

# M38 - DVT

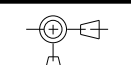
## 11/16/05

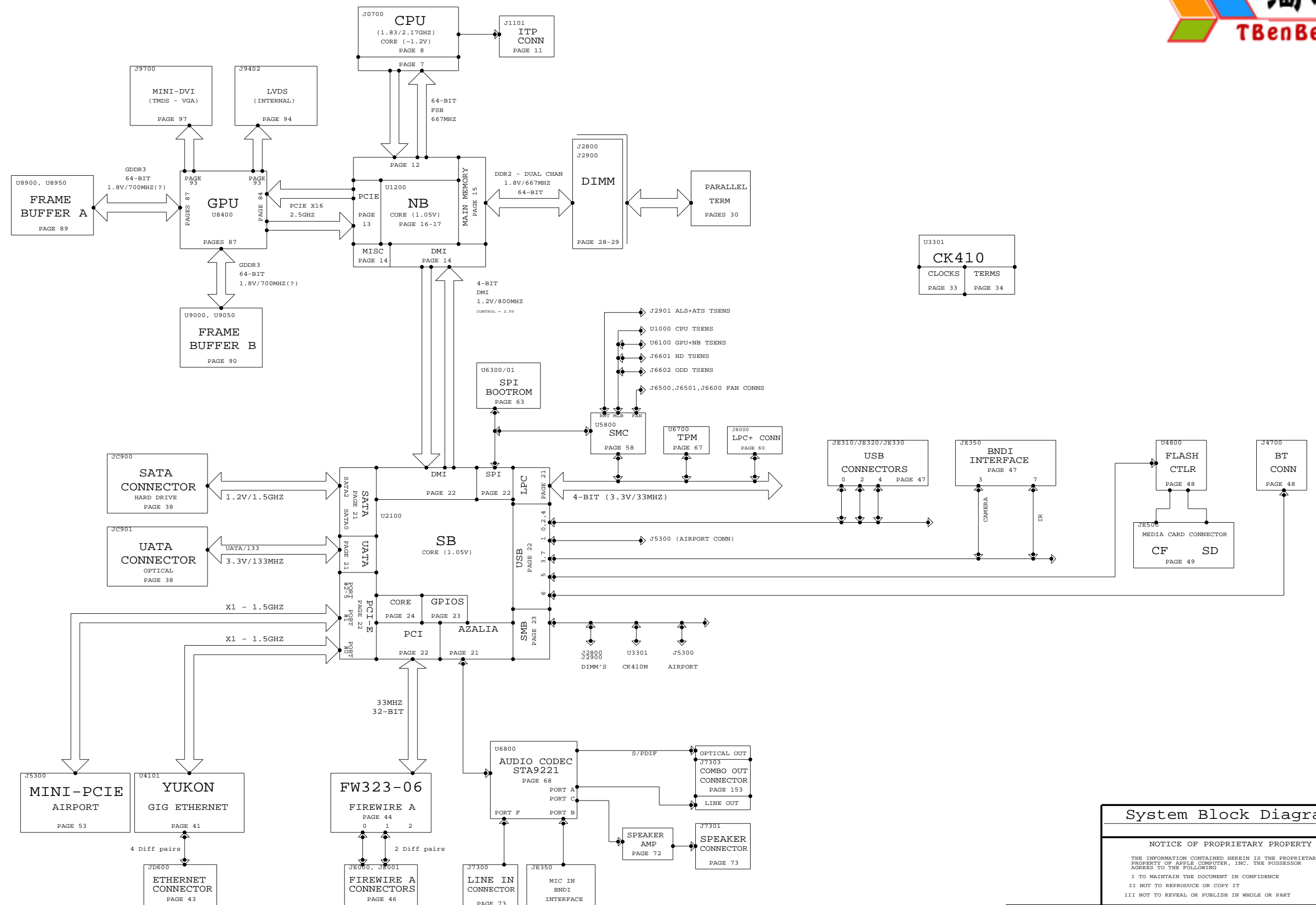
1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%.  
 2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.  
 3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV	ZONE	ECN	DESC
09		400372	ENGINEERING RELEASED   09/20/05   09/22/05

PAGE	DR1	PDF	CIRCUIT
1	JD	JD 1	TABLE OF CONTENTS
2	JD	JD 2	SYSTEM BLOCK DIAGRAM
3	RT	RT 3	POWER BLOCK DIAGRAM
4	JD	JD 4	TABLE ITEMS & REVISION HISTORY
5	JD	JD 5	FUNC TEST
6	RT	RT 6	POWER CONNECTOR / POWER ALIAS
(M42) 7	MS	JD 7	CPU - BUS INTERFACE
(M42) 8	MS	JD 8	CPU - PWR & GND
9	MS	JD 9	CPU - DECAPS
(M42) 10	MS	JD 10	CPU - THERMAL SENSOR
M42 11	MS	JD 11	CPU - ITP CONN
M1 12	PS	JH 12	NB - CPU INTERFACE
M1 13	PS	JH 13	NB - VIDEO INTERFACE
14	PS	JH 14	NB - MISC INTERFACES
M1 15	PS	JH 15	NB - DDR2 INTERFACE
M1 16	PS	JH 16	NB - POWER 1
M1 17	PS	JH 17	NB - POWER 2
M1 18	PS	JH 18	NB - GROUNDS
19	PS	JH 19	NB - DECAPS
M1 20	PS	JH 20	NB - CONFIG STRAPS
21	JD	JD 21	SB - RTC, LAN, AUDIO, ATA, CPU, LPC
22	JD	JD 22	SB - PCIE, SPI, USB, DMI, PCI
23	JD	JD 23	SB - SMB, GPIO, PM, CLKS
24	JD	JD 24	SB - POWERS AND GROUNDS
25	JD	JD 25	SB - DECAPS
26	JD	JD 26	SB - MISC
27	JD	JD 27	SB - SMB BUS CONNECTIONS
28	PS	JD 28	DDR2 - SO-DIMM CONN A
29	PS	JD 29	DDR2 - SO-DIMM CONN B (REVERSED)
30	PS	JD 30	DDR2 - TERMINATION
M1 31	RT	RT 31	DDR2 - VTT SUPPLY
M42 33	JD	JD 32	CLOCKS - GENERATOR
34	JD	JD 33	CLOCKS - TERMINATIONS
38	JD	JD 34	ATA (SATA AND IDE) CONN'S
(M42) 41	JD	JD 35	LAN - YUKON'S PCIE INTERFACE
42	JD	JD 36	LAN - YUKON'S PWR, MISC
43	JD	JD 37	LAN - CONN
44	JD	JD 38	FIREWIRE - FW323-06
45	JD	JD 39	FIREWIRE - DECAPS
46	JD	JD 40	FIREWIRE - CONN'S
47	JD	JD 41	USB - CONN'S
49	JD	JD 42	USB - FLASH CONN

PAGE	DR1	PDF	CIRCUIT
53	JD	JD 43	PCI-E - AIRPORT MINI-PCIE CONN
54	JD	JD 44	PCI-E - UNUSED PORTS
58	MS	MS 45	SMC - H8S2116
59	MS	MS 46	SMC - SMB BUSSES, MISC
60	MS	MS 47	SMC - LPC+ CONN
61	JH	JH 48	SMC - GPU/NB THERMAL SENSOR
RX 63	MS	JD 49	SMC - SPI BOOTROM
65	MS	MS 50	SMC - FANS
66	MS	MS 51	SMC - FANS
67	JD	JD 52	SMC - TPM
SO 68	PT	JD 53	AUDIO - CODEC, VREG, MIC BIAS
SO 72	PT	JD 54	AUDIO - INTERNAL SPEAKER AMP
SO 73	PT	JD 55	AUDIO - I/O CONN'S, EMC
SO 74	PT	JD 56	AUDIO - DETECT TRANSLATORS
RP 75	RT	RT 57	VR - CPU CORE
RP 76	RT	RT 58	VR - CPU I-V SENSE CKT
RP 77	RT	RT 59	VR - "S0" 1.2V & 2.5V (GRAFIX)
RP 78	RT	RT 60	VR - "S0" 1.8V
RP 79	RT	RT 61	VR - "S3" 1.8V
RP 80	RT	RT 62	VR - "S0" 1.5V
RP 81	RT	RT 63	VR - "S0" 1.05V
RP 83	RT	RT 64	VR - "S3" 3.3V AND 5V
JH 84	JH	JH 65	GPU - M56 PCI-E
M1 85	JH	JH 66	GPU - VCORE SUPPLY
M1 86	JH	JH 67	GPU - M56 CORE PWR
M1 87	JH	JH 68	GPU - M56 FRAME BUFFER
M1 88	JH	JH 69	GPU - MISC
M1 89	JH	JH 70	GPU - GDDR SDRAM A
M1 90	JH	JH 71	GPU - GDDR SDRAM B
M1 91	JH	JH 72	GPU - M56 GPIO, DVO, MISC
M1 92	JH	JH 73	GPU - M56 CLOCKS
M1 93	JH	JH 74	GPU - M56 VIDEO INTERFACES
JH 94	JH	JH 75	GPU - INTERNAL DISPLAY CONN'S
JH 95	JH	JH 76	GPU - TP'S
JH 96	JH	JH 77	GPU - TMDS, INVERTER, EXT VGA
JH 97	JH	JH 78	GPU - EXTERNAL DISPLAY CONN'S

DIMENSIONS ARE IN MILLIMETERS		METRIC		Apple Computer Inc.	
XX : _____	_____	DRAPPR	DESIGN CR	NOTICE OF PROPRIETARY PROPERTY THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING: I. TO MAINTAIN THE DOCUMENT IN CONFIDENCE II. NOT TO REPRODUCE OR COPY IT III. NOT TO REVEAL OR PUBLISH IN WHOLE OR PART	
X.XX : _____	_____	ENG APPD	MFG APPD		
X.XXX : _____	_____	QA APPD	DESIGNER		
ANGLES : _____	_____	RELEASE	SCALE		
DO NOT SCALE DRAWING		NONE		TITLE	
 THIRD ANGLE PROJECTION		MATERIAL/FINISH NOTED AS APPLICABLE		DRAWING NUMBER	
		SIZE D		051-6949	
				REV. 09	
				SHT 1 OF 111	



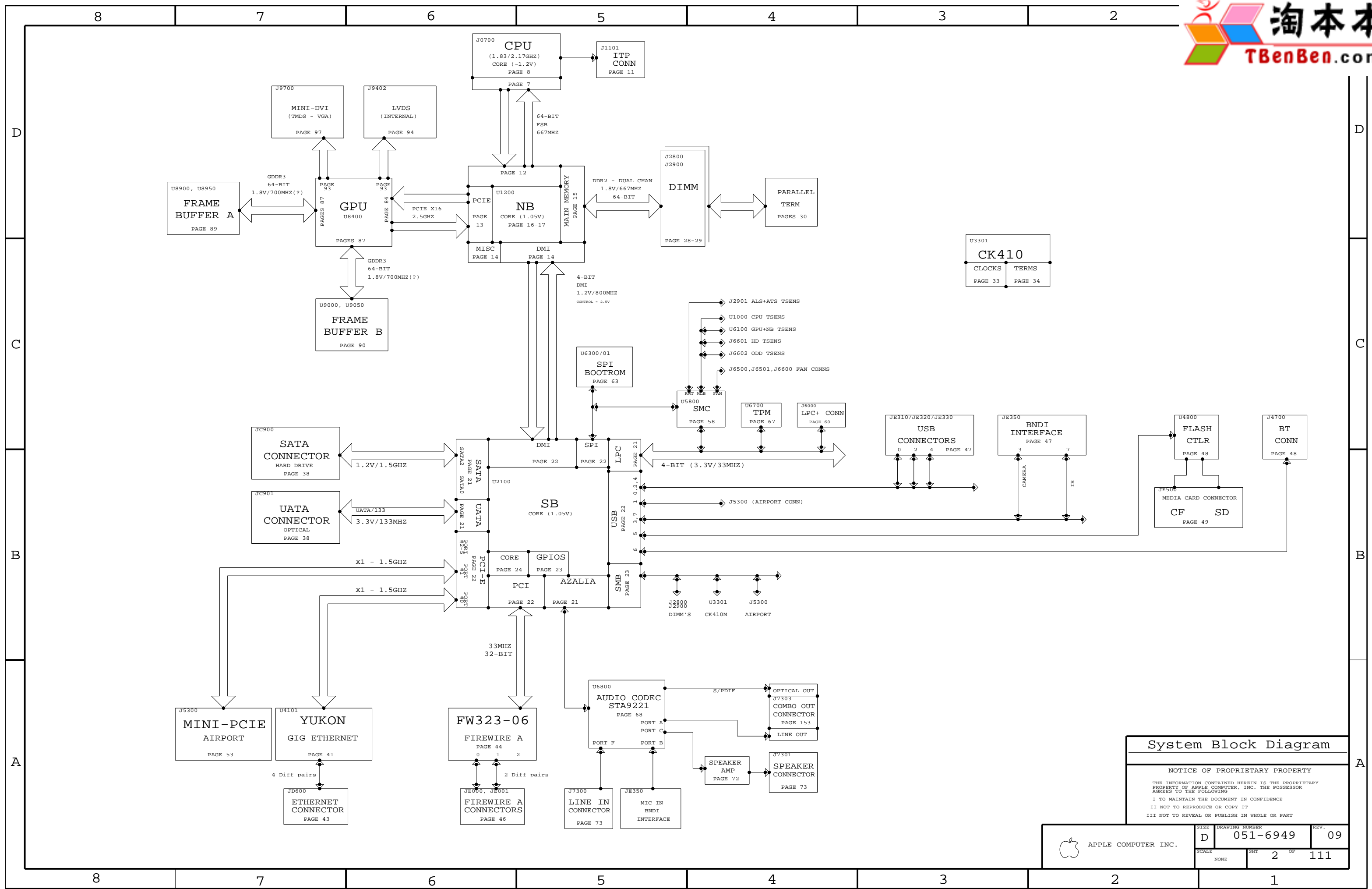
### System Block Diagram

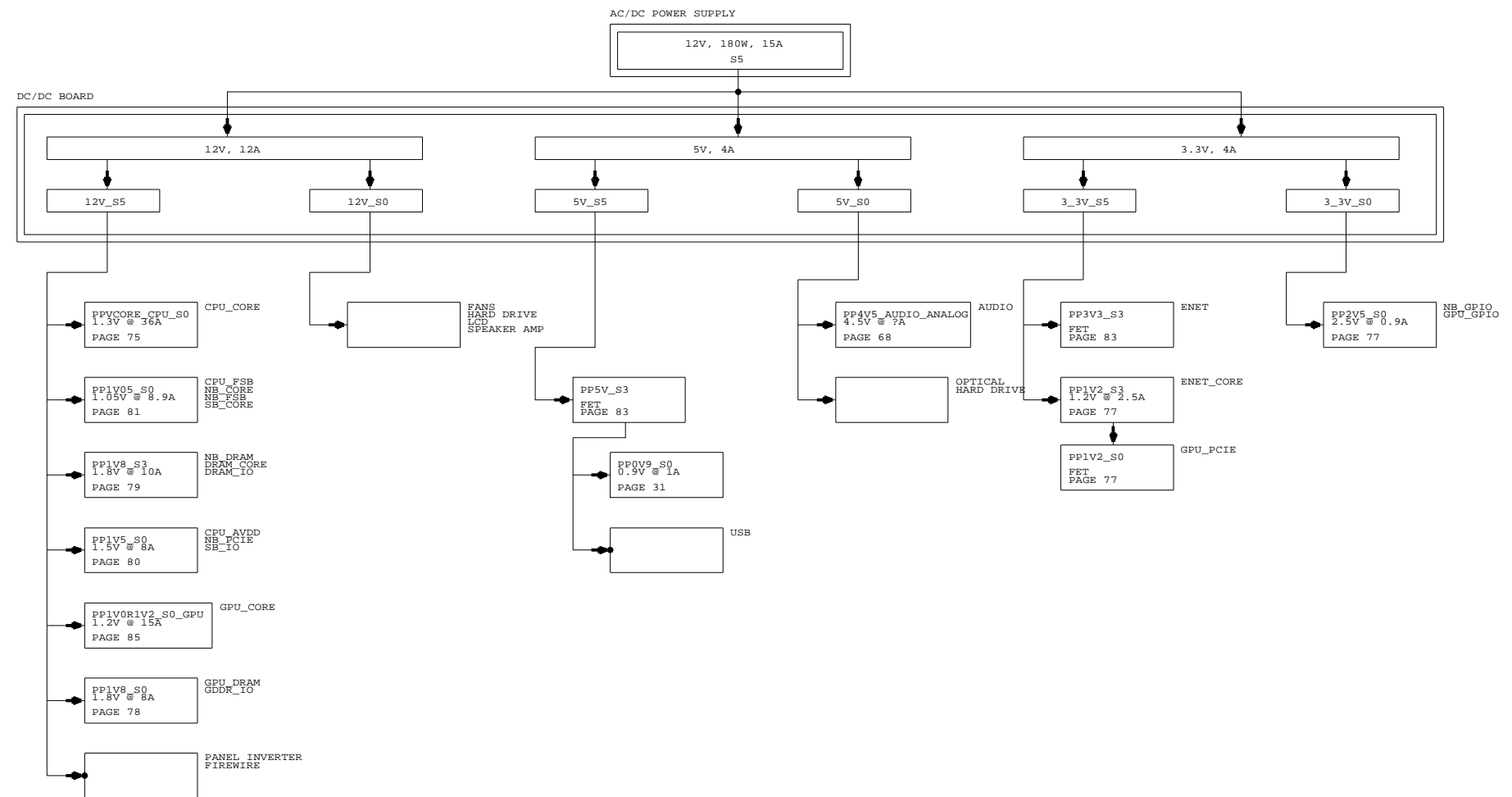
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Power Block Diagram

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NONE	3		

8 7 6 5 4 3 2

COMMON

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
511S0025	1	IC,CPU-SKT,479BGA	J0700	CRITICAL	
338S0269	1	IC,945GM,NORTHBRIDGE	U1200	CRITICAL	
343S0385	1	IC,SB,652BGA	U2100	CRITICAL	
742-0048	1	BAT,COIN,3V,220MAH,CR2032	BT2600	CRITICAL	
359S0101	1	IC,CY28445-5,CLK GEN,68PIN QFP	U3301	CRITICAL	
338S0270	1	IC,88E8053,GIGABIT ETH XVR,64P QFN,MD	U4101	CRITICAL	
(335S0382) 341S1797	1	IC,ENET LAN ROM	U4102	CRITICAL	
338S0279	1	IC,FW32306,1394A LINK,TQFP	U4400	CRITICAL	
338S0274	1	IC,SMC,H58/2116,BLANK	U5800	CRITICAL	
341S1789	1	IC,TPM,TSSOP,28P	U6700	CRITICAL	LEMENU
353S1235	1	IC,CPU VREG,IMVP,TWO PHASE	U7500	CRITICAL	
338S0266	1	IC,ATI,M56P,GRAFIX CTLR,880BGA,LF	U8400	CRITICAL	ATI_B24
338S0305	1	IC,ATI,M56P,GRAFIX CTLR,880BGA,LF	U8400	CRITICAL	ATI_A24
128S0078	3	CAP,EL,AL,330UF,20V,16V,10X12,7MM,SMD,LF	C7517,C7518,C7910	CRITICAL	

M38

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
051-6949	1	PCB,SCHEM,MLB,M38	SCH1		17_INCH_LCD
820-1919	1	PCB,FAB,MLB,M38	MLB1		17_INCH_LCD
(335S0384) 341T0003	1	EFI ROM,M38	U6301	CRITICAL	17_INCH_LCD
337S3241	1	M38/M39 LOW-SPEED CPU (QINY)	CPU	CRITICAL	CPU_M38
337S3242	1	M00-SPEED CPU (QINZ)	CPU	CRITICAL	CPU_M00

M39

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
051-6950	1	PCB,SCHEM,MLB,M39	SCH1		20_INCH_LCD
820-1888	1	PCB,FAB,MLB,M39	MLB1		20_INCH_LCD
(335S0384) 341T0004	1	EFI ROM,M39	U6301	CRITICAL	20_INCH_LCD
337S3243	1	M39 HI-SPEED CPU (QHJ)	CPU	CRITICAL	CPU_M39

M38 / M39

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
333S0354	4	IC,SGRAM,GDDR3,8MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_128M_SAMSUNG
333S0358	4	IC,SGRAM,GDDR3,8MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_128M_HYNIX

M39 - CTO

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
333S0350	4	IC,SGRAM,GDDR3,16MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_256M_SAMSUNG
333S0351	4	IC,SGRAM,GDDR3,16MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_256M_HYNIX

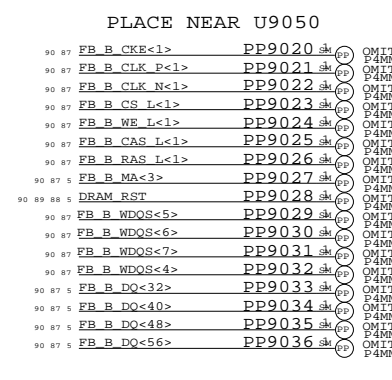
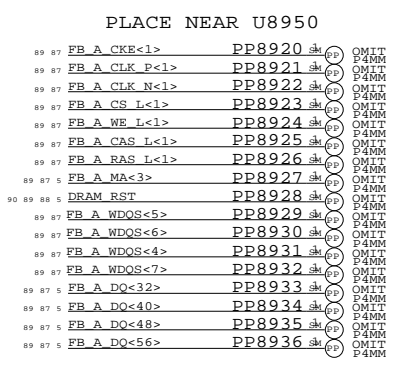
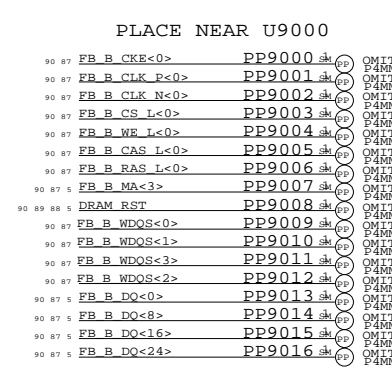
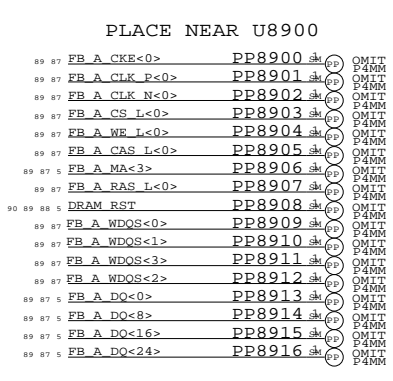
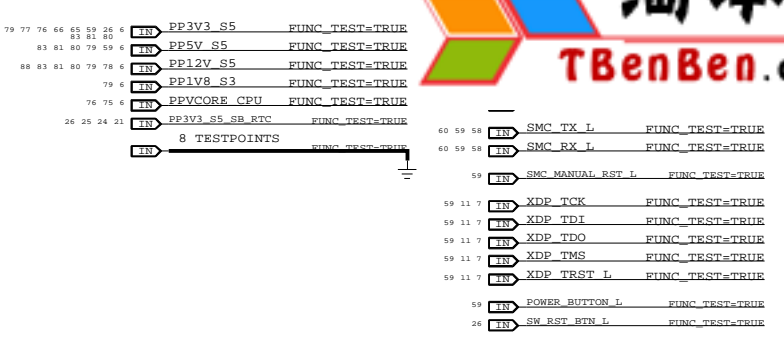
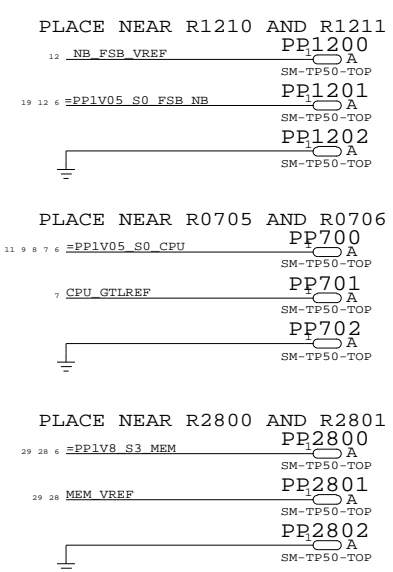
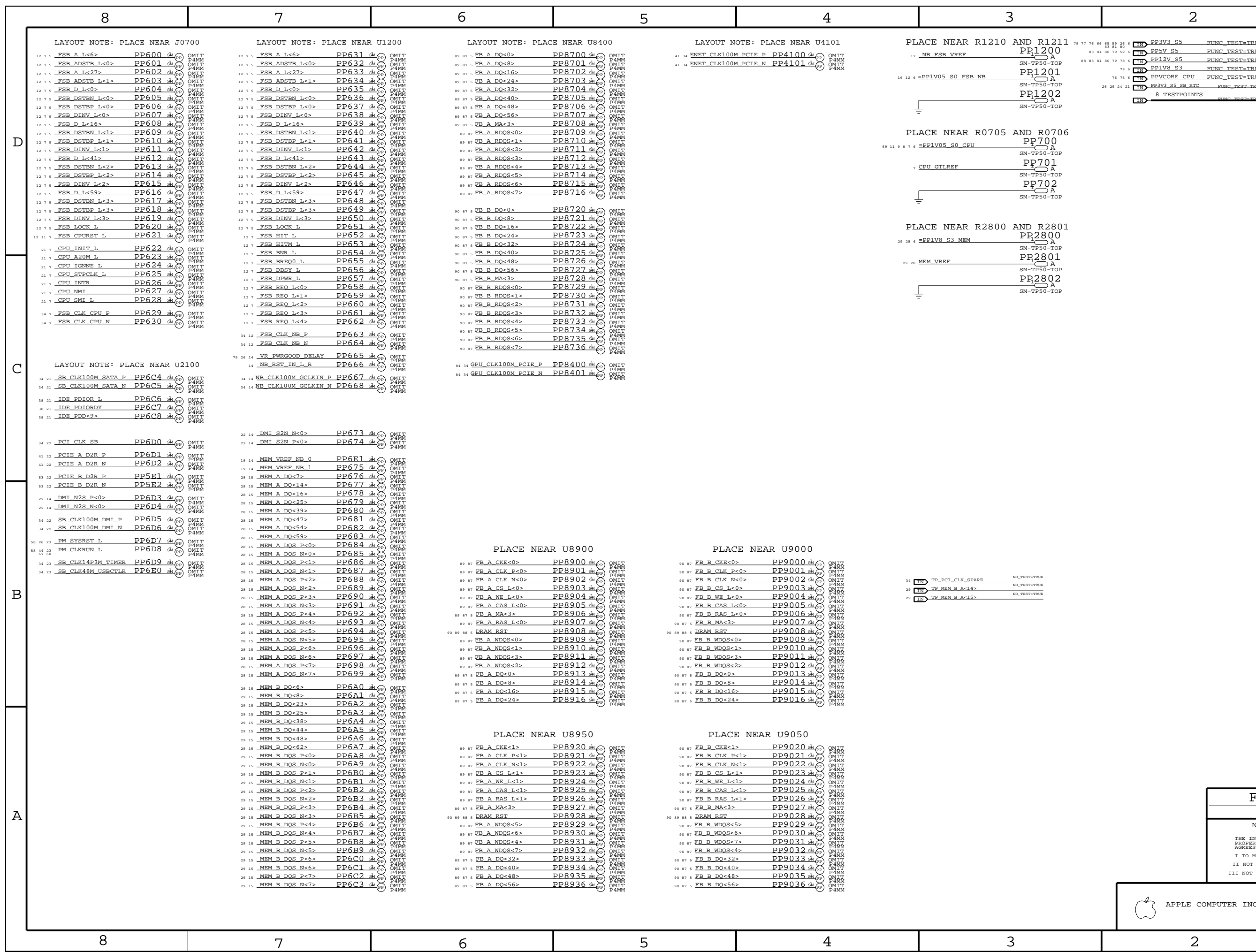
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
126S0096	126S0076		C7801	SANYO W16CK680EX 680UF 16V LFP
126S0086	126S0078		C699,C940,C1900,C1901,C1968	SANYO W6CE330F8 330UF 6.3V LFP
128S0080	128S0078		C7517,C7518,C7910	SANYO 160VP330W 330UF 16V SMD LFP
197S0177	197S0020		Y4101	XTAL,25MHZ,50PPM,16PF,3.2X2.5 SMD,LF
338S0302	338S0266		U8400	IC,ATI,M36D,GRAFIX CTLR,880BGA,LF

8 7 6 5 4 3 2 1

Table Items

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NONE	4	111	



FUNC TEST 1 OF 2

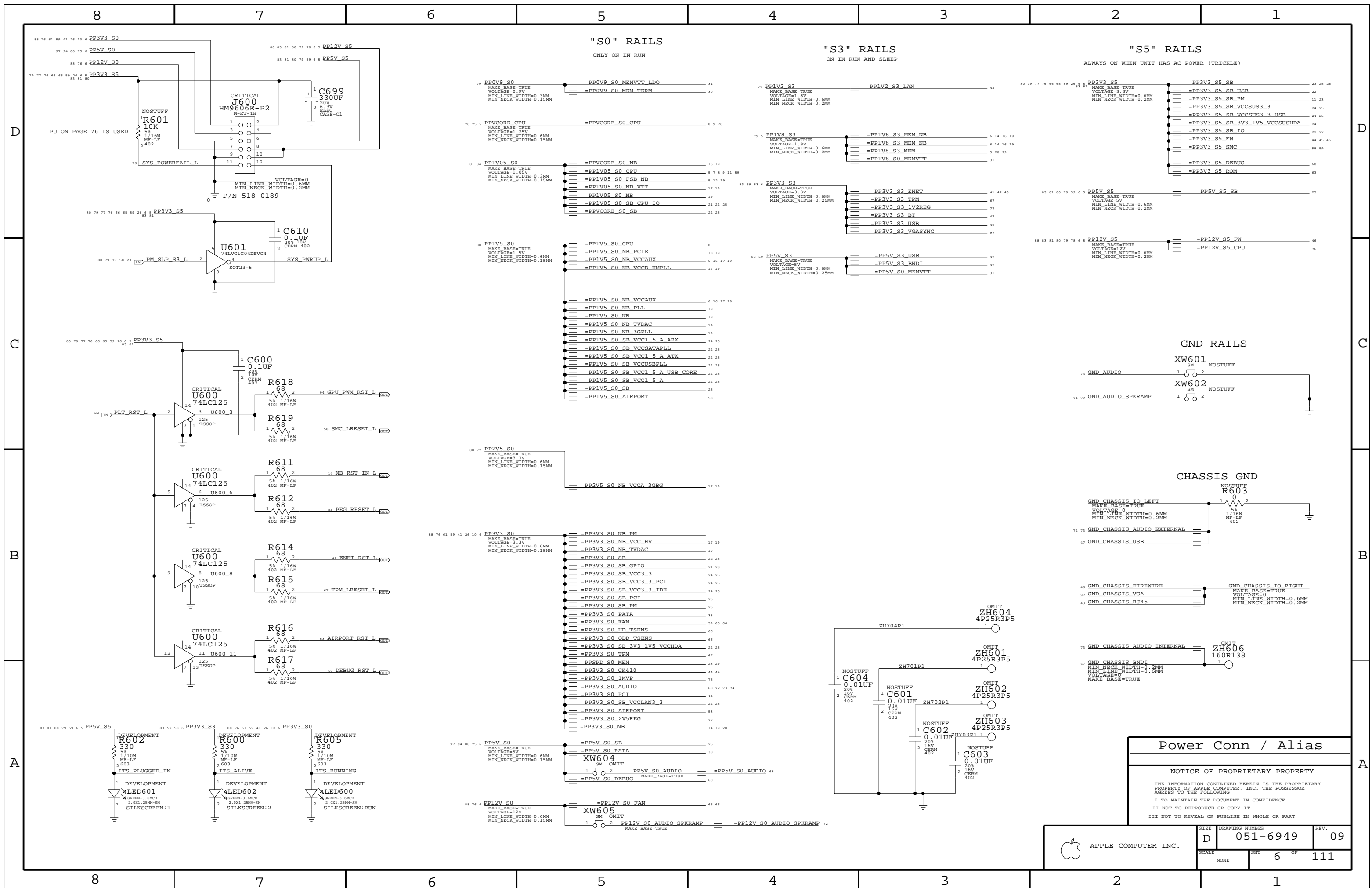
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"S0" RAILS

ONLY ON IN RUN

"S3" RAILS

ON IN RUN AND SLEEP

"S5" RAILS

ALWAYS ON WHEN UNIT HAS AC POWER (TRICKLE)

GND RAILS

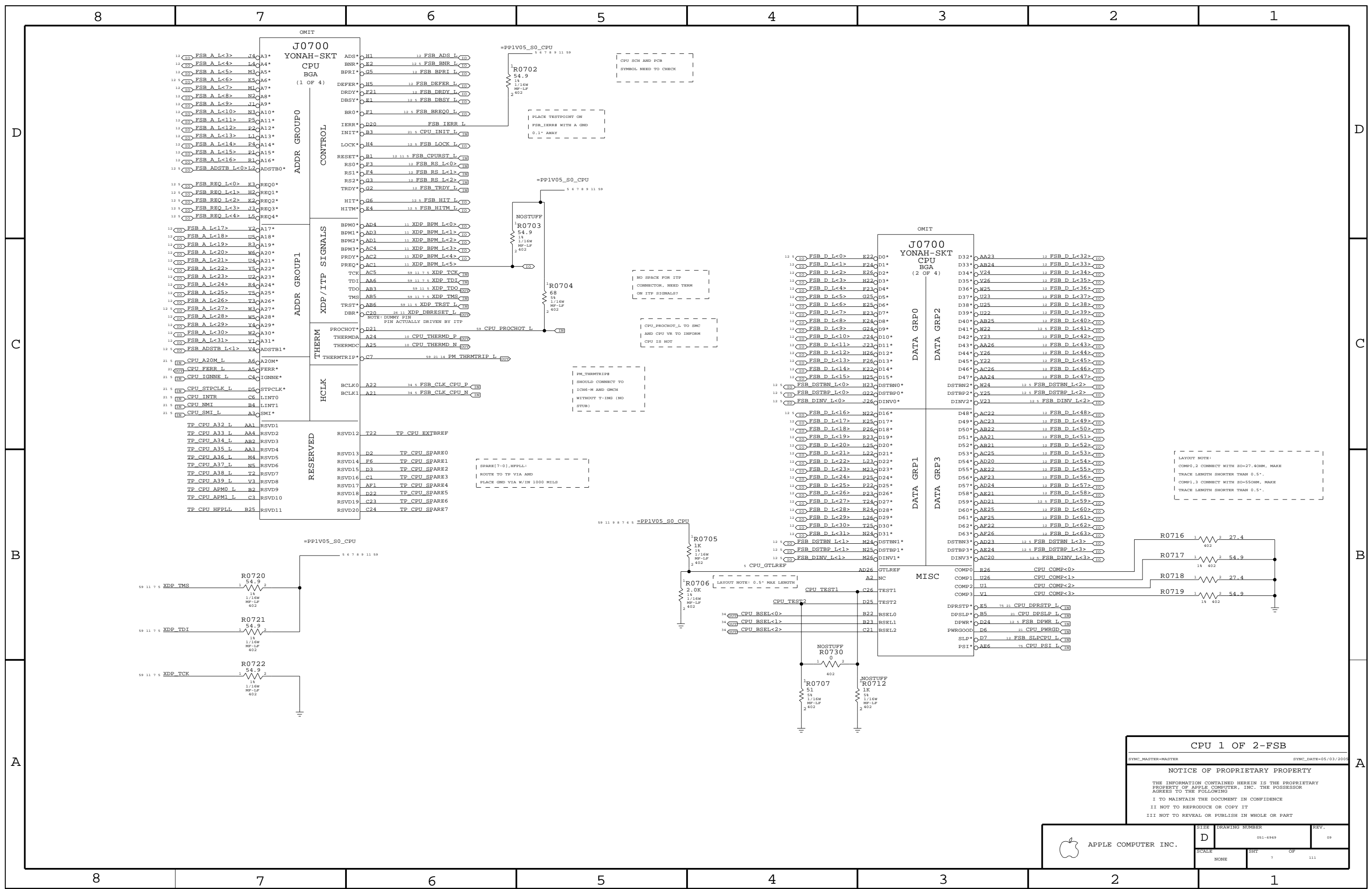
CHASSIS GND

Power Conn / Alias

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NONE	6	111	



**CPU 1 OF 2-FSB**

SYNC\_MASTER=MASTER SYNC\_DATE=05/03/2005

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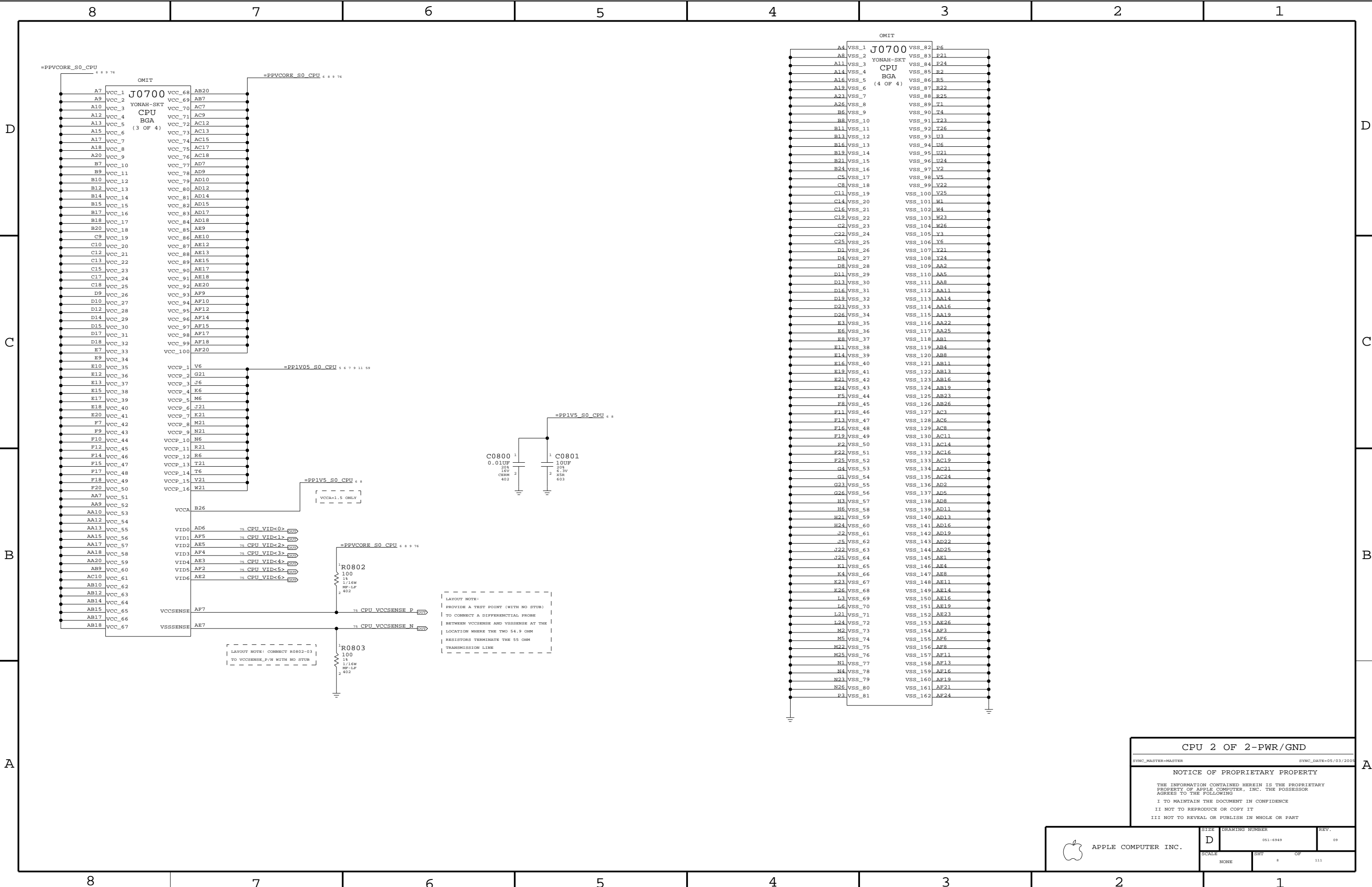
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**CPU 2 OF 2-PWR/GND**

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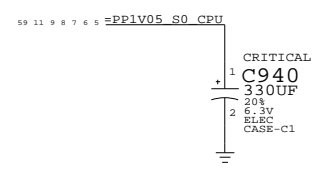
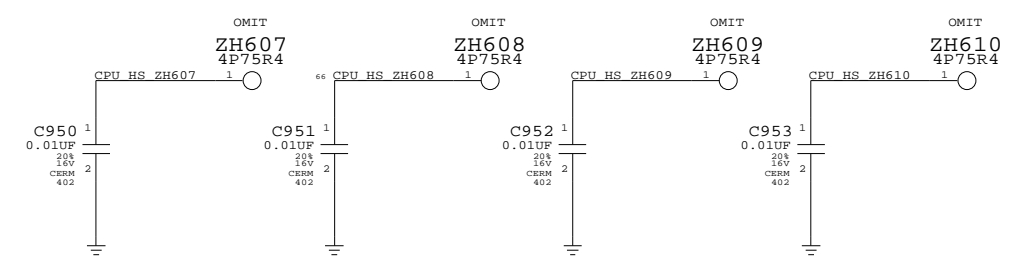
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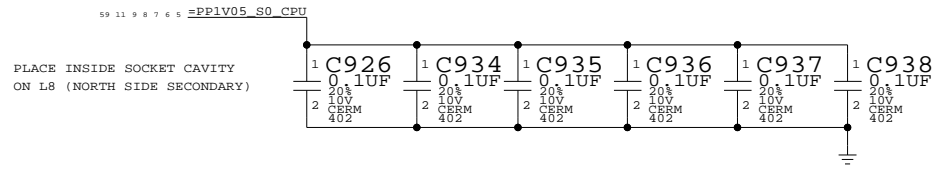
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6949	REV. 09
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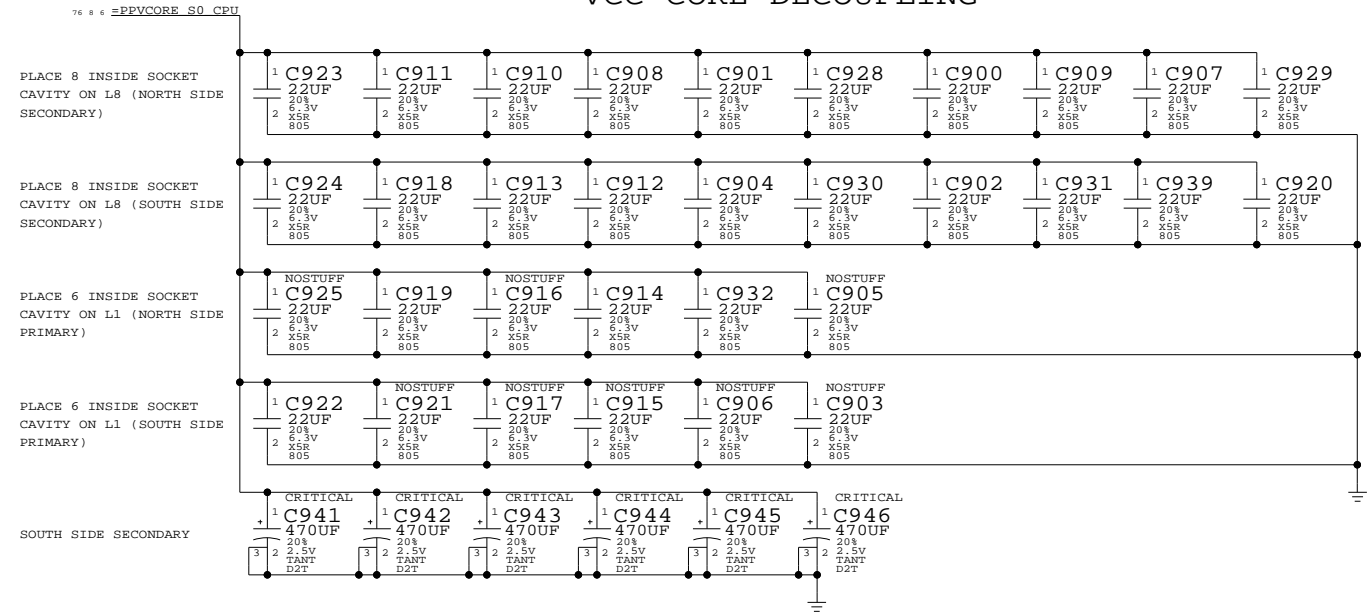
CPU HEATSINK MOUNTING HOLES



VCCP CORE DECOUPLING



VCC CORE DECOUPLING



CPU DECAPS & VID<>

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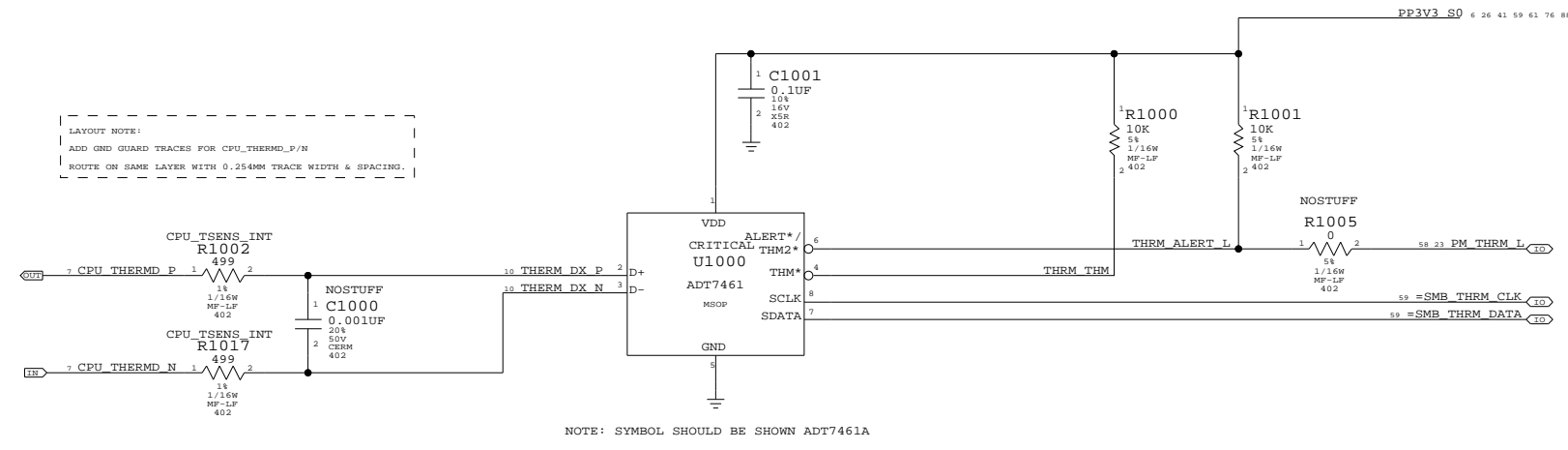
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NONE			

# CPU THERMAL SENSOR

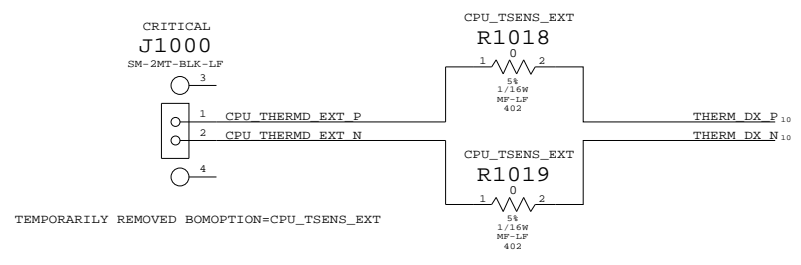
NOTE:  
IF CPU T DIODE TO BE READ IN OFF STATE,  
THEN THIS SHOULD BE S5



LAYOUT NOTE:  
ADD GND GUARD TRACES FOR CPU\_THERMD\_P/N  
ROUTE ON SAME LAYER WITH 0.254MM TRACE WIDTH & SPACING.

NOTE: SYMBOL SHOULD BE SHOWN ADT7461A

LAYOUT NOTE:  
PLACE R1002 AND R1018 SUCH THAT THEY SHARE ONE PAD  
PLACE R1017 AND R1019 SUCH THAT THEY SHARE ONE PAD



CPU TEMP SENSOR

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SCALE	SHT		OF
NONE	10		111

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C

C

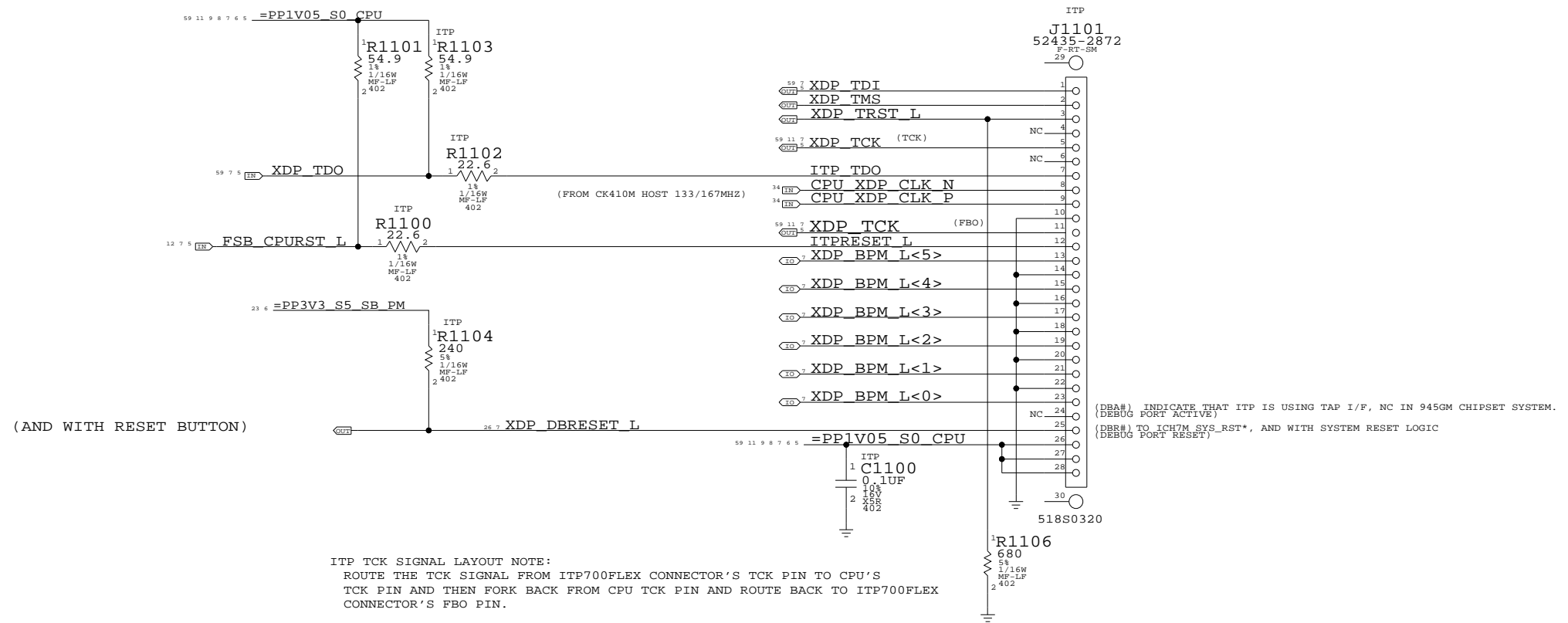
B

B

A

A

### CPU ITP700FLEX DEBUG SUPPORT



#### CPU ITP700FLEX DEBUG

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NONE	11		

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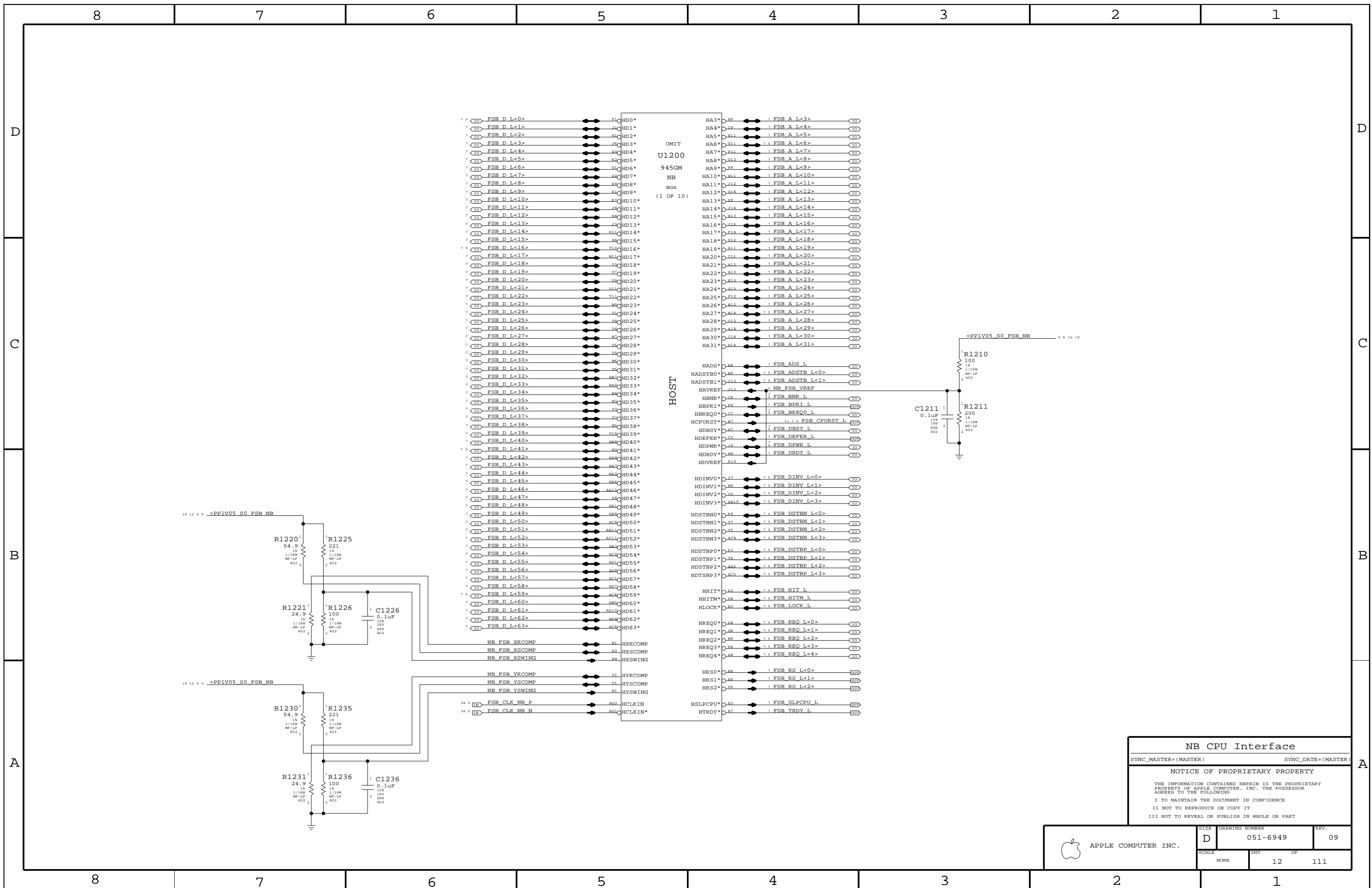
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4

3

2

1



**NB CPU Interface**

SYNC\_MASTER=(MASTER)      SYNC\_DATE=(MASTER)

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	SCALE: NONE	SHEET: 12	OF: 111

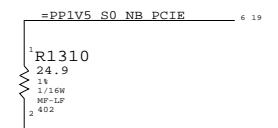
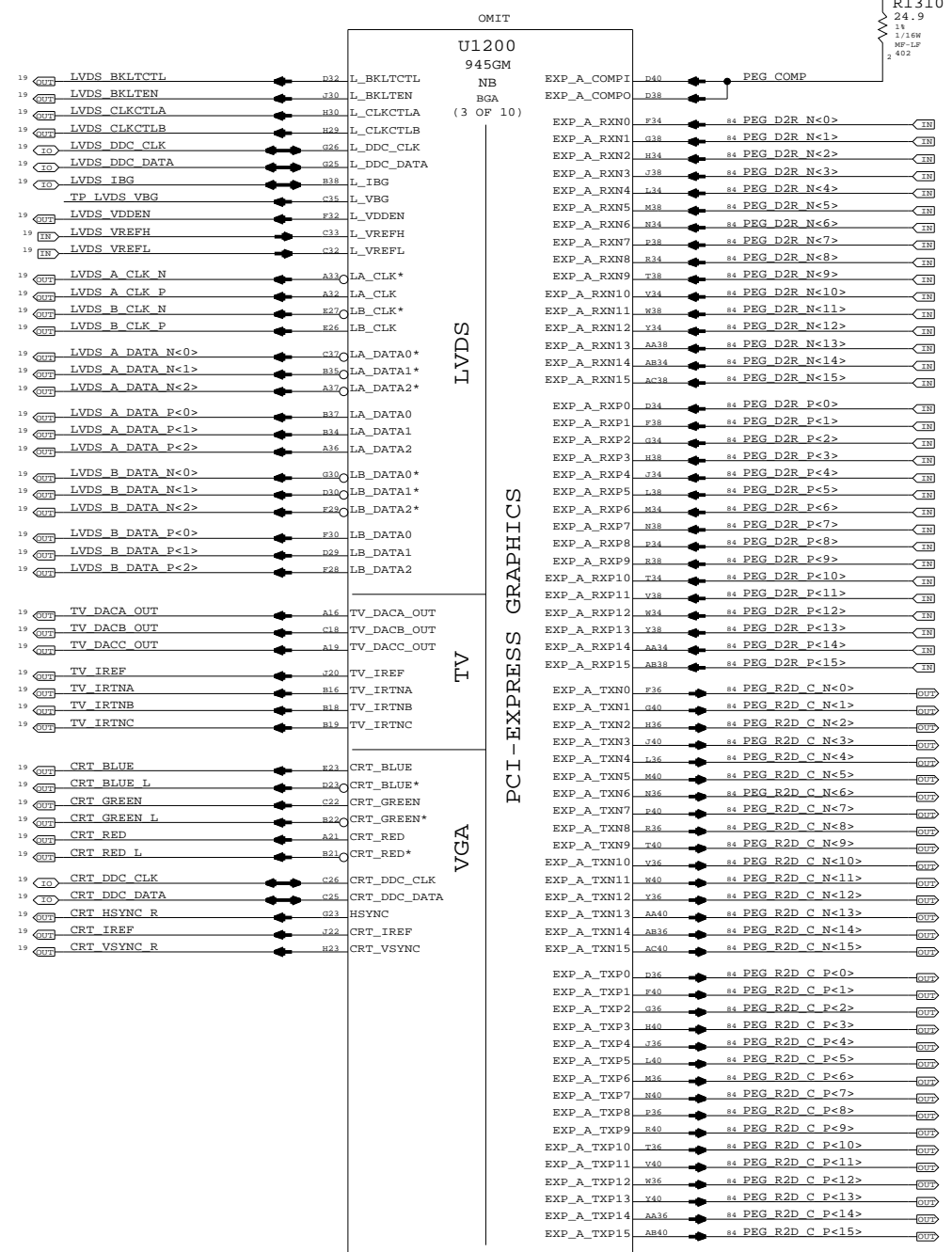
**LVDS Disable**  
 Can leave all signals NC if LVDS is not implemented  
 Tie VCC\_TXLVDS and VCCA\_LVDS to GND. If SDVO is used  
 VCCD\_LVDS must remain powered with proper decoupling.  
 Otherwise, tie VCCD\_LVDS to GND also.

**TV-Out Signal Usage:**  
 Composite: DACA only  
 S-Video: DACB & DACC only  
 Component: DACA, DACB & DACC

Unused DAC outputs must remain powered, but can omit  
 filtering components. Unused DAC outputs should  
 connect to GND through 75-ohm resistors.

**TV-Out Disable**  
 Tie DACx\_OUT, IRTNx, and IREF to 1.5V power rail.  
 Tie VCCD\_TVDAC, VCCD\_QTVDAC, VCCA\_TVDACx, and  
 VCCA\_TVVBG to 1.5V power rail. Tie VSSA\_TVVBG to GND.

**CRT Disable**  
 Tie R/R#/G/G#/B/B# and IREF to VCC Core rail, tie  
 HSYNC and VSYNC to GND. Tie VCCA\_CRTDAC to VCC Core  
 rail, and tie VSSA\_CRTDAC and VCC\_SYNC to GND.



SDVO Alternate Function

SDVO\_TVCLKIN#  
 SDVO\_INT#  
 SDVO\_FLDSTALL#

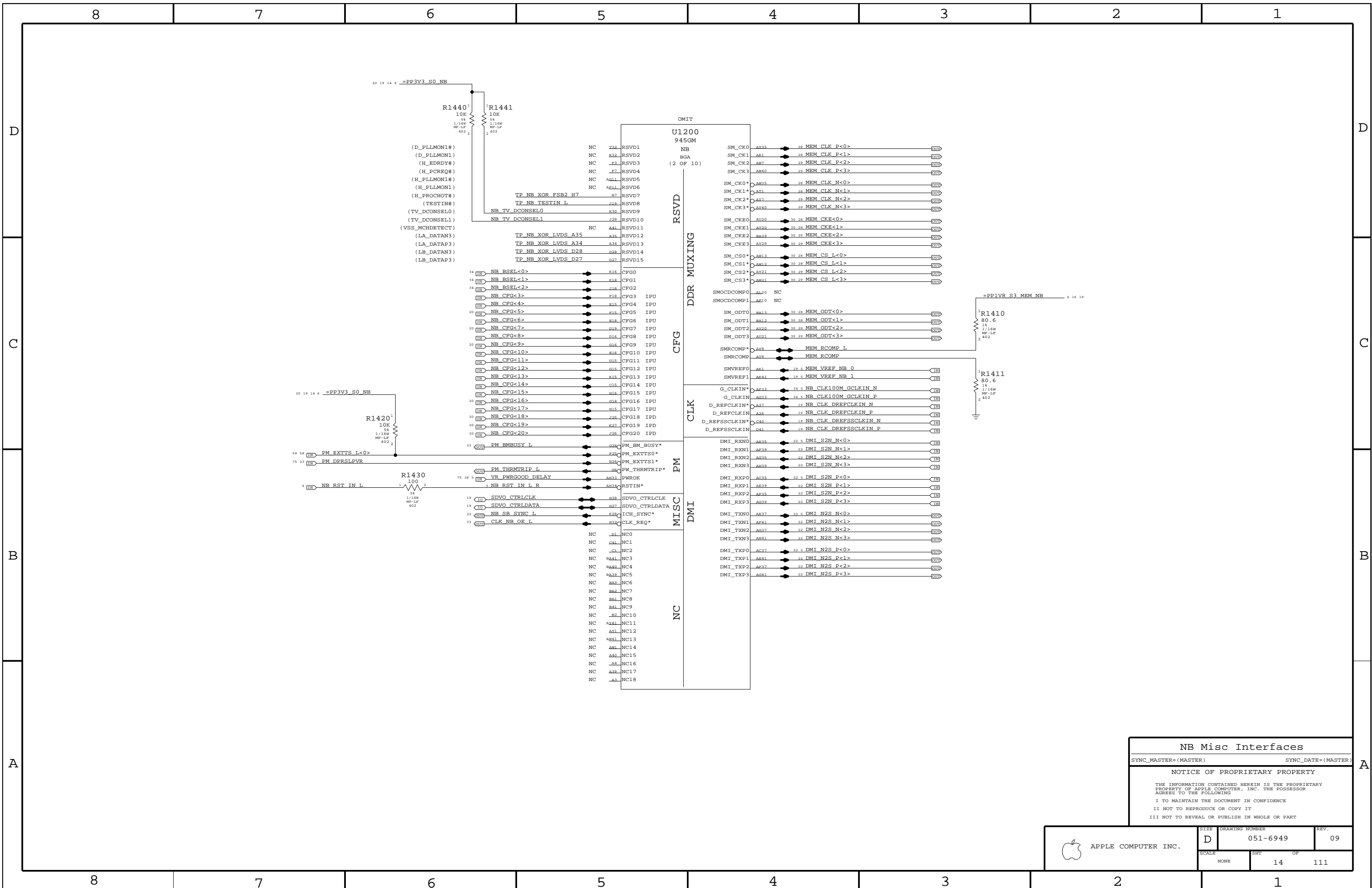
SDVO\_TVCLKIN  
 SDVO\_INT  
 SDVO\_FLDSTALL

SDVOB\_RED#  
 SDVOB\_GREEN#  
 SDVOB\_BLUE#  
 SDVOB\_CLKN  
 SDVOC\_RED#  
 SDVOC\_GREEN#  
 SDVOC\_BLUE#  
 SDVOC\_CLKN

SDVOB\_RED  
 SDVOB\_GREEN  
 SDVOB\_BLUE  
 SDVOB\_CLKP  
 SDVOC\_RED  
 SDVOC\_GREEN  
 SDVOC\_BLUE  
 SDVOC\_CLKP

**NB PEG / Video Interfaces**  
 SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)  
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT OF		
NONE	13		111



**NB Misc Interfaces**

SYNC\_MASTER=(MASTER)      SYNC\_DATE=(MASTER)

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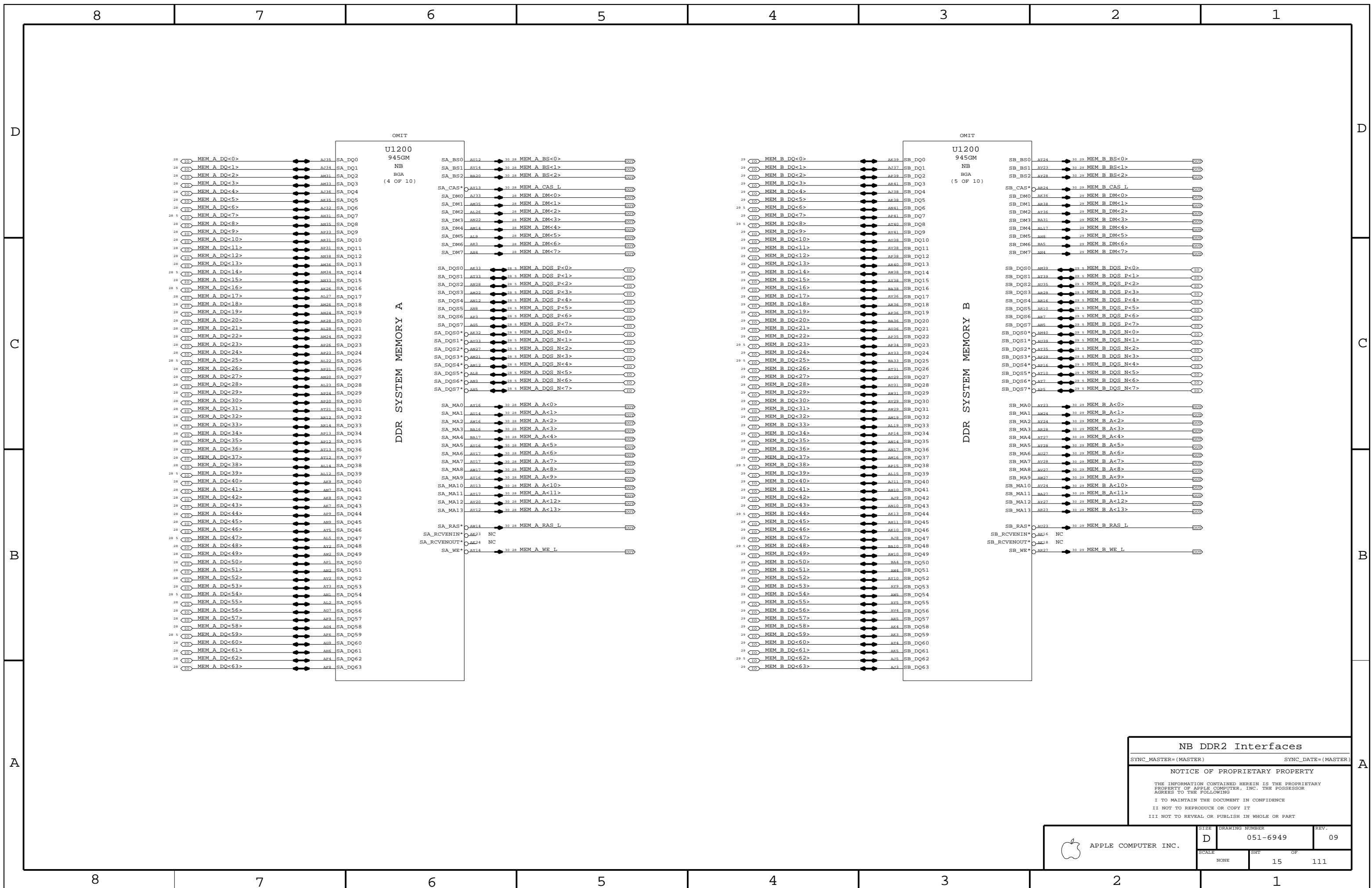
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	SCALE: NONE	SHEET: <b>14</b>	OF: <b>111</b>



**NB DDR2 Interfaces**

SYNC\_MASTER=(MASTER)      SYNC\_DATE=(MASTER)

**NOTICE OF PROPRIETARY PROPERTY**

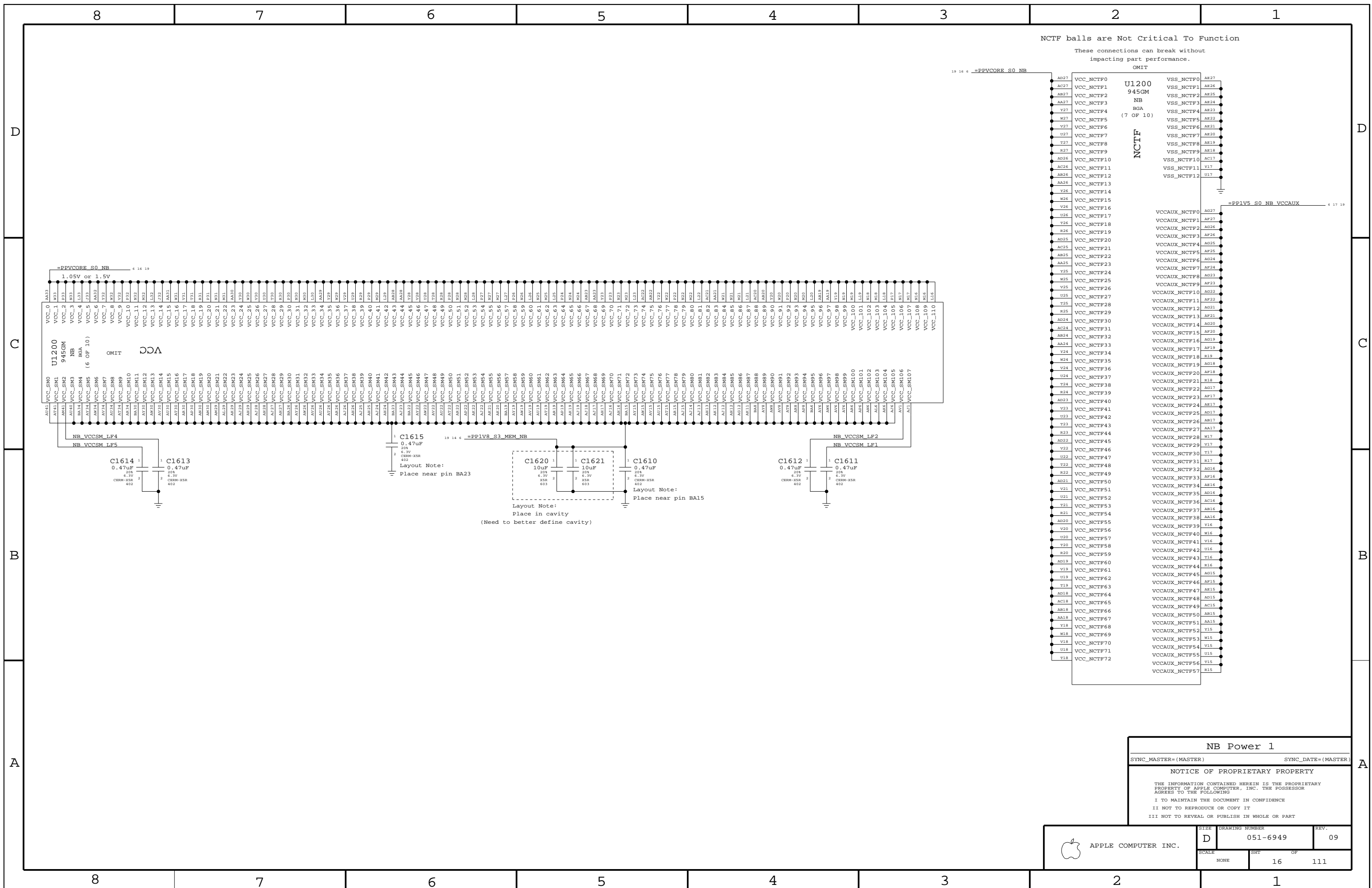
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	SHEET OF: 15 OF 111		



**NB Power 1**

SYNC\_MASTER=(MASTER)      SYNC\_DATE=(MASTER)

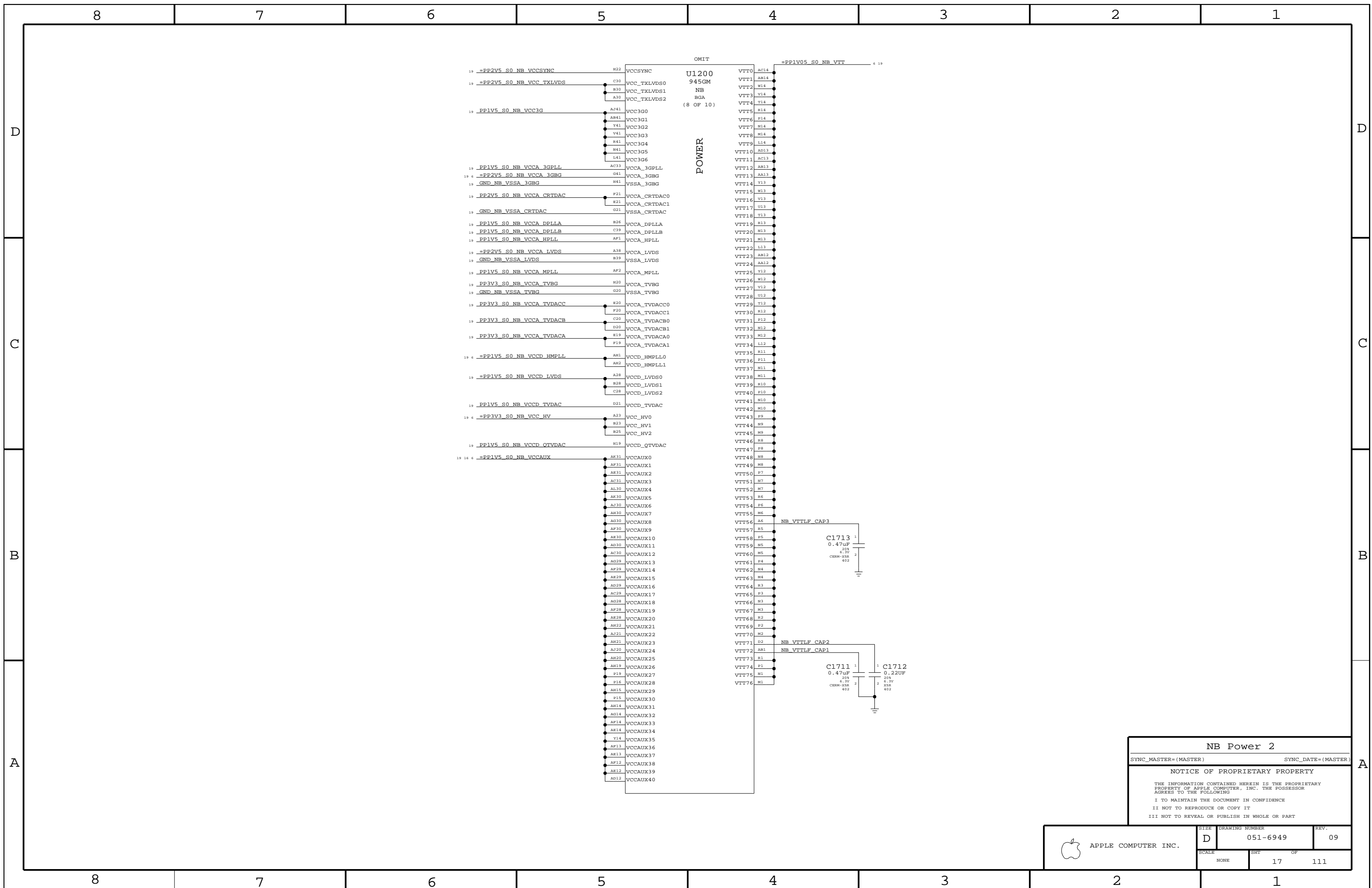
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	SCALE NONE	SHEET 16	OF 111





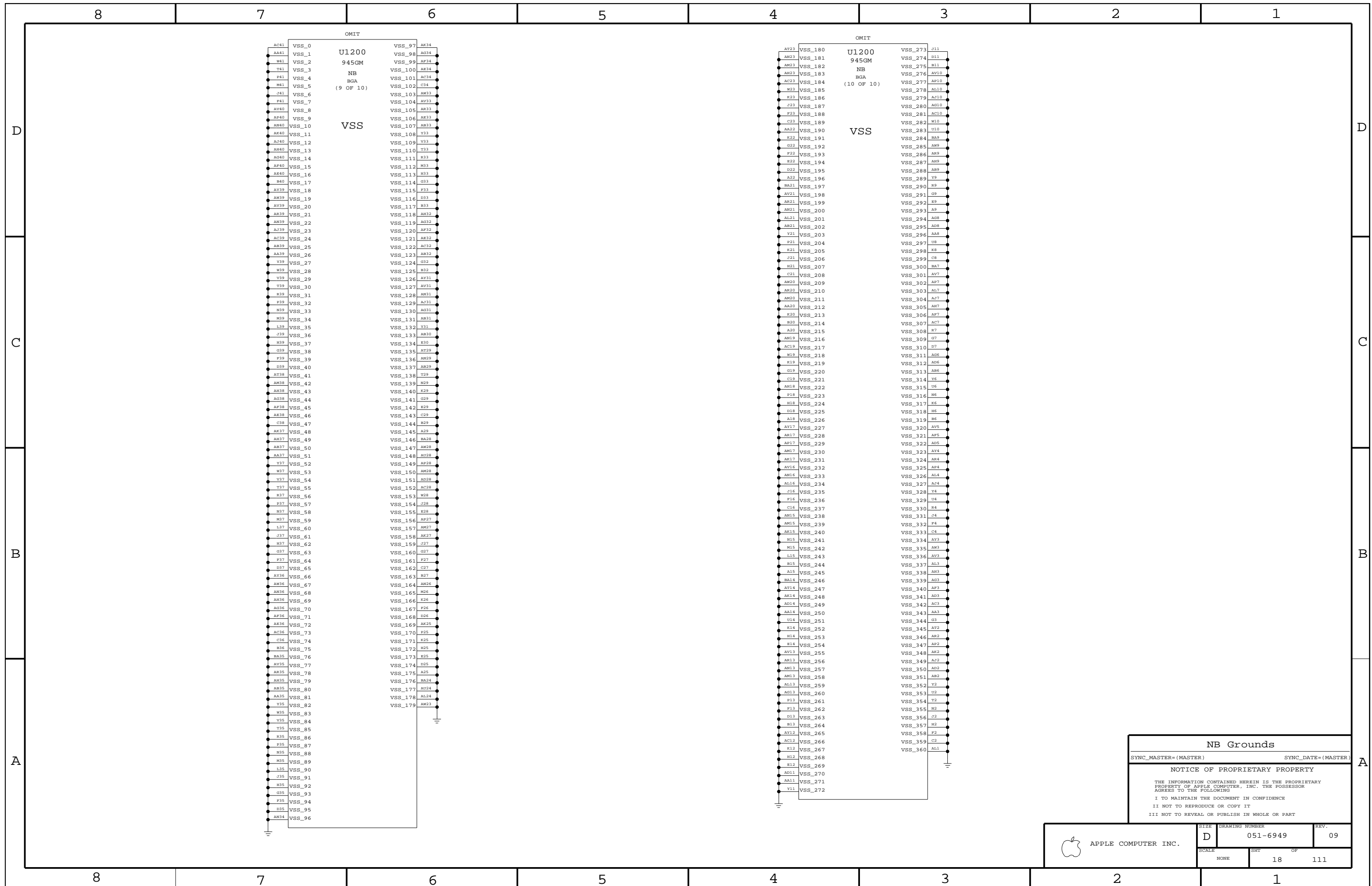
NB Power 2

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	OF	
NONE	17	111	



**NB Grounds**

SYNC\_MASTER=(MASTER)      SYNC\_DATE=(MASTER)

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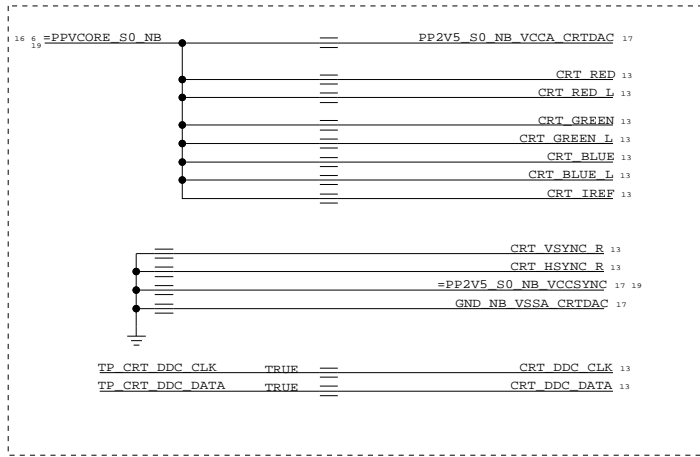
APPLE COMPUTER INC.	SIZE <b>D</b>	DRAWING NUMBER <b>051-6949</b>	REV. <b>09</b>
	SCALE NONE	SHEET <b>18</b>	OF <b>111</b>

### Power Interface

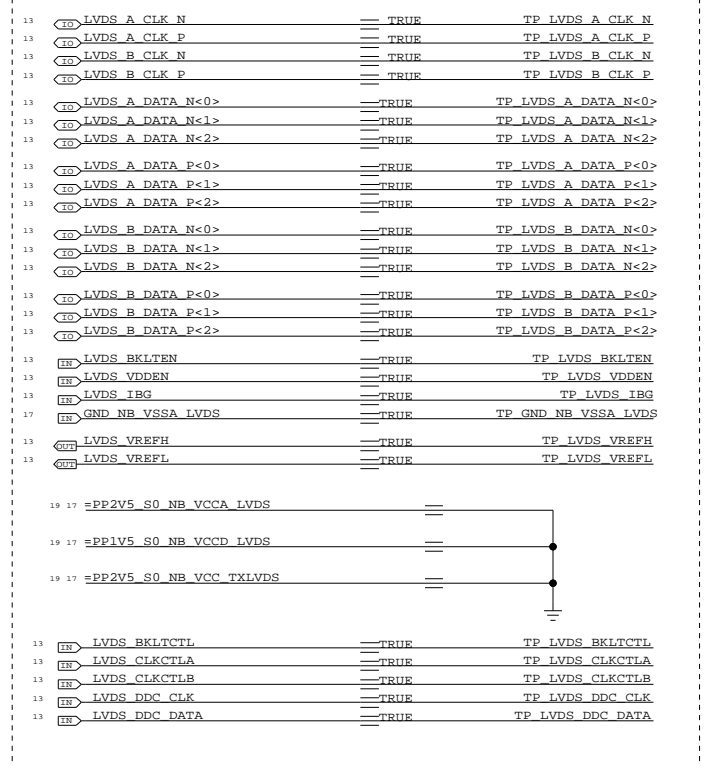
These are the power signals that leave the NB "block"

PP1V05_S0_FSB_NB	5 6 12
PPVCORE_S0_NB	6 16 19
PP1V05_S0_NB	6
PP1V05_S0_NB_VTT	6 17 19
PP1V5_S0_NB	6 19
PP1V5_S0_NB_PCIE	6 13
PP1V5_S0_NB_PLL	6 19
PP1V5_S0_NB_TVDAC	6 19
PP1V5_S0_NB_VCCD_HMPLL	6 19
PP1V5_S0_NB_VCCD_LVDS	17 19
PP1V5_S0_NB_VCCAUX	6 16 17 19
PP1V8_S3_MEM_NB	6 14 16 19
PP2V5_S0_NB_VCCSYNCR	17 19
PP2V5_S0_NB_VCC_TXLVDS	17 19
PP2V5_S0_NB_VCCA_3GBG	6 17 19
PP2V5_S0_NB_VCCA_LVDS	17 19
PP3V3_S0_NB	6 14 20
PP3V3_S0_NB_TVDAC	6
PP3V3_S0_NB_VCC_HV	6 17 19

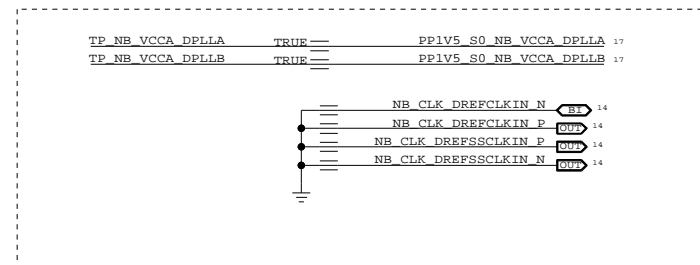
### TVOUT DISABLE



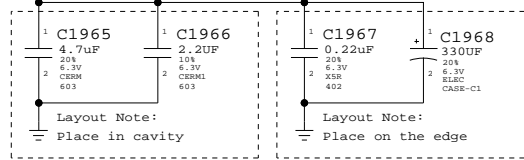
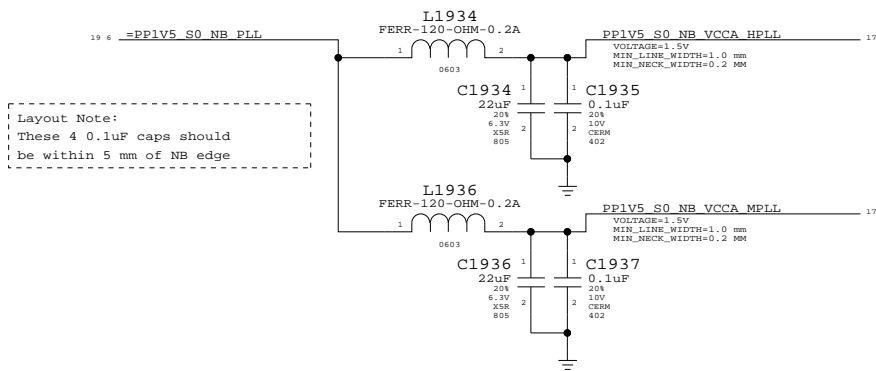
### LVDS DISABLE



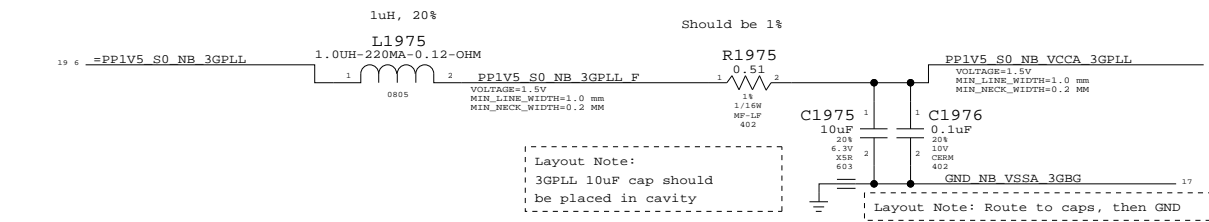
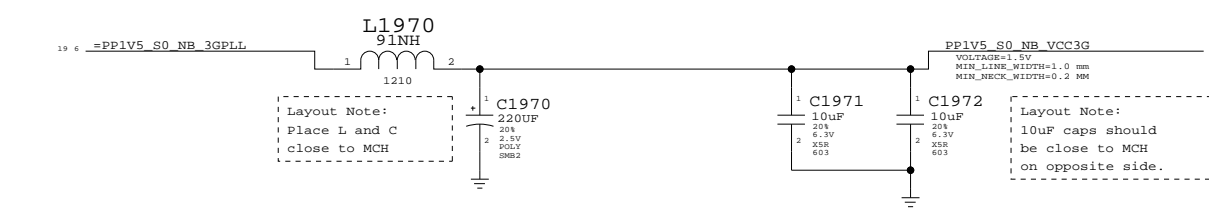
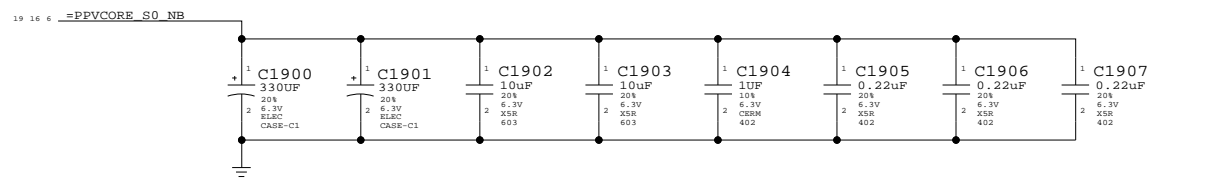
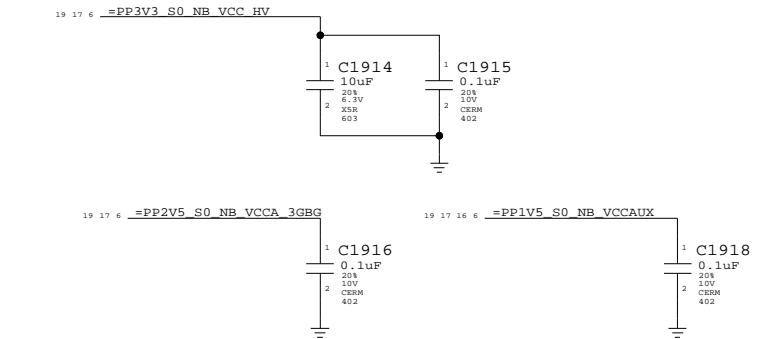
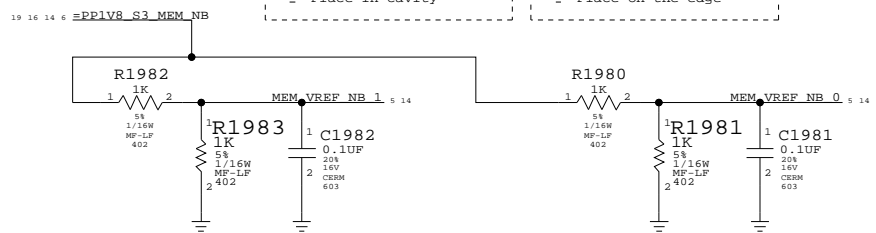
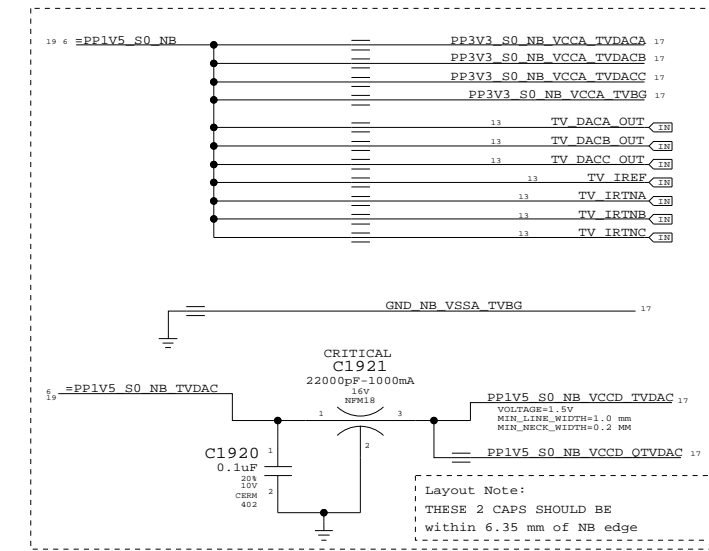
### DISPLAY DISABLE



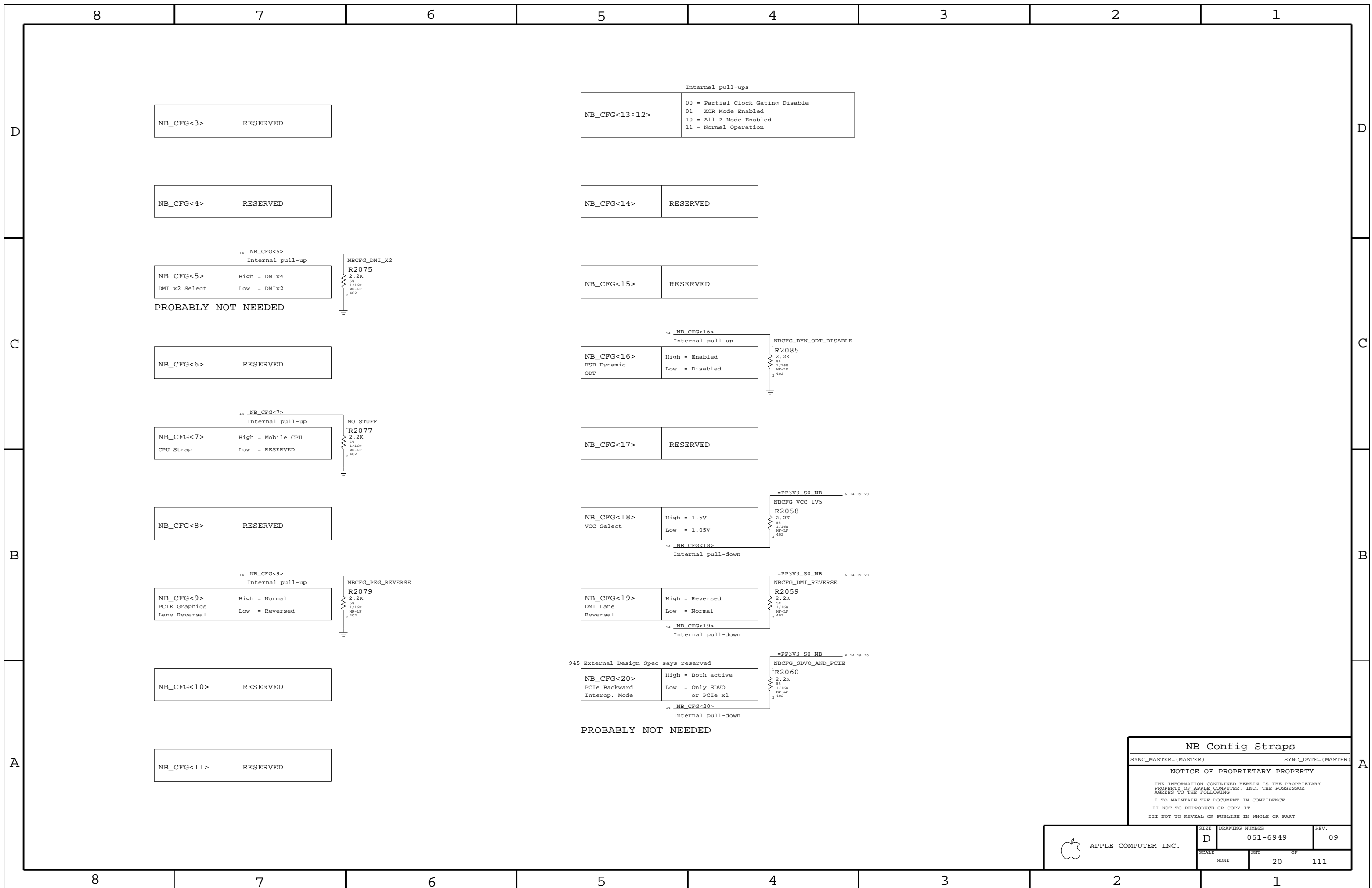
Layout Note:  
These 4 0.1uF caps should be within 5 mm of NB edge



### TVOUT DISABLE



**NB (GM) Decoupling**  
 SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)  
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NB_CFG<3>	RESERVED
-----------	----------

NB_CFG<13:12>	Internal pull-ups 00 = Partial Clock Gating Disable 01 = XOR Mode Enabled 10 = All-Z Mode Enabled 11 = Normal Operation
---------------	---

NB_CFG<4>	RESERVED
-----------	----------

NB_CFG<14>	RESERVED
------------	----------

14 NB_CFG<5> Internal pull-up	
NB_CFG<5>	High = DMIX4 DMI x2 Select Low = DMIX2

PROBABLY NOT NEEDED

NB_CFG<15>	RESERVED
------------	----------

NB_CFG<6>	RESERVED
-----------	----------

14 NB_CFG<16> Internal pull-up	
NB_CFG<16>	High = Enabled FSB Dynamic ODT Low = Disabled

14 NB_CFG<7> Internal pull-up	
NB_CFG<7>	High = Mobile CPU CPU Strap Low = RESERVED

NO STUFF

NB_CFG<17>	RESERVED
------------	----------

NB_CFG<8>	RESERVED
-----------	----------

14 NB_CFG<18> Internal pull-down	
NB_CFG<18>	High = 1.5V VCC Select Low = 1.05V

14 NB_CFG<9> Internal pull-up	
NB_CFG<9>	High = Normal PCIe Graphics Lane Reversal Low = Reversed

14 NB_CFG<19> Internal pull-down	
NB_CFG<19>	High = Reversed DMI Lane Reversal Low = Normal

NB_CFG<10>	RESERVED
------------	----------

945 External Design Spec says reserved	
14 NB_CFG<20> Internal pull-down	
NB_CFG<20>	High = Both active PCIe Backward Interop. Mode Low = Only SDVO or PCIe x1

PROBABLY NOT NEEDED

NB_CFG<11>	RESERVED
------------	----------

**NB Config Straps**

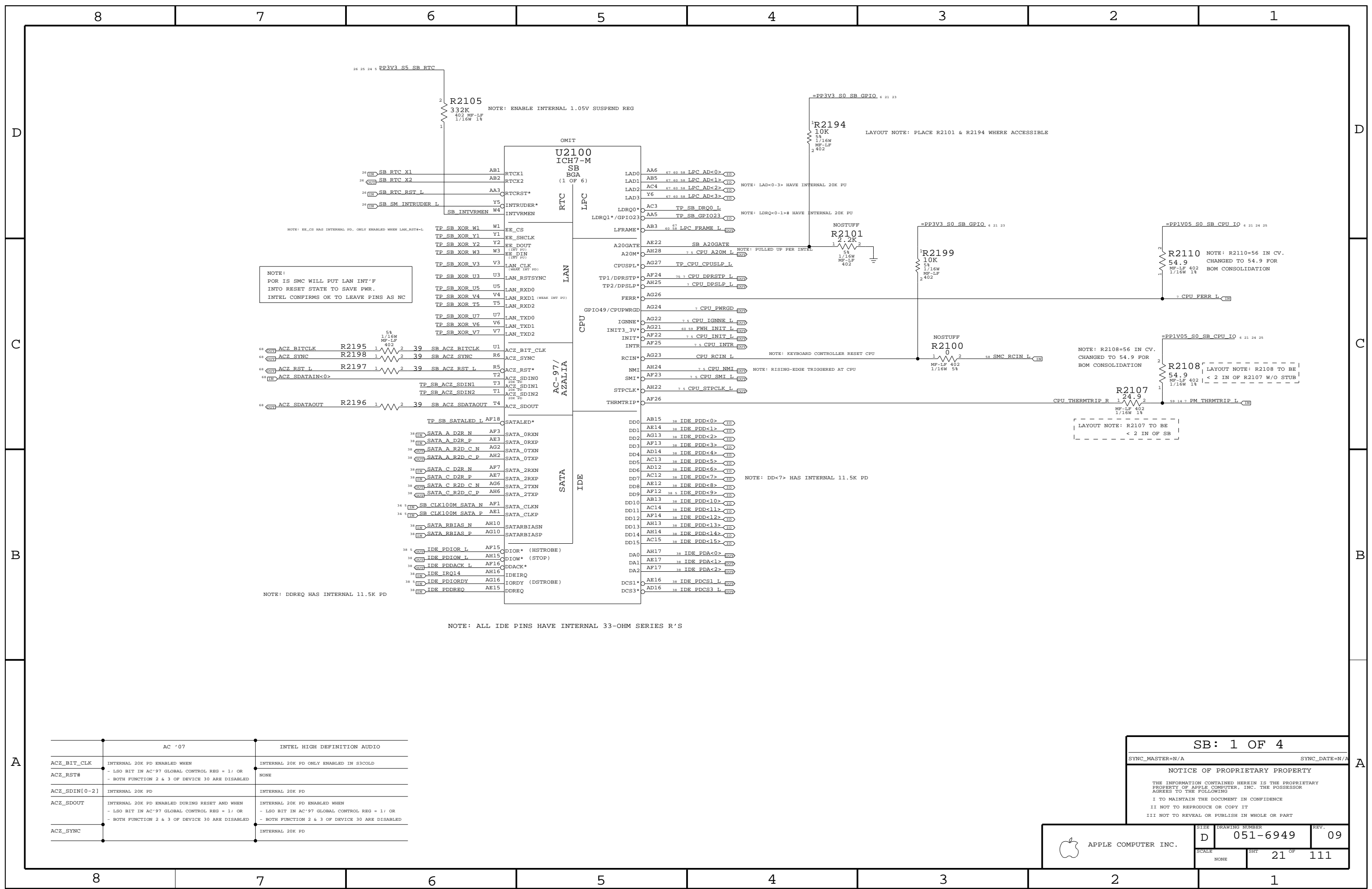
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	D	051-6949	09
SCALE		SHT	OF
NONE		20	111



NOTE:  
POR IS SMC WILL PUT LAN INT'F  
INTO RESET STATE TO SAVE PWR.  
INTEL CONFIRMS OK TO LEAVE PINS AS NC

NOTE: DDREQ HAS INTERNAL 11.5K PD

NOTE: ALL IDE PINS HAVE INTERNAL 33-OHM SERIES R'S

AC '07	INTEL HIGH DEFINITION AUDIO
ACZ_BIT_CLK	INTERNAL 20K PD ENABLED WHEN - LSO BIT IN AC'97 GLOBAL CONTROL REG = 1; OR
ACZ_RST#	NONE
ACZ_SDIN[0-2]	INTERNAL 20K PD
ACZ_SDOUT	INTERNAL 20K PD ENABLED DURING RESET AND WHEN - LSO BIT IN AC'97 GLOBAL CONTROL REG = 1; OR - BOTH FUNCTION 2 & 3 OF DEVICE 30 ARE DISABLED
ACZ_SYNC	INTERNAL 20K PD

**SB: 1 OF 4**

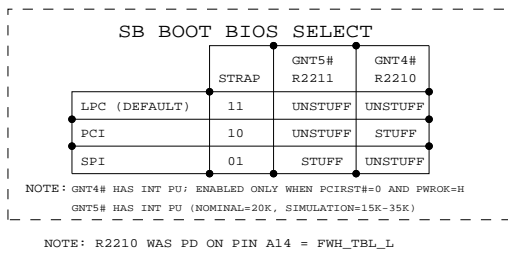
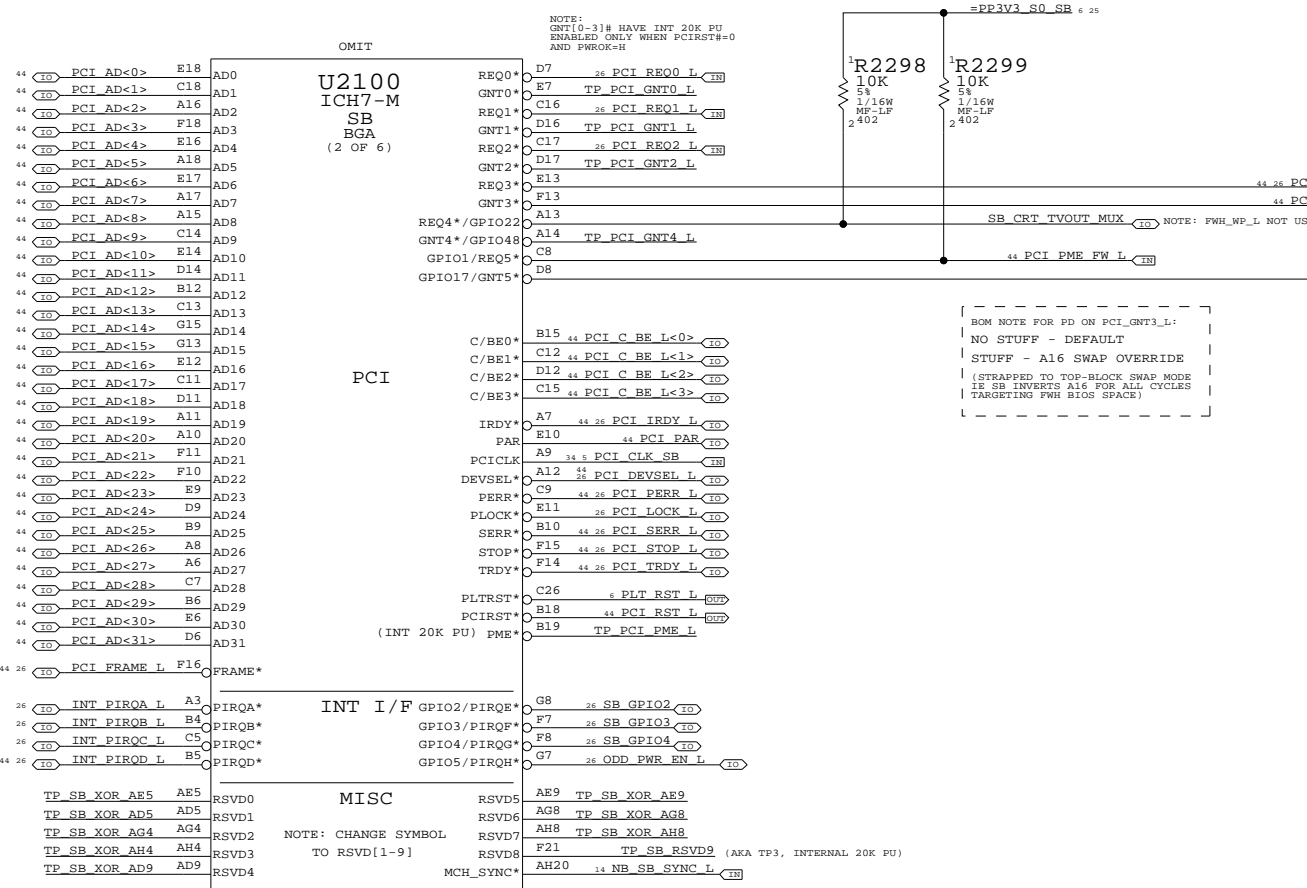
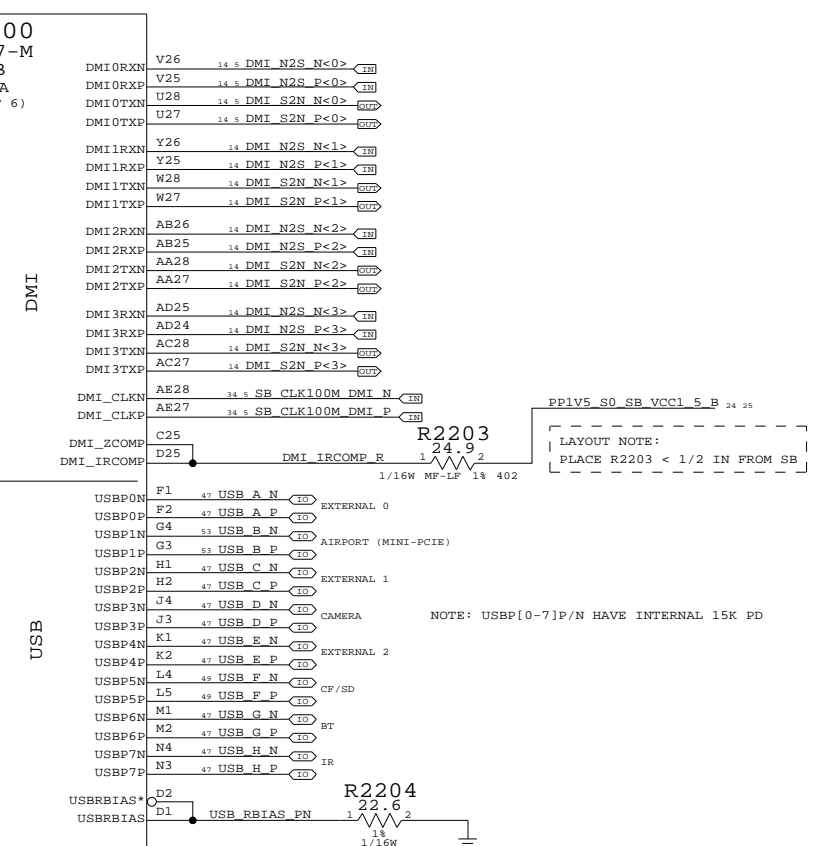
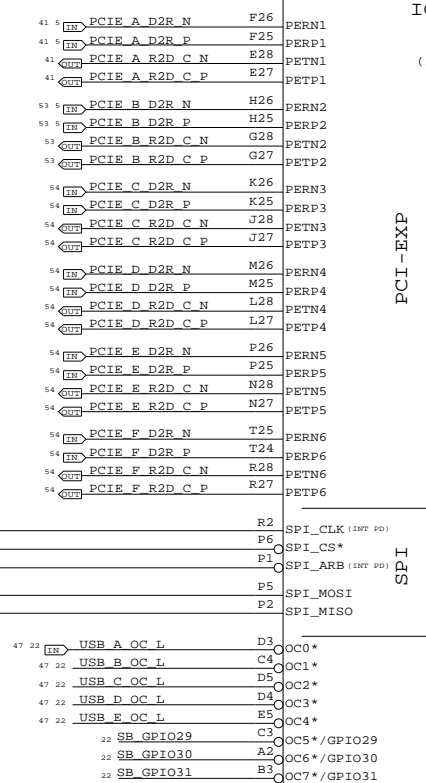
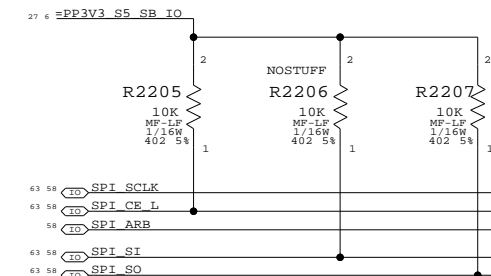
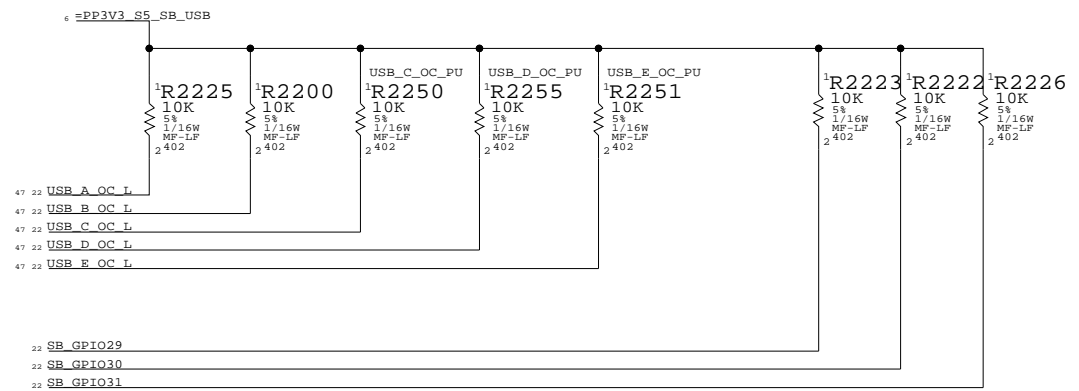
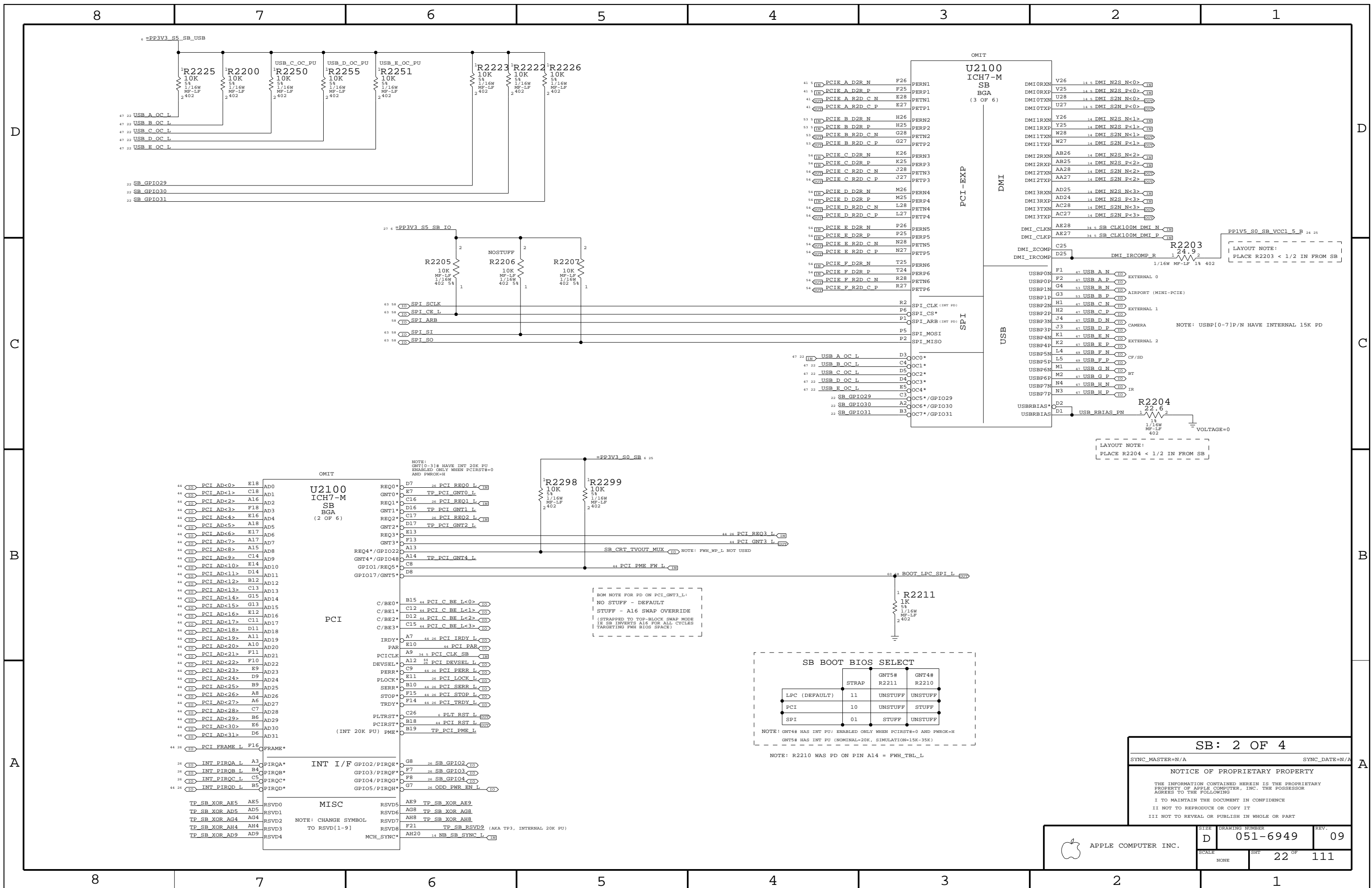
SYNC\_MASTER=N/A SYNC\_DATE=N/A

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	D	051-6949	09
SCALE	SHT	21 OF	111
NONE			



SB: 2 OF 4

SYNC\_MASTER=N/A SYNC\_DATE=N/A

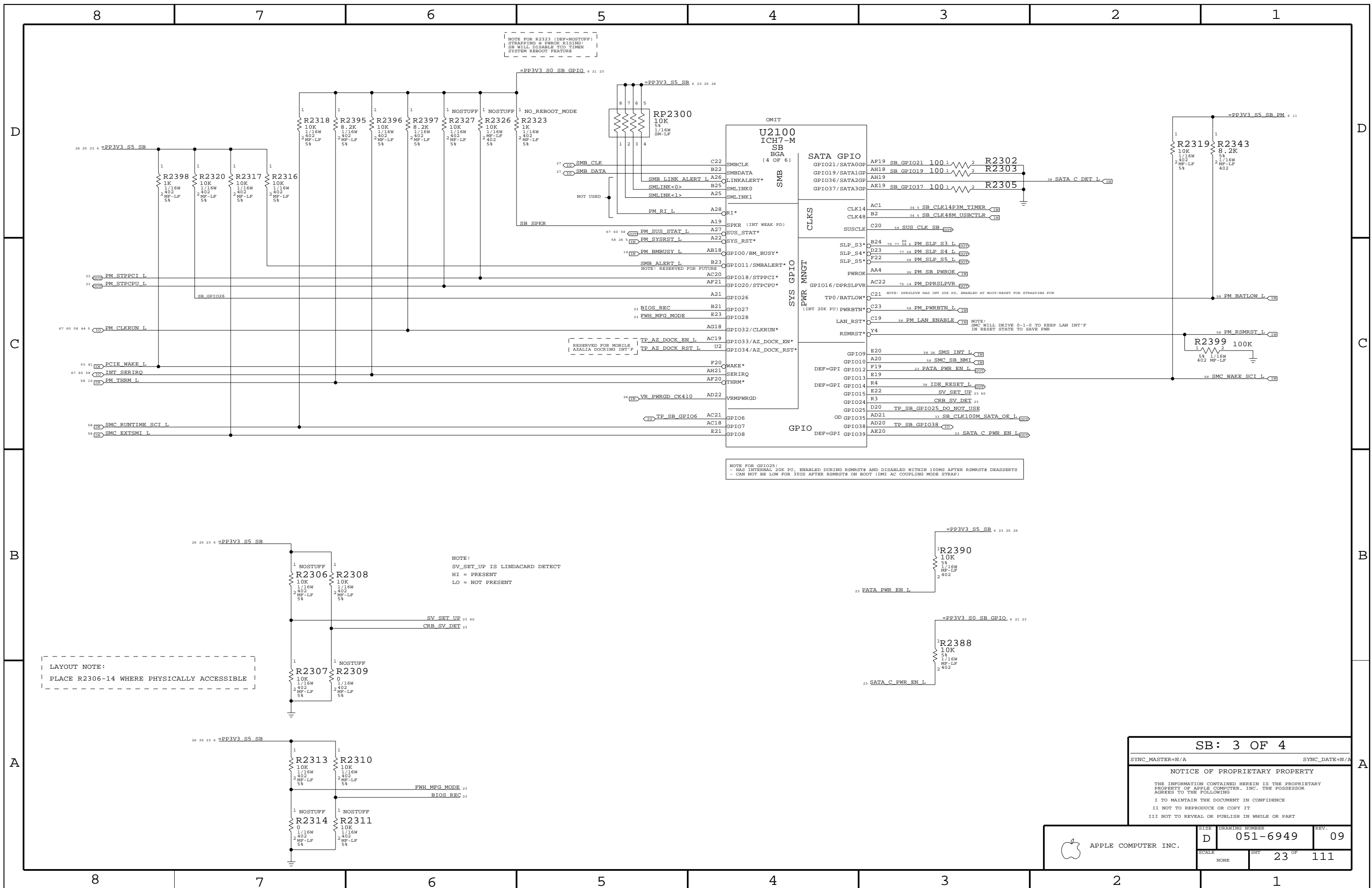
NOTICE OF PROPRIETARY PROPERTY

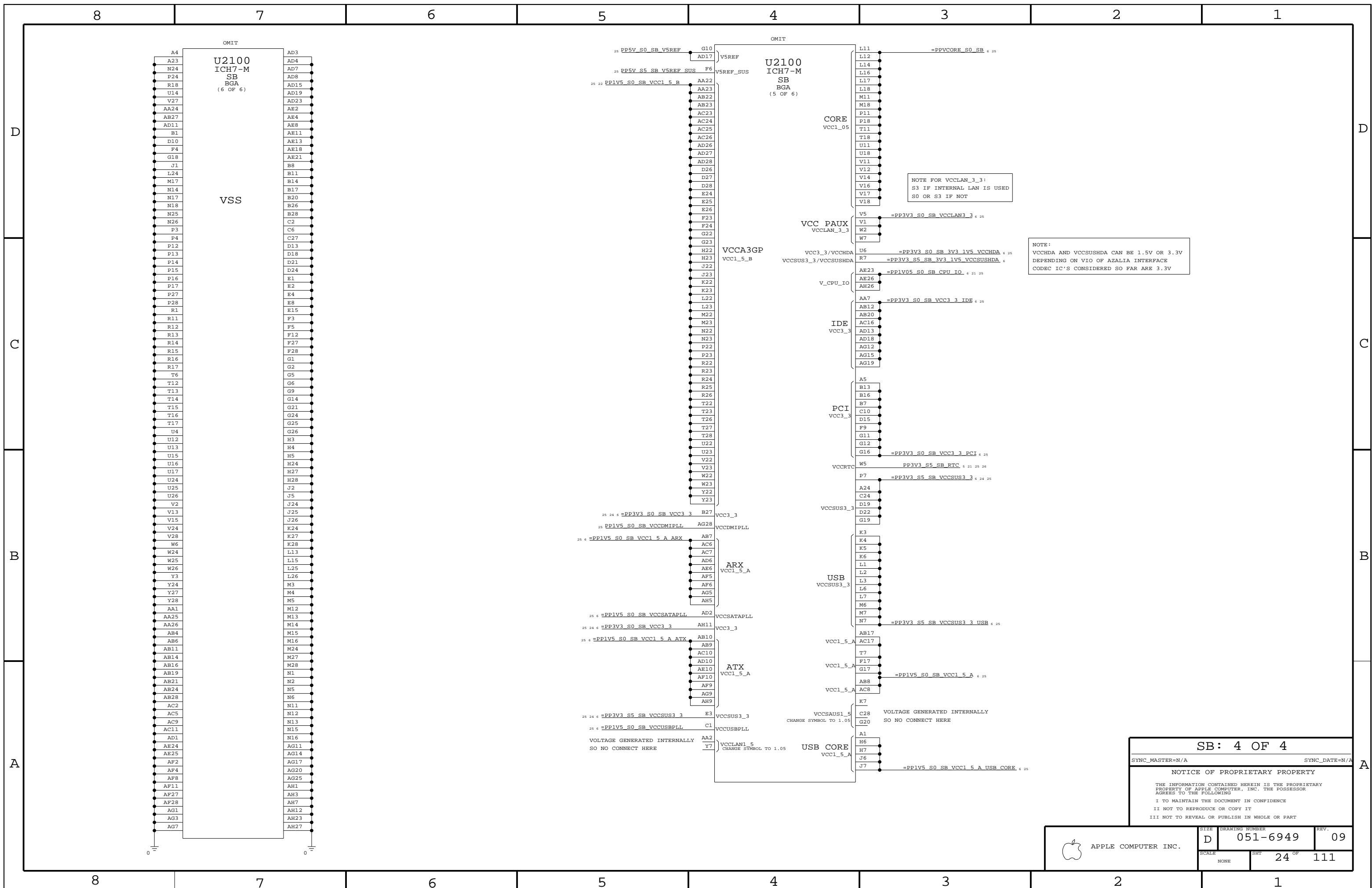
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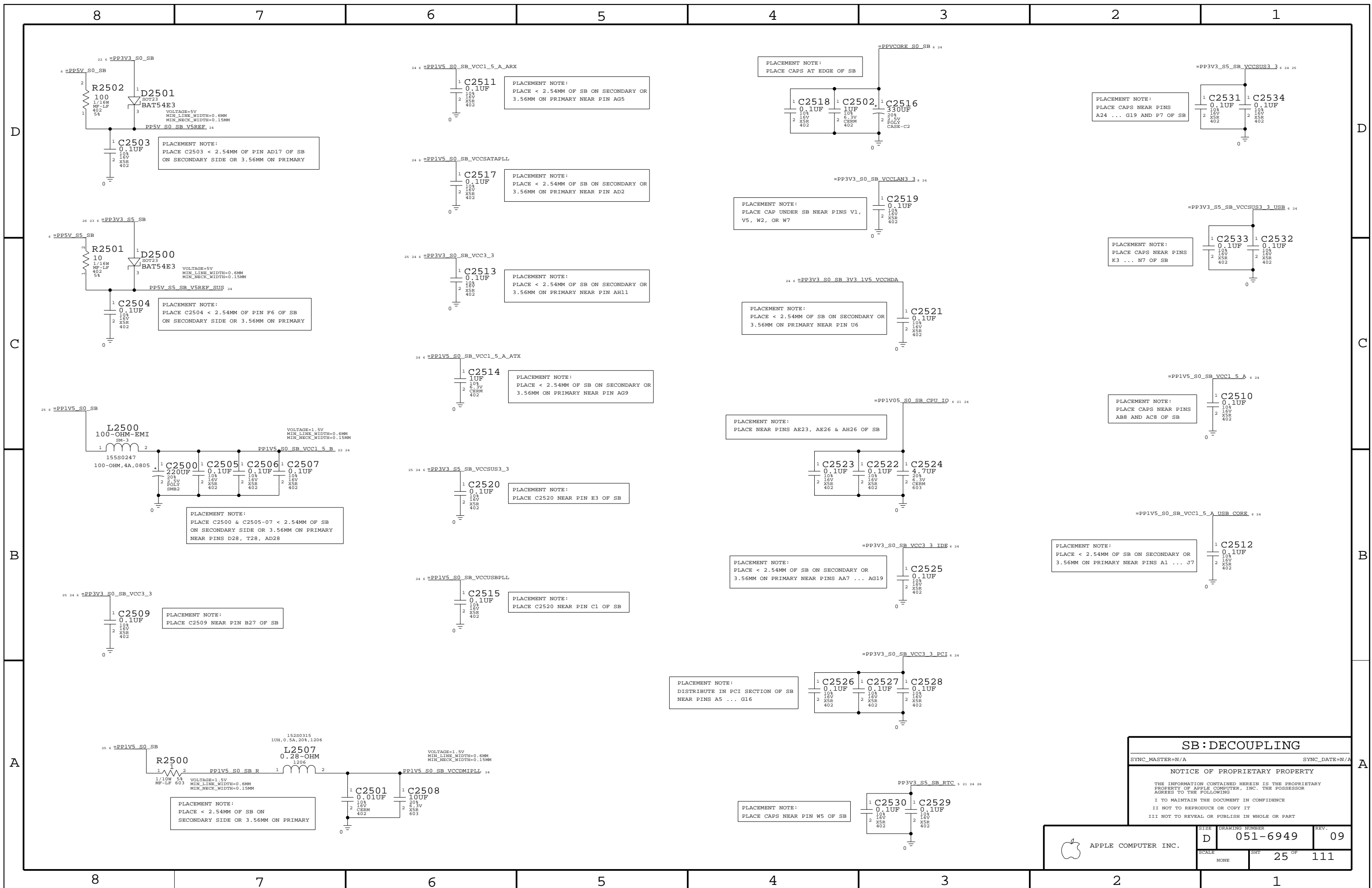
NOTE FOR VCCLAN\_3\_3:  
S3 IF INTERNAL LAN IS USED  
S0 OR S3 IF NOT

NOTE:  
VCC3\_3 AND VCCSUS3\_3 CAN BE 1.5V OR 3.3V  
DEPENDING ON VIO OF AZALIA INTERFACE  
CODEC IC'S CONSIDERED SO FAR ARE 3.3V

SB: 4 OF 4  
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SHEET		24 OF 111	





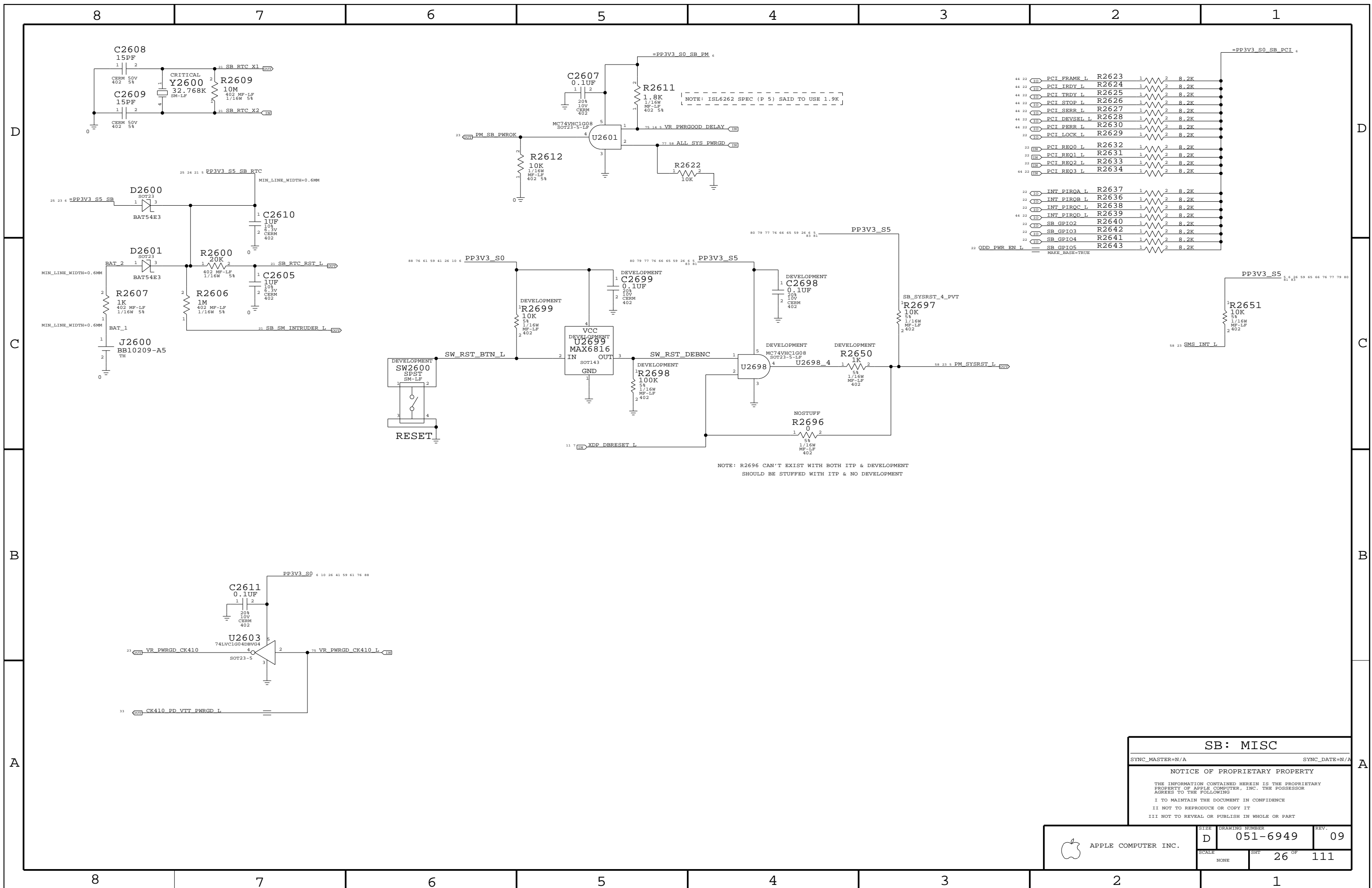
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SCALE	SHT	25 OF	111
NONE			



**SB: MISC**

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	D	051-6949	09
SCALE	SHT	26	OF 111
NONE			

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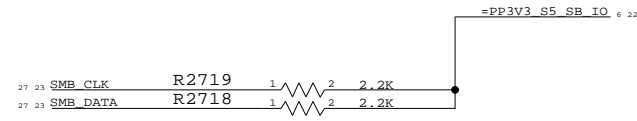
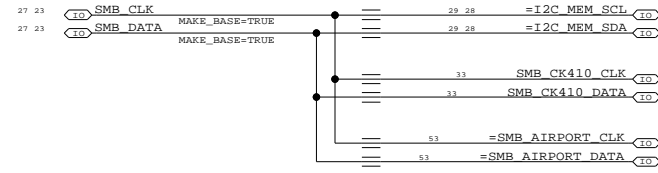
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### SB I2C BUSSES



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C

B

B

A

A

**SB: SMB HUB**

SYNC\_MASTER=N/A SYNC\_DATE=N/A

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	SCALE NONE	SHEET <b>27</b> OF	TOTAL SHEETS <b>111</b>

8

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# Page Notes

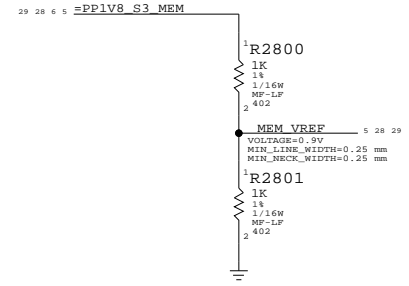
Power aliases required by this page:  
 - =PPIV8\_S3\_MEM  
 - =PPSPD\_S0\_MEM (2.5V - 3.3V)

Signal aliases required by this page:  
 - =I2C\_MEM\_SCL  
 - =I2C\_MEM\_SDA

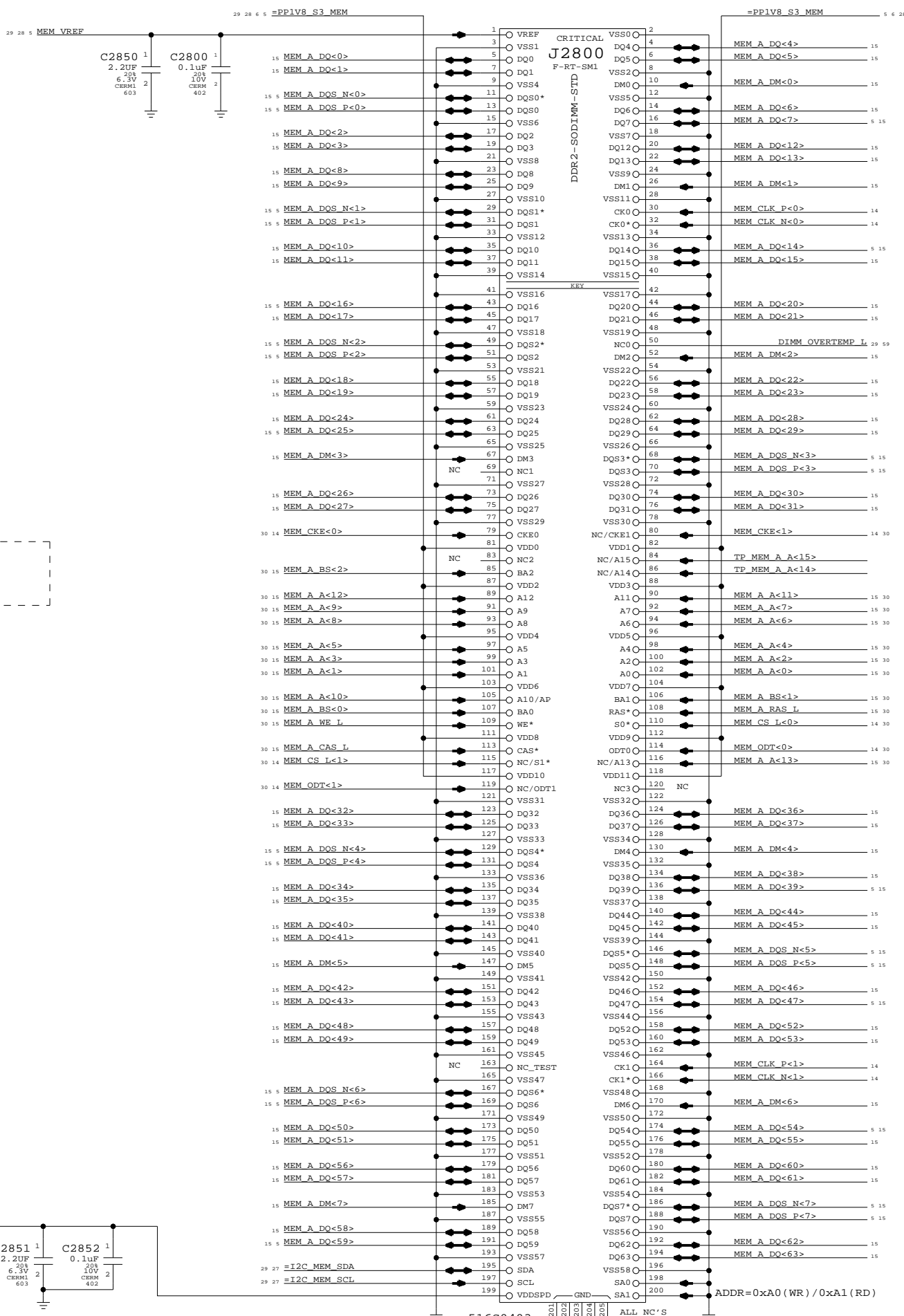
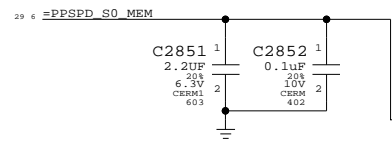
BOM options provided by this page:  
 (NONE)

## DDR2 VRef

One 0.1uF per connector

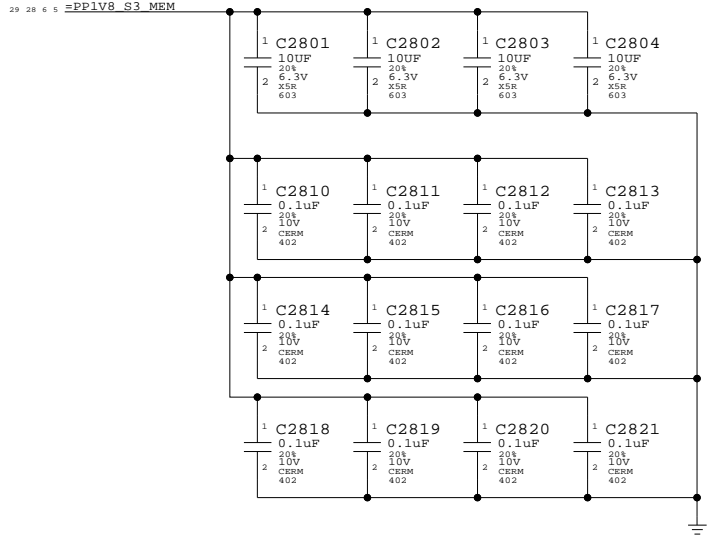


Yellow uses 10K divider and TLV2463 to drive MCH and DIMM connectors.  
 (See Capell Valley pg 47)



## DDR2 Bypass Caps

(For return current)



**DDR2 SO-DIMM Connector A**  
 SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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	28	111	

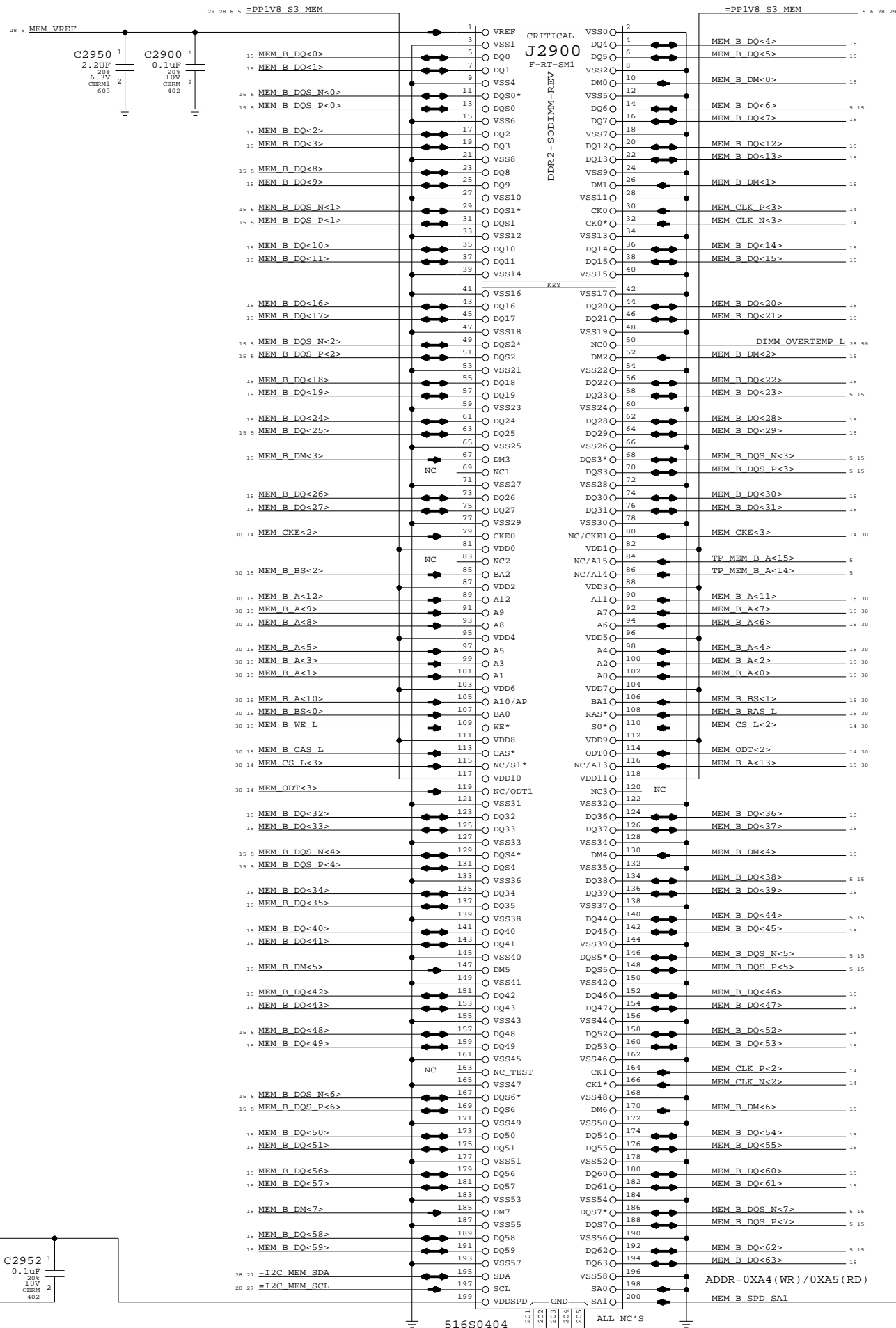
# Page Notes

Power aliases required by this page:  
 - =PP1V8\_S3\_MEM  
 - =PPSPD\_S0\_MEM (2.5V - 3.3V)

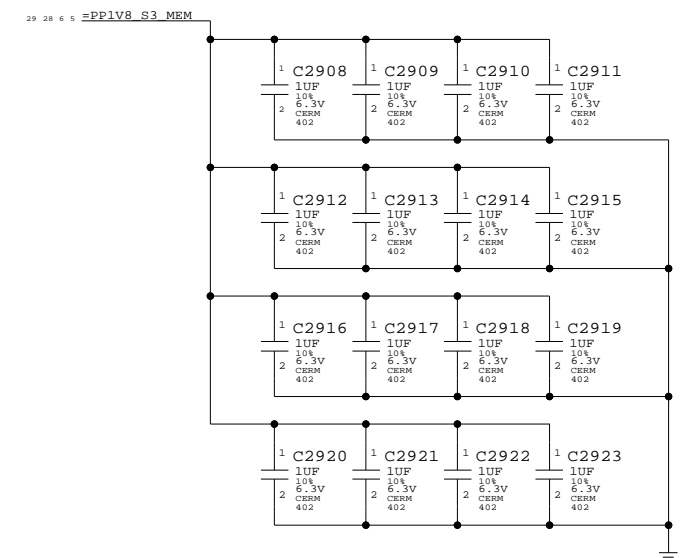
Signal aliases required by this page:  
 - =I2C\_MEM\_SCL  
 - =I2C\_MEM\_SDA

BOM options provided by this page:  
 (NONE)

NOTE: This page does not supply VREF.  
 The reference voltage must be provided by another page.



## DDR2 Bypass Caps (For return current)



## DDR2 SO-DIMM Connector B

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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	NONE	D 051-6949	09
	SHT	OF	
	29	111	

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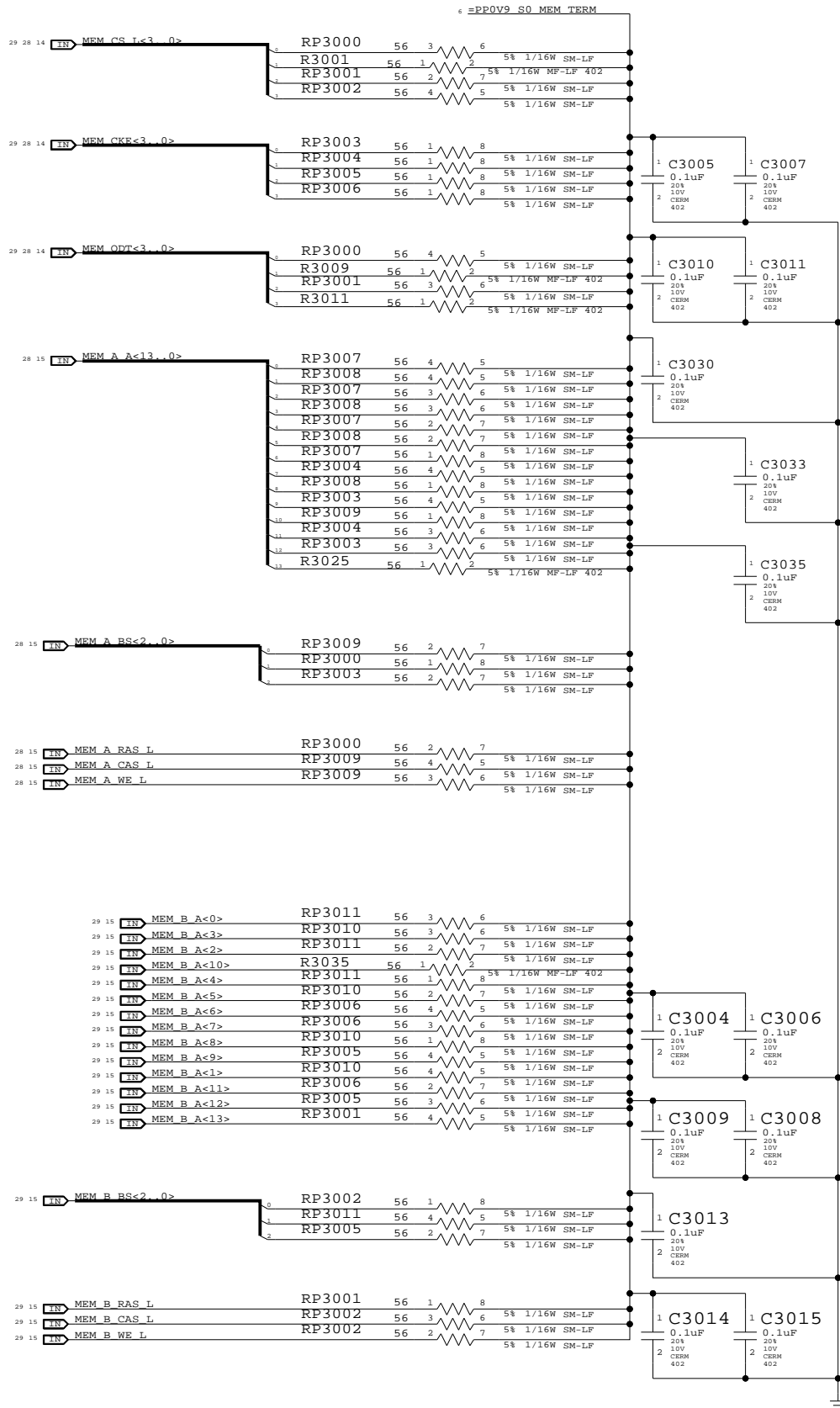
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One cap for each side of every RPAK, one cap for every two discrete resistors  
BOMOPTION shown at the top of each group applies to every part below it



Memory Active Termination

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT		OF
NONE	30		111

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Page Notes

Power aliases required by this page:

- =PP5V\_S0\_MEMVTT
- =PP1V8\_S0\_MEMVTT
- =PP0V9\_S0\_MEMVTT\_LDO

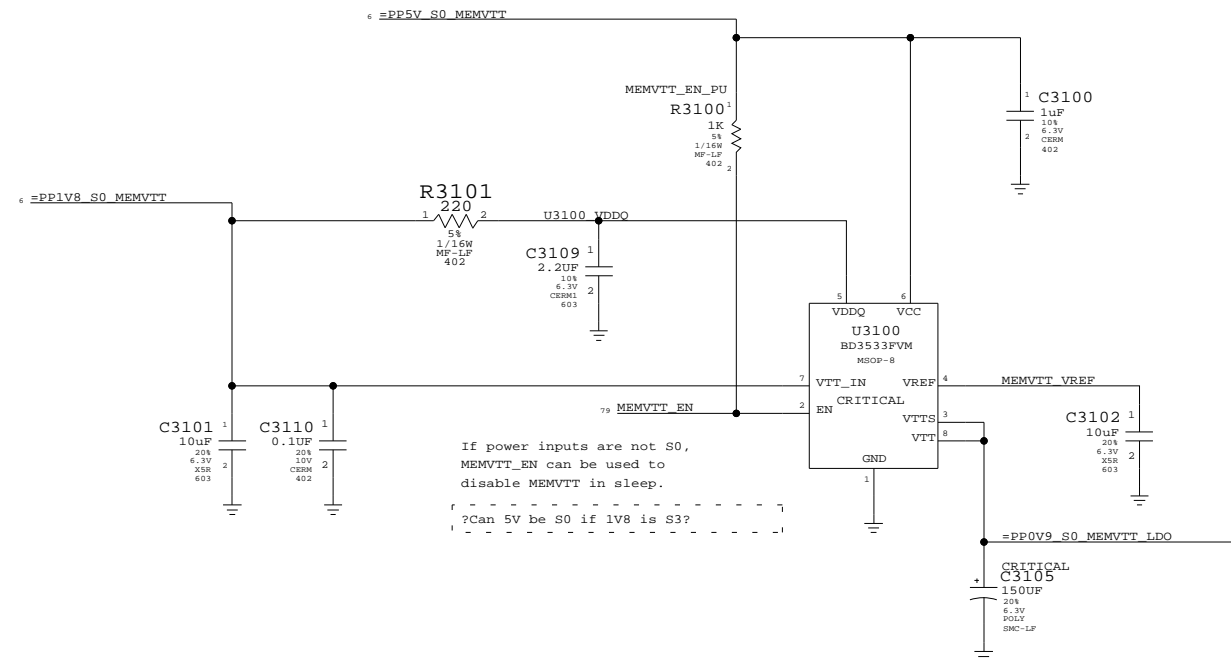
Signal aliases required by this page:

(NONE)

BOM options provided by this page:

(NONE)

DDR2 Vtt Regulator



Memory Vtt Supply

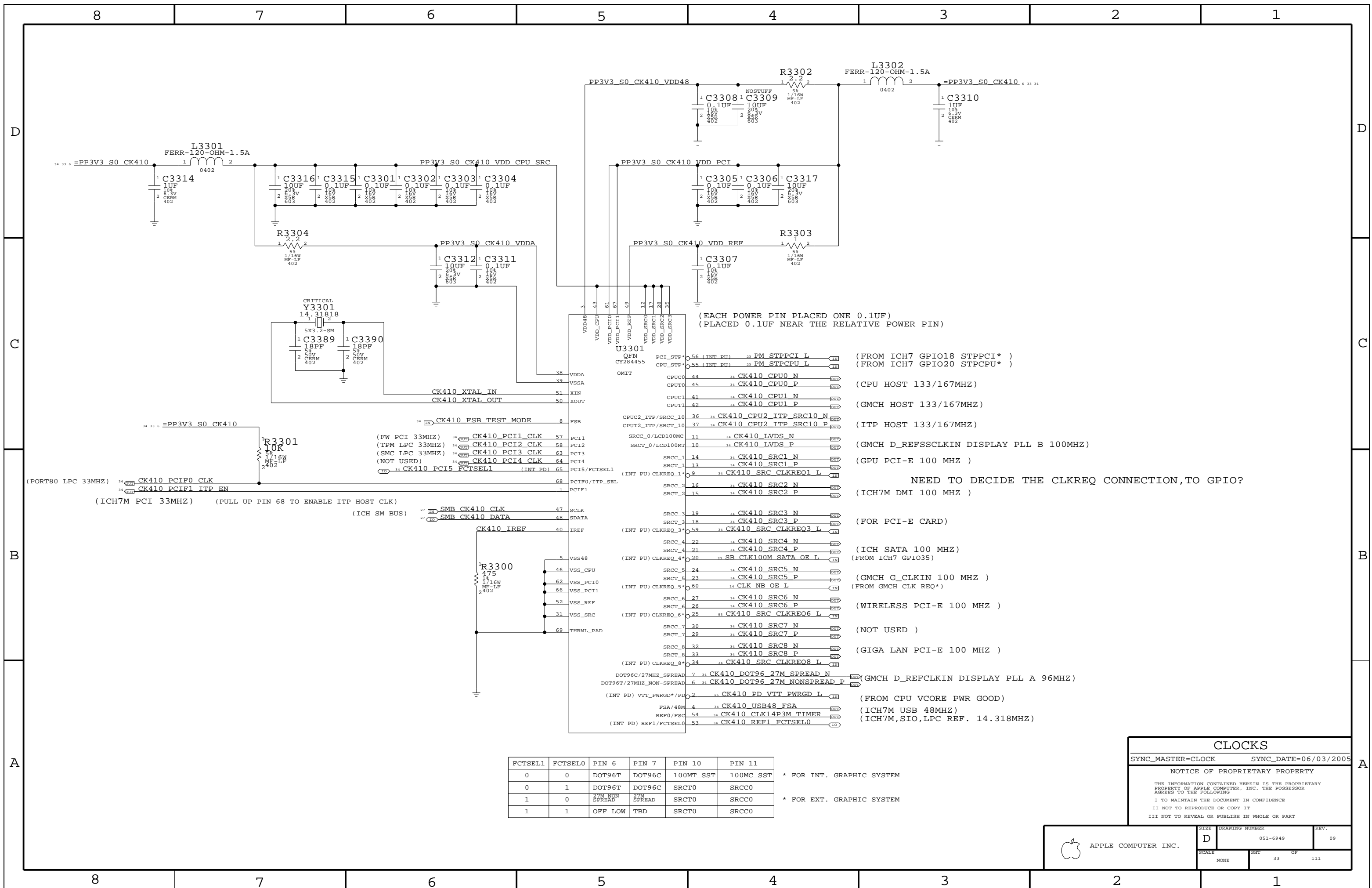
SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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	D	051-6949	09
SCALE	SHT	OF	
NONE	31	111	



(EACH POWER PIN PLACED ONE 0.1UF)  
(PLACED 0.1UF NEAR THE RELATIVE POWER PIN)

(FROM ICH7 GPIO18 STPPCI\* )  
(FROM ICH7 GPIO20 STPCPU\* )

(CPU HOST 133/167MHZ)

(GMCH HOST 133/167MHZ)

(ITP HOST 133/167MHZ)

(GMCH D\_REFSSCLKIN DISPLAY PLL B 100MHZ)

(GPU PCI-E 100 MHZ )

NEED TO DECIDE THE CLKREQ CONNECTION, TO GPIO?

(ICH7M DMI 100 MHZ )

(FOR PCI-E CARD)

(ICH SATA 100 MHZ)

(FROM ICH7 GPIO35)

(GMCH G\_CLKIN 100 MHZ )

(FROM GMCH CLK\_REQ\*)

(WIRELESS PCI-E 100 MHZ )

(NOT USED )

(GIGA LAN PCI-E 100 MHZ )

(GMCH D\_REFCLKIN DISPLAY PLL A 96MHZ)

(FROM CPU VCORE PWR GOOD)

(ICH7M USB 48MHZ)

(ICH7M, SIO, LPC REF. 14.318MHZ)

FCTSEL1	FCTSEL0	PIN 6	PIN 7	PIN 10	PIN 11
0	0	DOT96T	DOT96C	100MT_SST	100MC_SST
0	1	DOT96T	DOT96C	SRCT0	SRCC0
1	0	27M NON SPREAD	27M SPREAD	SRCT0	SRCC0
1	1	OFF LOW	TBD	SRCT0	SRCC0

\* FOR INT. GRAPHIC SYSTEM

\* FOR EXT. GRAPHIC SYSTEM

**CLOCKS**

SYNC\_MASTER=CLOCK      SYNC\_DATE=06/03/2005

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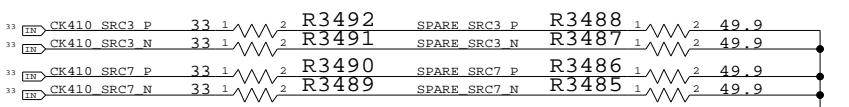
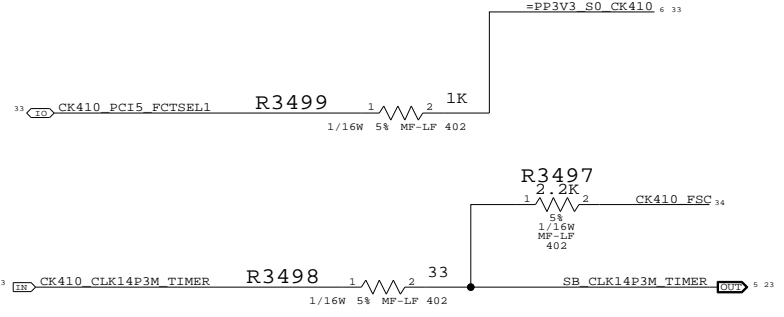
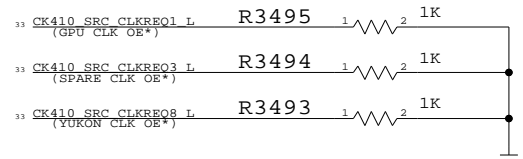
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SIZE	DRAWING NUMBER	REV.
D	051-6949	09
SCALE	SHT	OF
NONE	33	111

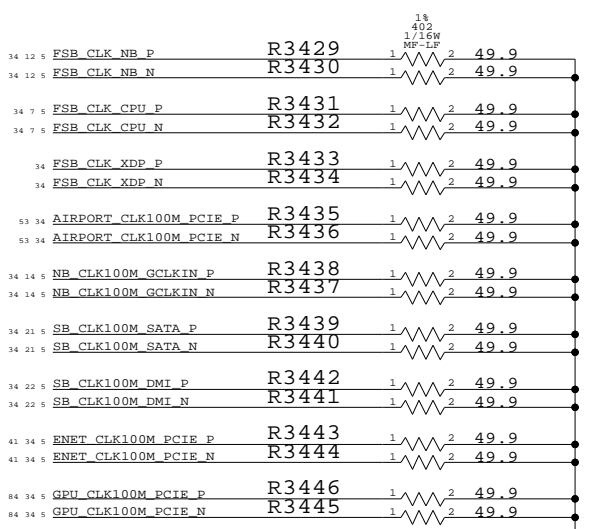
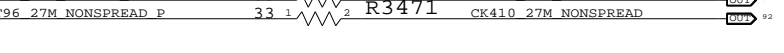
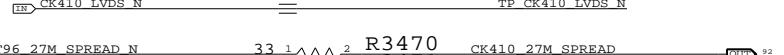
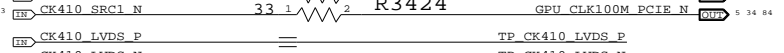
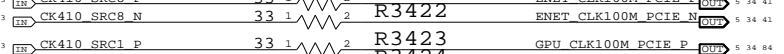
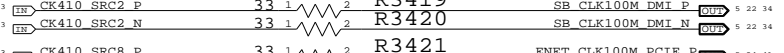
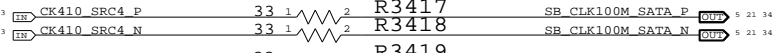
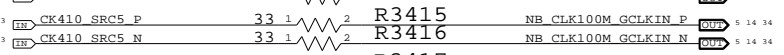
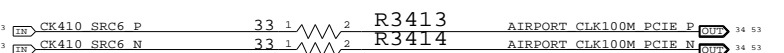
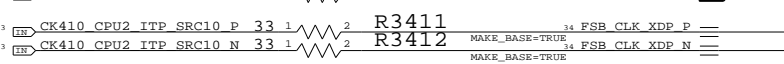
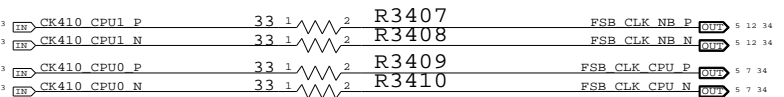
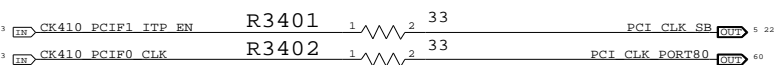
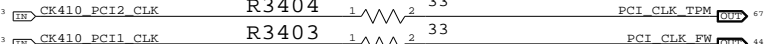
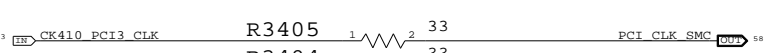
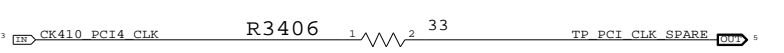
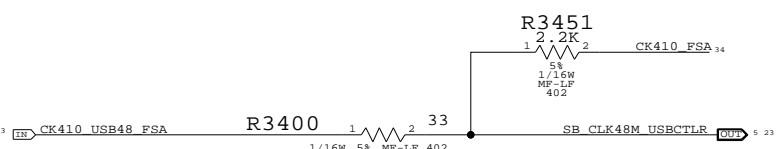
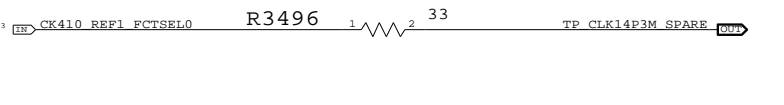
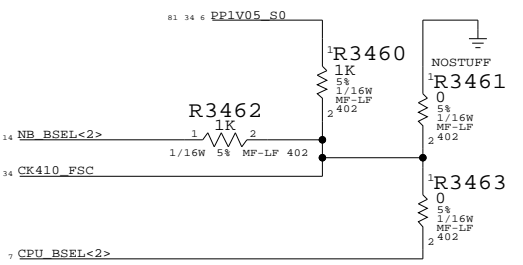
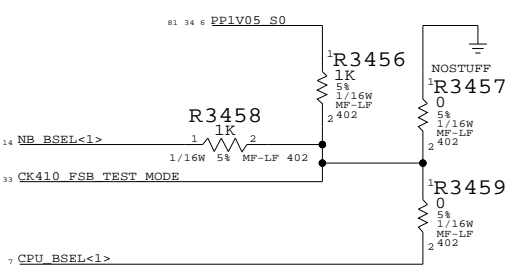
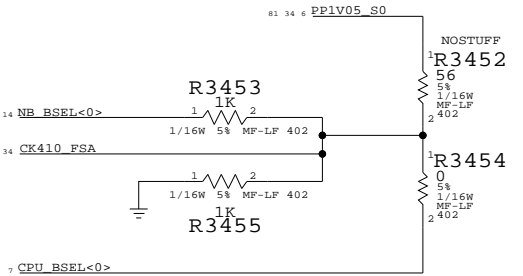


NOTE: USE THESE PULL-DOWNS IF NOT CONNECTED TO GPIO'S



FSB FREQUENCY SELECT:

	STUFF	NO STUFF
CPU DRIVEN	R3453 R3454 R3455	R3456 R3457
533MHZ (133MHZ CPU CLK)	R3452 R3461	R3458 R3459
667MHZ (166MHZ CPU CLK)	R3452 R3461	R3458 R3459



CLOCKS: TERMINATIONS

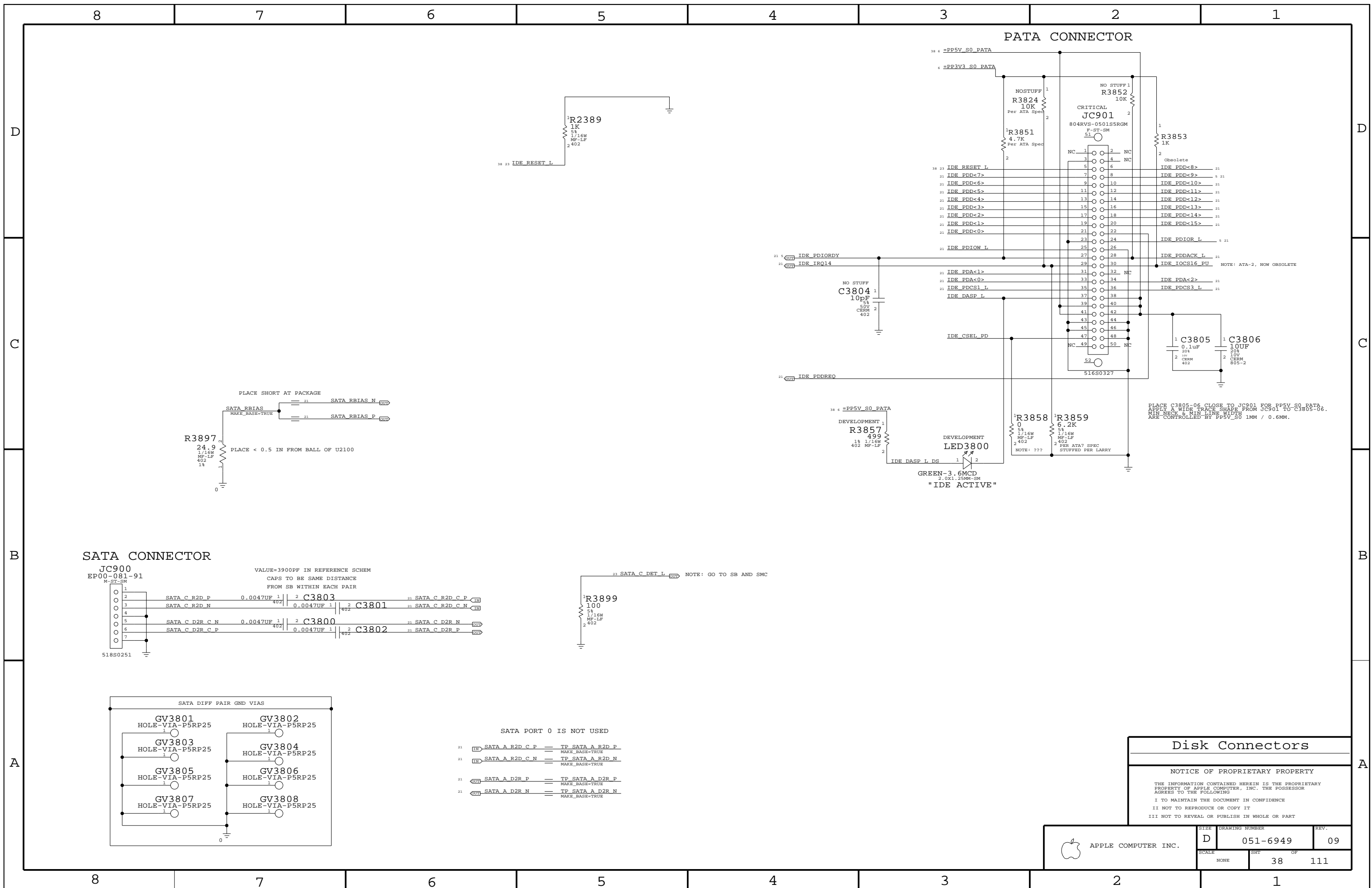
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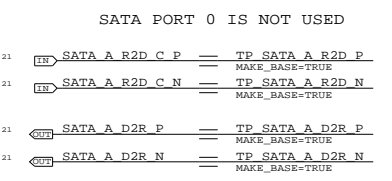
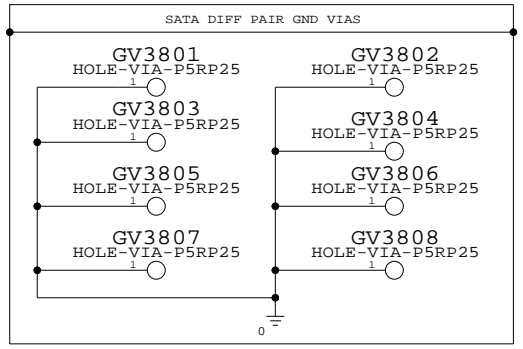
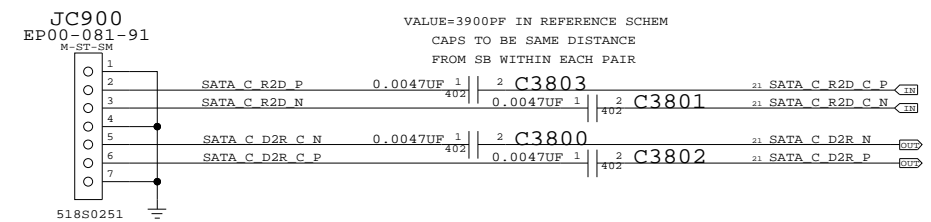
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APPLE COMPUTER INC.

SCALE	DRAWING NUMBER	REV.
NONE	D 051-6949	09
SHT	34	OF 111



**SATA CONNECTOR**



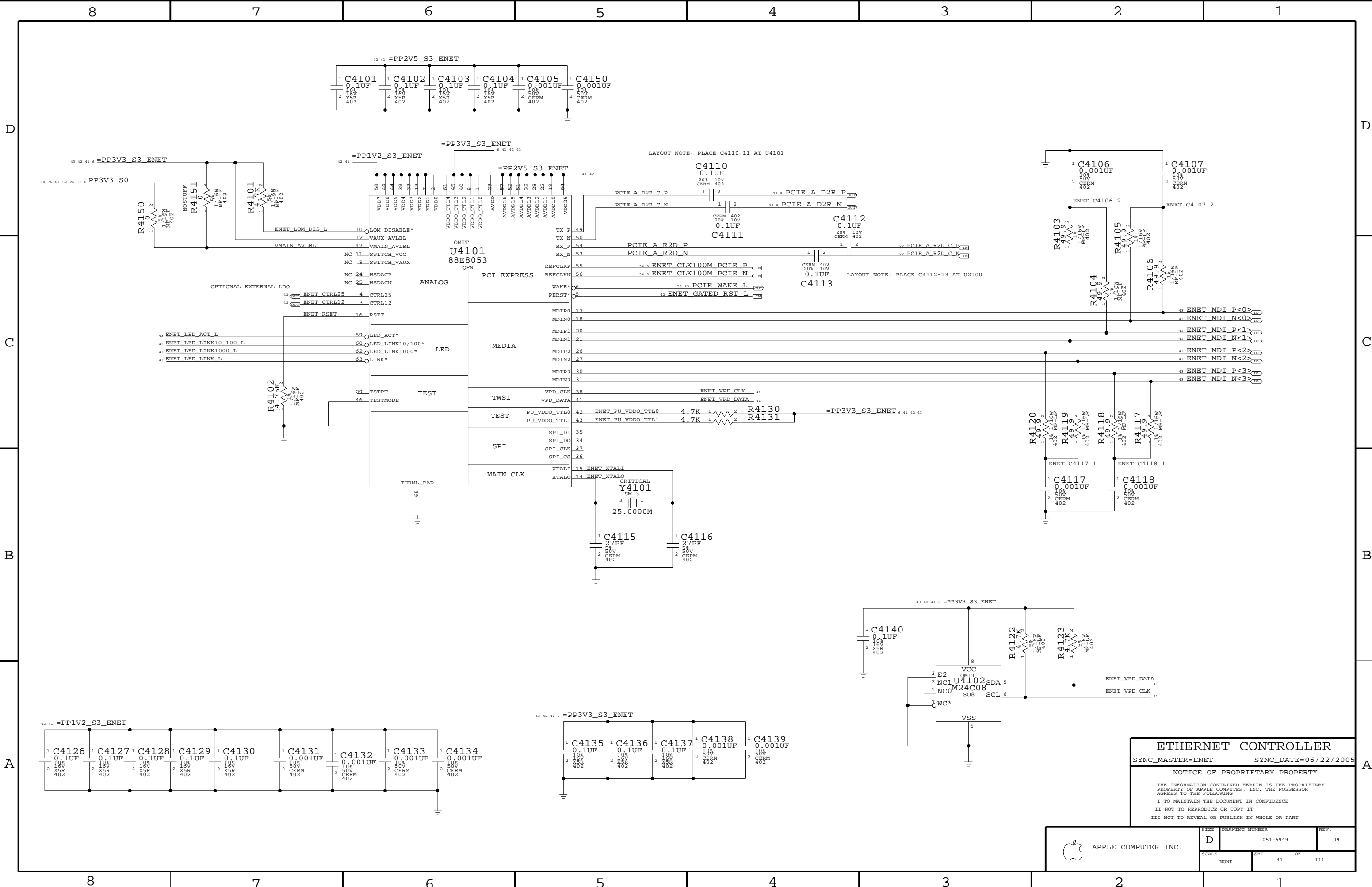
**Disk Connectors**

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	D	051-6949	09
SCALE	SHT OF		
NONE	38	111	

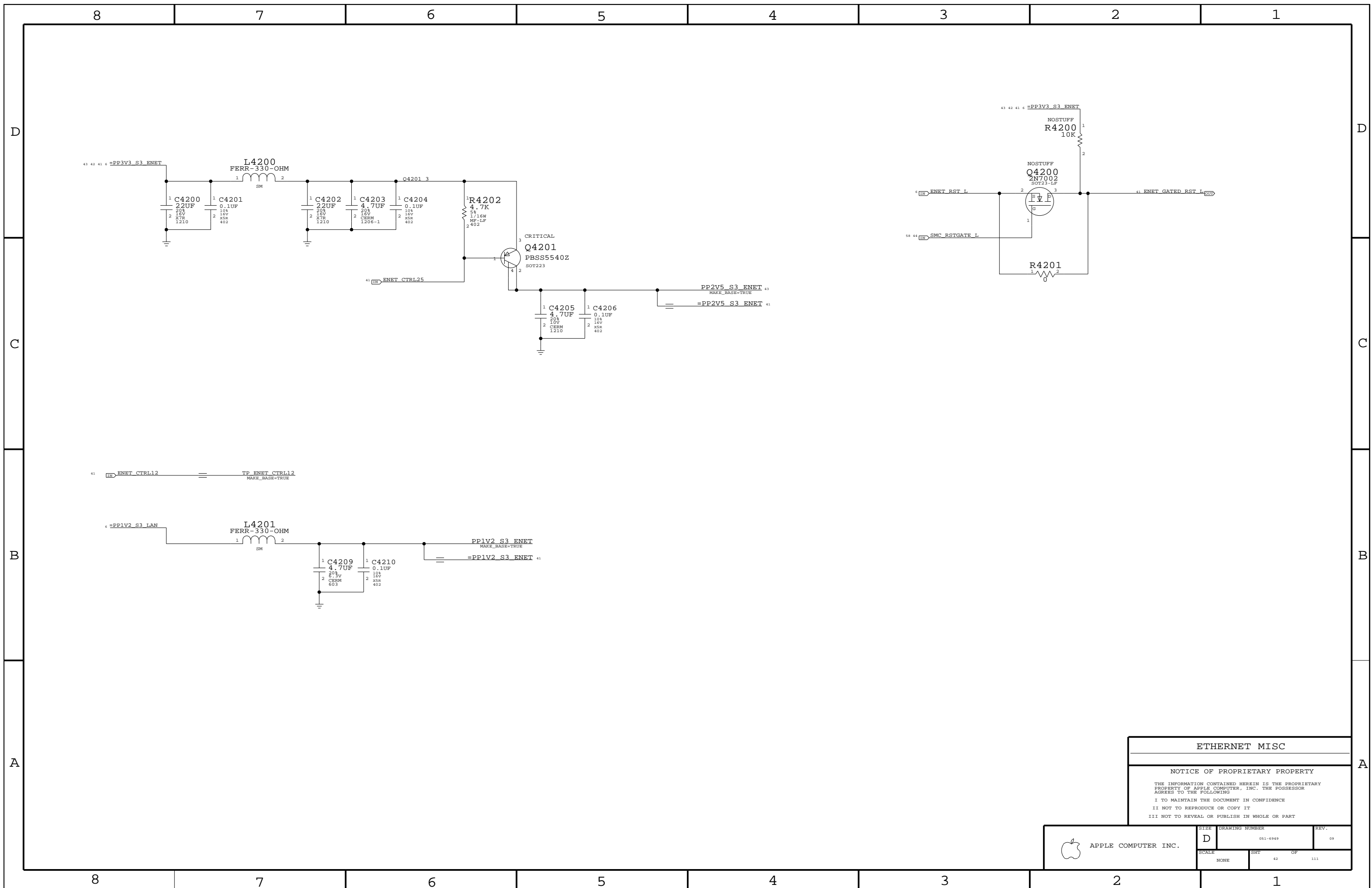


**ETHERNET CONTROLLER**  
 SYNC\_MASTER=ENET SYNC\_DATE=06/22/2005

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**ETHERNET MISC**

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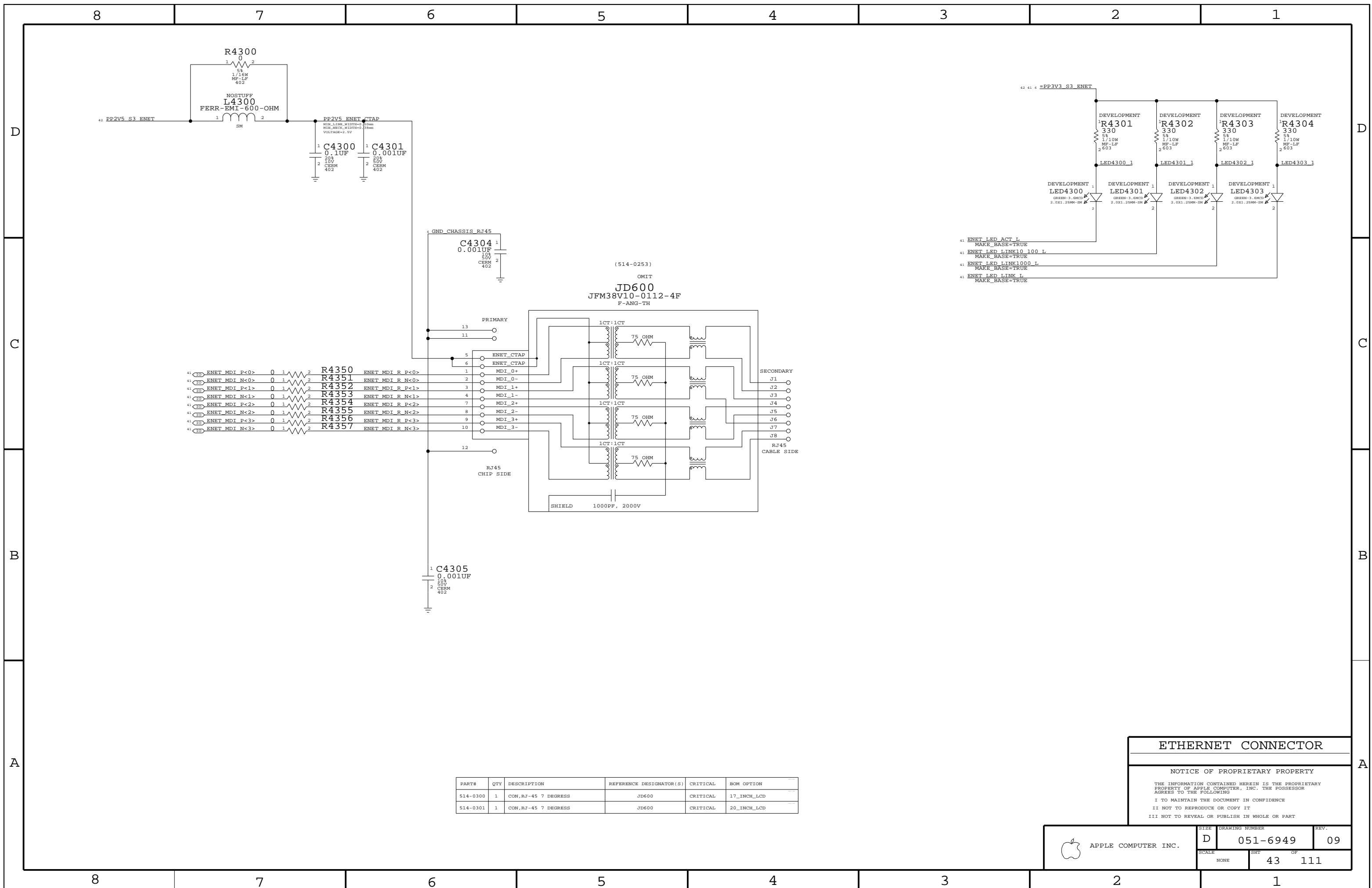
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APPLE COMPUTER INC.	SIZE <b>D</b>	DRAWING NUMBER 051-6949	REV. 09
	SCALE NONE	SHEET 42	OF 111



ENET MDI P<0>	0	1	2	R4350	ENET MDI R P<0>
ENET MDI N<0>	0	1	2	R4351	ENET MDI R N<0>
ENET MDI P<1>	0	1	2	R4352	ENET MDI R P<1>
ENET MDI N<1>	0	1	2	R4353	ENET MDI R N<1>
ENET MDI P<2>	0	1	2	R4354	ENET MDI R P<2>
ENET MDI N<2>	0	1	2	R4355	ENET MDI R N<2>
ENET MDI P<3>	0	1	2	R4356	ENET MDI R P<3>
ENET MDI N<3>	0	1	2	R4357	ENET MDI R N<3>

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0300	1	CON,RJ-45 7 DEGRESS	JD600	CRITICAL	17_INCH_LCD
514-0301	1	CON,RJ-45 7 DEGRESS	JD600	CRITICAL	20_INCH_LCD

**ETHERNET CONNECTOR**

NOTICE OF PROPRIETARY PROPERTY

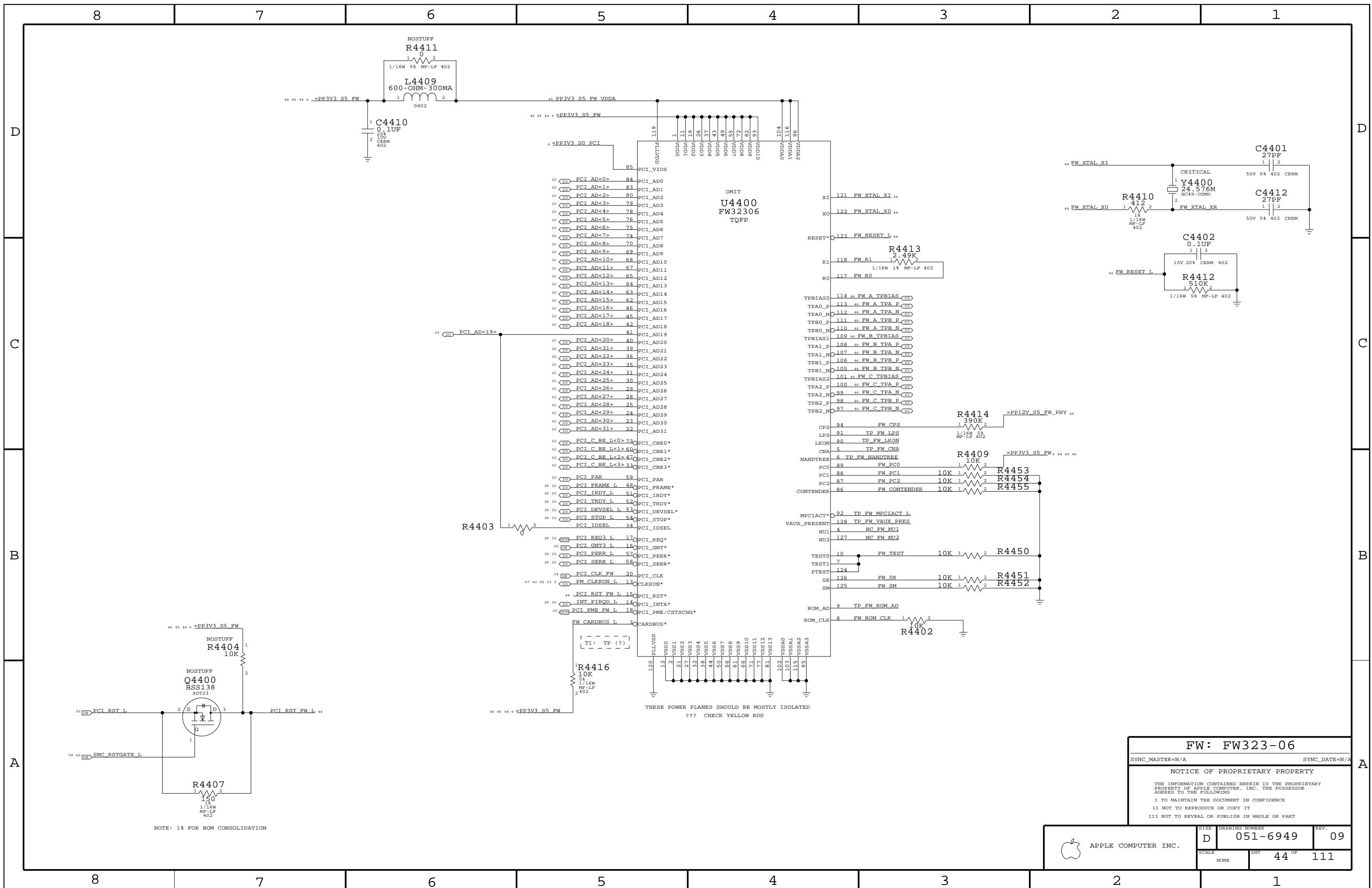
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	D	051-6949	09
SCALE	SHT		OF
NONE	43		111



THESE POWER PLANES SHOULD BE MOSTLY ISOLATED  
 ??? CHECK YELLOW EDS

NOTE: 1% FOR BOM CONSOLIDATION

**FW: FW323-06**

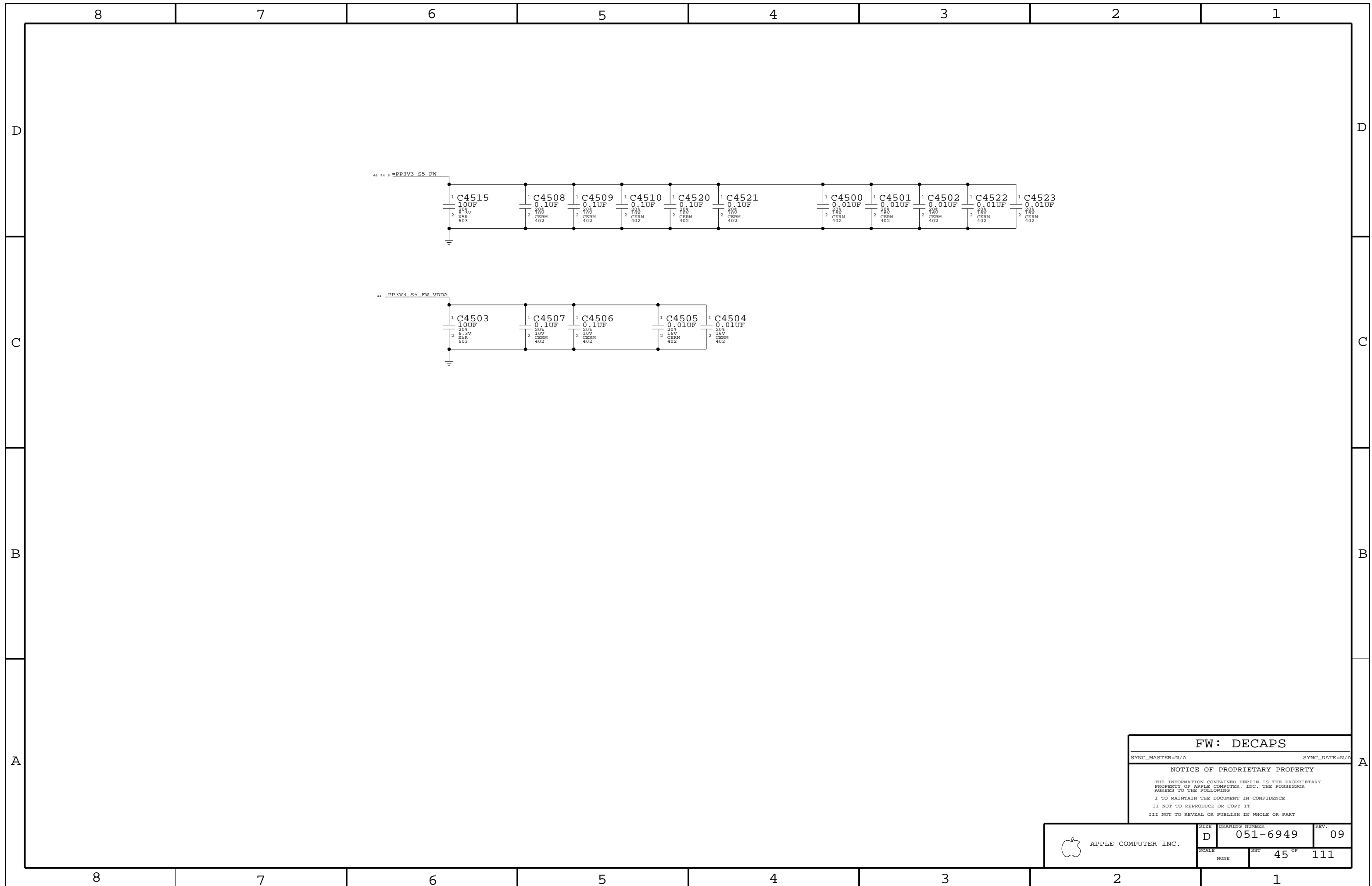
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	SCALE NONE	SHEET <b>44</b> OF <b>111</b>	



**FW: DECAPS**

SYNC\_MASTER=N/A SYNC\_DATE=N/A


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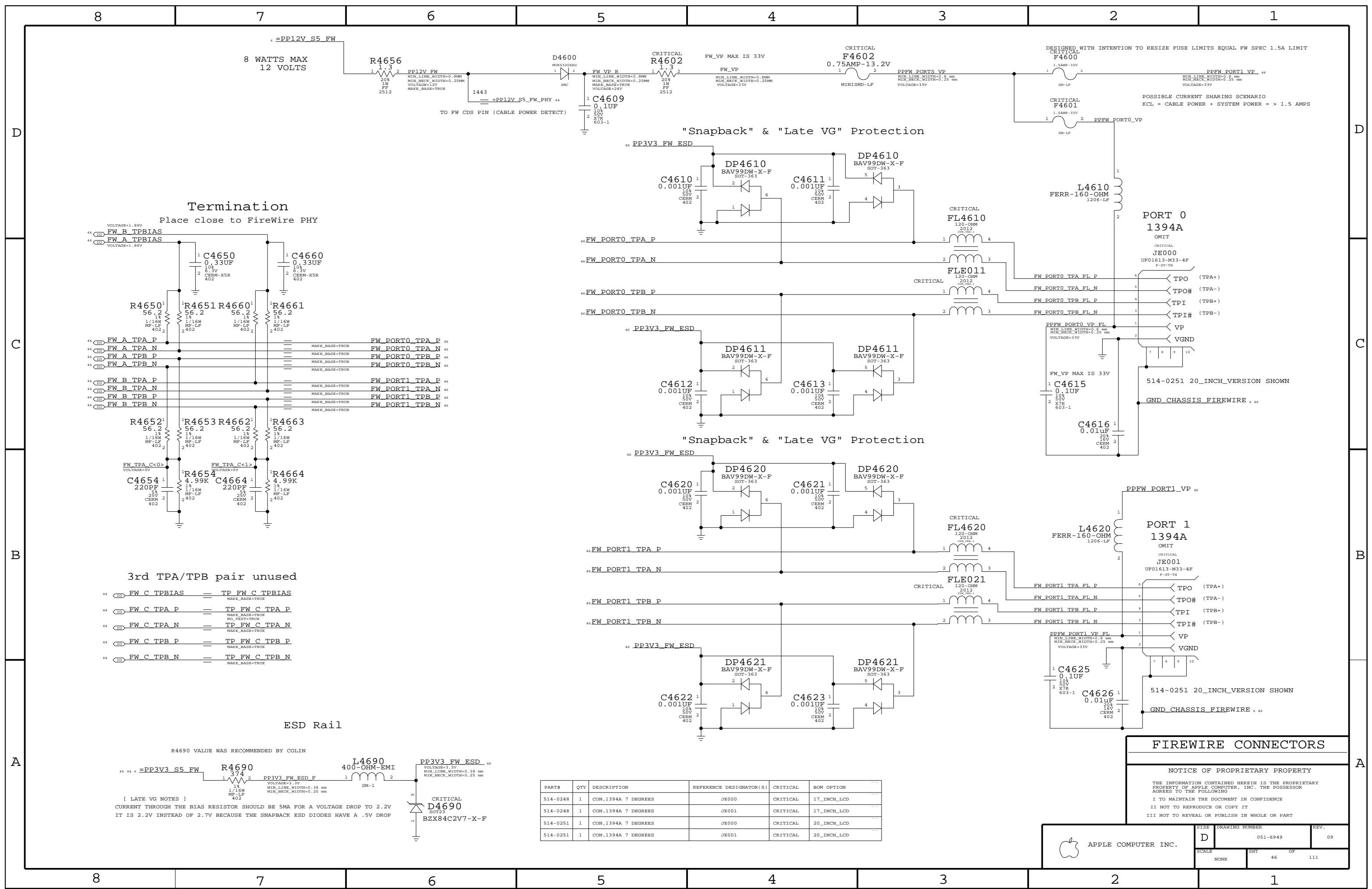
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	D	051-6949	09
SCALE		SHT	OF
NONE		45	111



**Termination**  
Place close to FireWire PHY

"Snapback" & "Late VG" Protection

"Snapback" & "Late VG" Protection

3rd TPA/TPB pair unused

ESD Rail

R4690 VALUE WAS RECOMMENDED BY COLIN

[ LATE VG NOTES ]  
CURRENT THROUGH THE BIAS RESISTOR SHOULD BE 5MA FOR A VOLTAGE DROP TO 2.2V  
IT IS 2.2V INSTEAD OF 2.7V BECAUSE THE SNAPBACK ESD DIODES HAVE A .5V DROP

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0248	1	CON, 1394A 7 DEGREES	JE000	CRITICAL	17_INCH_LCD
514-0248	1	CON, 1394A 7 DEGREES	JE001	CRITICAL	17_INCH_LCD
514-0251	1	CON, 1394A 7 DEGREES	JE000	CRITICAL	20_INCH_LCD
514-0251	1	CON, 1394A 7 DEGREES	JE001	CRITICAL	20_INCH_LCD

**FIREWIRE CONNECTORS**

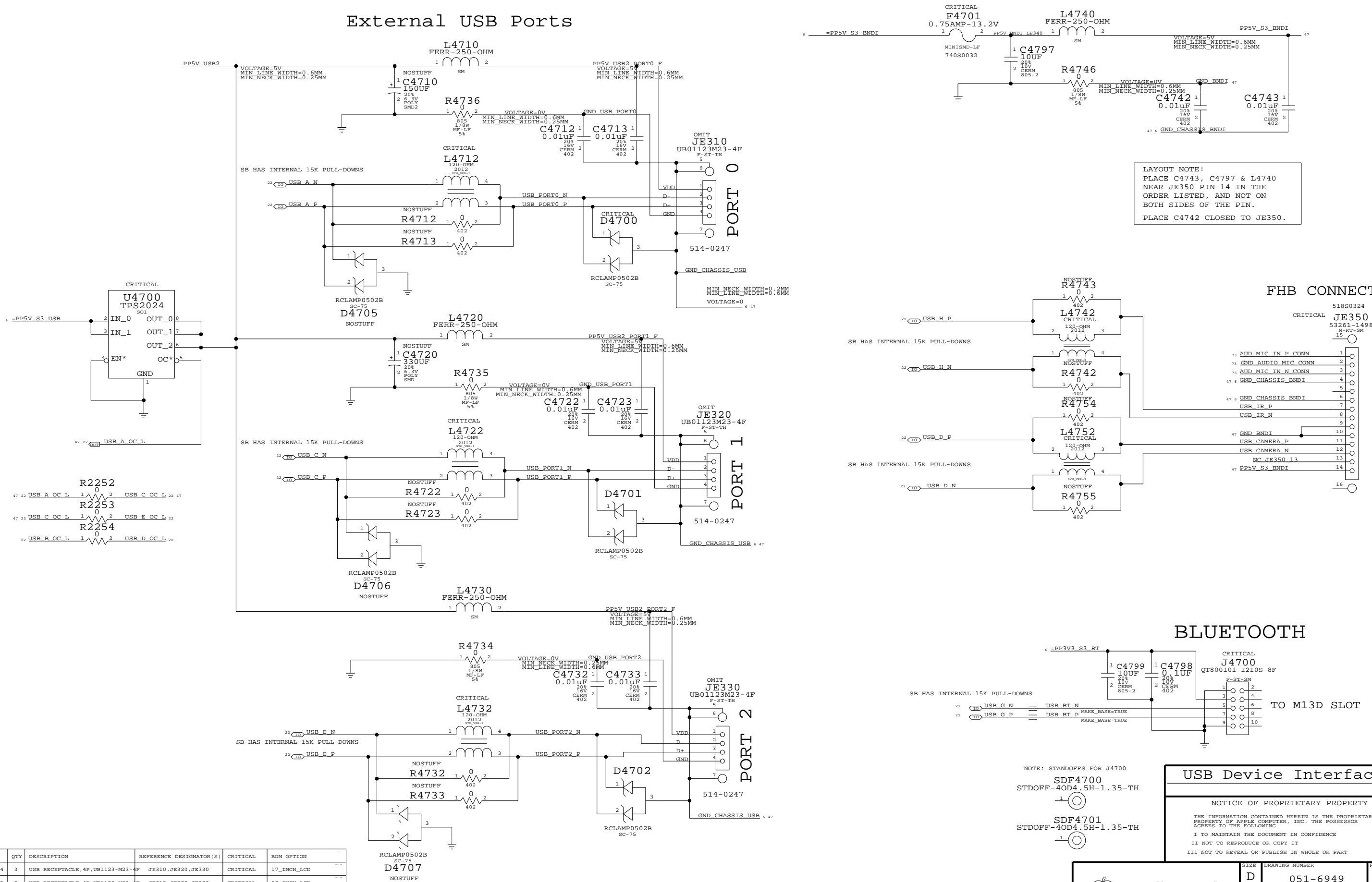
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	SCALE NONE	SHEET 46	OF 111



# External USB Ports



LAYOUT NOTE:  
PLACE C4743, C4797 & L4740  
NEAR JE350 PIN 14 IN THE  
ORDER LISTED, AND NOT ON  
BOTH SIDES OF THE PIN.  
PLACE C4742 CLOSED TO JE350.

## BLUETOOTH

NOTE: STANDOFFS FOR J4700  
SDF4700  
STDOFF-40D4.5H-1.35-TH  
SDF4701  
STDOFF-40D4.5H-1.35-TH

## USB Device Interfaces

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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0294	3	USB RECEPTACLE, 4P, UB1123-M23-4F	JE310, JE320, JE330	CRITICAL	17_INCH_LCD
514-0295	3	USB RECEPTACLE, 4P, UB1123-M33-4F	JE310, JE320, JE330	CRITICAL	20_INCH_LCD

APPLE COMPUTER INC.	SCALE	SHT	OF
	NONE	47	111

8

7

6

5

4

3

2

1

D

D

C

C

B

B

A

A

8

7

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3

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1

BLANK

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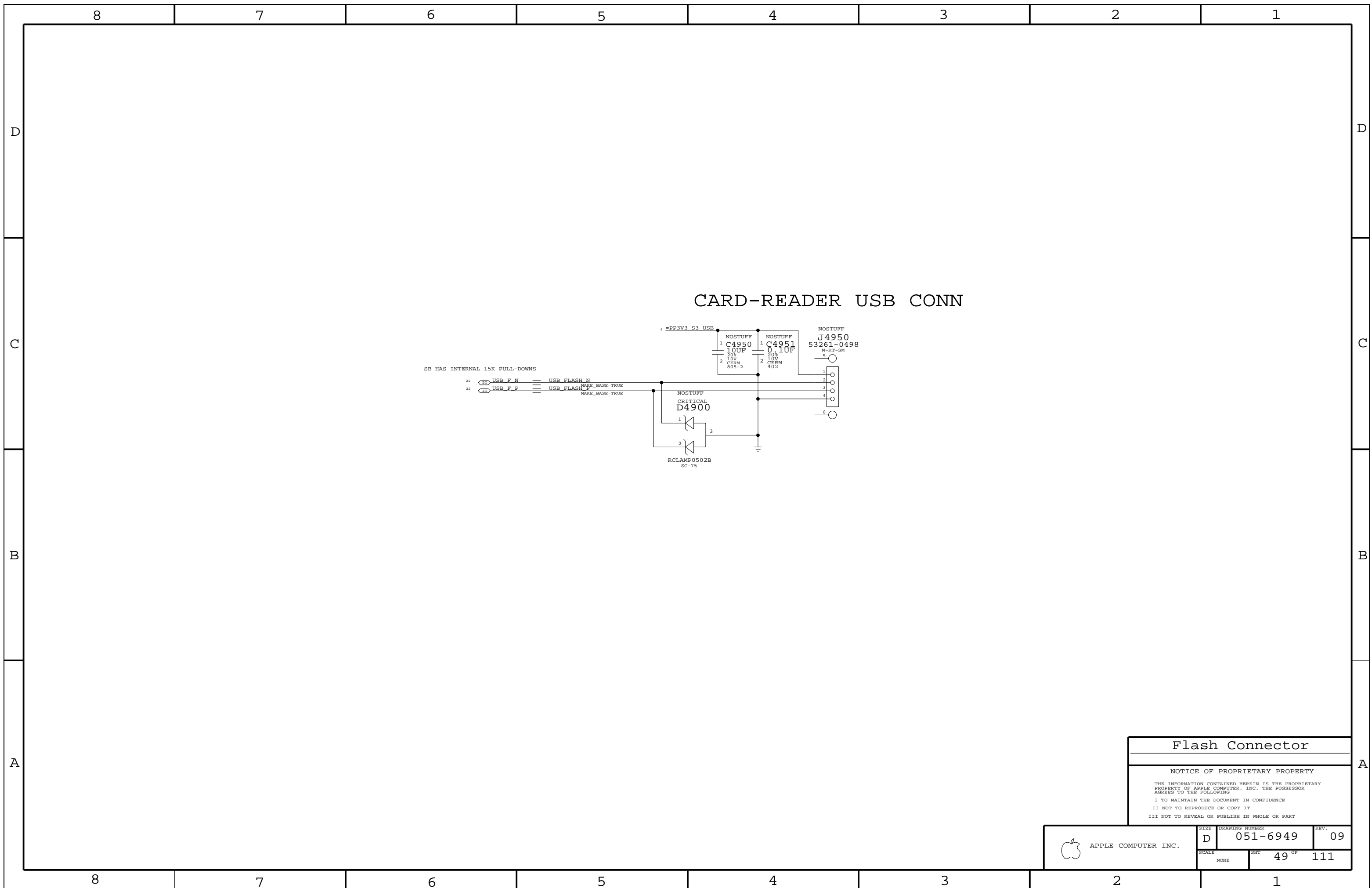
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SIZE	DRAWING NUMBER	REV.
D	051-6949	09
SCALE	SHT	OF
NONE	48	111



**Flash Connector**

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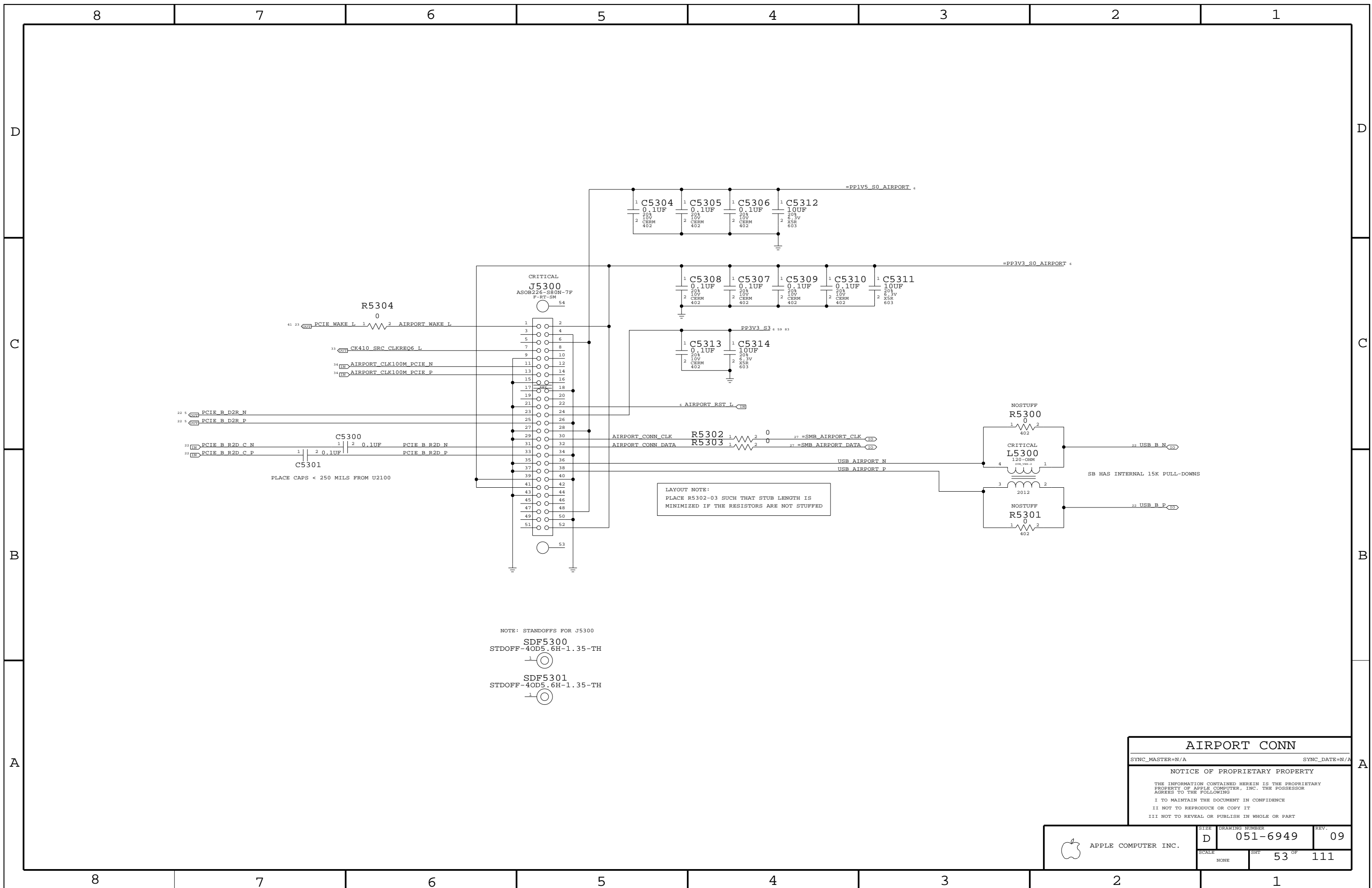
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	SCALE NONE	SHIT <b>49</b> OF	<b>111</b>



**AIRPORT CONN**

SYNC\_MASTER=N/A SYNC\_DATE=N/A

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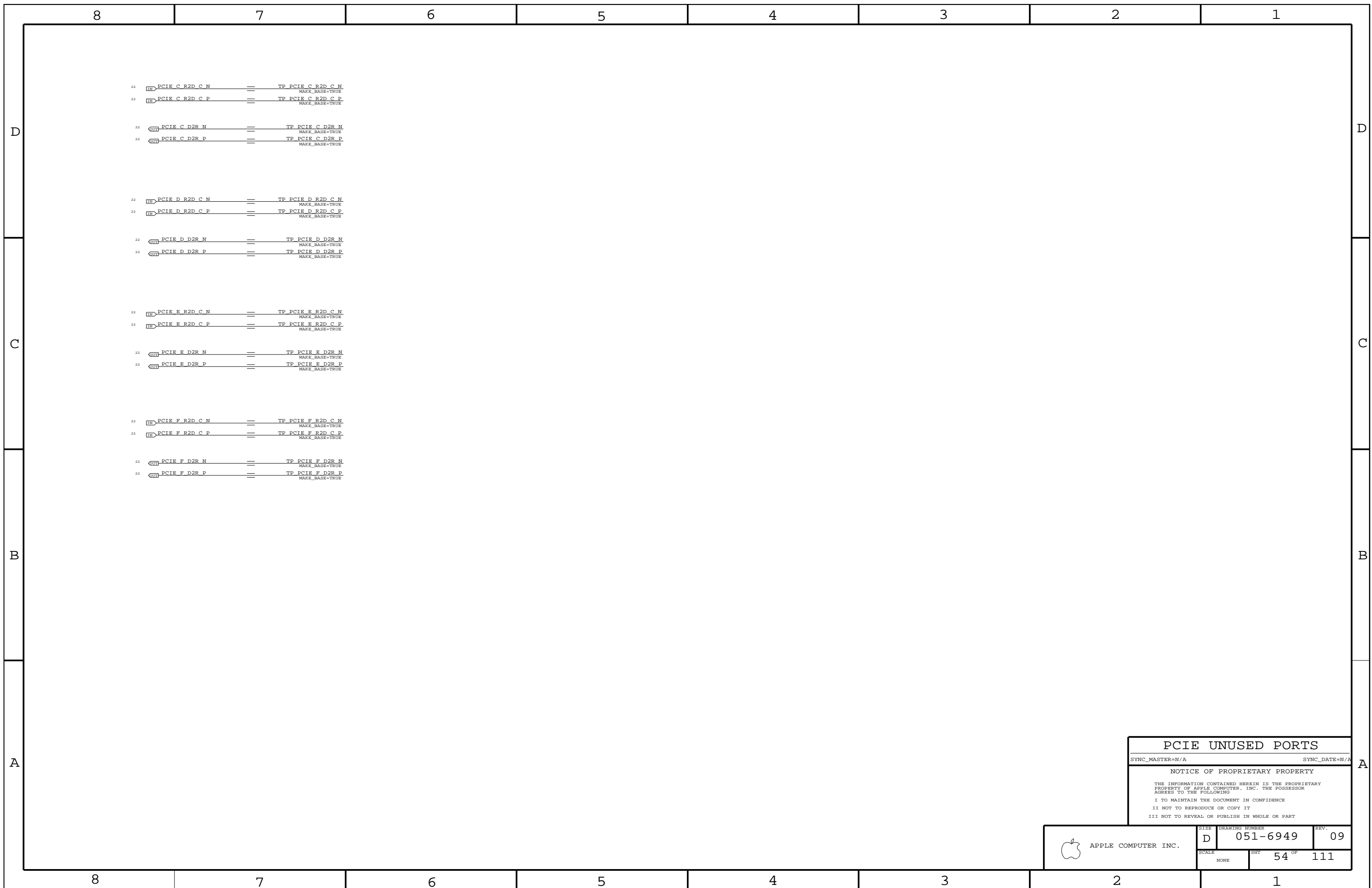
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	SCALE NONE	SHEET <b>53</b> OF	TOTAL SHEETS <b>111</b>



22	IN	PCIE C R2D C N	==	TP PCIE C R2D C N	MAKE_BASE=TRUE
22	IN	PCIE C R2D C P	==	TP PCIE C R2D C P	MAKE_BASE=TRUE
22	OUT	PCIE C D2R N	==	TP PCIE C D2R N	MAKE_BASE=TRUE
22	OUT	PCIE C D2R P	==	TP PCIE C D2R P	MAKE_BASE=TRUE
22	IN	PCIE D R2D C N	==	TP PCIE D R2D C N	MAKE_BASE=TRUE
22	IN	PCIE D R2D C P	==	TP PCIE D R2D C P	MAKE_BASE=TRUE
22	OUT	PCIE D D2R N	==	TP PCIE D D2R N	MAKE_BASE=TRUE
22	OUT	PCIE D D2R P	==	TP PCIE D D2R P	MAKE_BASE=TRUE
22	IN	PCIE E R2D C N	==	TP PCIE E R2D C N	MAKE_BASE=TRUE
22	IN	PCIE E R2D C P	==	TP PCIE E R2D C P	MAKE_BASE=TRUE
22	OUT	PCIE E D2R N	==	TP PCIE E D2R N	MAKE_BASE=TRUE
22	OUT	PCIE E D2R P	==	TP PCIE E D2R P	MAKE_BASE=TRUE
22	IN	PCIE F R2D C N	==	TP PCIE F R2D C N	MAKE_BASE=TRUE
22	IN	PCIE F R2D C P	==	TP PCIE F R2D C P	MAKE_BASE=TRUE
22	OUT	PCIE F D2R N	==	TP PCIE F D2R N	MAKE_BASE=TRUE
22	OUT	PCIE F D2R P	==	TP PCIE F D2R P	MAKE_BASE=TRUE

**PCIE UNUSED PORTS**

SYNC\_MASTER=N/A SYNC\_DATE=N/A

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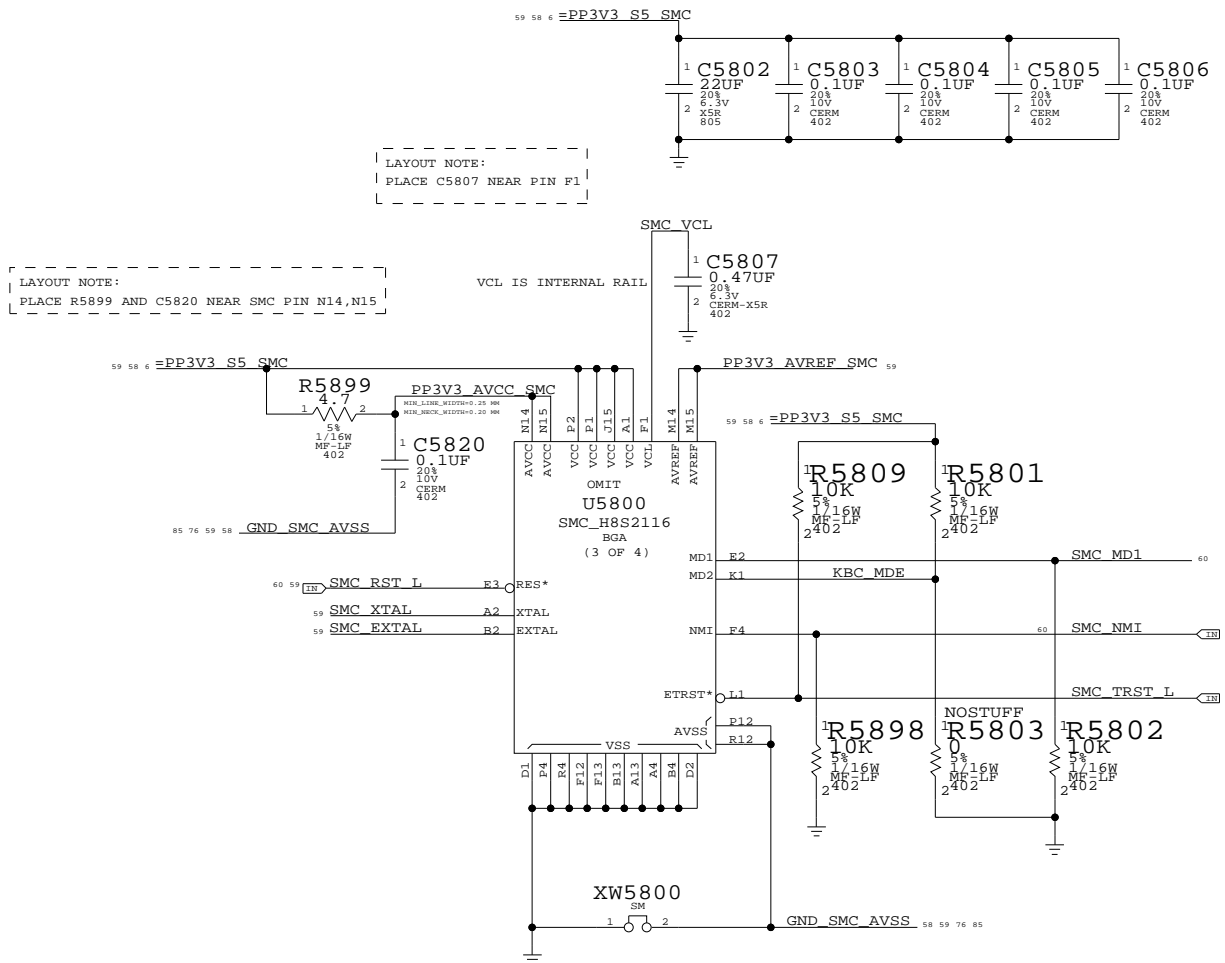
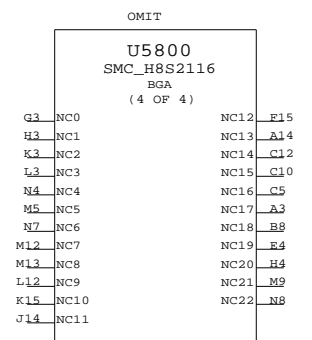
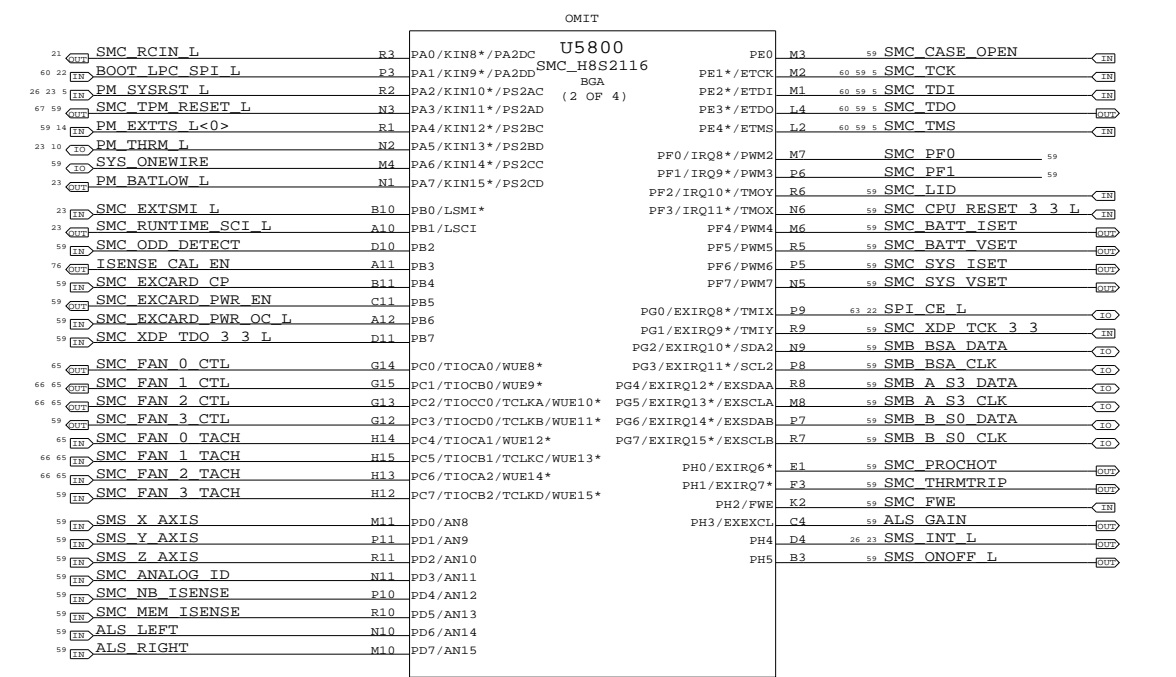
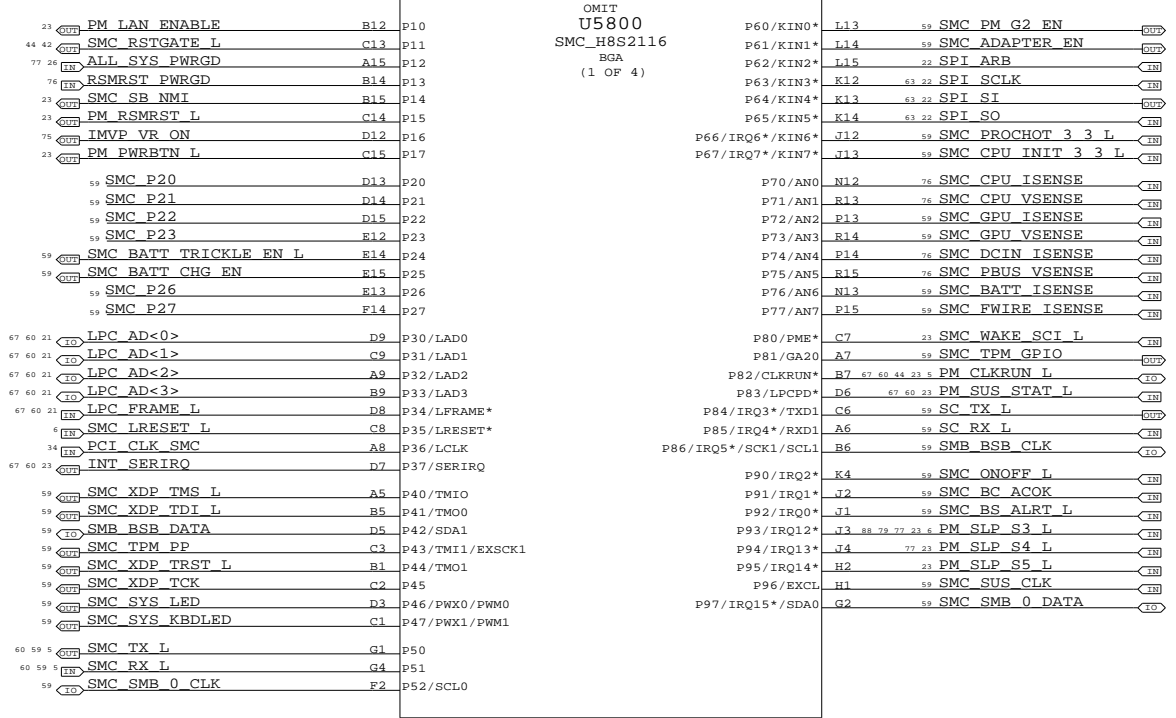
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	D	051-6949	09
	SCALE	SHT	OF
	NONE	54	111

UNUSED PINS HAVE THE FORMAT SMC\_XXX WHERE XXX IS THE PORT NUMBER. THEY ARE SET BY SOFTWARE TO BE DRIVEN OUTPUTS ALWAYS SO THEY CAN BE LEFT NO-CONNECTED.

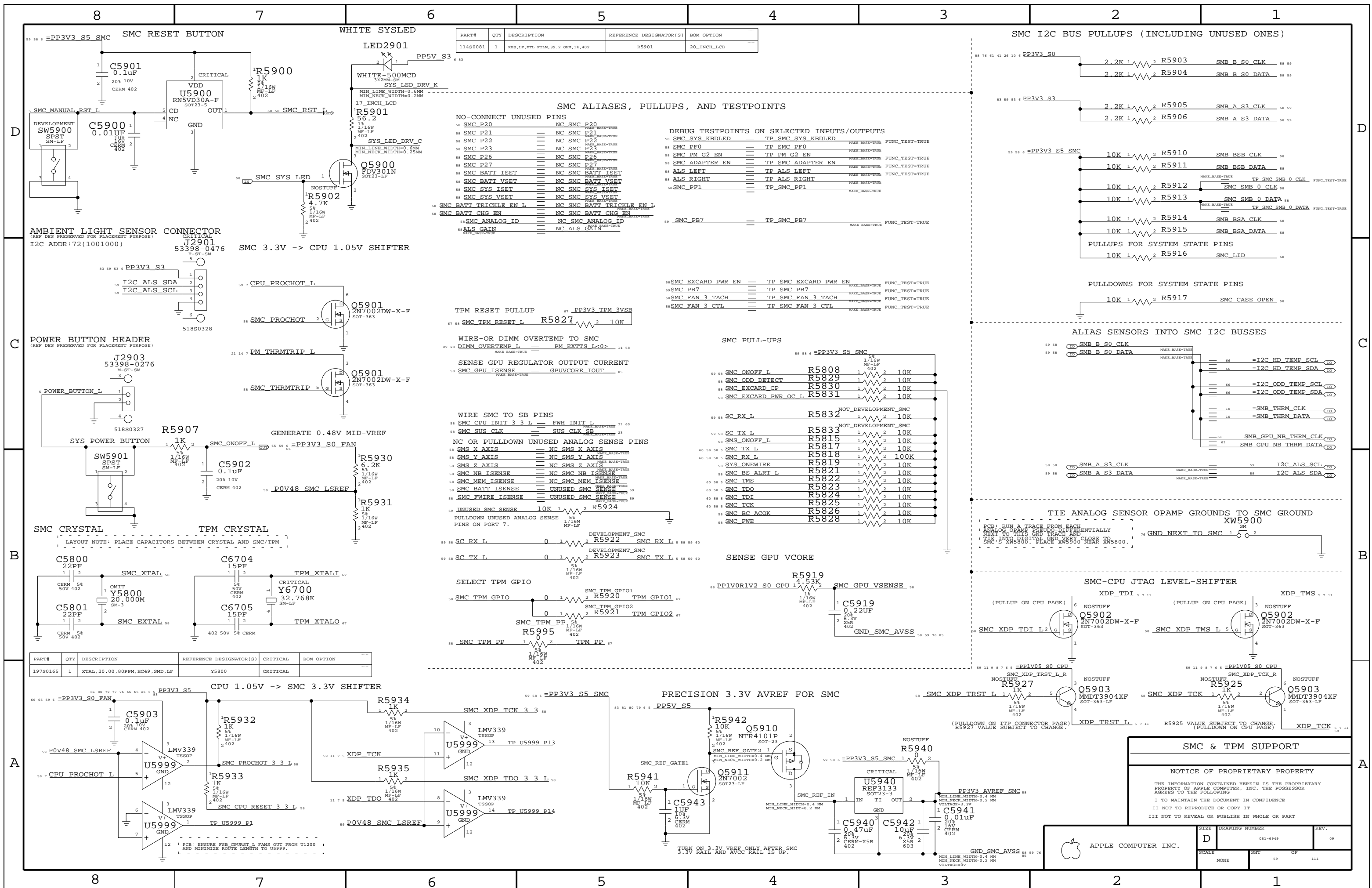


LAYOUT NOTE: PLACE C5807 NEAR PIN F1

LAYOUT NOTE: PLACE R5899 AND C5820 NEAR SMC PIN N14,N15

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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
11450081	1	RES,LP,WTL FILM,39.2 OHM,14,402	R5901	20_INCH_LCD

### SMC ALIASES, PULLUPS, AND TESTPOINTS

NO-CONNECT UNUSED PINS	DEBUG TESTPOINTS ON SELECTED INPUTS/OUTPUTS
58 SMC P20 == NC SMC P20	58 SMC SYS_KBDLED == TP_SMC_SYS_KBDLED MAKE_BASE=TRUE FUNC_TEST=TRUE
58 SMC P21 == NC SMC P21	58 SMC PF0 == TP_SMC_PF0 MAKE_BASE=TRUE
58 SMC P22 == NC SMC P22	58 SMC PM_G2_EN == TP_PM_G2_EN MAKE_BASE=TRUE FUNC_TEST=TRUE
58 SMC P23 == NC SMC P23	58 SMC_ADAPTER_EN == TP_SMC_ADAPTER_EN MAKE_BASE=TRUE FUNC_TEST=TRUE
58 SMC P26 == NC SMC P26	58 ALS_LEFT == TP_ALS_LEFT MAKE_BASE=TRUE FUNC_TEST=TRUE
58 SMC P27 == NC SMC P27	58 ALS_RIGHT == TP_ALS_RIGHT MAKE_BASE=TRUE FUNC_TEST=TRUE
58 SMC_BATT_ISET == NC SMC_BATT_ISET	58 SMC_PF1 == TP_SMC_PF1 MAKE_BASE=TRUE
58 SMC_BATT_VSET == NC SMC_BATT_VSET	
58 SMC_SYS_ISET == NC SMC_SYS_ISET	
58 SMC_SYS_VSET == NC SMC_SYS_VSET	
58 SMC_BATT_TRICKLE_EN_L == NC SMC_BATT_TRICKLE_EN_L	
58 SMC_BATT_CHG_EN == NC SMC_BATT_CHG_EN	
58 SMC_ANALOG_ID == NC SMC_ANALOG_ID	
58 ALS_GAIN == NC ALS_GAIN	
	59 SMC_PB7 == TP_SMC_PB7 MAKE_BASE=TRUE FUNC_TEST=TRUE
	58 SMC_EXCARD_PWR_EN == TP_SMC_EXCARD_PWR_EN MAKE_BASE=TRUE FUNC_TEST=TRUE
	58 SMC_PB7 == TP_SMC_PB7 MAKE_BASE=TRUE FUNC_TEST=TRUE
	58 SMC_FAN_3_TACH == TP_SMC_FAN_3_TACH MAKE_BASE=TRUE FUNC_TEST=TRUE
	58 SMC_FAN_3_CTL == TP_SMC_FAN_3_CTL MAKE_BASE=TRUE FUNC_TEST=TRUE

### SMC PULL-UPS

58 SMC_ONOFF_L	R5808	10K
58 SMC_ODD_DETECT	R5829	10K
58 SMC_EXCARD_CP	R5830	10K
58 SMC_EXCARD_PWR_OC_L	R5831	10K
58 SC_RX_L	R5832	10K
58 SC_TX_L	R5833	10K
58 SMS_ONOFF_L	R5815	10K
58 SMC_TX_L	R5817	10K
58 SMC_RX_L	R5818	100K
58 SYS_ONEWIRE	R5819	10K
58 SMC_BS_ALERT_L	R5821	10K
58 SMC_TMS	R5822	10K
58 SMC_TDO	R5823	10K
58 SMC_TDI	R5824	10K
58 SMC_TCK	R5825	10K
58 SMC_BC_ACOK	R5826	10K
58 SMC_FWE	R5828	10K

### WIRE SMC TO SB PINS

58 SMC_CPU_INIT_3_3_L	FWH_INIT_L	21
58 SMC_SUS_CLK	SUS_CLK_SB	23
58 SMS_X_AXIS	NC_SMS_X_AXIS	
58 SMS_Y_AXIS	NC_SMS_Y_AXIS	
58 SMS_Z_AXIS	NC_SMS_Z_AXIS	
58 SMC_NB_ISENSE	NC_SMC_NB_ISENSE	
58 SMC_MEM_ISENSE	NC_SMC_MEM_ISENSE	
58 SMC_BATT_ISENSE	UNUSED_SMC_ISENSE	
58 SMC_FWIRE_ISENSE	UNUSED_SMC_ISENSE	

### WIRE SMC TO SB PINS

58 SMC_CPU_INIT_3_3_L	FWH_INIT_L	21
58 SMC_SUS_CLK	SUS_CLK_SB	23
58 SMC_TPM_PP	R5995	10K
58 SMC_TPM_PP	R5995	10K
58 SMC_TPM_PP	R5995	10K

### SELECT TPM GPIO

58 SMC_TPM_GPIO	R5920	TPM_GPIO1
58 SMC_TPM_GPIO	R5921	TPM_GPIO2
58 SMC_TPM_PP	R5995	TPM_PP

### SENSE GPU VCORE

58 SMC_GPU_VSENSE	R5919	4.53K
-------------------	-------	-------

### SENSE GPU VCORE

58 SMC_GPU_VSENSE	R5919	4.53K
-------------------	-------	-------

### PRECISION 3.3V AVREF FOR SMC

58 SMC_REF_GATE1	R5941	10K
58 SMC_REF_GATE2	R5942	10K
58 SMC_REF_GATE3	R5943	10K

### PRECISION 3.3V AVREF FOR SMC

58 SMC_REF_GATE1	R5941	10K
58 SMC_REF_GATE2	R5942	10K
58 SMC_REF_GATE3	R5943	10K

### PRECISION 3.3V AVREF FOR SMC

58 SMC_REF_GATE1	R5941	10K
58 SMC_REF_GATE2	R5942	10K
58 SMC_REF_GATE3	R5943	10K

### PRECISION 3.3V AVREF FOR SMC

58 SMC_REF_GATE1	R5941	10K
58 SMC_REF_GATE2	R5942	10K
58 SMC_REF_GATE3	R5943	10K

### PRECISION 3.3V AVREF FOR SMC

58 SMC_REF_GATE1	R5941	10K
58 SMC_REF_GATE2	R5942	10K
58 SMC_REF_GATE3	R5943	10K

### PRECISION 3.3V AVREF FOR SMC

58 SMC_REF_GATE1	R5941	10K
58 SMC_REF_GATE2	R5942	10K
58 SMC_REF_GATE3	R5943	10K

TURN ON 3.3V VREF ONLY AFTER SMC 3.3V RAIL AND AVCC RAIL IS UP.

### SMC & TPM SUPPORT

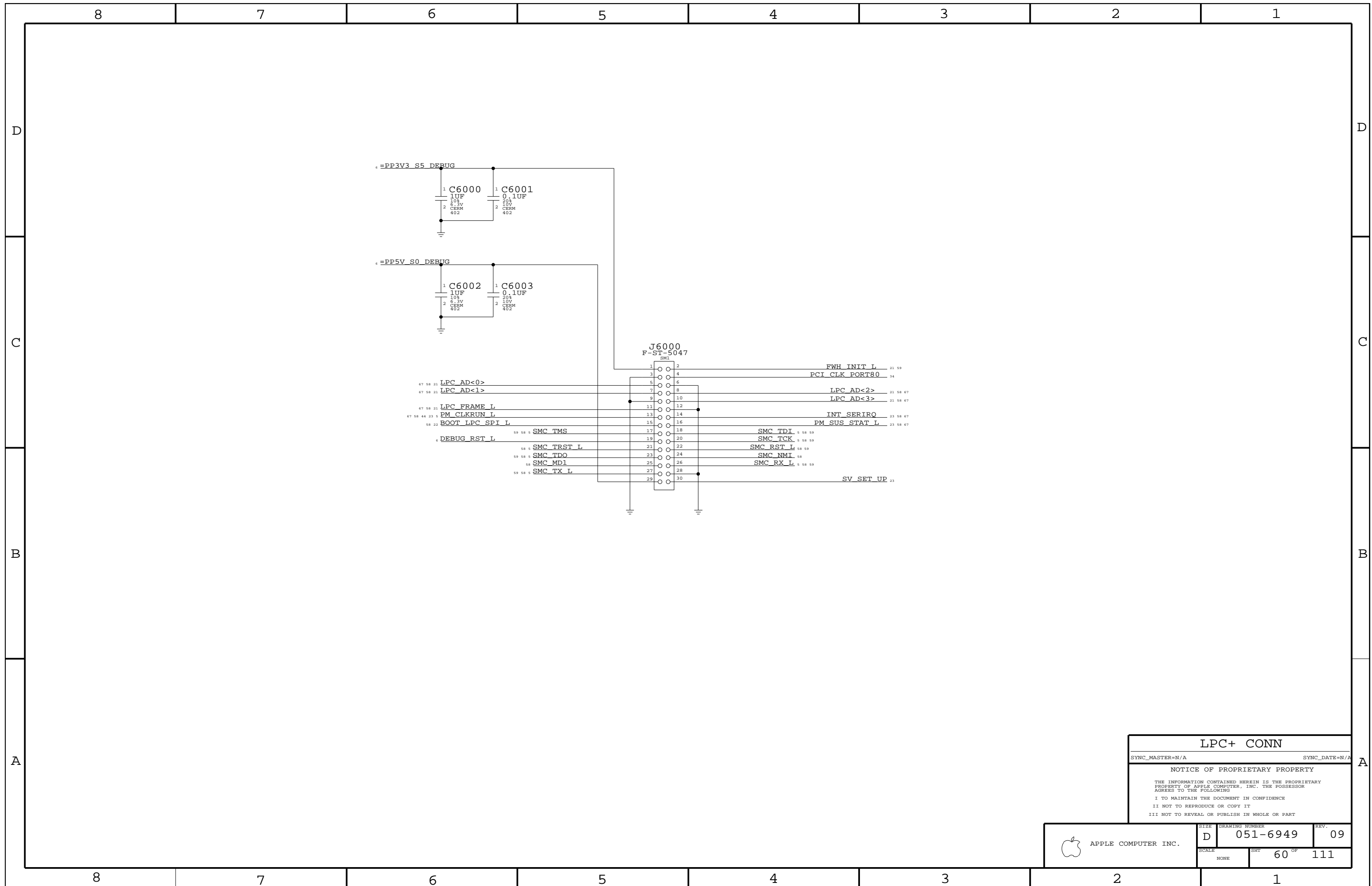
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NONE	59	111



LPC+ CONN

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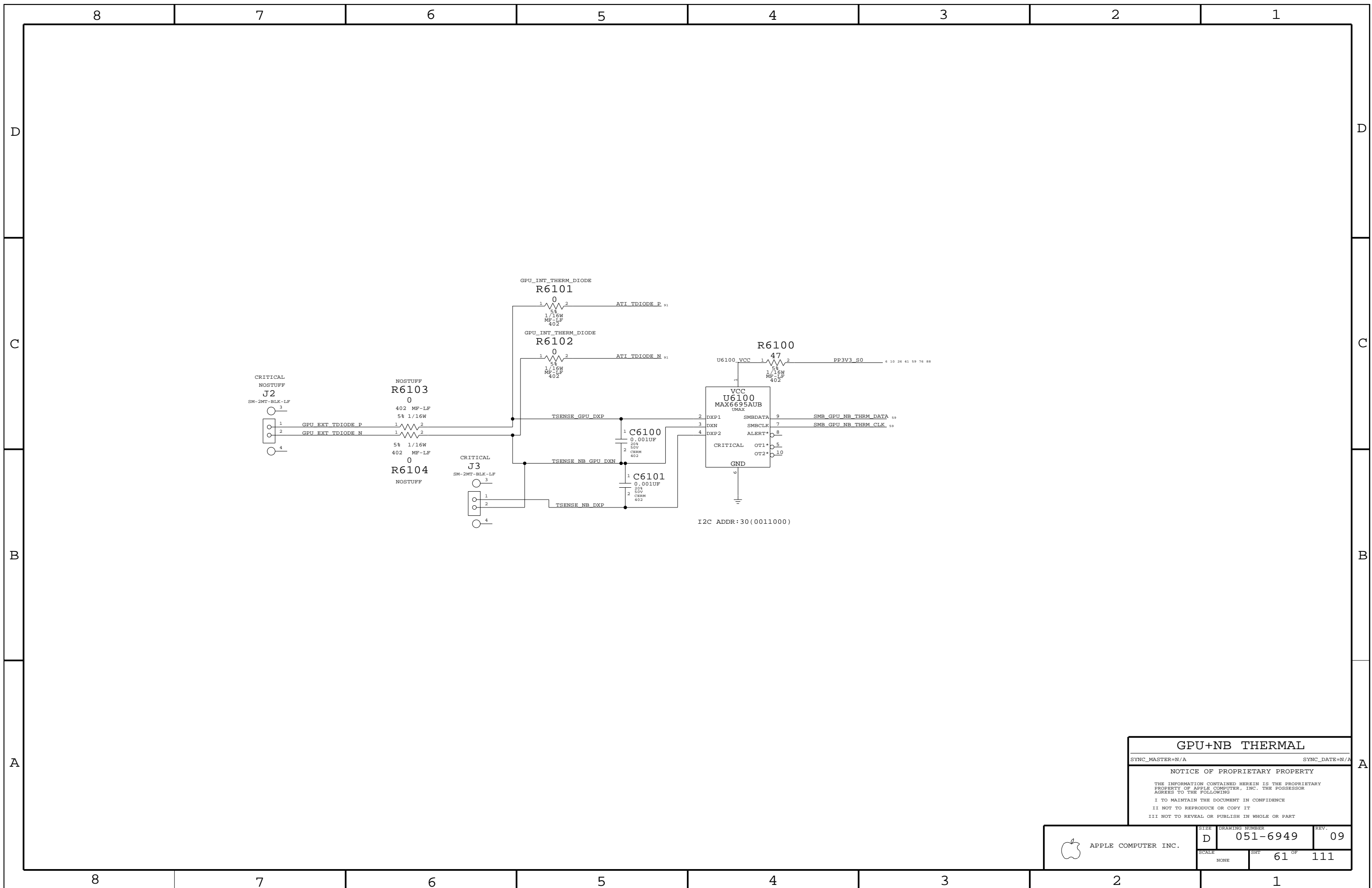
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SCALE	SHT		OF
NONE	60		111





**GPU+NB THERMAL**

SYNC\_MASTER=N/A SYNC\_DATE=N/A

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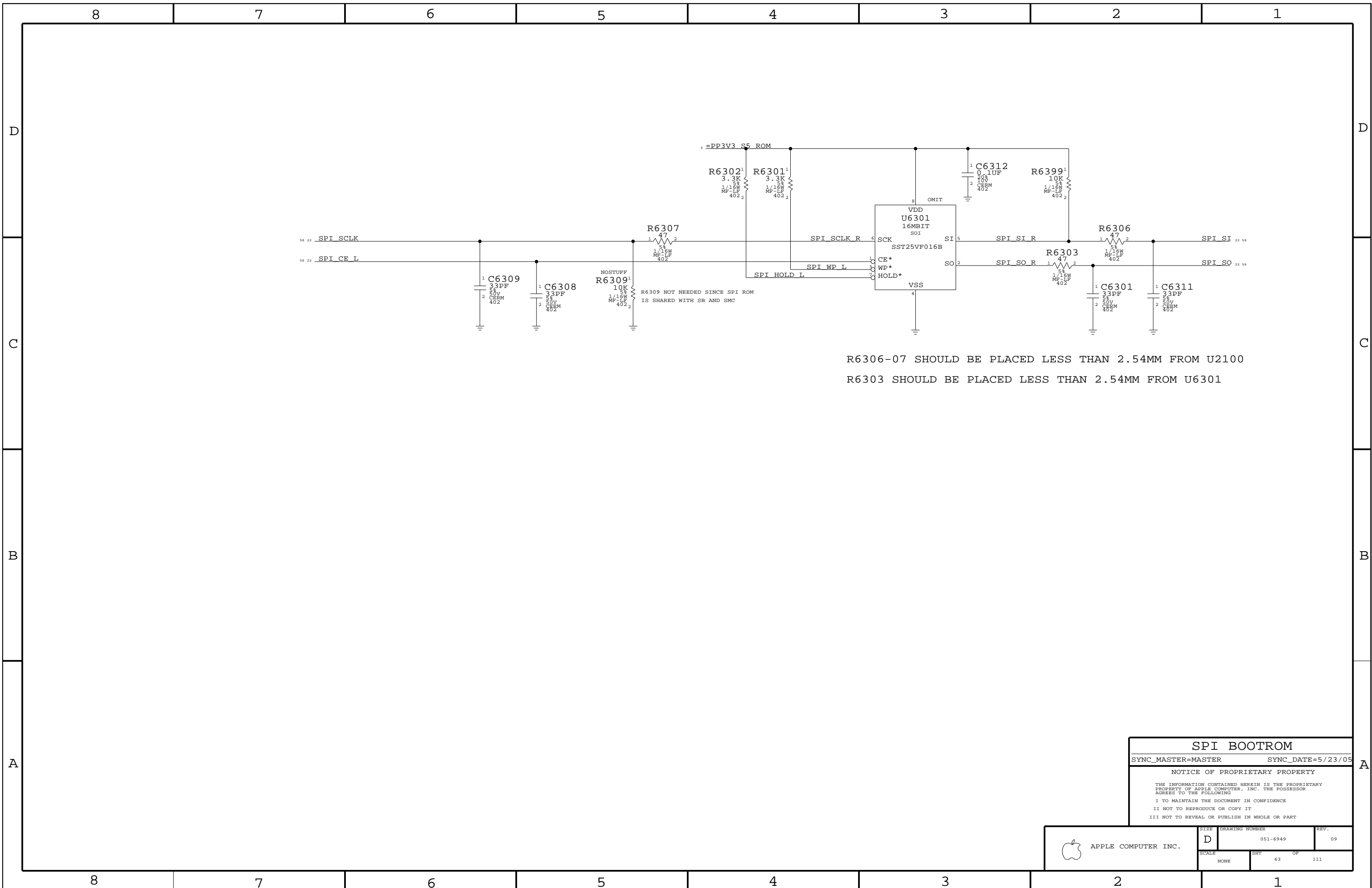
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	D	051-6949	09
SCALE	SHT		OF
NONE	61		111



R6306-07 SHOULD BE PLACED LESS THAN 2.54MM FROM U2100  
 R6303 SHOULD BE PLACED LESS THAN 2.54MM FROM U6301

**SPI BOOTROM**  
 SYNC\_MASTER=MASTER SYNC\_DATE=5/23/05

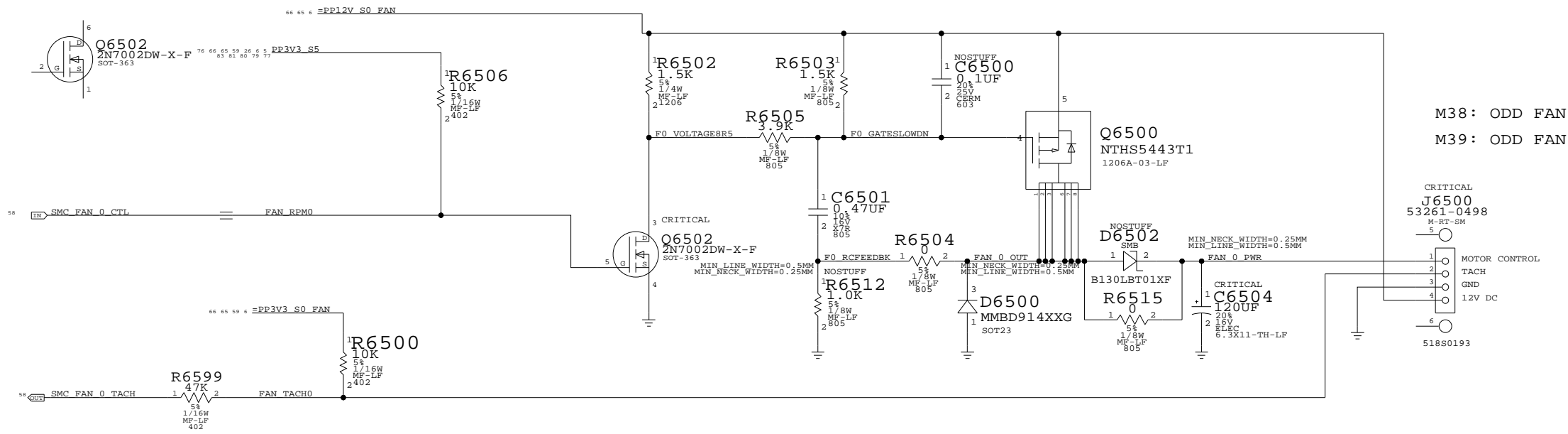
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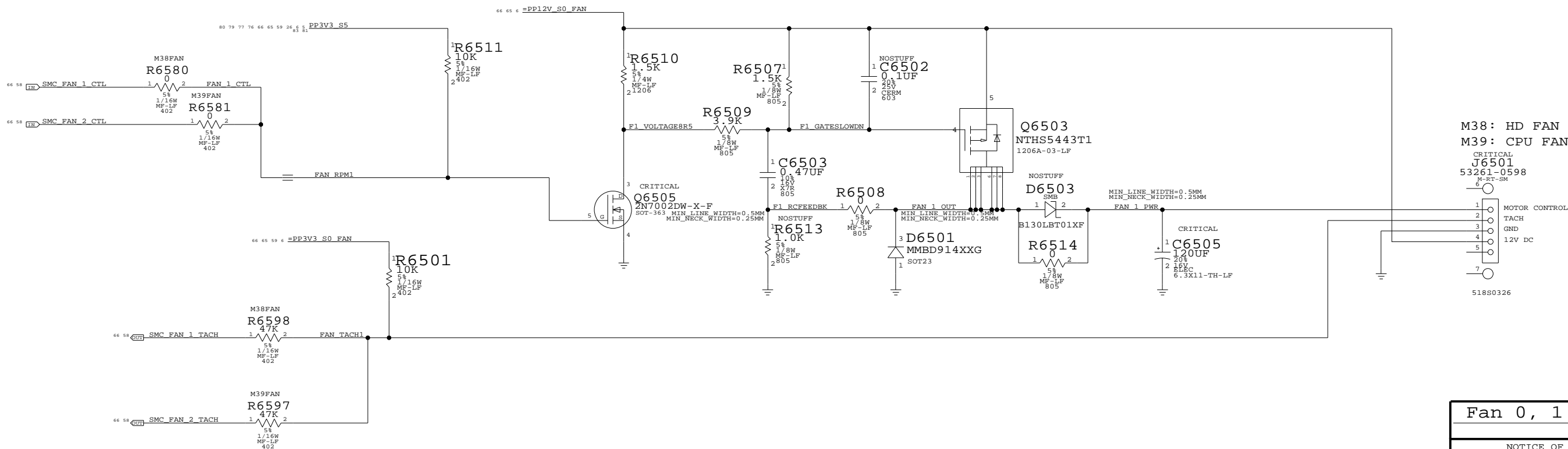
APPLE COMPUTER INC.	SIZE <b>D</b>	DRAWING NUMBER 051-6949	REV. 09
	SCALE NONE	SHEET 63	OF 111

# FAN 0



NOTE: ADDED TO PROTECT SMC

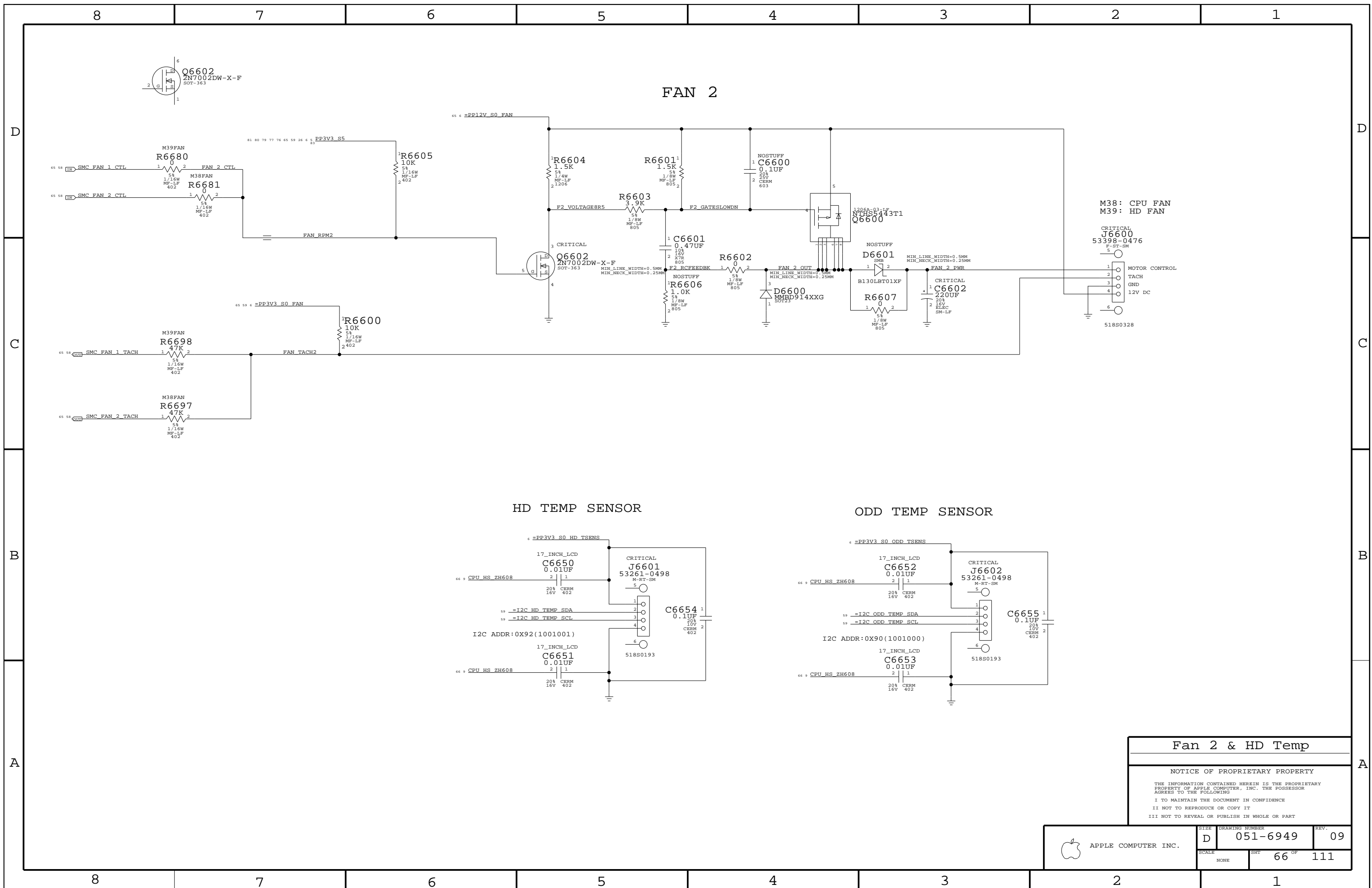
# FAN 1



## Fan 0, 1 & System Temp

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SCALE	NONE	SHT	65 OF 111



**Fan 2 & HD Temp**

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**NOTICE OF PROPRIETARY PROPERTY**

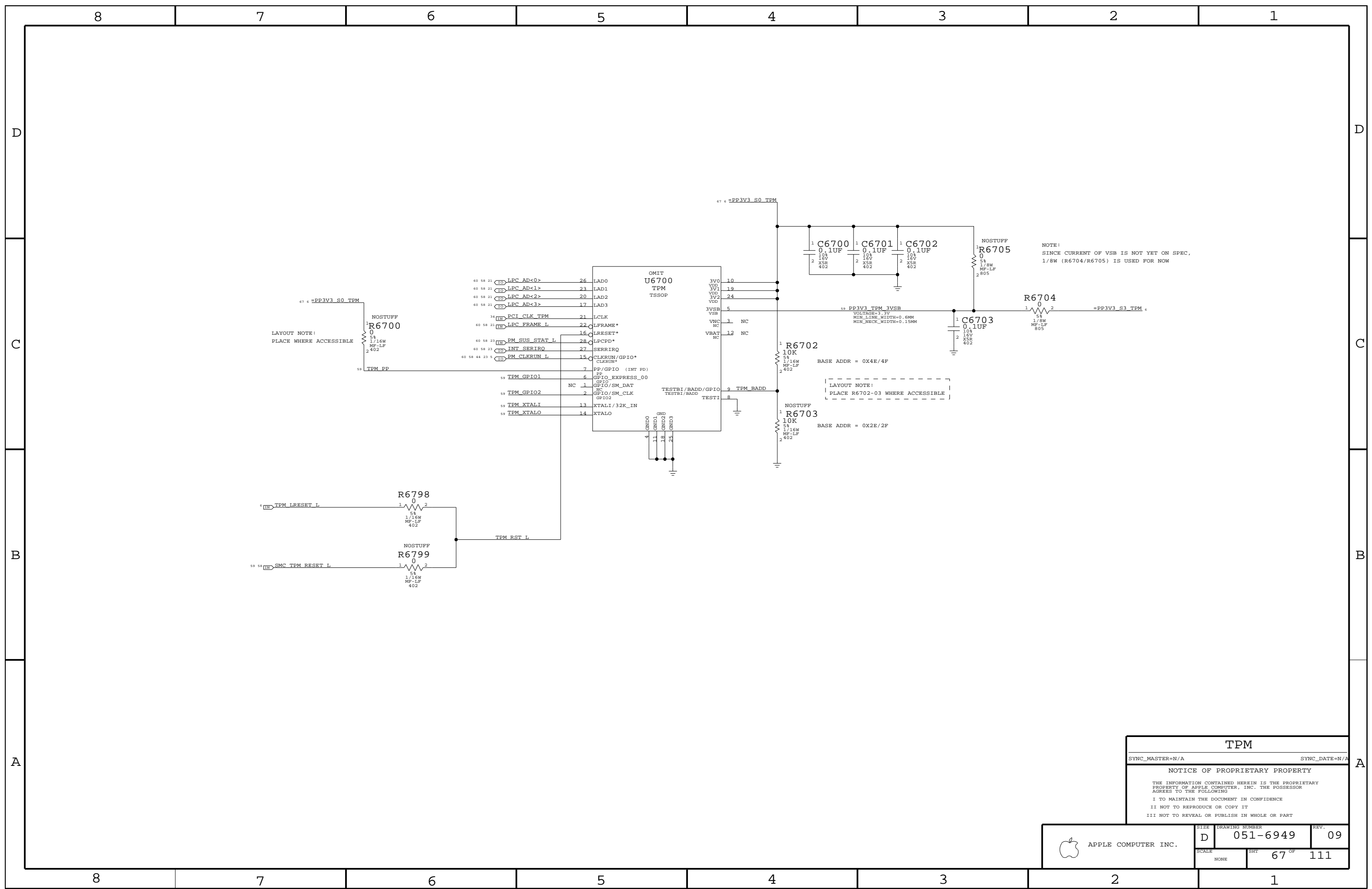
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	SCALE NONE	SHEET <b>66</b> OF <b>111</b>	



LAYOUT NOTE:  
PLACE WHERE ACCESSIBLE

LAYOUT NOTE:  
PLACE R6702-03 WHERE ACCESSIBLE

NOTE:  
SINCE CURRENT OF VSB IS NOT YET ON SPEC,  
1/8W (R6704/R6705) IS USED FOR NOW

OMIT		U6700		TPM		TSSOP	
60 58 21	LPC_AD<0>	26	LAD0	3V0	10	VDD	10
60 58 21	LPC_AD<1>	23	LAD1	3V1	19	VDD	19
60 58 21	LPC_AD<2>	20	LAD2	3V2	24	VDD	24
60 58 21	LPC_AD<3>	17	LAD3	3V2	24	VDD	24
34	PCI_CLK_TPM	21	LCLK	3VSB	5	VSB	5
60 58 21	LPC_FRAME_L	22	LFRAME*	VNC	3	NC	3
60 58 21	LPC_RESET*	16	LRESET*	NC	12	NC	12
60 58 23	PM_SUS_STAT_L	28	LPCPD*	VBAT	12	NC	12
60 58 23	INT_SERRIQ	27	SERRIRQ	NC	8	TESTI	8
60 58 44 23 5	PM_CLKRUN_L	15	CLKRUN/GPIO*	NC	9	TPM_BADD	9
59	TPM_GPIO1	7	PP/GPIO (INT PD)	NC	8	TESTI	8
59	TPM_GPIO2	6	GPIO_EXPRESS_00	NC	9	TPM_BADD	9
59	TPM_XTALI	13	XTALI/32K_IN	NC	9	TPM_BADD	9
59	TPM_XTALO	14	XTALO	NC	9	TPM_BADD	9

**TPM**

SYNC\_MASTER=N/A SYNC\_DATE=N/A

**NOTICE OF PROPRIETARY PROPERTY**

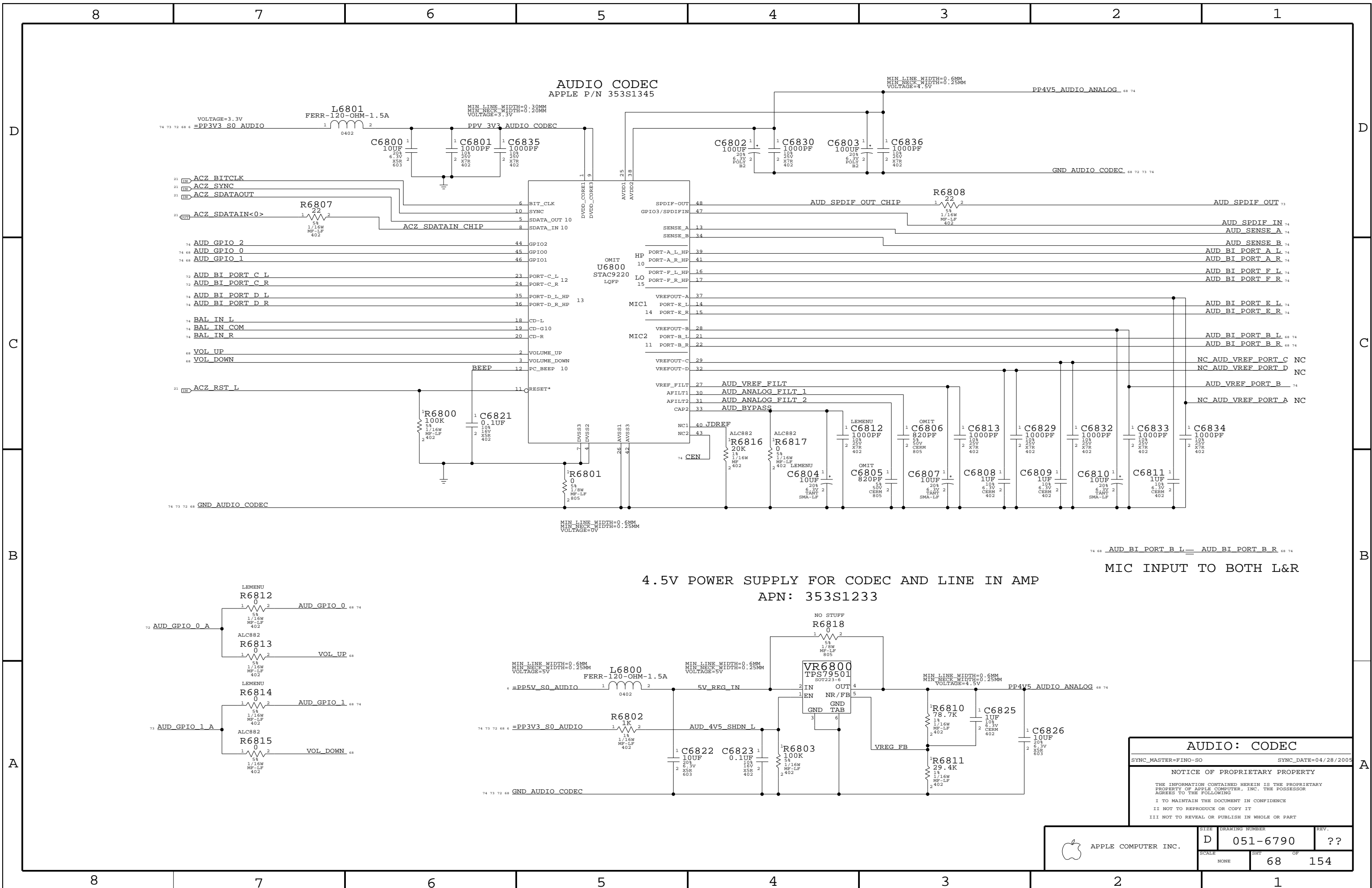
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	D	051-6949	09
SCALE	SHT	67 OF	111
NONE			

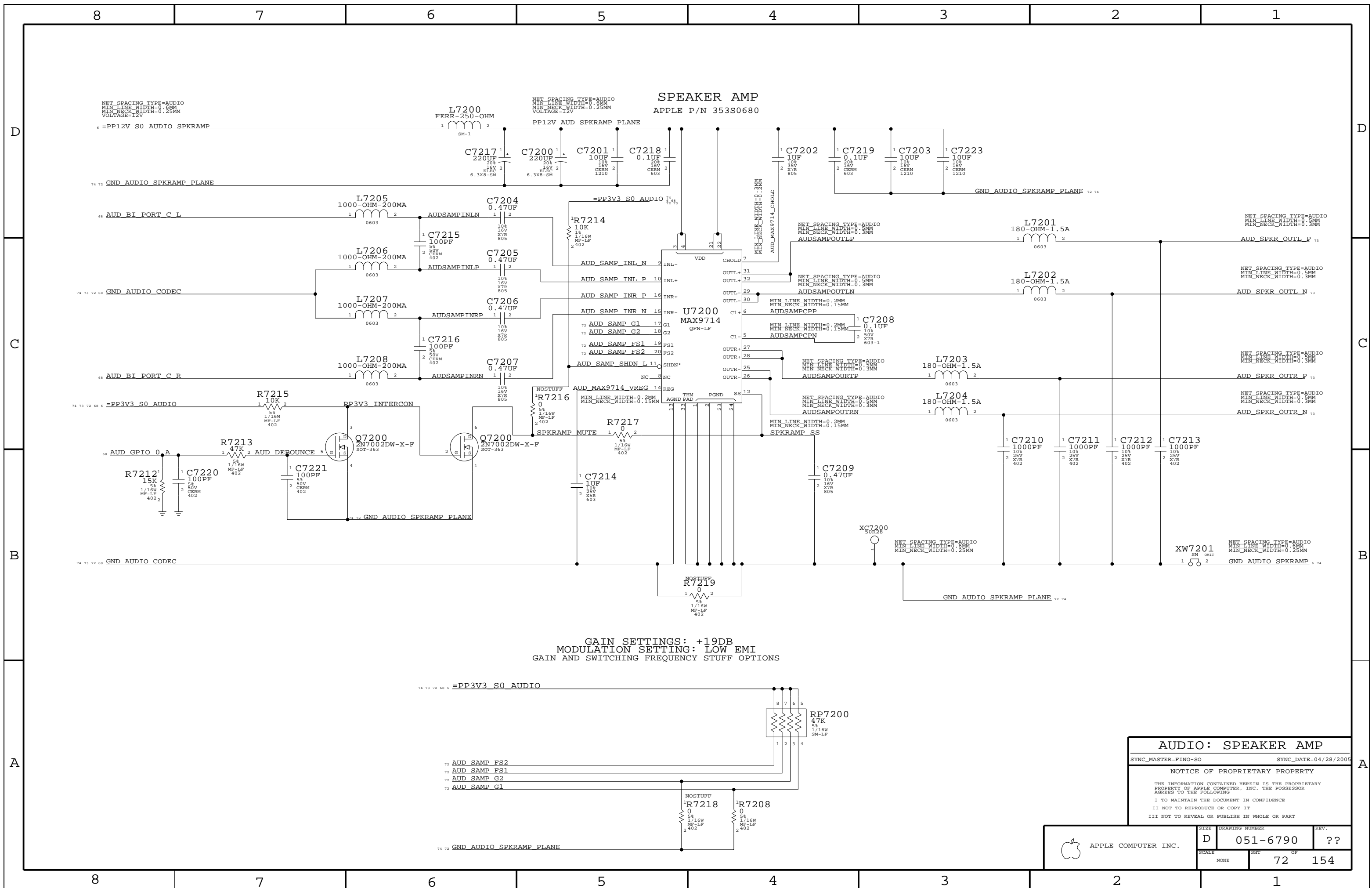


**AUDIO CODEC**  
APPLE P/N 353S1345

**4.5V POWER SUPPLY FOR CODEC AND LINE IN AMP**  
APN: 353S1233

**AUDIO: CODEC**  
 SYNC\_MASTER=FINO-SO      SYNC\_DATE=04/28/2005  
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APPLE COMPUTER INC.	SIZE: D DRAWING NUMBER: 051-6790 SCALE: NONE	REV: ?? SHEET OF: 68 OF 154

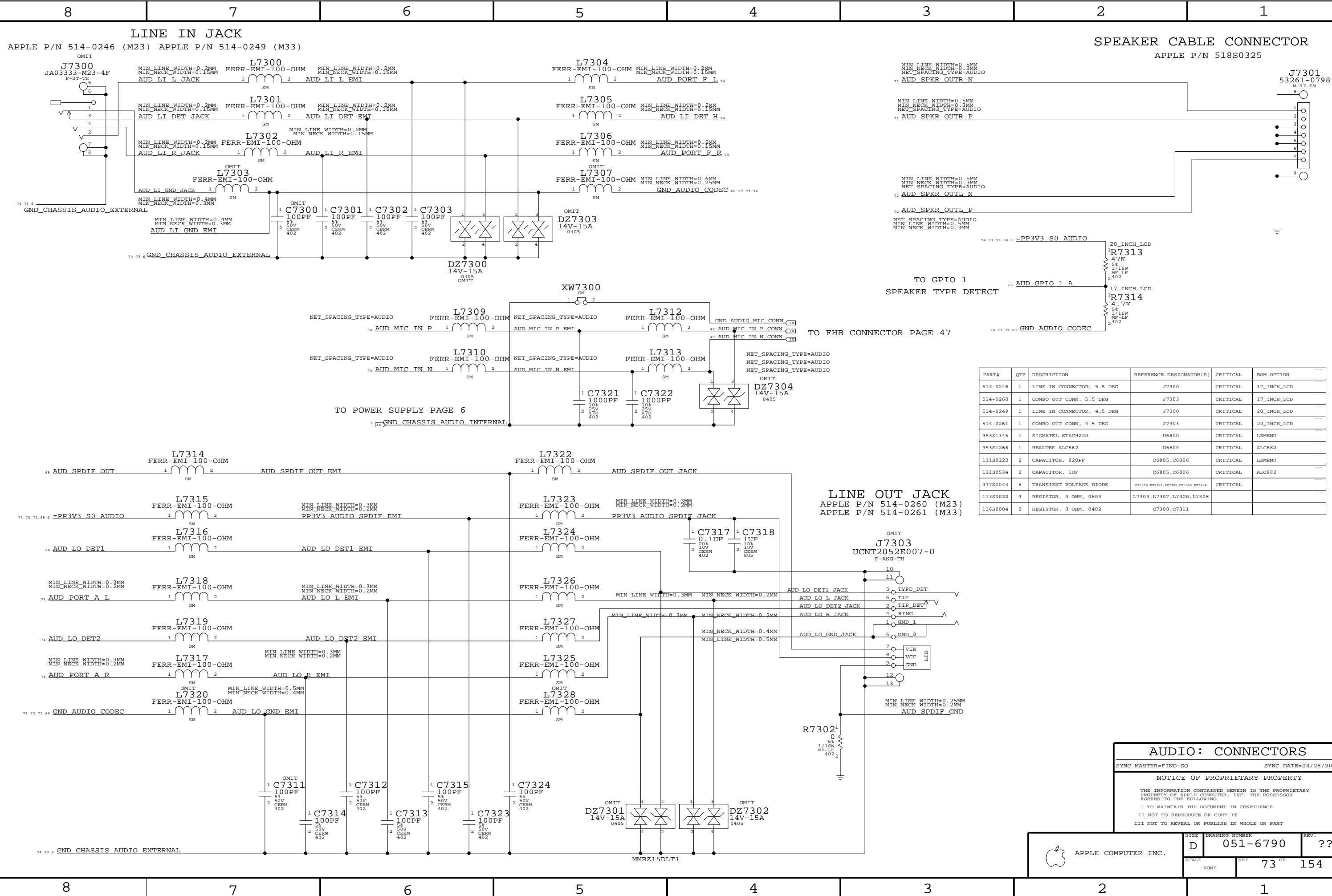


**SPEAKER AMP**  
APPLE P/N 353S0680

GAIN SETTINGS: +19DB  
MODULATION SETTING: LOW EMI  
GAIN AND SWITCHING FREQUENCY STUFF OPTIONS

**AUDIO: SPEAKER AMP**  
SYNC\_MASTER=FINO-SO SYNC\_DATE=04/28/2005  
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	D	051-6790	??
SCALE	NONE	SHT	OF
		72	154



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0246	1	LINE IN CONNECTOR, 5.5 DEG	J7300	CRITICAL	17_INCH_LCD
514-0260	1	COMBO OUT CONN, 5.5 DEG	J7303	CRITICAL	17_INCH_LCD
514-0249	1	LINE IN CONNECTOR, 4.5 DEG	J7300	CRITICAL	20_INCH_LCD
514-0261	1	COMBO OUT CONN, 4.5 DEG	J7303	CRITICAL	20_INCH_LCD
353S1345	1	SIGMATEL STAC9220	U6800	CRITICAL	LEMENU
353S1268	1	REALTEK ALC882	U6800	CRITICAL	ALC882
131S8223	2	CAPACITOR, 820PF	C6805,C6806	CRITICAL	LEMENU
131S0534	2	CAPACITOR, 1UF	C6805,C6806	CRITICAL	ALC882
377S0043	5	TRANSIENT VOLTAGE DIODE	DZ7300,DZ7301,DZ7302,DZ7303,DZ7304	CRITICAL	
113S0022	4	RESISTOR, 0 OHM, 0603	L7303,L7307,L7320,L7328		
116S0004	2	RESISTOR, 0 OHM, 0402	C7300,C7311		

**AUDIO: CONNECTORS**

SYNC\_MASTER=FINO-SO SYNC\_DATE=04/28/2005

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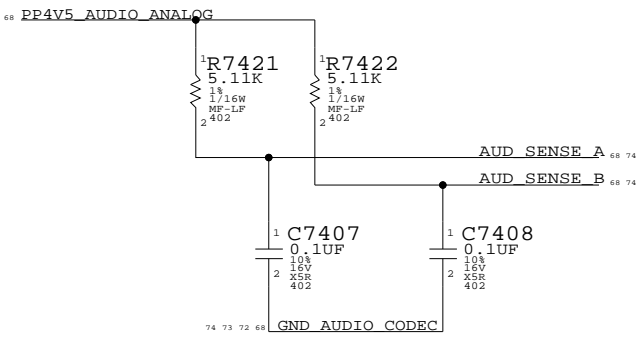
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	D	051-6790	??
SCALE	SHT	73 OF	154
NONE			



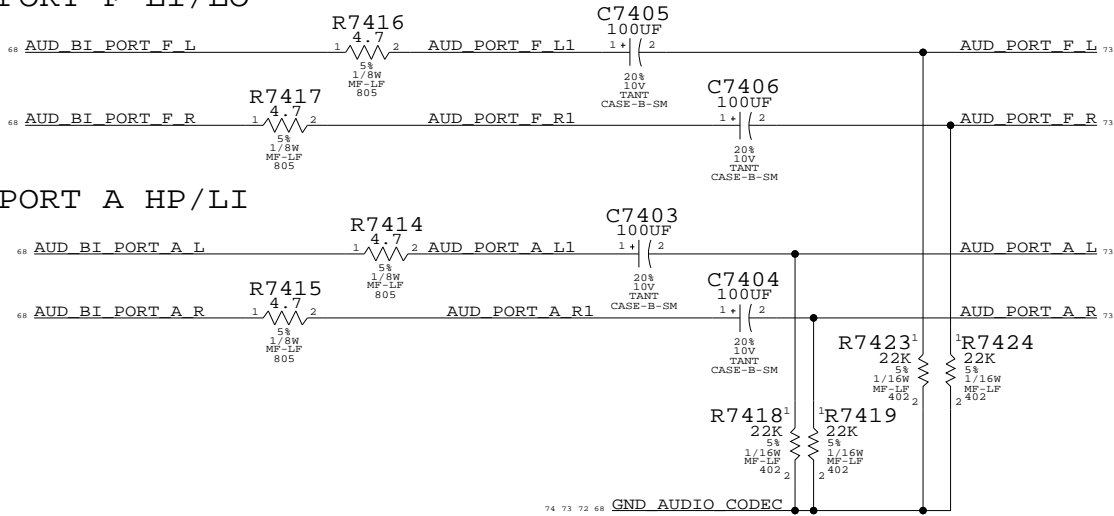
JACK SENSE PULL UPS (PLACE NEXT TO CODEC)



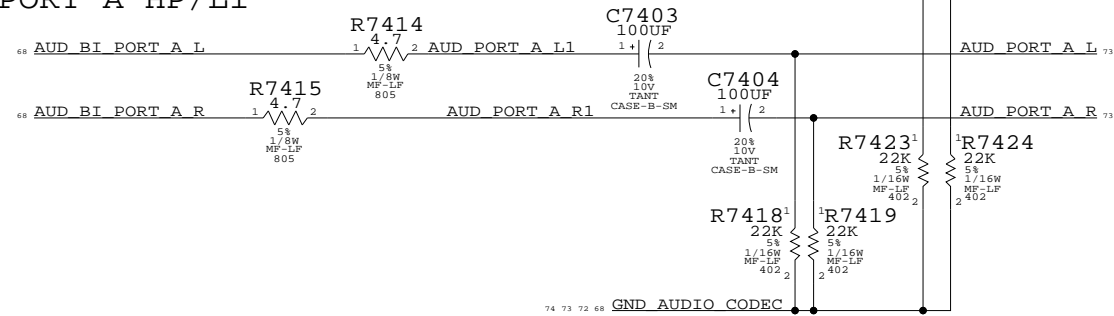
USED PORTS  
 PORT A HP/LI  
 PORT B MIC IN  
 PORT C BI SPEAKERS  
 PORT F LI/LO

UNUSED PORTS  
 PORT E  
 PORT D

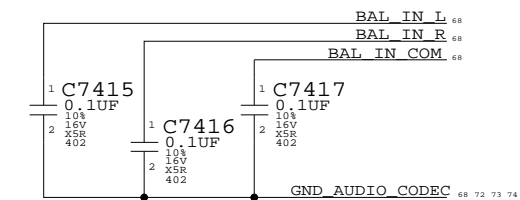
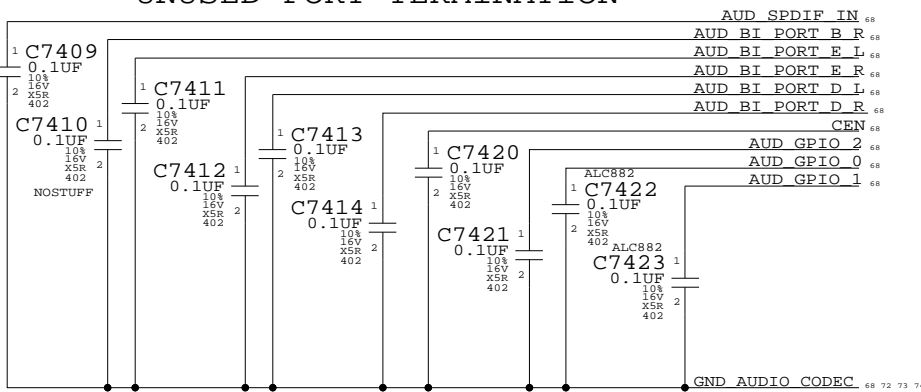
PORT F LI/LO



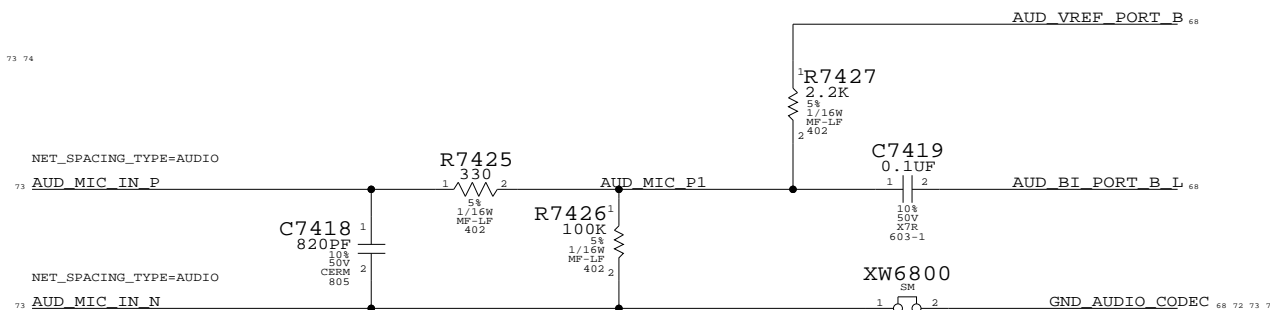
PORT A HP/LI



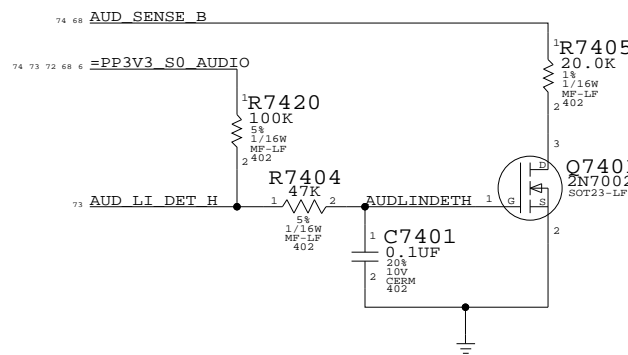
UNUSED PORT TERMINATION



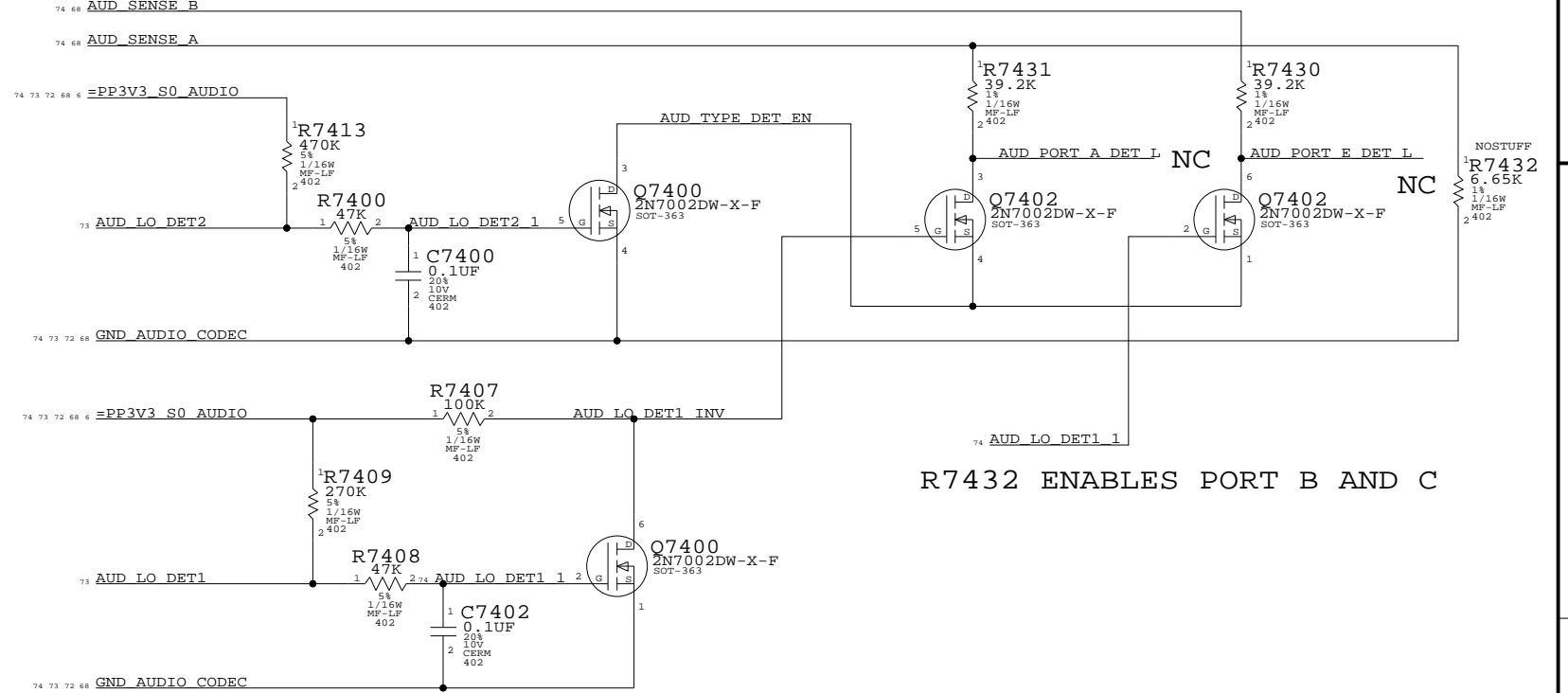
MICROPHONE IMPEDANCE MATCHING CIRCUIT



PORT F (LI/LO) PLUG DETECT

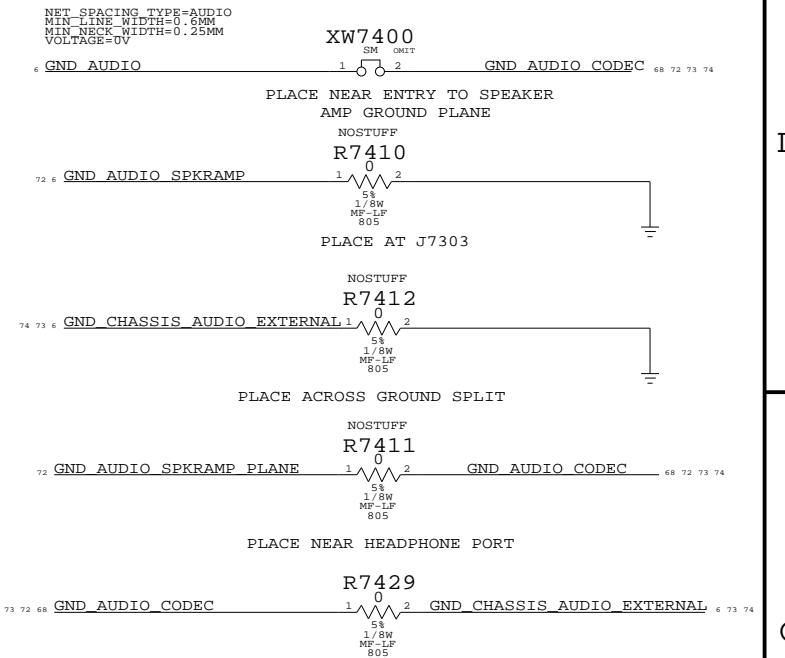


PORT A/H (HP/LI/DIG\_OUT) PLUG DETECT (E TELLS H TO COME ON)



R7432 ENABLES PORT B AND C

AUDIO GROUND RETURNS



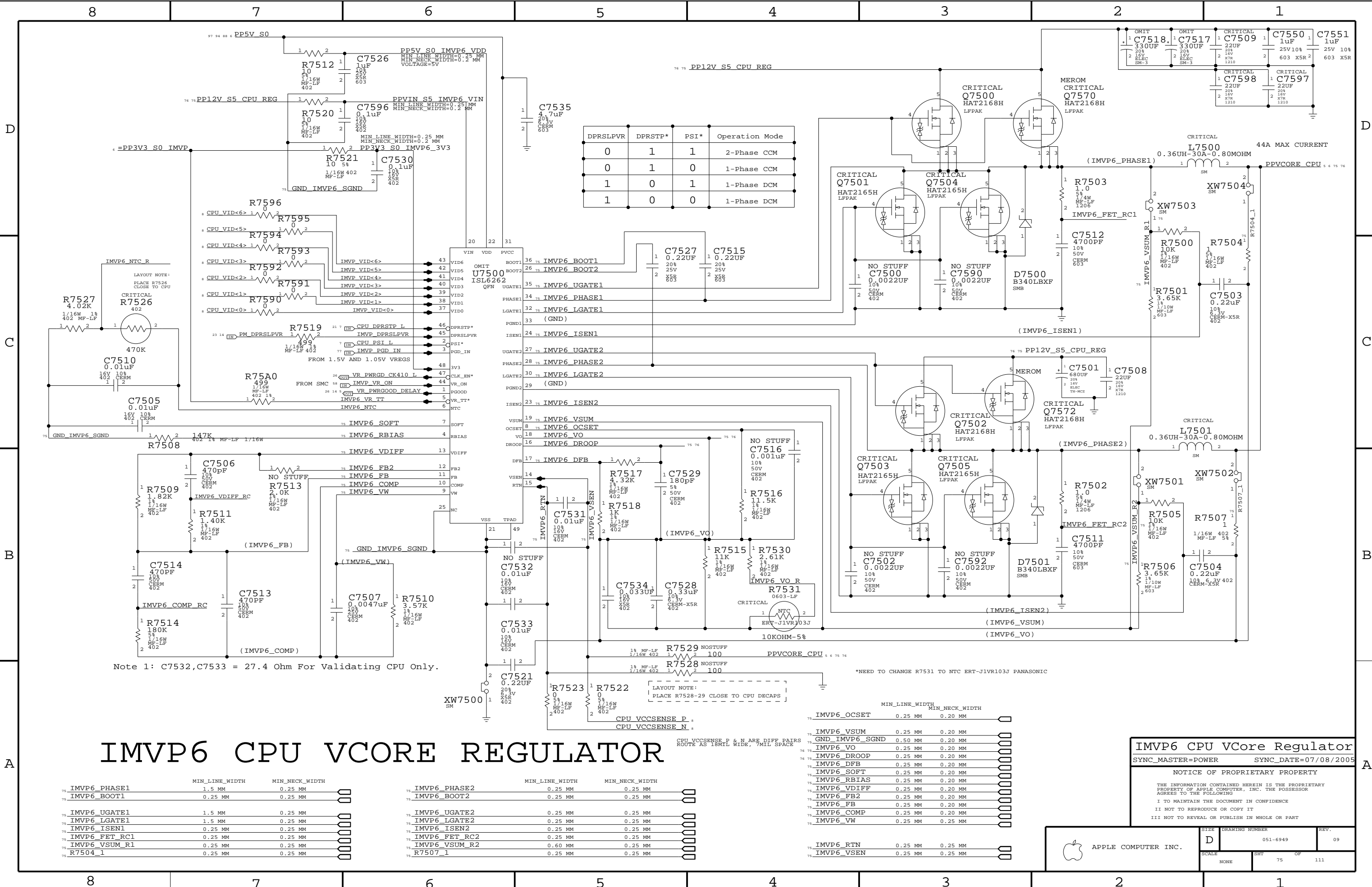
AUDIO: POWER SUPPLIES

SYNC\_MASTER=FINO-SO SYNC\_DATE=04/28/2005

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SCALE	NONE	SHT	OF
		74	154



DPRSLPVR	DPRSTP*	PSI*	Operation Mode
0	1	1	2-Phase CCM
0	1	0	1-Phase CCM
1	0	1	1-Phase DCM
1	0	0	1-Phase DCM

Note 1: C7532, C7533 = 27.4 Ohm For Validating CPU Only.

LAYOUT NOTE:  
PLACE R7528-29 CLOSE TO CPU DECAPS

\*NEED TO CHANGE R7531 TO NTC ERT-J1VR103J PANASONIC

# IMVP6 CPU VCore Regulator

	MIN_LINE_WIDTH	MIN_NECK_WIDTH
75 IMVP6_PHASE1	1.5 MM	0.25 MM
75 IMVP6_BOOT1	0.25 MM	0.25 MM
75 IMVP6_UGATE1	1.5 MM	0.25 MM
75 IMVP6_LGATE1	1.5 MM	0.25 MM
75 IMVP6_ISEN1	0.25 MM	0.25 MM
75 IMVP6_FET_RC1	0.25 MM	0.25 MM
75 IMVP6_VSUM_R1	0.25 MM	0.25 MM
75 R7504_1	0.25 MM	0.25 MM

	MIN_LINE_WIDTH	MIN_NECK_WIDTH
75 IMVP6_PHASE2	0.25 MM	0.25 MM
75 IMVP6_BOOT2	0.25 MM	0.25 MM
75 IMVP6_UGATE2	0.25 MM	0.25 MM
75 IMVP6_LGATE2	0.25 MM	0.25 MM
75 IMVP6_ISEN2	0.25 MM	0.25 MM
75 IMVP6_FET_RC2	0.25 MM	0.25 MM
75 IMVP6_VSUM_R2	0.60 MM	0.25 MM
75 R7507_1	0.25 MM	0.25 MM

	MIN_LINE_WIDTH	MIN_NECK_WIDTH
75 IMVP6_OCSET	0.25 MM	0.20 MM
75 IMVP6_VSUM	0.25 MM	0.20 MM
75 GND_IMVP6_SGND	0.50 MM	0.20 MM
75 IMVP6_VO	0.25 MM	0.20 MM
75 IMVP6_DROOP	0.25 MM	0.20 MM
75 IMVP6_DFB	0.25 MM	0.20 MM
75 IMVP6_SOFT	0.25 MM	0.20 MM
75 IMVP6_RBIAS	0.25 MM	0.20 MM
75 IMVP6_VDIFF	0.25 MM	0.20 MM
75 IMVP6_FB2	0.25 MM	0.20 MM
75 IMVP6_FB	0.25 MM	0.20 MM
75 IMVP6_COMP	0.25 MM	0.20 MM
75 IMVP6_VW	0.25 MM	0.25 MM
75 IMVP6_RTIN	0.25 MM	0.25 MM
75 IMVP6_VSEN	0.25 MM	0.25 MM

IMVP6 CPU VCore Regulator  
 SYNC\_MASTER=POWER SYNC\_DATE=07/08/2005

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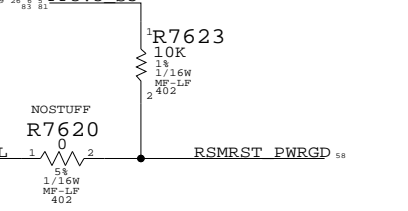
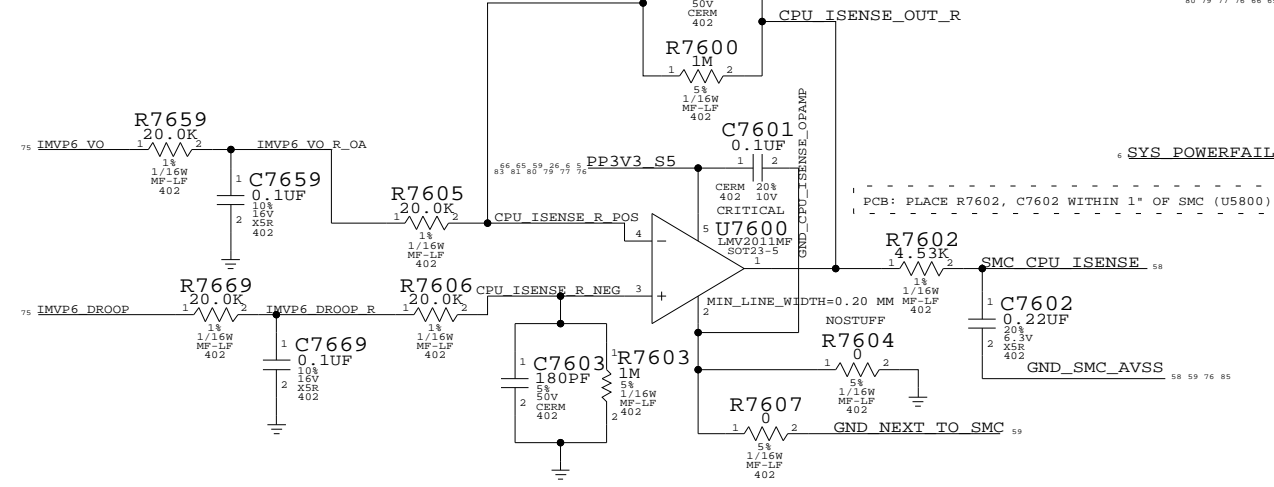
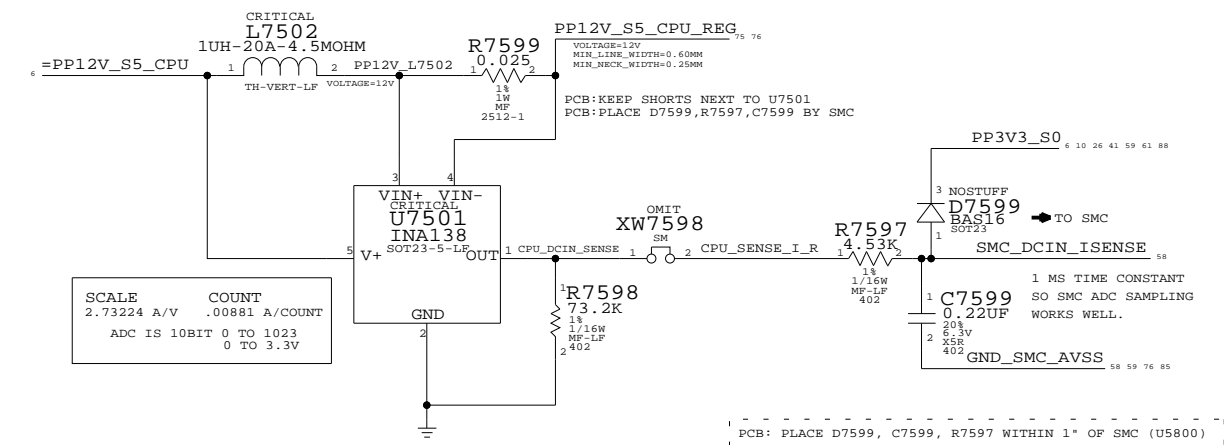
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	NONE	D 051-6949	09
	SHEET	OF	
	75	111	

8 7 6 5 4 3 2 1

**PROCESSOR VCORE CURRENT SENSE**  
(USING 12V INPUT CURRENT TO DERIVE CPU CURRENT)

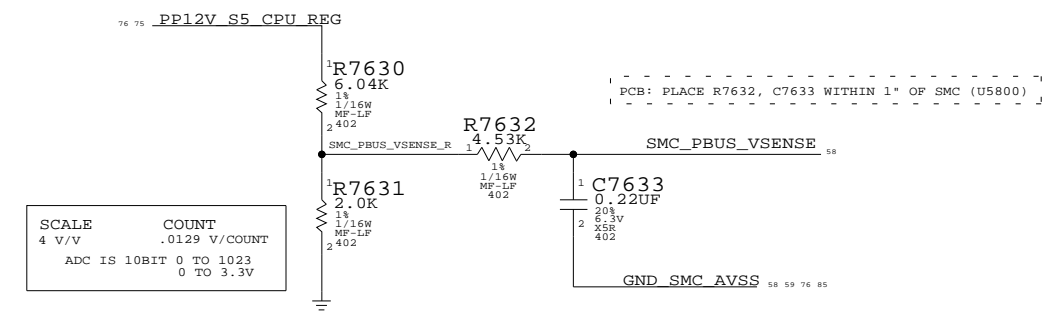
**PROCESSOR VCORE CURRENT SENSE**  
(MEASURING DC/DC INDUCTOR DCR TO DERIVE CPU CURRENT)

**SMC PWRGD PULLUP**

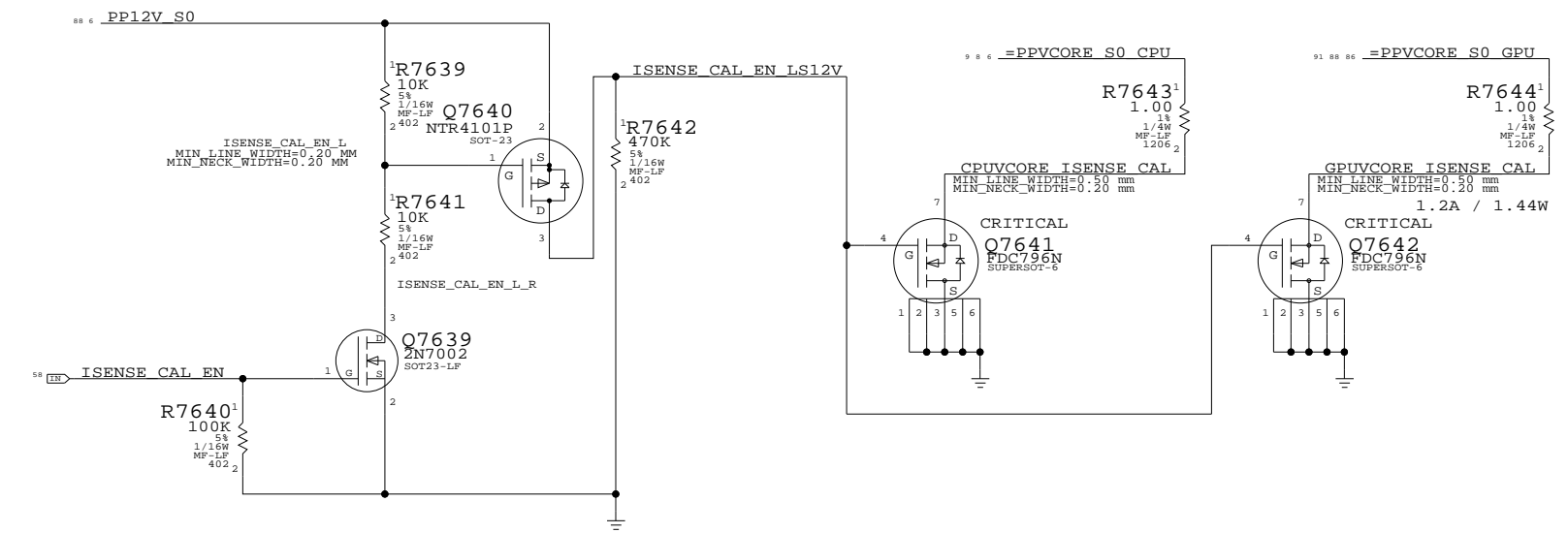


**PROCESSOR DCIN VOLTAGE SENSE**  
(SCALING 12V INPUT VOLTAGE TO SMC)

**PROCESSOR VCORE SENSE**



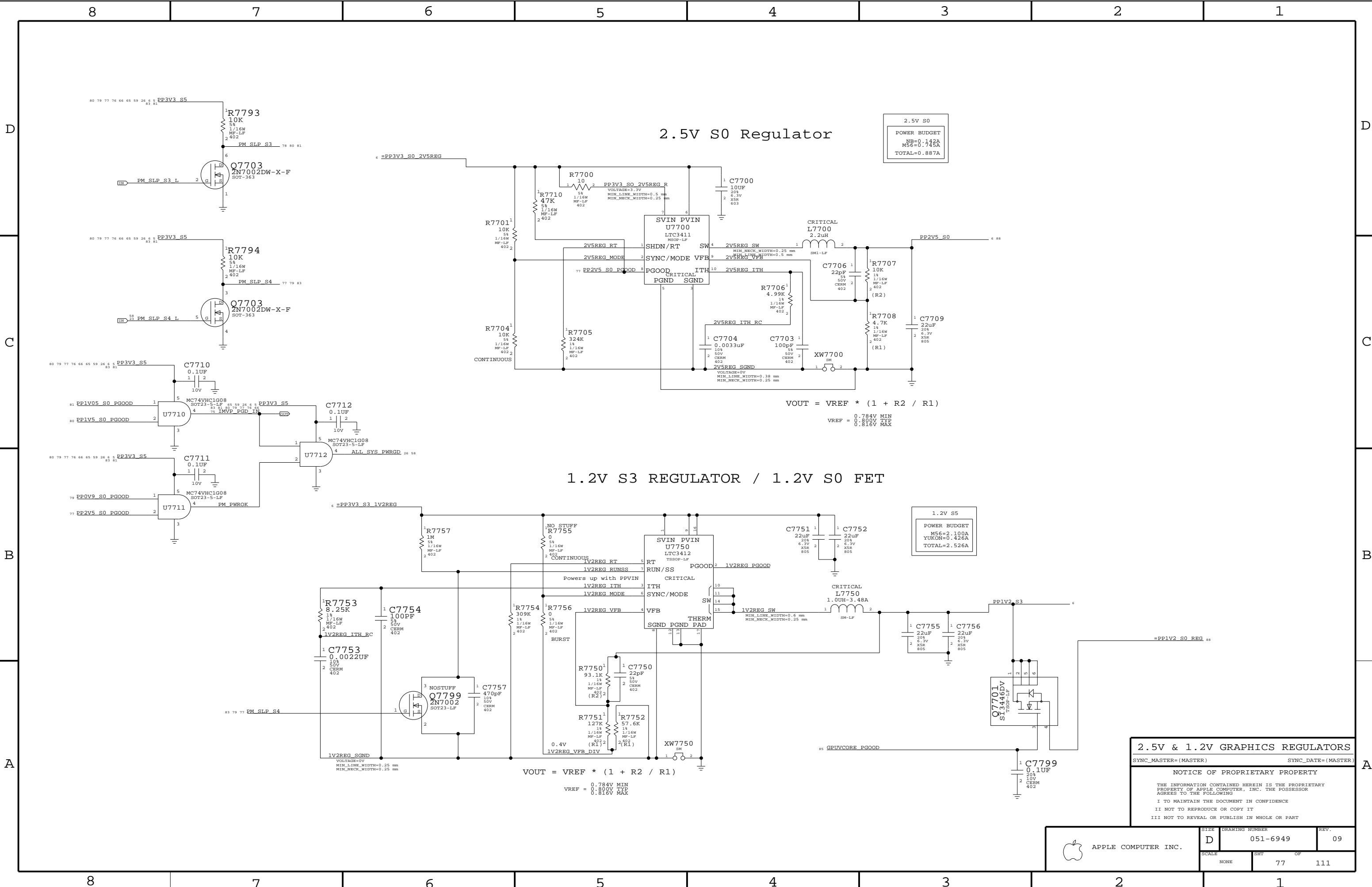
**Current Sense Calibration Circuit**  
Switches in fixed load on power supplies to calibrate current sense circuits



**CPU SENSE CIRCUITRIES**  
SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)  
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APPLE COMPUTER INC.	SCALE	DRAWING NUMBER	REV.
	NONE	D 051-6949	09
		SHT	76 OF 111

8 7 6 5 4 3 2 1



2.5V S0 Regulator

2.5V S0  
POWER BUDGET  
MS6=0.142A  
YUKON=0.745A  
TOTAL=0.887A

$V_{OUT} = V_{REF} * (1 + R2 / R1)$   
 $V_{REF} = 0.784V \text{ MIN}$   
 $V_{REF} = 0.800V \text{ TYP}$   
 $V_{REF} = 0.816V \text{ MAX}$

1.2V S3 REGULATOR / 1.2V S0 FET

1.2V S5  
POWER BUDGET  
MS6=2.100A  
YUKON=0.426A  
TOTAL=2.526A

$V_{OUT} = V_{REF} * (1 + R2 / R1)$   
 $V_{REF} = 0.784V \text{ MIN}$   
 $V_{REF} = 0.800V \text{ TYP}$   
 $V_{REF} = 0.816V \text{ MAX}$

2.5V & 1.2V GRAPHICS REGULATORS

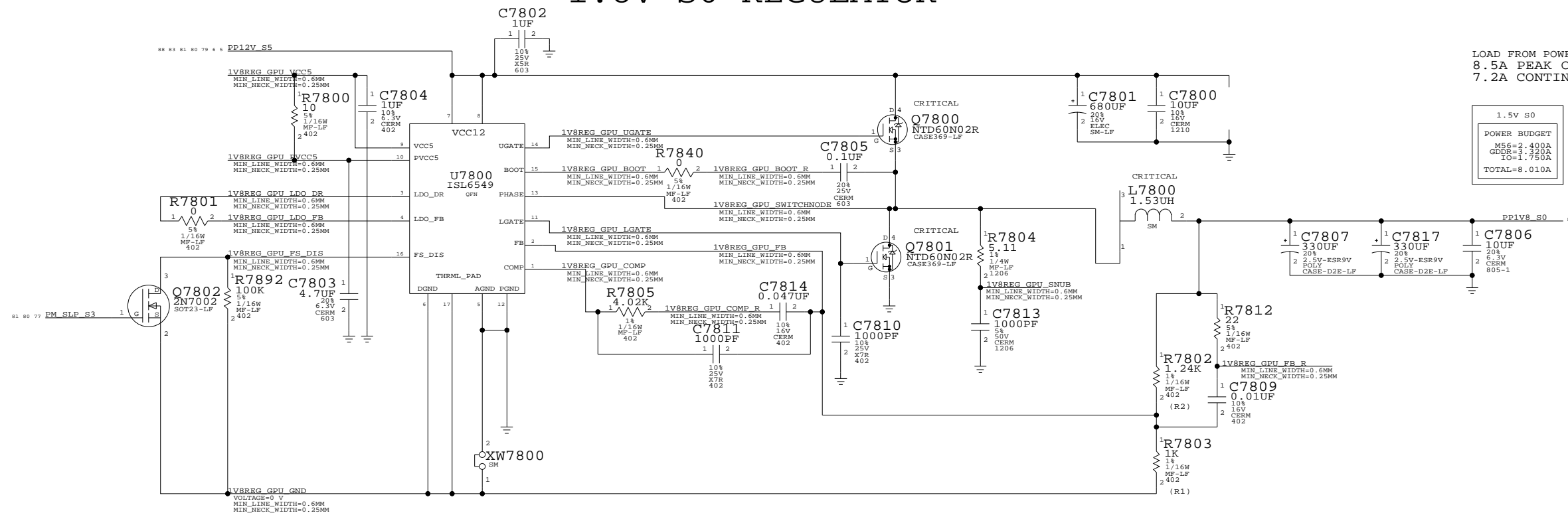
SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	OF	
NONE	77	111	

# 1.8V S0 REGULATOR



LOAD FROM POWER BUDGET  
8.5A PEAK CURRENT DRAW  
7.2A CONTINUOUS CURRENT DRAW

1.5V S0  
POWER BUDGET  
M56=2.400A  
GDDR=2.200A  
IO=1.700A  
TOTAL=8.010A

$$V_{OUT} = V_{REF} * (1 + R2/R1)$$

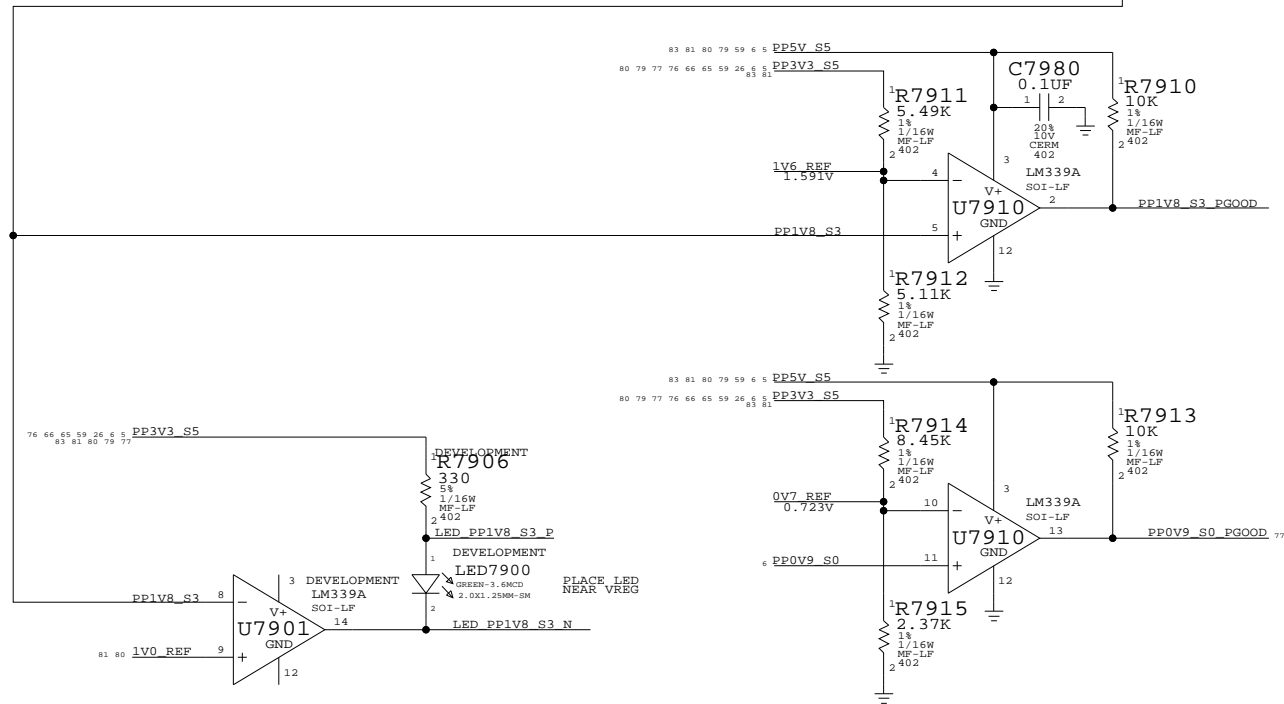
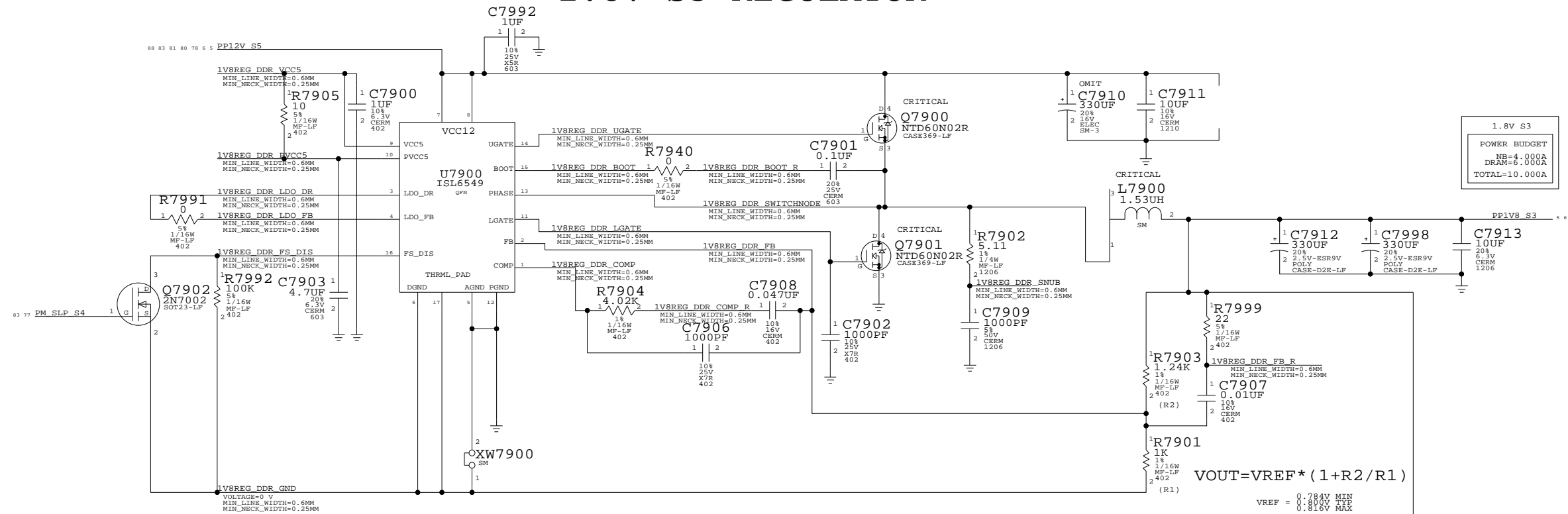
VREF = 0.784V MIN  
VREF = 0.800V TYP  
VREF = 0.816V MAX

**1.8V GDDR REGULATOR**  
SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)  
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	78 OF 111	
NONE			

TRUE

# 1.8V S3 REGULATOR



## 1.8V Vreg

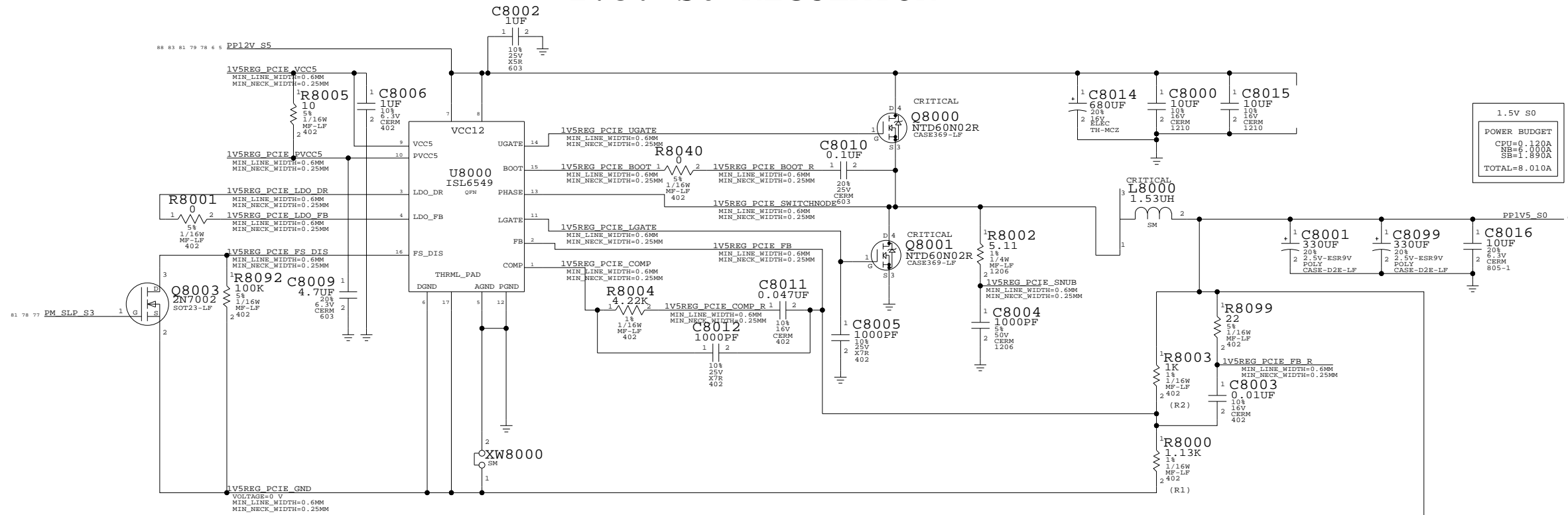
SYNC\_MASTER=M23-PC SYNC\_DATE=04/12/2005

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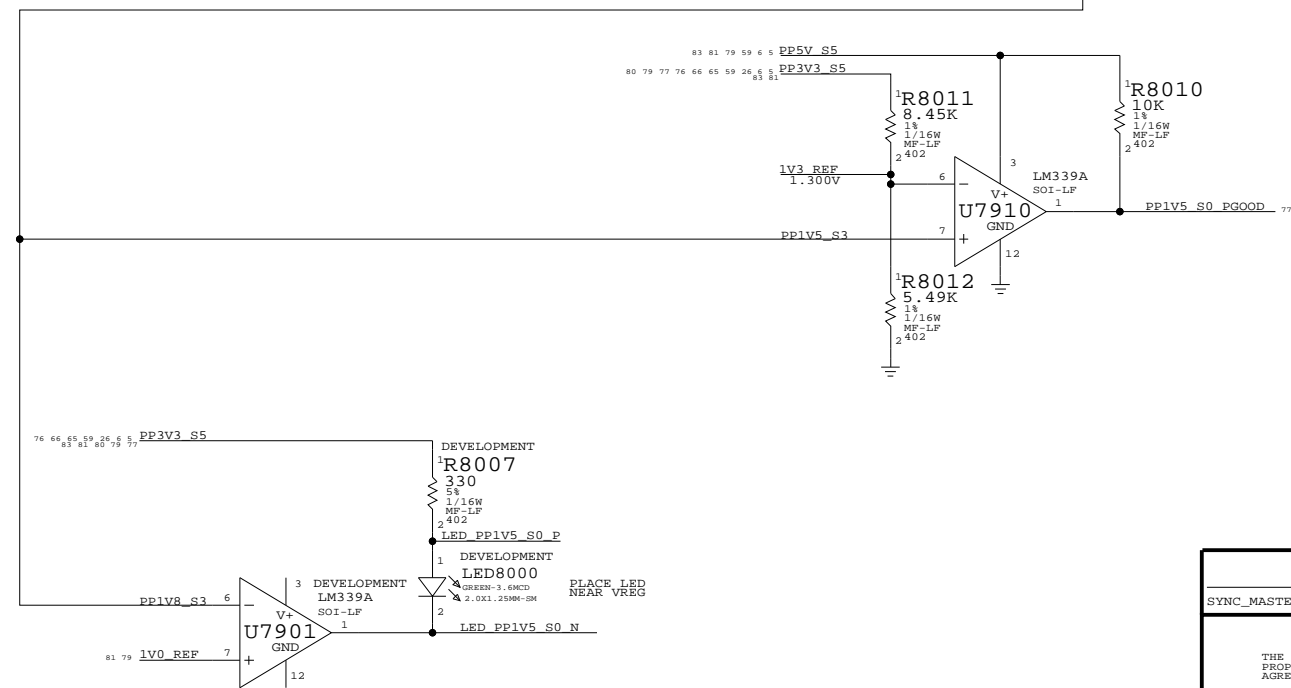
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	79 OF	111
NONE			

# 1.5V S0 REGULATOR



$$V_{OUT} = V_{REF} * (1 + R2/R1)$$

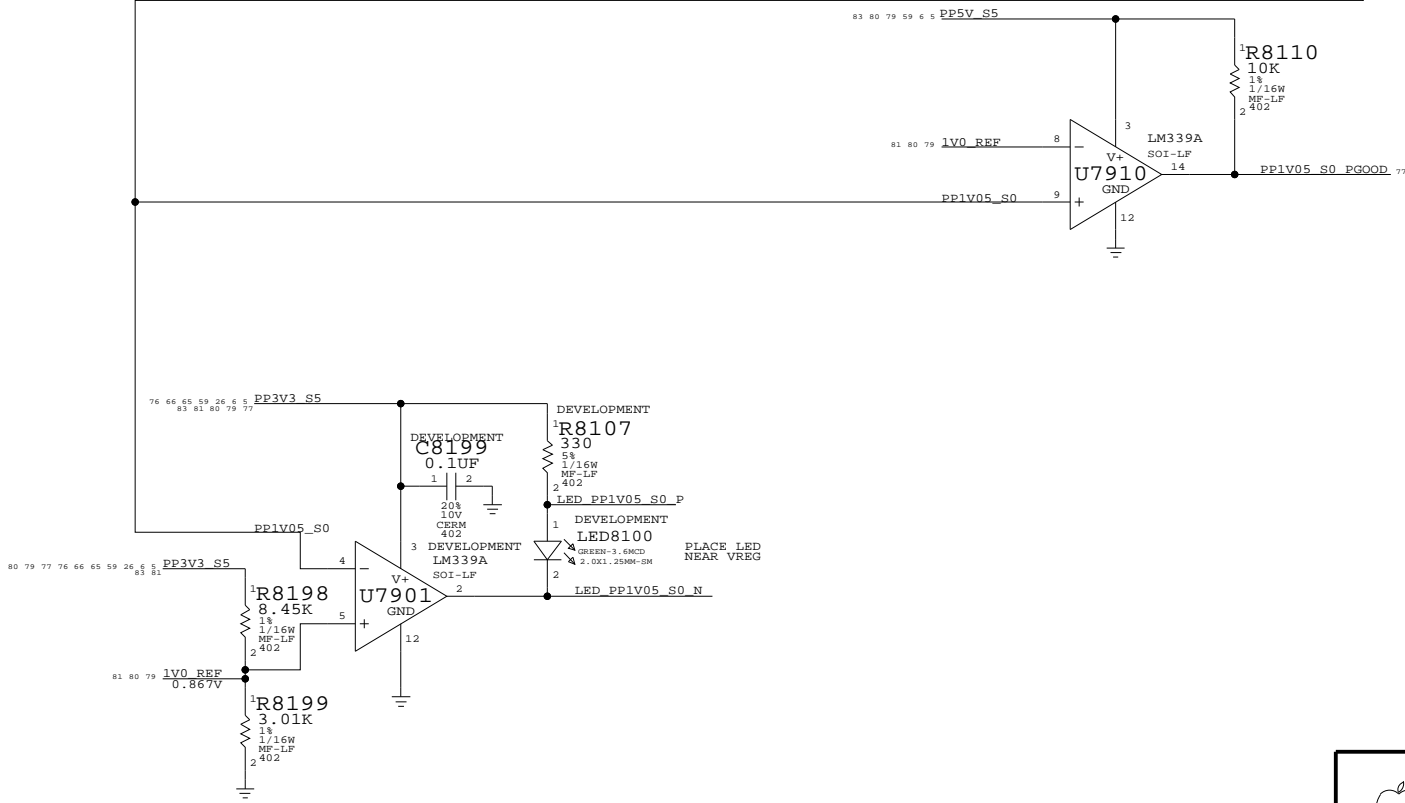
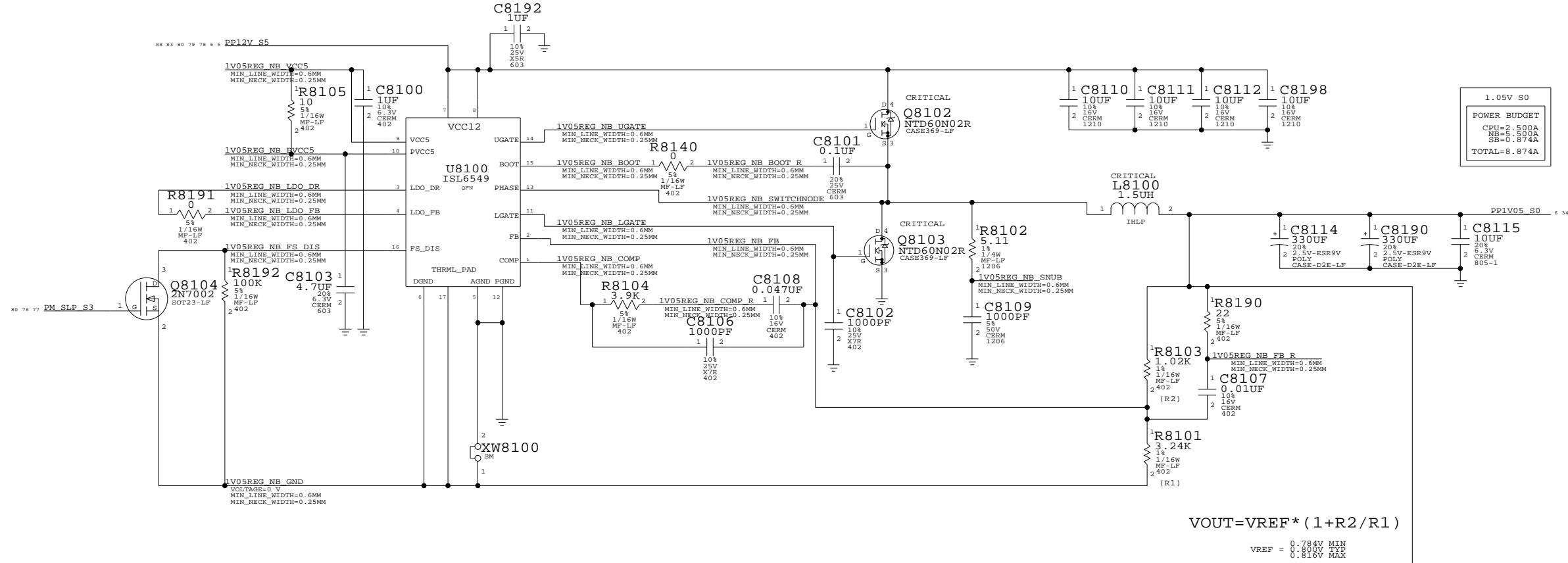
$$V_{REF} = \begin{matrix} 0.784V \text{ MIN} \\ 0.800V \text{ TYP} \\ 0.816V \text{ MAX} \end{matrix}$$



**1.5V Vreg**  
 SYNC\_MASTER=FINO-PC SYNC\_DATE=05/18/2005  
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	80 OF	111
NONE			

# 1.05V S0 REGULATOR



**1.05V VREG**

SYNC\_MASTER=M38-RT SYNC\_DATE=05/18/2005

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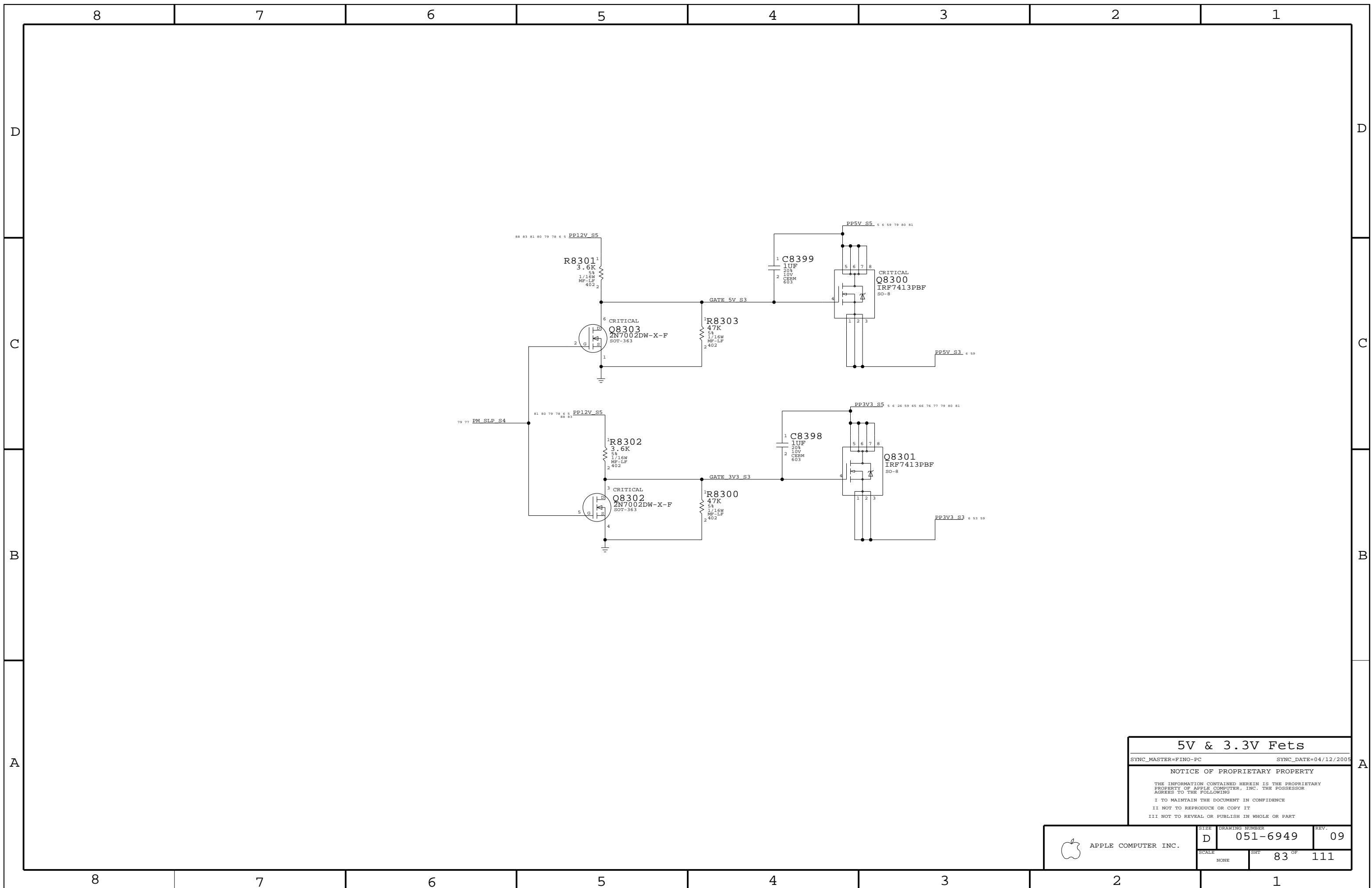
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	NONE	SHT	81 OF 111





**5V & 3.3V Fets**

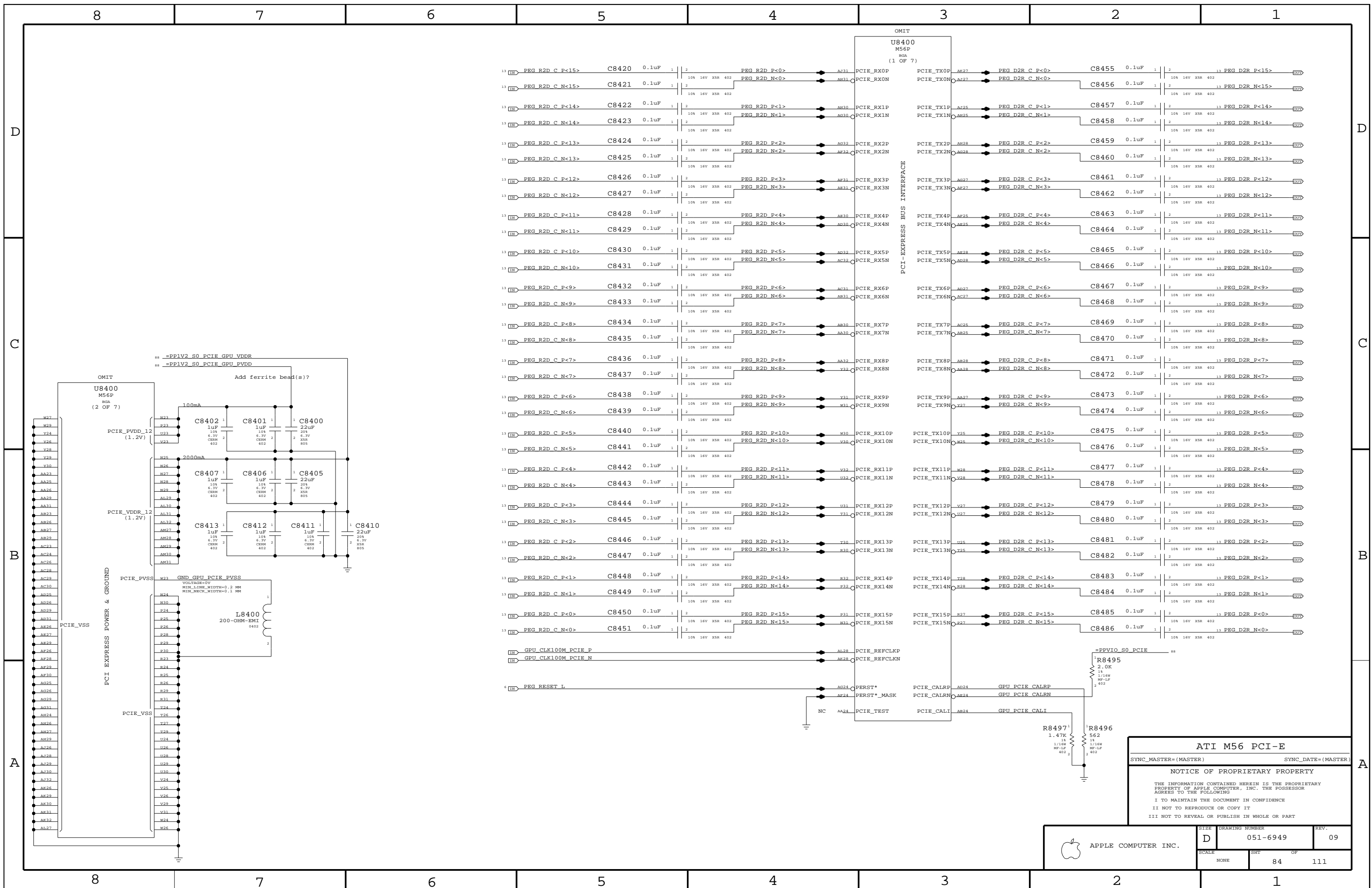
SYNC\_MASTER=FINO-PC SYNC\_DATE=04/12/2005

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE		SHT	OF
NONE		83	111



Signal	Capacitor	Value	GPU Pin	System Pin	GPU Pin	System Pin
PEG R2D C P<15>	C8420	0.1uF	1	2	PCIE_RX0P	AE27
PEG R2D C N<15>	C8421	0.1uF	1	2	PCIE_RX0N	AE27
PEG R2D C P<14>	C8422	0.1uF	1	2	PCIE_RX1P	AE25
PEG R2D C N<14>	C8423	0.1uF	1	2	PCIE_RX1N	AE25
PEG R2D C P<13>	C8424	0.1uF	1	2	PCIE_RX2P	AE28
PEG R2D C N<13>	C8425	0.1uF	1	2	PCIE_RX2N	AE28
PEG R2D C P<12>	C8426	0.1uF	1	2	PCIE_RX3P	AE27
PEG R2D C N<12>	C8427	0.1uF	1	2	PCIE_RX3N	AE27
PEG R2D C P<11>	C8428	0.1uF	1	2	PCIE_RX4P	AE25
PEG R2D C N<11>	C8429	0.1uF	1	2	PCIE_RX4N	AE25
PEG R2D C P<10>	C8430	0.1uF	1	2	PCIE_RX5P	AE28
PEG R2D C N<10>	C8431	0.1uF	1	2	PCIE_RX5N	AE28
PEG R2D C P<9>	C8432	0.1uF	1	2	PCIE_RX6P	AE27
PEG R2D C N<9>	C8433	0.1uF	1	2	PCIE_RX6N	AE27
PEG R2D C P<8>	C8434	0.1uF	1	2	PCIE_RX7P	AE25
PEG R2D C N<8>	C8435	0.1uF	1	2	PCIE_RX7N	AE25
PEG R2D C P<7>	C8436	0.1uF	1	2	PCIE_RX8P	AE28
PEG R2D C N<7>	C8437	0.1uF	1	2	PCIE_RX8N	AE28
PEG R2D C P<6>	C8438	0.1uF	1	2	PCIE_RX9P	AE27
PEG R2D C N<6>	C8439	0.1uF	1	2	PCIE_RX9N	AE27
PEG R2D C P<5>	C8440	0.1uF	1	2	PCIE_RX10P	AE25
PEG R2D C N<5>	C8441	0.1uF	1	2	PCIE_RX10N	AE25
PEG R2D C P<4>	C8442	0.1uF	1	2	PCIE_RX11P	AE28
PEG R2D C N<4>	C8443	0.1uF	1	2	PCIE_RX11N	AE28
PEG R2D C P<3>	C8444	0.1uF	1	2	PCIE_RX12P	AE27
PEG R2D C N<3>	C8445	0.1uF	1	2	PCIE_RX12N	AE27
PEG R2D C P<2>	C8446	0.1uF	1	2	PCIE_RX13P	AE25
PEG R2D C N<2>	C8447	0.1uF	1	2	PCIE_RX13N	AE25
PEG R2D C P<1>	C8448	0.1uF	1	2	PCIE_RX14P	AE28
PEG R2D C N<1>	C8449	0.1uF	1	2	PCIE_RX14N	AE28
PEG R2D C P<0>	C8450	0.1uF	1	2	PCIE_RX15P	AE27
PEG R2D C N<0>	C8451	0.1uF	1	2	PCIE_RX15N	AE27
GPU_CLK100M_PCIE_P					PCIE_REFCLKP	AE28
GPU_CLK100M_PCIE_N					PCIE_REFCLKN	AE28
PEG RESET L					PERST*	AE24
					PERST*_MASK	AE24
					PCIE_TEST	AA24
					PCIE_CALRP	AE24
					GPU_PCIE_CALRP	
					PCIE_CALRN	AE24
					GPU_PCIE_CALRN	
					PCIE_CALI	AE24
					GPU_PCIE_CALI	

ATI M56 PCI-E

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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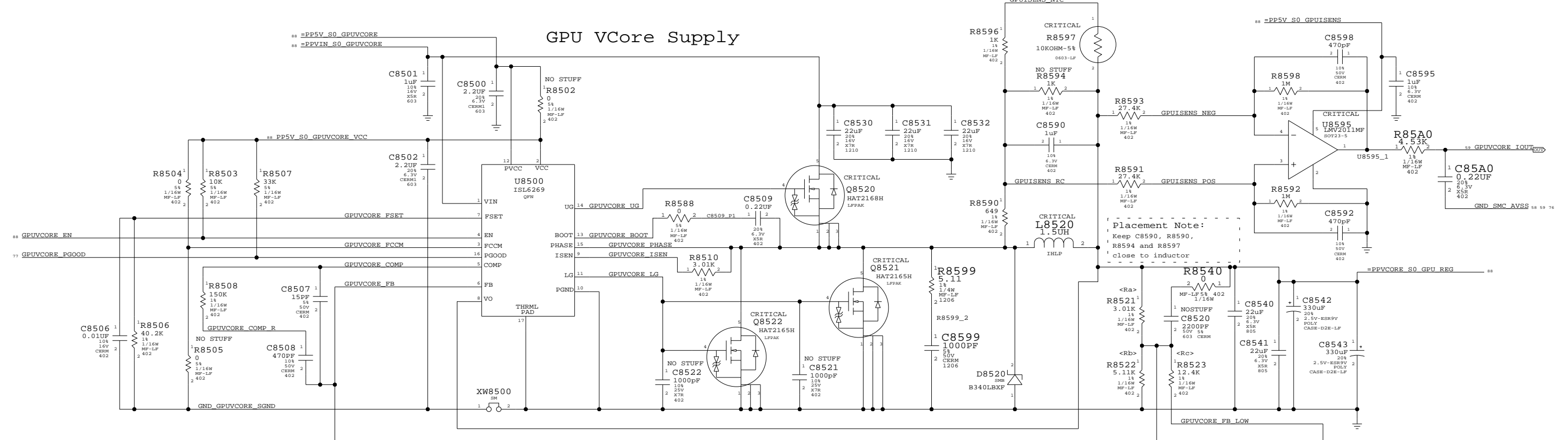
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APPLE COMPUTER INC.	SCALE	SHT	OF
	NONE	84	111

### GPU VCore Current Sense



**Placement Note:**  
 Keep C8590, R8590, R8594 and R8597 close to inductor

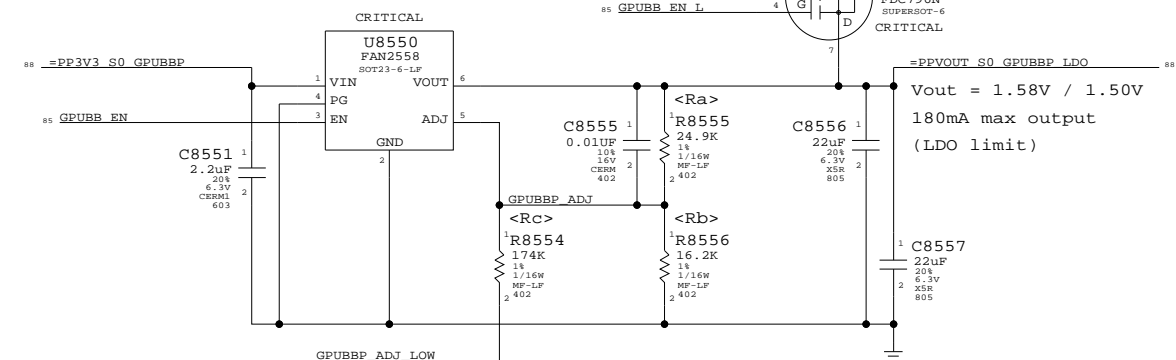
$$V_{out}(low) = 0.6V * (1 + R_a/R_b)$$

$$V_{out}(high) = 0.6V * (1 + R_a/R_{eq})$$

$$R_{eq} = R_b || R_c$$

### Back-Bias Positive Supply

Back-bias positive supply provides VDDC + 0.5V when active. When inactive, provides VDDC to BBP pins.  
 NOTE: BBP tracks VDDC based on GPU voltage GPIO.



$$V_{out}(low) = 0.59V * (1 + R_a/R_b)$$

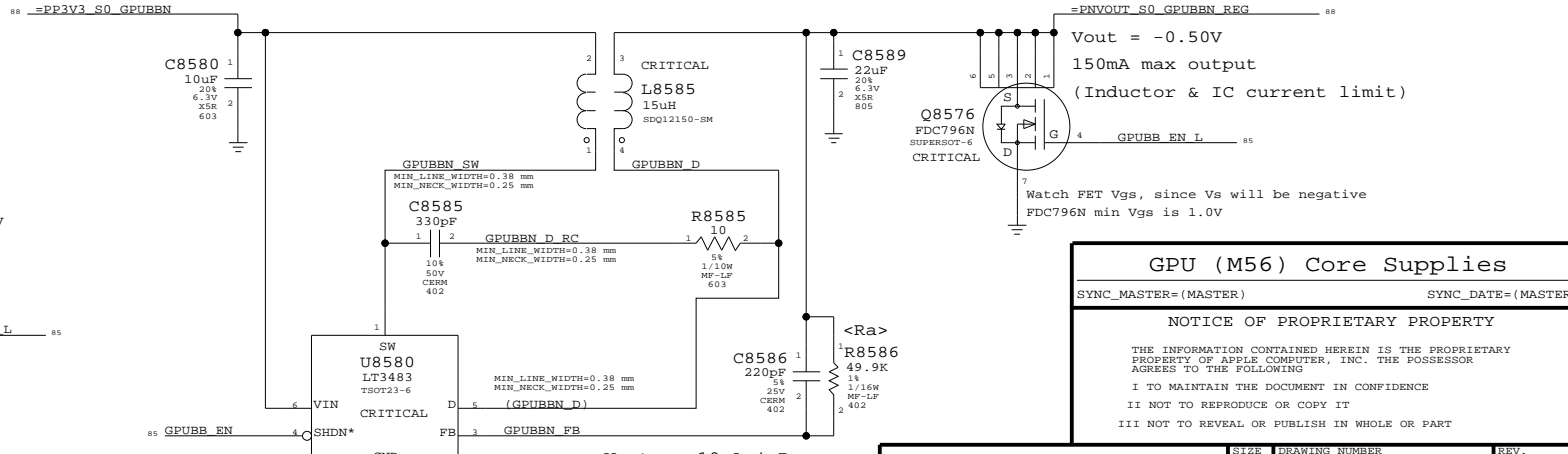
$$V_{out}(high) = 0.59V * (1 + R_a/R_{eq})$$

$$R_{eq} = R_b || R_c$$

Pull-up voltage must be high enough to satisfy BBP FET Vgs (where Vs = 1.2V)  
 FDC796N max Vgs is 3.0V  
 Vin must be > 4.2V

### Back-Bias Negative Supply

Back-bias negative supply provides VSS - 0.5V when active. When inactive, provides VSS to BBN pins.



$$V_{out} = -10\mu A * R_a$$

### GPU (M56) Core Supplies

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)  
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	OF	
NONE	85	111	

# Page Notes

Power aliases required by this page:  
 - =PP1V5\_GPU\_VDD15  
 - =PP1VR1V3\_GPU\_VCORE

Signal aliases required by this page:  
 (NONE)

BOM options provided by this page:  
 (NONE)

8 7 6 5 4 3 2 1

D

D

C

C

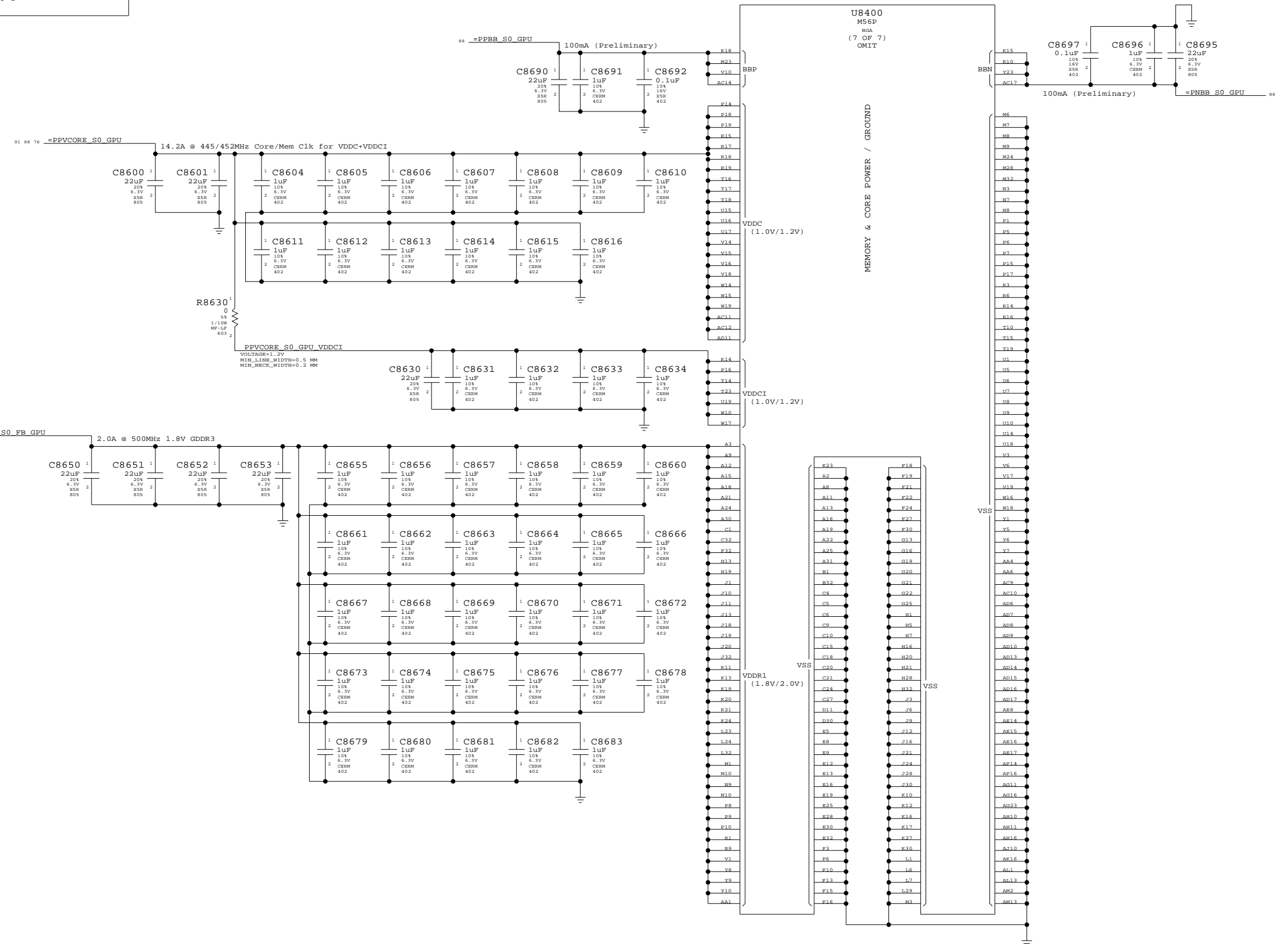
B

B

A

A

8 7 6 5 4 3 2 1



ATI M56 Core Power

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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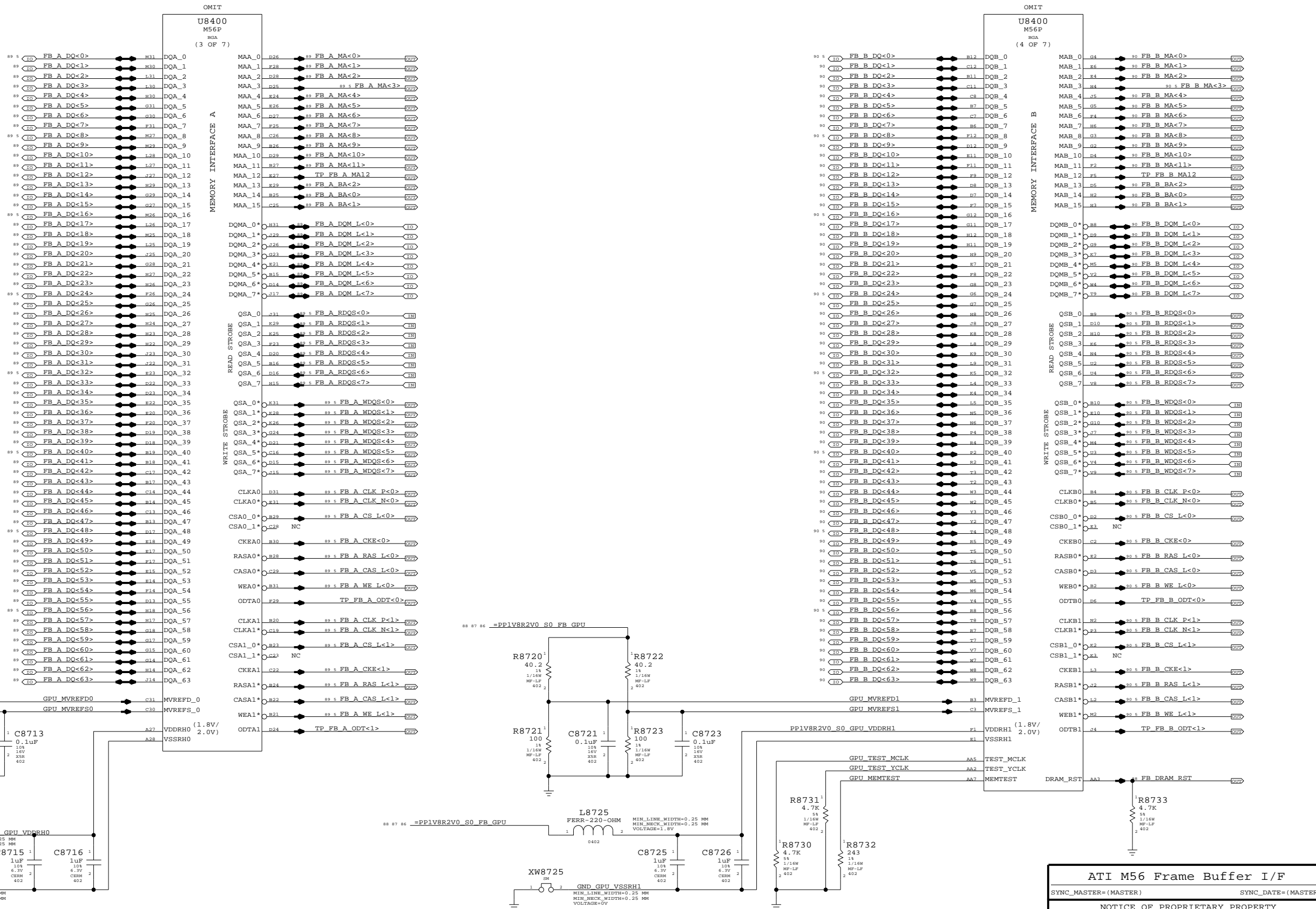
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	NONE	SHT	OF
		86	111

# Page Notes

Power aliases required by this page:  
 - =PP1V8R2V0\_S0\_FB\_GPU

Signal aliases required by this page:  
 (NONE)

BOM options provided by this page:  
 (NONE)



## ATI M56 Frame Buffer I/F

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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APPLE COMPUTER INC.	DRAWING NUMBER <b>D</b> 051-6949	REV. 09
	SCALE NONE	SHEET 87

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### "S0" GPU RAILS

ONLY ON IN RUN

59 EP1V0R1V2\_S0\_GPU  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

85 PP5V\_S0\_GPUVCORE\_VCC  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=5V

PP1V2\_GPU\_IO\_S0  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

PPBB\_S0\_GPU  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.5MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

PNBB\_S0\_GPU  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.5MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=0V

76 61 59 41 26 10 6 PP3V3\_S0  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

77 6 PP2V5\_S0  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

PP1V8R2V0\_S0\_FB\_GPU  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.8V

83 81 80 79 78 6 5 PP12V\_S5  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

76 6 PP12V\_S0  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=1.2V

97 94 76 6 PP5V\_S0  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=5V

85 GPUVCORE\_EN  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=5V

87 FB\_DRAM\_RST  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=5V

### M56 GPIOs

94 91 GPU\_GPIO\_0  
 GPIO 0 = TRANSMITTER POWER SAVINGS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_1  
 GPIO 1 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_2  
 GPIO 2 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_3  
 GPIO 3 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_4  
 GPIO 4 = DEBUG SIGNALS OUT

91 GPU\_GPIO\_5  
 GPIO 5 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_6  
 GPIO 6 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

TP\_GPU\_GPIO\_7  
 MAKE\_BASE=TRUE  
 GPIO 7 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_8  
 GPIO 8 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

NC\_GPU\_GPIO\_10  
 MAKE\_BASE=TRUE  
 GPIO 10 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_9  
 GPIO 9 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_13  
 GPIO 13 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_12  
 GPIO 12 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_11  
 GPIO 11 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

GPIO 9,13,12,11 = ROM ID CFG  
 INTERNAL PULL DOWN  
 0010 = 256 M APERATURE SIZE

91 GPU\_GPIO\_24  
 GPIO 24 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_27  
 GPIO 27 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_28  
 GPIO 28 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

91 GPU\_GPIO\_29  
 GPIO 29 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

85 GPU\_VCORE\_LOW  
 MAKE\_BASE=TRUE  
 MIN\_LINE\_WIDTH=0.6MM  
 MIN\_NECK\_WIDTH=0.125MM  
 VOLTAGE=5V  
 GPIO 15 = SWITCH CORE VOLTAGE HIGH TO LOW  
 EXTERNAL PULL DOWN RECOMMENDED

=PP3V3\_S0\_GPU\_VDDR3 88 91

TP\_GPU\_GPIO\_14  
 MAKE\_BASE=TRUE  
 GPIO 14 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

TP\_GPU\_GPIO\_17  
 MAKE\_BASE=TRUE  
 GPIO 17 = TRANSMITTER DE-EMPHASIS ENABLE  
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

TP\_GPU\_VGA\_R  
 MAKE\_BASE=TRUE  
 GPU\_VGA\_R

TP\_GPU\_VGA\_G  
 MAKE\_BASE=TRUE  
 GPU\_VGA\_G

TP\_GPU\_VGA\_B  
 MAKE\_BASE=TRUE  
 GPU\_VGA\_B

TP\_GPU\_VGA\_HSYNC  
 MAKE\_BASE=TRUE  
 GPU\_VGA\_HSYNC

TP\_GPU\_VGA\_VSYNC  
 MAKE\_BASE=TRUE  
 GPU\_VGA\_VSYNC

TP\_GPU\_TV\_Y  
 MAKE\_BASE=TRUE  
 GPU\_TV\_Y

TP\_GPU\_TV\_COMP  
 MAKE\_BASE=TRUE  
 GPU\_TV\_COMP

TP\_GPU\_TV\_C  
 MAKE\_BASE=TRUE  
 GPU\_TV\_C

TP\_GPU\_DDC\_B\_CLK  
 MAKE\_BASE=TRUE  
 GPU\_DDC\_B\_CLK

TP\_GPU\_DDC\_B\_DATA  
 MAKE\_BASE=TRUE  
 GPU\_DDC\_B\_DATA

GPU MISC

8

7

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3

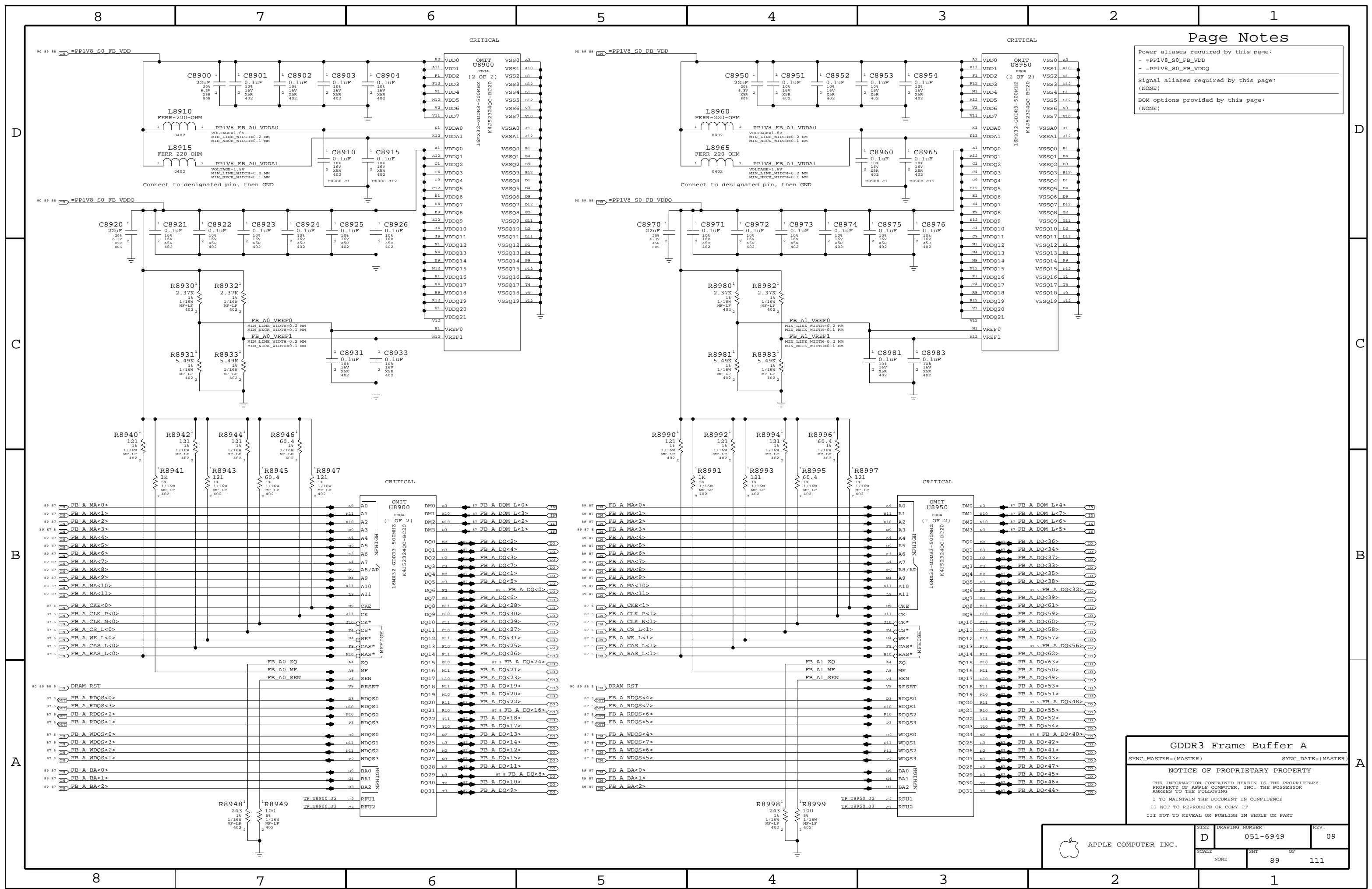
2

1

Power aliases required by this page:  
 - =PPIV8\_S0\_FB\_VDD  
 - =PPIV8\_S0\_FB\_VDDQ

Signal aliases required by this page:  
 (NONE)

BOM options provided by this page:  
 (NONE)



**GDDR3 Frame Buffer A**

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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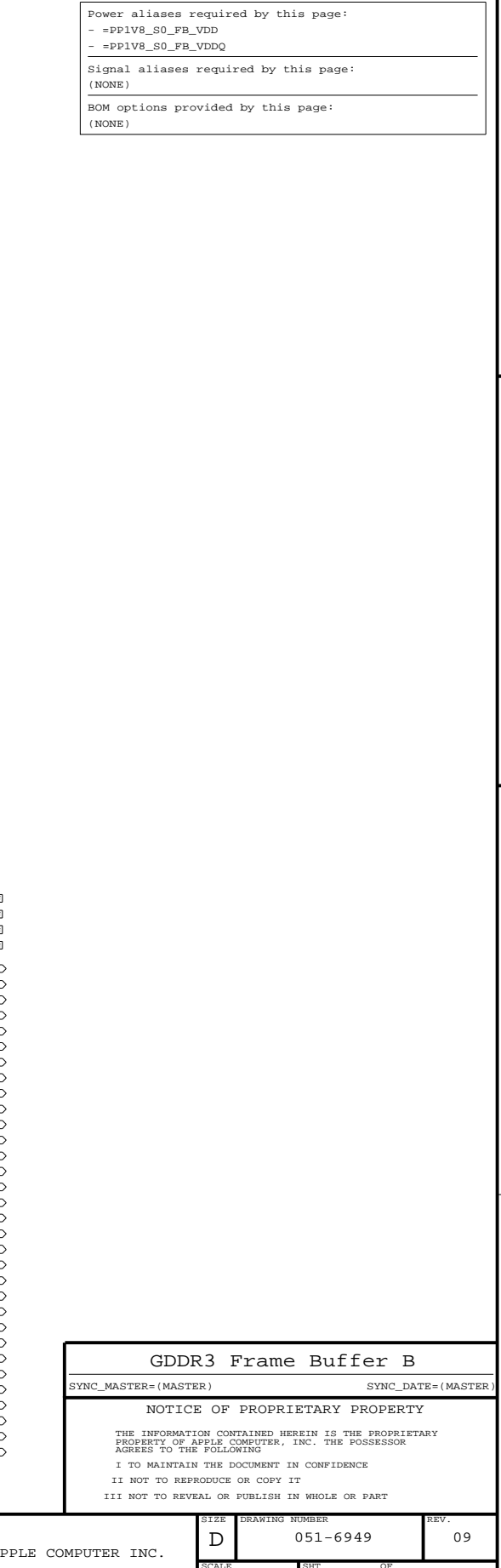
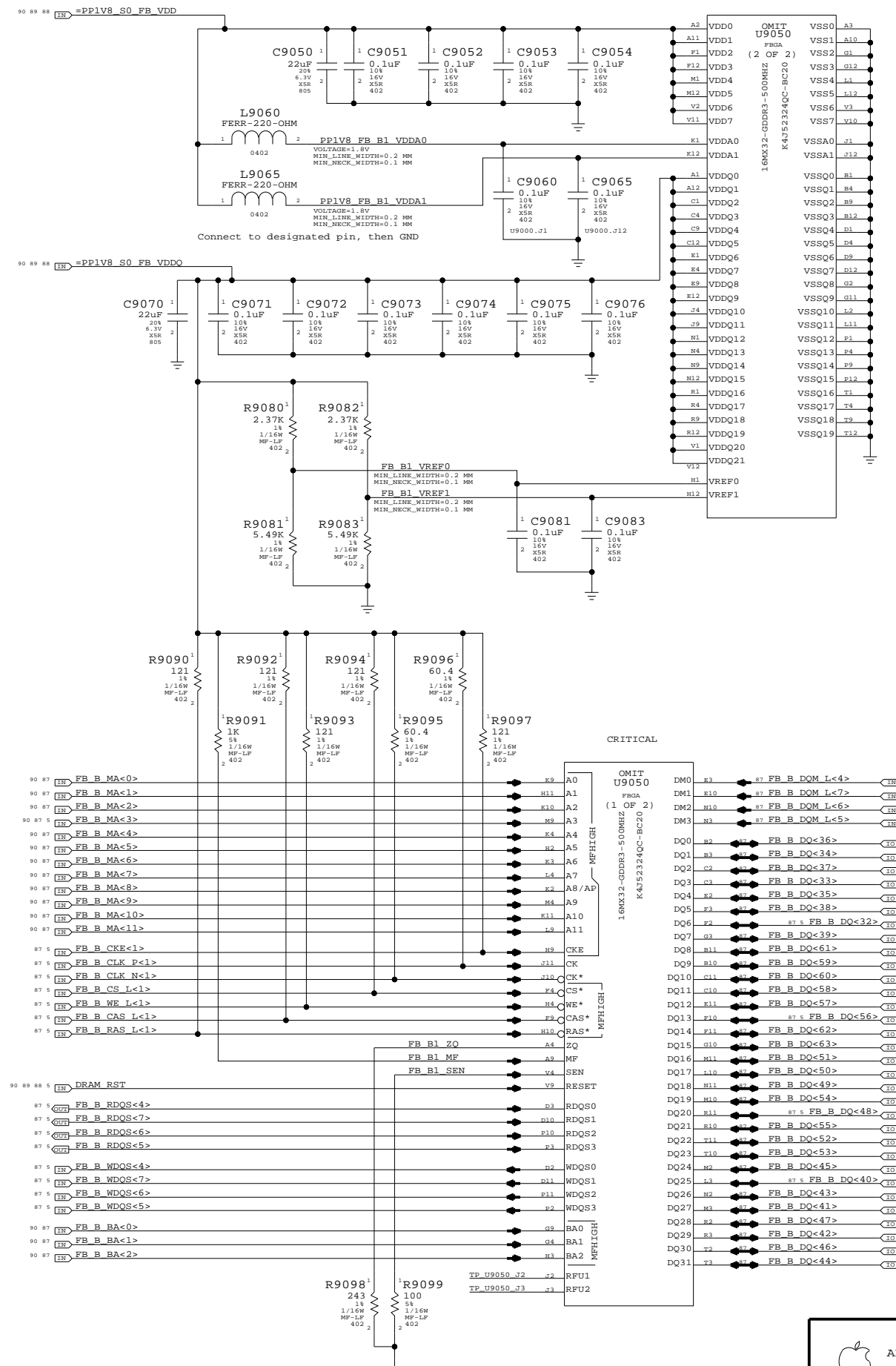
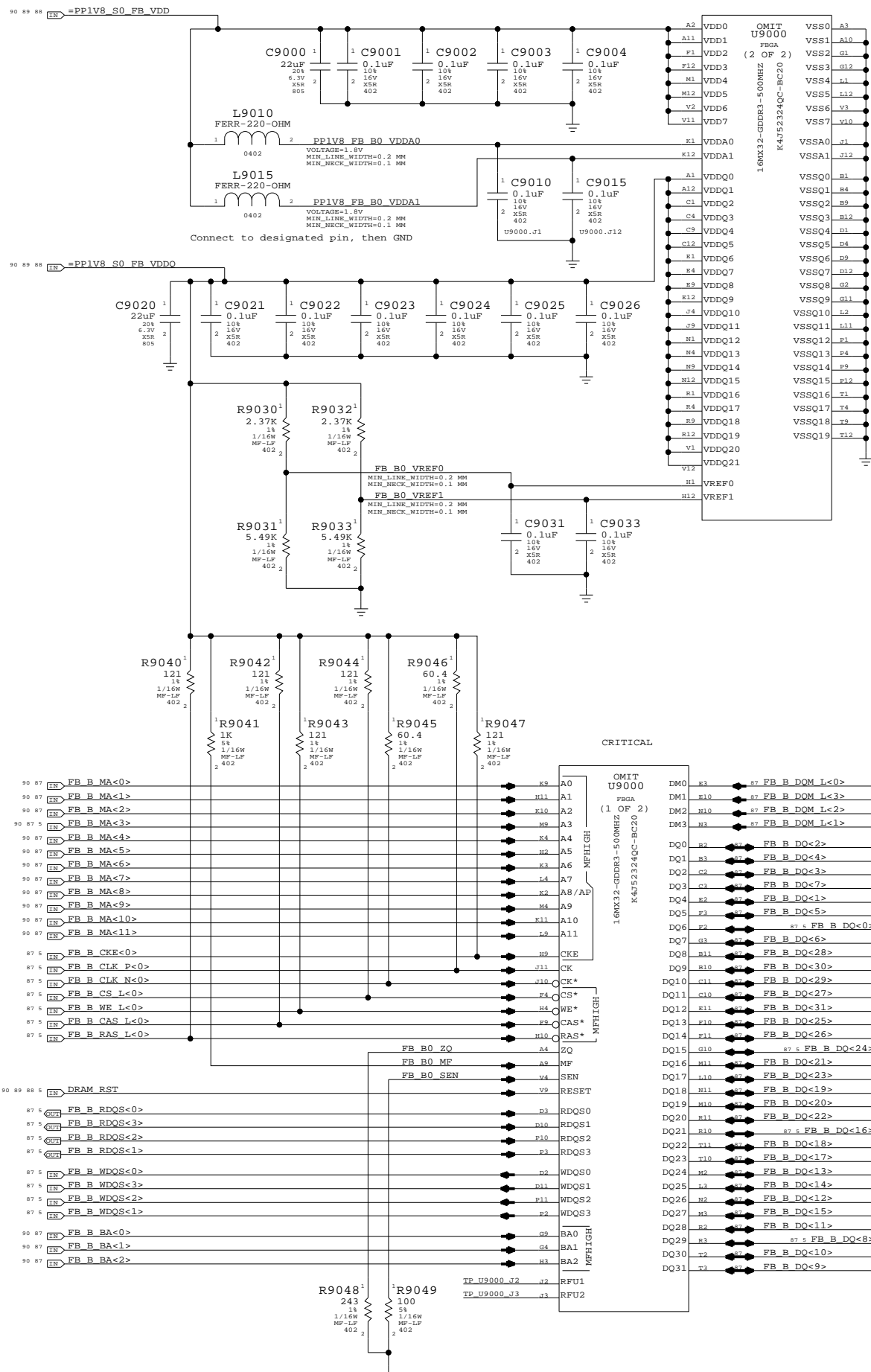
Power aliases required by this page:  
 - =PPIV8\_S0\_FB\_VDD  
 - =PPIV8\_S0\_FB\_VDDQ

Signal aliases required by this page:  
 (NONE)

BOM options provided by this page:  
 (NONE)

CRITICAL

CRITICAL



**GDDR3 Frame Buffer B**

SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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Page Notes

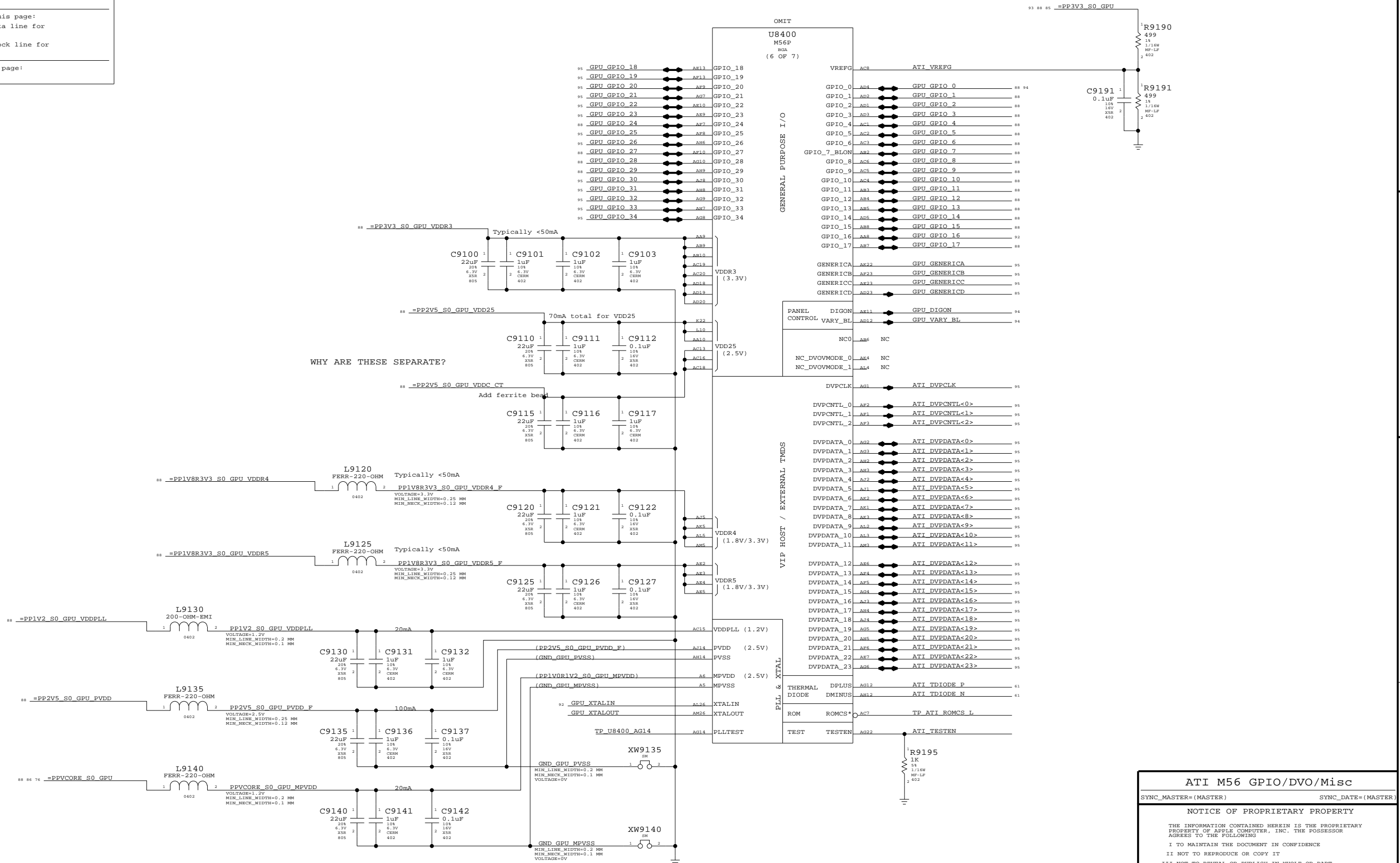
Power aliases required by this page:

- =PP3V3\_GPU\_GPIOS
- =PP2V5\_PVDD
- =PP1V8\_GPU\_LVDS\_PLL

Signal aliases required by this page:

- =I2C\_GPU\_TMDS\_SDA - I2C data line for external TMDS transmitters
- =I2C\_GPU\_TMDS\_SCL - I2C clock line for external TMDS transmitters

BOM options provided by this page:  
(NONE)



ATI M56 GPIO/DVO/Misc  
 SYNC\_MASTER=(MASTER) SYNC\_DATE=(MASTER)

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	D	051-6949	09
SCALE	SHT	OF	
NONE	91	111	

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### Page Notes

Power aliases required by this page:

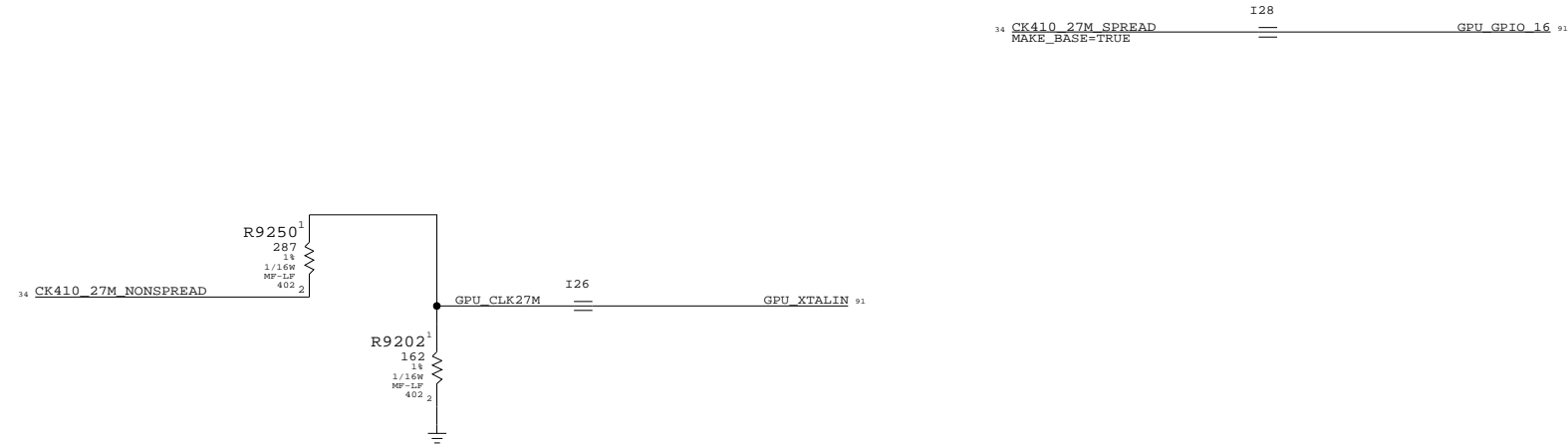
- =PP3V3\_GPU\_CLOCKS      - =PP3V3\_GPU\_PWRSEQ
- =PPVIN\_GPU\_LVDDR\_LDO    - =PP2V5\_GPU\_PWRSEQ
- =PP2V5\_GPU\_LVDDR\_LDO    - =PP1V8\_GPU\_PWRSEQ
- =PP1V5\_GPU\_PWRSEQ

Signal aliases required by this page:

(NONE)

BOM options provided by this page:

- GPU\_SS                      - GPU\_LVDDR\_2V8



### GPU CLOCKS

SYNC\_MASTER=BOZEMAN      SYNC\_DATE=05/21/2005

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	SCALE	SHT	OF	REV.
	NONE	92	111	09

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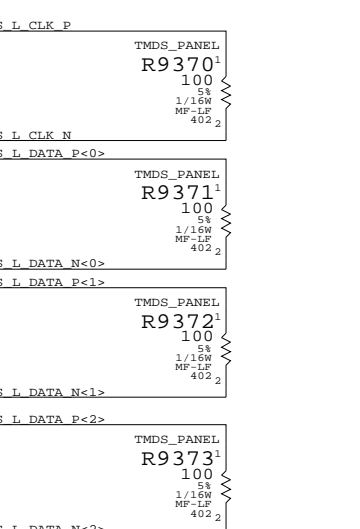
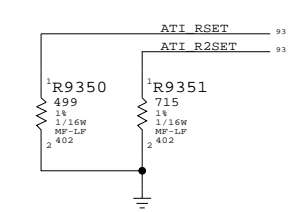
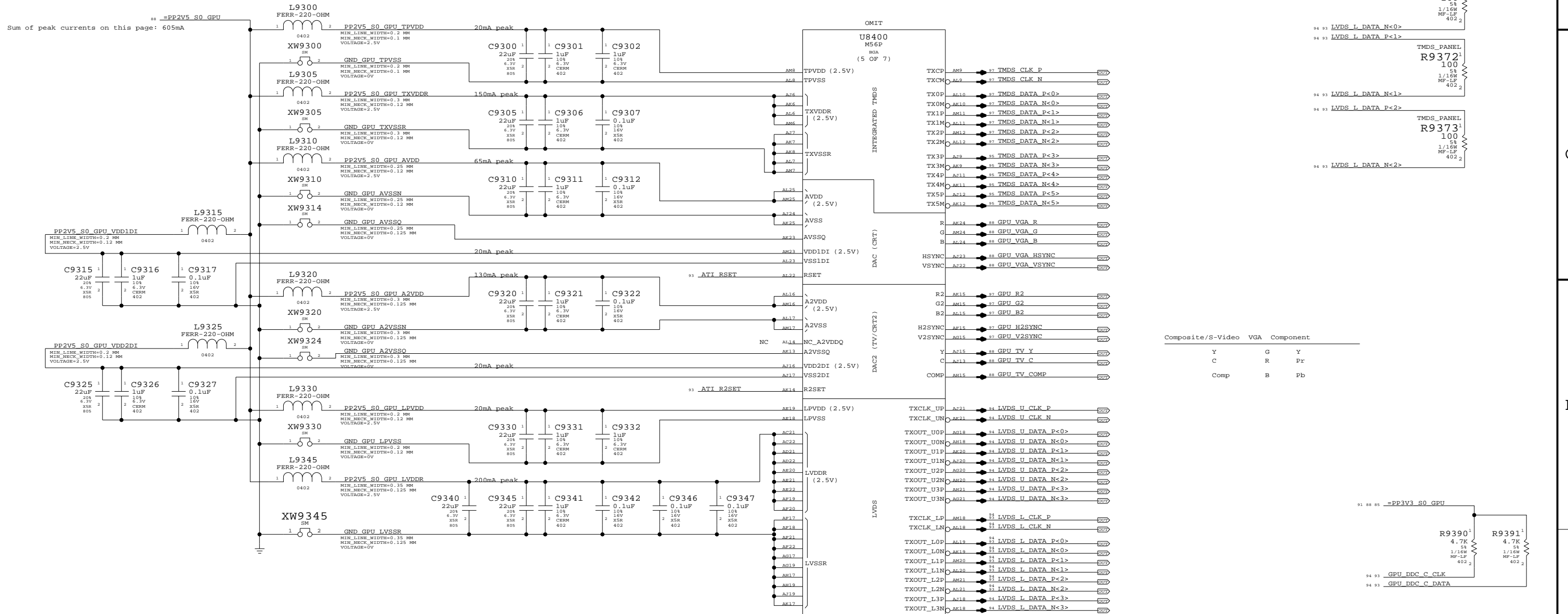
Page Notes

Power aliases required by this page:  
 - =PP2V5\_S0\_GPU  
 - =PP1V8R2V5\_S0\_GPU\_LVDDR

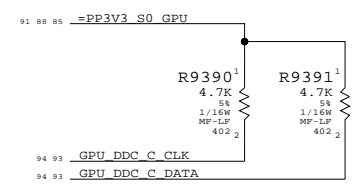
Signal aliases required by this page:  
 (NONE)

BOM options provided by this page:  
 (NONE)

TERMINATION FOR TMDS USAGE OF LVDS PINS  
 PLACE CLOSE TO GPU (U8400)



Composite/S-Video	VGA	Component
Y	G	Y
C	R	Pr
Comp	B	Pb



**ATI M56 Video Interfaces**

SYNC\_MASTER=(MASTER)      SYNC\_DATE=(MASTER)

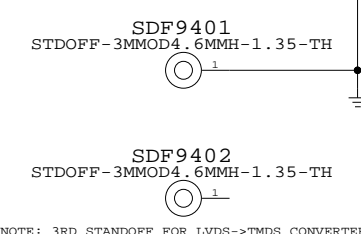
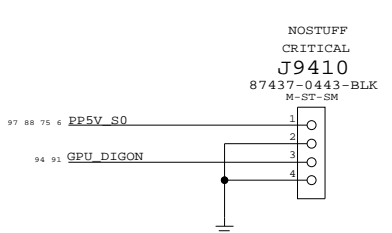
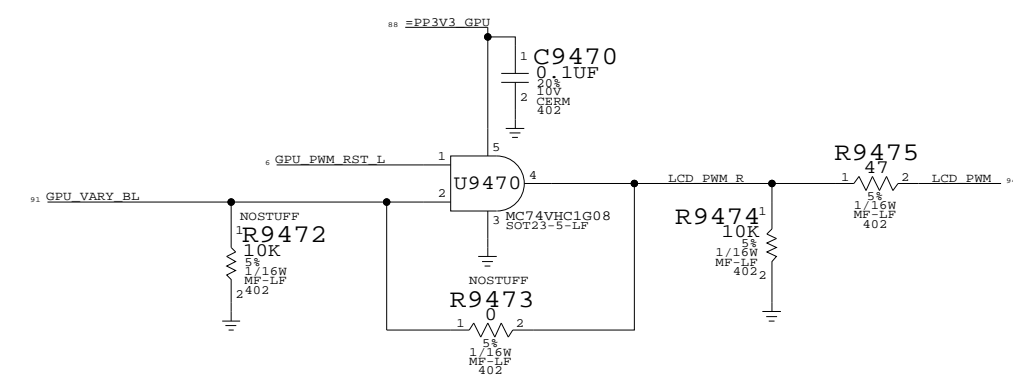
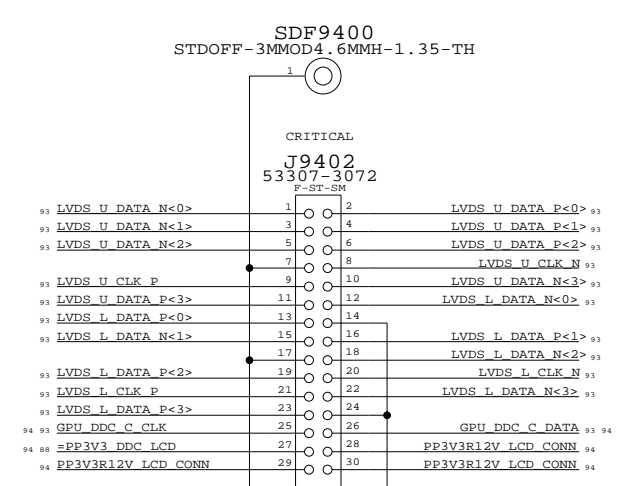
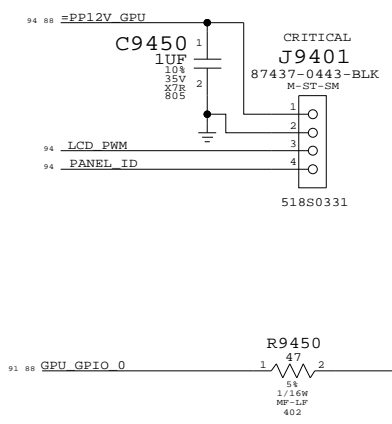
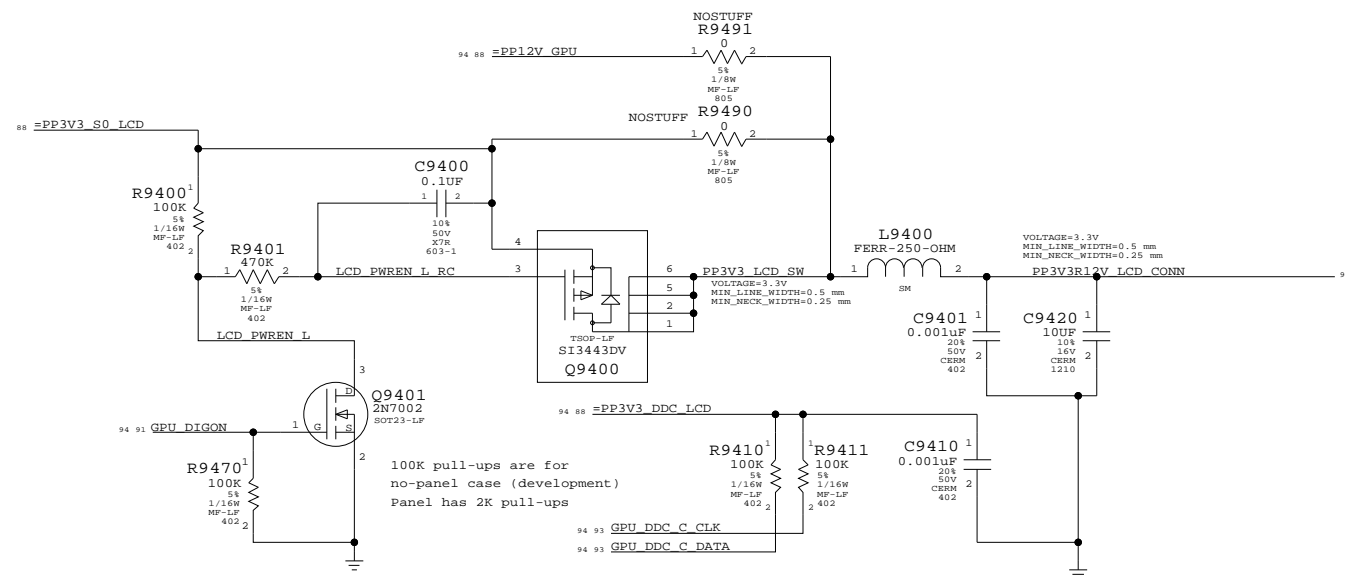
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# LCD (LVDS) INTERFACE

# INVERTER INTERFACE



NOTE: 3RD STANDOFF FOR LVDS->TMDS CONVERTER BOARD

**Internal Display Conns**  
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	D	051-6949	09
SCALE	SHT	OF	
NONE	94	111	

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D

D

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C

C

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### M56 TPS


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SCALE	SHT		OF
NONE	95		111

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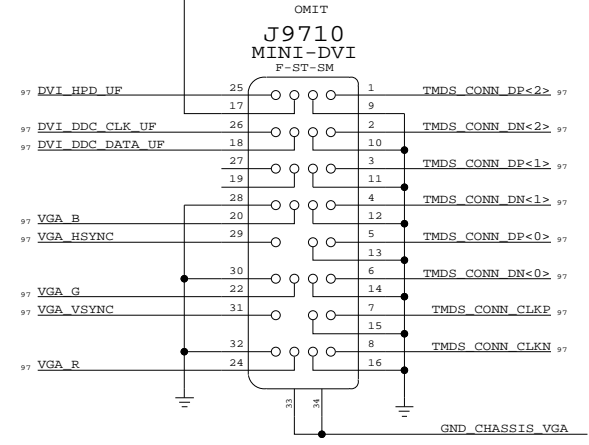
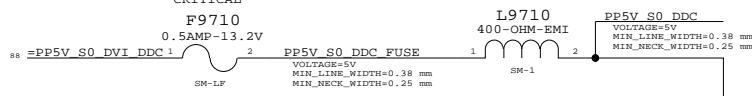
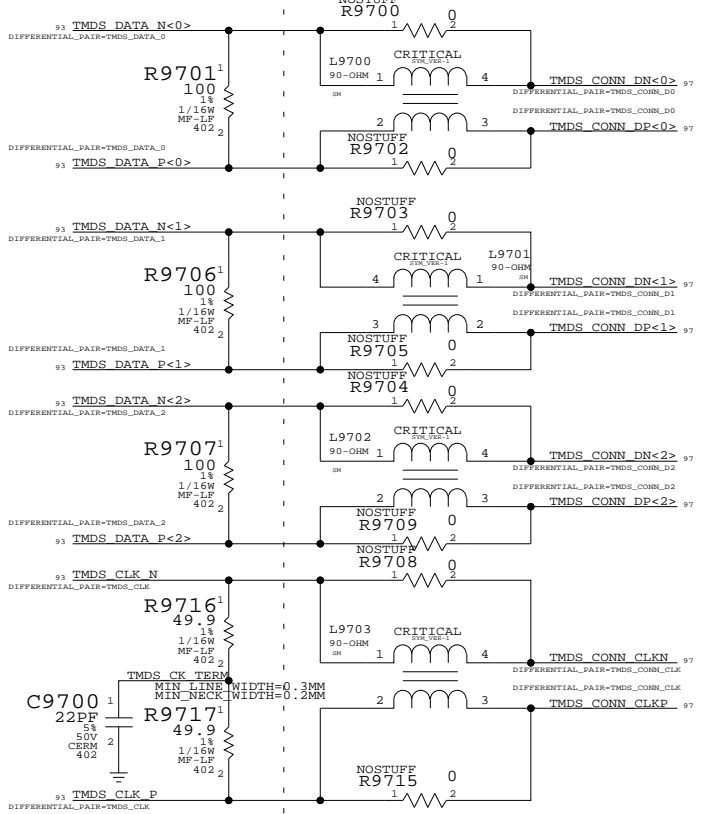
1

PLACE LEFT SIDE  
AS CLOSE TO GPU (U8400)  
AS POSSIBLE

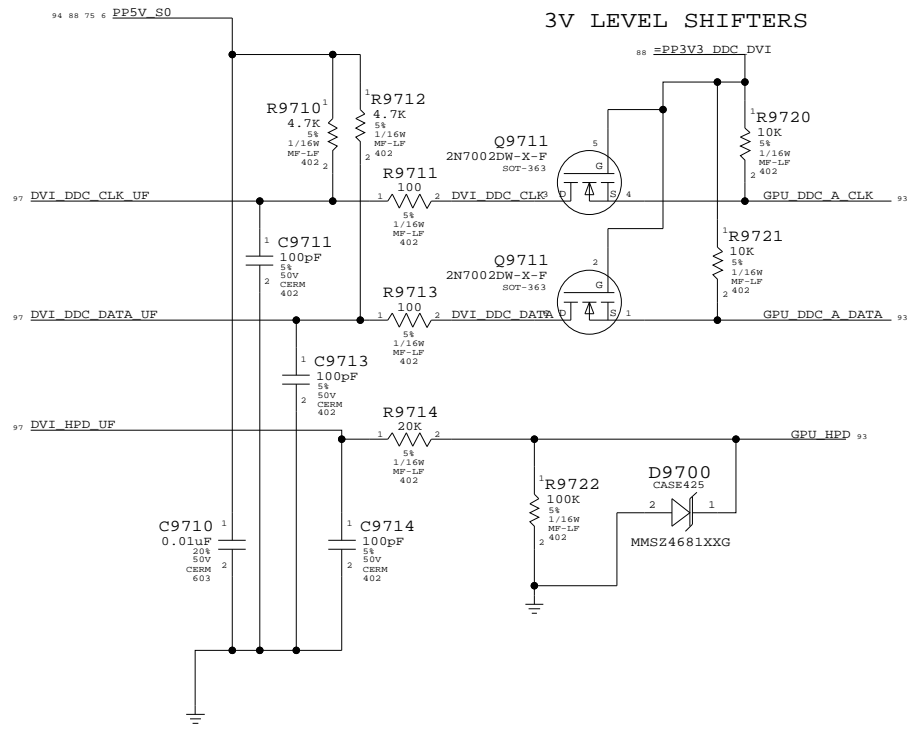
PLACE FILTER CLOSE  
TO TMD5 CONNECTOR

### DVI DDC CURRENT LIMIT DVI INTERFACE

(55mA requirement per DVI spec)

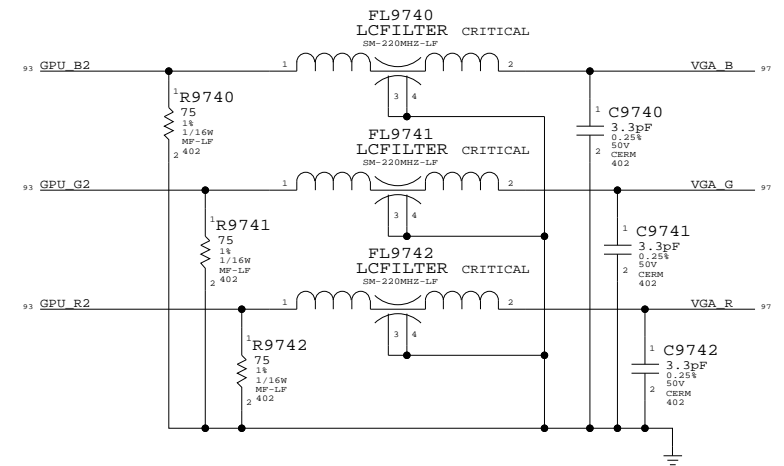


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
51480114	1	CONN, 32-P MINI-DVI RCPT MG3,LF	J9710	CRITICAL	17_INCH_LCD
51480116	1	CONN, 32-P MINI-DVI RCPT MG3,LF	J9710	CRITICAL	20_INCH_LCD

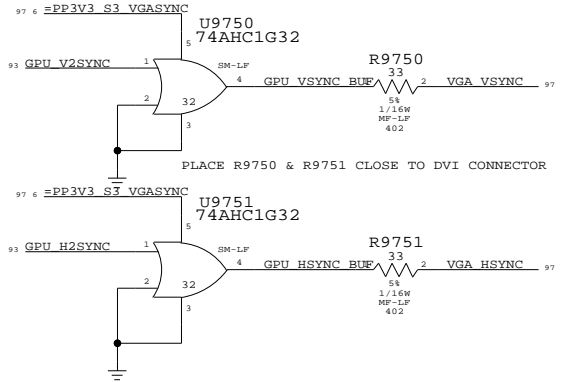


### ANALOG FILTERING

PLACE CLOSE TO CONNECTOR



### VGA SYNC BUFFERS



**External Display Conns**  
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Table with 8 columns (8-1) and 28 rows (A-D). Each cell contains technical identifiers (e.g., LVP6\_FB, LVP6\_FB2, LVP6\_FET\_RC1) and their corresponding values (e.g., 75A4 75B6, 75A4 75B6, 75A8 75C2).













Table with columns 8, 7, 6, 5, 4, 3, 2 and rows A, B, C, D. Each cell contains alphanumeric codes and reference numbers.





	8	7	6	5	4	3	2	
D	XW9314 SHORT_SM m38[93C7]	XW9320 SHORT_SM m38[93B7]	XW9324 SHORT_SM m38[93B7]	XW9330 SHORT_SM m38[93B7]	XW9345 SHORT_SM m38[93A7]	Y2600 CRYSTAL_4PIN_SM-LF m38[26D8]	Y3301 CRYSTAL_5X3_2-SM m38[33C7]	Y4101 CRYSTAL_4PIN_SM-3 m38[41B5]
	Y4400 CRYSTAL_HC49-USMD m38[44D2]	Y5800 CRYSTAL_SM-3 m38[59B8]	Y6700 CRYSTAL_4PIN_SM-LF m38[59B7]	ZH500 HOLE_VIA m38[5C1]	ZH501 HOLE_VIA m38[5C1]	ZH502 HOLE_VIA m38[5C1]	ZH503 HOLE_VIA m38[5C1]	ZH504 HOLE_VIA m38[5B1]
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C	ZH609 MTGHOLE m38[9D2]	ZH610 MTGHOLE m38[9D2]						
B								
A								
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