MS-7524 VER:0A

CPU:

Core2 Duo, Wolfdale, Kentsfield and Yorkfield processors in LGA775 Package.

System Chipset:

North Bridge - Intel Eagle Lake P45/G45
North Bridge - Intel ICH10

On Board Chipset:

Clock Gen - SLG8XP548
LPC Super I/O - Fintek F71882F
LAN - Intel82567
Audio Codec - ALC888
1394 Controller - JMB381
SATA Controller - JMB363

Main Memory:

DDR 2*4(Max4GB)

Expansion Slots:

PCI EXPRESS X16 SLOT *1
PCI EXPRESS X1 SLOT *1
PCI SLOT * 2

PWM:

Intersil ISL6333 (3 Phases)

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Eaglelake - Power / GND	10, 11
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Title: Cover Sheet

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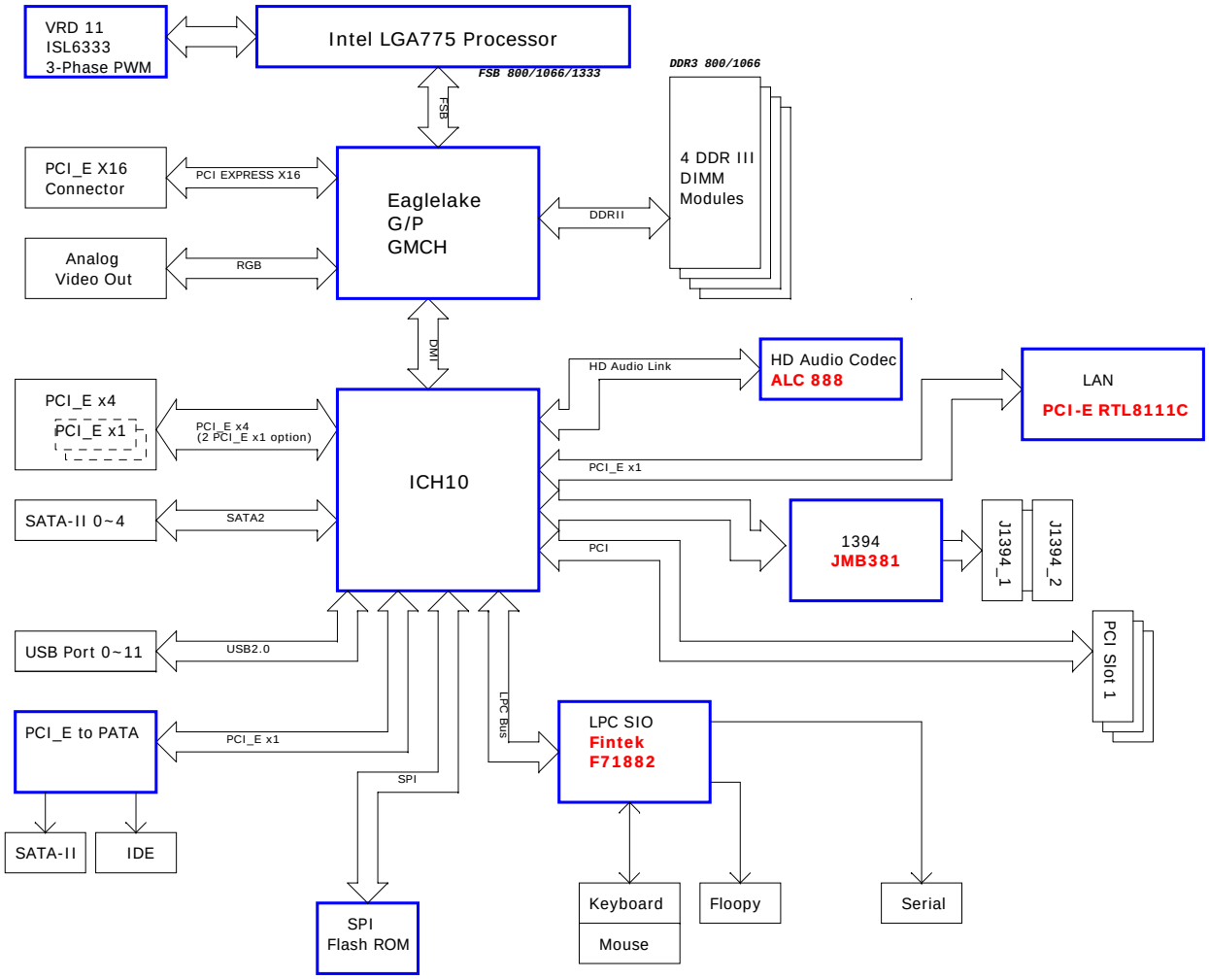
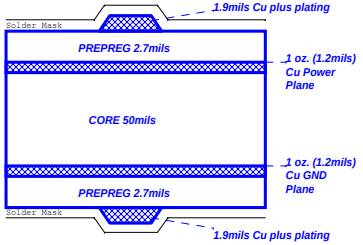
Block Diagram



Board Stack-up

(1080 Prepreg Considerations)



Single End 50ohm Top/Bottom : 4mils
USB2.0 - 90ohm : 15/4.5/7.5/4.5/15
SATA - 95ohm : 15/4/8/4/15
LAN - 100ohm : 15/4/8/4/15
PCIE - 95ohm : 15/4/8/4/15
IEEE1394 - 110ohm : 15/4/9/4/15
IDE : 15/4/8/4/15

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Title: Block Diagram

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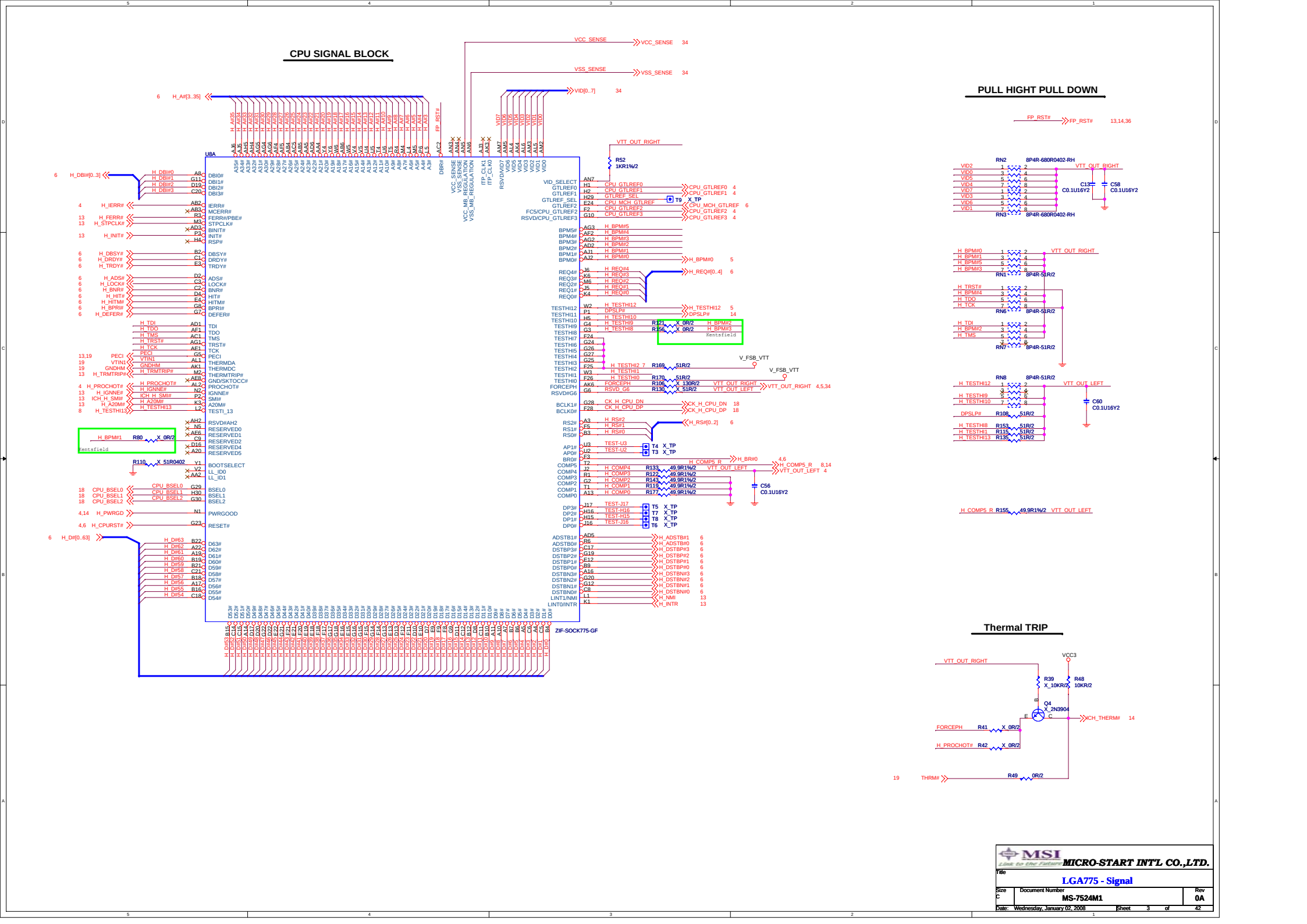
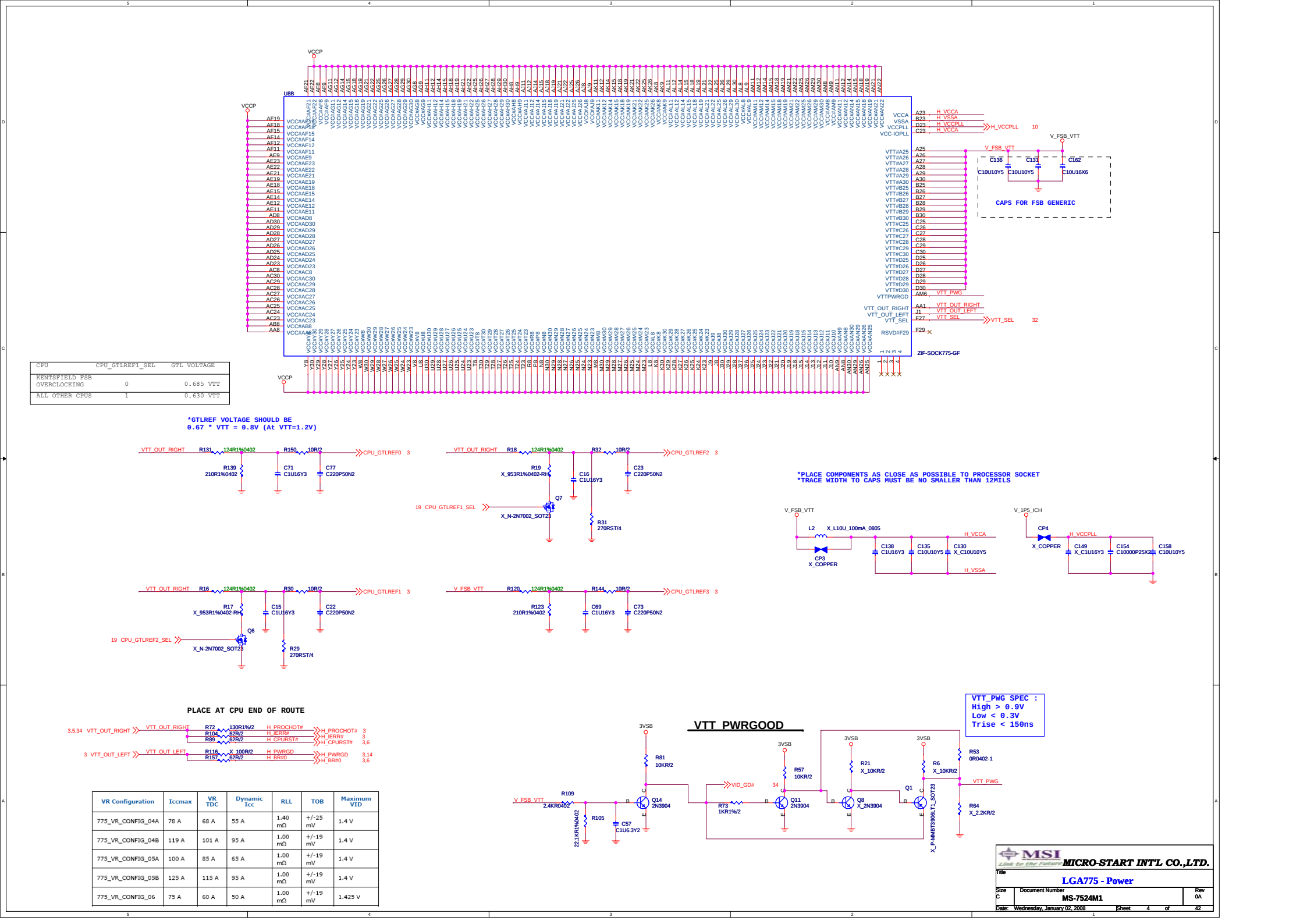

CPU SIGNAL BLOCK
PULL HIGHT PULL DOWN
Thermal TRIP
U8A
ZIF-SOCK775-GF
VCC_SENSE
VSS_SENSE
VID[0..7]
H_A#[3..35]
H_D#[0..63]
H_DBI#[0..3]
FP_RST#
VTT_OUT_RIGHT
V_FSB_VTT
VTT_OUT_LEFT
H_BPM#1 R80 X_0R/2
R110 X_51R0402
CPU_BSEL0
CPU_BSEL1
CPU_BSEL2
H_PWRGD
H_CPURST#
H_BPM#0
H_BPM#1
H_BPM#2
H_BPM#3
H_BPM#4
H_BPM#5
H_REQ#[0..4]
H_RS#[0..2]
H_TESTHI12
H_TESTHI11
H_TESTHI10
H_TESTHI9
H_TESTHI8
H_TESTHI7
H_TESTHI6
H_TESTHI5
H_TESTHI4
H_TESTHI3
H_TESTHI2
H_TESTHI1
H_TESTHI0
H_COMP0
H_COMP1
H_COMP2
H_COMP3
H_COMP4
H_COMP5_R
H_BR#0
H_ADSTB#0
H_ADSTB#1
H_DSTBP#0
H_DSTBP#1
H_DSTBP#2
H_DSTBP#3
H_DSTBN#0
H_DSTBN#1
H_DSTBN#2
H_DSTBN#3
H_NMI
H_INTR
R52 1KR1%/2
R169 51R/2
R170 51R/2
R171 51R/2
R133 49.9R1%/2
R122 49.9R1%/2
R143 49.9R1%/2
R119 49.9R1%/2
R177 49.9R1%/2
R155 49.9R1%/2
C56 C0.1U16Y2
C58 C0.1U16Y2
C60 C0.1U16Y2
RN1 8P4R-51R/2
RN2 8P4R-680R0402-RH
RN3 8P4R-680R0402-RH
RN5 8P4R-51R/2
RN7 8P4R-51R/2
RN8 8P4R-51R/2
R108 51R/2
R153 51R/2
R115 51R/2
R135 51R/2
R39 X_10KR/2
R48 10KR/2
R41 X_0R/2
R42 X_0R/2
R49 0R/2
Q4 X_2N3904
VCC3
THRM#
XCH_THERM#
FORCEPH
H_PROCHOT#
T1 X_TP
T2 X_TP
T3 X_TP
T4 X_TP
T5 X_TP
T6 X_TP
T7 X_TP
T8 X_TP
T9 X_TP
Kentsfield
MSI
MICRO-START INT'L CO.,LTD.
Title
LGA775 - Signal
Size C
Document Number MS-7524M1
Rev 0A
Date: Wednesday, January 02, 2008
Sheet 3 of 42



CPU	CPU_GTLREF1_SEL	GTL VOLTAGE
KENTSFIELD FSB OVERCLOCKING	0	0.685 VTT
ALL OTHER CPUS	1	0.630 VTT

***GTLREF VOLTAGE SHOULD BE**
0.67 * VTT = 0.8V (At VTT=1.2V)

***PLACE COMPONENTS AS CLOSE AS POSSIBLE TO PROCESSOR SOCKET**
***TRACE WIDTH TO CAPS MUST BE NO SMALLER THAN 12MILS**

PLACE AT CPU END OF ROUTE

VR Configuration	Iccmax	VR TDC	Dynamic Icc	RLL	TOB	Maximum VID
775_VR_CONFIG_04A	78 A	68 A	55 A	1.40 mΩ	+/-25 mV	1.4 V
775_VR_CONFIG_04B	119 A	101 A	95 A	1.00 mΩ	+/-19 mV	1.4 V
775_VR_CONFIG_05A	100 A	85 A	65 A	1.00 mΩ	+/-19 mV	1.4 V
775_VR_CONFIG_05B	125 A	115 A	95 A	1.00 mΩ	+/-19 mV	1.4 V
775_VR_CONFIG_06	75 A	60 A	50 A	1.00 mΩ	+/-19 mV	1.425 V

VTT_PWRGOOD

VTT_PWG SPEC :
High > 0.9V
Low < 0.3V
Trise < 150ns

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Title: **LGA775 - Power**

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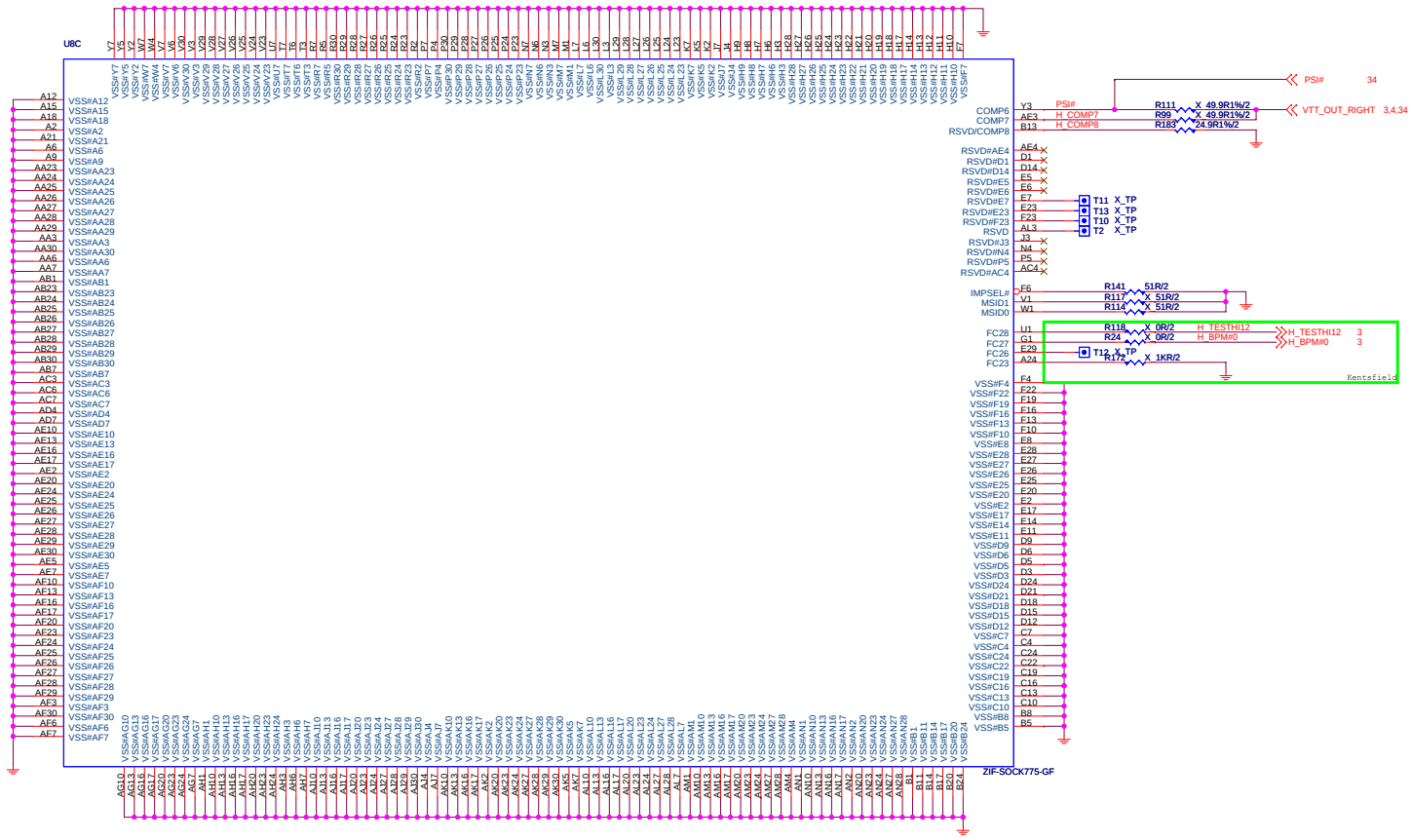
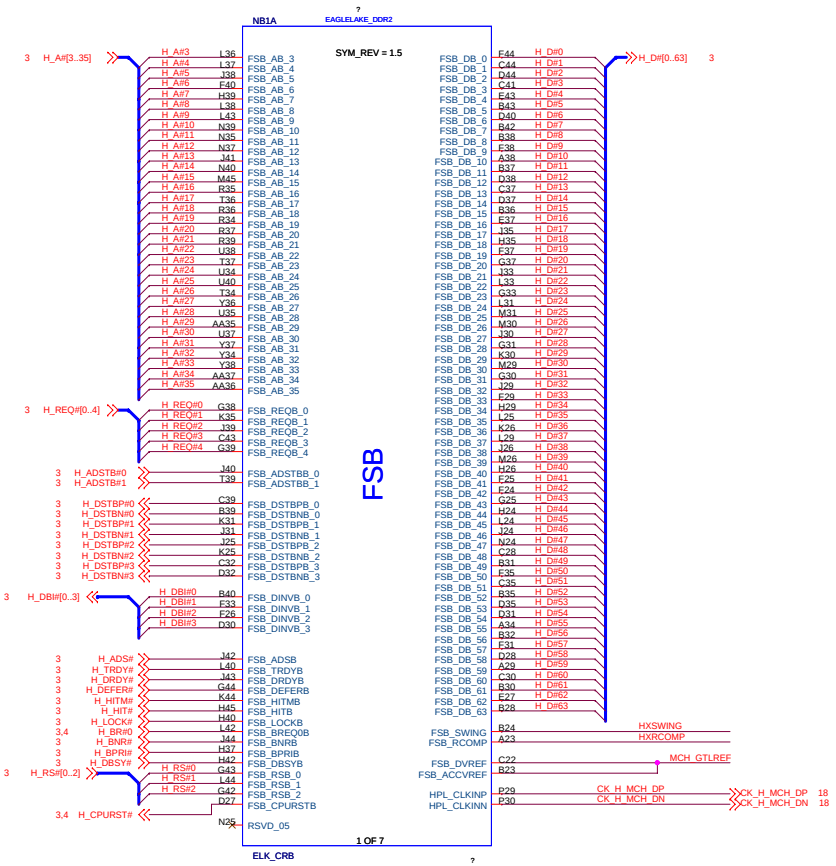


MSI MICRO-STAR INT'L CO.,LTD.			
Title: LGA775 - GND			
Size: C	Document Number: MS-7524M1		Rev: 0A
Date: Wednesday, January 02, 2008	Sheet 5 of 42		

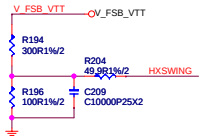


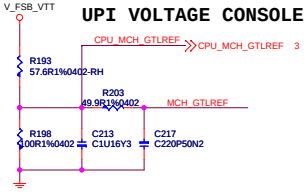
Really need or just reserve the invert?

PIN	H	L	Description
MTYPE	DDR2	DDR3	MEMORY TYPE
EXP_SLR	Normal	Reverse	PCI_E Lane Reversal
EXP_EN	Concurrent	Non-concurrent	PCI_E/SDVO co-existence
MCH_TCEN	Enable	Disable	TLS confidentiality

***GTLREF VOLTAGE SHOULD BE 0.67*VTT=0.8V (At VTT=1.2V)**

HXSWING SHOULD BE 1/4*VTT





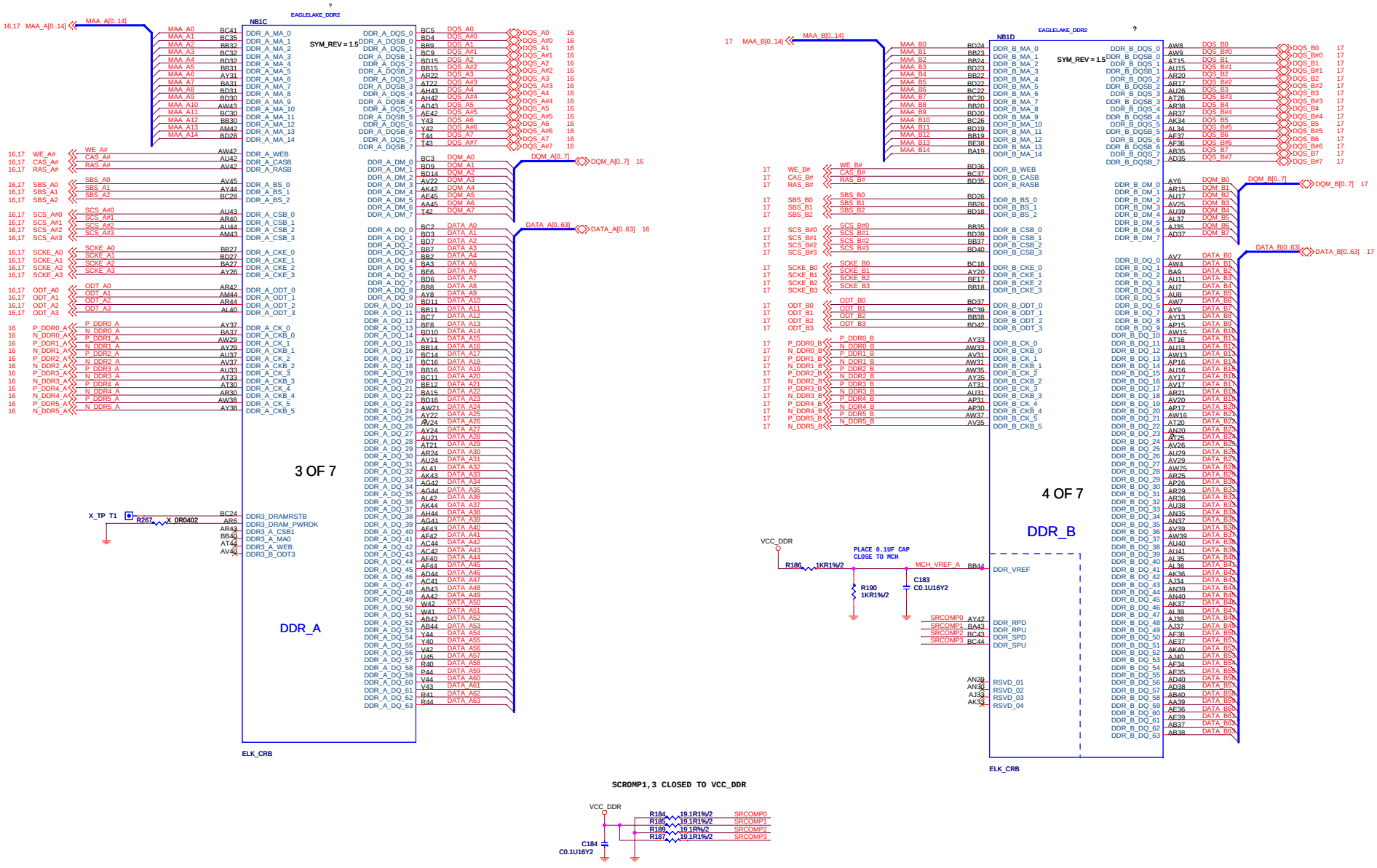
R225, R226 is from changingof the demo board

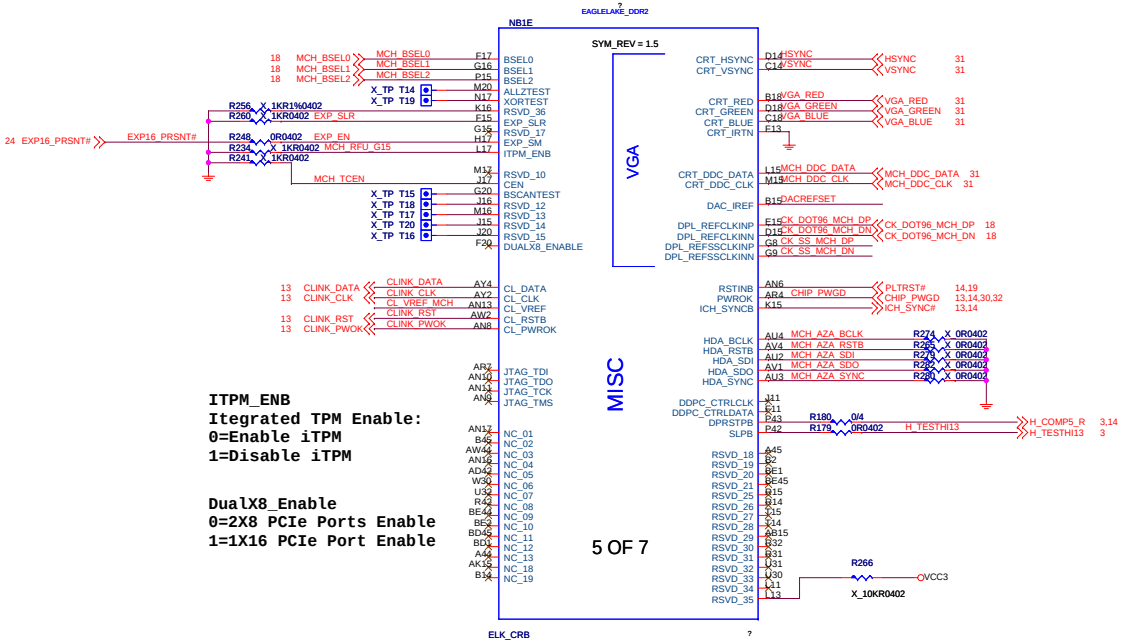
MSI MICRO-START INT'L CO.,LTD.

Title: Eagle - FSB

Size	Document Number	Rev
C	MS-7524M1	0A

Date: Wednesday, January 02, 2008 Sheet 6 of 42

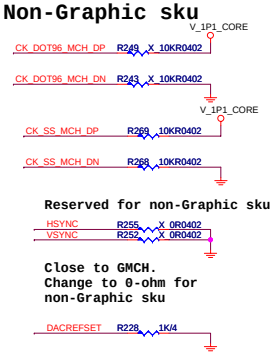

NB1C
EAGLELAKE_DDR2
SYM_REV = 1.5
3 OF 7
DDR_A
ELK_CRB
NB1D
4 OF 7
DDR_B
SCROMP1,3 CLOSED TO VCC_DDR
PLACE 0.1UF CAP CLOSE TO MCH
MICRO-START INT'L CO.,LTD.
Eagle - Memory DDR2
MS-7524M1
0A
Wednesday, January 02, 2008

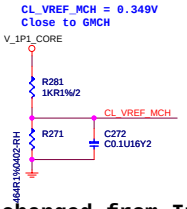


ITPM_ENB
Itegrated TPM Enable:
0=Enable iTPM
1=Disable iTPM

DualX8_Enable
0=2X8 PCIe Ports Enable
1=1X16 PCIe Port Enable

Non-Graphic sku





R290 is changed from Intel's review

MICRO-START INT'L CO.,LTD.		
Title: Eagle - MSIC		
Size: C	Document Number: MS-7524M1	Rev: 0A
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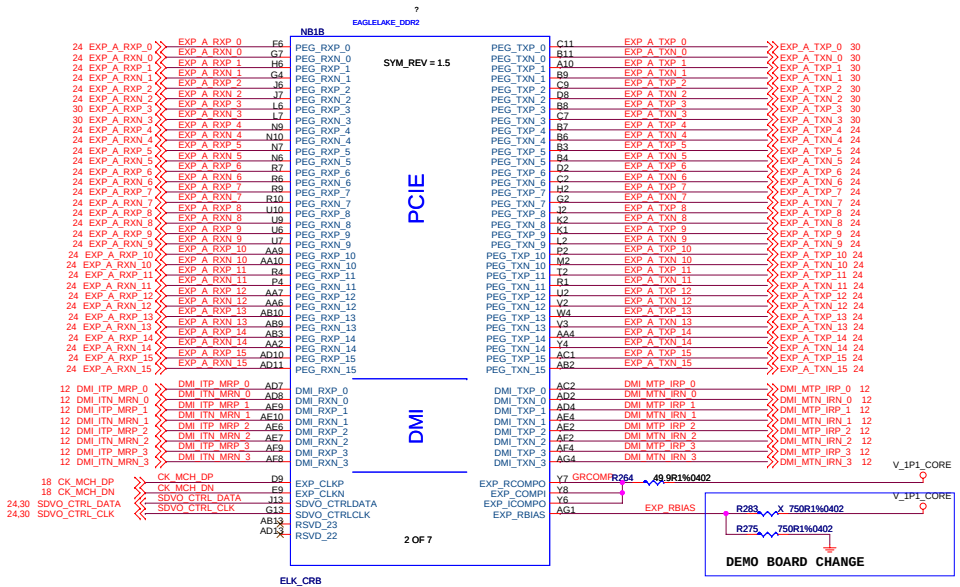

Primary _PEG_Presence
Primary PCIe port Detect:
0=PCIe Card is in Primary Slot
1=PCIe Card is not in Primary Slot

MSI MICRO-STAR INT'L CO.,LTD.

Title: Eagle - PCIE

Size	Document Number	Rev
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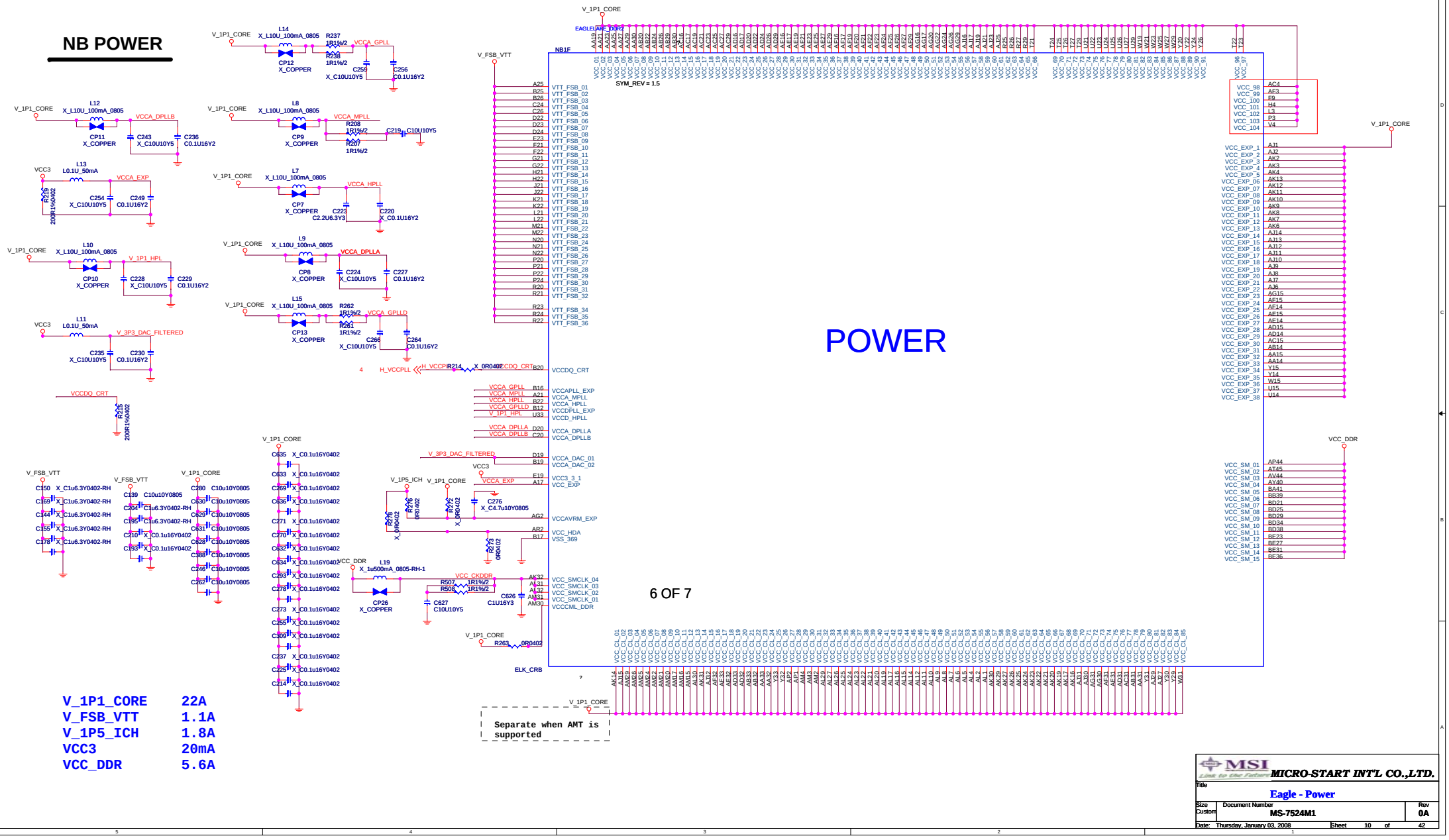
NB POWER



MSI	MICRO-START INT'L CO.,LTD.
Title	Eagle - Power
Size: Custom	Document Number: MS-7524M1
Rev	0A
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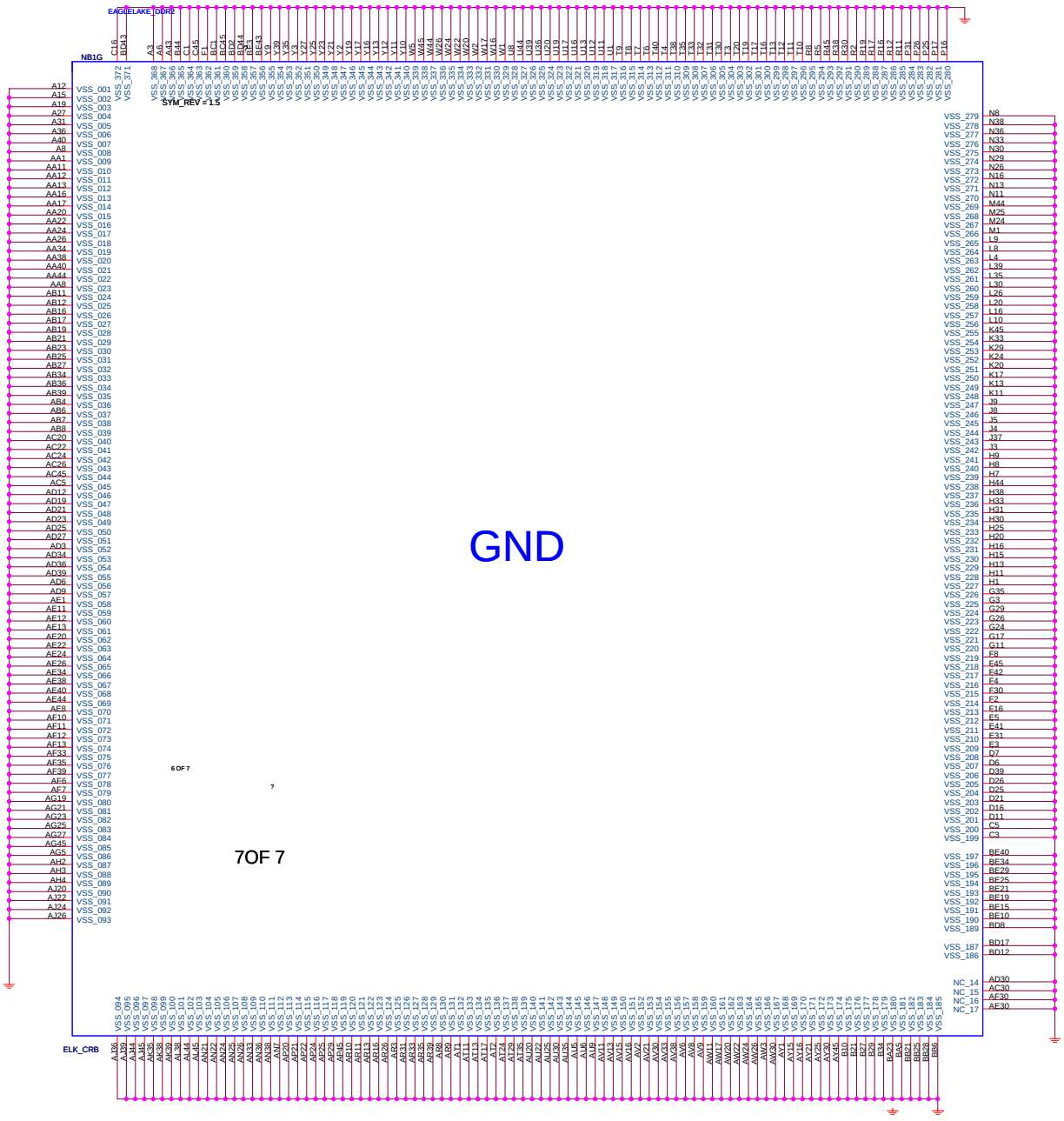
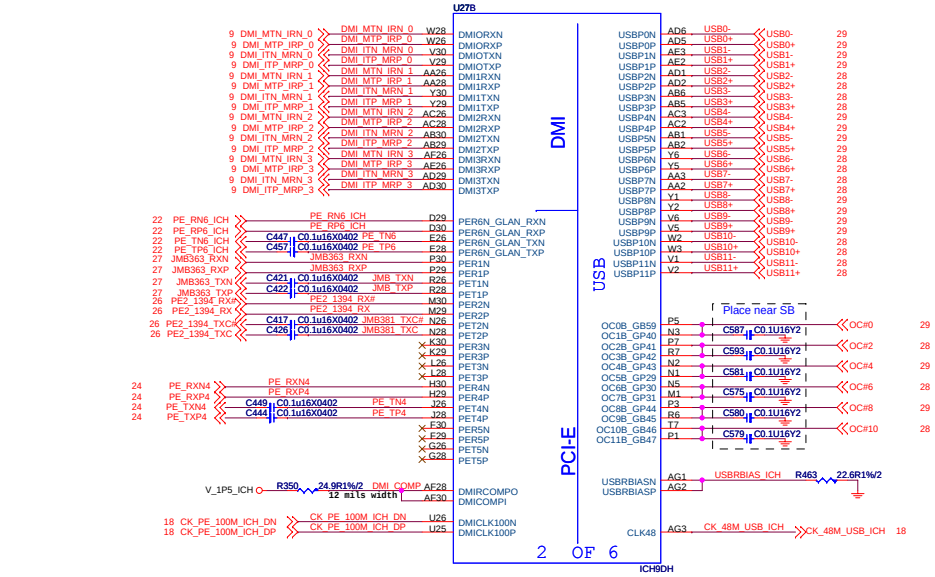
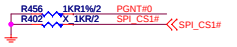


MSI MICRO-STAR INT'L CO.,LTD.			
Title: Eagle - GND			
Size: C	Document Number: MS-7524M1		Rev: 0A
Date: Wednesday, January 02, 2008	Sheet 11 of 42		



SB STRAPPING RESISTOR

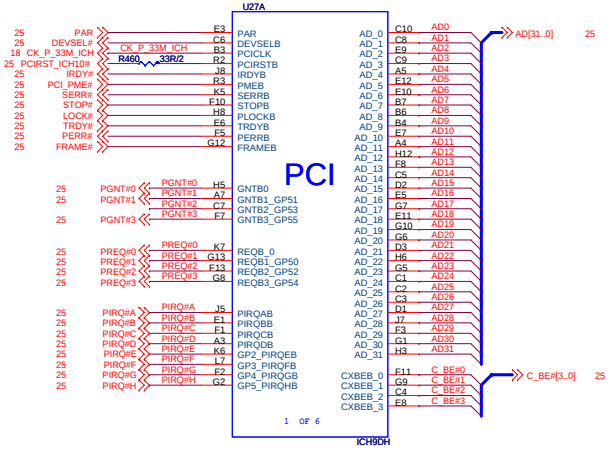


BOOT SELECT STRAPS		
BOOT DEVICE	GNT#0	SPI_CS1#
FWH	1	1
SPI	0	1
PCI	1	0

PGNT#[3:0]Internal Pull-up

SIGNAL	H	L	DES.
GNT3	DIS	EN	A16 OVERIDE
GNT2	N/A	SET BIT	PCIE PORT CONFIG 2 BIT 0 (5-6)

HDA_SDOUT/HDA_SYNC strap PCI_E port configuration bit[1:0].Internal weak pull down.
00:1X/1X/1X/1X 11:0X/0X/4X



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Title: ICH10 - PCI, USB, DMI, TPM

Size: C | Document Number: MS-7524M1 | Rev: 0A

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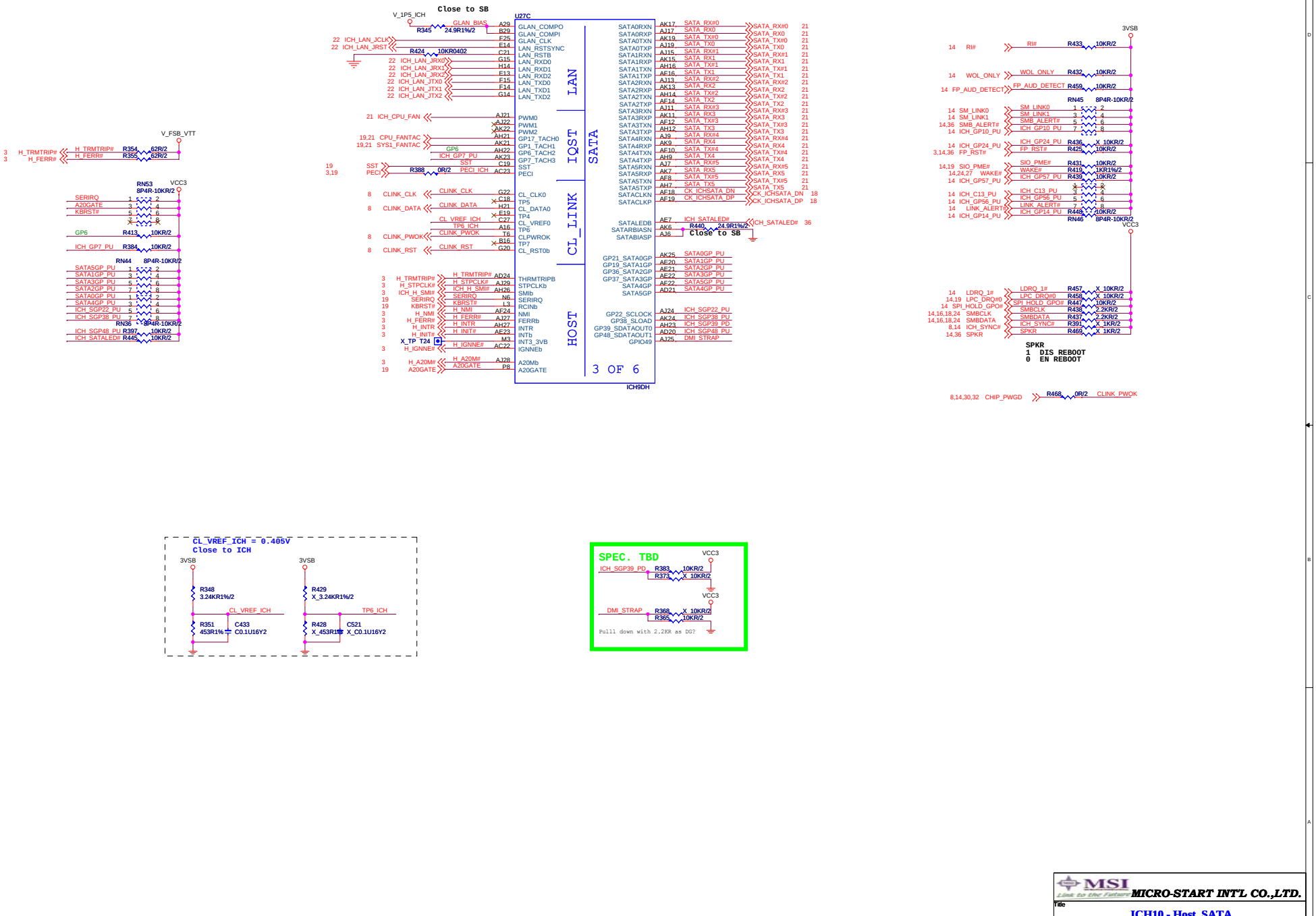
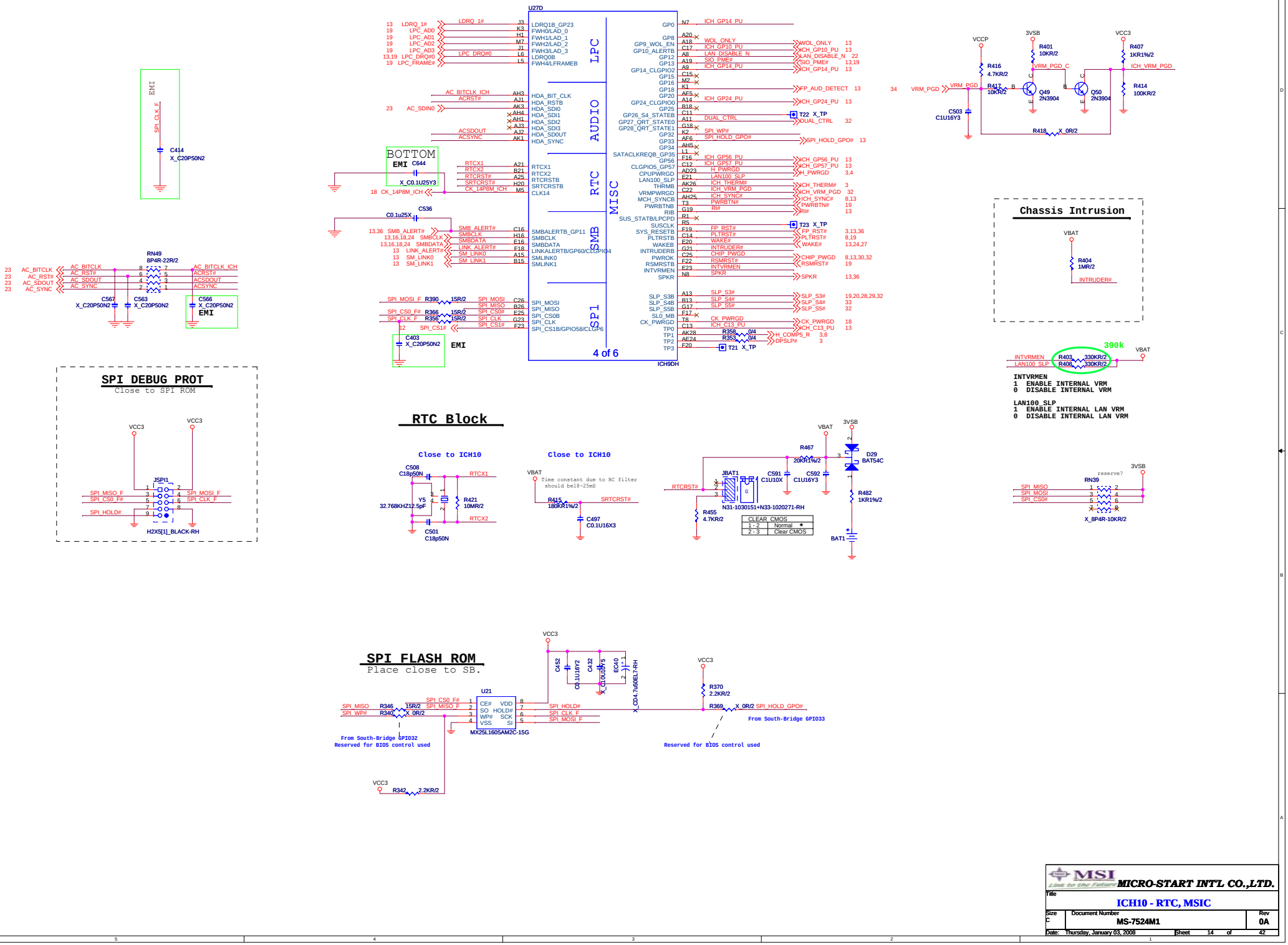


MSI MICRO-START INT'L CO.,LTD.

Title: ICH10 - Host, SATA

Size	Document Number	Rev
C	MS-7524M1	0A

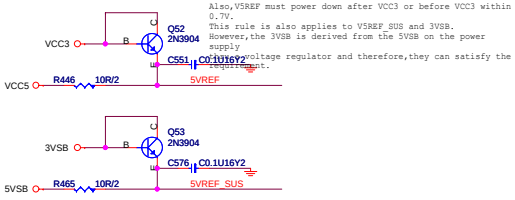
Date: Wednesday, January 02, 2008 Sheet 13 of 42



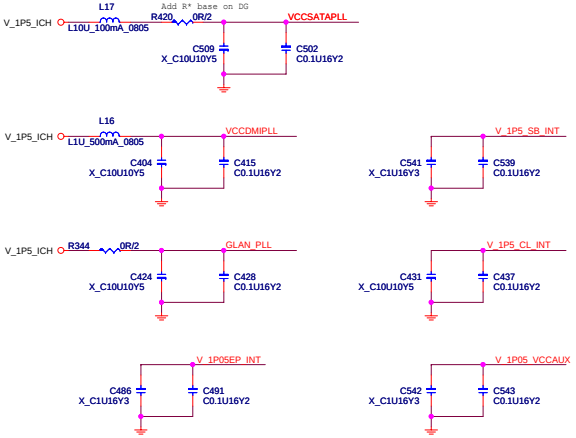
MSI / MICRO-START INT'L CO.,LTD.		
Title	ICH10 - RTC, MSIC	
Size: C	Document Number: MS-7524M1	Rev: 0A
Date: Thursday, January 03, 2008	Sheet 14 of 42	

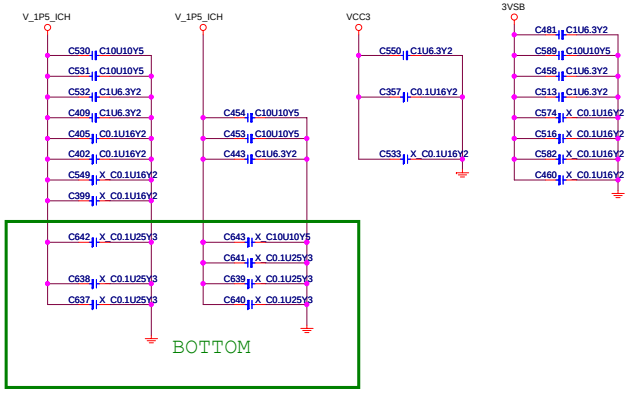
5VREF & 5VREF_SUS Sequencing Circuit

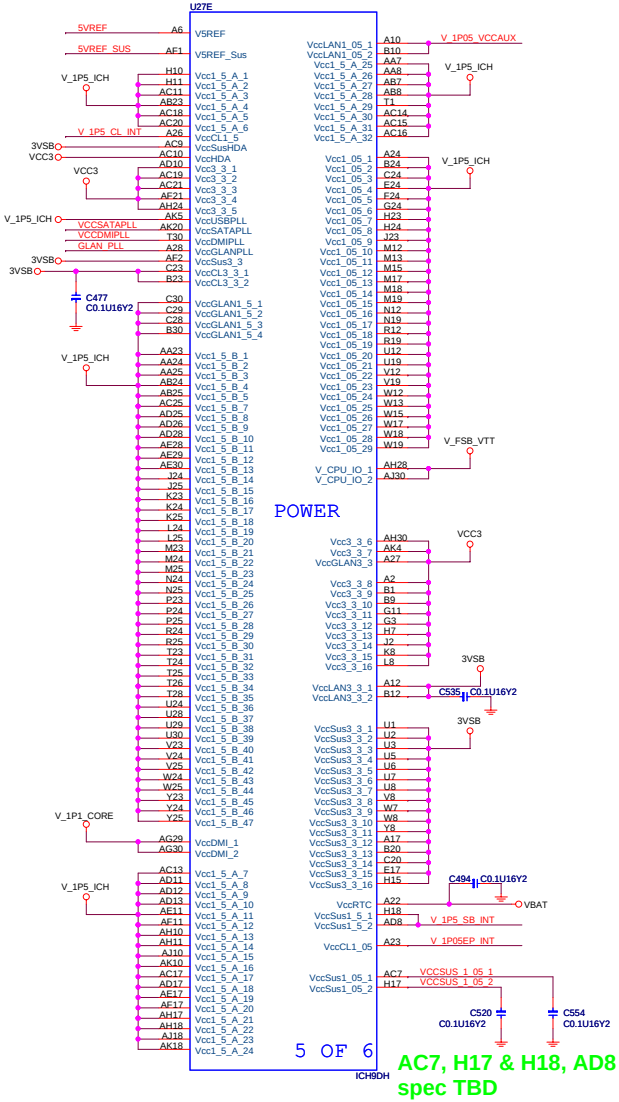
V5REF must be powered up beforeVCC3 or after VCC3 within 0.7V.
Also,V5REF must power down after VCC3 or before VCC3 within 0.7V.
This rule is also applies to V5REF_SUS and 3VSB.
However,the 3VSB is derived from the 5VSB on the power supply
voltage regulator and therefore,they can satisfy the requirement.

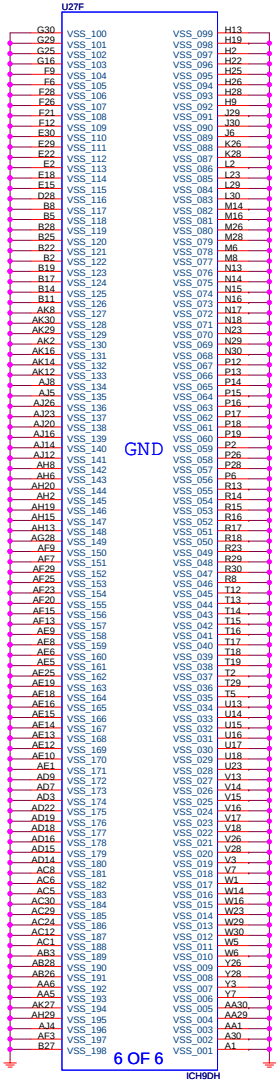


SB POWER









AC7, H17 & H18, AD8 spec TBD

V_1P1_CORE	2.3A
V_1P5_ICH	2.45A
VCC3	0.6A

MSI	MICRO-START INT'L CO.,LTD.		
Title	ICH10 - Power, GND		
Size C	Document Number MS-7524M1		Rev 0A
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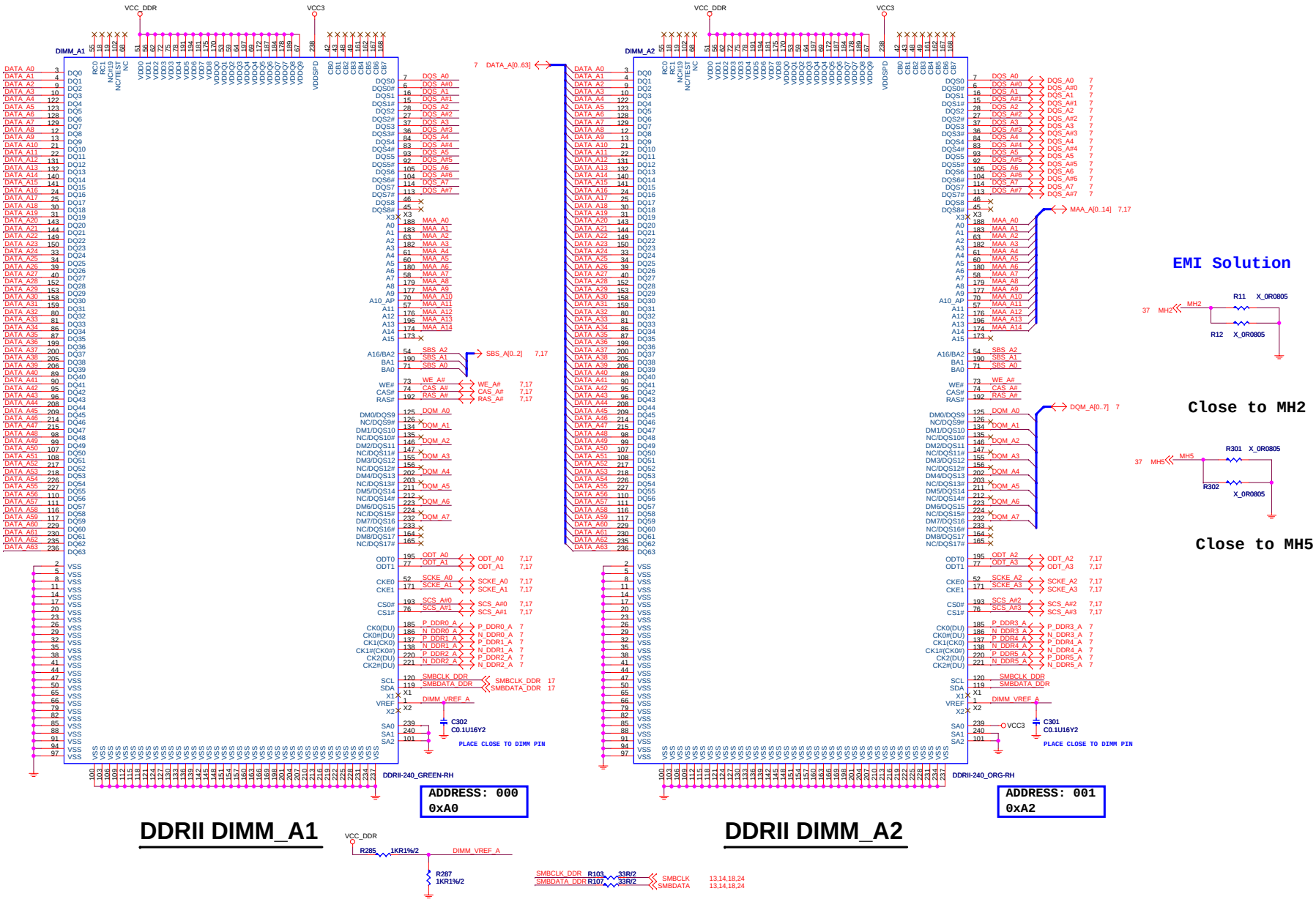

MSI MICRO-START INT'L CO.,LTD.

Title: DDR2 Channel 1

Size	Document Number	Rev
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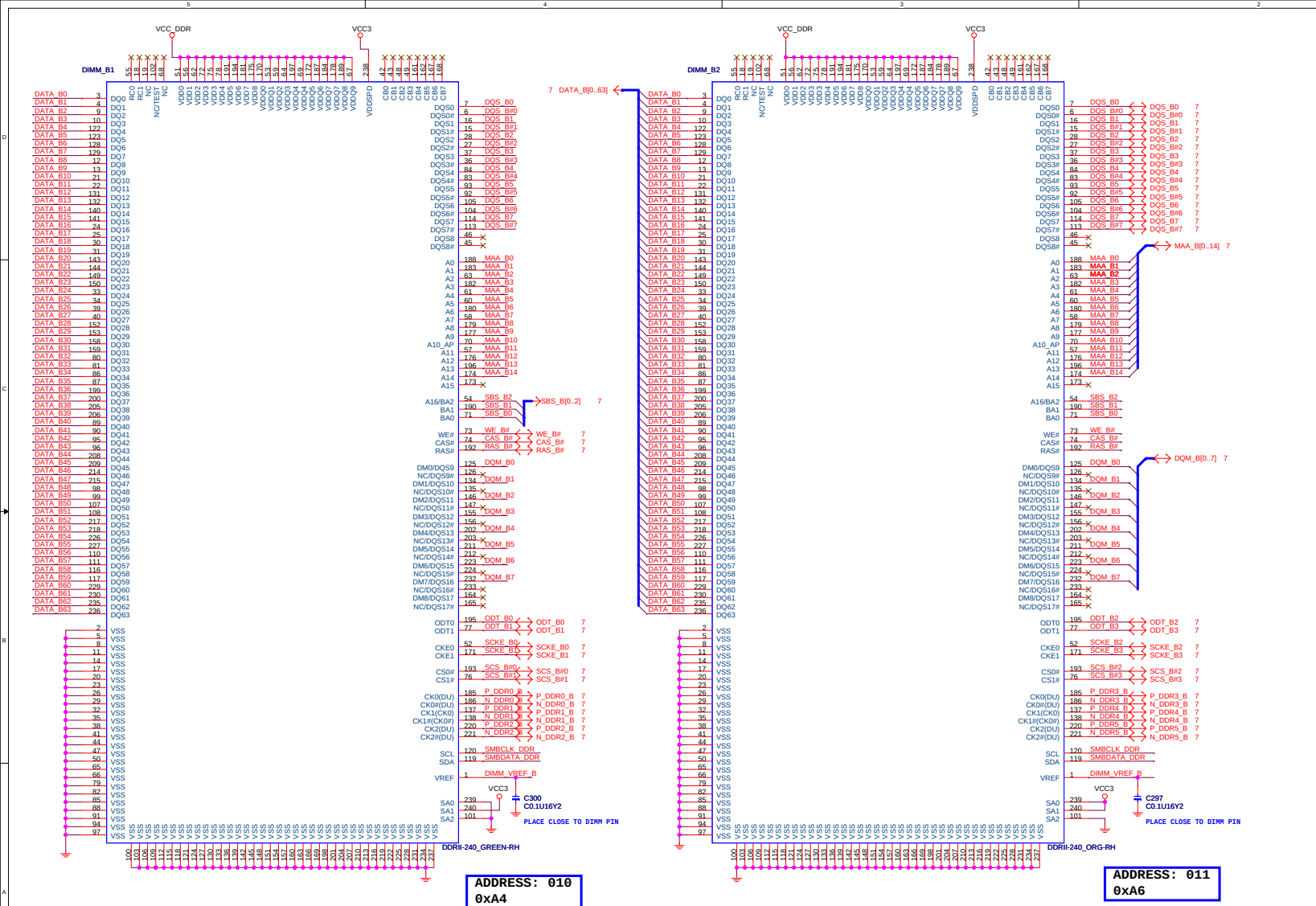
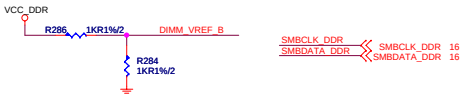
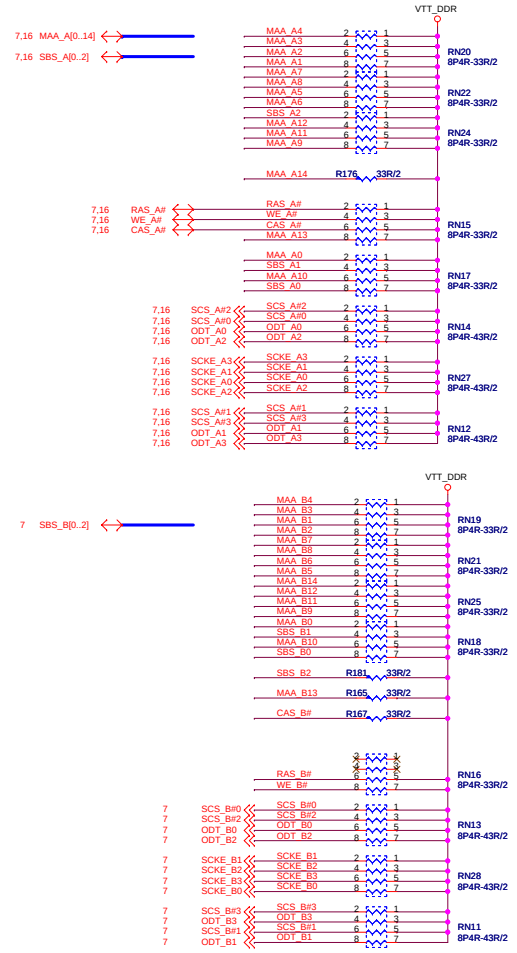
DDR II Termination







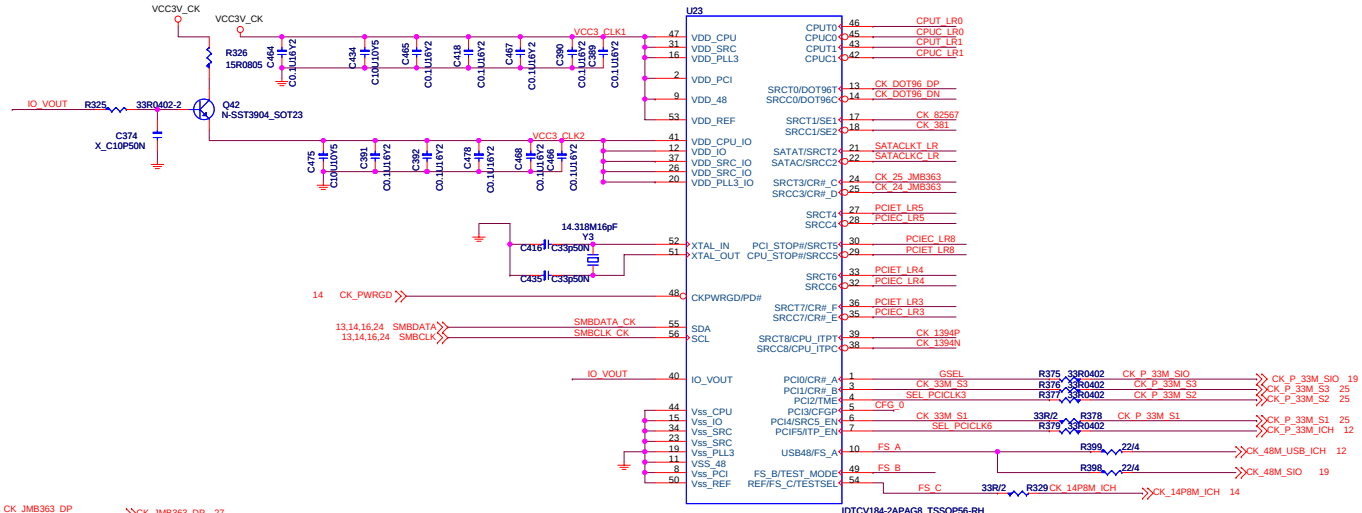
MSI
Link to the Future
MICRO-START INT'L CO.,LTD.

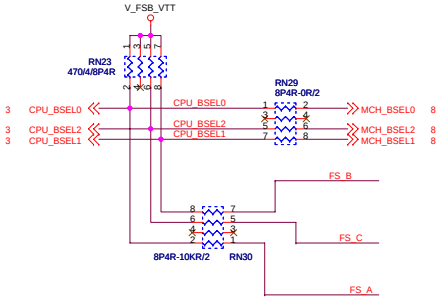
Title: DDR2 Channel 2 / Termination

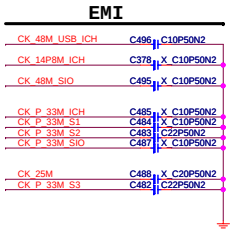
Size	Document Number	Rev
Custom	MS-7524M1	0A

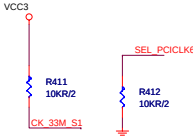
Date: Wednesday, January 02, 2008 Sheet 17 of 42

Symbol	Description	Conditions	Min	Typ	Max	Unit
Idd_3.3V	Operating Supply Current, default configuration				250	mA
Idd_IO_3.3V	Differential I/O current, all output enabled		25		80	mA









0 = Pin 38/39 as SRC_8
1 = Pin 38/39 as CPU_ITP

0 = Pin 29/30 as CPU_STOP#/PCI_STOP#
1 = Pin 29/30 as SRC_5

AMT POWER

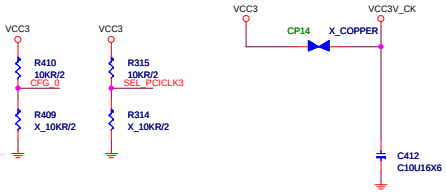


Table 3. CFG_1 and CFG_0 Configuration

CFG_1	CFG_0	Pin 17	Pin 18	Pin 21	Pin 22
Low	Low	25MHz_0_F	25MHz_1	SRC_2	SRC_2#
Mid	Low	SRC_1	SRC_1#	SRC_2	SRC_2#
High	Low	25MHz_0_F	24.576MHz	SRC_2	SRC_2#
Low	High	25MHz_0_F	25MHz_1	SATA	SATA#
Mid	High	SRC_1	SRC_1#	SATA	SATA#
High	High	25MHz_0_F	24.576MHz	SATA	SATA#

FS_C	FS_B	FS_A	CPU (MHz)	SRC (MHz)	PCI (MHz)	REF (MHz)	DOT_96 (MHz)	USB (MHz)
0	0	0	266.6	100.0	33.3	14.318	96.0	48.0
0	0	1	133.3	100.0	33.3	14.318	96.0	48.0
0	1	0	200.0	100.0	33.3	14.318	96.0	48.0
0	1	1	166.6	100.0	33.3	14.318	96.0	48.0
1	0	0	333.3	100.0	33.3	14.318	96.0	48.0
1	0	1	100.0	100.0	33.3	14.318	96.0	48.0
1	1	0	400.0	100.0	33.3	14.318	96.0	48.0
1	1	1	Reserved					

MICRO-START INT'L CO.,LTD.

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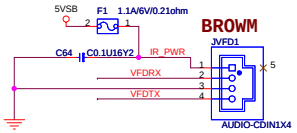
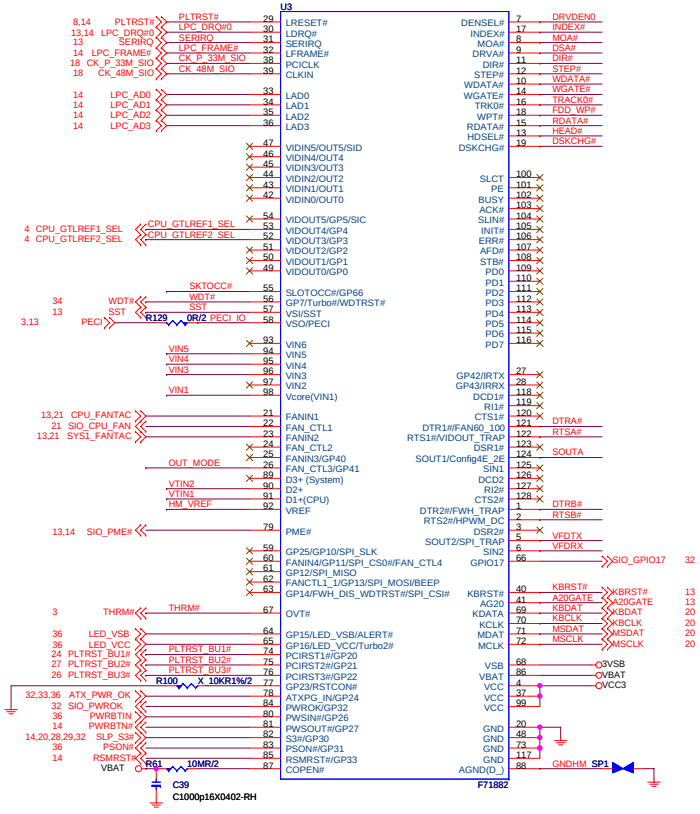
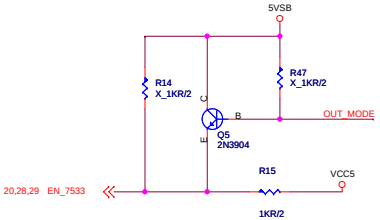
Front LCD (SERIAL PORT 2)

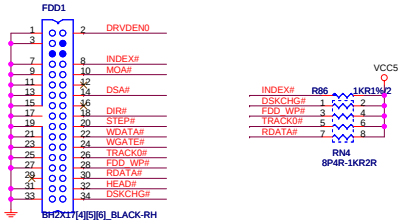


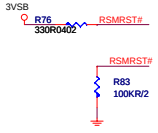
Parameter	Typ	Unit
Main Supply Average Current	5	mA
Main Supply Standby Current	2.5	mA
Standby Supply Average Current	1.0	mA
Battery Supply Current	0.24	uA



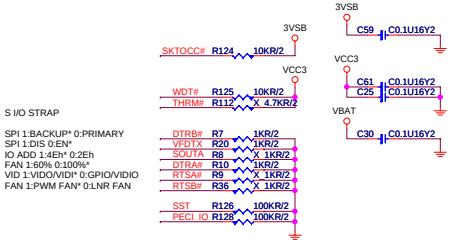


FLOPPY CONNECTOR

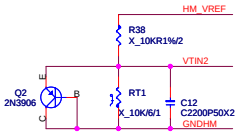


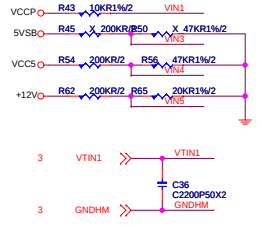


LPC I/O STRAPPING RESISTOR



Thermal Resistor





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Title: F71882			
Size: C	Document Number: MS-7524M1		Rev: 0A
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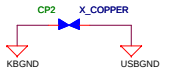
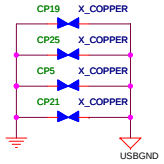
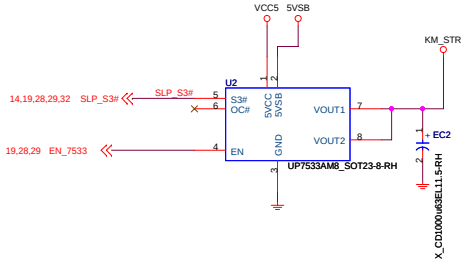
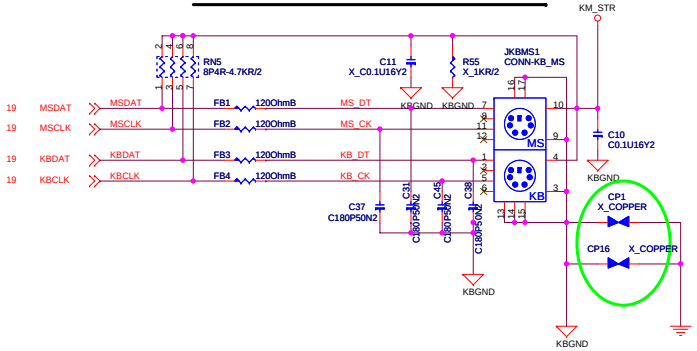
EMI Solution







PS2 KEYBOARD & MOUSE CONNECTOR



MSI MICRO-STAR INT'L CO.,LTD.		
Title: PS2 Keyboard & Mouse		
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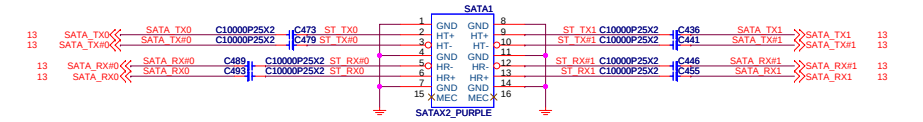
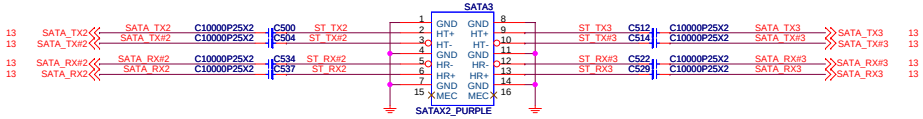
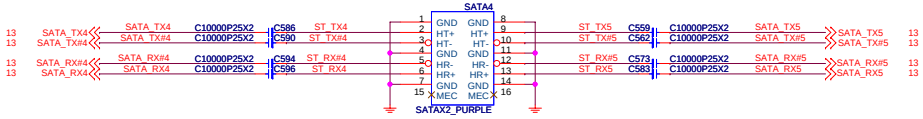
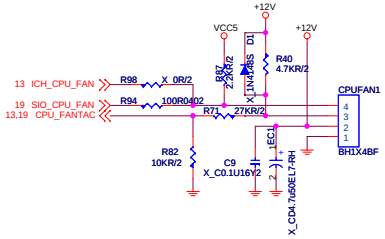
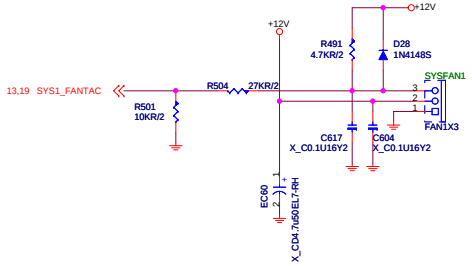






FAN-COUNTROL CIRCUIT





Modify System FAN circuit & Remove PWR_FAN
for spec need 3pin DC Smart FAN 07.3.30 by Robile

MSI MICRO-START INT'L CO.,LTD.

Title: SATA / FAN Control

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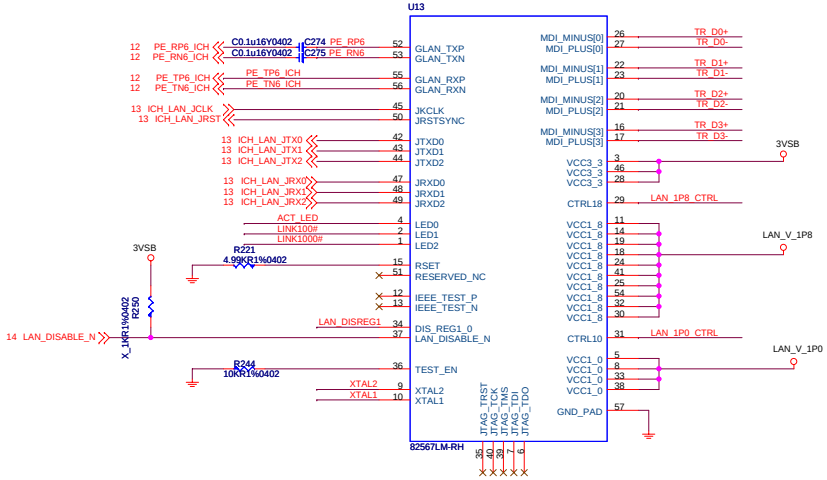
Maximum current of 1.8 V is less then 270mA, Maximum current of 1.0 V is less then 139mA.

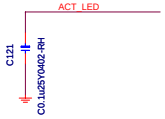
For proper and safe operation, the power supplies must follow the following rule:

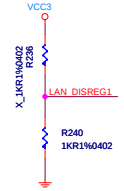
VDDO (3.3V) ≥ AVDD (1.8) ≥ DVDD (1.05V)

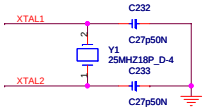
This means that VDDO must start ramping before AVDD and DVDD, but DVDD may reach its nominal operating range before AVDD and VDDO.

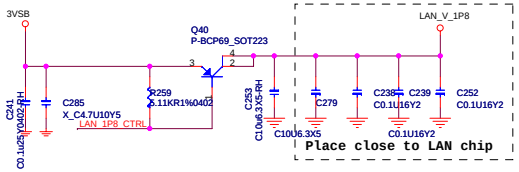


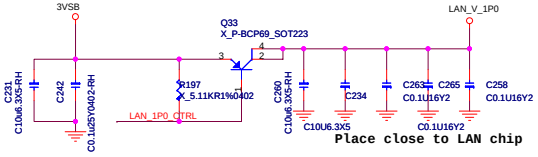
EMI Solution

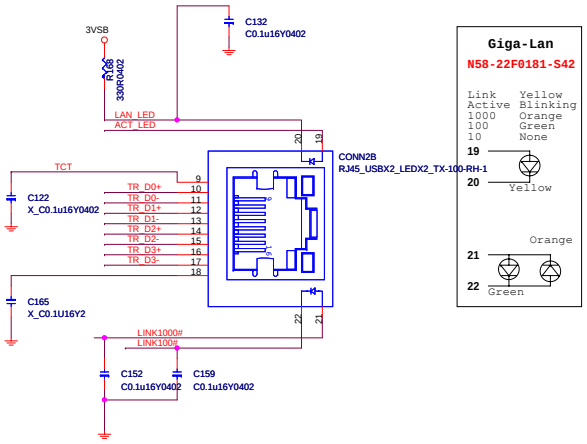












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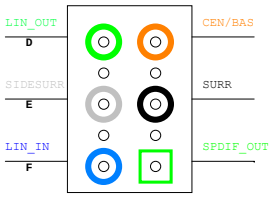
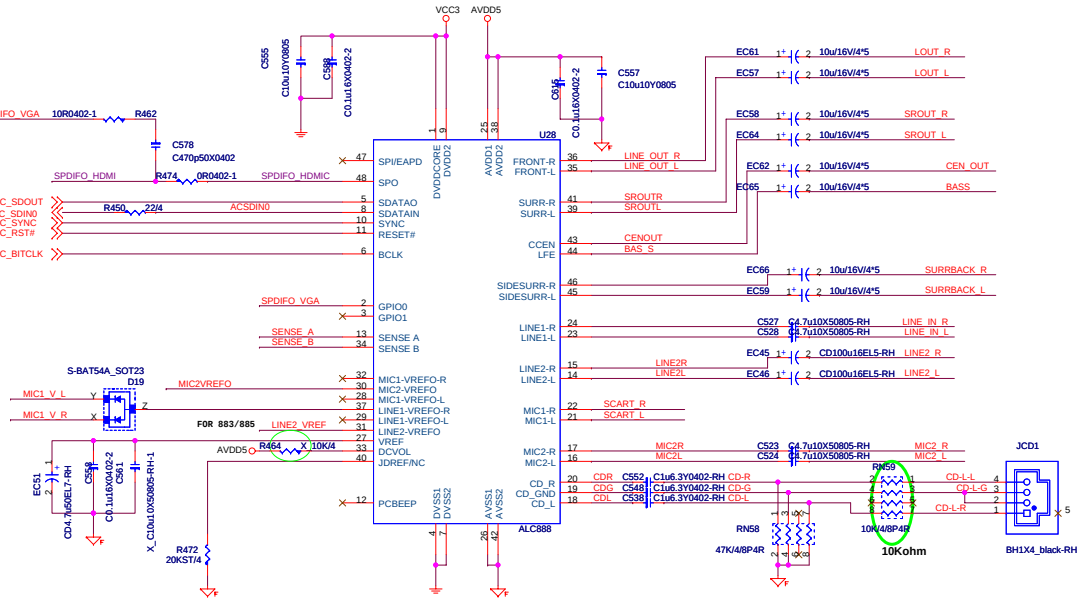
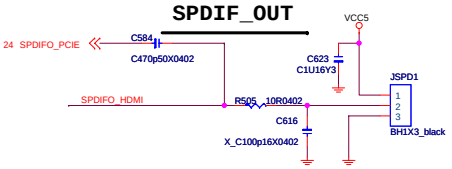
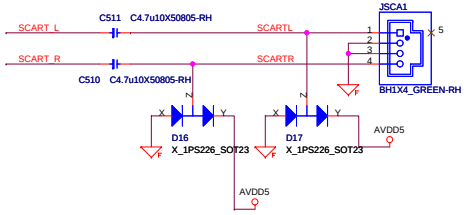
Description	D0
1~12 DVDD	35.5
13~48 AVDD	50.1

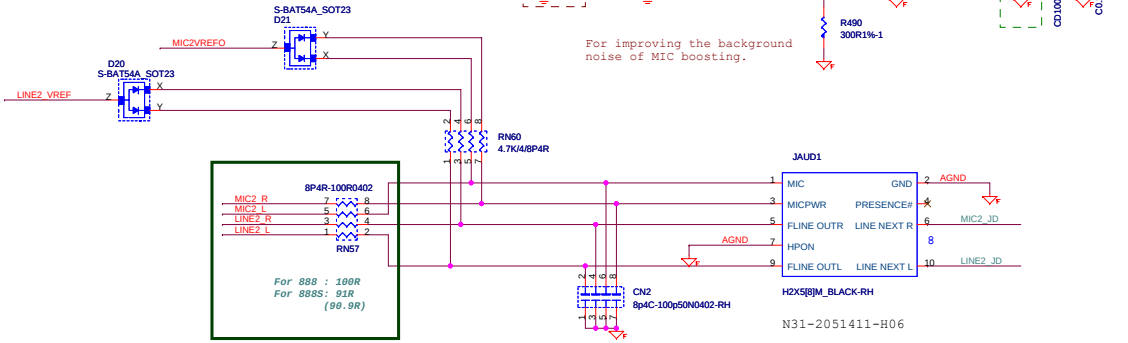
	ALC888	ALC888S
Del	c573	R938
	R441	

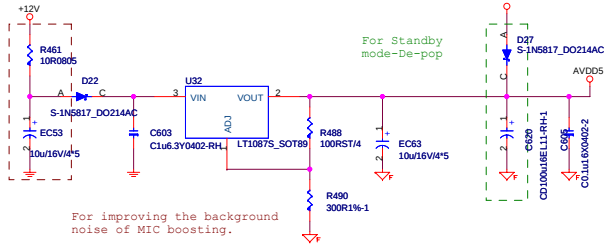


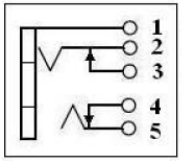


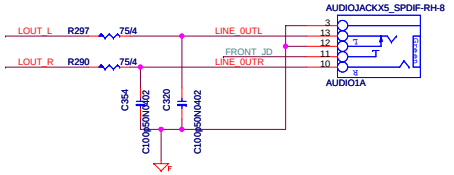


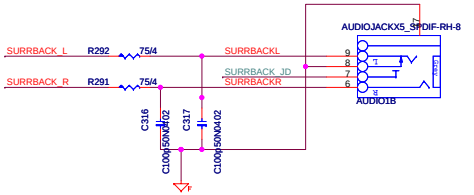


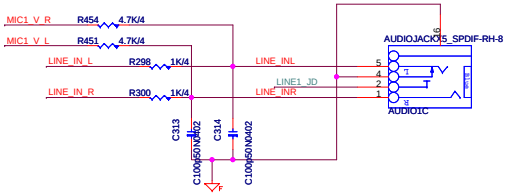


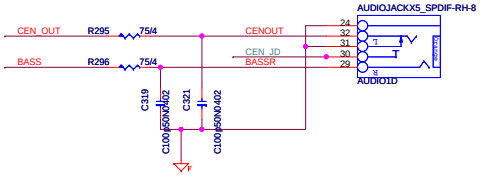


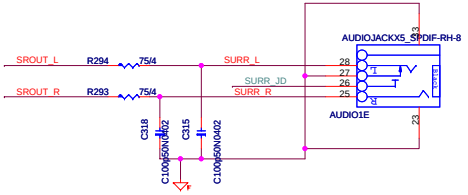


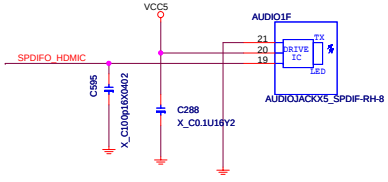


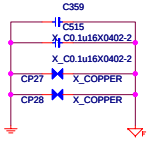












N31-2051411-H06

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Title: ALC888

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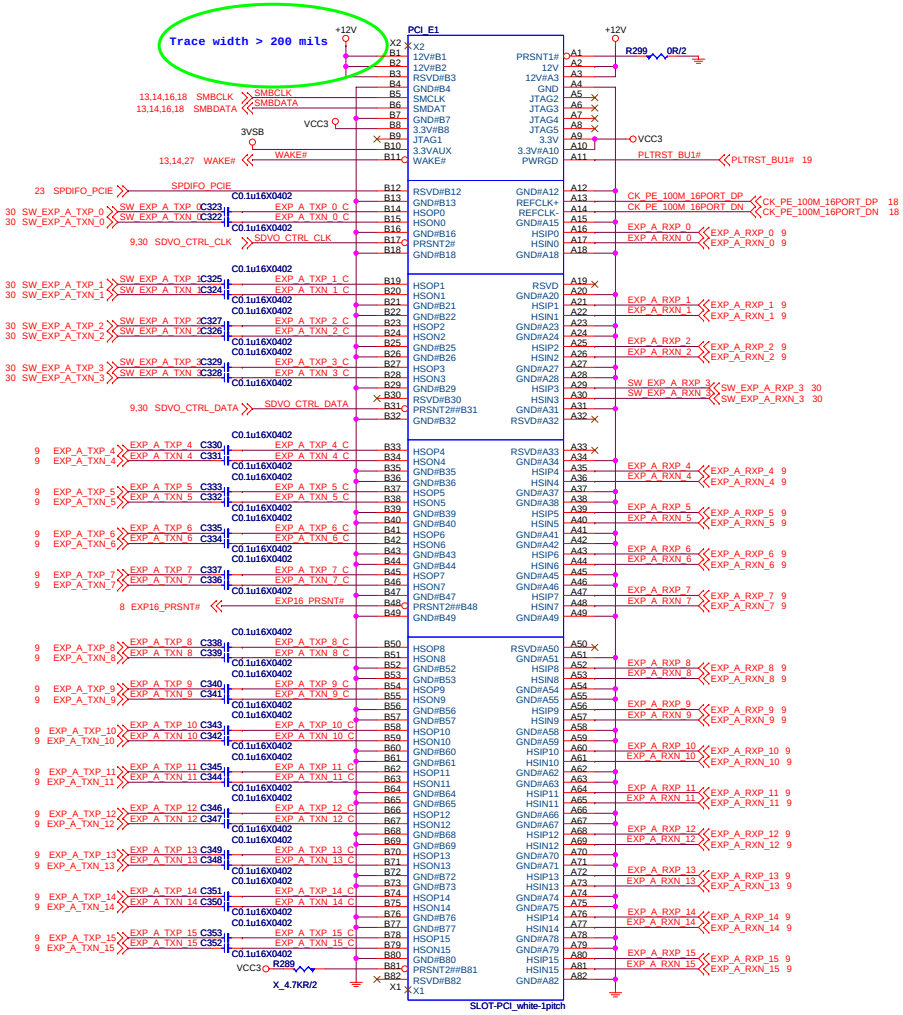
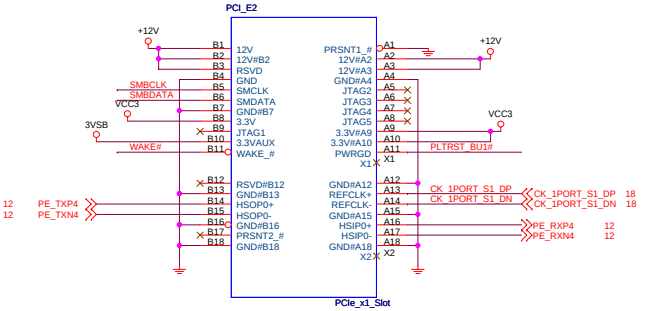
PCI_Express X16 Slot

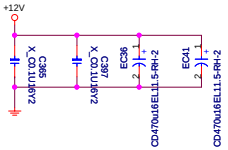


+12V 5.5A VCC3 3A

PCI_Express X4 Slot
(Share with PCI_E x1 Slots)



+12V 0.5A VCC3 3A



MICRO-START INT'L CO.,LTD.

Title: PCIE x16 & x1

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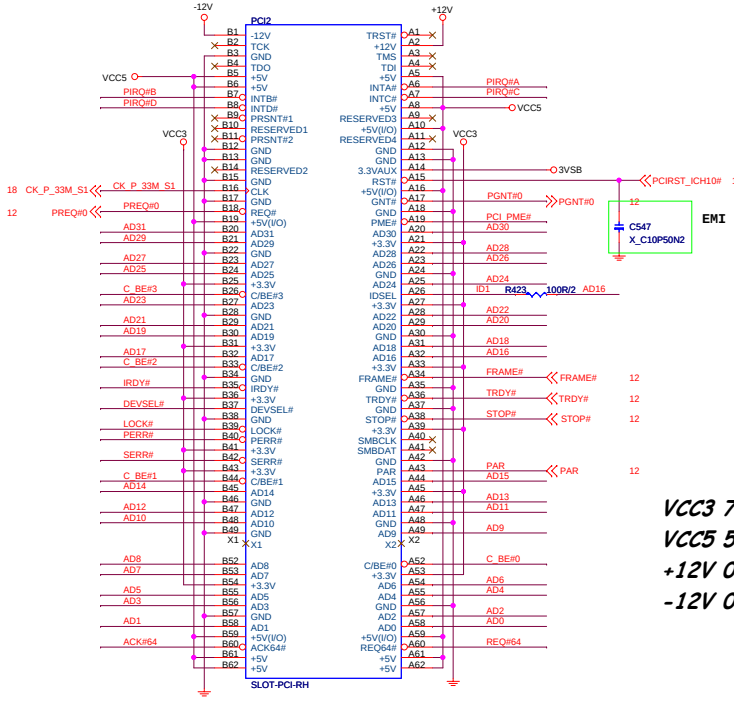
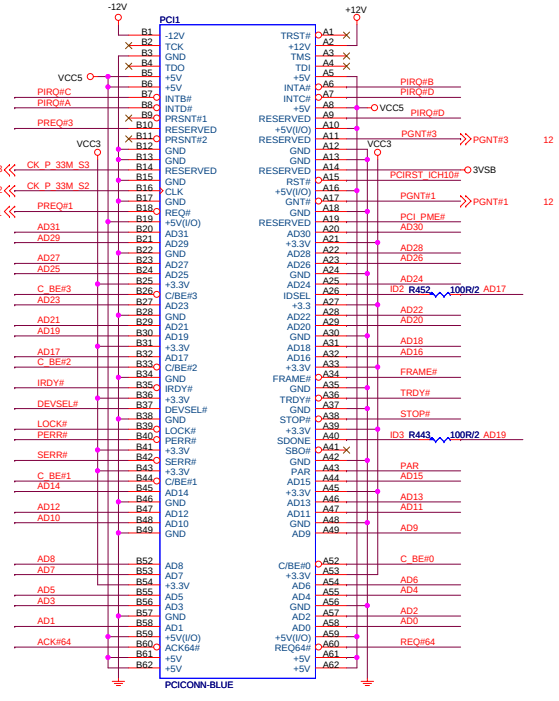
PCI SLOT 2 (PCI VER: 2.2 COMPLY)



IDSEL = AD16
MASTER = PREQ#0
PIRQ#A

PCI SLOT 1 (PCI VER: 2.2 COMPLY)



IDSEL = AD17
MASTER = PREQ#1
PIRQ#B

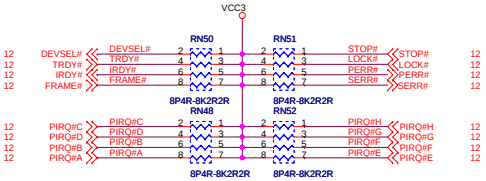
IDSEL = AD19
MASTER = PREQ#3
PIRQ#C

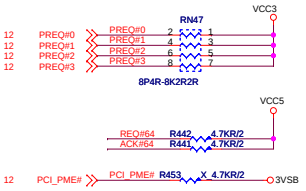
VCC3 7.6A
VCC5 5A
+12V 0.5A
-12V 0.5A

12 AD[31..0] — AD[31..0]

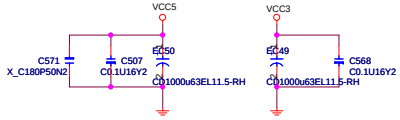
12 C_BE#[3..0] — C_BE#[3..0]

PCI PULL-UP / DOWN RESISTORS





PCI SLOT DECOUPLING CAPACITORS



MSI — MICRO-START INT'L CO.,LTD.

Title: **PCI Slot 1 & 2**

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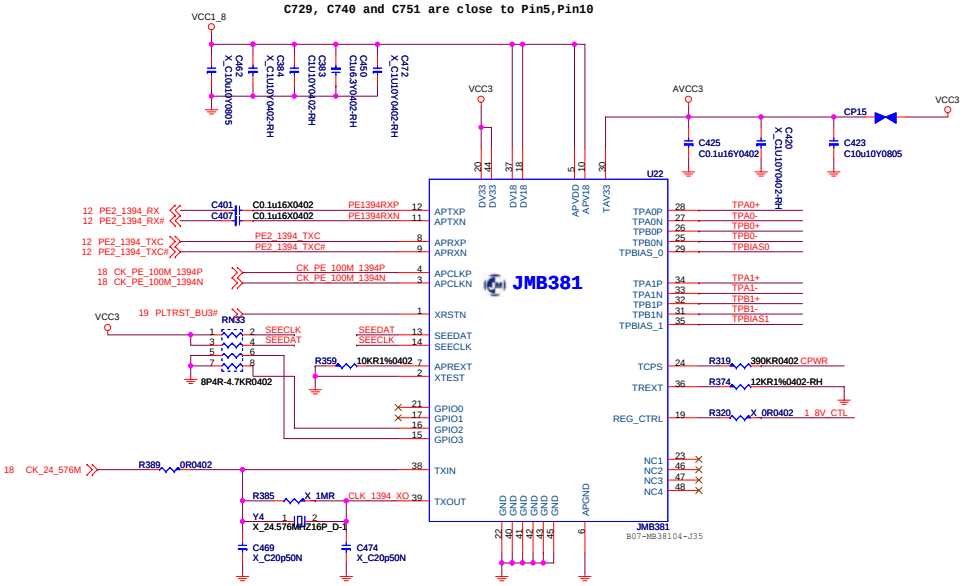
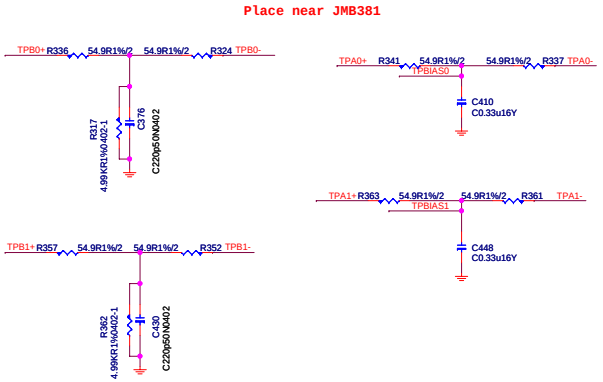
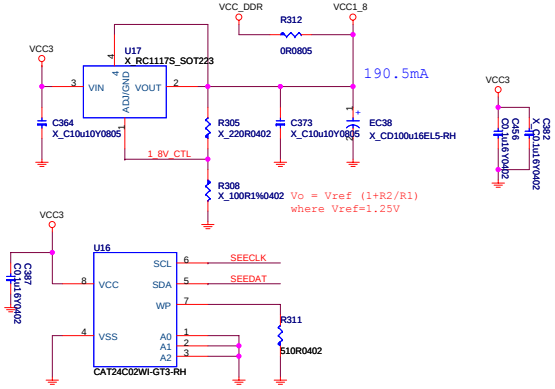
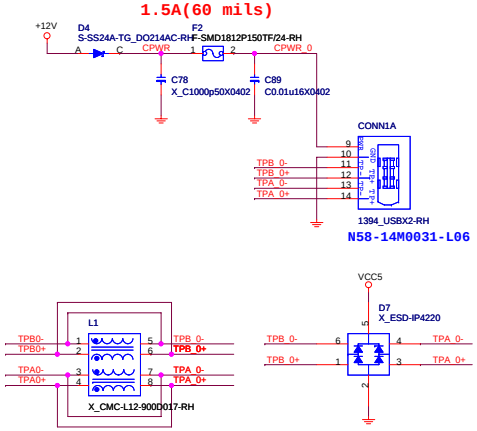
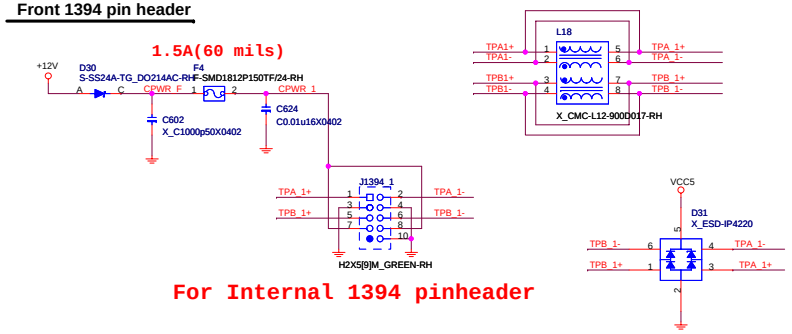




Digital Core (DV18)		40.0	mA
Digital IO (DV33)		5.0	mA
PCIE PHY Power (APV18+APVDD)		58.0	mA
Digital 3.3V Power (TAV33)		45.5	mA







MSI MICRO-START INT'L CO.,LTD.

Title: JMB381

Size	Document Number	Rev
C	MS-7524M1	0A

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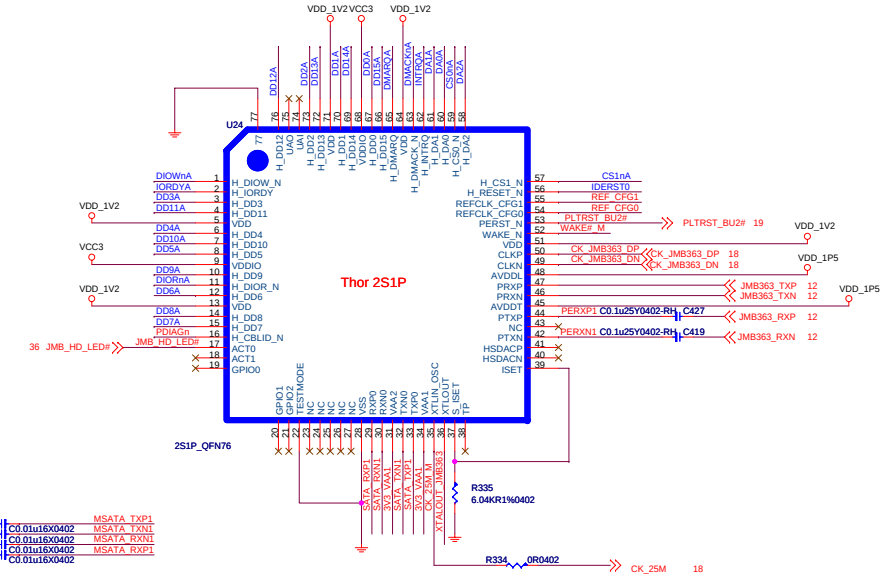
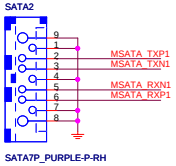
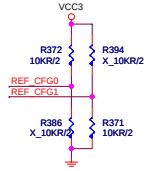
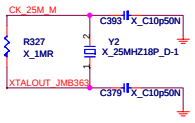


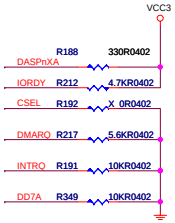


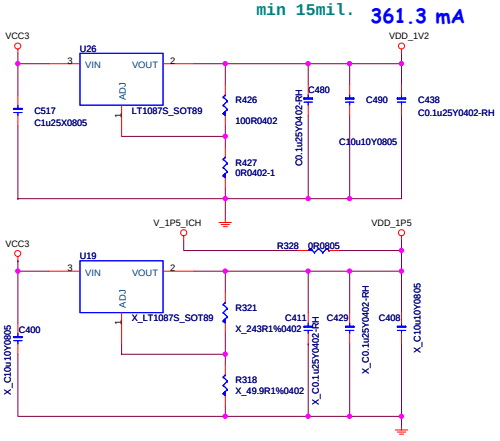
Parameter	Symbol	Min	Typ	Max	Units
Analog Power for PCI-E Phy (1.5V)	I_{AVDDT}/I_{AVDDL}		65		mA
Analog Power for Crystal Oscillator, PLL, PCI	I_{VAA1}		25		mA
Analog Power for SATA Phy	I_{VAA2}		75		mA
Digital Core Power	I_{VDD}		170		mA
Digital I/O Power	I_{VDDIO}		30		mA

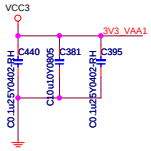


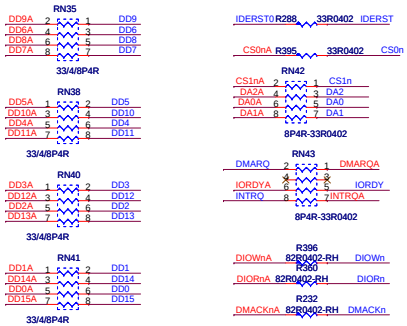
REF_CFG[1:0] =
00:20MHz
01:25MHz

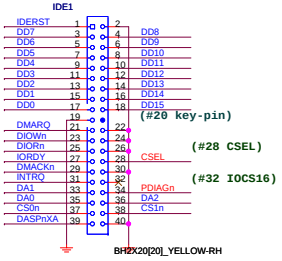












if the length of JMB-363 to IDE connector more than 4inch, that must stuff dampping resistor.

MSI MICRO-STAR INT'L CO.,LTD.

Title: JMB363

Size	Document Number	Rev
C	MS-7524M1	0A

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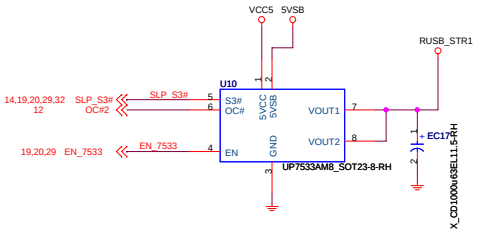
Rear USB Connector

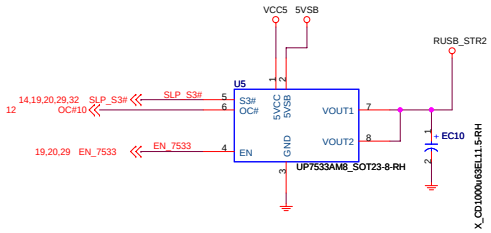
USB POWER FOR PORT 2,3

NEAR CONNECTOR



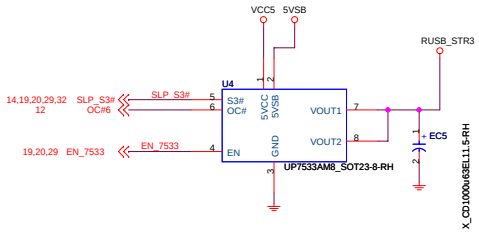
USB POWER FOR PORT 10,11

NEAR CONNECTOR

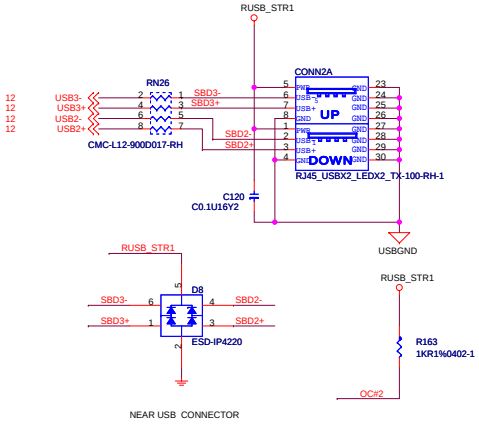


USB POWER FOR PORT 6,7

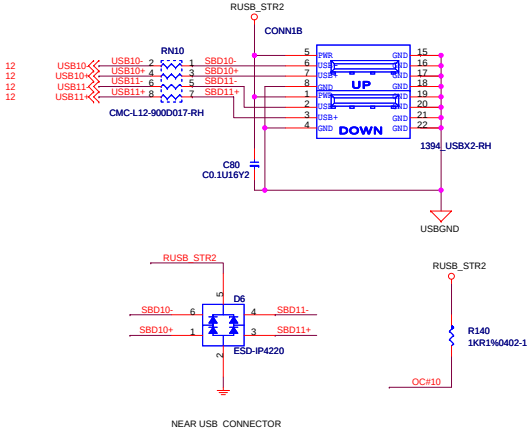
NEAR CONNECTOR



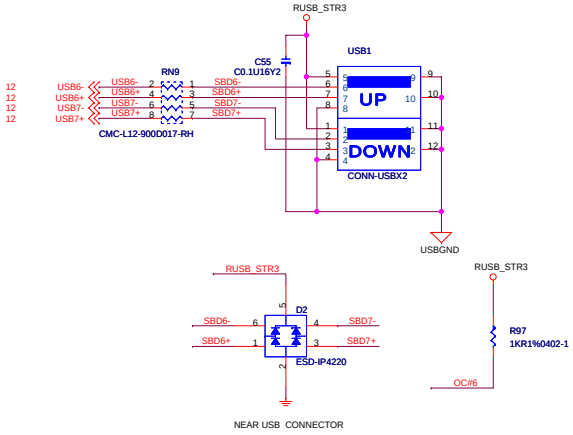
REAR USB PORT 2,3



REAR USB PORT 10,11



REAR USB PORT 6,7



	S0/S1	S3	S4/S5
USB	500mA	500mA	500mA
PS2	300mA	300mA	300mA

MICRO-START INT'L CO.,LTD.

Title: Rear USB Connectors

Size	Document Number	Rev
C	MS-7524M1	0A

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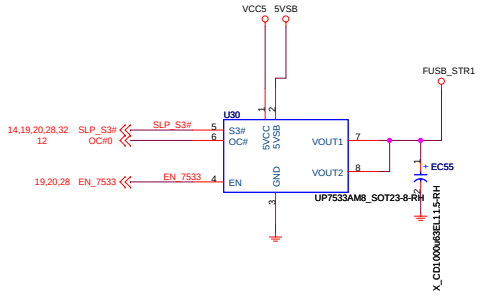
Front USB Connector

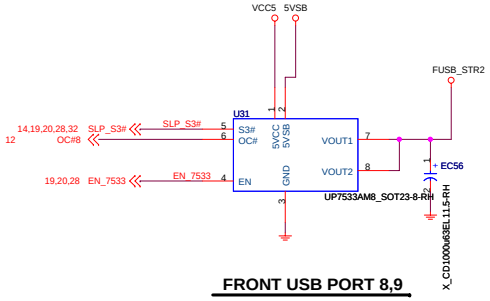
USB POWER FOR PORT 0,1

NEAR CONNECTOR



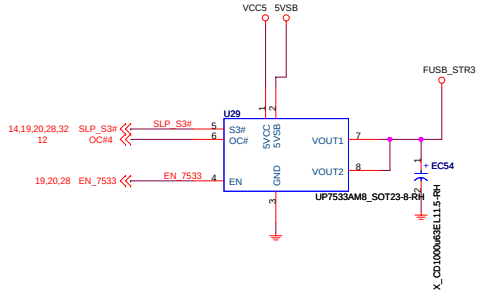
USB POWER FOR PORT 8,9

NEAR CONNECTOR

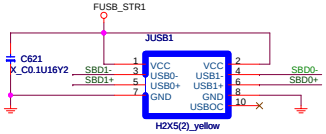


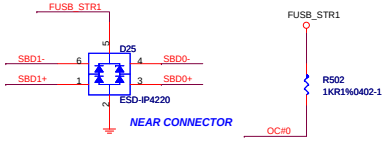
USB POWER FOR PORT 4,5

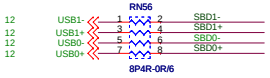
NEAR CONNECTOR



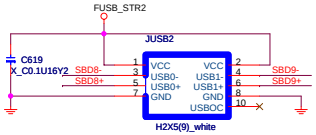
FRONT USB PORT 0,1

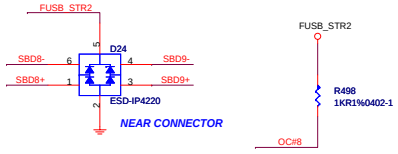


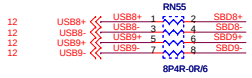




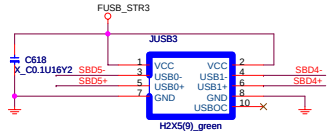
FRONT USB PORT 8,9

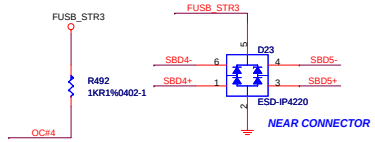






FRONT USB PORT 4,5





MSI — MICRO-START INT'L CO.,LTD.		
Title: Front USB Connectors		
Size: C	Document Number: MS-7524M1	Rev: 0A
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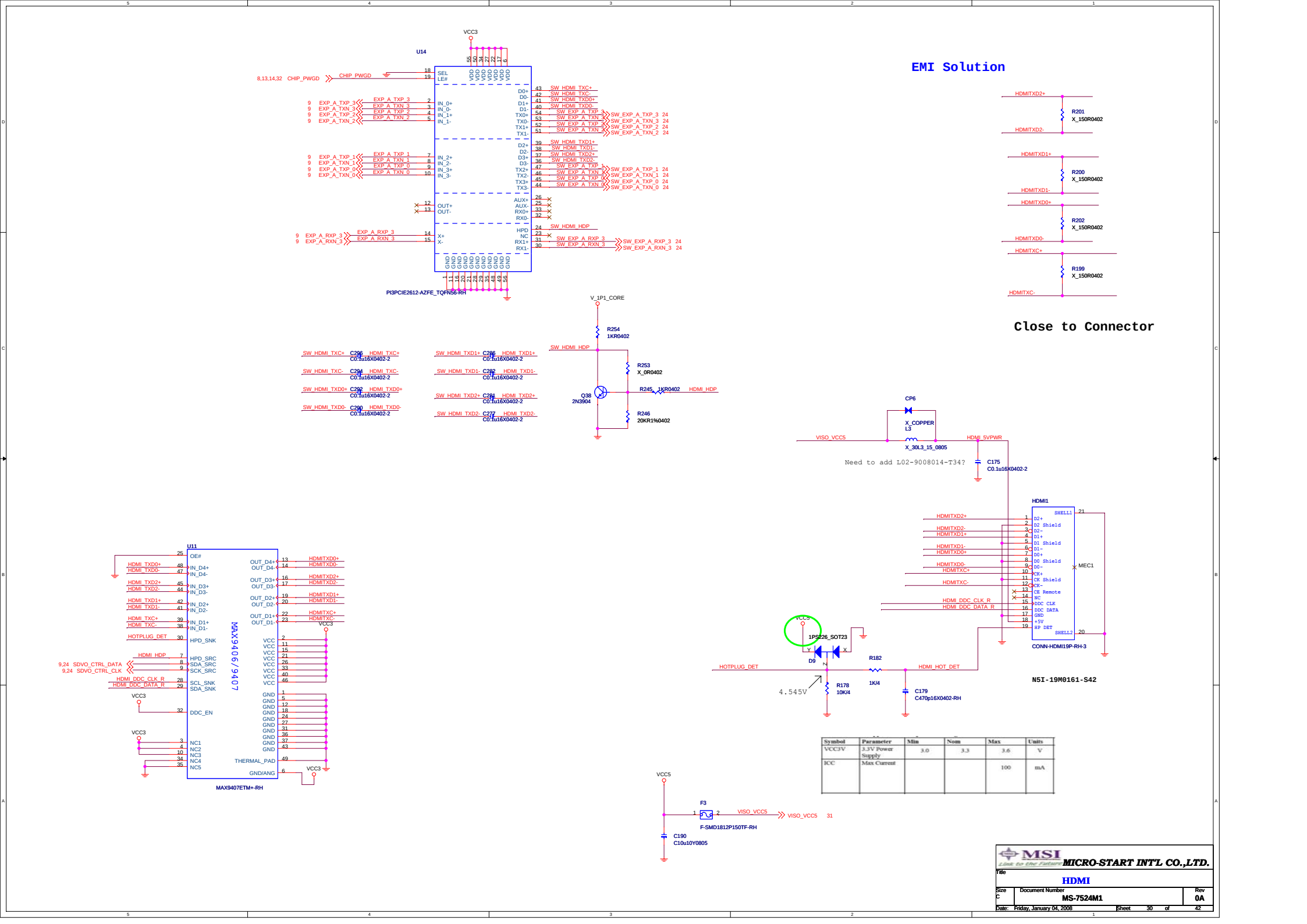
EMI Solution
Close to Connector
U14
PI3PCIE2612-AZFE_TQFN56-RH
U11
MAX9406/9407
MAX9407ETM+-RH
HDMI1
CONN-HDMI19P-RH-3
MEC1
N5I-19M0161-S42
R201
X_150R0402
R200
X_150R0402
R202
X_150R0402
R199
X_150R0402
R254
1KR0402
R253
X_0R0402
R245
1KR0402
R246
20KR1%0402
Q38
2N3904
CP6
X_COPPER
L3
X_30L3_15_0805
C175
C0.1u16X0402-2
Need to add L02-9008014-T34?
D9
1PS226_SOT23
R182
1K/4
R178
10K/4
4.545V
C179
C470p16X0402-RH
F3
F-SMD1812P150TF-RH
C190
C10u10Y0805
VCC3
V_1P1_CORE
VCC5
VISO_VCC5
HDMI_5VPWR
HDMI_HDP
HOTPLUG_DET
HDMI_HOT_DET
HDMI_DDC_CLK_R
HDMI_DDC_DATA_R
Symbol
Parameter
Min
Nom
Max
Units
VCC3V
3.3V Power Supply
3.0
3.3
3.6
V
ICC
Max Current
100
mA
MSI
MICRO-START INT'L CO.,LTD.
Title
HDMI
Size
C
Document Number
MS-7524M1
Rev
0A
Date: Friday, January 04, 2008
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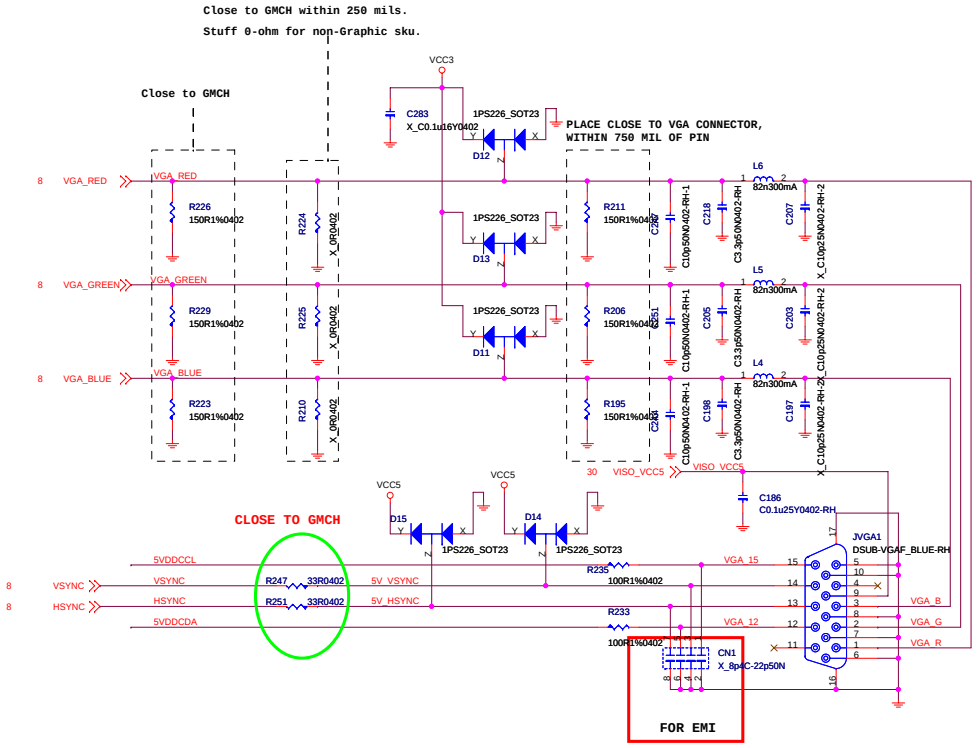
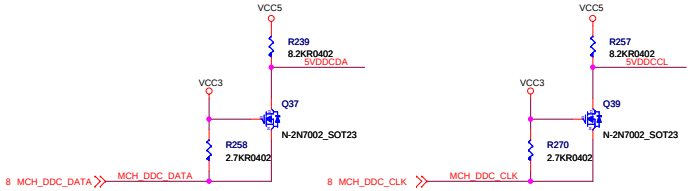




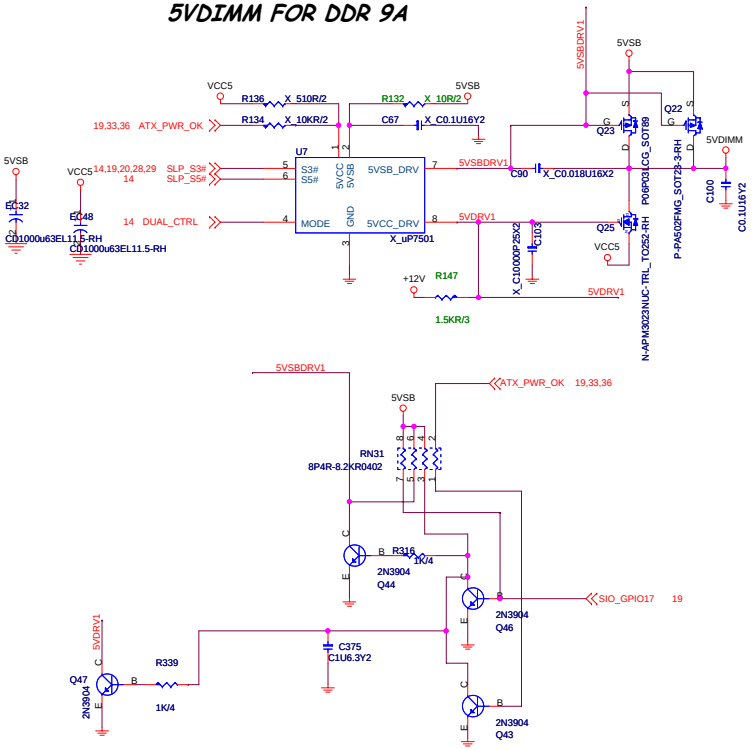
MSI MICRO-START INT'L CO.,LTD.

Title: VGA

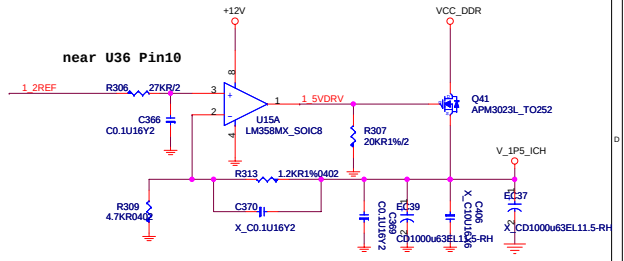
Size	Document Number	Rev
C	MS-7524M1	0A

Date: Thursday, January 03, 2008 Sheet 31 of 42

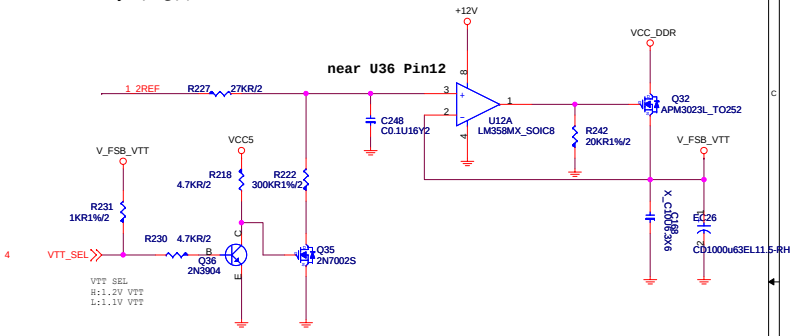
5VDIMM FOR DDR 9A



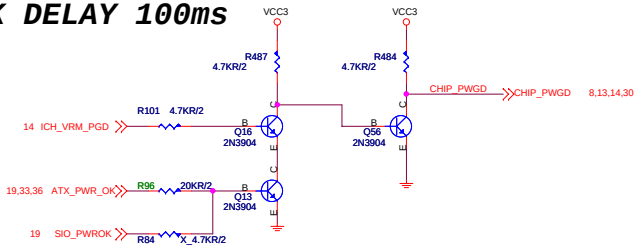
SB 1.5V 3.543A



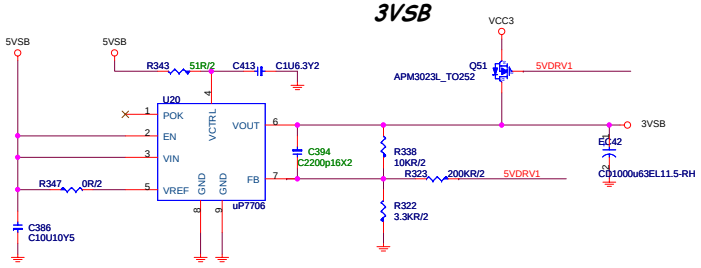
1.2V 6A



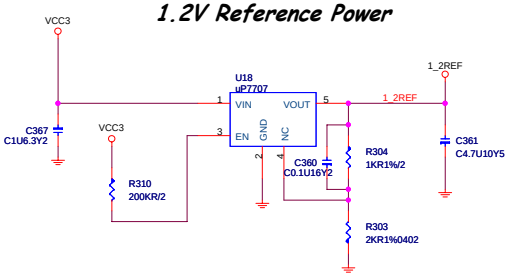
PWROK DELAY 100ms



3VSB



1.2V Reference Power



MSI Link to the Future MICRO-START INT'L CO.,LTD.

Title: ACPI Controller UPI

Size	Document Number	Rev
Custom	MS-7524M1	0A

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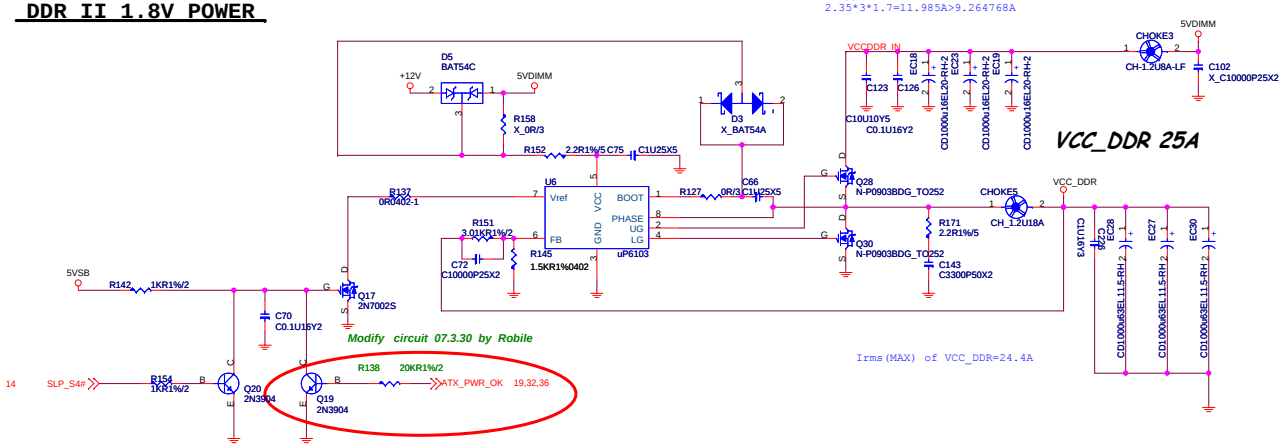
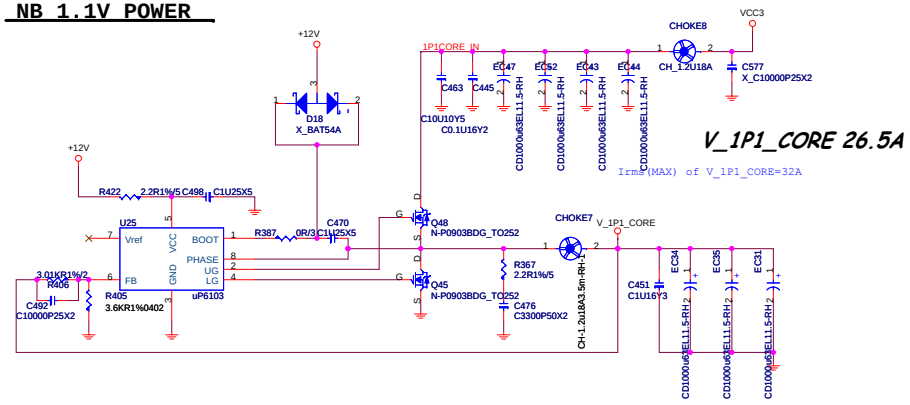
DDR II 1.8V POWER

Iripple=24.127*0.8*√(1.8/5)*√(1-1.8/5)/1=9.264768A
2.35*3*1.7=11.985A>9.264768A



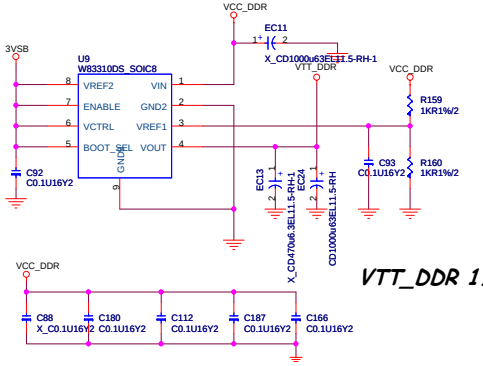
To meet Intel power down sequence.

NB 1.1V POWER



DDR VTT Power

To CPU Copper trace width > 250mils , Fill island behind DIMM > 400mils .



de- VCC_DDR high frequency noise.

MSI MICRO-START INT'L CO.,LTD.

Title: NB Core & DDR Power

Size	Document Number	Rev
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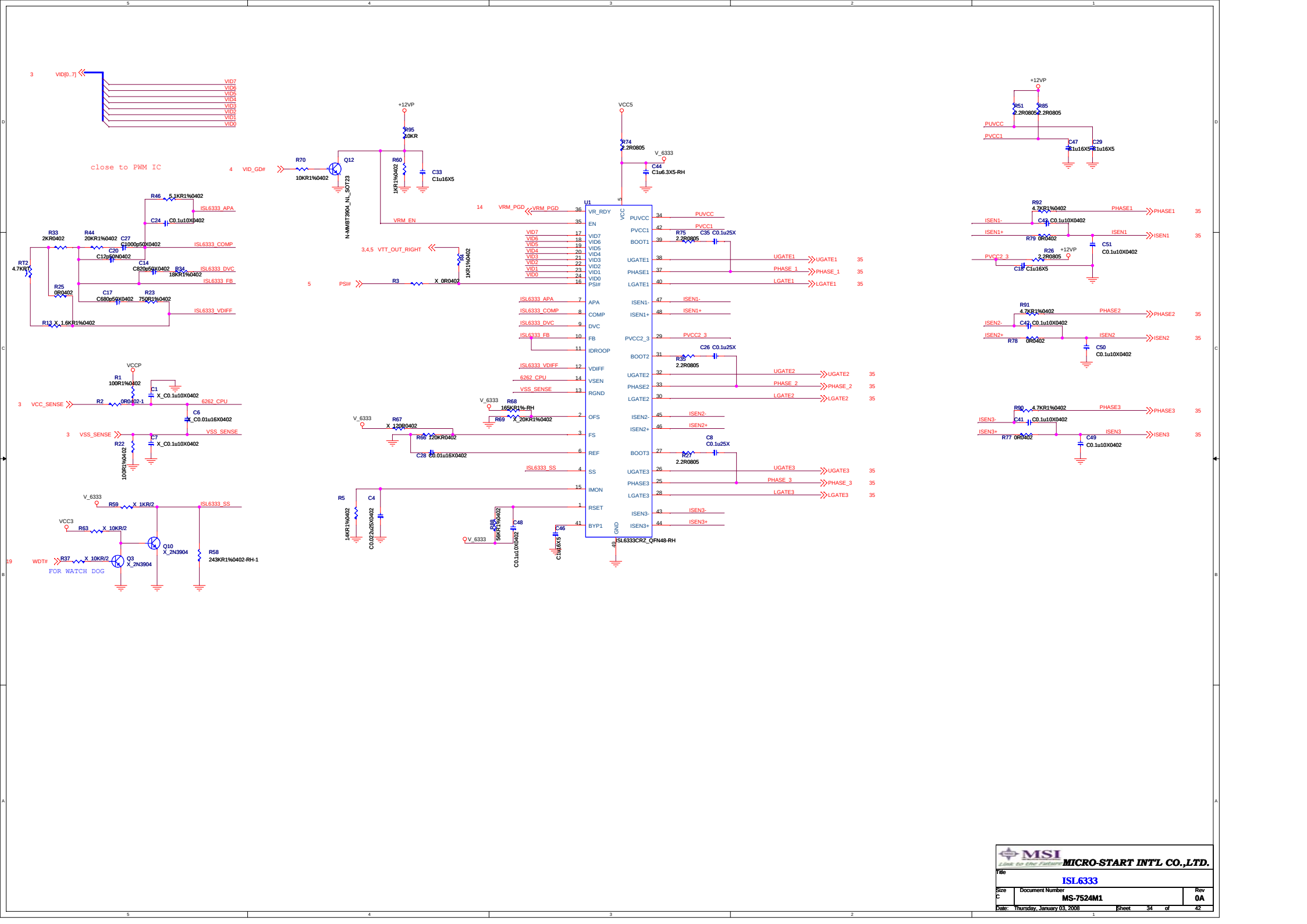
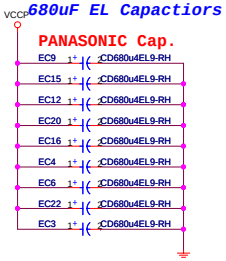


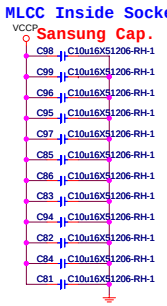
MICRO-START INT'L CO.,LTD.

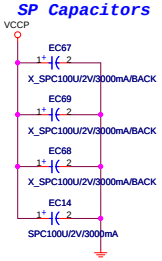
Title: ISL6333

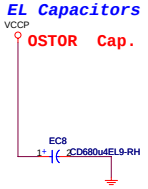
Size	Document Number	Rev
C	MS-7524M1	0A

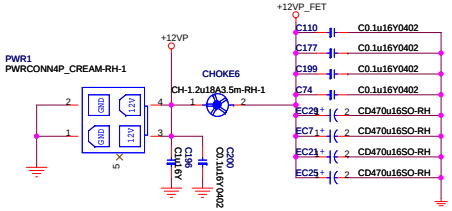
Date: Thursday, January 03, 2008 Sheet 34 of 42



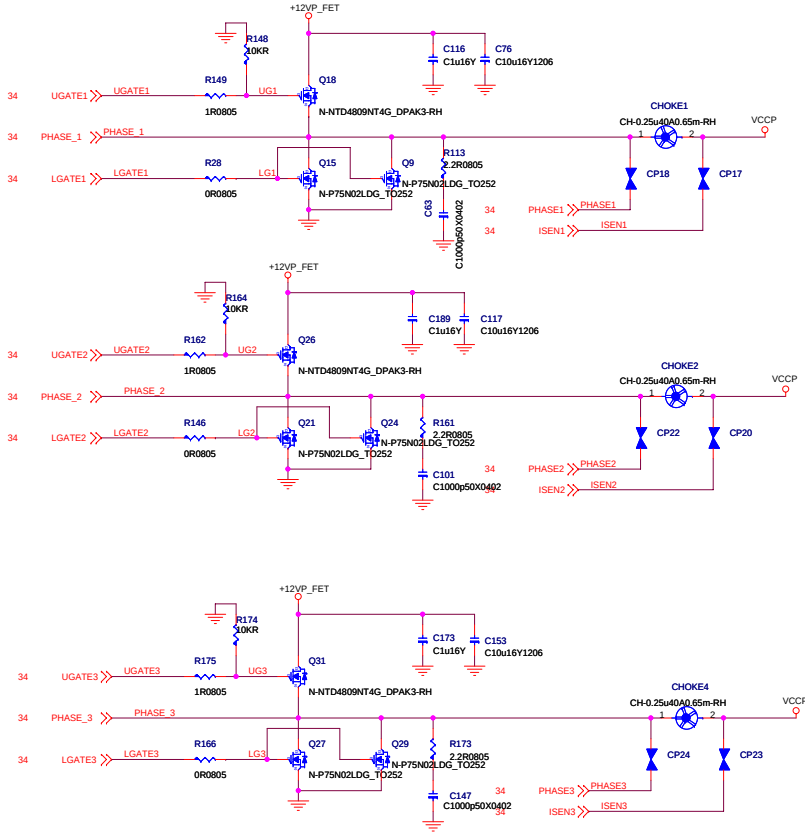








Part Number Description	Rated voltage (VDC)	Rated Capacitance (µF)	tanδ	Leakage Current (µA)	E S R 100-300kHz at 20°C (mΩ)	Rated ripple current 100kHz at105°C (mA r.m.s.)
APSC160E--471MJB58	16	470	0.10	1504	10	6100



MSI MICRO-START INT'L CO.,LTD.

Title: ISL6333

Size	Document Number	Rev
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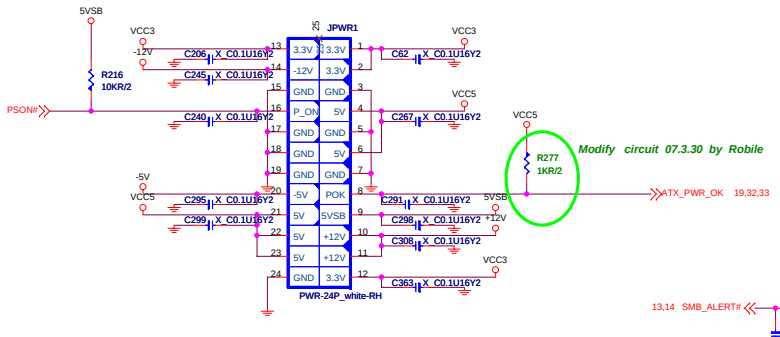
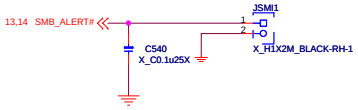
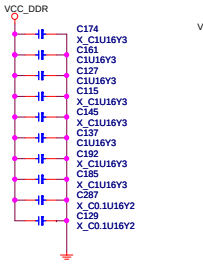
ATX POWER CONNECTOR



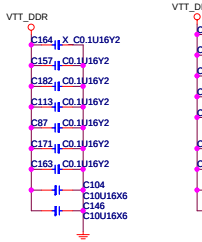
SMI

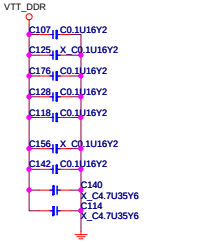


CHANNEL A V_SM_VTT DECOUPLING CAPS

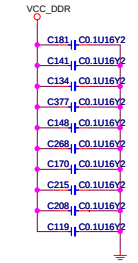


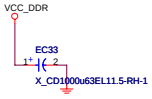
CHANNEL B V_SM_VTT DECOUPLING CAPS

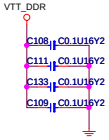


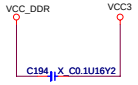


FOR EMI

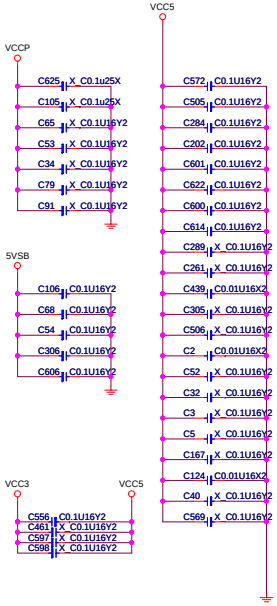


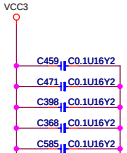


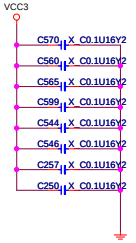


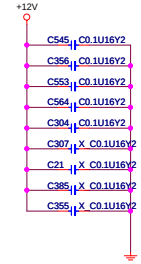


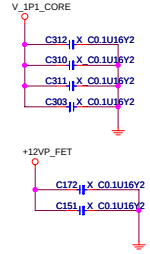
Cap. for EMI & Power

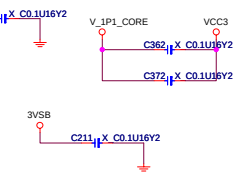


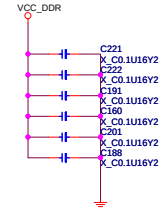




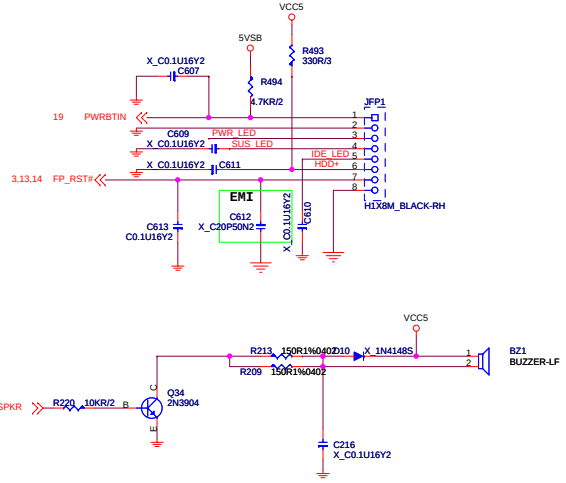




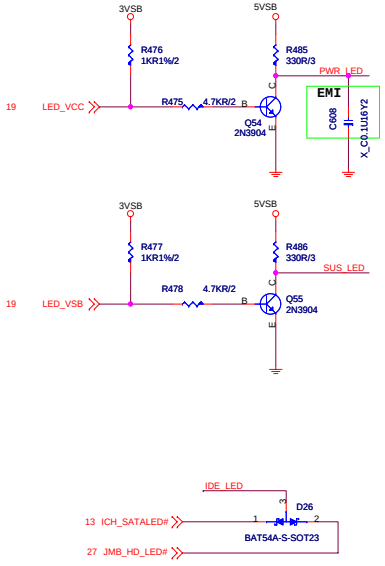




FRONT PANNEL

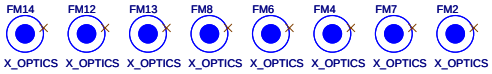


LED (for Fintek 71882)

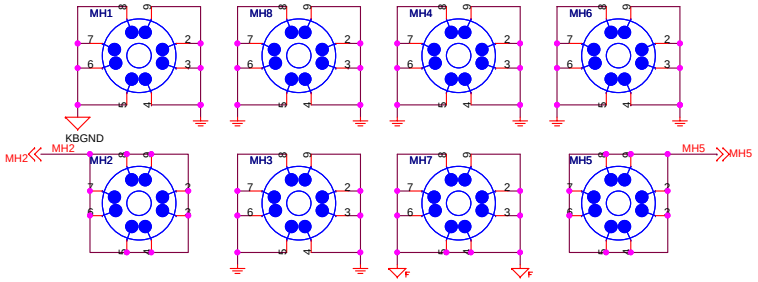


Optical Fiducial Marks-120

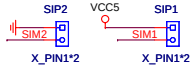
Optical Fiducial Marks-100

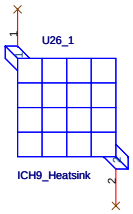


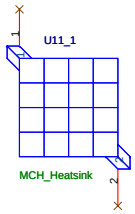
Mounting Holes



Simulation







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Title: Manual & Option Parts

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Custom	MS-7524M1	0A

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