

M38A - PVT

09/27/06

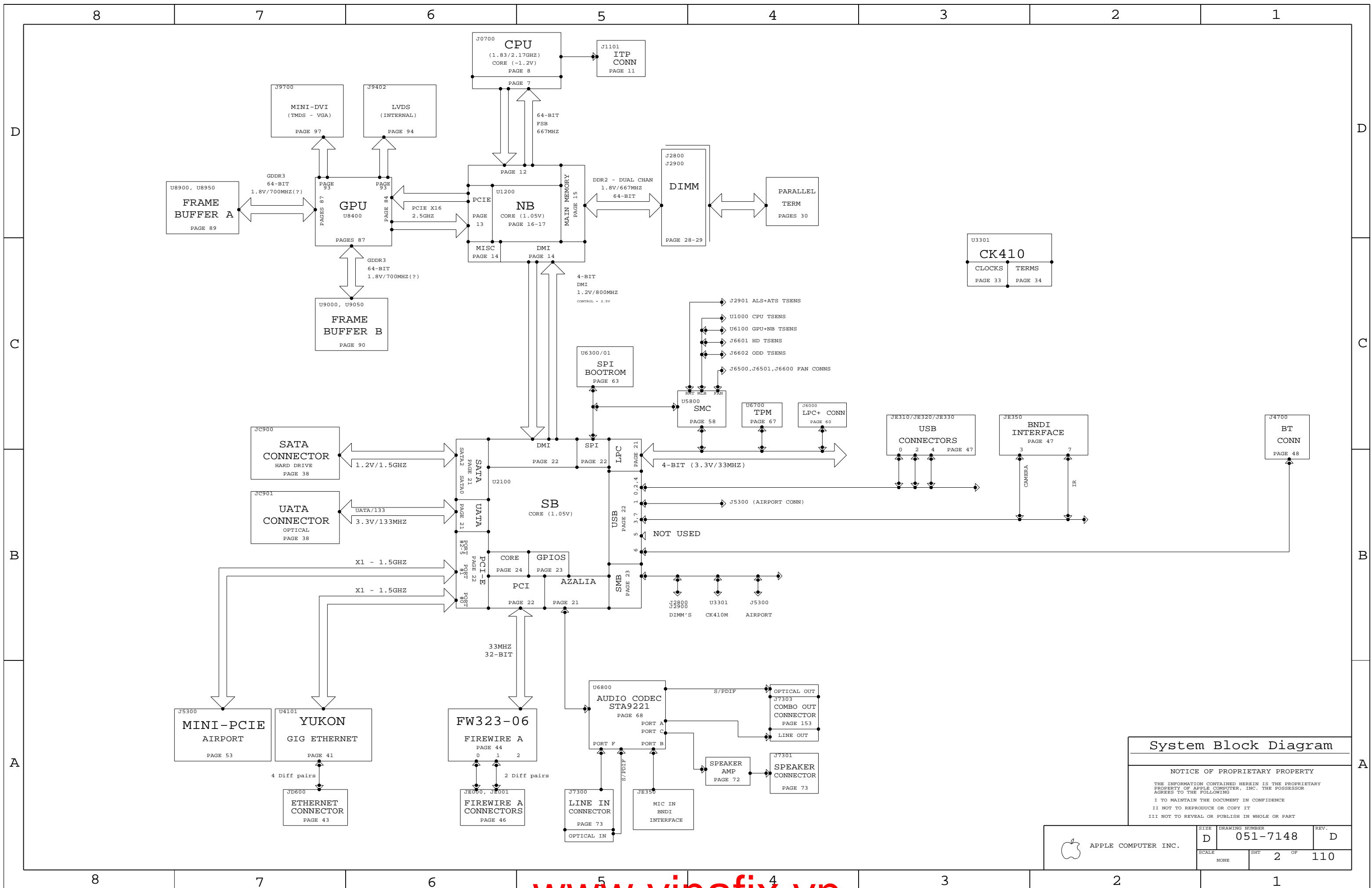
1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%.
2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD	ENG APPD
				DATE	DATE
D		464236	PRODUCTION RELEASED	09/27/06	06/22/04

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
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(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

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

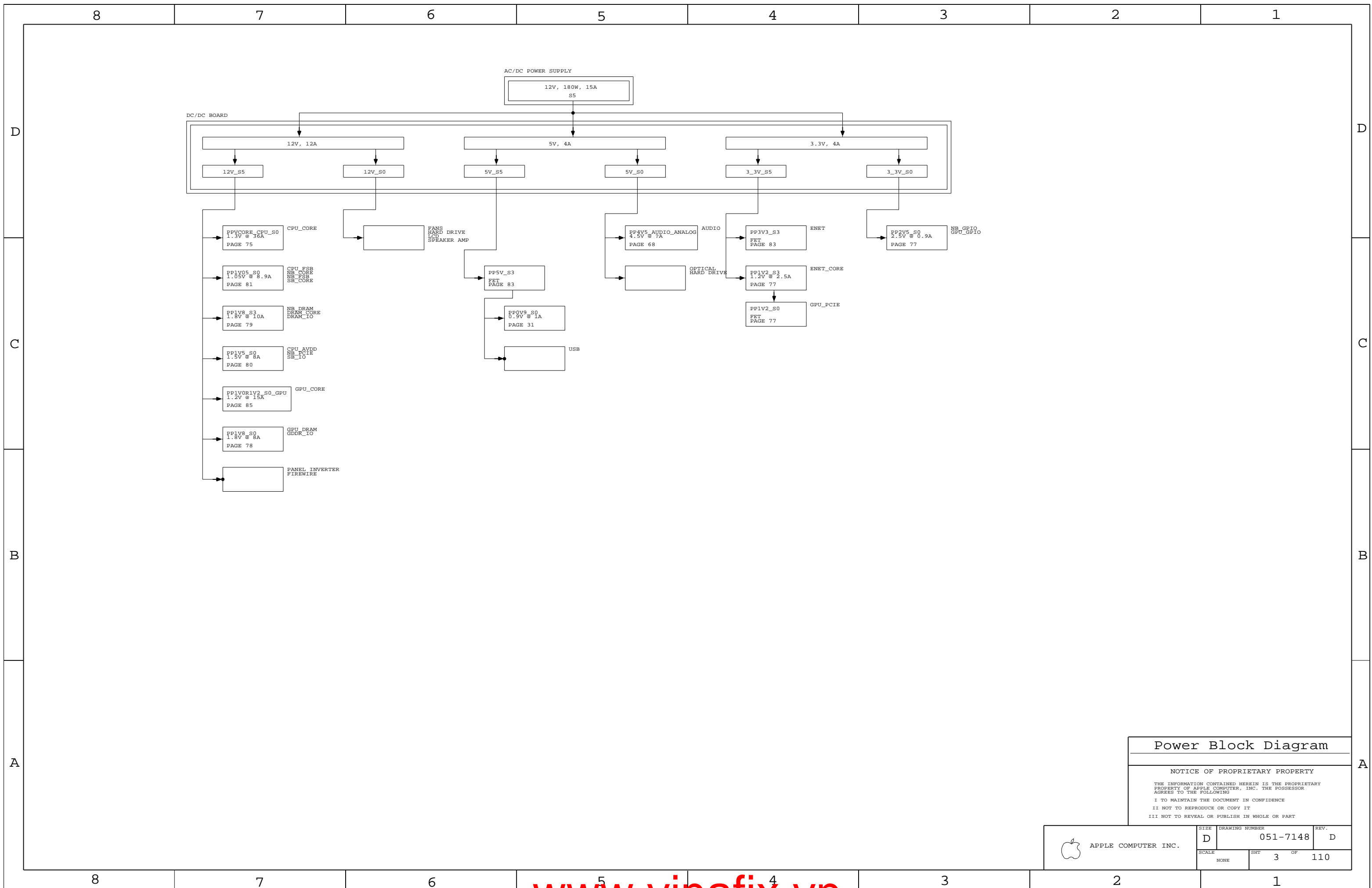
<p style="font-size: small;">DIMENSIONS ARE IN MILLIMETERS</p> <p>XX : _____</p> <p>X.XX : _____</p> <p>X.XXX : _____</p> <p>ANGLES : _____</p> <p style="text-align: center;">DO NOT SCALE DRAWING</p> <div style="text-align: center;"> <p style="font-size: x-small;">THIRD ANGLE PROJECTION</p> </div>	<p>METRIC</p>	<p>Apple Computer Inc.</p>
<p>DRAPTER <input type="checkbox"/> DESIGN CK <input type="checkbox"/></p> <p>ENG APPD <input type="checkbox"/> MFG APPD <input type="checkbox"/></p> <p>QA APPD <input type="checkbox"/> DESIGNER <input type="checkbox"/></p> <p>RELEASE <input type="checkbox"/> SCALE NONE <input type="checkbox"/></p> <p style="font-size: x-small;">MATERIAL/FINISH NOTED AS APPLICABLE</p>		<p>NOTICE OF PROPRIETARY PROPERTY</p> <p>THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING</p> <p>I TO MAINTAIN THE DOCUMENT IN CONFIDENCE</p> <p>II NOT TO REPRODUCE OR COPY IT</p> <p>III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART</p>
		<p>TITLE</p> <p>SCH, MLB, M38A</p>
		<p>DRAWING NUMBER 051-7148 REV. D</p> <p style="font-size: x-small;">SHT 1 OF 110</p>



System Block Diagram

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	D	051-7148	D
SCALE	SHEET		OF
NONE	2		110



Power Block Diagram

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	D	051-7148	D
SCALE	SHT	OF	110
NONE	3		

8

7

6

5

4

3

2

1

COMMON

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
511S0025	1	IC,CPU-SKT,479BGA	J0700	CRITICAL	
338S0328	1	IC,945PM,NORTHBRIDGE	U1200	CRITICAL	
343S0385	1	IC,SB,652BGA	U2100	CRITICAL	
338S0344	1	IC,ATI,M56P,GRAFIXCTLR,880BGA,LF	U8400	CRITICAL	
359S0101	1	IC,CY28445-5,CLK GEN,68PIN QFN	U3301	CRITICAL	
338S0270	1	IC,88E8053,GIGABIT ENET XCVR,64P QFN,SMD	U4101	CRITICAL	
(335S0382) 341S1797	1	IC,ENET LAN ROM	U4102	CRITICAL	
338S0279	1	IC,FW32306,1394A LINK,TQFP	U4400	CRITICAL	

341S1789	1	IC,TPM,TSSOP,28P	U6700	CRITICAL	LEMENU
UNSCREENED P/N 353S1235 353S1465	1	IC,CPU VREG,IMVP,TWO PHASE	U7500	CRITICAL	

128S0078	3	CAP,EL,AL,330UF,20V,16V,10X12.7MM,SMD,LF	C7517,C7518,C7910	CRITICAL	
825-6447	1	MLB LABEL,48_0X4.8	X14	CRITICAL	
155S0289	7	EMI CHOKE	FLR011,FLR021,FL4610,FL4620,L4712,L4722,L4732	CRITICAL	

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
124-0338	124-0333		C7501,C8014	CAP,AL,EL,680UF,16V,RAD,10X12.5MM
138S0580	138S0552			22UF 0805
353S1321	353S1105		U7910	LM339
378S0141	378S0140		LED01,LED02,LED03	SMD

353S1461	353S1465		U7500	CPU REGULATOR - ISL9504
138S0598	138S0512			SAMSUNG

155S0232	155S0289		FLR011,FLR021,FL4610,FL4620,L4712,L4722,L4732	EMI CHOKE
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
051-7148	1	PCB,SCHM,MLB,M38A	SCH1		17_INCH_LCD
820-2052	1	PCB,FAB,MLB,M38A	MLB1		17_INCH_LCD
(341S1908 - DEVEL) (341S1909 - FINAL) (335S0384 - BLNK) 341T0040	1	EFI ROM,M38A	U6301	CRITICAL	17_INCH_LCD
114S0264	1	3.01K,1%,1/16W,402,MF-LF	R8522		GPU_VCORE_1P2V
(341S1907 - PROG) (338S0274 - BLNK) 341T0039	1	IC,SMC,M38A	U5800	CRITICAL	17_INCH_LCD
338S0315	1	IC,ATI,M56LP,GRAFIX CTLR,880BGA,LF	U8400	CRITICAL	GPU_B26_LP
114S0287	1	5.11K,1%,1/16W,402,MF-LF	R8522		GPU_VCORE_0P953V
114S0281	1	4.53K,1%,1/16W,402,MF-LF	R8522		GPU_VCORE_1P0V
337S3388	1	2.00GHZ MEROM	CPU	CRITICAL	2P00_CPU
337S3390	1	2.16GHZ MEROM	CPU	CRITICAL	2P16_CPU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
333S0354	4	IC,SURAM,GDDR3,8MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_128M_SAMSUNG
333S0358	4	IC,SURAM,GDDR3,8MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_128M_HYNIX
333S0376	4	IC,SURAM,GDDR3,8MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_128M_INFINEON

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
333S0350	4	IC,SURAM,GDDR3,16MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_256M_SAMSUNG
333S0351	4	IC,SURAM,GDDR3,16MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_256M_HYNIX
333S0377	4	IC,SURAM,GDDR3,16MX32,700MHZ,136FBGA	U8900,U8950,U9000,U9050	CRITICAL	ATI_FB_256M_INFINEON

Table Items

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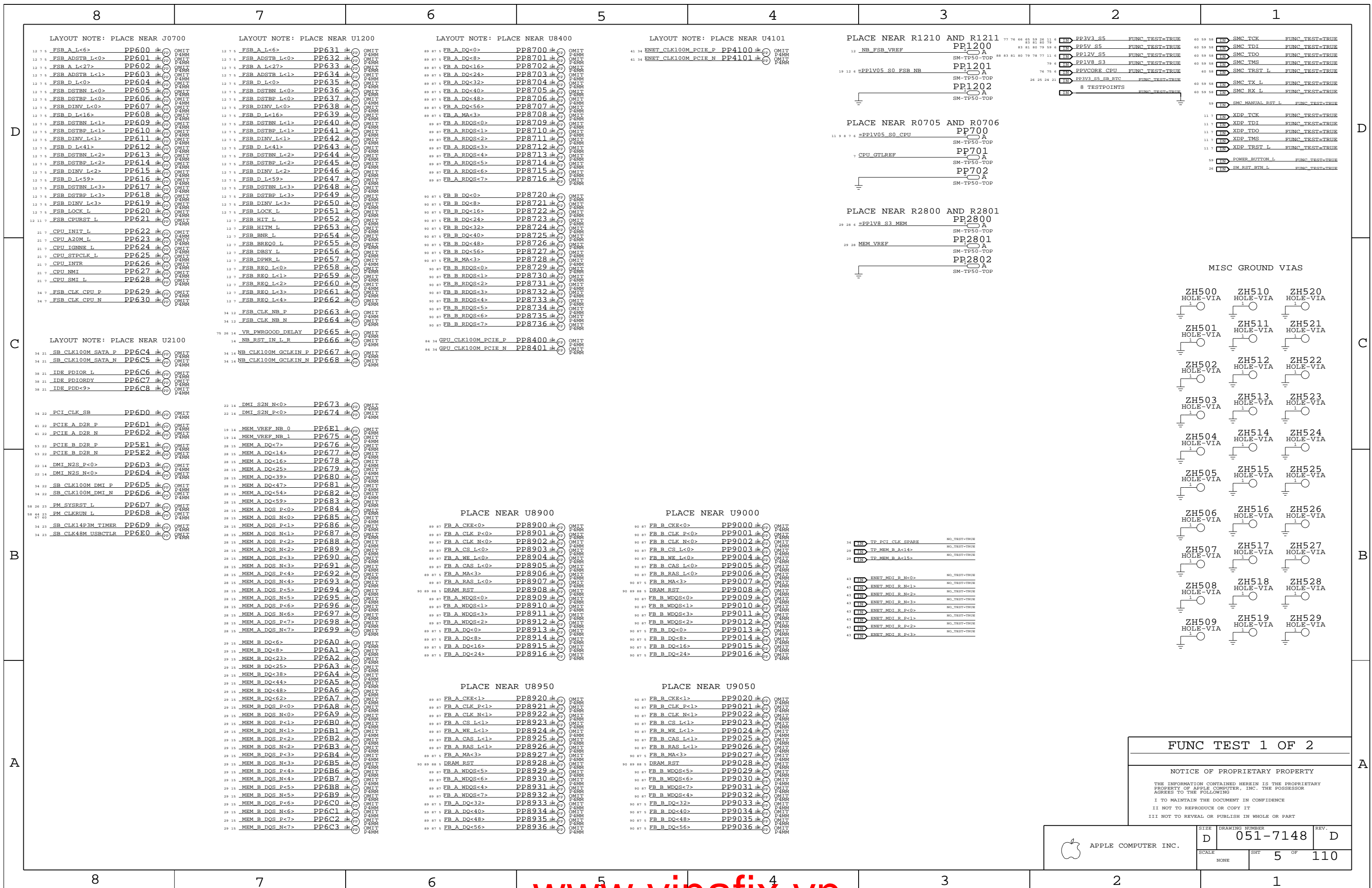
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SIZE	DRAWING NUMBER	REV.
D	051-7148	D
SCALE	SHT	OF
NONE	4	110



FUNC TEST 1 OF 2

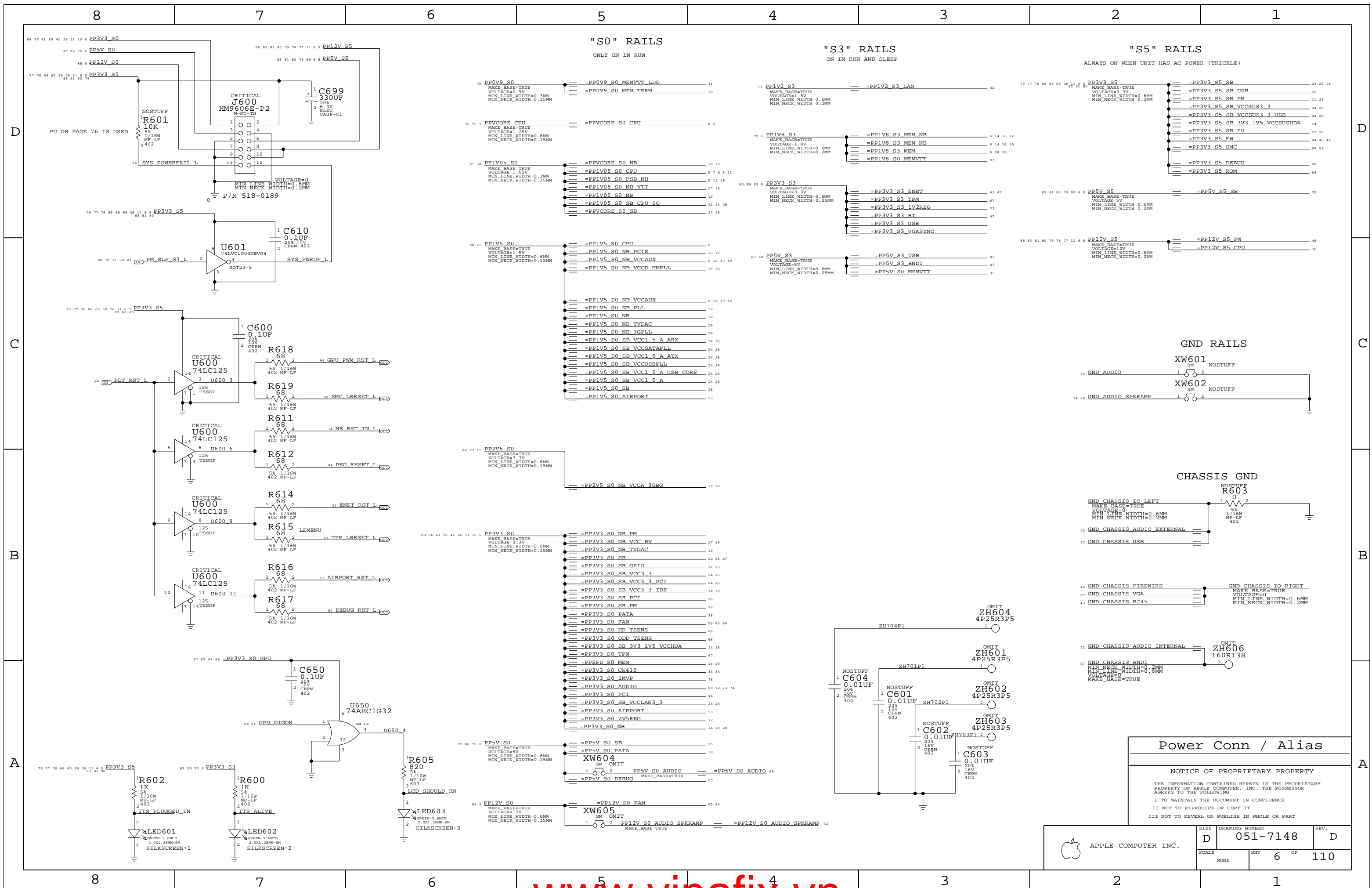
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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7148	D
SCALE	SHEET	OF
NONE	5	110



"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

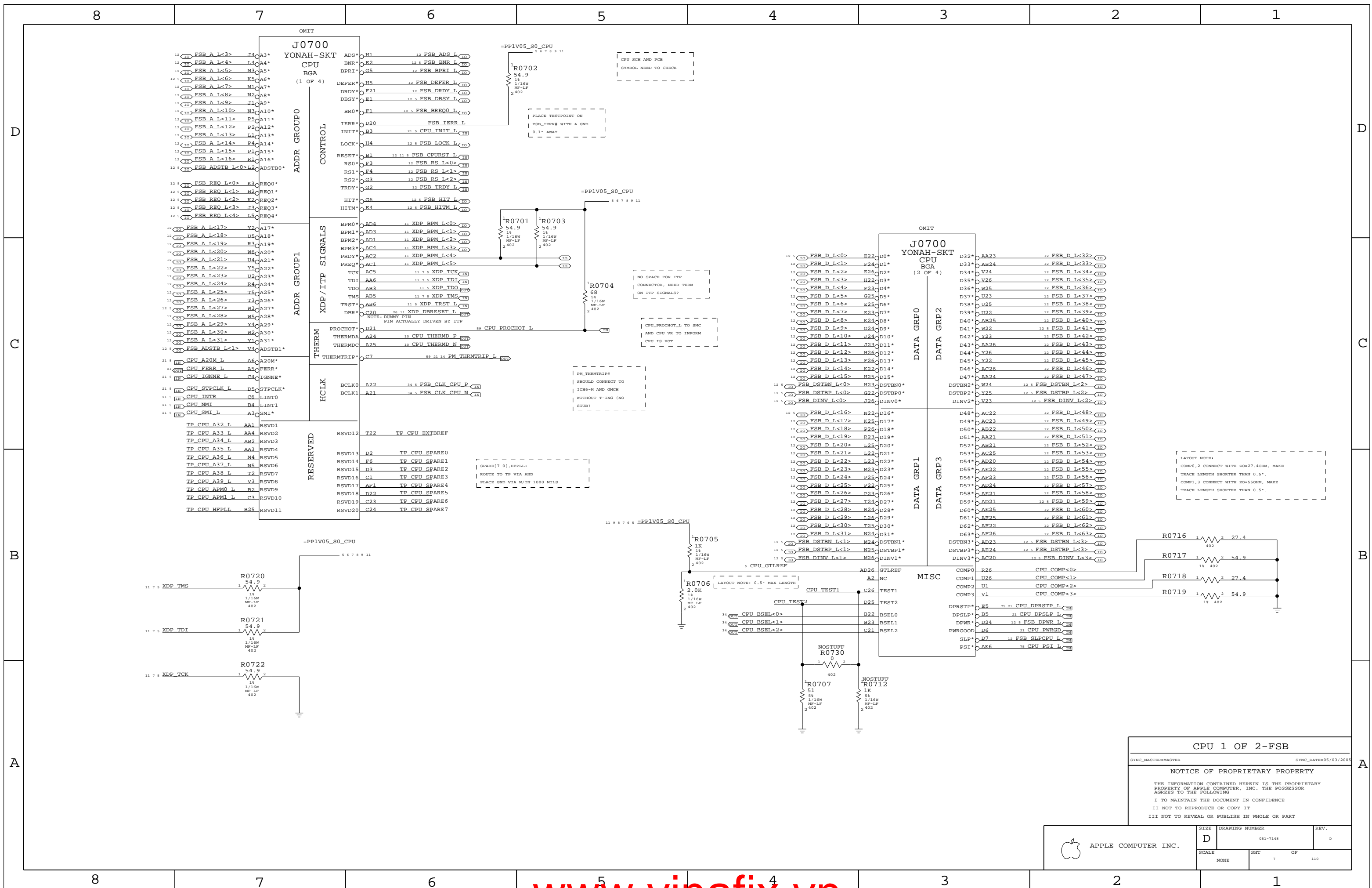
CHASSIS GND

Power Conn / Alias

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	SCALE NONE	SHEET 6 OF 110	



CPU 1 OF 2-FSB

SYNC_MASTER=MASTER SYNC_DATE=05/03/2005

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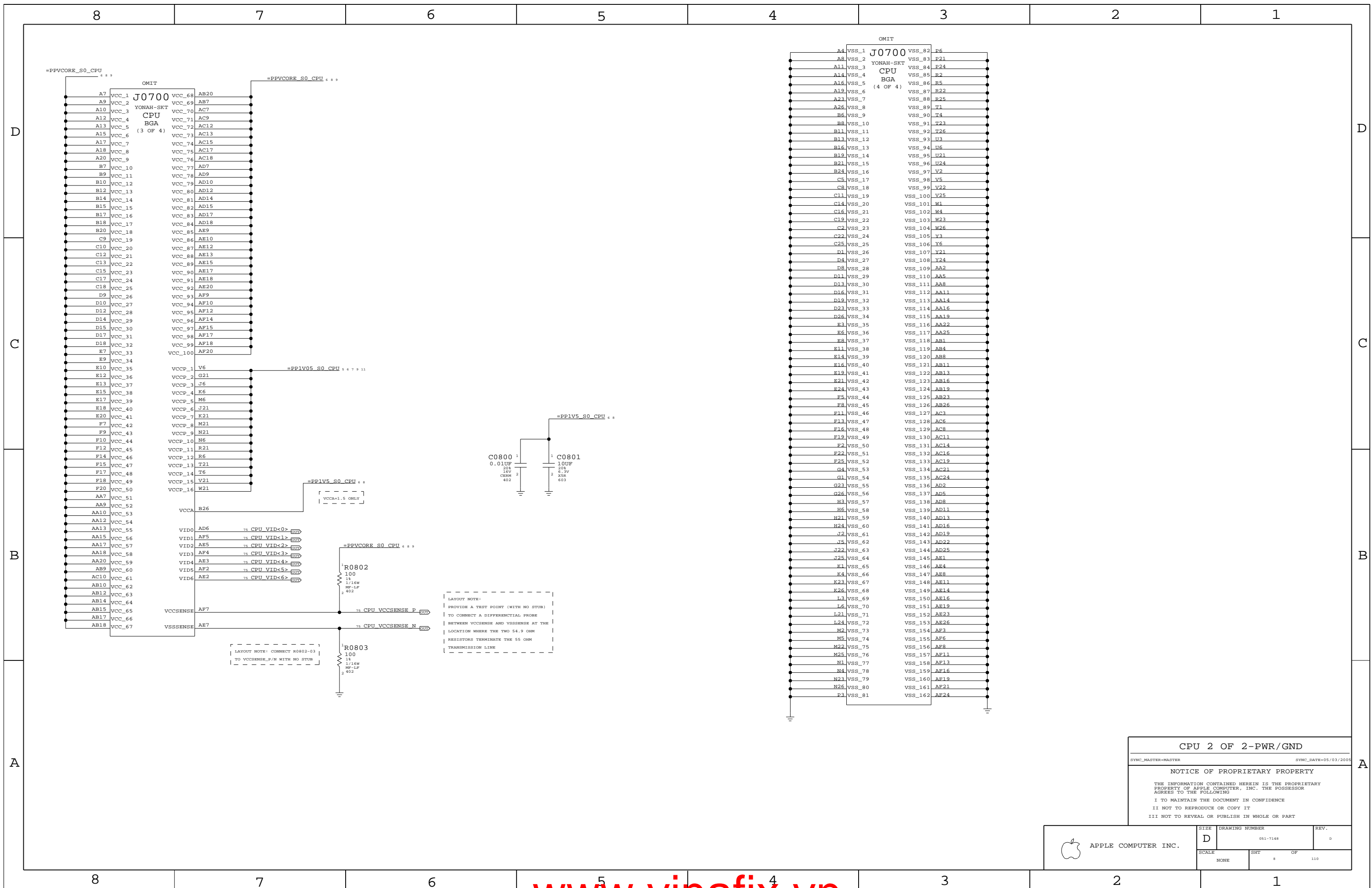
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	D	051-7148	D
SCALE	SHT	OF	110
NONE	7		



OMIT

A4	VSS_1	P6
A8	VSS_2	P21
A11	VSS_3	VSS_84
A14	VSS_4	VSS_85
A16	VSS_5	VSS_86
A19	VSS_6	VSS_87
A23	VSS_7	VSS_88
A26	VSS_8	VSS_89
B6	VSS_9	VSS_90
B8	VSS_10	VSS_91
B11	VSS_11	VSS_92
B13	VSS_12	VSS_93
B16	VSS_13	VSS_94
B19	VSS_14	VSS_95
B21	VSS_15	VSS_96
B24	VSS_16	VSS_97
C5	VSS_17	VSS_98
C8	VSS_18	VSS_99
C11	VSS_19	VSS_100
C14	VSS_20	VSS_101
C16	VSS_21	VSS_102
C19	VSS_22	VSS_103
C2	VSS_23	VSS_104
C22	VSS_24	VSS_105
C25	VSS_25	VSS_106
D1	VSS_26	VSS_107
D4	VSS_27	VSS_108
D8	VSS_28	VSS_109
D11	VSS_29	VSS_110
D13	VSS_30	VSS_111
D16	VSS_31	VSS_112
D19	VSS_32	VSS_113
D23	VSS_33	VSS_114
D26	VSS_34	VSS_115
E3	VSS_35	VSS_116
E6	VSS_36	VSS_117
ER	VSS_37	VSS_118
E11	VSS_38	VSS_119
E14	VSS_39	VSS_120
E16	VSS_40	VSS_121
E19	VSS_41	VSS_122
E21	VSS_42	VSS_123
E24	VSS_43	VSS_124
F5	VSS_44	VSS_125
FR	VSS_45	VSS_126
F11	VSS_46	VSS_127
F13	VSS_47	VSS_128
F16	VSS_48	VSS_129
F19	VSS_49	VSS_130
F2	VSS_50	VSS_131
F22	VSS_51	VSS_132
F25	VSS_52	VSS_133
G4	VSS_53	VSS_134
G1	VSS_54	VSS_135
G23	VSS_55	VSS_136
G26	VSS_56	VSS_137
H3	VSS_57	VSS_138
H6	VSS_58	VSS_139
H21	VSS_59	VSS_140
H24	VSS_60	VSS_141
J2	VSS_61	VSS_142
J5	VSS_62	VSS_143
J22	VSS_63	VSS_144
J25	VSS_64	VSS_145
K1	VSS_65	VSS_146
K4	VSS_66	VSS_147
K23	VSS_67	VSS_148
K26	VSS_68	VSS_149
L3	VSS_69	VSS_150
L6	VSS_70	VSS_151
L21	VSS_71	VSS_152
L24	VSS_72	VSS_153
M2	VSS_73	VSS_154
M5	VSS_74	VSS_155
M22	VSS_75	VSS_156
M25	VSS_76	VSS_157
N1	VSS_77	VSS_158
N4	VSS_78	VSS_159
N23	VSS_79	VSS_160
N26	VSS_80	VSS_161
P1	VSS_81	VSS_162

CPU 2 OF 2-PWR/GND

SYNC_MASTER=MASTER SYNC_DATE=05/03/2005

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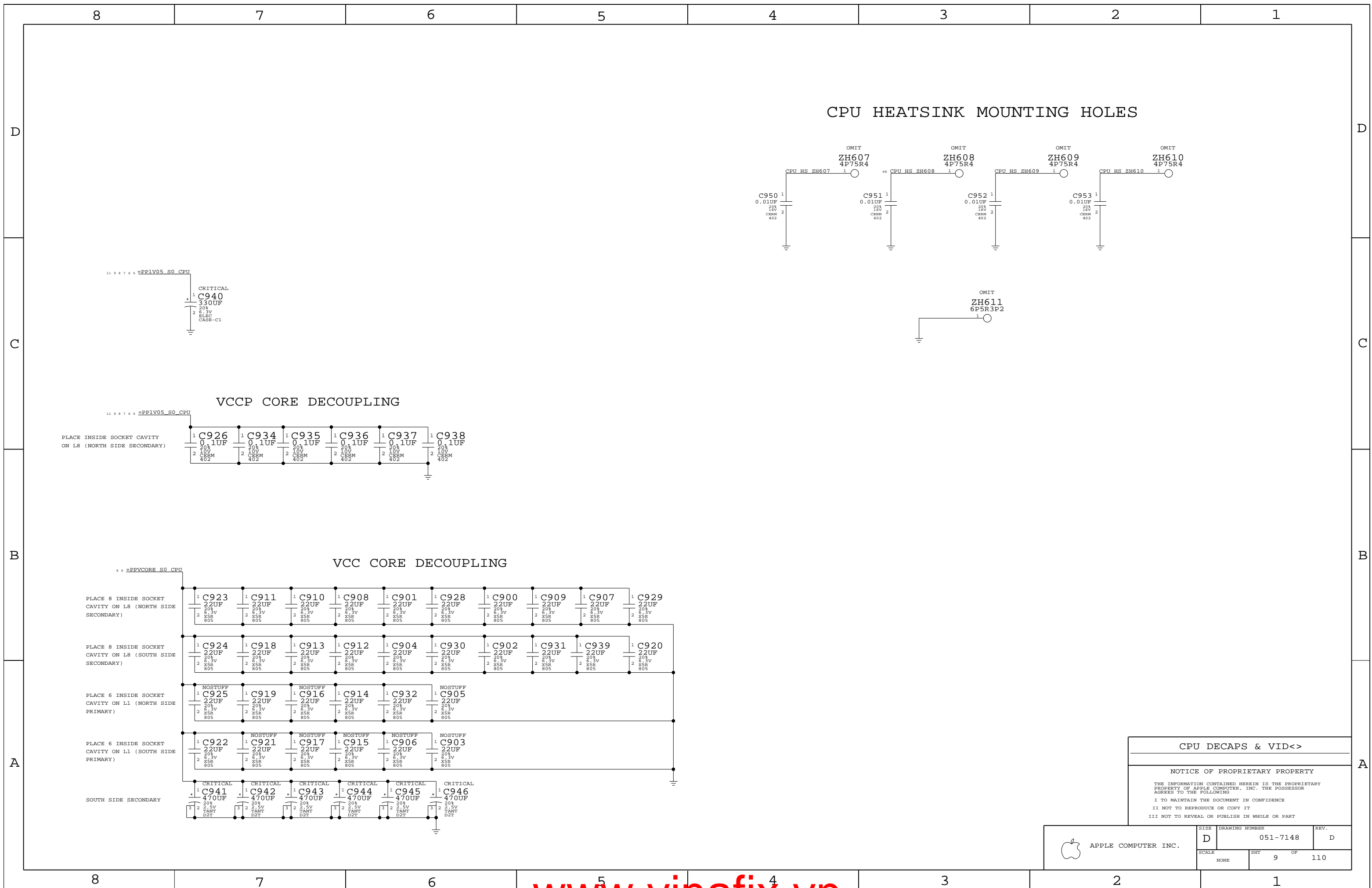
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D	DRAWING NUMBER 051-7148	REV. D
SCALE NONE	SHT 8	OF 110



CPU DECAPS & VID<>

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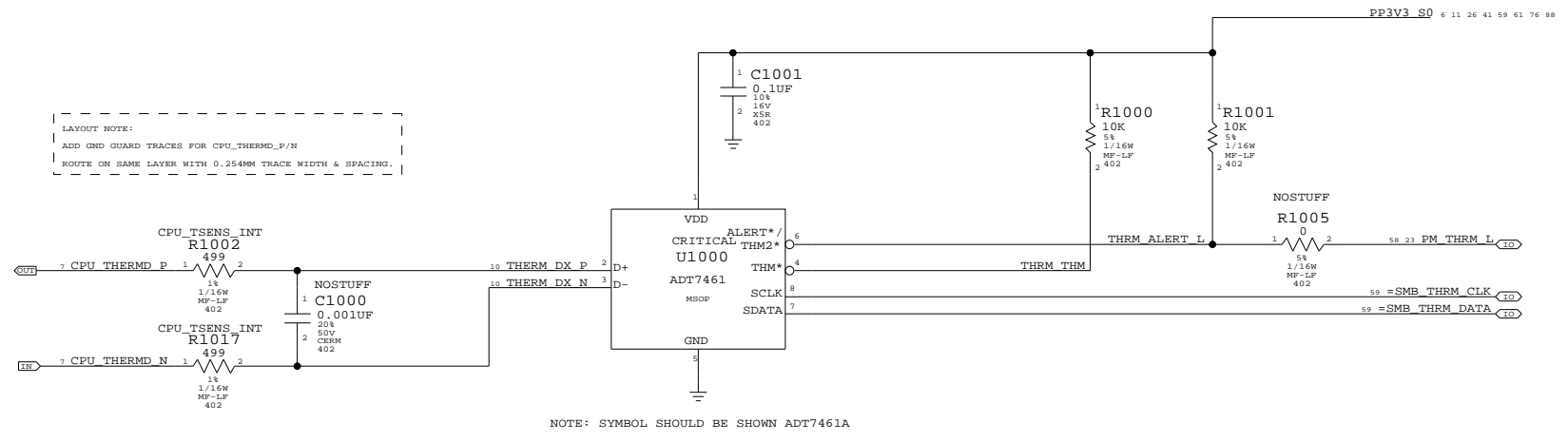
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	SCALE	SHT	OF
	NONE	9	110

CPU THERMAL SENSOR

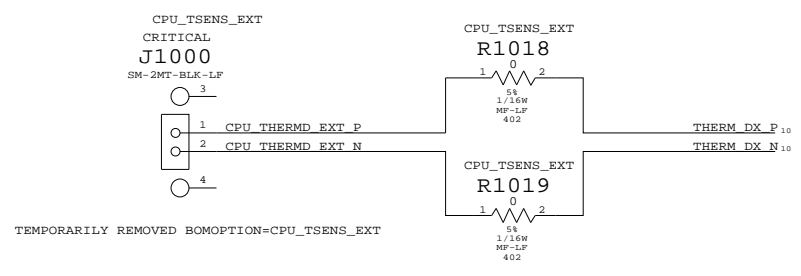
NOTE:
IF CPU T DIODE TO BE READ IN OFF STATE,
THEN THIS SHOULD BE S5

LAYOUT NOTE:
ADD GND GUARD TRACKS 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



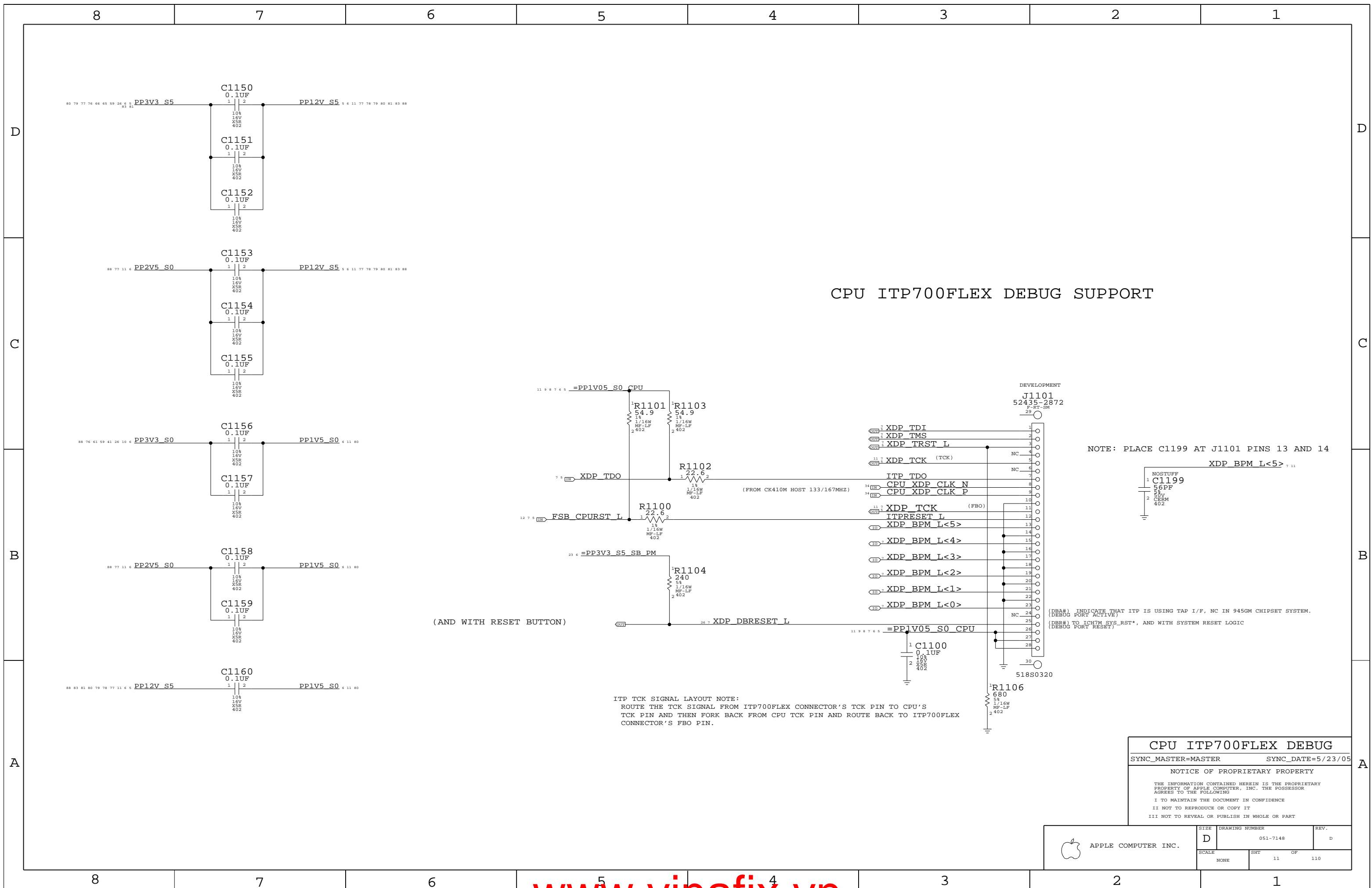
CPU TEMP SENSOR

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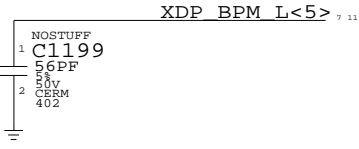
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	OF	REV.
NONE	10	110	



CPU ITP700FLEX DEBUG SUPPORT

NOTE: PLACE C1199 AT J1101 PINS 13 AND 14

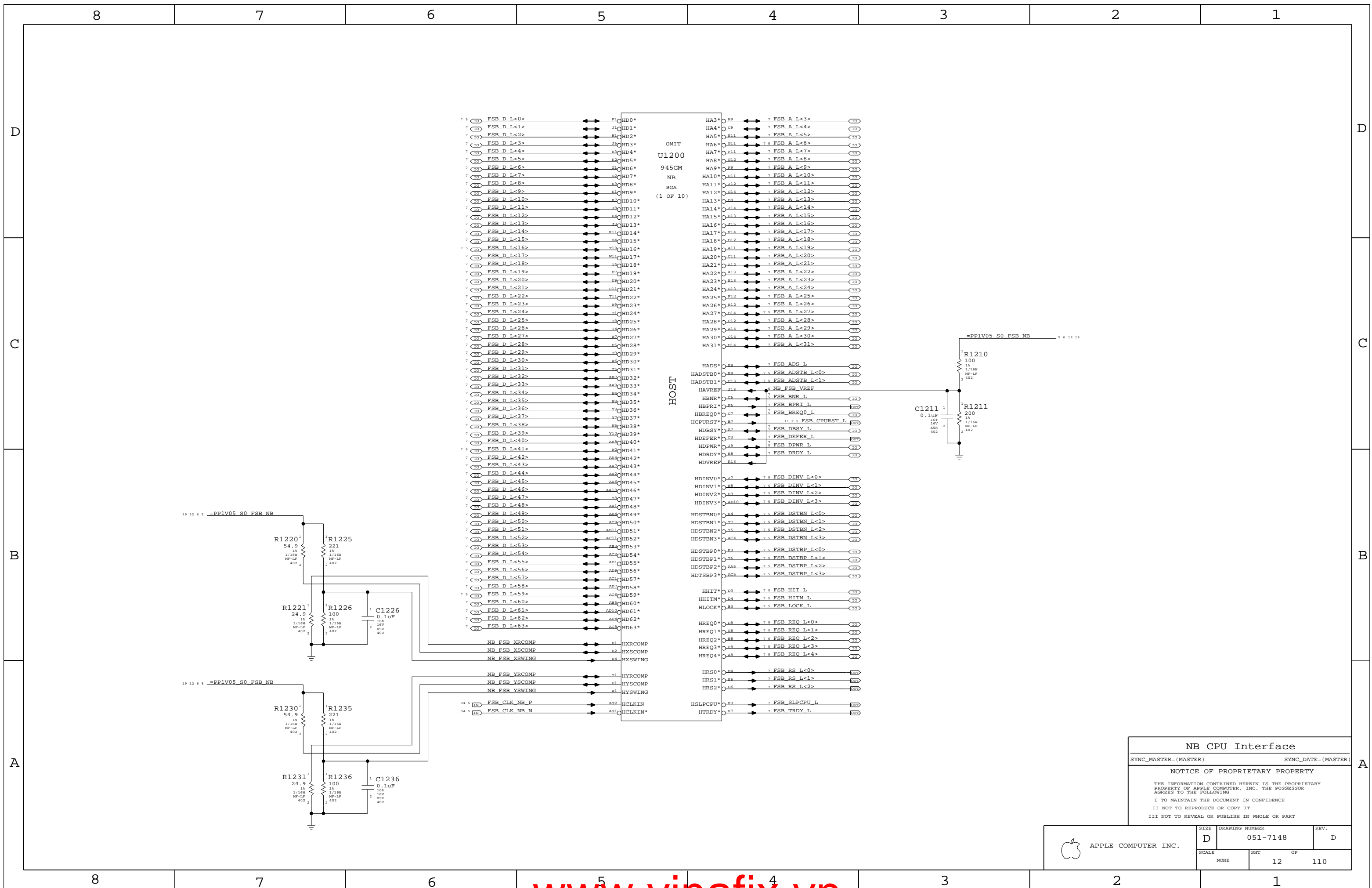


(DBA#) INDICATE THAT ITP IS USING TAP I/F, NC IN 945GM CHIPSET SYSTEM.
 (DBG#) TO ICH7M SYS_RST*, AND WITH SYSTEM RESET LOGIC
 (DBG#) TO ICH7M SYS_RST*, AND WITH SYSTEM RESET LOGIC
 (DBG#) TO ICH7M SYS_RST*, AND WITH SYSTEM RESET LOGIC

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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SCALE	SHT	OF	110
NONE	11		



NB CPU Interface

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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	SCALE NONE	SHEET 12	OF 110

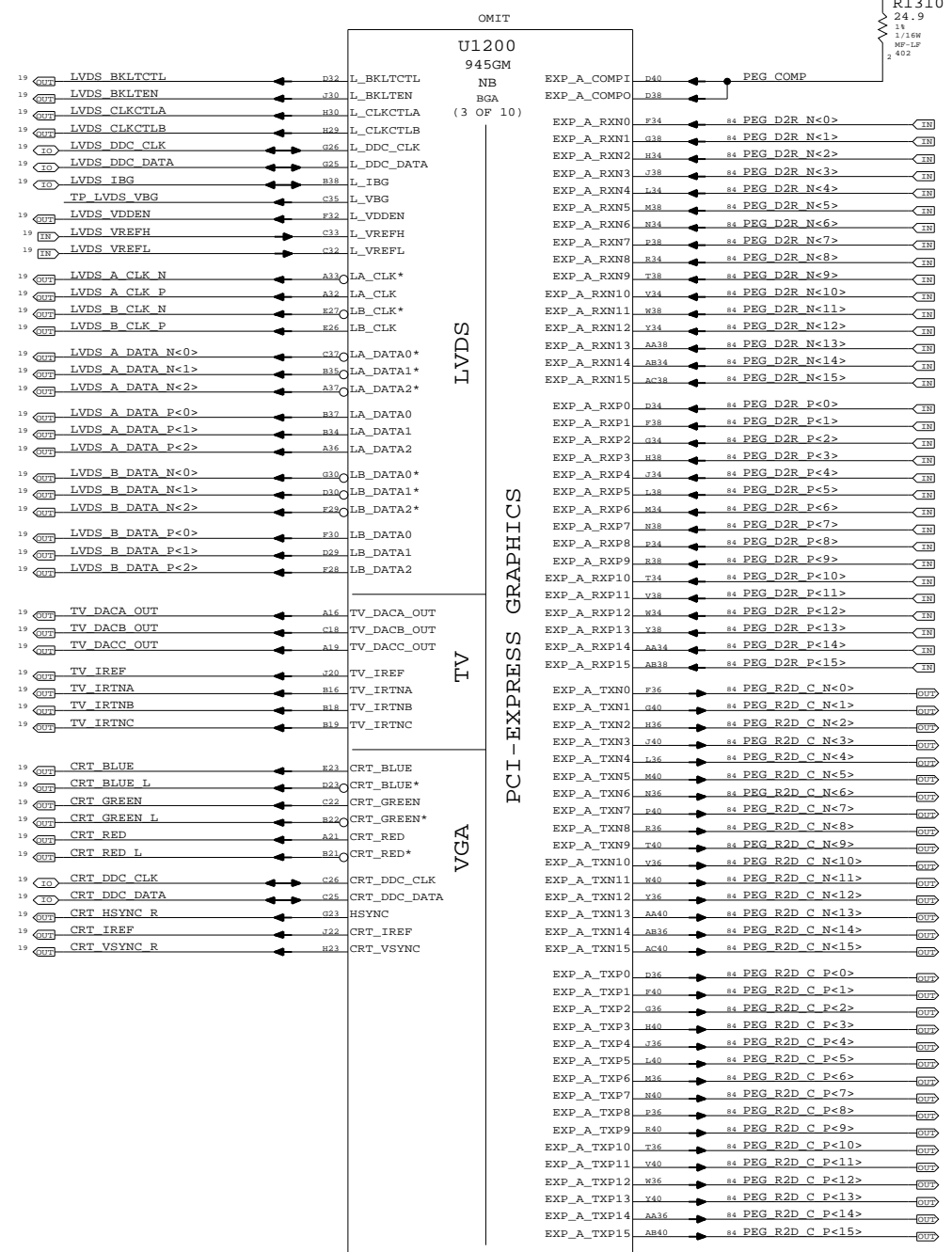
LVDS Disable
 Can leave all signals NC if LVDS is not implemented
 Tie VCC_TXLVDS and VCCA_LVDS to GND. If SDVO is used
 VCCD_LVDS must remain powered with proper decoupling.
 Otherwise, tie VCCD_LVDS to GND also.

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#

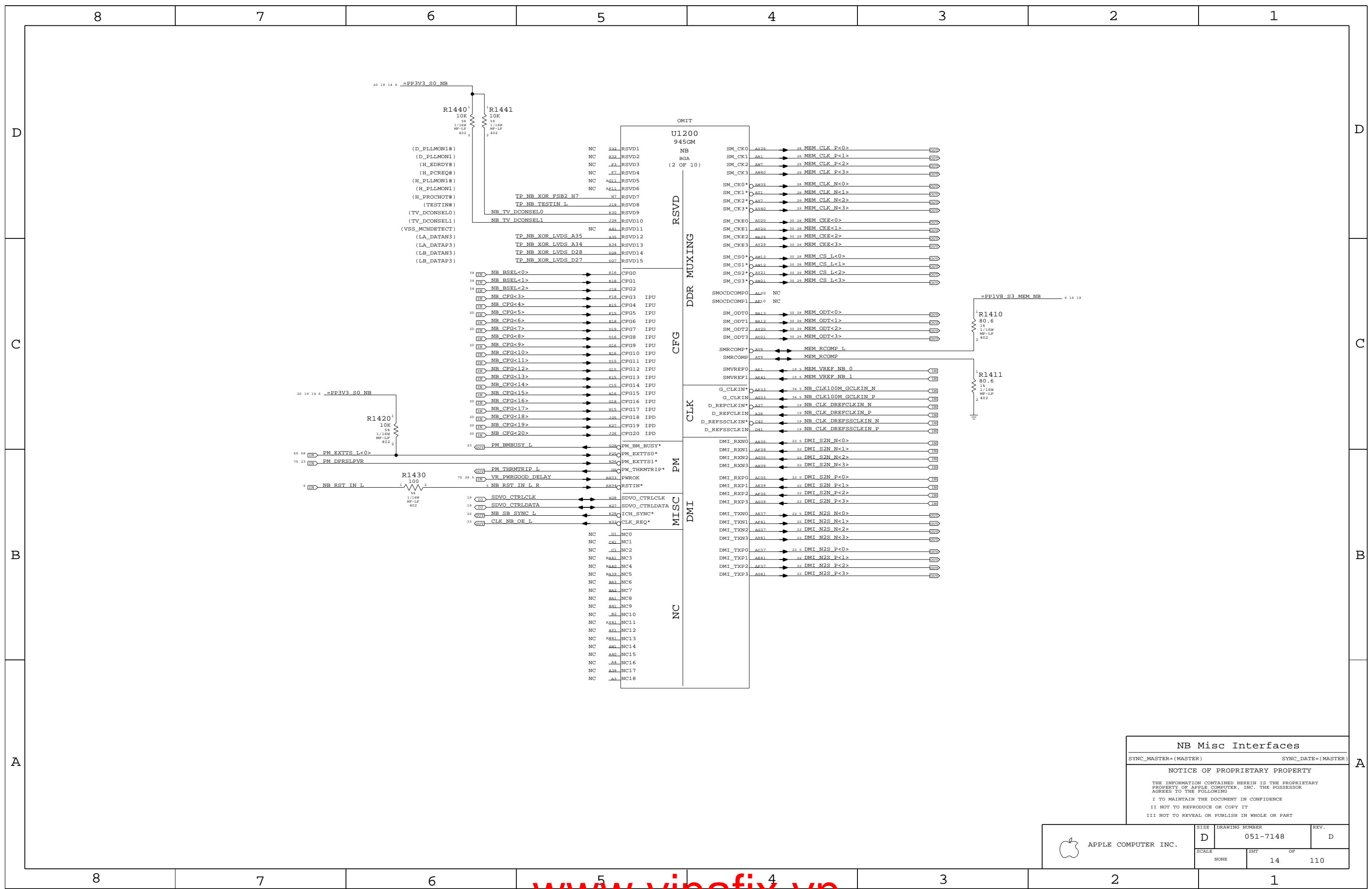
SDVO_TVCLKIN
 SDVO_INT
 SDVO_FLDSTALL

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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SCALE	SHT	OF	
NONE	13	110	



NB Misc Interfaces

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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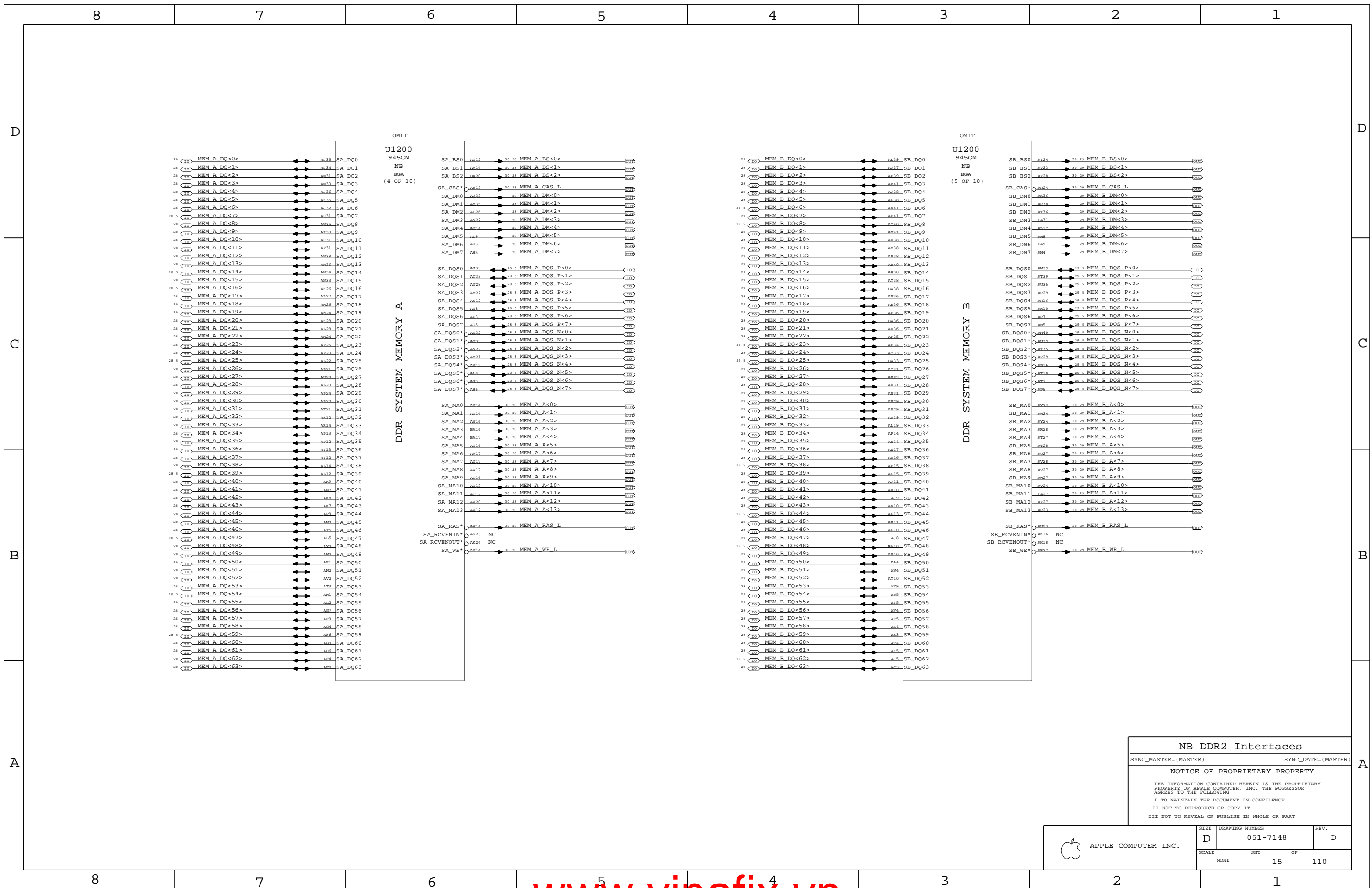
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	SCALE NONE	SHEET 14	OF 110



NB DDR2 Interfaces

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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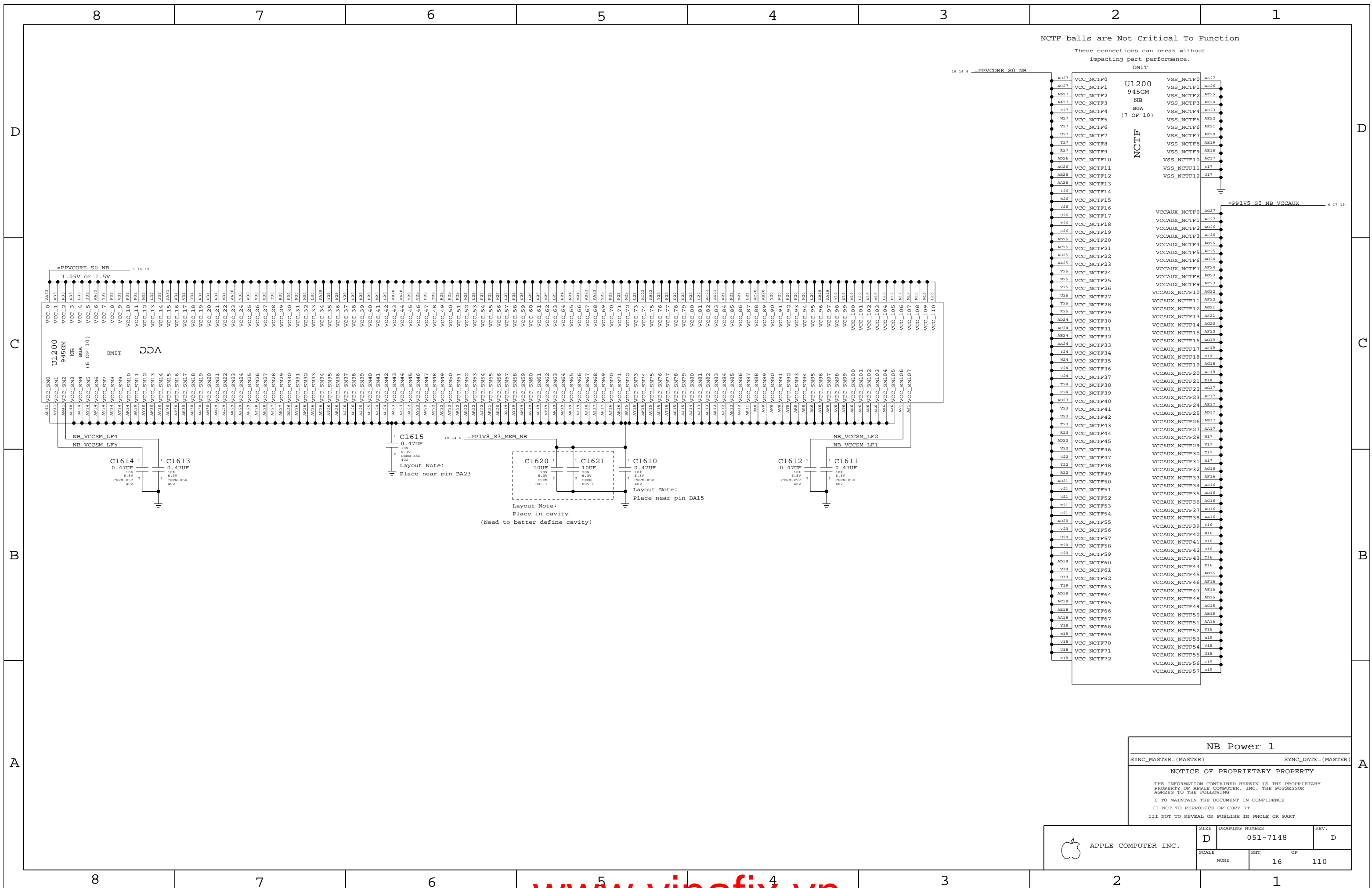
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	SCALE NONE	SHEET 15	OF 110



NCTF balls are Not Critical To Function
 These connections can break without impacting part performance.
 OMIT

U1200
 945GM
 NB
 BGA
 (7 OF 10)
 NCTF

VCC_NCTF0
 VCC_NCTF1
 VCC_NCTF2
 VCC_NCTF3
 VCC_NCTF4
 VCC_NCTF5
 VCC_NCTF6
 VCC_NCTF7
 VCC_NCTF8
 VCC_NCTF9
 VCC_NCTF10
 VCC_NCTF11
 VCC_NCTF12
 VCC_NCTF13
 VCC_NCTF14
 VCC_NCTF15
 VCC_NCTF16
 VCC_NCTF17
 VCC_NCTF18
 VCC_NCTF19
 VCC_NCTF20
 VCC_NCTF21
 VCC_NCTF22
 VCC_NCTF23
 VCC_NCTF24
 VCC_NCTF25
 VCC_NCTF26
 VCC_NCTF27
 VCC_NCTF28
 VCC_NCTF29
 VCC_NCTF30
 VCC_NCTF31
 VCC_NCTF32
 VCC_NCTF33
 VCC_NCTF34
 VCC_NCTF35
 VCC_NCTF36
 VCC_NCTF37
 VCC_NCTF38
 VCC_NCTF39
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 VCC_NCTF41
 VCC_NCTF42
 VCC_NCTF43
 VCC_NCTF44
 VCC_NCTF45
 VCC_NCTF46
 VCC_NCTF47
 VCC_NCTF48
 VCC_NCTF49
 VCC_NCTF50
 VCC_NCTF51
 VCC_NCTF52
 VCC_NCTF53
 VCC_NCTF54
 VCC_NCTF55
 VCC_NCTF56
 VCC_NCTF57

VSS_NCTF0
 VSS_NCTF1
 VSS_NCTF2
 VSS_NCTF3
 VSS_NCTF4
 VSS_NCTF5
 VSS_NCTF6
 VSS_NCTF7
 VSS_NCTF8
 VSS_NCTF9
 VSS_NCTF10
 VSS_NCTF11
 VSS_NCTF12

VCCAUX_NCTF0
 VCCAUX_NCTF1
 VCCAUX_NCTF2
 VCCAUX_NCTF3
 VCCAUX_NCTF4
 VCCAUX_NCTF5
 VCCAUX_NCTF6
 VCCAUX_NCTF7
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 VCCAUX_NCTF54
 VCCAUX_NCTF55
 VCCAUX_NCTF56
 VCCAUX_NCTF57

VCC_0
 VCC_1
 VCC_2
 VCC_3
 VCC_4
 VCC_5
 VCC_6
 VCC_7
 VCC_8
 VCC_9
 VCC_10
 VCC_11
 VCC_12
 VCC_13
 VCC_14
 VCC_15
 VCC_16
 VCC_17
 VCC_18
 VCC_19
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 VCC_99
 VCC_100
 VCC_101
 VCC_102
 VCC_103
 VCC_104
 VCC_105
 VCC_106
 VCC_107
 VCC_108
 VCC_109
 VCC_110
 VCC_111

NB VCCSM LP4
 NB VCCSM LP5
 NB VCCSM LP2
 NB VCCSM LP1

C1614
 0.47UF
 6.3V
 CERM-XSR
 402

C1613
 0.47UF
 6.3V
 CERM-XSR
 402

C1615
 0.47UF
 10V
 8-3V
 CERM-XSR
 402

C1620
 10UF
 6.3V
 CERM
 805-1

C1621
 10UF
 6.3V
 CERM
 805-1

C1610
 0.47UF
 10V
 8-3V
 CERM-XSR
 402

C1612
 0.47UF
 10V
 8-3V
 CERM-XSR
 402

C1611
 0.47UF
 10V
 8-3V
 CERM-XSR
 402

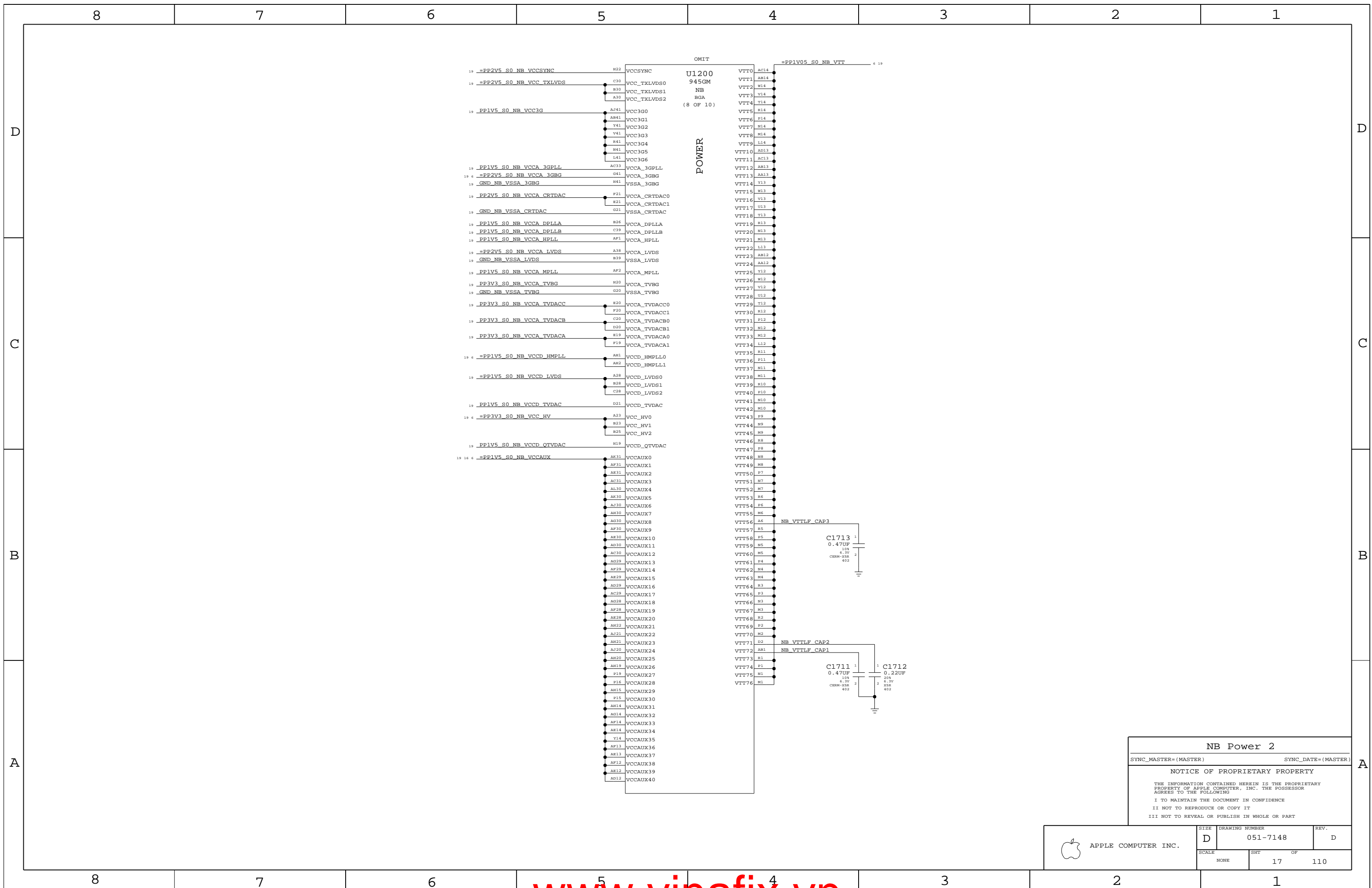
Layout Note:
 Place near pin BA23

Layout Note:
 Place in cavity
 (Need to better define cavity)

Layout Note:
 Place near pin BA15

NB Power 1
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)
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SCALE	SHT	OF	REV.
NONE	16	110	



NB Power 2

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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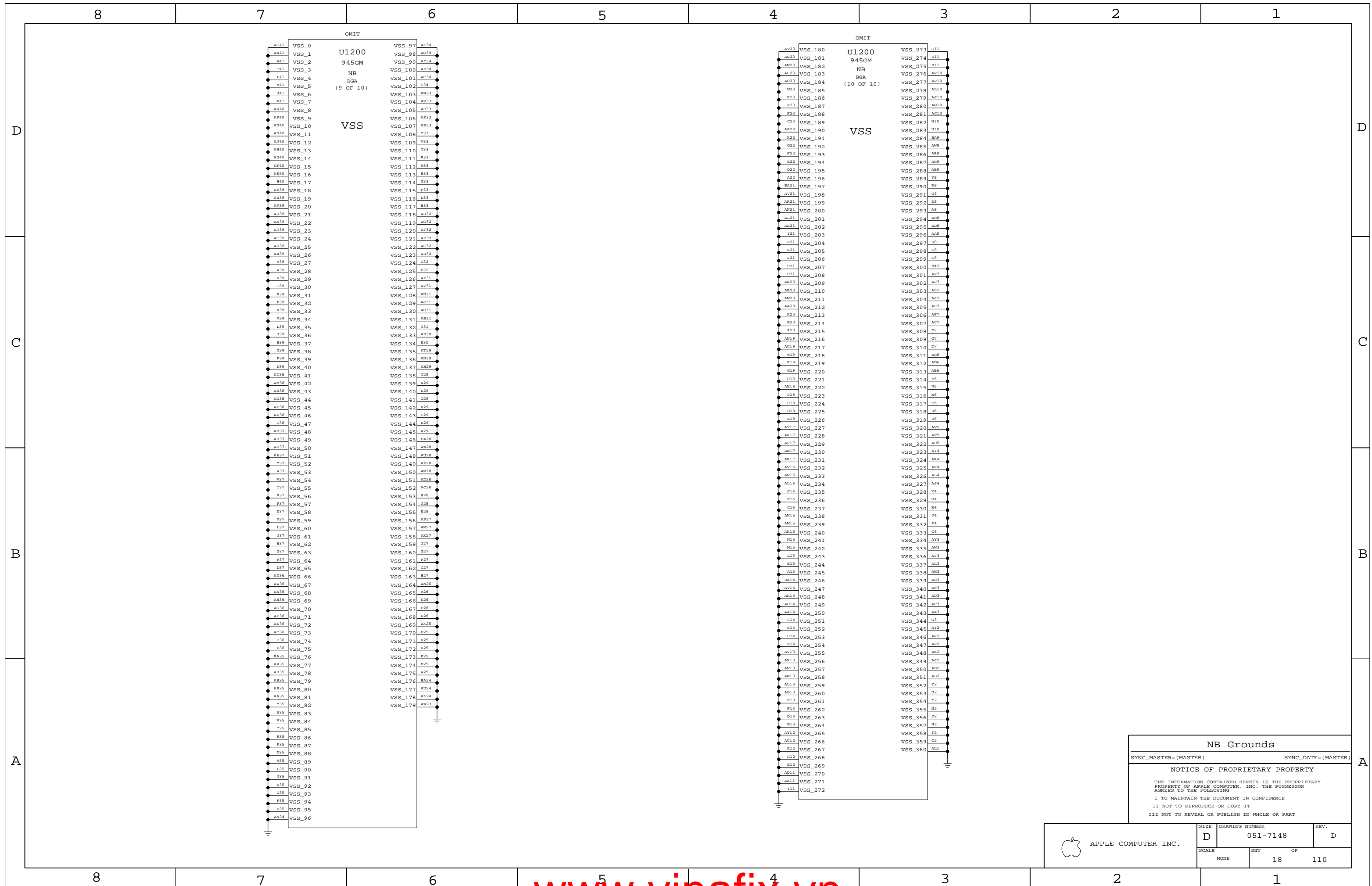
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	SCALE NONE	SHEET OF 17 OF 110	



NB Grounds

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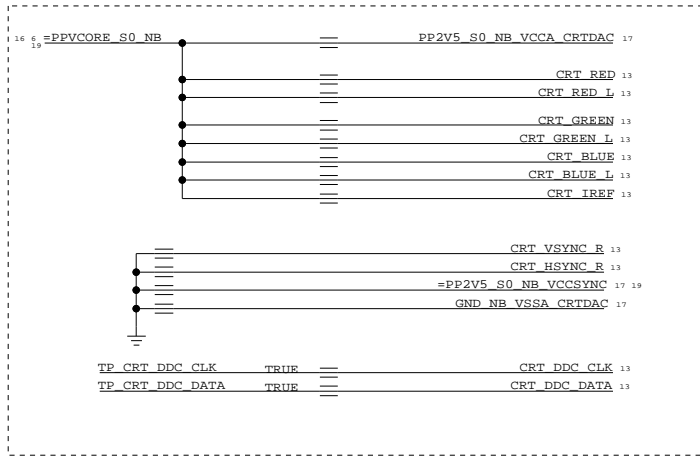
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7148	REV. D
	SCALE NONE	SHEET 18	OF 110

Power Interface

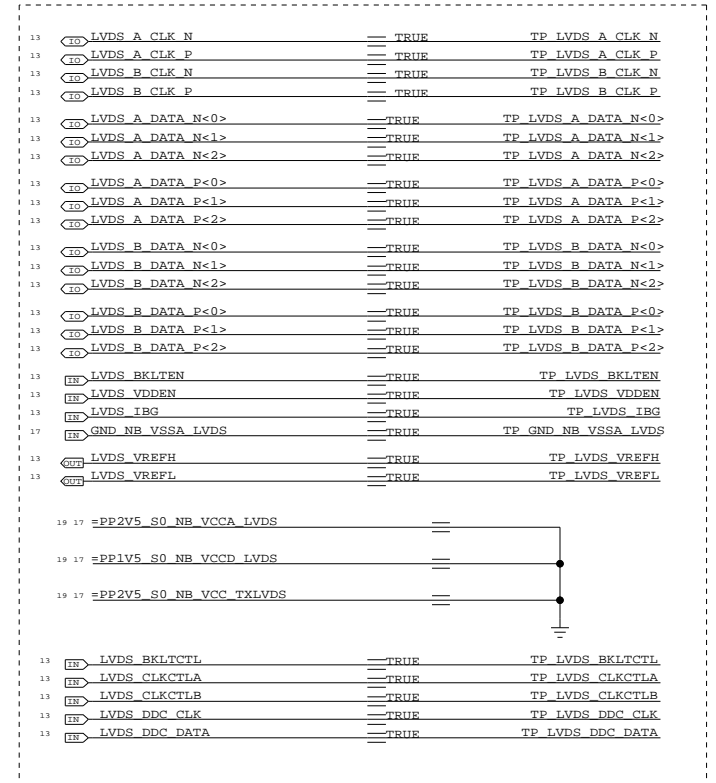
These are the power signals that leave the NB "block"

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_HV	6 17
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

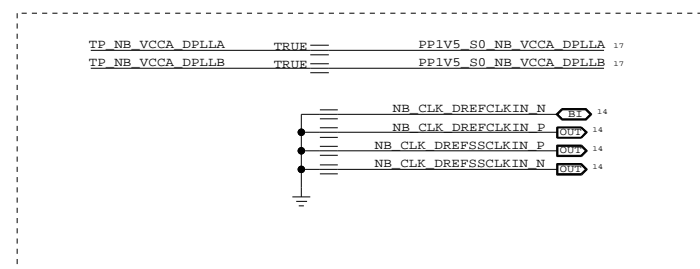
TVOUT DISABLE



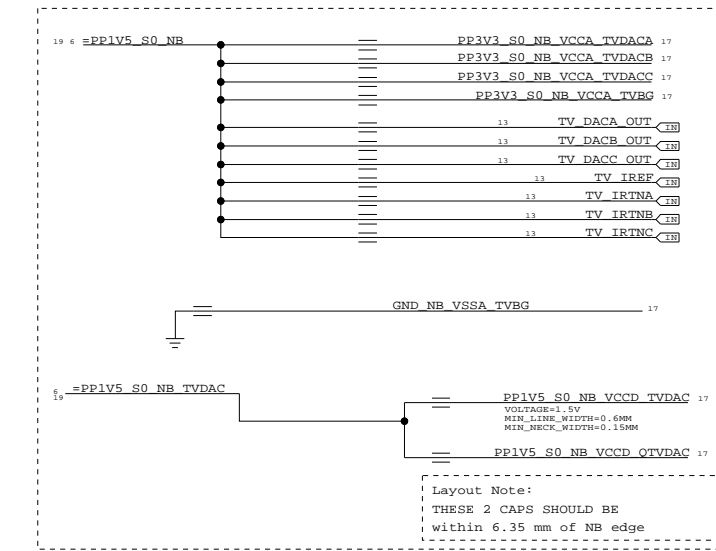
LVDS DISABLE



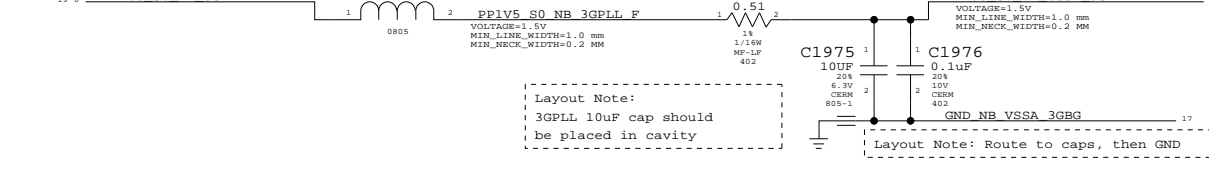
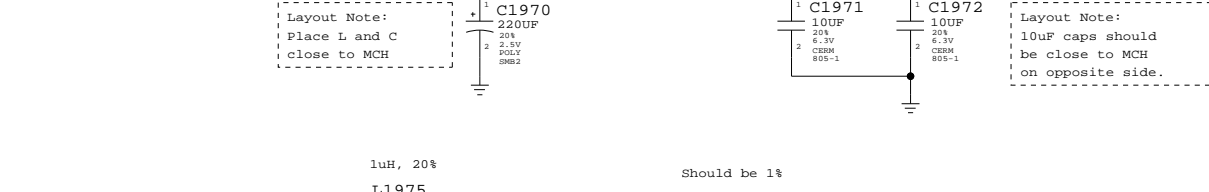
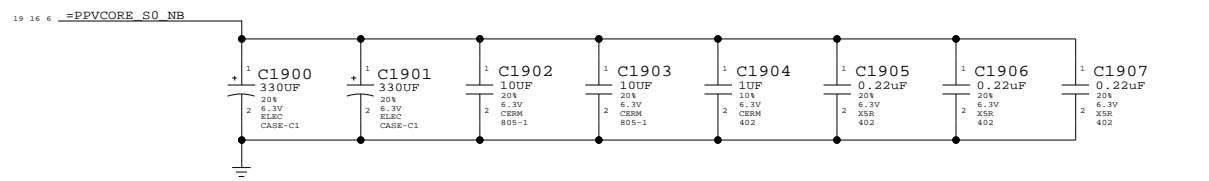
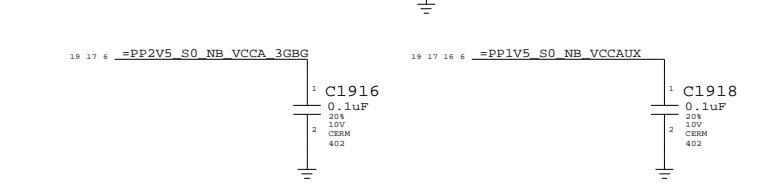
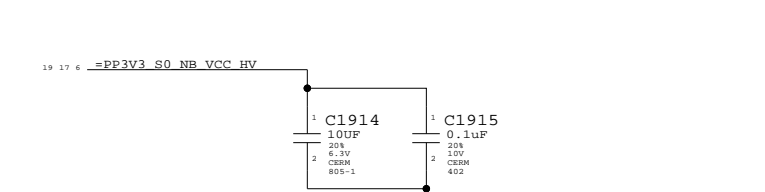
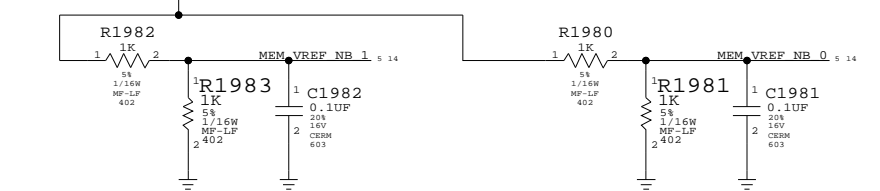
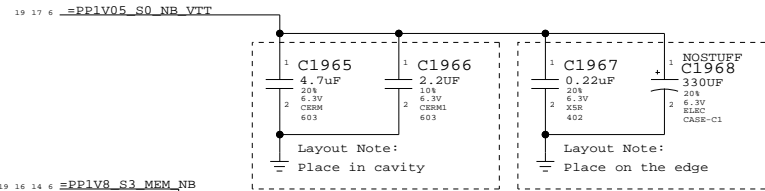
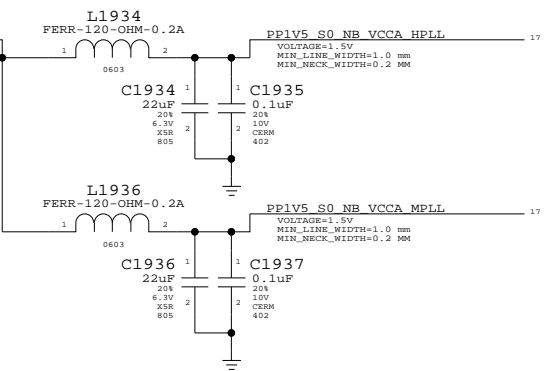
DISPLAY DISABLE



TVOUT DISABLE

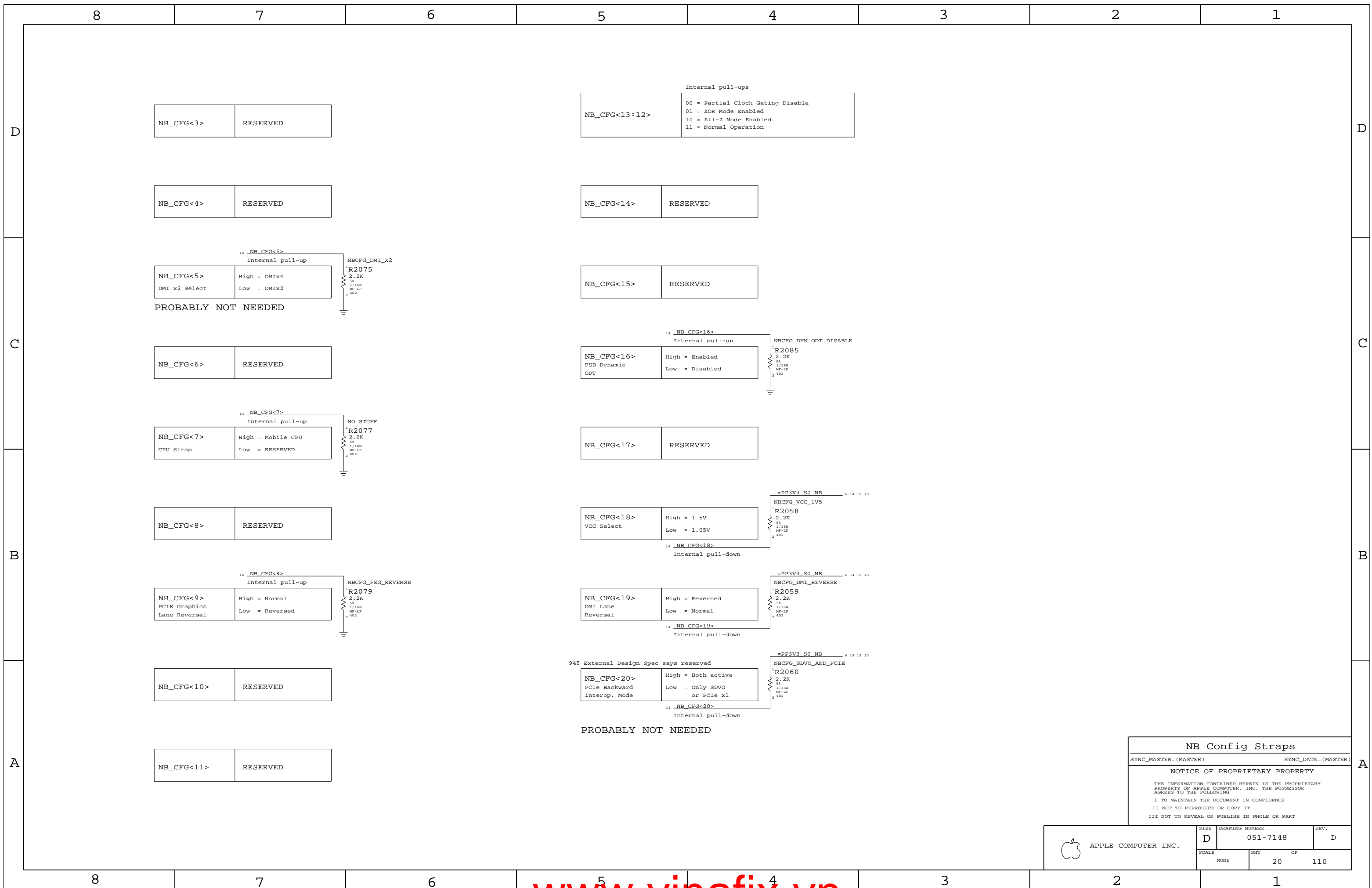


Layout Note:
These 4 0.1uF caps should be within 5 mm of NB edge



NB (GM) Decoupling
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---------------------	------------	-------------------------	----------	--------	--------



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

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

14 NB_CFG<5> Internal pull-up	
NB_CFG<5>	High = DMIX4 DMI x2 Select Low = DMIX2
PROBABLY NOT NEEDED	

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

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

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

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

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

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

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

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

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

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

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

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

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

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 Config Straps

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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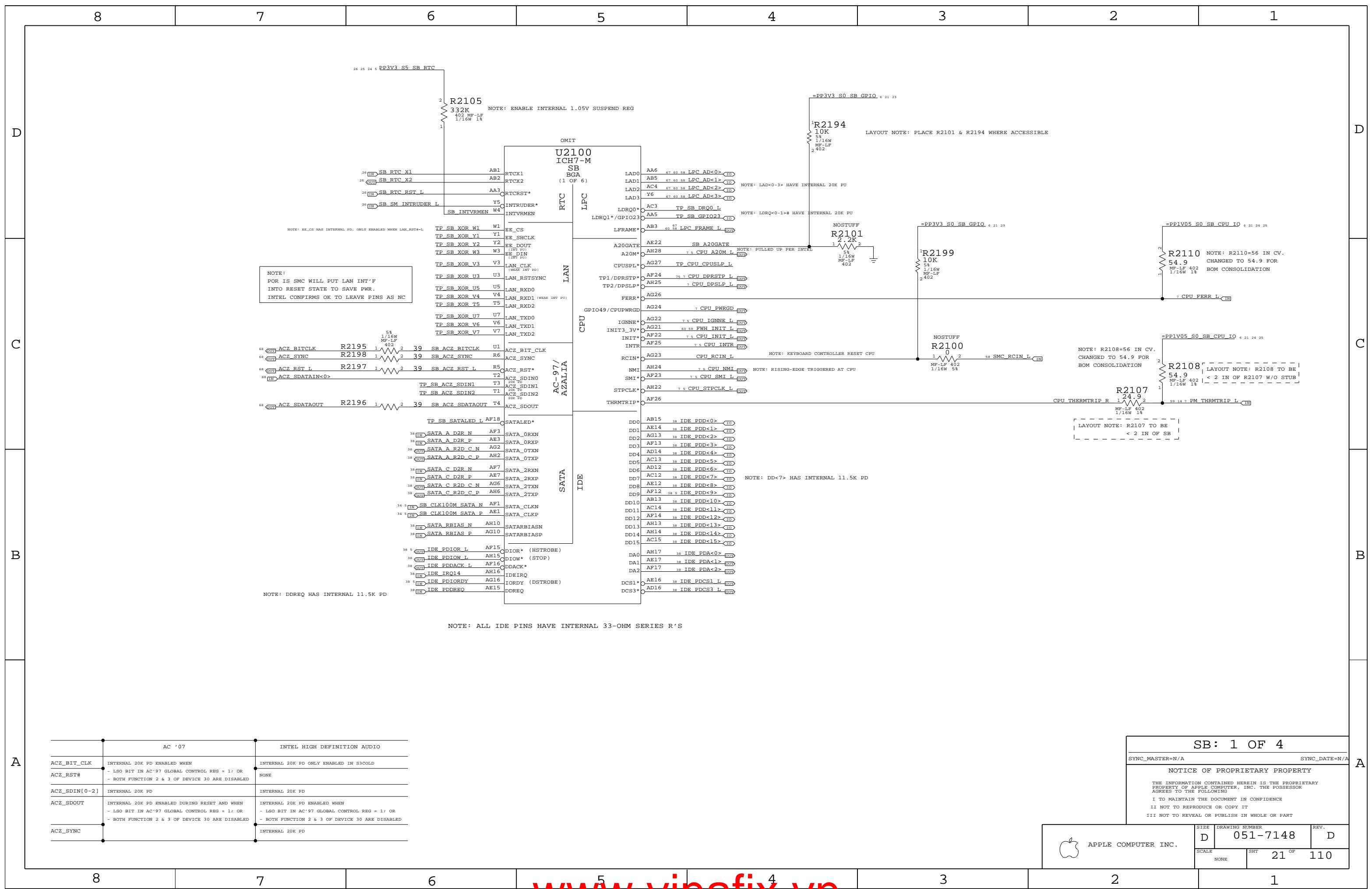
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SCALE	SHT	OF	
NONE	20	110	



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

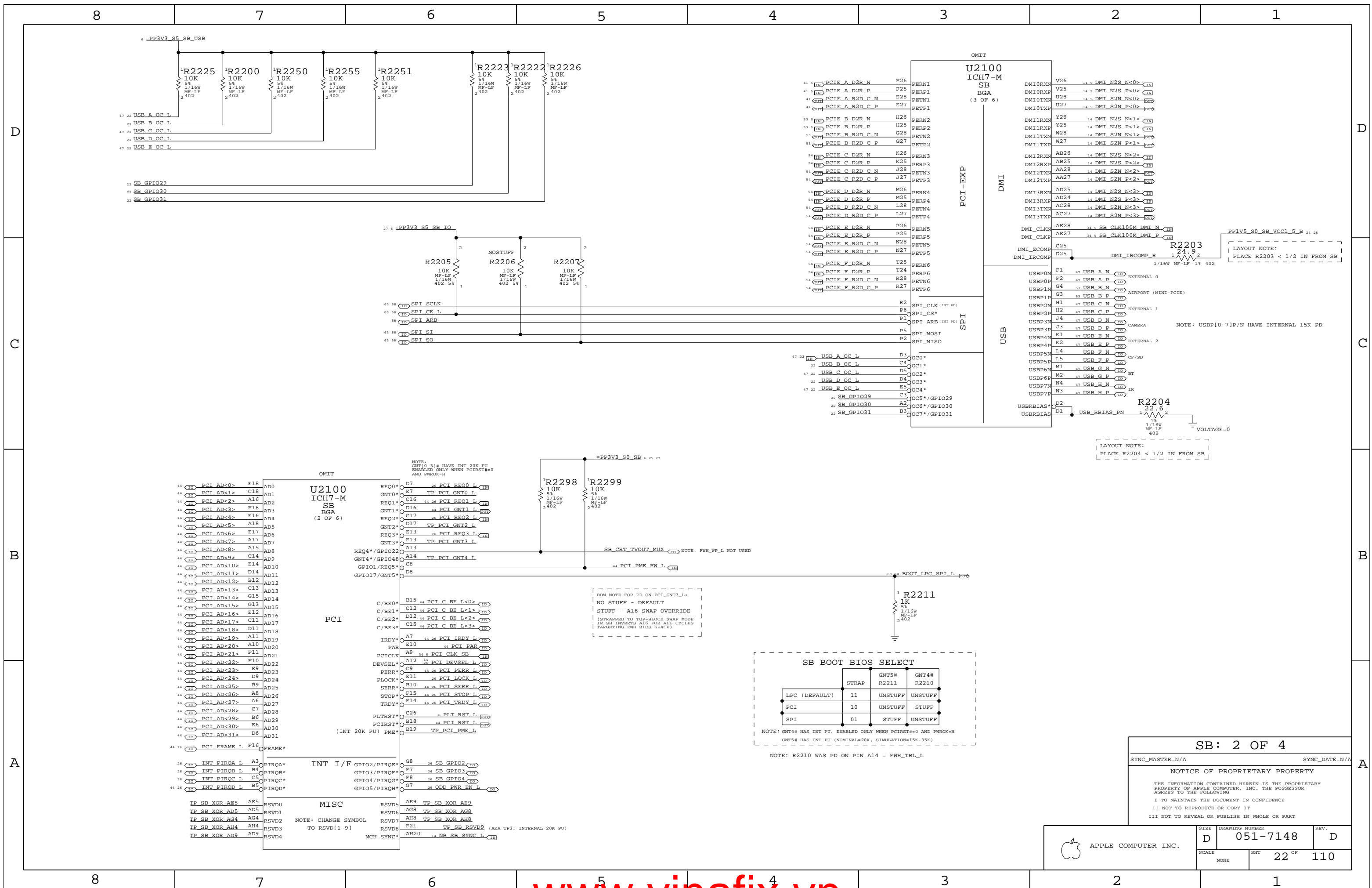
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SCALE	SHT	21 OF	110
NONE			



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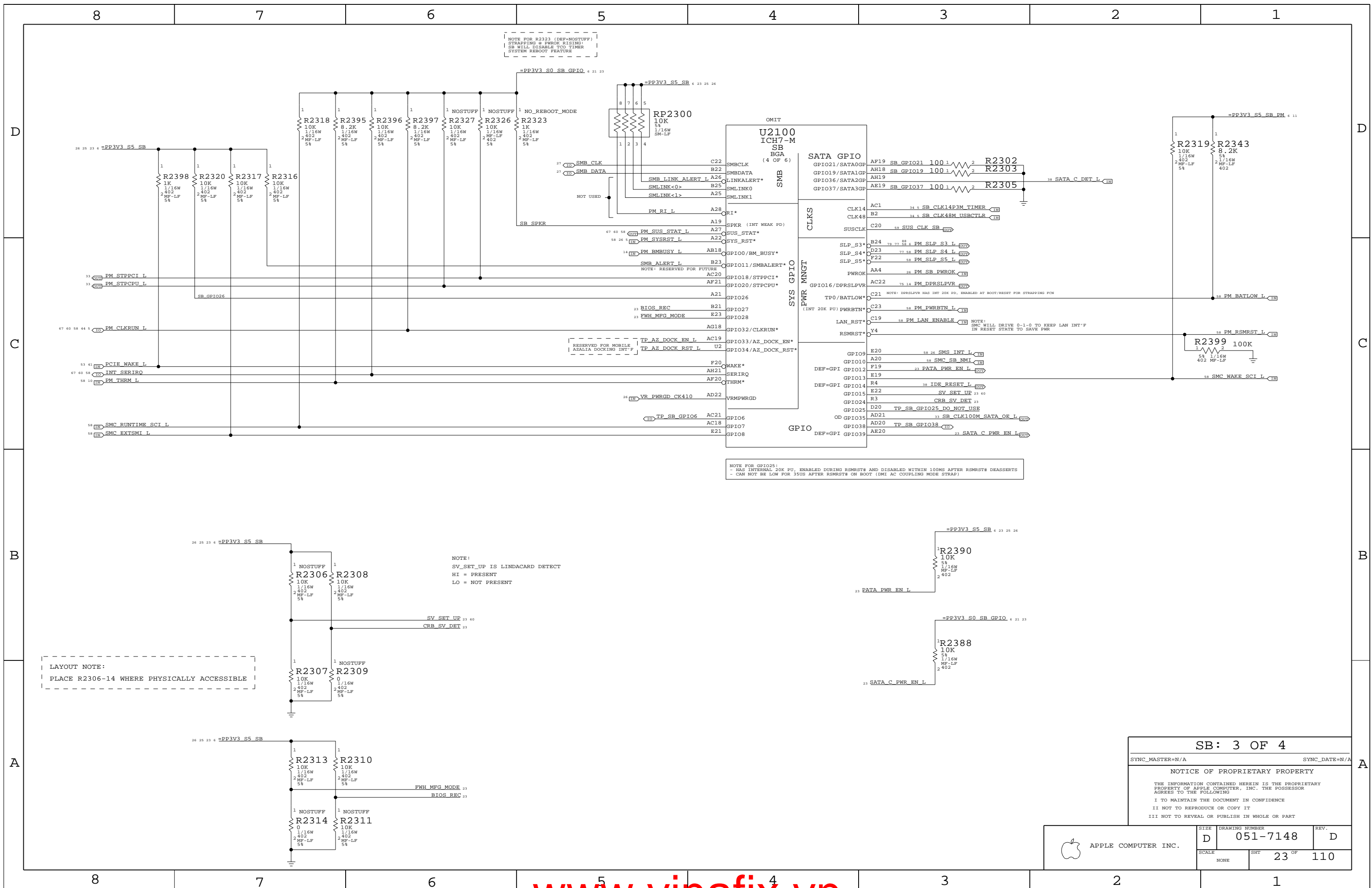
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APPLE COMPUTER INC.	SCALE	SHT	REV.
	NONE	22 OF 110	D



NOTE FOR R2323 (DEF-NOSTUFF):
STRAPPING & PWROK RISING:
SB WILL DISABLE TOO 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

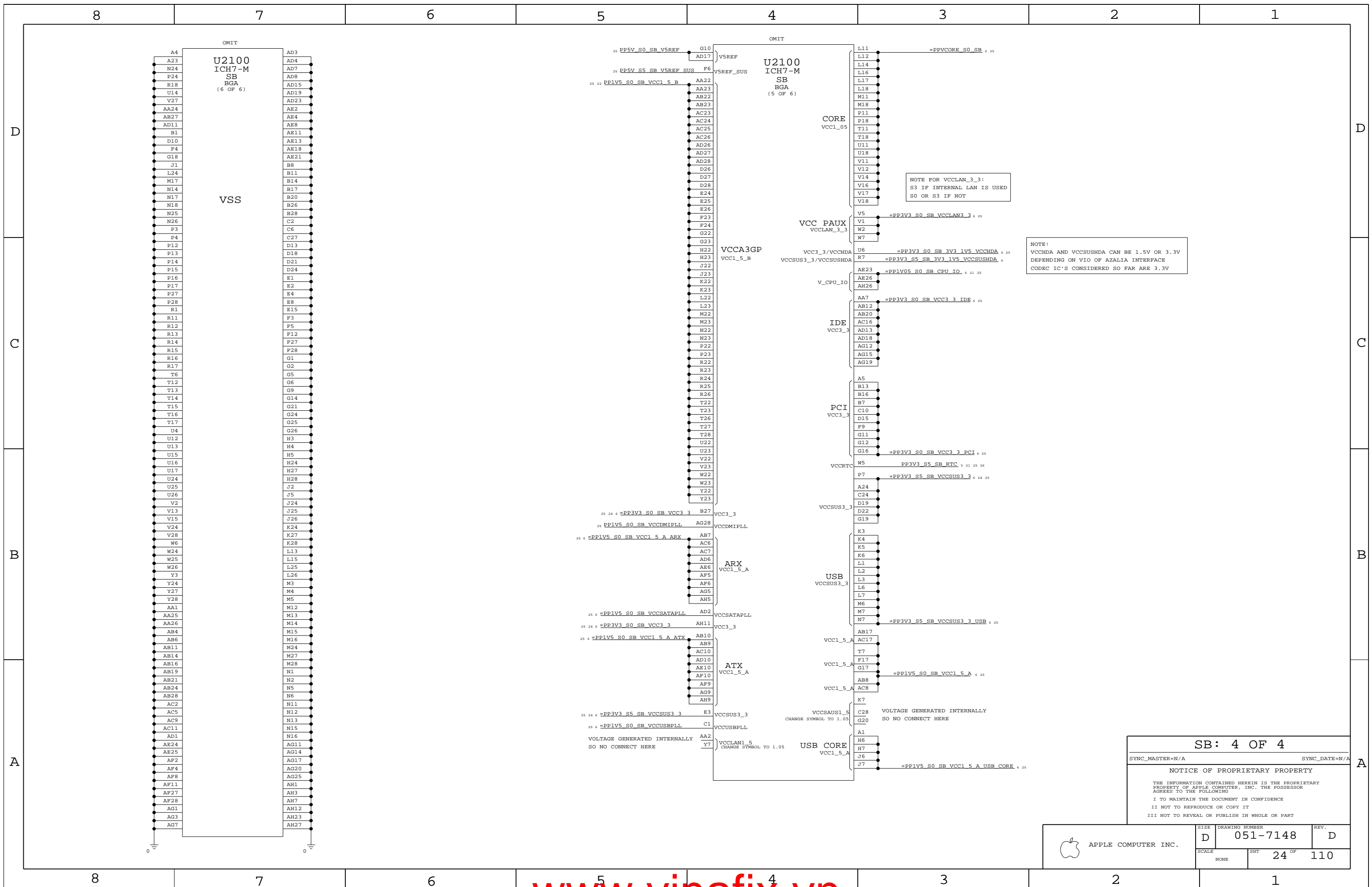
LAYOUT NOTE:
PLACE R2306-14 WHERE PHYSICALLY ACCESSIBLE

SB: 3 OF 4

SYNC_MASTER=N/A SYNC_DATE=N/A

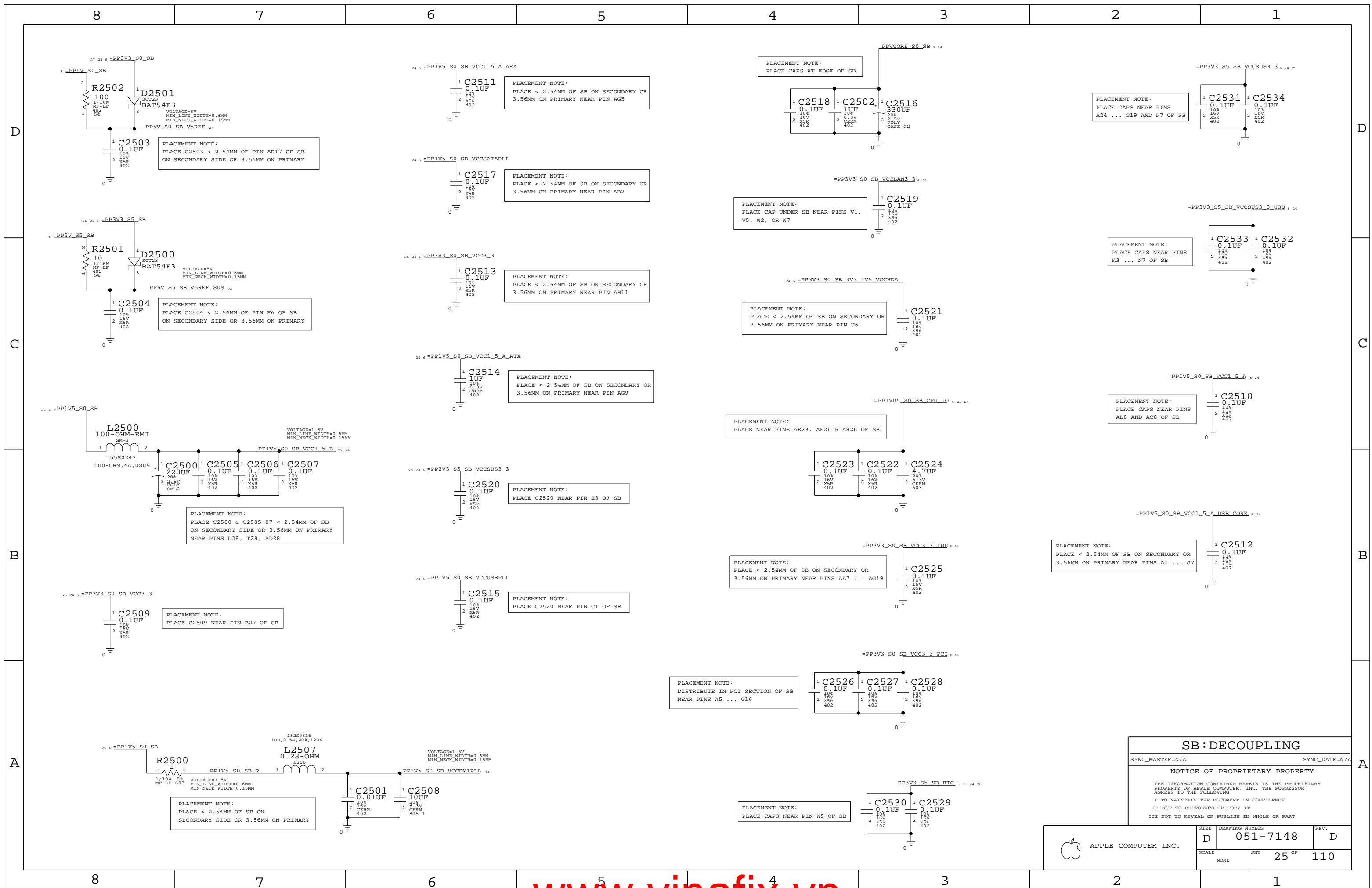
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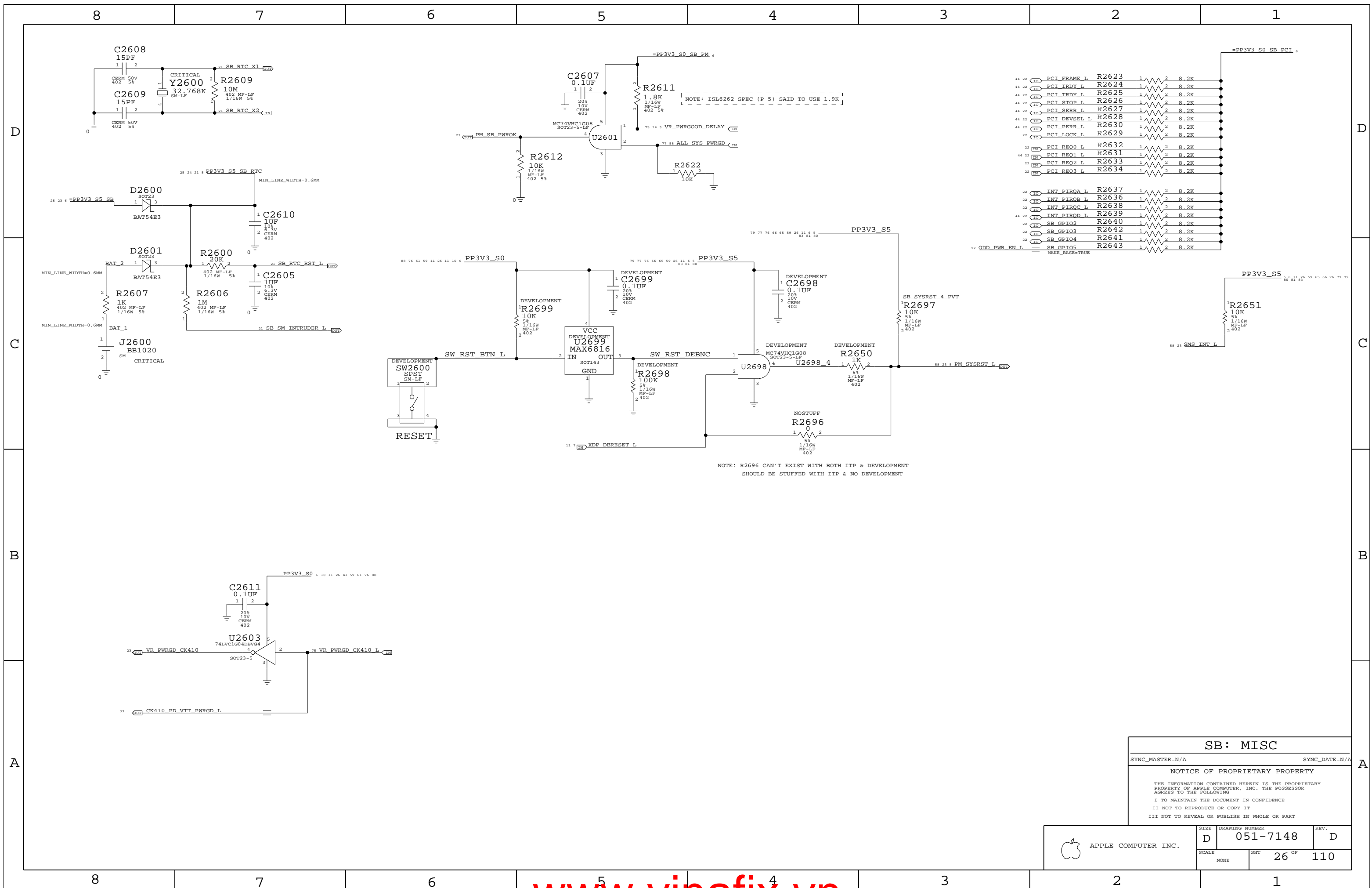
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	23 OF	110
NONE			



SB: 4 OF 4
 SYNC_MASTER=N/A SYNC_DATE=N/A
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	D	051-7148	D
SCALE	SHT	REV.	
NONE	24 OF 110		





SB: MISC

SYNC_MASTER=N/A SYNC_DATE=N/A

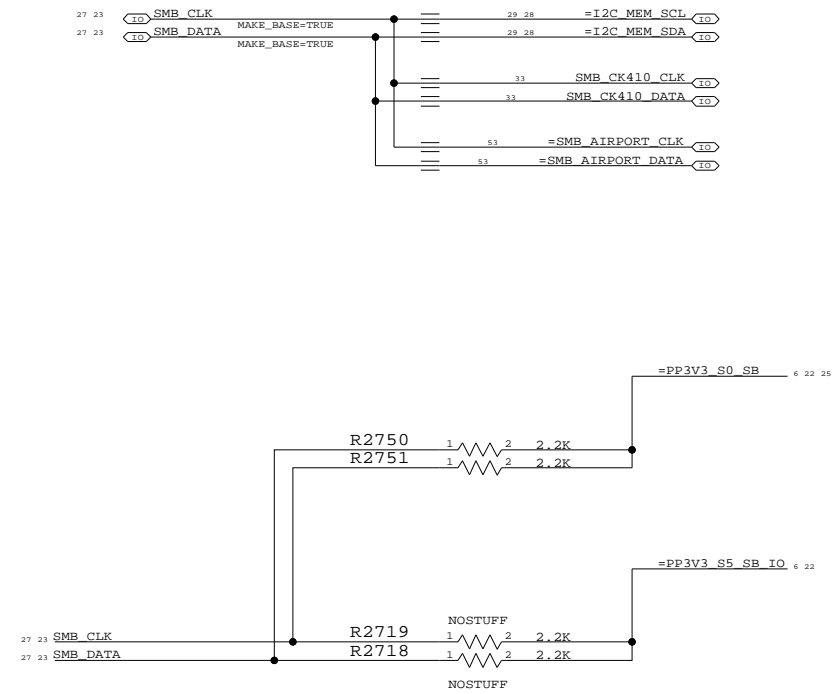
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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7148	REV. D
	SCALE NONE	SHT 26 OF	110

SB I2C BUSSES




SB: SMB HUB

SYNC_MASTER=N/A SYNC_DATE=N/A

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 APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	27 OF 110	
NONE			

Page Notes

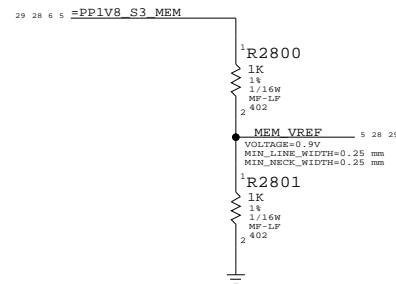
Power aliases required by this page:
 - =PPIV8_S3_MEM
 - =PPSPD_S0_MEM (2.5V - 3.3V)

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

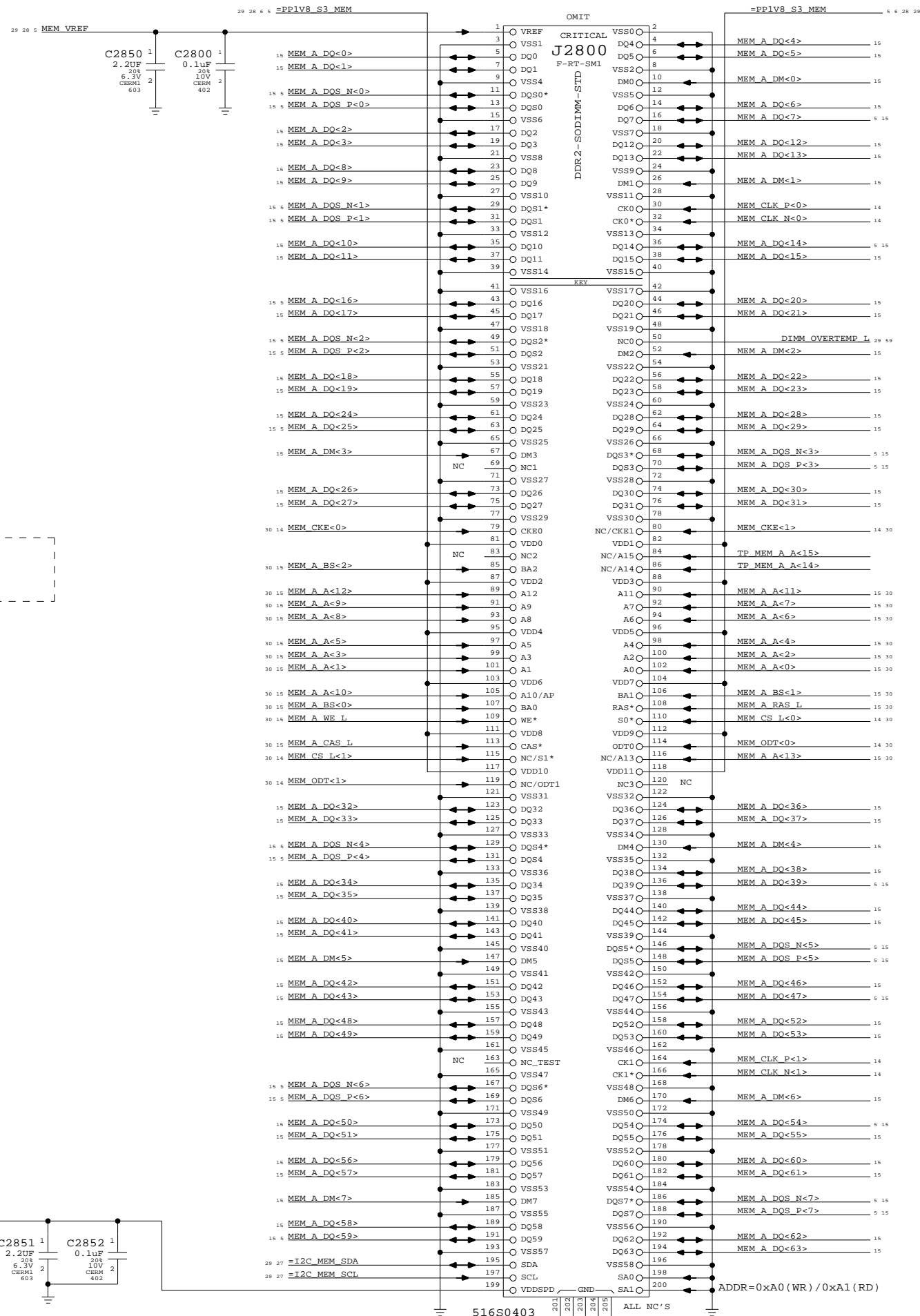
BOM options provided by this page:
 (NONE)

DDR2 VRef

One 0.1uF per connector



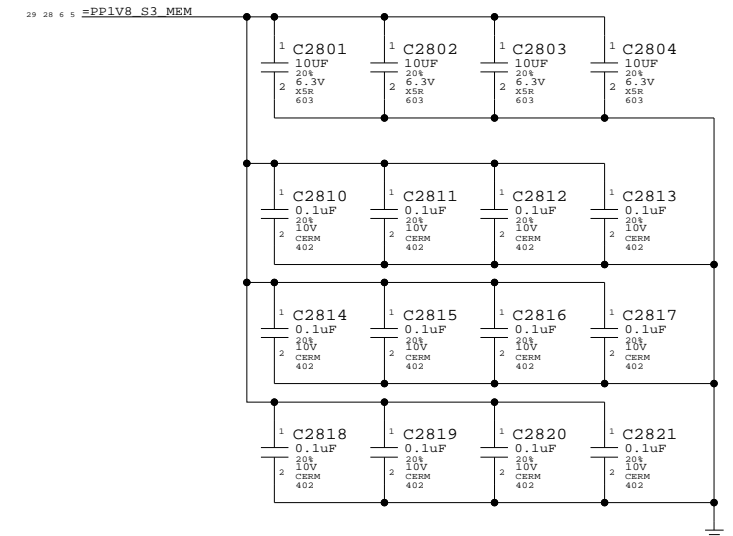
Yellow uses 10K divider and TLV2463 to drive MCH and DIMM connectors.
 (See Capell Valley pg 47)



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
51680503	1	DDR2 SODIMM STD CONN	J2800	CRITICAL	

DDR2 Bypass Caps

(For return current)



DDR2 SO-DIMM Connector A

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	
NONE	28	110	

Page Notes

Power aliases required by this page:

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

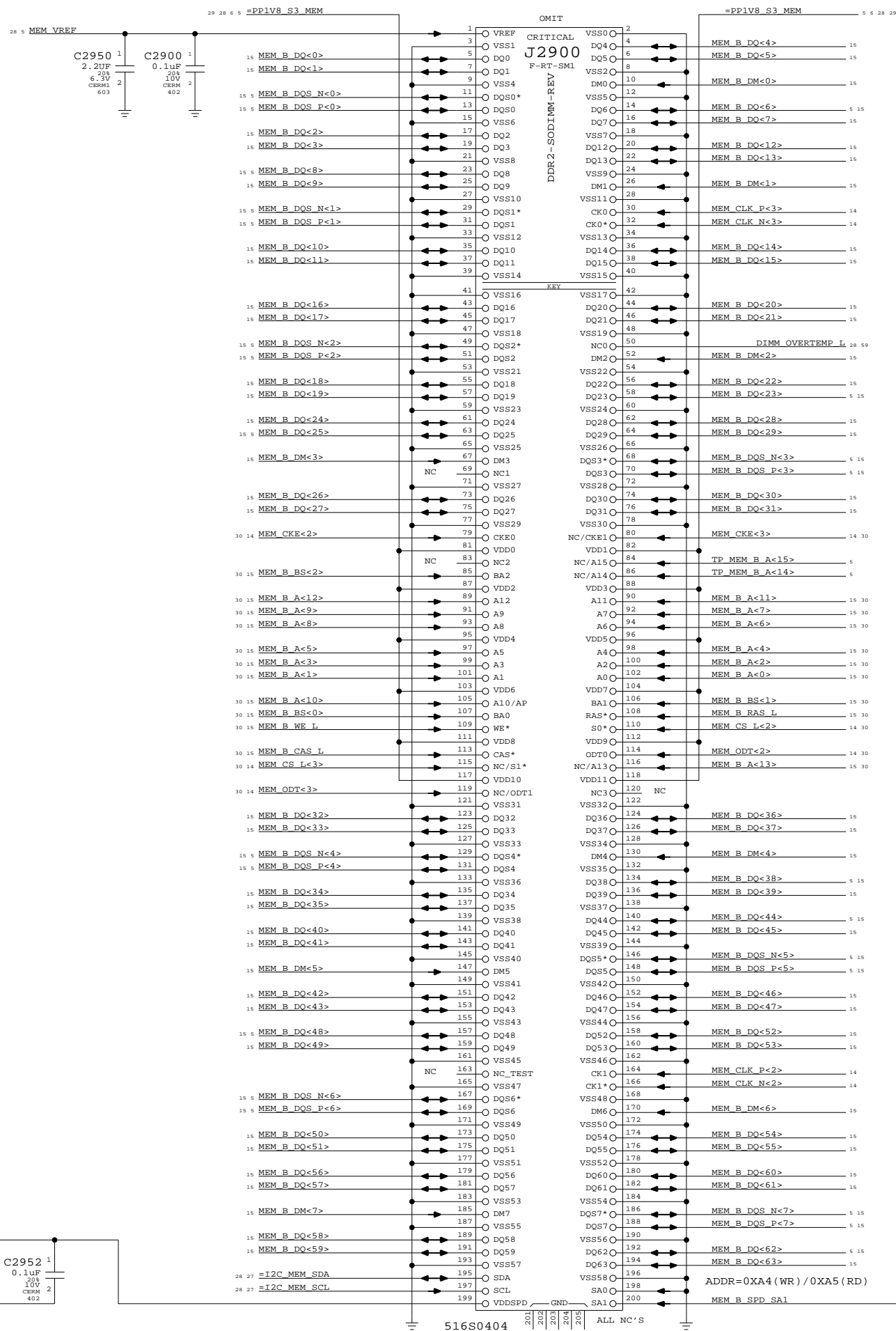
Signal aliases required by this page:

- =I2C_MEM_SCL
- =I2C_MEM_SDA

BOM options provided by this page:

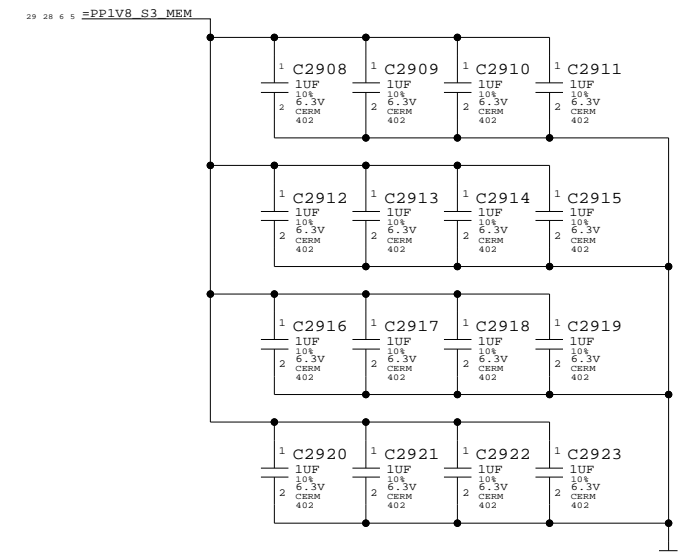
(NONE)

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



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
516S0504	1	DDR2 SODIMM REV CONN	J2900	CRITICAL	

DDR2 Bypass Caps (For return current)



DDR2 SO-DIMM Connector B

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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SCALE	SHT	OF	REV.
NONE	29	110	D

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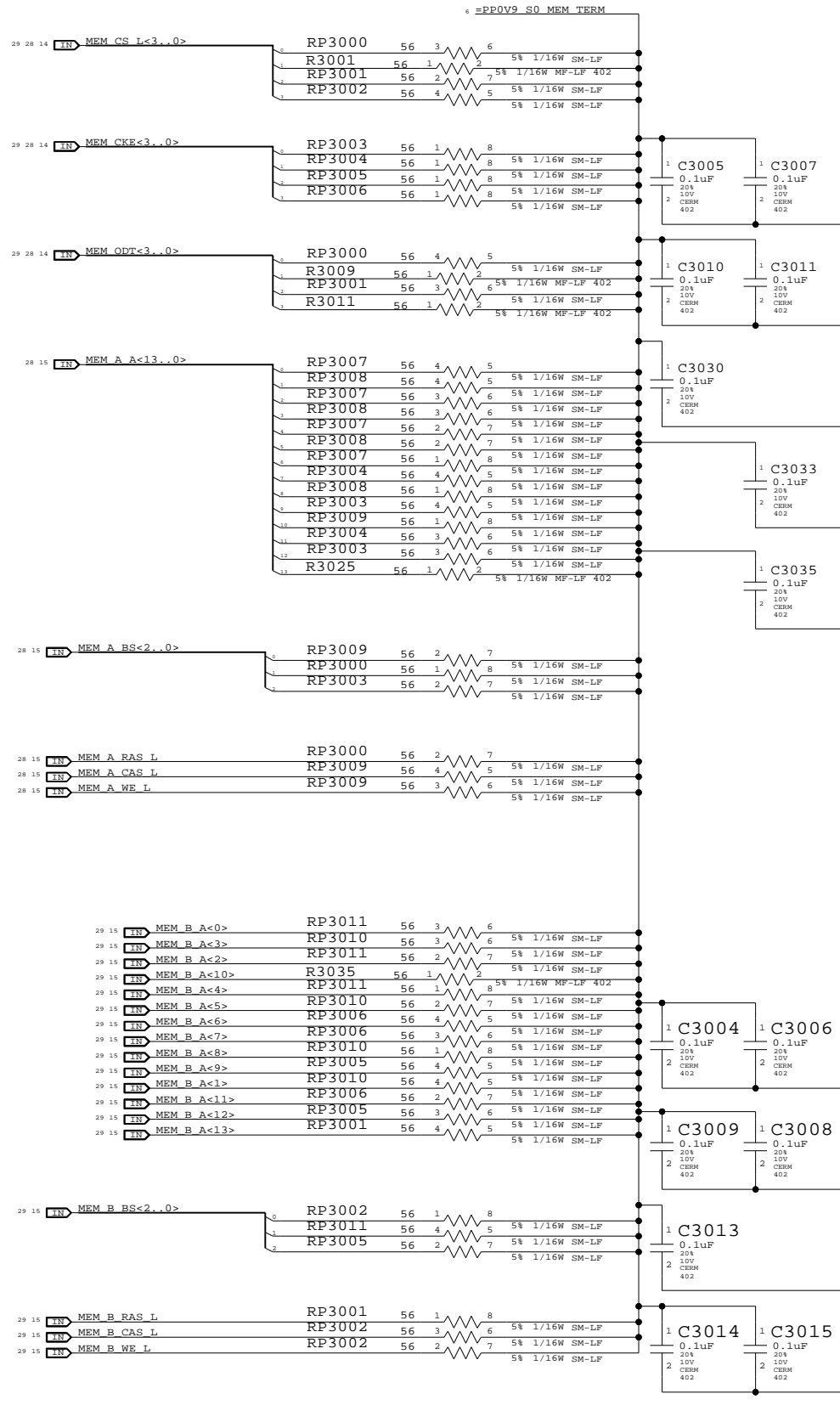
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One cap for each side of every RPAK, one cap for every two discrete resistors
BOMOPTION shown at the top of each group applies to every part below it



Memory Active Termination

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	
NONE	30	110	

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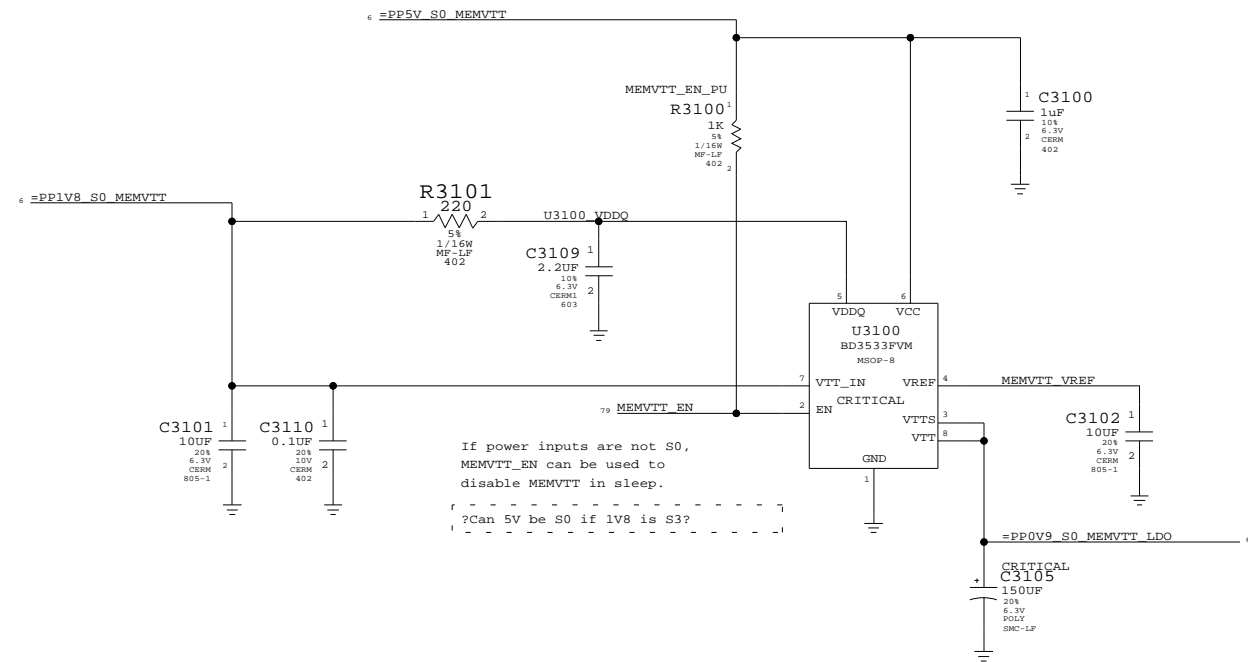
Page Notes

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

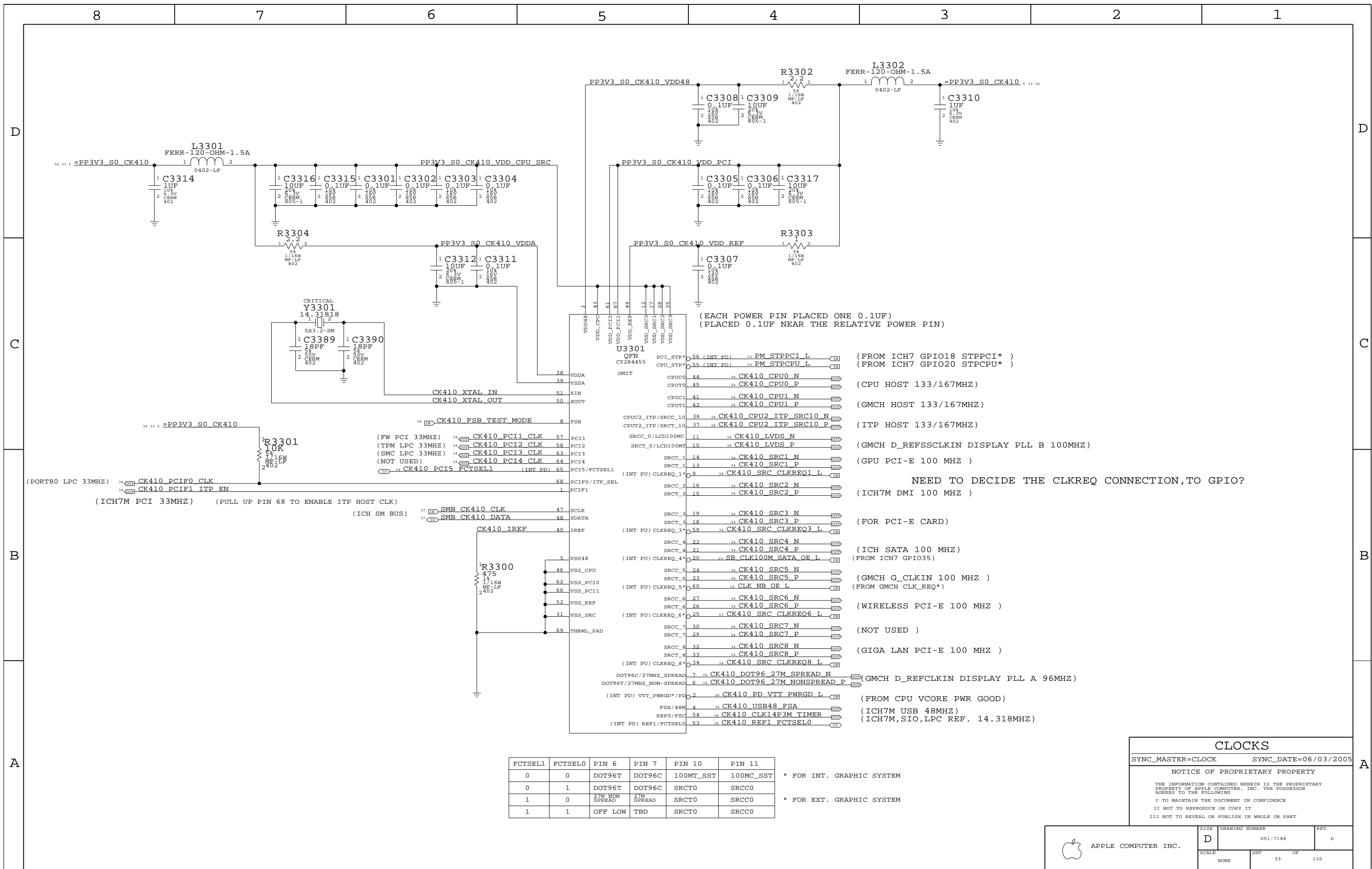
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	REV.
NONE	31	110	



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

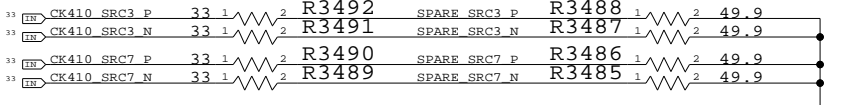
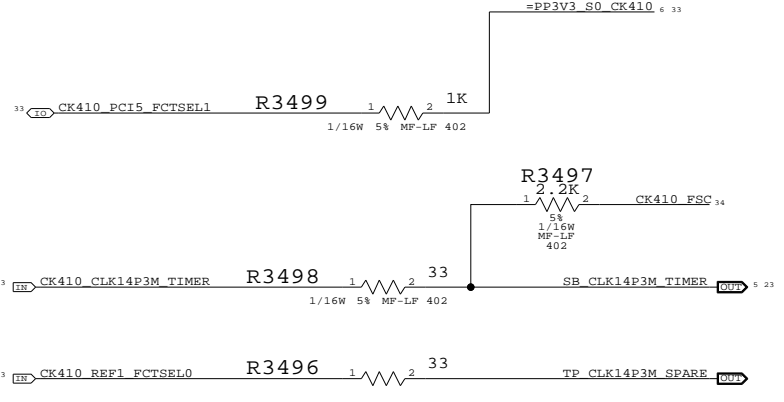
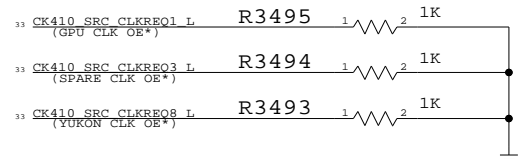
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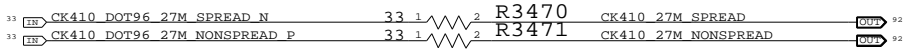
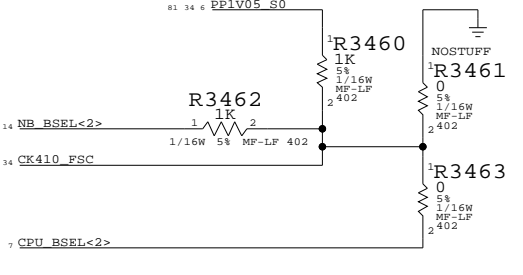
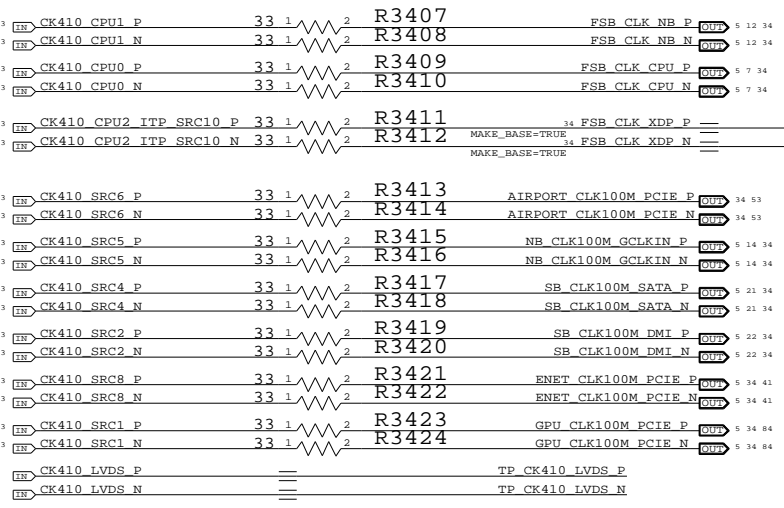
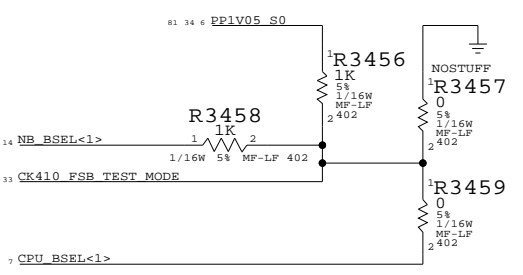
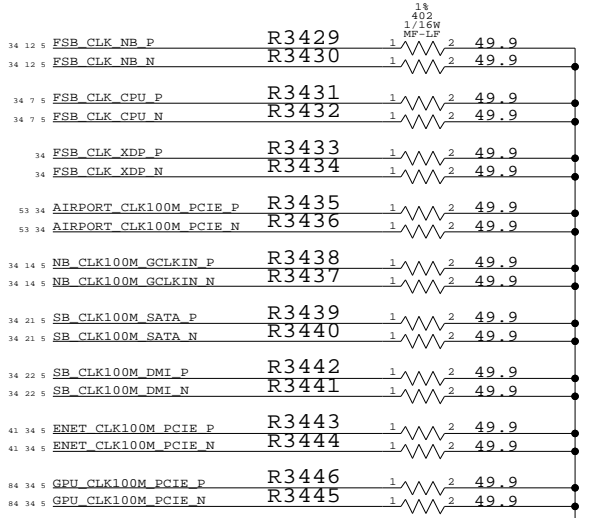
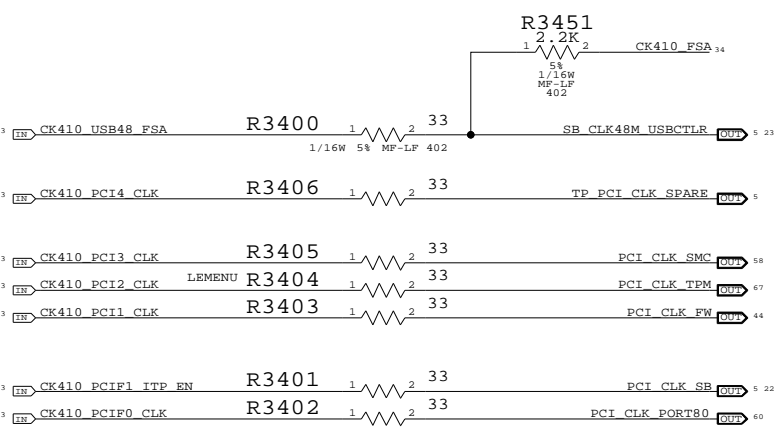
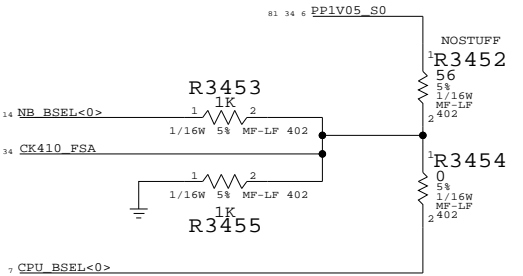
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	110
NONE	33		

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 R3454 R3455	R3456 R3457
667MHZ (166MHZ CPU CLK)	R3452 R3454 R3455	R3456 R3457



CLOCKS: TERMINATIONS

SYNC_MASTER=N/A SYNC_DATE=N/A

NOTICE OF PROPRIETARY PROPERTY

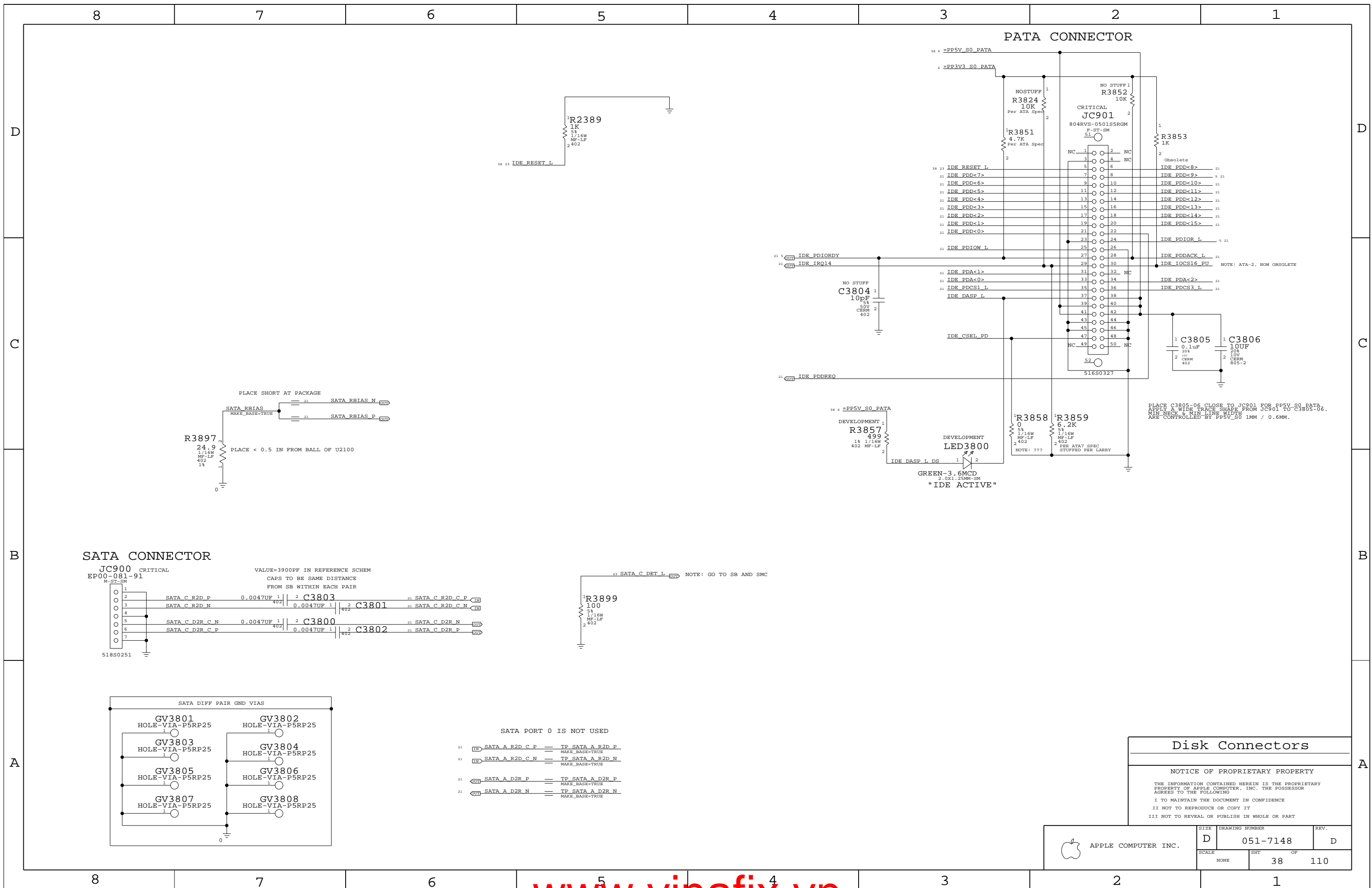
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	D	051-7148	D
SCALE	SHT	OF	REV.
NONE	34	110	



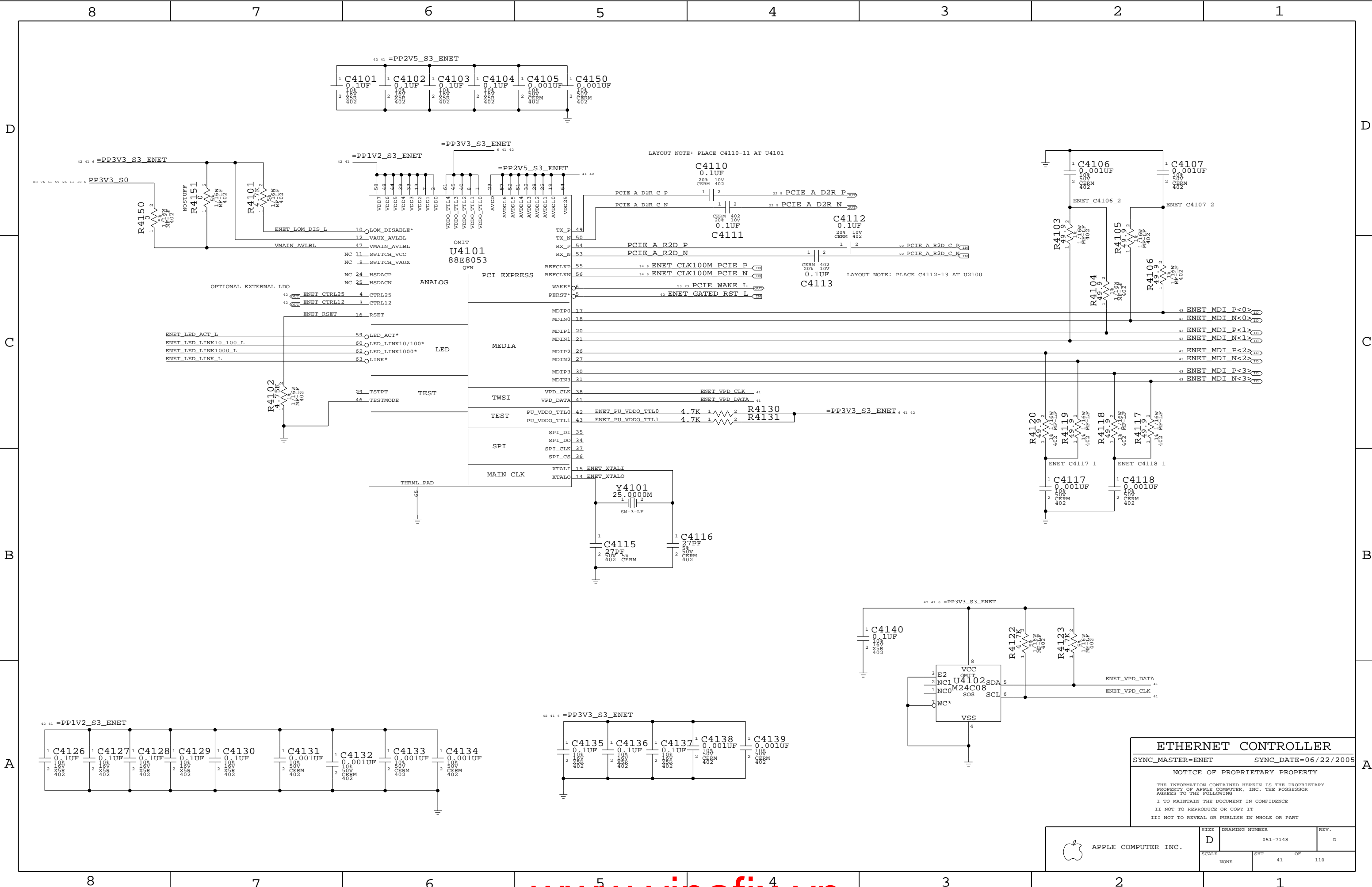
Disk Connectors

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	D	051-7148	D
SCALE	SHT OF		
NONE	38	110	



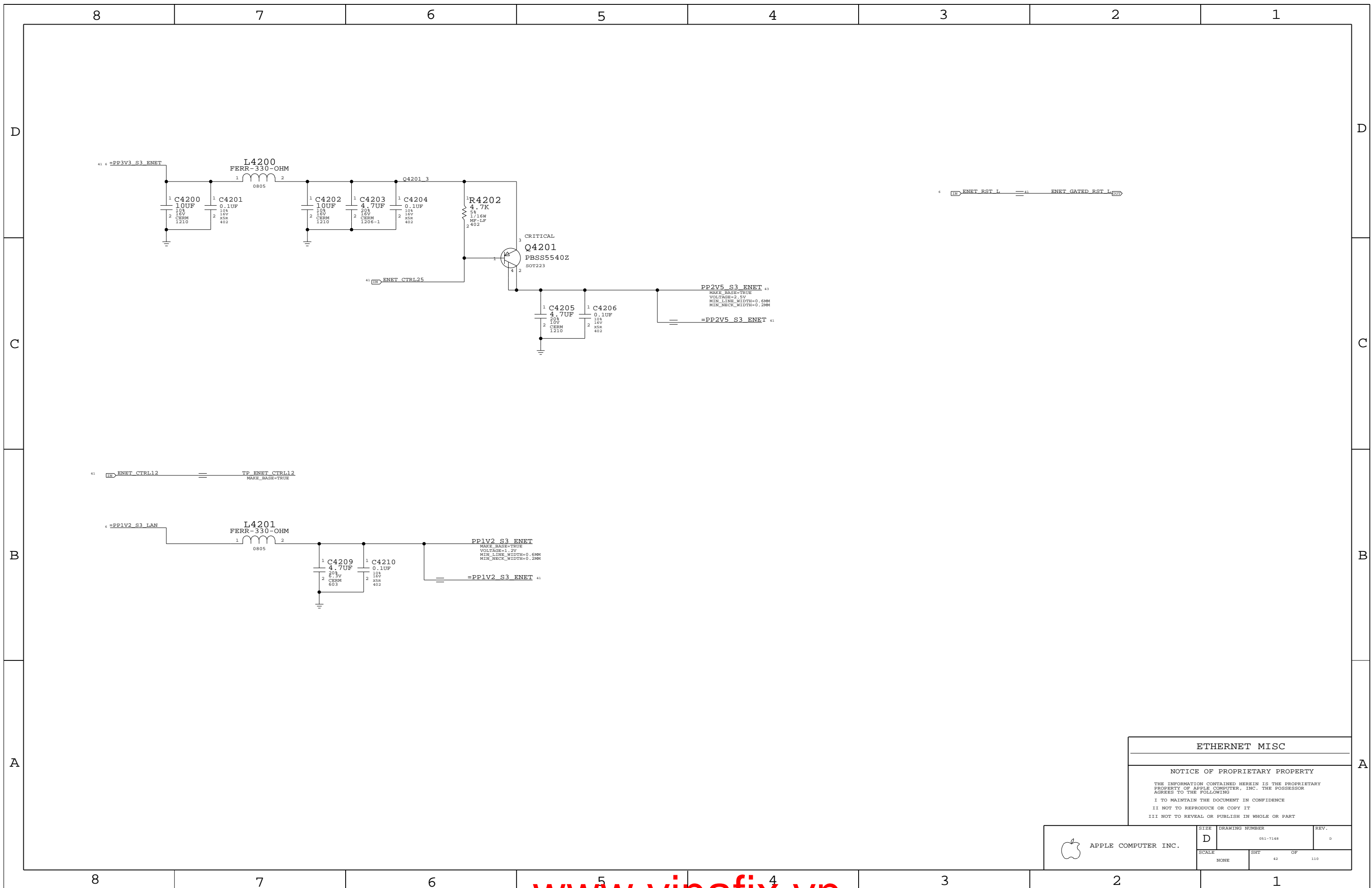
ETHERNET CONTROLLER
 SYNC_MASTER=ENET SYNC_DATE=06/22/2005

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	SCALE NONE	SHEET 41	OF 110



ETHERNET MISC

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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7148	REV. D
	SCALE NONE	SHEET 42	OF 110

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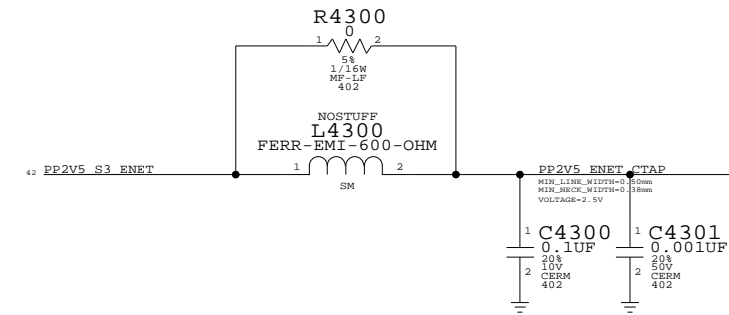
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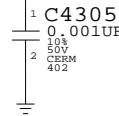
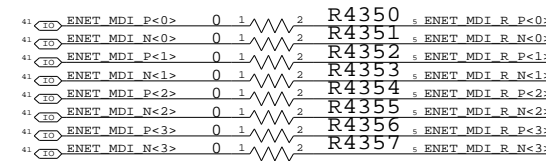
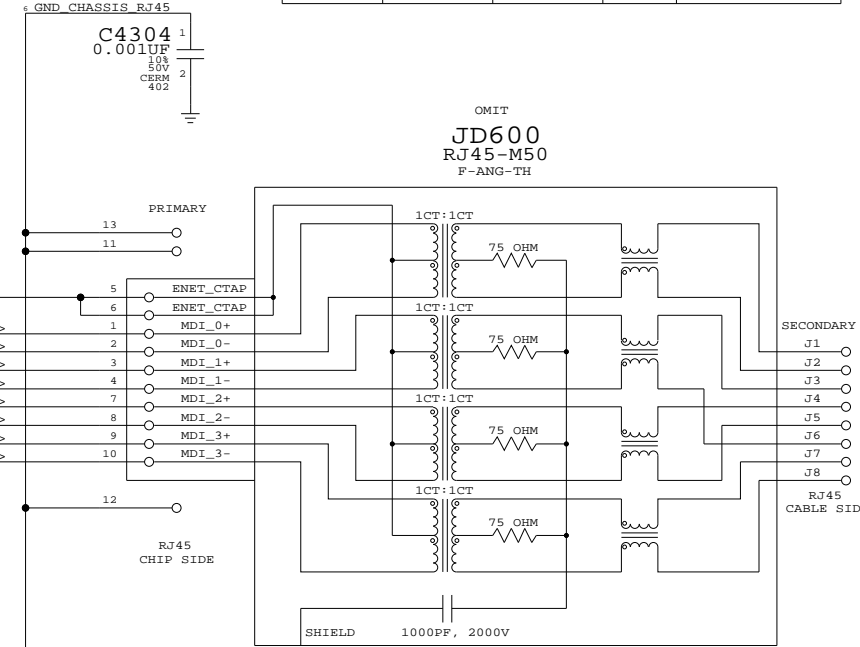
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0366	1	FOXCONN AND DELTA RJ45	JD600	CRITICAL	

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:



ETHERNET CONNECTOR

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	D	051-7148	D
SCALE	SHT OF		
NONE	43 OF 110		

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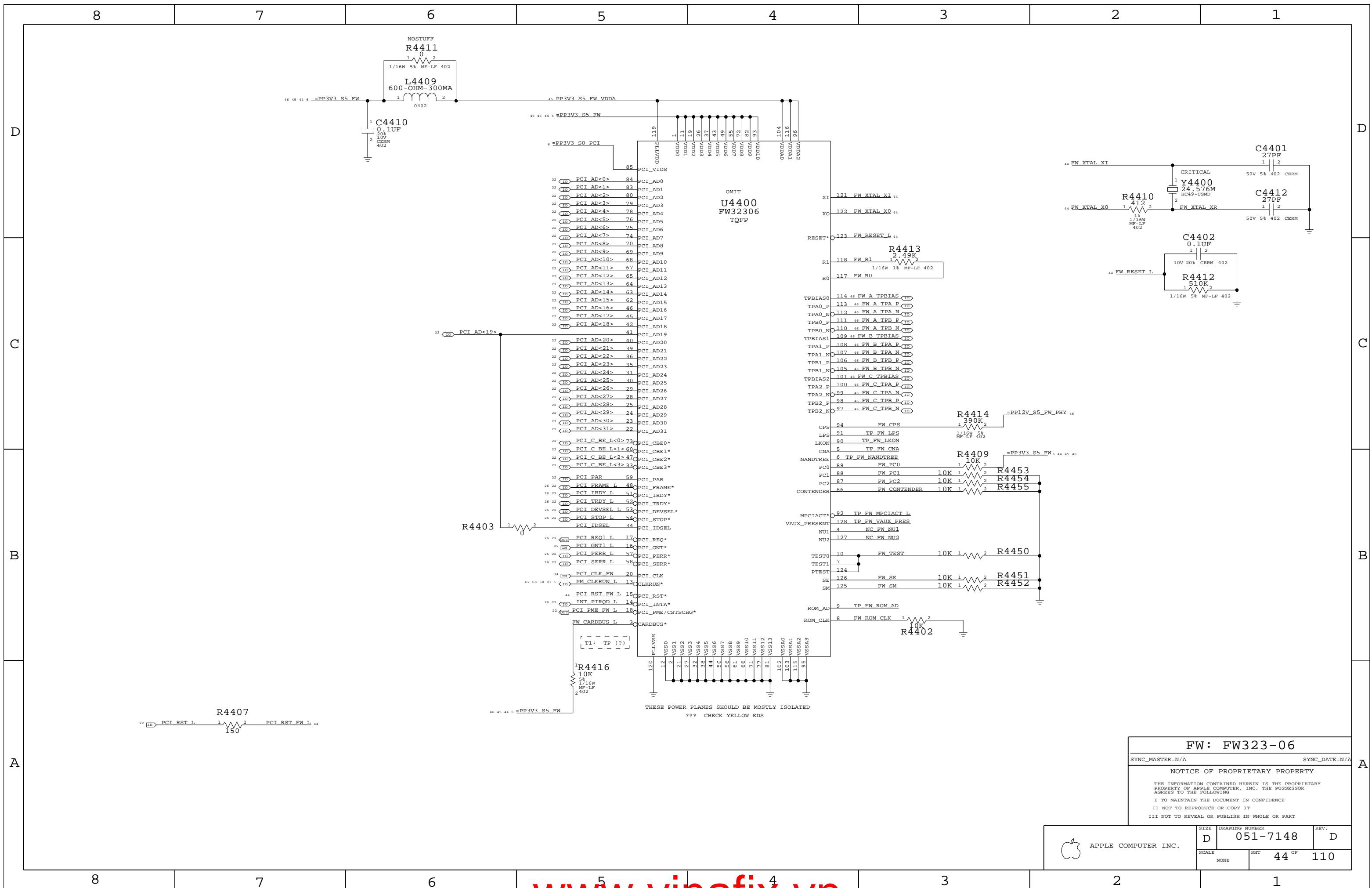
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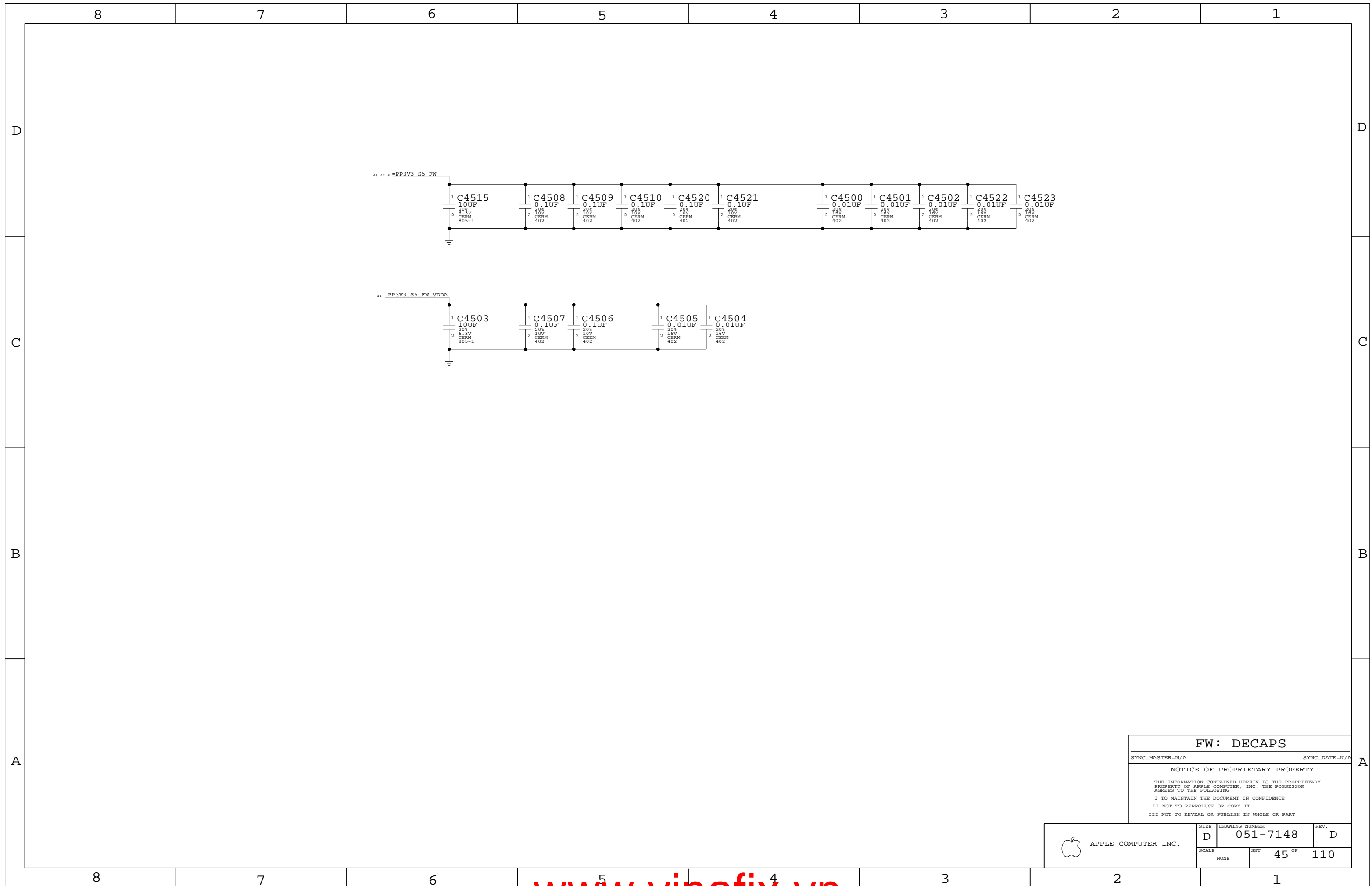
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FW: FW323-06
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	D	051-7148	D
SCALE	SHT	44 OF	110
NONE			



FW: DECAPS

SYNC_MASTER=N/A SYNC_DATE=N/A


NOTICE OF PROPRIETARY PROPERTY

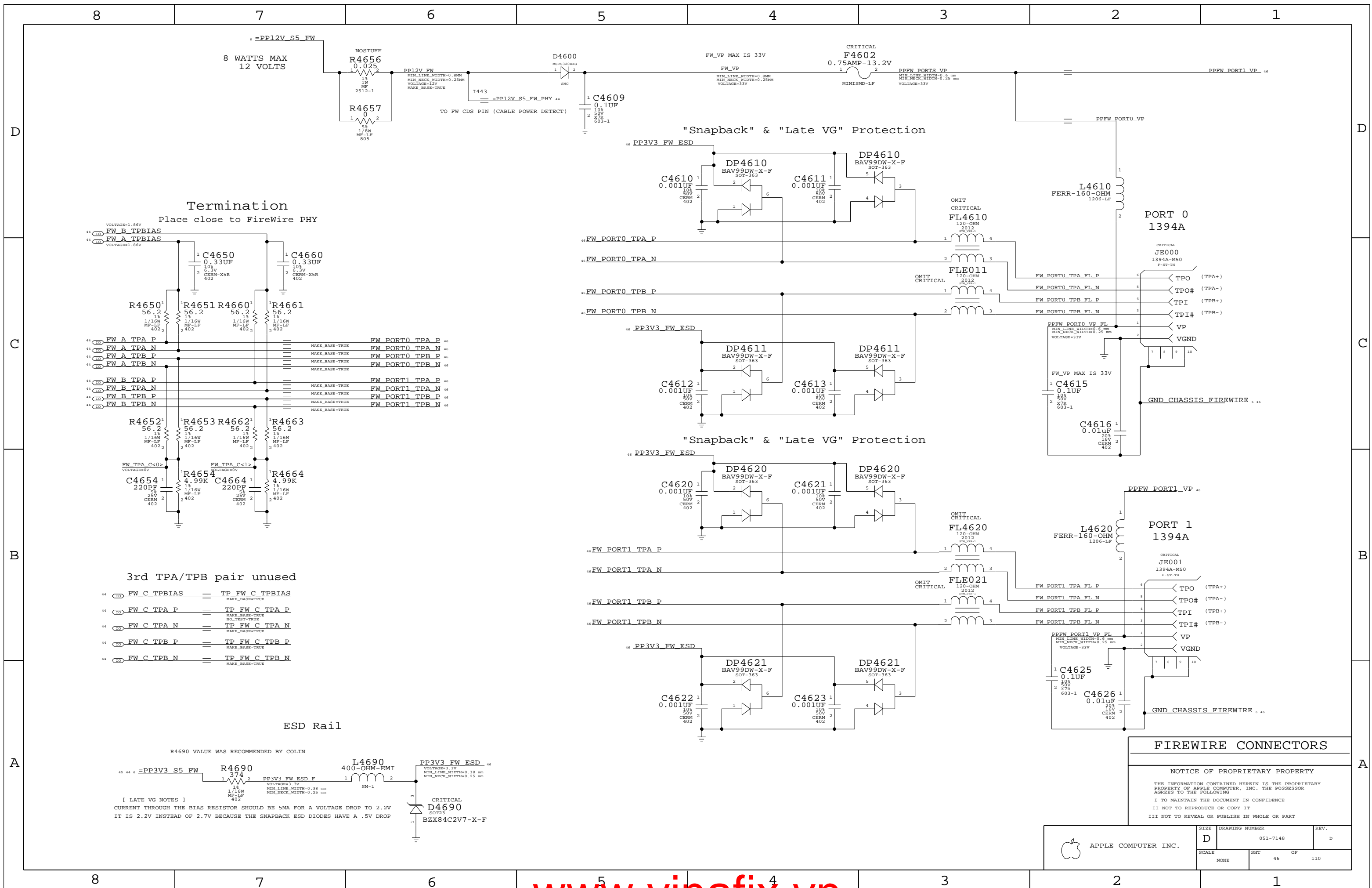
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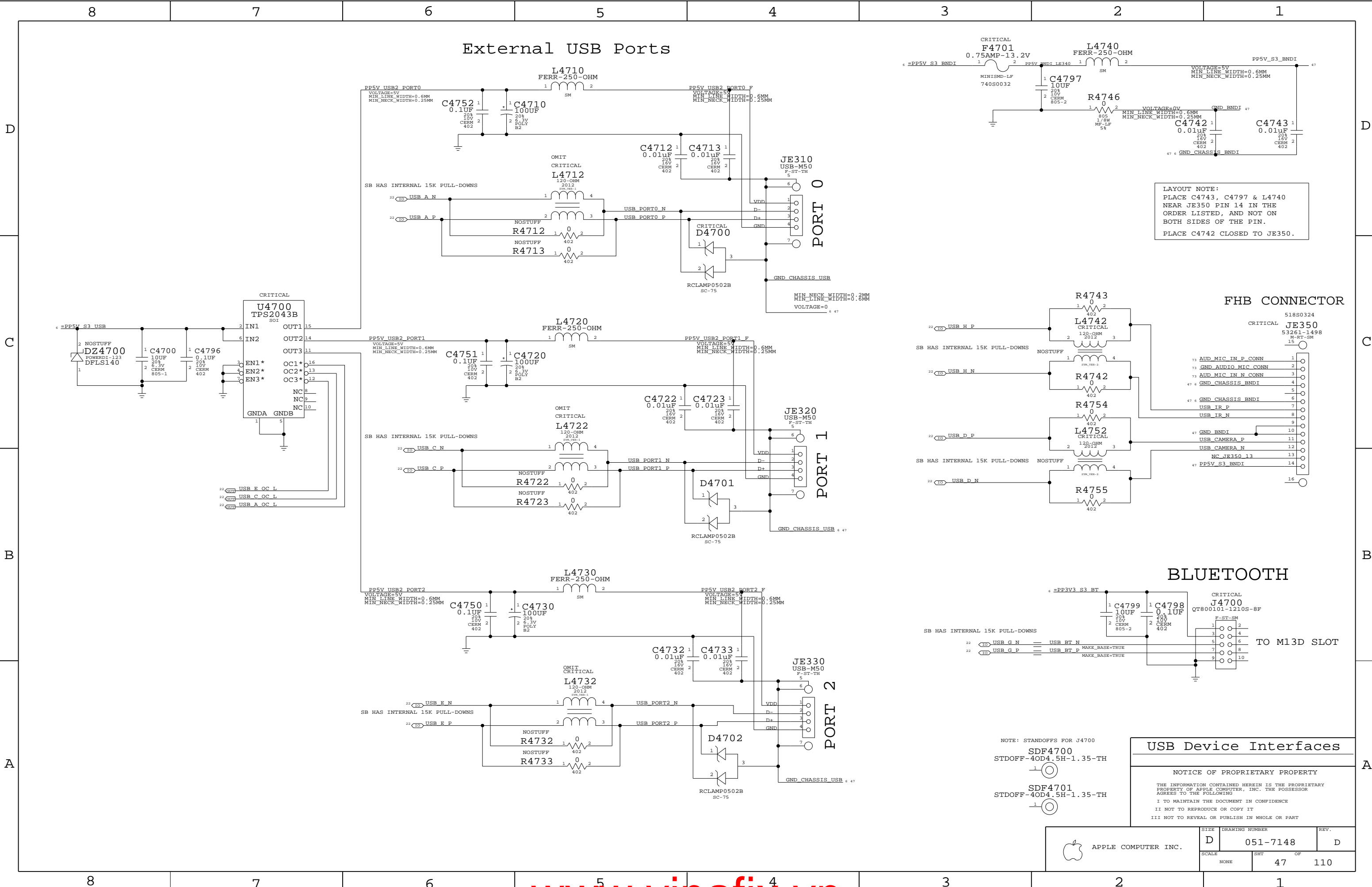
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	D	051-7148	D
SCALE	SHT	OF	
NONE	45	110	

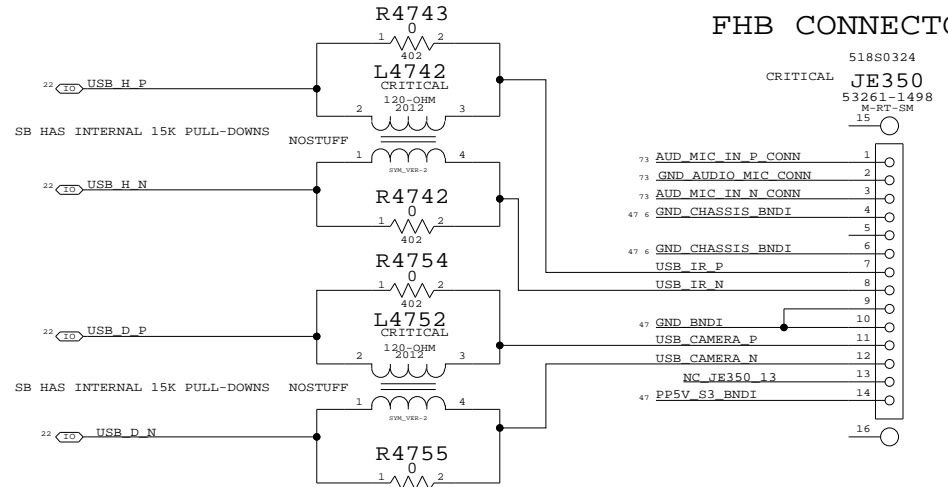


External USB Ports

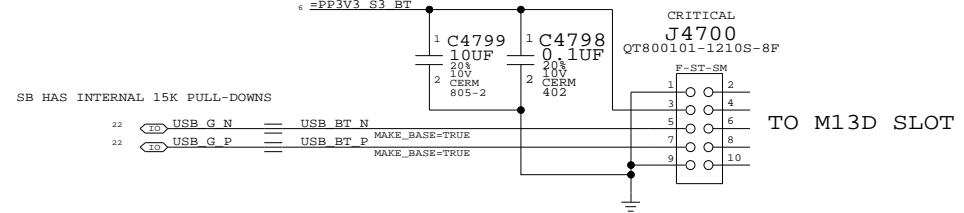


LAYOUT NOTE:
 PLACE C4743, C4797 & L4740
 NEAR JE350 PIN 14 IN THE
 ORDER LISTED, AND NOT ON
 BOTH SIDES OF THE PIN.
 PLACE C4742 CLOSED TO JE350.

FHB CONNECTOR



BLUETOOTH

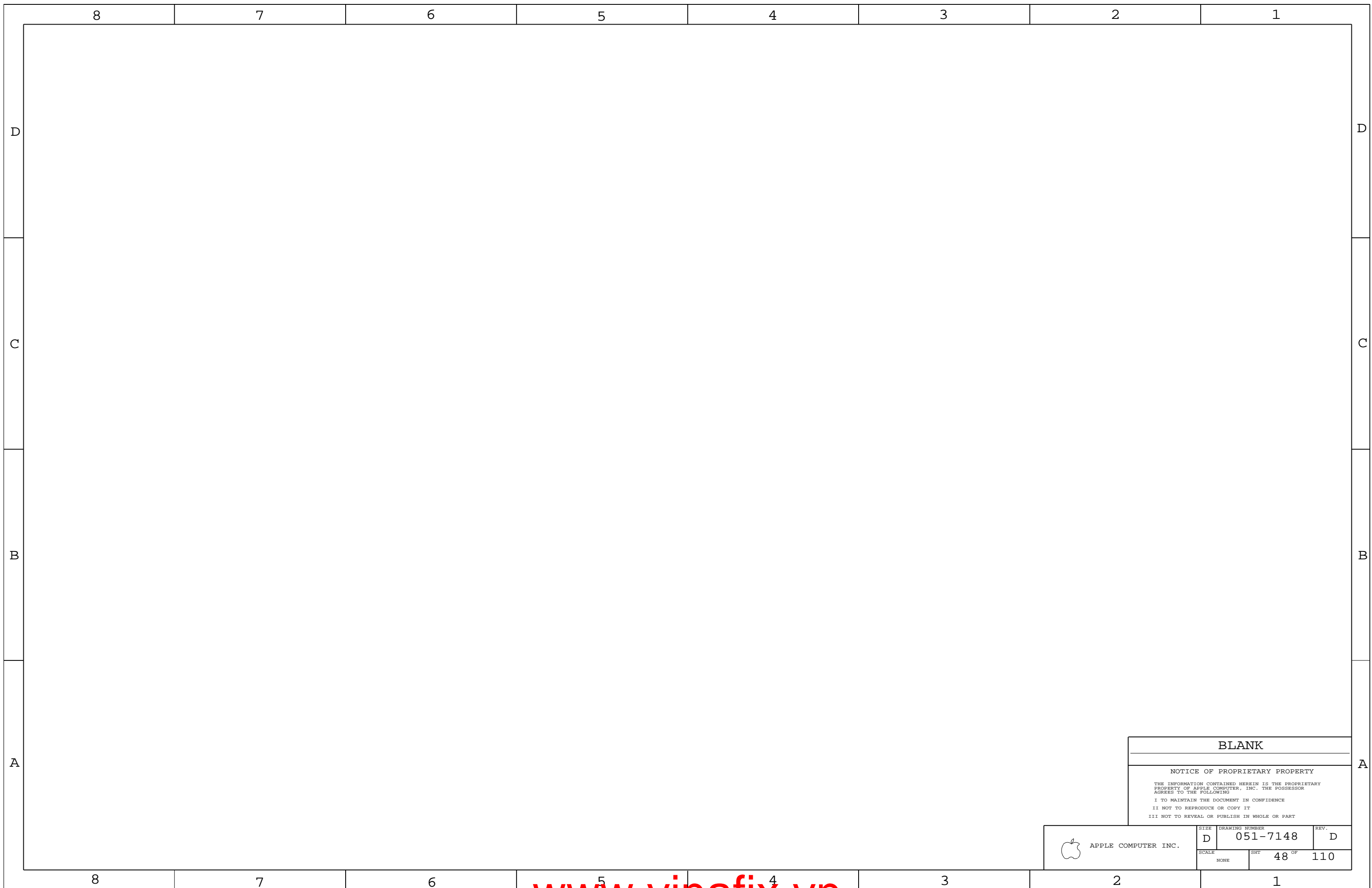


NOTE: STANDOFFS FOR J4700
 SDF4700
 STDOFF-40D4.5H-1.35-TH
 SDF4701
 STDOFF-40D4.5H-1.35-TH

USB Device Interfaces

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	D	051-7148	D
SCALE	NONE	SHT	OF
		47	110



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	<small>SCALE</small> NONE	<small>SHT</small> 48 OF	<small>110</small>

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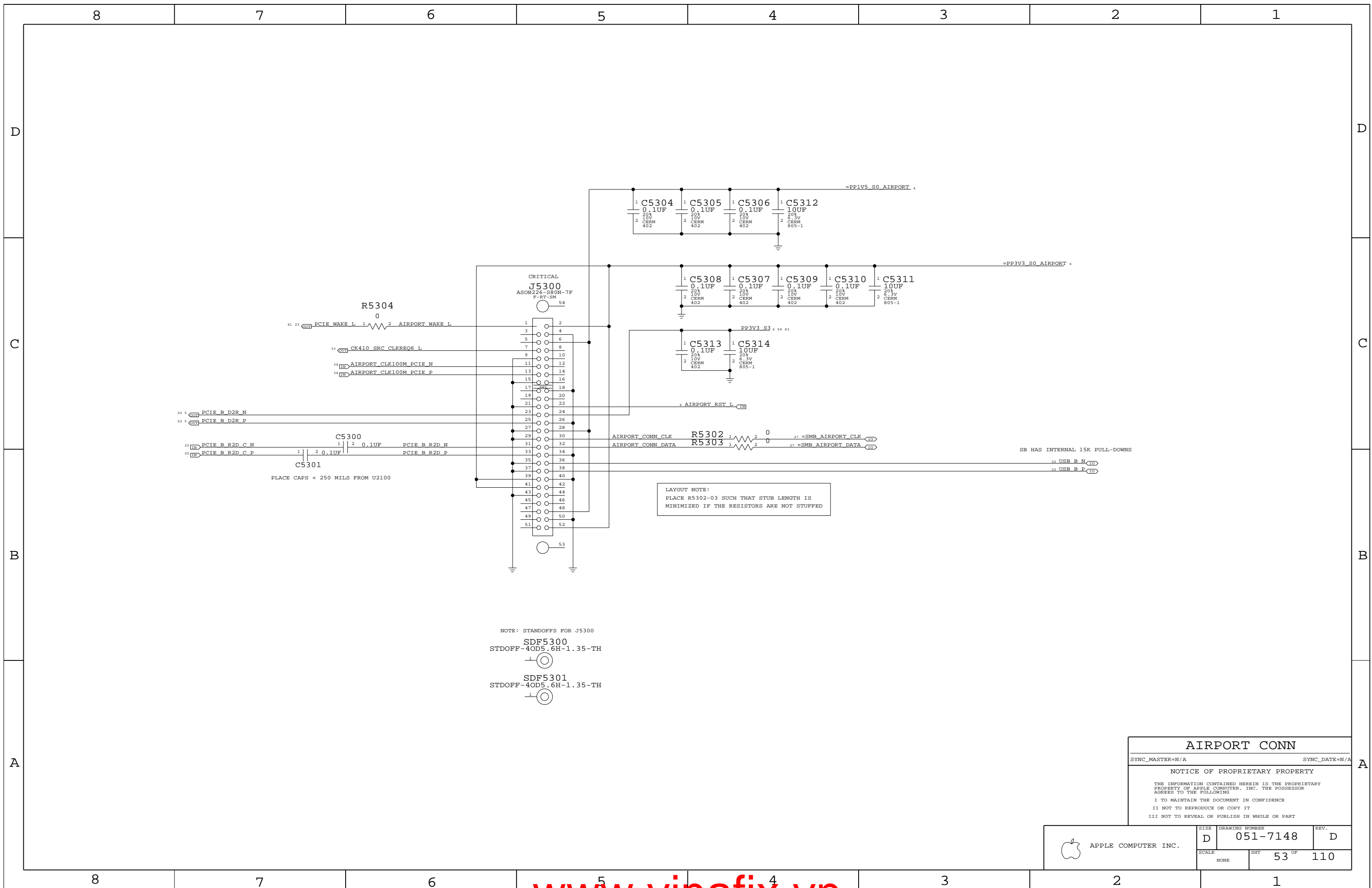
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www.vinafix.vn



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
22 USB_B_N
22 USB_B_P

AIRPORT CONN

SYNC_MASTER=N/A SYNC_DATE=N/A

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	SCALE NONE	SHEET 53 OF 110	

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D

D

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C

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B

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22		PCIE C R2D C N	==	TP PCIE C R2D C N	MAKE_BASE=TRUE
22		PCIE C R2D C P	==	TP PCIE C R2D C P	MAKE_BASE=TRUE
22		PCIE C D2R N	==	TP PCIE C D2R N	MAKE_BASE=TRUE
22		PCIE C D2R P	==	TP PCIE C D2R P	MAKE_BASE=TRUE
22		PCIE D R2D C N	==	TP PCIE D R2D C N	MAKE_BASE=TRUE
22		PCIE D R2D C P	==	TP PCIE D R2D C P	MAKE_BASE=TRUE
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PCIE UNUSED PORTS

SYNC_MASTER=N/A SYNC_DATE=N/A

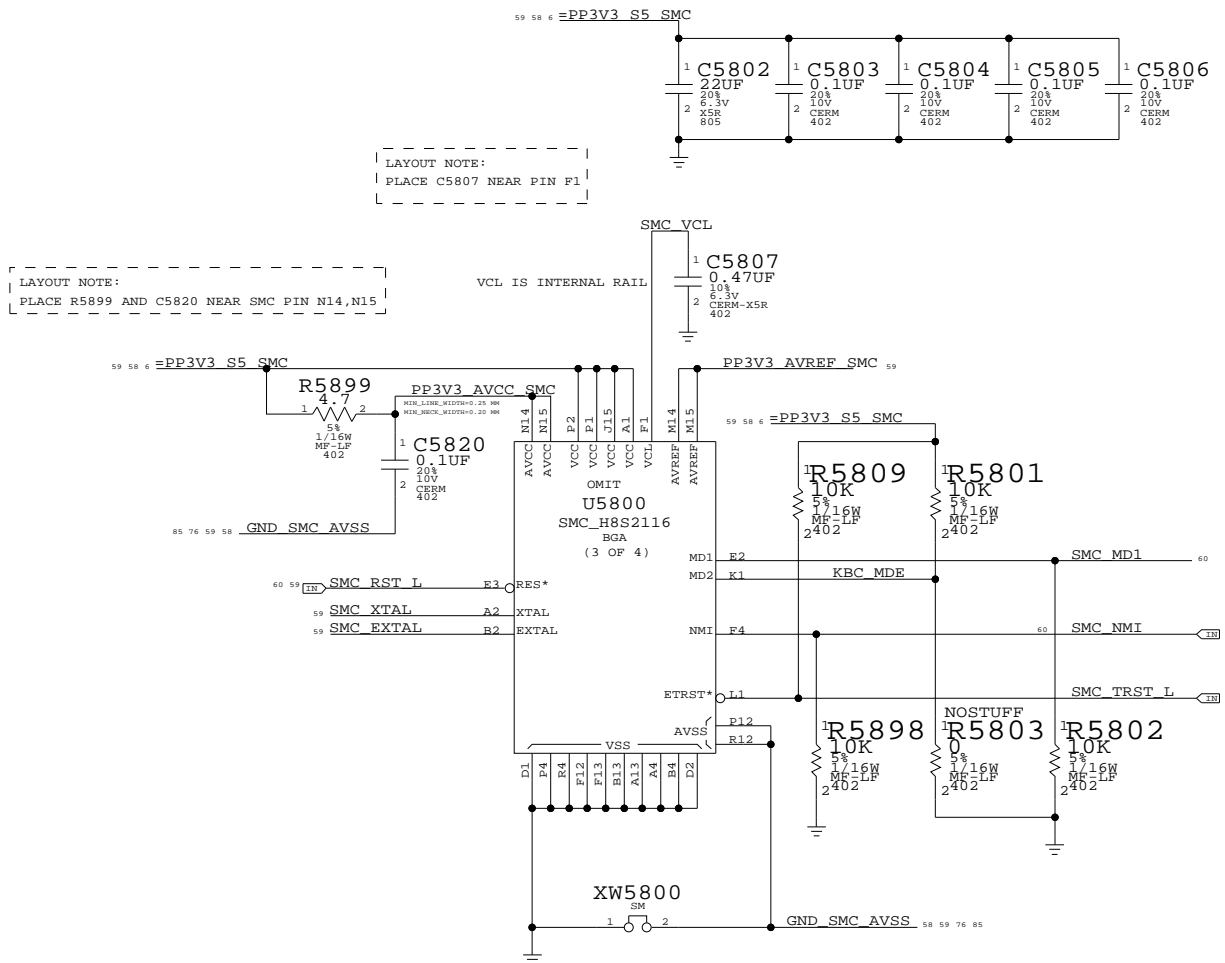
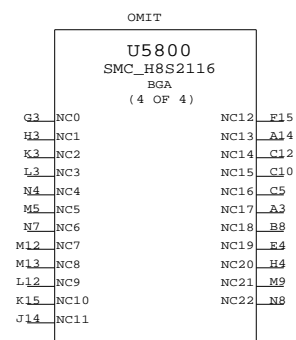
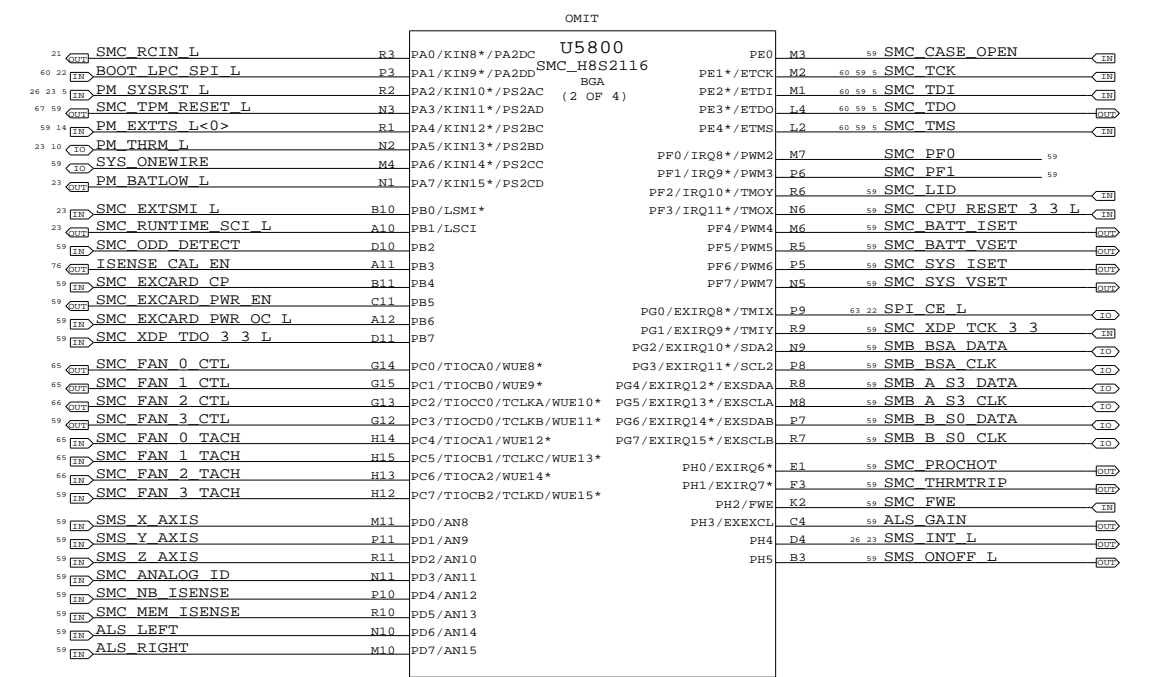
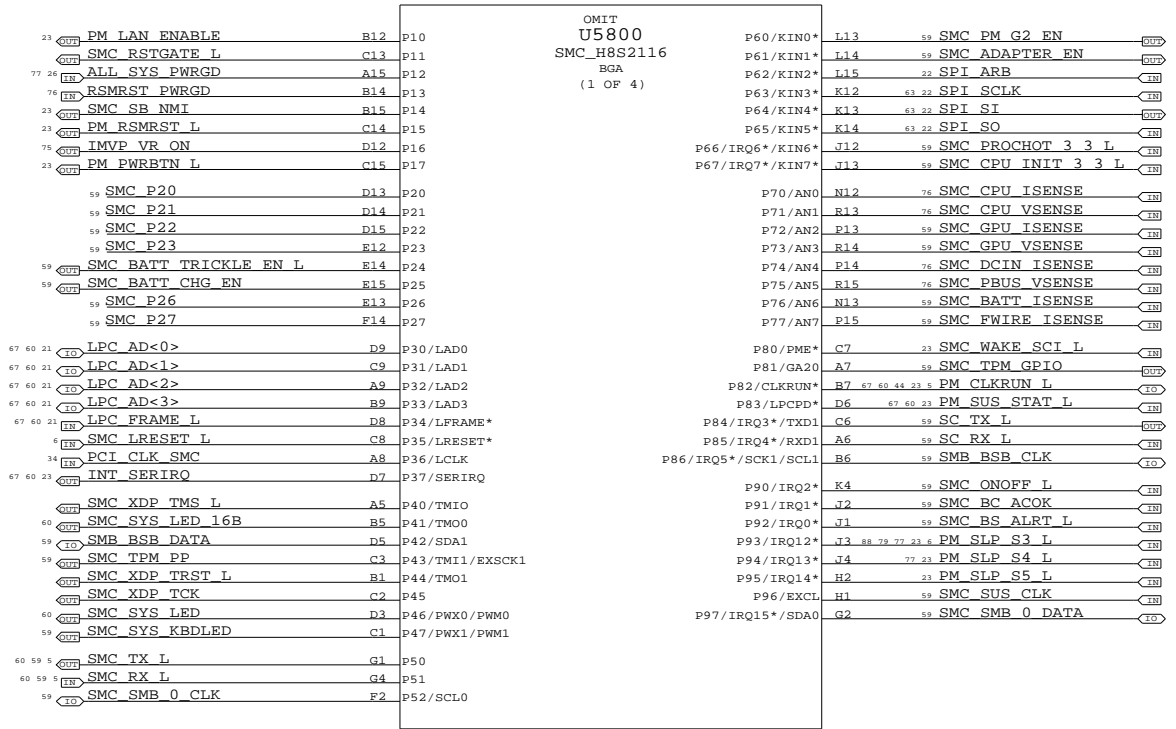
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	APPLE COMPUTER INC.		SIZE	DRAWING NUMBER	REV.
			D	051-7148	D
	SCALE	SHT			
	NONE	54 OF	110		

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.



SMC

SYNC_MASTER=N/A SYNC_DATE=N/A

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	SCALE NONE	SHT 58 OF 110	

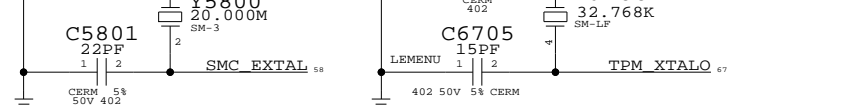
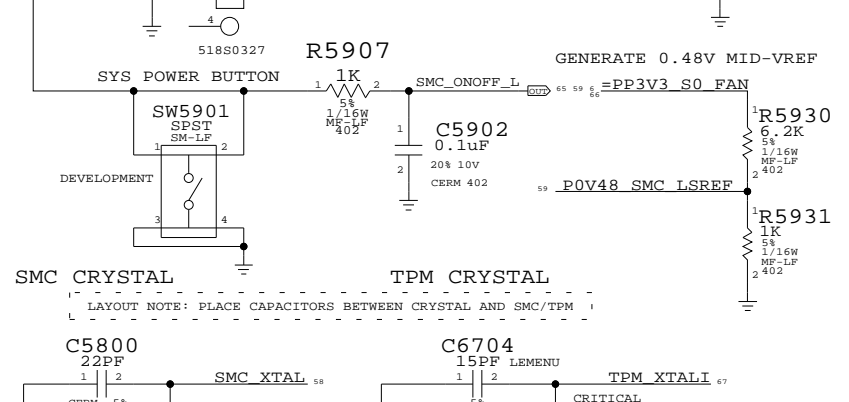
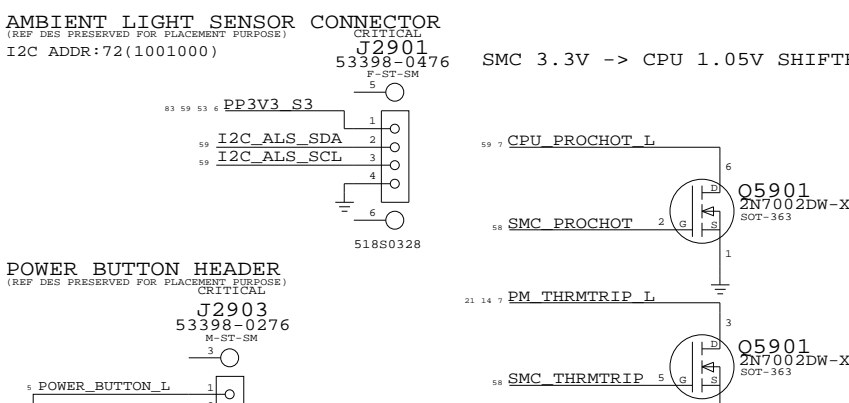
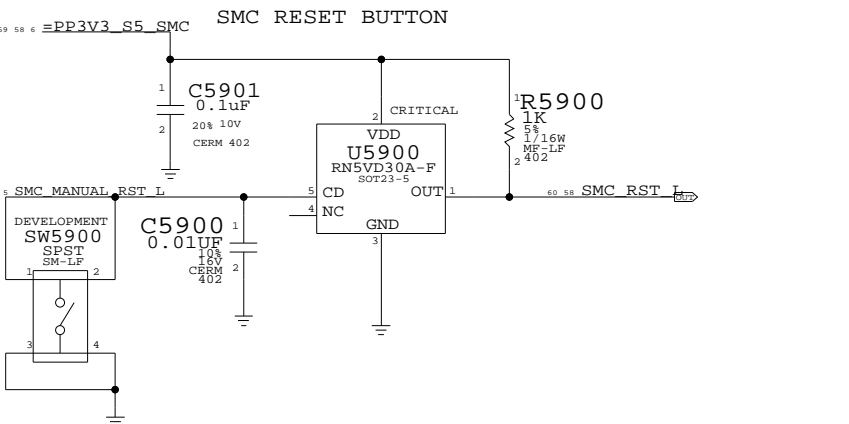
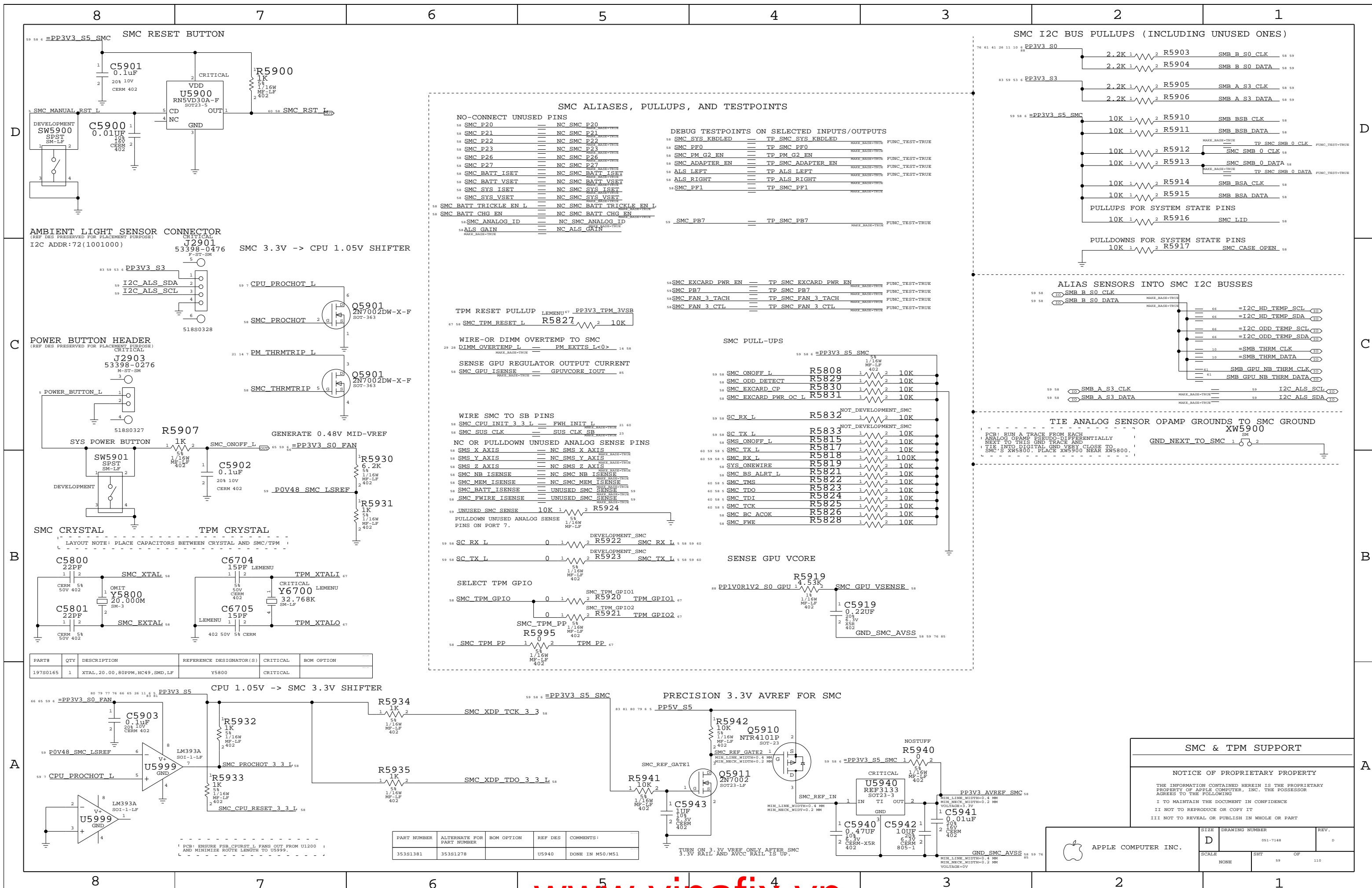
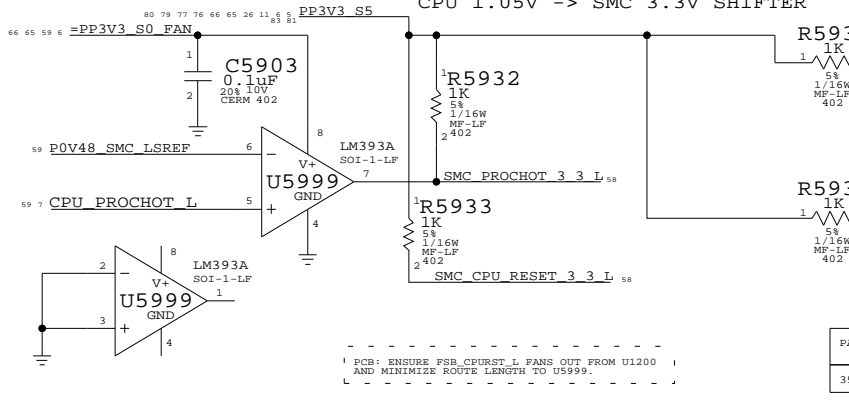


Table with 5 columns: PART#, QTY, DESCRIPTION, REFERENCE DESIGNATOR(S), CRITICAL, BOM OPTION. Row 1: 197S0165, 1, XTAL, 20.00, 80PPM, HC49, SMD, LF, Y5800, CRITICAL.



SMC ALIASES, PULLUPS, AND TESTPOINTS table listing various pins and their connections to testpoints or pullups.

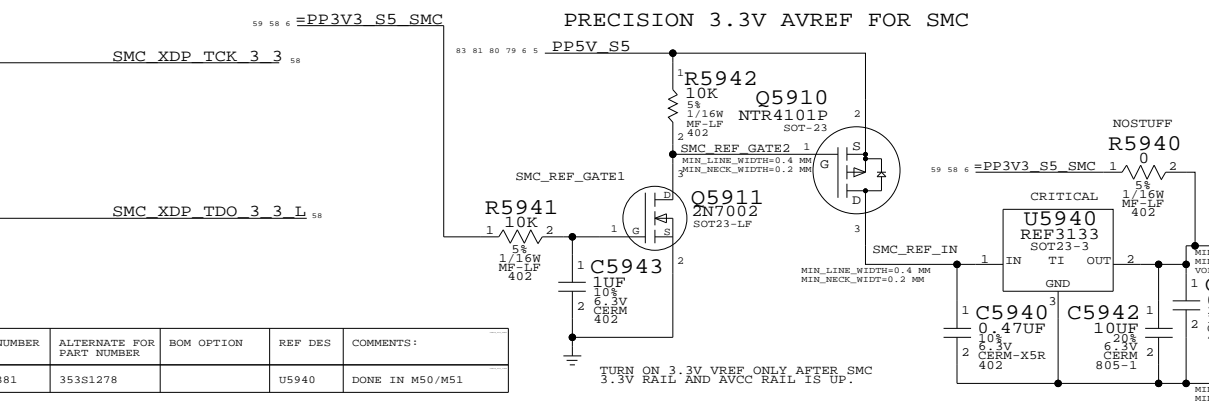
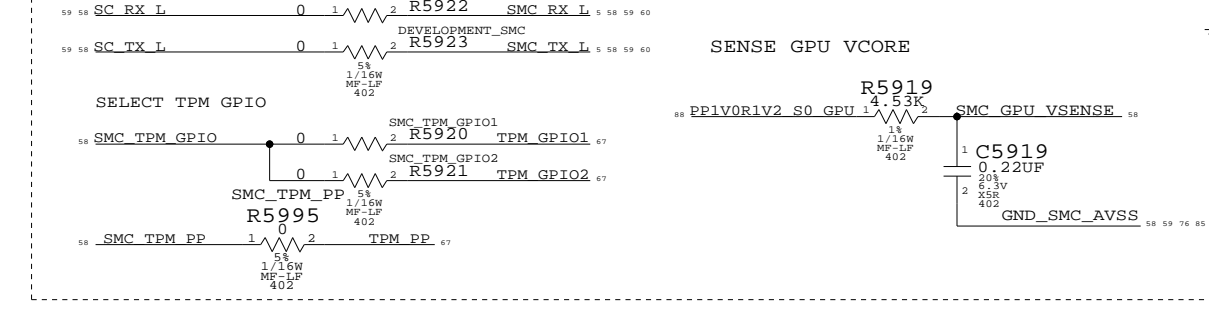
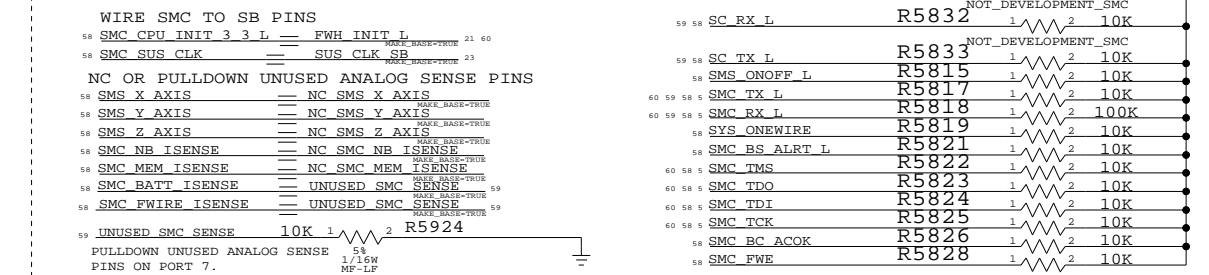
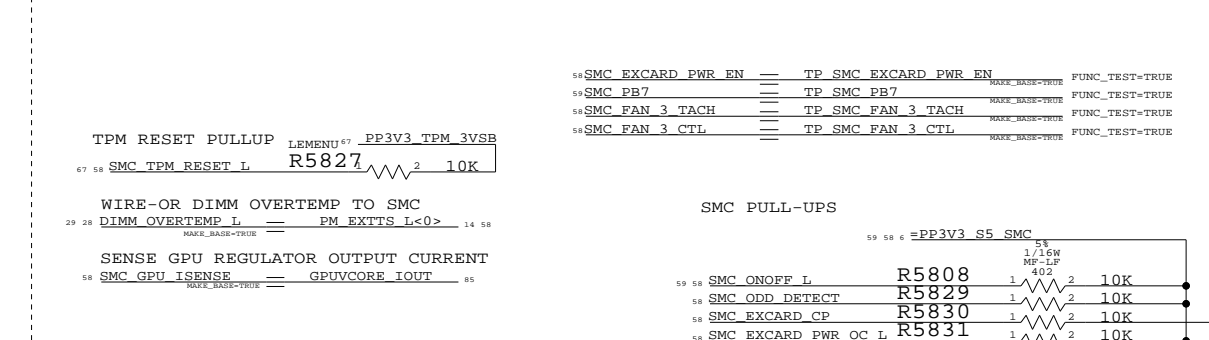
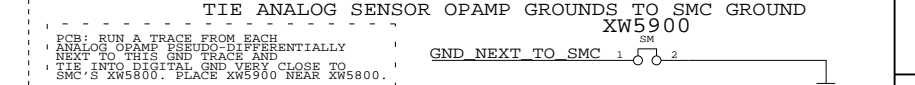
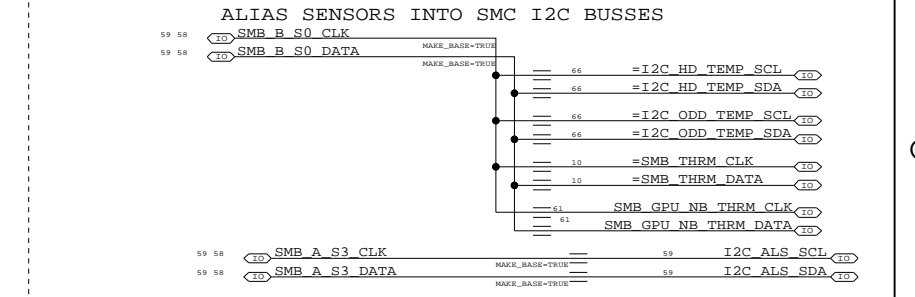
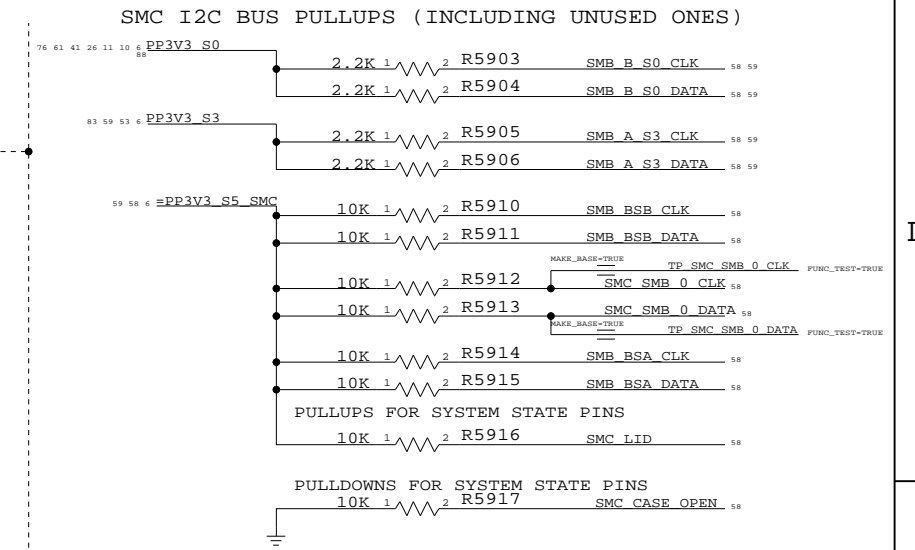
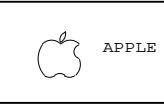


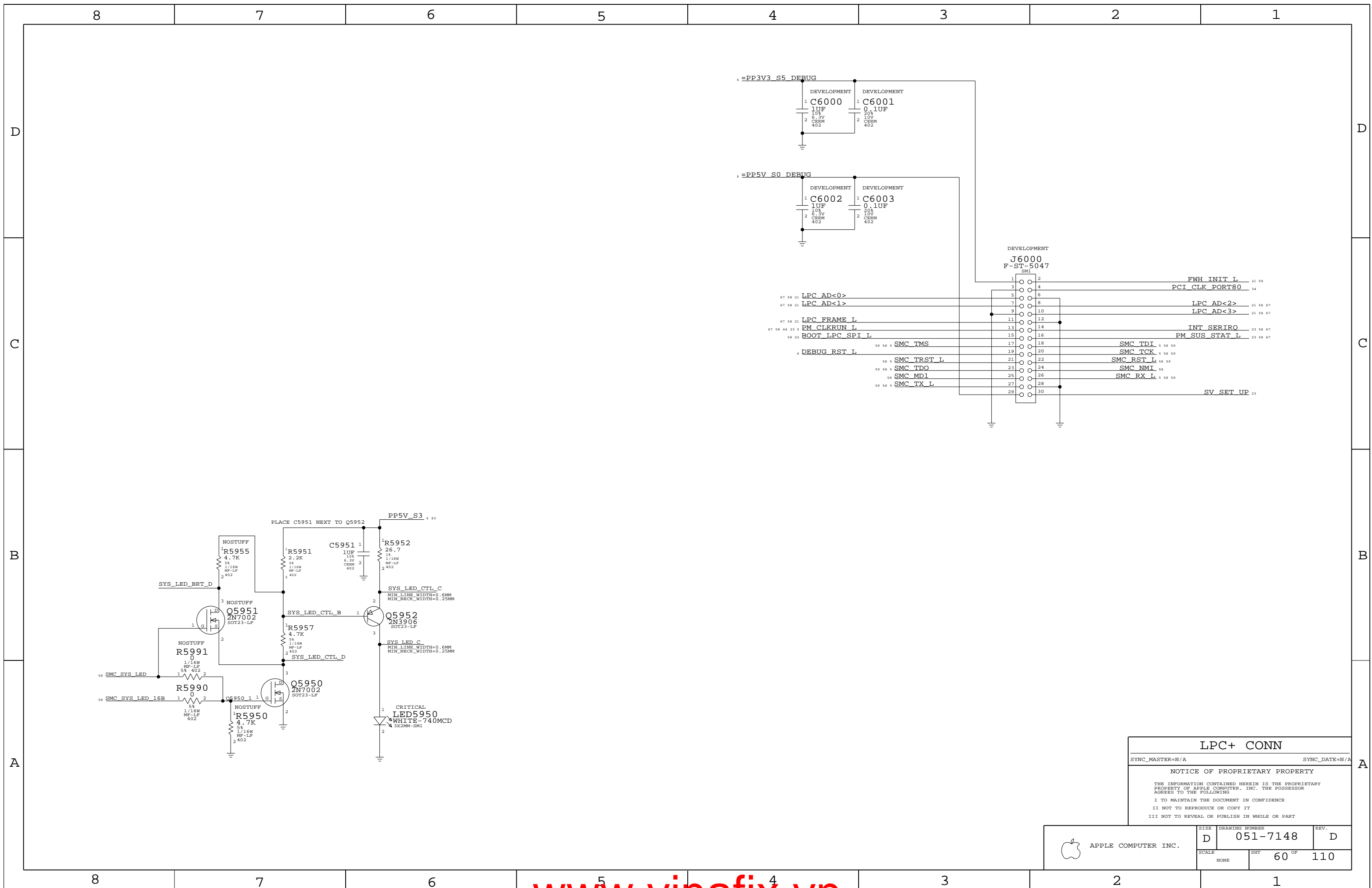
Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Row 1: 353S1381, 353S1278, , U5940, DONE IN M50/M51.



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Table with 4 columns: SIZE, DRAWING NUMBER, REV., SCALE, SHEET, OF. Row 1: D, 051-7148, D, NONE, 59, 110.





LPC+ CONN

SYNC_MASTER=N/A SYNC_DATE=N/A

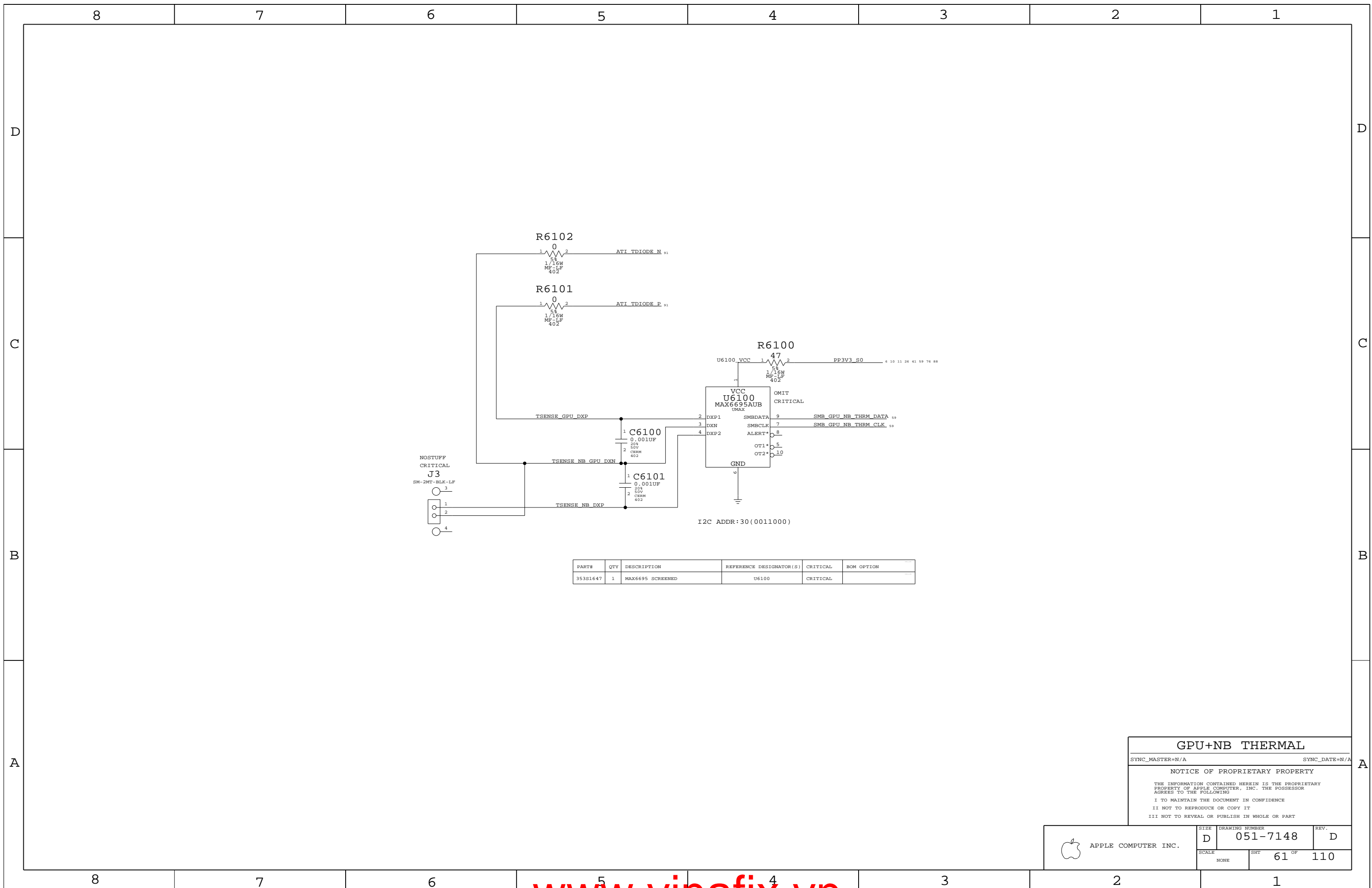
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S1647	1	MAX6695 SCREENED	U6100	CRITICAL	

GPU+NB THERMAL

SYNC_MASTER=N/A SYNC_DATE=N/A

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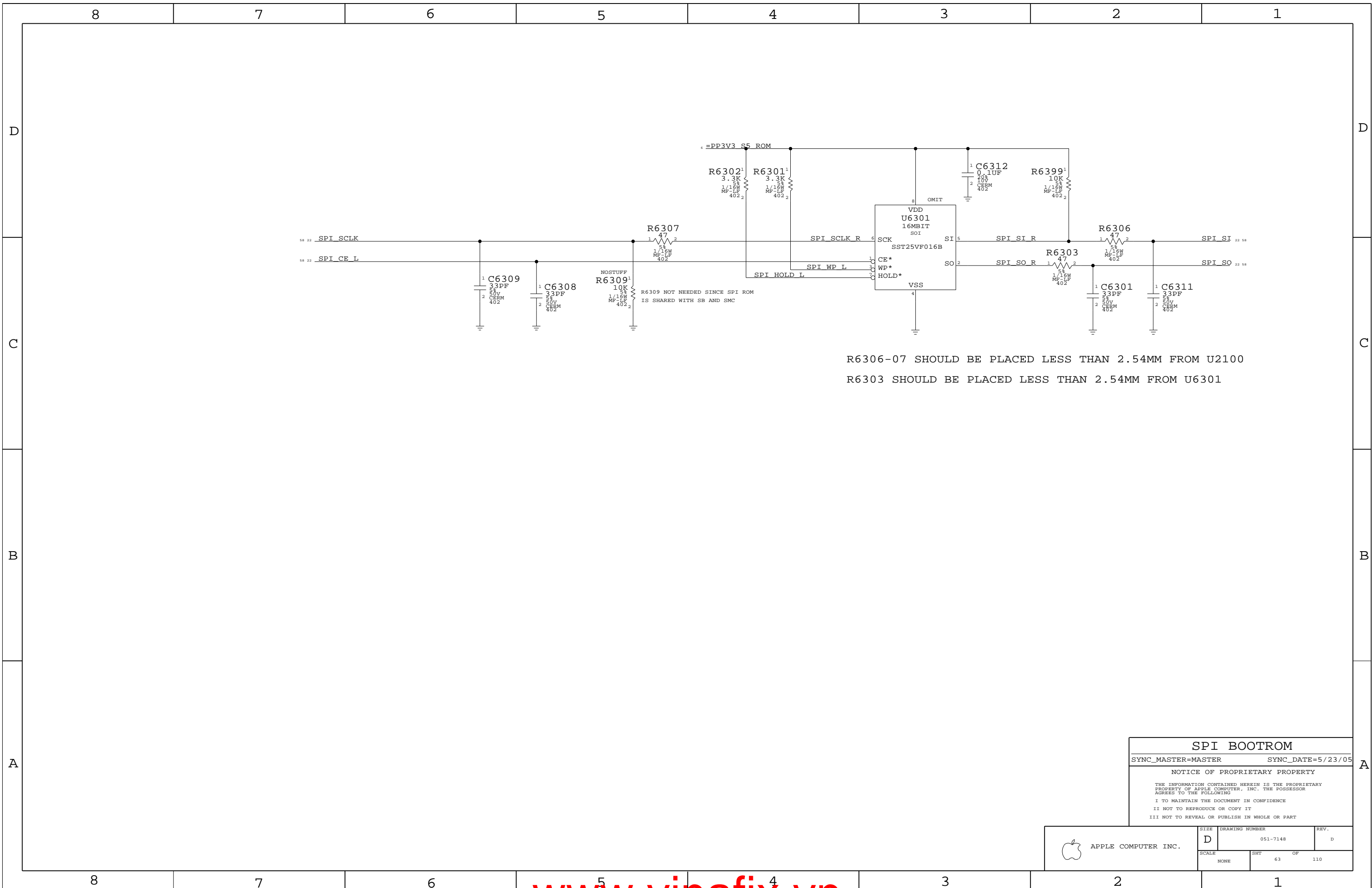
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	D	051-7148	D
SCALE	SHT	61 OF 110	
NONE			

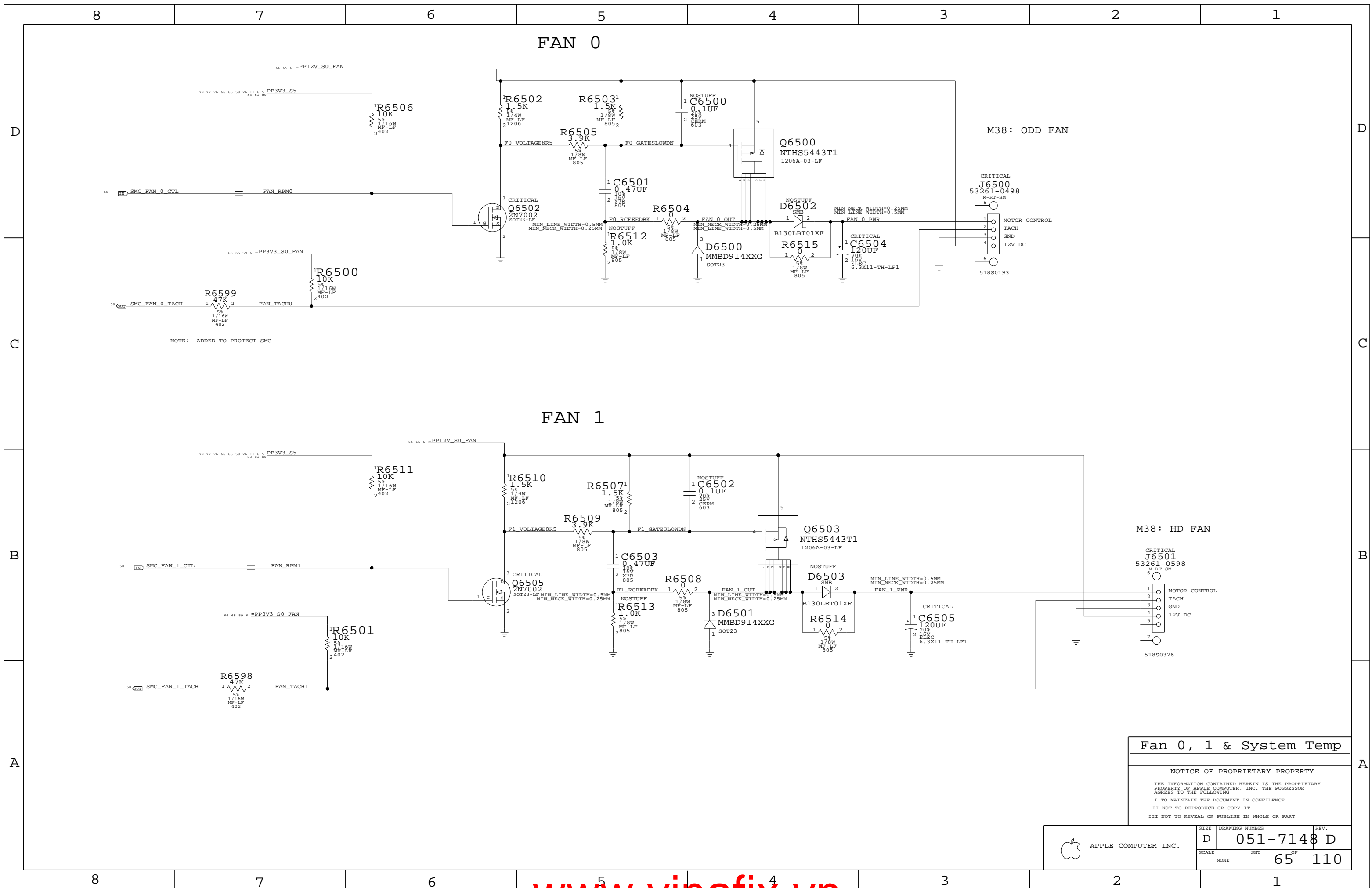


SPI BOOTROM

SYNC_MASTER=MASTER SYNC_DATE=5/23/05

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	SCALE NONE	SHEET 63	OF 110

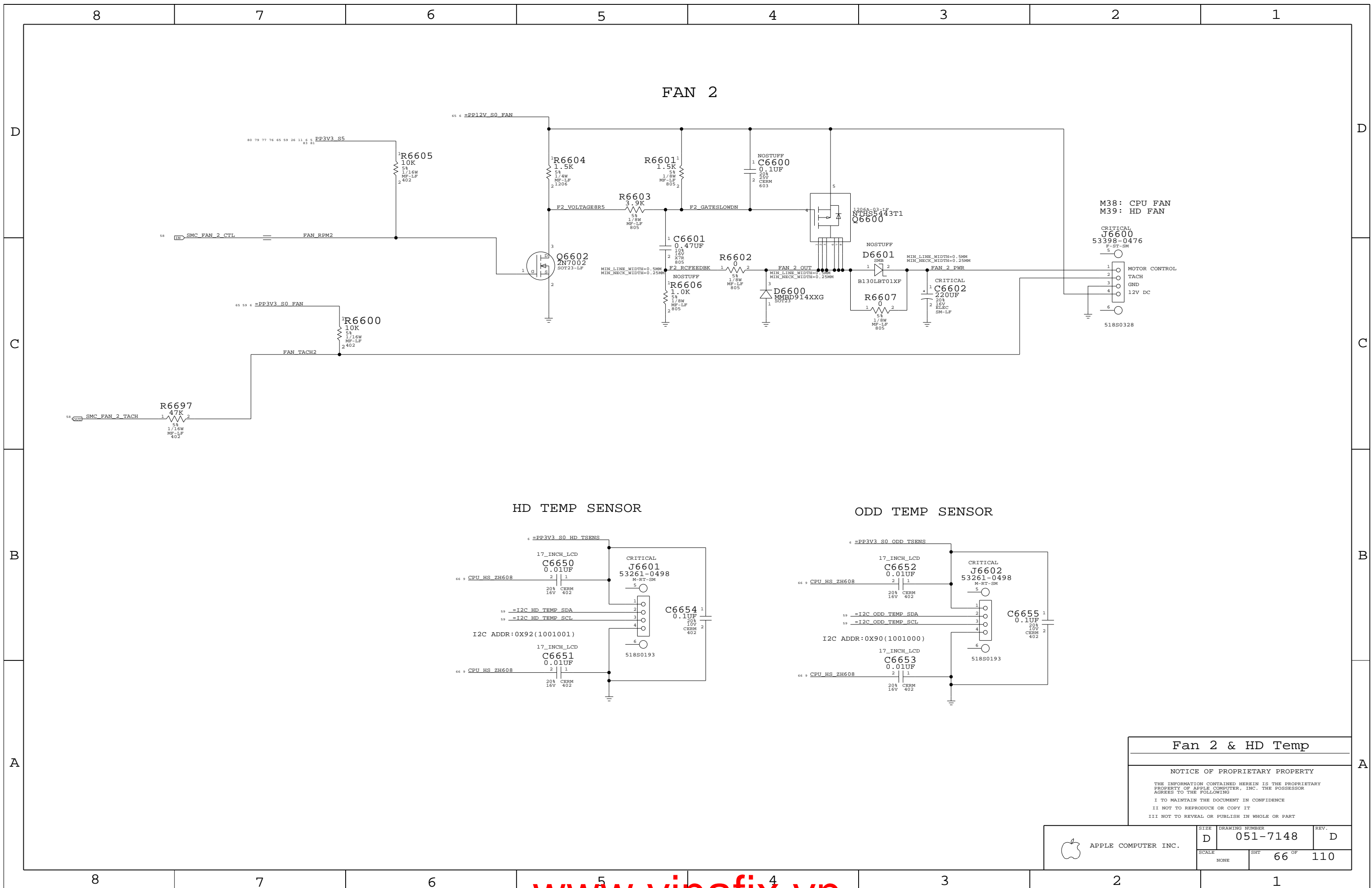


NOTE: ADDED TO PROTECT SMC

Fan 0, 1 & System Temp

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	D	051-7148	D
SCALE	NONE	SHT	OF
		65	110



Fan 2 & HD Temp

NOTICE OF PROPRIETARY PROPERTY

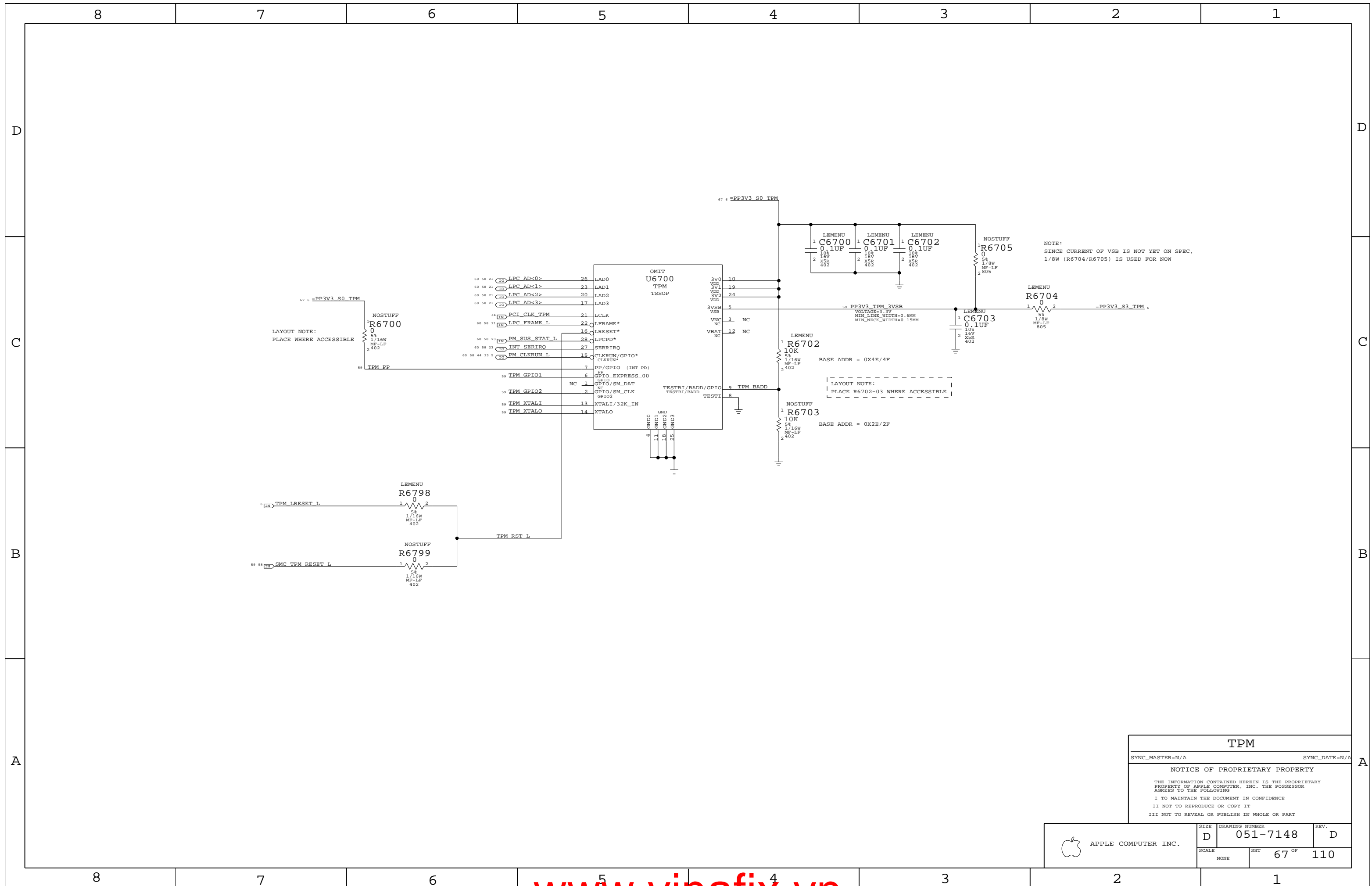
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	D	051-7148	D
SCALE	SHT	OF	REV.
NONE	66	110	



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

NOTICE OF PROPRIETARY PROPERTY

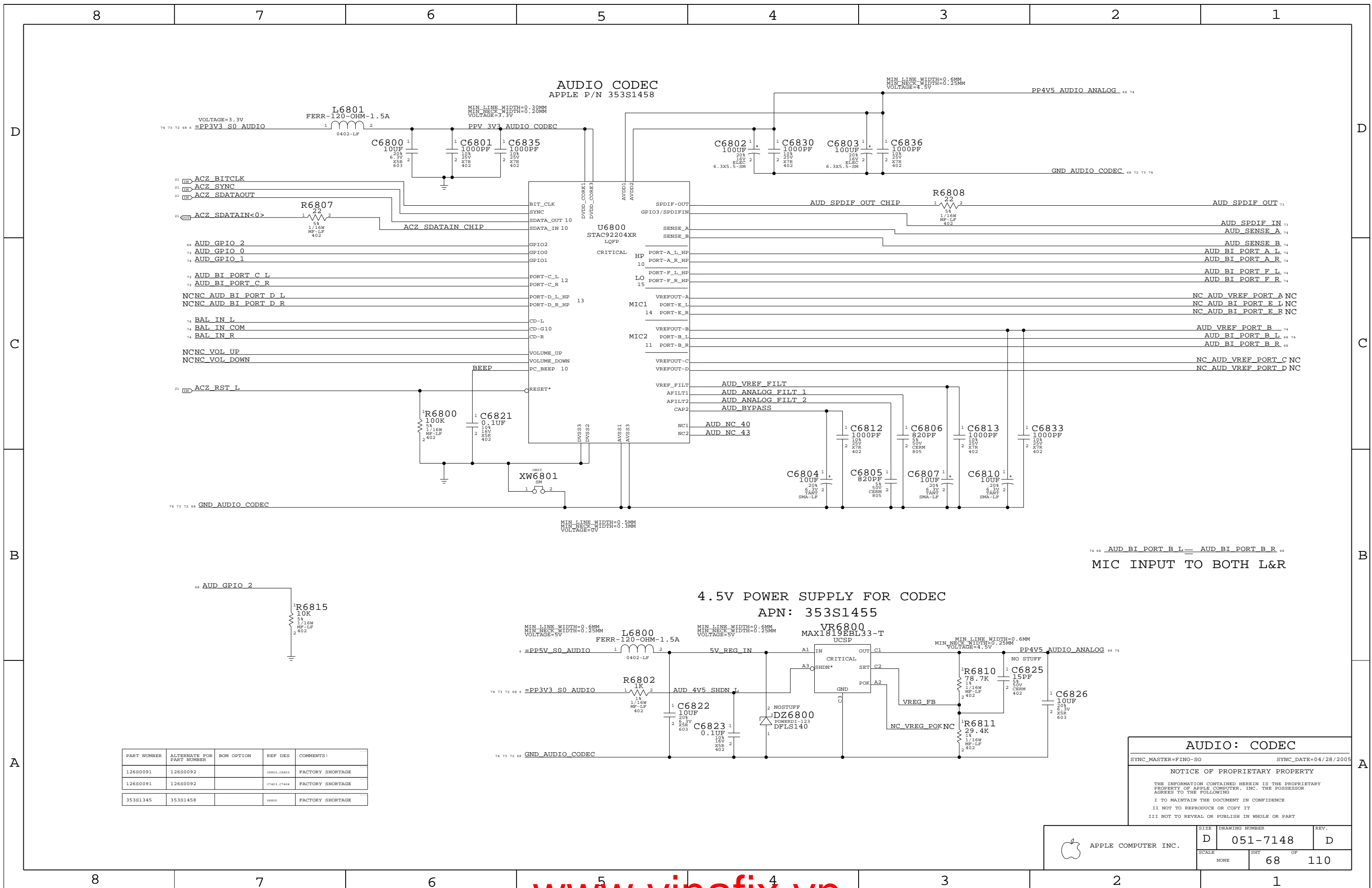
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	D	051-7148	D
SCALE	SHT	67 OF 110	
NONE			



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
126S0091	126S0092		C6802, C6803	FACTORY SHORTAGE
126S0091	126S0092		C7403, C7404	FACTORY SHORTAGE
353S1345	353S1458		U6800	FACTORY SHORTAGE

AUDIO: CODEC

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

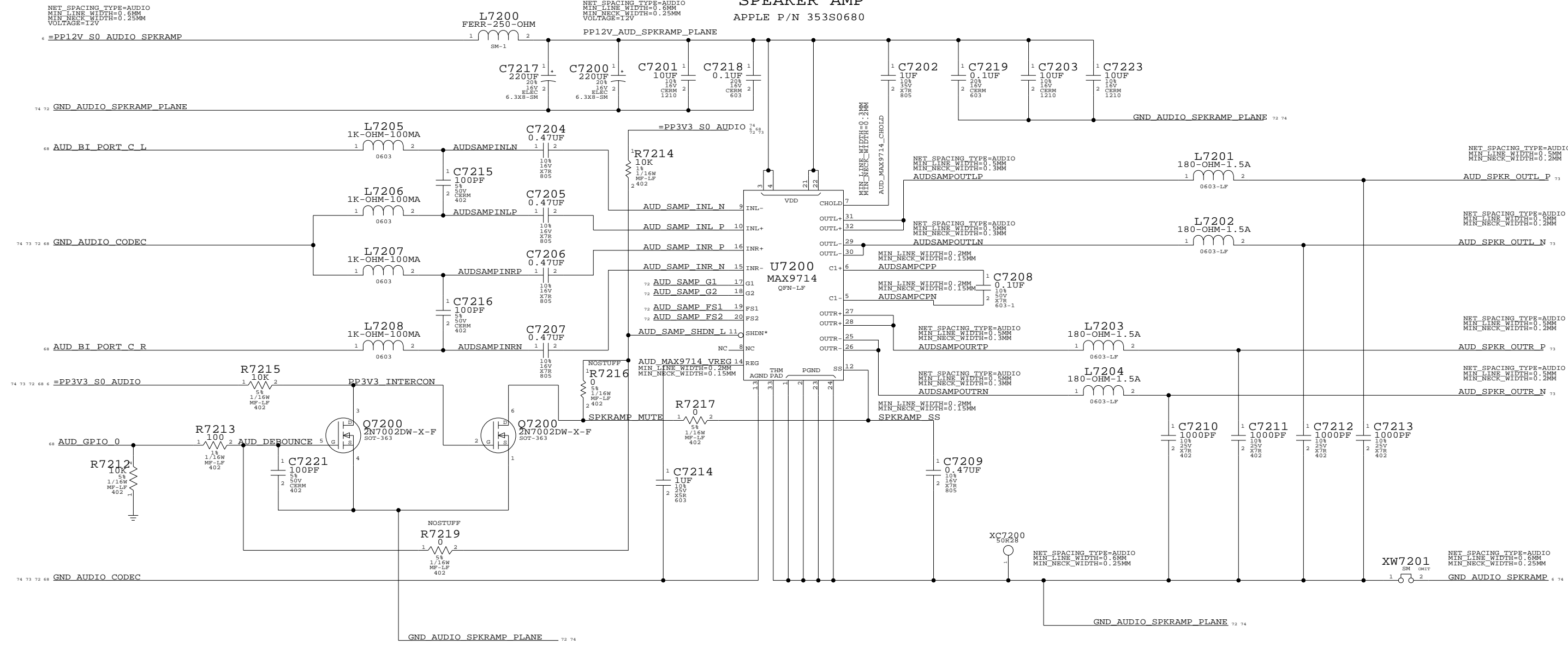
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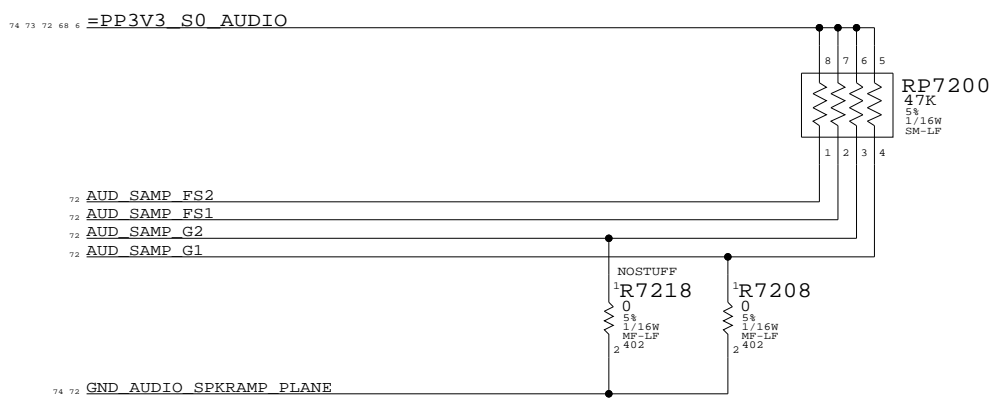
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	NONE	SHT OF	68 110

SPEAKER AMP
APPLE P/N 353S0680

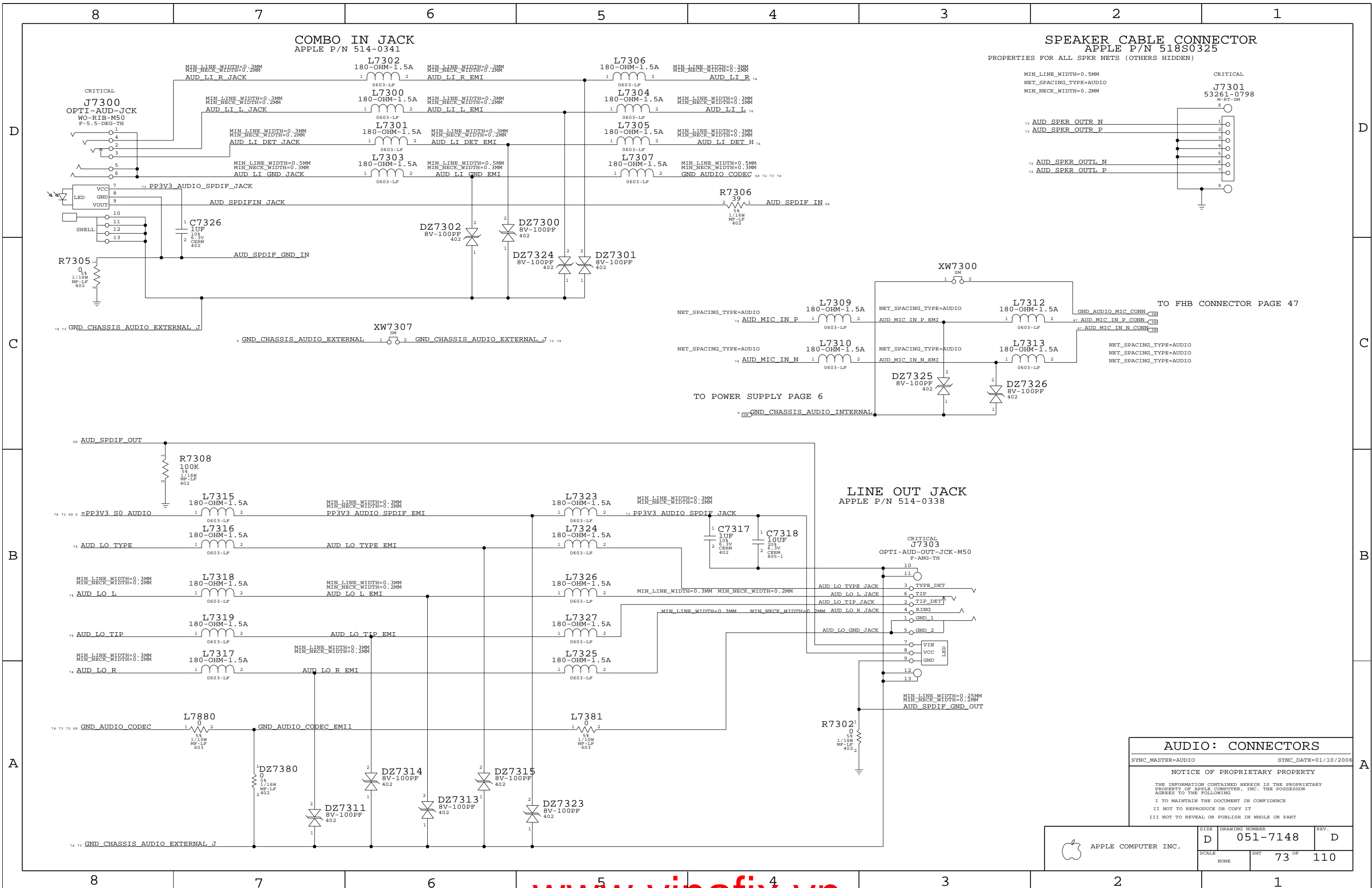


GAIN SETTINGS: +19DB
MODULATION SETTING: LOW EMI
GAIN AND SWITCHING FREQUENCY STUFF OPTIONS



AUDIO: SPEAKER AMP
SYNC_MASTER=FINO-SO SYNC_DATE=04/28/2005
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SCALE	NONE	SHT	OF
		72	110

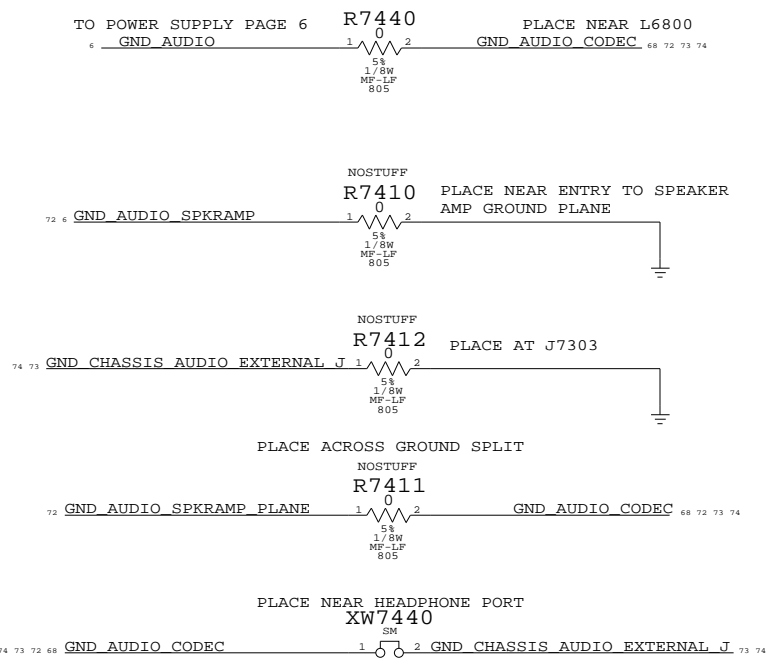
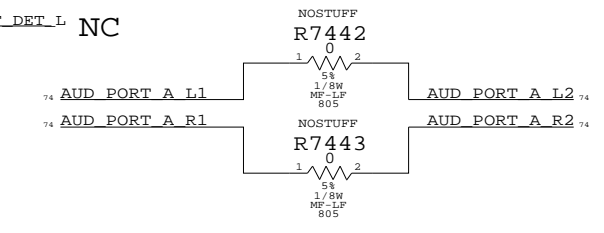
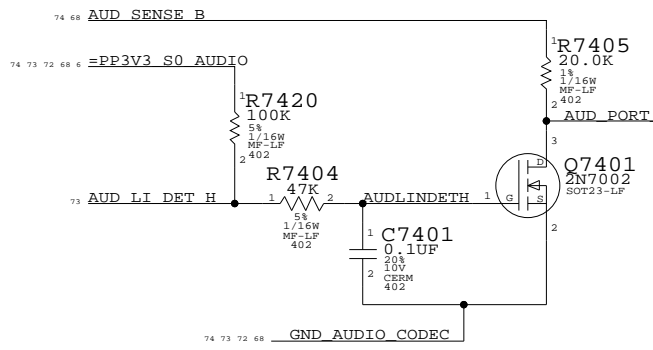
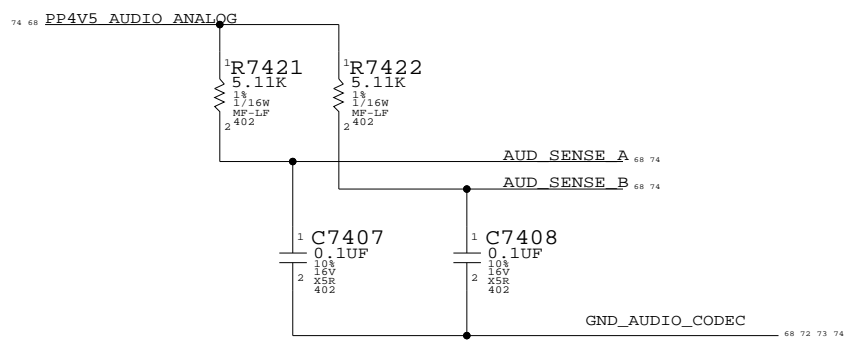


AUDIO: CONNECTORS		
SYNC_MASTER=AUDIO	SYNC_DATE=01/10/2006	
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	D	051-7148	D
SCALE	SHT	73 OF	110
NONE			

PORT F (LI) PLUG DETECT AUDIO GROUND RETURNS

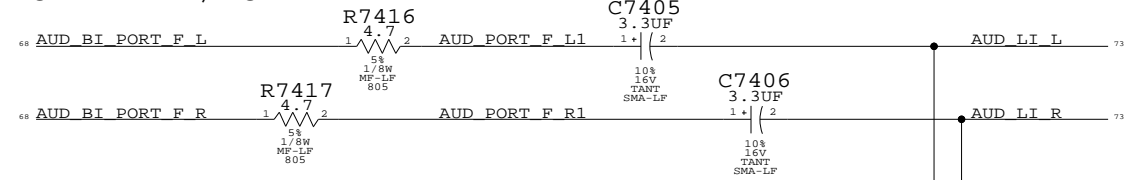
JACK SENSE PULL UPS (PLACE NEXT TO CODEC)



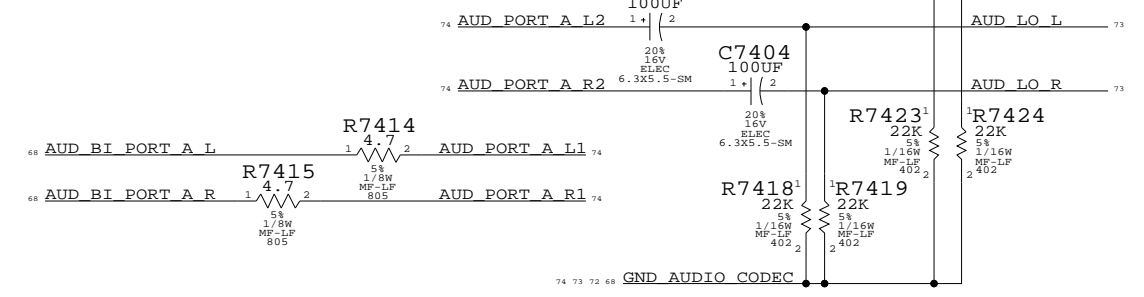
USED PORTS
 PORT A HP/LI
 PORT B MIC IN, VREF 80%
 PORT C BI SPEAKERS
 PORT F LI/LO

UNUSED PORTS
 PORT E SPDIF OUT DELEGATE
 PORT D

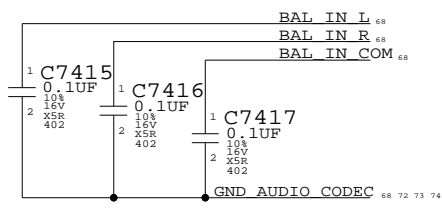
PORT F LI/LO



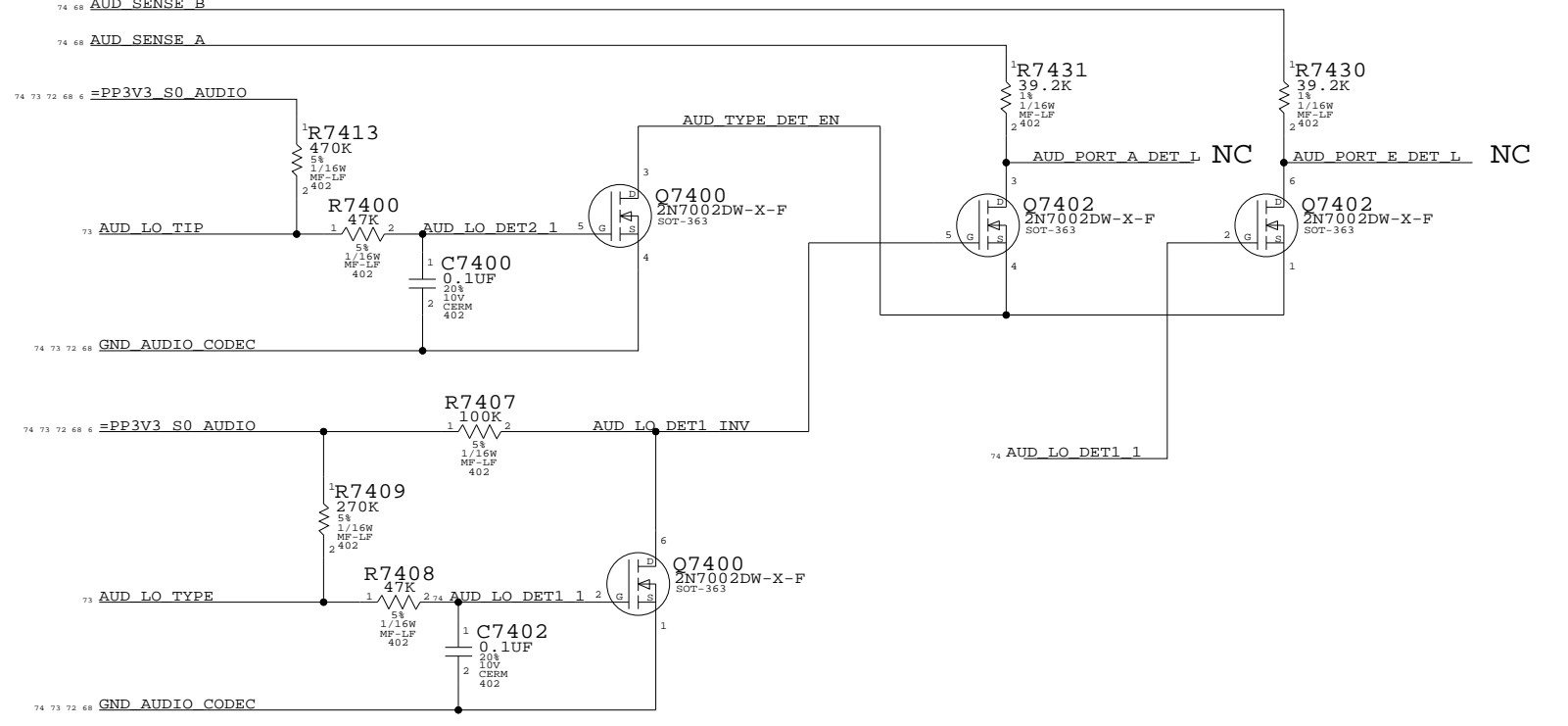
PORT A HP/LI



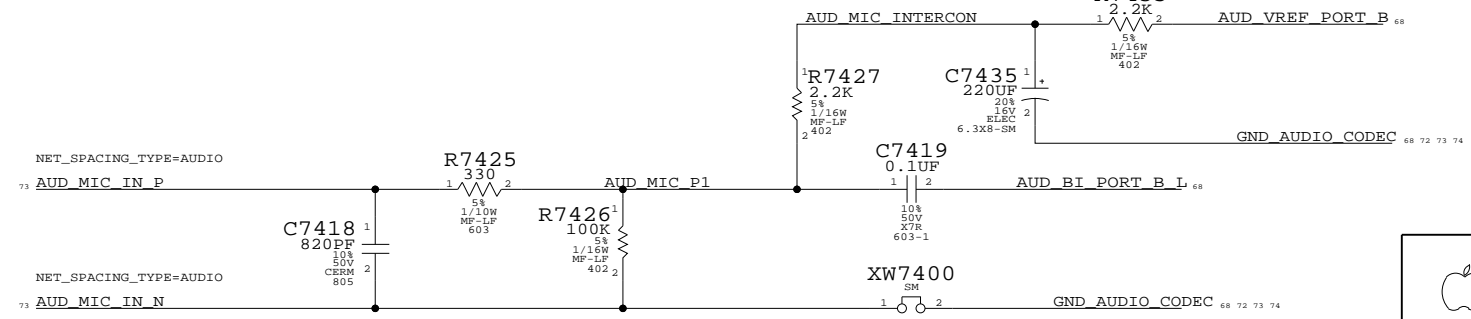
UNUSED PORT TERMINATION



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



MICROPHONE IMPEDANCE MATCHING CIRCUIT



AUDIO: POWER SUPPLIES

SYNC_MASTER=AUDIO SYNC_DATE=02/23/2006

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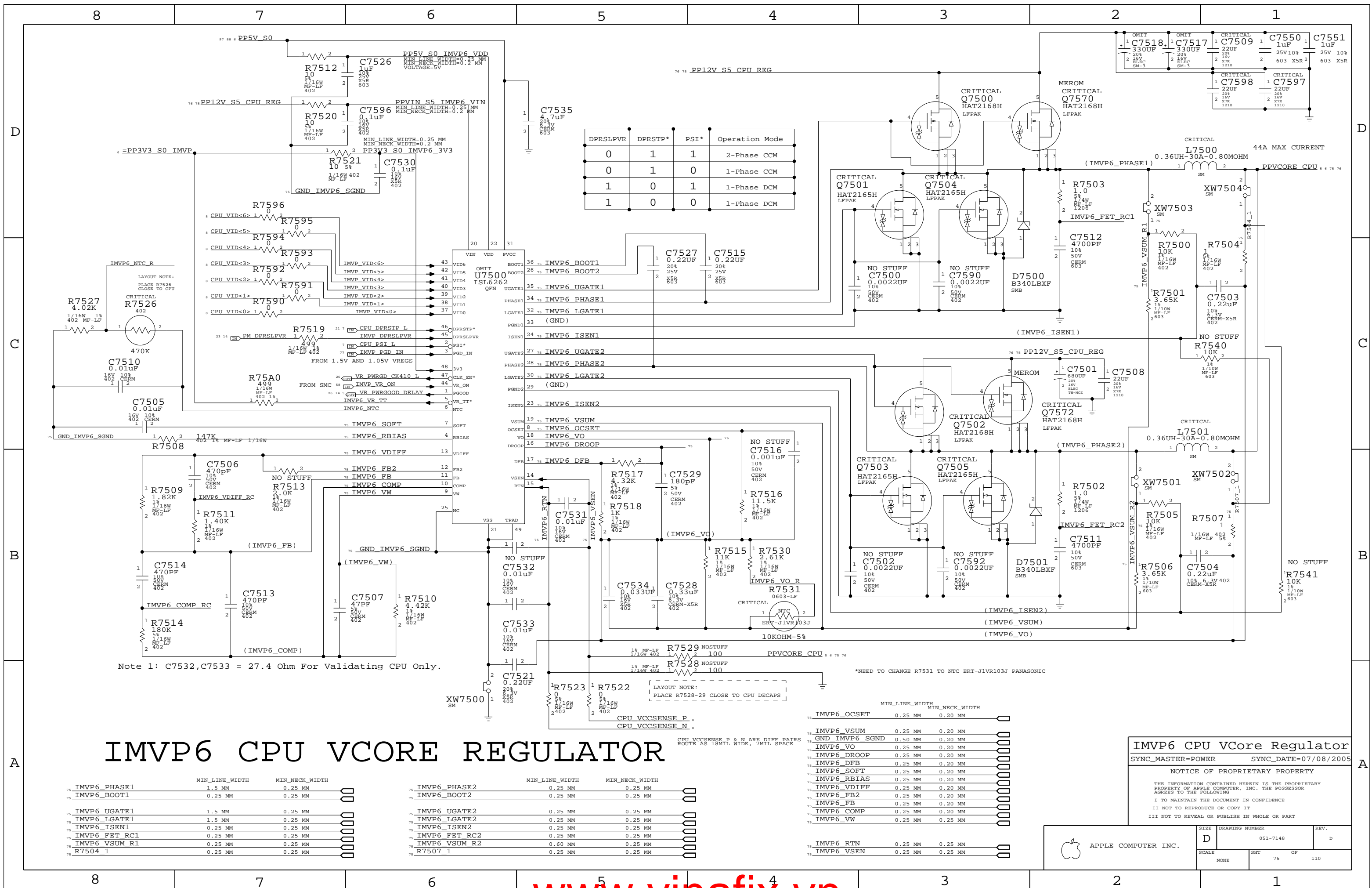
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	D	051-7148	D
SCALE	SHT	74 OF	110
NONE			



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

IMVP6_PHASE1	IMVP6_PHASE2	IMVP6_VSUM	IMVP6_VO
0	0	0	0
0	1	0	0
1	0	0	0
1	1	0	0

IMVP6_VSUM	IMVP6_VO
0	0
0	1
1	0
1	1

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

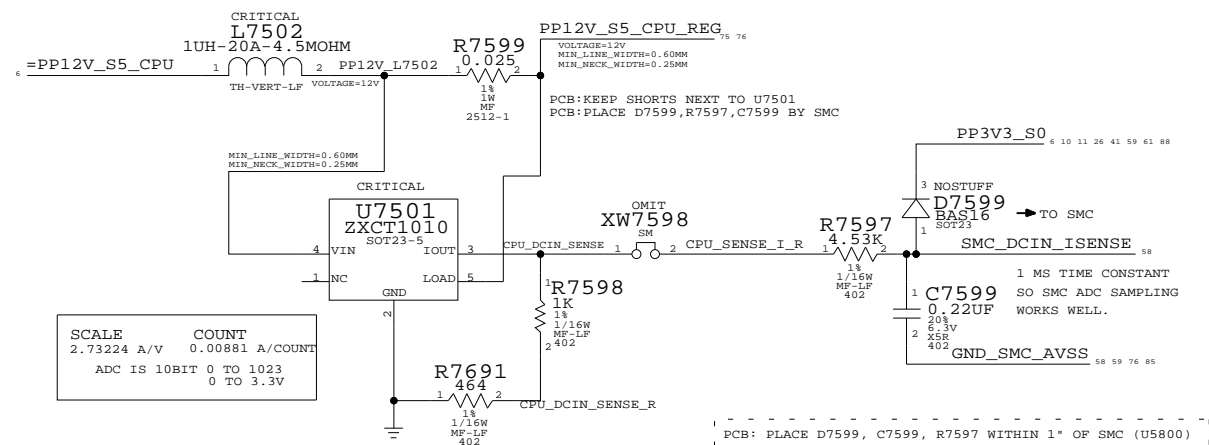
	MIN_LINE_WIDTH	MIN_NECK_WIDTH
75 IMVP6_OCSET	0.25 MM	0.20 MM
75 IMVP6_VSUM	0.25 MM	0.20 MM
75 GND_IMVP6_SGND	0.50 MM	0.20 MM
75 IMVP6_VO	0.25 MM	0.20 MM
75 IMVP6_DROOP	0.25 MM	0.20 MM
75 IMVP6_DFB	0.25 MM	0.20 MM
75 IMVP6_SOFT	0.25 MM	0.20 MM
75 IMVP6_RBIAS	0.25 MM	0.20 MM
75 IMVP6_VDIFF	0.25 MM	0.20 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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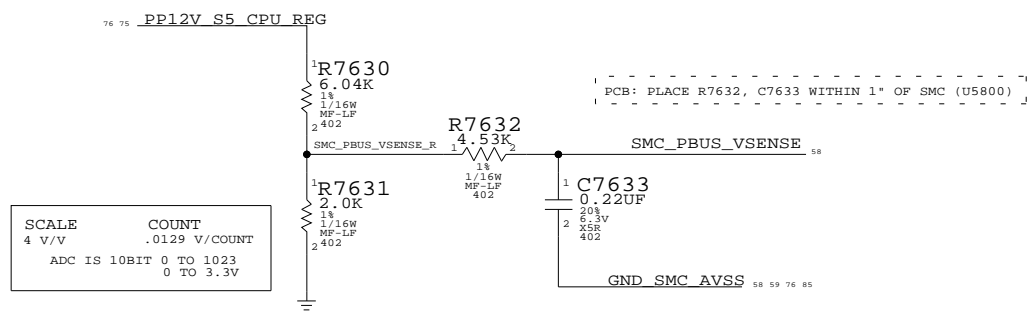
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHEET	OF	
NONE	75	110	

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



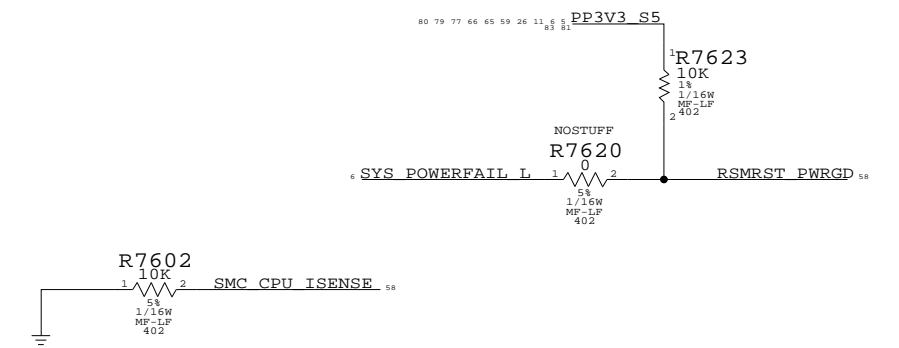
SCALE COUNT
2.73224 A/V 0.00881 A/COUNT
ADC IS 10BIT 0 TO 1023
 0 TO 3.3V

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

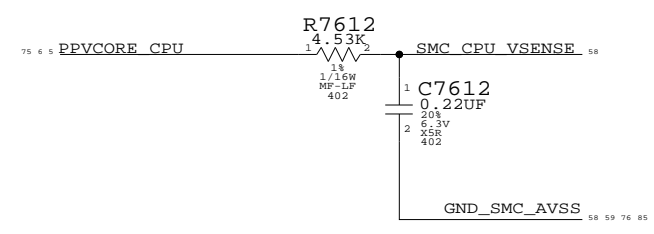


SCALE COUNT
4 V/V .0129 V/COUNT
ADC IS 10BIT 0 TO 1023
 0 TO 3.3V

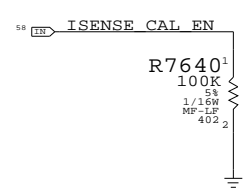
SMC PWRGD PULLUP



PROCESSOR VCORE SENSE



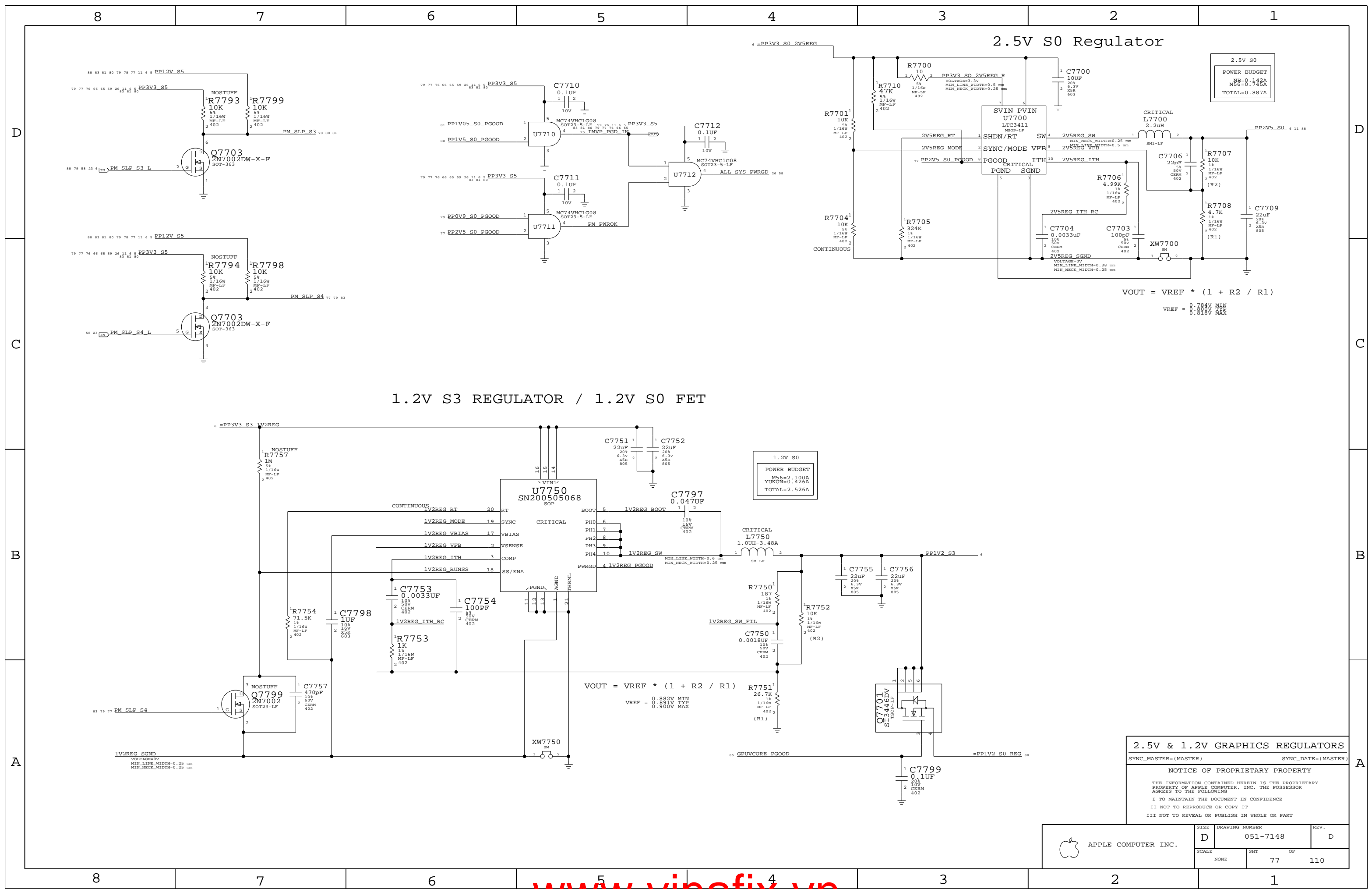
Current Sense Calibration Circuit
Switches in fixed load on power supplies to calibrate current sense circuits



CPU SENSE CIRCUITRIES
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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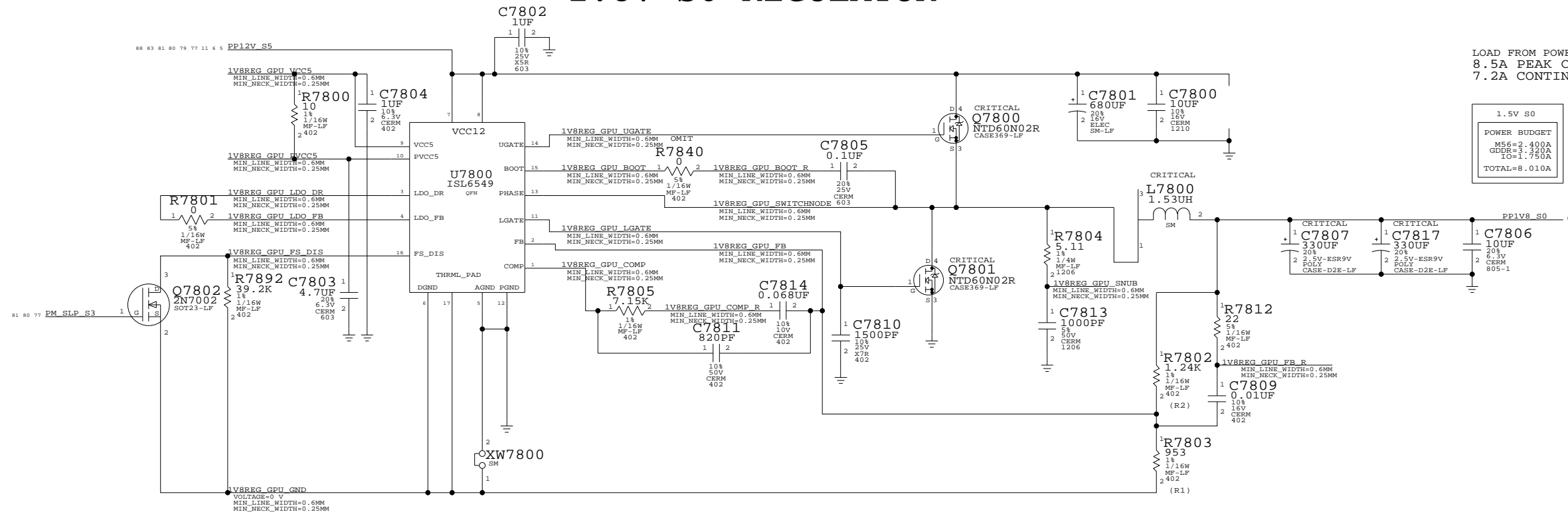
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	76 OF	110
NONE			



APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	
NONE	77	110	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
11480514	1	5.11 OHM 0402 1% 1/16W LF	R7840		

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=3.300A
TO=1.750A
TOTAL=8.010A

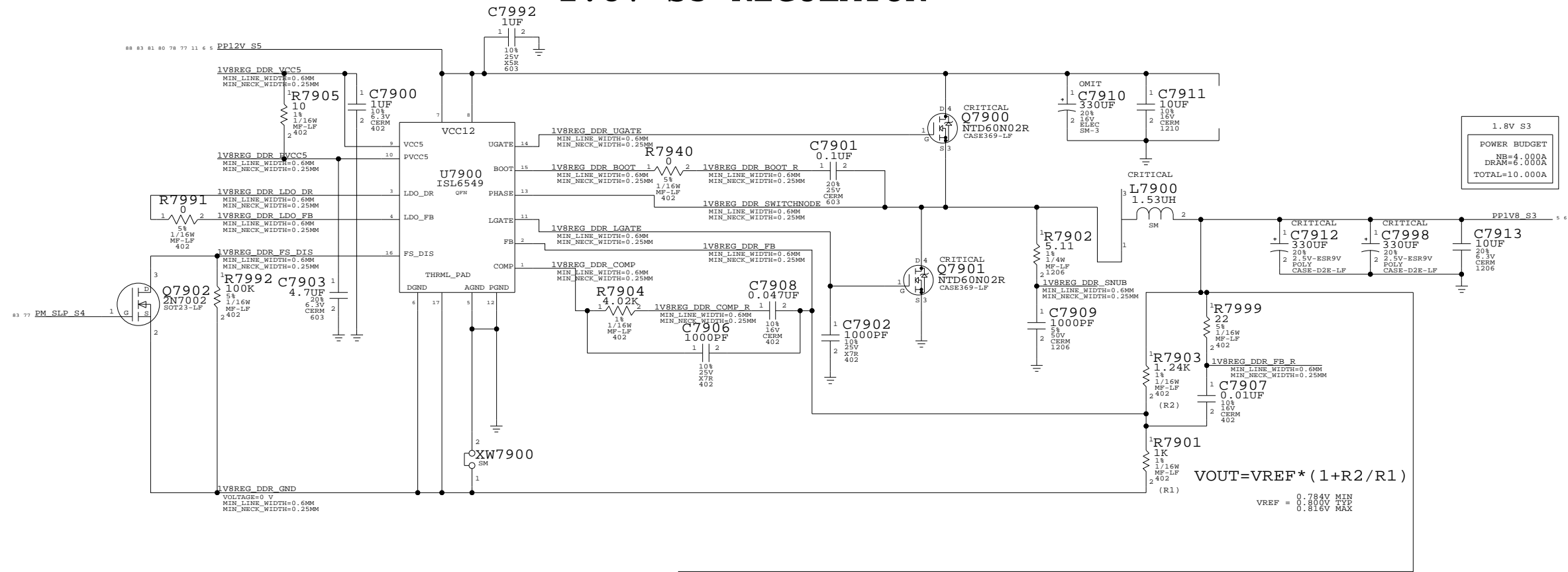
$$V_{OUT} = V_{REF} * (1 + R2/R1)$$

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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SCALE	SHT	OF	REV.
NONE	78	110	

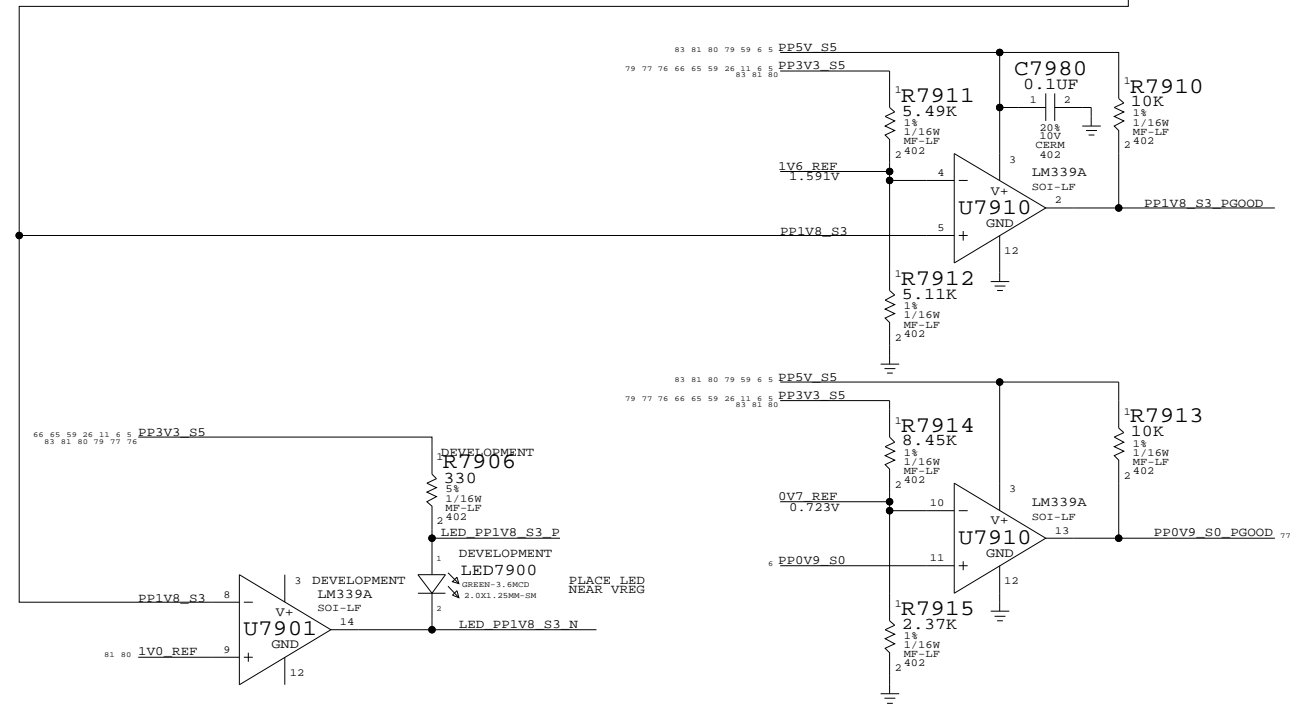
1.8V S3 REGULATOR



1.8V S3
POWER BUDGET
NB=4.000A
DRAM=6.000A
TOTAL=10.000A

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

VREF = 0.784V MIN
0.800V TYP
0.816V MAX



1.8V Vreg

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

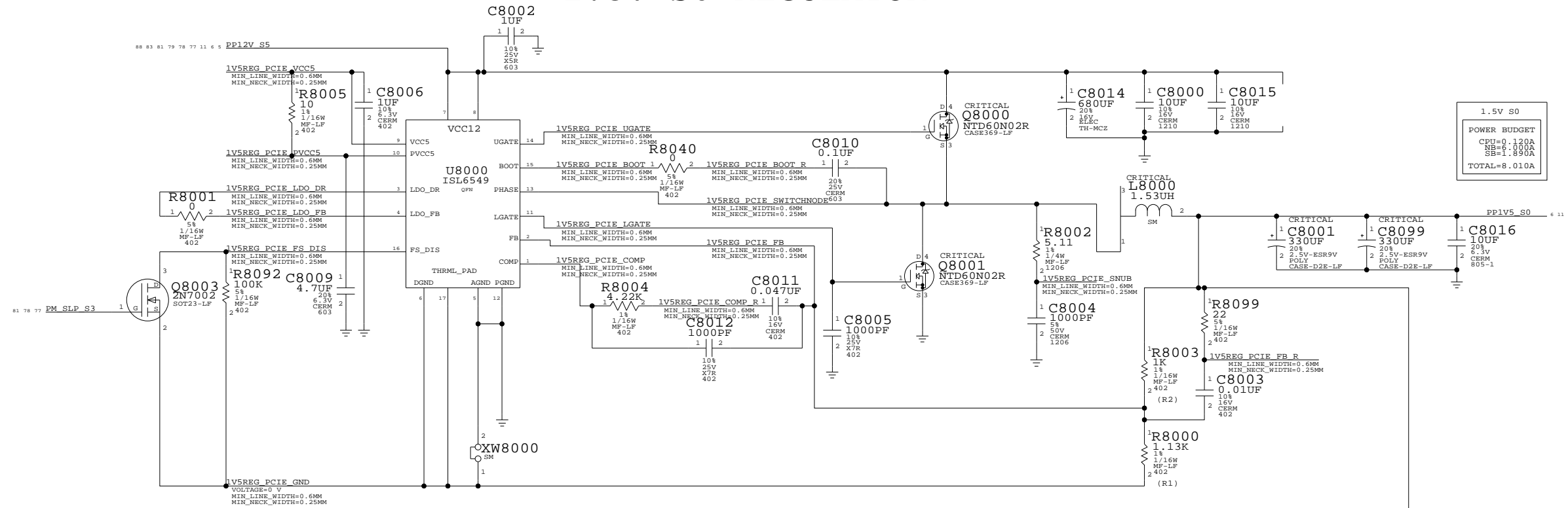
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	NONE	SHT	79 OF 110

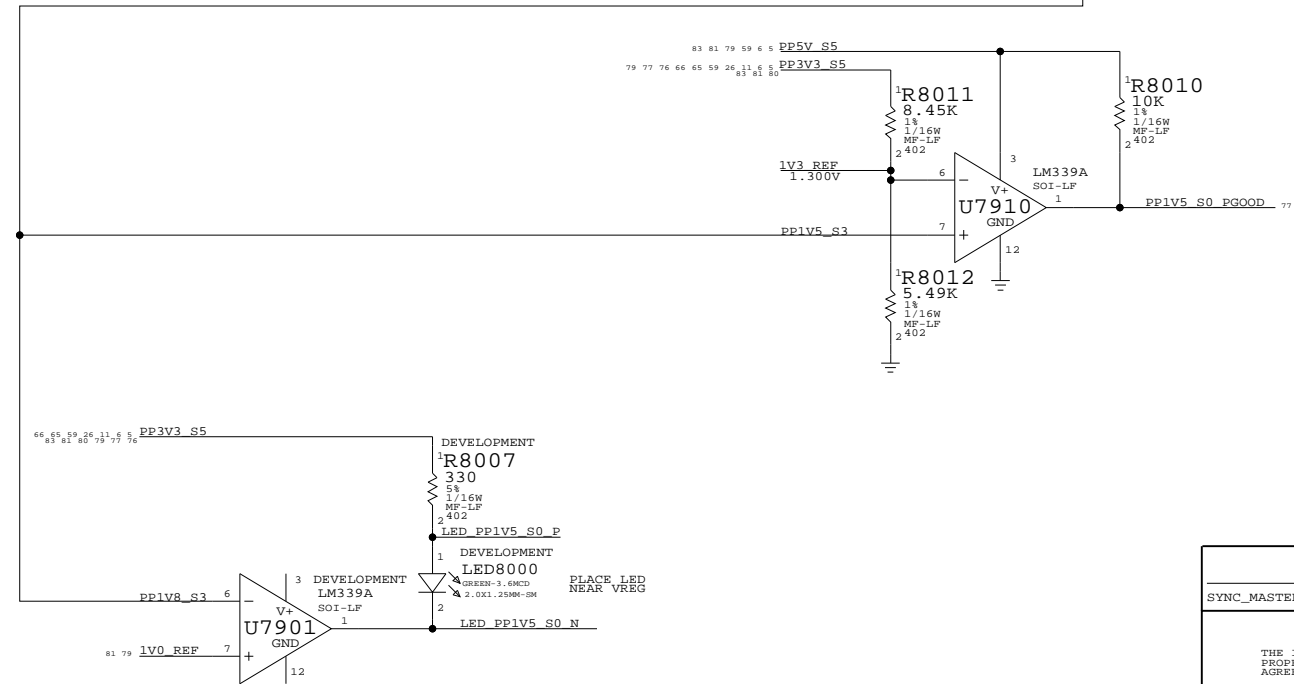
1.5V S0 REGULATOR



1.5V S0
POWER BUDGET
CPU=0.120A
NB=6.800A
SB=1.890A
TOTAL=8.010A

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

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



1.5V Vreg

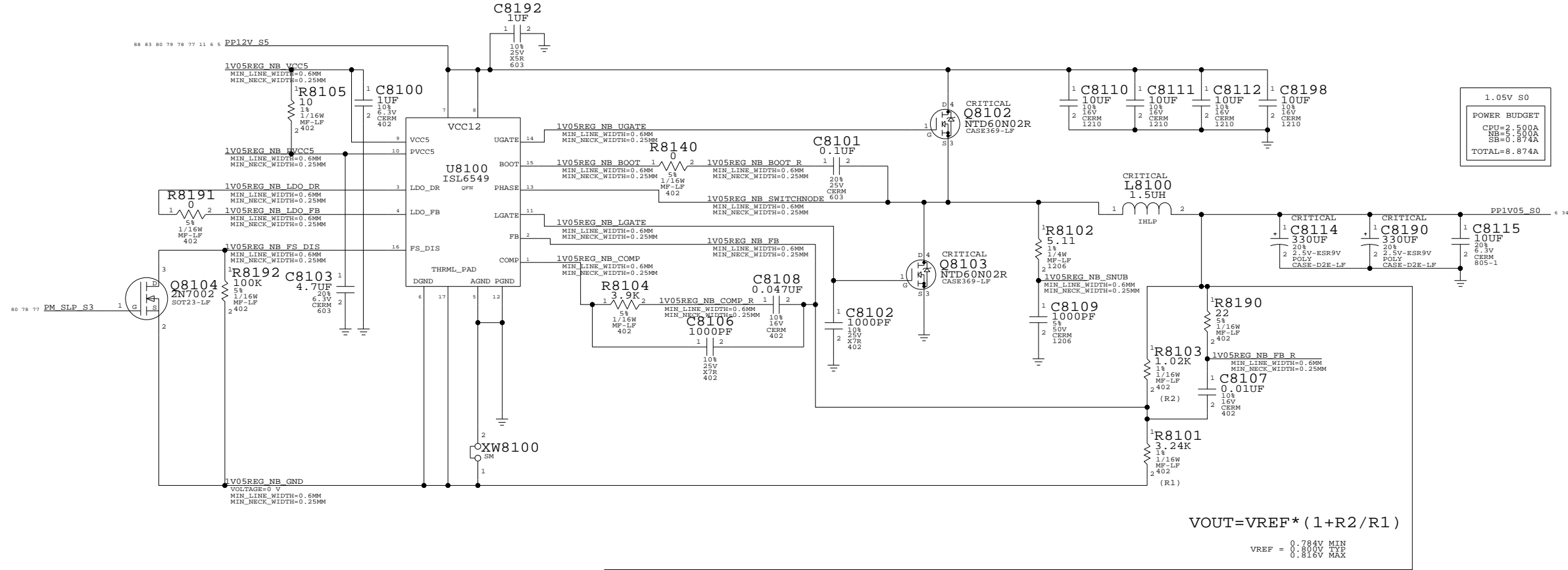
SYNC_MASTER=FINO-PC SYNC_DATE=05/18/2005

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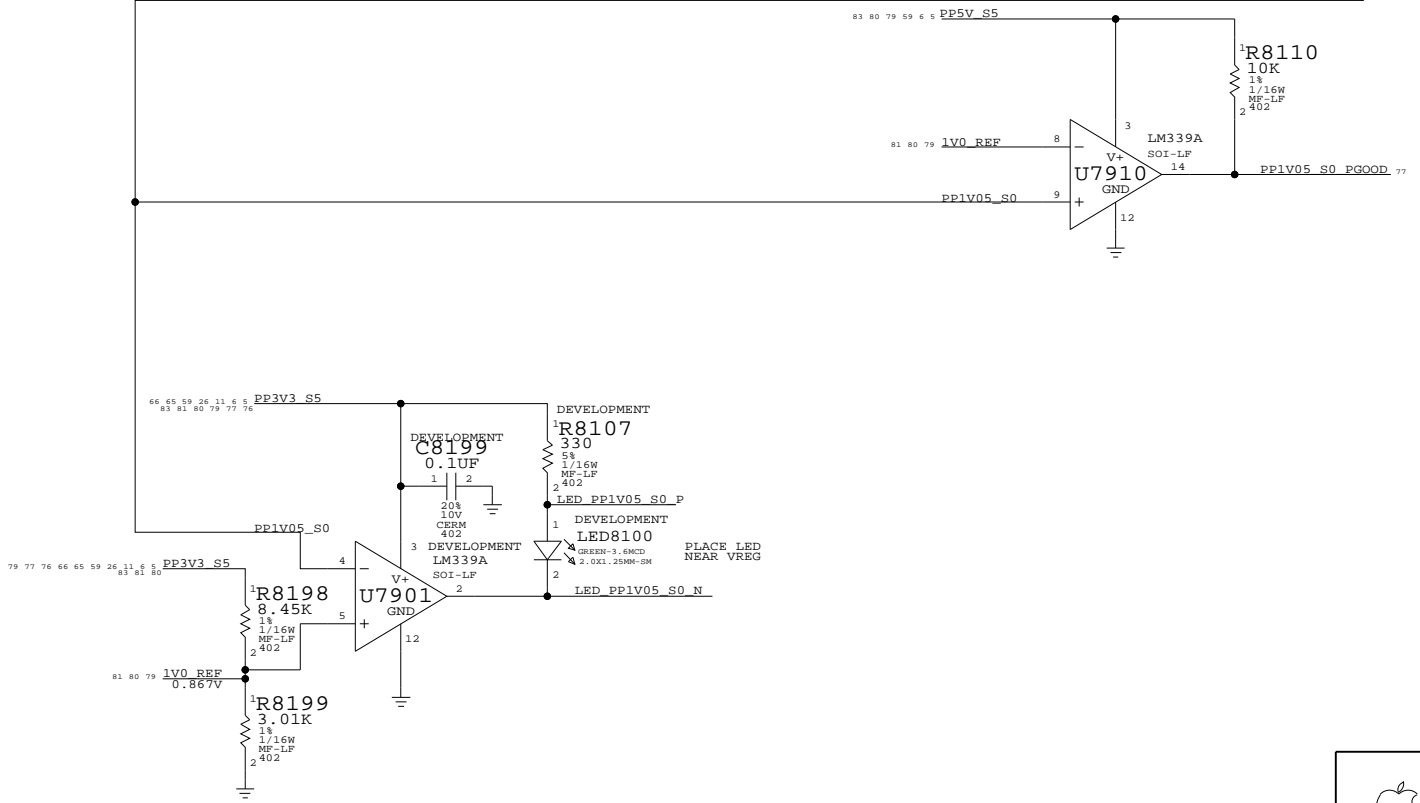
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	80 OF	110
NONE			

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

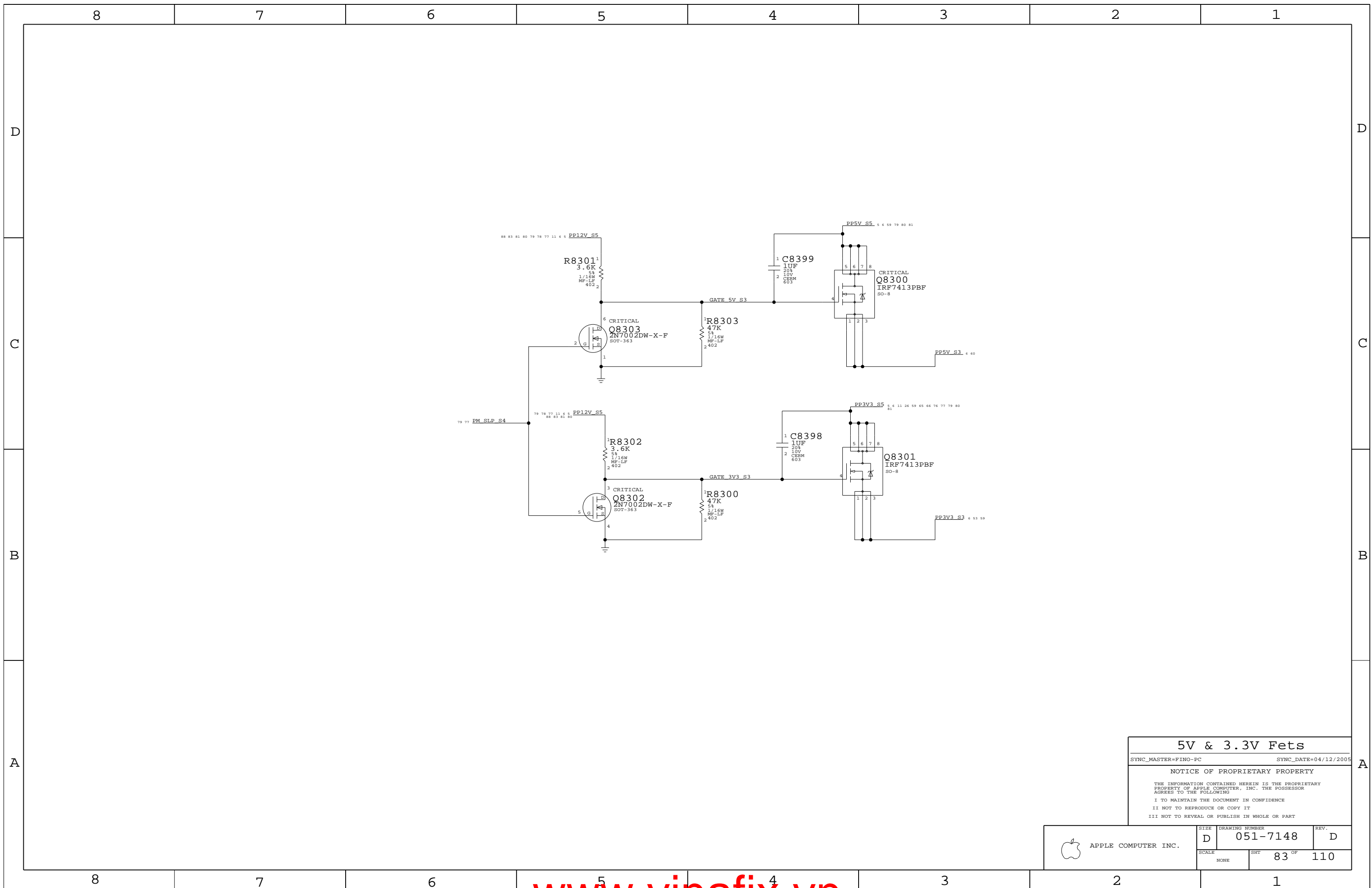
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	NONE	SHT	81 OF 110



5V & 3.3V Fets

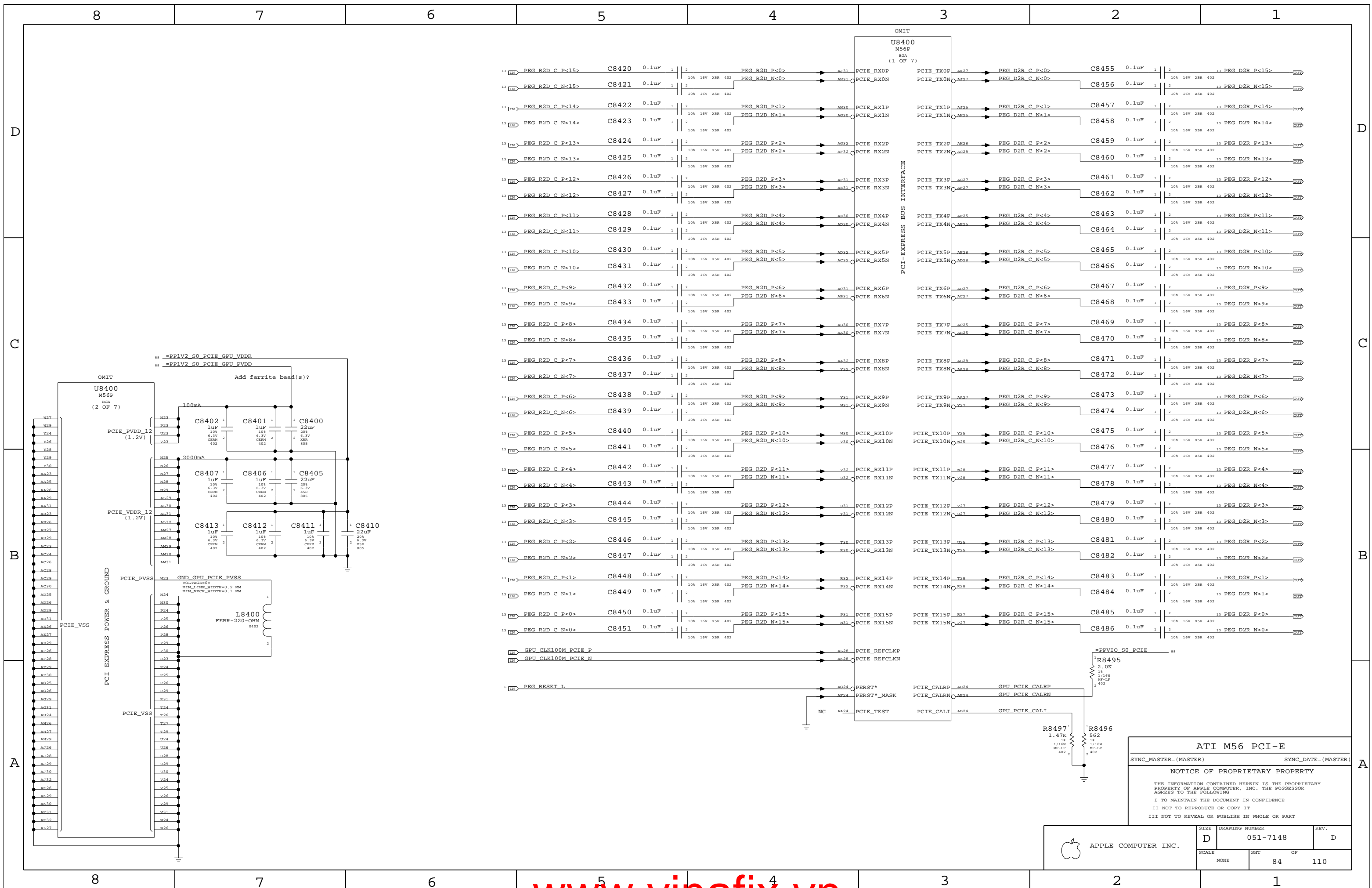
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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7148	REV. D
	SCALE NONE	SHT 83 OF	110



ATI M56 PCI-E

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

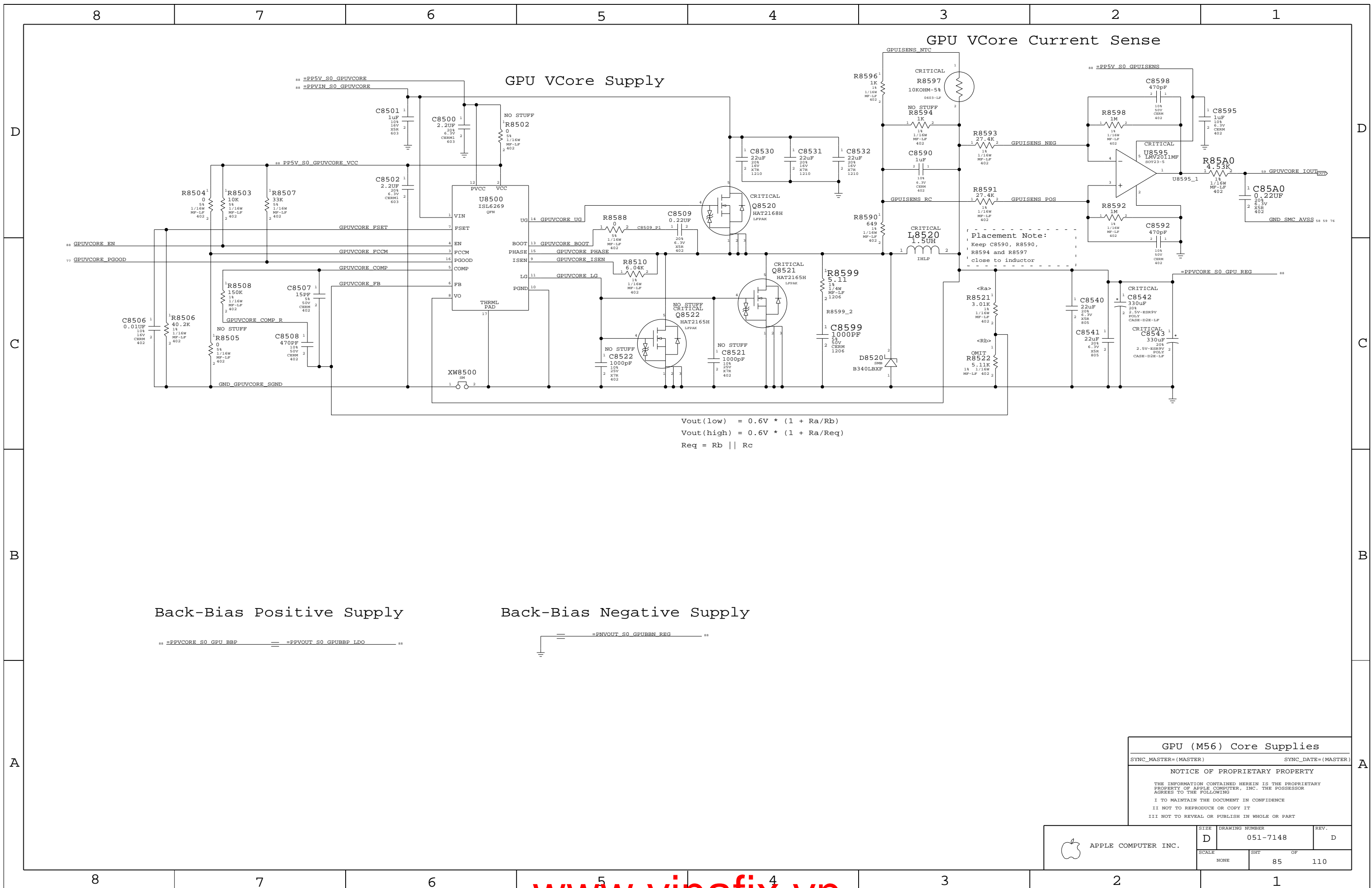
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	D	051-7148	D
SCALE	SHT	OF	
NONE	84	110	



GPU (M56) Core Supplies

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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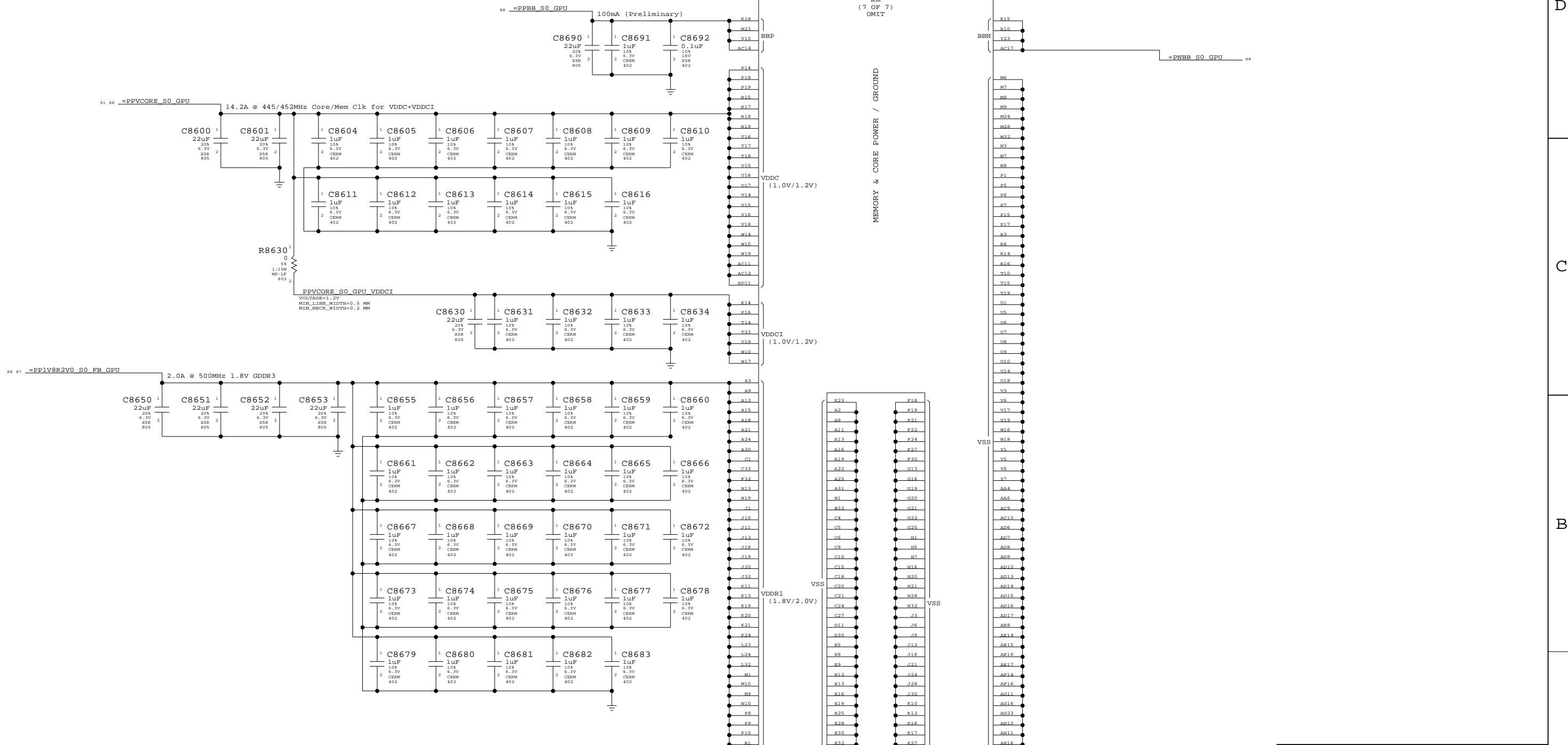
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	OF	
NONE	85	110	

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)



ATI M56 Core Power

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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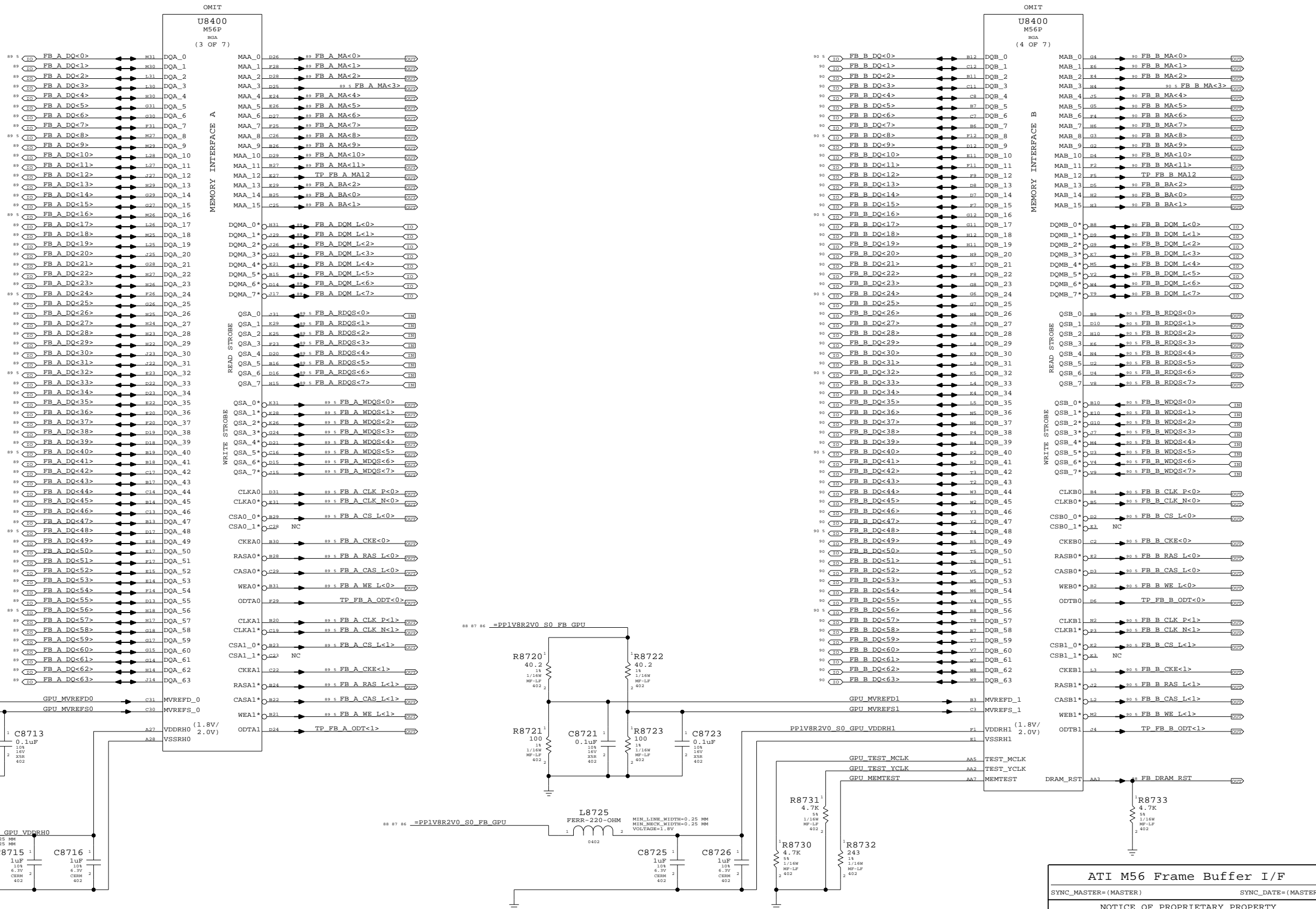
II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
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SCALE	NONE	SHT OF	86 OF 110

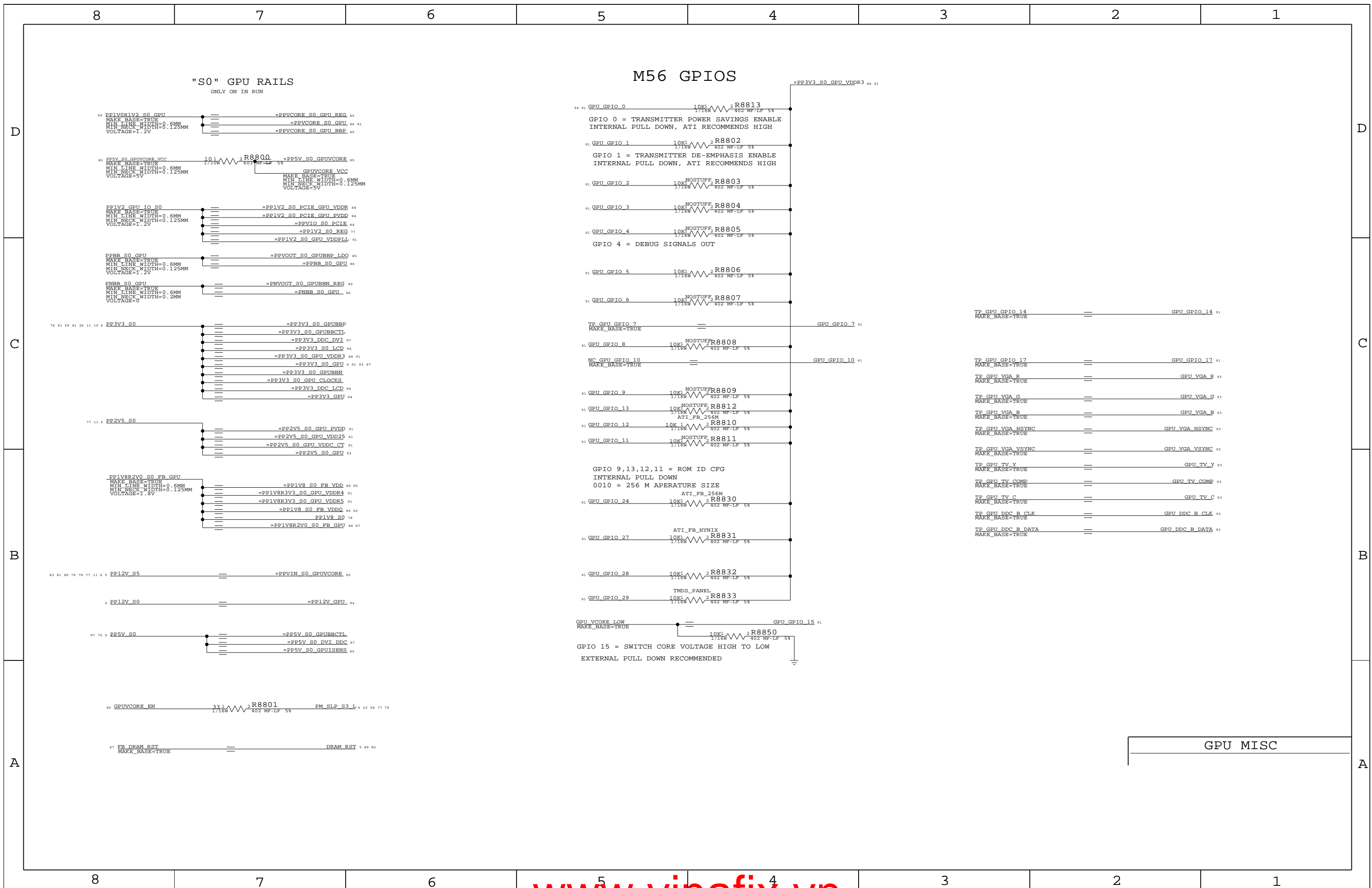
Page Notes

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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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Table with columns: SIZE (D), DRAWING NUMBER (051-7148), REV. (D), SCALE (NONE), SHEET (87), OF (110).



"S0" GPU RAILS
ONLY ON IN RUN

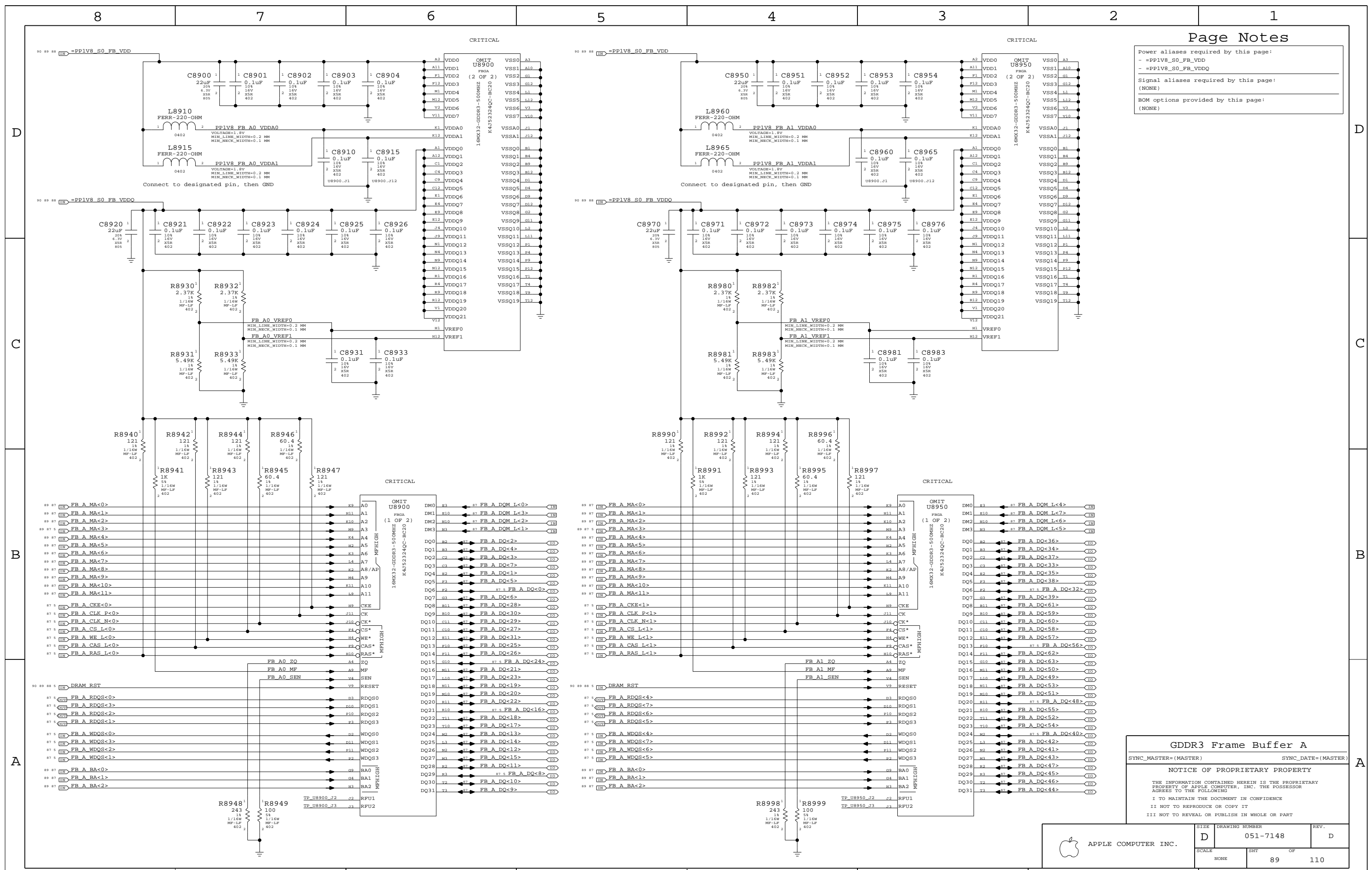
M56 GPIOs

GPU MISC

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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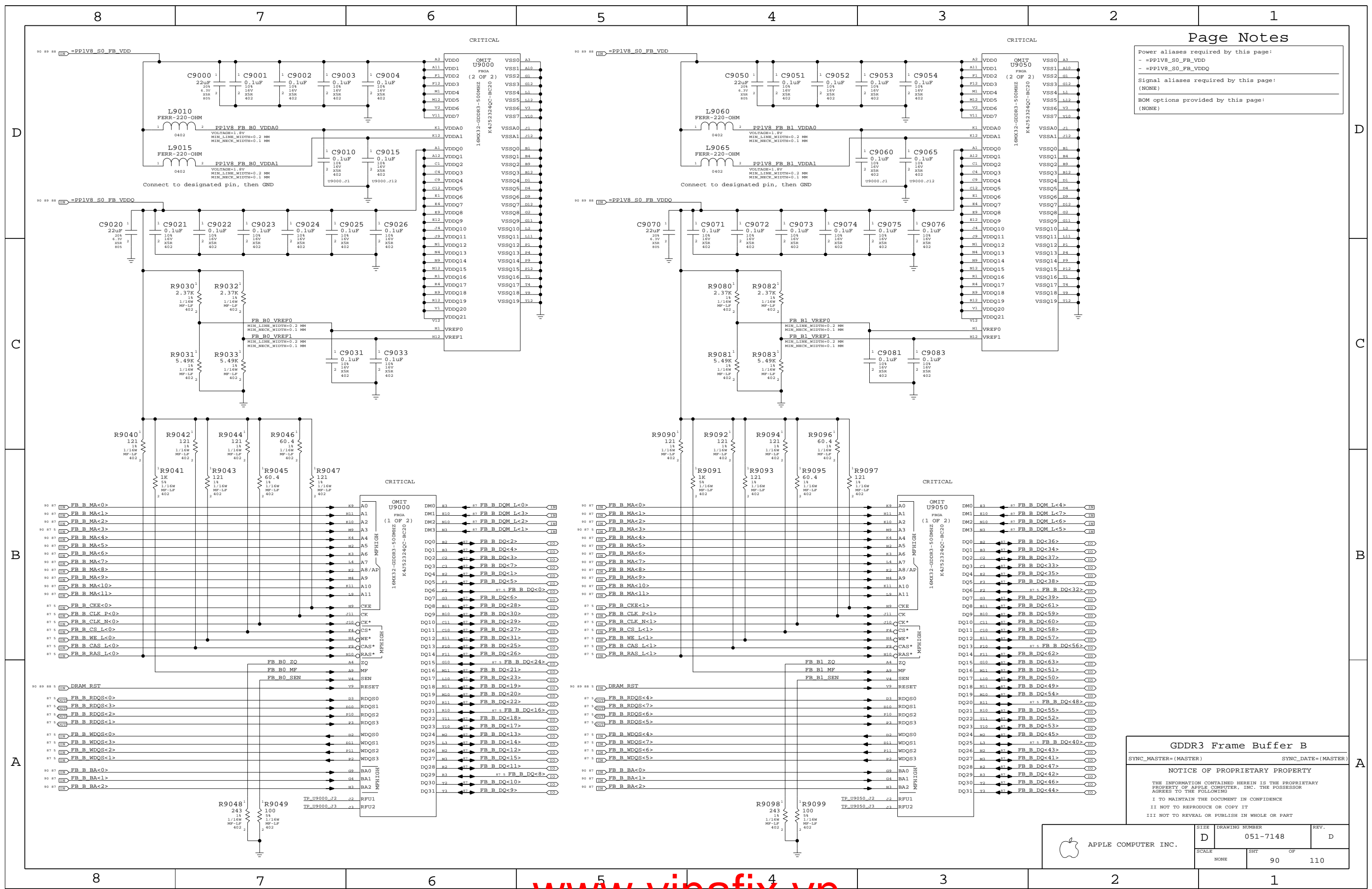
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	
NONE	89	110	

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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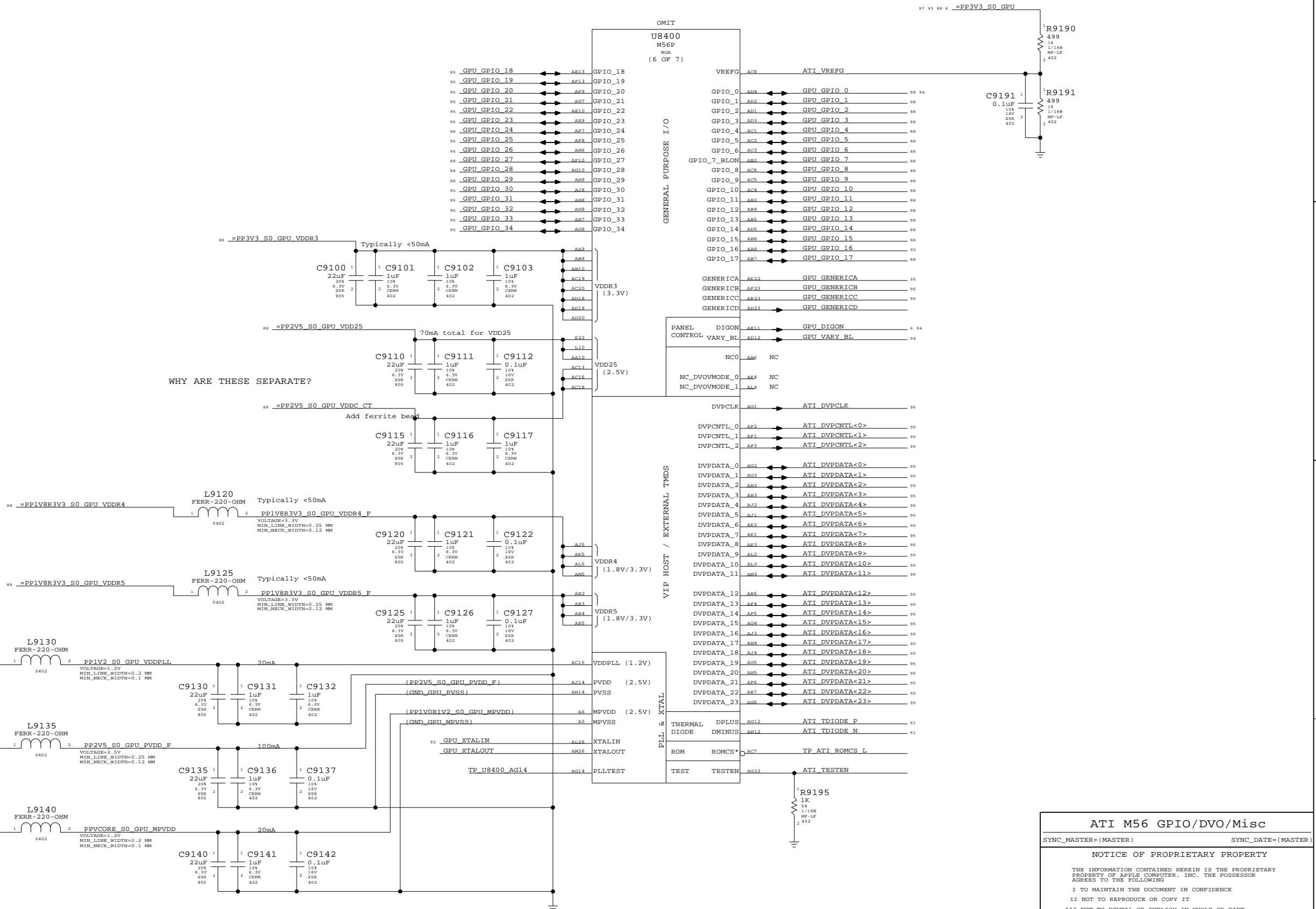
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7148	D
SCALE	SHT	OF	
NONE	90	110	

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	051-7148	D
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Page Notes

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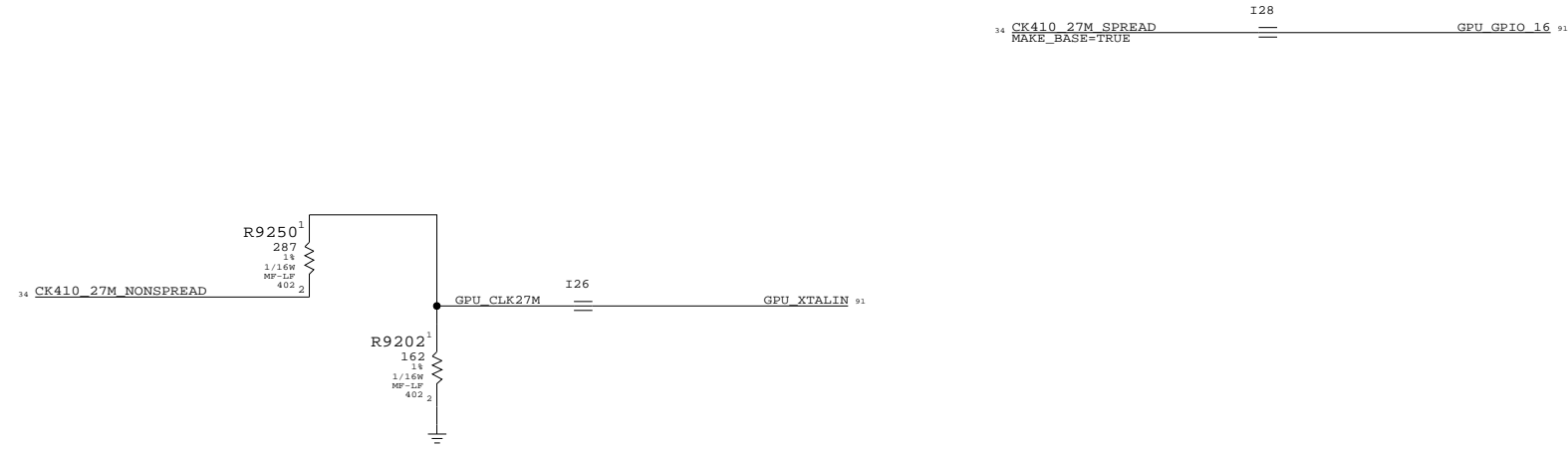
- =PP3V3_GPU_CLOCKS - =PP3V3_GPU_PWRSEQ
- =PPVIN_GPU_LVDDR_LDO - =PP2V5_GPU_PWRSEQ
- =PP2V5_GPU_LVDDR_LDO - =PP1V8_GPU_PWRSEQ
- =PP1V5_GPU_PWRSEQ

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

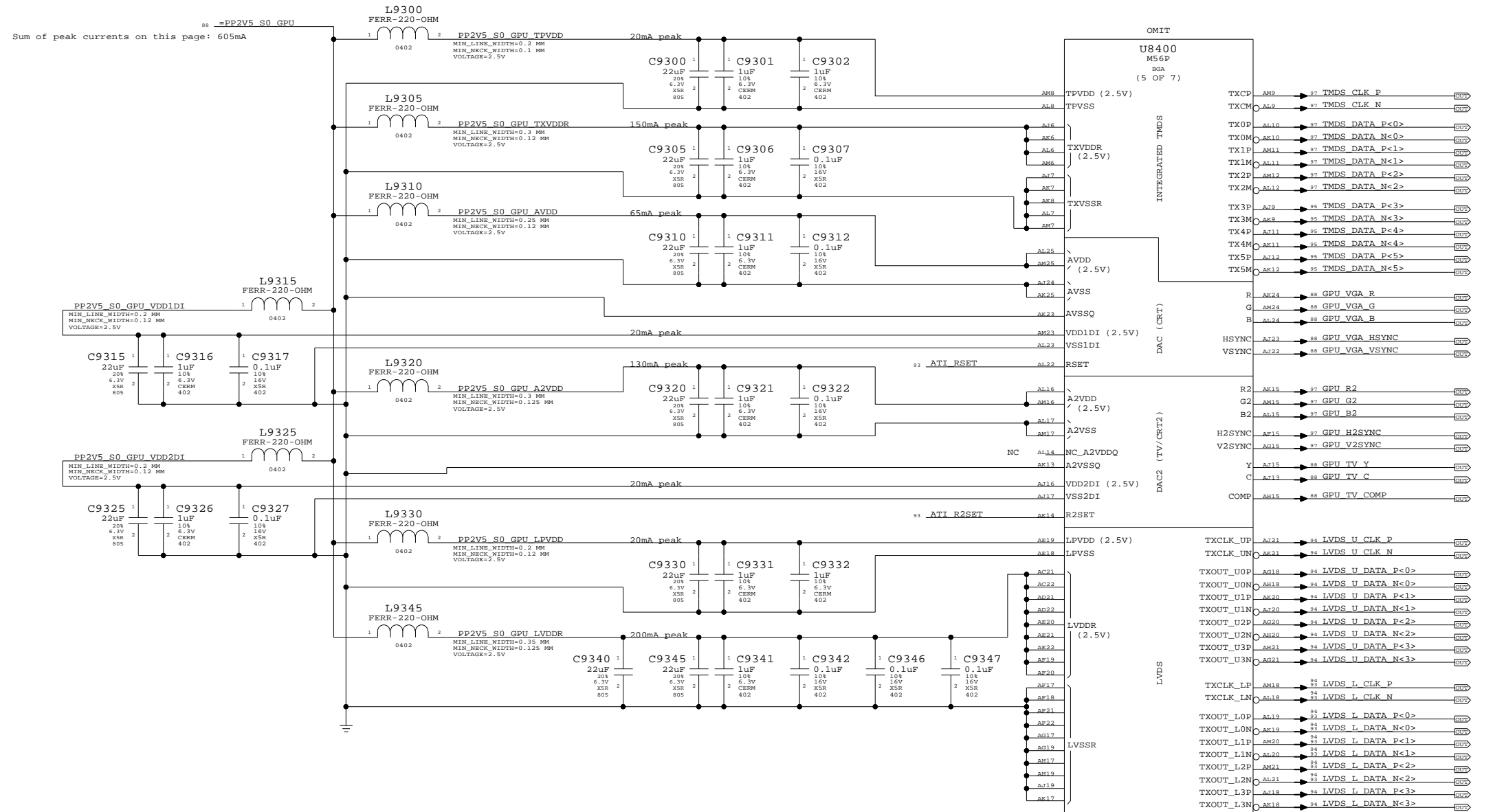
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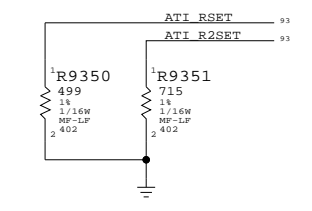
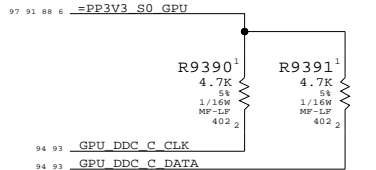
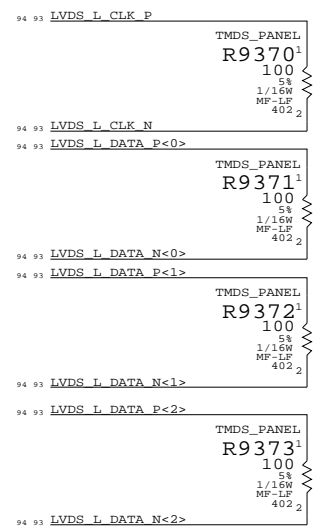
BOM options provided by this page:
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TERMINATION FOR TMDS USAGE OF LVDS PINS
 PLACE CLOSE TO GPU (U8400)

Sum of peak currents on this page: 605mA



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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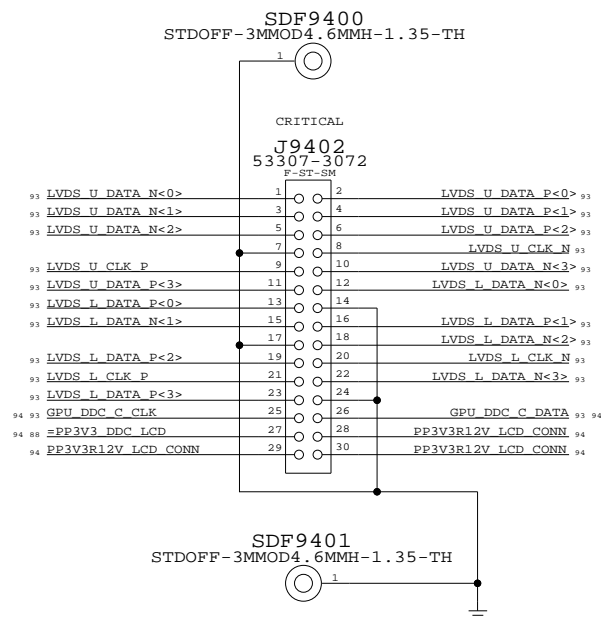
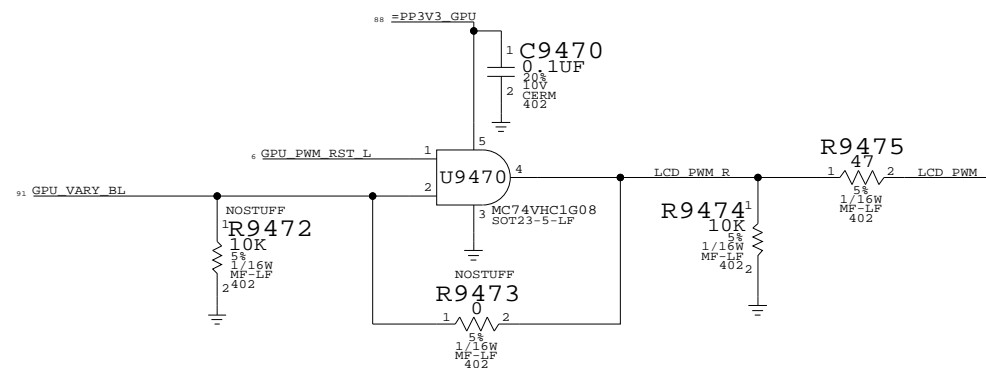
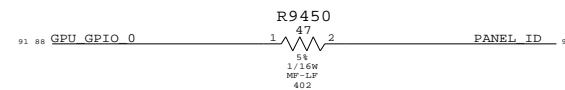
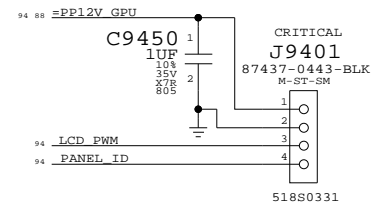
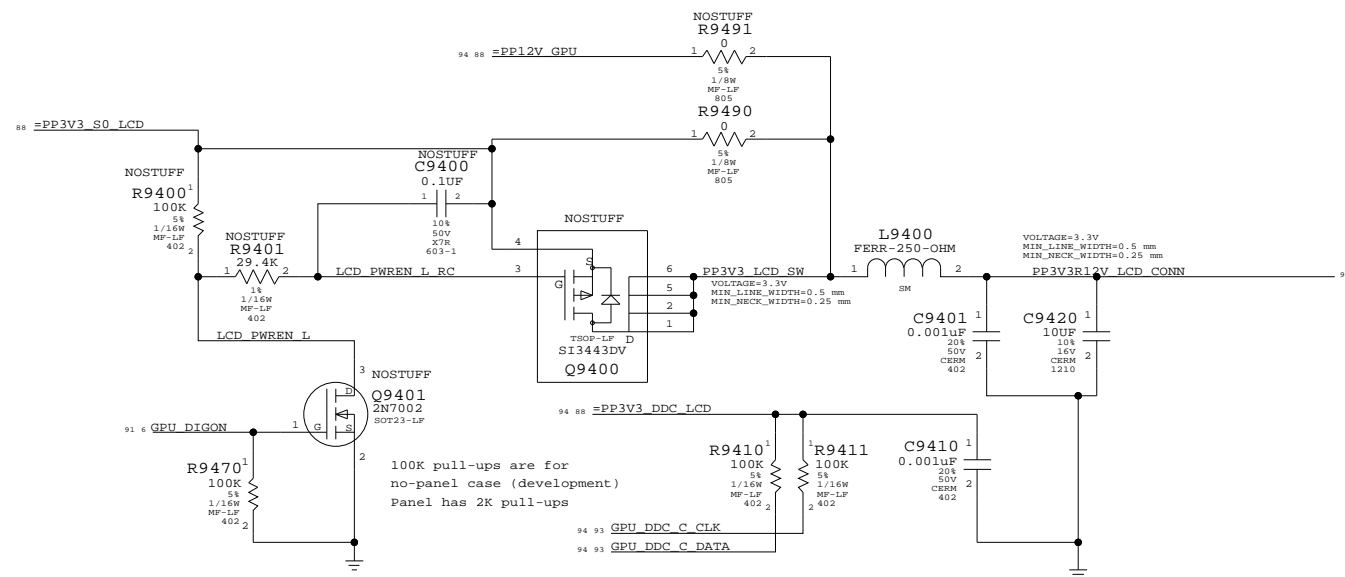
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	NONE	93	110	D

LCD (LVDS) INTERFACE

INVERTER INTERFACE



Internal Display Conns
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SCALE	SHT	OF	
NONE	94	110	

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M56 TPS


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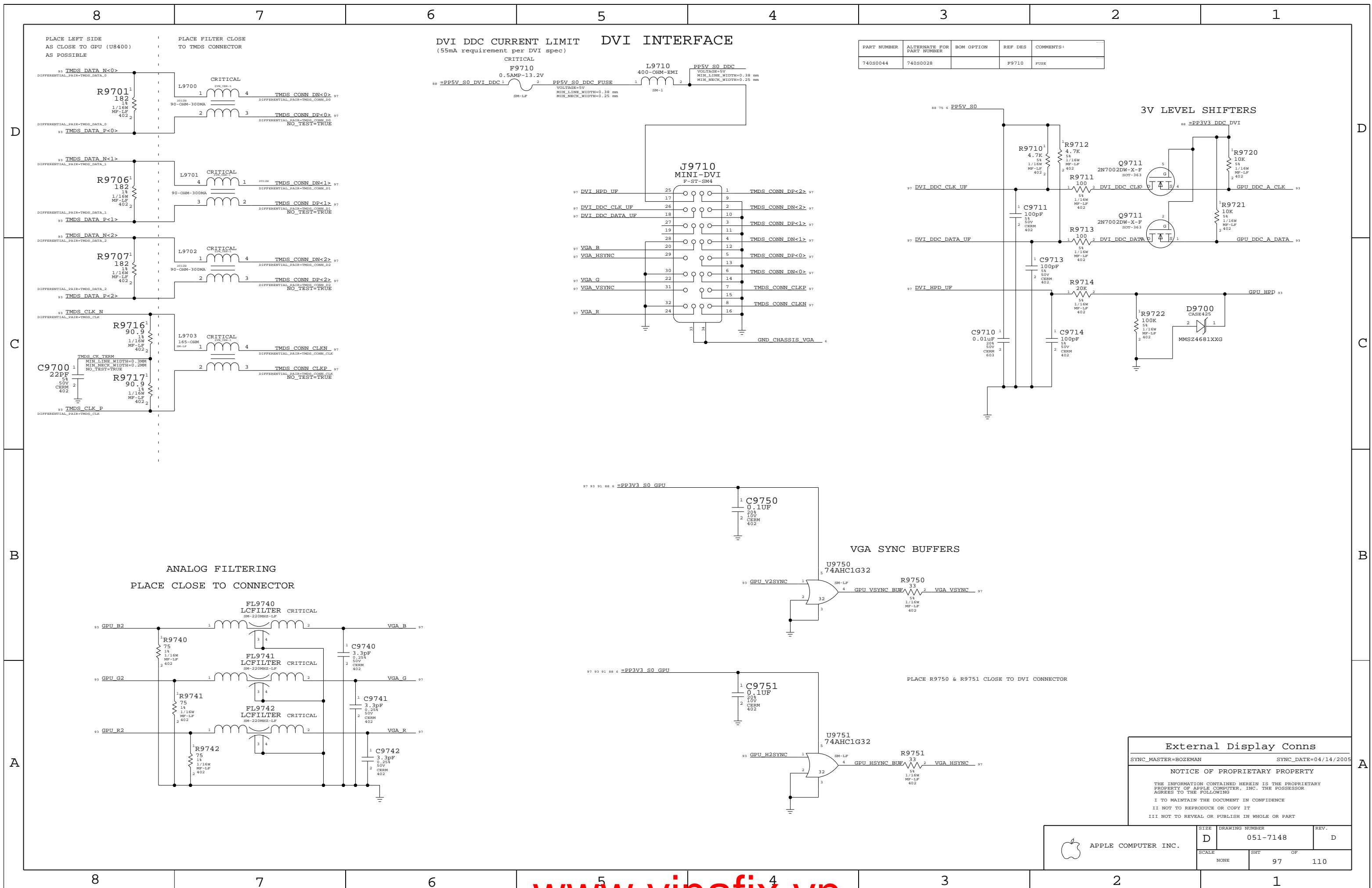
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NONE			



External Display Conns
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SCALE	SHT	OF	
NONE	97	110	

8			7			6			5			4			3			2			1														
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