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# MS-7418 (MS-6496)

**Version 1.0**

## **CPU:**

**Intel Dimondville**

## **System Chipset:**

**Intel 945GC (North Bridge)**

**Intel ICH7(South Bridge)**

## **On Board Chipset:**

**BIOS -- SPI**

**HD AUDIO CODEC(ALC888)**

**LAN -- Realtek RTL8111C**

**Clock Generator - ICS954119**

## **Main Memory:**

**DDR II SO-DIMM x 1 (Max 2GB)**


**CF Card Connector for flash Memory**

## **Expansion Slots:**

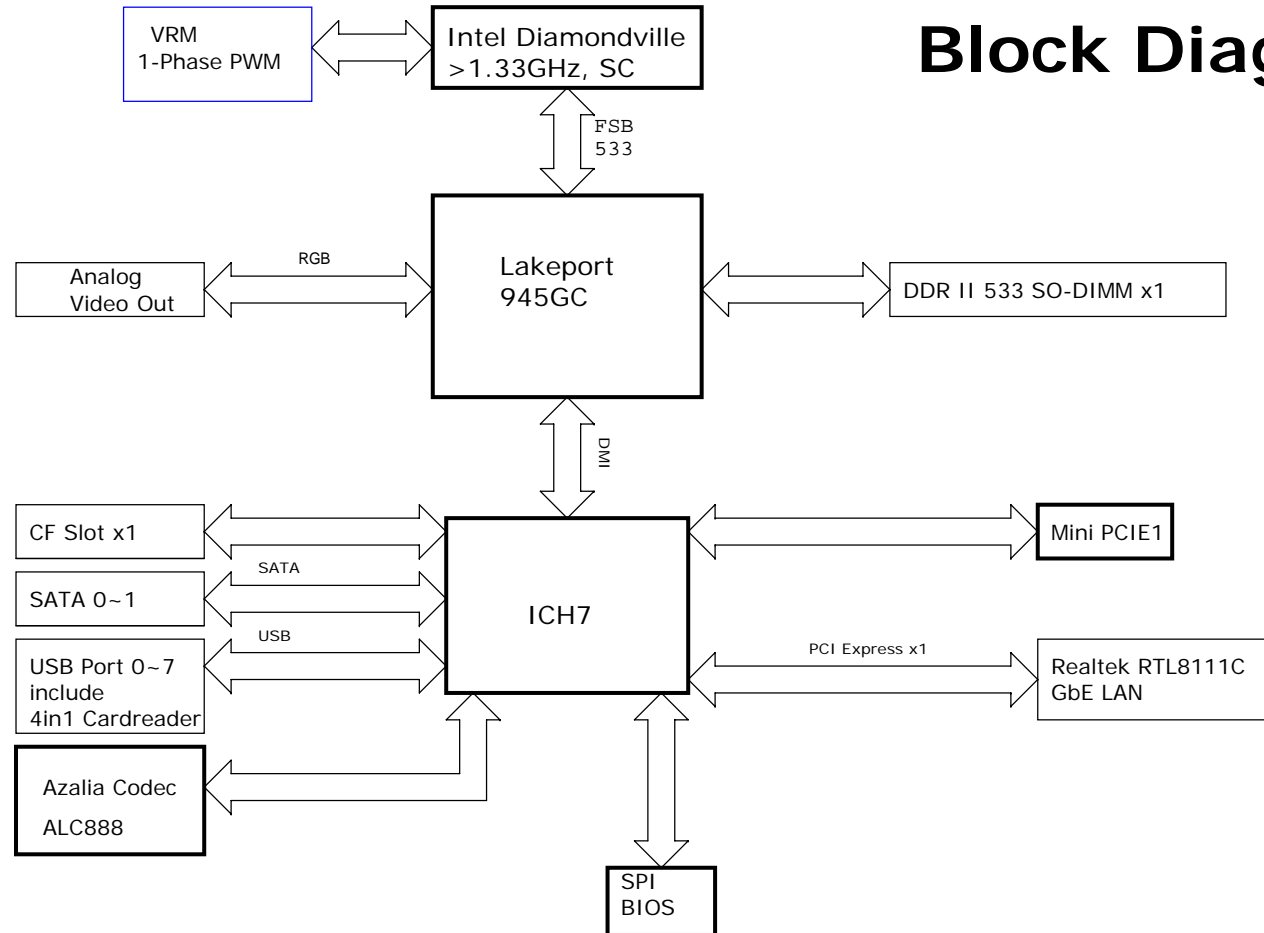
**Internal Mini PCIE x1**

## **Intersil PWM:**

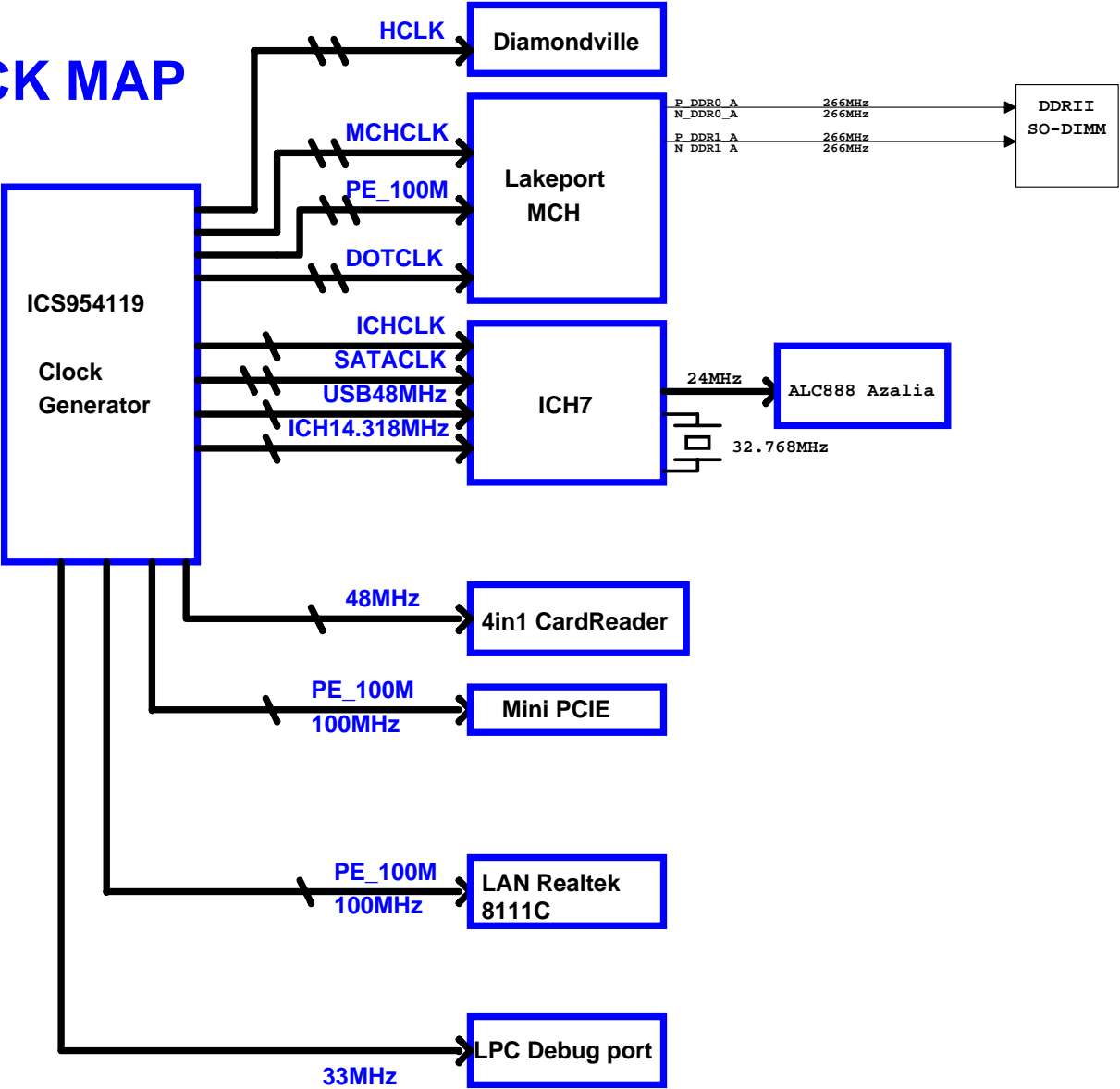
**Controller: 6314**

		<b>MICRO-STAR INT'L CO., LTD.</b>	
Title COVER SHEET			
Size	Document Number MS-7418		Rev 1.0
Date:	Friday, June 06, 2008		Sheet 1 of 32

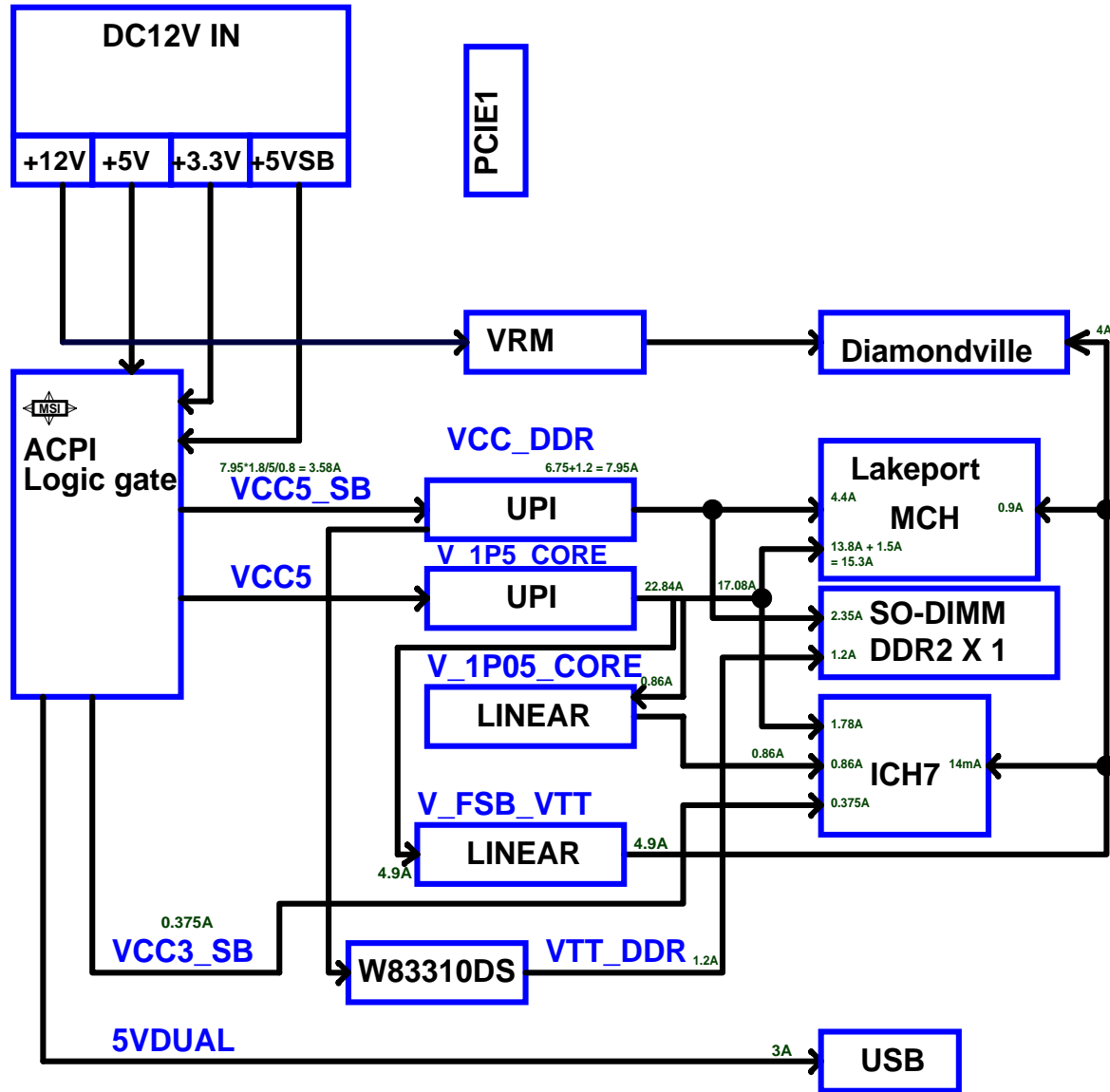
# Block Diagram



# CLOCK MAP



# POWER MAP



ICH7

GPIO	Alt Func	Pin	I/O/NC	Power	PU	SMI	Tol	Default	Signal Name or status
GPIO[0]	SIO_SMI#	AB18	I/O	Vcc3p3	N	Y	5	Input	pull high VCC3
GPIO[1]	PCIREQ[5]#	C8	I/O	V5REF	N	Y	5	Input	PREQ#5
GPIO[2]	PIRQE#	G8	I/OD	V5REF	N	Y	5	Input	PIRQ#E
GPIO[3]	PIRQF#	F7	I/OD	V5REF	N	Y	5	Input	PIRQ#F
GPIO[4]	PIRQG#	F8	I/OD	V5REF	N	Y	5	Input	PIRQ#G
GPIO[5]	PIRQH#	G7	I/OD	V5REF	N	Y	5	Input	PIRQ#H
GPIO[6]	ATADET0	AC21	I/O	Vcc3p3	N	Y	3.3	Input	ATADET0
GPIO[7]	GPI7	AC18	I/O	Vcc3p3	N	Y	3.3	Input	pull high VCC3
GPIO[8]	SIO_PME#	E21	I/O	VccSus3p3	N	Y	3.3	Input	SIO_PME# pull high VCC3_SB
GPIO[9]	WLAN_PWRON	E20	I/O	VccSus3p3	N	Y	3.3	Output	pull high VCC3_SB
GPIO[10]	unmuxed	A20	I/O	VccSus3p3	N	Y	3.3	Input	pull high VCC3_SB
GPIO[11]	SMBALERT#	B23	I/O	VccSus3p3	N	Y	3.3	Input	pull high VCC3_SB
GPIO[12]	unmuxed	F19	I/O	VccSus3p3	N	Y	3.3	Input	pull high VCC3_SB
GPIO[13]	unmuxed	E19	I/O	VccSus3p3	N	Y	3.3	Input	pull high VCC3_SB
GPIO[14]	ADT7467_ALERT	R4	I/O	VccSus3p3	N	Y	3.3	Input	pull high VCC3_SB
GPIO[15]	unmuxed	E22	I/O	VccSus3p3	N	Y	3.3	Input	pull high VCC3_SB
GPIO[16]	unmuxed	AC22	I/O	Vcc3p3	N	N	3.3	0	NC
GPIO[17]	PCIGNT[5]#	D8	I/O	Vcc3p3	N	N	3.3	N/A	NC
GPIO[18]	unmuxed	AC20	I/O	Vcc3p3	N	N	3.3	1	NC
GPIO[19]	SATA1GP	AH18	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[20]	unmuxed	AF21	I/O	Vcc3p3	N	N	3.3	1	NC
GPIO[21]	SATA0GP	AF19	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[22]	PCIREQ[4]#	A13	I/O	Vcc3p3	N	N	3.3	Input	PREQ#4
GPIO[23]	LDRQ1#	AA5	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[24]	unmuxed	R3	I/O	VccSus3p3	N	N	3.3	No Change	NC
GPIO[25]	S1_3_LED	D20	I/O	VccSus3p3	Y	N	3.3	1	pull high VCC3 SB
GPIO[26]	unmuxed	A21	I/O	VccSus3p3	N	N	3.3	0	NC
GPIO[27]	unmuxed	B21	I/O	VccSus3p3	N	N	3.3	0	NC
GPIO[28]	unmuxed	E23	I/O	VccSus3p3	N	N	3.3	0	NC
GPIO[29]	OC#2	C3	I/O	VccSus3p3	N	N	3.3	Input	OC#5
GPIO[30]	OC#2	A2	I/O	VccSus3p3	N	N	3.3	Input	OC#6
GPIO[31]	OC#2	B3	I/O	VccSus3p3	N	N	3.3	Input	OC#7
GPIO[32]	CLEAR_CMOS#	AG18	I/O	Vcc3p3	N	N	3.3	1	CLEAR_CMOS#, ONLY pull high VCC3
GPIO[33]	unmuxed	AC19	I/O	Vcc3p3	N	N	3.3	1	NC
GPIO[34]	unmuxed	U2	I/O	Vcc3p3	N	N	3.3	0	NC
GPIO[35]	unmuxed	AD21	I/O	Vcc3p3	N	N	3.3	1	NC
GPIO[36]	SATA2GP	AH19	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[37]	SATA3GP	AE19	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[38]	unmuxed	AD20	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[39]	unmuxed	AE20	I/O	Vcc3p3	N	N	3.3	Input	pull high VCC3
GPIO[48]	GNT4#	A14	I/O	Vcc3p3	N	N	3.3	N/A	GNT4#
GPIO[49]	CPUPWRGD	AG24	I/O	V_CPU_IO	N	N	CPU	N/A	H_PWRGD
GPI[15..0] can configured to cause a SMI# or SCI.									

Following are the GPIOs that need to be terminated properly if not used:  
GPIO[39;36;23;21;19;7;0]: default as inputs and should be pulled up to Vcc3\_3 if unused.  
GPIO[31;29;15;8]: default as inputs and should be pulled up to VccSus3\_3 if unused.

<b>FWH</b> Note: FWH GPs should only be used for static options, do not put dynamic nets on these				
GPIO	Pin#	Power	Tol	Signal Name
FPGI[0]	6	Main	3.3	pull-down
FPGI[1]	5	Main	3.3	pull-down
FPGI[2]	4	Main	3.3	pull-down
FPGI[3]	3	Main	3.3	pull-down
FPGI[4]	30	Main	3.3	pull-down

SIGNAL	DEVICE
MiniPCleRST#	MINI PCIE SLOT
TPMRST#	TPM
LANRST#	LAN 8111C
PCIRST_ICH7#	BUFFER IC
CF_RST#	CF_CARD
H_CPURST#	CPU
FWHRST#	LPT Debug port
MCHRST#	MCH

SMBCLK, SMBDATA, DDR2, PCIEX1, CLKGEN, ICH7, ADT7464

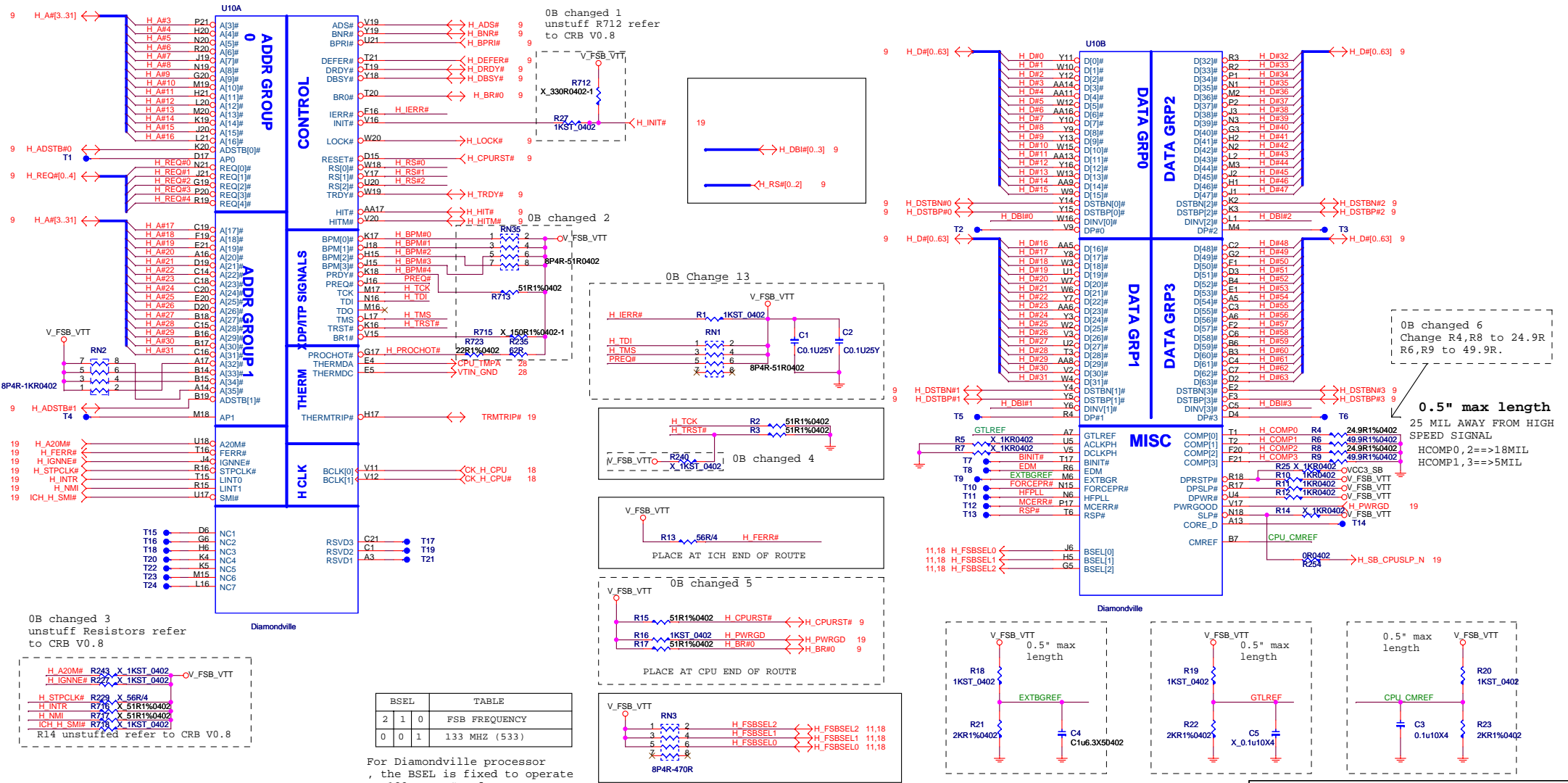
DDRII DIMM Config.

DEVICE	ADDRESS	CLOCK
DIMM 1	A0H	MCLK_A0/MCLK_A#0 MCLK_A1/MCLK_A#1 MCLK_A2/MCLK_A#2

JUMPER SETTING

<b>JBAT1</b>	(1-2)NORMAL	(2-3)CLEAR
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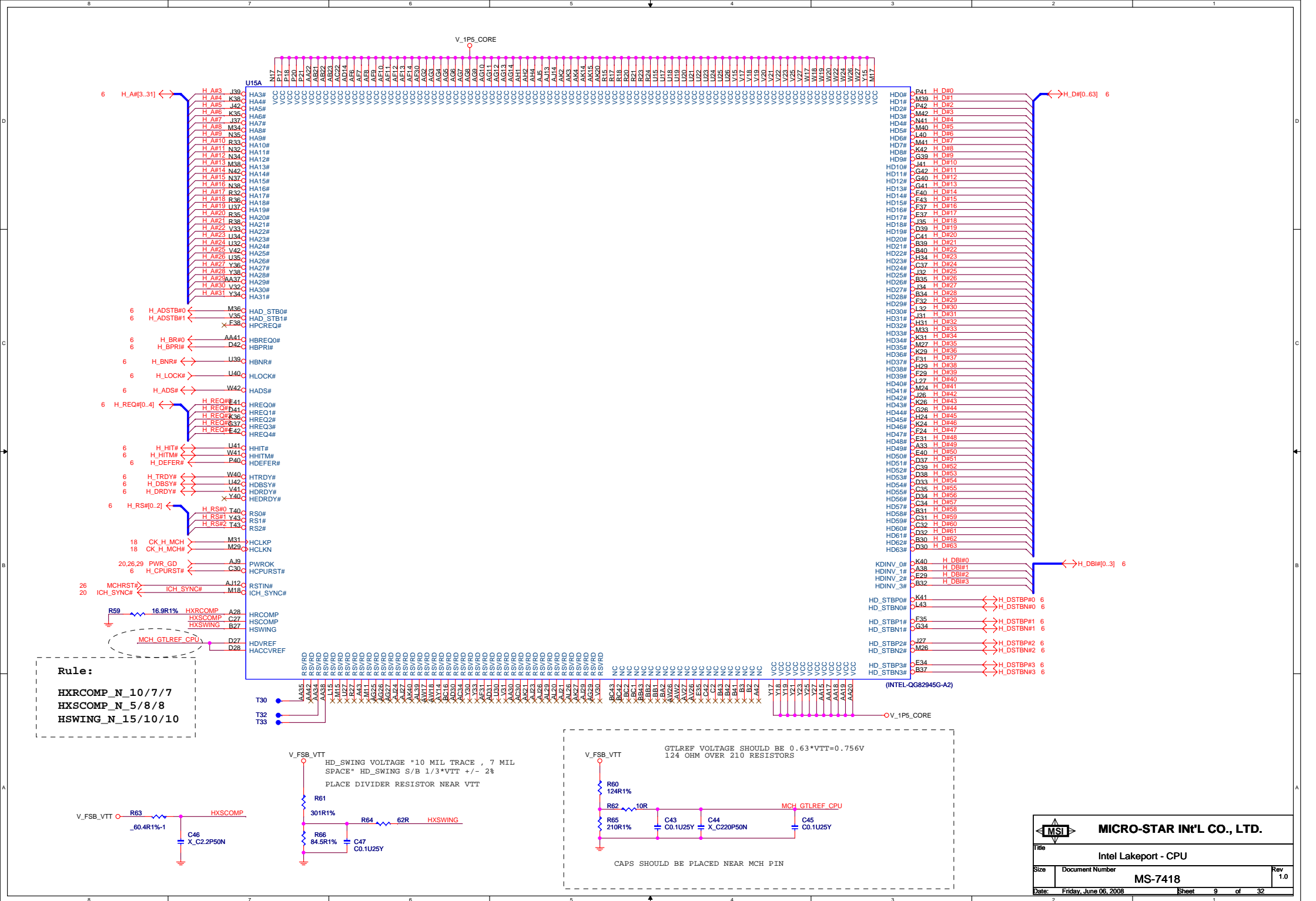
# CPU SIGNAL BLOCK

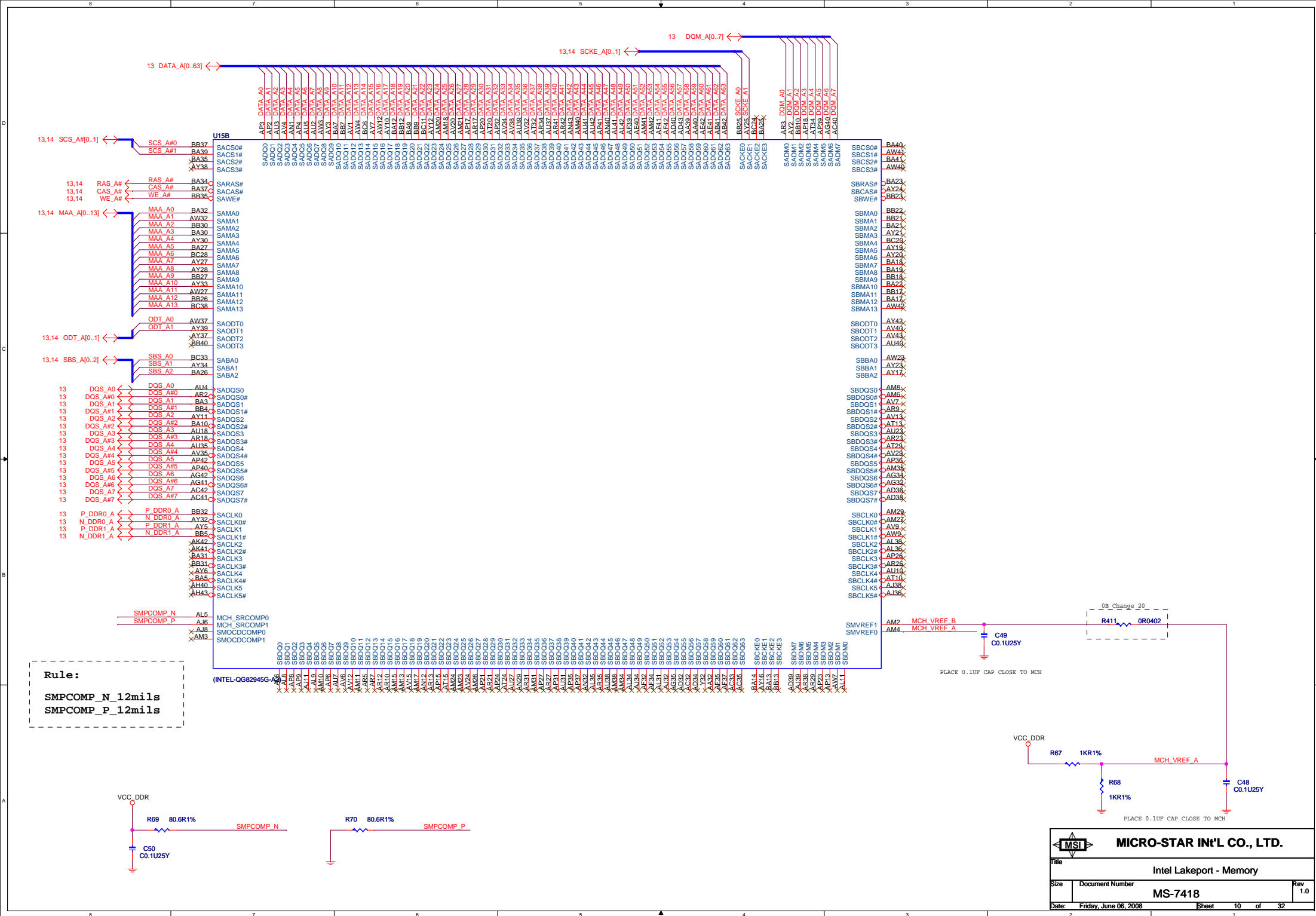




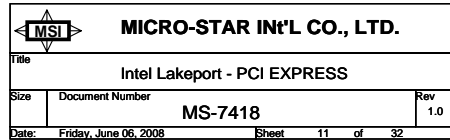


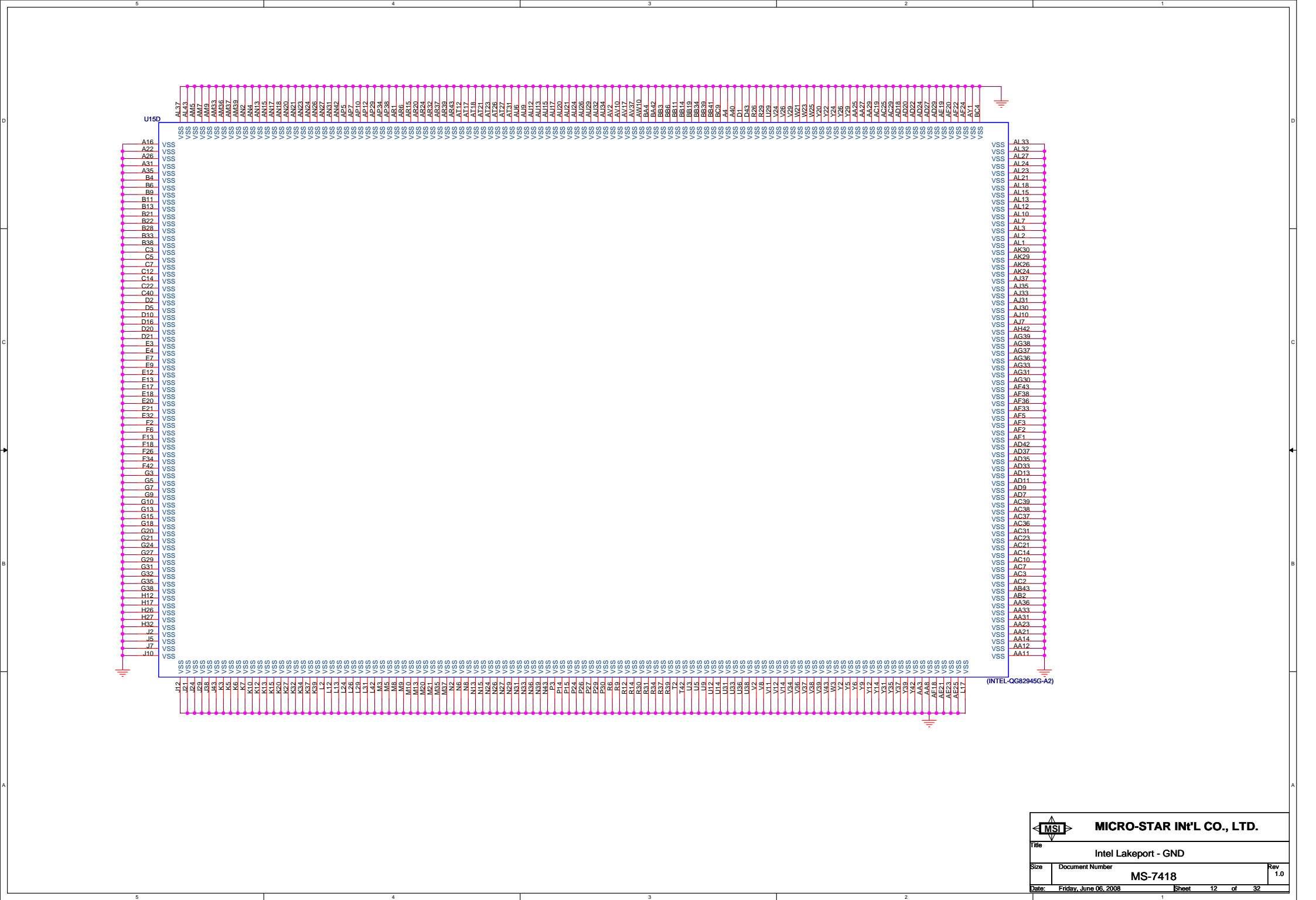




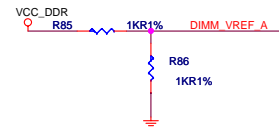
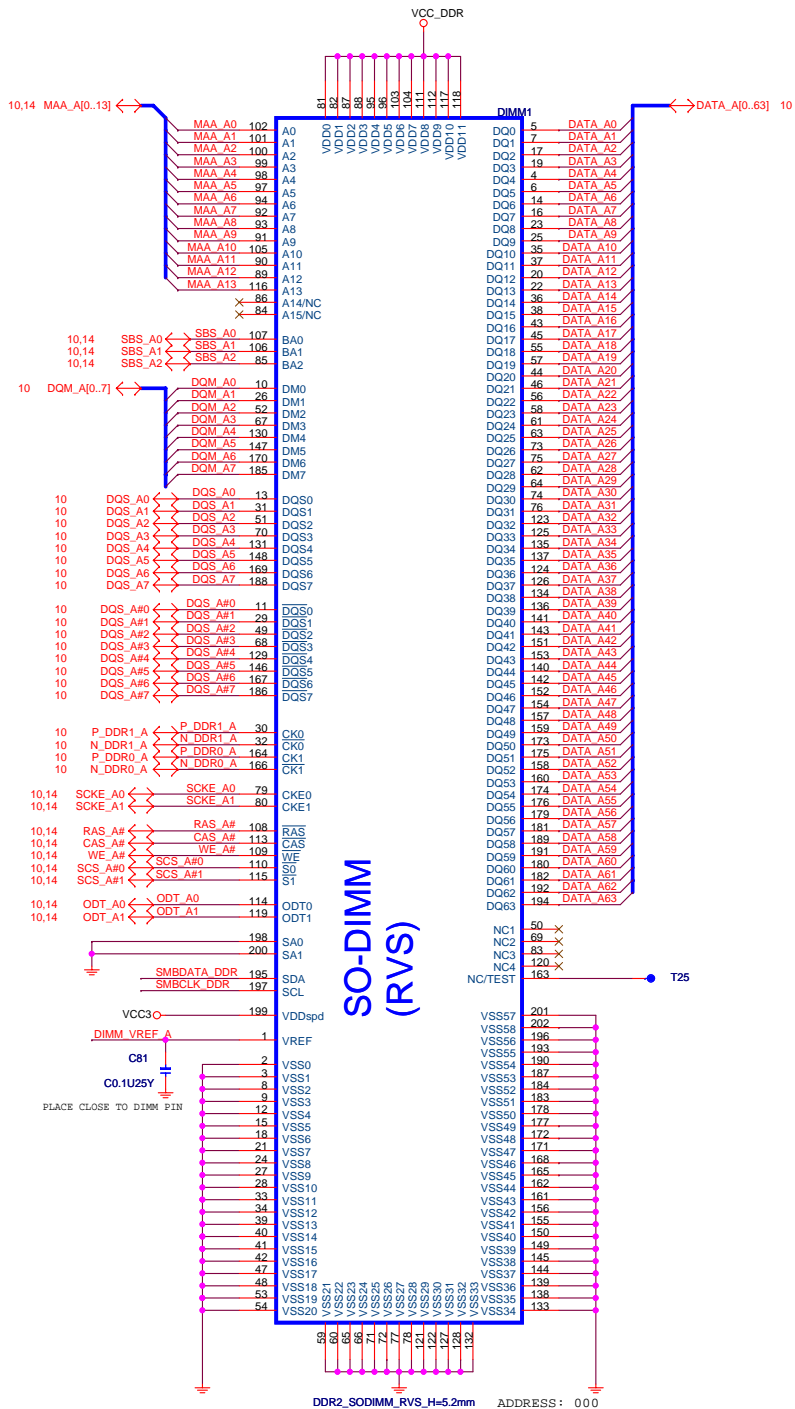


```
0: Only SDVO or PCI-E Operational
1: SDVO and PCI-E operating
simultaneously via PCI Express-G
port
```

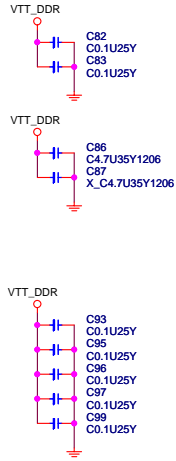




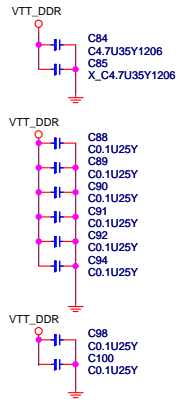
# DDR2 SO-DIMM



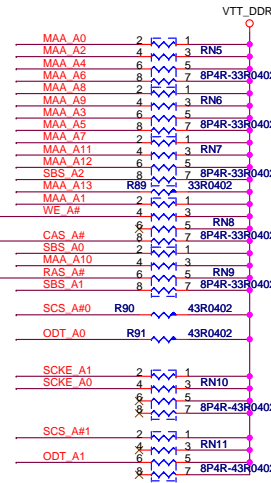
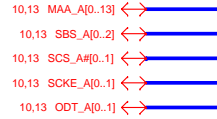
CHANNEL A V\_SM\_VTT  
DECOUPLING CAPS



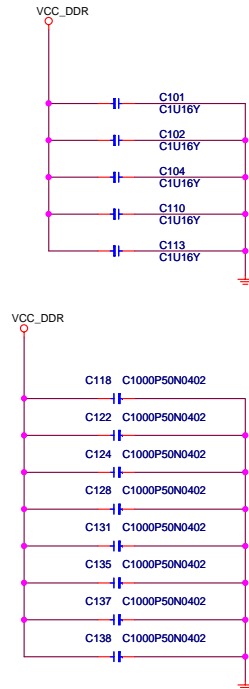
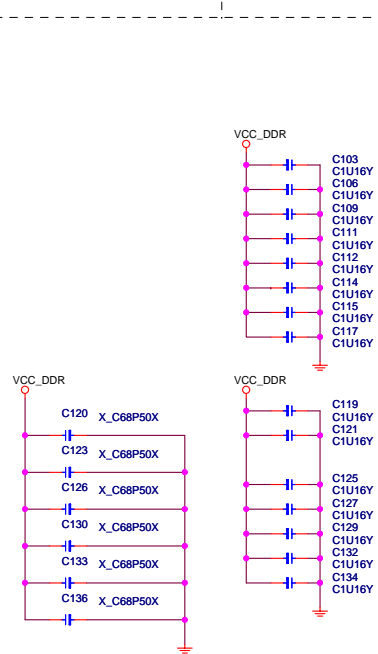
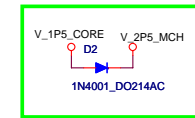
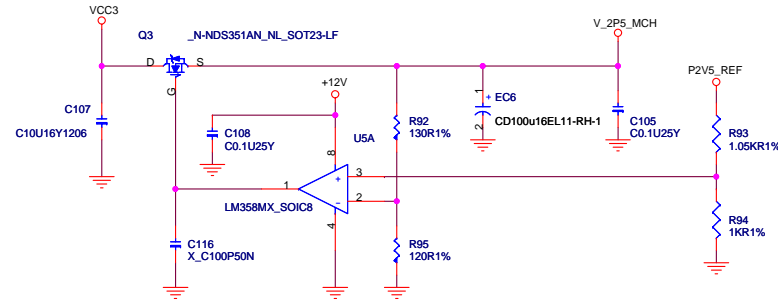
CHANNEL B V\_SM\_VTT  
DECOUPLING CAPS

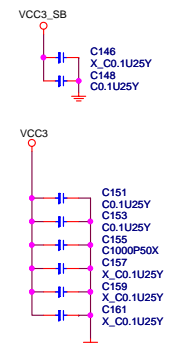
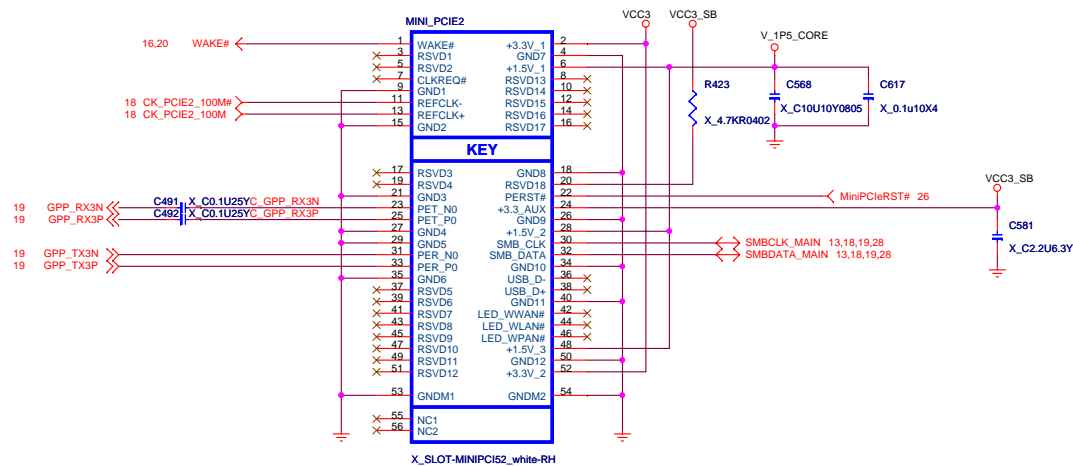
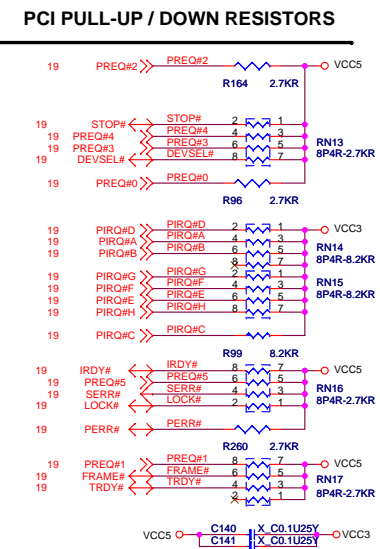
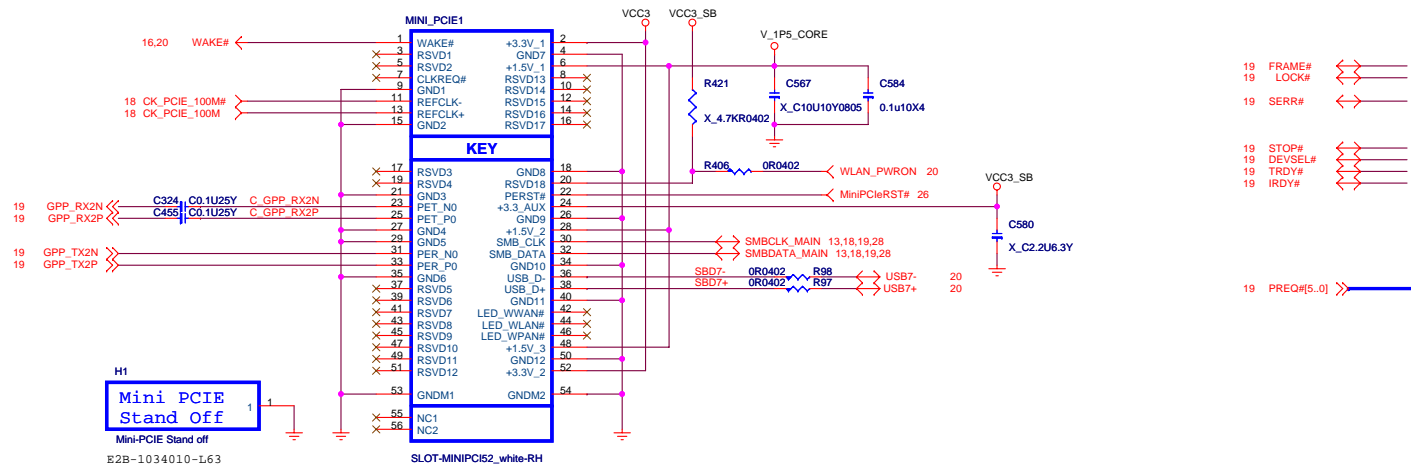


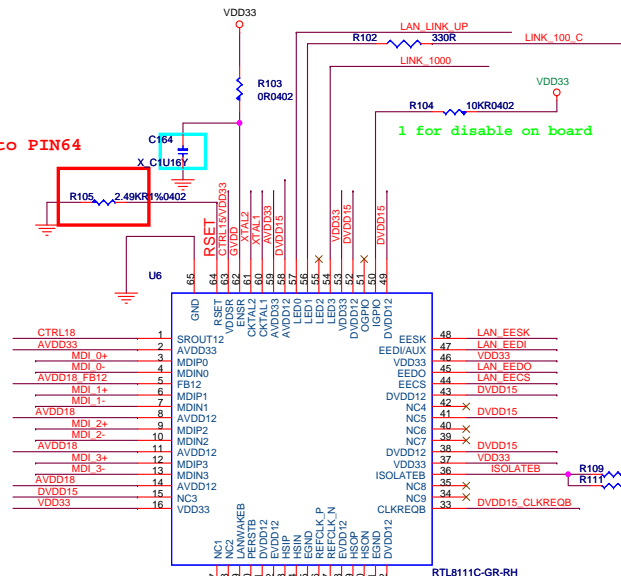
SCS\_A#0 change 43 ohm



Grantsdale GMCH Power Sequencing  
Requirement Between 1.5V Core and 2.5V DAC

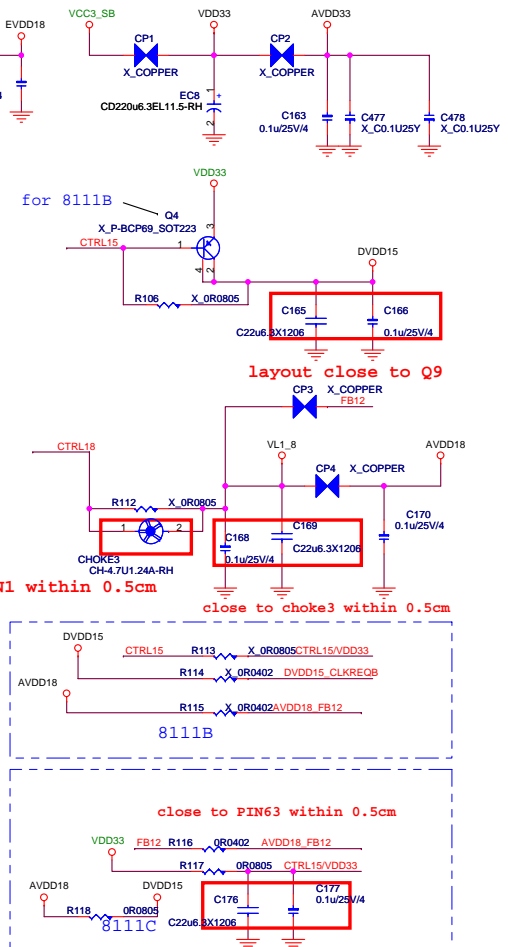








	RTL8111B / RTL8101E	RTL8111C	
AVDD33	3.3V	3.3V	
AVDD18	1.8V	1.2V	
EVDD18	1.8V	1.2V	
DVDD15	1.5V	1.2V	

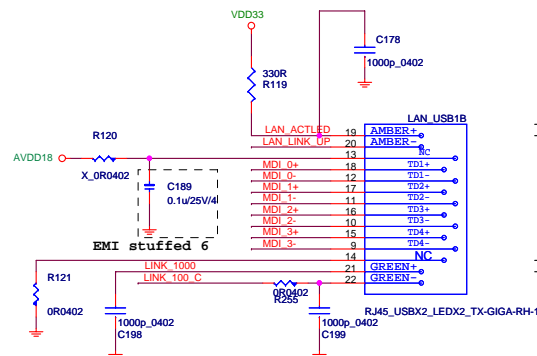
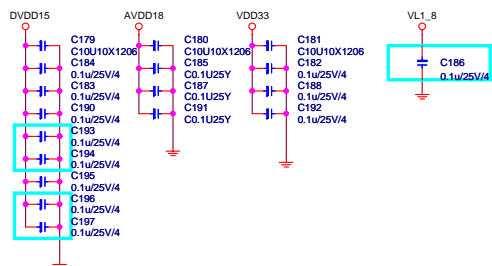
	Q9	Q10
RTL8111B	<i>Need</i>	<i>Need</i>
RTL8111C	<i>N/A</i>	<i>N/A</i>



Power consumption		
	1G	100M
3.3V	103mA	TBD
1.5V	367mA	TBD
1.8V	198mA	TBD

-16F0031-F02

Giga-Lan		10/100-Lan	
N58-22F0181-842		N58-22F0061-842 N58-22F0061-F02	
Link	Yellow	Link	Yellow
Active	Blinking	Active	Blinking
1000	Orange	100	Green
100	Green	10	None
10	None		
19		19	
20	Yellow	20	Yellow
21	Orange	21	
22	Green	22	Green





# Video Connector

Power 20 mils

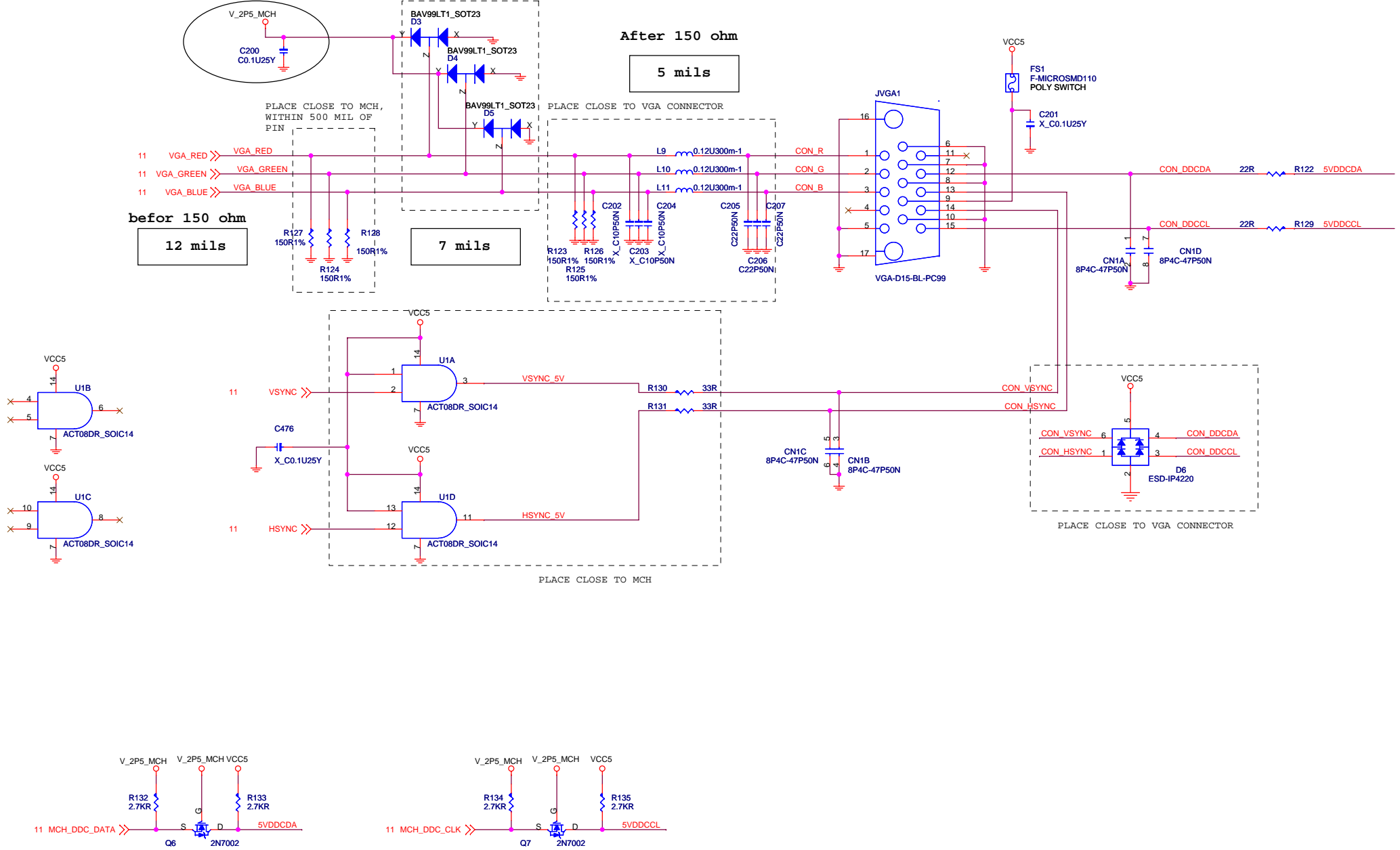
After 150 ohm

5 mils

before 150 ohm

12 mils

7 mils



Trace length less than 0.5inches

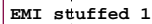
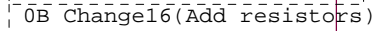
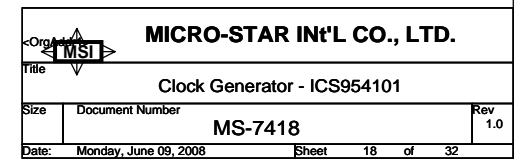
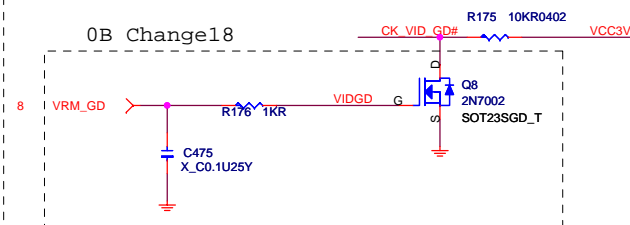
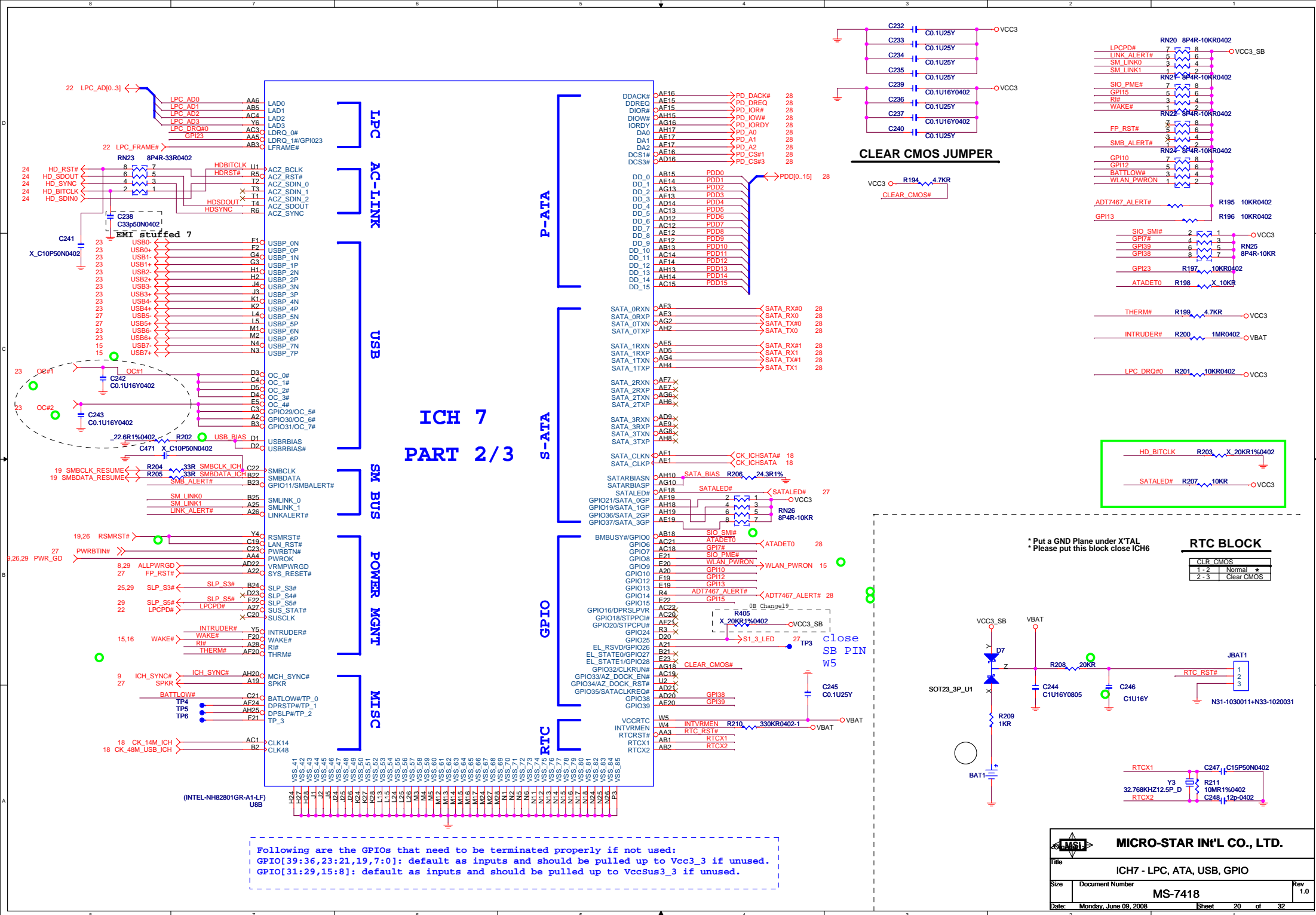
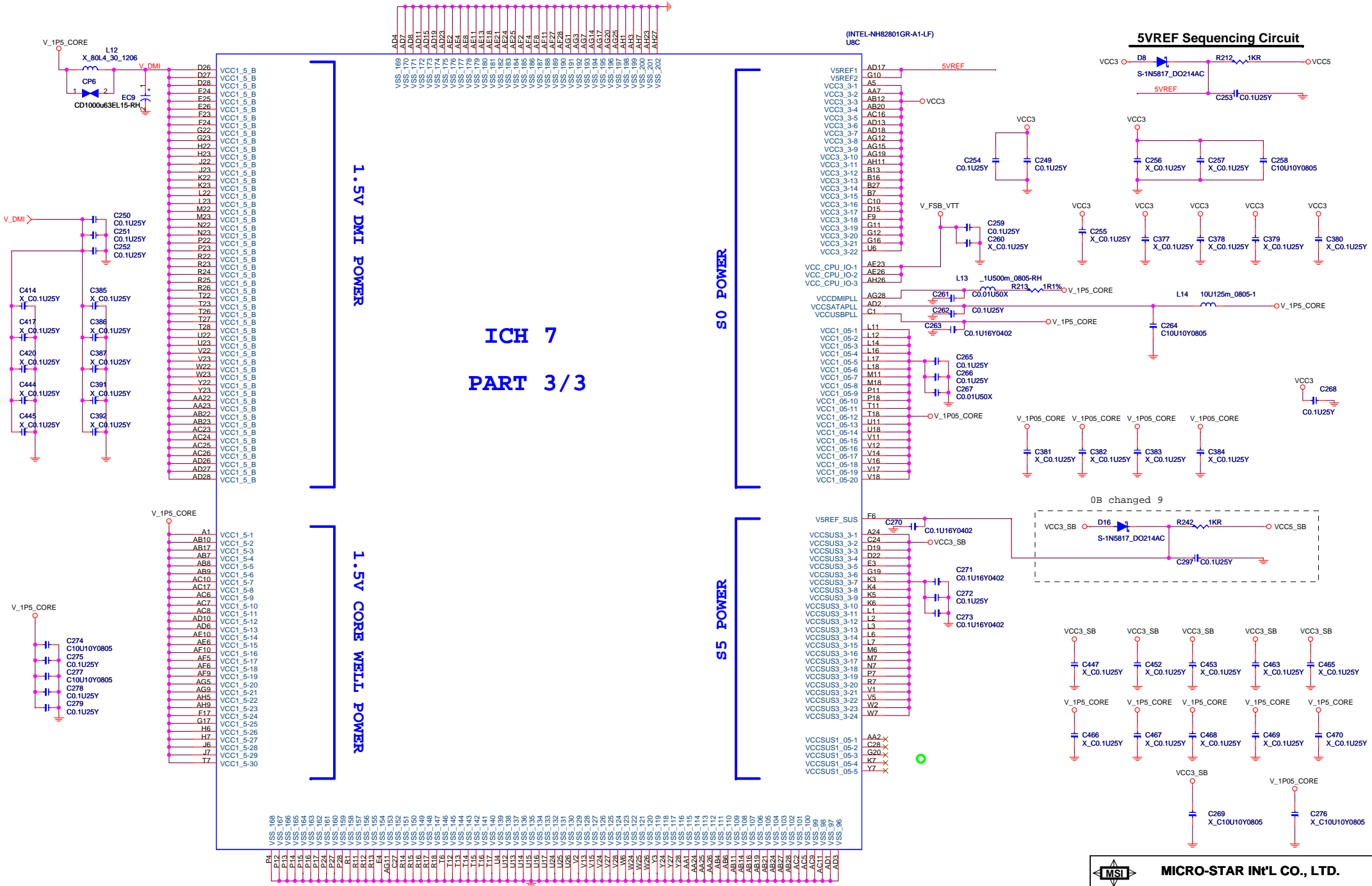


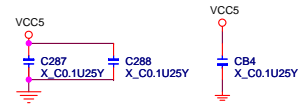
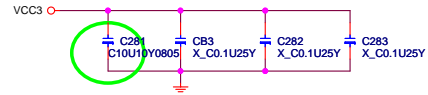
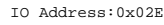
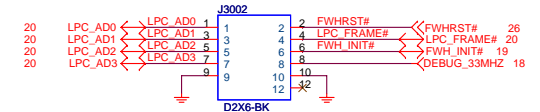
Diagram illustrating the connection of the 8P4R-1KR0402 device to the RN18 resistor network. The device has three input channels (H\_FSBSEL1, H\_FSBSEL0, H\_FSBSEL2) and three output channels (FSB, FSA, FSC). The inputs are labeled 6,11 and the outputs are labeled 7,8, 5,6, and 3,4 respectively. The resistor network is labeled RN18 and 8P4R-1KR0402.





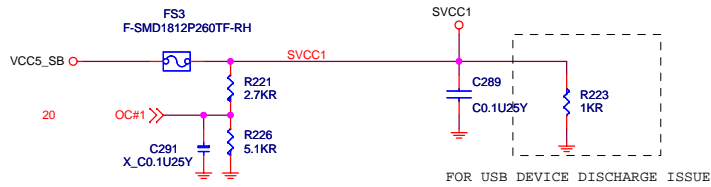




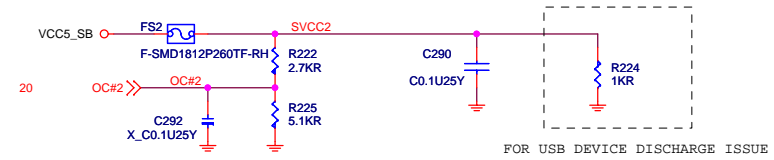


TESTBI/BADD Pin  
If this pin is connected to GND,  
addresses 2EH/2FH are used.  
If it is strapped to VCC,  
addresses 4EH/4FH are used.

## POWER CIRCUIT FOR USB PORT 0,1,2,3 (REAR)

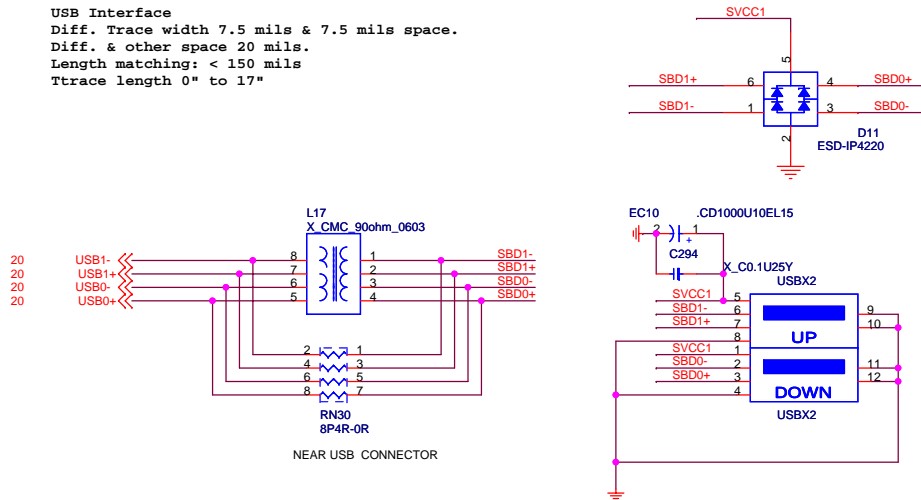


## POWER CIRCUIT FOR USB PORT 4,6,7 (FRONT)



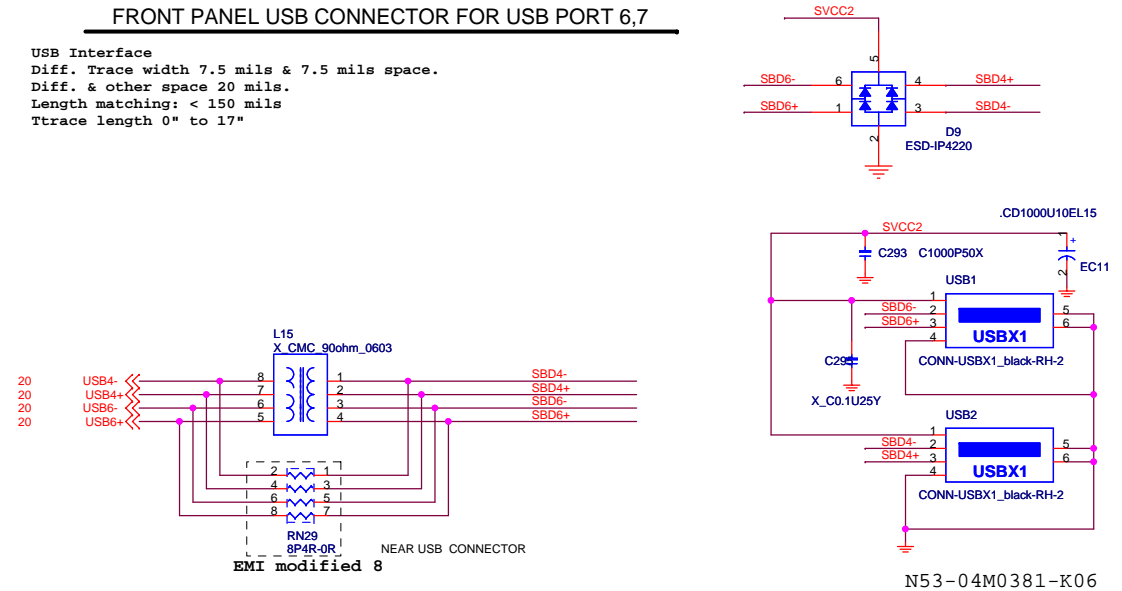
## REAR PANEL USB CONNECTOR FOR USB PORT 0,1

USB Interface  
Diff. Trace width 7.5 mils & 7.5 mils space.  
Diff. & other space 20 mils.  
Length matching: < 150 mils  
Ttrace length 0" to 17"



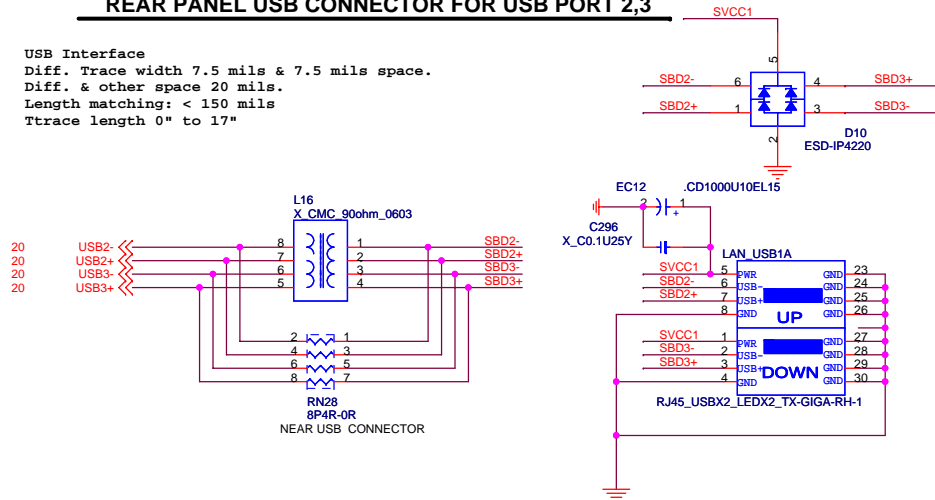
## FRONT PANEL USB CONNECTOR FOR USB PORT 6,7

USB Interface  
Diff. Trace width 7.5 mils & 7.5 mils space.  
Diff. & other space 20 mils.  
Length matching: < 150 mils  
Ttrace length 0" to 17"



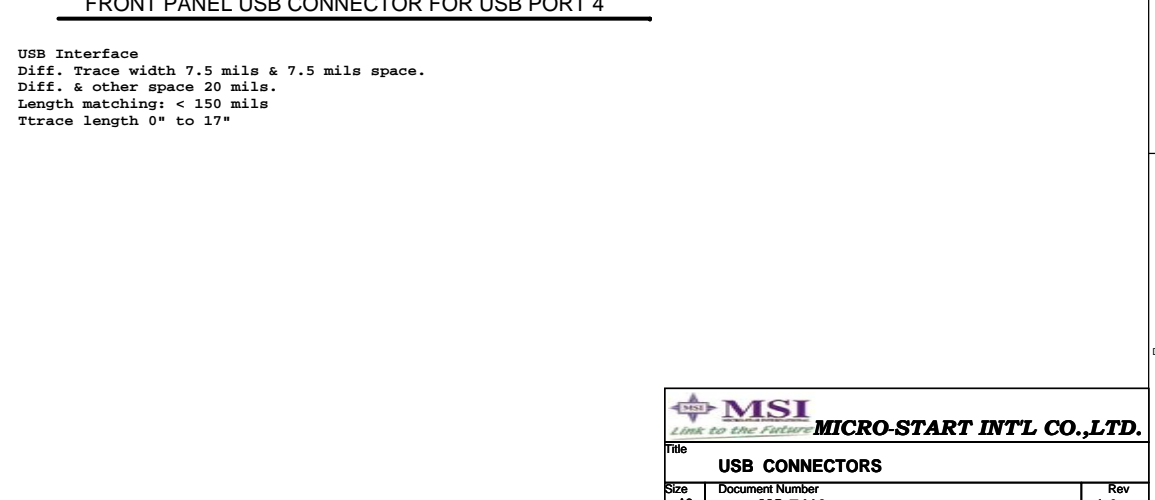
## REAR PANEL USB CONNECTOR FOR USB PORT 2,3

USB Interface  
Diff. Trace width 7.5 mils & 7.5 mils space.  
Diff. & other space 20 mils.  
Length matching: < 150 mils  
Ttrace length 0" to 17"

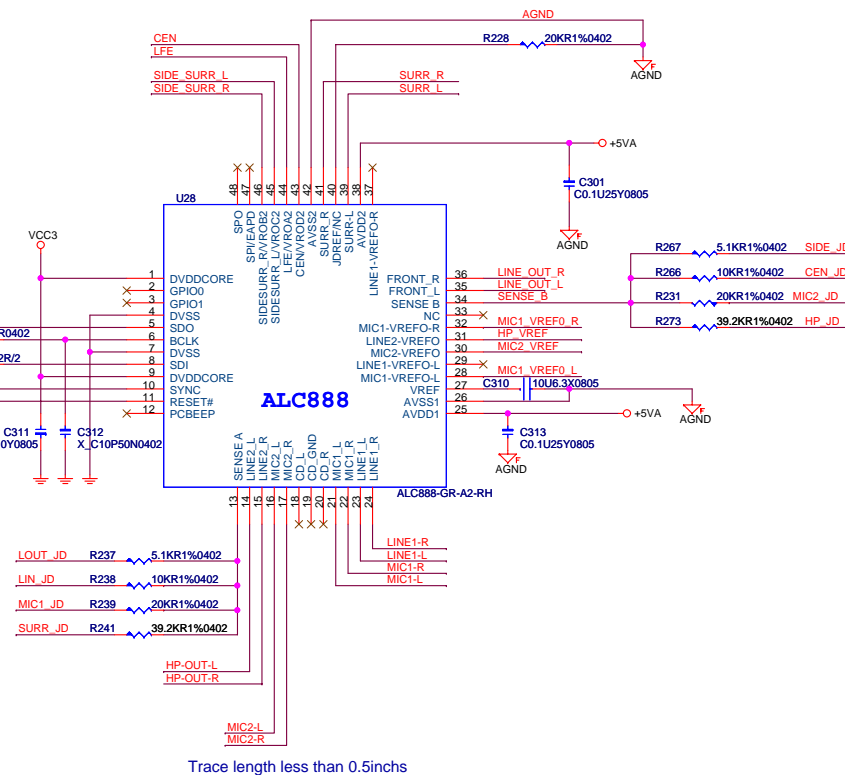


## FRONT PANEL USB CONNECTOR FOR USB PORT 4

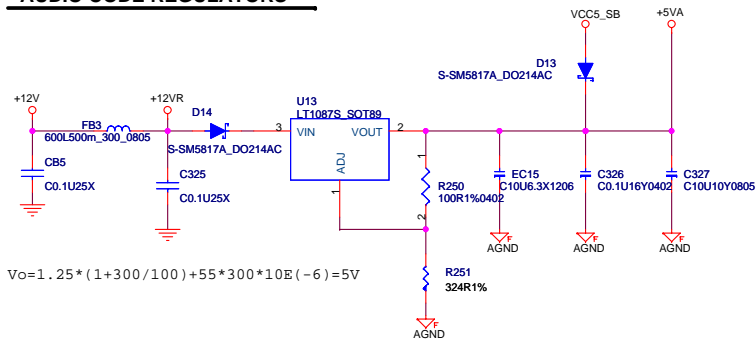
USB Interface  
Diff. Trace width 7.5 mils & 7.5 mils space.  
Diff. & other space 20 mils.  
Length matching: < 150 mils  
Ttrace length 0" to 17"



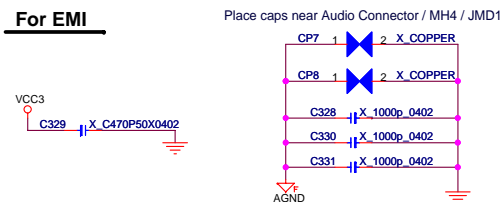
**ALC888**



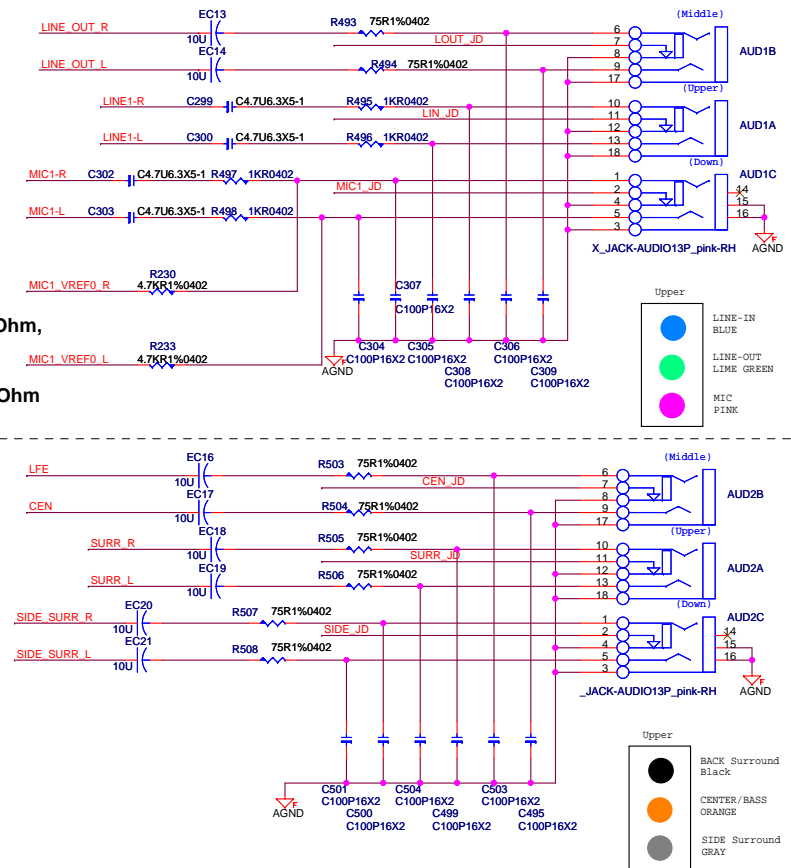
## AUDIO CODE REGULATORS



**For EMI**

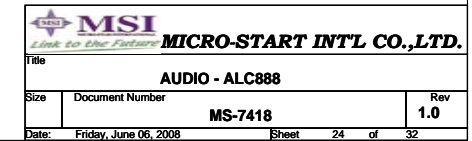
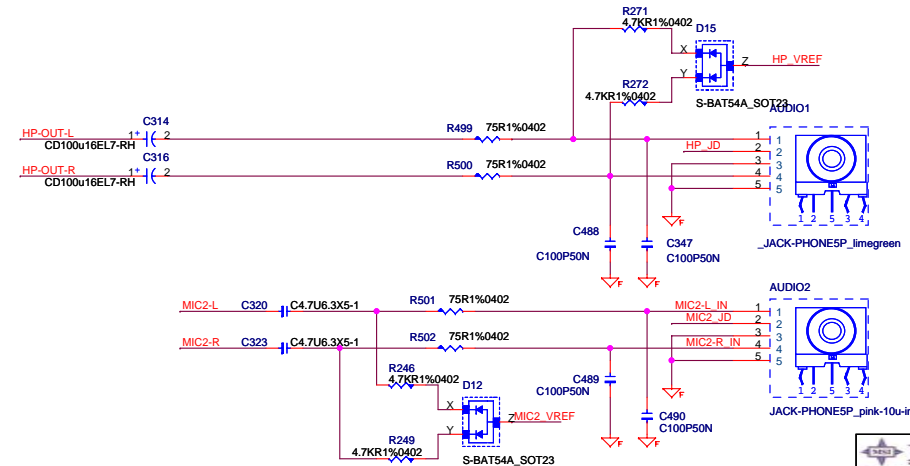


### PHONE JACKER (HDA JACK)

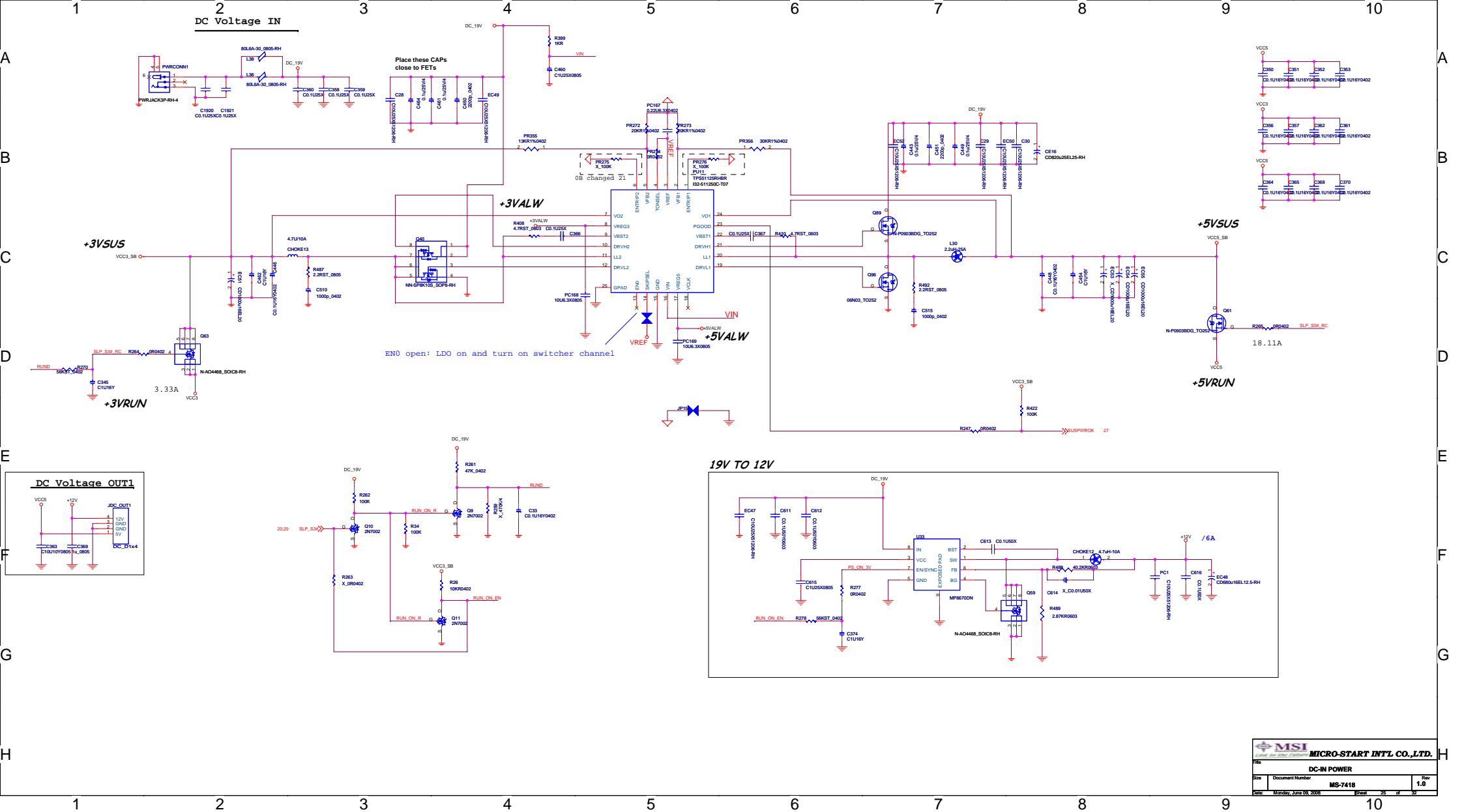


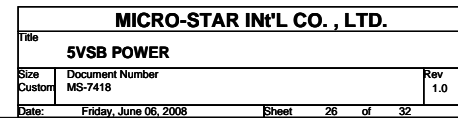
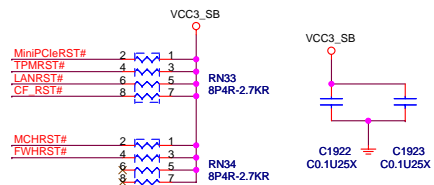
5.1 ch-->N54-13F0171-S42  
R495&R496&R497&R498 =75 Ohm,

7.1 ch-->N54-26F0111-K06  
R495&R496&R497&R498 =1K Ohm



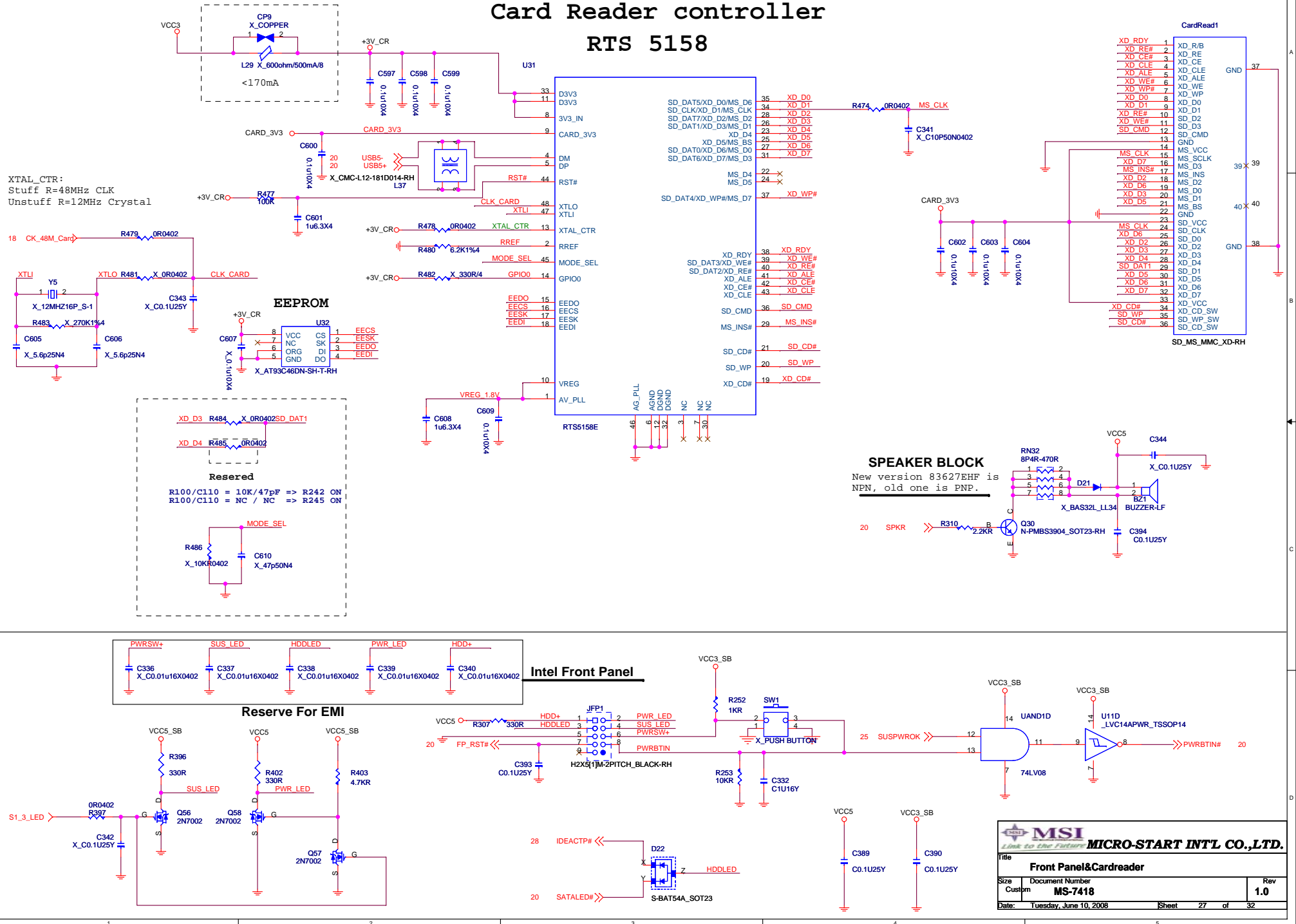




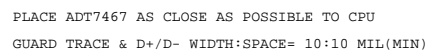
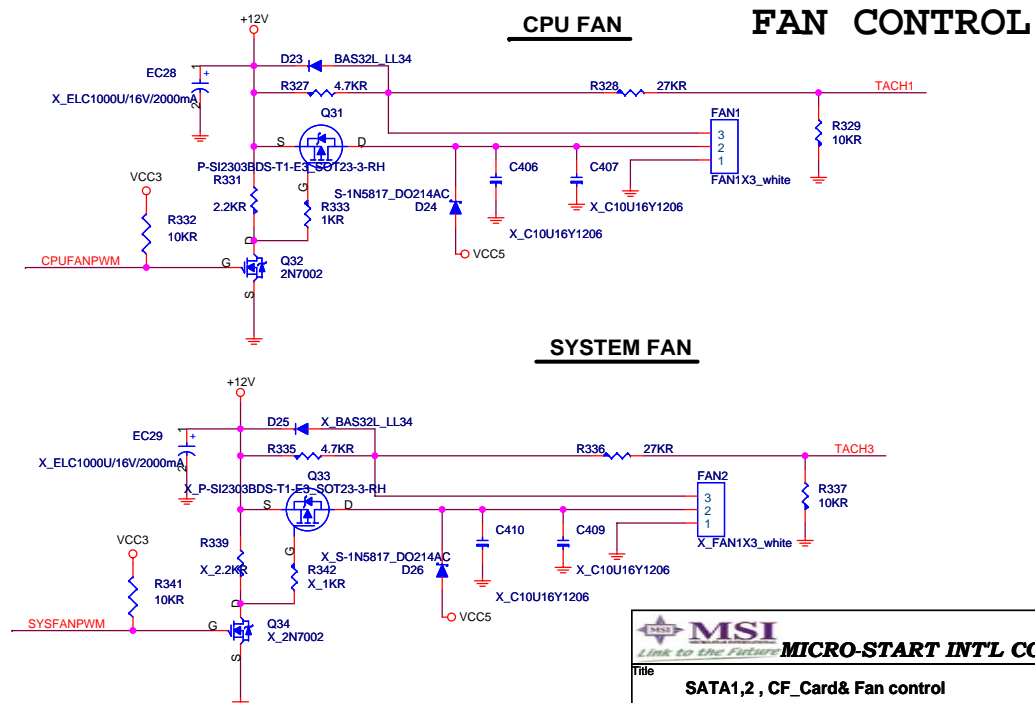
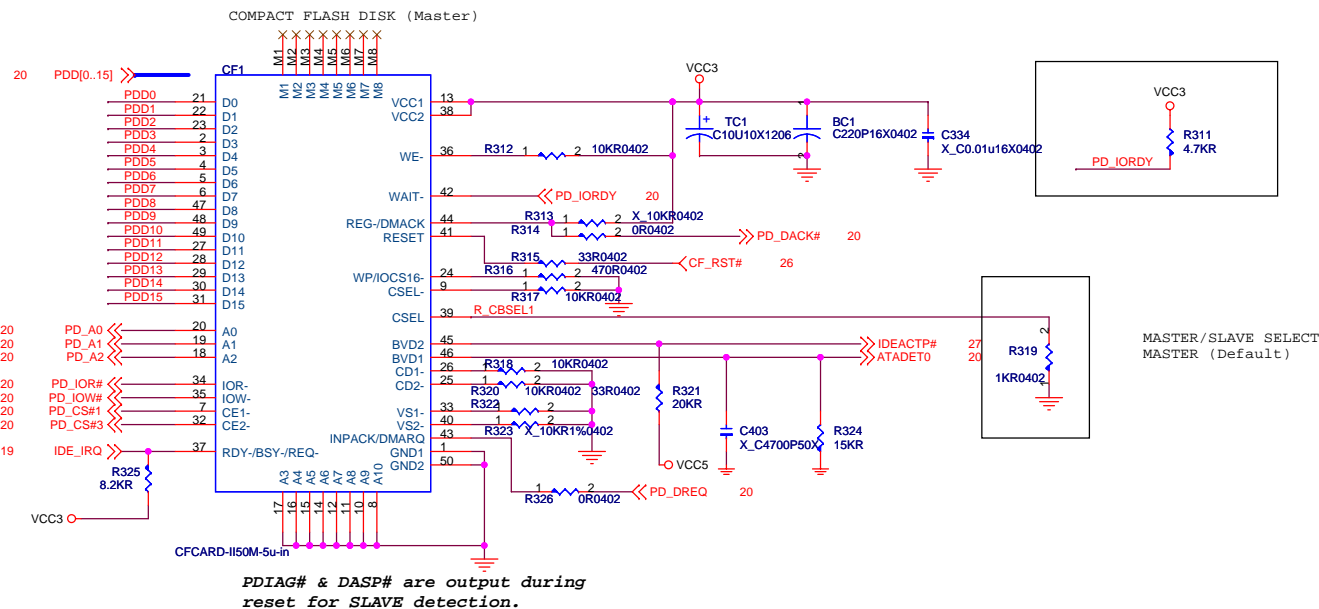


# Flash Card Socket

## Card Reader controller RTS 5158



## COMPACT FLASH CONNECTOR



# ACPI Controller

## DDR2 1.8V POWER...7.95A

Internal reference  $V_{fb}=0.6V$  (+/- 1.5%)  
Better than external reference (+/-5%)  
==>Using Stand-alone mode

$$V_{fb}=V_{output}*[1.5/(1.5+3.01)]=0.6V \quad V_{output}=1.804V$$

## DDR2 1.5V POWER...22.84A

$$V_{fb}=V_{output}*[2/(2+3.01)]=0.6V \quad V_{output}=1.503V$$

## VTT1.1V POWER...4.9A

### DDR VTT Power

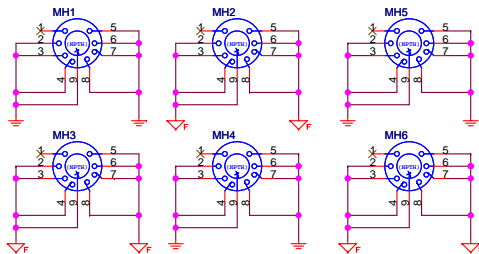


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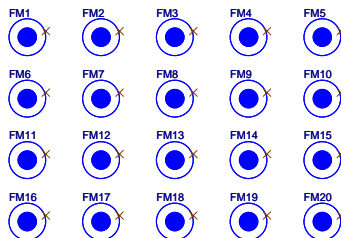
MS7 ACPI CONTROLLER		
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## Auto-BOM Manual Parts

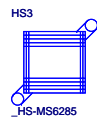
### Mounting Holes



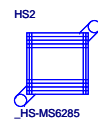
### Optics Orientation Holes



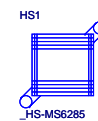
### CPU HEAT SINK



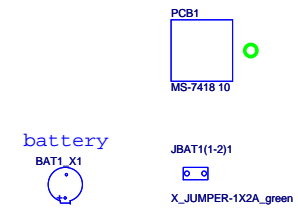
### NB HEAT SINK



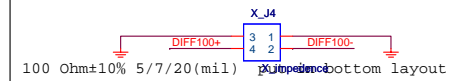
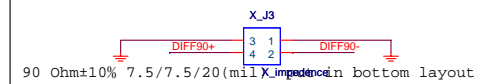
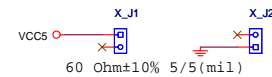
### SB HEAT SINK



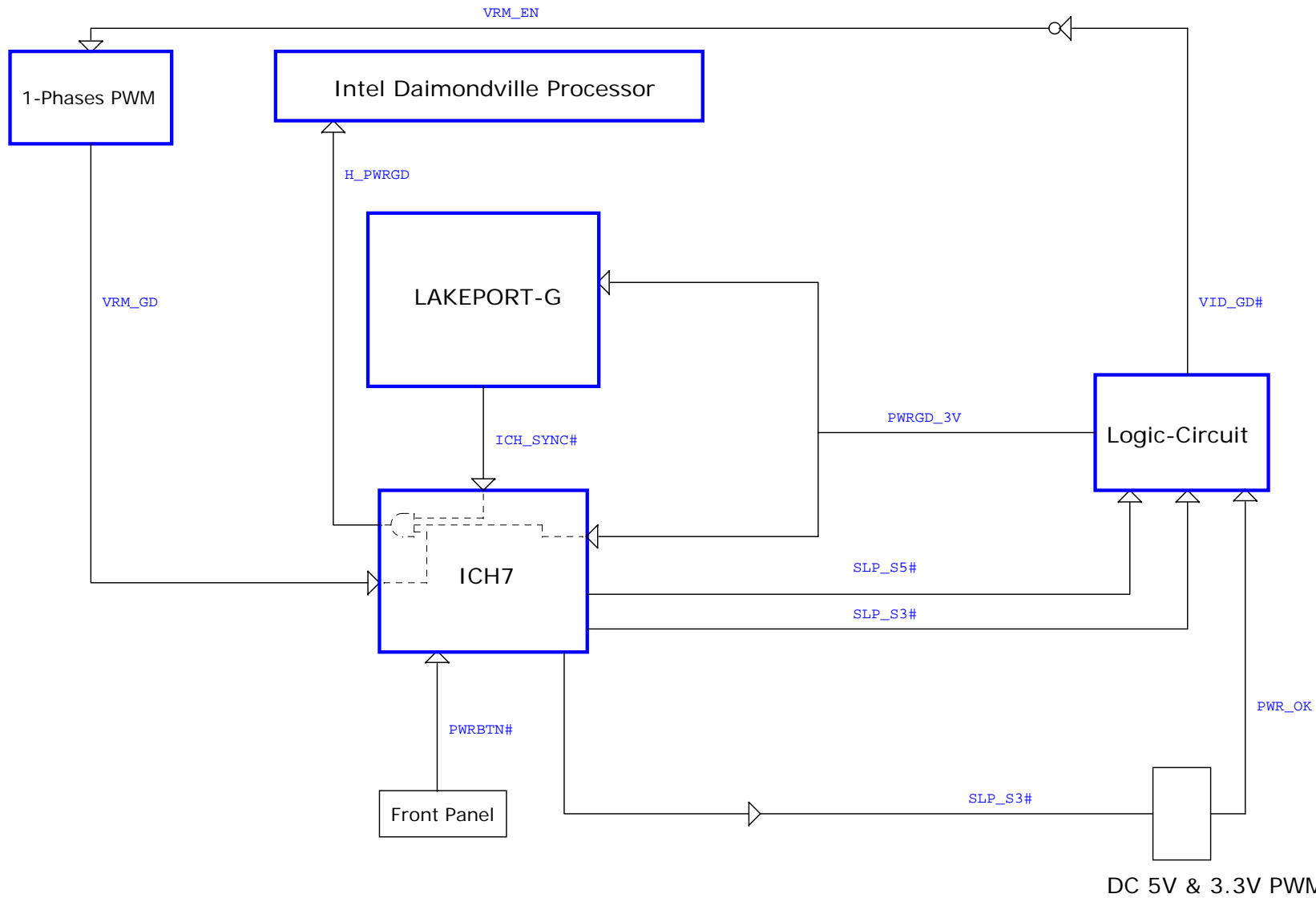
### MANUAL PART




### Simulation



# PWROK MAP



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0B changed 1-->Pull up follow design guide.(page6)  
0B changed 2-->Pull up follow design guide.(page6)  
0B changed 3-->Pull up follow design guide.(page6)  
0B changed 4-->Pull up follow design guide.(page6)  
0B changed 5-->Pull up follow design guide.(page6)  
0B changed 6-->Change R4,R8 to 24.9R, R6,R9 to 49.9R. (page6)  
0B changed 7-->unstuff R304,stuff R303 follow CRB V0.7.(page7)  
0B changed 8-->-->change pull up circuit follow CRB V0.7.(page7)  
0B changed 9-->make sure the power sequence.(page21)  
0B changed 10-->improve the "PWR\_GD" single waveform negative pulse issue. (page8)  
0B changed 11-->improve the "VRM\_GD","ALLPWRGD" single waveform pulse issue. (page29)  
0B changed 12-->Change resistor value follow design guide.(page19)  
0B changed 13-->Pull up follow design guide.(page6)  
0B changed 14-->unstuff R188 follow CRB V0.7.(page19)  
0B changed 15-->Add SPI Bios interface and strapping resistor. Add PCI interface.  
0B changed 16-->Add pull down Resistors.(page18)  
0B changed 17-->Change EC28 same as EC29 for mechanical issue.(page28)  
0B changed 18-->Change R176 from 5.6k to 1k and change Q8 from 3904 to 2N7002 for UBUF2's pin11 voltage level drop to 2V issue.(page18)  
**0B changed 19-->unstuff R405 for GPIO25.(page20)**  
0B changed 20-->Connect MCHREF voltage to SMVREF0 and SMVREF1.(page10)  
0B changed 21-->Unstuff PR275,PR276 for no standby power issue.(page25)  
0B changed 22-->Reserve test point on MCH H\_A#32~H\_A#35 (page9)  
0B changed 23-->Remove FWH BIOS interface(page22)  
**0B changed 24-->Change 19V to 12V circuit.(page25)**  
**0B changed 25-->Change CPU part number to A09-1320165-I06 (page 6&9)**  
**0B changed 26-->Stuff TPM circuit for BIOS bring up(page 22)**  
**0B changed 27-->Unstuff MiniPCIE2 circuit(page 15)**  
**0B changed 28-->Change CPU,NB,SB heatsink footprint(page 30)**  
**0B changed 29-->Change MIC1,HP-OUT Vref circuit(page 24)**  
**0B changed 30-->Change VID circuit for jump VID and add 4pcs 10u cap.(page7,8)**  
**0B changed 31-->Change choke11 material(page29)**  
**0B changed 32-->Add 6 pcs 0.1uF caps for EMI issue(page26)**  
**0B changed 33-->change LAN chip from VBO to VCO version.**

1.0 change:  
Add EMI solution 1~8.  
unstuff FAN2 circuit.  
change DC Jack to new part N92-03M0391-H06.  
unstuff SW1 and

0B changed 34-->  
VCCP  
1. R40: 14.7k ohm (droop)  
2. C24: 0.022uF (RC)  
3. R42: 24k ohm (RC)  
4. R45: 487 ohm (OCP)  
5. R50: 22k ohm (comp)  
6. C37: 0.1uF (comp)  
7. C22: no pop  
  
VCC\_DDR  
1. R350: 3.09k ohm (offset)  
2. R354: 1.54k ohm (offset)  
  
V\_1P5\_CORE  
1. CHOKE11: L04-11A7231-W15

0B to 0C change:  
1. Change page25 19V to 12V  
2. Add C1920~C1923  
3. Modify FAN control sch  
4. change R399 to 1k For the AC ON/OFF issue  
5. EC53不上件,EC51,EC54,EC55改爲C94-1021671-P01  
6. EC48改爲C94-6811621-N10  
  
0C change:  
stuff C14 for lost USB controller issue.  
unstuff C407 for FAN voltage not linear issue.

		<b>MICRO-STAR INT'L CO., LTD.</b>	
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