

SAPPORO M (BTW20)

LA-1691 REV0.4 Schematic Document

Intel Mobile P4 uFCBGA/uFCPGA Northwood Celeron

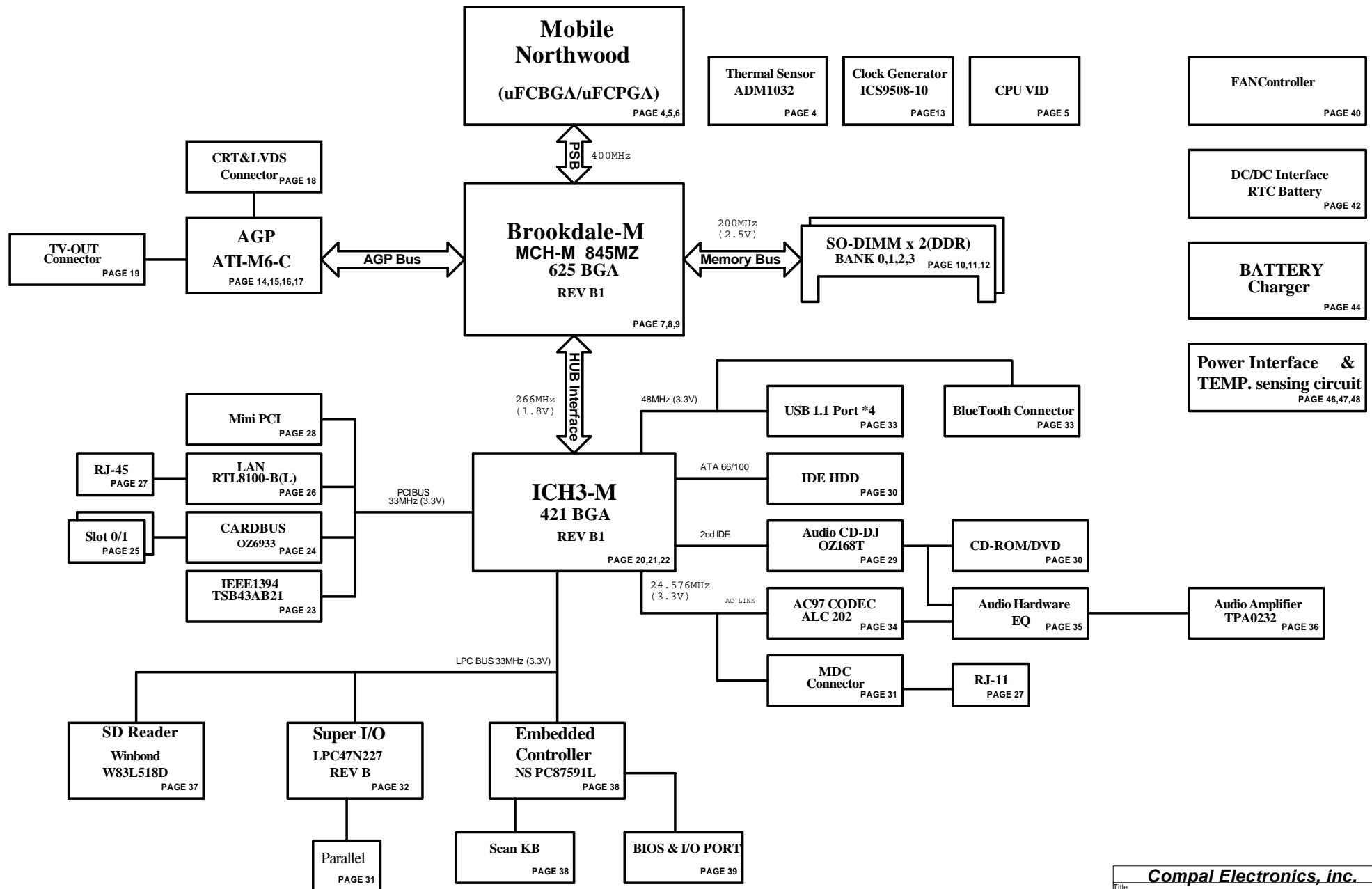
MCH-M(845MZ)+ICH3-M+M6-C(16MB VRAM)

2002-12-12

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Size	Document Number	
Custom	401241	Rev 1A
Date:	星期二, 一月 07, 2003	Sheet 1 of 53

BTW20 LA-1691 BLOCK DIAGRAM



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Title			
Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	2 of 53

Voltage Rails

Power Plane	Description	S1	S3	S5
VIN	Adapter power supply (19V)	N/A	N/A	N/A
B+	AC or battery power rail for power circuit.	N/A	N/A	N/A
+CPU_VCC	Core voltage for CPU	ON	OFF	OFF
+1.2VP	1.2V switched power rail for CPU AGTL Bus	ON	OFF	OFF
+1.2VS	1.2V switched power rail for Montara core	ON	OFF	OFF
+1.25VS	1.25V switched power rail	ON	OFF	OFF
+1.5VS	AGP 4X	ON	OFF	OFF
+1.8VALW	1.8V always power rail	ON	ON	ON*
+1.8VS	1.8V switched power rail	ON	OFF	OFF
+2.5V	2.5V power rail	ON	ON	OFF
+2.5VS	2.5V switched power rail	ON	OFF	OFF
+3VALW	3.3V always on power rail	ON	ON	ON*
+3V	3.3V power rail	ON	ON	OFF
+3VS	3.3V switched power rail	ON	OFF	OFF
+5VALW	5V always on power rail	ON	ON	ON*
+5V	5V power rail	ON	ON	OFF
+5VS	5V switched power rail	ON	OFF	OFF
+12VALW	12V always on power rail	ON	ON	ON*
RTCVCC	RTC power	ON	ON	ON

Note : ON* means that this power plane is ON only with AC power available, otherwise it is OFF.

External PCI Devices

Device	IDSEL#	REQ#/GNT#	Interrupts
CardBus	AD20	2	PIRQA/PIRQB(PIRQE/PIRQF)
LAN	AD17	3	PIRQB(PIRQD)
Mini-PCI	AD18	1/4	PIRQC/PIRQD(PIRQG/PIRQH)
1394	AD16	0	PIRQA

EC SM Bus1 address

Device	Address	Device	Address
Smart Battery	0001 011X b	ADM1032	1001 110X b
EEPROM(24C16/02)	1010 000X b	OZ168	0011 0100 b
(24C04)	1011 000Xb	Smart Battery	0001 011X b
		Docking	0011 011X b
		DOT Board	XXXX XXXXb

ICH3 SM Bus address

Device	Address
Clock Generator (ICS-950810)	1101 001X

STATE	SIGNAL	SLP_S1#	SLP_S3#	SLP_S4#	SLP_S5#	+VALW	+V	+VS	Clock
Full ON		HIGH	HIGH	HIGH	HIGH	ON	ON	ON	ON
S1(Power On Suspend)		LOW	HIGH	HIGH	HIGH	ON	ON	ON	LOW
S3 (Suspend to RAM)		LOW	LOW	HIGH	HIGH	ON	ON	OFF	OFF
S4 (Suspend to Disk)		LOW	LOW	LOW	HIGH	ON	OFF	OFF	OFF
S5 (Soft OFF)		LOW	LOW	LOW	LOW	ON	OFF	OFF	OFF

Board ID Table for AD channel

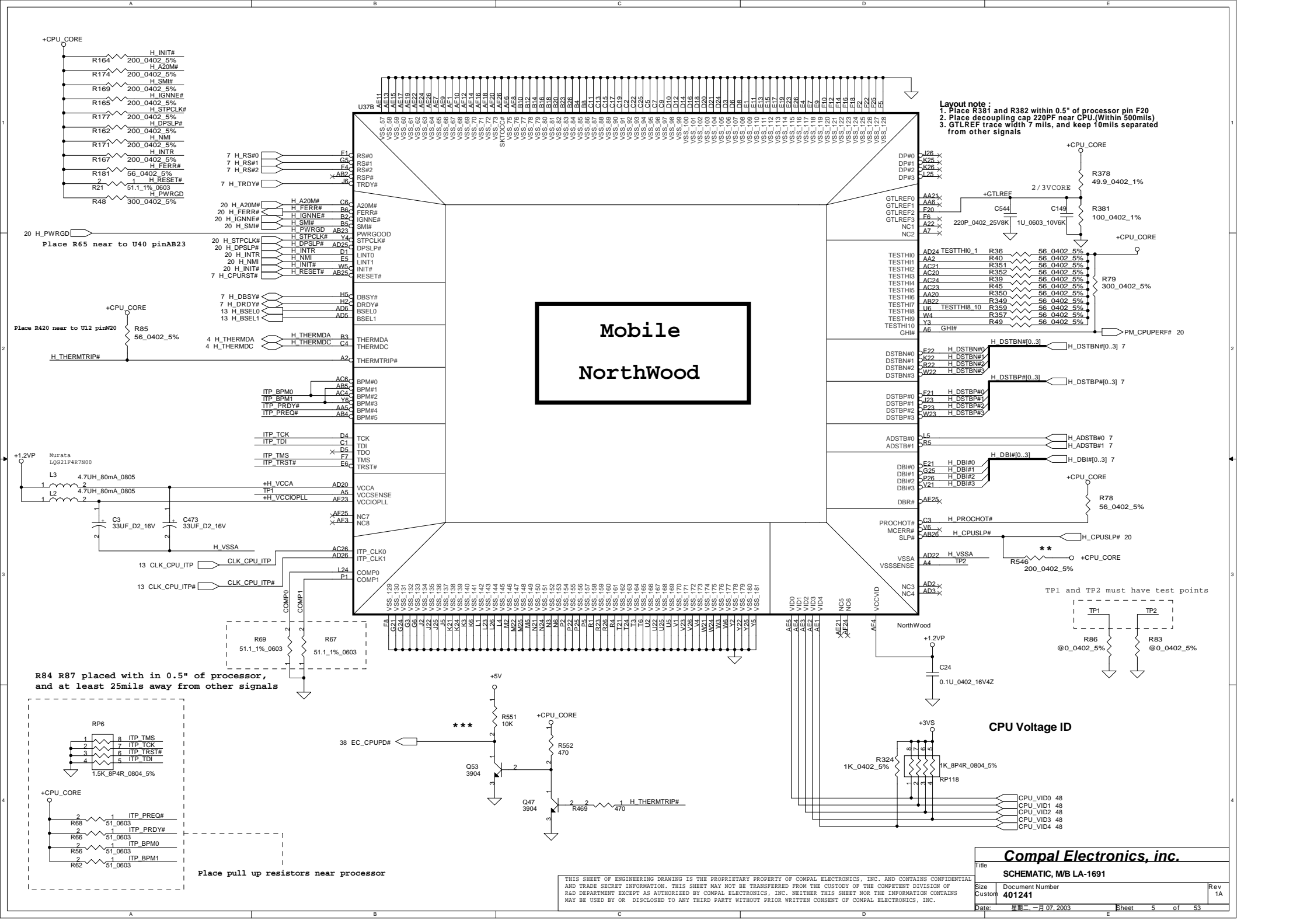
Vcc	3.3V +/- 5%			
Ra	100K +/- 5%			
Board ID	Rb	VAD_BID min	VAD_BID typ	VAD_BID max
0	0	0 V	0 V	0 V
1	8.2K +/- 5%	0.216 V	0.250 V	0.289 V
2	18K +/- 5%	0.436 V	0.503 V	0.538 V
3	33K +/- 5%	0.712 V	0.819 V	0.875 V
4	56K +/- 5%	1.036 V	1.185 V	1.264 V
5	100K +/- 5%	1.453 V	1.650 V	1.759 V
6	200K +/- 5%	1.935 V	2.200 V	2.341 V
7	NC	2.500 V	3.300 V	3.300 V

Board ID	PCB Revision
0	0.1,0.2
1	0.3
2	NO DIRECT CD PLAY
3	
4	
5	
6	
7	

	Topology Mount R458 RP122 Unmount R474 RP125 R533
1394	Trace:PIRQA#_1394 Use IRQA
CardBus	Trace:PIRQA#/E# PIRQB#/F#/D# Use IRQA IRQB
LAN	Trace:PIRQB#/F#/D# Use IRQB
MINIPCI	Trace:PIRQC#/G# PIRQD#/H# Use IRQC IRQD

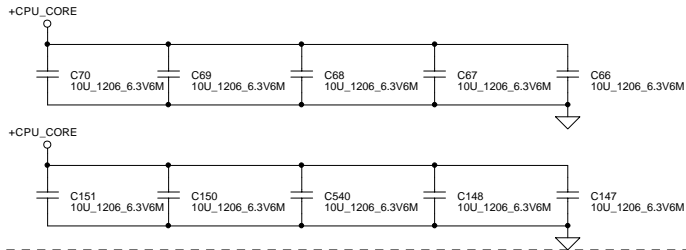
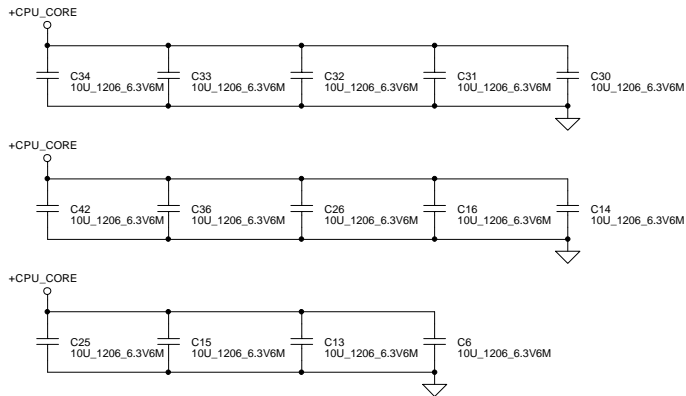
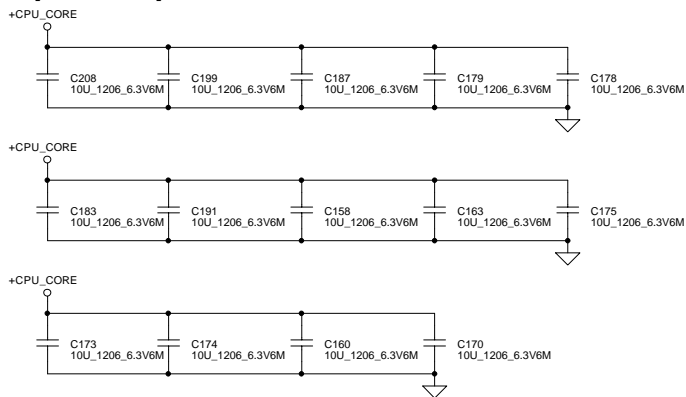
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Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	3 of 53

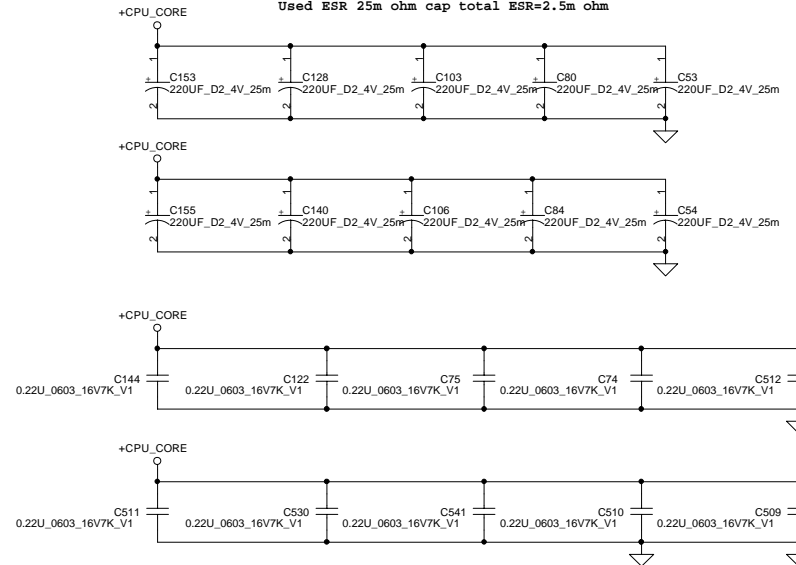


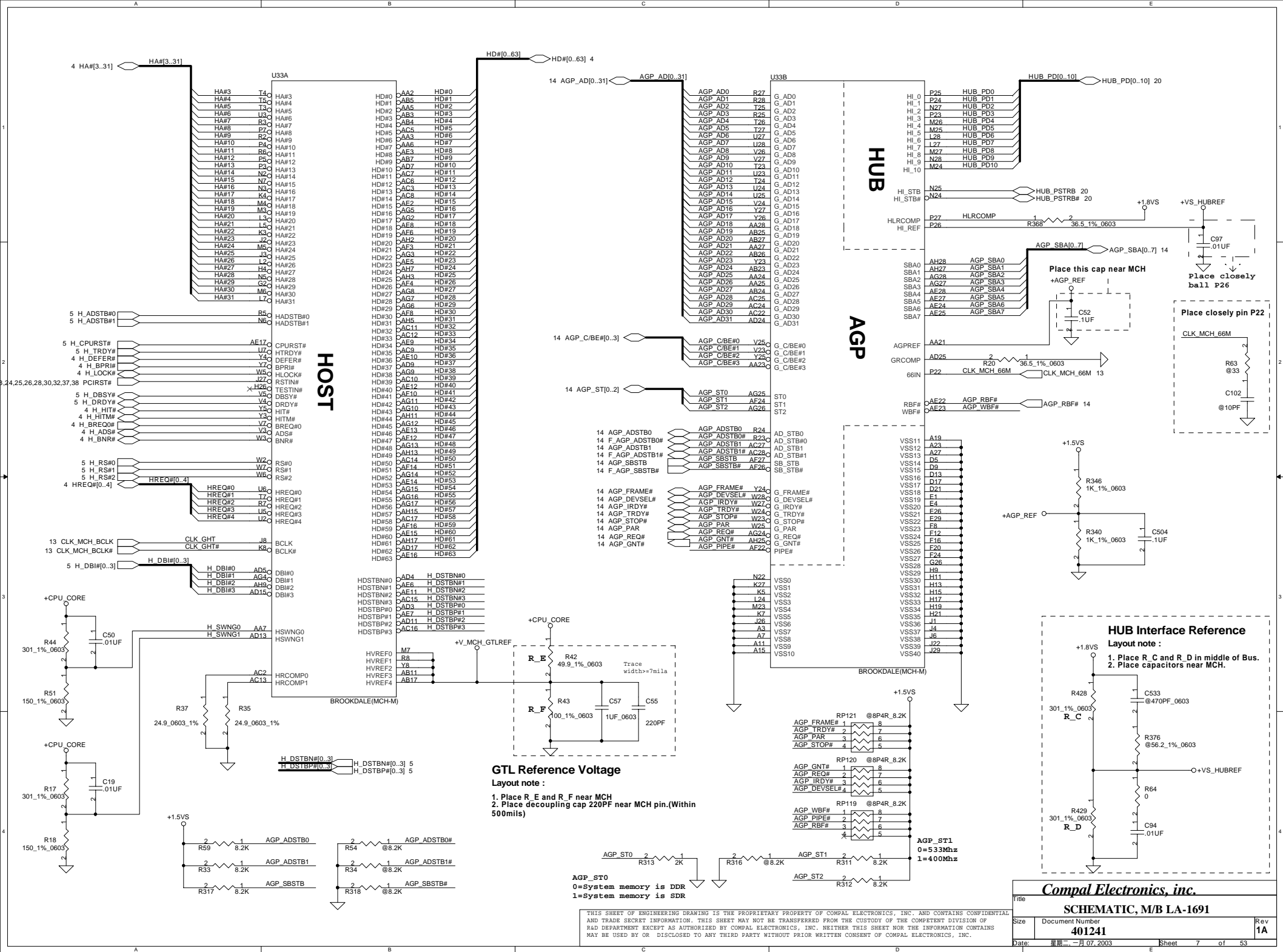
Layout note :

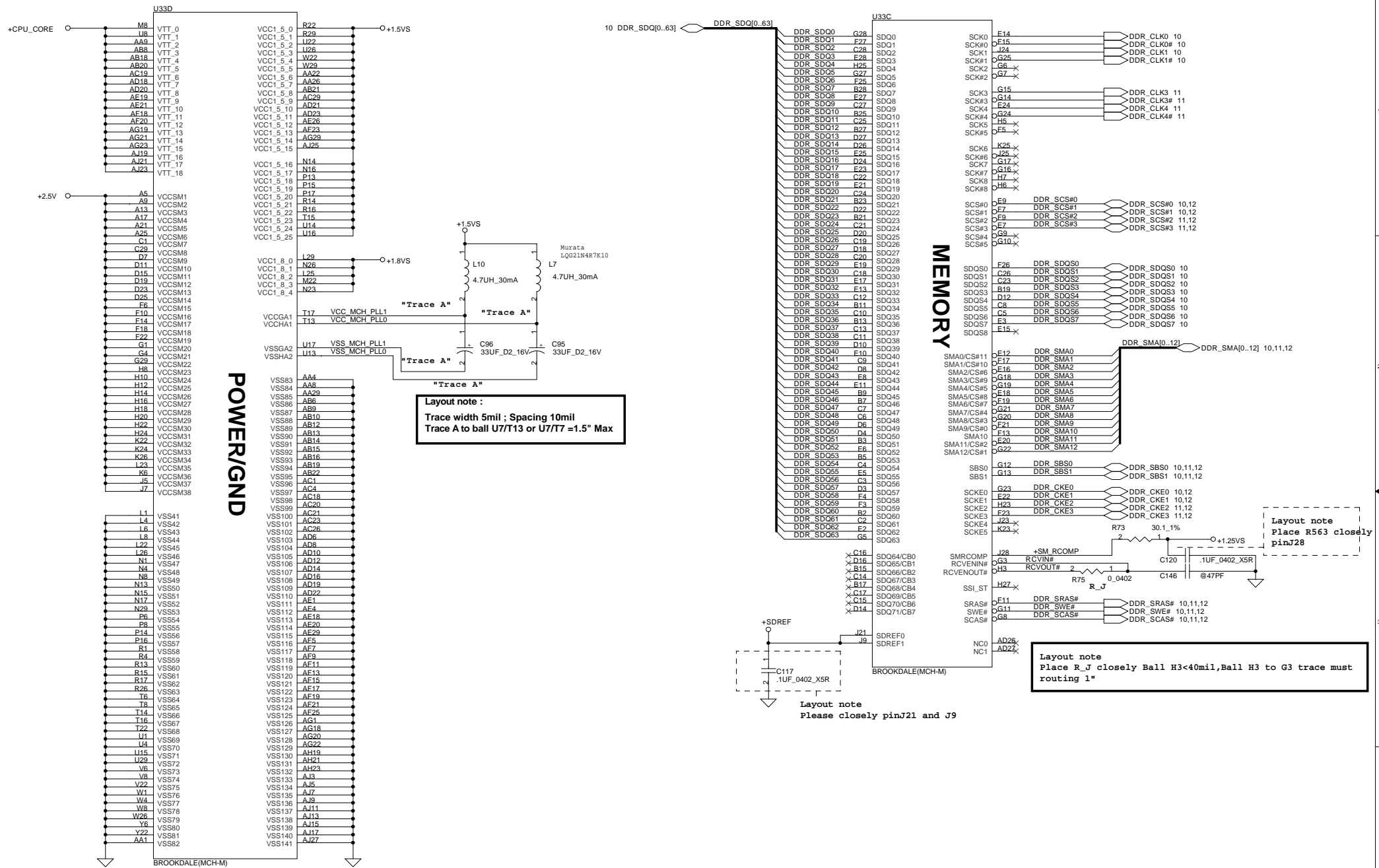
Place close to CPU. Use 2-3 vias per PAD.
Place 22uF caps underneath balls on solder side.
Place 10uF caps on the peripheral near balls.
Use 2-3 vias per PAD.

Please place these cap in the socket cavity area**Please place these cap on the socket north side****Please place these cap on the socket south side****Layout note :**

Place close to CPU power and
ground pin as possible
(<1inch)

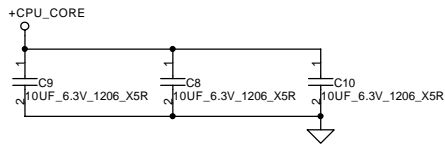
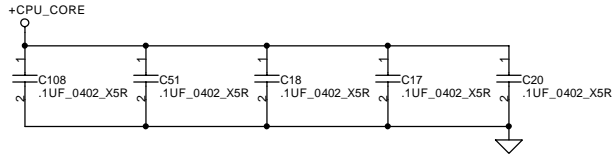
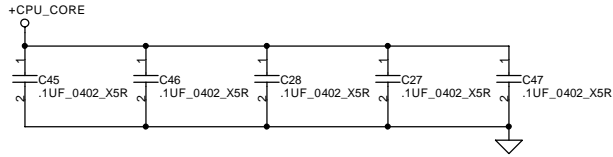
Used ESR 25m ohm cap total ESR=2.5m ohm



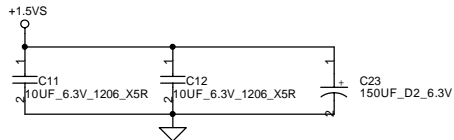
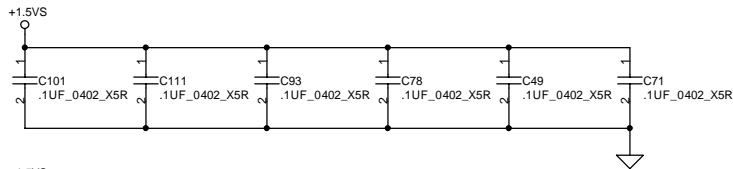


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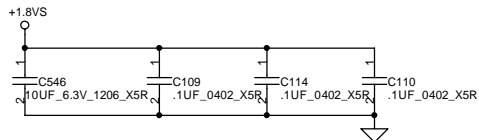
Layout note : Processor system bus
Distribute as close as possible
to MCH Processor Quadrant.(between VTTFSB and VSS pin)



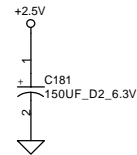
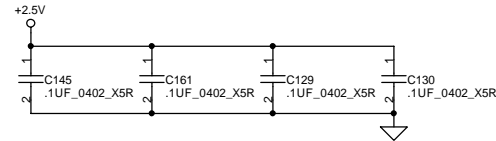
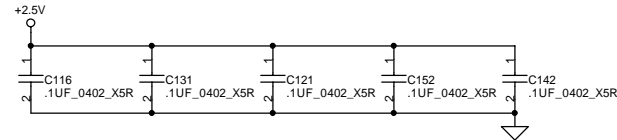
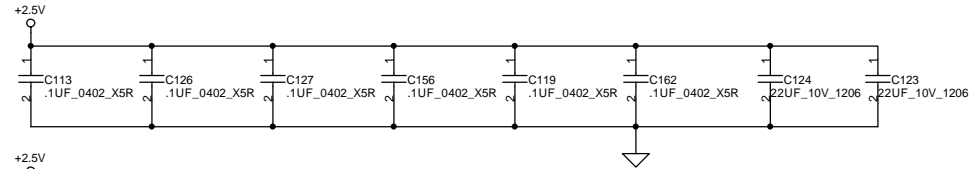
Layout note : AGP/CORE
Distribute as close as possible
to MCH Processor Quadrant.(between VCCAGP/VCCCORE
and VSS pin)



Layout note : Hub-Link
Distribute as close as possible
to MCH Processor Quadrant.(between VCCHL and VSS pin)



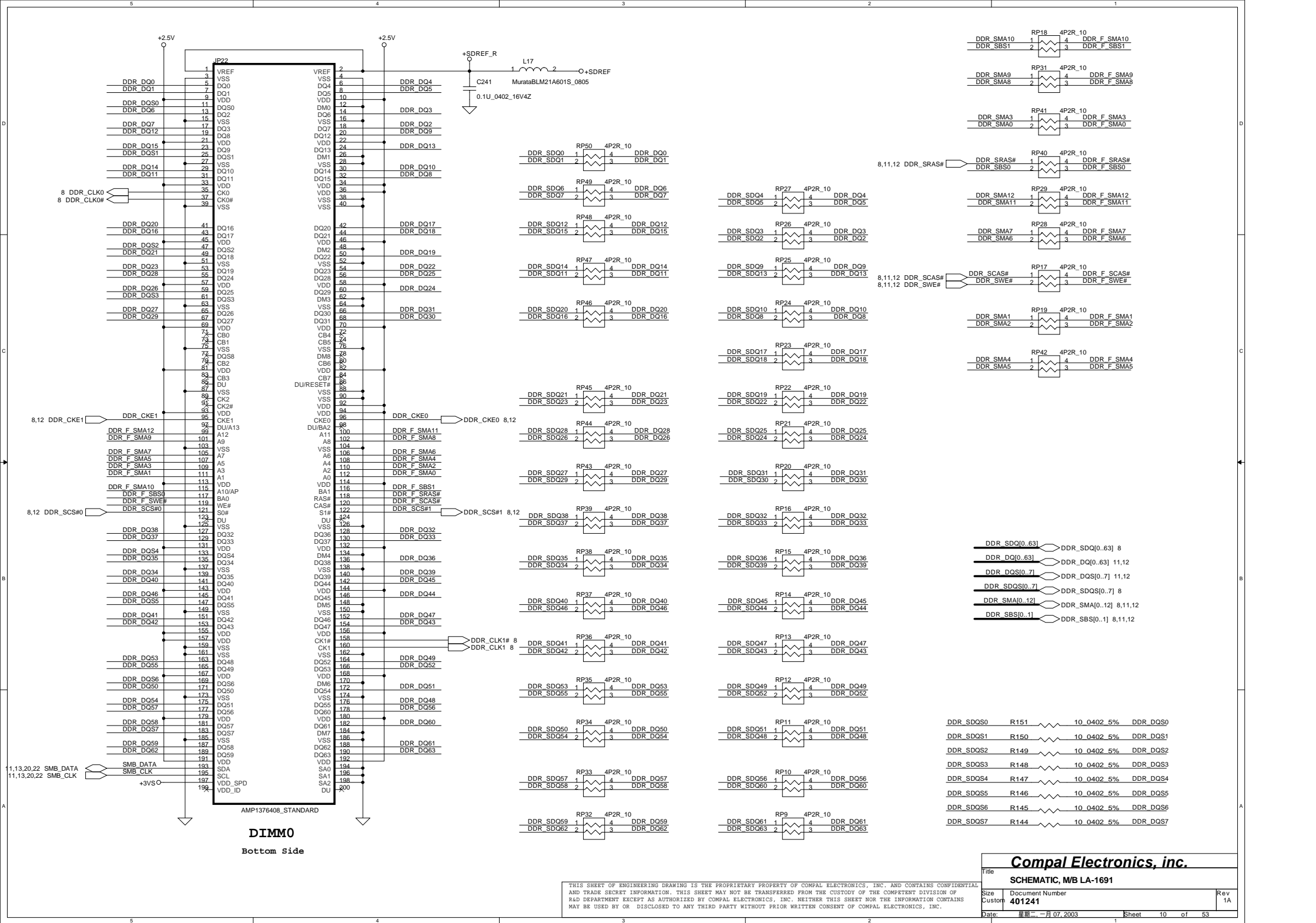
Layout note : DDR Memory interface
Distribute as close as possible
to MCH Processor Quadrant.(between VCCSM and VSS pin)

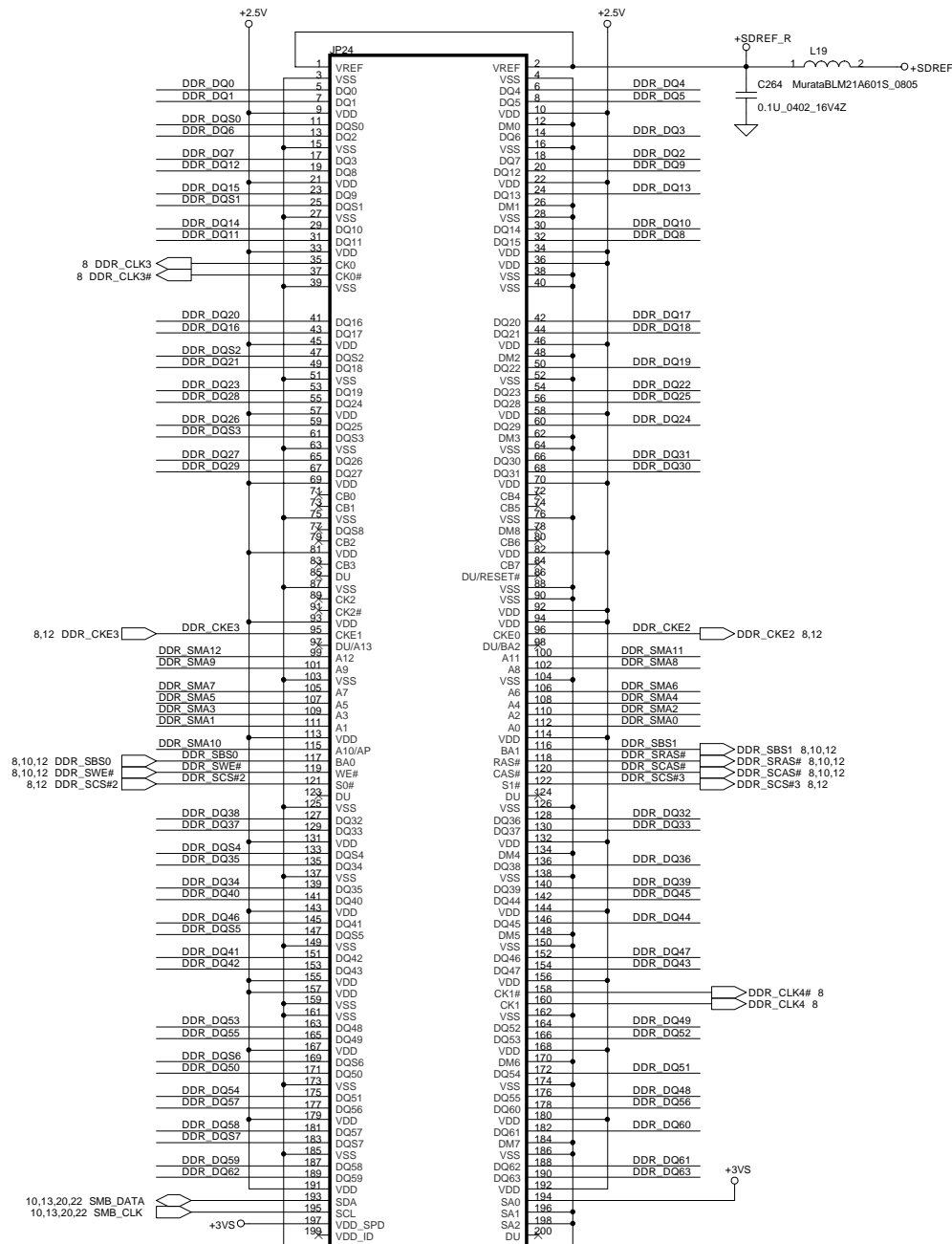


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Title			
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Size	Document Number		Rev
	401241		1A
Date:	~P 附二, 一月 07, 2003		Sheet 9 of 53



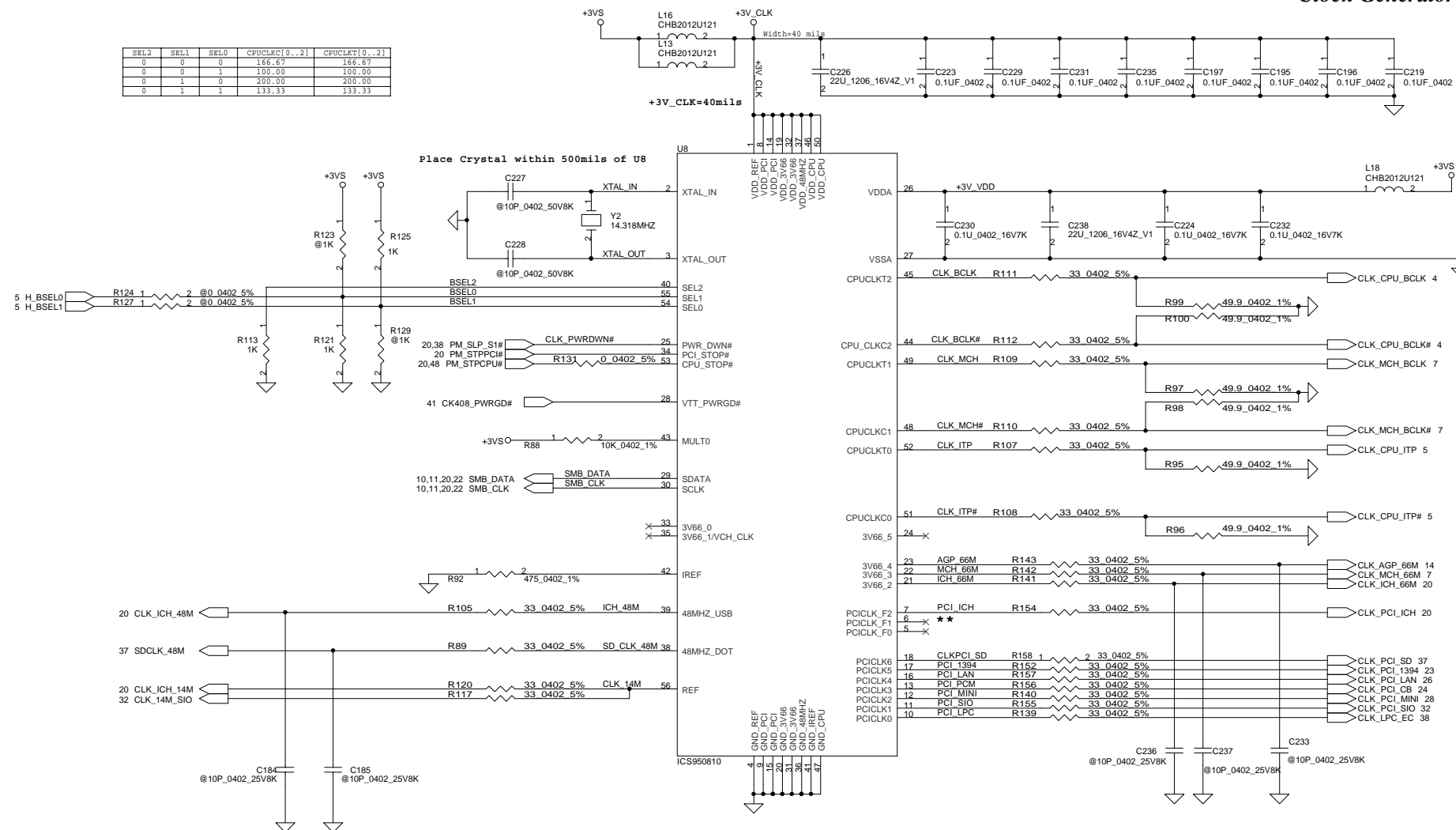


DDR_DQ[0..63] 10,12
DDR_SMA[0..12] 8,10,12
DDR_DQS[0..7] 10,12
DDR_CKE[0..3] 8,10,12

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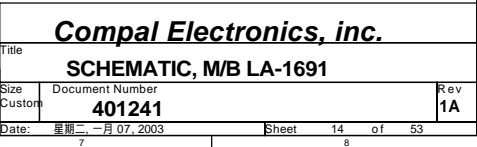
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Title			
Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	11 of 53

Clock Generator

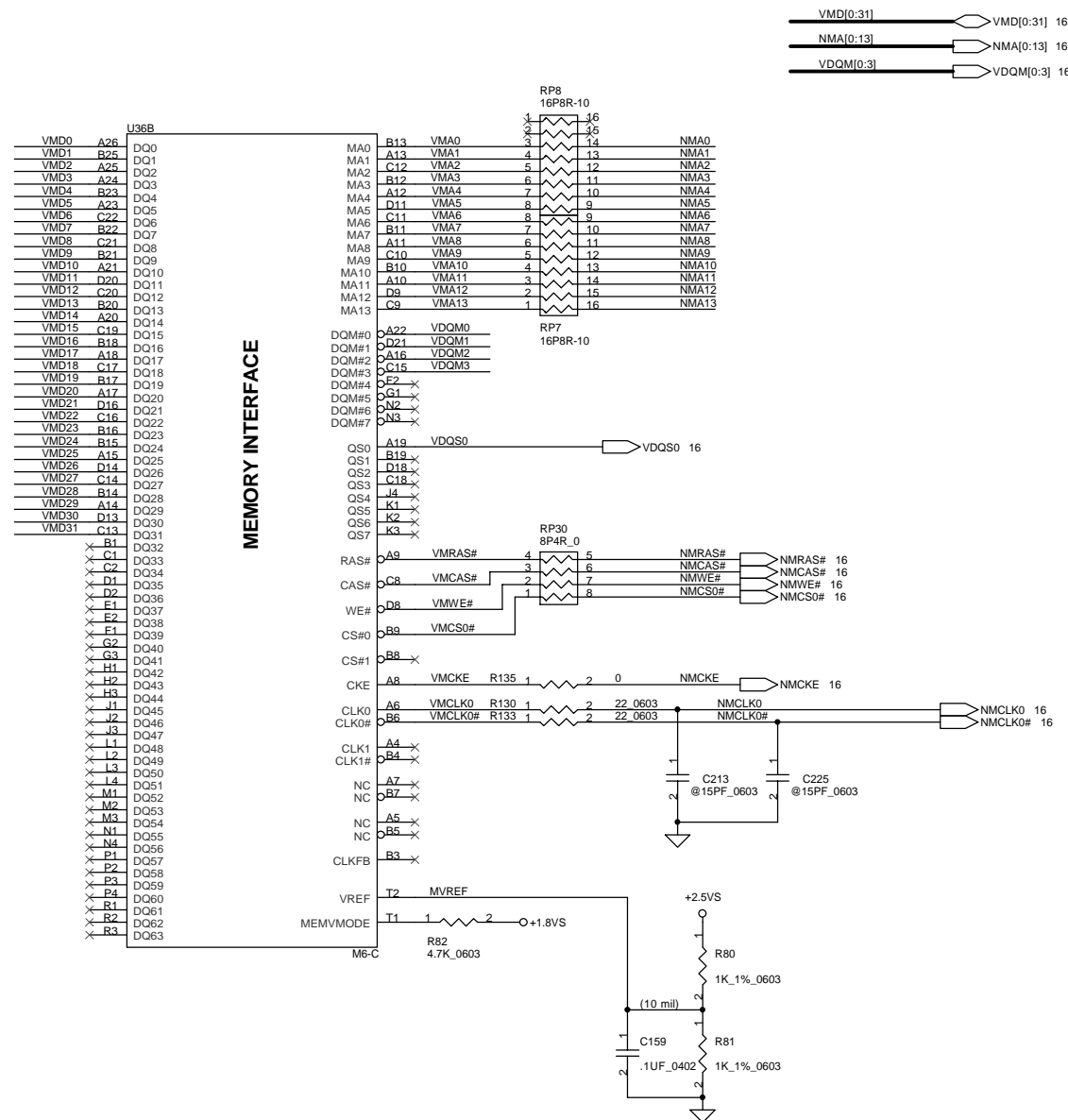


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SCHEMATIC, M/B LA-1691			
Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	13 of 53



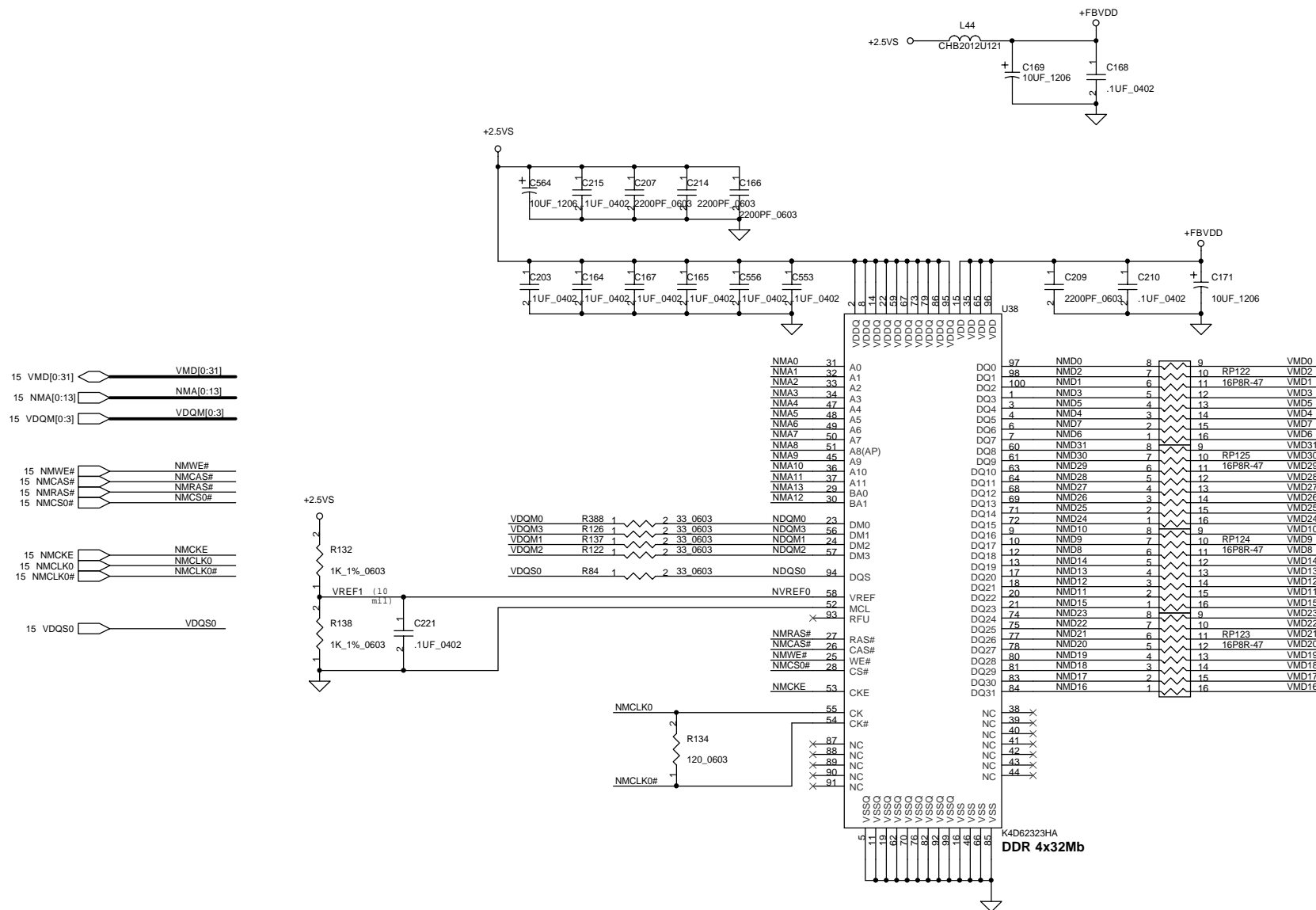
MEMORY INTERFACE



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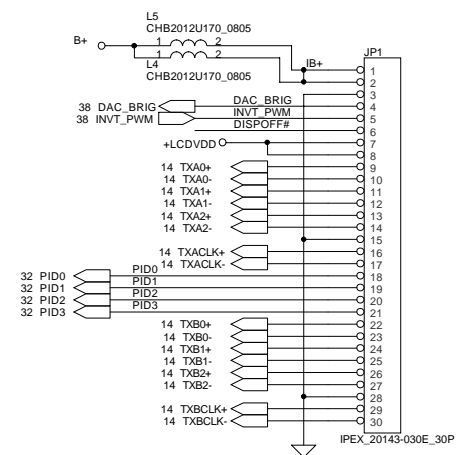
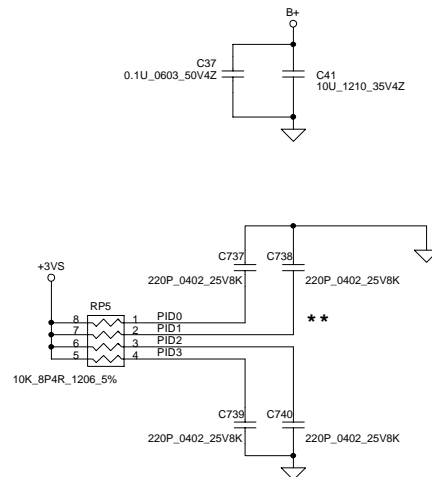
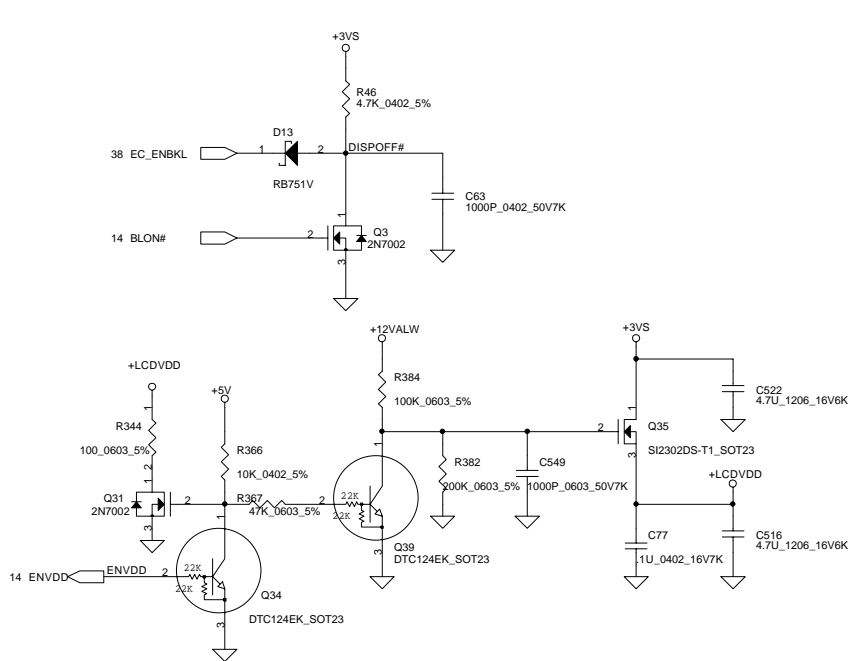
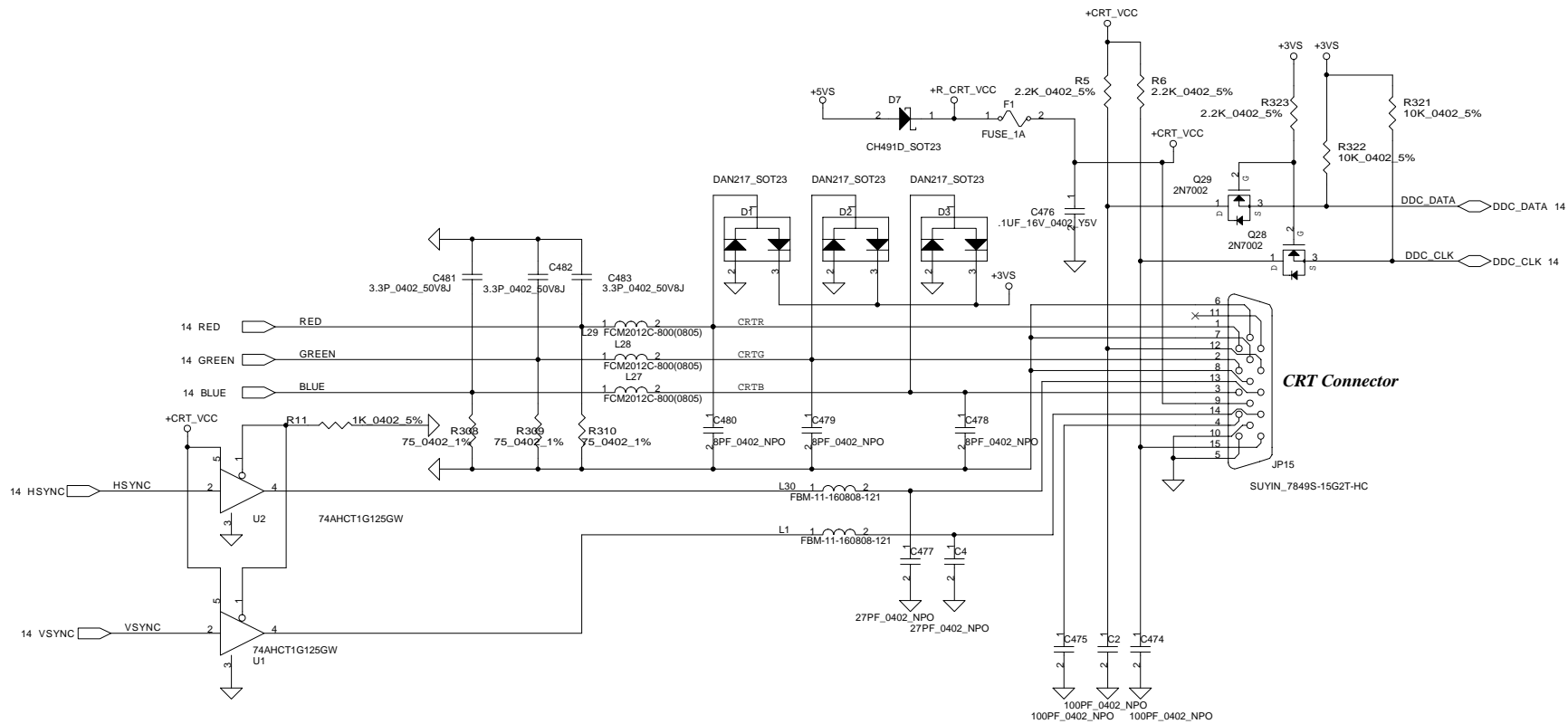
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Title	SCHEMATIC, M/B LA-1691
Size	Document Number
Custom	401241
Date: 星期二, 一月 07, 2003	Sheet 15 of 53
Rev	1A

DDR SDRAM 4X32Mb



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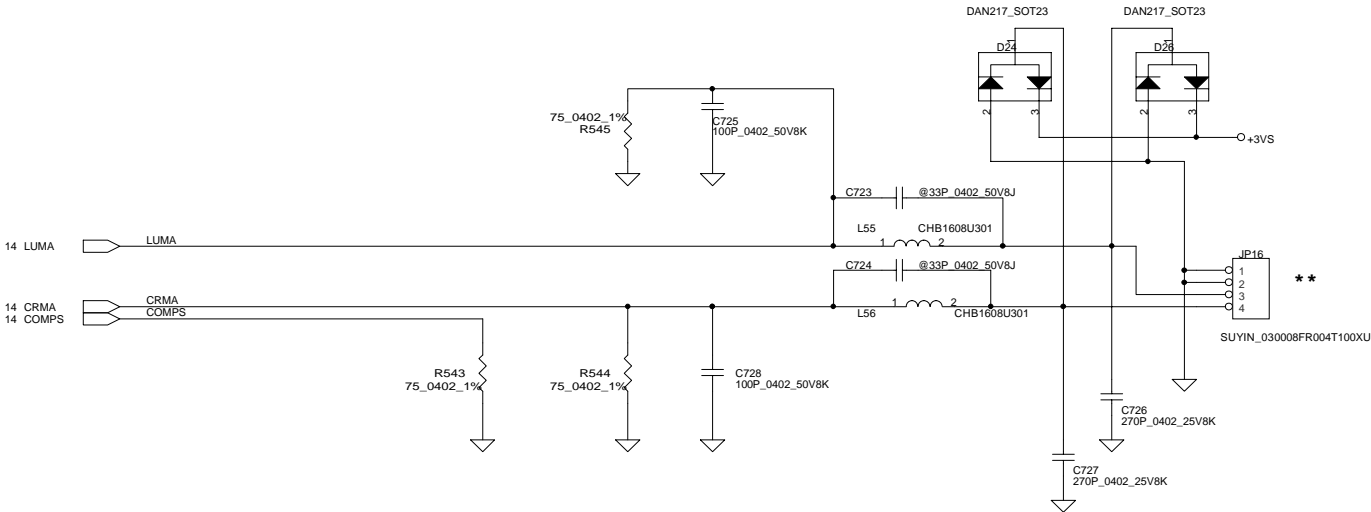
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Title	Document Number	Rev
Size	401241	1A
Date:	星期一, 一月 07, 2003	Sheet 16 of 53



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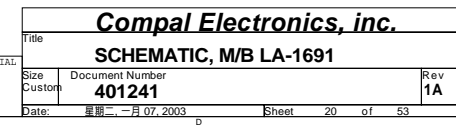
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Title	Document Number	Rev	
Size	401241	1A	
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Date	星期二, 一月 07, 2003	Sheet	18 of 53

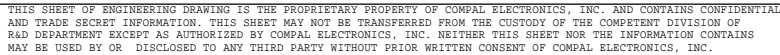
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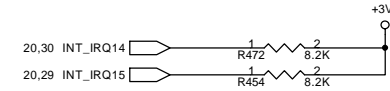
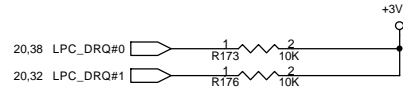
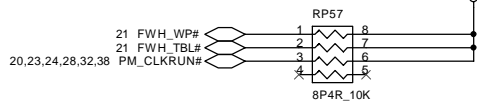
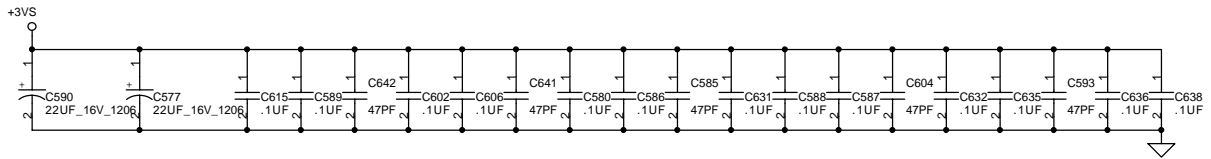
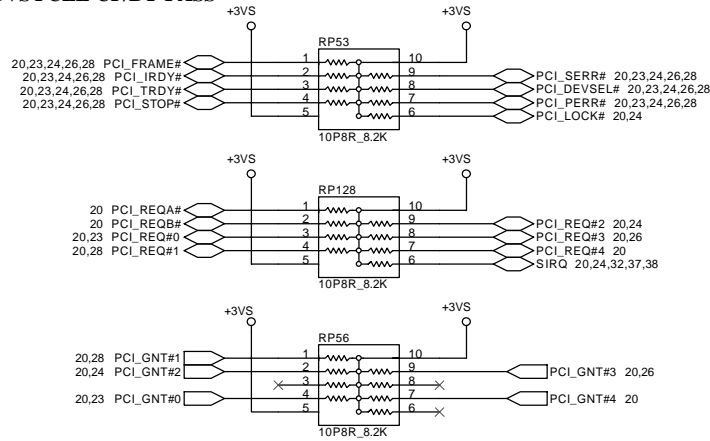
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Size	Document Number		Rev
Custom	401241		1A
Date:	星期二, 一月 07, 2003		Sheet 19 of 53

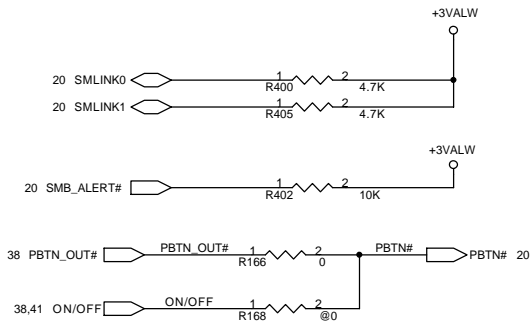




+3VS PULL-UP/BY-PASS



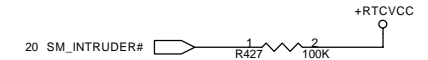
+3VALW PULL-UP



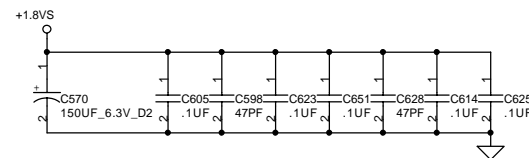
+3V PULL-UP/BY-PASS



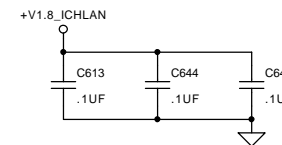
+RTCVCC PULL-UP



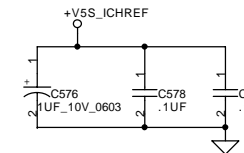
+1.8SV BY-PASS



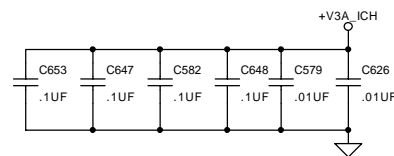
+V1.8S_ICHLAN BY-PASS



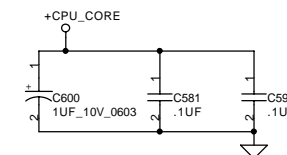
+V5S_ICHREF BY-PASS



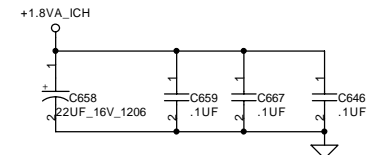
+V3A_ICH BY-PASS



+CPU_CORE BY-PASS

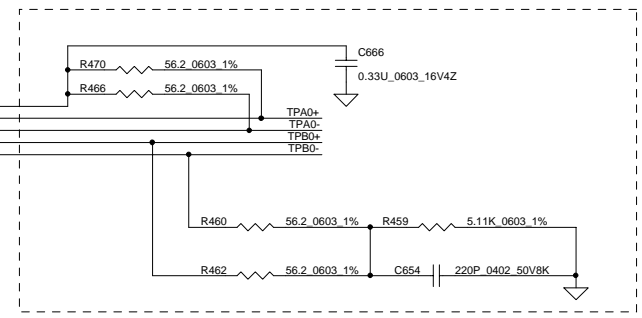
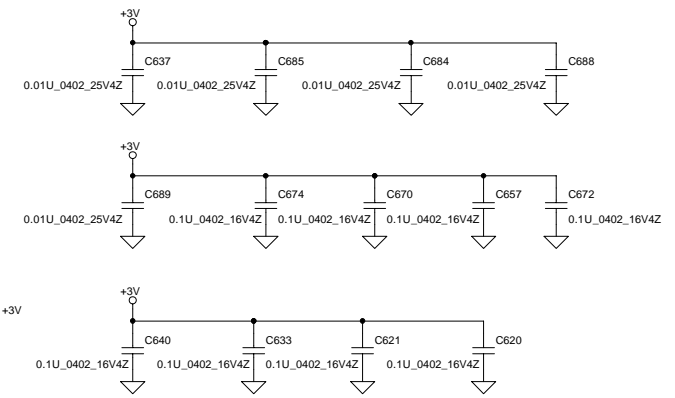


+1.8VA_ICH BY-PASS



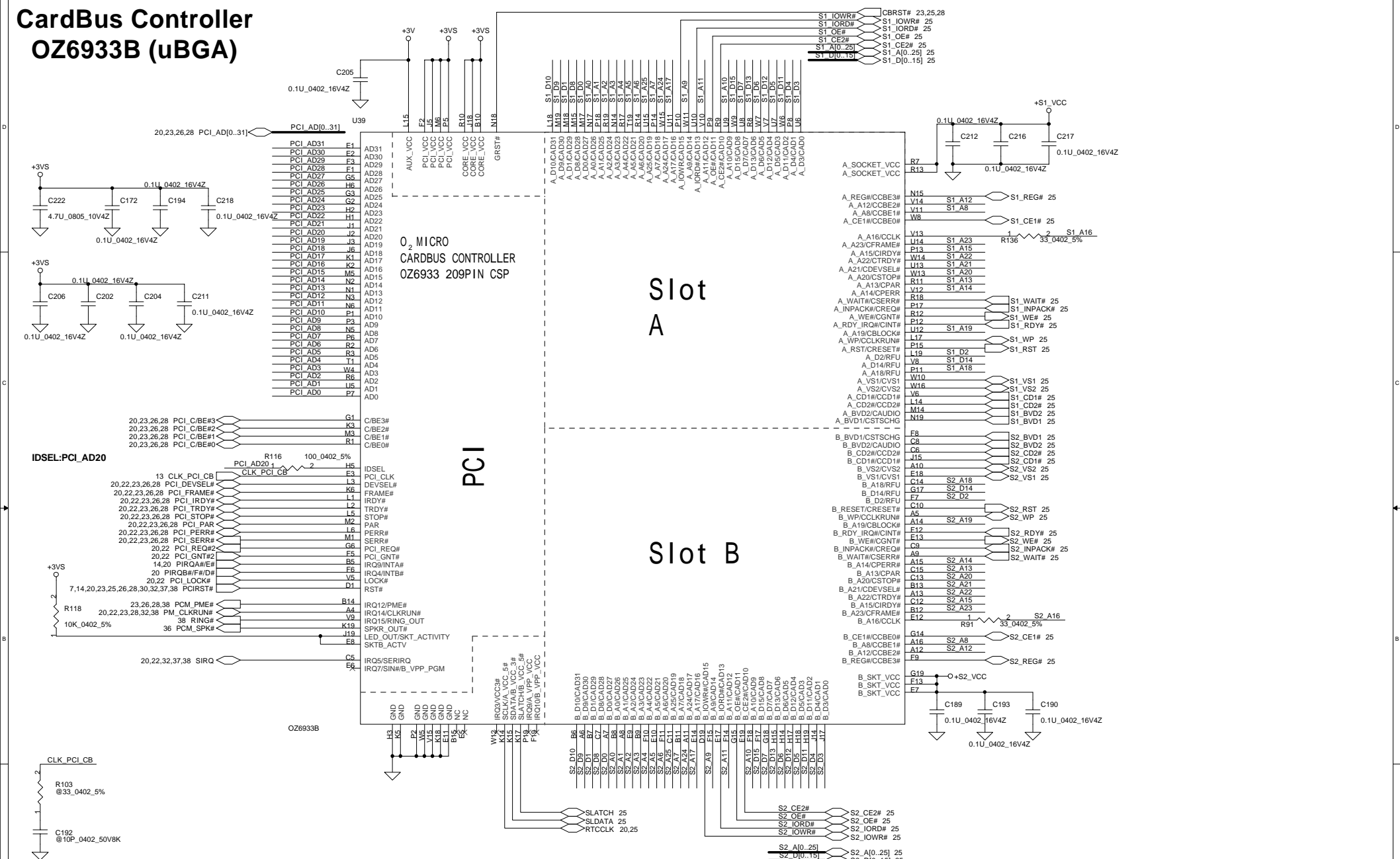
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SCHEMATIC, M/B LA-1691			
Size	Document Number	Rev	
Custom	401241	1A	
Date:	~P 周二, 一月 07, 2003	Sheet	22 of 53



Place these components close to U48 pin112 to pin116

CardBus Controller OZ6933B (uBGA)



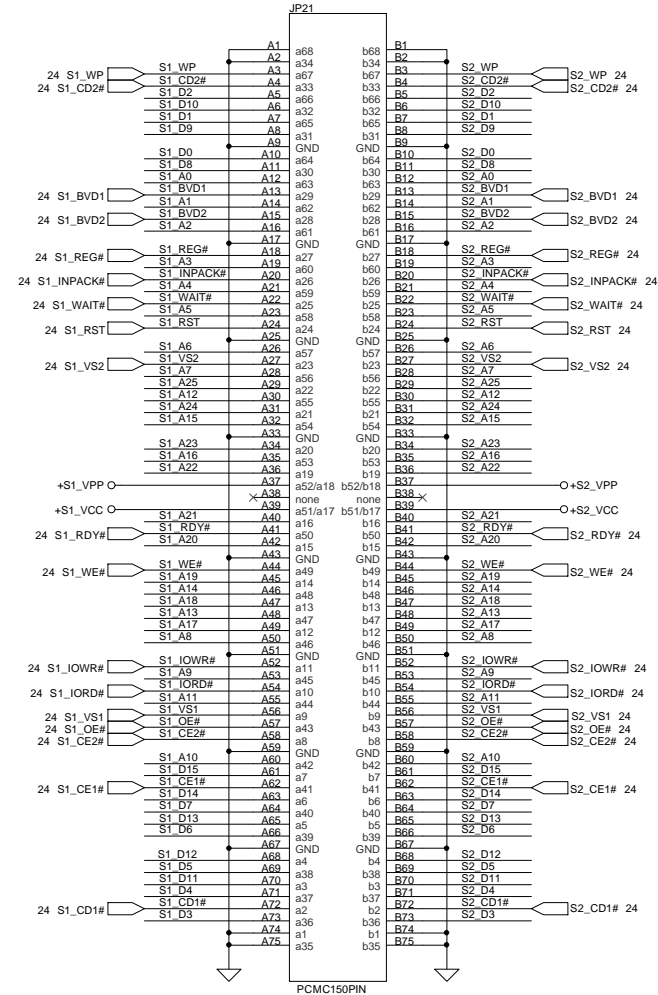
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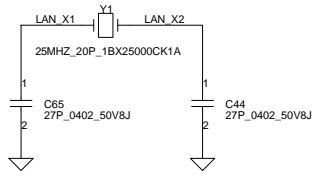
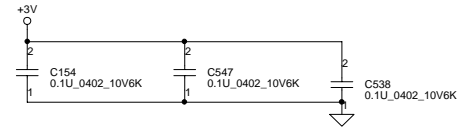
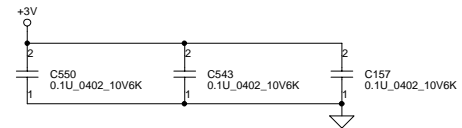
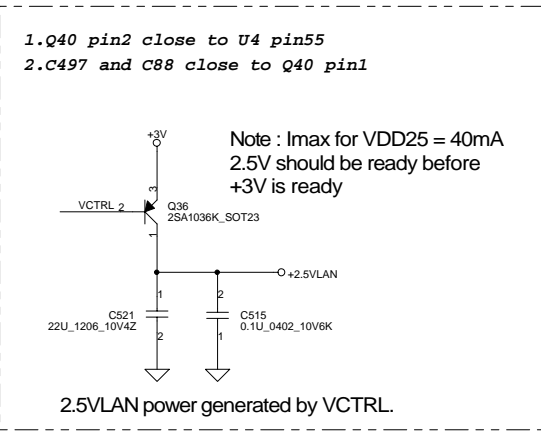
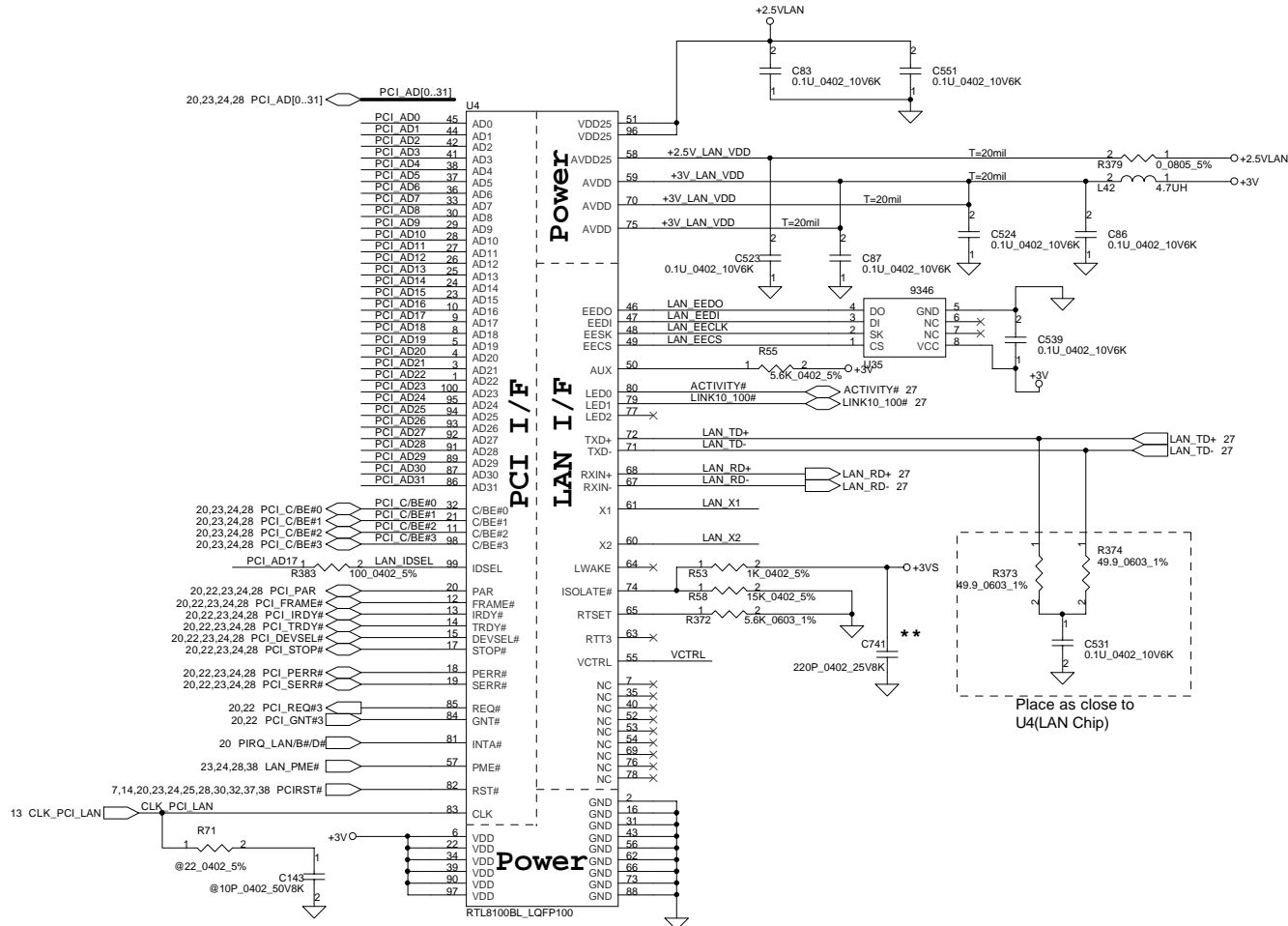
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Custom	401241	1A
Date:	星期二, 一月 07, 2003	Sheet 24 of 53

CARDBUS
SOCKET



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Size Custom	Document Number 401241		Rev 1A
Date:	星期二, 一月 07, 2003	Sheet	25 of 53

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Note : Please inform the PCI_GNT, PCI_REQ, PIRQ(INT) and IDSEL number with BIOS team

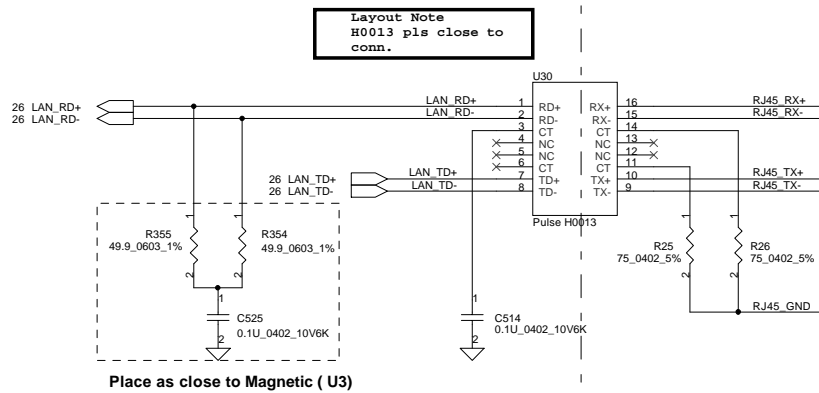
Layout Recommend :

1. LAN_RD+, LAN_RD- should be equal length as possible
2. LAN_TD+, LAN_TD- should be equal length as possible
3. The Maximum trace length between LAN chip(U4) and Magnetic(U30) is 12cm(4.7")
4. The distance between Connector(JP17) and Magnetic(U34) should be as short as possible
5. The Magnetic(U34) have differnt pin out if you select others parts(like H0022), and it is needed to check the high limit with ME team

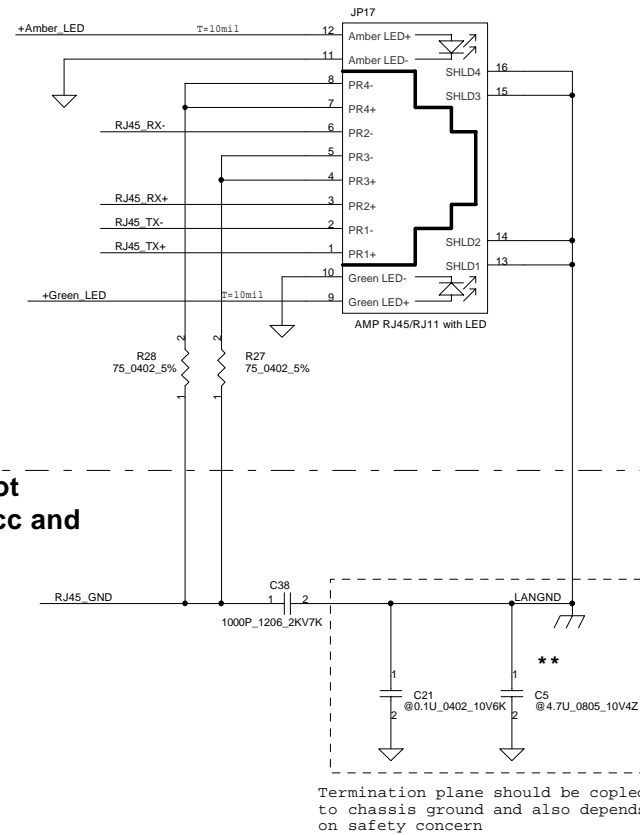
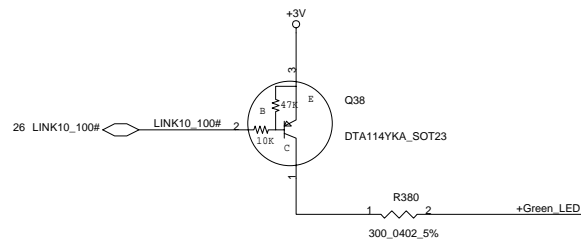
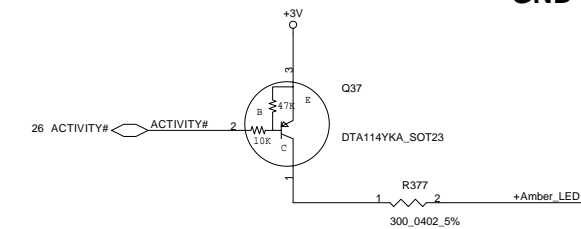
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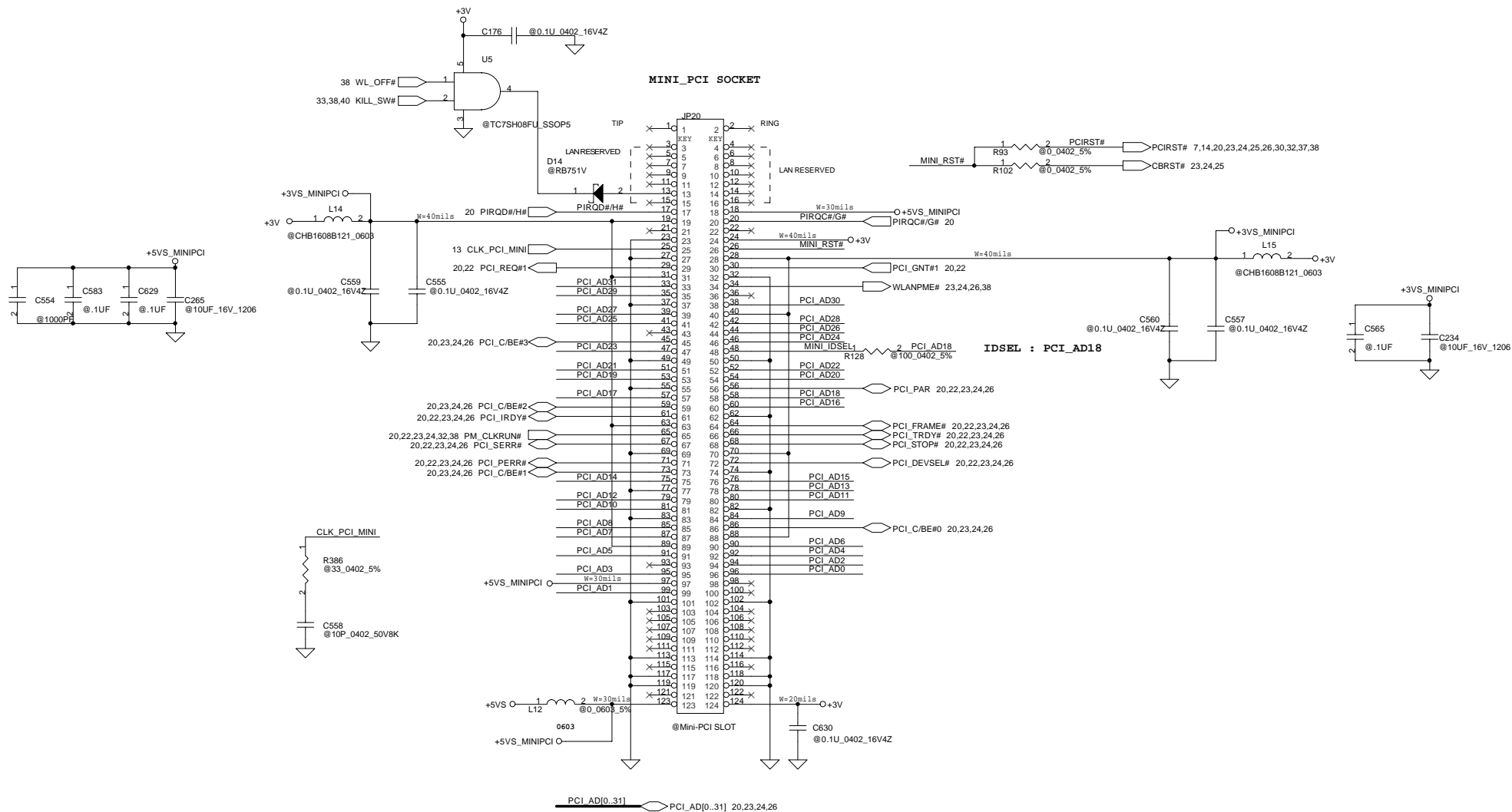
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Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	26 of 53

Keep Out 40mil



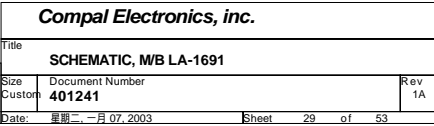
LAYOUT NOTICE: This area do not connect to power plan include Vcc and GND in any layer



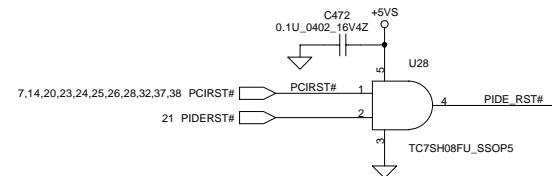
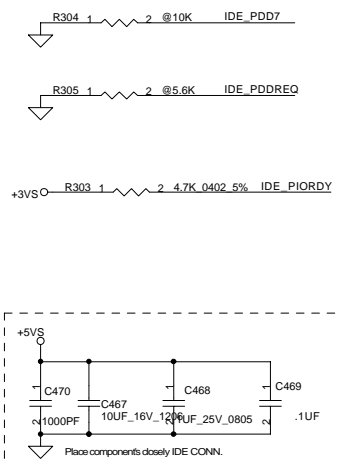
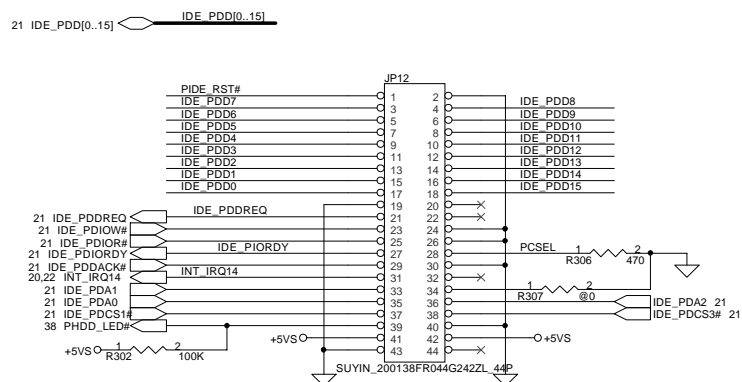


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Title			
SCHEMATIC, W/B LA-1691			
Size	Document Number		Rev
Custon	401241		1A
Date:	星期二, 一月 07, 2003	Sheet	28 of 53

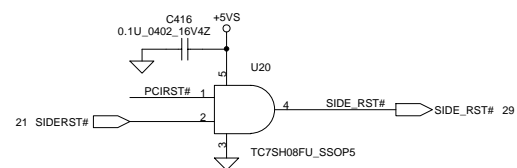
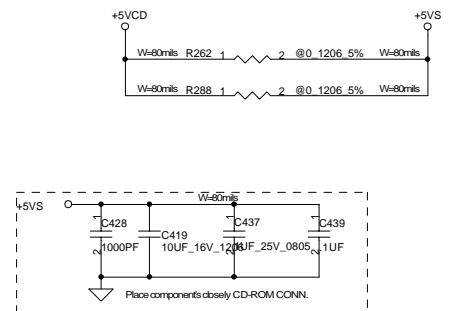
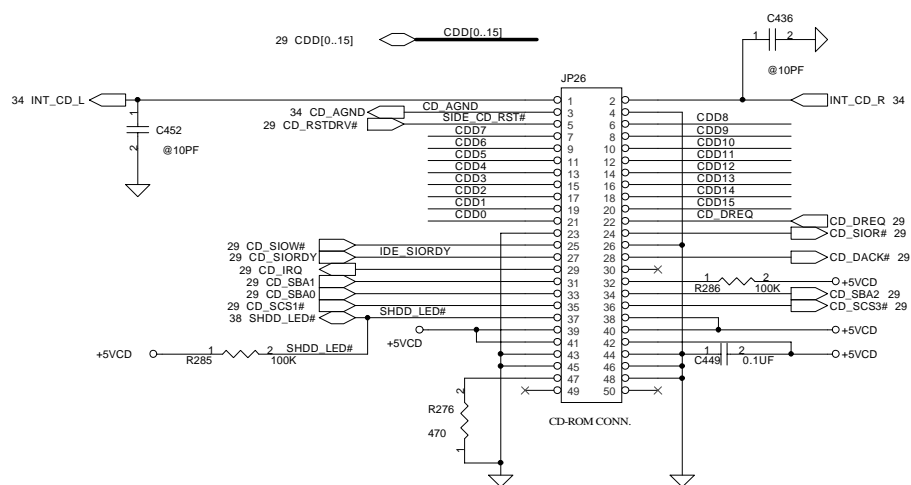
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IDE Module CONN.



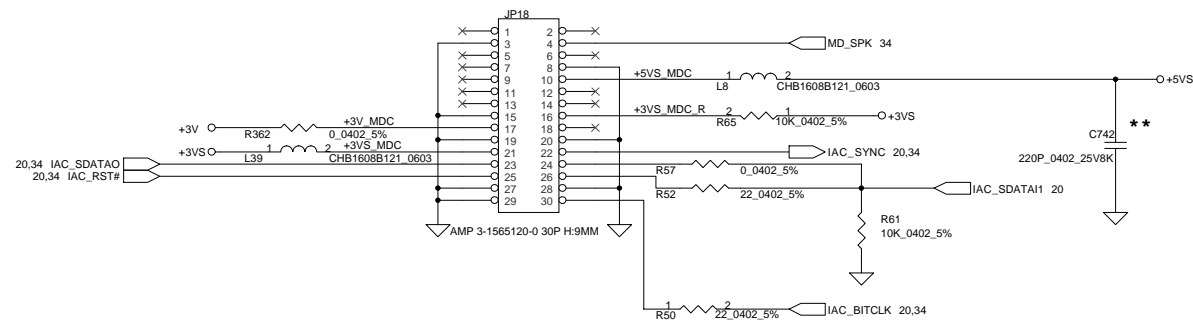
CD-ROM Module CONN.



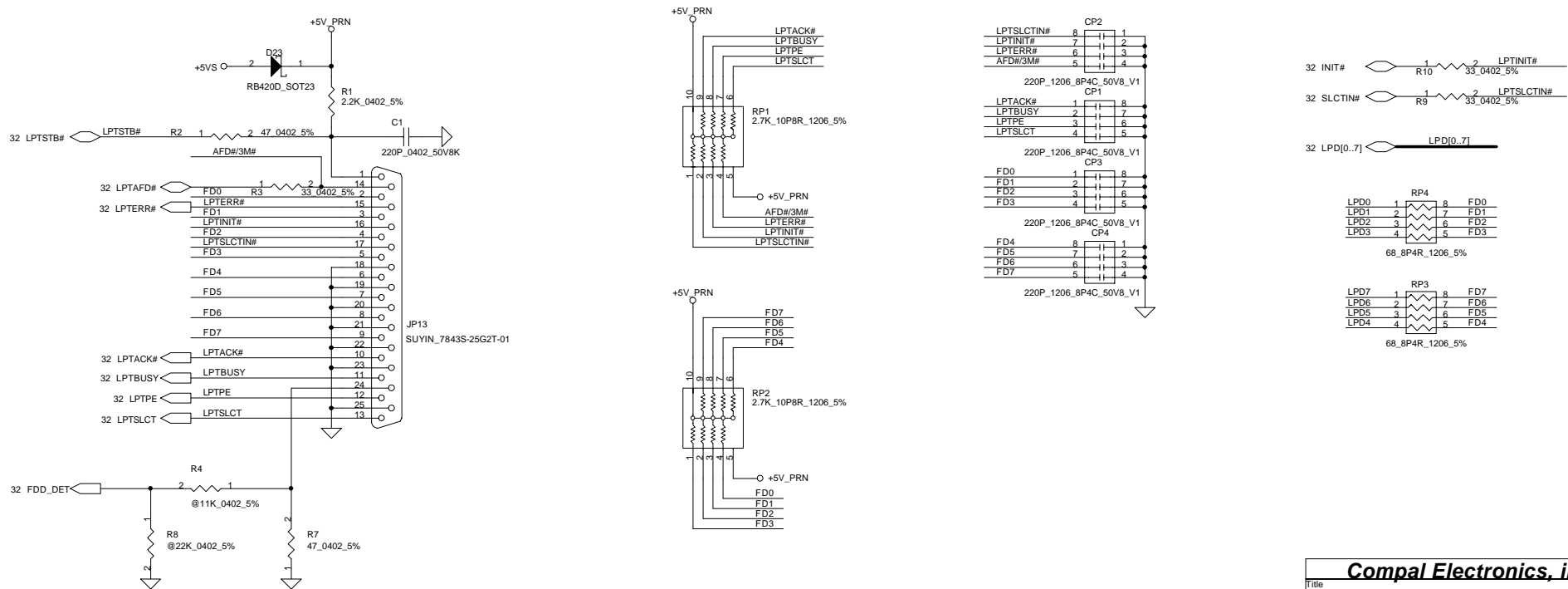
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Title			
SCHEMATIC, W/B LA-1691			
Size		Document Number	
Custom		401241	
Date:		星期二, 一月 07, 2003	Sheet 30 of 53
		Rev	1A

MDC Connector



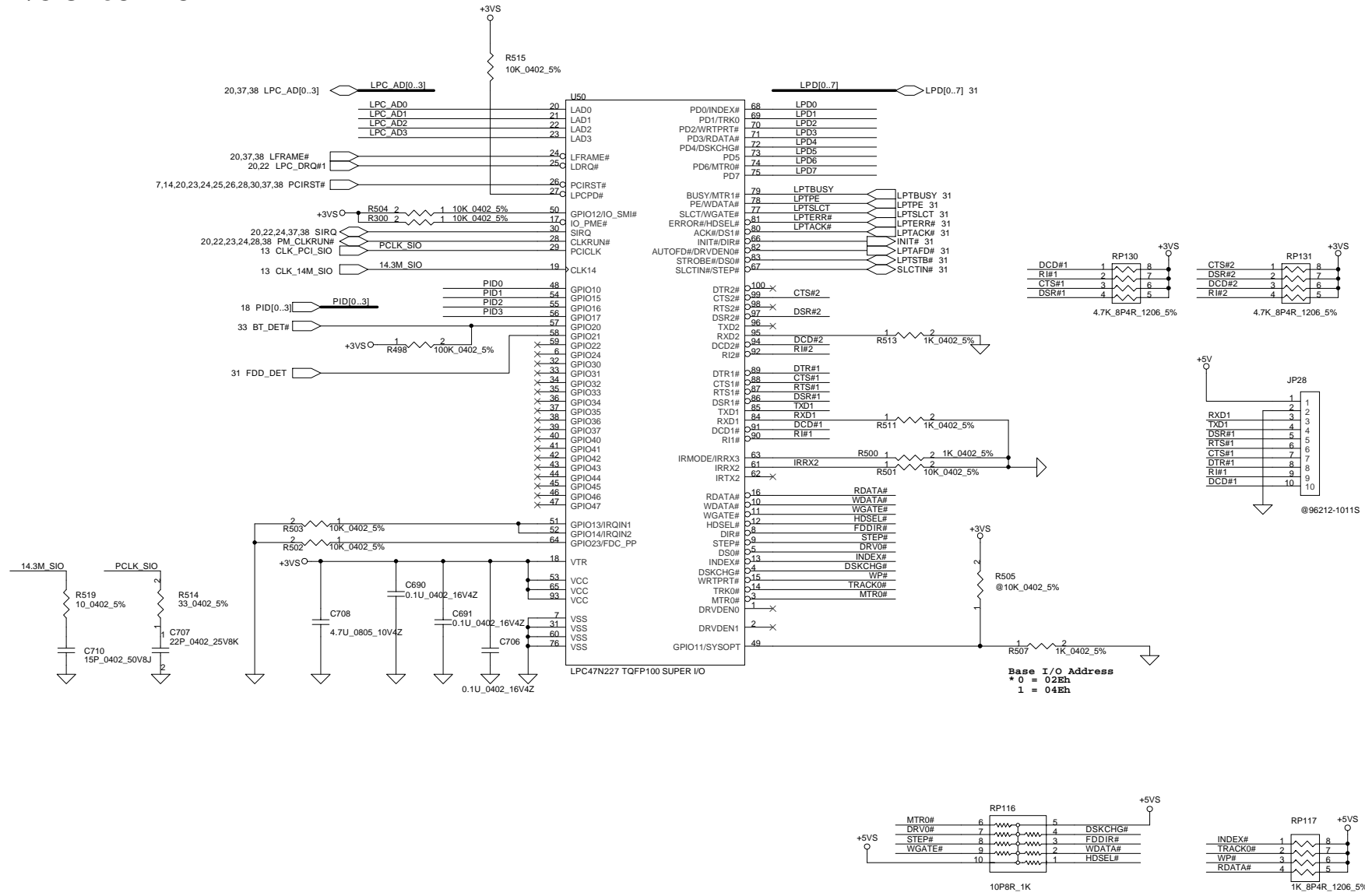
Parallel Port

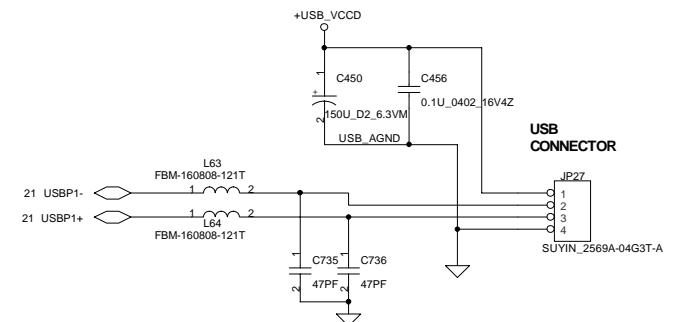
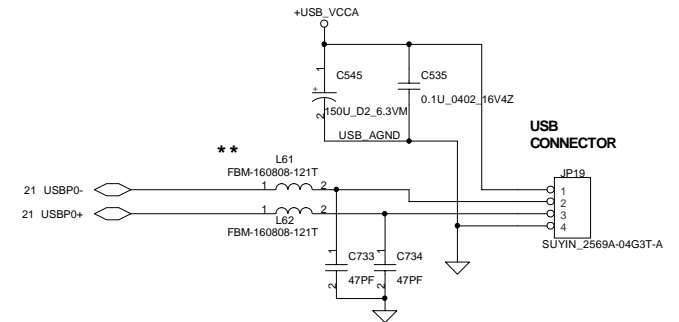
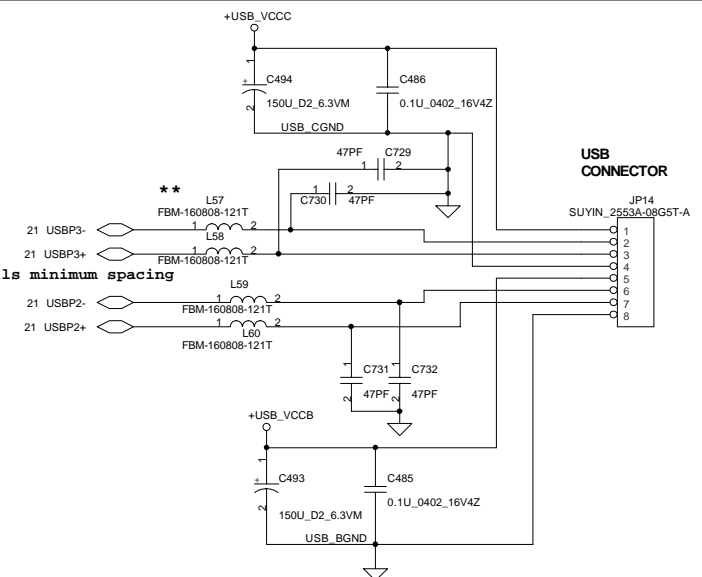
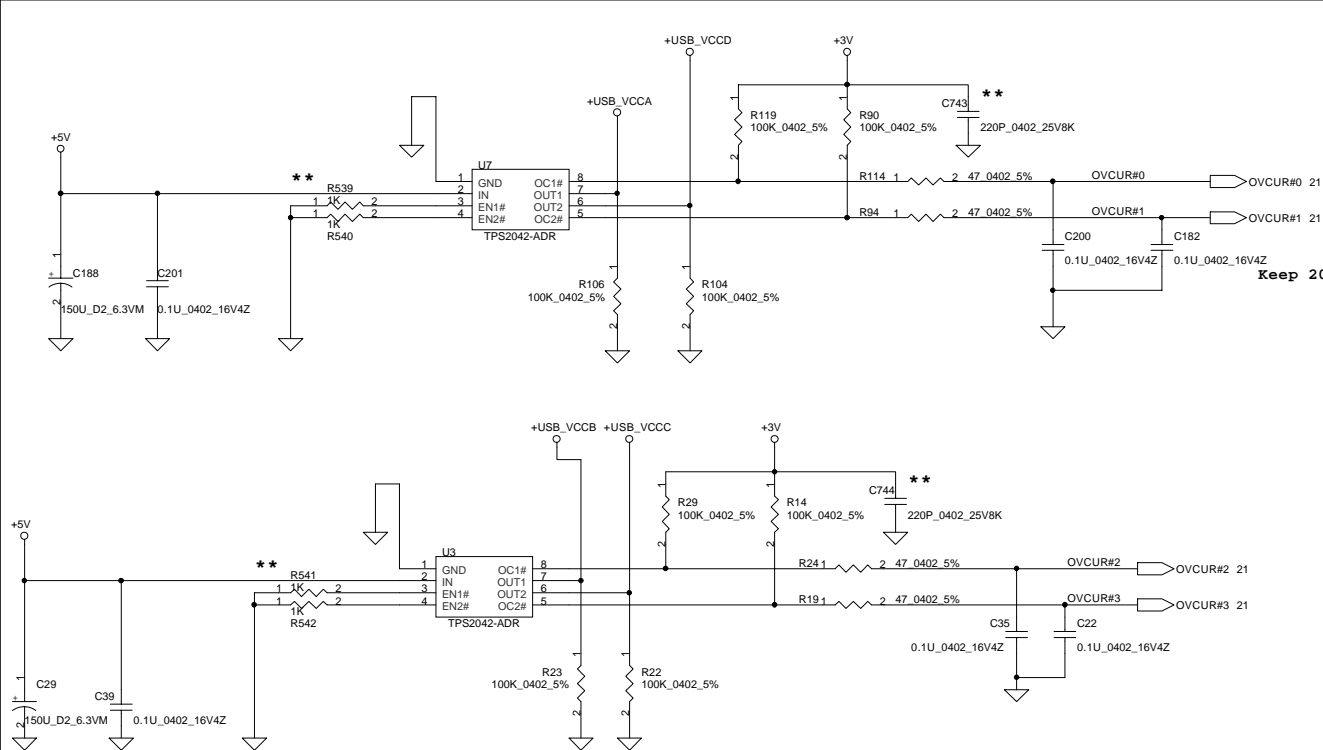


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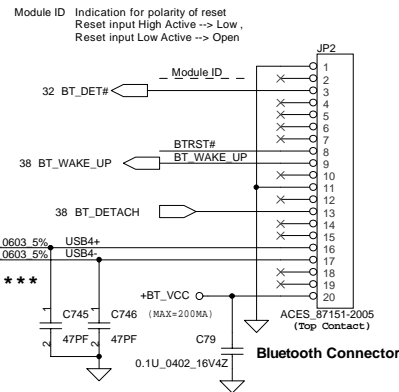
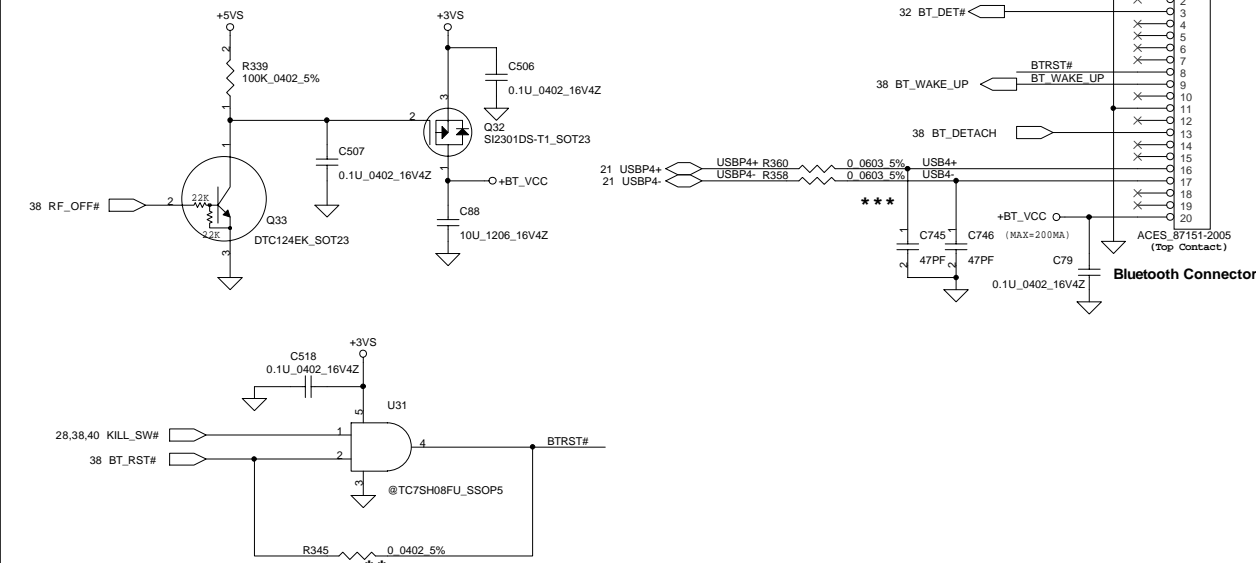
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Title			
SCHEMATIC, W/B LA-1691			
Size	Document Number		Rev
Custom	401241		
Date:	星期二, 一月 07, 2003	Sheet 31 of 53	1A

SUPER I/O SMsC FDC47N227





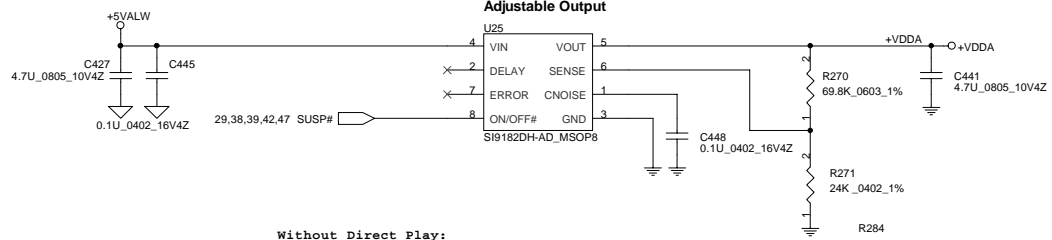
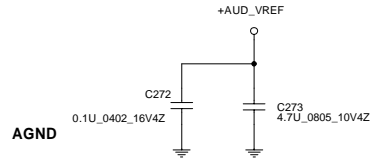
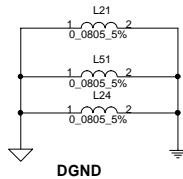
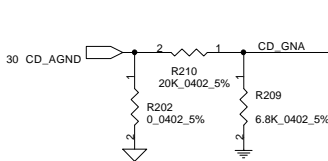
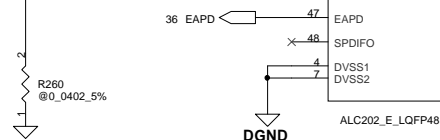
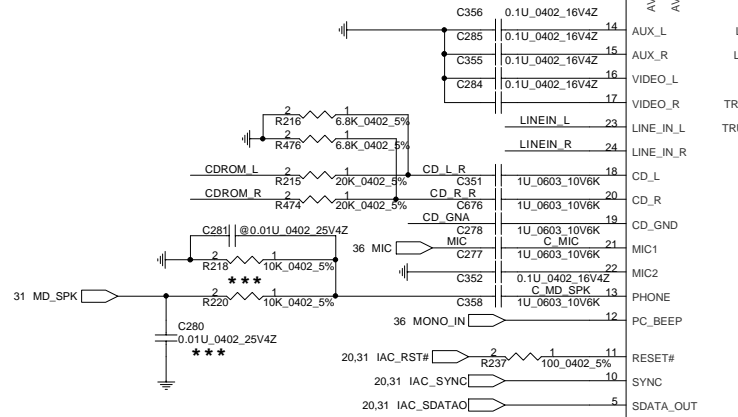
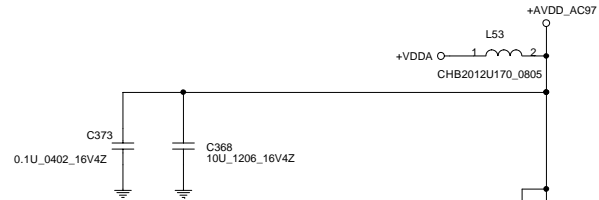
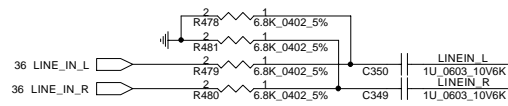
BlueTooth Interface



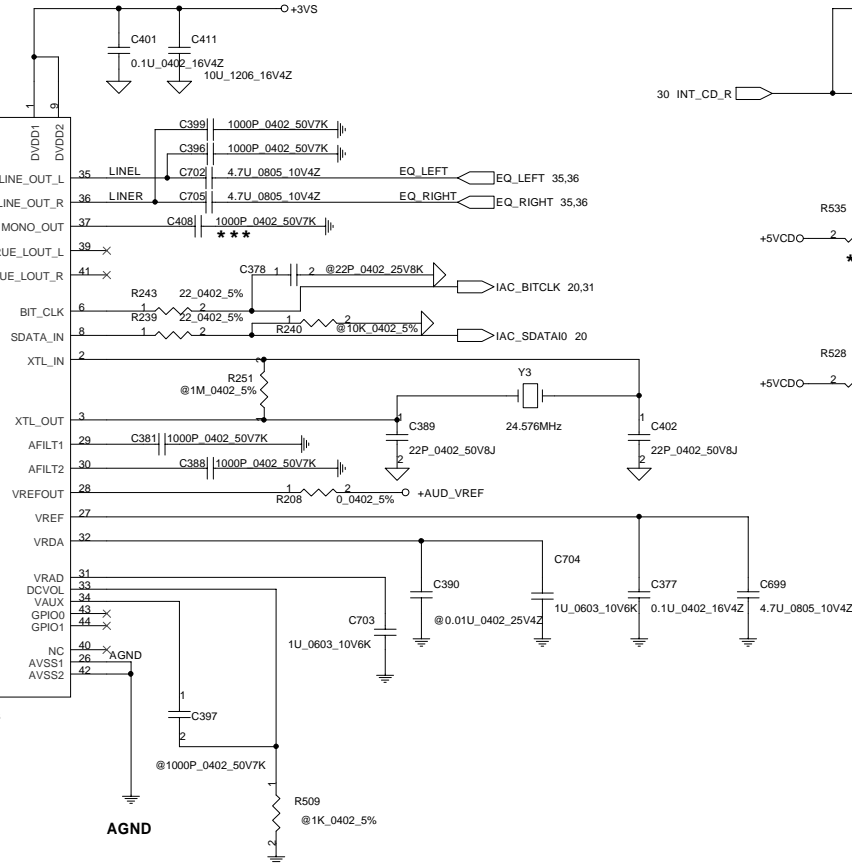
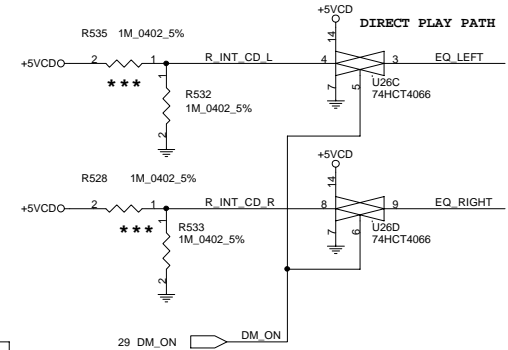
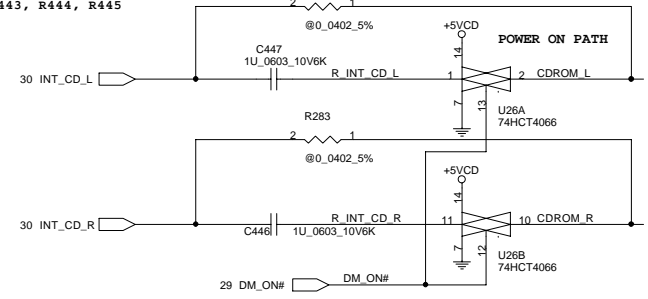
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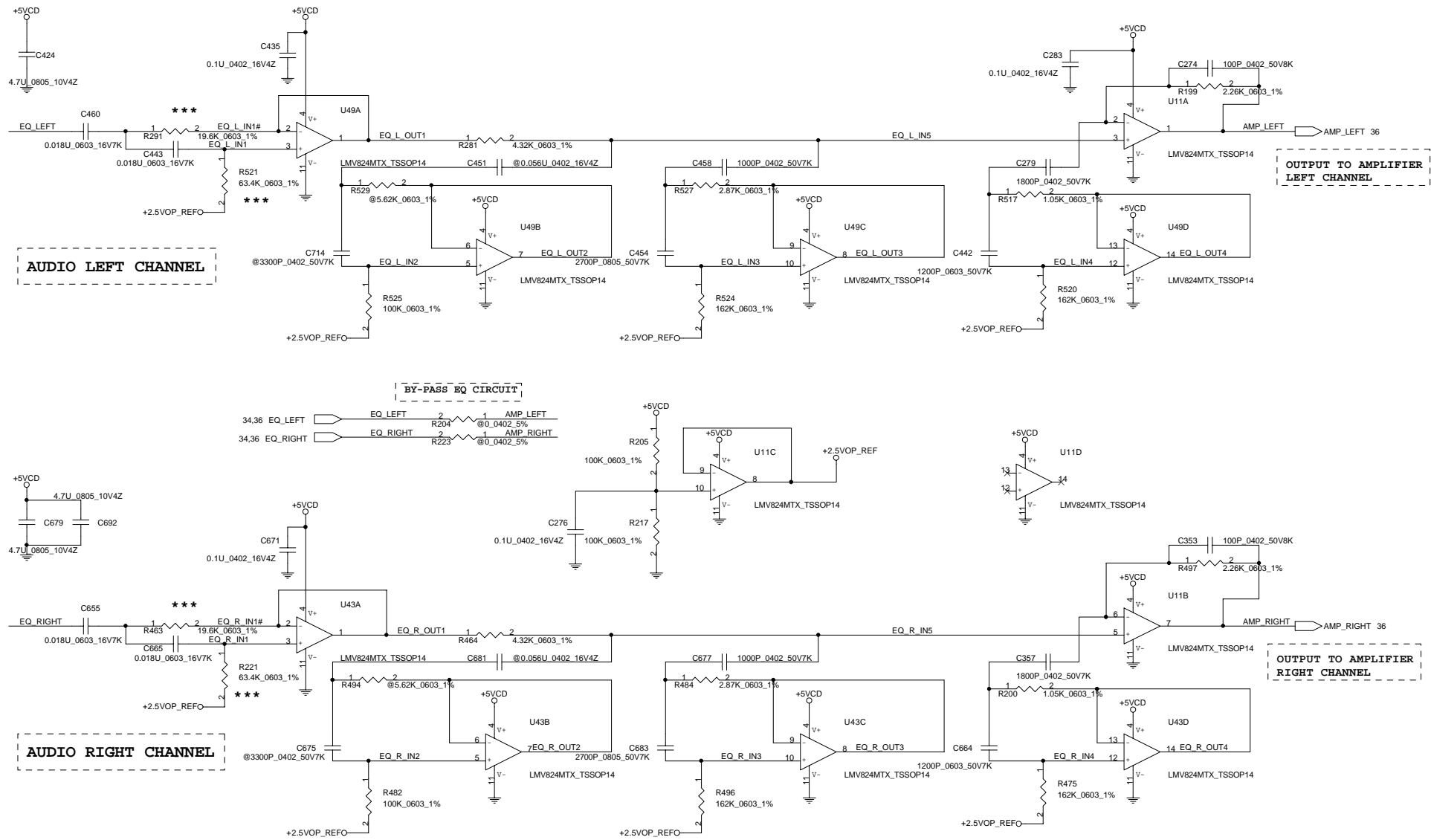
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Title	SCHEMATIC, W/B LA-1691		
Size	Document Number		
Custom	401241		
Date:	星期二, 一月 07, 2003	Sheet	33 of 53

AC97 Codec



```
Without Direct Play:
Unmount U45, C612, C613, R442, R443, R444, R445
Mount R477, R478
```

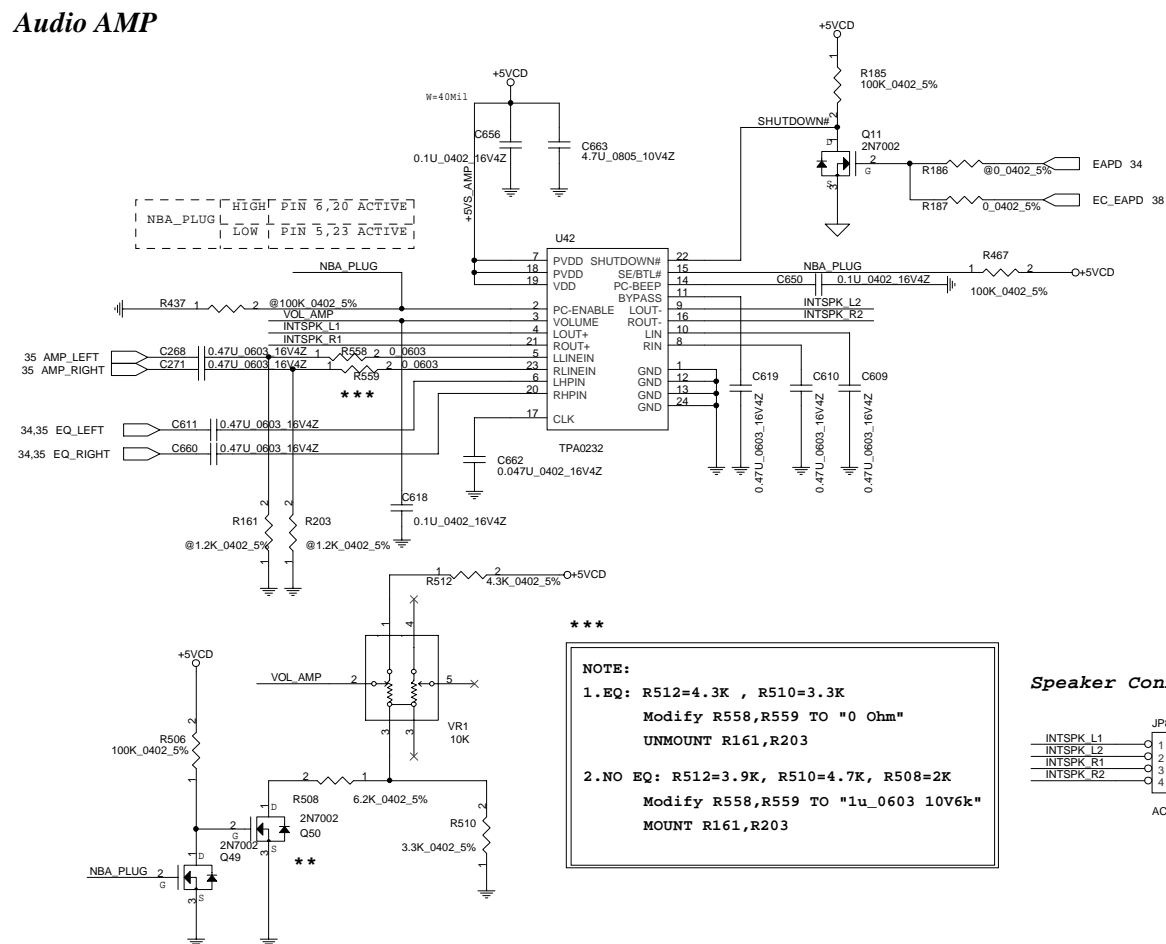




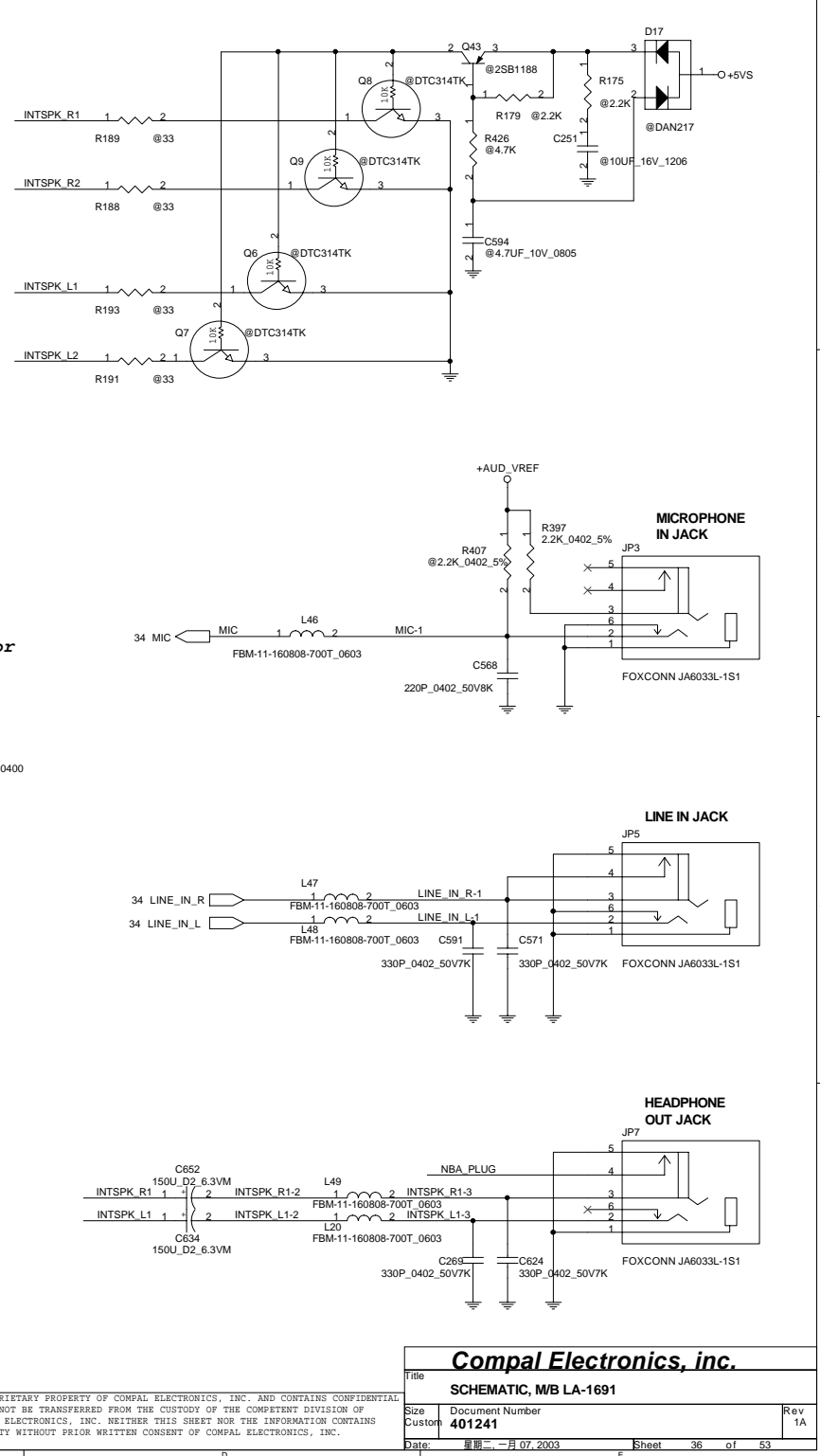
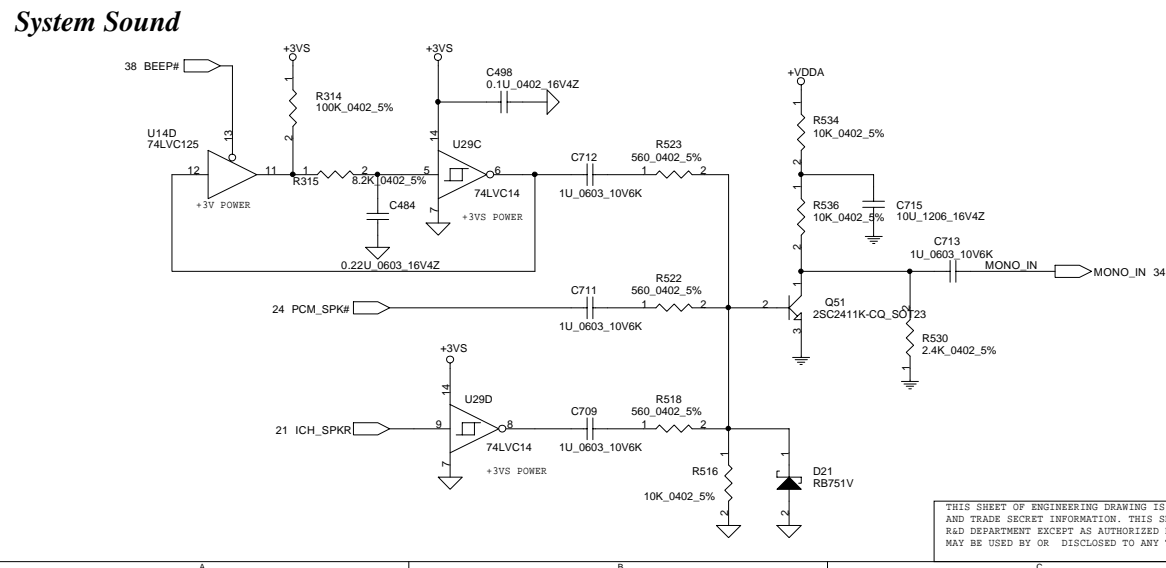
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Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	35 of 53

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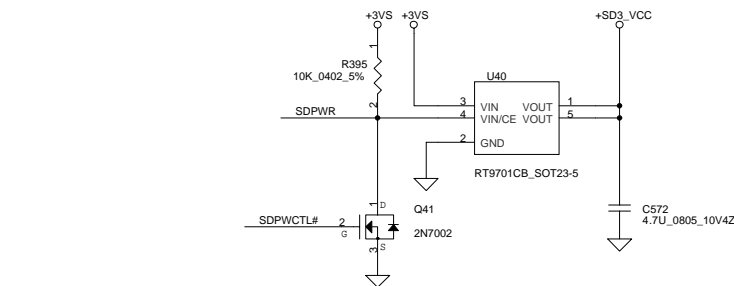
Audio AMP



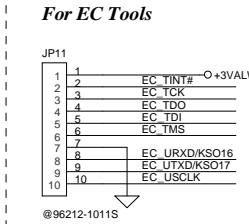
System Sound

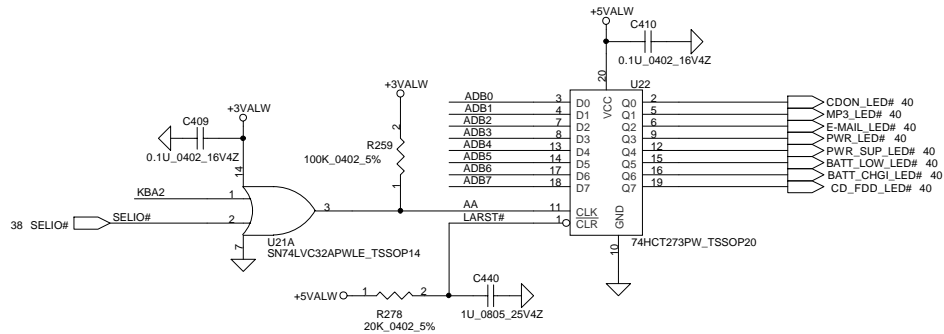


SD Power Switch

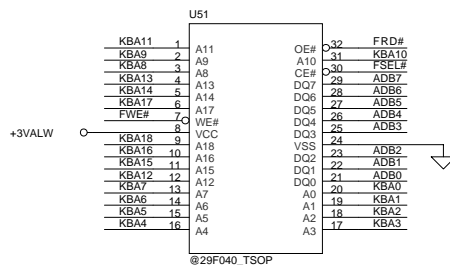
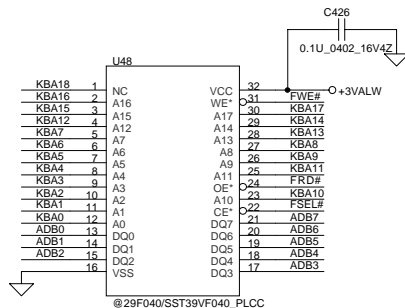
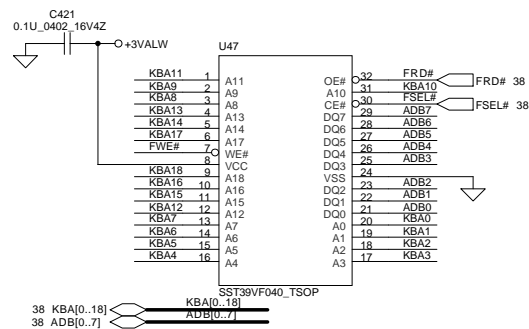
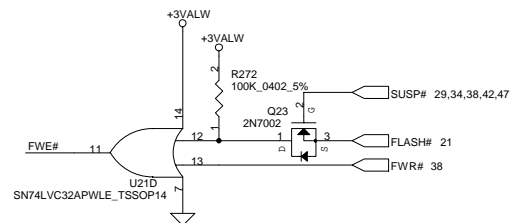
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Size Custom	Document Number 401241		Rev 1A
Date:	星期二 01月 07, 2003	Sheet 37 of 53	

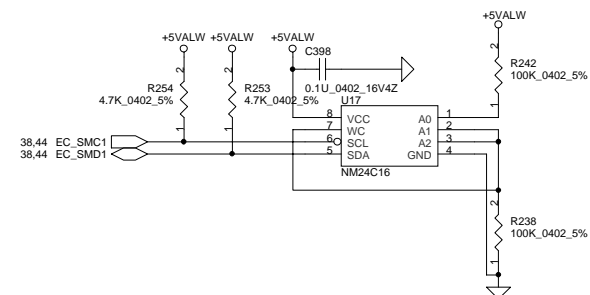




System BIOS



SMBus EEPROM



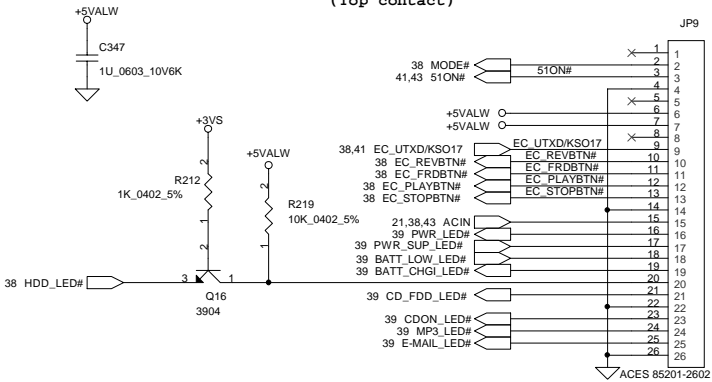
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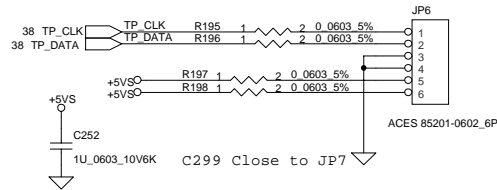
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Date:	星期二, 一月 07, 2003	Sheet	39 of 53

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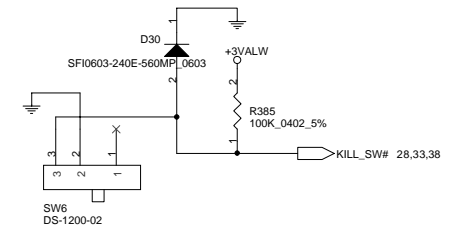
SW BOARD (Top contact)



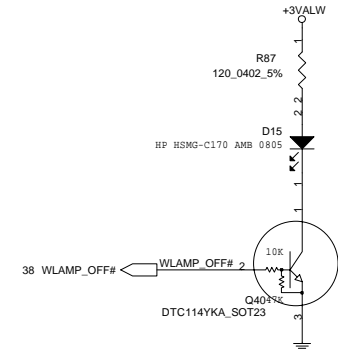
Touch Pad Connector



Kill SWITCH



WIRELESS ACTIVE AMB LED

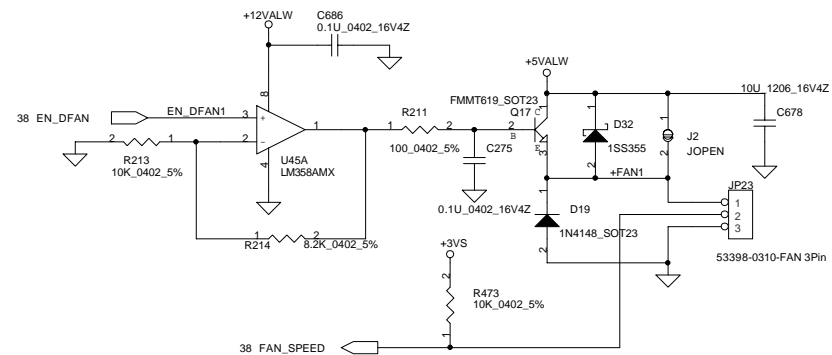


FAN CONN

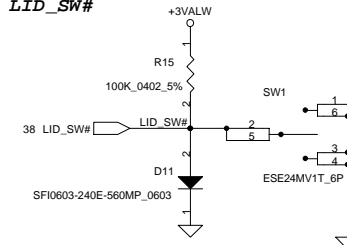
FAN CONTROL TYPE

PWM Poped R758, R759 & others de-poped

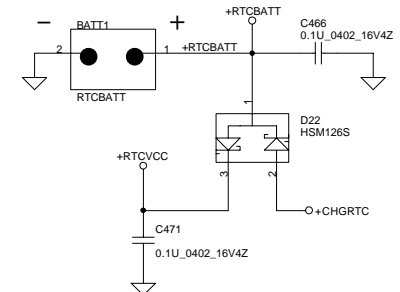
RPM De-poped R758, R759 & Others popped



LID_SW#



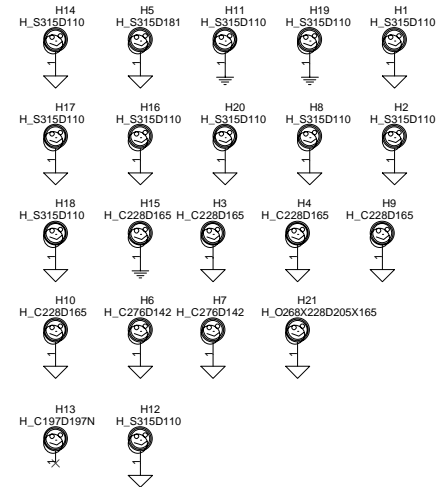
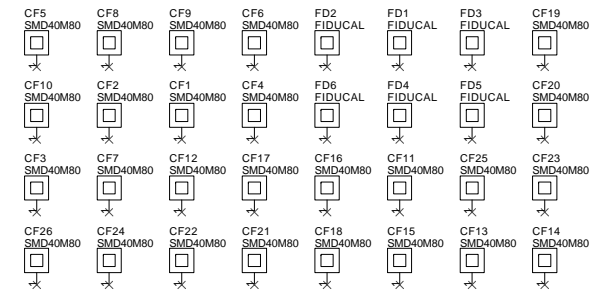
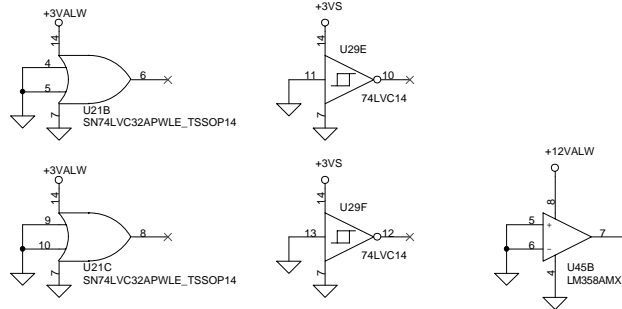
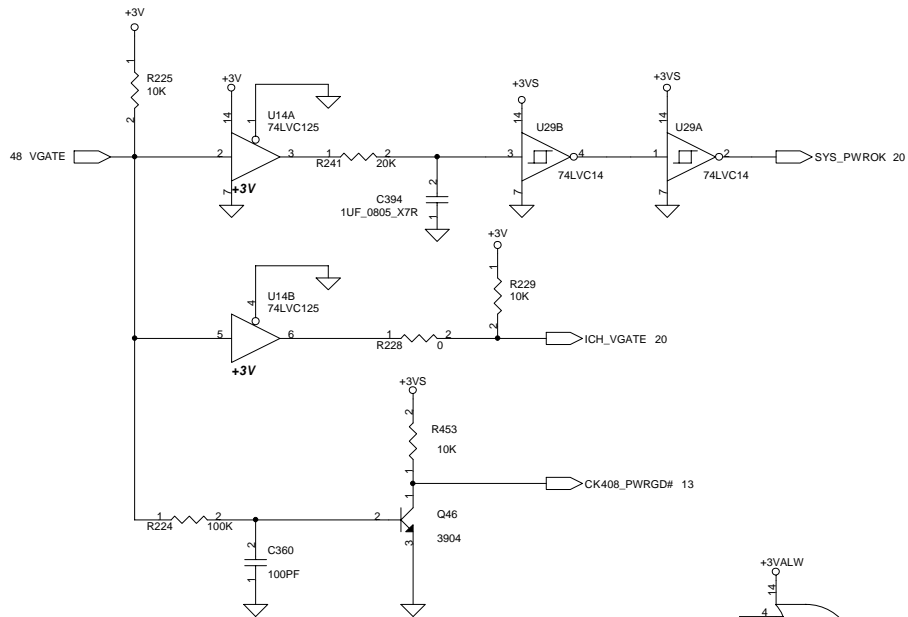
RTC BATT



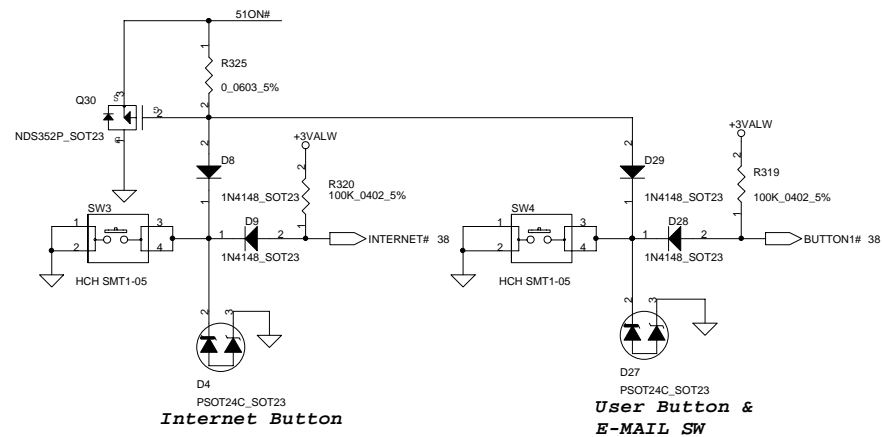
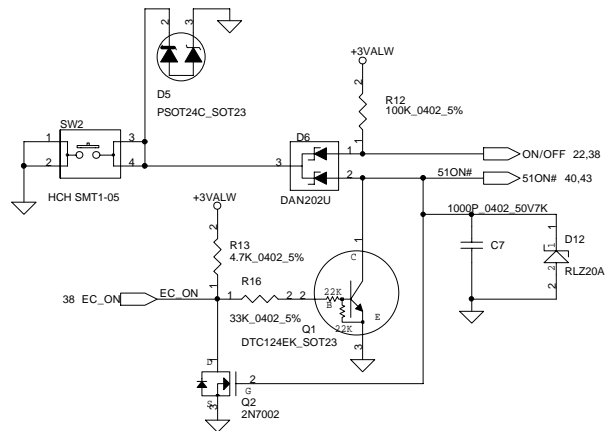
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Size Custom	Document Number 401241	Rev 1A	
Date: 星期二, 一月 07, 2003	Sheet 40	of 53	

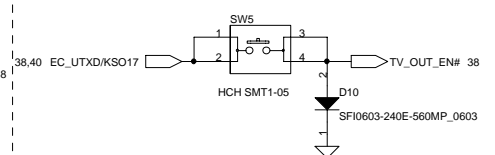
Power Good Circuit



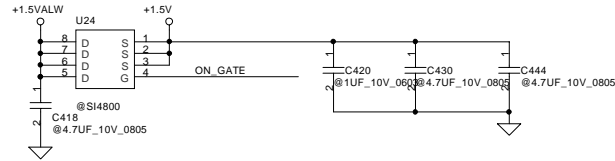
Power Button



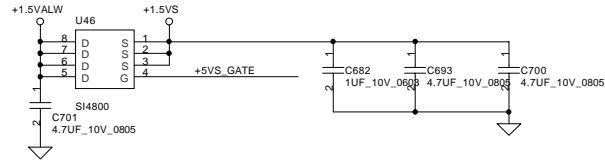
TV-OUT BUTTON



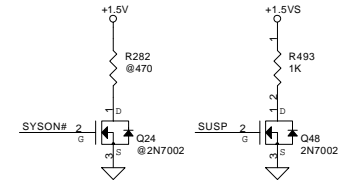
+1.5VALW To +1.5V Transfer



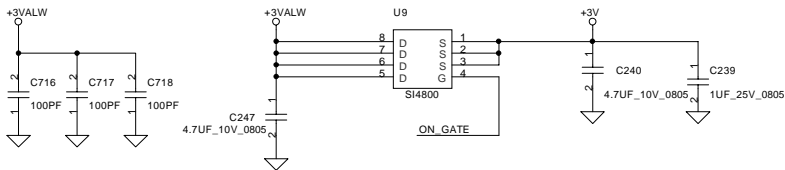
+1.5VALW To +1.5VS Transfer



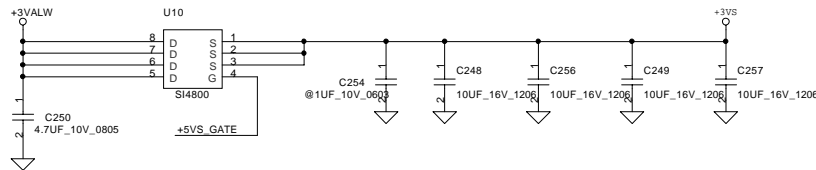
+1.5V & +1.5VS Discharge



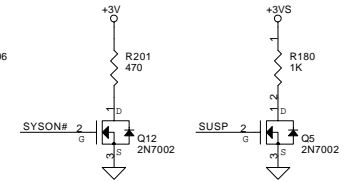
+3VALW To +3V Transfer



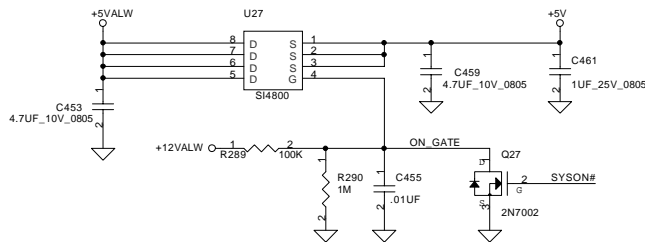
+3VALW To +3VS Transfer



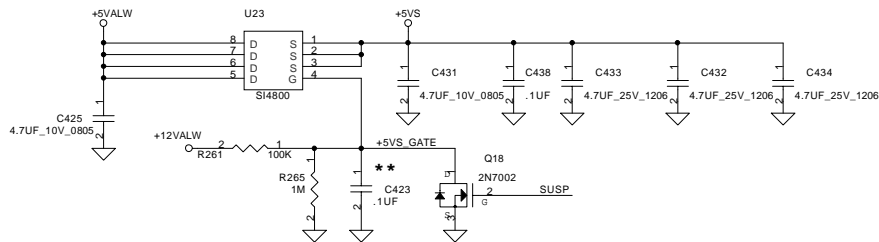
+3V & +3VS Discharge



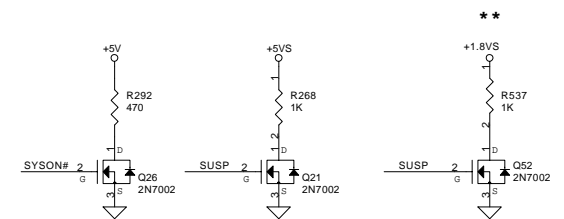
+5VALW To +5V Transfer



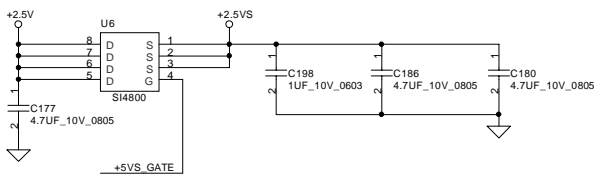
+5VALW To +5VS Transfer



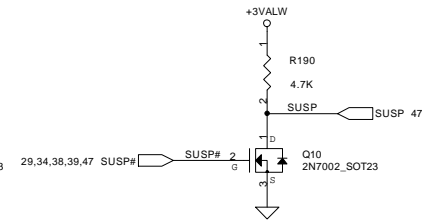
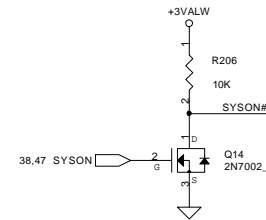
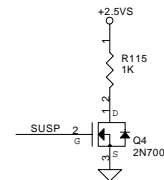
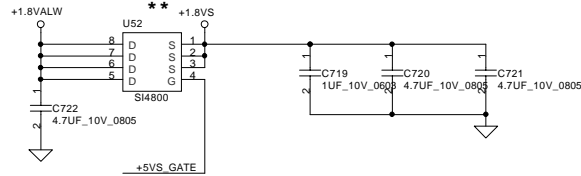
+5V & +5VS Discharge



+2.5V To +2.5VS Transfer

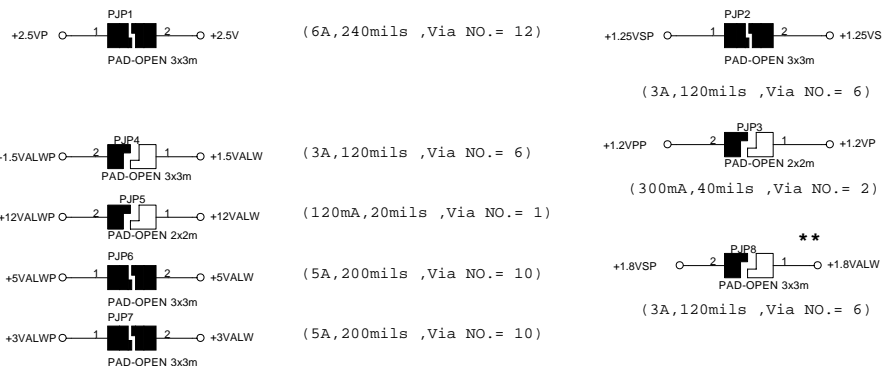
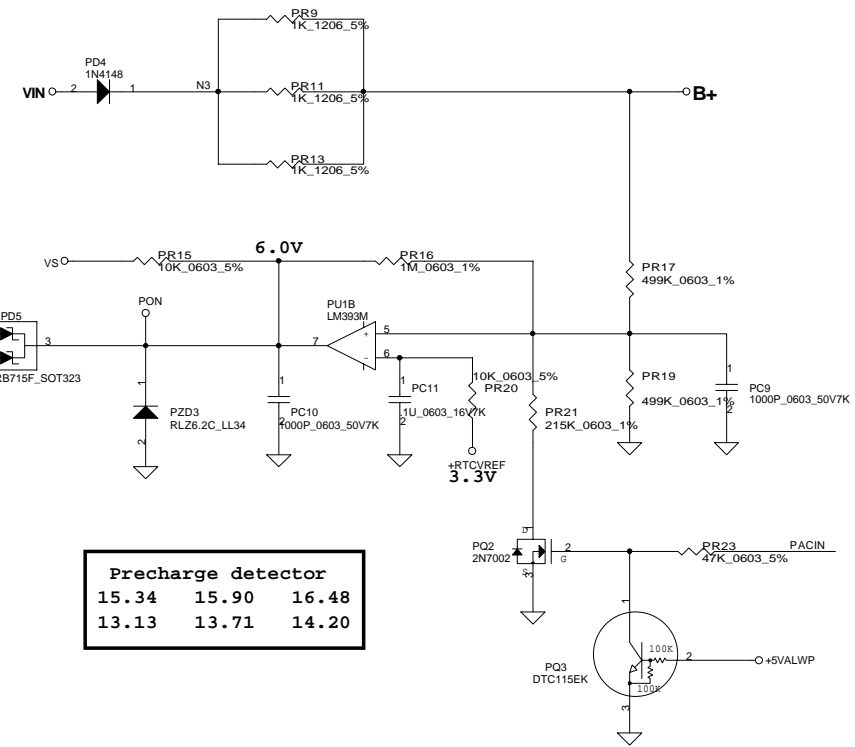
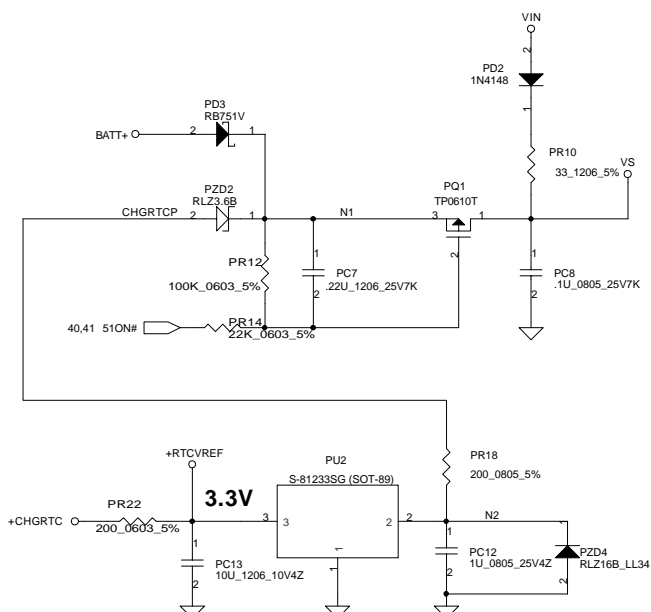
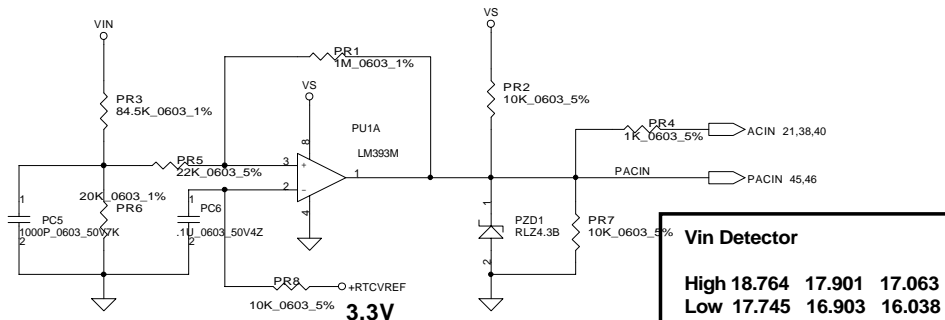
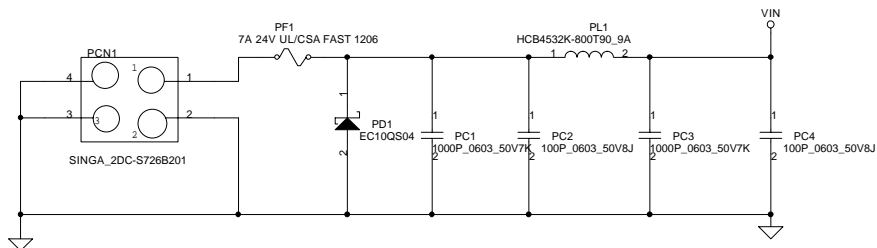


+1.8VALW To +1.8VS Transfer



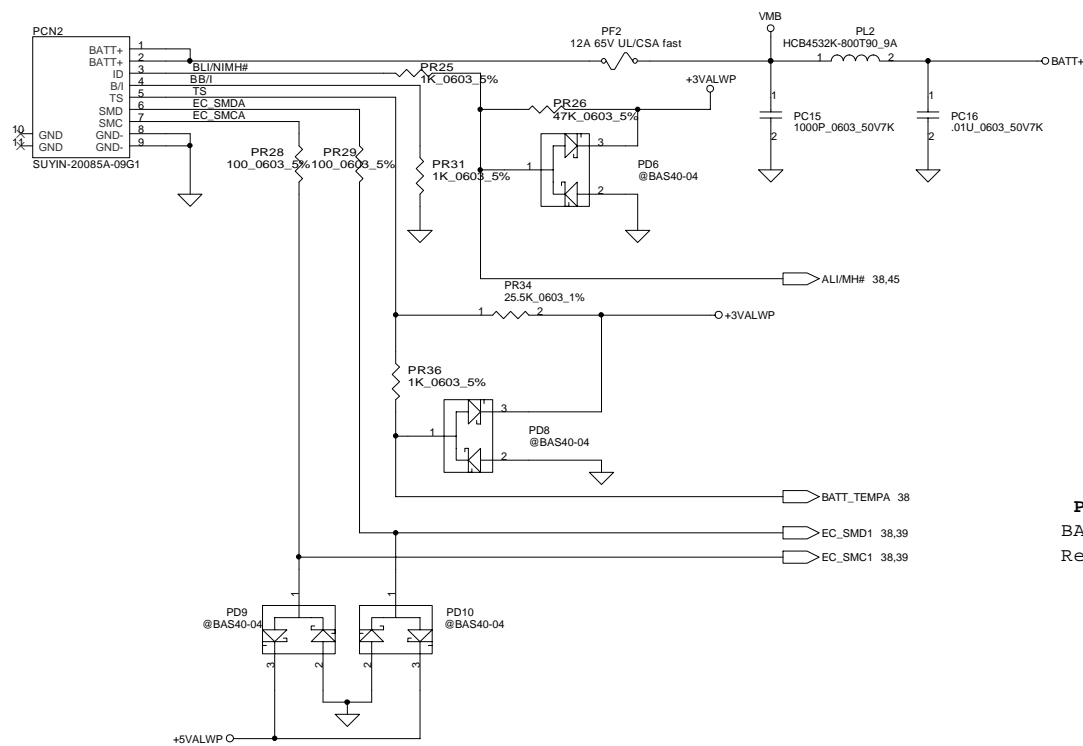
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Title			
Compal Electronics, inc.			
SCHEMATIC, M/B LA-1691			
Size	Document Number	Rev	
Custom	401241	1A	
Date:	星期二, 一月 07, 2003	Sheet	42 of 53

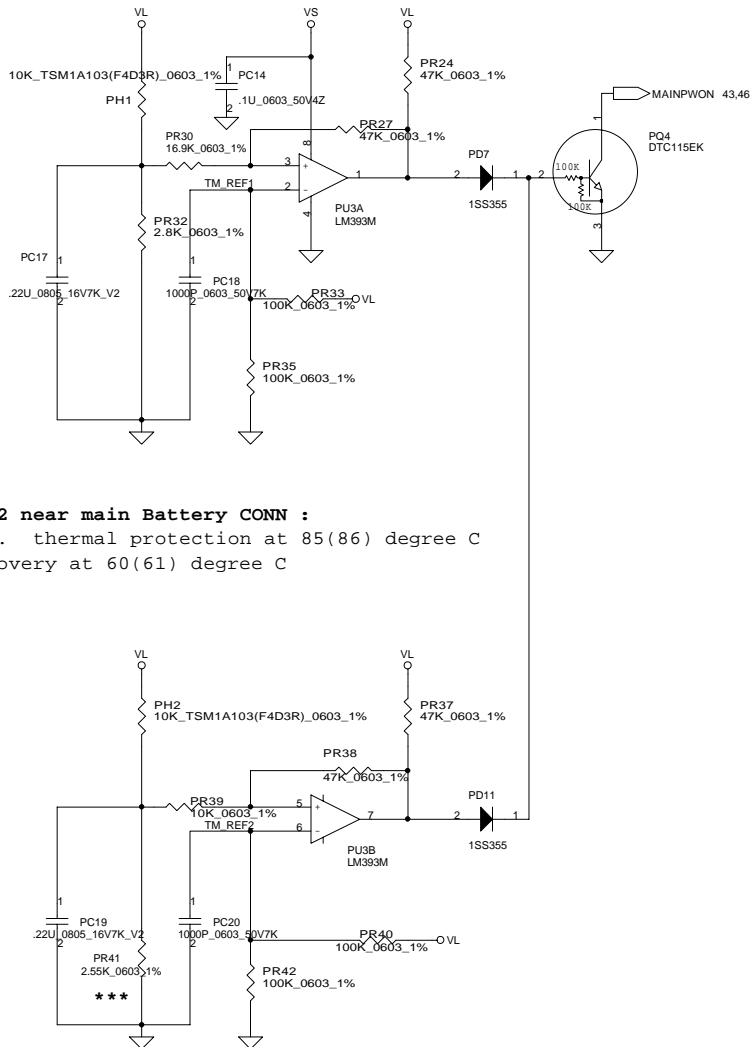


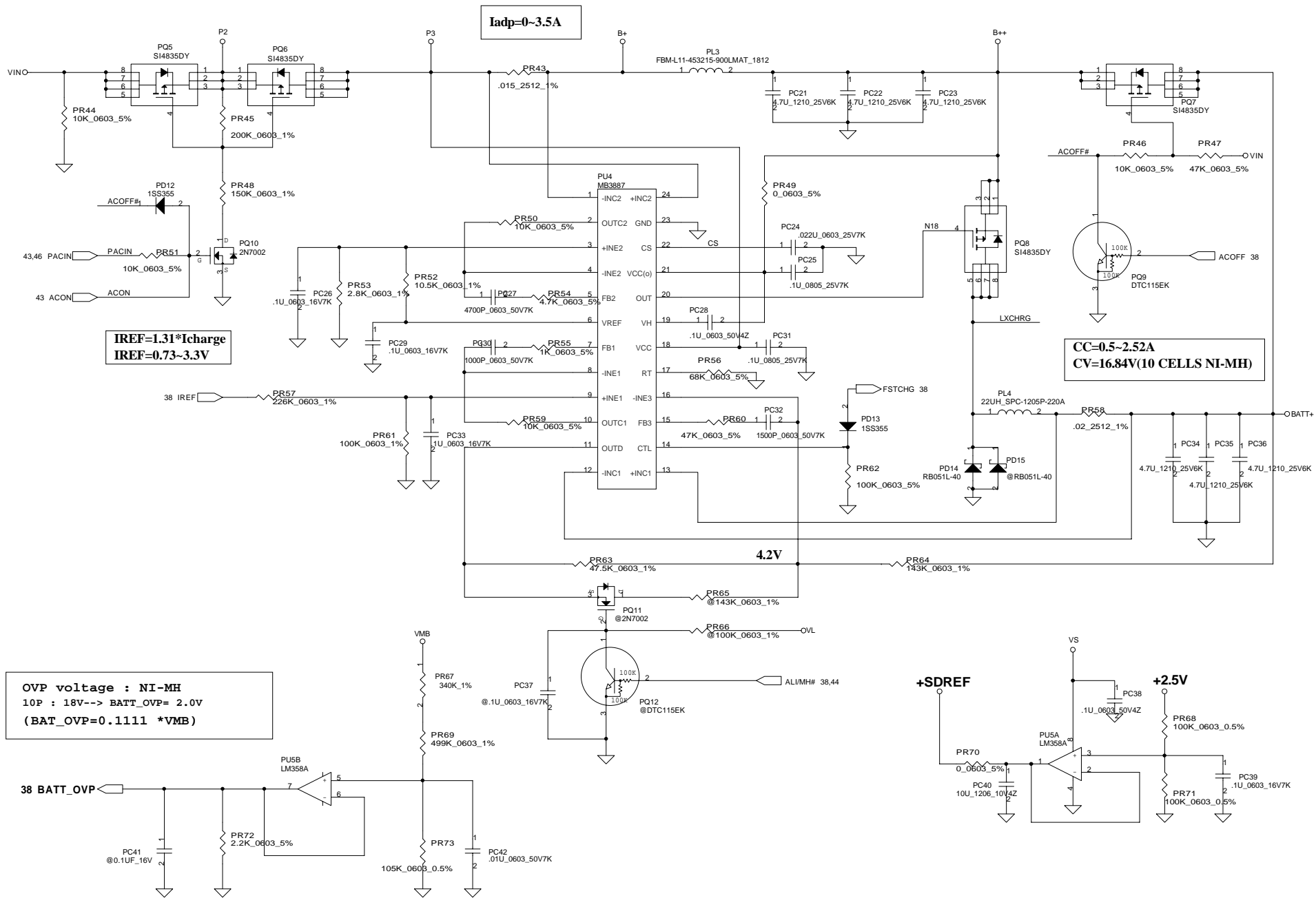
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PH1 under CPU botten side :
 CPU thermal protection at 90(91) degree C
 Recovery at 50 degree C

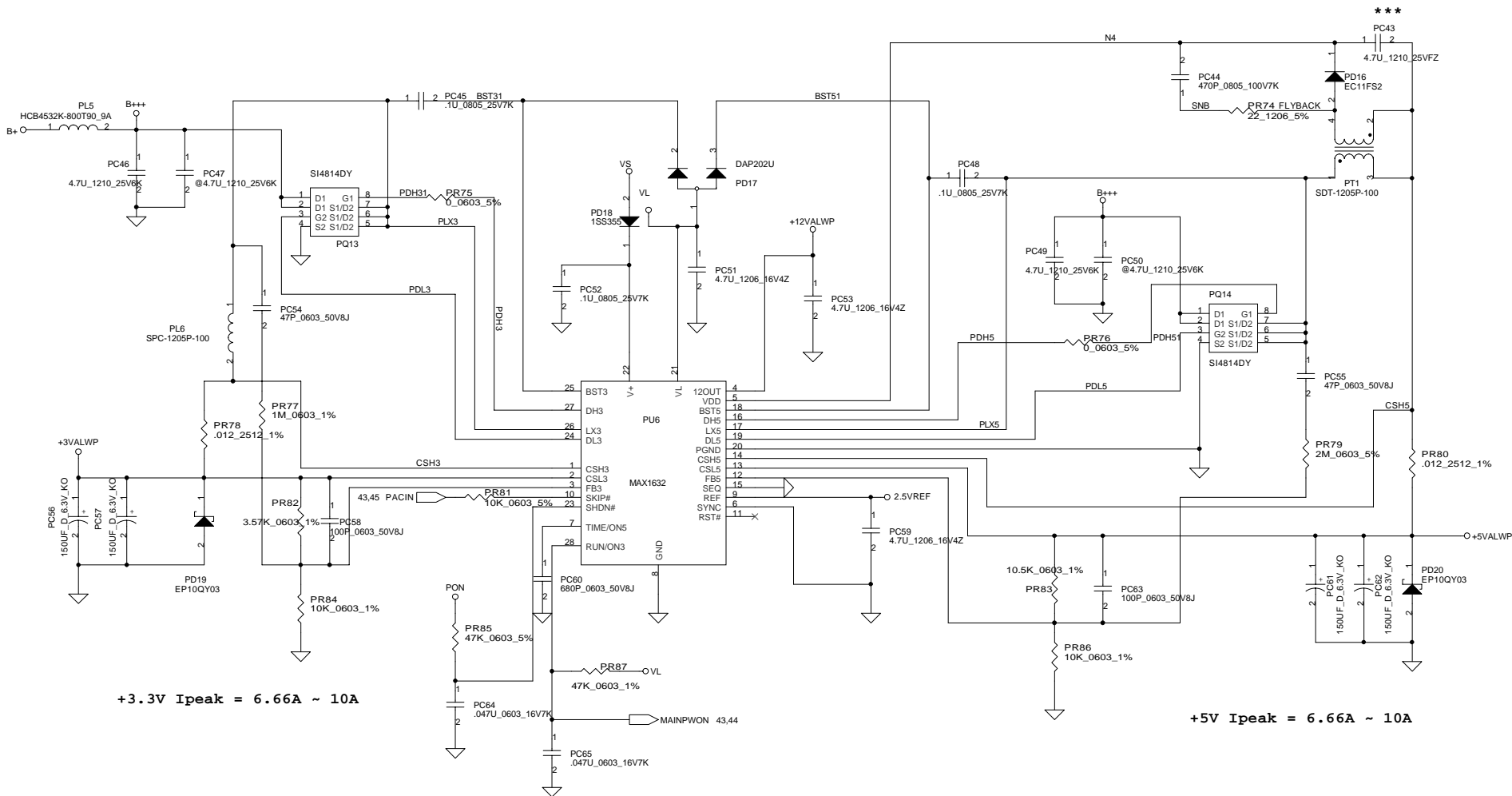


PH2 near main Battery CONN :
 BAT. thermal protection at 85(86) degree C
 Recovery at 60(61) degree C



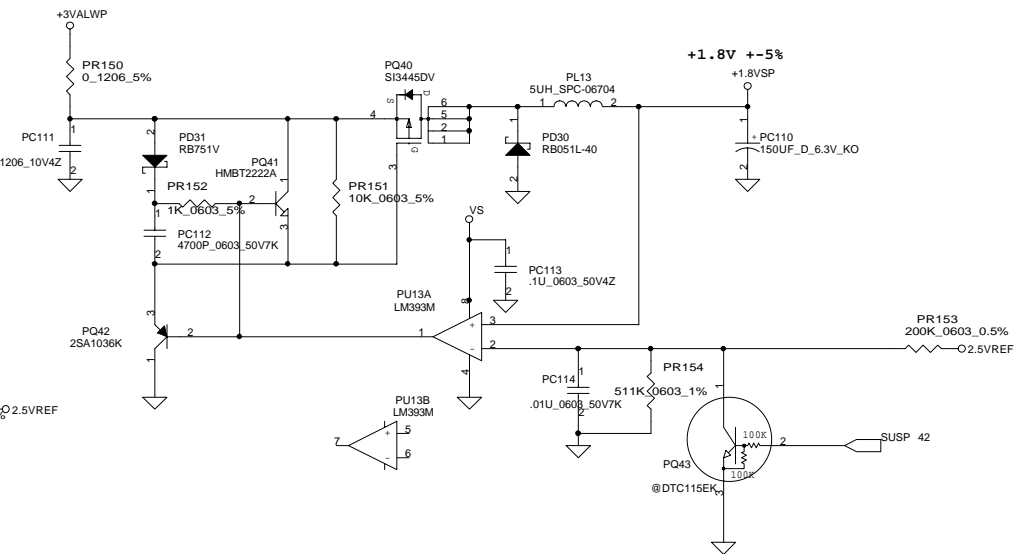
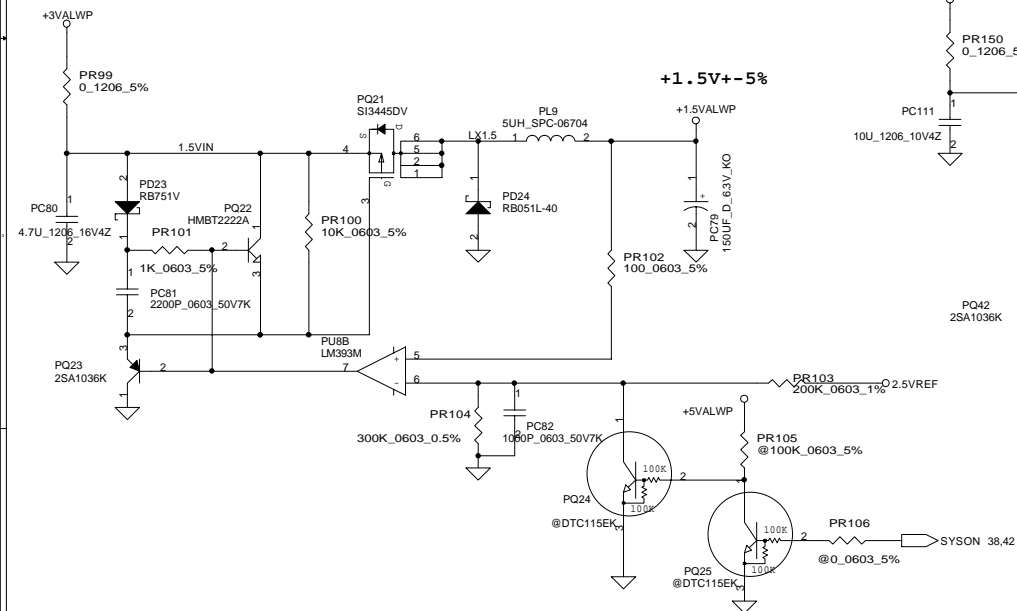
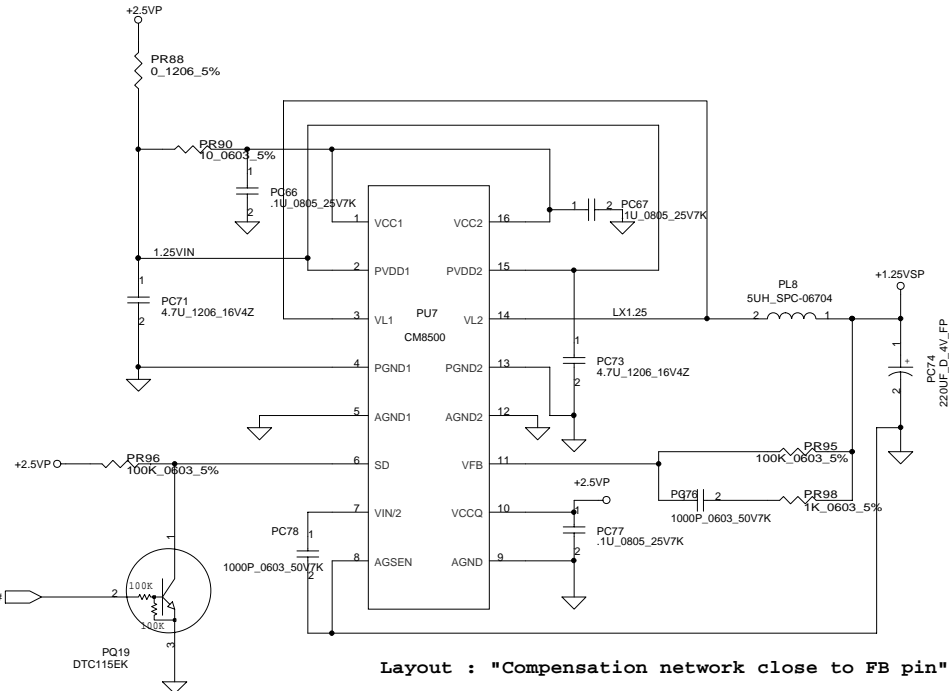
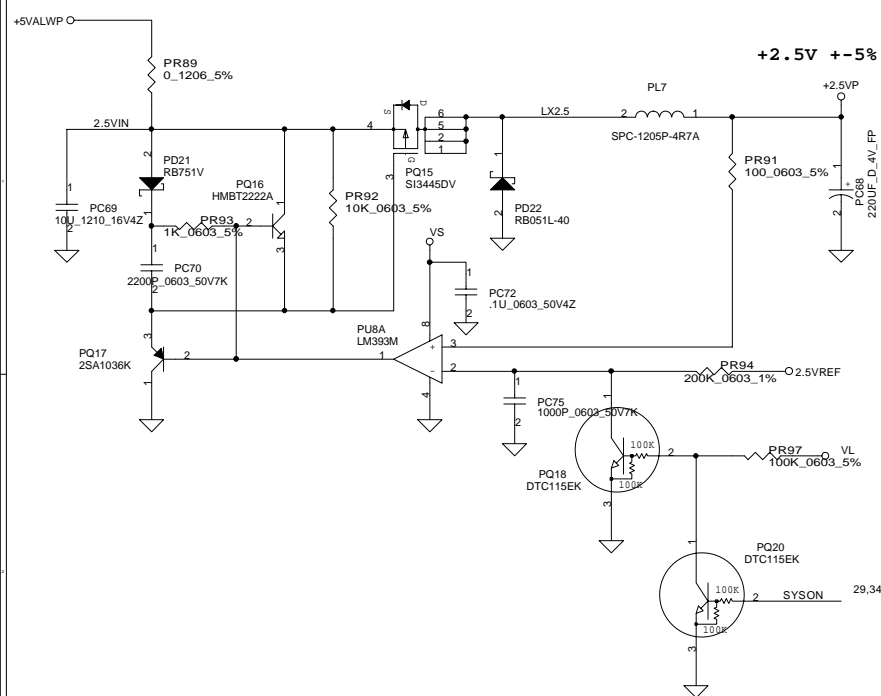


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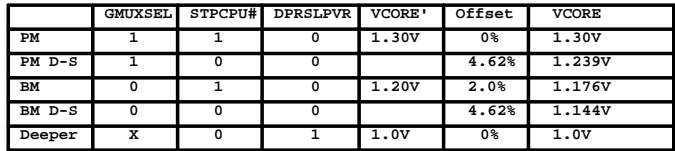
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Compal Electronics, inc.			
SCHEMATIC, M/B LA-1691			
Size	Document Number	Rev	
Custom	401241	1A	
Date: 星期三, 一月 07, 2003	Sheet	46	of 53



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Compal Electronics, inc.			
SCHEMATIC, M/B LA-1691			
Size	Document Number	Rev	
Custom	401241	1A	
Date: 星期二, 一月 07, 2003	Sheet	47	of 53



Compal Electronics, inc.

Size Custom	Document Number 401241	Rev 1A
Date: 星期二, 一月 07, 2003	Sheet 48 of 53	

Rev 0.2

Page	Location	From	To	Page	Location	From	To
4	Modify R31	56 Ohm	10K	17	Modify C99	470P_0603	470P_0402
5	ADD R551	X	10K	18	ADD C737,C738 C739,C740	X	220P_0402
5	ADD R552	X	470 Ohm	19	Modify JP16	7 PIN	4 PIN
5	ADD Q53	X	NPN	19	DEL D25	DAN217	X
5	ADD R546	X	200 Ohm	19	DEL C487,C488 C489	270P_0402	X
10,11	DEL	LPC_AD0	X	19	ADD C726,C727	X	270P_0402
10,11	DEL	LPC_AD1	X	19	DEL C490,C491 C492	33P_0402	X
10,11	DEL	LPC_AD2	X	19	ADD C723,C724	X	33P_0402
10,11	DEL	LPC_AD3	X	19	DEL L31,L32,L33	CHB1608U301	X
10,11	DEL	LFRAME#	X	19	ADD L55,L56	X	CHB1608U301
10,11	DEL	PCLK_80H	X	19	DEL C495,C496 C497	100P_0402	X
10,11	DEL	KBA5	X	19	ADD C725,C728	X	100P_0402
10,11	DEL	PCIRST#	X	19	DEL R326,R327 R328	75 Ohm	X
11	DEL R172	33 Ohm	X	19	ADD R543,R544 R545	X	75 Ohm
11	DEL C253	10PF	X	20	CHANGE	RP127	RP58
13	DEL R153	33 Ohm	X	20	CHANGE	R483	R458
14	ADD R538	X	20K	21	DEL	USB_EN_0	X
14	ADD R547	X	0 Ohm	21	DEL	USB_EN_1	X
14	Modify R41	499_0603	499_0402	21	DEL	USB_EN_2	X
17	DEL L6,L9	CHB1608U301	X	21	DEL	USB_EN_3	X

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Compal Electronics, inc.		
Title		
SCHEMATIC, M/B LA-1691		
Size	Document Number	Rev
Custom	401241	1A
Date: 星期二, 一月 07, 2003	Sheet	49 of 53

Rev 0.2

Page	Location	From	To	Page	Location	From	To
26	ADD C741	X	220P	33	ADD R345	0 Ohm	X
27	DEL C5	4.7U	X	35	Modify R291,R463	8.45K	54.9K
29	ADD R233	X	5.6K	35	Modify R281,R464	2.32K	4.32K
29	ADD R244	X	10K	35	DEL C451,C681	0.1U	X
31	ADD C742	X	220P	35	DEL R529,R494	1.82K	X
33	ADD C743,C744	X	220P	35	DEL C714,C675	3900P	X
33	ADD R539,R540 R541,R542	X	1K	35	Modify C458,C677	3900P	1000P
33	DEL	USB_EN_0	X	35	Modify R527,R484	1.47K	2.87K
33	DEL	USB_EN_1	X	35	Modify C454,C683	1500P	2700P
33	DEL	USB_EN_2	X	35	Modify R524,R496	113K	162K
33	DEL	USB_EN_3	X	35	Modify R517,R200	1.13K	1.05K
33	DEL L35,L36 L41,L54	JTSO402-03_4P	X	36	Modify R512	3.9K	4.3K
33	DEL R364,R365 R330,R331 R332,R333 R531,R526	0 Ohm	X	36	Modify R508	27K	6.2K
				36	Modify R510	3K	3.3K
33	ADD L57,L58 L59,L60 L61,L62 L63,L64	X	FBM-160808 -121T	36	Modify Q49,Q50	CHANGE 1 AND 3 PIN	
				37	DEL	SD_PME#	X
33	ADD C729,C730 C731,C732 C733,C734 C735,C736	X	47P	38	DEL	SD_PME#	X
				38	DEL R246	0 Ohm	X
33	Modify U3,U7	TPS2052	TPS2042-ADR	38	ADD R548	X	0 Ohm
33	DEL U31	TC7SH08FU	X	38	ADD	X	EC_CPUPD#

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Title			
SCHEMATIC, M/B LA-1691			
Size	Document Number		Rev
Custom	401241		1A
Date:	星期二, 一月 07, 2003		Sheet 50 of 53

Rev 0.3

Page	Location	From	To	Page	Location	From	To
5	ADD Q47,Q53	X	3904	44	CHANGE PR32	3K	2.8K
5	ADD R551	X	10K	44	CHANGE PR41	3.24K	2.32K
5	ADD R469,R552	X	470 Ohm	46	CHANGE PC43	2.2U	4.7U
33	Modify R358 R360	0402	0603				
33	ADD C745,C746	X	47pf				
34	Modify R218	2.4K	10K				
34	ADD C280	X	0.01U				
34	Modify R532,R533 R528,R535	10K	1M				
35	Modify R291,R463	54.9K	19.6K	Rev 0.4			
35	Modify R521,R221	143K	63.4K				
29	ADD R557	X	0 Ohm	31	DEL	MD_MIC	X
29	ADD	DVD_DETECT		34	DEL C412	1u_0805	X
37	ADD PAD1,PAD2	X	2.5*3	34	DEL	MD_MIC	X
38	Modify R301	0 Ohm	8.2K	47	DEL PQ43	DTC115EK	X
38	ADD R553	X	0 Ohm				
38	ADD	DVD_DETECT					
38	ADD	PM_SLP_S1#					
36	DEL C612,C270	1U_0603	X				
36	ADD R558,R559	X	0 Ohm				
36	DEL R161,R203	1.2K	X				

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Title			
SCHEMATIC, M/B LA-1691			
Size	Document Number		Rev
Custom	401241		1A
Date:	星期二, 一月 07, 2003		Sheet 52 of 53

Rev 1.0

Page	Location	From	To	Page	Location	From	To
14	DEL R538	20K	X	<div>NOTE: 1.EQ: R512=4.3K , R510=3.3K Modify R558,R559 TO "0 Ohm" UNMOUNT R161,R203 2.NO EQ: R512=3.9K, R510=4.7K, R508=2K Modify R558,R559 TO "1u_0603 10V6k" MOUNT R161,R203</div>			
14	ADD R547	X	0 Ohm				
28	DEL JP20	PCI SLOT	X				
28	DEL U5	TC7SH08FU	X				
28	DEL D14	RB751V	X				
28	DEL C176,C583,C629 C559,C555,C560 C557,C565,C630	0.1u_0402	X				
28	DEL L12,L14,L15	CHB1608B121	X				
28	DEL C234,C265	10u_1206	X				
28	DEL C558	10P_0402	X				
28	DEL C554	1000P_0402	X				
28	DEL R93	0_0402	X				
28	DEL R128	100_0402	X				
28	DEL R386	33_0402	X				
42	DEL U24	SI4800	X				
42	DEL C418,C430 C444	4.7u_0805	X				
42	DEL C420	1u_0603	X				
42	DEL Q24	2N7002	X				
42	DEL R282	470 Ohm	X				
42	Modify PR41	2.32K	2.55K				

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SCHEMATIC, M/B LA-1691			
Size	Document Number		Rev
Custom	401241		1A
Date: 星期二, 一月 07, 2003		Sheet	53 of 53