

8

7

6

5

4

3

2

1

- 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.

K36B MLB SCHEMATIC

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD	ENG APPD
13		659856	ENGINEERING RELEASED		
				DATE	DATE
				12/22/08	?

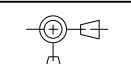
12/23/2008

Page	(.csm)	Contents	Date
1	1	Table of Contents	08/22/2007
2	2	System Block Diagram	08/17/2008
3	3	Power Block Diagram	08/17/2008
4	4	CONFIGURATION OPTIONS	08/17/2008
5	5	Revision History	08/17/2008
6	6	JTAG Scan Chain	08/17/2008
7	7	FUNC TEST	08/17/2008
8	8	Power Aliases	08/17/2008
9	9	SIGNAL ALIAS	08/17/2008
10	10	CPU FSB	08/18/2008
11	11	CPU Power & Ground	08/17/2008
12	12	CPU Decoupling	08/17/2008
13	13	eXtended Debug Port(MiniXDP)	01/08/2008
14	14	MCP CPU Interface	08/17/2008
15	15	MCP Memory Interface	08/17/2008
16	16	MCP Memory Misc	08/17/2008
17	17	MCP PCIe Interfaces	08/17/2008
18	18	MCP Ethernet & Graphics	08/17/2008
19	19	MCP PCI & LPC	08/17/2008
20	20	MCP SATA & USB	08/17/2008
21	21	MCP HDA & MISC	08/17/2008
22	22	MCP Power & Ground	08/17/2008
23	24	MCP79 A01 Silicon Support	08/17/2008
24	25	MCP Standard Decoupling	08/17/2008
25	26	MCP Graphics Support	08/17/2008
26	28	SB Misc	08/17/2008
27	29	FSB/DDR2 VREF MARGINING	08/17/2008
28	31	DDR2 SO-DIMM Connector A	08/17/2008
29	32	DDR2 SO-DIMM Connector B	08/17/2008
30	33	Memory Active Termination	08/17/2008
31	34	Right Clutch Connector	08/17/2008
32	37	Ethernet PHY (RTL8211CL)	03/20/2008
33	38	Ethernet & AirPort Support	04/04/2008
34	39	ETHERNET CONNECTOR	04/04/2008
35	41	FireWire LLC/PHY(FW643E)	08/17/2008
36	42	FireWire Port Power	08/17/2008
37	43	FireWire Ports	(MASTER) 08/17/2008

Page	(.csm)	Contents	Date
38	45	SATA Connectors	08/17/2008
39	46	External USB Connectors	08/17/2008
40	48	Front Flex Support	07/17/2008
41	49	SMC	08/17/2008
42	50	SMC Support	08/17/2008
43	51	LPC+SPI Debug Connector	08/17/2008
44	52	SMBUS CONNECTIONS	08/17/2008
45	53	VOLTAGE SENSING	08/17/2008
46	54	Current Sensing	08/17/2008
47	55	Thermal Sensors	08/17/2008
48	56	Fan	08/17/2008
49	58	GEYSER	08/17/2008
50	59	SMS	08/17/2008
51	61	SPI ROM	08/17/2008
52	62	AUDIO: CODEC	08/29/2008
53	66	AUDIO: SPEAKER AMP	08/29/2008
54	67	AUDIO: JACK	08/29/2008
55	68	AUDIO: JACK TRANSLATORS	08/29/2008
56	69	DC-In & Battery Connectors	08/17/2008
57	70	PBUS Supply/Battery Charger	08/17/2008
58	72	5V/3.3V SUPPLY	08/17/2008
59	73	1.8V/0.9V DDR2 SUPPLY	08/17/2008
60	74	IMVP6 CPU VCore Regulator	08/17/2008
61	75	MCP VCore REGULATOR	08/17/2008
62	76	CPU VTT(1.05V) SUPPLY	08/17/2008
63	77	MISC POWER SUPPLIES	08/17/2008
64	78	POWER SEQUENCING	08/17/2008
65	79	POWER FETS	08/17/2008
66	90	INVERTER, LVDS	08/17/2008
67	93	TMDS ALIASES	08/17/2008
68	94	MINI-DVI CONNECTOR	08/17/2008
69	100	CPU/FSB Constraints	08/17/2008
70	101	Memory Constraints	08/17/2008
71	102	MCP Constraints 1	08/17/2008
72	103	MCP Constraints 2	08/17/2008
73	104	Ethernet Constraints	08/17/2008
74	105	FireWire Constraints	08/17/2008
75	106	SMC Constraints	08/17/2008
76	109	K36B RULE DEFINITIONS	08/17/2008

Schematic / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-7852	1	SCHEM, MLB, K36B	SCH	CRITICAL	
820-2496	1	PCBF, MLB, K36B	PCB	CRITICAL	

DIMENSIONS ARE IN MILLIMETERS		METRIC		APPLE INC.	
XX :	_____	DRAPTR	DESIGN CK	NOTICE OF PROPRIETARY PROPERTY THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING: I. TO MAINTAIN THE DOCUMENT IN CONFIDENCE II. NOT TO REPRODUCE OR COPY IT III. NOT TO REVEAL OR PUBLISH IN WHOLE OR PART	
X.XX :	_____	ENG APPD	MFG APPD		
X.XXX :	_____	QA APPD	DESIGNER		
ANGLES :	_____	RELEASE	SCALE		
DO NOT SCALE DRAWING		NONE		TITLE	
 THIRD ANGLE PROJECTION		MATERIAL/FINISH NOTED AS APPLICABLE		SIZE D	DRAWING NUMBER
				051-7852	REV. 13
				SHT 1 OF 109	

8

7

6

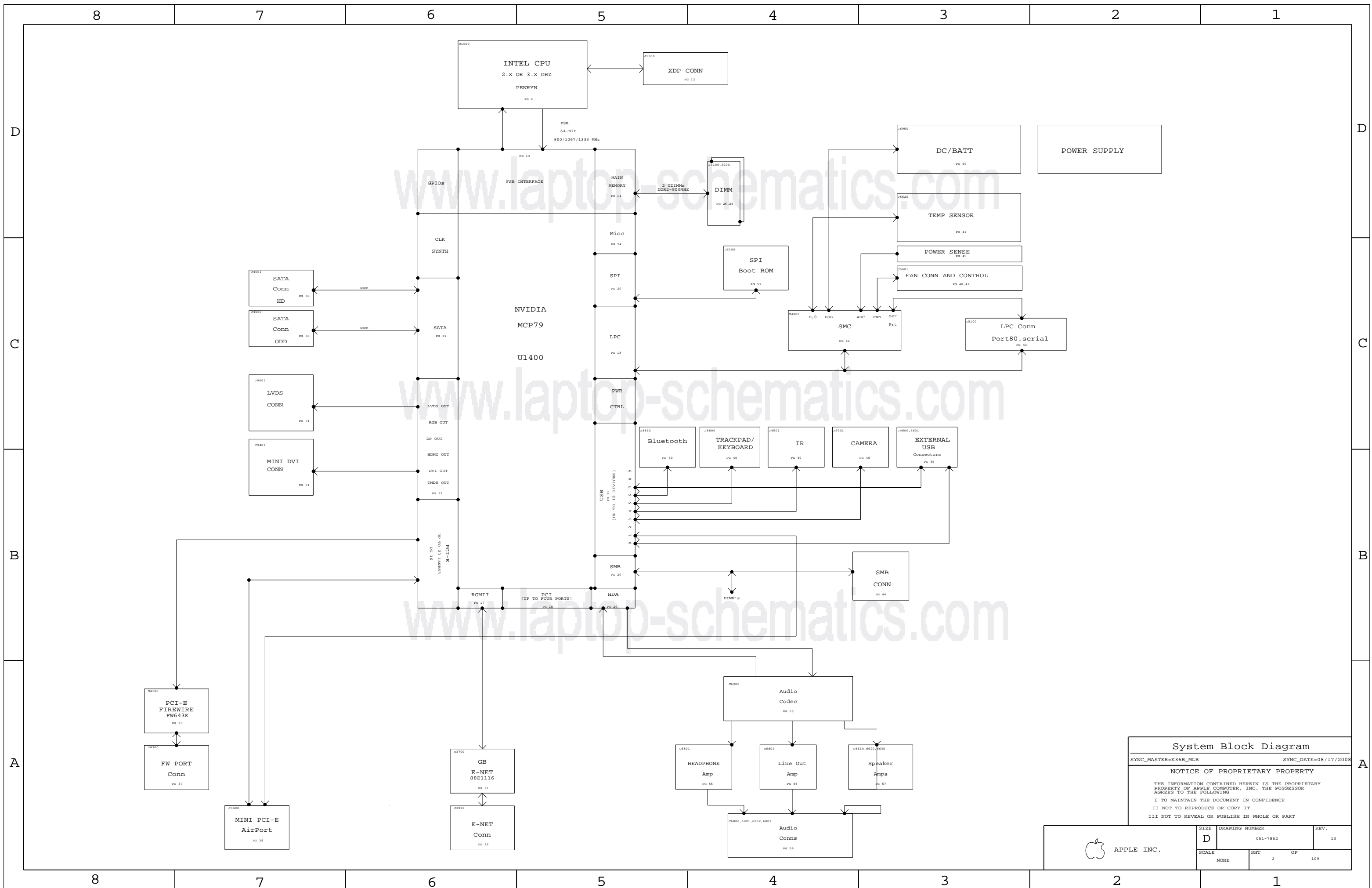
5

4

3

2

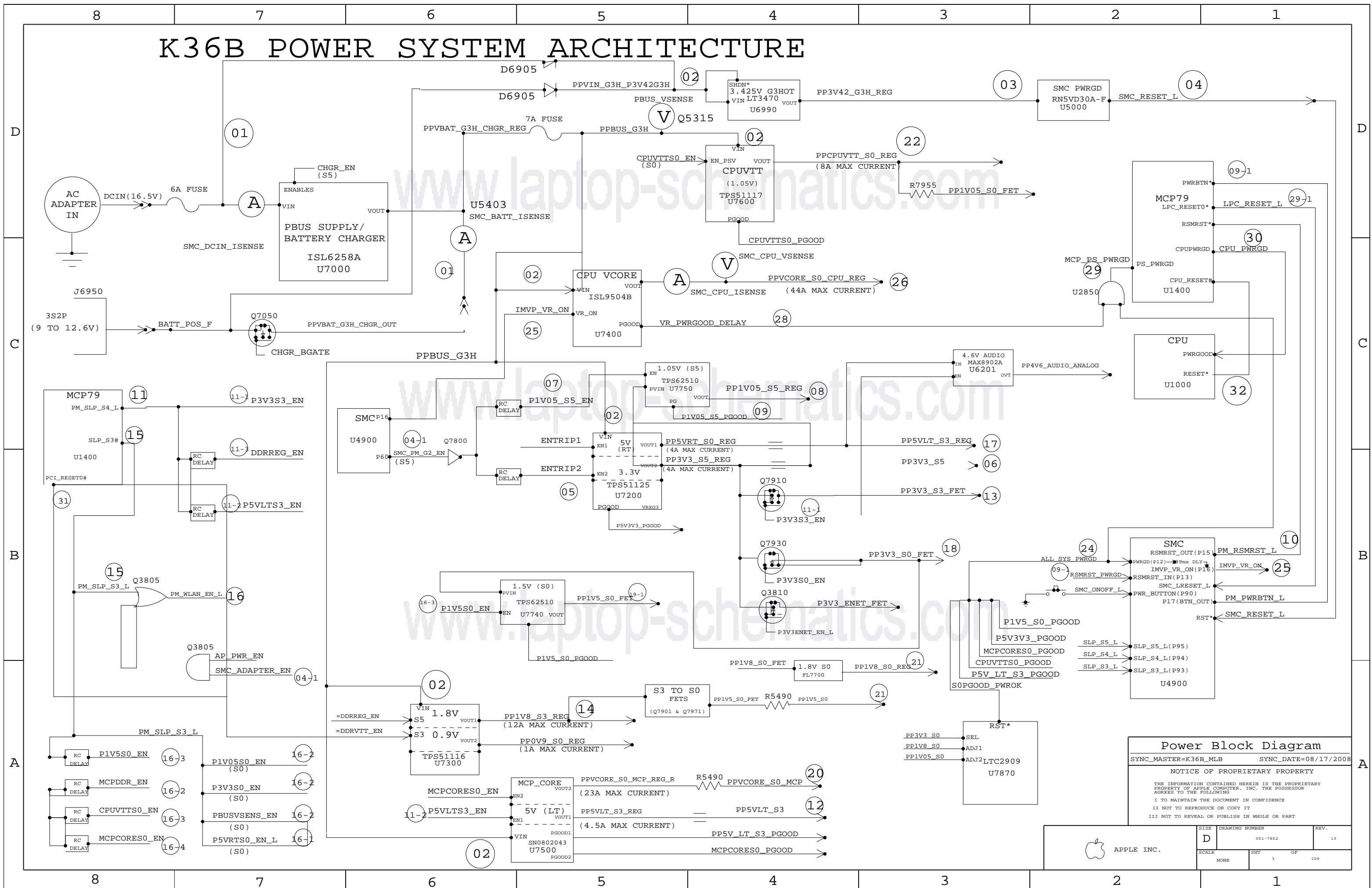
1



System Block Diagram
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT		OF
NONE	2		109

K36B POWER SYSTEM ARCHITECTURE



Power Block Diagram
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE D	DRAWING NUMBER 051-7852	REV. 13
	SCALE NONE	SHEET 3	OF 109

Page Notes

Power aliases required by this page:
(NONE)

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)

BOM OPTION

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
341S2420	1	IC, SMC, HSB/2117, 9X9MM, TLP, HF, BLANK	U4900	CRITICAL	SMC_PROG
341S2418	1	IC, FLASH, SPI, 32MBIT, 3.3V, 86MHZ, 8-SOP	U6100	CRITICAL	BOOTROM_PROG
341S2093	1	IC, CYPRESS, CY7C63833	U4800	CRITICAL	
338S0654	1	IC, P8643K, 1394B PHY/ONCI L2M/PCI-E, L27	U4100	CRITICAL	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
826-4393	1	LBL, P/N LABEL, PCB, 28MMX6MM	[EEE:3TN]	CRITICAL	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
337S3693	1	PCB, SLIDE, PRO, 2.00mm, 25x, 106x, R0.3M, BGA	U1000	CRITICAL	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
338S0702	1	IC, ONCP, MCP79, 35X35MM, BGA1437, B03	U1400	CRITICAL	

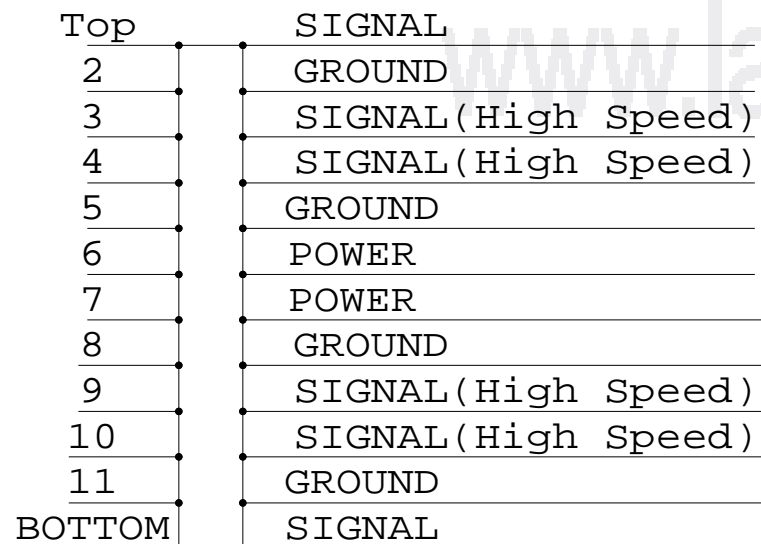
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
338S0694	1	IC, RTL8251CA-VB-GR, GIGE TRANSCEIVER, 4SP	U3700	CRITICAL	

ALTERNATES OPTION

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
128S0093	128S0218		ALL	ALTERNATE PER CYNDI
152S0694	152S0138		ALL	ALTERNATE PER CYNDI
152S0847	152S0586		ALL	ALTERNATE PER CYNDI
152S0874	152S0516		ALL	ALTERNATE PER CYNDI
152S0796	152S0685		ALL	ALTERNATE PER CYNDI
152S0778	152S0693		ALL	ALTERNATE PER CYNDI
157S0058	157S0055		ALL	ALTERNATE PER CYNDI

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0665	1	CONN, RCPT, MINI-DVI, 32P, R/A	J9401	CRITICAL	
514-0666	1	CONN, RCPT, 3.5MM AUDIO IN, R/A	J6750	CRITICAL	
514-0667	1	CONN, RCPT, 3.5MM AUDIO OUT, R/A	J6700	CRITICAL	
514-0668	1	CONN, RCPT, RJ45, NO FILTER, 8P	J3900	CRITICAL	
514-0669	1	CONN, RCPT, USB, 4P, MIDPLANE	J4600	CRITICAL	
514-0669	1	CONN, RCPT, USB, 4P, MIDPLANE	J4601	CRITICAL	

BOARD STACK-UP AND CONSTRUCTION



CONFIGURATION OPTIONS

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

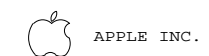
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	4	109

Revision History

*****2008/08/21*****
PAGE 61:
- U7500 PIN V5DRV1 LINK TO PP5V_S0_MCPREG_VCC.
- U7500 PIN TONSEL LINK TO GND DIRECTLY.
PAGE 64:
- R7859 CHANGE TO 100 OHM.
- R7879 CHANGE TO 100K OHM.
PAGE 65:
- DELETE 1.05V S0 FET CIRCUIT.
PAGE 57:
- R7011 CHANGE TO 9.31K OHM, 1%
*****2008/08/22*****
PAGE 7:
- ADD SMC_EXCARD_PWR_EN TEST_POINT
PAGE 8:
- ADD =PP3V42_G3H_RTC_D LINK TO =PP3V42_G3H_REG
PAGE 14:
- R1410 CHANGE TO 49.9 OHM
- CHANGE R1440 TO 150.5% AND NO STUFF
PAGE 26:
- R2872 CHANGE TO 0OHM
- RTC FOLLOW M97 DESIGN AND USE SUPERCAP SOLUTION
- MCP S0 PWRGD FOLLOW M97 DESIGN
PAGE 29:
- PULL R3240 DOWN TO GND. PULL R3241 HIGH
PAGE 32,33,34
- FOLLOW M97 DESIGN
PAGE 39:
- D4600/D4601/PIN-6 CONNECT TO USB VBUS (FOLLOW M97D)
PAGE 44:
- R5270/R5271 = 1K (FOLLOW M97D)
- R5280/R5281 = 1K (FOLLOW M97D)
PAGE 68:
- CHANGE C9411, C9412 TO 220PF
- CHANGE R9462, R9463 TO 2.7KOHM
- ADD C9480 0.1UF_16V_0402 FROM GND_CHASSIS_TMDS_DOWN TO GND
- CHANGE R9460,R9461 TO 0OHM,
- CHANG C9442 AND C9443 TO 47PF
*****2008/08/23*****
MODIFY ALL NOSTUFF TO NO STUFF.
PAGE 6:
- REMOVE ETHERNET CIRCUIT.
PAGE 8:
- ADD =PP3V3_S5_P3V3ENETFFET LINK TO PP3V3_S5
- ADD =PP1V05_ENET_PHY LINK TO PP1V2R1V05_ENET.
PAGE 9:
- ADD =RTL8211_ENSWRE LINK TO GND.
- ADD =PP3V3_ENET_PHY_VDDREG LINK TO TP_PP3V3_ENET_PHY_VDDREG.
- ADD =RTL8211_REGOUT LINK TO NC_RTL8211_REGOUT.
- =P3V3ENET_EN_L LINK TO PM_SLP_RMG_T_L
- =P1V05ENET_EN LINK TO PM_SLP_RMG_T_L
PAGE 10:
- CHANGE XDP_TDO_CONN TO XDP_TDO
PAGE 13:
- XDP FOLLOW M98 DESIGN. CONNECTOR FROM 516S0625 CHANGE TO 998-1571.
PAGE 23:
- DELETE R2400-R2413 FOR MCP A01 VERSION.
PAGE 31:
- REMOVE R3400, R3401
- L3401 FROM NO STUFF CHANGE TO STUFF.
PAGE 39
- DELETE R4699.
- R4690 FROM NO STUFF CHANGE TO STUFF.
PAGE 41:
- SMC_NB_DDR_ISENSE CHANGE TO SMC_MCP_DDR_ISENSE
- SMC_NB_CORE_ISENSE CHANGE TO SMC_MCP_CORE_ISENSE
PAGE 46:
- SMC_NB_DDR_ISENSE CHANGE TO SMC_MCP_DDR_ISENSE
- SMC_NB_CORE_ISENSE CHANGE TO SMC_MCP_CORE_ISENSE
- R5417 ADD BOM OPTION FOR NO STUFF
- R5416 ADD BOM OPTION FOR NO STUFF
PAGE 50:
- ADD C5926 (10UF,20%,0603) TO =PP3V3_S3_SMS
PAGE 63:
- REMOVE USB_PWR_EN_S3
PAGE 66:
- REMOVE R9010, R9011
*****2008/08/24*****
PAGE 6:
- R0602 BOMOPTION FROM JTAG_1DEV CHANGE TO NO STUFF.
PAGE 13:
- XDP FOLLOW M97 DESIGN. CONNECTOR FROM 998-1571 CHANGE TO 516S0625.
PAGE 18:
- R1860 AND R1861 CHANGE TO PAGE 68.
PAGE 25:
- C2504-C2507 FROM 138S0578(402) CHANGE TO 138S0614(402-1)
- C2516-C2517 FROM 138S0578(402) CHANGE TO 138S0614(402-1)
PAGE 35:
- R4150 FROM 118S0343 (0201) CHANGE TO 116S0056(0402)
PAGE 58:
- C7281, C7241, C7272 FROM 138S0555(603) CHANGE TO 138S0615(603-1)
- C7280, C7240 FROM 128S0092(POLY) CHANGE TO 128S0128(POLY-TANT)
- C7291, C7292, C7252, C7251 FROM 128S0115(POLY,CASE-B2) CHANGE TO 128S0222(POLY,CASE-B2-SM)
- Q7260, Q7261 FROM 376S0512 CHANGE TO 376S0652 (H-F)
PAGE 59:
- Q7320 FROM 376S0512 CHANGE TO 376S0652 (H-F)
- Q7321 FROM 376S0511 CHANGE TO 376S0651 (H-F)
- C7321 FROM 128S0111(POLY) CHANGE TO 128S0218 (POLY,CASE-D2E-SM)
- C7343 FROM 128S0073 CHANGE TO 128S0233.
PAGE 60:
- XW7400 ADD BOMOPTION OMIT.
- Q7400, Q7402 FROM 376S0472 CHANGE TO 376S0617.
PAGE 61:
- L7500 FROM 152S0869 CHANGE TO 152S0685.
- Q7500 FROM 376S0512 CHANGE TO 376S0652.
- C7560 FROM 128S0092 CHANGE TO 128S0218.
PAGE 62:
- Q7620 FROM 376S0512 CHANGE TO 376S0652.
- C7601 FROM 138S0578 CHANGE TO 138S0614.

*****2008/08/25*****
CHANGE CSA BASE ON WILL'S SUGGESTION.
PAGE 9:
- ADD GMUX_JTAG_TMS AND GMUX_JTAG_TDI IN MISC NC MCP79 ALIASES.
PAGE 18:
- NETNAME ENET_INTR_L CHANGE TO TP_ENET_INTR_L.
- ENET_PWRDWN_L CHANGE TO TP_ENET_PWRDWN_L
PAGE 19:
- DELETE R1987,R1988,R1995,R1970,R1971,R1972,R1973,R1996,R1997,R1998,R1999,R1978,R1979
(FOLLOW M97 DESIGN).
- NET DPMUX_LOWPWR_L SYNC M97 NETNAME AUD_IPHS_SWITCH_EN
- NET LVDSMUX_SEL_IG_L SYNC M97 NETNAME
- NET DPMUX_SEL_IG_L SYNC M97 NETNAME
PAGE 28:
- REMOVE NET_DIMM_OVERTEMPA_L
PAGE 29:
- REMOVE NET_DIMM_OVERTEMPA_L
PAGE 42:
- ADD SMC_EXCARD_PWR_EN TO TP_SMC_EXCARD_PWR_EN
- ADD SMC_RSTGATE_L TO TP_SMC_RSTGATE_L
- ADD ALS_GAIN TO NC_ALS_GAIN
- ADD ESTARLDO_EN TO NC_ESTARLDO_EN
- ADD SMC_ANALOG_ID TO NC_SMC_ANALOG_ID
- ADD SMC_SYS_KBDLED TO NC_SMC_SYS_KBDLED
- ADD R5054 10KOHM LINK SMC_GPU_ISENSE PULL DOWN TO GND.
- ADD R5055 10KOHM LINK SMC_NB_MISC_ISENSE PULL DOWN TO GND.
PAGE 43:
- R5142 CHANGE TO NO STUFF.
PAGE 46:
- R5416 CHANGE TO 4.53K AND DELETE BOM OPTION.
- R5417 CHANGE TO 4.53K AND DELETE BOM OPTION.
- R5418 CHANGE TO 4.53K AND DELETE BOM OPTION.
PAGE 57:
- NETNAME FROM CHGR LOWCURRENT REF CHANGE TO CHGR_LOWCURRENT_REF
- NETNAME FROM CHGR LOWCURRENT GATE CHANGE TO CHGR_LOWCURRENT_GATE
PAGE :
- REMOVE R7884 AND C7884
PAGE 66:
- REMOVE J9001 PIN 20 AND PIN21 NET.
*****2008/09/02*****
PAGE 45:
- CHANGE ODD CONNECTOR FROM 516S0720 TO 516S0719
*****2008/09/27*****
PAGE 9:
- ADD STANDOFF 860-0964 X 4
- ADD STANDOFF 860-0723 X 1
- ADD STANDOFF 860-0749 X 1
PAGE 29:
- REMOVE BOMOPTION TABLE OF R2903/R2905/R2909/R2911
PAGE 66:
- C6601/C6603 CHANGE TO APN 128S0135, and REMOVE BOMOPTION OMIT
- C6605 CHANGE TO APN 128S0148, HF APN 128S0221, and REMOVE BOMOPTION OMIT
PAGE 68:
- C6830/C6831 CHANGE TO APN 128S0220, and REMOVE BOMOPTION OMIT
PAGE 72:
- R7272 CHANGE FROM 57.6K 1%(114S0389) TO 75K 1%(114S0399)
*****2008/10/20*****
PAGE 29:
- ADD R2903/R2905 BOMOTION AND CHANGE VALUE TO 200 OHM
PAGE 50:
- REMOVE ALT TABLE
PAGE 74:
- REMOVE ALT TABLE
PAGE 94:
- REMOVE K36 BOM OPTION TABLE AND ALT TABLE
*****2008/10/22*****
PAGE 12:
- C1200 - C1219 CHANGE TO 138S0580
PAGE 28:
- C2870 CHANGE TO 138S0614
PAGE 37:
- ADD R3731 (116S0026 22 ohm 5% 0402) FOR EMI 125MHZ NOISE
- TP_RTL8211_CLK125 CHANGE TO RTL8211_CLK125
PAGE 48:
- C4803 CHANGE TO 138S0614
PAGE 66:
- C6605 CHANGE TO HF APN 128S0221
PAGE 70:
- C7040/C7041/C7047 CHANGE TO 138S0614
PAGE 90:
- L9002 CHANGE TO 116S0004(0ohm,5%,0402)
- C9003 CHANGE TO 116S0004(0ohm,5%,0402)
*****2008/10/24*****
PAGE 19:
- R1950/R1951/R1952/1953 CHANGE TO 116S0004 (0 OHM,5%,0402)
PAGE 28:
- R2825/R2826 CHANGE TO 116S0004 (0 OHM,5%,0402)
PAGE 34:
- J3400 516S0635 CHANGE TO HF APN 516S0729
PAGE 52:
- ADD C5250/C5251/C5270/C5271/C5260/C5261/C5280/C5281 131S1104 (22pF,5%,0402) NO STUFF
- TEXT "ALS" CHANGE TO "MINI-PCIE"
- I2C_ALS_SCL CHANGE TO I2C_MINI_PCIE_SCL
- I2C_ALS_SDA CHANGE TO I2C_MINI_PCIE_SDA
PAGE 67:
- J6700 514-0604 CHANGE TO HF APN 514-0521
- J6750 514-0603 CHANGE TO HF APN 514-0519
PAGE 69:
- J6950 516S0620 CHANGE TO HF APN 516S0735
*****2008/10/25*****
PAGE 52:
- STUFF C5250/C5251/C5270/C5271/C5260/C5261/C5280/C5281
*****2008/10/28*****
PAGE 34:
- J3400 516S0729 CHANGE TO 516S0635
*****2008/10/30*****
PAGE 69:
- J6950 516S0735 CHANGE TO 516S0620

*****2008/10/31*****
PAGE 41:
- U4100 CHANGE FROM 338S0523 TO 338S0654
*****2008/11/01*****
PAGE 4:
- BOM change U1400 CHANGE FROM 338S0678 TO 338S0702
*****2008/11/05*****
PAGE 62:
- C6210 CHANGE FROM 127S0062 TO 127S0108
PAGE 68:
- C6832, C6833 CHANGE FROM 127S0062 TO 127S0108
PAGE 45:
- DELETE L4502, NET SATA_HDD_D2R_UF_P / SATA_HDD_D2R_UF_N
- L4501 / F14520 / FL4525 CHANGE FROM 155S0303 TO 155S0371
PAGE 102:
- DELETE PHYSICAL/SPACING SETTING OF SATA_HDD_D2R_UF_P / SATA_HDD_D2R_UF_N
*****2008/11/06*****
- U5413 CHANGE FROM 353S1432 TO 353S2220
- R7417 CHANGE FROM 5.36K(114S0289) TO 4.42K(114S0280)
*****2008/11/12*****
- U1000 CHANGE FROM 373S3646 TO 373S3702
*****2008/11/19*****
- J6950 CHANGE FROM 516S0620 TO 516S0735
- J9401 CHANGE FROM 514-0517 TO 514-0665
- J6750 CHANGE FROM 514-0519 TO 514-0666
- J6700 CHANGE FROM 514-0521 TO 514-0667
- J3900 CHANGE FROM 514-0523 TO 514-0668
- J4600, J4601 CHANGE FROM 514-0527 TO 514-0669
- U3700 CHANGE FROM 338S0570 TO 338S0694
*****2008/11/26*****
- PAGE 61 NOTE : CORRECT REFERENCE TO R5164 AND R5144
- J3400 CHANGE TO 516S0729
*****2008/12/12*****
- R5144 and R5164 changed to 10K 5% 0402 (116S0090)
*****2008/12/17*****
- U4900 symbol update
*****2008/12/20*****
- R5156, R5157, R5158 change from 0 to 33 ohm, 5%, 0402(116S0030)

D

D

C

C

B

B

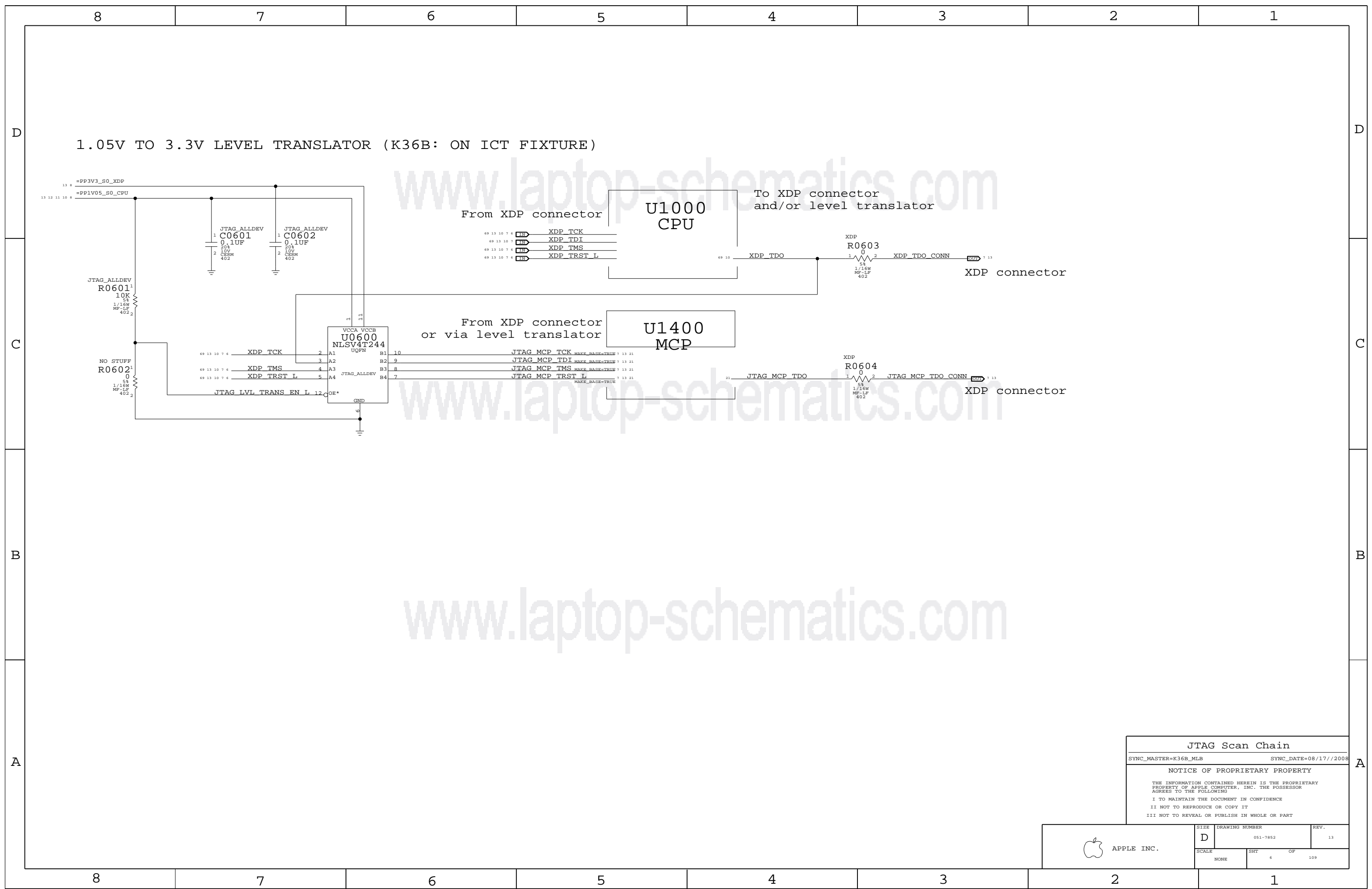
A

A

13
SYNC_MASTER=K36B_MLB
NOTICE OF PROPRIETARY PROPERTY
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.
SCALE NONE 5 OF 109
D 051-7852 13

NOTE: All page numbers are .csa, not PDF. See page 1 for .csa -> PDF mapping.



JTAG Scan Chain

SYNC_MASTER=K36H_MLB SYNC_DATE=08/17//2008


NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

 APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	
NONE	6	109	

Functional Test Points

#J5601 Fan Connectors

#J5601 TRUE PP5VRT_S0 7 8
 #J5601 TRUE FAN_RT_PWM 48
 #J5601 TRUE FAN_RT_TACH 48
 #J5601 TRUE GND

#J6950 Battery/Lid Connector

#J6950 TRUE SMC_BS_ALERT_L_F 56
 #J6950 TRUE SMBUS_BATT_SCL_F 56
 #J6950 TRUE SMBUS_BATT_SDA_F 56
 #J6950 TRUE PPVBAT_G3H_CONN_F 56
 #J6950 TRUE SMC_LID_F 56
 #J6950 TRUE GND_SMC_LID_F 56
 #J6950 TRUE PP3V42_G3H_LIDSWITCH_F 56
 #J6950 TRUE GND Need 6 TP

#J6900 MagSafe DC Power Jack

#J6900 TRUE PP18V5_DCN_FUSE Need 2 TP 56
 #J6900 TRUE ADAPTER_SENSE 56
 #J6900 TRUE GND Need 2 TP

#J9000 INVERTER Connector

#J9000 TRUE PPBUS_ALL_INV_CONN Need 2 TP 66
 #J9000 TRUE INV_GND 66
 #J9000 TRUE PP5V_INV_F 66
 #J9000 TRUE INV_BKLIGHT_PWM_L Need 4 TP 66

#J9001 LCD + CAMERA CONNECTOR

#J9001 TRUE PP3V3_LCDVDD_SW_F 66
 #J9001 TRUE PP3V3_S0_LCD_F 66
 #J9001 TRUE LVDS_IG_DDC_CLK 18 66
 #J9001 TRUE LVDS_IG_DDC_DATA 18 66
 #J9001 TRUE LVDS_IG_A_DATA_N<0> 18 66 71
 #J9001 TRUE LVDS_IG_A_DATA_P<0> 18 66 71
 #J9001 TRUE LVDS_IG_A_DATA_N<1> 18 66 71
 #J9001 TRUE LVDS_IG_A_DATA_P<1> 18 66 71
 #J9001 TRUE LVDS_IG_A_DATA_N<2> 18 66 71
 #J9001 TRUE LVDS_IG_A_DATA_P<2> 18 66 71
 #J9001 TRUE LVDS_IG_A_CLK_F_N 66
 #J9001 TRUE LVDS_IG_A_CLK_F_P 66
 #J9001 TRUE USB2_CAMERA_CONN_P 66 72
 #J9001 TRUE USB2_CAMERA_CONN_N 66 72
 #J9001 TRUE PP5V_S3_CAMERA_F 66
 #J9001 TRUE GND

#J6701 MIC CONNECTOR

#J6701 TRUE MIC_LO_CONN 54
 #J6701 TRUE MIC_HI_CONN 54
 #J6701 TRUE MIC_SHLD_CONN 54 55

#J6702 Left SPEAKER CONNECTOR

#J6702 TRUE SPKRCONN_L_P_OUT 53 54
 #J6702 TRUE SPKRCONN_L_N_OUT 53 54

#J6703 Right SUB SPEAKER CONNECTOR

#J6703 TRUE SPKRCONN_SUB_P_OUT 53 54
 #J6703 TRUE SPKRCONN_SUB_N_OUT 53 54
 #J6703 TRUE SPKRCONN_R_P_OUT 53 54
 #J6703 TRUE SPKRCONN_R_N_OUT 53 54

#J5800 GEYSER AND DIMMO REMOTE TEMP SENSORS

#J5800 TRUE TPAD_GND_F 49
 #J5800 TRUE CONN_TPAD_ONOFF_FLTR_L 49
 #J5800 TRUE CONN_TPAD_USB_P 49 72
 #J5800 TRUE CONN_TPAD_USB_N 49 72
 #J5800 TRUE SMC_LID_LC 49
 #J5800 TRUE PP5V_S3_TPAD_F 49

#J5520 CPU/MCP Thermal Sensor

#J5520 TRUE CPUTHSNS_D2_P 47
 #J5520 TRUE CPUTHSNS_D2_N 47
 #J5520 TRUE MCPTHMSNS_D2_P 47
 #J5520 TRUE MCPTHMSNS_D2_N 47

#J4810 BLUETOOTH

#J4810 TRUE PP3V3_S3_BT_F_CONN 40
 #J4810 TRUE USB2_BT_F_N_CONN 40 72
 #J4810 TRUE USB2_BT_F_P_CONN 40 72
 #J4810 TRUE GND_BT_F_CONN 40

#J4500 SATA ODD

#J4500 TRUE SATA_ODD_R2D_UF_P 38 71
 #J4500 TRUE SATA_ODD_R2D_UF_N 38 71
 #J4500 TRUE SATA_ODD_D2R_C_N 38 71
 #J4500 TRUE SATA_ODD_D2R_C_P 38 71
 #J4500 TRUE PP3V3_S0 Need 4 TP 7 8
 #J4500 TRUE SMC_ODD_DETECT 38 41
 #J4500 TRUE GND Need 6 TP

#J4501 SATA HD System LED and IR

#J4501 TRUE SATA_HDD_R2D_P 38 71
 #J4501 TRUE SATA_HDD_R2D_N 38 71
 #J4501 TRUE SATA_HDD_D2R_C_N 38 71
 #J4501 TRUE SATA_HDD_D2R_C_P 38 71
 #J4501 TRUE PP5V_S0_HDD_FLT Need 4 TP 38
 #J4501 TRUE SYS_LED_ANODE_L 38
 #J4501 TRUE IR_RX_OUT 38 40
 #J4501 TRUE PP5V_S3_IR_CONN 38
 #J4501 TRUE GND Need 4 TP

#J3400 Airport

#J3400 TRUE PCIE_WAKE_L 17 31
 #J3400 TRUE MINI_CLKREQ_L 17 31
 #J3400 TRUE PCIE_CLK100M_MINI_N 17 31 71
 #J3400 TRUE PCIE_CLK100M_MINI_P 17 31 71
 #J3400 TRUE PCIE_MINI_D2R_N 17 31 71
 #J3400 TRUE PCIE_MINI_D2R_P 17 31 71
 #J3400 TRUE PCIE_MINI_R2D_N 31 71
 #J3400 TRUE PCIE_MINI_R2D_P 31 71
 #J3400 TRUE PP3V3_WLAN Need 4 TP 31
 #J3400 TRUE PP1V5_S0_R Need 3 TP 7 8
 #J3400 TRUE MINI_RESET 31
 #J3400 TRUE PP3V3_S3_AIRPORT_CONN 31
 #J3400 TRUE I2C_MINI_PCIE_SCL 31 44
 #J3400 TRUE I2C_MINI_PCIE_SDA 31 44
 #J3400 TRUE USB2_AIRPORT_N 31 72
 #J3400 TRUE USB2_AIRPORT_P 31 72
 #J3400 TRUE GND Need 6 TP

Other Func Test Points

#Other TRUE ALL_SYS_PWRGD 26 41 64
 #Other TRUE PPVCORE_S0_CPU 8
 #Other TRUE PPCPUVTT_S0 7 8
 #Other TRUE PPVCORE_S0_MCP_R 8
 #Other TRUE PPVCORE_S0_MCP_P 8
 #Other TRUE PP0V9_S0 8
 #Other TRUE PP1V05_S0 7 8
 #Other TRUE PP1V5_S0_R 7 8
 #Other TRUE PP1V8_S0 8
 #Other TRUE PP1V8_S0_R 8
 #Other TRUE PP1V05_S0_MCP_PEX_AVDD 8 24
 #Other TRUE PP1V05_S0 7 8
 #Other TRUE PP1V05_S0_MCP_SATA_AVDD 8 24
 #Other TRUE PP1V05_S0 7 8
 #Other TRUE PP5VRT_S0 7 8
 #Other TRUE PP3V3_S0 7 8
 #Other TRUE PP1V0_FW 8
 #Other TRUE PP1V8_S3 8
 #Other TRUE PP3V3_S3 8
 #Other TRUE PP5VLT_S3 8
 #Other TRUE PPVTT_S3_DDR_BUF 8
 #Other TRUE PP1V05_S5_REG 8
 #Other TRUE PP3V3_S5 8
 #Other TRUE PP3V42_G3H 7 8
 #Other TRUE PP18V5_G3H 8
 #Other TRUE PPBUS_G3H 8
 #Other TRUE PPBUS_G3H_CPU_ISNS 8
 #Other TRUE PP3V3_ENET_PHY 8
 #Other TRUE PP1V2R1V05_ENET 8
 #Other TRUE PPVP_FW 8

#J1300 XDP

#J1300 TRUE XDP_BPM_L<5> 10 13 69
 #J1300 TRUE XDP_BPM_L<4> 10 13 69
 #J1300 TRUE XDP_BPM_L<3> 10 13 69
 #J1300 TRUE XDP_BPM_L<2> 10 13 69
 #J1300 TRUE XDP_BPM_L<1> 10 13 69
 #J1300 TRUE XDP_BPM_L<0> 10 13 69
 #J1300 TRUE TP_XDP_OBSFN_B0 13
 #J1300 TRUE TP_XDP_OBSFN_B1 13
 #J1300 TRUE TP_XDP_OBSDATA_B0 13
 #J1300 TRUE TP_XDP_OBSDATA_B1 13
 #J1300 TRUE TP_XDP_OBSDATA_B2 13
 #J1300 TRUE TP_XDP_OBSDATA_B3 13
 #J1300 TRUE XDP_PWRGD 13
 #J1300 TRUE XDP_OBS20 13
 #J1300 TRUE PM_LATRIGGER_L 13 19
 #J1300 TRUE JTAG_MCP_TCK 6 13 21
 #J1300 TRUE SMBUS_MCP_0_DATA 13 21 44 72
 #J1300 TRUE SMBUS_MCP_0_CLK 13 21 44 72
 #J1300 TRUE XDP_TCK 6 10 13 69
 #J1300 TRUE PPCPUVTT_S0 7 8
 #J1300 TRUE TP3V3_S0 7 8
 #J1300 TRUE JTAG_MCP_TDO_CONN 6 13
 #J1300 TRUE JTAG_MCP_TRST_L 6 13 21
 #J1300 TRUE MCP_DEBUG<0> 13 19 72
 #J1300 TRUE MCP_DEBUG<1> 13 19 72
 #J1300 TRUE MCP_DEBUG<2> 13 19 72
 #J1300 TRUE MCP_DEBUG<3> 13 19 72
 #J1300 TRUE JTAG_MCP_TDI 6 13 21
 #J1300 TRUE JTAG_MCP_TMS 6 13 21
 #J1300 TRUE MCP_DEBUG<4> 13 19 72
 #J1300 TRUE MCP_DEBUG<5> 13 19 72
 #J1300 TRUE MCP_DEBUG<6> 13 19 72
 #J1300 TRUE MCP_DEBUG<7> 13 19 72
 #J1300 TRUE FSB_CLK_ITP_P 13 14 69
 #J1300 TRUE XDP_CPURST_L 13 69
 #J1300 TRUE XDP_DBRESET_L 10 13 26
 #J1300 TRUE XDP_TDO_CONN 6 13
 #J1300 TRUE XDP_TRST_L 6 10 13 69
 #J1300 TRUE XDP_TDI 6 10 13 69
 #J1300 TRUE XDP_TMS 6 10 13 69
 #J1300 TRUE GND Need 8 TP

#J5100 LPC+SPI Connector

#J5100 TRUE PP3V42_G3H 7 8
 #J5100 TRUE PP5VRT_S0 7 8
 #J5100 TRUE LPC_AD<0> 19 41 43 72
 #J5100 TRUE LPC_AD<1> 19 41 43 72
 #J5100 TRUE SPI_ALT_MOSI 43
 #J5100 TRUE SPI_ALT_MISO 43
 #J5100 TRUE LPC_FRAME_L 19 41 43 72
 #J5100 TRUE PM_CLKRUN_L 19 41 43
 #J5100 TRUE SMC_TMS 41 42 43
 #J5100 TRUE DEBUG_RESET_L 26 43
 #J5100 TRUE SMC_TDO 41 42 43
 #J5100 TRUE SMC_TRST_L 41 43
 #J5100 TRUE SMC_MD1 41 43
 #J5100 TRUE SMC_TX_L 39 41 42 43
 #J5100 TRUE LPC_CLK33M_LPCPLUS 26 43 72
 #J5100 TRUE LPC_AD<2> 19 41 43 72
 #J5100 TRUE LPC_AD<3> 19 41 43 72
 #J5100 TRUE SPIROM_USE_MLB 43
 #J5100 TRUE SPI_ALT_CLK 43
 #J5100 TRUE SPI_ALT_CS_L 43
 #J5100 TRUE LPC_SERIRQ 19 41 43
 #J5100 TRUE LPC_PWRDWN_L 19 41 43
 #J5100 TRUE SMC_TDI 41 42 43
 #J5100 TRUE SMC_TCK 41 42 43
 #J5100 TRUE SMC_RESET_L 41 42 43
 #J5100 TRUE SMC_NMI 41 43
 #J5100 TRUE SMC_RX_L 39 41 42 43
 #J5100 TRUE LPCPLUS_GPIO 18 43
 #J5100 TRUE GND Need 2 TP

FUNC TEST

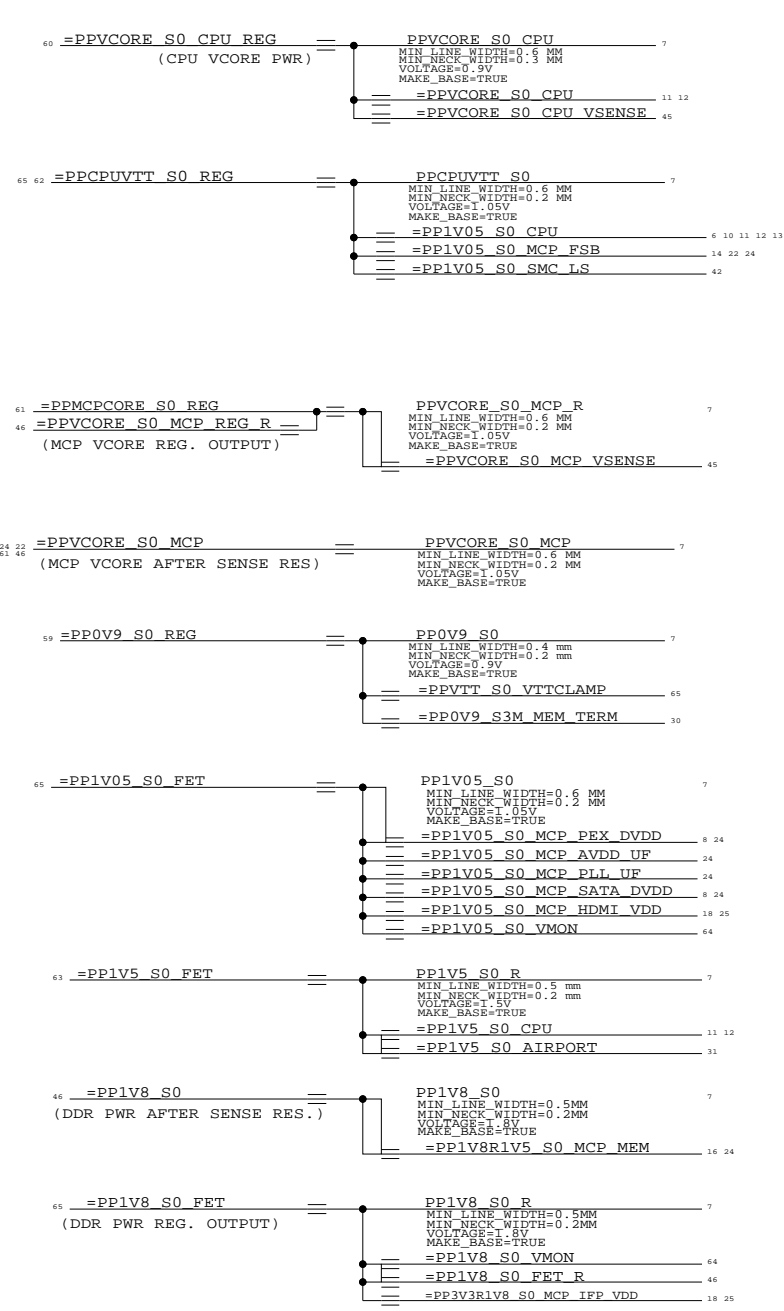
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

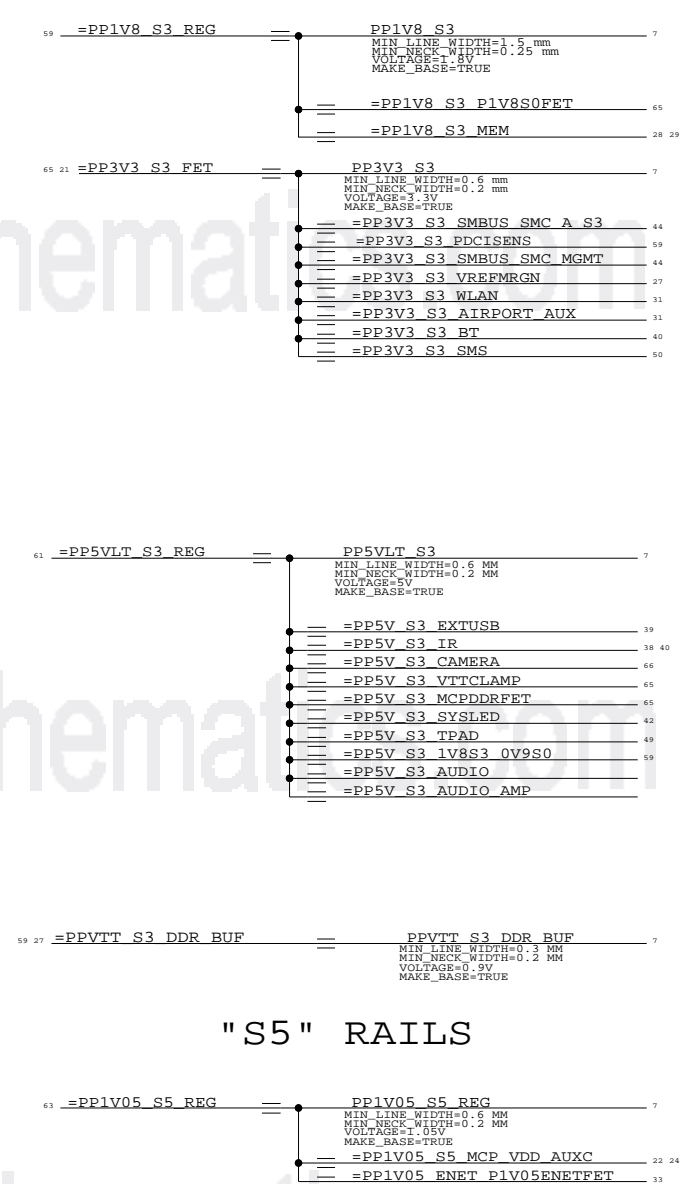


SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	7	109

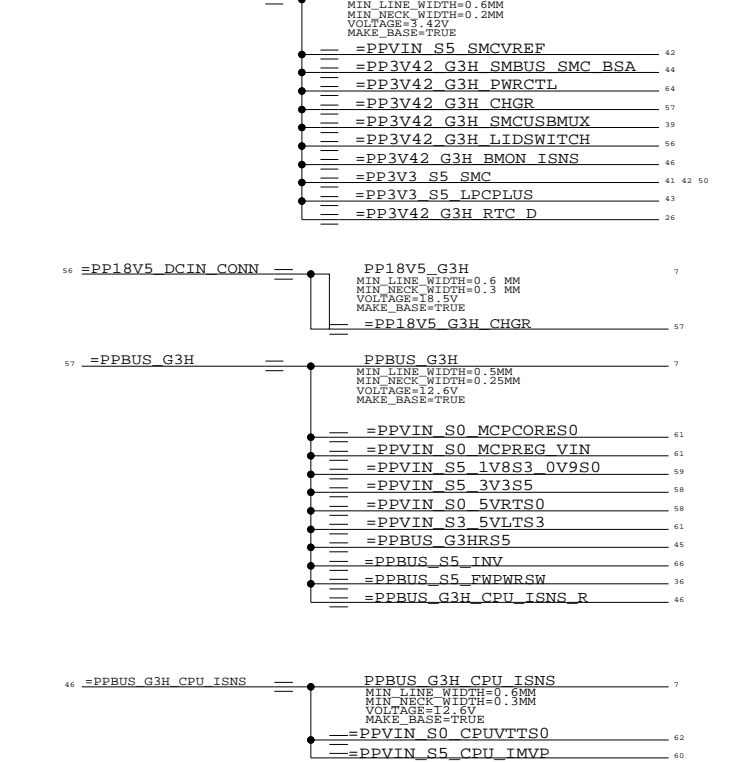
"S0,S0M" RAILS



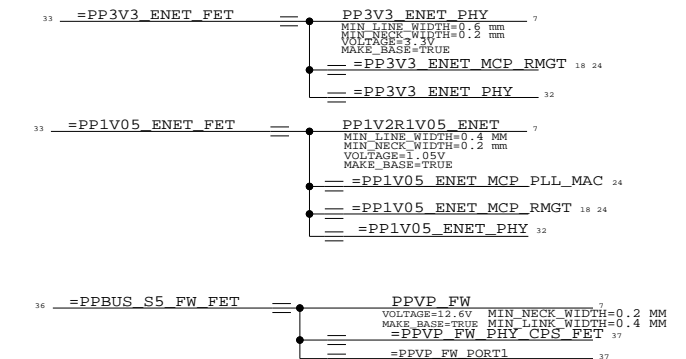
"S3" RAILS



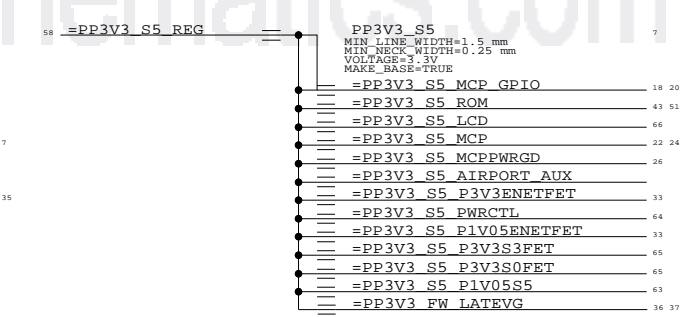
"G3H" RAILS



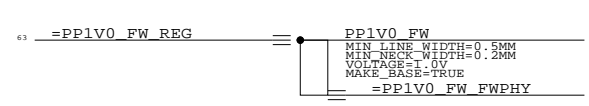
"ENET" RAILS



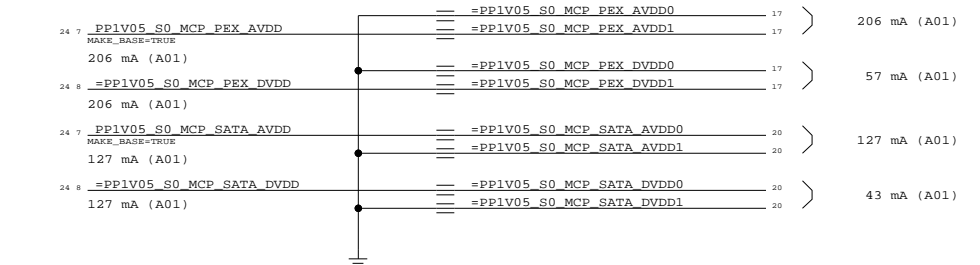
"S5" RAILS



"FW" RAILS



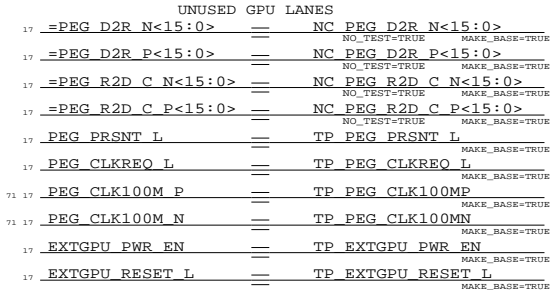
PEX & SATA AVDD/DVDD aliases



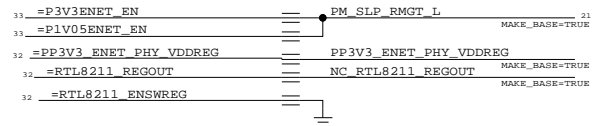
Power Aliases
 SYNC_MASTER=K36B_MLB

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

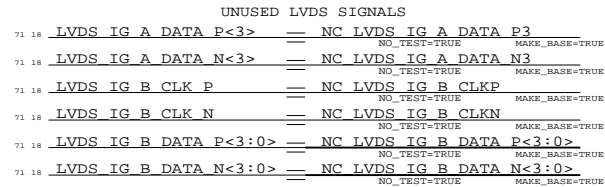
PCI-E ALIASES



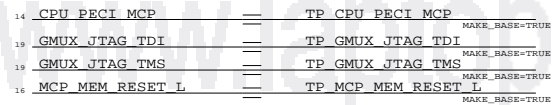
ETHERNET ALIASES



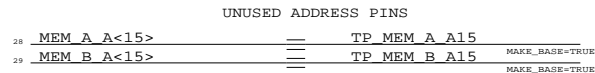
LVDS ALIASES



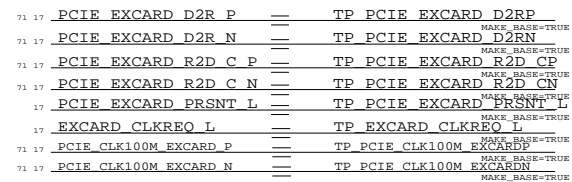
MISC NC MCP79 ALIASES



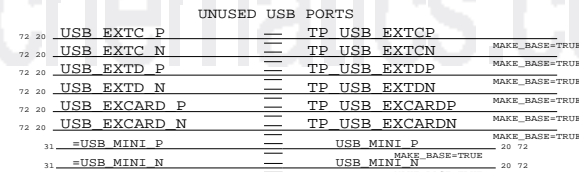
SO-DIMM ALIASES



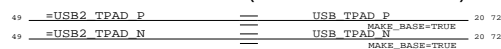
UNUSED EXPRESS CARD LANE



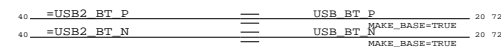
USB ALIASES



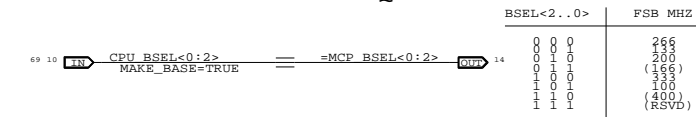
TRACKPAD (WELLSPRING)



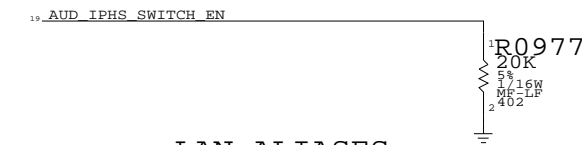
BLUETOOTH



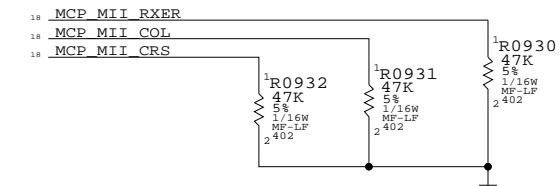
CPU FSB FREQUENCY STRAPS



HDA PULL-DOWN



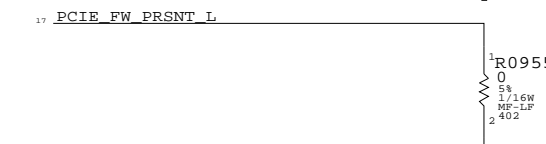
LAN ALIASES



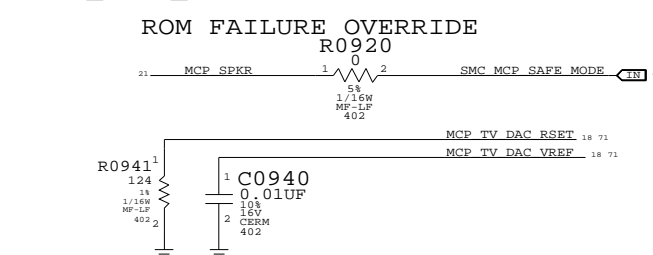
DP HOTPLUG PULL-DOWN



FW PULL-DOWN

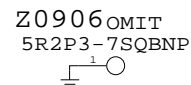


MCP_SAFE_MODE SIGNAL TO SUPPORT

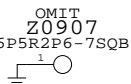


Screw Holes

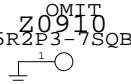
BATTERY,AUDIO,DIP DIMM CONNECTOR CHASSIS GND



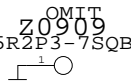
SATA,LVDS CONNECTOR CHASSIS GND



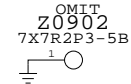
DIP DIMM CONNECTOR CHASSIS GND



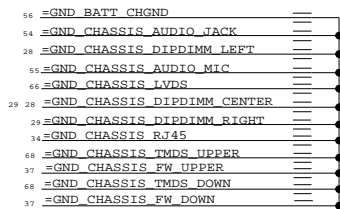
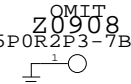
DIP DIMM CONNECTOR CHASSIS GND



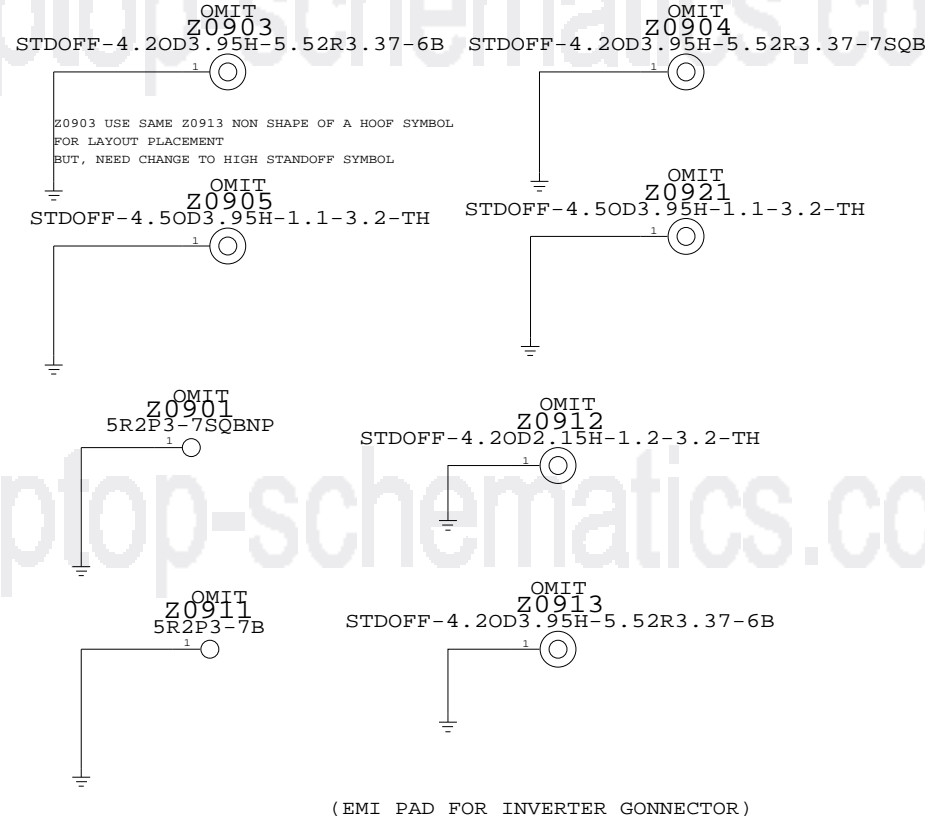
DCIN CONNECTOR CHASSIS GND



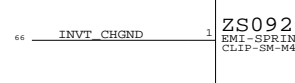
I/O CONNECTOR CHASSIS GND



CPU HEATSINK STANDOFF SCREW HOLE



(EMI PAD FOR INVERTER GONNECTOR)



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
860-0964	4	THERMAL STANDOFF	Z0903, Z0904, Z0905, Z0921	?	STANDOFF
860-0723	1	STANDOFF WIRELESS	Z0912	?	STANDOFF
860-0749	1	STANDOFF W/THRU HOLES,WIRELESS	Z0913	?	STANDOFF

SIGNAL ALIAS

SYNC_MASTER=K36B_MLB

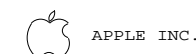
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

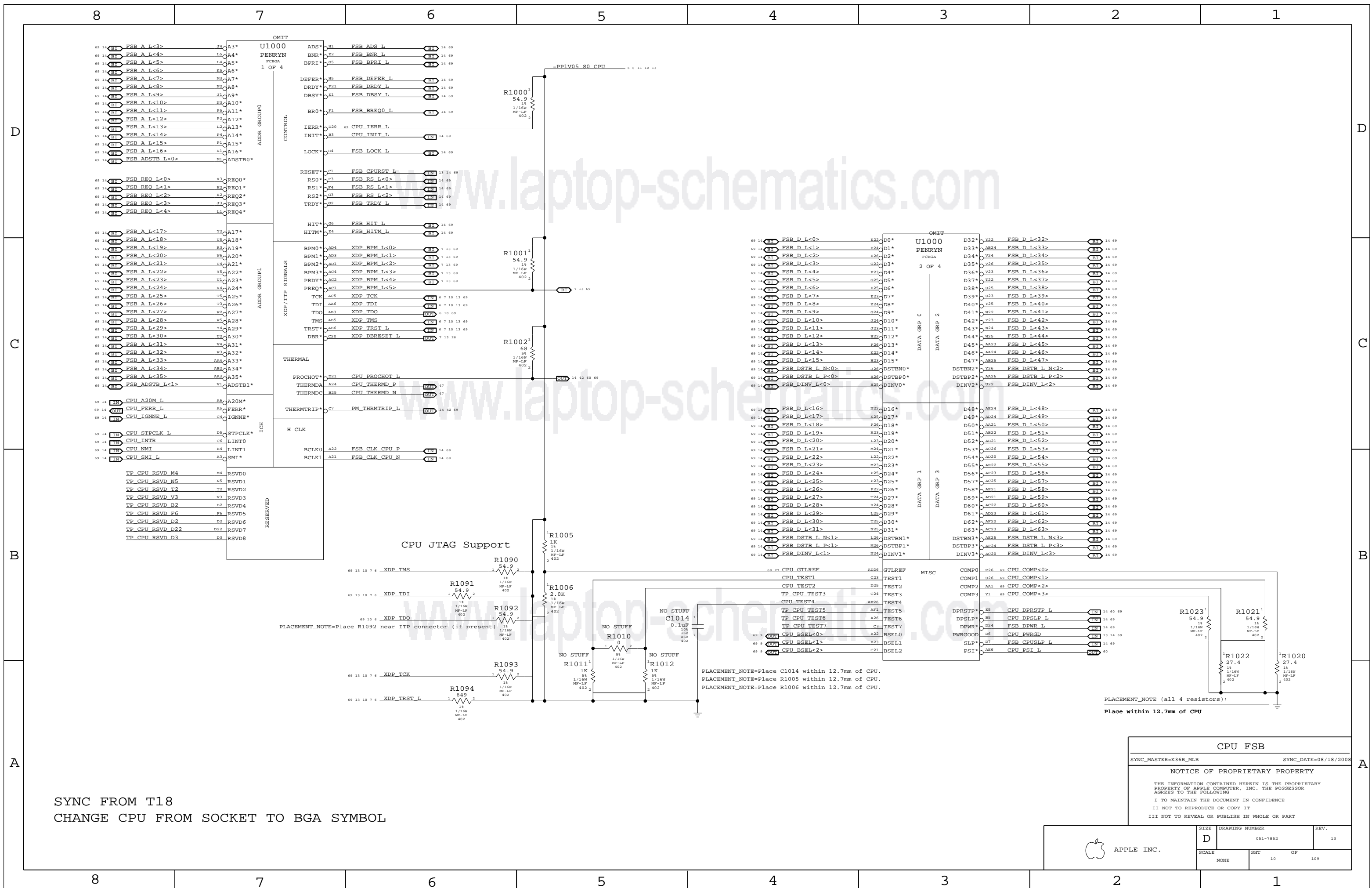
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	9	109



www.laptop-schematics.com

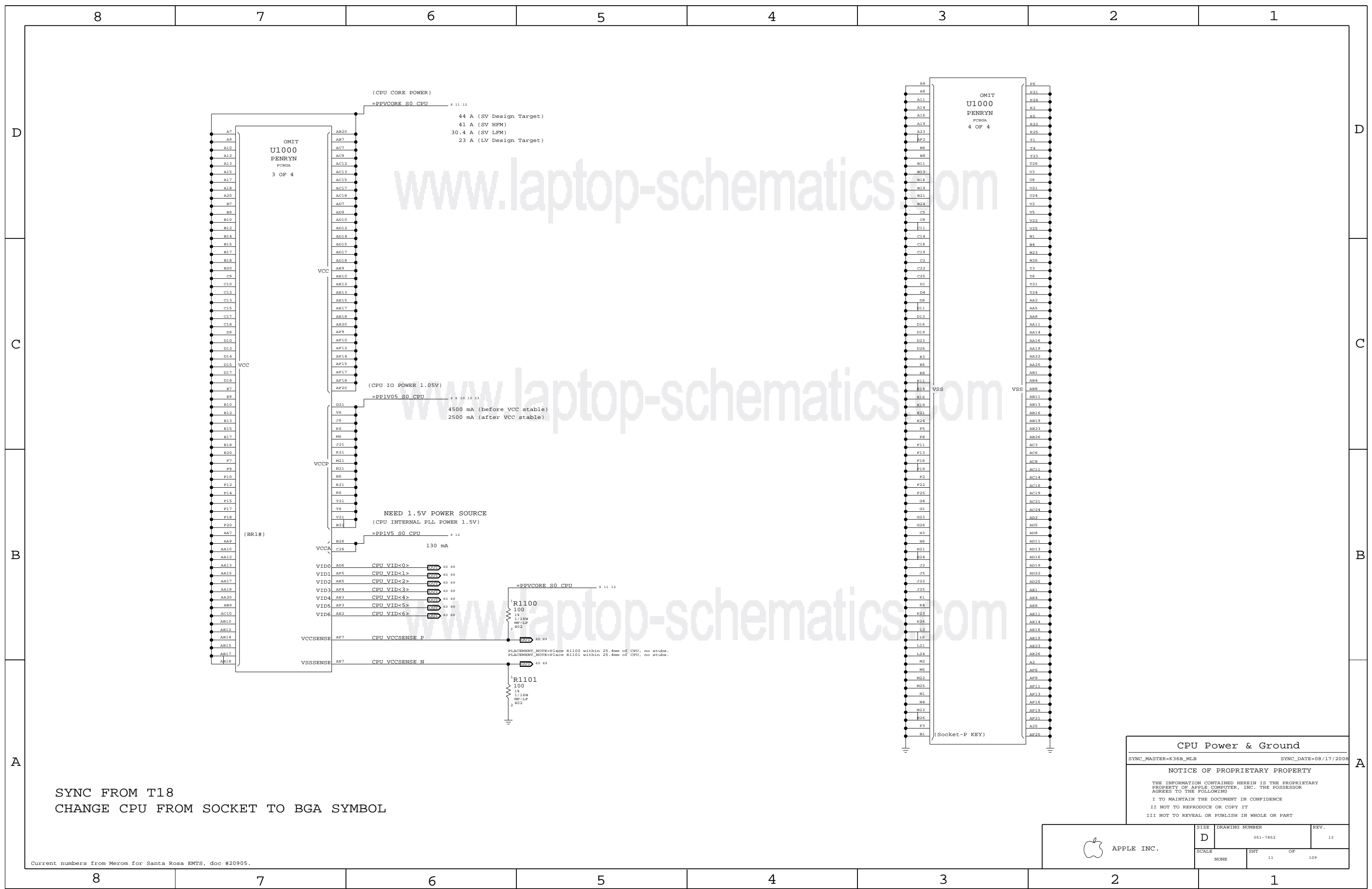
www.laptop-schematics.com

www.laptop-schematics.com

SYNC FROM T18
CHANGE CPU FROM SOCKET TO BGA SYMBOL

CPU FSB
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/18/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHEET		OF
NONE	10		109



SYNC FROM T18
 CHANGE CPU FROM SOCKET TO BGA SYMBOL

Current numbers from Merom for Santa Rosa EMTS, doc #20905.

CPU Power & Ground

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

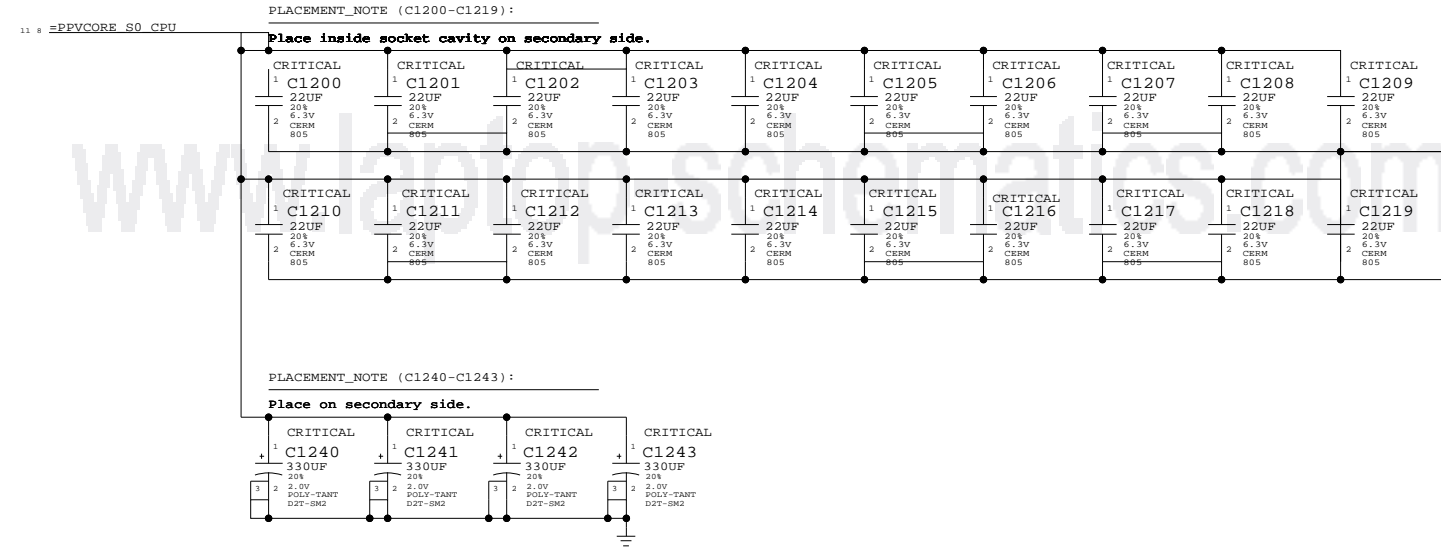
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

 APPLE INC.	SIZE D	DRAWING NUMBER 051-7852	REV. 13
	SCALE NONE	SHEET 11	OF 109

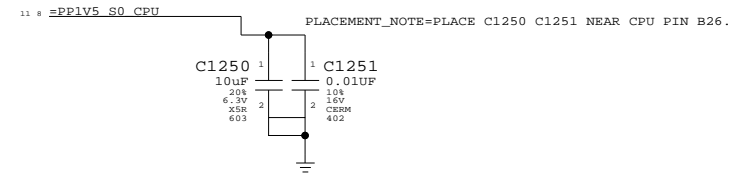
CPU VCore HF and Bulk Decoupling

6x 330uF, 32x 22uF 0805 (20 stuffed)



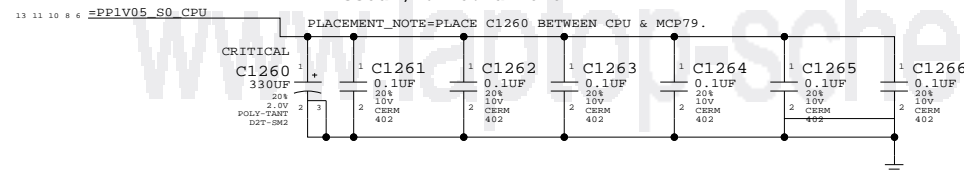
VCCA (CPU AVdd) DECOUPLING

1x 10uF, 1x 0.01uF



VCCP (CPU I/O) DECOUPLING

1x 330uF, 6x 0.1uF 0402



SYNC FROM T18

CPU Decoupling

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

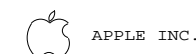
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



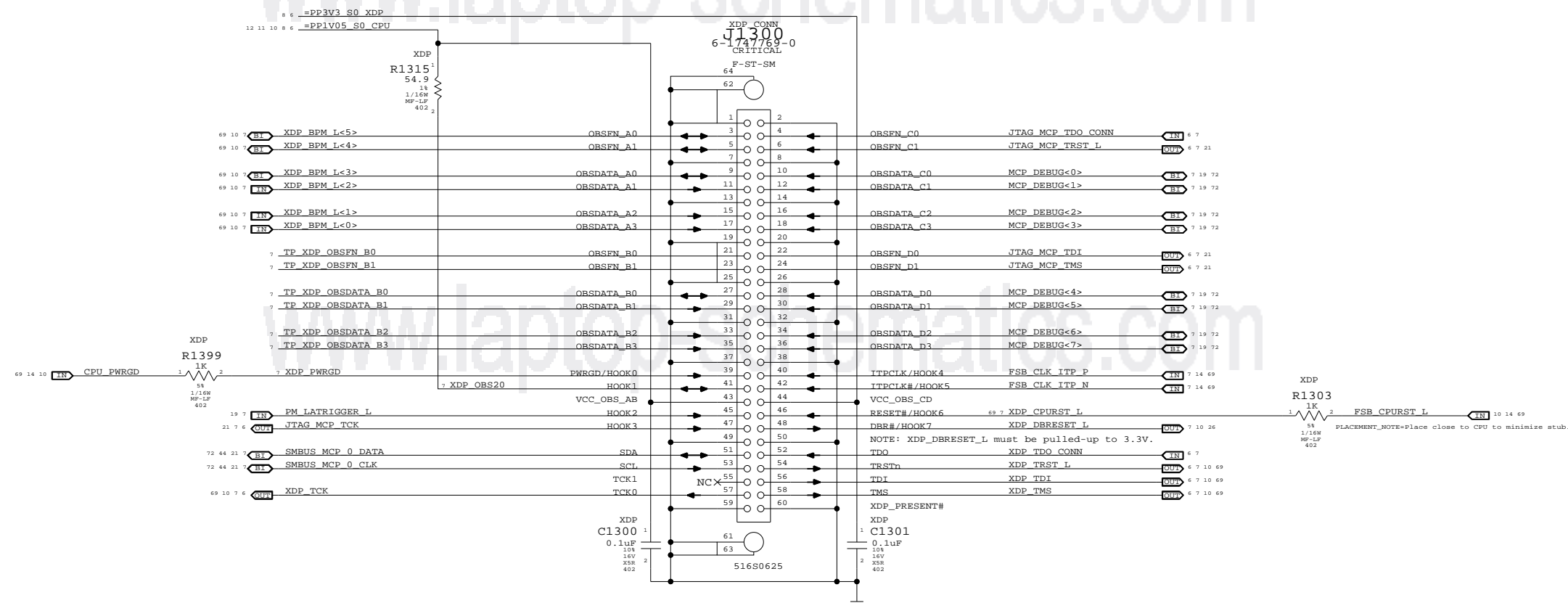
APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	12	109

Mini-XDP Connector

NOTE: This is not the standard XDP pinout.
Use with 920-0620 adapter board to support CPU, MCP debugging.

MCP79-specific pinout



Direction of XDP module

Please avoid any obstructions
on even-numbered side of J1300

eXtended Debug Port (MiniXDP)

SYNC_MASTER=M99_MLB SYNC_DATE=01/08/2008

NOTICE OF PROPRIETARY PROPERTY

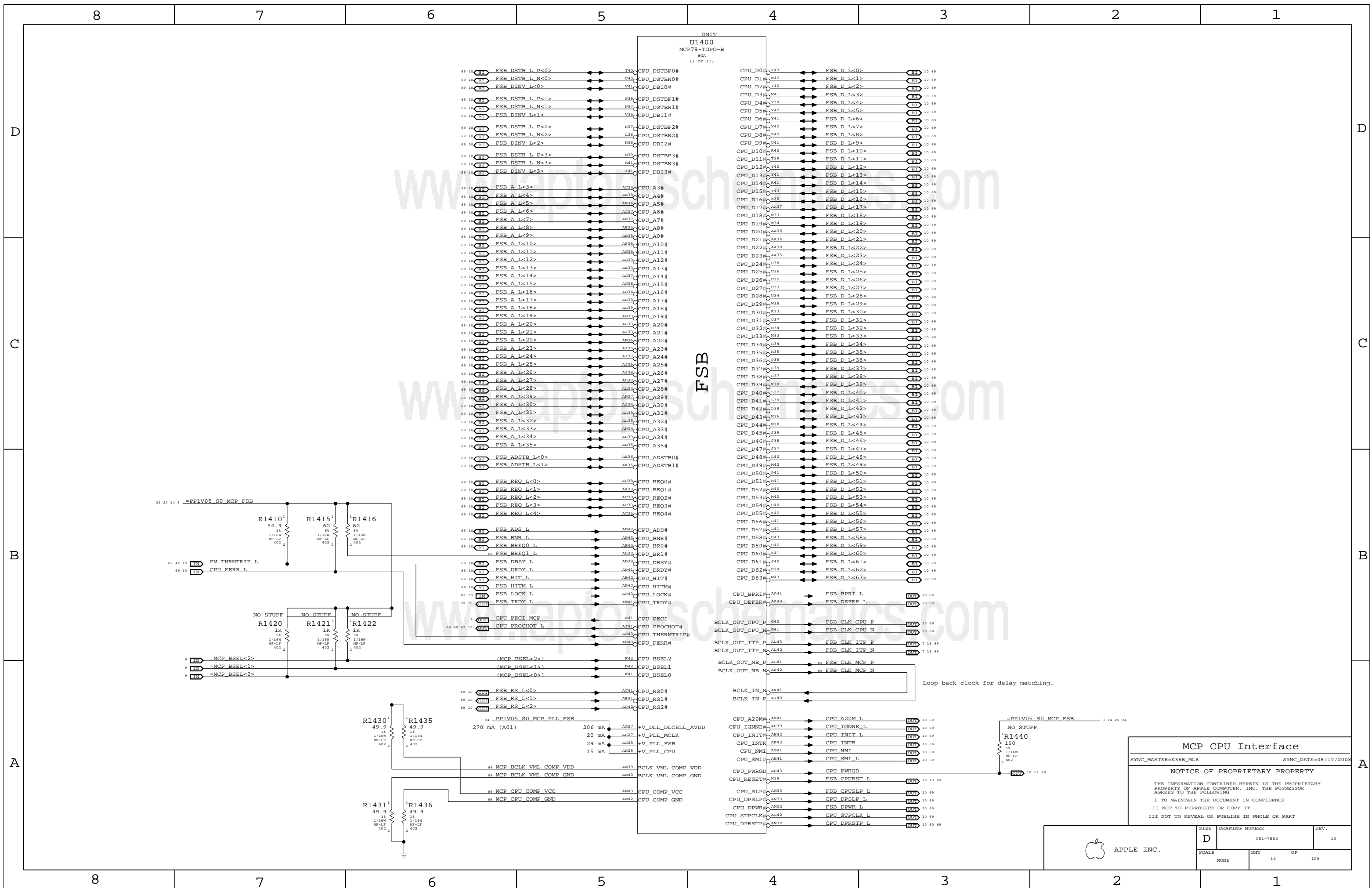
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT		OF
NONE	13		109



MCP CPU Interface

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

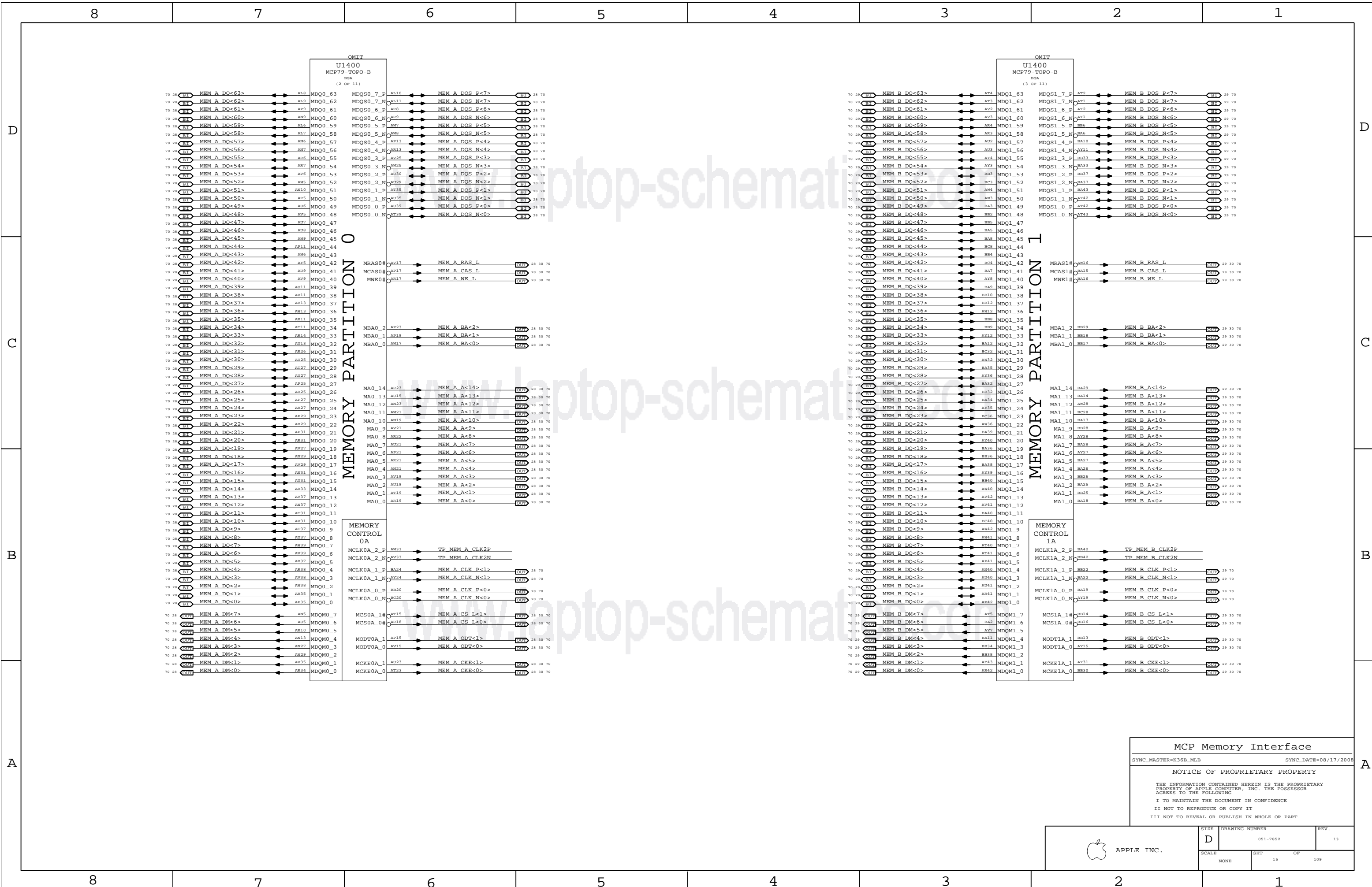
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

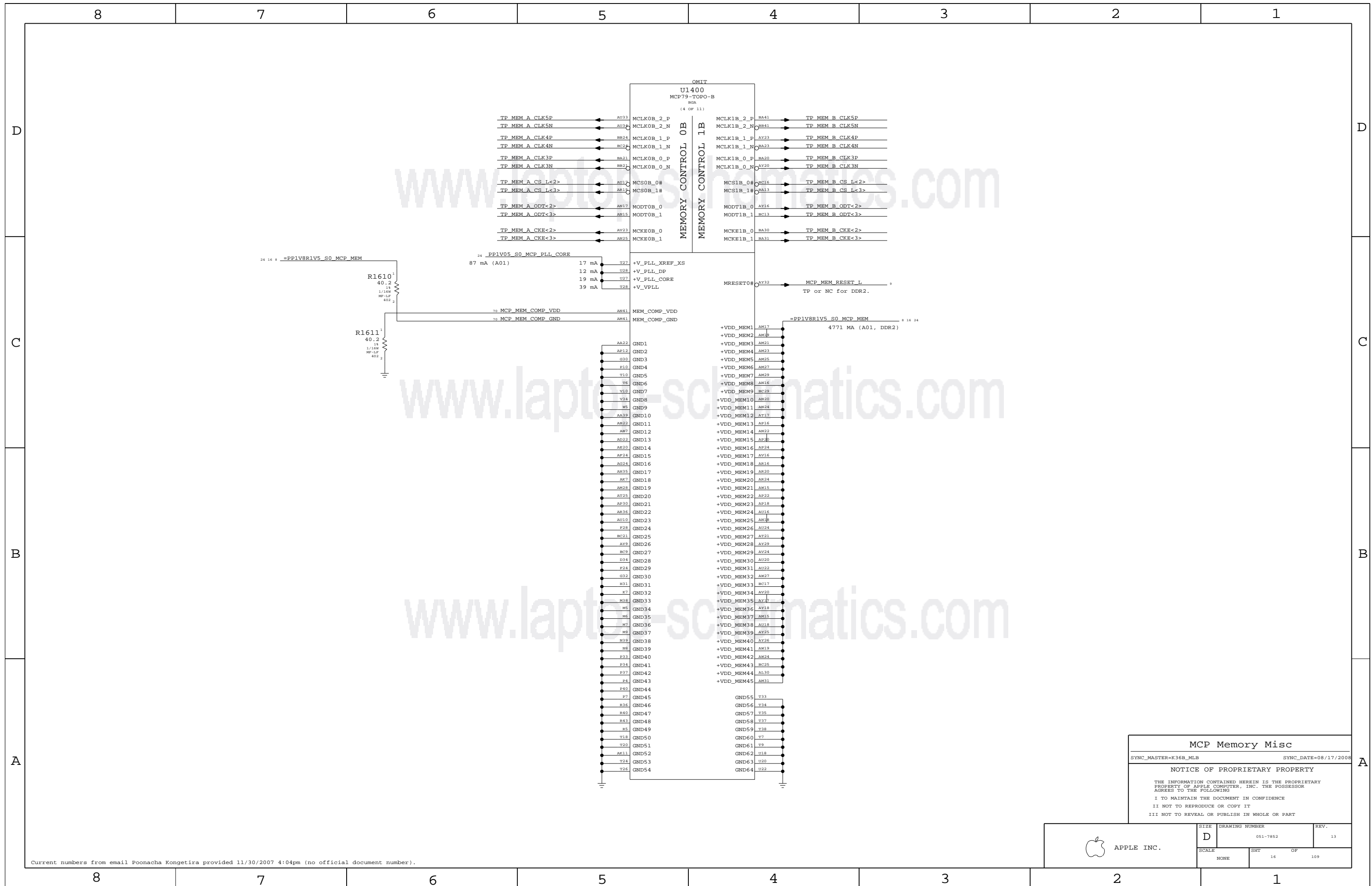
II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE D	DRAWING NUMBER 051-7852	REV. 13
	SCALE NONE	SHEET 14	OF 109



MCP Memory Interface
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



MCP Memory Misc

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

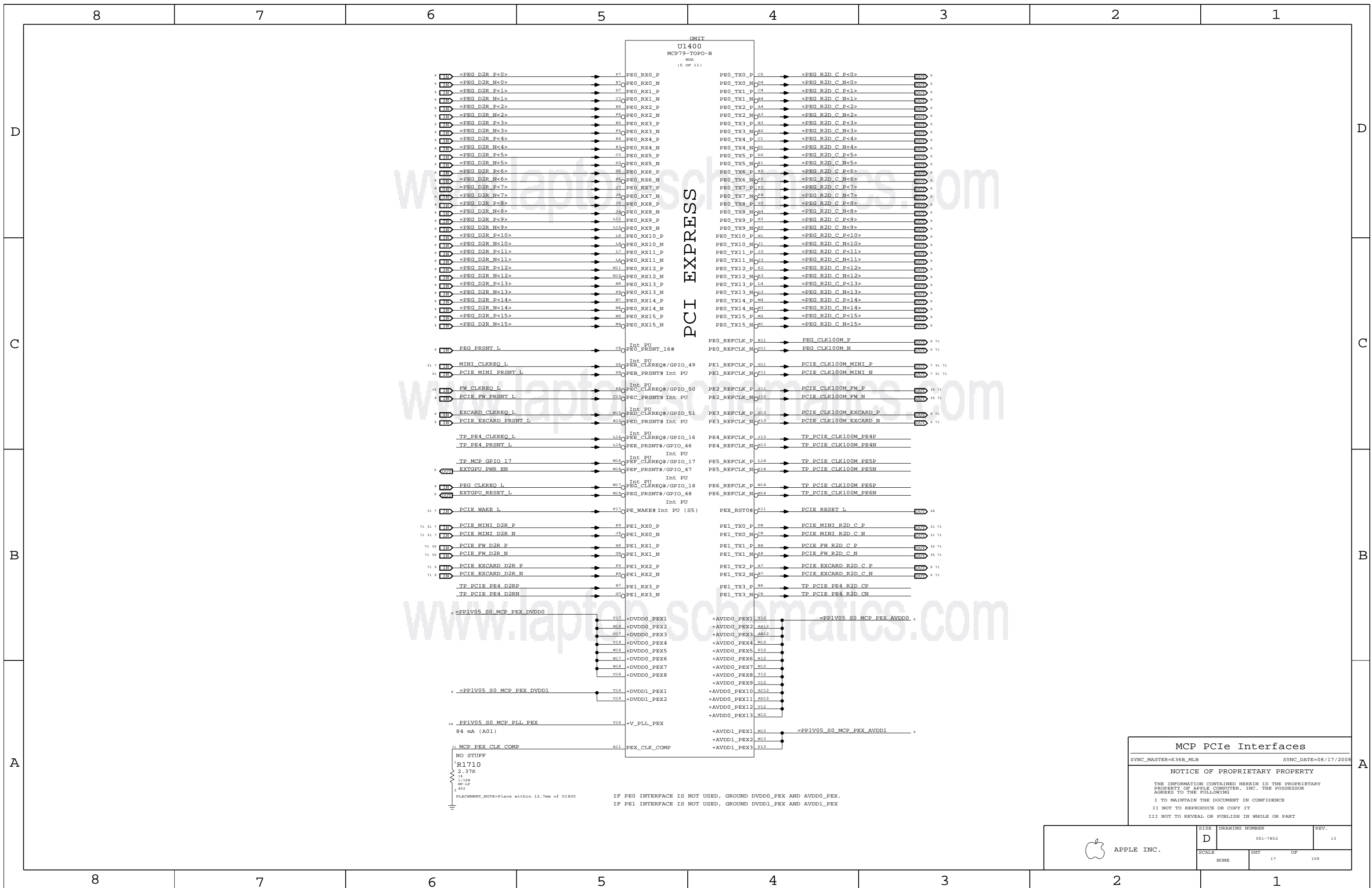
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE D	DRAWING NUMBER 051-7852	REV. 13
	SCALE NONE	SHEETS 16	OF 109

Current numbers from email Poonacha Kongetira provided 11/30/2007 4:04pm (no official document number).



MCP PCIe Interfaces

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

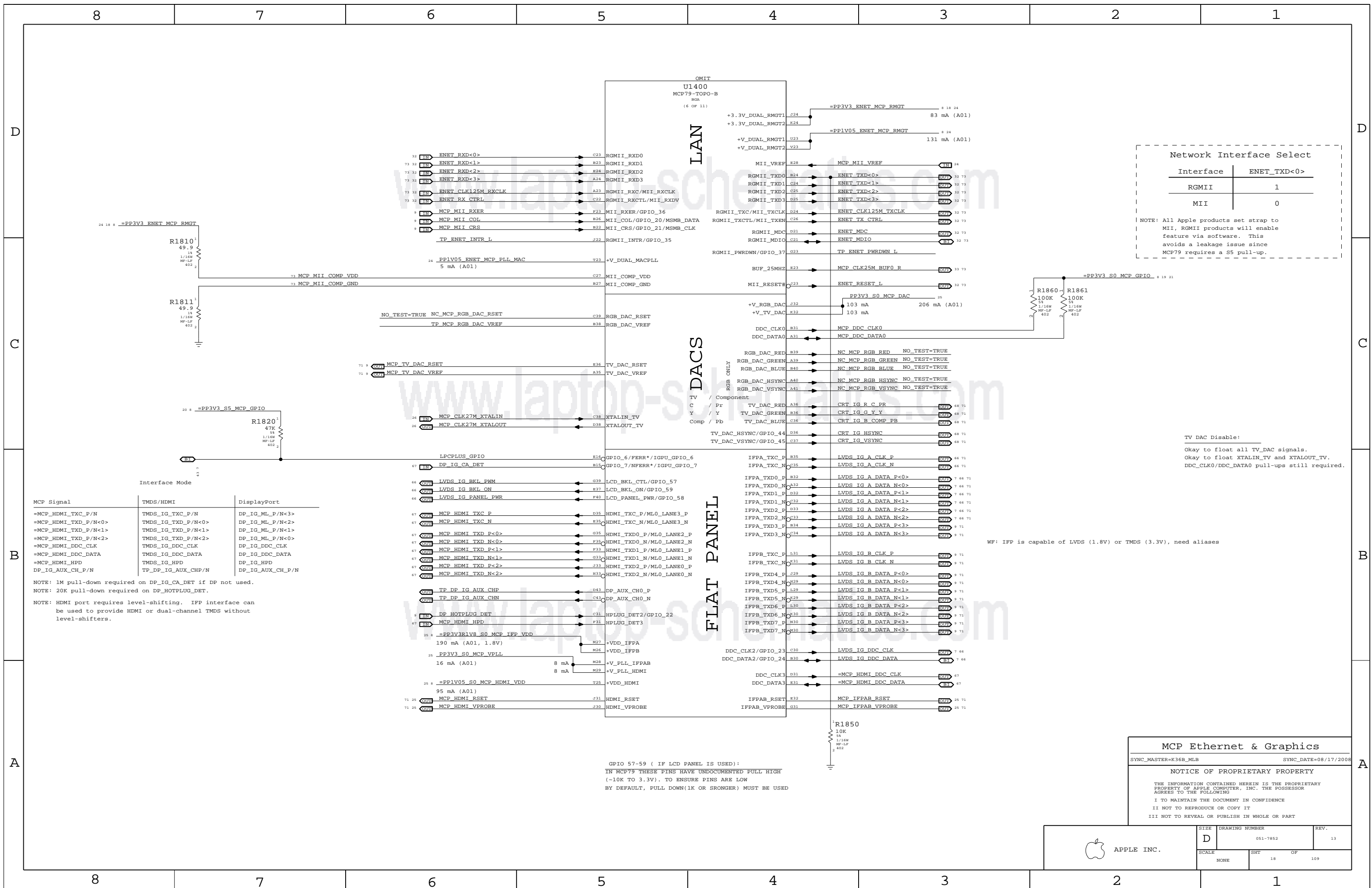
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

 APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	17		



Network Interface Select	
Interface	ENET_TXD<0>
RGMII	1
MII	0

NOTE: All Apple products set strap to MII, RGMI products will enable feature via software. This avoids a leakage issue since MCP79 requires a S5 pull-up.

TV DAC Disable:
 Okay to float all TV_DAC signals.
 Okay to float XTALIN_TV and XTALOUT_TV.
 DDC_CLK0/DDC_DATA0 pull-ups still required.

MCP Signal	TMDS/HDMI	DisplayPort
=MCP_HDMI_TXC_P/N	TMDS_IG_TXC_P/N	DP_IG_ML_P/N<3>
=MCP_HDMI_TXD_P/N<0>	TMDS_IG_TXD_P/N<0>	DP_IG_ML_P/N<2>
=MCP_HDMI_TXD_P/N<1>	TMDS_IG_TXD_P/N<1>	DP_IG_ML_P/N<1>
=MCP_HDMI_TXD_P/N<2>	TMDS_IG_TXD_P/N<2>	DP_IG_ML_P/N<0>
=MCP_HDMI_DDC_CLK	TMDS_IG_DDC_CLK	DP_IG_DDC_CLK
=MCP_HDMI_DDC_DATA	TMDS_IG_DDC_DATA	DP_IG_DDC_DATA
=MCP_HDMI_HPD	TMDS_IG_HPD	DP_IG_HPD
DP_IG_AUX_CH_P/N	TP_DP_IG_AUX_CH_P/N	DP_IG_AUX_CH_P/N

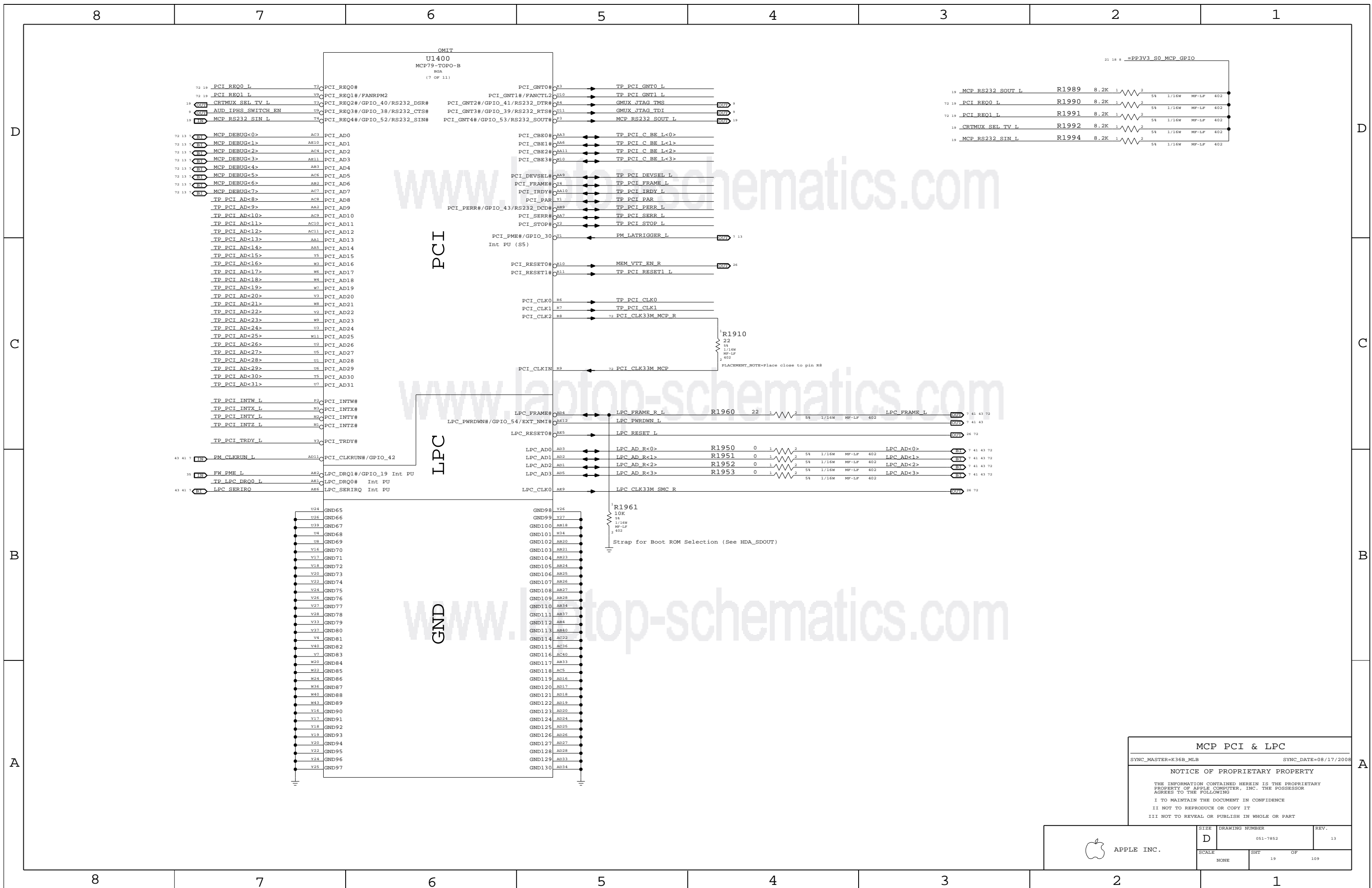
NOTE: 1M pull-down required on DP_IG_CA_DET if DP not used.
 NOTE: 20K pull-down required on DP_HOTPLUG_DET.
 NOTE: HDMI port requires level-shifting. IFP interface can be used to provide HDMI or dual-channel TMDS without level-shifters.

GPIO 57-59 (IF LCD PANEL IS USED):
 IN MCP79 THESE PINS HAVE UNDOCUMENTED PULL HIGH (~10K TO 3.3V). TO ENSURE PINS ARE LOW BY DEFAULT, PULL DOWN(1K OR STRONGER) MUST BE USED

MCP Ethernet & Graphics
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	18		



MCP PCI & LPC

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

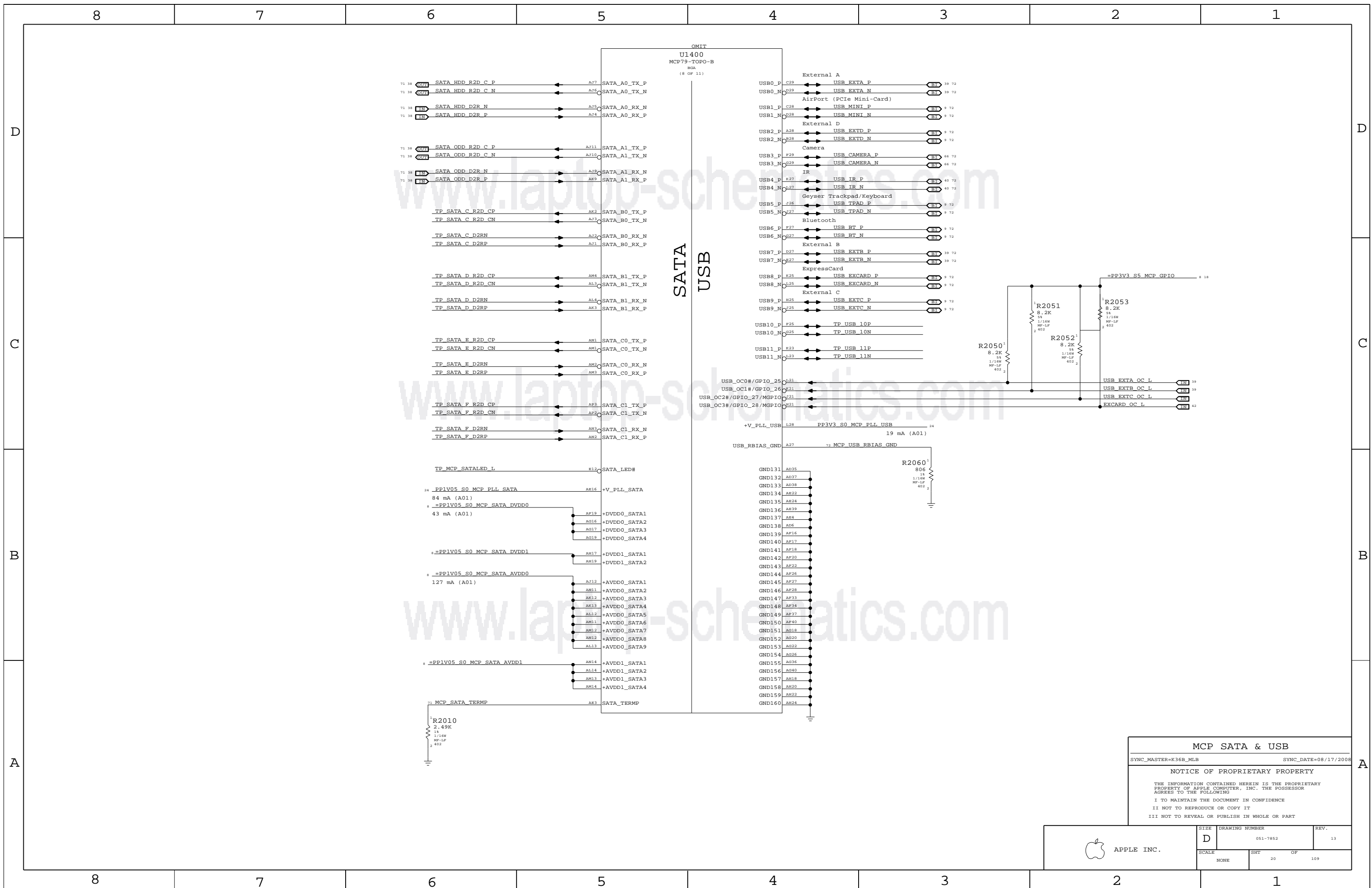
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE D	DRAWING NUMBER 051-7852	REV. 13
	SCALE NONE	SHEET 19	OF 109



MCP SATA & USB

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

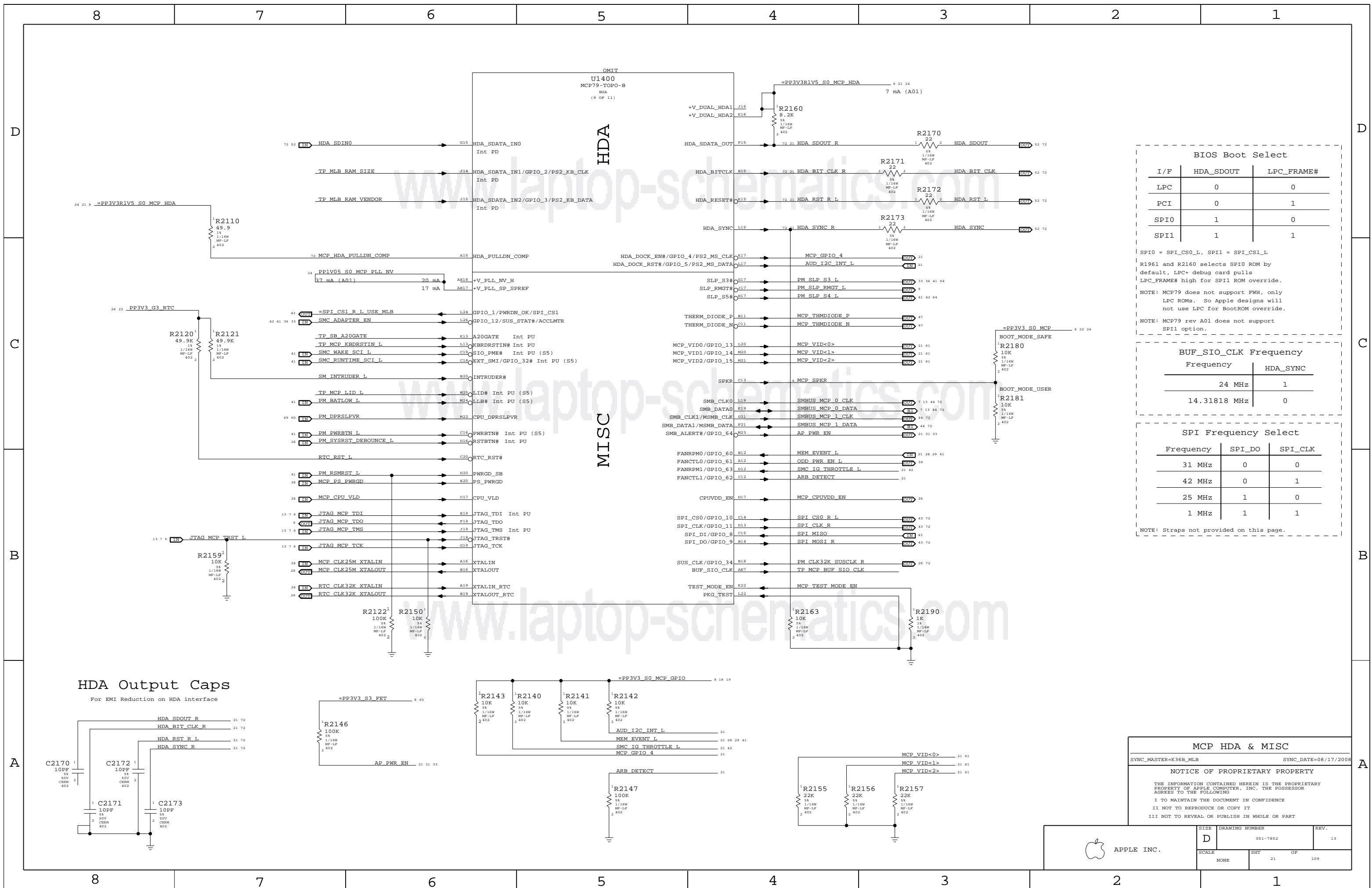
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT OF		
NONE	20 OF 109		



BIOS Boot Select

I/F	HDA_SDOUT	LPC_FRAME#
LPC	0	0
PCI	0	1
SPI0	1	0
SPI1	1	1

SPI0 = SPI_CS0_L, SPI1 = SPI_CS1_L
 R1961 and R2160 selects SPI0 ROM by default, LPC+ debug card pulls LPC_FRAME# high for SPI1 ROM override.
 NOTE: MCP79 does not support FWB, only LPC ROMs. So Apple designs will not use LPC for BootROM override.
 NOTE: MCP79 rev A01 does not support SPI1 option.

BUF_SIO_CLK Frequency

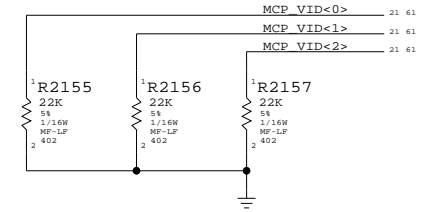
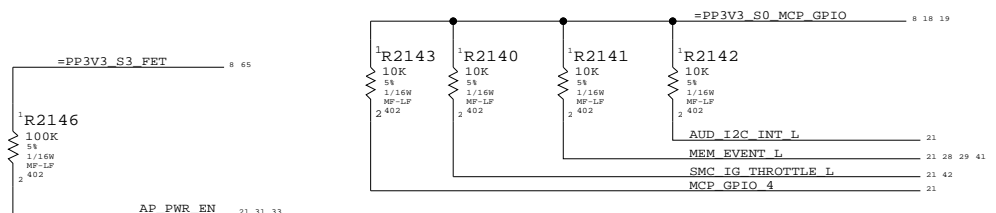
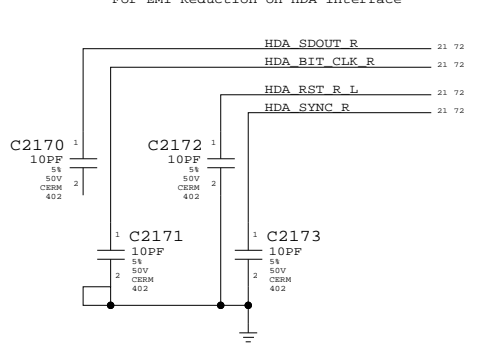
Frequency	HDA_SYNC
24 MHz	1
14.31818 MHz	0

SPI Frequency Select

Frequency	SPI_DO	SPI_CLK
31 MHz	0	0
42 MHz	0	1
25 MHz	1	0
1 MHz	1	1

NOTE: Straps not provided on this page.

HDA Output Caps
 For EMI Reduction on HDA interface



MCP HDA & MISC

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

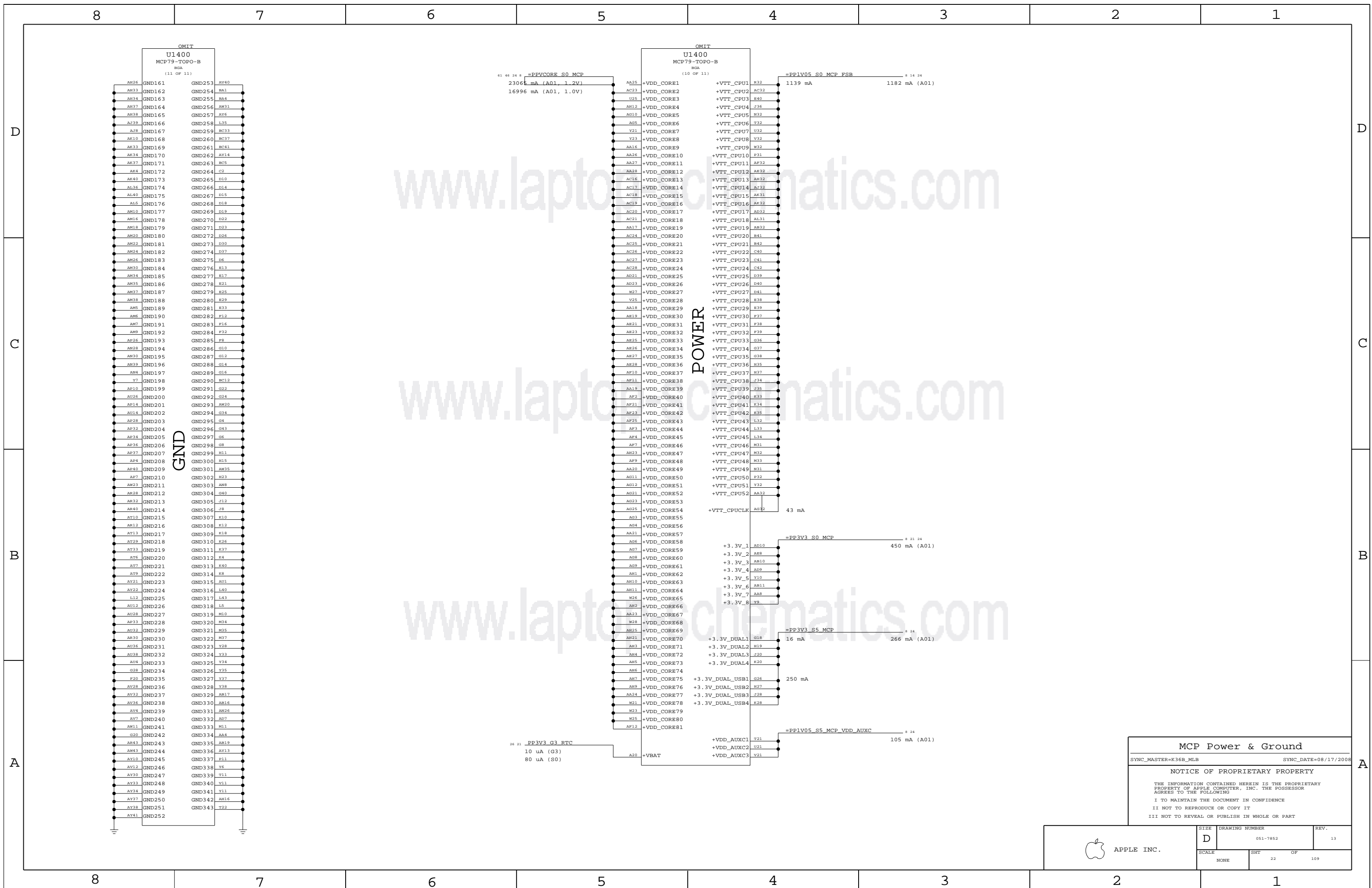
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	21		



MCP Power & Ground
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART


APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	22		

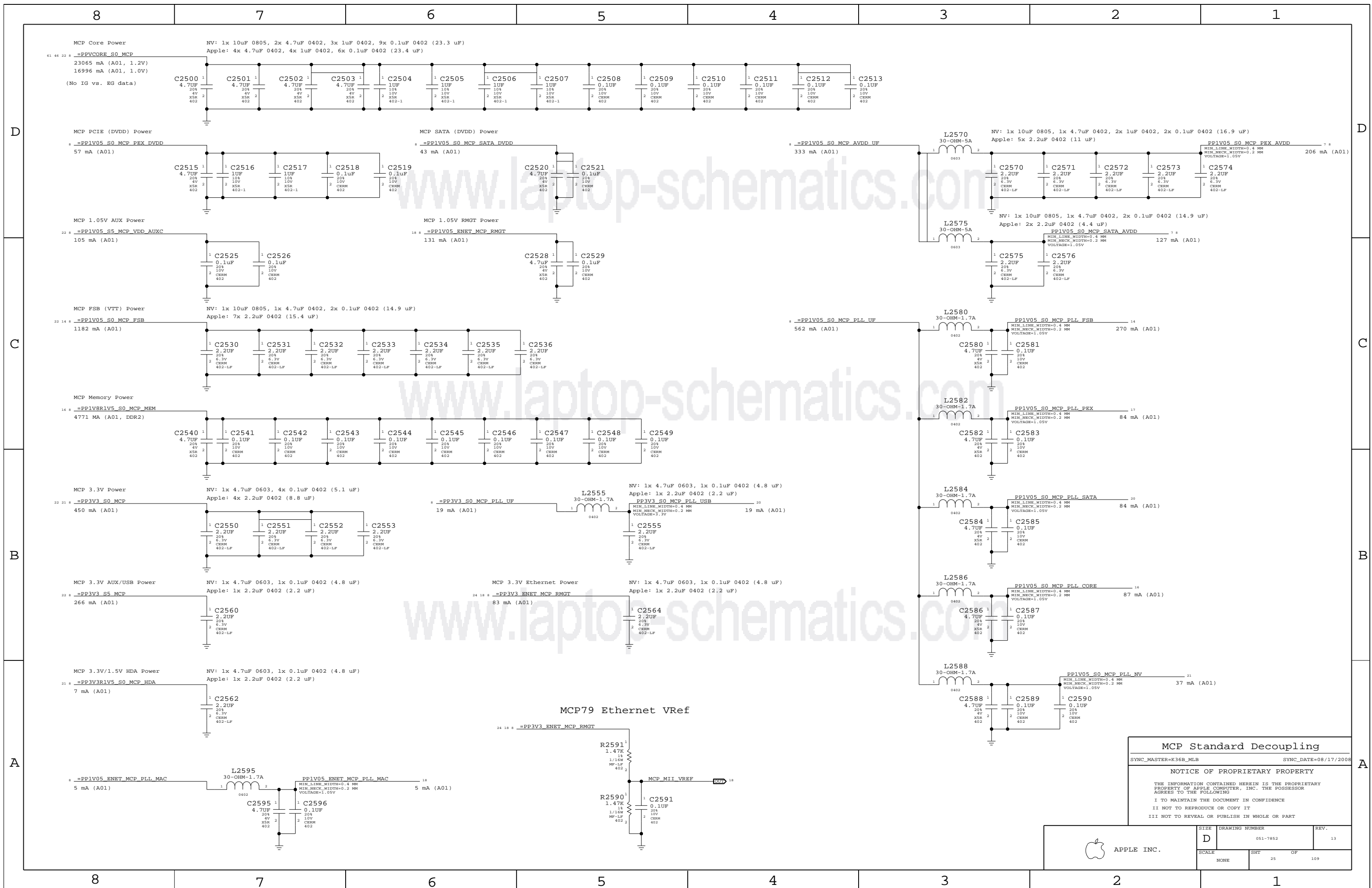
www.laptop-schematics.com

www.laptop-schematics.com

www.laptop-schematics.com

MCP79 A01 Silicon Support
SYNC_MASTER=K36H_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

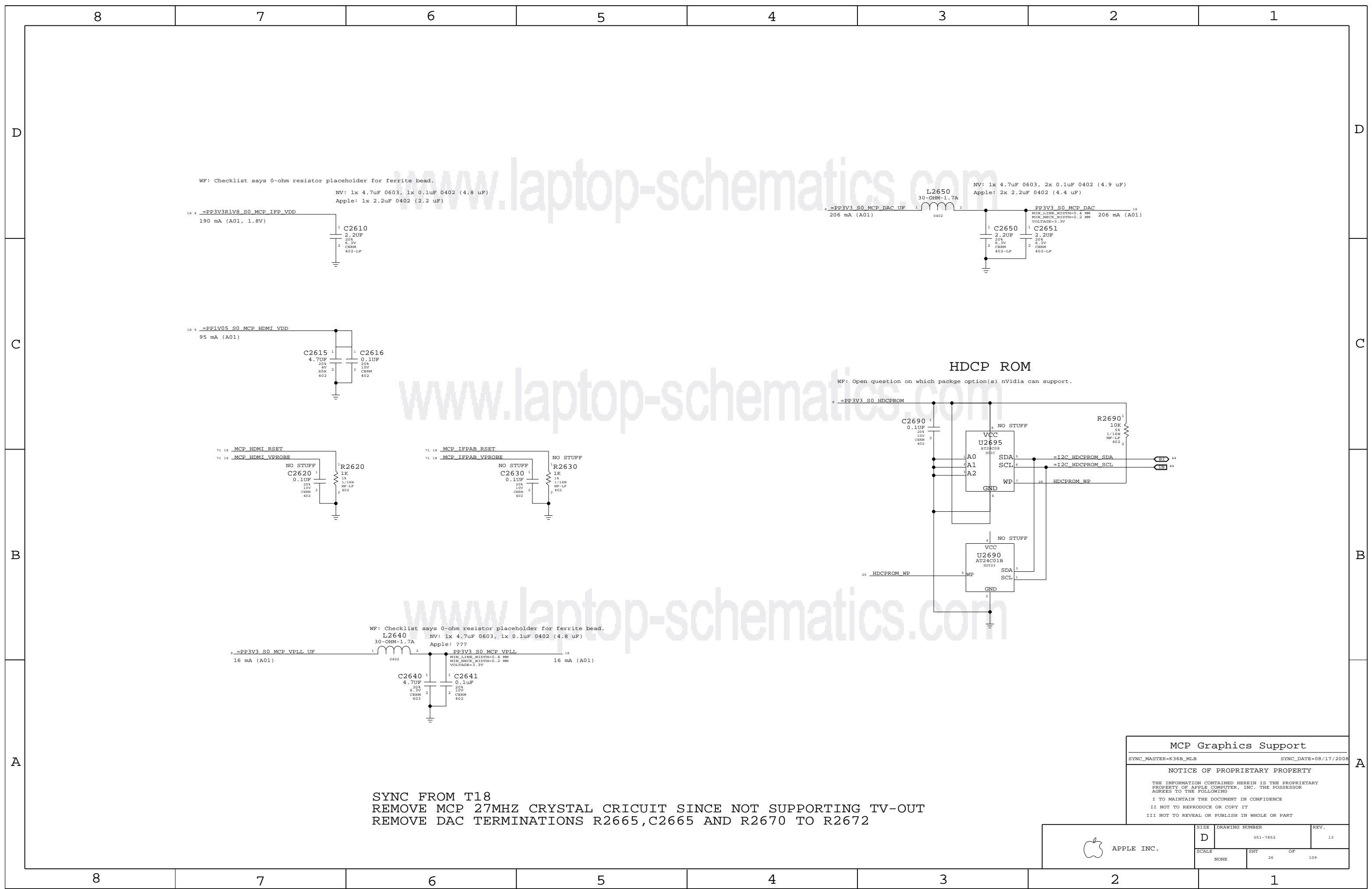
 APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	
NONE	24	109	



MCP Standard Decoupling
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	
NONE	25	109	



WF: Checklist says 0-ohm resistor placeholder for ferrite bead.
 NV: 1x 4.7uF 0603, 1x 0.1uF 0402 (4.8 uF)
 Apple: 1x 2.2uF 0402 (2.2 uF)

NV: 1x 4.7uF 0603, 2x 0.1uF 0402 (4.9 uF)
 Apple: 2x 2.2uF 0402 (4.4 uF)

WF: Open question on which package option(s) nVidia can support.

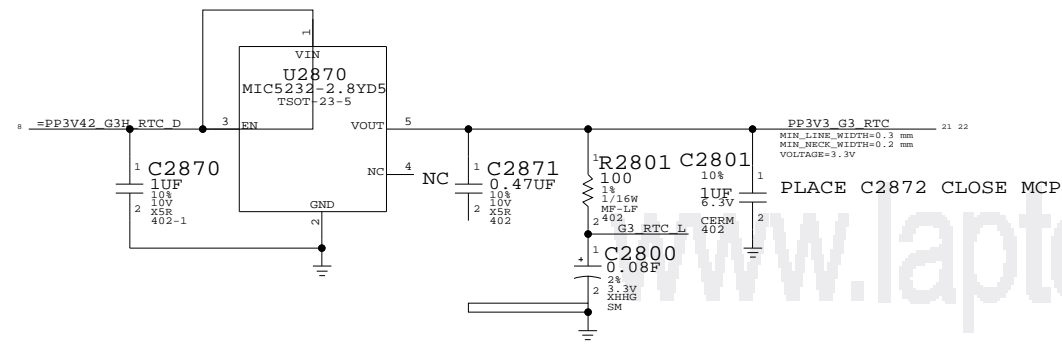
WF: Checklist says 0-ohm resistor placeholder for ferrite bead.
 NV: 1x 4.7uF 0603, 1x 0.1uF 0402 (4.8 uF)
 Apple: ???

SYNC FROM T18
 REMOVE MCP 27MHZ CRYSTAL CRICUIT SINCE NOT SUPPORTING TV-OUT
 REMOVE DAC TERMINATIONS R2665,C2665 AND R2670 TO R2672

MCP Graphics Support
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

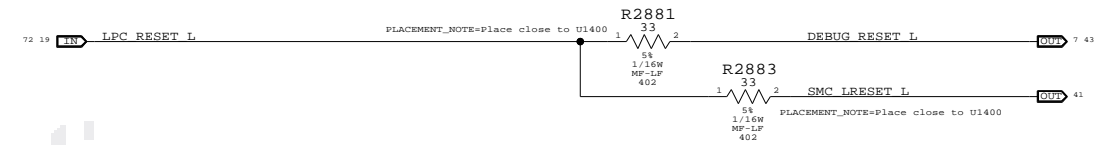
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	26		

RTC Power Sources

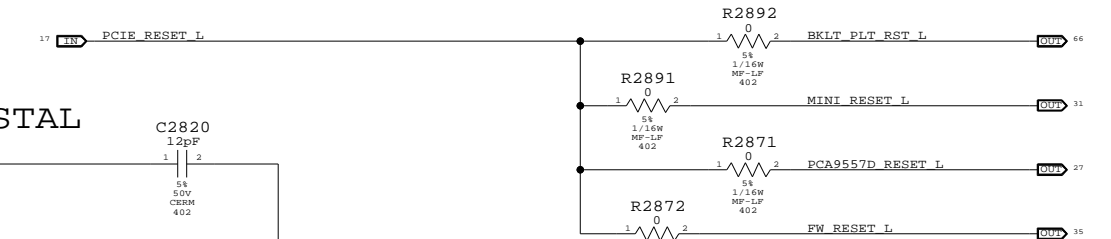


Platform Reset Connections

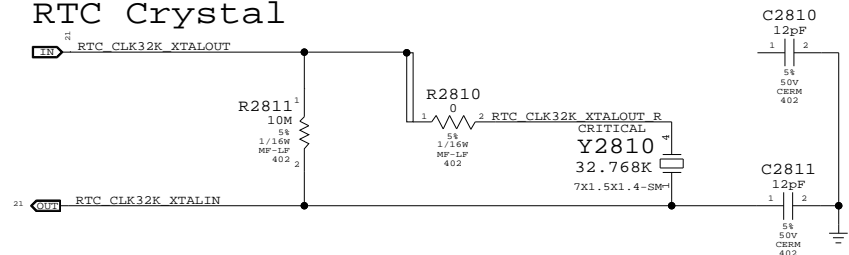
LPC Reset (Unbuffered)



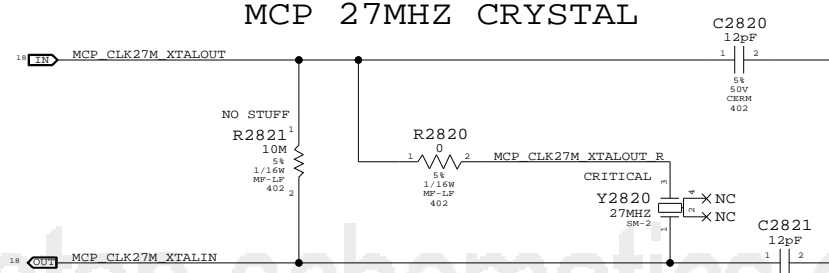
PCIE Reset (Unbuffered)



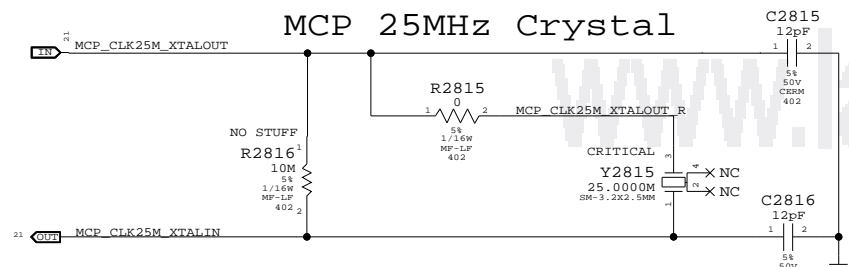
RTC Crystal



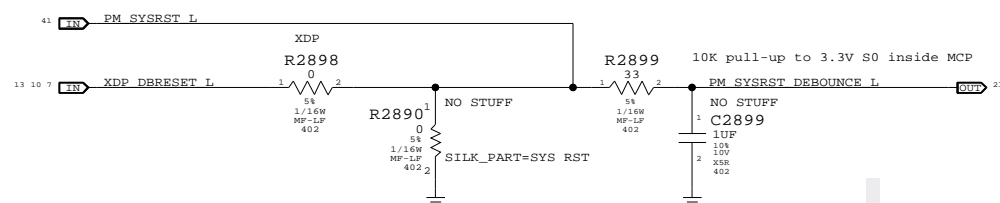
MCP 27MHZ CRYSTAL



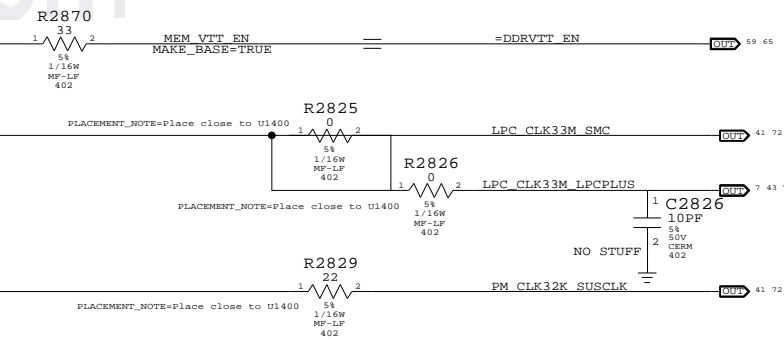
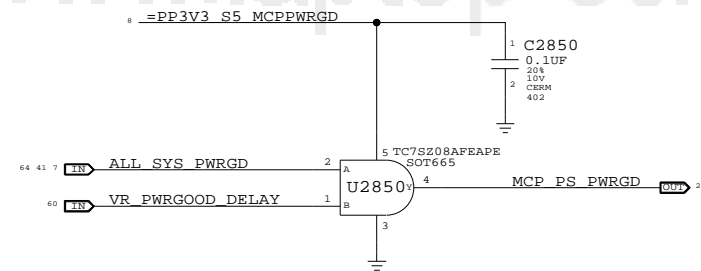
MCP 25MHz Crystal



Reset Button



MCP S0 PWRGD



SYNC FROM T18
 CHANGE RESET BUTTON TO RESET PADS
 REMOVE UNUSED PCIE RESET SIGNALS
 REMOVE R2824 AND NET PCI_CLK33M_SLOT_A
 CHANGE RTC POWER SOURCE FROM COIN CELL TO SUPER CAPS
 ALIAS MEM_VTT_EN TO =DDRVTT_EN
 CHANGE Y2810 AND U2850 TO SMALLER PARTS

SB Misc		
SYNC_MASTER=K36B_MLB	SYNC_DATE=08/17/2008	
NOTICE OF PROPRIETARY PROPERTY		
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING		
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE		
II NOT TO REPRODUCE OR COPY IT		
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART		

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	28		

Page Notes

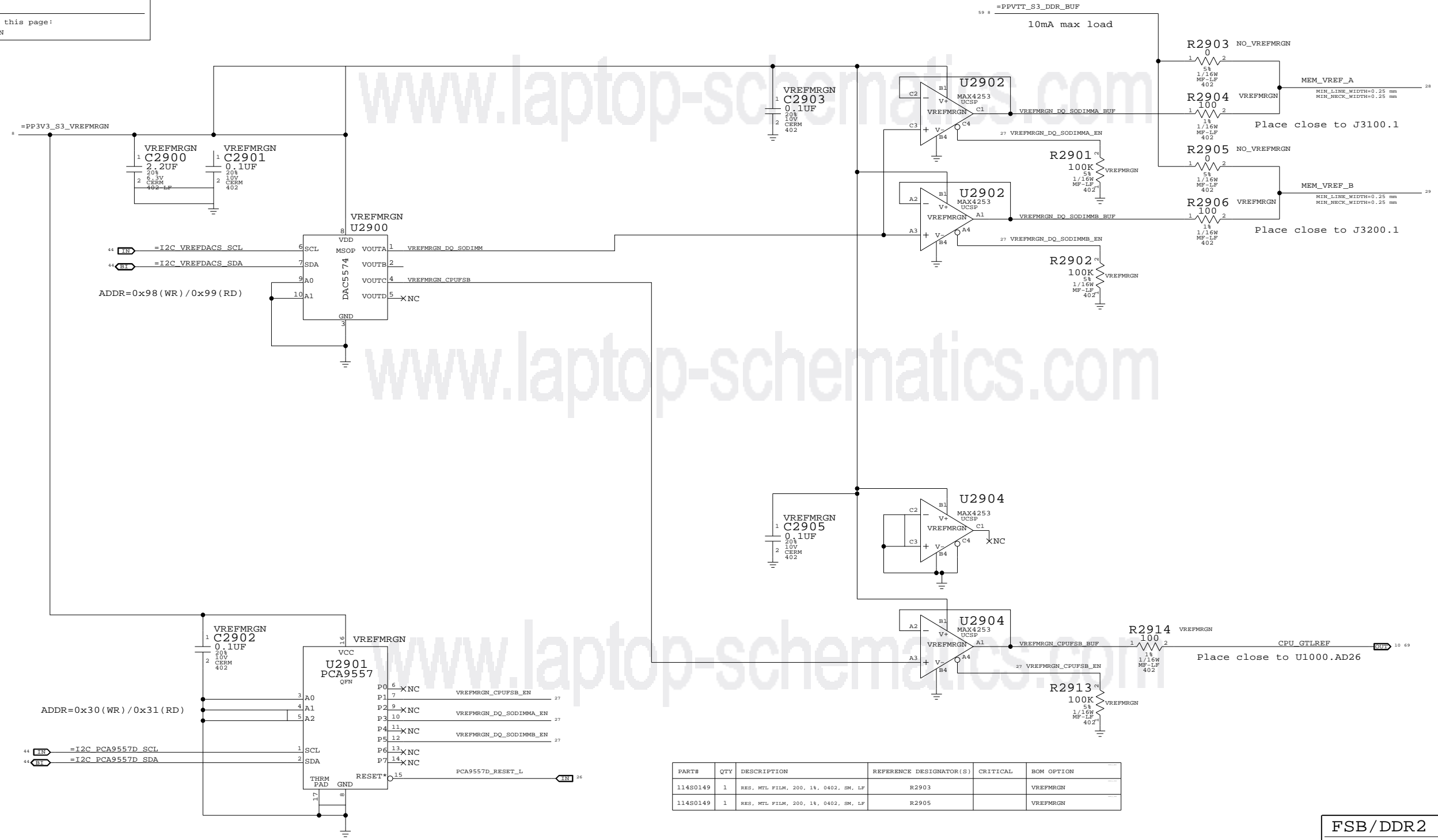
Power aliases required by this page:
 - =PP3V3_S3_VREFMRGN
 - =PP3V3_S5_VREFMRGN
 - =PPVTT_S3_DDR_BUF

Signal aliases required by this page:
 - =I2C_VREFDACS_SCL
 - =I2C_VREFDACS_SDA
 - =I2C_PCA9557D_SCL
 - =I2C_PCA9557D_SDA

BOM options provided by this page:
 VREFMRGN AND NO VREFMRGN

Voltage divider resistor values at op-amp outputs not yet finalized.

BOM OPTION TO SELECT VREF SOURCE



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
114S0149	1	RES, MTL FILM, 200, 1%, 0402, SM, LF	R2903		VREFMRGN
114S0149	1	RES, MTL FILM, 200, 1%, 0402, SM, LF	R2905		VREFMRGN

FSB/DDR2 VREF MARGINING

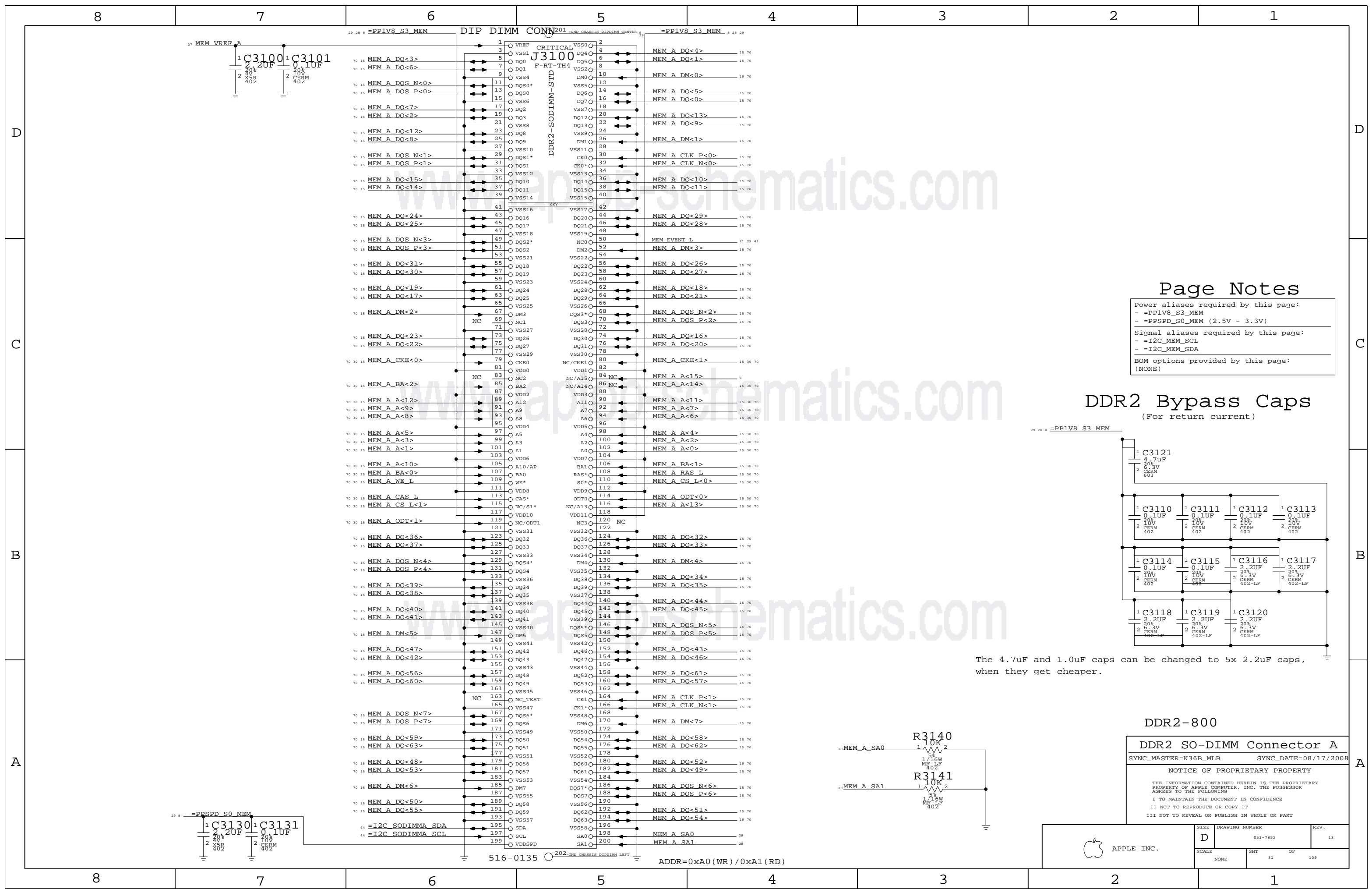
SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



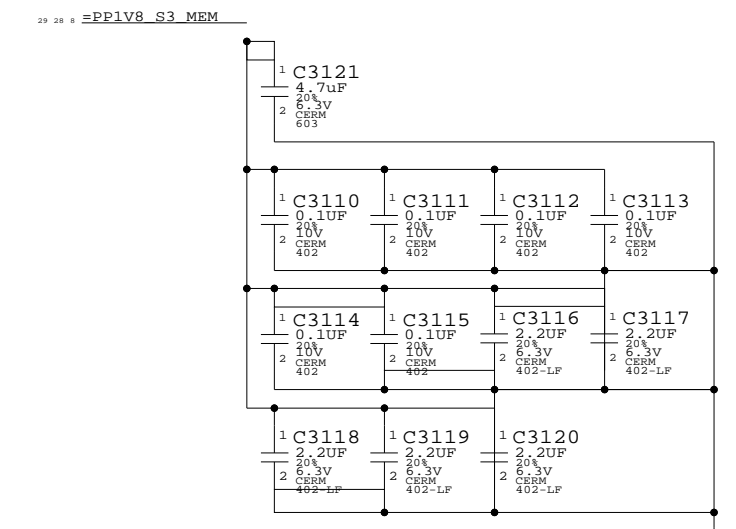
SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	29	109



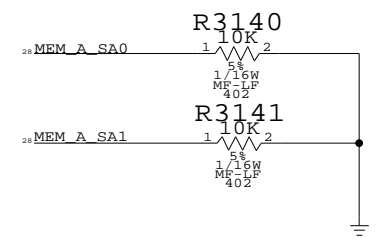
Page Notes

- 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)

DDR2 Bypass Caps (For return current)



The 4.7uF and 1.0uF caps can be changed to 5x 2.2uF caps, when they get cheaper.

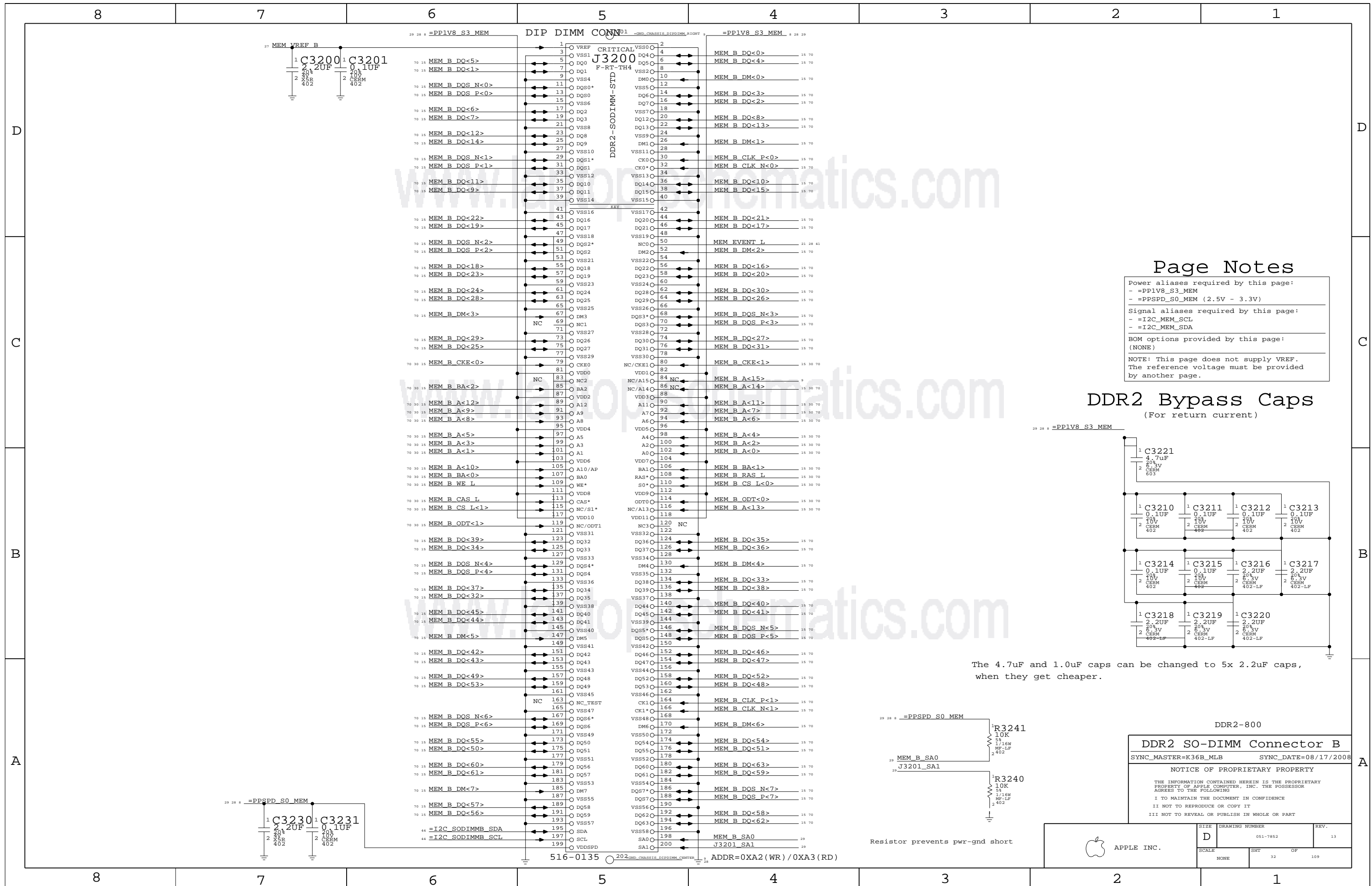


DDR2-800

DDR2 SO-DIMM Connector A
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	
NONE	31	109	

ADDR=0xA0 (WR) / 0xA1 (RD)



Page Notes

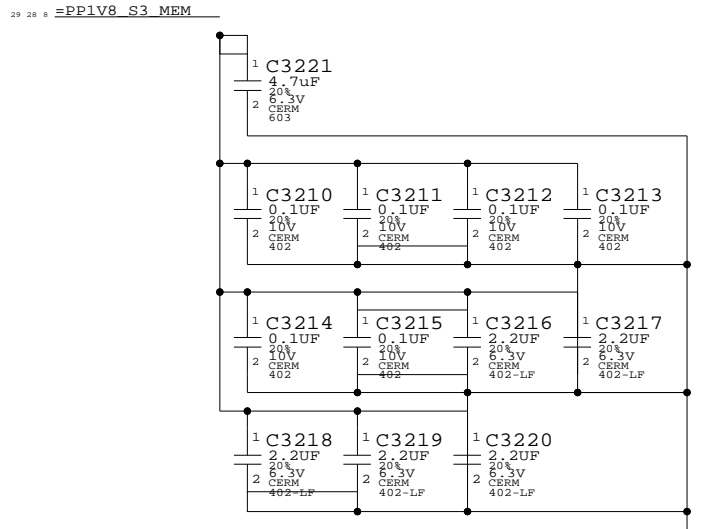
Power aliases required by this page:
 - =P1V8_S3_MEM
 - =PPSPD_S0_MEM (2.5V - 3.3V)

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

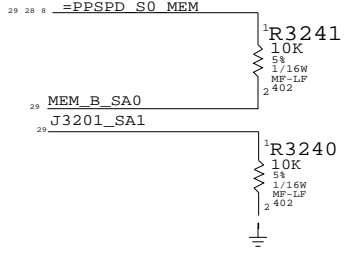
BOM options provided by this page:
 (NONE)

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

DDR2 Bypass Caps (For return current)



The 4.7uF and 1.0uF caps can be changed to 5x 2.2uF caps, when they get cheaper.



Resistor prevents pwr-gnd short

DDR2-800

DDR2 SO-DIMM Connector B

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

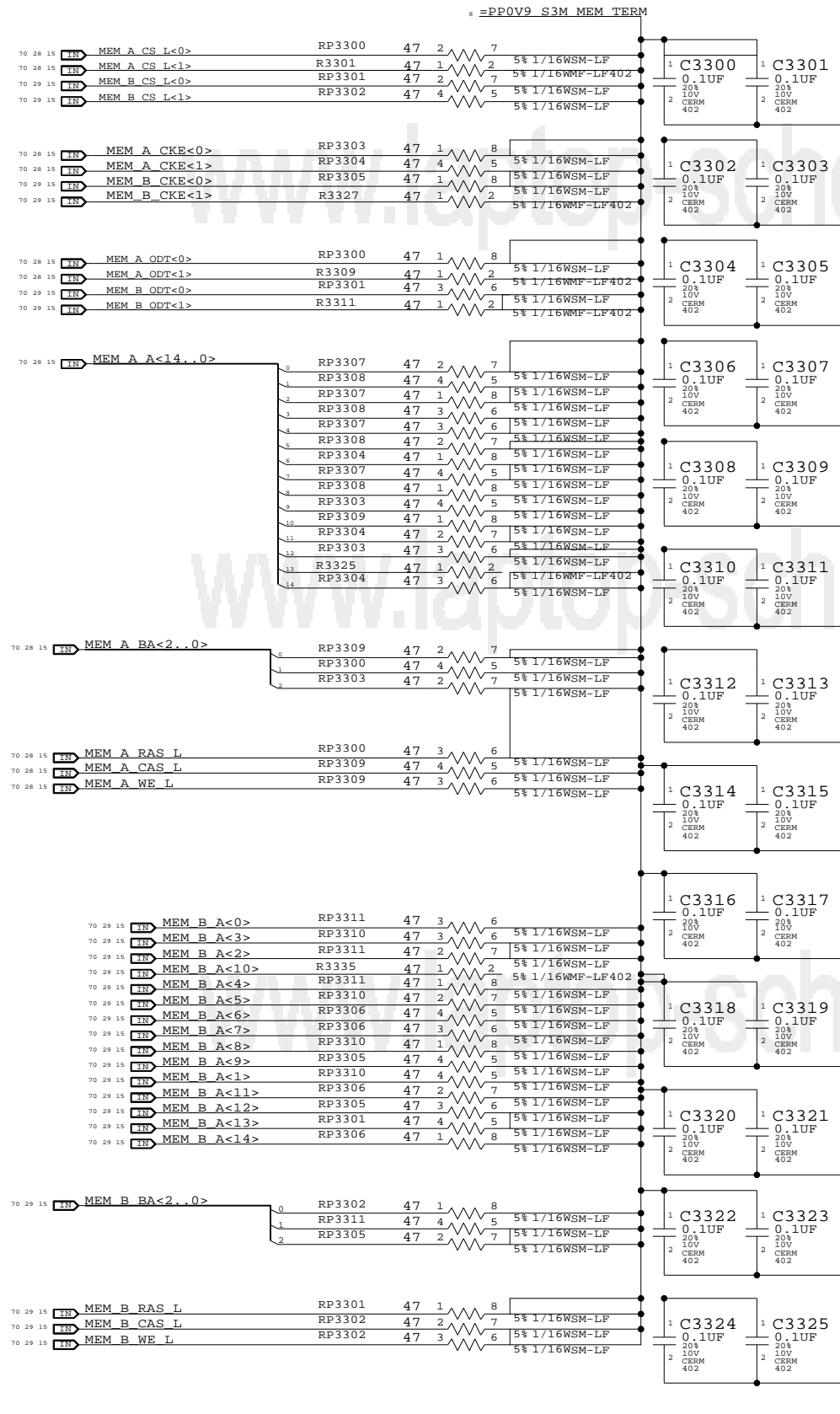
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	32		

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



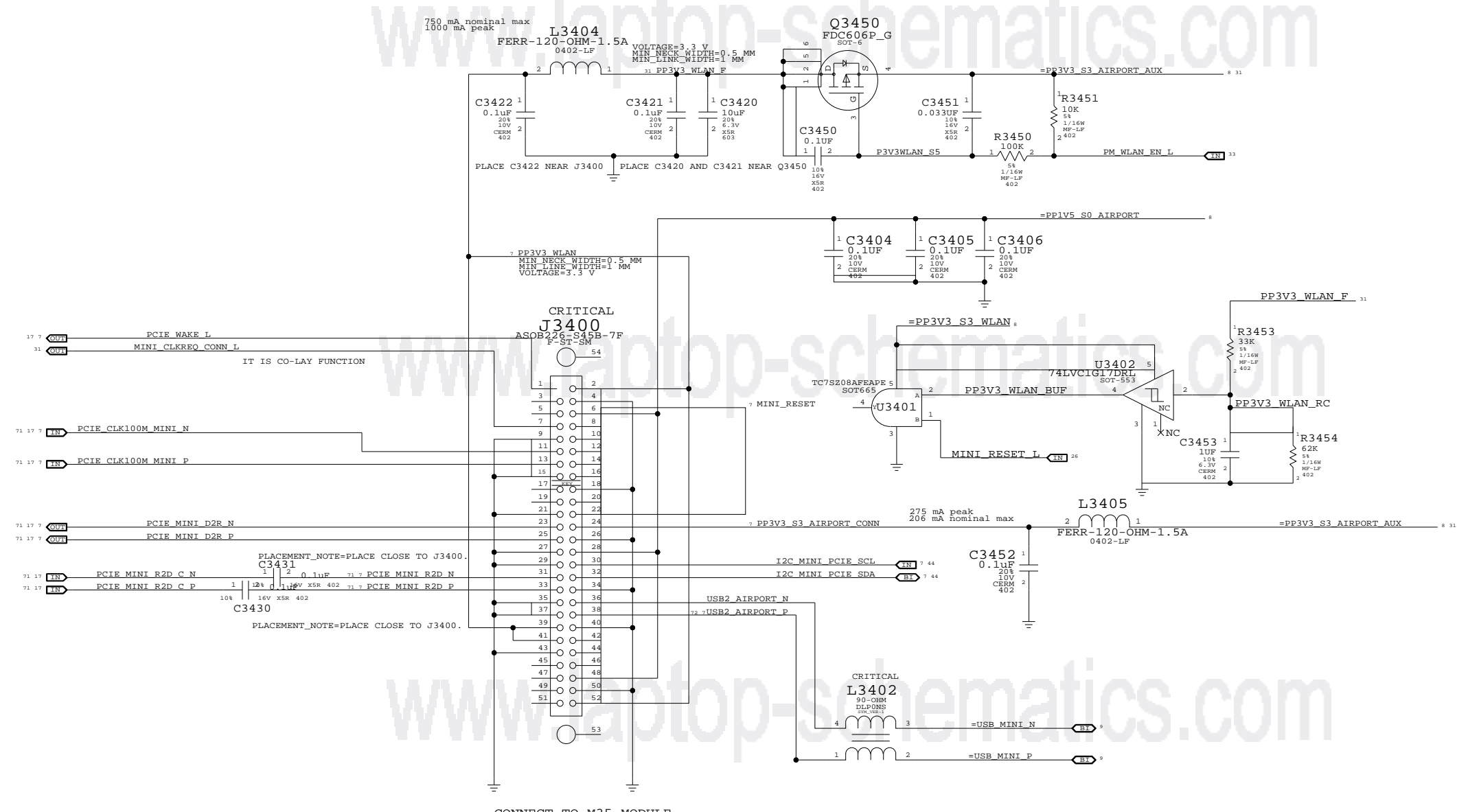
LAYOUT NOTE: PLACE ONE CAP CLOSE TO EVERY TWO PULLUP RESISTORS TERMINATED TO PP0V9_S0_MEM_TERM

Memory Active Termination

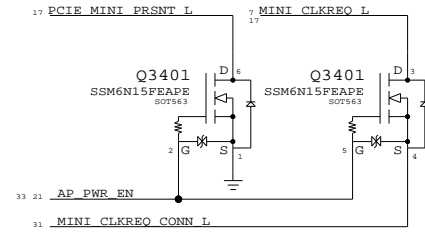
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	33		

AIRPORT

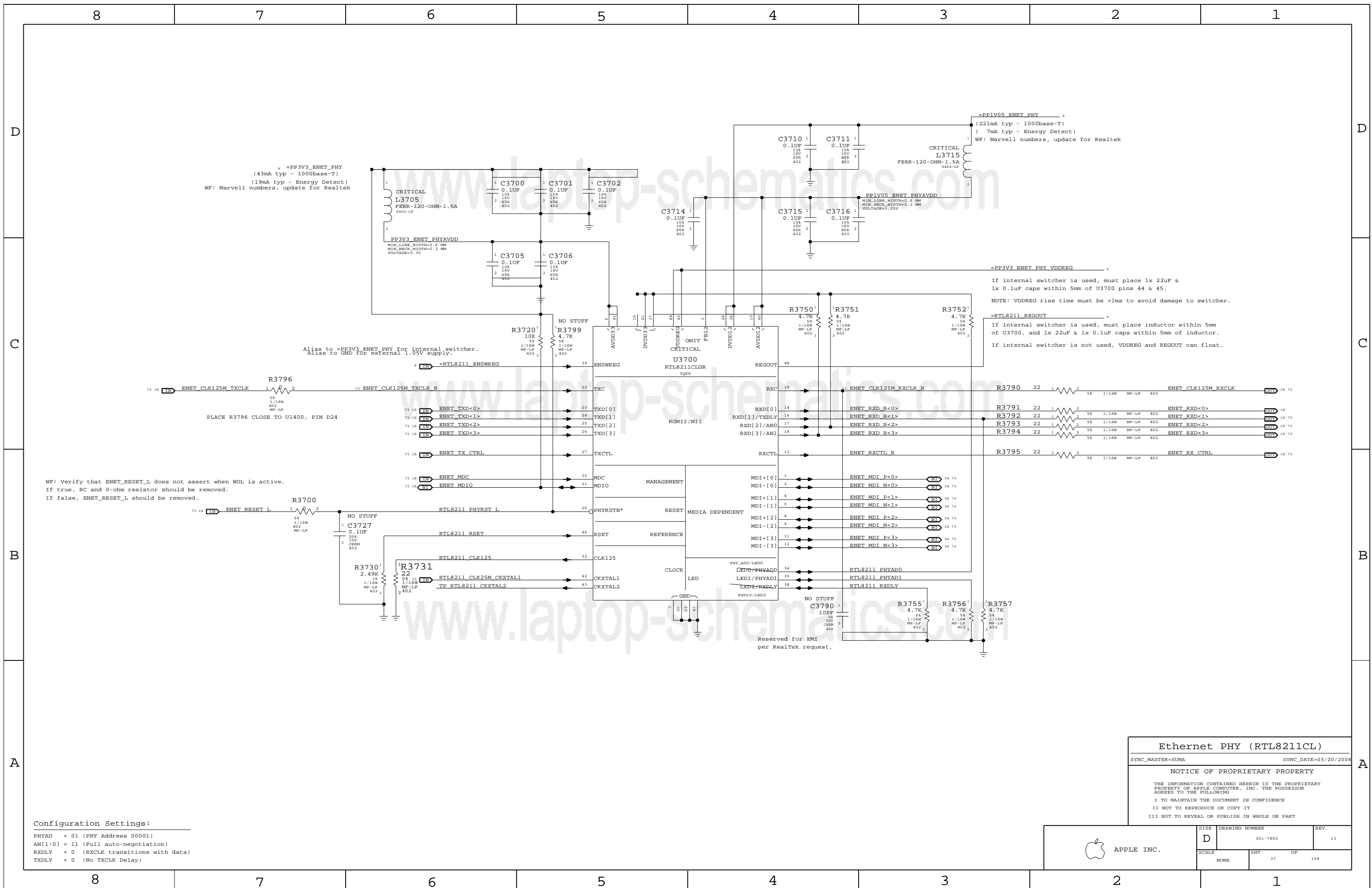


CONNECT TO M35 MODULE
 OLD:516S0406 (FOXCONN ONLY)
 NEW:516S0635 (FOXCONN & ACON)



Right Clutch Connector
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	34		



=PP3V3_ENET_PHY
(43mA typ - 1000base-T)
(19mA typ - Energy Detect)
WF: Marvell numbers, update for Realtek

=PP1V05_ENET_PHY
(221mA typ - 1000base-T)
(7mA typ - Energy Detect)
WF: Marvell numbers, update for Realtek

Alias to =PP3V3_ENET_PHY for internal switcher.
Alias to GND for external 1.05V supply.

=PP3V3_ENET_PHY_VDDREG
If internal switcher is used, must place 1x 22uF &
1x 0.1uF caps within 5mm of U3700 pins 44 & 45.
NOTE: VDDREG rise time must be >1ms to avoid damage to switcher.

=RTL8211_REGOUT
If internal switcher is used, must place inductor within 5mm
of U3700, and 1x 22uF & 1x 0.1uF caps within 5mm of inductor.
If internal switcher is not used, VDDREG and REGOUT can float.

PLACE R3796 CLOSE TO U1400, PIN D24

WF: Verify that ENET_RESET_L does not assert when WOL is active.
If true, RC and 0-ohm resistor should be removed.
If false, ENET_RESET_L should be removed.

Reserved for EMI
per Realtek request.

Configuration Settings:
PHYAD = 01 (PHY Address 00001)
AN[1:0] = 11 (Full auto-negotiation)
RXDLY = 0 (RXCLK transitions with data)
TXDLY = 0 (No TXCLK Delay)

Ethernet PHY (RTL8211CL)
SYNC_MASTER=SUMA SYNC_DATE=03/20/2008
NOTICE OF PROPRIETARY PROPERTY
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY
PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR
AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	37		

D

D

C

C

B

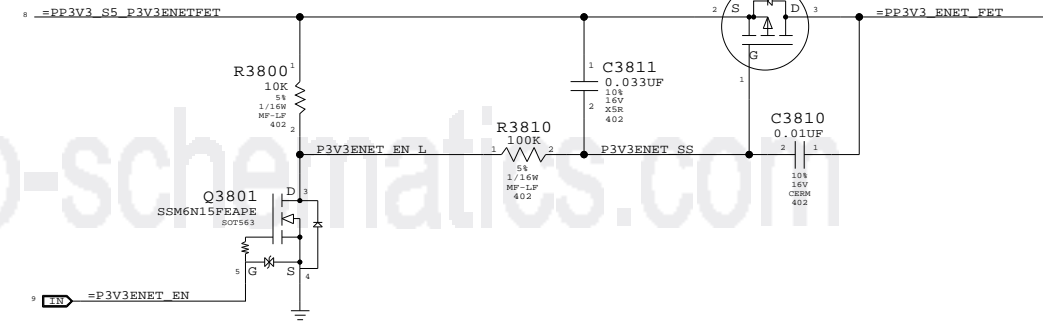
B

A

A

3.3V ENET FET

@ 2.5V Vgs:
Rds(on) = 90mOhm max
I(max) = 1.7A (85C)

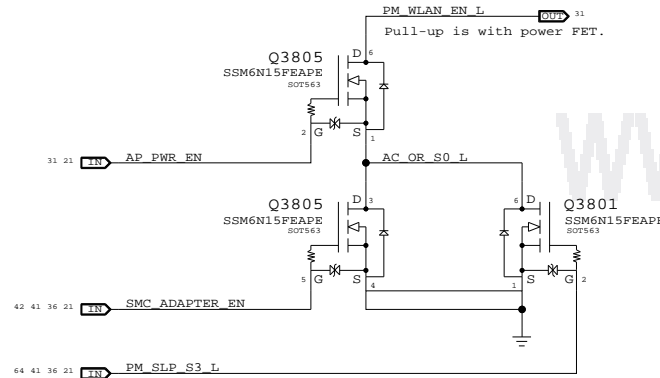


MOBILE:
Recommend aliasing PM_SLP_RMGT_L and =P3V3ENET_EN. Nets separated on ARB for alternate power options.

WLAN Enable Generation

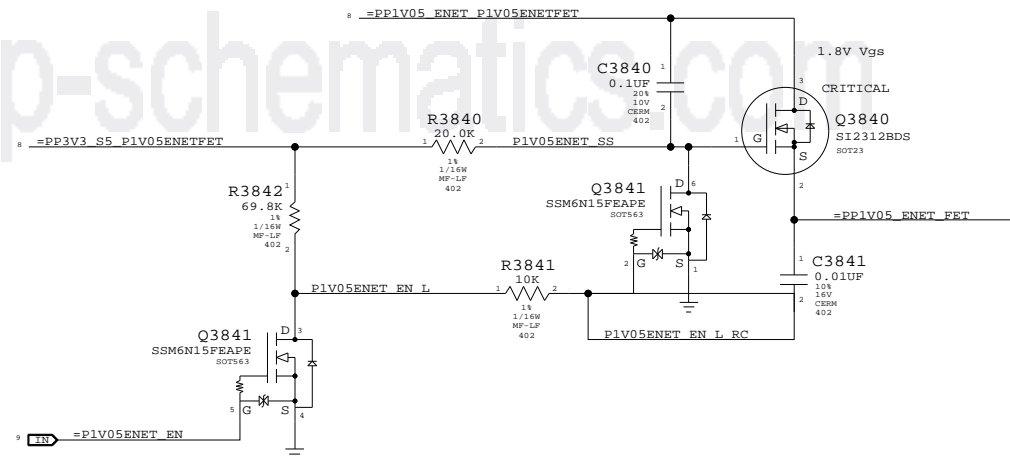
"WLAN" = ("S3" && "AP_PWR_EN" && ("AC" || "S0"))

NOTE: S3 term is guaranteed by S3 pull-up on open-drain AP_PWR_EN signal.



1.05V ENET FET

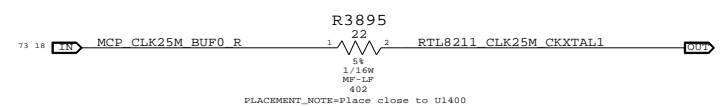
1.8V Vgs



Non-ARB:
Recommend aliasing PM_SLP_RMGT_L and =P1V05ENET_EN. Nets separated on ARB for alternate power options.

RTL8211 25MHz Clock

NOTE: MCP79 can provide 25MHz clock, but clock runs whenever RMGT rails are powered. Designs must ensure PHY is powered whenever RMGT rails are, or use separate crystal.

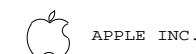


Ethernet & AirPort Support

SYNC_MASTER=SUMA SYNC_DATE=04/04/2008

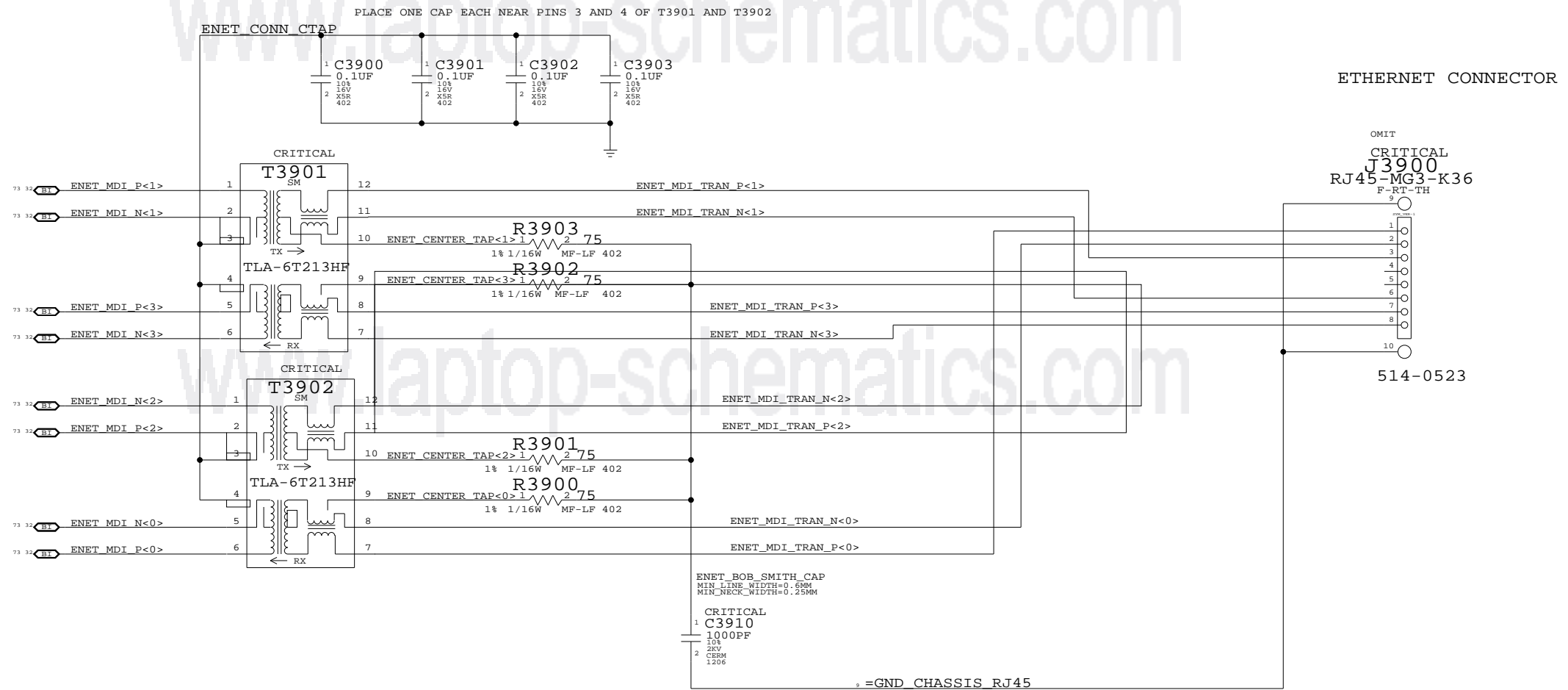
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	38	109



ETHERNET CONNECTOR

SYNC_MASTER=SUMA SYNC_DATE=04/04/2008

NOTICE OF PROPRIETARY PROPERTY

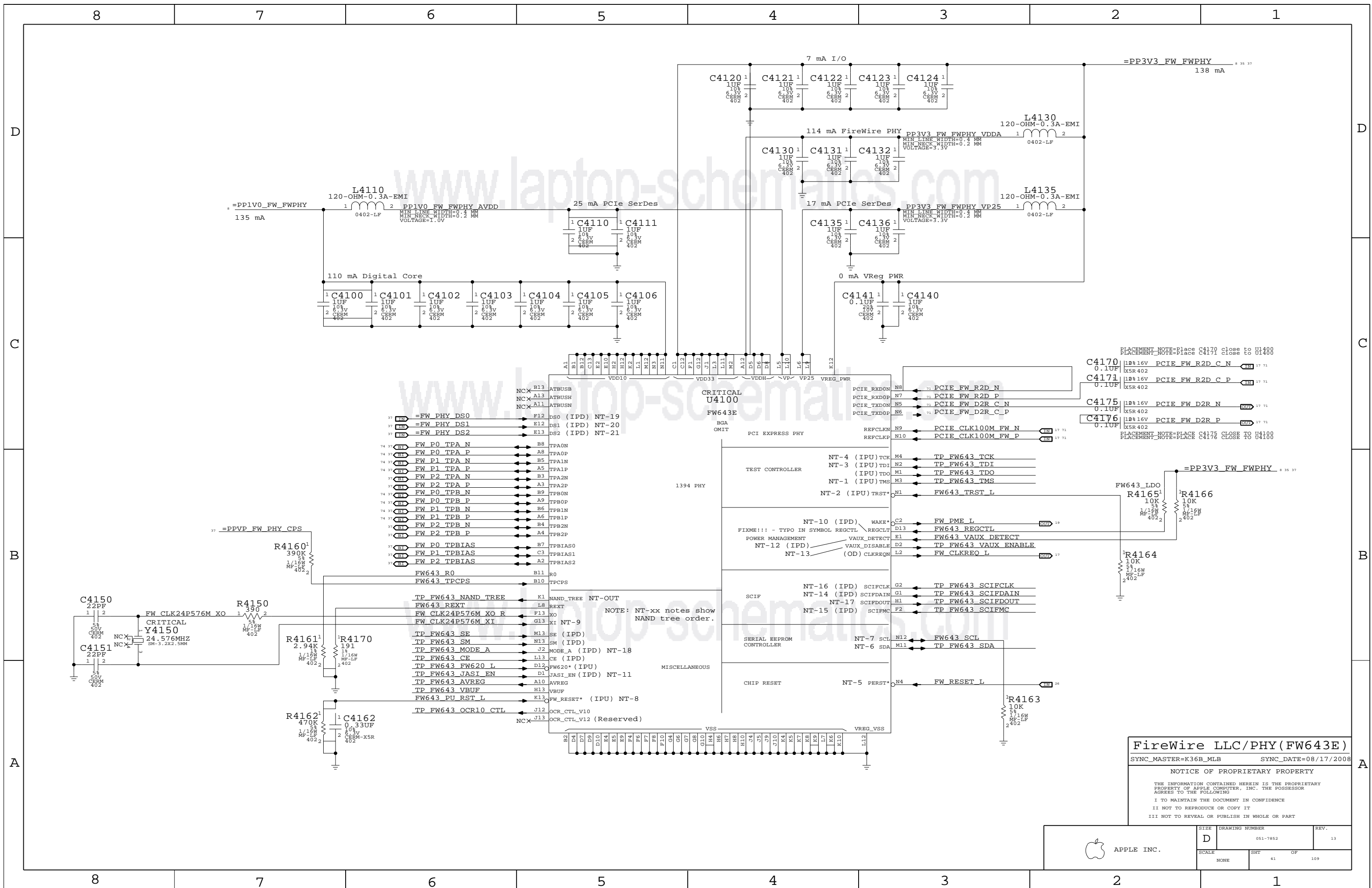
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT		OF
NONE	39		109

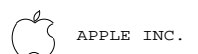


FireWire LLC/PHY (FW643E)

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	41	109

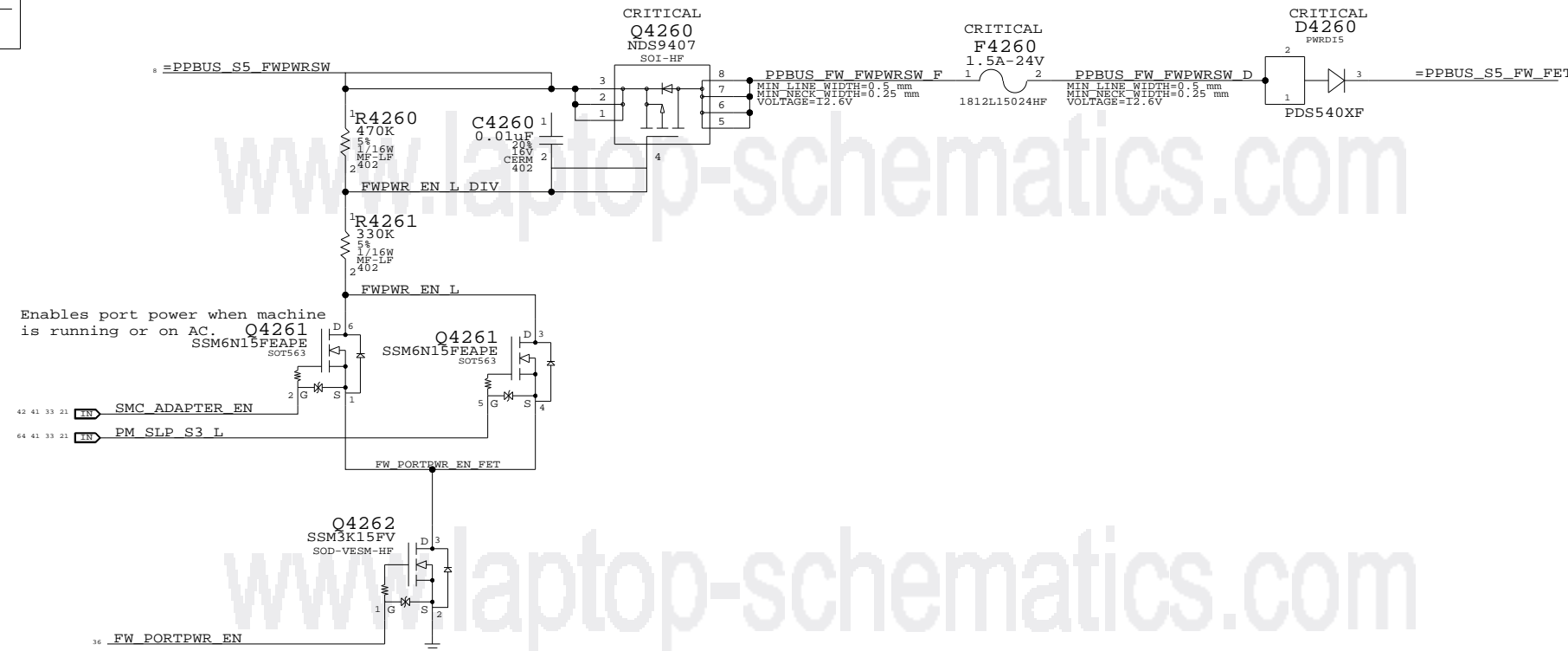
Page Notes

Power aliases required by this page:
 - =PPBUS_S5_FWPWRSW (system supply for bus power)
 - =PP3V3_FW_LATEVG_ACTIVE
 - =PPVP_FW_SUMNODE (power passthru summation node)

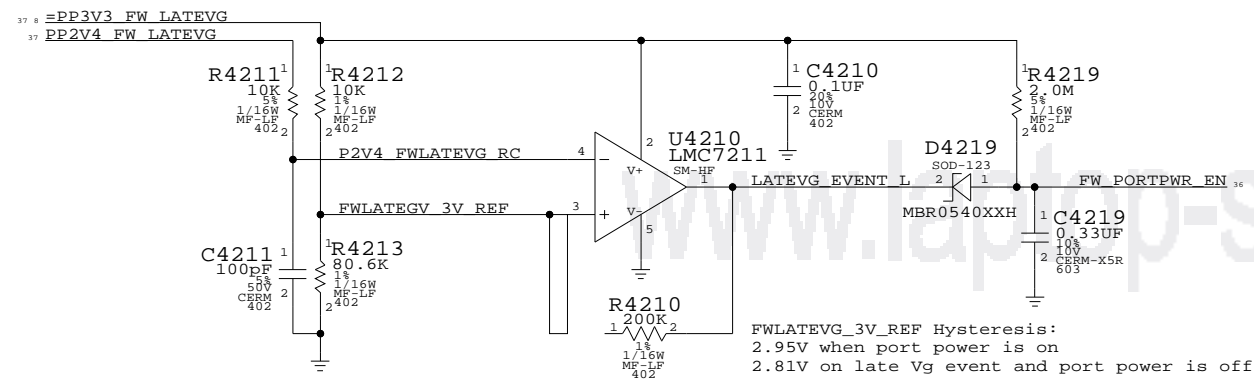
Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 - FW_PORT_FAULT_PU

FireWire Port Power Switch



Late-VG Event Detection



FireWire Port Power

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	42	109

Page Notes

Power aliases required by this page:
 - =PPVP_FW_PORT1
 - =PP3V3_FW_LATEVG

Signal aliases required by this page:
 (NONE)

NOTE: This page is expected to contain the necessary aliases to map the FireWire TPA/TPB pairs to their appropriate connectors and/or to properly terminate unused signals.

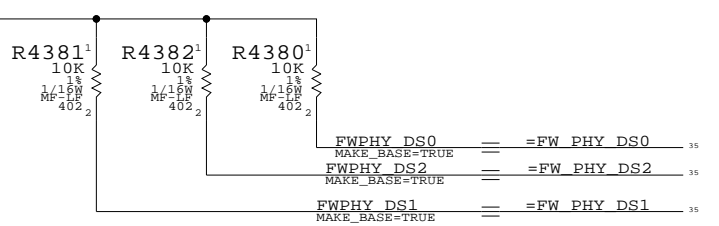
BOM options provided by this page:
 (NONE)

NOTE: FireWire TPA/TPB pairs are NOT constrained on this page. It is assumed that FireWire PHY page will provide the appropriate constraints to apply to entire TPA/TPB XNets.

1394b implementation based on Apple FireWire Design Guide (FWDG 0.6, 5/14/03)

FireWire PHY Config Straps

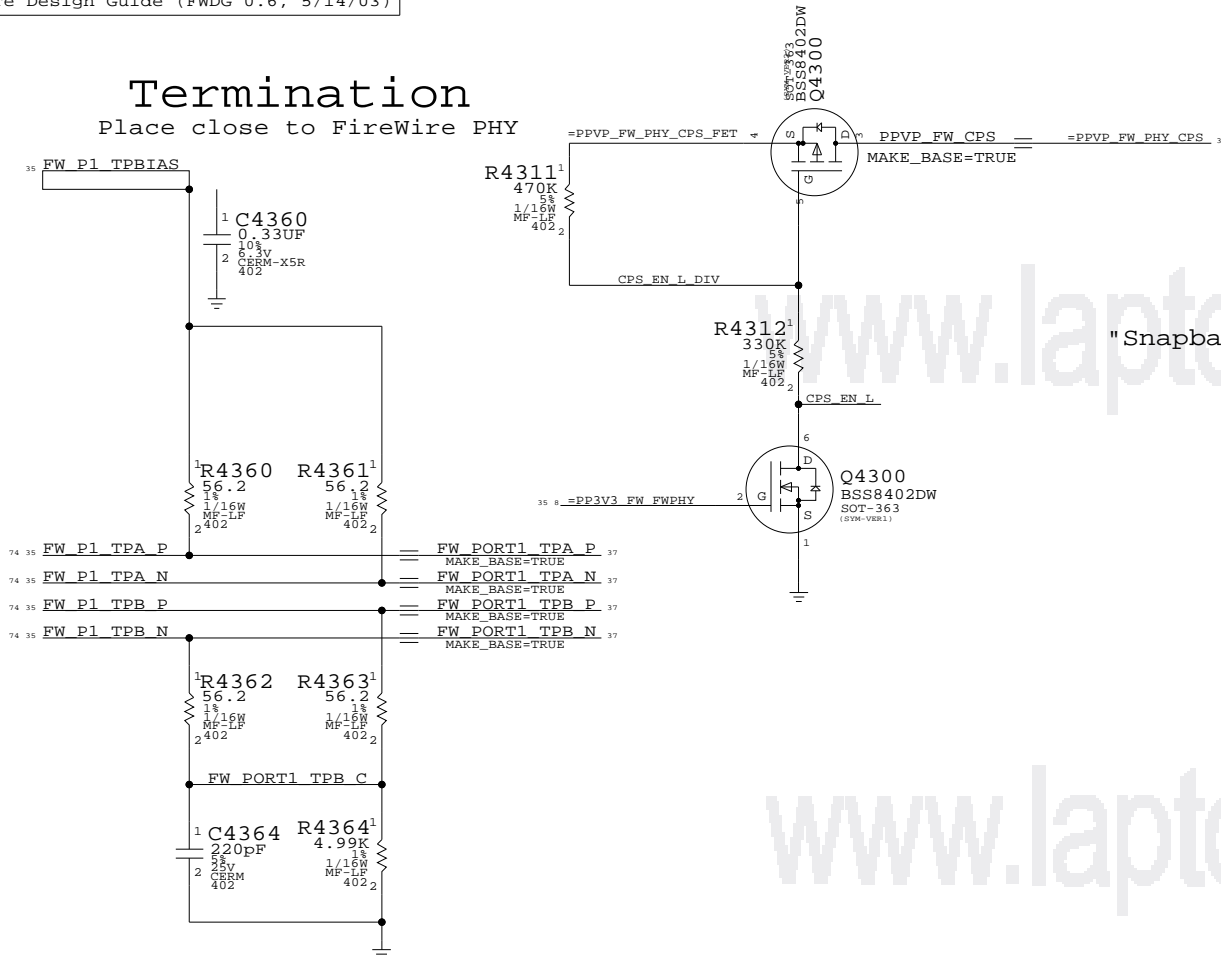
Configures PHY for:
 - 1-port Portable Power Class (0)



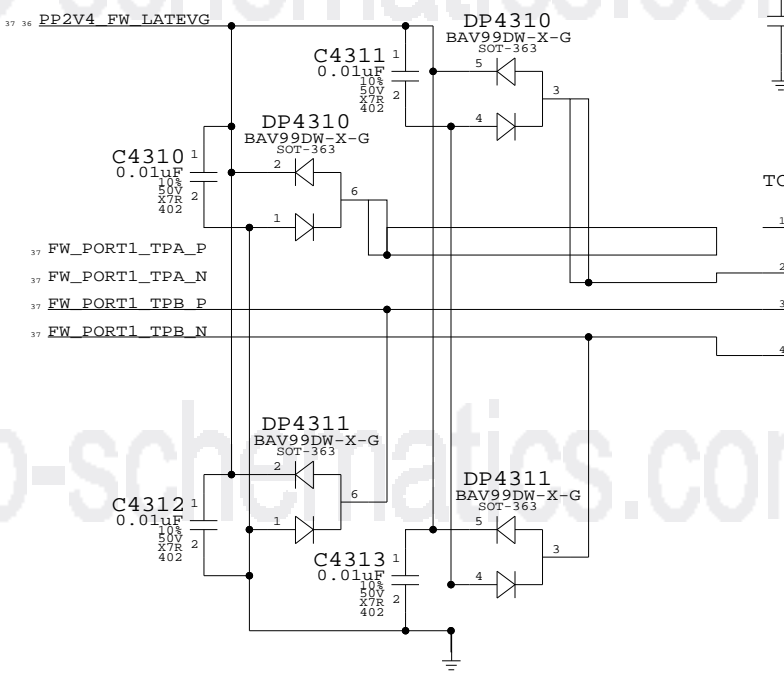
35	FW_P0_TPBIAS	=	NC_FW0_TPBIAS	MAKE_BASE=TRUE
35	FW_P2_TPBIAS	=	NC_FW2_TPBIAS	MAKE_BASE=TRUE
74	FW_P0_TPA_N	=	NC_FW0_TPAN	MAKE_BASE=TRUE
74	FW_P0_TPA_P	=	NC_FW0_TPAP	MAKE_BASE=TRUE
35	FW_P2_TPA_N	=	NC_FW2_TPAN	MAKE_BASE=TRUE
35	FW_P2_TPA_P	=	NC_FW2_TPAP	MAKE_BASE=TRUE
74	FW_P0_TPB_N	=	NC_FW0_TPB_N	MAKE_BASE=TRUE
35	FW_P0_TPB_P	=	NC_FW0_TPB_P	MAKE_BASE=TRUE
35	FW_P2_TPB_N	=	NC_FW2_TPB_N	MAKE_BASE=TRUE
35	FW_P2_TPB_P	=	NC_FW2_TPB_P	MAKE_BASE=TRUE

Termination

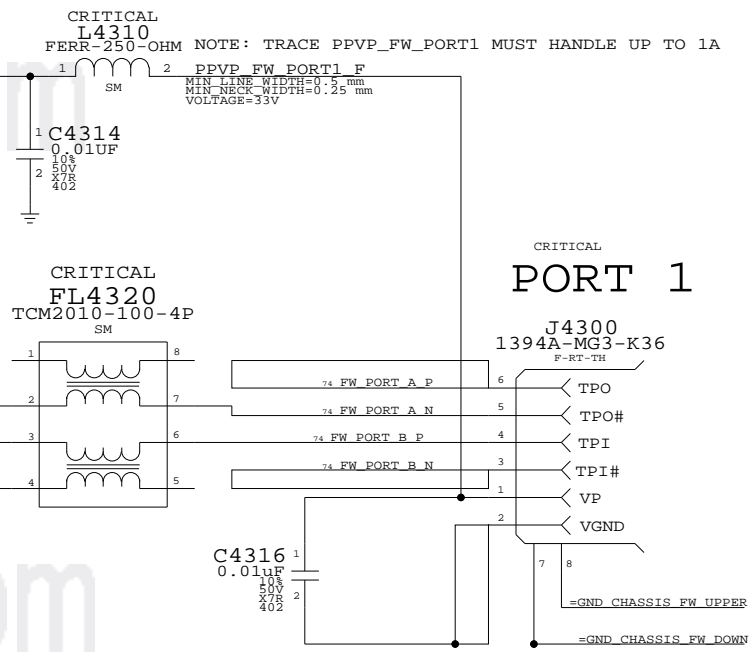
Place close to FireWire PHY



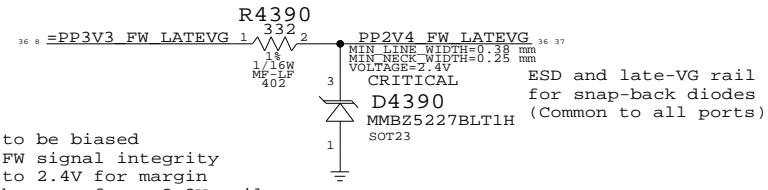
"Snapback" & "Late VG" Protection



Cable Power



Late-VG Protection Power



PP2V4_FWLATEVG needs to be biased to at least 2.1V for FW signal integrity and should be biased to 2.4V for margin. R4390 should be 390 Ohms max for a 3.3V rail.

FireWire Ports
 SYNC_MASTER=K36B_MLB SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	43		

ODD Power Control

NOTE: 3.3V must be S0 if 5V is S3 or S5 to ensure the drive is unpowered in S3/S5.

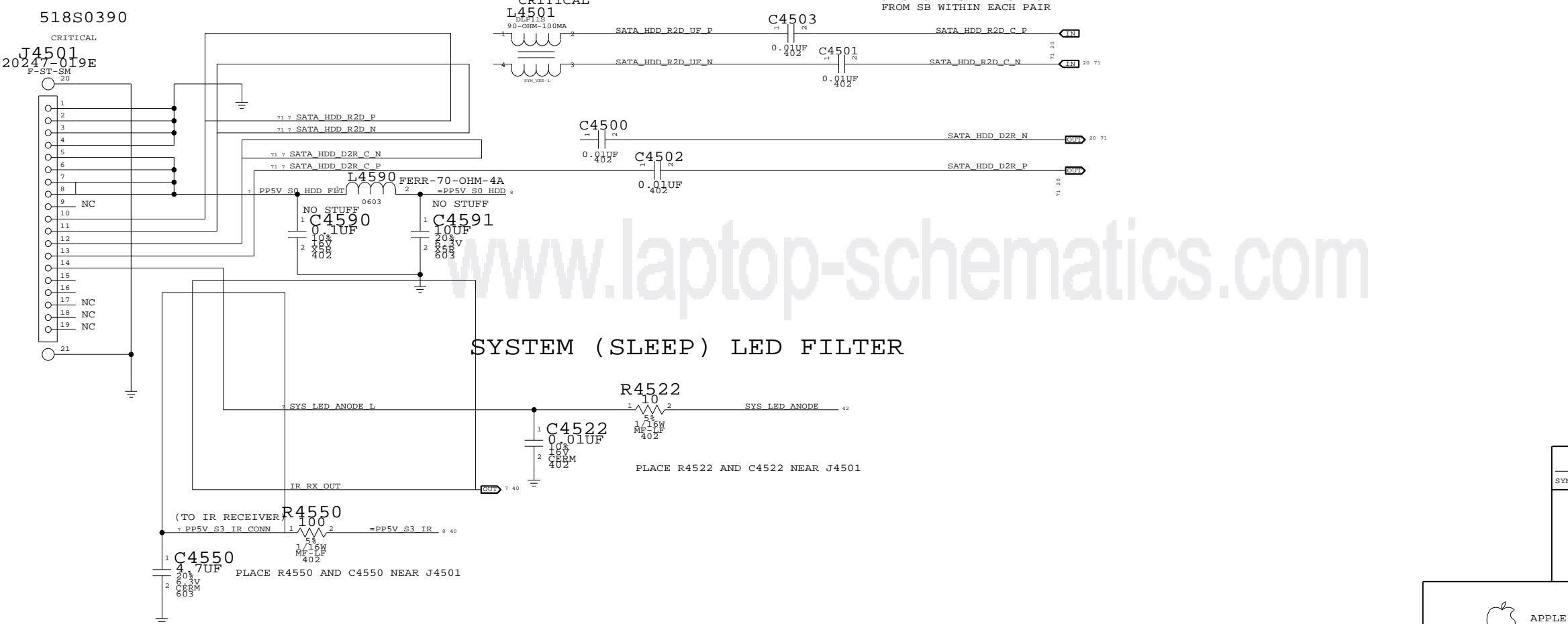
SATA ODD Port

SATA CONNECTOR

SYSTEM (SLEEP) LED FILTER

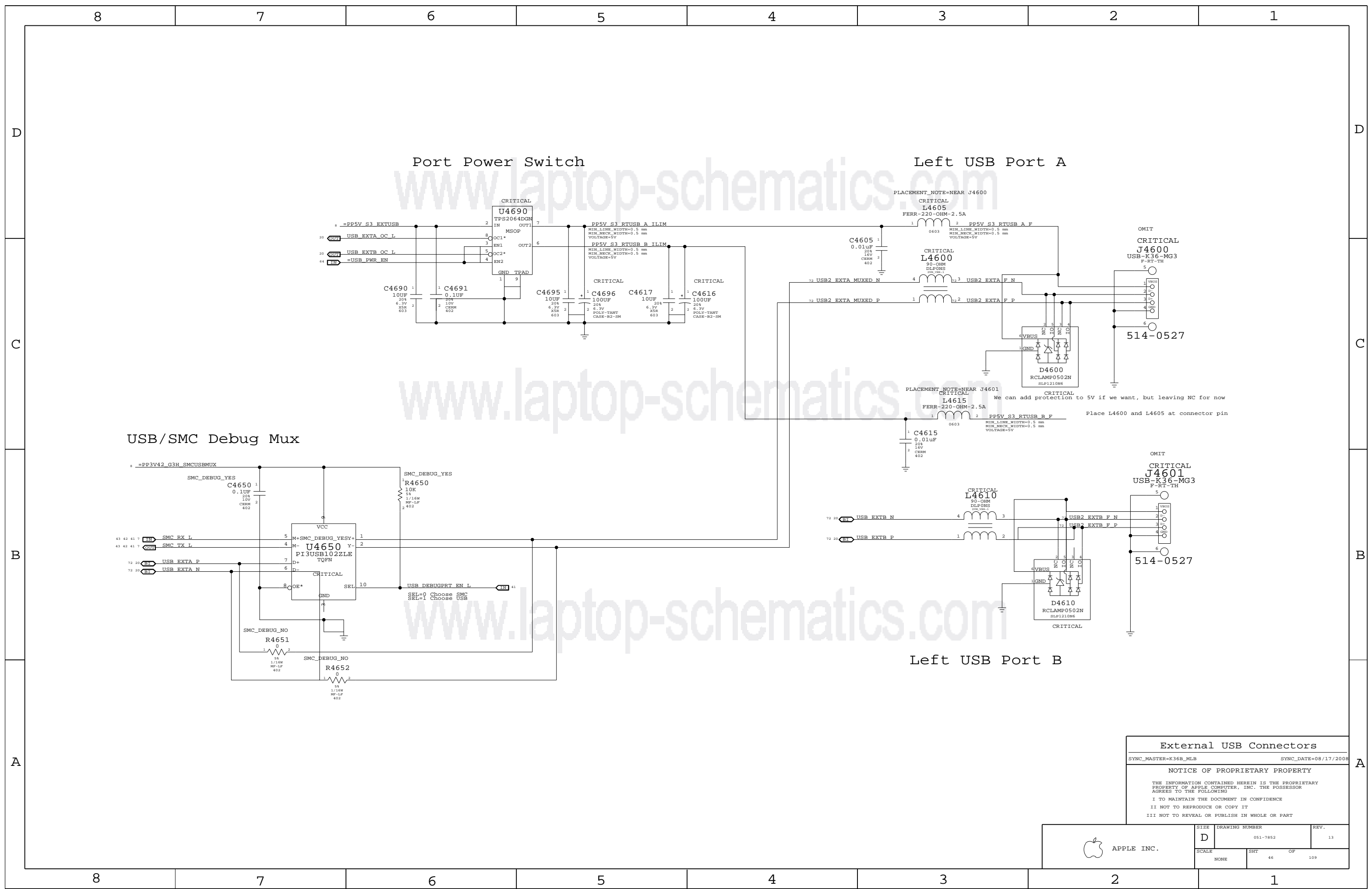
518S0390

J4501
20247-019E



SATA Connectors		
SYNC_MASTER=K36B_MLB	SYNC_DATE=08/17/2008	
NOTICE OF PROPRIETARY PROPERTY		
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING		
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE		
II NOT TO REPRODUCE OR COPY IT		
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART		

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	NONE	SHT	OF
		45	109



External USB Connectors
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT		OF
NONE	46		109

D

D

C

C

B

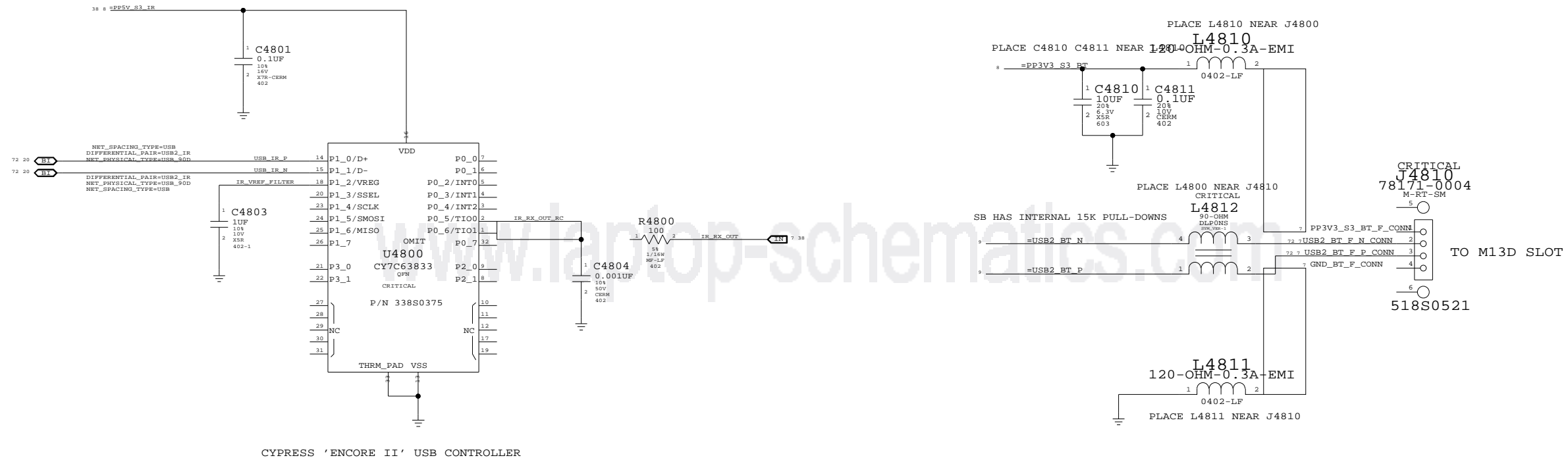
B

A

A

IR CTRL

BLUETOOTH



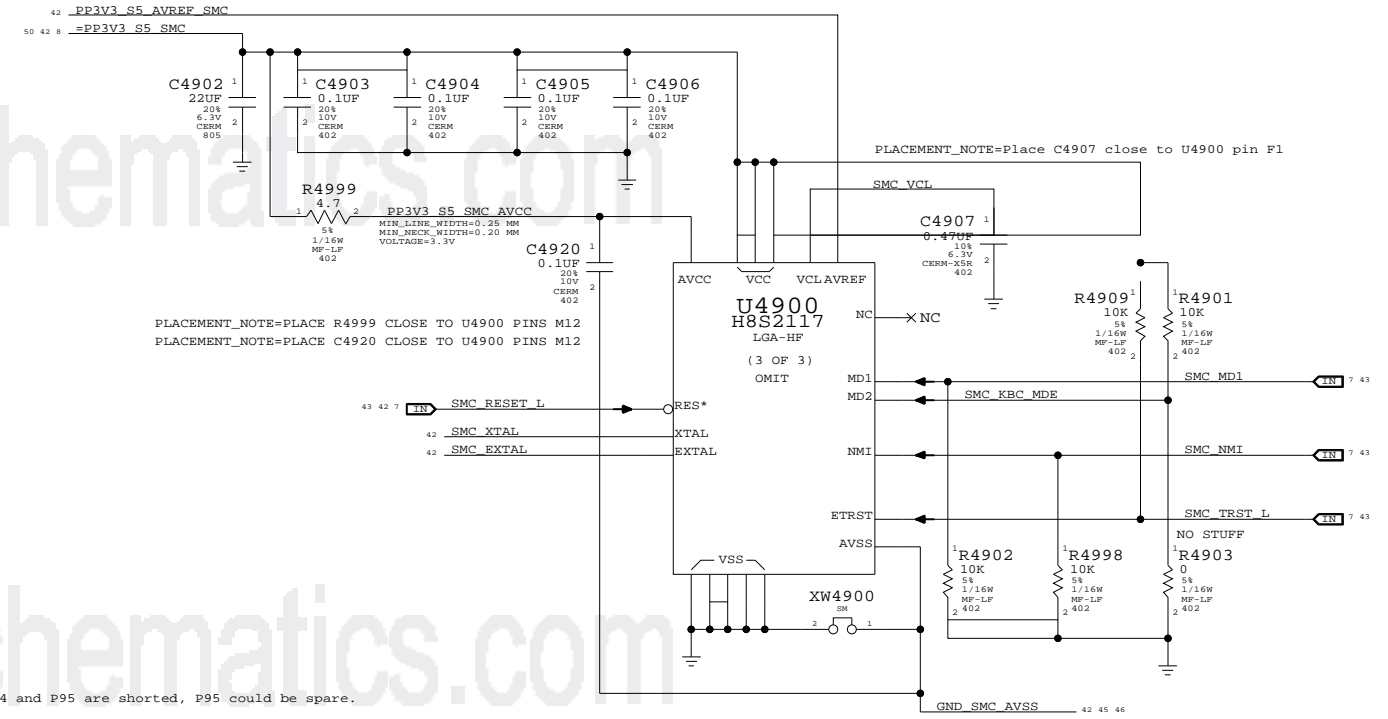
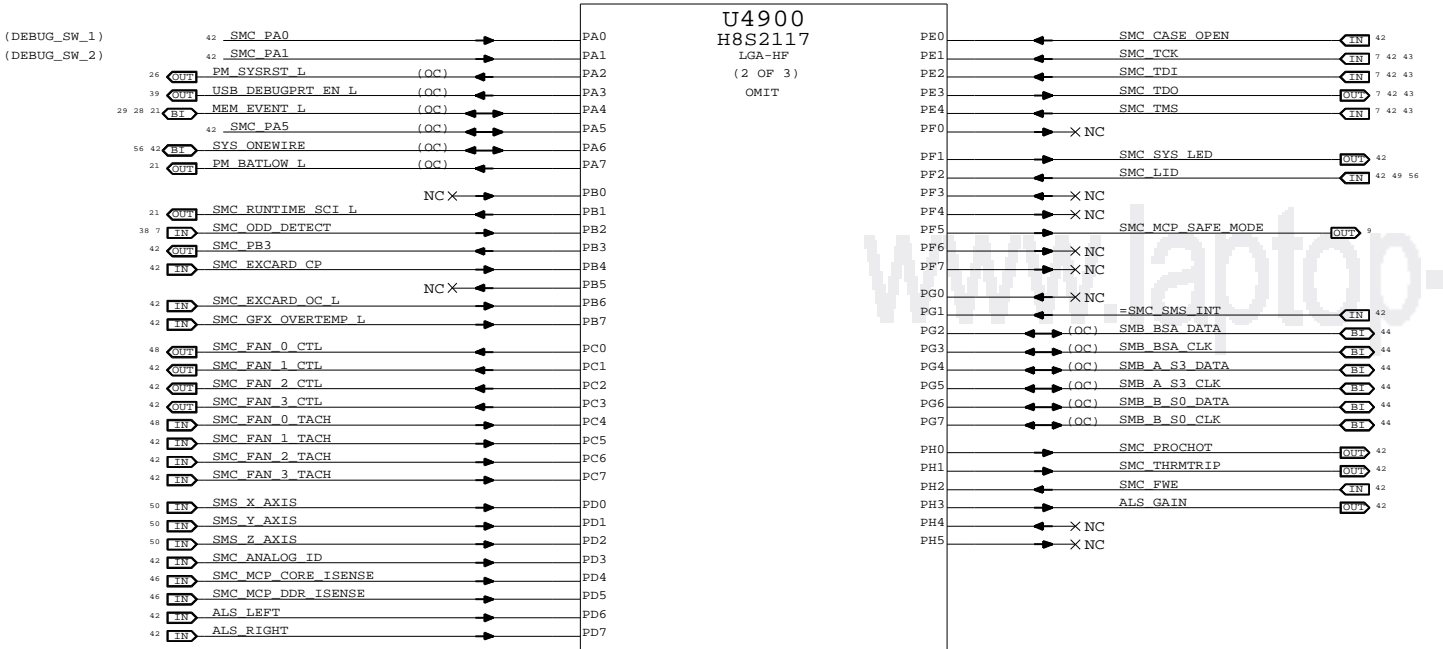
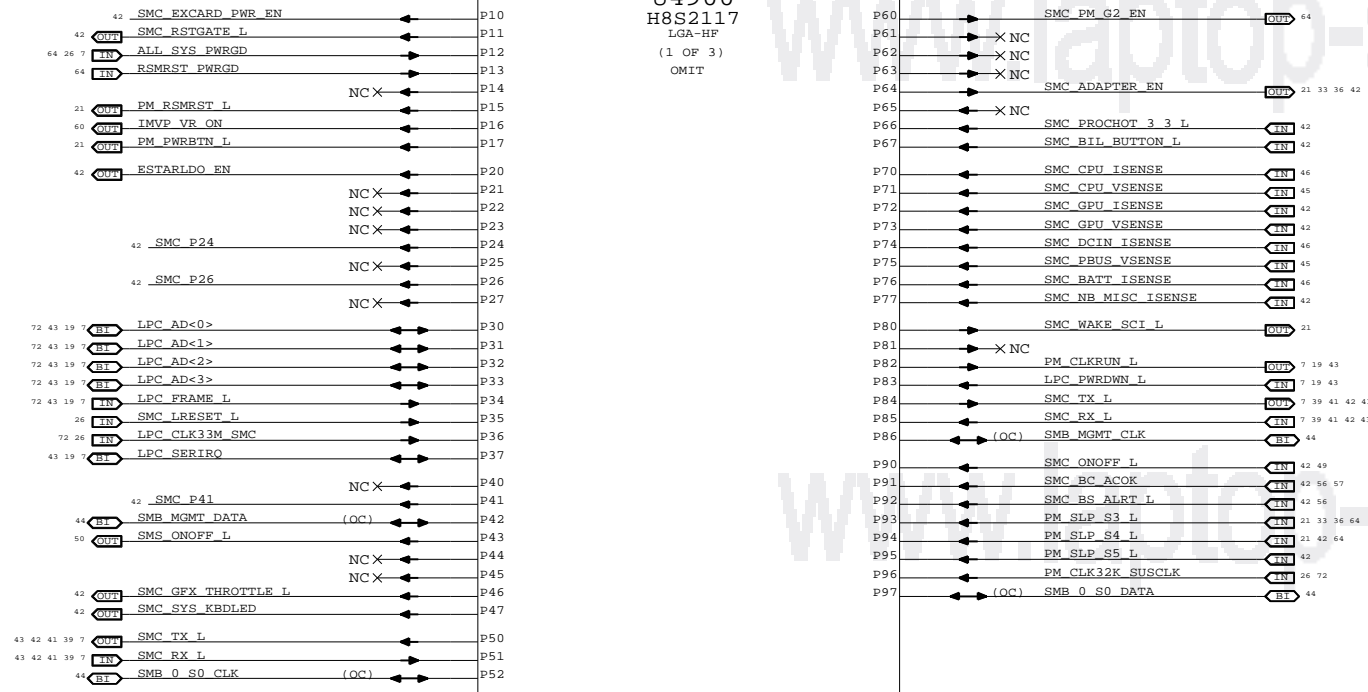
CYPRESS 'ENCORE II' USB CONTROLLER

www.laptop-schematics.com

Front Flex Support
 SYNC_MASTER=K36B_MLB SYNC_DATE=07/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	REV.
NONE	48	109	

NOTE: Unused pins have "SMC_Pxx" names. Unused pins designed as outputs can be left floating, those designated as inputs require pull-ups.



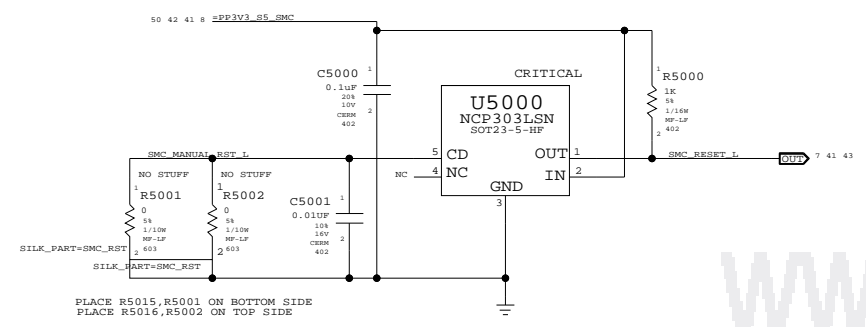
NOTE: P94 and P95 are shorted, P95 could be spare.

NOTE: SMS interrupt can be active high or low, rename net accordingly. If SMS interrupt is not used, pull up to SMC rail.

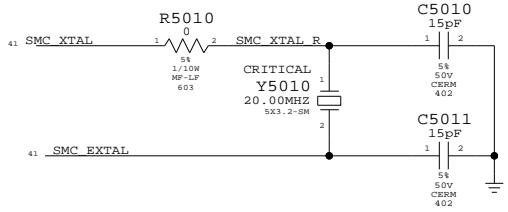
SMC
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT OF		109
NONE	49		

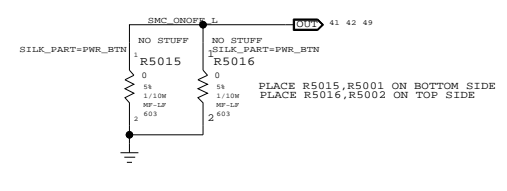
SMC Reset "Button" / Brownout Detect



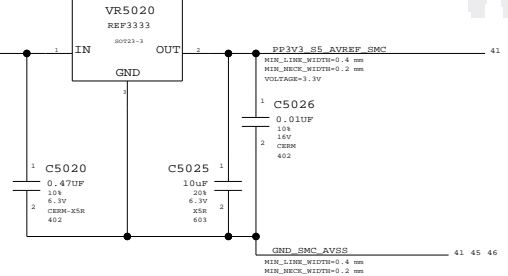
SMC Crystal Circuit



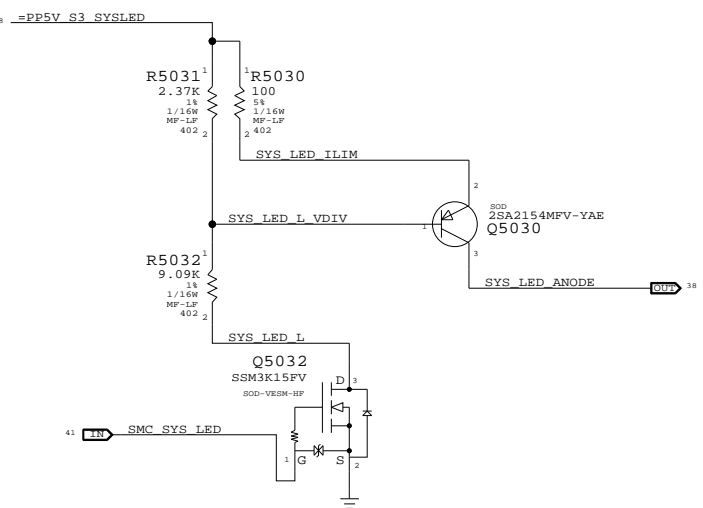
Debug Power "Button"



SMC AVREF Supply

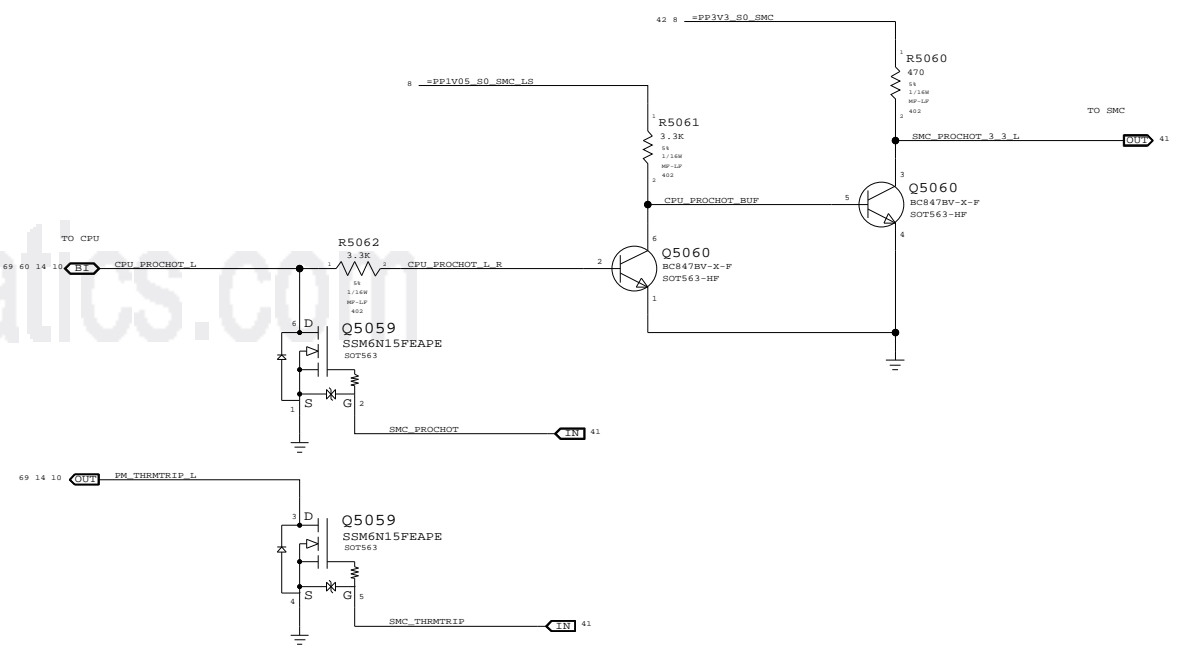


System (Sleep) LED Circuit

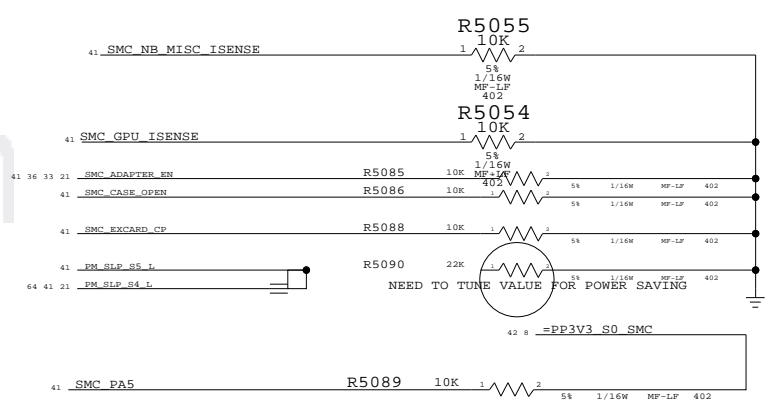


41	_SMC_FAN_1_CTL	==	NC_SMC_FAN_1_CTL	41		
41	_SMC_FAN_1_TACH	==	NC_SMC_FAN_1_TACH	41		
41	_SMC_FAN_2_CTL	==	NC_SMC_FAN_2_CTL	41		
41	_SMC_FAN_2_TACH	==	NC_SMC_FAN_2_TACH	41		
41	_SMC_FAN_3_CTL	==	NC_SMC_FAN_3_CTL	41		
41	_SMC_FAN_3_TACH	==	NC_SMC_FAN_3_TACH	41		
41	_SMC_GFX_OVERTEMP_L	==	TP_SMC_GFX_OVERTEMP_L	41		
41	_SMC_GFX_THROTTLE_L	==	SMC_IQ_THROTTLE_L	41		
57	56	42	_SMC_BC_ACLK	==	=CHRG_ACLK	41
41	_ALS_GAIN	==	NC_ALS_GAIN	41		
41	_SMC_PB3	==	NC_SMC_PB3	41		
41	_SMC_P24	==	TP_SMC_P24	41		
41	_SMC_P26	==	SMC_BROWN_MIX_SEL	41		
41	_SMC_P41	==	TP_SMC_P41	41		
41	_SMC_RSTGATE_L	==	MAKE_BASE=TRUE TP_SMC_RSTGATE_L	41		
41	_SMC_EXCARD_PWR_EN	==	TP_SMC_EXCARD_PWR_EN	41		
41	_ALS_RIGHT	==	NC_ALS_RIGHT	41		
41	_ESTABLDO_EN	==	NC_ESTABLDO_EN	41		
41	_SMC_ANALOG_ID	==	NC_SMC_ANALOG_ID	41		
41	_SMC_SYS_FENLDD	==	NC_SMC_SYS_FENLDD	41		
41	_SMC_SMC_INT	==	SMC_INT_L	41		
45	_SMC_MCP_VSENSE	==	SMC_GPU_VSENSE	41		
45	_SMC_CPU_PSB_ISENSE	==	ALS_LEFT	41		

SMC FSB to 3.3V Level Shifting



41	_SMC_PA0	R5091	100K	5%	1/16W	MP-LP	402		
41	_SMC_PA1	R5092	100K	5%	1/16W	MP-LP	402		
49	42	41	_SMC_ONOFF_L	R5070	10K	5%	1/16W	MP-LP	402
56	49	41	_SMC_LID	R5071	100K	5%	1/16W	MP-LP	402
41	_SMC_PWR	R5072	10K	5%	1/16W	MP-LP	402		
43	41	39	_SMC_TX_L	R5073	10K	5%	1/16W	MP-LP	402
43	41	39	_SMC_RX_L	R5074	100K	5%	1/16W	MP-LP	402
56	41	_SYS_ONWIRE	R5075	2.0K	5%	1/16W	MP-LP	402	
56	41	_SMC_BS_ALERT_L	R5076	100K	5%	1/16W	MP-LP	402	
43	41	_SMC_TMS	R5077	10K	5%	1/16W	MP-LP	402	
43	41	_SMC_TDO	R5078	10K	5%	1/16W	MP-LP	402	
43	41	_SMC_TDI	R5079	10K	5%	1/16W	MP-LP	402	
43	41	_SMC_TCK	R5080	10K	5%	1/16W	MP-LP	402	
43	41	_SMC_BTN_BUTTON_L	R5081	10K	5%	1/16W	MP-LP	402	
57	56	42	_SMC_BC_ACLK	R5087	470K	5%	1/16W	MP-LP	402



SMC Support

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

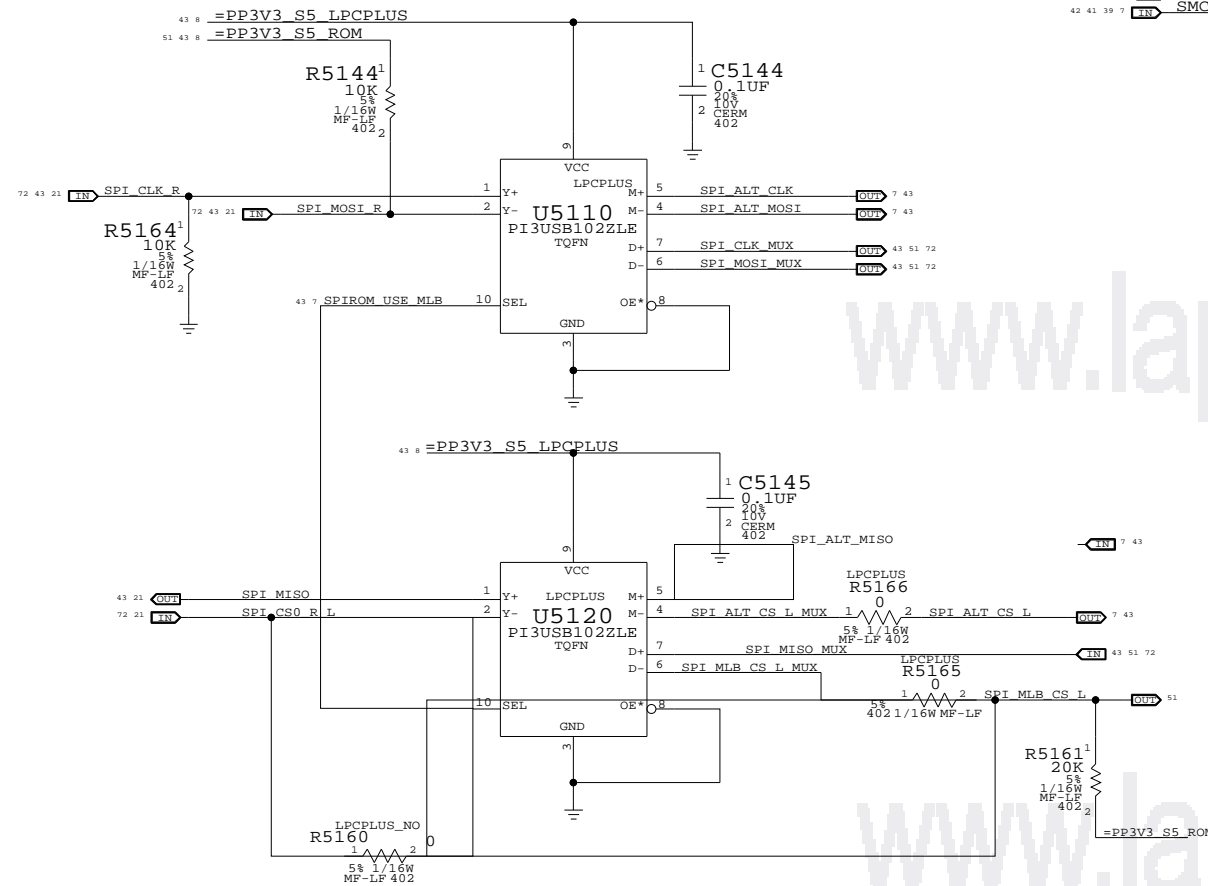
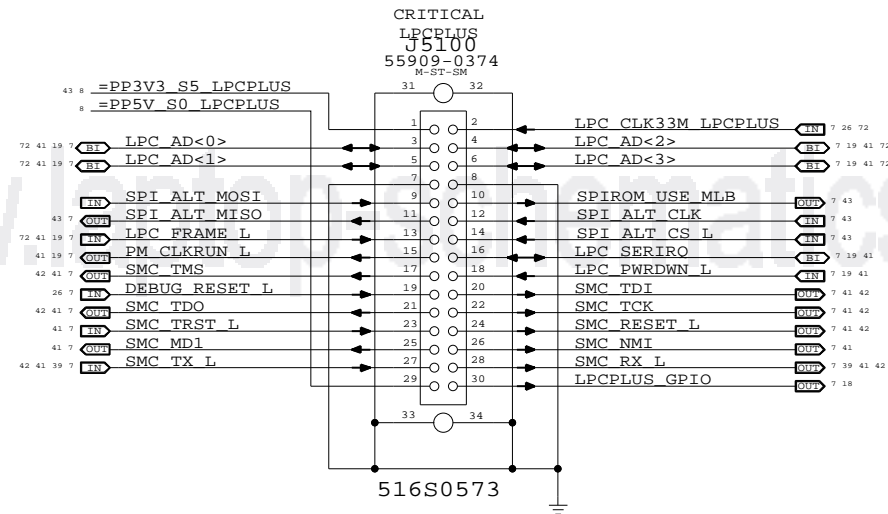
II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

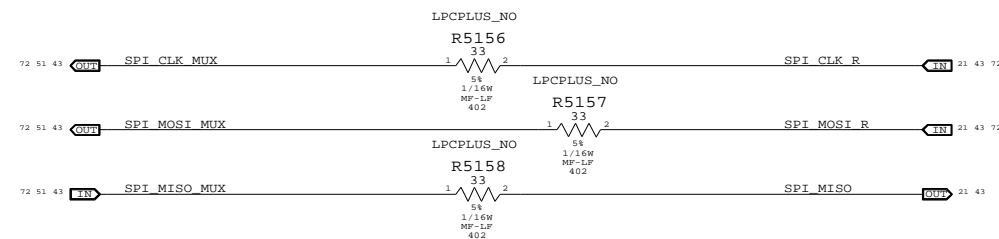
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	NONE	SHT	50 OF 109

LPC+SPI Connector

Alternate SPI ROM Support



SPI Bus Series Resistance Option



LPC+SPI Debug Connector

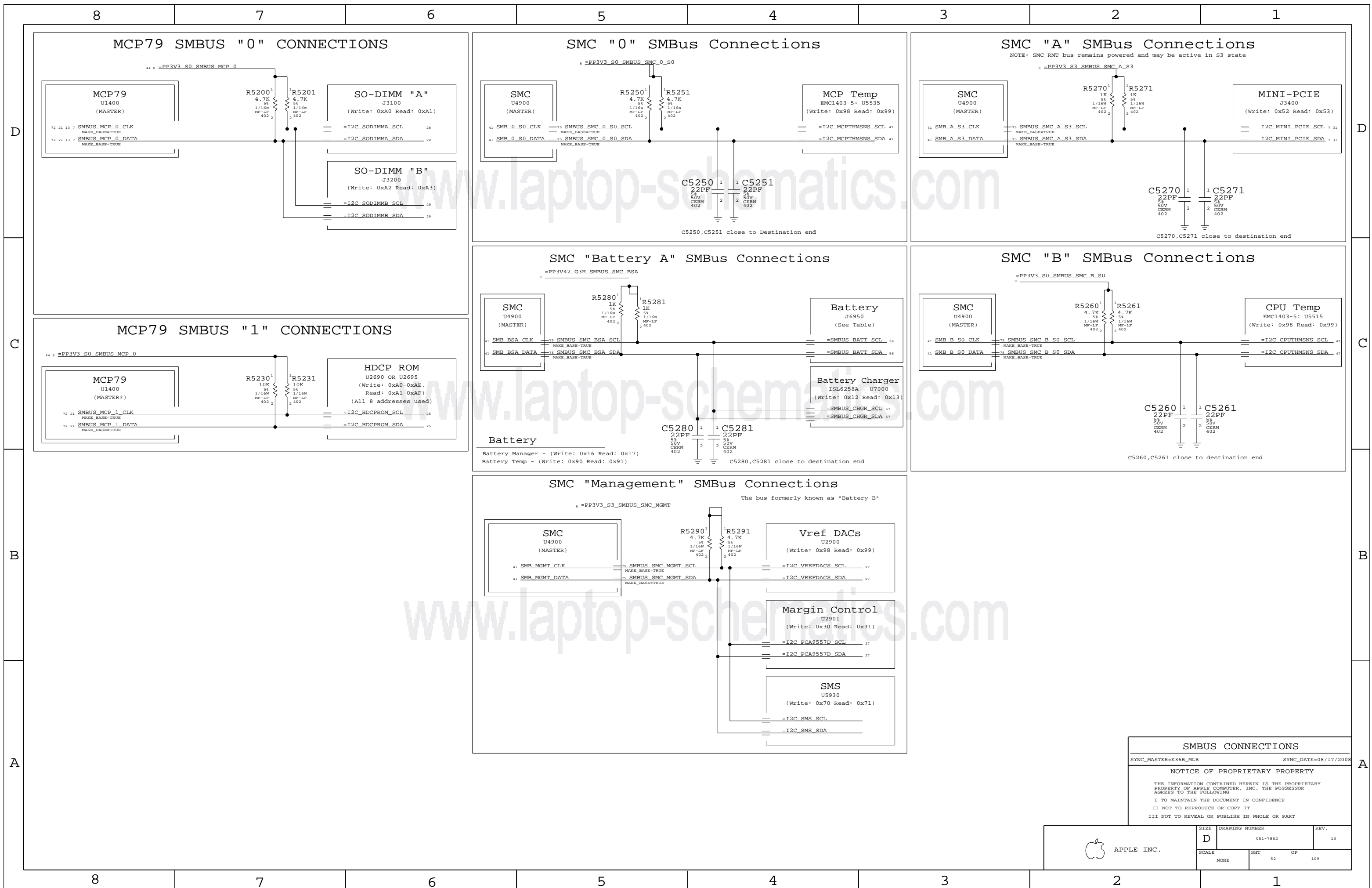
SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	51		



SMBUS CONNECTIONS
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	52		

8

7

6

5

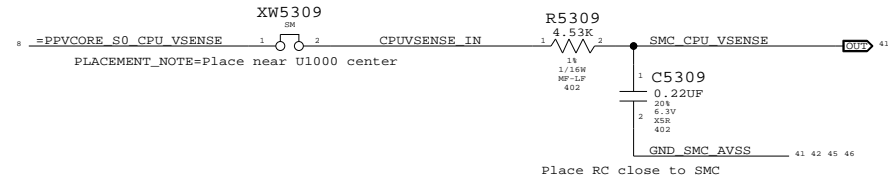
4

3

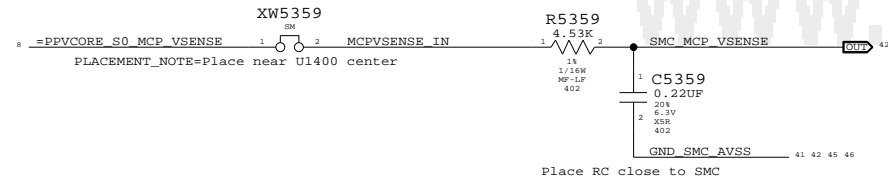
2

1

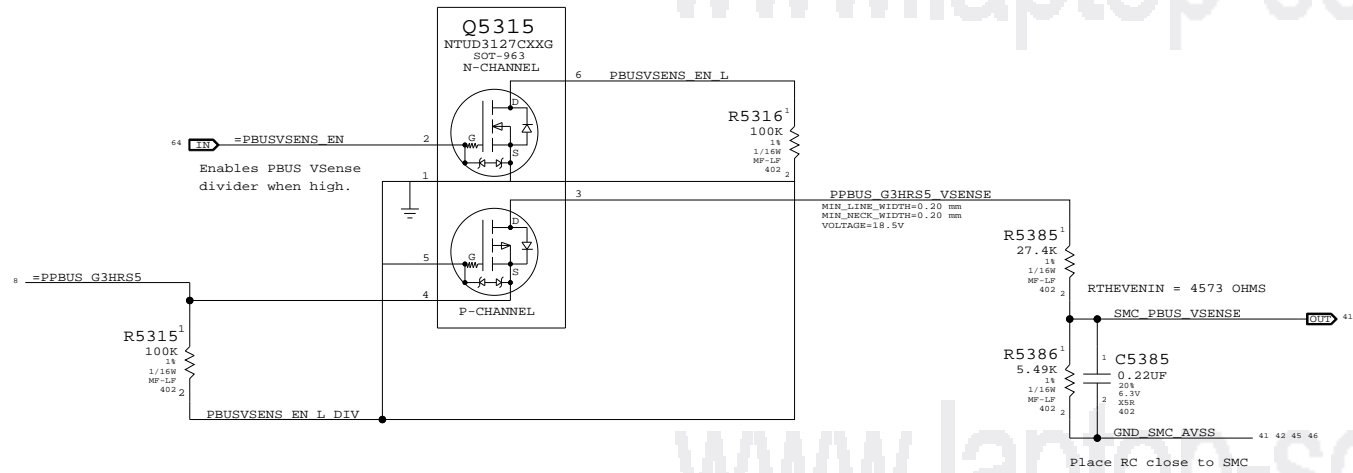
CPU Voltage Sense / Filter



MCP Voltage Sense / Filter



PBUS VOLTAGE SENSE ENABLE & FILTER



VOLTAGE SENSING

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	53	109

8

7

6

5

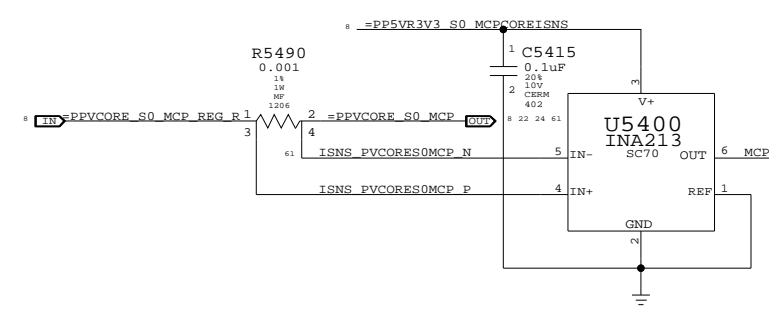
4

3

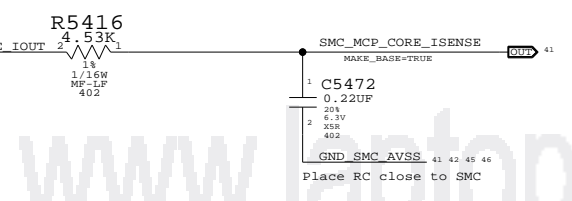
2

1

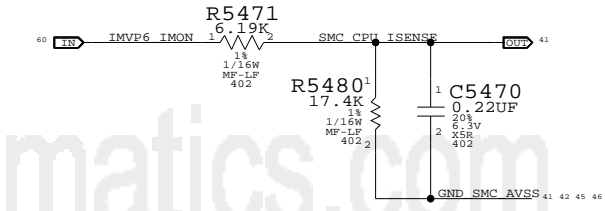
MCP VCore Current Sense



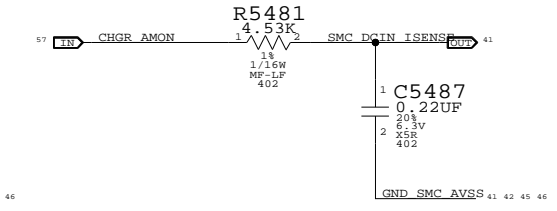
MCP VCore Current Sense Filter



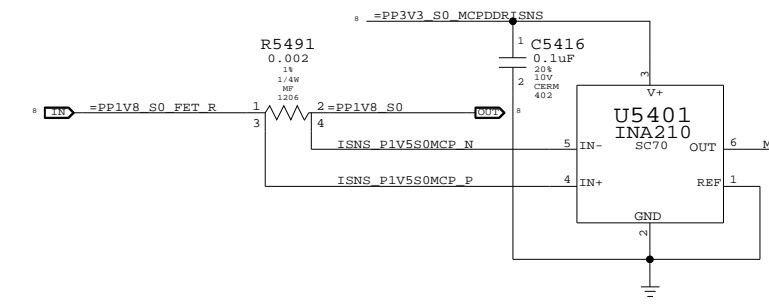
CPU VCore Load Side Current Sensor / Filter



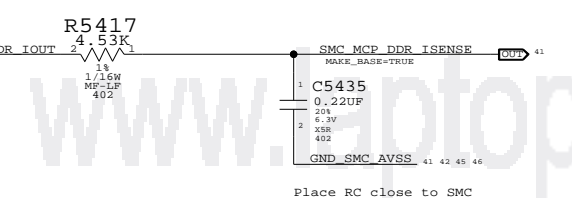
DC-IN (AMON) Current Sense



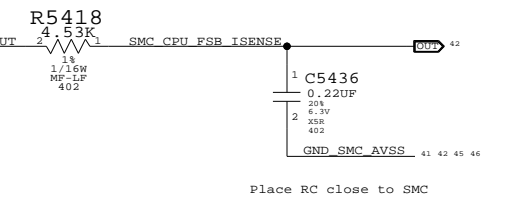
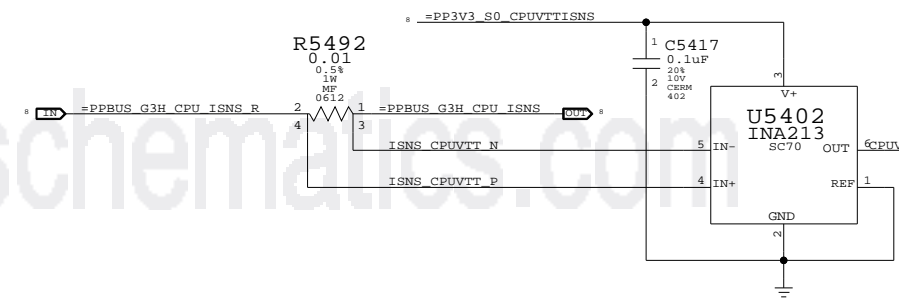
MCP MEM VDD Current Sense



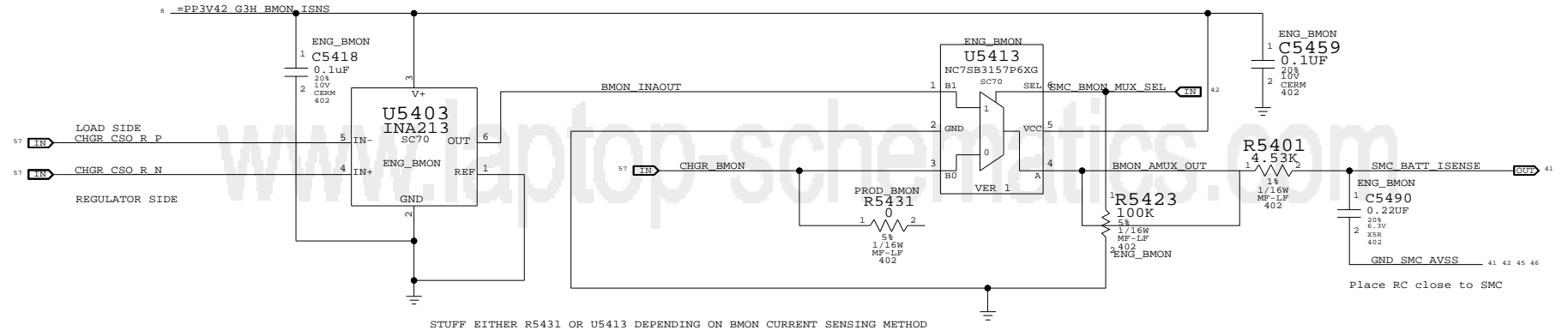
MCP MEM VDD Current Sense Filter



CPU 1.05V Current Sense



CHARGER BMON Current Sense

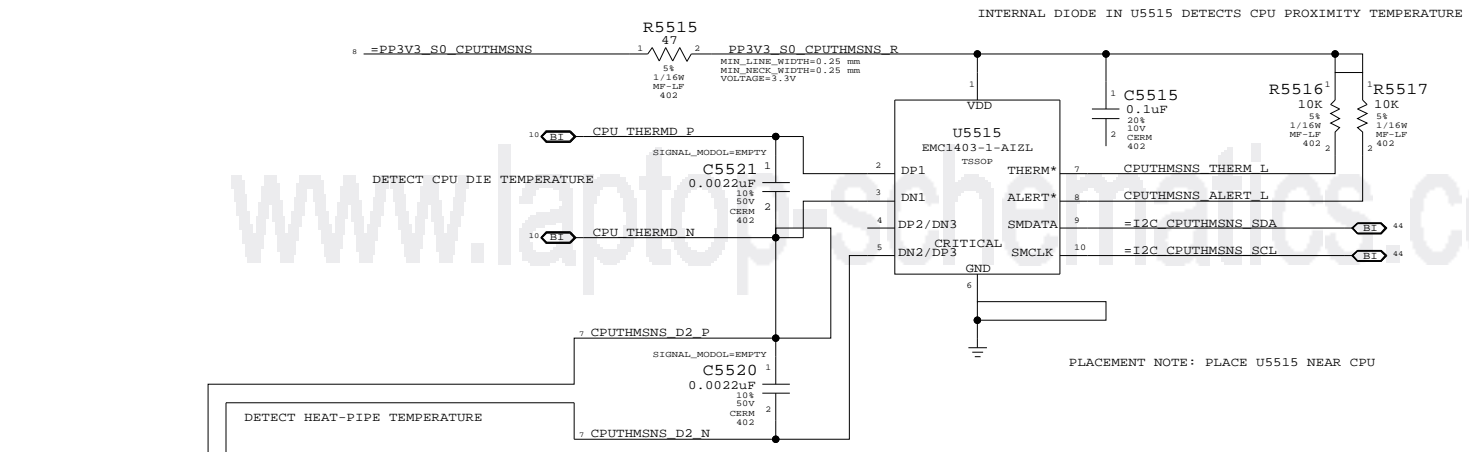


STUFF EITHER R5431 OR U5413 DEPENDING ON BMON CURRENT SENSING METHOD

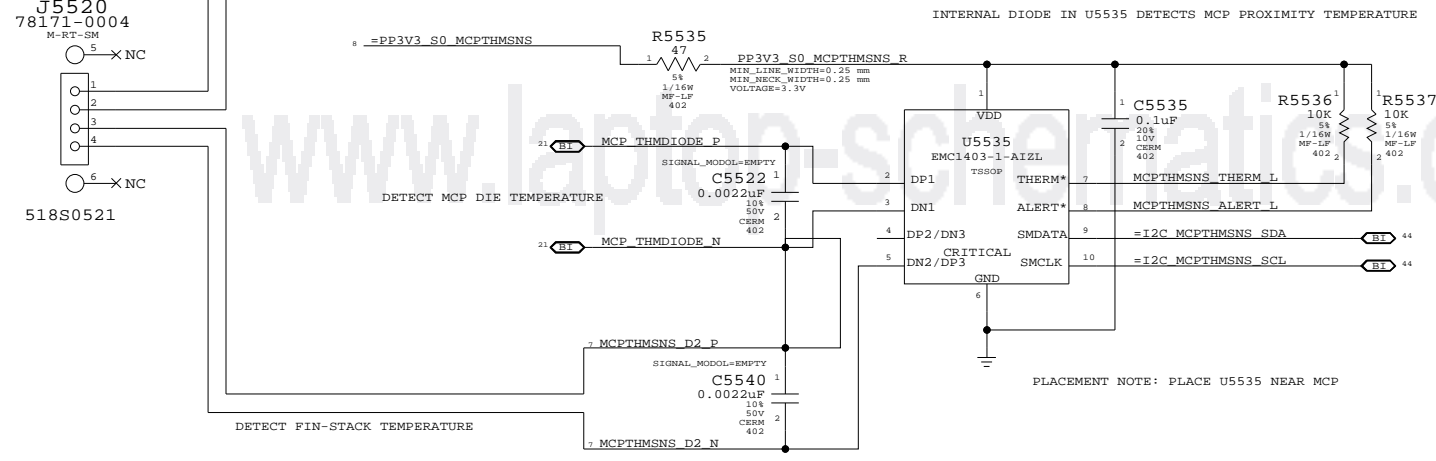
Current Sensing
SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	54		

CPU T-Diode Thermal Sensor



MCP T-Diode Thermal Sensor



www.laptop-schematics.com

Thermal Sensors

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

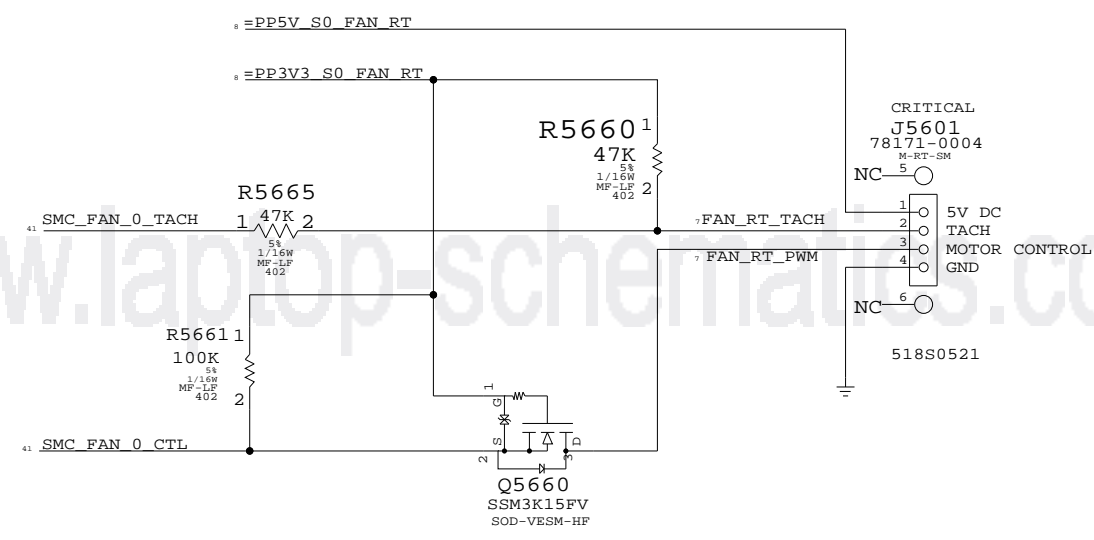
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	55		

www.laptop-schematics.com

www.laptop-schematics.com

www.laptop-schematics.com



Fan

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	56	109

8

7

6

5

4

3

2

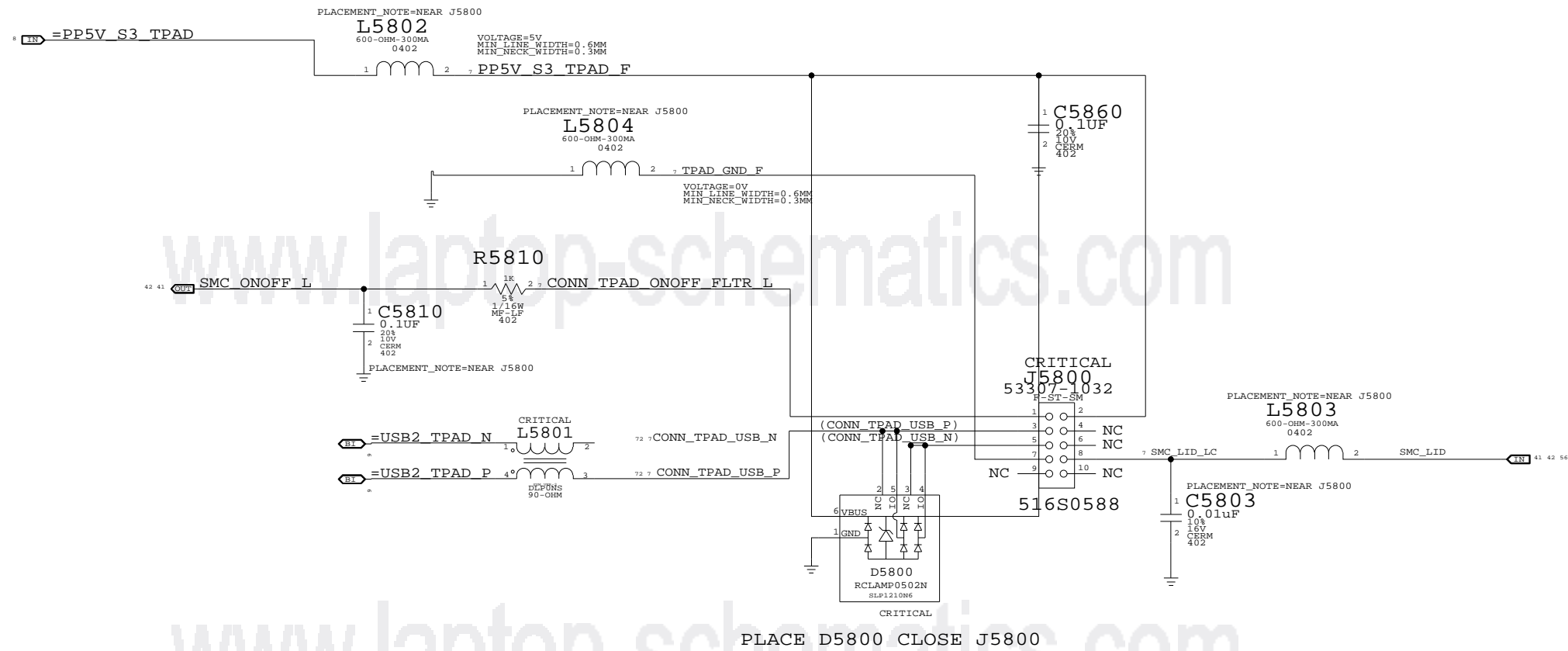
1

- SYNC WITH T18
- COPY THIS PAGE FROM T18 CSA.58

PLACEMENT NOTE

PLACE L5800,L5801,L5803 NEAR J5800
PLACE C5800,C5810,C5803 NEAR J5800
PLACE D5800 NEAR J5800

www.laptop-schematics.com
GEYSER



GEYSER
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT OF		
NONE	58 OF 109		

8

7

6

5

4

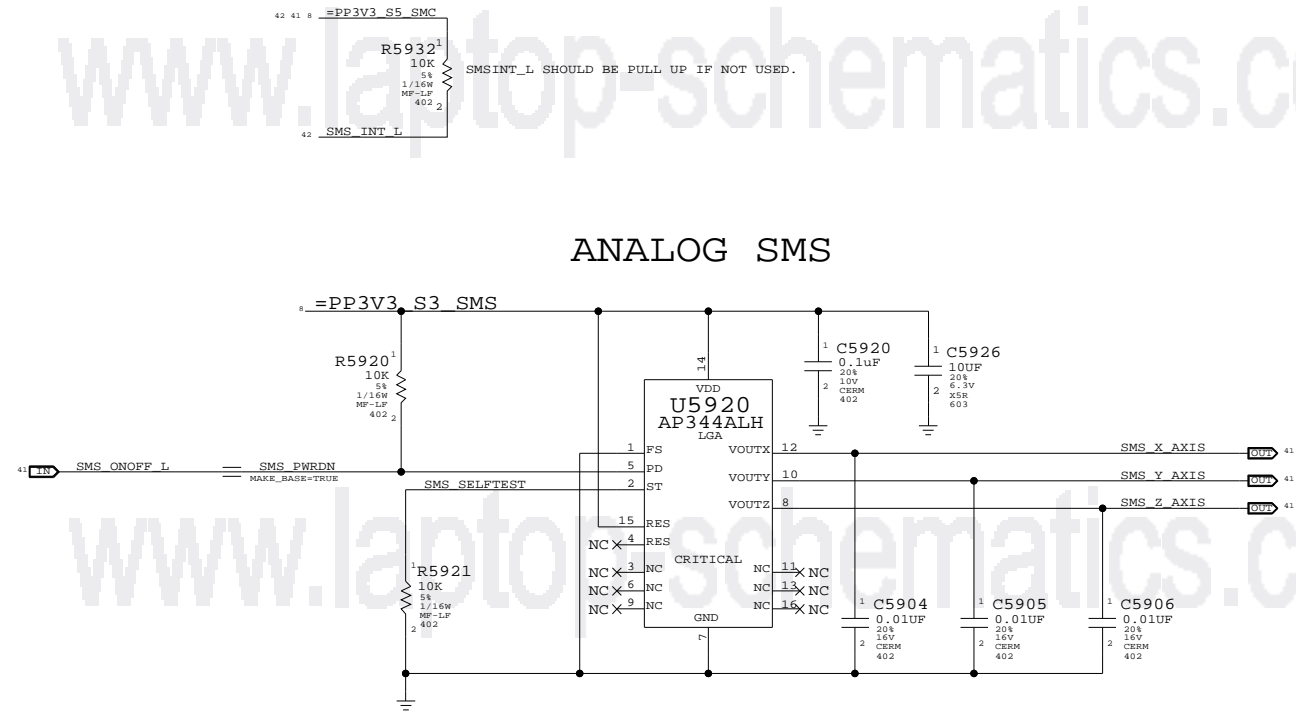
3

2

1

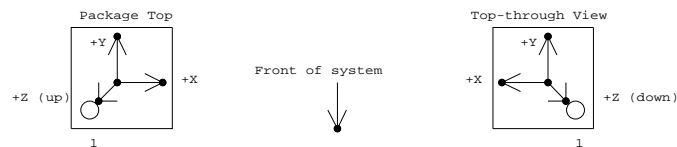
www.laptop-schematics.com

ANALOG SMS



Desired orientation when placed on board top-side:

Desired orientation when placed on board bottom-side:



www.laptop-schematics.com

SMS

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

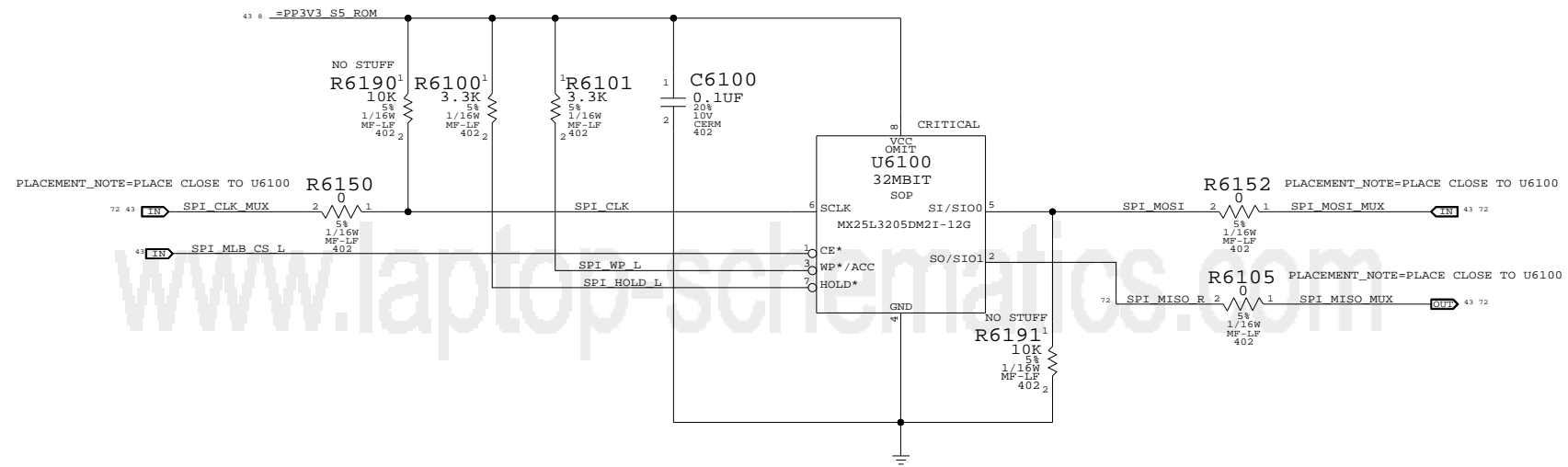
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT OF		
NONE	59 OF		109

www.laptop-schematics.com



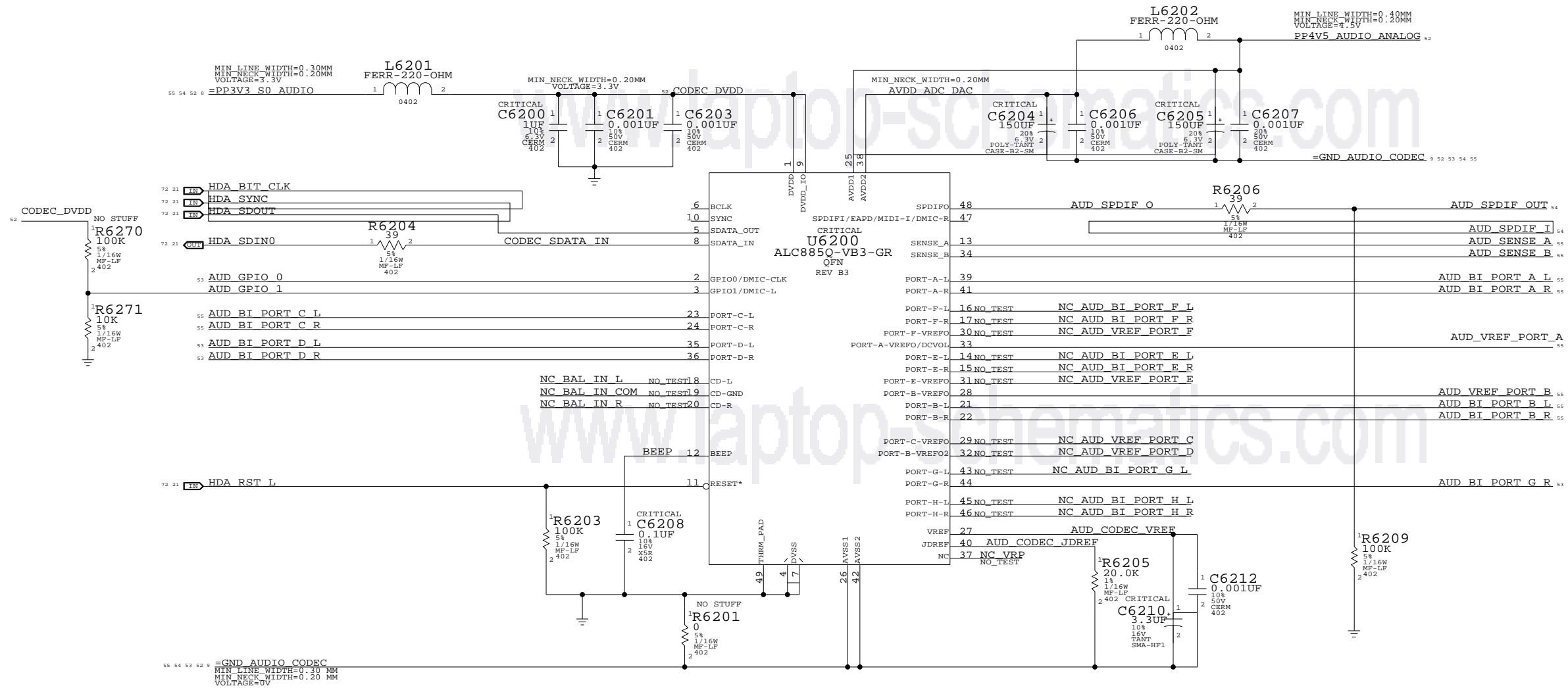
MCP79 SPI Frequency Select		
Frequency	SPI_MOSI	SPI_CLK
31 MHz	0	0
42 MHz	0	1
25 MHz	1	0
1 MHz	1	1

25MHZ IS SELECTED WITH R5164 AND R5144
 ANY FO THE 4 FREQUENCIES CAN BE SELECTED
 WITH R6190, R6191, R5164 AND R5144

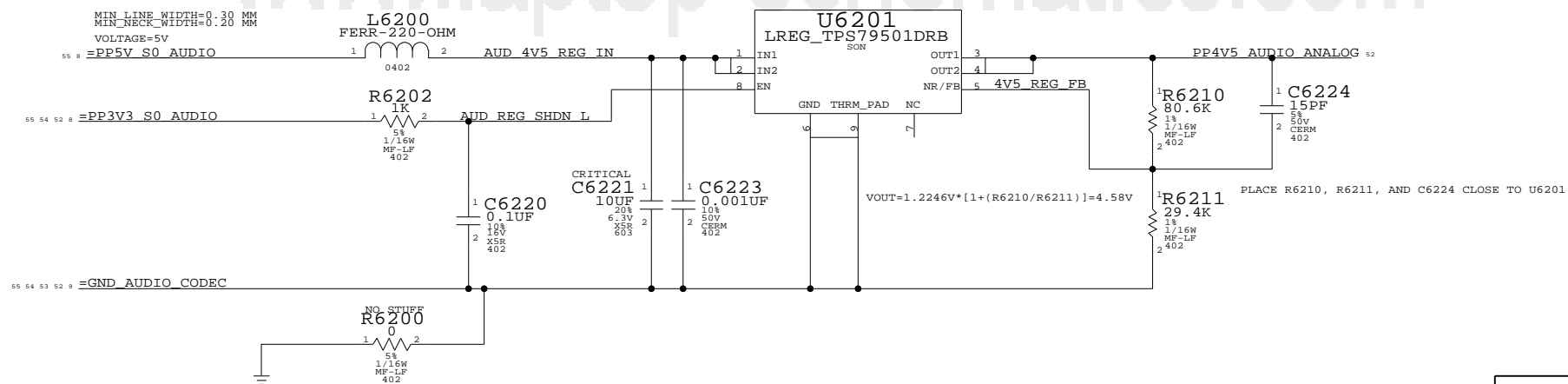
SPI ROM		
SYNC_MASTER=K36B_MLB	SYNC_DATE=081/17/2008	
NOTICE OF PROPRIETARY PROPERTY		
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING		
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE		
II NOT TO REPRODUCE OR COPY IT		
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART		

	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	61		

AUDIO CODEC
APPLE P/N 353S1538



AUDIO 4.5V REGULATOR
APPLE P/N 353S1576



AUDIO: CODEC

SYNC_MASTER=K36A_MLB

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

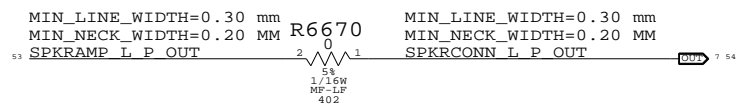
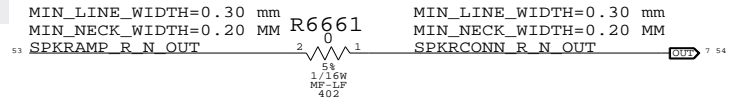
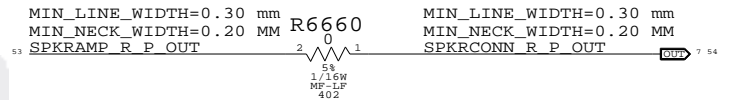
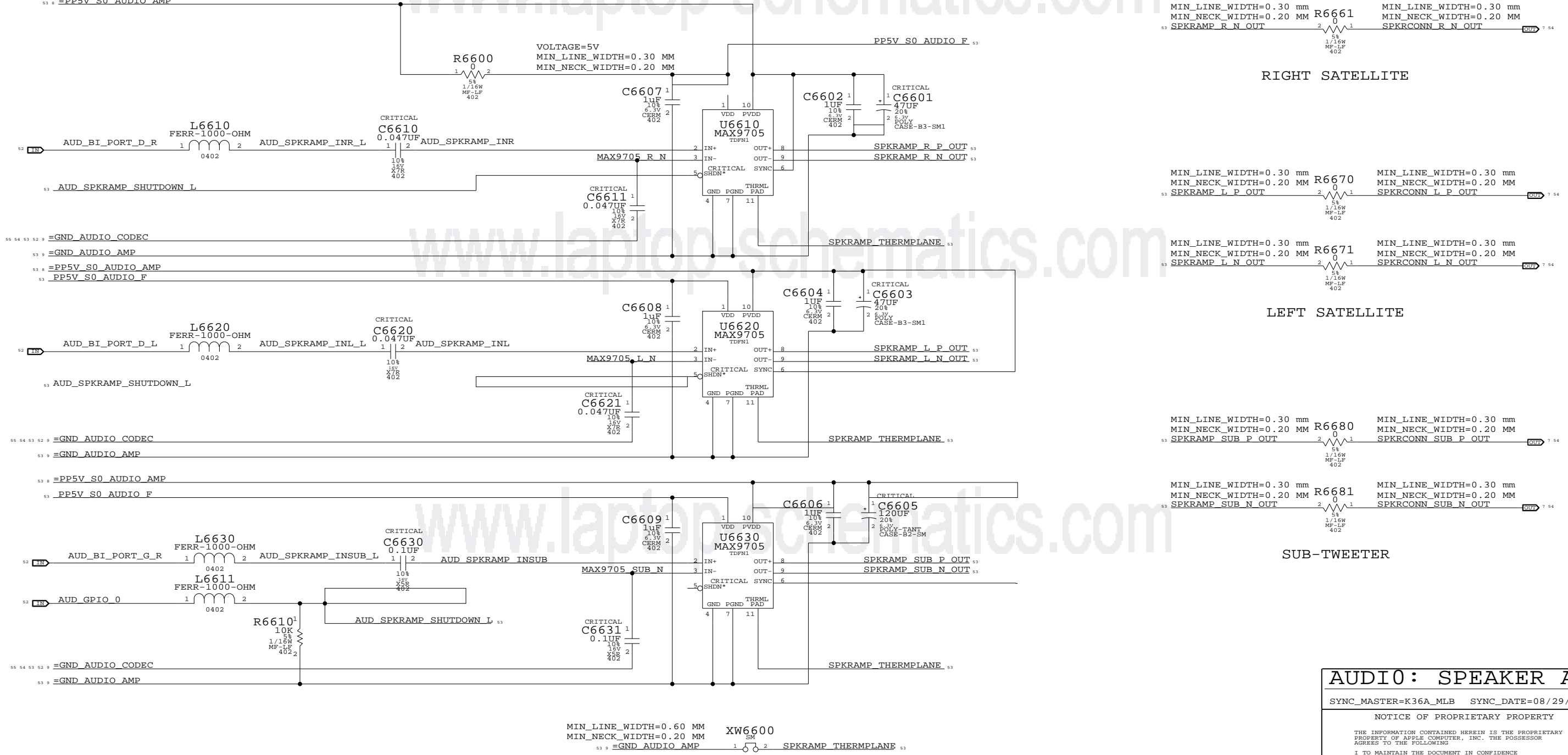
II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

SATELLITE & SUB TWEETER AMPLIFIER APN:353S1595

SATELLITE 169 HZ < FC < 282 HZ
 SUB 80 HZ < FC < 132 HZ
 GAIN 12DB

VOLTAGE=5V
 MIN_LINE_WIDTH=0.60 MM
 MIN_NECK_WIDTH=0.20 MM
 =PP5V_S0_AUDIO_AMP



RIGHT SATELLITE

LEFT SATELLITE

SUB-TWEETER

MIN_LINE_WIDTH=0.60 MM XW6600
 MIN_NECK_WIDTH=0.20 MM SM
 =GND_AUDIO_AMP

AUDIO: SPEAKER AMP
 SYNC_MASTER=K36A_MLB SYNC_DATE=08/29/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	66		

AUDIO JACK 1: LO/HP CONNECTOR, SPDIF TX

MIC CONNECTOR

APN:518S0392

CRITICAL
J6701
48227-0301
M-RT-SM

SPEAKER CONNECTOR

APN:518S0519

CRITICAL
J6702
78171-0002
M-RT-SM

CRITICAL
J6703
78171-0004
M-RT-SM

APN:518S0521

XW6705

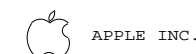
MIC EMI FILTER

AUDIO JACK

SYNC_MASTER=K36A_MLB SYNC_DATE=08/29/2008

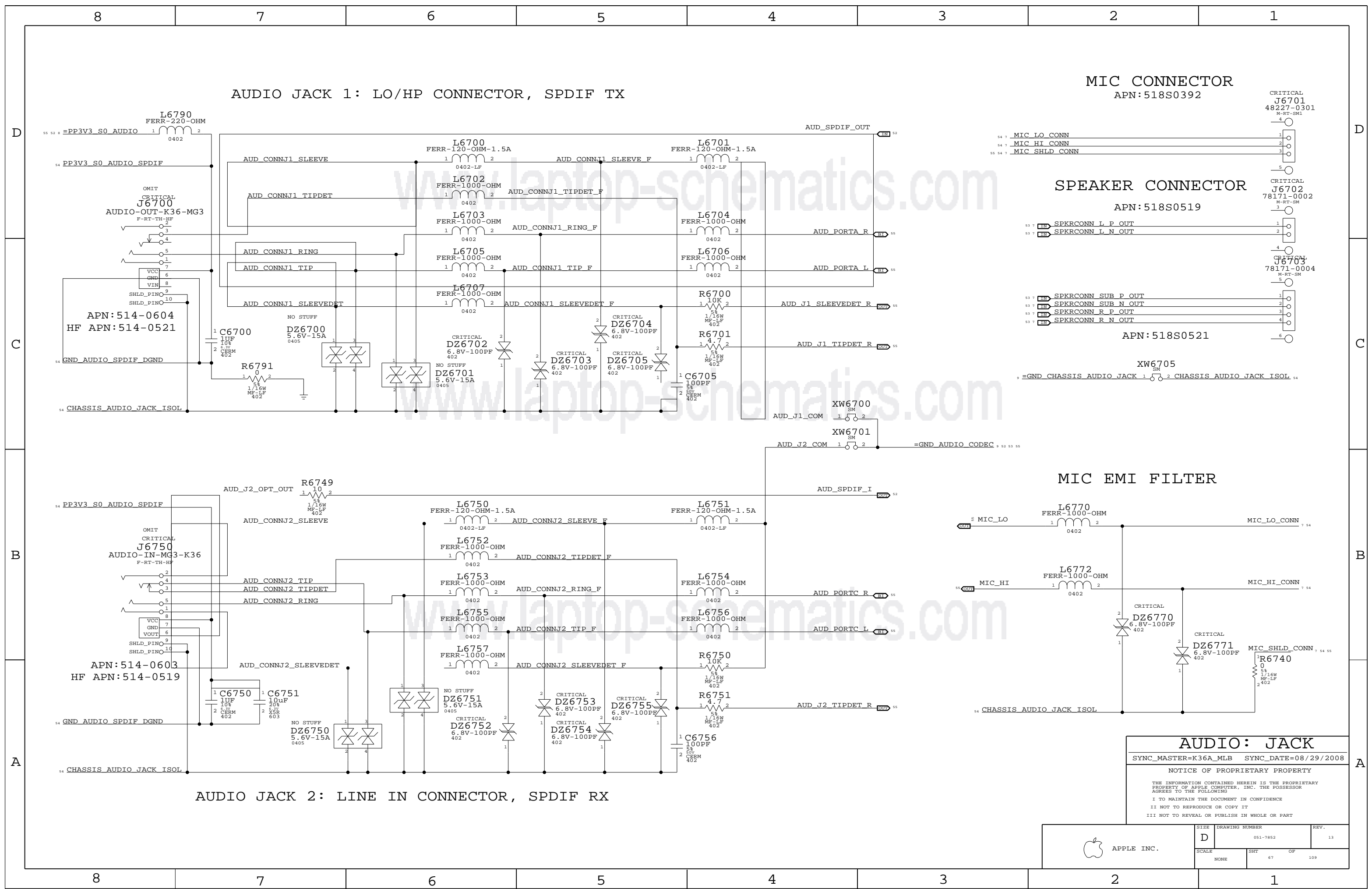
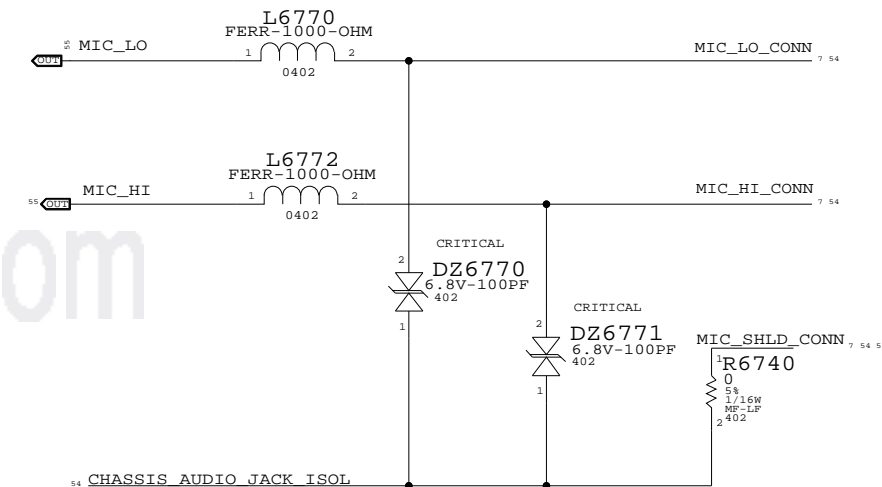
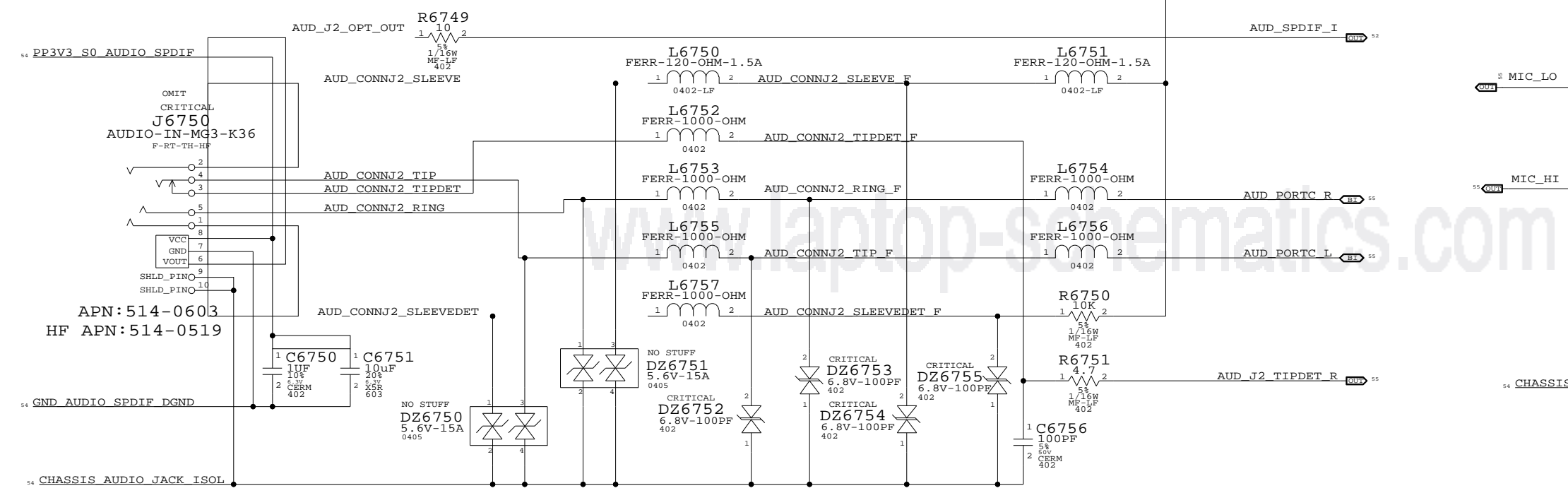
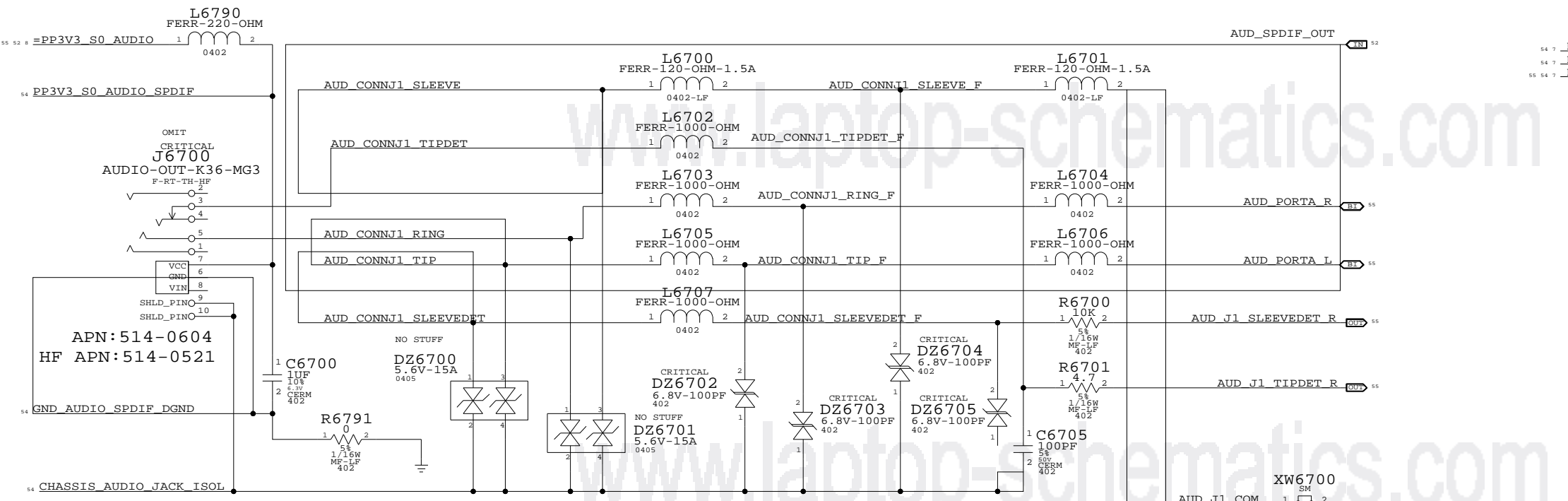
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	67	109

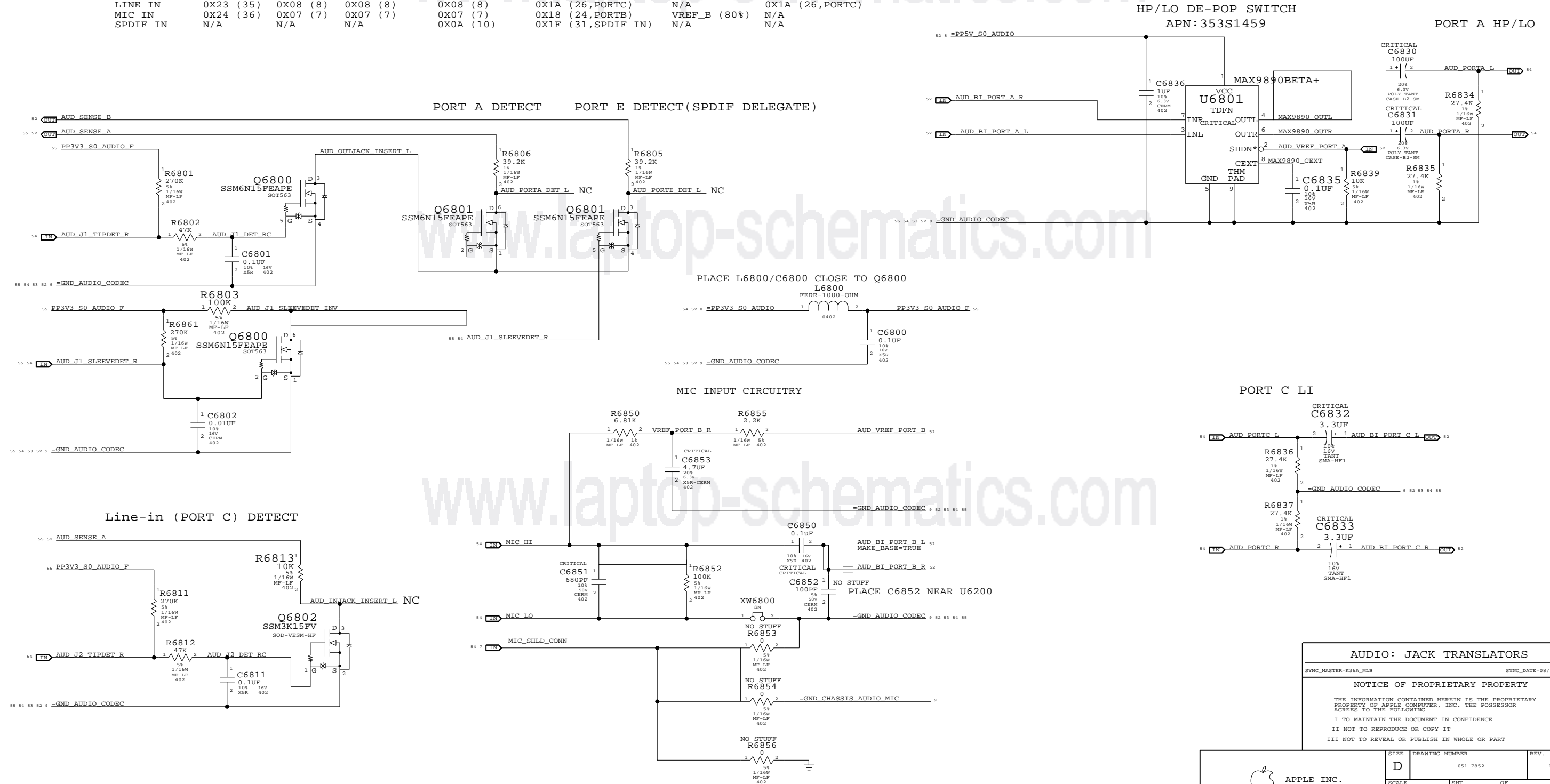


CODEC OUTPUT SIGNAL PATHS

FUNCTION	VOLUME	CONVERTER	PIN COMPLEX	MUTE CONTROL	DET ASSIGNMENT
HP OUT	0X0F (15)	0X05 (5)	0X15 (21,PORTA)	VREF_A(100%)	0X15 (21,PORTA)
SAT SPKR	0X26 (38)	0X25 (37)	0X14 (20,PORTD)	GPIO 0	N/A
SUB SPKR	0X0E (14)	0X04 (4)	0X16 (22,PORTG)	GPIO 0	N/A
SPDIF OUT	N/A	0X06 (6)	0X1E (30,SPDIF OUT)	N/A	0X1B (27,PORTE)

CODEC INPUT SIGNAL PATHS

FUNCTION	MIXER	VOLUME	MUTE CONTROL	CONVERTER	PIN COMPLEX	VREF	DET ASSIGNMENT
LINE IN	0X23 (35)	0X08 (8)	0X08 (8)	0X08 (8)	0X1A (26,PORTC)	N/A	0X1A (26,PORTC)
MIC IN	0X24 (36)	0X07 (7)	0X07 (7)	0X07 (7)	0X18 (24,PORTB)	VREF_B (80%)	N/A
SPDIF IN	N/A	N/A	N/A	0X0A (10)	0X1F (31,SPDIF IN)	N/A	N/A

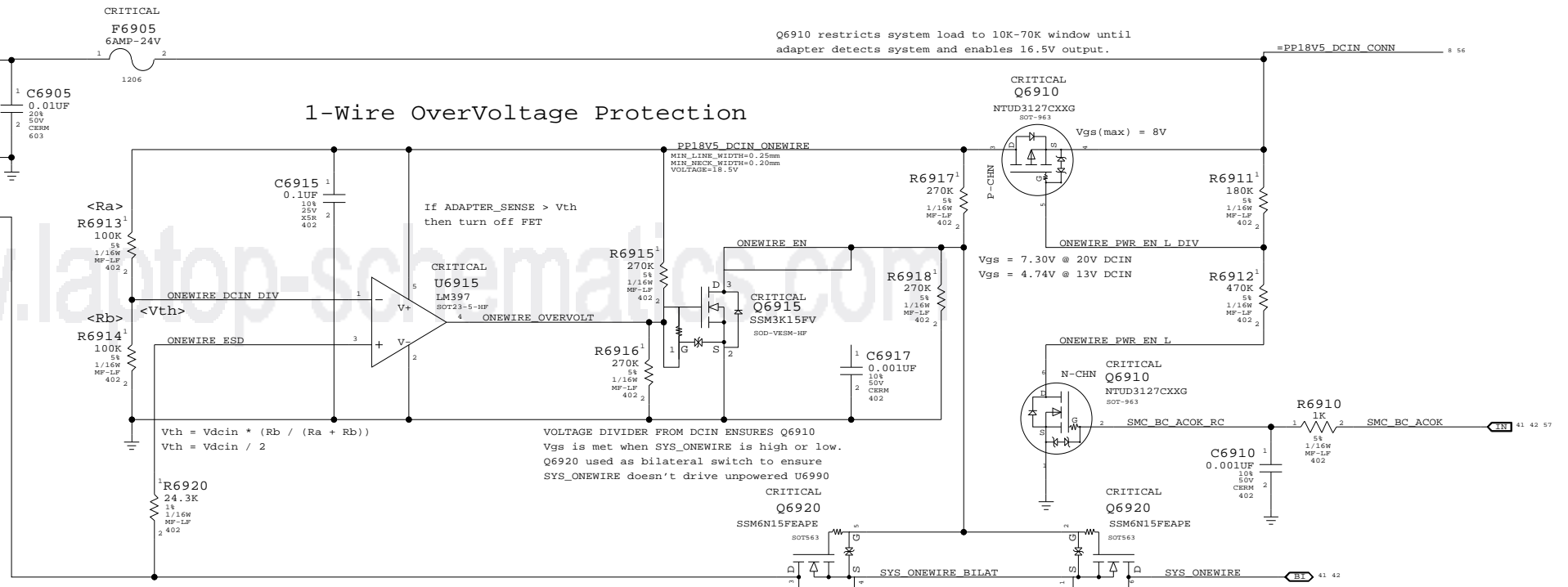
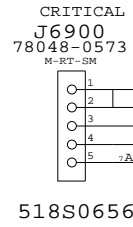


AUDIO: JACK TRANSLATORS
 SYNC_MASTER=K36A_MB SYNC_DATE=08/29/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

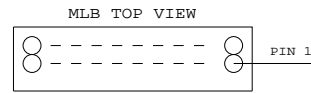
APPLE INC.	SCALE	SHT	OF	REV.
	NONE	68	109	13

- COPY THIS PAGE FROM T18 CSA.69
 - DO WE NEED TO CHANGE BATTERY CONNECTOR?

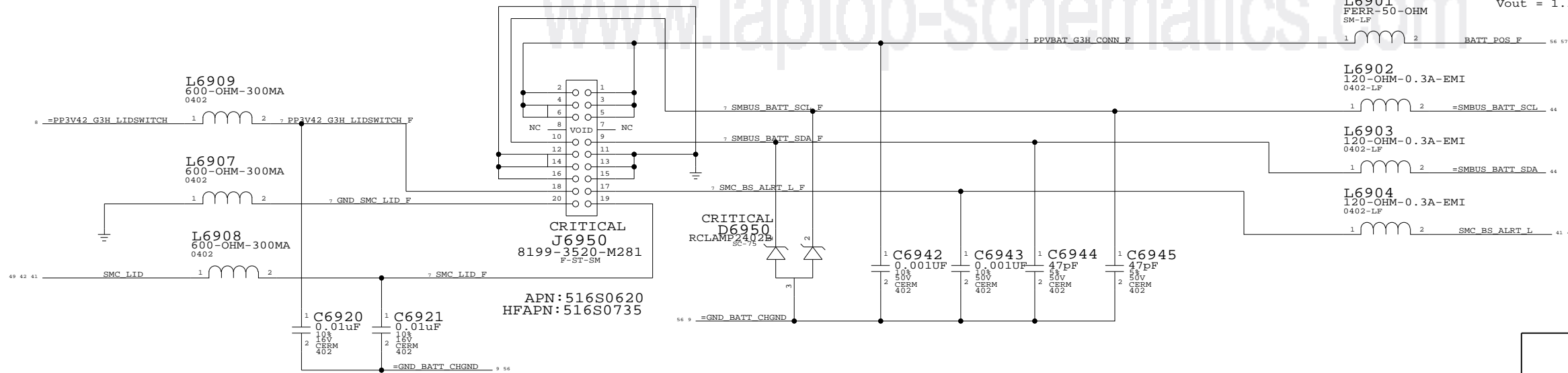
MagSafe DC Power Jack



LID HALL EFFECT SENSOR

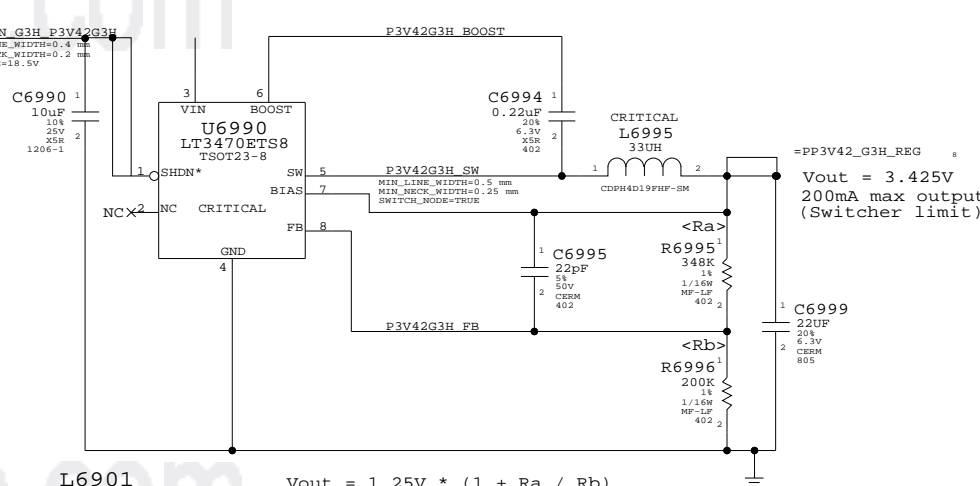


BATTERY/LID CONNECTOR



3.425V "G3Hot" Supply

Supply needs to guarantee 3.31V delivered to SMC Vref generator



DC-In & Battery Connectors

SYNC_MASTER=RAYMOND SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

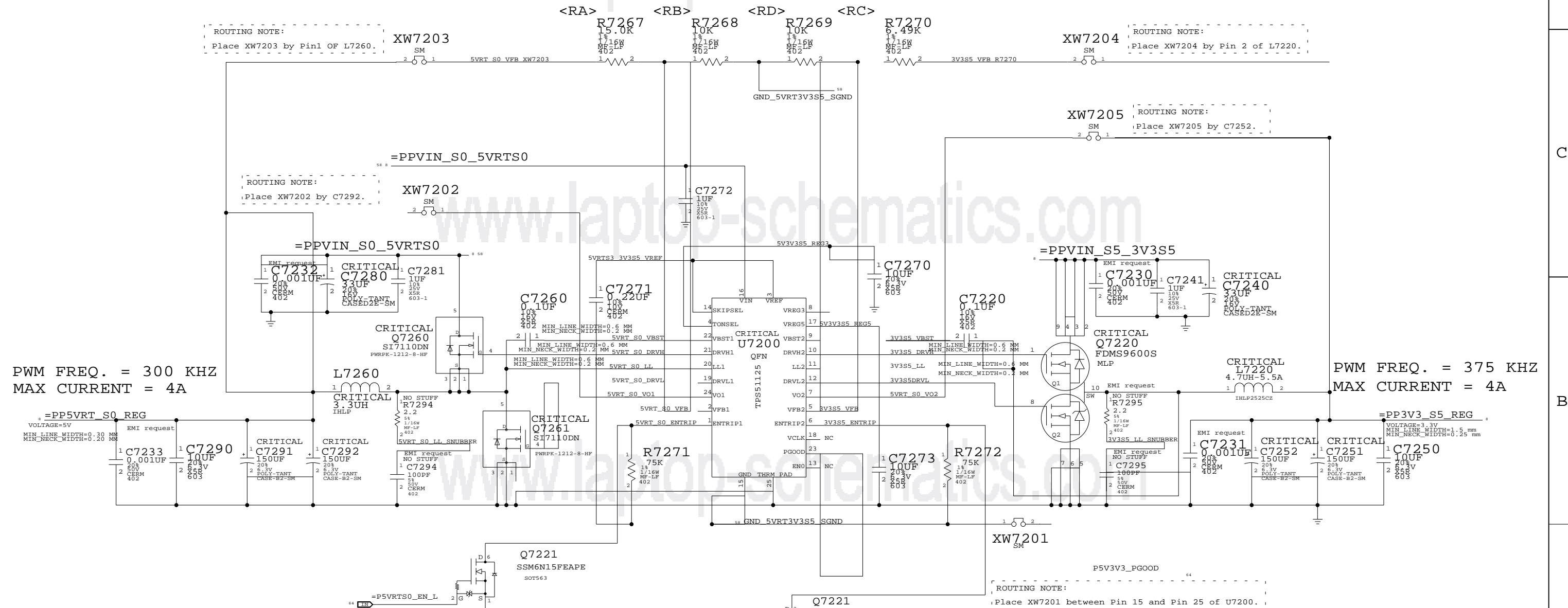
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	NONE	SHT	OF 109

5V_RT/3.3V POWER SUPPLY

$$V_{OUT} = (2 * RA / RB) + 2$$

$$V_{OUT} = (2 * RC / RD) + 2$$



PWM FREQ. = 300 KHZ
MAX CURRENT = 4A

PWM FREQ. = 375 KHZ
MAX CURRENT = 4A

5V/3.3V SUPPLY

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

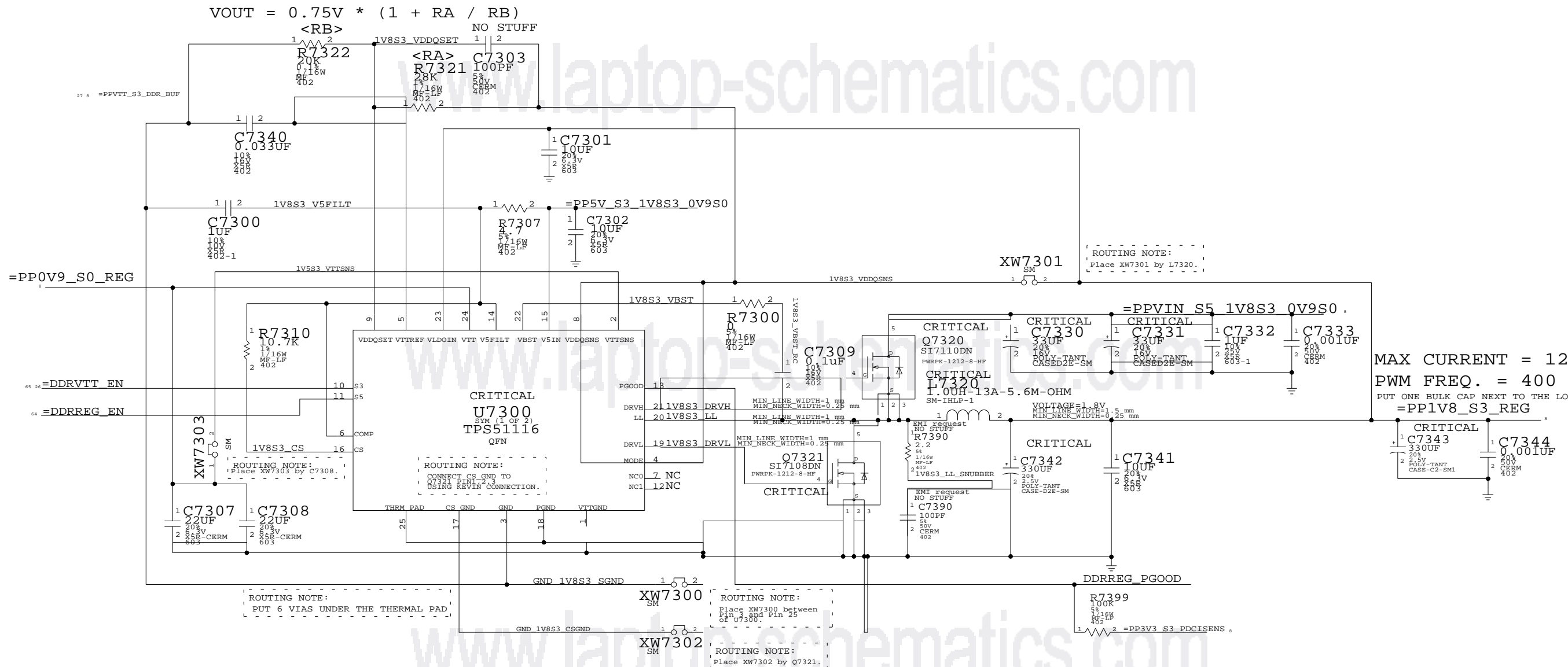
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	72		

1.8V/0.9V(DDR2) POWER SUPPLY



MAX CURRENT = 12A
 PWM FREQ. = 400 KHZ
 PUT ONE BULK CAP NEXT TO THE LOAD
 =PP1V8_S3_REG

STATE	PM_SLP_S4_L	PM_SLP_S3_L	PP1V8_S3	PP0V9_S0
S0	HIGH	HIGH	1.8V	0.9V
S3	HIGH	LOW	1.8V	0.0V
S5/G3HOT	LOW	LOW	0.0V	0.0V

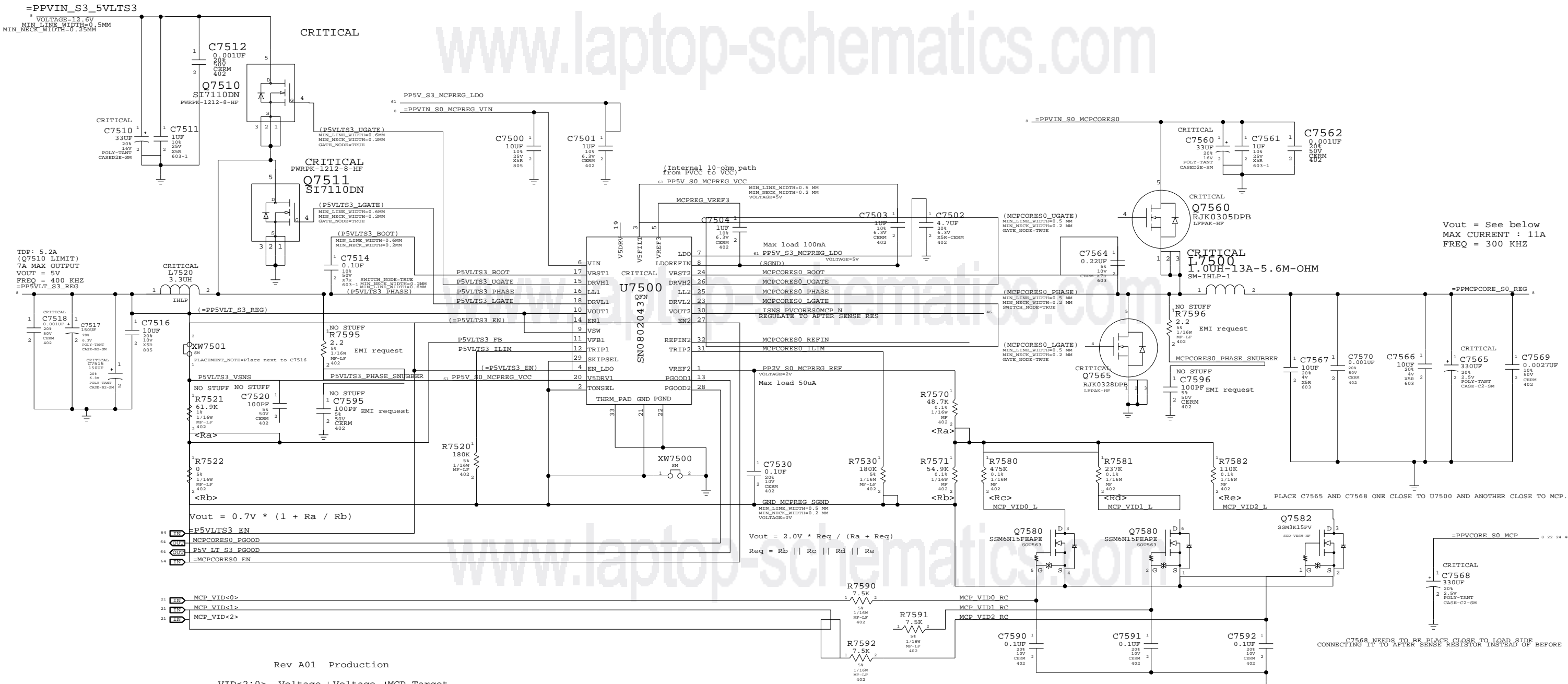
1.8V/0.9V DDR2 SUPPLY
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	NONE	SHT	73 OF 109

MCP VCORE / 5V_S3 LEFT REGULATOR

- SYNC WITH T18
- COPY THIS PAGE FROM T18 CSA.75

www.laptop-schematics.com



Vout = See below
MAX CURRENT : 11A
FREQ = 300 KHZ

TDP: 5.2A
(Q7510 LIMIT)
7A MAX OUTPUT
VOUT = 5V
FREQ = 400 KHZ
=PP5VLT_S3_REG

Vout = 0.7V * (1 + Ra / Rb)
Vout = 2.0V * Req / (Ra + Req)
Req = Rb || Rc || Rd || Re

Rev A01 Production

VID<2:0>	Voltage	Voltage	MCP Target
000	+1.224V	+1.060V	+1.05V
001	+1.159V	+0.994V	+1.00V
010	+1.101V	+0.937V	+0.95V
011	+1.049V	+0.885V	+0.90V
100	+0.995V	+0.830V	+0.85V
101	+0.952V	+0.789V	+0.80V
110	+0.913V	+0.752V	+0.75V
111	+0.876V	+0.719V	+0.70V

M97 DIFFERENCES FROM LAST SYNC ON 12/05/07 TO T18 MLB:
Added C7568 bulk cap on output.
Tied TON to REF.
Changed Q7510 to 376S0674.
C7500 changed to 138S0638.
L7560 changed from T18 MLB inductor to 152S0782.
Changed Q7565 to 376S0637.
Changed R7514 to 280K, R7564 to 180K.

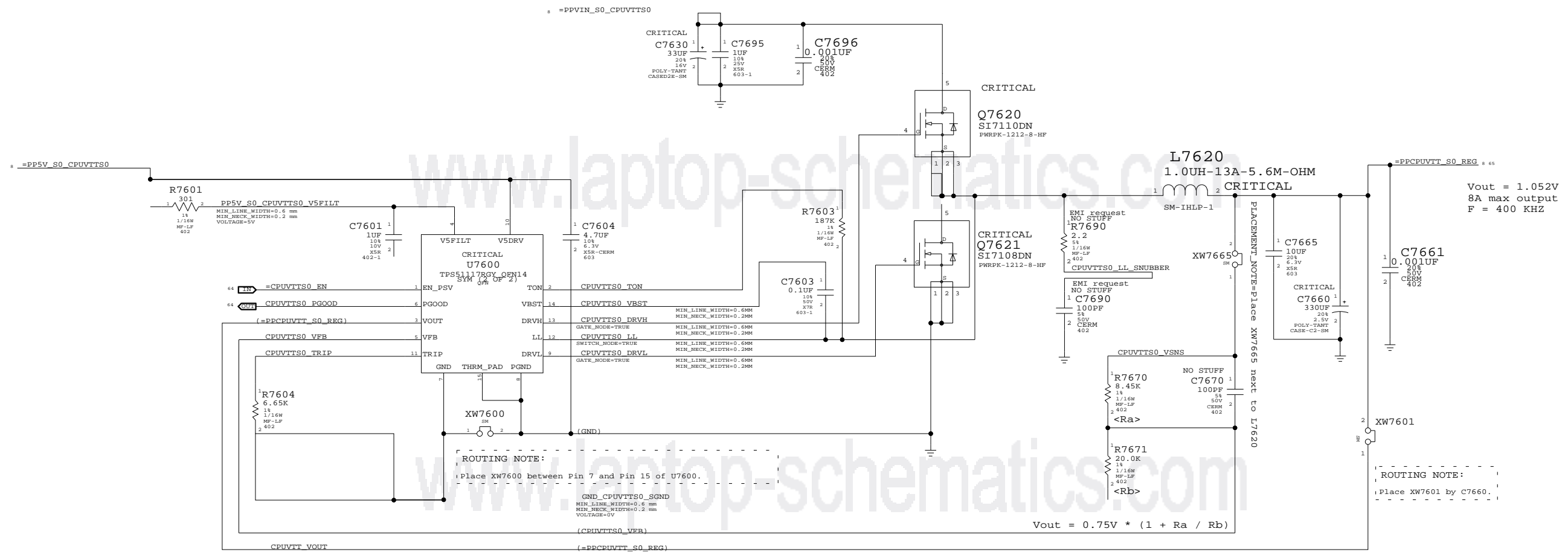
MCP VCORE REGULATOR
SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	75	109

CPUVTT POWER SUPPLY

www.laptop-schematics.com

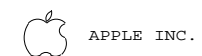


CPU VTT(1.05V) SUPPLY

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

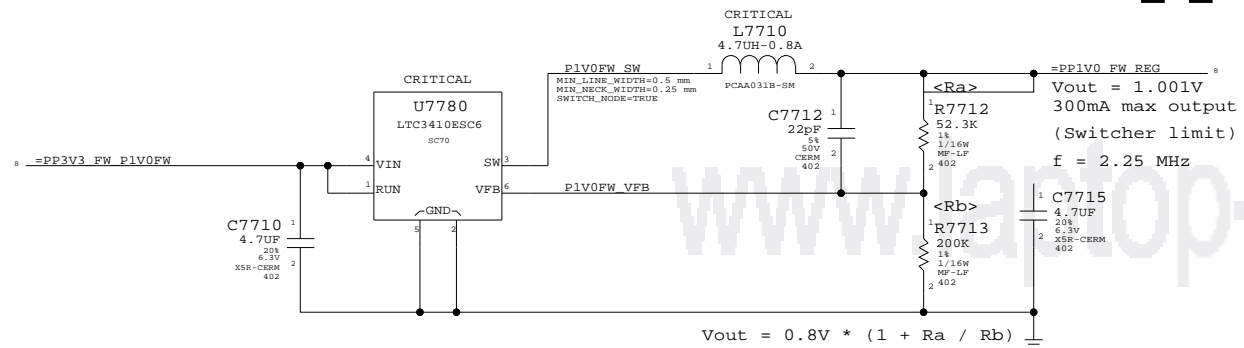
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

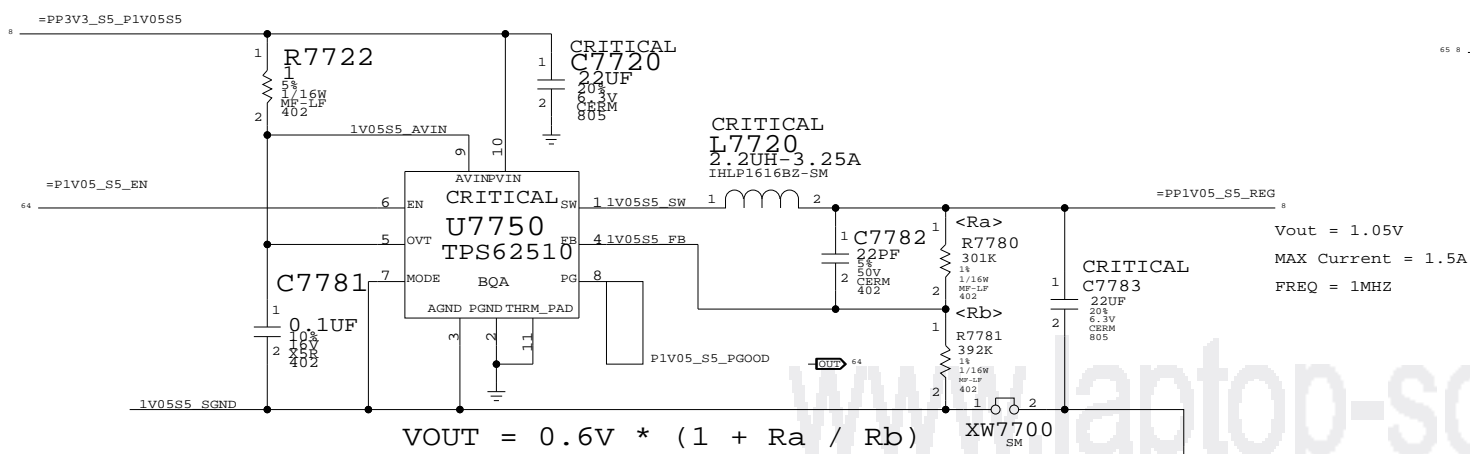


SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	76	109

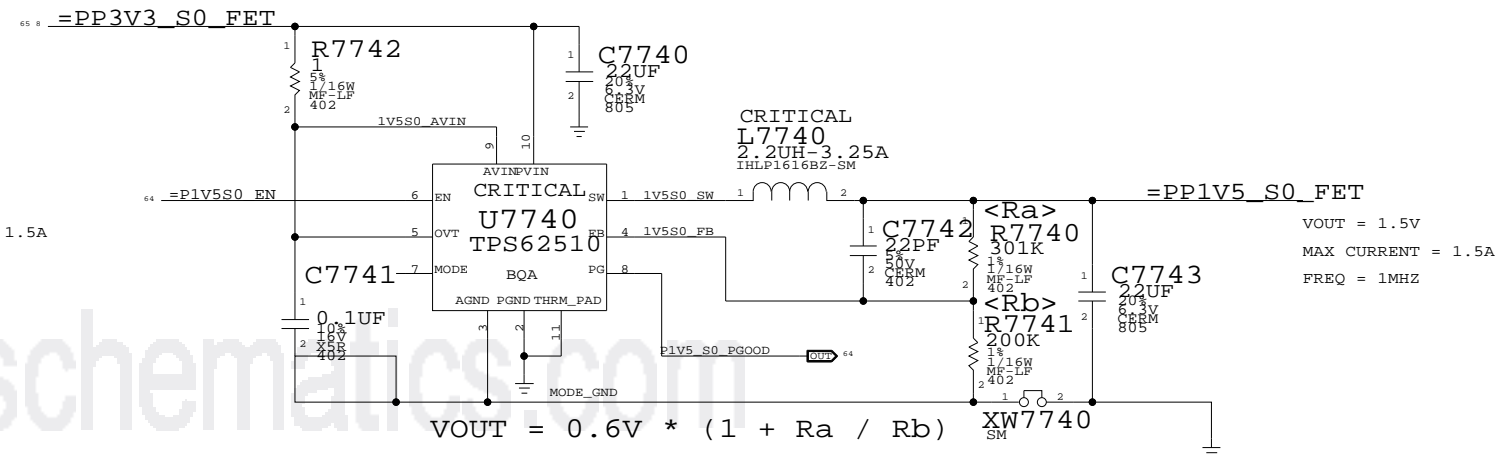
FireWire 1.0V (Core) Supply



MCP 1.05V_S5 AUXC SUPPLY



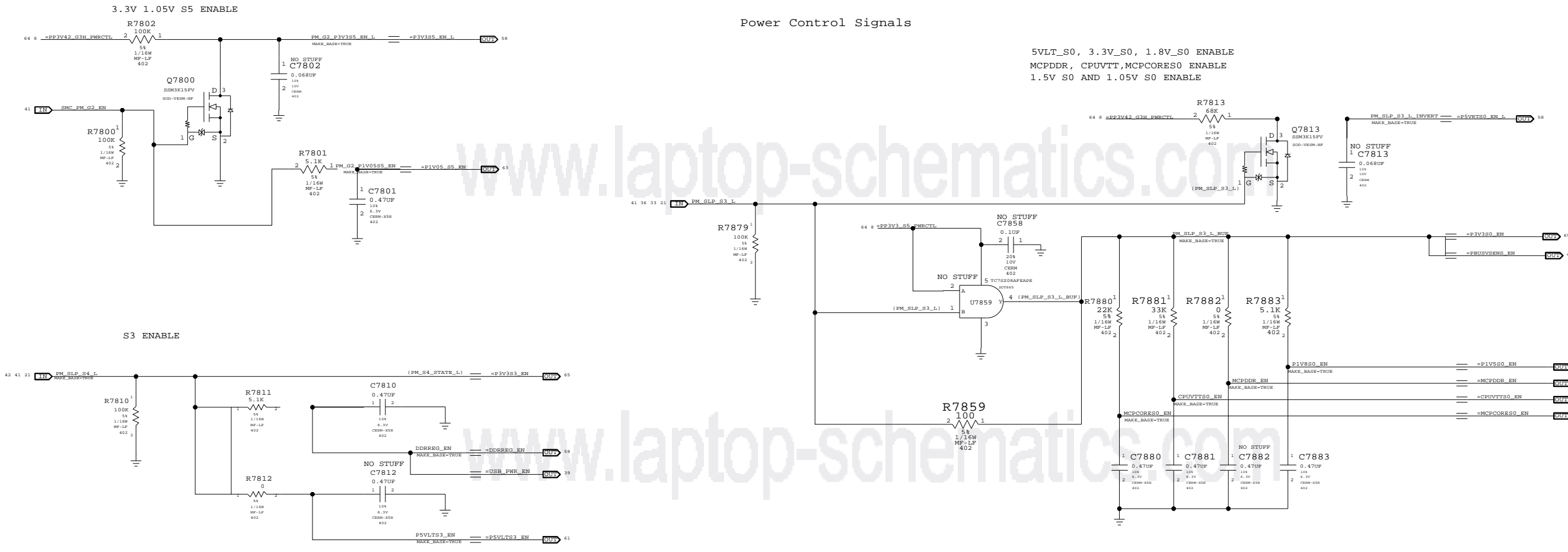
1.5V S0 SWITCH



MISC POWER SUPPLIES
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	77		

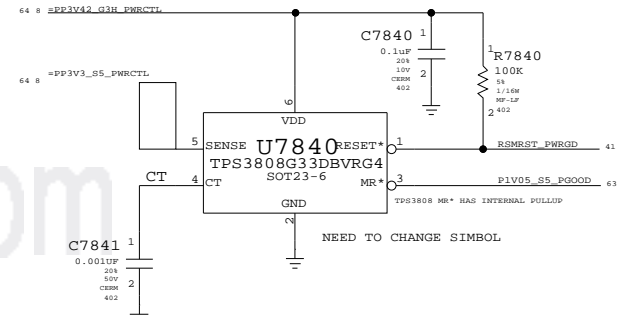
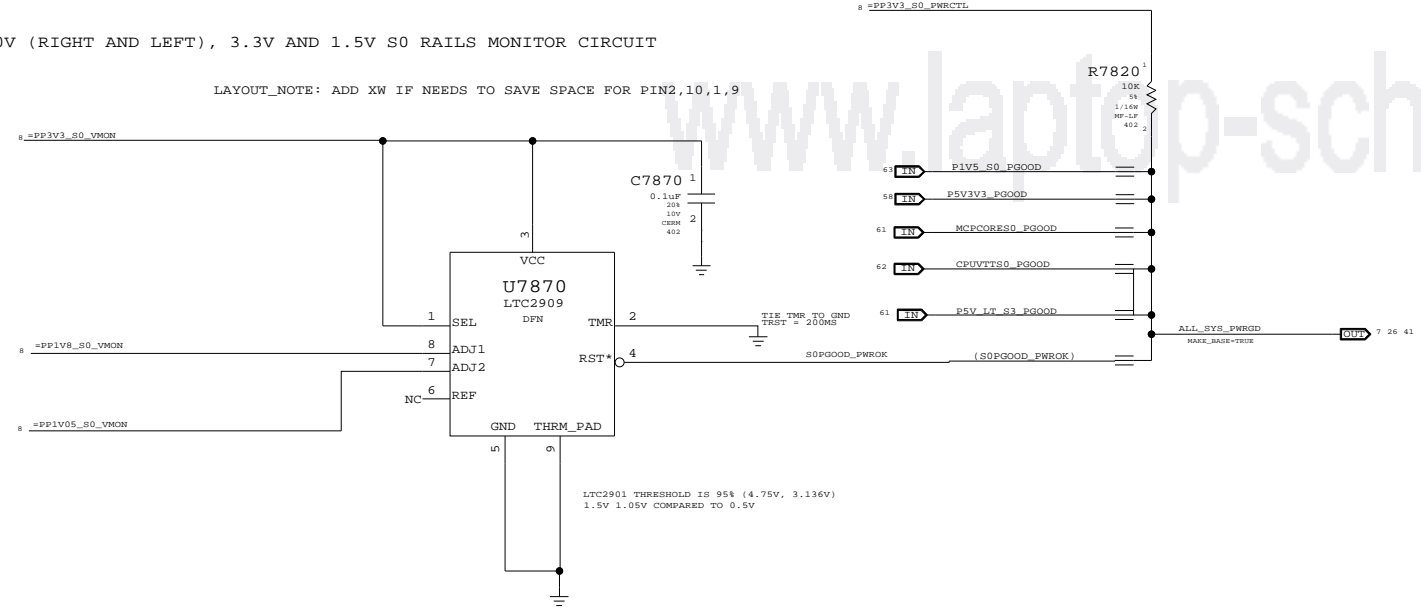
Power Control Signals



OTHER S0 RAILS PGOOD

5.0V (RIGHT AND LEFT), 3.3V AND 1.5V S0 RAILS MONITOR CIRCUIT

LAYOUT_NOTE: ADD XW IF NEEDS TO SAVE SPACE FOR PIN2,10,1,9



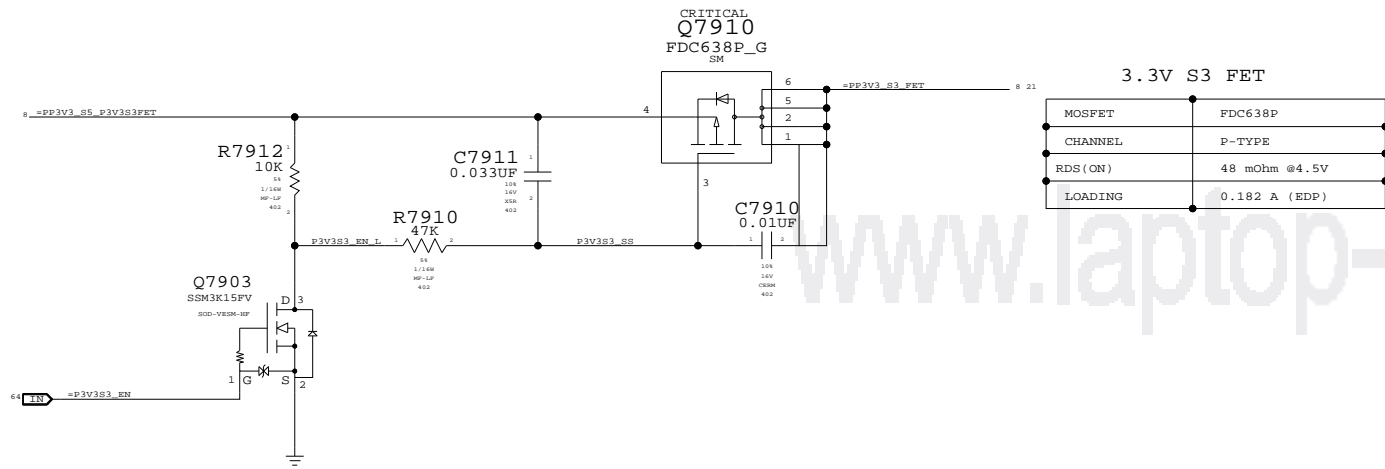
Unused PGOOD signal

TP_SENSE_PGOOD = SENSE_PGOOD

POWER SEQUENCING		
SYNC_MASTER=K36B_MLB	SYNC_DATE=08/17/2008	
NOTICE OF PROPRIETARY PROPERTY		
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING		
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE		
II NOT TO REPRODUCE OR COPY IT		
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART		

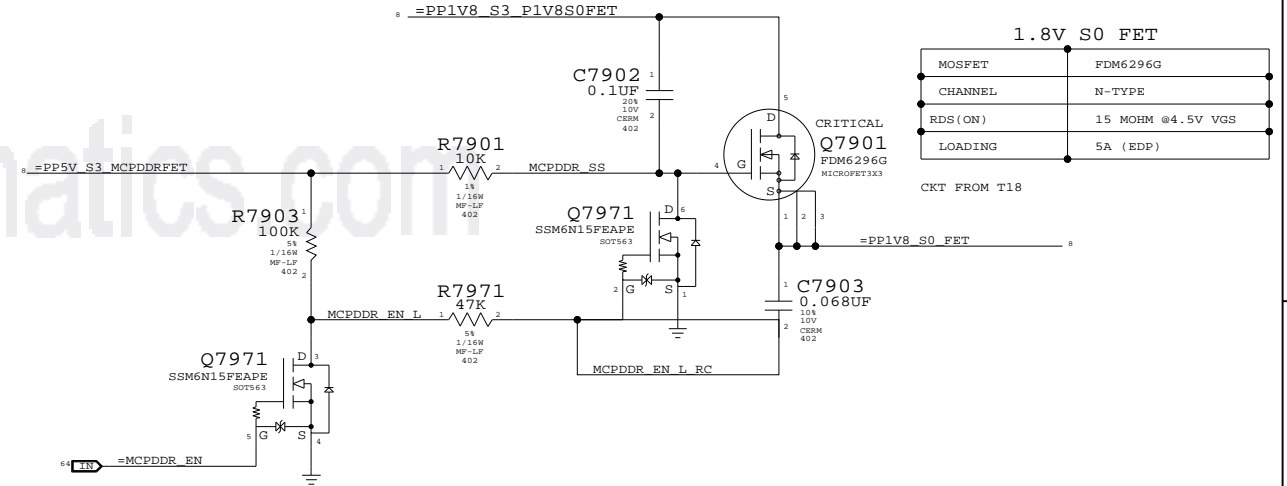
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	78		

3.3V S3 FET



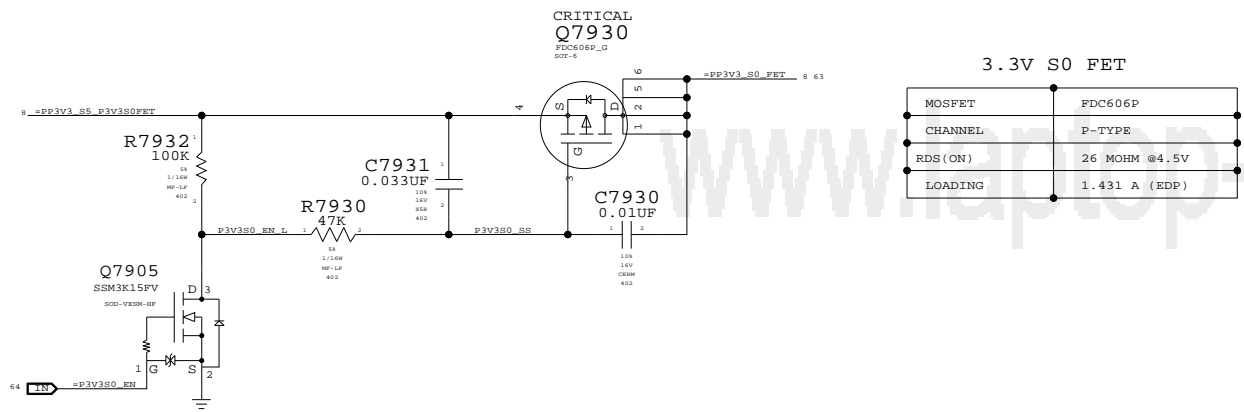
MOSFET	FDC638P
CHANNEL	P-TYPE
RDS(ON)	48 mOhm @4.5V
LOADING	0.182 A (EDP)

1.8V S0 FET
(1.8V S0 FET FOR DDR2 MEM)



MOSFET	FDM6296G
CHANNEL	N-TYPE
RDS(ON)	15 MOHM @4.5V VGS
LOADING	5A (EDP)

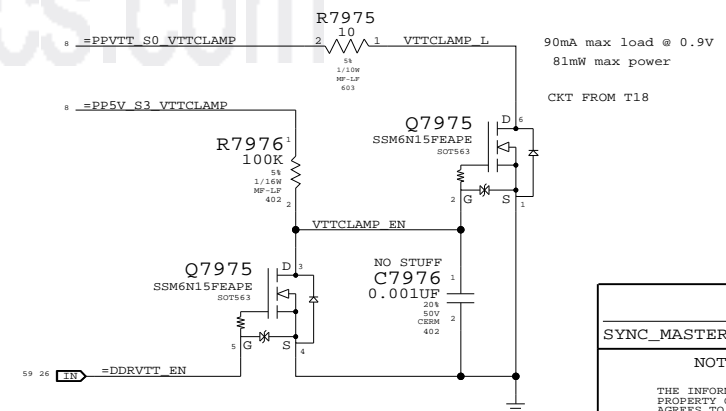
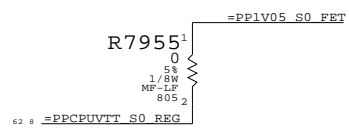
3.3V S0 FET



MOSFET	FDC606P
CHANNEL	P-TYPE
RDS(ON)	26 MOHM @4.5V
LOADING	1.431 A (EDP)

MCP79 DDRVTT FET

MCP79 DDR PAD LEAKAGE IS HIGH ENOUGH THAT NVIDIA RECOMMENDS UNPOWERING DURING SLEEP. IN ORDER TO SUPPORT UNPOWERING RAIL, HARDWARE MUST GUARANTEE MEM_CKE SIGNALS ARE LOW BEFORE RAIL IS TURNED OFF, AND REMAINS LOW UNTIL AFTER RAIL TURNS BACK ON OR DIMMS WILL EXIT SELF-REFRESH PREMATURELY. MEM_VTT_EN OUTPUT FROM MCP79 USED TO ENABLE CLAMP ON VTT RAIL, WHICH PULLS ALL CKE SIGNALS LOW THROUGH VTT TERMINATION RESISTORS.



90mA max load @ 0.9V
81mW max power
CKT FROM T18

POWER FETS

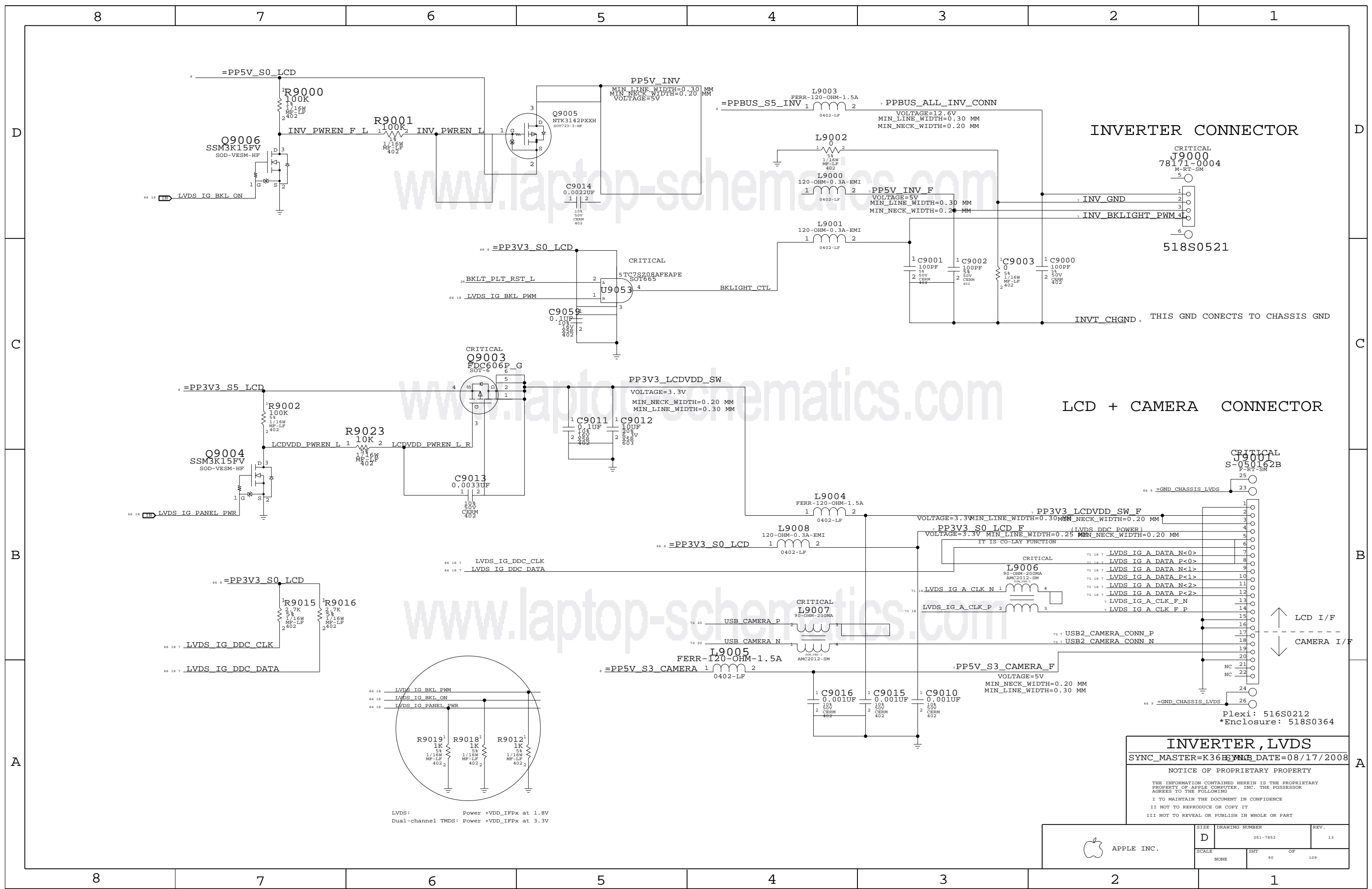
SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
II NOT TO REPRODUCE OR COPY IT
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	79	109



INVERTER CONNECTOR

LCD + CAMERA CONNECTOR

INVERTER, LVDS
 SYNC_MASTER=K365 DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	NONE	SHT	90 OF 109

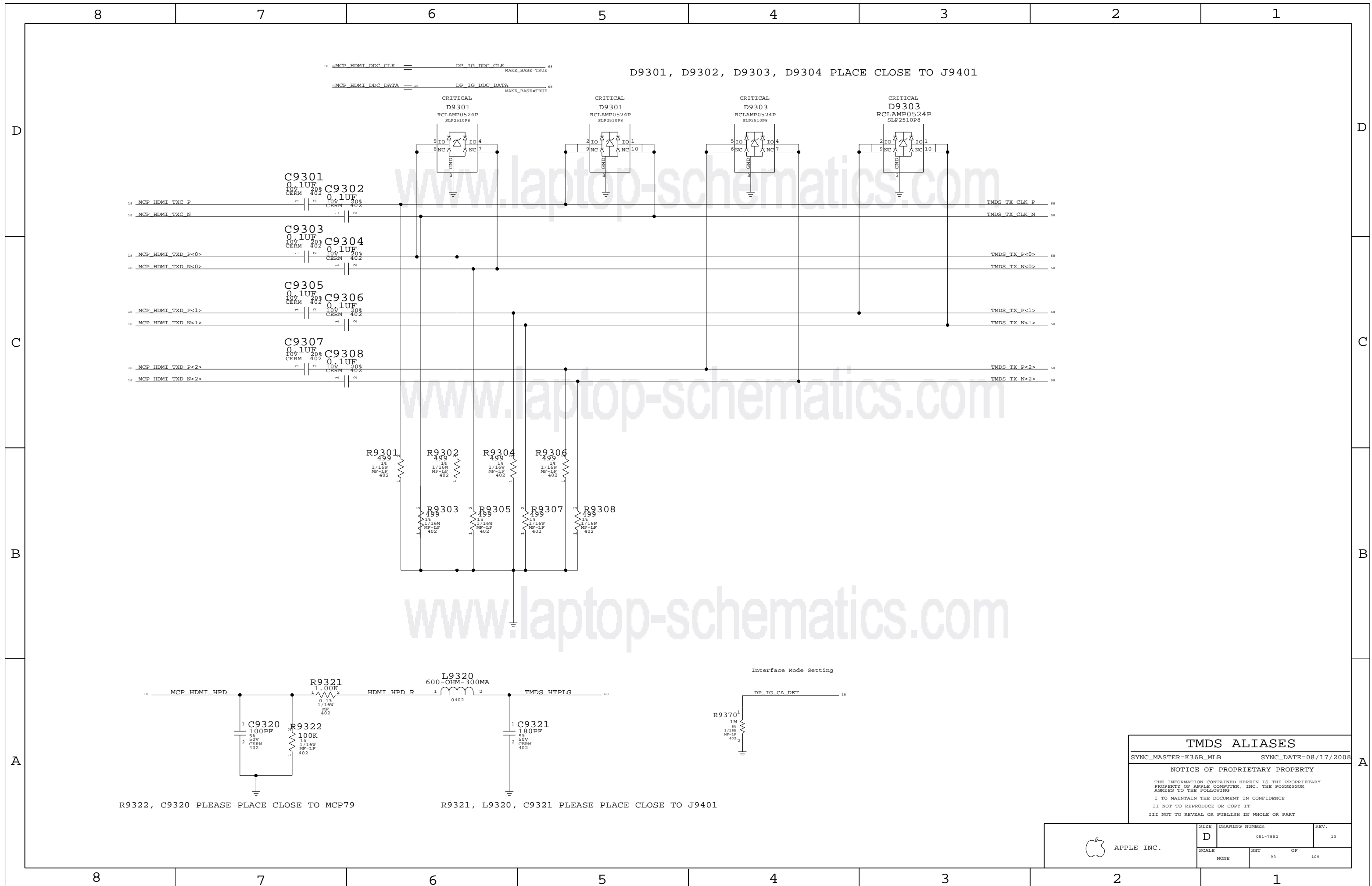
www.laptop-schematics.com

www.laptop-schematics.com

www.laptop-schematics.com

LVDS: Power +VDD_IFPx at 1.8V
 Dual-channel TMDs: Power +VDD_IFPx at 3.3V

Plexi: 516S0212
 *Enclosure: 518S0364



TMDS ALIASES
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

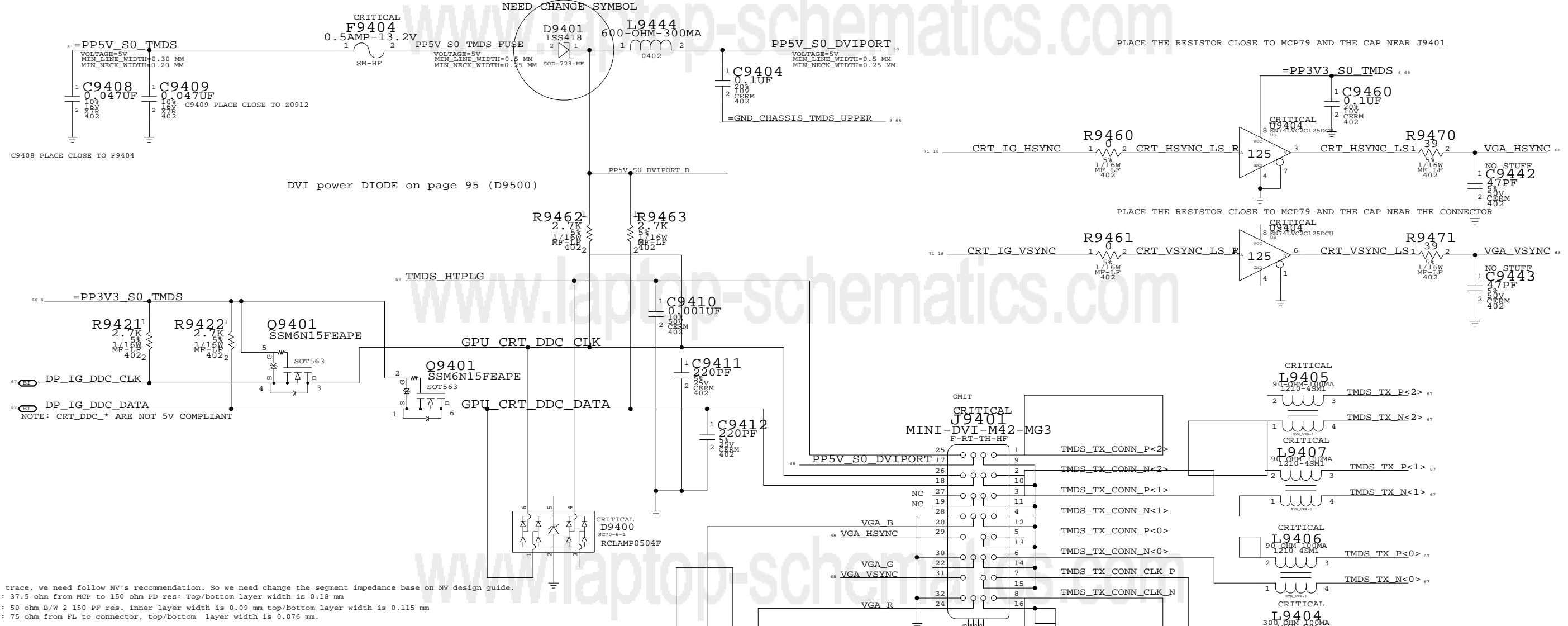
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	93		

Video Connectors

EXTERNAL VIDEO (VGA) INTERFACE

Isolation required for DVI power switch

TMDS (MINI DVI) INTERFACE



for VG signal trace, we need follow NV's recommendation. So we need change the segment impedance base on NV design guide.
 for A segment: 37.5 ohm from MCP to 150 ohm PD res: Top/bottom layer width is 0.18 mm
 for B segment: 50 ohm B/W 2 150 PF res. inner layer width is 0.09 mm top/bottom layer width is 0.115 mm
 for C segment: 75 ohm from FL to connector, top/bottom layer width is 0.076 mm.

MINI-DVI CONNECTOR

SYNC_MASTER=K365 SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	109
NONE	94		

FSB (Front-Side Bus) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
FSB_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
FSB_DSTB_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT	SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FSB_DATA	*	=2x_DIELECTRIC	?	FSB_DATA	TOP,BOTTOM	=4x_DIELECTRIC	?
FSB_DSTB	*	=3x_DIELECTRIC	?	FSB_DSTB	TOP,BOTTOM	=5x_DIELECTRIC	?
FSB_ADDR	*	=STANDARD	?	FSB_ADDR	TOP,BOTTOM	=3x_DIELECTRIC	?
FSB_ADSTB	*	=2x_DIELECTRIC	?	FSB_ADSTB	TOP,BOTTOM	=4x_DIELECTRIC	?
FSB_1X	*	=STANDARD	?	FSB_1X	TOP,BOTTOM	=3x_DIELECTRIC	?

All 4x/2x/1x FSB signals with impedance requirements are 50-ohm single-ended.

FSB 4X signals / groups shown in signal table on right.
 Signals within each 4x group should be matched within 5 ps of strobe.
 DSTB# complementary pairs should be matched within 1 ps of each other, all DSTB#s matched to +/- 300 ps.
 Spacing is 2x dielectric between DATA#, DINV# signals, with 3x dielectric spacing to the DSTB#s.
 DSTB# complementary pairs are spaced normally and are NOT routed as differential pairs.

FSB 2X signals / groups shown in signal table on right.
 Signals within each 2x group should be matched within 20 ps. ADTSB#s should be matched +/- 300 ps.
 Spacing is 1x dielectric between ADDR#, REQ# signals, with 2x dielectric spacing to ADTSB#.

FSB 1X signals shown in signal table on right.
 Signals within each 1x group should be matched to CPU clock, +/-1000 mils.

Design Guide recommends each strobe/signal group is routed on the same layer.
 Intel Design Guide recommends FSB signals be routed only on internal layers.

NOTE: Intel Design Guide allows closer spacing if signal lengths can be shortened.

SOURCE: MCP79 Interface DG (DG-03328-001_v01), Section 2.2
 SOURCE: Santa Rosa Platform DG, Rev 1.5 (#22294), Sections 4.2 & 4.3

CPU Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CPU_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
CPU_27P4S	*	=27P4_OHM_SE	=27P4_OHM_SE	=27P4_OHM_SE	=27P4_OHM_SE	7 MIL	7 MIL

NOTE: 7 mil gap is for VCCSense pair, which Intel says to route with 7 mil spacing without specifying a target impedance.

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT	SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CPU_AGTL	*	=STANDARD	?	CPU_AGTL	TOP,BOTTOM	=2x_DIELECTRIC	?
CPU_8MIL	*	8 MIL	?				
CPU_COMP	*	25 MIL	?				
CPU_GTLREF	*	25 MIL	?				
CPU_ITP	*	=2:1_SPACING	?				
CPU_VCCSENSE	*	25 MIL	?				

SR DG recommends at least 25 mils, >50 mils preferred

Most CPU signals with impedance requirements are 55-ohm single-ended.
 Some signals require 27.4-ohm single-ended impedance.

SOURCE: MCP79 Interface DG (DG-03328-001_v01), Section 2.2
 SOURCE: Santa Rosa Platform DG, Rev 0.9 (#20517), Sections 4.4 & 5.8.2.4

MCP FSB COMP Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MCP_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MCP_FSB_COMP	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v01), Section 2.2.4

FSB Clock Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CLK_FSB_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT	SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLK_FSB	*	=3x_DIELECTRIC	?	CLK_FSB	TOP,BOTTOM	=4x_DIELECTRIC	?

SOURCE: MCP79 Interface DG (DG-03328-001_v01), Section 2.2.5

CPU / FSB Net Properties

ELECTRICAL_CONSTRAINT_SET	PHYSICAL	NET_TYPE	SPACING
FSB_DATA_GROUP0	FSB_50S	FSB_DATA	FSB D L<15..0>
FSB_DATA_GROUP0	FSB_50S	FSB_DATA	FSB DINV L<0>
FSB_DSTB0	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L P<0>
FSB_DSTB0	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L N<0>
FSB_DATA_GROUP1	FSB_50S	FSB_DATA	FSB D L<31..16>
FSB_DATA_GROUP1	FSB_50S	FSB_DATA	FSB DINV L<1>
FSB_DSTB1	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L P<1>
FSB_DSTB1	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L N<1>
FSB_DATA_GROUP2	FSB_50S	FSB_DATA	FSB D L<47..32>
FSB_DATA_GROUP2	FSB_50S	FSB_DATA	FSB DINV L<2>
FSB_DSTB2	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L P<2>
FSB_DSTB2	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L N<2>
FSB_DATA_GROUP3	FSB_50S	FSB_DATA	FSB D L<63..48>
FSB_DATA_GROUP3	FSB_50S	FSB_DATA	FSB DINV L<3>
FSB_DSTB3	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L P<3>
FSB_DSTB3	FSB_DSTB_50S	FSB_DSTB	FSB DSTB L N<3>
FSB_ADDR_GROUP0	FSB_50S	FSB_ADDR	FSB A L<16..3>
FSB_ADDR_GROUP0	FSB_50S	FSB_ADDR	FSB REQ L<4..0>
FSB_ADSTB0	FSB_50S	FSB_ADSTB	FSB ADSTB L<0>
FSB_ADDR_GROUP1	FSB_50S	FSB_ADDR	FSB A L<35..17>
FSB_ADSTB1	FSB_50S	FSB_ADSTB	FSB ADSTB L<1>
FSB_1X	FSB_50S	FSB_1X	FSB ADS L
FSB_BREQ0_I	FSB_50S	FSB_1X	FSB BREQ0 L
FSB_BREQ1_I	FSB_50S	FSB_1X	FSB BREQ1 L
FSB_1X	FSB_50S	FSB_1X	FSB BNR L
FSB_1X	FSB_50S	FSB_1X	FSB BPRI L
FSB_1X	FSB_50S	FSB_1X	FSB DBSY L
FSB_1X	FSB_50S	FSB_1X	FSB DEFER L
FSB_1X	FSB_50S	FSB_1X	FSB DRDY L
FSB_1X	FSB_50S	FSB_1X	FSB HIT L
FSB_1X	FSB_50S	FSB_1X	FSB HITM L
FSB_1X	FSB_50S	FSB_1X	FSB LOCK L
FSB_CPURST_L	FSB_50S	FSB_1X	FSB CPURST L
FSB_1X	FSB_50S	FSB_1X	FSB RS L<2..0>
FSB_1X	FSB_50S	FSB_1X	FSB TRDY L
CPU_ASYNC	CPU_50S	CPU_AGTL	CPU A20M L
CPU_BSEL	CPU_50S	CPU_AGTL	CPU BSEL<2..0>
CPU_FERR_L	CPU_50S	CPU_BMIL	CPU FERR L
CPU_ASYNC	CPU_50S	CPU_AGTL	CPU IGARNE L
CPU_INIT_L	CPU_50S	CPU_AGTL	CPU INIT L
CPU_ASYNC_R	CPU_50S	CPU_AGTL	CPU INTR
CPU_ASYNC_R	CPU_50S	CPU_AGTL	CPU NMI
CPU_PROCHOT_L	CPU_50S	CPU_AGTL	CPU PROCHOT L
CPU_PWRGD	CPU_50S	CPU_AGTL	CPU PWRGD
CPU_ASYNC	CPU_50S	CPU_AGTL	CPU SMI L
CPU_ASYNC	CPU_50S	CPU_AGTL	CPU STPECLK L
PM_THRMTRIP_L	CPU_50S	CPU_BMIL	PM THRMTRIP L
FSB_CPURST_L	CPU_50S	CPU_AGTL	FSB CPURST L
CPU_PERR_SR	CPU_50S	CPU_AGTL	CPU DPSSLPLV
CPU_DPRSTP_L	CPU_50S	CPU_AGTL	CPU DPRSTP L
CPU_ASYNC	CPU_50S	CPU_AGTL	FSB DPWR L
MCP_CPU_COMP	MCP_50S	MCP_FSB_COMP	MCP BCLK VML COMP VDD
MCP_CPU_COMP	MCP_50S	MCP_FSB_COMP	MCP BCLK VML COMP GND
MCP_CPU_COMP	MCP_50S	MCP_FSB_COMP	MCP CPU COMP VCC
MCP_CPU_COMP	MCP_50S	MCP_FSB_COMP	MCP CPU COMP GND
FSB_CLK_CPU	CLK_FSB_100D	CLK_FSB	FSB CLK CPU P
FSB_CLK_CPU	CLK_FSB_100D	CLK_FSB	FSB CLK CPU N
FSB_CLK_ITP	CLK_FSB_100D	CLK_FSB	FSB CLK ITP P
FSB_CLK_ITP	CLK_FSB_100D	CLK_FSB	FSB CLK ITP N
FSB_CLK_MCP	CLK_FSB_100D	CLK_FSB	FSB CLK MCP P
FSB_CLK_MCP	CLK_FSB_100D	CLK_FSB	FSB CLK MCP N
CPU_IERR_I	CPU_50S		CPU IERR L
PM_DPRSLPVR	CPU_50S	CPU_AGTL	PM DPRSLPVR
(See above)	CPU_50S	CPU_AGTL	IMVP DPRSLPVR
CPU_GTLREF	CPU_50S	CPU_GTLREF	CPU GTLREF
CPU_COMP	CPU_50S	CPU_COMP	CPU COMP<3>
CPU_COMP	CPU_27P4S	CPU_COMP	CPU COMP<2>
CPU_COMP	CPU_50S	CPU_COMP	CPU COMP<1>
CPU_COMP	CPU_27P4S	CPU_COMP	CPU COMP<0>
XDP_TDI	CPU_50S	CPU_ITP	XDP TDI
XDP_TDO	CPU_50S	CPU_ITP	XDP TDO
XDP_TMS	CPU_50S	CPU_ITP	XDP TMS
XDP_TCK	CPU_50S	CPU_ITP	XDP TCK
XDP_TRST_L	CPU_50S	CPU_ITP	XDP TRST L
XDP_BPM_I	CPU_50S	CPU_ITP	XDP BPM L<4..0>
XDP_BPM_I5	CPU_50S	CPU_ITP	XDP BPM L<5>
(FSB_CPURST_L)	CPU_50S	CPU_ITP	XDP CPURST L
	CPU_50S	CPU_BMIL	CPU VID<6..0>
	CPU_50S	CPU_BMIL	IMVP6 VID<6..0>
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU VCCSENSE P
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU VCCSENSE N
(CPU_VCCSENSE)	CPU_27P4S	CPU_VCCSENSE	IMVP6_VSEN P
(CPU_VCCSENSE)	CPU_27P4S	CPU_VCCSENSE	IMVP6_VSEN N

CPU/FSB Constraints
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

Memory Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_40S	*	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=STANDARD	=STANDARD
MEM_40S_VDD	*	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=40_OHM_SE	=STANDARD	=STANDARD
MEM_70D	*	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF
MEM_70D_VDD	*	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MEM_CLK2MEM	*	=4:1_SPACING	?
MEM_CTRL2CTRL	*	=2:1_SPACING	?
MEM_CTRL2MEM	*	=2.5:1_SPACING	?
MEM_CMD2CMD	*	=1.5:1_SPACING	?
MEM_CMD2MEM	*	=3:1_SPACING	?
MEM_DATA2DATA	*	=1.5:1_SPACING	?
MEM_DATA2MEM	*	=3:1_SPACING	?
MEM_DQS2MEM	*	=3:1_SPACING	?
MEM_2OTHER	*	25 MIL	?

Memory Bus Spacing Group Assignments

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	MEM_CLK	*	MEM_CLK2MEM
MEM_CLK	MEM_CTRL	*	MEM_CLK2MEM
MEM_CLK	MEM_CMD	*	MEM_CLK2MEM
MEM_CLK	MEM_DATA	*	MEM_CLK2MEM
MEM_CLK	MEM_DQS	*	MEM_CLK2MEM
MEM_CMD	MEM_CMD	*	MEM_CMD2MEM
MEM_CMD	MEM_CTRL	*	MEM_CMD2MEM
MEM_CMD	MEM_CMD	*	MEM_CMD2CMD
MEM_CMD	MEM_DATA	*	MEM_CMD2MEM
MEM_CMD	MEM_DQS	*	MEM_CMD2MEM
MEM_CTRL	MEM_CTRL	*	MEM_CTRL2MEM
MEM_CTRL	MEM_CTRL	*	MEM_CTRL2CTRL
MEM_CTRL	MEM_CMD	*	MEM_CTRL2MEM
MEM_CTRL	MEM_DATA	*	MEM_CTRL2MEM
MEM_CTRL	MEM_DQS	*	MEM_CTRL2MEM
MEM_DATA	MEM_DATA	*	MEM_DATA2MEM
MEM_DATA	MEM_CTRL	*	MEM_DATA2MEM
MEM_DATA	MEM_CMD	*	MEM_DATA2MEM
MEM_DATA	MEM_DATA	*	MEM_DATA2DATA
MEM_DATA	MEM_DQS	*	MEM_DATA2MEM
MEM_DQS	MEM_CLK	*	MEM_DQS2MEM
MEM_DQS	MEM_CTRL	*	MEM_DQS2MEM
MEM_DQS	MEM_CMD	*	MEM_DQS2MEM
MEM_DQS	MEM_DATA	*	MEM_DQS2MEM
MEM_DQS	MEM_DQS	*	MEM_DQS2MEM
MEM_2OTHER	*	*	MEM_2OTHER
MEM_2OTHER	*	*	MEM_2OTHER
MEM_2OTHER	*	*	MEM_2OTHER
MEM_2OTHER	*	*	MEM_2OTHER
MEM_2OTHER	*	*	MEM_2OTHER

Need to support MEM_*-style wildcards!

DDR2:

DQ signals should be matched within 20 ps of associated DQS pair.
 DQS intra-pair matching should be within 1 ps, no inter-pair matching requirement.
 All DQS pairs should be matched within 100 ps of clocks.
 CLK intra-pair matching should be within 1 ps, inter-pair matching should be within 140 ps.
 A/BA/cmd signals should be matched within 75 ps, no CLK matching requirement.
 All memory signals maximum length is 1.005 ps. CLK minimum length is 594 ps (lengths include substrate).
 DQ/A/BA/cmd signal spacing is 3x dielectric, DQS/CLK is 4x dielectric.

DDR3:

DQ signals should be matched within 5 ps of associated DQS pair.
 DQS intra-pair matching should be within 1 ps, inter-pair matching should be within 180 ps
 No DQS to clock matching requirement.
 CLK intra-pair matching should be within 1 ps, inter-pair matching should be within 2 ps.
 A/BA/cmd signals should be matched within 5 ps of CLK pairs.
 All memory signals maximum length is 1.005 ps. CLK minimum length is 594 ps (lengths include substrate).
 DQ/A/BA/cmd signal spacing is 3x dielectric, DQS/CLK is 4x dielectric.

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.3
 SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Section 6.2

MCP MEM COMP Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MCP_MEM_COMP	*	Y	7 MIL	7 MIL	=STANDARD	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MCP_MEM_COMP	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.3.4

Memory Net Properties

ELECTRICAL_CONSTRAINT_SET	PHYSICAL	NET_TYPE	SPACING
MEM_A_CLK	MEM_70D_VDD	MEM_CLK	MEM_A_CLK P<5..0>
MEM_A_CLK	MEM_70D_VDD	MEM_CLK	MEM_A_CLK N<5..0>
MEM_A_CKE	MEM_40S_VDD	MEM_CTRL	MEM_A_CKE<3..0>
MEM_A_CKE	MEM_40S_VDD	MEM_CTRL	MEM_A_CS L<3..0>
MEM_A_CKE	MEM_40S_VDD	MEM_CTRL	MEM_A_ODT<3..0>
MEM_A_CMD	MEM_40S_VDD	MEM_CMD	MEM_A A<14..0>
MEM_A_CMD	MEM_40S_VDD	MEM_CMD	MEM_A BA<2..0>
MEM_A_CMD	MEM_40S_VDD	MEM_CMD	MEM_A RAS L
MEM_A_CMD	MEM_40S_VDD	MEM_CMD	MEM_A CAS L
MEM_A_CMD	MEM_40S_VDD	MEM_CMD	MEM_A WE L
MEM_A_DQ_BYTE0	MEM_40S	MEM_DATA	MEM_A DQ<7..0>
MEM_A_DQ_BYTE1	MEM_40S	MEM_DATA	MEM_A DQ<15..8>
MEM_A_DQ_BYTE2	MEM_40S	MEM_DATA	MEM_A DQ<23..16>
MEM_A_DQ_BYTE3	MEM_40S	MEM_DATA	MEM_A DQ<31..24>
MEM_A_DQ_BYTE4	MEM_40S	MEM_DATA	MEM_A DQ<39..32>
MEM_A_DQ_BYTE5	MEM_40S	MEM_DATA	MEM_A DQ<47..40>
MEM_A_DQ_BYTE6	MEM_40S	MEM_DATA	MEM_A DQ<55..48>
MEM_A_DQ_BYTE7	MEM_40S	MEM_DATA	MEM_A DQ<63..56>
MEM_A_DQ_BYTE0	MEM_40S	MEM_DATA	MEM_A DM<0>
MEM_A_DQ_BYTE1	MEM_40S	MEM_DATA	MEM_A DM<1>
MEM_A_DQ_BYTE2	MEM_40S	MEM_DATA	MEM_A DM<2>
MEM_A_DQ_BYTE3	MEM_40S	MEM_DATA	MEM_A DM<3>
MEM_A_DQ_BYTE4	MEM_40S	MEM_DATA	MEM_A DM<4>
MEM_A_DQ_BYTE5	MEM_40S	MEM_DATA	MEM_A DM<5>
MEM_A_DQ_BYTE6	MEM_40S	MEM_DATA	MEM_A DM<6>
MEM_A_DQ_BYTE7	MEM_40S	MEM_DATA	MEM_A DM<7>
MEM_A_DQS0	MEM_70D	MEM_DQS	MEM_A DQS P<0>
MEM_A_DQS0	MEM_70D	MEM_DQS	MEM_A DQS N<0>
MEM_A_DQS1	MEM_70D	MEM_DQS	MEM_A DQS P<1>
MEM_A_DQS1	MEM_70D	MEM_DQS	MEM_A DQS N<1>
MEM_A_DQS2	MEM_70D	MEM_DQS	MEM_A DQS P<2>
MEM_A_DQS2	MEM_70D	MEM_DQS	MEM_A DQS N<2>
MEM_A_DQS3	MEM_70D	MEM_DQS	MEM_A DQS P<3>
MEM_A_DQS3	MEM_70D	MEM_DQS	MEM_A DQS N<3>
MEM_A_DQS4	MEM_70D	MEM_DQS	MEM_A DQS P<4>
MEM_A_DQS4	MEM_70D	MEM_DQS	MEM_A DQS N<4>
MEM_A_DQS5	MEM_70D	MEM_DQS	MEM_A DQS P<5>
MEM_A_DQS5	MEM_70D	MEM_DQS	MEM_A DQS N<5>
MEM_A_DQS6	MEM_70D	MEM_DQS	MEM_A DQS P<6>
MEM_A_DQS6	MEM_70D	MEM_DQS	MEM_A DQS N<6>
MEM_A_DQS7	MEM_70D	MEM_DQS	MEM_A DQS P<7>
MEM_A_DQS7	MEM_70D	MEM_DQS	MEM_A DQS N<7>
MEM_B_CLK	MEM_70D_VDD	MEM_CLK	MEM_B_CLK P<5..0>
MEM_B_CLK	MEM_70D_VDD	MEM_CLK	MEM_B_CLK N<5..0>
MEM_B_CKE	MEM_40S_VDD	MEM_CTRL	MEM_B_CKE<3..0>
MEM_B_CKE	MEM_40S_VDD	MEM_CTRL	MEM_B_CS L<3..0>
MEM_B_CKE	MEM_40S_VDD	MEM_CTRL	MEM_B_ODT<3..0>
MEM_B_CMD	MEM_40S_VDD	MEM_CMD	MEM_B A<14..0>
MEM_B_CMD	MEM_40S_VDD	MEM_CMD	MEM_B BA<2..0>
MEM_B_CMD	MEM_40S_VDD	MEM_CMD	MEM_B RAS L
MEM_B_CMD	MEM_40S_VDD	MEM_CMD	MEM_B CAS L
MEM_B_CMD	MEM_40S_VDD	MEM_CMD	MEM_B WE L
MEM_B_DQ_BYTE0	MEM_40S	MEM_DATA	MEM_B DQ<7..0>
MEM_B_DQ_BYTE1	MEM_40S	MEM_DATA	MEM_B DQ<15..8>
MEM_B_DQ_BYTE2	MEM_40S	MEM_DATA	MEM_B DQ<23..16>
MEM_B_DQ_BYTE3	MEM_40S	MEM_DATA	MEM_B DQ<31..24>
MEM_B_DQ_BYTE4	MEM_40S	MEM_DATA	MEM_B DQ<39..32>
MEM_B_DQ_BYTE5	MEM_40S	MEM_DATA	MEM_B DQ<47..40>
MEM_B_DQ_BYTE6	MEM_40S	MEM_DATA	MEM_B DQ<55..48>
MEM_B_DQ_BYTE7	MEM_40S	MEM_DATA	MEM_B DQ<63..56>
MEM_B_DQ_BYTE0	MEM_40S	MEM_DATA	MEM_B DM<0>
MEM_B_DQ_BYTE1	MEM_40S	MEM_DATA	MEM_B DM<1>
MEM_B_DQ_BYTE2	MEM_40S	MEM_DATA	MEM_B DM<2>
MEM_B_DQ_BYTE3	MEM_40S	MEM_DATA	MEM_B DM<3>
MEM_B_DQ_BYTE4	MEM_40S	MEM_DATA	MEM_B DM<4>
MEM_B_DQ_BYTE5	MEM_40S	MEM_DATA	MEM_B DM<5>
MEM_B_DQ_BYTE6	MEM_40S	MEM_DATA	MEM_B DM<6>
MEM_B_DQ_BYTE7	MEM_40S	MEM_DATA	MEM_B DM<7>
MEM_B_DQS0	MEM_70D	MEM_DQS	MEM_B DQS P<0>
MEM_B_DQS0	MEM_70D	MEM_DQS	MEM_B DQS N<0>
MEM_B_DQS1	MEM_70D	MEM_DQS	MEM_B DQS P<1>
MEM_B_DQS1	MEM_70D	MEM_DQS	MEM_B DQS N<1>
MEM_B_DQS2	MEM_70D	MEM_DQS	MEM_B DQS P<2>
MEM_B_DQS2	MEM_70D	MEM_DQS	MEM_B DQS N<2>
MEM_B_DQS3	MEM_70D	MEM_DQS	MEM_B DQS P<3>
MEM_B_DQS3	MEM_70D	MEM_DQS	MEM_B DQS N<3>
MEM_B_DQS4	MEM_70D	MEM_DQS	MEM_B DQS P<4>
MEM_B_DQS4	MEM_70D	MEM_DQS	MEM_B DQS N<4>
MEM_B_DQS5	MEM_70D	MEM_DQS	MEM_B DQS P<5>
MEM_B_DQS5	MEM_70D	MEM_DQS	MEM_B DQS N<5>
MEM_B_DQS6	MEM_70D	MEM_DQS	MEM_B DQS P<6>
MEM_B_DQS6	MEM_70D	MEM_DQS	MEM_B DQS N<6>
MEM_B_DQS7	MEM_70D	MEM_DQS	MEM_B DQS P<7>
MEM_B_DQS7	MEM_70D	MEM_DQS	MEM_B DQS N<7>
MCP_MEM_COMP	MCP_MEM_COMP	MCP_MEM_COMP	MCP_MEM_COMP_VDD
MCP_MEM_COMP	MCP_MEM_COMP	MCP_MEM_COMP	MCP_MEM_COMP_GND

Memory Constraints

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SCALE	SHEET	OF	REV.
	NONE	101	109	13

PCI-Express

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
PCI_E_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF
CLK_PCI_E_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCI_E	*	=3X_DIELECTRIC	?
CLK_PCI_E	*	20 MIL	?
MCP_PEX_COMP	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.4

Analog Video Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CRT_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CRT	*	=4:1_SPACING	?
CRT_2CRT	*	=STANDARD	?
CRT_2CLK	*	50 MIL	?
CRT_2SWITCHER	*	250 MIL	?
CRT_SYNC	*	16 MIL	?
MCP_DAC_COMP	*	=2:1_SPACING	?

CRT signal single-ended impedance varies by location:

- 37.5-ohm from MCP to first termination resistor.
- 50-ohm from first to second termination resistor.
- 75-ohm from output of three-pole filter to connector (if possible).

R/G/B signals should be matched as close as possible and < 10 inches.
SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Sections 2.5.1 & 2.5.2.

Digital Video Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
DP_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
LVDS_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
MCP_DV_COMP	*	?	20 MIL	20 MIL	=STANDARD	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DISPLAYPORT	*	=3X_DIELECTRIC	?
LVDS	*	=3X_DIELECTRIC	?

LVDS intra-pair matching should be 5 mils. Pairs should be within 100 mils of clock length.
DisplayPort/TMDS intra-pair matching should be 5 ps. Inter-pair matching should be within 150 ps.
DisplayPort AUX CH intra-pair matching should be 5 ps. No relationship to other signals.
Max length of LVDS/DisplayPort/TMDS traces: 12 inches.

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Sections 2.5.3 & 2.5.4.

SATA Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SATA_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
SATA_100D_HDD	*	=100_OHM_DIFF_HDD	=100_OHM_DIFF_HDD	=100_OHM_DIFF_HDD	=100_OHM_DIFF_HDD	=100_OHM_DIFF_HDD	=100_OHM_DIFF_HDD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SATA	*	=4X_DIELECTRIC	?
SATA_TERM	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.7.1.

ELECTRICAL_CONSTRAINT_SET	PHYSICAL	SPACING	NET_TYPE
PEG_R2D	PCIE_90D	PCIE	PEG_R2D P<15..0>
PEG_R2D	PCIE_90D	PCIE	PEG_R2D N<15..0>
PEG_R2D	PCIE_90D	PCIE	PEG_R2D C P<15..0>
PEG_R2D	PCIE_90D	PCIE	PEG_R2D C N<15..0>
PEG_D2R	PCIE_90D	PCIE	PEG_D2R P<15..0>
PEG_D2R	PCIE_90D	PCIE	PEG_D2R N<15..0>
PEG_D2R	PCIE_90D	PCIE	PEG_D2R C P<15..0>
PEG_D2R	PCIE_90D	PCIE	PEG_D2R C N<15..0>
PCIE_MINI_R2D_P	PCIE_90D	PCIE	PCIE_MINI_R2D_P
PCIE_MINI_R2D_N	PCIE_90D	PCIE	PCIE_MINI_R2D_N
PCIE_MINI_R2D_C_P	PCIE_90D	PCIE	PCIE_MINI_R2D_C_P
PCIE_MINI_R2D_C_N	PCIE_90D	PCIE	PCIE_MINI_R2D_C_N
PCIE_MINI_D2R_P	PCIE_90D	PCIE	PCIE_MINI_D2R_P
PCIE_MINI_D2R_N	PCIE_90D	PCIE	PCIE_MINI_D2R_N
PCIE_FW_R2D_P	PCIE_90D	PCIE	PCIE_FW_R2D_P
PCIE_FW_R2D_N	PCIE_90D	PCIE	PCIE_FW_R2D_N
PCIE_FW_R2D_C_P	PCIE_90D	PCIE	PCIE_FW_R2D_C_P
PCIE_FW_R2D_C_N	PCIE_90D	PCIE	PCIE_FW_R2D_C_N
PCIE_FW_D2R_P	PCIE_90D	PCIE	PCIE_FW_D2R_P
PCIE_FW_D2R_N	PCIE_90D	PCIE	PCIE_FW_D2R_N
PCIE_FW_D2R_C_P	PCIE_90D	PCIE	PCIE_FW_D2R_C_P
PCIE_FW_D2R_C_N	PCIE_90D	PCIE	PCIE_FW_D2R_C_N
PCIE_EXCARD_R2D_P	PCIE_90D	PCIE	PCIE_EXCARD_R2D_P
PCIE_EXCARD_R2D_N	PCIE_90D	PCIE	PCIE_EXCARD_R2D_N
PCIE_EXCARD_R2D_C_P	PCIE_90D	PCIE	PCIE_EXCARD_R2D_C_P
PCIE_EXCARD_R2D_C_N	PCIE_90D	PCIE	PCIE_EXCARD_R2D_C_N
PCIE_EXCARD_D2R_P	PCIE_90D	PCIE	PCIE_EXCARD_D2R_P
PCIE_EXCARD_D2R_N	PCIE_90D	PCIE	PCIE_EXCARD_D2R_N
PEG_CLK100M_P	CLK_PCI_E_100D	CLK_PCI_E	PEG_CLK100M_P
PEG_CLK100M_N	CLK_PCI_E_100D	CLK_PCI_E	PEG_CLK100M_N
PCI_E_CLK100M_MINI_P	CLK_PCI_E_100D	CLK_PCI_E	PCI_E_CLK100M_MINI_P
PCI_E_CLK100M_MINI_N	CLK_PCI_E_100D	CLK_PCI_E	PCI_E_CLK100M_MINI_N
PCI_E_CLK100M_FW_P	CLK_PCI_E_100D	CLK_PCI_E	PCI_E_CLK100M_FW_P
PCI_E_CLK100M_FW_N	CLK_PCI_E_100D	CLK_PCI_E	PCI_E_CLK100M_FW_N
PCI_E_CLK100M_EXCARD_P	CLK_PCI_E_100D	CLK_PCI_E	PCI_E_CLK100M_EXCARD_P
PCI_E_CLK100M_EXCARD_N	CLK_PCI_E_100D	CLK_PCI_E	PCI_E_CLK100M_EXCARD_N
MCP_PEX_CLK_COMP		MCP_PEX_COMP	MCP_PEX_CLK_COMP
CRT_IG_R_C_PR	CRT_MCP_P	CRT	CRT_IG_R_C_PR
CRT_IG_G_Y_Y	CRT_MCP_P	CRT	CRT_IG_G_Y_Y
CRT_IG_B_COMP_PB	CRT_MCP_P	CRT	CRT_IG_B_COMP_PB
CRT_IG_HSYNC	CRT_50S	CRT_SYNC	CRT_IG_HSYNC
CRT_IG_VSYNC	CRT_50S	CRT_SYNC	CRT_IG_VSYNC
MCP_DAC_RSET	MCP_DAC_COMP	MCP_DAC_COMP	MCP_DAC_RSET
MCP_TV_DAC_VREF	MCP_DAC_COMP	MCP_DAC_COMP	MCP_TV_DAC_VREF
TMDS_IG_TXC_P	DP_100D	DISPLAYPORT	TMDS_IG_TXC_P
TMDS_IG_TXC_N	DP_100D	DISPLAYPORT	TMDS_IG_TXC_N
TMDS_IG_TXD_P<2..0>	DP_100D	DISPLAYPORT	TMDS_IG_TXD_P<2..0>
TMDS_IG_TXD_N<2..0>	DP_100D	DISPLAYPORT	TMDS_IG_TXD_N<2..0>
DP_IG_ML_P<3..0>	DP_100D	DISPLAYPORT	DP_IG_ML_P<3..0>
DP_IG_ML_N<3..0>	DP_100D	DISPLAYPORT	DP_IG_ML_N<3..0>
TP_DP_IG_AUX_CH_P	DP_100D	DISPLAYPORT	TP_DP_IG_AUX_CH_P
TP_DP_IG_AUX_CH_N	DP_100D	DISPLAYPORT	TP_DP_IG_AUX_CH_N
MCP_HDMI_RSET	MCP_DV_COMP	MCP_DV_COMP	MCP_HDMI_RSET
MCP_HDMI_VPROBE	MCP_DV_COMP	MCP_DV_COMP	MCP_HDMI_VPROBE
LVDS_IG_A_CLK_P	LVDS_100D	LVDS	LVDS_IG_A_CLK_P
LVDS_IG_A_CLK_N	LVDS_100D	LVDS	LVDS_IG_A_CLK_N
LVDS_IG_A_DATA_P<2..0>	LVDS_100D	LVDS	LVDS_IG_A_DATA_P<2..0>
LVDS_IG_A_DATA_N<2..0>	LVDS_100D	LVDS	LVDS_IG_A_DATA_N<2..0>
LVDS_IG_A_DATA_P<3>	LVDS_100D	LVDS	LVDS_IG_A_DATA_P<3>
LVDS_IG_A_DATA_N<3>	LVDS_100D	LVDS	LVDS_IG_A_DATA_N<3>
LVDS_IG_B_CLK_P	LVDS_100D	LVDS	LVDS_IG_B_CLK_P
LVDS_IG_B_CLK_N	LVDS_100D	LVDS	LVDS_IG_B_CLK_N
LVDS_IG_B_DATA_P<2..0>	LVDS_100D	LVDS	LVDS_IG_B_DATA_P<2..0>
LVDS_IG_B_DATA_N<2..0>	LVDS_100D	LVDS	LVDS_IG_B_DATA_N<2..0>
LVDS_IG_B_DATA_P<3>	LVDS_100D	LVDS	LVDS_IG_B_DATA_P<3>
LVDS_IG_B_DATA_N<3>	LVDS_100D	LVDS	LVDS_IG_B_DATA_N<3>
MCP_IFPAB_RSET	MCP_DV_COMP	MCP_DV_COMP	MCP_IFPAB_RSET
MCP_IFPAB_VPROBE	MCP_DV_COMP	MCP_DV_COMP	MCP_IFPAB_VPROBE
SATA_HDD_R2D_C_P	SATA_100D_HDD	SATA	SATA_HDD_R2D_C_P
SATA_HDD_R2D_C_N	SATA_100D_HDD	SATA	SATA_HDD_R2D_C_N
SATA_HDD_R2D_P	SATA_100D_HDD	SATA	SATA_HDD_R2D_P
SATA_HDD_R2D_N	SATA_100D_HDD	SATA	SATA_HDD_R2D_N
SATA_HDD_R2D_UF_P	SATA_100D_HDD	SATA	SATA_HDD_R2D_UF_P
SATA_HDD_R2D_UF_N	SATA_100D_HDD	SATA	SATA_HDD_R2D_UF_N
SATA_HDD_D2R_P	SATA_100D_HDD	SATA	SATA_HDD_D2R_P
SATA_HDD_D2R_N	SATA_100D_HDD	SATA	SATA_HDD_D2R_N
SATA_HDD_D2R_C_P	SATA_100D_HDD	SATA	SATA_HDD_D2R_C_P
SATA_HDD_D2R_C_N	SATA_100D_HDD	SATA	SATA_HDD_D2R_C_N
SATA_ODD_R2D_C_P	SATA_100D	SATA	SATA_ODD_R2D_C_P
SATA_ODD_R2D_C_N	SATA_100D	SATA	SATA_ODD_R2D_C_N
SATA_ODD_R2D_P	SATA_100D	SATA	SATA_ODD_R2D_P
SATA_ODD_R2D_N	SATA_100D	SATA	SATA_ODD_R2D_N
SATA_ODD_R2D_UF_P	SATA_100D	SATA	SATA_ODD_R2D_UF_P
SATA_ODD_R2D_UF_N	SATA_100D	SATA	SATA_ODD_R2D_UF_N
SATA_ODD_D2R_P	SATA_100D	SATA	SATA_ODD_D2R_P
SATA_ODD_D2R_N	SATA_100D	SATA	SATA_ODD_D2R_N
SATA_ODD_D2R_C_P	SATA_100D	SATA	SATA_ODD_D2R_C_P
SATA_ODD_D2R_C_N	SATA_100D	SATA	SATA_ODD_D2R_C_N
SATA_ODD_D2R_UF_P	SATA_100D	SATA	SATA_ODD_D2R_UF_P
SATA_ODD_D2R_UF_N	SATA_100D	SATA	SATA_ODD_D2R_UF_N
MCP_SATA_TERM	SATA_100D	SATA_TERM	MCP_SATA_TERM

MCP Constraints 1

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	102	109

PCI Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
PCI_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
CLK_PCI_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCI	*	=STANDARD	?
CLK_PCI	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.8.

LPC Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
LPC_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
CLK_LPC_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
LPC	*	6 MIL	?
CLK_LPC	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.9.1.

USB 2.0 Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MCP_USB_RBIAS	*	=STANDARD	8 MIL	8 MIL	=STANDARD	=STANDARD	=STANDARD
USB_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT	SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	*	=2x_DIELECTRIC	?	USB	TOP,BOTTOM	=4x_DIELECTRIC	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.10.1.

SMBus Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SMB_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SMB	*	=2x_DIELECTRIC	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.11.1.

HD Audio Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
HDA_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
HDA	*	=2x_DIELECTRIC	?
MCP_HDA_COMP	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.12.1.

SIO Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CLK_SLOW_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLK_SLOW	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.13.

SPI Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SPI_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SPI	*	8 MIL	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.14.

ELECTRICAL_CONSTRAINT_SET	PHYSICAL	NET_TYPE	SPACING	
MCP_DEBUG	PCI_55S	PCI		MCP_DEBUG<7..0> 7 13 19
PCI_AD	PCI_55S	PCI		PCI_AD<23..8>
PCI_AD24	PCI_55S	PCI		PCI_AD<24>
PCI_AD	PCI_55S	PCI		PCI_AD<31..25>
PCI_AD	PCI_55S	PCI		PCI_PAR
PCI_C_BE_L	PCI_55S	PCI		PCI_C_BE_L<3..0>
PCI_CNTL	PCI_55S	PCI		PCI_IRDY_L
PCI_CNTL	PCI_55S	PCI		PCI_DEVSEL_L
PCI_CNTL	PCI_55S	PCI		PCI_PERR_L
PCI_CNTL	PCI_55S	PCI		PCI_SERR_L
PCI_CNTL	PCI_55S	PCI		PCI_STOP_L
PCI_CNTL	PCI_55S	PCI		PCI_TRDY_L
PCI_CNTL	PCI_55S	PCI		PCI_FRAME_L
PCI_REQ0_I	PCI_55S	PCI		PCI_REQ0_I
PCI_GNT0_L	PCI_55S	PCI		PCI_GNT0_L
PCI_REQ1_I	PCI_55S	PCI		PCI_REQ1_I
PCI_GNT1_L	PCI_55S	PCI		PCI_GNT1_L
PCI_INTX_I	PCI_55S	PCI		PCI_INTX_L
PCI_INTX_I	PCI_55S	PCI		PCI_INTX_L
PCI_INTX_I	PCI_55S	PCI		PCI_INTX_L
PCI_INTX_I	PCI_55S	PCI		PCI_INTX_L
MCP_PCI_CLK2	CLK_PCI_55S	CLK_PCI		PCI_CLK33M MCP_R
MCP_PCI_CLK2	CLK_PCI_55S	CLK_PCI		PCI_CLK33M MCP
LPC_AD	LPC_55S	LPC		LPC_AD<3..0> 7 19 41 43
LPC_FRAME_L0	LPC_55S	LPC		LPC_FRAME_L 7 19 41 43
LPC_RESET_L	LPC_55S	LPC		LPC_RESET_L 19 26
MCP_LPC_CLK	CLK_LPC_55S	CLK_LPC		LPC_CLK33M SMC_R
MCP_LPC_CLK	CLK_LPC_55S	CLK_LPC		LPC_CLK33M SMC
MCP_LPC_CLK	CLK_LPC_55S	CLK_LPC		LPC_CLK33M LPCPLUS 7 26 43
USB_EXTN	USB_90D	USB		USB_EXTN_P 20 39
USB_EXTN	USB_90D	USB		USB_EXTN_N 20 39
USB_EXTN	USB_90D	USB		USB2_EXTN_MUXED_P 39
USB_EXTN	USB_90D	USB		USB2_EXTN_MUXED_N 39
USB_EXTN	USB_90D	USB		USB2_EXTN_F_P 39
USB_EXTN	USB_90D	USB		USB2_EXTN_F_N 39
USB_MINI	USB_90D	USB		USB_MINI_P 9 20
USB_MINI	USB_90D	USB		USB_MINI_N 9 20
USB_MINI	USB_90D	USB		USB2_AIRPORT_P 7 31
USB_MINI	USB_90D	USB		USB2_AIRPORT_N 7 31
USB_EXTD	USB_90D	USB		USB_EXTD_P 9 20
USB_EXTD	USB_90D	USB		USB_EXTD_N 9 20
USB_CAMERA	USB_90D	USB		USB_CAMERA_P 20 66
USB_CAMERA	USB_90D	USB		USB_CAMERA_N 20 66
USB_CAMERA	USB_90D	USB		USB2_CAMERA_CONN_P 7 66
USB_CAMERA	USB_90D	USB		USB2_CAMERA_CONN_N 7 66
USB_IR	USB_90D	USB		USB_IR_P 20 40
USB_IR	USB_90D	USB		USB_IR_N 20 40
USB_TPAD	USB_90D	USB		USB_TPAD_P 9 20
USB_TPAD	USB_90D	USB		USB_TPAD_N 9 20
USB_TPAD	USB_90D	USB		CONN_TPAD_USB_P 7 49
USB_TPAD	USB_90D	USB		CONN_TPAD_USB_N 7 49
USB_BT	USB_90D	USB		USB_BT_P 9 20
USB_BT	USB_90D	USB		USB_BT_N 9 20
USB_BT	USB_90D	USB		USB2_BT_F_P_CONN 7 40
USB_BT	USB_90D	USB		USB2_BT_F_N_CONN 7 40
USB_EXTB	USB_90D	USB		USB_EXTB_P 20 39
USB_EXTB	USB_90D	USB		USB_EXTB_N 20 39
USB_EXTB	USB_90D	USB		USB2_EXTB_F_P 39
USB_EXTB	USB_90D	USB		USB2_EXTB_F_N 39
USB_EXCARD	USB_90D	USB		USB_EXCARD_P 9 20
USB_EXCARD	USB_90D	USB		USB_EXCARD_N 9 20
USB_EXTC	USB_90D	USB		USB_EXTC_P 9 20
USB_EXTC	USB_90D	USB		USB_EXTC_N 9 20
MCP_USB_RBIAS	MCP_USB_RBIAS			MCP_USB_RBIAS_GND 20
SMBUS_MCP_0_CLK	SMB_55S	SMB		SMBUS_MCP_0_CLK 7 13 21 44
SMBUS_MCP_0_DATA	SMB_55S	SMB		SMBUS_MCP_0_DATA 7 13 21 44
SMBUS_MCP_1_CLK	SMB_55S	SMB		SMBUS_MCP_1_CLK 21 44
SMBUS_MCP_1_DATA	SMB_55S	SMB		SMBUS_MCP_1_DATA 21 44
HDA_BIT_CLK	HDA_55S	HDA		HDA_BIT_CLK 21 52
HDA_BIT_CLK	HDA_55S	HDA		HDA_BIT_CLK_R 21
HDA_SYNC	HDA_55S	HDA		HDA_SYNC 21 52
HDA_SYNC	HDA_55S	HDA		HDA_SYNC_R 21
HDA_RST_L	HDA_55S	HDA		HDA_RST_R_L 21
HDA_RST_L	HDA_55S	HDA		HDA_RST_L 21 52
HDA_SDIN0	HDA_55S	HDA		HDA_SDIN0 21 52
HDA_SDIN0	HDA_55S	HDA		HDA_SDIN_CODEC 21 52
HDA_SDOUT	HDA_55S	HDA		HDA_SDOUT 21 52
HDA_SDOUT	HDA_55S	HDA		HDA_SDOUT_R 21
MCP_HDA_PULLDN_COMP	MCP_HDA_COMP			MCP_HDA_PULLDN_COMP 21
MCP_SUS_CLK	CLK_SLOW_55S	CLK_SLOW		FM_CLK32K_SUSCLK_R 21 26
MCP_SUS_CLK	CLK_SLOW_55S	CLK_SLOW		FM_CLK32K_SUSCLK 26 41
SPI_CLK	SPI_55S	SPI		SPI_CLK_R 21 43
SPI_MOSI	SPI_55S	SPI		SPI_CLK_MUX 43 51
SPI_MOSI	SPI_55S	SPI		SPI_MOSI_R 43 51
SPI_MOSI	SPI_55S	SPI		SPI_MOSI_MUX 43 51
SPI_MISO	SPI_55S	SPI		SPI_MISO_MUX 43 51
SPI_MISO	SPI_55S	SPI		SPI_MISO_R 51
SPI_CS0	SPI_55S	SPI		SPI_CS0_R_L 21 43
SPI_CS0	SPI_55S	SPI		SPI_CS0_L 21 43

MCP Constraints 2

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SCALE	DRAWING NUMBER	REV.
	NONE	051-7852	13
	SHT	OF	
	103	109	

MCP RGMI (Ethernet) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MCP_MII_COMP	*	=STANDARD	7.5 MIL	7.5 MIL	=STANDARD	=STANDARD	=STANDARD
ENET_MII_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MCP_BUF0_CLK	*	=3:1_SPACING	?
ENET_MII	*	12 MIL	?

SOURCE: MCP73 Interface DG (DG-02974-001_v01), Sections 2.7.2 & 2.7.4

88E1116R (Ethernet PHY) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
ENET_MDI_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
ENET_MDI	*	25 MIL	?

SOURCE: MCP73 Interface DG (DG-02974-001_v01), Section 2.7.4

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
MCP_MII_COMP	MCP_MII_COMP		MCP MII COMP VDD 18
MCP_MII_COMP	MCP_MII_COMP		MCP MII COMP GND 18
MCP_CLK25M_BUF0	ENET_MII_55S	MCP_BUF0_CLK	MCP_CLK25M_BUF0_R 18 33
MCP_CLK25M_BUF0	ENET_MII_55S	MCP_BUF0_CLK	MCP_CLK25M_BUF0 18
ENET_INTR_I	ENET_MII_55S	ENET_MII	ENET_INTR_L 18 32
ENET_MDIO	ENET_MII_55S	ENET_MII	ENET_MDIO 18 32
ENET_MDC	ENET_MII_55S	ENET_MII	ENET_MDC 18 32
ENET_PWRDWN_I	ENET_MII_55S	ENET_MII	ENET_PWRDWN_L 18 32
ENET_RXCLK	ENET_MII_55S	ENET_MII	ENET_CLK125M_RXCLK 18 32
ENET_RXCLK	ENET_MII_55S	ENET_MII	ENET_CLK125M_RXCLK_R 32
ENET_RXD_STEAD	ENET_MII_55S	ENET_MII	ENET_RXD<3..1> 18 32
ENET_RXD	ENET_MII_55S	ENET_MII	ENET_RX_CTRL 18 32
ENET_TXCLK	ENET_MII_55S	ENET_MII	ENET_CLK125M_TXCLK 18 32
ENET_TXCLK	ENET_MII_55S	ENET_MII	ENET_CLK125M_TXCLK_R 32
ENET_TXD	ENET_MII_55S	ENET_MII	ENET_TXD<0> 18 32
ENET_TXD	ENET_MII_55S	ENET_MII	ENET_TXD<3..1> 18 32
ENET_TXD	ENET_MII_55S	ENET_MII	ENET_TX_CTRL 18 32
ENET_RESET	ENET_MII_55S	ENET_MII	ENET_RESET_L 18 32
ENET_MDI	ENET_MDI_100D	ENET_MDI	ENET MDI P<3..0> 32 34
ENET_MDI	ENET_MDI_100D	ENET_MDI	ENET MDI N<3..0> 32 34

www.laptop-schematics.com

www.laptop-schematics.com

Ethernet Constraints
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT	OF	
NONE	104	109	

8

7

6

5

4

3

2

1

FireWire Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
FW_110D	*	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FW_TP	*	=3:1_SPACING	?

FireWire Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		NET_NAME	SIZE	TYPE
	PHYSICAL	SPACING			
FW_P0_TPA	FW_110D	FW_TP	FW_P0_TPA_P	35	37
FW_P0_TPB	FW_110D	FW_TP	FW_P0_TPB_P	35	37
FW_P1_TPA	FW_110D	FW_TP	FW_P1_TPA_P	35	37
FW_P1_TPB	FW_110D	FW_TP	FW_P1_TPB_P	35	37
FW_PORT_A	FW_110D	FW_TP	FW_PORT_A_P	37	
FW_PORT_B	FW_110D	FW_TP	FW_PORT_B_P	37	

Port 2 Not Used

www.laptop-schematics.com

www.laptop-schematics.com

www.laptop-schematics.com

D

D

C

C

B

B

A

A

8

7

6

5

4

3

2

1

FireWire Constraints

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

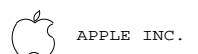
NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	105	109

8

7

6

5

4

3

2

1

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
1TO1_DIFFPAIR	*	=STANDARD	=STANDARD	=STANDARD	=STANDARD	0.1 MM	0.1 MM

SMC SMBus Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
SMBUS_SMC_A_S3_SCL	SMB 55G	SMB	SMBUS_SMC_A_S3_SCL 44
SMBUS_SMC_A_S3_SDA	SMB 55G	SMB	SMBUS_SMC_A_S3_SDA 44
SMBUS_SMC_B_S0_SCL	SMB 55G	SMB	SMBUS_SMC_B_S0_SCL 44
SMBUS_SMC_B_S0_SDA	SMB 55G	SMB	SMBUS_SMC_B_S0_SDA 44
SMBUS_SMC_O_S0_SCL	SMB 55G	SMB	SMBUS_SMC_O_S0_SCL 44
SMBUS_SMC_O_S0_SDA	SMB 55G	SMB	SMBUS_SMC_O_S0_SDA 44
SMBUS_SMC_BSA_SCL	SMB 55G	SMB	SMBUS_SMC_BSA_SCL 44
SMBUS_SMC_BSA_SDA	SMB 55G	SMB	SMBUS_SMC_BSA_SDA 44
SMBUS_SMC_MGMT_SCL	SMB 55G	SMB	SMBUS_SMC_MGMT_SCL 44
SMBUS_SMC_MGMT_SDA	SMB 55G	SMB	SMBUS_SMC_MGMT_SDA 44

www.laptop-schematics.com

SMBus Charger Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
CHGR_CSI	1TO1_DIFFPAIR		CHGR_CSI_P CHGR_CSI_N
CHGR_CSO	1TO1_DIFFPAIR		CHGR_CSO_P CHGR_CSO_N

www.laptop-schematics.com

www.laptop-schematics.com

SMC Constraints

SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

- I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
- II NOT TO REPRODUCE OR COPY IT
- III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART



SIZE	DRAWING NUMBER	REV.
D	051-7852	13
SCALE	SHT	OF
NONE	106	109

8

7

6

5

4

3

2

1

K36B BOARD-SPECIFIC SPACING & PHYSICAL CONSTRAINTS

BOARD LAYERS			BOARD AREAS				BOARD UNITS (MIL OR MM)	ALLEGRO VERSION
TOP, ISL2, ISL3, ISL4, ISL5, ISL6, ISL7, ISL8, ISL9, ISL10, ISL11, BOTTOM			NO_TYPE, BGA_P1MM				MM	15.5.1

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
DEFAULT	*	Y	=50_OHM_SE	=50_OHM_SE	30 MM	0 MM	0 MM
STANDARD	*	Y	=DEFAULT	=DEFAULT	12.7 MM	=DEFAULT	=DEFAULT

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
55_OHM_SE	TOP, BOTTOM	Y	0.090 MM	0.090 MM			
55_OHM_SE	*	Y	0.076 MM	0.076 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
50_OHM_SE	TOP, BOTTOM	Y	0.115 MM	0.115 MM			
50_OHM_SE	*	Y	0.090 MM	0.090 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
40_OHM_SE	TOP, BOTTOM	Y	0.165 MM	0.165 MM			
40_OHM_SE	*	Y	0.145 MM	0.145 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
27F4_OHM_SE	TOP, BOTTOM	Y	0.310 MM	0.310 MM			
27F4_OHM_SE	*	Y	0.275 MM	0.275 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
70_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
70_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.175 MM	0.175 MM		0.200 MM	0.200 MM
70_OHM_DIFF	TOP, BOTTOM	Y	0.185 MM	0.185 MM		0.200 MM	0.200 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
90_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
90_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.109 MM	0.109 MM		0.220 MM	0.220 MM
90_OHM_DIFF	TOP, BOTTOM	Y	0.112 MM	0.112 MM		0.220 MM	0.220 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
100_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.089 MM	0.089 MM		0.230 MM	0.230 MM
100_OHM_DIFF	TOP, BOTTOM	Y	0.091 MM	0.091 MM		0.230 MM	0.230 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_OHM_DIFF_HDD	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
100_OHM_DIFF_HDD	ISL3, ISL4, ISL9, ISL10	Y	0.095 MM	0.095 MM		0.400 MM	0.400 MM
100_OHM_DIFF_HDD	TOP, BOTTOM	Y	0.095 MM	0.095 MM		0.400 MM	0.400 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
110_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
110_OHM_DIFF	ISL3, ISL4, ISL9, ISL10	Y	0.075 MM	0.075 MM		0.330 MM	0.330 MM
110_OHM_DIFF	TOP, BOTTOM	Y	0.077 MM	0.077 MM		0.330 MM	0.330 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
1:1_DIFFPAIR	*	Y	=STANDARD	=STANDARD	=STANDARD	0.1 MM	0.1 MM

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DEFAULT	*	0.1 MM	?
STANDARD	*	=DEFAULT	?
BGA_P1MM	*	=DEFAULT	?
BGA_P2MM	*	=DEFAULT	?
BGA_P3MM	*	=DEFAULT	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1.5:1_SPACING	*	0.15 MM	?
2:1_SPACING	*	0.2 MM	?
2.5:1_SPACING	*	0.25 MM	?
3:1_SPACING	*	0.3 MM	?
4:1_SPACING	*	0.4 MM	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
2X_DIELECTRIC	TOP, BOTTOM	0.140 MM	?
3X_DIELECTRIC	TOP, BOTTOM	0.210 MM	?
4X_DIELECTRIC	TOP, BOTTOM	0.280 MM	?
5X_DIELECTRIC	TOP, BOTTOM	0.350 MM	?
2X_DIELECTRIC	*	0.152 MM	?
3X_DIELECTRIC	*	0.228 MM	?
4X_DIELECTRIC	*	0.304 MM	?
5X_DIELECTRIC	*	0.380 MM	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
*	*	BGA_P1MM	BGA_P1MM
MEM_CLK	*	BGA_P1MM	BGA_P2MM
CLK_FSB	*	BGA_P1MM	BGA_P2MM
CLK_LPC	*	BGA_P1MM	BGA_P2MM
CLK_PCI	*	BGA_P1MM	BGA_P2MM
CLK_PCIE	*	BGA_P1MM	BGA_P2MM
CLK_SLOW	*	BGA_P1MM	BGA_P2MM
FSB_DSTB	FSB_DSTB	BGA_P1MM	BGA_P3MM

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
MEM_40S	BGA_P1MM	STANDARD
MEM_40S_VDD	BGA_P1MM	STANDARD

K36B RULE DEFINITIONS
 SYNC_MASTER=K36B_MLB SYNC_DATE=08/17/2008
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7852	13
SCALE	SHT		OF
NONE	109		109