

Last Schematic Update Date:
04/26/2002

MS-6581 VERSION:0.A

SIS 645 CHIPSET
Willamette/Northwood 478pin mPGA-B Processor Schematics

CPU:
Willamette/Northwood mPGA-478B Processor

System Brookdale Chipset:
SIS 645 (North Bridge) +
962 (South Bridge)

On Board Chipset:
LPC Super I/O -- W83697HF
ETHERNET CONTROLLER--INTEL 82551QM

Expansion Slots:
AGP2.0 SLOT * 1
PCI2.2 SLOT* 6
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 NORTH BRIDGE	7- 10
DDR SLOT	11-12
DDR TERMINATOR	13
SIS 962 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
ACPI CONTROL	35
ATX POWER CON	36
FRONT PANEL	37
Decoupling Capacitor	38
LAVON (1)	39
LAVON (2)	40
LAYOUT SCREW	41

System Block Diagram

SOCKET-478

Host Bus

SIS645 VGA

VGA D-SUB

VGA Connector

VGA SLOT

VGA CONNECTOR

DDR SDRAM

SSTL-2 Termination (Only for DDR)

DIMM 1

DIMM 2

DIMM 3

Rtt

INTEL 82551

Support Max to six-PCI Devices

PCI SLOT 6

PCI SLOT 5

PCI SLOT 4

PCI SLOT 3

PCI SLOT 2

PCI SLOT 1

HyperZip 512 MB

SIS962

IDE 1

IDE 2

KEYBOARD / MOUSE

PS/2

AC'97 Audio Codec

Analog In

Analog Out

ACR

USB 3

USB 2

USB 4

USB 5

USB 0

USB 1

LPC Bus

LPC Super I/O

FAN 1

FAN 2

FAN CONTROL

Legacy ROM

FAN CONTROL

VOLTAGE MONITOR

TEMPERATURE MONITOR

GPIOs

IR/CIR

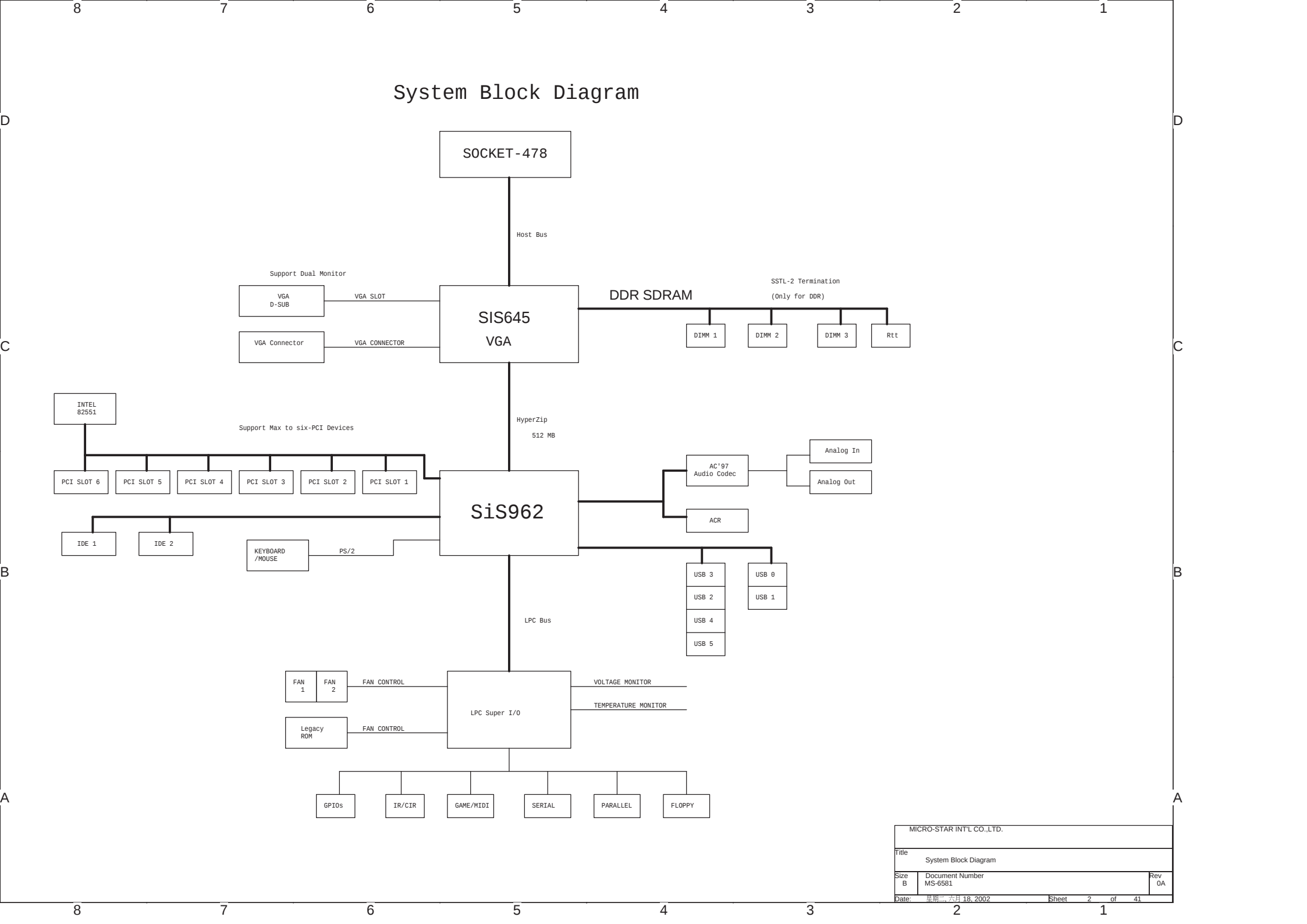
GAME/MIDI

SERIAL

PARALLEL

FLOPPY

MICRO-STAR INT'L CO., LTD.			
Title System Block Diagram			
Size B	Document Number MS-6581		Rev 0A
Date: 星期二, 六月 18, 2002	Sheet 2	of 41	



System Block Diagram

The diagram illustrates the architecture of the MS-6581 motherboard, centered around the **SIS645 VGA** and **SiS962** chipsets.

- Host Bus:** Connects the **SOCKET-478** to the **SIS645 VGA**.
- DDR SDRAM:** Connected to the **SIS645 VGA** via **DIMM 1**, **DIMM 2**, **DIMM 3**, and **Rtt**. Note: SSTL-2 Termination (Only for DDR).
- HyperZip 512 MB:** Connects the **SIS645 VGA** to the **SiS962**.
- SiS962 Chipset:**
 - PCI Slots:** Supports up to six PCI devices (PCI SLOT 1 to PCI SLOT 6). An **INTEL 82551** is connected to PCI SLOT 6.
 - IDE:** Supports IDE 1 and IDE 2.
 - Keyboard/Mouse:** Connected via PS/2.
 - AC'97 Audio Codec:** Provides Analog In and Analog Out.
 - ACR (Audio Codec瑞星):** Connected to the audio codec.
 - USB:** Supports USB 0, USB 1, USB 2, USB 3, USB 4, and USB 5.
 - LPC Bus:** Connects to the **LPC Super I/O**.
- LPC Super I/O:**
 - FAN CONTROL:** Manages FAN 1 and FAN 2.
 - VOLTAGE MONITOR:** Monitors system voltage.
 - TEMPERATURE MONITOR:** Monitors system temperature.
 - Legacy I/O:** Includes GPIOs, IR/CIR, GAME/MIDI, SERIAL, PARALLEL, and FLOPPY.

Legend:

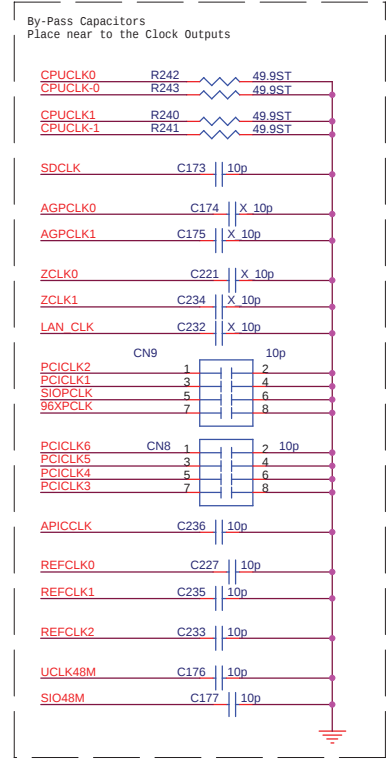
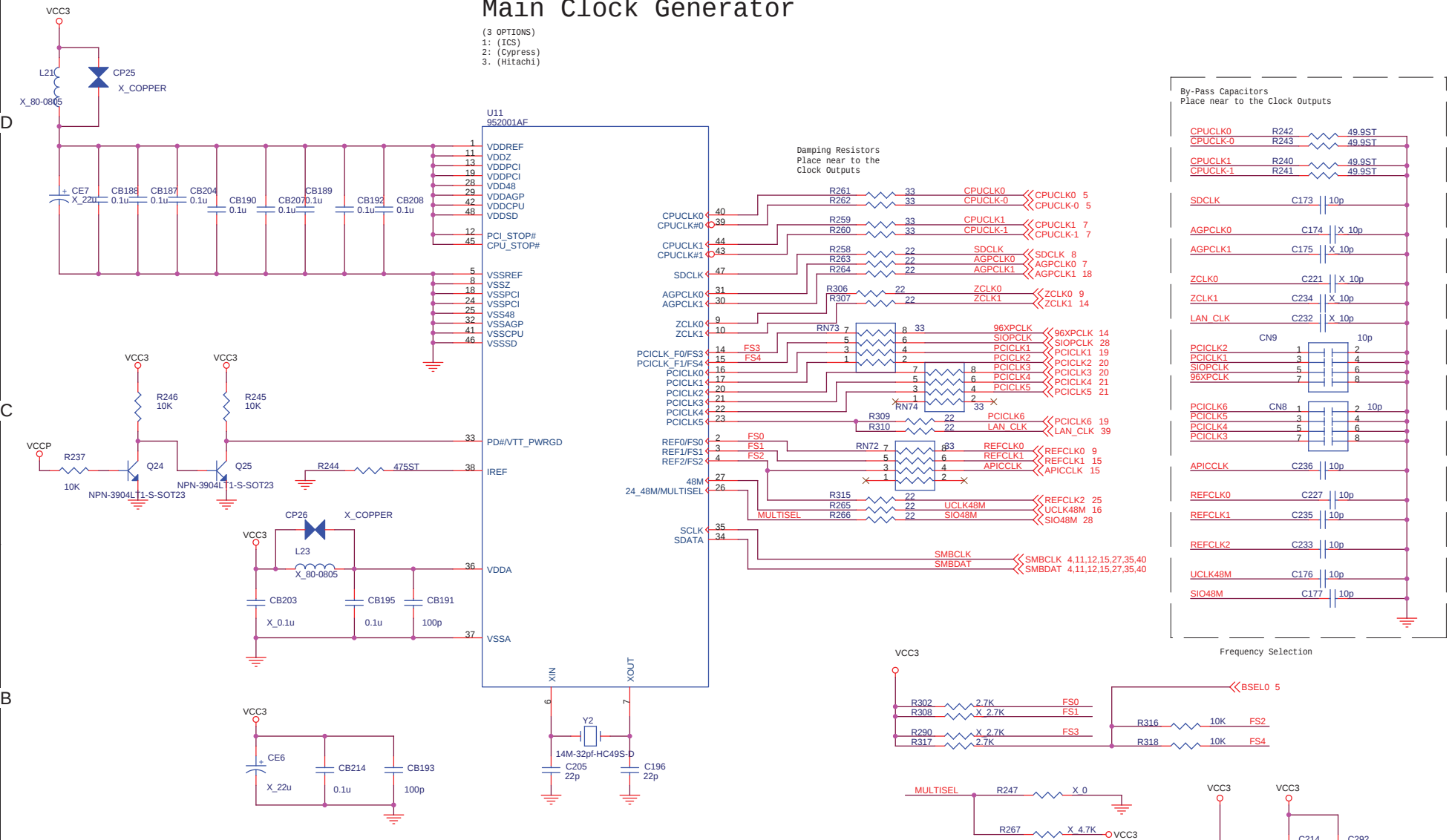
- Support Dual Monitor
- Support Max to six-PCI Devices
- SSTL-2 Termination (Only for DDR)

Document Information:

MICRO-STAR INT'L CO., LTD.		
Title: System Block Diagram		
Size: B	Document Number: MS-6581	Rev: 0A
Date: 2002.06.18	Sheet: 2	of 41

Main Clock Generator

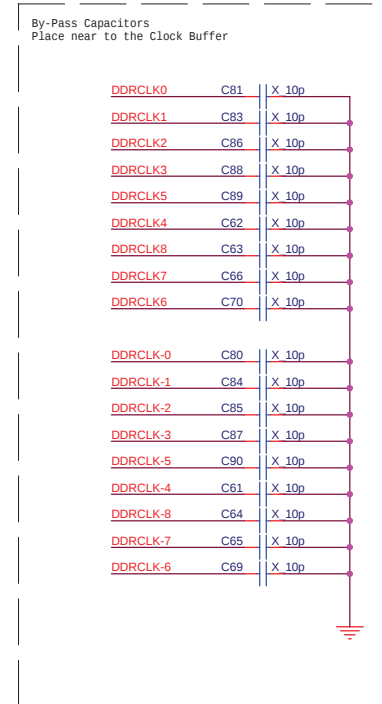
(3 OPTIONS)
1: (ICS)
2: (Cypress)
3: (Hitachi)



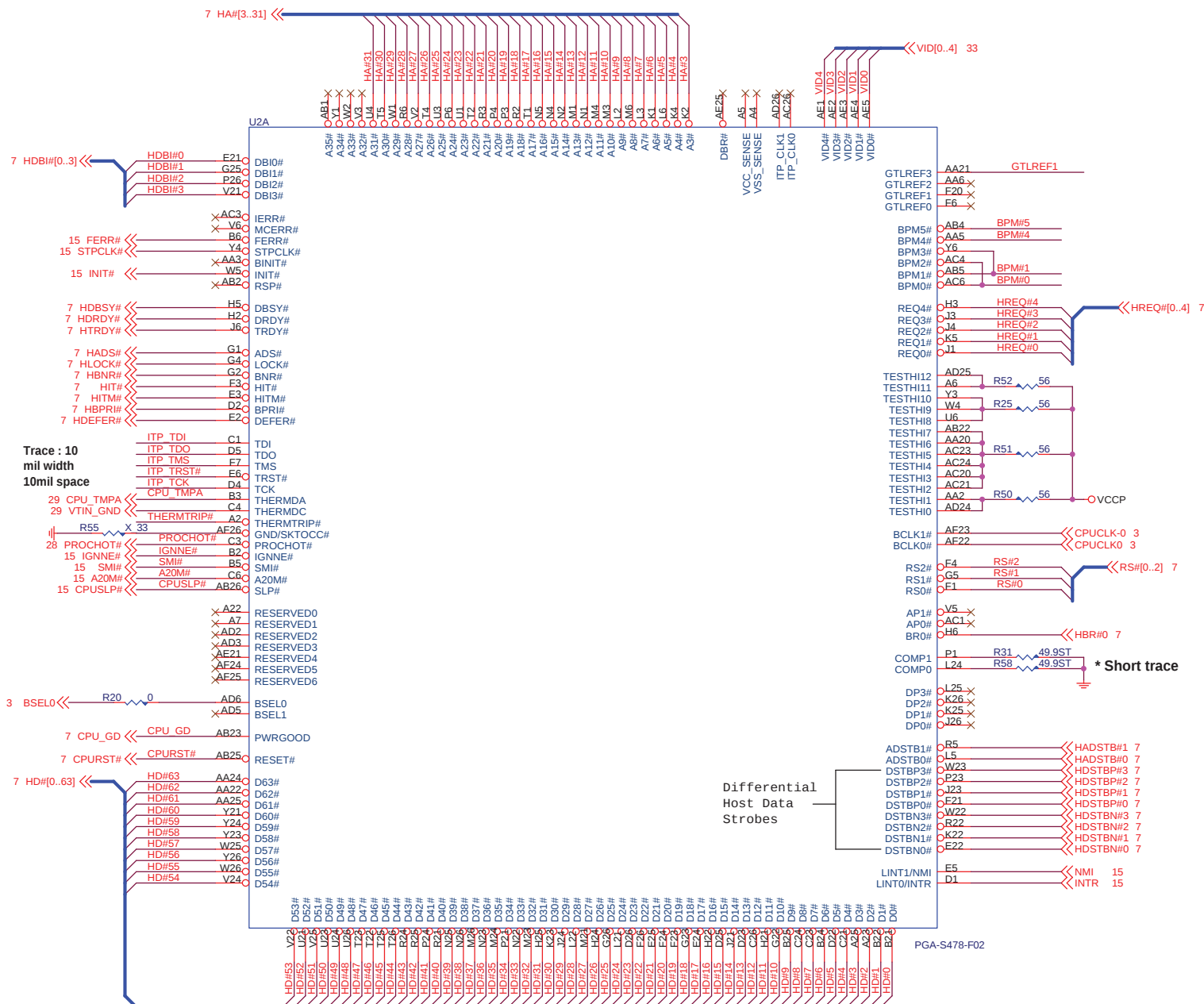
SIS650 CLOCK									
FS4	FS3	FS2	FS1	FS0	CPU (MHz)	SDRAM (MHz)	ZCLK (MHz)	AGPCLK (MHz)	PCI (MHz)
0	0	0	0	0					
0	0	0	0	1					
0	0	0	1	0					
0	0	0	1	1					
0	0	1	0	0					
0	0	1	0	1					
0	0	1	1	0					
0	0	1	1	1					
0	1	0	0	0					
0	1	0	0	1					
0	1	0	1	0					
0	1	0	1	1					
0	1	1	0	0					
0	1	1	0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

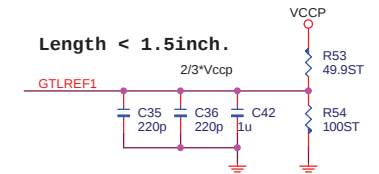
(OPTIONS)
1: (ICS-93705)



CPU SIGNAL BLOCK

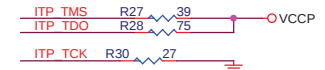


CPU GTL REFERENCE VOLTAGE BLOCK



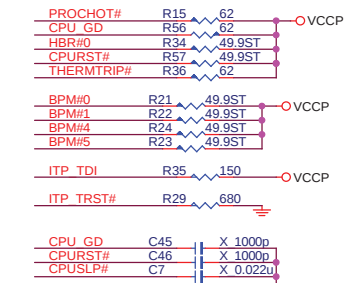
Every pin put one 220pF cap near it.
Trace Width 15mils, Space 15mils.
Keep the voltage dividers within 1.5 inches of the first GTLREF Pin

CPU ITP BLOCK



CPU STRAPPING RESISTORS

ALL COMPONENTS CLOSE TO CPU



MICRO-STAR INT'L CO.,LTD.

Title	mPGA478 CPU-1
-------	---------------

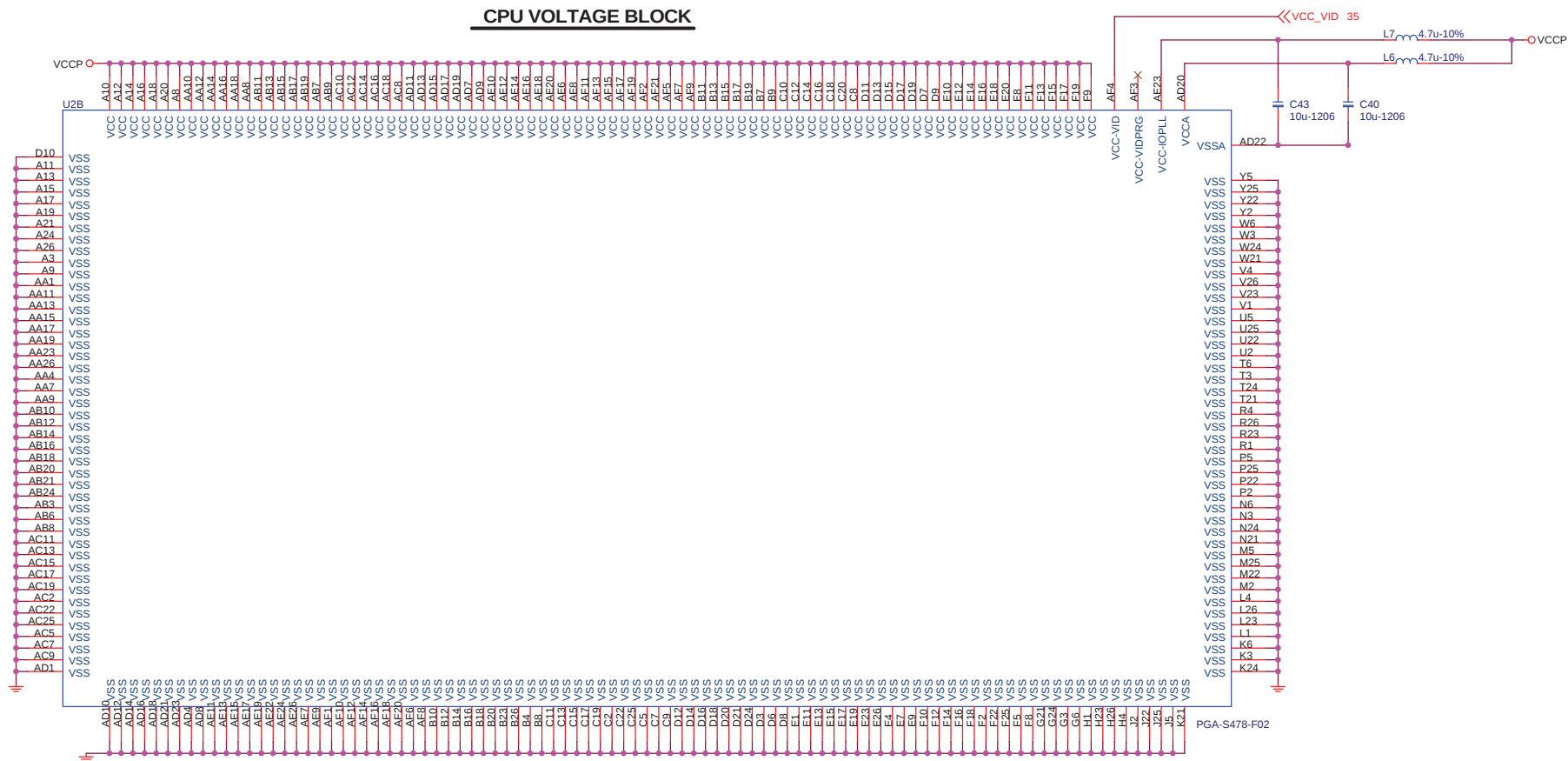
Size	Document Number MS-6581
------	----------------------------

Custom
Date: 星期一 六月 18 20

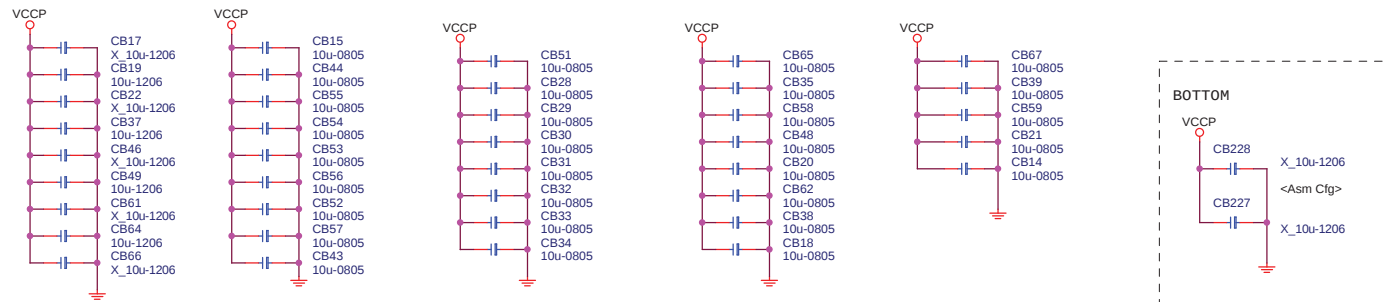
Sheet 5 of 41

Rev
0A

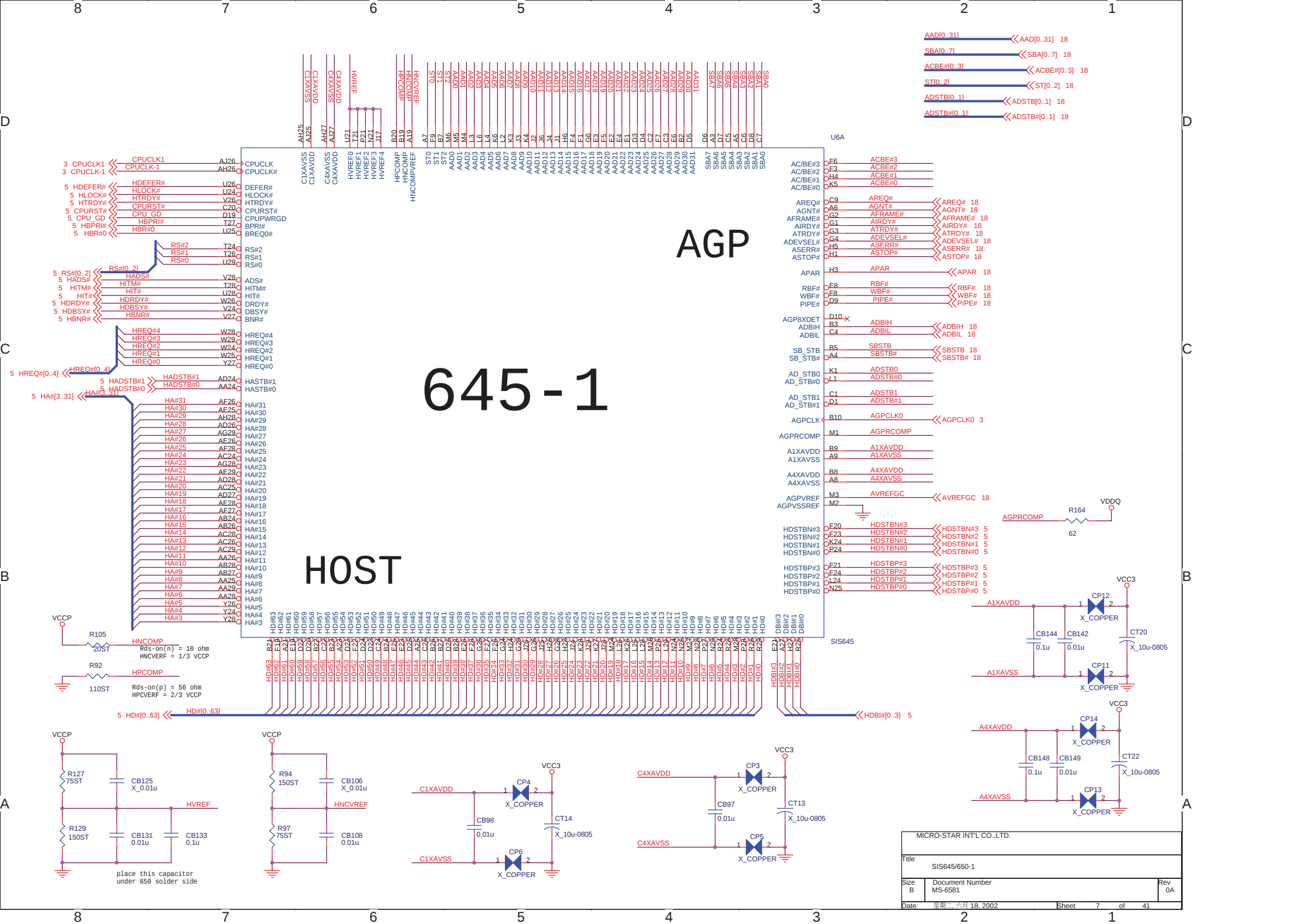
CPU VOLTAGE BLOCK

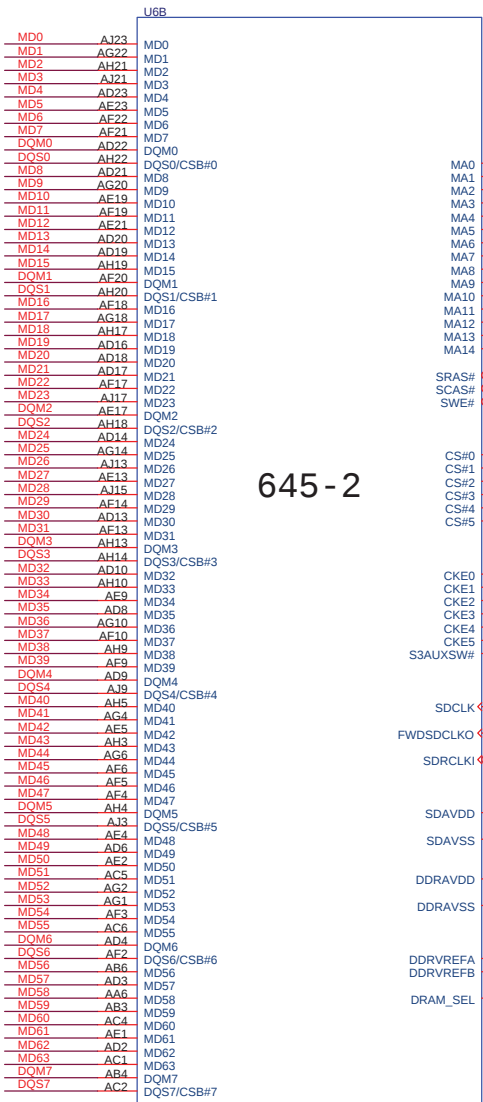
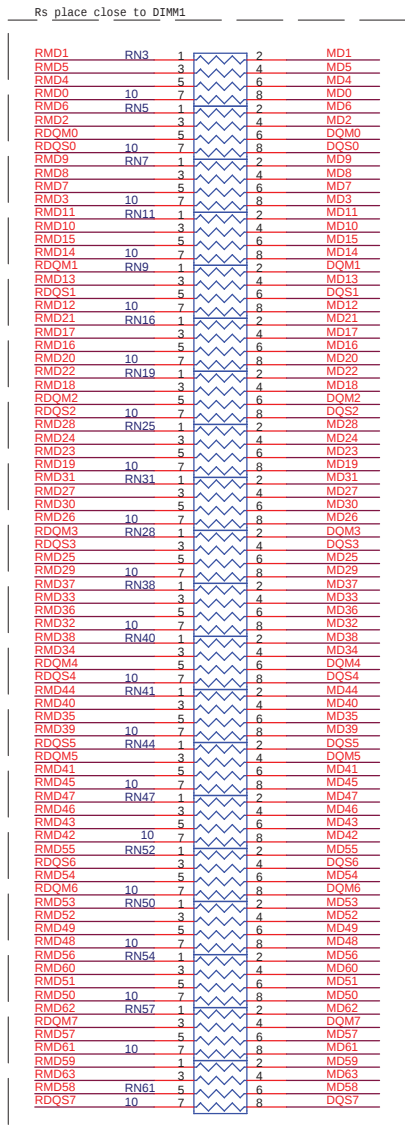


CPU DECOUPLING CAPACITORS

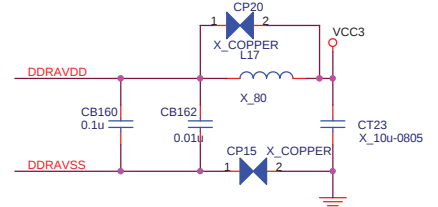
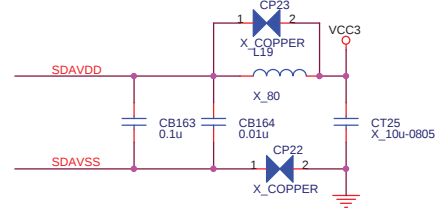
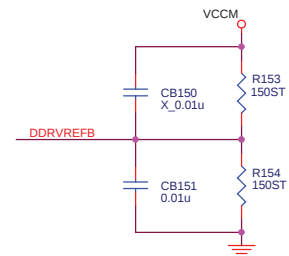
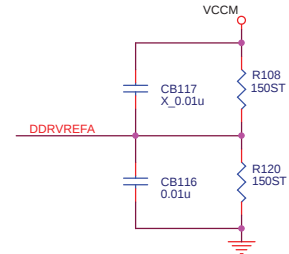
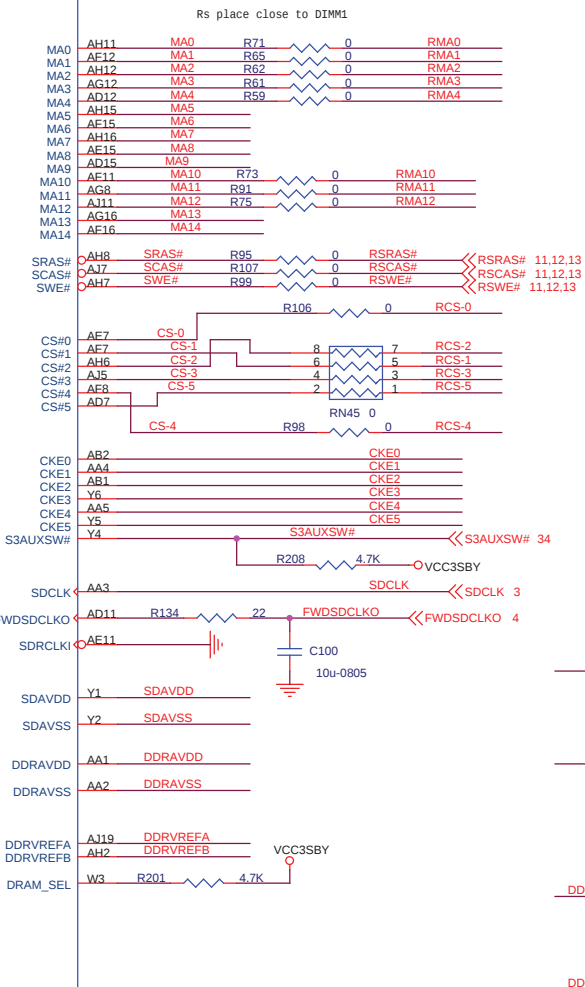
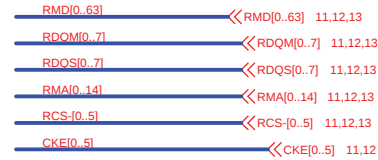
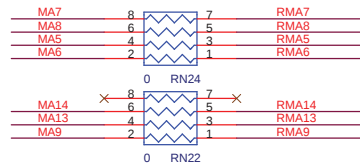


PLACE CAPS WITHIN CPU CAVITY





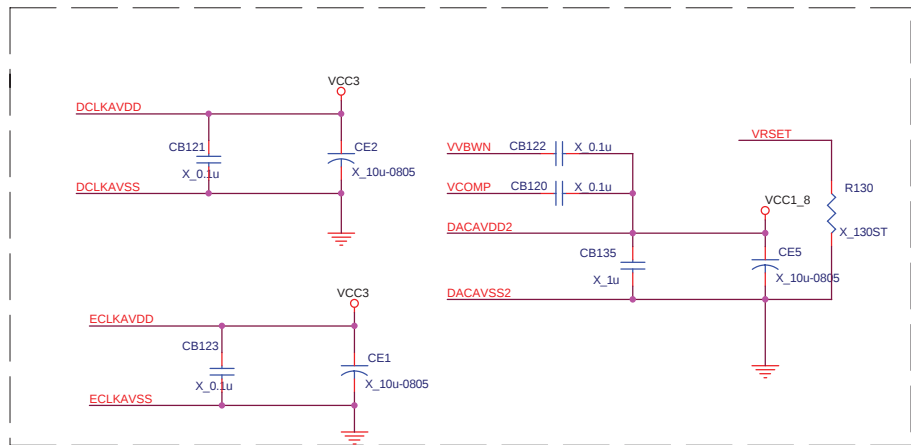
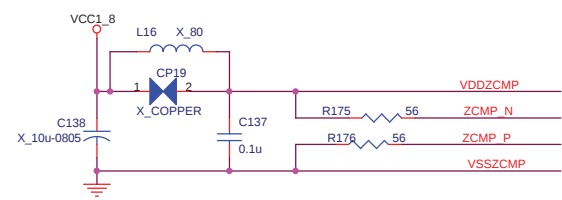
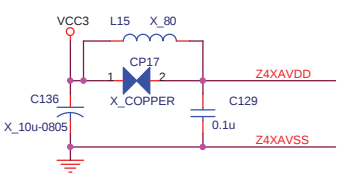
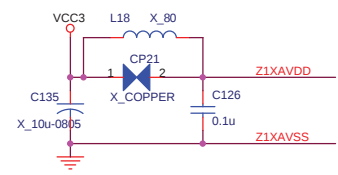
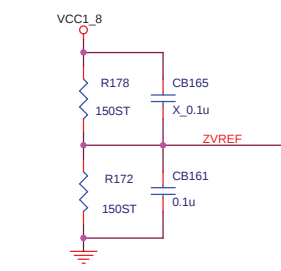
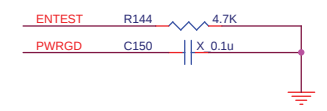
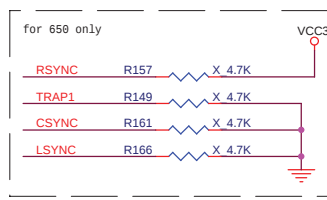
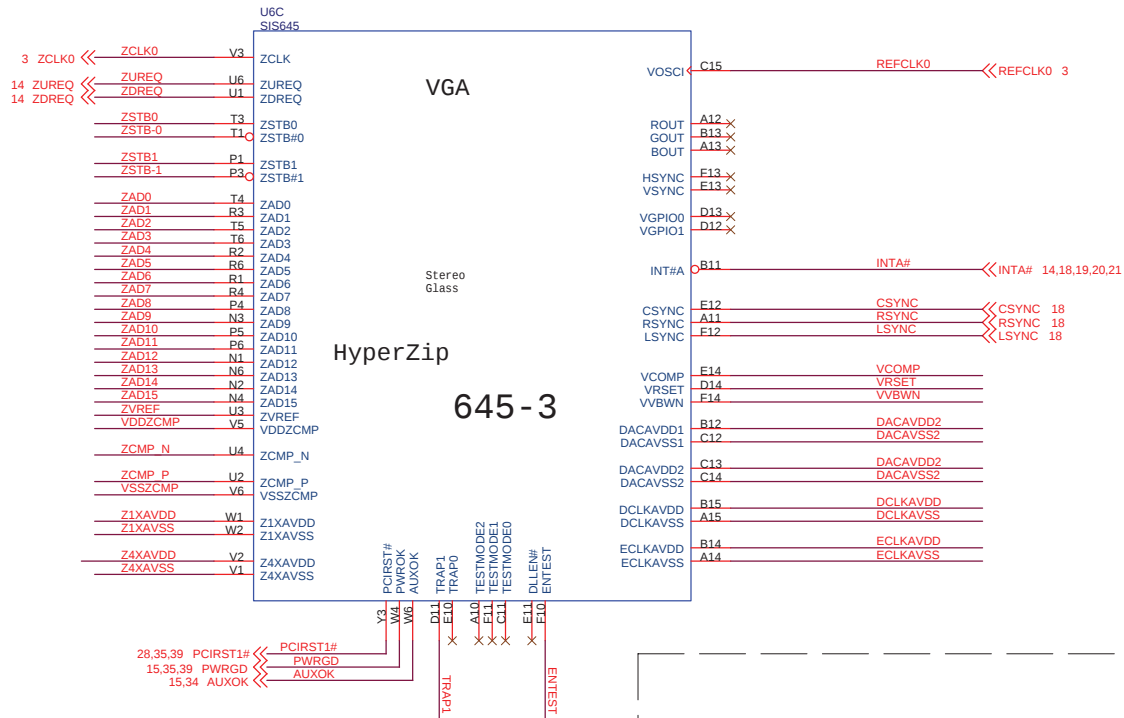
SIS645



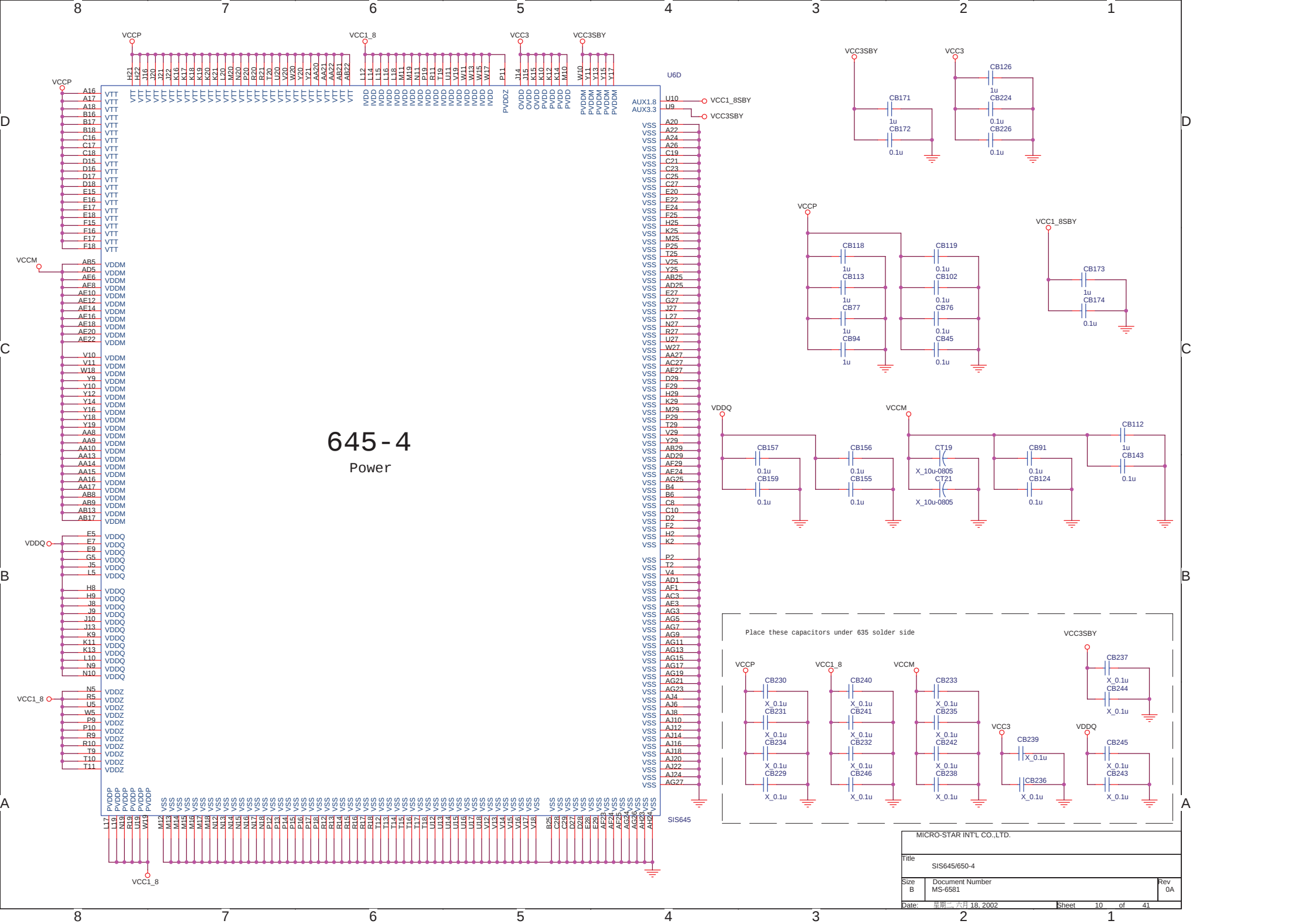
NOTE: This page is for universal PCB design(suitable for both 645 or 650)

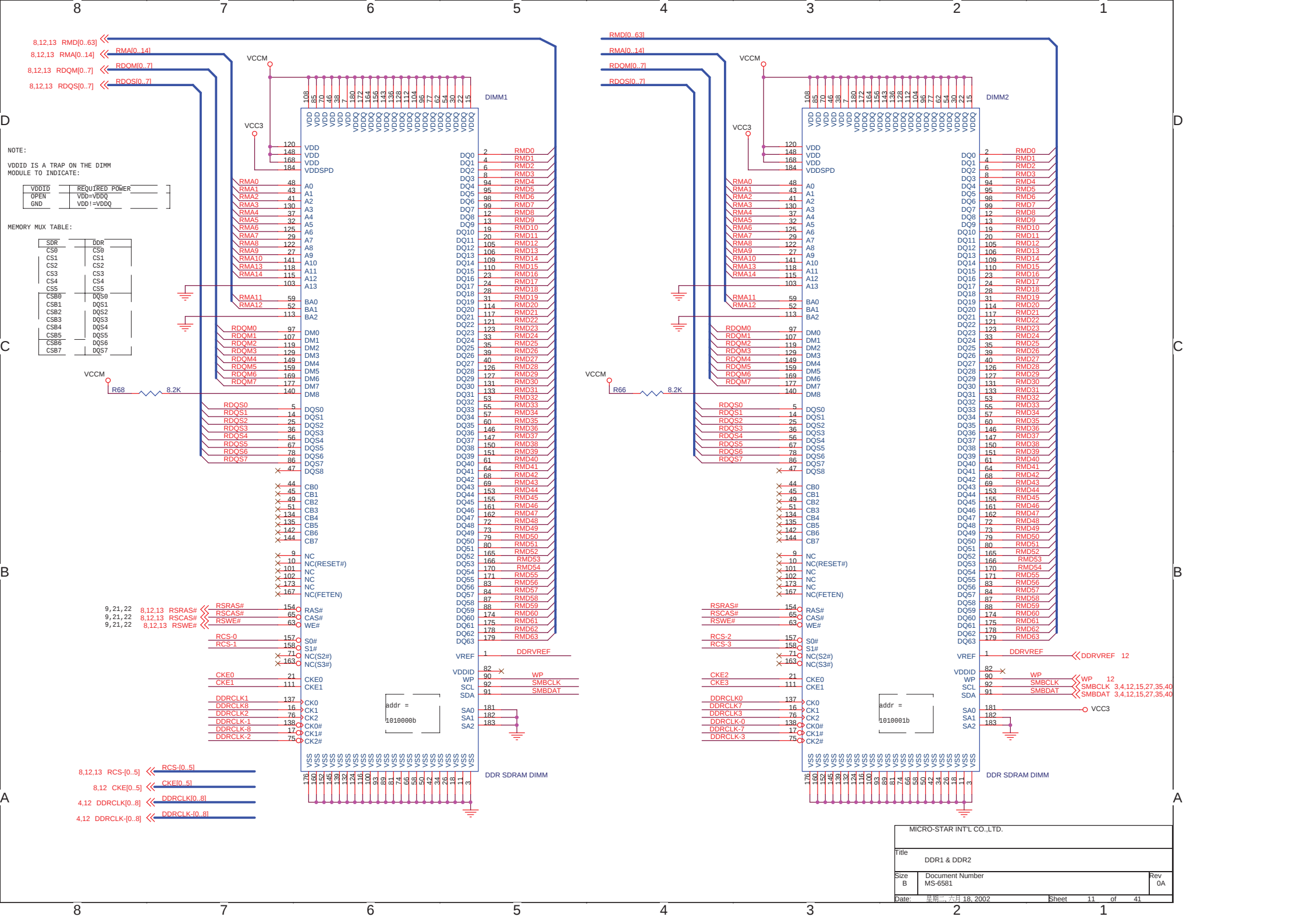
NB Hardware Trap Table

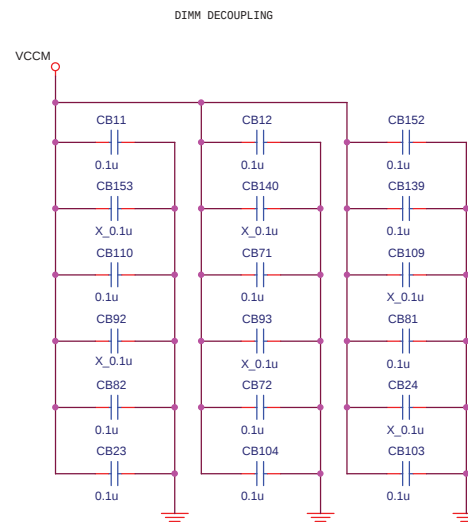
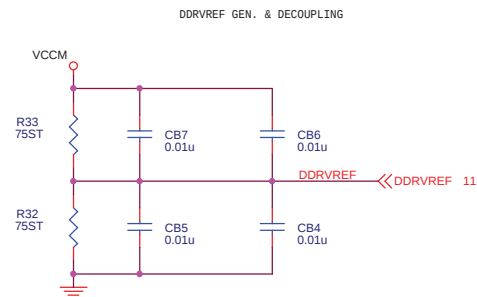
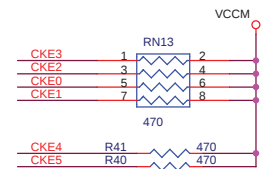
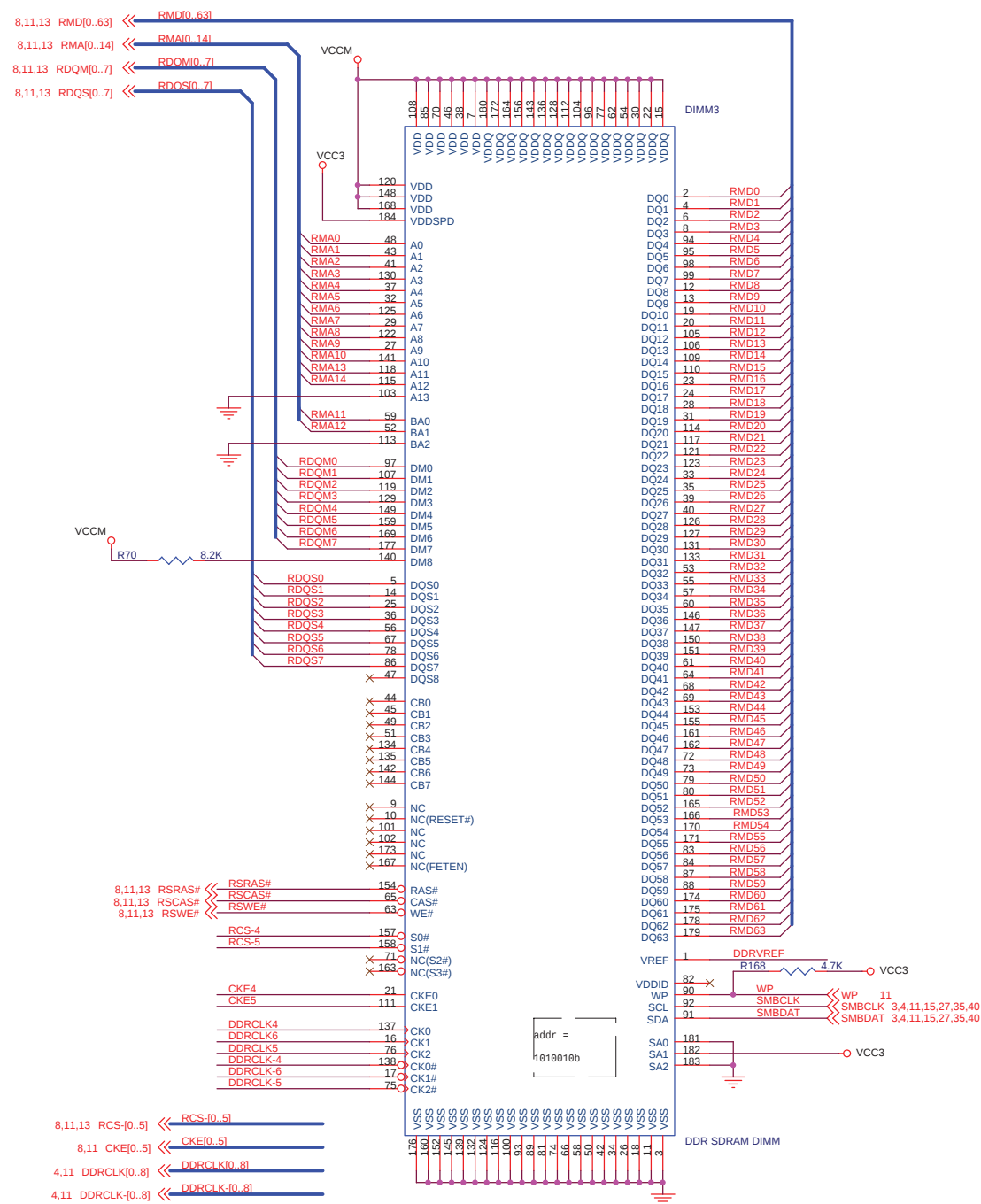
	0	1	Default	embedded pull-low (30-50K Ohm)
DLEN#	enable PLL	disable PLL	0	yes
DRAM_SEL	SDR	DDR	1(DDR)	yes
TRAP0	normal	NB debug mode	0	yes
TRAP1	TV selection, NTSC/PAL(0/1)			0
CSYNC	enable VB		0	
RSYNC	enable VGA interface		1	
LSYNC	enable panel link		0	



MICRO-STAR INT'L CO.,LTD.		
Title SIS645/650		
Size B	Document Number MS-6581	Rev 0A
Date 星期二, 六月 18, 2002	Sheet 9	of 41





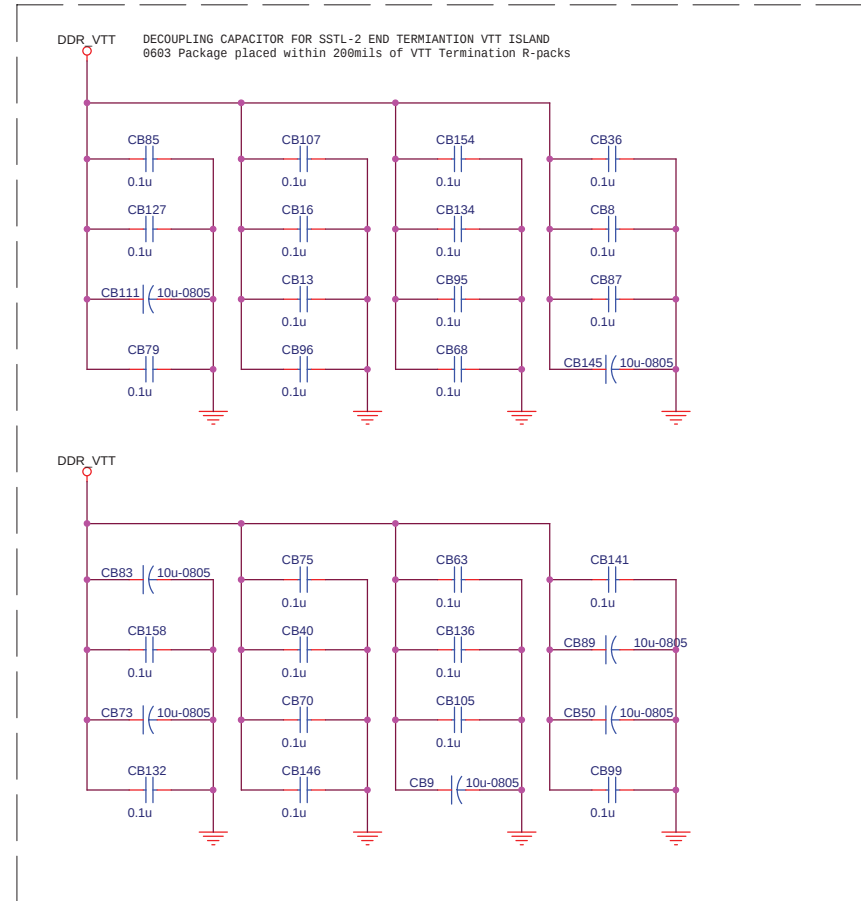
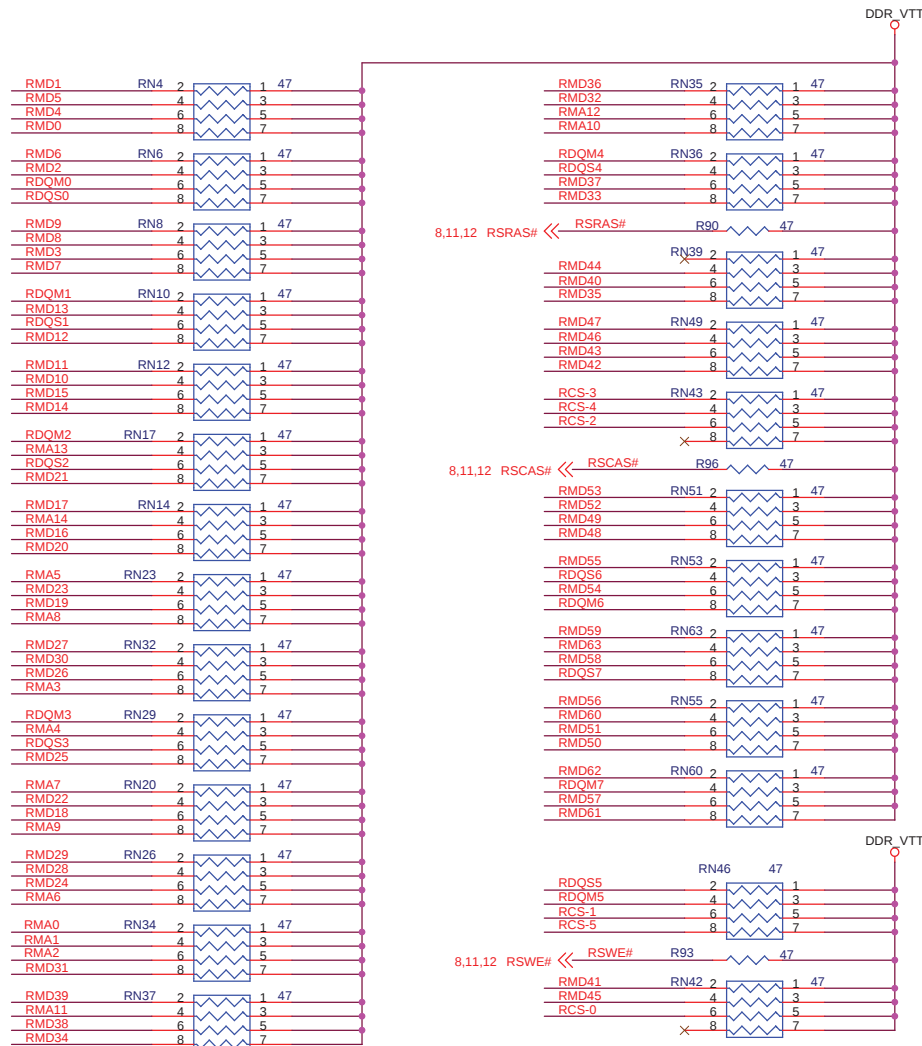


MICRO-STAR INT'L CO.,LTD.			
Title DDR3			
Size B	Document Number MS-6581		Rev 0A
Date:	星期二, 六月 18, 2002	Sheet 12 of 41	

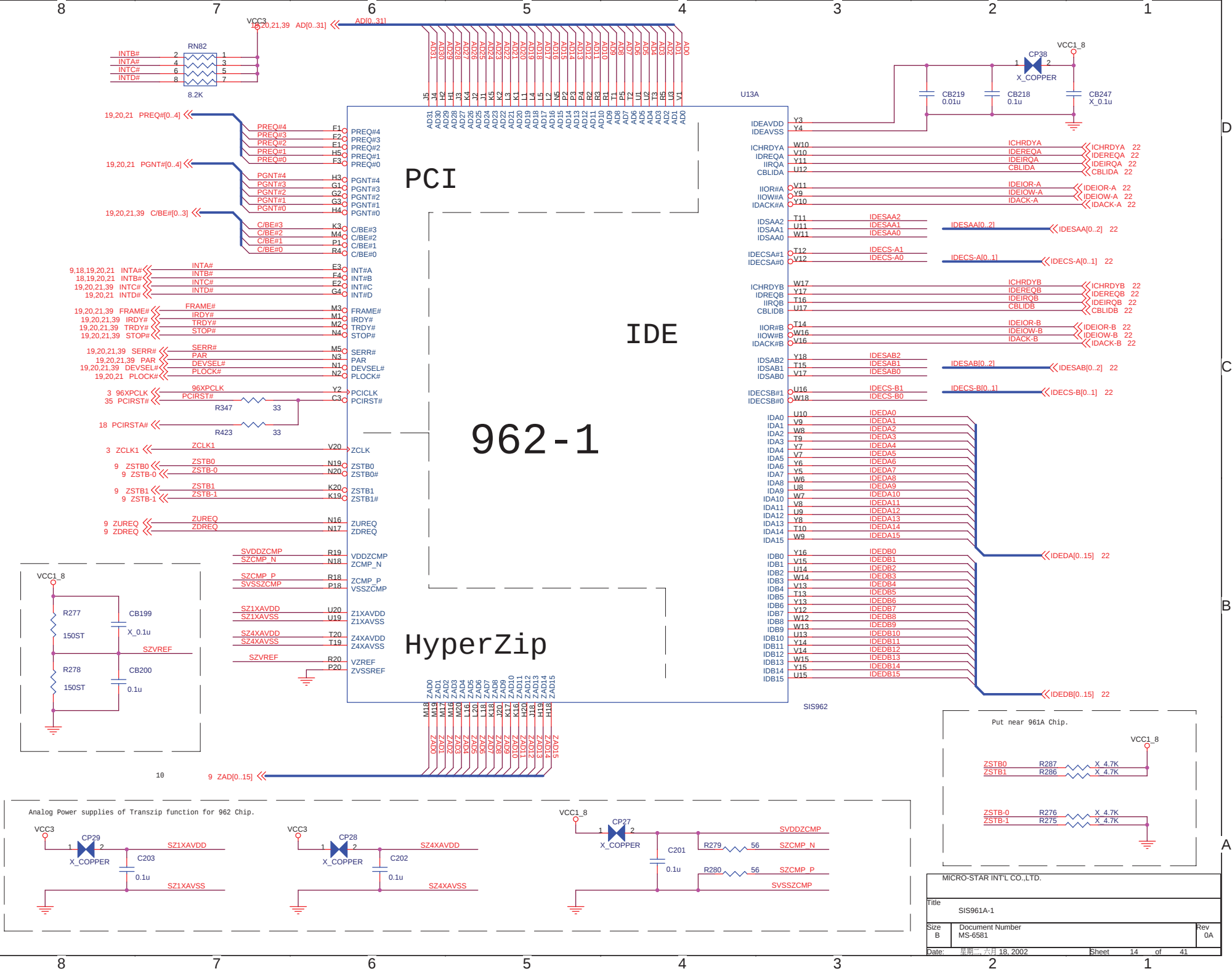
SSTL-2 Termination Resistors

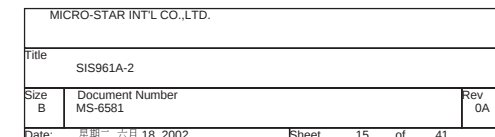
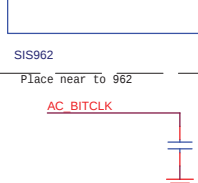
RMD[0..63]	<<RMD[0..63]	8,11,12
RDOM[0..7]	<<RDOM[0..7]	8,11,12
RDO5[0..7]	<<RDO5[0..7]	8,11,12
RMA[0..14]	<<RMA[0..14]	8,11,12
RCS[0..5]	<<RCS[0..5]	8,11,12

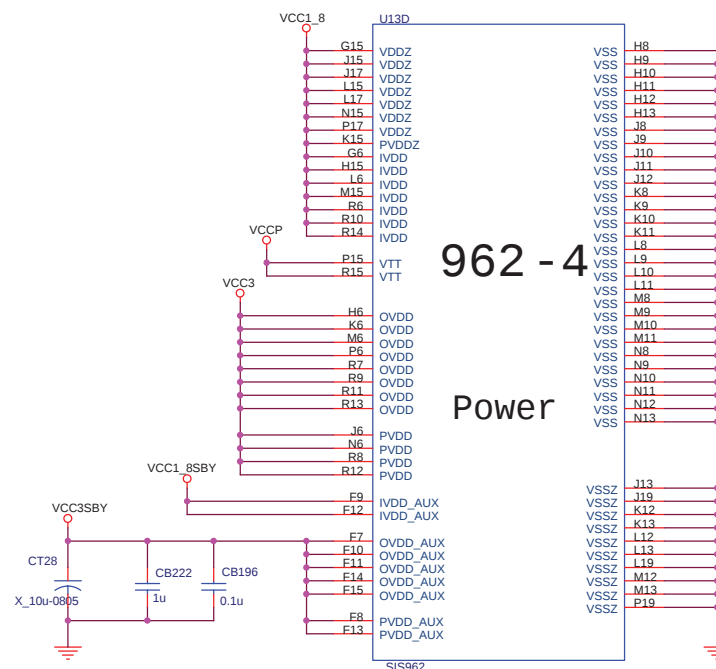
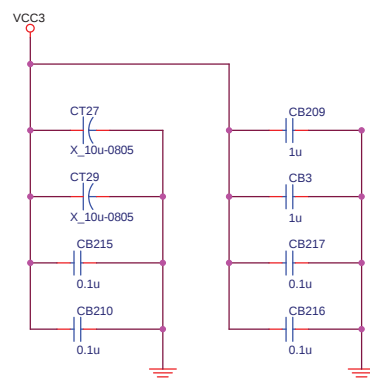
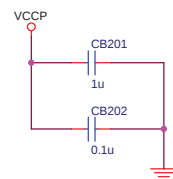
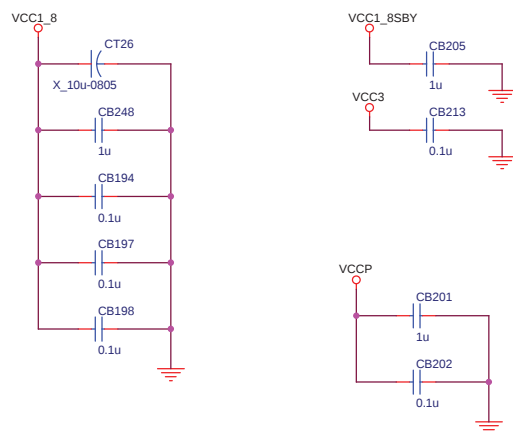
	SDR		DDR		
MD/DQM(/DQS)	LV-CMOS	RS	SSTL-2	RS	RTT
MA/Control	LV-CMOS	10/10/-	SSTL-2	10	47
CS	LV-CMOS	10	SSTL-2	0	47
CKE	DD 3.3V	0	DD 2.5V	0	47



MICRO-STAR INT'L CO.,LTD.			
Title			
DDR TERMINATOR			
Size	Document Number	Rev	
Custom	MS-6581	0A	
Date:	星期二, 六月 18, 2002	Sheet	13 of 41

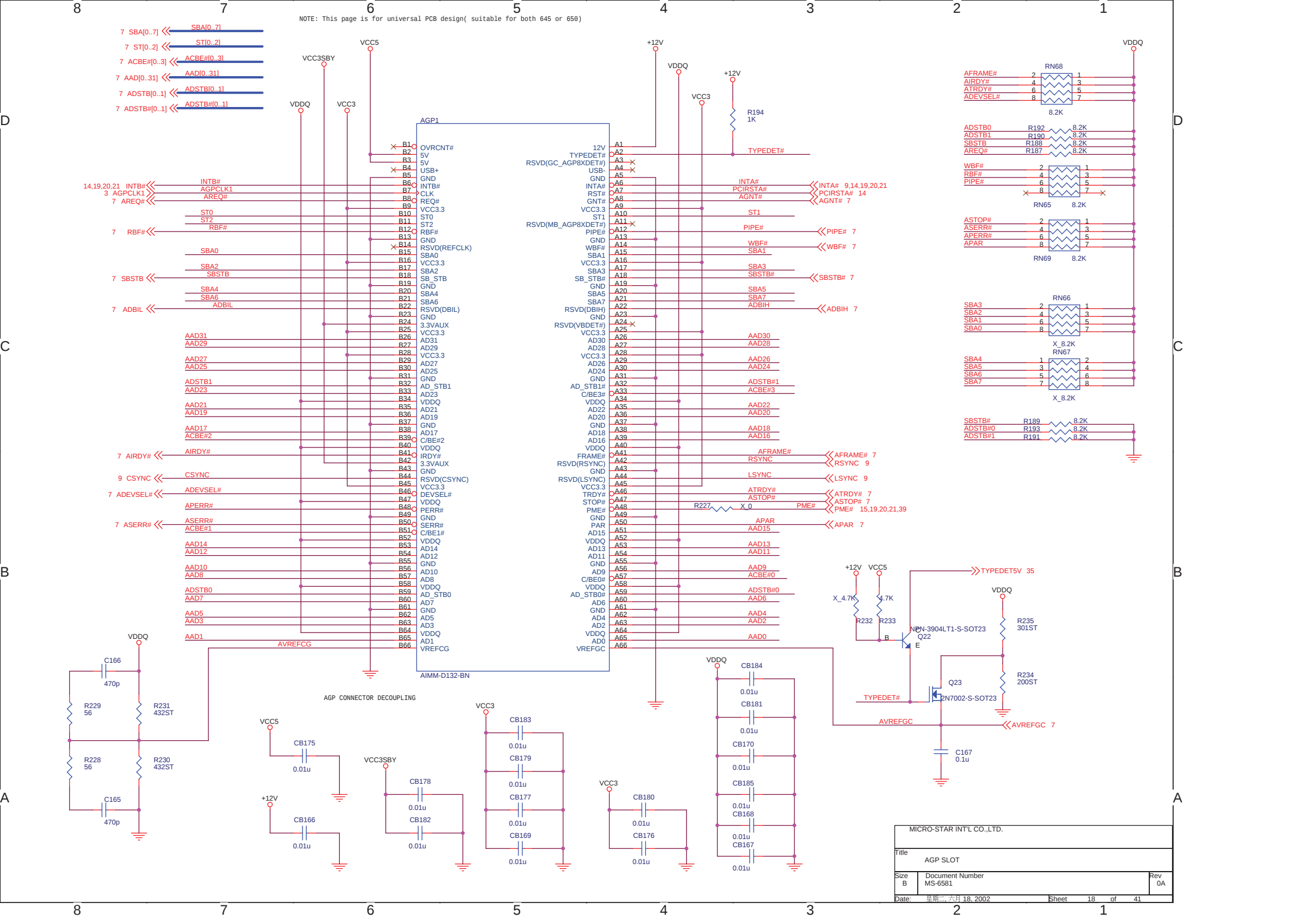


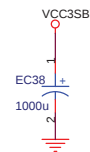
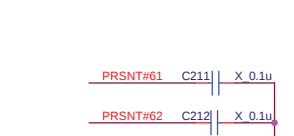
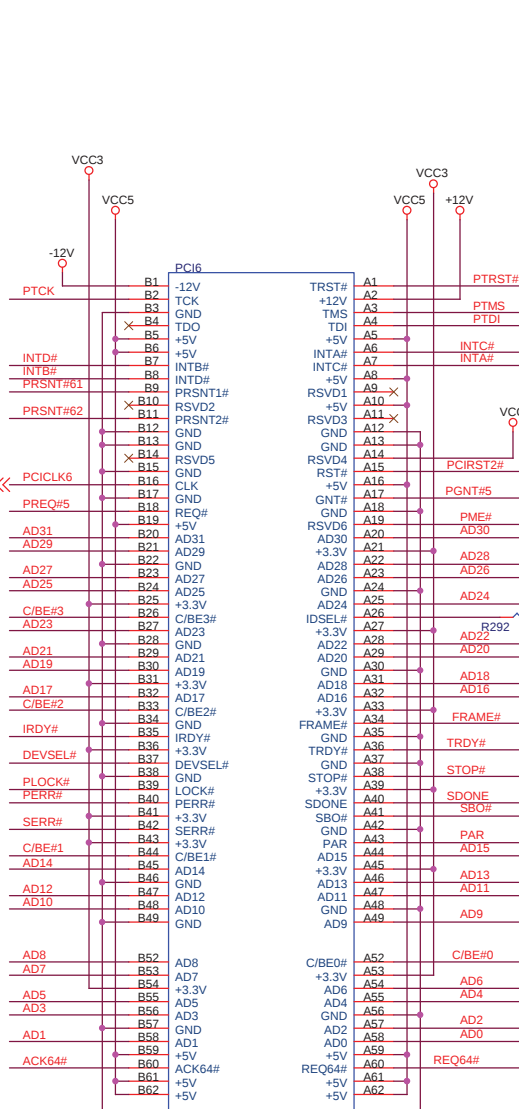
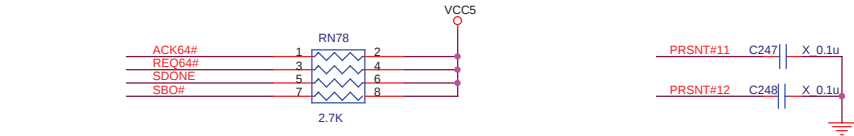
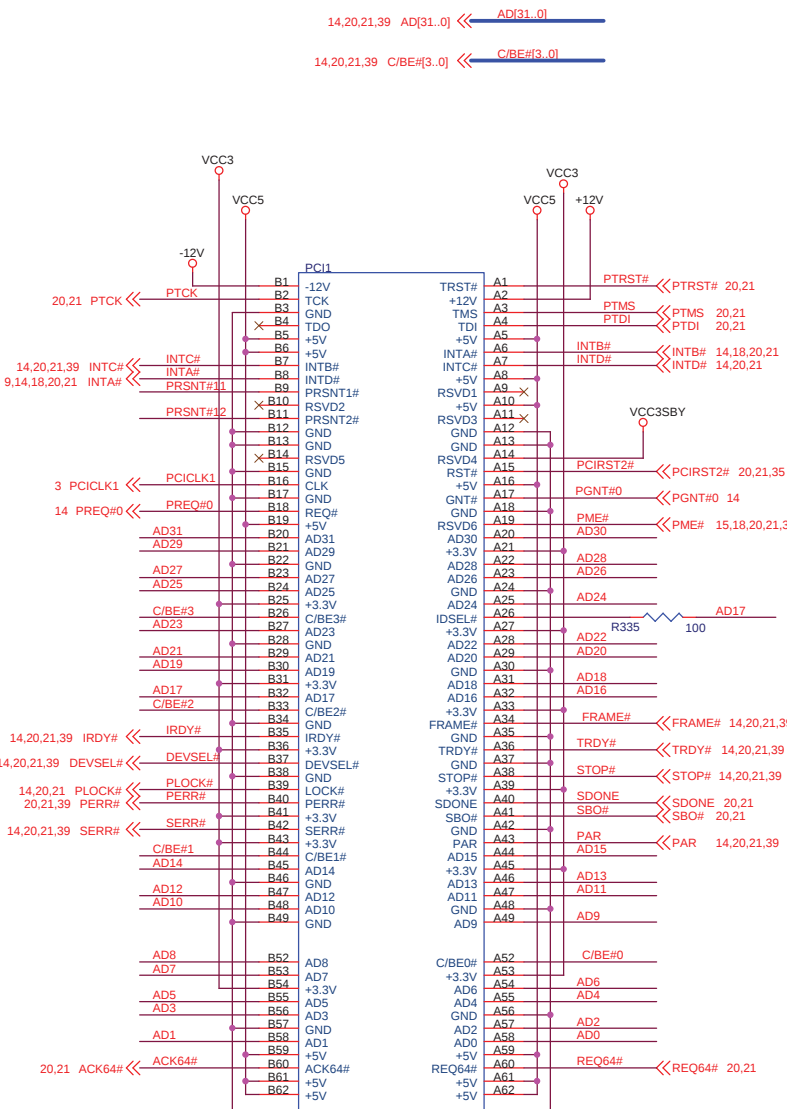




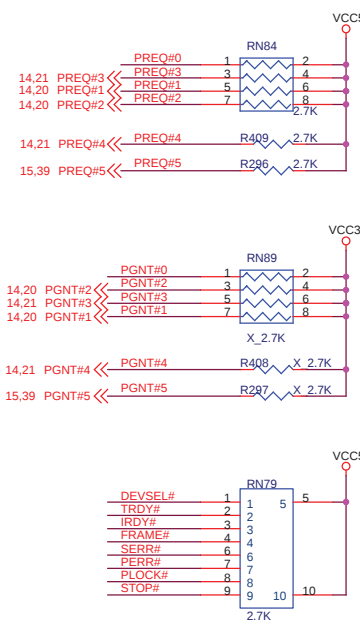
962 - 4

Power

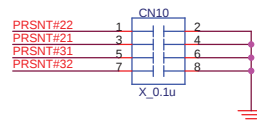
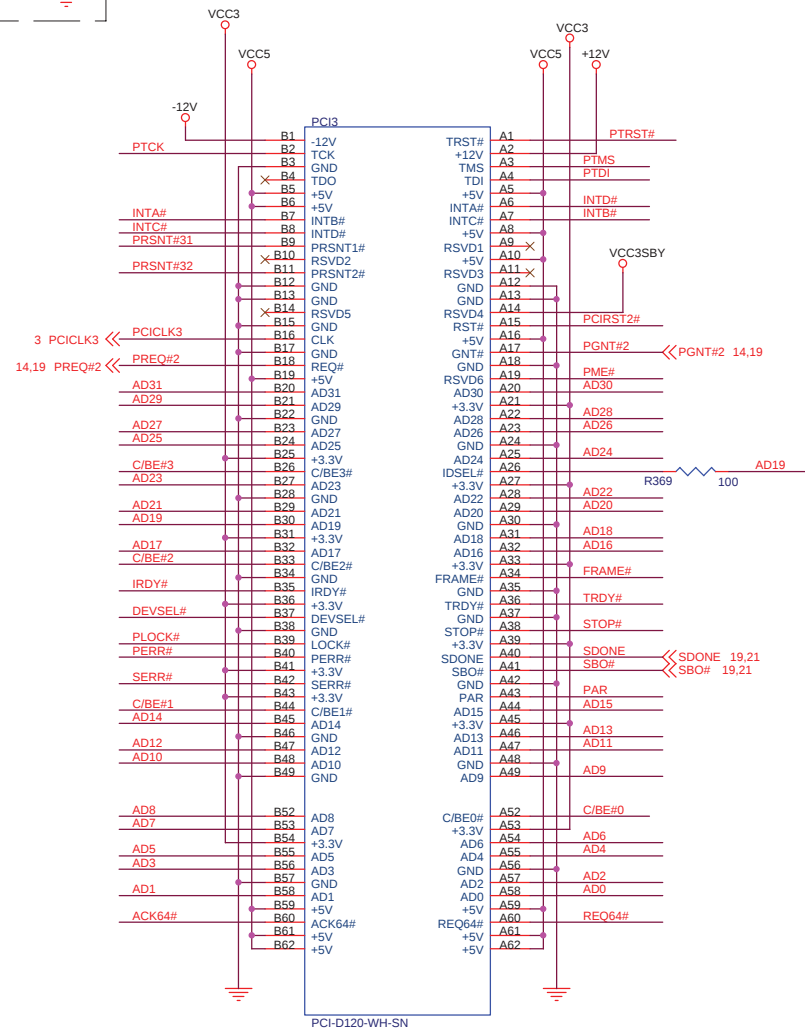
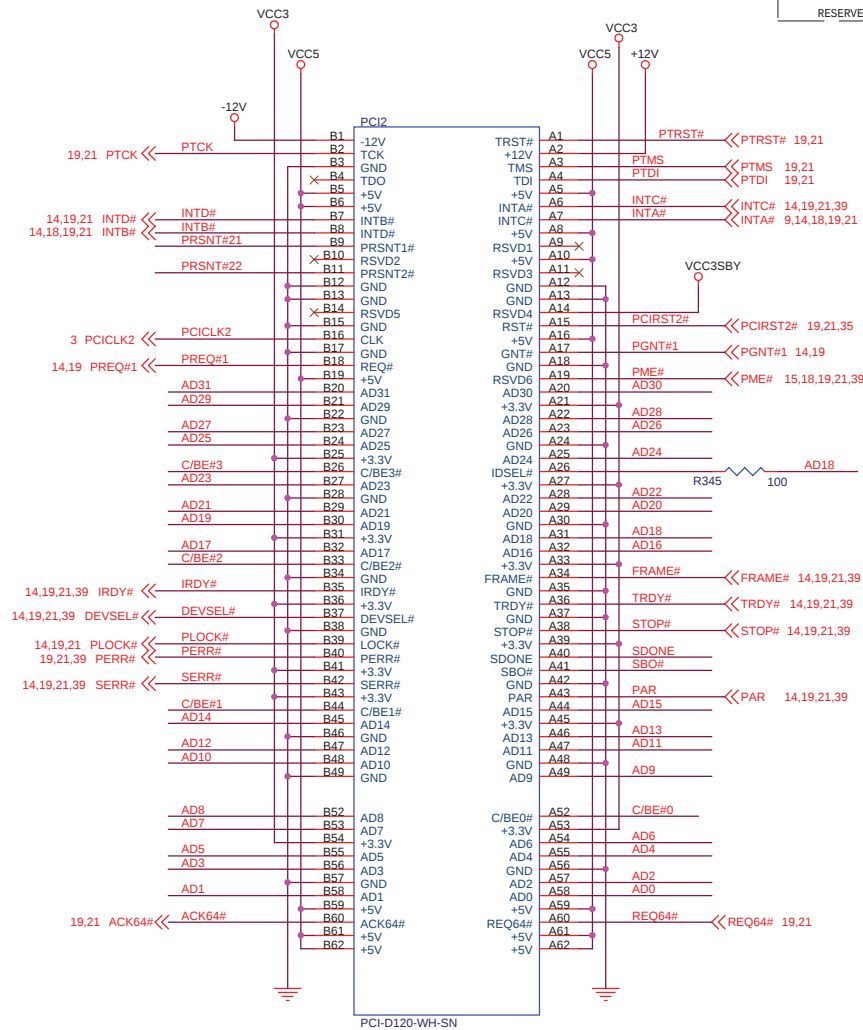
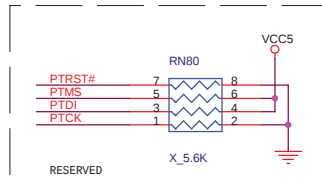


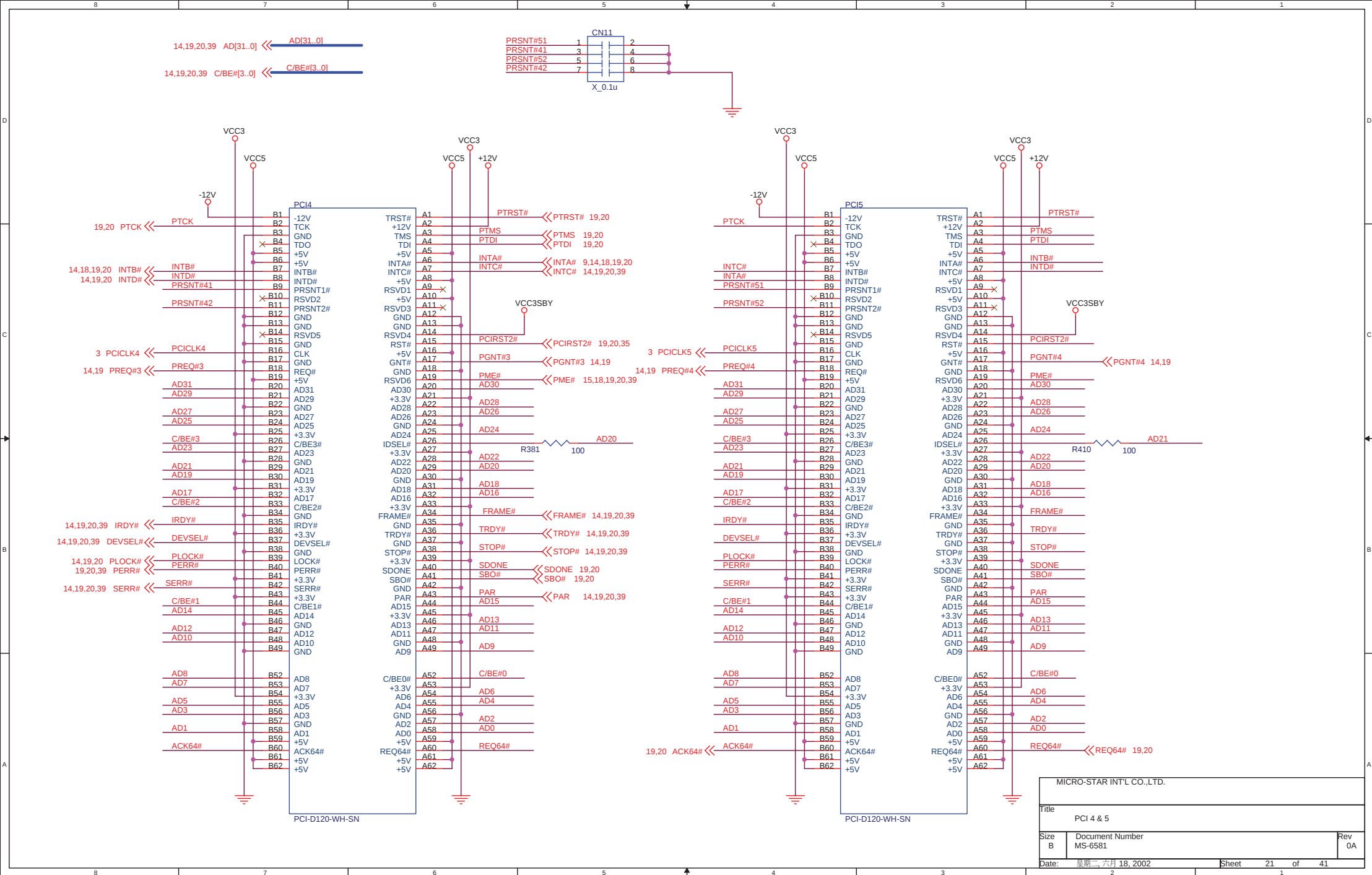


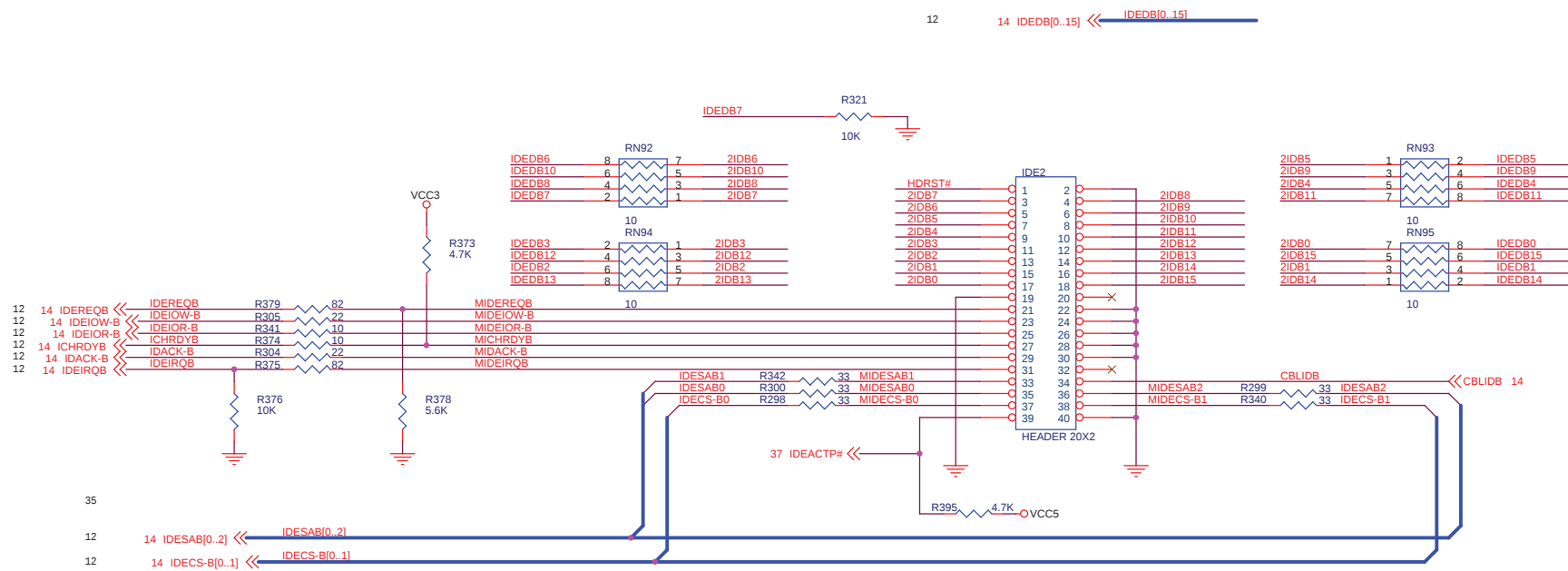
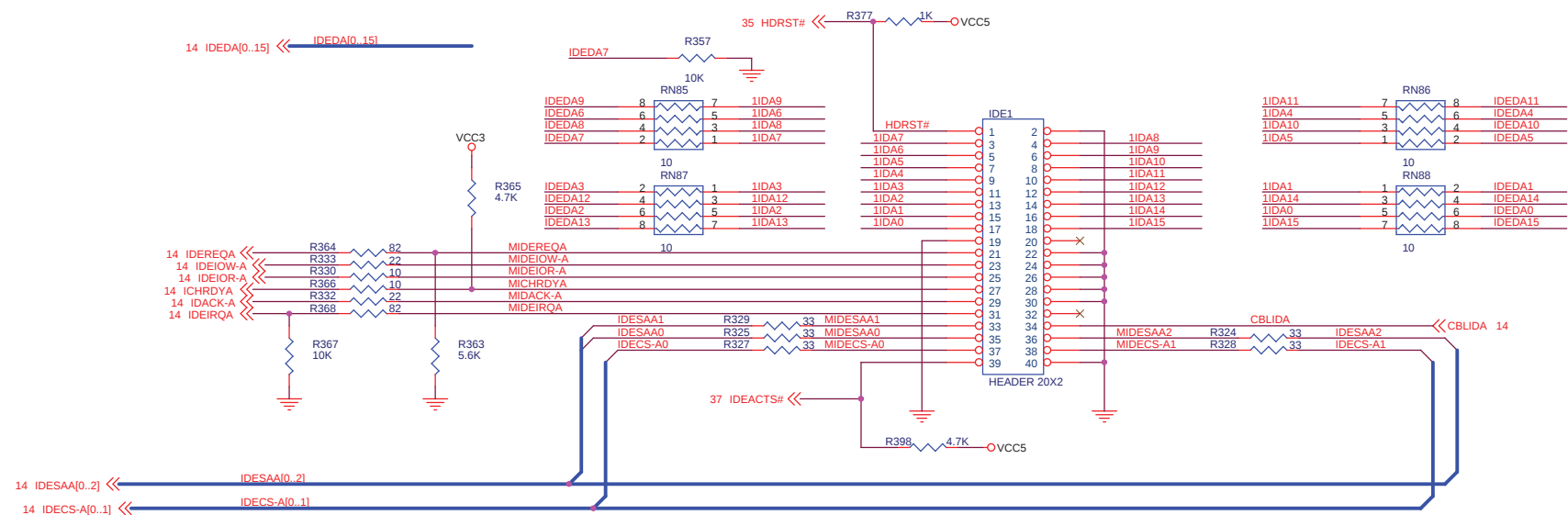
PCI BUS PULL-UP



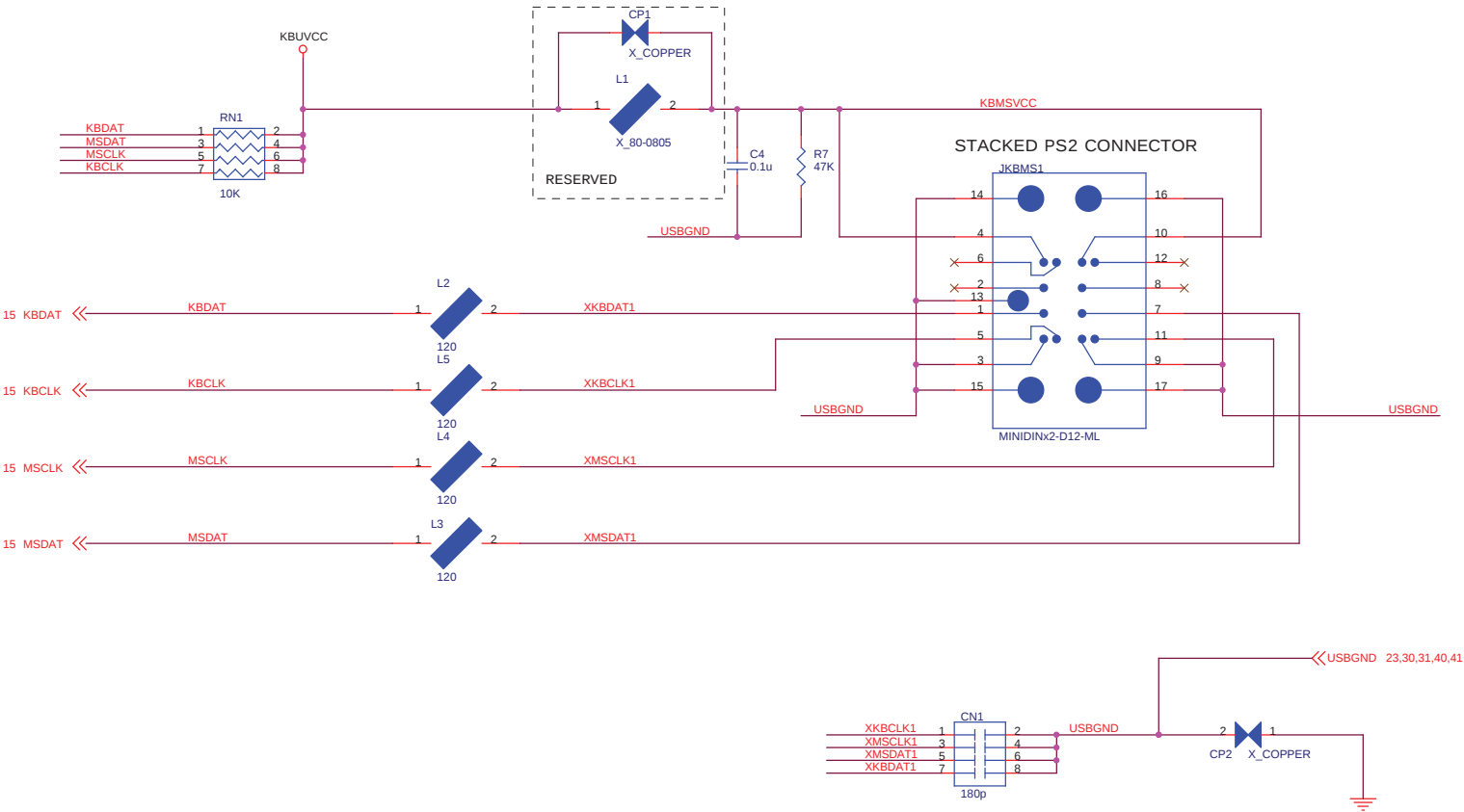
14,19,21,39 AD[31..0] << AD[31..0]
14,19,21,39 C/BE#[3..0] << C/BE#[3..0]

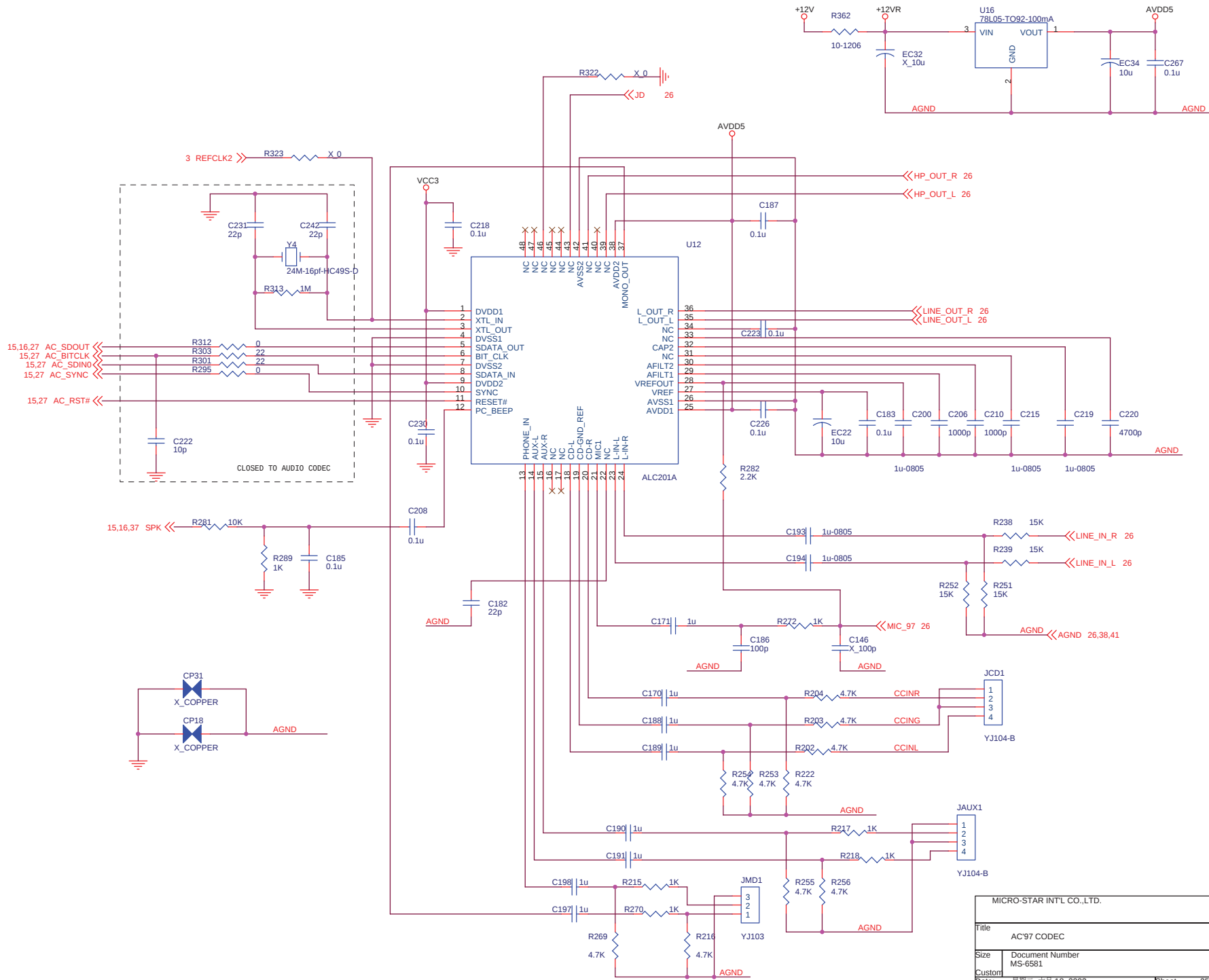




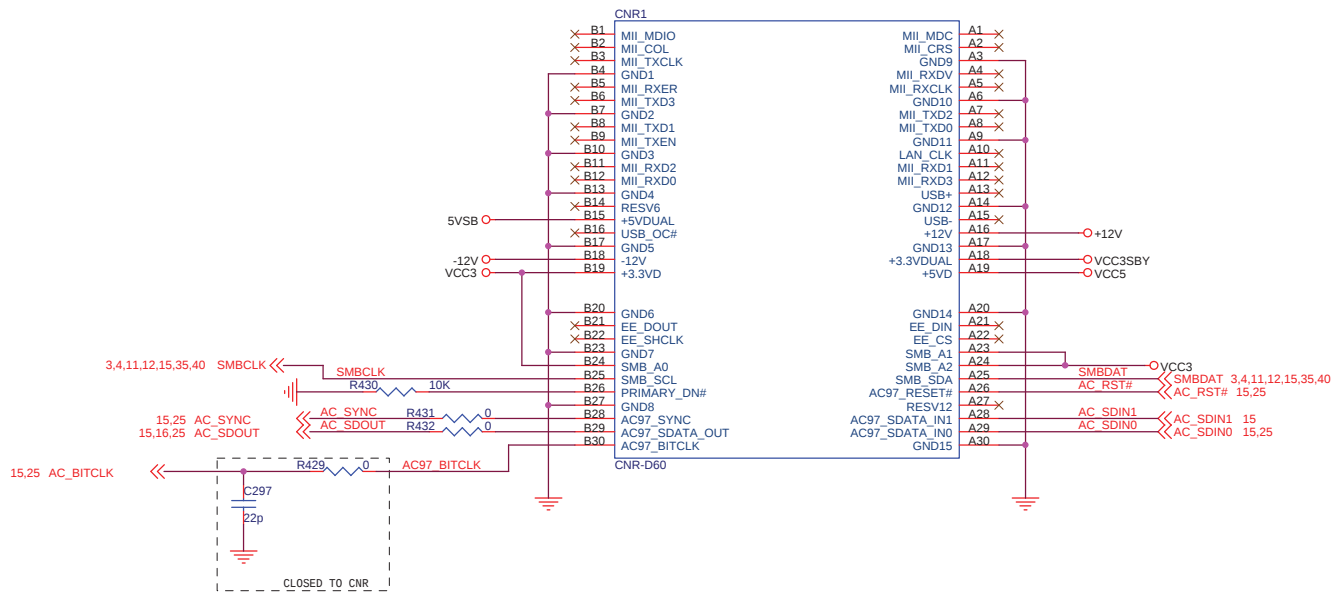


KEYBOARD/MOUSE PORTS

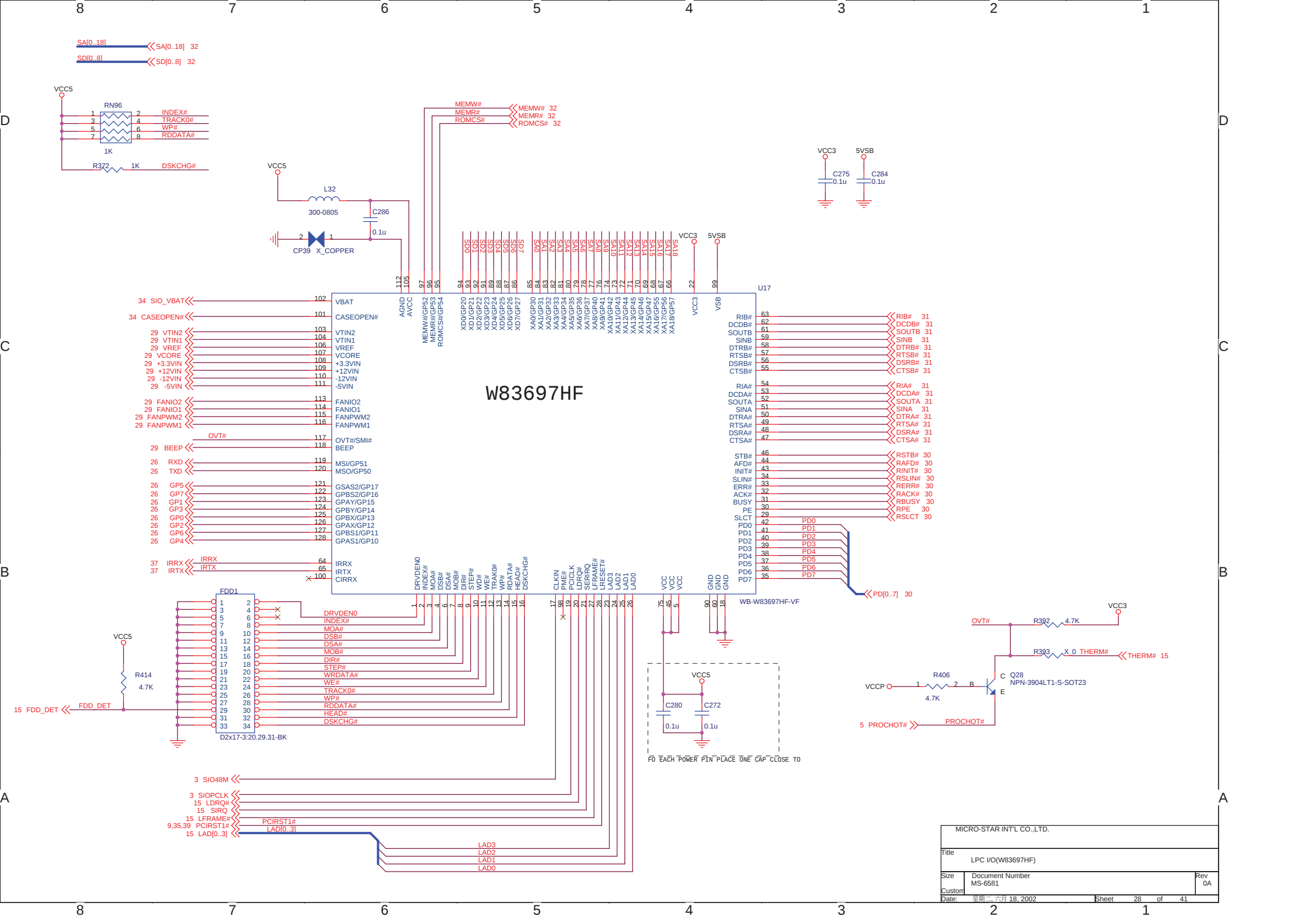




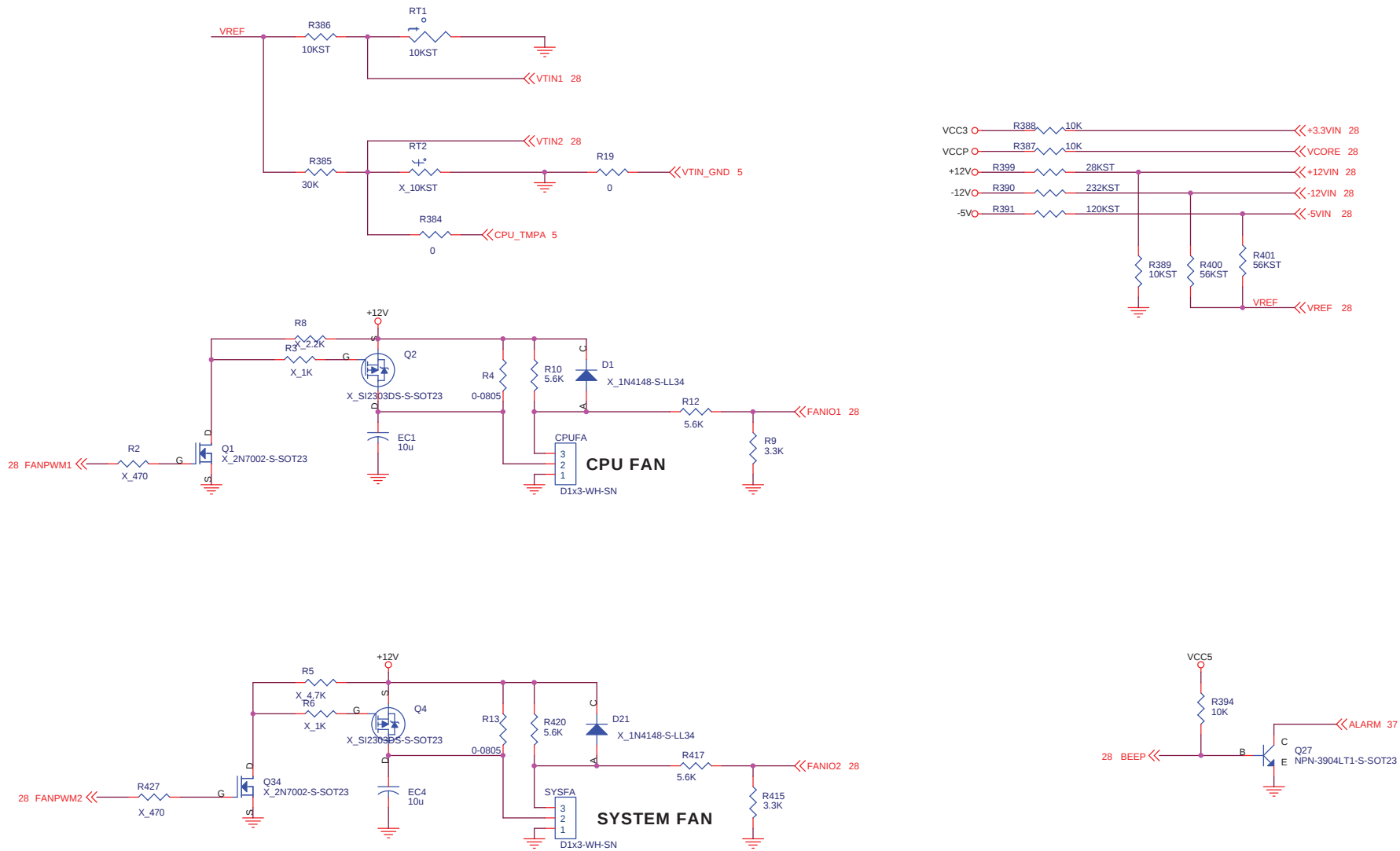
MICRO-STAR INT'L CO.,LTD.			
Title AC'97 CODEC			
Size	Document Number MS-6581		Rev 0A
Custom			
Date:	18/06/2002		Sheet 25 of 41

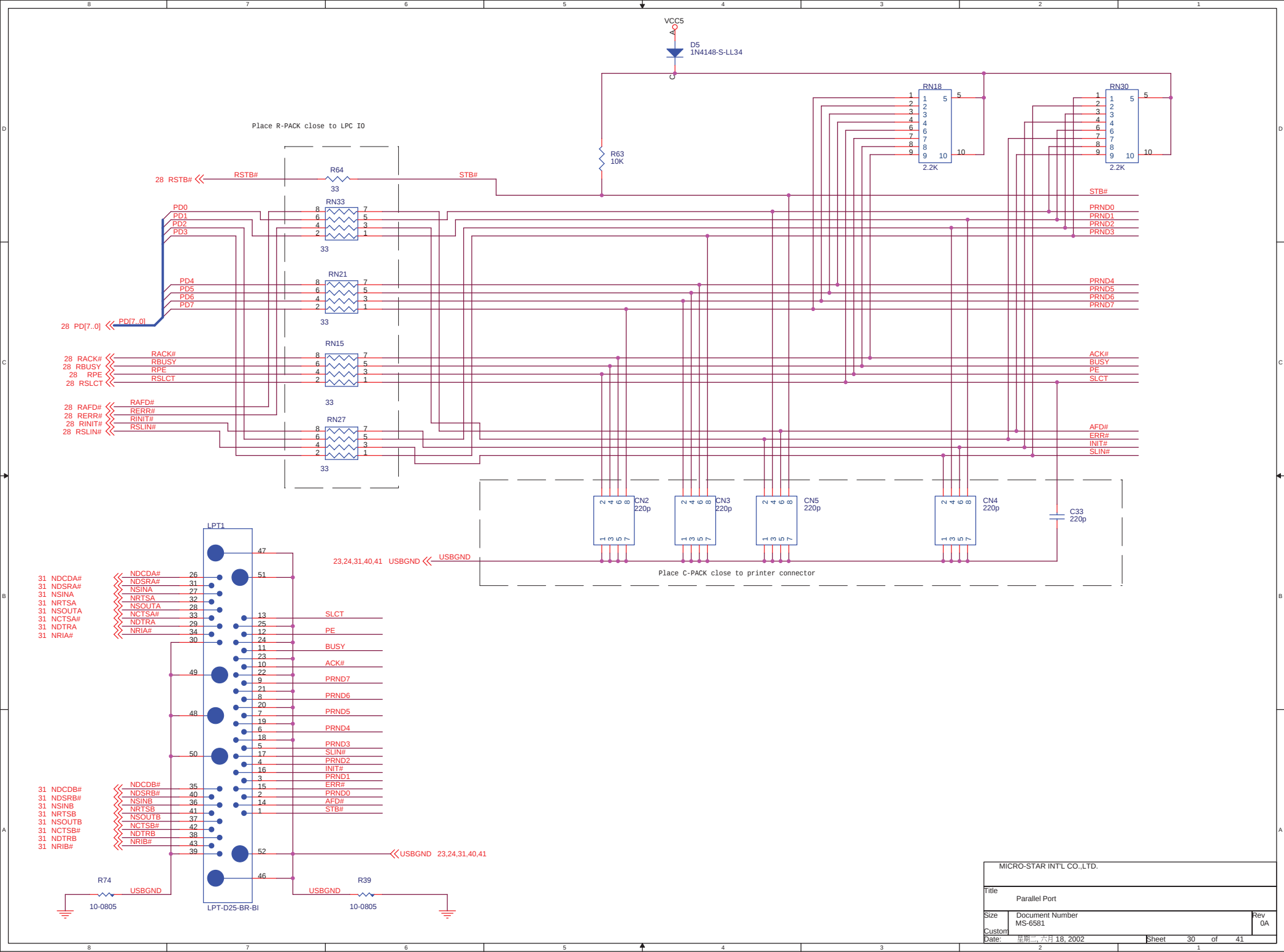


MICRO-STAR INT'L CO.,LTD.			
Title CNR CONNECTOR			
Size Custom	Document Number MS-6581		Rev 0A
Date: 星期二, 六月 18, 2002	Sheet 27	of 41	

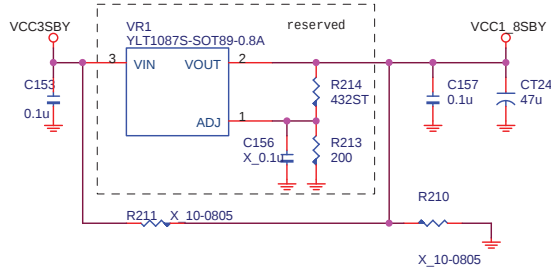


Hardware Monitor



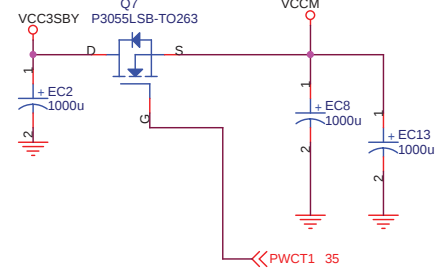


1.8V STANDBY POWER TRANSLATOR (30mils trace / 15 mils space)

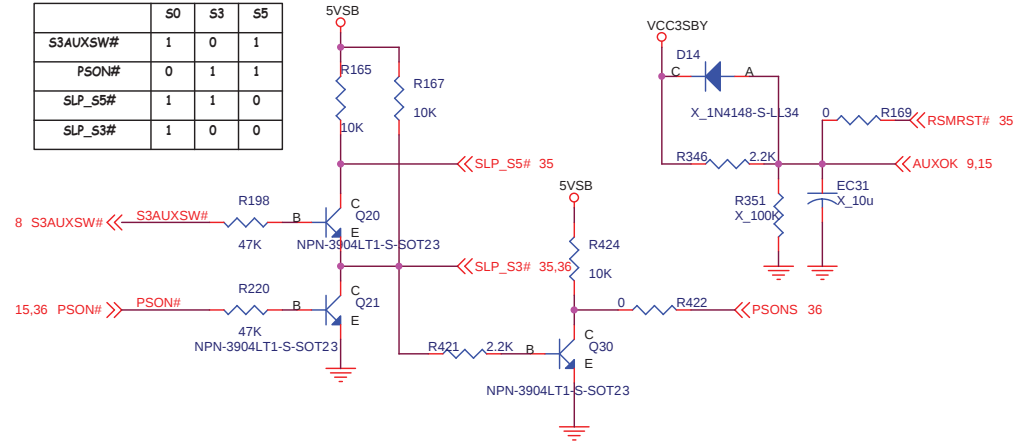


ACPI S3 (STR) POWER TRANSLATE CIRCUIT

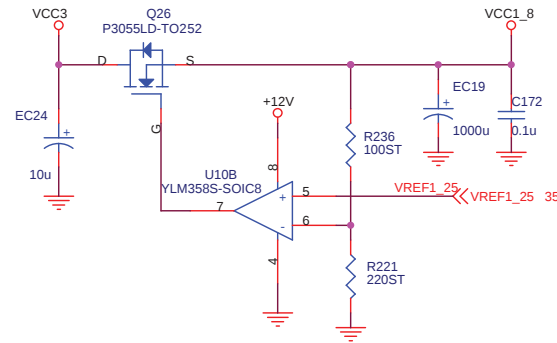
NEAR DIMM



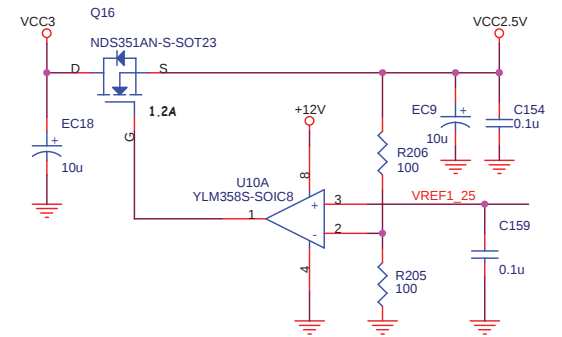
	S0	S3	S5
S3AUXSW#	1	0	1
PSON#	0	1	1
SLP_S5#	1	1	0
SLP_S3#	1	0	0



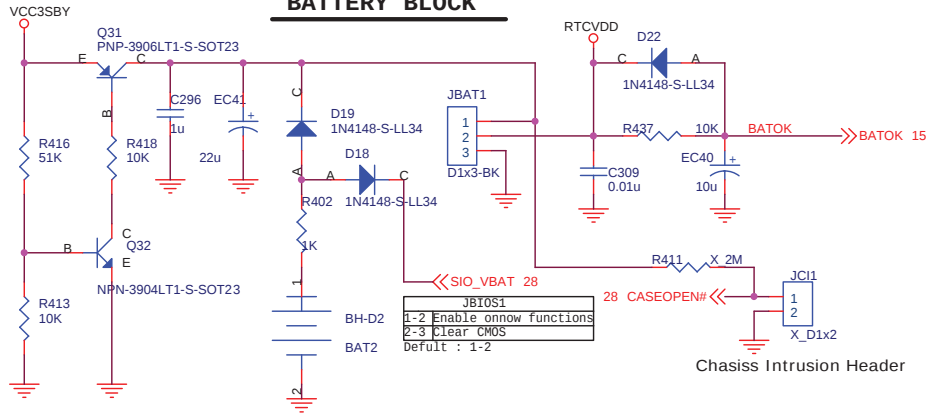
1.8V POWER TRANSLATOR (50mils trace / 15 mils space)



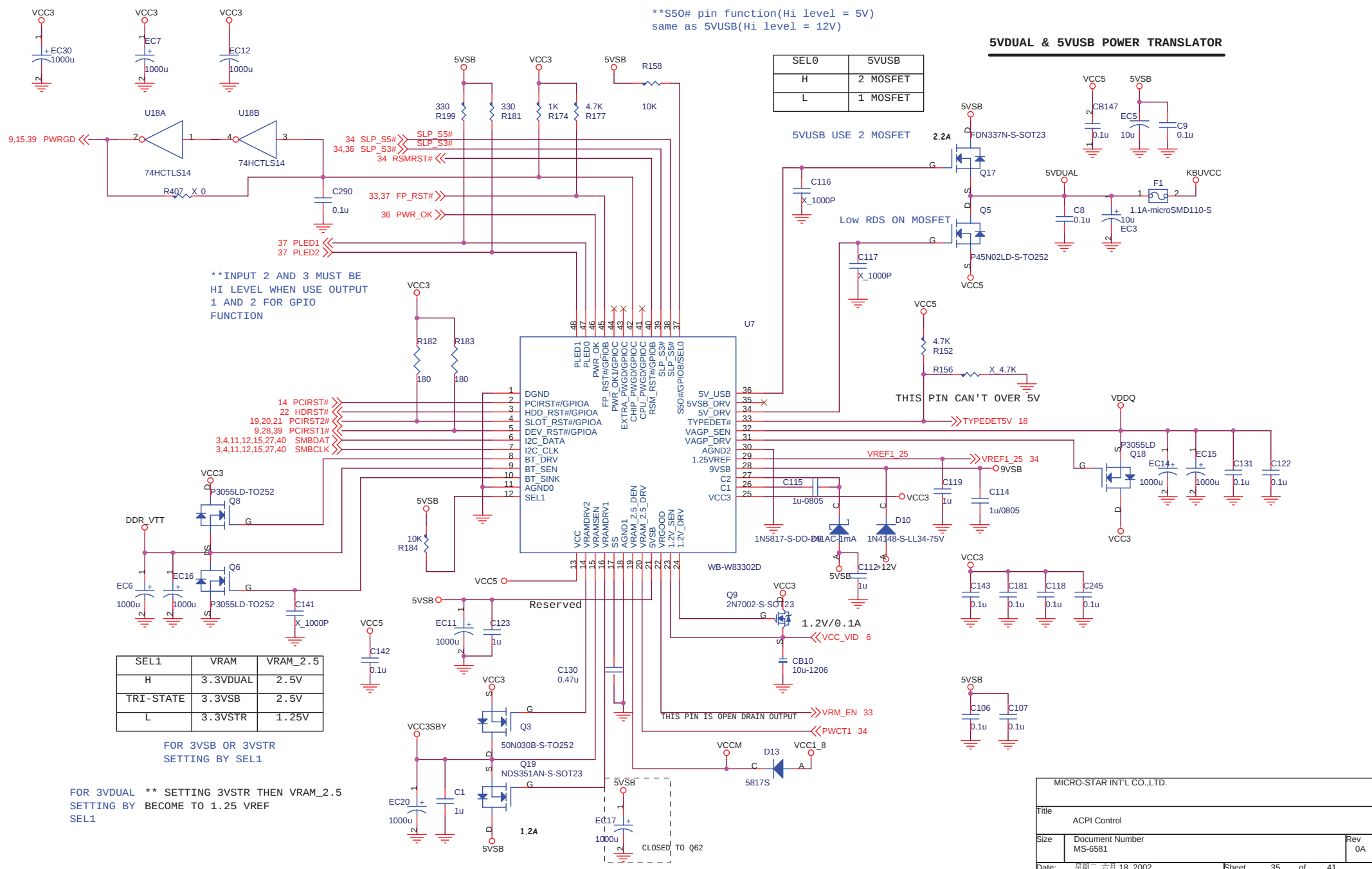
2.5V POWER TRANSLATOR



BATTERY BLOCK



MICRO-STAR INT'L CO.,LTD.		
Title VOLTAGE REGULATOR 1		
Size B	Document Number MS-6581	Rev 0A
Date 星期二, 六月 18, 2002	Sheet 34	of 41



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

5VDUAL & 5VUSB POWER TRANSLATOR

SEL0	5VUSB
H	2 MOSFET
L	1 MOSFET

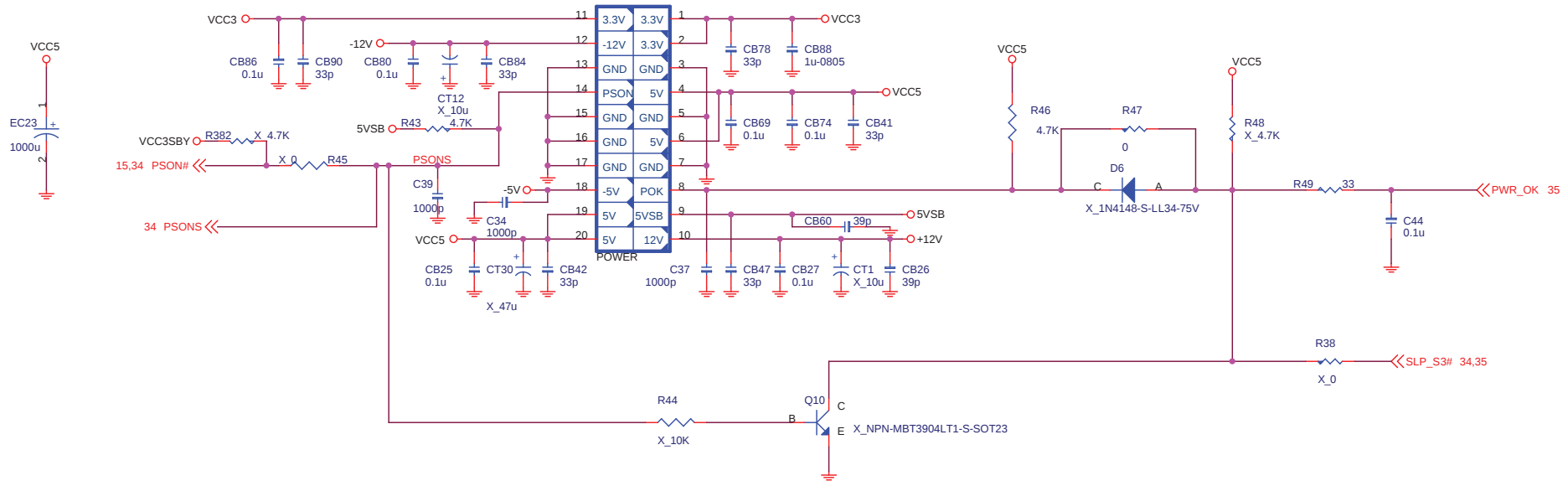
5VUSB USE 2 MOSFET

THIS PIN CAN'T OVER 5V

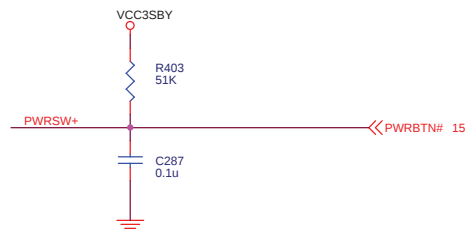
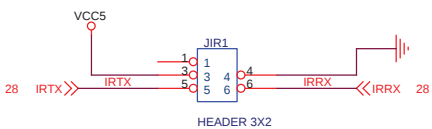
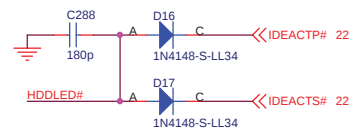
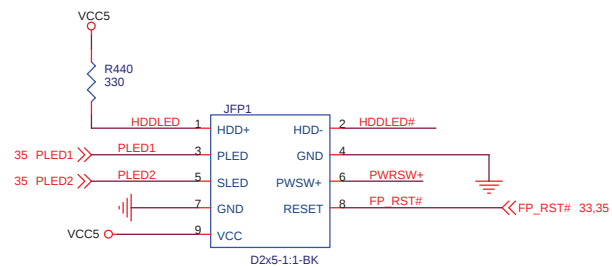
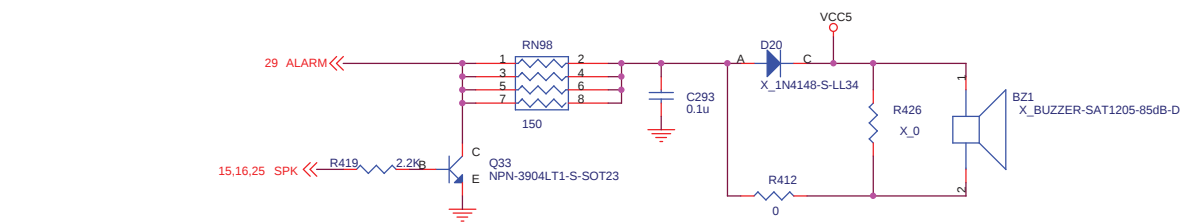
SEL1	VRAM	VRAM_2.5
H	3.3VDUAL	2.5V
TRI-STATE	3.3VSB	2.5V
L	3.3VSTR	1.25V

FOR 3VSB OR 3VSTR
SETTING BY SEL1

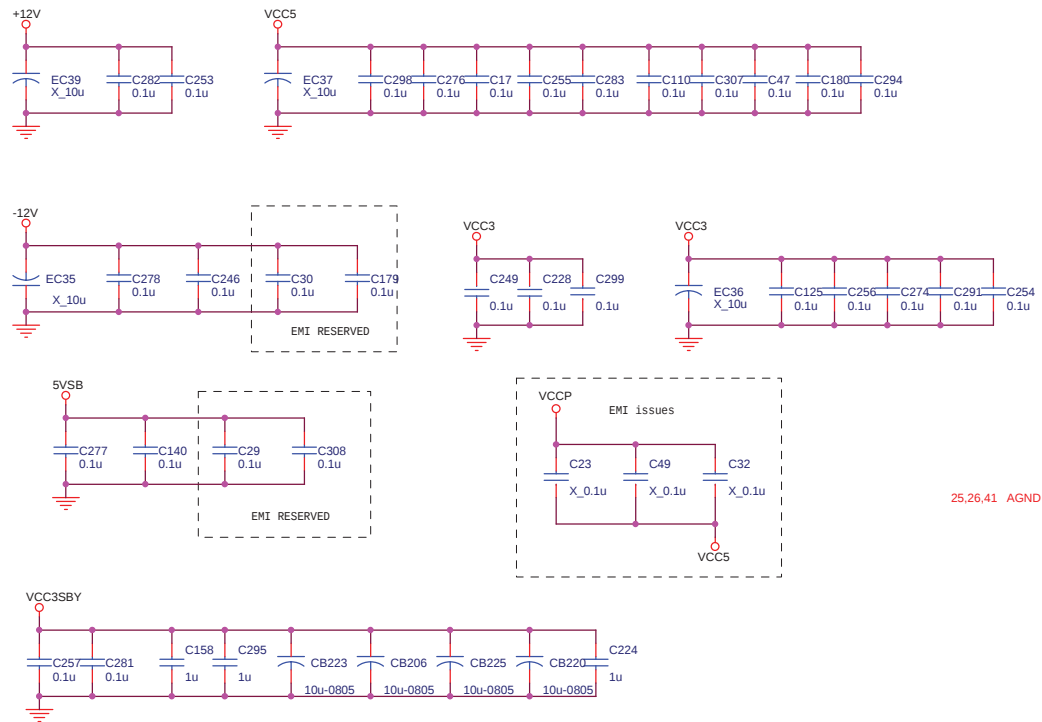
FOR 3VDUAL ** SETTING 3VSTR THEN VRAM_2.5
SETTING BY BECOME TO 1.25 VREF
SEL1



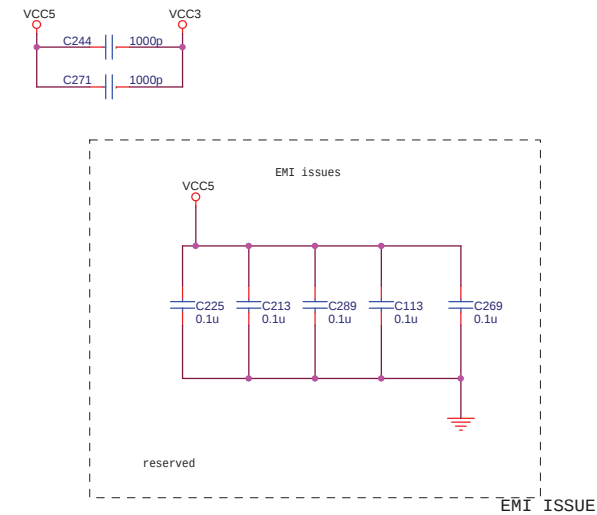
Sheet 36 of 41



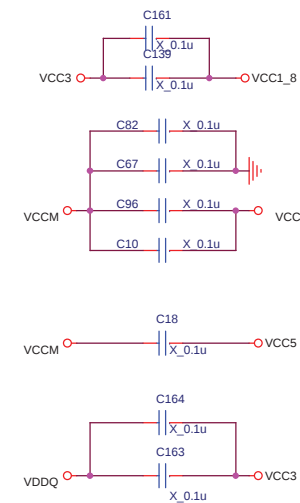
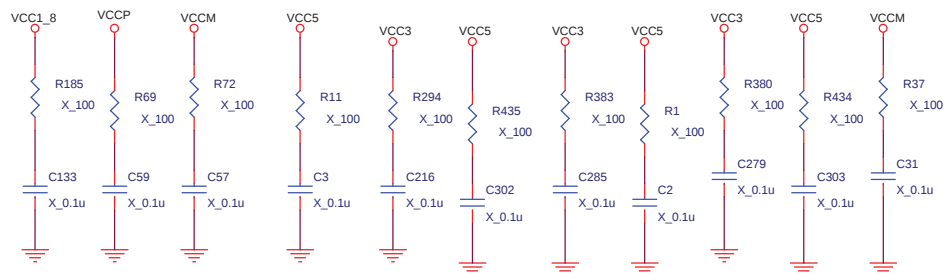
System Decoupling Capacitors



High Freq. return current decoupling

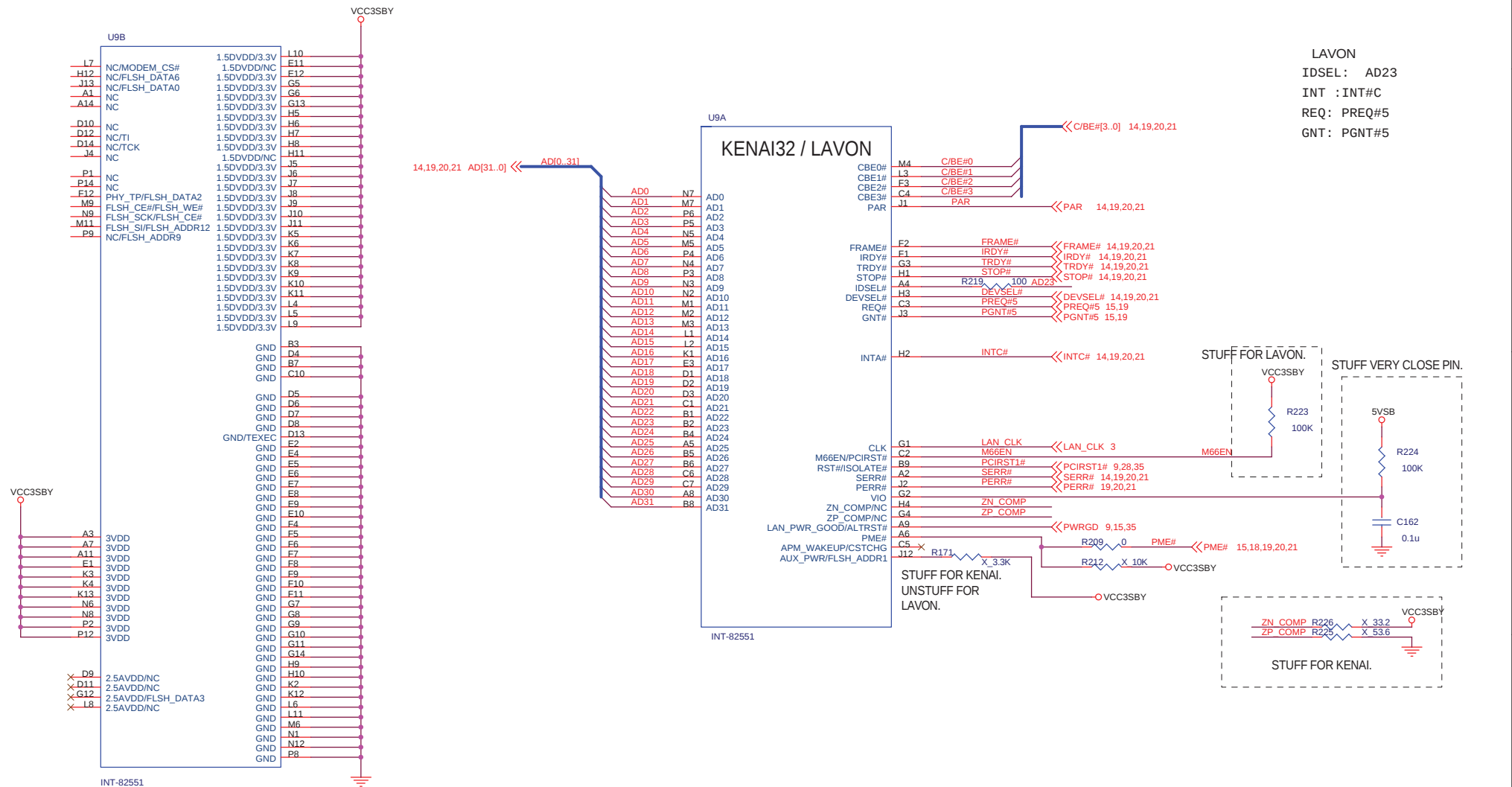


EMI ISSUE



MICRO-STAR INTL CO.,LTD.			
Title			
DECOUPLING CAPACITOR			
Size	Document Number		Rev
Custom	MS-6581		0A
Date:	星期二, 六月 18, 2002		Sheet
	38		of
	41		

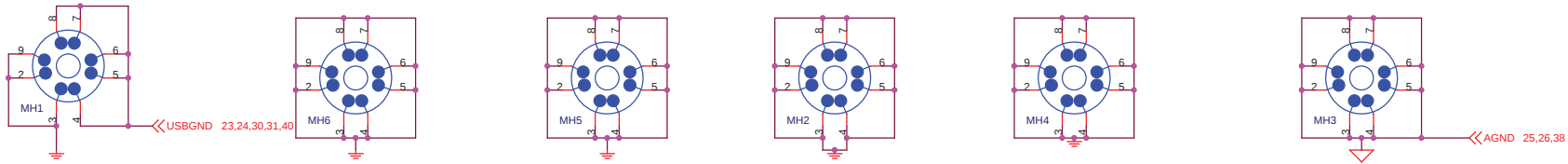
KENAI32 / LAVON DUAL LAYOUT.



Title		
LAVON (1)		
Size	Document Number	Rev
Custom	MS-6581	0A
Date:	星期二, 六月 18, 2002	Sheet 39 of 41

PCB OTHER COMPONENT

BS1_X1 BS2_X1 BS3_X1 BS4_X1 BS5_X1



PCB1
ATX
P01-654710B

U24-BIOS
M31-2902008-W03

BAT2
BATTERY

CPU
uATX
E91-0000036

U9 HSINK
Heat Sink

COM1
COMport

COM2
COMport

Q14
MOS-HEATSINK

Q12
MOS-HEATSINK

JBAT1(1-2)
JC-D2-GN

FM23
X_F_PADS

FM22
X_F_PADS

FM21
X_F_PADS

FM1
X_F_PADS

FM18
X_F_PADS

FM19
X_F_PADS

FM20
X_F_PADS

FM2
X_F_PADS

FM10
X_F_PADS

FM3
X_F_PADS

FM9
X_F_PADS

FM14
X_F_PADS

FM16
X_F_PADS

FM7
X_F_PADS

FM5
X_F_PADS

FM6
X_F_PADS

FM12
X_F_PADS

FM15
X_F_PADS

FM17
X_F_PADS

FM13
X_F_PADS

FM11
X_F_PADS

FM4
X_F_PADS

J1
VCC5
X_PIN1*2
CPU

J2
X_PIN1*2
AGP

R288
DUMMY RESISTOR

MICRO-STAR INT'L CO.,LTD.			
Title LAYOUT SCREW HOLE			
Size	Document Number MS-6581		Rev 0A
Custom Date:	星期二, 六月 18, 2002		Sheet 1
		41 of 41	