

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

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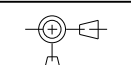
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ALIASES RESOLVED

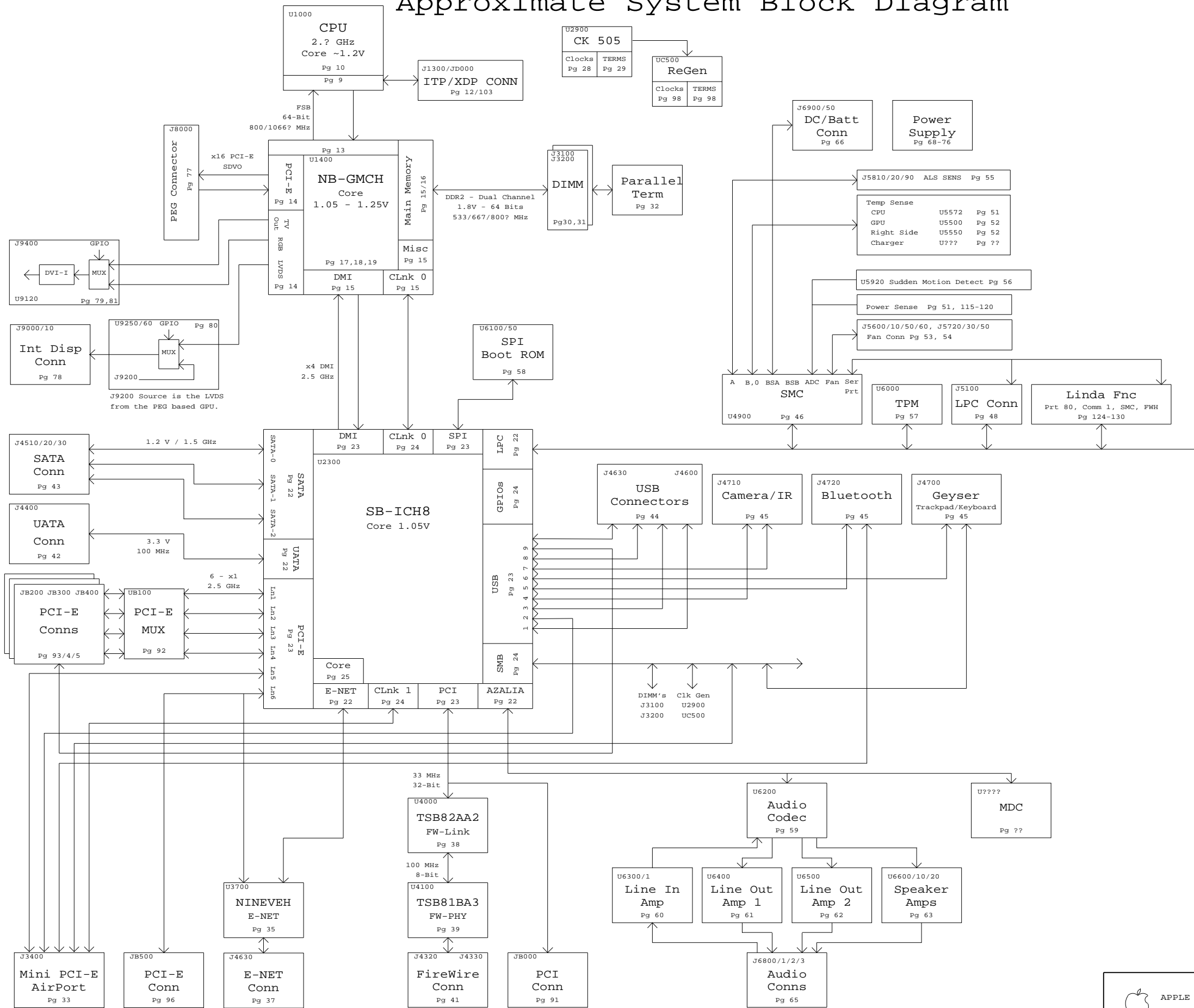
Schematic / PCB #'s

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

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	2	88	

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Power Block Diagram

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

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D	051-7225	A.0.0
SCALE	SHT	OF
NONE	3	88

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Power Block Diagram
 SYNC_MASTER=N/A SYNC_DATE=N/A

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 APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SH# 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

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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	5	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

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Table with columns: DRAWING NUMBER (051-7225), REV. (A.0.0), SCALE (NONE), SHEET (6 OF 88)



APPLE COMPUTER INC.

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 DPRSLPVR	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_PWR0K	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_PWRGOOD_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 DPRSLPVR	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)

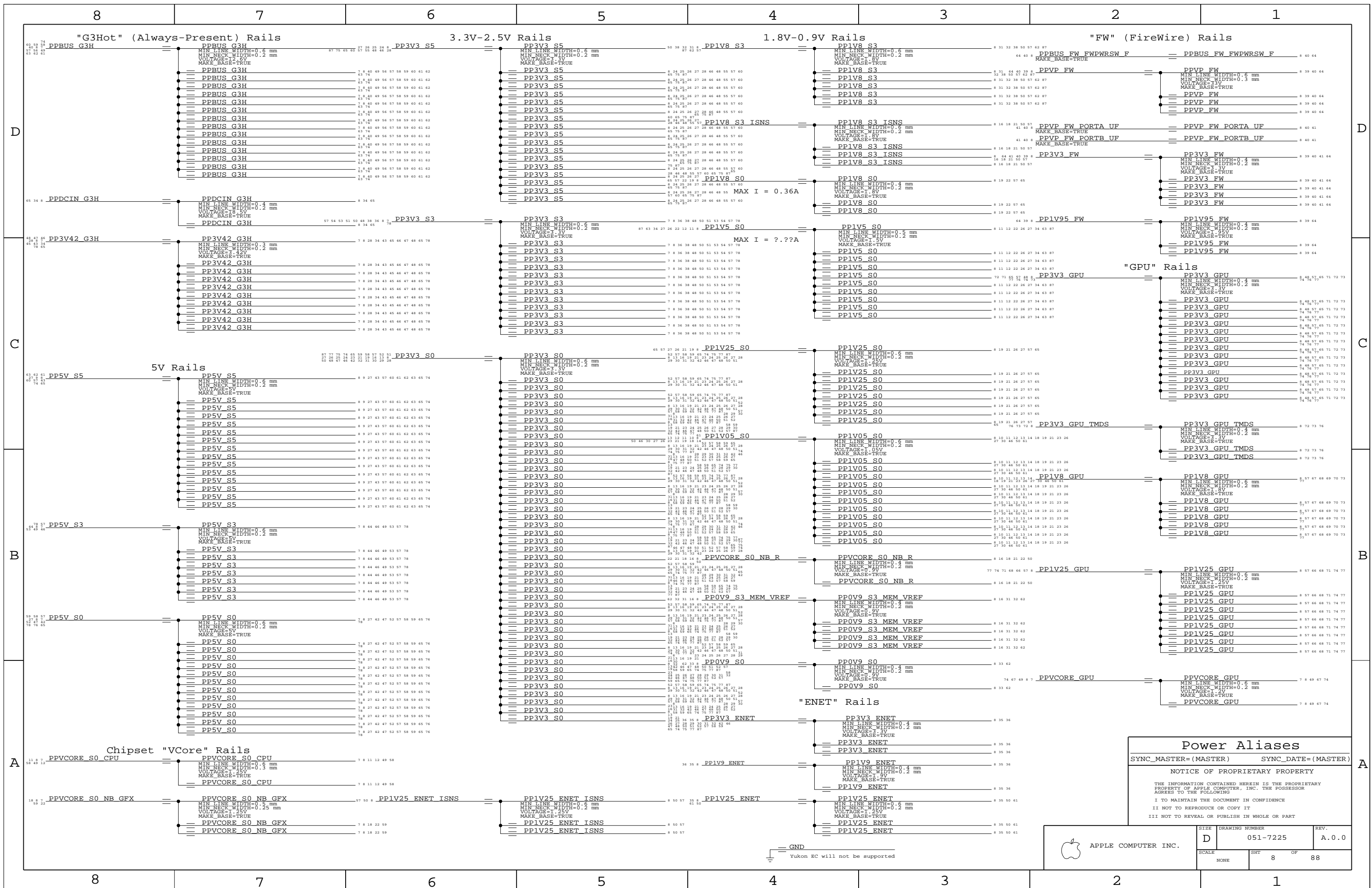
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SCALE	SHT	OF
NONE	7	88



Power Aliases

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

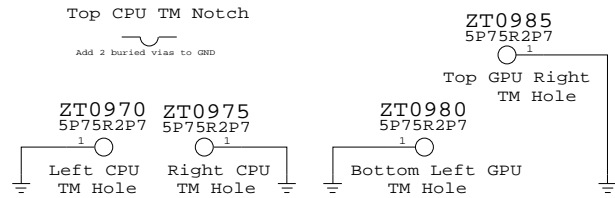
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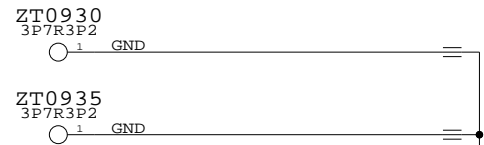
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NONE	8	88	

GND
 Yukon EC will not be supported

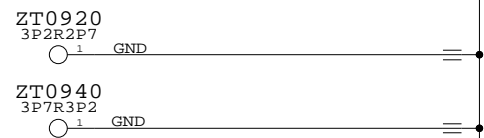
Thermal Module Holes



RAM Door (Torx) Holes

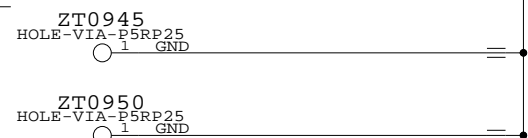


Frame Holes



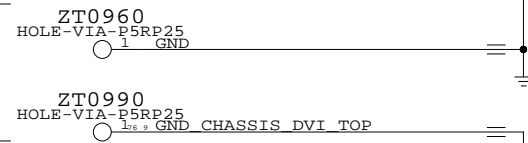
Board Edge Notches

(Can't be PTH)

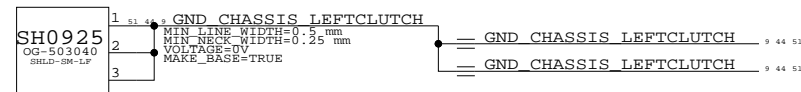
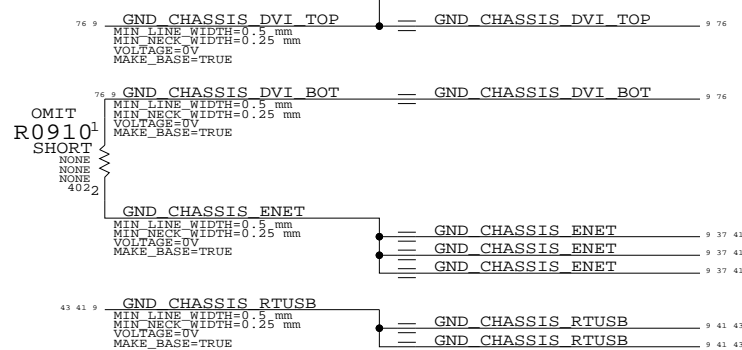


Tooling Holes

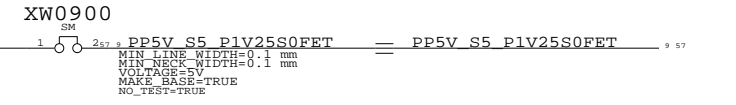
(Can't be PTH)



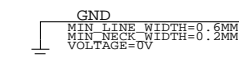
Chassis GNDs



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



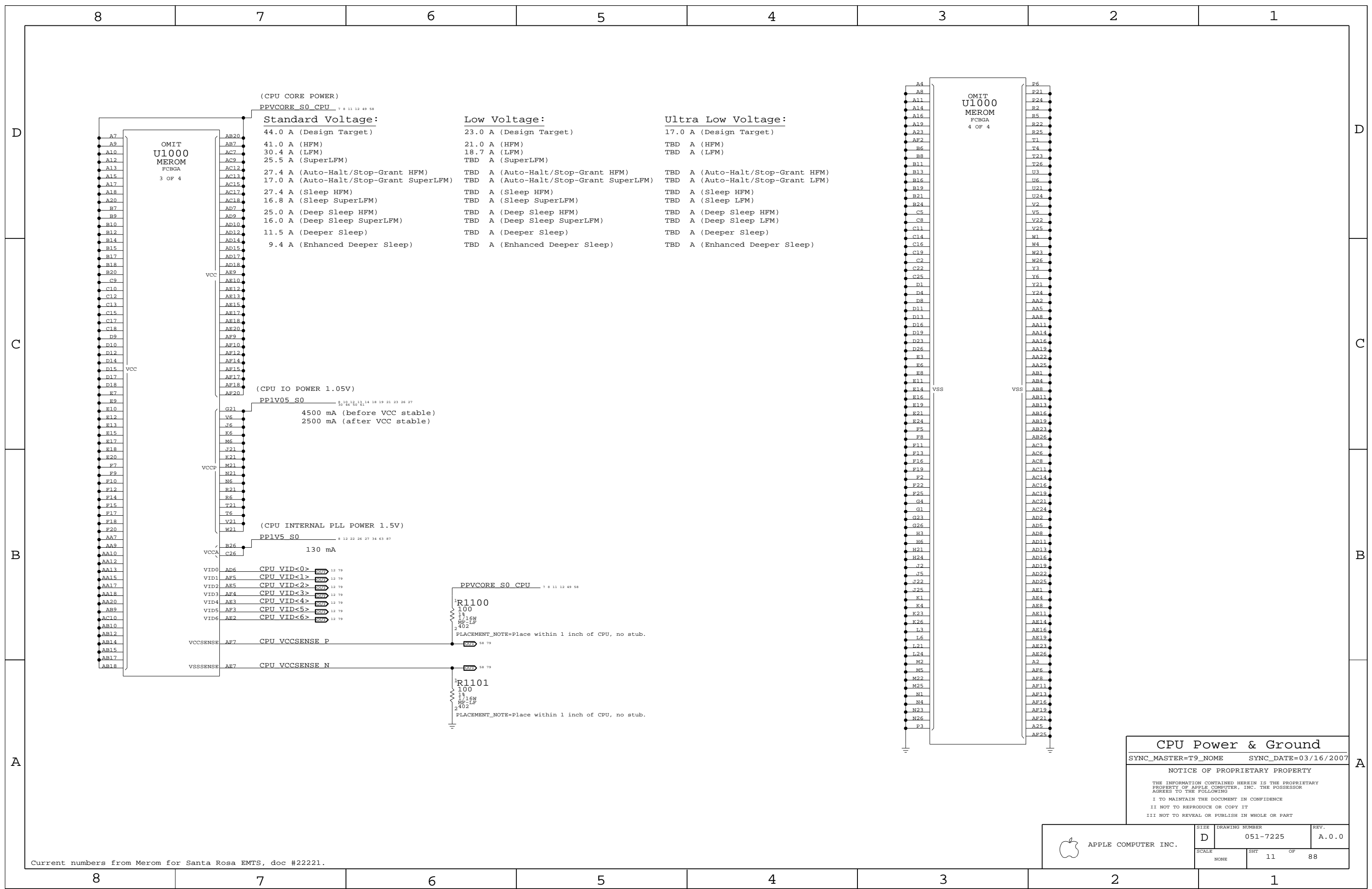
Signal Aliases

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

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SCALE	SHT	OF	
NONE	9	88	



(CPU CORE POWER)
PPVCORE_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)

(CPU IO POWER 1.05V)
PPIV05_S0_5 10 13 14 18 19 21 23 26 27

- 4500 mA (before VCC stable)
- 2500 mA (after VCC stable)

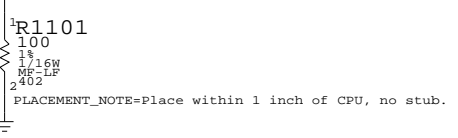
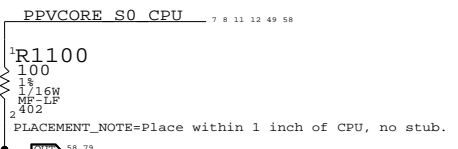
(CPU INTERNAL PLL POWER 1.5V)
PPIV5_S0_8 12 22 26 27 34 63 87

- 130 mA

- VID0 AD6 CPU VID<0>
- VID1 AE5 CPU VID<1>
- VID2 AE5 CPU VID<2>
- VID3 AF4 CPU VID<3>
- VID4 AE3 CPU VID<4>
- VID5 AF3 CPU VID<5>
- VID6 AE2 CPU VID<6>

VCCSENSE AF7 CPU VCCSENSE P

VSSSENSE AE7 CPU VCCSENSE N



CPU Power & Ground

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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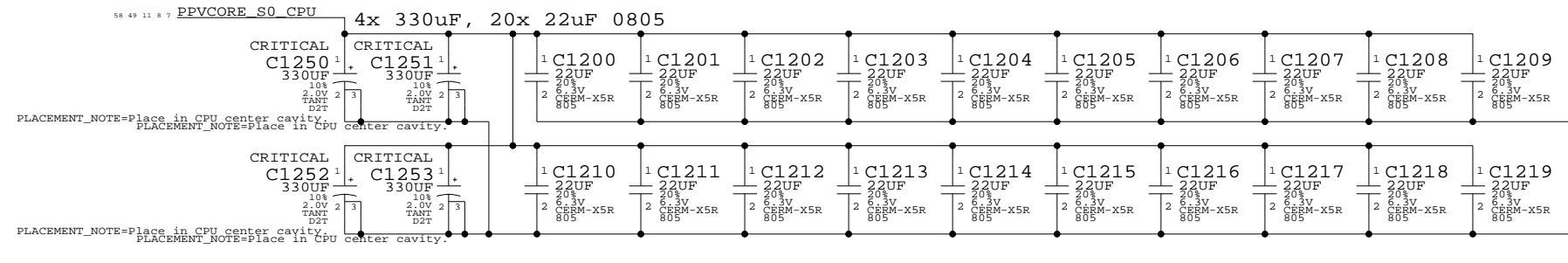
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	SCALE NONE	SHEET 11	OF 88

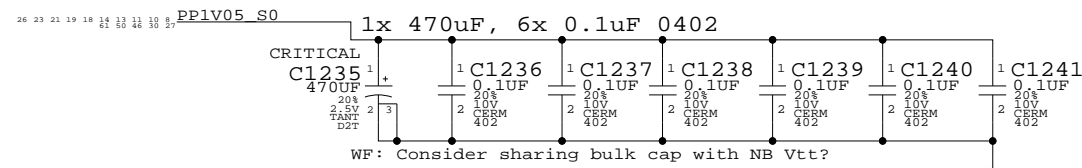
CPU VCORE HF AND BULK DECOUPLING



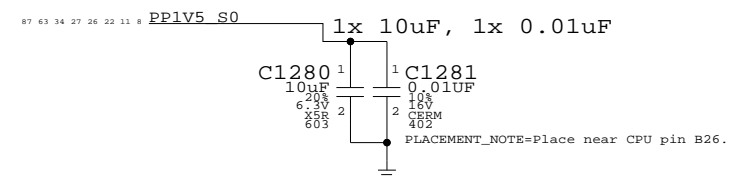
CPU VCORE VID CONNECTIONS

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

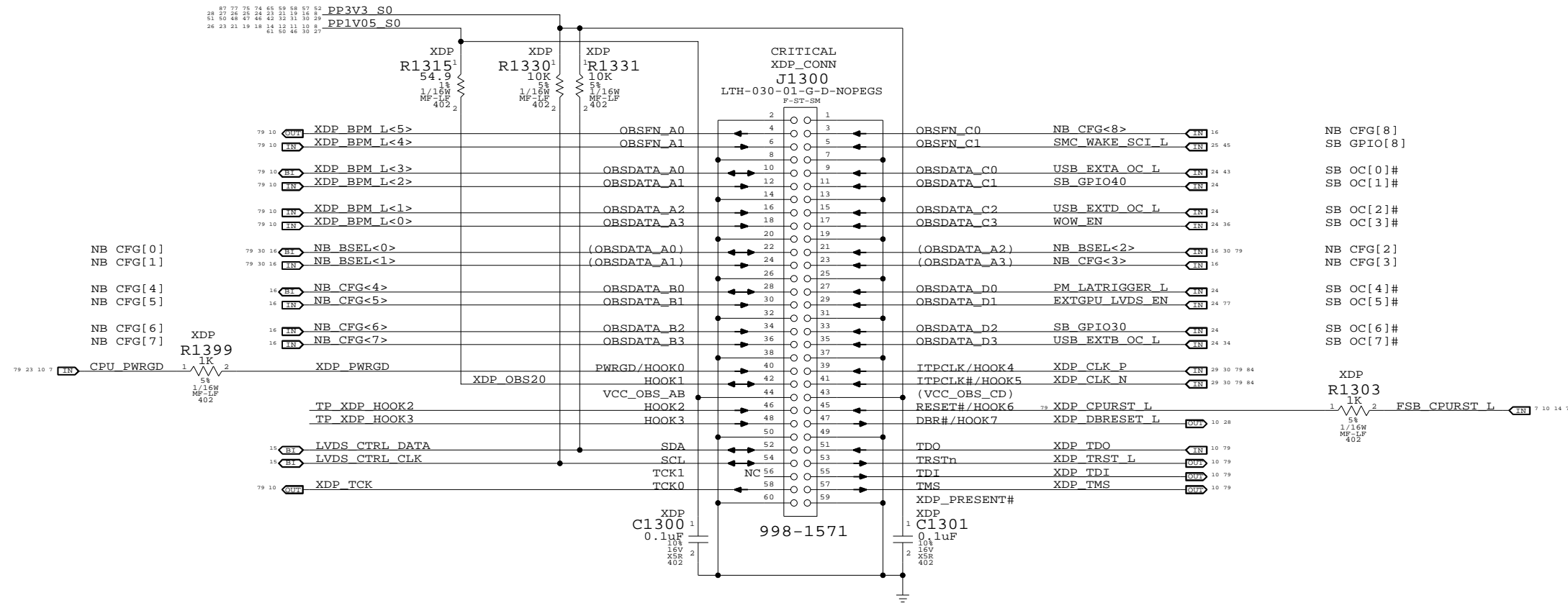
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NONE			

Mini-XDP Connector

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

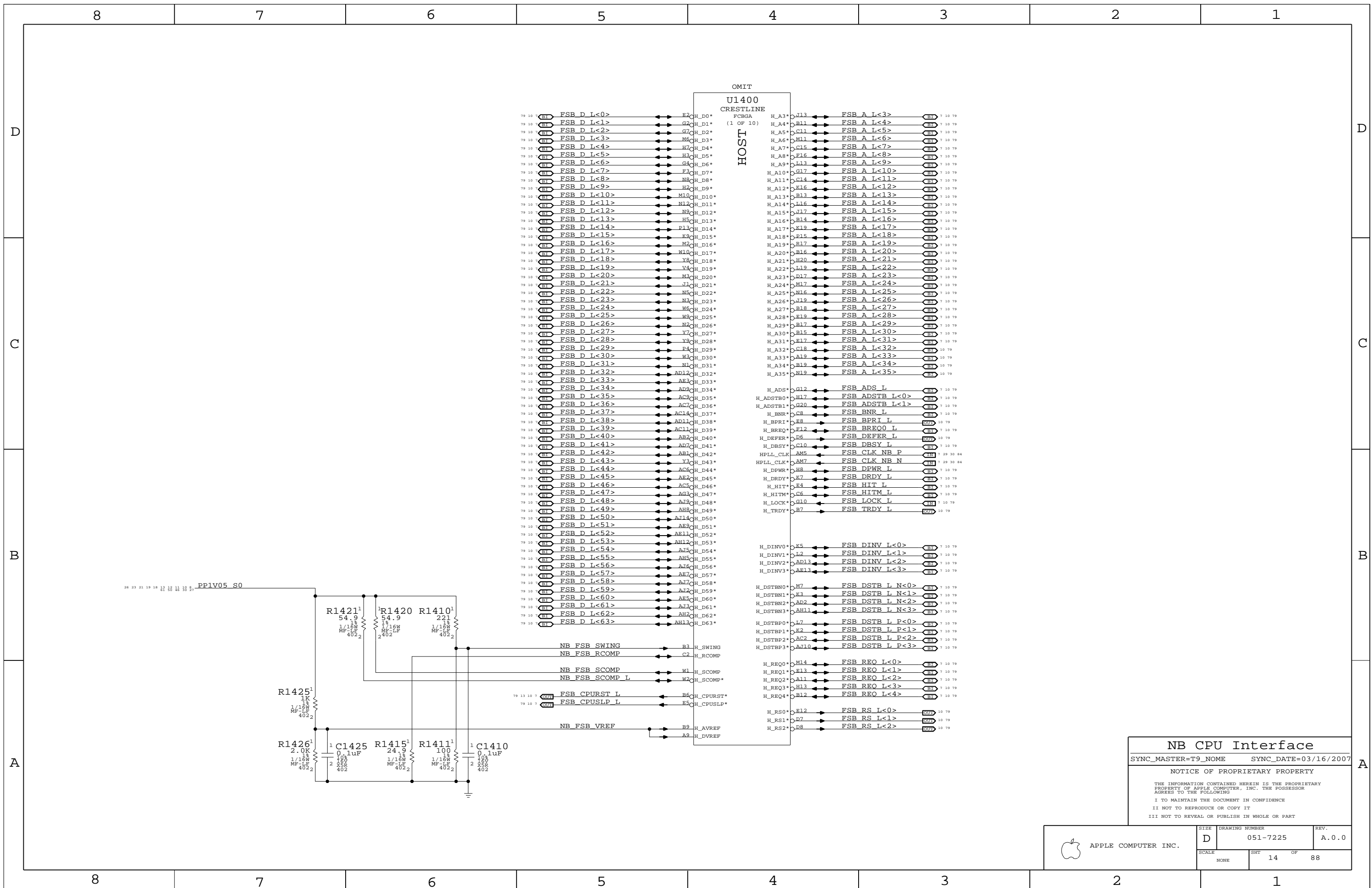


← Direction of XDP module
Please avoid any obstructions
on even-numbered side of J1300

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

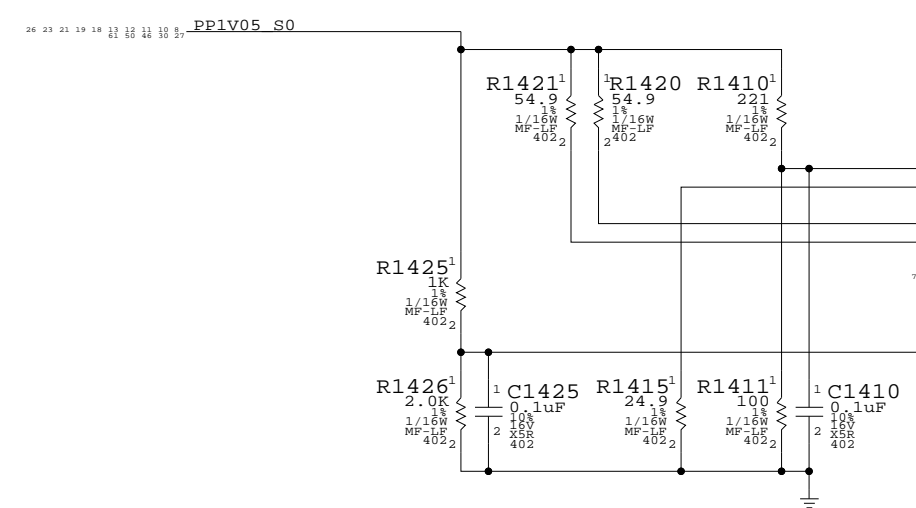
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SCALE	SHT	OF	
NONE	13	88	



OMIT
U1400
CRESTLINE
FCBGA
(1 OF 10)

Host Pin	Host Label	Processor Pin	Processor Label
H_A3*	J13	E2	FSB D L<0>
H_A4*	B11	G2	FSB D L<1>
H_A5*	C11	G7	FSB D L<2>
H_A6*	M11	M6	FSB D L<3>
H_A7*	C15	H7	FSB D L<4>
H_A8*	F16	H3	FSB D L<5>
H_A9*	L13	G4	FSB D L<6>
H_A10*	G17	F3	FSB D L<7>
H_A11*	C14	N8	FSB D L<8>
H_A12*	K16	H8	FSB D L<9>
H_A13*	B13	M10	FSB D L<10>
H_A14*	L16	N12	FSB D L<11>
H_A15*	J17	N9	FSB D L<12>
H_A16*	B14	H5	FSB D L<13>
H_A17*	K19	P13	FSB D L<14>
H_A18*	P15	K9	FSB D L<15>
H_A19*	R17	M2	FSB D L<16>
H_A20*	B16	M10	FSB D L<17>
H_A21*	H20	Y8	FSB D L<18>
H_A22*	L19	V4	FSB D L<19>
H_A23*	D17	M3	FSB D L<20>
H_A24*	M17	J1	FSB D L<21>
H_A25*	N16	N5	FSB D L<22>
H_A26*	J19	N3	FSB D L<23>
H_A27*	B18	M6	FSB D L<24>
H_A28*	E19	M9	FSB D L<25>
H_A29*	B17	N2	FSB D L<26>
H_A30*	B15	Y7	FSB D L<27>
H_A31*	E17	Y9	FSB D L<28>
H_A32*	C18	F4	FSB D L<29>
H_A33*	A19	W3	FSB D L<30>
H_A34*	B19	N1	FSB D L<31>
H_A35*	N19	AD12	FSB D L<32>
		AE3	FSB D L<33>
		AD9	FSB D L<34>
		AC9	FSB D L<35>
		AC7	FSB D L<36>
		AC14	FSB D L<37>
		AD11	FSB D L<38>
		AC11	FSB D L<39>
		AE8	FSB D L<40>
		AD7	FSB D L<41>
		AB1	FSB D L<42>
		Y3	FSB D L<43>
		AC6	FSB D L<44>
		AE2	FSB D L<45>
		AC5	FSB D L<46>
		AG3	FSB D L<47>
		AJ9	FSB D L<48>
		AH8	FSB D L<49>
		M14	FSB D L<50>
		AE8	FSB D L<51>
		AE11	FSB D L<52>
		AH12	FSB D L<53>
		AJ5	FSB D L<54>
		AH5	FSB D L<55>
		AJ6	FSB D L<56>
		AE7	FSB D L<57>
		AJ7	FSB D L<58>
		AJ2	FSB D L<59>
		AE5	FSB D L<60>
		AJ3	FSB D L<61>
		AH2	FSB D L<62>
		AH13	FSB D L<63>
		B3	NB FSB SWING
		C2	NB FSB RCOMP
		W1	NB FSB SCOMP
		W2	NB FSB SCOMP L
		B6	FSB CPURST L
		E5	FSB CPUSLP L
		B9	NB FSB VREF
		A9	H_AVREF
			H_DVREF
		H_A3*	FSB A L<3>
		H_A4*	FSB A L<4>
		H_A5*	FSB A L<5>
		H_A6*	FSB A L<6>
		H_A7*	FSB A L<7>
		H_A8*	FSB A L<8>
		H_A9*	FSB A L<9>
		H_A10*	FSB A L<10>
		H_A11*	FSB A L<11>
		H_A12*	FSB A L<12>
		H_A13*	FSB A L<13>
		H_A14*	FSB A L<14>
		H_A15*	FSB A L<15>
		H_A16*	FSB A L<16>
		H_A17*	FSB A L<17>
		H_A18*	FSB A L<18>
		H_A19*	FSB A L<19>
		H_A20*	FSB A L<20>
		H_A21*	FSB A L<21>
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		H_A23*	FSB A L<23>
		H_A24*	FSB A L<24>
		H_A25*	FSB A L<25>
		H_A26*	FSB A L<26>
		H_A27*	FSB A L<27>
		H_A28*	FSB A L<28>
		H_A29*	FSB A L<29>
		H_A30*	FSB A L<30>
		H_A31*	FSB A L<31>
		H_A32*	FSB A L<32>
		H_A33*	FSB A L<33>
		H_A34*	FSB A L<34>
		H_A35*	FSB A L<35>
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		H_ADSTB0*	FSB ADSTB L<0>
		H_ADSTB1*	FSB ADSTB L<1>
		H_BNR*	FSB BNR L
		H_BPRI*	FSB BPRI L
		H_BREQ*	FSB BREQ L
		H_DEFER*	FSB DEFER L
		H_DBSY*	FSB DBSY L
		HPLL_CLK*	FSB CLK NB P
		HPLL_CLK*	FSB CLK NB N
		H_DPWR*	FSB DPWR L
		H_DRDY*	FSB DRDY L
		H_HIT*	FSB HIT L
		H_HITM*	FSB HITM L
		H_LOCK*	FSB LOCK L
		H_TRDY*	FSB TRDY L
		H_DINV0*	FSB DINV L<0>
		H_DINV1*	FSB DINV L<1>
		H_DINV2*	FSB DINV L<2>
		H_DINV3*	FSB DINV L<3>
		H_DSTBN0*	FSB DSTB L N<0>
		H_DSTBN1*	FSB DSTB L N<1>
		H_DSTBN2*	FSB DSTB L N<2>
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		H_DSTBP0*	FSB DSTB L P<0>
		H_DSTBP1*	FSB DSTB L P<1>
		H_DSTBP2*	FSB DSTB L P<2>
		H_DSTBP3*	FSB DSTB L P<3>
		H_REQ0*	FSB REQ L<0>
		H_REQ1*	FSB REQ L<1>
		H_REQ2*	FSB REQ L<2>
		H_REQ3*	FSB REQ L<3>
		H_REQ4*	FSB REQ L<4>
		H_RS0*	FSB RS L<0>
		H_RS1*	FSB RS L<1>
		H_RS2*	FSB RS L<2>



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

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	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	14	OF	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

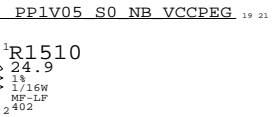
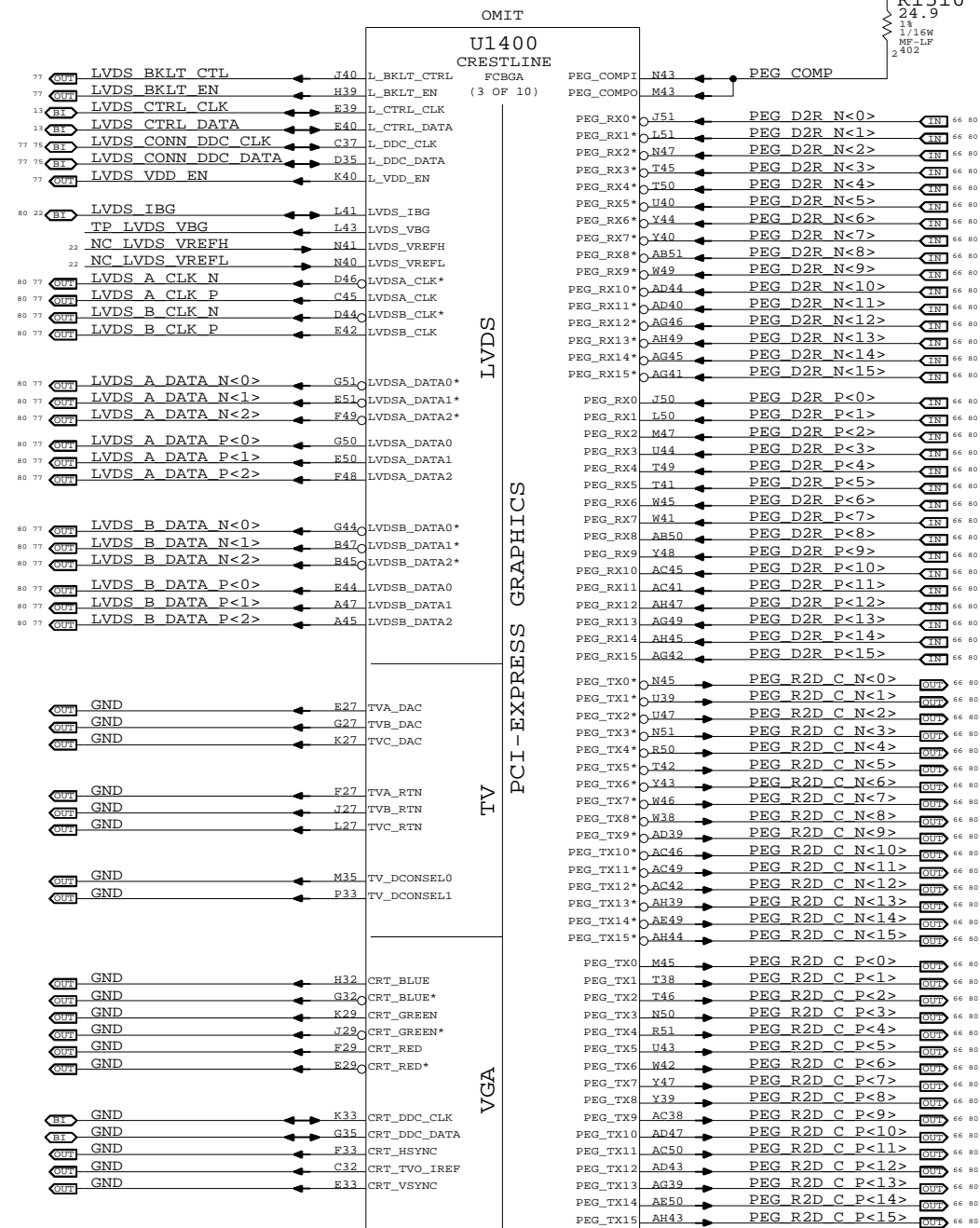
Tie TVx_DAC, TVx_RTN, R/R#/G/G#/B/B#, HSYNC, VSYNC and CRT_TVO_IREF to GND. Can tie the following rails to GND: VCCA_CRT_DAC, VCCA_DAC_BG, VCCA_TVx_DAC, VCCD_CRT, VCCD_QDAC and VCC_SYNC.

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

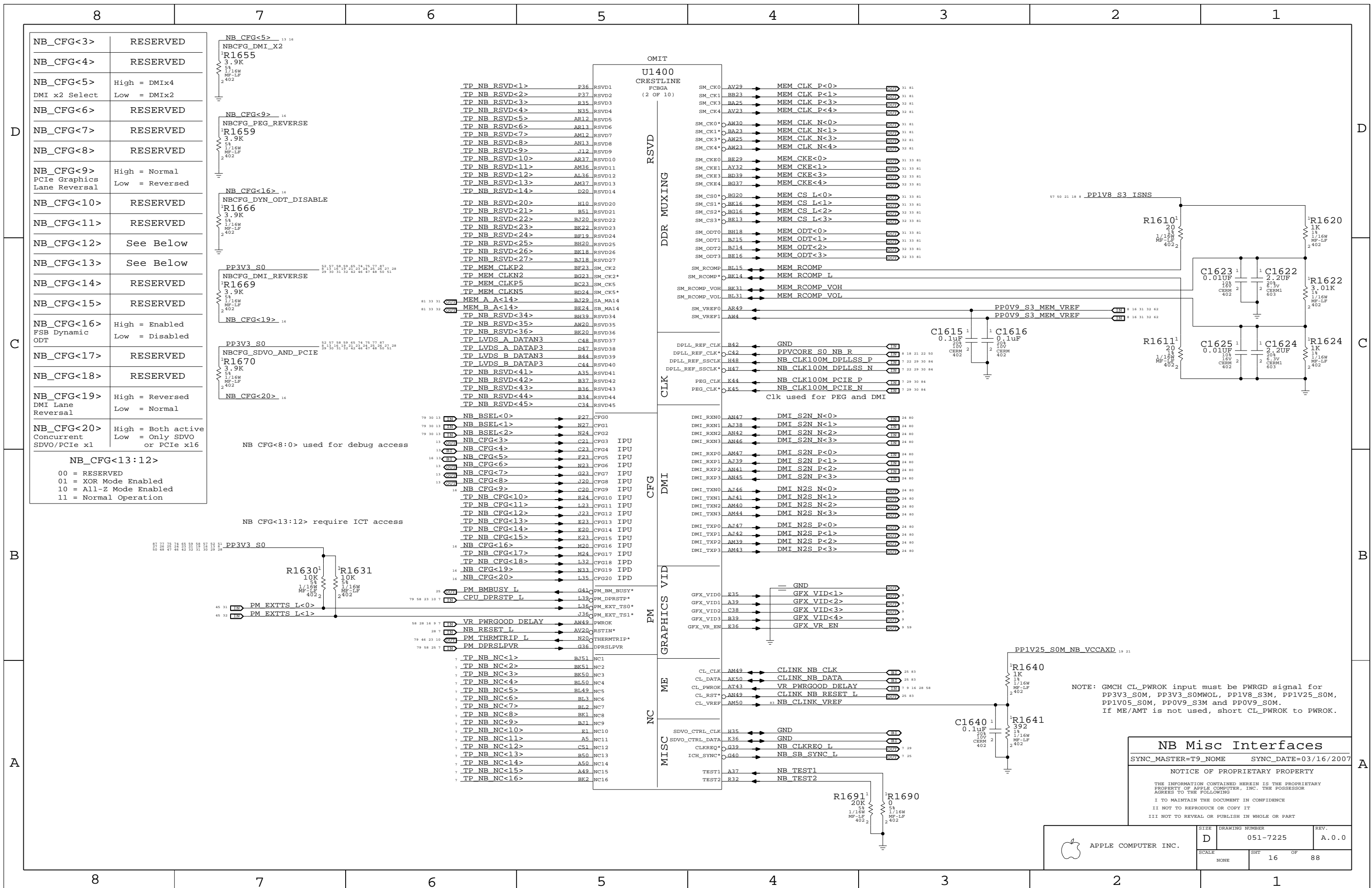
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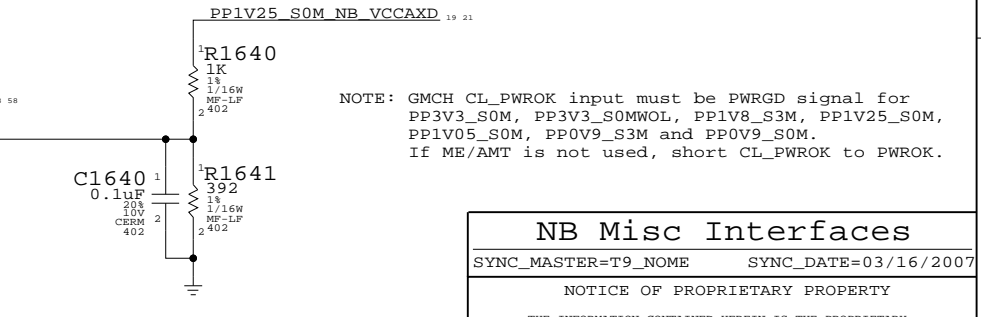
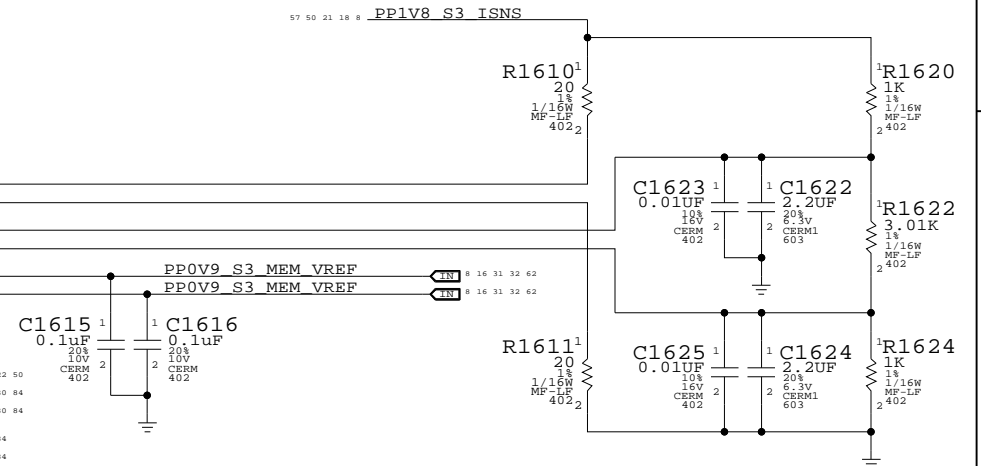
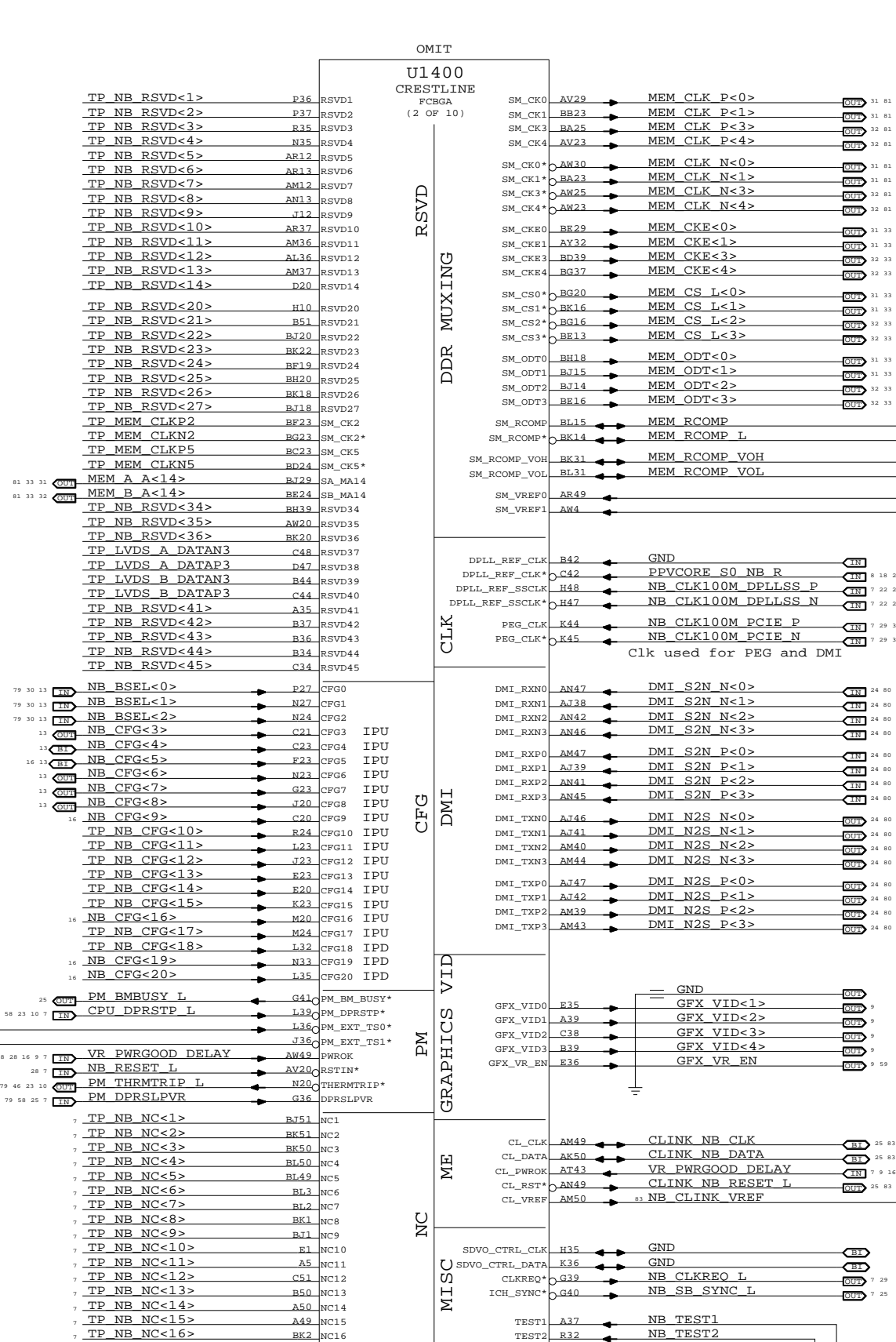
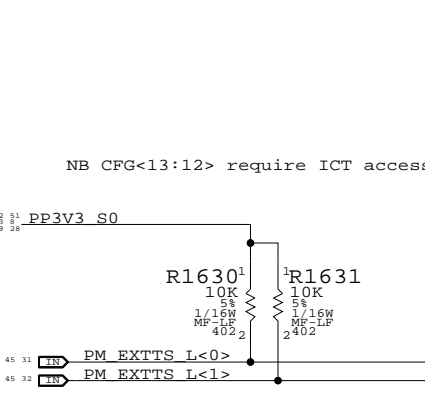
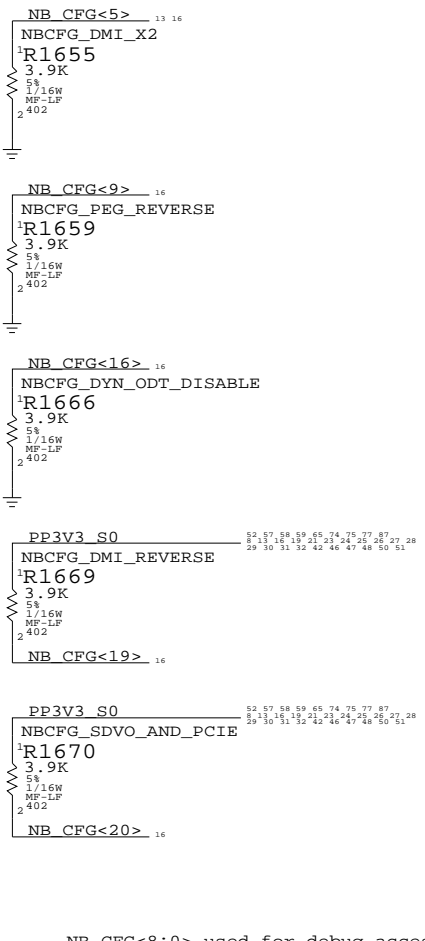
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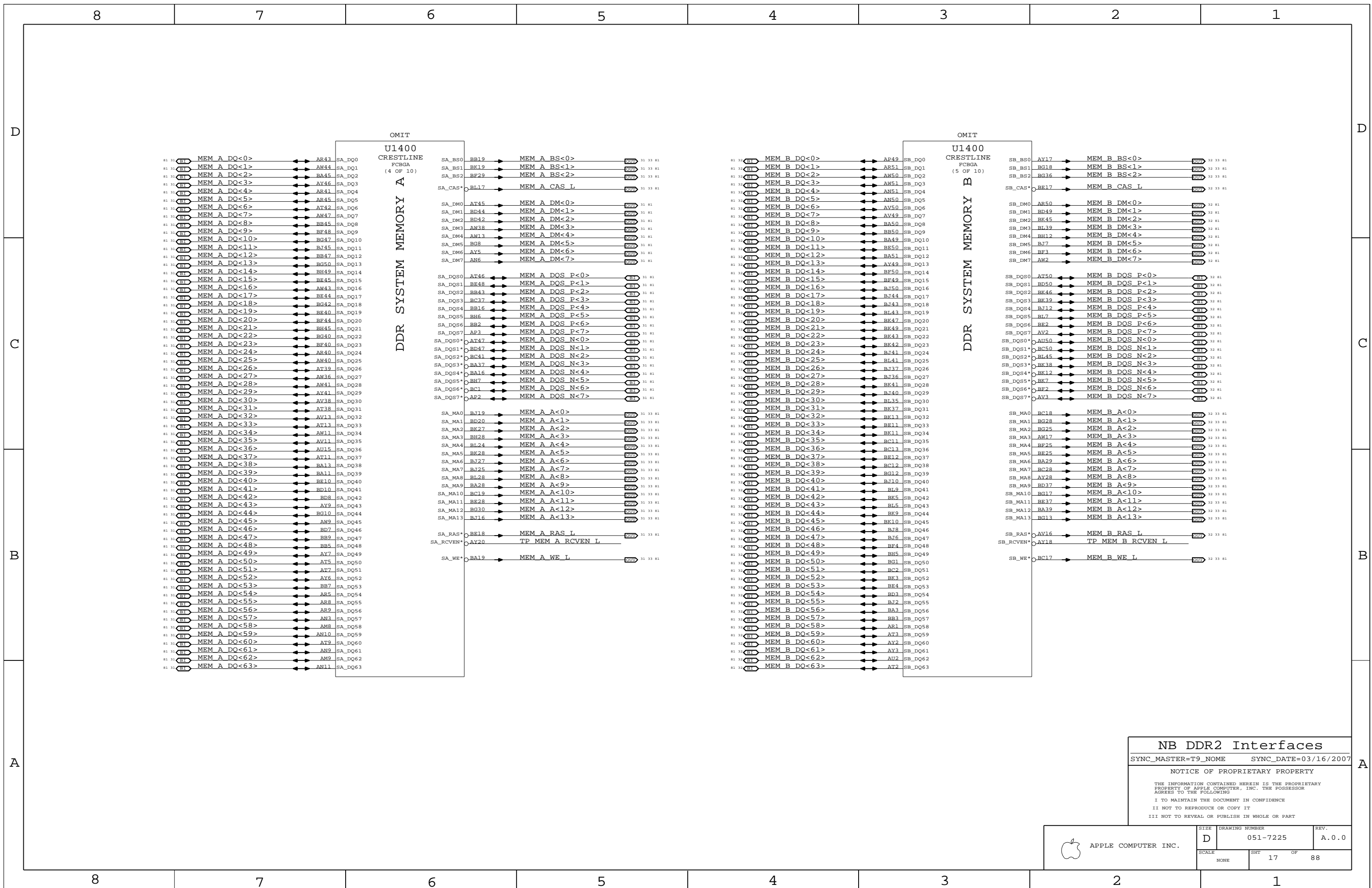
NB_CFG<3>	RESERVED
NB_CFG<4>	RESERVED
NB_CFG<5>	High = DMIx4 Low = DMIx2
NB_CFG<6>	RESERVED
NB_CFG<7>	RESERVED
NB_CFG<8>	RESERVED
NB_CFG<9>	High = Normal PCIe Graphics Lane Reversal Low = Reversed
NB_CFG<10>	RESERVED
NB_CFG<11>	RESERVED
NB_CFG<12>	See Below
NB_CFG<13>	See Below
NB_CFG<14>	RESERVED
NB_CFG<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



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

APPLE COMPUTER INC.



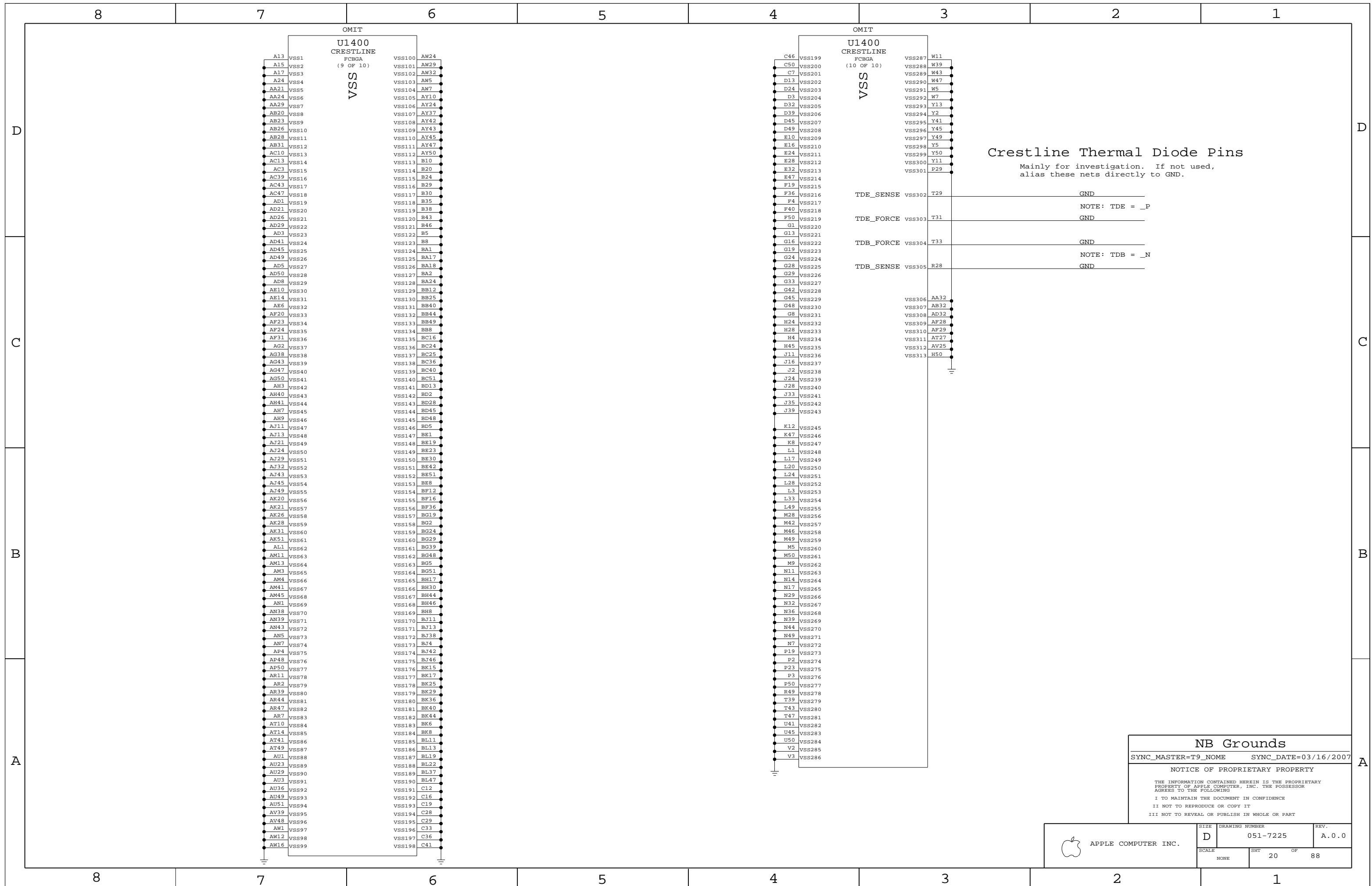
NB DDR2 Interfaces
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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	SCALE NONE	SHEET 17	OF 88



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

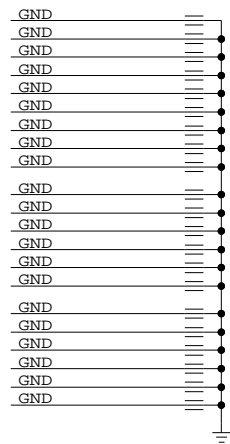
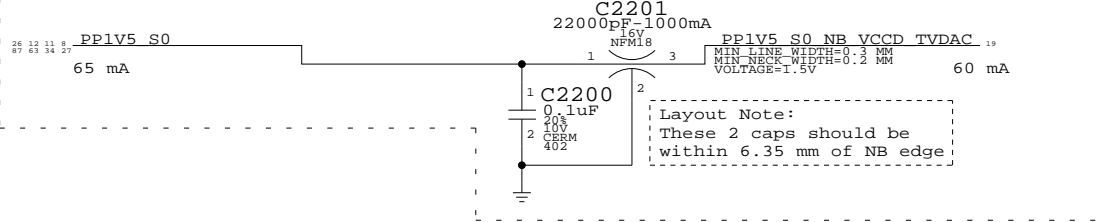
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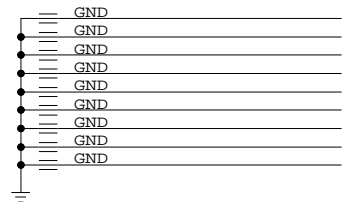
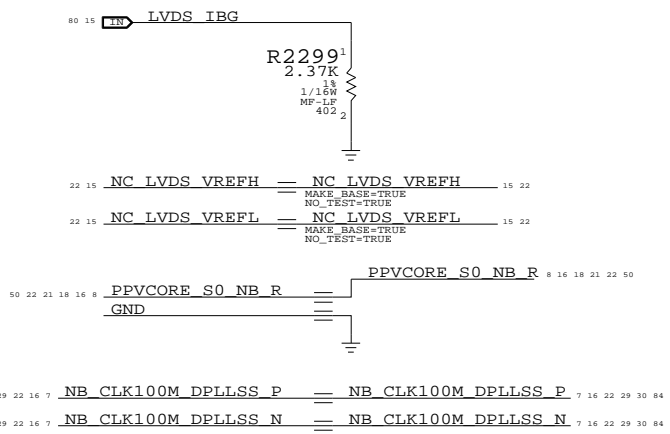
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	SCALE NONE	SHEET 20	OF 88

NOTE: This filter is required even if using only external graphics.
 VCCD_TVDAC also powers internal thermal sensors.

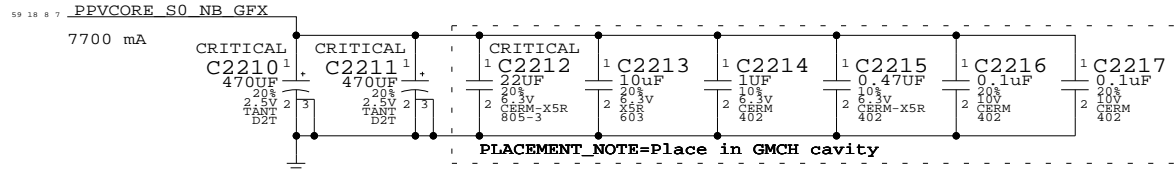


Crestline LVDS Support

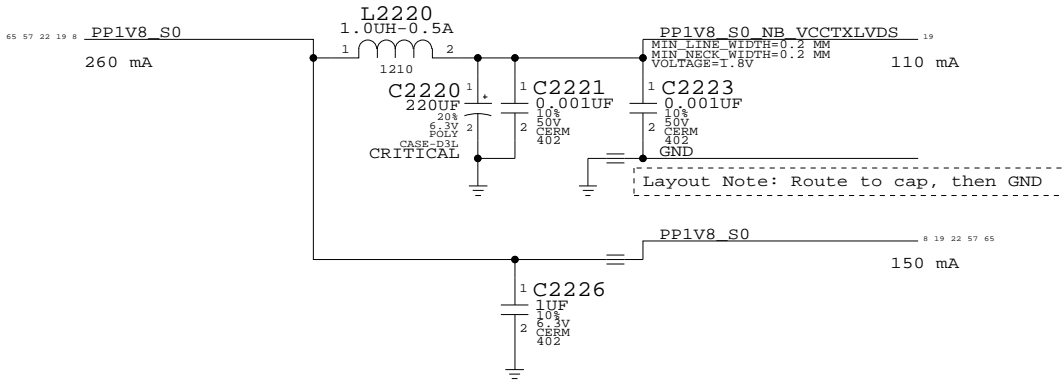


C

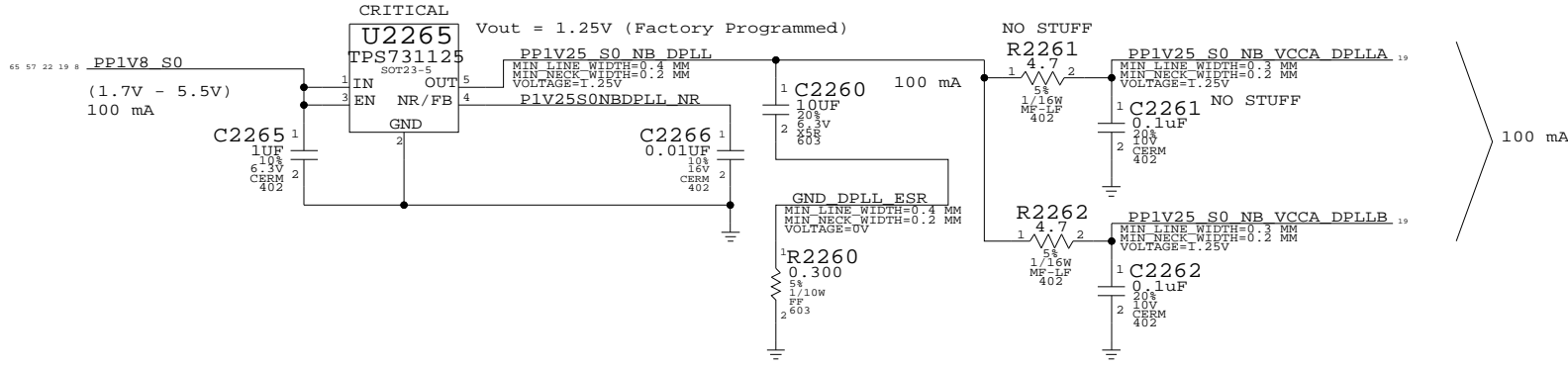
GMCH Graphics Core Power



B



A



NB Graphics Decoupling

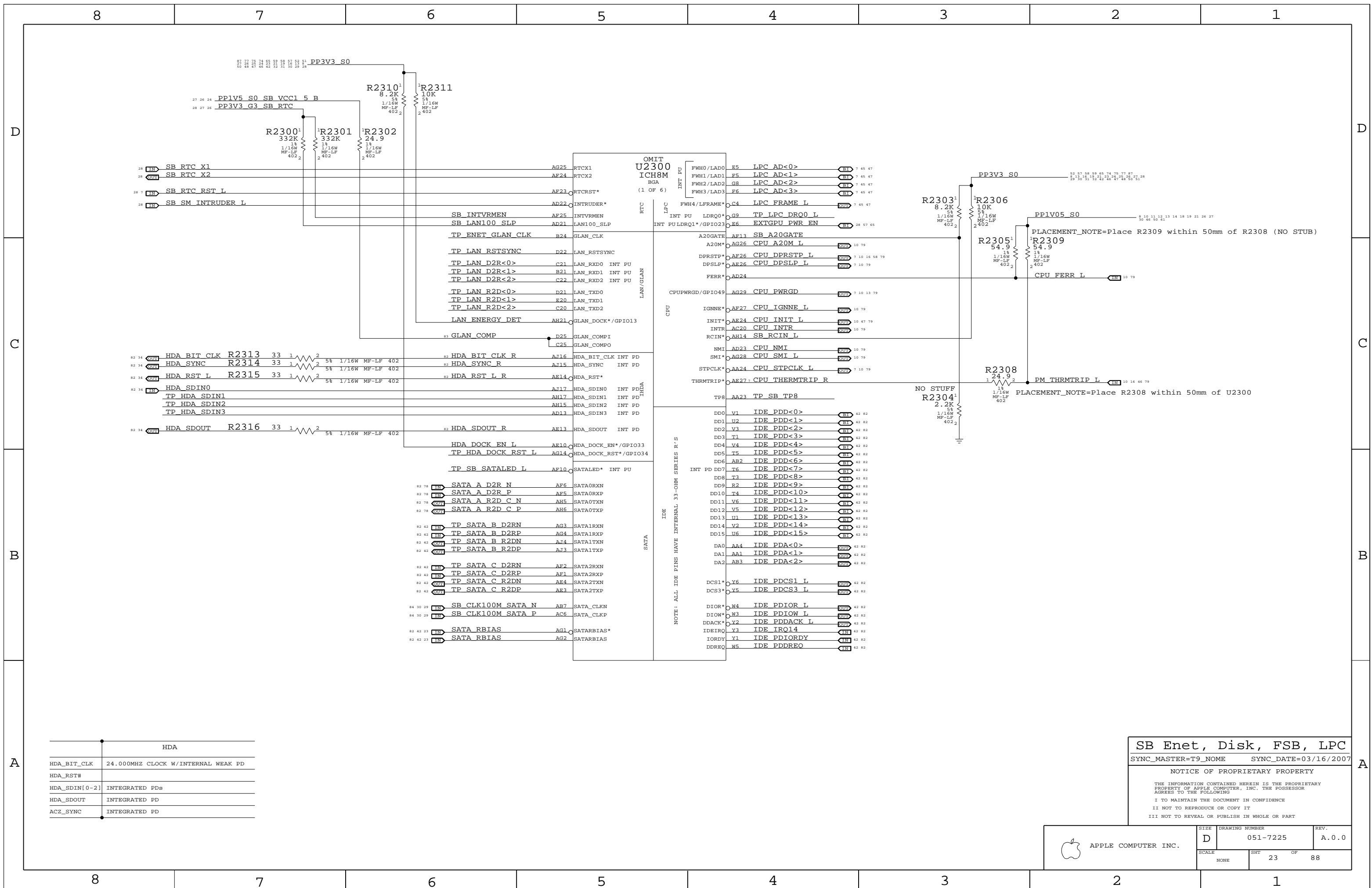
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SCALE	SHT	OF	REV.
NONE	22	88	

Current numbers from Crestline EDS Addendum, doc #20127.

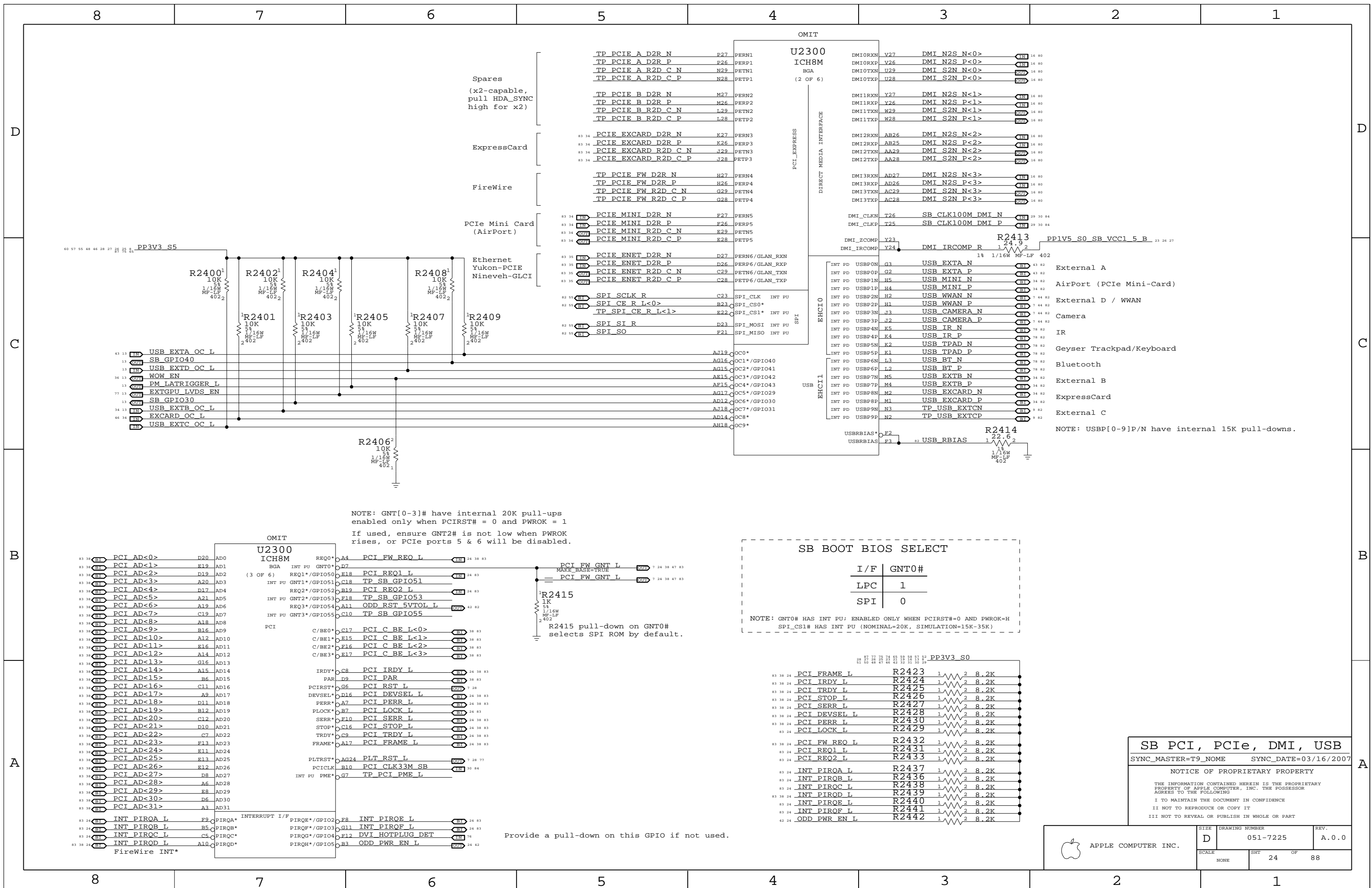


HDA	
HDA_BIT_CLK	24.000MHZ CLOCK W/INTERNAL WEAK PD
HDA_RST#	
HDA_SDIN[0-2]	INTEGRATED PDs
HDA_SDOUT	INTEGRATED PD
ACZ_SYNC	INTEGRATED PD

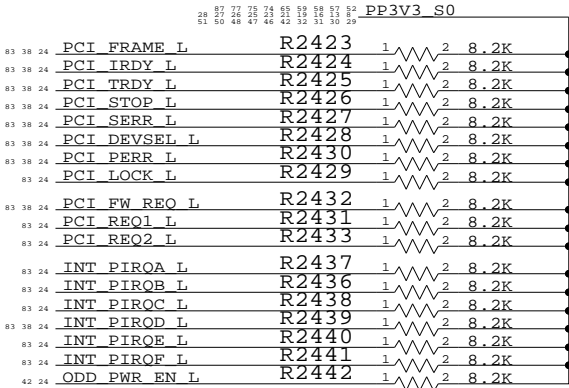
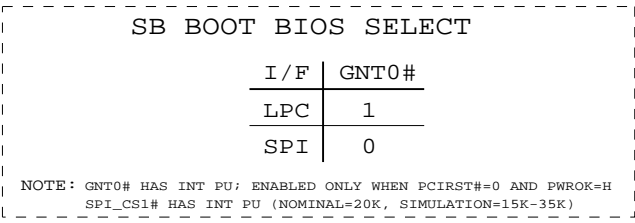
SB Enet, Disk, FSB, LPC
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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SCALE	SHT	OF	REV.
NONE	23	88	

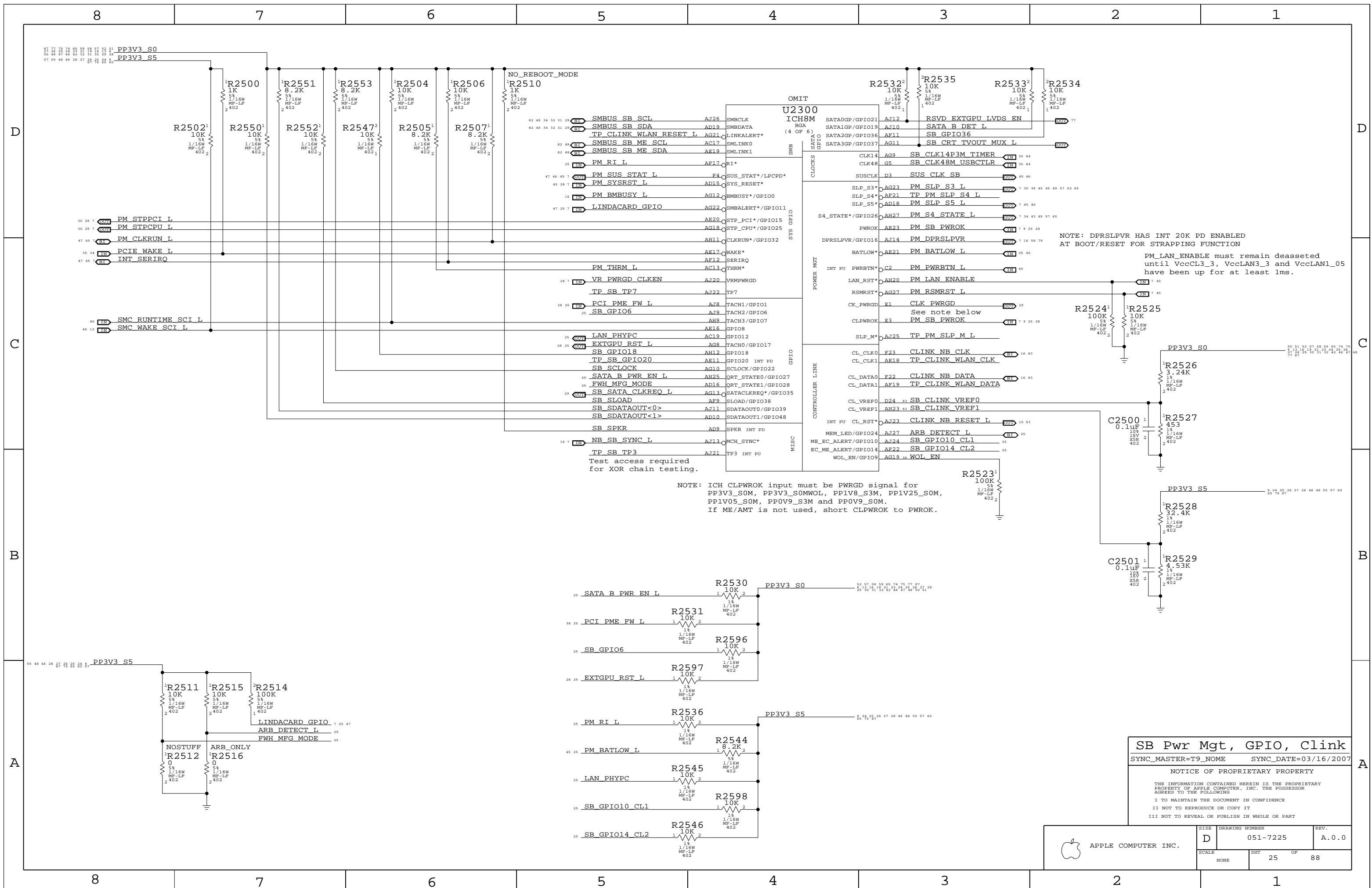


NOTE: GNT[0-3]# have internal 20K pull-ups enabled only when PCIRST# = 0 and PWROK = 1. If used, ensure GNT2# is not low when PWROK rises, or PCIe ports 5 & 6 will be disabled.



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

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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.

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.

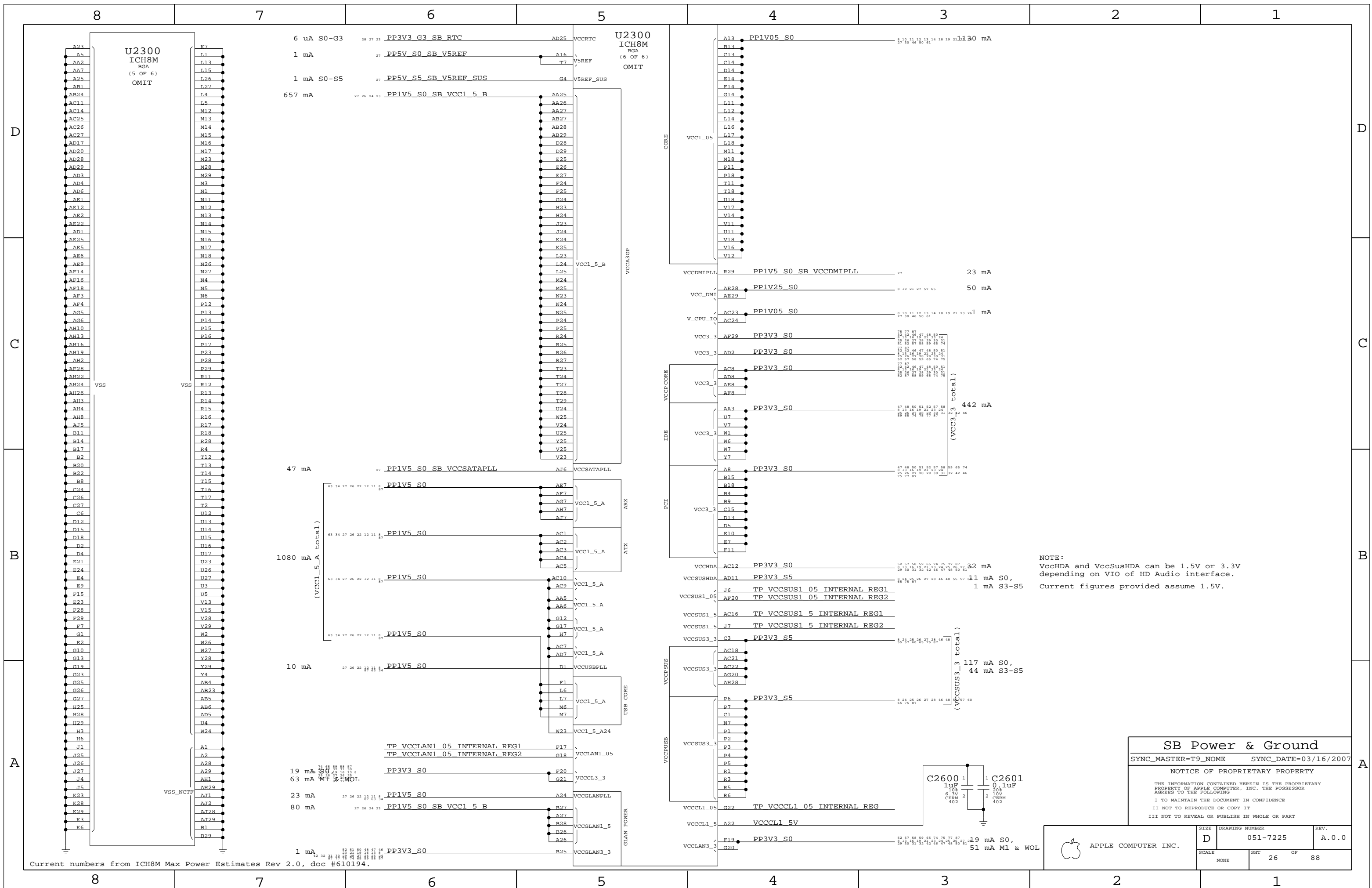
SB Pwr Mgt, GPIO, Clink
 SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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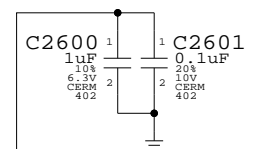
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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	25	88	



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

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



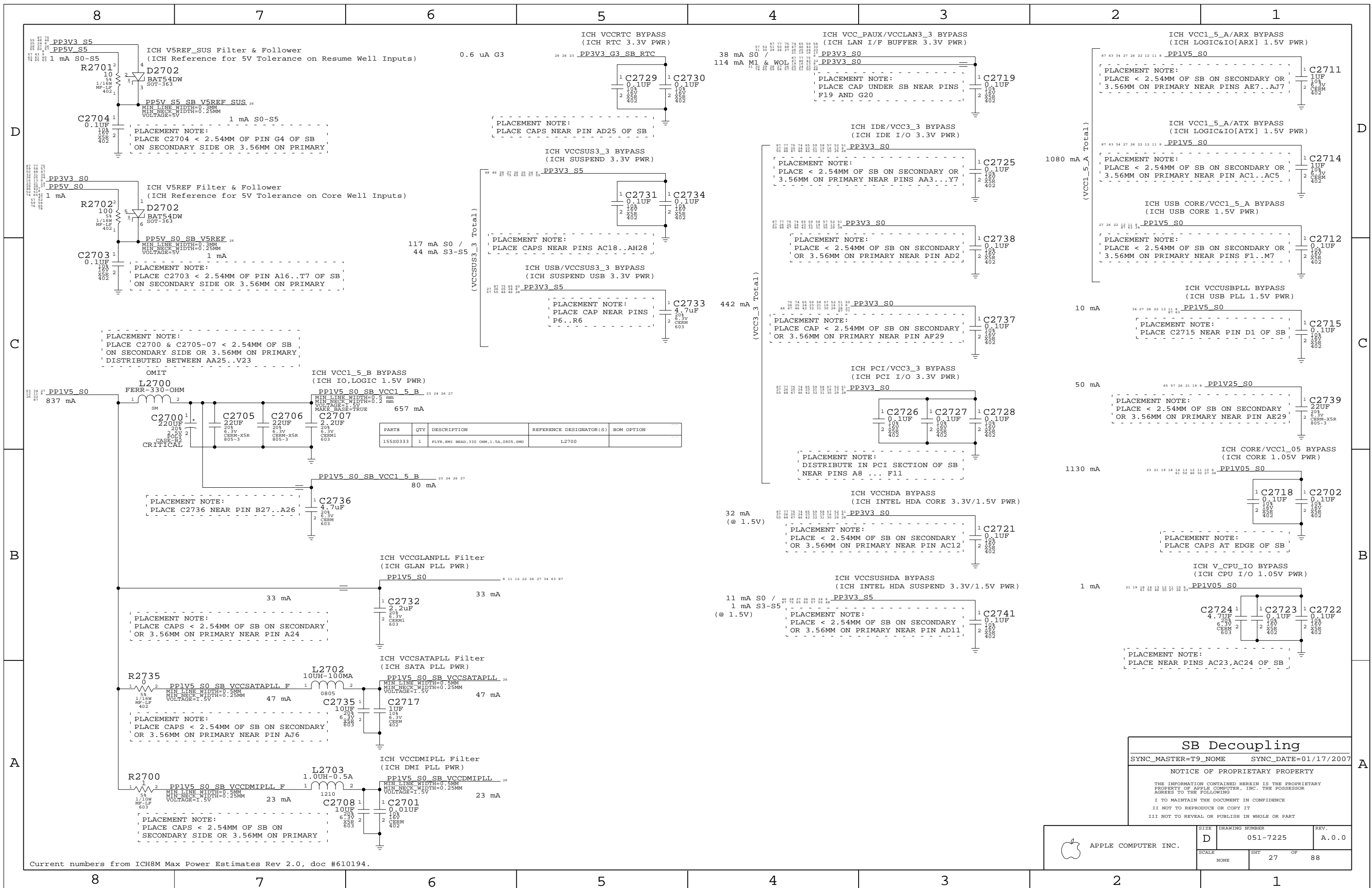
SB Power & Ground

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

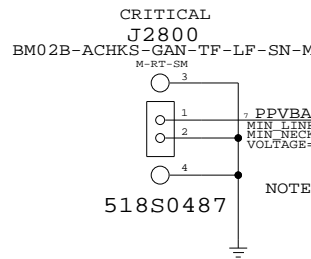
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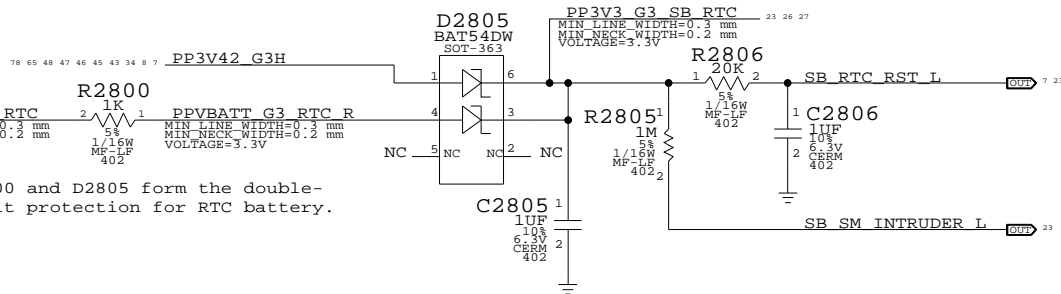
SCALE NONE	SHEET 26	OF 88	SIZE	DRAWING NUMBER	REV.
			D	051-7225	A.0.0
APPLE COMPUTER INC.			SCALE	SHEET	OF
			NONE	26	88



Coin-Cell Connector

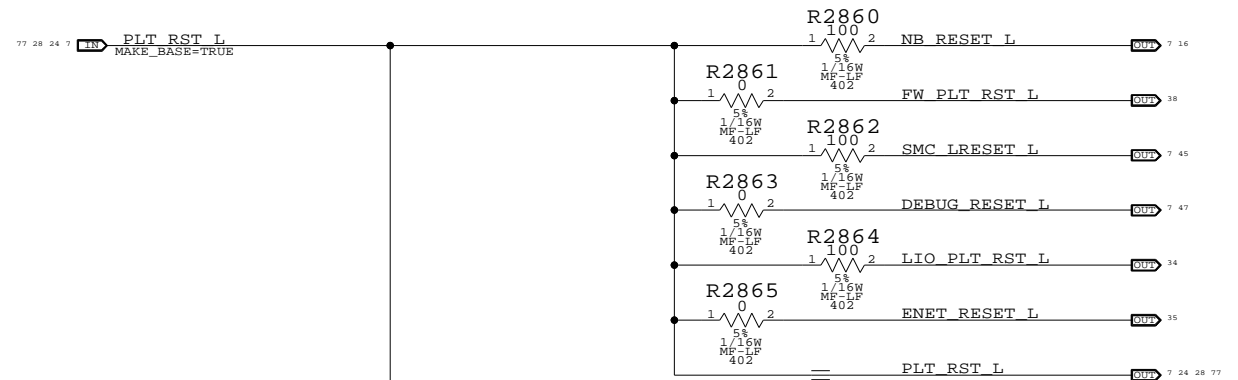


RTC Power Sources

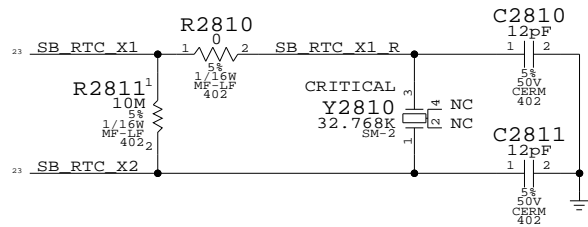


Platform Reset Connections

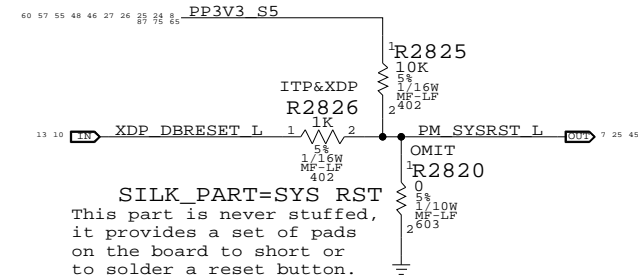
Unbuffered



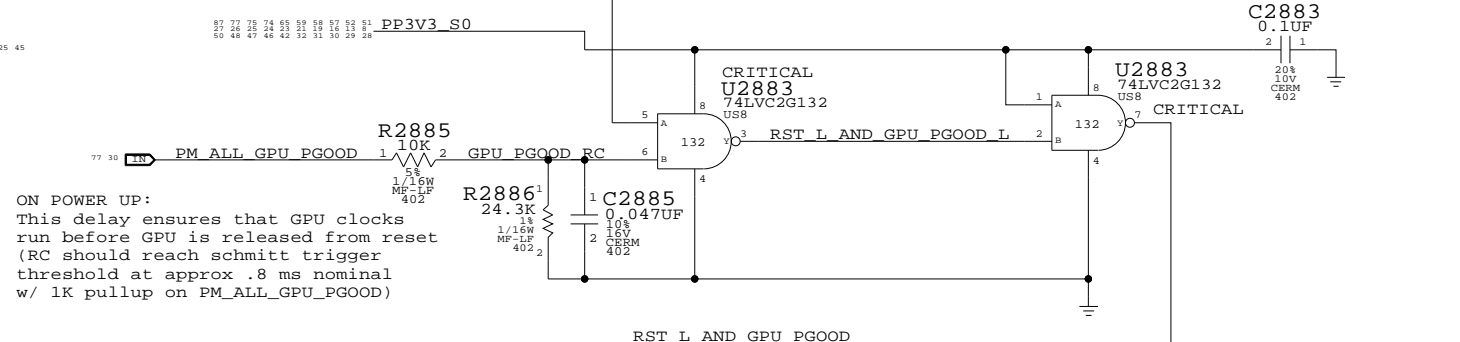
SB RTC Crystal



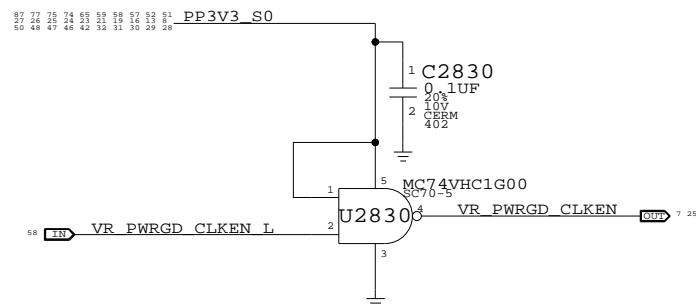
System Reset "Button"



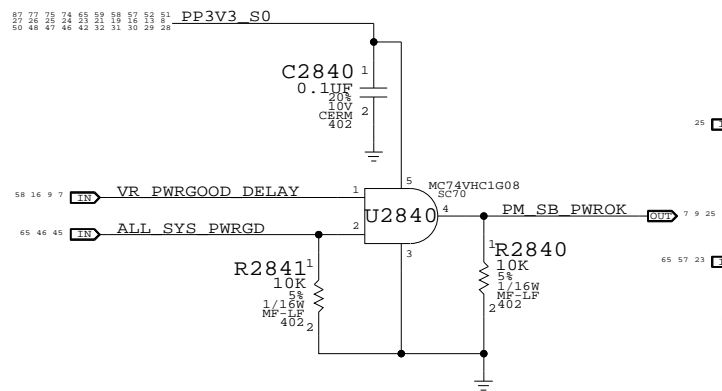
Muxed GFX GPU Reset Support



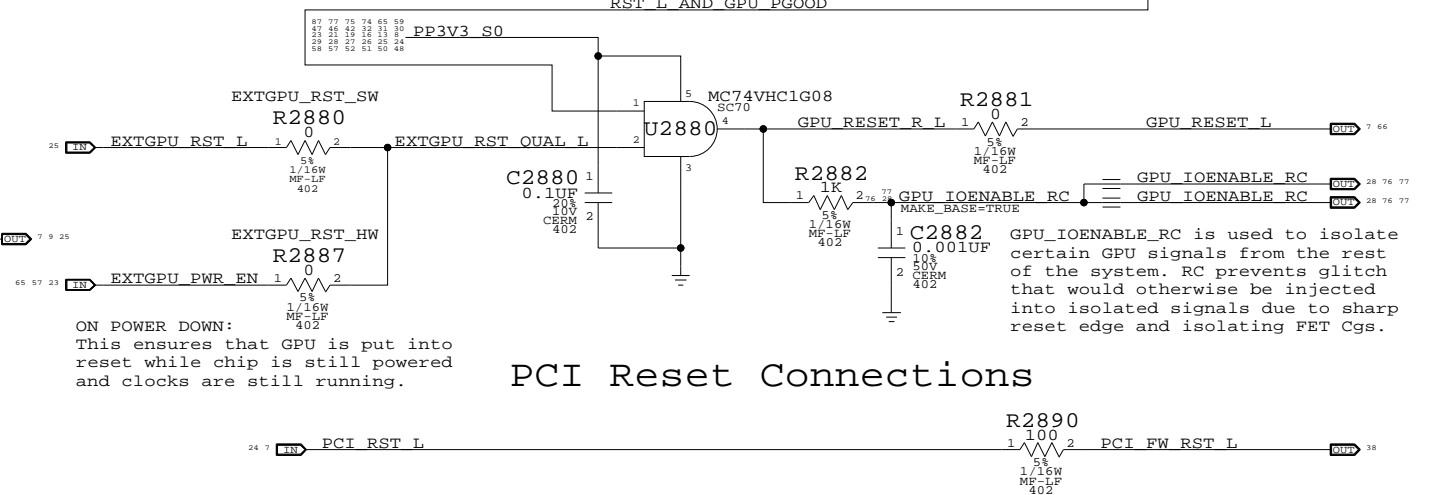
VRMPWRGD Inverter



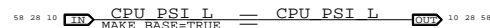
PWROK Circuit



PCI Reset Connections



CPU VCore ForcePSI



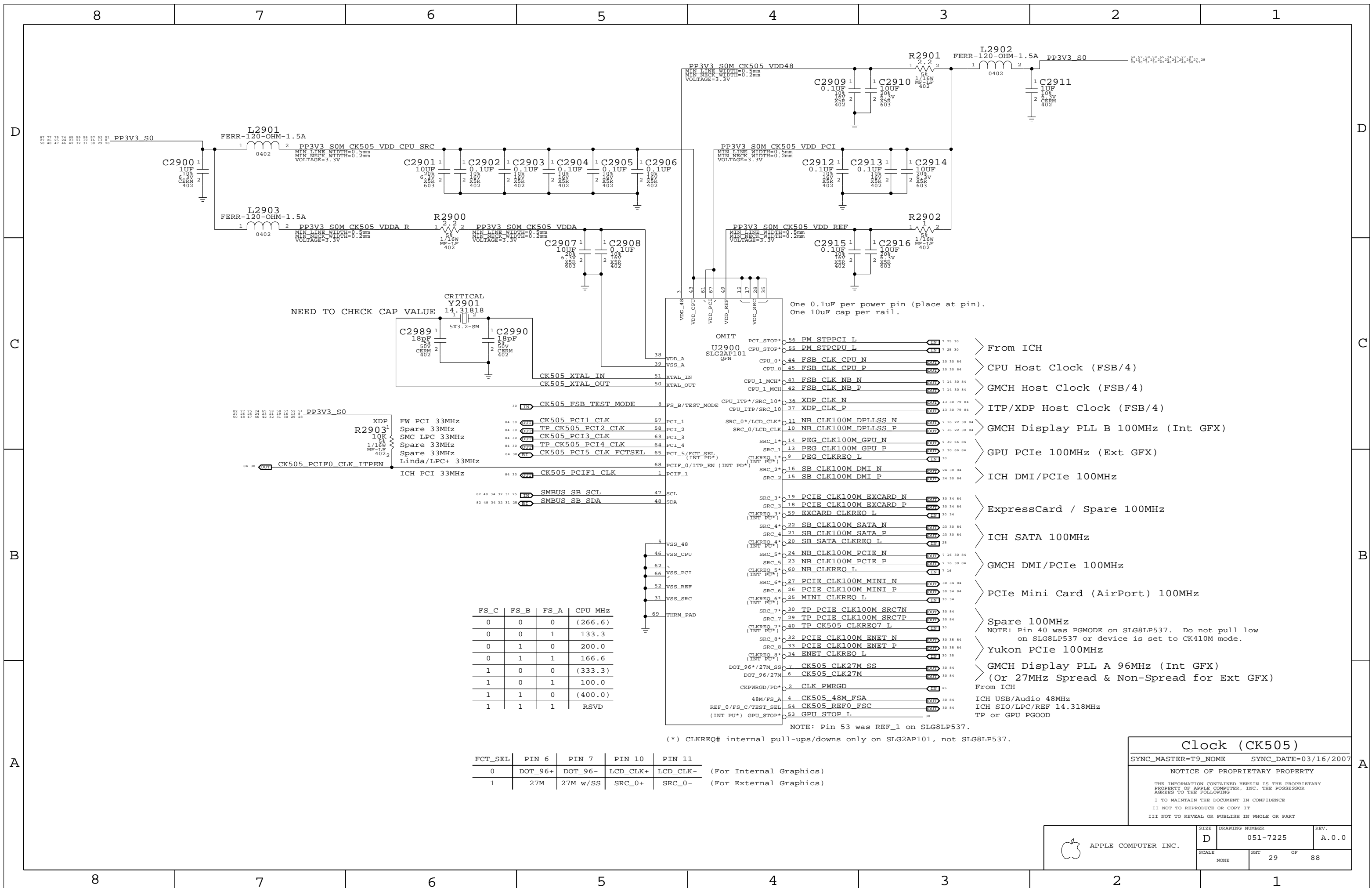
SB Misc

SYNC_MASTER=(T9_MLB) SYNC_DATE=08/24/2006

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SCALE	SHT	OF	
NONE	28	88	



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-
1	27M	27M w/SS	SRC_0+	SRC_0-

(For Internal Graphics)
(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

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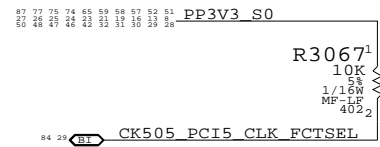
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	29	88	

CLK Termination

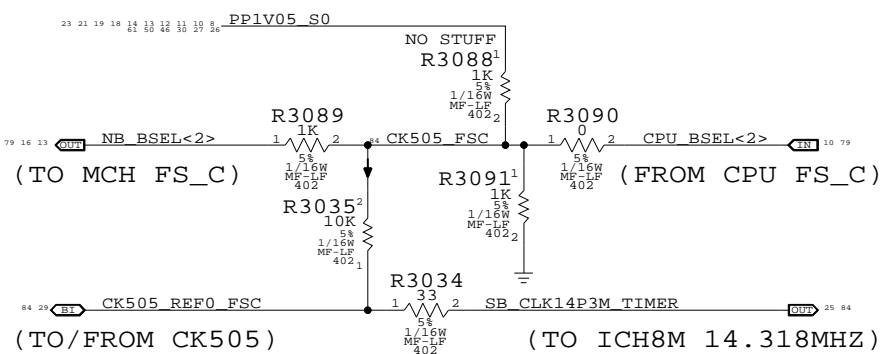
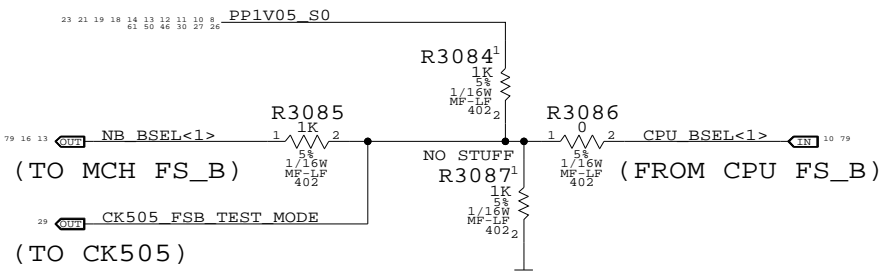
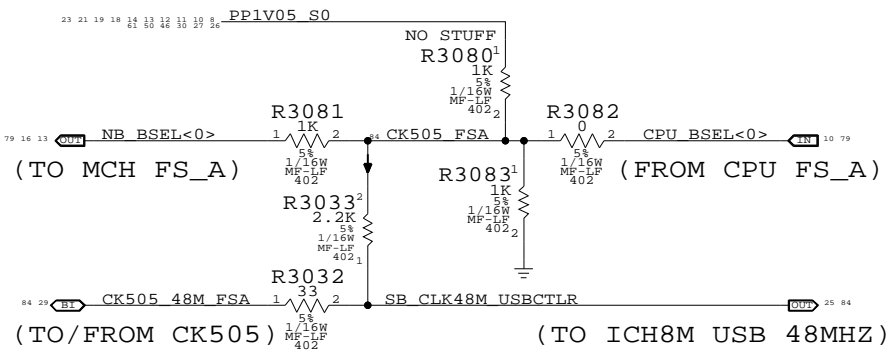
(Note: HOST/SRC/GFX clock termination removed. Silego SL8GLP536 or equiv. support only)

CK505 Configuration Straps

FCT_SEL (GFX clock select)



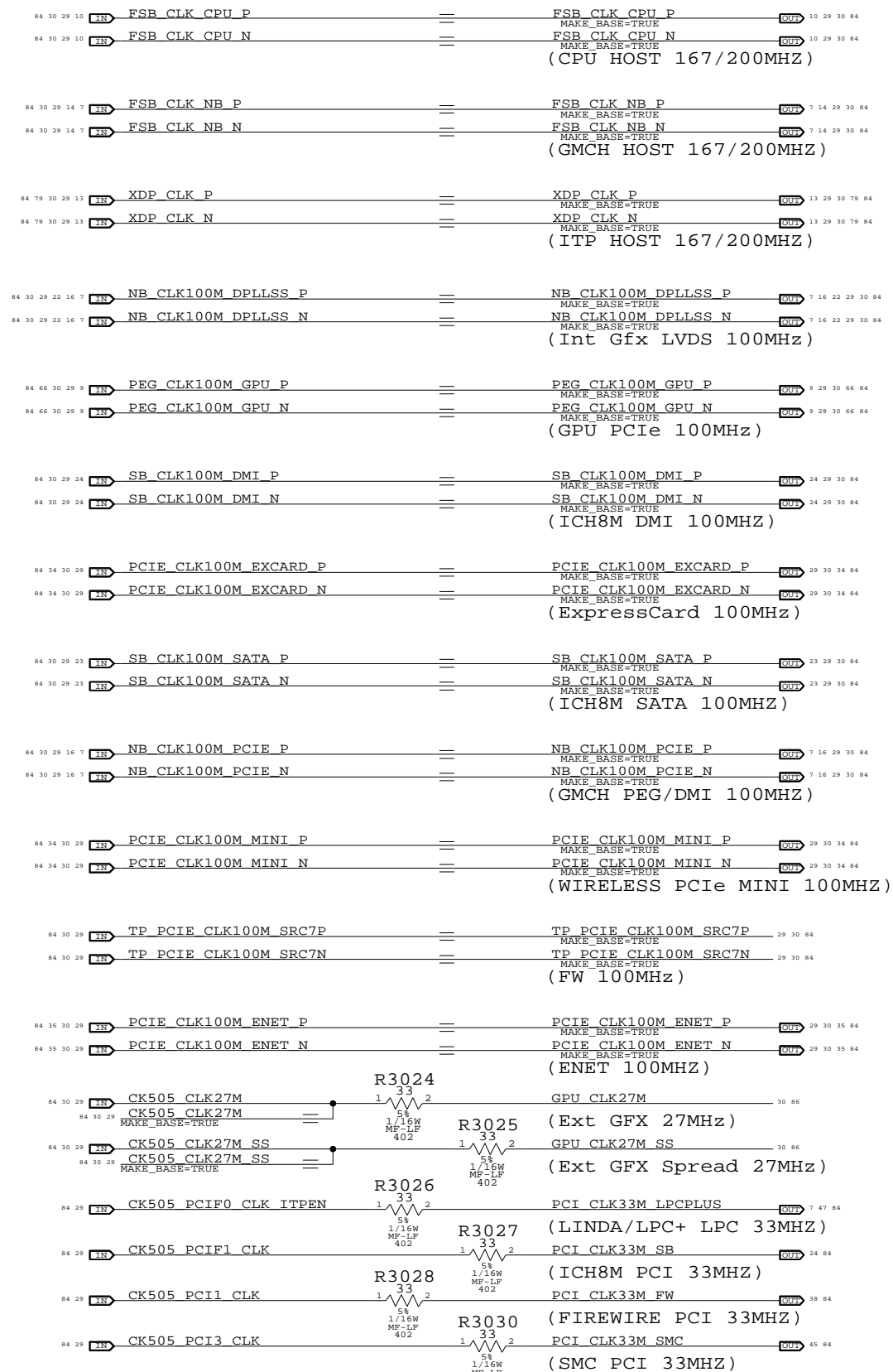
FS_A, FS_B, FS_C (Host clock freq select)



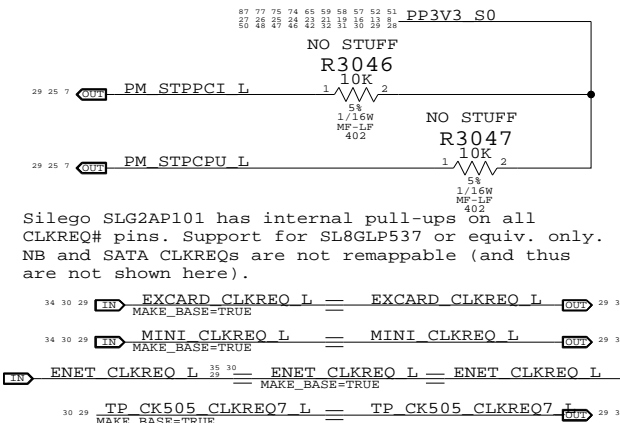
FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

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

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

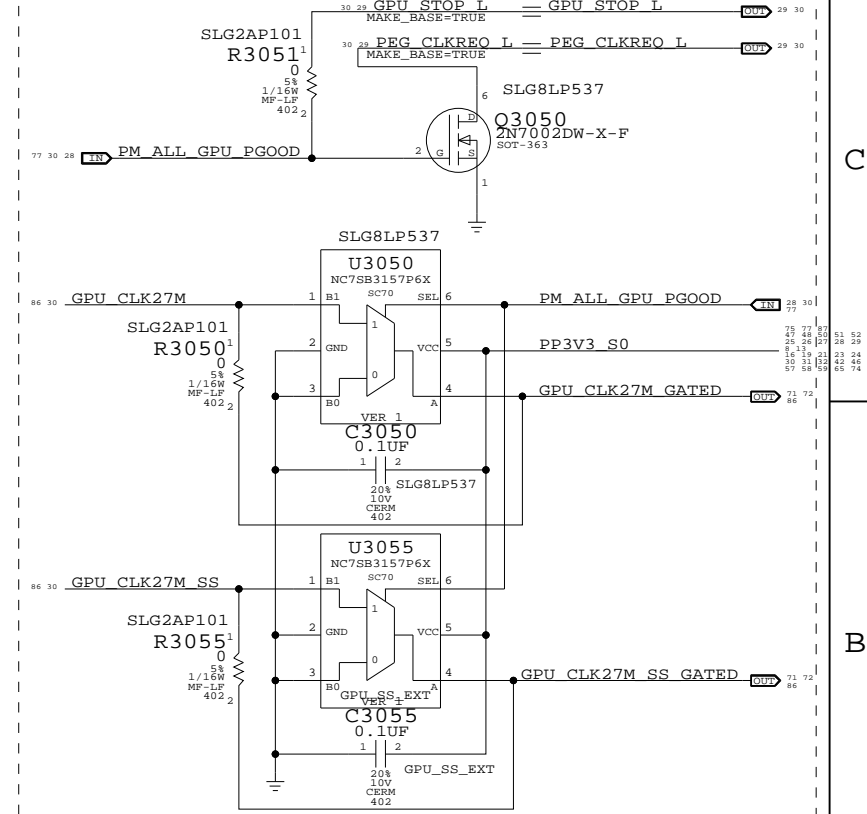


CLKREQ Controls

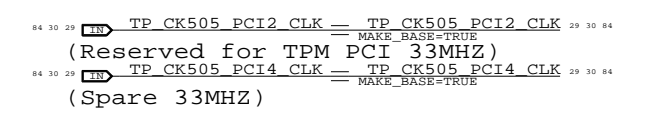


Silego SLG2AP101 has internal pull-ups on all CLKREQ# pins. Support for SL8GLP537 or equiv. only. NB and SATA CLKREQs are not remappable (and thus are not shown here).

GPU Clock Gating



Unused Clocks



Clock Termination
 SYNC_MASTER=(MASTER) SYNC_DATE=08/23/2006
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	30	88	

Page Notes

Power aliases required by this page:

- =PP1V8_S3M_MEM_A
- =PP0V9_S3M_MEM_DIMMVREFA
- =PPSPD_S0M_MEM_A (2.5V - 3.3V)

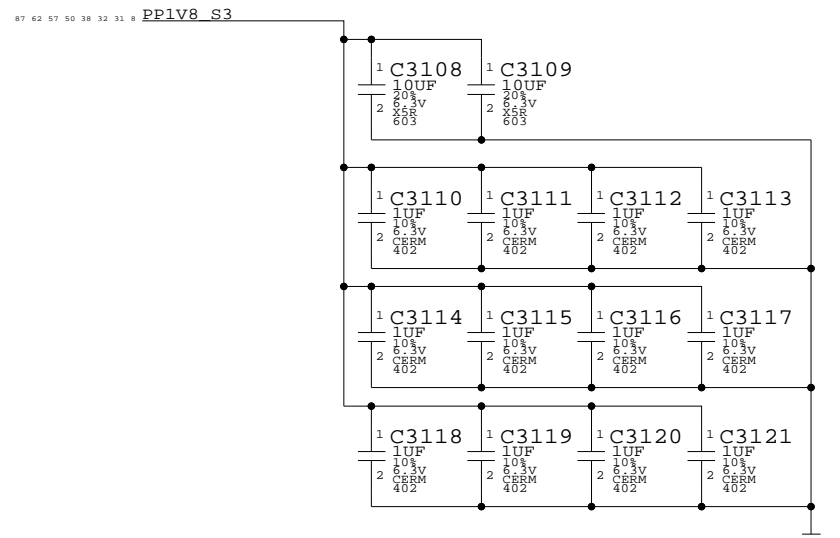
Signal aliases required by this page:

- =I2C_SODIMMA_SCL
- =I2C_SODIMMA_SDA

BOM options provided by this page:
(NONE)

"Factory" (thru-hole) slot

DDR2 Bypass Caps (For return current)

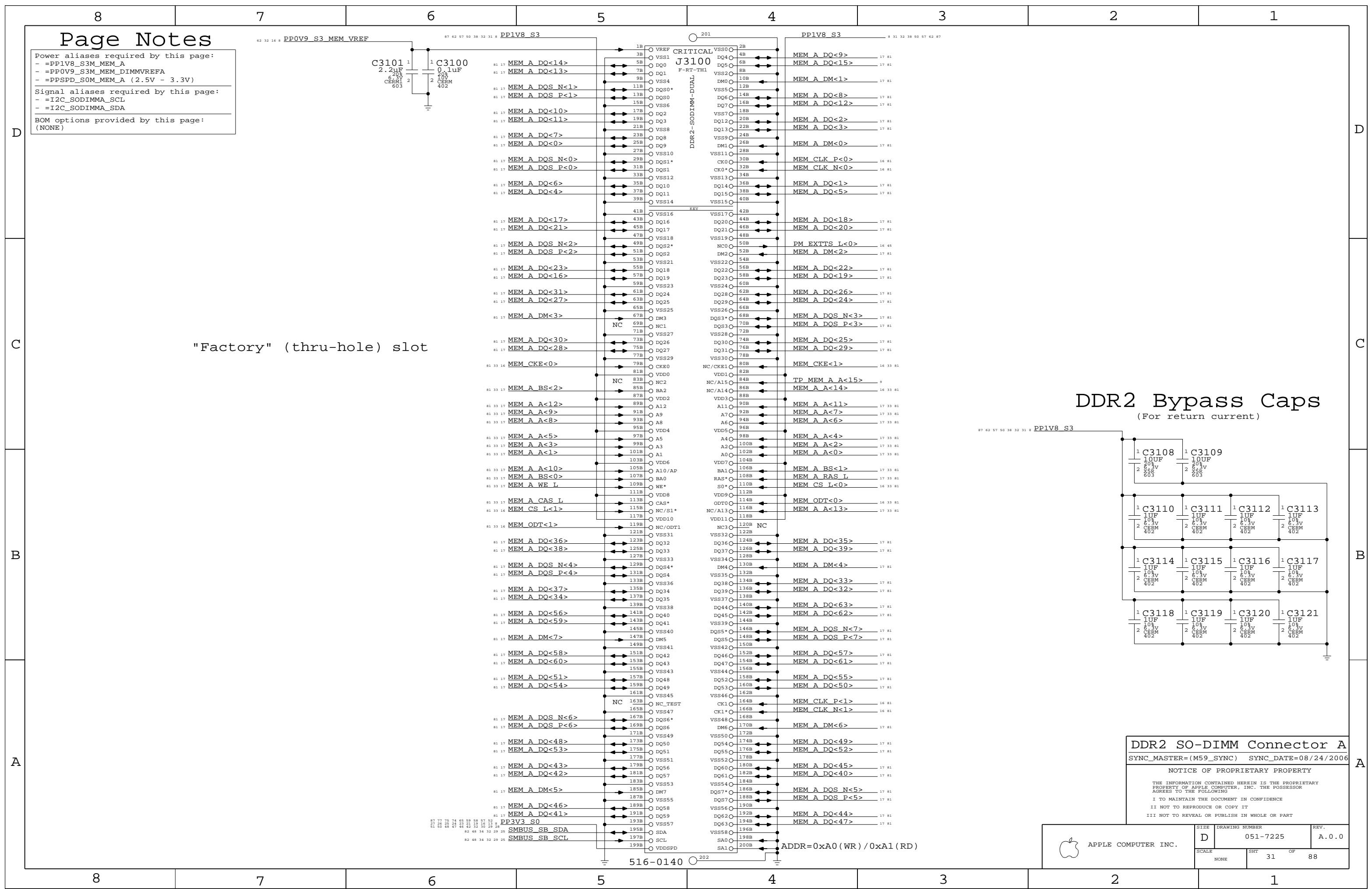


DDR2 SO-DIMM Connector A
SYNC_MASTER=(M59_SYNC) SYNC_DATE=08/24/2006

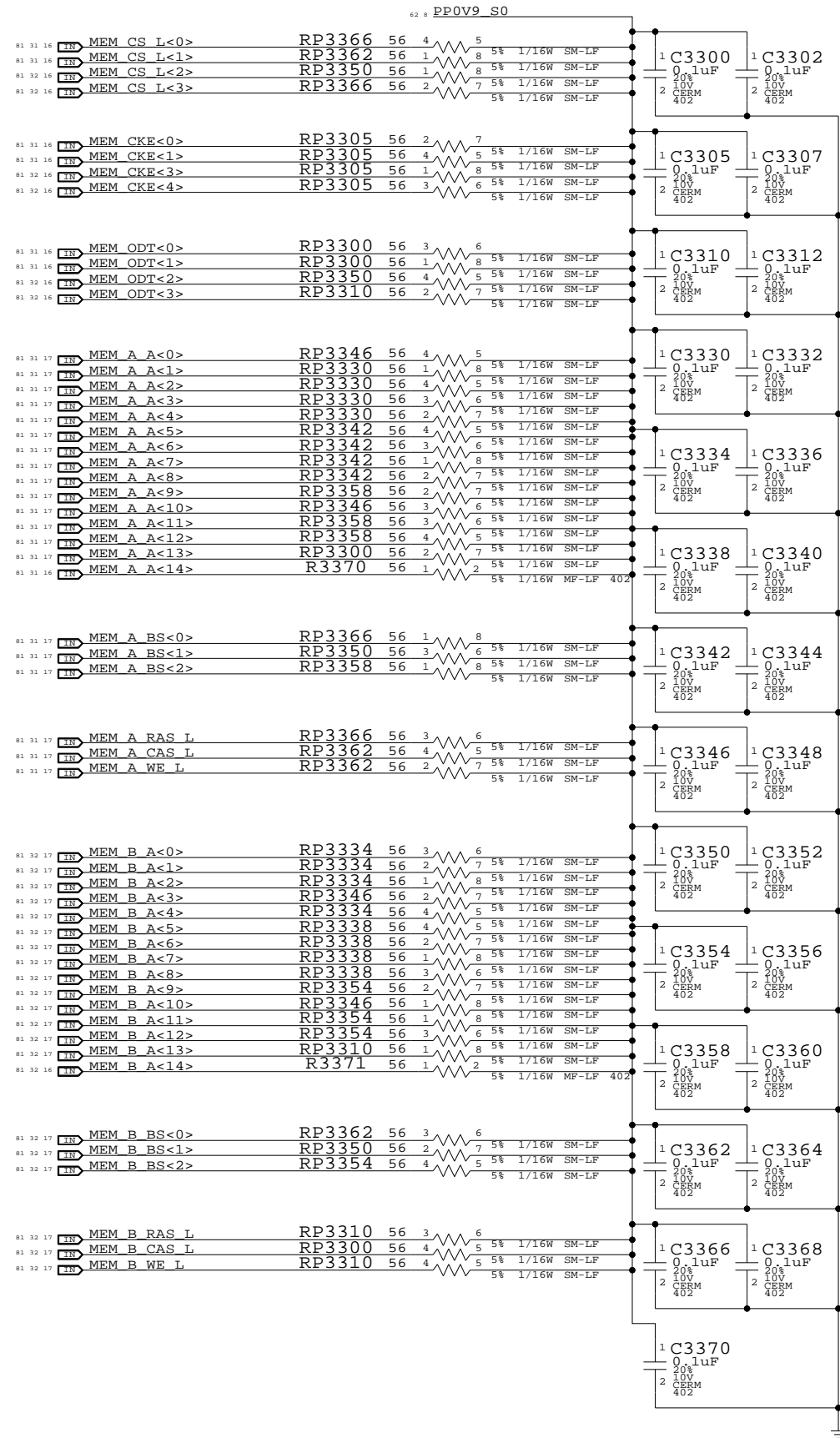
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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	31	88	



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



Memory Active Termination
SYNC_MASTER=(T9_NOME) SYNC_DATE=11/14/2006

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	33	88	

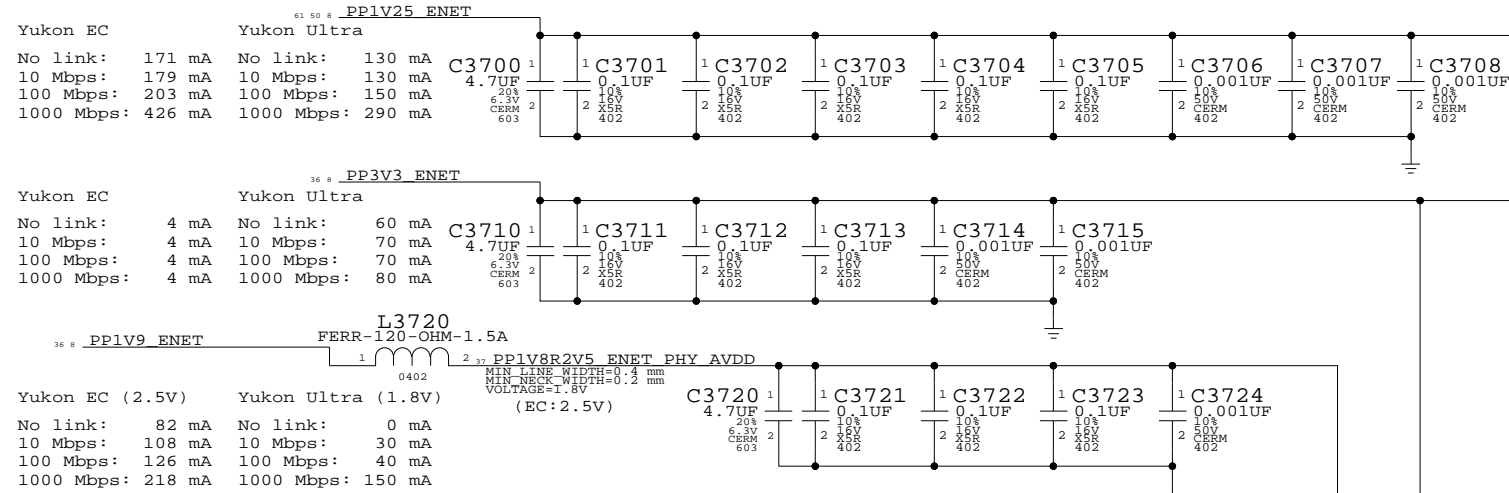
Page Notes

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

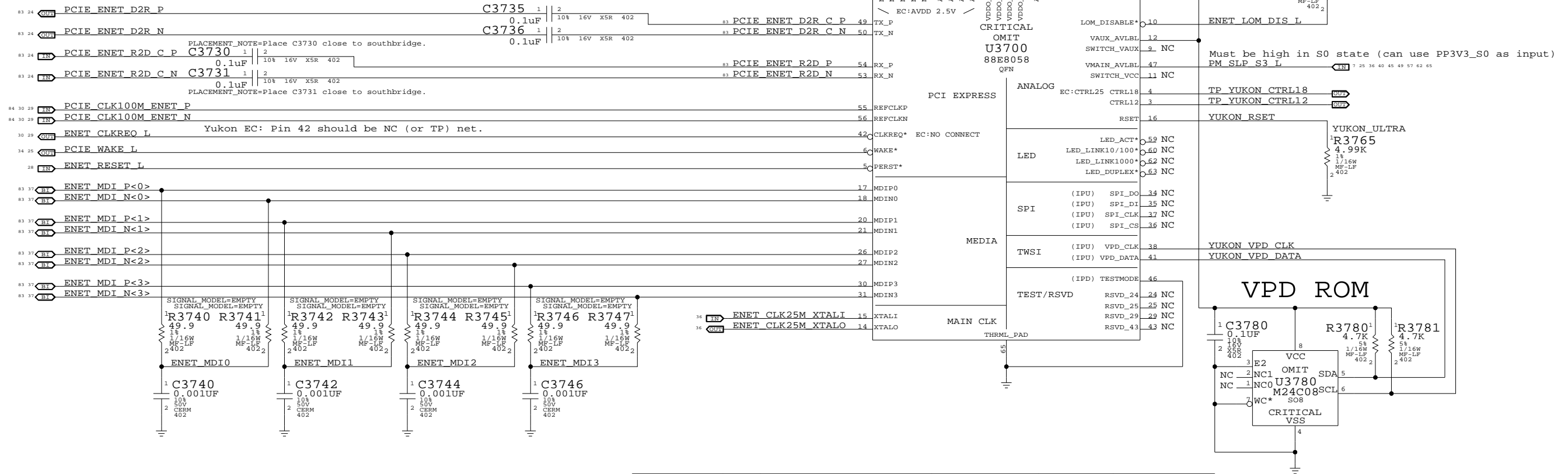
Signal aliases required by this page:
 - =ENET_CLKREQ_L (NC/TP for Yukon EC)
 - =ENET_VMAIN_AVLBLE (See note by pin)

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

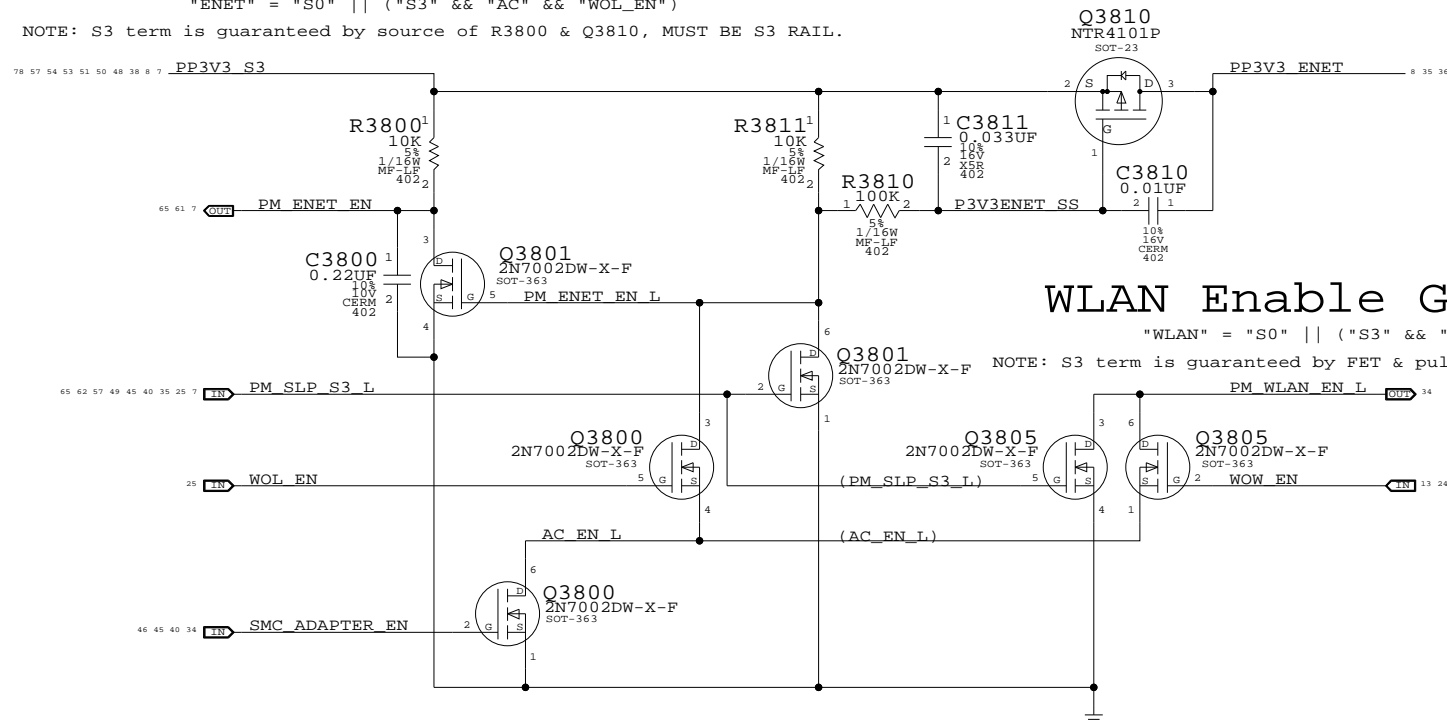
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ENET Enable Generation

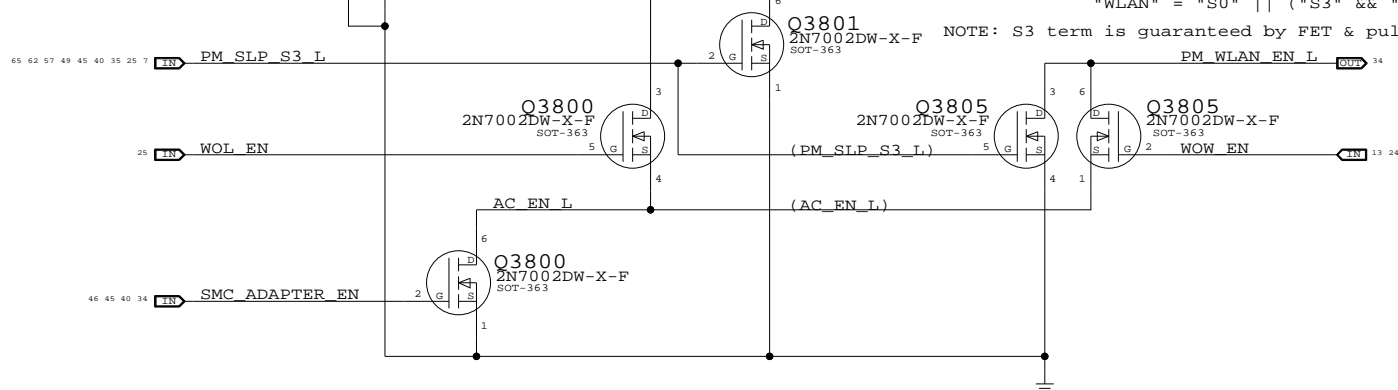
"ENET" = "S0" || ("S3" && "AC" && "WOL_EN")
 NOTE: S3 term is guaranteed by source of R3800 & Q3810, MUST BE S3 RAIL.



3.3V ENET FET

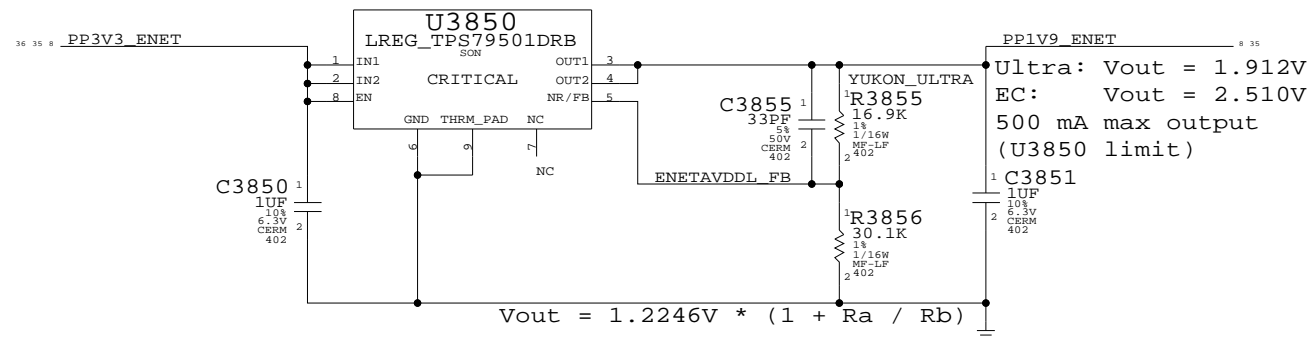
WLAN Enable Generation

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



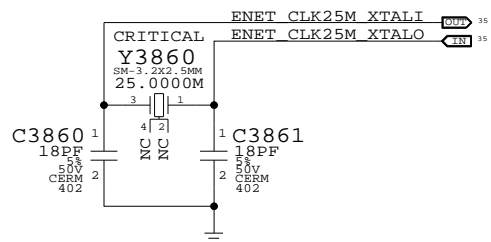
Yukon AVDDL LDO

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

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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	36	88	

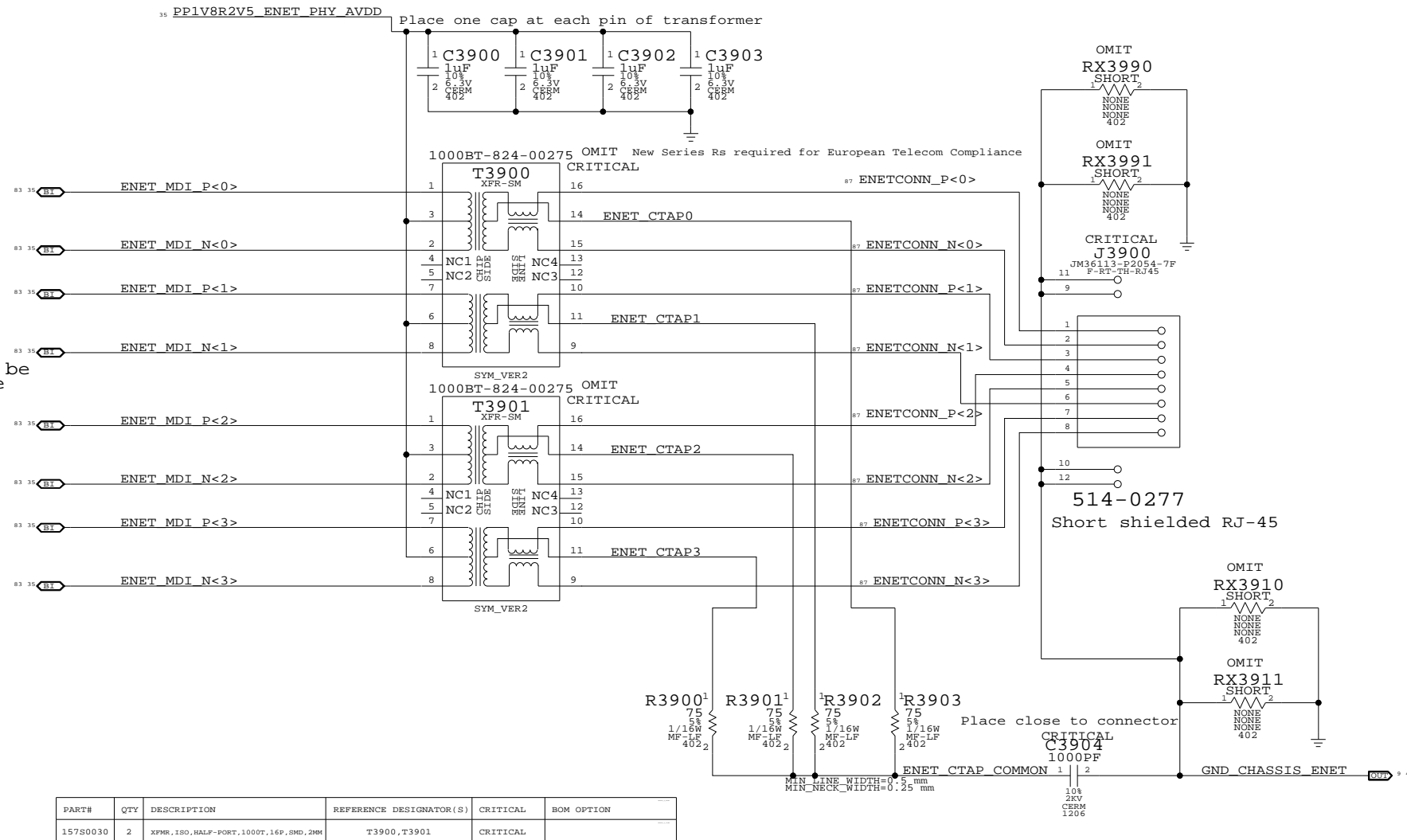
Page Notes

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



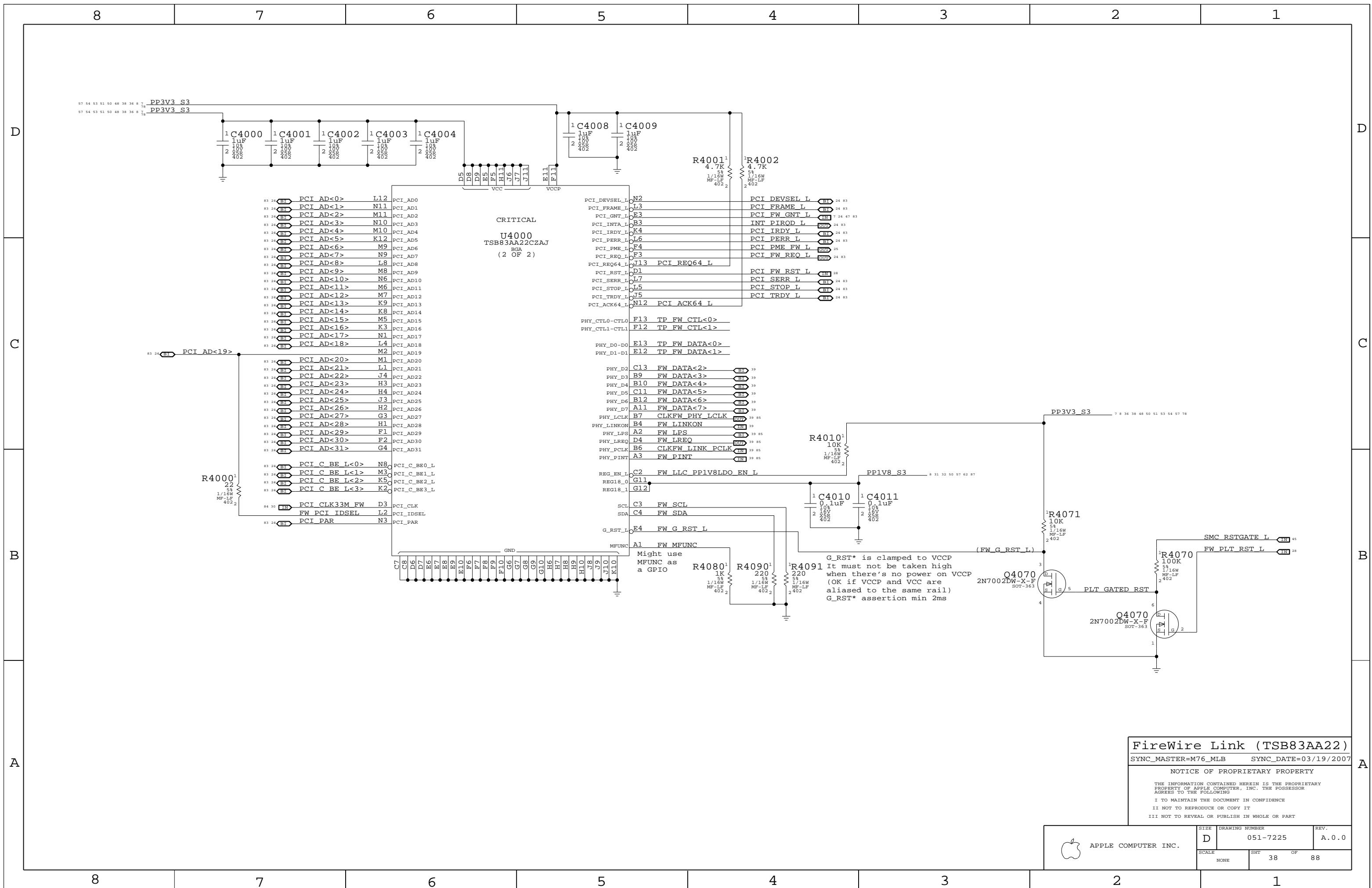
Ethernet Connector
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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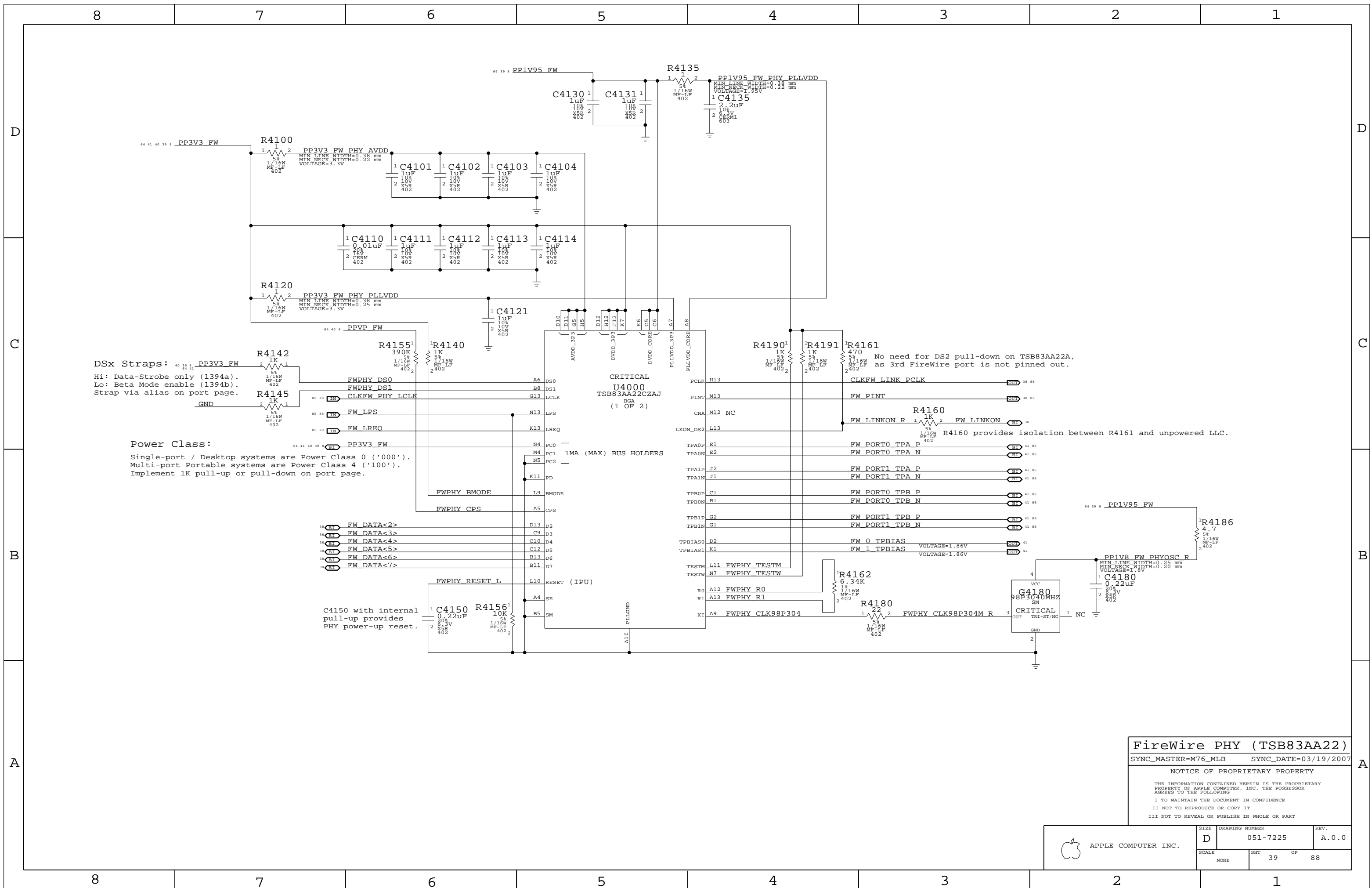
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	37	88	



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

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



8 7 6 5 4 3 2 1

D

D

C

C

B

B

A

A

DSx Straps: PP3V3_FW
 Hi: Data-Strobe only (1394a).
 Lo: Beta Mode enable (1394b).
 Strap via alias on port page.

Power Class:
 Single-port / Desktop systems are Power Class 0 ('000').
 Multi-port Portable systems are Power Class 4 ('100').
 Implement 1K pull-up or pull-down on port page.

No need for DS2 pull-down on TSB83AA22A,
 as 3rd FireWire port is not pinned out.

R4160 provides isolation between R4161 and unpowered LLC.

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

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

8 7 6 5 4 3 2 1

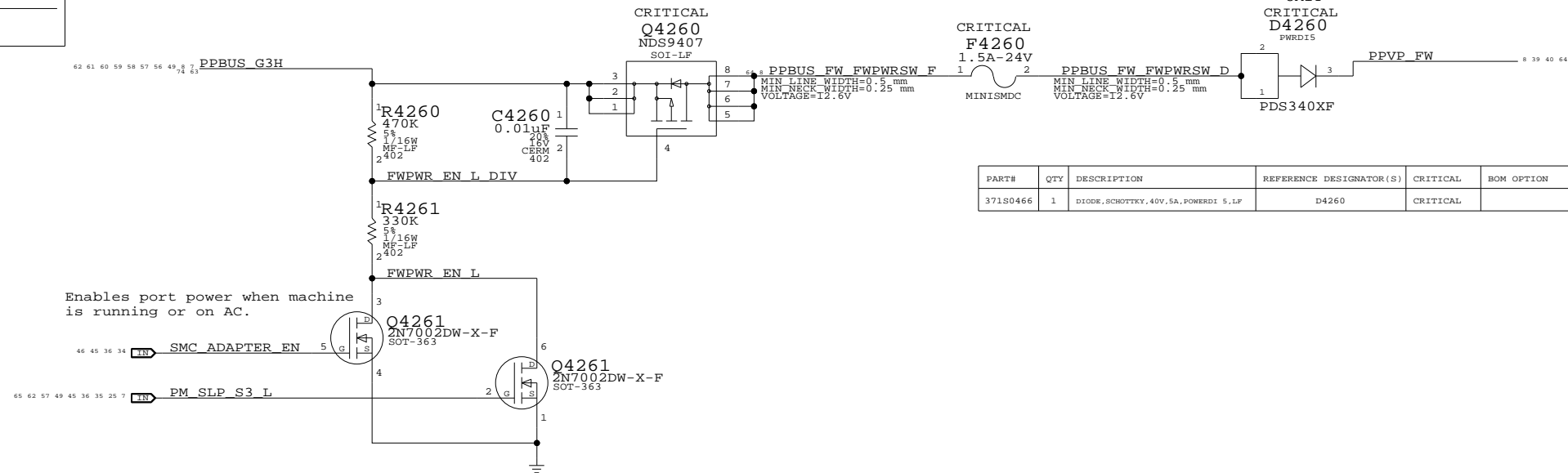
Page Notes

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

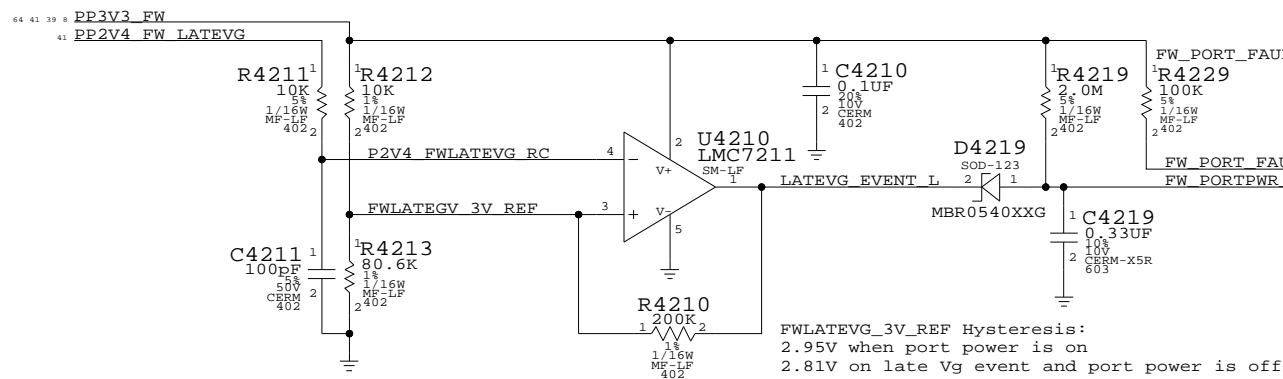


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
371S0466	1	DIODE,SCHOTTKY,40V,5A,POWERDI 5_LF	D4260	CRITICAL	

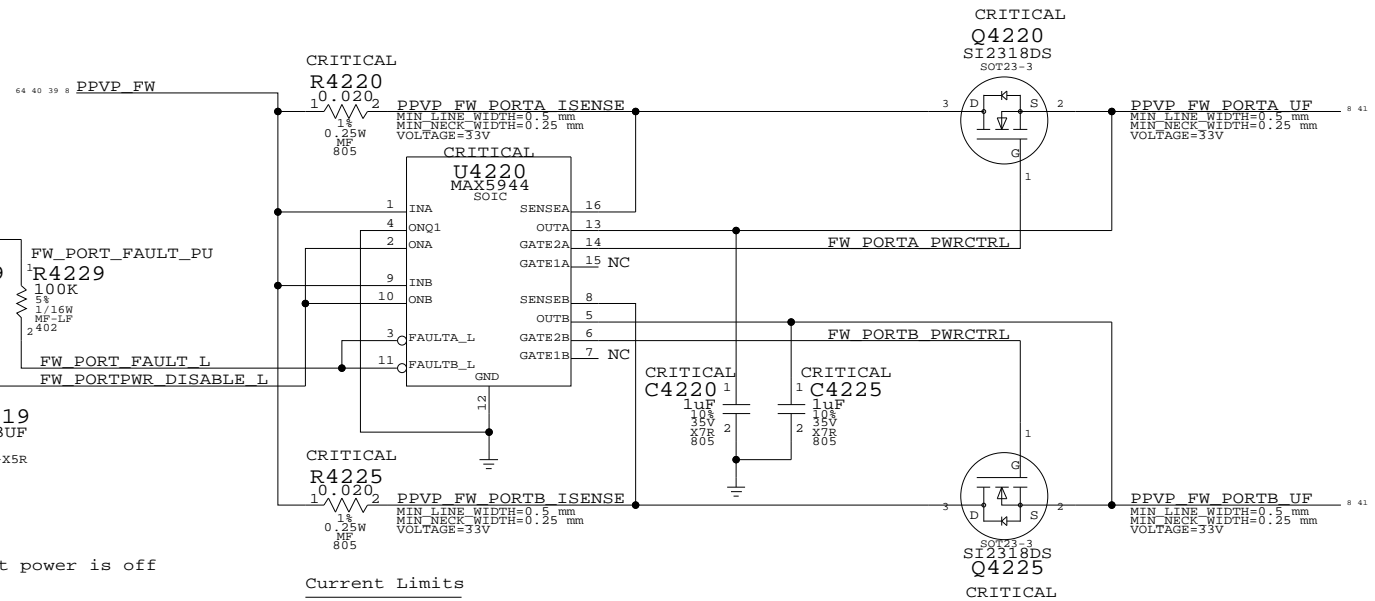
Enables port power when machine is running or on AC.

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

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	D	051-7225	A.0.0
SCALE	SHT	OF	REV.
NONE	40	88	

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)

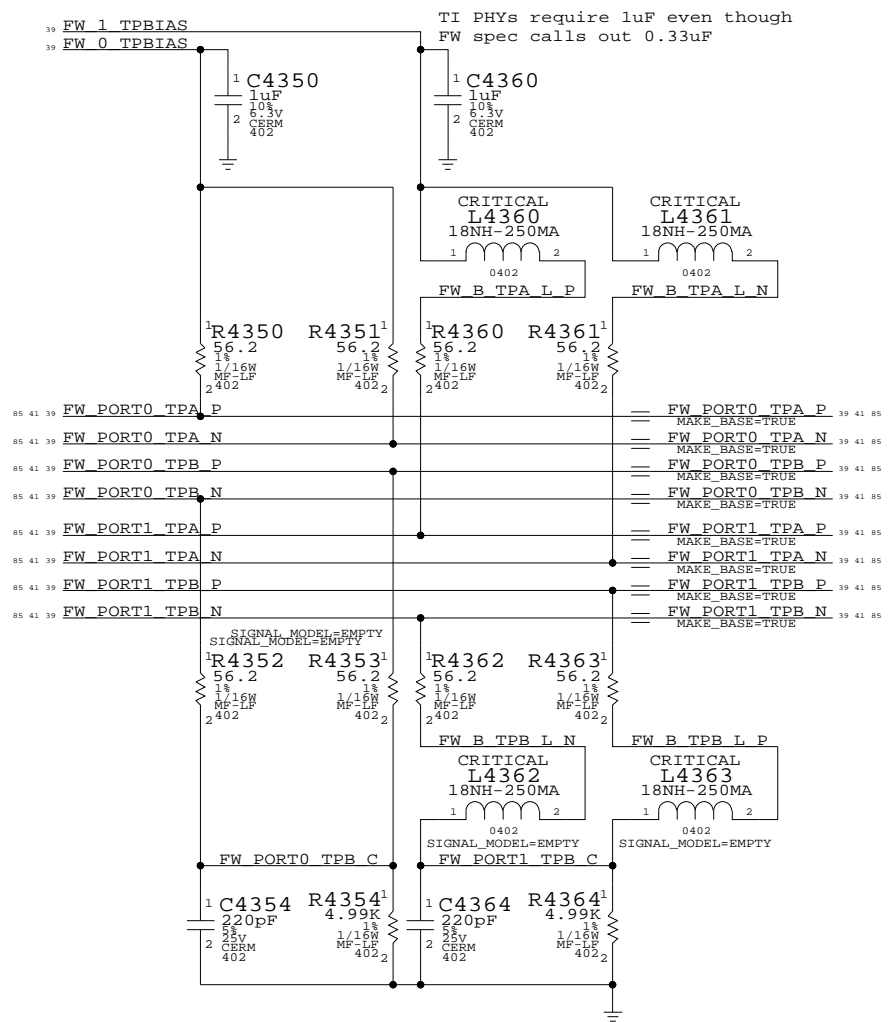
FireWire PHY Config Straps

Configures PHY for:

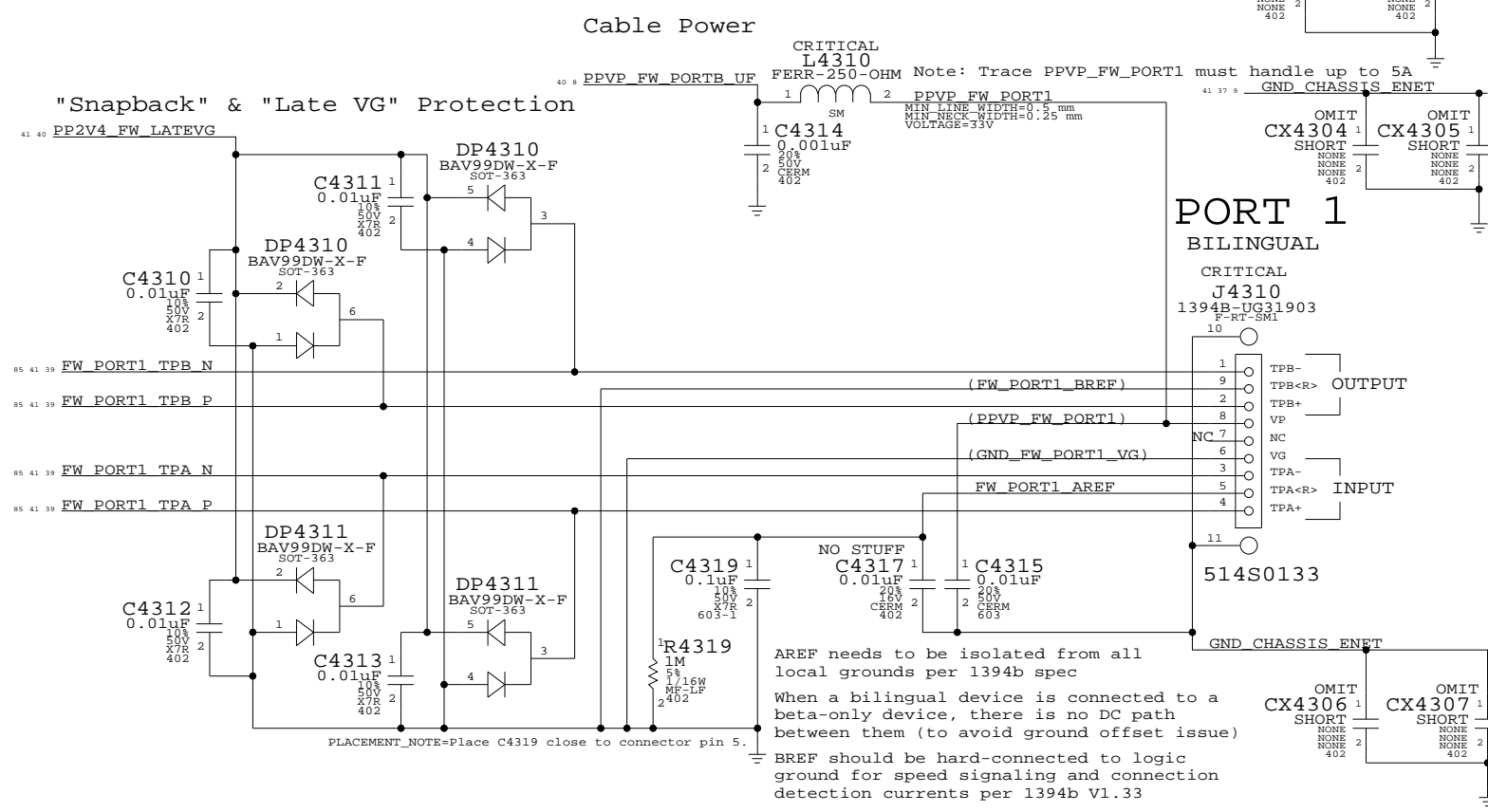
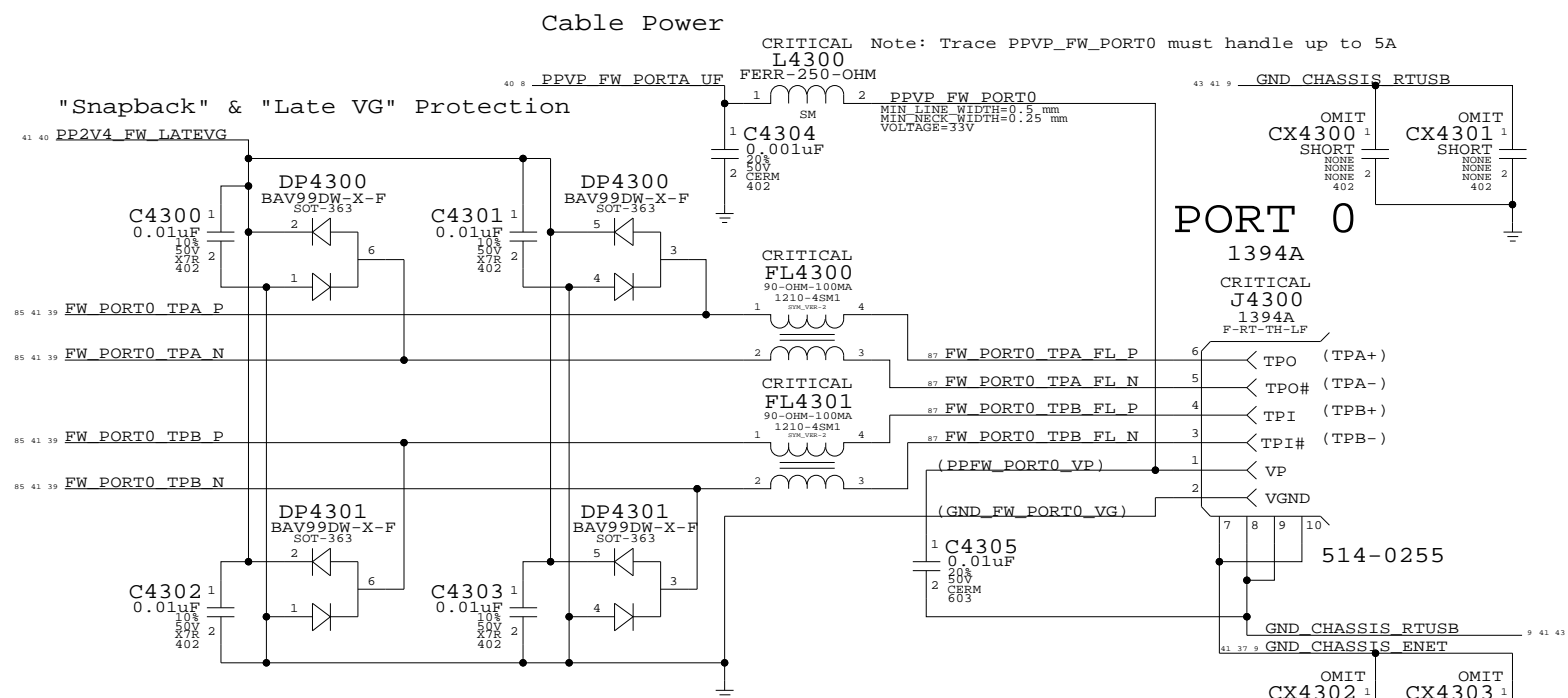
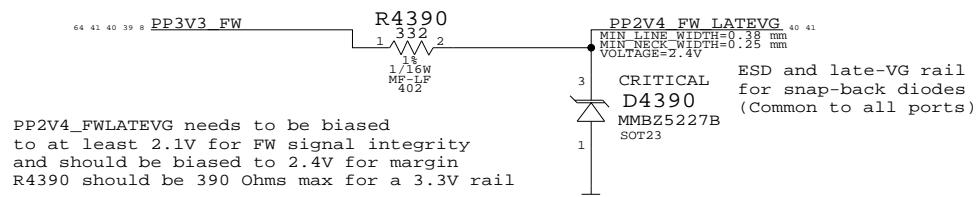
- 2-port Portable Power Class (4)
- Port "0" Data-Strobe only (1394A)
- Port "1" Bilingual (1394B)

Termination

Place close to FireWire PHY



Late-VG Protection Power



FireWire Ports

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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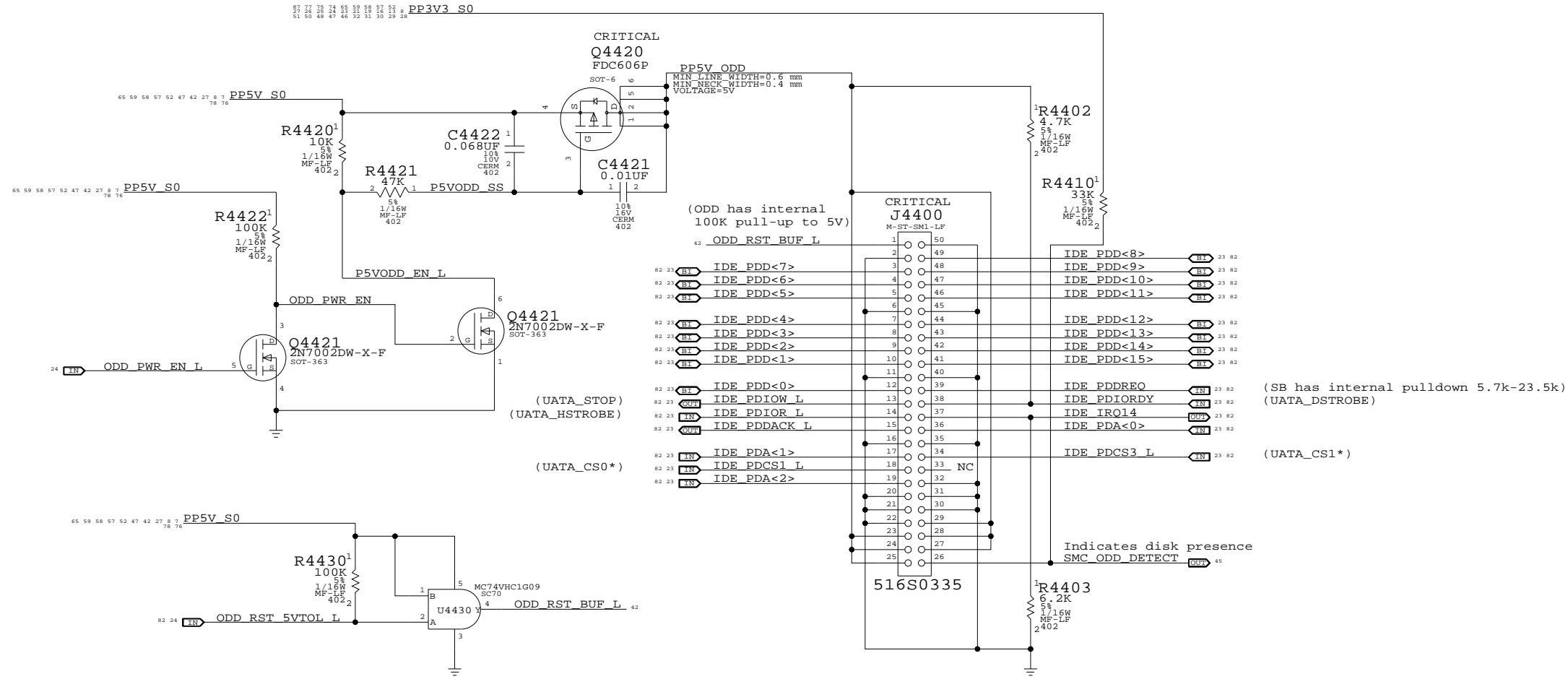
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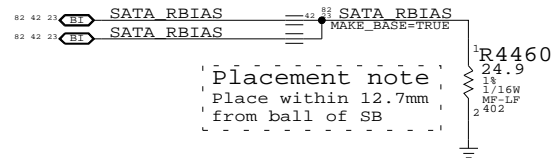
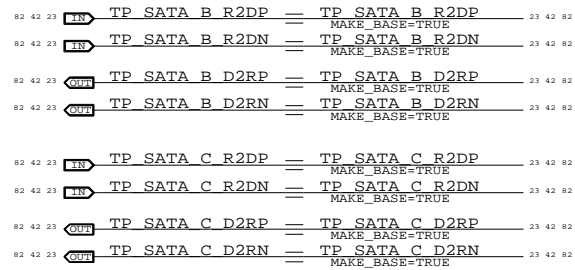
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

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

IDE (ODD) Connector



Unused SATA Ports



PATA Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

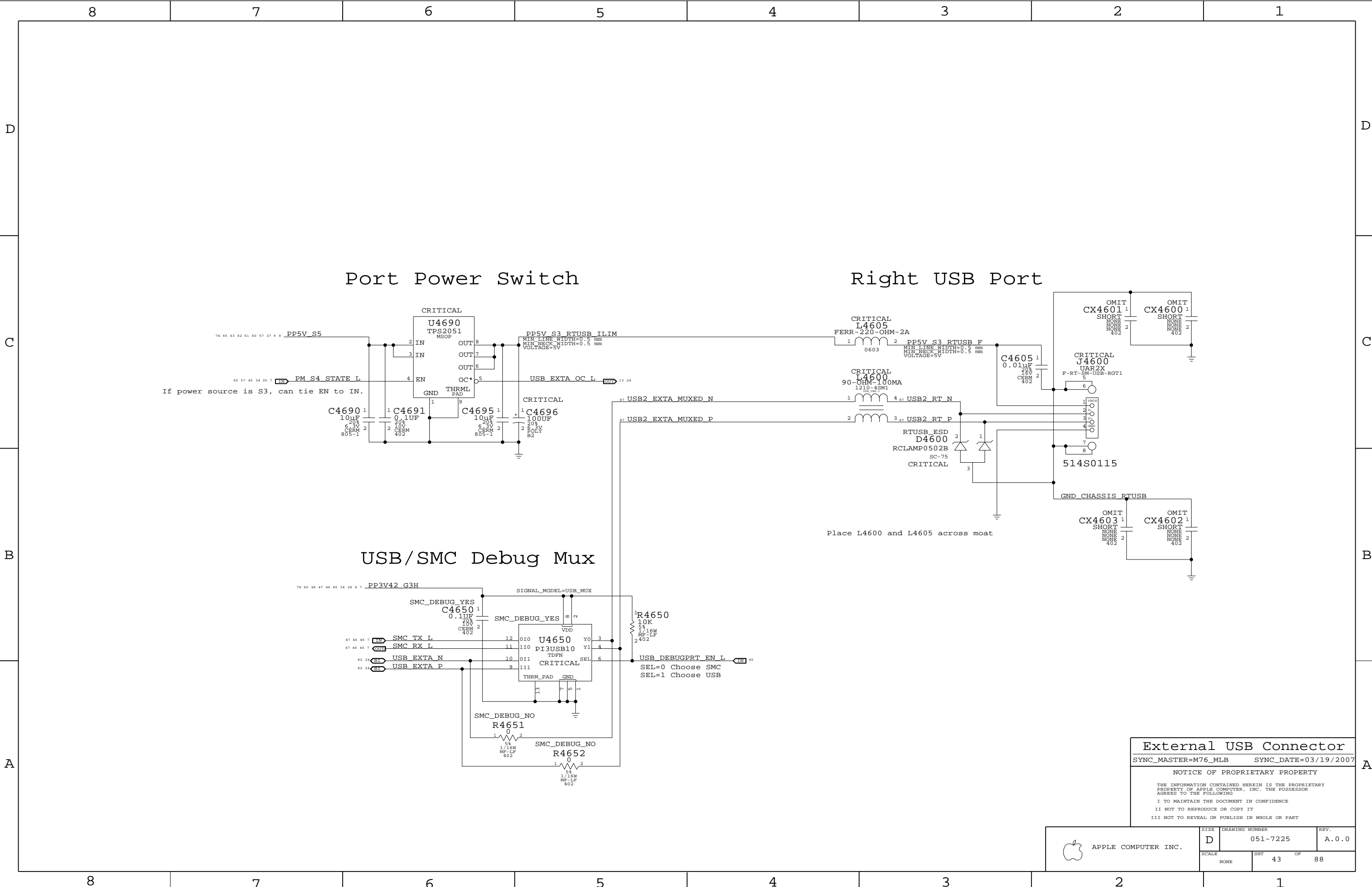
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	42	88	



Port Power Switch

Right USB Port

USB/SMC Debug Mux

Place L4600 and L4605 across moat

External USB Connector

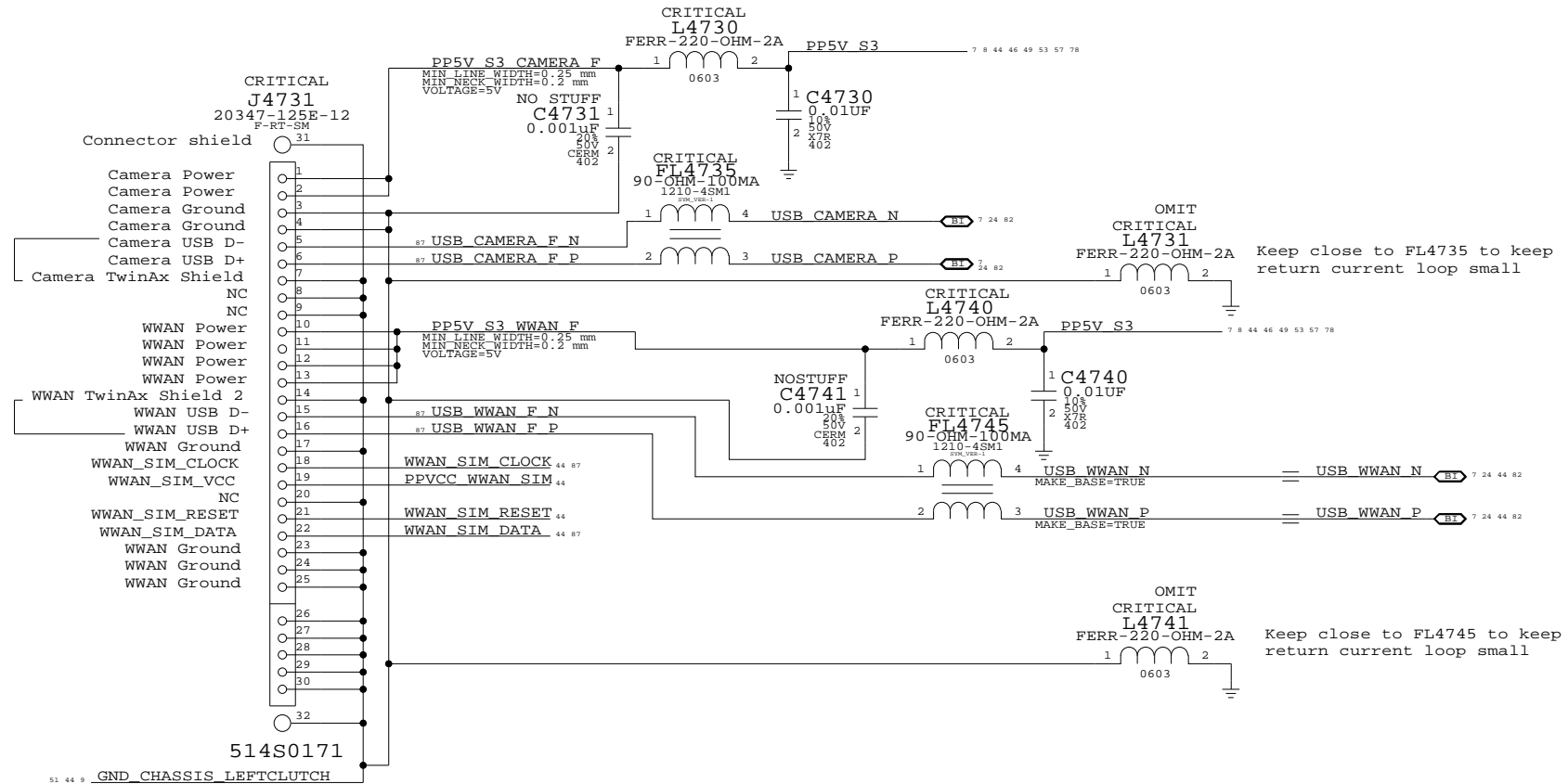
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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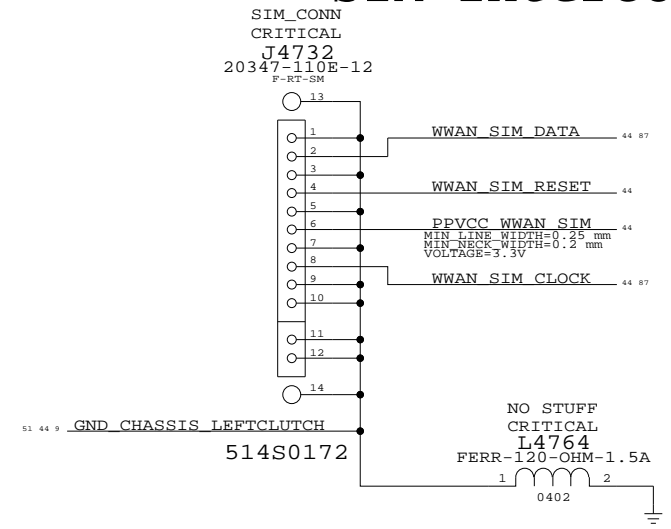
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT 43 OF 88		
NONE			

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

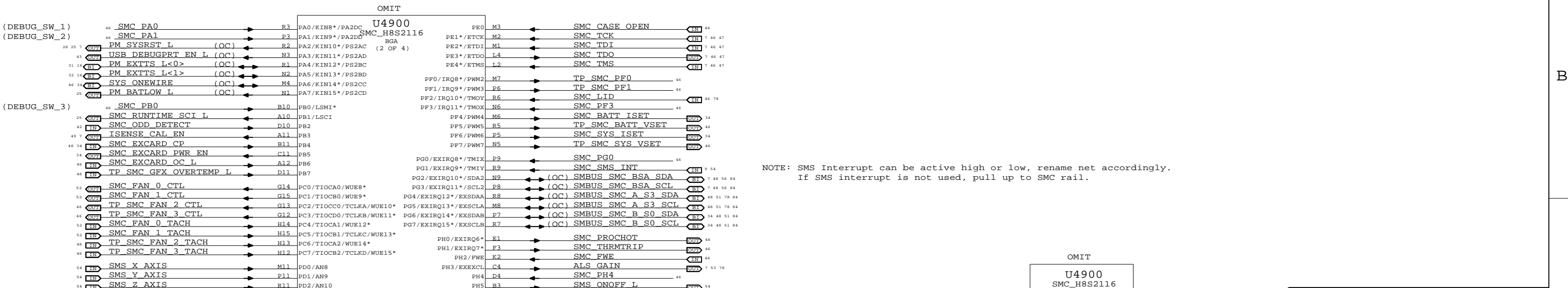
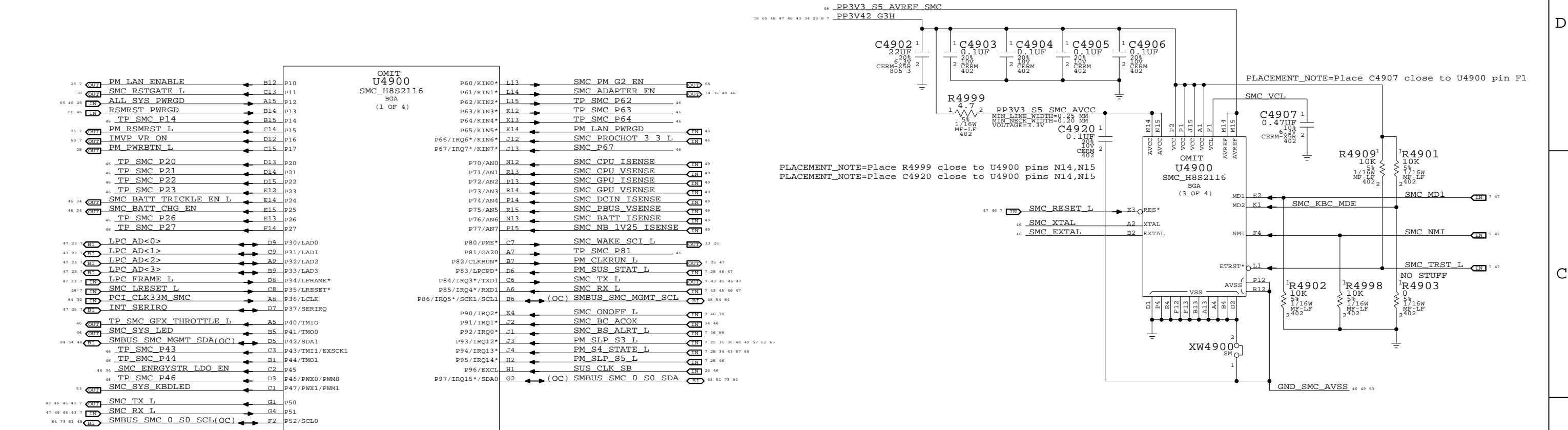


Left Clutch Barrel Interconnect
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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	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.



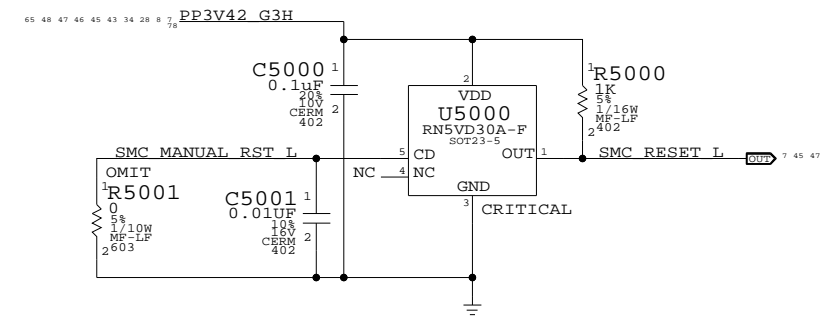
NOTE: SMS Interrupt can be active high or low, rename net accordingly. If SMS interrupt is not used, pull up to SMC rail.

SMC
SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007
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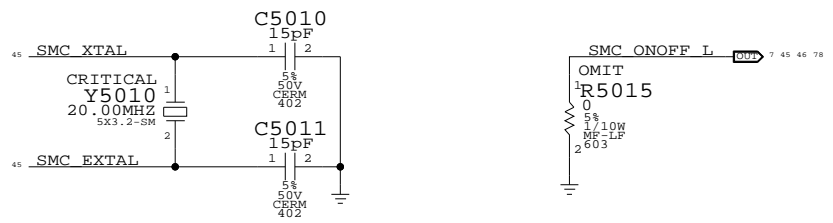
SIZE	DRAWING NUMBER	REV.
D	051-7225	A.0.0
SCALE	SHT	OF
NONE	45	88



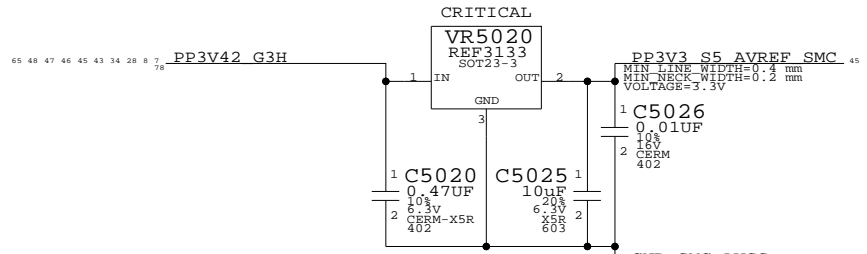
SMC Reset "Button" / Brownout Detect



SMC Crystal Circuit Debug Power "Button"

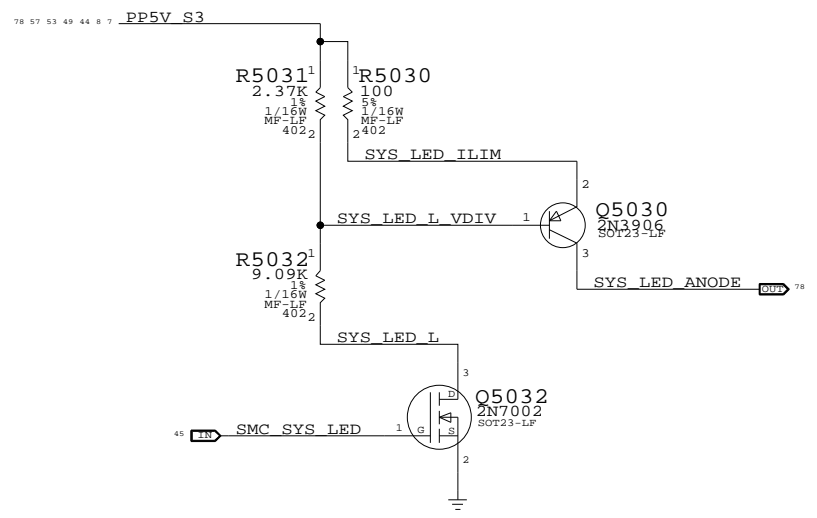


SMC AVREF Supply



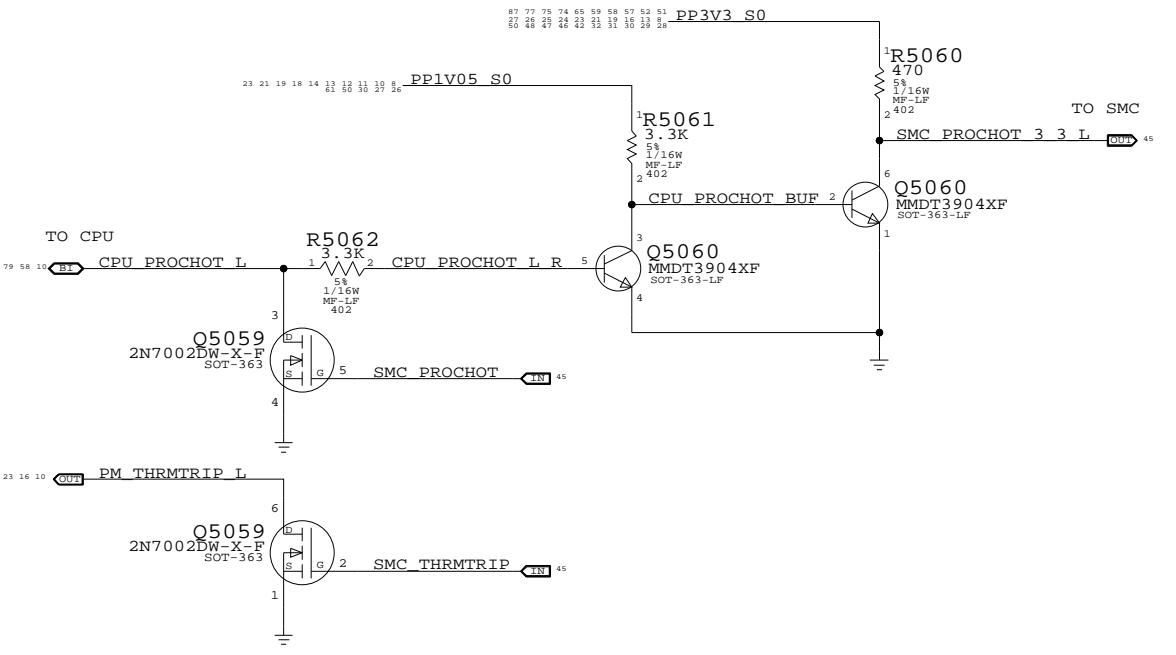
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
35381381	35381278		ALL	Interail ISL60002-33

System (Sleep) LED Circuit



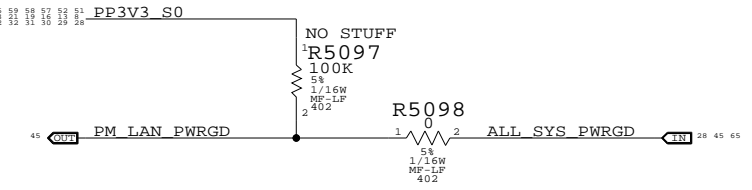
- TP_SMC_FAN_2_CTL == TP_SMC_FAN_2_CTL
- TP_SMC_FAN_2_TACH == TP_SMC_FAN_2_TACH
- TP_SMC_FAN_3_CTL == TP_SMC_FAN_3_CTL
- TP_SMC_FAN_3_TACH == TP_SMC_FAN_3_TACH
- TP_SMC_GFX_OVERTEMP_L == TP_SMC_GFX_OVERTEMP_L
- TP_SMC_GFX_THROTTLE_L == TP_SMC_GFX_THROTTLE_L
- TP_SMC_BATT_VSET == TP_SMC_BATT_VSET
- TP_SMC_SYS_VSET == 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_PF0 == TP_SMC_PF0
- TP_SMC_PF1 == TP_SMC_PF1

SMC FSB to 3.3V Level Shifting



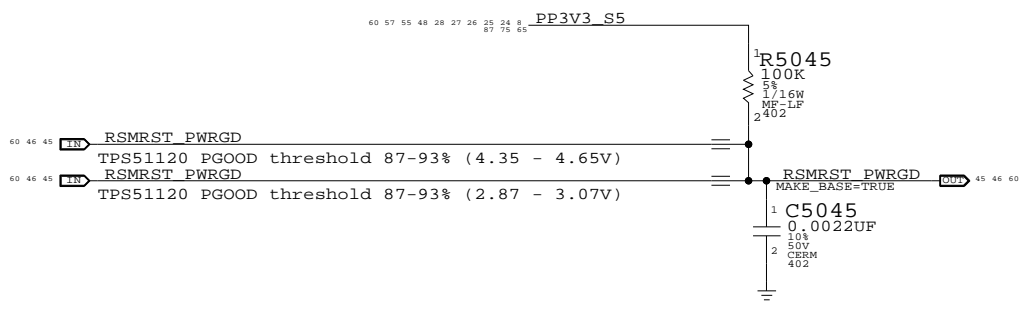
- SMC_EXCARD_OC_L == EXCARD_OC_L
- SUS_CLK_SB == SUS_CLK_SB
- SMC_ENRGYSTR_LDO_EN == SMC_ENRGYSTR_LDO_EN

LAN PWRGD Circuit



S5 Rail PWRGD Circuit

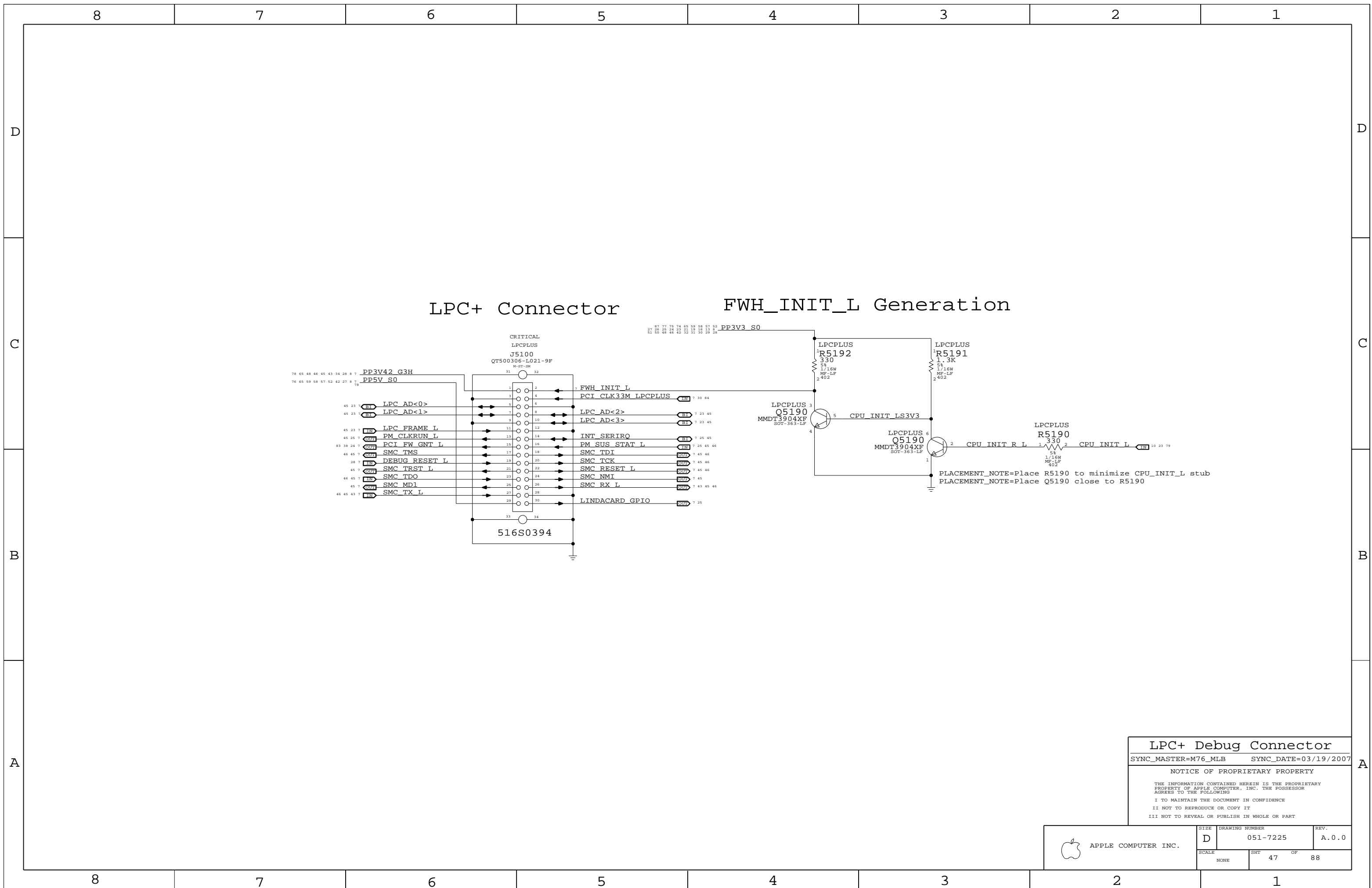
Reports when 5V S5 and 3.3V S5 are in regulation



- 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

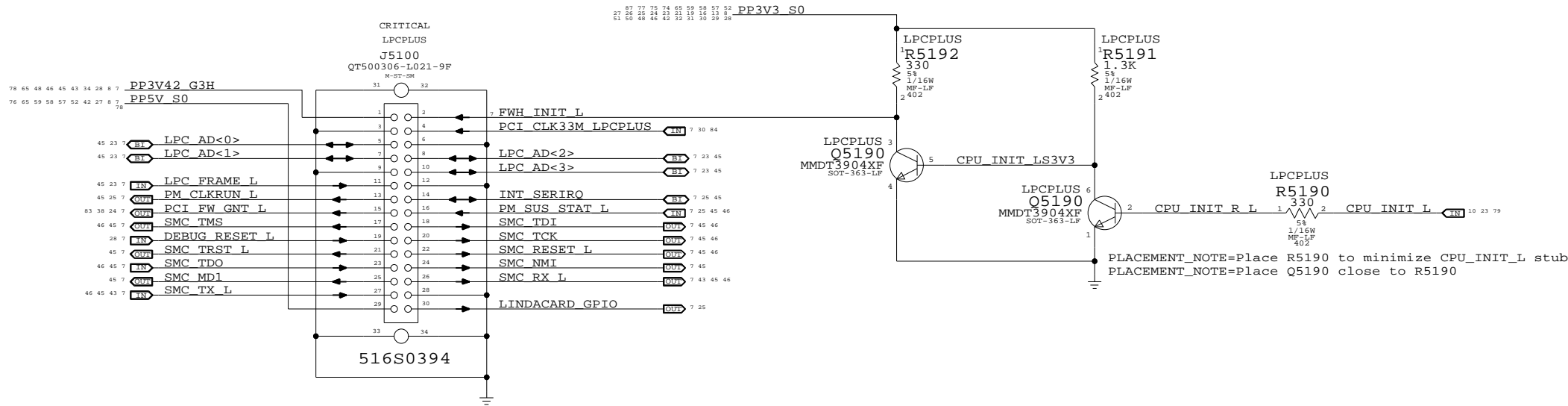
SMC Support
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)
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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	46	88	



LPC+ Connector

FWH_INIT_L Generation

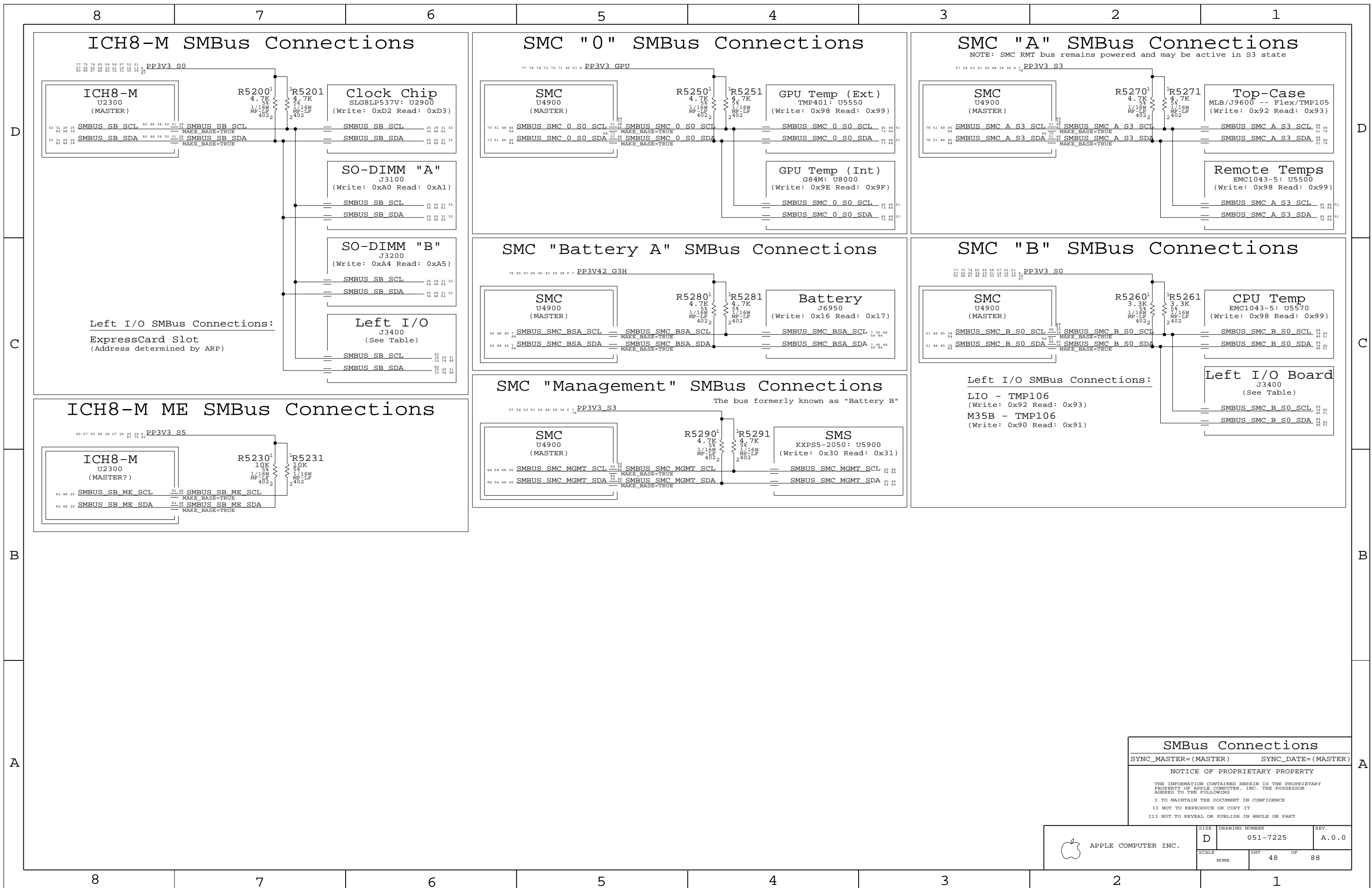


LPC+ Debug Connector

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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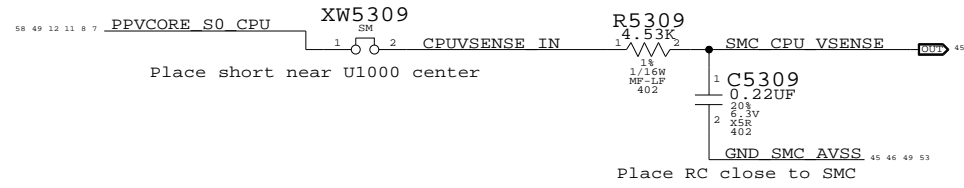
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	47	88	



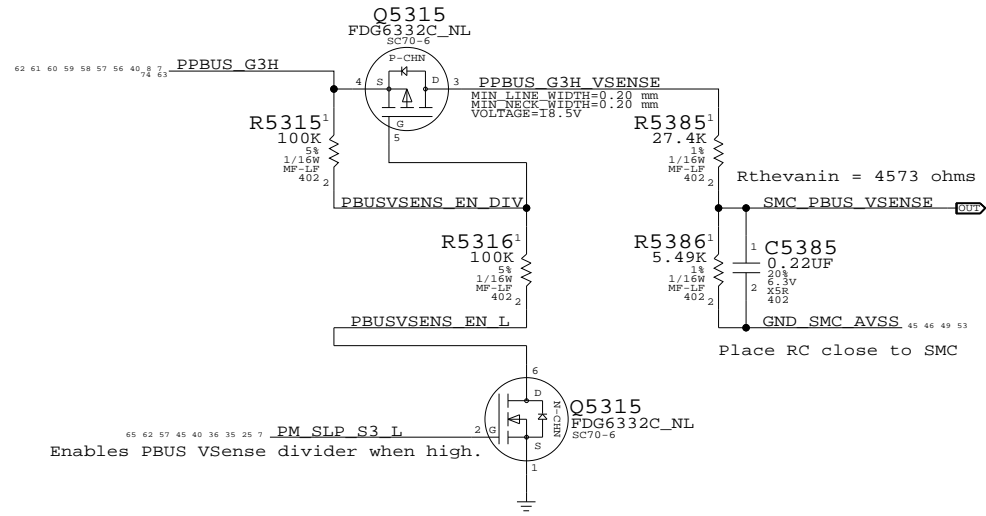
SMBus Connections		
SYNC_MASTER=(MASTER)	SYNC_DATE=(MASTER)	
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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	48	88	

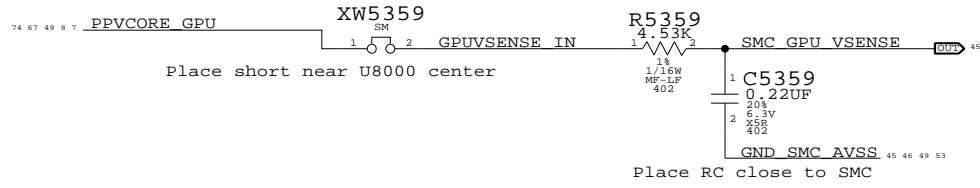
CPU Voltage Sense / Filter



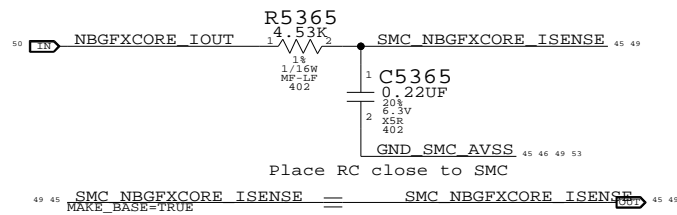
PBUS Voltage Sense & Filter



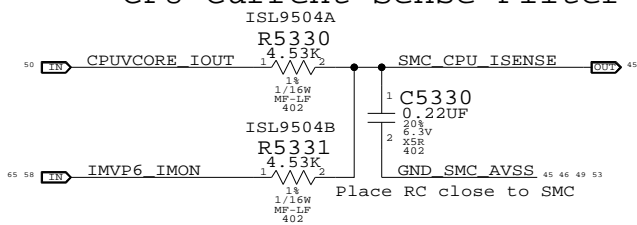
GPU Voltage Sense / Filter



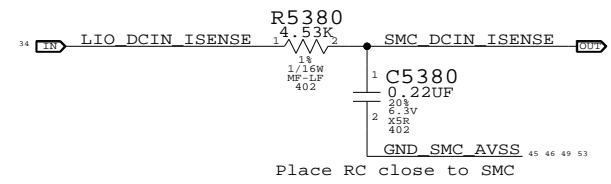
NB GFX Current Sense Filter



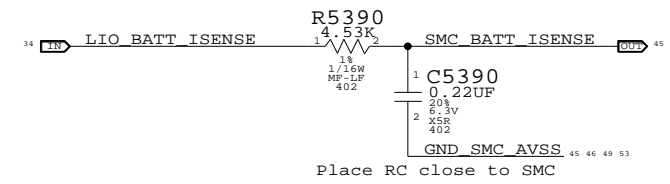
CPU Current Sense Filter



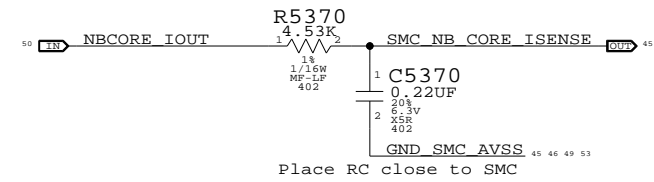
DCIN Current Sense Filter



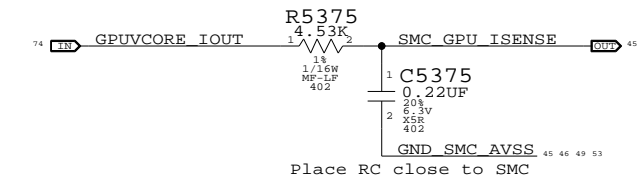
Battery (PBUS) Current Sense Filter



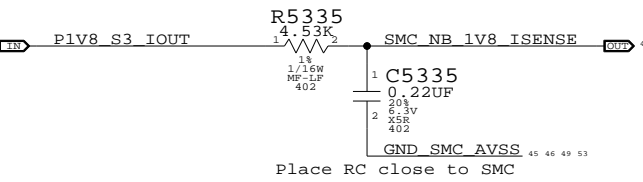
NB Core Current Sense Filter



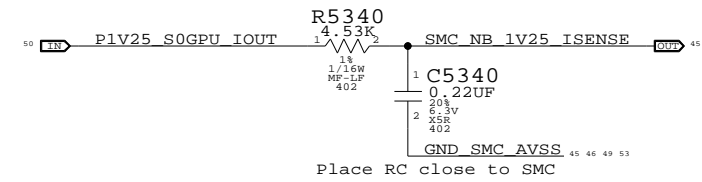
GPU Current Sense Filter



NB 1.8V Current Sense Filter

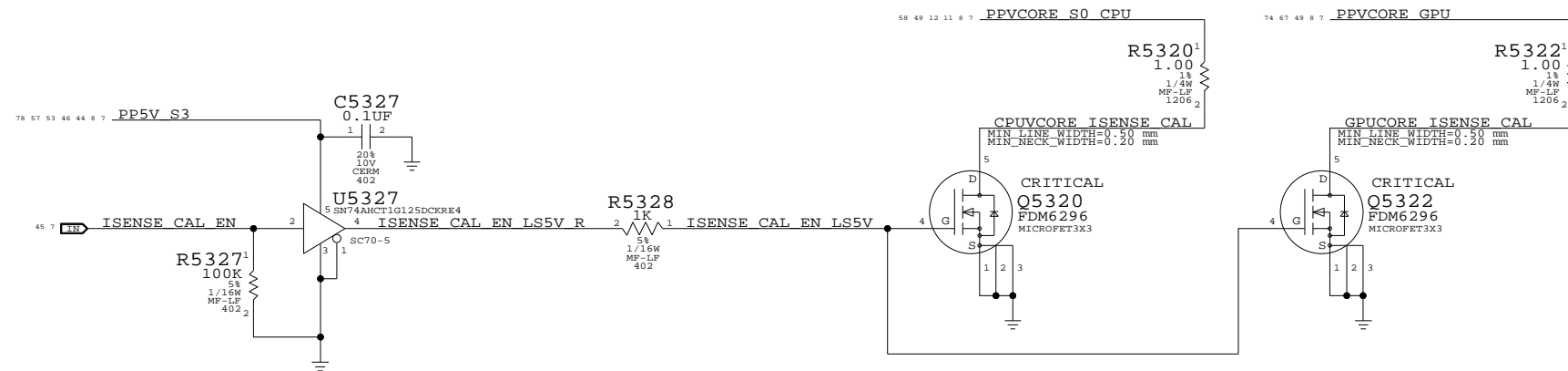


S0/GPU 1.25V Current Sense Filter



Current Sense Calibration Circuit

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



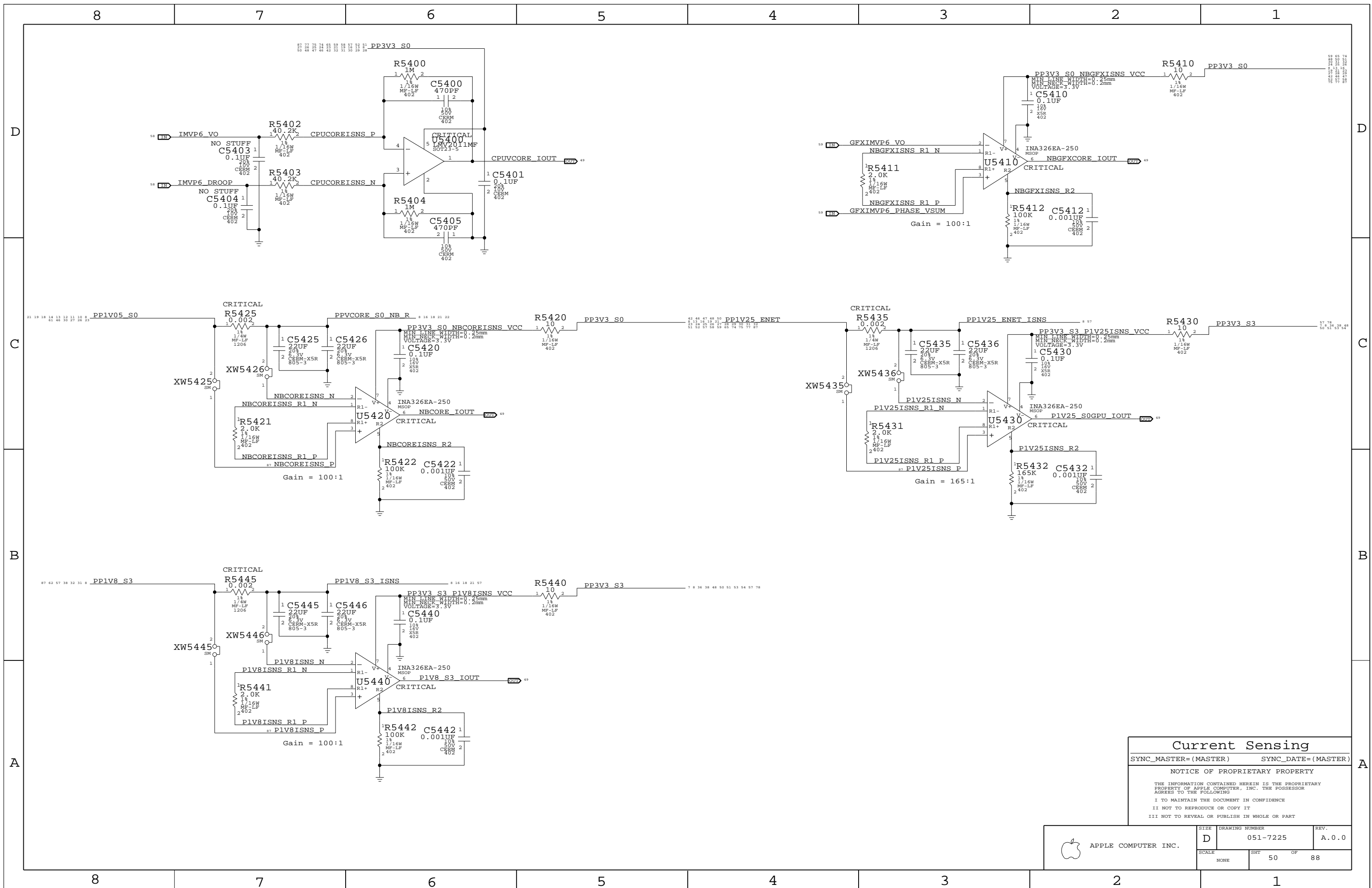
Current & Voltage Sensing

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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SCALE	SHT	OF	REV.
NONE	49	88	



Current Sensing

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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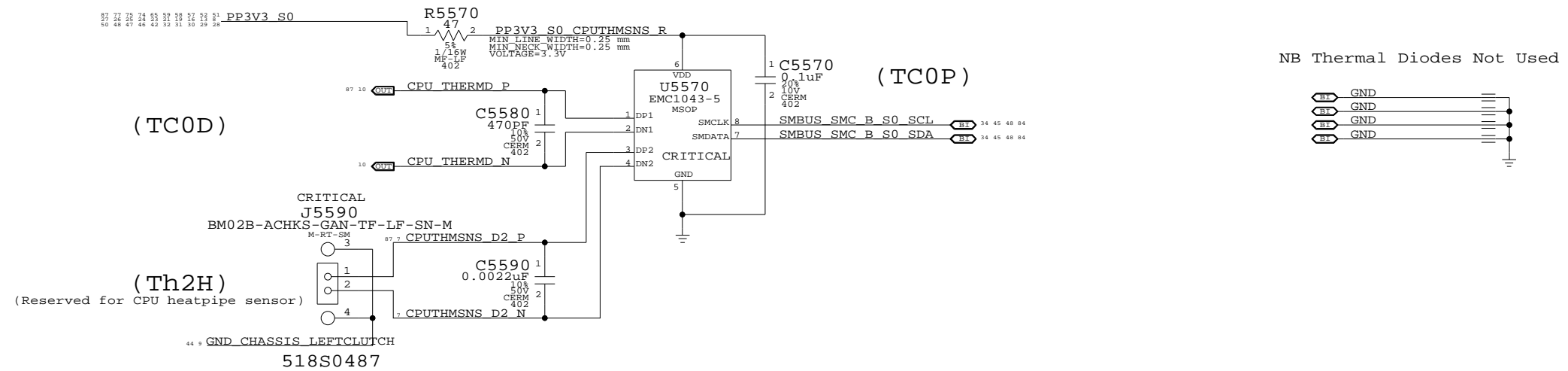
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

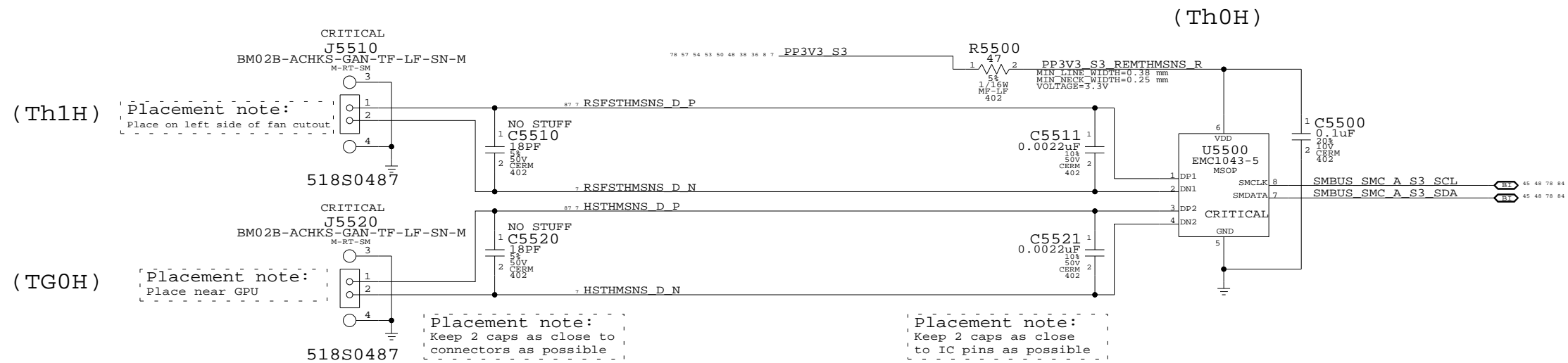
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

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

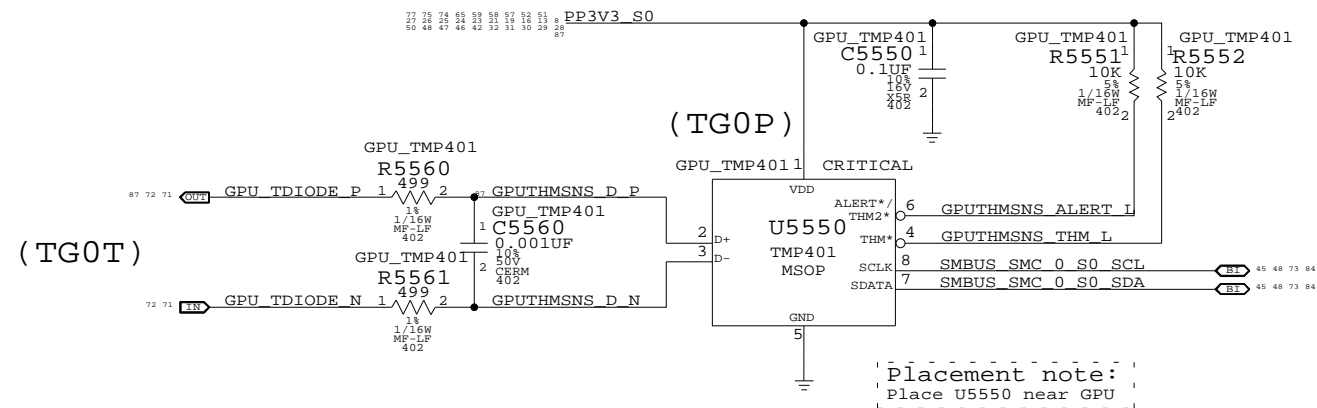
CPU T-Diode Thermal Sensor



GPU/Heat Pipe & Bottom Case Skin Thermal Sensor

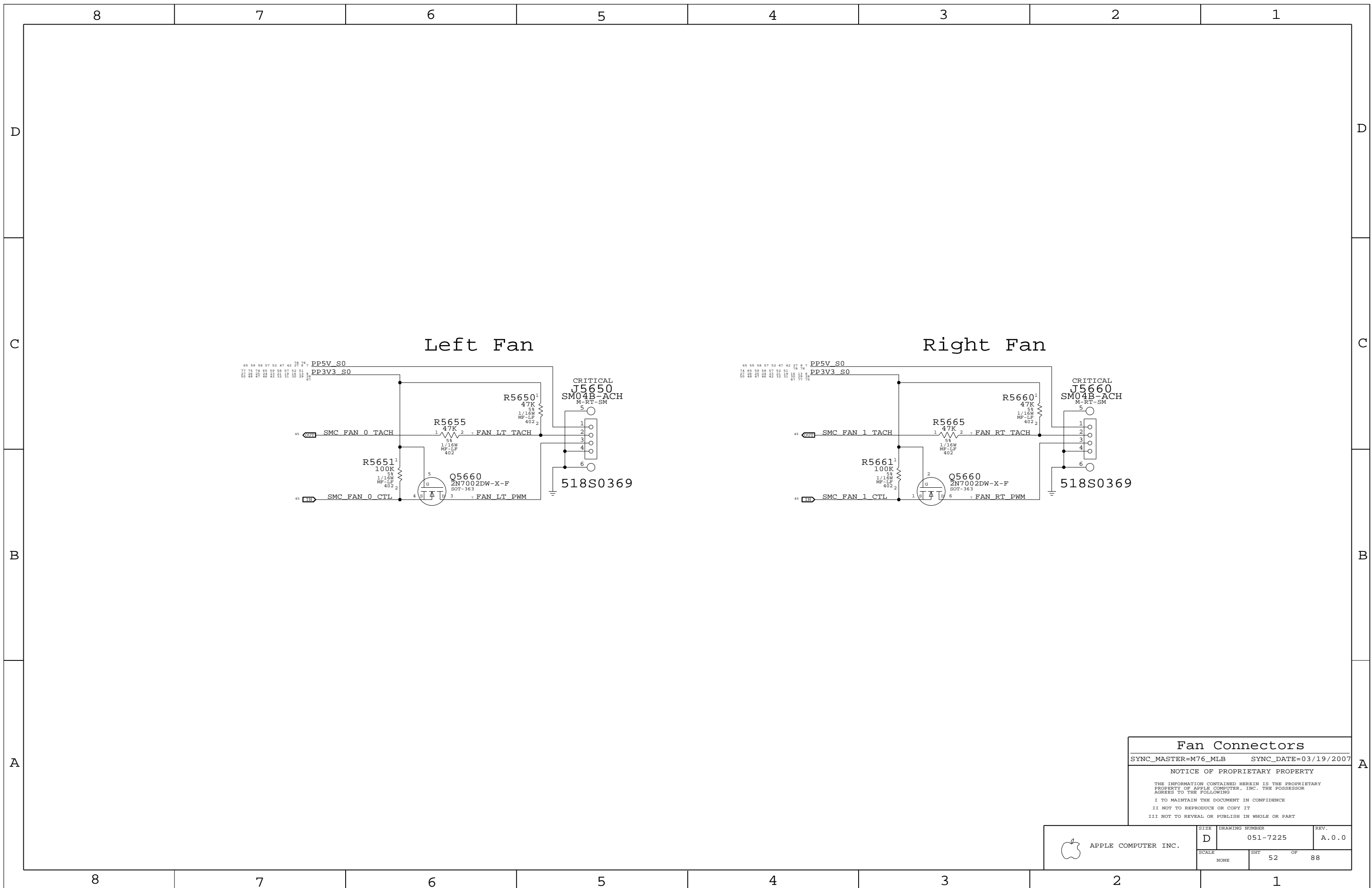


GPU Die Thermal Sensor



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



Fan Connectors

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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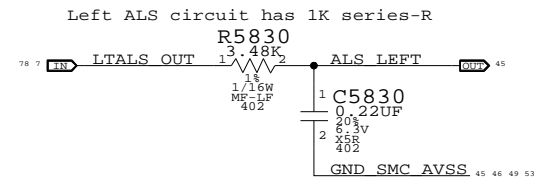
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

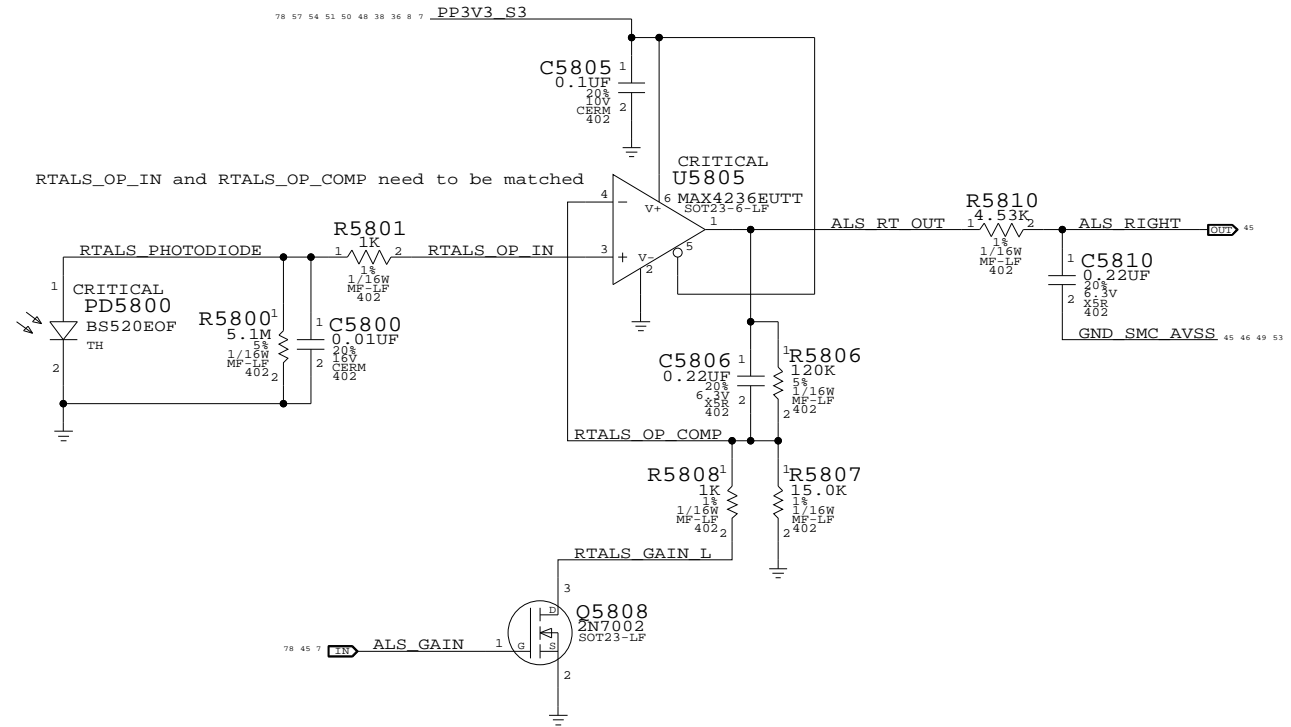
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

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

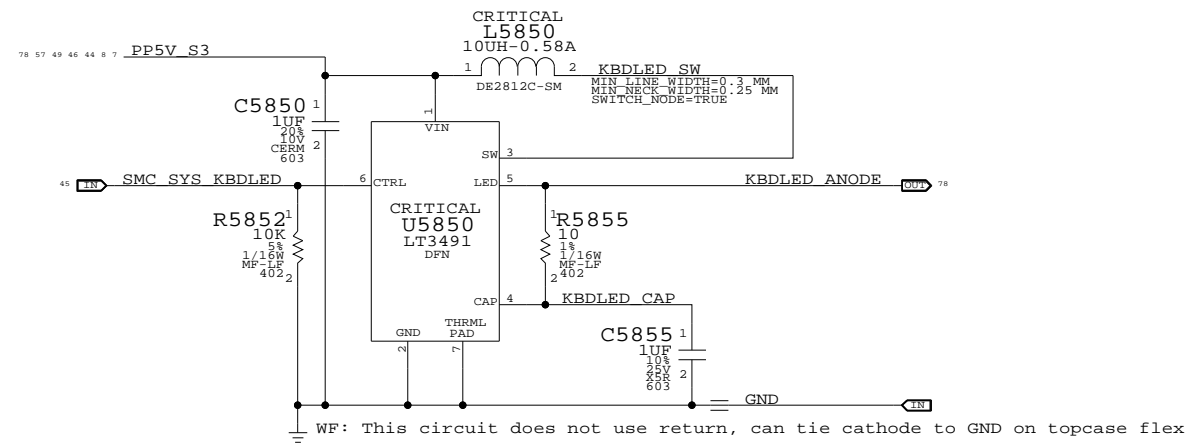
Left ALS Filter



Right ALS Circuit



Keyboard LED Driver



ALS Support

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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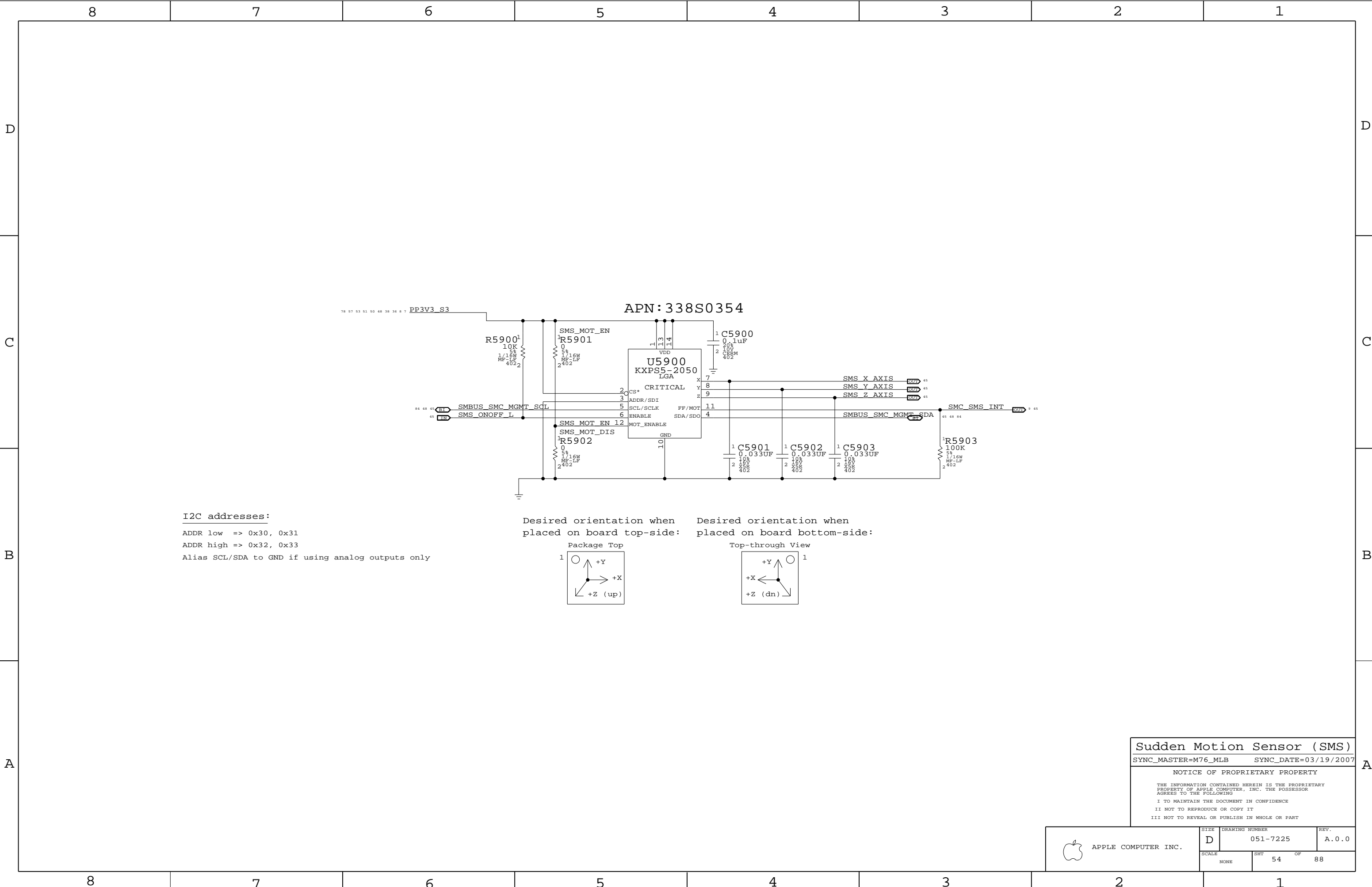
II NOT TO REPRODUCE OR COPY IT

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APPLE COMPUTER INC.

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



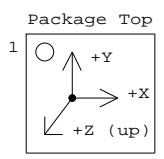
APN: 338S0354

I2C addresses:

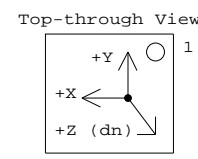
ADDR low => 0x30, 0x31
 ADDR high => 0x32, 0x33

Alias SCL/SDA to GND if using analog outputs only

Desired orientation when placed on board top-side:



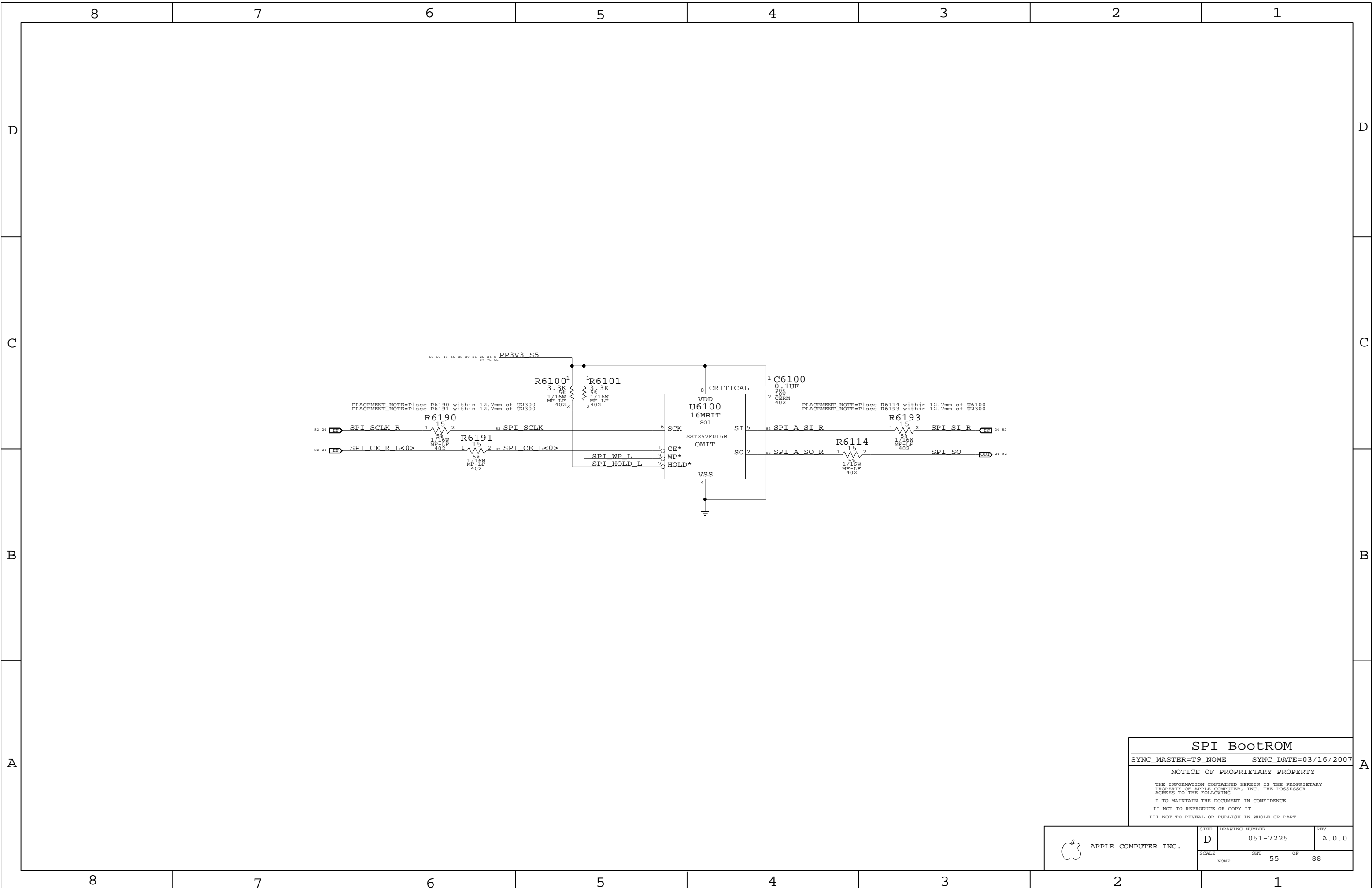
Desired orientation when placed on board bottom-side:



Sudden Motion Sensor (SMS)
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SCALE	SHT		OF
NONE	54		88



SPI BootROM

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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	SCALE NONE	SHEET 55	OF 88

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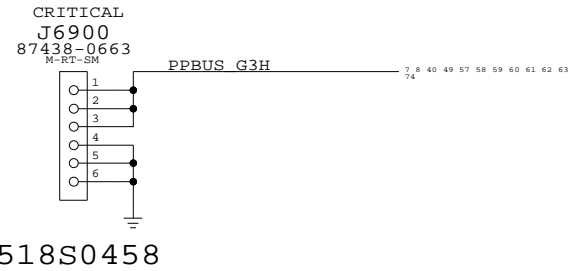
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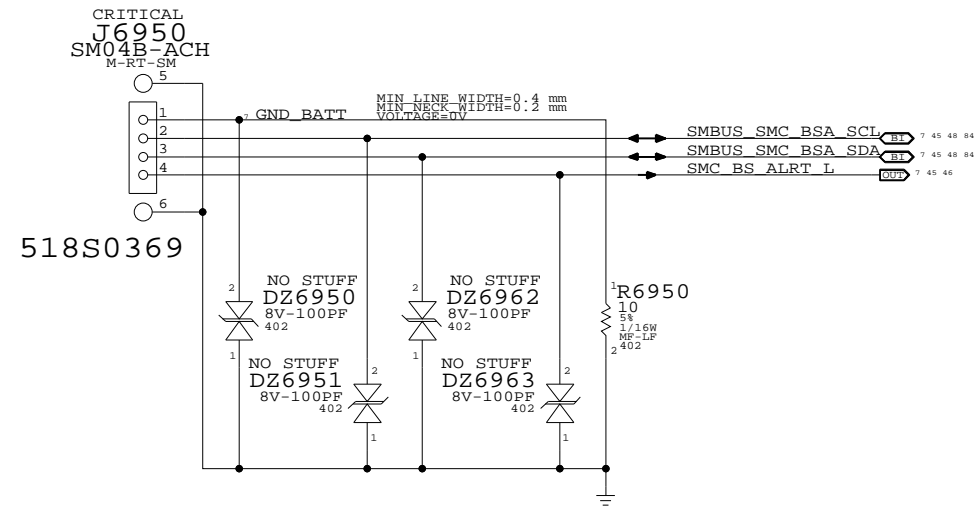
2

1

Left I/O Power Connector



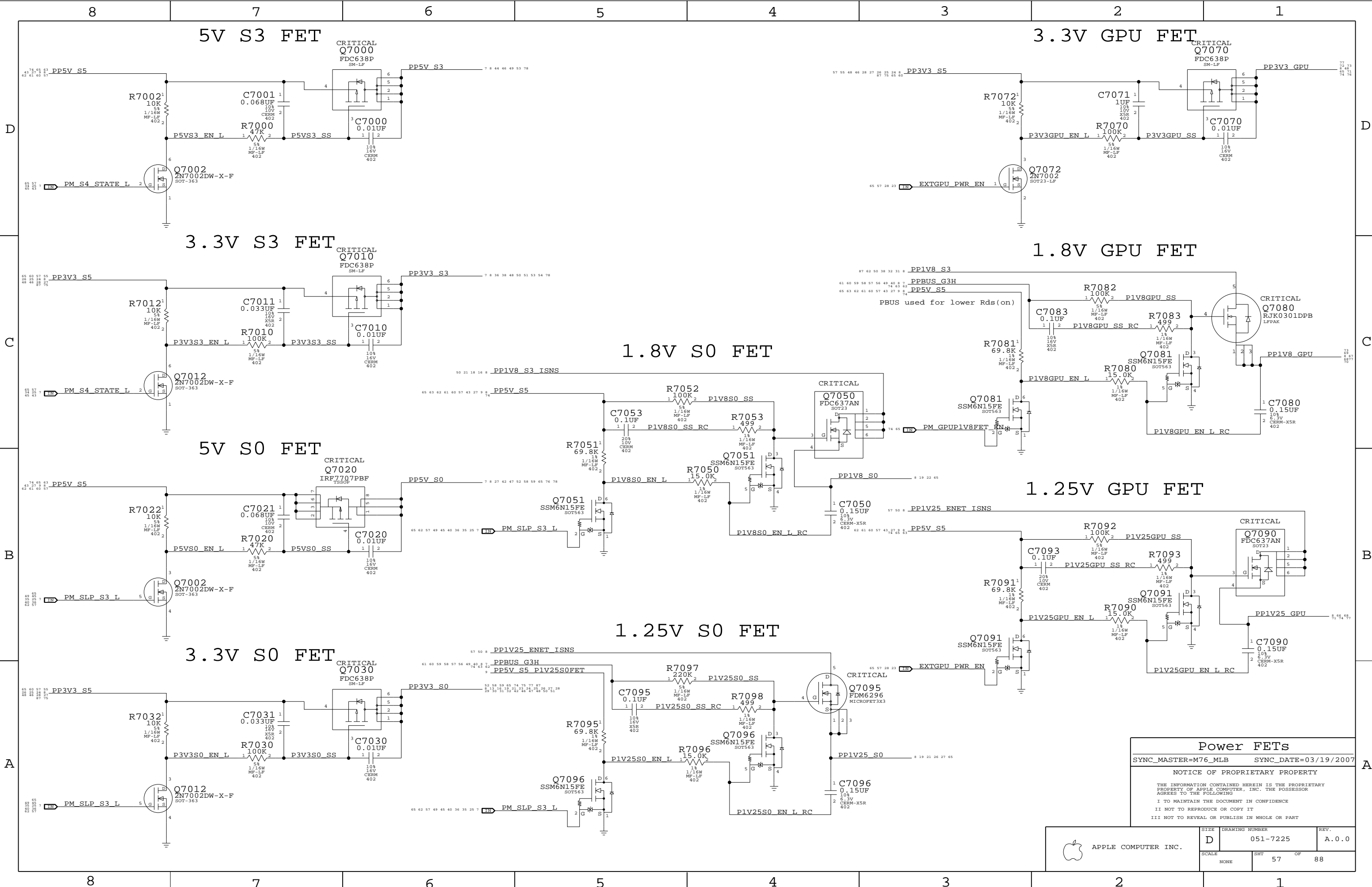
Battery Connector (Digital Signals)



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

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SCALE	SHT		OF
NONE	56		88



Power FETs

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

NOTICE OF PROPRIETARY PROPERTY

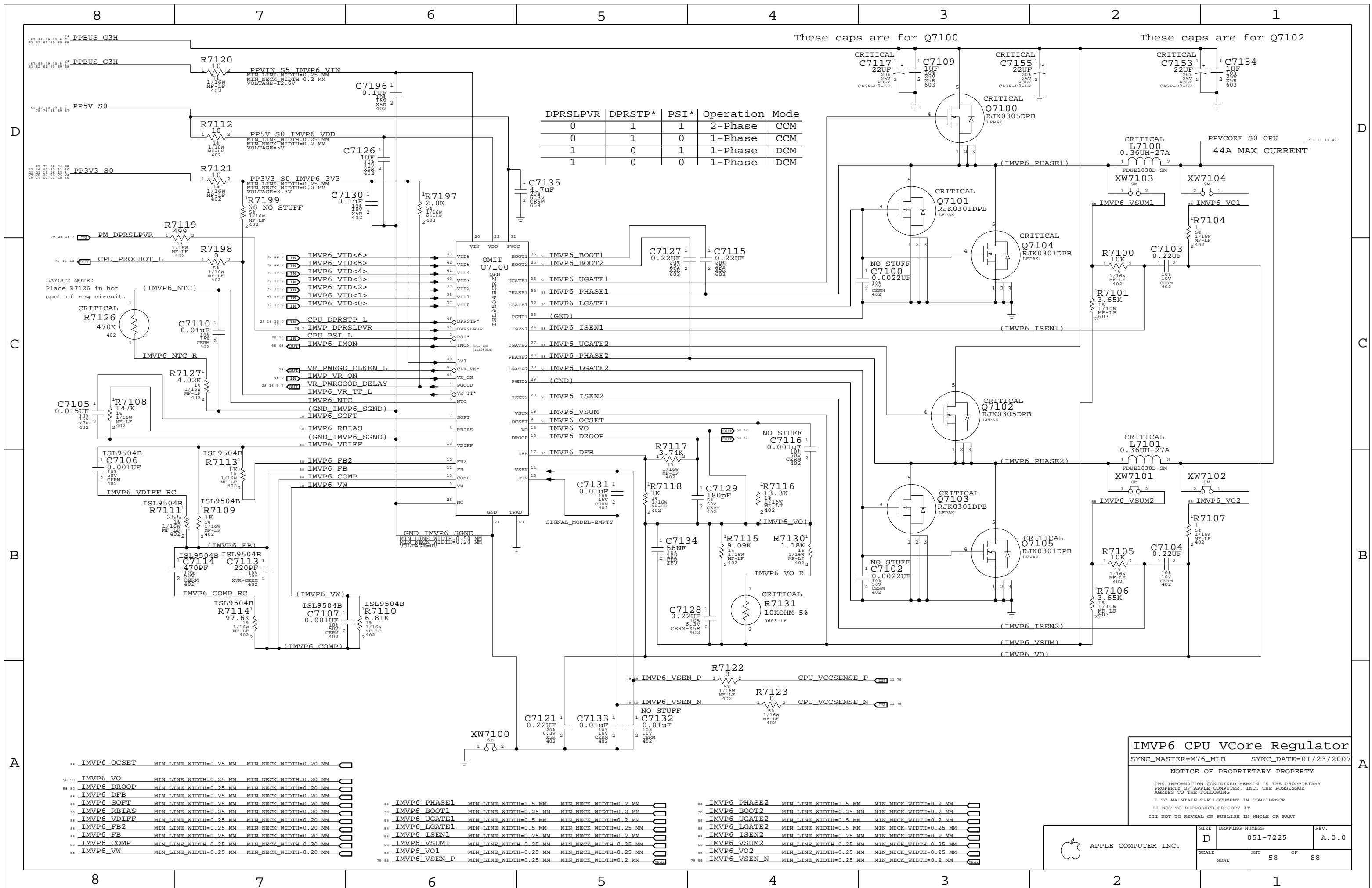
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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	57	88	



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

ISL9504	QFN
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
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69	69
70	70
71	71
72	72
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76	76
77	77
78	78
79	79
80	80

These caps are for Q7100

These caps are for Q7102

LAYOUT NOTE:
Place R7126 in hot spot of reg circuit.

IMVP6 CPU VCore Regulator

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

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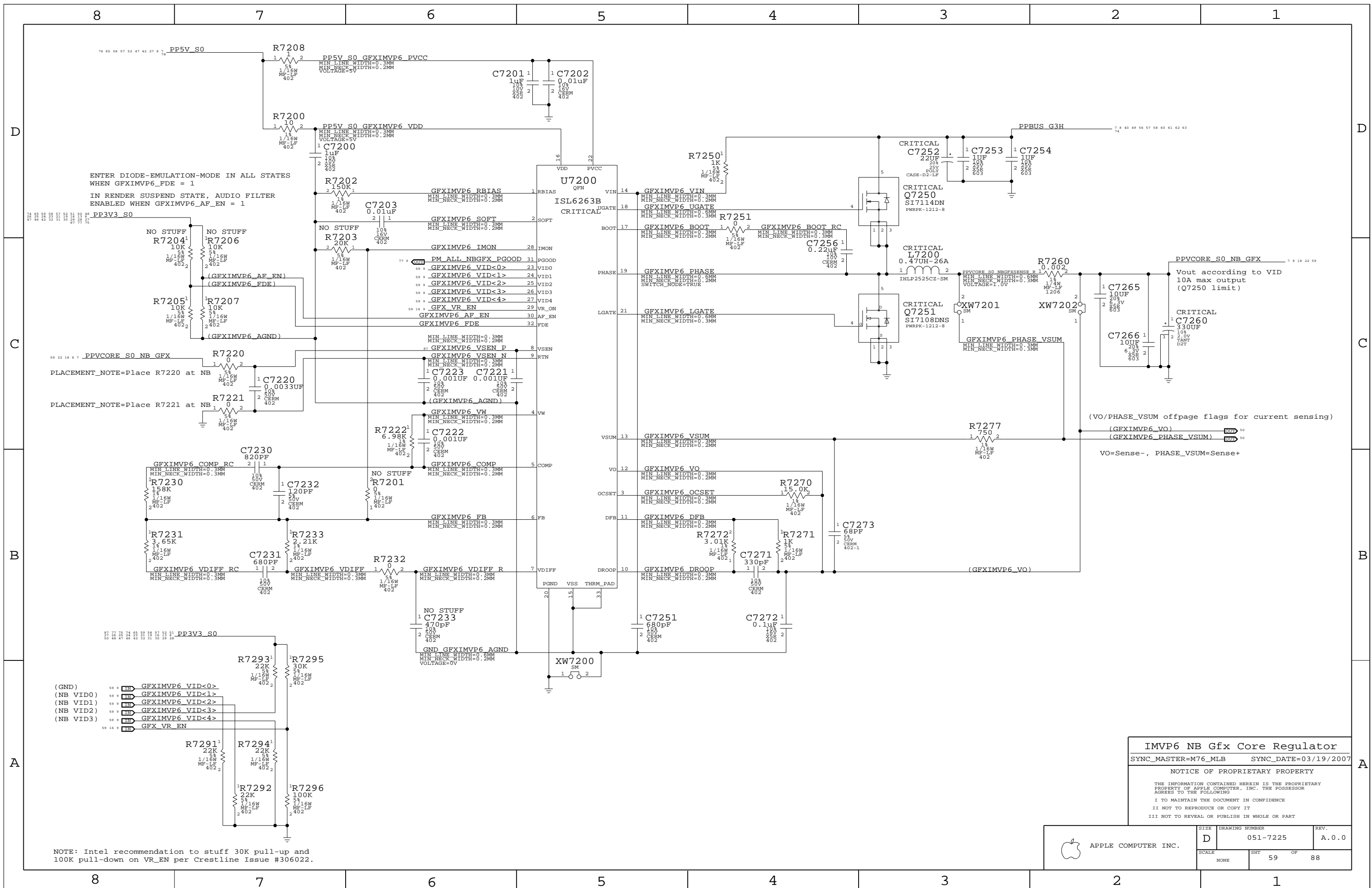
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SCALE	SHEET	OF	
NONE	58	OF	88

58	IMVP6_OCSET	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
59	IMVP6_VO	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
60	IMVP6_DROOP	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
61	IMVP6_DFB	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
62	IMVP6_SOFT	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
63	IMVP6_RBIAS	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
64	IMVP6_VDIFF	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
65	IMVP6_FB2	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
66	IMVP6_FB	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
67	IMVP6_COMP	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM
68	IMVP6_VW	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.20 MM

58	IMVP6_PHASE1	MIN_LINE_WIDTH=1.5 MM	MIN_NECK_WIDTH=0.2 MM
59	IMVP6_BOOT1	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM
60	IMVP6_BOOT2	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM
61	IMVP6_UGATE1	MIN_LINE_WIDTH=0.5 MM	MIN_NECK_WIDTH=0.2 MM
62	IMVP6_LGATE1	MIN_LINE_WIDTH=0.5 MM	MIN_NECK_WIDTH=0.25 MM
63	IMVP6_ISEN1	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM
64	IMVP6_VSUM1	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.25 MM
65	IMVP6_VO1	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.25 MM
66	IMVP6_VSEN_P	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM

58	IMVP6_PHASE2	MIN_LINE_WIDTH=1.5 MM	MIN_NECK_WIDTH=0.2 MM
59	IMVP6_BOOT2	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM
60	IMVP6_UGATE2	MIN_LINE_WIDTH=0.5 MM	MIN_NECK_WIDTH=0.2 MM
61	IMVP6_LGATE2	MIN_LINE_WIDTH=0.5 MM	MIN_NECK_WIDTH=0.25 MM
62	IMVP6_ISEN2	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM
63	IMVP6_VSUM2	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.25 MM
64	IMVP6_VO2	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.25 MM
65	IMVP6_VSEN_N	MIN_LINE_WIDTH=0.25 MM	MIN_NECK_WIDTH=0.2 MM



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

R7200 10k
C7200 1uF

PP5V_S0 GFXIMVP6 VDD

R7202 150k
C7203 0.01uF

U7200 ISL6263B

VIN 14
UGATE 18
BOOT 17
PHASE 19
LGATE 21

GFXIMVP6 VIN
GFXIMVP6 UGATE
GFXIMVP6 BOOT
GFXIMVP6 PHASE
GFXIMVP6 LGATE

IMON 28
PGOOD 31
VID0 23
VID1 24
VID2 25
VID3 26
VID4 27
VR_ON 29
AF_EN 30
FDE 32

PM_ALL_NBGFX_PGOOD
GFXIMVP6 VID<0>
GFXIMVP6 VID<1>
GFXIMVP6 VID<2>
GFXIMVP6 VID<3>
GFXIMVP6 VID<4>
GFX VR_EN
GFXIMVP6 AF_EN
GFXIMVP6 FDE

VSEN 8
RTN 9
VW 4
COMP 5
FB 6
VDIFF 7

GFXIMVP6 VSEN_P
GFXIMVP6 VSEN_N
GFXIMVP6 AGND
GFXIMVP6 VW
GFXIMVP6 COMP
GFXIMVP6 FB
GFXIMVP6 VDIFF

VSUM 13
VO 12
OCSET 3
DFB 11
DROOP 10

GFXIMVP6 VSUM
GFXIMVP6 VO
GFXIMVP6 OCSET
GFXIMVP6 DFB
GFXIMVP6 DROOP

PGND 20
VSS 15
THRM_PAD 33

GND GFXIMVP6 AGND

XW7200

C7252 22uF
C7253 1uF
C7254 1uF

R7250 1k
R7251 10k
C7256 0.22uF

L7200 0.47uH-26A
Q7250 SI7114DN
Q7251 SI7108DNS

R7260 0.002
C7265 10uF
C7266 10uF
C7260 330uF

R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF

R7277 750
C7271 330pF
C7272 0.1uF

R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

C7230 820pF
C7232 120pF
C7231 680pF
C7233 2.21k
C7232 6.98k
C7233 470pF
C7231 680pF
C7232 0.1uF

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

R7204 10k
R7206 10k
R7207 10k
R7208 10k
R7203 20k
R7220 10k
R7221 10k
R7222 6.98k
R7223 10k
R7221 10k
R7222 0.001uF
R7223 0.001uF
R7201 10k
R7270 150k
R7272 3.01k
R7271 1k
C7273 68pF
R7293 22k
R7295 30k
R7294 22k
R7292 22k
R7296 100k

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

NO STUFF R7204 10k

NO STUFF R7206 10k

(GFXIMVP6_AF_EN)

(GFXIMVP6_FDE)

R7205 10k

R7207 10k

(GFXIMVP6_AGND)

PPVCORE_S0_NB_GFX

R7220 10k

PLACEMENT_NOTE=Place R7220 at NB

C7220 0.0033uF

R7221 10k

PLACEMENT_NOTE=Place R7221 at NB

C7223 0.001uF

C7221 0.001uF

(GFXIMVP6_AGND)

GFXIMVP6 VSEN_P

GFXIMVP6 VSEN_N

GFXIMVP6 VW

GFXIMVP6 COMP

GFXIMVP6 FB

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

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GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

GFXIMVP6 VDIFF

IMVP6 NB Gfx Core Regulator

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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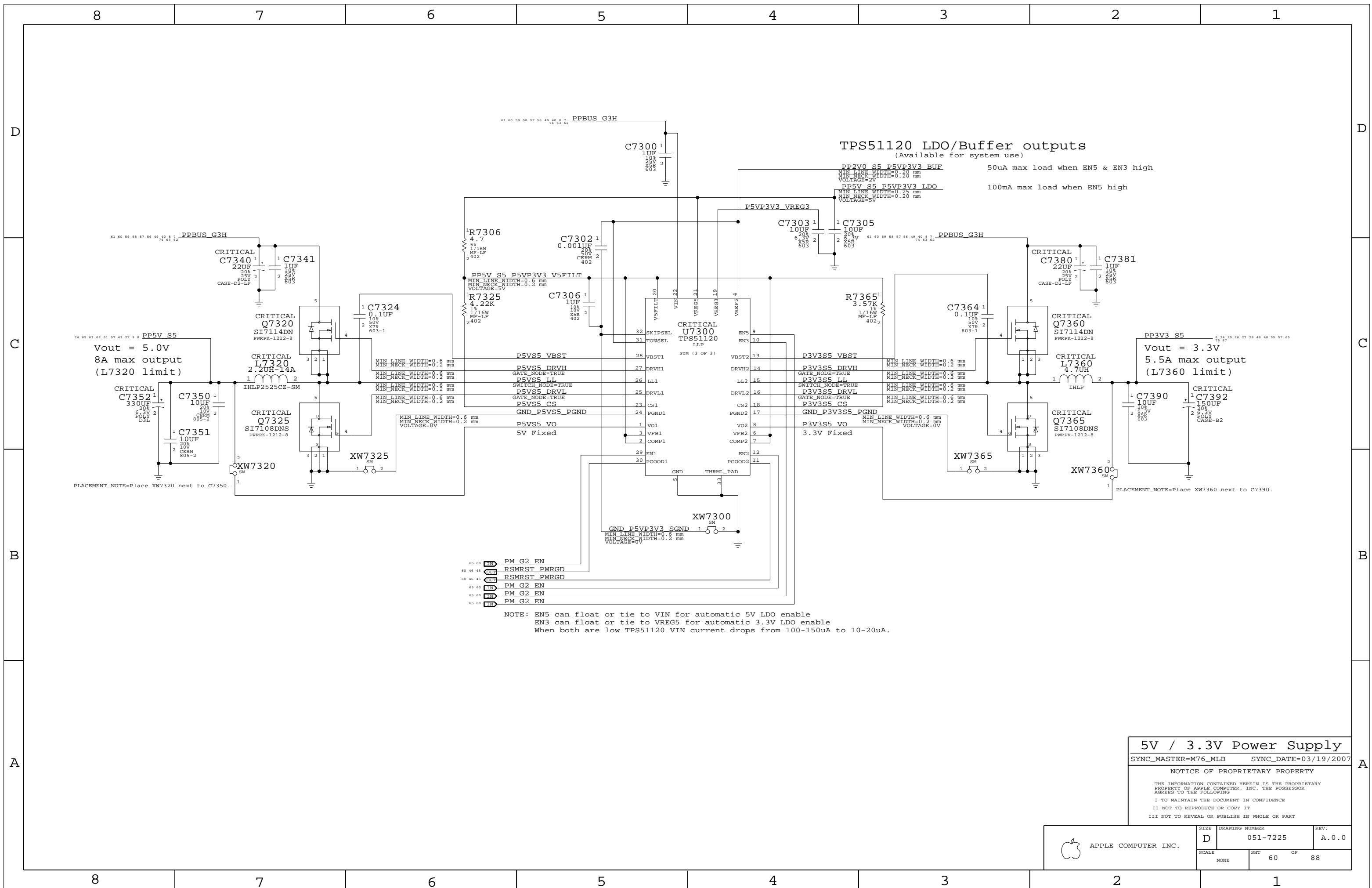
SCALE DRAWING NUMBER REV.
NONE D 051-7225 A.0.0

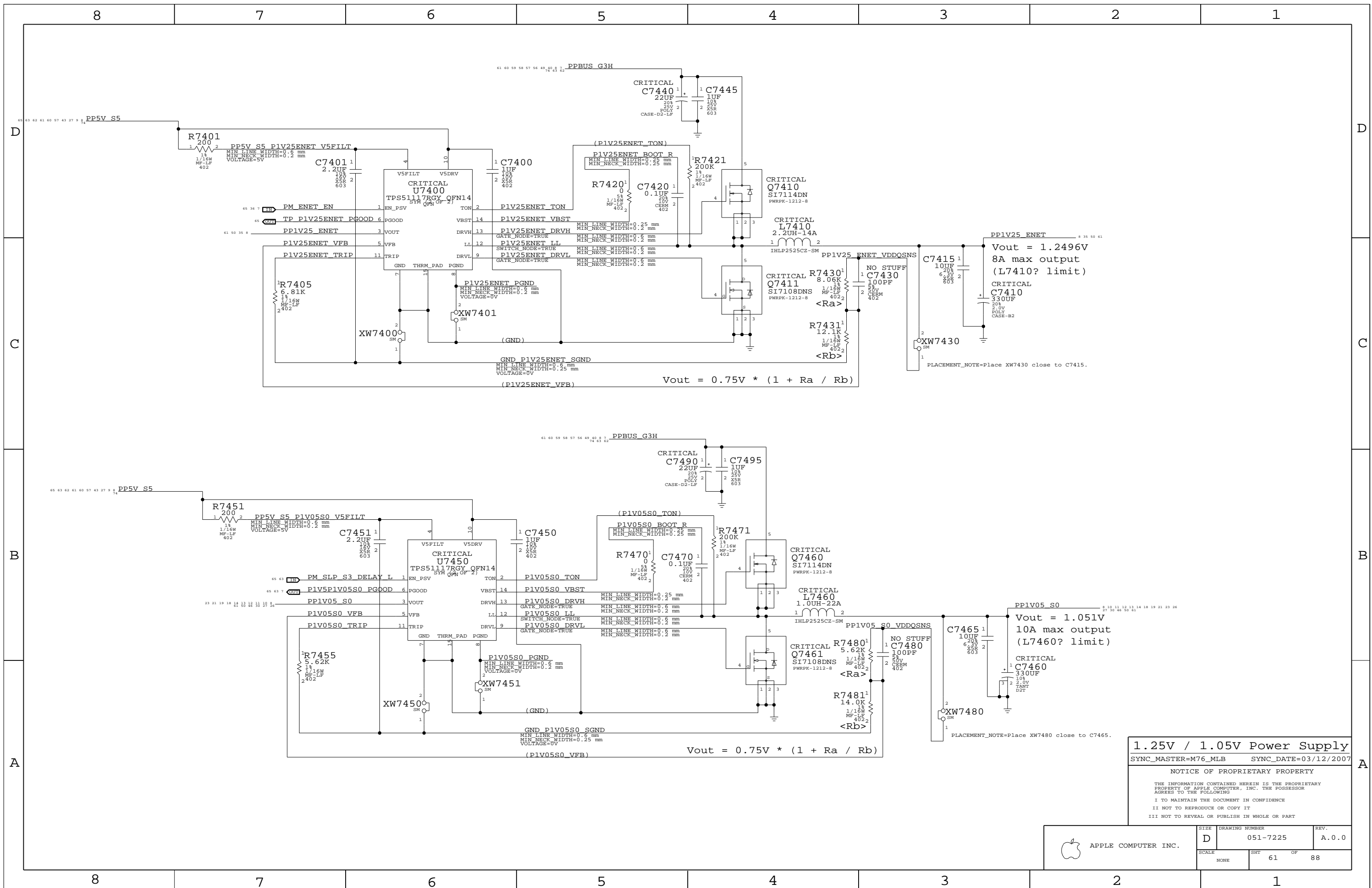
SHEET 59 OF 88

APPLE COMPUTER INC.

NOTE: Intel recommendation to stuff 30K pull-up and
100K pull-down on VR_EN per Crestline Issue #306022.

8 7 6 5 4 3 2 1

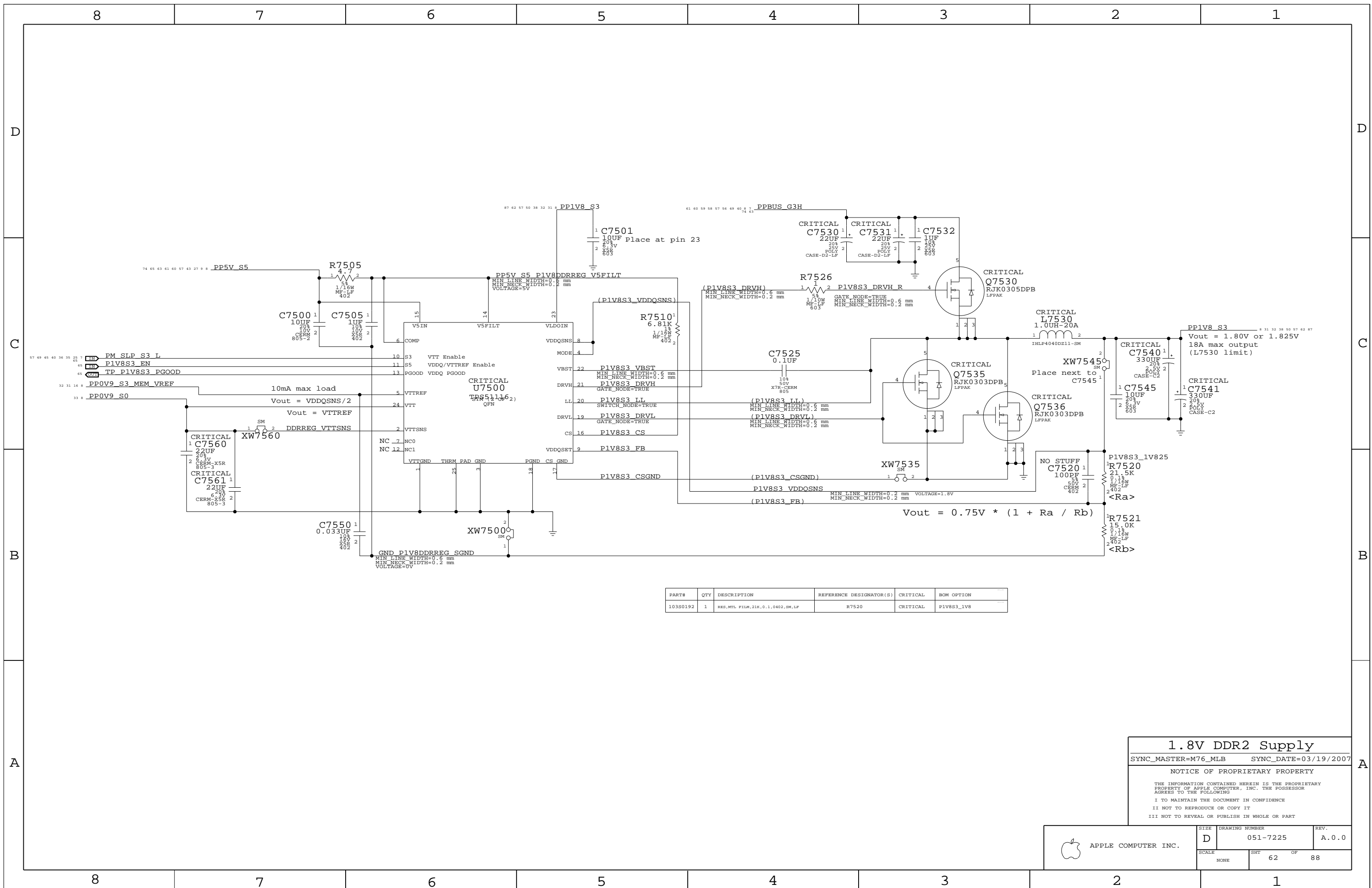




1.25V / 1.05V Power Supply
 SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	61	88	



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
10380192	1	RES,MTL FILM,21K,0.1,0402,SM,LF	R7520	CRITICAL	P1V8S3_1V8

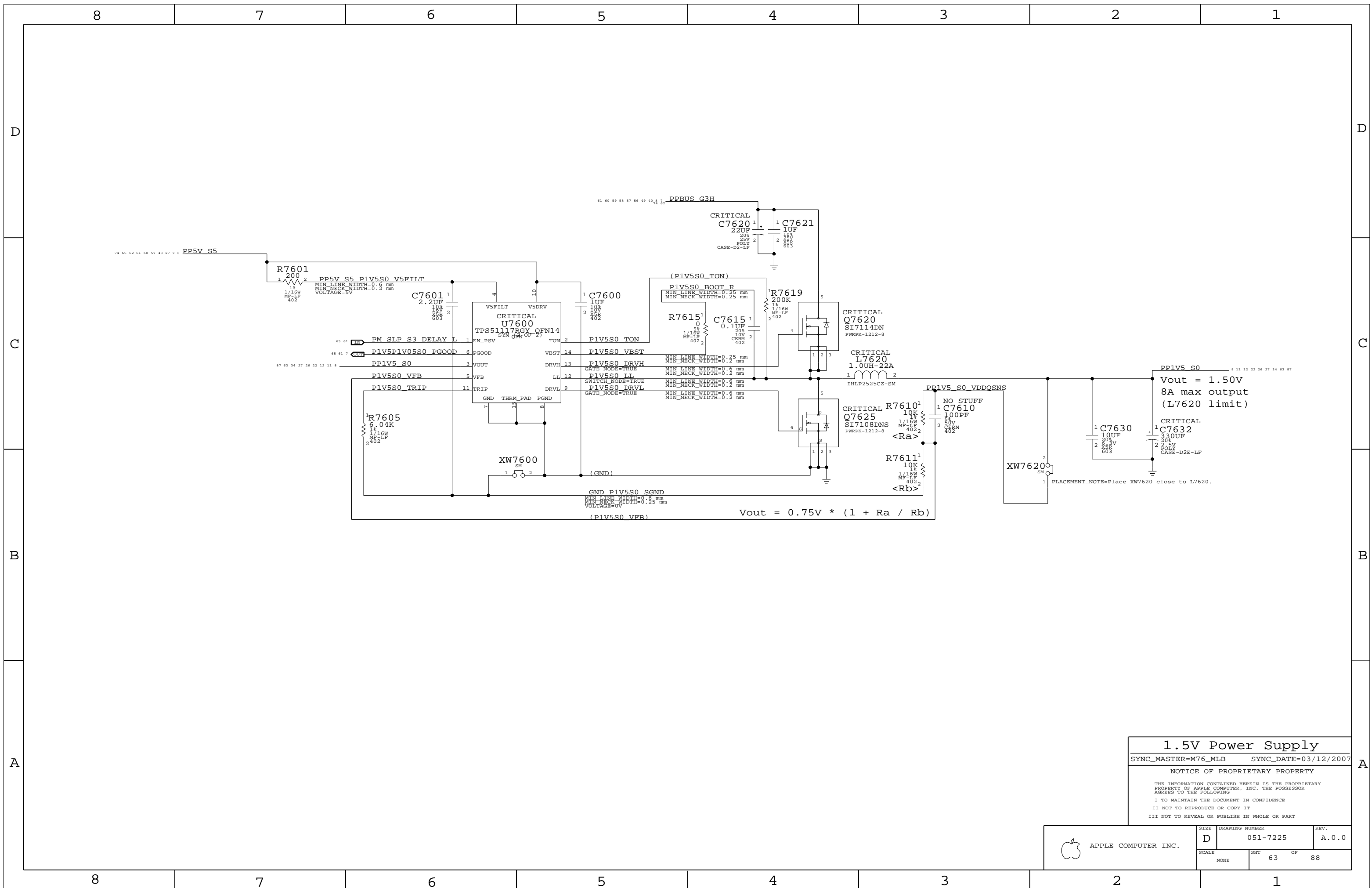
1.8V DDR2 Supply
 SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	62	88	

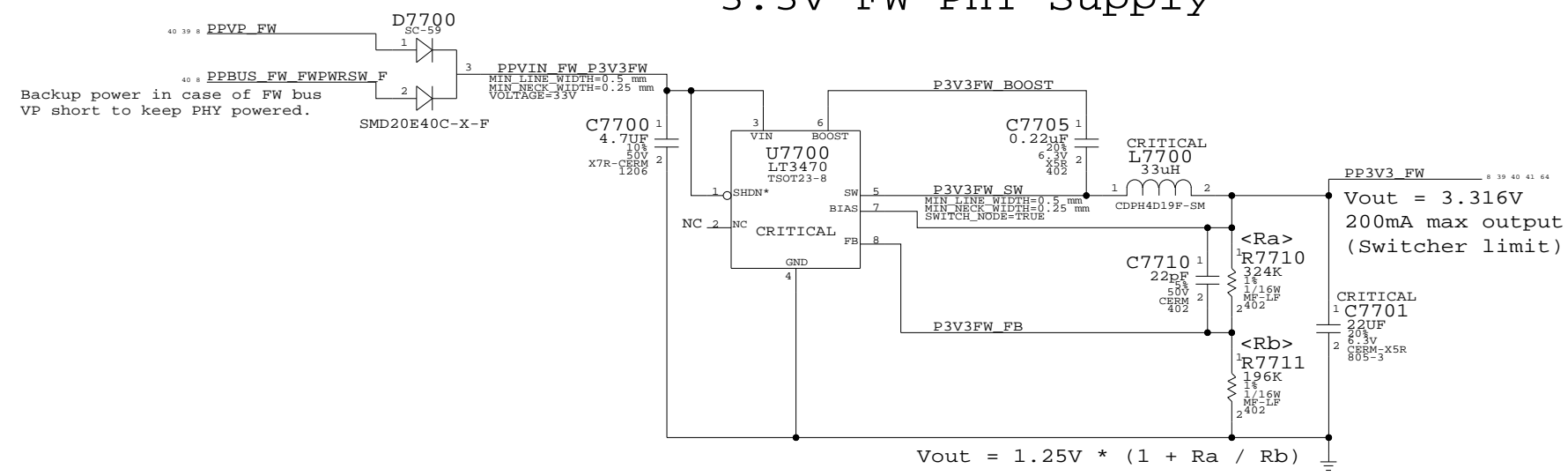


1.5V Power Supply
 SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

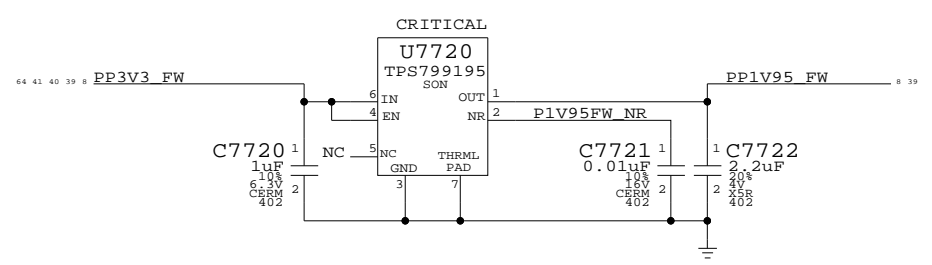
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	88
NONE	63		

3.3V FW PHY Supply



1.95V FW PHY Supply



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

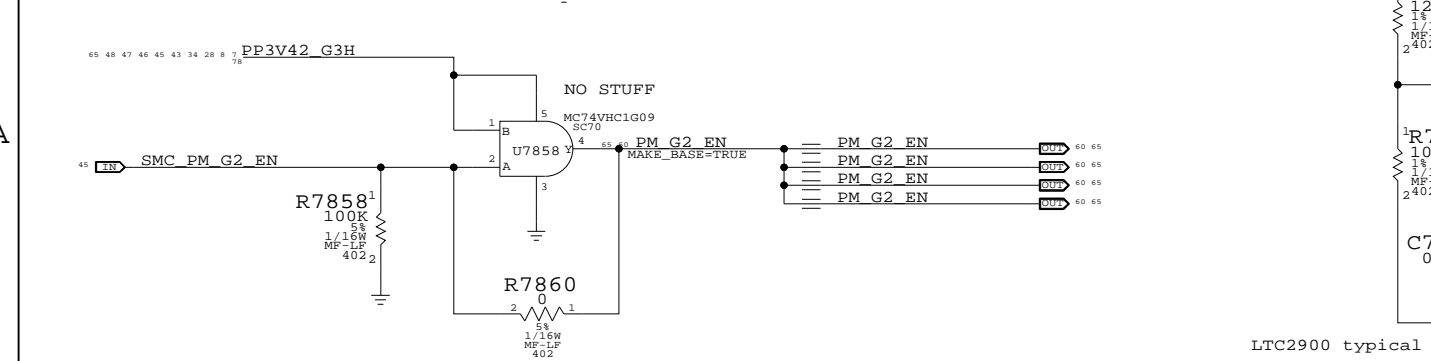
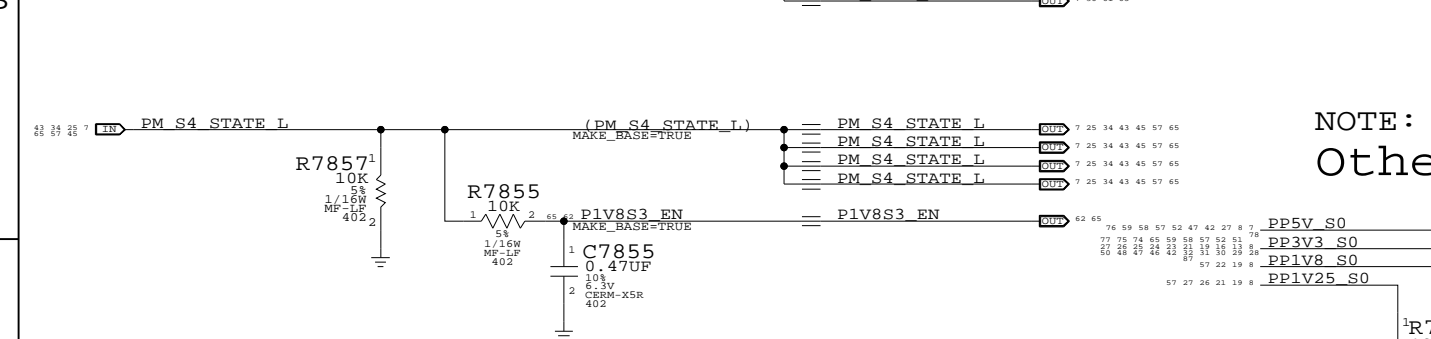
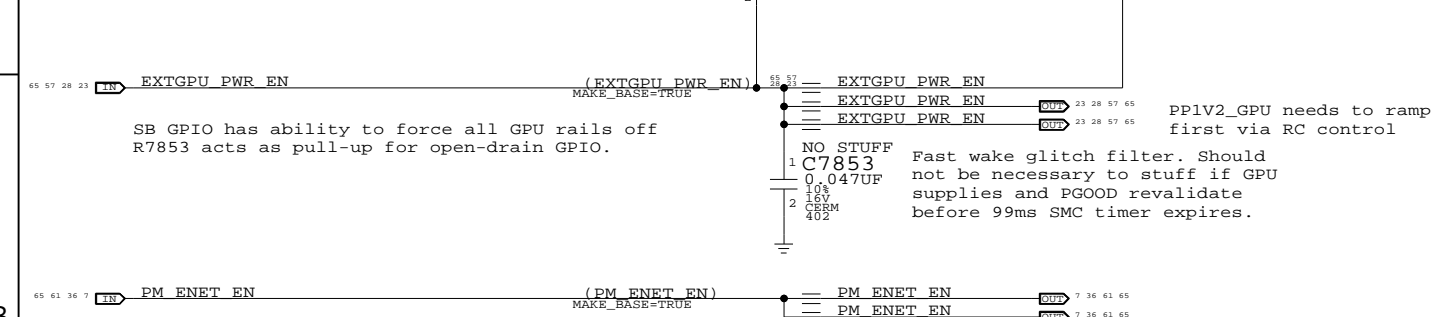
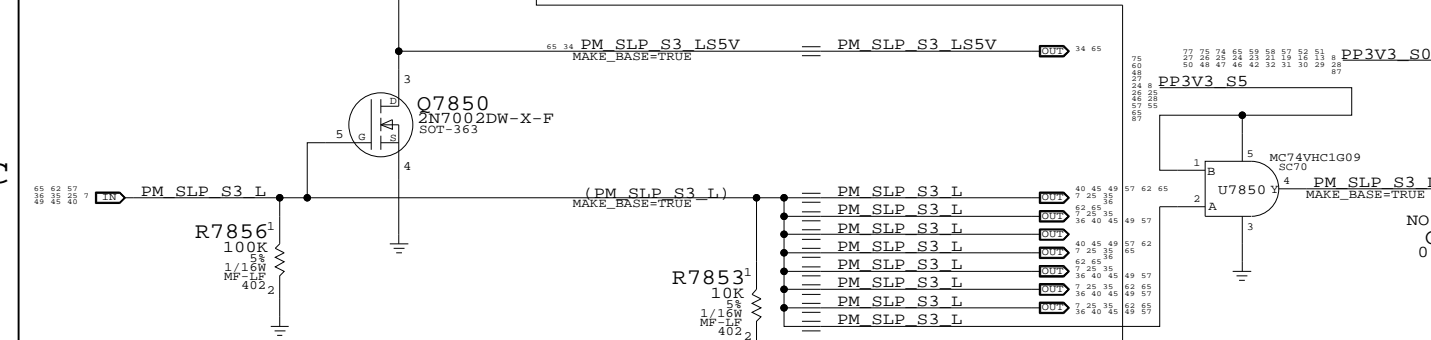
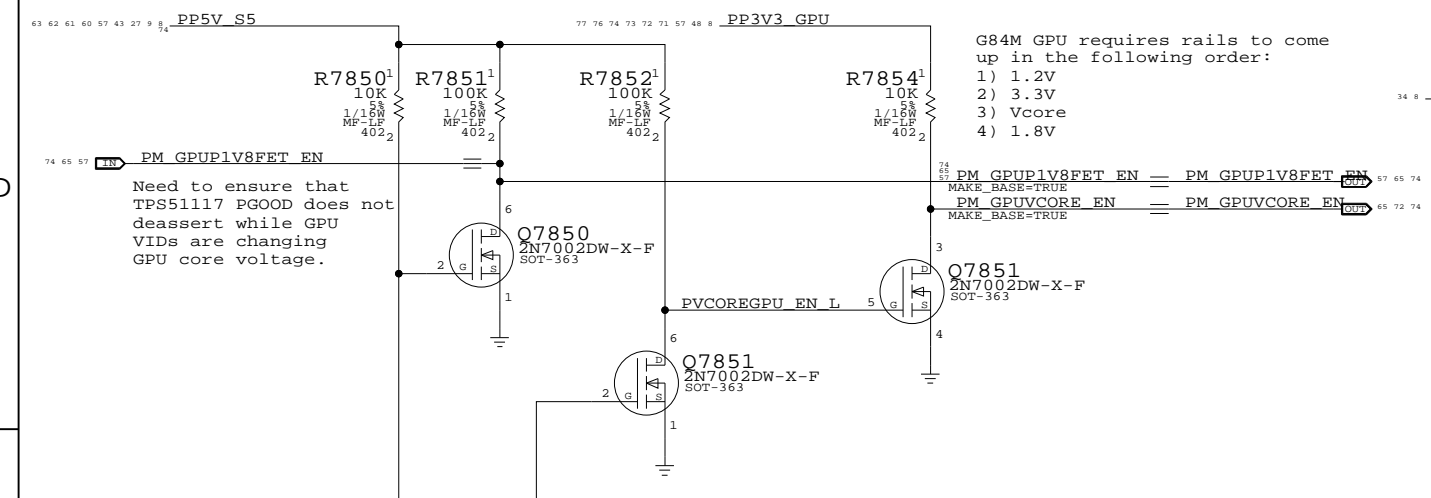
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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. A.0.0
	SCALE NONE	SHEET 64	OF 88

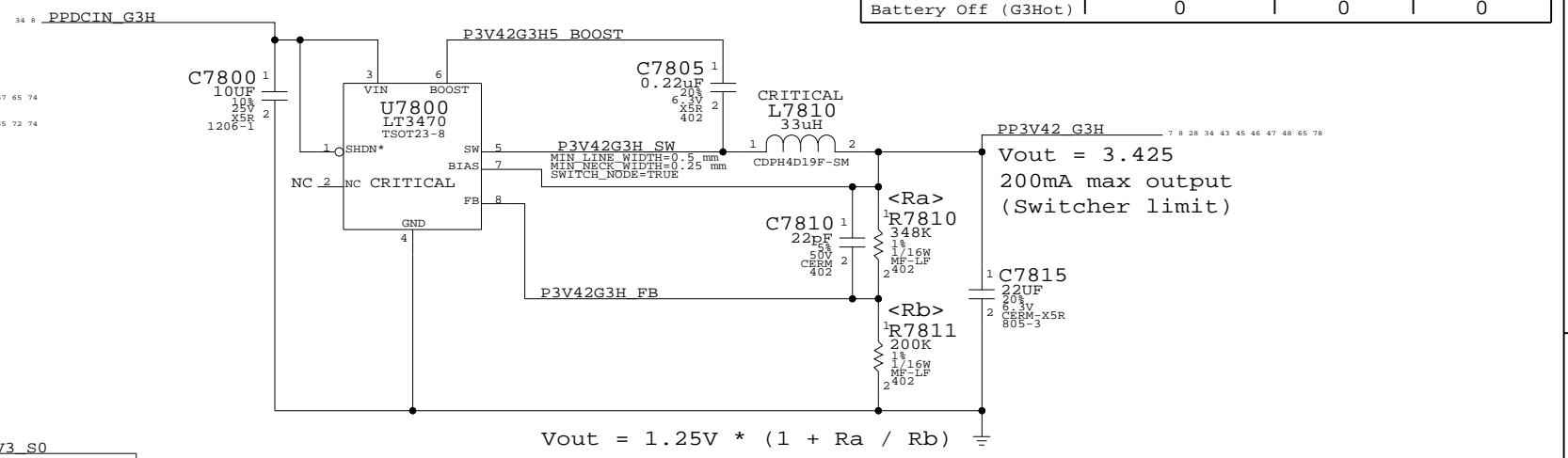
Power Control Signals



3.425V "G3Hot" Supply

Supply needs to guarantee 3.31V delivered to SMC Vref generator

State	SMC_PM_G2_ENABLE	PM_SLP_S4_L	PM_SLP_S3_L
Run (S0)	1	1	1
Sleep (S3)	1	1	0
Soft-Off (S5)	1	0	0
Battery Off (G3Hot)	0	0	0



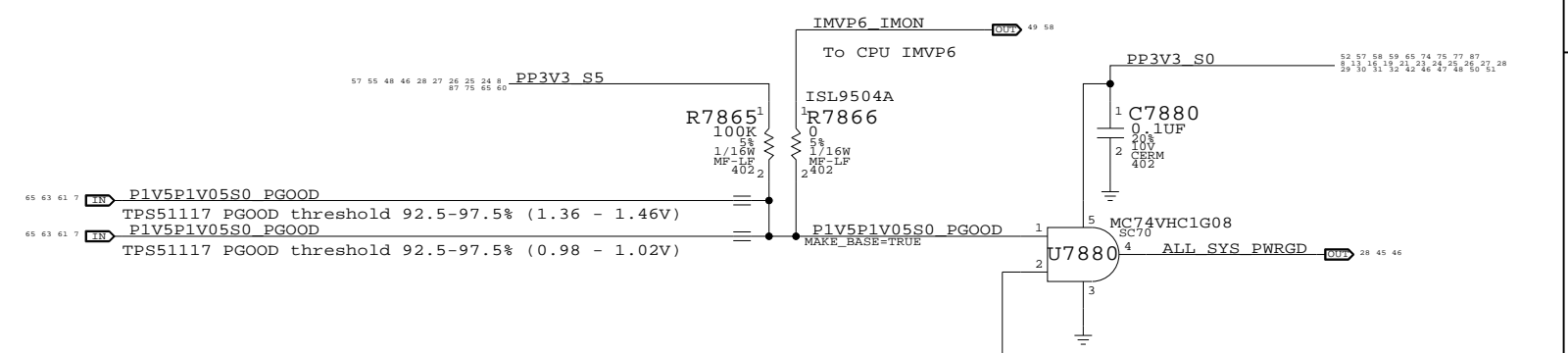
Vout = 3.425
200mA max output
(Switcher limit)

Unused PGOOD Signals

TP_P1V25ENET_PGOOD	=	TP_P1V25ENET_PGOOD
TP_P1V8S3_PGOOD	=	TP_P1V8S3_PGOOD

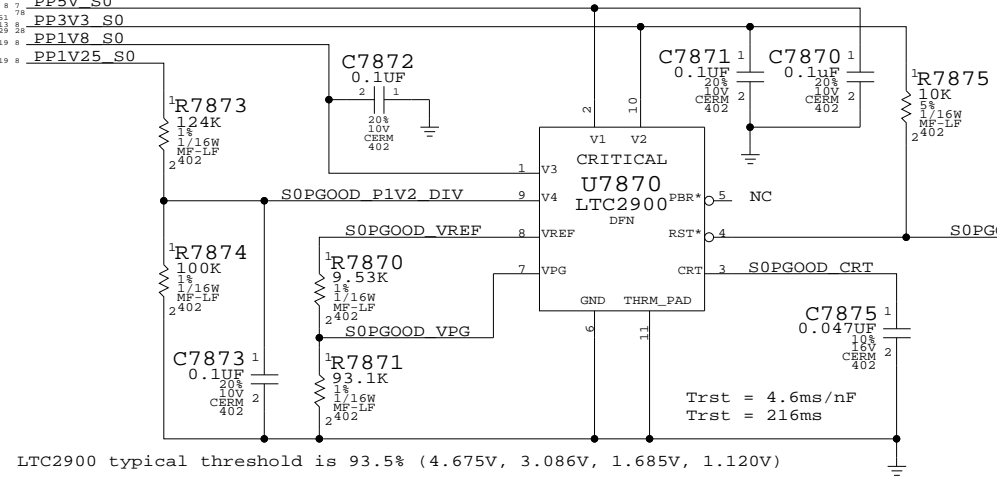
1.5V / 1.05V PWRGD Circuit

Reports when 1.5V S0 and 1.05V S0 are in regulation



NOTE: 0.9V/2.5V is not checked! Other S0 Rails PWRGD Circuit

Does not include GFX rails



3.425V G3Hot Supply & Power Control

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	65	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:

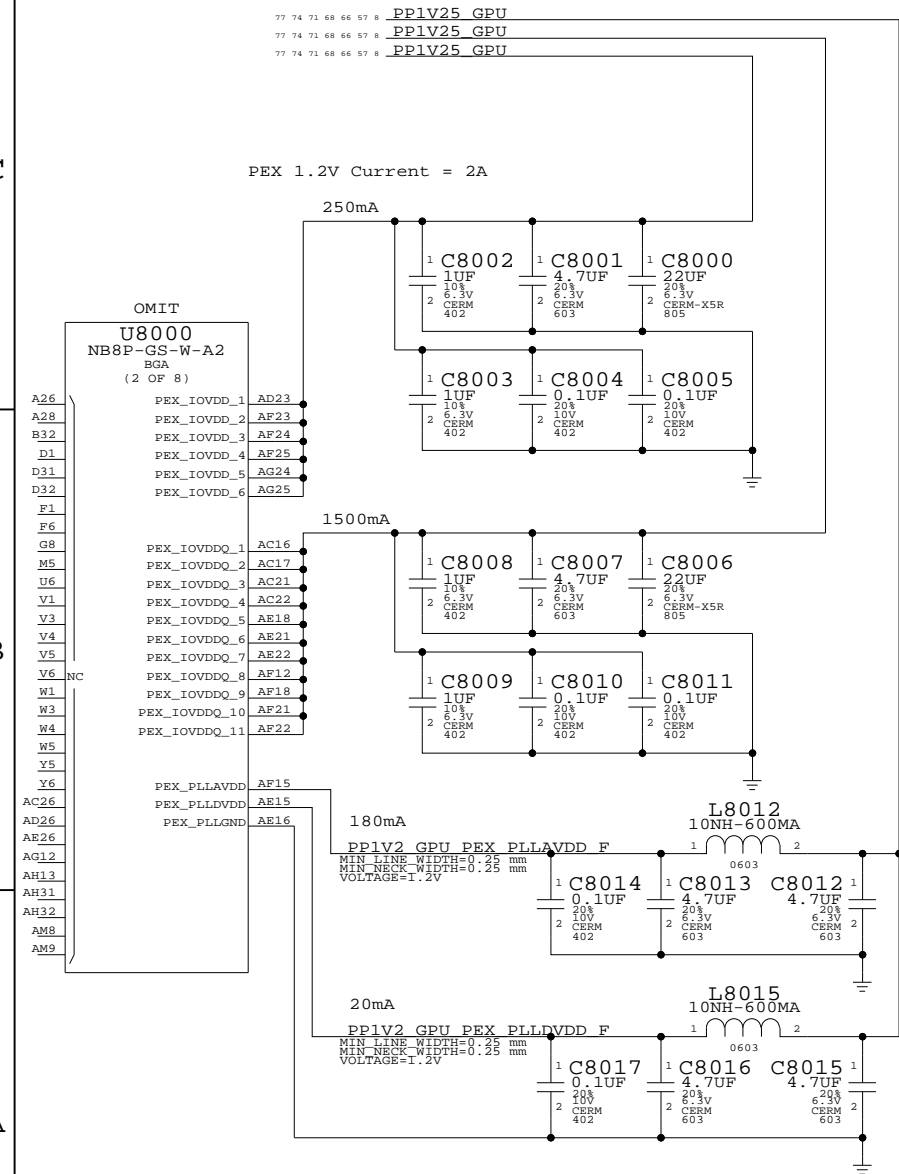
(NONE)

D

C

B

A



OMIT
U8000
NB8P-GS-W-A2
BGA
(1 OF 8)

PCI EXPRESS BUS INTERFACE



NV G84M PCI-E
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	66	88	

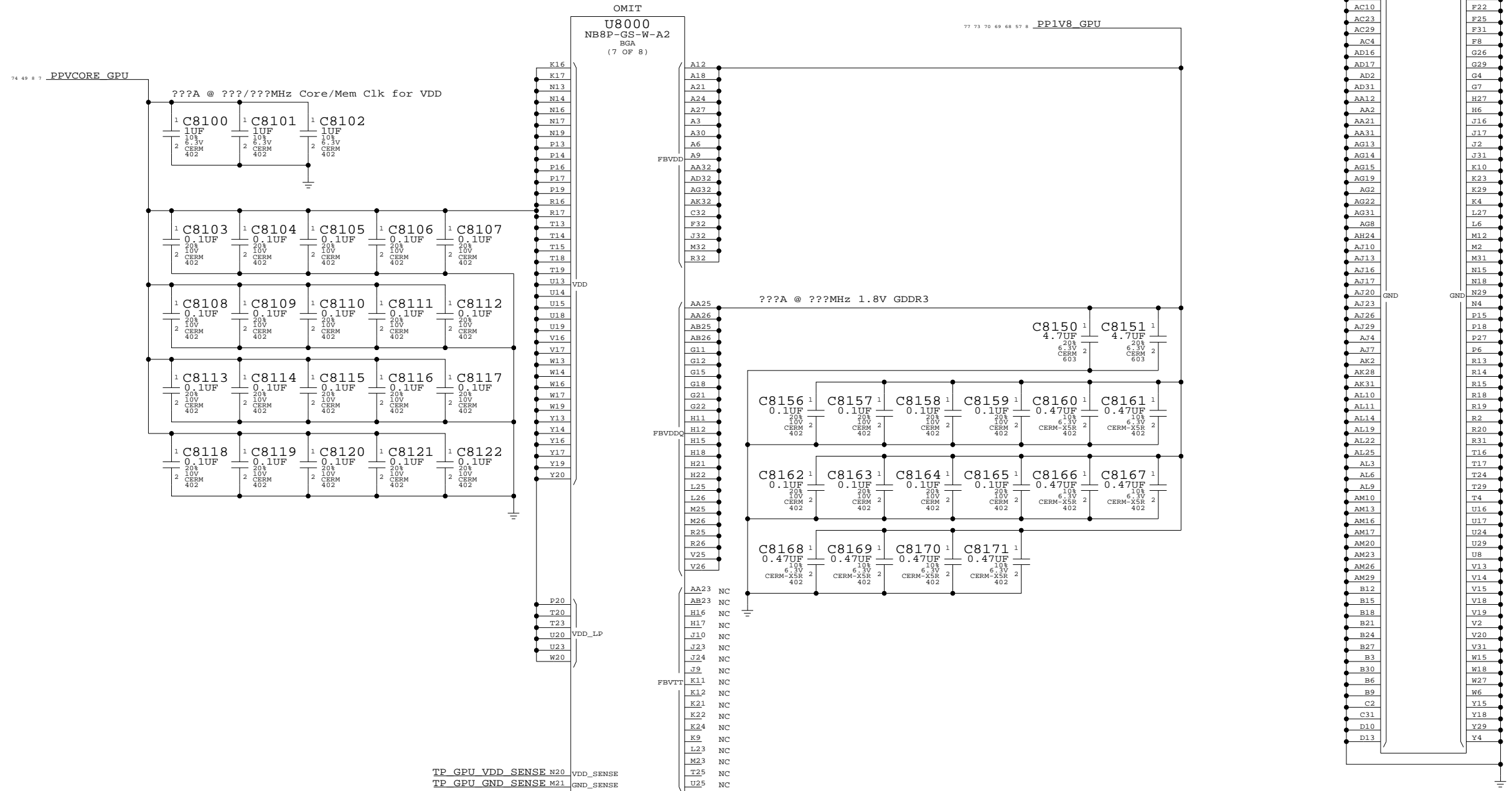
Page Notes

Power aliases required by this page:

- =PPVCORE_GPU
- =PP1V8_GPU_FBVDQ

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)

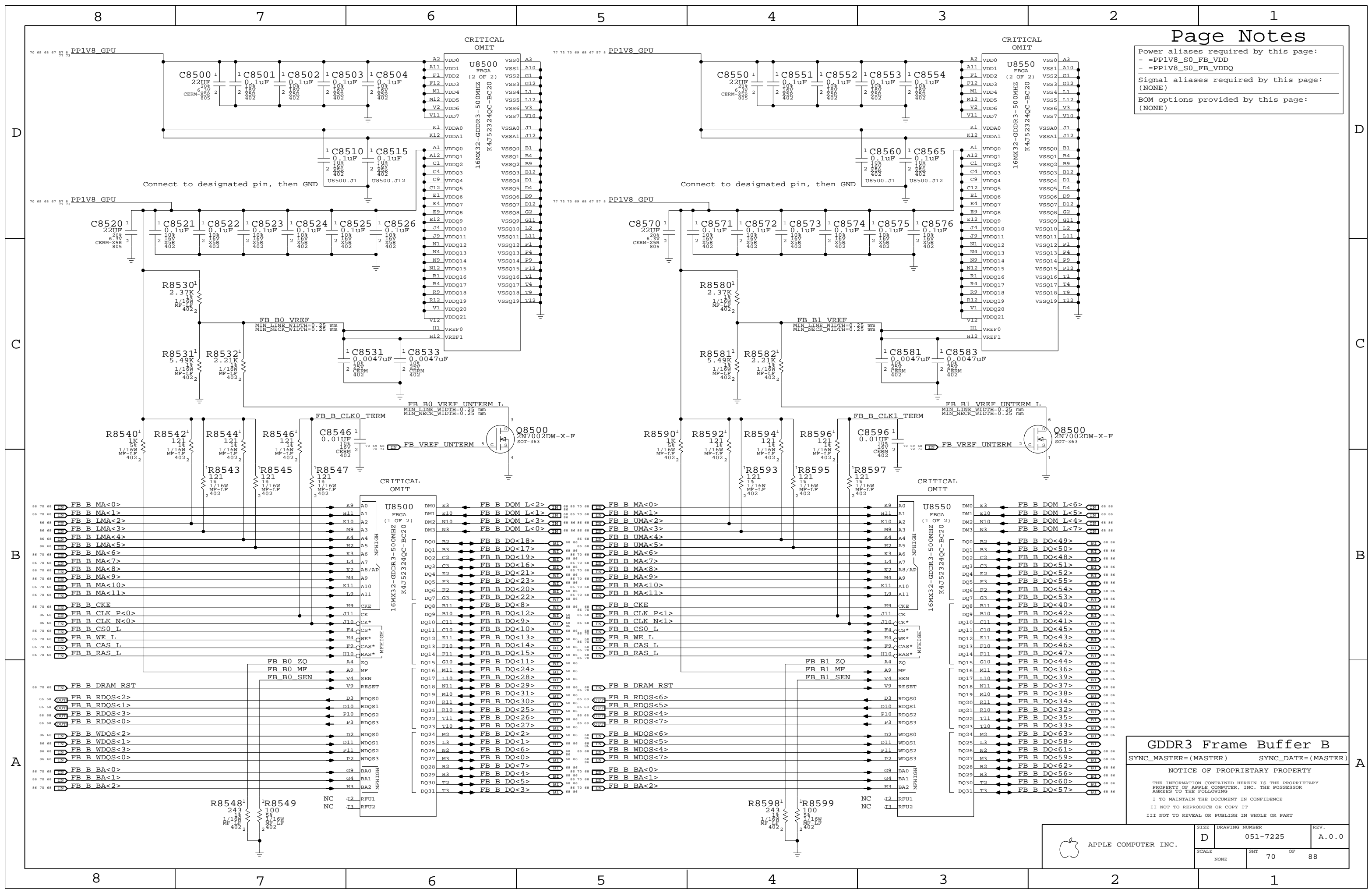


NV G84M Core/FB Power
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT		OF
NONE	67		88

Power aliases required by this page:
- =PP1V8_S0_FB_VDD
- =PP1V8_S0_FB_VDDQ
Signal aliases required by this page:
(NONE)
BOM options provided by this page:
(NONE)



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

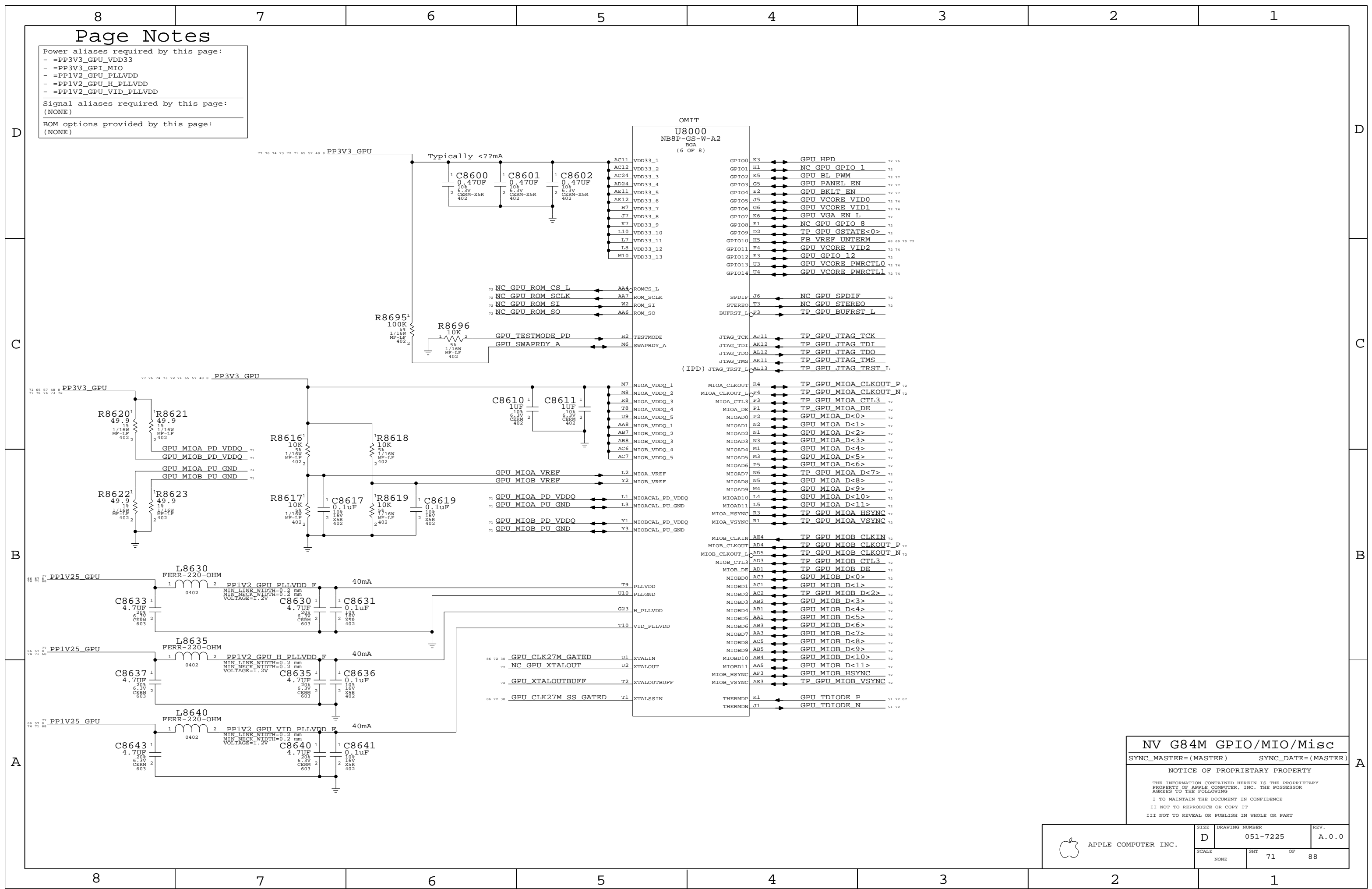
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Page Notes

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)



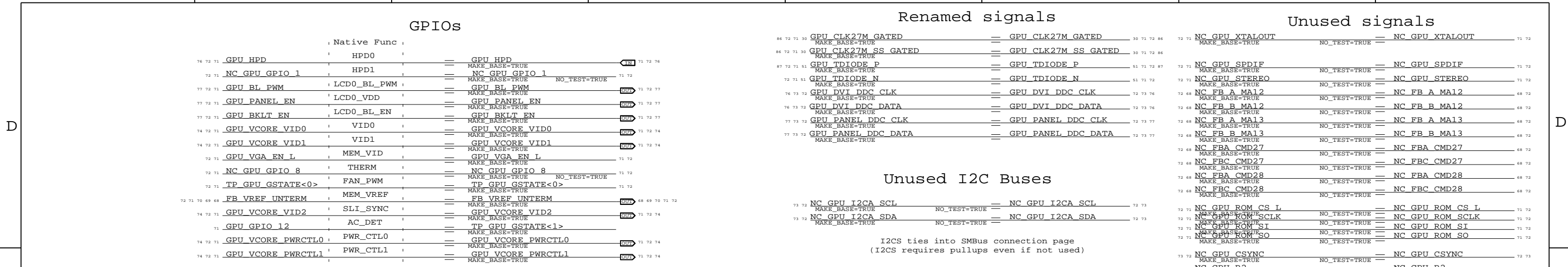
NV G84M GPIO/MIO/Misc

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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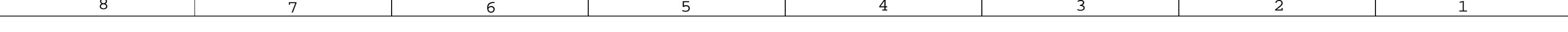
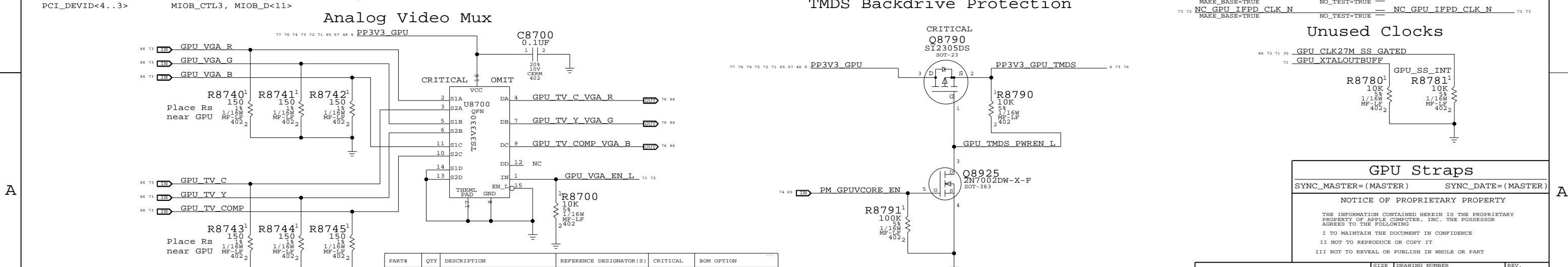
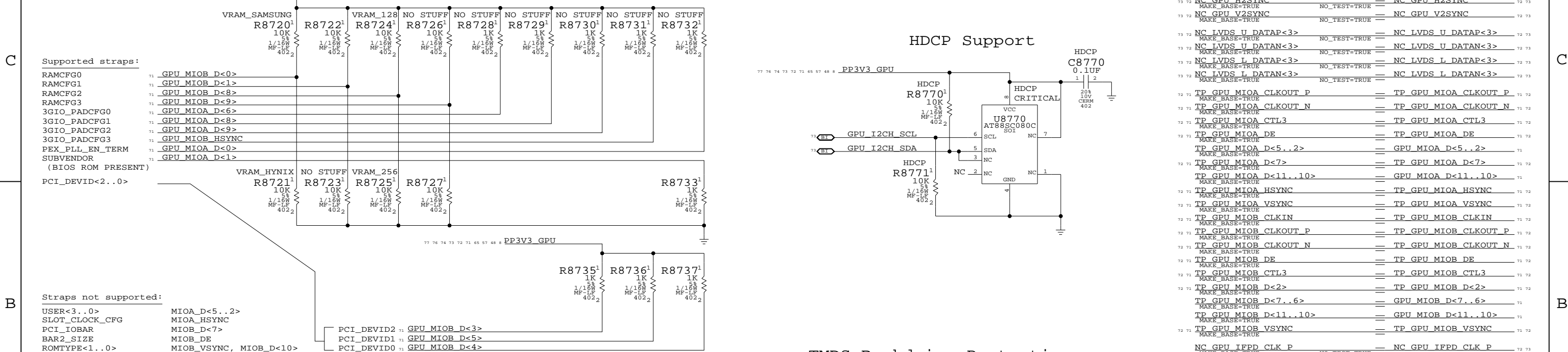
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	71	88	



Unused I2C Buses

NC_GPU_I2CA_SCL	NC_GPU_I2CA_SCL
NC_GPU_I2CA_SDA	NC_GPU_I2CA_SDA

I2CS ties into SMBus connection page (I2CS requires pullups even if not used)

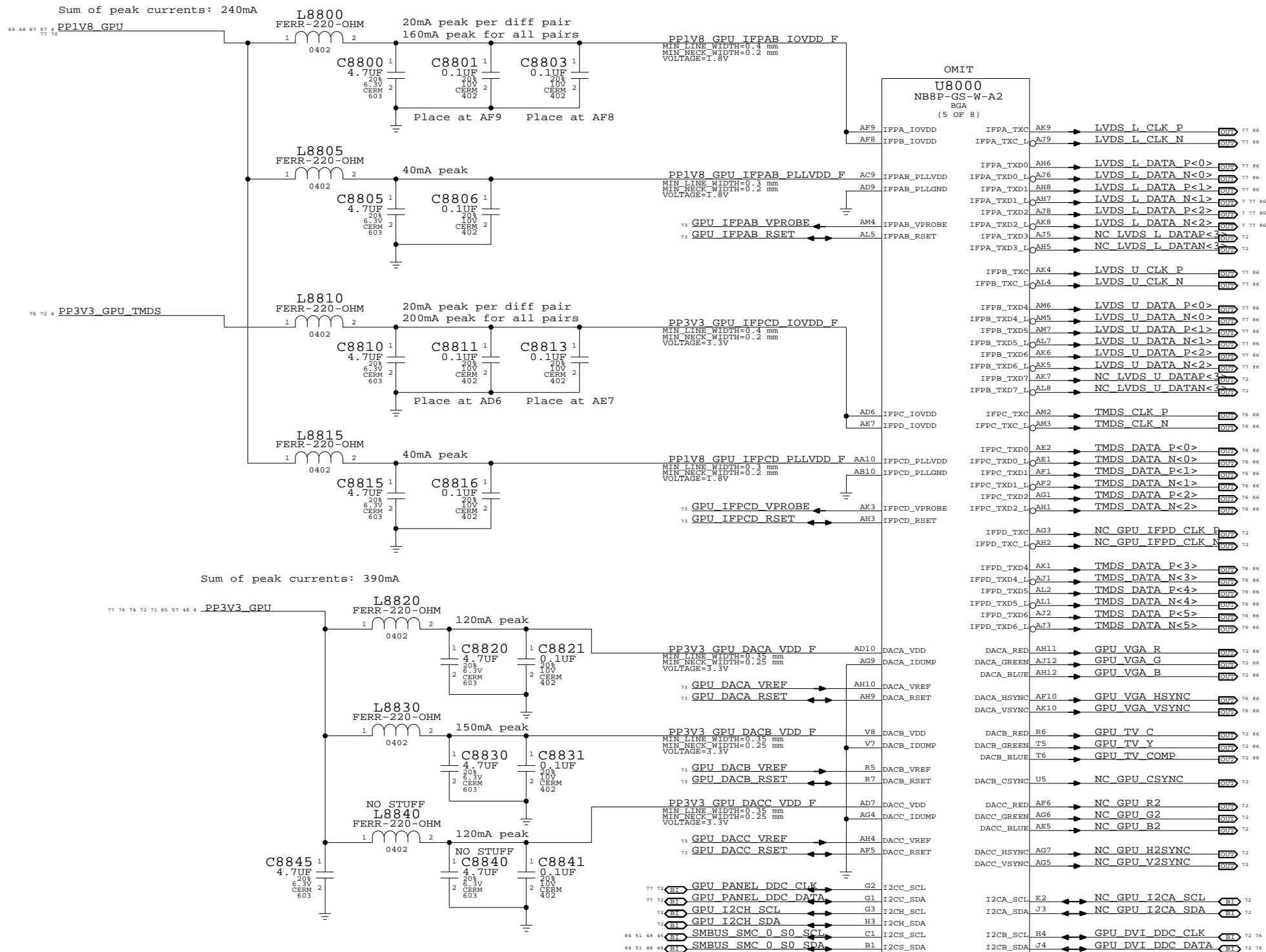


Page Notes

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

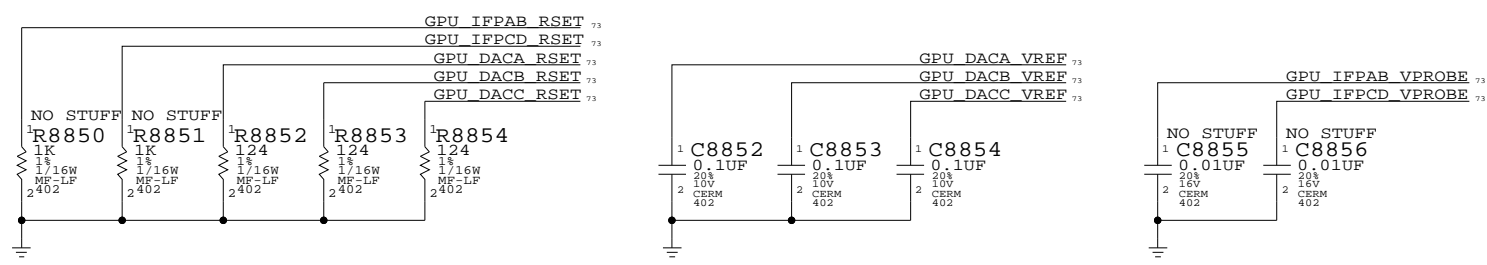
Signal aliases required by this page:
 (NONE)

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)

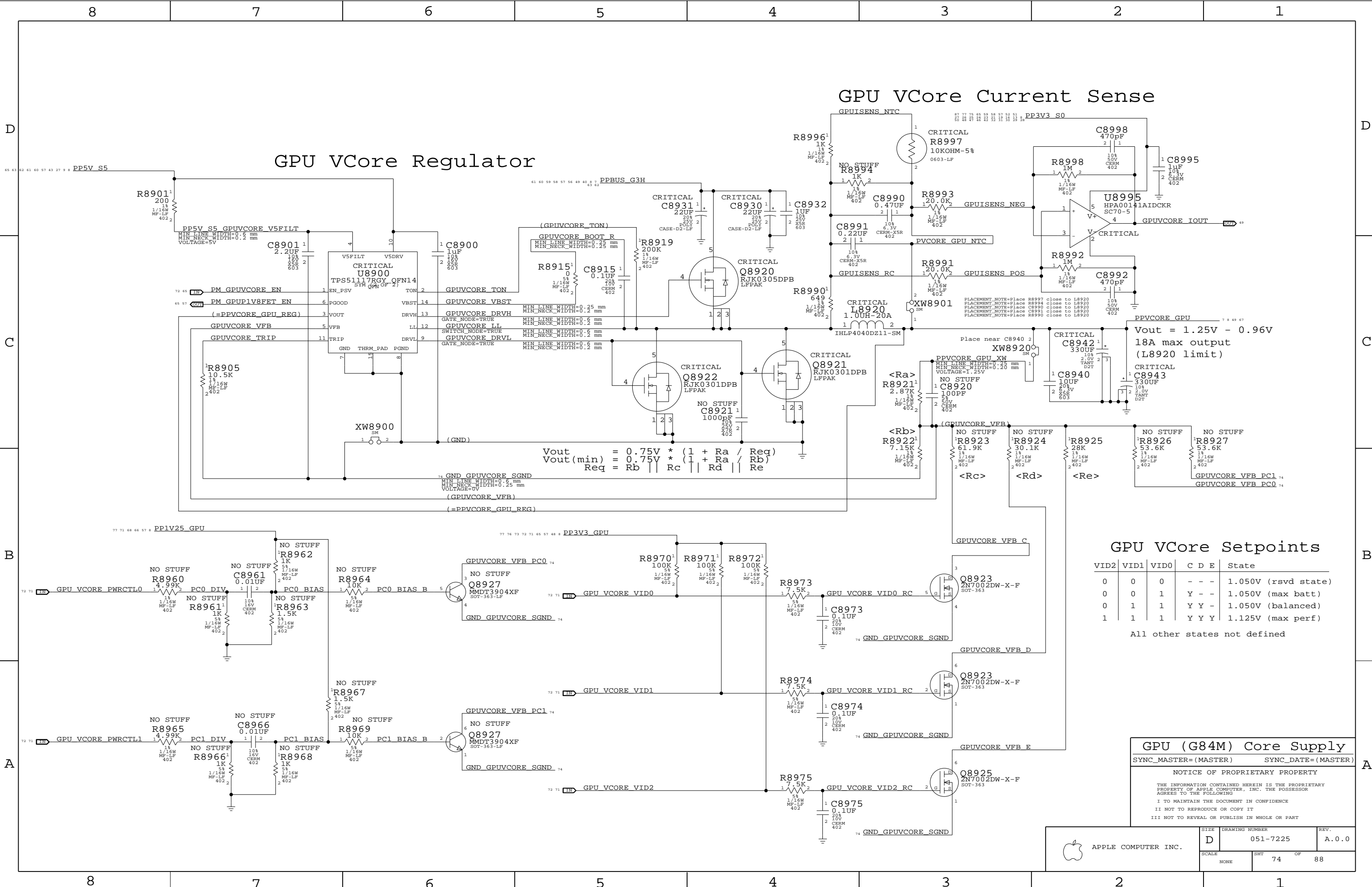
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SCALE	SHT	OF	
NONE	73	88	

GPU VCore Regulator

GPU VCore Current Sense



$$V_{out} = 1.25V \cdot \left(1 + \frac{R_a}{R_{eq}}\right)$$

$$V_{out}(\min) = 0.75V \cdot \left(1 + \frac{R_a}{R_b \parallel R_c \parallel R_d \parallel R_e}\right)$$

$$R_{eq} = R_b \parallel R_c \parallel R_d \parallel R_e$$

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)

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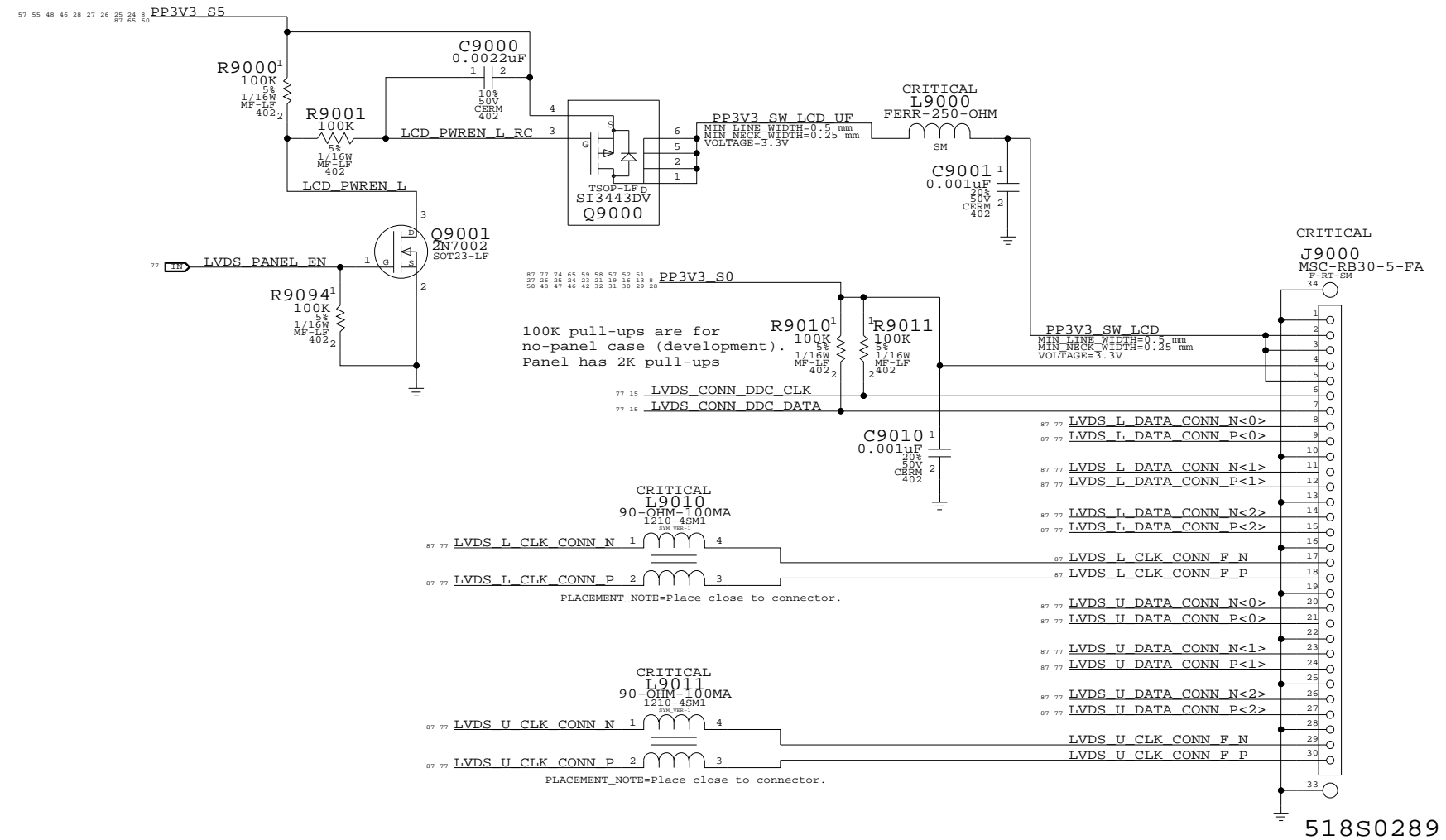
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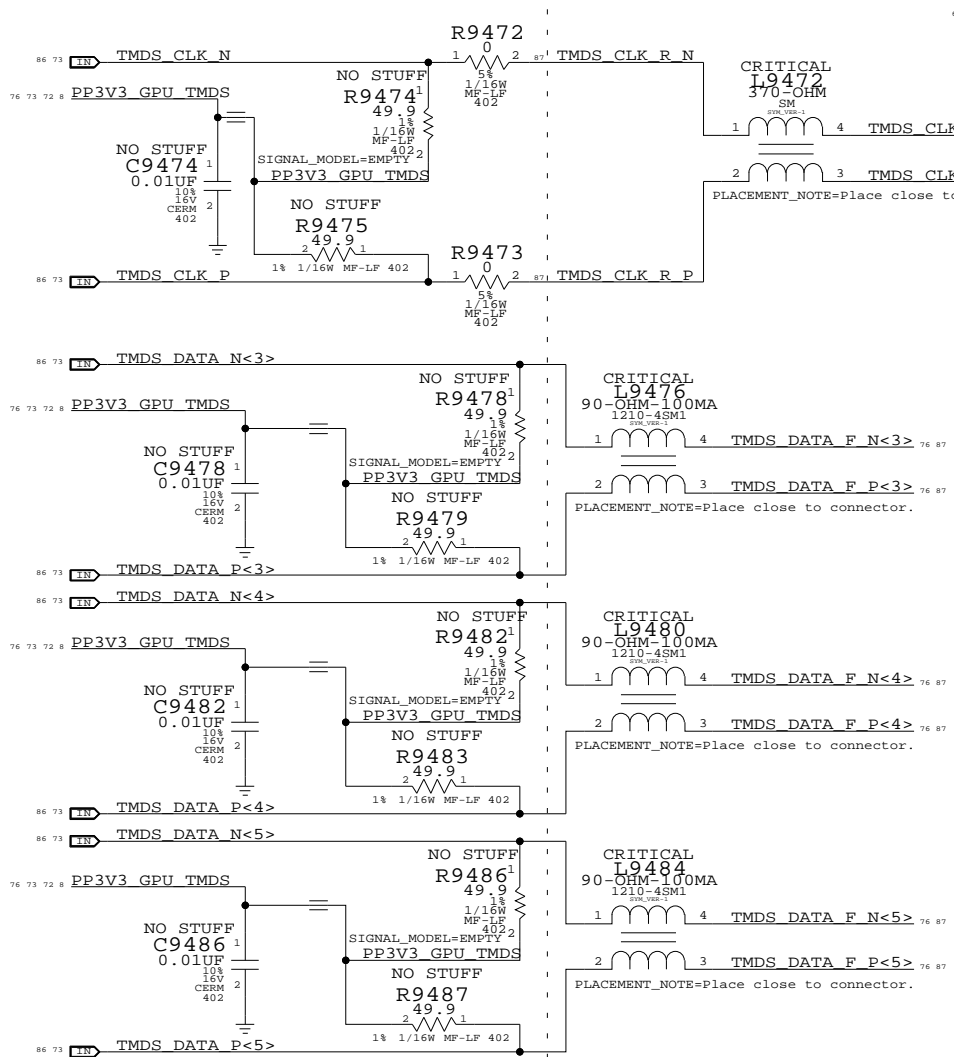
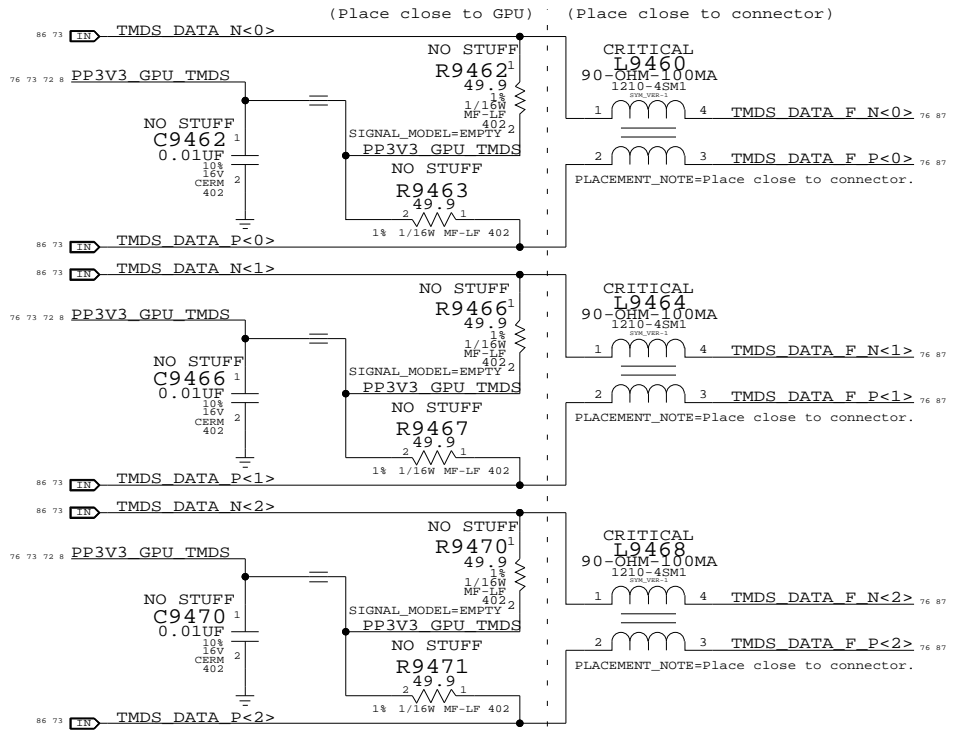
LCD (LVDS) INTERFACE



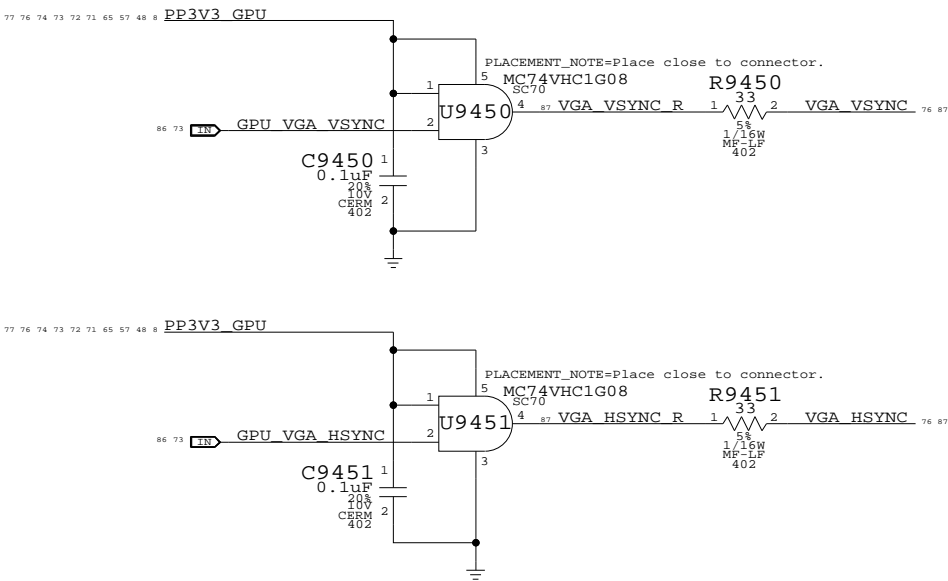
LVDS Display Connector
 SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)
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NONE			

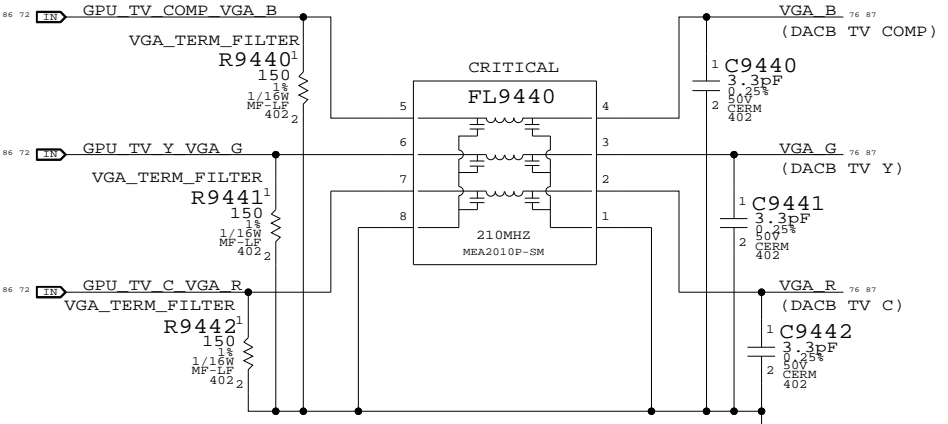
TMDS Filtering



VGA SYNC Buffers

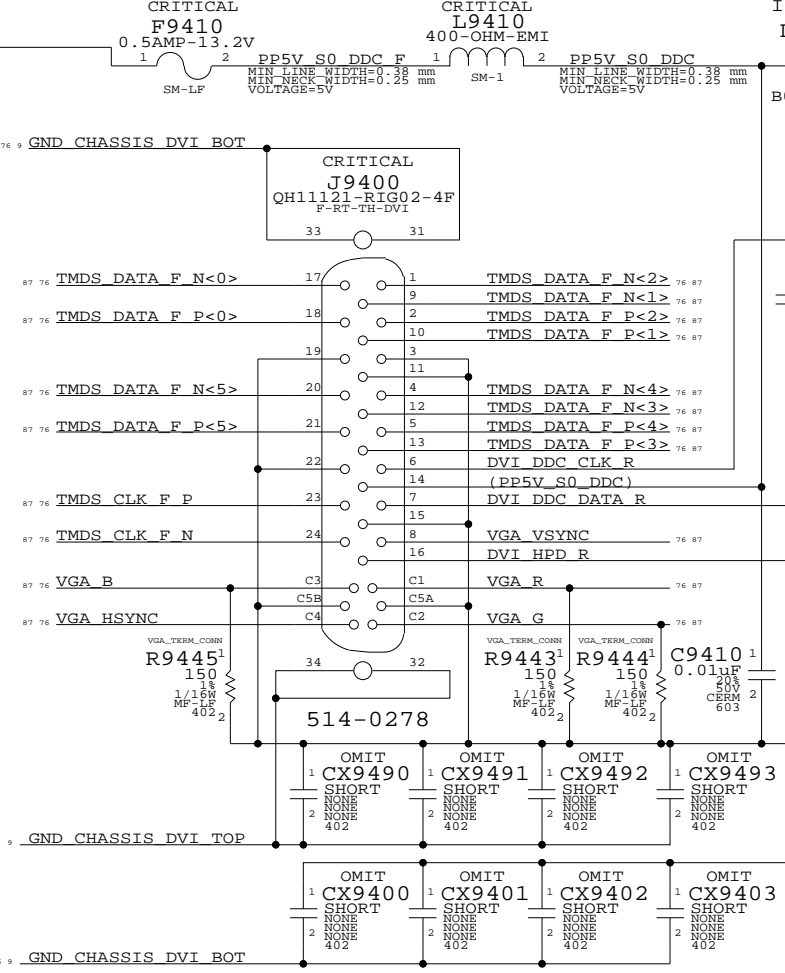


ANALOG FILTERING PLACE CLOSE TO CONNECTOR



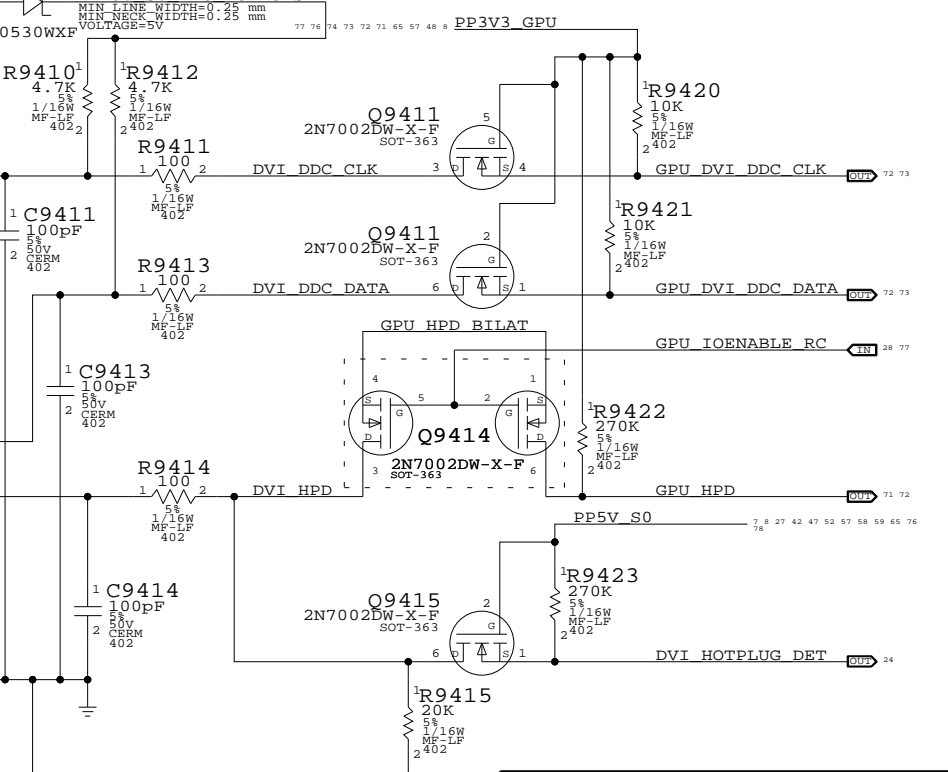
DVI INTERFACE

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



Isolation required for DVI->ADC Adapter

GPU Isolation / Level-Shift



DVI Display Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

NOTICE OF PROPRIETARY PROPERTY

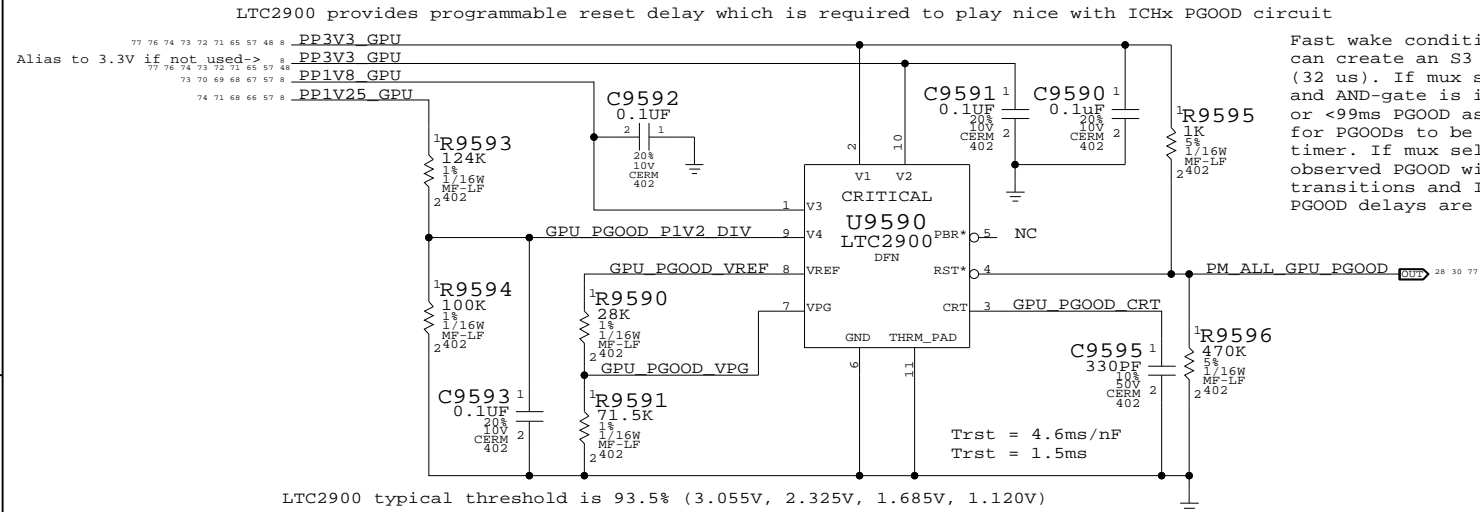
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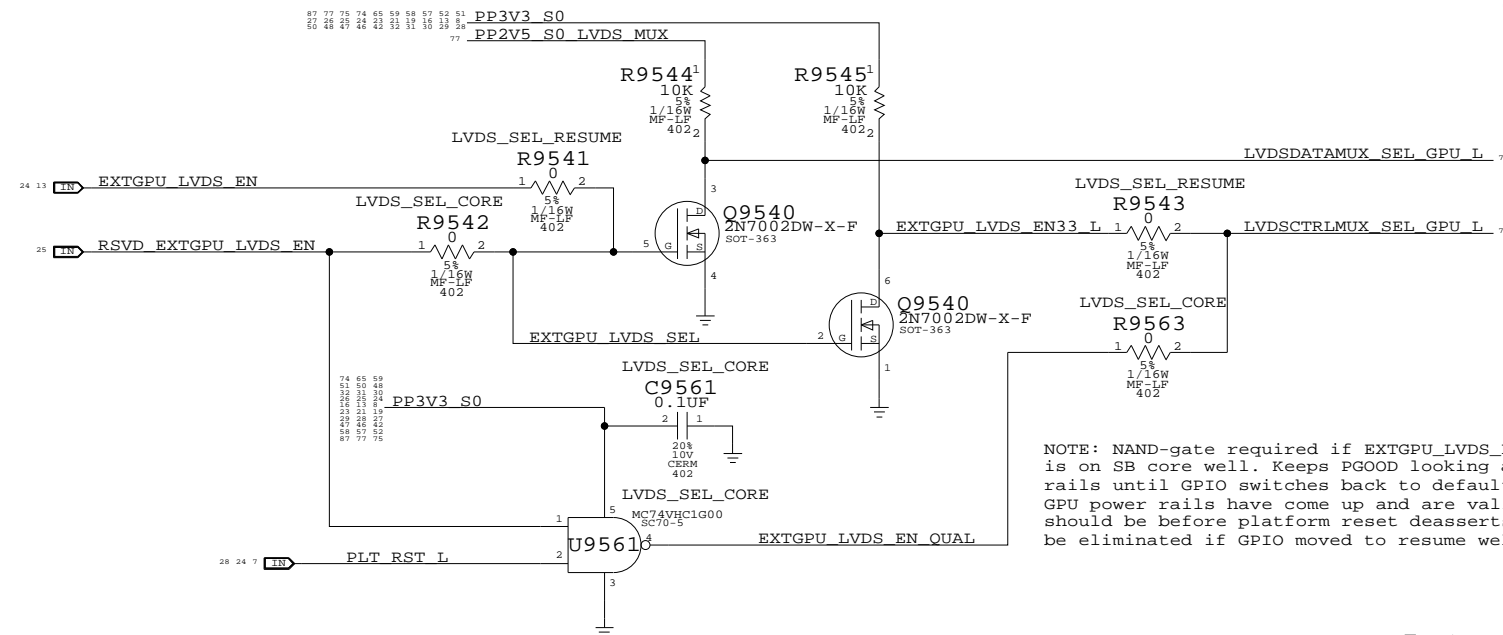
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PGOOD Monitor for GPU Rails



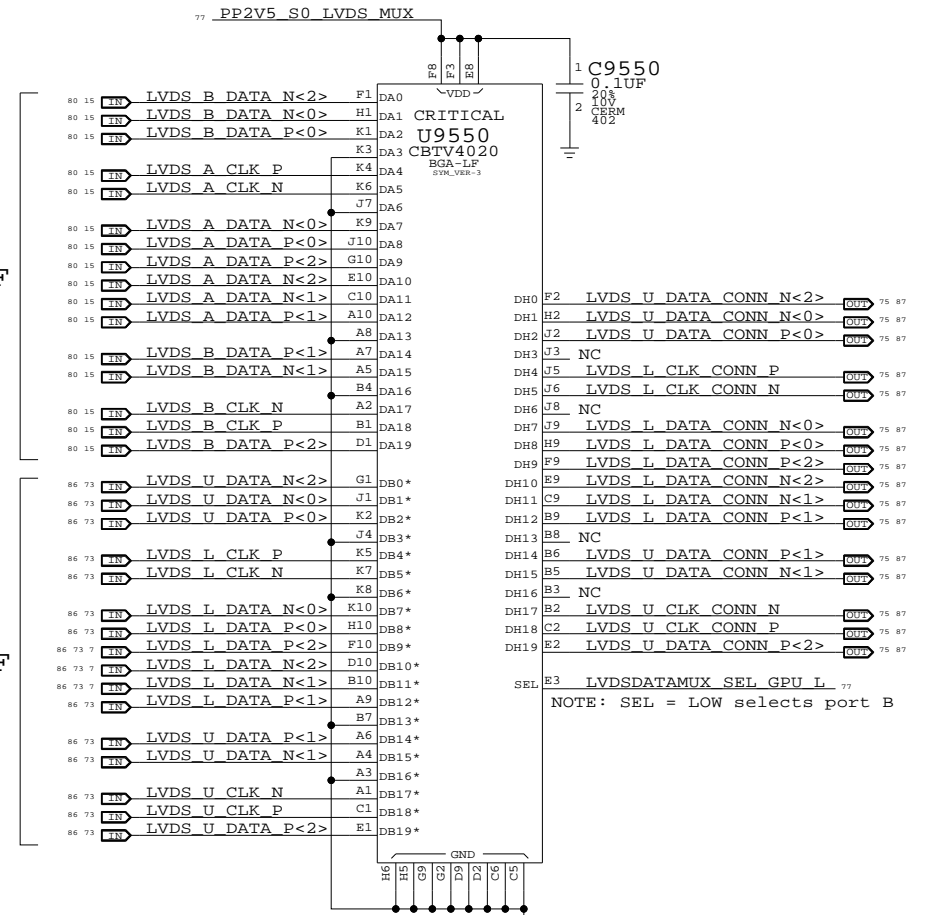
LTC2900 typical threshold is 93.5% (3.055V, 2.325V, 1.685V, 1.120V)

Mux Select Conditioning

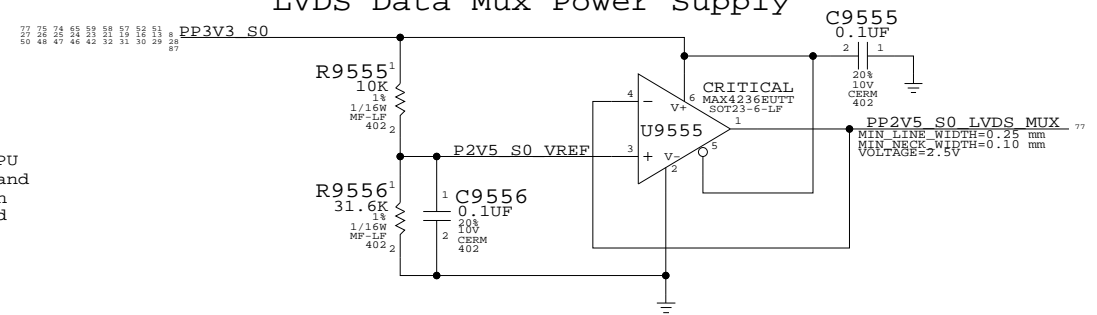


GPU LVDS I/F

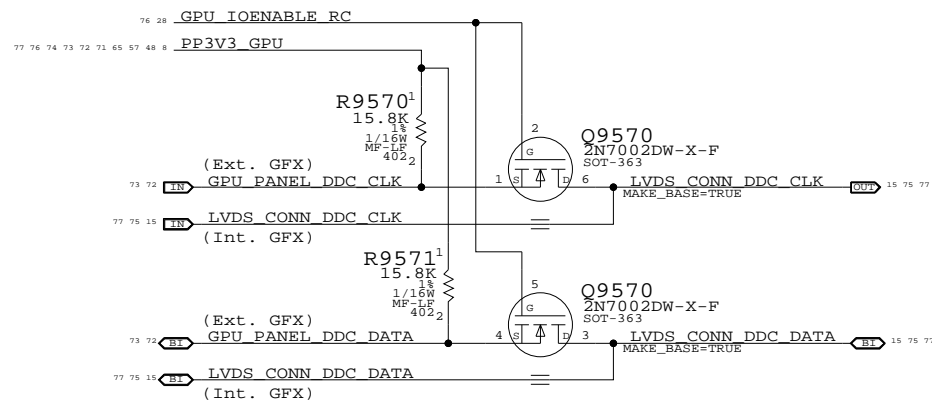
LVDS I/F Mux



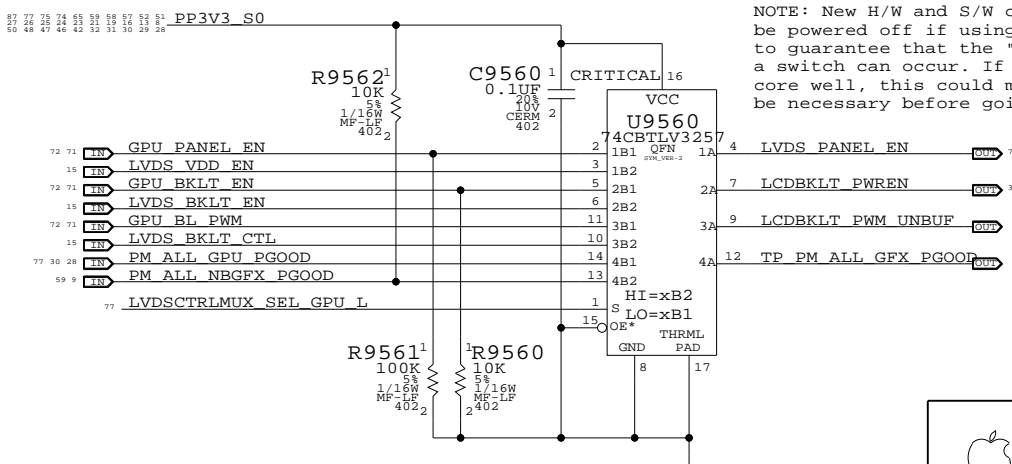
LVDS Data Mux Power Supply



GPU DDC Pass FETs



Panel/Backlight Control Mux



LVDS Interface Mux

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

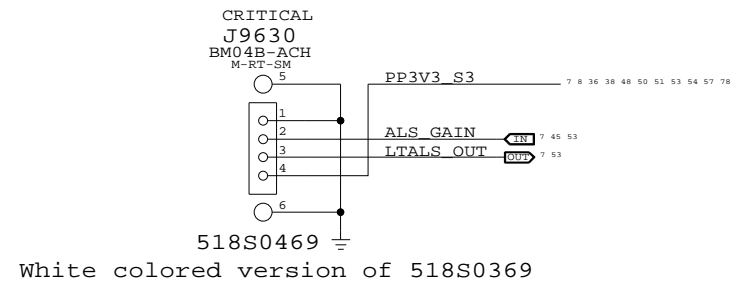
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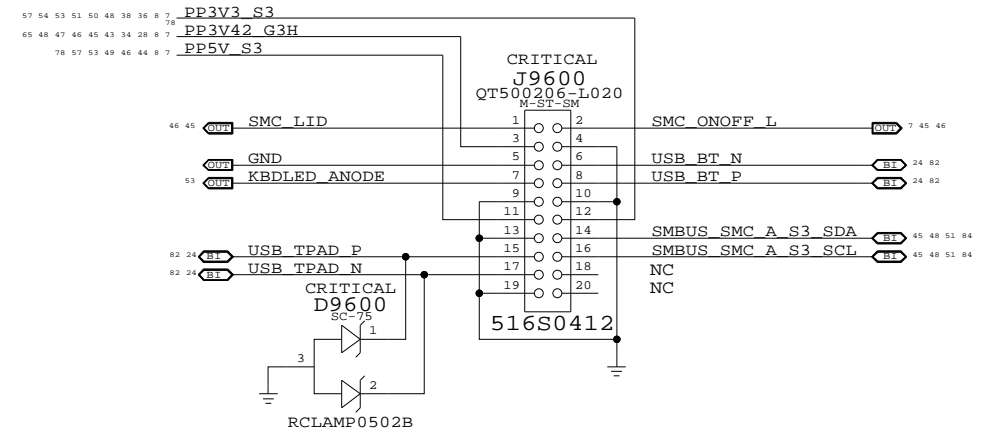
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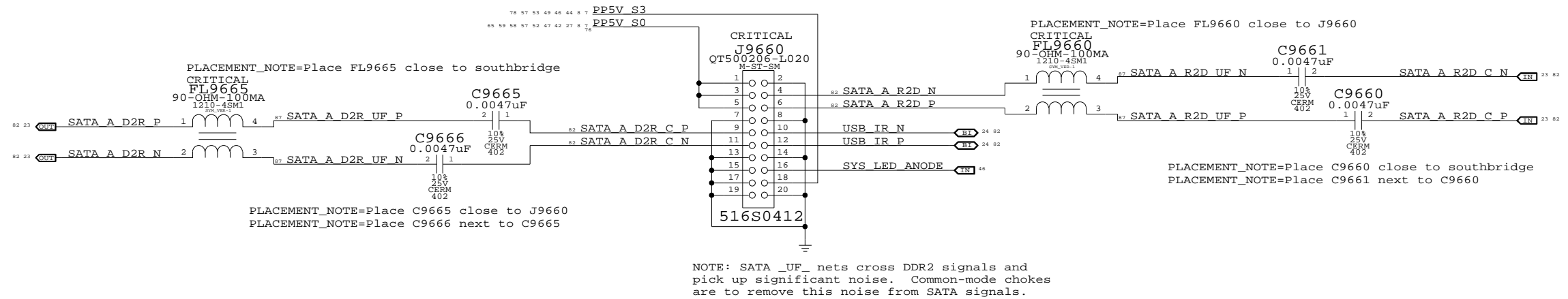
Left ALS Connector



Top-Case Connector



SATA HDD & IR & SIL Flex Connector



NOTE: SATA_UF_nets cross DDR2 signals and pick up significant noise. Common-mode chokes are to remove this noise from SATA signals.

Project Specific Connectors
 SYNC_MASTER=(M59_SYNC) SYNC_DATE=08/24/2006

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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_100D	CLK_FSB_100D	CLK_FSB	XDP CLK P	13 29 30 84
CLK_FSB_100D	CLK_FSB_100D	CLK_FSB	XDP CLK N	13 29 30 84
(FSB_CPURST_L)	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

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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

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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

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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

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APPLE COMPUTER INC.	SCALE	DRAWING NUMBER	REV.
	NONE	051-7225	A.0.0
	SHT	OF	
	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_PIRQC_L	PCI_55S	PCI	INT PIRQC_L	24
INT_PIRQD_L	PCI_55S	PCI	INT PIRQD_L	24 38
INT_PIRQA_L	PCI_55S	PCI	INT PIRQA_L	24
INT_PIRQF_L	PCI_55S	PCI	INT PIRQF_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_NAME SYNC_DATE=01/17/2007

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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_NBH	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_IPTH	CLK_FSB_100D	CLK_FSB	XDP CLK P	13 29 30 79 84
CK505_IPTN	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_PCI1	CLK_MED_55S	CLK_MED	CK505 PCI1 CLK	29 30
CK505_PCI2	CLK_MED_55S	CLK_MED	TP CK505 PCI2 CLK	29 30
CK505_PCI3	CLK_MED_55S	CLK_MED	CK505 PCI3 CLK	29 30
CK505_PCI4	CLK_MED_55S	CLK_MED	TP CK505 PCI4 CLK	29 30
CK505_PCI5	CLK_MED_55S	CLK_MED	CK505 PCI5 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
CK505_LVDS	CLK_PCIE_100D	CLK_PCIE	CK505 CLK27M SS	29 30
CK505_SRC1	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPLLSS P	7 16 22 29 30 84
CK505_SRC2	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPLLSS N	7 16 22 29 30 84
CK505_SRC3	CLK_PCIE_100D	CLK_PCIE	PEG CLK100M GPU P	9 29 30 66 84
CK505_SRC4	CLK_PCIE_100D	CLK_PCIE	PEG CLK100M GPU N	9 29 30 66 84
CK505_SRC5	CLK_PCIE_100D	CLK_PCIE	SB CLK100M DMI P	24 29 30 84
CK505_SRC6	CLK_PCIE_100D	CLK_PCIE	SB CLK100M DMI N	24 29 30 84
CK505_SRC7	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M EXCARD P	29 30 34 84
CK505_SRC8	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M EXCARD N	29 30 34 84
CK505_SRC9	CLK_PCIE_100D	CLK_PCIE	SB CLK100M SATA P	23 29 30 84
CK505_SRC10	CLK_PCIE_100D	CLK_PCIE	SB CLK100M SATA N	23 29 30 84
CK505_SRC11	CLK_PCIE_100D	CLK_PCIE	NB CLK100M PCIE P	7 16 29 30 84
CK505_SRC12	CLK_PCIE_100D	CLK_PCIE	NB CLK100M PCIE N	7 16 29 30 84
CK505_SRC13	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M MINI P	29 30 34 84
CK505_SRC14	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M MINI N	29 30 34 84
CK505_SRC15	CLK_PCIE_100D	CLK_PCIE	TP PCIE CLK100M SRC7P	29 30
CK505_SRC16	CLK_PCIE_100D	CLK_PCIE	TP PCIE CLK100M SRC7N	29 30
CK505_SRC17	CLK_PCIE_100D	CLK_PCIE	PCIE CLK100M ENET P	29 30 35 84
CK505_SRC18	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_NBH)	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_IPTH)	CLK_FSB_100D	CLK_FSB	XDP CLK P	13 29 30 79 84
(CK505_IPTN)	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_PCI1)	CLK_MED_55S	CLK_MED	PCI CLK33M FW	30 38
(CK505_PCI2)	CLK_MED_55S	CLK_MED	PCI CLK33M TPM	30 45
(CK505_PCI3)	CLK_MED_55S	CLK_MED	PCI CLK33M SMC	30 45
(CPU_BSEL0)	CLK_MED_55S	CLK_MED	CK505 PCI4 is project-specific	
(CPU_BSEL2)	CLK_MED_55S	CLK_MED	CK505 PCI5 is project-specific	
(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 DPLLSS P	7 16 22 29 30 84
(CK505_LVDS)	CLK_PCIE_100D	CLK_PCIE	NB CLK100M DPLLSS 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 SMC Bus 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

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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

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	D	051-7225	A.0.0
SCALE	SHT	OF	
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>	68 69
FB_A_CLK_N	GDDR3_80D	GDDR3_CLK	FB A CLK N<0>	68 69
FB_B_CLK_P	GDDR3_80D	GDDR3_CLK	FB A CLK P<1>	68 69
FB_B_CLK_N	GDDR3_80D	GDDR3_CLK	FB A CLK N<1>	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A MA<1..0>	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A MA<11..6>	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A BA<2..0>	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A RAS L	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A CAS L	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A WE L	68 69
FB_AB_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB A CKE	68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB A CS0 L	68 69
FB_AB_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB A DRAM_RST	68 69
FB_A_CMD	GDDR3_50SE	GDDR3_CMD	FB A LMA<5..2>	68 69
FB_B_CMD	GDDR3_50SE	GDDR3_CMD	FB A UMA<5..2>	68 69
FB_A_WDQS0	GDDR3_50SE	GDDR3_DQS	FB A WDQS<0>	68 69
FB_A_WDQS1	GDDR3_50SE	GDDR3_DQS	FB A WDQS<1>	68 69
FB_A_WDQS2	GDDR3_50SE	GDDR3_DQS	FB A WDQS<2>	68 69
FB_A_WDQS3	GDDR3_50SE	GDDR3_DQS	FB A WDQS<3>	68 69
FB_A_RDQS0	GDDR3_50SE	GDDR3_DQS	FB A RDQS<0>	68 69
FB_A_RDQS1	GDDR3_50SE	GDDR3_DQS	FB A RDQS<1>	68 69
FB_A_RDQS2	GDDR3_50SE	GDDR3_DQS	FB A RDQS<2>	68 69
FB_A_RDQS3	GDDR3_50SE	GDDR3_DQS	FB A RDQS<3>	68 69
FB_A_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB A DQ<7..0>	68 69
FB_A_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB A DQ<15..8>	68 69
FB_A_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB A DQ<23..16>	68 69
FB_A_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB A DQ<31..24>	68 69
FB_A_DQM0	GDDR3_50SE	GDDR3_DATA	FB A DQM L<0>	68 69
FB_A_DQM1	GDDR3_50SE	GDDR3_DATA	FB A DQM L<1>	68 69
FB_A_DQM2	GDDR3_50SE	GDDR3_DATA	FB A DQM L<2>	68 69
FB_A_DQM3	GDDR3_50SE	GDDR3_DATA	FB A DQM L<3>	68 69
FB_B_WDQS0	GDDR3_50SE	GDDR3_DQS	FB A WDQS<4>	68 69
FB_B_WDQS1	GDDR3_50SE	GDDR3_DQS	FB A WDQS<5>	68 69
FB_B_WDQS2	GDDR3_50SE	GDDR3_DQS	FB A WDQS<6>	68 69
FB_B_WDQS3	GDDR3_50SE	GDDR3_DQS	FB A WDQS<7>	68 69
FB_B_RDQS0	GDDR3_50SE	GDDR3_DQS	FB A RDQS<4>	68 69
FB_B_RDQS1	GDDR3_50SE	GDDR3_DQS	FB A RDQS<5>	68 69
FB_B_RDQS2	GDDR3_50SE	GDDR3_DQS	FB A RDQS<6>	68 69
FB_B_RDQS3	GDDR3_50SE	GDDR3_DQS	FB A RDQS<7>	68 69
FB_B_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB A DQ<39..32>	68 69
FB_B_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB A DQ<47..40>	68 69
FB_B_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB A DQ<55..48>	68 69
FB_B_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB A DQ<63..56>	68 69
FB_B_DQM0	GDDR3_50SE	GDDR3_DATA	FB A DQM L<4>	68 69
FB_B_DQM1	GDDR3_50SE	GDDR3_DATA	FB A DQM L<5>	68 69
FB_B_DQM2	GDDR3_50SE	GDDR3_DATA	FB A DQM L<6>	68 69
FB_B_DQM3	GDDR3_50SE	GDDR3_DATA	FB A DQM L<7>	68 69

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>	68 70
FB_C_CLK_N	GDDR3_80D	GDDR3_CLK	FB B CLK N<0>	68 70
FB_D_CLK_P	GDDR3_80D	GDDR3_CLK	FB B CLK P<1>	68 70
FB_D_CLK_N	GDDR3_80D	GDDR3_CLK	FB B CLK N<1>	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B MA<1..0>	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B MA<11..6>	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B BA<2..0>	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B RAS L	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B CAS L	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B WE L	68 70
FB_CD_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB B CKE	68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB B CS0 L	68 70
FB_CD_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB B DRAM_RST	68 70
FB_C_CMD	GDDR3_50SE	GDDR3_CMD	FB B LMA<5..2>	68 70
FB_D_CMD	GDDR3_50SE	GDDR3_CMD	FB B UMA<5..2>	68 70
FB_C_WDQS0	GDDR3_50SE	GDDR3_DQS	FB B WDQS<0>	68 70
FB_C_WDQS1	GDDR3_50SE	GDDR3_DQS	FB B WDQS<1>	68 70
FB_C_WDQS2	GDDR3_50SE	GDDR3_DQS	FB B WDQS<2>	68 70
FB_C_WDQS3	GDDR3_50SE	GDDR3_DQS	FB B WDQS<3>	68 70
FB_C_RDQS0	GDDR3_50SE	GDDR3_DQS	FB B RDQS<0>	68 70
FB_C_RDQS1	GDDR3_50SE	GDDR3_DQS	FB B RDQS<1>	68 70
FB_C_RDQS2	GDDR3_50SE	GDDR3_DQS	FB B RDQS<2>	68 70
FB_C_RDQS3	GDDR3_50SE	GDDR3_DQS	FB B RDQS<3>	68 70
FB_C_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB B DQ<7..0>	68 70
FB_C_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB B DQ<15..8>	68 70
FB_C_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB B DQ<23..16>	68 70
FB_C_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB B DQ<31..24>	68 70
FB_C_DQM0	GDDR3_50SE	GDDR3_DATA	FB B DQM L<0>	68 70
FB_C_DQM1	GDDR3_50SE	GDDR3_DATA	FB B DQM L<1>	68 70
FB_C_DQM2	GDDR3_50SE	GDDR3_DATA	FB B DQM L<2>	68 70
FB_C_DQM3	GDDR3_50SE	GDDR3_DATA	FB B DQM L<3>	68 70
FB_D_WDQS0	GDDR3_50SE	GDDR3_DQS	FB B WDQS<4>	68 70
FB_D_WDQS1	GDDR3_50SE	GDDR3_DQS	FB B WDQS<5>	68 70
FB_D_WDQS2	GDDR3_50SE	GDDR3_DQS	FB B WDQS<6>	68 70
FB_D_WDQS3	GDDR3_50SE	GDDR3_DQS	FB B WDQS<7>	68 70
FB_D_RDQS0	GDDR3_50SE	GDDR3_DQS	FB B RDQS<4>	68 70
FB_D_RDQS1	GDDR3_50SE	GDDR3_DQS	FB B RDQS<5>	68 70
FB_D_RDQS2	GDDR3_50SE	GDDR3_DQS	FB B RDQS<6>	68 70
FB_D_RDQS3	GDDR3_50SE	GDDR3_DQS	FB B RDQS<7>	68 70
FB_D_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB B DQ<39..32>	68 70
FB_D_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB B DQ<47..40>	68 70
FB_D_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB B DQ<55..48>	68 70
FB_D_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB B DQ<63..56>	68 70
FB_D_DQM0	GDDR3_50SE	GDDR3_DATA	FB B DQM L<4>	68 70
FB_D_DQM1	GDDR3_50SE	GDDR3_DATA	FB B DQM L<5>	68 70
FB_D_DQM2	GDDR3_50SE	GDDR3_DATA	FB B DQM L<6>	68 70
FB_D_DQM3	GDDR3_50SE	GDDR3_DATA	FB B DQM L<7>	68 70

G84M Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
(CK505_DOT96)	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M	30
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_GATED	30 71 72
CK505_CLK27MSS	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS	30
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS_GATED	30 71 72
	LVDS_100D	LVDS	LVDS L CLK P	73 77
	LVDS_100D	LVDS	LVDS L CLK N	73 77
	LVDS_100D	LVDS	LVDS L DATA P<3..0>	73 77
	LVDS_100D	LVDS	LVDS L DATA N<3..0>	73 77
	LVDS_100D	LVDS	LVDS U CLK P	73 77
	LVDS_100D	LVDS	LVDS U CLK N	73 77
	LVDS_100D	LVDS	LVDS U DATA P<3..0>	73 77
	LVDS_100D	LVDS	LVDS U DATA N<3..0>	73 77
TMDS_CLK	TMDS_100D	TMDS	TMDS CLK P	73 76
TMDS_CLK	TMDS_100D	TMDS	TMDS CLK N	73 76
TMDS_DATA	TMDS_100D	TMDS	TMDS DATA P<5..0>	73 76
TMDS_DATA	TMDS_100D	TMDS	TMDS DATA N<5..0>	73 76
VGA_B_TV_C	VGA_50S	VGA	GPU_TV_C_VGA_R	72 76
VGA_G_TV_Y	VGA_50S	VGA	GPU_TV_Y_VGA_G	72 76
VGA_B_TV_COMP	VGA_50S	VGA	GPU_TV_COMP_VGA_B	72 76
	VGA_50S	VGA	GPU_VGA_R	72 73
	VGA_50S	VGA	GPU_VGA_G	72 73
	VGA_50S	VGA	GPU_VGA_B	72 73
	VGA_50S	VGA	GPU_TV_C	72 73
	VGA_50S	VGA	GPU_TV_Y	72 73
	VGA_50S	VGA	GPU_TV_COMP	72 73
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_HSYNC	73 76
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_VSYNC	73 76

GPU (G84M) Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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	D	051-7225	A.0.0
SCALE	SHT	OF	
NONE	86	88	

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 MILLS	?

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		
	PHYSICAL	SPACING	
(PCIE_EXCARD)	PCIE_100D	PCIE	PCIE_EXCARD_R2D_P 34
(PCIE_EXCARD)	PCIE_100D	PCIE	PCIE_EXCARD_R2D_N 34
(PCIE_MINI)	PCIE_100D	PCIE	PCIE_MINI_R2D_P 34
(PCIE_MINI)	PCIE_100D	PCIE	PCIE_MINI_R2D_N 34
	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> 37
	ENET_100D	ENETCONN	ENETCONN_N<3..0> 37
	FW_110D	FW_TP	FW_PORT0_TPA_FL_P 41
	FW_110D	FW_TP	FW_PORT0_TPA_FL_N 41
	FW_110D	FW_TP	FW_PORT0_TPB_FL_P 41
	FW_110D	FW_TP	FW_PORT0_TPB_FL_N 41
(SATA_A_R2D)	SATA_100D	SATA	SATA_A_R2D_UF_P 78
(SATA_A_R2D)	SATA_100D	SATA	SATA_A_R2D_UF_N 78
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_P 78
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_N 78
(USB_EXT_A)	USB_90D	USB	USB2_EXT_A_MUXED_P 43
(USB_EXT_A)	USB_90D	USB	USB2_EXT_A_MUXED_N 43
(USB_EXT_A)	USB_90D	USB	USB2_RT_P 43
(USB_EXT_A)	USB_90D	USB	USB2_RT_N 43
(USB_EXT_D)	USB_90D	USB	USB_WWAN_F_P 44
(USB_EXT_D)	USB_90D	USB	USB_WWAN_F_N 44
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_P 44
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_N 44
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	GFXIMVP6_VSEN_P 59
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	NBCOREISNS_P 50
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	P1V8ISNS_P 50
SENSE_DIFFPAIR	SENSE_1T01_55S	SENSE	P1V25ISNS_P 50
THERM_DIFFPAIR	THERM_1T01_55S	THERM	CPU_THERMSNS_D2_P 7 51
THERM_DIFFPAIR	THERM_1T01_55S	THERM	CPU_THERMD_P 10 51
THERM_DIFFPAIR	THERM_1T01_55S	THERM	GPU_THERMSNS_D_P 51
THERM_DIFFPAIR	THERM_1T01_55S	THERM	GPU_TDIODE_P 51 71 72
THERM_DIFFPAIR	THERM_1T01_55S	THERM	HSTHERMSNS_D_P 7 51
THERM_DIFFPAIR	THERM_1T01_55S	THERM	REMTHERMSNS_DX_P 7 51
THERM_DIFFPAIR	THERM_1T01_55S	THERM	RSFSTHERMSNS_D_P 7 51
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_P 75
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_N 75
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_P 75 77
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_N 75 77
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_P<3..0> 75 77
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_N<3..0> 75 77
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_P 75 77
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_N 75 77
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_P<3..0> 75 77
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_N<3..0> 75 77
	TMDS_100D	TMDS	TMDS_CLK_R_P 76
	TMDS_100D	TMDS	TMDS_CLK_R_N 76
	TMDS_100D	TMDS	TMDS_CLK_F_P 76
	TMDS_100D	TMDS	TMDS_CLK_F_N 76
	TMDS_100D	TMDS	TMDS_DATA_F_P<5..0> 76
	TMDS_100D	TMDS	TMDS_DATA_F_N<5..0> 76
(VGA_R_TV_Y)	VGA_50S	VGA	VGA_R 76
(VGA_G_TV_C)	VGA_50S	VGA	VGA_G 76
(VGA_B_TV_COMP)	VGA_50S	VGA	VGA_B 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC_R 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC_R 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC 76
	PP1V8_MEM	PP1V8_S3	8 31 32 38 50 57 62 87
	PP1V8_MEM	PP1V8_S3	8 31 32 38 50 57 62 87
	GND	GND	
	SB_POWER	PP3V3_S5	8 24 25 26 27 28 46 48 55 57 60
	SB_POWER	PP3V3_S0	8 27 58 59 66 74 75 77
	SB_POWER	PP1V5_S0	8 11 12 22 26 27 34 63
	WWAN_SIM	WWAN_SIM	WWAN_SIM_CLOCK 44
	WWAN_SIM	WWAN_SIM	WWAN_SIM_DATA 44

Project Specific Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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SCALE	DRAWING NUMBER	REV.
NONE	D 051-7225	A.0.0
	SHT 87 OF 88	

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)

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