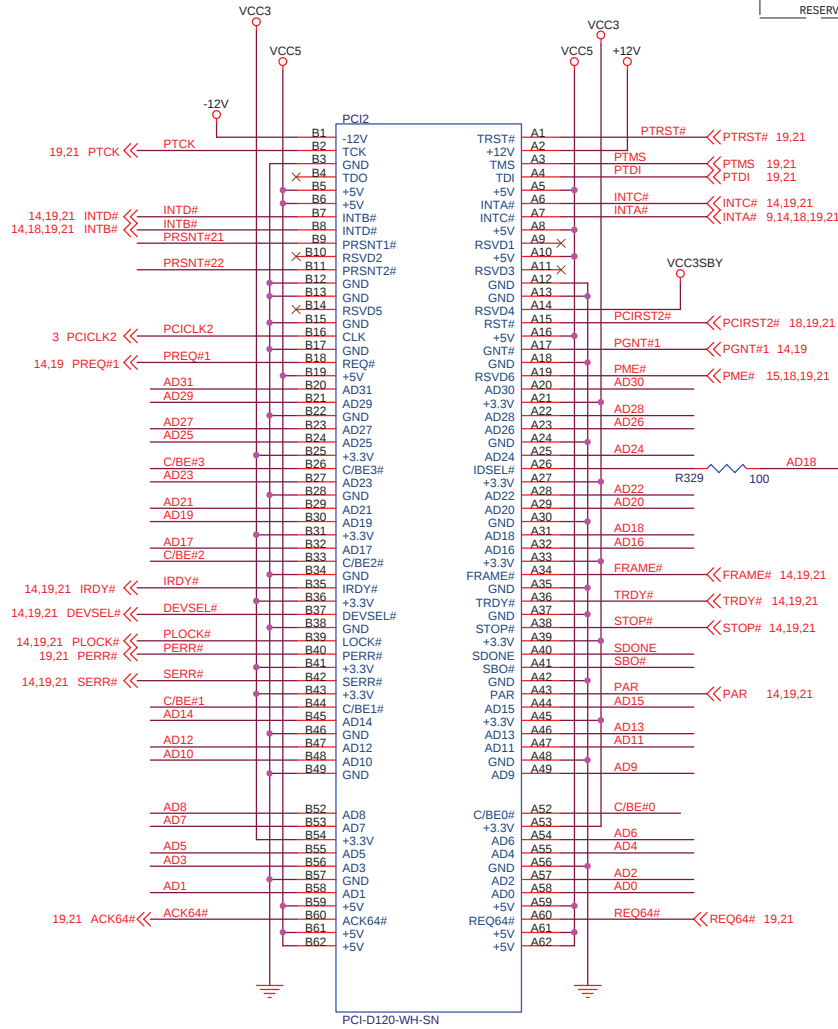
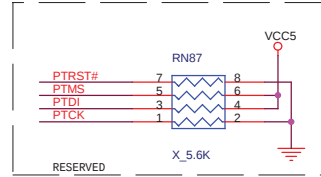
MICRO-STAR INT'L CO.,LTD.		
Title SIS961A-3		
Size B	Document Number MS-6547	Rev 1.0A
Date: 星期二, 十一月 13, 2001	Sheet 16	of 39



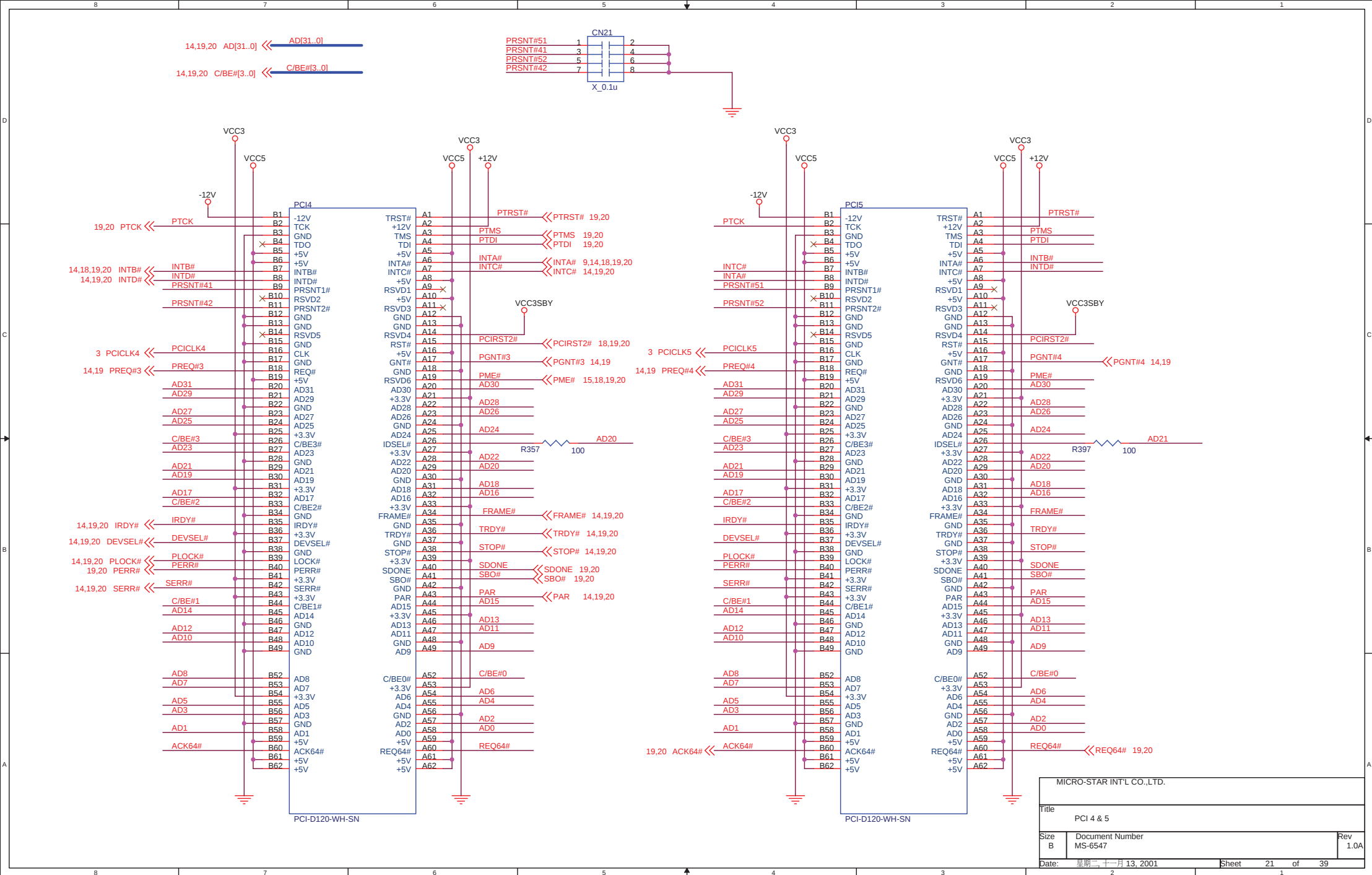
MICRO-STAR INT'L CO.,LTD.			
Title SIS961A-3			
Size B	Document Number MS-6547		Rev 1.0A
Date:	星期三 十一月 13, 2001	Sheet 17 of 39	

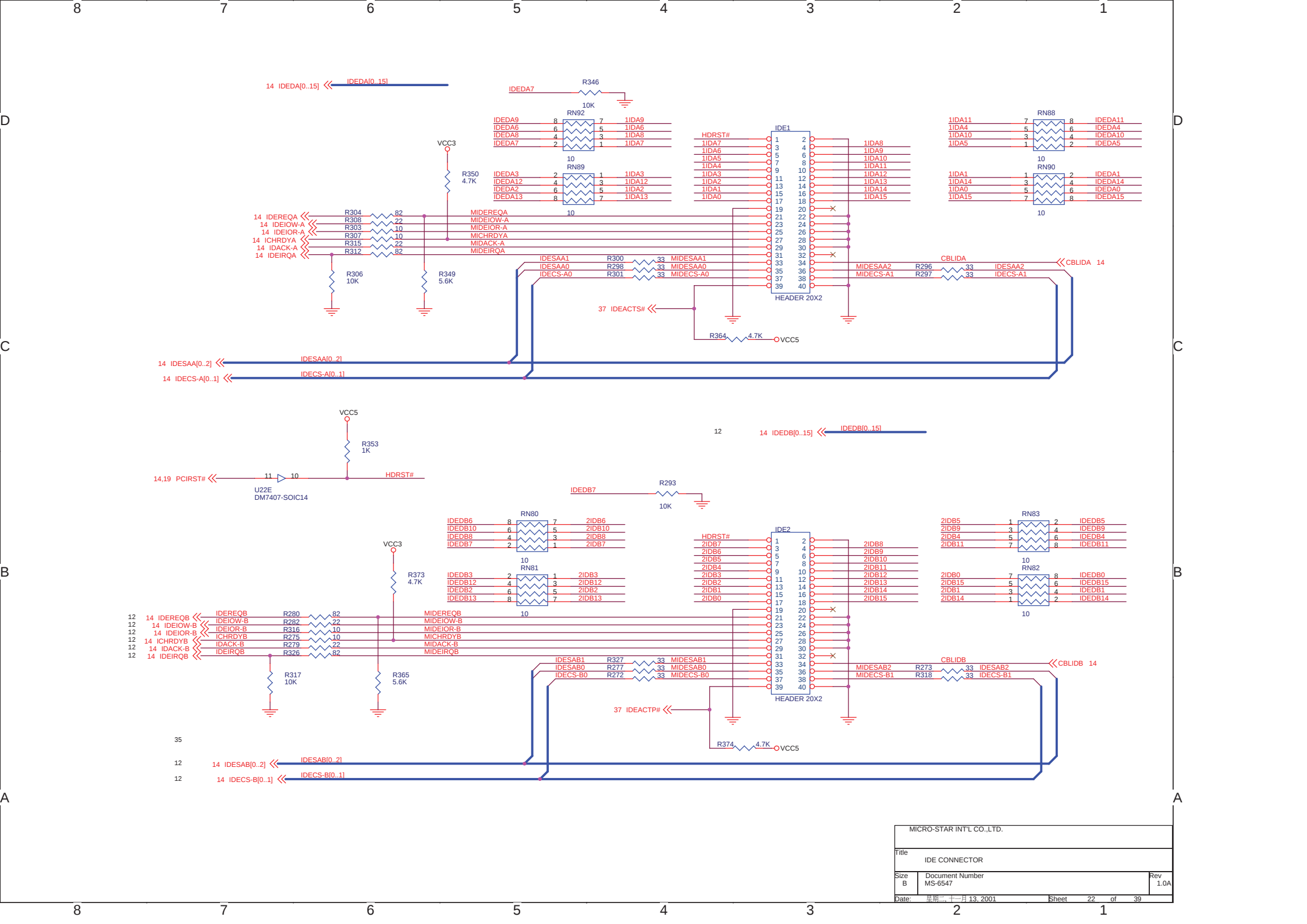


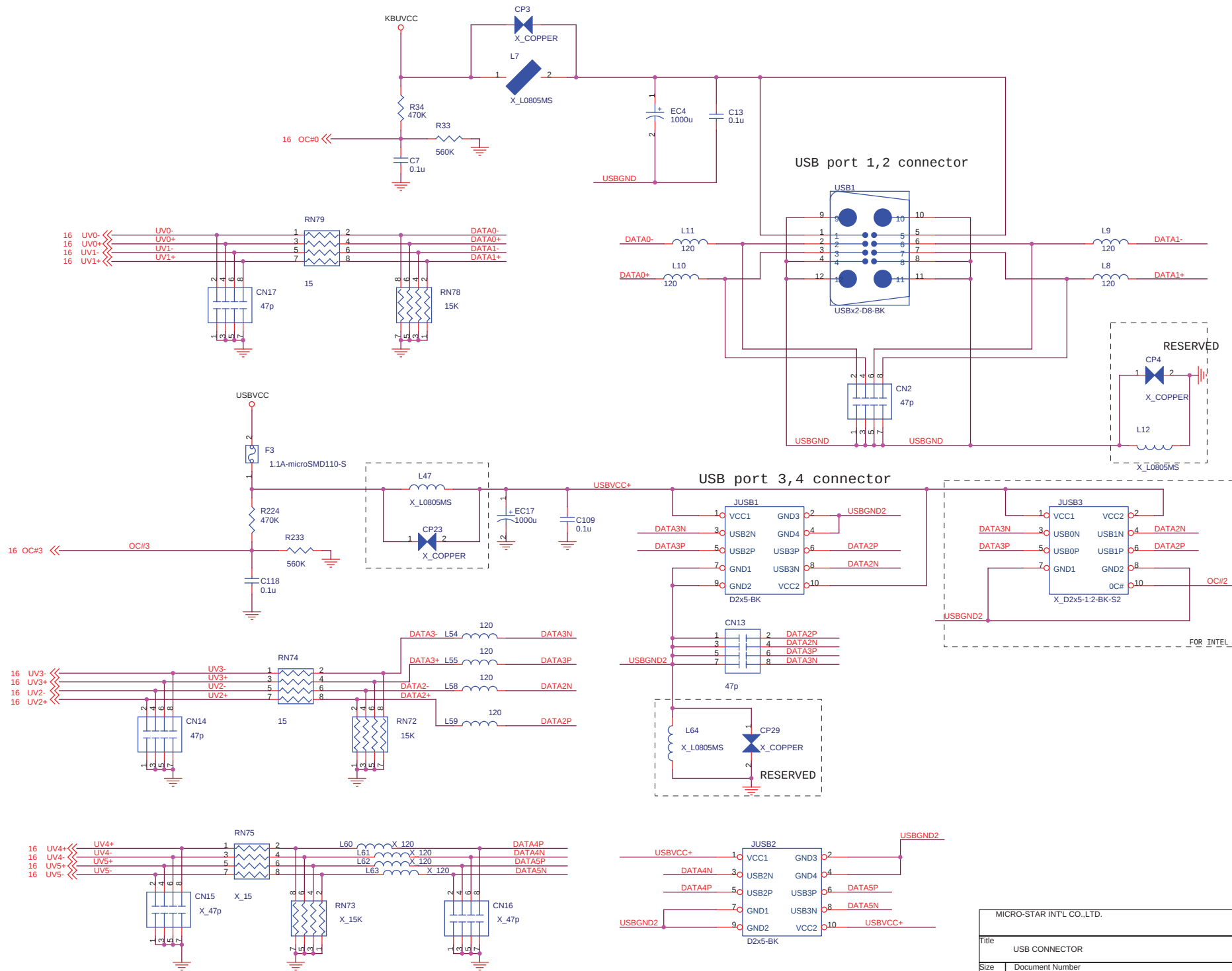
14,19,21 AD[31..0] << AD[31..0]
14,19,21 C/BE#[3..0] << C/BE#[3..0]



MICRO-STAR INT'L CO.,LTD.			
Title PCI 2 & 3			
Size	Document Number		Rev
Custom	MS-6547		1.0A
Date:	星期二, 十一月 13, 2001	Sheet	20 of 39

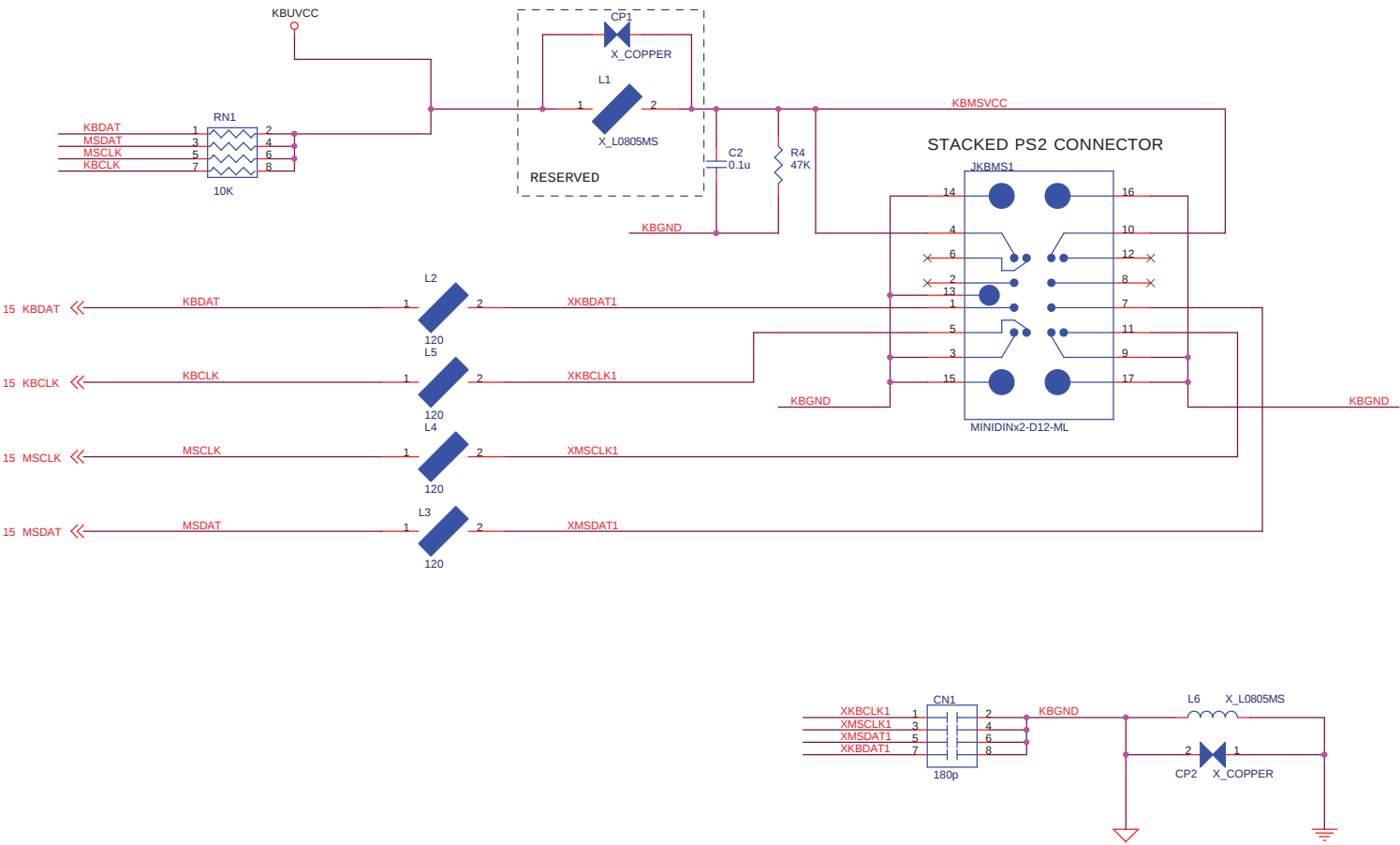


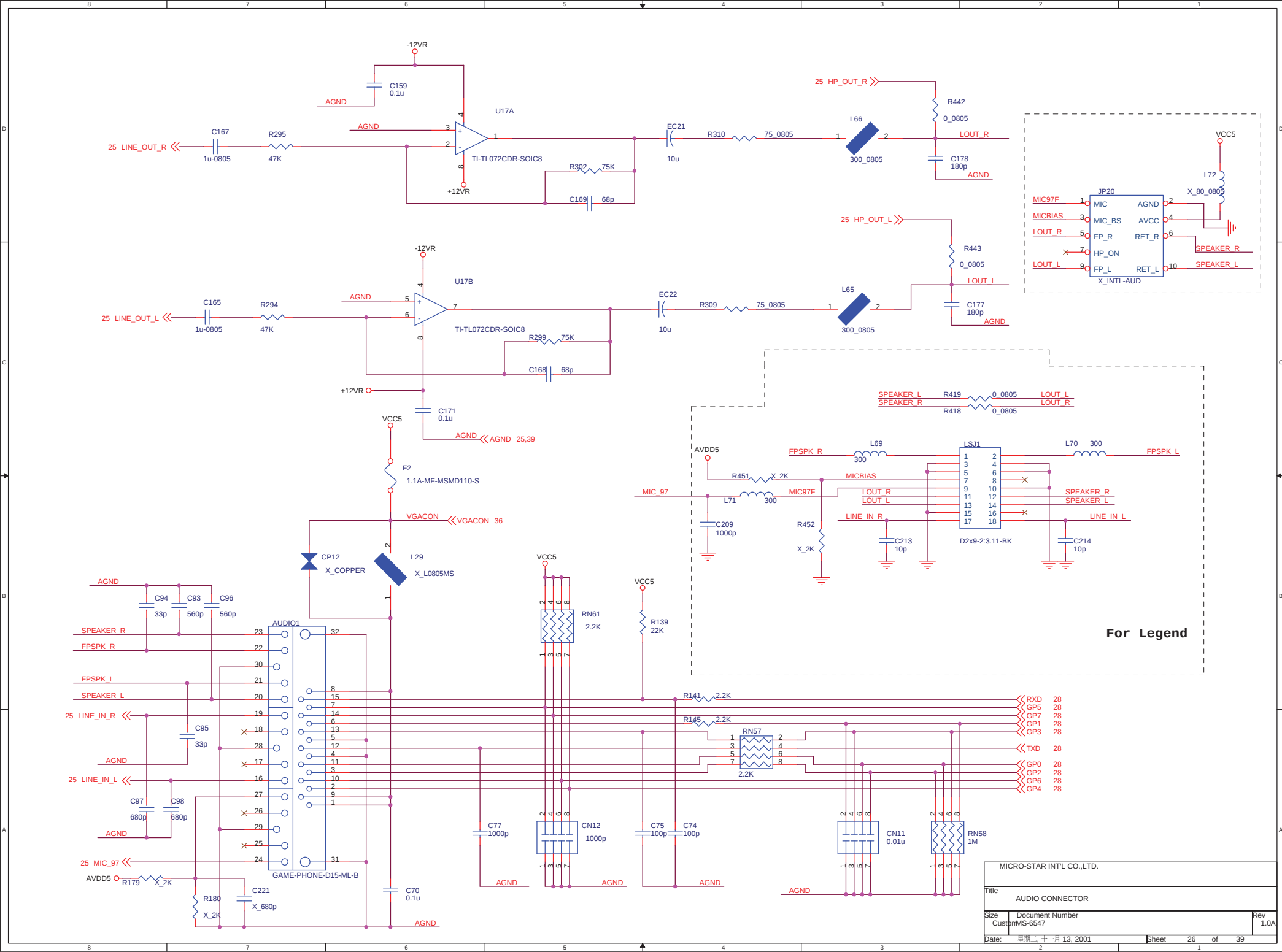




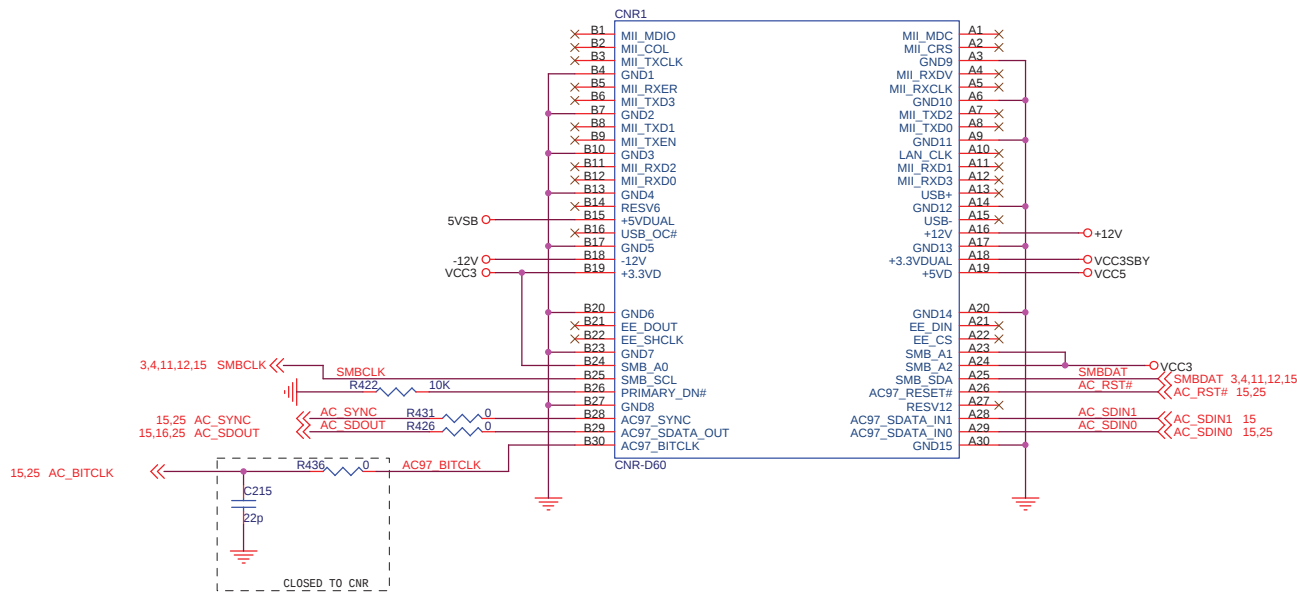
MICRO-STAR INT'L CO.,LTD.		
Title	USB CONNECTOR	
Size	Document Number	Rev
MS-6547		1.0A
Custom		
Date:	星期二, 十一月 13, 2001	Sheet 23 of 39

KEYBOARD/MOUSE PORTS

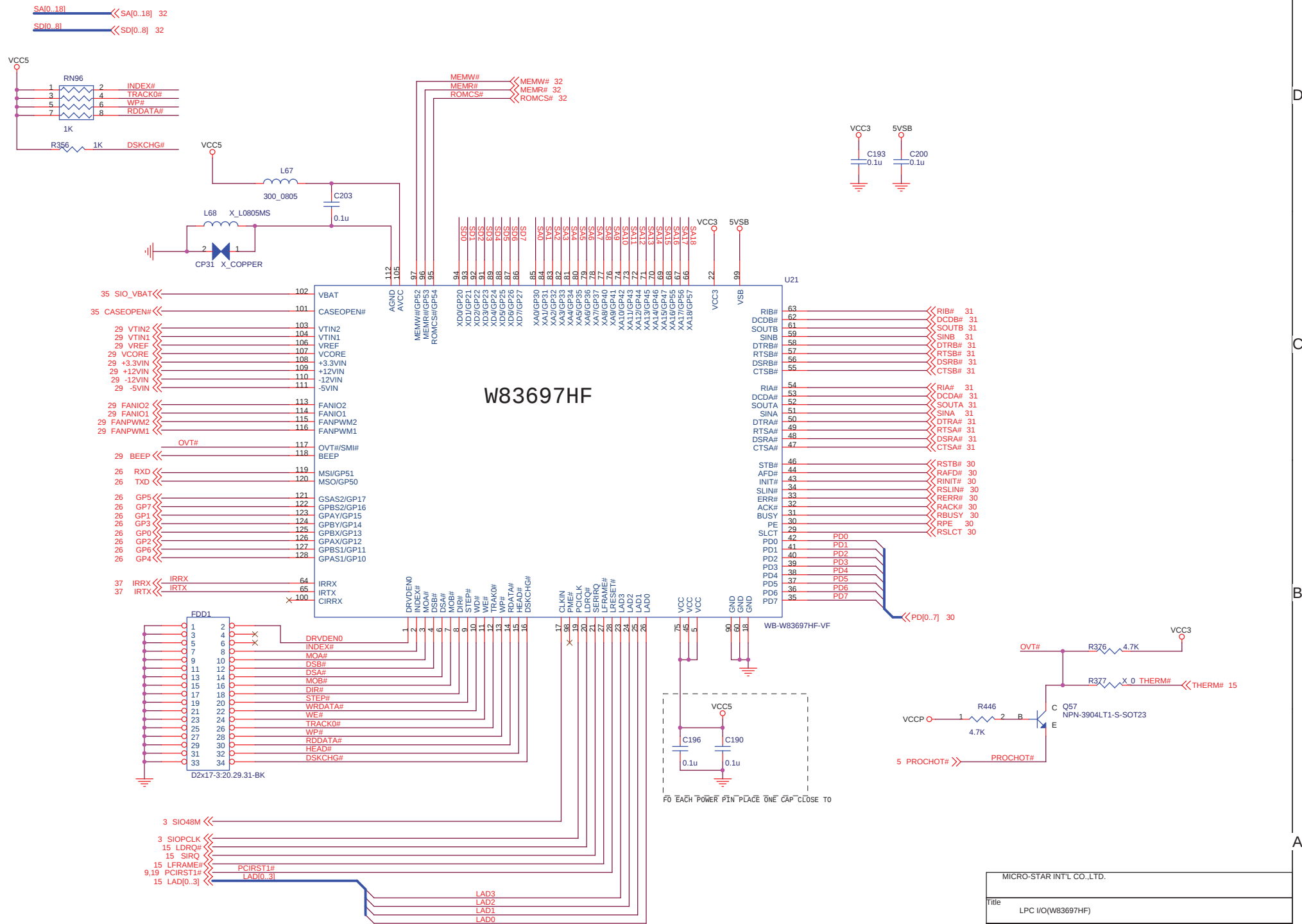




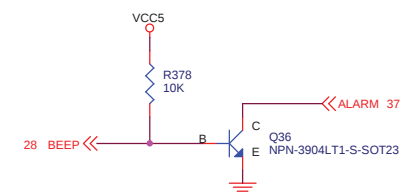
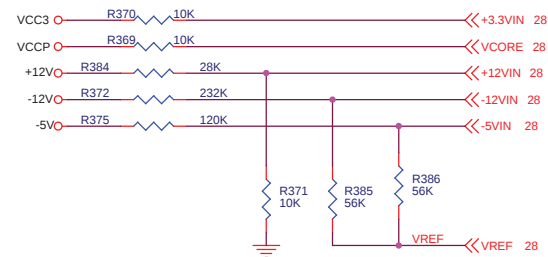
MICRO-STAR INT'L CO.,LTD.			
Title			
AUDIO CONNECTOR			
Size			
Document Number			
CustomMS-6547			
Rev			
1.0A			
Date:	星期二, 十一月 13, 2001	Sheet	26 of 39

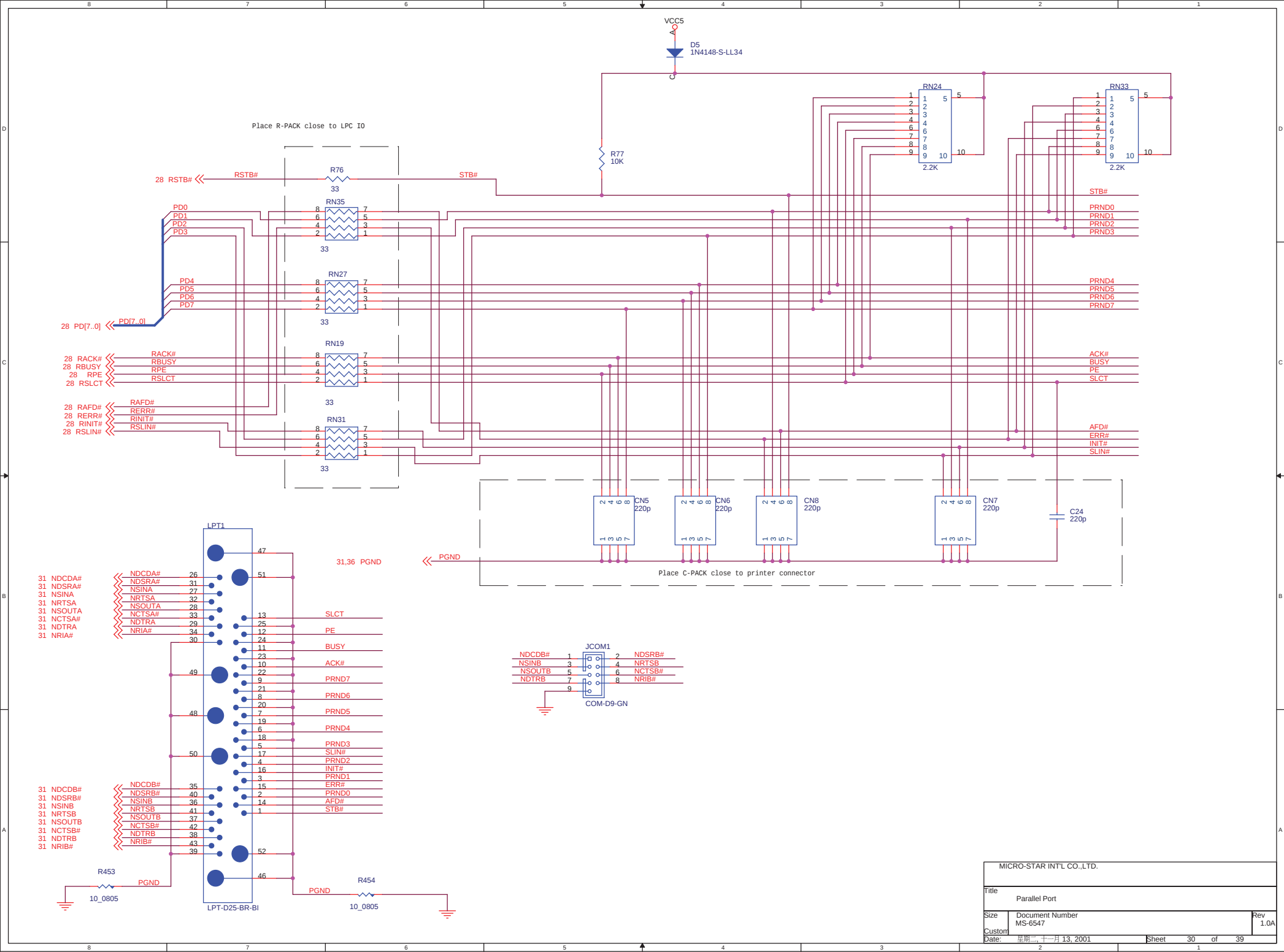


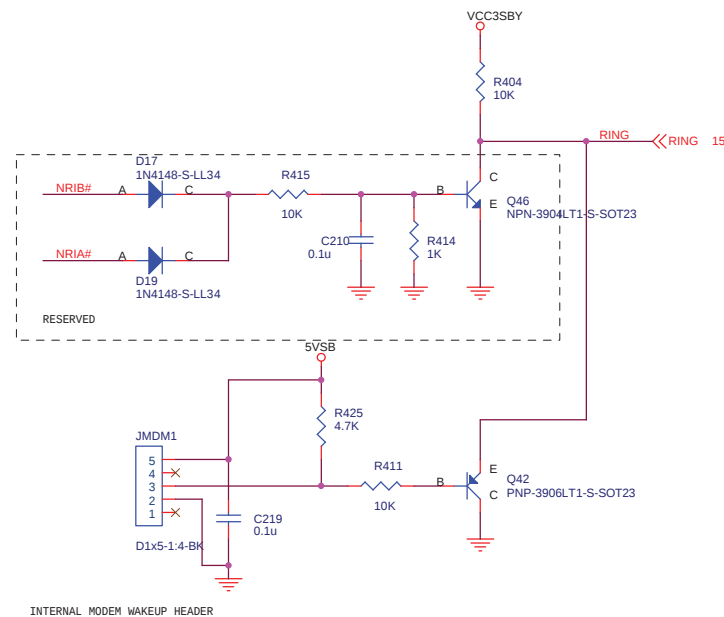
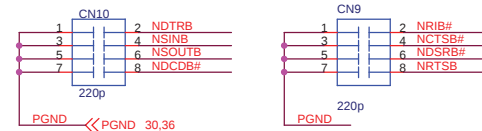
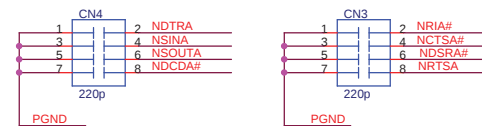
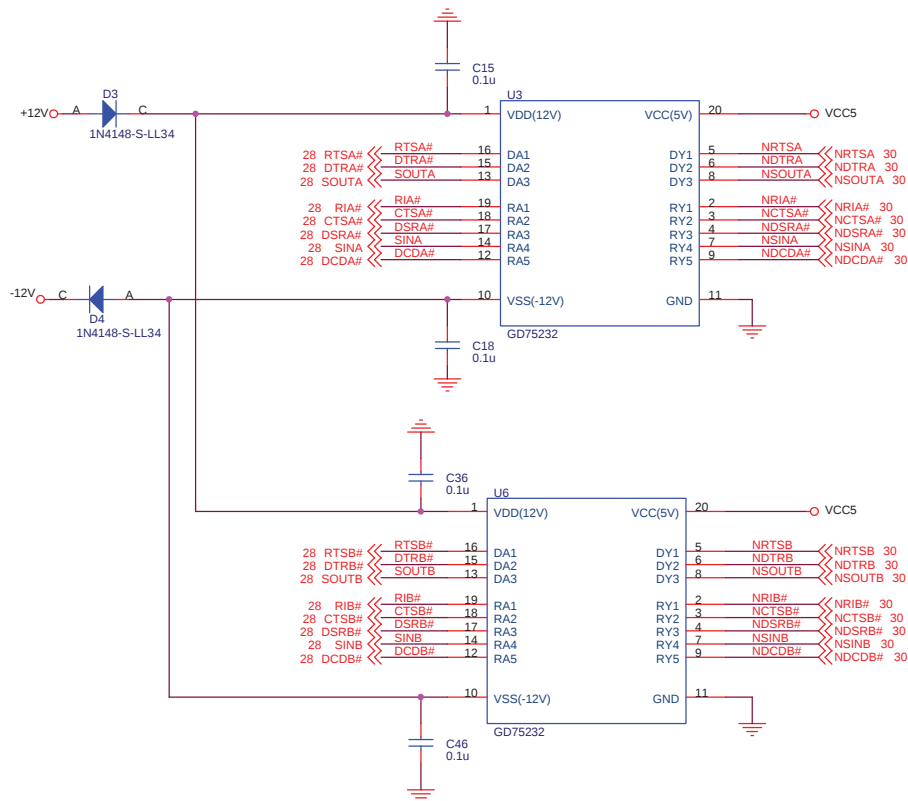
MICRO-STAR INT'L CO.,LTD.			
Title CNR CONNECTOR			
Size Custom	Document Number MS-6547		Rev 1.0A
Date:	星期一, 十一月 13, 2001	Sheet 27	of 39



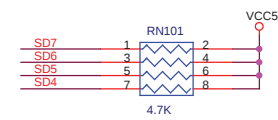
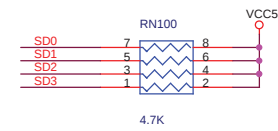
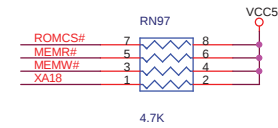
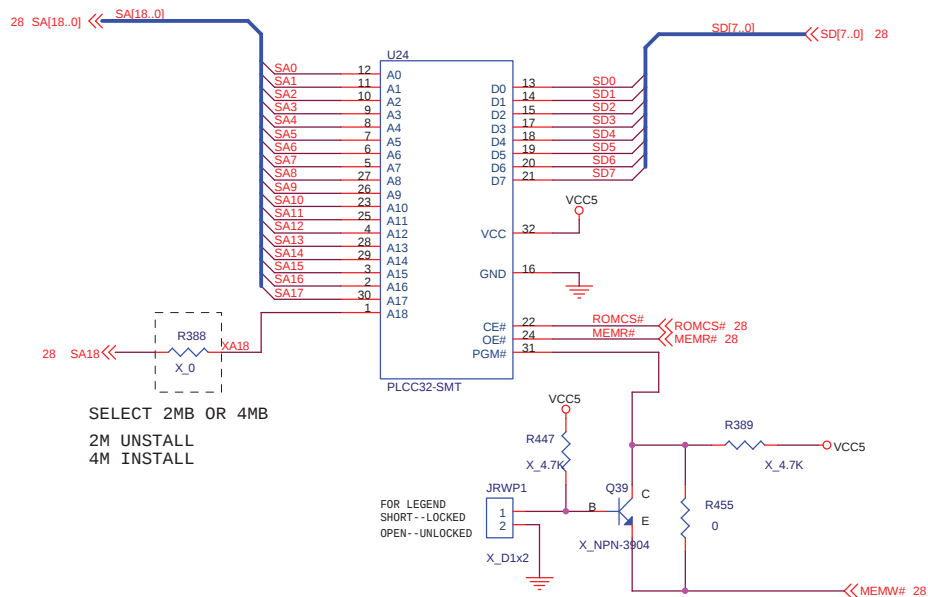
8	7	6	5	4	3	2	1
---	---	---	---	---	---	---	---

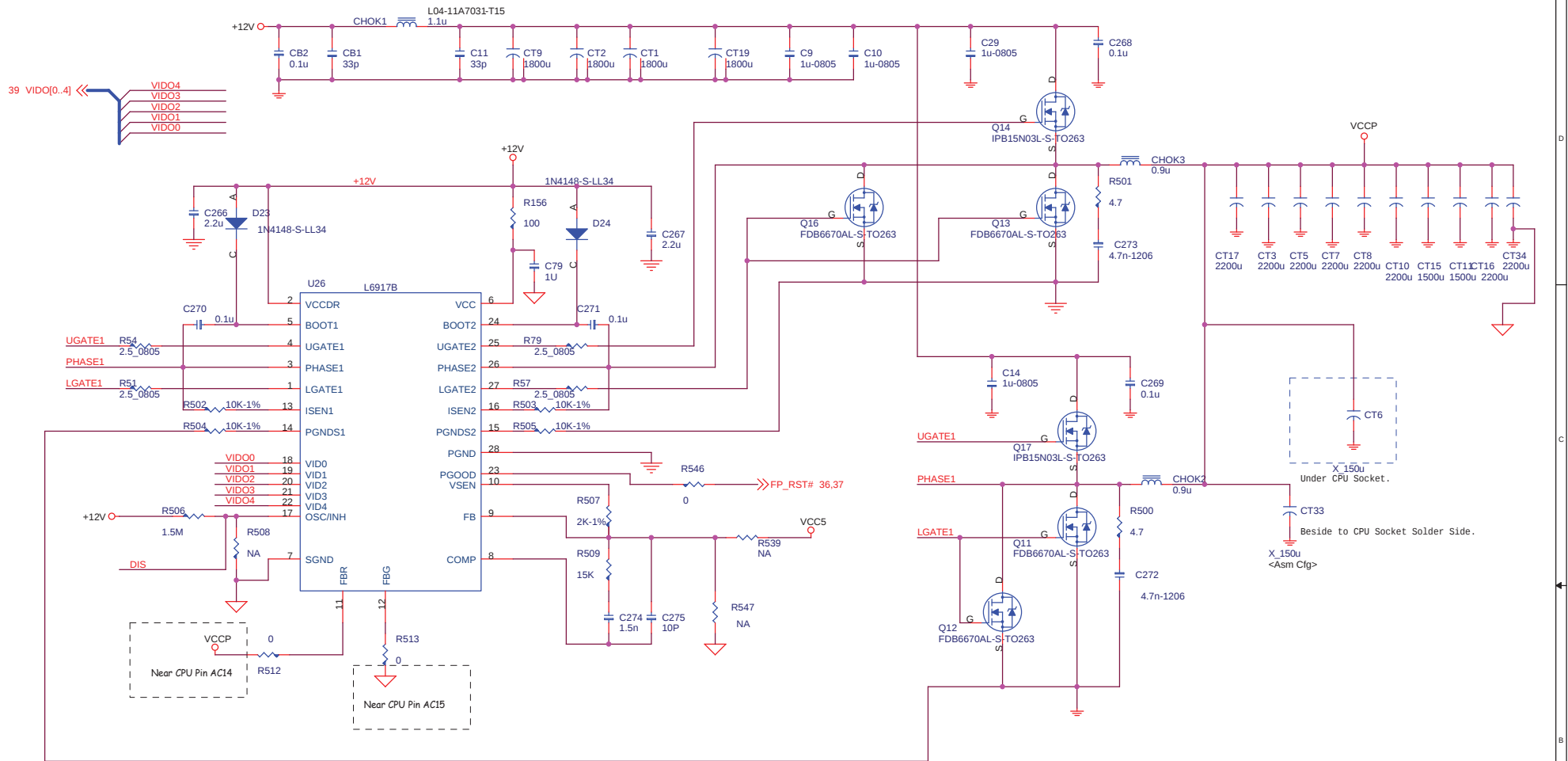






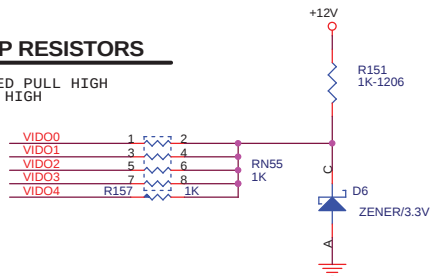
MICRO-STAR INT'L CO.,LTD.			
Title SERIAL PORT			
Size	Document Number MS-6547		Rev 1.0
Custom			
Date:	星期二, 十一月 13, 2001	Sheet 31 of 39	



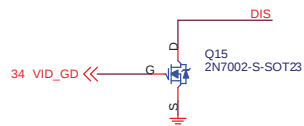


VID PULL-UP RESISTORS

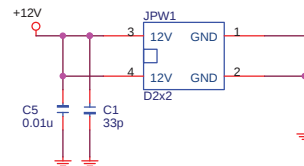
HIP6301V DON'T NEED PULL HIGH
HIP6301 NEED PULL HIGH



PWM GOOD

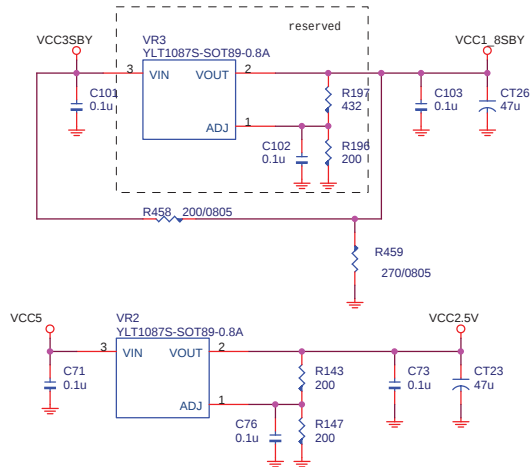


ATX12V POWER CONNECTOR

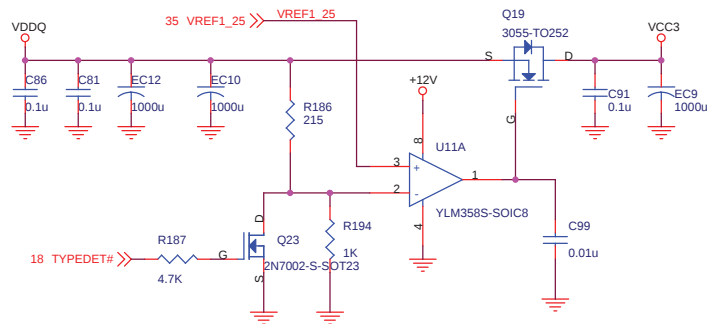


MICRO-STAR INT'L CO.,LTD.		
Title	VRM 9.0	
Size	Document Number	Rev
Custom	MS-6547	1.0A
Date:	星期四, 十二月 06, 2001	Sheet 33 of 39

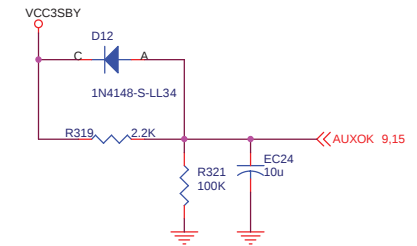
1.8V STANDBY POWER TRANSLATOR (30mils trace / 15 mils space)



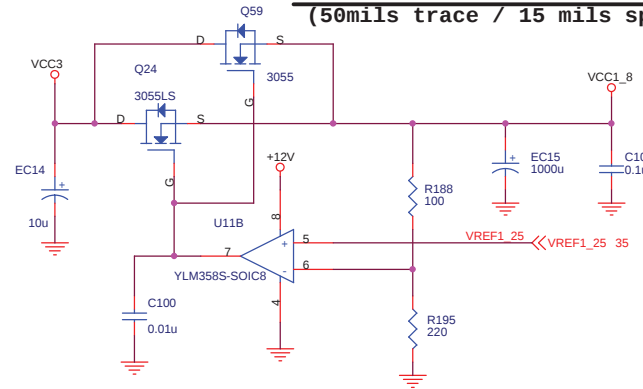
AGP 4X SLOT 1.5V or 3.3V POWER TRANSLATOR



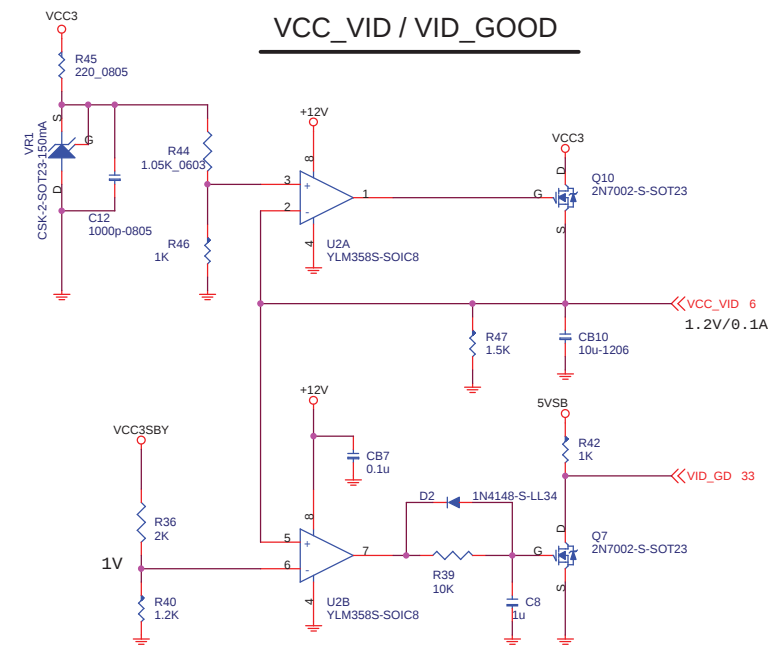
AUX_OK BLOCK



1.8V POWER TRANSLATOR (50mils trace / 15 mils space)

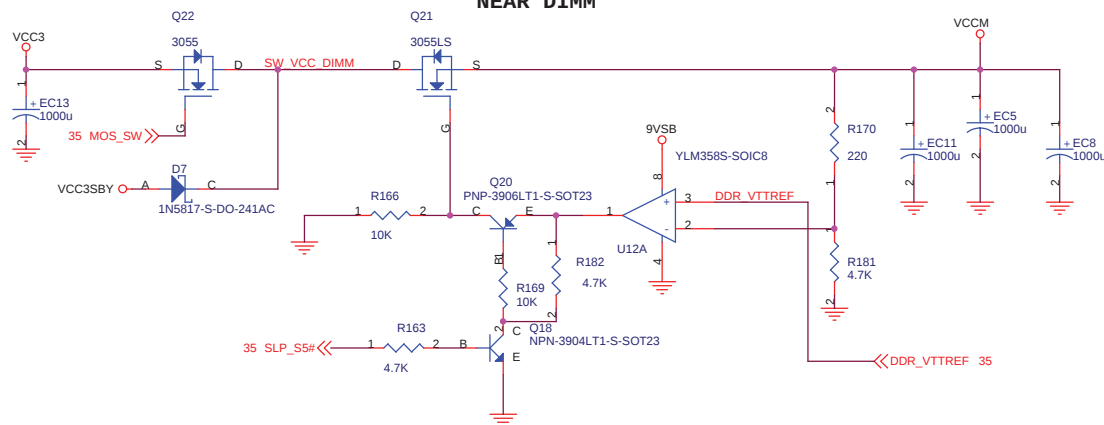


VCC_VID / VID_GOOD



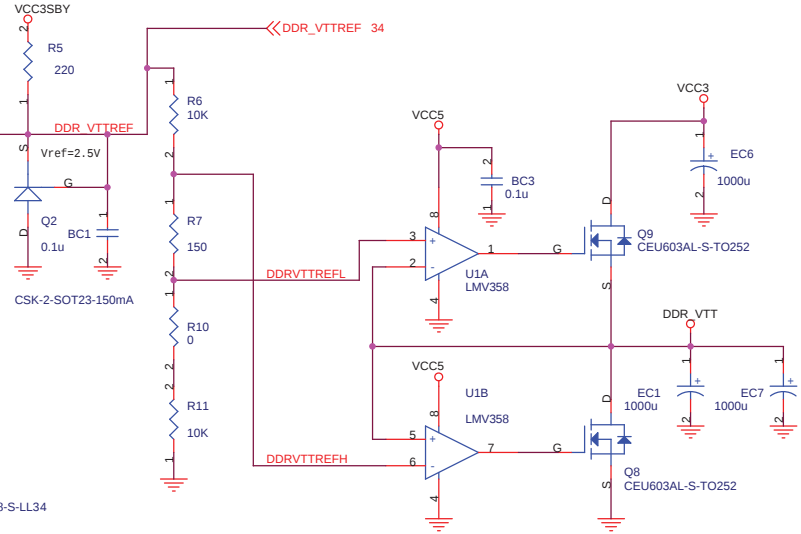
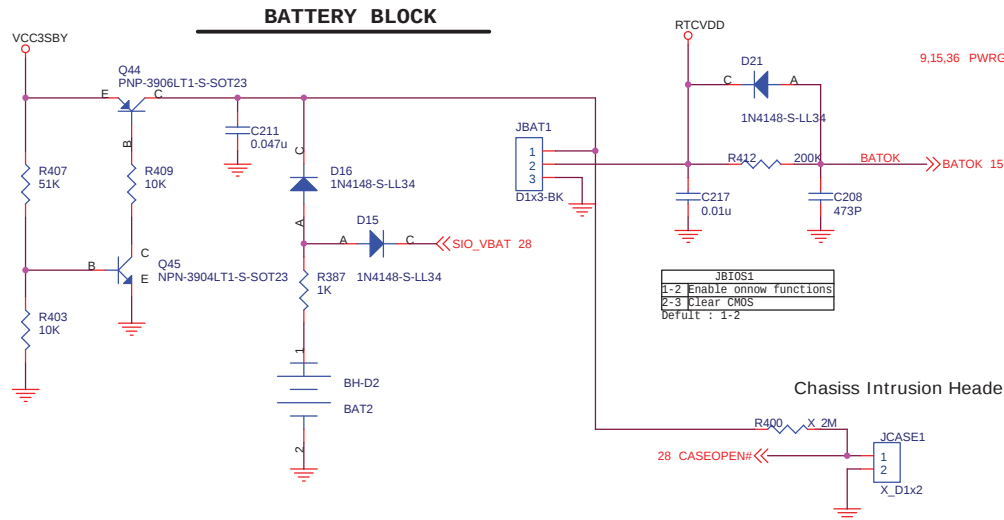
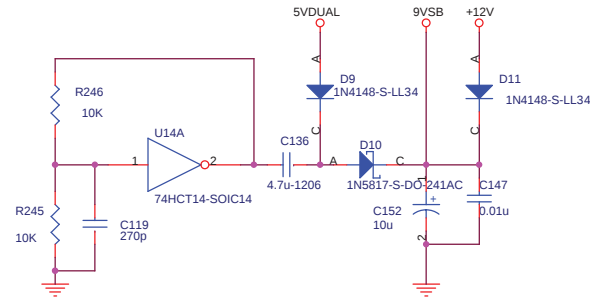
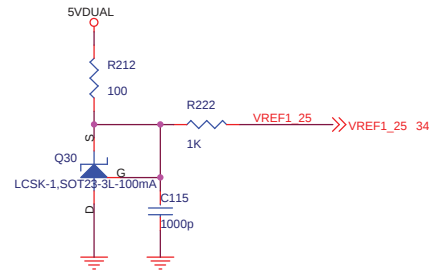
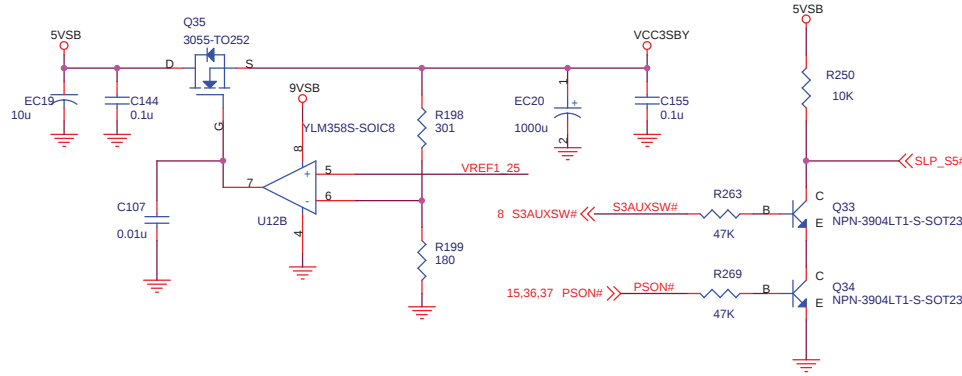
ACPI S3 (STR) POWER TRANSLATE CIRCUIT

NEAR DIMM

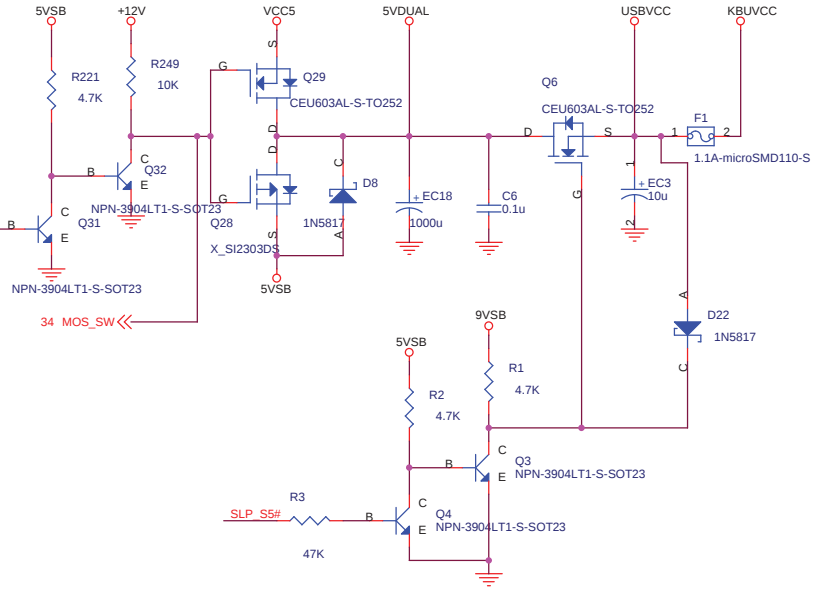


MICRO-STAR INT'L CO.,LTD.			
Title VOLTAGE REGULATOR 1			
Size MS-6547	Document Number		Rev 1.0A
Date: 星期二, 十一月 13, 2001	Sheet	34	of 39

3.3V STANDBY POWER TRANSLATOR (40mils trace / 15 mils space)



5VDUAL & 5VUSB POWER TRANSLATOR

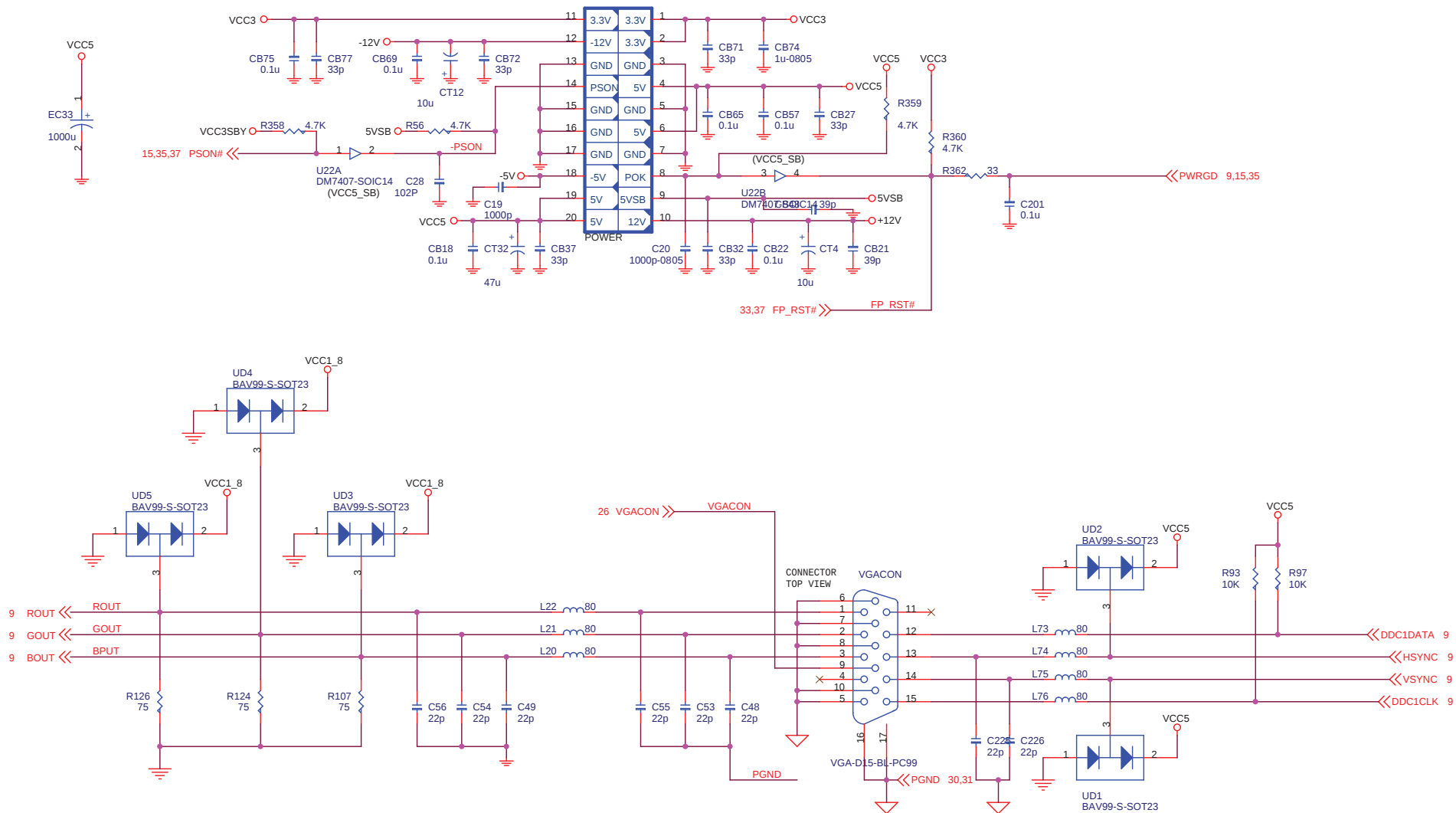


J810S1
1-2 Enable onnow functions
2-3 Clear CMOS
Default : 1-2

Chassis Intrusion Header

MICRO-STAR INT'L CO.,LTD.			
Title	VOLTAGE REGULATOR 2		
Size	Document Number	Rev	
Custom	MS-6547	1.0A	
Date:	星期二, 十一月 13, 2001	Sheet	35 of 39

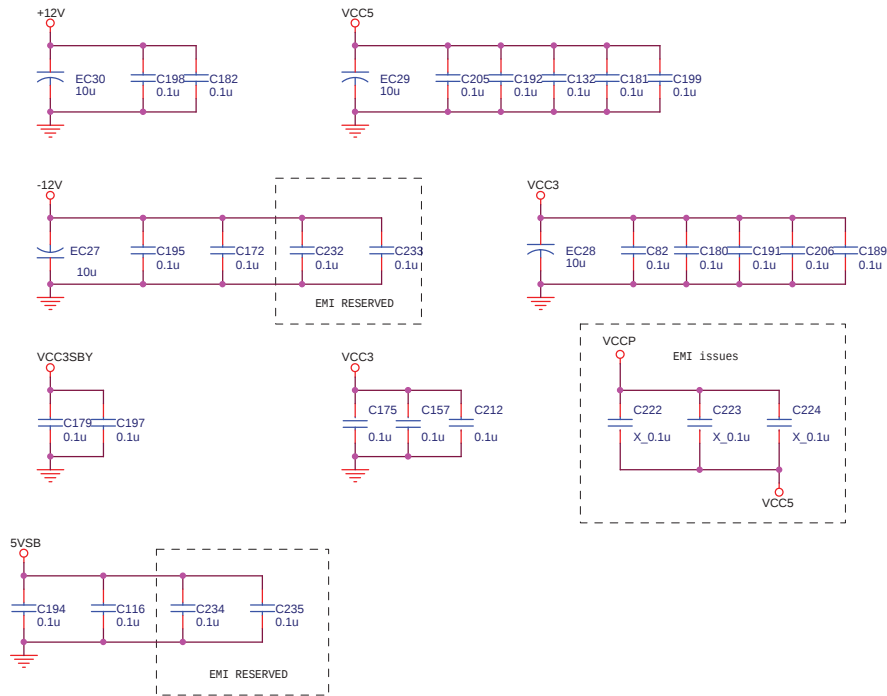
ATX CONNECTOR



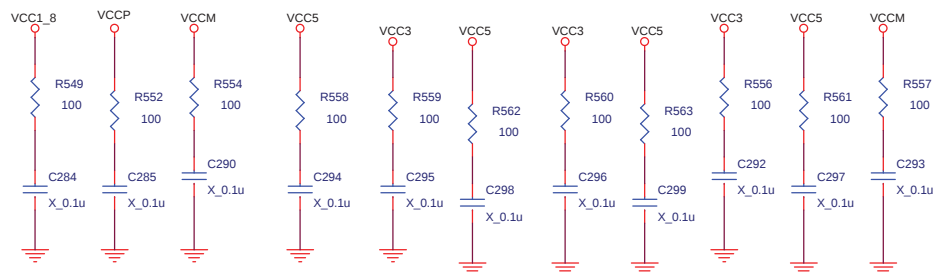
VGA CONNECTOR

MICRO-STAR INT'L CO.,LTD.			
Title ATX POWER CONNECTOR			
Size B	Document Number MS-6547		Rev 1.0A
Date:	星期二, 十一月 27, 2001	Sheet	36 of 39

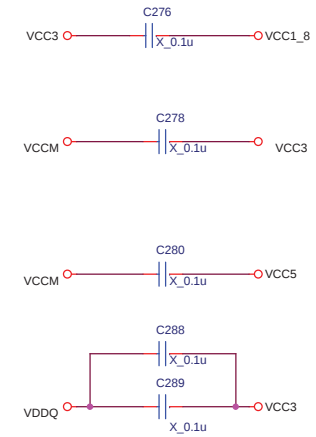
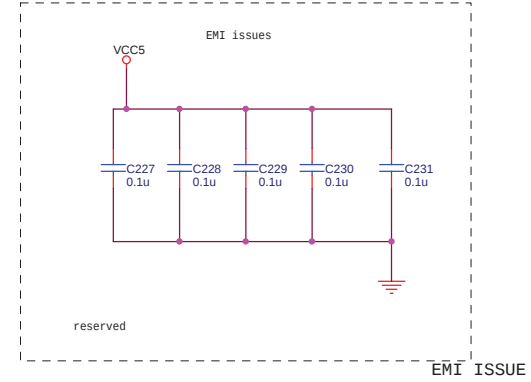
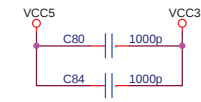
System Decoupling Capacitors



EMI ISSUE

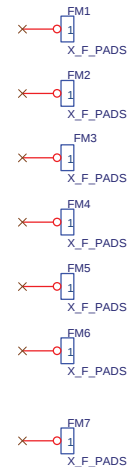
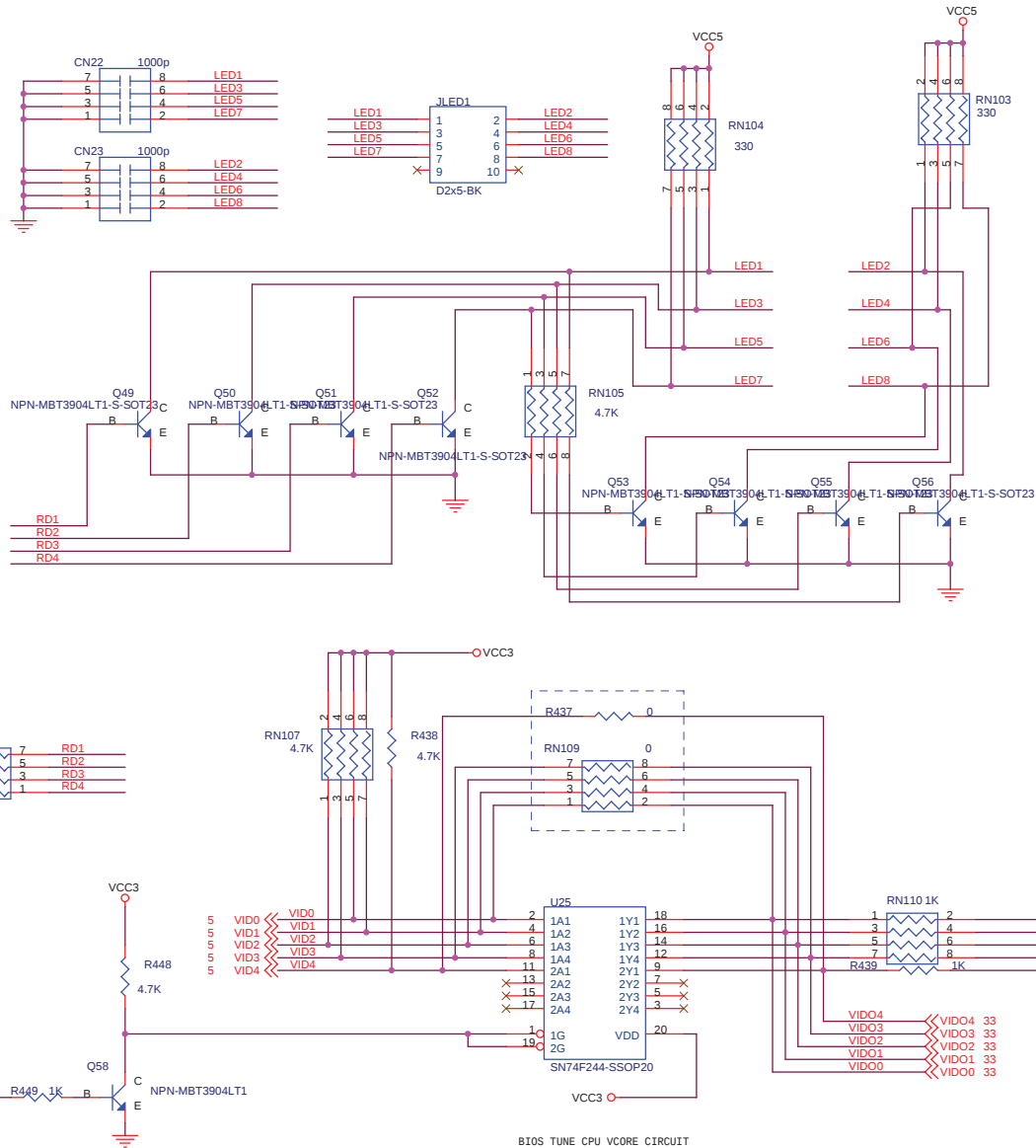
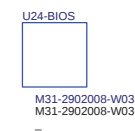
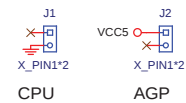
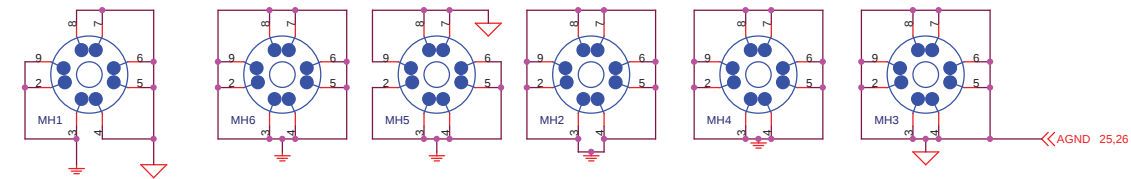


High Freq. return current decoupling



MICRO-STAR INTL CO.,LTD.			
Title DECOUPLING CAPACITOR			
Size	Document Number CustomMS-6547		Rev 1.0A
Date:	星期二, 十一月 13, 2001	Sheet 38 of 39	

PCB OTHER COMPONENT



MICRO-STAR INT'L CO.,LTD.			
Title LAYOUT SCREW HOLE			
Size	Document Number	Rev	
MS-6547		1.0A	
Custom	Date	Sheet	of
	星期二,十一月13,2001	39	39

BIOS TUNE CPU VCORE CIRCUIT