

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.

SCHEM, MLB, MBP15

04/24/2007

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD	ENG APPD
?		?	?		
				DATE	DATE
				?	?

Page	(.csa)	Contents	Sync	Date
1	1	Table of Contents	N/A	N/A
2	2	System Block Diagram	(T9_MLB)	08/23/2006
3	3	Power Block Diagram	(T9_MLB)	08/23/2006
4	4	Power Block Diagram	N/A	N/A
5	5	BOM Configuration	N/A	N/A
6	6	Revision History	N/A	N/A
7	7	Functional / ICT Test	(MASTER)	(MASTER)
8	8	Power Aliases	(MASTER)	(MASTER)
9	9	Signal Aliases	(T9_MLB)	08/23/2006
10	10	CPU FSB	T9_NOME	03/16/2007
11	11	CPU Power & Ground	T9_NOME	03/16/2007
12	12	CPU Decoupling & VID	M76_MLB	03/19/2007
13	13	eXtended Debug Port (XDP)	T9_NOME	12/12/2006
14	14	NB CPU Interface	T9_NOME	03/16/2007
15	15	NB PEG / Video Interfaces	T9_NOME	03/16/2007
16	16	NB Misc Interfaces	T9_NOME	03/16/2007
17	17	NB DDR2 Interfaces	T9_NOME	03/16/2007
18	18	NB Power 1	T9_NOME	03/16/2007
19	19	NB Power 2	T9_NOME	03/16/2007
20	20	NB Grounds	T9_NOME	03/16/2007
21	21	NB Standard Decoupling	T9_NOME	01/17/2007
22	22	NB Graphics Decoupling	M76_MLB	03/12/2007
23	23	SB Enet, Disk, FSB, LPC	T9_NOME	03/16/2007
24	24	SB PCI, PCIE, DMI, USB	T9_NOME	03/16/2007
25	25	SB Pwr Mgt, GPIO, Clink	T9_NOME	03/16/2007
26	26	SB Power & Ground	T9_NOME	03/16/2007
27	27	SB Decoupling	T9_NOME	01/17/2007
28	28	SB Misc	(T9_MLB)	08/24/2006
29	29	Clock (CK505)	T9_NOME	03/16/2007
30	30	Clock Termination	(MASTER)	08/23/2006
31	31	DDR2 SO-DIMM Connector A	(M59_SYNC)	08/24/2006
32	32	DDR2 SO-DIMM Connector B	(M59_SYNC)	08/24/2006
33	33	Memory Active Termination	(T9_NOME)	11/14/2006
34	34	Left I/O Board Connector	(M59_SYNC)	08/24/2006
35	35	Ethernet (Yukon)	T9_NOME	03/16/2007
36	36	Yukon Power Control	T9_NOME	03/16/2007
37	37	Ethernet Connector	M76_MLB	03/19/2007
38	38	FireWire Link (TSB83AA22)	M76_MLB	03/19/2007
39	39	FireWire PHY (TSB83AA22)	M76_MLB	03/19/2007
40	40	FireWire Port Power	M76_MLB	03/19/2007
41	41	FireWire Ports	M76_MLB	03/19/2007
42	42	PATA Connector	(MASTER)	(MASTER)
43	43	External USB Connector	M76_MLB	03/19/2007
44	44	Left Clutch Barrel Interconnect	M76_MLB	03/19/2007

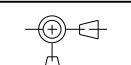
Page	(.csa)	Contents	Sync	Date
45	45	SMC	T9_NOME	01/17/2007
46	46	SMC Support	(MASTER)	(MASTER)
47	47	LPC+ Debug Connector	M76_MLB	03/19/2007
48	48	SMBus Connections	(MASTER)	(MASTER)
49	49	Current & Voltage Sensing	(MASTER)	(MASTER)
50	50	Current Sensing	(MASTER)	(MASTER)
51	51	Thermal Sensors	(MASTER)	(MASTER)
52	52	Fan Connectors	M76_MLB	03/19/2007
53	53	ALS Support	M76_MLB	03/19/2007
54	54	Sudden Motion Sensor (SMS)	M76_MLB	03/19/2007
55	55	SPI BootROM	T9_NOME	03/16/2007
56	56	PBus-In & Battery Connectors	(M59_SYNC)	09/09/2006
57	57	Power FETs	M76_MLB	03/19/2007
58	58	IMVP6 CPU VCore Regulator	M76_MLB	01/23/2007
59	59	IMVP6 NB Gfx Core Regulator	M76_MLB	03/19/2007
60	60	5V / 3.3V Power Supply	M76_MLB	03/19/2007
61	61	1.25V / 1.05V Power Supply	M76_MLB	03/12/2007
62	62	1.8V DDR2 Supply	M76_MLB	03/19/2007
63	63	1.5V Power Supply	M76_MLB	03/12/2007
64	64	FW PHY Power Supplies	M76_MLB	03/19/2007
65	65	3.425V G3Hot Supply & Power Control	(MASTER)	(MASTER)
66	66	NV G84M PCI-E	(MASTER)	(MASTER)
67	67	NV G84M Core/FB Power	(MASTER)	(MASTER)
68	68	NV G84M Frame Buffer I/F	(MASTER)	(MASTER)
69	69	GDDR3 Frame Buffer A	(MASTER)	(MASTER)
70	70	GDDR3 Frame Buffer B	(MASTER)	(MASTER)
71	71	NV G84M GPIO/MIO/Misc	(MASTER)	(MASTER)
72	72	GPU Straps	(MASTER)	(MASTER)
73	73	NV G84M Video Interfaces	(MASTER)	(MASTER)
74	74	GPU (G84M) Core Supply	(MASTER)	(MASTER)
75	75	LVDS Display Connector	(MASTER)	(MASTER)
76	76	DVI Display Connector	(MASTER)	(MASTER)
77	77	LVDS Interface Mux	(MASTER)	(MASTER)
78	78	Project Specific Connectors	(M59_SYNC)	08/24/2006
79	79	CPU/FSB Constraints	T9_NOME	01/17/2007
80	80	NB Constraints	T9_NOME	01/17/2007
81	81	Memory Constraints	T9_NOME	01/17/2007
82	82	SB Constraints (1 of 2)	T9_NOME	01/17/2007
83	83	SB Constraints (2 of 2)	T9_NOME	01/17/2007
84	84	Clock & SMC Constraints	T9_NOME	01/17/2007
85	85	FireWire Constraints	T9_NOME	01/17/2007
86	86	GPU (G84M) Constraints	(MASTER)	(MASTER)
87	87	Project Specific Constraints	(MASTER)	(MASTER)
88	88	PCB Rule Definitions	(MASTER)	(MASTER)

ALIASES RESOLVED

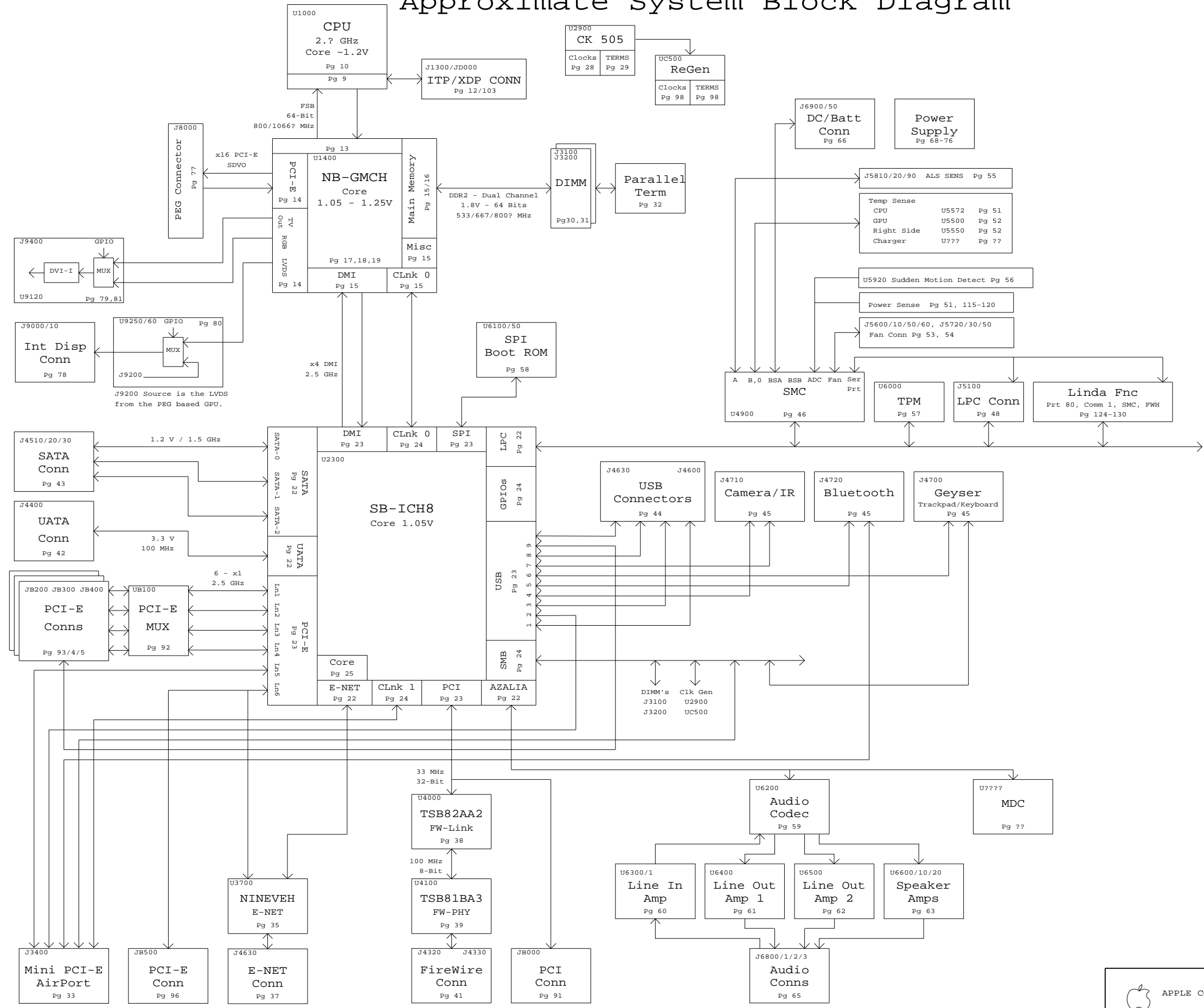
Schematic / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-7225	1	SCHEM, MLB, MBP15	SCH	CRITICAL	
820-2101	1	PCBF, MLB, MBP15	PCB	CRITICAL	

DRAWING
 TITLE=MLB
 ABBREV=DRAWING
 LAST_MODIFIED=Thu Apr 24 17:23:54 2007

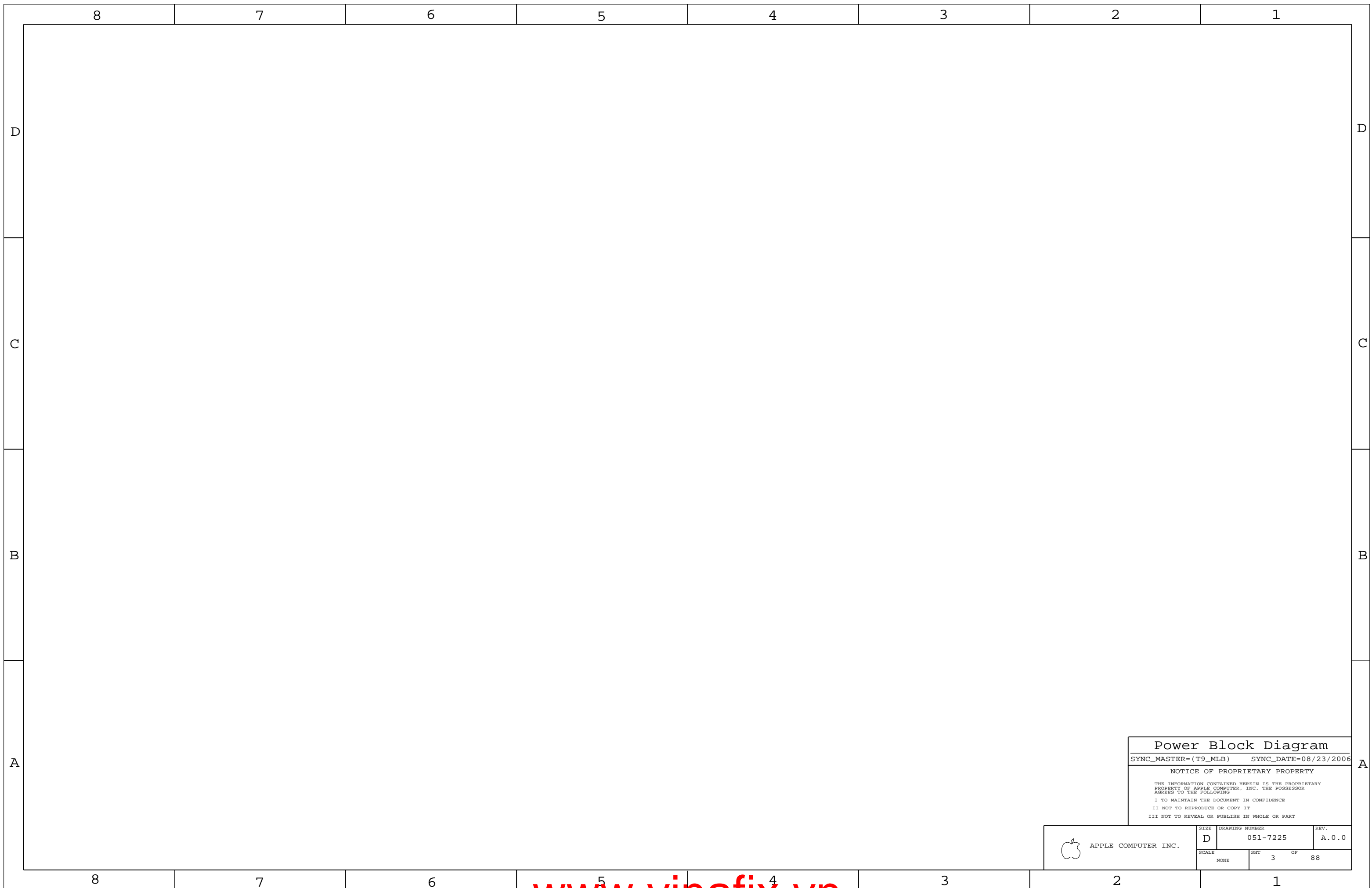
DIMENSIONS ARE IN MILLIMETERS		METRIC		Apple Computer Inc.	
XX :	_____	DRAPTR	/	DESIGN CK	/
X.XX :	_____	ENG APPD	/	MFG APPD	/
X.XXX :	_____	QA APPD	/	DESIGNER	/
ANGLES :	_____	RELEASE	/	SCALE	NONE
DO NOT SCALE DRAWING		MATERIAL/FINISH NOTED AS APPLICABLE		SIZE D	
 THIRD ANGLE PROJECTION		DRAWING NUMBER		051-7225	
		REV.		A.0.0	
		SHT		1 OF 88	

Approximate System Block Diagram



System Block Diagram
 SYNC_MASTER=(T9_MLB) SYNC_DATE=08/23/2006
 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT 2 OF 88		
NONE			



Power Block Diagram

SYNC_MASTER=(T9_MLB) SYNC_DATE=08/23/2006


NOTICE OF PROPRIETARY PROPERTY

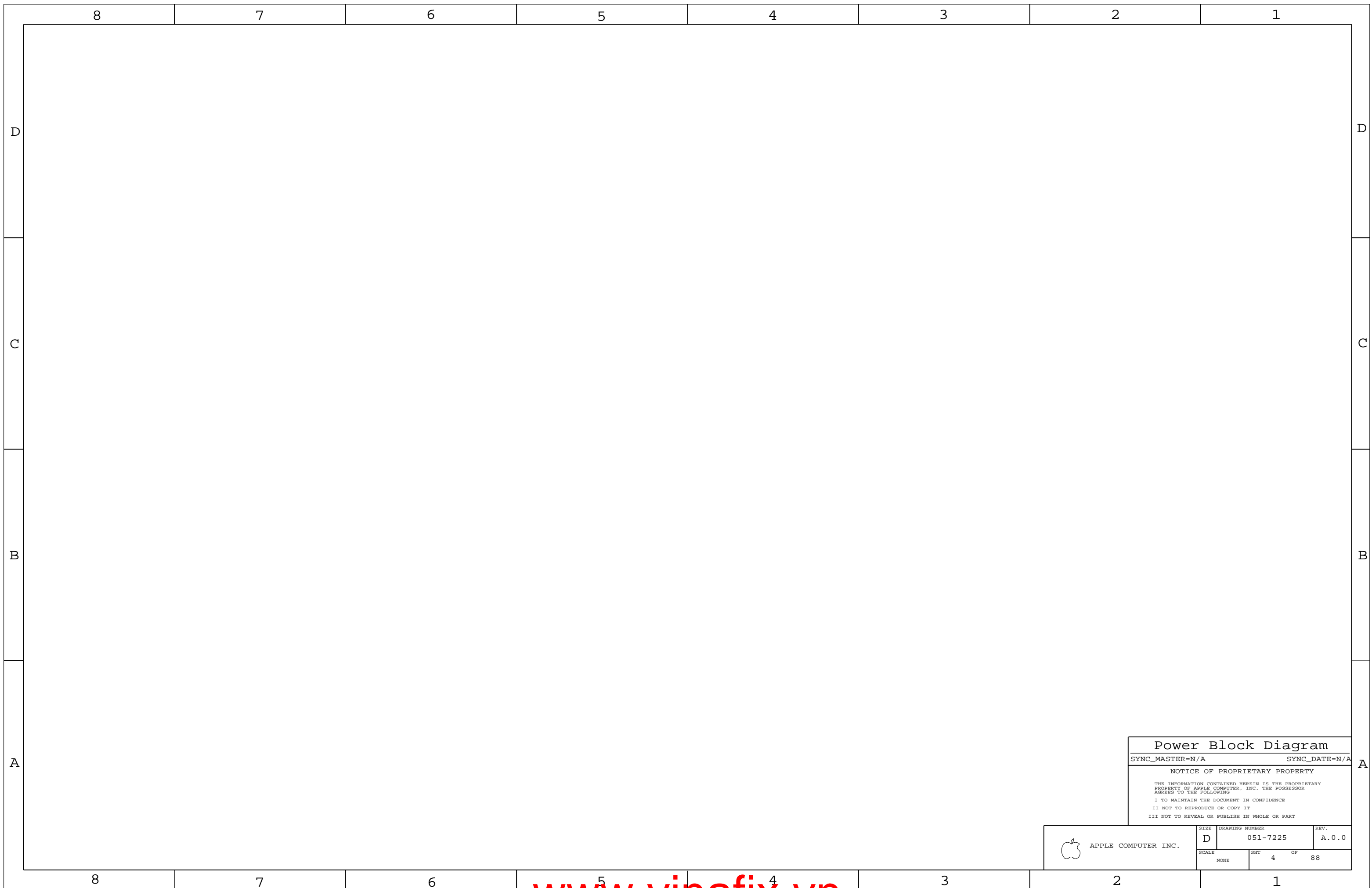
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	3	88	



Power Block Diagram

SYNC_MASTER=N/A SYNC_DATE=N/A


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 COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHIT 4	OF 88

BOM Variants

BOM NUMBER	BOM NAME	BOM OPTIONS
630-7931	PCBA, 2.2GHZ, 128SAM_VRAM, M75, MBP15	M75_COMMON, EEE_X5D, CPU_2_2GHZ, FB_128_SAMSUNG
630-7932	PCBA, 2.4GHZ, 256SAM_VRAM, M75, MBP15	M75_COMMON, EEE_X5E, CPU_2_4GHZ, FB_256_SAMSUNG
630-8659	PCBA, 2.2GHZ, 128HY_VRAM, M75, MBP15	M75_COMMON, EEE_XXS, CPU_2_2GHZ, FB_128_HYNIX
630-8662	PCBA, 2.4GHZ, 256HY_VRAM, M75, MBP15	M75_COMMON, EEE_XXT, CPU_2_4GHZ, FB_256_HYNIX

M75 BOM Groups

BOM GROUP	BOM OPTIONS
M75_COMMON	ALTERNATE, COMMON, M75_COMMON1, M75_COMMON2, M75_DEBUG, M75_PROGPARTS
M75_COMMON1	EXTGPU_RST_HW, ISL9504B, LVDS_SEL_RESUME, ONEWIRE_PU
M75_COMMON2	P1V8S3_1V825, SLG2AP101, SMS_MOT_DIS, YUKON_ULTRA, VGA_TERM_CONN
M75_DEBUG	SMC_DEBUG_NO, XDP, LPCPLUS
M75_PROGPARTS	BOOTROM_PROG, SMC_PROG

BOM GROUP	BOM OPTIONS
FB_128_SAMSUNG	VRAM_128, VRAM_SAMSUNG, VRAM_128_SAMSUNG
FB_128_HYNIX	VRAM_128, VRAM_HYNIX, VRAM_128_HYNIX
FB_256_SAMSUNG	VRAM_256, VRAM_SAMSUNG, VRAM_256_SAMSUNG
FB_256_HYNIX	VRAM_256, VRAM_HYNIX, VRAM_256_HYNIX

Bar Code Labels / EEE #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
826-4393	1	LBL, P/N LABEL, PCB, 28MM X 6 MM	[EEE:X5D]	CRITICAL	EEE_X5D
826-4393	1	LBL, P/N LABEL, PCB, 28MM X 6 MM	[EEE:X5E]	CRITICAL	EEE_X5E
826-4393	1	LBL, P/N LABEL, PCB, 28MM X 6 MM	[EEE:XXS]	CRITICAL	EEE_XXS
826-4393	1	LBL, P/N LABEL, PCB, 28MM X 6 MM	[EEE:XXT]	CRITICAL	EEE_XXT

Module Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
337S3464	1	IC, MDC, SR, E1, PRQ, 2.2G, 35W, 800FSB, 4M, BGA	U1000	CRITICAL	CPU_2_2GHZ
337S3465	1	IC, MDC, SR, E1, PRQ, 2.4G, 35W, 800FSB, 4M, BGA	U1000	CRITICAL	CPU_2_4GHZ
338S0388	1	IC, GPU, NV G84M, BGA	U8000	CRITICAL	
338S0432	1	IC, NB, CRESTLINE, GM, CO, PRQ, 965PM	U1400	CRITICAL	
338S0434	1	IC, SB, ICH8M, B1, PRQ, BGA	U2300	CRITICAL	
353S1461	1	IC, ISL9504, SYNC REG CTRL, 2PHAS, QFN48, LF	U7100	CRITICAL	ISL9504A
353S1651	1	IC, ISL9504B, 2PH IMVP6 REG, PMON, QFN48	U7100	CRITICAL	ISL9504B
359S0127	1	IC, 68 PIN, CK505, LOW POWER CLOCK GENER	U2900	CRITICAL	SLG8LP537
359S0130	1	IC, SLG2AP101, 1.5W PWR CLK GEN, CK505, QFN68	U2900	CRITICAL	SLG2AP101
338S0386	1	IC, 88E8058, GIGABIT ENET XCVR, 64P QFN	U3700	CRITICAL	
338S0274	1	IC, SMC, HSS/2116	U4900	CRITICAL	SMC_BLANK
341S2004	1	IC, SMC, DEVELOPMENT, M75	U4900	CRITICAL	SMC_PROG
335S0384	1	IC, 16MBIT 8-PIN SPI SERIAL FLASH, SOIC8	U6100	CRITICAL	BOOTROM_BLANK
341S2002	1	IC, EFI ROM, DEVELOPMENT, M75	U6100	CRITICAL	BOOTROM_PROG

333S0404	4	IC, SGRAM, GDDR3, 8Mx32, 700MHZ, 136 FBGA	U8400, U8450, U8500, U8550	CRITICAL	VRAM_128_SAMSUNG
333S0409	4	IC, SGRAM, GDDR3, 8Mx32, 700MHZ, 136 FBGA	U8400, U8450, U8500, U8550	CRITICAL	VRAM_128_HYNIX
333S0382	4	IC, SGRAM, GDDR3, 16Mx32, 700MHZ, 136 FBGA	U8400, U8450, U8500, U8550	CRITICAL	VRAM_256_SAMSUNG
333S0401	4	IC, SGRAM, GDDR3, 16Mx32, 700MHZ, 136 FBGA	U8400, U8450, U8500, U8550	CRITICAL	VRAM_256_HYNIX

PART NUMBER	IS ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
157S0011	157S0030		ALL	See alt to TOK/BI-Tech magnetica
152S0476	152S0276		ALL	Inductor alternate
353S1681	353S1294		ALL	TI alt to National
138S0603	138S0602		ALL	Murata alt to Samsung

BOM Configuration

SYNC_MASTER=N/A SYNC_DATE=N/A

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 COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHEET 5	OF 88

PROTO

See Perforce change notes for updates before Proto Release
12/22/06 -- Released for Proto (Schem Rev 08, PCB Rev 01)

EVT

8.1.0:
01/05/07 -- Clock Termination: Removed NO STUFF property from R3067
01/05/07 -- GPU FB: Corrected FB CLK termination (added cap and removed connection to VDDQ)
8.2.0:
01/08/07 -- GPU FB: Added VREF support for unterminated memory mode (added FETs and pulldown Rs)
9.0.0:
01/09/07 -- Temp Sensors: NO STUFFed C5520 (circuit should have only 1 cap)
01/12/07 -- Power Aliases: Moved Ethernet to PP3V3_S3 from S5 (layout improvements)
01/12/07 -- Power Supplies: Minor power supply feedback connection changes from M76
9.1.0:
01/17/07 -- Power Aliases: Moved LCD panel FET to PP3V3_S5 from S0
01/17/07 -- SMBus: Changed R5260 & R5261 from 4.7K to 3.3K
01/17/07 -- Sync with T9 noME (6.1.4) to pull in WOL_EN and Wake-on-Wireless support
01/17/07 -- Power FETs: Corrected BOM values for 5V/3.3V S3/S0 FETs
01/17/07 -- Power Sequencing: Added RC delay on PP1V8_S3 switcher enable
01/17/07 -- Testpoints: Removed FUNC_TEST from NB_RESET_L and FSB_DPWR_L per PCB request
01/17/07 -- BOM: Consolidated 3 caps on page 59 from 132S0120 to 132S0131
01/17/07 -- BOM: Added Hynix BOM configurations
9.2.0:
01/17/07 -- Power Aliases: Deleted alias that accidentally eliminated filtering on PP1V5_S0_SB_VCC1_5_B
01/18/07 -- Clock Termination: Changed series termination on all single ended clocks to 33 ohms
01/18/07 -- IMVP: Updated BOMPTIONS and values for ISL9504B
01/18/07 -- Testpoints: Added NO_TEST property to LVDS_L_DATA_N<1>, _N<2>, _P<2> due to lack of layout space for TP
01/18/07 -- ODD Conn: Reconnected ODD power FET gate control circuitry to properly implement soft start (added one cap)
9.3.0:
01/19/07 -- SB Decoupling: Removed filtering for PP1V5_S0_SB_VCCGLANPLL to enable PP1V5_S0 corrections at SB
01/19/07 -- Ethernet Conn: Changed resistor short reference designators from R392x to RX392x
01/19/07 -- Clock Termination: Changed R3050 and R3055 to bypass discrete muxes for pending change to SLG2AP101
01/19/07 -- Power Sequencing: Added C7859 to create RC delay for 1.5 and 1.05V S0 rails
01/19/07 -- Power Sequencing: Changed power rail for U7850 to PP3V3_S5 to eliminate a leakage path
9.4.0:
01/19/07 -- GPU GPIOs: Added 2 TPs on GPIOs to make G-state externally visible
01/19/07 -- SB GPIOs: Changed SB_GPIO42 to WOW_EN and changed pullup to pulldown (T9_noME change 40787)
9.5.0:
01/22/07 -- LIO Conn: Removed unnecessary aliases as T9 reference design now matches M75 (T9_noME change 40998)
01/22/07 -- Clocks: Changed U2900 to SLG2AP101 as primary clock chip (T9_noME change 40975)
01/22/07 -- Clock Termination: Added R3051 for Silego 537/101 compatibility
01/22/07 -- BOM: Added BOMPTIONS for SLG2AP101 (primary) and SLG8LP537 (backup)
01/22/07 -- BOM: Selected P1V8S3_1V825 BOMPTION to lift voltage at FB memories
10.0.0:
01/23/07 -- BOM: Changed C3860/61 to 22pF from 27 pF based on -R characterization (T9_noME change 41248)
01/23/07 -- BOM: Changed FB memories to new Samsung and Hynix APNs (also added new BOMPTIONS to GPU straps)
01/23/07 -- Released for EVT (Schem Rev 10, PCB Rev 02)

EVT_SE

10.1.0:
01/24/07 -- PATA Conn: Added pass FET Q4430 to allow PCIREQ3 (ODD reset GPIO) to pullup to S0
01/24/07 -- PATA Conn: Changed =PP5V_S0_ODDPWREN to =PP3V3_S0_ODDPWREN for minor power savings
01/24/07 -- Power Aliases: Updated PP3V3_S0 aliases to support above changes
10.2.0:
01/25/07 -- PATA Conn: Replaced PCIREQ pass FET with OD buffer to correct a corner case during PLTRST
01/25/07 -- Power Aliases: Updated PP5V_S0 aliases to support above changes
11.0.0:
01/25/07 -- BOM: Updated gain of PP1V25_ENET current sense amplifier to 165 (R5432 to 165K)
01/25/07 -- BOM: Updated all Intel APNs to use QS parts
01/25/07 -- Released for EVT (Schem Rev 11, PCB Rev 03)
12.0.0:
02/19/07 -- GPU Reset: Changed C2885 to 0.047uF to reduce reset delay on powerup
02/19/07 -- GPU PGOOD: Changed C9595 to 330pF to reduce PGOOD delay on powerup
02/19/07 -- Power Sequencing: NO STUFFed U7885 to remove GPU PGOOD from PWROK chain
02/19/07 -- Power Sequencing Rework: Short pins 2 and 4 of U7885 to complete PWROK chain
02/19/07 -- Released post-EVT to document what was built (Schem Rev 12)

DVT

12.1.0:
02/20/07 -- GPU FB: Changed cal resistors per Nvidia PUN (R8290 to 45.3 ohm and R8291 to 24.9 ohm)
02/20/07 -- GPU FB: Changed unterminated-mode reference voltage to 40% (R8297 -> 1.02K, R8432/82, R8532/82 -> 2.21K)
02/21/07 -- FireWire: Changed to Rev C of TI FireWire MCM (APN: 338S0435)
02/21/07 -- Power Sequencing: Removed U7885/C7885 to take GFX_PGOOD out of PWR_OK chain (rdar://4974927)
02/26/07 -- GPU Vcore: NO STUFFed all PWRCTL related components (feature not to be supported)
02/26/07 -- GPU Vcore: Updated voltage setpoints to 1.000/1.070/1.125V (rdar://5021453)
02/26/07 -- SB GPIOs: Sync'd page25.csa to T9_MLB to get pullup updates
02/26/07 -- Thermal Sensors: Updated topology of EMC1033 filter caps (added C5515 next to IC, moved other caps to connectors - rdar://5025773)
12.2.0:
02/27/07 -- ODD Conn: Changed ODD power FET to FDC606P (from FDC638P) for reduced Rds(on) (rdar://4993378)
02/28/07 -- Power Aliases: Moving PP1V8_GPU FET source to PP1V8_S3 rather than PP1V8_S3_ISNS to improve power delivery to GPU (rdar://5021462)
12.3.0:
02/28/07 -- Left Clutch IC: Updated both I-PEX connectors to new APN (part update for shell plating)
02/28/07 -- NB GFX Core: Changed Vcore controller to ISL6263B (part consolidation effort between Apple/Intersil - rdar://5009109)
02/28/07 -- Power Supplies: Replaced APN 152S0511 with 152S0368 (duplicate APNs for same part - rdar://5009109)
03/01/07 -- Thermal Sensors: Updated topology of EMC1033 sensors (removed shorts, changed connector caps to 18pF)
03/01/07 -- NB GFX Decoupling/Power Aliases: Connected VCCD_CRT of NB to GND per CRT disable guidelines
12.4.0:
03/01/07 -- LVDS Connector: Changed pin 5 of connector from NC to PP3V3_SW_LCD (in case we add extra cable for power - rdar://5024882)
03/01/07 -- NB GFX Decoupling: Added R2260 (0.3 ohm, 0603) to bring ESR of regulator output cap in spec (rdar://5000272)
12.5.0:
03/02/07 -- Power/Signal Aliases: Added XW0900 to PP5V_S5 to enable layout improvements
12.6.0:
03/06/07 -- Power FETs: Changed Q7080 to RJK0301 which provides much lower Rds(on)
03/06/07 -- FireWire Ports: Changed D4260 to PDS340 for lower height
12.7.0:
03/06/07 -- FireWire Ports: Changed D4260 to PDS540 for higher current capacity
03/06/07 -- Ethernet Connector: Removed RX shorts on Ethernet MDI lines per EMC request
03/06/07 -- SB GPIOs: Changed R2514 from pulldown to pullup to correct auto power-on issue (Linda card detect GPIO)
03/06/07 -- DDR2 Regulator: Changed FB resistors to 0.1% to raise guaranteed lowest output voltage

DVT (cont'd)

12.8.0:
03/08/07 -- Thermal Sensors: Added R5515/R5516 in case low pass filter is needed for EMC1033
13.0.0:
03/12/07 -- Power Control: Corrected alias connections for 5V/3V3 S5 enable signals
13.1.0:
03/13/07 -- BOM Options: Removed HDCP BOM option from stuffing list (feature removed)
03/14/07 -- Constraints: Constrained WWAN_SIM signals to 50 ohms
03/14/07 -- Thermal Sensors/Aliases: Changed mounting pads of Th2H sensor connector to left clutch chassis gnd
13.2.0:
03/16/07 -- Thermal Sensors: Replaced EMC1033 with second EMC1043 for improved noise filtering
03/16/07 -- NB GFX: LVDS_VREFL/VREFH changed to single pin nets to prevent LVDS glitches per Intel
03/16/07 -- Yukon Power Control: Crystal caps changed to 18pF (rdar://4946795 and rdar://4945362)
13.3.0:
03/16/07 -- Thermal Sensors: Moved remote sensor U5500 to SMC SMBus "A" and S3 power rail to clear I2C addr clash
13.4.0:
03/19/07 -- Thermal Sensors: Updated U5500 power alias to indicate device should be on S3 rail
03/19/07 -- Power Control: Added U7858 to level shift PM_G2_EN from 3.42V to 5V
03/19/07 -- Power Supplies: For 1.8, 3.3 and 5V, removed VBST 0-ohm series R (rdar://5070179)
03/19/07 -- Power Supplies: For 1.8, 3.3 and 5V, increased cap size to 0603/0805 on VBST caps (rdar://5070179)
13.5.0:
03/19/07 -- Power Control: Tied all 4 5V/3.3V enables (EN1, EN2, EN3, EN5) together as part of PM_G2_EN
14.0.0:
03/20/07 -- GPU Vcore: Updated setpoints for GPU Vcore based upon Nvidia Vmin (i.e. 1.05V,1.05V,1.05V,1.125V)
03/20/07 -- FB: Changed FB VREF caps to 2x0.0047uF as required in Nvidia PUN 02736-001-v07 (which requests 1x0.01uF)
15.0.0:
03/30/07 -- SIL: Changed R5031 to 2.21K and R5032 to 9.53K to raise SIL current approx 15% (lightpipe dimmed by 20%)
03/30/07 -- Power Supply: Changed 1.05V power supply current limit to 10A from 8A (R7455 to 5.62k -- rdar://5095642)
04/03/07 -- Power Supply: Changed numerous 10K Rs to 100K for Energy Star compliance (rdar://5102118)
04/03/07 -- GPU FB: Changed FB clock termination to 242 ohms (2x121) per Nvidia PUN
04/03/07 -- CPU Vcore: Changed R7117,C7134 and R7115,R7130 for calibration improvements (rdar://5085959)
04/03/07 -- Released for DVT (BOM update)
16.0.0:
04/17/07 -- Power Sequencing: NO STUFFED U7858 and stuffed R7860 to allow SMC to drive S5 enable pins directly
04/17/07 -- Released for DVT (As-Built)
PVT
16.1.0:
04/18/07 -- GPU Misc: Added R8735-37 to implement PCI DEVID 0x407 in hardware
16.2.0:
04/18/07 -- Power FETs: Changed Q7095 to FDM6296 and pulled up to PBUS for better PP1V25_S0 FET Rds(on)
04/18/07 -- Modules: Updated Intel chipset to PRQ parts
16.3.0:
04/20/07 -- Power FETs: Changed R7097 to 220K to maintain EnergyStar compliance with FET gate pulled to PBUS
04/20/07 -- Power FETs: Changed C7095/C7083 to 16V for proper rating of parts tied to PBUS
04/20/07 -- CPU VCore: Changed C7196 to 16V to eliminate a BOM item
17.0.0:
04/20/07 -- No changes. Weekly BOM release.
A.0.0:
04/24/07 -- SB Decoupling: Changed L2700 from 155S0152 to 155S0333 for AVL updates
04/24/07 -- SMC Support: Changed R5031 to 2.37K, R5032 to 9.09K to meet SIL brightness targets
04/24/07 -- Released for PVT

Revision History

SYNC_MASTER=N/A SYNC_DATE=N/A

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

Table with columns: SCALE, DRAWING NUMBER, REV. Values: NONE, 051-7225, A.0.0

Functional Test Points

ICT Test Points

Fan Connectors

FUNC_TEST	Pin
TRUE PP5V_S0	7 8 27 42 47 52 57
TRUE FAN_LT_PWM	52
TRUE FAN_LT_TACH	52
TRUE FAN_RT_PWM	52
TRUE FAN_RT_TACH	52

Battery Digital Connector

FUNC_TEST	Pin
TRUE SMC_BS_ALERT_L	45 46 56
TRUE SMBUS_SMC_BSA_SCL	45 48 56 84
TRUE SMBUS_SMC_BSA_SDA	45 48 56 84
TRUE GND_BATT	56

CPU FSB NO_TESTS

NO_TEST	Pin
TRUE FSB_A_L<31..3>	10 14 79
TRUE FSB_ADS_L	10 14 79
TRUE FSB_ADSTB_L<1..0>	10 14 79
TRUE FSB_BNR_L	10 14 79
TRUE FSB_BREQ0_L	10 14 79
TRUE FSB_D_L<63..0>	10 14 79
TRUE FSB_DBSY_L	10 14 79
TRUE FSB_DINV_L<3..0>	10 14 79
TRUE FSB_DRDY_L	10 14 79
TRUE FSB_DSTB_L_N<3..0>	10 14 79
TRUE FSB_DSTB_L_P<3..0>	10 14 79
TRUE FSB_HIT_L	10 14 79
TRUE FSB_HITM_L	10 14 79
TRUE FSB_LOCK_L	10 14 79
TRUE FSB_REQ_L<4..0>	10 14 79

NB NO_TESTS

NO_TEST	Pin
TRUE NC_NB_NC<1..16>	== TP_NB_NC<1..16> 16

LPC+ Debug Connector

FUNC_TEST	Pin
TRUE PP3V42_G3H	8 28 35 41 45 46 47
TRUE PP5V_S0	7 8 27 42 47 52 57 58
TRUE LPC_AD<0>	23 45 47
TRUE LPC_AD<1>	23 45 47
TRUE LPC_FRAME_L	23 45 47
TRUE PM_CLKRUN_L	25 45 47
TRUE PCI_FW_GNT_L	24 38 47 83
TRUE SMC_TMS	45 46 47
TRUE DEBUG_RESET_L	28 47
TRUE SMC_TRST_L	45 47
TRUE SMC_TDO	45 46 47
TRUE SMC_MD1	45 47
TRUE SMC_TX_L	43 45 46 47
TRUE FWH_INIT_L	47
TRUE PCI_CLK33M_LPCPLUS	30 47 84
TRUE LPC_AD<2>	23 45 47
TRUE LPC_AD<3>	23 45 47
TRUE INT_SERRIO	25 45 47
TRUE PM_SUS_STAT_L	25 45 46 47
TRUE SMC_TDI	45 46 47
TRUE SMC_TCK	45 46 47
TRUE SMC_RESET_L	45 46 47
TRUE SMC_NMI	45 47
TRUE SMC_RX_L	43 45 46 47
TRUE LINDACARD_GPIO	25 47

Left I/O Power Connector

FUNC_TEST	Pin
TRUE PPBUS_G3H	8 40 49 56 57 58 59 60 61 62 63
TRUE GND	

Request for at least 10 GND test points
NOTE: 10 additional GND test points are called out separately in these notes.

RTC Battery Connector

FUNC_TEST	Pin
TRUE PPVBATT_G3_RTC	28
TRUE GND	

Current Sense Calibration

FUNC_TEST	Pin
TRUE ISENSE_CAL_EN	45 49
TRUE PP5V_S3	7 8 44 46 49 53 57 78
TRUE PPVCORE_S0_NB_GFX	8 18 32 49
TRUE PPVCORE_S0_CPU	8 11 12 49
TRUE PPVCORE_GPU	8 49 67 74
TRUE GND	

6 TPs, 2 with each of above TP pairs

Left Clutch Barrel Connector

FUNC_TEST	Pin
TRUE PP5V_S3	7 8 44 46 49 53 57 78
TRUE USB_CAMERA_N	24 44 82
TRUE USB_CAMERA_P	24 44 82
TRUE PP5V_S3	7 8 44 46 49 53 57 78
TRUE USB_WWAN_N	24 44 82
TRUE USB_WWAN_P	24 44 82

Other Func Test Points

FUNC_TEST	Pin
TRUE PM_SYSRST_L	25 28 45
TRUE SMC_ONOFF_L	45 46 78

Left ALS Connector

FUNC_TEST	Pin
TRUE PP3V3_S3	8 36 38 48 50 51 53
TRUE ALS_GAIN	45 53 78
TRUE LTALS_OUT	53 78
TRUE GND	

Thermal Diode Connectors

FUNC_TEST	Pin
TRUE HSTHMSNS_D_P	51 87
TRUE HSTHMSNS_D_N	51
TRUE RSFTHMSNS_D_P	51 87
TRUE RSFTHMSNS_D_N	51
TRUE CPUTHMSNS_D2_P	51 87
TRUE CPUTHMSNS_D2_N	51

CPUTHMSNS can not be supported due to layout constraints

System Validation TPs

FUNC_TEST	Pin
TRUE CPU_PWRGD	10 13 23 79
TRUE CPU_DPSLP_L	7 10 23 79
TRUE PM_DPRS_LPVR	16 25 58 79
TRUE CPU_DPSLP_L	7 10 23 79
TRUE PM_LAN_ENABLE	25 45
TRUE PCI_RST_L	24 28
TRUE PM_RSMRST_L	25 45
TRUE PM_SB_PWROK	9 25 28
TRUE SB_RTC_RST_L	23 28
TRUE PM_STPCPU_L	25 29 30
TRUE PM_STPPCI_L	25 29 30
TRUE VR_PWRGD_CLKEN	25 28
TRUE VR_PWRGD_DELAY	9 16 28 58
TRUE FSB_CPURST_L	10 13 14 79
TRUE FSB_CPUSLP_L	10 14 79
TRUE FSB_DPWR_L	10 14 79
TRUE NB_SB_SYNC_L	16 25

FUNC_TEST	Pin
TRUE IMVP_VR_ON	45 58
TRUE IMVP_DPRS_LPVR	58 79
TRUE PM_SLP_S3_L	25 35 36 40 45 49 57 62 65
TRUE PM_S4_STATE_L	25 34 43 45 57 65
TRUE PM_SLP_S5_L	25 45 46
TRUE PM_ENET_EN	36 61 65
TRUE P1V5P1V05S0_PGOOD	61 63 65
TRUE CPU_DPRSTP_L	10 16 23 58 79
TRUE IMVP6_VID<6..0>	12 58 79
TRUE PLT_RST_L	24 28 77
TRUE NB_RESET_L	16 28
TRUE GPU_RESET_L	28 66
TRUE SMC_LRESET_L	28 45
TRUE CPU_STPCLK_L	10 23 79
TRUE FSB_CLK_NB_P	14 29 30 84
TRUE FSB_CLK_NB_N	14 29 30 84
TRUE NB_CLKREQ0_L	16 29
TRUE NB_CLK100M_PCIE_P	16 29 30 84
TRUE NB_CLK100M_PCIE_N	16 29 30 84
TRUE NB_CLK96M_DOT_P	84
TRUE NB_CLK96M_DOT_N	84
TRUE NB_CLK100M_DPLLSS_P	16 22 29 30 84
TRUE NB_CLK100M_DPLLSS_N	16 22 29 30 84
TRUE CPU_THERMTRIP_R	33

Functional / ICT Test

SYNC_MASTER=(MASTER) 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	7	88	



Power Aliases

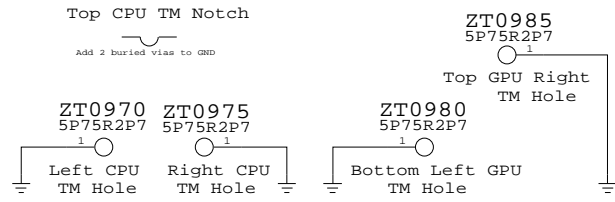
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

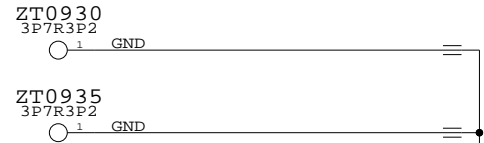
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	8	88	

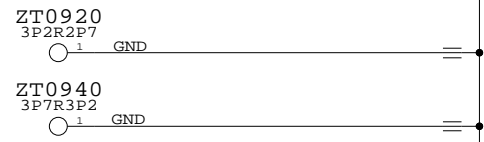
Thermal Module Holes



RAM Door (Torx) Holes

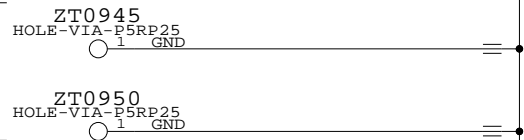


Frame Holes



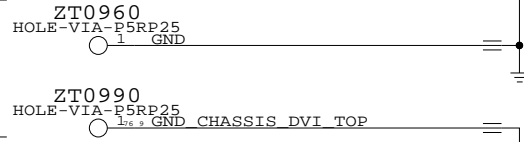
Board Edge Notches

(Can't be PTH)

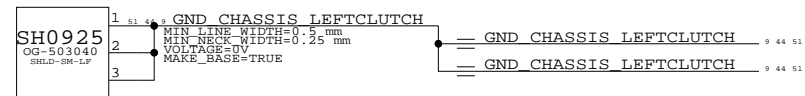
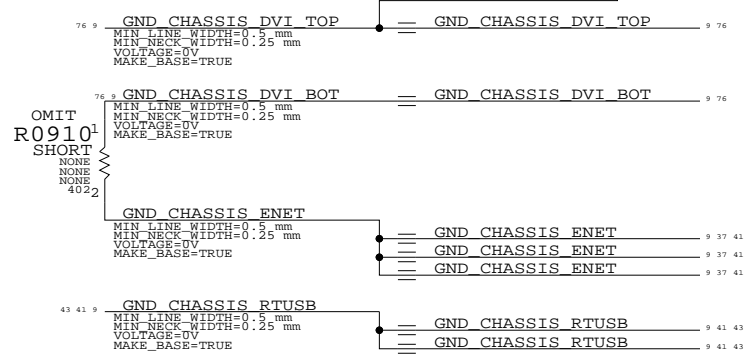


Tooling Holes

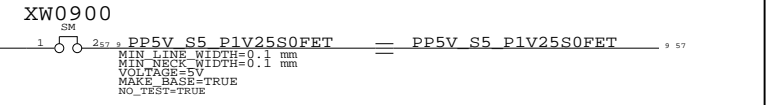
(Can't be PTH)



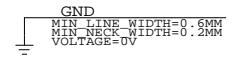
Chassis GNDs



28 25 9 7	PM_SB_PWROK MAKE_BASE=TRUE	==	PM_SB_PWROK	7 9 25 28
58 28 16 9 7	VR_PWRGOOD_DELAY MAKE_BASE=TRUE	==	VR_PWRGOOD_DELAY	7 9 16 28 58
54 45 9	SMC_SMS_INT MAKE_BASE=TRUE	==	SMC_SMS_INT	9 45 54
84 66 30 29 9	PEG_CLK100M_GPU_P MAKE_BASE=TRUE	==	PEG_CLK100M_GPU_P	9 29 30 66 84
84 66 30 29 9	PEG_CLK100M_GPU_N MAKE_BASE=TRUE	==	PEG_CLK100M_GPU_N	9 29 30 66 84
77 59 9	PM_ALL_NBGFX_PGOOD MAKE_BASE=TRUE	==	PM_ALL_NBGFX_PGOOD	9 59 77
59 16 9	GFX_VR_EN MAKE_BASE=TRUE	==	GFX_VR_EN	9 16 59
59	GFXIMVP6_VID<4..0> MAKE_BASE=TRUE	==	GFX_VID<4..0>	16
31 9	TP_MEM_A_A<15> MAKE_BASE=TRUE	==	TP_MEM_A_A<15>	9 31
32 9	TP_MEM_B_A<15> MAKE_BASE=TRUE	==	TP_MEM_B_A<15>	9 32
82 24 9	TP_USB_EXTCP MAKE_BASE=TRUE	==	TP_USB_EXTCP	9 24 82
82 24 9	TP_USB_EXTCN MAKE_BASE=TRUE	==	TP_USB_EXTCN	9 24 82



Digital Ground



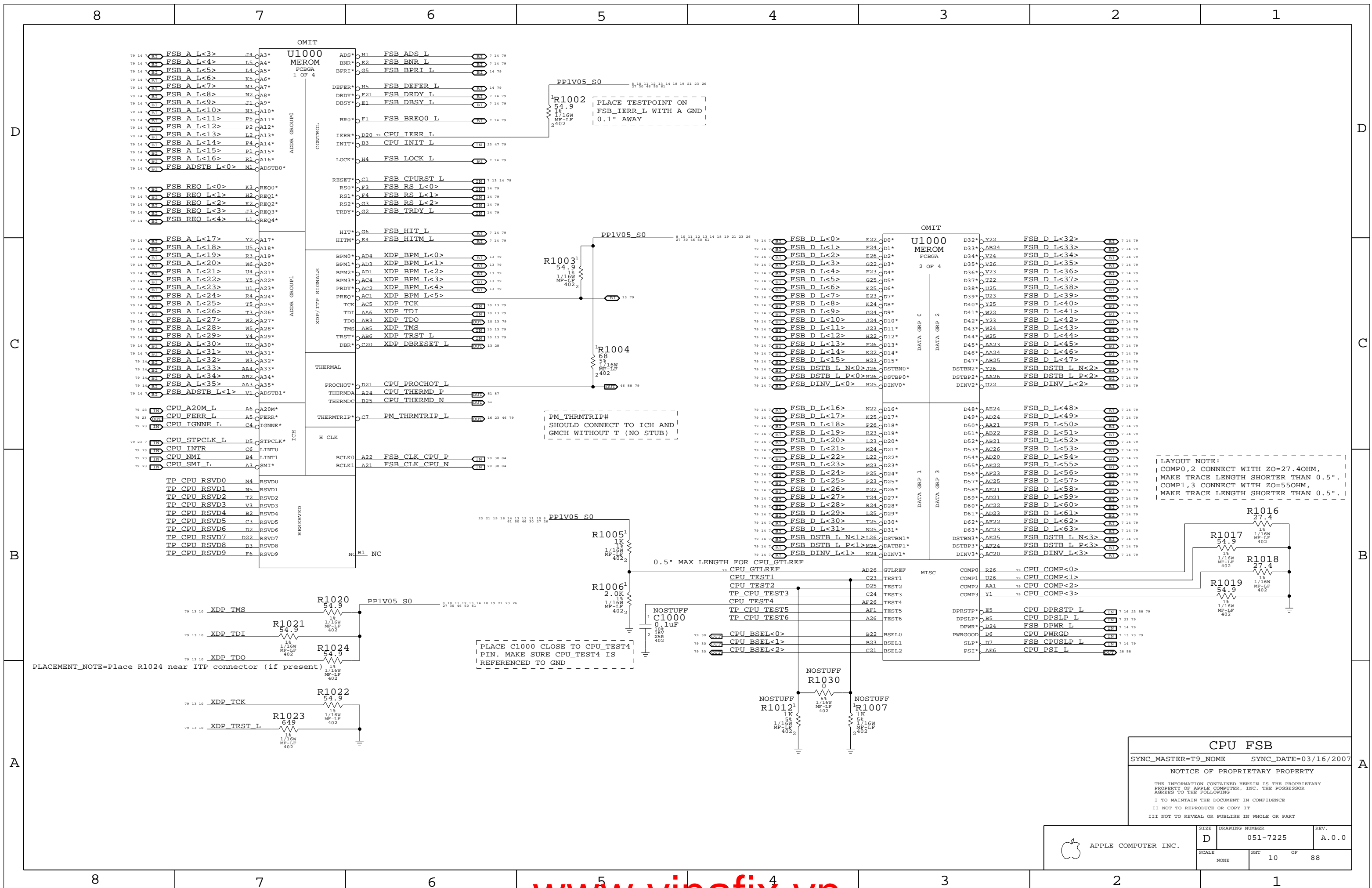
Signal Aliases

SYNC_MASTER=(T9_MLB) SYNC_DATE=08/23/2006

NOTICE OF PROPRIETARY PROPERTY

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

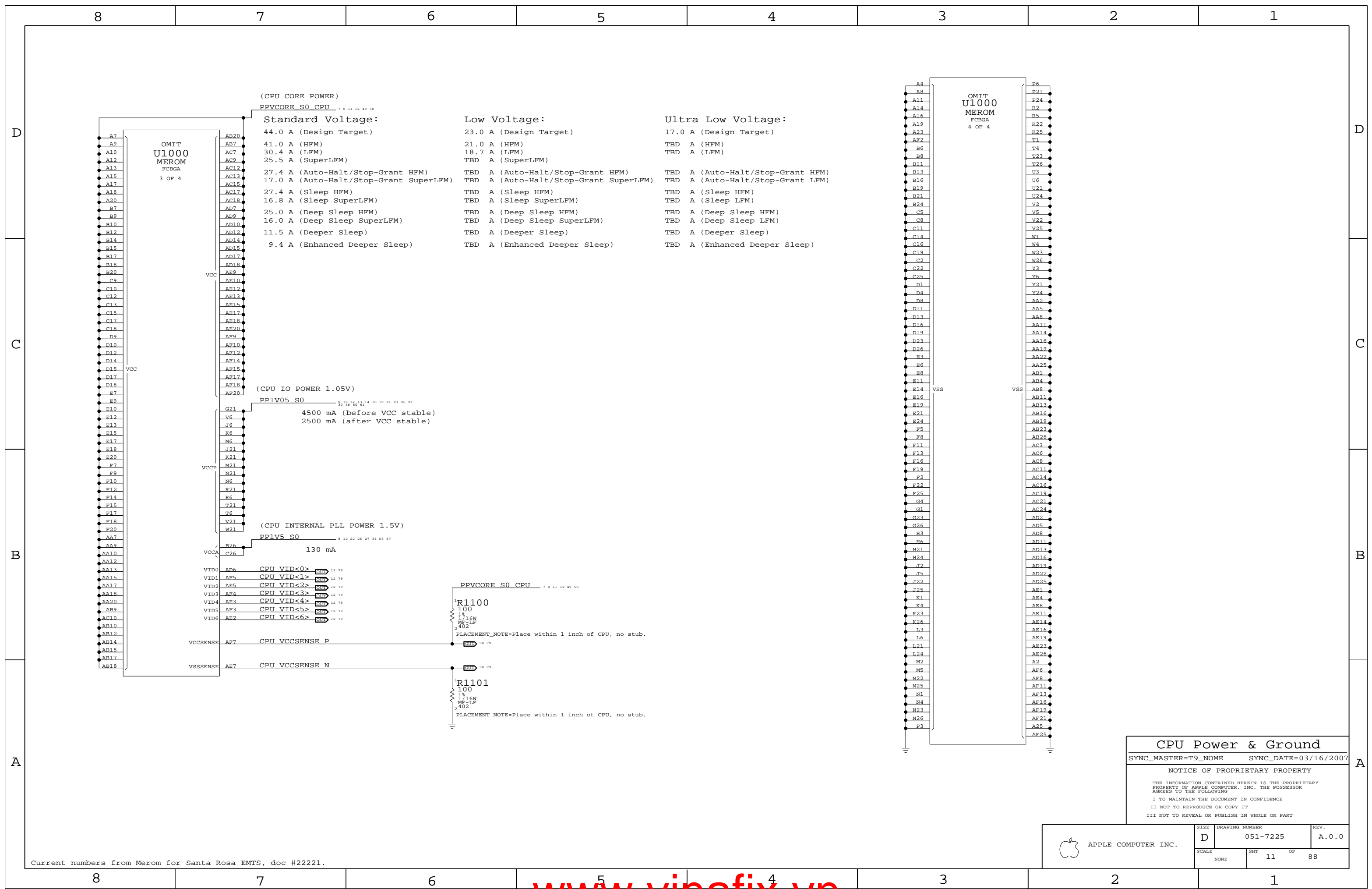
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	9	88	



LAYOUT NOTE:
 COMPO,2 CONNECT WITH ZO=27.4OHM,
 MAKE TRACE LENGTH SHORTER THAN 0.5".
 COMPL,3 CONNECT WITH ZO=55OHM,
 MAKE TRACE LENGTH SHORTER THAN 0.5".

CPU FSB
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007
 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	10	88	



(CPU CORE POWER)

PPV CORE S0 CPU 7 8 11 12 49 58

Standard Voltage:

- 44.0 A (Design Target)
- 41.0 A (HFM)
- 30.4 A (LFM)
- 25.5 A (SuperLFM)
- 27.4 A (Auto-Halt/Stop-Grant HFM)
- 17.0 A (Auto-Halt/Stop-Grant SuperLFM)
- 27.4 A (Sleep HFM)
- 16.8 A (Sleep SuperLFM)
- 25.0 A (Deep Sleep HFM)
- 16.0 A (Deep Sleep SuperLFM)
- 11.5 A (Deeper Sleep)
- 9.4 A (Enhanced Deeper Sleep)

Low Voltage:

- 23.0 A (Design Target)
- 21.0 A (HFM)
- 18.7 A (LFM)
- TBD A (SuperLFM)
- TBD A (Auto-Halt/Stop-Grant HFM)
- TBD A (Auto-Halt/Stop-Grant SuperLFM)
- TBD A (Sleep HFM)
- TBD A (Sleep SuperLFM)
- TBD A (Deep Sleep HFM)
- TBD A (Deep Sleep SuperLFM)
- TBD A (Deeper Sleep)
- TBD A (Enhanced Deeper Sleep)

Ultra Low Voltage:

- 17.0 A (Design Target)
- TBD A (HFM)
- TBD A (LFM)
- TBD A (Auto-Halt/Stop-Grant HFM)
- TBD A (Auto-Halt/Stop-Grant LFM)
- TBD A (Sleep HFM)
- TBD A (Sleep LFM)
- TBD A (Deep Sleep HFM)
- TBD A (Deep Sleep LFM)
- TBD A (Deeper Sleep)
- TBD A (Enhanced Deeper Sleep)

OMIT
U1000
MEROM
FCBGA
4 OF 4

CPU Power & Ground

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

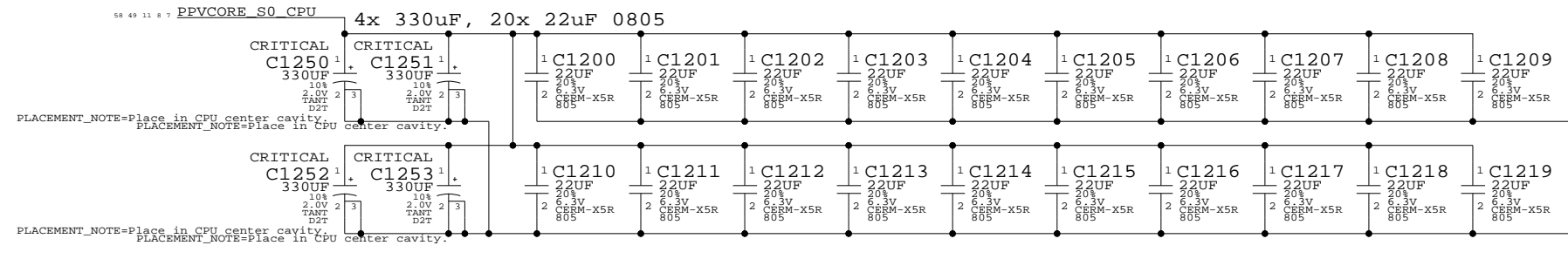
NOTICE OF PROPRIETARY PROPERTY

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	11	88	

Current numbers from Merom for Santa Rosa EMTS, doc #22221.

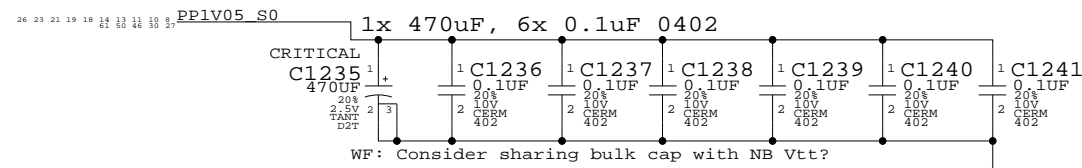
CPU VCORE HF AND BULK DECOUPLING



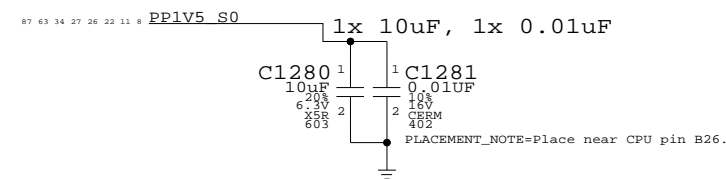
CPU VCORE VID CONNECTIONS

79 11 CPU VID<0..6> == IMVP6 VID<0..6> 7 58 79
MAKE_BASE=TRUE

VCCP (CPU I/O) DECOUPLING



VCCA (CPU AVdd) DECOUPLING



CPU Decoupling & VID

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

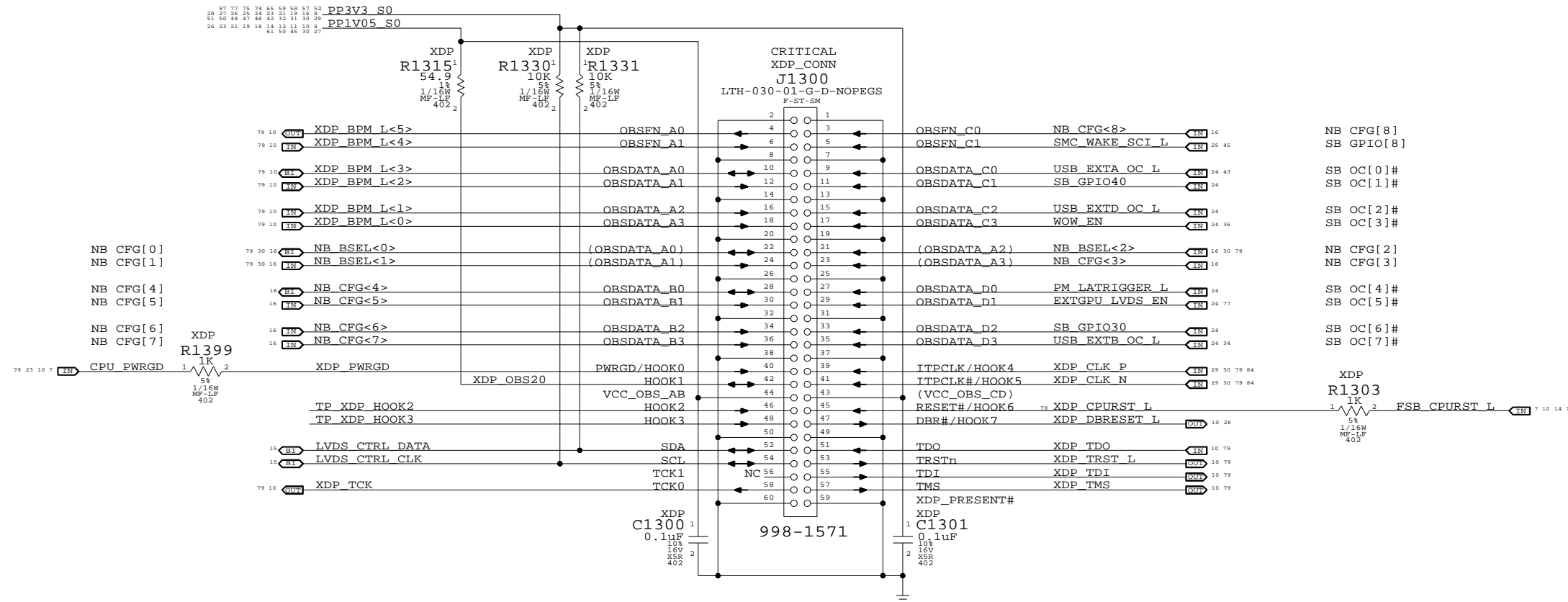
NOTICE OF PROPRIETARY PROPERTY

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT		OF
NONE	12		88

Mini-XDP Connector

NOTE: This is not the standard XDP pinout.
Use with 920-0451 adapter board to support CPU, NB & SB debugging.

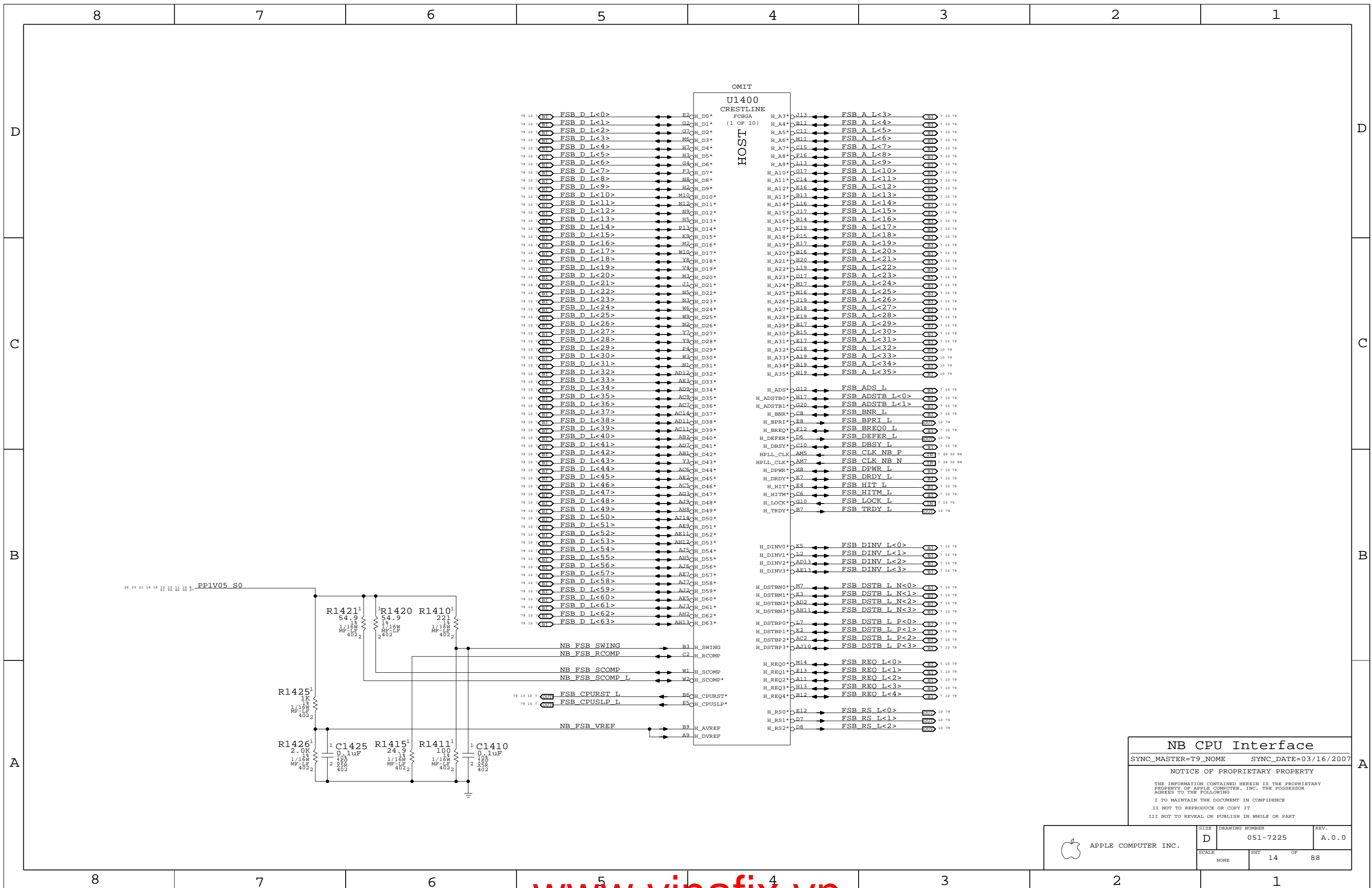


← Direction of XDP module
Please avoid any obstructions on even-numbered side of J1300

eXtended Debug Port (XDP)
SYNC_MASTER=T9_NOME SYNC_DATE=12/12/2006

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	13	88	



NB CPU Interface
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	14	88	

LVDS Disable

Can leave all signals NC if LVDS is not implemented. Tie VCC_TX_LVDS and VCCA_LVDS to GND.

If SDVO is used, VCCD_LVDS must remain powered with proper decoupling. Otherwise, tie VCCD_LVDS to GND also.

Note: SR DG says to tie LVDS_VREFH/L to GND. This causes a glitch during wake-up on LVDS DATA/CLK pairs. New recommendation is to float both signals, see Radar #5067636.

TV-Out Signal Usage:

Composite: DACA only
S-Video: DACB & DACC only
Component: DACA, DACB & DACC

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

TV-Out Disable / CRT Enable

Tie TVx_DAC and TVx_RTN to GND. Must power all TVDAC rails. VCCA_TVx_DAC and VCCA_DAC_BG can share filtering with VCCA_CRT_DAC.

CRT Disable / TV-Out Enable

Tie R/R#/G/G#/B/B#, HSYNC and VSYNC to GND. All CRT/TVDAC rails must be powered. All rails must be filtered except for VCCA_CRT.

CRT & TV-Out Disable

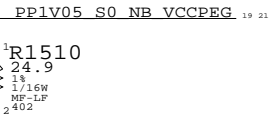
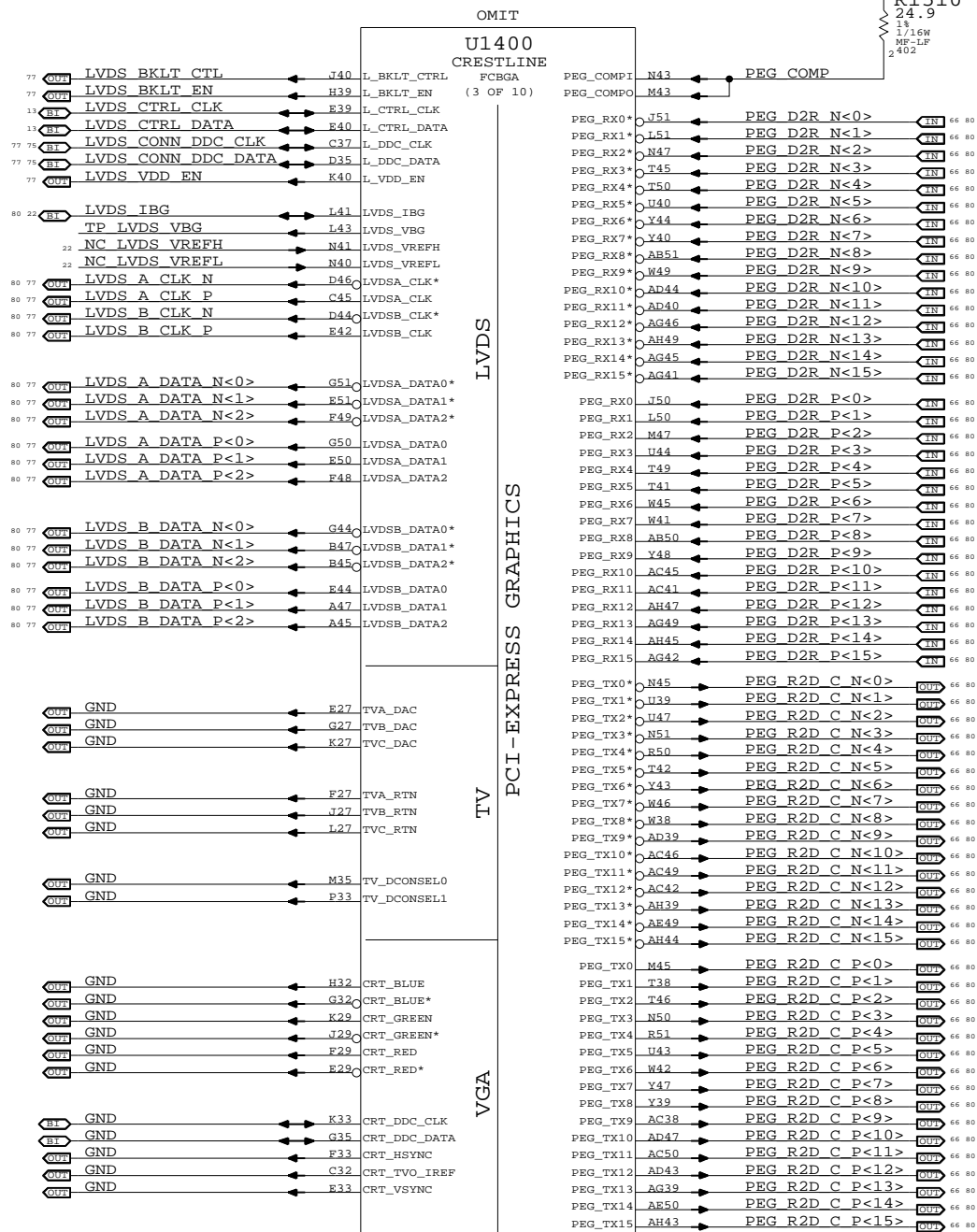
Tie TVx_DAC, TVx_RTN, R/R#/G/G#/B/B#, HSYNC, VSYNC and CRT_TVO_IREF to GND. Can tie the following rails to GND: VCCA_CRT_DAC, VCCA_DAC_BG, VCCA_TVx_DAC, VCCD_CRT, VCCD_QDAC and VCC_SYNC.

NOTE: Must keep VDDC_TVDAC powered and filtered at all times!

Internal Graphics Disable

Follow instructions for LVDS and CRT & TV-Out Disable above. Can also tie CRT_DDC*, L_CTRL*, L_DDC*, SDVO_CTRL* and TV_DCONSELx to GND.

Tie DPLL_REF_CLK and DPLL_REF_SSCLK to GND. Tie DPLL_REF_CLK* and DPLL_REF_SSCLK* to VCC (VCore). Tie VCCA_DPLLA and VCCA_DPLLB to VCC (VCore). Tie VCC_AXG and VCC_AXG_NCTF to GND. Leave GFX_VID<3..0> and GFX_VR_EN as NC.



SDVO Alternate Function

SDVO_TVCLKIN#
SDVO_INT#
SDVO_FLDSTALL#

SDVO_TVCLKIN
SDVO_INT
SDVO_FLDSTALL

SDVOB_RED#
SDVOB_GREEN#
SDVOB_BLUE#
SDVOB_CLKN
SDVOC_RED#
SDVOC_GREEN#
SDVOC_BLUE#
SDVOC_CLKN

SDVOB_RED
SDVOB_GREEN
SDVOB_BLUE
SDVOB_CLKP
SDVOC_RED
SDVOC_GREEN
SDVOC_BLUE
SDVOC_CLKP

NB PEG / Video Interfaces

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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

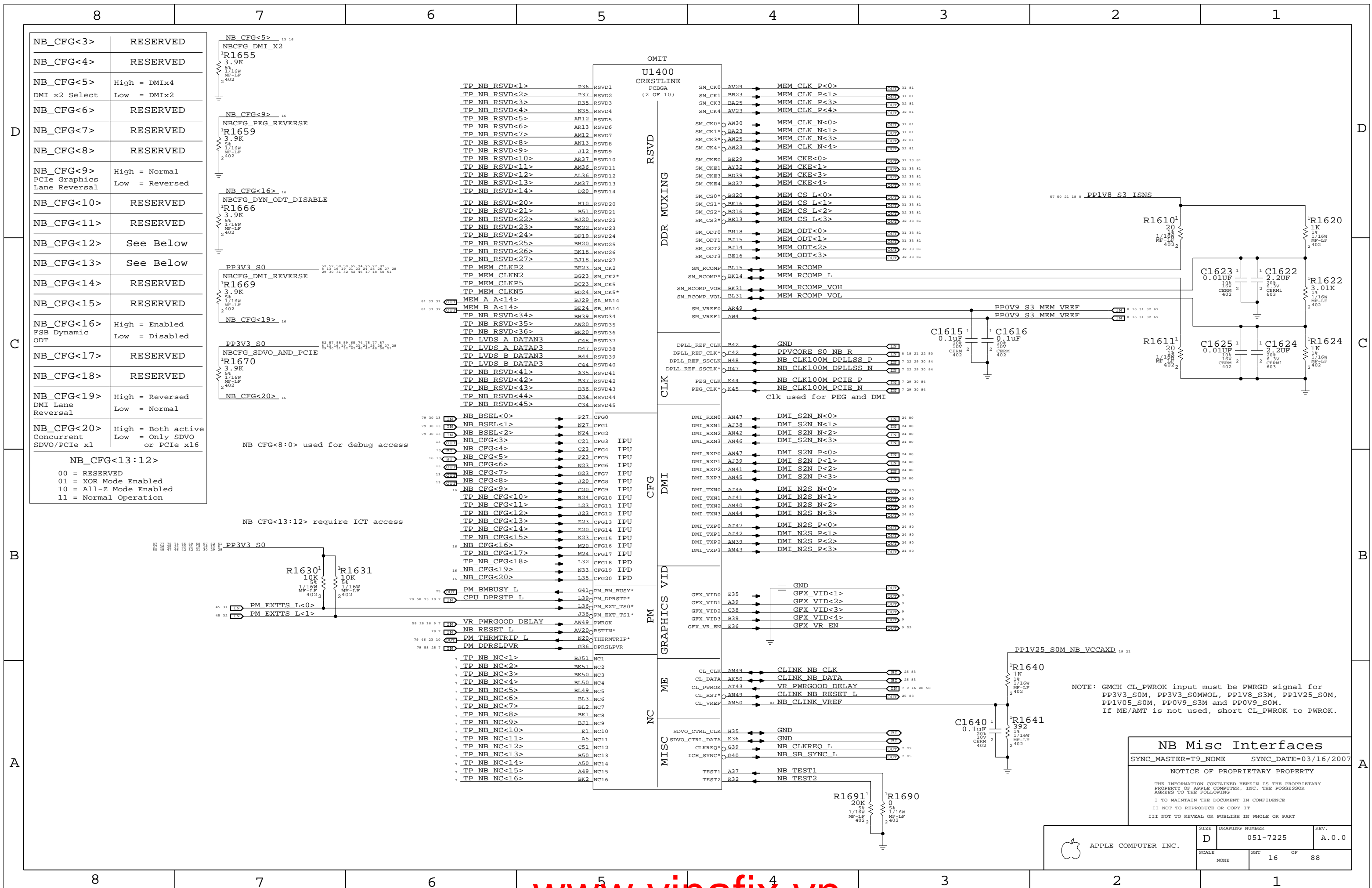
II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

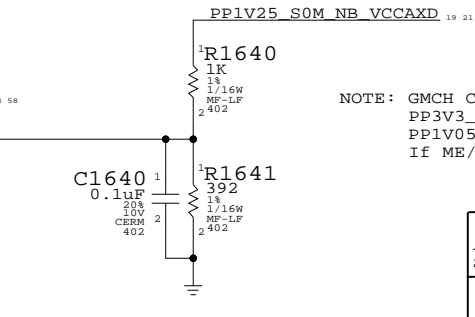
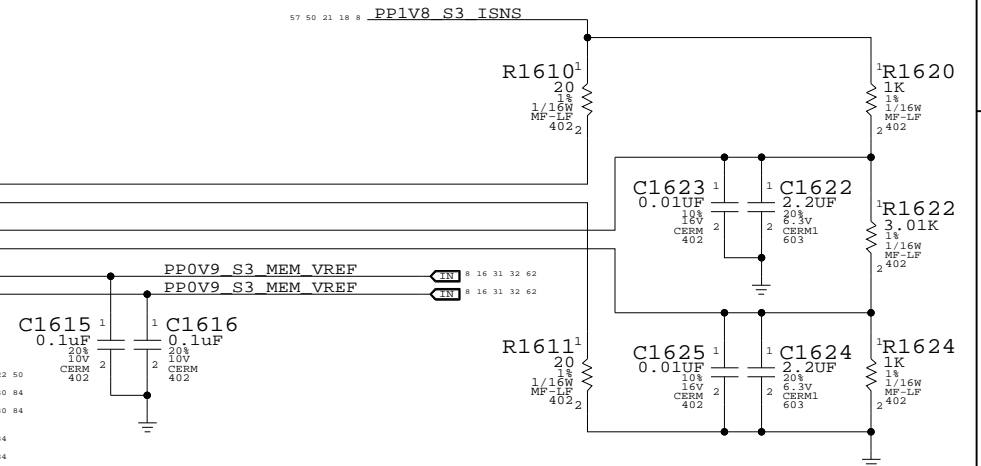
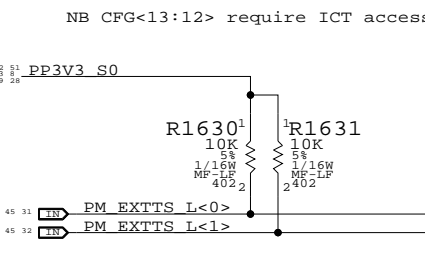
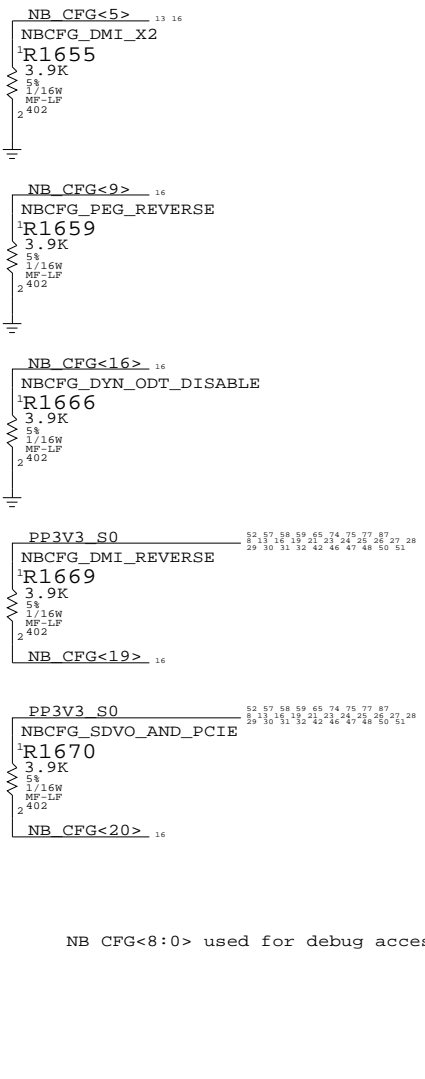
Table with columns: SCALE, DRAWING NUMBER, SHEET, OF, REV. Values: NONE, 051-7225, 15, OF 88, A.0.0



APPLE COMPUTER INC.



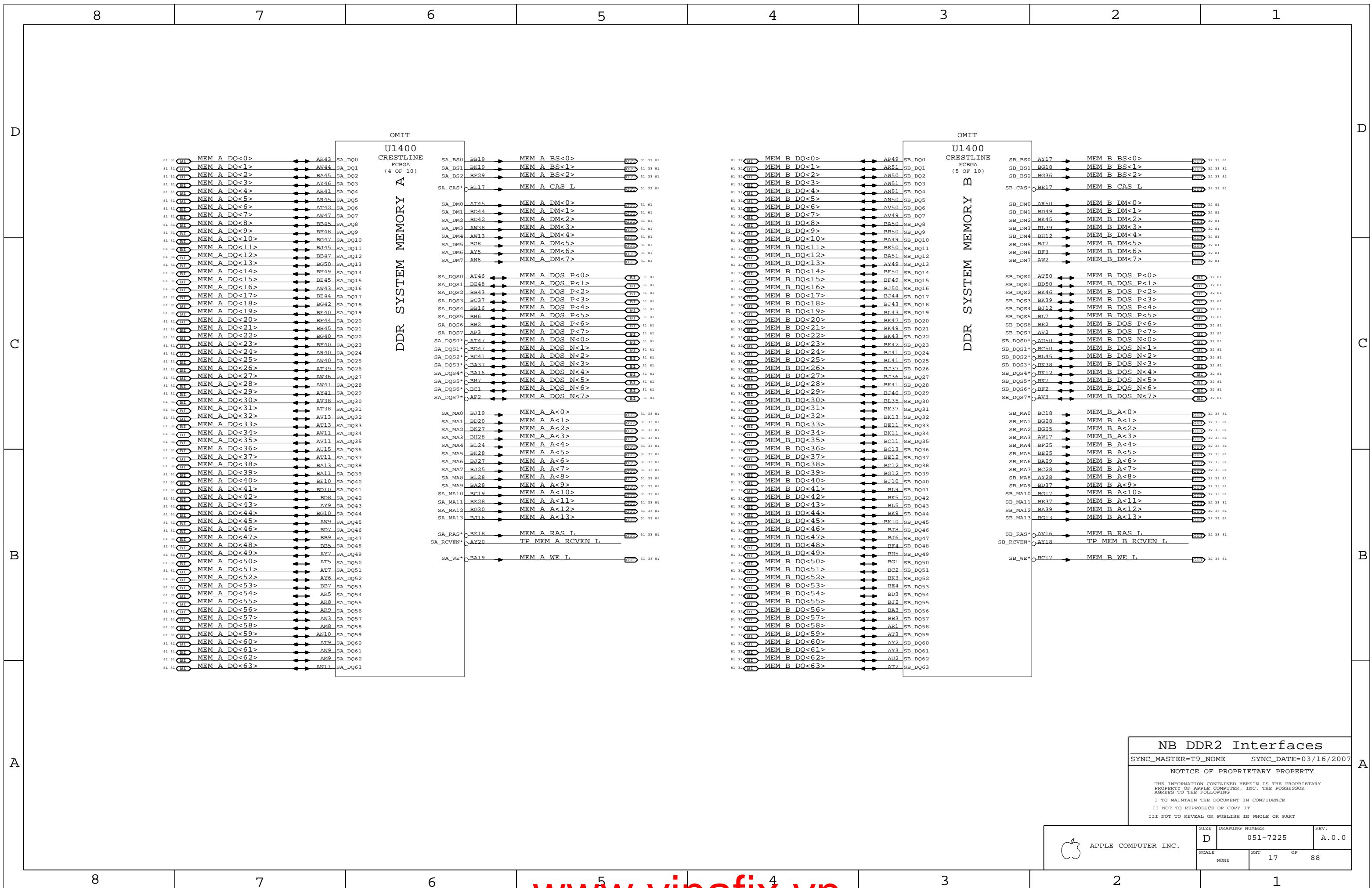
NB_CFG<3>	RESERVED
NB_CFG<4>	RESERVED
NB_CFG<5>	High = DMIx4 Low = DMIx2
NB_CFG<6>	RESERVED
NB_CFG<7>	RESERVED
NB_CFG<8>	RESERVED
NB_CFG<9>	High = Normal PCIe Graphics Lane Reversal Low = Reversed
NB_CFG<10>	RESERVED
NB_CFG<11>	RESERVED
NB_CFG<12>	See Below
NB_CFG<13>	See Below
NB_CFG<14>	RESERVED
NB_CFG<15>	RESERVED
NB_CFG<16>	High = Enabled FSB Dynamic ODT Low = Disabled
NB_CFG<17>	RESERVED
NB_CFG<18>	RESERVED
NB_CFG<19>	High = Reversed DMI Lane Reversal Low = Normal
NB_CFG<20>	High = Both active Concurrent Low = Only SDVO SDVO/PCIe x1 or PCIe x16



NOTE: GMCH CL_PWROK input must be PWRGD signal for PP3V3_SOM, PP3V3_SOMWOL, PP1V8_S3M, PP1V25_SOM, PP1V05_SOM, PP0V9_S3M and PP0V9_SOM. If ME/AMT is not used, short CL_PWROK to PWROK.

NB Misc Interfaces		
SYNC_MASTER=T9_NOME	SYNC_DATE=03/16/2007	
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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	16	88	



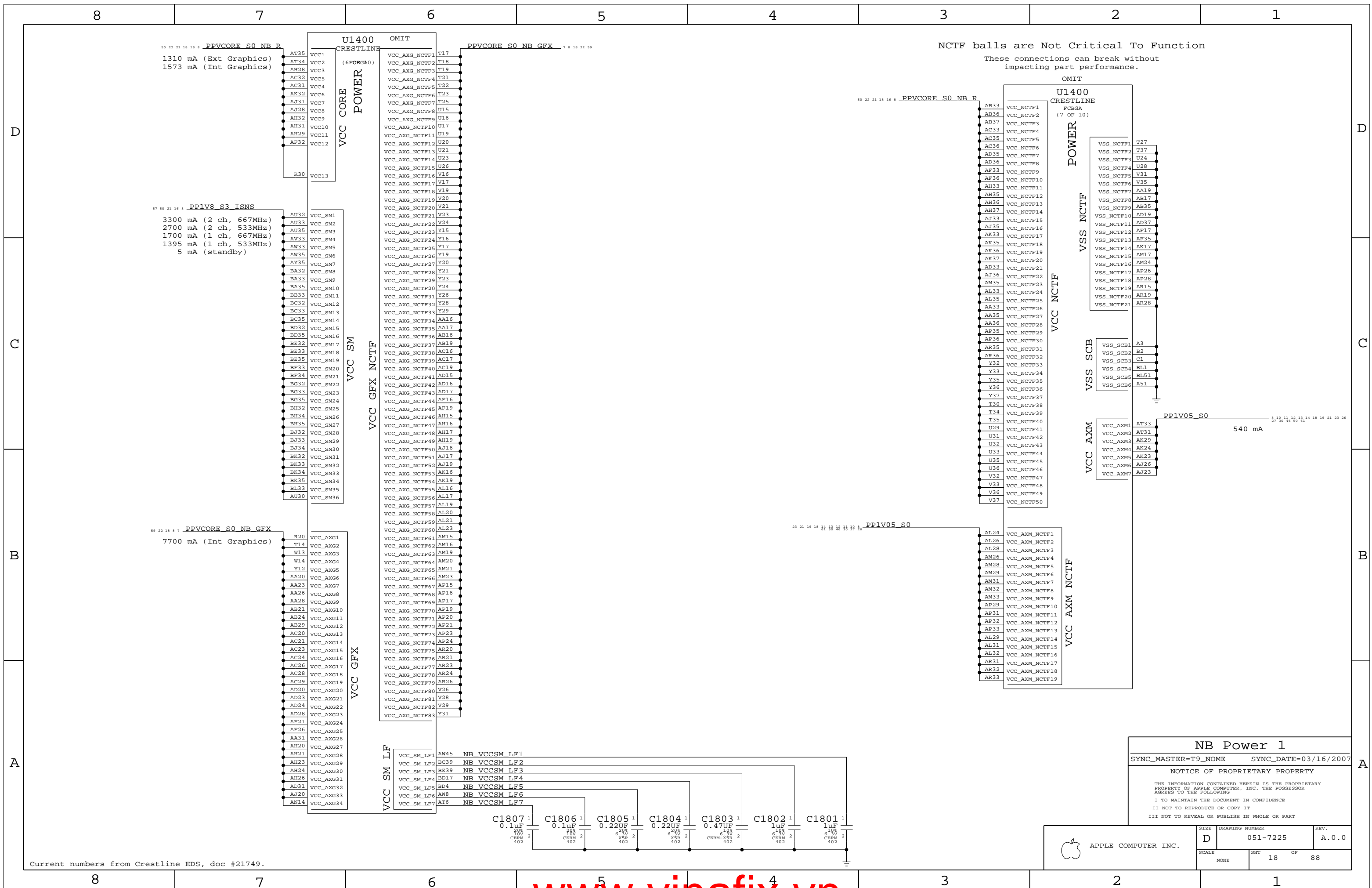
NB DDR2 Interfaces
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	17	88	



50 22 21 18 16 8 PPVCORE_S0_NB_R
 1310 mA (Ext Graphics)
 1573 mA (Int Graphics)

57 50 21 16 8 PP1V8_S3_ISNS
 3300 mA (2 ch, 667MHz)
 2700 mA (2 ch, 533MHz)
 1700 mA (1 ch, 667MHz)
 1395 mA (1 ch, 533MHz)
 5 mA (standby)

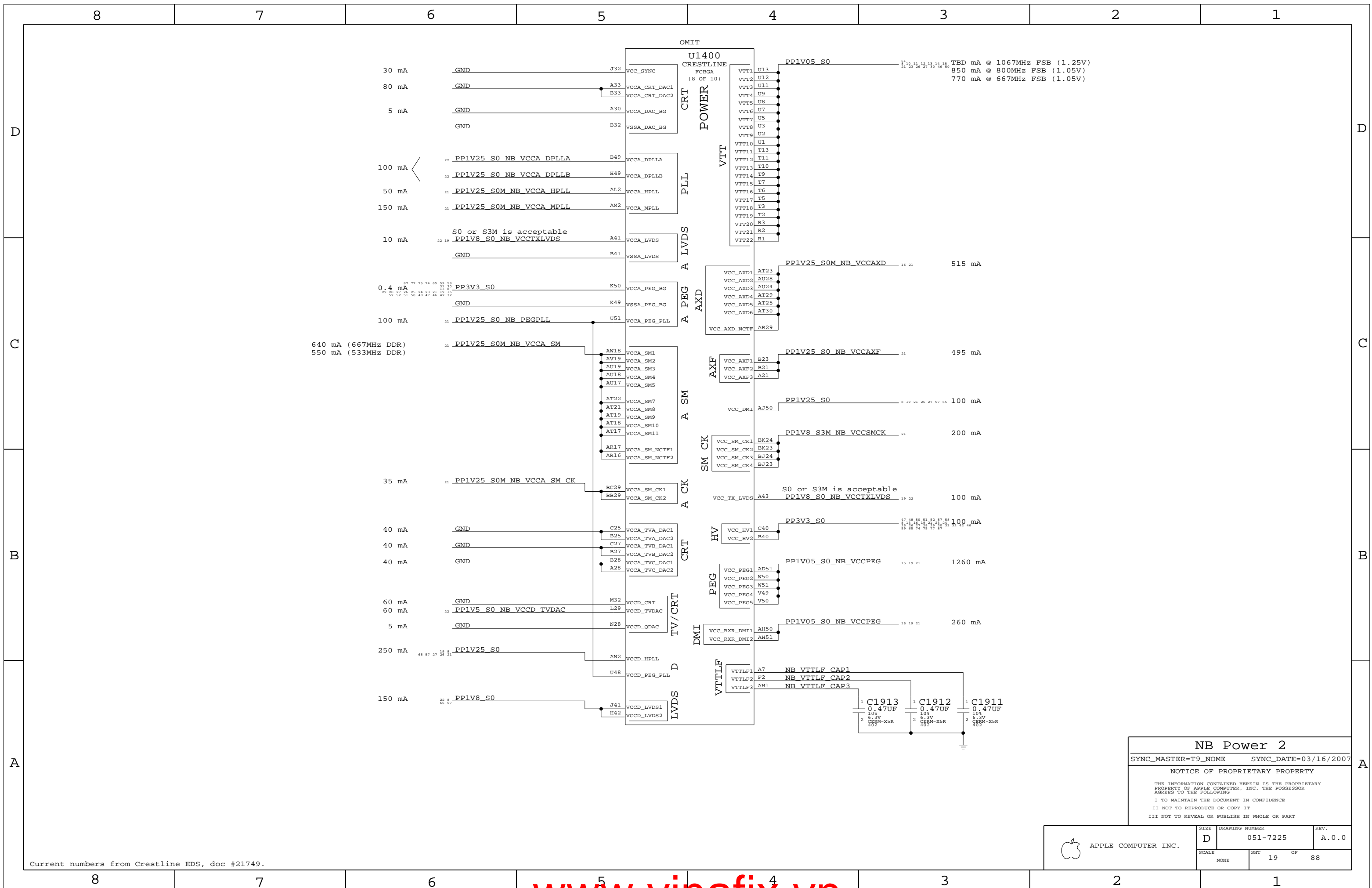
59 22 18 8 7 PPVCORE_S0_NB_GFX
 7700 mA (Int Graphics)

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

NB Power 1
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007
 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	18	88	

Current numbers from Crestline EDS, doc #21749.



Current numbers from Crestline EDS, doc #21749.

NB Power 2

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

NOTICE OF PROPRIETARY PROPERTY

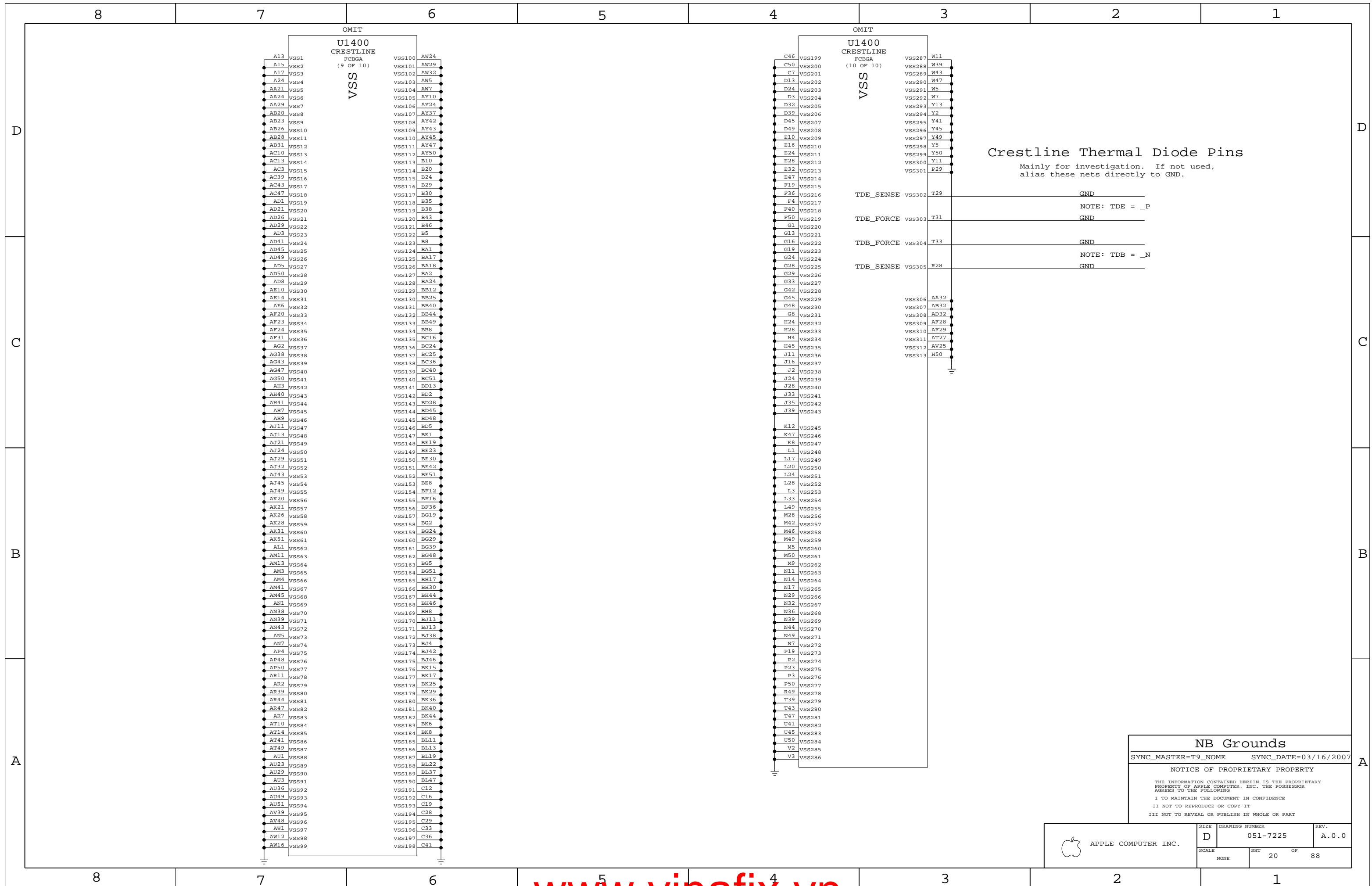
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

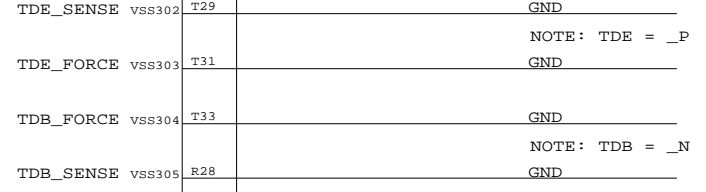
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHEET 19	OF 88



U1400
CRESTLINE
FCBGA
(9 OF 10)
VSS

U1400
CRESTLINE
FCBGA
(10 OF 10)
VSS

Crestline Thermal Diode Pins
Mainly for investigation. If not used,
alias these nets directly to GND.



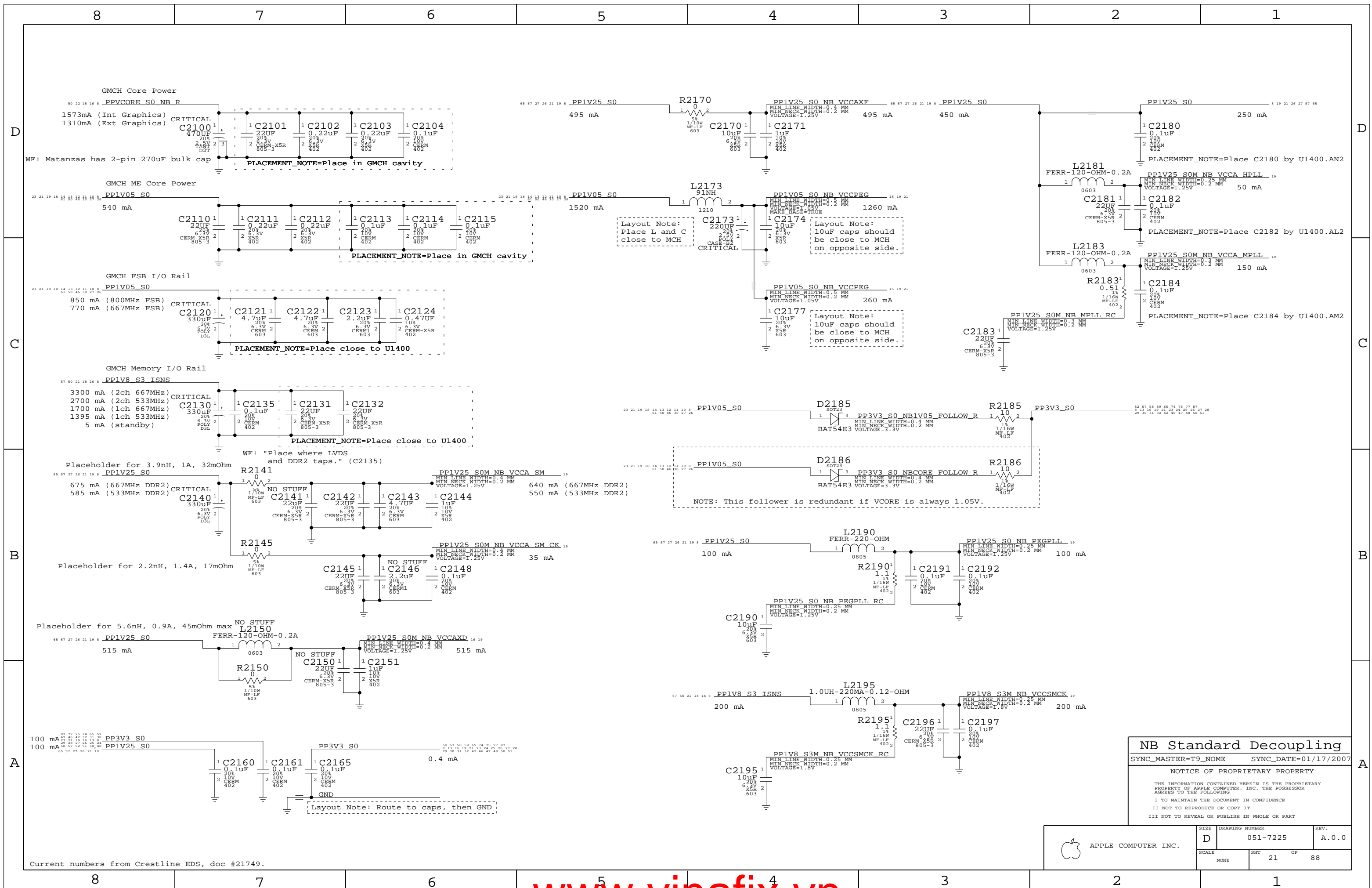
NB Grounds
SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT		OF
NONE	20		88



NB Standard Decoupling

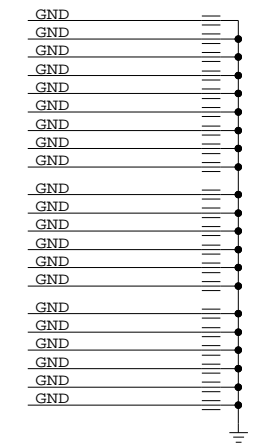
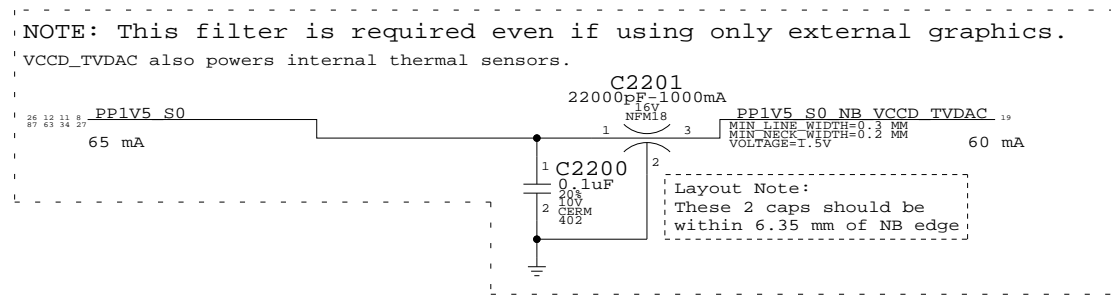
SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

NOTICE OF PROPRIETARY PROPERTY

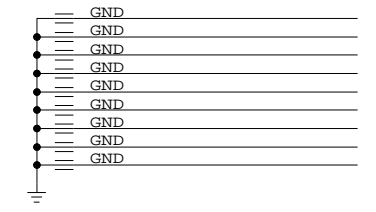
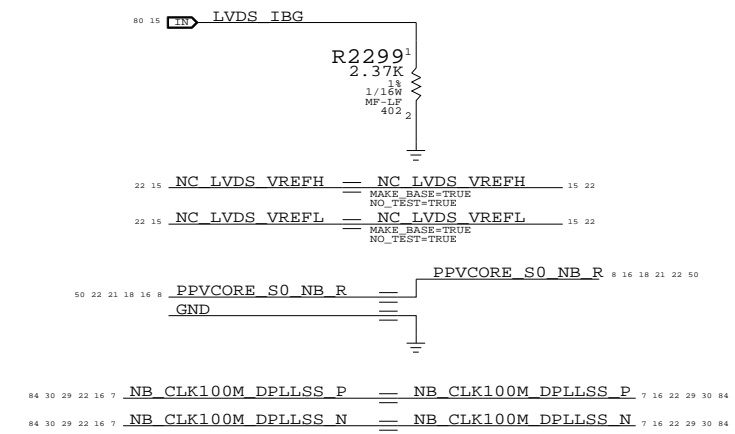
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

SCALE NONE	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SHT 21	OF 88	

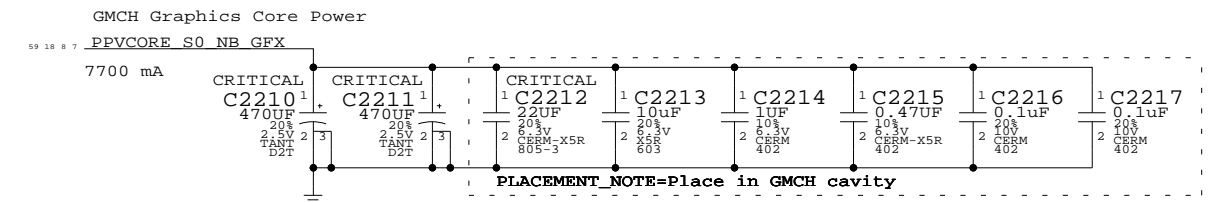
Current numbers from Crestline EDS, doc #21749.



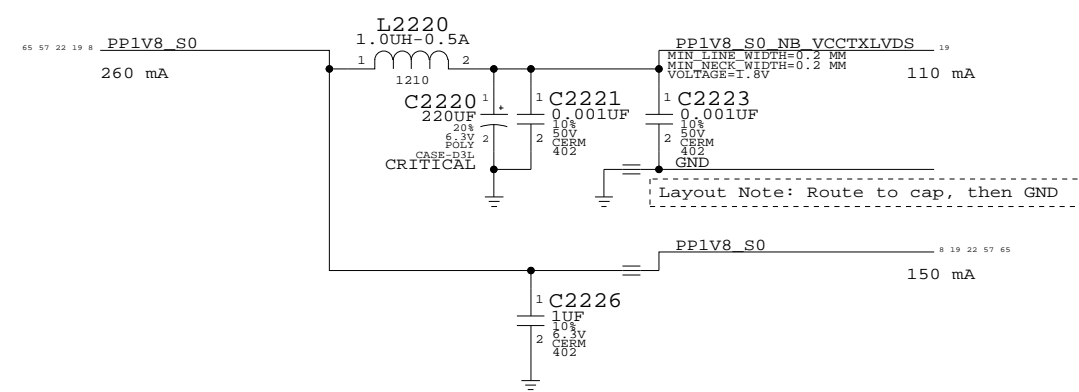
Crestline LVDS Support



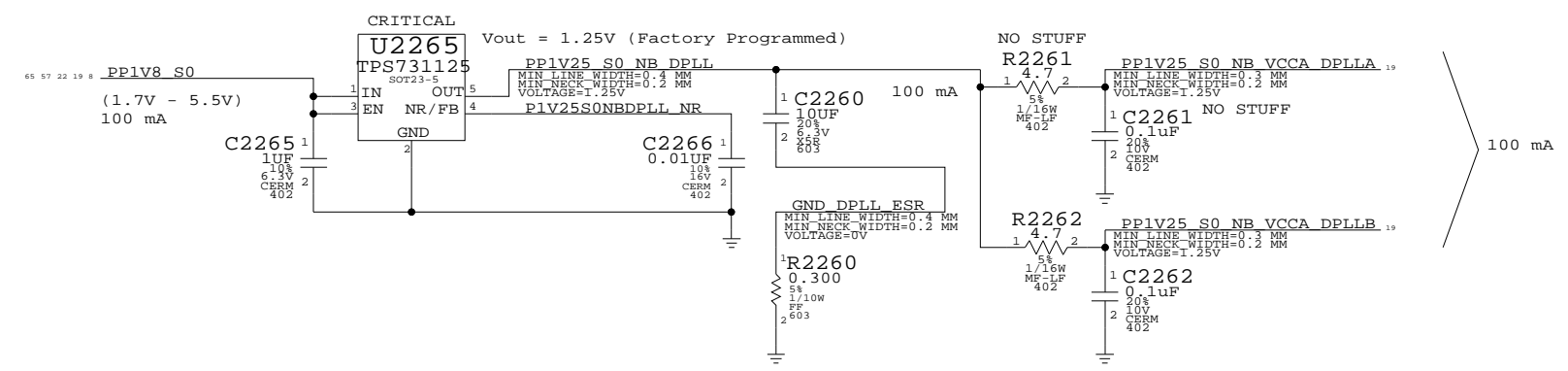
C



B



A



NB Graphics Decoupling

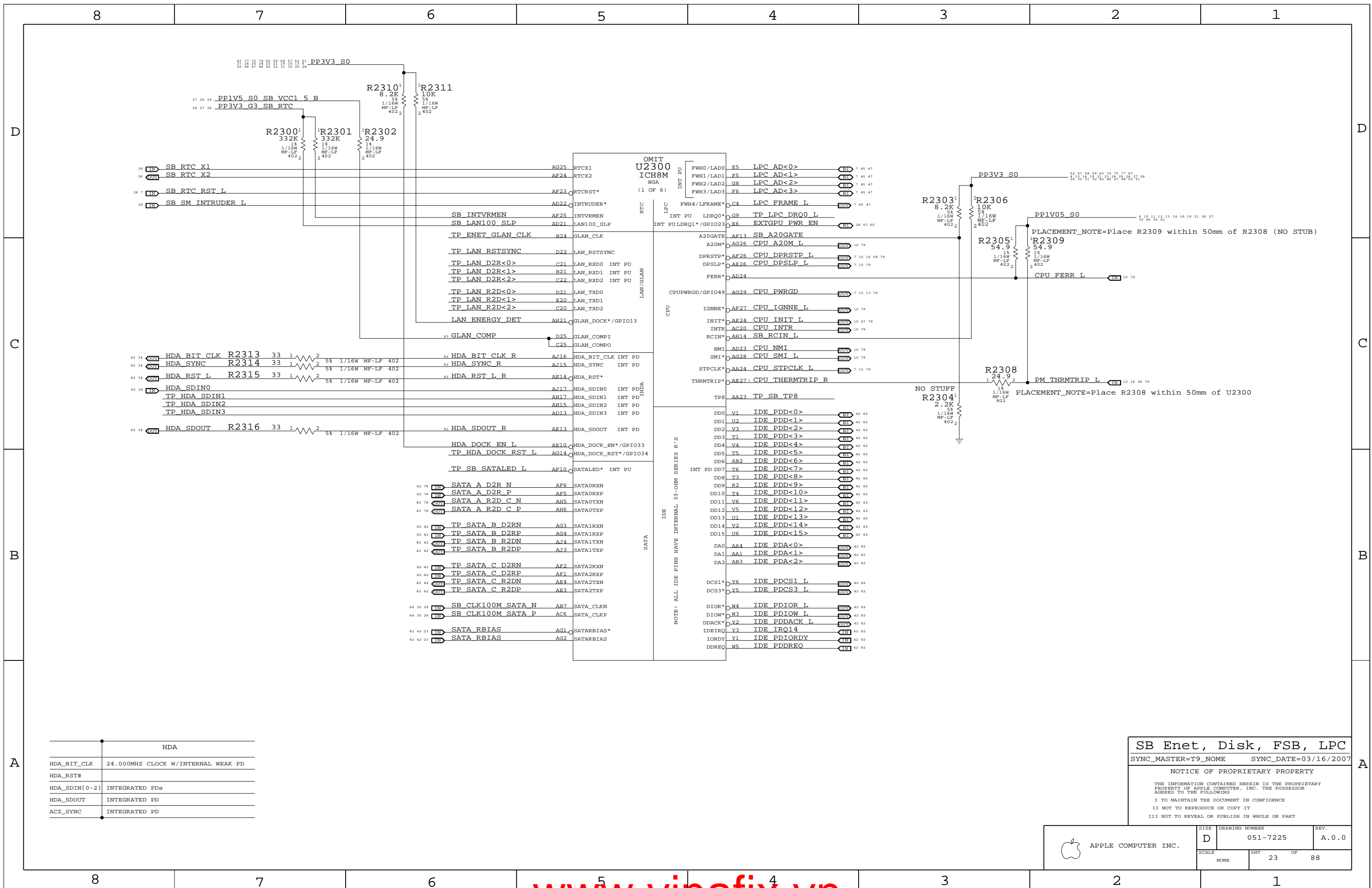
SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	22	88	

Current numbers from Crestline EDS Addendum, doc #20127.



HDA	
HDA_BIT_CLK	24.000MHZ CLOCK W/INTERNAL WEAK PD
HDA_RST#	
HDA_SDIN[0-2]	INTEGRATED PDs
HDA_SDOUT	INTEGRATED PD
ACZ_SYNC	INTEGRATED PD

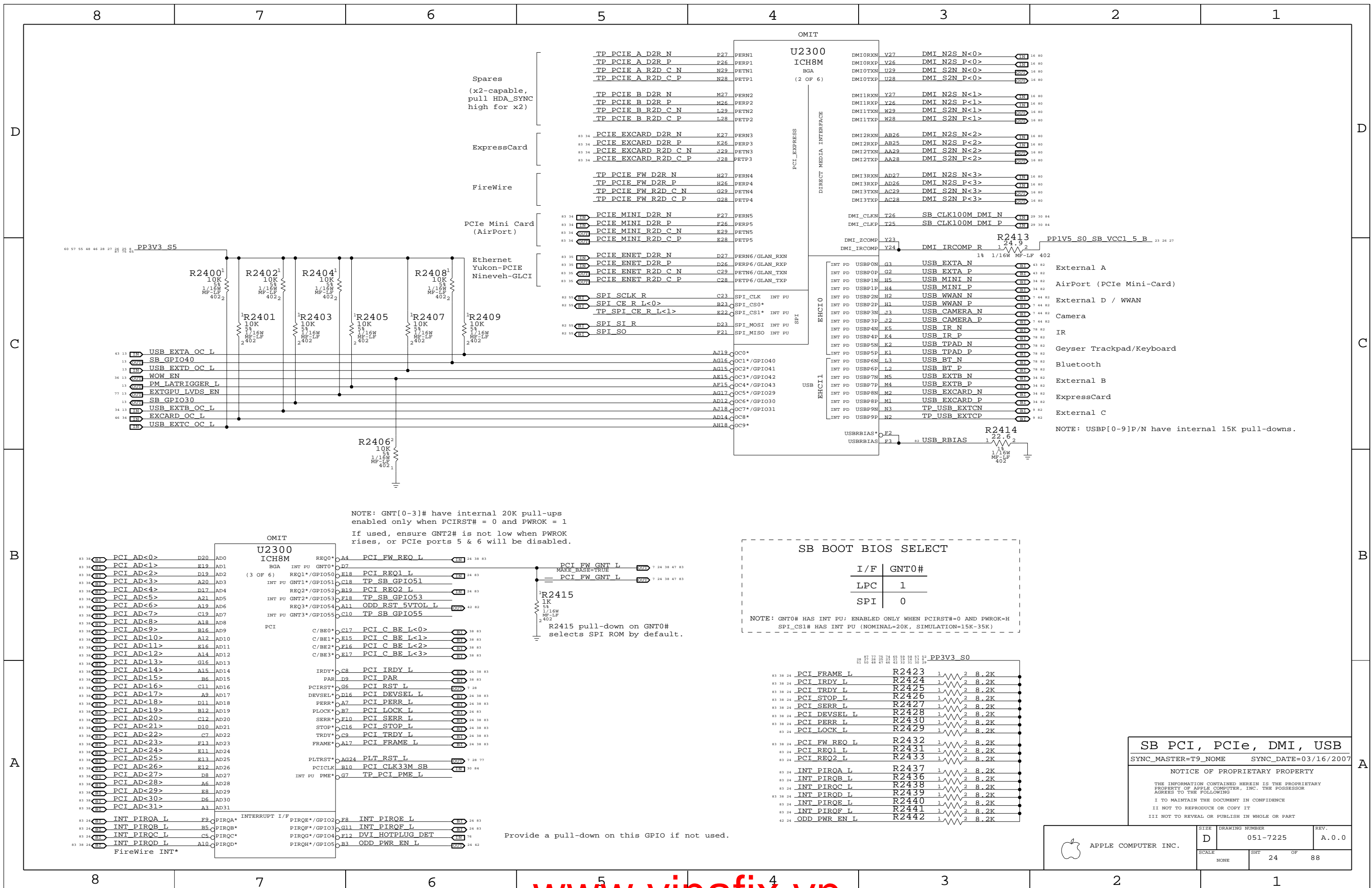
SB Enet, Disk, FSB, LPC
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

NOTICE OF PROPRIETARY PROPERTY

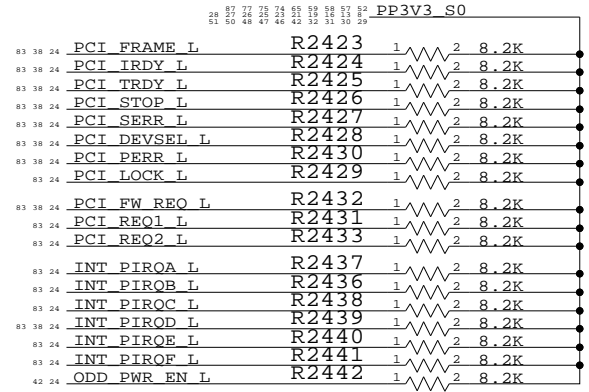
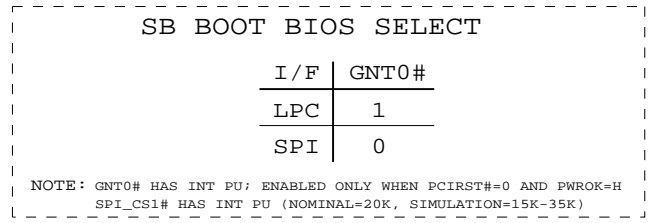
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	23	88	



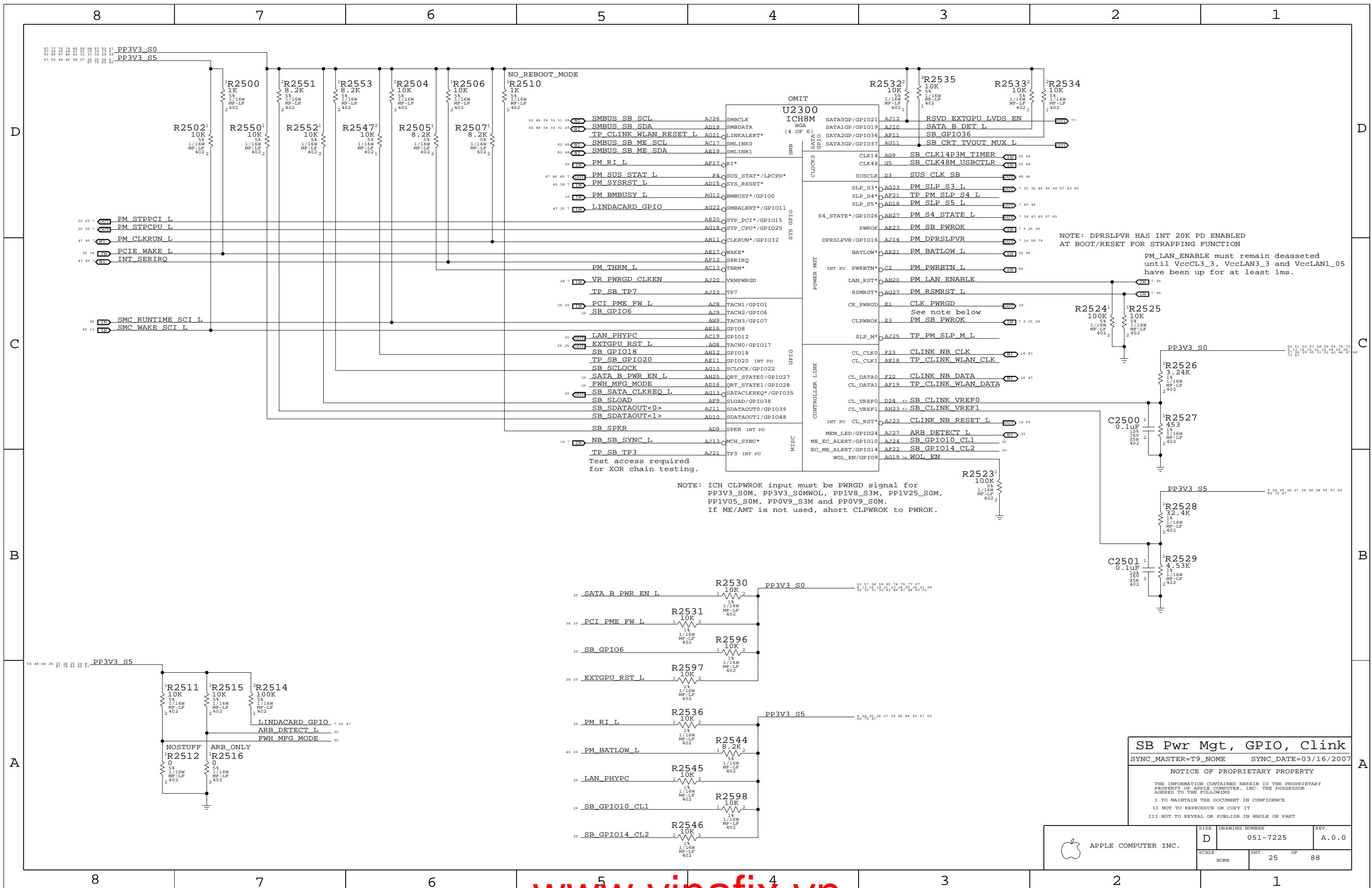
NOTE: GNT[0-3]# have internal 20K pull-ups enabled only when PCIRST# = 0 and PWROK = 1. If used, ensure GNT2# is not low when PWROK rises, or PCIe ports 5 & 6 will be disabled.



SB PCI, PCIe, DMI, USB
SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	24	88	



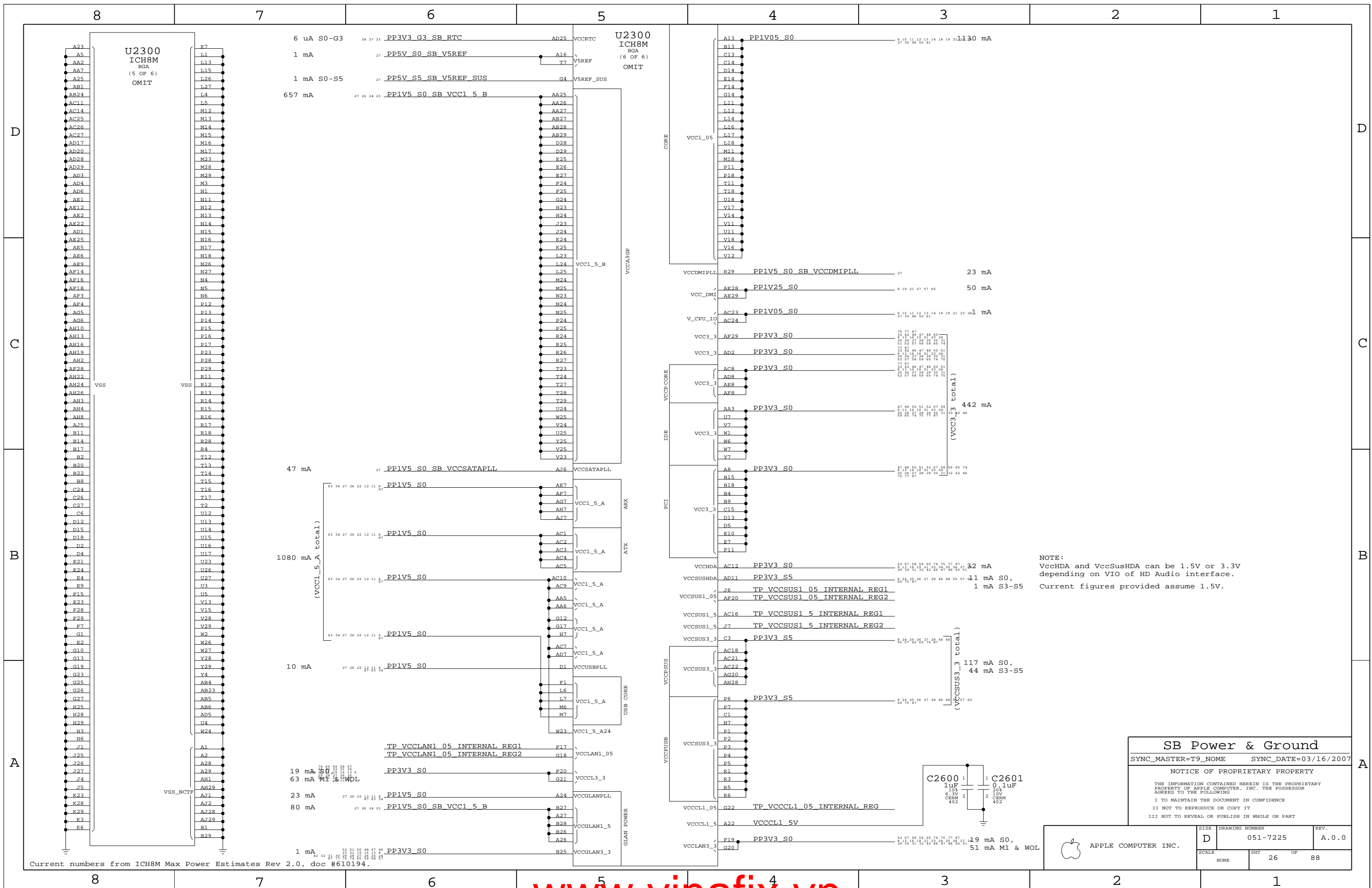
NOTE: ICH CLPWROK input must be PWRGD signal for PP3V3_S0M, PP3V3_S0MWOL, PP1V8_S3M, PP1V25_S0M, PP1V05_S0M, PP0V9_S3M and PP0V9_S0M. If ME/AMT is not used, short CLPWROK to PWROK.

NOTE: DPRSLPVR HAS INT 20K PD ENABLED AT BOOT/RESET FOR STRAPPING FUNCTION
 PM_LAN_ENABLE must remain deasserted until VccCL3_3, VccLAN3_3 and VccLAN1_05 have been up for at least 1ms.

SB Pwr Mgt, GPIO, Clink
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	25	88	



NOTE:
VccHDA and VccSusHDA can be 1.5V or 3.3V depending on VIO of HD Audio interface.
Current figures provided assume 1.5V.

SB Power & Ground

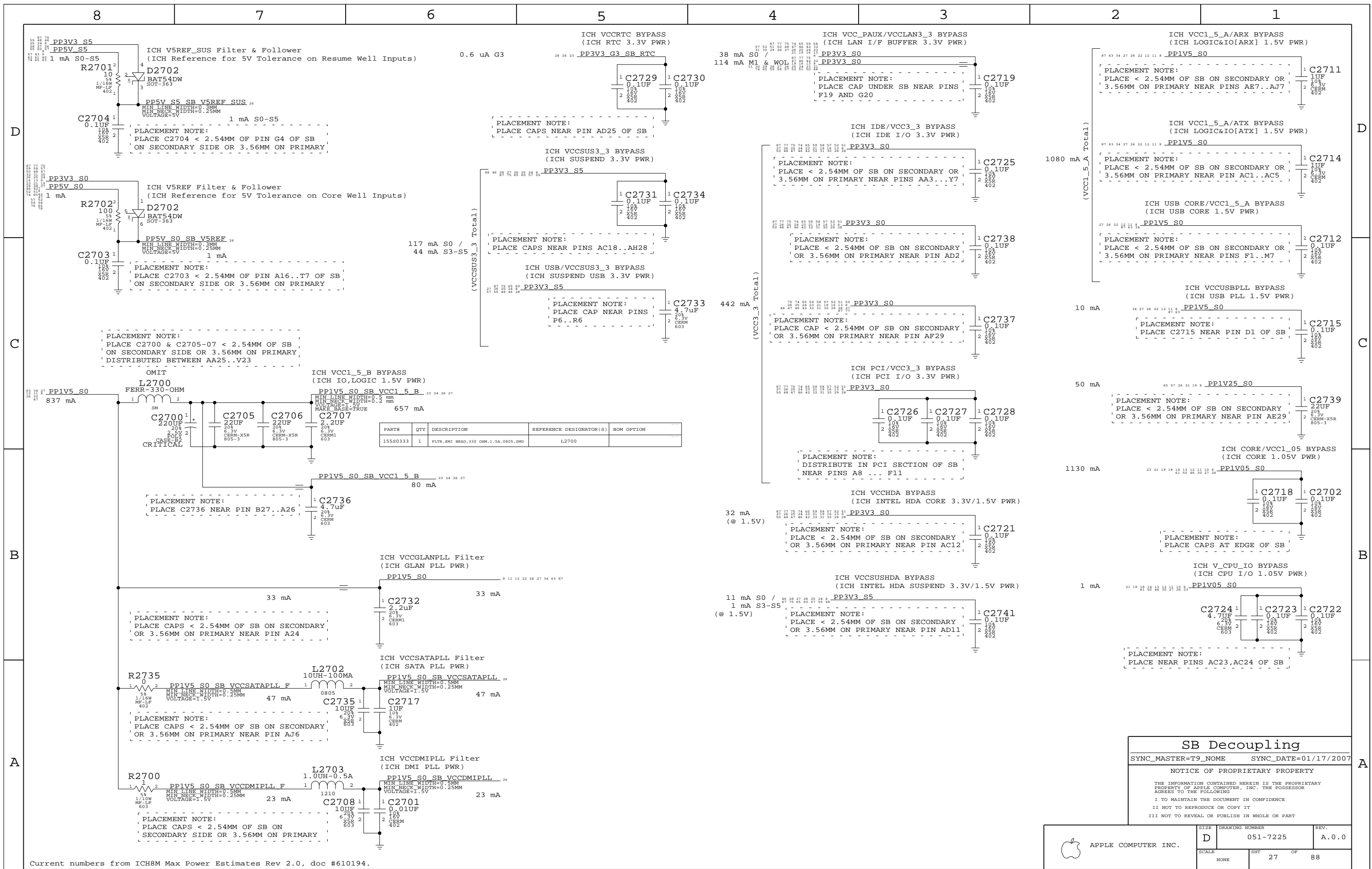
SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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

SCALE NONE	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SHT 26	OF 88	



SB Decoupling

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

NOTICE OF PROPRIETARY PROPERTY

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

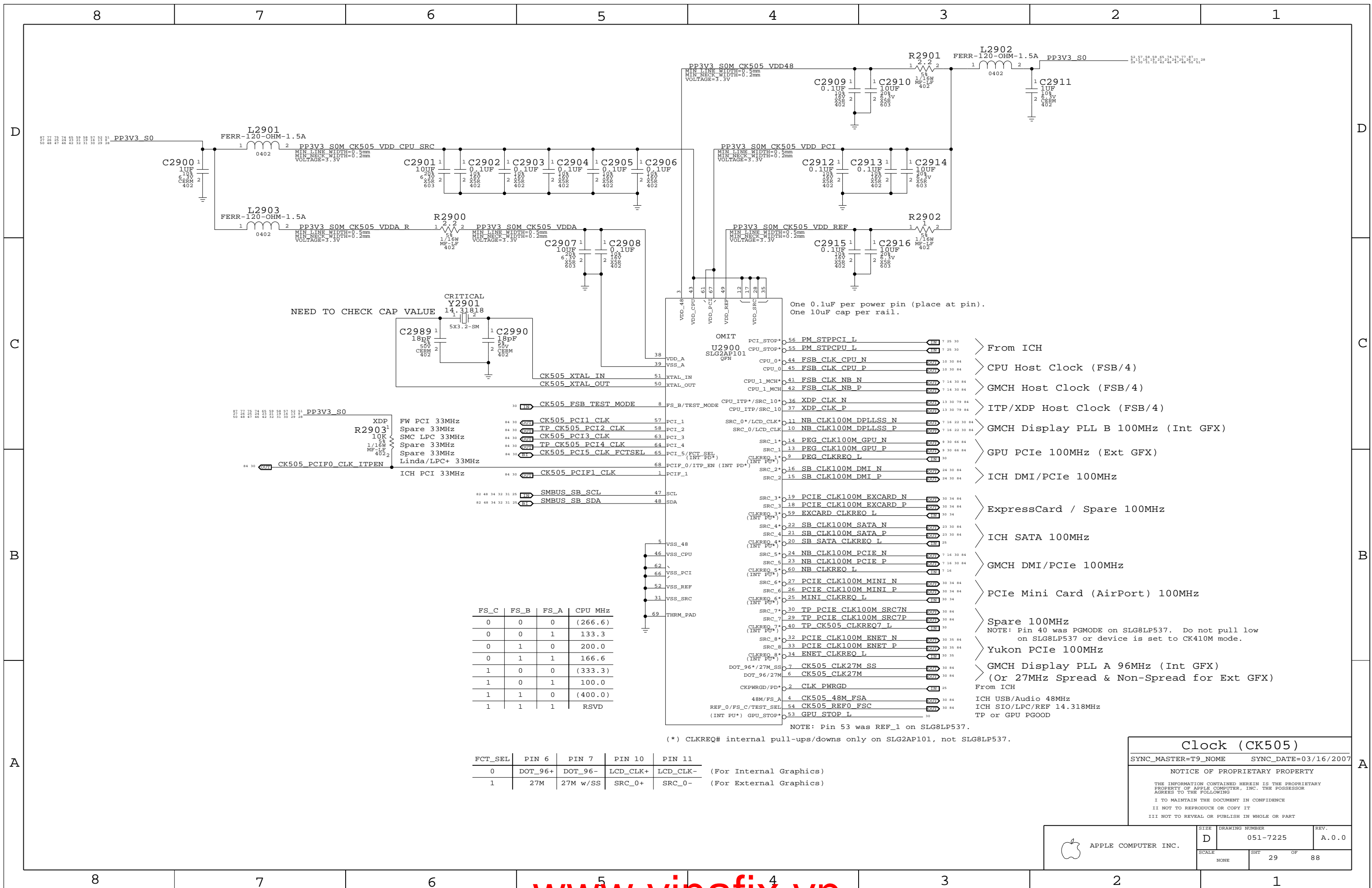
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	27	88	

Current numbers from ICH8M Max Power Estimates Rev 2.0, doc #610194.



NEED TO CHECK CAP VALUE

CRITICAL
Y2901
14.31818

C2989 18pF 50V CERM 402
C2990 18pF 50V CERM 402

One 0.1uF per power pin (place at pin).
One 10uF cap per rail.

FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

FCT_SEL	PIN 6	PIN 7	PIN 10	PIN 11	
0	DOT_96+	DOT_96-	LCD_CLK+	LCD_CLK-	(For Internal Graphics)
1	27M	27M w/SS	SRC_0+	SRC_0-	(For External Graphics)

- From ICH
- CPU Host Clock (FSB/4)
- GMCH Host Clock (FSB/4)
- ITP/XDP Host Clock (FSB/4)
- GMCH Display PLL B 100MHz (Int GFX)
- GPU PCIe 100MHz (Ext GFX)
- ICH DMI/PCIe 100MHz
- ExpressCard / Spare 100MHz
- ICH SATA 100MHz
- GMCH DMI/PCIe 100MHz
- PCIe Mini Card (AirPort) 100MHz
- Spare 100MHz
- NOTE: Pin 40 was PGMODE on SLG8LP537. Do not pull low on SLG8LP537 or device is set to CK410M mode.
- Yukon PCIe 100MHz
- GMCH Display PLL A 96MHz (Int GFX)
- (Or 27MHz Spread & Non-Spread for Ext GFX)
- From ICH
- ICH USB/Audio 48MHz
- ICH SIO/LPC/REF 14.318MHz
- TP or GPU PGOOD

NOTE: Pin 53 was REF_1 on SLG8LP537.

(*) CLKREQ# internal pull-ups/downs only on SLG2AP101, not SLG8LP537.

Clock (CK505)

SYNC_MASTER=T9_NAME SYNC_DATE=03/16/2007

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

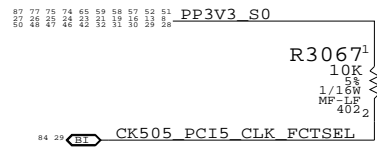
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	29	88	

CLK Termination

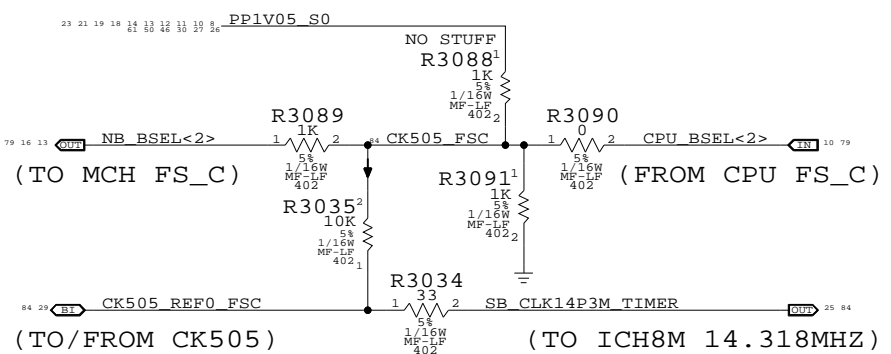
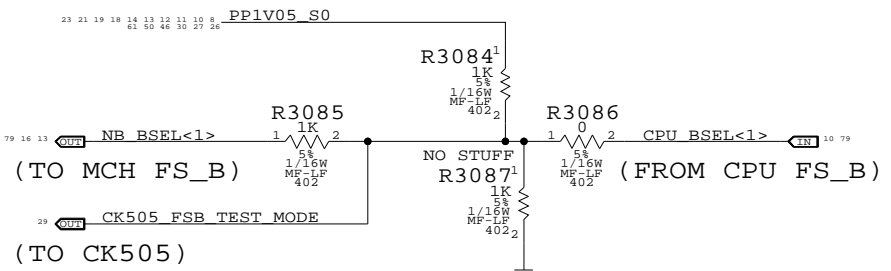
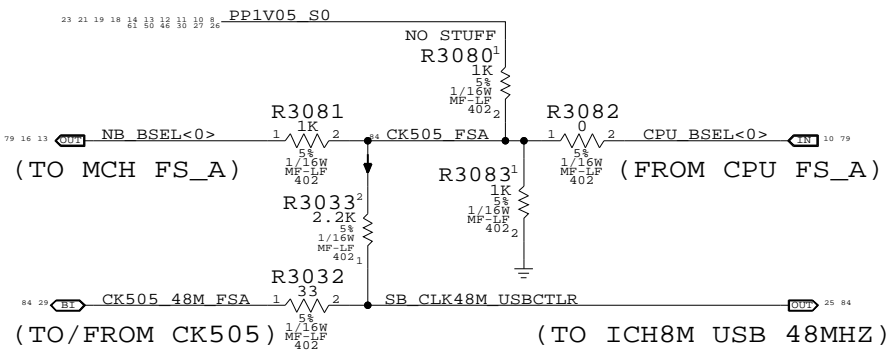
(Note: HOST/SRC/GFX clock termination removed. Silego SL8GLP536 or equiv. support only)

CK505 Configuration Straps

FCT_SEL (GFX clock select)



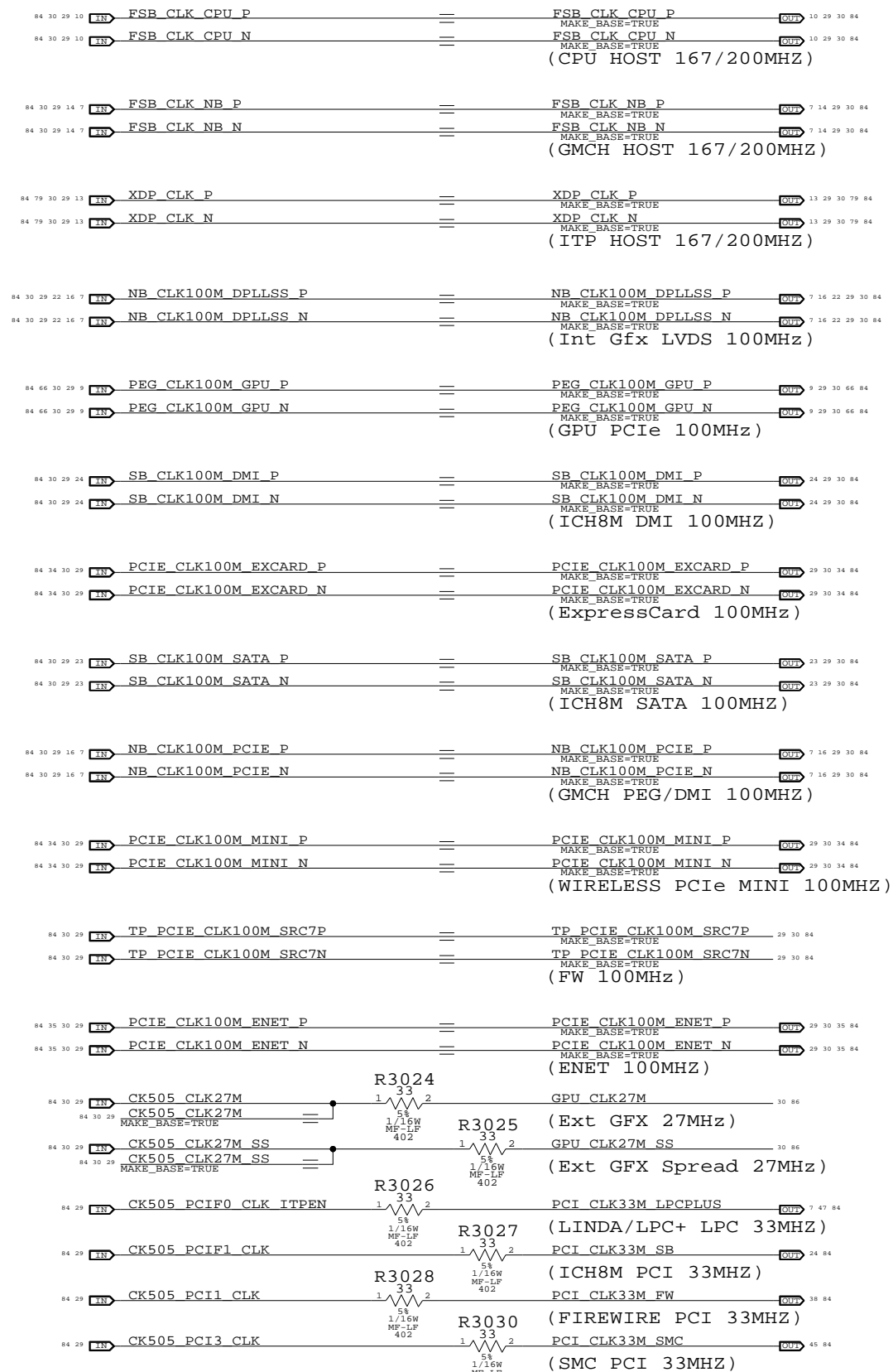
FS_A, FS_B, FS_C (Host clock freq select)



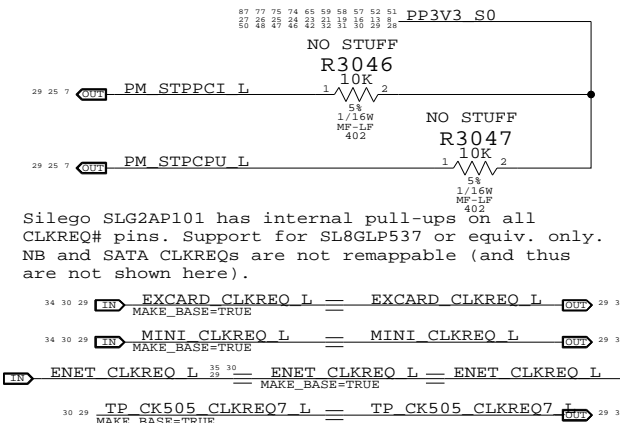
FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

NO STUFF R3082, R3086 & R3090 for manual CPU clk frequency.

(Only 100-200MHz supported by SLG8LP536 and CY28545-5)

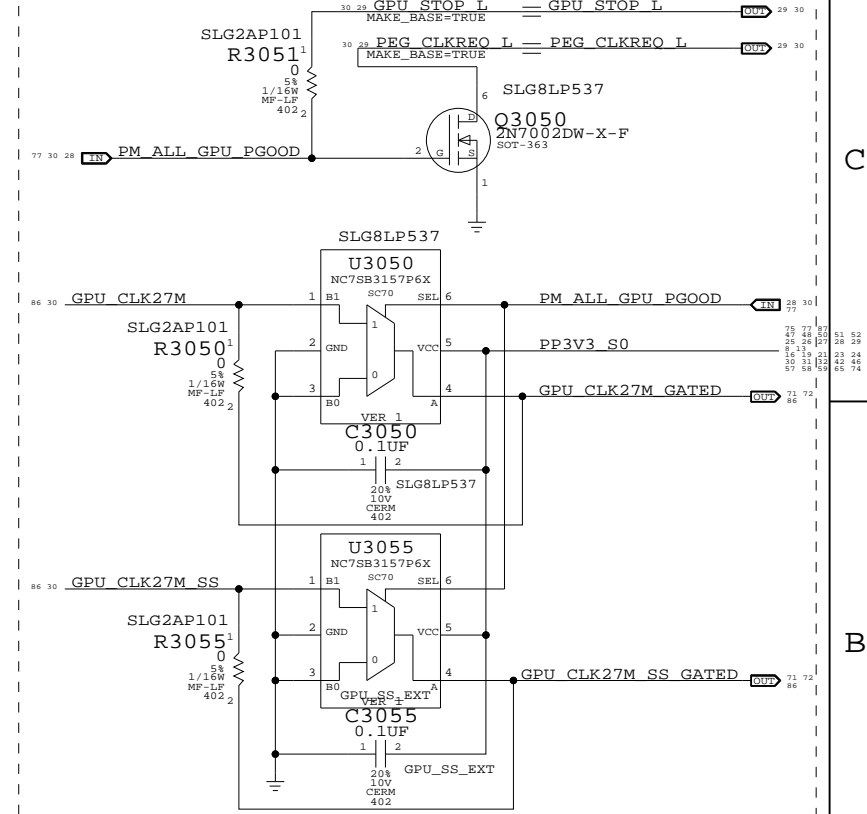


CLKREQ Controls

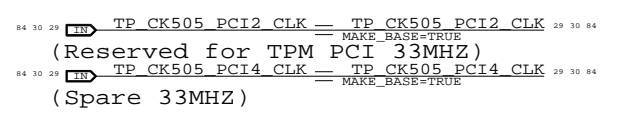


Silego SLG2AP101 has internal pull-ups on all CLKREQ# pins. Support for SL8GLP537 or equiv. only. NB and SATA CLKREQs are not remappable (and thus are not shown here).

GPU Clock Gating



Unused Clocks



Clock Termination

SYNC_MASTER=(MASTER) SYNC_DATE=08/23/2006

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

	DRAWING NUMBER		REV.
	D	051-7225	A.0.0
SCALE		SHT	OF
NONE		30	88

One cap for each side of every RPAK, one cap for every two discrete resistors
 Ensure CS_L and ODT resistors are close to SO-DIMM connector

D

D

C

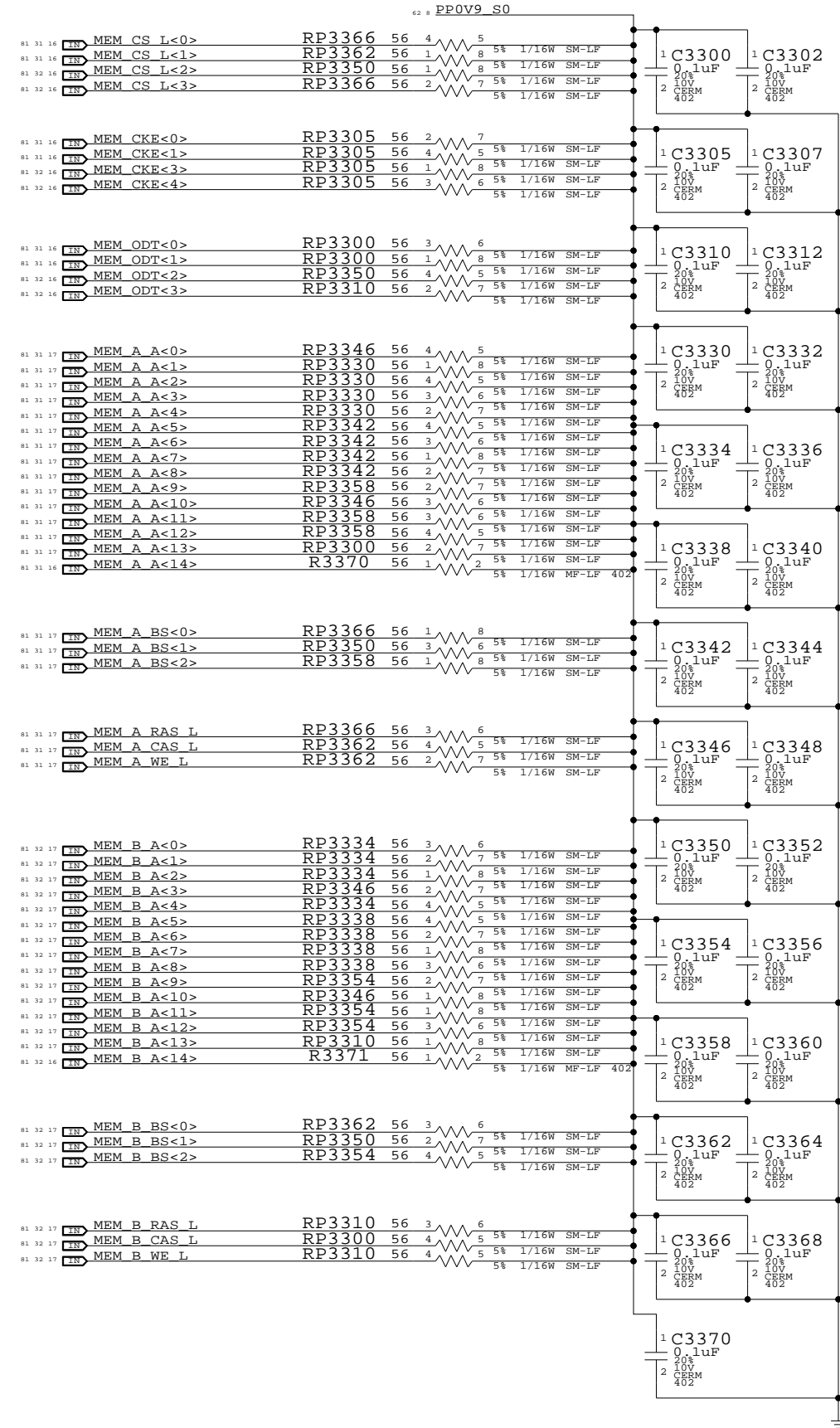
C

B

B

A

A



Memory Active Termination
 SYNC_MASTER=(T9_NOME) SYNC_DATE=11/14/2006
 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	33	88	

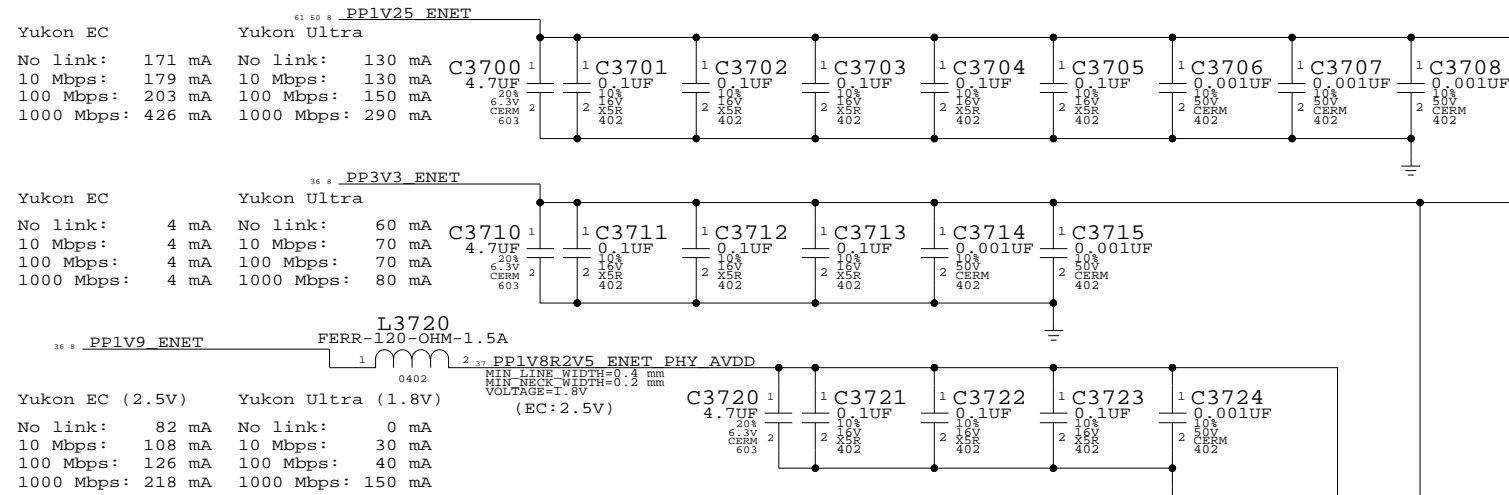
Page Notes

Power aliases required by this page:
 - =PP3V3_ENET_PHY (EC / Ultra)
 - =PP1V8R2V5_ENET_PHY (2.5V / 1.8V)
 - =YUKON_EC_PP2V5_ENET (2.5V / GND)
 - =PP1V2_ENET_PHY

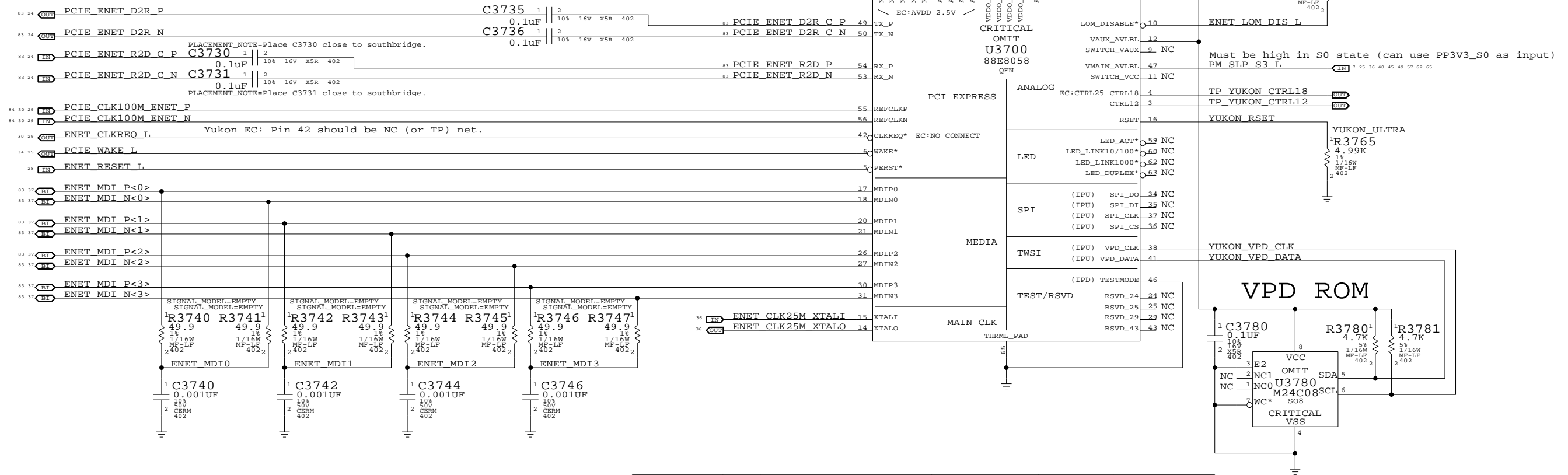
Signal aliases required by this page:
 - =ENET_CLKREQ_L (NC/TP for Yukon EC)
 - =ENET_VMAIN_AVLBLE (See note by pin)

BOM options provided by this page:
 YUKON_EC - Selects Yukon EC RSET value.
 YUKON_ULTRA - Selects Yukon Ultra RSET.

NOTE: See bottom of page for instructions for dual Yukon EC / Yukon Ultra schematic support.



GND
 Yukon EC: Alias to PP1V8R2V5_ENET_PHY_AVDD, add 1x 0.1uF & 1x 0.001uF caps
 Yukon Ultra: Alias to GND



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
338S0386	1	IC, 88E8058, GIGABIT ENET XCVR, 64P QFN	U3700	CRITICAL	YUKON_ULTRA
341S2060	1	IC, FLASH, 88E8058 ETHERNET VPD, IIC, S08	U3780	CRITICAL	YUKON_ULTRA
338S0270	1	IC, 88E8053, GIGABIT ENET XCVR, 64P QFN	U3700	CRITICAL	YUKON_EC
341S1797	1	IC, EEPROM, SERIAL IIC, 8KBIT, S08	U3780	CRITICAL	YUKON_EC
114S0285	1	RES, 4.87K, 1%, 1/16W, 0402, LF	R3760		YUKON_EC

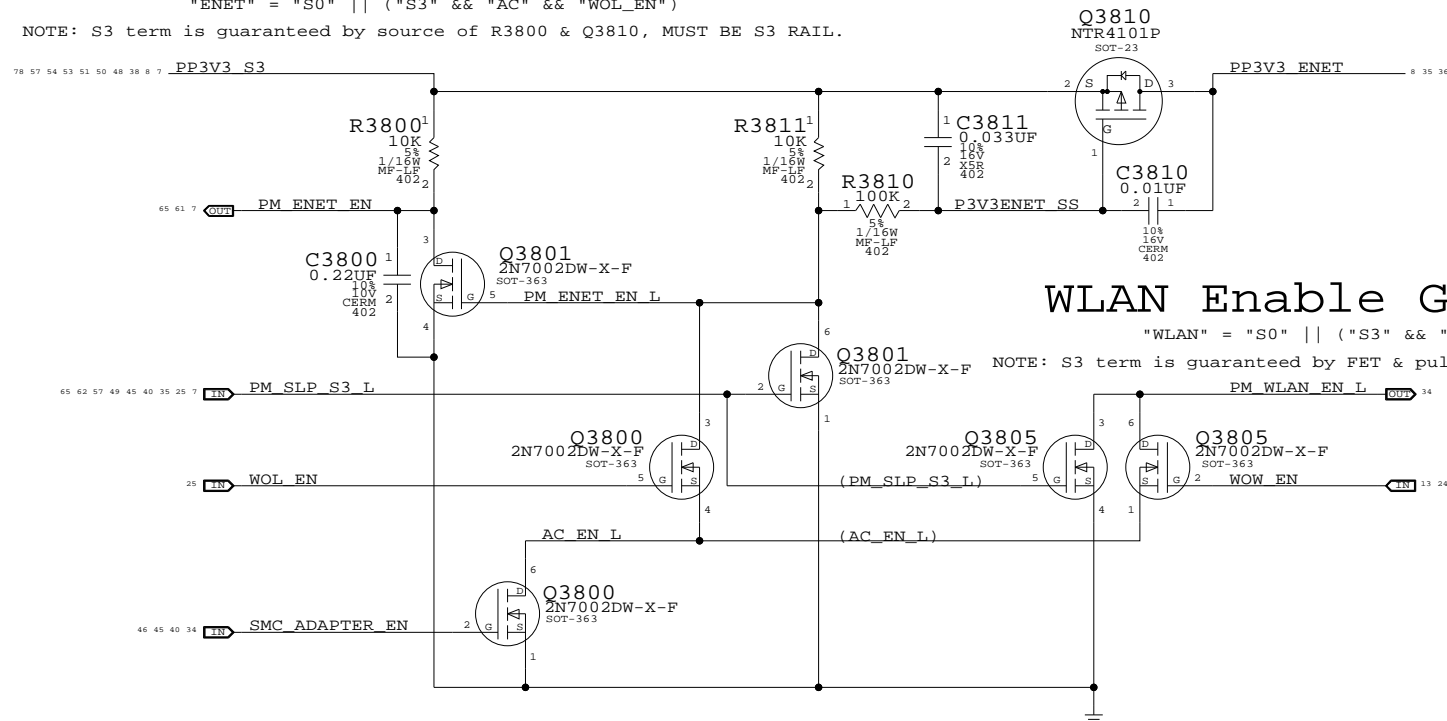
To support Yukon EC and Ultra on the same board:
 - Alias =YUKON_EC_PP2V5_ENET to PP1V8R2V5_ENET_PHY_AVDD, add 1x 0.1uF and 1x 0.001uF caps
 - Use 0-ohm resistors or variable supply to provide 1.8V or 2.5V to =PP1V8R2V5_ENET_PHY and magnetics. Can also use BCP69T1 connected to CTRL18 pin 4 for internal VR.
 - Connect =ENET_CLKREQ_L to clock generator via 0-ohm resistor (BOMOPTION: YUKON_ULTRA)
 - Use YUKON_EC and YUKON_ULTRA BOMOPTIONS to select stuffed part

Ethernet (Yukon)
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007
 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	35	88	

ENET Enable Generation

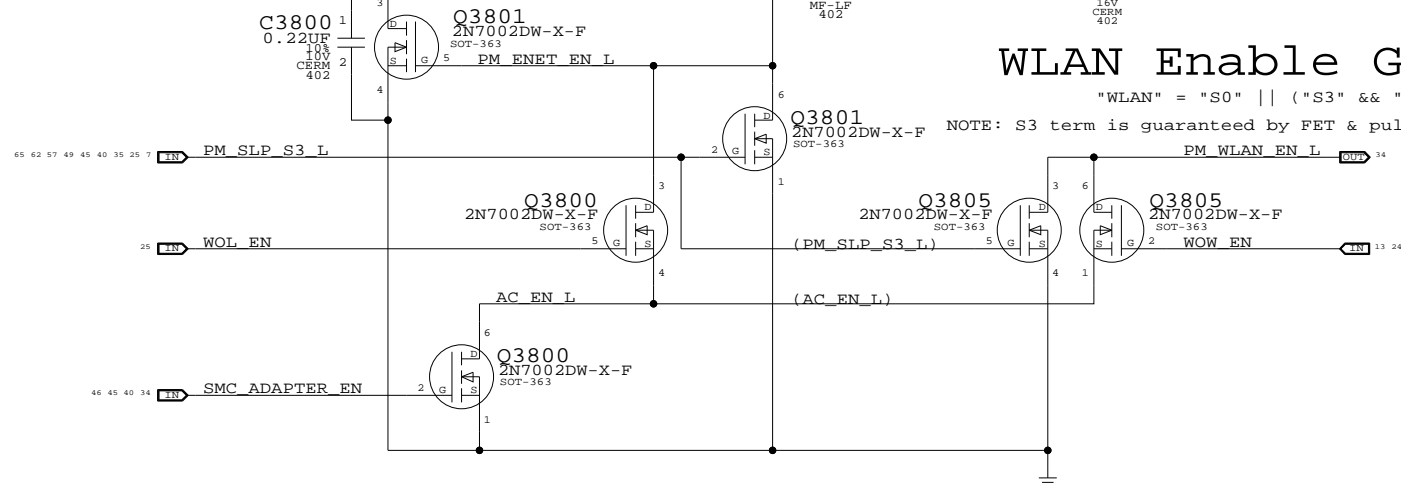
"ENET" = "S0" || ("S3" && "AC" && "WOL_EN")
 NOTE: S3 term is guaranteed by source of R3800 & Q3810, MUST BE S3 RAIL.



3.3V ENET FET

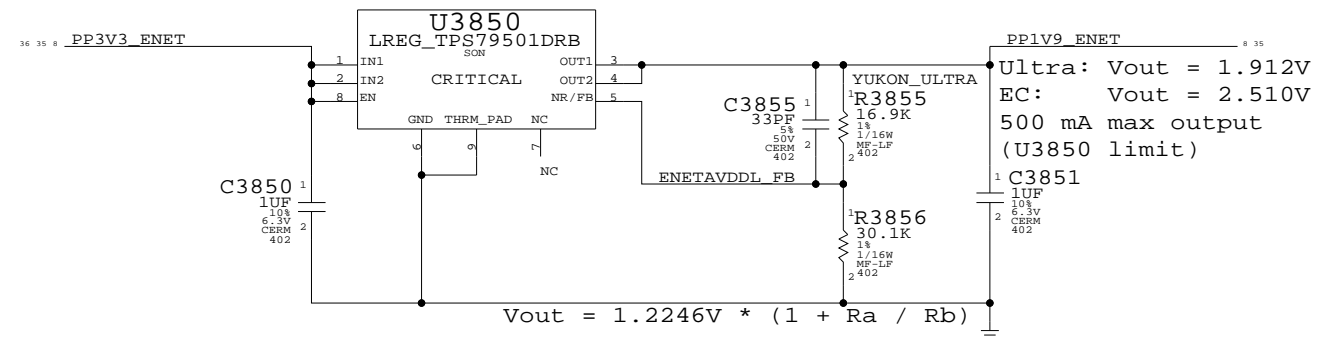
WLAN Enable Generation

"WLAN" = "S0" || ("S3" && "AC" && "WOW_EN")
 NOTE: S3 term is guaranteed by FET & pull-up source, MUST BE S3 RAIL.



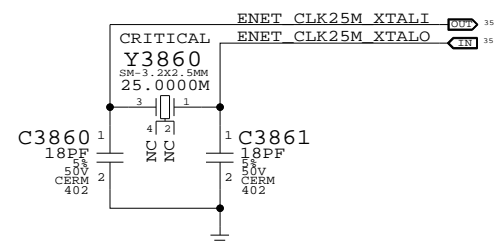
Yukon AVDDL LDO

1.9V for Yukon Ultra, 2.5V for Yukon EC
 Yukon Ultra requires 1.9V on its magnetics to pass compliance tests



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
114S0363	1	RES,31.6K,1%,1/16W,402,LF	R3855		YUKON_EC

Yukon Crystal



Yukon Power Control

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT 36 OF 88		
NONE			

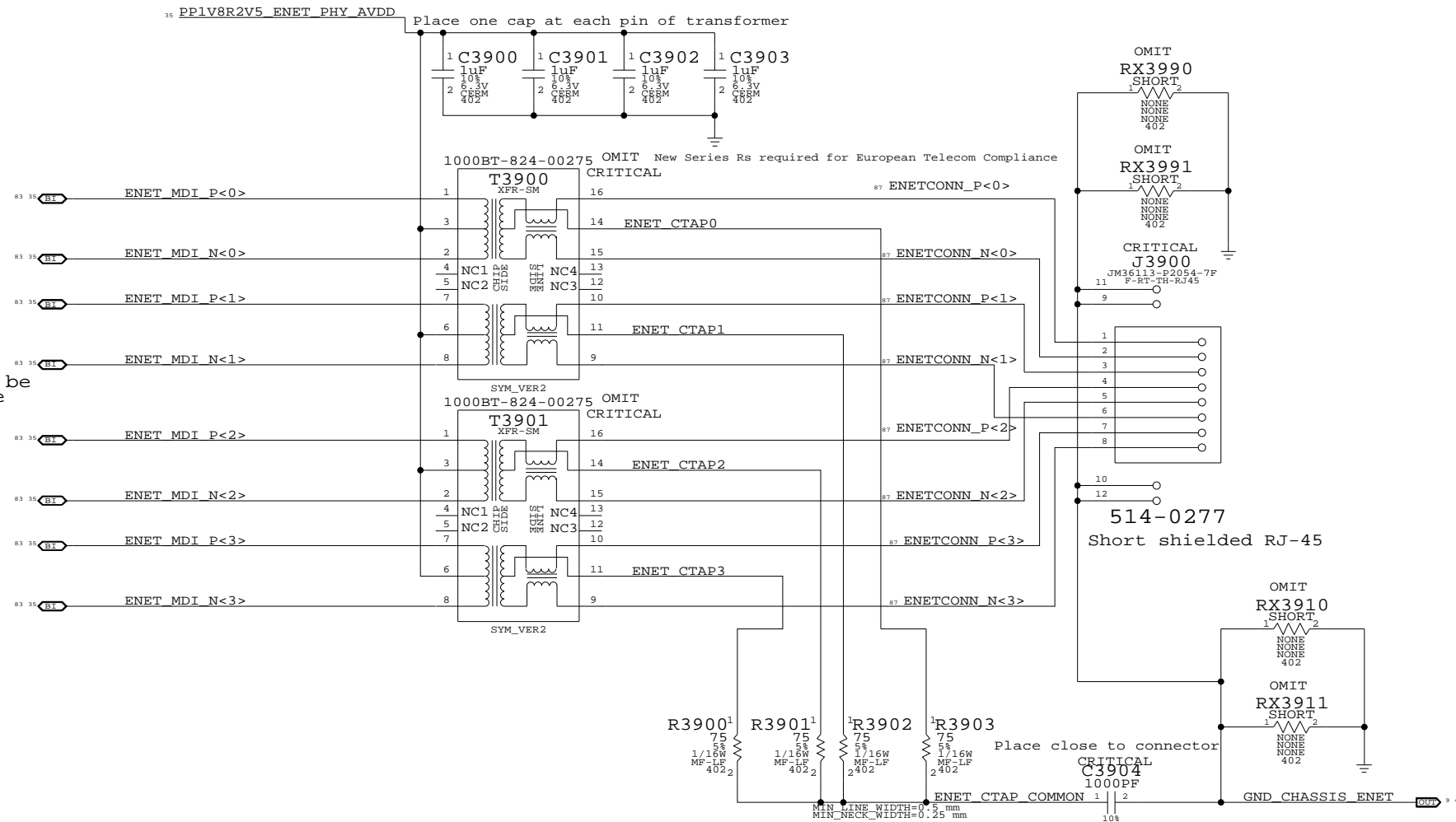
Page Notes

Power aliases required by this page:
 - =GND_CHASSIS_ENET

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

Transformers should be mirrored on opposite sides of the board



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
15780030	2	XPRM_ISO_HALF-PORT_1000T_16P_SMD_2MM	T3900, T3901	CRITICAL	

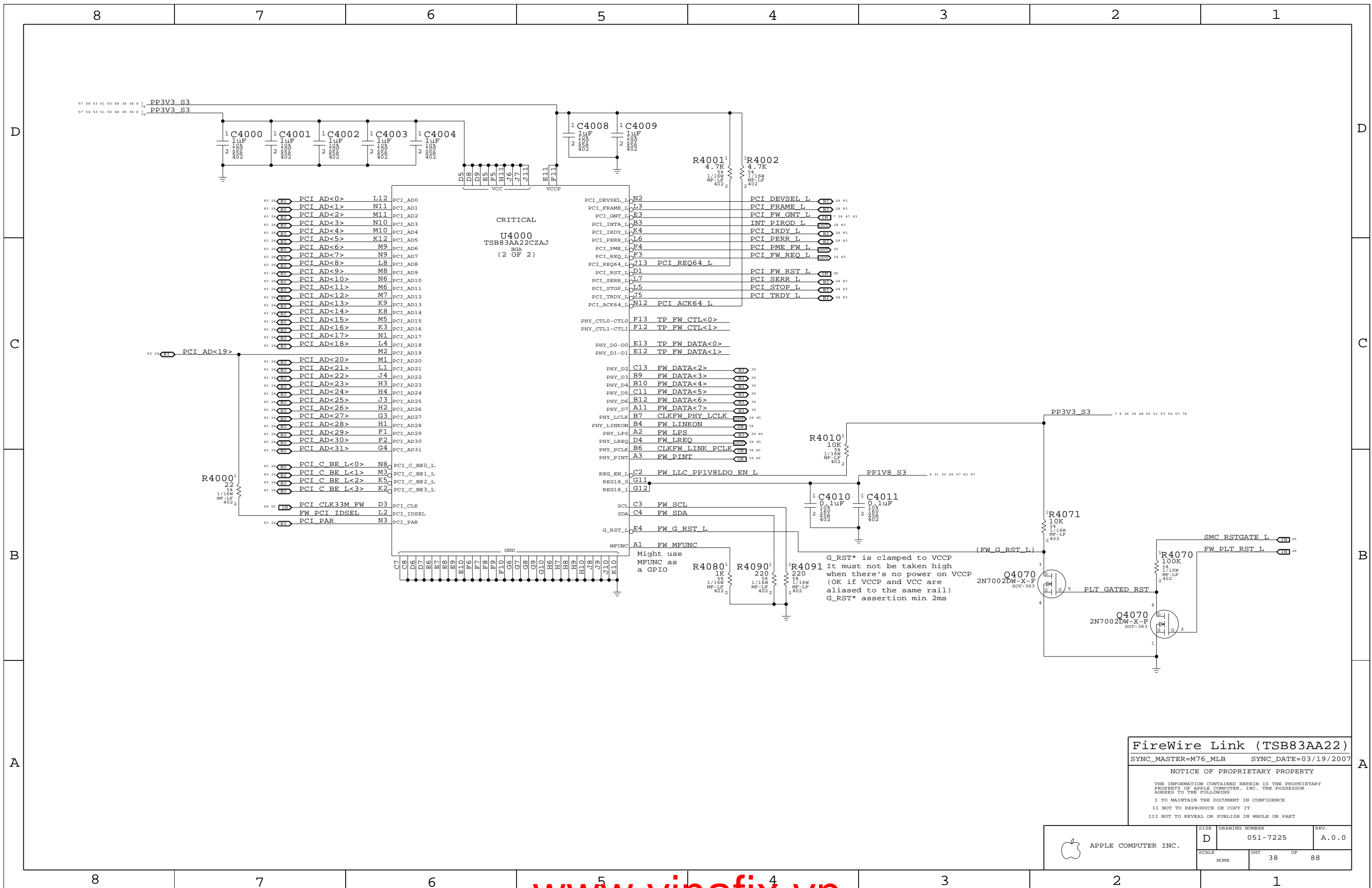
Ethernet Connector
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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

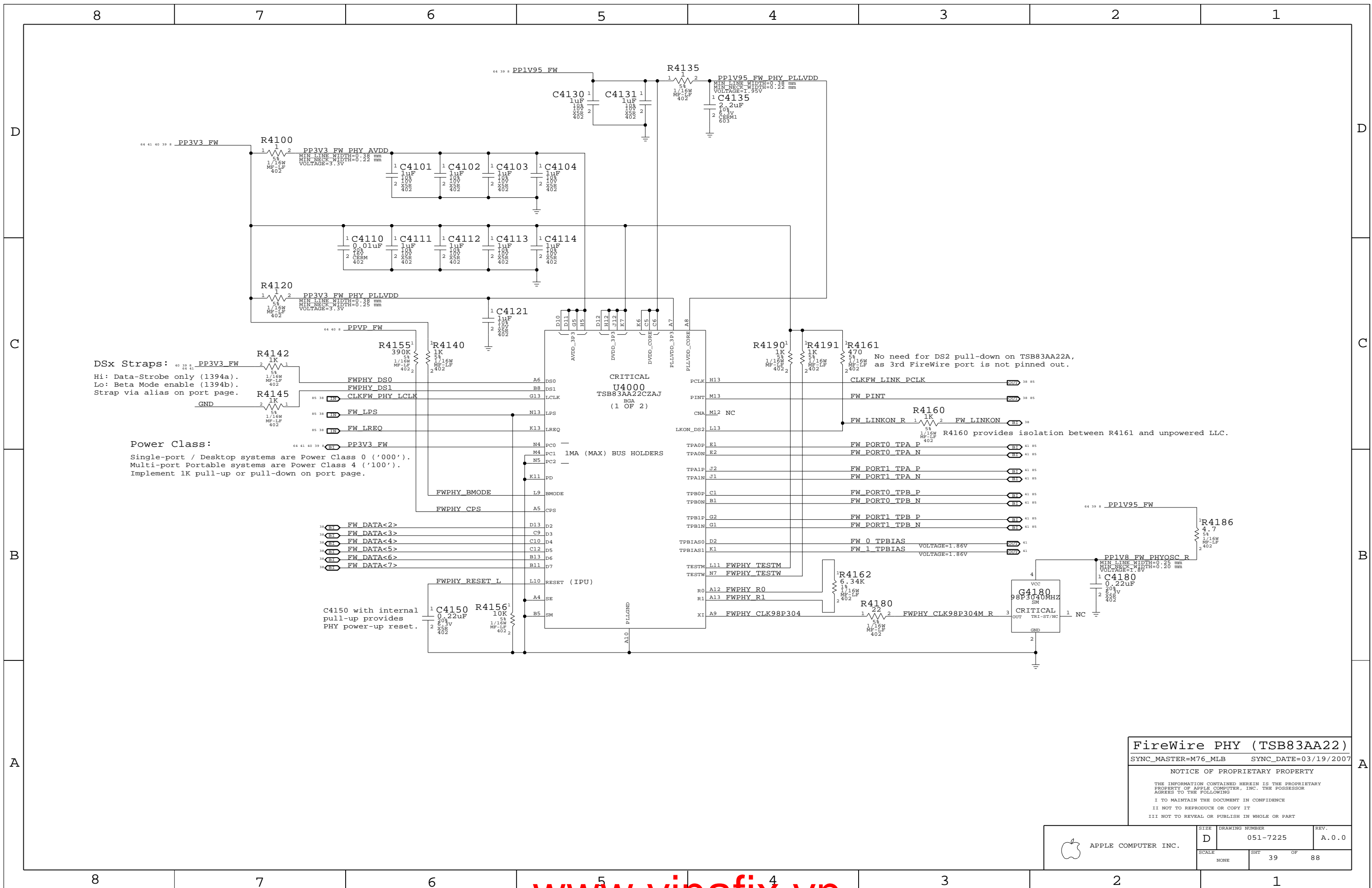
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	37	88	



FireWire Link (TSB83AA22)
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT 38 OF 88		
NONE			



FireWire PHY (TSB83AA22)
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT 39 OF 88		
NONE			

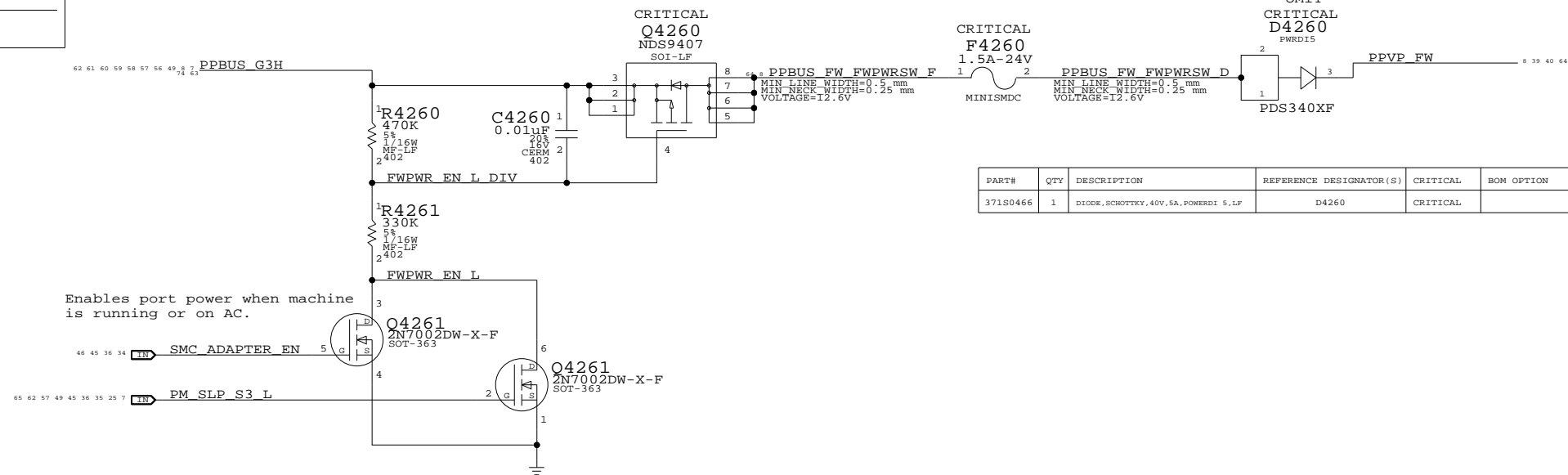
Page Notes

Power aliases required by this page:
 - =PPBUS_S5_FWPWSW (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

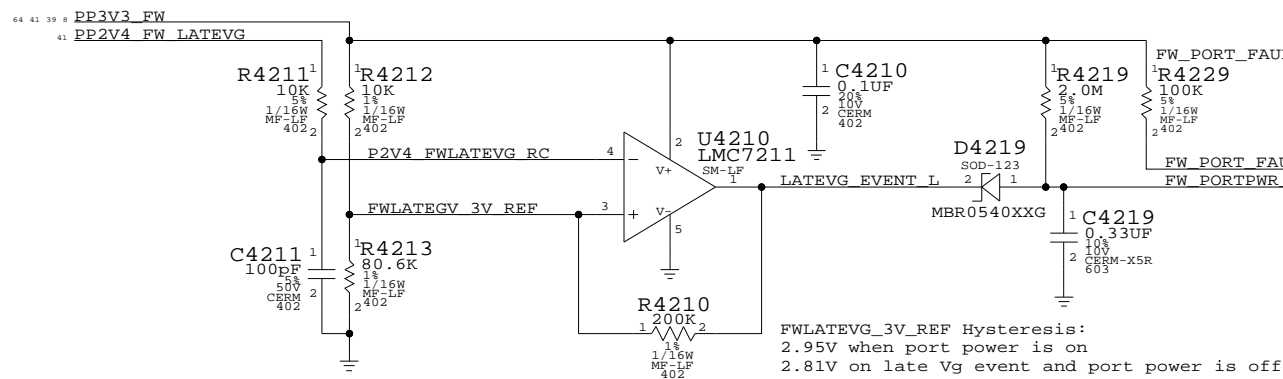


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
371S0466	1	DIODE,SCHOTTKY,40V,5A,POWERDI 5_LF	D4260	CRITICAL	

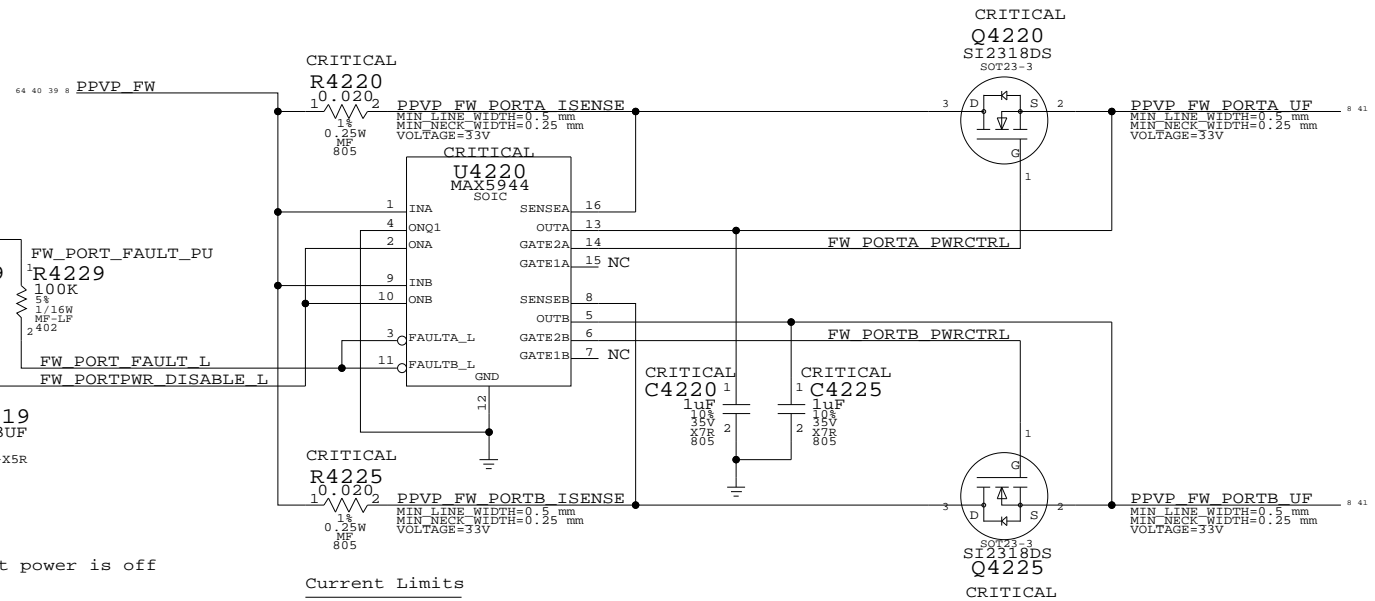
Enables port power when machine is running or on AC.

Current Limit/Active Late-VG Protection

Late-VG Event Detection



FWLATEVG_3V_REF Hysteresis:
 2.95V when port power is on
 2.81V on late Vg event and port power is off



Current Limits
 0.020 ohm => 2.4A
 0.025 ohm => 2A
 0.030 ohm => 1.66A (Ideal)
 0.033 ohm => 1.5A

MAX5944 current limiter trips if integrator (counter) reaches 16. A new sample (taken every 125 us) is weighted as +1 if over the limit (at any point during the period) and -1/128 if under the limit. As a result, the device tends to trip easily on devices that produce periodic current spikes. Current limit has been set higher to compensate.

FireWire Port Power

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	88
NONE	40		

Page Notes

Power aliases required by this page:
 - =PPVP_FW_PORT0
 - =PPVP_FW_PORT1
 - =PP3V3_FW_LATEVG
 - =GND_CHASSIS_FW_PORT0L
 - =GND_CHASSIS_FW_PORT0U
 - =GND_CHASSIS_FW_PORT1
 - =GND_CHASSIS_FW_EMI_R

Signal aliases required by this page:
 (NONE)

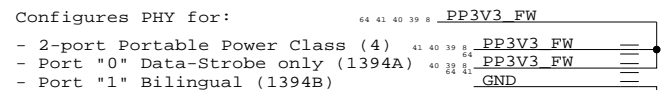
NOTE: This page is expected to contain the necessary aliases to map the FireWire TPA/TPB pairs to their appropriate connectors and/or to properly terminate unused signals.

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.

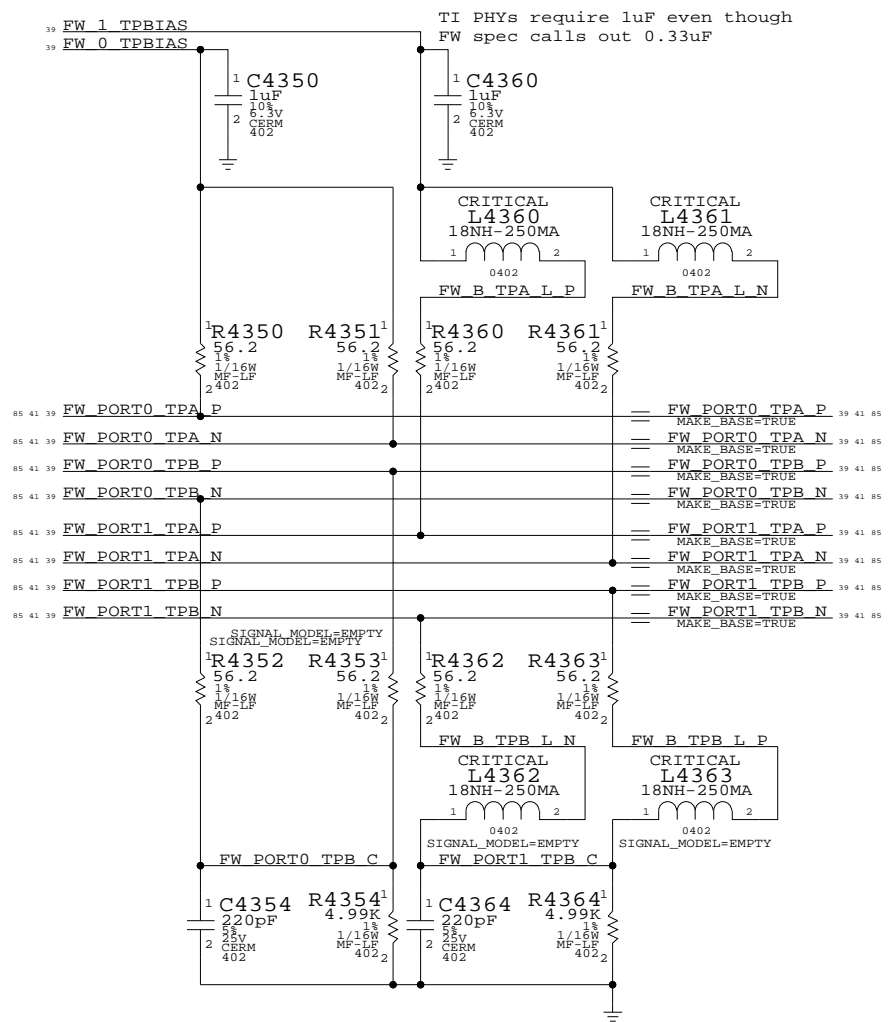
1394b implementation based on Apple FireWire Design Guide (FWDG 0.6, 5/14/03)

FireWire PHY Config Straps

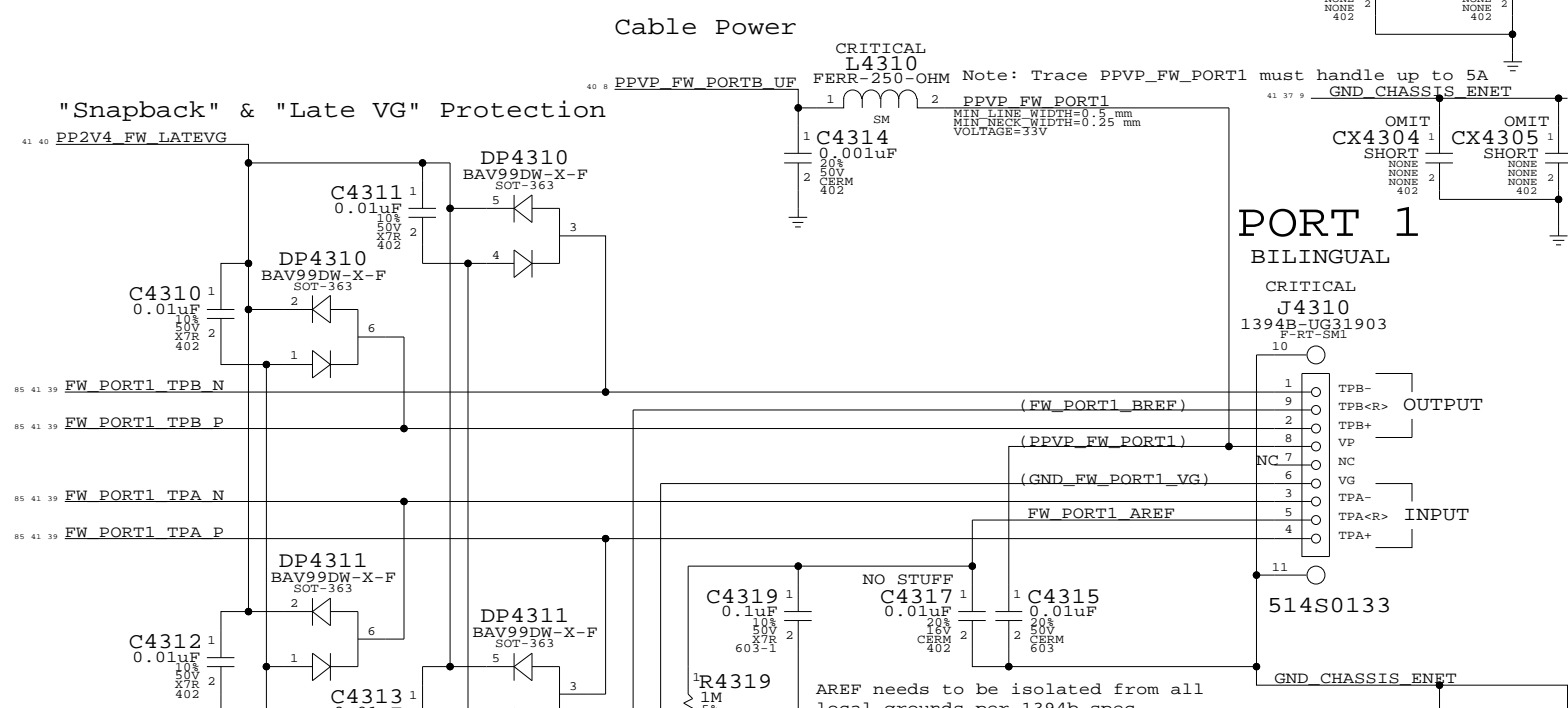
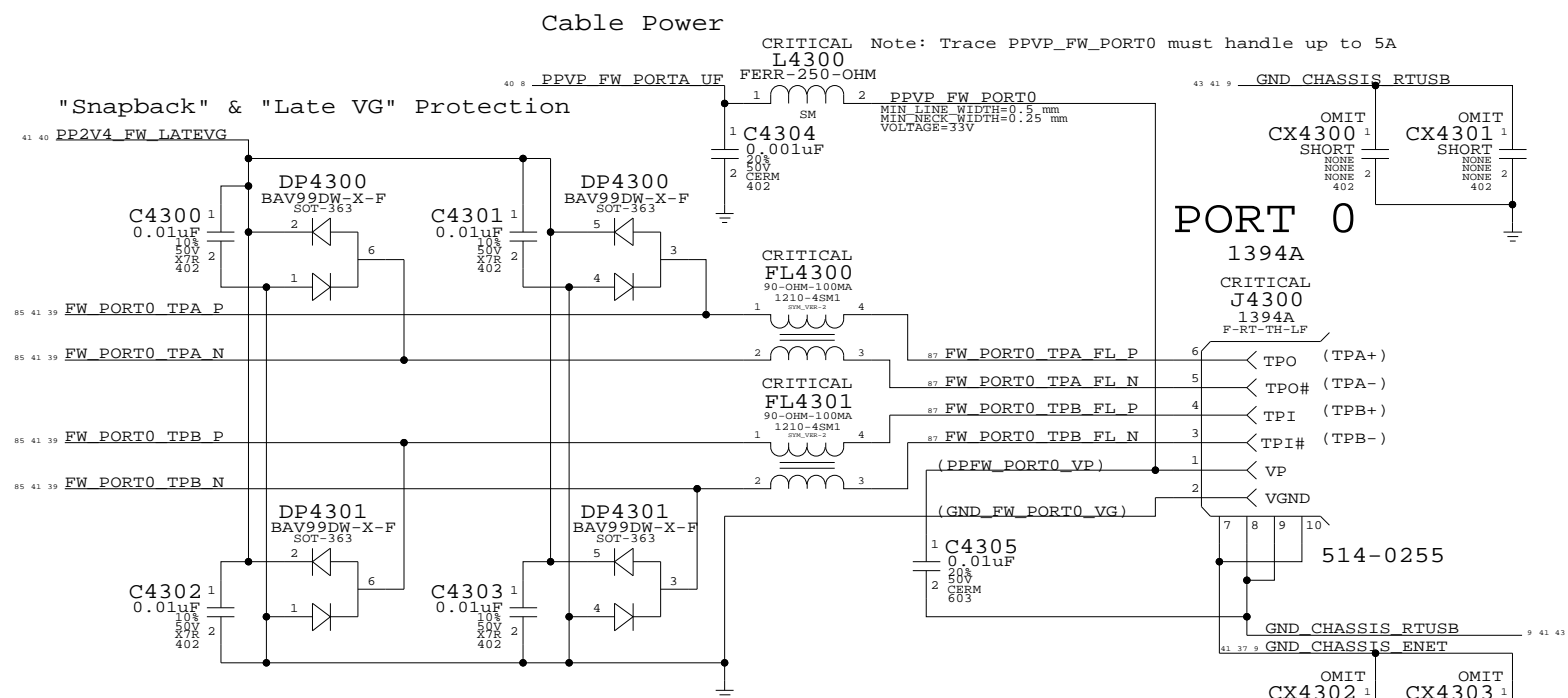
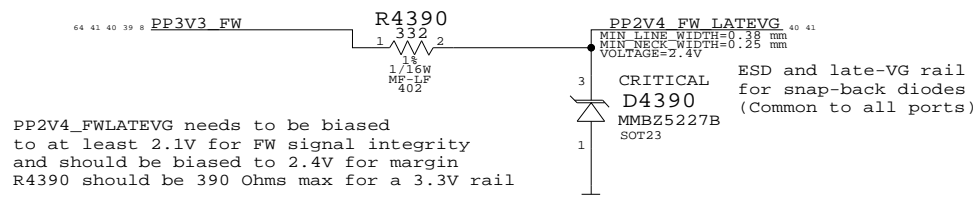


Termination

Place close to FireWire PHY



Late-VG Protection Power



FireWire Ports

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

NOTICE OF PROPRIETARY PROPERTY

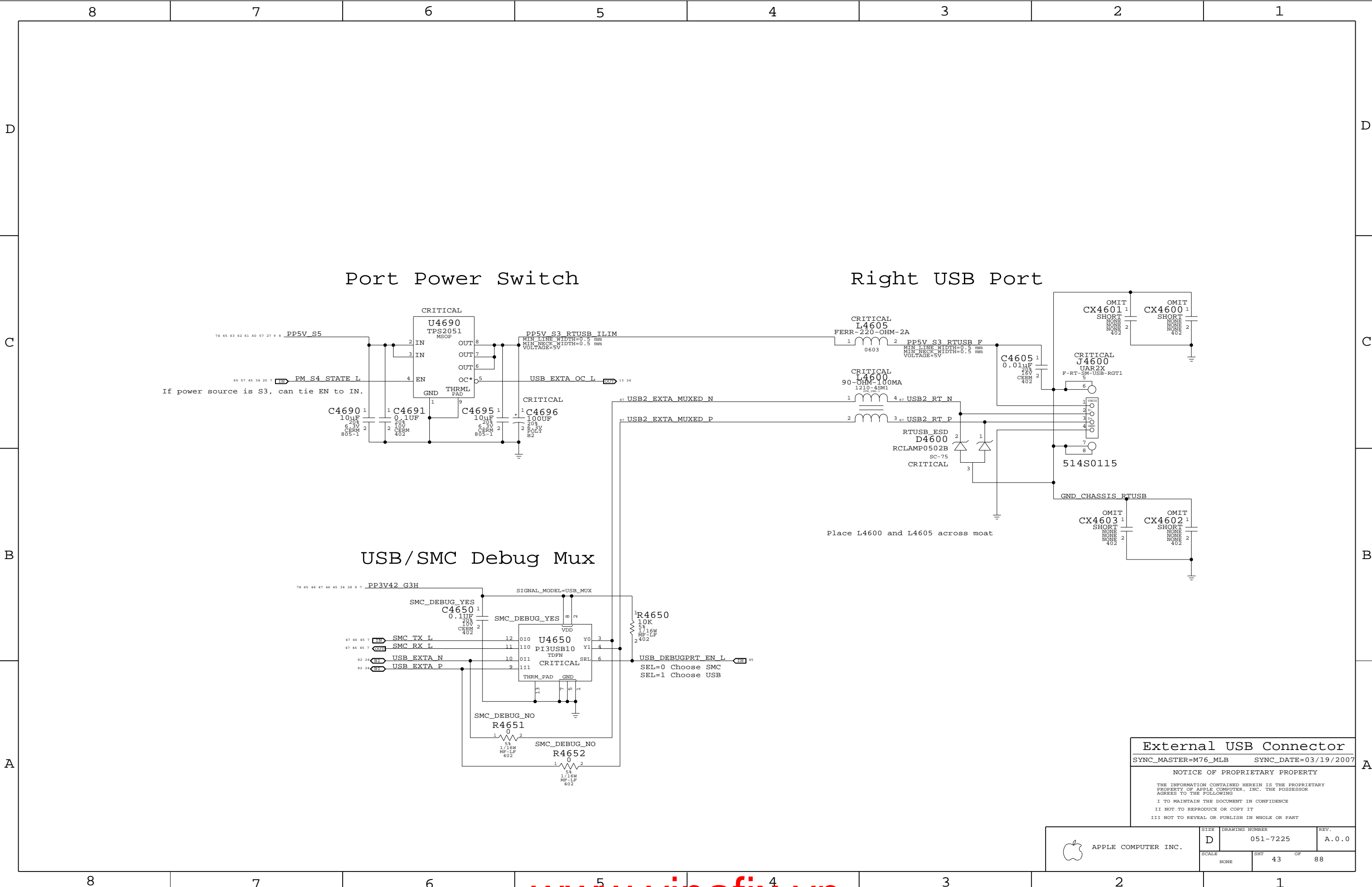
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	41	88	



External USB Connector

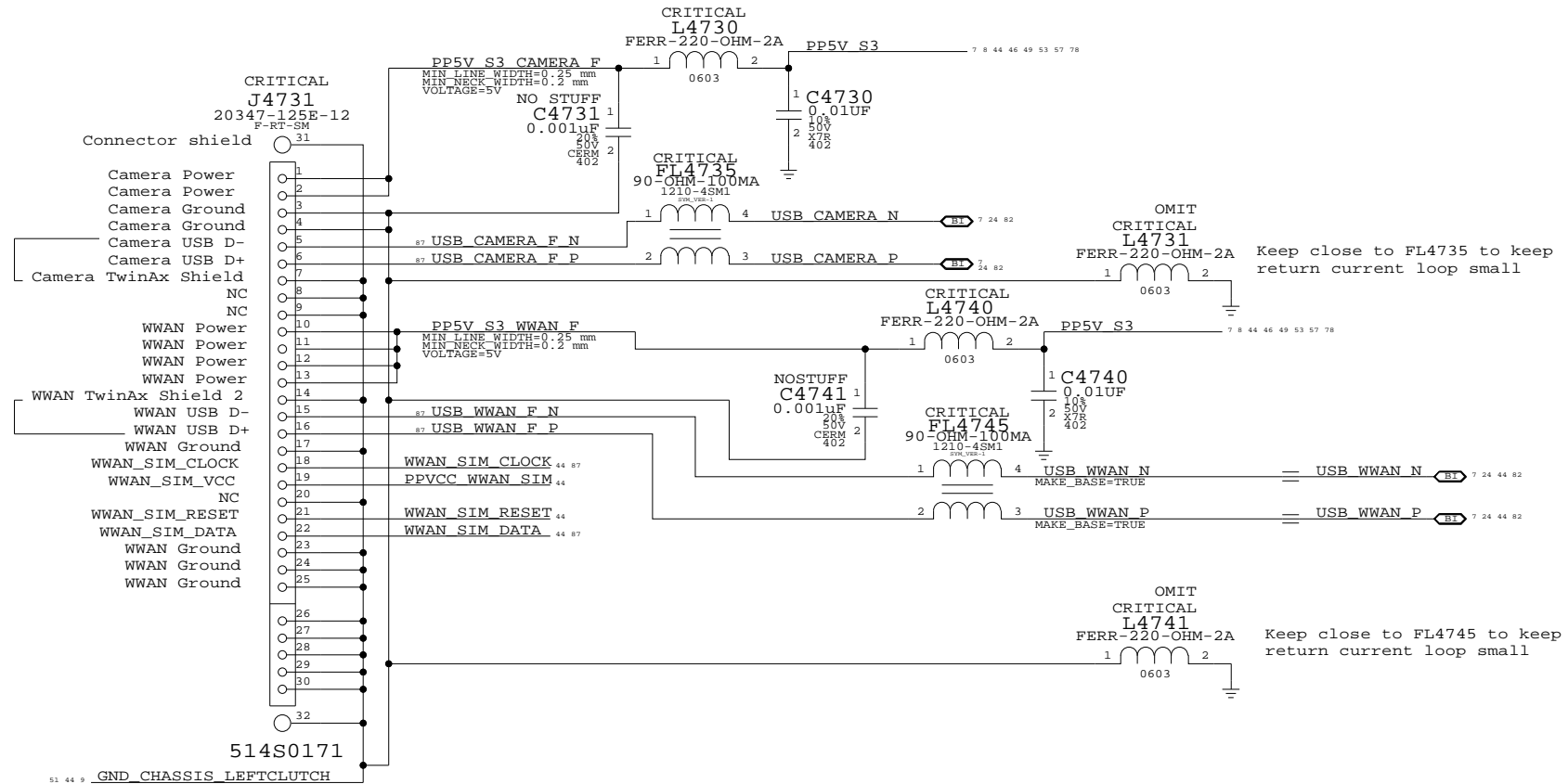
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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

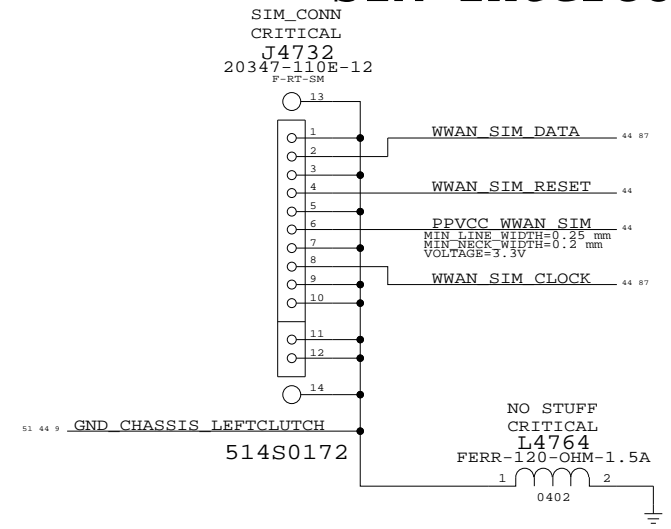
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT		OF
NONE	43		88

Left Clutch Barrel Interconnect



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
113S0022	2	RES, MF, 1/10W, 00HM, 5, 0603, SM, LF	L4731, L4741	CRITICAL	

SIM Interconnect



Left Clutch Barrel Interconnect
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	44	88	

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

D

C

B

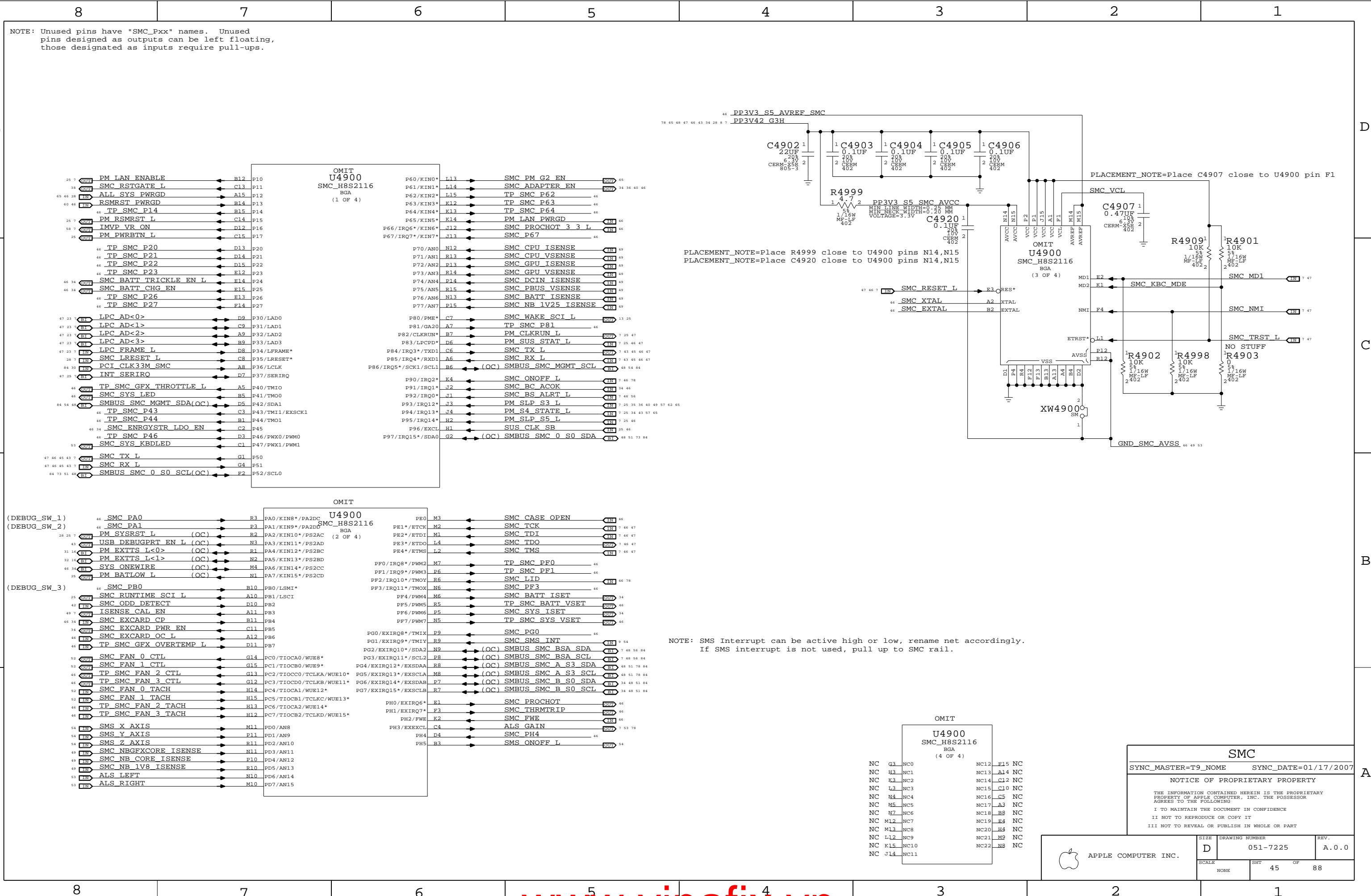
A

D

C

B

A



PLACEMENT_NOTE=Place R4999 close to U4900 pins N14,N15
 PLACEMENT_NOTE=Place C4920 close to U4900 pins N14,N15

PLACEMENT_NOTE=Place C4907 close to U4900 pin F1

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

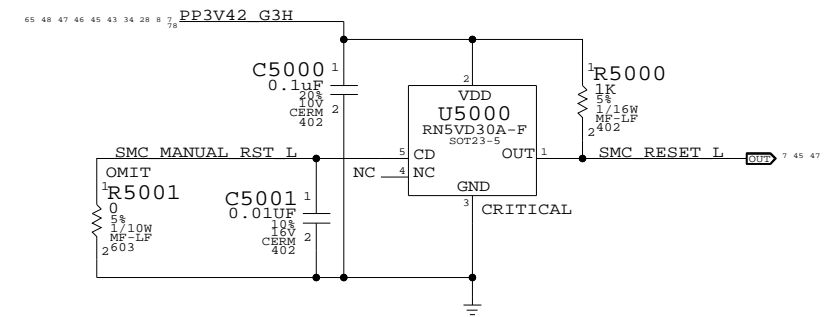
OMIT U4900 SMC_H8S2116 BGA (1 OF 4)		OMIT U4900 SMC_H8S2116 BGA (2 OF 4)		OMIT U4900 SMC_H8S2116 BGA (4 OF 4)			
25 7	PM LAN ENABLE	B12	P10	PE0	M3	SMC CASE OPEN	46
38	SMC_RSTGATE L	C13	P11	PE1*/ETCK	M2	SMC TCK	7 46 47
65 46 28	ALL SYS PWRGD	A15	P12	PE2*/ETDI	M1	SMC TDI	7 46 47
60 46	RSMRST_PWRGD	B14	P13	PE3*/ETDO	L4	SMC TDO	7 46 47
46	TP_SMC_P14	B15	P14	PE4*/ETMS	L2	SMC TMS	7 46 47
25 7	PM_RSMRST L	C14	P15	PF0/IRQ8*/PWM2	M7	TP_SMC_PF0	46
58 7	IMVP_VR_ON	D12	P16	PF1/IRQ9*/PWM3	P6	TP_SMC_FF1	46
25	PM_PWRBTN L	C15	P17	PF2/IRQ10*/TMOY	R6	SMC LID	46 78
46	TP_SMC_P20	D13	P20	PF3/IRQ11*/TMOX	N6	SMC PF3	46
46	TP_SMC_P21	D14	P21	PF4/PWM4	M6	SMC BATT ISET	34
46	TP_SMC_P22	D15	P22	PF5/PWM5	R5	TP_SMC_BATT_VSET	34
46	TP_SMC_P23	E12	P23	PF6/PWM6	P5	SMC SYS ISET	34
46 34	SMC_BATT_TRICKLE_EN L	E14	P24	PF7/PWM7	N5	TP_SMC_SYS_VSET	46
46 34	SMC_BATT_CHG_EN	E15	P25	PG0/EXIRQ8*/TMIX	P9	SMC PG0	46
46	TP_SMC_P26	E13	P26	PG1/EXIRQ9*/TMIX	R9	SMC SMS INT	9 44
46	TP_SMC_P27	F14	P27	PG2/EXIRQ10*/SDA2	N9	(OC) SMBUS_SMC_BSA_SDA	7 48 56 84
47 23 7	LPC_AD<0>	D9	P30/LAD0	PG3/EXIRQ11*/SCL2	R8	(OC) SMBUS_SMC_BSA_SCL	7 48 56 84
47 23 7	LPC_AD<1>	C9	P31/LAD1	PG4/EXIRQ12*/EXSDAA	R8	(OC) SMBUS_SMC_A_S3_SDA	48 51 78 84
47 23 7	LPC_AD<2>	A9	P32/LAD2	PG5/EXIRQ13*/EXSCLA	M8	(OC) SMBUS_SMC_A_S3_SCL	48 51 78 84
47 23 7	LPC_AD<3>	B9	P33/LAD3	PG6/EXIRQ14*/EXSDAB	P7	(OC) SMBUS_SMC_B_S0_SDA	34 48 51 84
47 23 7	LPC_FRAME L	D8	P34/LFRAME*	PG7/EXIRQ15*/EXSCLB	R7	(OC) SMBUS_SMC_B_S0_SCL	34 48 51 84
26 7	SMC_LRESET L	C8	P35/LRESET*	PH0/EXIRQ6*	E1	SMC PROCHOT	46
64 30	PCI_CLK33M_SMC	A8	P36/LCLK	PH1/EXIRQ7*	F3	SMC THRMTRIP	46
47 25 7	INT_SERIRO	D7	P37/SERIRQ	PH2/FWE	K2	SMC FWE	46
46	TP_SMC_GFX_THROTTLE L	A5	P40/TMIO	PH3/EXEXCL	C4	ALS_GAIN	7 53 78
46	SMC_SYS_LED	B5	P41/TMO0	PH4	D4	SMC PH4	46
84 54 46	SMBUS_SMC_MGMT_SDA(OC)	D5	P42/SDA1	PH5	B3	SMS_ONOFF L	54
46	TP_SMC_P43	C3	P43/TMI1/EXSCK1				
46	TP_SMC_P44	B1	P44/TMO1				
46 34	SMC_ENRGYSTR_LDO_EN	C2	P45				
46	TP_SMC_P46	D3	P46/PWX0/PWM0				
53	SMC_SYS_KBDLED	C1	P47/PWX1/PWM1				
47 46 45 43 7	SMC_TX L	G1	P50				
47 46 45 43 7	SMC_RX L	G4	P51				
84 73 51 49	SMBUS_SMC_0_S0_SCL(OC)	F2	P52/SCL0				

OMIT U4900 SMC_H8S2116 BGA (4 OF 4)		NC			
NC	G3	NC0	NC12	E15	NC
NC	H3	NC1	NC13	A14	NC
NC	K3	NC2	NC14	C12	NC
NC	L3	NC3	NC15	C10	NC
NC	N4	NC4	NC16	C5	NC
NC	M5	NC5	NC17	A3	NC
NC	N7	NC6	NC18	BB	NC
NC	M2	NC7	NC19	E4	NC
NC	M3	NC8	NC20	H4	NC
NC	L12	NC9	NC21	M9	NC
NC	K15	NC10	NC22	MB	NC
NC	J14	NC11			

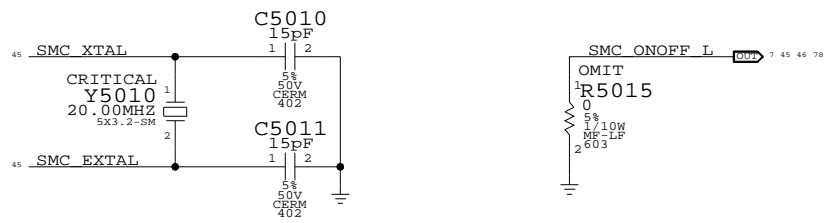
SMC
 SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	45	88	

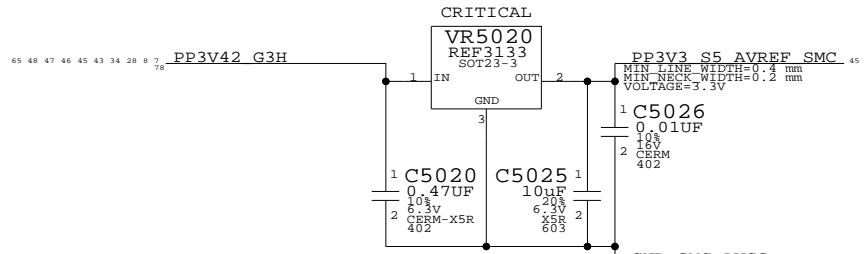
SMC Reset "Button" / Brownout Detect



SMC Crystal Circuit Debug Power "Button"

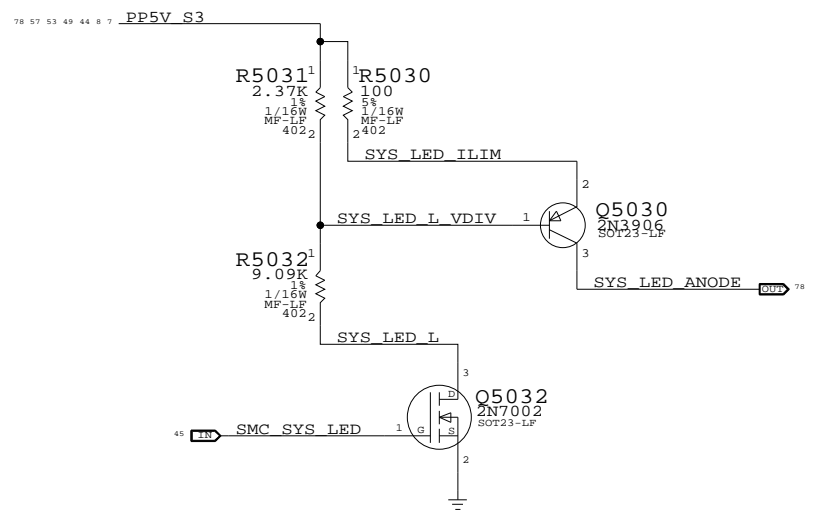


SMC AVREF Supply



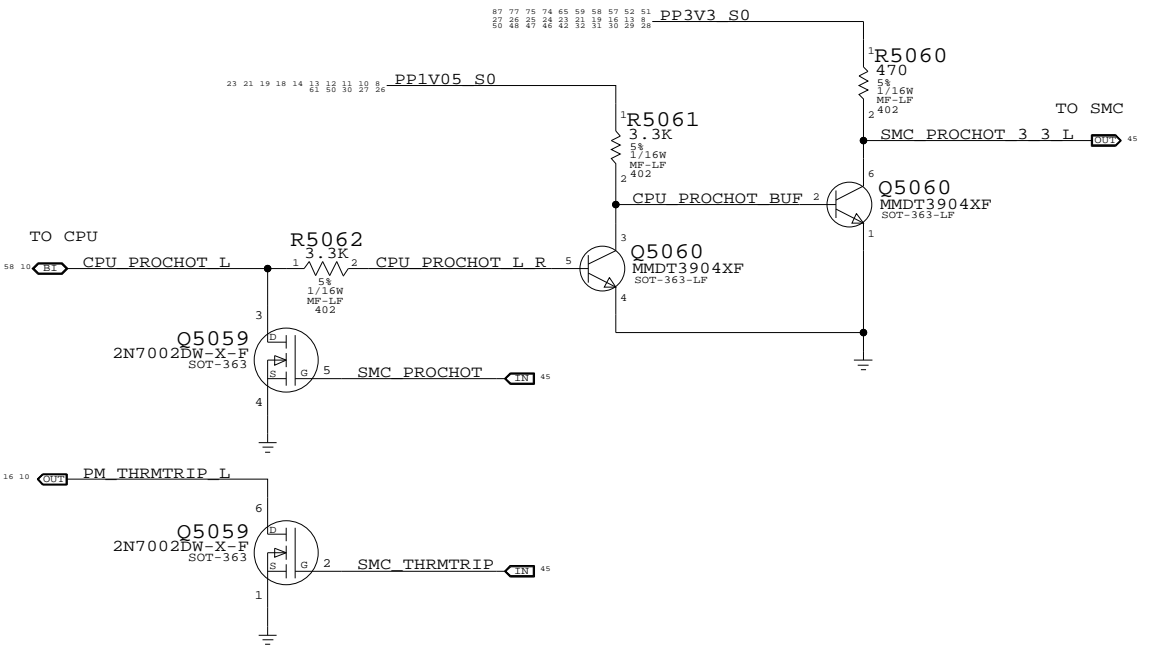
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
35381381	35381278		ALL	Interail ISL60002-33

System (Sleep) LED Circuit



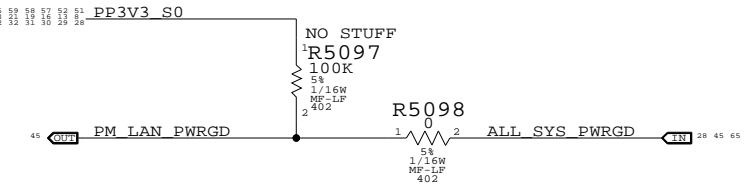
- TP_SMC_FAN_2_CTL == TP_SMC_FAN_2_CTL
- TP_SMC_FAN_2_TACH == TP_SMC_FAN_2_TACH
- TP_SMC_FAN_3_CTL == TP_SMC_FAN_3_CTL
- TP_SMC_FAN_3_TACH == TP_SMC_FAN_3_TACH
- TP_SMC_GFX_OVERTEMP_L == TP_SMC_GFX_OVERTEMP_L
- TP_SMC_GFX_THROTTLE_L == TP_SMC_GFX_THROTTLE_L
- TP_SMC_BATT_VSET == TP_SMC_BATT_VSET
- TP_SMC_SYS_VSET == TP_SMC_SYS_VSET
- TP_SMC_P14 == TP_SMC_P14
- TP_SMC_P20 == TP_SMC_P20
- TP_SMC_P21 == TP_SMC_P21
- TP_SMC_P22 == TP_SMC_P22
- TP_SMC_P23 == TP_SMC_P23
- TP_SMC_P26 == TP_SMC_P26
- TP_SMC_P27 == TP_SMC_P27
- TP_SMC_P43 == TP_SMC_P43
- TP_SMC_P44 == TP_SMC_P44
- TP_SMC_P46 == TP_SMC_P46
- TP_SMC_P62 == TP_SMC_P62
- TP_SMC_P63 == TP_SMC_P63
- TP_SMC_P64 == TP_SMC_P64
- TP_SMC_P81 == TP_SMC_P81
- TP_SMC_PFO == TP_SMC_PFO
- TP_SMC_PF1 == TP_SMC_PF1

SMC FSB to 3.3V Level Shifting

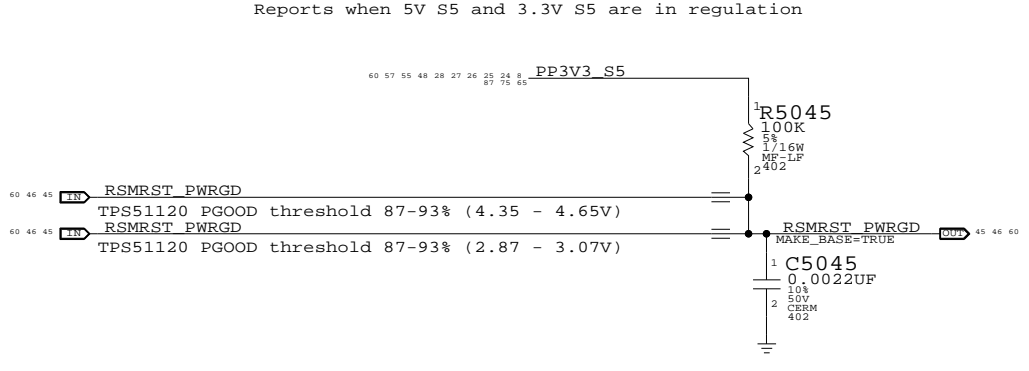


- SMC_EXCARD_OC_L == EXCARD_OC_L
- SUS_CLK_SB == SUS_CLK_SB
- SMC_ENRGYSTR_LDO_EN == SMC_ENRGYSTR_LDO_EN

LAN PWRGD Circuit



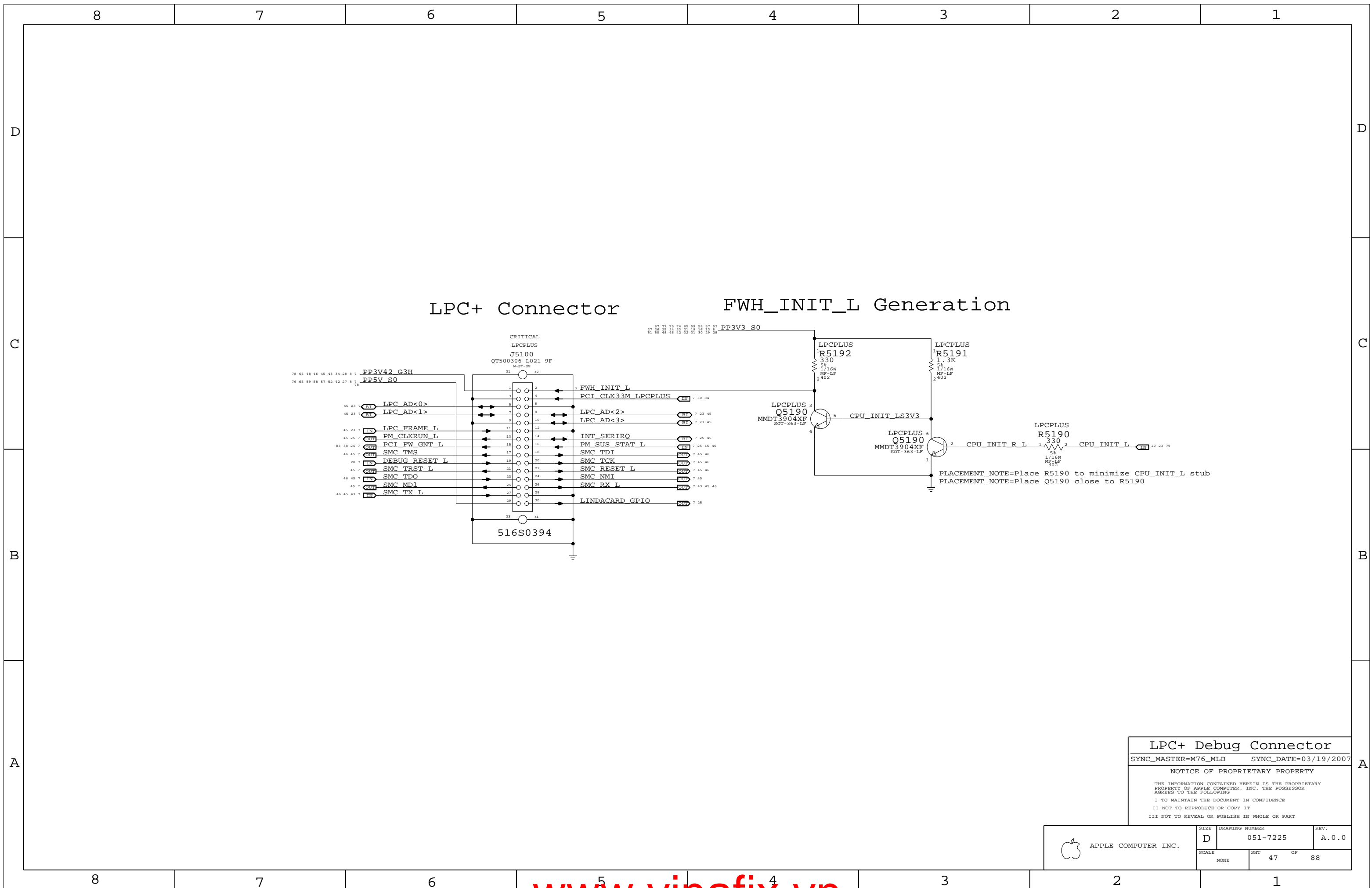
S5 Rail PWRGD Circuit



- SMC_PA0 == R5091 100K
- SMC_PA1 == R5092 100K
- SMC_PB0 == R5093 100K
- SMC_ONOFF_L == R5070 10K
- SMC_LID == R5071 100K
- SMC_FWE == R5072 10K
- SMC_TX_L == R5073 10K
- SMC_RX_L == R5074 100K
- SMC_BS_ALRT_L == R5076 100K
- SMC_TMS == R5077 10K
- SMC_TDO == R5078 10K
- SMC_TDI == R5079 10K
- SMC_TCK == R5080 10K
- SMC_P67 == R5094 10K
- SMC_P63 == R5081 10K
- SMC_P60 == R5096 10K
- SMC_PH4 == R5082 10K
- SMC_BATT_TRICKLE_EN_L == R5083 10K
- SMC_BATT_CHG_EN == R5084 10K
- SMC_ADAPTER_EN == R5085 10K
- SMC_CASE_OPEN == R5086 10K
- SMC_BC_ACOK == R5087 470K
- SMC_EXCARD_CP == R5088 10K
- PM_SUS_STAT_L == R5089 100K
- PM_SLP_S5_L == R5090 100K

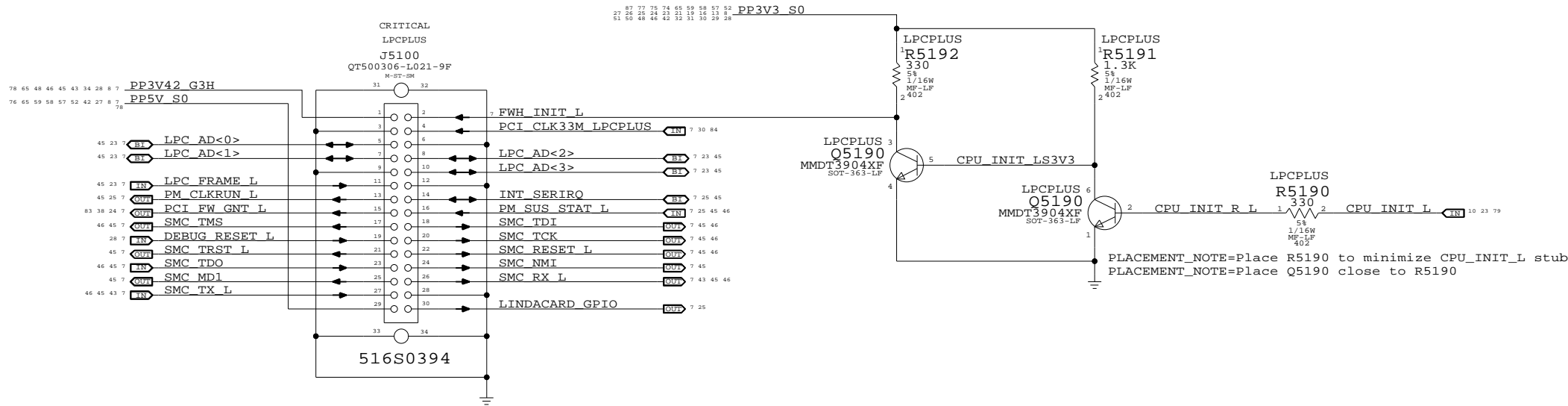
SMC Support
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)
NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING:
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL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

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	46	88	



LPC+ Connector

FWH_INIT_L Generation



LPC+ Debug Connector

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

NOTICE OF PROPRIETARY PROPERTY

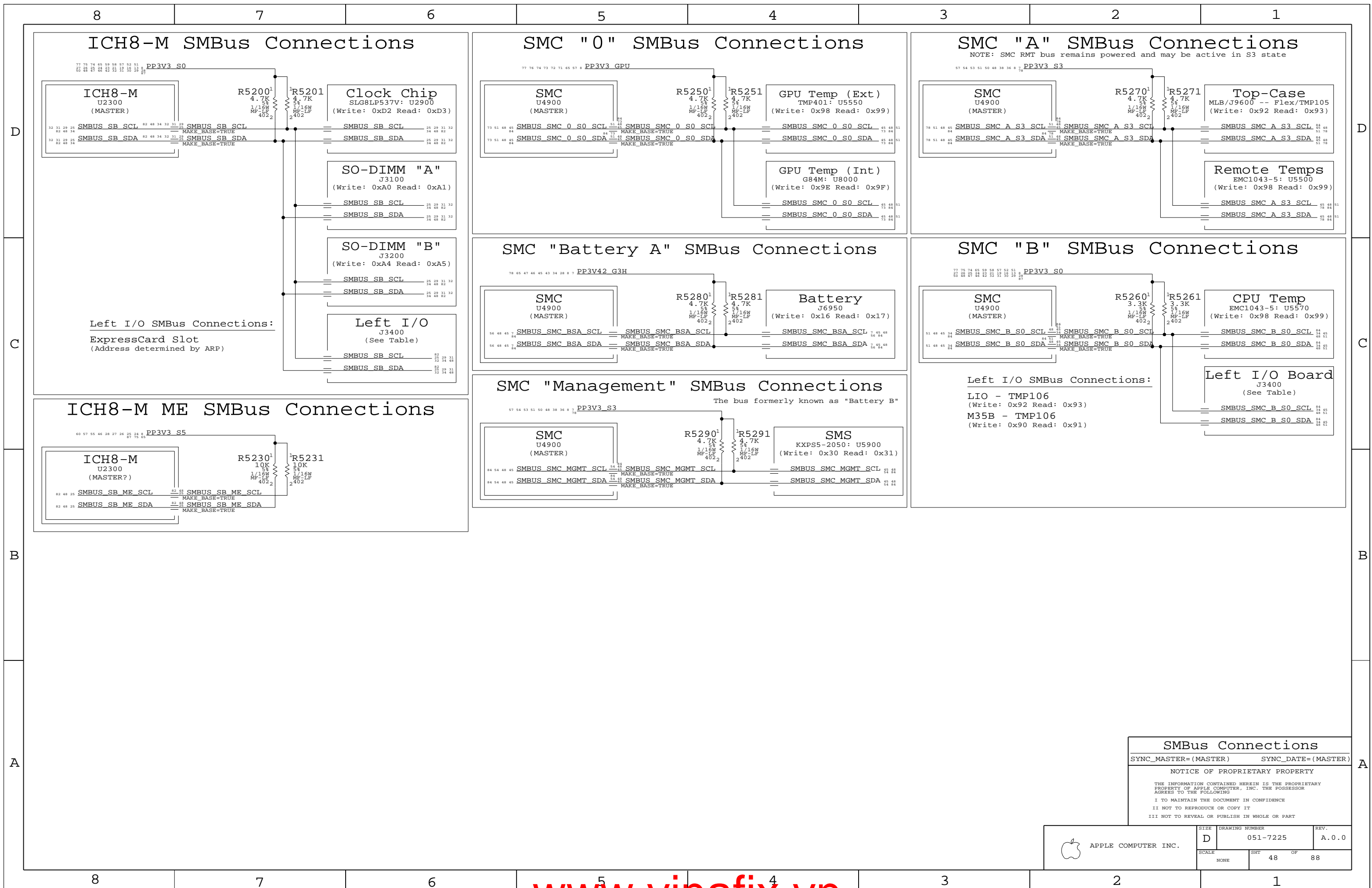
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	47	88	



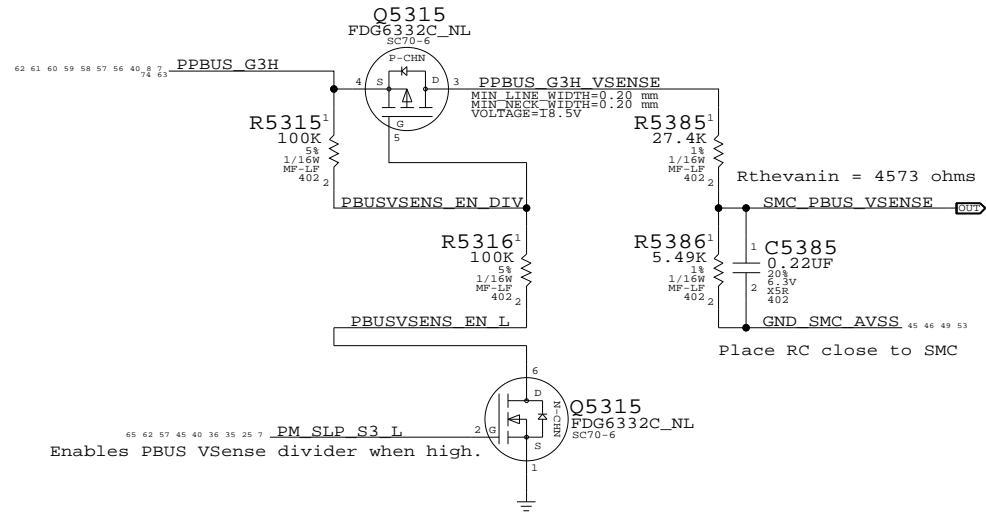
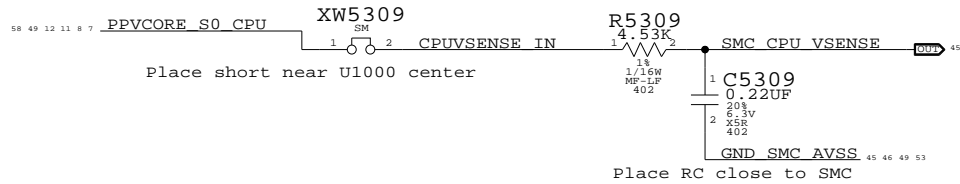
SMBus Connections
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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

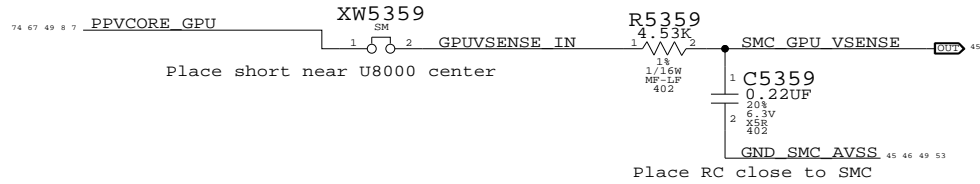
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	48	88	

CPU Voltage Sense / Filter

PBUS Voltage Sense & Filter



GPU Voltage Sense / Filter

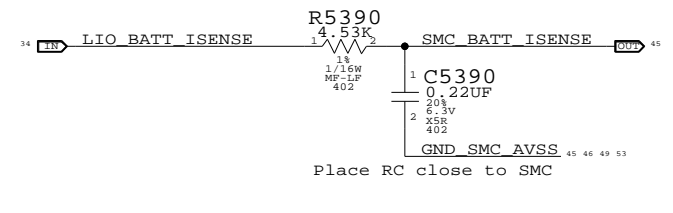
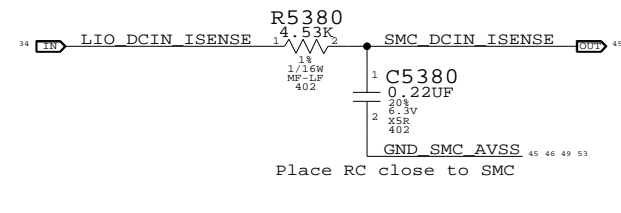
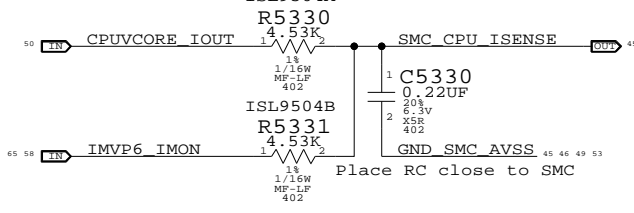
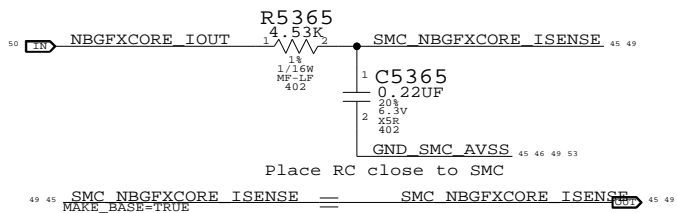


NB GFX Current Sense Filter

CPU Current Sense Filter

DCIN Current Sense Filter

Battery (PBUS) Current Sense Filter

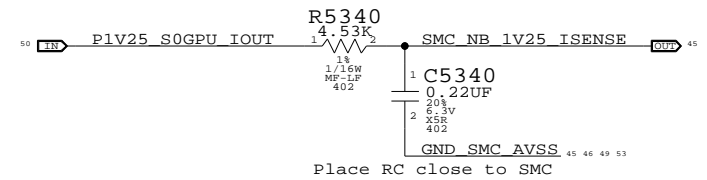
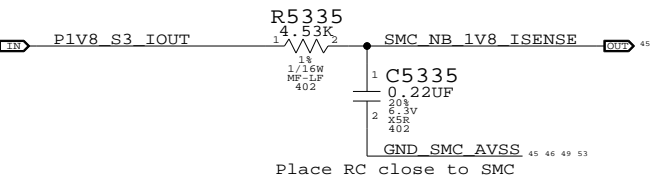
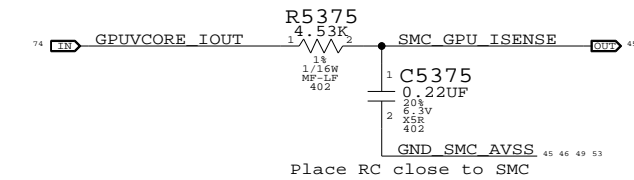
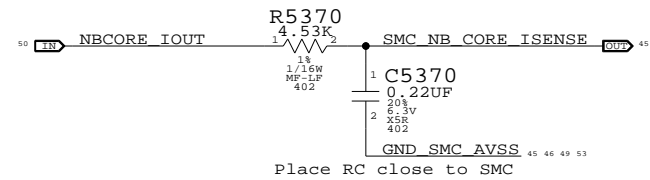


NB Core Current Sense Filter

GPU Current Sense Filter

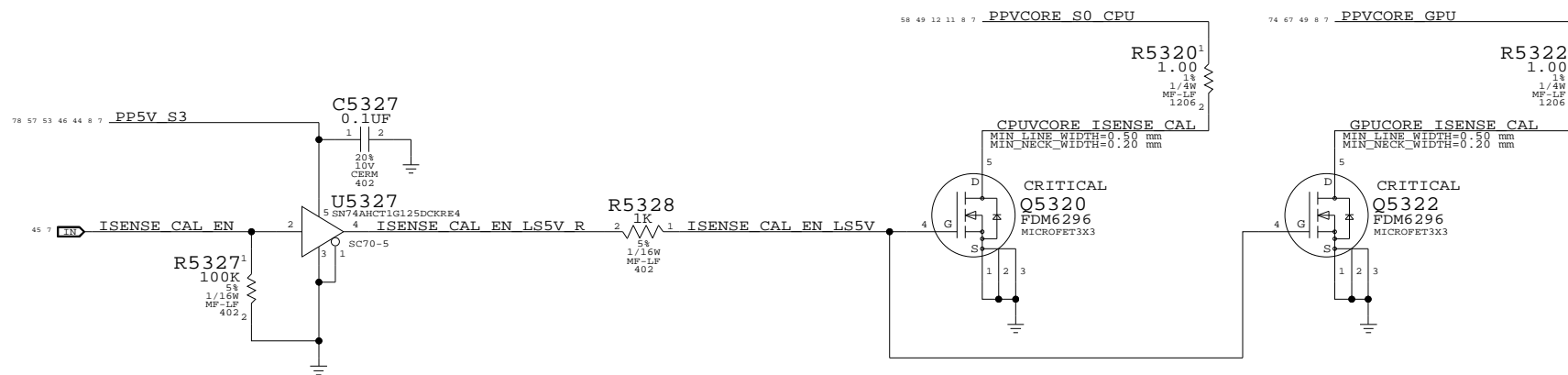
NB 1.8V Current Sense Filter

S0/GPU 1.25V Current Sense Filter



Current Sense Calibration Circuit

Switches in fixed load on power supplies to calibrate current sense circuits



Current & Voltage Sensing

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

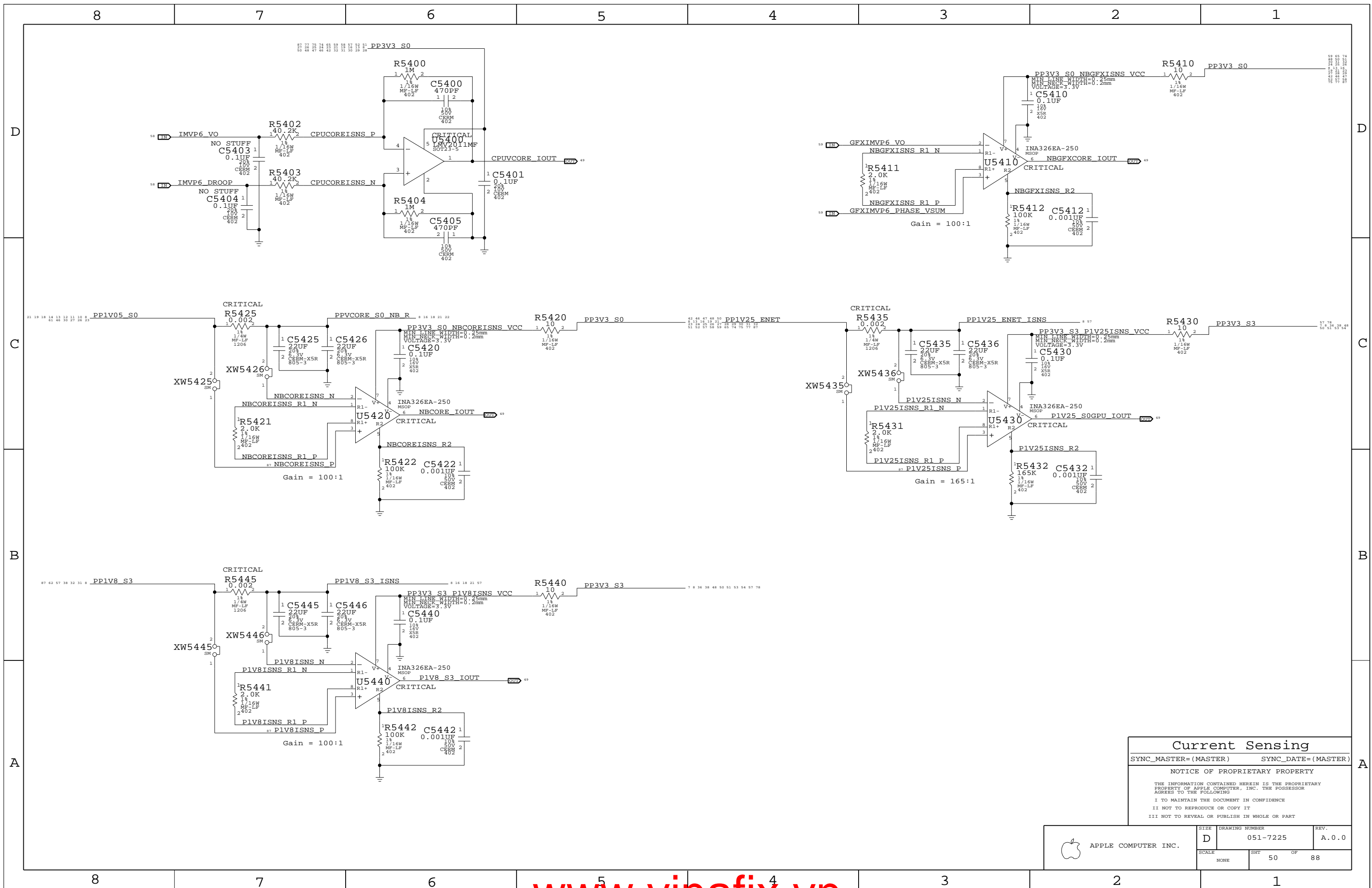
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	88
NONE	49		



Current Sensing

SYNC_MASTER=(MASTER) 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

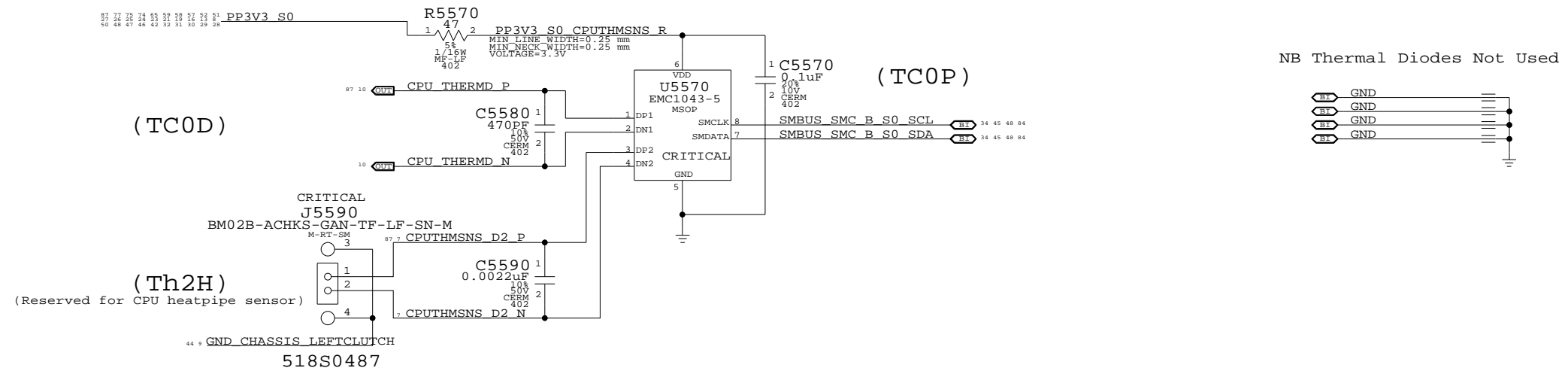
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

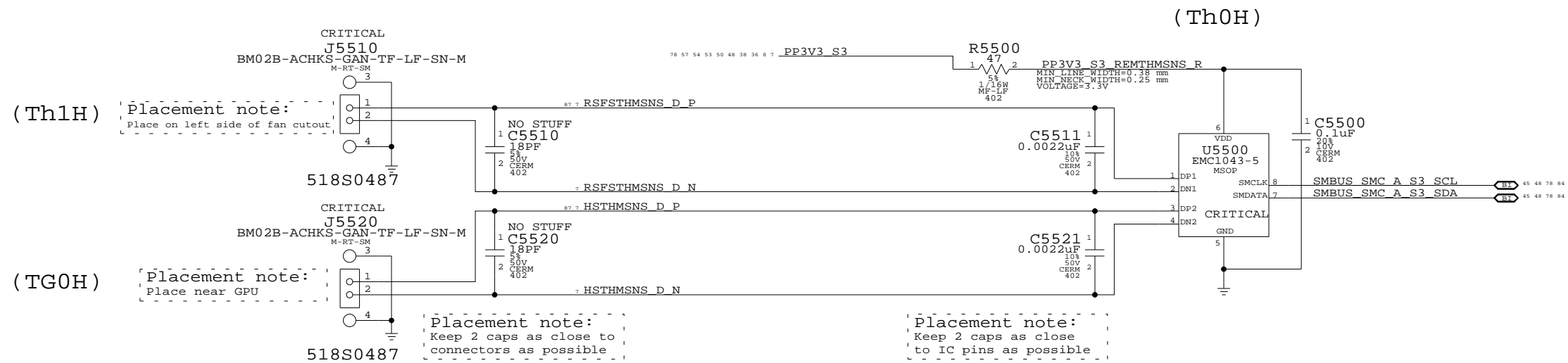
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHEET 50	OF 88

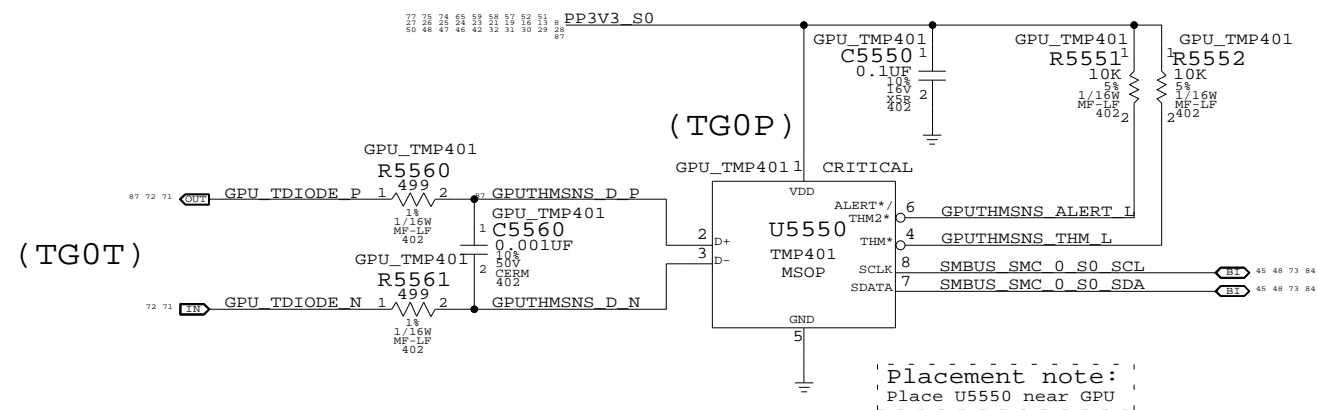
CPU T-Diode Thermal Sensor



GPU/Heat Pipe & Bottom Case Skin Thermal Sensor

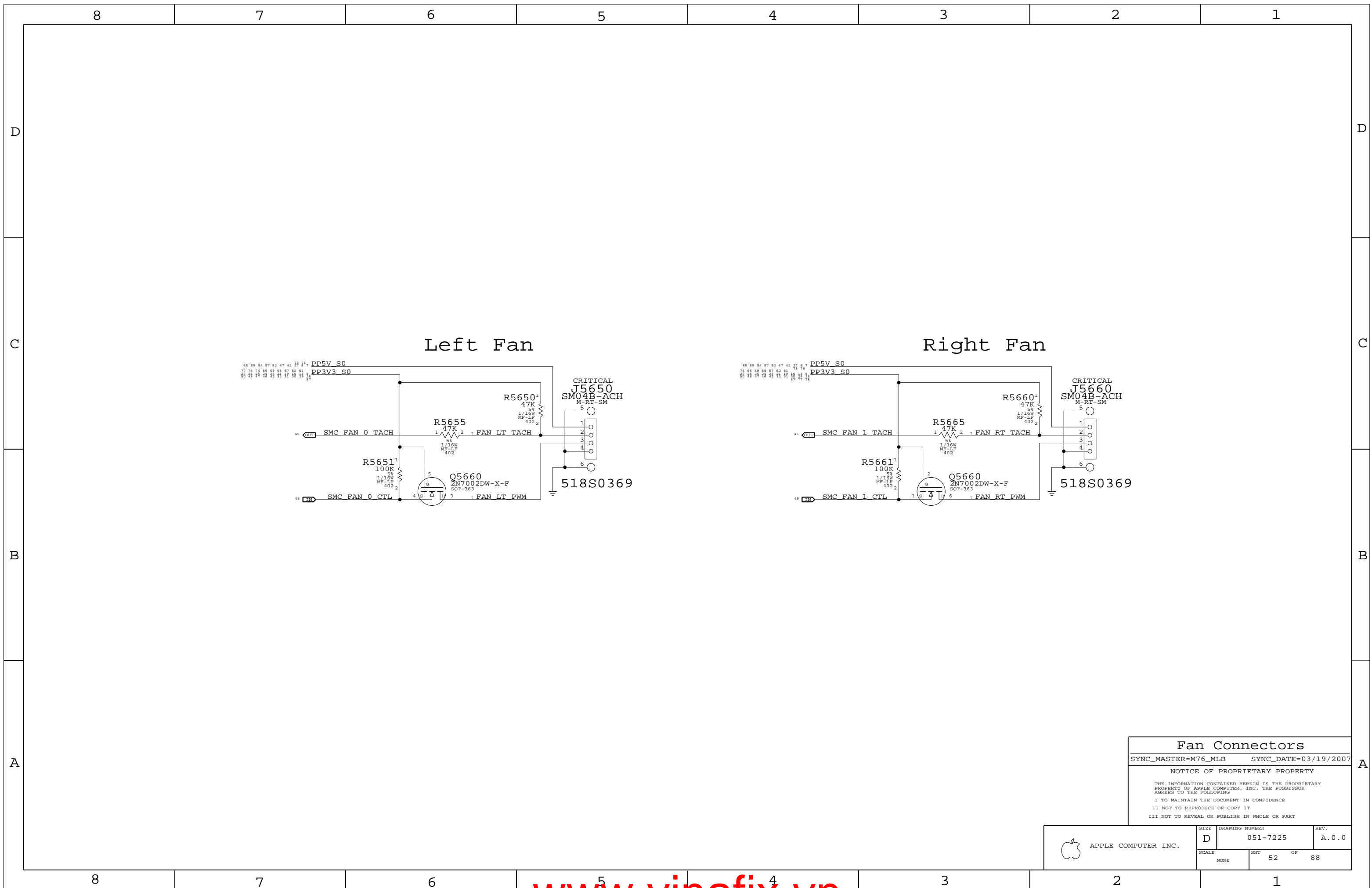


GPU Die Thermal Sensor



Thermal Sensors
 SYNC_MASTER=(MASTER) 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT		OF
NONE	51		88



Fan Connectors

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

NOTICE OF PROPRIETARY PROPERTY

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

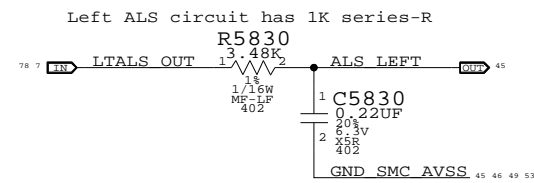
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

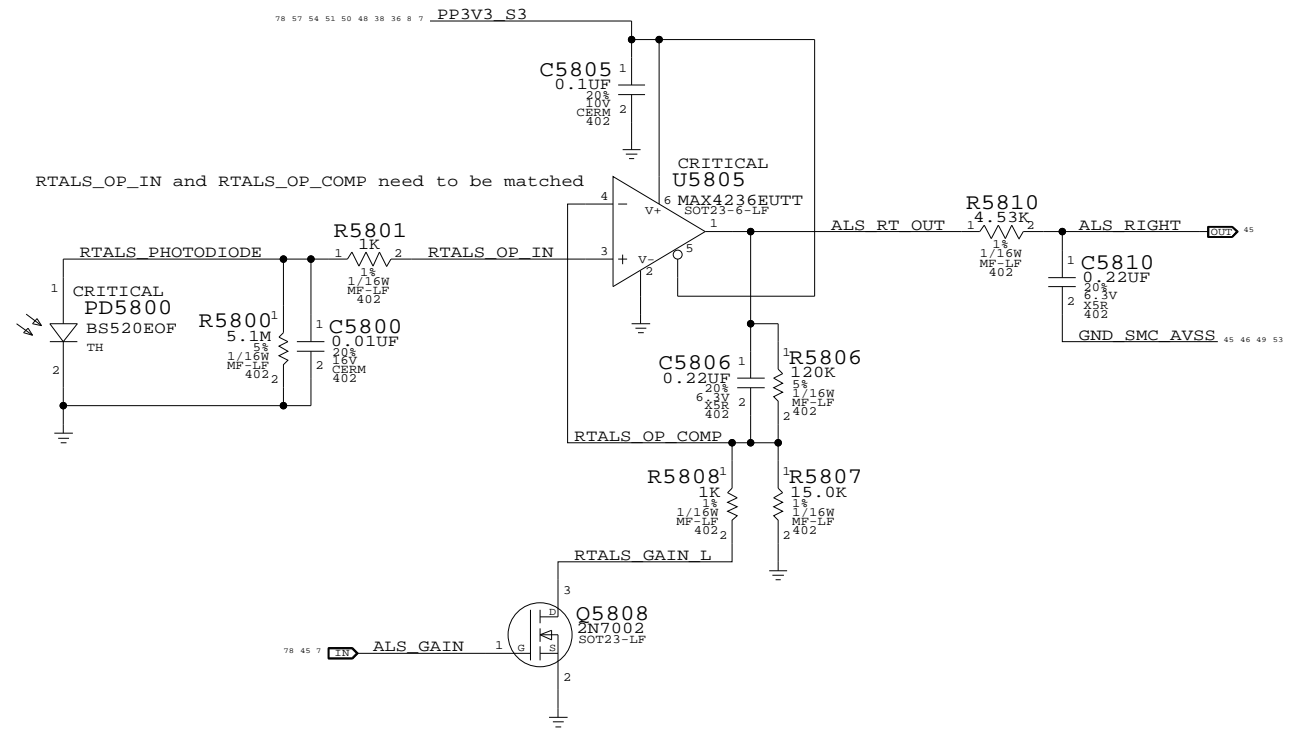
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHT 52	OF 88

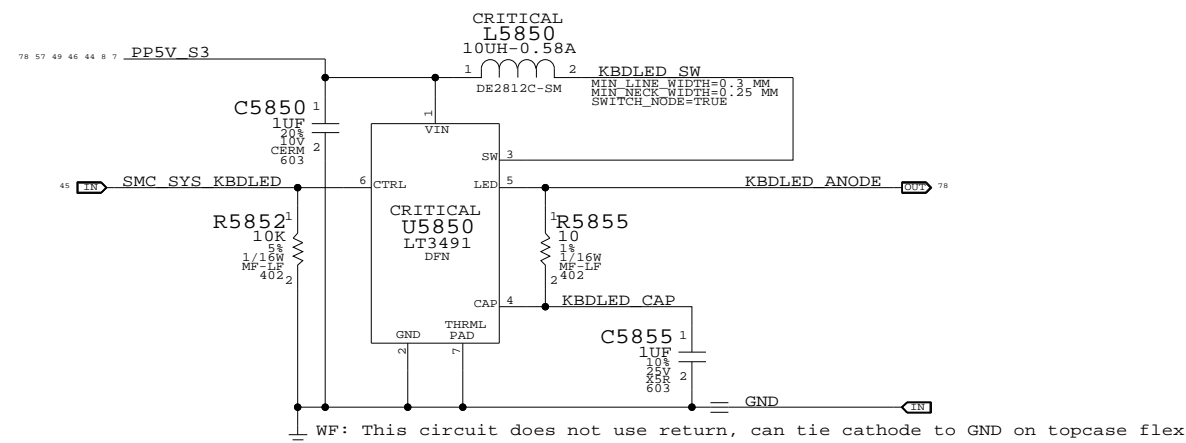
Left ALS Filter



Right ALS Circuit



Keyboard LED Driver



ALS Support

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

NOTICE OF PROPRIETARY PROPERTY

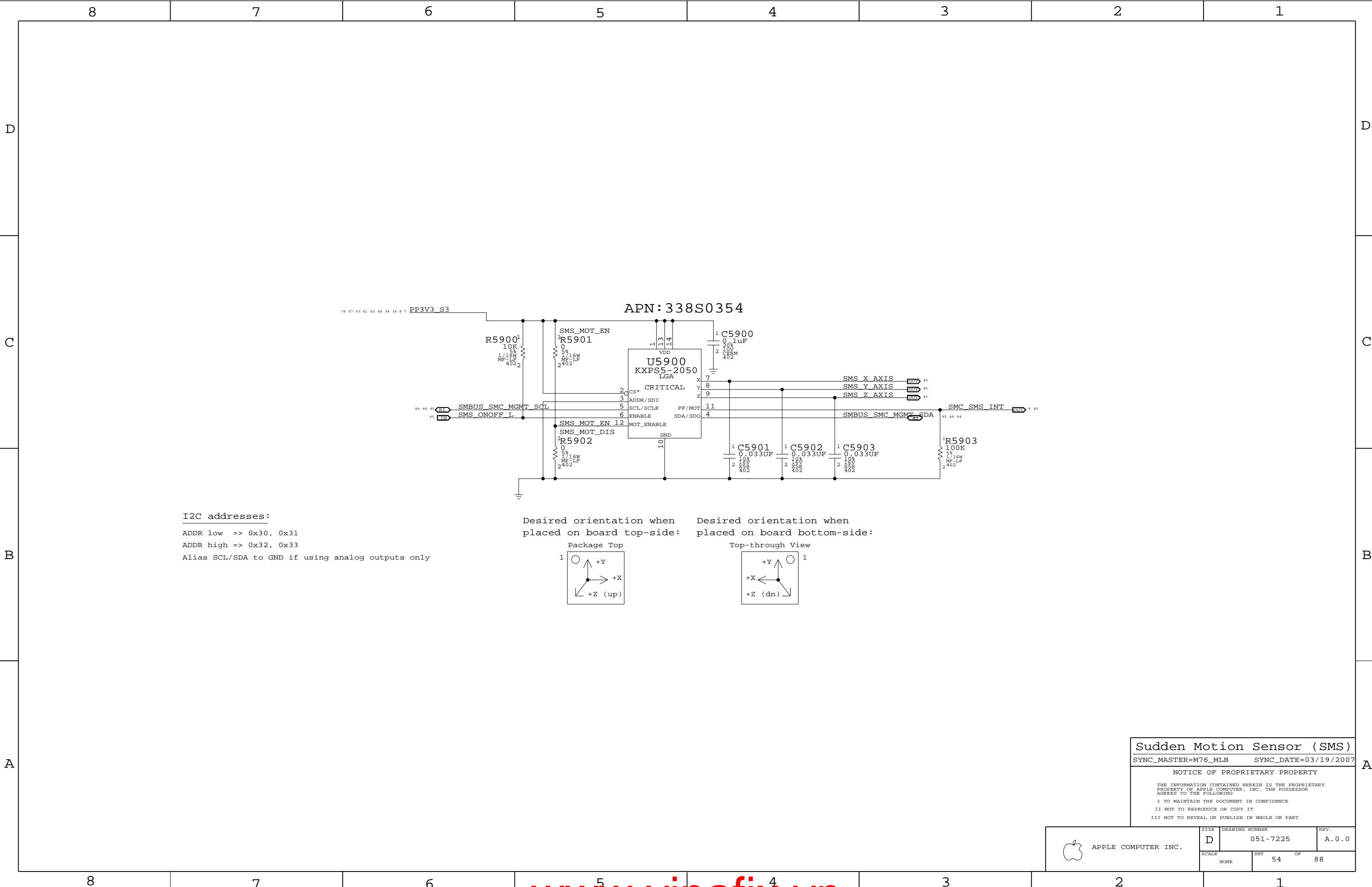
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	53	88	



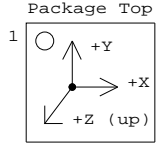
APN: 338S0354

I2C addresses:

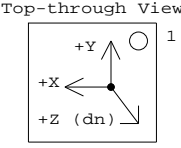
ADDR low => 0x30, 0x31
 ADDR high => 0x32, 0x33

Alias SCL/SDA to GND if using analog outputs only

Desired orientation when placed on board top-side:



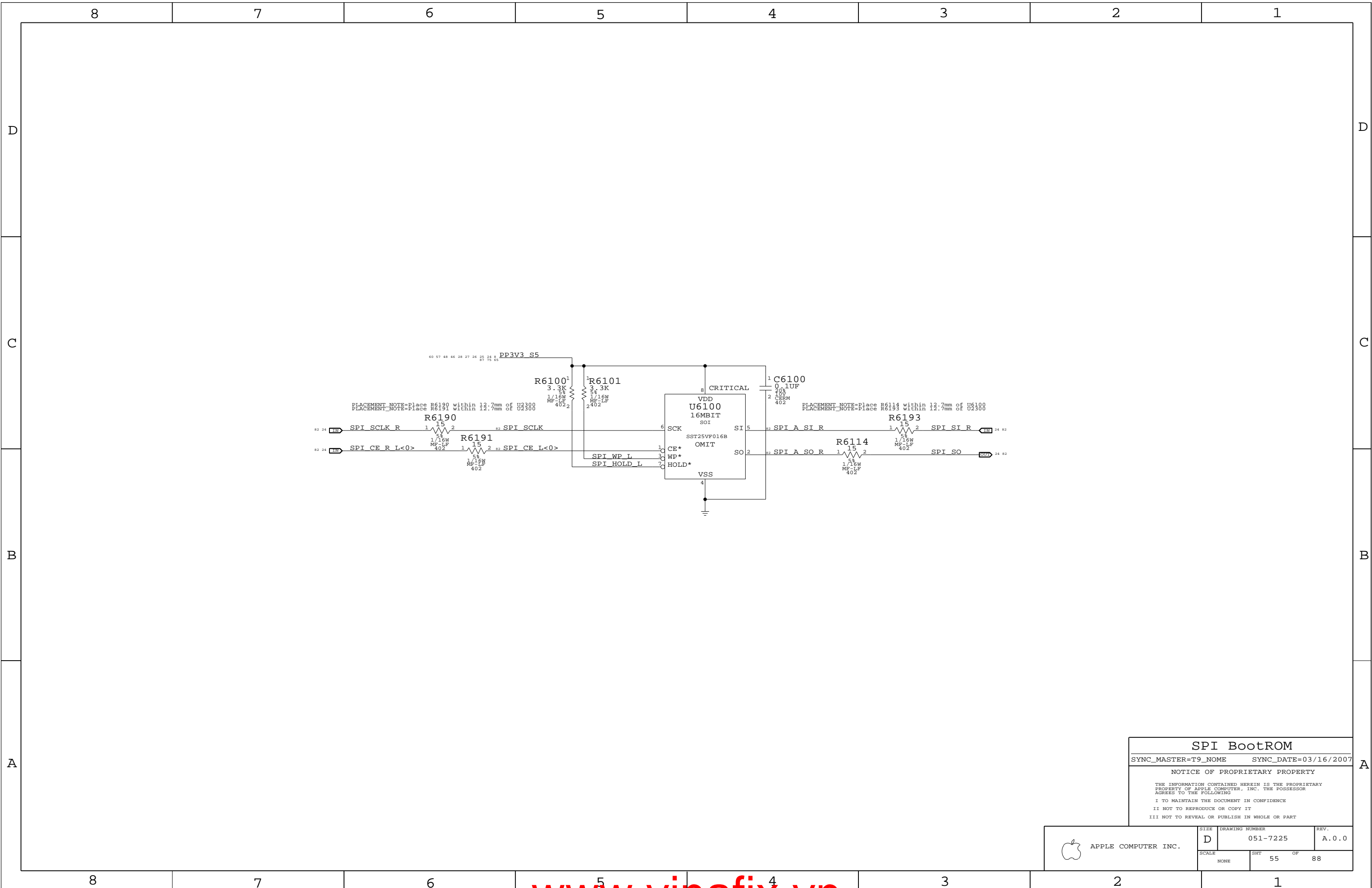
Desired orientation when placed on board bottom-side:



Sudden Motion Sensor (SMS)
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	54	88	



SPI BootROM

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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 COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHEET 55	OF 88

8

7

6

5

4

3

2

1

D

D

C

C

B

B

A

A

8

7

6

5

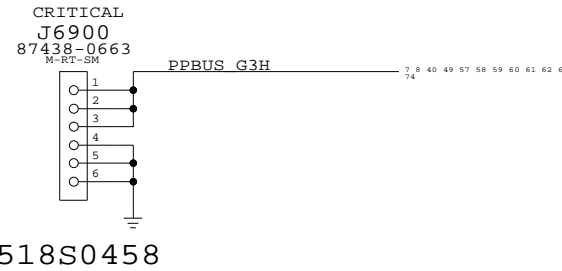
4

3

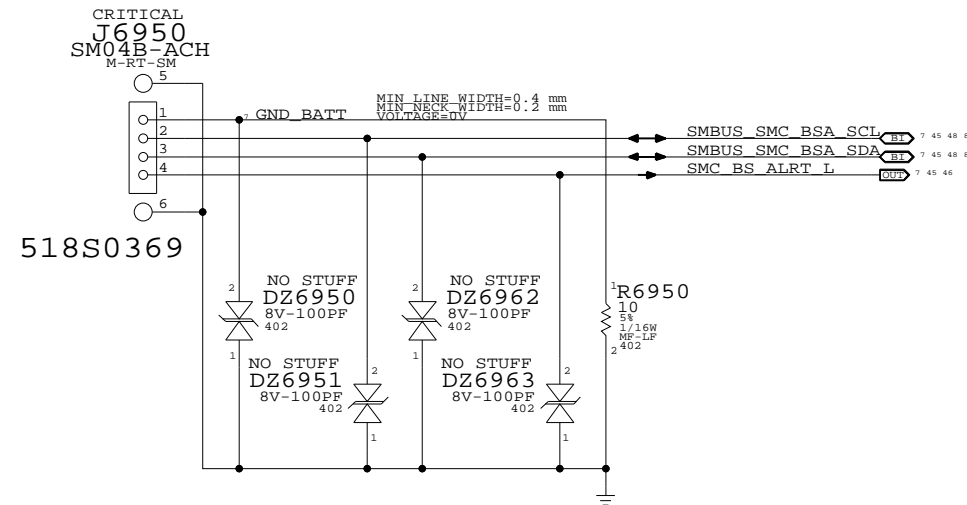
2

1

Left I/O Power Connector



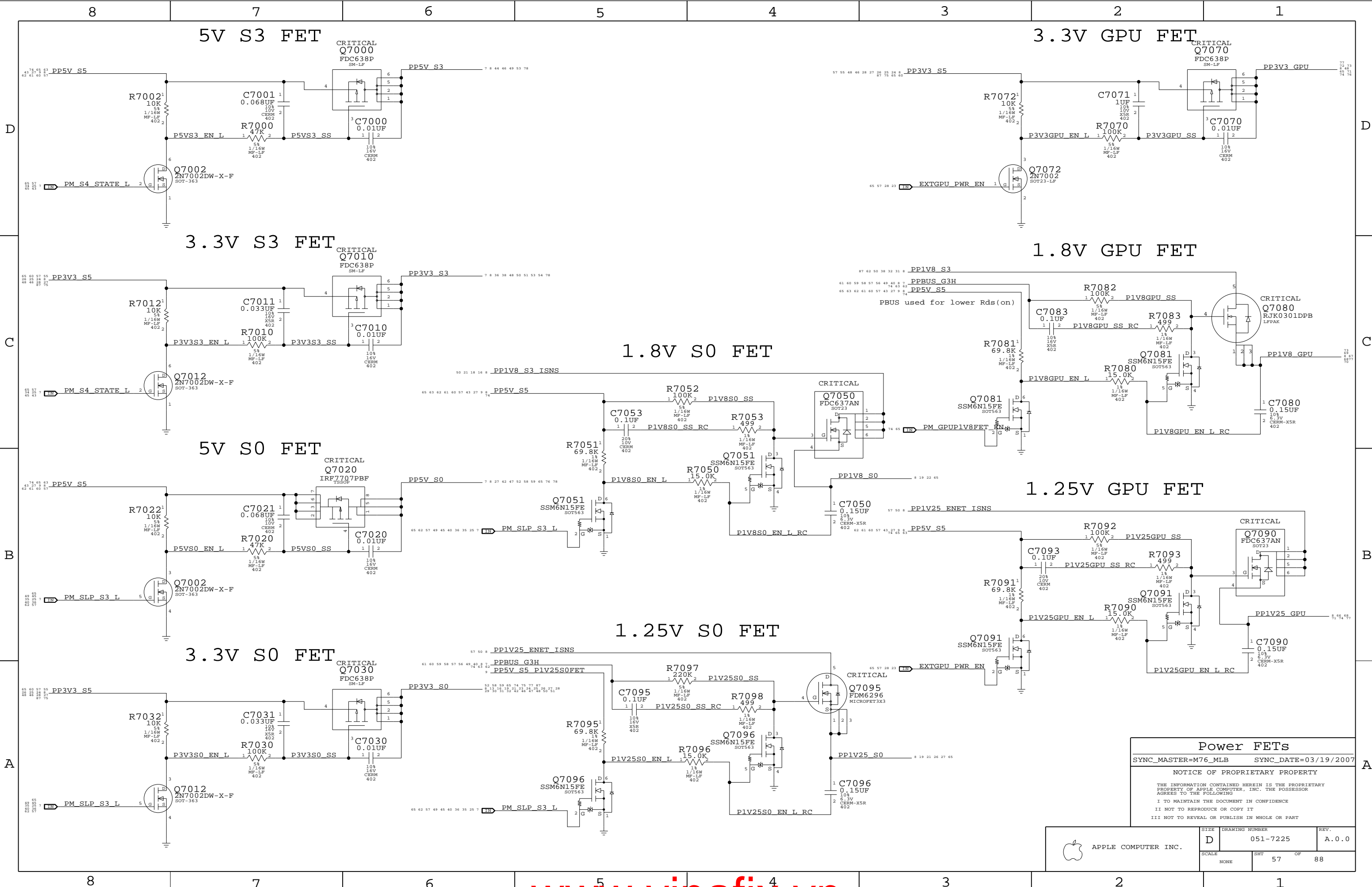
Battery Connector (Digital Signals)



PBus-In & Battery Connectors
 SYNC_MASTER=(M59_SYNC) SYNC_DATE=09/09/2006

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

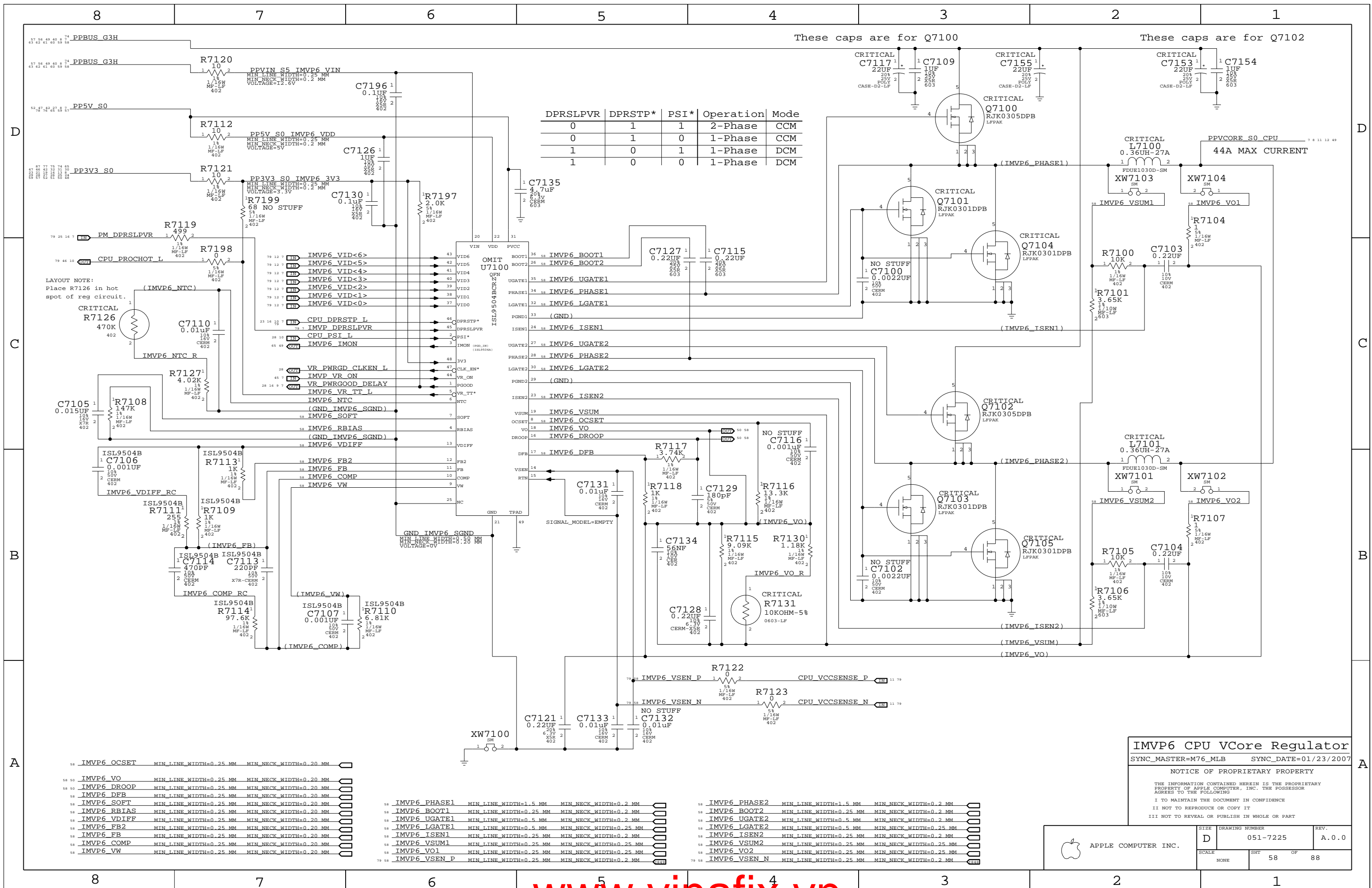
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT		OF
NONE	56		88



Power FETs
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	57	88	



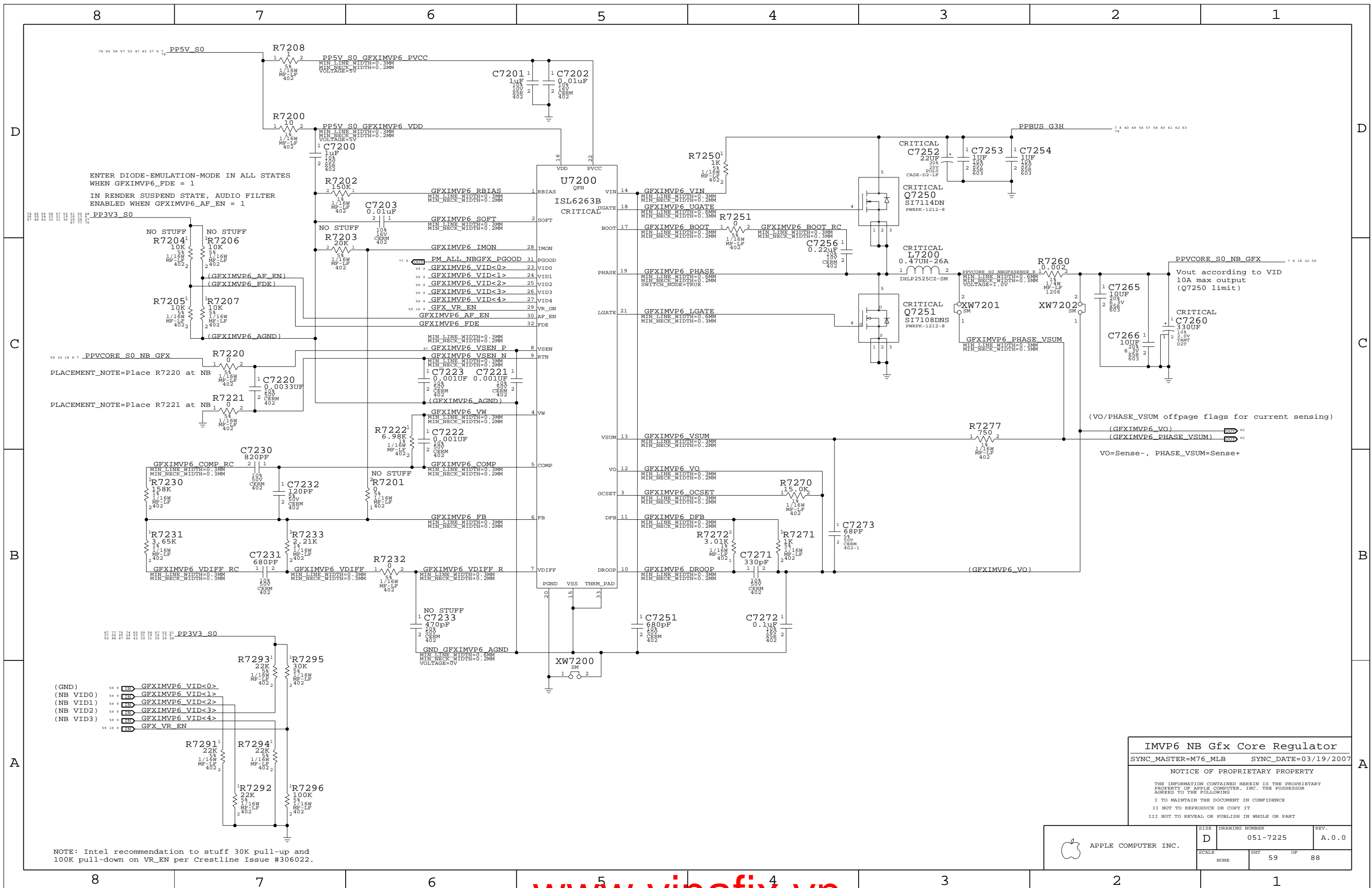
DPRSLPVR	DPRSTP*	PSI*	Operation	Mode
0	1	1	2-Phase	CCM
0	1	0	1-Phase	CCM
1	0	1	1-Phase	DCM
1	0	0	1-Phase	DCM

Signal	Value
C7127	0.22uF
C7115	0.22uF
C7128	0.22uF
C7134	56nF
C7131	0.01uF
C7132	0.01uF
C7133	0.01uF
C7129	180pF
C7116	0.001uF
C7106	0.001uF
C7110	0.01uF
C7105	0.015uF
C7104	0.22uF
C7103	0.22uF
C7102	0.22uF
C7101	0.22uF
C7100	0.0022uF
C7117	22uF
C7109	1uF
C7155	22uF
C7153	22uF
C7154	1uF
C7196	0.1uF
C7126	0.1uF
C7130	0.1uF
C7197	2.0K
C7135	4.7uF
C7111	3.74K
C7118	1K
C7119	180pF
C7116	13.3K
C7114	470pF
C7113	220pF
C7112	220pF
C7111	470pF
C7114	97.6K
C7117	1K
C7110	6.81K
C7111	0.001uF
C7112	0.001uF
C7113	0.001uF
C7114	0.001uF
C7115	0.001uF
C7116	0.001uF
C7117	0.001uF
C7118	0.001uF
C7119	0.001uF
C7120	0.001uF
C7121	0.001uF
C7122	0.001uF
C7123	0.001uF
C7124	0.001uF
C7125	0.001uF
C7126	0.001uF
C7127	0.001uF
C7128	0.001uF
C7129	0.001uF
C7130	0.001uF
C7131	0.001uF
C7132	0.001uF
C7133	0.001uF
C7134	0.001uF
C7135	0.001uF

IMVP6 CPU VCore Regulator
 SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHEET	OF	
NONE	58	OF	88



8 7 6 5 4 3 2 1

D

D

C

C

B

B

A

A

PP5V_S0

PP5V_S0 GFXIMVP6 PVCC

C7201 1uF
C7202 0.01uF

PP5V_S0 GFXIMVP6 VDD

C7200 1uF

R7202 150K

C7203 0.01uF

U7200 ISL6263B

R7250 1K

C7252 22uF

C7253 1uF

C7254 1uF

PPBUS_G3H

ENTER DIODE-EMULATION-MODE IN ALL STATES
WHEN GFXIMVP6_FDE = 1

IN RENDER SUSPEND STATE, AUDIO FILTER
ENABLED WHEN GFXIMVP6_AF_EN = 1

PP3V3_S0

R7204 10K

R7206 10K

R7205 10K

R7207 10K

R7203 20K

R7201 10K

R7220 10K

R7221 10K

C7223 0.001uF

C7221 0.001uF

R7222 6.98K

C7222 0.001uF

R7223 2.21K

R7224 10K

R7225 10K

R7226 10K

R7227 10K

R7228 10K

R7229 10K

R7230 10K

R7231 3.65K

R7232 10K

R7233 2.21K

R7234 10K

R7235 10K

R7236 10K

R7237 10K

R7238 10K

R7239 10K

R7240 10K

R7241 10K

R7242 10K

R7243 10K

R7244 10K

R7245 10K

R7246 10K

R7247 10K

R7248 10K

R7249 10K

R7250 10K

R7251 10K

R7252 10K

R7253 10K

R7254 10K

R7255 10K

R7256 10K

R7257 10K

R7258 10K

R7259 10K

R7260 10K

R7261 10K

R7262 10K

R7263 10K

R7264 10K

R7265 10K

R7266 10K

R7267 10K

R7268 10K

R7269 10K

R7270 10K

R7271 10K

R7272 10K

R7273 10K

R7274 10K

R7275 10K

R7276 10K

R7277 10K

R7278 10K

R7279 10K

R7280 10K

R7281 10K

R7282 10K

R7283 10K

R7284 10K

R7285 10K

R7286 10K

R7287 10K

R7288 10K

R7289 10K

R7290 10K

R7291 10K

R7292 10K

R7293 10K

R7294 10K

R7295 10K

R7296 10K

R7297 10K

R7298 10K

R7299 10K

R7300 10K

R7301 10K

R7302 10K

R7303 10K

R7304 10K

R7305 10K

R7306 10K

R7307 10K

R7308 10K

R7309 10K

R7310 10K

R7311 10K

R7312 10K

R7313 10K

R7314 10K

R7315 10K

R7316 10K

R7317 10K

R7318 10K

R7319 10K

R7320 10K

R7321 10K

R7322 10K

R7323 10K

R7324 10K

R7325 10K

R7326 10K

R7327 10K

R7328 10K

R7329 10K

R7330 10K

R7331 10K

R7332 10K

R7333 10K

R7334 10K

R7335 10K

R7336 10K

R7337 10K

R7338 10K

R7339 10K

R7340 10K

R7341 10K

R7342 10K

R7343 10K

R7344 10K

R7345 10K

R7346 10K

R7347 10K

R7348 10K

R7349 10K

R7350 10K

R7351 10K

R7352 10K

R7353 10K

R7354 10K

R7355 10K

R7356 10K

R7357 10K

R7358 10K

R7359 10K

R7360 10K

R7361 10K

R7362 10K

R7363 10K

R7364 10K

R7365 10K

R7366 10K

R7367 10K

R7368 10K

R7369 10K

R7370 10K

R7371 10K

R7372 10K

R7373 10K

R7374 10K

R7375 10K

R7376 10K

R7377 10K

R7378 10K

R7379 10K

R7380 10K

R7381 10K

R7382 10K

R7383 10K

R7384 10K

R7385 10K

R7386 10K

R7387 10K

R7388 10K

R7389 10K

R7390 10K

R7391 10K

R7392 10K

R7393 10K

R7394 10K

R7395 10K

R7396 10K

R7397 10K

R7398 10K

R7399 10K

R7400 10K

R7401 10K

R7402 10K

R7403 10K

R7404 10K

R7405 10K

R7406 10K

R7407 10K

R7408 10K

R7409 10K

R7410 10K

R7411 10K

R7412 10K

R7413 10K

R7414 10K

R7415 10K

R7416 10K

R7417 10K

R7418 10K

R7419 10K

R7420 10K

R7421 10K

R7422 10K

R7423 10K

R7424 10K

R7425 10K

R7426 10K

R7427 10K

R7428 10K

R7429 10K

R7430 10K

R7431 10K

R7432 10K

R7433 10K

R7434 10K

R7435 10K

R7436 10K

R7437 10K

R7438 10K

R7439 10K

R7440 10K

R7441 10K

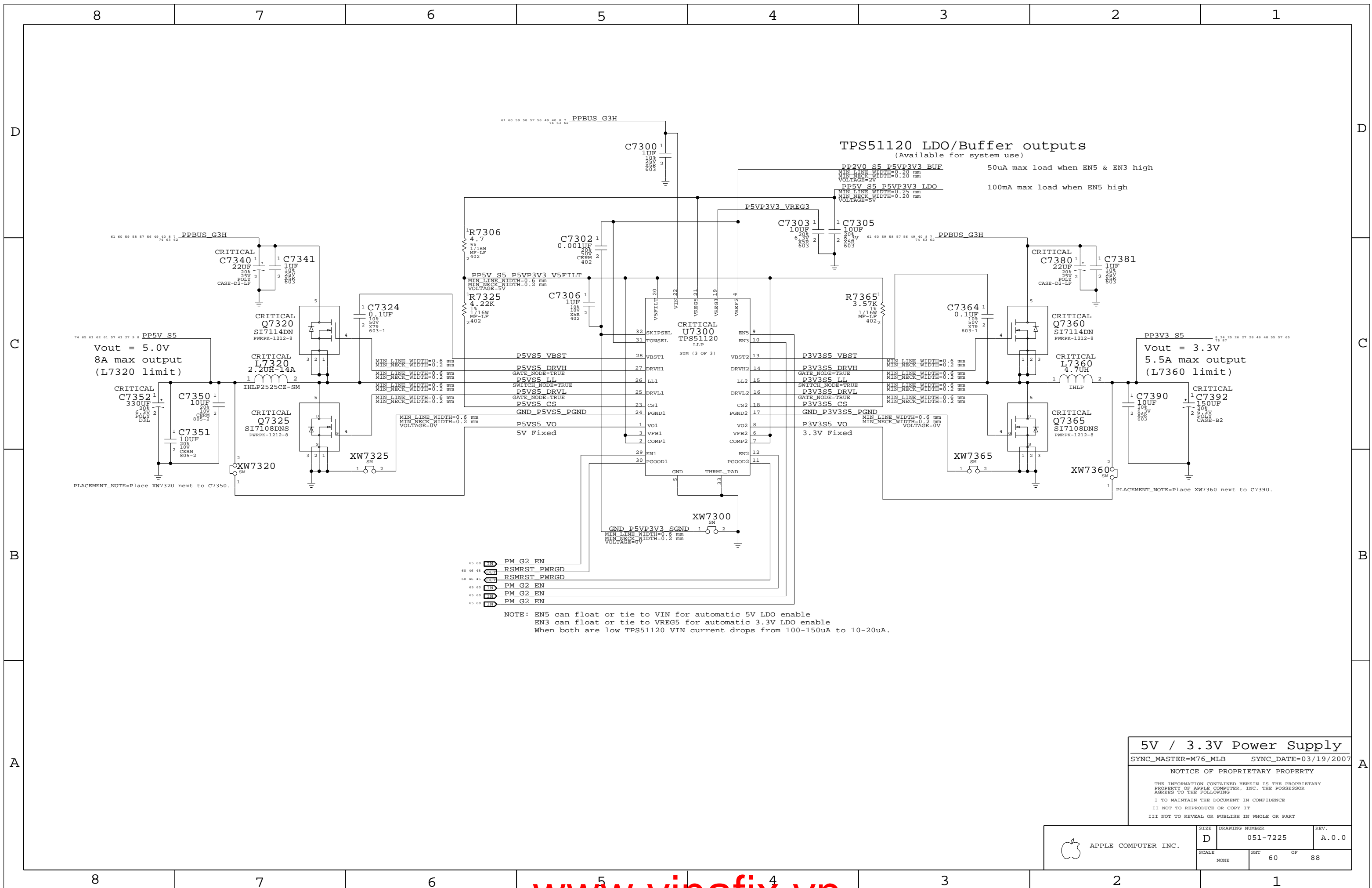
R7442 10K

R7443 10K

R7444 10K

R7445 10K

R7446 10K



TPS51120 LDO/Buffer outputs
 (Available for system use)

PP2V0_S5_P5VP3V3_BUF 50uA max load when EN5 & EN3 high
 MIN_LINE_WIDTH=0.20 mm
 MIN_NECK_WIDTH=0.20 mm
 VOLTAGE=2V

PP5V_S5_P5VP3V3_LDO 100mA max load when EN5 high
 MIN_LINE_WIDTH=0.25 mm
 MIN_NECK_WIDTH=0.20 mm
 VOLTAGE=5V

Vout = 5.0V
 8A max output
 (L7320 limit)

Vout = 3.3V
 5.5A max output
 (L7360 limit)

NOTE: EN5 can float or tie to VIN for automatic 5V LDO enable
 EN3 can float or tie to VREG5 for automatic 3.3V LDO enable
 When both are low TPS51120 VIN current drops from 100-150uA to 10-20uA.

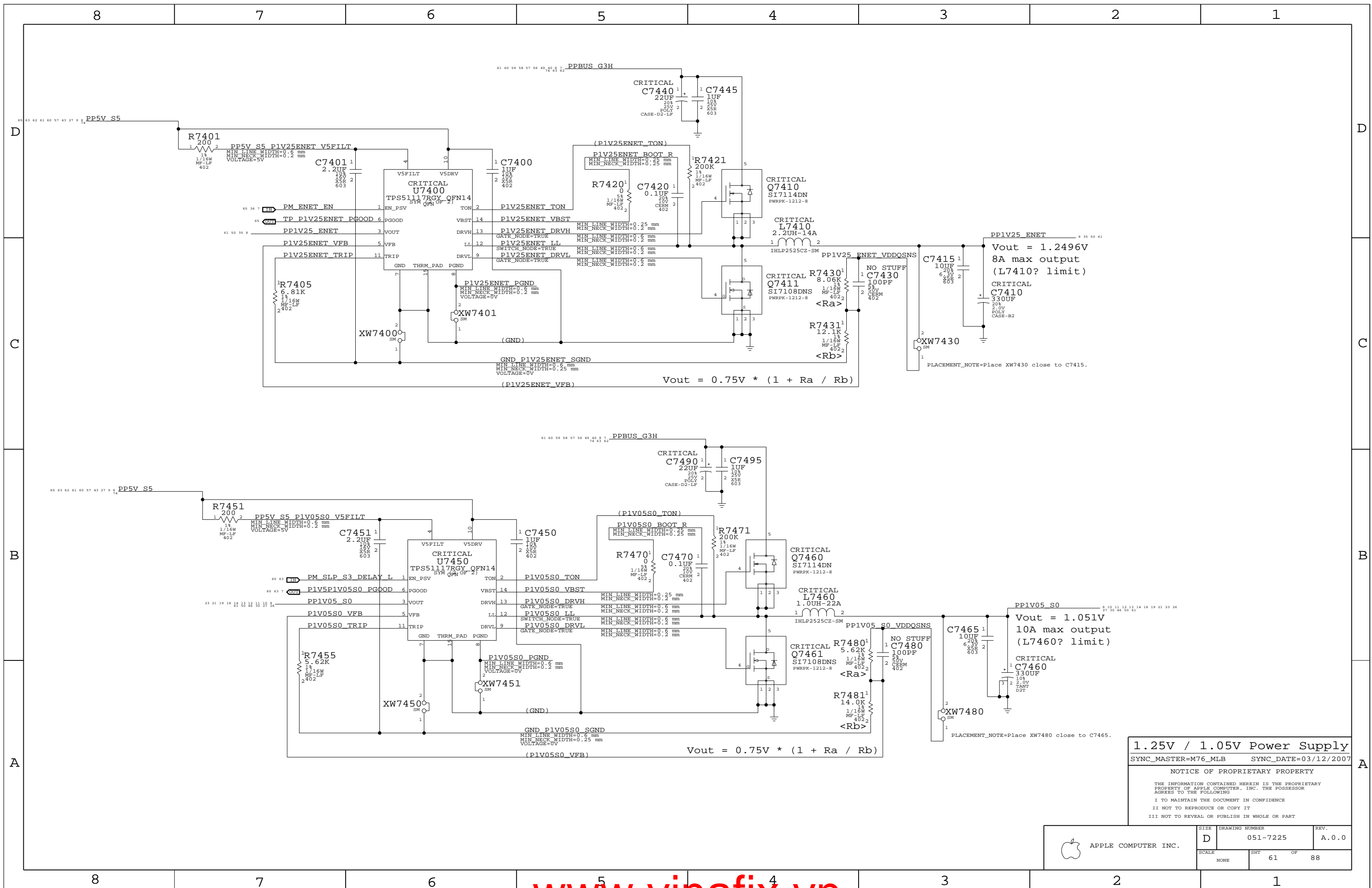
5V / 3.3V Power Supply
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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

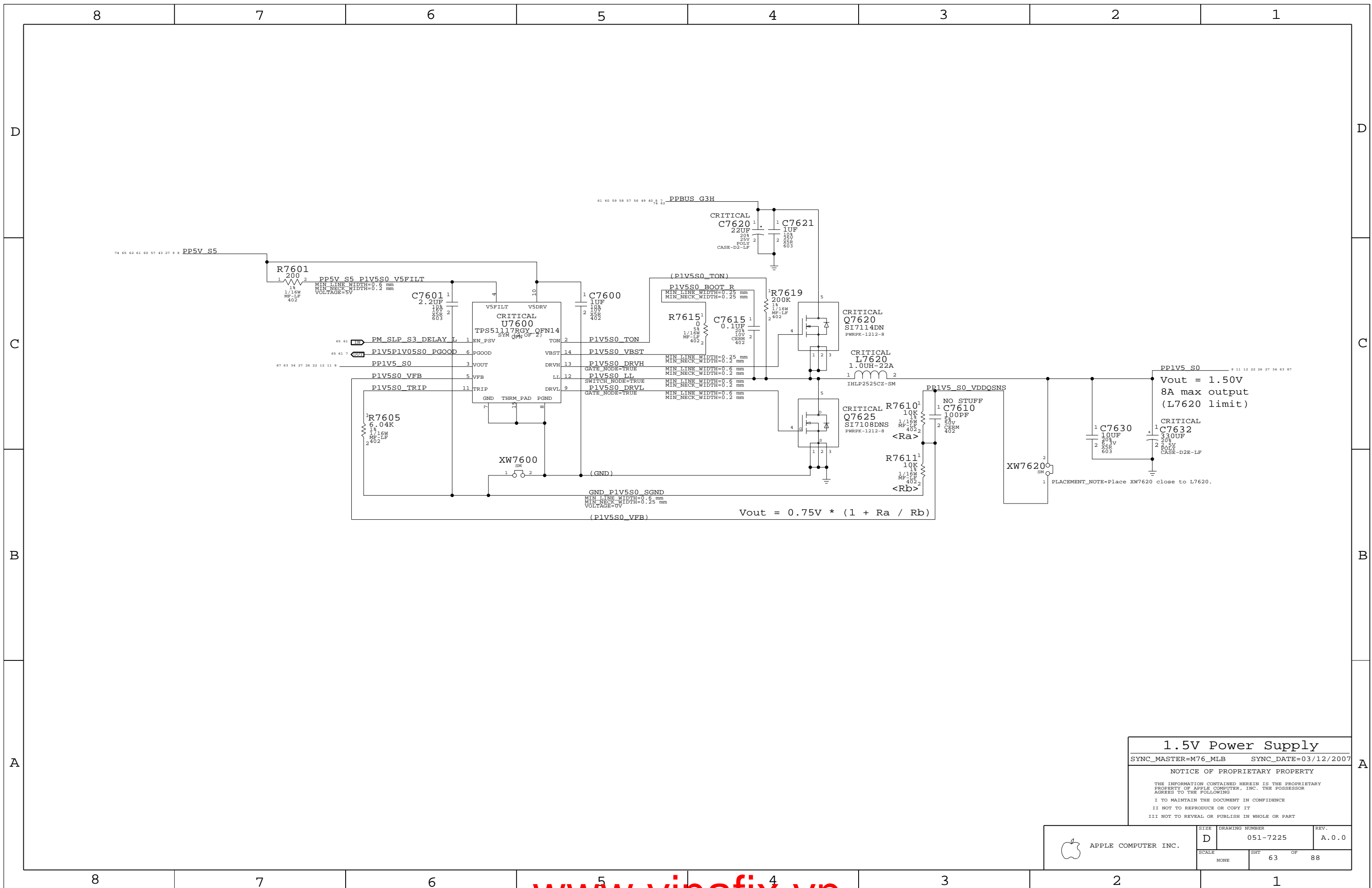
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	60	88	



1.25V / 1.05V Power Supply
 SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

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

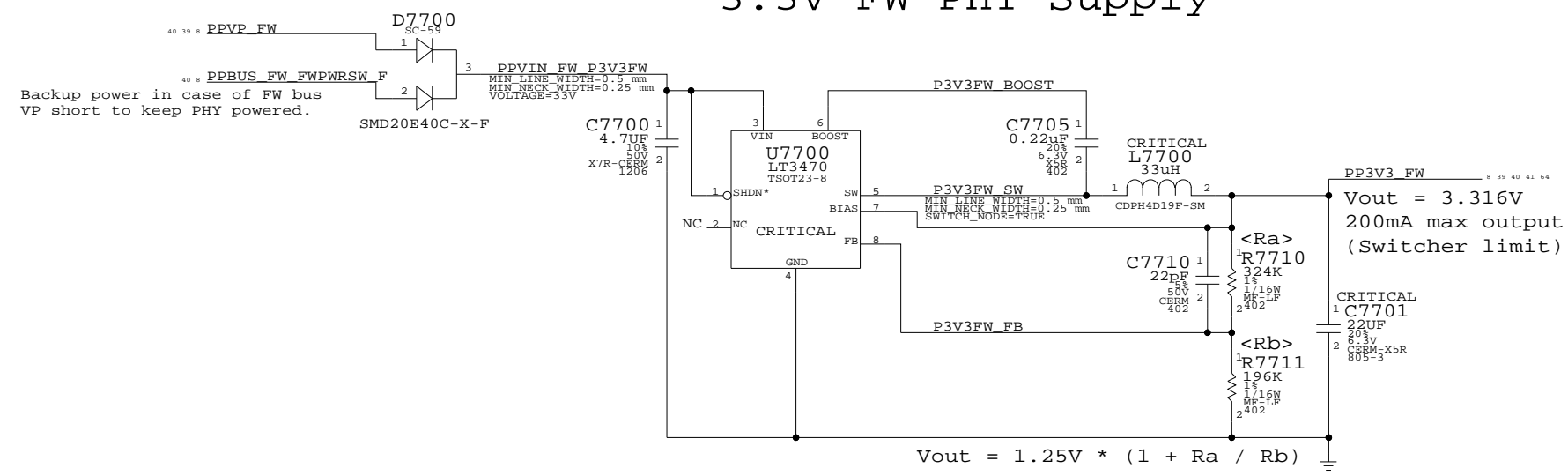
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	61	88	



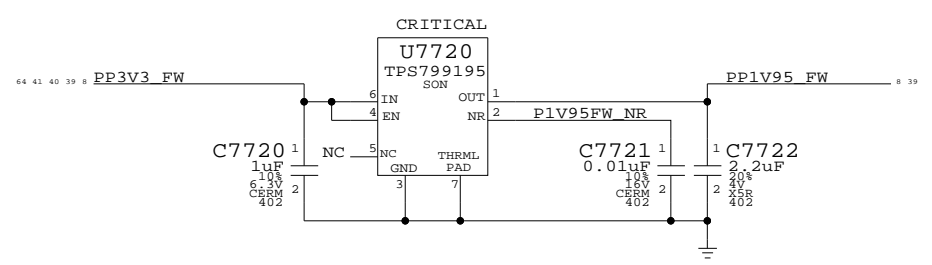
1.5V Power Supply
 SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007
 NOTICE OF PROPRIETARY PROPERTY
 THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING
 I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
 II NOT TO REPRODUCE OR COPY IT
 III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	NONE	SHT	63 OF 88

3.3V FW PHY Supply



1.95V FW PHY Supply



FW PHY Power Supplies
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	64	88	

Page Notes

Power aliases required by this page:

- =PP1V2_GPU_PEX_PLLXVDD
- =PP1V2_GPU_PEX_IOVDDQ
- =PP1V2_GPU_PEX_IOVDD

Signal aliases required by this page:

(NONE)

BOM options provided by this page:

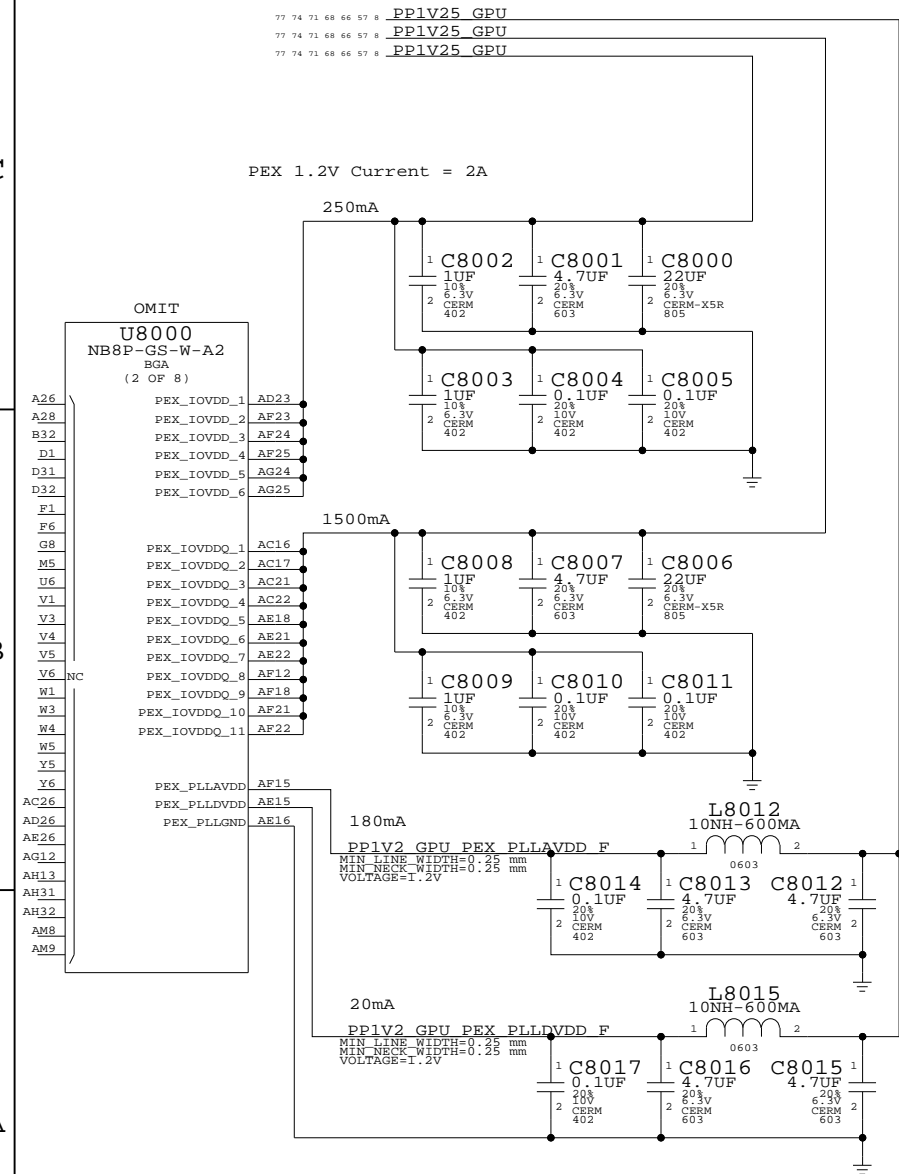
(NONE)

D

C

B

A



PCI EXPRESS BUS INTERFACE



NV G84M PCI-E
 SYNC_MASTER=(MASTER) 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	66	88	

Page Notes

Power aliases required by this page:

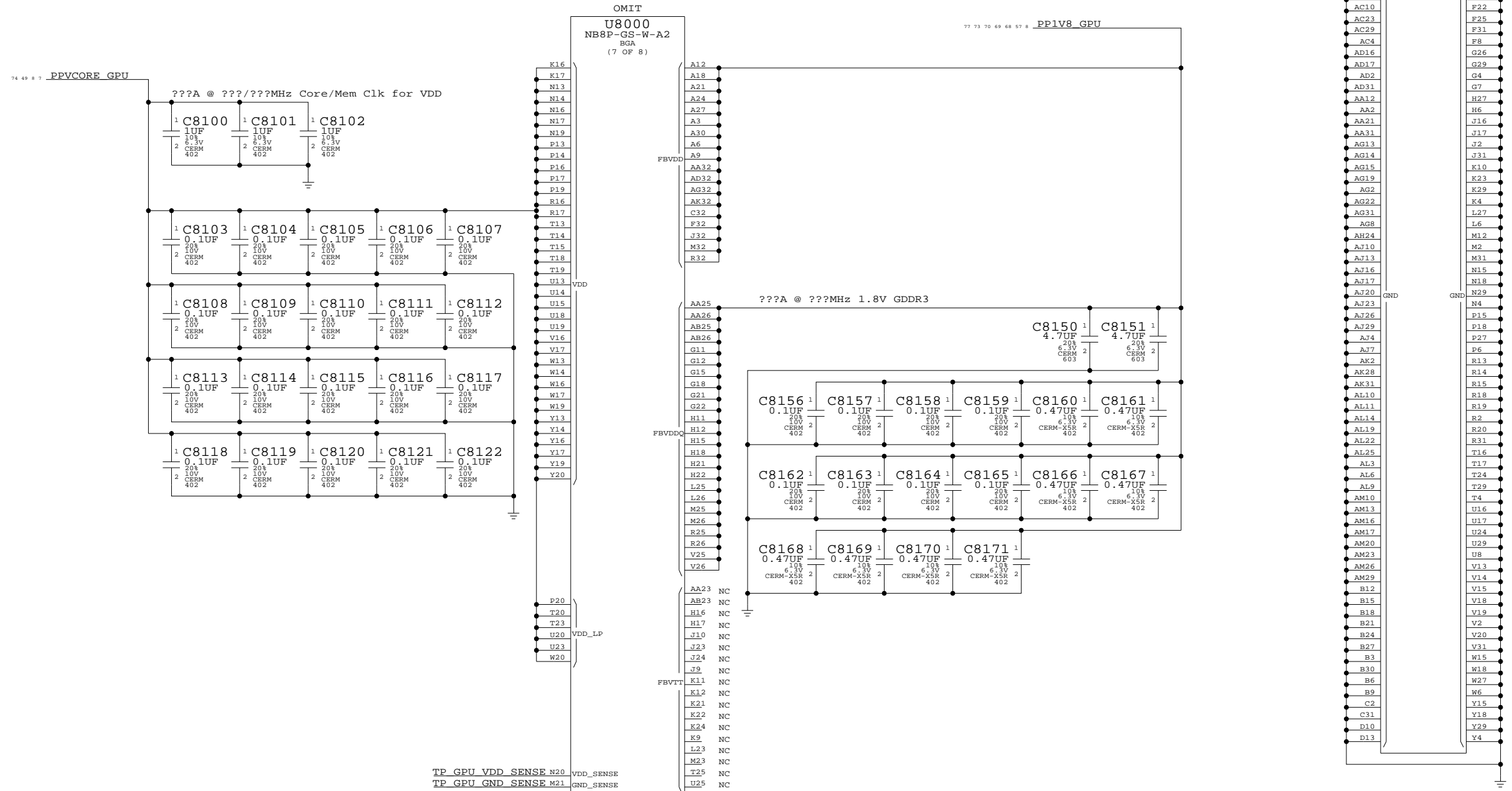
- =PPVCORE_GPU
- =PP1V8_GPU_FBVDDQ

Signal aliases required by this page:

(NONE)

BOM options provided by this page:

(NONE)



NV G84M Core/FB Power
 SYNC_MASTER=(MASTER) 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	67	88	

Page Notes

Power aliases required by this page:

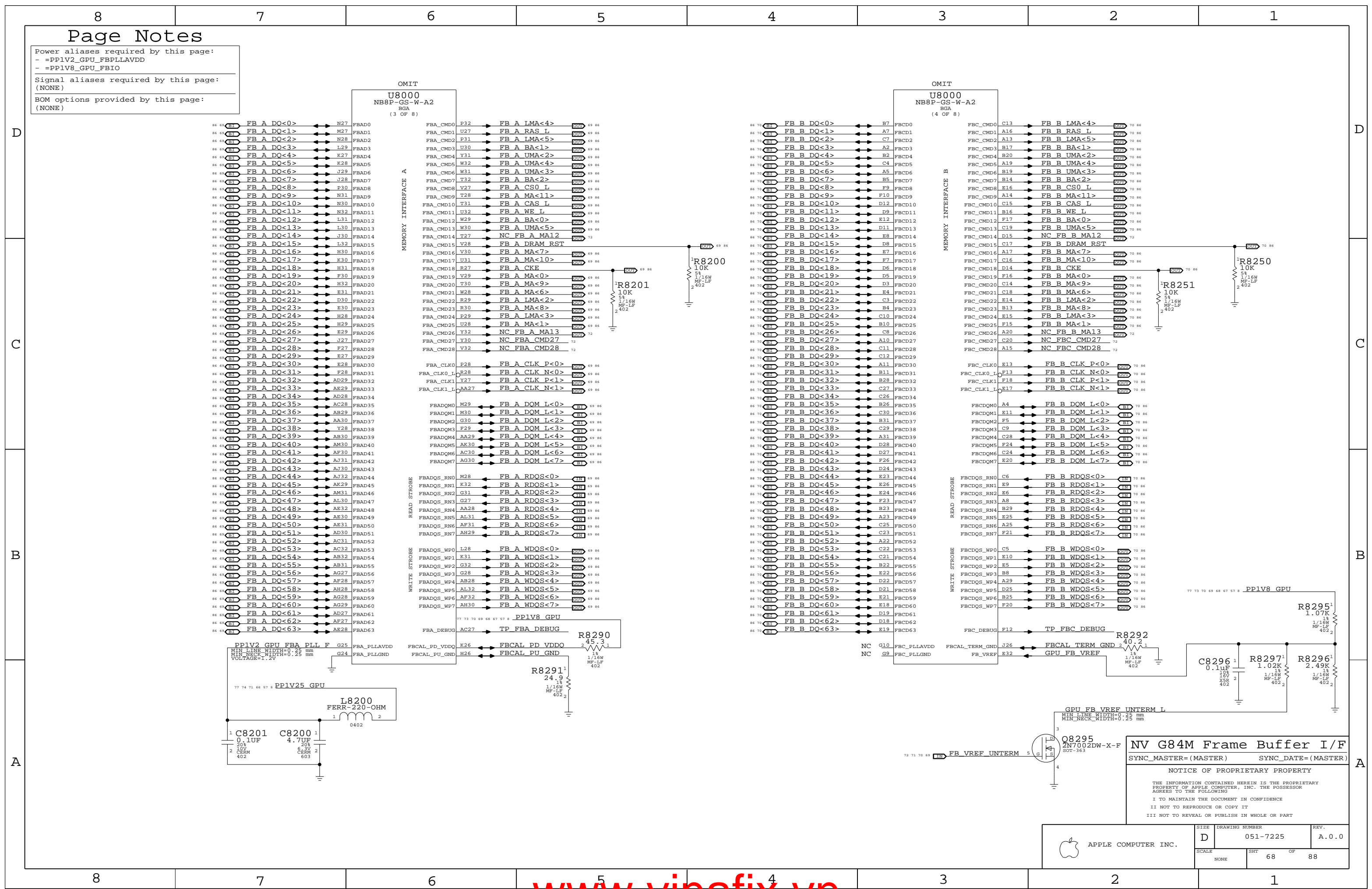
- =PPIV2_GPU_FBPLLAVDD
- =PPIV8_GPU_FBIO

Signal aliases required by this page:

(NONE)

BOM options provided by this page:

(NONE)



NV G84M Frame Buffer I/F
SYNC_MASTER=(MASTER) 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

SIZE	DRAWING NUMBER	REV.
D	051-7225	A.0.0
SCALE	SHT	OF
NONE	68	88

Page Notes

Power aliases required by this page:
 - =PP3V3_GPU_VDD33
 - =PP3V3_GPU_MIO
 - =PP1V2_GPU_PLLVDD
 - =PP1V2_GPU_H_PLLVDD
 - =PP1V2_GPU_VID_PLLVDD

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

D

D

C

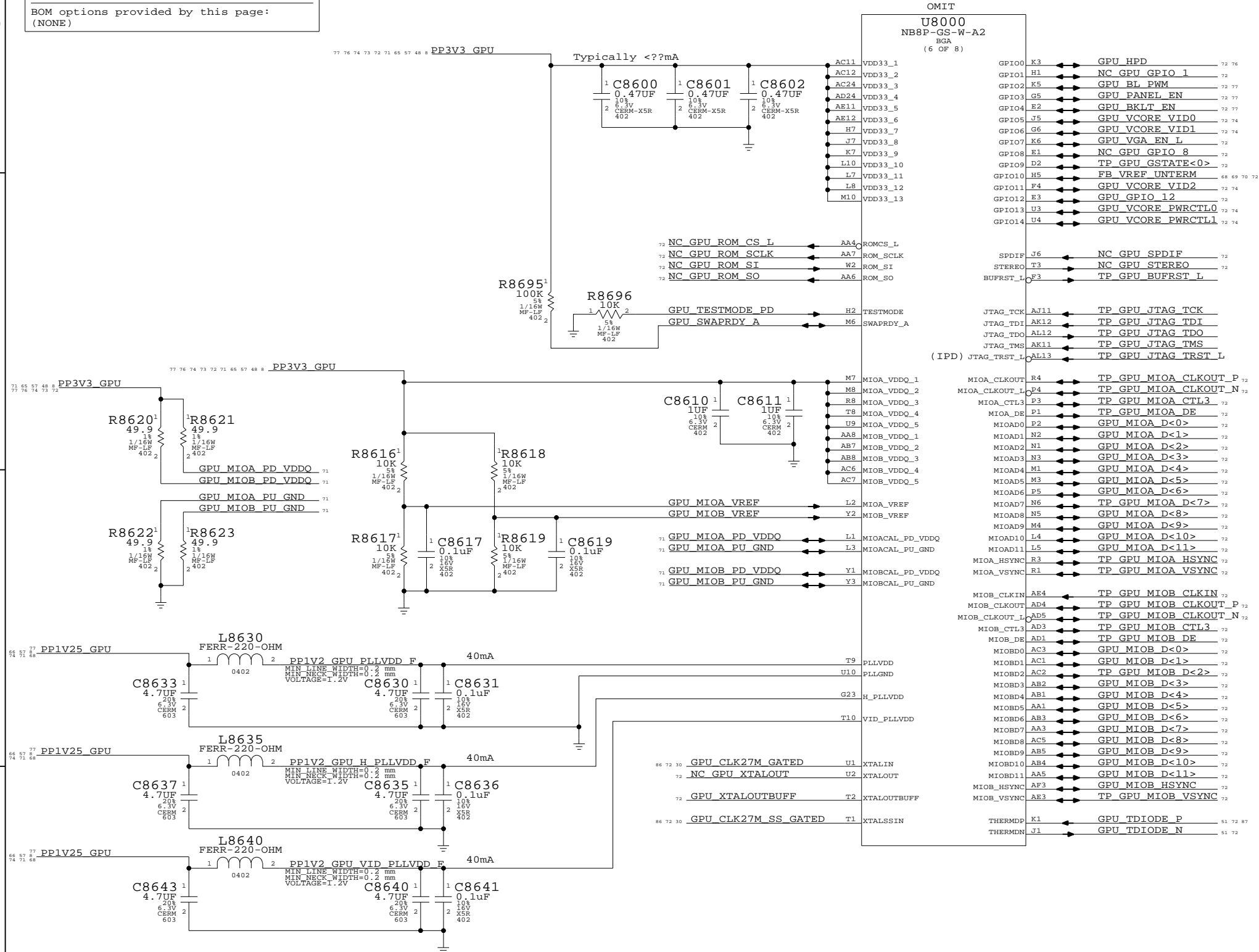
C

B

B

A

A



NV G84M GPIO/MIO/Misc

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

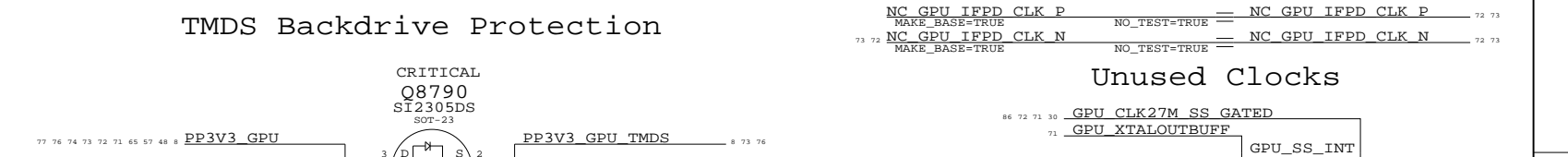
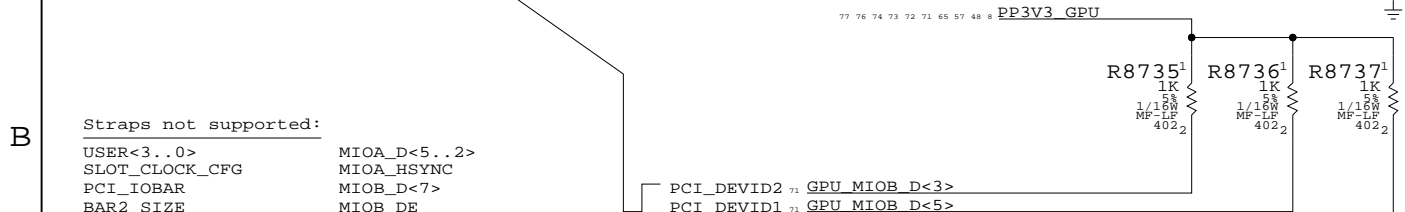
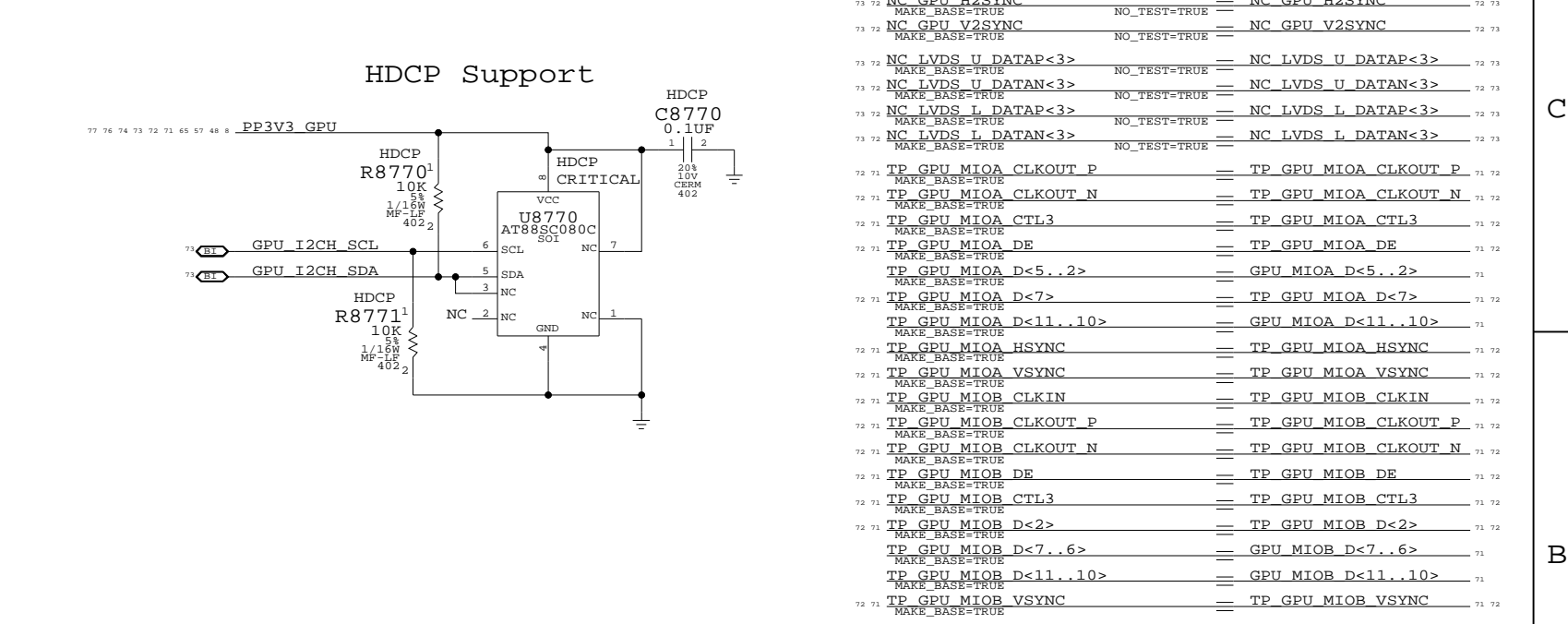
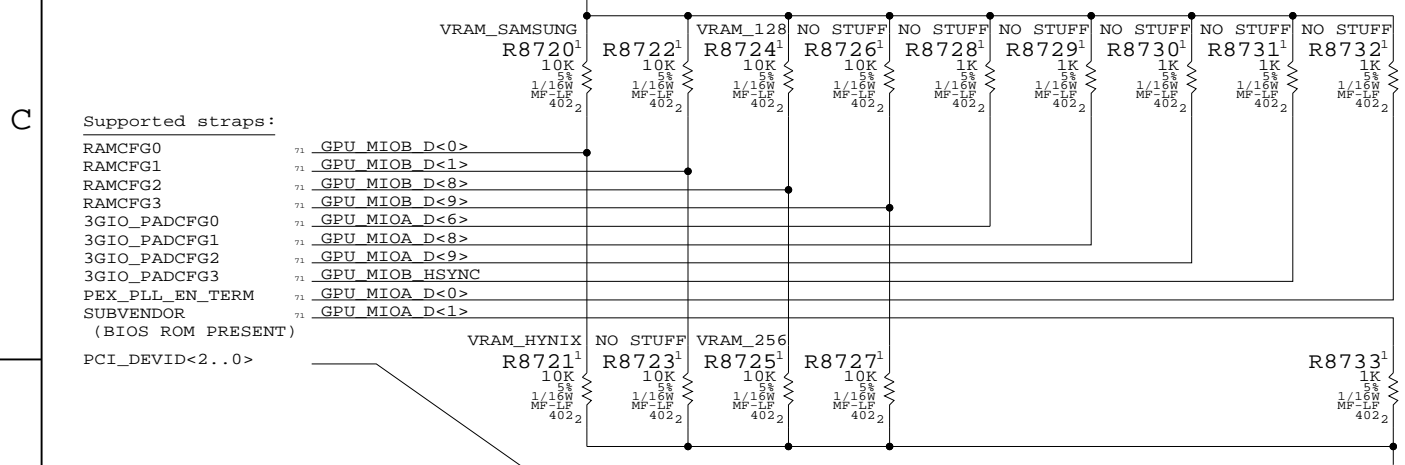
NOTICE OF PROPRIETARY PROPERTY

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	71	88	

GPIOs		Renamed signals		Unused signals	
76 72 71	GPU HPD	HPD0	GPU HPD	GPU CLK27M GATED	GPU CLK27M GATED
72 71	NC GPU GPIO 1	HPD1	NC GPU GPIO 1	GPU CLK27M SS GATED	GPU CLK27M SS GATED
77 72 71	GPU BL PWM	LCD0_BL_PWM	GPU BL_PWM	GPU TDIODE P	GPU TDIODE P
77 72 71	GPU PANEL EN	LCD0_VDD	GPU PANEL EN	GPU TDIODE N	GPU TDIODE N
77 72 71	GPU BKLT EN	LCD0_BL_EN	GPU BKLT EN	GPU DVI DDC CLK	GPU DVI DDC CLK
74 72 71	GPU VCORE VID0	VID0	GPU VCORE VID0	GPU DVI DDC DATA	GPU DVI DDC DATA
74 72 71	GPU VCORE VID1	VID1	GPU VCORE VID1	GPU PANEL DDC CLK	GPU PANEL DDC CLK
72 71	GPU VGA_EN L	MEM_VID	GPU VGA_EN L	GPU PANEL DDC DATA	GPU PANEL DDC DATA
72 71	NC GPU GPIO 8	THERM	NC GPU GPIO 8		
72 71	TP GPU GSTATE<0>	FAN_PWM	TP GPU GSTATE<0>		
72 71 70 69 48	FB VREF UNTERM	MEM_VREF	FB VREF UNTERM		
74 72 71	GPU VCORE VID2	SLI_SYNC	GPU VCORE VID2		
71	GPU GPIO 12	AC_DET	TP GPU GSTATE<1>		
74 72 71	GPU VCORE PWRCTL0	PWR_CTL0	GPU VCORE PWRCTL0		
74 72 71	GPU VCORE PWRCTL1	PWR_CTL1	GPU VCORE PWRCTL1		

Config Straps		Unused I2C Buses	
77 76 74 73 72 71 65 57 48 8	PP3V3_GPU	72 71	NC GPU I2CA_SCL
		72 71	NC GPU I2CA_SDA



GPU Straps

SYNC_MASTER=(MASTER) 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

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S1718	1	IC,TS3V330,QUAD VIDEO SW,QFN16	U8700	CRITICAL	
		ALTERNATE FOR PART NUMBER	REF DES	COMMENTS:	
353S1579		353S1718	ALL (U8700)	TS3V330 alt to TS3V340	

APPLE COMPUTER INC.

SCALE: NONE

DRAWING NUMBER: 051-7225

SHEET: 72 OF 88

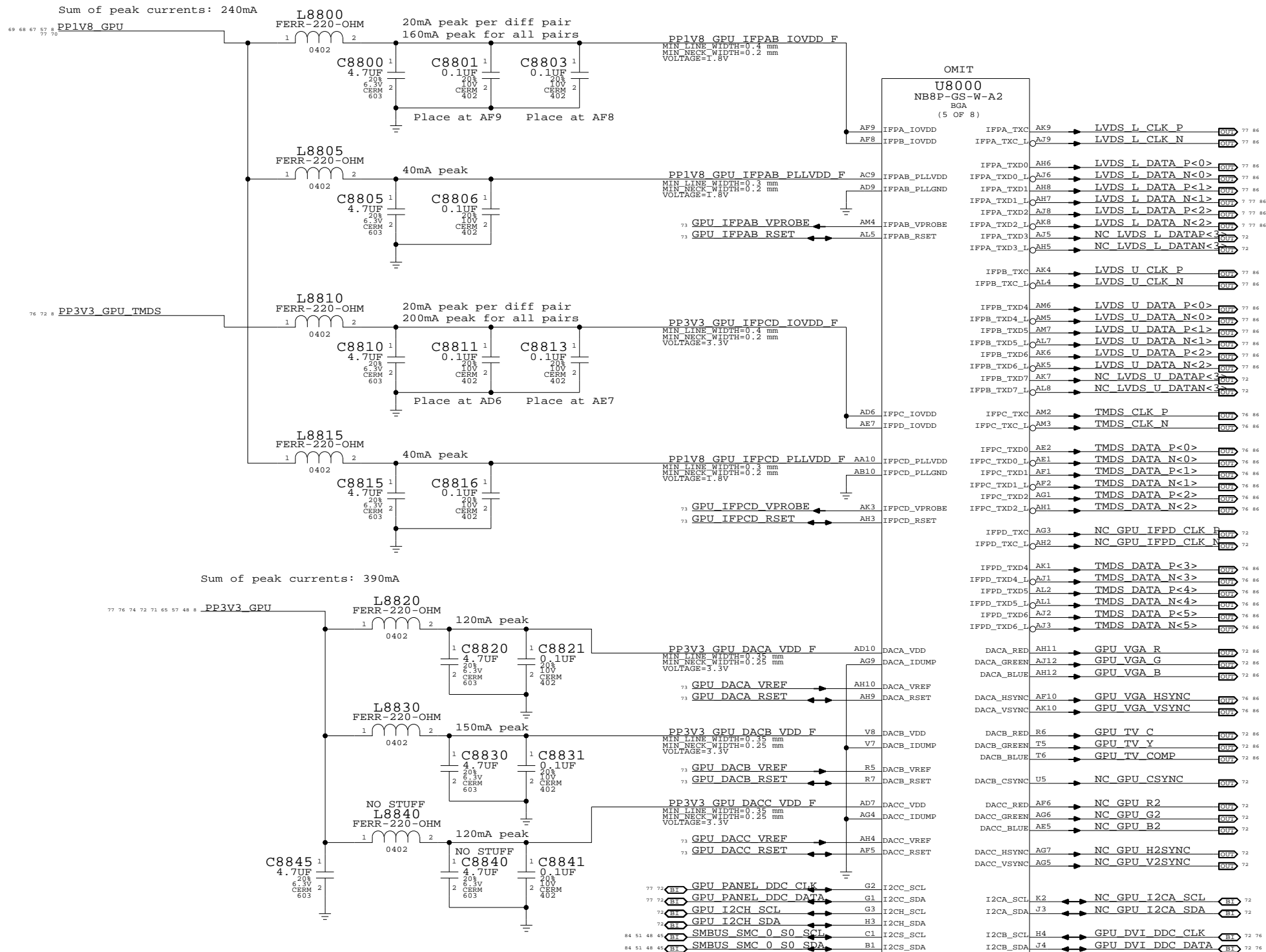
REV: A.0.0

Page Notes

Power aliases required by this page:
 - =PP1V8_GPU_IFPX
 - =PP3V3_GPU_IFPCD_IOVDD
 - =PP3V3_GPU_DAC

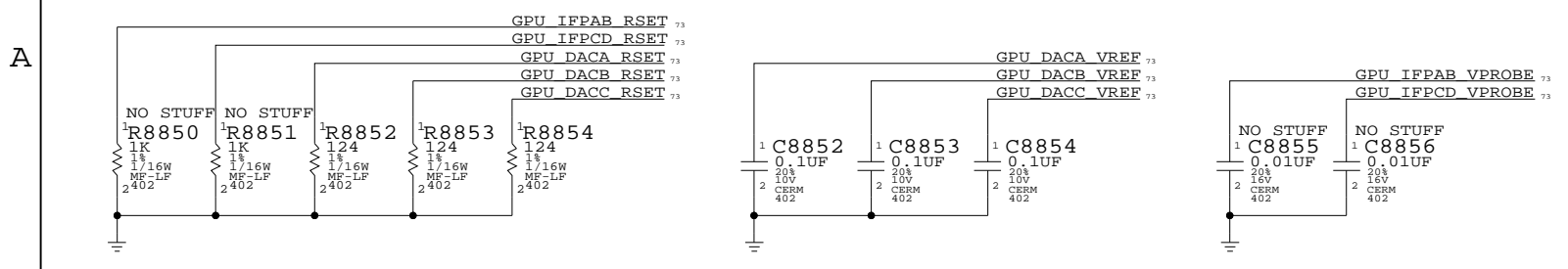
Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)



I2CS must be pulled up if not used
 I2CS addr fixed at 0x9E,0x9F

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



NV G84M Video Interfaces

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

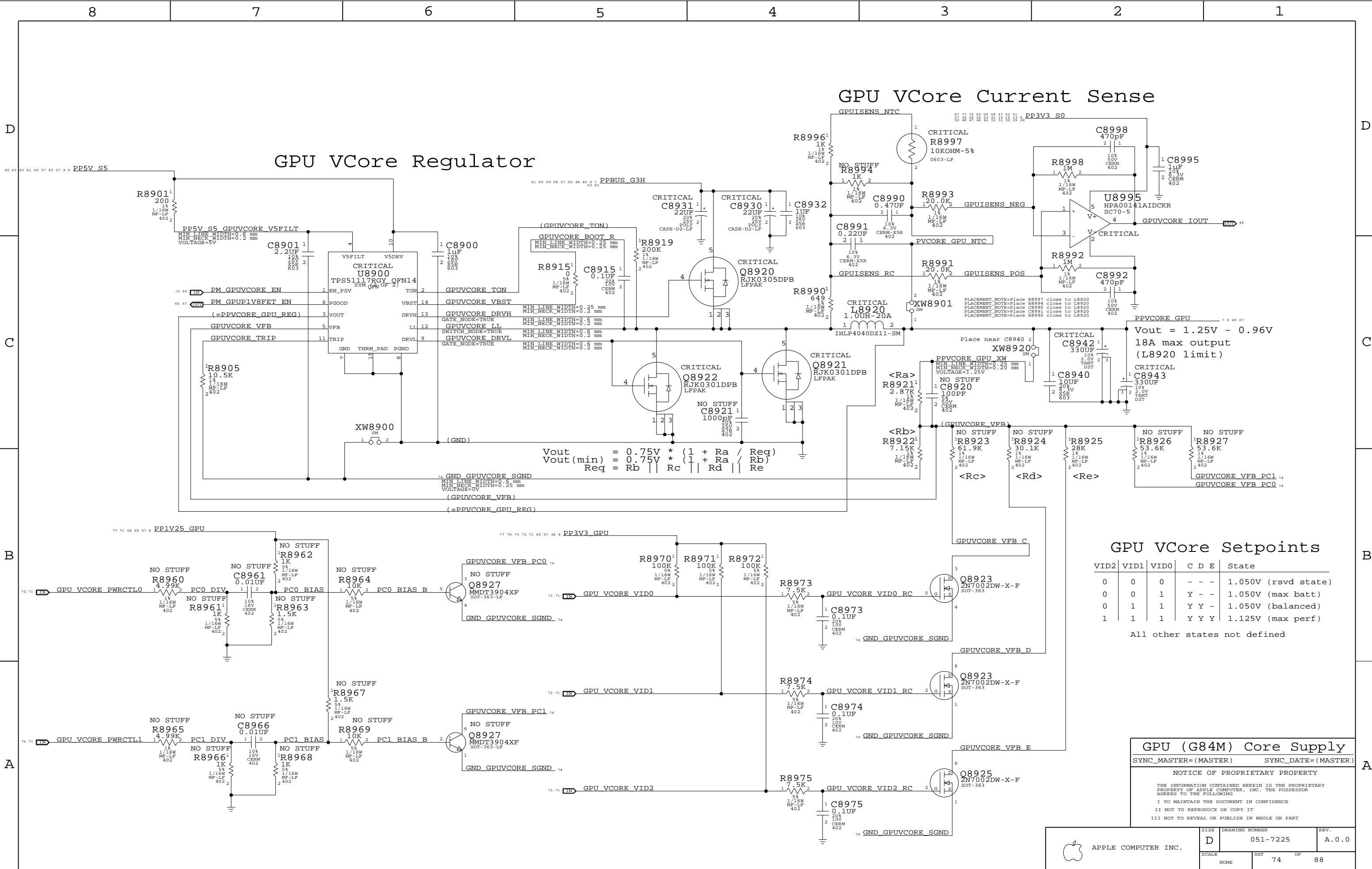
NOTICE OF PROPRIETARY PROPERTY

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	NONE	SHT	73 OF 88

GPU VCore Regulator

GPU VCore Current Sense



$$V_{out} = 0.75V * (1 + \frac{R_a}{R_{eq}})$$

$$V_{out(min)} = 0.75V * (1 + \frac{R_a}{R_b || R_c || R_d || R_e})$$

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

GPU VCore Setpoints

VID2	VID1	VID0	C	D	E	State
0	0	0	-	-	-	1.050V (rsvd state)
0	0	1	Y	-	-	1.050V (max batt)
0	1	1	Y	Y	-	1.050V (balanced)
1	1	1	Y	Y	Y	1.125V (max perf)

All other states not defined

GPU (G84M) Core Supply

SYNC_MASTER=(MASTER) 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

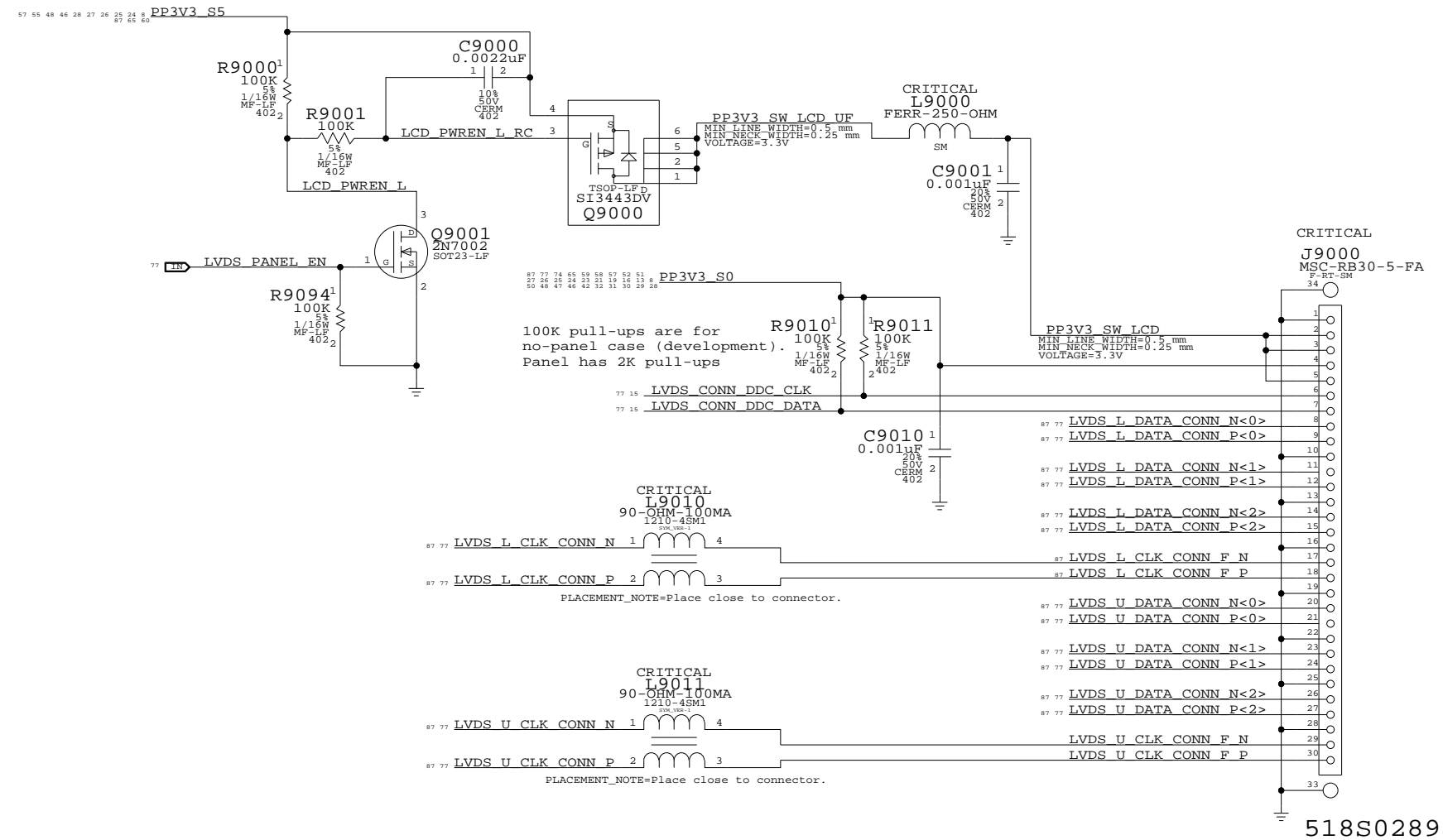
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	74	88	

LCD (LVDS) INTERFACE



LVDS Display Connector

SYNC_MASTER=(MASTER) 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

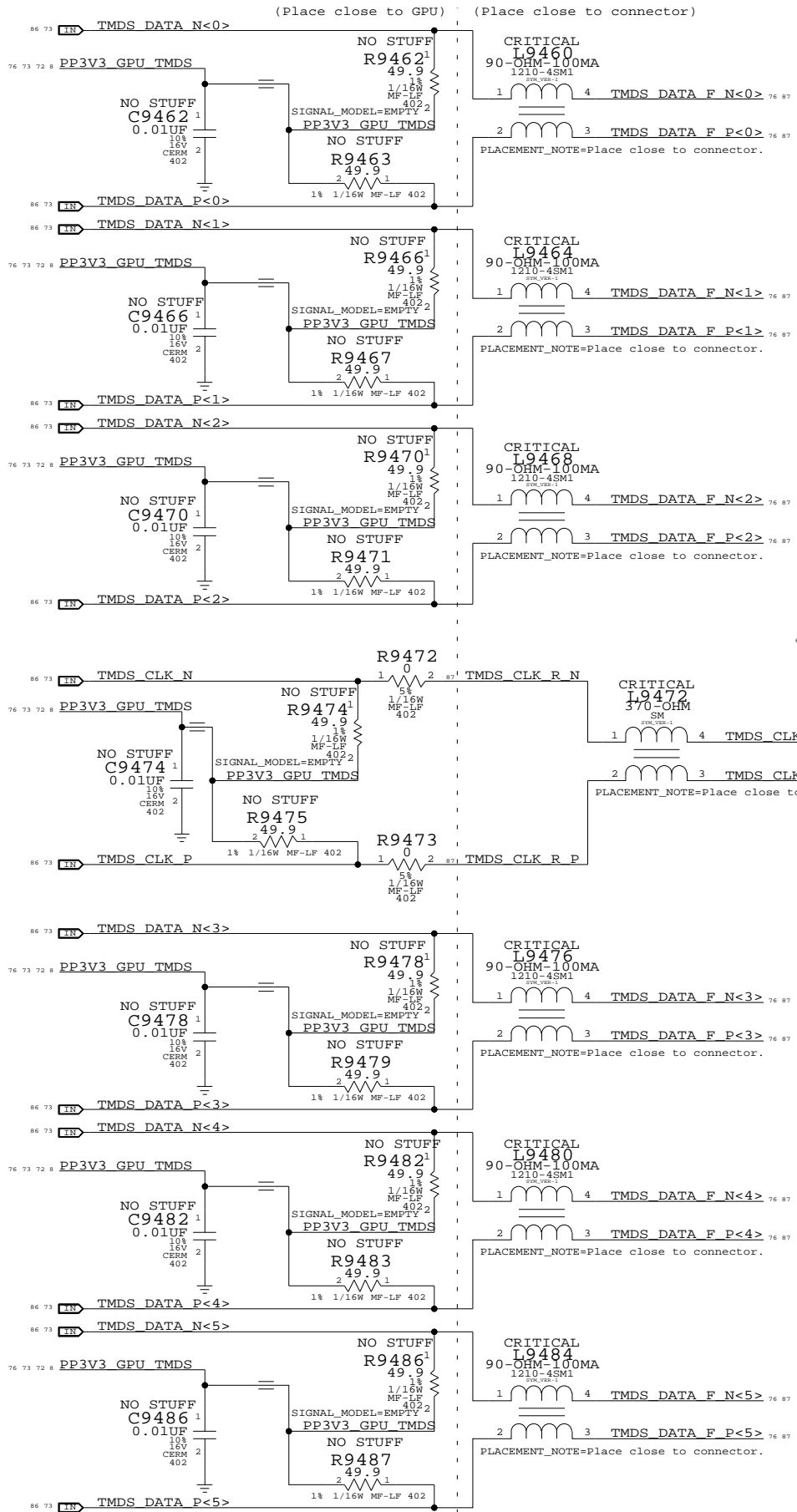
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

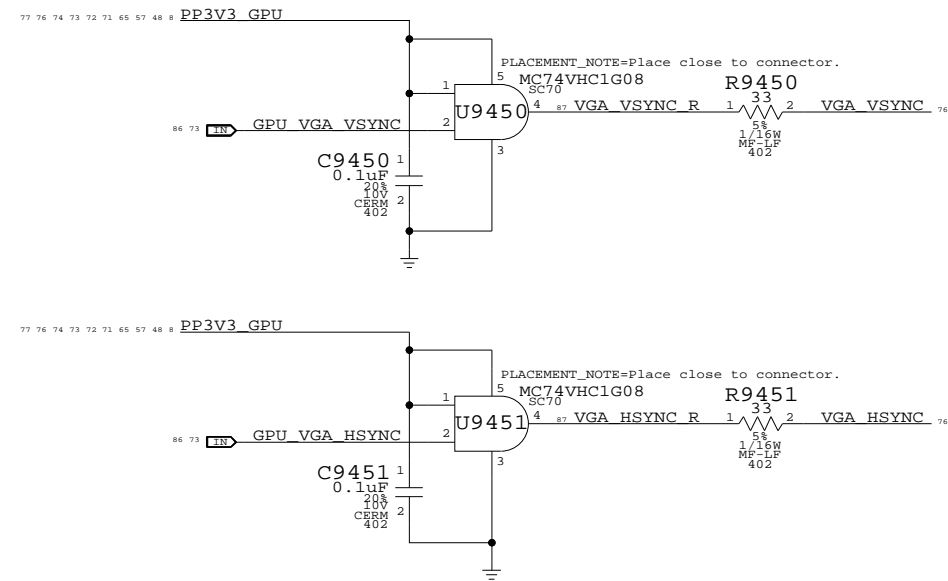
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT 75 OF 88		
NONE			

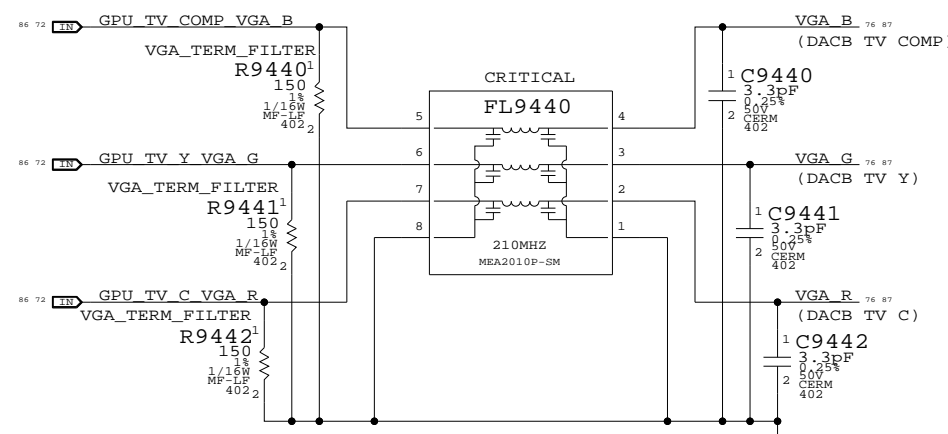
TMDS Filtering



VGA SYNC Buffers

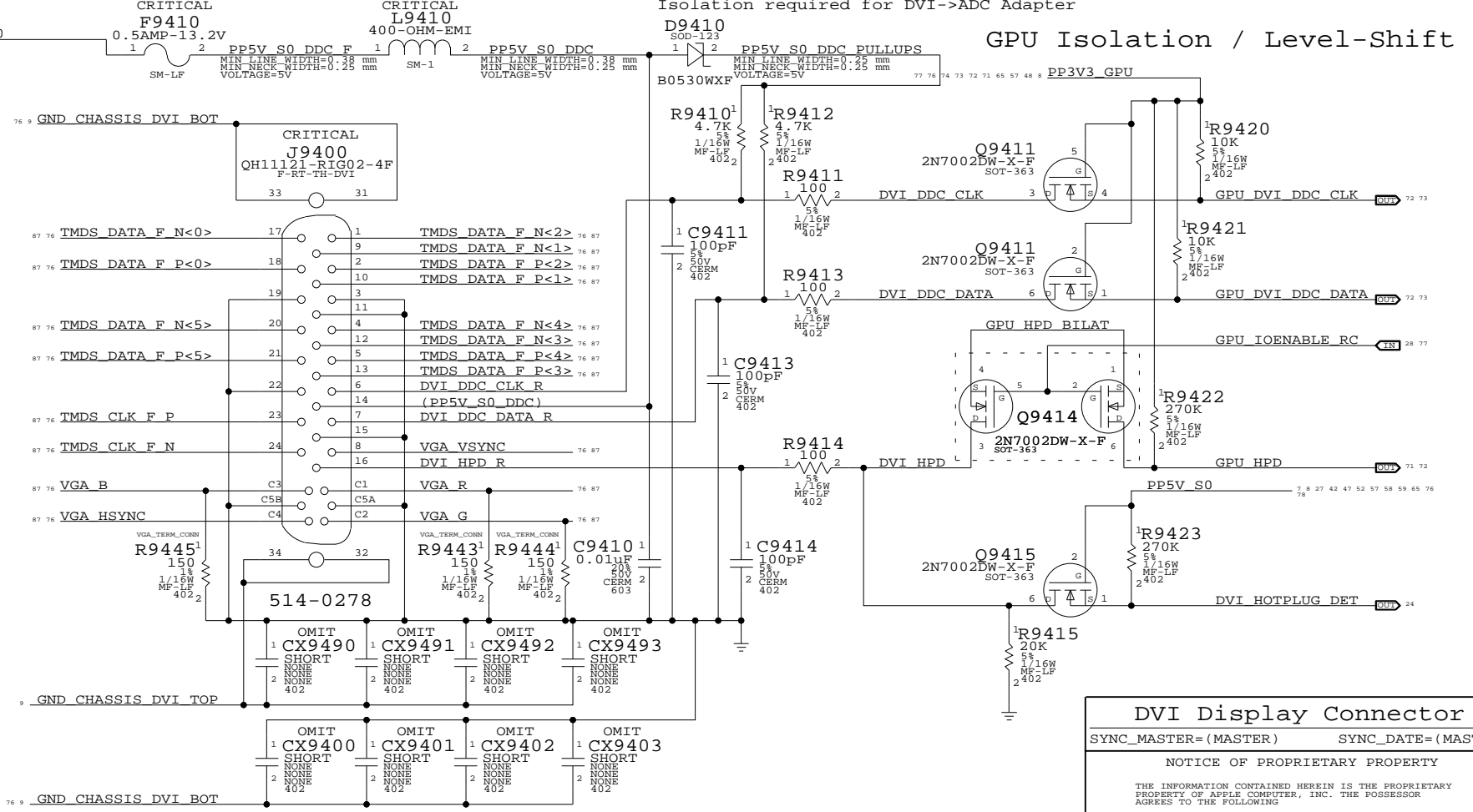


ANALOG FILTERING PLACE CLOSE TO CONNECTOR



DVI INTERFACE

DVI DDC Current Limit (55mA requirement per DVI spec)



DVI Display Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

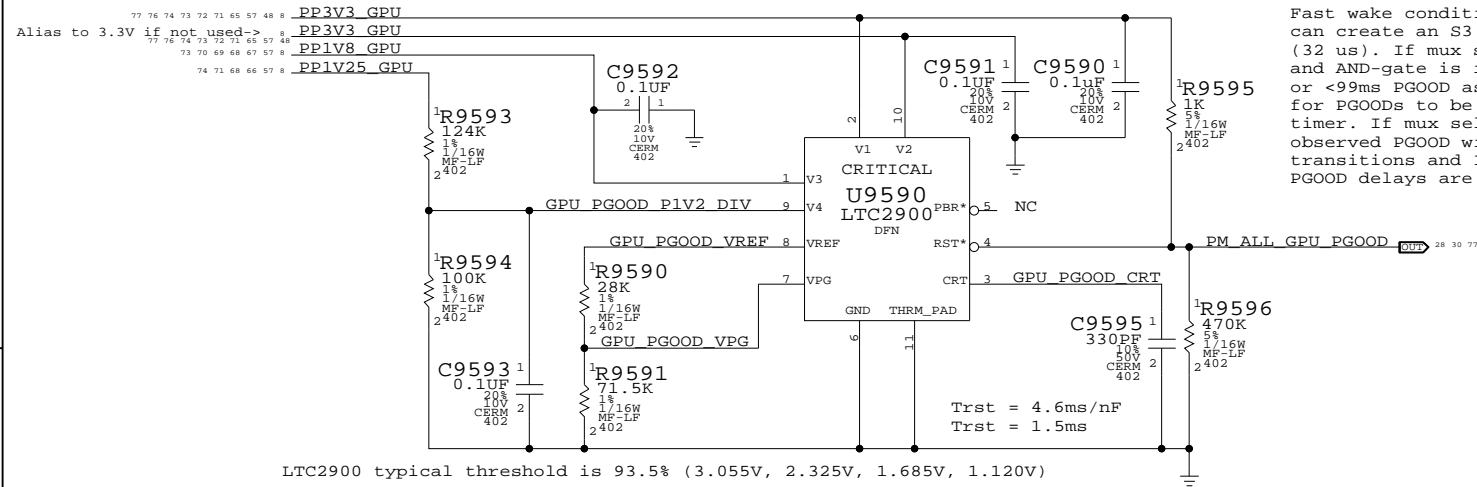
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	76	88	

PGOOD Monitor for GPU Rails

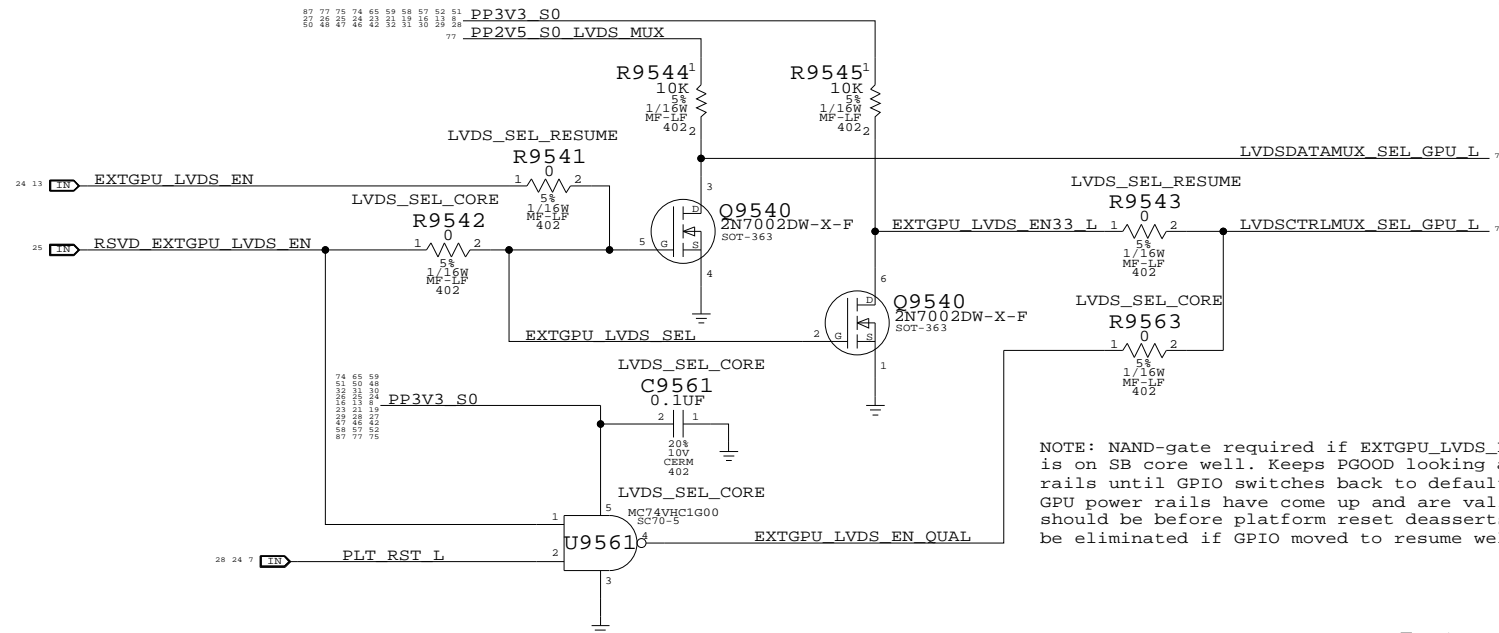
LTC2900 provides programmable reset delay which is required to play nice with ICHx PGOOD circuit



Fast wake condition is worst case. ICHx can create an S3 duration of 1 RTC clock (32 us). If mux select is on core well and AND-gate is implemented, glitch filter or <99ms PGOOD assertion time is required for PGOODs to be valid at end of 99 ms SMC timer. If mux select on resume well, then observed PGOOD will not change during S3 transitions and ICHx will honor whatever PGOOD delays are provided.

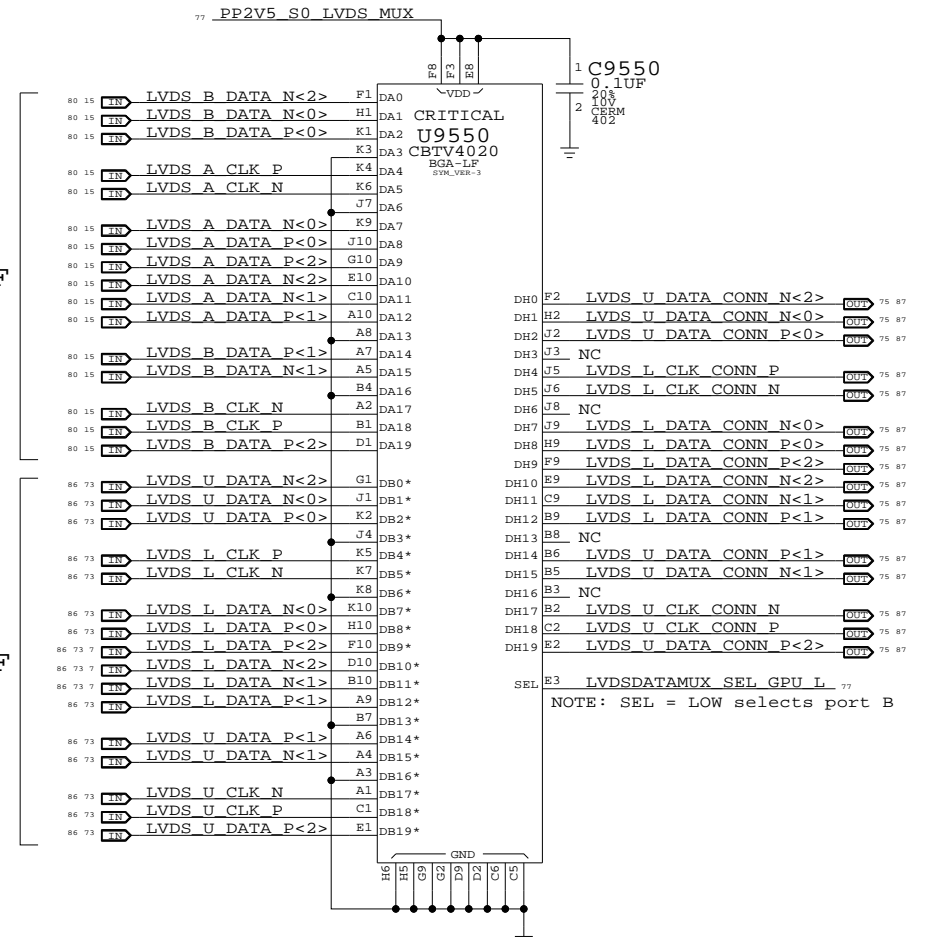
LTC2900 typical threshold is 93.5% (3.055V, 2.325V, 1.685V, 1.120V)

Mux Select Conditioning



NOTE: NAND-gate required if EXTGPU LVDS_EN GPIO is on SB core well. Keeps PGOOD looking at non-GPU rails until GPIO switches back to default state and GPU power rails have come up and are valid (which should be before platform reset deasserts). Could be eliminated if GPIO moved to resume well.

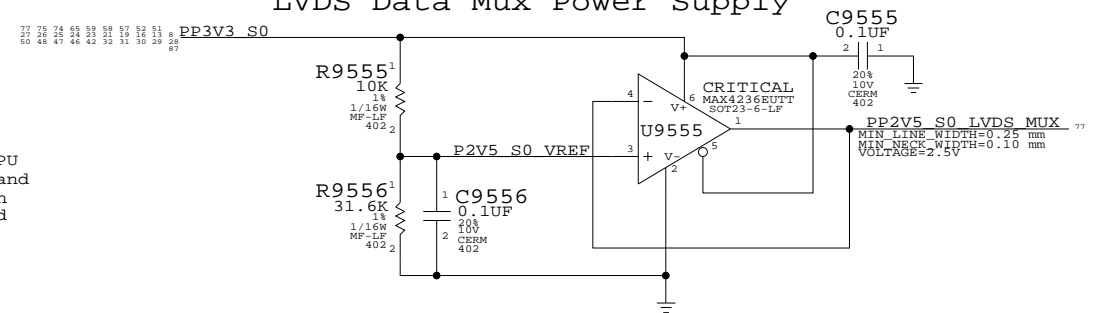
LVDS I/F Mux



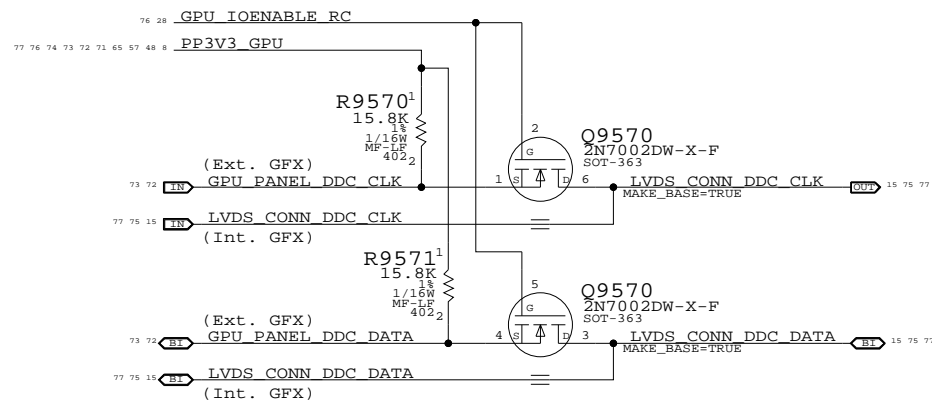
NB LVDS I/F

GPU LVDS I/F

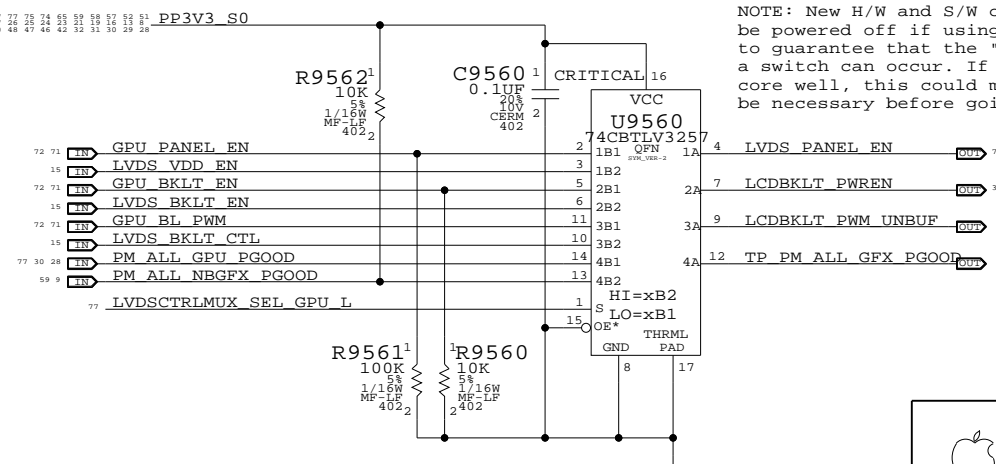
LVDS Data Mux Power Supply



GPU DDC Pass FETs



Panel/Backlight Control Mux



NOTE: New H/W and S/W challenge since NB gfx might be powered off if using external GPU. S/W will have to guarantee that the "other" device is ready before a switch can occur. If mux select GPIO is still on a core well, this could mean powering up IG supply will be necessary before going to sleep to keep PGOODs valid.

LVDS Interface Mux

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

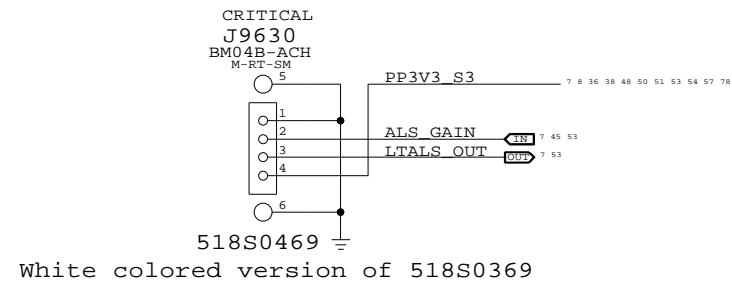
NOTICE OF PROPRIETARY PROPERTY

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

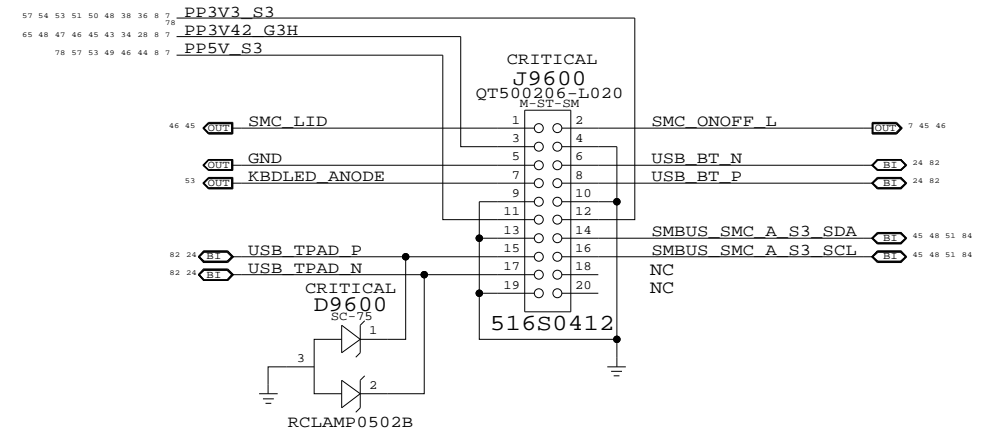
- I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
- II NOT TO REPRODUCE OR COPY IT
- III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	77	88	

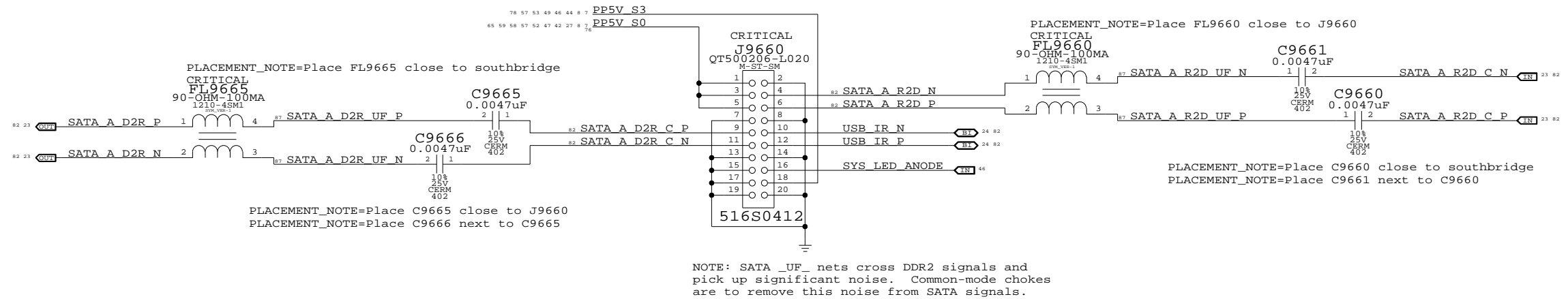
Left ALS Connector



Top-Case Connector



SATA HDD & IR & SIL Flex Connector



Project Specific Connectors

SYNC_MASTER=(M59_SYNC) SYNC_DATE=08/24/2006

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	NONE	SHT	78 OF 88

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_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
FSB_DSTB_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FSB_ADDR	*	=3:1_SPACING	?
FSB_ADDR2ADDR	*	=2:1_SPACING	?
FSB_ADSTB	*	=3:1_SPACING	?
FSB_ADDR2ADSTB	*	=3:1_SPACING	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FSB_DATA	*	=3:1_SPACING	?
FSB_DATA2DATA	*	=2:1_SPACING	?
FSB_DSTB	*	=3:1_SPACING	?
FSB_DATA2DSTB	*	=3:1_SPACING	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FSB_COMMON	*	=2:1_SPACING	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
FSB_ADDR	FSB_ADDR	*	FSB_ADDR2ADDR
FSB_ADDR	FSB_ADSTB	*	FSB_ADDR2ADSTB
FSB_DATA	FSB_DATA	*	FSB_DATA2DATA
FSB_DATA	FSB_DSTB	*	FSB_DATA2DSTB

All FSB signals with impedance requirements are 55-ohm single-ended. Worst-case spacing is 2:1 within Addr bus, with 3:1 spacing to the ADSTBs. Worst-case spacing is 2:1 within Data bus, with 3:1 spacing to the DSTBs. DSTB complementary pairs are spaced 1:1 and routed as differential pairs.

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

NOTE: Design Guide does not indicate FSB spacing to other signals, assumed 3:1. NOTE: Design Guide allows closer spacing if signal lengths can be shortened.

SOURCE: Santa Rosa Platform DG, Rev 0.9 (#20517), 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_27P4S	*	Y	=27P4_OHM_SE	=27P4_OHM_SE	=27P4_OHM_SE	7 MIL	7 MIL
CPU_55S	*	Y	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CPU_2T01	*	=2:1_SPACING	?
CPU_COMP	*	25 MIL	?
CPU_GTLREF	*	25 MIL	?
CPU_ITP	*	=2:1_SPACING	?
CPU_VCCSENSE	*	25 MIL	?

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

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: Santa Rosa Platform DG, Rev 0.9 (#20517), Sections 4.4 & 5.8.2.4

CPU / FSB Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
FSB_COMMON	FSB_55S	FSB_COMMON	FSB ADS L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB BNR L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB BPRI L	10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB BRQ0 L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB DBSY L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB DEFER L	10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB DPWR L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB DRDY L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB HIT L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB HITM L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB LOCK L	7 10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB RS L<2..0>	10 14
FSB_COMMON	FSB_55S	FSB_COMMON	FSB TRDY L	10 14
FSB_CPURST_L	FSB_55S	FSB_COMMON	FSB CPURST L	7 10 13 14
FSB_DATA_GROUP0	FSB_55S	FSB_DATA	FSB D L<15..0>	7 10 14
FSB_DATA_GROUP0	FSB_55S	FSB_DATA	FSB DINV L<0>	7 10 14
FSB_DSTB0	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L P<0>	7 10 14
FSB_DSTB0	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L N<0>	7 10 14
FSB_DATA_GROUP1	FSB_55S	FSB_DATA	FSB D L<31..16>	7 10 14
FSB_DATA_GROUP1	FSB_55S	FSB_DATA	FSB DINV L<1>	7 10 14
FSB_DSTB1	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L P<1>	7 10 14
FSB_DSTB1	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L N<1>	7 10 14
FSB_DATA_GROUP2	FSB_55S	FSB_DATA	FSB D L<47..32>	7 10 14
FSB_DATA_GROUP2	FSB_55S	FSB_DATA	FSB DINV L<2>	7 10 14
FSB_DSTB2	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L P<2>	7 10 14
FSB_DSTB2	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L N<2>	7 10 14
FSB_DATA_GROUP3	FSB_55S	FSB_DATA	FSB D L<63..48>	7 10 14
FSB_DATA_GROUP3	FSB_55S	FSB_DATA	FSB DINV L<3>	7 10 14
FSB_DSTB3	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L P<3>	7 10 14
FSB_DSTB3	FSB_DSTB_55S	FSB_DSTB	FSB DSTB L N<3>	7 10 14
FSB_ADDR_GROUP0	FSB_55S	FSB_ADDR	FSB A L<16..3>	7 10 14
FSB_ADDR_GROUP0	FSB_55S	FSB_ADDR	FSB REQ L<4..0>	7 10 14
FSB_ADSTB0	FSB_55S	FSB_ADSTB	FSB ADSTB L<0>	7 10 14
FSB_ADDR_GROUP1	FSB_55S	FSB_ADDR	FSB A L<35..17>	7 10 14
FSB_ADSTB1	FSB_55S	FSB_ADSTB	FSB ADSTB L<1>	7 10 14
CPU_IERR_L	CPU_55S		CPU IERR L	10
CPU_FERR_L	CPU_55S		CPU FERR L	10 23
CPU_PROCHOT_L	CPU_55S	CPU_2T01	CPU PROCHOT L	10 46 58
CPU_PWRGD	CPU_55S		CPU PWRGD	7 10 13 23
CPU_FRGM_SB	CPU_55S		CPU INTR	10 23
CPU_FRGM_SB	CPU_55S		CPU NMI	10 23
CPU_FRGM_SB	CPU_55S		CPU A20M L	10 23
CPU_FRGM_SB	CPU_55S		CPU DPSTP L	7 10 23
CPU_FRGM_SB	CPU_55S		CPU IGNE L	10 23
CPU_INIT_L	CPU_55S		CPU INIT L	10 23 47
CPU_FRGM_SB	CPU_55S		CPU SMI L	10 23
CPU_FRGM_SB	CPU_55S		CPU STPCLK L	7 10 23
PM_THRMTRIP_L	CPU_55S	CPU_2T01	PM THRMTRIP L	10 16 23 46
FSB_CPUSLP_L	CPU_55S		FSB CPUSLP L	7 10 14
PM_DPRSLEVR	CPU_55S	CPU_2T01	PM DPRSLPVR	7 16 25 58
(See above)	CPU_55S	CPU_2T01	IMVP DPRSLPVR	7 8
CPU_BSEL0	CPU_55S	CPU_2T01	CPU BSEL<0>	10 30
(See above)	CPU_55S	CPU_2T01	NB BSEL<0>	13 16 30
CPU_BSEL1	CPU_55S	CPU_2T01	CPU BSEL<1>	10 30
(See above)	CPU_55S	CPU_2T01	NB BSEL<1>	13 16 30
CPU_BSEL2	CPU_55S	CPU_2T01	CPU BSEL<2>	10 30
(See above)	CPU_55S	CPU_2T01	NB BSEL<2>	13 16 30
CPU_DPRSTP_L	CPU_55S	CPU_2T01	CPU DPRSTP L	7 10 16 23 58
CPU_GTLREF	CPU_55S	CPU_GTLREF	CPU GTLREF	10
CPU_COMP	CPU_55S	CPU_COMP	CPU COMP<3>	10
CPU_COMP	CPU_27P4S	CPU_COMP	CPU COMP<2>	10
CPU_COMP	CPU_55S	CPU_COMP	CPU COMP<1>	10
CPU_COMP	CPU_27P4S	CPU_COMP	CPU COMP<0>	10
XDP_TDI	CPU_55S	CPU_ITP	XDP TDI	10 13
XDP_TDO	CPU_55S	CPU_ITP	XDP TDO	10 13
XDP_TMS	CPU_55S	CPU_ITP	XDP TMS	10 13
XDP_TCK	CPU_55S	CPU_ITP	XDP TCK	10 13
XDP_TEST_L	CPU_55S	CPU_ITP	XDP TRST L	10 13
XDP_BPM_L	CPU_55S	CPU_ITP	XDP BPM L<4..0>	10 13
XDP_BPM_L5	CPU_55S	CPU_ITP	XDP BPM L<5>	10 13
CLK_FSB_1000	CLK_FSB_1000	CLK_FSB	XDP CLK P	13 29 30 84
(FSB_CPURST_L)	CLK_FSB_1000	CLK_FSB	XDP CLK N	13 29 30 84
	CPU_55S	CPU_ITP	XDP CPURST L	13
	CPU_55S	CPU_2T01	CPU VID<6..0>	11 12
	CPU_55S	CPU_2T01	IMVP6 VID<6..0>	7 12 58
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU VCCSENSE P	11 58
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU VCCSENSE N	11 58
	CPU_27P4S	CPU_VCCSENSE	IMVP6 VSEN P	58
	CPU_27P4S	CPU_VCCSENSE	IMVP6 VSEN N	58

CPU/FSB Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	79	88	

PCI-Express / DMI 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
PCIE_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
DMI_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
PCIE	*	20 MIL	?
DMI	*	20 MIL	?

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 7.2, 9.2 & 10.5

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
LVDS_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
CRT_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
CRT_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
LVDS	*	20 MIL	?
CRT	*	25 MIL	?
CRT_2CRT	*	20 MIL	?
CRT_SYNC	*	25 MIL	?
CRT_SYNC2SYNC	*	20 MIL	?
TVDAC	*	25 MIL	?
TVDAC_2TVDAC	*	20 MIL	?

DG Says 40 mil spacing minimum

DG Says 30 mil spacing minimum

DG Says 40 mil spacing minimum

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CRT	CRT	*	CRT_2CRT
CRT_SYNC	CRT_SYNC	*	CRT_SYNC2SYNC
TVDAC	TVDAC	*	TVDAC_2TVDAC

LVDS signals are 100-ohm +/- 20% differential impedance.
 CRT & TVDAC signal single-ended impedance varies by location:
 - 37.5-ohm +/- 15% from GMCH to first termination resistor.
 - 50-ohm +/- 15% from first to second termination resistor.
 - 55-ohm +/- 15% from second termination resistor to connector.
 CRT_HSYNC/CRT_VSYNC signals are 55-ohm +/- 15% single-ended impedance.

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 8.1 - 8.3.

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
PEG_R2D	PCIE_100D	PCIE	PEG R2D P<15..0> 66
	PCIE_100D	PCIE	PEG R2D N<15..0> 66
	PCIE_100D	PCIE	PEG R2D C P<15..0> 15 66
	PCIE_100D	PCIE	PEG R2D C N<15..0> 15 66
PEG_D2R	PCIE_100D	PCIE	PEG D2R P<15..0> 15 66
	PCIE_100D	PCIE	PEG D2R N<15..0> 15 66
	PCIE_100D	PCIE	PEG D2R C P<15..0> 66
	PCIE_100D	PCIE	PEG D2R C N<15..0> 66
DMI_N2S	DMI_100D	DMI	DMI N2S P<3..0> 16 24
	DMI_100D	DMI	DMI N2S N<3..0> 16 24
DMI_S2N	DMI_100D	DMI	DMI S2N P<3..0> 16 24
	DMI_100D	DMI	DMI S2N N<3..0> 16 24
LVDS_A_CLK	LVDS_100D	LVDS	LVDS A CLK P 15 77
LVDS_A_CLK	LVDS_100D	LVDS	LVDS A CLK N 15 77
LVDS_A_DATA	LVDS_100D	LVDS	LVDS A DATA P<2..0> 15 77
LVDS_A_DATA	LVDS_100D	LVDS	LVDS A DATA N<2..0> 15 77
LVDS_A_DATA3	LVDS_100D	LVDS	LVDS A DATA P<3> 15 77
LVDS_A_DATA3	LVDS_100D	LVDS	LVDS A DATA N<3> 15 77
LVDS_B_CLK	LVDS_100D	LVDS	LVDS B CLK P 15 77
LVDS_B_CLK	LVDS_100D	LVDS	LVDS B CLK N 15 77
LVDS_B_DATA	LVDS_100D	LVDS	LVDS B DATA P<2..0> 15 77
LVDS_B_DATA	LVDS_100D	LVDS	LVDS B DATA N<2..0> 15 77
LVDS_B_DATA3	LVDS_100D	LVDS	LVDS B DATA P<3> 15 77
LVDS_B_DATA3	LVDS_100D	LVDS	LVDS B DATA N<3> 15 77
LVDS_IBG		LVDS	LVDS IBG 15 22
CRT_TVO_IREF		CRT	CRT TVO IREF
CRT_RED	CRT_50S	CRT	CRT RED
CRT_GREEN	CRT_50S	CRT	CRT GREEN
CRT_BLUE	CRT_50S	CRT	CRT BLUE
CRT_SYNC	CRT_55S	CRT_SYNC	CRT HSYNC R
CRT_SYNC	CRT_55S	CRT_SYNC	CRT VSYNC R
TV_A_DAC	CRT_50S	TVDAC	TV A DAC
TV_B_DAC	CRT_50S	TVDAC	TV B DAC
TV_C_DAC	CRT_50S	TVDAC	TV C DAC

NB Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	80	88	

DDR2 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_45S	*	=45_OHM_SE	=45_OHM_SE	=45_OHM_SE	=45_OHM_SE	=STANDARD	=STANDARD
MEM_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_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_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
MEM_CLK2MEM	*	=4:1_SPACING	?
MEM_CTRL2CTRL	*	=2:1_SPACING	?
MEM_CTRL2MEM	*	=3:1_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	?

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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CMD	MEM_CLK	*	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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CTRL	MEM_CLK	*	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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_DATA	MEM_CLK	*	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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	*	*	MEM_2OTHER
MEM_CTRL	*	*	MEM_2OTHER
MEM_CMD	*	*	MEM_2OTHER
MEM_DATA	*	*	MEM_2OTHER
MEM_DQS	*	*	MEM_2OTHER

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
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

Need to support MEM*-style wildcards!
SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Section 6.2

Memory Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
MEM_A_CLK	MEM_70D	MEM_CLK	MEM CLK P<2..0>	16 31
	MEM_70D	MEM_CLK	MEM CLK N<2..0>	16 31
MEM_A_CNTRL	MEM_45S	MEM_CTRL	MEM CKE<1..0>	16 31 33
MEM_A_CNTRL	MEM_45S	MEM_CTRL	MEM CS L<1..0>	16 31 33
MEM_A_CNTRL	MEM_45S	MEM_CTRL	MEM ODT<1..0>	16 31 33
MEM_A_CMD	MEM_55S	MEM_CMD	MEM A A<14..0>	16 17 31 33
MEM_A_CMD	MEM_55S	MEM_CMD	MEM A BS<2..0>	17 31 33
MEM_A_CMD	MEM_55S	MEM_CMD	MEM A RAS L	17 31 33
MEM_A_CMD	MEM_55S	MEM_CMD	MEM A CAS L	17 31 33
MEM_A_CMD	MEM_55S	MEM_CMD	MEM A WE L	17 31 33
MEM_A_DQ_BYTE0	MEM_55S	MEM_DATA	MEM A DQ<7..0>	17 31
MEM_A_DQ_BYTE1	MEM_55S	MEM_DATA	MEM A DQ<15..8>	17 31
MEM_A_DQ_BYTE2	MEM_55S	MEM_DATA	MEM A DQ<23..16>	17 31
MEM_A_DQ_BYTE3	MEM_55S	MEM_DATA	MEM A DQ<31..24>	17 31
MEM_A_DQ_BYTE4	MEM_55S	MEM_DATA	MEM A DQ<39..32>	17 31
MEM_A_DQ_BYTE5	MEM_55S	MEM_DATA	MEM A DQ<47..40>	17 31
MEM_A_DQ_BYTE6	MEM_55S	MEM_DATA	MEM A DQ<55..48>	17 31
MEM_A_DQ_BYTE7	MEM_55S	MEM_DATA	MEM A DQ<63..56>	17 31
MEM_A_DM0	MEM_55S	MEM_DATA	MEM A DM<0>	17 31
MEM_A_DM1	MEM_55S	MEM_DATA	MEM A DM<1>	17 31
MEM_A_DM2	MEM_55S	MEM_DATA	MEM A DM<2>	17 31
MEM_A_DM3	MEM_55S	MEM_DATA	MEM A DM<3>	17 31
MEM_A_DM4	MEM_55S	MEM_DATA	MEM A DM<4>	17 31
MEM_A_DM5	MEM_55S	MEM_DATA	MEM A DM<5>	17 31
MEM_A_DM6	MEM_55S	MEM_DATA	MEM A DM<6>	17 31
MEM_A_DM7	MEM_55S	MEM_DATA	MEM A DM<7>	17 31
MEM_A_DQS0	MEM_85D	MEM_DQS	MEM A DQS P<0>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<0>	17 31
MEM_A_DQS1	MEM_85D	MEM_DQS	MEM A DQS P<1>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<1>	17 31
MEM_A_DQS2	MEM_85D	MEM_DQS	MEM A DQS P<2>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<2>	17 31
MEM_A_DQS3	MEM_85D	MEM_DQS	MEM A DQS P<3>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<3>	17 31
MEM_A_DQS4	MEM_85D	MEM_DQS	MEM A DQS P<4>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<4>	17 31
MEM_A_DQS5	MEM_85D	MEM_DQS	MEM A DQS P<5>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<5>	17 31
MEM_A_DQS6	MEM_85D	MEM_DQS	MEM A DQS P<6>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<6>	17 31
MEM_A_DQS7	MEM_85D	MEM_DQS	MEM A DQS P<7>	17 31
	MEM_85D	MEM_DQS	MEM A DQS N<7>	17 31
MEM_B_CLK	MEM_70D	MEM_CLK	MEM CLK P<5..3>	16 32
	MEM_70D	MEM_CLK	MEM CLK N<5..3>	16 32
MEM_B_CNTRL	MEM_45S	MEM_CTRL	MEM CKE<4..3>	16 32 33
MEM_B_CNTRL	MEM_45S	MEM_CTRL	MEM CS L<3..2>	16 32 33
MEM_B_CNTRL	MEM_45S	MEM_CTRL	MEM ODT<3..2>	16 32 33
MEM_B_CMD	MEM_55S	MEM_CMD	MEM B A<14..0>	16 17 32 33
MEM_B_CMD	MEM_55S	MEM_CMD	MEM B BS<2..0>	17 32 33
MEM_B_CMD	MEM_55S	MEM_CMD	MEM B RAS L	17 32 33
MEM_B_CMD	MEM_55S	MEM_CMD	MEM B CAS L	17 32 33
MEM_B_CMD	MEM_55S	MEM_CMD	MEM B WE L	17 32 33
MEM_B_DQ_BYTE0	MEM_55S	MEM_DATA	MEM B DQ<7..0>	17 32
MEM_B_DQ_BYTE1	MEM_55S	MEM_DATA	MEM B DQ<15..8>	17 32
MEM_B_DQ_BYTE2	MEM_55S	MEM_DATA	MEM B DQ<23..16>	17 32
MEM_B_DQ_BYTE3	MEM_55S	MEM_DATA	MEM B DQ<31..24>	17 32
MEM_B_DQ_BYTE4	MEM_55S	MEM_DATA	MEM B DQ<39..32>	17 32
MEM_B_DQ_BYTE5	MEM_55S	MEM_DATA	MEM B DQ<47..40>	17 32
MEM_B_DQ_BYTE6	MEM_55S	MEM_DATA	MEM B DQ<55..48>	17 32
MEM_B_DQ_BYTE7	MEM_55S	MEM_DATA	MEM B DQ<63..56>	17 32
MEM_B_DM0	MEM_55S	MEM_DATA	MEM B DM<0>	17 32
MEM_B_DM1	MEM_55S	MEM_DATA	MEM B DM<1>	17 32
MEM_B_DM2	MEM_55S	MEM_DATA	MEM B DM<2>	17 32
MEM_B_DM3	MEM_55S	MEM_DATA	MEM B DM<3>	17 32
MEM_B_DM4	MEM_55S	MEM_DATA	MEM B DM<4>	17 32
MEM_B_DM5	MEM_55S	MEM_DATA	MEM B DM<5>	17 32
MEM_B_DM6	MEM_55S	MEM_DATA	MEM B DM<6>	17 32
MEM_B_DM7	MEM_55S	MEM_DATA	MEM B DM<7>	17 32
MEM_B_DQS0	MEM_85D	MEM_DQS	MEM B DQS P<0>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<0>	17 32
MEM_B_DQS1	MEM_85D	MEM_DQS	MEM B DQS P<1>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<1>	17 32
MEM_B_DQS2	MEM_85D	MEM_DQS	MEM B DQS P<2>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<2>	17 32
MEM_B_DQS3	MEM_85D	MEM_DQS	MEM B DQS P<3>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<3>	17 32
MEM_B_DQS4	MEM_85D	MEM_DQS	MEM B DQS P<4>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<4>	17 32
MEM_B_DQS5	MEM_85D	MEM_DQS	MEM B DQS P<5>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<5>	17 32
MEM_B_DQS6	MEM_85D	MEM_DQS	MEM B DQS P<6>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<6>	17 32
MEM_B_DQS7	MEM_85D	MEM_DQS	MEM B DQS P<7>	17 32
	MEM_85D	MEM_DQS	MEM B DQS N<7>	17 32

Memory Constraints
 SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

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 COMPUTER INC.

SCALE: NONE SHEET: 81 OF 88

DRAWING NUMBER: 051-7225 REV: A.0.0

Disk 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
IDE_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
SATA_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
SATA_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
IDE	*	=1.8:1_SPACING	?
SATA	*	20 MIL	?

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 10.7 & 10.9

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	*	=1.8:1_SPACING	?

SOURCE: Napa Platform DG, Rev 0.9 (#17978), Section 10.9.1

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
USB_60S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=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
USB	*	20 MIL	?
USB_2CLK	*	25 MIL	?

DG says minimum spacing 50 mils to clocks

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Section 10.13.2

Internal 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
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
SMB	*	=3:1_SPACING	?
SPI	*	=1.8:1_SPACING	?

SOURCE: Santa Platform DG, Rev 1.0 (#21112), Section 10.17

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
IDE_PDD	IDE_55S	IDE	IDE_PDD<15..0>	23 42
IDE_PDA	IDE_55S	IDE	IDE_PDA<2..0>	23 42
IDE_PDCS	IDE_55S	IDE	IDE_PDCS1 L	23 42
IDE_PDCS	IDE_55S	IDE	IDE_PDCS3 L	23 42
IDE_CNVL	IDE_55S	IDE	IDE_PDIOW L	23 42
IDE_PDIOR_L	IDE_55S	IDE	IDE_PDIOR L	23 42
IDE_CNVL	IDE_55S	IDE	IDE_PDDACK L	23 42
IDE_CNVL	IDE_55S	IDE	IDE_PDDREO	23 42
IDE_PDIORDY	IDE_55S	IDE	IDE_PDIORDY	23 42
IDE_IRQ14	IDE_55S	IDE	IDE_IRQ14	23 42
IDE_RST_L	IDE_55S	IDE	ODD_RST_5VTOL L	24 42
SATA_A_R2D	SATA_100D	SATA	SATA_A_R2D C P	23 78
SATA_100D	SATA	SATA	SATA_A_R2D C N	23 78
SATA_100D	SATA	SATA	SATA_A_R2D P	78
SATA_100D	SATA	SATA	SATA_A_R2D N	78
SATA_A_D2R	SATA_100D	SATA	SATA_A_D2R P	23 78
SATA_100D	SATA	SATA	SATA_A_D2R N	23 78
SATA_100D	SATA	SATA	SATA_A_D2R C P	78
SATA_100D	SATA	SATA	SATA_A_D2R C N	78
SATA_B_R2D	SATA_100D	SATA	TP_SATA_B_R2DP	23 42
SATA_100D	SATA	SATA	TP_SATA_B_R2DN	23 42
SATA_100D	SATA	SATA	SATA_B_R2D P	23 42
SATA_100D	SATA	SATA	SATA_B_R2D N	23 42
SATA_B_D2R	SATA_100D	SATA	TP_SATA_B_D2RP	23 42
SATA_100D	SATA	SATA	TP_SATA_B_D2RN	23 42
SATA_100D	SATA	SATA	SATA_B_D2R C P	23 42
SATA_100D	SATA	SATA	SATA_B_D2R C N	23 42
SATA_C_R2D	SATA_100D	SATA	TP_SATA_C_R2DP	23 42
SATA_100D	SATA	SATA	TP_SATA_C_R2DN	23 42
SATA_100D	SATA	SATA	SATA_C_R2D P	23 42
SATA_100D	SATA	SATA	SATA_C_R2D N	23 42
SATA_C_D2R	SATA_100D	SATA	TP_SATA_C_D2RP	23 42
SATA_100D	SATA	SATA	TP_SATA_C_D2RN	23 42
SATA_100D	SATA	SATA	SATA_C_D2R C P	23 42
SATA_100D	SATA	SATA	SATA_C_D2R C N	23 42
SATA_RBIAS	SATA_55S		SATA_RBIAS	23 42
HDA_BIT_CLK	HDA_55S	HDA	HDA_BIT_CLK	23 34
HDA_55S	HDA	HDA	HDA_BIT_CLK R	23
HDA_SYNC	HDA_55S	HDA	HDA_SYNC	23 34
HDA_55S	HDA	HDA	HDA_SYNC R	23
HDA_RST_L	HDA_55S	HDA	HDA_RST L	23 34
HDA_55S	HDA	HDA	HDA_RST L R	23
HDA_SDIN0	HDA_55S	HDA	HDA_SDIN0	23 34
HDA_55S	HDA	HDA	HDA_SDIN CODEC	23
HDA_SDOUT	HDA_55S	HDA	HDA_SDOUT	23 34
HDA_55S	HDA	HDA	HDA_SDOUT R	23
USB_EXT_A	USB_90D	USB	USB_EXT_A P	24 43
USB_90D	USB	USB	USB_EXT_A N	24 43
USB_90D	USB	USB	USB_EXT_A MUXED P	24 43
USB_90D	USB	USB	USB_EXT_A MUXED N	24 43
USB_MINI	USB_90D	USB	USB_MINI P	24 34
USB_90D	USB	USB	USB_MINI N	24 34
USB_EXT_D	USB_90D	USB	USB_WWAN P	7 24 44
USB_90D	USB	USB	USB_WWAN N	7 24 44
USB_CAMERA	USB_90D	USB	USB_CAMERA P	7 24 44
USB_90D	USB	USB	USB_CAMERA N	7 24 44
USB_BT	USB_90D	USB	USB_BT P	24 78
USB_90D	USB	USB	USB_BT N	24 78
USB_TPAD	USB_90D	USB	USB_TPAD P	24 78
USB_90D	USB	USB	USB_TPAD N	24 78
USB_IR	USB_90D	USB	USB_IR P	24 78
USB_90D	USB	USB	USB_IR N	24 78
USB_EXT_B	USB_90D	USB	USB_EXT_B P	24 34
USB_90D	USB	USB	USB_EXT_B N	24 34
USB_EXCARD	USB_90D	USB	USB_EXCARD P	24 34
USB_90D	USB	USB	USB_EXCARD N	24 34
USB_EXTC	USB_90D	USB	TP_USB_EXTCP	9 24
USB_90D	USB	USB	TP_USB_EXTCN	9 24
USB_RBIAS	USB_60S		USB_RBIAS	24
SMB_SB_SCL	SMB_55S	SMB	SMBUS_SB_SCL	25 29 31 32 34 48
SMB_SB_SDA	SMB_55S	SMB	SMBUS_SB_SDA	25 29 31 32 34 48
SMB_SB_ME_SCL	SMB_55S	SMB	SMBUS_SB_ME_SCL	25 48
SMB_SB_ME_SDA	SMB_55S	SMB	SMBUS_SB_ME_SDA	25 48
SPI_SCLK	SPI_55S	SPI	SPI_SCLK R	24 55
SPI_55S	SPI	SPI	SPI_SCLK	55
SPI_55S	SPI	SPI	SPI_A_SCLK R	55
SPI_55S	SPI	SPI	SPI_B_SCLK R	55
SPI_SI	SPI_55S	SPI	SPI_SI R	24 55
SPI_55S	SPI	SPI	SPI_SI	55
SPI_55S	SPI	SPI	SPI_A_SI R	55
SPI_55S	SPI	SPI	SPI_B_SI R	55
SPI_SO	SPI_55S	SPI	SPI_SO	24 55
SPI_55S	SPI	SPI	SPI_A_SO R	55
SPI_55S	SPI	SPI	SPI_B_SO R	55
SPI_55S	SPI	SPI	SPI_B_SO R	55
SPI_CE_L0	SPI_55S	SPI	SPI_CE R L<0>	24 55
SPI_55S	SPI	SPI	SPI_CE L<0>	55
SPI_55S	SPI	SPI	SPI_CE R L<1>	55
SPI_55S	SPI	SPI	SPI_CE L<1>	55

SB Constraints (1 of 2)

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	82	88	

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCI	*	=2:1_SPACING	?

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 10.18.1 & 10.19

Controller Link (AMT) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CLINK_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
CLINK_12MIL	*	=STANDARD	12 MILS	5 MILS	300 MILS	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLINK	*	=1.8:1_SPACING	?
CLINK_VREF	*	12 MILS	?

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 10.27.1.5-7, 10.29 & 10.30

Ethernet (Yukon) 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_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 MILS	?

SOURCE: Based on Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 10.27.1.5-7, 10.29 & 10.30

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
PCI_AD	PCI_55S	PCI	PCI AD<18..0>	24 38
PCI_AD19	PCI_55S	PCI	PCI AD<19>	24 38
PCI_AD20	PCI_55S	PCI	PCI AD<20>	24 38
PCI_AD	PCI_55S	PCI	PCI AD<31..21>	24 38
PCI_AD	PCI_55S	PCI	PCI PAR	24 38
PCI_C_BE_L	PCI_55S	PCI	PCI C BE L<3..0>	24 38
PCI_CNTRL	PCI_55S	PCI	PCI IRDY_L	24 38
PCI_CNTRL	PCI_55S	PCI	PCI DEVSEL_L	24 38
PCI_CNTRL	PCI_55S	PCI	PCI PERR_L	24 38
PCI_LOCK_L	PCI_55S	PCI	PCI LOCK_L	24
PCI_CNTRL	PCI_55S	PCI	PCI SERR_L	24 38
PCI_CNTRL	PCI_55S	PCI	PCI STOP_L	24 38
PCI_CNTRL	PCI_55S	PCI	PCI TRDY_L	24 38
PCI_CNTRL	PCI_55S	PCI	PCI FRAME_L	24 38
PCI_FW_REQ_L	PCI_55S	PCI	PCI FW REQ_L	24 38
PCI_FW_GNT_L	PCI_55S	PCI	PCI FW GNT_L	7 24 38 47
PCI_REQ1_L	PCI_55S	PCI	PCI REQ1_L	24
PCI_GNT1_L	PCI_55S	PCI	PCI GNT1_L	24
PCI_REQ2_L	PCI_55S	PCI	PCI REQ2_L	24
PCI_GNT2_L	PCI_55S	PCI	PCI GNT2_L	24
INT_PIRQA_L	PCI_55S	PCI	INT PIRQA_L	24
INT_PIRQB_L	PCI_55S	PCI	INT PIRQB_L	24
INT_PIROC_L	PCI_55S	PCI	INT PIROC_L	24
INT_PIROD_L	PCI_55S	PCI	INT PIROD_L	24 38
INT_PIROE_L	PCI_55S	PCI	INT PIROE_L	24
INT_PIROF_L	PCI_55S	PCI	INT PIROF_L	24
PCIE_A_R2D	PCIE_100D	PCIE	PCIE A R2D C P	
PCIE_A_R2D	PCIE_100D	PCIE	PCIE A R2D C N	
PCIE_A_D2R	PCIE_100D	PCIE	PCIE A D2R P	
PCIE_A_D2R	PCIE_100D	PCIE	PCIE A D2R N	
PCIE_B_R2D	PCIE_100D	PCIE	PCIE B R2D C P	
PCIE_B_R2D	PCIE_100D	PCIE	PCIE B R2D C N	
PCIE_B_D2R	PCIE_100D	PCIE	PCIE B D2R P	
PCIE_B_D2R	PCIE_100D	PCIE	PCIE B D2R N	
PCIE_EXCARD_R2D	PCIE_100D	PCIE	PCIE EXCARD R2D C P	24 34
PCIE_EXCARD_R2D	PCIE_100D	PCIE	PCIE EXCARD R2D C N	24 34
PCIE_EXCARD_D2R	PCIE_100D	PCIE	PCIE EXCARD D2R P	24 34
PCIE_EXCARD_D2R	PCIE_100D	PCIE	PCIE EXCARD D2R N	24 34
PCIE_FW_R2D	PCIE_100D	PCIE	PCIE FW R2D C P	
PCIE_FW_R2D	PCIE_100D	PCIE	PCIE FW R2D C N	
PCIE_FW_D2R	PCIE_100D	PCIE	PCIE FW D2R P	
PCIE_FW_D2R	PCIE_100D	PCIE	PCIE FW D2R N	
PCIE_MINI_R2D	PCIE_100D	PCIE	PCIE MINI R2D C P	24 34
PCIE_MINI_R2D	PCIE_100D	PCIE	PCIE MINI R2D C N	24 34
PCIE_MINI_D2R	PCIE_100D	PCIE	PCIE MINI D2R P	24 34
PCIE_MINI_D2R	PCIE_100D	PCIE	PCIE MINI D2R N	24 34
GLAN_COMP			GLAN COMP	23
CLINK_NB	CLINK_55S	CLINK	CLINK NB CLK	16 25
CLINK_NB	CLINK_55S	CLINK	CLINK NB DATA	16 25
CLINK_NB_RESET_L	CLINK_55S	CLINK	CLINK NB RESET_L	16 25
CLINK_WLAN	CLINK_55S	CLINK	CLINK WLAN CLK	
CLINK_WLAN	CLINK_55S	CLINK	CLINK WLAN DATA	
CLINK_WLAN_RESET_L	CLINK_55S	CLINK	CLINK WLAN RESET_L	
NB_CLINK_VREF	CLINK_12MIL	CLINK_VREF	NB CLINK VREF	16
SB_CLINK_VREF0	CLINK_12MIL	CLINK_VREF	SB CLINK VREF0	25
SB_CLINK_VREF1	CLINK_12MIL	CLINK_VREF	SB CLINK VREF1	25
PCIE_ENET_R2D	PCIE_100D	PCIE	PCIE ENET R2D C P	24 35
PCIE_ENET_R2D	PCIE_100D	PCIE	PCIE ENET R2D C N	24 35
PCIE_ENET_R2D	PCIE_100D	PCIE	PCIE ENET R2D P	35
PCIE_ENET_R2D	PCIE_100D	PCIE	PCIE ENET R2D N	35
PCIE_ENET_D2R	PCIE_100D	PCIE	PCIE ENET D2R P	24 35
PCIE_ENET_D2R	PCIE_100D	PCIE	PCIE ENET D2R N	24 35
PCIE_ENET_D2R	PCIE_100D	PCIE	PCIE ENET D2R C P	35
PCIE_ENET_D2R	PCIE_100D	PCIE	PCIE ENET D2R C N	35
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI P<0>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI N<0>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI P<1>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI N<1>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI P<2>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI N<2>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI P<3>	35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET MDI N<3>	35 37

SB Constraints (2 of 2)

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

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 COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	A.0.0
SCALE	SHT	OF
NONE	83	88

Clock 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_FSB_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
CLK_PCIE_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
CLK_MED_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
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_FSB	*	25 MIL	?
CLK_PCIE	*	20 MIL	?
CLK_MED	*	20 MIL	?
CLK_SLOW	*	10 MIL	?

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Sections 14.1 - 14.6

Clock Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
CK505_CPUH	CLK_FSB_100D	CLK_FSB	FSB CLK CPU P	10 29 30 84
CK505_CPUN	CLK_FSB_100D	CLK_FSB	FSB CLK CPU N	10 29 30 84
CK505_NBP	CLK_FSB_100D	CLK_FSB	FSB CLK NB P	7 14 29 30 84
CK505_NBN	CLK_FSB_100D	CLK_FSB	FSB CLK NB N	7 14 29 30 84
CK505_ITP	CLK_FSB_100D	CLK_FSB	XDP CLK P	13 29 30 79 84
CK505_ITN	CLK_FSB_100D	CLK_FSB	XDP CLK N	13 29 30 79 84
CK505_PCIF0	CLK_MED_55S	CLK_MED	CK505 PCIF0 CLK ITPEN	29 30
CK505_PCIF1	CLK_MED_55S	CLK_MED	CK505 PCIF1 CLK	29 30
CK505_PCII1	CLK_MED_55S	CLK_MED	CK505 PCII1 CLK	29 30
CK505_PCII2	CLK_MED_55S	CLK_MED	TP CK505 PCII2 CLK	29 30
CK505_PCII3	CLK_MED_55S	CLK_MED	CK505 PCII3 CLK	29 30
CK505_PCII4	CLK_MED_55S	CLK_MED	TP CK505 PCII4 CLK	29 30
CK505_PCII5	CLK_MED_55S	CLK_MED	CK505 PCII5 CLK PCTSEL	29 30
(CPU_BSEL0)	CLK_MED_55S	CLK_MED	CK505 48M FSA	29 30
(CPU_BSEL2)	CLK_MED_55S	CLK_MED	CK505 REF0 FSC	29 30
CK505_DOT96	CLK_PCIE_100D	CLK_PCIE	CK505 CLK27M	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505 CLK27M SS	29 30
CK505_LVDS	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPPLLSS P	7 16 22 29 30 84
	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPPLLSS N	7 16 22 29 30 84
CK505_SRC1	CLK_PCIE_100D	CLK_PCIE	PEG CLK100M GPU P	9 29 30 66 84
	CLK_PCIE_100D	CLK_PCIE	PEG CLK100M GPU N	9 29 30 66 84
CK505_SRC2	CLK_PCIE_100D	CLK_PCIE	SB CLK100M DMI P	24 29 30 84
	CLK_PCIE_100D	CLK_PCIE	SB CLK100M DMI N	24 29 30 84
CK505_SRC3	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M EXCARD P	29 30 34 84
	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M EXCARD N	29 30 34 84
CK505_SRC4	CLK_PCIE_100D	CLK_PCIE	SB CLK100M SATA P	23 29 30 84
	CLK_PCIE_100D	CLK_PCIE	SB CLK100M SATA N	23 29 30 84
CK505_SRC5	CLK_PCIE_100D	CLK_PCIE	NB CLK100M PCIE P	7 16 29 30 84
	CLK_PCIE_100D	CLK_PCIE	NB CLK100M PCIE N	7 16 29 30 84
CK505_SRC6	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M MINI P	29 30 34 84
	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M MINI N	29 30 34 84
CK505_SRC7	CLK_PCIE_100D	CLK_PCIE	TP PCIE CLK100M SRC7P	29 30
	CLK_PCIE_100D	CLK_PCIE	TP PCIE CLK100M SRC7N	29 30
CK505_SRC8	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M ENET P	29 30 35 84
	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M ENET N	29 30 35 84
(CK505_CPU)	CLK_FSB_100D	CLK_FSB	FSB CLK CPU P	10 29 30 84
(CK505_CPUN)	CLK_FSB_100D	CLK_FSB	FSB CLK CPU N	10 29 30 84
(CK505_NBP)	CLK_FSB_100D	CLK_FSB	FSB CLK NB P	7 14 29 30 84
(CK505_NBN)	CLK_FSB_100D	CLK_FSB	FSB CLK NB N	7 14 29 30 84
(CK505_ITP)	CLK_FSB_100D	CLK_FSB	XDP CLK P	13 29 30 79 84
(CK505_ITN)	CLK_FSB_100D	CLK_FSB	XDP CLK N	13 29 30 79 84
(CK505_PCIF0)	CLK_MED_55S	CLK_MED	PCI CLK33M LPCPLUS	7 30 47
(CK505_PCIF1)	CLK_MED_55S	CLK_MED	PCI CLK33M SB	24 30
(CK505_PCII1)	CLK_MED_55S	CLK_MED	PCI CLK33M FW	30 38
(CK505_PCII2)	CLK_MED_55S	CLK_MED	PCI CLK33M TPM	30 45
(CK505_PCII3)	CLK_MED_55S	CLK_MED	PCI CLK33M SMC	30 45
(CPU_BSEL0)	CLK_MED_55S	CLK_MED	SB CLK48M USBCTLR	25 30
(CPU_BSEL2)	CLK_MED_55S	CLK_MED	SB CLK14P3M TIMER	25 30
(CPU_BSEL0)	CLK_MED_55S	CLK_MED	CK505 FSA	30
(CPU_BSEL2)	CLK_MED_55S	CLK_MED	CK505 FSC	30
(CK505_DOT96)	CLK_PCIE_100D	CLK_PCIE	NB CLK96M DOT P	7
(CK505_DOT96)	CLK_PCIE_100D	CLK_PCIE	NB CLK96M DOT N	7
(CK505_LVDS)	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPPLLSS P	7 16 22 29 30 84
(CK505_LVDS)	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPPLLSS N	7 16 22 29 30 84
(CK505_SRC1)	CLK_PCIE_100D	CLK_PCIE	PEG CLK100M GPU P	9 29 30 66 84
(CK505_SRC1)	CLK_PCIE_100D	CLK_PCIE	PEG CLK100M GPU N	9 29 30 66 84
(CK505_SRC2)	CLK_PCIE_100D	CLK_PCIE	SB CLK100M DMI P	24 29 30 84
(CK505_SRC2)	CLK_PCIE_100D	CLK_PCIE	SB CLK100M DMI N	24 29 30 84
(CK505_SRC3)	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M EXCARD P	29 30 34 84
(CK505_SRC3)	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M EXCARD N	29 30 34 84
(CK505_SRC4)	CLK_PCIE_100D	CLK_PCIE	SB CLK100M SATA P	23 29 30 84
(CK505_SRC4)	CLK_PCIE_100D	CLK_PCIE	SB CLK100M SATA N	23 29 30 84
(CK505_SRC5)	CLK_PCIE_100D	CLK_PCIE	NB CLK100M PCIE P	7 16 29 30 84
(CK505_SRC5)	CLK_PCIE_100D	CLK_PCIE	NB CLK100M PCIE N	7 16 29 30 84
(CK505_SRC6)	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M MINI P	29 30 34 84
(CK505_SRC6)	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M MINI N	29 30 34 84
(CK505_SRC7)	CLK_PCIE_100D	CLK_PCIE	CK505 SRC7 is project-specific	
(CK505_SRC8)	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M ENET P	29 30 35 84
(CK505_SRC8)	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M ENET N	29 30 35 84

SMC SMBus Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
SMBUS_SMC_A_S3_SCL	SMB_55S	SMB	SMBUS_SMC A S3_SCL	45 48 51 78
SMBUS_SMC_A_S3_SDA	SMB_55S	SMB	SMBUS_SMC A S3_SDA	45 48 51 78
SMBUS_SMC_B_S0_SCL	SMB_55S	SMB	SMBUS_SMC B S0_SCL	34 45
SMBUS_SMC_B_S0_SDA	SMB_55S	SMB	SMBUS_SMC B S0_SDA	34 45
SMBUS_SMC_0_S0_SCL	SMB_55S	SMB	SMBUS_SMC 0 S0_SCL	45 48 51 73
SMBUS_SMC_0_S0_SDA	SMB_55S	SMB	SMBUS_SMC 0 S0_SDA	45 48 51 73
SMBUS_SMC_BSA_SCL	SMB_55S	SMB	SMBUS_SMC BSA_SCL	7 45 48 56
SMBUS_SMC_BSA_SDA	SMB_55S	SMB	SMBUS_SMC BSA_SDA	7 45 48 56
SMBUS_SMC_MGMT_SCL	SMB_55S	SMB	SMBUS_SMC MGMT_SCL	45 48 54
SMBUS_SMC_MGMT_SDA	SMB_55S	SMB	SMBUS_SMC MGMT_SDA	45 48 54

Clock & SMC Constraints

SYNC_MASTER=T9_NAME SYNC_DATE=01/17/2007

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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	84	88	

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_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
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	*	=2:1_SPACING	?
FW_TP	*	=3:1_SPACING	?

FireWire Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
EW_D_CTL	EW_55S	FW	FW LINK<7..0>
EW_D_CTL	EW_55S	FW	FW CTL<1..0>
EW_LCLK	CLK_MED_55S	CLK_MED	CLKFW LINK LCLK
EW_LCLK	CLK_MED_55S	CLK_MED	CLKFW PHY LCLK 38 39
EW_PCLK	CLK_MED_55S	CLK_MED	CLKFW LINK PCLK 38 39
EW_PCLK	CLK_MED_55S	CLK_MED	CLKFW PHY PCLK 38 39
EW_LKON	EW_55S	FW	FW LKON
EW_LKON	EW_55S	FW	FW LKON R
EW_LPS	EW_55S	FW	FW LPS 38 39
EW_LREQ	EW_55S	FW	FW LREQ 38 39
EW_PINT	EW_55S	FW	FW PINT 38 39
EWPHY_CLK98P304M_XI	CLK_MED_55S	CLK_MED	CLK98P304M FW XI R
EWPHY_CLK98P304M_XI	CLK_MED_55S	CLK_MED	CLK98P304M FW XI
EW_0_TPA	EW_110D	EW_TP	FW PORT0 TPA P 39 41
EW_0_TPA	EW_110D	EW_TP	FW PORT0 TPA N 39 41
EW_0_TPB	EW_110D	EW_TP	FW PORT0 TPB P 39 41
EW_0_TPB	EW_110D	EW_TP	FW PORT0 TPB N 39 41
EW_1_TPA	EW_110D	EW_TP	FW PORT1 TPA P 39 41
EW_1_TPA	EW_110D	EW_TP	FW PORT1 TPA N 39 41
EW_1_TPB	EW_110D	EW_TP	FW PORT1 TPB P 39 41
EW_1_TPB	EW_110D	EW_TP	FW PORT1 TPB N 39 41
Port 2 Not Used			

FireWire Constraints
 SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007
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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	85	88	

GDDR3 Frame Buffer 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
GDDR3_40R50SE	*	=50_OHM_SE	=40_OHM_SE	=50_OHM_SE	12.7 MM	=STANDARD	=STANDARD
GDDR3_50SE	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
GDDR3_80D	*	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
GDDR3_CLK	*	=2.5:1_SPACING	?
GDDR3_CMD	*	=2.5:1_SPACING	?
GDDR3_DATA	*	=2.5:1_SPACING	?
GDDR3_DQS	*	=2.5:1_SPACING	?

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
TMDS_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
VGA_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
VGA_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
TMDS	*	20 MIL	?
VGA	*	20 MIL	?
VGA_SYNC	*	20 MIL	?

GDDR3 FB A/B Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
FB_A_CLK_P	GDDR3_80D	GDDR3_CLK	FB A CLK P<0>
FB_B_CLK_P	GDDR3_80D	GDDR3_CLK	FB B CLK P<0>
FB_A_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A MA<1..0>
FB_B_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B MA<1..0>
FB_A_CS0_L	GDDR3_40R50SE	GDDR3_CMD	FB A CAS L
FB_B_CS0_L	GDDR3_40R50SE	GDDR3_CMD	FB B CAS L
FB_A_CS1_L	GDDR3_40R50SE	GDDR3_CMD	FB A WE L
FB_B_CS1_L	GDDR3_40R50SE	GDDR3_CMD	FB B WE L
FB_A_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB A CS0 L
FB_B_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB B CS0 L
FB_A_CS2_L	GDDR3_40R50SE	GDDR3_CMD	FB A DRAM_RST
FB_B_CS2_L	GDDR3_40R50SE	GDDR3_CMD	FB B DRAM_RST
FB_A_CS3_L	GDDR3_40R50SE	GDDR3_CMD	FB A LMA<5..2>
FB_B_CS3_L	GDDR3_40R50SE	GDDR3_CMD	FB B LMA<5..2>
FB_A_CS4_L	GDDR3_40R50SE	GDDR3_CMD	FB A UMA<5..2>
FB_B_CS4_L	GDDR3_40R50SE	GDDR3_CMD	FB B UMA<5..2>
FB_A_CS5_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<0>
FB_B_CS5_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<0>
FB_A_CS6_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<1>
FB_B_CS6_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<1>
FB_A_CS7_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<2>
FB_B_CS7_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<2>
FB_A_CS8_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<3>
FB_B_CS8_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<3>
FB_A_CS9_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<0>
FB_B_CS9_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<0>
FB_A_CS10_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<1>
FB_B_CS10_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<1>
FB_A_CS11_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<2>
FB_B_CS11_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<2>
FB_A_CS12_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<3>
FB_B_CS12_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<3>
FB_A_CS13_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<7..0>
FB_B_CS13_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<7..0>
FB_A_CS14_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<15..8>
FB_B_CS14_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<15..8>
FB_A_CS15_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<23..16>
FB_B_CS15_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<23..16>
FB_A_CS16_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<31..24>
FB_B_CS16_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<31..24>
FB_A_CS17_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<0>
FB_B_CS17_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<0>
FB_A_CS18_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<1>
FB_B_CS18_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<1>
FB_A_CS19_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<2>
FB_B_CS19_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<2>
FB_A_CS20_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<3>
FB_B_CS20_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<3>
FB_A_CS21_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<4>
FB_B_CS21_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<4>
FB_A_CS22_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<5>
FB_B_CS22_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<5>
FB_A_CS23_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<6>
FB_B_CS23_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<6>
FB_A_CS24_L	GDDR3_40R50SE	GDDR3_CMD	FB A WDO<7>
FB_B_CS24_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<7>
FB_A_CS25_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<4>
FB_B_CS25_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<4>
FB_A_CS26_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<5>
FB_B_CS26_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<5>
FB_A_CS27_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<6>
FB_B_CS27_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<6>
FB_A_CS28_L	GDDR3_40R50SE	GDDR3_CMD	FB A RDQ<7>
FB_B_CS28_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<7>
FB_A_CS29_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<39..32>
FB_B_CS29_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<39..32>
FB_A_CS30_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<47..40>
FB_B_CS30_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<47..40>
FB_A_CS31_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<55..48>
FB_B_CS31_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<55..48>
FB_A_CS32_L	GDDR3_40R50SE	GDDR3_CMD	FB A DO<63..56>
FB_B_CS32_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<63..56>
FB_A_CS33_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<4>
FB_B_CS33_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<4>
FB_A_CS34_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<5>
FB_B_CS34_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<5>
FB_A_CS35_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<6>
FB_B_CS35_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<6>
FB_A_CS36_L	GDDR3_40R50SE	GDDR3_CMD	FB A DQ<7>
FB_B_CS36_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<7>

GDDR3 FB C/D Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
FB_C_CLK_P	GDDR3_80D	GDDR3_CLK	FB B CLK P<0>
FB_D_CLK_P	GDDR3_80D	GDDR3_CLK	FB B CLK P<1>
FB_C_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B MA<1..0>
FB_D_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B MA<1..0>
FB_C_CS0_L	GDDR3_40R50SE	GDDR3_CMD	FB B CAS L
FB_D_CS0_L	GDDR3_40R50SE	GDDR3_CMD	FB B CAS L
FB_C_CS1_L	GDDR3_40R50SE	GDDR3_CMD	FB B WE L
FB_D_CS1_L	GDDR3_40R50SE	GDDR3_CMD	FB B WE L
FB_C_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB B CS0 L
FB_D_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB B CS0 L
FB_C_CS2_L	GDDR3_40R50SE	GDDR3_CMD	FB B DRAM_RST
FB_D_CS2_L	GDDR3_40R50SE	GDDR3_CMD	FB B DRAM_RST
FB_C_CS3_L	GDDR3_40R50SE	GDDR3_CMD	FB B LMA<5..2>
FB_D_CS3_L	GDDR3_40R50SE	GDDR3_CMD	FB B LMA<5..2>
FB_C_CS4_L	GDDR3_40R50SE	GDDR3_CMD	FB B UMA<5..2>
FB_D_CS4_L	GDDR3_40R50SE	GDDR3_CMD	FB B UMA<5..2>
FB_C_CS5_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<0>
FB_D_CS5_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<0>
FB_C_CS6_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<1>
FB_D_CS6_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<1>
FB_C_CS7_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<2>
FB_D_CS7_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<2>
FB_C_CS8_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<3>
FB_D_CS8_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<3>
FB_C_CS9_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<0>
FB_D_CS9_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<0>
FB_C_CS10_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<1>
FB_D_CS10_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<1>
FB_C_CS11_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<2>
FB_D_CS11_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<2>
FB_C_CS12_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<3>
FB_D_CS12_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<3>
FB_C_CS13_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<7..0>
FB_D_CS13_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<7..0>
FB_C_CS14_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<15..8>
FB_D_CS14_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<15..8>
FB_C_CS15_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<23..16>
FB_D_CS15_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<23..16>
FB_C_CS16_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<31..24>
FB_D_CS16_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<31..24>
FB_C_CS17_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<0>
FB_D_CS17_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<0>
FB_C_CS18_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<1>
FB_D_CS18_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<1>
FB_C_CS19_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<2>
FB_D_CS19_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<2>
FB_C_CS20_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<3>
FB_D_CS20_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<3>
FB_C_CS21_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<4>
FB_D_CS21_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<4>
FB_C_CS22_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<5>
FB_D_CS22_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<5>
FB_C_CS23_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<6>
FB_D_CS23_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<6>
FB_C_CS24_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<7>
FB_D_CS24_L	GDDR3_40R50SE	GDDR3_CMD	FB B WDO<7>
FB_C_CS25_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<4>
FB_D_CS25_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<4>
FB_C_CS26_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<5>
FB_D_CS26_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<5>
FB_C_CS27_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<6>
FB_D_CS27_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<6>
FB_C_CS28_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<7>
FB_D_CS28_L	GDDR3_40R50SE	GDDR3_CMD	FB B RDQ<7>
FB_C_CS29_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<39..32>
FB_D_CS29_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<39..32>
FB_C_CS30_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<47..40>
FB_D_CS30_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<47..40>
FB_C_CS31_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<55..48>
FB_D_CS31_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<55..48>
FB_C_CS32_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<63..56>
FB_D_CS32_L	GDDR3_40R50SE	GDDR3_CMD	FB B DO<63..56>
FB_C_CS33_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<4>
FB_D_CS33_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<4>
FB_C_CS34_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<5>
FB_D_CS34_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<5>
FB_C_CS35_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<6>
FB_D_CS35_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<6>
FB_C_CS36_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<7>
FB_D_CS36_L	GDDR3_40R50SE	GDDR3_CMD	FB B DQ<7>

G84M Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
(CK505_DOT96)	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_GATED
CK505_CLK27MSS	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS_GATED
	LVDS_100D	LVDS	LVDS L CLK P
	LVDS_100D	LVDS	LVDS L CLK N
	LVDS_100D	LVDS	LVDS L DATA P<3..0>
	LVDS_100D	LVDS	LVDS L DATA N<3..0>
	LVDS_100D	LVDS	LVDS U CLK P
	LVDS_100D	LVDS	LVDS U CLK N
	LVDS_100D	LVDS	LVDS U DATA P<3..0>
	LVDS_100D	LVDS	LVDS U DATA N<3..0>
TMDS_CLK	TMDS_100D	TMDS	TMDS CLK P
TMDS_CLK	TMDS_100D	TMDS	TMDS CLK N
TMDS_DATA	TMDS_100D	TMDS	TMDS DATA P<5..0>
TMDS_DATA	TMDS_100D	TMDS	TMDS DATA N<5..0>
VGA_B_TV_C	VGA_50S	VGA	GPU_TV_C_VGA_R
VGA_G_TV_Y	VGA_50S	VGA	GPU_TV_Y_VGA_G
VGA_B_TV_COMP	VGA_50S	VGA	GPU_TV_COMP_VGA_B
	VGA_50S	VGA	GPU_VGA_R
	VGA_50S	VGA	GPU_VGA_G
	VGA_50S	VGA	GPU_VGA_B
	VGA_50S	VGA	GPU_TV_C
	VGA_50S	VGA	GPU_TV_Y
	VGA_50S	VGA	GPU_TV_COMP
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_HSYNC
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_VSYNC

GPU (G84M) Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SENSE_1T01_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR
THERM_1T01_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SENSE	*	=2:1_SPACING	?
THERM	*	=2:1_SPACING	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
ENETCONN	*	25 MILS	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
GND	*	=STANDARD	?
PP1V8_MEM	*	=STANDARD	?

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
GND_P2MM	*	0.20 MM	1000
PWR_P2MM	*	0.20 MM	1000

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	GND	*	GND_P2MM
MEM_CMD	GND	*	GND_P2MM
MEM_CTRL	GND	*	GND_P2MM
MEM_DATA	GND	*	GND_P2MM
MEM_DQS	GND	*	GND_P2MM
MEM_CLK	PP1V8_MEM	*	PWR_P2MM
MEM_CMD	PP1V8_MEM	*	PWR_P2MM
MEM_CTRL	PP1V8_MEM	*	PWR_P2MM
MEM_DATA	PP1V8_MEM	*	PWR_P2MM
MEM_DQS	PP1V8_MEM	*	PWR_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CLINK_VREF	GND	*	GND_P2MM
CLK_MED	GND	*	GND_P2MM
CLK_PCIE	GND	*	GND_P2MM
DMI	GND	*	GND_P2MM
PCIE	GND	*	GND_P2MM
SATA	GND	*	GND_P2MM
USB	GND	*	GND_P2MM
CLK_PCIE	SB_POWER	*	PWR_P2MM
DMI	SB_POWER	*	PWR_P2MM
SATA	SB_POWER	*	PWR_P2MM
USB	SB_POWER	*	PWR_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CLK_FSB	GND	*	GND_P2MM
CPU_COMP	GND	*	GND_P2MM
CPU_GTLREF	GND	*	GND_P2MM
CPU_VCCSENSE	GND	*	GND_P2MM
FSB_DSTB	GND	*	GND_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
ENET_MDI	GND	*	GND_P2MM
ENET_MDI	ENET_POWER	*	PWR_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CLK_MED	FW_POWER	*	GND_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
LVDS	GND	*	GND_P2MM

Memory Constraint Relaxations

Allow 0.127 mm necks for >0.127 mm lines for GMCH fanout.

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_70D	BOTTOM			0.127 MM	6.35 MM		

Allow 0.1 mm necks for >0.1 mm lines between thru-hole SO-DIMM pins.

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_45S	OVERRIDE	OVERRIDE	OVERRIDE	0.100 MM	2.54 MM	OVERRIDE	OVERRIDE
MEM_70D	ISL10			0.100 MM	2.54 MM		
MEM_85D	ISL4, ISL10			0.100 MM	2.54 MM		

Graphics Constraint Relaxations

Alternate diffpair width/gap through BGA fanout areas (95-ohm diff)

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
LVDS_100D	BGA	100_DIFF_BGA
TMDS_100D	BGA	100_DIFF_BGA

SIM Card Constraints

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
WWAN_SIM	*	=2:1_SPACING	?

M75 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SIZE
	PHYSICAL	SPACING	
(PCIE_EXCARD)	PCIE_100D	PCIE	PCIE_EXCARD_R2D_P
(PCIE_EXCARD)	PCIE_100D	PCIE	PCIE_EXCARD_R2D_N
(PCIE_MINI)	PCIE_100D	PCIE	PCIE_MINI_R2D_P
(PCIE_MINI)	PCIE_100D	PCIE	PCIE_MINI_R2D_N
	ENET_100D	ENET_MDI	ENET_MDI_R_P<3..0>
	ENET_100D	ENET_MDI	ENET_MDI_R_N<3..0>
	ENET_100D	ENETCONN	ENETCONN_P<3..0>
	ENET_100D	ENETCONN	ENETCONN_N<3..0>
	FW_110D	FW_TP	FW_PORT0_TPA_FL_P
	FW_110D	FW_TP	FW_PORT0_TPA_FL_N
	FW_110D	FW_TP	FW_PORT0_TPB_FL_P
	FW_110D	FW_TP	FW_PORT0_TPB_FL_N
(SATA_A_R2D)	SATA_100D	SATA	SATA_A_R2D_UF_P
(SATA_A_R2D)	SATA_100D	SATA	SATA_A_R2D_UF_N
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_P
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_N
(USB_EXT_A)	USB_90D	USB	USB2_EXT_A_MUXED_P
(USB_EXT_A)	USB_90D	USB	USB2_EXT_A_MUXED_N
(USB_EXT_A)	USB_90D	USB	USB2_RT_P
(USB_EXT_A)	USB_90D	USB	USB2_RT_N
(USB_EXT_D)	USB_90D	USB	USB_WWAN_F_P
(USB_EXT_D)	USB_90D	USB	USB_WWAN_F_N
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_P
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_N
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	GFXIMVP6_VSEN_P
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	NBCOREISNS_P
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	PIV8ISNS_P
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	PIV25ISNS_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	CPU_THERMSNS_D2_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	CPU_THERMD_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	GPU_THERMSNS_D_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	GPU_TDIODE_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	HSTHERMSNS_D_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	REMTHERMSNS_DX_P
THERM_DIFFPAIR	THERM_1T01_55S	THERM	RSFSTHERMSNS_D_P
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_P
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_N
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_P
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_N
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_P<3..0>
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_N<3..0>
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_P
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_N
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_P<3..0>
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_N<3..0>
	TMDS_100D	TMDS	TMDS_CLK_R_P
	TMDS_100D	TMDS	TMDS_CLK_R_N
	TMDS_100D	TMDS	TMDS_CLK_F_P
	TMDS_100D	TMDS	TMDS_CLK_F_N
	TMDS_100D	TMDS	TMDS_DATA_F_P<5..0>
	TMDS_100D	TMDS	TMDS_DATA_F_N<5..0>
(VGA_R_TV_Y)	VGA_50S	VGA	VGA_R
(VGA_G_TV_C)	VGA_50S	VGA	VGA_G
(VGA_B_TV_COMP)	VGA_50S	VGA	VGA_B
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC_R
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC_R
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC
	PP1V8_MEM		PP1V8_S3
	PP1V8_MEM		PP1V8_S3
	GND		GND
	SB_POWER		PP3V3_S5
	SB_POWER		PP3V3_S0
	SB_POWER		PP1V5_S0
WWAN_SIM	WWAN_SIM		WWAN_SIM_CLOCK
WWAN_SIM	WWAN_SIM		WWAN_SIM_DATA

Project Specific Constraints

SYNC_MASTER=(MASTER) 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 COMPUTER INC.

SCALE	SHT	OF	REV.
NONE	87	88	A.0.0

M75 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				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	=55_OHM_SE	=55_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	0.100 MM	0.100 MM			
55_OHM_SE	ISL2, ISL11	Y	0.250 MM	0.076 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	0.125 MM	0.125 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
45_OHM_SE	TOP, BOTTOM	Y	0.150 MM	0.150 MM			
45_OHM_SE	*	Y	0.105 MM	0.105 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	0.185 MM	0.185 MM			
40_OHM_SE	*	Y	0.131 MM	0.131 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
27P4_OHM_SE	TOP, BOTTOM	Y	0.335 MM	0.335 MM			
27P4_OHM_SE	*	Y	0.240 MM	0.240 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	Y	0.149 MM	0.149 MM		0.125 MM	0.125 MM
70_OHM_DIFF	ISL9, ISL10	Y	0.149 MM	0.149 MM		0.125 MM	0.125 MM
70_OHM_DIFF	ISL2, ISL11	Y	0.185 MM	0.185 MM		0.125 MM	0.125 MM
70_OHM_DIFF	TOP, BOTTOM	Y	0.185 MM	0.185 MM		0.125 MM	0.125 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
80_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
80_OHM_DIFF	ISL3, ISL4	Y	0.115 MM	0.115 MM		0.125 MM	0.125 MM
80_OHM_DIFF	ISL9, ISL10	Y	0.115 MM	0.115 MM		0.125 MM	0.125 MM
80_OHM_DIFF	ISL2, ISL11	Y	0.140 MM	0.140 MM		0.125 MM	0.125 MM
80_OHM_DIFF	TOP, BOTTOM	Y	0.140 MM	0.140 MM		0.125 MM	0.125 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
85_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
85_OHM_DIFF	ISL3, ISL4	Y	0.101 MM	0.101 MM		0.125 MM	0.125 MM
85_OHM_DIFF	ISL9, ISL10	Y	0.101 MM	0.101 MM		0.125 MM	0.125 MM
85_OHM_DIFF	ISL2, ISL11	Y	0.125 MM	0.125 MM		0.125 MM	0.125 MM
85_OHM_DIFF	TOP, BOTTOM	Y	0.125 MM	0.125 MM		0.125 MM	0.125 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	Y	0.102 MM	0.102 MM		0.220 MM	0.220 MM
90_OHM_DIFF	ISL9, ISL10	Y	0.102 MM	0.102 MM		0.220 MM	0.220 MM
90_OHM_DIFF	ISL2, ISL11	Y	0.130 MM	0.130 MM		0.220 MM	0.220 MM
90_OHM_DIFF	TOP, BOTTOM	Y	0.130 MM	0.130 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	Y	0.080 MM	0.080 MM		0.200 MM	0.200 MM
100_OHM_DIFF	ISL9, ISL10	Y	0.080 MM	0.080 MM		0.200 MM	0.200 MM
100_OHM_DIFF	ISL2, ISL11	Y	0.099 MM	0.099 MM		0.200 MM	0.200 MM
100_OHM_DIFF	TOP, BOTTOM	Y	0.099 MM	0.099 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
110_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
110_OHM_DIFF	ISL3, ISL4	Y	0.077 MM	0.077 MM		0.330 MM	0.330 MM
110_OHM_DIFF	ISL9, ISL10	Y	0.077 MM	0.077 MM		0.330 MM	0.330 MM
110_OHM_DIFF	ISL2, ISL11	Y	0.089 MM	0.089 MM		0.330 MM	0.330 MM
110_OHM_DIFF	TOP, BOTTOM	Y	0.089 MM	0.089 MM		0.330 MM	0.330 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	?
1.8:1_SPACING	*	0.18 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	?

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
*	*	BGA	BGA_P1MM
MEM_CLK	*	BGA	BGA_P2MM
CLK_FSB	*	BGA	BGA_P2MM
CLK_PCIE	*	BGA	BGA_P2MM
CLK_MED	*	BGA	BGA_P2MM
CLK_SLOW	*	BGA	BGA_P2MM
FSB_DSTB	FSB_DSTB	BGA	BGA_P3MM

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

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_DIFF_BGA	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
100_DIFF_BGA	ISL3, ISL4	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM
100_DIFF_BGA	ISL9, ISL10	Y	0.075 MM	0.075 MM		0.125 MM	0.125 MM

NOTE: 100_DIFF_BGA is 100-ohms differential impedance on outer layers and 95-ohms on inner layers.

PCB Rule Definitions

SYNC_MASTER=(MASTER) 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 COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	88	88	