

M39 - DVT

11/16/05

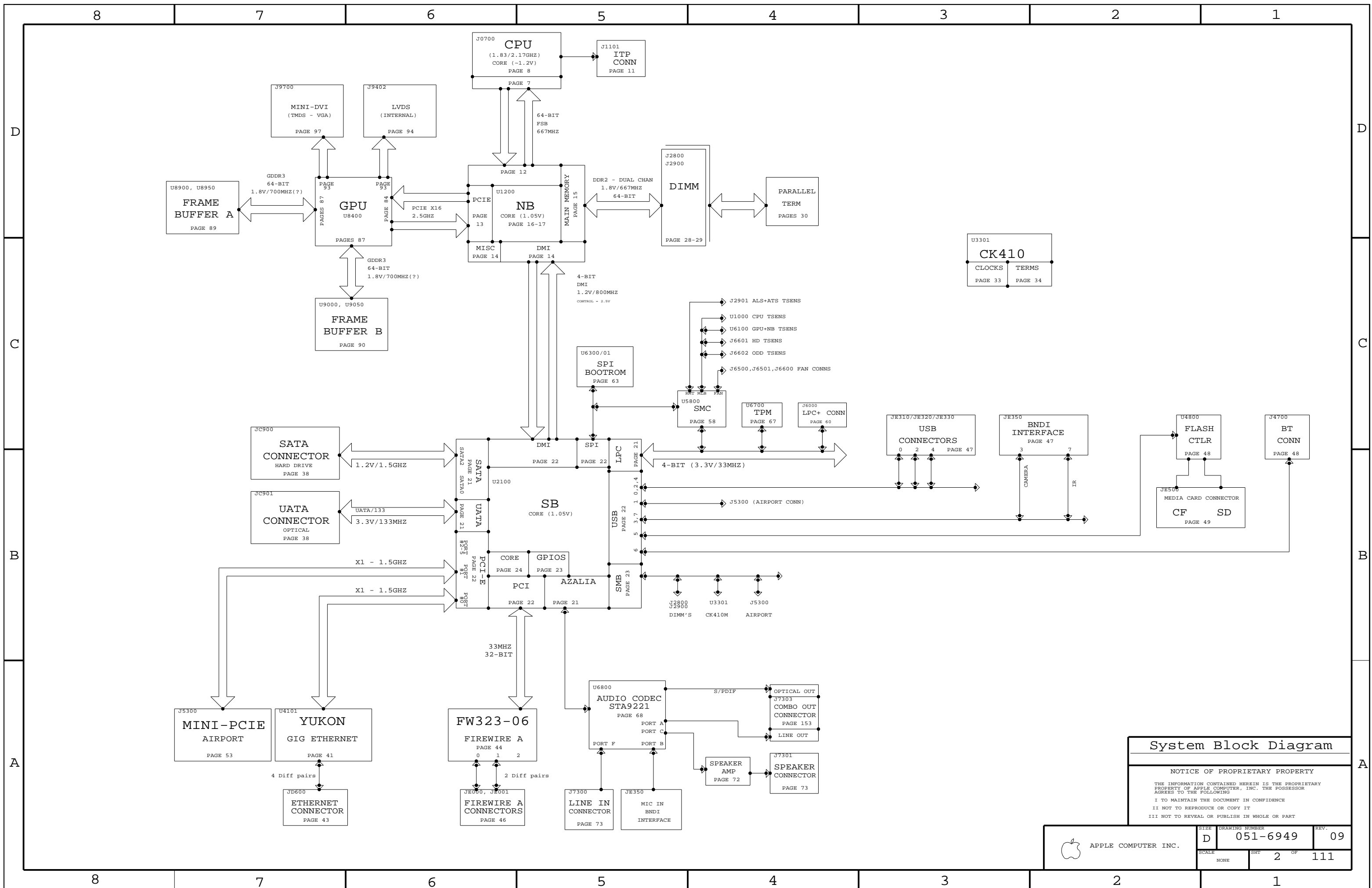
1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD	ENG APPD
				DATE	DATE
06		400374	ENGINEERING RELEASED	09/16/05	06/22/04

PAGE	DRI	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	33 CLOCKS - GENERATOR
34	JD	JD	34 CLOCKS - TERMINATIONS
38	JD	JD	38 ATA (SATA AND IDE) CONN'S
(M42) 41	JD	JD	41 LAN - YUKON'S PCIE INTERFACE
42	JD	JD	42 LAN - YUKON'S PWR, MISC
43	JD	JD	43 LAN - CONN
44	JD	JD	44 FIREWIRE - FW323-06
45	JD	JD	45 FIREWIRE - DECAPS
46	JD	JD	46 FIREWIRE - CONN'S
47	JD	JD	47 USB - CONN'S
49	JD	JD	49 USB - FLASH CONN

PAGE	DRI	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

<p style="font-size: small;">DIMENSIONS ARE IN MILLIMETERS</p> <p>XX : _____</p> <p>X.XX : _____</p> <p>X.XXX : _____</p> <p>ANGLES : _____</p> <p style="text-align: center; font-size: x-small;">DO NOT SCALE DRAWING</p> <div style="text-align: center;"> <p style="font-size: x-small;">THIRD ANGLE PROJECTION</p> </div>	<p>METRIC</p>	Apple Computer Inc.															
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RELEASE	SCALE																
	NONE																
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">MATERIAL/FINISH NOTED AS APPLICABLE</td> <td style="width: 50%;">SIZE D</td> </tr> </table>		MATERIAL/FINISH NOTED AS APPLICABLE	SIZE D	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 70%;">DRAWING NUMBER</td> <td style="width: 30%;">REV.</td> </tr> <tr> <td style="text-align: center;">051-6950</td> <td style="text-align: center;">06</td> </tr> </table>	DRAWING NUMBER	REV.	051-6950	06									
MATERIAL/FINISH NOTED AS APPLICABLE	SIZE D																
DRAWING NUMBER	REV.																
051-6950	06																
<p style="text-align: center;">SHT 1 OF 111</p>																	



System Block Diagram

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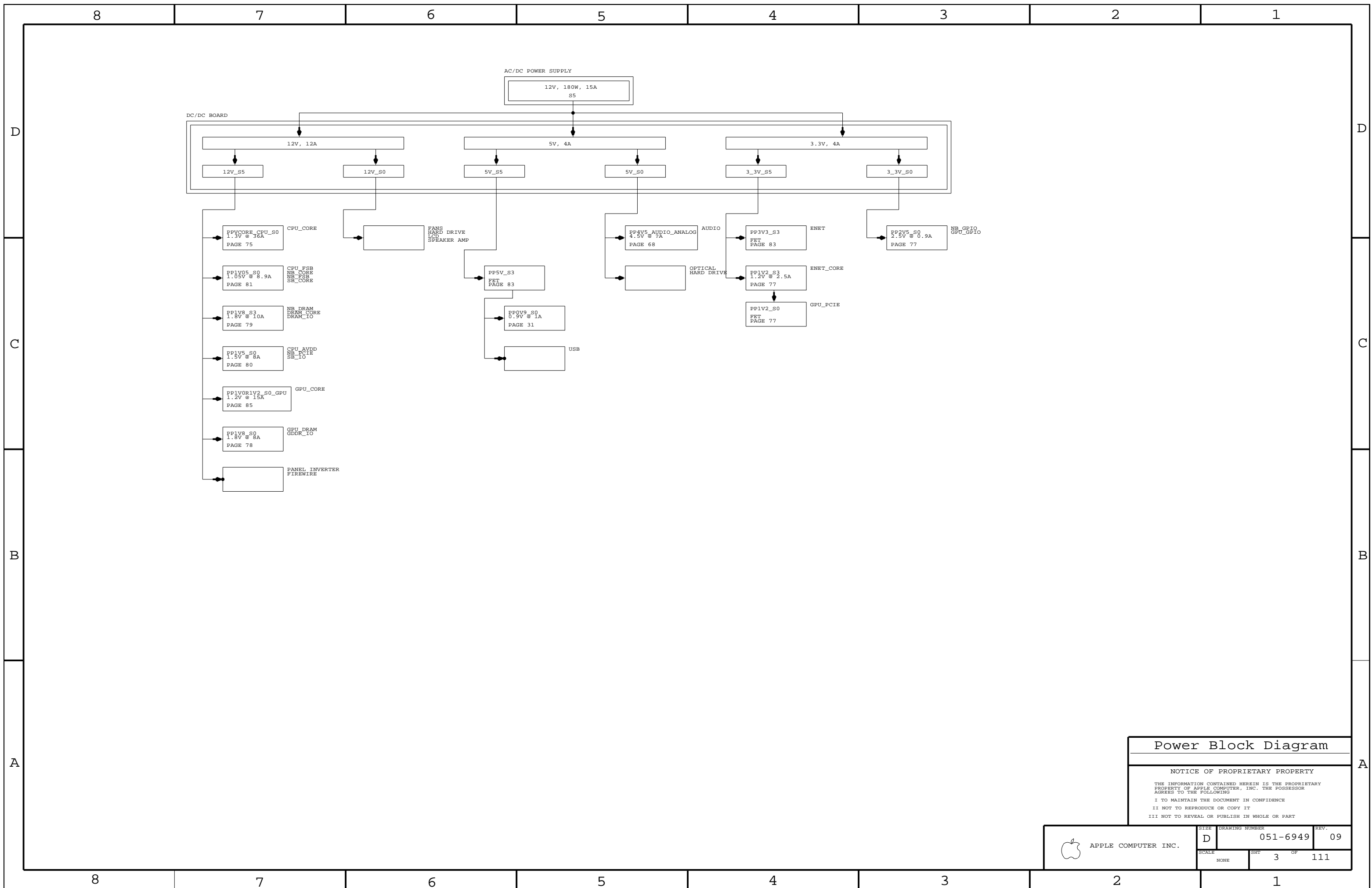
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	SCALE NONE	SHEET 2	OF 111



Power Block Diagram

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	D	051-6949	09
SCALE	SHT	OF	
NONE	3	111	

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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,HSS/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,LFP
338S0302	338S0266		U8400	IC,ATI,M36D,GRAFIX CTLR,880BGA,LF

Table Items

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SCALE	SHT	OF
NONE	4	111

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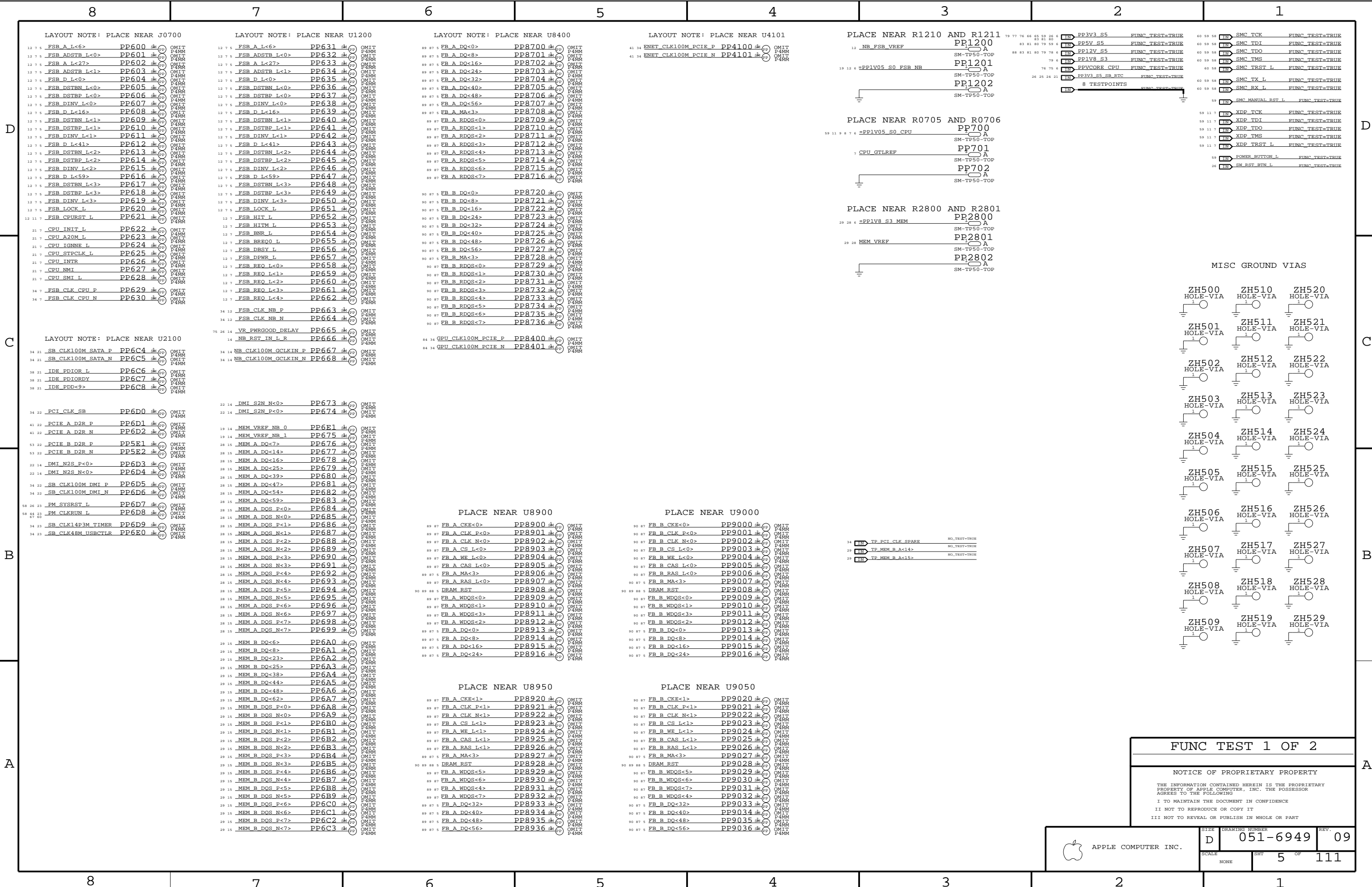
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LAYOUT NOTE: PLACE NEAR J0700

LAYOUT NOTE: PLACE NEAR U1200

LAYOUT NOTE: PLACE NEAR U8400

LAYOUT NOTE: PLACE NEAR U4101

PLACE NEAR R1210 AND R1211

PLACE NEAR R0705 AND R0706

PLACE NEAR R2800 AND R2801

MISC GROUND VIAS

LAYOUT NOTE: PLACE NEAR U2100

PLACE NEAR U8900

PLACE NEAR U9000

PLACE NEAR U8950

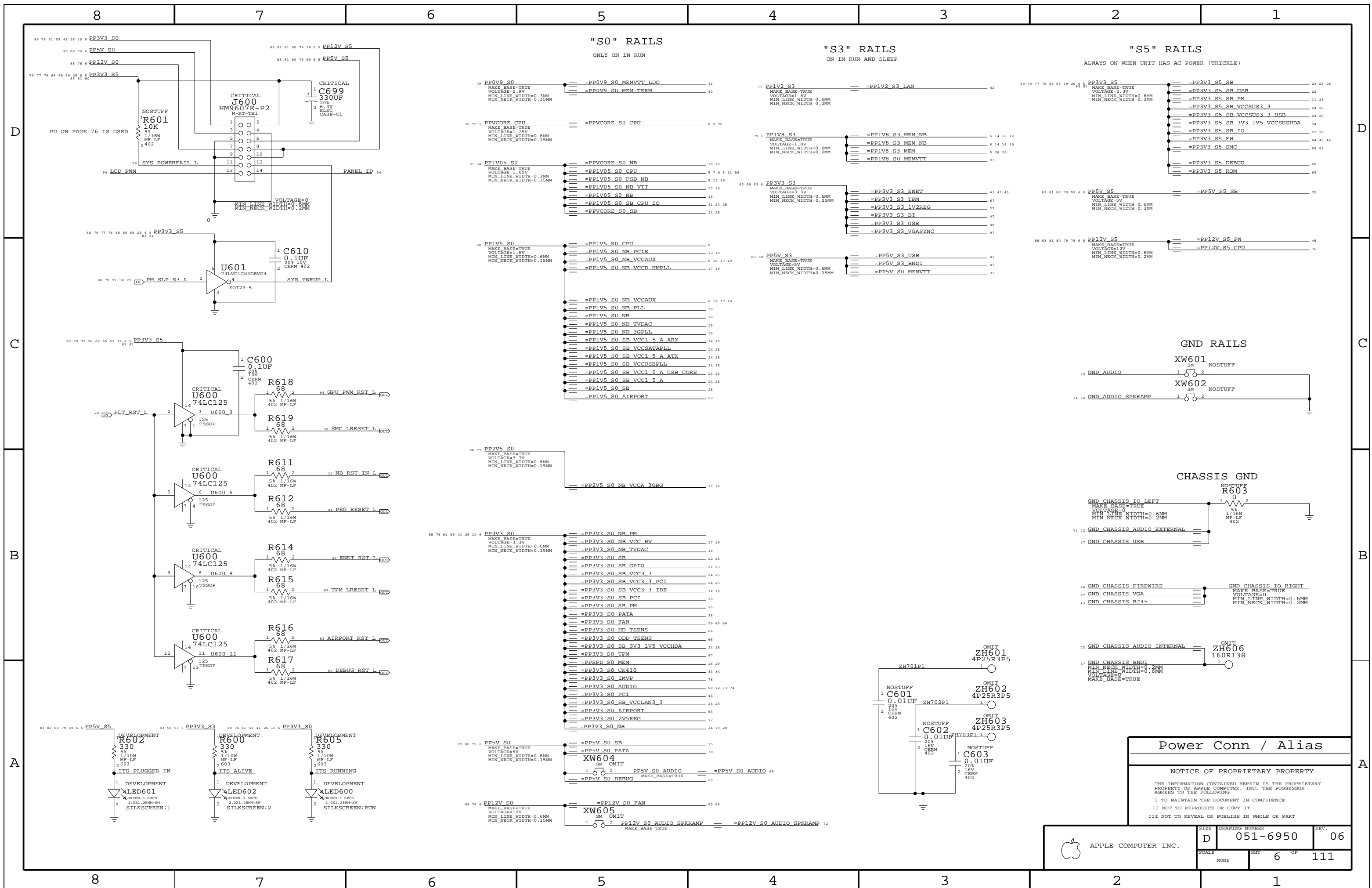
PLACE NEAR U9050

FUNC TEST 1 OF 2

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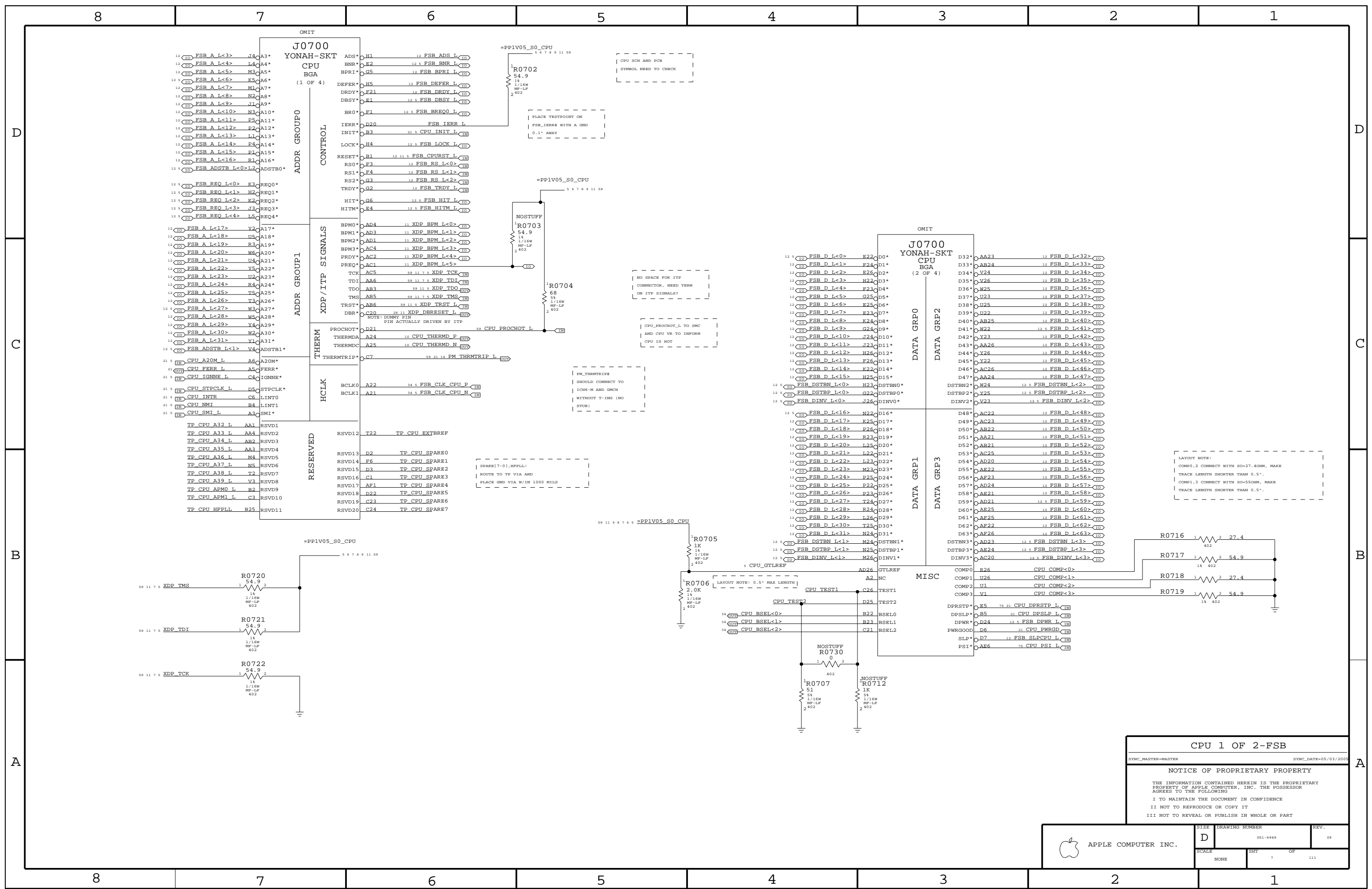


Power Conn / Alias

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	D	051-6950	06
SCALE	SHT	6 OF	111
NONE			



CPU 1 OF 2-FSB

SYNC_MASTER=MASTER SYNC_DATE=05/03/2005

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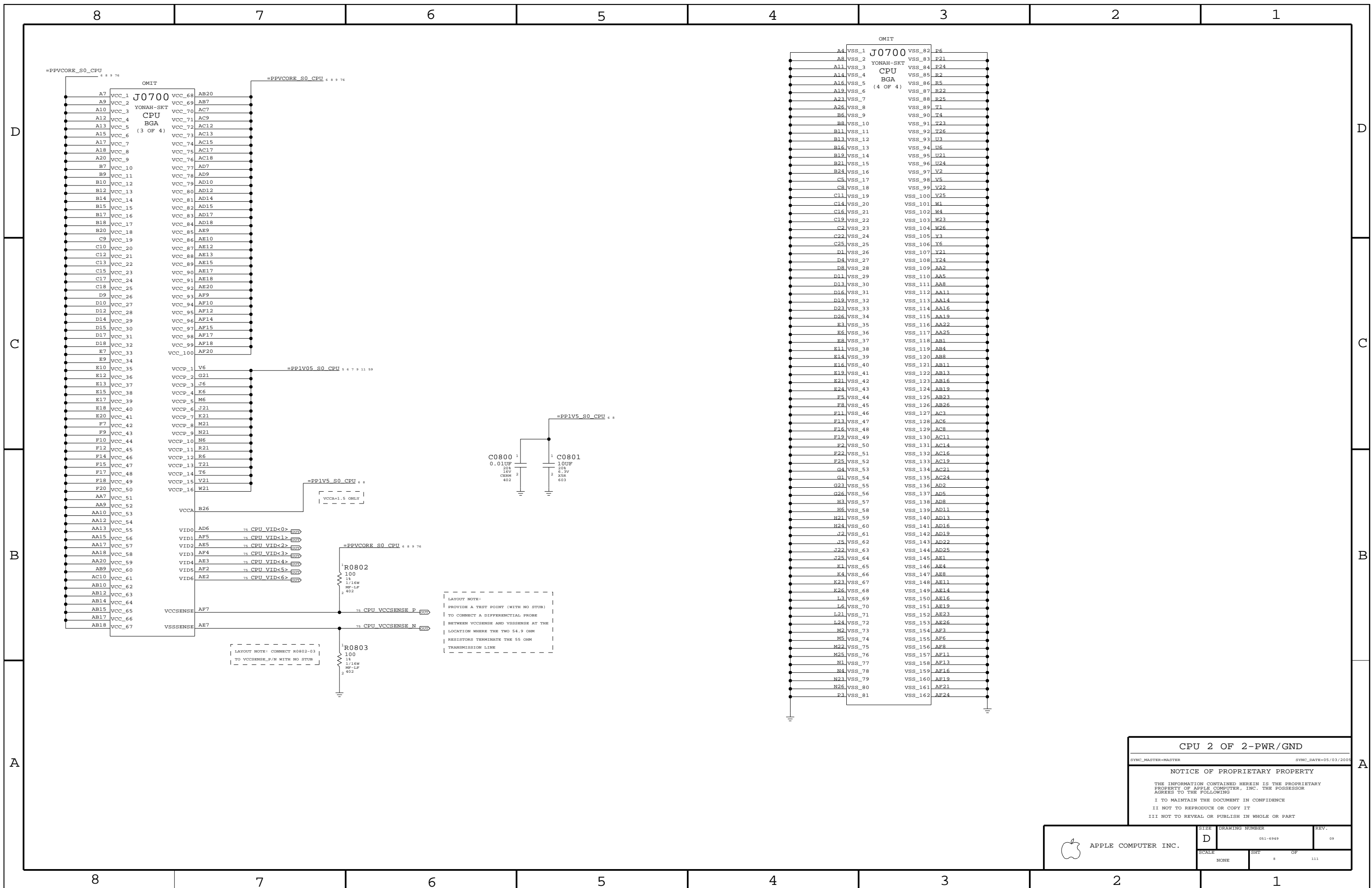
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	D	051-6949	09
SCALE	SHT	OF	111
NONE	7		



CPU 2 OF 2-PWR/GND

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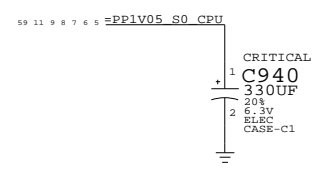
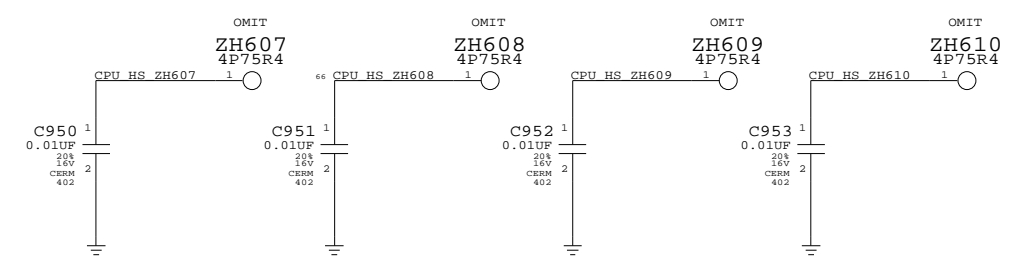
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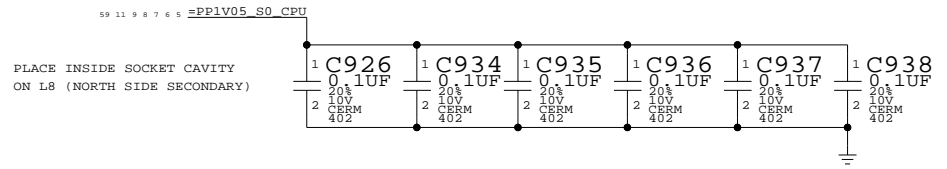
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	SCALE NONE	SHEET 8	OF 111

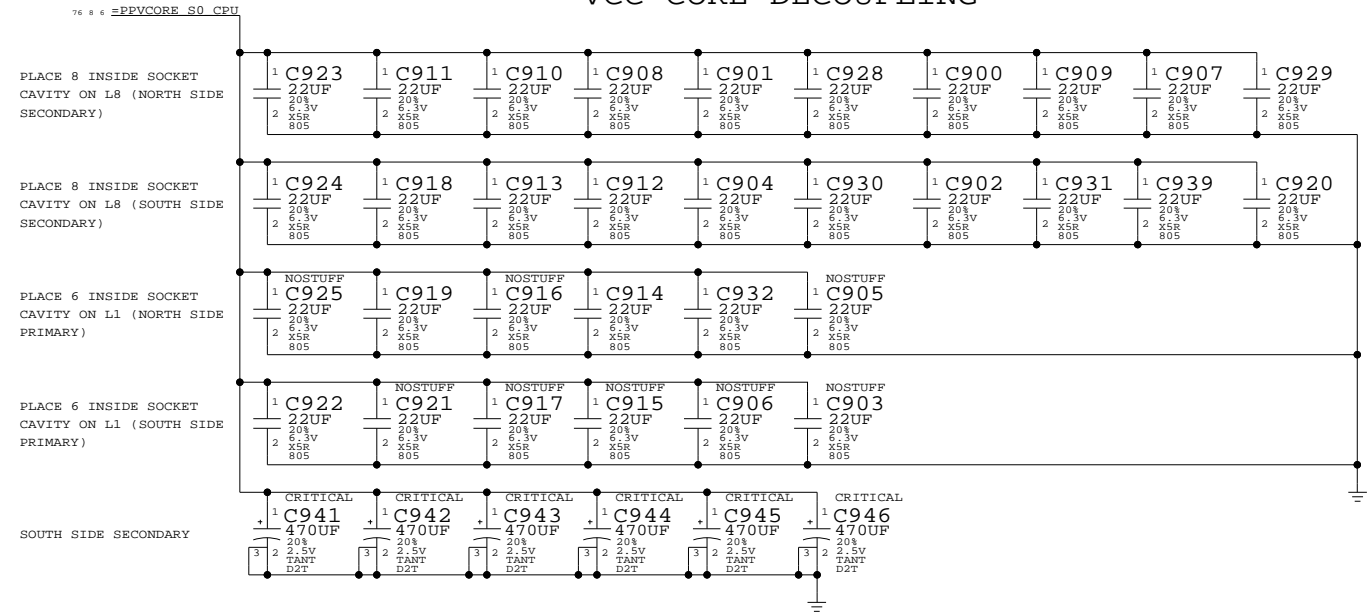
CPU HEATSINK MOUNTING HOLES



VCCP CORE DECOUPLING



VCC CORE DECOUPLING



CPU DECAPS & VID<>

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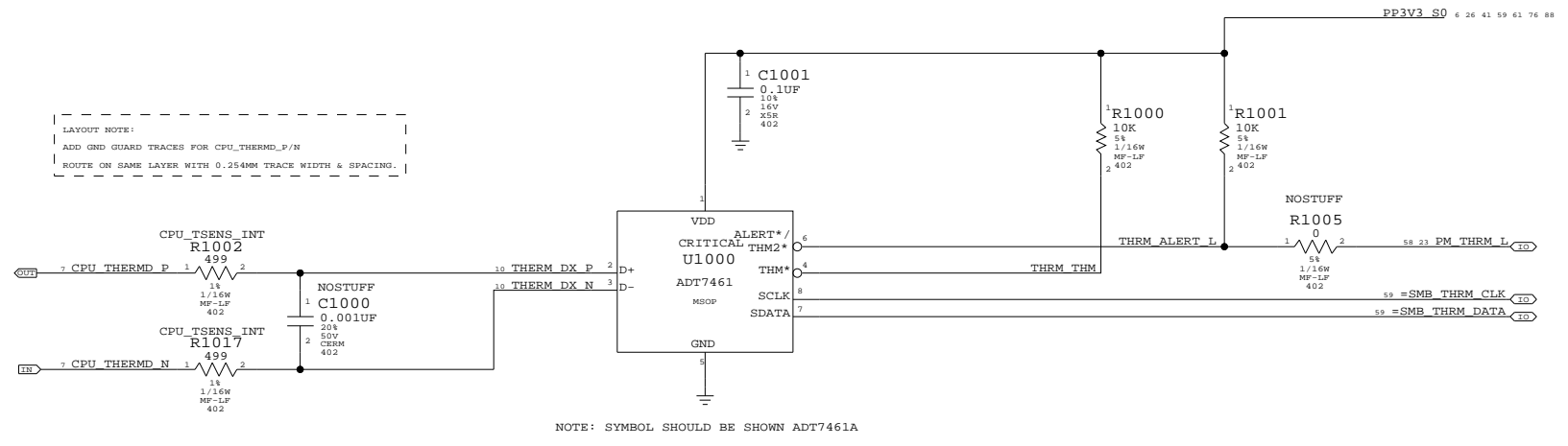
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SCALE	SHT		OF
NONE	9		111

CPU THERMAL SENSOR

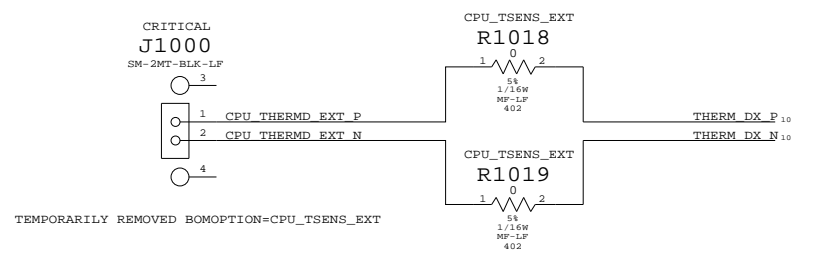
NOTE:
IF CPU T DIODE TO BE READ IN OFF STATE,
THEN THIS SHOULD BE S5

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	111
NONE	10		

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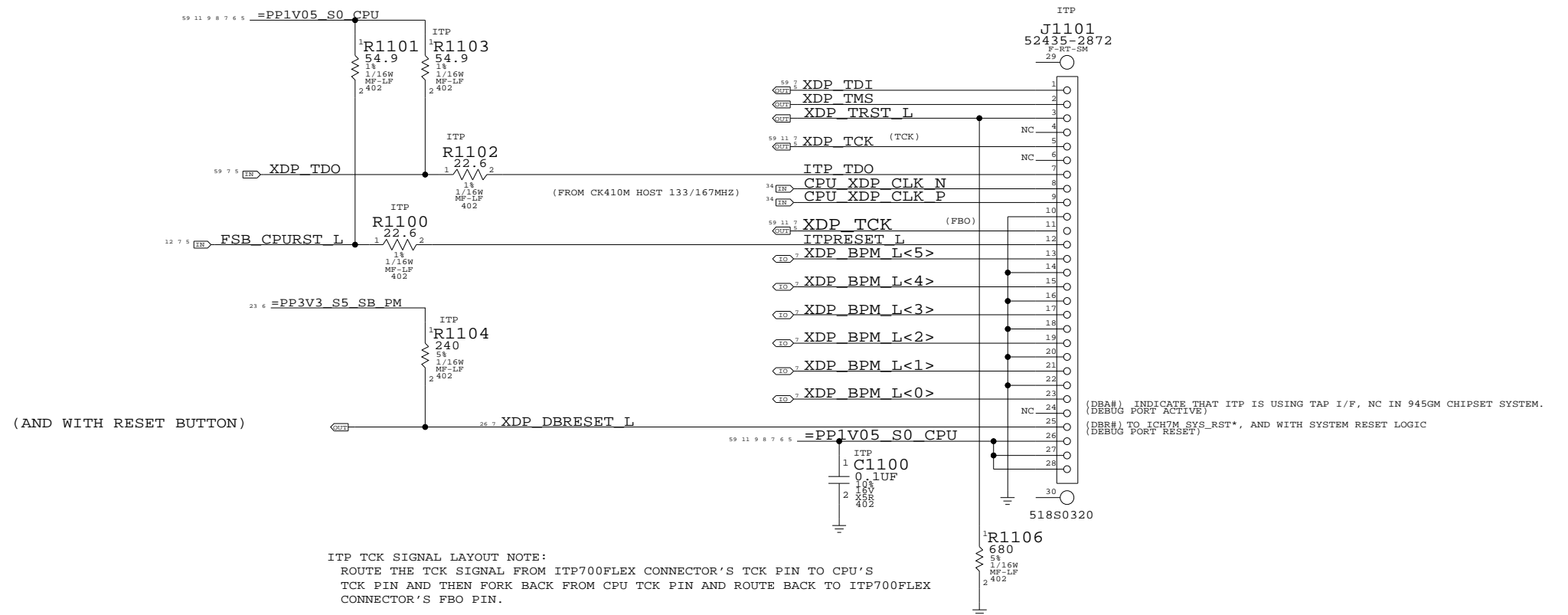
B

B

A

A

CPU ITP700FLEX DEBUG SUPPORT



ITP TCK SIGNAL LAYOUT NOTE:
 ROUTE THE TCK SIGNAL FROM ITP700FLEX CONNECTOR'S TCK PIN TO CPU'S
 TCK PIN AND THEN FORK BACK FROM CPU TCK PIN AND ROUTE BACK TO ITP700FLEX
 CONNECTOR'S FBO PIN.

CPU ITP700FLEX DEBUG
 SYNC_MASTER=MASTER SYNC_DATE=5/23/05
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NONE	11		

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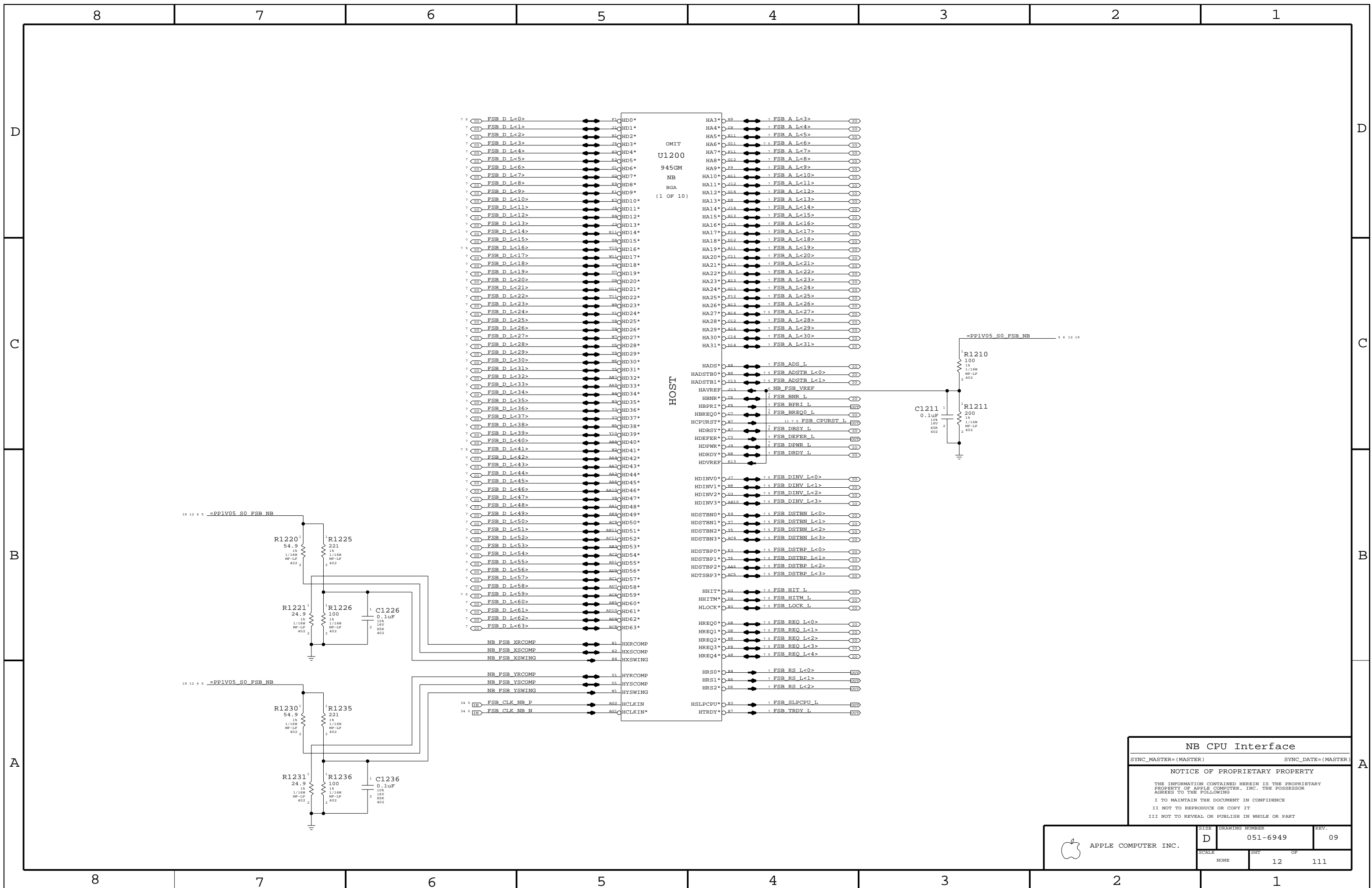
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NB CPU Interface

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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	SCALE: NONE	SHEET: 12	OF: 111

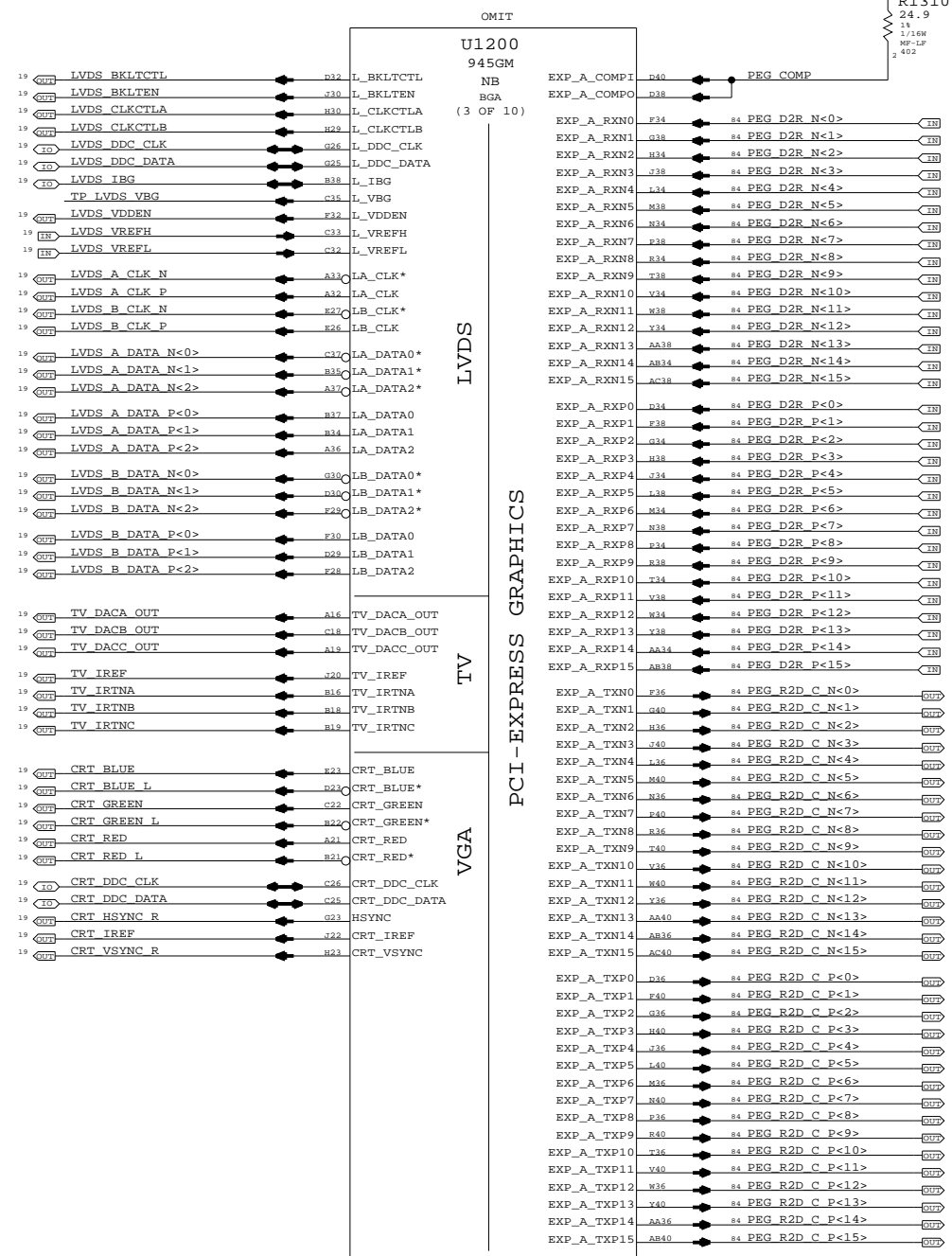
LVDS Disable
 Can leave all signals NC if LVDS is not implemented
 Tie VCC_TXLVDS and VCCA_LVDS to GND. If SDVO is used
 VCCD_LVDS must remain powered with proper decoupling.
 Otherwise, tie VCCD_LVDS to GND also.

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#

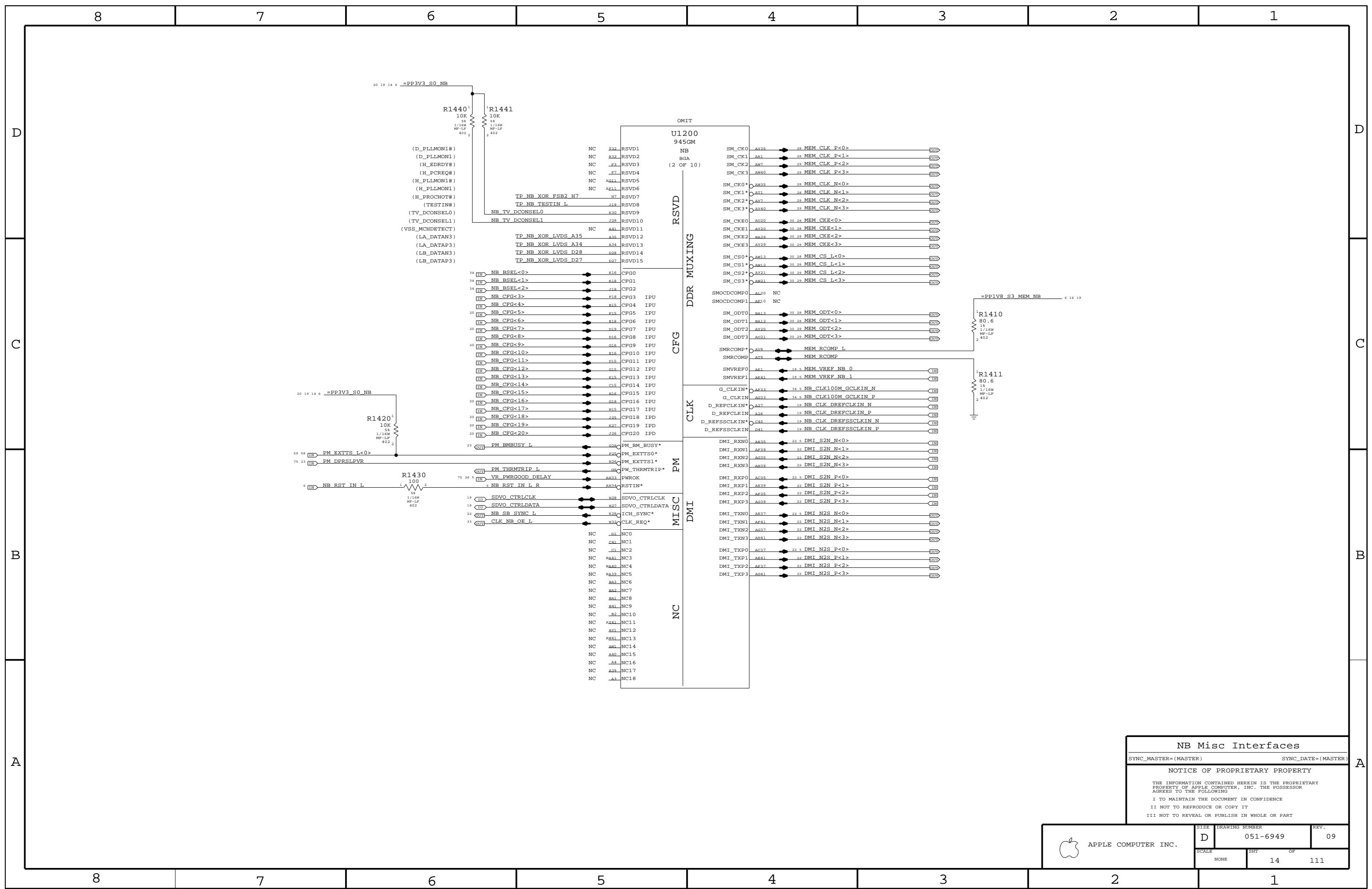
SDVO_TVCLKIN
 SDVO_INT
 SDVO_FLDSTALL

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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 REV.: 09
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NB Misc Interfaces

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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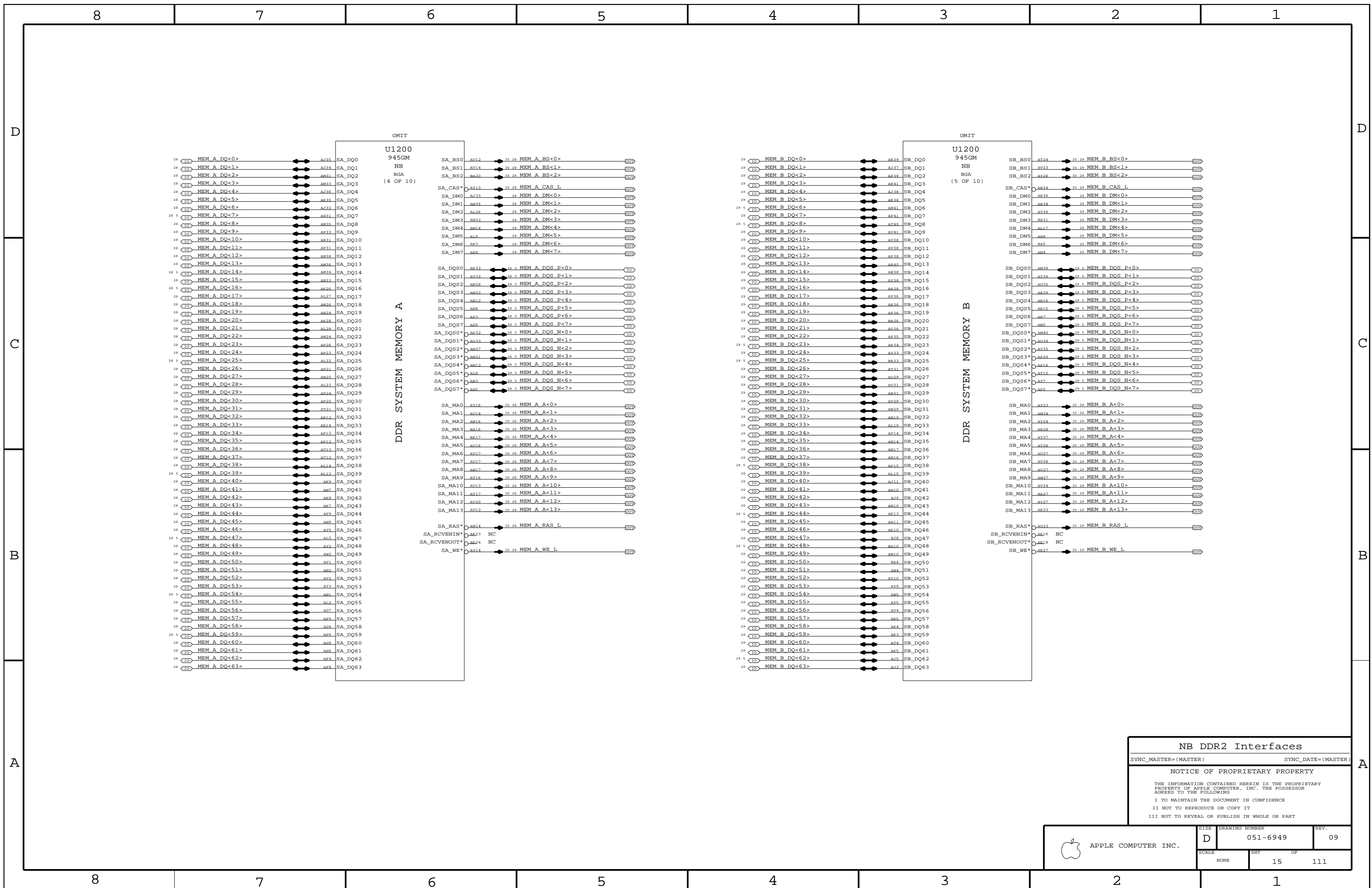
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	SCALE: NONE	SHEET: 14	OF: 111



NB DDR2 Interfaces

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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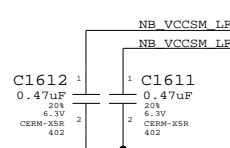
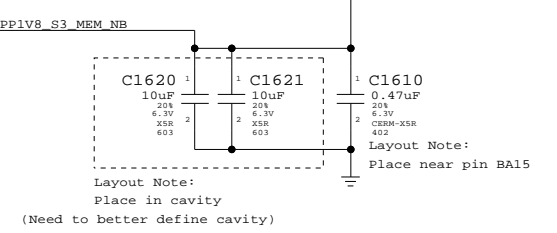
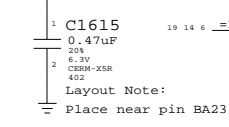
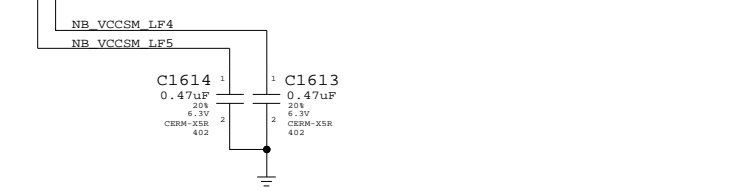
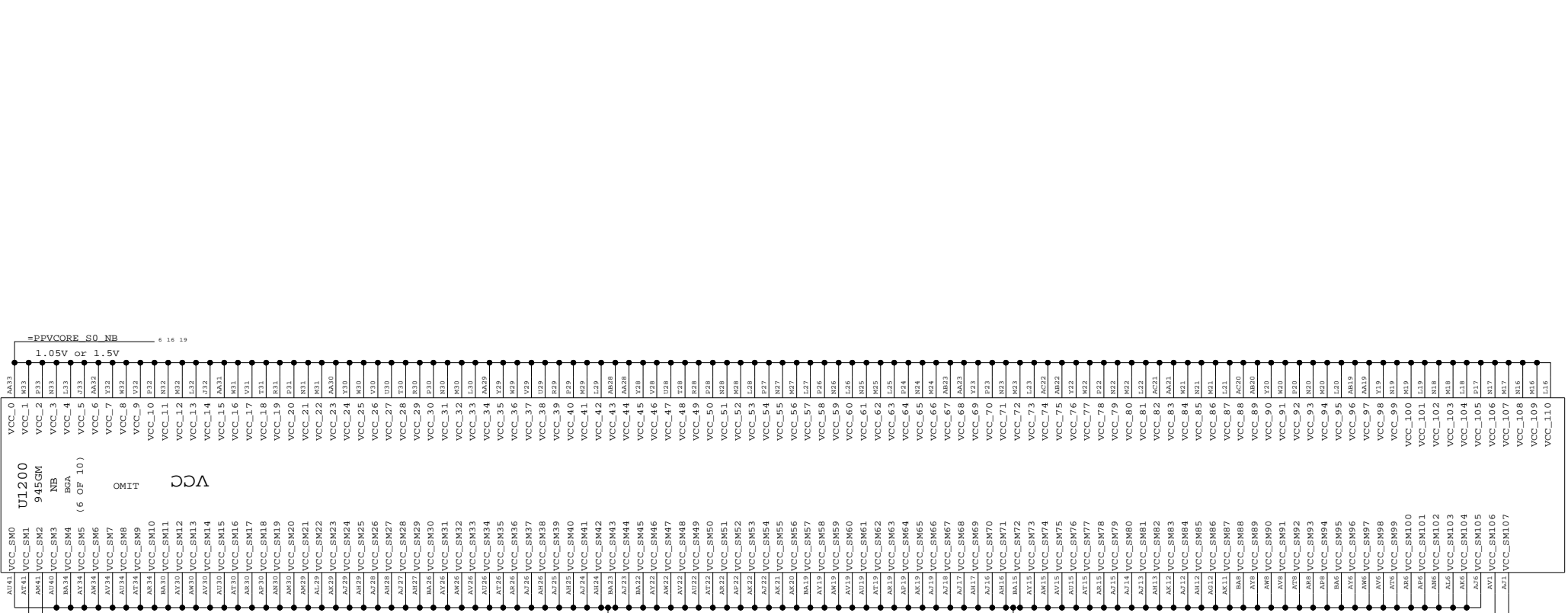
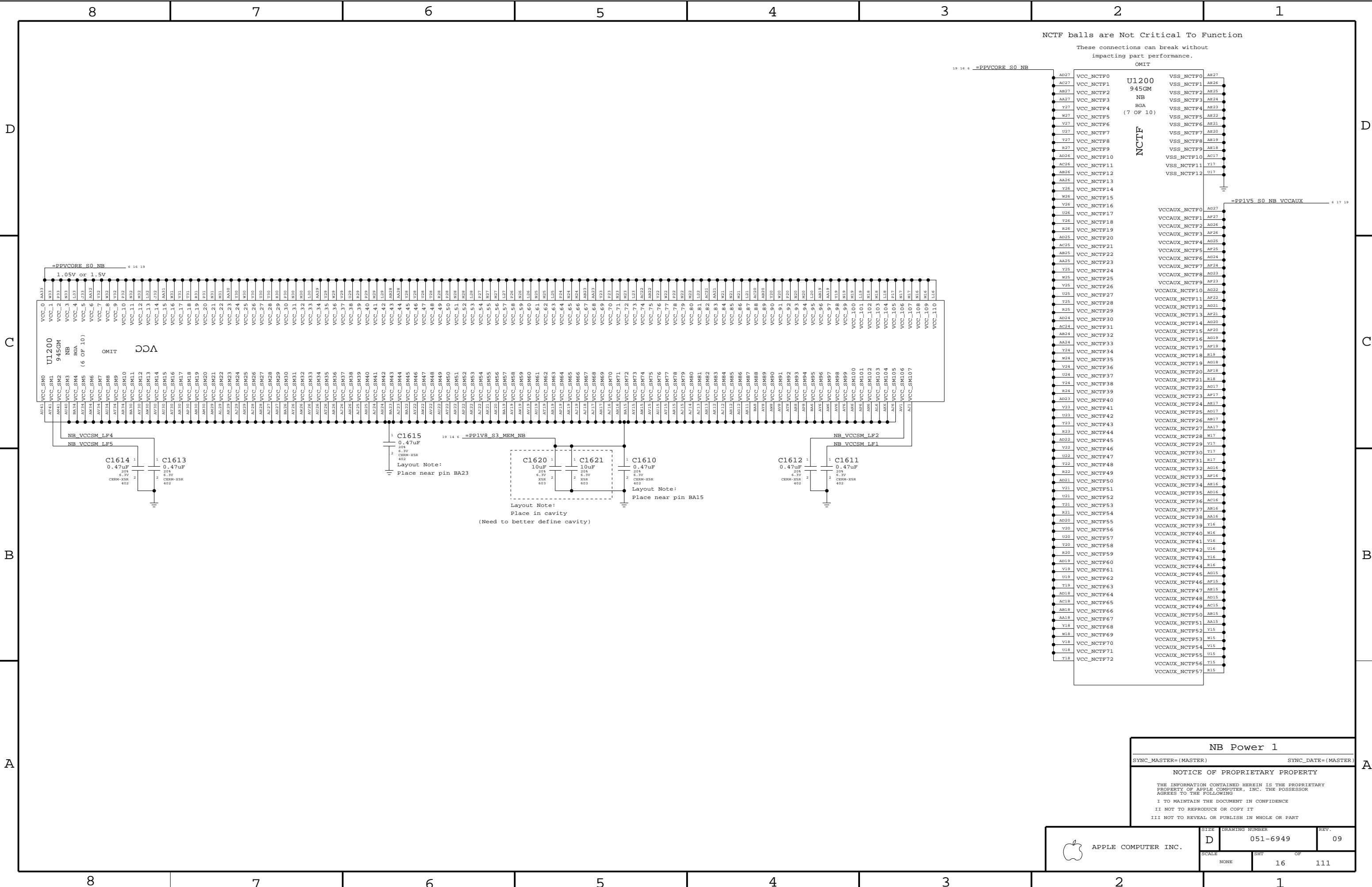
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE: D	DRAWING NUMBER: 051-6949	REV.: 09
	SCALE: NONE	SHEET: 15	OF: 111

NCTF balls are Not Critical To Function

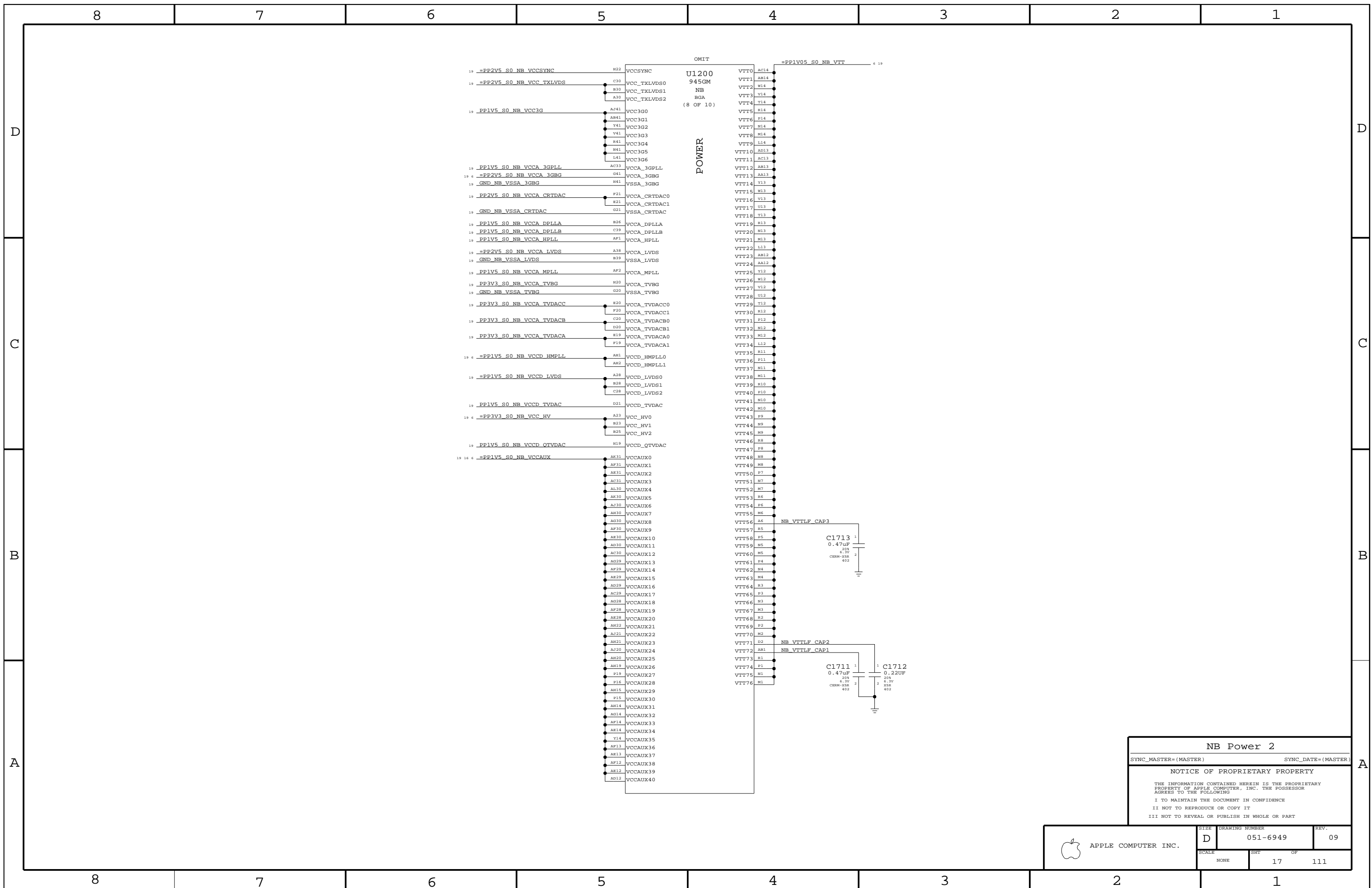
These connections can break without impacting part performance.

OMIT



NB Power 1
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)
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	D	051-6949	09
SCALE	SHT	OF	
NONE	16	111	



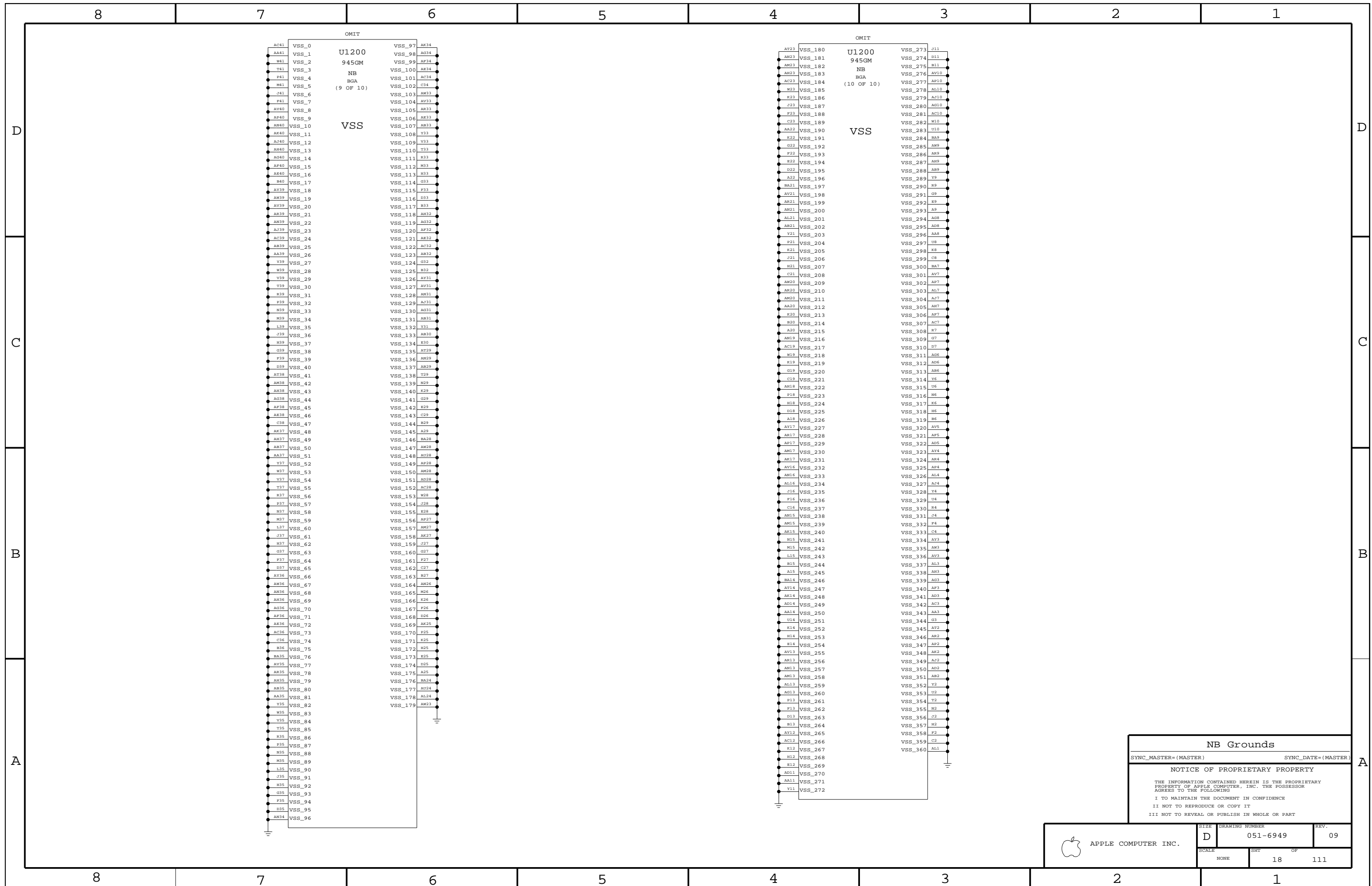
NB Power 2

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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SCALE	SHT	OF	
NONE	17	111	



NB Grounds

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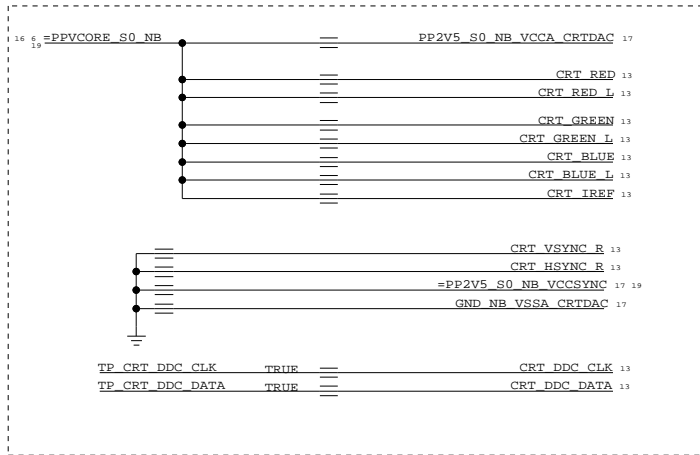
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6949	REV. 09
	SCALE NONE	SHEET 18	OF 111

Power Interface

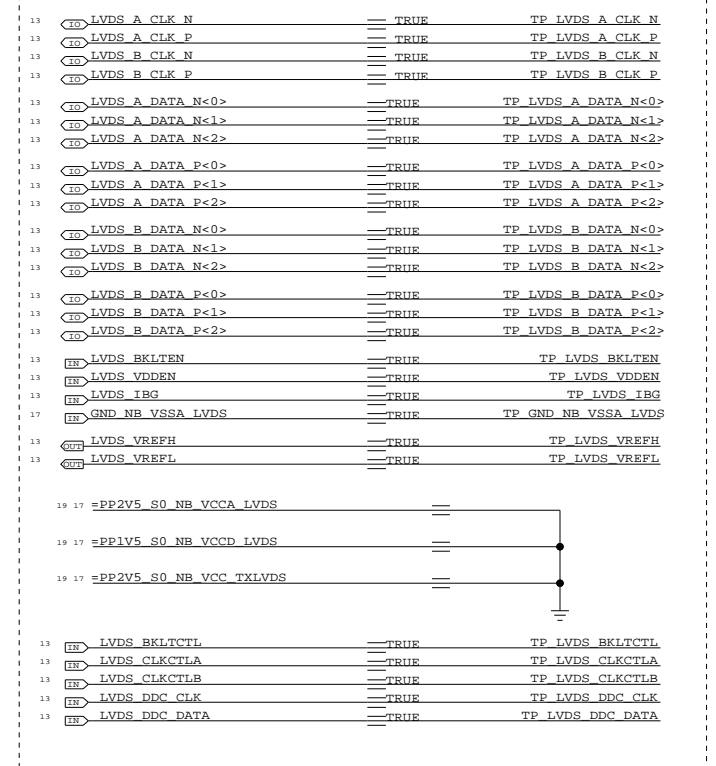
These are the power signals that leave the NB "block"

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

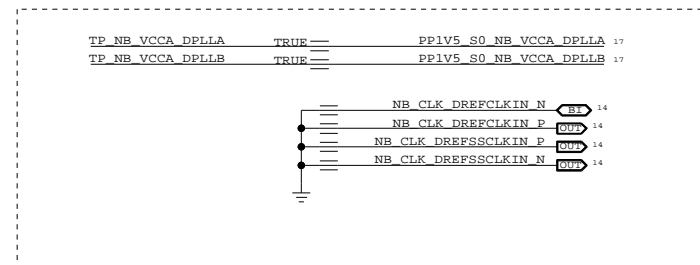
TVOUT DISABLE



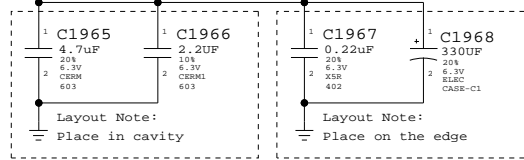
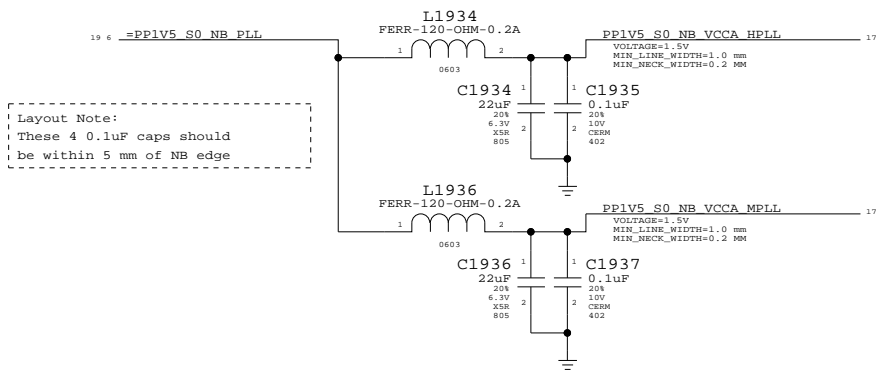
LVDS DISABLE



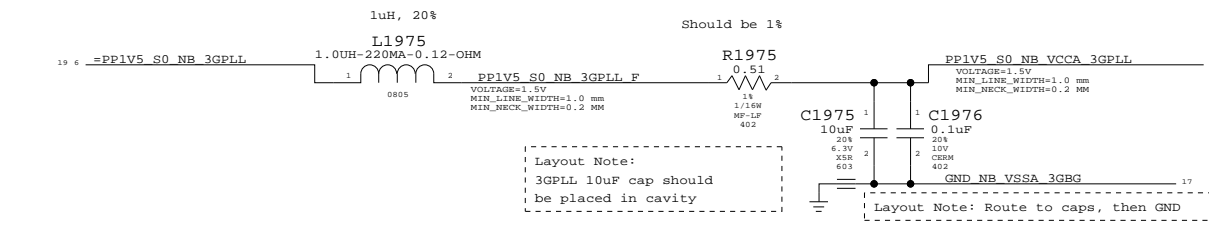
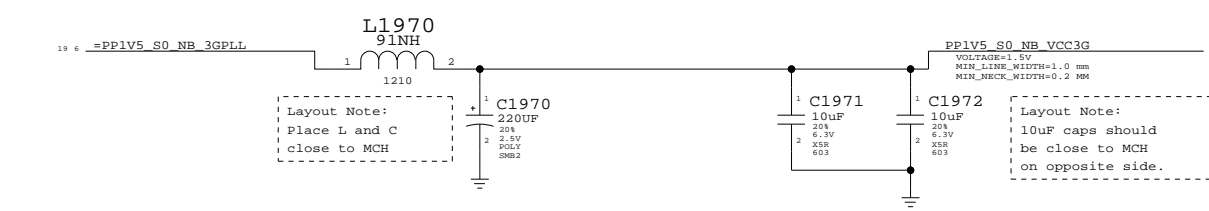
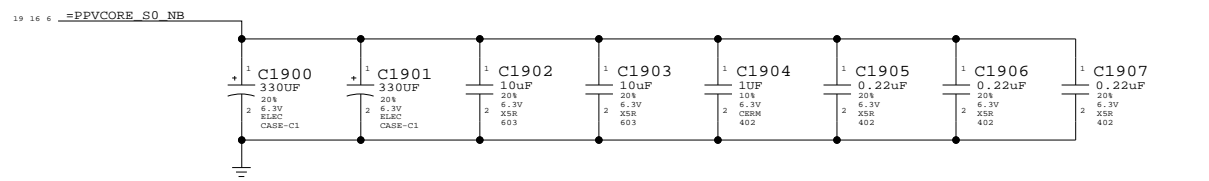
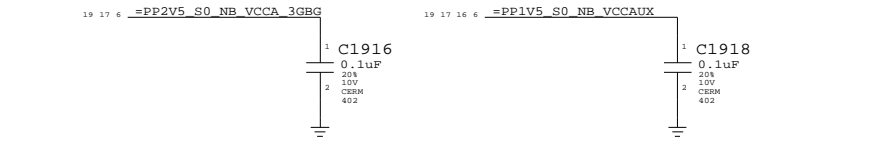
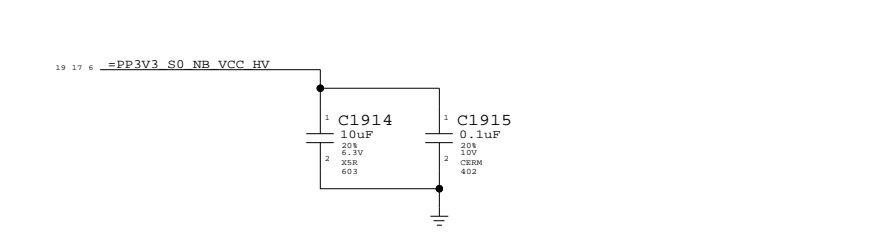
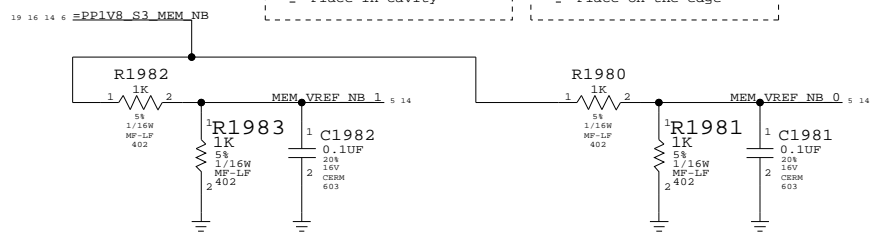
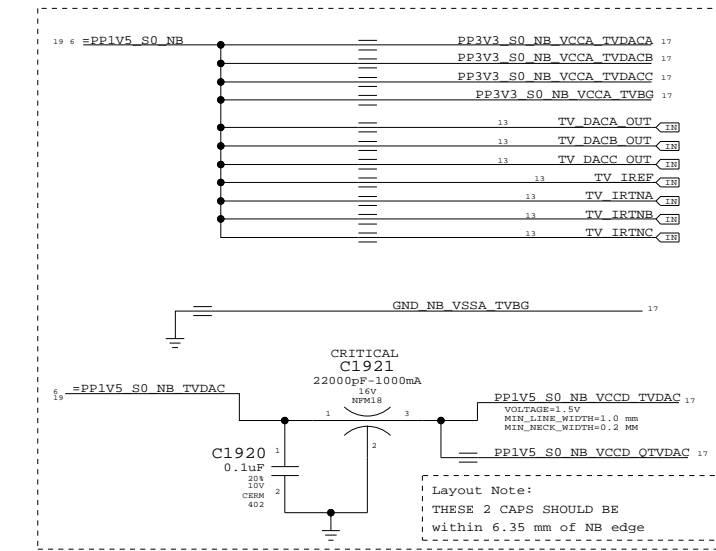
DISPLAY DISABLE



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)

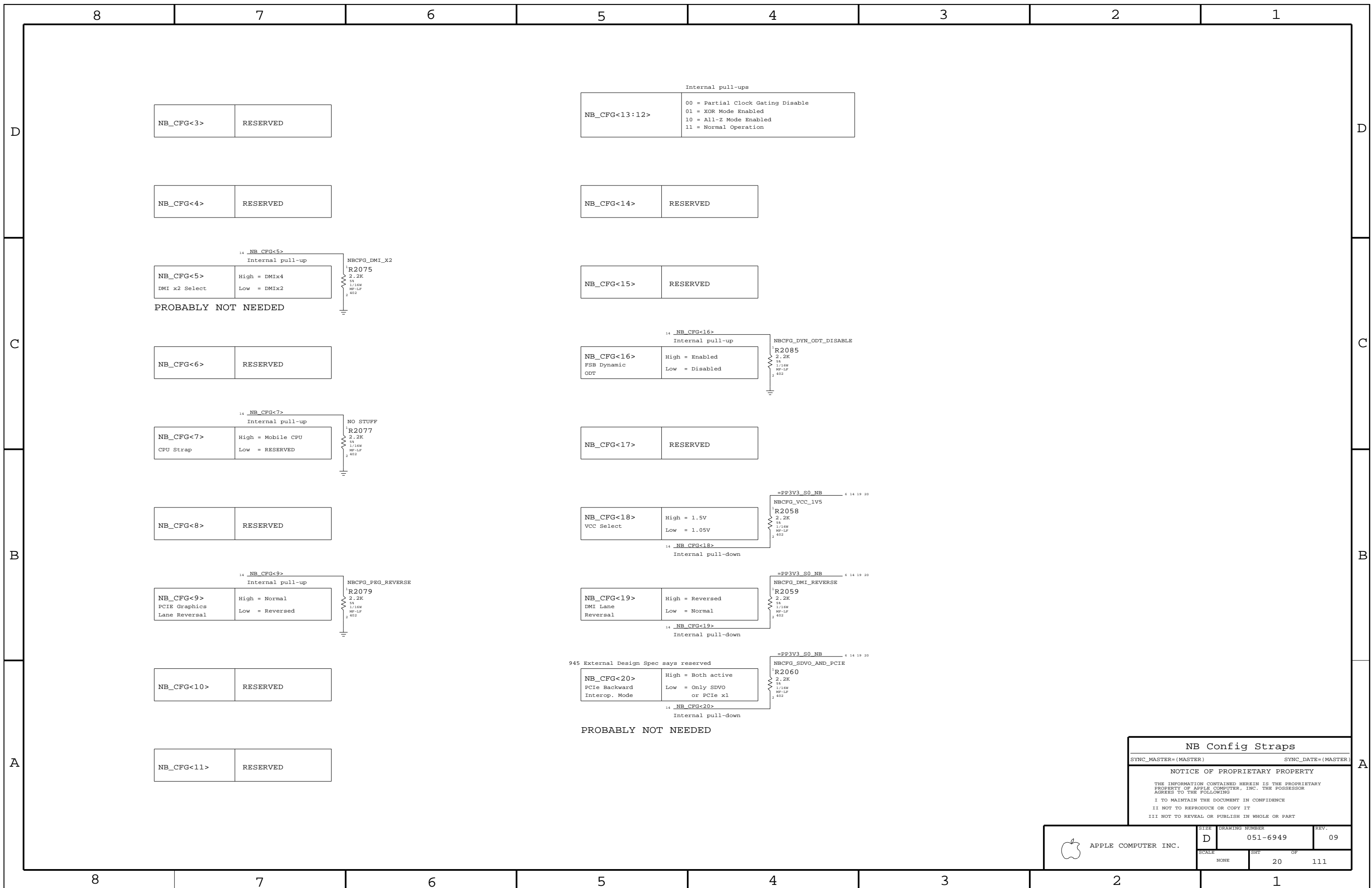
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NB_CFG<3>	RESERVED
-----------	----------

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

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

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

=PP3V3_S0_NB NBCFG_VCC_LV5	
NB_CFG<18>	High = 1.5V VCC Select Low = 1.05V
14 NB_CFG<18> Internal pull-down	

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

=PP3V3_S0_NB NBCFG_DMI_REVERSE	
NB_CFG<19>	High = Reversed DMI Lane Reversal Low = Normal
14 NB_CFG<19> Internal pull-down	

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

945 External Design Spec says reserved =PP3V3_S0_NB NBCFG_SDVO_AND_PCIE	
NB_CFG<20>	High = Both active PCIe Backward Interop. Mode Low = Only SDVO or PCIe x1
14 NB_CFG<20> Internal pull-down	

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

PROBABLY NOT NEEDED

NB Config Straps

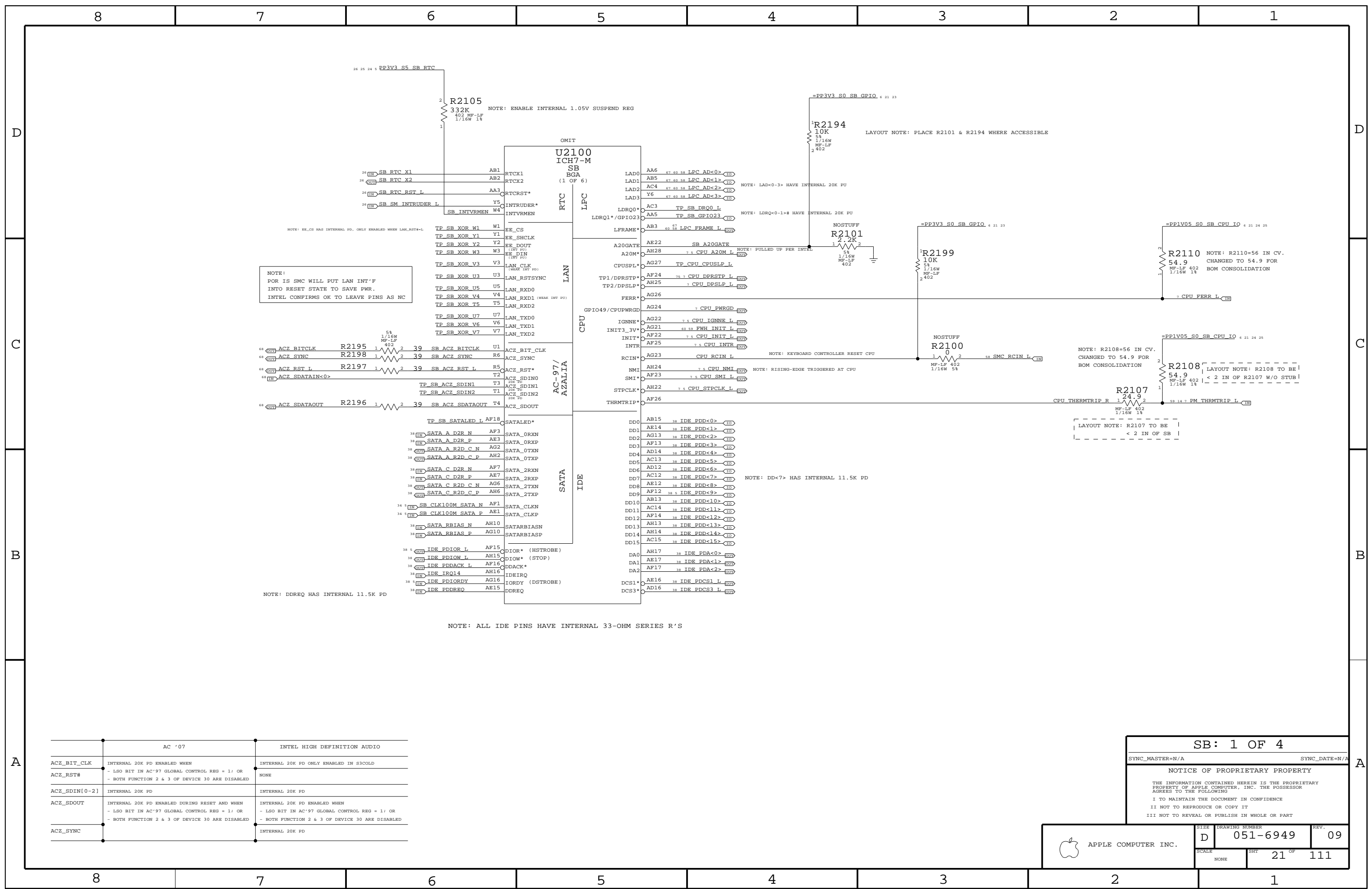
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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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

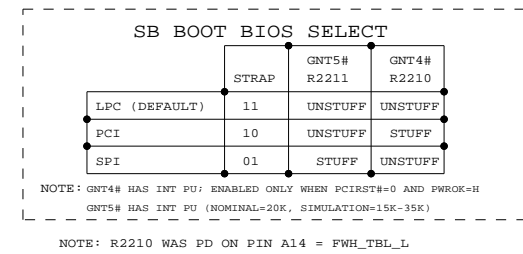
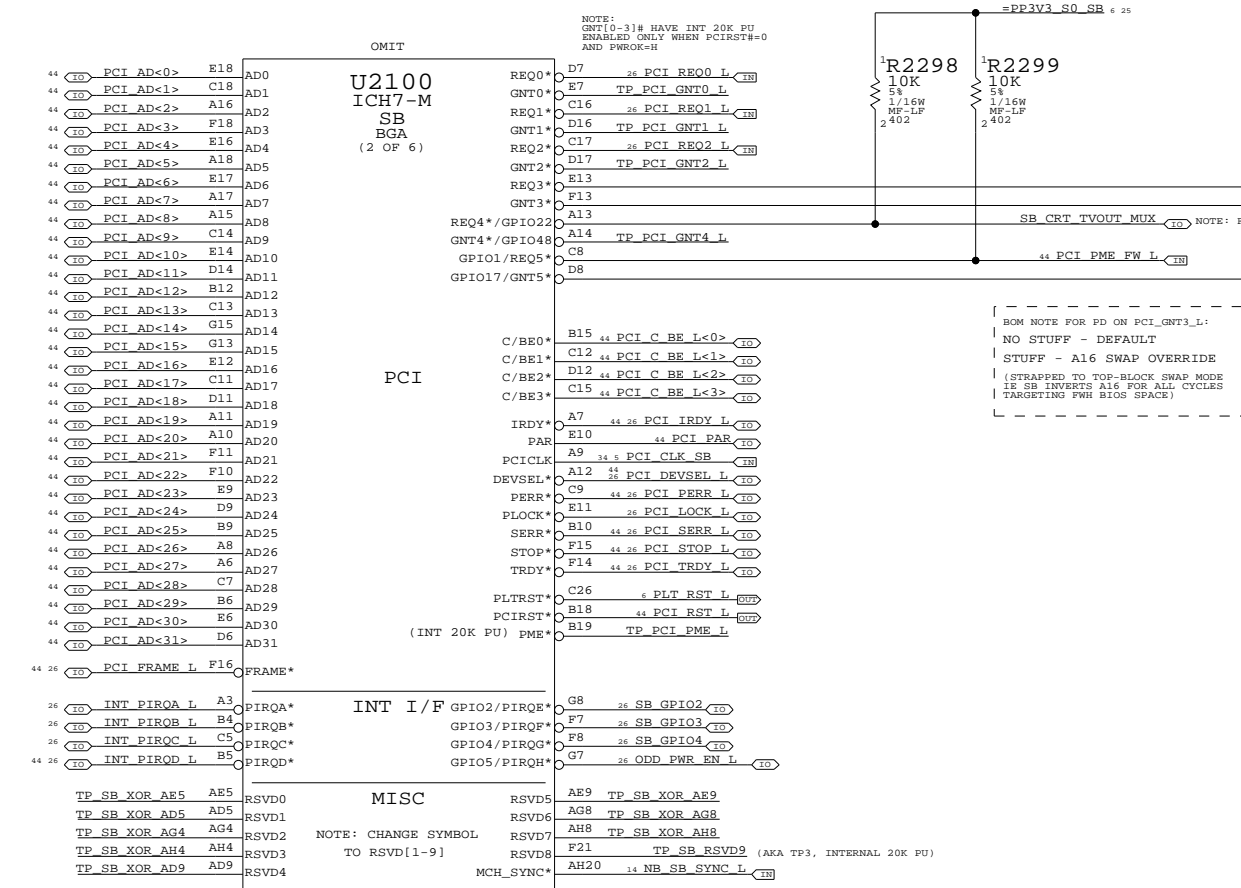
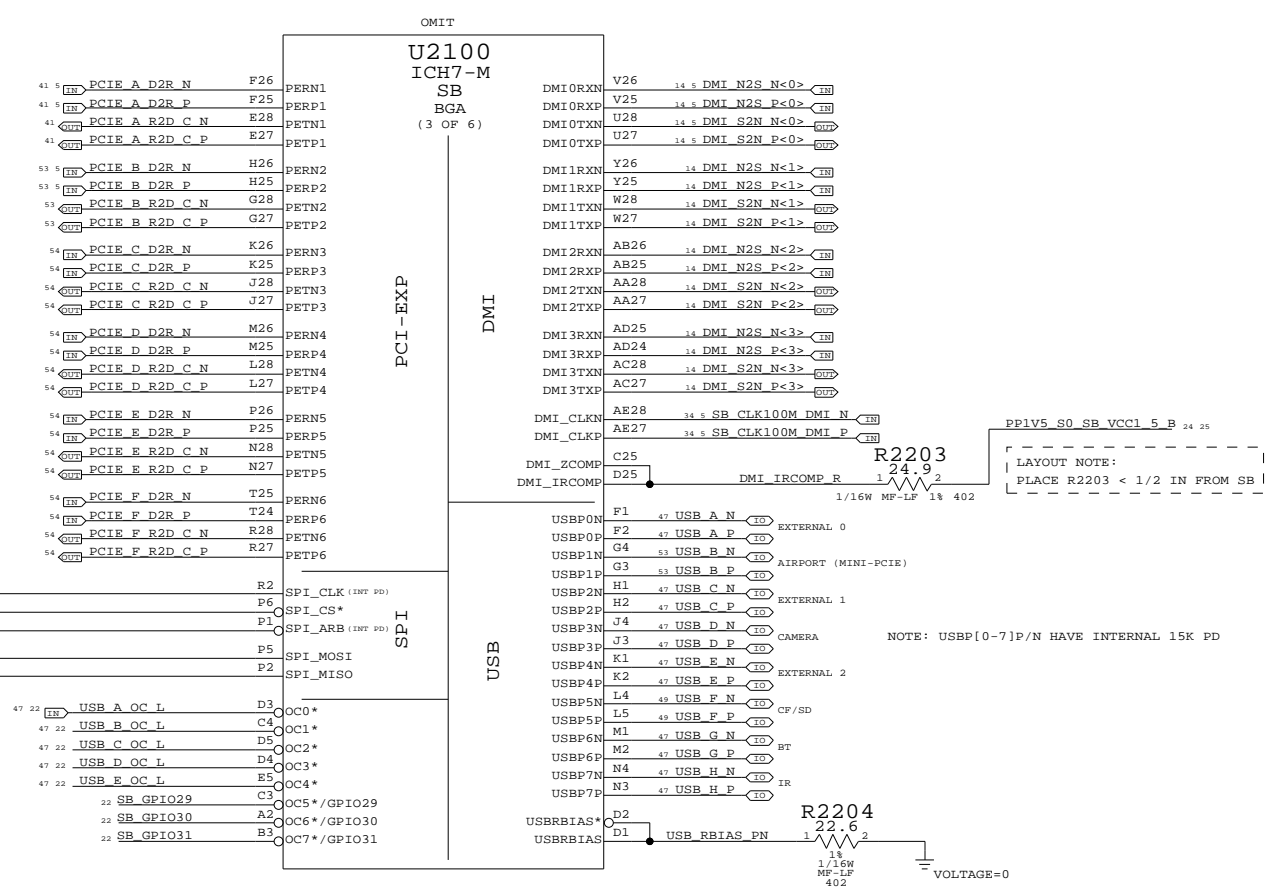
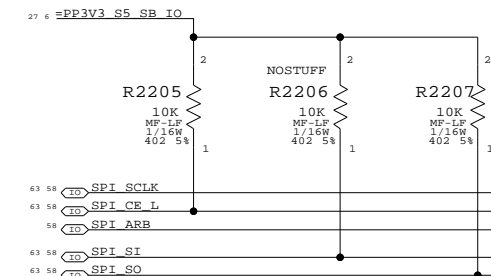
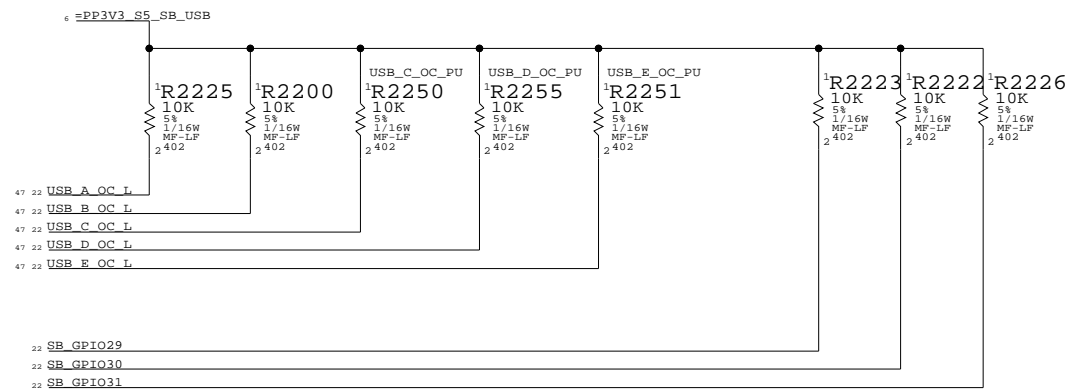
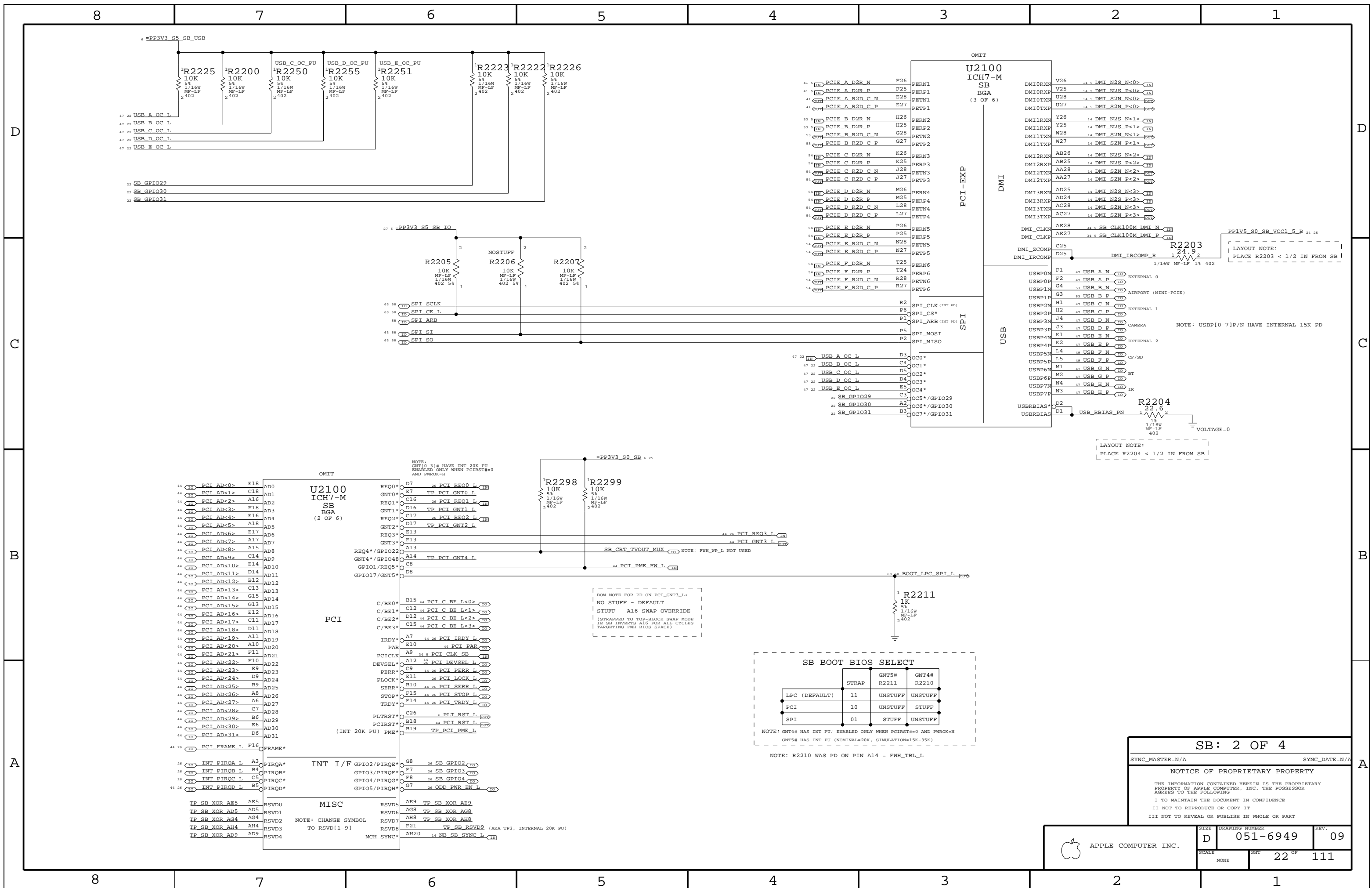
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SCALE	SHT	21 OF 111	
NONE			



SB: 2 OF 4

SYNC_MASTER=N/A SYNC_DATE=N/A

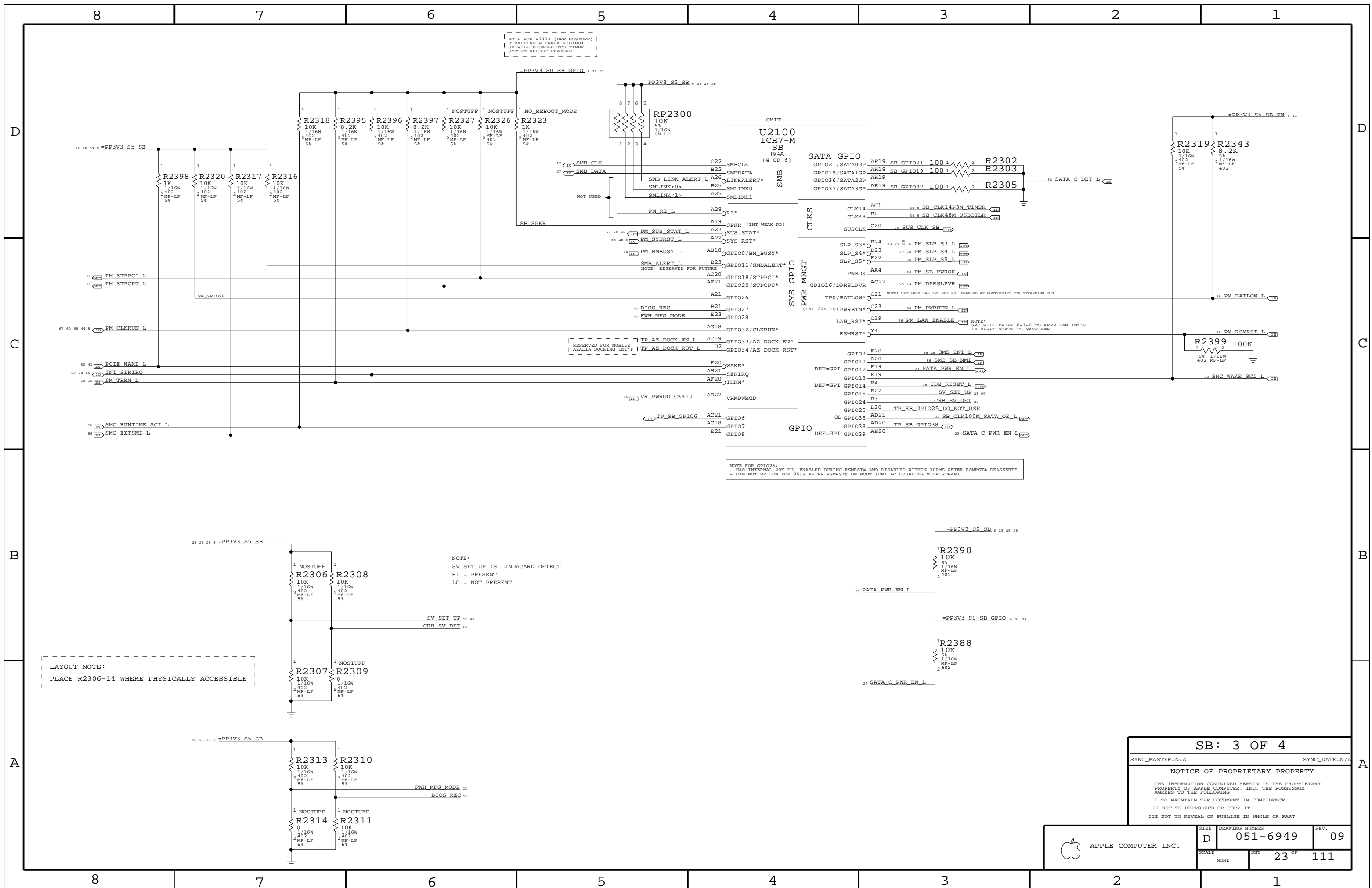
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NOTE FOR R2323 (DEF-NOSTUFF) | STRAPPING @ PWROK RISING: SB WILL DISABLE TCO TIMER SYSTEM REBOOT FEATURE

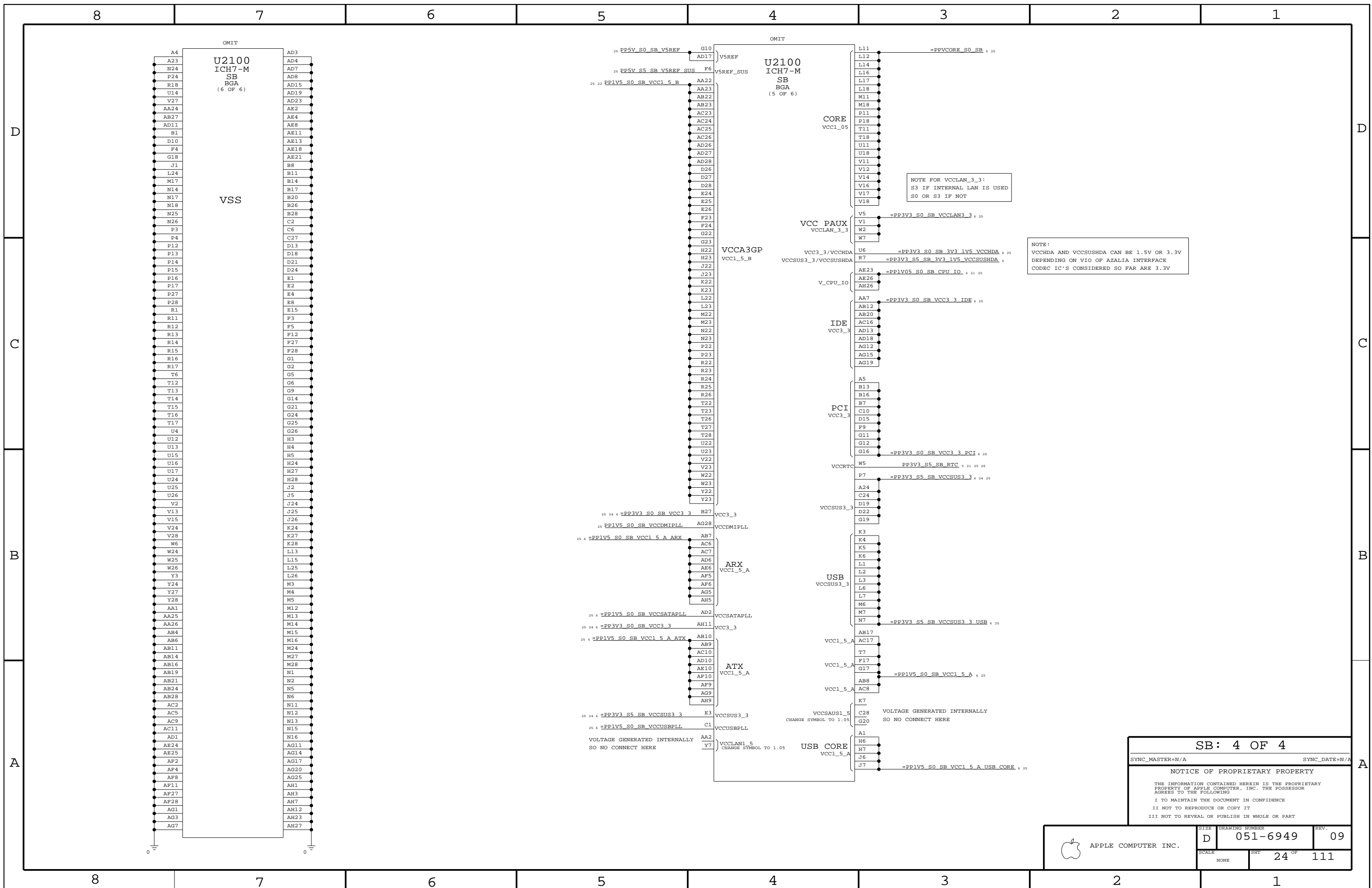
NOTE FOR GPIO25:
 - HAS INTERNAL 20K PU, ENABLED DURING RSMRST# AND DISABLED WITHIN 100MS AFTER RSMRST# DEASSERTS
 - CAN NOT BE LOW FOR 35US AFTER RSMRST# ON BOOT (DMI AC COUPLING MODE STRAP)

NOTE:
 SV_SET_UP IS LINDACARD DETECT
 HI = PRESENT
 LO = NOT PRESENT

LAYOUT NOTE:
 PLACE R2306-14 WHERE PHYSICALLY ACCESSIBLE

SB: 3 OF 4
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SCALE	NONE	SHT	23 OF 111



SB: 4 OF 4

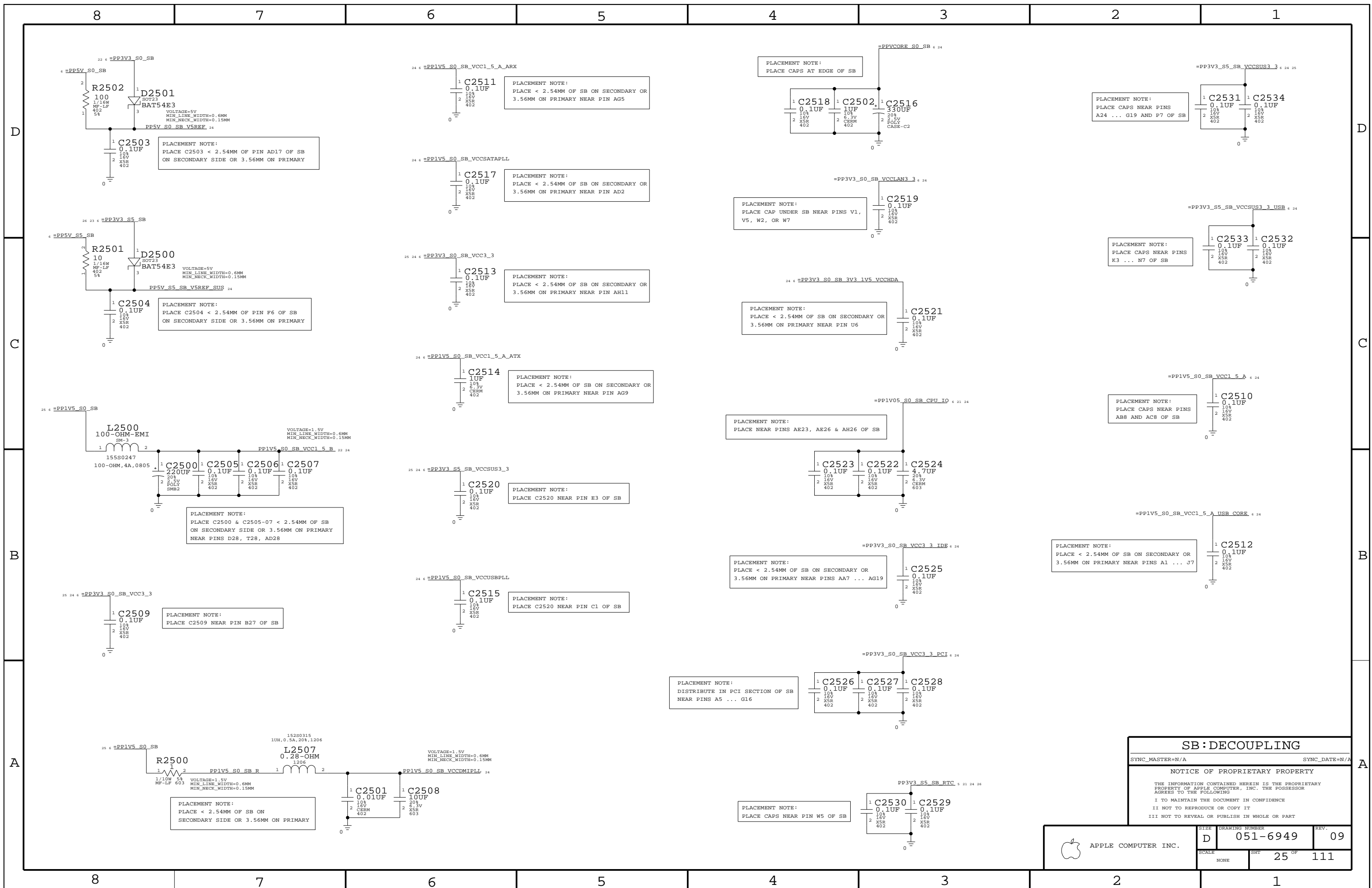
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	SCALE: NONE	SHEET: 24 OF 111	



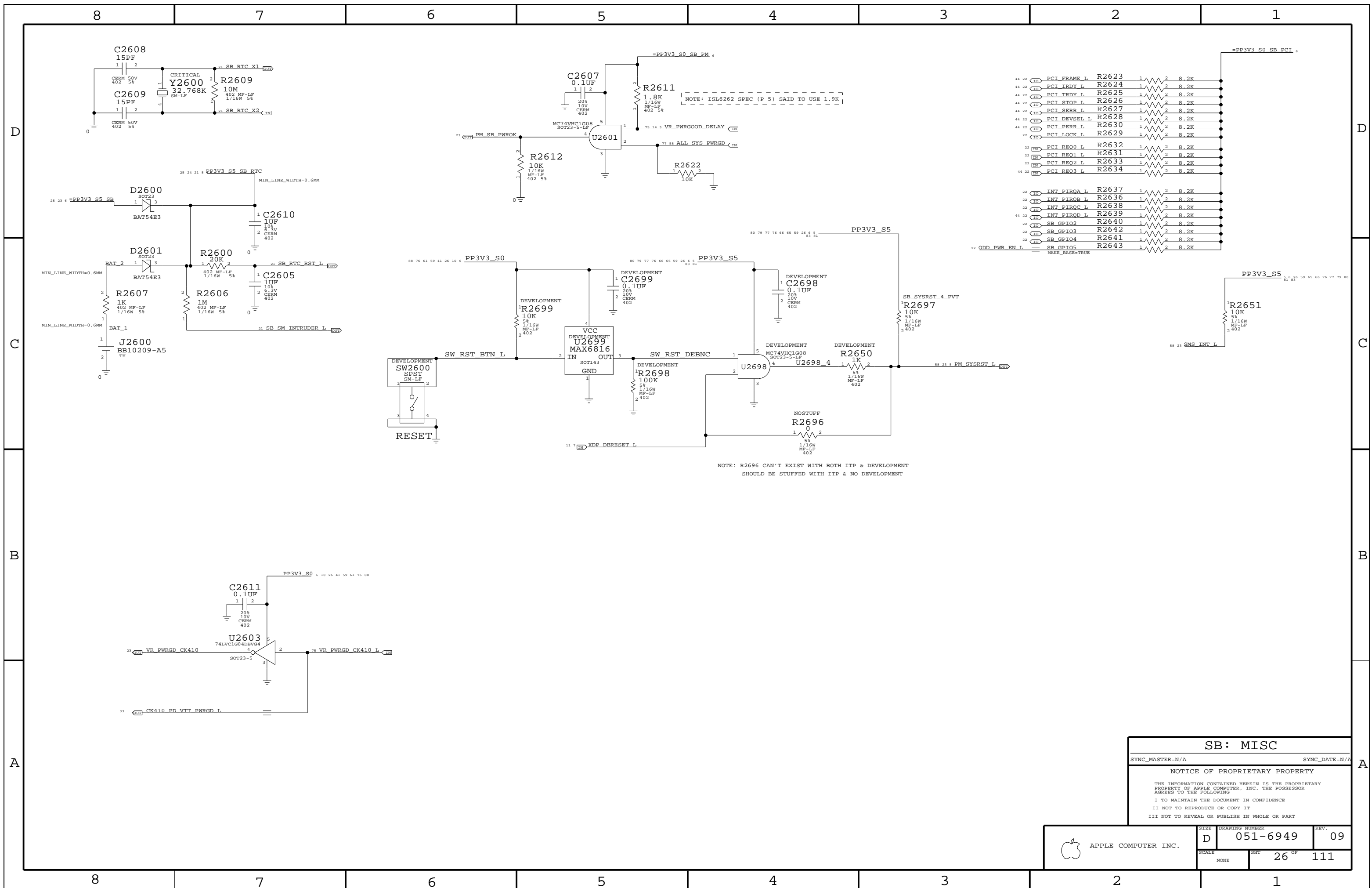
SB: DECOUPLING

SYNC_MASTER=N/A SYNC_DATE=N/A

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	D	051-6949	09
SCALE	NONE	SHT	25 OF 111



SB: MISC

SYNC_MASTER=N/A SYNC_DATE=N/A

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	D	051-6949	09
SCALE	SHT	OF	REV.
NONE	26	111	

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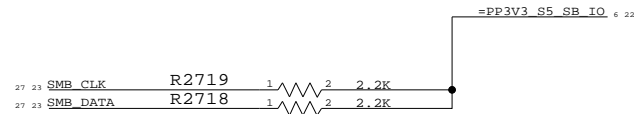
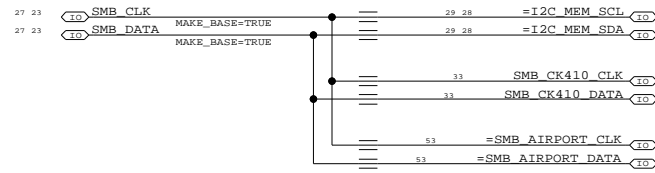
4

3

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1

SB I2C BUSSES



SB: SMB HUB

SYNC_MASTER=N/A SYNC_DATE=N/A

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SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	OF
NONE	27	111

Page Notes

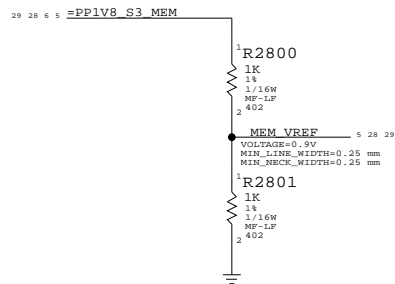
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 - =PP1V8_S3_MEM
 - =PPSPD_S0_MEM (2.5V - 3.3V)

Signal aliases required by this page:
 - =I2C_MEM_SCL
 - =I2C_MEM_SDA

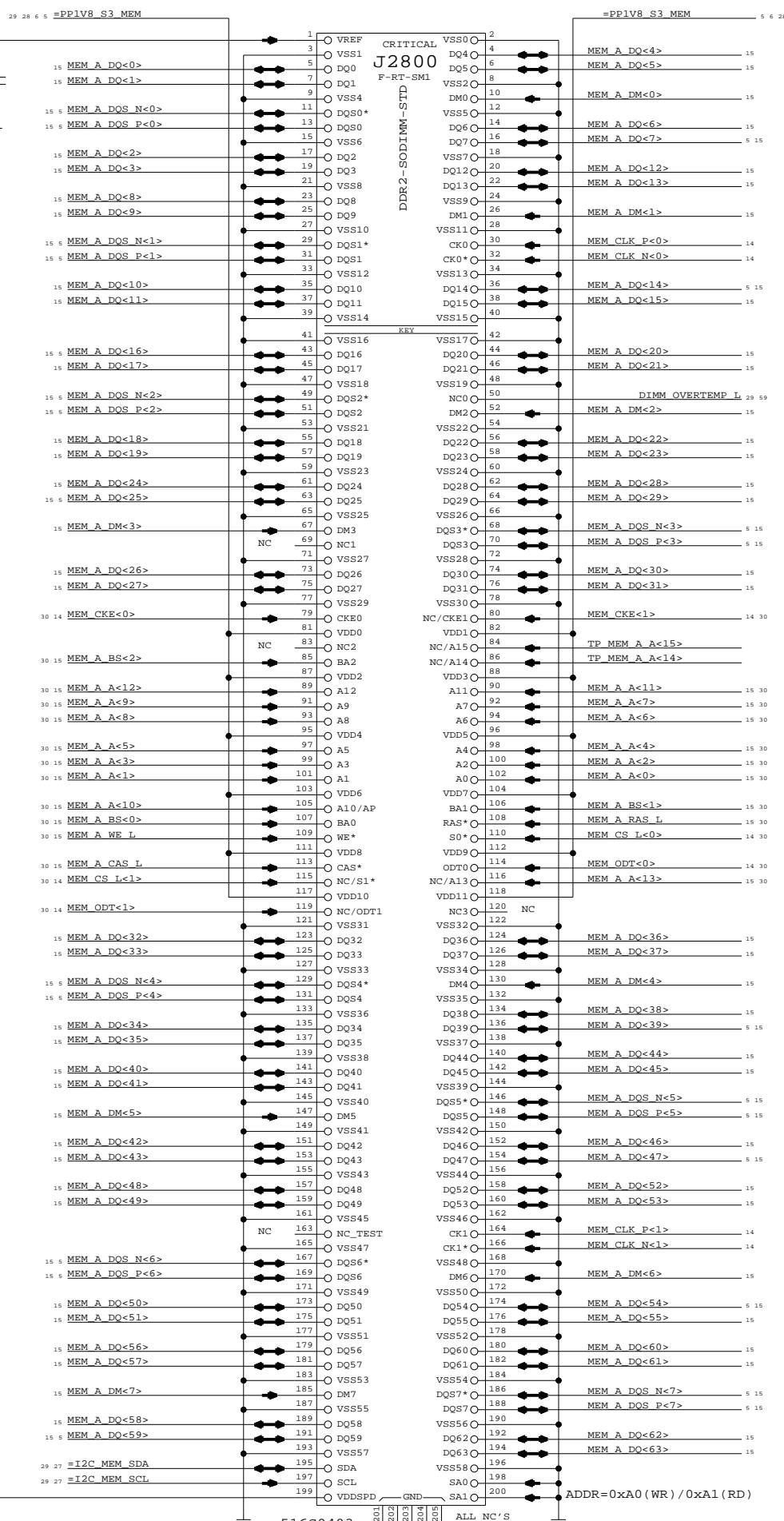
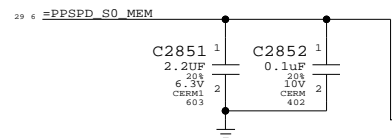
BOM options provided by this page:
 (NONE)

DDR2 VRef

One 0.1uF per connector

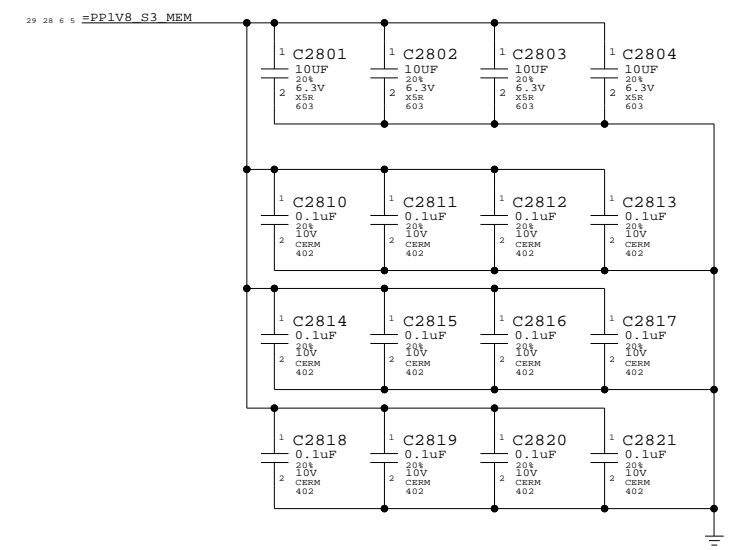


Yellow uses 10K divider and TLV2463 to drive MCH and DIMM connectors.
 (See Capell Valley pg 47)



DDR2 Bypass Caps

(For return current)



DDR2 SO-DIMM Connector A
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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	NONE	051-6949	09
SHEET		OF	
28		111	

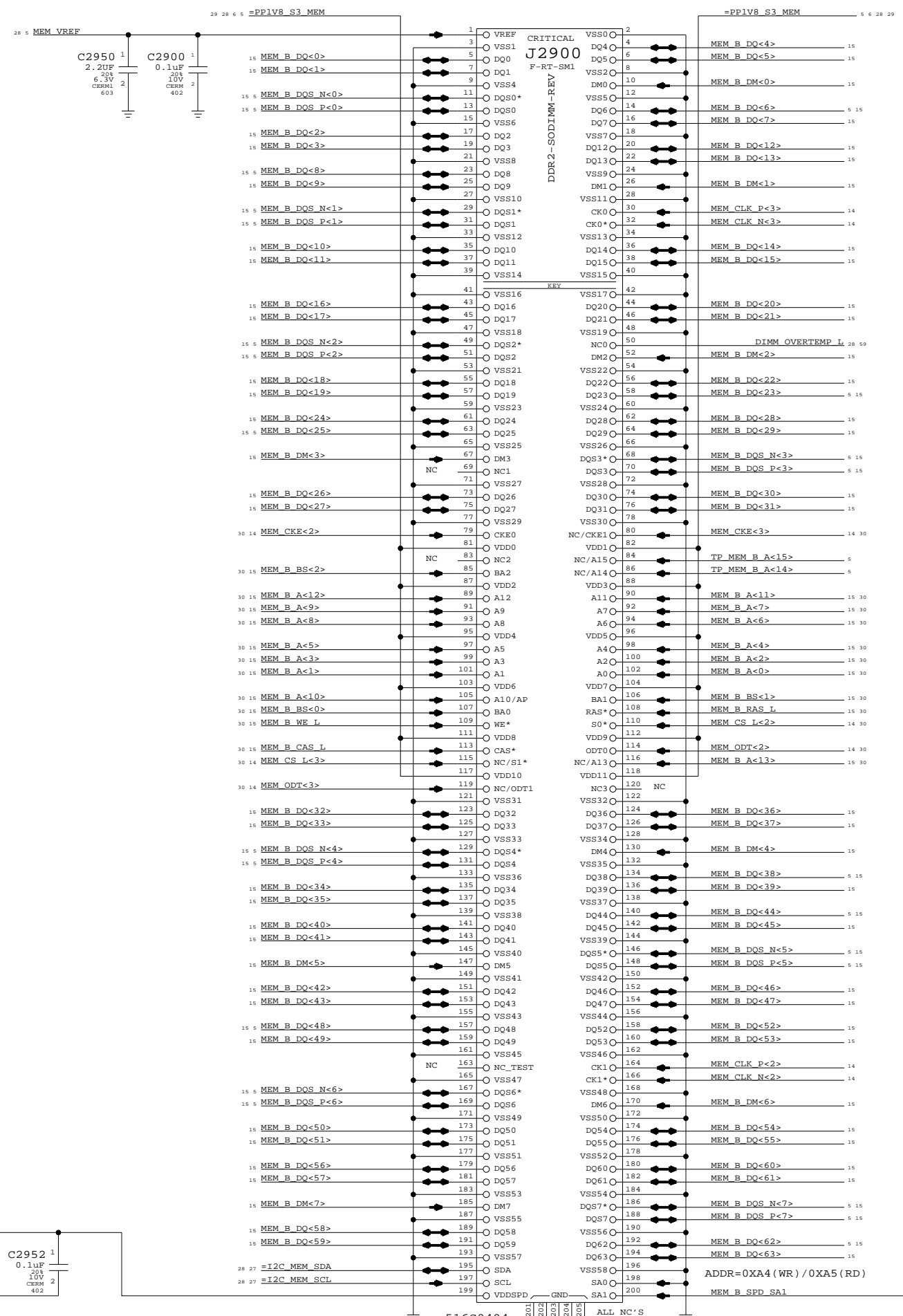
Page Notes

Power aliases required by this page:
 - =PP1V8_S3_MEM
 - =PPSPD_S0_MEM (2.5V - 3.3V)

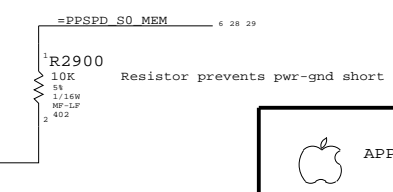
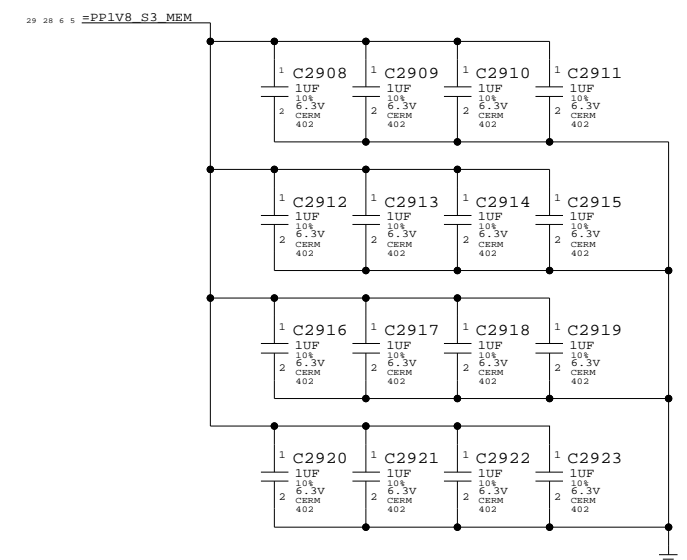
Signal aliases required by this page:
 - =I2C_MEM_SCL
 - =I2C_MEM_SDA

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
SHEET		OF	
29		111	

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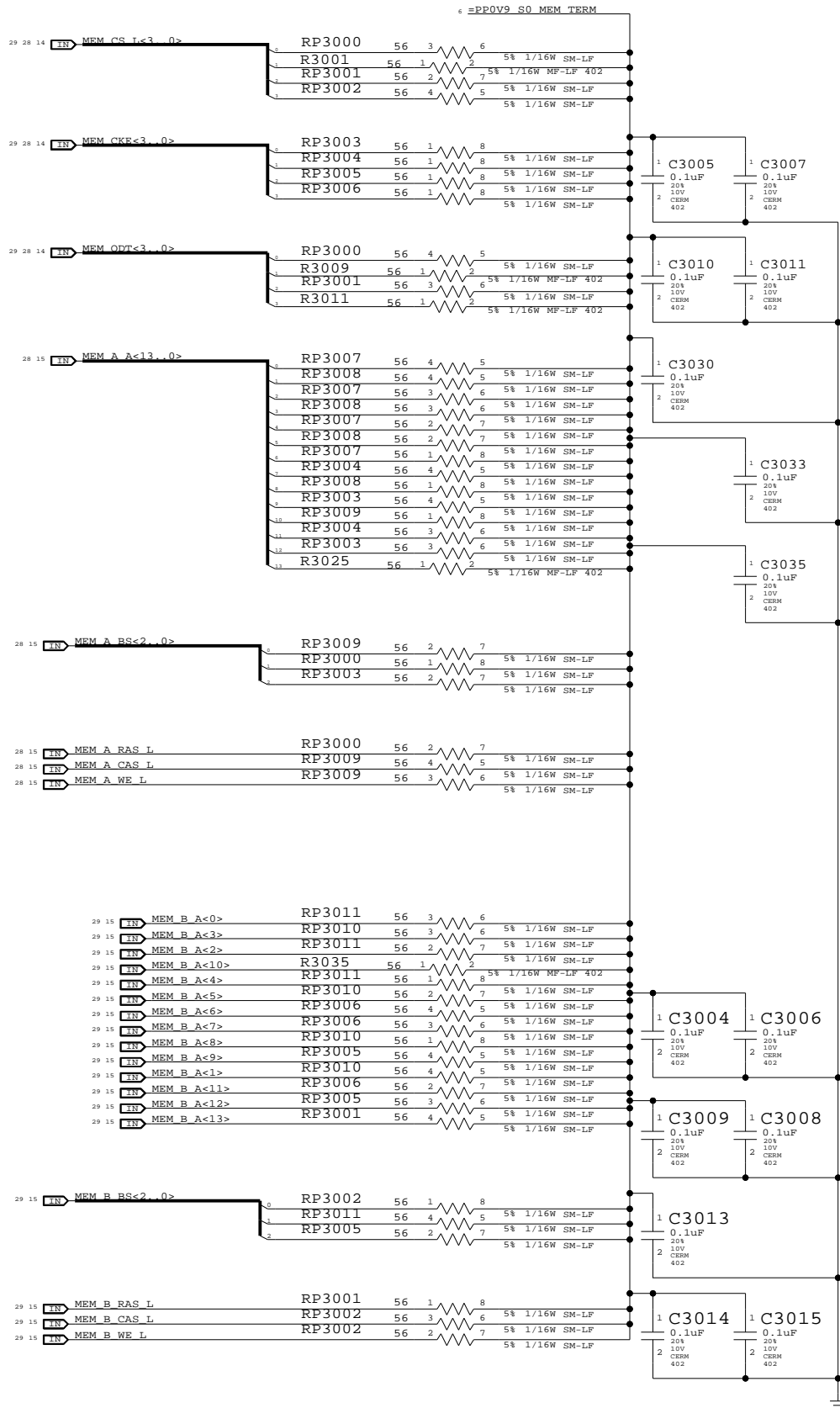
4

3

2

1

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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	D	051-6949	09
SCALE	SHT		OF
NONE	30		111

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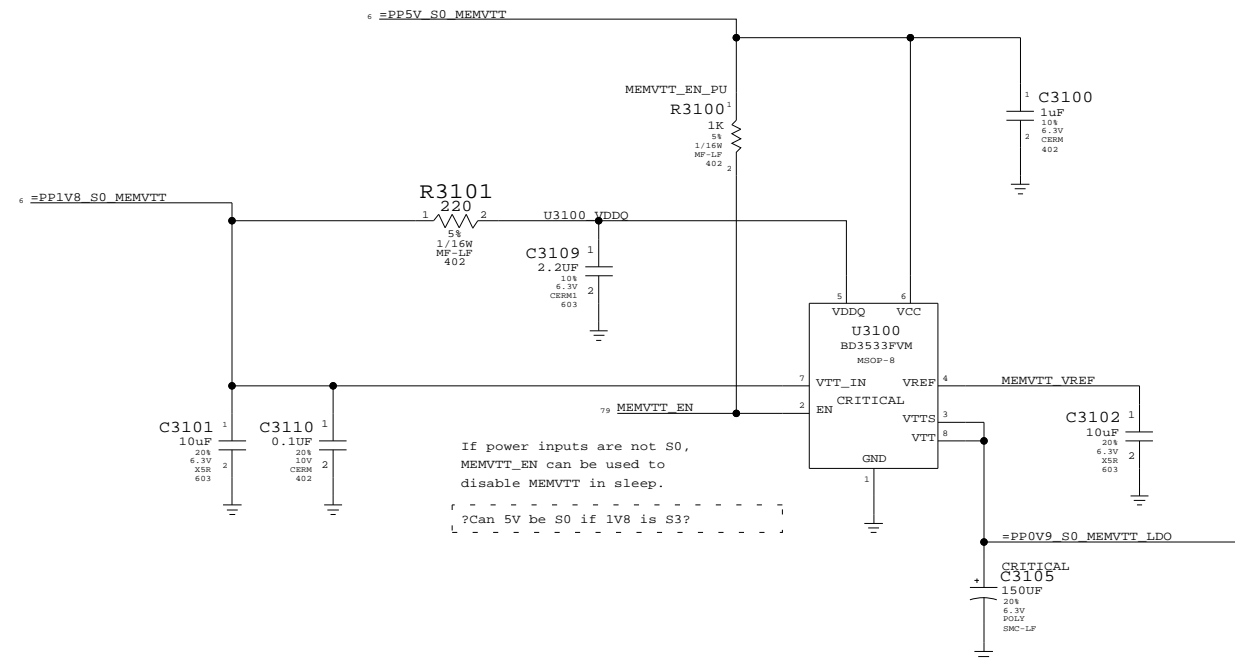
Page Notes

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)

NOTICE OF PROPRIETARY PROPERTY

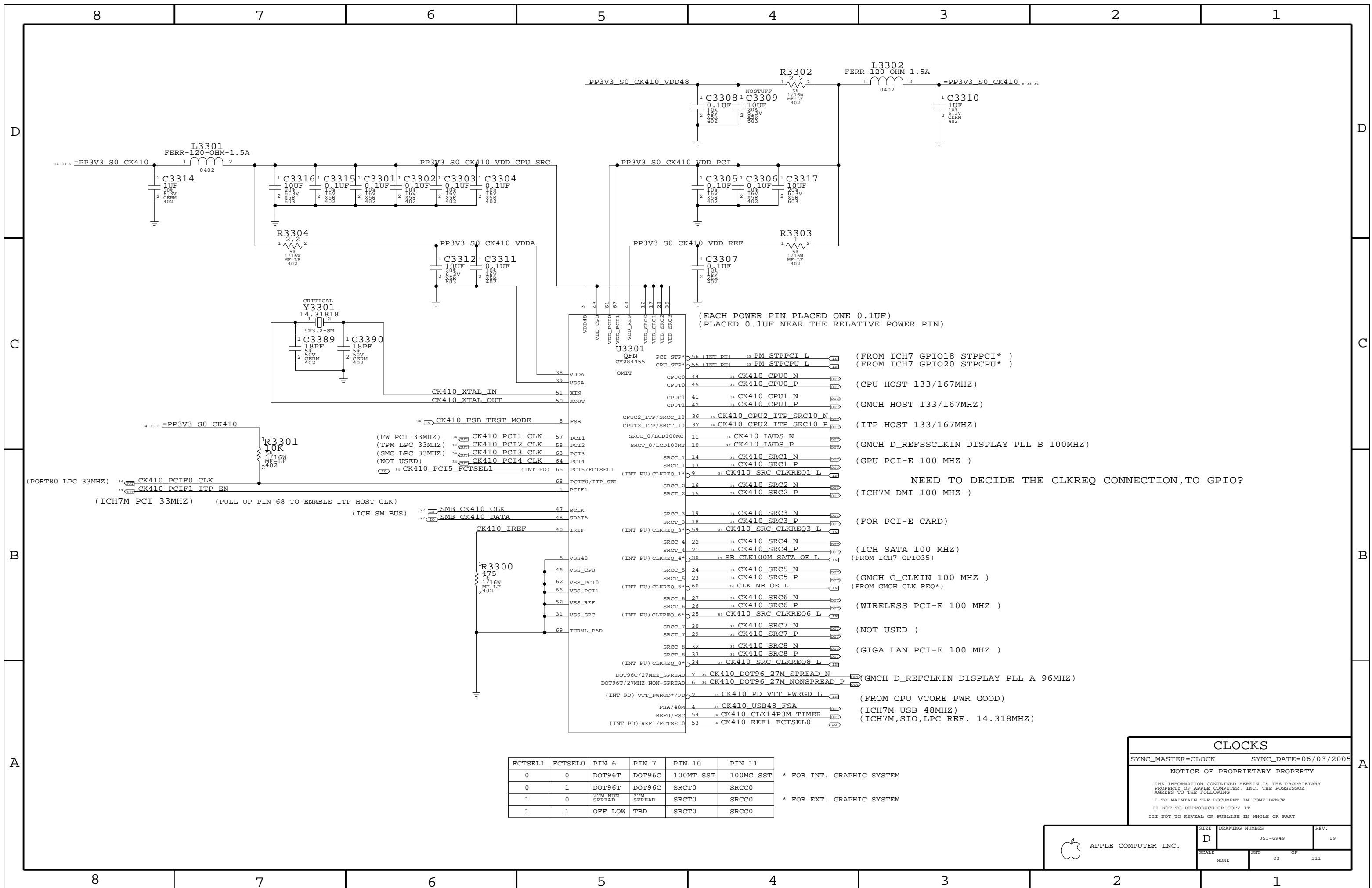
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	D	051-6949	09
SCALE	SHT	OF	
NONE	31	111	



(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

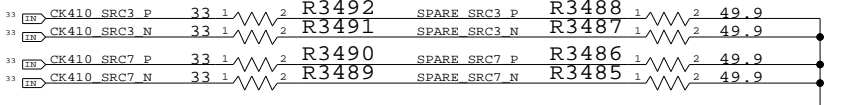
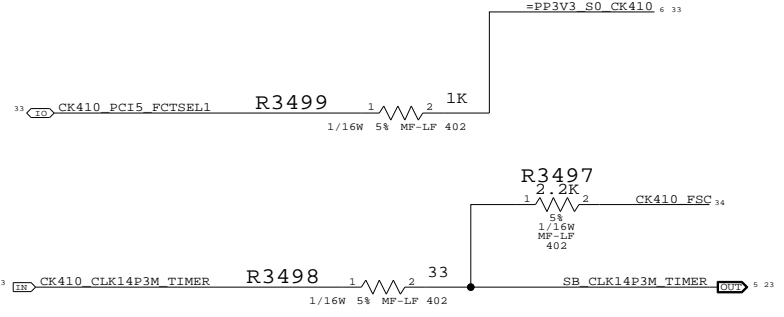
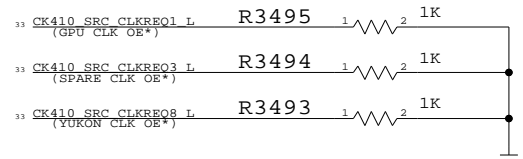
SYNC_MASTER=CLOCK SYNC_DATE=06/03/2005

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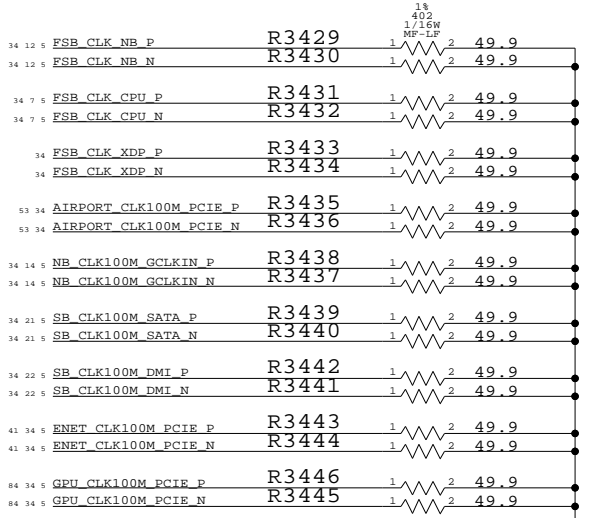
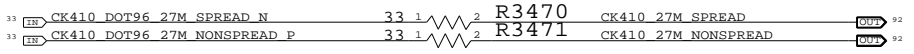
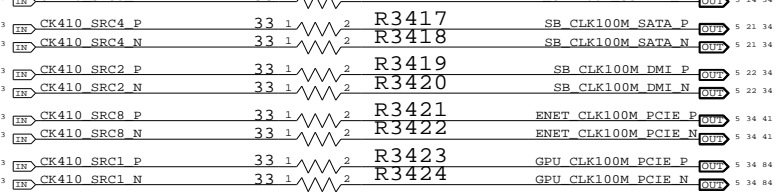
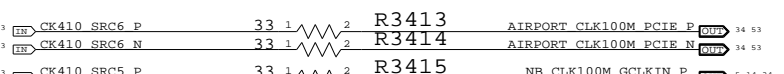
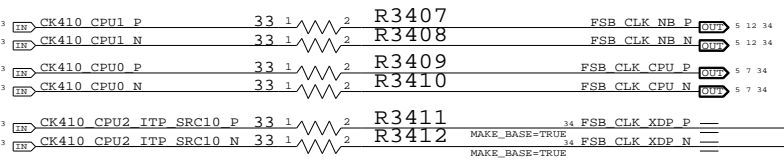
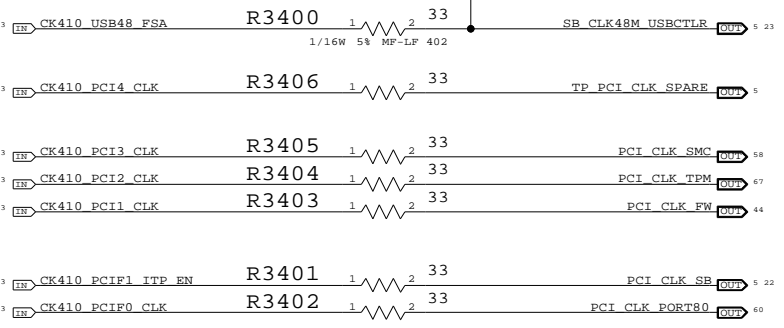
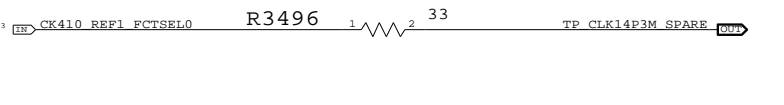
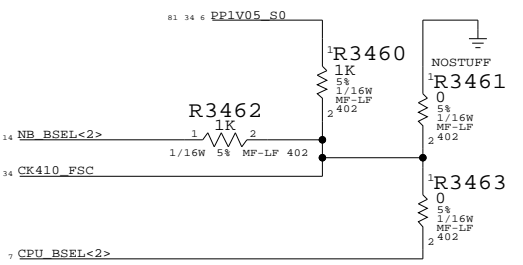
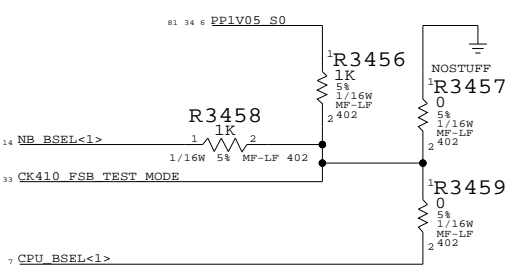
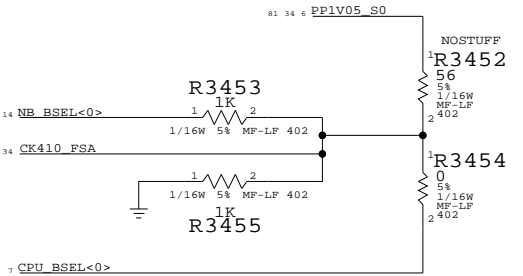
APPLE COMPUTER INC.	SCALE	DRAWING NUMBER	REV.
	NONE	D 051-6949	09
SHEET		OF	
33		111	

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



FSB FREQUENCY SELECT:

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



CLOCKS: TERMINATIONS

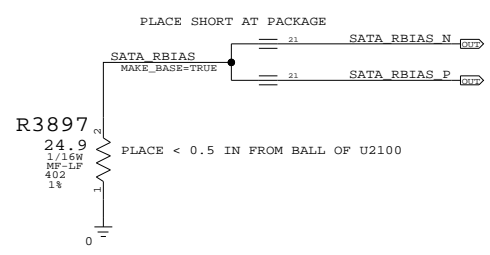
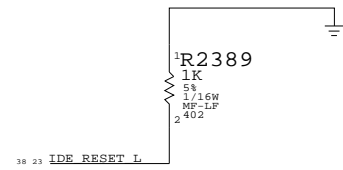
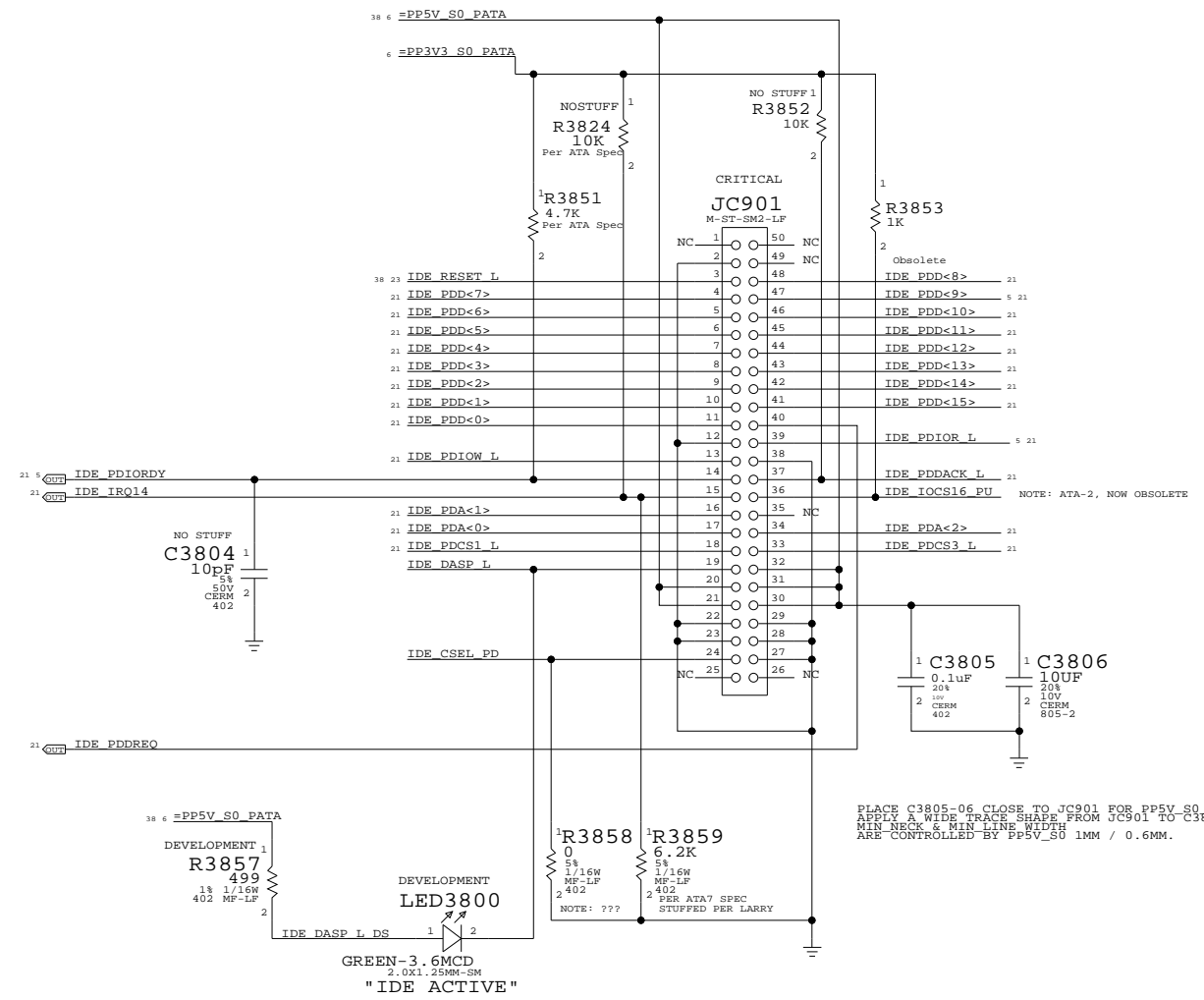
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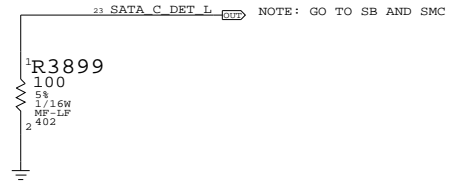
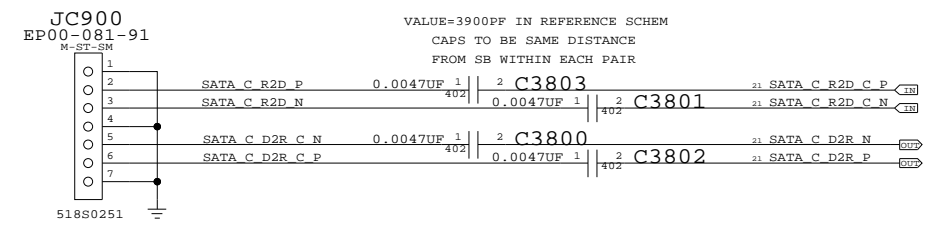
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	OF	111
NONE	34		

PATA CONNECTOR

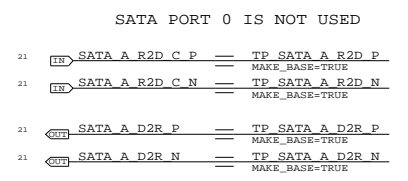
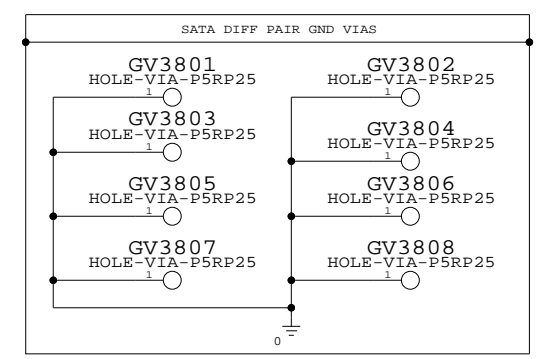
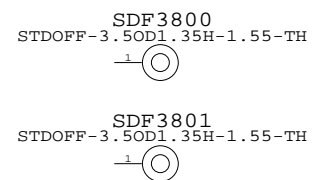


PLACE C3805-06 CLOSE TO JC901 FOR PP5V_S0_PATA. APPLY A WIDE TRACE SHAPE FROM JC901 TO C3805-06. MIN NECK & MIN LINE WIDTHS ARE CONTROLLED BY PP5V_S0 1MM / 0.6MM.

SATA CONNECTOR



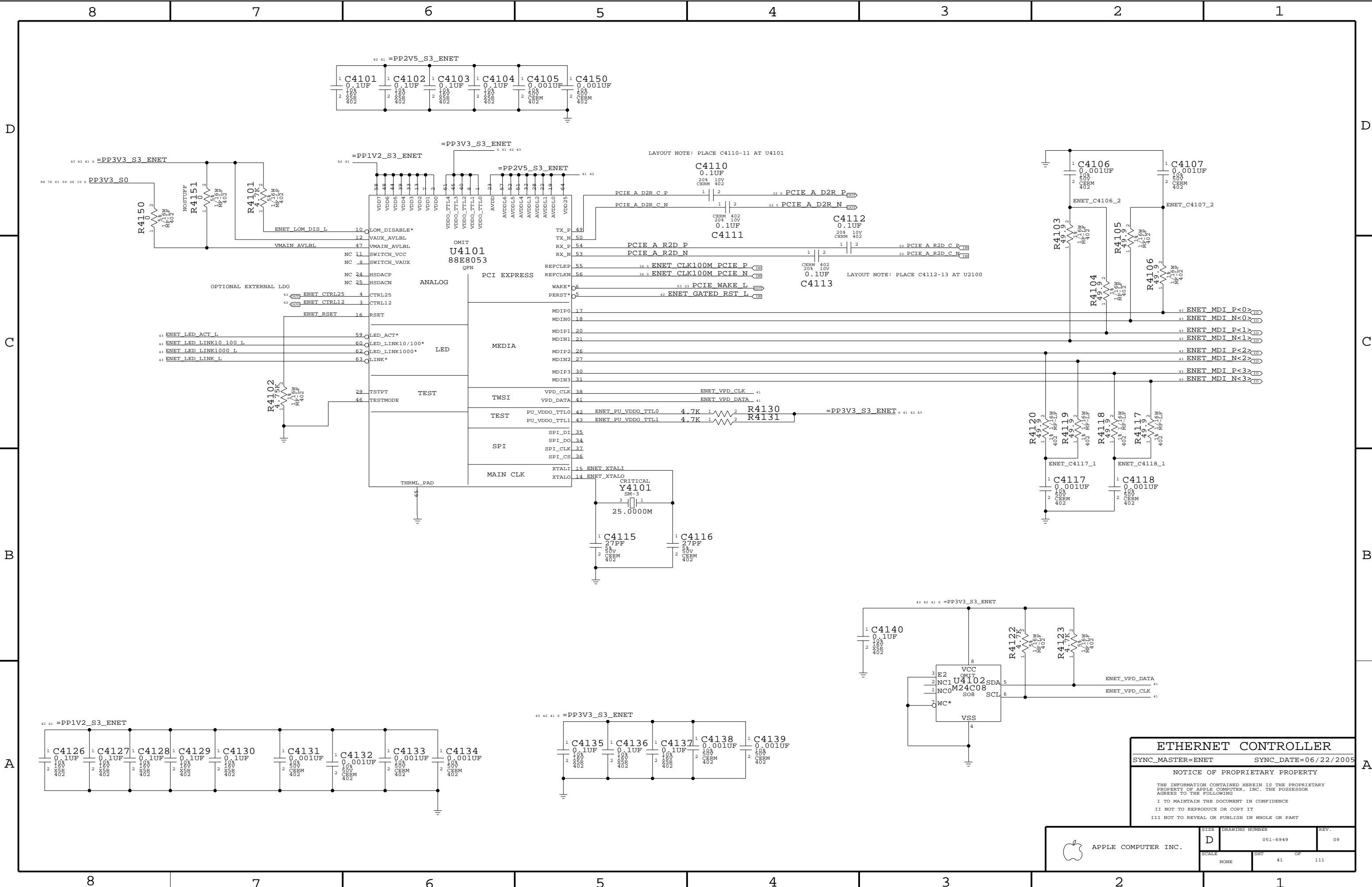
SMT NUTS FOR ODD ADAPTER



Disk Connectors

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6950	06
SCALE	NONE	SHT OF	38 OF 111



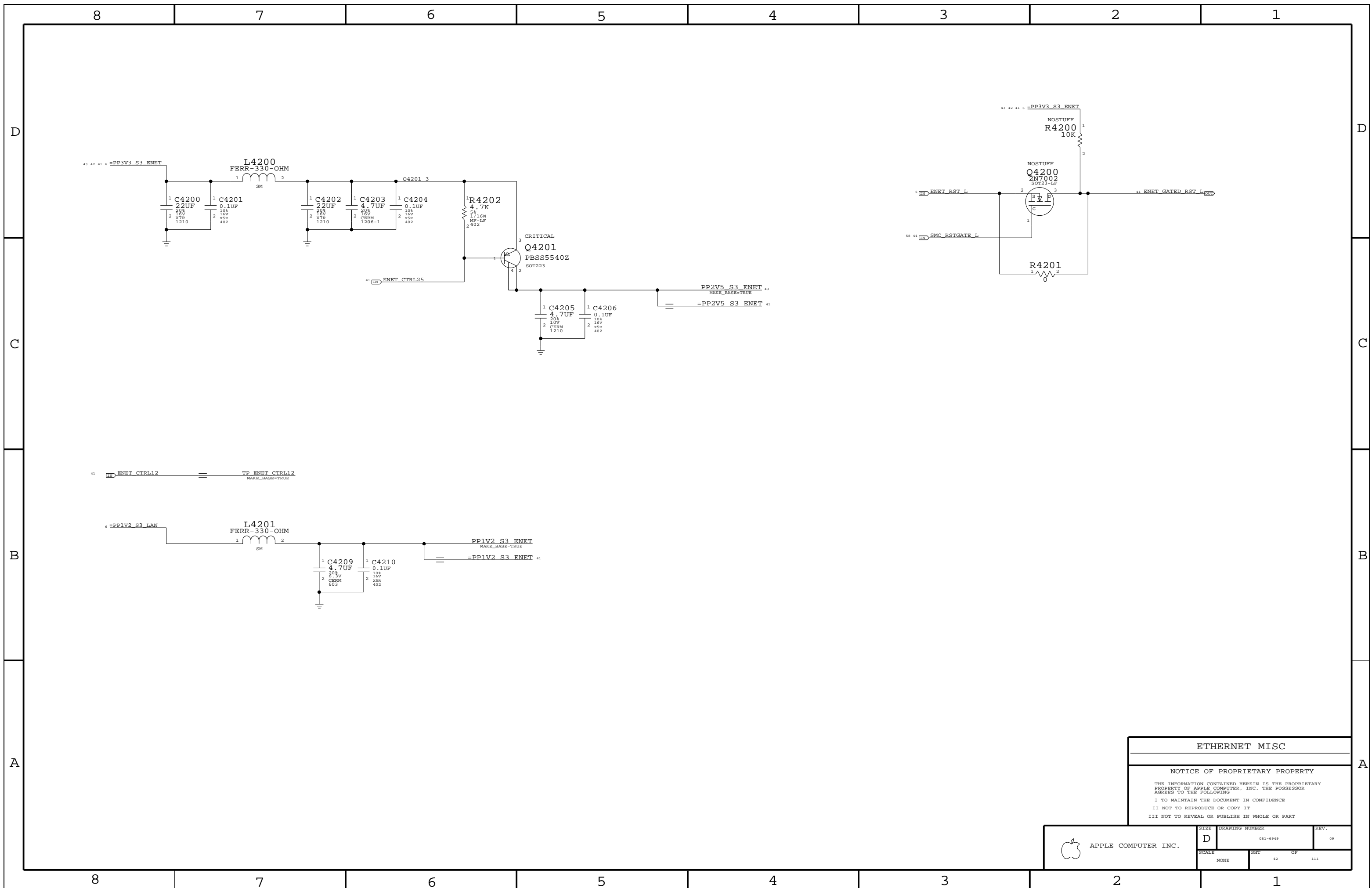
ETHERNET CONTROLLER

SYNC_MASTER=ENET SYNC_DATE=06/22/2005

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	NONE	SHT	41 OF 111



ETHERNET MISC

NOTICE OF PROPRIETARY PROPERTY

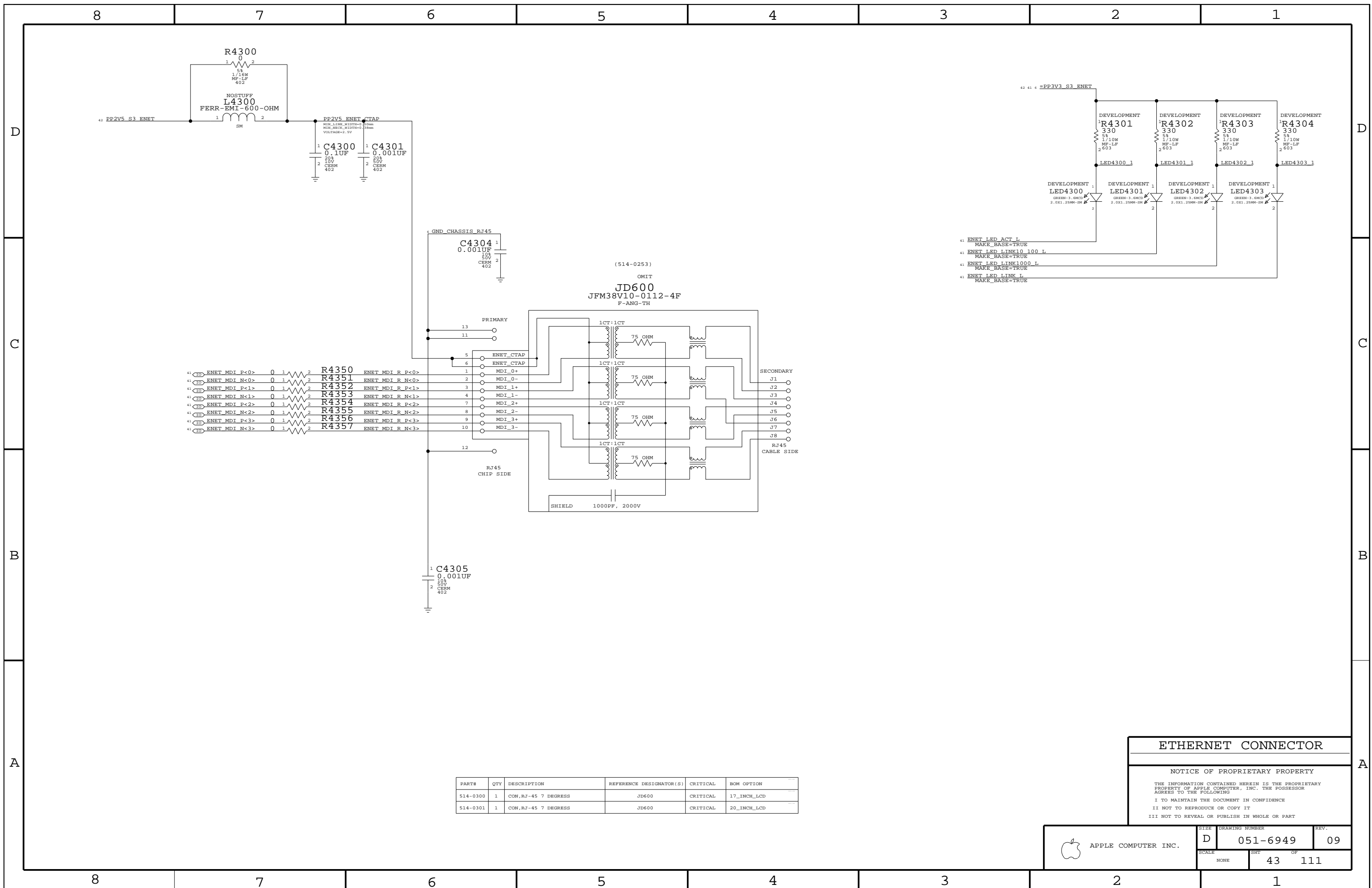
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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6949	REV. 09
	SCALE NONE	SHEET 42	OF 111



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

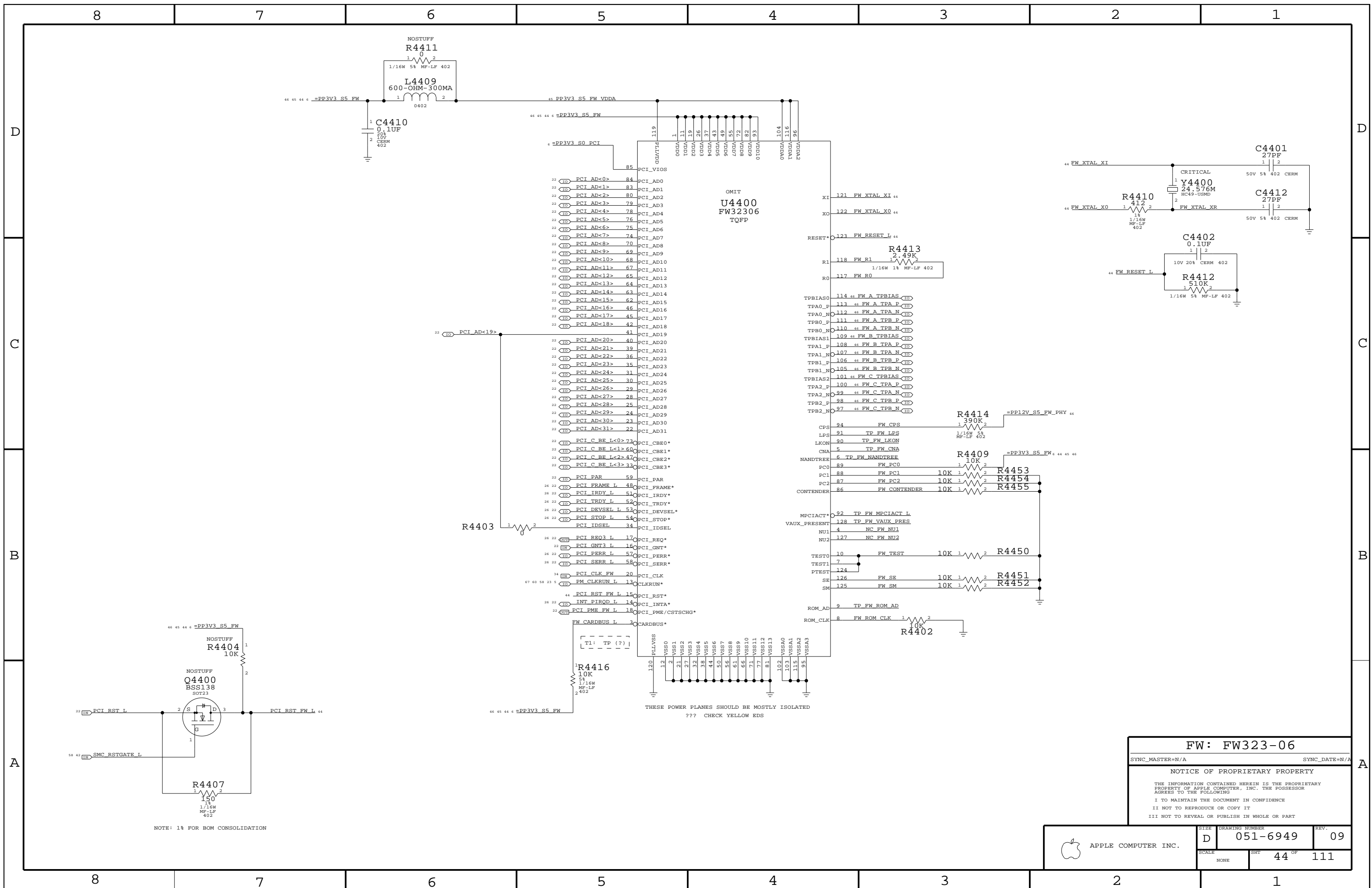
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	D	051-6949	09
SCALE	SHT		OF
NONE	43		111



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

NOTE: 1% FOR BOM CONSOLIDATION

FW: FW323-06

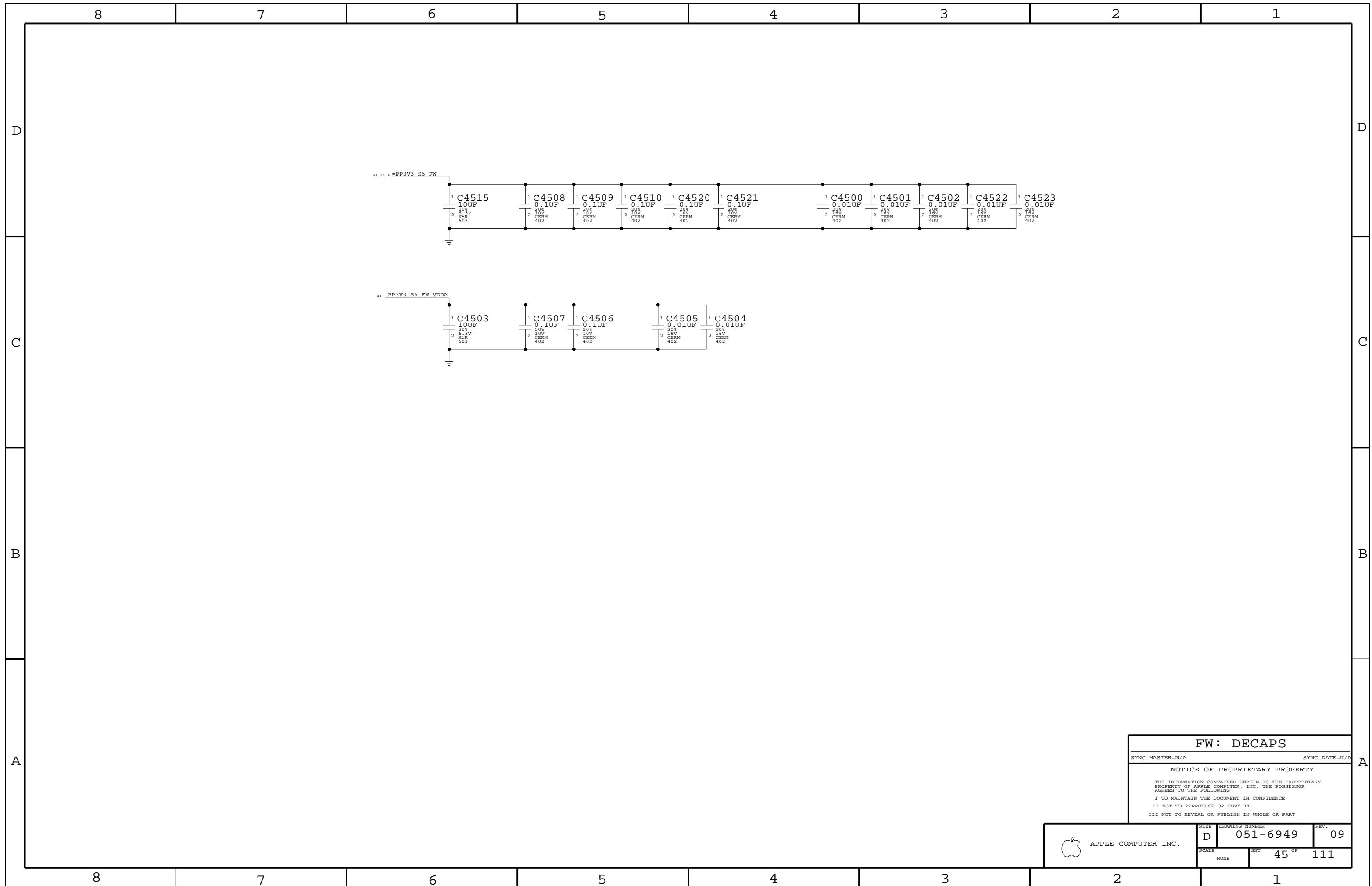
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	SCALE: NONE	SHEET: 44 OF 111	



FW: DECAPS

SYNC_MASTER=N/A SYNC_DATE=N/A


NOTICE OF PROPRIETARY PROPERTY

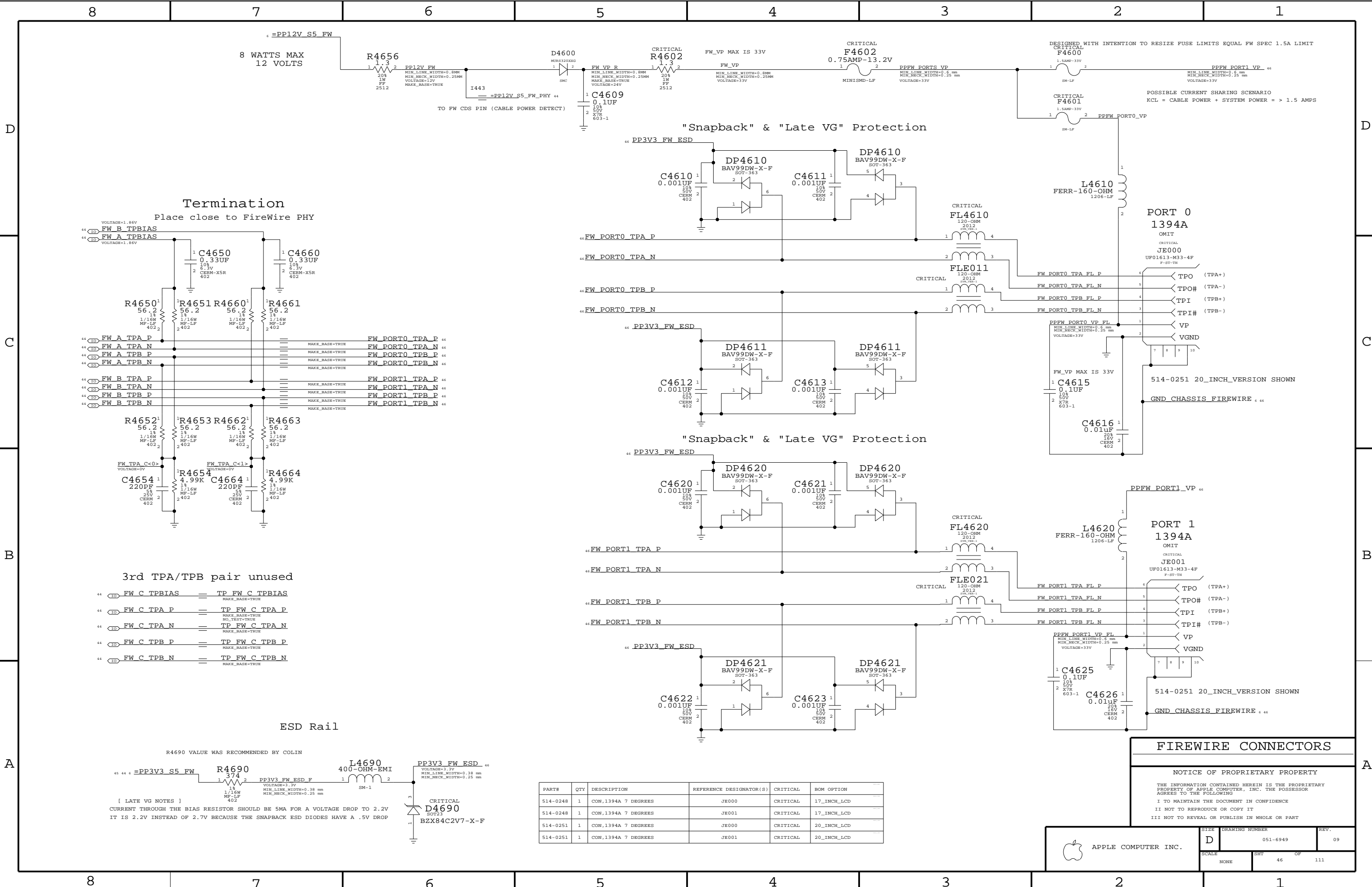
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	D	051-6949	09
SCALE	SHT		OF
NONE	45		111



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

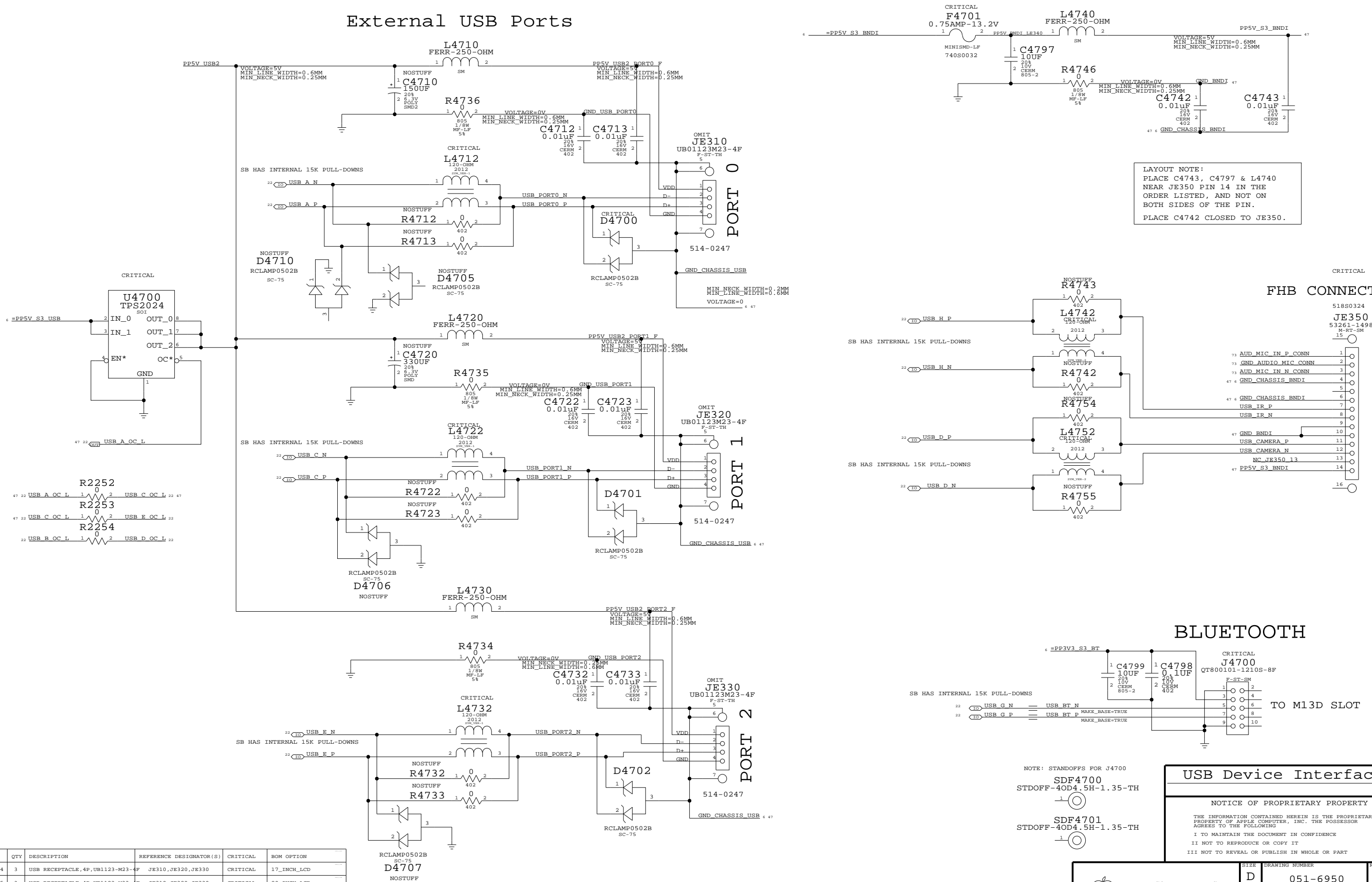
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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6949	09
SCALE	SHT	OF
NONE	46	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.

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.

DRAWING NUMBER: D 051-6950 REV. 06

SCALE: NONE SHEET 47 OF 111

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	SCALE NONE	SHEET 48 OF	TOTAL SHEETS 111

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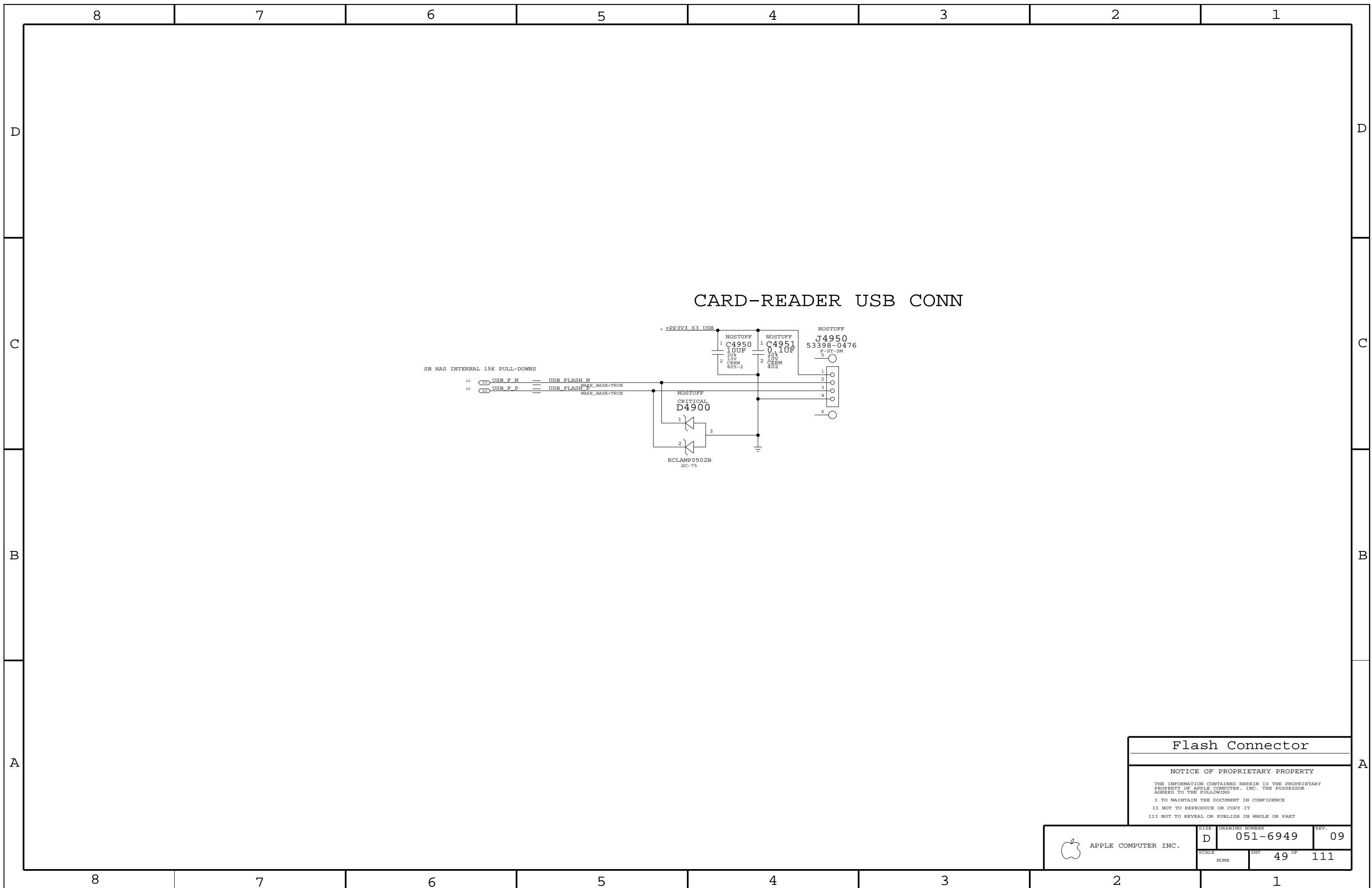
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Flash Connector

NOTICE OF PROPRIETARY PROPERTY

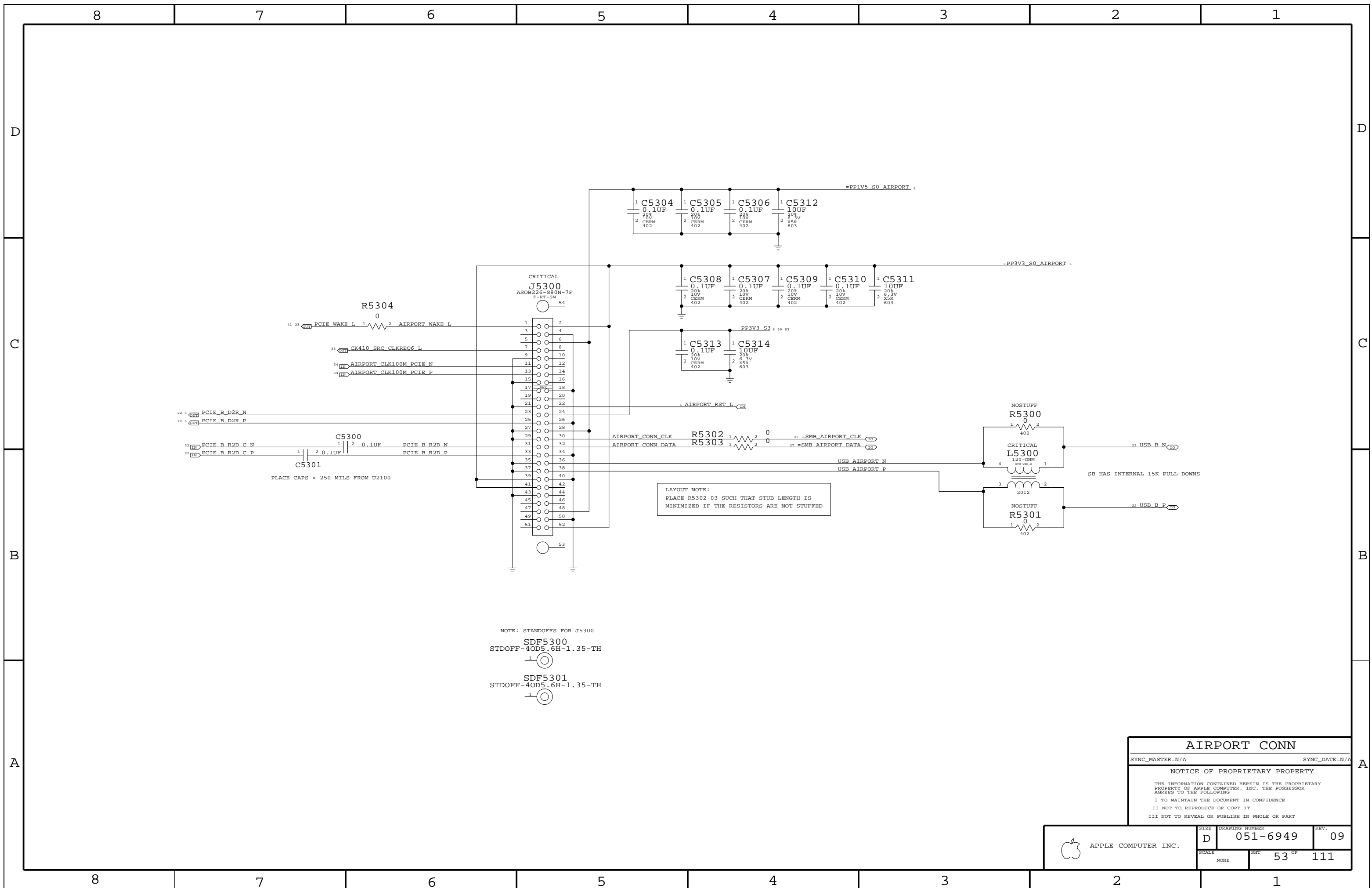
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	SCALE NONE	SHIT 49 OF	111



NOTE: STANDOFFS FOR J5300

SDF5300
STDOFF-40D5.6H-1.35-TH

SDF5301
STDOFF-40D5.6H-1.35-TH

LAYOUT NOTE:
PLACE R5302-03 SUCH THAT STUB LENGTH IS
MINIMIZED IF THE RESISTORS ARE NOT STUFFED

SB HAS INTERNAL 15K PULL-DOWNS

AIRPORT CONN

SYNC_MASTER=N/A SYNC_DATE=N/A

NOTICE OF PROPRIETARY PROPERTY

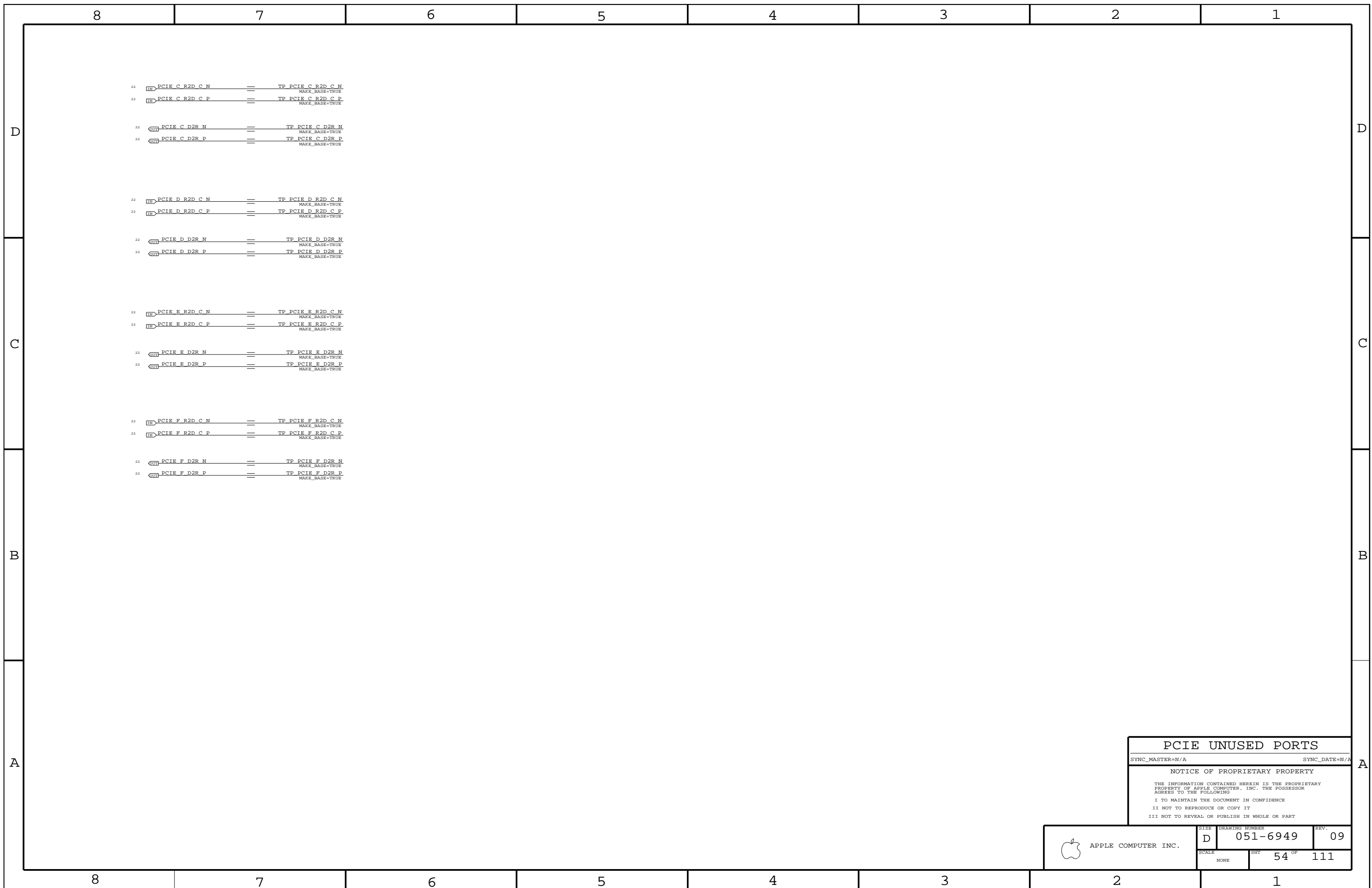
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	D	051-6949	09
SCALE	SHT	OF	
NONE	53	111	



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


NOTICE OF PROPRIETARY PROPERTY

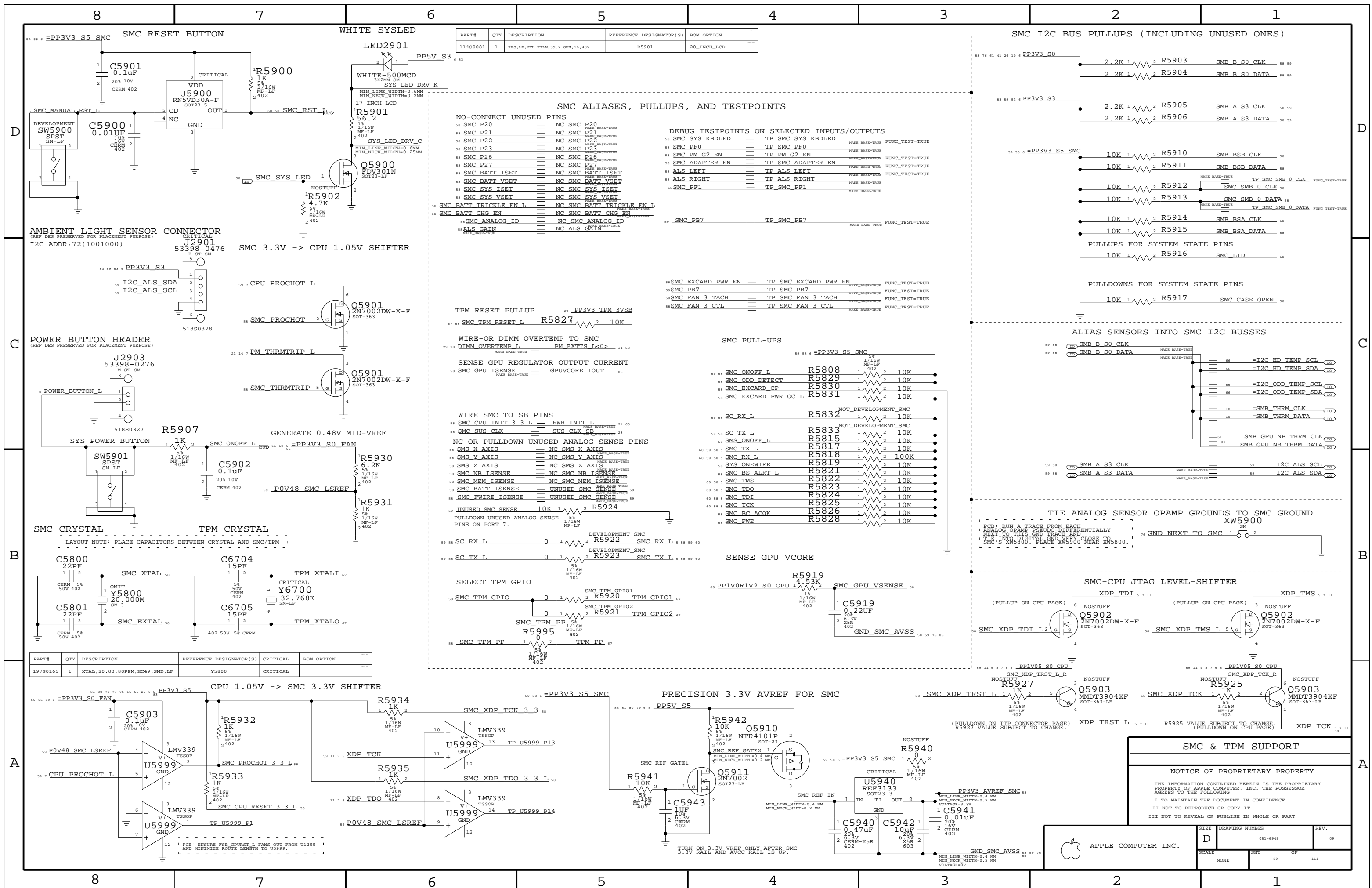
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	SCALE NONE	SHEET 54 OF	TOTAL SHEETS 111



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

NO-CONNECT UNUSED PINS	SMC ALIASES, PULLUPS, AND TESTPOINTS
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_EXCARD_PWR_EN == TP_SMC_EXCARD_PWR_EN MAKE_BASE=TRUE FUNC_TEST=TRUE
58 SMC_SYS_ISET == NC SMC_SYS_ISET	58 SMC_PB7 == TP_SMC_PB7 MAKE_BASE=TRUE FUNC_TEST=TRUE
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	

SMC PULL-UPS	SMC CPU INIT 3 3 L
58 SMC_ONOFF_L == R5808 10K	58 SMC_CPU_INIT_3_3_L == FWH_INIT_L
58 SMC_ODD_DETECT == R5829 10K	58 SMC_SUS_CLK == SUS_CLK_SB
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 SMC_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	

SELECT TPM GPIO	SMC CPU INIT 3 3 L
58 SMC_TPM_GPIO == R5920 10K	58 SMC_CPU_INIT_3_3_L == FWH_INIT_L
58 SMC_TPM_PP == R5921 10K	58 SMC_SUS_CLK == SUS_CLK_SB
58 SMC_TPM_PP == R5922 10K	
58 SMC_TPM_PP == R5923 10K	
58 SMC_TPM_PP == R5924 10K	

SMC CPU INIT 3 3 L	PRECISION 3.3V AVREF FOR SMC
58 SMC_CPU_INIT_3_3_L == FWH_INIT_L	58 SMC_REF_GATE1 == R5941 10K
58 SMC_SUS_CLK == SUS_CLK_SB	58 SMC_REF_GATE2 == R5942 10K
	58 SMC_REF_IN == R5943 10K

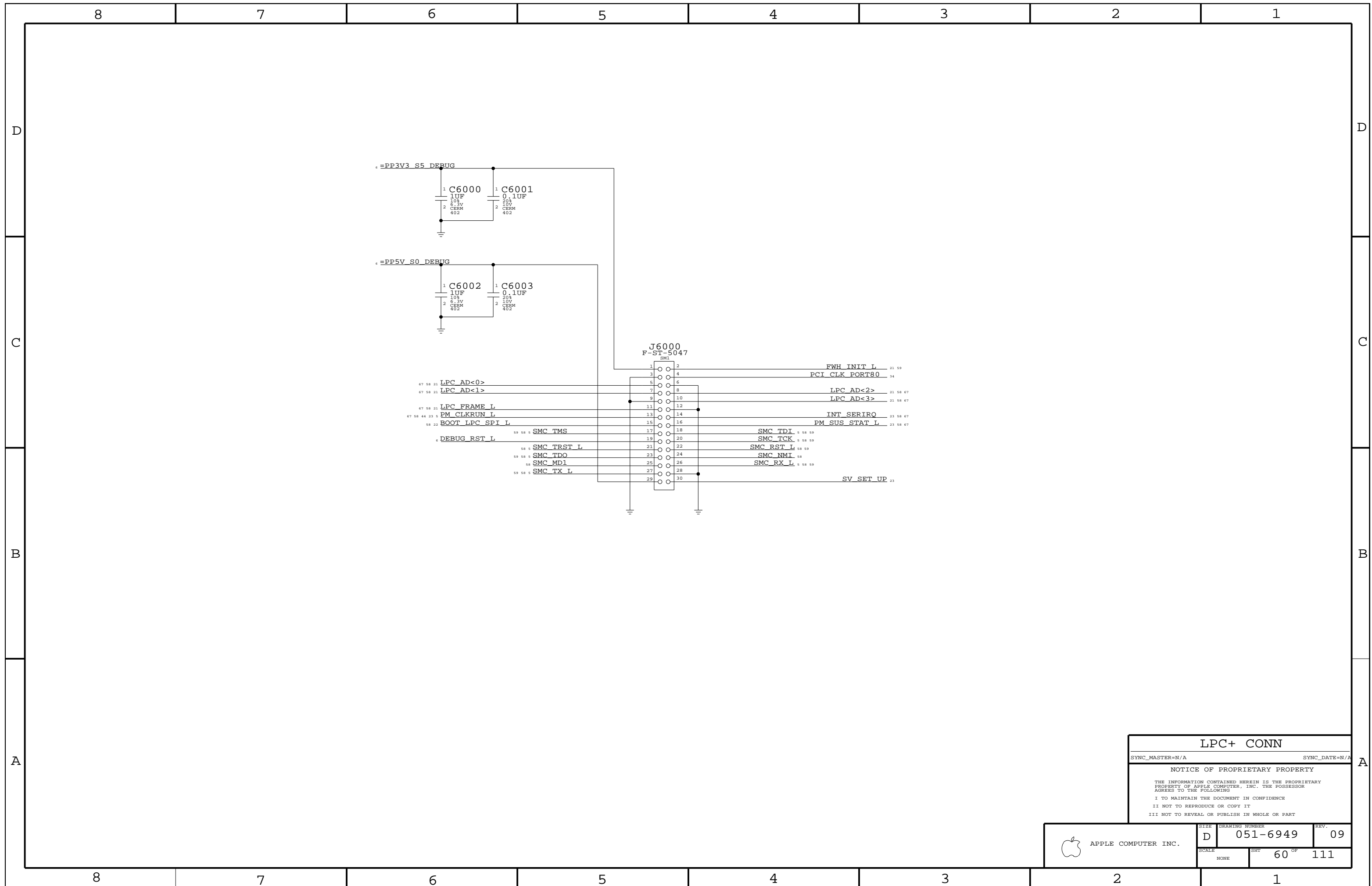
TURN ON 3.3V VREF ONLY AFTER SMC 3.3V RAIL AND AVCC RAIL IS UP.

SMC & TPM SUPPORT

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SIZE	DRAWING NUMBER	REV.
D	051-6949	09
SCALE	SHT	OF
NONE	59	111

APPLE COMPUTER INC.



LPC+ CONN

SYNC_MASTER=N/A SYNC_DATE=N/A

NOTICE OF PROPRIETARY PROPERTY

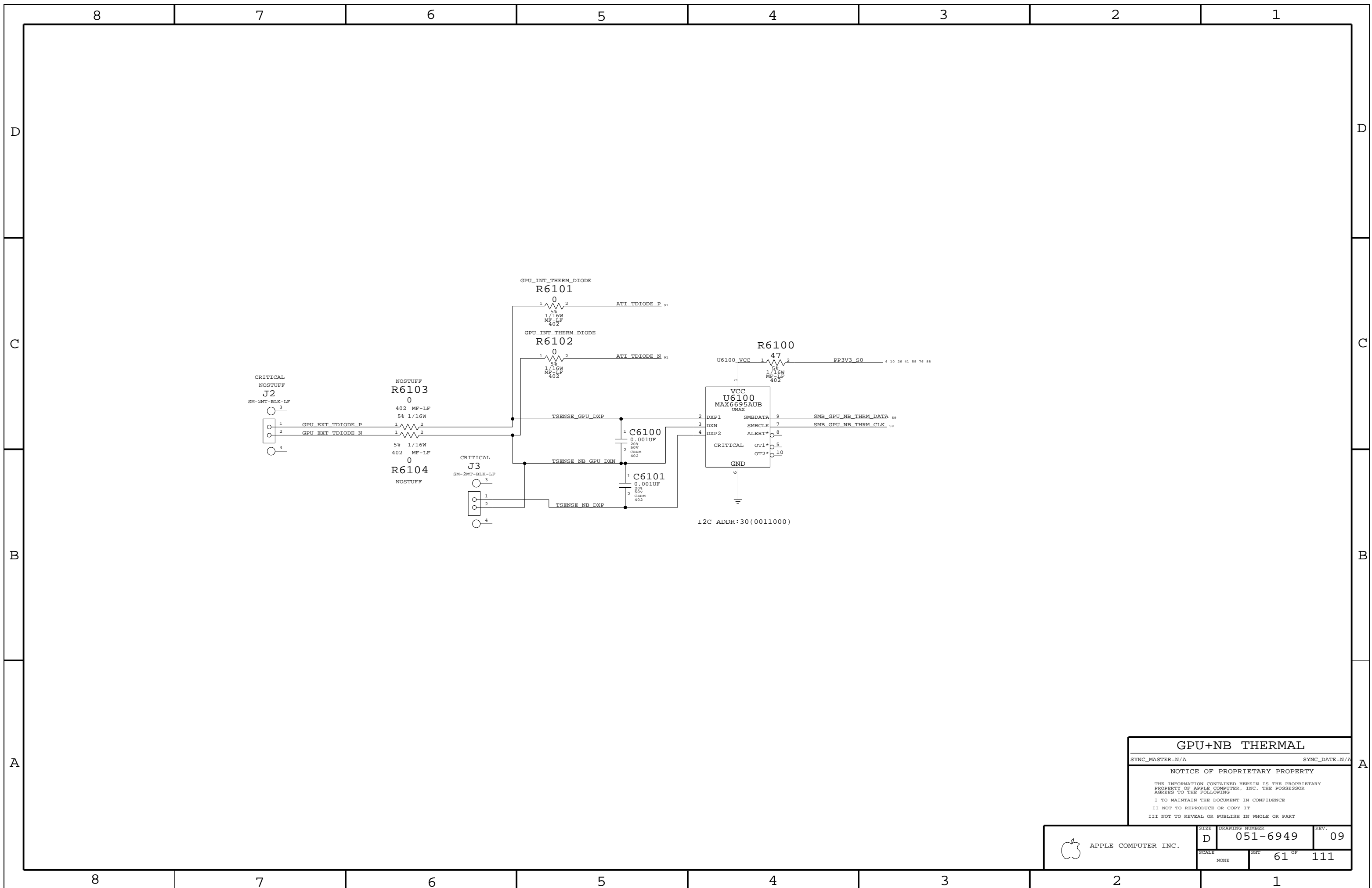
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	SCALE NONE	SHEET 60 OF	TOTAL SHEETS 111



GPU+NB THERMAL

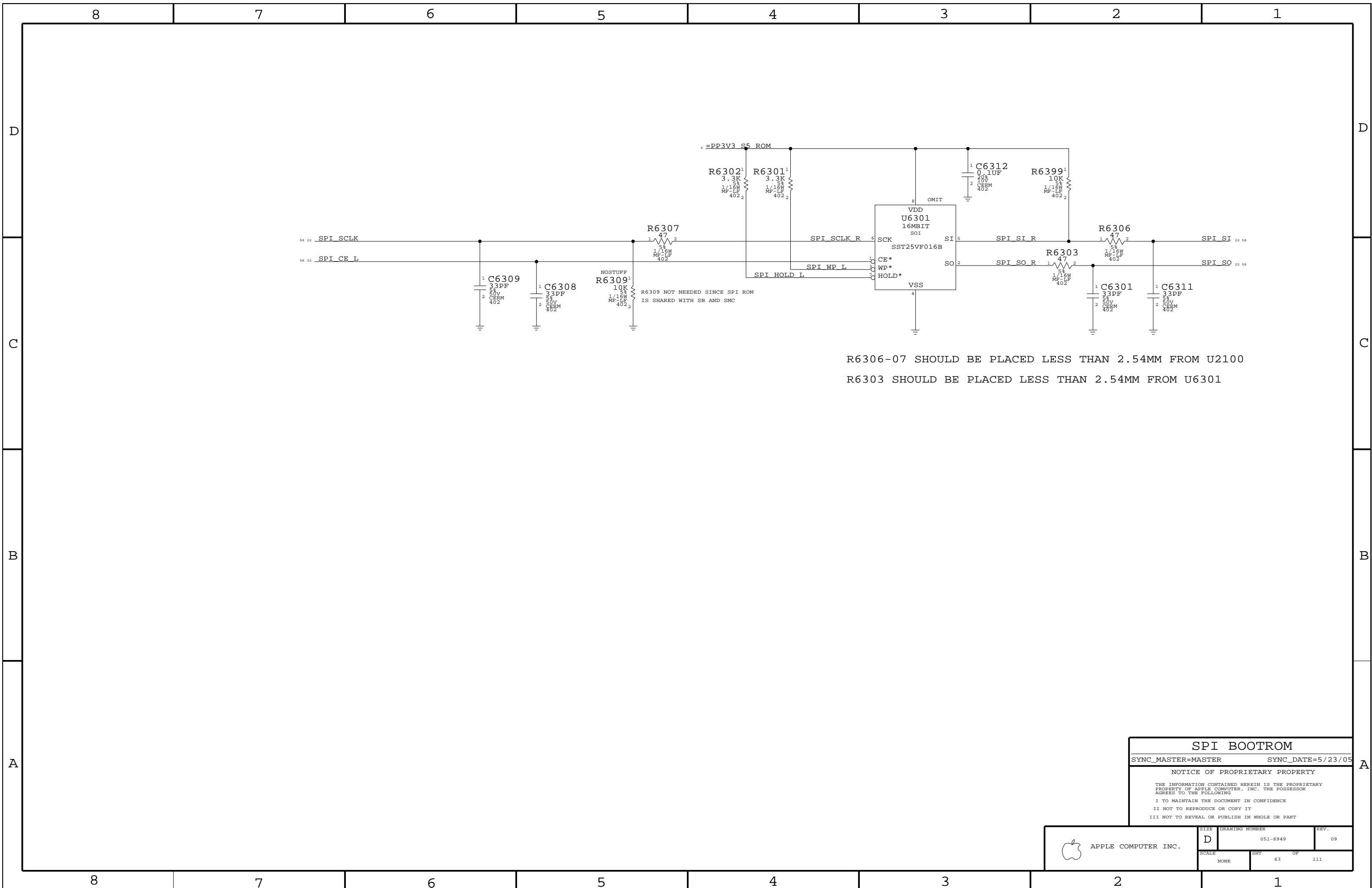
SYNC_MASTER=N/A SYNC_DATE=N/A

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE		SHT	OF
NONE		61	111

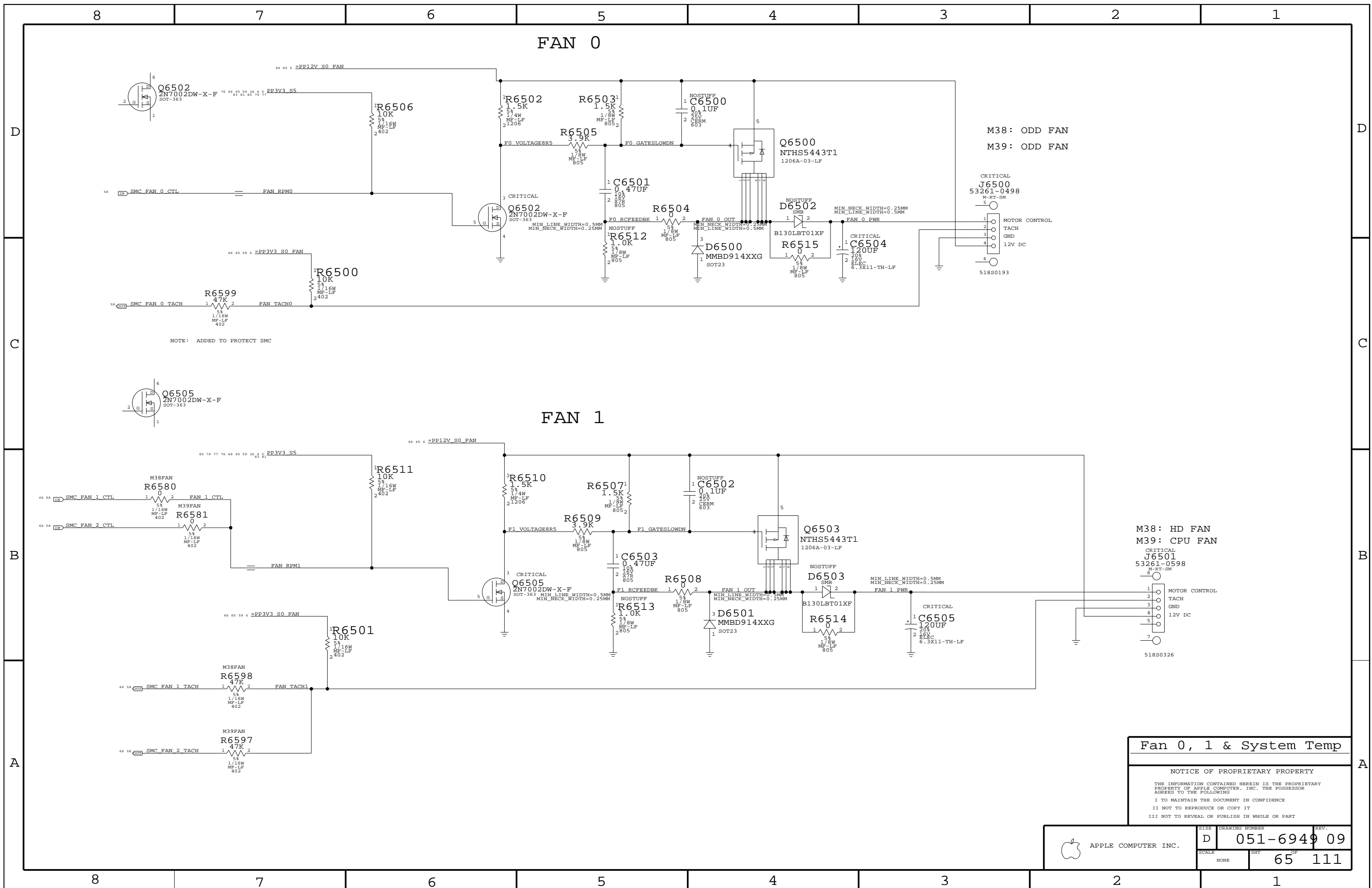


SPI BOOTROM

SYNC_MASTER=MASTER SYNC_DATE=5/23/05

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	SCALE NONE	SHEET 63	OF 111



Fan 0, 1 & System Temp

NOTICE OF PROPRIETARY PROPERTY

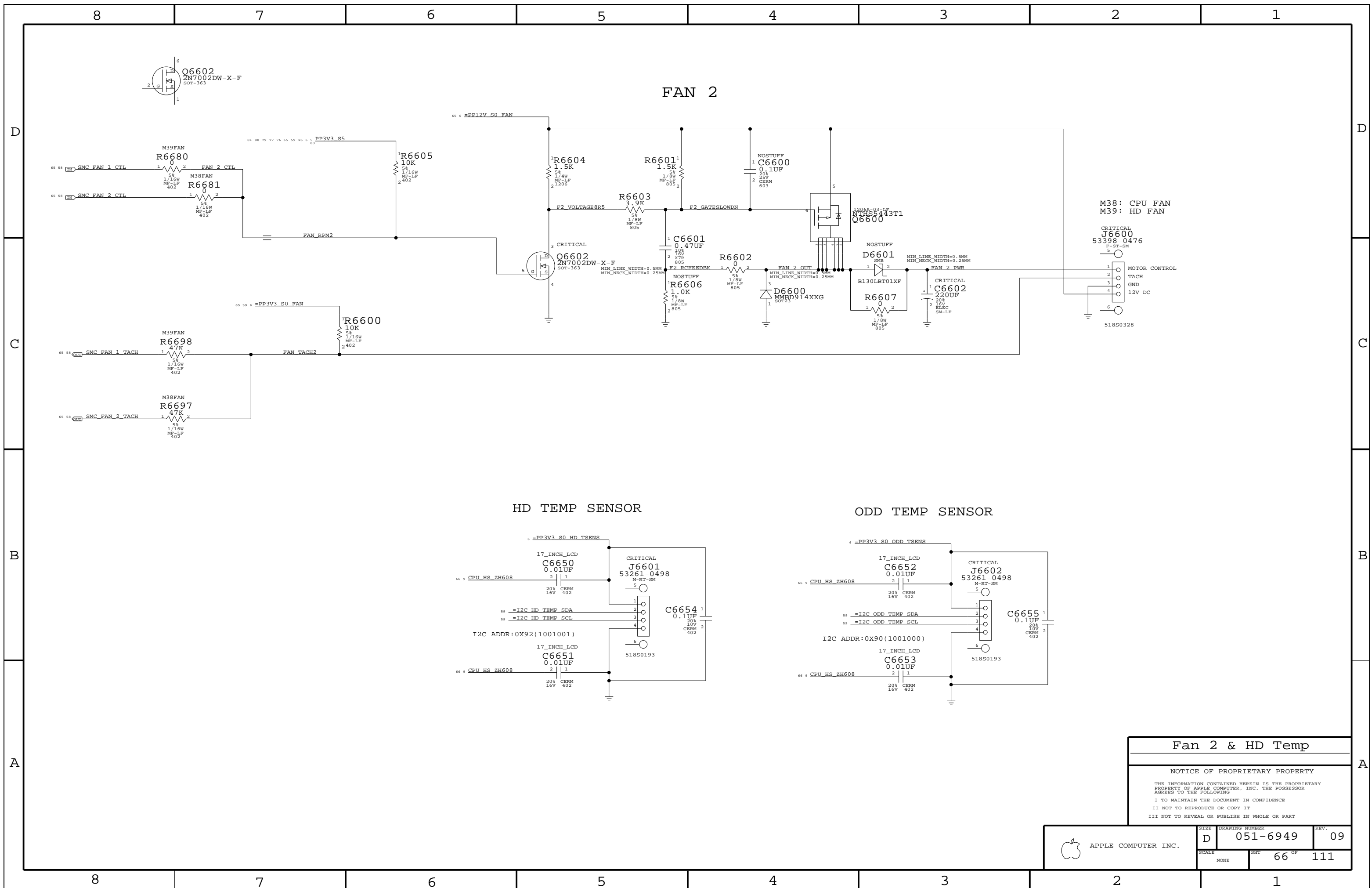
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	D	051-6949	09
SCALE	NONE	SHT	OF
		65	111



FAN 2

HD TEMP SENSOR

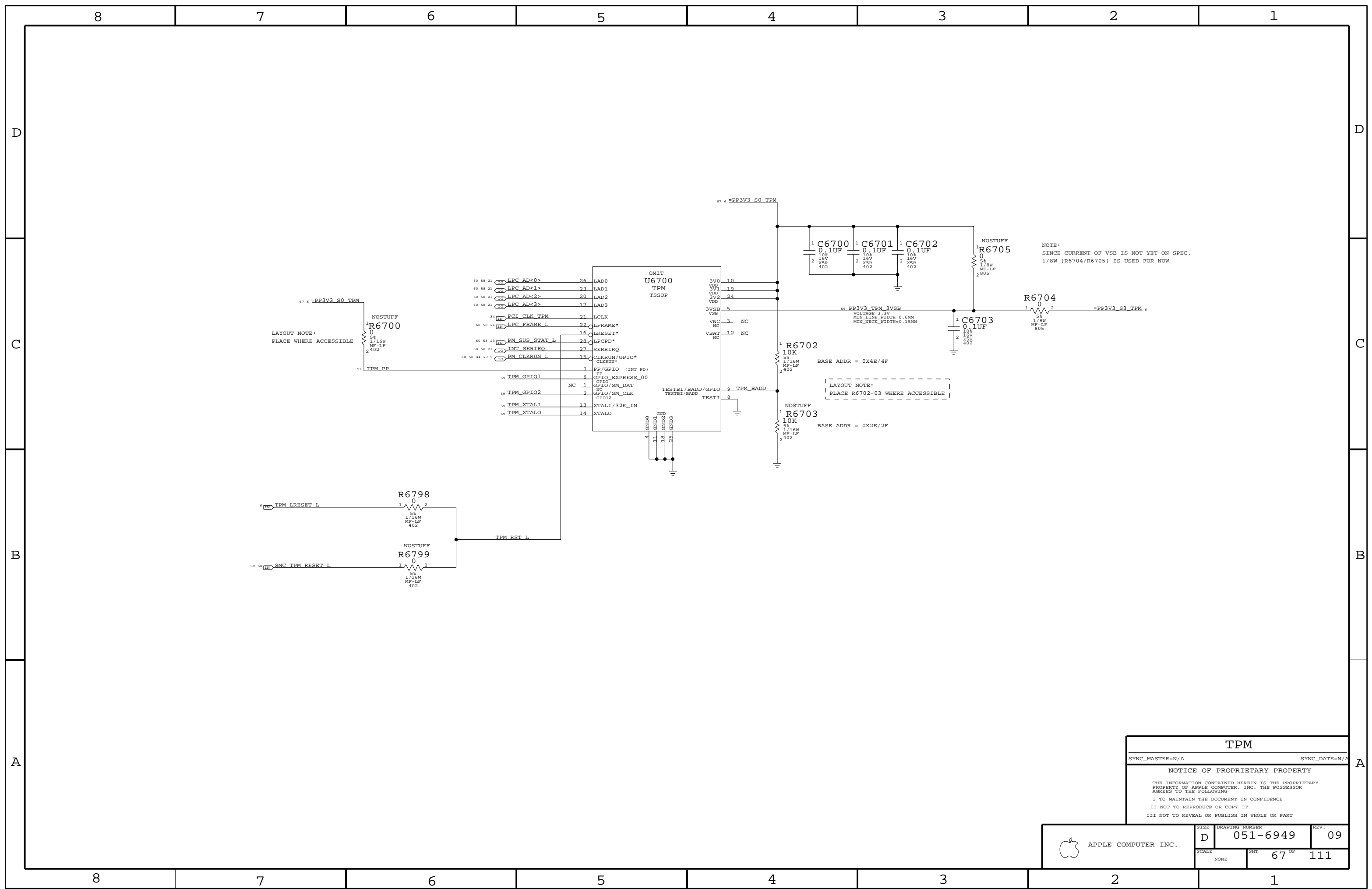
ODD TEMP SENSOR

Fan 2 & HD Temp

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	D	051-6949	09
SCALE	SHEET		OF
NONE	66		111



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

TPM

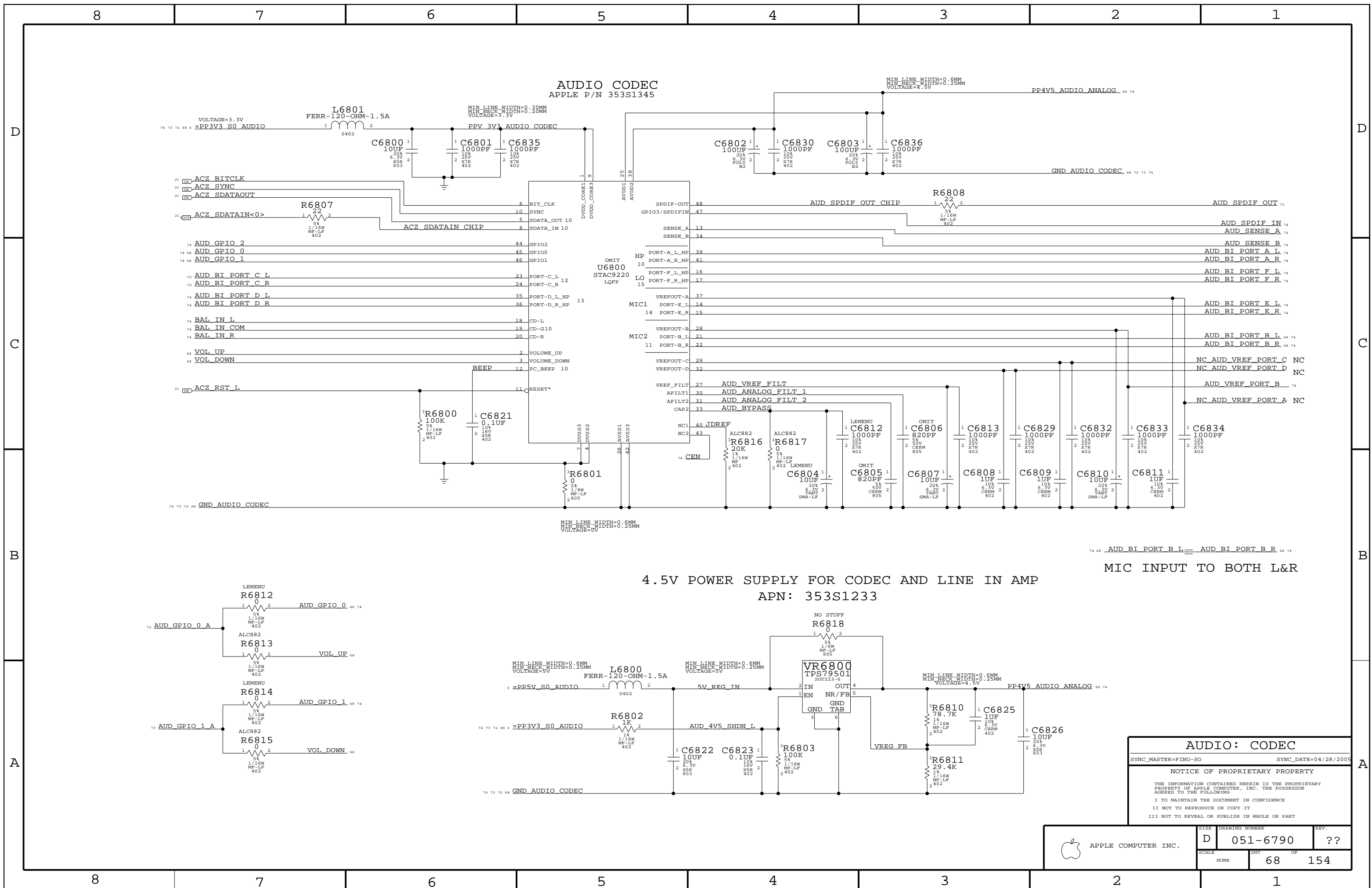
SYNC_MASTER=N/A SYNC_DATE=N/A

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	SCALE NONE	SHEET 67 OF 111	

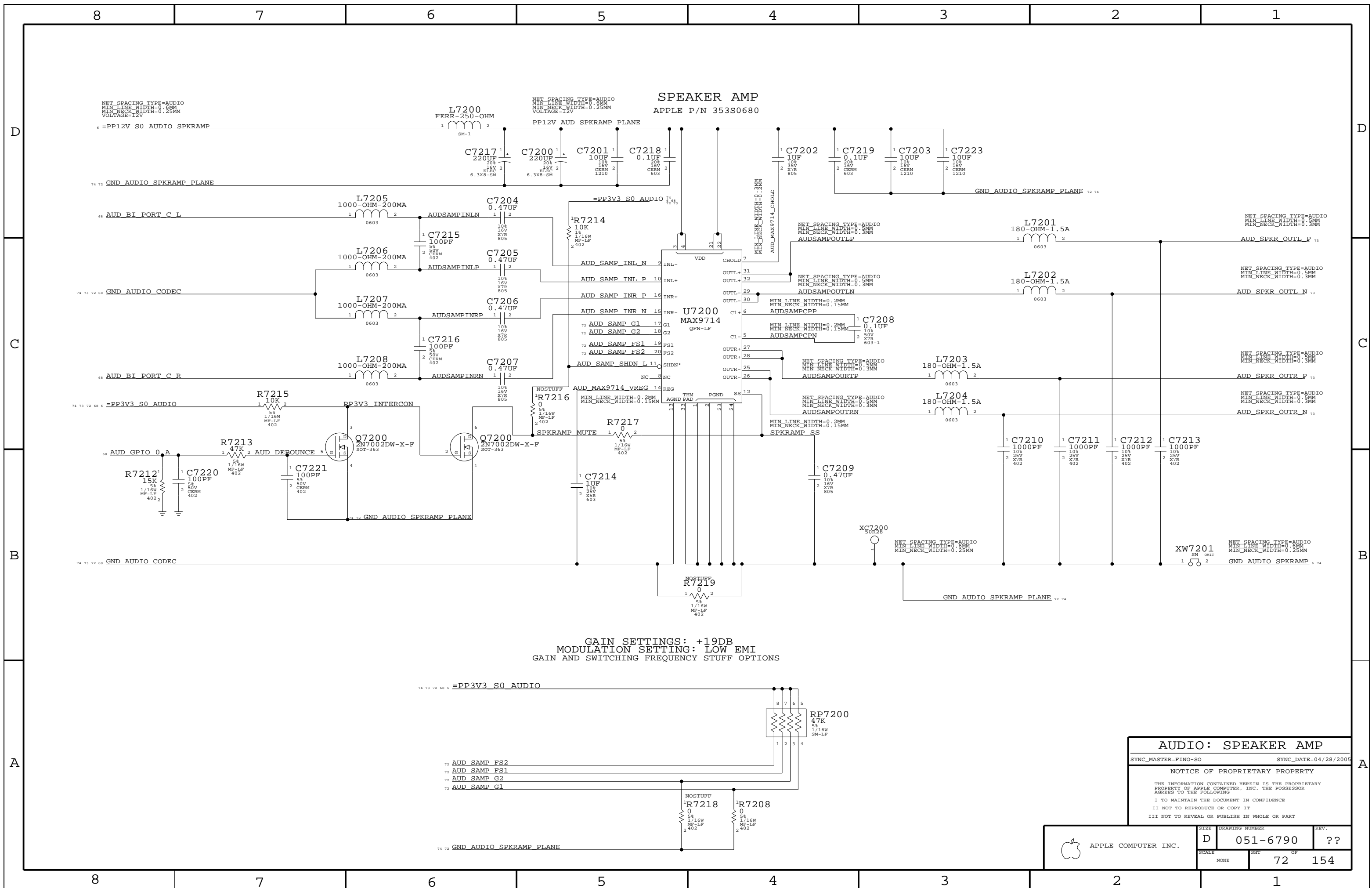


AUDIO CODEC
APPLE P/N 353S1345

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	REV. ??
	SCALE NONE	SHEET 68	OF 154

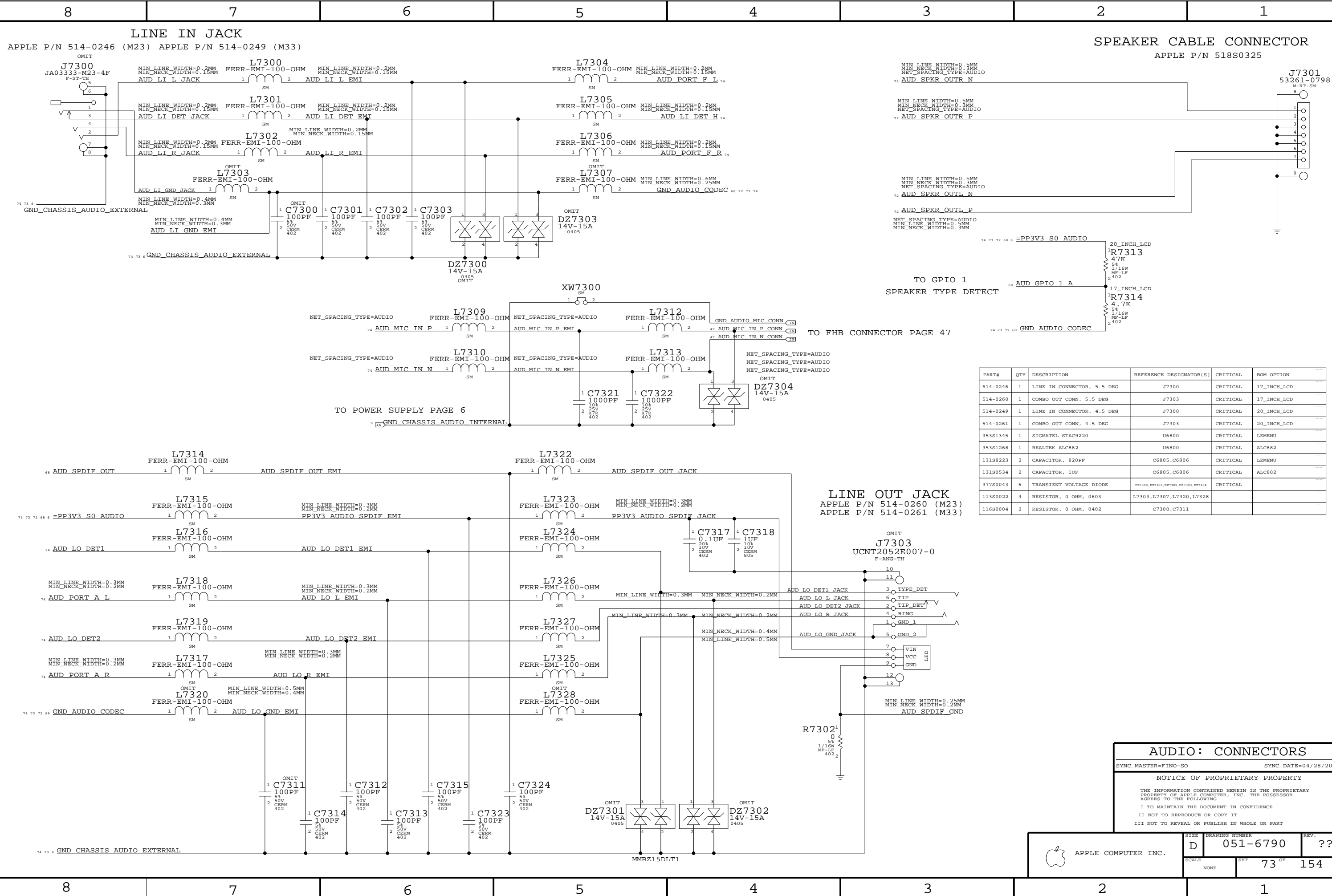


SPEAKER AMP
APPLE P/N 353S0680

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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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6790	??
SCALE	NONE	SHT	OF
		72	154

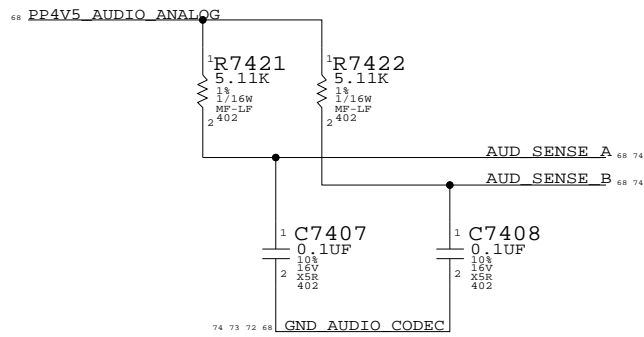


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0246	1	LINE IN CONNECTOR, 5.5 DEG	J7300	CRITICAL	17_INCH_LCD
514-0260	1	COMBO OUT CONN, 5.5 DEG	J7303	CRITICAL	17_INCH_LCD
514-0249	1	LINE IN CONNECTOR, 4.5 DEG	J7300	CRITICAL	20_INCH_LCD
514-0261	1	COMBO OUT CONN, 4.5 DEG	J7303	CRITICAL	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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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6790	??
SCALE	SHT	73 OF	154
NONE			

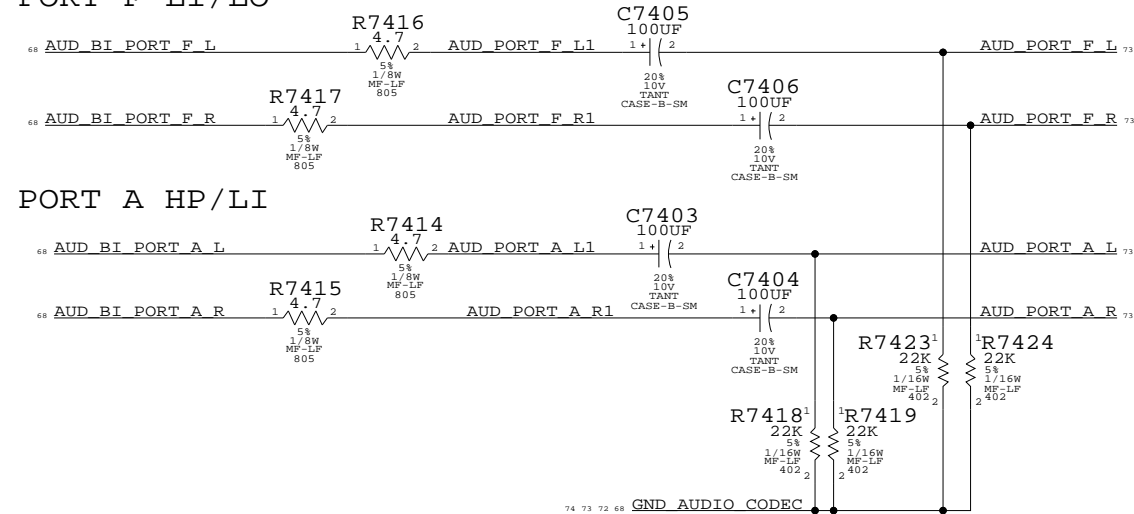
JACK SENSE PULL UPS (PLACE NEXT TO CODEC)



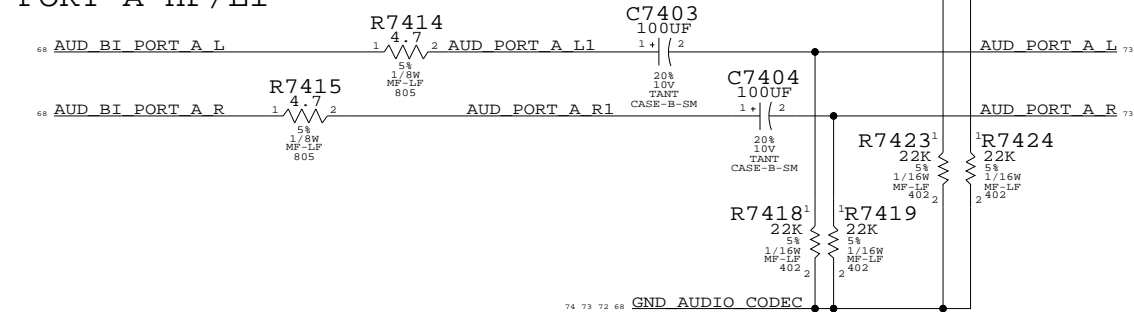
USED PORTS
 PORT A HP/LI
 PORT B MIC IN
 PORT C BI SPEAKERS
 PORT F LI/LO

UNUSED PORTS
 PORT E
 PORT D

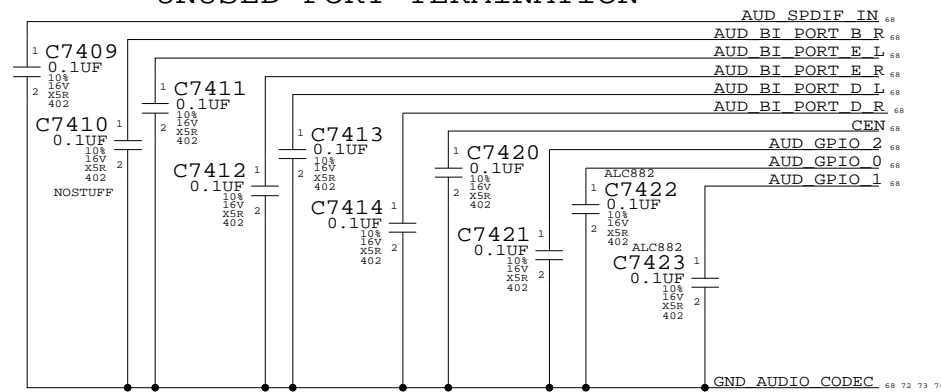
PORT F LI/LO



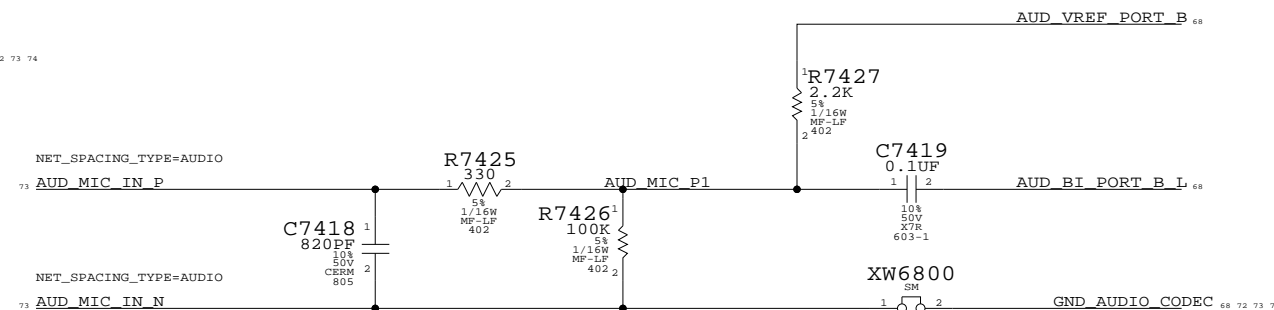
PORT A HP/LI



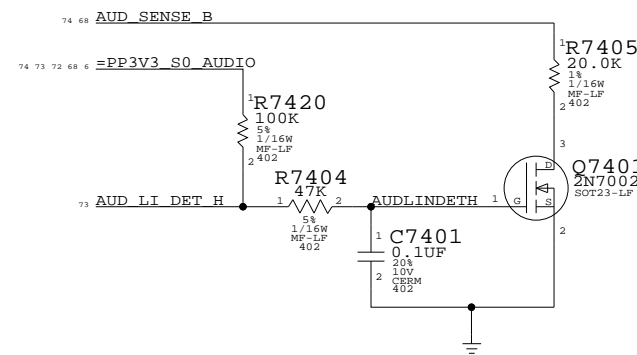
UNUSED PORT TERMINATION



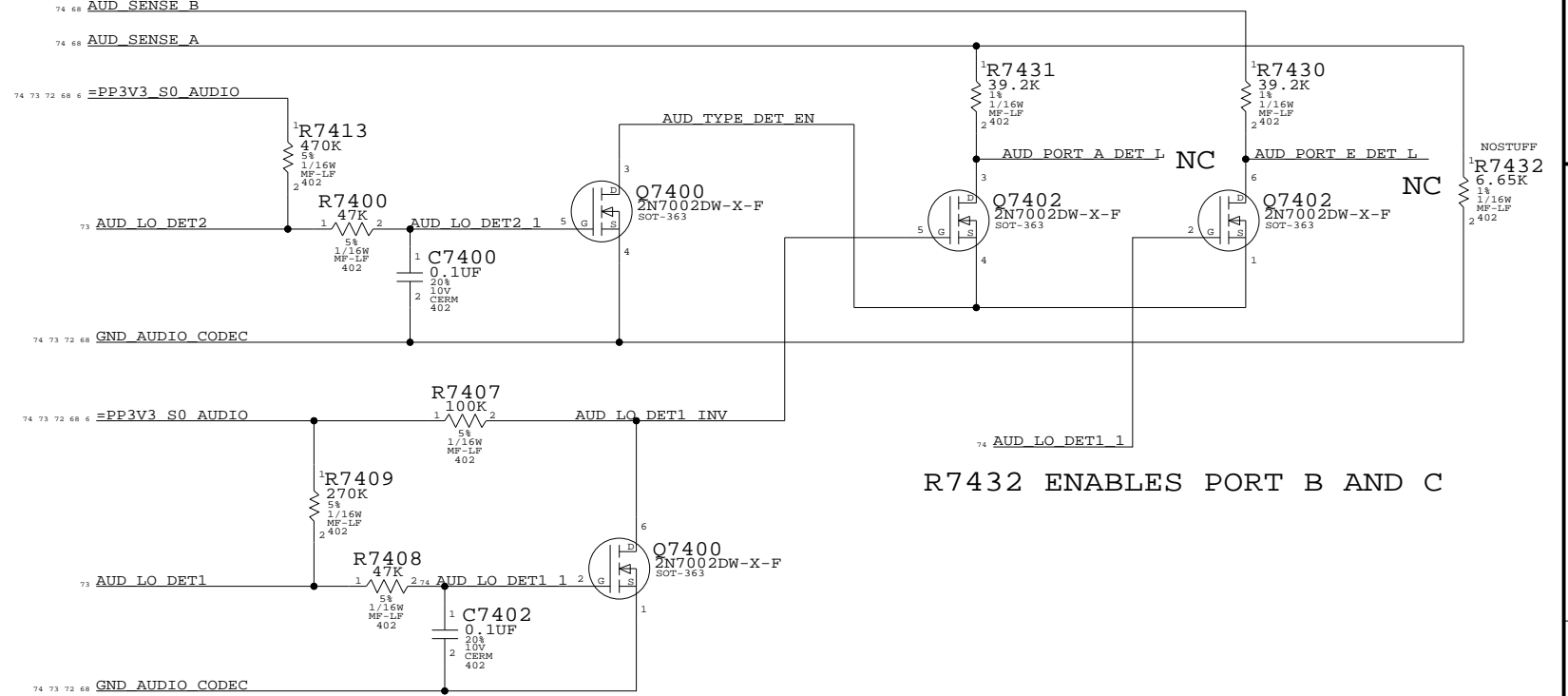
MICROPHONE IMPEDANCE MATCHING CIRCUIT



PORT F (LI/LO) PLUG DETECT

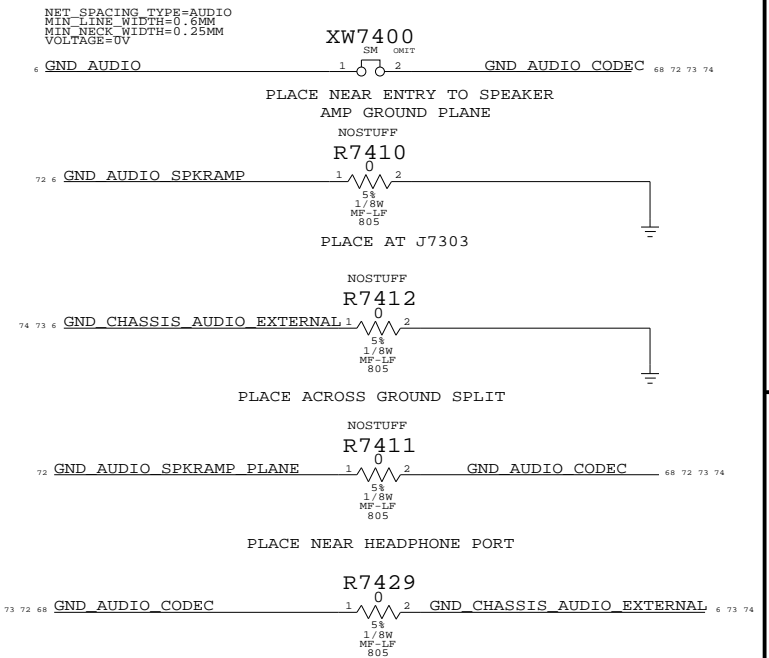


PORT A/H (HP/LI/DIG_OUT) PLUG DETECT (E TELLS H TO COME ON)



R7432 ENABLES PORT B AND C

AUDIO GROUND RETURNS



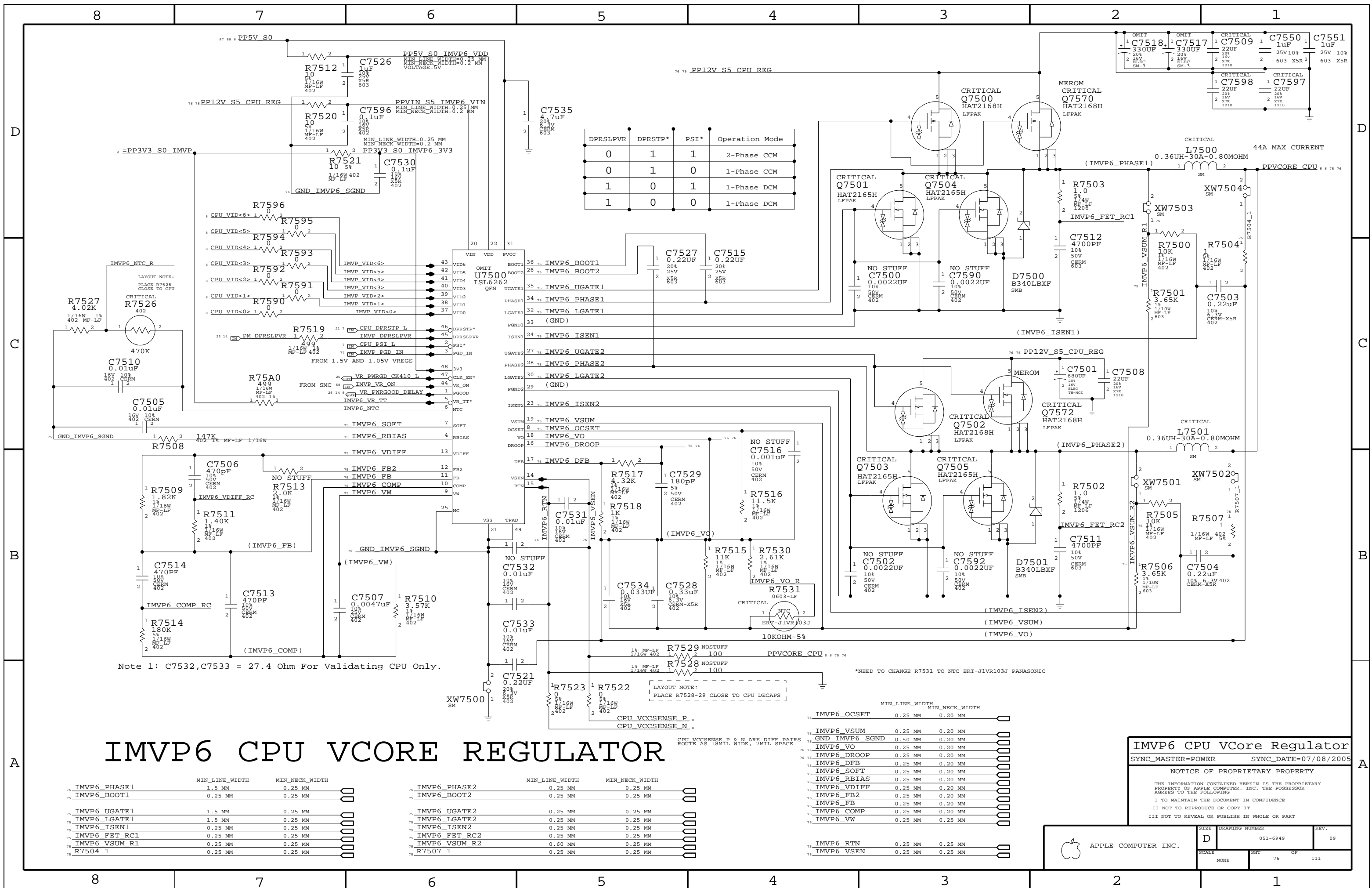
AUDIO: POWER SUPPLIES

SYNC_MASTER=FINO-SO SYNC_DATE=04/28/2005

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	D	051-6790	??
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

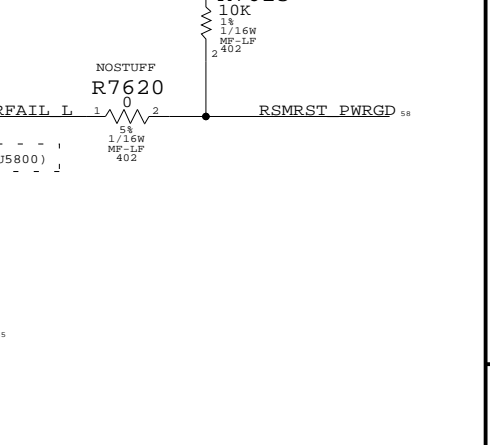
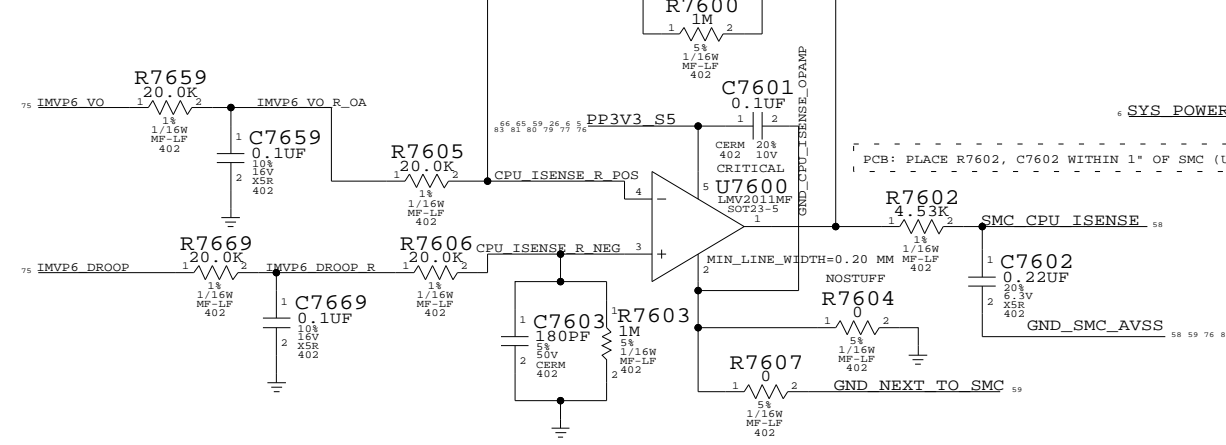
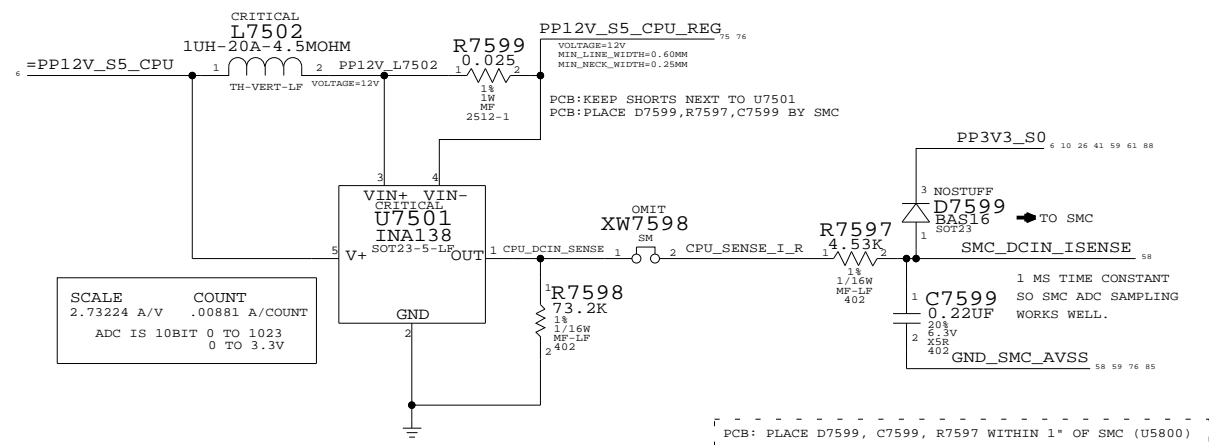
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APPLE COMPUTER INC.	SCALE	DRAWING NUMBER	REV.
	NONE	D 051-6949	09
	SHEET	OF	
	75	111	

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

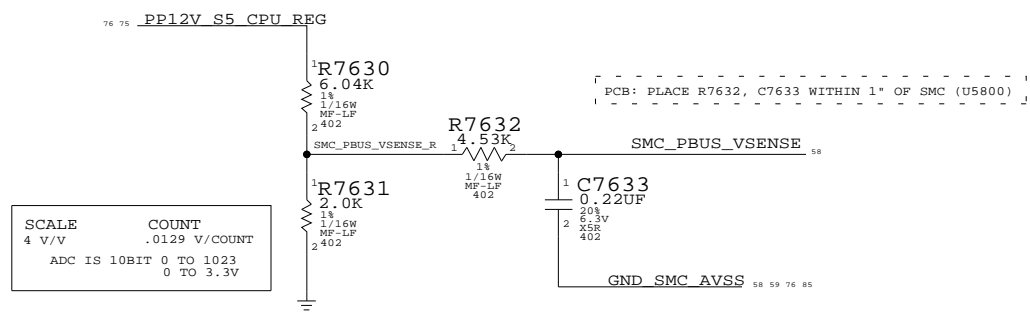
PROCESSOR VCORE CURRENT SENSE
(MEASURING DC/DC INDUCTOR DCR TO DERIVE CPU CURRENT)

SMC PWRGD PULLUP

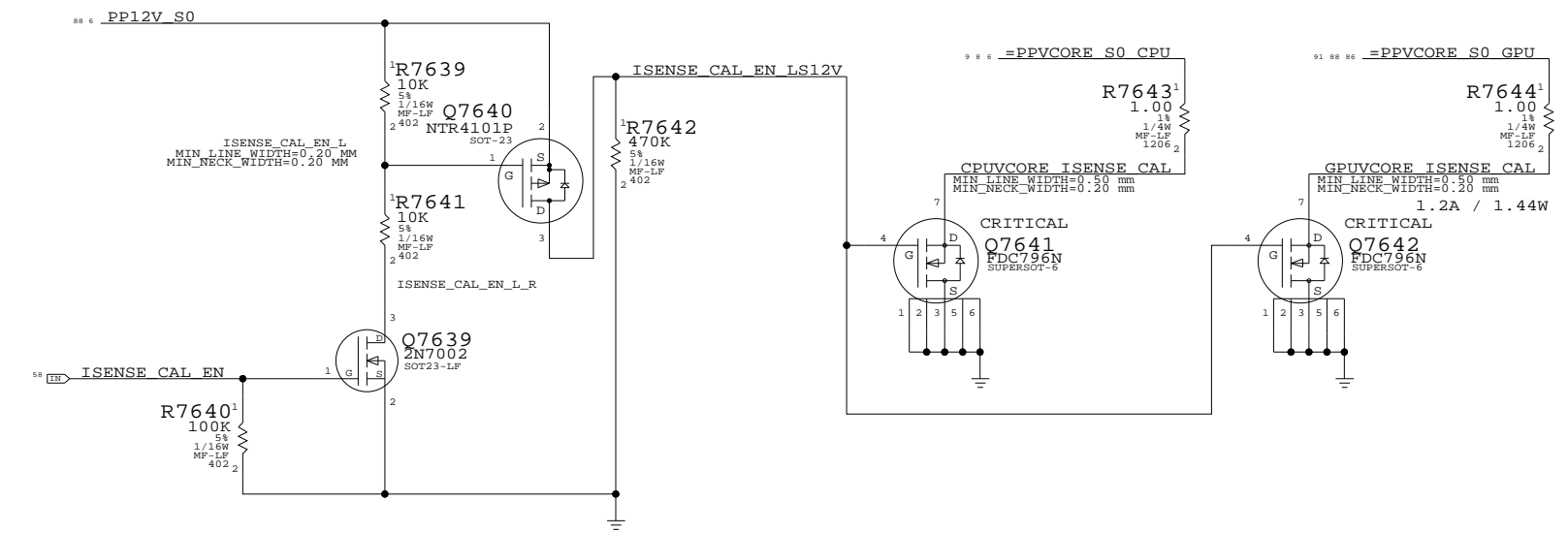


PROCESSOR DCIN VOLTAGE SENSE
(SCALING 12V INPUT VOLTAGE TO SMC)

PROCESSOR VCORE SENSE

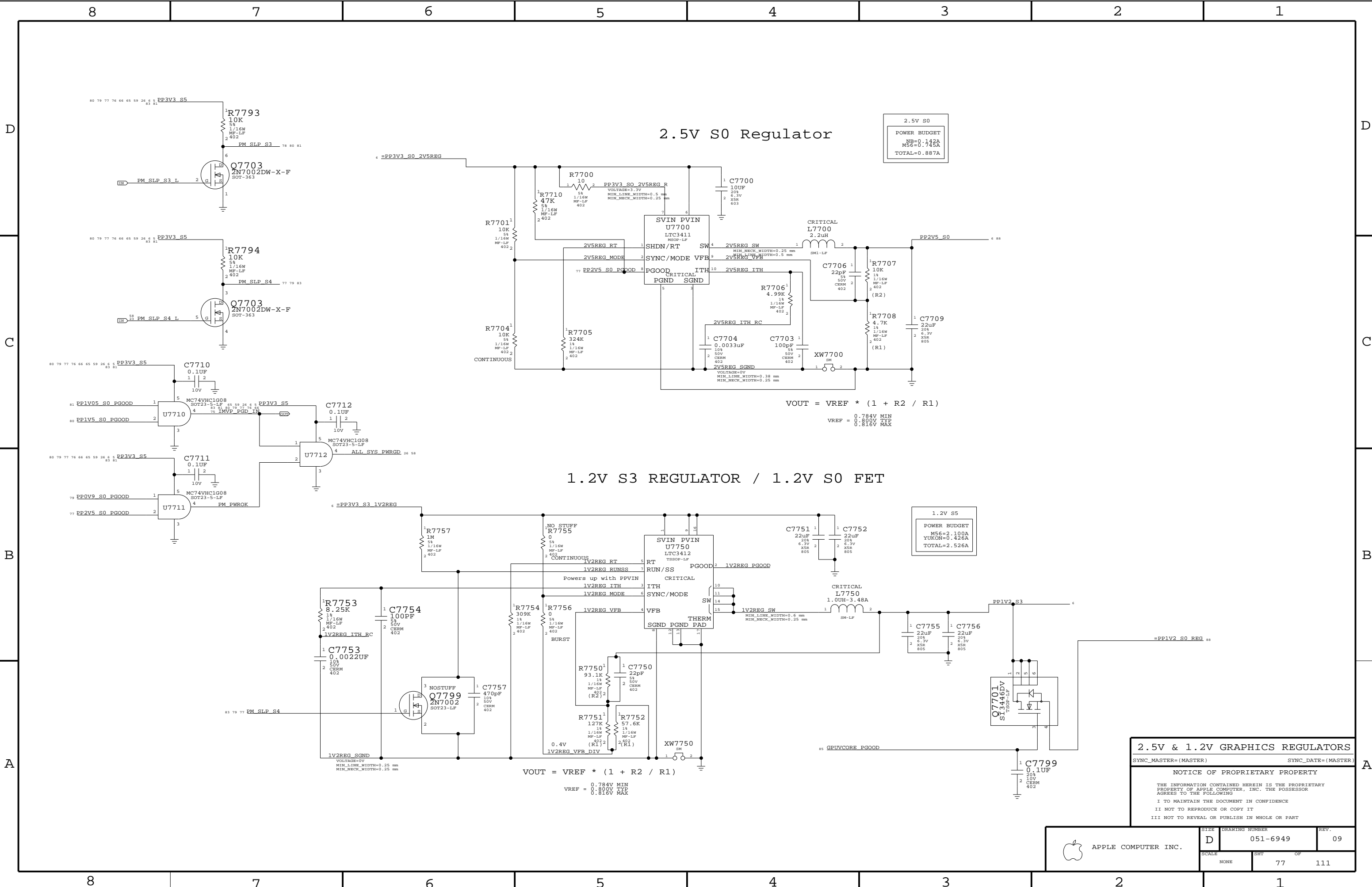


Current Sense Calibration Circuit
Switches in fixed load on power supplies to calibrate current sense circuits



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



2.5V & 1.2V GRAPHICS REGULATORS

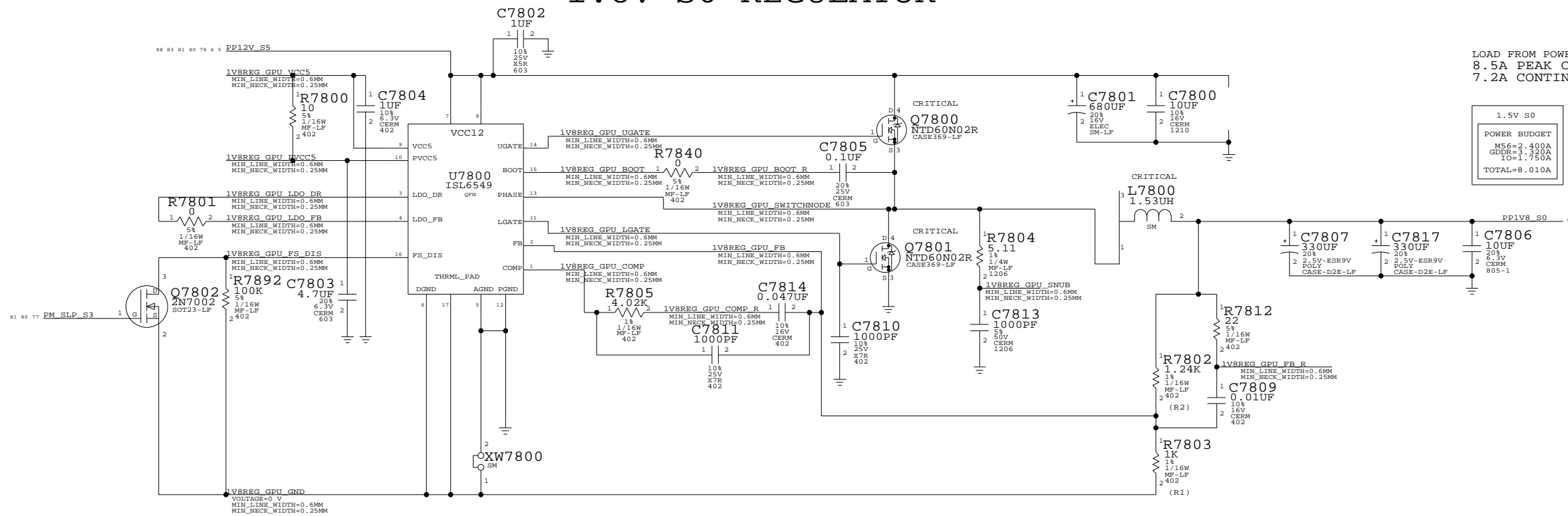
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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	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
TOTAL=8.010A

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

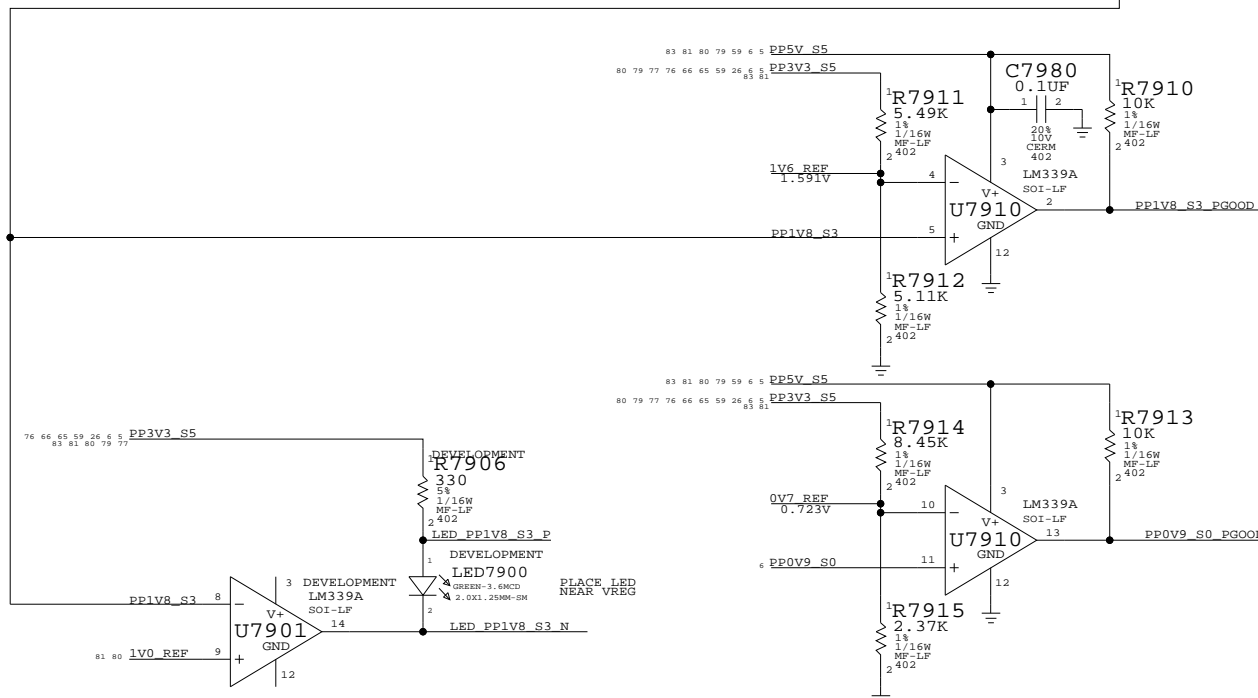
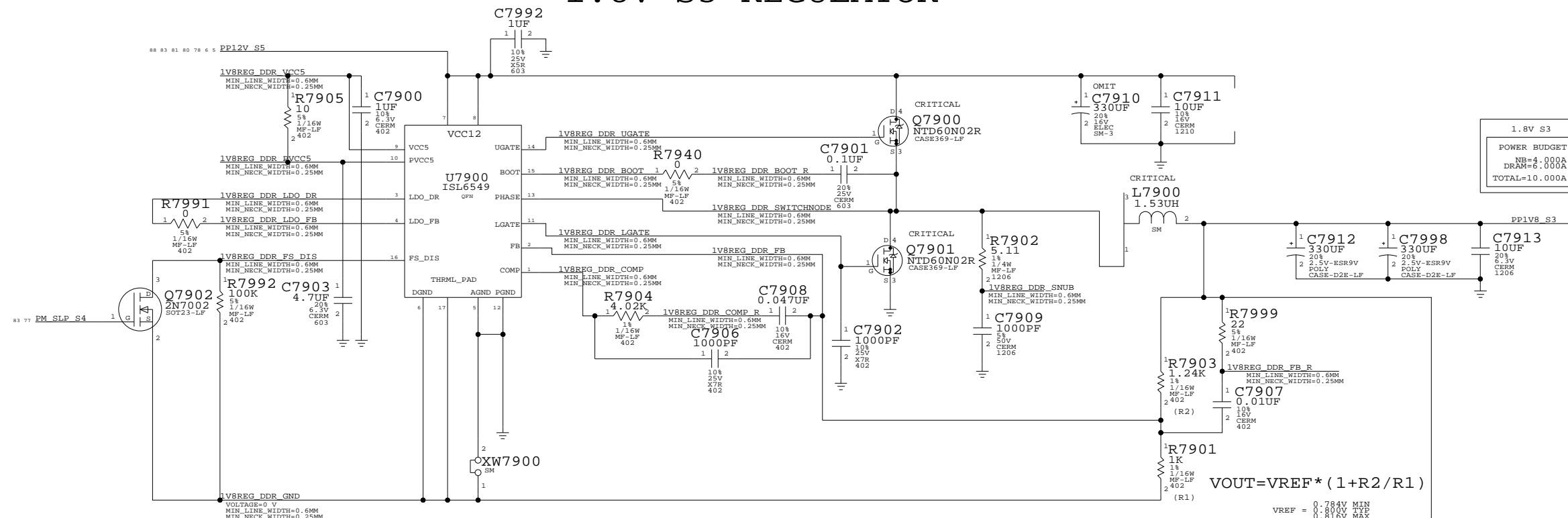
VREF = 0.784V MIN
VREF = 0.800V TYP
VREF = 0.816V MAX

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

1.8V S3 REGULATOR



1.8V Vreg

SYNC_MASTER=M23-PC SYNC_DATE=04/12/2005

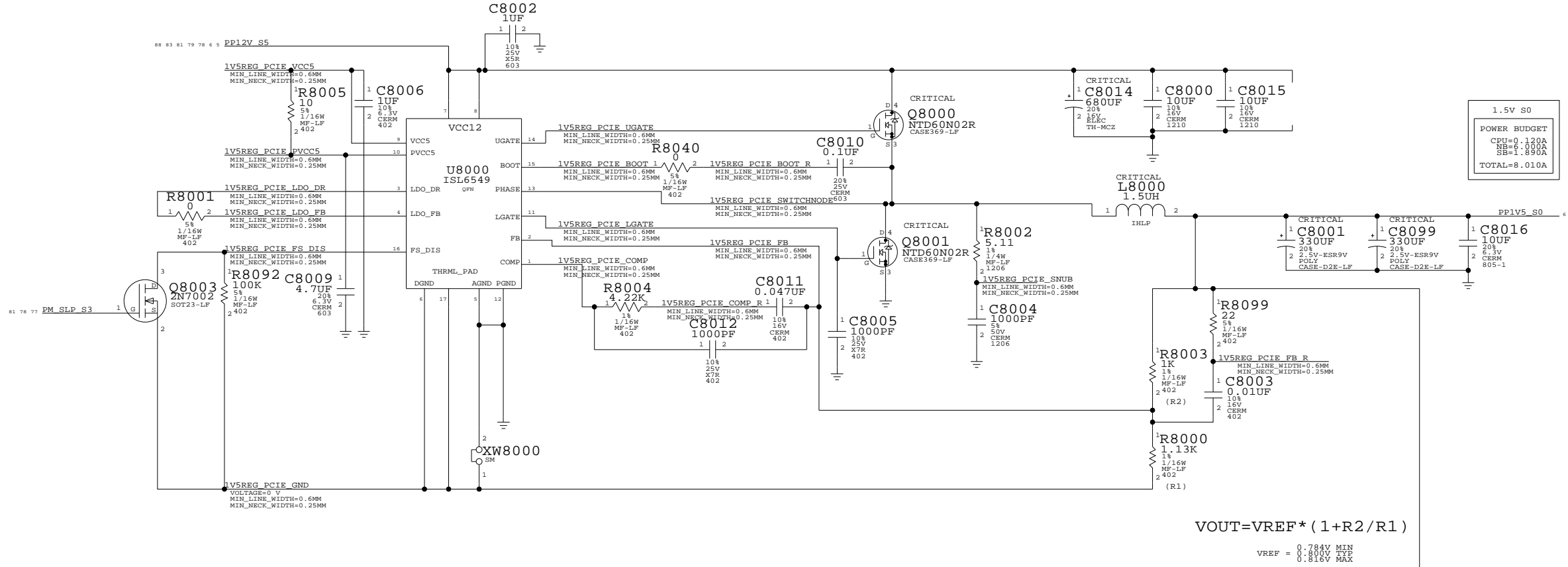
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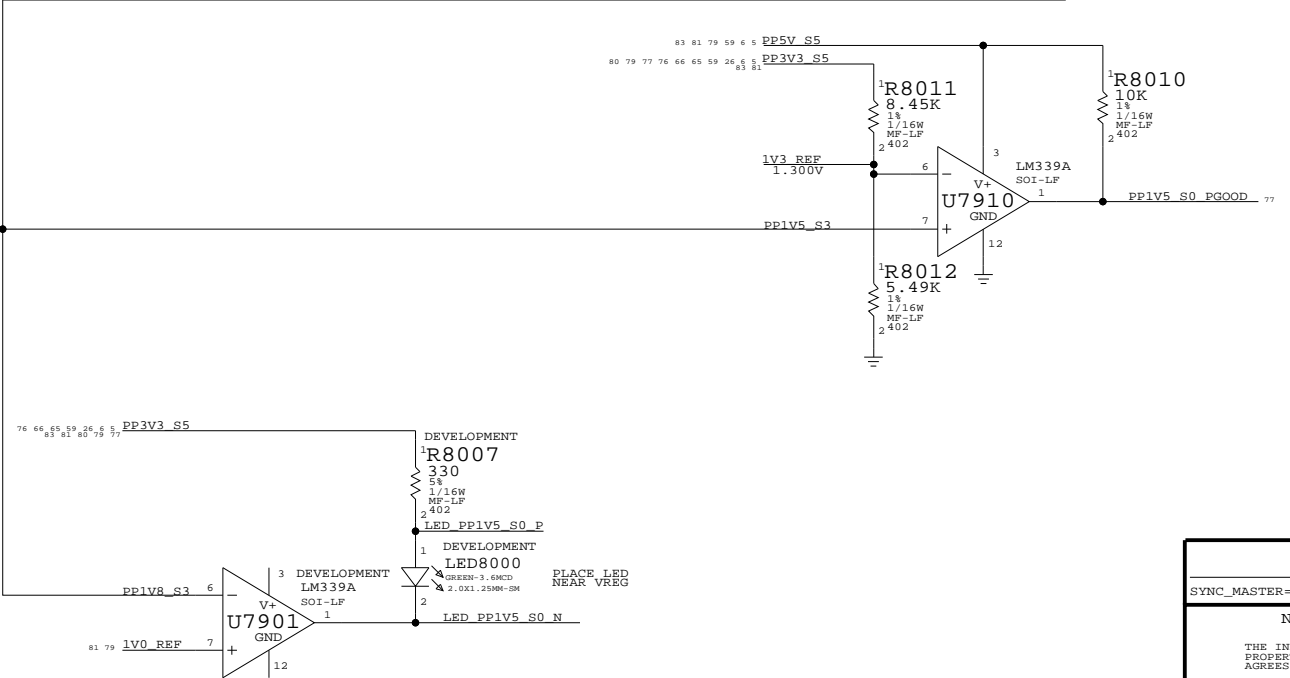
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	79 OF	111
NONE			

1.5V S0 REGULATOR



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

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



1.5V Vreg

SYNC_MASTER=FINO-PC SYNC_DATE=05/18/2005

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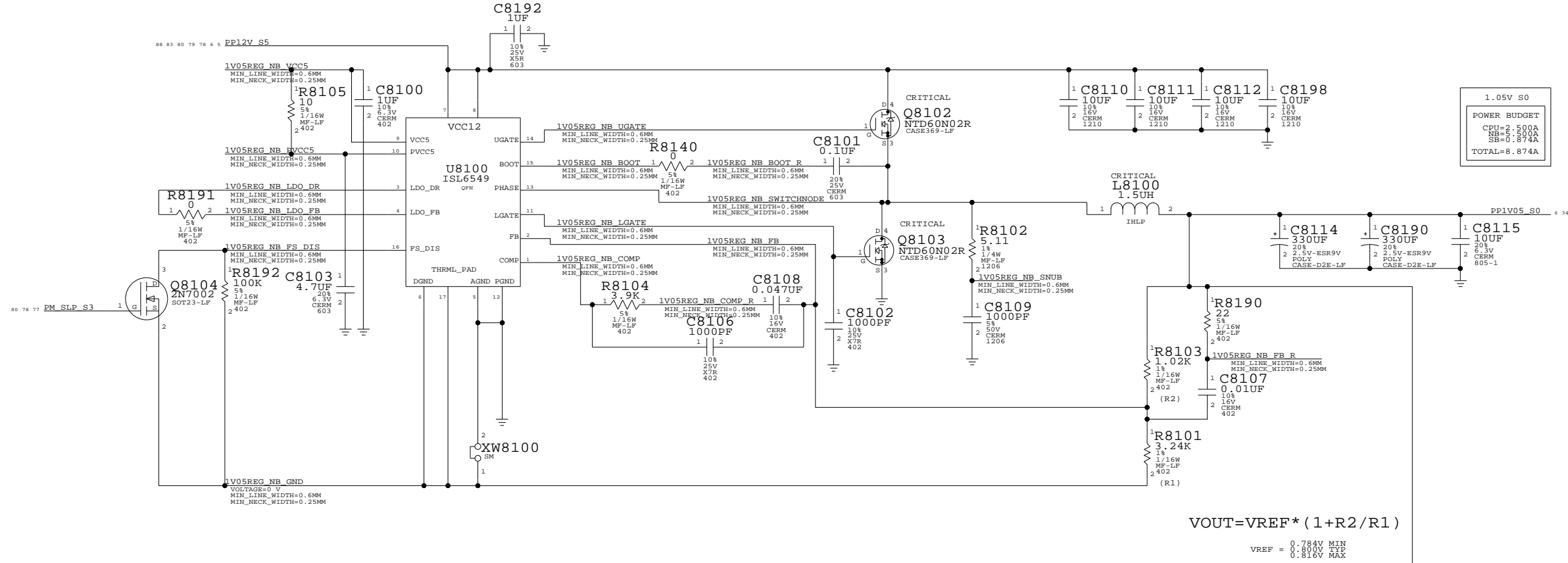
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III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

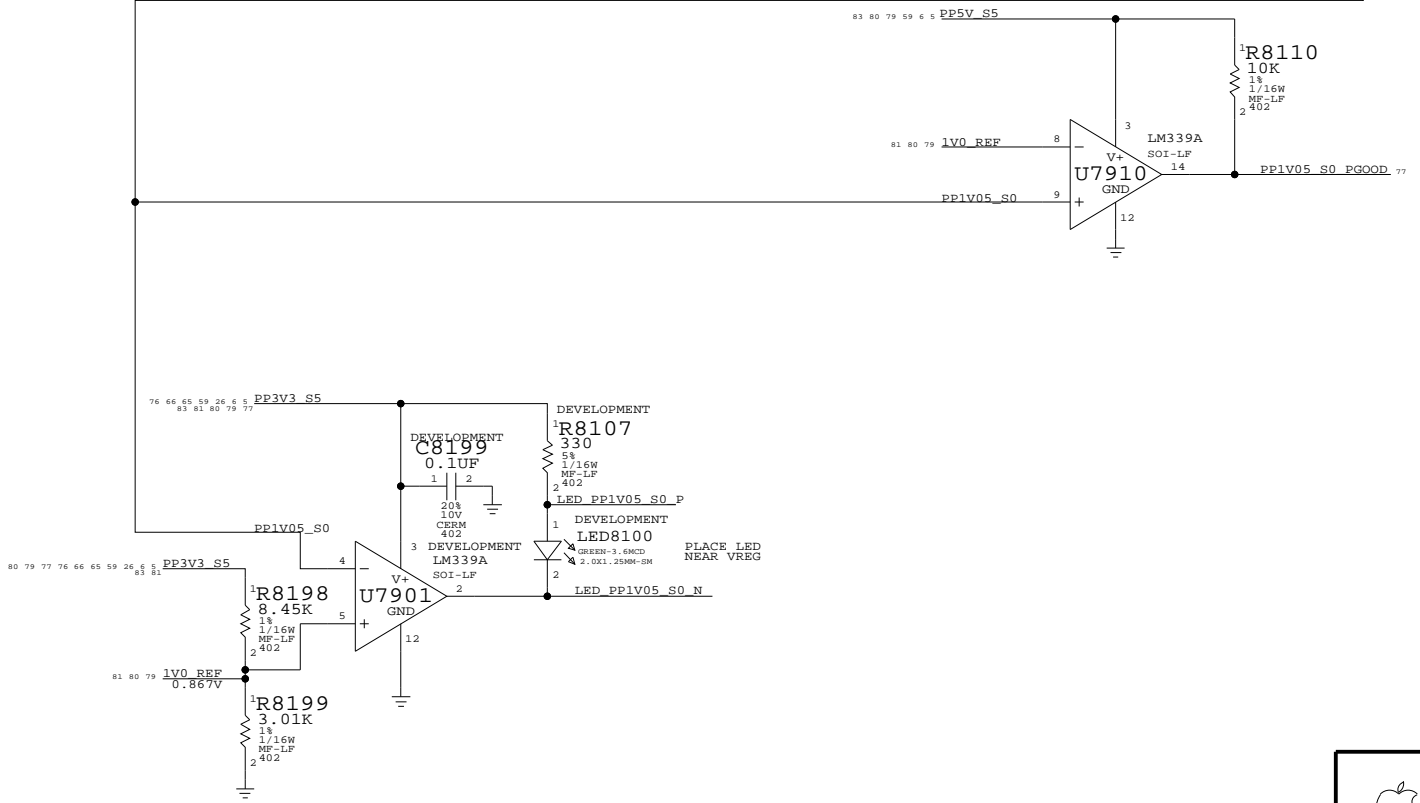
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6950	06
SCALE	SHT	80 OF	111
NONE			

1.05V S0 REGULATOR



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

VREF = 0.784V MIN
0.800V TYP
0.816V MAX



1.05V VREG

SYNC_MASTER=M38-RT SYNC_DATE=05/18/2005

NOTICE OF PROPRIETARY PROPERTY

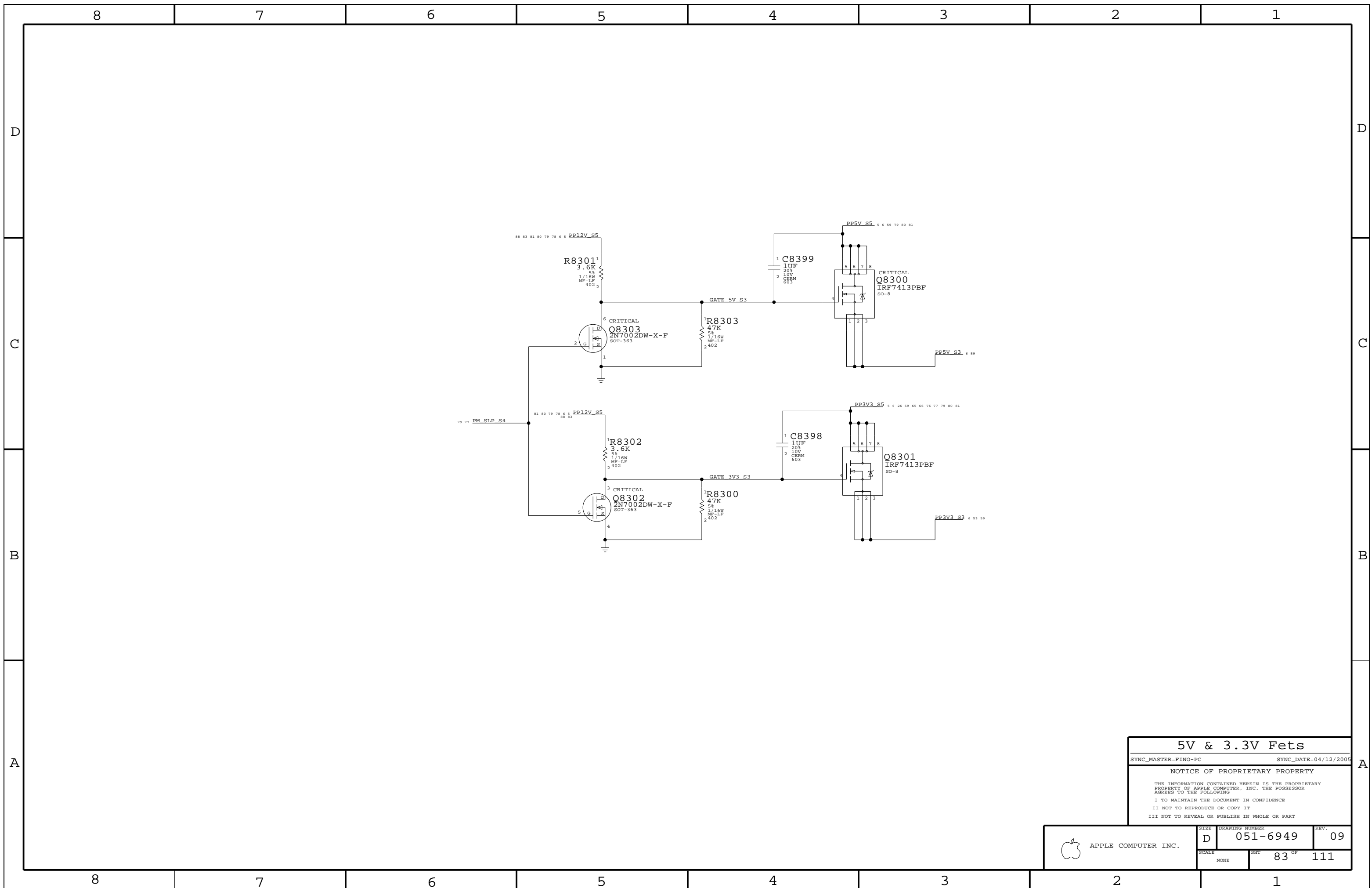
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	D	051-6949	09
SCALE	SHT	81 OF	111
NONE			



5V & 3.3V Fets

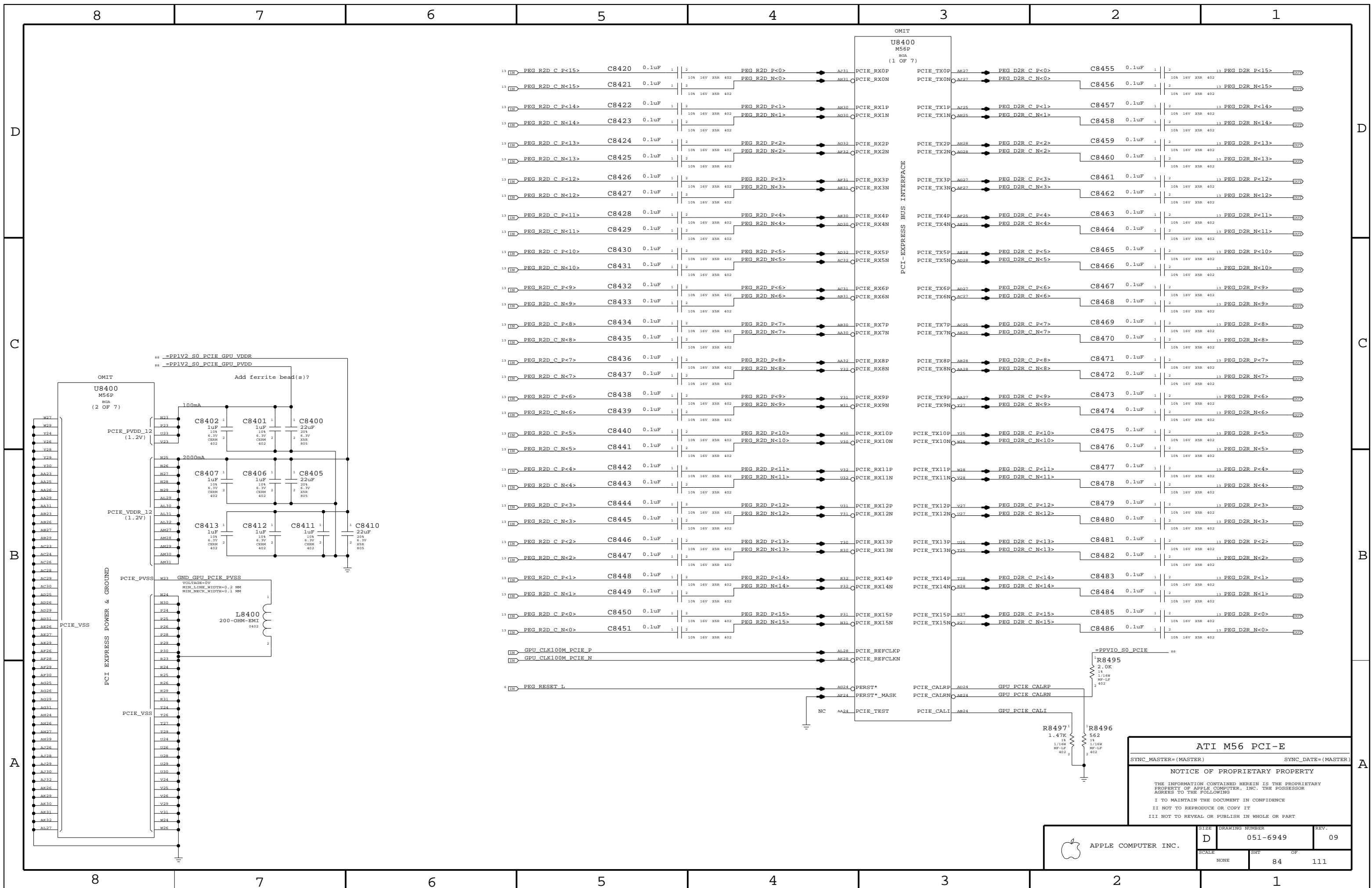
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	SCALE NONE	SHEET 83 OF	TOTAL SHEETS 111



ATI M56 PCI-E

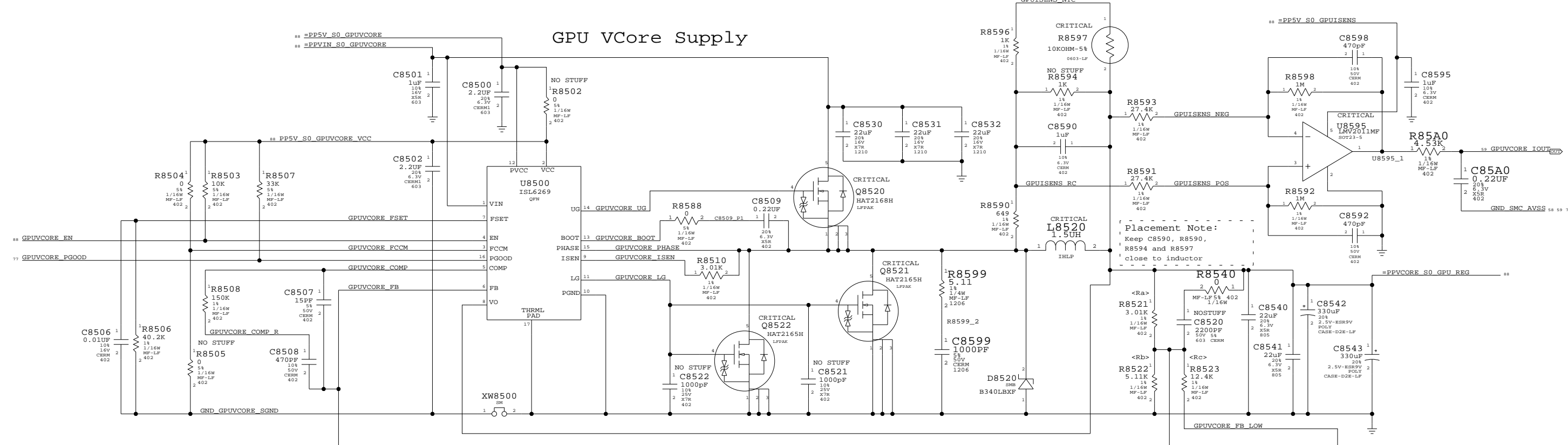
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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APPLE COMPUTER INC.	SCALE NONE	SHEET 84	DRAWING NUMBER 051-6949	REV. 09
	OF 111			

GPU VCore Current Sense



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

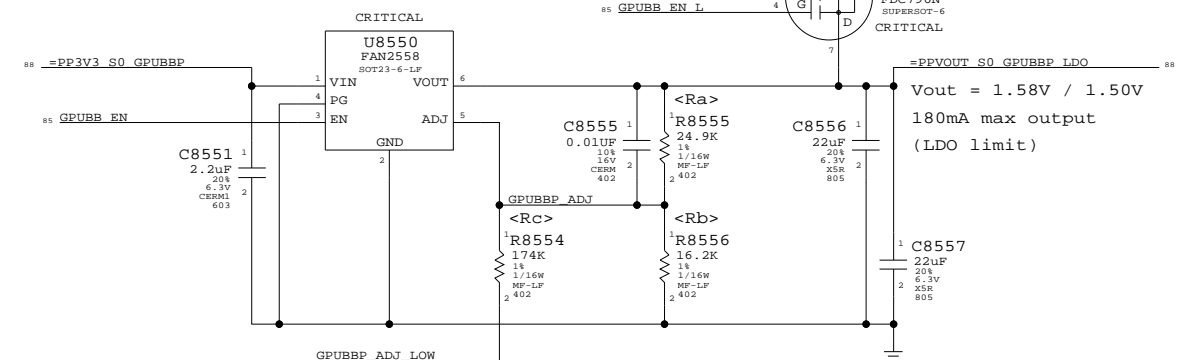
$$V_{out}(low) = 0.6V * (1 + R_a/R_b)$$

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

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

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.



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

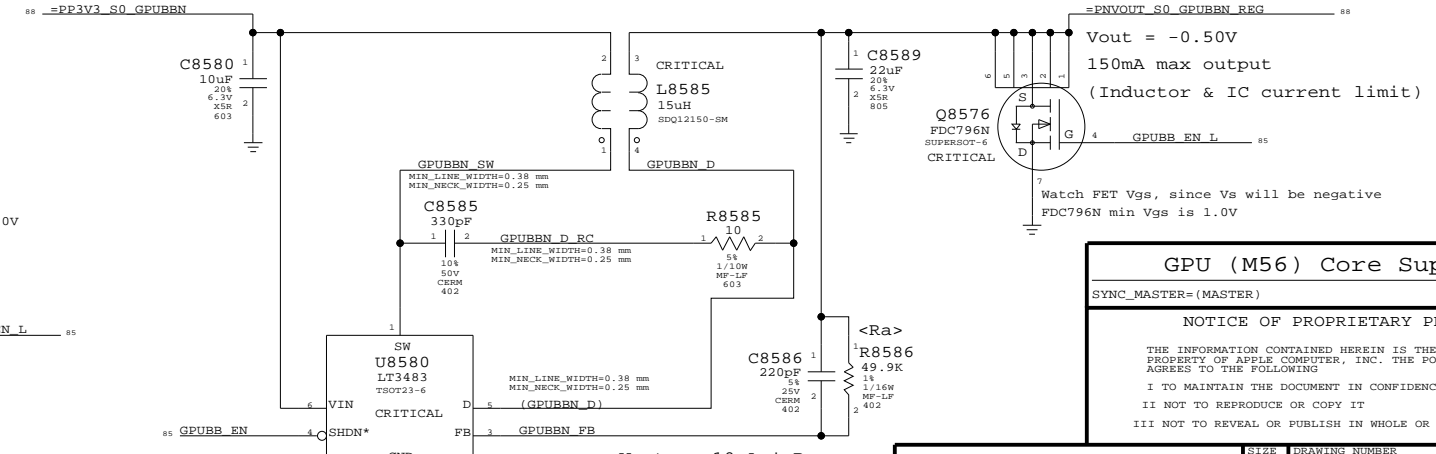
$$V_{out}(high) = 0.59V * (1 + R_a/R_{eq})$$

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

Pull-up voltage must be high enough to satisfy BBP FET Vgs (where Vs = 1.2V)

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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	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

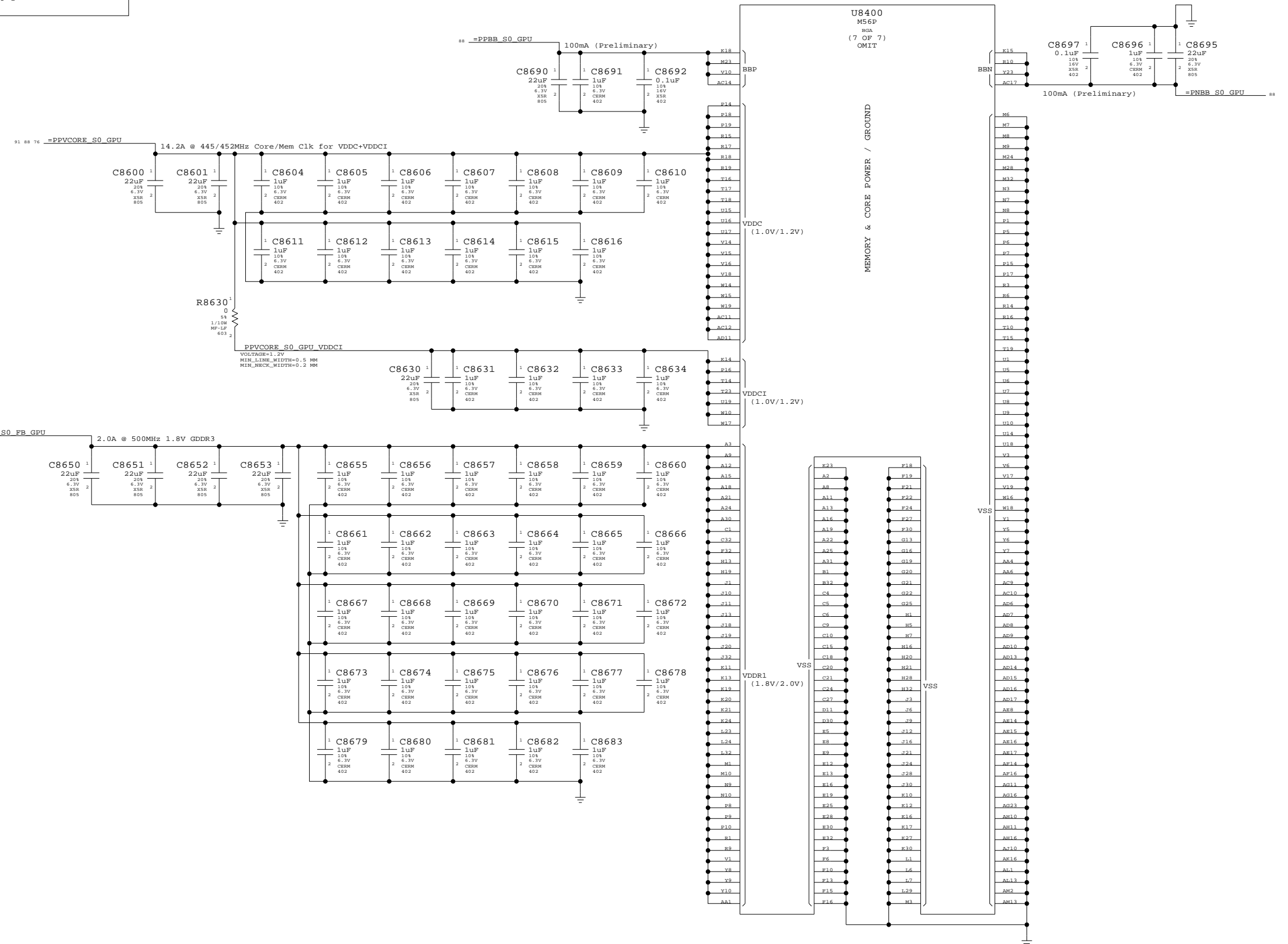
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B

A

A

8 7 6 5 4 3 2 1



ATI M56 Core Power

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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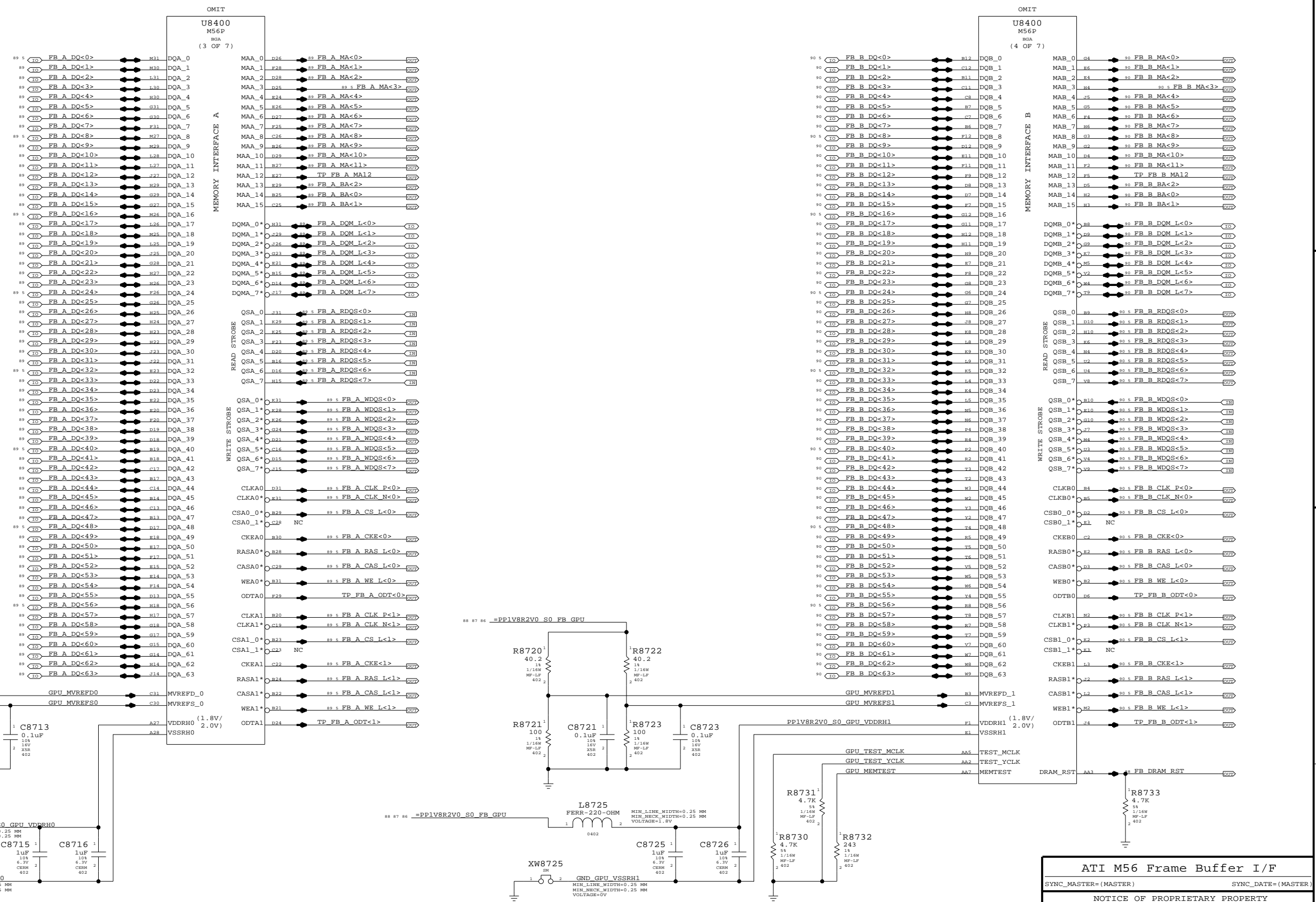
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	D	051-6949	09
SCALE	NONE	SHT	OF
		86	111

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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"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

PPNB_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 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
 MIN_LINE_WIDTH=0.6MM
 MIN_NECK_WIDTH=0.125MM
 VOLTAGE=1.2V

91 GPU_GPIO_8
 GPIO 8 = TRANSMITTER DE-EMPHASIS ENABLE
 INTERNAL PULL DOWN, ATI RECOMMENDS HIGH

NC_GPU_GPIO_10
 MAKE_BASE=TRUE
 MIN_LINE_WIDTH=0.6MM
 MIN_NECK_WIDTH=0.125MM
 VOLTAGE=1.2V

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=1.2V

GPU_GPIO_15
 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

TP_GPU_GPIO_17
MAKE_BASE=TRUE

TP_GPU_VGA_R
MAKE_BASE=TRUE

TP_GPU_VGA_G
MAKE_BASE=TRUE

TP_GPU_VGA_B
MAKE_BASE=TRUE

TP_GPU_VGA_HSYNC
MAKE_BASE=TRUE

TP_GPU_VGA_VSYNC
MAKE_BASE=TRUE

TP_GPU_TV_Y
MAKE_BASE=TRUE

TP_GPU_TV_COMP
MAKE_BASE=TRUE

TP_GPU_TV_C
MAKE_BASE=TRUE

TP_GPU_DDC_B_CLK
MAKE_BASE=TRUE

TP_GPU_DDC_B_DATA
MAKE_BASE=TRUE

GPU MISC

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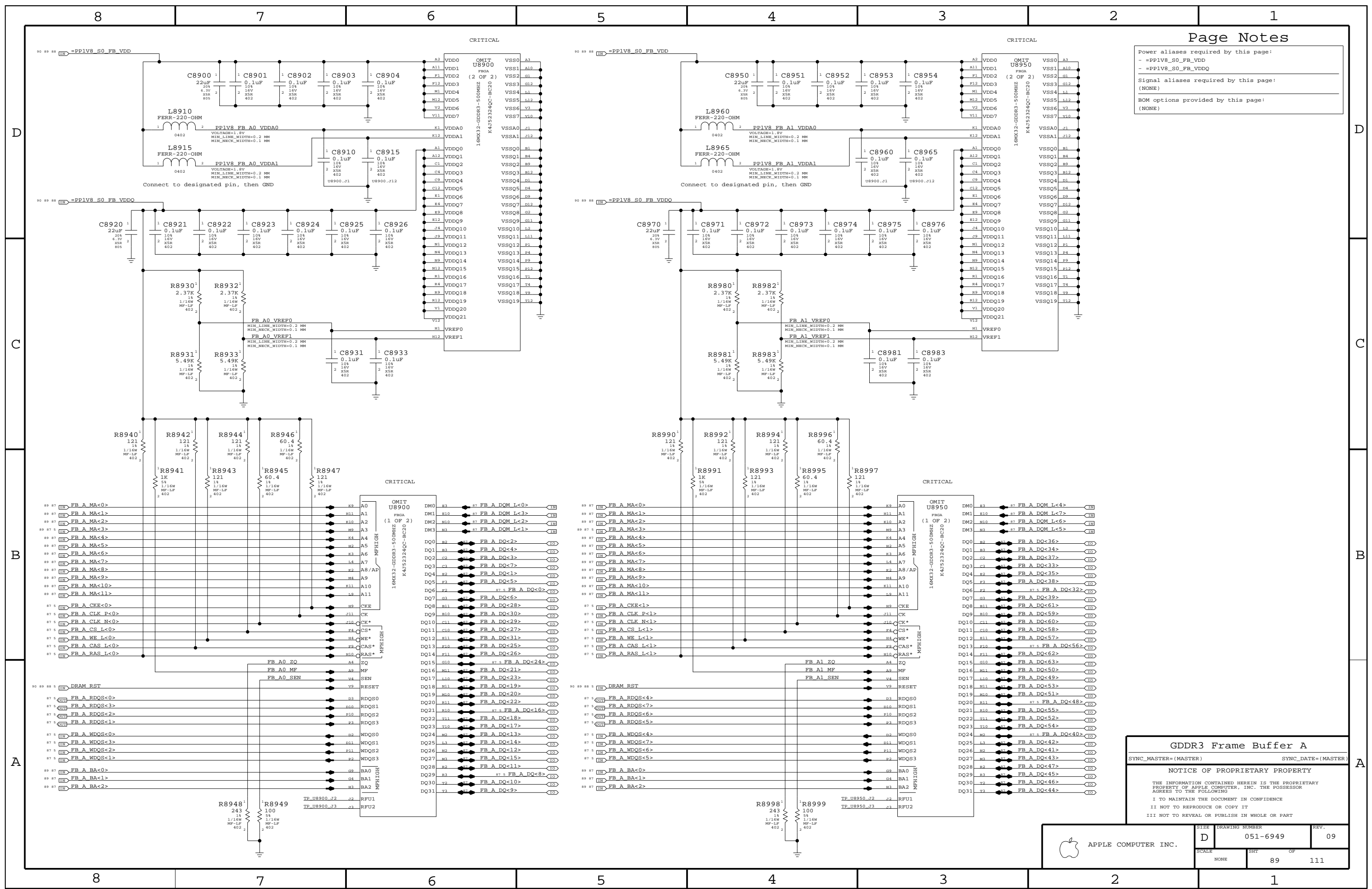
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1

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:
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GDDR3 Frame Buffer A

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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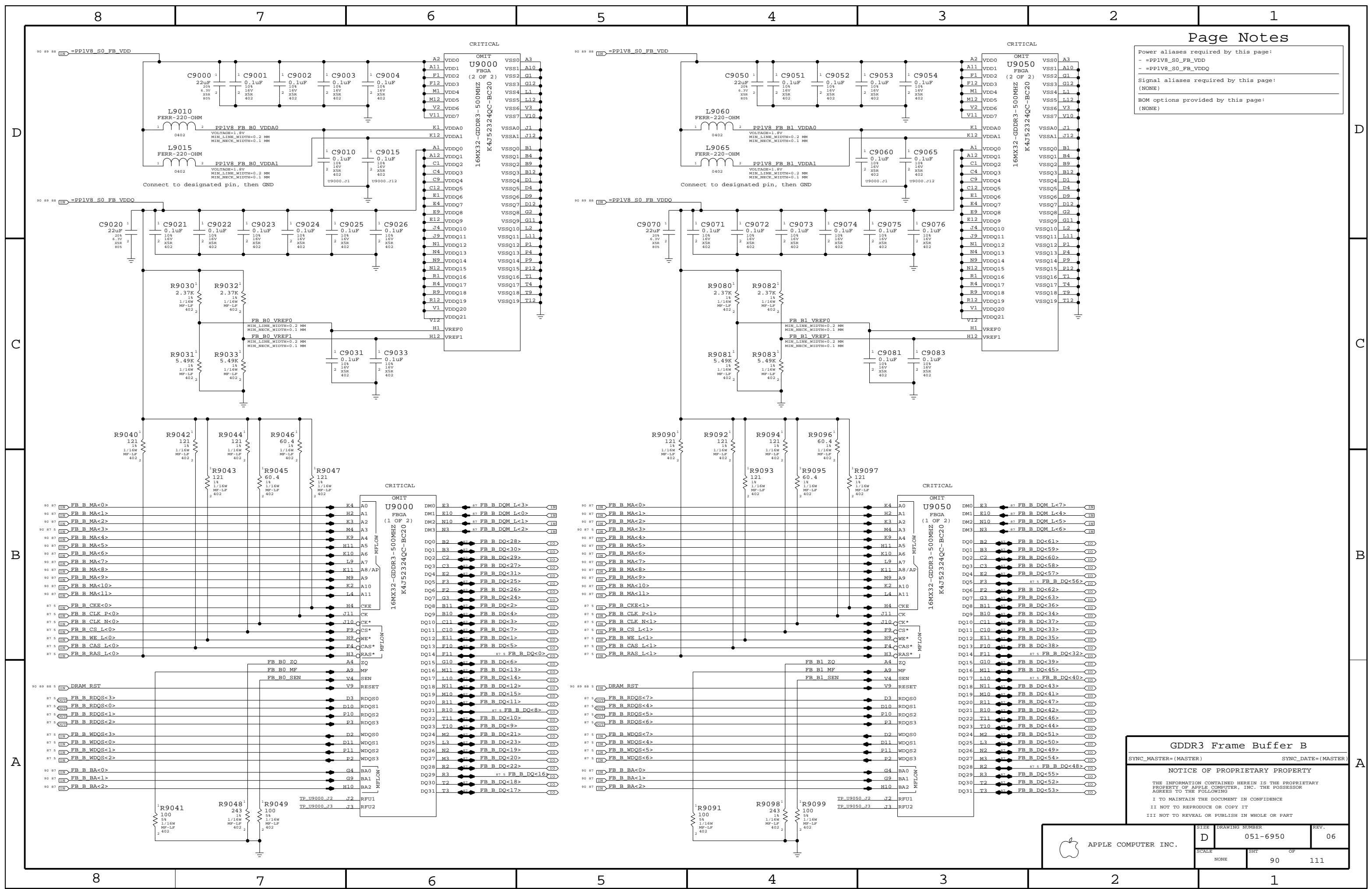
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Power aliases required by this page:
 - =PPIV8_S0_FB_VDD
 - =PPIV8_S0_FB_VDDQ

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)



GDDR3 Frame Buffer B
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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NONE	90	111	

Page Notes

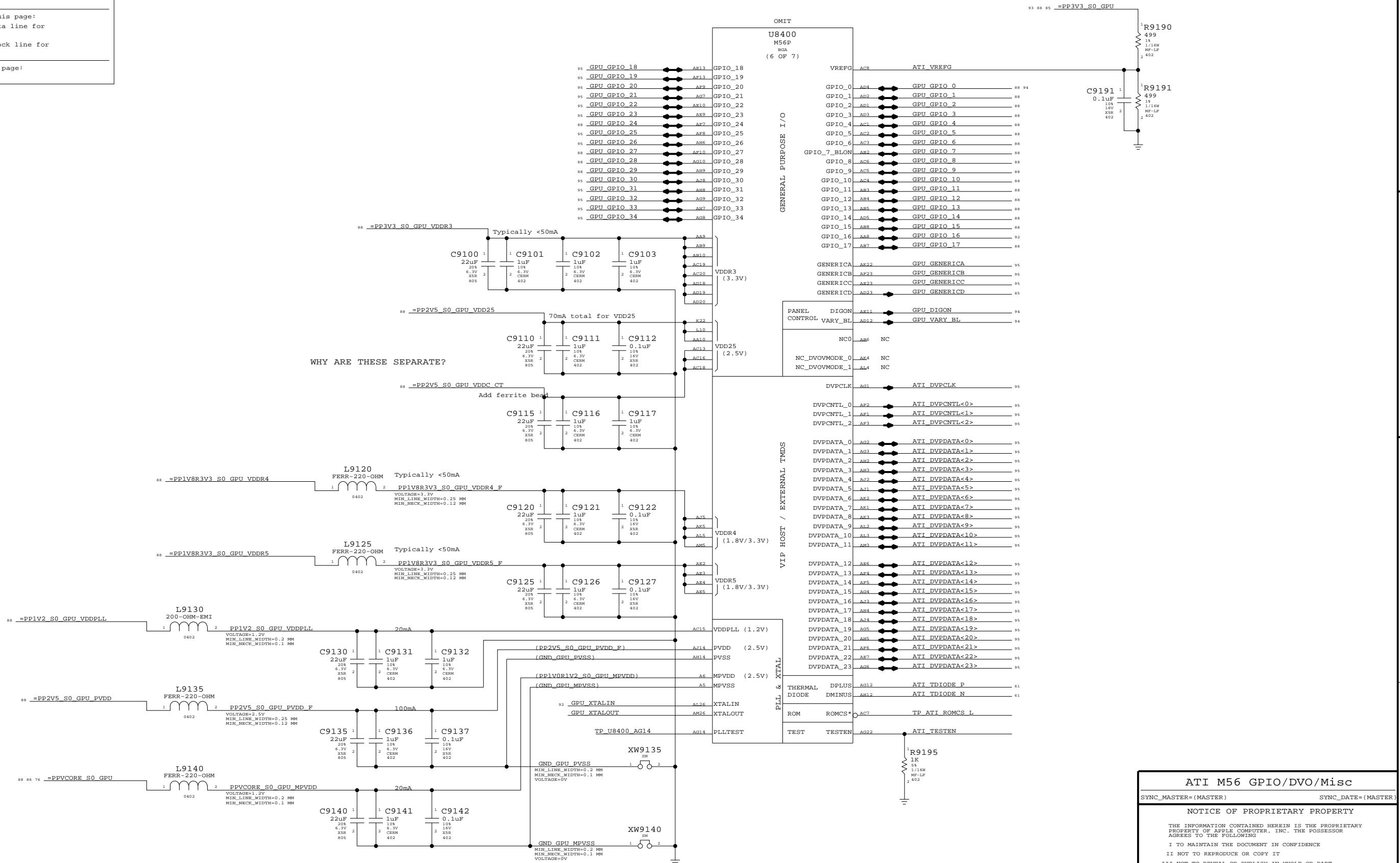
Power aliases required by this page:

- =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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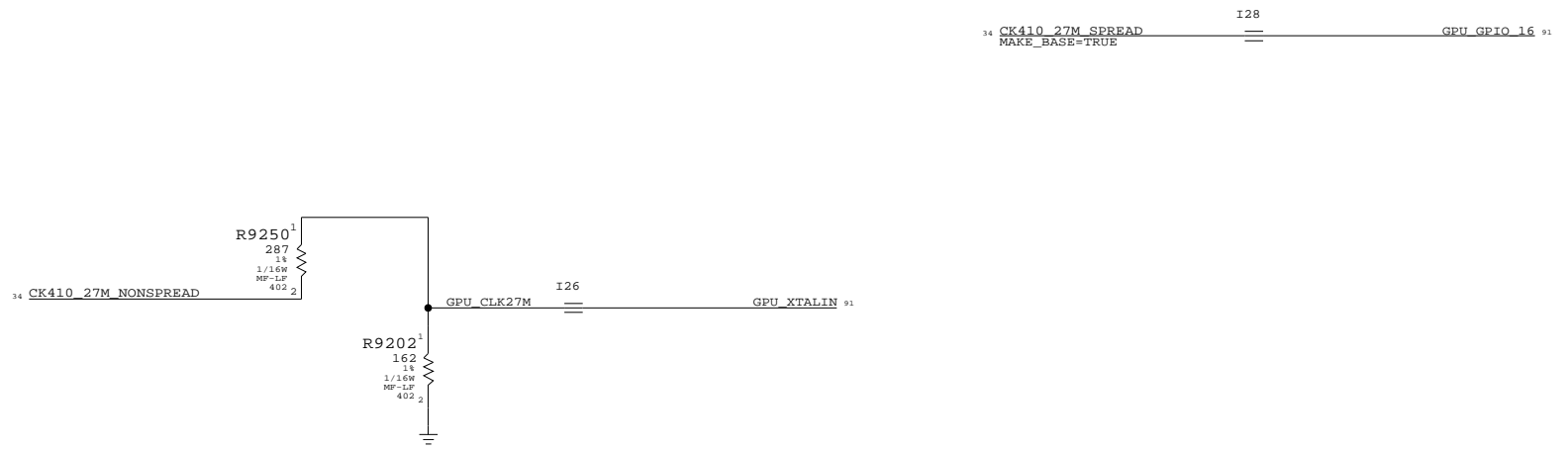
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6949	09
SCALE	SHT	OF	
NONE	91	111	

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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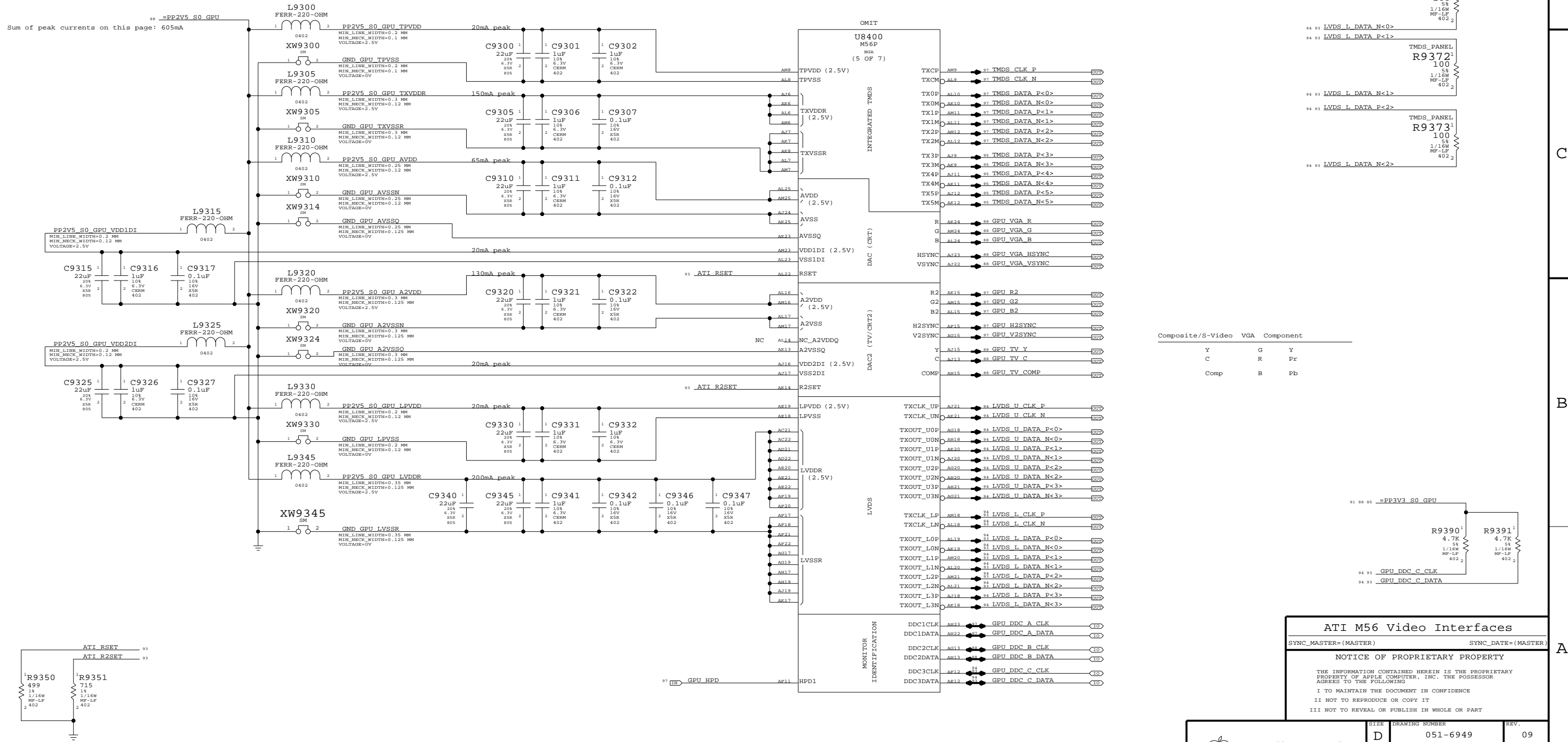
Page Notes

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)

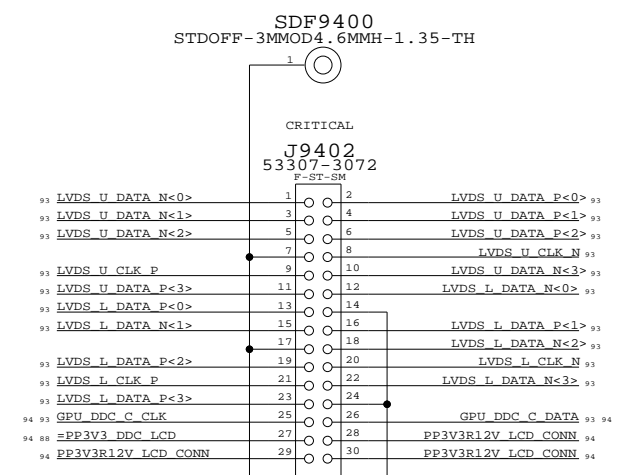
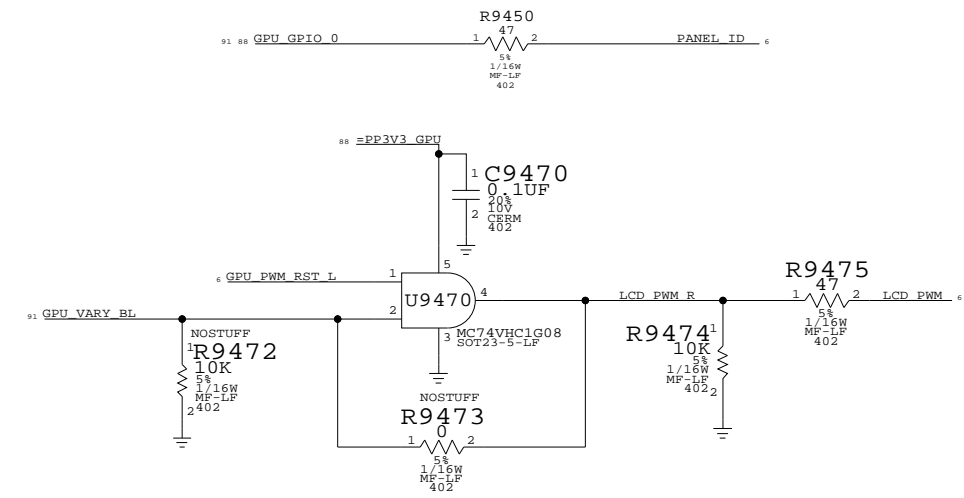
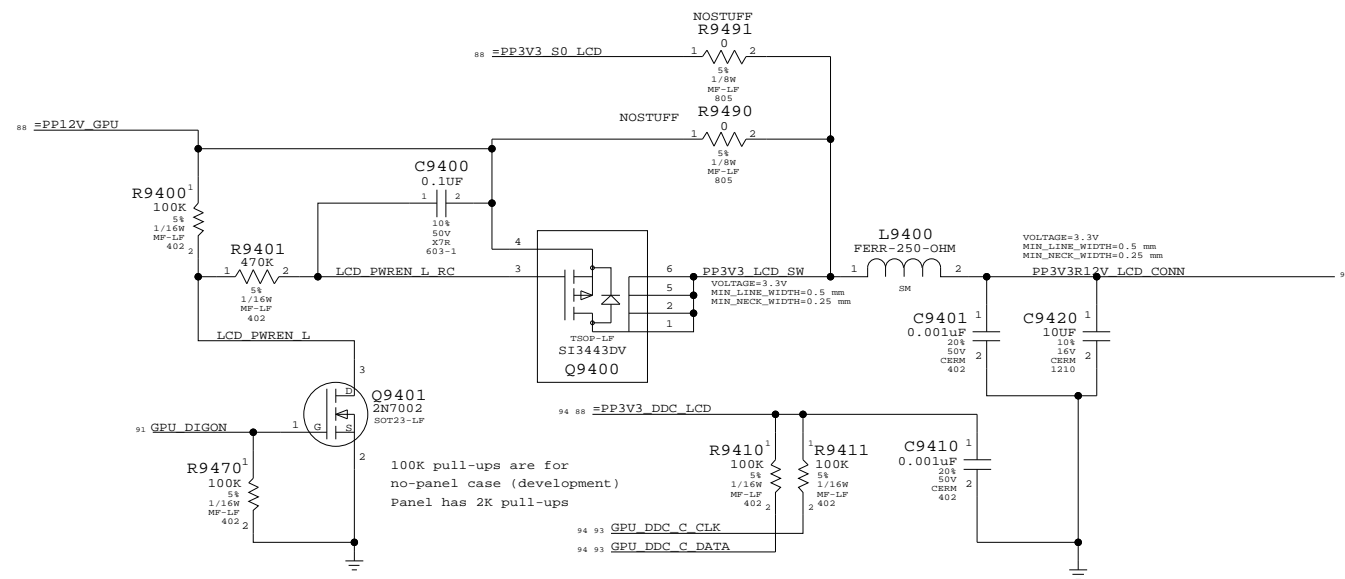
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	NONE	051-6949	09
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	93	111	

LCD (LVDS) INTERFACE

INVERTER INTERFACE



Internal Display Conns
 SYNC_MASTER=BOZEMAN SYNC_DATE=04/27/2005
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	D	051-6950	06
SCALE	SHT	OF	
NONE	94	111	

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C

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M56 TPS

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SIZE	DRAWING NUMBER	REV.
D	051-6949	09
SCALE	SHT 95 OF 111	
NONE		

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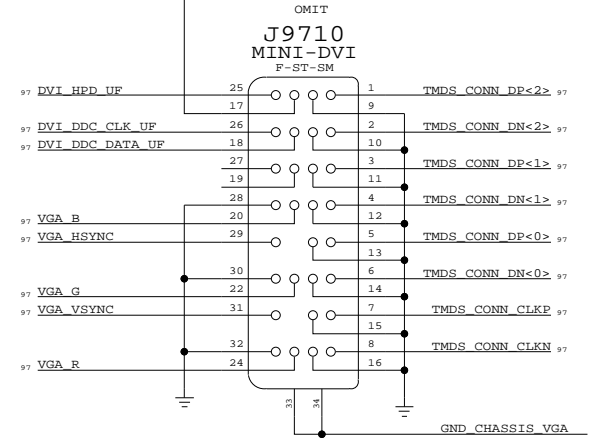
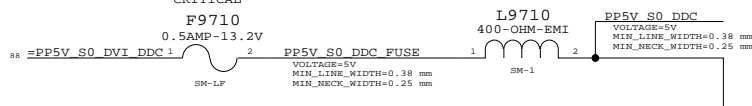
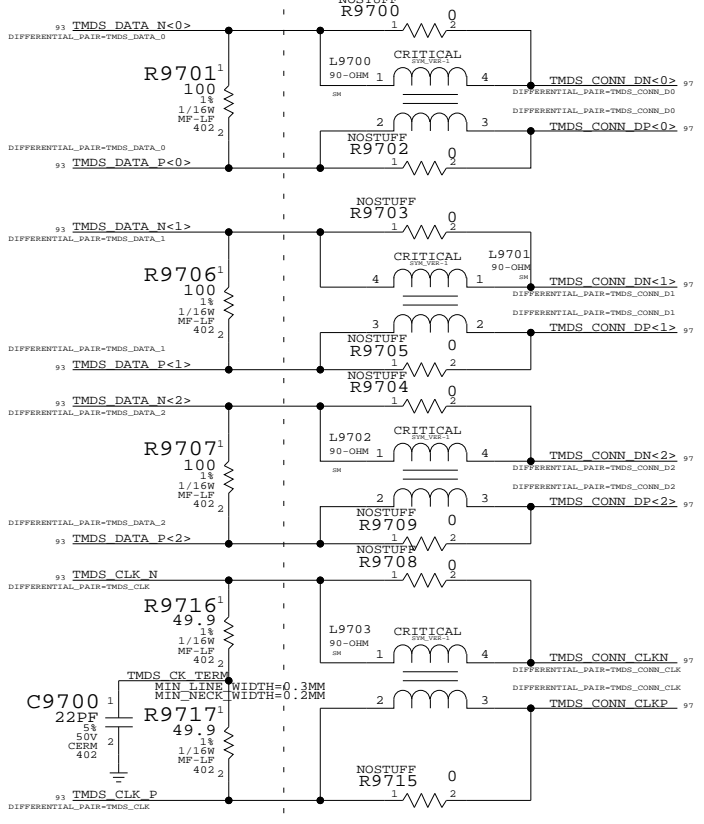
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PLACE LEFT SIDE AS CLOSE TO GPU (U8400) AS POSSIBLE

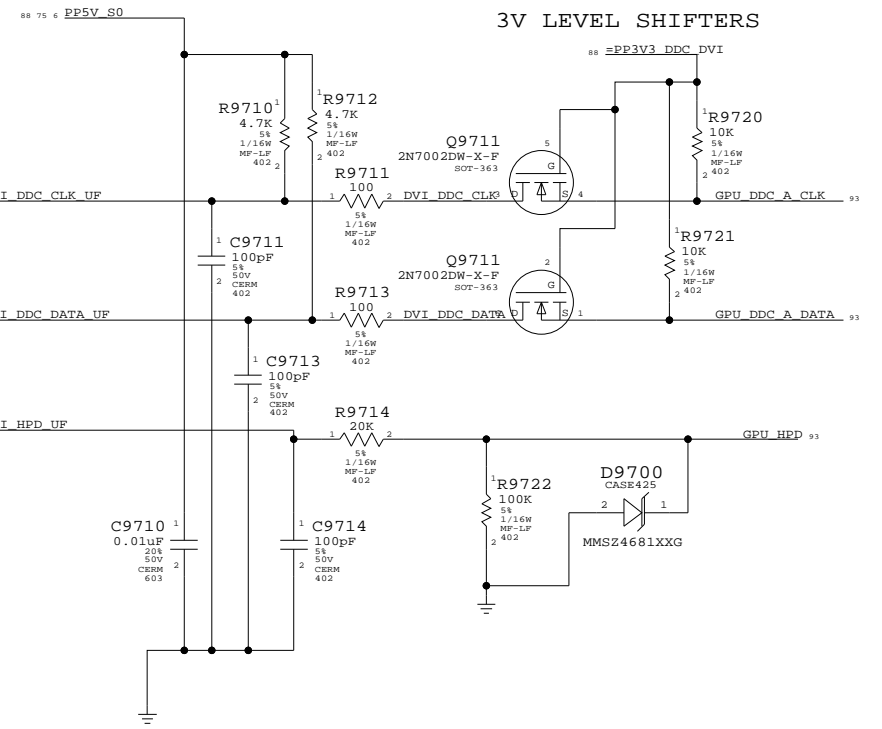
PLACE FILTER CLOSE TO TMD5 CONNECTOR

DVI DDC CURRENT LIMIT DVI INTERFACE

(55mA requirement per DVI spec)

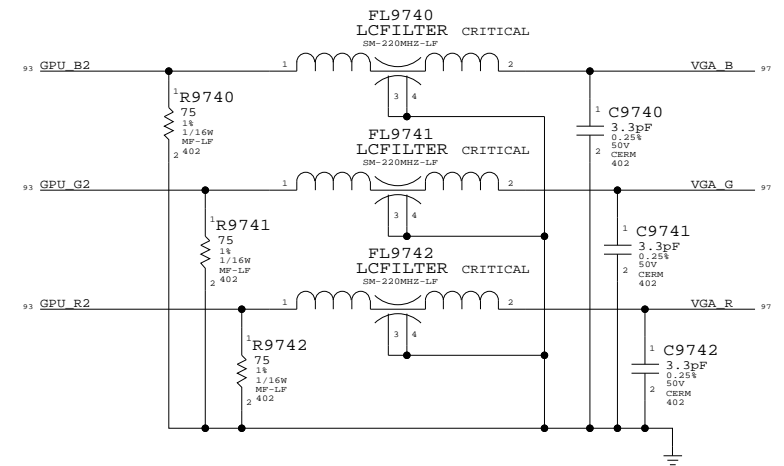


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
51480114	1	CONN, 32-P MINI-DVI RCPT MG3,LF	J9710	CRITICAL	17_INCH_LCD
51480116	1	CONN, 32-P MINI-DVI RCPT MG3,LF	J9710	CRITICAL	20_INCH_LCD

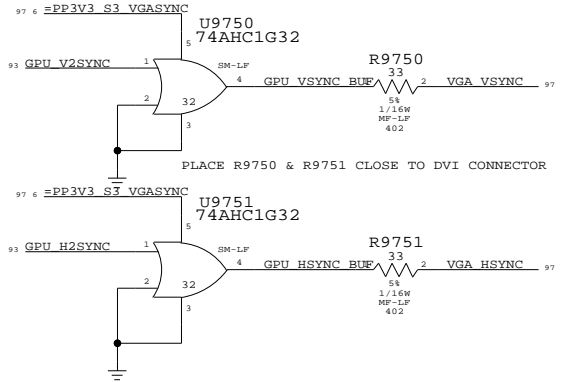


ANALOG FILTERING

PLACE CLOSE TO CONNECTOR



VGA SYNC BUFFERS



External Display Conns
 SYNC_MASTER=BOZEMAN SYNC_DATE=04/14/2005
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Table with 8 columns (labeled 1-8) and multiple rows of text containing identifiers and numerical values. The table is bordered and has letters A, B, C, and D on the sides. Column 1 is the leftmost, and column 8 is the rightmost. The content is organized into sections by column headers and row headers.

D

D

C

C

B

B

A

A

8				7				6				5				4				3				2				1			
Title: Cref Part Report Design: m39 Date: Nov 15 18:33:07 2005				C2515 CAP_402 m39[2586] C2516 CAP_P_CASE-C2 m39[25D3] C2517 CAP_402 m39[25D6] C2518 CAP_402 m39[25D4] C2519 CAP_402 m39[25D3] C2520 CAP_402 m39[25B6] C2521 CAP_402 m39[25C3] C2522 CAP_402 m39[25B3] C2523 CAP_402 m39[25B4] C2524 CAP_603 m39[25B3] C2525 CAP_402 m39[25B3] C2526 CAP_402 m39[25A4] C2527 CAP_402 m39[25A3] C2528 CAP_402 m39[25A3] C2529 CAP_402 m39[25A3] C2530 CAP_402 m39[25A3] C2531 CAP_402 m39[25D1] C2532 CAP_402 m39[25C1] C2533 CAP_402 m39[25C1] C2534 CAP_402 m39[25D1] C2605 CAP_402 m39[26C7] C2607 CAP_402 m39[26D5] C2608 CAP_402 m39[26D8] C2609 CAP_402 m39[26D8] C2610 CAP_402 m39[26C7] C2611 CAP_402 m39[26B7] C2698 CAP_402 m39[26C4] C2699 CAP_402 m39[26C5] C2800 CAP_402 m39[28D6] C2801 CAP_603 m39[28B2] C2802 CAP_603 m39[28B2] C2803 CAP_603 m39[28B1] C2804 CAP_603 m39[28B1] C2810 CAP_402 m39[28B2] C2811 CAP_402 m39[28B2] C2812 CAP_402 m39[28B1] C2813 CAP_402 m39[28B1] C2814 CAP_402 m39[28B2] C2815 CAP_402 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	Q8303	TRA_2N7002DW_SOT-363	m39[83C5]	R2308	RES_402	m39[23B7]	R3456	RES_402	m39[34B7]	R5821	RES_402	m39[58B3]
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	Q8522	TRA_HAT2165H_LFFPAK	m39[85C5]	R2311	RES_402	m39[23A7]	R3459	RES_402	m39[34A7]	R5824	RES_402	m39[58B3]
	Q8523	TRA_2N7002DW_SOT-363	m39[85B3 85B2]	R2313	RES_402	m39[23A7]	R3460	RES_402	m39[34A7]	R5825	RES_402	m39[58B3]
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	Q8575	TRA_FDC796N_SUPERSOT	m39[85B6]	R2317	RES_402	m39[23D7]	R3463	RES_402	m39[34A7]	R5828	RES_402	m39[58B3]
C	Q8576	TRA_FDC796N_SUPERSOT	m39[85A2]	R2318	RES_402	m39[23D2]	R3470	RES_402	m39[34A5]	R5829	RES_402	m39[58B3]
	Q9400	TRA_SI3443DV_TSOP-LF	m39[94C7]	R2319	RES_402	m39[23D2]	R3471	RES_402	m39[34A5]	R5830	RES_402	m39[58B3]
	Q9401	TRA_2N7002_SOT23-LF	m39[94C7]	R2320	RES_402	m39[23D7]	R3485	RES_402	m39[34D1]	R5831	RES_402	m39[58B3]
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	R85A0	RES_402	m39[85B1]	R2327	RES_402	m39[23D6]	R3488	RES_402	m39[34D1]	R5834	RES_402	m39[58B3]
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	R616	RES_402	m39[6A7]	R2500	RES_603	m39[25A8]	R3498	RES_402	m39[34D5]	R5844	RES_402	m39[58B3]
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	R619	RES_402	m39[6B7]	R2623	RES_402	m39[26D2]	R3899	RES_402	m39[38B5]	R5854	RES_402	m39[58B3]
	R619	RES_402	m39[6B7]	R2624	RES_402	m39[26D2]	R4101	RES_402	m39[41D7]	R5855	RES_402	m39[58B3]
	R619	RES_402	m39[6B7]	R2625	RES_402	m39[26D2]	R4102	RES_402	m39[41C7]	R5856	RES_402	m39[58B3]
	R619	RES_402	m39[6B7]	R2626	RES_402	m39[26D2]	R4103	RES_402	m39[41C2]	R5857	RES_402	m39[58B3]
	R619	RES_402	m39[6B7]	R2627	RES_402	m39[26D2]	R4104	RES_402	m39[41C2]	R5858	RES_402	m39[58B3]

