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,MBP17

05/07/2007

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD DATE	ENG APPD DATE
?		502656	PVT Release	?	?

Schematic / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-7261	1	SCHEM,MLB,MBP17	SCH	CRITICAL	
820-2132	1	PCBF,MLB,MBP17	PCB	CRITICAL	

DRAWING
TITLE=MLB
ABBREV=DRAWING
LAST_MODIFIED=Mon May 7 19:12:36 2007

DIMENSIONS ARE IN MILLIMETERS
XX ±
X.XX ±
X.XXX ±
ANGLES ±
DO NOT SCALE DRAWING

THIRD ANGLE PROJECTION

METRIC

DRAFTER		DESIGN CK	
ENG APPD		MFG APPD	
QA APPD		DESIGNER	
RELEASE		SCALE	NONE

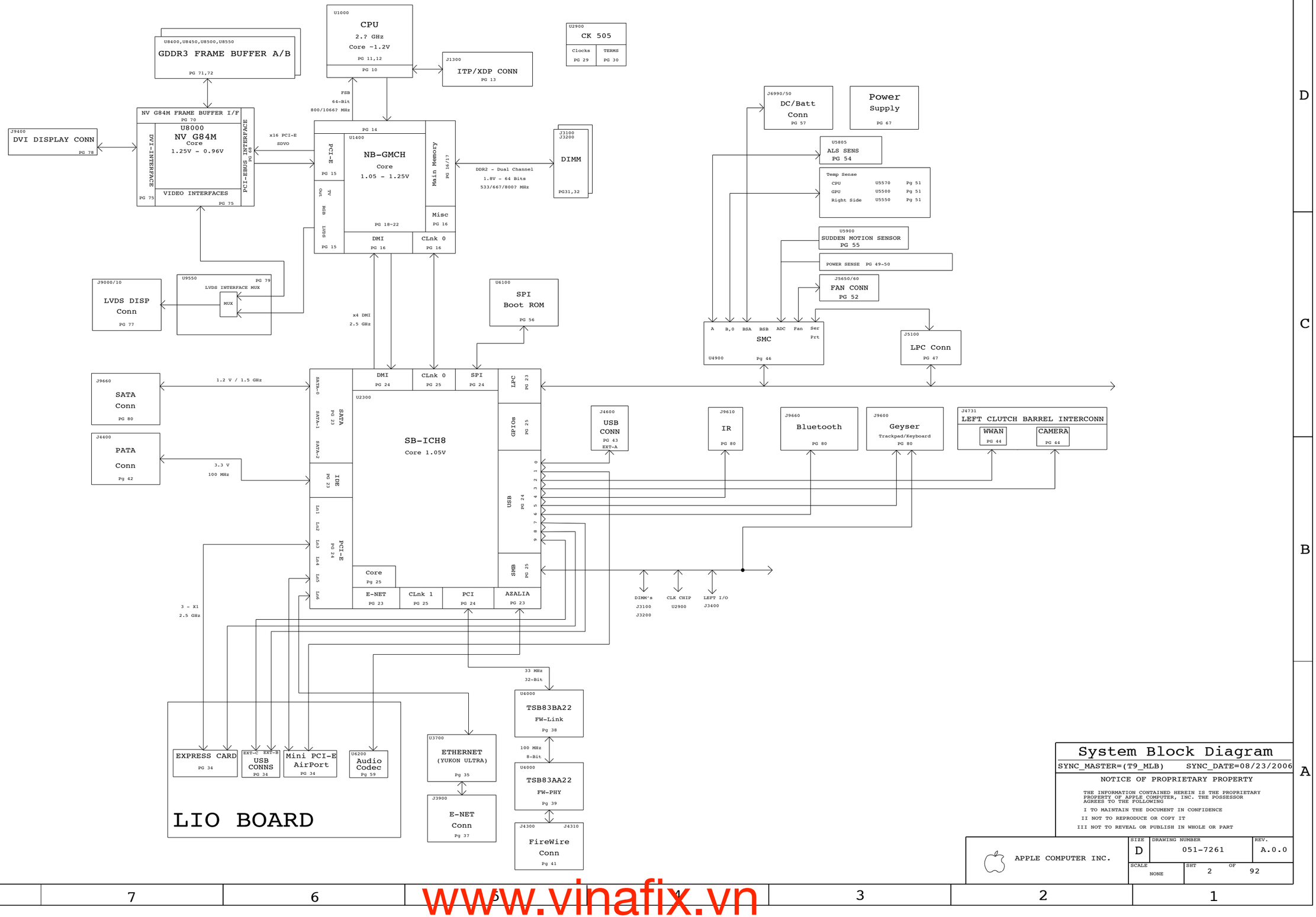
MATERIAL/FINISH NOTED AS APPLICABLE

SIZE D

Apple Computer Inc.

TITLE
SCHEM,MLB,MBP17

DRAWING NUMBER 051-7261
REV. A.0.0
SHT 1 OF 92



System Block Diagram

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

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SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 2 OF 92	

M76 POWER SYSTEM ARCHITECTURE

J6990
CRITICAL
87438-0832

518S0456

PP18V5_DCIN

Q6950
INRUSH LIMITER
(PAGE 57)

PP18V5_G3H_CHGR

U5705
LIO_DCIN_ISENSE

CHGR_EN

PBUS SUPPLY / BATTERY CHARGER
ISL6255A
U7900
(PAGE 67)

PPDCIN_G3H

PPBUS_G3H

U5705
LIO_DCIN_ISENSE

J6950
CRITICAL
87438-1043

518S0457

8A FUSE

BATT_POS

PPVBATT_G3H_FET

BATTERY CHARGE FET
(PAGE 67)

PPVBATT_G3H_CHGR_OUT

SMC_PBUS_VSENSE

Q5315

PM_SLP_S3_L

1.5V
TPS51117
U7600
(PAGE 64)

(8A MAX CURRENT)
PP1V5_S0
352.31UF

PM_SLP_S3_L

1.05V
TPS51117
U7450
(PAGE 62)

P1V5P1V05S0_PGOOD

3.425V"G3HOT"
LT3470
U7800
(PAGE 66)

(0.2A MAX CURRENT)
PP3V42_G3H

SMC RESET "BUTTON"
RN5VD30A-F
U5000
(PAGE 46)

SMC_RESET_L

PP1V05_S0 (10A MAX CURRENT)
1175.81UF

U5420
NBCORE_IOUT
PPVCORE_S0_NB_R
536.54UF

SMC_GPU_VSENSE

U8995
GPUVCORE_IOUT
(18A MAX CURRENT)
PPVCORE_GPU
675UF

PM_GPUVCORE_EN

TPS51117
U8900
(PAGE 76)

GPUVCORE_PGOOD

Q7000
PP5V_S3
0.02UF
P5VS3_SS

Q7020
PP5V_S0
5.9UF
P5VS0_SS

PP5V_S5
384.1UF

SMC_CPU_VSENSE

U5400
CPUVCORE_IOUT
(44A MAX CURRENT)
PPVCORE_S0_CPU
1720UF

CPUVCORE
ISL9504
U7100
(PAGE 59)

IMVP_VR_ON

VR_PWRGD_CLKEN_L

VR_PWRGOOD_DELAY

U2830
VR_PWRGD_CLKEN

U2840
PM_SB_PWROK

ICH8M
U2300
PWRBTN*
PLTRST*
RSMRST*
PWROK
CLPWROK
CPUPWRGD(GPIO49)

27
PLT_RST_L
26
CPU_PWRGD

CPU
U1000
PWRGOOD
RESET*

Q7002
Q7012
Q7091
Q7072
Q7851
Q7850
Q7081
Q7080
Q7050
Q7095
Q7030
Q7010
Q7070
Q3810
Q4260
Q3800
Q3801
DELAY
R=100K
C=68NF
C=1UF

P5VS3_SS
P3V3S3_SS
PM_SLP_S4_L
P1V25GPU_SS
P3V3GPU_SS
PM_GPUVCORE_EN
PM_SLP_S3_L
PM_GPUP1V8FET_EN
P1V8GPU_SS
SMC_ADAPTER_EN
PM_ENET_EN
P3V3ENET_SS
P5VS0_SS
P3V3S0_SS
P1V8S0_SS
P1V25S0_SS

ICH8M
U2300
SLP_S4*
GPIO23
SLP_S3*
EXTGPU_PWR_EN
PM_SLP_S3_LS5V
GPUVCORE_PGOOD

SMC_PM_G2_EN

5V
3.3V
TPS51120
U7300
(PAGE 61)

PP5V_S5
(8A MAX CURRENT)
PP3V3_S5
(5.5A MAX CURRENT)
RSMRST_PWRGD

PM_SLP_S3_L
PM_SLP_S4_L
0.9V
1.8V
TPS511160
U7500
(PAGE 63)
TP1V8S3_PGOOD
(UNUSED)

PP0V9_S0
2.7UF
PP1V8_S3
728.6UF
U5440
P1V8_S3_IOUT

PP1V8_S3_ISNS
418.1UF
PP1V8_GPU
159.36UF

PP3V3_S5
165UF
PP3V3_S3
7.2UF

PP3V3_S0
3.4UF

PP3V3_GPU
3.91UF

PP3V3_ENET
6.102UF
U3850
TPS79501
(PAGE 36)
PP1V9_ENET
1UF

PM_ENET_EN

TPS51117
U7400
(PAGE 62)
(8A MAX CURRENT)
PP1V25_ENET
345.203UF
TP1V25ENET_PGOOD
(UNUSED)

U5430
P1V25_S0GPU_IOUT

22.1UF
PP1V25_GPU
81.3UF

PP1V25_S0

GFX_VR_EN

ISL6263
U7200
(PAGE 60)

U5410
(10A MAX CURRENT)
PPVCORE_SO_NB_GFX
NBGFXCORE_IOUT
1323.67UF

PM_ALL_NBGFX_PGOOD

PANEL/BACKLIGHT CONTROL MUX
74CBTLV3257
U9560
(PAGE 79)

PM_ALL_GFX_PGOOD

PM_ALL_GPU_PGOOD

LVDSCTRLMUX_SEL_GPU_L

V1(3.3V)
V2(3.3V)
V3(1.8V)
V4(1.25V)
RST*
LTC2900
U9590
(PAGE 79)

V1(5V)
V2(3.3V)
V3(1.8V)
V4(1.25V)
RST*
LTC2900
U7870
(PAGE 66)

PP3V3_FW (0.2A MAX CURRENT)
27.11UF

LT3470
U7700
(PAGE 65)

PPBUS_FW_FWPWRSW_F
1.5A FUSE
PPVP_FW
PPVIN_FW_3.3VFW

TPS799195
U7720
(PAGE 65)
PP1V95_FW
4.2UF

U7880
ALL_SYS_PWRGD
PM_ALL_S0_PWRGD

U7885
S0_PGOOD_PWROK

SMC
U4900
(PAGE 45)
RSMRST_OUT(P15)
PWRGD(P12)
99ms DLY
IMVP_VR_ON(P16)
RSMRST_IN(P13)
PWR_BUTTON(P90)
P17(BTN_OUT)
PM_SLP_S5_L(P95)
PM_SLP_S4_L(P94)
PM_SLP_S3_L(P93)
RSMRST_PWRGD
SMC_ONOFF_L
PM_RSMRST_L
IMVP_VR_ON
PLT_RST
PM_PWRBTN_L
RST*

10
BATTERY ONLY: 05
ADAPTER IN : 08-1

SIGNAL DELAY TIME

IMVP_VR_ON	99ms
S0PWRGD_OK	200ms
VR_PWRGOOD_DELAY	7ms

POWER ON SEQUENCE LIST

PWR/RST STATUS	STEP
G3H POWER ON	01-04
S5 POWER ON	01,05-09
S3 POWER ON	10-13
S0 SYSTEM POWER ON	14-18
S0 CPU POWER ON	17,19-24
PLATFORM,CPU RESET	25-27

STEP 06 (S5 POWER STATUS)TRUTH TABLE

NO AC/BATTERY	L(S5 OFF)
BATTERY ONLY	L(S5 OFF)
ACIN WITH/WITHOUT BATTERY	H(S5 ON)
BATTERY ONLY,PRESS PWR BUTTON	H(S5 ON)

Power Block Diagram

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

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SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 3 OF 92	

8 7 6 5 4 3 2 1

D C B A

Power Block Diagram

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	4	92

BOM Variants

BOM NUMBER	BOM NAME	BOM OPTIONS
630-7943	PCBA,2.4GHZ,BTR,VRAM-SAM,MBP17	M76_COMMON,CPU_2_4GHZ,FB_256_SAMSUNG,INV_BYPASS,EEE_X6P
630-8549	PCBA,2.4GHZ,BTR,VRAM-HY,MBP17	M76_COMMON,CPU_2_4GHZ,FB_256_HYNIX,INV_BYPASS,EEE_XWU
630-8732	PCBA,2.4GHZ,CTO,VRAM-SAM,MBP17	M76_COMMON,CPU_2_4GHZ,FB_256_SAMSUNG,M76_CTO,EEE_XZ6
630-8733	PCBA,2.4GHZ,CTO,VRAM-HY,MBP17	M76_COMMON,CPU_2_4GHZ,FB_256_HYNIX,M76_CTO,EEE_XZ7

M76 BOM Groups

BOM GROUP	BOM OPTIONS
M76_COMMON	COMMON,ALTERNATE,M76_COMMON1,M76_COMMON2,M76_DEBUG,M76_PROGPARTS,ISL6257H
M76_COMMON1	EXTGPU_RST_HW,ISL9504B,LVDS_SEL_RESUME,ONEWIRE_PU,CPU_NTC_A,GPU_XW1
M76_COMMON2	P1V8S3_1V825_GPUFB,SLG2AP101,SMS_MOT_DIS,YUKON_ULTRA,VGA_TERM_CONN
M76_CTO	INV_SPLIT,INV_17INCH
M76_DEBUG	SMC_DEBUG_NO,XDP,LPCPLUS
M76_PROGPARTS	BOOTROM_PROG,SMC_PROG

BOM GROUP	BOM OPTIONS
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:X6P]	CRITICAL	EEE_X6P
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEE:XWU]	CRITICAL	EEE_XWU
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEE:XZ6]	CRITICAL	EEE_XZ6
826-4393	1	LBL,P/N LABEL,PCB,28MM X 6 MM	[EEE:XZ7]	CRITICAL	EEE_XZ7

Module Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
338S0388	1	IC,GPU,NV G84M,BGA	U8000	CRITICAL	
338S0432	1	IC,NB,CRESTLINE,GM,C0,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,LW PWR CLK GEN,CK505,QFN68	U2900	CRITICAL	SLG2AP101
338S0386	1	IC,88E8058,GIGABIT ENET XCVR,64P QFN	U3700	CRITICAL	
338S0274	1	IC,SMC,HS8/2116	U4900	CRITICAL	SMC_BLANK
341S2050	1	IC,SMC,DEVELOPMENT,M76	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

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
337S3465	1	IC,MDC,SR,E1,PRQ,2.4G,35W,800FSB,4M,BGA	U1000	CRITICAL	CPU_2_4GHZ

Alternate Parts

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
157S0011	157S0030		ALL	EA8 alt to TDK/BiTech magnetics
152S0476	152S0276		ALL	Inductor alternate
138S0603	138S0602		ALL	Murata alt to Samsung ZZnF acoustic caps
353S1681	353S1294		ALL	TI alternate to National
376S0543	376S0466		ALL	AOS alternate to Illinois 814413
376S0526	376S0451		ALL	Fairchild FDW254P alternate to IRF7707

BOM Configuration

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

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SCALE: NONE	SHT 5 OF 92	

DVT

13.1.0:
3/05/07 -- Integrated m75/mlb pages 22,25,28,30-32,50,53-55,72,74,76,78,80-82,84-90,94,95 through:
Change 46833 by cerickso@m75_mlb_051-7225_12.5.0_tmp.Ecad on 2007/03/02 09:49:13
Changes since previous major release (12.3.0):
- LVDS Connector: Changed pin 5 of connector from NC to PP3V3_SW_LCD (in case we add extra cable for power - rdar://5024882)
- NB GFX Decoupling: Added R2260 (0.3 ohm, 0603) to bring ESR of regulator output cap in spec (rdar://5000272)
Changes since previous major release (12.2.0):
- Left Clutch IC: Updated both I-PEX connectors to new APN (part update for shell plating)
- NB GFX Core: Changed Vcore controller to ISL6263B (part consolidation effort between Apple/Intersil - rdar://5009109)
- Power Supplies: Replaced APN 152S0511 with 152S0368 (duplicate APNs for same part - rdar://5009109)
- Thermal Sensors: Updated topology of EMC1033 sensors (removed shorts, changed connector caps to 18pF)
- NB GFX Decoupling/Power Aliases: Connected VCCD_CRT of NB to GND per CRT disable guidelines
Changes since previous bom release (12.0.0):
- GPU FB: Changed cal resistors per NVidia PUN (R8290 to 45.3 ohm and R8291 to 24.9 ohm)
- GPU FB: Changed unterminated-mode reference voltage to 40% (R8297 -> 1.02k, R8432/82, R8532/82 -> 2.21K)
- Power Sequencing: Removed U7885/C7885 to take GFX_PGOOD out of PWR_OK chain (rdar://4974927)
- GPU Vcore: NO STUFFed all PWRCTL related components (feature not to be supported)
- GPU Vcore: Updated voltage setpoints to 1.000/1.070/1.125V
- SB GPIOs: Sync'd page25.csa to T9_MLB to get pullup updates
- Thermal Sensors: Updated topology of EMC1033 filter caps (added C5515 next to IC, moved other caps to connectors)
3/5/07 -- Added GPU Vcore VFB resistor BOM table and GCORE_M76 BOM Option to M76_COMMON BOM group.
3/5/07 -- Removed RX3920-RX3927.
3/5/07 -- FireWire: Changed to Rev C of TI FireWire MCM (APN: 338S0435)
3/5/07 -- ODD Conn: Changed ODD power FET to FDC606P (from FDC638P) for reduced Rds(on)
3/5/07 -- Changed 1.8V supply feedback resistors R7520 to 21.5K 0.1% and R7521 15.0K 0.1%.%
13.2.0
3/07/07 -- Integrated m75/mlb pages 25,42,70 through:
Change 47192 by cerickso@m75_mlb_051-7225_12.7.0_tmp.Ecad on 2007/03/06 18:36:54
Changes since previous major release (12.6.0):
- FireWire Ports: Changed D4260 to PDS540 for higher current capacity
- SB GPIOs: Changed R2514 from pulldown to pulldown to correct auto power-on issue (Linda card detect GPIO)
3/07/07 -- Q7080 PP1V8_GPU FET changed for lower Rds on from FDM6296 to RJK0301DPB
13.3.0
3/08/07 -- Removed =PP1V5_S0_NB_VCCD_CRT alias to PP1V5_S0 since VCCD_CRT is GNDed per CRT disable guidelines.
3/08/07 -- Battery charge current limit circuit changes.
3/08/07 -- Changed R9811 from 15.0K to 14.0K. This is so that M57 inverter and split inverter can use same backlight table.
3/08/07 -- Changed R9950 from 220K to NOSTUFF to improve current and voltage asymmetry ratio.
3/08/07 -- Changed BOM option on R9960 511K from NOSTUFF to INV_SPLIT to improve current and voltage asymmetry ratio.
3/08/07 -- Integrated CSA pg. 55 through:
Change 47450 by cerickso@m75_mlb_051-7225_12.8.0_tmp.Ecad on 2007/03/08 10:49:26
Changes since previous major release (12.7.0):
- Thermal Sensors: Added R5515/R5516 in case low pass filter is needed for EMC1033
3/08/07 -- Integrated CSA pg. 79 through:
Change 47440 by xyang@m75_lio_051-7226_7.9.0_tmp.Ecad on 2007/03/08 10:25:46
Changed Charger PWM limit resistor according to MARC K.'S M70 values
13.4.0
3/12/07 -- Added BOM option P1V8S3_1V825 to M76_COMMON2 BOM group.
3/12/07 -- Modified R7520 and R7521 to use symbols for 0.1% resistors.
Removed OMIT BOM option from R7521.
Changed BOM options for R7520 to choose between 1.8V or 1.825V 0.1% resistors.
14.0.0
3/14/07 -- Removed BOM option for HDCP as feature is removed.
3/14/07 -- Moved =PP1V8_GPU_P1V8GPUFET from PP1V8_S3_ISNS to PP1V8_S3. This is to remove the current sense resistor from the GPU 1.8V path.
Cleaned up unused aliases.
3/14/07 -- Constraints: Constrained WWAN_SIM signals to 50 ohms
3/14/07 -- Integrated m75/mlb CSA pages 55 & 78 through:
Change 48122 by cerickso@cerickso_m75.Ecad on 2007/03/14 15:27:36
- Thermal Sensors/Aliases: Changed mounting pads of Th2H sensor connector to left clutch chassis gnd
- Power Control: Corrected alias connections for 5V/3V3 S5 enable signals
14.1.0
3/14/07 -- Moved =PP1V8_S0_P1V8S0FET from PP1V8_S3_ISNS to PP1V8_S3.
14.2.0
3/15/07 -- Changes to low voltage inverter for M76 piezo.
14.5.0
3/19/07 --
Integrated m75/mlb CSA pgs. 28,30-32,50,53-55,80-82,84-88,90,94,95 through:
Change 48405 by cerickso@m75_mlb_051-7225_13.3.0_tmp.Ecad on 2007/03/16 12:18:46
Changes since previous major release (13.2.0):
- Thermal Sensors: Moved remote sensor U5500 to SMC SMBus A and S3 power rail to clear I2C addr clash
3/19/07 --Integrated t9/mlb_noME CSA pgs. 15 & 38 through:
Change 48372 by wferry@wferry_projects.Ecad on 2007/03/16 09:11:01
Quick submit of T9 noME branch. Major release will follow once changes are properly documented in Radar and revision history.
Page 15: Sync from main-line (renamed LVDS_VREFx nets).
Page 38: Changed Yukon crystal load caps to 18pF per radar://4946795 (really radar://4945362).
3/19/07 -- Added OMIT BOM option to L4731 and L4741.
3/19/07 -- Added BOM table with 0 Ohm 0603 resistors at L4731,L4741.
3/19/07 -- SMBus: moved Remote Temps from SMC B to SMC A in order to use EMC1043-5.
3/19/07 --
<rdar://problem/5070179> BOM update: boost circuit open causes MLB & SIMM damage (see 5064997)
Deleted R7364 and made C7364 0603 size, still 0.1uF (132S0100).
Deleted R7420 and R7470 and made C7420 and C7470 0603 size, still 0.1uF (132S0100).
Deleted R7525 and made C7525 0805 size, still 0.1uF (132S0201).
Deleted R7615 and made C7615 0603 size, still 0.1uF (132S0100).
Deleted R8915 and made C8915 0603 size, still 0.1uF (132S0100).
3/19/07 -- Changes to low voltage inverter for M76 piezo.
L9950 changed from 152S0527 (15uH, 2.8A, 115mOhm) to 152S0585 (22uH, 2.8A, 129mOhm).
14.6.0
3/19/07 -- Integrated m75/mlb CSA pgs. 55 & 78 through:
Change 48590 by cerickso@m75_mlb_051-7225_13.4.0_tmp.Ecad on 2007/03/19 14:26:14
Changes since previous major release (13.3.0):
- Thermal Sensors: Updated U5500 power alias to indicate device should be on S3 rail
- Power Control: Added U7858 to level shift PM_G2_EN to 3.42V to 5V
3/19/07 -- Updated SMC A SMBus information for Left I/O Board and Top-Case.
3/19/07 -- Deleted R7324 and made C7324 0603 size, still 0.1uF (132S0100).
14.7.0
3/19/07 -- Added three 0603 0 ohm resistors R4740-R4742 for EMC return current path.
3/19/07 -- Battery charge current limit circuit changes for max charge current of 4.5A.
3/19/07 -- Integrated m75/mlb CSA pgs. 22 & 78 through:
Change 48660 by cerickso@m75_mlb_051-7225_13.5.0_tmp.Ecad on 2007/03/19 20:17:1 Changes since previous major release (13.4.0):
- Power Control: Tied all 4 5V/3.3V enables (EN1, EN2, EN3 and EN5) together as part of PM_G2_EN
14.8.0
3/21/07 -- Integrated m75/mlb CSA pgs. 84,85 & 89 through:
Change 48885 by cerickso@m75_mlb_051-7225_14.0.0_tmp.Ecad on 2007/03/20 21:27:14
This fab release is for DVT!
Changes since previous major release (13.5.0):
- GPU Vcore: Updated setpoints for GPU Vcore based upon Nvidia Vmin (i.e. 1.05V, 1.05V, 1.05V, 1.125V)
- FB: Changed FB VREF caps to 2x0.0047uF as required by Nvidia PUN 02736-001-v07 (which requests 1x0.01uF)
3/21/07 -- <rdar://problem/4838347> EMC - M76 MLB changes
Change BOM option on L4764 to OMIT and added BOM table entry for 0 ohm resistor at L4764.
3/21/07 -- <rdar://problem/5073301> M76: Change GPU Vmin
Changed resistors for M76 Vcore setpoints (i.e. 1.05V, 1.05V, 1.125V, 1.25V)
Removed NOSTUFF BOM option from R8924.
Changed R8924 to 28K.
Changed R8925 to 16.9K.
Changed table text notes.
3/22/07 -- Items relating to <rdar://problem/5061583> Task: Current Surge When Insert Battery Without AC Plugged-In
3/22/07 -- Added D7903 for voltage ripple on ISL6257 BOOT and PHASE pins.
3/22/07 -- Added Q7970 for potential battery inrush current.
15.0.0
3/26/07 -- Removed C7930 and R7903 for space reasons.
15.2.0
3/28/07 -- Change BOM option for 1.8V regulator feedback to 1.8V GPU FET input.
3/28/07 -- Added XW7580 and R7580 for option to tie 1.8V S3 regulator feedback point to input of 1.8V GPU FET.
3/28/07 -- Integrated m75/mlb CSA pg. 87 through
Change 49919 by cerickso@cerickso_m75.Ecad on 2007/03/28 14:28:29
Changes since previous fab release (14.0.0):
- GPU Straps: Added PCI_DEVID<3..0> pullup straps
15.3.0
3/29/07-- Moved XW7580 to XW0980, and R7580 to R0980.
15.4.0
3/31/97 -- Changed C9950 from 22uF to 10uF for acoustic noise per Flo Kim.
3/31/97 --Added C9951 B2 case size as placeholder for new cap for acoustic noise per Flo Kim.

Revision History

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 6 OF 92	

Functional Test Points

Fan Connectors

FUNC_TEST

E497	TRUE	=PP5V_S0_FAN_LT	8 52
E492	TRUE	FAN_LT_PWM	52
E490	TRUE	FAN_LT_TACH	52
E495	TRUE	FAN_RT_PWM	52
E494	TRUE	FAN_RT_TACH	52

LPC+ Debug Connector

FUNC_TEST

E490	TRUE	=PP3V3_S5_LPCPLUS	8 47
E491	TRUE	=PP5V_S0_LPCPLUS	8 47
E492	TRUE	LPC_AD<0>	23 45 47
E493	TRUE	LPC_AD<1>	23 45 47
E424	TRUE	LPC_FRAME_L	23 45 47
E423	TRUE	PM_CLKRUN_L	25 45 47
E422	TRUE	BOOT_LPC_SPI_L	24 47
E421	TRUE	SMC_TMS	45 46 47
E420	TRUE	DEBUG_RESET_L	28 47
E419	TRUE	SMC_TRST_L	45 47
E418	TRUE	SMC_TDO	45 46 47
E417	TRUE	SMC_MD1	45 47
E416	TRUE	SMC_TX_L	43 45 46 47
E415	TRUE	FWH_INIT_L	47
E414	TRUE	PCI_CLK33M_LPCPLUS	30 47 88
E413	TRUE	LPC_AD<2>	23 45 47
E412	TRUE	LPC_AD<3>	23 45 47
E411	TRUE	INT_SERIRQ	25 45 47
E410	TRUE	PM_SUS_STAT_L	25 45 46 47
E409	TRUE	SMC_TDI	45 46 47
E408	TRUE	SMC_TCK	45 46 47
E407	TRUE	SMC_RESET_L	45 46 47
E406	TRUE	SMC_NMI	45 47
E405	TRUE	SMC_RX_L	43 45 46 47
E403	TRUE	LINDACARD_GPIO	25 47

Left ALS

FUNC_TEST

E448	TRUE	ALS_GAIN	34 45 54
E447	TRUE	LTALS_OUT	34 54
	TRUE	GND	

Thermal Diode Connectors

FUNC_TEST

E560	TRUE	HSTHMSNS_D_P	51 91
E561	TRUE	HSTHMSNS_D_N	51
E443	TRUE	RSFSTHMSNS_D_P	51 91
E442	TRUE	RSFSTHMSNS_D_N	51
E520	TRUE	CPUTHMSNS_D2_P	51 91
E521	TRUE	CPUTHMSNS_D2_N	51

Battery Digital Connector

FUNC_TEST

E509	TRUE	SMC_BS_ALRT_L	45 46 57
E507	TRUE	=SMBUS_BATT_SCL	48 57
E506	TRUE	=SMBUS_BATT_SDA	48 57
E531	TRUE	=BATT_POS	57 67
E530	TRUE	=BATT_NEG	57 67
	TRUE	GND (HOST_DETECT_L)	

Left I/O Power Connector

FUNC_TEST

E529	TRUE	PP18V5_DCIN	57
E438	TRUE	=PPBUS_G3H_LIO_CONN	8 57
	TRUE	GND	

Request for 2 test points
Request for 3 test points

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

E515	TRUE	PPVBATT_G3_RTC	28
	TRUE	GND	

Current Sense Calibration

FUNC_TEST

E431	TRUE	ISENSE_CAL_EN	45 49
E430	TRUE	=PP5V_S0_ISENSECAL	8 49
E428	TRUE	=PPVCORE_S0_NBGFX_REG	8 60
E427	TRUE	=PPVCORE_S0_CPU_REG	8 49 59
E426	TRUE	=PPVCORE_GPU_REG	8 49 76
	TRUE	GND	

2 TPs per

6 TPs, 2 with each of above TP pairs

Left Clutch Barrel Connector

FUNC_TEST

E516	TRUE	PP5V_S3_CAMERA_F	44
E517	TRUE	USB_CAMERA_F_N	44 91
E518	TRUE	USB_CAMERA_F_P	44 91
E519	TRUE	PP5V_S3_WWAN_F	44
E522	TRUE	USB_WWAN_F_N	44 91
E523	TRUE	USB_WWAN_F_P	44 91

Other Func Test Points

FUNC_TEST

E433	TRUE	PM_SYSRST_L	25 28 45
E432	TRUE	SMC_ONOFF_L	45 46 80

Inverter Connector

FUNC_TEST

E533	TRUE	PPBUS_S0_LCDBKLT_FUSED	82
E532	TRUE	=GND_CHASSIS_INVERTER	9 82
E536	TRUE	PP5V_SW_LCDBKLT	81 82
E535	TRUE	LCDBKLT_PWM	81 82
	TRUE	GND	

IR & Sleep LED Connector

FUNC_TEST

E539	TRUE	=PP5V_S3_IR	8 80
E540	TRUE	USB_IR_N	24 80 86
E542	TRUE	USB_IR_P	24 80 86
E541	TRUE	SYS_LED_ANODE	46 80
	TRUE	GND	

System Validation TPs

FUNC_TEST

	TRUE	CPU_PWRGD	10 13 23 83
	TRUE	CPU_DPSLP_L	7 10 23 83
	TRUE	PM_DPRSLPVR	16 25 59 83
	TRUE	CPU_DPSLP_L	7 10 23 83
	TRUE	PM_LAN_ENABLE	25 45
	TRUE	PCI_RST_L	24 28
	TRUE	PM_RSMRST_L	25 45
	TRUE	PM_SB_PWROK	9 25 28
	TRUE	SB_RTC_RST_L	23 28
	TRUE	PM_STPCPU_L	25 29 30
	TRUE	PM_STPPCI_L	25 29 30
	TRUE	VR_PWRGD_CLKEN	25 28
	TRUE	VR_PWRGOOD_DELAY	9 16 28 59
	TRUE	FSB_CPURST_L	10 13 14 83
	TRUE	FSB_CPUSLP_L	10 14 83
	TRUE	FSB_DPWR_L	10 14 83
	TRUE	NB_SB_SYNC_L	16 25
E561	TRUE	PM_BMBUSY_L	16 25

FUNC_TEST

	TRUE	IMVP_VR_ON	45 59
	TRUE	IMVP_DPRSLPVR	59 83
	TRUE	PM_SLP_S3_L	25 36 40 45 66
	TRUE	PM_S4_STATE_L	25 45 66
	TRUE	PM_SLP_S5_L	25 45 46
	TRUE	PM_ENET_EN	36 66
	TRUE	P1V5P1V05S0_PGOOD	66
	TRUE	CPU_DPRSTP_L	10 16 23 59 83
	TRUE	IMVP6_VID<6..0>	12 59 83
	TRUE	FSB_CLK_CPU_N	10 30 88
	TRUE	FSB_CLK_CPU_P	10 30 88
	TRUE	PLT_RST_L	9 24 28 79
	TRUE	NB_RESET_L	16 28
	TRUE	GPU_RESET_L	28 68
	TRUE	SMC_LRESET_L	28 45
	TRUE	CPU_STPCLK_L	10 23 83
	TRUE	FSB_CLK_NB_P	14 30 88
	TRUE	FSB_CLK_NB_N	14 30 88
	TRUE	NB_CLKREQ_L	16 29
	TRUE	NB_CLK100M_PCIE_P	16 30 88
	TRUE	NB_CLK100M_PCIE_N	16 30 88
	TRUE	NB_CLK96M_DOT_P	88
	TRUE	NB_CLK96M_DOT_N	88
	TRUE	NB_CLK100M_DPLLSS_P	22 30 88
	TRUE	NB_CLK100M_DPLLSS_N	22 30 88
	TRUE	CPU_THERMTRIP_R	23

ICT Test Points

CPU FSB NO_TESTs

MAKE BASE — NO_TEST

E538		TRUE	FSB_A_L<31..3>	10 14 83
E537		TRUE	FSB_ADS_L	10 14 83
E536		TRUE	FSB_ADSTB_L<1..0>	10 14 83
E535		TRUE	FSB_BNR_L	10 14 83
E534		TRUE	FSB_BREQ0_L	10 14 83
E533		TRUE	FSB_D_L<63..0>	10 14 83
E532		TRUE	FSB_DBSY_L	10 14 83
E531		TRUE	FSB_DINV_L<3..0>	10 14 83
E530		TRUE	FSB_DRDY_L	10 14 83
E529		TRUE	FSB_DSTB_L_N<3..0>	10 14 83
E528		TRUE	FSB_DSTB_L_P<3..0>	10 14 83
E527		TRUE	FSB_HIT_L	10 14 83
E526		TRUE	FSB_HITM_L	10 14 83
E525		TRUE	FSB_LOCK_L	10 14 83
E524		TRUE	FSB_REQ_L<4..0>	10 14 83
E570	TRUE	TRUE	NC_CPU_RSVD5 = TP_CPU_RSVD5	10

NB NO_TESTs

MAKE BASE — NO_TEST

E555		TRUE	NC_NB_NC<1..16> = TP_NB_NC<1..16>	16
E569	TRUE	TRUE	NC_NB_RSVD<26..27> = TP_NB_RSVD<26..27>	16
E570	TRUE	TRUE	NC_NB_RSVD<24> = TP_NB_RSVD<24>	16

GPU NO_TESTs

NO_TEST

E551	TRUE	LVDS_L_CLK_P	75 79 90
E552	TRUE	LVDS_L_DATA_P<0>	75 79 90
E564	TRUE	TP_GPU_MIOB_CLKIN	74
E565	TRUE	TP_GPU_MIOB_CLKOUT_P	74
E566	TRUE	TP_GPU_MIOB_CTL3	74
E576	TRUE	NC_GPUVCORE_VFB_PC0	76
E577	TRUE	NC_GPUVCORE_VFB_PC1	76

Functional / ICT Test

SYNC_MASTER=MASTER SYNC_DATE=MASTER

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	7	92

"G3Hot" (Always-Present) Rails

=PPVBAT_G3H_CHGR_REG → PPBUS_G3H
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=12.6V
MAKE_BASE=TRUE
- =PPBUS_S5_FWPWRSW 40
- =PPBUS_S5_P1V8GPUFET 58
- =PPVIN_S5_CPU_IMVP_VIN 59
- =PPVIN_S5_CPU_IMVP 59
- =PPVIN_S5_P5VP3V3 61
- =PPVIN_S5_P5VS5 61
- =PPVIN_S5_P3V3S5 61
- =PPVIN_ENET_P1V25ENET 62
- =PPVIN_S3_P1V8S3 63
- =PPVIN_S0_P1V5S0 64
- =PPBUS_S0_LCDBKLT 82
- =PPVIN_S0_GFXIMVP6 60
- =PPVIN_S0_P1V05S0 62
- =PPVIN_GPU_GPUVCORE 76
- =PPBUS_G3H_LIO_CONN 7 57
- =PPBUS_S5_P1V25S0FET 58

=PPDCIN_G3H → PPDCIN_G3H
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=18.5V
MAKE_BASE=TRUE
- =PPVIN_G3H_P3V42G3H 66
- =PPVBATT_G3H_LIO_CONN 67

=PP3V42_G3H_REG → PP3V42_G3H
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.42V
MAKE_BASE=TRUE
- =PP3V42_G3H_SB_RTC 28
- =PP3V42_G3H_ACIN 57 67
- =PP3V42_G3H_SMCUSBMUX 43
- =PP3V42_G3H_SMBUS_SMC_BSA 48
- =PP3V42_G3H_LIDSWITCH 80
- =PP3V3_S5_SMC 45 46
- =PP3V3_S5_LPCPLUS 7 47
- =PPVIN_S5_SMCVREF 46
- =PP3V42_G3H_PWRCTL 66

5V Rails

=PP5V_S5_REG → PP5V_S5
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE
- =PP5V_S5_SB 27
- =PP5V_S5_P1V8GPUFET 58
- =PP5V_S5_P1V8S0FET 58
- =PP5V_S5_P1V25GPUFET 58
- =PP5V_S5_P1V25S0FET 58
- =PP5V_S5_P1V25ENET 62
- =PP5V_S5_P1V05S0 62
- =PP5V_S5_P1V8DDRREG 63
- =PP5V_S5_P1V5S0 64
- =PP5V_S5_PWRCTL 66
- =PP5V_S5_GPUVCORE 76
- =PP5V_S3_RTUSB 43
- =PP5V_S3_P5VS3FET 58
- =PP5V_S0_P5VS0FET 58
- =PP5V_S0_ODD 42

=PP5V_S3_FET → PP5V_S3
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE
- =PP5V_S3_SYSLED 46
- =PP5V_S3_CAMERA 44
- =PP5V_S3_WWAN 44
- =PP5V_S3_IR 7 80
- =PP5V_S3_TOPCASE 80

=PP5V_S0_FET → PP5V_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE
- =PP5V_S0_SB 27
- =PP5V_S0_ODDPWREN 42
- =PP5V_S0_LPCPLUS 7 47
- =PP5V_S0_ISENSECAL 7 49
- =PP5V_S0_FAN_LT 7 52
- =PP5V_S0_FAN_RT 52
- =PP5V_S0_KBDLED 54
- =PP5V_S0_CPU_IMVP 59
- =PP5V_S0_GFXIMVP6 60
- =PP5V_S0_LCDBKLT 81
- =PP5V_S0_DVI_DDC 78
- =PP5V_S0_SB_HPD 78
- =PP5V_S0_HDD 80
- =PP5V_S0_PCIREQFIX 42

Chipset "VCore" Rails

=PPVCORE_S0_CPU_REG → PPVCORE_S0_CPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.3 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PPVCORE_S0_CPU 11 12 49

=PPVCORE_S0_NBGFX_REG → PPVCORE_S0_NB_GFX
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PPVCORE_S0_NB_GFX 18 22
- =PPVCORE_S0_NBGFX_VSEN 60

3.3V-2.5V Rails

=PP3V3_S5_REG → PP3V3_S5
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_S5_SB_PM 28
- =PP3V3_S5_SB_USB 24
- =PP3V3_S5_SB 25 27
- =PP3V3_S5_SB_CLINK1 25
- =PP3V3_S5_SB_GPIO 25
- =PP3V3_S5_SB_3V3_VCCSUSHDA 26 27
- =PP3V3_S5_SB_VCCSUS3_3 26 27
- =PP3V3_S5_SB_VCCSUS3_3_USB 26 27
- =PP3V3_S5_S5PWRGD 46
- =PP3V3_S5_SMBUS_SB_ME 48
- =PP3V3_S5_ROM 56
- =PP3V3_S5_P1V5P1V05PG 66
- =PP3V3_S5_PWRCTL 66
- =PP3V3_S3_P3V3S3FET 58
- =PP3V3_S0_P3V3S0FET 58
- =PP3V3_S0_LCD 77
- =PP3V3_GPU_P3V3GPUFET 58

=PP3V3_S3_FET → PP3V3_S3
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_S3_P3V3ENETFET 36
- =PP3V3_S3_FW 38
- =PP3V3_S3_PCI 38
- =PP3V3_S3_SMBUS_SMC_A_S3 48
- =PP3V3_S3_RTALS 54
- =PP3V3_S3_SMS 55
- =PP3V3_S3_BT 80
- =PP3V3_S3_TOPCASE 80
- =PP3V3_S3_SMBUS_SMC_MGMT 48
- =PP3V3_S3_P1V25ISNS 50
- =PP3V3_S3_P1V8ISNS 50
- =PP3V3_S3_REMTHMSNS 51

=PP3V3_S0_FET → PP3V3_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_S0_NB_VCCHV 16 19 21
- =PP3V3_S0_NB_VCCA_PEG_BG 19 21
- =PP3V3_S0_NB_FOLLOW 21
- =PP3V3_S0_SB_GPIO 23 25
- =PP3V3_S0_SB_PCI 24
- =PP3V3_S0_SB_VCC3_3_IDE 26 27
- =PP3V3_S0_SB_VCC3_3_PCI 26 27
- =PP3V3R1V5_S0_SB_VCCHDA 26 27
- =PP3V3_S0_SB_VCC3_3_DMI 26 27
- =PP3V3_S0_SB_VCC3_3_VCCPCORE 26
- =PP3V3_S0_SB_VCCGLAN3_3 26
- =PP3V3_S0_SB_VCC3_3_SATA 26 27
- =PP3V3_S0_SB 27
- =PP3V3_S0_SB_PM 28
- =PP3V3_S0_RSTBUF 28
- =PP3V3_S0_CK505 29 30
- =PP3V3_S0_IDE 42
- =PP3V3_S0_SMC 46
- =PP3V3_S0_LPCPLUS 47
- =PP3V3_S0_SMBUS_SB 48
- =PP3V3_S0_SMBUS_SMC_B_S0 48
- =PP3V3_S0_CPUCOREISNS 50
- =PP3V3_S0_NBGFXCOREISNS 50
- =PP3V3_S0_CPUTHMSNS 51
- =PP3V3_S0_GPUTHMSNS 51
- =PP3V3_S0_FAN_LT 52
- =PP3V3_S0_FAN_RT 52
- =PP3V3_S0_IMVP 59
- =PP3V3_S0_GFXIMVP6 60
- =PP3V3_S0_NBCOREISNS 50
- =PP3V3_S0_ALLSYSPG 66
- =PP3V3_S0_DDC_LCD 77
- =PP3V3_S0_LCDBKLT 81
- =PP3V3_S0_LVDS_MUX 79
- =PP3V3R5V_GPU_GPUISENS 76
- =PP3V3_S0_XDP 13
- =PP3V3_S0M_CK505 29 30
- =PP3V3_S0_GPUCLKGATE 30
- =PPSPD_S0M_MEM_A 31
- =PPSPD_S0M_MEM_B 32
- =PP3V3_S0MWOL_SB_CLINK0 25
- =PP3V3_S0MWOL_SB_VCCCL3_3 26 27
- =PP3V3_S0MWOL_SB_VCCLAN3_3 26 27
- =PP3V3_S0_PBATTISENS 53
- =PP3V3_S0_PDCISENS 53
- =PP3V3_S0_TMPSNSR 53
- =PP3V3_S0_PWRCTL 66

=PP1V25_ENET_ISNS → PP1V25_ENET_ISNS
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PP1V25_S0_P1V25S0FET 58
- =PP1V25_GPU_P1V25GPUFET 58

1.8V-0.9V Rails

=PP1V8_S3_REG → PP1V8_S3
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE
- =PP1V8_S3_FW 38
- =PP1V8_S3M_MEM_A 31 91
- =PP1V8_S3M_MEM_B 32 91
- =PP1V8_S3_ISNS_R 50
- =PP1V8_GPU_P1V8GPUFET 9 58
- =PP1V8_S0_P1V8S0FET 58

=PP1V8_S3_ISNS → PP1V8_S3_ISNS
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE
- =PP1V8_S3M_MEM_NB 16 18 21
- =PP1V8_S3M_NB_VCC 21

=PP1V8_S0_FET → PP1V8_S0
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE
MAX I = 0.36A
- =PP1V8_S0_NB_LVDS 22
- =PP1VIN_S0_NB_DPLL 22

=PP1V5_S0_REG → PP1V5_S0
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=1.5V
MAKE_BASE=TRUE
MAX I = ?.??A
- =PP1V5_S0_CPU 11 12
- =PP1V5_S0_NB_TVDAC 22
- =PP1V5_S0_SB 27
- =PP1V5_S0_SB_VCC1_5_A_ARX 26 27
- =PP1V5_S0_SB_VCC1_5_A_ATX 26 27
- =PP1V5_S0_SB_VCC1_5_A 26
- =PP1V5_S0_SB_VCCUSBPLL 26 27
- =PP1V5_S0_SB_VCC1_5_A_USB_CORE 26 27
- =PP1V5_S0_LIO 34

=PP1V25_S0_FET → PP1V25_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PP1V25_S0M_NB_PLL 21
- =PP1V25_S0M_NB_VCC 21
- =PP1V25_S0M_NB_VCCA 21
- =PP1V25_S0_NB_VCCDMI 19 21
- =PP1V25_S0_NB_PLL 21
- =PP1V25_S0_NB_VCC 21
- =PP1V25_S0_SB_DMI 26 27

=PP1V05_S0_REG → PP1V05_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.05V
MAKE_BASE=TRUE
- =PP1V05_S0M_NB_VCCAXM 18 21
- =PP1V05_S0_CPU 10 11 12 13
- =PP1V05_S0_NB_FOLLOW 21
- =PP1V05_S0_NB_PCIE 21
- =PP1V05_S0_SB_CPU_IO 23 26 27
- =PP1V05_S0_SMC_LS 46
- =PP1V25R1V05_S0_FSB_NB 14 30
- =PP1V25R1V05_S0_NB_VTT 19 21
- =PPVCORE_S0_NBCOREISNS 50
- =PPVCORE_S0_NB_FOLLOW 21
- =PPVCORE_S0_SB 26 27

=PPVCORE_S0_NB_R → PPVCORE_S0_NB_R
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE
- =PPVCORE_S0_NB 18 21 22

=PP0V9_S3_VTTR_BUF → PP0V9_S3_MEM_VREF
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE
- =PP0V9_S3M_MEM_NBVREFA 16
- =PP0V9_S3M_MEM_NBVREFB 16
- =PP0V9_S3M_MEM_DIMMVREFA 31
- =PP0V9_S3M_MEM_DIMMVREFB 32

=PP0V9_S0_VTT_LDO → PP0V9_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE
- =PP0V9_S0M_MEM_TERM 33

"ENET" Rails

=PP3V3_ENET_FET → PP3V3_ENET
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_ENET_PHY 35
- =PP3V3_ENET_AVDDLDO 36

=PPVOUT_ENET_AVDDLDO → PP1V9_ENET
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.9V
MAKE_BASE=TRUE
- =PP1V8R2V5_ENET_PHY 35

=YUKON_EC_PP2V5_ENET 35
Yukon EC will not be supported

=PP1V25_ENET_REG → PP1V25_ENET
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PP1V2_ENET_PHY 35
- =PP1V25_ENET_ISNS_R 50

"FW" (FireWire) Rails

PPBUS_FW_FWPWRSW_F → =PPBU_S0_P3V3FW 65
MAKE_BASE=TRUE

=PPBUS_S5_FW_FET → PPVP_FW
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.3 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PPVP_FW_SUMNODE 40
- =PPVP_FW_CPS 39
- =PPVP_FW_P3V3FW 65

PPVP_FW_PORTA_UF → =PPVP_FW_PORT0 41
MAKE_BASE=TRUE

PPVP_FW_PORTB_UF → =PPVP_FW_PORT1 41
MAKE_BASE=TRUE

=PP3V3_FW_REG → PP3V3_FW
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_FW_PHY 39 41
- =PP3V3_FW_LATEVG_ACTIVE 40
- =PP3V3_FW_LATEVG 41
- =PPVIN_FW_P1V95FW 65

=PP1V95_FW_LDO → PP1V95_FW
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.95V
MAKE_BASE=TRUE
- =PP1V95_FW_PHY 39
- =PP1V8_FW_PHYOSC 39

"GPU" Rails

=PP3V3_GPU_FET → PP3V3_GPU
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_GPU_VDD33 73
- =PP3V3_GPU_MIO 73 74
- =PP3V3_GPU_DAC 75
- =PP3V3_GPU_DVI 78
- =PP3V3_GPU_LVDS_DDC 79
- =PP3V3_GPU_VGASYNC 78
- =PP3V3_GPU_TMDS 74
- =PP3V3_GPU_VIDEOMUX 74
- =PP2V5_GPU_LTC2900 79
- =PP3V3_GPU_SMBUS_SMC_0_S0 48
- =PP3V3_GPU_PWRCTL 66
- =PP3V3_GPU_VCORELOGIC 76
- =PP3V3_GPU_HDCP 74

=PP3V3_GPU_TMDS_FET → PP3V3_GPU_TMDS
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE
- =PP3V3_GPU_TMDSBIAS 78
- =PP3V3_GPU_IFPCD_IOVDD 75

=PP1V8_GPU_FET → PP1V8_GPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE
- =PP1V8_GPU_FB_VDD 71 72
- =PP1V8_GPU_FB_VDDQ 71 72
- =PP1V8_GPU_FBVDDQ 69
- =PP1V8_GPU_FBIO 70
- =PP1V8_GPU_IFPX 75

=PP1V25_GPU_FET → PP1V25_GPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PP1V2_GPU_PEX_IOVDDQ 68
- =PP1V2_GPU_PEX_IOVDD 68
- =PP1V2_GPU_PEX_PLLXVDD 68
- =PP1V2_GPU_PLLVDD 73
- =PP1V2_GPU_H_PLLVDD 73
- =PP1V2_GPU_VID_PLLVDD 73
- =PP1V2_GPU_FBPLLAVDD 70
- =PP1V2_GPU_VCOREPWRCTL 76

=PPVCORE_GPU_REG → PPVCORE_GPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE
- =PPVCORE_GPU 69

Power Aliases

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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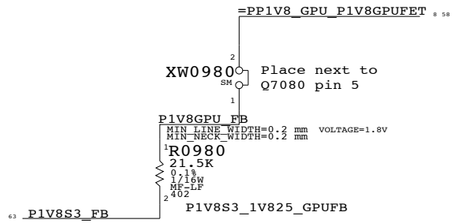
SCALE NONE | SHT 8 OF 92



Stuff either R7520 or R0980.

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
103S0192	1	RES,MTL FILM,21K,0.1,0402,SM,LF	R7580	CRITICAL	P1V8S3_1V8_GPUFB

28 25 7 PM_SB_PWROK — =SB_CLINK_MPWROK 25
MAKE_BASE=TRUE

59 28 16 7 VR_PWRGOOD_DELAY — =NB_CLINK_MPWROK 16
MAKE_BASE=TRUE

68 30 PEG_CLK100M_GPU_P — PEG_CLK100M_P 88
MAKE_BASE=TRUE

68 30 PEG_CLK100M_GPU_N — PEG_CLK100M_N 88
MAKE_BASE=TRUE

55 SMC_SMS_INT — =SMC_SMS_INT 45
MAKE_BASE=TRUE

60 GFX_VR_EN — =GFX_VR_EN 16
MAKE_BASE=TRUE

79 PM_ALL_NBGFX_PGOOD — GFXIMVP6_PGOOD 60
MAKE_BASE=TRUE

60 GFXIMVP6_VID<4..0> — GFX_VID<4..0> 16
MAKE_BASE=TRUE

79 28 24 7 PLT_RST_L — PLT_RESET_L 81

46 SMC_ENRGYSTR_LDO_EN — PBUS_LDO_EN 67

TP_MEM_A_A<15> — MEM_A_A<15> 31
MAKE_BASE=TRUE

TP_MEM_B_A<15> — MEM_B_A<15> 32
MAKE_BASE=TRUE

Thermal Module Holes

Top CPU TM "Hole"

Add 8 blind vias per side to GND

OMIT ZT0970 195R106 — Left CPU TM Hole

OMIT ZT0975 195R106 — Right CPU TM Hole

Top Right GPU TM Hole

OMIT ZT0985 195R106

OMIT ZT0980 195R106 — Bottom Left GPU TM Hole

All holes are plated through holes with two exceptions:

GND_CHASSIS_RIGHT_FAN_NOTCH (to the left of small well on lower board edge near USB)

GND_CHASSIS_BATTCONN_HOLE (to the left of DIMM cutout near board edge)

Chassis GNDs

OMIT ZT0901 195R106

GND_CHASSIS_RTIO
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=0V
MAKE_BASE=TRUE

=GND_CHASSIS_FW_PORT0L 41
=GND_CHASSIS_RTUSB 43

OMIT ZT0900 195R106

=GND_CHASSIS_DVI_TOP 78

=GND_CHASSIS_DVI_BOT 78

=GND_CHASSIS_ENET 37
=GND_CHASSIS_FW_PORT1 41
=GND_CHASSIS_FW_PORT0U 41

Chassis connection to be made at the mounting hole east of the LVDS connector

GND_CHASSIS_LVDS
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V
MAKE_BASE=TRUE

SH0925 OG-503040 SHLD-SM-LF

GND_CHASSIS_INVERTER
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=0V
MAKE_BASE=TRUE

=GND_CHASSIS_INVERTER 7 82
=GND_CHASSIS_LEFTCLUTCH 44 80
=GND_CHASSIS_J5590 51

Digital Ground

GND
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

RAM door (Torx) holes

OMIT ZT0930 235R126

GND_CHASSIS_RAMDOOR_HOLE_0
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

OMIT ZT0935 235R126

GND_CHASSIS_RAMDOOR_HOLE_1
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

Frame holes

GND_CHASSIS_RIGHT_FAN_HOLE
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

GND_CHASSIS_RIGHT_FAN_NOTCH
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

GND_CHASSIS_DIMM_NOTCH
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

OMIT ZT0955 195R106

GND_CHASSIS_LIOFLEX_HOLE
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

9 GND_CHASSIS_BATTCONN_HOLE
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

OMIT ZT0965 195R106

GND_CHASSIS_LNDACARD_HOLE
MIN_LINE_WIDTH=0.6mm
MIN_NECK_WIDTH=0.25mm
VOLTAGE=0V

9 GND_CHASSIS_BATTCONN_HOLE — =GND_BATT_CHGND 67
MAKE_BASE=TRUE

Signal Aliases

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

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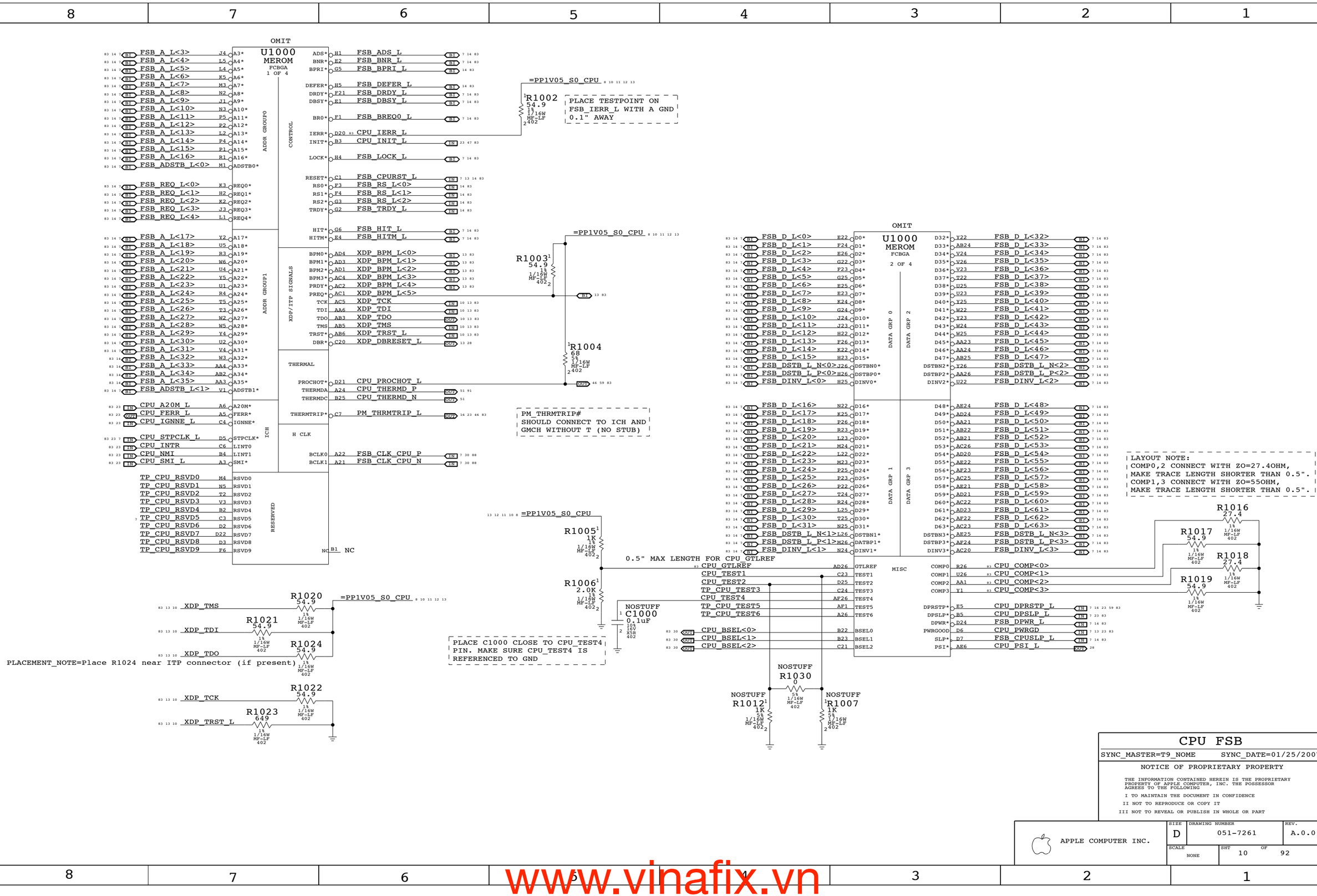
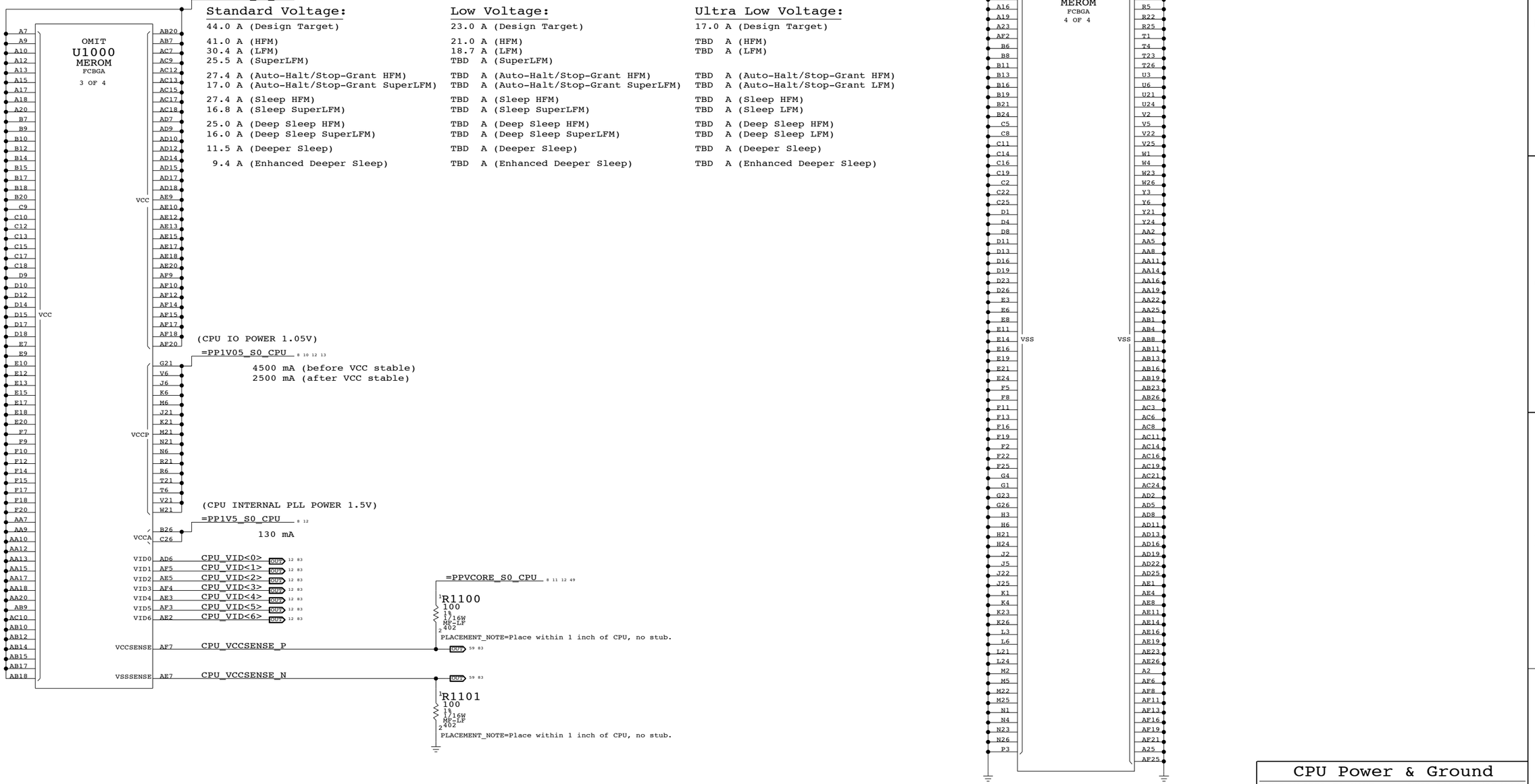
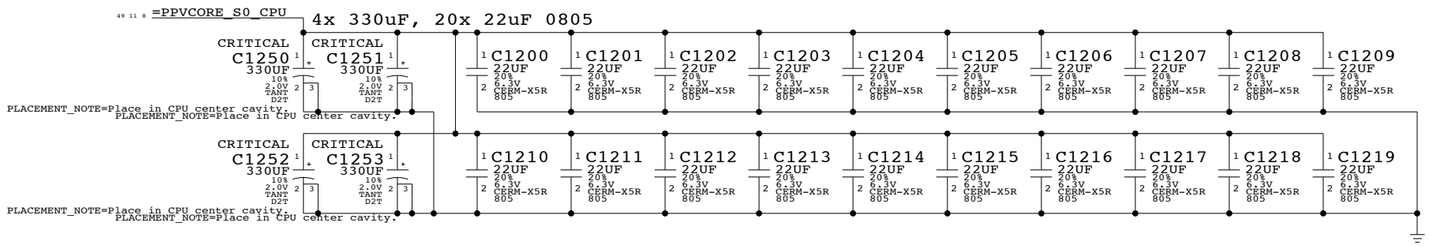
SCALE NONE | SHT 9 OF 92



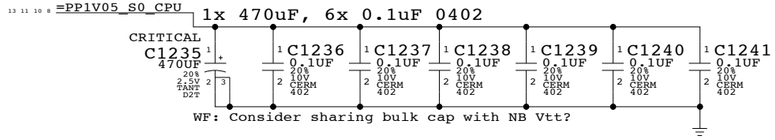


Current numbers from Merom for Santa Rosa EMTS, doc #22221.

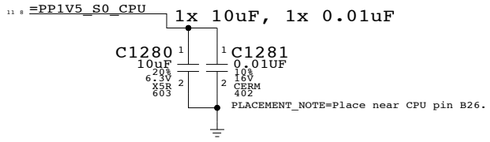
CPU VCORE HF AND BULK DECOUPLING



VCCP (CPU I/O) DECOUPLING



VCCA (CPU AVdd) DECOUPLING



CPU VCORE VID CONNECTIONS

83 11 CPU_VID<0..6> = IMVP6_VID<0..6> 7 59 83
MAKE_BASE=TRUE

CPU Decoupling & VID

SYNC_MASTER=M75_MLB SYNC_DATE=12/07/2006

APPLE COMPUTER INC.

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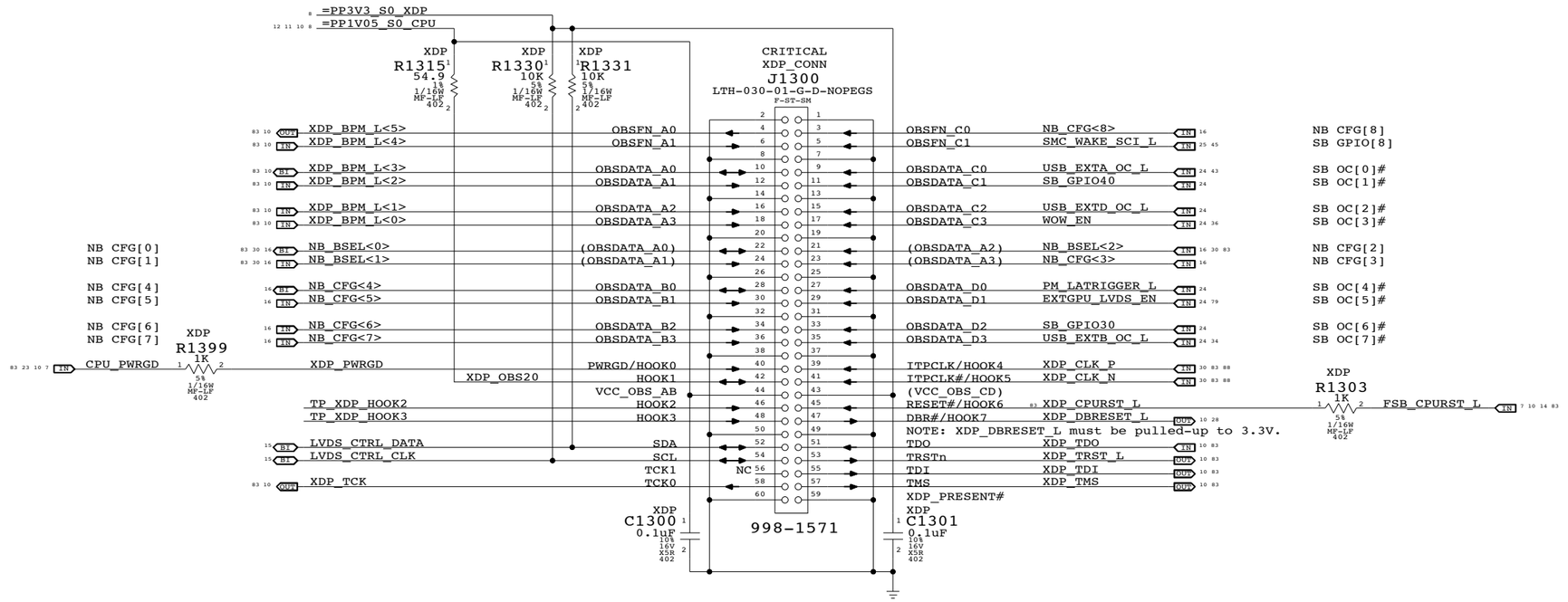
Mini-XDP Connector

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=01/22/2007

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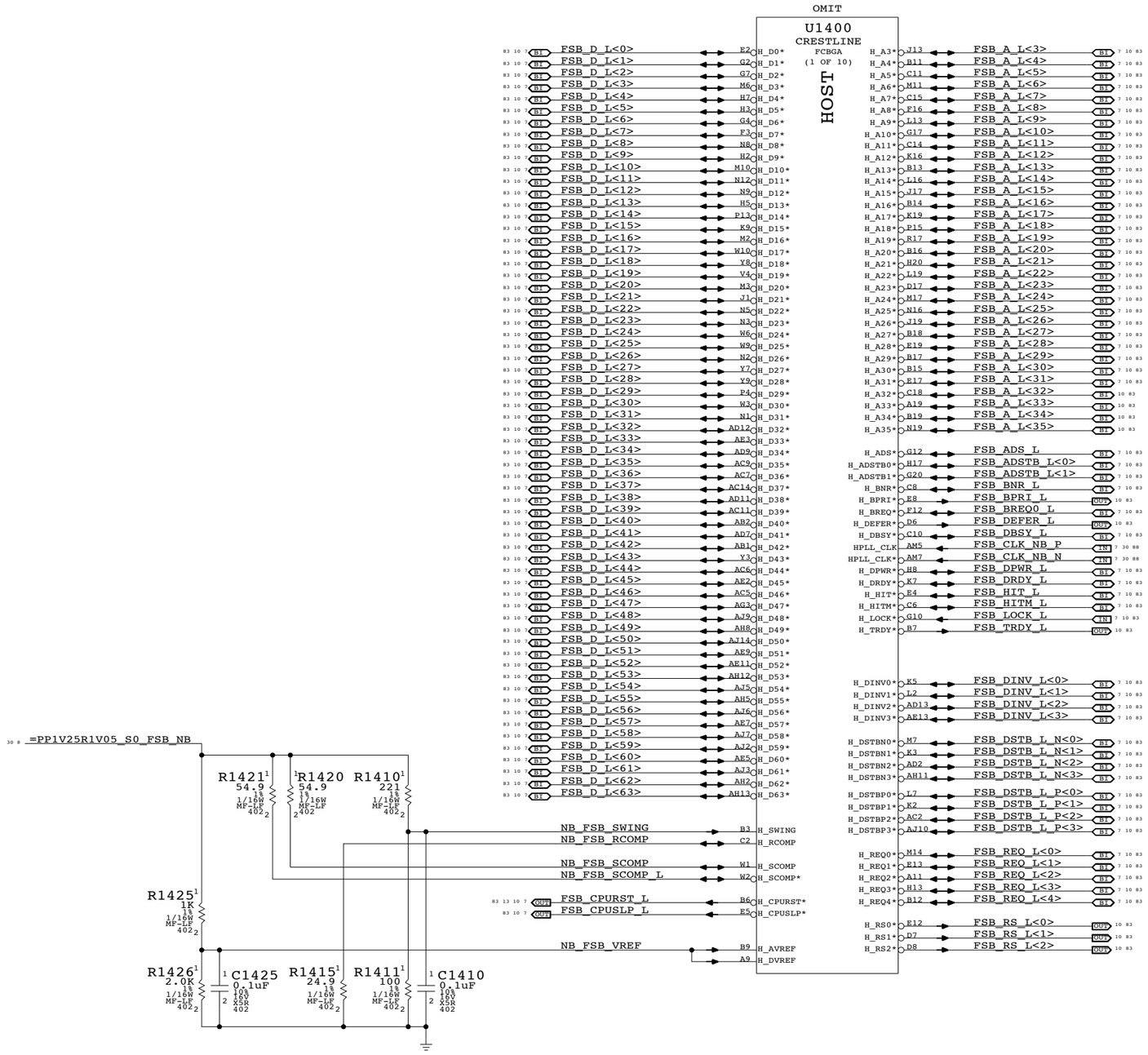

NB CPU Interface

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

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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.

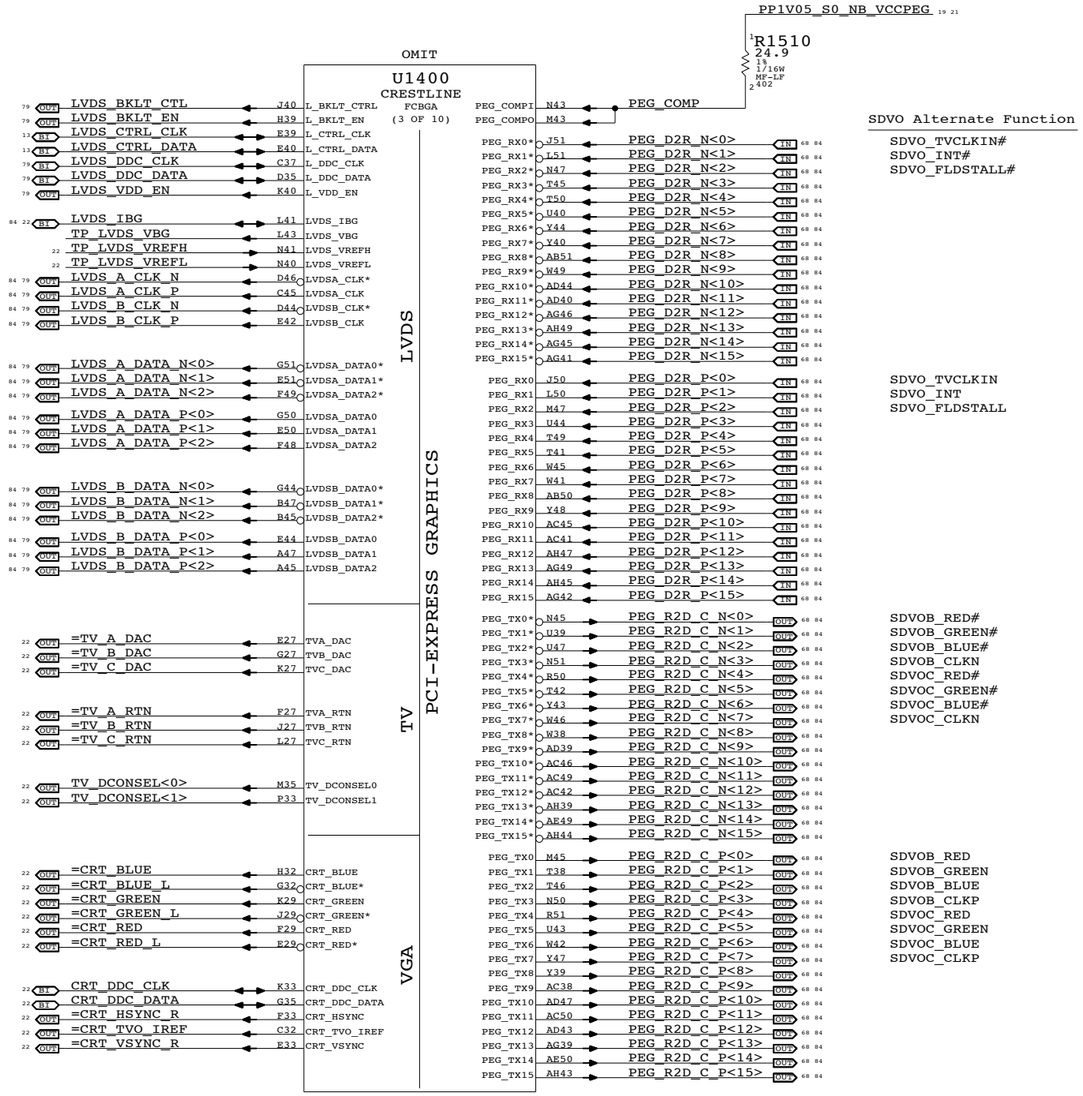
CRT & TV-Out Disable

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.



NB PEG / Video Interfaces

SYNC_MASTER=T9_NOME SYNC_DATE=03/19/2007

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SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	OF
NONE	15	92

NB_CFG<3>	RESERVED
NB_CFG<4>	RESERVED
NB_CFG<5> DMI x2 Select	High = DMIx4 Low = DMIx2
NB_CFG<6>	RESERVED
NB_CFG<7>	RESERVED
NB_CFG<8>	RESERVED
NB_CFG<9> PCIe Graphics Lane Reversal	High = Normal 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> FSB Dynamic ODT	High = Enabled Low = Disabled
NB_CFG<17>	RESERVED
NB_CFG<18>	RESERVED
NB_CFG<19> DMI Lane Reversal	High = Reversed Low = Normal
NB_CFG<20> Concurrent SDVO/PCIe x1	High = Both active Low = Only SDVO or PCIe x16

NB_CFG<13:12>

00 = RESERVED
01 = XOR Mode Enabled
10 = All-Z Mode Enabled
11 = Normal Operation

NB_CFG<5> 13 16
NBCFG_DMI_X2
R1655 3.9K 5% 1/16W MF-LF 402

NB_CFG<9> 16
NBCFG_PEG_REVERSE
R1659 3.9K 5% 1/16W MF-LF 402

NB_CFG<16> 16
NBCFG_DYN_ODT_DISABLE
R1666 3.9K 5% 1/16W MF-LF 402

=PP3V3_S0_NB_VCCHV 8 16 19 21
NBCFG_DMI_REVERSE
R1669 3.9K 5% 1/16W MF-LF 402

NB_CFG<19> 16

=PP3V3_S0_NB_VCCHV 8 16 19 21
NBCFG_SDVO_AND_PCIE
R1670 3.9K 5% 1/16W MF-LF 402

NB_CFG<20> 16

NB CFG<8:0> used for debug access

NB CFG<13:12> require ICT access

21 19 16 8 =PP3V3_S0_NB_VCCHV
R1630 10K 5% 1/16W MF-LF 402
R1631 10K 5% 1/16W MF-LF 402
45 31 IN PM_EXTTS_L<0>
45 32 IN PM_EXTTS_L<1>

OMIT

U1400
CRESTLINE
FCBGA
(2 OF 10)

RSVD

TP_NB_RSVD<1>	P36	RSVD1
TP_NB_RSVD<2>	P37	RSVD2
TP_NB_RSVD<3>	R35	RSVD3
TP_NB_RSVD<4>	N35	RSVD4
TP_NB_RSVD<5>	AR12	RSVD5
TP_NB_RSVD<6>	AR13	RSVD6
TP_NB_RSVD<7>	AM12	RSVD7
TP_NB_RSVD<8>	AN13	RSVD8
TP_NB_RSVD<9>	J12	RSVD9
TP_NB_RSVD<10>	AR37	RSVD10
TP_NB_RSVD<11>	AM36	RSVD11
TP_NB_RSVD<12>	AL36	RSVD12
TP_NB_RSVD<13>	AM37	RSVD13
TP_NB_RSVD<14>	D20	RSVD14
TP_NB_RSVD<20>	H10	RSVD20
TP_NB_RSVD<21>	B51	RSVD21
TP_NB_RSVD<22>	BJ20	RSVD22
TP_NB_RSVD<23>	BK22	RSVD23
7 TP_NB_RSVD<24>	BF19	RSVD24
TP_NB_RSVD<25>	BH20	RSVD25
7 TP_NB_RSVD<26>	BK18	RSVD26
7 TP_NB_RSVD<27>	BJ18	RSVD27

DDR MUXING

TP_MEM_CLKP2	BF23	SM_CK2
TP_MEM_CLKN2	BG23	SM_CK2*
TP_MEM_CLKP5	BC23	SM_CK5
TP_MEM_CLKN5	BD24	SM_CK5*
85 33 31 OUT MEM_A_A<14>	BJ29	SA_MA14
85 33 32 OUT MEM_B_A<14>	BE24	SB_MA14
TP_NB_RSVD<34>	BH39	RSVD34
TP_NB_RSVD<35>	AW20	RSVD35
TP_NB_RSVD<36>	BK20	RSVD36
TP_LVDS_A_DATAN3	C48	RSVD37
TP_LVDS_A_DATAP3	D47	RSVD38
TP_LVDS_B_DATAN3	B44	RSVD39
TP_LVDS_B_DATAP3	C44	RSVD40
TP_NB_RSVD<41>	A35	RSVD41
TP_NB_RSVD<42>	B37	RSVD42
TP_NB_RSVD<43>	B36	RSVD43
TP_NB_RSVD<44>	B34	RSVD44
TP_NB_RSVD<45>	C34	RSVD45

CFG

83 30 13 IN NB_BSEL<0>	P27	CFG0	
83 30 13 IN NB_BSEL<1>	N27	CFG1	
83 30 13 IN NB_BSEL<2>	N24	CFG2	
13 OUT NB_CFG<3>	C21	CFG3	IPU
13 BI NB_CFG<4>	C23	CFG4	IPU
16 13 BI NB_CFG<5>	F23	CFG5	IPU
13 OUT NB_CFG<6>	N23	CFG6	IPU
13 OUT NB_CFG<7>	G23	CFG7	IPU
13 OUT NB_CFG<8>	J20	CFG8	IPU
16 NB_CFG<9>	C20	CFG9	IPU
TP_NB_CFG<10>	R24	CFG10	IPU
TP_NB_CFG<11>	L23	CFG11	IPU
TP_NB_CFG<12>	J23	CFG12	IPU
TP_NB_CFG<13>	E23	CFG13	IPU
TP_NB_CFG<14>	E20	CFG14	IPU
TP_NB_CFG<15>	K23	CFG15	IPU
16 NB_CFG<16>	M20	CFG16	IPU
TP_NB_CFG<17>	M24	CFG17	IPU
TP_NB_CFG<18>	L32	CFG18	IPD
16 NB_CFG<19>	N33	CFG19	IPD
16 NB_CFG<20>	L35	CFG20	IPD

PM

25 7 OUT PM_BMBUSY_L	G41	PM_BM_BUSY*
83 59 23 10 7 IN CPU_DPRSTP_L	L39	PM_DPRSTP*
	L36	PM_EXT_TS0*
	J36	PM_EXT_TS1*
59 28 9 7 IN VR_PWRGOOD_DELAY	AW49	PWROK
28 7 IN NB_RESET_L	AV20	RSTIN*
83 46 23 10 OUT PM_THRMTRIP_L	N20	THERMTRIP*
83 59 25 7 IN PM_DPRSLPVR	G36	DPRSLPVR

NC

7 TP_NB_NC<1>	BJ51	NC1
7 TP_NB_NC<2>	BK51	NC2
7 TP_NB_NC<3>	BK50	NC3
7 TP_NB_NC<4>	BL50	NC4
7 TP_NB_NC<5>	BL49	NC5
7 TP_NB_NC<6>	BL3	NC6
7 TP_NB_NC<7>	BL2	NC7
7 TP_NB_NC<8>	BK1	NC8
7 TP_NB_NC<9>	BJ1	NC9
7 TP_NB_NC<10>	E1	NC10
7 TP_NB_NC<11>	A5	NC11
7 TP_NB_NC<12>	C51	NC12
7 TP_NB_NC<13>	B50	NC13
7 TP_NB_NC<14>	A50	NC14
7 TP_NB_NC<15>	A49	NC15
7 TP_NB_NC<16>	BK2	NC16

CLK

DPLL_REF_CLK	B42	=NB_CLK96M_DOT_P IN 22
DPLL_REF_CLK*	C42	=NB_CLK96M_DOT_N IN 22
DPLL_REF_SSCLK	H48	=NB_CLK100M_DPLLSS_P IN 22
DPLL_REF_SSCLK*	H47	=NB_CLK100M_DPLLSS_N IN 22
PEG_CLK	K44	NB_CLK100M_PCIE_P IN 7 30 88
PEG_CLK*	K45	NB_CLK100M_PCIE_N IN 7 30 88

Clk used for PEG and DMI

DMI

DMI_RXN0	AN47	DMI_S2N_N<0> IN 24 84
DMI_RXN1	AJ38	DMI_S2N_N<1> IN 24 84
DMI_RXN2	AN42	DMI_S2N_N<2> IN 24 84
DMI_RXN3	AN46	DMI_S2N_N<3> IN 24 84
DMI_RXP0	AM47	DMI_S2N_P<0> IN 24 84
DMI_RXP1	AJ39	DMI_S2N_P<1> IN 24 84
DMI_RXP2	AN41	DMI_S2N_P<2> IN 24 84
DMI_RXP3	AN45	DMI_S2N_P<3> IN 24 84
DMI_TXN0	AJ46	DMI_N2S_N<0> OUT 24 84
DMI_TXN1	AJ41	DMI_N2S_N<1> OUT 24 84
DMI_TXN2	AM40	DMI_N2S_N<2> OUT 24 84
DMI_TXN3	AM44	DMI_N2S_N<3> OUT 24 84
DMI_TXP0	AJ47	DMI_N2S_P<0> OUT 24 84
DMI_TXP1	AJ42	DMI_N2S_P<1> OUT 24 84
DMI_TXP2	AM39	DMI_N2S_P<2> OUT 24 84
DMI_TXP3	AM43	DMI_N2S_P<3> OUT 24 84

GRAPHICS VID

GFX_VID0	E35	GFX_VID<0> OUT 9
GFX_VID1	A39	GFX_VID<1> OUT 9
GFX_VID2	C38	GFX_VID<2> OUT 9
GFX_VID3	B39	GFX_VID<3> OUT 9
GFX_VR_EN	E36	=GFX_VR_EN OUT 9

ME

CL_CLK	AM49	CLINK_NB_CLK BI 25 87
CL_DATA	AK50	CLINK_NB_DATA BI 25 87
CL_PWROK	AT43	=NB_CLINK_MPWROK IN 9
CL_RST*	AN49	CLINK_NB_RESET_L OUT 25 87
CL_VREF	AM50	87 NB_CLINK_VREF

MISC

SDVO_CTRL_CLK	H35	SDVO_CTRLCLK BI 22
SDVO_CTRL_DATA	K36	SDVO_CTRLDATA BI 22
CLKREQ*	G39	NB_CLKREQ_L OUT 7 29
ICH_SYNC*	G40	NB_SB_SYNC_L OUT 7 25
TEST1	A37	NB_TEST1
TEST2	R32	NB_TEST2

R1691 20K 5% 1/16W MF-LF 402
R1690 0 5% 1/16W MF-LF 402

SM_RCOMP BL15 MEM_RCOMP
SM_RCOMP* BK14 MEM_RCOMP_L
SM_RCOMP_VOH BK31 MEM_RCOMP_VOH
SM_RCOMP_VOL BL31 MEM_RCOMP_VOL
SM_VREF0 AR49 =PP0V9_S3M_MEM_NBVREFA IN 8
SM_VREF1 AW4 =PP0V9_S3M_MEM_NBVREFB IN 8

C1615 0.1uF 20% 10V CERM 402
C1616 0.1uF 20% 10V CERM 402

SM_CK0 AV29 MEM_CLK_P<0> OUT 31 85
SM_CK1 BB23 MEM_CLK_P<1> OUT 31 85
SM_CK3 BA25 MEM_CLK_P<3> OUT 32 85
SM_CK4 AV23 MEM_CLK_P<4> OUT 32 85
SM_CK0* AW30 MEM_CLK_N<0> OUT 31 85
SM_CK1* BA23 MEM_CLK_N<1> OUT 31 85
SM_CK3* AW25 MEM_CLK_N<3> OUT 32 85
SM_CK4* AW23 MEM_CLK_N<4> OUT 32 85
SM_CKE0 BE29 MEM_CKE<0> OUT 31 33 85
SM_CKE1 AY32 MEM_CKE<1> OUT 31 33 85
SM_CKE3 BD39 MEM_CKE<3> OUT 32 33 85
SM_CKE4 BG37 MEM_CKE<4> OUT 32 33 85
SM_CS0* BG20 MEM_CS_L<0> OUT 31 33 85
SM_CS1* BK16 MEM_CS_L<1> OUT 31 33 85
SM_CS2* BG16 MEM_CS_L<2> OUT 32 33 85
SM_CS3* BE13 MEM_CS_L<3> OUT 32 33 85
SM_ODT0 BH18 MEM_ODT<0> OUT 31 33 85
SM_ODT1 BJ15 MEM_ODT<1> OUT 31 33 85
SM_ODT2 BJ14 MEM_ODT<2> OUT 32 33 85
SM_ODT3 BE16 MEM_ODT<3> OUT 32 33 85

21 18 8 =PP1V8_S3M_MEM_NB
R1610 20 1% 1/16W MF-LF 402
R1620 1K 1% 1/16W MF-LF 402
R1622 3.01K 1% 1/16W MF-LF 402
R1611 20 1% 1/16W MF-LF 402
R1624 1K 1% 1/16W MF-LF 402
C1623 0.01UF 10% 16V CERM 402
C1622 2.2UF 20% 6.3V CERM1 603
C1625 0.01UF 10% 16V CERM 402
C1624 2.2UF 20% 6.3V CERM1 603

PP1V25_S0M_NB_VCCAXD 19 21
R1640 1K 1% 1/16W MF-LF 402
C1640 0.1uF 20% 10V CERM 402
R1641 392 1% 1/16W MF-LF 402

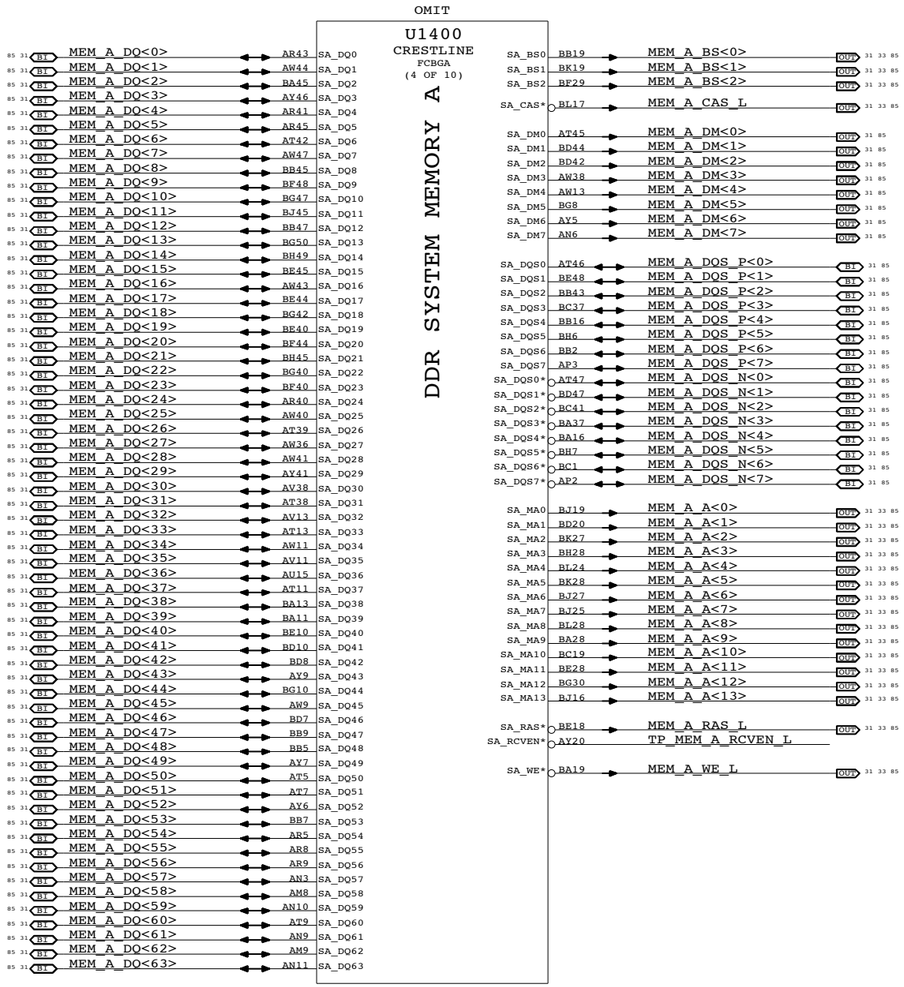
NOTE: GMCH CL_PWROK input must be PWRGD signal for PP3V3_S0M, PP3V3_S0MWOL, PP1V8_S3M, PP1V25_S0M, PP1V05_S0M, PP0V9_S3M and PP0V9_S0M.
If ME/AMT is not used, short CL_PWROK to PWROK.

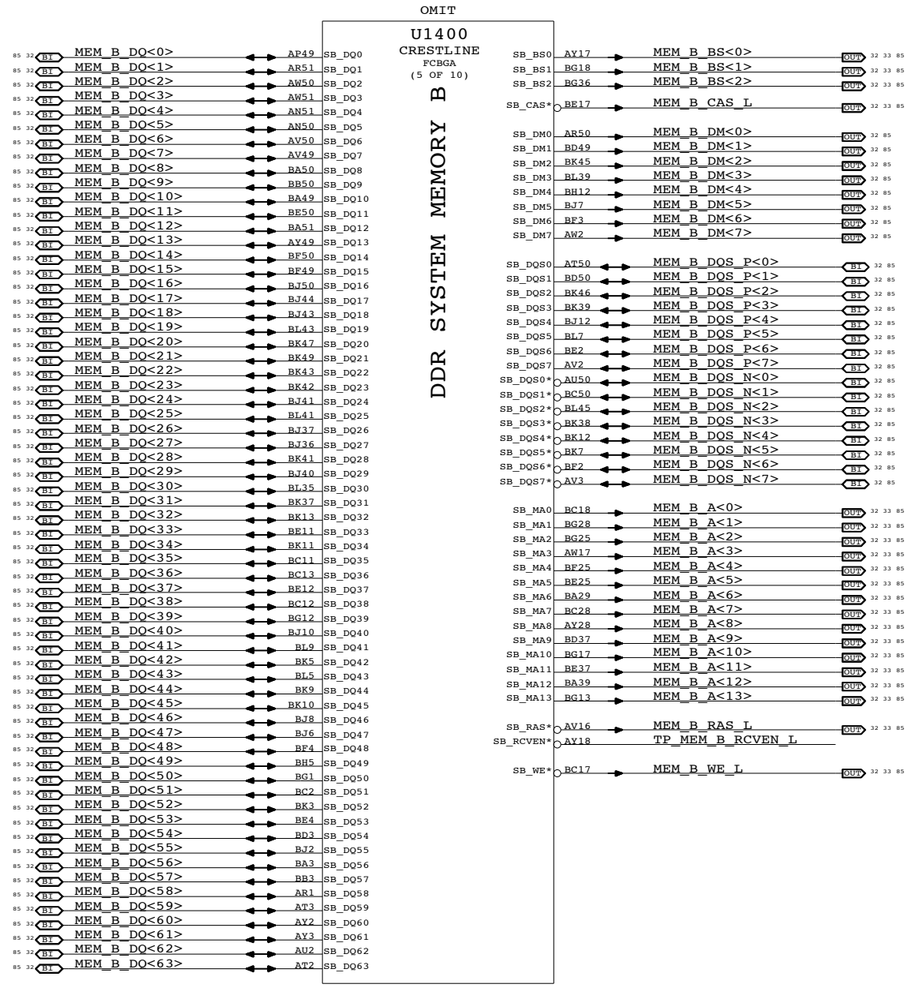
NB Misc Interfaces

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 16 OF 92	





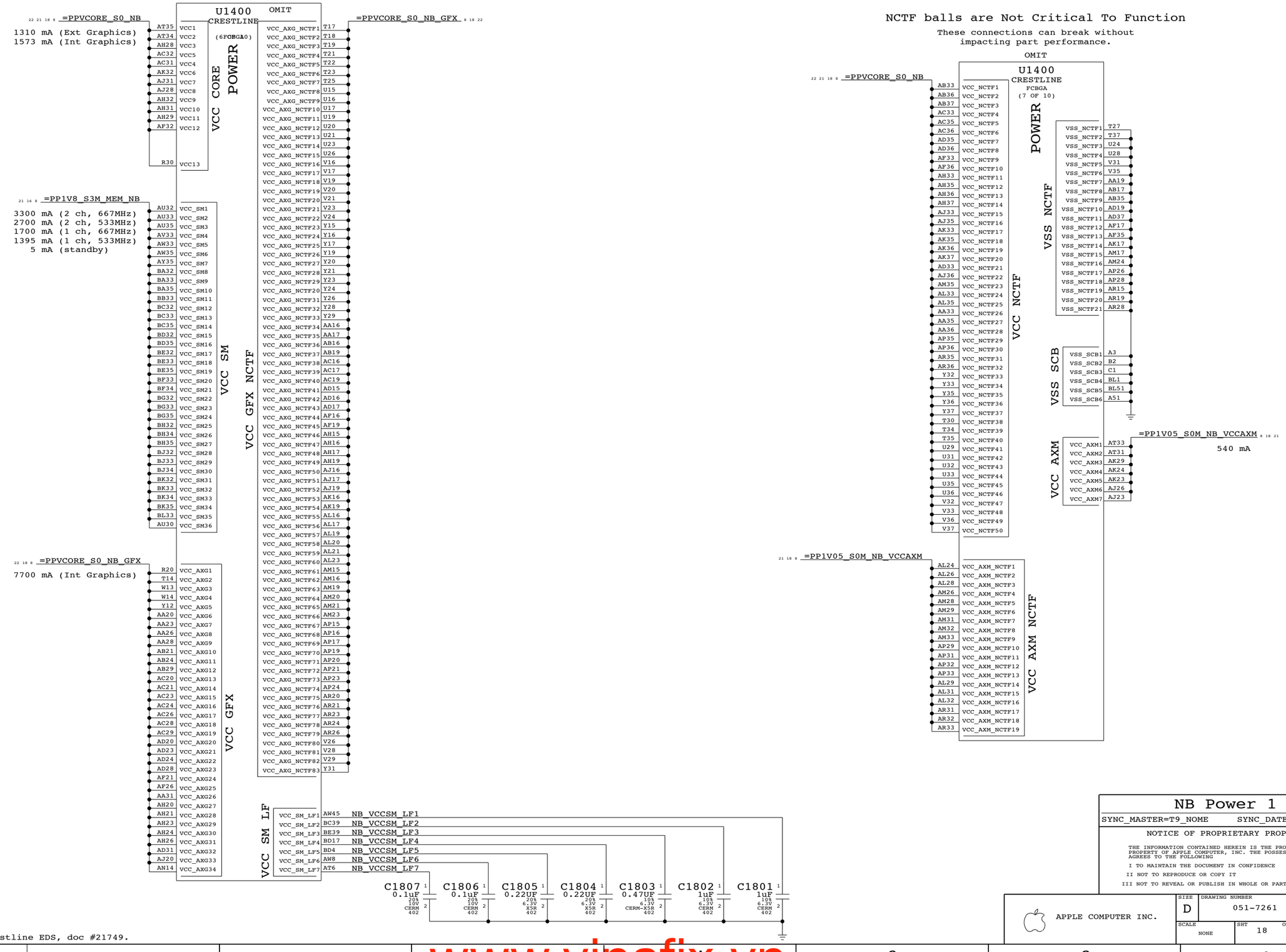
NB DDR2 Interfaces

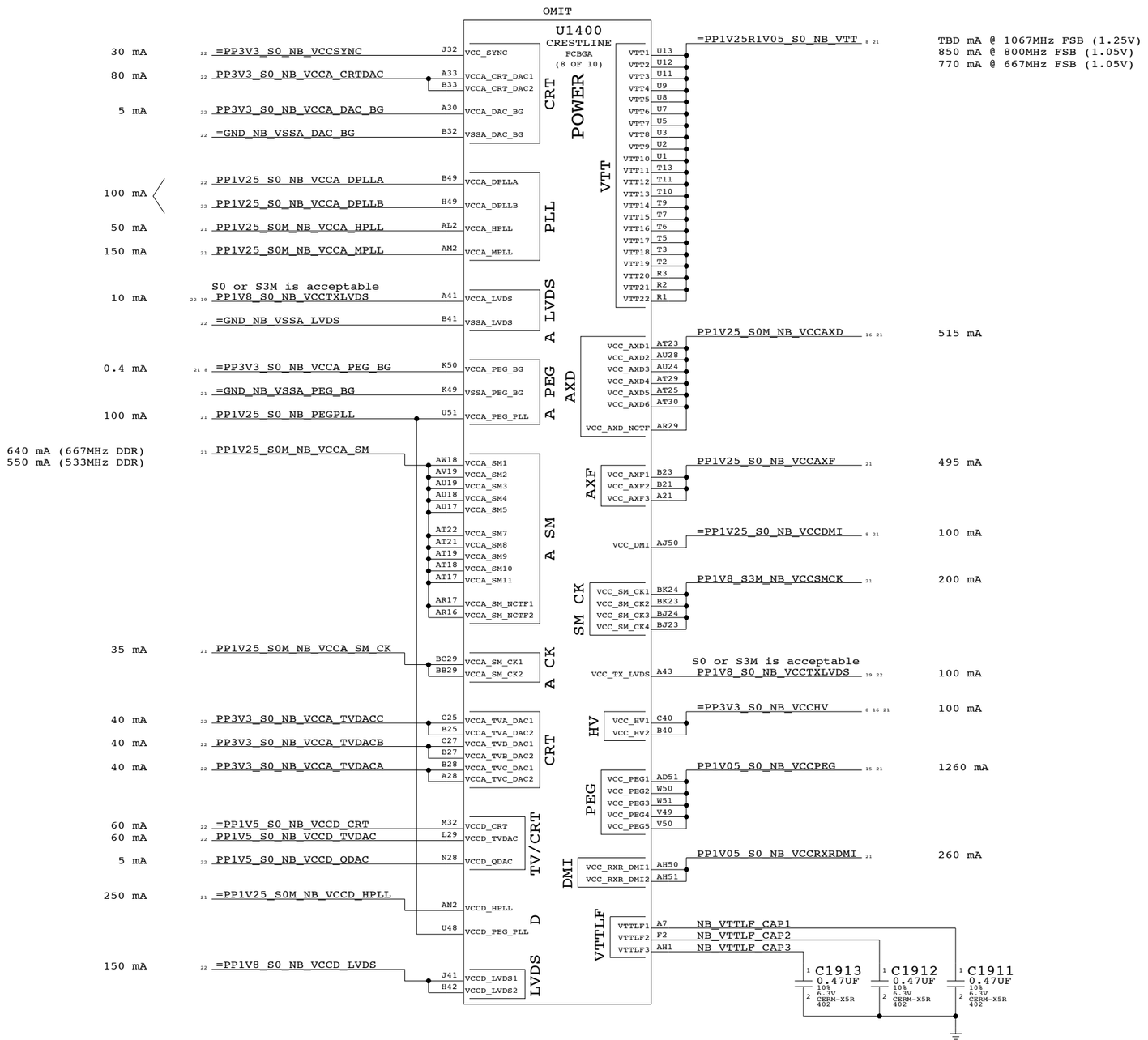
SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	17	92





Current numbers from Crestline EDS, doc #21749.

NB Power 2

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
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OMIT

U1400
CRESTLINE
FCBGA
(9 OF 10)
VSS

A13	VSS1	VSS100	AW24
A15	VSS2	VSS101	AW29
A17	VSS3	VSS102	AW32
A24	VSS4	VSS103	AW5
AA21	VSS5	VSS104	AW7
AA24	VSS6	VSS105	AY10
AA29	VSS7	VSS106	AY24
AB20	VSS8	VSS107	AY37
AB23	VSS9	VSS108	AY42
AB26	VSS10	VSS109	AY43
AB28	VSS11	VSS110	AY45
AB31	VSS12	VSS111	AY47
AC10	VSS13	VSS112	AY50
AC13	VSS14	VSS113	B10
AC3	VSS15	VSS114	B20
AC39	VSS16	VSS115	B24
AC43	VSS17	VSS116	B29
AC47	VSS18	VSS117	B30
AD1	VSS19	VSS118	B35
AD21	VSS20	VSS119	B38
AD26	VSS21	VSS120	B43
AD29	VSS22	VSS121	B46
AD3	VSS23	VSS122	B5
AD41	VSS24	VSS123	B8
AD45	VSS25	VSS124	BA1
AD49	VSS26	VSS125	BA17
AD5	VSS27	VSS126	BA18
AD50	VSS28	VSS127	BA2
AD8	VSS29	VSS128	BA24
AE10	VSS30	VSS129	BB12
AE14	VSS31	VSS130	BB25
AE6	VSS32	VSS131	BB40
AF20	VSS33	VSS132	BB44
AF23	VSS34	VSS133	BB49
AF24	VSS35	VSS134	BB8
AF31	VSS36	VSS135	BC16
AG2	VSS37	VSS136	BC24
AG38	VSS38	VSS137	BC25
AG43	VSS39	VSS138	BC36
AG47	VSS40	VSS139	BC40
AG50	VSS41	VSS140	BC51
AH3	VSS42	VSS141	BD13
AH40	VSS43	VSS142	BD2
AH41	VSS44	VSS143	BD28
AH7	VSS45	VSS144	BD45
AH9	VSS46	VSS145	BD48
AJ11	VSS47	VSS146	BD5
AJ13	VSS48	VSS147	BE1
AJ21	VSS49	VSS148	BE19
AJ24	VSS50	VSS149	BE23
AJ29	VSS51	VSS150	BE30
AJ32	VSS52	VSS151	BE42
AJ43	VSS53	VSS152	BE51
AJ45	VSS54	VSS153	BE8
AJ49	VSS55	VSS154	BF12
AK20	VSS56	VSS155	BF16
AK21	VSS57	VSS156	BF36
AK26	VSS58	VSS157	BG19
AK28	VSS59	VSS158	BG2
AK31	VSS60	VSS159	BG24
AK51	VSS61	VSS160	BG29
AL1	VSS62	VSS161	BG39
AM11	VSS63	VSS162	BG48
AM13	VSS64	VSS163	BG5
AM3	VSS65	VSS164	BG51
AM4	VSS66	VSS165	BH17
AM41	VSS67	VSS166	BH30
AM45	VSS68	VSS167	BH44
AN1	VSS69	VSS168	BH46
AN38	VSS70	VSS169	BH8
AN39	VSS71	VSS170	BJ11
AN43	VSS72	VSS171	BJ13
AN5	VSS73	VSS172	BJ38
AN7	VSS74	VSS173	BJ4
AP4	VSS75	VSS174	BJ42
AP48	VSS76	VSS175	BJ46
AP50	VSS77	VSS176	BK15
AR11	VSS78	VSS177	BK17
AR2	VSS79	VSS178	BK25
AR39	VSS80	VSS179	BK29
AR44	VSS81	VSS180	BK36
AR47	VSS82	VSS181	BK40
AR7	VSS83	VSS182	BK44
AT10	VSS84	VSS183	BK6
AT14	VSS85	VSS184	BK8
AT41	VSS86	VSS185	BL11
AT49	VSS87	VSS186	BL13
AU1	VSS88	VSS187	BL19
AU23	VSS89	VSS188	BL22
AU29	VSS90	VSS189	BL37
AU3	VSS91	VSS190	BL47
AU36	VSS92	VSS191	C12
AU49	VSS93	VSS192	C16
AU51	VSS94	VSS193	C19
AV39	VSS95	VSS194	C28
AV48	VSS96	VSS195	C29
AW1	VSS97	VSS196	C33
AW12	VSS98	VSS197	C36
AW16	VSS99	VSS198	C41

OMIT

U1400
CRESTLINE
FCBGA
(10 OF 10)
VSS

C46	VSS199	VSS287	W11
C50	VSS200	VSS288	W39
C7	VSS201	VSS289	W43
D13	VSS202	VSS290	W47
D24	VSS203	VSS291	W5
D3	VSS204	VSS292	W7
D32	VSS205	VSS293	Y13
D39	VSS206	VSS294	Y2
D45	VSS207	VSS295	Y41
D49	VSS208	VSS296	Y45
E10	VSS209	VSS297	Y49
E16	VSS210	VSS298	Y5
E24	VSS211	VSS299	Y50
E28	VSS212	VSS300	Y11
E32	VSS213	VSS301	P29
E47	VSS214		
F19	VSS215		
F36	VSS216	TDE_SENSE VSS302	T29
F4	VSS217		
F40	VSS218		
F50	VSS219	TDE_FORCE VSS303	T31
G1	VSS220		
G13	VSS221		
G16	VSS222	TDB_FORCE VSS304	T33
G19	VSS223		
G24	VSS224		
G28	VSS225	TDB_SENSE VSS305	R28
G29	VSS226		
G33	VSS227		
G42	VSS228		
G45	VSS229	VSS306	AA32
G48	VSS230	VSS307	AB32
G8	VSS231	VSS308	AD32
H24	VSS232	VSS309	AF28
H28	VSS233	VSS310	AF29
H4	VSS234	VSS311	AT27
H45	VSS235	VSS312	AV25
J11	VSS236	VSS313	H50
J16	VSS237		
J2	VSS238		
J24	VSS239		
J28	VSS240		
J33	VSS241		
J35	VSS242		
J39	VSS243		
K12	VSS245		
K47	VSS246		
K8	VSS247		
L1	VSS248		
L17	VSS249		
L20	VSS250		
L24	VSS251		
L28	VSS252		
L3	VSS253		
L33	VSS254		
L49	VSS255		
M28	VSS256		
M42	VSS257		
M46	VSS258		
M49	VSS259		
M5	VSS260		
M50	VSS261		
M9	VSS262		
N11	VSS263		
N14	VSS264		
N17	VSS265		
N29	VSS266		
N32	VSS267		
N36	VSS268		
N39	VSS269		
N44	VSS270		
N49	VSS271		
N7	VSS272		
P19	VSS273		
P2	VSS274		
P23	VSS275		
P3	VSS276		
P50	VSS277		
R49	VSS278		
T39	VSS279		
T43	VSS280		
T47	VSS281		
U41	VSS282		
U45	VSS283		
U50	VSS284		
V2	VSS285		
V3	VSS286		

Crestline Thermal Diode Pins

Mainly for investigation. If not used, alias these nets directly to GND.

TDE_SENSE T29 =NB_TDE_SENSE 51

NOTE: TDE = _P

TDE_FORCE T31 =NB_TDE_FORCE 51

TDB_FORCE T33 =NB_TDB_FORCE 51

NOTE: TDB = _N

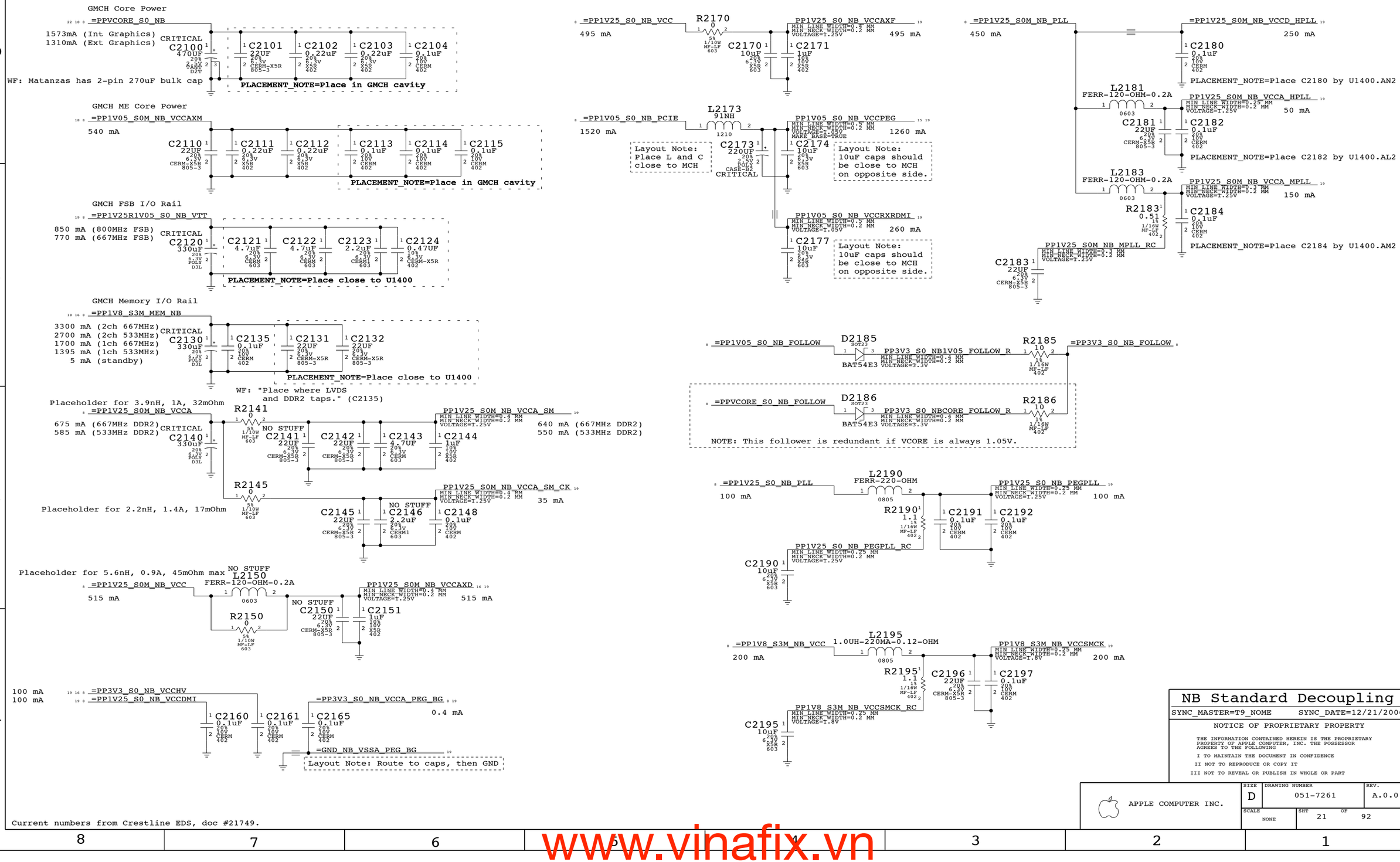
TDB_SENSE R28 =NB_TDB_SENSE 51

NB Grounds

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 20 OF 92	



Crestline LVDS Support

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

=PP1V5_S0_NB_TVDAC
65 mA

C2201
22000pF-1000mA
16V
NFM18

C2200
0.1uF
20%
10V
CERM
402

PP1V5_S0_NB_VCCD_TVDAC
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.5V
60 mA

Layout Note:
These 2 caps should be
within 6.35 mm of NB edge

=CRT_RED
=CRT_RED_L
=CRT_GREEN
=CRT_GREEN_L
=CRT_BLUE
=CRT_BLUE_L
=CRT_HSYNC_R
=CRT_VSYNC_R
=CRT_TVO_IREF

=TV_A_DAC
=TV_A_RTN
=TV_B_DAC
=TV_B_RTN
=TV_C_DAC
=TV_C_RTN

CRT_DDC_CLK
CRT_DDC_DATA
SDVO_CTRLCLK
SDVO_CTRLDATA
TV_DCONSEL<0>
TV_DCONSEL<1>

LVDS_IBG
R2299
2.37K
1%
1/16W
MF-LF
402

TP_LVDS_VREFH — NC_LVDS_VREFH
MAKE_BASE=TRUE
NO_TEST=TRUE
TP_LVDS_VREFL — NC_LVDS_VREFL
MAKE_BASE=TRUE
NO_TEST=TRUE

=PPVCORE_S0_NB

=NB_CLK96M_DOT_N
=NB_CLK96M_DOT_P

=NB_CLK100M_DPLLSS_P — NB_CLK100M_DPLLSS_P
=NB_CLK100M_DPLLSS_N — NB_CLK100M_DPLLSS_N

=PP1V5_S0_NB_VCCD_CRT
PP3V3_S0_NB_VCCA_CRTDAC
=PP3V3_S0_NB_VCCSYNC
PP1V5_S0_NB_VCCD_QDAC
PP3V3_S0_NB_VCCA_DAC_BG
=GND_NB_VSSA_DAC_BG
PP3V3_S0_NB_VCCA_TVDACA
PP3V3_S0_NB_VCCA_TVDACB
PP3V3_S0_NB_VCCA_TVDACC

GMCH Graphics Core Power

=PPVCORE_S0_NB_GFX
7700 mA

CRITICAL
C2210
470UF
20%
2.5V
TANT
D2T

CRITICAL
C2211
470UF
20%
2.5V
TANT
D2T

C2212
22UF
20%
6.3V
CERM-X5R
805-3

C2213
10uF
20%
6.3V
X5R
603

C2214
1UF
10%
6.3V
CERM
402

C2215
0.47UF
10%
6.3V
CERM-X5R
402

C2216
0.1uF
20%
10V
CERM
402

C2217
0.1uF
20%
10V
CERM
402

PLACEMENT_NOTE=Place in GMCH cavity

=PP1V8_S0_NB_LVDS
260 mA

L2220
1.0UH-0.5A
1210

C2220
220UF
20%
6.3V
POLY
CASE-D3L
CRITICAL

C2221
0.001UF
10%
50V
CERM
402

PP1V8_S0_NB_VCCTXLVDS
MIN_LINE_WIDTH=0.2 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.8V
110 mA

C2223
0.001UF
10%
50V
CERM
402

=GND_NB_VSSA_LVDS

Layout Note: Route to cap, then GND

=PP1V8_S0_NB_VCCD_LVDS
150 mA

C2226
1UF
10%
6.3V
CERM
402

CRITICAL
U2265
TPS731125
SOT23-5
IN
EN
OUT
NR/FB
GND

=PPVIN_S0_NB_DPLL
(1.7V - 5.5V)
100 mA

Vout = 1.25V (Factory Programmed)

PP1V25_S0_NB_DPLL
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V

P1V25S0NBDPLL_NR

C2265
1UF
10%
6.3V
CERM
402

C2266
0.01UF
10%
16V
CERM
402

C2260
10UF
20%
6.3V
X5R
603

100 mA

GND_DPLL_ESR
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=0V

R2260
0.300
5%
1/10W
FF
603

NO STUFF
R2261
4.7
5%
1/16W
MF-LF
402

PP1V25_S0_NB_VCCA_DPLLA
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V

C2261
0.1uF
20%
10V
CERM
402

NO STUFF

R2262
4.7
5%
1/16W
MF-LF
402

PP1V25_S0_NB_VCCA_DPLLB
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V

C2262
0.1uF
20%
10V
CERM
402

100 mA

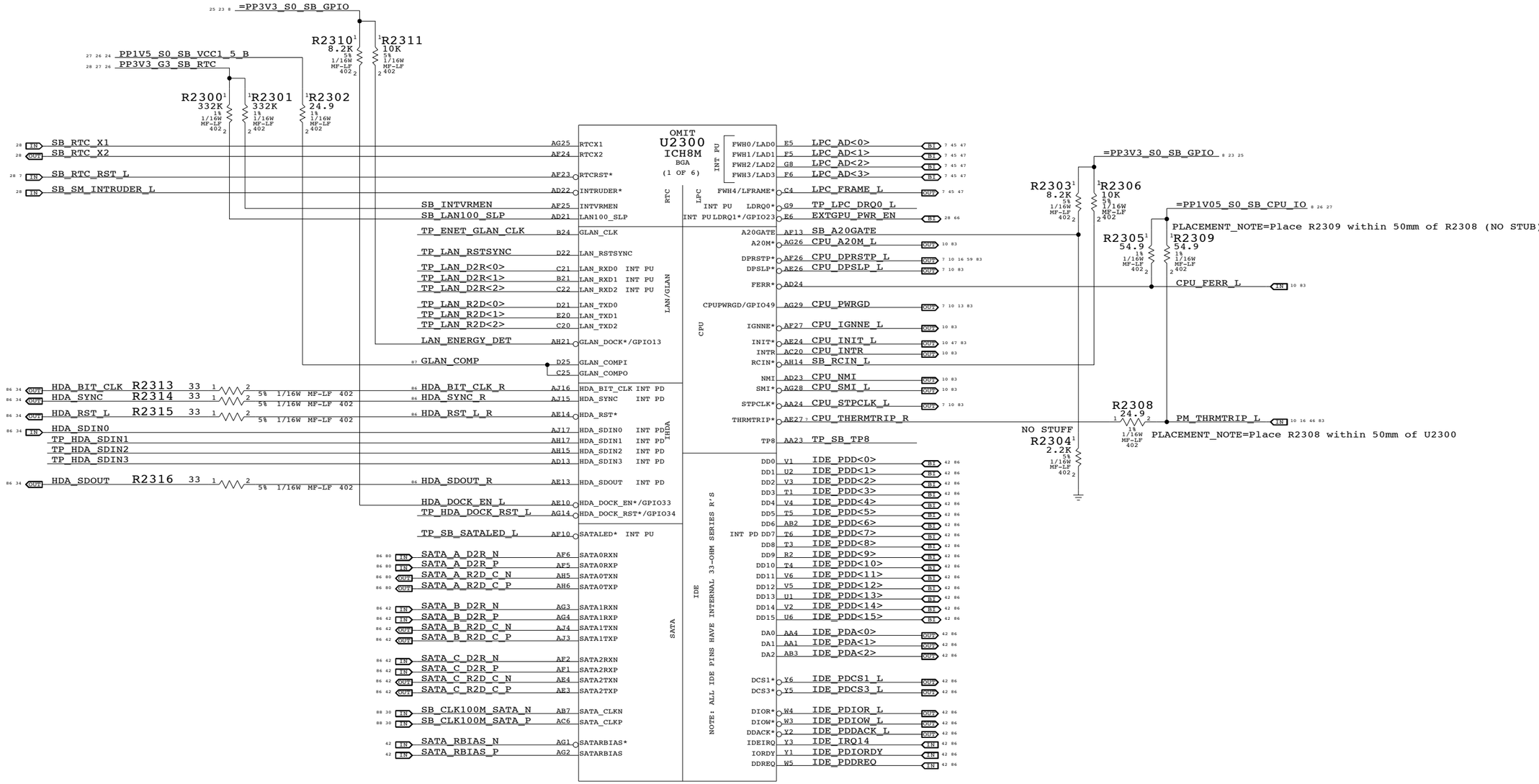
Current numbers from Crestline EDS Addendum, doc #20127.

NB Graphics Decoupling

SYNC_MASTER=M75_MLB SYNC_DATE=03/20/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 22 OF 92	



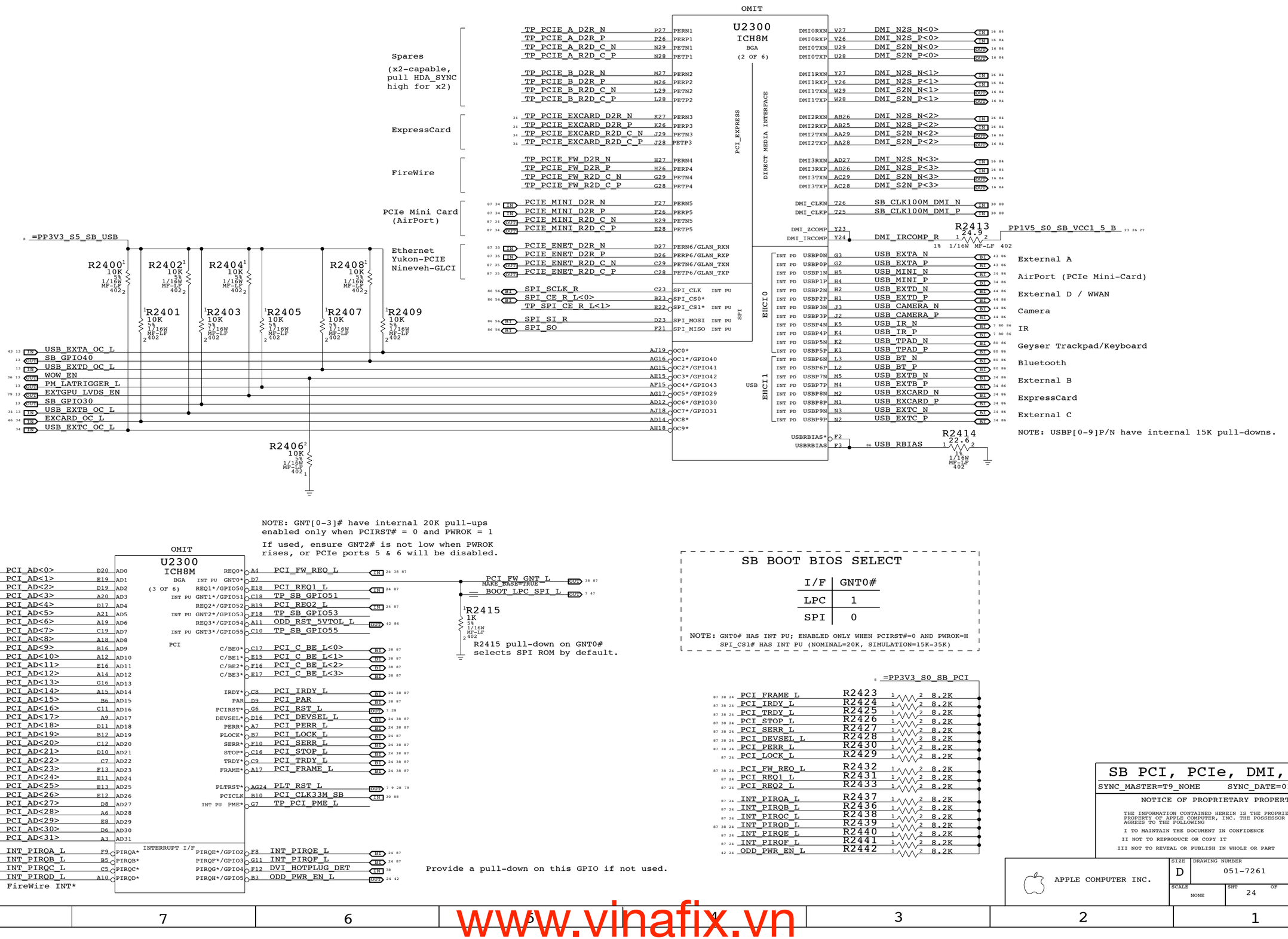
	HDA
HDA_BIT_CLK	24.000MHZ CLOCK W/INTERNAL WEAK PD
HDA_RST#	
HDA_SDIN[0-2]	INTEGRATED PDs
HDA_SDOUT	INTEGRATED PD
ACZ_SYNC	INTEGRATED PD

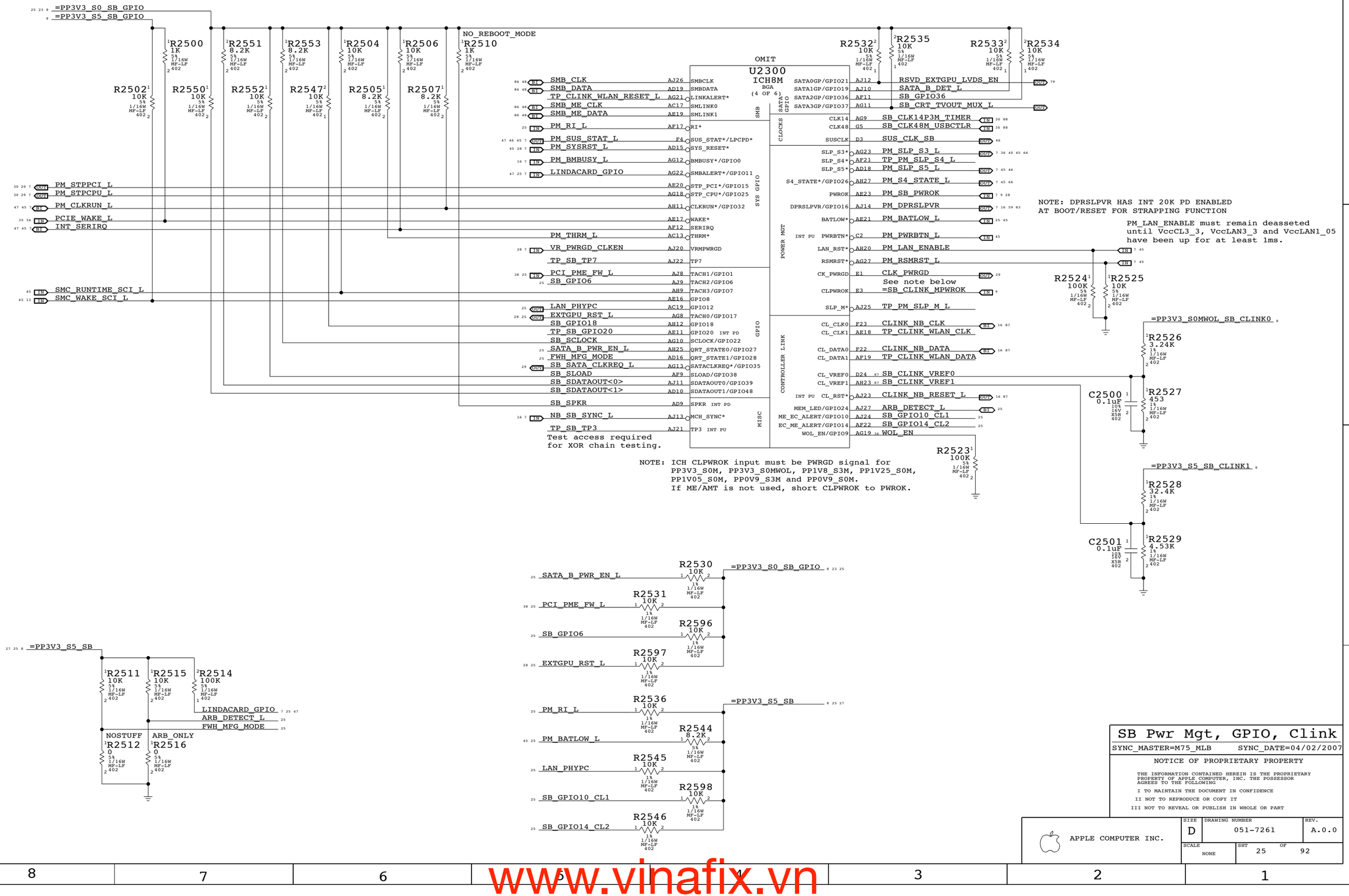
SB Enet, Disk, FSB, LPC

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 23 OF 92	





SB Pwr Mgt, GPIO, Clink	
SYNC_MASTER=M75_MLB	SYNC_DATE=04/02/2007

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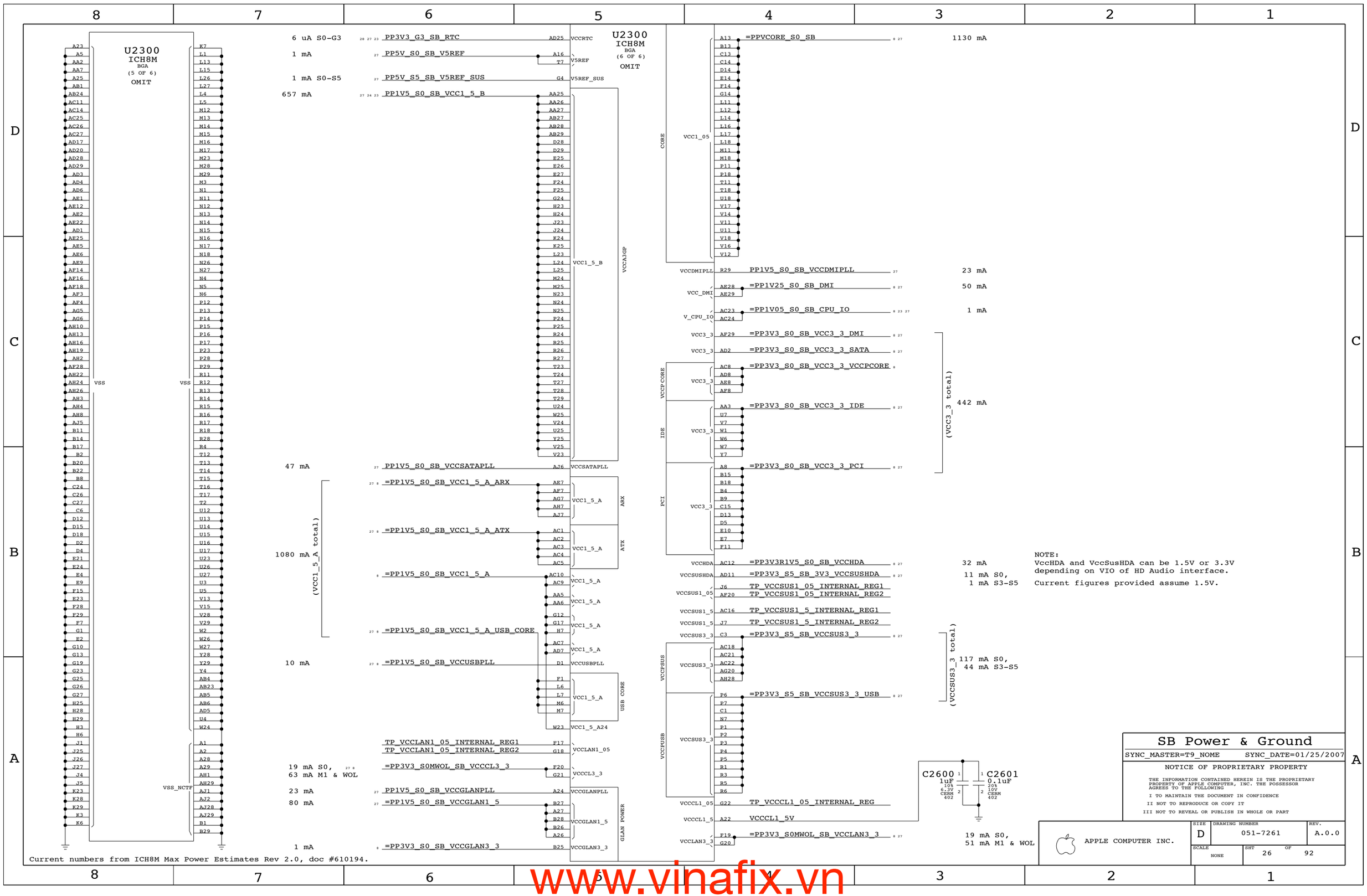
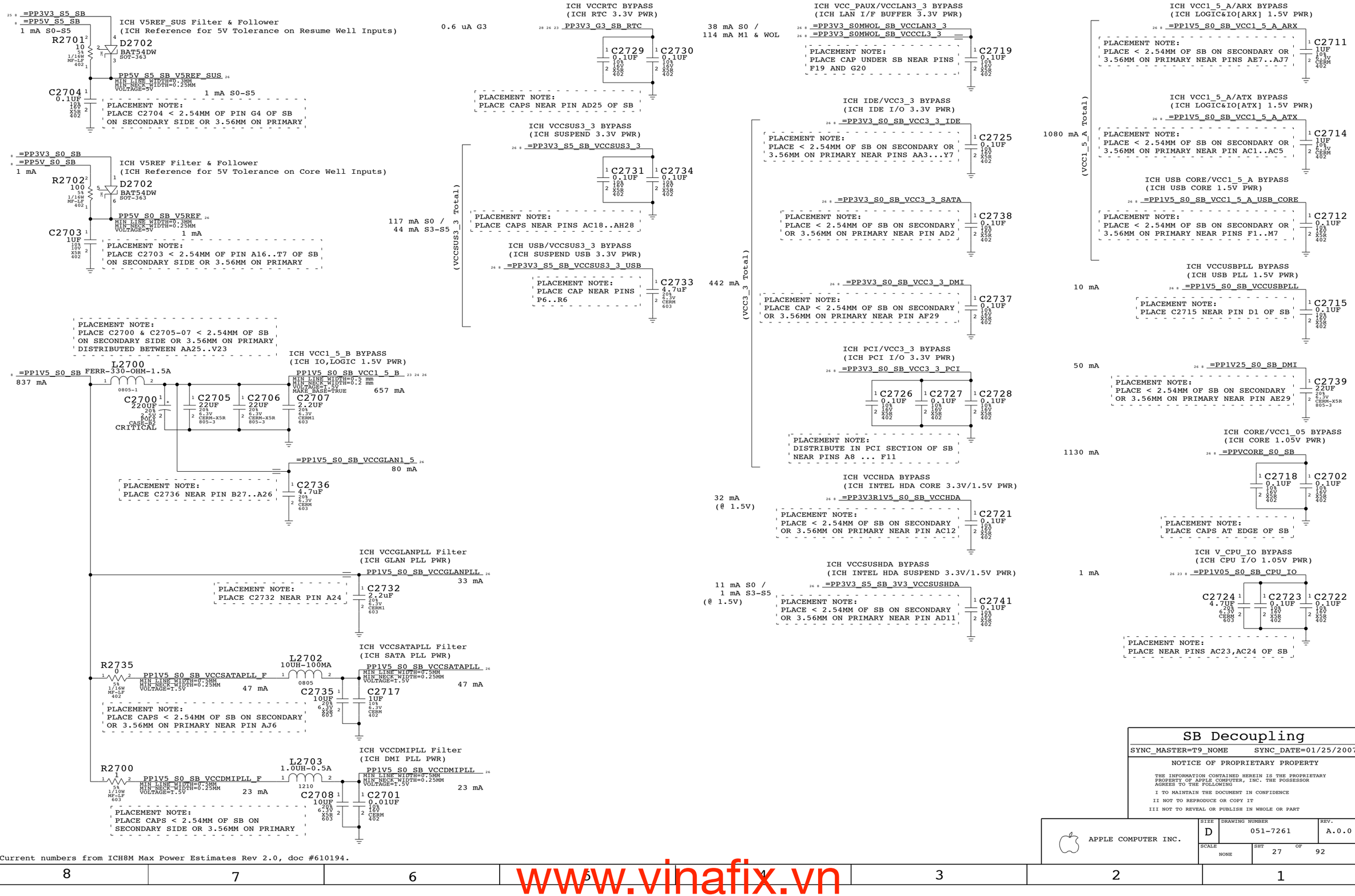
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7261	REV. A.0.0
	SCALE NONE	SHT 25 OF 92	





RTC Power Sources

Coin-Cell Connector

CRITICAL
J2800
BM02B-ACHKS-GAN-TF-LF-SN-M
M-RT-SM
518S0487

PPVBATT_G3_RTC
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V

R2800 1K 5% 1/16W MF-LF 402

PPVBATT_G3_RTC_R
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V

NOTE: R2800 and D2805 form the double-fault protection for RTC battery.

=PP3V42_G3H_SB_RTC

D2805
BAT54DW
SOT-363
NC NC NC NC

PP3V3_G3_SB_RTC
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V

R2806 20K 5% 1/16W MF-LF 402

SB_RTC_RST_L

C2806 1UF 10% 6.3V CERM 402

R2805 1M 5% 1/16W MF-LF 402

C2805 1UF 10% 6.3V CERM 402

SB_SM_INTRUDER_L

Platform Reset Connections

Unbuffered

PLT_RST_L
MAKE_BASE=TRUE

R2860 100 5% 1/16W MF-LF 402 — NB_RESET_L
R2861 0 5% 1/16W MF-LF 402 — FW_PLT_RST_L
R2862 100 5% 1/16W MF-LF 402 — SMC_LRESET_L
R2863 0 5% 1/16W MF-LF 402 — DEBUG_RESET_L
R2864 100 5% 1/16W MF-LF 402 — LIO_PLT_RST_L
R2865 0 5% 1/16W MF-LF 402 — ENET_RESET_L
LCDBKLT_PLT_RST_L

SB RTC Crystal

SB_RTC_X1
R2810 0 5% 1/16W MF-LF 402
SB_RTC_X1_R
C2810 12pF 5% 50V CERM 402
R2811 10M 5% 1/16W MF-LF 402
CRITICAL
Y2810 32.768K SM-2 NC NC
C2811 12pF 5% 50V CERM 402
SB_RTC_X2

System Reset "Button"

=PP3V3_S5_SB_PM
R2825 10K 5% 1/16W MF-LF 402
ITP&XDP
R2826 1K 5% 1/16W MF-LF 402
XDP_DBRESET_L
PM_SYSRST_L
OMIT
R2820 0 5% 1/10W MF-LF 603

SILK_PART=SYS_RST
This part is never stuffed, it provides a set of pads on the board to short or to solder a reset button.

Muxed GFX GPU Reset Support

=PP3V3_S0_RSTBUF
C2883 0.1UF 20% 10V CERM 402
CRITICAL
U2883 74LVC2G132 US8
PM_ALL_GPU_PGOOD
R2885 10K 5% 1/16W MF-LF 402
GPU_PGOOD_RC
R2886 24.3K 1% 1/16W MF-LF 402
C2885 0.047UF 10% 16V CERM 402
RST_L_AND_GPU_PGOOD_L

ON POWER UP:
This delay ensures that GPU clocks run before GPU is released from reset (RC should reach schmitt trigger threshold at approx .8 ms nominal w/ 1K pullup on PM_ALL_GPU_PGOOD)

RST_L_AND_GPU_PGOOD
=PP3V3_S0_RSTBUF
U2880 MC74VHC1G08 SC70

EXTGPU_RST_SW
R2880 0 5% 1/16W MF-LF 402
EXTGPU_RST_L
EXTGPU_RST_QUAL_L
C2880 0.1UF 20% 10V CERM 402
GPU_RESET_R_L
R2881 0 5% 1/16W MF-LF 402
GPU_RESET_L
R2882 1K 5% 1/16W MF-LF 402
GPU_IOENABLE_RC
MAKE_BASE=TRUE
=GPU_DDC_ENABLE
=GPU_HPD_ENABLE
C2882 0.001UF 10% 50V CERM 402

GPU_IOENABLE_RC is used to isolate certain GPU signals from the rest of the system. RC prevents glitch that would otherwise be injected into isolated signals due to sharp reset edge and isolating FET Cgs.

EXTGPU_RST_HW
R2887 0 5% 1/16W MF-LF 402
EXTGPU_PWR_EN

ON POWER DOWN:
This ensures that GPU is put into reset while chip is still powered and clocks are still running.

VRMPWRGD Inverter

=PP3V3_S0_SB_PM
C2830 0.1UF 20% 10V CERM 402
MC74VHC1G00 SC70-5 U2830
VR_PWRGD_CLKEN_L
VR_PWRGD_CLKEN

PWROK Circuit

=PP3V3_S0_SB_PM
C2840 0.1UF 20% 10V CERM 402
MC74VHC1G08 SC70 U2840
VR_PWRGOOD_DELAY
ALL_SYS_PWRGD
PM_SB_PWROK
R2840 10K 5% 1/16W MF-LF 402
R2841 10K 5% 1/16W MF-LF 402

PCI Reset Connections

PCI_RST_L
R2890 100 5% 1/16W MF-LF 402
PCI_FW_RST_L

CPU VCore ForcePSI

CPU_PSI_L
MAKE_BASE=TRUE
IMVP6_PSI_L

SB Misc

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

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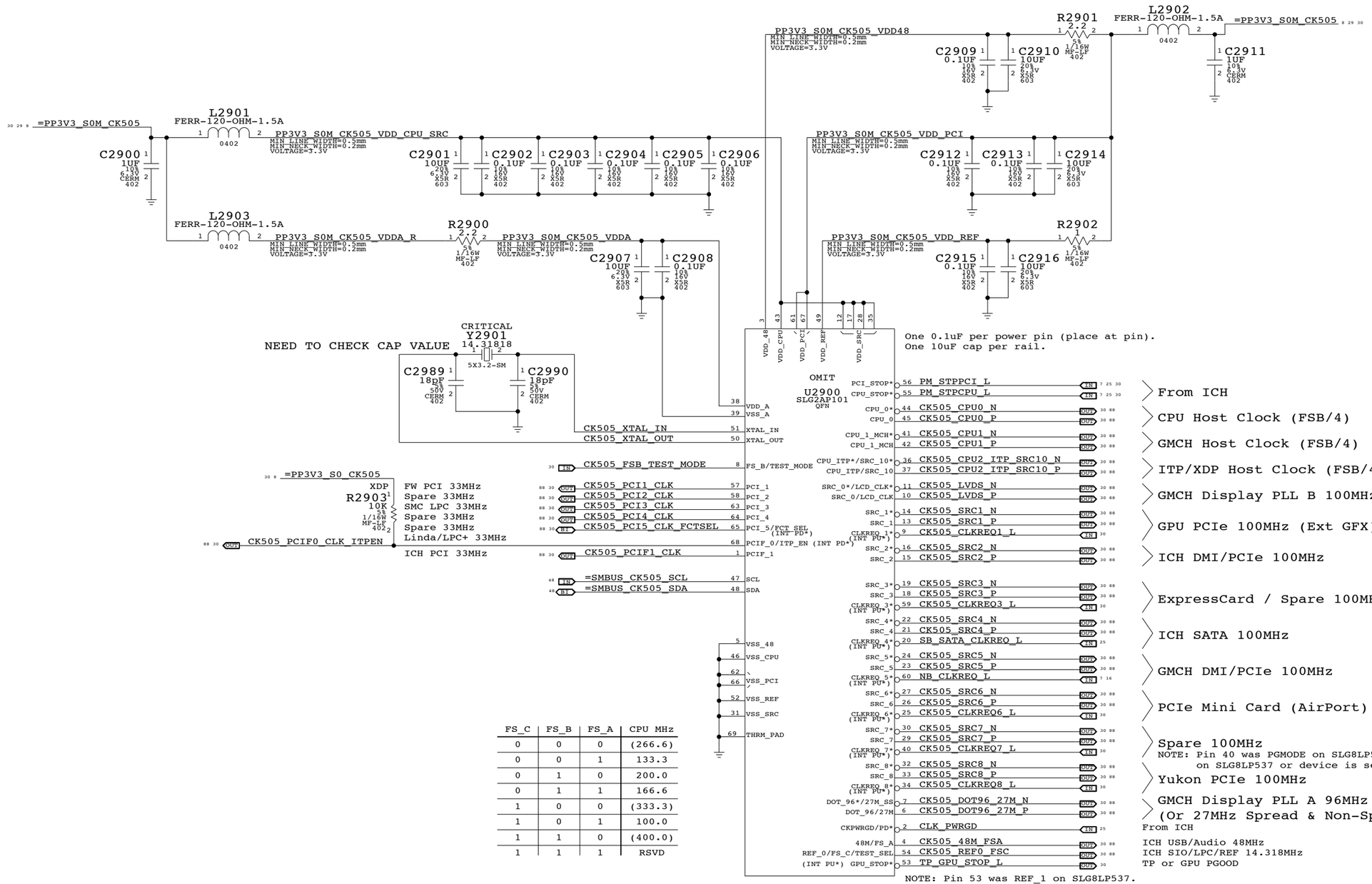

FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

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

Clock (CK505)

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
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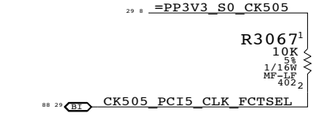
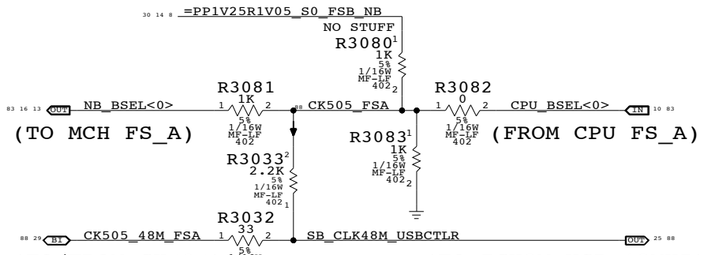
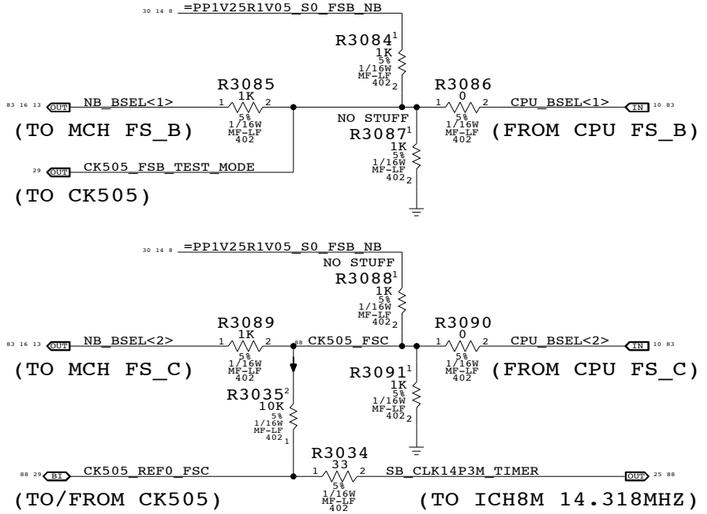
CK505 Configuration Straps

FCT_SEL (GFX clock select)



FS_A, FS_B, FS_C (Host clock freq select)





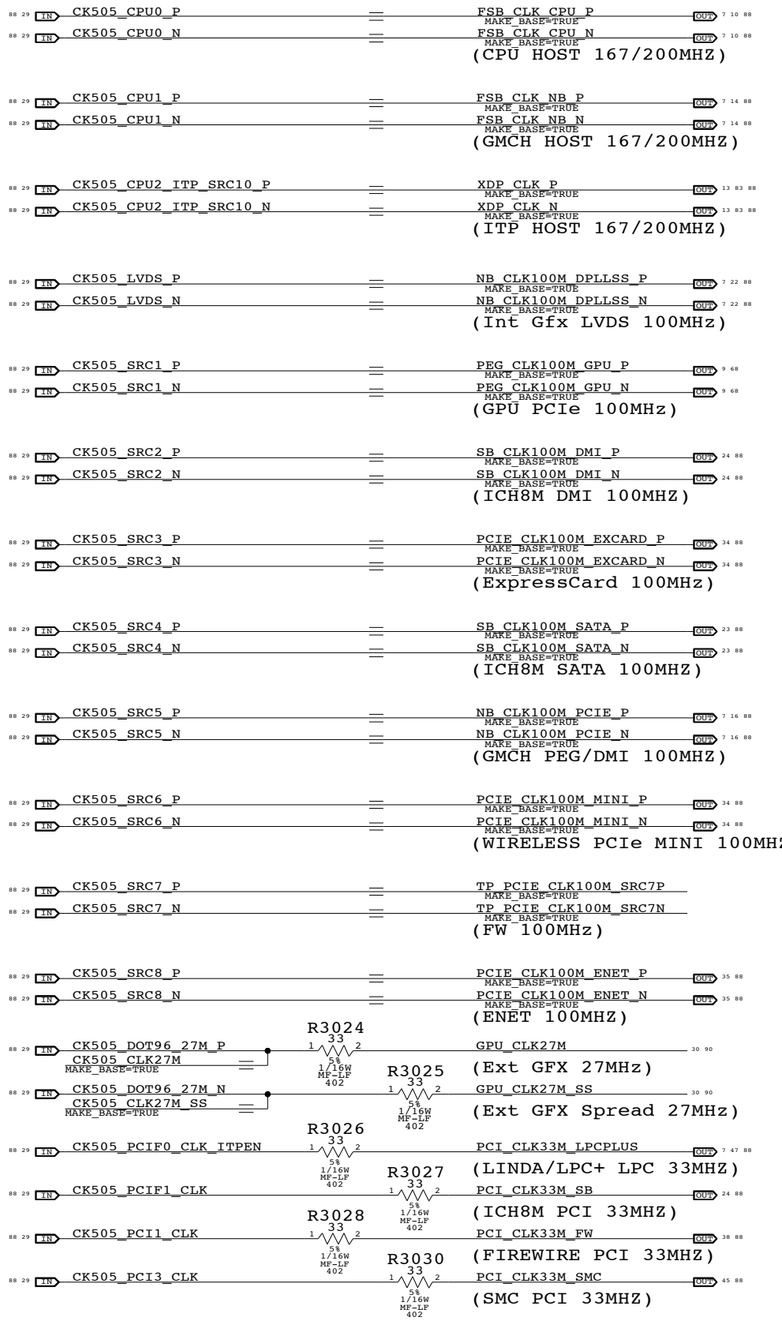
FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

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

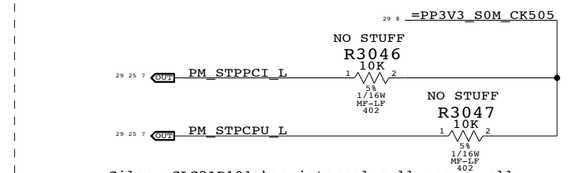
(Only 100-200MHz supported by SLG8LP536 and CY28545-5)

CLK Termination

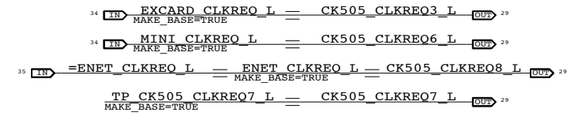
(Note: HOST/SRC/GFX clock termination removed. Silego SL8GLP536 or equiv. support only)



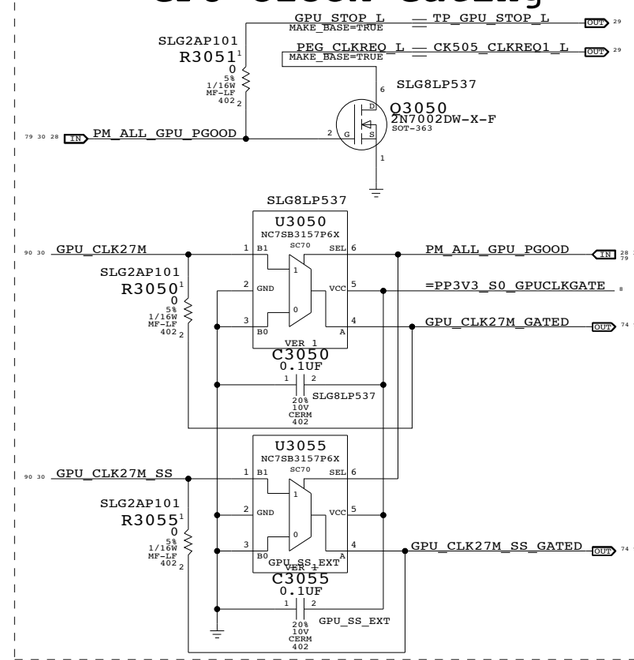
CLKREQ Controls



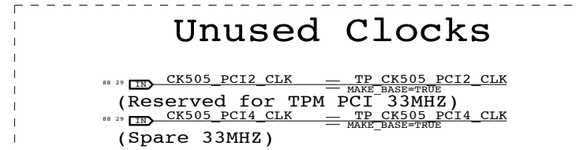
Silego SLG2AP101 has internal pull-ups on all CLKREQ# pins. Support for SL8GLP537 or equiv. only. NB and SATA CLKREQs are not remappable (and thus are not shown here).



GPU Clock Gating



Unused Clocks



Clock Termination

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

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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

=PP0V9_S3M_MEM_DIMMVREFA

C3101 2.2uF 20% 6.3V CERM1 603

C3100 0.1uF 20% 10V CERM 402

=PP1V8_S3M_MEM_A

CRITICAL
J3100
F-RT-TH1
DDR2-SODIMM-DUAL

	1B	VREF		2B	VSS0		
	3B	VSS1	MEM_A_DQ<9>	4B	DQ4		
MEM_A_DQ<14>	5B	DQ0	MEM_A_DQ<15>	6B	DQ5		
MEM_A_DQ<13>	7B	DQ1		8B	VSS2		
	9B	VSS4	MEM_A_DM<1>	10B	DM0		
MEM_A_DQS_N<1>	11B	DQS0*		12B	VSS5		
MEM_A_DQS_P<1>	13B	DQS0	MEM_A_DQ<8>	14B	DQ6		
	15B	VSS6	MEM_A_DQ<12>	16B	DQ7		
MEM_A_DQ<10>	17B	DQ2		18B	VSS7		
MEM_A_DQ<11>	19B	DQ3	MEM_A_DQ<2>	20B	DQ12		
	21B	VSS8	MEM_A_DQ<3>	22B	DQ13		
MEM_A_DQ<7>	23B	DQ8		24B	VSS9		
MEM_A_DQ<0>	25B	DQ9	MEM_A_DM<0>	26B	DM1		
	27B	VSS10		28B	VSS11		
MEM_A_DQS_N<0>	29B	DQS1*	MEM_CLK_P<0>	30B	CK0		
MEM_A_DQS_P<0>	31B	DQS1	MEM_CLK_N<0>	32B	CK0*		
	33B	VSS12		34B	VSS13		
MEM_A_DQ<6>	35B	DQ10	MEM_A_DQ<1>	36B	DQ14		
MEM_A_DQ<4>	37B	DQ11	MEM_A_DQ<5>	38B	DQ15		
	39B	VSS14		40B	VSS15		
		KEY					
	41B	VSS16		42B	VSS17		
MEM_A_DQ<17>	43B	DQ16	MEM_A_DQ<18>	44B	DQ20		
MEM_A_DQ<21>	45B	DQ17	MEM_A_DQ<20>	46B	DQ21		
	47B	VSS18		48B	VSS19		
MEM_A_DQS_N<2>	49B	DQS2*	PM_EXTTS_L<0>	50B	NC0		
MEM_A_DQS_P<2>	51B	DQS2	MEM_A_DM<2>	52B	DM2		
	53B	VSS21		54B	VSS22		
MEM_A_DQ<23>	55B	DQ18	MEM_A_DQ<22>	56B	DQ22		
MEM_A_DQ<16>	57B	DQ19	MEM_A_DQ<19>	58B	DQ23		
	59B	VSS23		60B	VSS24		
MEM_A_DQ<31>	61B	DQ24	MEM_A_DQ<26>	62B	DQ28		
MEM_A_DQ<27>	63B	DQ25	MEM_A_DQ<24>	64B	DQ29		
	65B	VSS25		66B	VSS26		
MEM_A_DM<3>	67B	DM3	MEM_A_DQS_N<3>	68B	DQS3*		
NC	69B	NC1	MEM_A_DQS_P<3>	70B	DQS3		
	71B	VSS27		72B	VSS28		
MEM_A_DQ<30>	73B	DQ26	MEM_A_DQ<25>	74B	DQ30		
MEM_A_DQ<28>	75B	DQ27	MEM_A_DQ<29>	76B	DQ31		
	77B	VSS29		78B	VSS30		
MEM_CKE<0>	79B	CKE0	MEM_CKE<1>	80B	NC/CKE1		
	81B	VDD0		82B	VDD1		
NC	83B	NC2	MEM_A_A<15>	84B	NC/A15		
MEM_A_BS<2>	85B	BA2	MEM_A_A<14>	86B	NC/A14		
	87B	VDD2		88B	VDD3		
MEM_A_A<12>	89B	A12	MEM_A_A<11>	90B	A11		
MEM_A_A<9>	91B	A9	MEM_A_A<7>	92B	A7		
MEM_A_A<8>	93B	A8	MEM_A_A<6>	94B	A6		
	95B	VDD4		96B	VDD5		
MEM_A_A<5>	97B	A5	MEM_A_A<4>	98B	A4		
MEM_A_A<3>	99B	A3	MEM_A_A<2>	100B	A2		
MEM_A_A<1>	101B	A1	MEM_A_A<0>	102B	A0		
	103B	VDD6		104B	VDD7		
MEM_A_A<10>	105B	A10/AP	MEM_A_BS<1>	106B	BA1		
MEM_A_BS<0>	107B	BA0	MEM_A_RAS_L	108B	RAS*		
MEM_A_WE_L	109B	WE*	MEM_CS_L<0>	110B	S0*		
	111B	VDD8		112B	VDD9		
MEM_A_CAS_L	113B	CAS*	MEM_ODT<0>	114B	ODT0		
MEM_CS_L<1>	115B	NC/S1*	MEM_A_A<13>	116B	NC/A13		
	117B	VDD10		118B	VDD11		
MEM_ODT<1>	119B	NC/ODT1	NC	120B	NC3		
	121B	VSS31		122B	VSS32		
MEM_A_DQ<36>	123B	DQ32	MEM_A_DQ<35>	124B	DQ36		
MEM_A_DQ<38>	125B	DQ33	MEM_A_DQ<39>	126B	DQ37		
	127B	VSS33		128B	VSS34		
MEM_A_DQS_N<4>	129B	DQS4*	MEM_A_DM<4>	130B	DM4		
MEM_A_DQS_P<4>	131B	DQS4		132B	VSS35		
	133B	VSS36	MEM_A_DQ<33>	134B	DQ38		
MEM_A_DQ<37>	135B	DQ34	MEM_A_DQ<32>	136B	DQ39		
MEM_A_DQ<34>	137B	DQ35		138B	VSS37		
	139B	VSS38	MEM_A_DQ<63>	140B	DQ44		
MEM_A_DQ<56>	141B	DQ40	MEM_A_DQ<62>	142B	DQ45		
MEM_A_DQ<59>	143B	DQ41		144B	VSS39		
	145B	VSS40	MEM_A_DQS_N<7>	146B	DQS5*		
MEM_A_DM<7>	147B	DM5	MEM_A_DQS_P<7>	148B	DQS5		
	149B	VSS41		150B	VSS42		
MEM_A_DQ<58>	151B	DQ42	MEM_A_DQ<57>	152B	DQ46		
MEM_A_DQ<60>	153B	DQ43	MEM_A_DQ<61>	154B	DQ47		
	155B	VSS43		156B	VSS44		
MEM_A_DQ<51>	157B	DQ48	MEM_A_DQ<55>	158B	DQ52		
MEM_A_DQ<54>	159B	DQ49	MEM_A_DQ<50>	160B	DQ53		
	161B	VSS45		162B	VSS46		
NC	163B	NC_TEST	MEM_CLK_P<1>	164B	CK1		
	165B	VSS47	MEM_CLK_N<1>	166B	CK1*		
MEM_A_DQS_N<6>	167B	DQS6*		168B	VSS48		
MEM_A_DQS_P<6>	169B	DQS6	MEM_A_DM<6>	170B	DM6		
	171B	VSS49		172B	VSS50		
MEM_A_DQ<48>	173B	DQ50	MEM_A_DQ<49>	174B	DQ54		
MEM_A_DQ<53>	175B	DQ51	MEM_A_DQ<52>	176B	DQ55		
	177B	VSS51		178B	VSS52		
MEM_A_DQ<43>	179B	DQ56	MEM_A_DQ<45>	180B	DQ60		
MEM_A_DQ<42>	181B	DQ57	MEM_A_DQ<40>	182B	DQ61		
	183B	VSS53		184B	VSS54		
MEM_A_DM<5>	185B	DM7	MEM_A_DQS_N<5>	186B	DQS7*		
	187B	VSS55	MEM_A_DQS_P<5>	188B	DQS7		
MEM_A_DQ<46>	189B	DQ58		190B	VSS56		
MEM_A_DQ<41>	191B	DQ59	MEM_A_DQ<44>	192B	DQ62		
=PPSPD_S0M_MEM_A	193B	VSS57	MEM_A_DQ<47>	194B	DQ63		
=I2C_SODIMMA_SDA	195B	SDA		196B	VSS58		
=I2C_SODIMMA_SCL	197B	SCL		198B	SA0		
	199B	VDDSPD		200B	SA1	ADDR=0xA0(WR)/0xA1(RD)	

516-0140

DDR2 Bypass Caps

(For return current)

=PP1V8_S3M_MEM_A

C3108 10UF 20% 6.3V X5R 603
C3109 10UF 20% 6.3V X5R 603
C3110 1UF 10% 6.3V CERM 402
C3111 1UF 10% 6.3V CERM 402
C3112 1UF 10% 6.3V CERM 402
C3113 1UF 10% 6.3V CERM 402
C3114 1UF 10% 6.3V CERM 402
C3115 1UF 10% 6.3V CERM 402
C3116 1UF 10% 6.3V CERM 402
C3117 1UF 10% 6.3V CERM 402
C3118 1UF 10% 6.3V CERM 402
C3119 1UF 10% 6.3V CERM 402
C3120 1UF 10% 6.3V CERM 402
C3121 1UF 10% 6.3V CERM 402

DDR2 SO-DIMM Connector A

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

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SCALE: NONE	SHT 31 OF 92	

Page Notes

Power aliases required by this page:
- =PP1V8_S3M_MEM_B
- =PP0V9_S3M_MEM_DIMMVREFB
- =PPSPD_S0M_MEM_B (2.5V - 3.3V)

Signal aliases required by this page:
- =I2C_SODIMMB_SCL
- =I2C_SODIMMB_SDA

BOM options provided by this page:
(NONE)

=PP0V9_S3M_MEM_DIMMVREFB

C3201 2.2uF 20% 6.3V CERM 603
C3200 0.1uF 20% 10V CERM 402

=PP1V8_S3M_MEM_B

CRITICAL
J3200
F-RT-SM-M9
DDR2-SODIMM-DUAL

1A	VREF		VSS0	2A	
3A	VSS1		DQ4	4A	MEM_B_DQ<9>
5A	DQ0	MEM_B_DQ<15>	DQ5	6A	MEM_B_DQ<11>
7A	DQ1	MEM_B_DQ<14>	VSS2	8A	
9A	VSS4		DM0	10A	MEM_B_DM<1>
11A	DQS0*	MEM_B_DQS_N<1>	VSS5	12A	
13A	DQS0	MEM_B_DQS_P<1>	DQ6	14A	MEM_B_DQ<12>
15A	VSS6		DQ7	16A	MEM_B_DQ<8>
17A	DQ2	MEM_B_DQ<10>	VSS7	18A	
19A	DQ3	MEM_B_DQ<13>	DQ12	20A	MEM_B_DQ<3>
21A	VSS8		DQ13	22A	MEM_B_DQ<6>
23A	DQ8	MEM_B_DQ<7>	VSS9	24A	
25A	DQ9	MEM_B_DQ<2>	DM1	26A	MEM_B_DM<0>
27A	VSS10		VSS11	28A	
29A	DQS1*	MEM_B_DQS_N<0>	CK0	30A	MEM_CLK_P<4>
31A	DQS1	MEM_B_DQS_P<0>	CK0*	32A	MEM_CLK_N<4>
33A	VSS12		VSS13	34A	
35A	DQ10	MEM_B_DQ<1>	DQ14	36A	MEM_B_DQ<0>
37A	DQ11	MEM_B_DQ<4>	DQ15	38A	MEM_B_DQ<5>
39A	VSS14		VSS15	40A	
		KEY			
41A	VSS16		VSS17	42A	
43A	DQ16	MEM_B_DQ<21>	DQ20	44A	MEM_B_DQ<22>
45A	DQ17	MEM_B_DQ<19>	DQ21	46A	MEM_B_DQ<18>
47A	VSS18		VSS19	48A	
49A	DQS2*	MEM_B_DQS_N<2>	NC0	50A	PM_EXTTS_L<1>
51A	DQS2	MEM_B_DQS_P<2>	DM2	52A	MEM_B_DM<2>
53A	VSS21		VSS22	54A	
55A	DQ18	MEM_B_DQ<20>	DQ22	56A	MEM_B_DQ<17>
57A	DQ19	MEM_B_DQ<23>	DQ23	58A	MEM_B_DQ<16>
59A	VSS23		VSS24	60A	
61A	DQ24	MEM_B_DQ<29>	DQ28	62A	MEM_B_DQ<26>
63A	DQ25	MEM_B_DQ<24>	DQ29	64A	MEM_B_DQ<28>
65A	VSS25		VSS26	66A	
67A	DM3	MEM_B_DM<3>	DQS3*	68A	MEM_B_DQS_N<3>
69A	NC1	NC	DQS3	70A	MEM_B_DQS_P<3>
71A	VSS27		VSS28	72A	
73A	DQ26	MEM_B_DQ<27>	DQ30	74A	MEM_B_DQ<31>
75A	DQ27	MEM_B_DQ<25>	DQ31	76A	MEM_B_DQ<30>
77A	VSS29		VSS30	78A	
79A	CKE0	MEM_CKE<3>	NC/CKE1	80A	MEM_CKE<4>
81A	VDD0		VDD1	82A	
83A	NC2	NC	NC/A15	84A	MEM_B_A<15>
85A	BA2	MEM_B_BS<2>	NC/A14	86A	MEM_B_A<14>
87A	VDD2		VDD3	88A	
89A	A12	MEM_B_A<12>	A11	90A	MEM_B_A<11>
91A	A9	MEM_B_A<9>	A7	92A	MEM_B_A<7>
93A	A8	MEM_B_A<8>	A6	94A	MEM_B_A<6>
95A	VDD4		VDD5	96A	
97A	A5	MEM_B_A<5>	A4	98A	MEM_B_A<4>
99A	A3	MEM_B_A<3>	A2	100A	MEM_B_A<2>
101A	A1	MEM_B_A<1>	A0	102A	MEM_B_A<0>
103A	VDD6		VDD7	104A	
105A	A10/AP	MEM_B_A<10>	BA1	106A	MEM_B_BS<1>
107A	BA0	MEM_B_BS<0>	RAS*	108A	MEM_B_RAS_L
109A	WE*	MEM_B_WE_L	S0*	110A	MEM_CS_L<2>
111A	VDD8		VDD9	112A	
113A	CAS*	MEM_B_CAS_L	ODT0	114A	MEM_ODT<2>
115A	NC/S1*	MEM_CS_L<3>	NC/A13	116A	MEM_B_A<13>
117A	VDD10		VDD11	118A	
119A	NC/ODT1	MEM_ODT<3>	NC3	120A	NC
121A	VSS31		VSS32	122A	
123A	DQ32	MEM_B_DQ<36>	DQ36	124A	MEM_B_DQ<32>
125A	DQ33	MEM_B_DQ<33>	DQ37	126A	MEM_B_DQ<37>
127A	VSS33		VSS34	128A	
129A	DQS4*	MEM_B_DQS_N<4>	DM4	130A	MEM_B_DM<4>
131A	DQS4	MEM_B_DQS_P<4>	VSS35	132A	
133A	VSS36		DQ38	134A	MEM_B_DQ<38>
135A	DQ34	MEM_B_DQ<34>	DQ39	136A	MEM_B_DQ<39>
137A	DQ35	MEM_B_DQ<35>	VSS37	138A	
139A	VSS38		DQ44	140A	MEM_B_DQ<56>
141A	DQ40	MEM_B_DQ<57>	DQ45	142A	MEM_B_DQ<59>
143A	DQ41	MEM_B_DQ<60>	VSS39	144A	
145A	VSS40		DQS5*	146A	MEM_B_DQS_N<7>
147A	DM5	MEM_B_DM<7>	DQS5	148A	MEM_B_DQS_P<7>
149A	VSS41		VSS42	150A	
151A	DQ42	MEM_B_DQ<61>	DQ46	152A	MEM_B_DQ<63>
153A	DQ43	MEM_B_DQ<62>	DQ47	154A	MEM_B_DQ<58>
155A	VSS43		VSS44	156A	
157A	DQ48	MEM_B_DQ<48>	DQ52	158A	MEM_B_DQ<54>
159A	DQ49	MEM_B_DQ<51>	DQ53	160A	MEM_B_DQ<53>
161A	VSS45		VSS46	162A	
163A	NC_TEST	NC	CK1	164A	MEM_CLK_P<3>
165A	VSS47		CK1*	166A	MEM_CLK_N<3>
167A	DQS6*	MEM_B_DQS_N<6>	VSS48	168A	
169A	DQS6	MEM_B_DQS_P<6>	DM6	170A	MEM_B_DM<6>
171A	VSS49		VSS50	172A	
173A	DQ50	MEM_B_DQ<50>	DQ54	174A	MEM_B_DQ<52>
175A	DQ51	MEM_B_DQ<55>	DQ55	176A	MEM_B_DQ<49>
177A	VSS51		VSS52	178A	
179A	DQ56	MEM_B_DQ<40>	DQ60	180A	MEM_B_DQ<46>
181A	DQ57	MEM_B_DQ<47>	DQ61	182A	MEM_B_DQ<43>
183A	VSS53		VSS54	184A	
185A	DM7	MEM_B_DM<5>	DQS7*	186A	MEM_B_DQS_N<5>
187A	VSS55		DQS7	188A	MEM_B_DQS_P<5>
189A	DQ58	MEM_B_DQ<42>	VSS56	190A	
191A	DQ59	MEM_B_DQ<45>	DQ62	192A	MEM_B_DQ<41>
193A	VSS57		DQ63	194A	MEM_B_DQ<44>
195A	SDA	=I2C_SODIMMB_SDA	VSS58	196A	
197A	SCL	=I2C_SODIMMB_SCL	SA0	198A	
199A	VDDSPD	=PPSPD_S0M_MEM_B	SA1	200A	SODIMM_B_SA1

202 204 516S0471

Resistor prevents pwr-gnd short

ADDR=0xA4(WR)/0xA5(RD)

=PPSPD_S0M_MEM_B

R3200 10K 5% 1/16W MF-LF 402

"Expansion" (surface-mount) slot

DDR2 Bypass Caps

(For return current)

=PP1V8_S3M_MEM_B

C3208 10UF 20% 6.3V X5R 603
C3209 10UF 20% 6.3V X5R 603
C3210 1UF 10% 6.3V CERM 402
C3211 0.1uF 20% 10V CERM 402
C3212 1UF 10% 6.3V CERM 402
C3213 1UF 10% 6.3V CERM 402
C3214 1UF 10% 6.3V CERM 402
C3215 1UF 10% 6.3V CERM 402
C3216 1UF 10% 6.3V CERM 402
C3217 0.1uF 20% 10V CERM 402
C3218 0.1uF 20% 10V CERM 402
C3219 0.1uF 20% 10V CERM 402
C3220 0.1uF 20% 10V CERM 402
C3221 0.1uF 20% 10V CERM 402

DDR2 SO-DIMM Connector B

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

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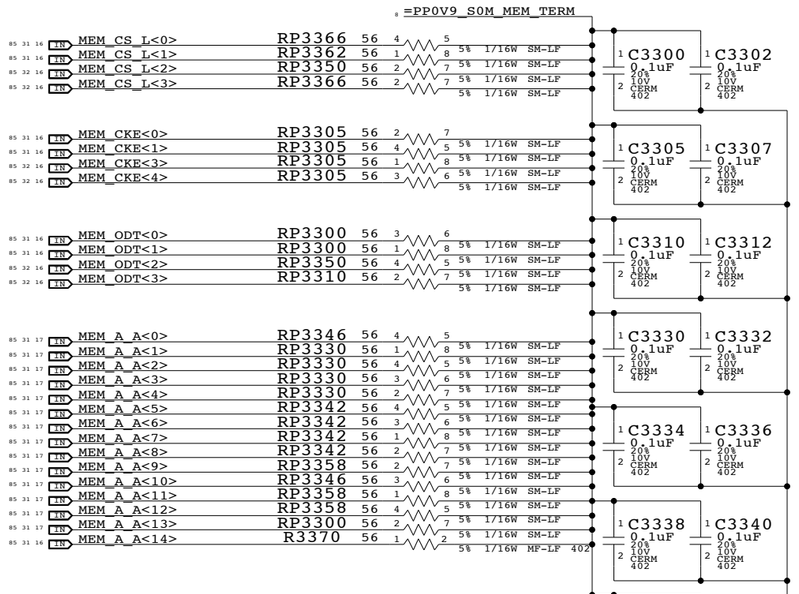
One cap for each side of every RPAK, one cap for every two discrete resistors

Ensure CS_L and ODT resistors are close to SO-DIMM connector



Memory Active Termination

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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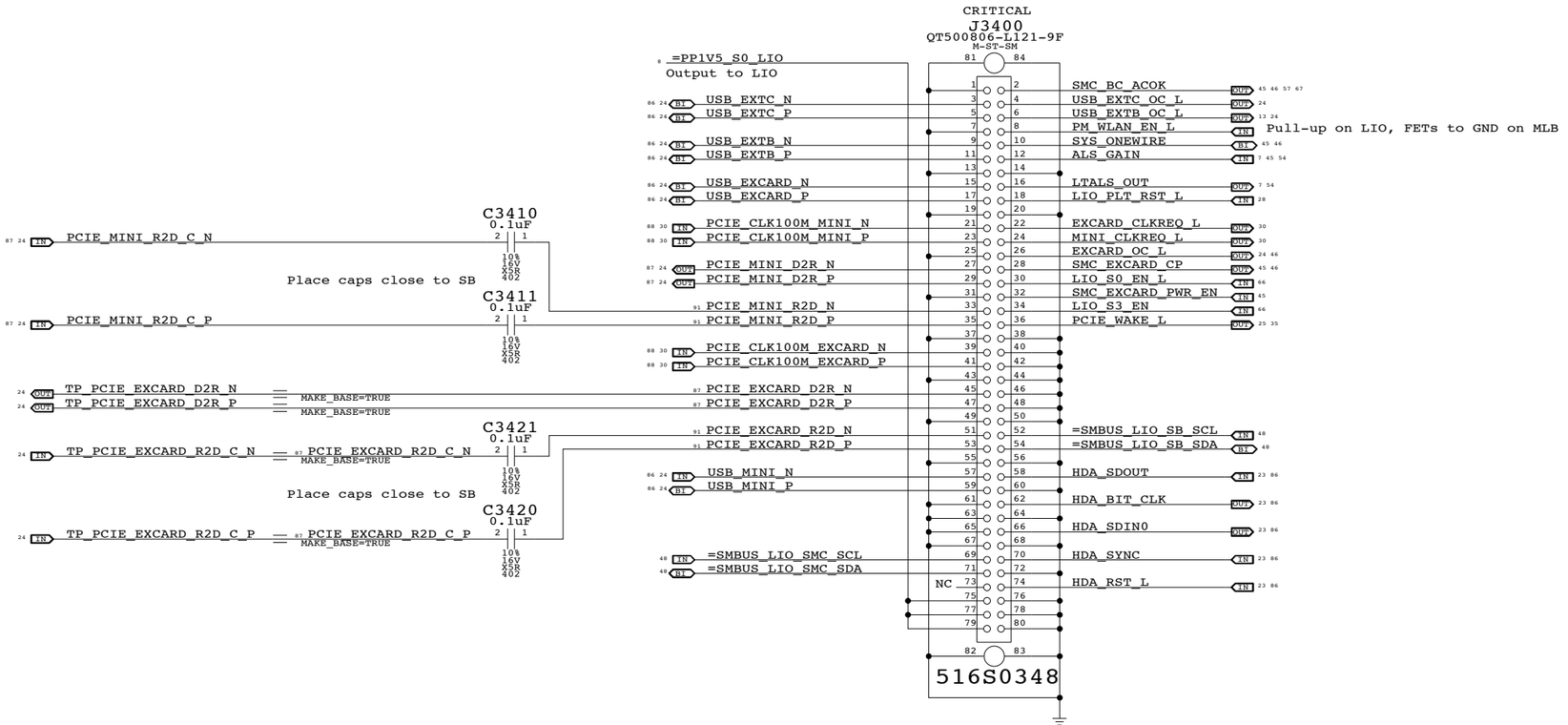
Left I/O Board Connector



Left I/O Board Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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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_AVLBL (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.

=PP1V2_ENET_PHY

Yukon EC		Yukon Ultra	
No link:	171 mA	No link:	130 mA
10 Mbps:	179 mA	10 Mbps:	130 mA
100 Mbps:	203 mA	100 Mbps:	150 mA
1000 Mbps:	426 mA	1000 Mbps:	290 mA

C3700 4.7UF 20% 6.3V CERM 603; C3701 0.1UF 10% 16V X5R 402; C3702 0.1UF 10% 16V X5R 402; C3703 0.1UF 10% 16V X5R 402; C3704 0.1UF 10% 16V X5R 402; C3705 0.1UF 10% 16V X5R 402; C3706 0.001UF 10% 50V CERM 402; C3707 0.001UF 10% 50V CERM 402; C3708 0.001UF 10% 50V CERM 402

=PP3V3_ENET_PHY

Yukon EC		Yukon Ultra	
No link:	4 mA	No link:	60 mA
10 Mbps:	4 mA	10 Mbps:	70 mA
100 Mbps:	4 mA	100 Mbps:	70 mA
1000 Mbps:	4 mA	1000 Mbps:	80 mA

C3710 4.7UF 20% 6.3V CERM 603; C3711 0.1UF 10% 16V X5R 402; C3712 0.1UF 10% 16V X5R 402; C3713 0.1UF 10% 16V X5R 402; C3714 0.001UF 10% 50V CERM 402; C3715 0.001UF 10% 50V CERM 402

=PP1V8R2V5_ENET_PHY L3720 FERR-120-OHM-1.5A 0402 PP1V8R2V5_ENET_PHY_AVDD
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
(EC:2.5V)

Yukon EC (2.5V)		Yukon Ultra (1.8V)	
No link:	82 mA	No link:	0 mA
10 Mbps:	108 mA	10 Mbps:	30 mA
100 Mbps:	126 mA	100 Mbps:	40 mA
1000 Mbps:	218 mA	1000 Mbps:	150 mA

C3720 4.7UF 20% 6.3V CERM 603; C3721 0.1UF 10% 16V X5R 402; C3722 0.1UF 10% 16V X5R 402; C3723 0.1UF 10% 16V X5R 402; C3724 0.001UF 10% 50V CERM 402

=YUKON_EC_PP2V5_ENET
Yukon EC: Alias to PP1V8R2V5_ENET_PHY_AVDD, add 1x 0.1uF & 1x 0.001uF caps
Yukon Ultra: Alias to GND

PCIE_ENET_D2R_P — C3735 0.1uF 10% 16V X5R 402 — PCIE_ENET_D2R_C_P
PCIE_ENET_D2R_N — C3736 0.1uF 10% 16V X5R 402 — PCIE_ENET_D2R_C_N
PLACEMENT_NOTE=Place C3730 close to southbridge.
PCIE_ENET_R2D_C_P — C3730 0.1uF 10% 16V X5R 402 — PCIE_ENET_R2D_P
PCIE_ENET_R2D_C_N — C3731 0.1uF 10% 16V X5R 402 — PCIE_ENET_R2D_N
PLACEMENT_NOTE=Place C3731 close to southbridge.
PCIE_CLK100M_ENET_P
PCIE_CLK100M_ENET_N
=ENET_CLKREQ_L — Yukon EC: Pin 42 should be NC (or TP) net.
PCIE_WAKE_L
ENET_RESET_L

ENET_MDI_P<0> / ENET_MDI_N<0> — R3740 49.9 1% 1/16W MF-LF 402; R3741 49.9 1% 1/16W MF-LF 402; C3740 0.001UF 10% 50V CERM 402; ENET_MDI0
ENET_MDI_P<1> / ENET_MDI_N<1> — R3742 49.9 1% 1/16W MF-LF 402; R3743 49.9 1% 1/16W MF-LF 402; C3742 0.001UF 10% 50V CERM 402; ENET_MDI1
ENET_MDI_P<2> / ENET_MDI_N<2> — R3744 49.9 1% 1/16W MF-LF 402; R3745 49.9 1% 1/16W MF-LF 402; C3744 0.001UF 10% 50V CERM 402; ENET_MDI2
ENET_MDI_P<3> / ENET_MDI_N<3> — R3746 49.9 1% 1/16W MF-LF 402; R3747 49.9 1% 1/16W MF-LF 402; C3746 0.001UF 10% 50V CERM 402; ENET_MDI3
SIGNAL_MODEL=EMPTY

ENET_CLK25M_XTALI
ENET_CLK25M_XTALO

CRITICAL
BOMOPTION=OMIT
U3700
88E8058
QFN

EC:AVDD 2.5V

PCI EXPRESS: TX_P, TX_N, RX_P, RX_N, REFCLKP, REFCLKN, CLKREQ* (EC:NO CONNECT), WAKE*, PERST*, MDIP0, MDIN0, MDIP1, MDIN1, MDIP2, MDIN2, MDIP3, MDIN3

MEDIA: XTALI, XTALO

MAIN CLK: THRML_PAD

ANALOG: LOM_DISABLE*, VAUX_AVLBL, SWITCH_VAUX (NC), VMAIN_AVLBL, SWITCH_VCC (NC), EC:CTRL25 CTRL18, CTRL12, RSET

LED: LED_ACT* (NC), LED_LINK10/100* (NC), LED_LINK1000* (NC), LED_DUPLEX* (NC)

SPI: (IPU) SPI_DO (NC), SPI_DI (NC), SPI_CLK (NC), SPI_CS (NC)

TWSI: (IPU) VPD_CLK, VPD_DATA; (IPD) TESTMODE

TEST/RSVD: RSVD_24 (NC), RSVD_25 (NC), RSVD_29 (NC), RSVD_43 (NC)

R3760 4.7K 5% 1/16W MF-LF 402 — ENET_LOM_DIS_L

Must be high in S0 state (can use PP3V3_S0 as input)
=ENET_VMAIN_AVLBL

TP_YUKON_CTRL18
TP_YUKON_CTRL12
YUKON_RSET

YUKON_ULTRA
R3765 4.99K 1% 1/16W MF-LF 402

YUKON_VPD_CLK
YUKON_VPD_DATA

VPD ROM
C3780 0.1UF 10% 25V CERM 402
U3780 M24C08 SO8
VCC, E2, NC, NC, WC*, SDA, SCL
R3780 4.7K 5% 1/16W MF-LF 402
R3781 4.7K 5% 1/16W MF-LF 402
CRITICAL
VSS

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,SO8	U3780	CRITICAL	YUKON_ULTRA
338S0270	1	IC,88E8053,GIGABIT ENET XCVR,64P QFN	U3700	CRITICAL	YUKON_EC
341S1797	1	IC,EEPROM,SERIAL IIC,8KBIT,SO8	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=01/25/2007

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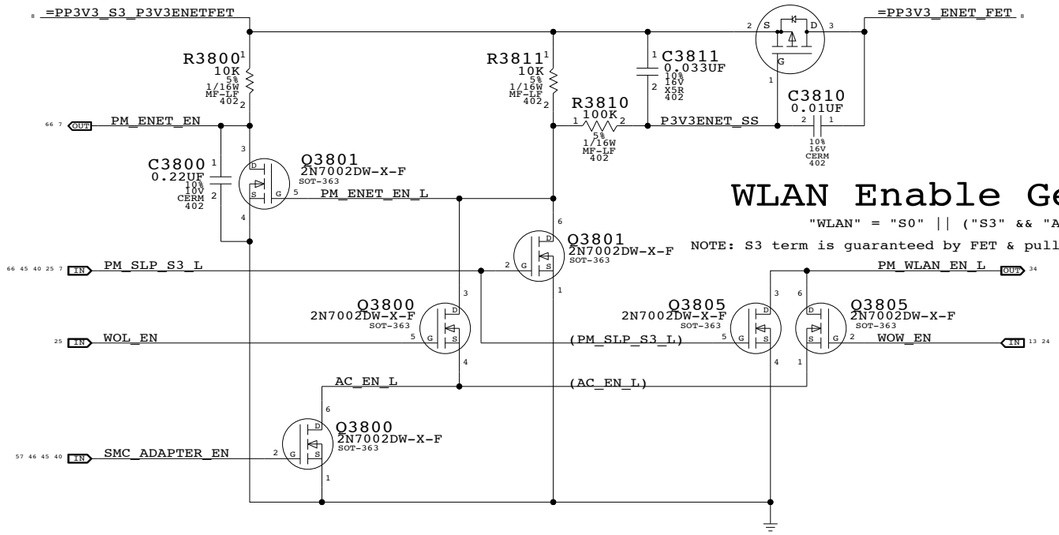
ENET Enable Generation

"ENET" = "S0" || ("S3" && "AC" && "WOL_EN")

NOTE: S3 term is guaranteed by source of R3800 & Q3810, MUST BE S3 RAIL.



WLAN Enable Generation

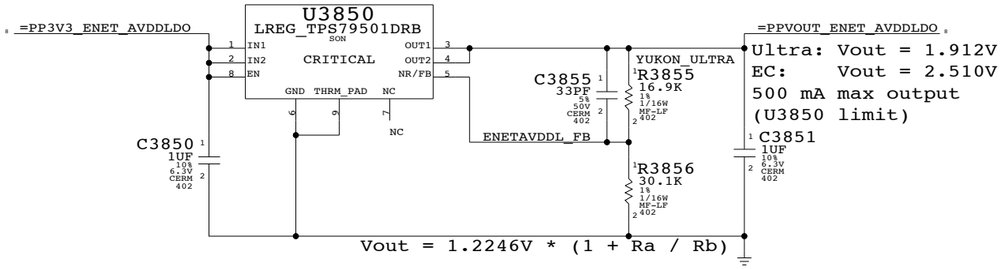
"WLAN" = "S0" || ("S3" && "AC" && "WOW_EN")

NOTE: S3 term is guaranteed by FET & pull-up source, MUST BE S3 RAIL.

Yukon AVDDL LDO

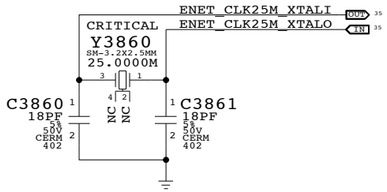
1.9V for Yukon Ultra, 2.5V for Yukon EC

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=03/19/2007

APPLE COMPUTER INC.

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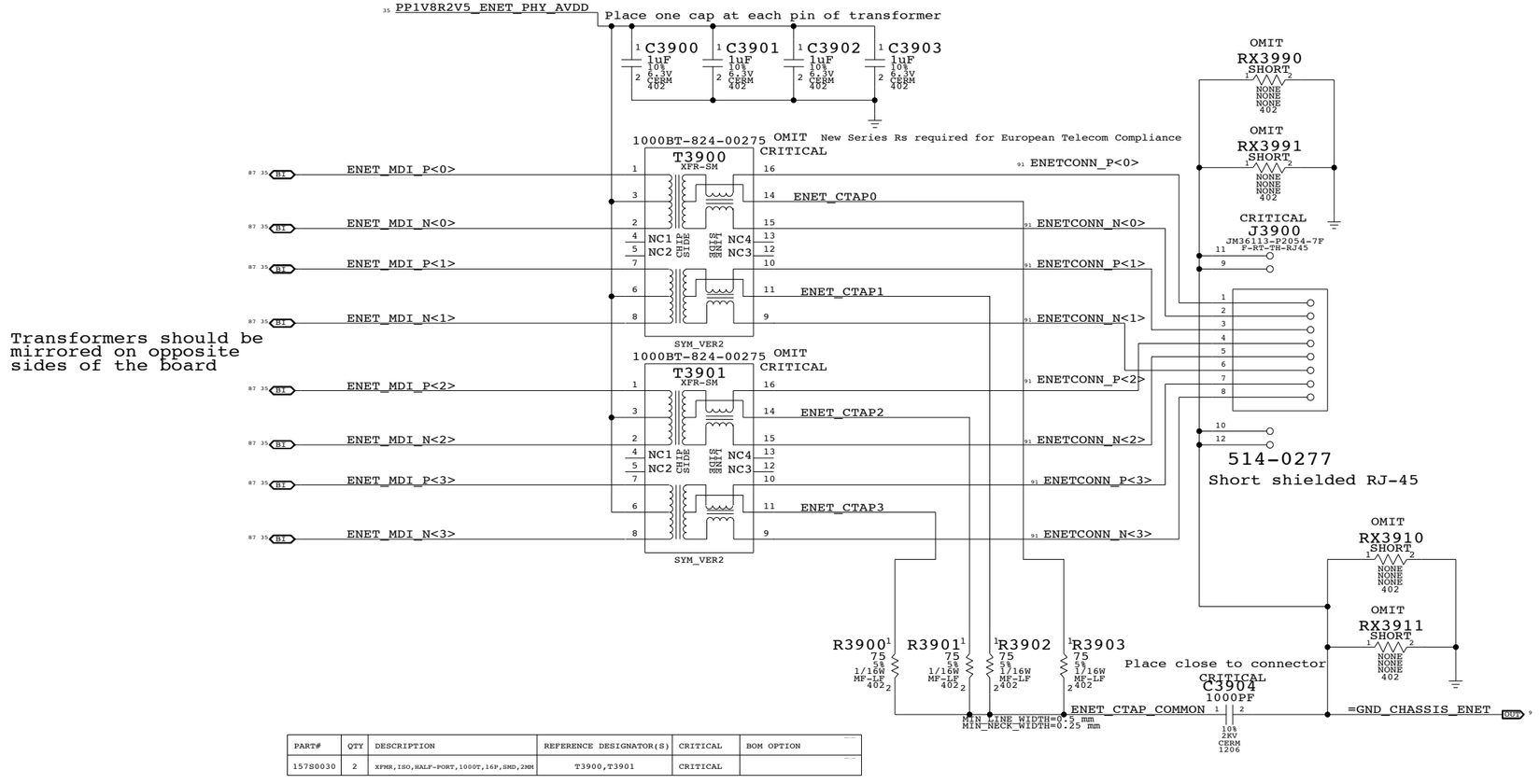
Page Notes

Power aliases required by this page:
- =GND_CHASSIS_ENET

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)



Transformers should be mirrored on opposite sides of the board

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
157S0030	2	XFMR,ISO,HALF-PORT,1000T,16P,SMD,2MM	T3900,T3901	CRITICAL	

Ethernet Connector

SYNC_MASTER=M75_MLB SYNC_DATE=12/21/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
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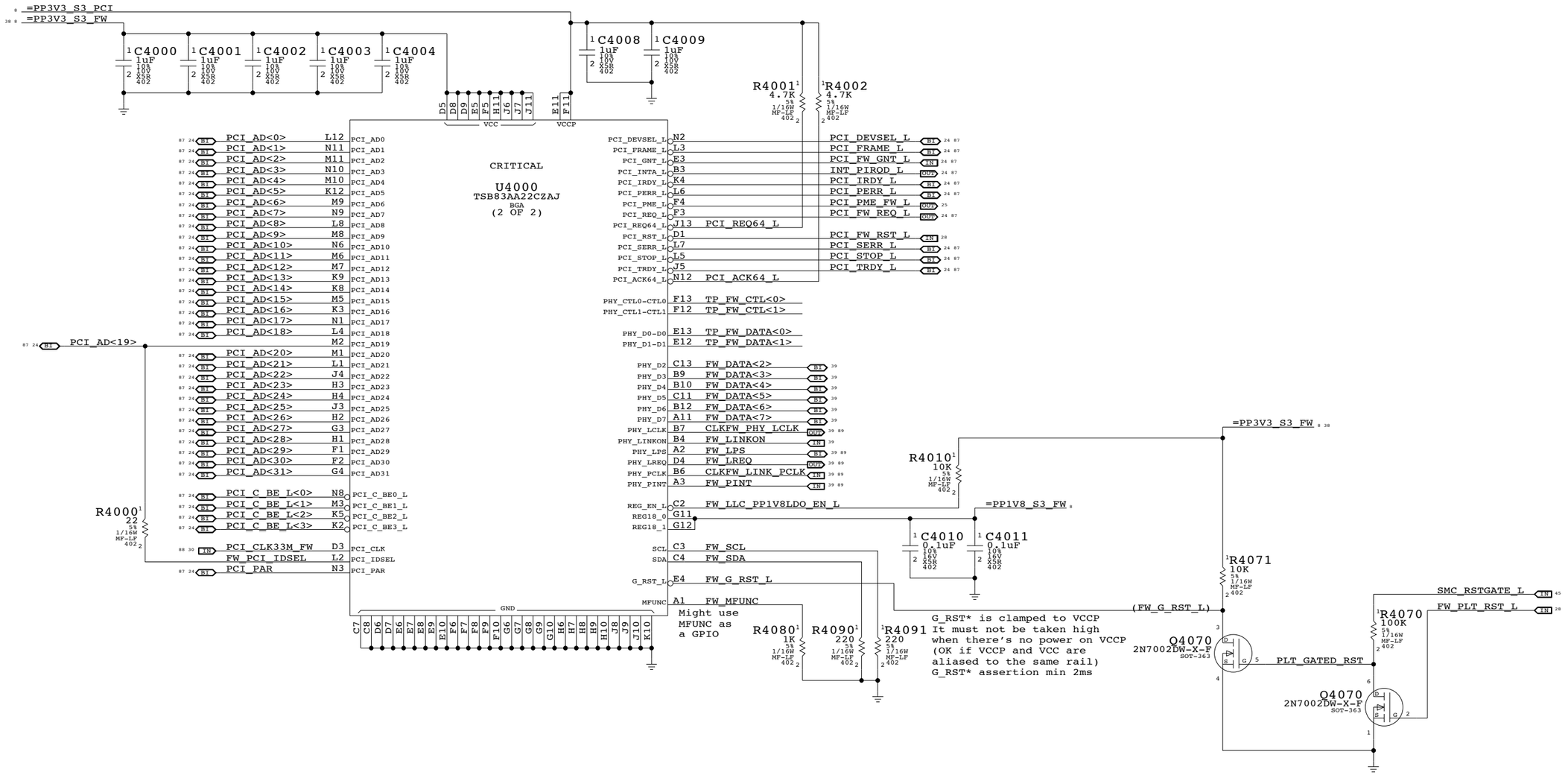


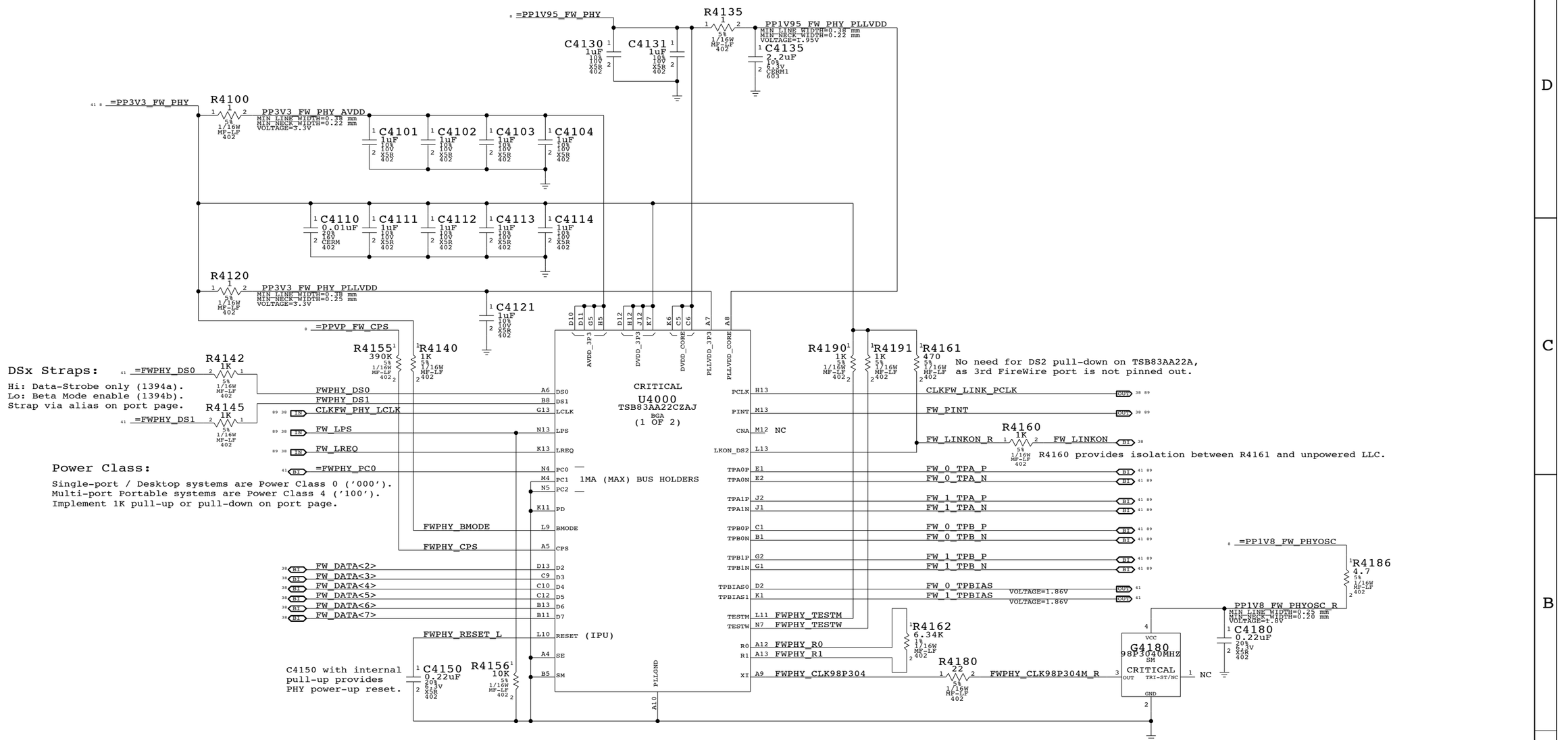
FireWire Link (TSB83AA22)

SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE: NONE SHT 38 OF 92



FireWire PHY (TSB83AA22)

SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	39	92

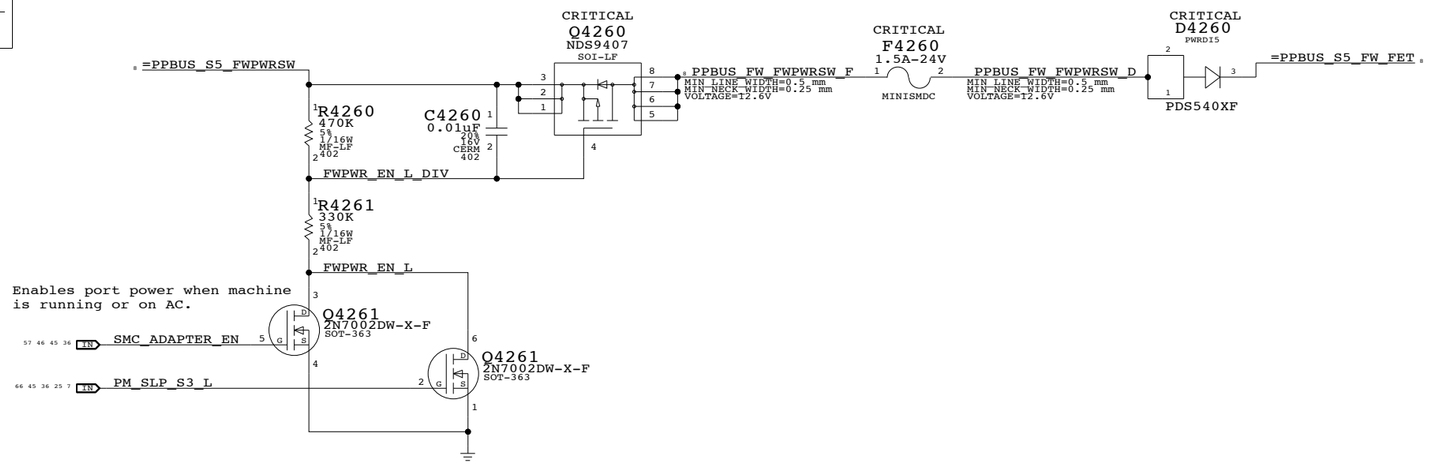
Page Notes

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

Signal aliases required by this page:
(NONE)

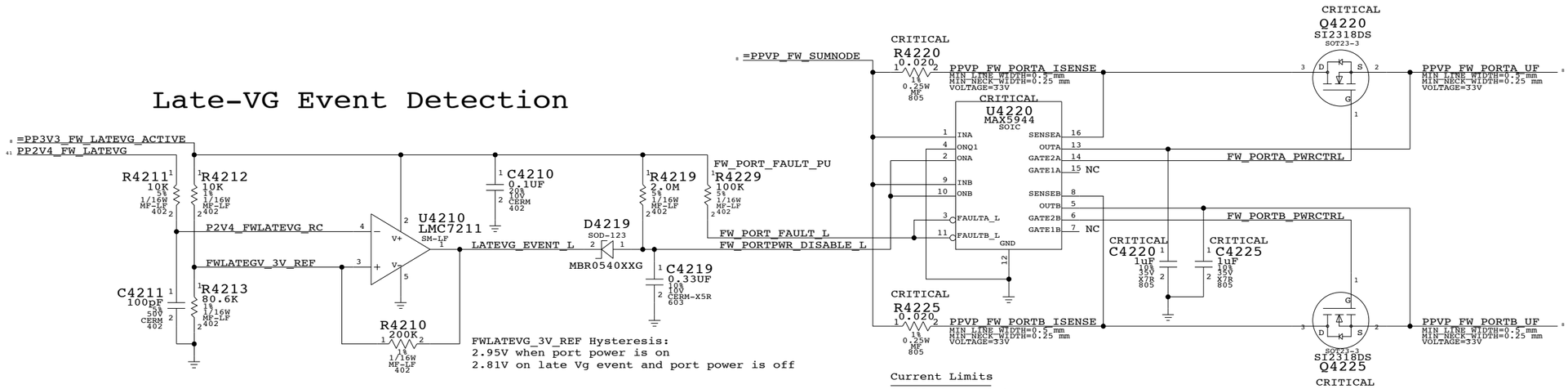
BOM options provided by this page:
- FW_PORT_FAULT_PU

FireWire Port Power Switch



Current Limit/Active Late-VG Protection

R4220 & R4225 PADS SHOULD BE ROUTED DIRECTLY TO MAX5944 SENSEA & SENSEB PINS RESPECTIVELY. SENSEA & SENSEB PINS SHOULD NOT BE PART OF THE MAIN CURRENT PATH



Late-VG Event Detection

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=M75_MLB SYNC_DATE=03/07/2007

APPLE COMPUTER INC.

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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)

39 8 =PP3V3_FW_PHY
39 =FWPHY_PC0
39 =FWPHY_DS0
39 =FWPHY_DS1

Termination

Place close to FireWire PHY

TI PHYs require 1uF even though FW spec calls out 0.33uF

39 FW_1_TPBIAS
39 FW_0_TPBIAS
C4350 1uF 10% 6.3V CERM 402
C4360 1uF 10% 6.3V CERM 402
CRITICAL L4360 18NH-250MA 0402 FW_B_TPA_L_P
CRITICAL L4361 18NH-250MA 0402 FW_B_TPA_L_N
R4350 56.2 1% 1/16W MF-LF 402
R4351 56.2 1% 1/16W MF-LF 402
R4360 56.2 1% 1/16W MF-LF 402
R4361 56.2 1% 1/16W MF-LF 402
89 39 FW_0_TPA_P — FW_PORT0_TPA_P 41 MAKE_BASE=TRUE
89 39 FW_0_TPA_N — FW_PORT0_TPA_N 41 MAKE_BASE=TRUE
89 39 FW_0_TPB_P — FW_PORT0_TPB_P 41 MAKE_BASE=TRUE
89 39 FW_0_TPB_N — FW_PORT0_TPB_N 41 MAKE_BASE=TRUE
89 39 FW_1_TPA_P — FW_PORT1_TPA_P 41 MAKE_BASE=TRUE
89 39 FW_1_TPA_N — FW_PORT1_TPA_N 41 MAKE_BASE=TRUE
89 39 FW_1_TPB_P — FW_PORT1_TPB_P 41 MAKE_BASE=TRUE
89 39 FW_1_TPB_N — FW_PORT1_TPB_N 41 MAKE_BASE=TRUE
SIGNAL_MODEL=EMPTY
R4352 56.2 1% 1/16W MF-LF 402
R4353 56.2 1% 1/16W MF-LF 402
R4362 56.2 1% 1/16W MF-LF 402
R4363 56.2 1% 1/16W MF-LF 402
FW_B_TPB_L_N
FW_B_TPB_L_P
CRITICAL L4362 18NH-250MA 0402 SIGNAL_MODEL=EMPTY
CRITICAL L4363 18NH-250MA 0402 SIGNAL_MODEL=EMPTY
FW_PORT0_TPB_C
FW_PORT1_TPB_C
C4354 220pF 5% 25V CERM 402
R4354 4.99K 1% 1/16W MF-LF 402
C4364 220pF 5% 25V CERM 402
R4364 4.99K 1% 1/16W MF-LF 402

Late-VG Protection Power

8 =PP3V3_FW_LATEVG
R4390 332 1% 1/16W MF-LF 402
PP2V4_FW_LATEVG 40 41 MIN_LINE_WIDTH=0.38 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=2.4V
CRITICAL D4390 MMBZ5227B SOT23

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

ESD and late-VG rail for snap-back diodes (Common to all ports)

Cable Power

CRITICAL Note: Trace PPVP_FW_PORT0 must handle up to 5A
9 =PPVP_FW_PORT0
L4300 FERR-250-OHM SM
PPVP_FW_PORT0 MIN_LINE_WIDTH=0.5 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=33V
C4304 0.001uF 20% 50V CERM 402

"Snapback" & "Late VG" Protection
41 40 PP2V4_FW_LATEVG
DP4300 BAV99DW-X-F SOT-363
C4300 0.01uF 10% 50V X7R 402
C4301 0.01uF 10% 50V X7R 402
41 FW_PORT0_TPA_P
41 FW_PORT0_TPA_N
41 FW_PORT0_TPB_P
41 FW_PORT0_TPB_N
DP4301 BAV99DW-X-F SOT-363
C4302 0.01uF 10% 50V X7R 402
C4303 0.01uF 10% 50V X7R 402
CRITICAL FL4300 90-OHM-100MA 1210-4SM1
CRITICAL FL4301 90-OHM-100MA 1210-4SM1
91 FW_PORT0_TPA_FL_P
91 FW_PORT0_TPA_FL_N
91 FW_PORT0_TPB_FL_P
91 FW_PORT0_TPB_FL_N
(PPFW_PORT0_VP)
(GND_FW_PORT0_VG)
C4305 0.01uF 20% 50V CERM 603

41 9 =GND_CHASSIS_FW_PORT0L
CX4300 OMIT SHORT NONE NONE NONE 402
CX4301 OMIT SHORT NONE NONE NONE 402

PORT 0
1394A
CRITICAL J4300 1394A F-RT-TH-LF
6 TPO (TPA+)
5 TPO# (TPA-)
4 TPI (TPB+)
3 TPI# (TPB-)
1 VP
2 VGND
7 8 9 10
514-0255

9 =GND_CHASSIS_FW_PORT0L 41
9 =GND_CHASSIS_FW_PORT0U
CX4302 OMIT SHORT NONE NONE NONE 402
CX4303 OMIT SHORT NONE NONE NONE 402

Cable Power

8 =PPVP_FW_PORT1
CRITICAL L4310 FERR-250-OHM SM Note: Trace PPVP_FW_PORT1 must handle up to 5A
PPVP_FW_PORT1 MIN_LINE_WIDTH=0.5 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=33V
C4314 0.001uF 20% 50V CERM 402

"Snapback" & "Late VG" Protection
41 40 PP2V4_FW_LATEVG
DP4310 BAV99DW-X-F SOT-363
C4311 0.01uF 10% 50V X7R 402
C4310 0.01uF 10% 50V X7R 402
41 FW_PORT1_TPB_N
41 FW_PORT1_TPB_P
41 FW_PORT1_TPA_N
41 FW_PORT1_TPA_P
DP4311 BAV99DW-X-F SOT-363
C4312 0.01uF 10% 50V X7R 402
C4313 0.01uF 10% 50V X7R 402
C4319 0.1uF 10% 50V X7R 603-1
R4319 1M 5% 1/16W MF-LF 402
NO STUFF C4317 0.01uF 20% 16V CERM 402
C4315 0.01uF 20% 50V CERM 603
PLACEMENT_NOTE=Place C4319 close to connector pin 5.

41 9 =GND_CHASSIS_FW_PORT1
CX4304 OMIT SHORT NONE NONE NONE 402
CX4305 OMIT SHORT NONE NONE NONE 402

PORT 1
BILINGUAL
CRITICAL J4310 1394B-UG31903 F-RT-SM1
10
1 TPB-
9 TPB<R> OUTPUT
2 TPB+
8 VP
NC 7 NC
6 VG
3 TPA-
5 TPA<R> INPUT
4 TPA+
11
514S0133

(FW_PORT1_BREF)
(PPVP_FW_PORT1)
(GND_FW_PORT1_VG)
FW_PORT1_AREF

AREF needs to be isolated from all local grounds per 1394b spec

When a bilingual device is connected to a beta-only device, there is no DC path between them (to avoid ground offset issue)

BREF should be hard-connected to logic ground for speed signaling and connection detection currents per 1394b V1.33

=GND_CHASSIS_FW_PORT1
CX4306 OMIT SHORT NONE NONE NONE 402
CX4307 OMIT SHORT NONE NONE NONE 402

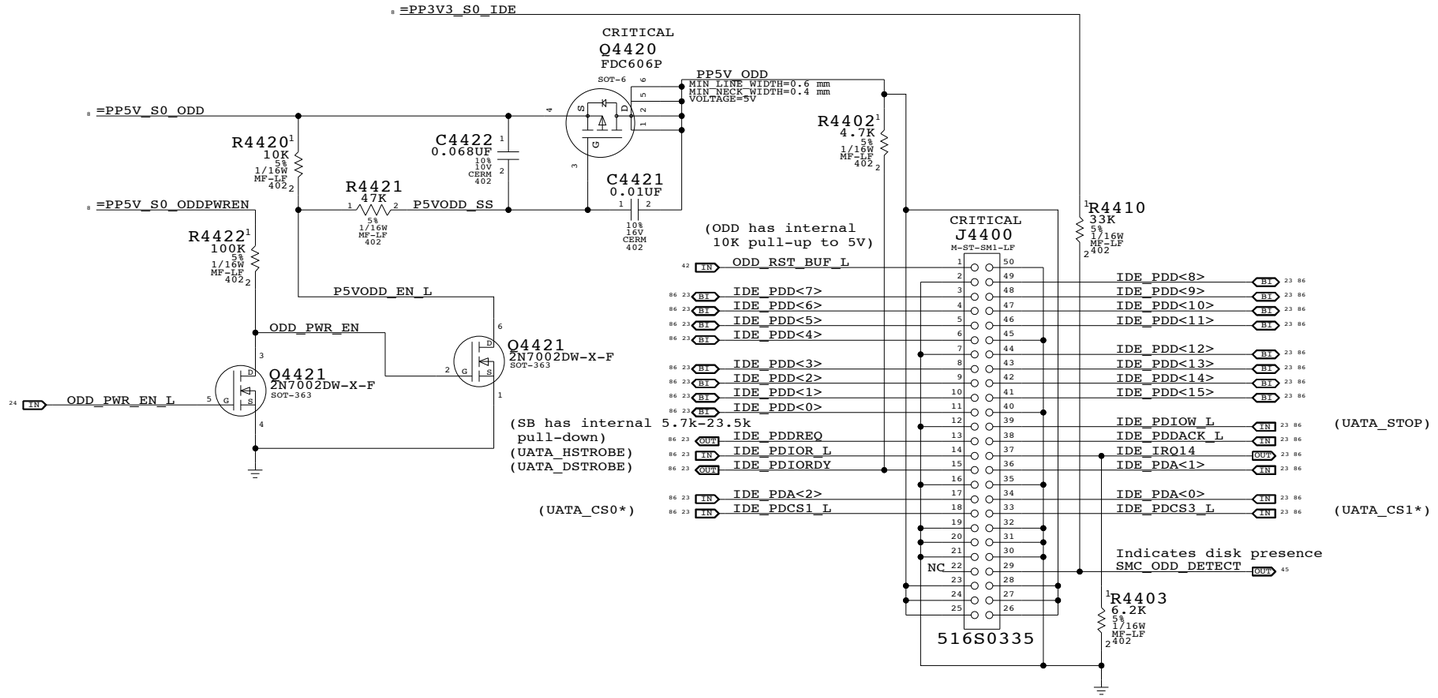
FireWire Ports

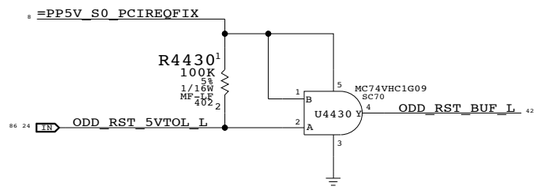
SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

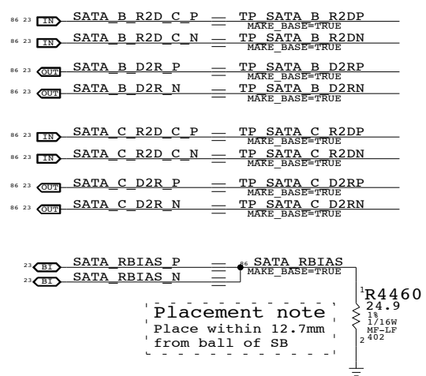
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 41 OF 92	

IDE (ODD) Connector





Unused SATA Ports



PATA Connector

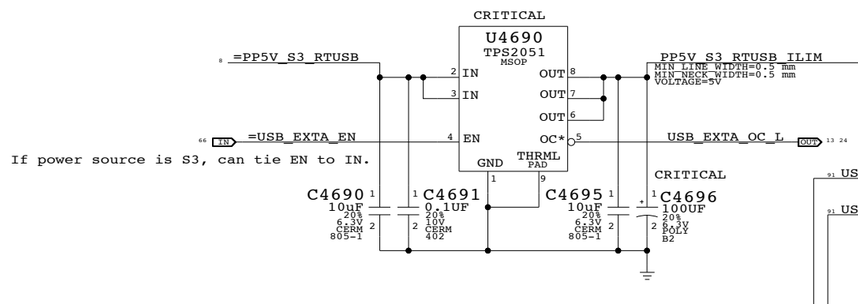
SYNC_MASTER=M75_MLB SYNC_DATE=12/07/2006

APPLE COMPUTER INC.

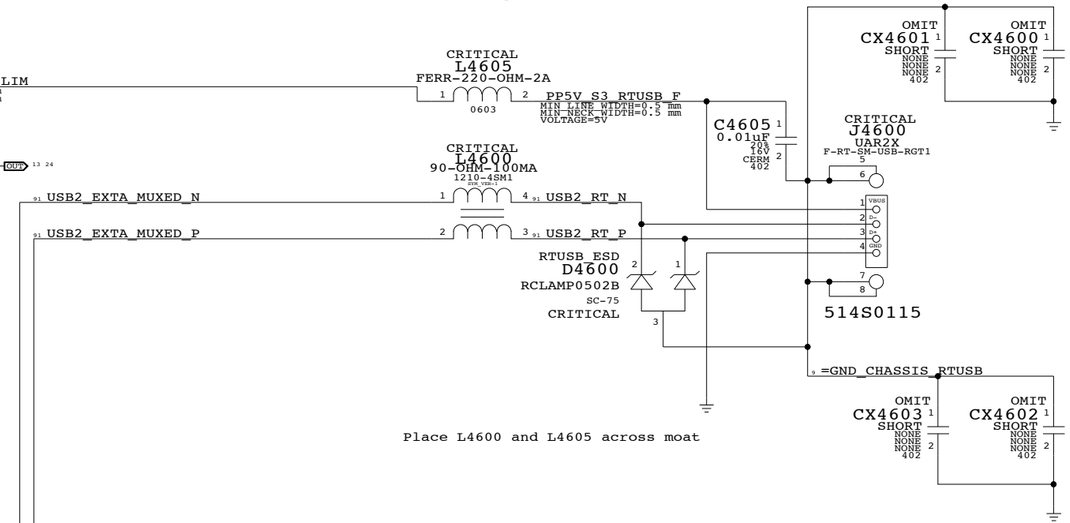
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE: NONE SHT 42 OF 92

Port Power Switch

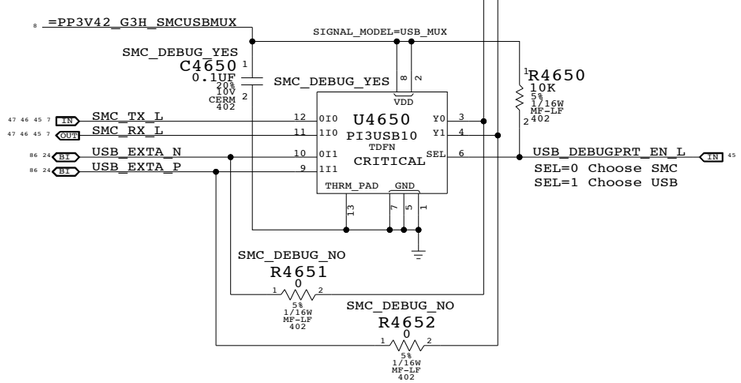


Right USB Port



Place L4600 and L4605 across moat

USB/SMC Debug Mux



External USB Connector

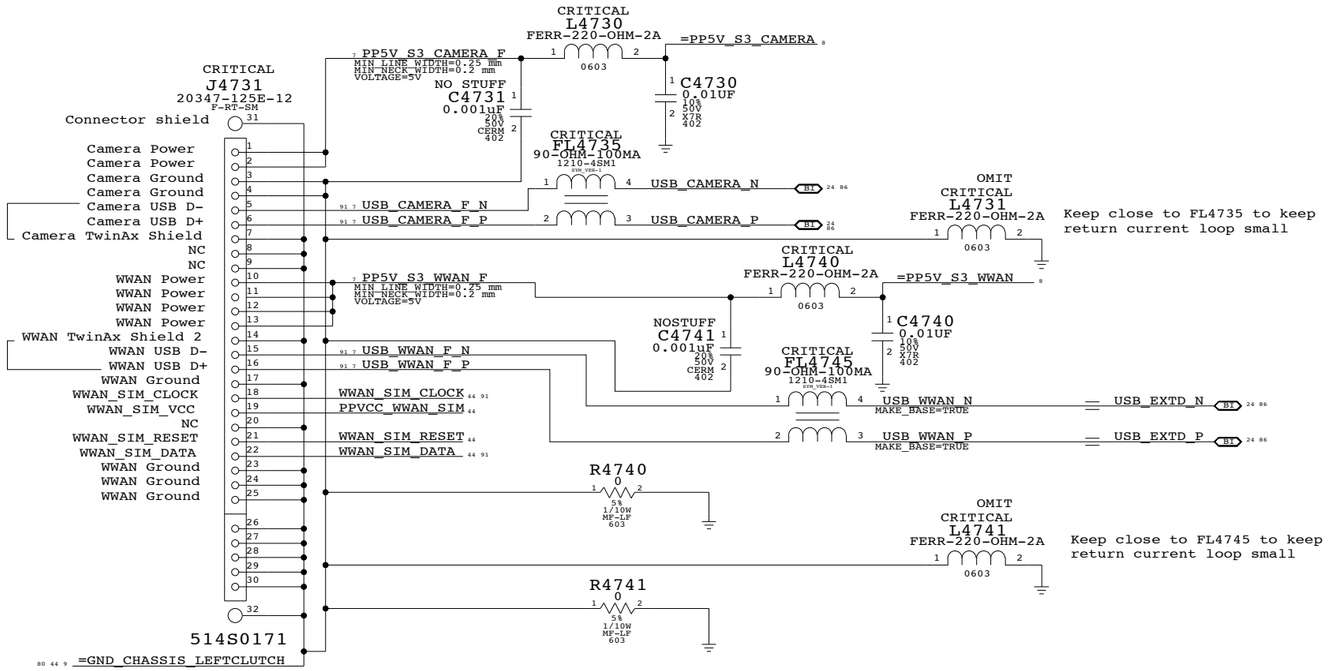
SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

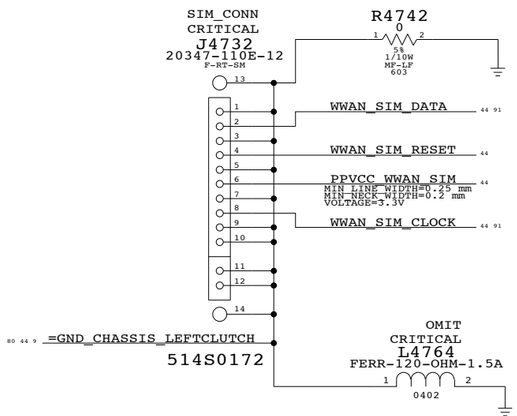
SCALE	SHT	OF
NONE	43	92

Left Clutch Barrel Interconnect



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
113S0022	2	RES,MF,1/10W,0OHM,5,0603,SM,LF	L4731,L4741	CRITICAL	
116S0004	1	RES,MF,1/16W,0OHM,5,0402,SM,LF	L4764	CRITICAL	

SIM Interconnect



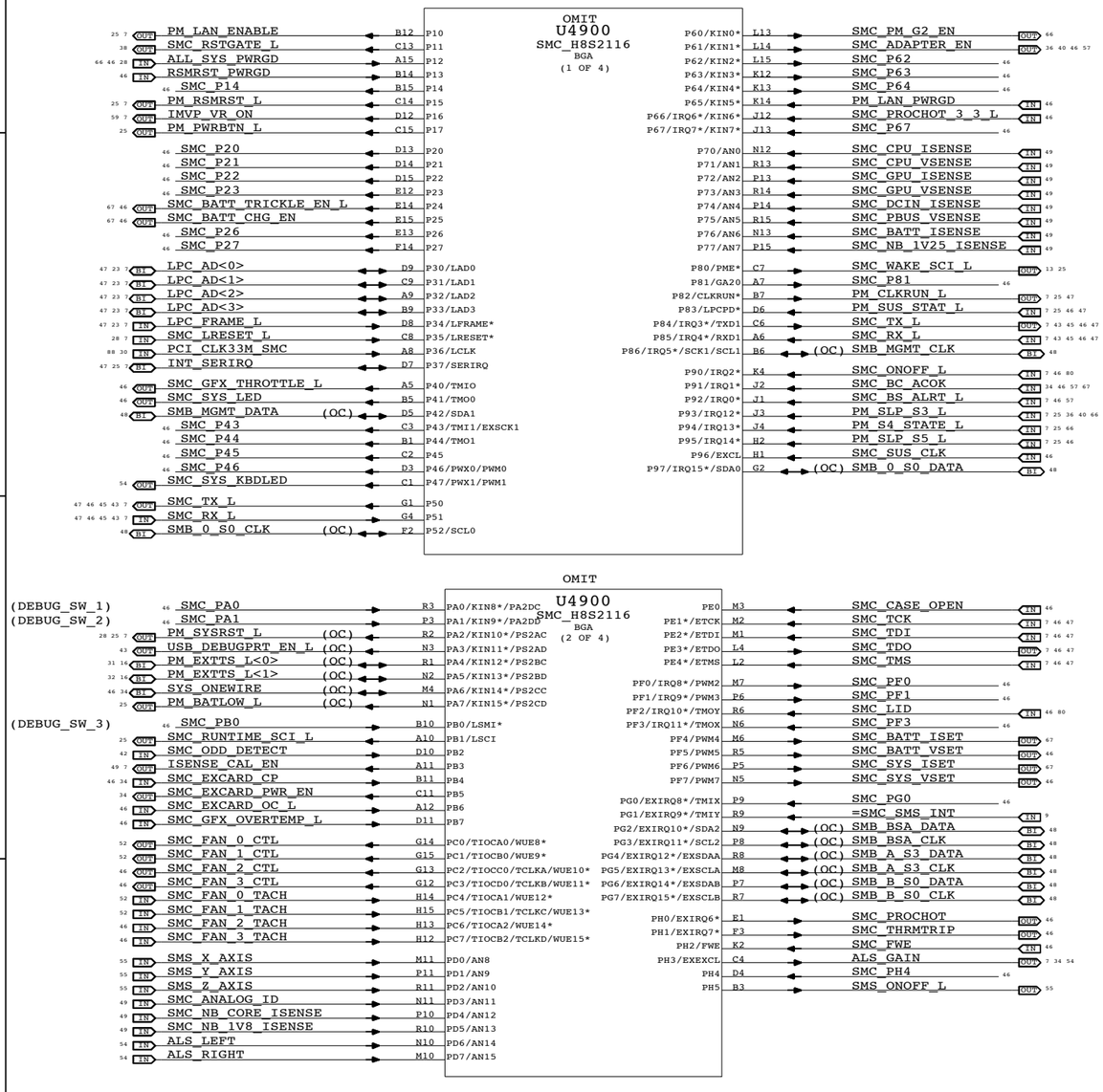
Left Clutch Barrel Interconnect

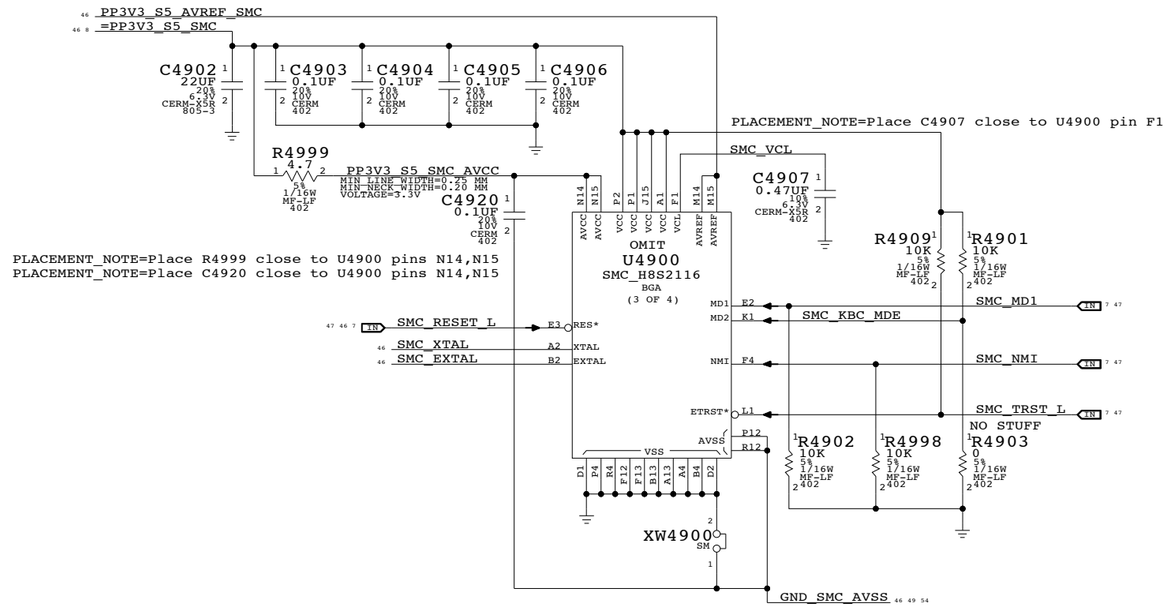
SYNC_MASTER=M75_MLB SYNC_DATE=12/21/2006

APPLE COMPUTER INC.

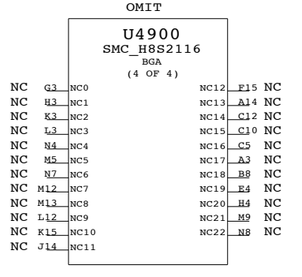
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 44 OF 92	

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

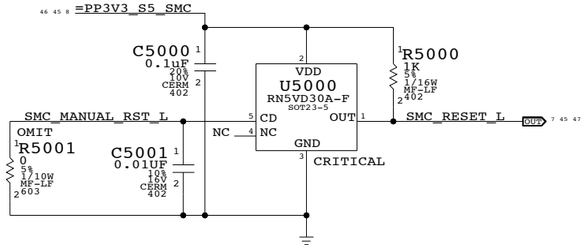
SYNC_MASTER=T9_NOME SYNC_DATE=12/21/2006

APPLE COMPUTER INC.

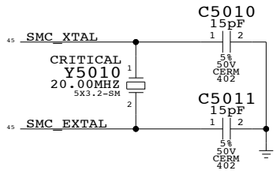
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	45	92

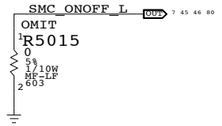
SMC Reset "Button" / Brownout Detect



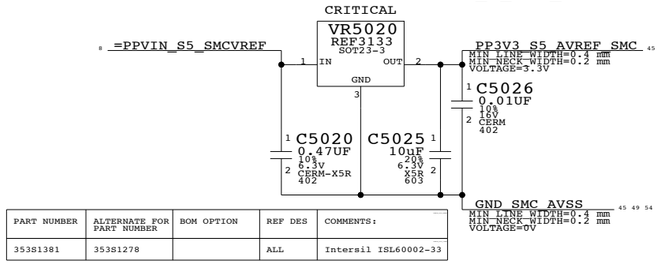
SMC Crystal Circuit



Debug Power "Button"

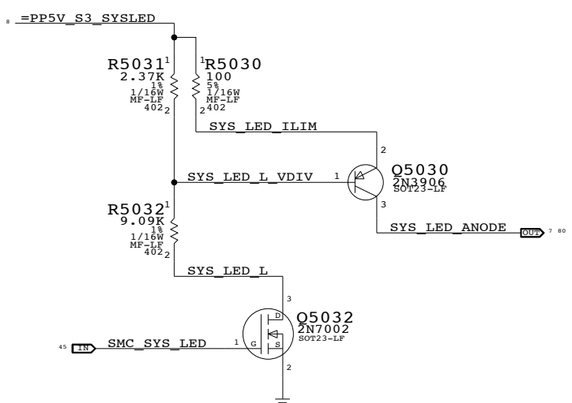


SMC AVREF Supply

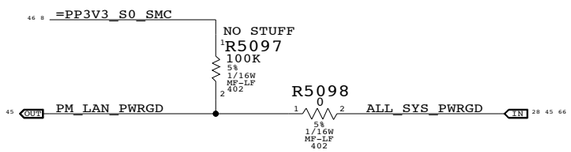


PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
353S1381	353S1278		ALL	Intersil ISL60002-33

System (Sleep) LED Circuit

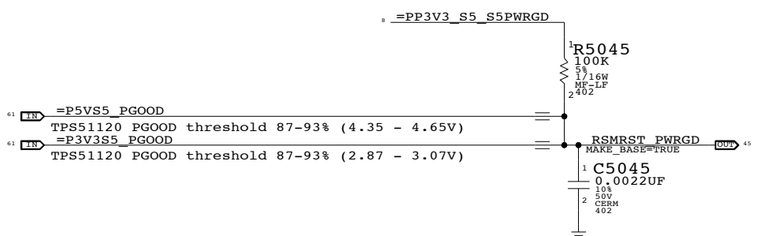


LAN PWRGD Circuit

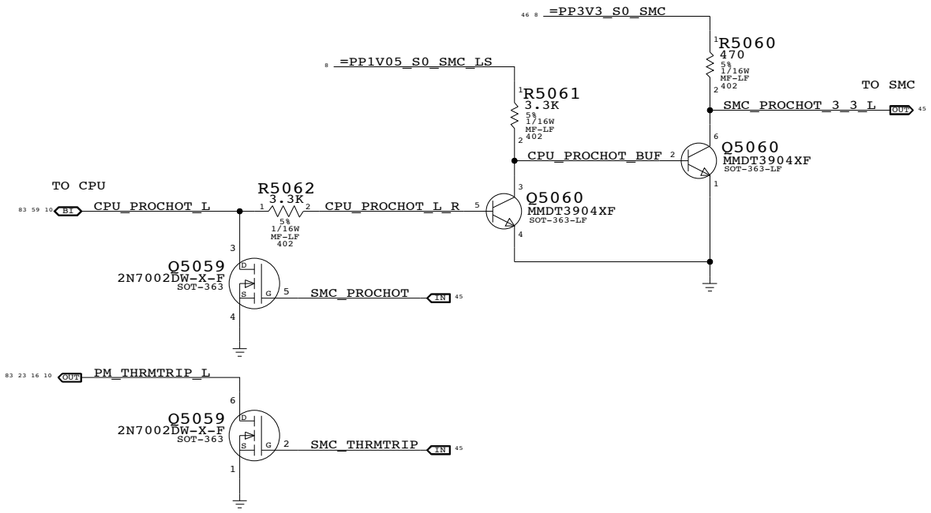


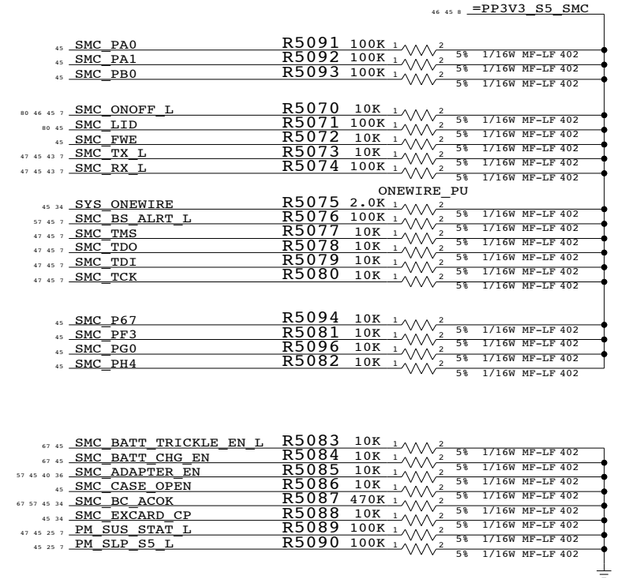
S5 Rail PWRGD Circuit

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



SMC FSB to 3.3V Level Shifting





SMC_FAN_2_CTL … SMC_PF1

SMC_FAN_2_CTL	TP_SMC_FAN_2_CTL	MAKE_BASE=TRUE
SMC_FAN_2_TACH	TP_SMC_FAN_2_TACH	MAKE_BASE=TRUE
SMC_FAN_3_CTL	TP_SMC_FAN_3_CTL	MAKE_BASE=TRUE
SMC_FAN_3_TACH	TP_SMC_FAN_3_TACH	MAKE_BASE=TRUE
SMC_GFX_OVERTEMP_L	TP_SMC_GFX_OVERTEMP_L	MAKE_BASE=TRUE
SMC_GFX_THROTTLE_L	TP_SMC_GFX_THROTTLE_L	MAKE_BASE=TRUE
SMC_BATT_VSET	TP_SMC_BATT_VSET	MAKE_BASE=TRUE
SMC_SYS_VSET	TP_SMC_SYS_VSET	MAKE_BASE=TRUE
SMC_P14	TP_SMC_P14	MAKE_BASE=TRUE
SMC_P20	TP_SMC_P20	MAKE_BASE=TRUE
SMC_P21	TP_SMC_P21	MAKE_BASE=TRUE
SMC_P22	TP_SMC_P22	MAKE_BASE=TRUE
SMC_P23	TP_SMC_P23	MAKE_BASE=TRUE
SMC_P26	TP_SMC_P26	MAKE_BASE=TRUE
SMC_P27	TP_SMC_P27	MAKE_BASE=TRUE
SMC_P43	TP_SMC_P43	MAKE_BASE=TRUE
SMC_P44	TP_SMC_P44	MAKE_BASE=TRUE
SMC_P46	TP_SMC_P46	MAKE_BASE=TRUE
SMC_P62	TP_SMC_P62	MAKE_BASE=TRUE
SMC_P63	TP_SMC_P63	MAKE_BASE=TRUE
SMC_P64	TP_SMC_P64	MAKE_BASE=TRUE
SMC_P81	TP_SMC_P81	MAKE_BASE=TRUE
SMC_PF0	TP_SMC_PF0	MAKE_BASE=TRUE
SMC_PF1	TP_SMC_PF1	MAKE_BASE=TRUE

SMC_EXCARD_OC_L … SMC_P45

SMC_EXCARD_OC_L	R5095 0 5% 1/16W MF-LF 402	EXCARD_OC_L
SMC_SUS_CLK	SUS_CLK_SB	MAKE_BASE=TRUE
SMC_P45	SMC_ENRGYSTR_LDO_EN	MAKE_BASE=TRUE, OUT

SMC Support	
SYNC_MASTER=M75_MLB	SYNC_DATE=04/25/2007

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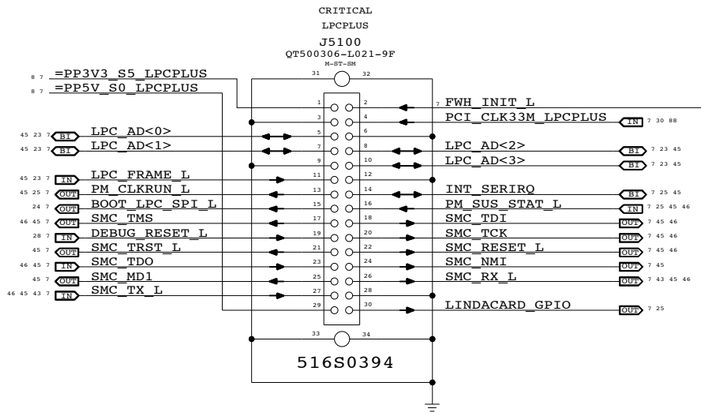
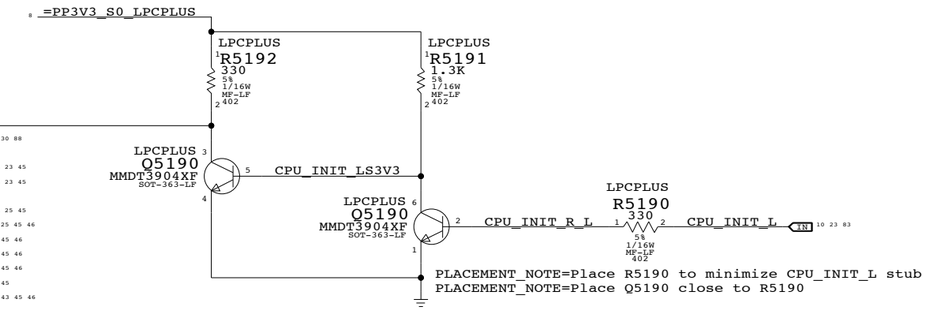
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7261	A.0.0
	SCALE: NONE	SHT 46 OF 92	

LPC+ Connector



FWH_INIT_L Generation

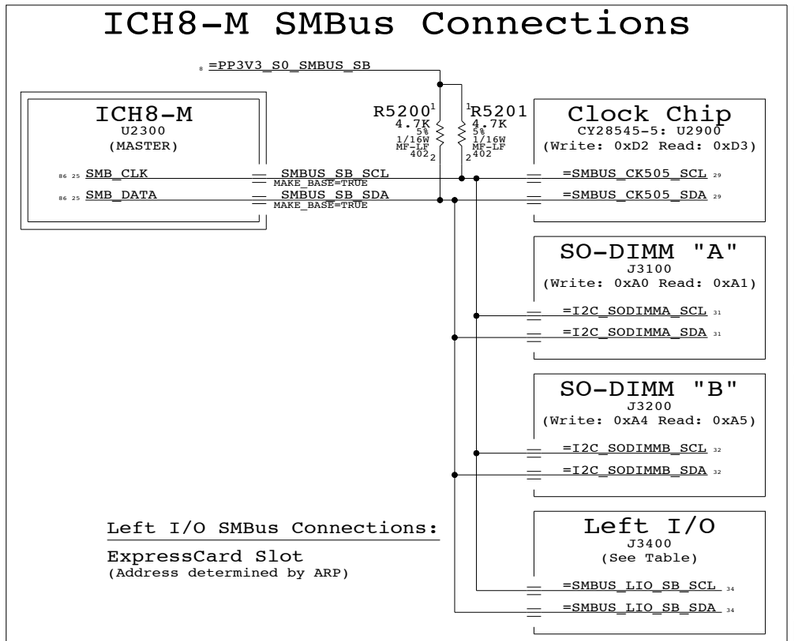


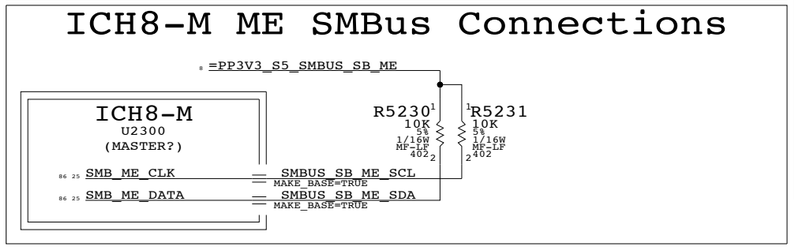
LPC+ Debug Connector

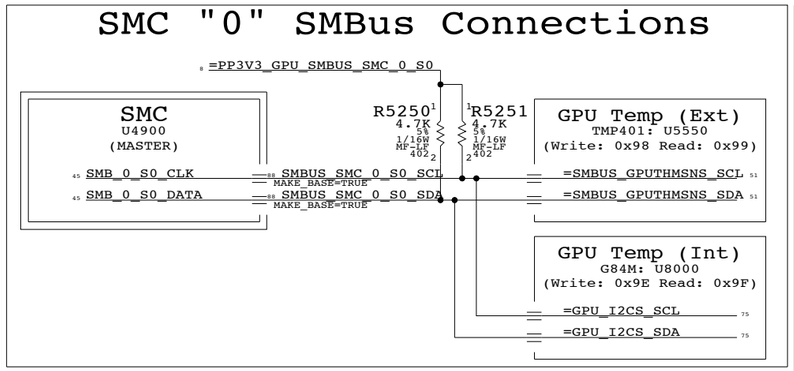
SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

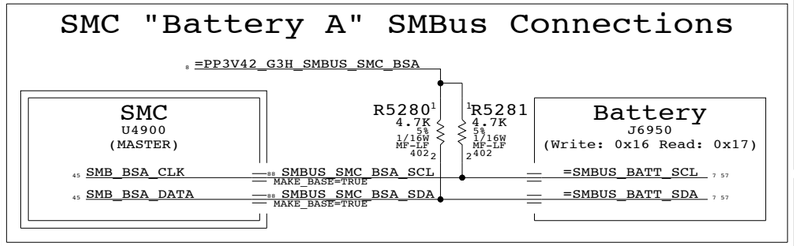
APPLE COMPUTER INC.

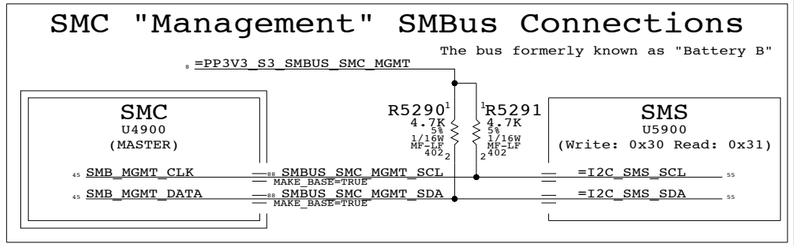
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 47 OF 92	

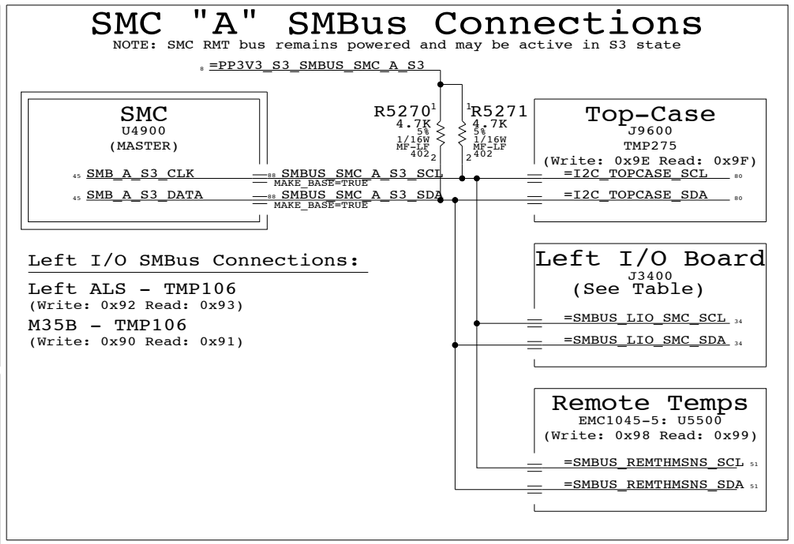


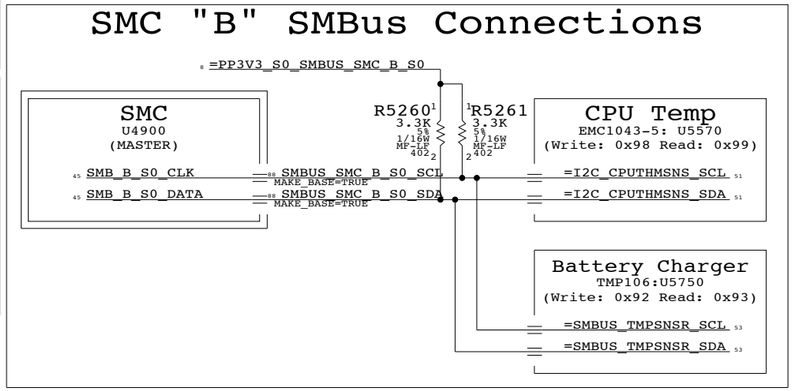












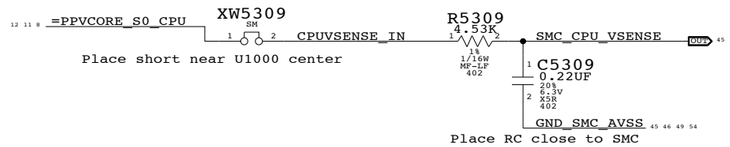
SMBus Connections

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

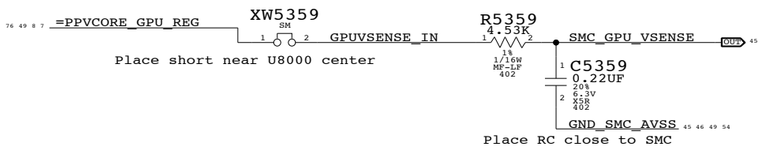
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 48 OF 92	

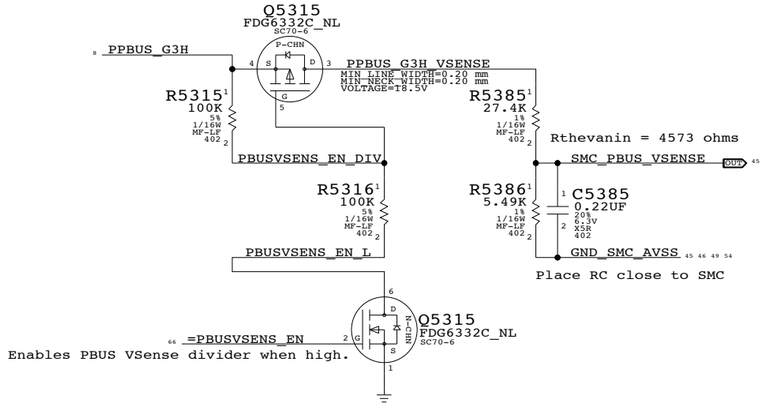
CPU Voltage Sense / Filter



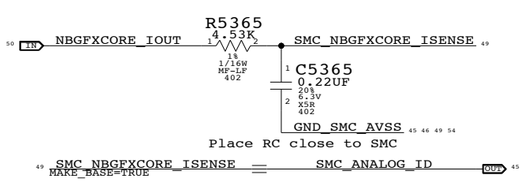
GPU Voltage Sense / Filter



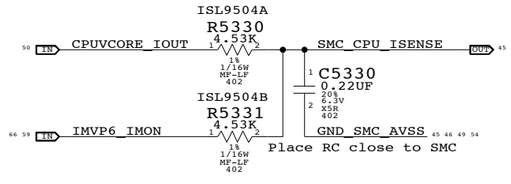
PBUS Voltage Sense & Filter



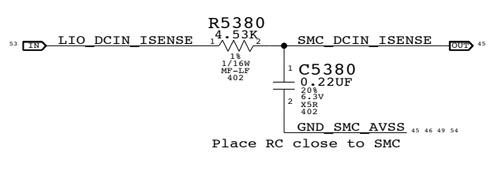
NB GFX Current Sense Filter



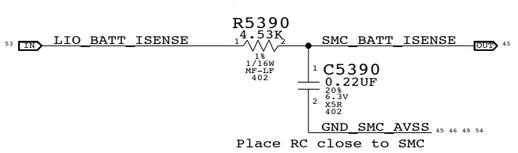
CPU Current Sense Filter



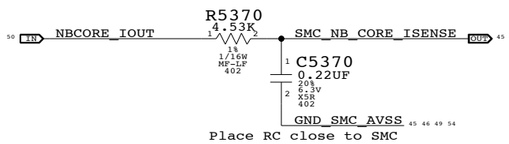
DCIN Current Sense Filter



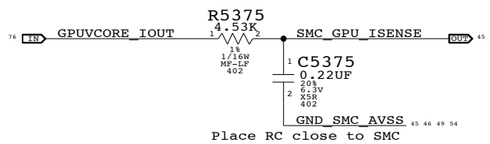
Battery (PBUS) Current Sense Filter



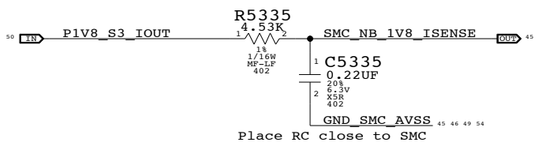
NB Core Current Sense Filter



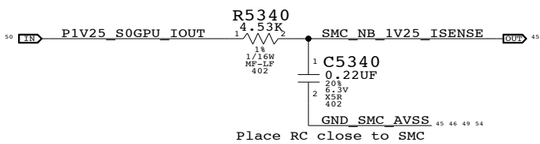
GPU Current Sense Filter



NB 1.8V Current Sense Filter

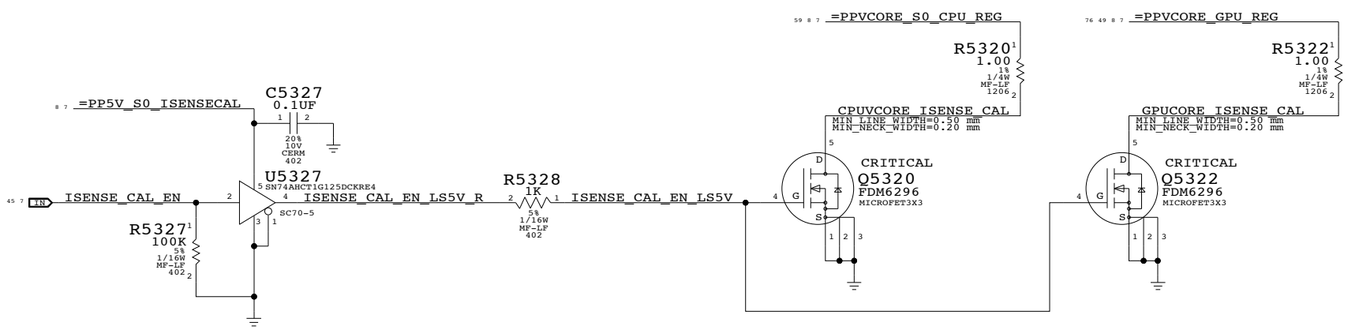


S0/GPU 1.25V Current Sense Filter



Current Sense Calibration Circuit

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



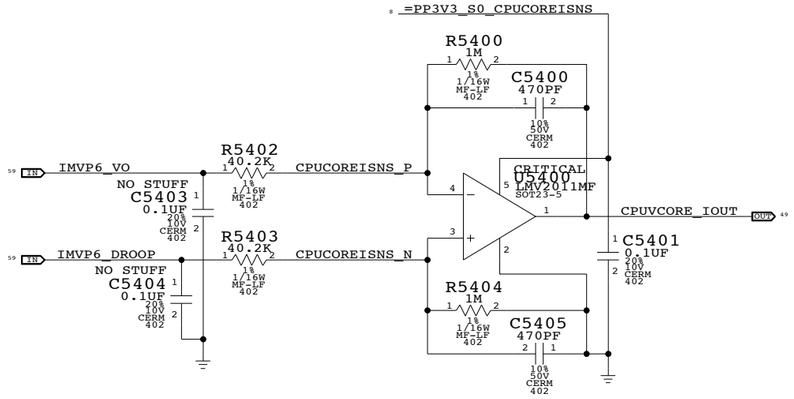
Current & Voltage Sensing

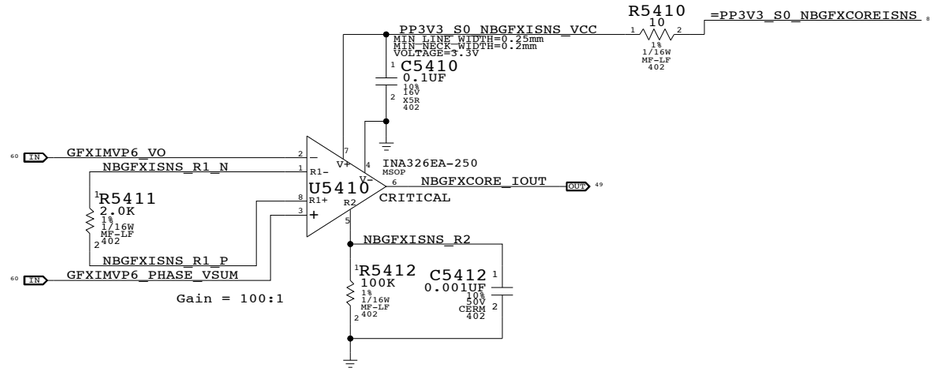
SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

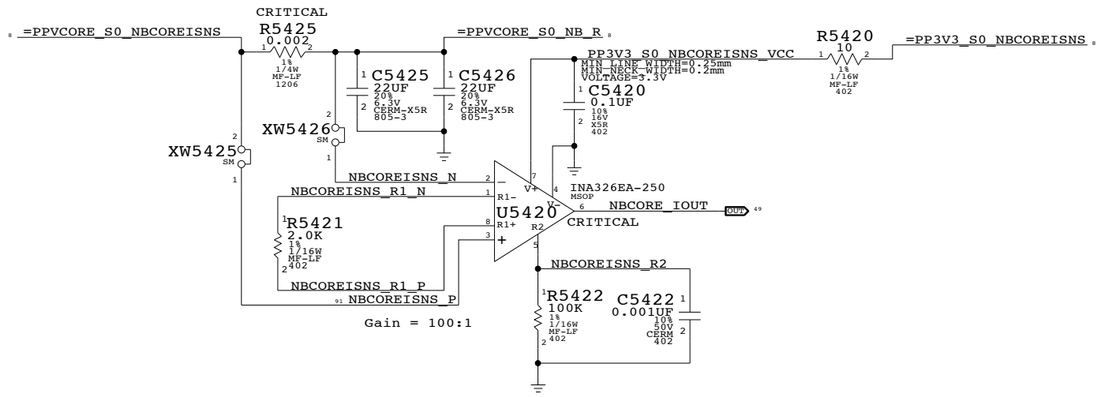
APPLE COMPUTER INC.

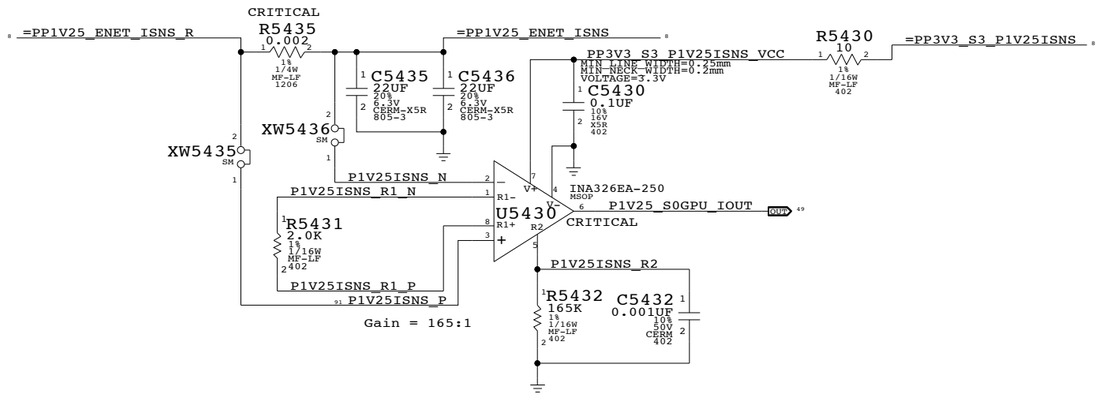
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

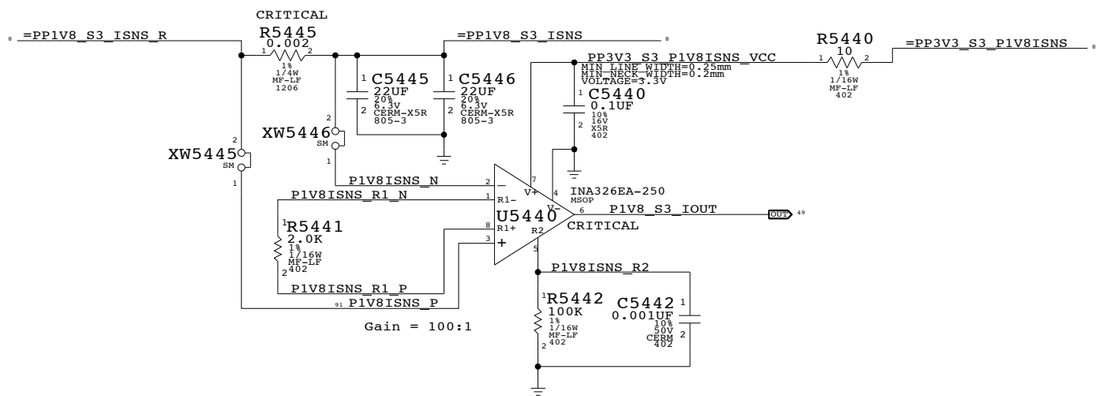
SCALE	SHT	OF
NONE	49	92











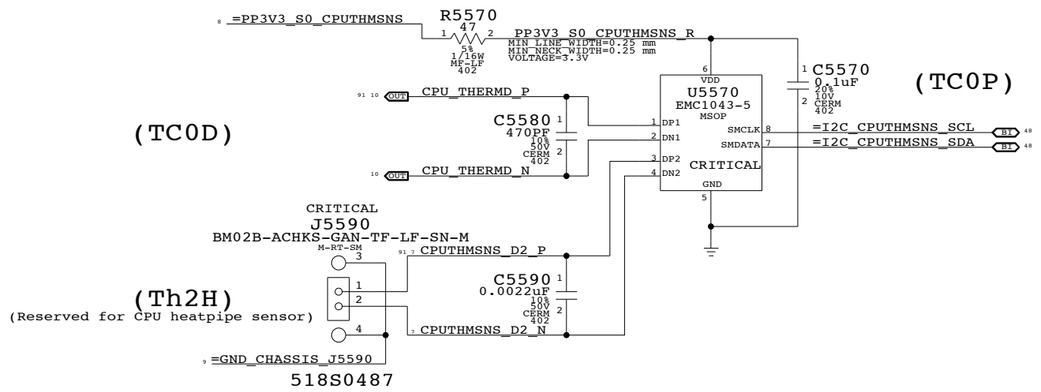
Current Sensing

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

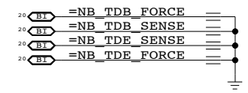
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 50 OF 92	

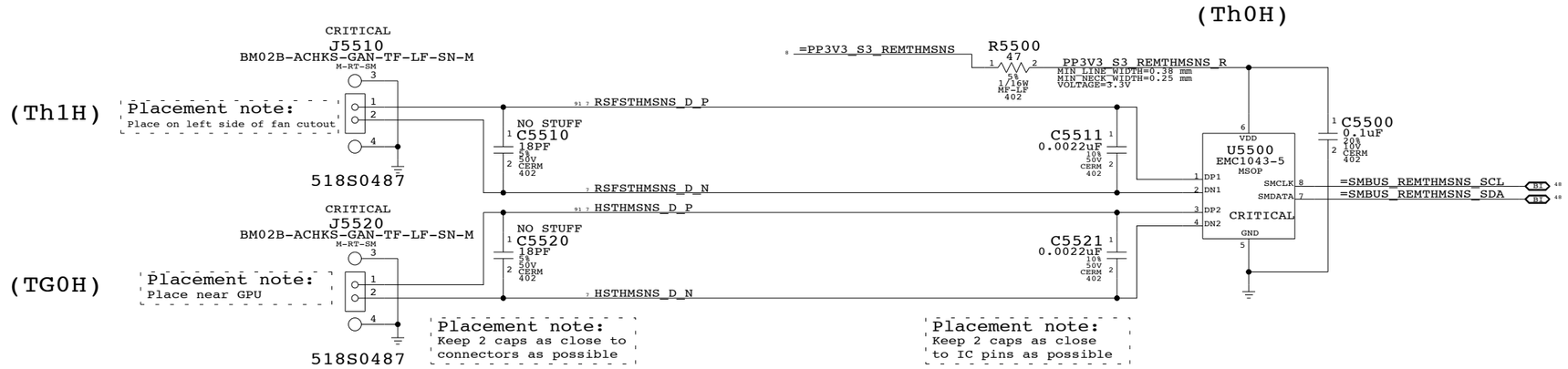
CPU T-Diode Thermal Sensor



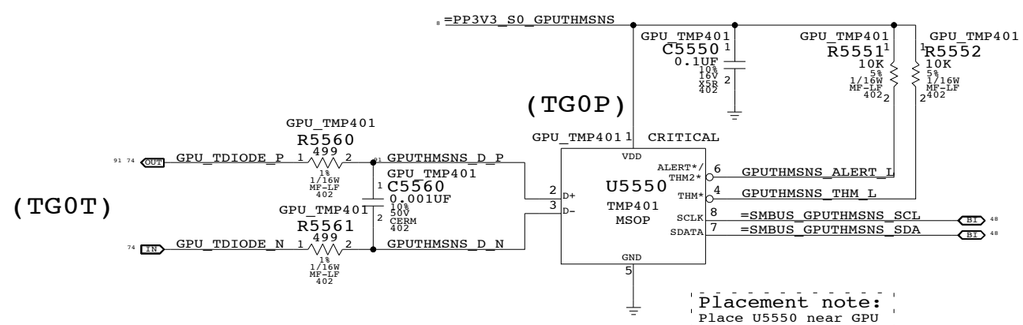
NB Thermal Diodes Not Used



GPU/Heat Pipe & Bottom Case Skin Thermal Sensor



GPU Die Thermal Sensor



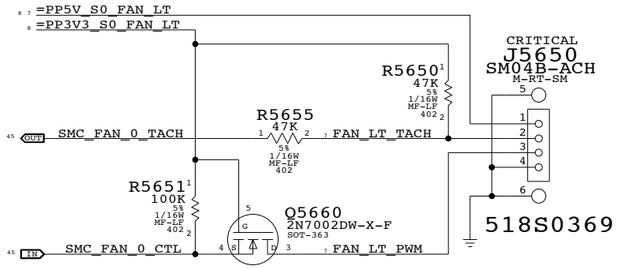
Thermal Sensors

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

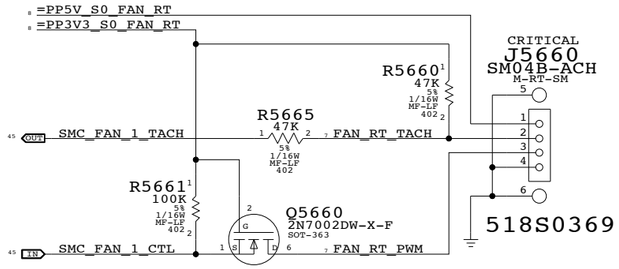
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 51 OF 92	

Left Fan



Right Fan



Fan Connectors

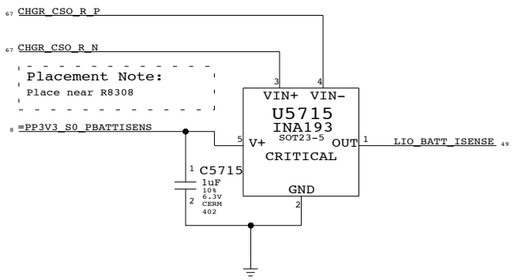
SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

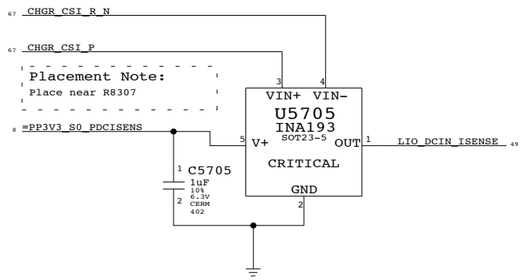
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	52	92

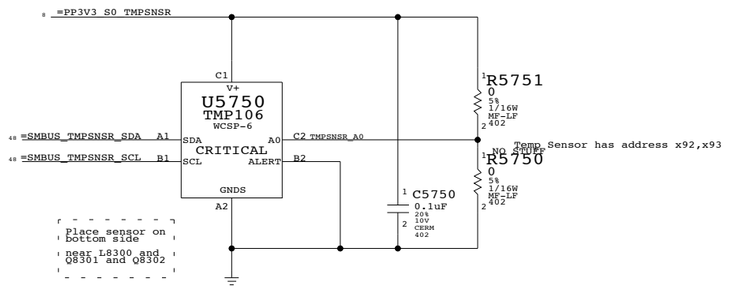
Battery Current Sense



DCIn Current Sense



Battery Charger Thermal Sensor



(Tm0P) R:0x93,W:0x92

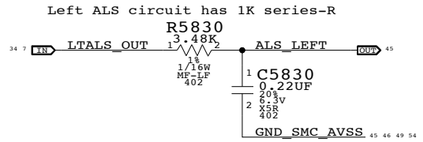
Current & Thermal Sensors

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

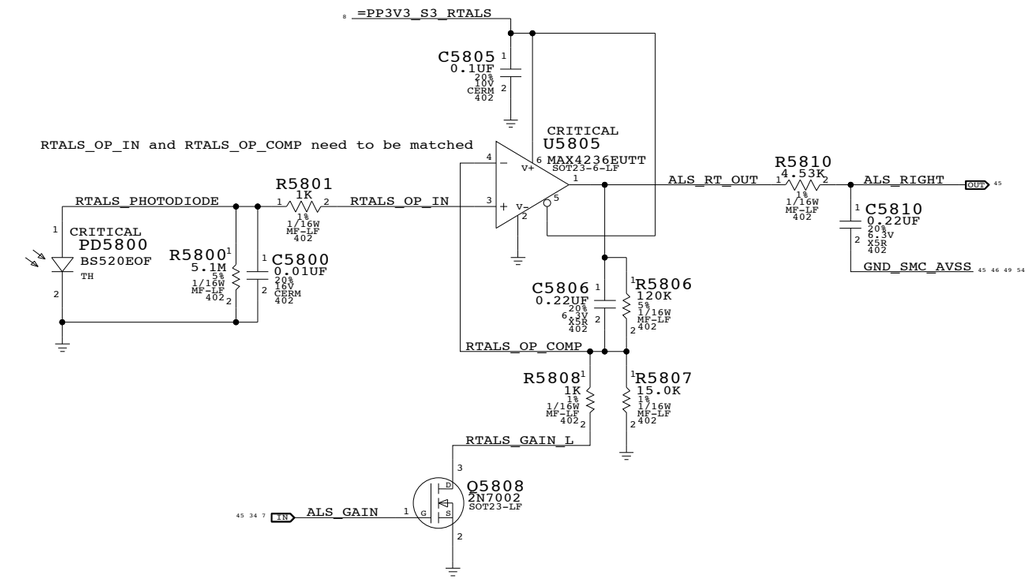
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 53 OF 92	

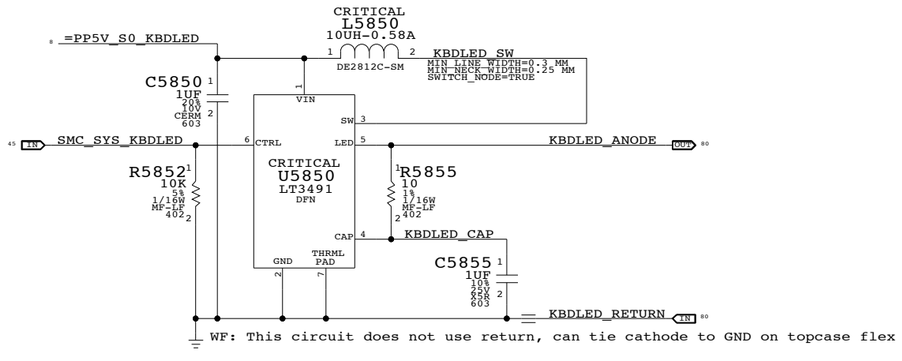
Left ALS Filter



Right ALS Circuit



Keyboard LED Driver



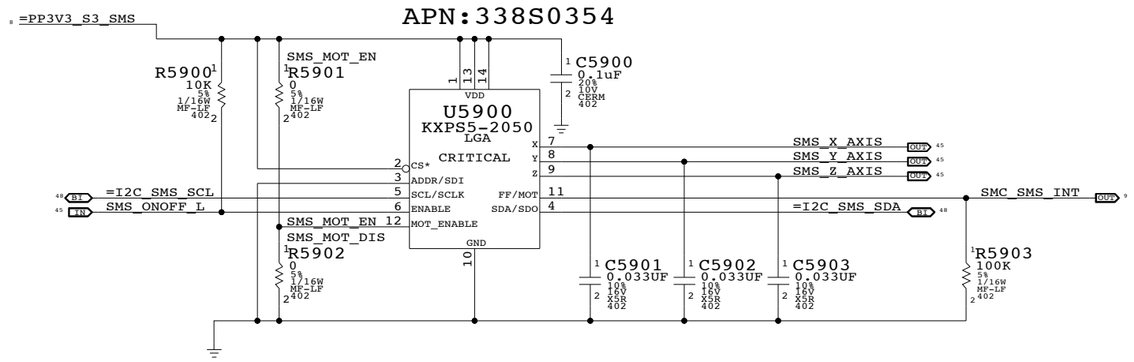
ALS Support

SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 54 OF 92	

APN:338S0354



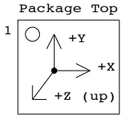
I2C addresses:

ADDR low => 0x30, 0x31

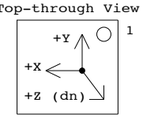
ADDR high => 0x32, 0x33

Alias SCL/SDA to GND if using analog outputs only

Desired orientation when placed on board top-side:



Desired orientation when placed on board bottom-side:



Sudden Motion Sensor (SMS)

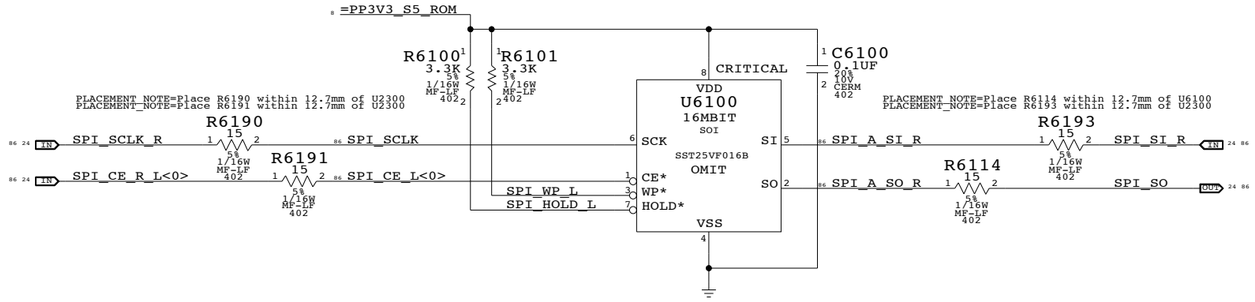
SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE: NONE

SHT 55 OF 92



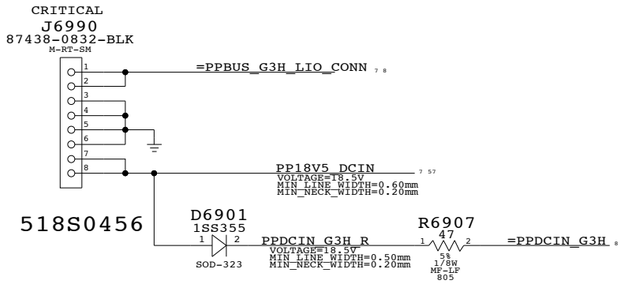
SPI BootROM

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

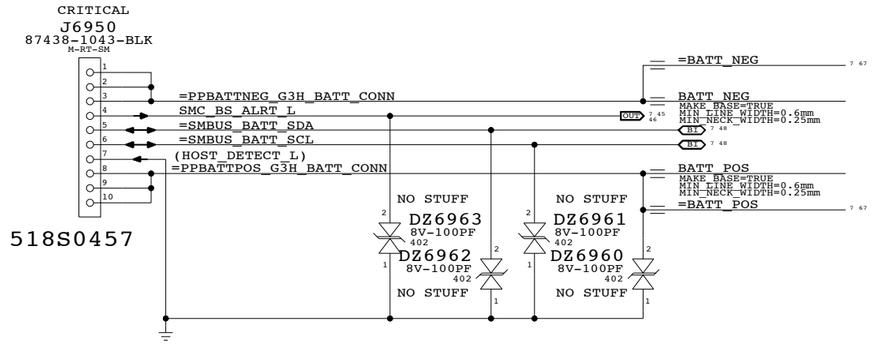
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 56 OF 92	

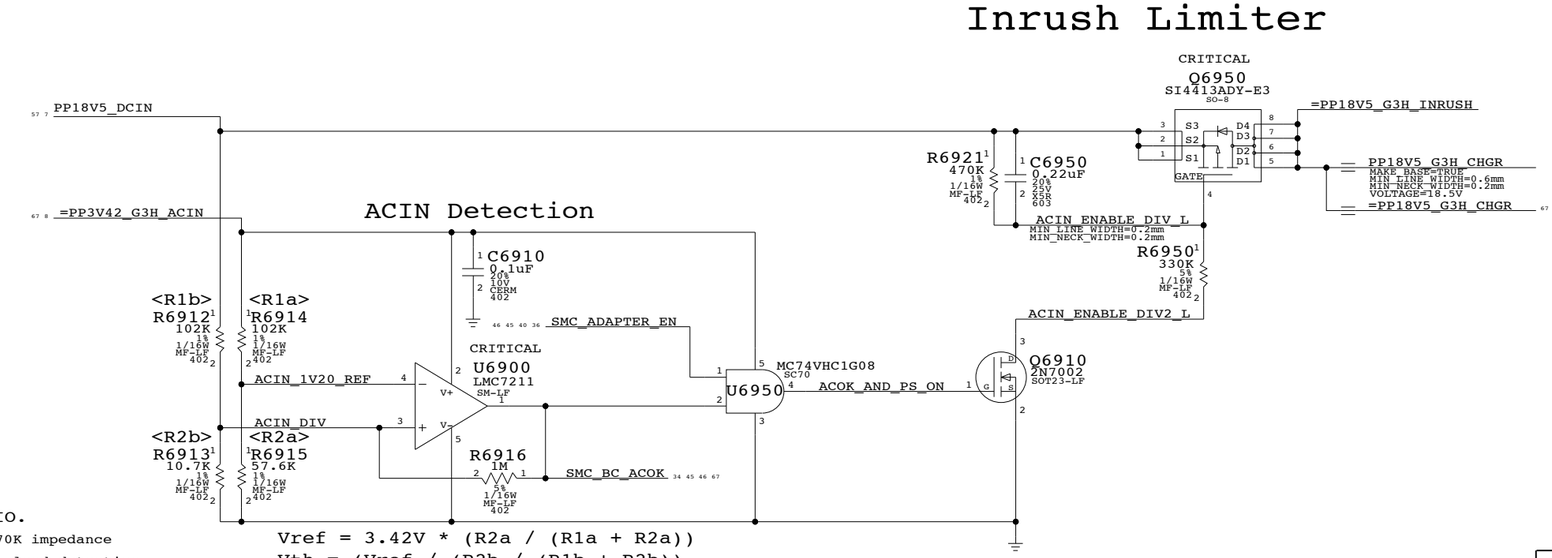
DC-In Connector



Battery Connector



Inrush Limiter



NOTE: R6910 is on LIO.
System must provide 10K-70K impedance
to A52 adapter for system load detection.
REQ of R6910 (on LIO), R6912, & R6913 is 36.9K.

Vref = 3.42V * (R2a / (R1a + R2a))
Vth = (Vref / (R2b / (R1b + R2b))

Vref = 1.23V
Vth = 13.0V

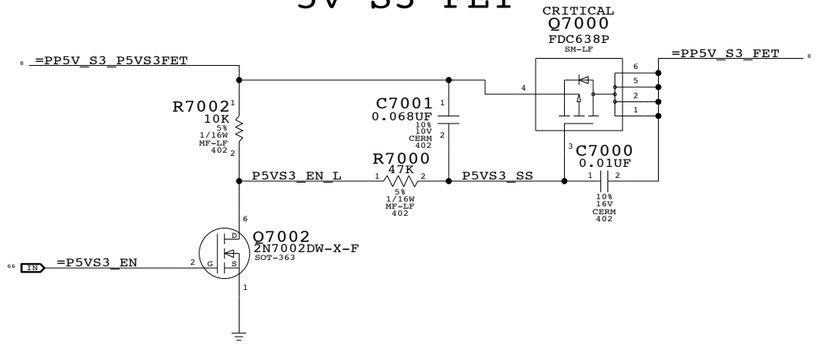
Assuming 1% variance for R6910-R6915 and 3.42V:
Worst case Vth: min:12.47V, max: 13.54V

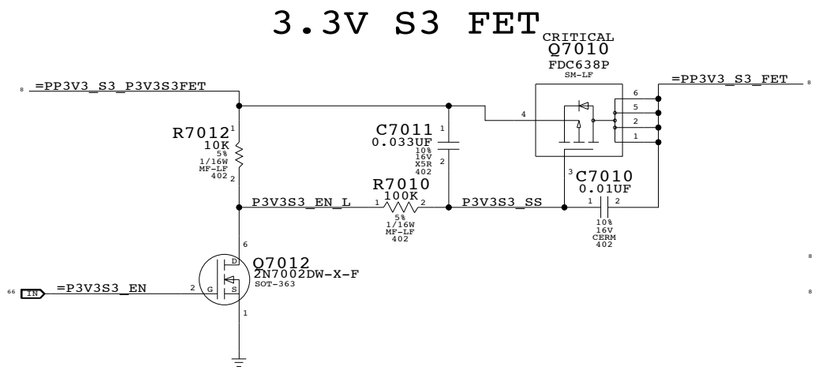
DC-In & Battery Connectors

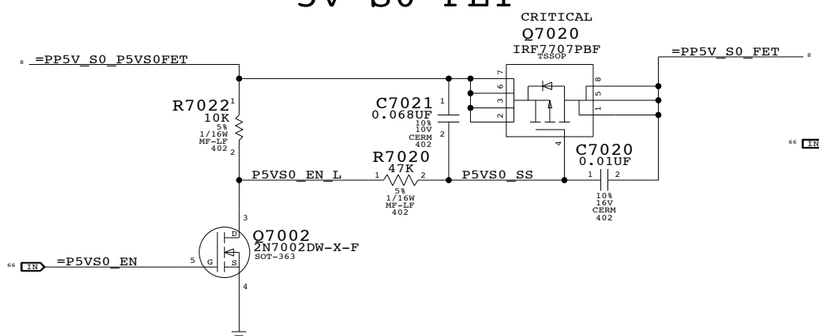
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

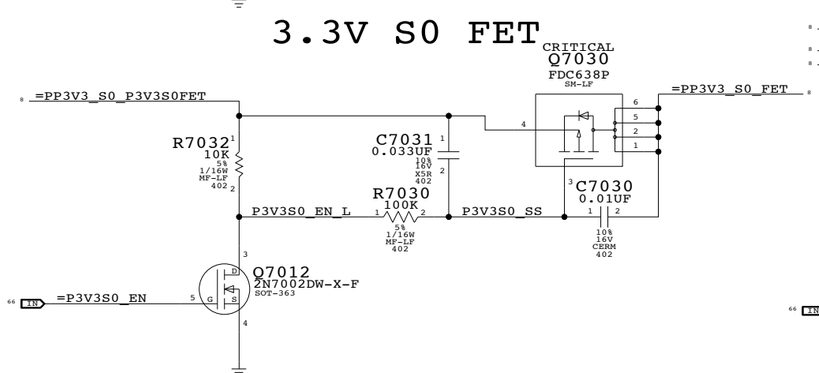
APPLE COMPUTER INC.

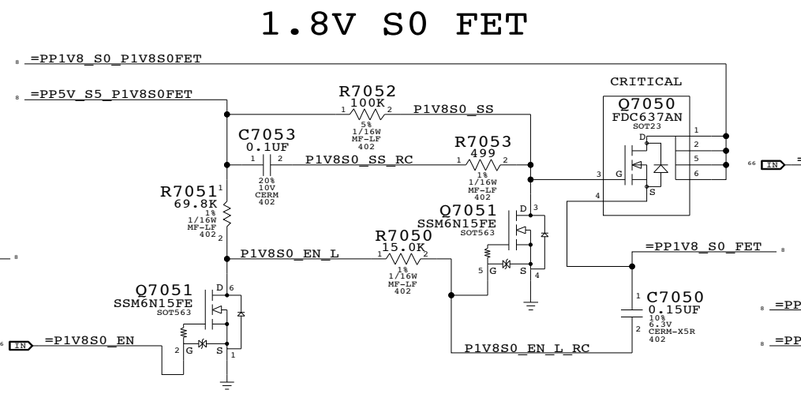
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 57 OF 92	

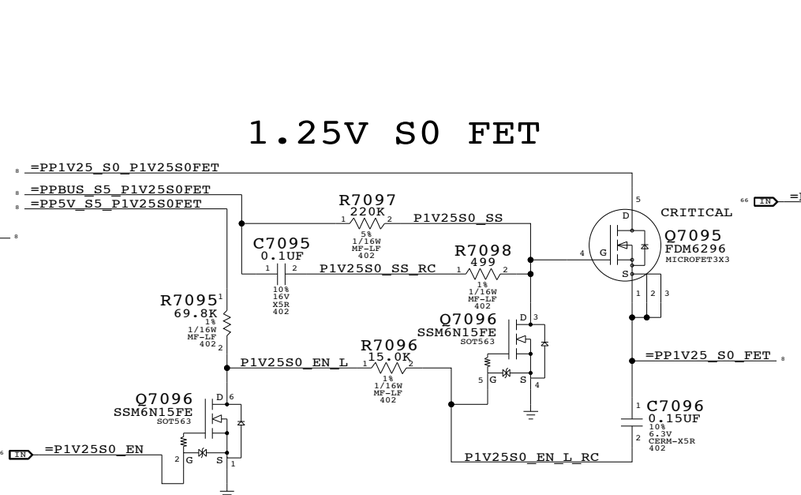


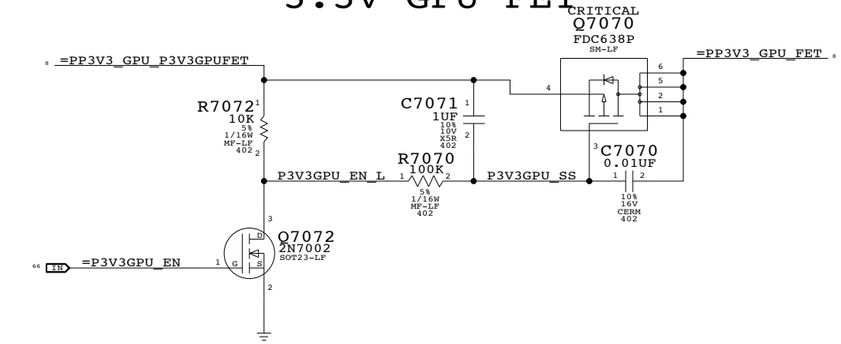


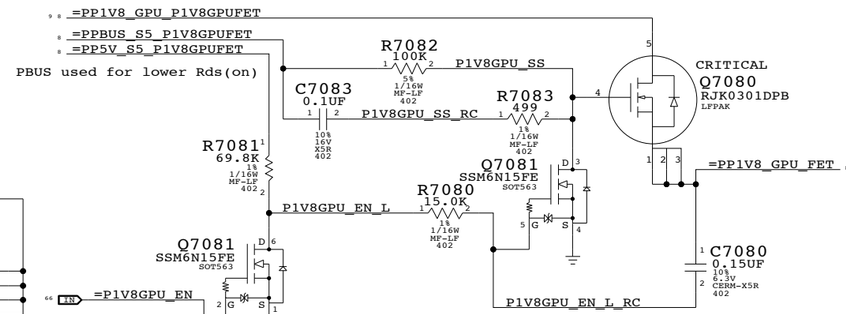


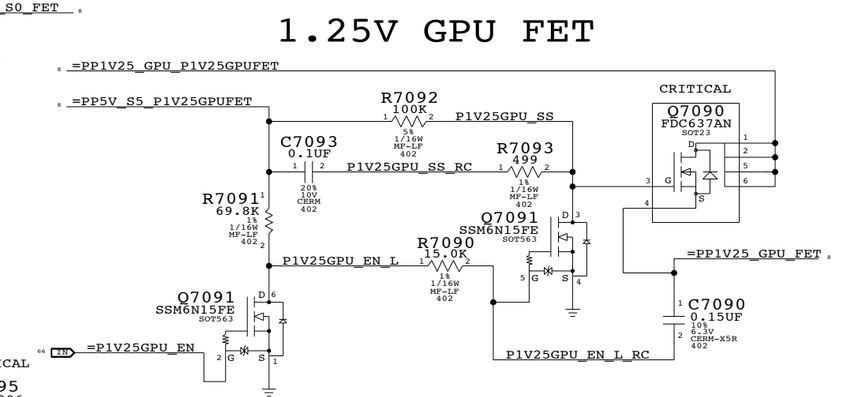












Power FETs

SYNC_MASTER=M75_MLB SYNC_DATE=04/24/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 58 OF 92	

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

These caps are for Q7100

These caps are for Q7102

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

PLACE R7131 CLOSE TO & IN BTW L7100, L7101 & CPU
PLACE IT AWAY FROM THE EDGE OF THE BOARD/FAN
FOR GOOD THERMAL COUPLING

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
152S0624	2	IND,0.36uH,20%,30A,1.2mOhm	L7100,L7101	CRITICAL	

IMVP6 CPU VCore Regulator

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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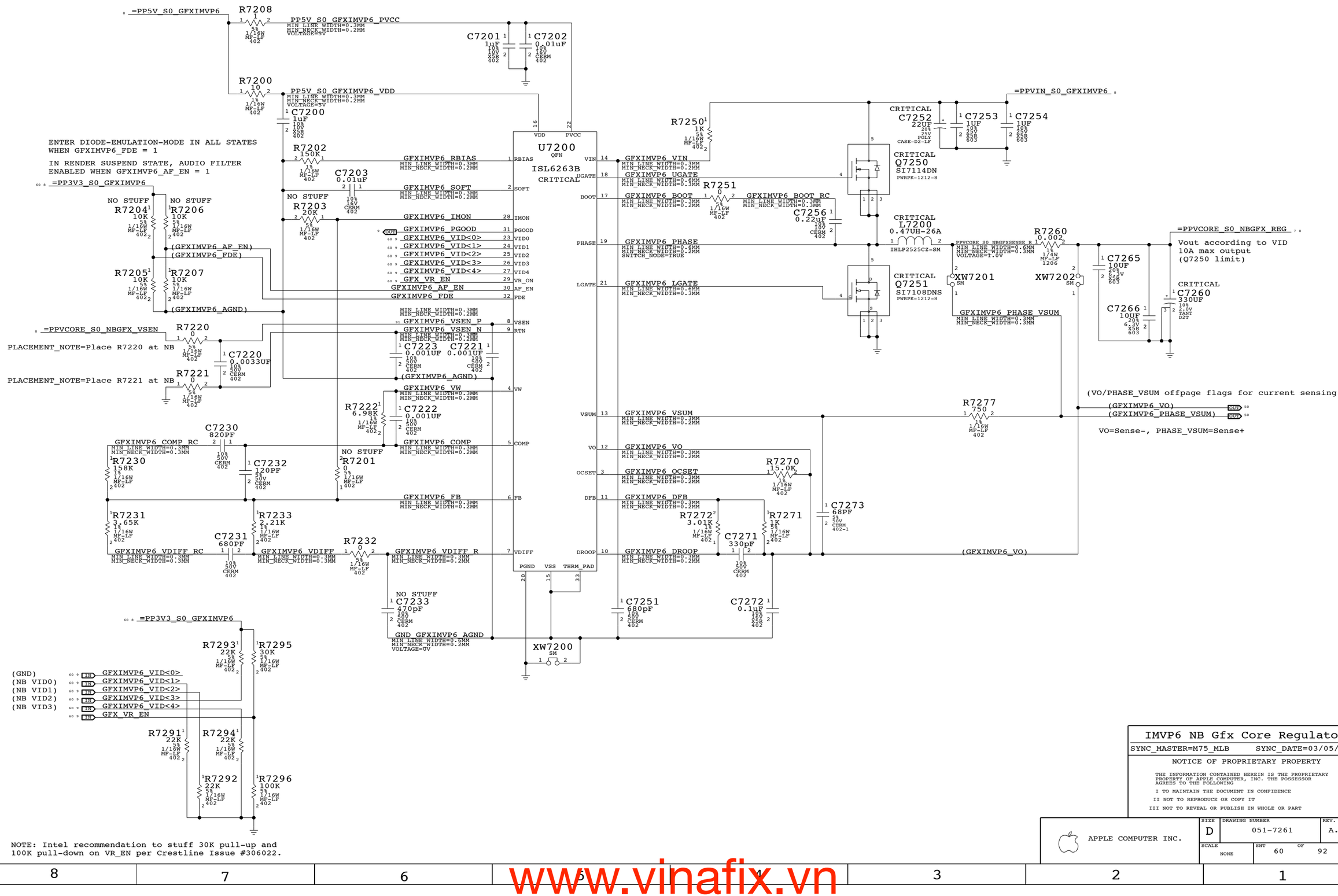
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 59 OF 92	



TPS51120 LDO/Buffer outputs

(Available for system use)

PP2V0_S5_P5VP3V3_BUF — 50uA max load when EN5 & EN3 high

PP5V_S5_P5VP3V3_LDO — 100mA max load when EN5 high

=PPVIN_S5_P5VP3V3

C7300 1UF 10% 25V X5R 603

P5VP3V3_VREG3

C7303 10UF 20% 6.3V X5R 603

C7305 10UF 20% 6.3V X5R 603

=PPVIN_S5_P5VS5

CRITICAL C7340 22UF 20% 25V POLY CASE-D2-LF

C7341 1UF 10% 25V X5R 603

R7306 4.7 5% 1/16W MF-LF 402

C7302 0.001UF 10% 50V CERM 402

PP5V_S5_P5VP3V3_V5FILT

MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V

R7325 4.22K 1% 1/16W MF-LF 402

C7306 1UF 10% 50V X5R 402

=PP5V_S5_REG

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

CRITICAL L7320 2.2UH-14A IHLP2525CZ-SM

CRITICAL C7352 330UF 20% 6.3V POLY D3L

C7350 10UF 20% 10V CERM 805-2

C7351 10UF 20% 10V CERM 805-2

CRITICAL Q7320 SI7114DN PWRPK-1212-8

C7324 0.1UF 10% 50V X7R 603-1

CRITICAL Q7325 SI7108DNS PWRPK-1212-8

XW7320 SM

XW7325 SM

PLACEMENT_NOTE=Place XW7320 next to C7350.

CRITICAL U7300 TPS51120 LLP

SYM (3 OF 3)

32	SKIPSEL	EN5	9
31	TONSEL	EN3	10
28	VBST1	VBST2	13
27	DRVH1	DRVH2	14
26	LL1	LL2	15
25	DRVL1	DRVL2	16
23	CS1	CS2	18
24	PGND1	PGND2	17
1	VO1	VO2	8
3	VFB1	VFB2	6
2	COMP1	COMP2	7
29	EN1	EN2	12
30	PGOOD1	PGOOD2	11
20	V5FILT		
22	VIN		
21	VREG5		
19	VREG3		
4	VREF2		
5	GND	THRML_PAD	33

P5VS5_VBST — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm
P5VS5_DRVH — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, GATE_NODE=TRUE
P5VS5_LL — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, SWITCH_NODE=TRUE
P5VS5_DRVL — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, GATE_NODE=TRUE
P5VS5_CS — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm
GND_P5VS5_PGND — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, VOLTAGE=0V
P5VS5_VO — 5V Fixed

P3V3S5_VBST — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm
P3V3S5_DRVH — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, GATE_NODE=TRUE
P3V3S5_LL — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, SWITCH_NODE=TRUE
P3V3S5_DRVL — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, GATE_NODE=TRUE
P3V3S5_CS — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm
GND_P3V3S5_PGND — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, VOLTAGE=0V
P3V3S5_VO — 3.3V Fixed

XW7300 SM

GND_P5VP3V3_SGND — MIN_LINE_WIDTH=0.6 mm, MIN_NECK_WIDTH=0.2 mm, VOLTAGE=0V

R7365 3.57K 1% 1/16W MF-LF 402

=PPVIN_S5_P3V3S5

CRITICAL C7380 22UF 20% 25V POLY CASE-D2-LF

C7381 1UF 10% 50V X5R 603

C7364 0.1UF 10% 50V X7R 603-1

CRITICAL Q7360 SI7114DN PWRPK-1212-8

=PP3V3_S5_REG

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

CRITICAL L7360 4.7UH IHLP

CRITICAL Q7365 SI7108DNS PWRPK-1212-8

C7390 10UF 20% 6.3V X5R 603

CRITICAL C7392 150UF 20% 6.3V POLY CASE-B2

XW7365 SM

XW7360 SM

PLACEMENT_NOTE=Place XW7360 next to C7390.

=P5VS5_EN
=P5VS5_PGOOD
=P3V3S5_PGOOD
=P3V3S5_EN
=P5VP3V3_EN3
=P5VP3V3_EN5

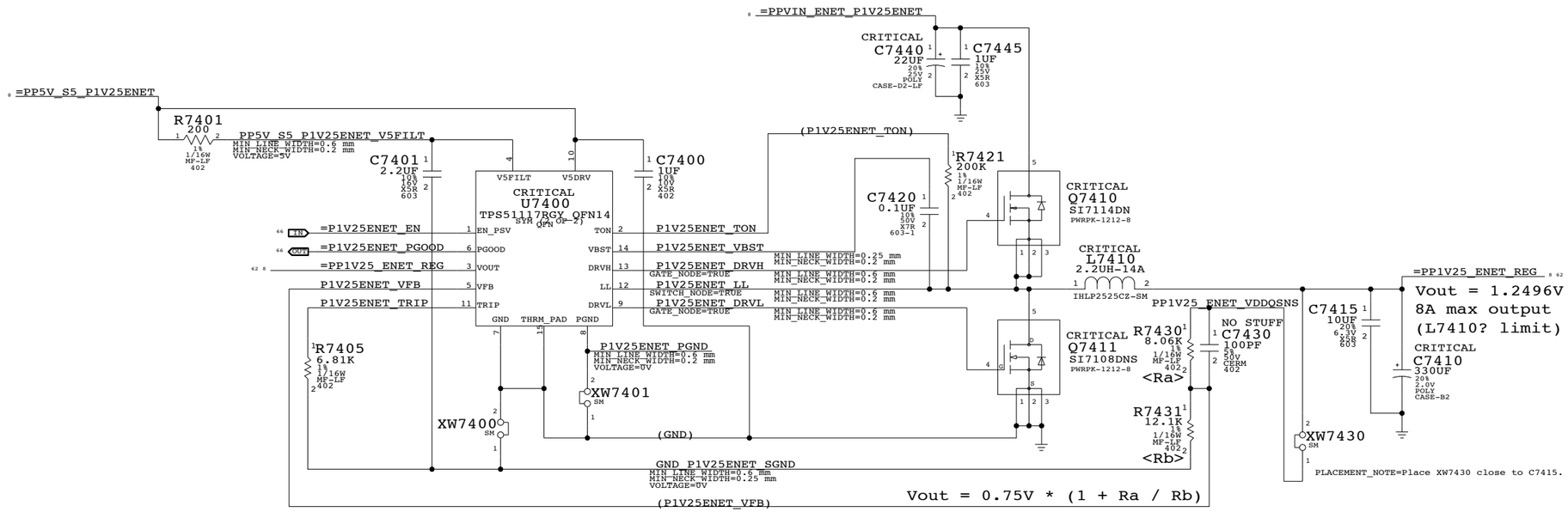
NOTE: EN5 can float or tie to VIN for automatic 5V LDO enable
EN3 can float or tie to VREG5 for automatic 3.3V LDO enable
When both are low TPS51120 VIN current drops from 100-150uA to 10-20uA.

5V / 3.3V Power Supply

SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 61 OF 92	

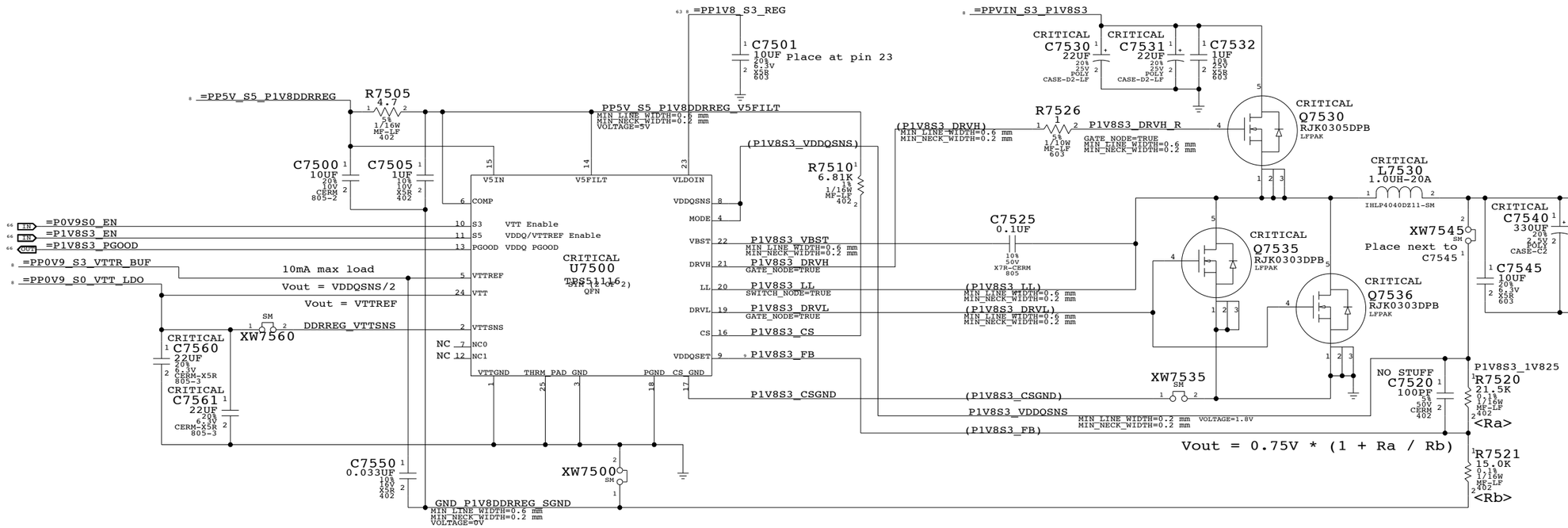


1.25V / 1.05V Power Supply

SYNC_MASTER=M75_MLB SYNC_DATE=03/05/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 62 OF 92	



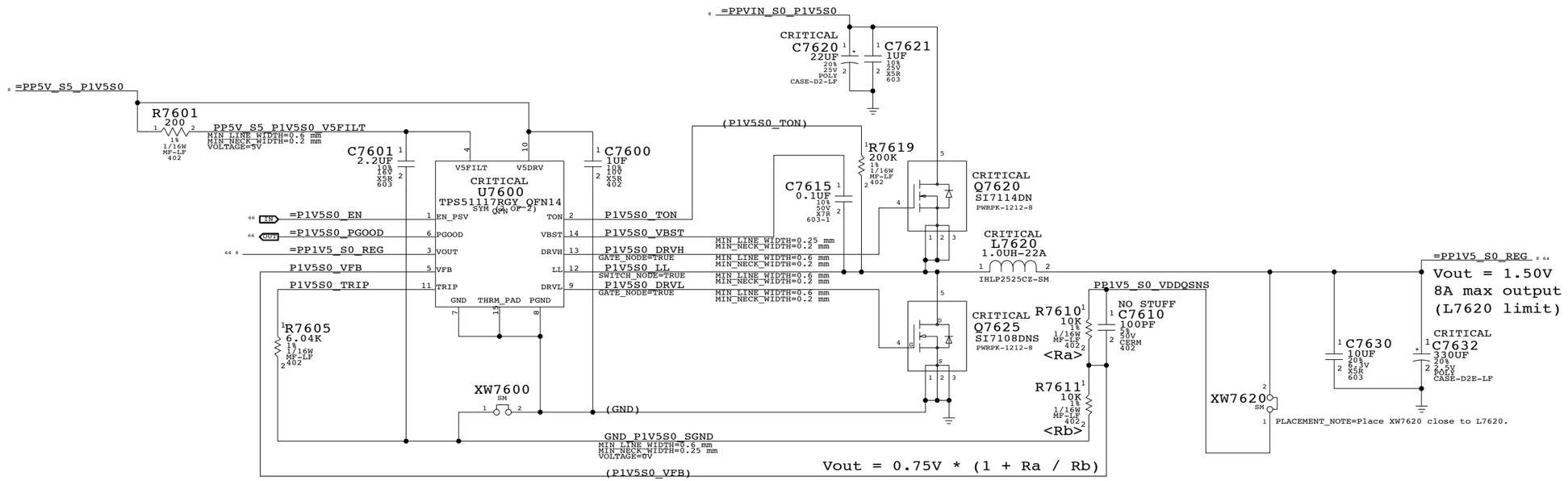
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
103S0192	1	RES,MTL FILM,21K,0.1,0402,SM,LF	R7520	CRITICAL	P1V8S3_1V8

1.8V DDR2 Supply

SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 63 OF 92	



1.5V Power Supply

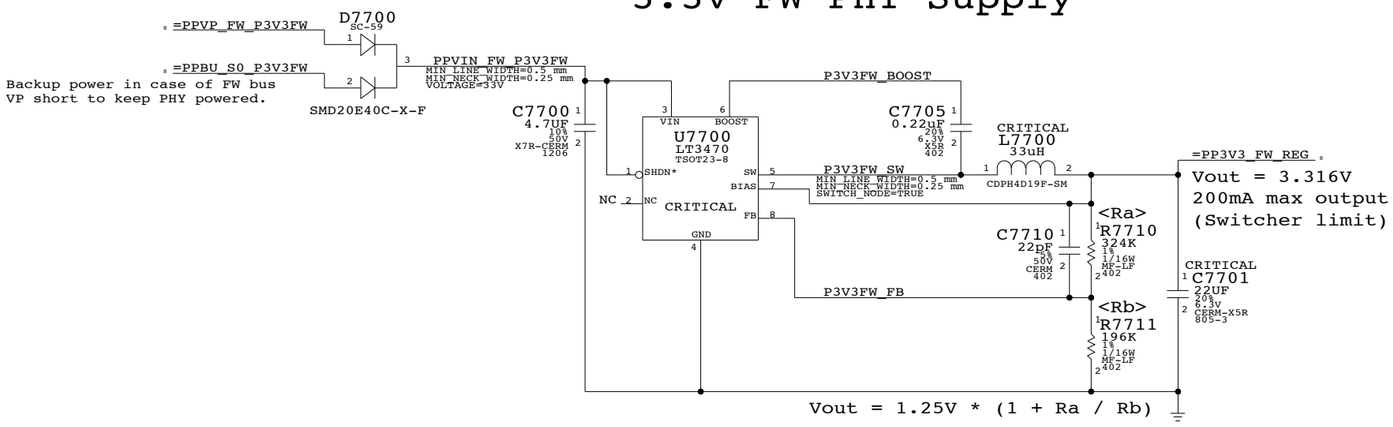
SYNC_MASTER=M75_MLB SYNC_DATE=03/05/2007

APPLE COMPUTER INC.

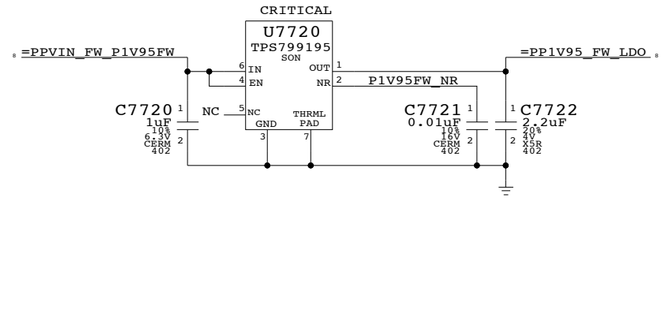
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	64	92

3.3V FW PHY Supply



1.95V FW PHY Supply



FW PHY Power Supplies

SYNC_MASTER=M75_MLB SYNC_DATE=12/04/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	65	92

Power Control Signals

=PP5V_S5_PWRCTL

=PP3V3_GPU_PWRCTL

R7850 10K 5% 1/16W MF-LF 402

R7851 100K 5% 1/16W MF-LF 402

R7852 100K 5% 1/16W MF-LF 402

R7854 10K 5% 1/16W MF-LF 402

=GPUVCORE_PGOOD

Need to ensure that TPS51117 PGOOD does not deassert while GPU VIDs are changing GPU core voltage.

Q7850 2N7002DW-X-F SOT-363

Q7851 2N7002DW-X-F SOT-363

PM_GPUP1V8FET_EN = =P1V8GPU_EN

PM_GPUVCORE_EN = =GPUVCORE_EN

PVCOREGPU_EN_L

Q7851 2N7002DW-X-F SOT-363

Q7851 2N7002DW-X-F SOT-363

G84M GPU requires rails to come up in the following order:
1) 1.2V
2) 3.3V
3) Vcore
4) 1.8V

PM_SLP_S3_LS5V = LIO_S0_EN_L

Q7850 2N7002DW-X-F SOT-363

PM_SLP_S3_L

R7856 100K 5% 1/16W MF-LF 402

(PM_SLP_S3_L)

=P5VS0_EN
=P3V3S0_EN
=P1V8S0_EN
=P1V25S0_EN
=P0V9S0_EN
=PBUSVSENS_EN
=ENET_VMAIN_AVLBL
=PM_SLP_S3_DELAY_L

R7853 10K 5% 1/16W MF-LF 402

EXTGPU_PWR_EN

(EXTGPU_PWR_EN)

=PVCOREGPU_EN
=P3V3GPU_EN
=P1V25GPU_EN

NO STUFF
C7853 0.047UF 10% 16V CERM 402

Fast wake glitch filter. Should not be necessary to stuff if GPU supplies and PGOOD revalidate before 99ms SMC timer expires.

SB GPIO has ability to force all GPU rails off
R7853 acts as pull-up for open-drain GPIO.

PP1V2_GPU needs to ramp first via RC control

PM_ENET_EN

(PM_ENET_EN)

=P3V3ENET_EN
=P1V25ENET_EN

PM_S4_STATE_L

(PM_S4_STATE_L)

=P3V3S3_EN
=P5VS3_EN
=USB_EXTA_EN
LIO_S3_EN

R7857 10K 5% 1/16W MF-LF 402

R7855 10K 5% 1/16W MF-LF 402

P1V8S3_EN = =P1V8S3_EN

C7855 0.47UF 10% 6.3V CERM-X5R 402

=PP3V42_G3H_PWRCTL

NO STUFF

U7858 MC74VHC1G09 SC70

SMC_PM_G2_EN

PM_G2_EN

=P5VS5_EN
=P3V3S5_EN
=P5VP3V3_EN5
=P5VP3V3_EN3

R7858 100K 5% 1/16W MF-LF 402

R7860 0 5% 1/16W MF-LF 402

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

=PPVIN_G3H_P3V42G3H

C7800 10UF 10% 25V X5R 1206-1

U7800 LT3470 TSOT23-8

P3V42G3H5_BOOST

C7805 0.22UF 20% 25V X5R 402

CRITICAL L7810 33UH-0.39A S1024AS-SM

P3V42G3H_SW

MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.25 mm
SWITCH_NODE=TRUE

NC CRITICAL

C7810 22PF 5% 50V CERM 402

<Ra> R7810 348K 1% 1/16W MF-LF 402

<Rb> R7811 200K 1% 1/16W MF-LF 402

P3V42G3H_FB

=PP3V42_G3H_REG

Vout = 3.425
200mA max output
(Switcher limit)

C7815 22UF 20% 6.3V CERM-X5R 805-3

Vout = 1.25V * (1 + Ra / Rb)

Unused PGOOD Signals

=P1V25ENET_PGOOD = TP_P1V25ENET_PGOOD MAKE_BASE=TRUE

=P1V8S3_PGOOD = TP_P1V8S3_PGOOD MAKE_BASE=TRUE

1.5V / 1.05V PWRGD Circuit

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

=PP3V3_S0_PWRCTL

=PP3V3_S5_PWRCTL

U7850 MC74VHC1G09 SC70

PM_SLP_S3_DELAY_L

R7859 10K 5% 1/16W MF-LF 402

NO STUFF
C7859 0.047UF 10% 16V CERM 402

=P1V5S0_EN

=P1V05S0_EN

IMVP6_IMON

To CPU IMVP6

=PP3V3_S5_P1V5P1V05PG

ISL9504A

R7865 100K 5% 1/16W MF-LF 402

R7866 0 5% 1/16W MF-LF 402

=P1V5S0_PGOOD

TPS51117 PGOOD threshold 92.5-97.5% (1.36 - 1.46V)

=P1V05S0_PGOOD

TPS51117 PGOOD threshold 92.5-97.5% (0.98 - 1.02V)

P1V5P1V05S0_PGOOD

=PP3V3_S0_ALLSYSPG

C7880 0.1UF 20% 10V CERM 402

U7880 MC74VHC1G08 SC70

ALL_SYS_PWRGD

NOTE: 0.9V/2.5V is not checked!

Other S0 Rails PWRGD Circuit

Does not include GFX rails

PP5V_S0
PP3V3_S0
PP1V8_S0
PP1V25_S0

R7873 124K 1% 1/16W MF-LF 402

C7872 0.1UF 20% 10V CERM 402

C7871 0.1UF 20% 10V CERM 402

C7870 0.1uF 20% 10V CERM 402

R7875 10K 5% 1/16W MF-LF 402

U7870 CRITICAL LTC2900 DFN

V1 V2 V3 V4 VREF VPG GND THRM_PAD PBR* RST* CRT

NC

S0PGOOD_P1V2_DIV

S0PGOOD_VREF

S0PGOOD_VPG

S0PGOOD_PWROK

S0PGOOD_CRT

R7874 100K 1% 1/16W MF-LF 402

R7870 9.53K 1% 1/16W MF-LF 402

R7871 93.1K 1% 1/16W MF-LF 402

C7873 0.1UF 20% 10V CERM 402

C7875 0.047UF 10% 16V CERM 402

Trst = 4.6ms/nF
Trst = 216ms

LTC2900 typical threshold is 93.5% (4.675V, 3.086V, 1.685V, 1.120V)

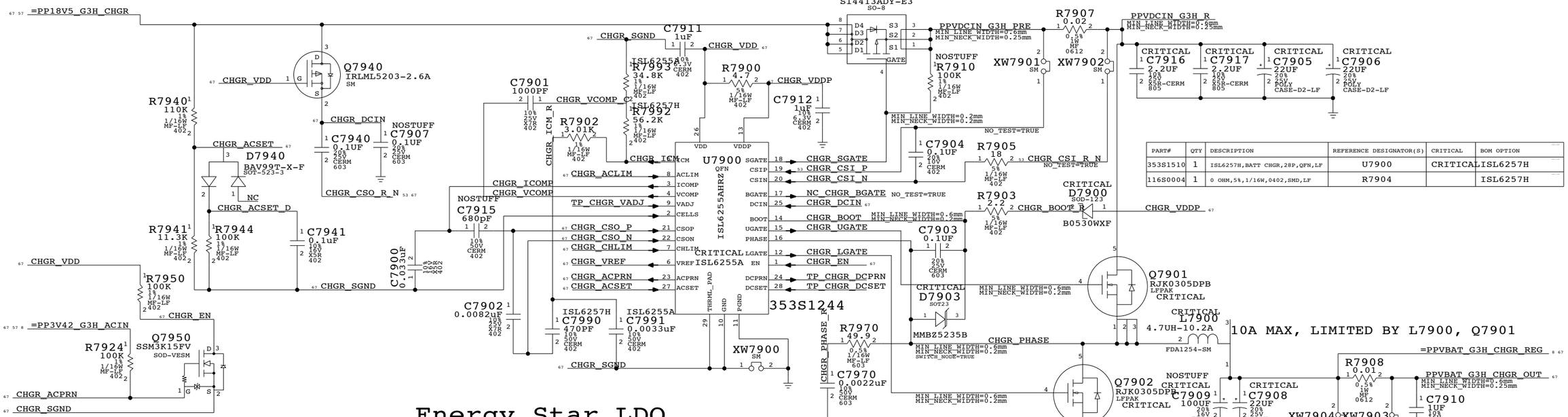
3.425V G3Hot Supply & Power Control

SYNC_MASTER=M75_MLB SYNC_DATE=04/02/2007

APPLE COMPUTER INC.

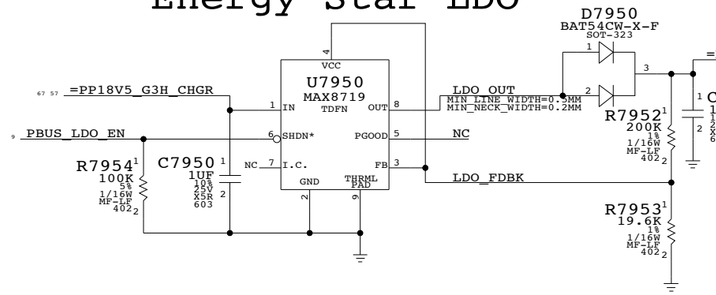
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 66 OF 92	

PBus Supply & Battery Charger

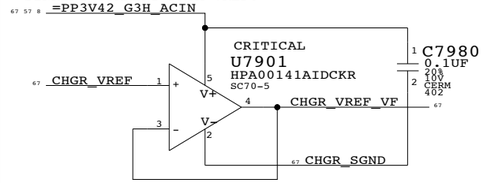


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S1510	1	ISL6257H,BATT CHGR,28P,QFN,LF	U7900	CRITICAL	ISL6257H
116S0004	1	0 OHM,5%,1/16W,0402,SMD,LF	R7904		ISL6257H

Energy Star LDO

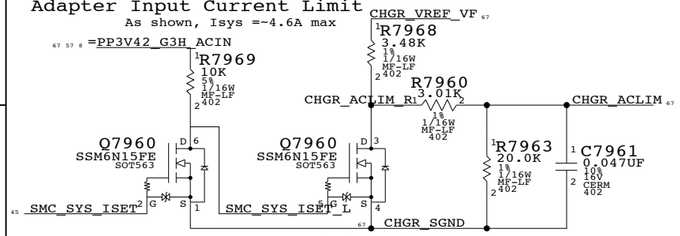


VOLTAGE FOLLOWER GUARANTEES CURRENT LIMIT CIRCUITS ARE PROVIDED WITH SUFFICIENT CURRENT WITHOUT SINKING CURRENT FROM VREF.



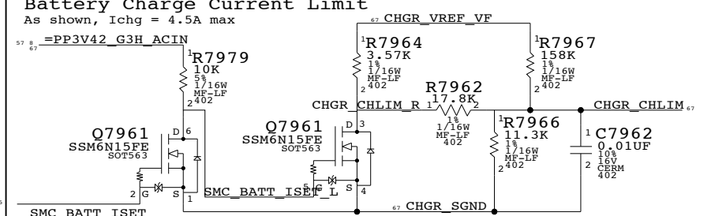
Adapter Input Current Limit

As shown, Isys =~4.6A max

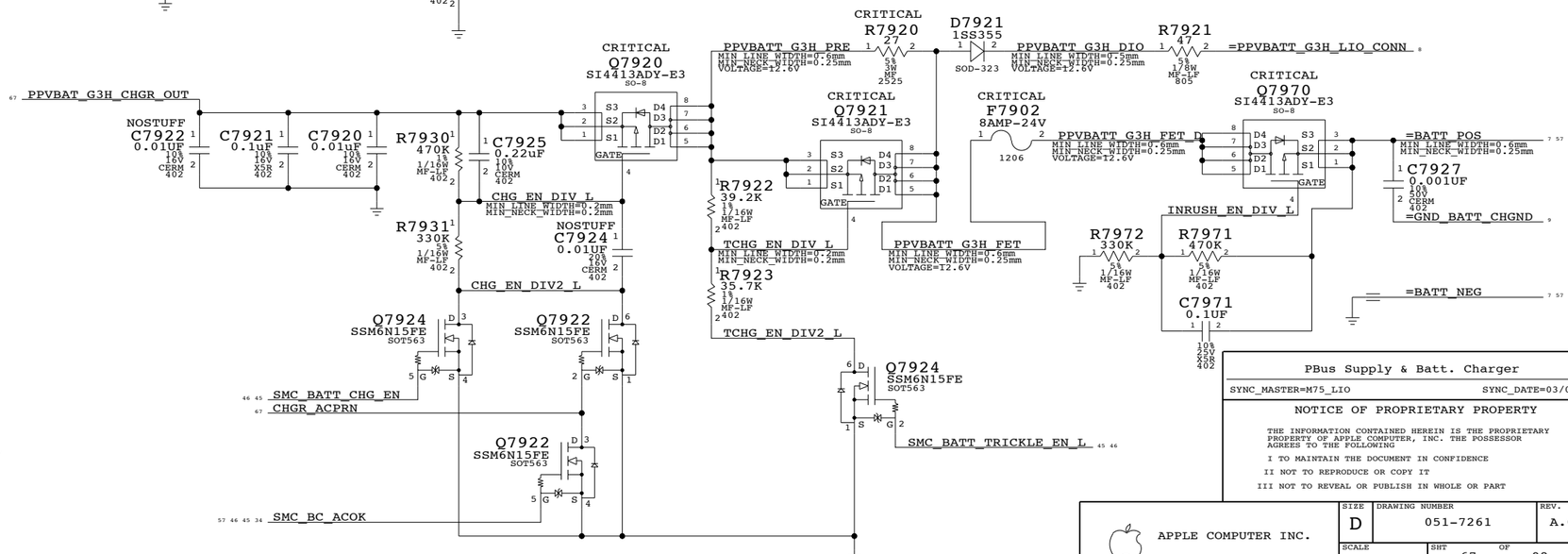


Battery Charge Current Limit

As shown, Ichg = 4.5A max



Battery Charge FETs



PBus Supply & Batt. Charger

SYNC_MASTER=M75_LIO SYNC_DATE=03/08/2007

APPLE COMPUTER INC.

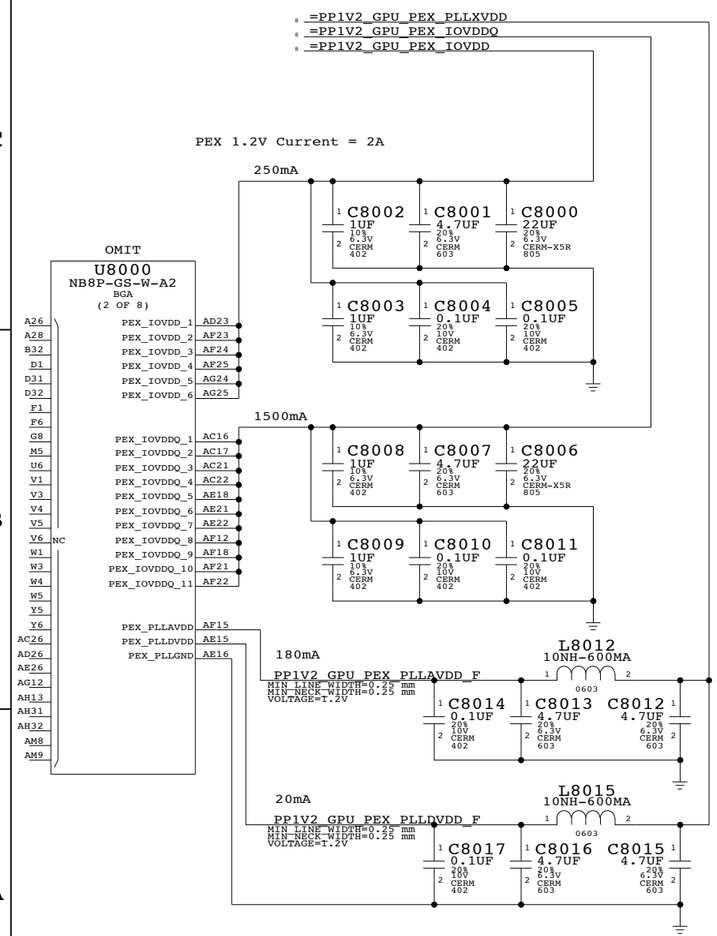
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 67 OF 92	

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)



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

PCI-EXPRESS BUS INTERFACE

PEG_R2D_C_P<0>	C8020 0.1uF	PEG_R2D_P<0>	AK13	PEX_RX0	PEX_TX0	AJ15	PEG_D2R_C_P<0>
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PEG_R2D_C_P<1>	C8022 0.1uF	PEG_R2D_P<1>	AM14	PEX_RX1	PEX_TX1	AH16	PEG_D2R_C_P<1>
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PEG_R2D_C_P<10>	C8040 0.1uF	PEG_R2D_P<10>	AL23	PEX_RX10	PEX_TX10	AG23	PEG_D2R_C_P<10>
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PEG_R2D_C_N<11>	C8043 0.1uF	PEG_R2D_N<11>	AM25	PEX_RX11_L	PEX_TX11_L	AJ24	PEG_D2R_C_N<11>
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PEG_R2D_C_N<12>	C8045 0.1uF	PEG_R2D_N<12>	AK26	PEX_RX12_L	PEX_TX12_L	AH25	PEG_D2R_C_N<12>
PEG_R2D_C_P<13>	C8046 0.1uF	PEG_R2D_P<13>	AL26	PEX_RX13	PEX_TX13	AH26	PEG_D2R_C_P<13>
PEG_R2D_C_N<13>	C8047 0.1uF	PEG_R2D_N<13>	AL27	PEX_RX13_L	PEX_TX13_L	AG26	PEG_D2R_C_N<13>
PEG_R2D_C_P<14>	C8048 0.1uF	PEG_R2D_P<14>	AM27	PEX_RX14	PEX_TX14	AK27	PEG_D2R_C_P<14>
PEG_R2D_C_N<14>	C8049 0.1uF	PEG_R2D_N<14>	AM28	PEX_RX14_L	PEX_TX14_L	AJ27	PEG_D2R_C_N<14>
PEG_R2D_C_P<15>	C8050 0.1uF	PEG_R2D_P<15>	AL28	PEX_RX15	PEX_TX15	AJ28	PEG_D2R_C_P<15>
PEG_R2D_C_N<15>	C8051 0.1uF	PEG_R2D_N<15>	AL29	PEX_RX15_L	PEX_TX15_L	AH27	PEG_D2R_C_N<15>
PEG_CLK100M_GPU_P			AH14	PEX_REFCLK	PEX_TSTCLK_OUT	AM12	TP_GPU_PEXTSTCLK_P
PEG_CLK100M_GPU_N			AJ14	PEX_REFCLK_L	PEX_TSTCLK_OUT_L	AM11	TP_GPU_PEXTSTCLK_N
GPU_RESET_L			AH15	PEX_RST_L			

All C80xx 0.1uF 10% 16V X5R 402

NV G84M PCI-E

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 68 OF 92	

Page Notes

Power aliases required by this page:
- =PPVCORE_GPU
- =PP1V8_GPU_FBVDDQ

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)

=PPVCORE_GPU

???A @ ???/???MHz Core/Mem Clk for VDD

C8100 1UF 10% 6.3V CERM 402
C8101 1UF 10% 6.3V CERM 402
C8102 1UF 10% 6.3V CERM 402
C8103 0.1UF 20% 10V CERM 402
C8104 0.1UF 20% 10V CERM 402
C8105 0.1UF 20% 10V CERM 402
C8106 0.1UF 20% 10V CERM 402
C8107 0.1UF 20% 10V CERM 402
C8108 0.1UF 20% 10V CERM 402
C8109 0.1UF 20% 10V CERM 402
C8110 0.1UF 20% 10V CERM 402
C8111 0.1UF 20% 10V CERM 402
C8112 0.1UF 20% 10V CERM 402
C8113 0.1UF 20% 10V CERM 402
C8114 0.1UF 20% 10V CERM 402
C8115 0.1UF 20% 10V CERM 402
C8116 0.1UF 20% 10V CERM 402
C8117 0.1UF 20% 10V CERM 402
C8118 0.1UF 20% 10V CERM 402
C8119 0.1UF 20% 10V CERM 402
C8120 0.1UF 20% 10V CERM 402
C8121 0.1UF 20% 10V CERM 402
C8122 0.1UF 20% 10V CERM 402

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

K16 K17 N13 N14 N16 N17 N19 P13 P14 P16 P17 P19 R16 R17 T13 T14 T15 T18 T19 U13 U14 U15 U18 U19 V16 V17 W13 W14 W16 W17 W19 Y13 Y14 Y16 Y17 Y19 Y20 — VDD

P20 T20 T23 U20 U23 W20 — VDD_LP

TP_GPU_VDD_SENSE N20 — VDD_SENSE
TP_GPU_GND_SENSE M21 — GND_SENSE

=PP1V8_GPU_FBVDDQ

A12 A18 A21 A24 A27 A3 A30 A6 A9 AA32 AD32 AG32 AK32 C32 F32 J32 M32 R32 — FBVDD

AA25 AA26 AB25 AB26 G11 G12 G15 G18 G21 G22 H11 H12 H15 H18 H21 H22 L25 L26 M25 M26 R25 R26 V25 V26 — FBVDDQ

AA23 AB23 H16 H17 J10 J23 J24 J9 K11 K12 K21 K22 K24 K9 L23 M23 T25 U25 — NC

FBVTT

???A @ ???MHz 1.8V GDDR3

C8150 4.7UF 20% 6.3V CERM 603
C8151 4.7UF 20% 6.3V CERM 603
C8156 0.1UF 20% 10V CERM 402
C8157 0.1UF 20% 10V CERM 402
C8158 0.1UF 20% 10V CERM 402
C8159 0.1UF 20% 10V CERM 402
C8160 0.47UF 10% 6.3V CERM-X5R 402
C8161 0.47UF 10% 6.3V CERM-X5R 402
C8162 0.1UF 20% 10V CERM 402
C8163 0.1UF 20% 10V CERM 402
C8164 0.1UF 20% 10V CERM 402
C8165 0.1UF 20% 10V CERM 402
C8166 0.47UF 10% 6.3V CERM-X5R 402
C8167 0.47UF 10% 6.3V CERM-X5R 402
C8168 0.47UF 10% 6.3V CERM-X5R 402
C8169 0.47UF 10% 6.3V CERM-X5R 402
C8170 0.47UF 10% 6.3V CERM-X5R 402
C8171 0.47UF 10% 6.3V CERM-X5R 402

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

AE17 AE27 AE6 AF11 AF26 AF29 AF4 AF7 AG10 AG11 AB27 AB6 AC10 AC23 AC29 AC4 AD16 AD17 AD2 AD31 AA12 AA2 AA21 AA31 AG13 AG14 AG15 AG19 AG2 AG22 AG31 AG8 AH24 AJ10 AJ13 AJ16 AJ17 AJ20 — GND
AJ23 AJ26 AJ29 AJ4 AJ7 AK2 AK28 AK31 AL10 AL11 AL14 AL19 AL22 AL25 AL3 AL6 AL9 AM10 AM13 AM16 AM17 AM20 AM23 AM26 AM29 B12 B15 B18 B21 B24 B27 B3 B30 B6 B9 C2 C31 D10 D13

D16 D17 D20 D23 D26 D29 D4 D7 F11 F14 F19 F2 F22 F25 F31 F8 G26 G29 G4 G7 H27 H6 J16 J17 J2 J31 K10 K23 K29 K4 L27 L6 M12 M2 M31 N15 N18 N29 — GND
N4 P15 P18 P27 P6 R13 R14 R15 R18 R19 R2 R20 R31 T16 T17 T24 T29 T4 U16 U17 U24 U29 U8 V13 V14 V15 V18 V19 V2 V20 V31 W15 W18 W27 W6 Y15 Y18 Y29 Y4

NV G84M Core/FB Power

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
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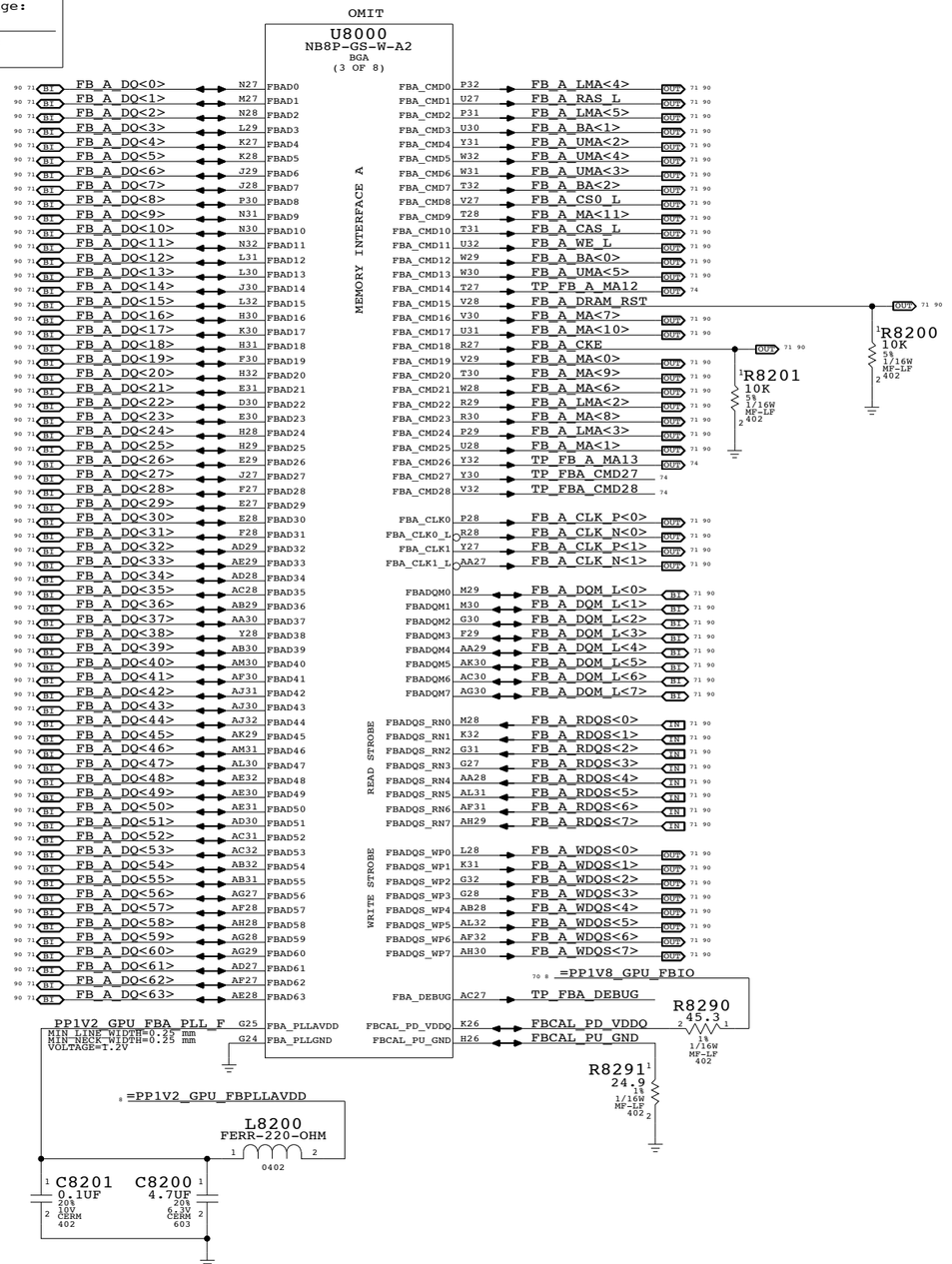
SCALE: NONE SHT 69 OF 92

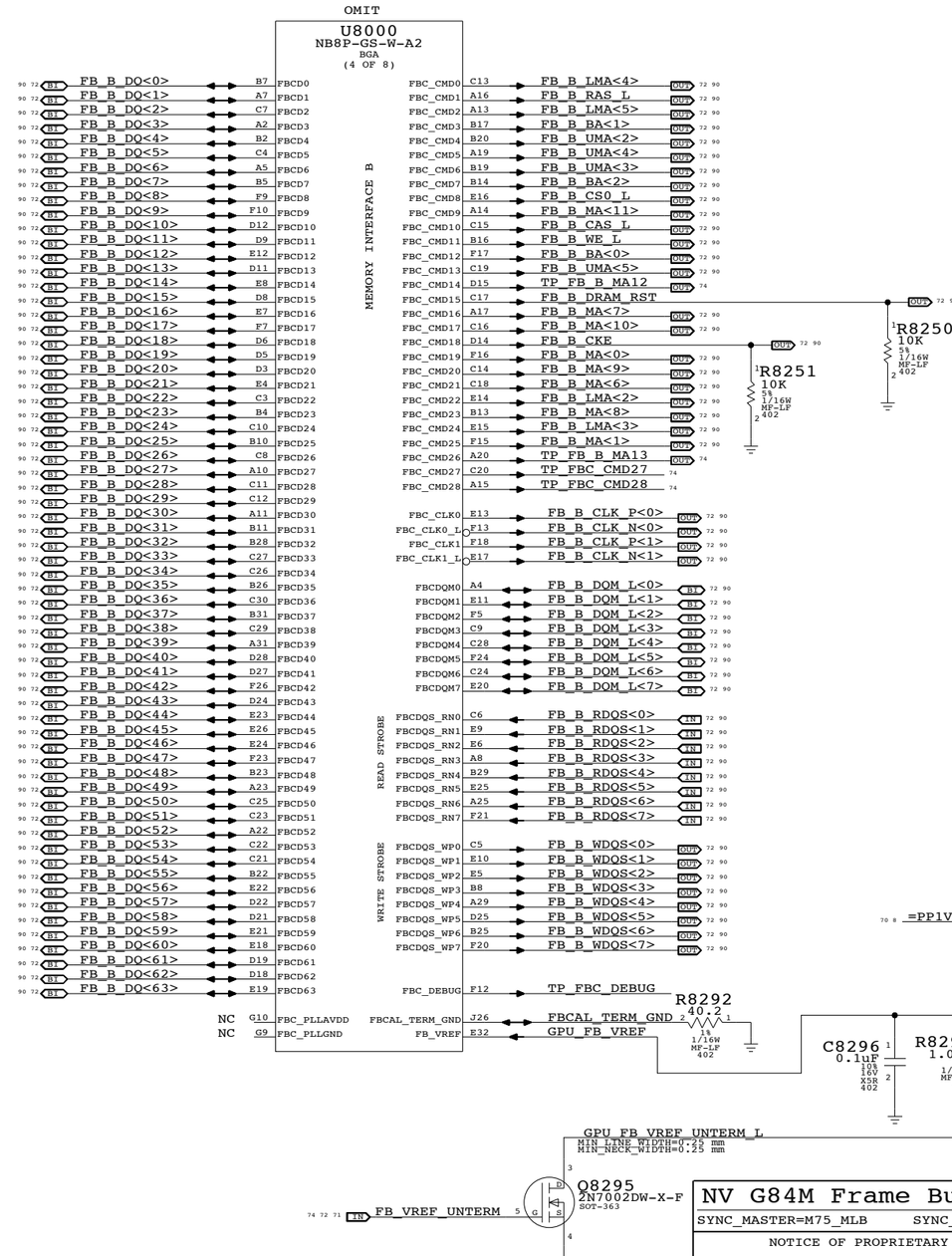
Page Notes

Power aliases required by this page:
- =PP1V2_GPU_FBPLLAVDD
- =PP1V8_GPU_FBIO

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)





NV G84M Frame Buffer I/F

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 70 OF 92	

Page Notes

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)

=PP1V8_GPU_FB_VDD

=PP1V8_GPU_FB_VDDQ

C8400 C8401 C8402 C8403 C8404 C8410 C8415 — 22UF 20% 6.3V CERM-X5R 805; 0.1uF 10% 16V X5R 402

Connect to designated pin, then GND

U8400.J1 U8400.J12

C8420 C8421 C8422 C8423 C8424 C8425 C8426 — 22UF 20% 6.3V CERM-X5R 805; 0.1uF 10% 16V X5R 402

R8430 2.37K 1% 1/16W MF-LF 402

R8431 5.49K 1% 1/16W MF-LF 402

R8432 2.21K 1% 1/16W MF-LF 402

FB_A0_VREF
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm

C8431 C8433 — 0.0047uF 10% 16V CERM 402

FB_A0_VREF_UNTERM_L
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm

FB_A_CLK0_TERM

R8440 1K 5% 1/16W MF-LF 402

R8442 121 1% 1/16W MF-LF 402

R8444 121 1% 1/16W MF-LF 402

R8446 121 1% 1/16W MF-LF 402

C8446 0.01UF 10% 16V CERM 402

FB_VREF_UNTERM

Q8400 2N7002DW-X-F SOT-363

R8443 R8445 R8447 — 121 1% 1/16W MF-LF 402

CRITICAL
OMIT

U8400 FBGA (2 OF 2) 16MX32-GDDR3-500MHZ K4J52324QC-BC20

MFHIGH

FB_A_MA<0>
FB_A_MA<1>
FB_A_MA<2>
FB_A_MA<3>
FB_A_MA<4>
FB_A_MA<5>
FB_A_MA<6>
FB_A_MA<7>
FB_A_MA<8>
FB_A_MA<9>
FB_A_MA<10>
FB_A_MA<11>

MFHIGH

FB_A_CKE
FB_A_CLK_P<0>
FB_A_CLK_N<0>
FB_A_CS0_L
FB_A_WE_L
FB_A_CAS_L
FB_A_RAS_L

MFHIGH

FB_A0_ZQ
FB_A0_MF
FB_A0_SEN

FB_A_DRAM_RST

FB_A_RDQS<0>
FB_A_RDQS<1>
FB_A_RDQS<2>
FB_A_RDQS<3>

FB_A_WDQS<0>
FB_A_WDQS<1>
FB_A_WDQS<2>
FB_A_WDQS<3>

FB_A_BA<0>
FB_A_BA<1>
FB_A_BA<2>

MFHIGH

NC NC

R8448 243 1% 1/16W MF-LF 402

R8449 100 5% 1/16W MF-LF 402

FB_A_DQM_L<0>
FB_A_DQM_L<1>
FB_A_DQM_L<2>
FB_A_DQM_L<3>

FB_A_DQ<0>
FB_A_DQ<1>
FB_A_DQ<2>
FB_A_DQ<3>
FB_A_DQ<4>
FB_A_DQ<5>
FB_A_DQ<6>
FB_A_DQ<7>
FB_A_DQ<8>
FB_A_DQ<9>
FB_A_DQ<10>
FB_A_DQ<11>
FB_A_DQ<12>
FB_A_DQ<13>
FB_A_DQ<14>
FB_A_DQ<15>
FB_A_DQ<16>
FB_A_DQ<17>
FB_A_DQ<18>
FB_A_DQ<19>
FB_A_DQ<20>
FB_A_DQ<21>
FB_A_DQ<22>
FB_A_DQ<23>
FB_A_DQ<24>
FB_A_DQ<25>
FB_A_DQ<26>
FB_A_DQ<27>
FB_A_DQ<28>
FB_A_DQ<29>
FB_A_DQ<30>
FB_A_DQ<31>

C8450 C8451 C8452 C8453 C8454 C8460 C8465 — 22UF 20% 6.3V CERM-X5R 805; 0.1uF 10% 16V X5R 402

Connect to designated pin, then GND

U8400.J1 U8400.J12

C8470 C8471 C8472 C8473 C8474 C8475 C8476 — 22UF 20% 6.3V CERM-X5R 805; 0.1uF 10% 16V X5R 402

R8480 2.37K 1% 1/16W MF-LF 402

R8481 5.49K 1% 1/16W MF-LF 402

R8482 2.21K 1% 1/16W MF-LF 402

FB_A1_VREF
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm

C8481 C8483 — 0.0047uF 10% 16V CERM 402

FB_A1_VREF_UNTERM_L
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm

FB_A_CLK1_TERM

R8490 1K 5% 1/16W MF-LF 402

R8492 121 1% 1/16W MF-LF 402

R8494 121 1% 1/16W MF-LF 402

R8496 121 1% 1/16W MF-LF 402

C8496 0.01UF 10% 16V CERM 402

FB_VREF_UNTERM

Q8400 2N7002DW-X-F SOT-363

R8493 R8495 R8497 — 121 1% 1/16W MF-LF 402

CRITICAL
OMIT

U8450 FBGA (1 OF 2) 16MX32-GDDR3-500MHZ K4J52324QC-BC20

MFHIGH

FB_A_MA<0>
FB_A_MA<1>
FB_A_MA<2>
FB_A_MA<3>
FB_A_MA<4>
FB_A_MA<5>
FB_A_MA<6>
FB_A_MA<7>
FB_A_MA<8>
FB_A_MA<9>
FB_A_MA<10>
FB_A_MA<11>

MFHIGH

FB_A_CKE
FB_A_CLK_P<1>
FB_A_CLK_N<1>
FB_A_CS0_L
FB_A_WE_L
FB_A_CAS_L
FB_A_RAS_L

MFHIGH

FB_A1_ZQ
FB_A1_MF
FB_A1_SEN

FB_A_DRAM_RST

FB_A_RDQS<7>
FB_A_RDQS<5>
FB_A_RDQS<6>
FB_A_RDQS<4>

FB_A_WDQS<7>
FB_A_WDQS<5>
FB_A_WDQS<6>
FB_A_WDQS<4>

FB_A_BA<0>
FB_A_BA<1>
FB_A_BA<2>

MFHIGH

NC NC

R8498 243 1% 1/16W MF-LF 402

R8499 100 5% 1/16W MF-LF 402

FB_A_DQM_L<7>
FB_A_DQM_L<5>
FB_A_DQM_L<6>
FB_A_DQM_L<4>

FB_A_DQ<62>
FB_A_DQ<56>
FB_A_DQ<58>
FB_A_DQ<59>
FB_A_DQ<57>
FB_A_DQ<63>
FB_A_DQ<60>
FB_A_DQ<61>
FB_A_DQ<40>
FB_A_DQ<47>
FB_A_DQ<46>
FB_A_DQ<45>
FB_A_DQ<42>
FB_A_DQ<44>
FB_A_DQ<41>
FB_A_DQ<43>
FB_A_DQ<50>
FB_A_DQ<48>
FB_A_DQ<52>
FB_A_DQ<51>
FB_A_DQ<55>
FB_A_DQ<49>
FB_A_DQ<54>
FB_A_DQ<53>
FB_A_DQ<34>
FB_A_DQ<33>
FB_A_DQ<35>
FB_A_DQ<32>
FB_A_DQ<36>
FB_A_DQ<37>
FB_A_DQ<39>
FB_A_DQ<38>

GDDR3 Frame Buffer A

SYNC_MASTER=M75_MLB SYNC_DATE=04/02/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 71 OF 92	

Page Notes

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)

=PP1V8_GPU_FB_VDD

=PP1V8_GPU_FB_VDDQ

Connect to designated pin, then GND

U8500 FBGA (2 OF 2) 16MX32-GDDR3-500MHZ K4J52324QC-BC20

U8550 FBGA (1 OF 2) 16MX32-GDDR3-500MHZ K4J52324QC-BC20

FB_B0_VREF MIN_LINE_WIDTH=0.25 mm MIN_NECK_WIDTH=0.25 mm

FB_B1_VREF MIN_LINE_WIDTH=0.25 mm MIN_NECK_WIDTH=0.25 mm

FB_B0_VREF_UNTERM_L MIN_LINE_WIDTH=0.25 mm MIN_NECK_WIDTH=0.25 mm

FB_B1_VREF_UNTERM_L MIN_LINE_WIDTH=0.25 mm MIN_NECK_WIDTH=0.25 mm

FB_B_CLK0_TERM

FB_B_CLK1_TERM

FB_VREF_UNTERM

Q8500 2N7002DW-X-F SOT-363

CRITICAL OMIT

FB_B0_ZQ FB_B0_MF FB_B0_SEN

FB_B1_ZQ FB_B1_MF FB_B1_SEN

GDDR3 Frame Buffer B

SYNC_MASTER=M75_MLB SYNC_DATE=04/02/2007

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APPLE COMPUTER INC.

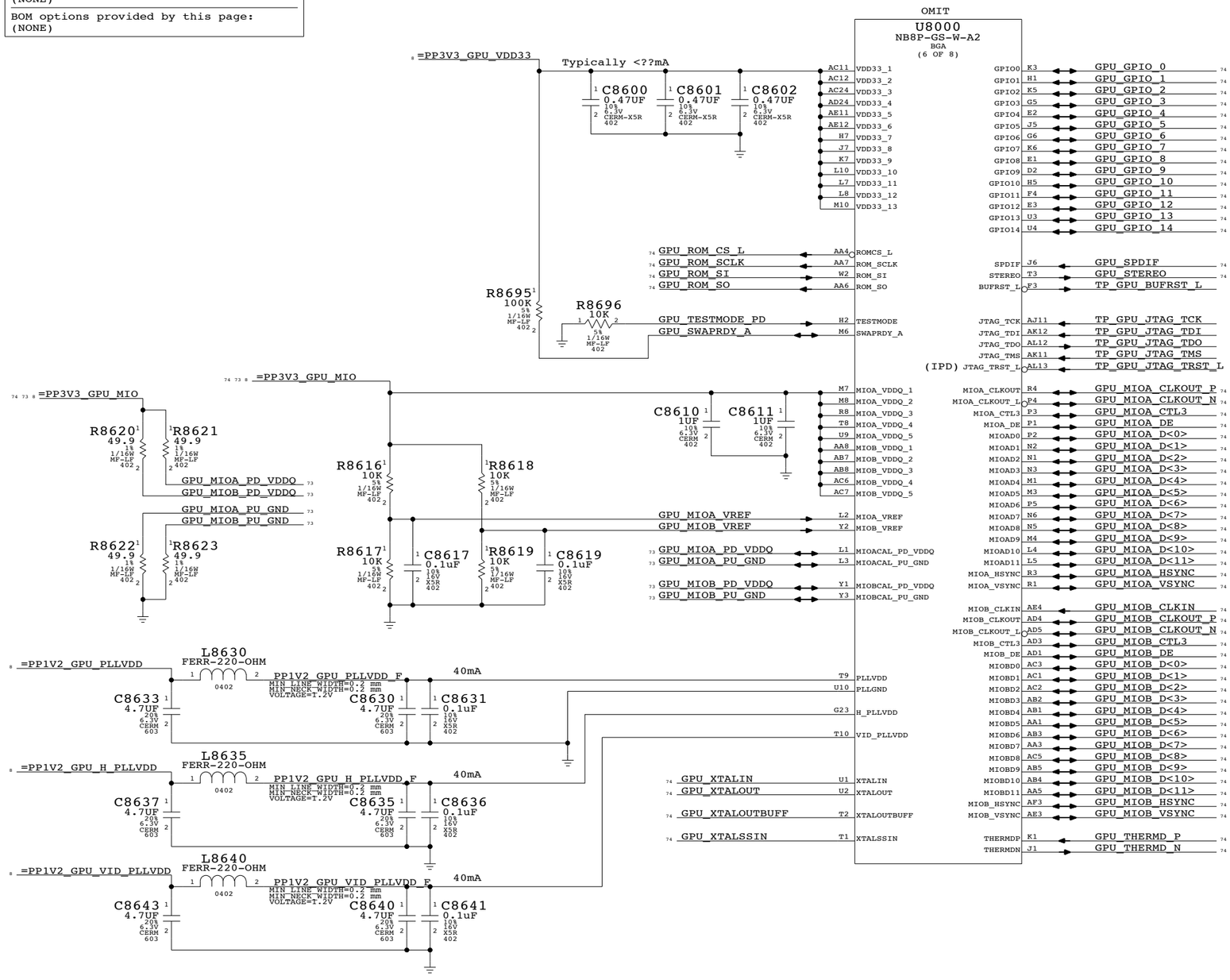
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 72 OF 92	

Page Notes

Power aliases required by this page:
- =PP3V3_GPU_VDD33
- =PP3V3_GPI_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=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 73 OF 92	

GPIOs

	Native Func		
GPU_GPIO_0	HPD0	GPU_HPD	IN 78
GPU_GPIO_1	HPD1	NC_GPU_GPIO_1	
GPU_GPIO_2	LCD0_BL_PWM	GPU_BL_PWM	OUT 79
GPU_GPIO_3	LCD0_VDD	GPU_PANEL_EN	OUT 79
GPU_GPIO_4	LCD0_BL_EN	GPU_BKLT_EN	OUT 79
GPU_GPIO_5	VID0	GPU_VCORE_VID0	OUT 76
GPU_GPIO_6	VID1	GPU_VCORE_VID1	OUT 76
GPU_GPIO_7	MEM_VID	GPU_VGA_EN_L	74
GPU_GPIO_8	THERM	NC_GPU_GPIO_8	
GPU_GPIO_9	FAN_PWM	TP_GPU_GSTATE<0>	
GPU_GPIO_10	MEM_VREF	FB_VREF_UNTERM	OUT 70 71 72
GPU_GPIO_11	SLI_SYNC	GPU_VCORE_VID2	OUT 76
GPU_GPIO_12	AC_DET	TP_GPU_GSTATE<1>	
GPU_GPIO_13	PWR_CTL0	GPU_VCORE_PWRCTL0	OUT 76
GPU_GPIO_14	PWR_CTL1	GPU_VCORE_PWRCTL1	OUT 76

Config Straps

74 73 8 =PP3V3_GPU_MIO

	VRAM_SAMSUNG	VRAM_128	NO STUFF		NO STUFF	NO STUFF	NO STUFF	NO STUFF
	R8720[1] 10K	R8722[1] 10K	R8724[1] 10K	R8726[1] 10K	R8728[1] 1K	R8729[1] 1K	R8730[1] 1K	R8731[1] 1K	R8732[1] 1K
Supported straps:									
RAMCFG0	GPU_MIOB_D<0>								
RAMCFG1		GPU_MIOB_D<1>							
RAMCFG2			GPU_MIOB_D<8>						
RAMCFG3				GPU_MIOB_D<9>					
3GIO_PADCFG0					GPU_MIOA_D<6>				
3GIO_PADCFG1						GPU_MIOA_D<8>			
3GIO_PADCFG2							GPU_MIOA_D<9>		
3GIO_PADCFG3								GPU_MIOB_HSYNC	
PEX_PLL_EN_TERM									GPU_MIOA_D<0>
SUBVENDOR (BIOS ROM PRESENT)									GPU_MIOA_D<1>

	VRAM_HYNIX	NO STUFF	VRAM_256		
	R8721[1] 10K	R8723[1] 10K	R8725[1] 10K	R8727[1] 10K	R8733[1] 1K
PCI_DEVID3					
PCI_DEVID0					

74 73 8 =PP3V3_GPU_MIO

	NO STUFF			
	R8734[1] 1K	R8735[1] 1K	R8736[1] 1K	R8737[1] 1K
PCI_DEVID3	GPU_MIOB_D<11>	GPU_MIOB_D<3>		
PCI_DEVID0	GPU_MIOB_D<5>	GPU_MIOB_D<4>		

Straps not supported:

USER<3..0>	MIOA_D<5..2>
ROMTYPE<1..0>	MIOB_VSYNC, MIOB_D<10>
SLOT_CLOCK_CFG	MIOA_HSYNC
PCI_IOBAR	MIOB_D<7>
BAR2_SIZE	MIOB_DE
PCI_DEVID<4>	MIOB_CTL3, MIOB_D<3,5>

Analog Video Mux

8 =PP3V3_GPU_VIDEOMUX

C8700 0.1UF 20% 10V CERM 402

CRITICAL OMIT

U8700 TS3V330 QFN16

GPU_VGA_R	S1A	DA	GPU_TV_C_VGA_R OUT 78 90
GPU_VGA_G	S2A	DB	GPU_TV_Y_VGA_G OUT 78 90
GPU_VGA_B	S1B	DC	GPU_TV_COMP_VGA_B OUT 78 90
	S2B	DD	NC
	S1C	IN	GPU_VGA_EN_L 74
GPU_TV_C	S2C	EN_L	
GPU_TV_Y	S1D		
GPU_TV_COMP	S2D		
	THRML PAD	GND	

Place Rs near GPU

R8740[1] 150 1% 1/16W MF-LF 402	R8741[1] 150 1% 1/16W MF-LF 402	R8742[1] 150 1% 1/16W MF-LF 402
R8743[1] 150 1% 1/16W MF-LF 402	R8744[1] 150 1% 1/16W MF-LF 402	R8745[1] 150 1% 1/16W MF-LF 402

R8700[1] 10K 5% 1/16W MF-LF 402

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S1718	1	IC,TS3V340,QUAD VIDEO SW,QFN16	U8700	CRITICAL	

PART NUMBER	IS ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
353S1579	353S1718		ALL (U8700)	TS3V330 alt to TS3V340

Renamed signals

90 30 GPU_CLK27M_GATED	=	GPU_XTALIN 73
90 30 GPU_CLK27M_SS_GATED	=	GPU_XTALSSIN 73 74
91 51 GPU_TDIODE_P	=	GPU_THERMD_P 73
51 GPU_TDIODE_N	=	GPU_THERMD_N 73
78 GPU_DVI_DDC_CLK	=	GPU_I2CB_SCL 75
78 GPU_DVI_DDC_DATA	=	GPU_I2CB_SDA 75
79 GPU_PANEL_DDC_CLK	=	GPU_I2CC_SCL 75
79 GPU_PANEL_DDC_DATA	=	GPU_I2CC_SDA 75

Unused I2C Buses

NC_GPU_I2CA_SCL	=	GPU_I2CA_SCL 75
NC_GPU_I2CA_SDA	=	GPU_I2CA_SDA 75

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

HDCP Support

8 =PP3V3_GPU_HDCP

HDCP R8770[1] 10K 5% 1/16W MF-LF 402

HDCP C8770 0.1UF 20% 10V CERM 402

HDCP CRITICAL

U8770 AT88SC080C SOI

BI 75 GPU_I2CH_SCL	6	SCL	NC 7
BI 75 GPU_I2CH_SDA	5	SDA	
	3	NC	
	2	NC	NC 1
	4	GND	

HDCP R8771[1] 10K 5% 1/16W MF-LF 402

TMDS Backdrive Protection

CRITICAL Q8790 SI2305DS SOT-23

8 =PP3V3_GPU_TMDS — =PP3V3_GPU_TMDS_FET 8

R8790[1] 10K 5% 1/16W MF-LF 402

GPU_TMDS_PWREN_L

Q8925 2N7002DW-X-F SOT-363

76 66 EN =GPUVCORE_EN

R8791[1] 100K 5% 1/16W MF-LF 402

Unused signals

NC_GPU_XTALOUT	=	GPU_XTALOUT 73
NC_GPU_SPDIF	=	GPU_SPDIF 73
NC_GPU_STEREO	=	GPU_STEREO 73
NC_FB_A_MA12	=	TP_FB_A_MA12 70
NC_FB_B_MA12	=	TP_FB_B_MA12 70
NC_FB_A_MA13	=	TP_FB_A_MA13 70
NC_FB_B_MA13	=	TP_FB_B_MA13 70
NC_FBA_CMD27	=	TP_FBA_CMD27 70
NC_FBC_CMD27	=	TP_FBC_CMD27 70
NC_FBA_CMD28	=	TP_FBA_CMD28 70
NC_FBC_CMD28	=	TP_FBC_CMD28 70
NC_GPU_ROM_CS_L	=	GPU_ROM_CS_L 73
NC_GPU_ROM_SCLK	=	GPU_ROM_SCLK 73
NC_GPU_ROM_SI	=	GPU_ROM_SI 73
NC_GPU_ROM_SO	=	GPU_ROM_SO 73
NC_GPU_CSYNC	=	GPU_CSYNC 75
NC_GPU_R2	=	GPU_R2 75
NC_GPU_G2	=	GPU_G2 75
NC_GPU_B2	=	GPU_B2 75
NC_GPU_H2SYNC	=	GPU_H2SYNC 75
NC_GPU_V2SYNC	=	GPU_V2SYNC 75
NC_LVDS_U_DATAP<3>	=	LVDS_U_DATA_P<3> 75 90
NC_LVDS_U_DATAN<3>	=	LVDS_U_DATA_N<3> 75 90
NC_LVDS_L_DATAP<3>	=	LVDS_L_DATA_P<3> 75 90
NC_LVDS_L_DATAN<3>	=	LVDS_L_DATA_N<3> 75 90
TP_GPU_MIOA_CLKOUT_P	=	GPU_MIOA_CLKOUT_P 73
TP_GPU_MIOA_CLKOUT_N	=	GPU_MIOA_CLKOUT_N 73
TP_GPU_MIOA_CTL3	=	GPU_MIOA_CTL3 73
TP_GPU_MIOA_DE	=	GPU_MIOA_DE 73
TP_GPU_MIOA_D<5..2>	=	GPU_MIOA_D<5..2> 73
TP_GPU_MIOA_D<7>	=	GPU_MIOA_D<7> 73
TP_GPU_MIOA_D<11..10>	=	GPU_MIOA_D<11..10> 73
TP_GPU_MIOA_HSYNC	=	GPU_MIOA_HSYNC 73
TP_GPU_MIOA_VSYNC	=	GPU_MIOA_VSYNC 73
7 TP_GPU_MIOB_CLKIN	=	GPU_MIOB_CLKIN 73
7 TP_GPU_MIOB_CLKOUT_P	=	GPU_MIOB_CLKOUT_P 73
TP_GPU_MIOB_CLKOUT_N	=	GPU_MIOB_CLKOUT_N 73
7 TP_GPU_MIOB_CTL3	=	GPU_MIOB_CTL3 73
TP_GPU_MIOB_DE	=	GPU_MIOB_DE 73
TP_GPU_MIOB_D<2>	=	GPU_MIOB_D<2> 73
TP_GPU_MIOB_D<7..6>	=	GPU_MIOB_D<7..6> 73
TP_GPU_MIOB_D<10>	=	GPU_MIOB_D<10> 73
TP_GPU_MIOB_VSYNC	=	GPU_MIOB_VSYNC 73
NC_GPU_IFPD_CLK_P	=	GPU_IFPD_CLK_P 75
NC_GPU_IFPD_CLK_N	=	GPU_IFPD_CLK_N 75

Unused Clocks

74 73 GPU_XTALSSIN
73 GPU_XTALOUTBUFF

R8780[1] 10K 5% 1/16W MF-LF 402

GPU_SS_INT

R8781[1] 10K 5% 1/16W MF-LF 402

GPU Straps

SYNC_MASTER=M75_MLB SYNC_DATE=04/02/2007

APPLE COMPUTER INC.

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D	051-7261	A.0.0
SCALE: NONE	SHT 74 OF 92	

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)

Sum of peak currents: 240mA

=PP1V8_GPU_IFPX

L8800 FERR-220-OHM 0402
20mA peak per diff pair
160mA peak for all pairs
C8800 4.7UF 20% 6.3V CERM 603
C8801 0.1UF 20% 10V CERM 402
C8803 0.1UF 20% 10V CERM 402
Place at AF9 Place at AF8

PP1V8_GPU_IFPAB_IOVDD_F
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V

L8805 FERR-220-OHM 0402
40mA peak
C8805 4.7UF 20% 6.3V CERM 603
C8806 0.1UF 20% 10V CERM 402

PP1V8_GPU_IFPAB_PLLVDD_F
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V

GPU_IFPAB_VPROBE
GPU_IFPAB_RSET

=PP3V3_GPU_IFPCD_IOVDD

L8810 FERR-220-OHM 0402
20mA peak per diff pair
200mA peak for all pairs
C8810 4.7UF 20% 6.3V CERM 603
C8811 0.1UF 20% 10V CERM 402
C8813 0.1UF 20% 10V CERM 402
Place at AD6 Place at AE7

PP3V3_GPU_IFPCD_IOVDD_F
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V

L8815 FERR-220-OHM 0402
40mA peak
C8815 4.7UF 20% 6.3V CERM 603
C8816 0.1UF 20% 10V CERM 402

PP1V8_GPU_IFPCD_PLLVDD_F
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V

GPU_IFPCD_VPROBE
GPU_IFPCD_RSET

Sum of peak currents: 390mA

=PP3V3_GPU_DAC

L8820 FERR-220-OHM 0402
120mA peak
C8820 4.7UF 20% 6.3V CERM 603
C8821 0.1UF 20% 10V CERM 402

PP3V3_GPU_DACA_VDD_F
MIN_LINE_WIDTH=0.35 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=3.3V

GPU_DACA_VREF
GPU_DACA_RSET

L8830 FERR-220-OHM 0402
150mA peak
C8830 4.7UF 20% 6.3V CERM 603
C8831 0.1UF 20% 10V CERM 402

PP3V3_GPU_DACB_VDD_F
MIN_LINE_WIDTH=0.35 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=3.3V

GPU_DACB_VREF
GPU_DACB_RSET

NO STUFF
L8840 FERR-220-OHM 0402
120mA peak
C8845 4.7UF 20% 6.3V CERM 603
NO STUFF
C8840 4.7UF 20% 6.3V CERM 603
C8841 0.1UF 20% 10V CERM 402

PP3V3_GPU_DACC_VDD_F
MIN_LINE_WIDTH=0.35 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=3.3V

GPU_DACC_VREF
GPU_DACC_RSET

GPU_I2CC_SCL
GPU_I2CC_SDA
GPU_I2CH_SCL
GPU_I2CH_SDA
=GPU_I2CS_SCL
=GPU_I2CS_SDA

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

OMIT
U8000 NB8P-GS-W-A2 BGA (5 OF 8)

AF9	IFPA_IOVDD	IFPA_TXC	AK9	LVDS_L_CLK_P	OUT
AF8	IFPB_IOVDD	IFPA_TXC_L	AJ9	LVDS_L_CLK_N	OUT
AC9	IFPAB_PLLVDD	IFPA_TXD0	AH6	LVDS_L_DATA_P<0>	OUT
AD9	IFPAB_PLLGND	IFPA_TXD0_L	AJ6	LVDS_L_DATA_N<0>	OUT
AM4	IFPAB_VPROBE	IFPA_TXD1	AH8	LVDS_L_DATA_P<1>	OUT
AL5	IFPAB_RSET	IFPA_TXD1_L	AH7	LVDS_L_DATA_N<1>	OUT
		IFPA_TXD2	AJ8	LVDS_L_DATA_P<2>	OUT
		IFPA_TXD2_L	AK8	LVDS_L_DATA_N<2>	OUT
		IFPA_TXD3	AJ5	LVDS_L_DATA_P<3>	OUT
		IFPA_TXD3_L	AH5	LVDS_L_DATA_N<3>	OUT
		IFPB_TXC	AK4	LVDS_U_CLK_P	OUT
		IFPB_TXC_L	AL4	LVDS_U_CLK_N	OUT
		IFPB_TXD4	AM6	LVDS_U_DATA_P<0>	OUT
		IFPB_TXD4_L	AM5	LVDS_U_DATA_N<0>	OUT
		IFPB_TXD5	AM7	LVDS_U_DATA_P<1>	OUT
		IFPB_TXD5_L	AL7	LVDS_U_DATA_N<1>	OUT
		IFPB_TXD6	AK6	LVDS_U_DATA_P<2>	OUT
		IFPB_TXD6_L	AK5	LVDS_U_DATA_N<2>	OUT
		IFPB_TXD7	AK7	LVDS_U_DATA_P<3>	OUT
		IFPB_TXD7_L	AL8	LVDS_U_DATA_N<3>	OUT
AD6	IFPC_IOVDD	IFPC_TXC	AM2	TMDS_CLK_P	OUT
AE7	IFPD_IOVDD	IFPC_TXC_L	AM3	TMDS_CLK_N	OUT
AA10	IFPCD_PLLVDD	IFPC_TXD0	AE2	TMDS_DATA_P<0>	OUT
AB10	IFPCD_PLLGND	IFPC_TXD0_L	AE1	TMDS_DATA_N<0>	OUT
AK3	IFPCD_VPROBE	IFPC_TXD1	AF1	TMDS_DATA_P<1>	OUT
AH3	IFPCD_RSET	IFPC_TXD1_L	AF2	TMDS_DATA_N<1>	OUT
		IFPC_TXD2	AG1	TMDS_DATA_P<2>	OUT
		IFPC_TXD2_L	AH1	TMDS_DATA_N<2>	OUT
		IFPD_TXC	AG3	GPU_IFPD_CLK_P	OUT
		IFPD_TXC_L	AH2	GPU_IFPD_CLK_N	OUT
		IFPD_TXD4	AK1	TMDS_DATA_P<3>	OUT
		IFPD_TXD4_L	AJ1	TMDS_DATA_N<3>	OUT
		IFPD_TXD5	AL2	TMDS_DATA_P<4>	OUT
		IFPD_TXD5_L	AL1	TMDS_DATA_N<4>	OUT
		IFPD_TXD6	AJ2	TMDS_DATA_P<5>	OUT
		IFPD_TXD6_L	AJ3	TMDS_DATA_N<5>	OUT
AD10	DACA_VDD	DACA_RED	AH11	GPU_VGA_R	OUT
AG9	DACA_IDUMP	DACA_GREEN	AJ12	GPU_VGA_G	OUT
AH10	DACA_VREF	DACA_BLUE	AH12	GPU_VGA_B	OUT
AH9	DACA_RSET	DACA_HSYNC	AF10	GPU_VGA_HSYNC	OUT
		DACA_VSYNC	AK10	GPU_VGA_VSYNC	OUT
V8	DACB_VDD	DACB_RED	R6	GPU_TV_C	OUT
V7	DACB_IDUMP	DACB_GREEN	T5	GPU_TV_Y	OUT
R5	DACB_VREF	DACB_BLUE	T6	GPU_TV_COMP	OUT
R7	DACB_RSET	DACB_CSYNC	U5	GPU_CSYNC	OUT
AD7	DACC_VDD	DACC_RED	AF6	GPU_R2	OUT
AG4	DACC_IDUMP	DACC_GREEN	AG6	GPU_G2	OUT
AH4	DACC_VREF	DACC_BLUE	AE5	GPU_B2	OUT
AF5	DACC_RSET	DACC_HSYNC	AG7	GPU_H2SYNC	OUT
		DACC_VSYNC	AG5	GPU_V2SYNC	OUT
G2	I2CC_SCL	I2CA_SCL	K2	GPU_I2CA_SCL	BI
G1	I2CC_SDA	I2CA_SDA	J3	GPU_I2CA_SDA	BI
G3	I2CH_SCL	I2CB_SCL	H4	GPU_I2CB_SCL	BI
H3	I2CH_SDA	I2CB_SDA	J4	GPU_I2CB_SDA	BI
C1	I2CS_SCL				
B1	I2CS_SDA				

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

GPU_IFPAB_RSET
GPU_IFPCD_RSET
GPU_DACA_RSET
GPU_DACB_RSET
GPU_DACC_RSET

NO STUFF R8850 1K 1% 1/16W MF-LF 402
NO STUFF R8851 1K 1% 1/16W MF-LF 402
R8852 124 1% 1/16W MF-LF 402
R8853 124 1% 1/16W MF-LF 402
R8854 124 1% 1/16W MF-LF 402

GPU_DACA_VREF
GPU_DACB_VREF
GPU_DACC_VREF

C8852 0.1UF 20% 10V CERM 402
C8853 0.1UF 20% 10V CERM 402
C8854 0.1UF 20% 10V CERM 402

GPU_IFPAB_VPROBE
GPU_IFPCD_VPROBE

NO STUFF C8855 0.01UF 20% 16V CERM 402
NO STUFF C8856 0.01UF 20% 16V CERM 402

NV G84M Video Interfaces

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

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GPU VCore Regulator

GPU VCore Current Sense

PLACE R8997 CLOSE TO L8920 &
AwAY FROM THE EDGE OF THE BOARD/FAN
FOR GOOD THERMAL COUPLING

=PP5V_S5_GPUVCORE
R8901 200 1% 1/16W MF-LF 402
PP5V_S5_GPUVCORE_V5FILT
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
C8901 2.2UF 10% 16V X5R 603
C8900 1uF 10% 16V X5R 603
U8900 CRITICAL TPS51117RGY_QFN14 SYM 1 OF 2
V5FILT V5DRV EN_PSV PGOOD VOUT VFB TRIP TON VBST DRVH LL DRVL GND THRM_PAD PGND
=GPUVCORE_EN
=GPUVCORE_PGOOD
(=PPVCORE_GPU_REG)
GPUVCORE_VFB
GPUVCORE_TRIP
GPUVCORE_TON
GPUVCORE_VBST
GPUVCORE_DRVH GATE_NODE=TRUE
GPUVCORE_LL SWITCH_NODE=TRUE
GPUVCORE_DRVL GATE_NODE=TRUE
MIN_LINE_WIDTH=0.25 mm MIN_NECK_WIDTH=0.2 mm
MIN_LINE_WIDTH=0.6 mm MIN_NECK_WIDTH=0.2 mm
R8905 10.5K 1% 1/16W MF-LF 402
XW8900 SM
(GND)
=PPVIN_GPU_GPUVCORE
C8931 CRITICAL 22UF 20% 25V POLY CASE-D2-LF
C8930 CRITICAL 22UF 20% 25V POLY CASE-D2-LF
C8932 1UF 10% 25V X5R 603
C8915 0.1UF 10% 50V X7R 603-1
R8919 200K 1% 1/16W MF-LF 402
Q8920 CRITICAL RJK0305DPB LFPAK
Q8922 CRITICAL RJK0301DPB LFPAK
Q8921 CRITICAL RJK0301DPB LFPAK
C8921 NO STUFF 1000pF 10% 25V X7R 402
GPUISENS_NTC
R8996 1K 1% 1/16W MF-LF 402
R8997 CRITICAL 10KOHM-5% 0603-LF
R8994 NO STUFF 1K 1% 1/16W MF-LF 402
C8990 0.47UF 10% 6.3V CERM-X5R 402
R8993 20.0K 1% 1/16W MF-LF 402
GPUISENS_NEG
C8991 0.22UF 10% 6.3V CERM-X5R 402
PVCORE_GPU_NTC
GPUISENS_RC
R8991 20.0K 1% 1/16W MF-LF 402
GPUISENS_POS
R8990 649 1% 1/16W MF-LF 402
L8920 CRITICAL 1.00UH-20A IHLP4040DZ11-SM
XW8901 SM
PLACEMENT_NOTE=Place R8997 close to L8920
PLACEMENT_NOTE=Place R8994 close to L8920
PLACEMENT_NOTE=Place C8990 close to L8920
PLACEMENT_NOTE=Place C8991 close to L8920
PLACEMENT_NOTE=Place R8990 close to L8920
=PP3V3R5V_GPU_GPUISENS
C8998 470pF 10% 50V CERM 402
C8995 1uF 10% 6.3V CERM 402
R8998 1M 1% 1/16W MF-LF 402
U8995 HPA00141AIDCKR SC70-5
GPUVCORE_IOUT
R8992 1M 1% 1/16W MF-LF 402
C8992 470pF 10% 50V CERM 402
=PPVCORE_GPU_REG
Vout = 1.25V - 0.96V
18A max output
(L8920 limit)
Place near C8940 2
XW8920 SM
XW8921 SM
PPVCORE_GPULOAD_XW
C8940 10UF 20% 6.3V X5R 603
C8942 CRITICAL 330UF 10% 2.0V TANT D2T
C8943 CRITICAL 330UF 10% 2.0V TANT D2T
C8944 GPU_LOADCAP CRITICAL 330UF 20% 2.0V POLY CASE-B2
C8945 GPU_LOADCAP CRITICAL 330UF 20% 2.0V POLY CASE-B2
GPU_XW2 R8928 2.87K 1% 1/16W MF-LF 402
<Ra> GPU_XW1 R8921 2.87K 1% 1/16W MF-LF 402
PPVCORE_GPU_XW
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.20 mm
VOLTAGE=1.25V
NO STUFF C8920 100PF 10% 50V CERM 402
<Rb> R8922 7.15K 1% 1/16W MF-LF 402
(GPUVCORE_VFB)
NO STUFF R8923 61.9K 1% 1/16W MF-LF 402 <Rc>
R8924 28K 1% 1/16W MF-LF 402 <Rd>
R8925 16.9K 1% 1/16W MF-LF 402 <Re>
XW8921, C8944, R8928, C8945, R8930, R8931 are for M76 only and not present in M75 due to layout differences. They should be removed if layout can be changed

Vout = 0.75V * (1 + Ra / Reg)
Vout(min) = 0.75V * (1 + Ra / Rb)
Reg = Rb || Rc || Rd || Re

GND_GPUVCORE_SGND
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=0V
(GPUVCORE_VFB)

(=PPVCORE_GPU_REG)
GPU_XW1 R8930 0 5% 1/16W MF 402
GPU_XW2 R8931 0 5% 1/16W MF 402
PPVCORE_GPULOAD_XW
=PP1V2_GPU_VCOREPWRCTL
=PP3V3_GPU_VCORELOGIC
NO STUFF R8962 1K 5% 1/16W MF-LF 402
NO STUFF R8960 4.99K 1% 1/16W MF-LF 402
NO STUFF C8961 0.01UF 10% 16V CERM 402
NO STUFF R8961 1K 5% 1/16W MF-LF 402
NO STUFF R8963 1.5K 5% 1/16W MF-LF 402
NO STUFF R8964 10K 5% 1/16W MF-LF 402
GPU_VCORE_PWRCTL0
PC0_DIV
PC0_BIAS
PC0_BIAS_B
NC_GPUVCORE_VFB_PC0
NO STUFF Q8927 MMDT3904XF SOT-363-LF
GND_GPUVCORE_SGND
R8970 100K 5% 1/16W MF-LF 402
R8971 100K 5% 1/16W MF-LF 402
R8972 100K 5% 1/16W MF-LF 402
GPU_VCORE_VID0
R8973 7.5K 5% 1/16W MF-LF 402
GPU_VCORE_VID0_RC
C8973 0.1UF 20% 10V CERM 402
Q8923 2N7002DW-X-F SOT-363
GPUVCORE_VFB_C
NO STUFF R8967 1.5K 5% 1/16W MF-LF 402
NO STUFF R8965 4.99K 1% 1/16W MF-LF 402
NO STUFF C8966 0.01UF 10% 16V CERM 402
NO STUFF R8966 1K 5% 1/16W MF-LF 402
NO STUFF R8968 1K 5% 1/16W MF-LF 402
NO STUFF R8969 10K 5% 1/16W MF-LF 402
GPU_VCORE_PWRCTL1
PC1_DIV
PC1_BIAS
PC1_BIAS_B
NC_GPUVCORE_VFB_PC1
NO STUFF Q8927 MMDT3904XF SOT-363-LF
GND_GPUVCORE_SGND
GPU_VCORE_VID1
R8974 7.5K 5% 1/16W MF-LF 402
GPU_VCORE_VID1_RC
C8974 0.1UF 20% 10V CERM 402
Q8923 2N7002DW-X-F SOT-363
GPUVCORE_VFB_D
GPU_VCORE_VID2
R8975 7.5K 5% 1/16W MF-LF 402
GPU_VCORE_VID2_RC
C8975 0.1UF 20% 10V CERM 402
Q8925 2N7002DW-X-F SOT-363
GPUVCORE_VFB_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 -	1.125V (balanced)
1	1	1	Y Y Y	1.250V (max perf)

All other states not defined

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
11480292	2	RES,5.76K,1%,1/16W,0402,LF	R8921,R8928		GPU_XW3

GPU (G84M) Core Supply

SYNC_MASTER=M75_MLB SYNC_DATE=03/21/2007

APPLE COMPUTER INC.

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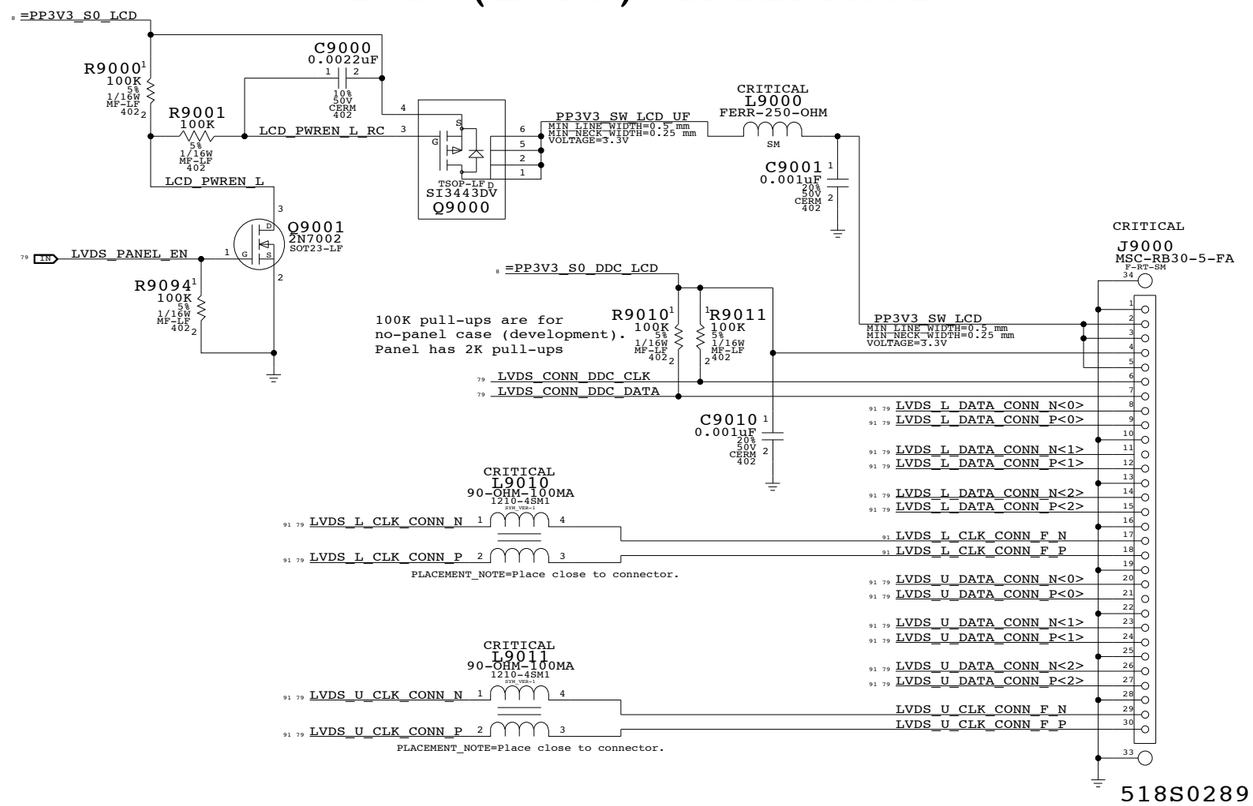
LCD (LVDS) INTERFACE



518S0289

LVDS Display Connector

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

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TMDS Filtering

(Place close to GPU) (Place close to connector)

TMDS_DATA_N<0> — =PP3V3_GPU_TMDSBIAS — TMDS_DATA_P<0>
NO STUFF C9462 0.01UF 10% 16V CERM 402
NO STUFF R9462 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_DATA_R0
NO STUFF R9463 49.9 1% 1/16W MF-LF 402
CRITICAL L9460 90-OHM-100MA 1210-4SM1 (SYM_VER=1)
TMDS_DATA_F_N<0> TMDS_DATA_F_P<0>
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<1> — =PP3V3_GPU_TMDSBIAS — TMDS_DATA_P<1>
NO STUFF C9466 0.01UF 10% 16V CERM 402
NO STUFF R9466 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_DATA_R1
NO STUFF R9467 49.9 1% 1/16W MF-LF 402
CRITICAL L9464 90-OHM-100MA 1210-4SM1 (SYM_VER=1)
TMDS_DATA_F_N<1> TMDS_DATA_F_P<1>
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<2> — =PP3V3_GPU_TMDSBIAS — TMDS_DATA_P<2>
NO STUFF C9470 0.01UF 10% 16V CERM 402
NO STUFF R9470 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_DATA_R2
NO STUFF R9471 49.9 1% 1/16W MF-LF 402
CRITICAL L9468 90-OHM-100MA 1210-4SM1 (SYM_VER=1)
TMDS_DATA_F_N<2> TMDS_DATA_F_P<2>
PLACEMENT_NOTE=Place close to connector.

TMDS_CLK_N — =PP3V3_GPU_TMDSBIAS — TMDS_CLK_P
NO STUFF C9474 0.01UF 10% 16V CERM 402
NO STUFF R9474 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_CLK_CMF
NO STUFF R9475 49.9 1% 1/16W MF-LF 402
R9472 0 5% 1/16W MF-LF 402 — TMDS_CLK_R_N
R9473 0 5% 1/16W MF-LF 402 — TMDS_CLK_R_P
CRITICAL L9472 370-OHM SM (SYM_VER=1)
TMDS_CLK_F_N TMDS_CLK_F_P
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<3> — =PP3V3_GPU_TMDSBIAS — TMDS_DATA_P<3>
NO STUFF C9478 0.01UF 10% 16V CERM 402
NO STUFF R9478 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_DATA_R3
NO STUFF R9479 49.9 1% 1/16W MF-LF 402
CRITICAL L9476 90-OHM-100MA 1210-4SM1 (SYM_VER=1)
TMDS_DATA_F_N<3> TMDS_DATA_F_P<3>
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<4> — =PP3V3_GPU_TMDSBIAS — TMDS_DATA_P<4>
NO STUFF C9482 0.01UF 10% 16V CERM 402
NO STUFF R9482 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_DATA_R4
NO STUFF R9483 49.9 1% 1/16W MF-LF 402
CRITICAL L9480 90-OHM-100MA 1210-4SM1 (SYM_VER=1)
TMDS_DATA_F_N<4> TMDS_DATA_F_P<4>
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<5> — =PP3V3_GPU_TMDSBIAS — TMDS_DATA_P<5>
NO STUFF C9486 0.01UF 10% 16V CERM 402
NO STUFF R9486 49.9 1% 1/16W MF-LF 402
SIGNAL_MODEL=EMPTY TMDS_DATA_R5
NO STUFF R9487 49.9 1% 1/16W MF-LF 402
CRITICAL L9484 90-OHM-100MA 1210-4SM1 (SYM_VER=1)
TMDS_DATA_F_N<5> TMDS_DATA_F_P<5>
PLACEMENT_NOTE=Place close to connector.

VGA SYNC Buffers

=PP3V3_GPU_VGASYNC — GPU_VGA_VSYNC
U9450 MC74VHC1G08 SC70
PLACEMENT_NOTE=Place close to connector.
C9450 0.1uF 20% 10V CERM 402
R9450 33 5% 1/16W MF-LF 402
VGA_VSYNC_R — VGA_VSYNC

=PP3V3_GPU_VGASYNC — GPU_VGA_HSYNC
U9451 MC74VHC1G08 SC70
PLACEMENT_NOTE=Place close to connector.
C9451 0.1uF 20% 10V CERM 402
R9451 33 5% 1/16W MF-LF 402
VGA_HSYNC_R — VGA_HSYNC

ANALOG FILTERING
PLACE CLOSE TO CONNECTOR

GPU_TV_COMP_VGA_B — VGA_TERM_FILTER R9440 150 1% 1/16W MF-LF 402 — VGA_B (DACB TV COMP)
GPU_TV_Y_VGA_G — VGA_TERM_FILTER R9441 150 1% 1/16W MF-LF 402 — VGA_G (DACB TV Y)
GPU_TV_C_VGA_R — VGA_TERM_FILTER R9442 150 1% 1/16W MF-LF 402 — VGA_R (DACB TV C)
CRITICAL FL9440 210MHZ MEA2010P-SM
C9440 3.3pF 0.25pF 50V CERM 402
C9441 3.3pF 0.25pF 50V CERM 402
C9442 3.3pF 0.25pF 50V CERM 402

DVI INTERFACE

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

=PP5V_S0_DVI_DDC — CRITICAL F9410 0.5AMP-13.2V SM-LF — PP5V_S0_DDC_F (MIN_LINE_WIDTH=0.38 mm, MIN_NECK_WIDTH=0.25 mm, VOLTAGE=5V)
CRITICAL L9410 400-OHM-EMI SM-1 — PP5V_S0_DDC (MIN_LINE_WIDTH=0.38 mm, MIN_NECK_WIDTH=0.25 mm, VOLTAGE=5V)

Isolation required for DVI->ADC Adapter
D9410 SOD-123 B0530WXF — PP5V_S0_DDC_PULLUPS (MIN_LINE_WIDTH=0.25 mm, MIN_NECK_WIDTH=0.25 mm, VOLTAGE=5V)

=GND_CHASSIS_DVI_BOT — CRITICAL J9400 QH11121-RIG02-4F F-RT-TH-DVI

TMDS_DATA_F_N<0>	17	1	TMDS_DATA_F_N<2>
	9	2	TMDS_DATA_F_N<1>
TMDS_DATA_F_P<0>	18	10	TMDS_DATA_F_P<2>
	19	3	TMDS_DATA_F_P<1>
TMDS_DATA_F_N<5>	20	11	TMDS_DATA_F_N<4>
	12	4	TMDS_DATA_F_N<3>
TMDS_DATA_F_P<5>	21	5	TMDS_DATA_F_P<4>
	13	6	TMDS_DATA_F_P<3>
	22	14	DVI_DDC_CLK_R
		7	(PP5V_S0_DDC)
TMDS_CLK_F_P	23	15	DVI_DDC_DATA_R
TMDS_CLK_F_N	24	8	VGA_VSYNC
		16	DVI_HPD_R
VGA_B	C3	C1	VGA_R
	C5B	C5A	
VGA_HSYNC	C4	C2	VGA_G
	34	32	

514-0278

VGA_TERM_CONN R9445 150 1% 1/16W MF-LF 402
VGA_TERM_CONN R9443 150 1% 1/16W MF-LF 402
VGA_TERM_CONN R9444 150 1% 1/16W MF-LF 402
C9410 0.01uF 20% 50V CERM 603

OMIT CX9490 SHORT NONE NONE NONE 402
OMIT CX9491 SHORT NONE NONE NONE 402
OMIT CX9492 SHORT NONE NONE NONE 402
OMIT CX9493 SHORT NONE NONE NONE 402
OMIT CX9400 SHORT NONE NONE NONE 402
OMIT CX9401 SHORT NONE NONE NONE 402
OMIT CX9402 SHORT NONE NONE NONE 402
OMIT CX9403 SHORT NONE NONE NONE 402

=GND_CHASSIS_DVI_TOP
=GND_CHASSIS_DVI_BOT

C9411 100pF 5% 50V CERM 402
C9413 100pF 5% 50V CERM 402
C9414 100pF 5% 50V CERM 402

R9410 4.7K 5% 1/16W MF-LF 402
R9412 4.7K 5% 1/16W MF-LF 402
R9411 100 5% 1/16W MF-LF 402
R9413 100 5% 1/16W MF-LF 402
R9414 100 5% 1/16W MF-LF 402

GPU Isolation / Level-Shift

=PP3V3_GPU_DVI
Q9411 2N7002DW-X-F SOT-363 — DVI_DDC_CLK — R9420 10K 5% 1/16W MF-LF 402 — GPU_DVI_DDC_CLK (OUT)
Q9411 2N7002DW-X-F SOT-363 — DVI_DDC_DATA — R9421 10K 5% 1/16W MF-LF 402 — GPU_DVI_DDC_DATA (OUT)
GPU_HPD_BILAT — =GPU_HPD_ENABLE (IN)
Q9414 2N7002DW-X-F SOT-363 — DVI_HPD — R9422 270K 5% 1/16W MF-LF 402 — GPU_HPD (OUT)
=PP5V_S0_SB_HPD
Q9415 2N7002DW-X-F SOT-363 — R9423 270K 5% 1/16W MF-LF 402 — DVI_HOTPLUG_DET (OUT)
R9415 20K 5% 1/16W MF-LF 402

DVI Display Connector

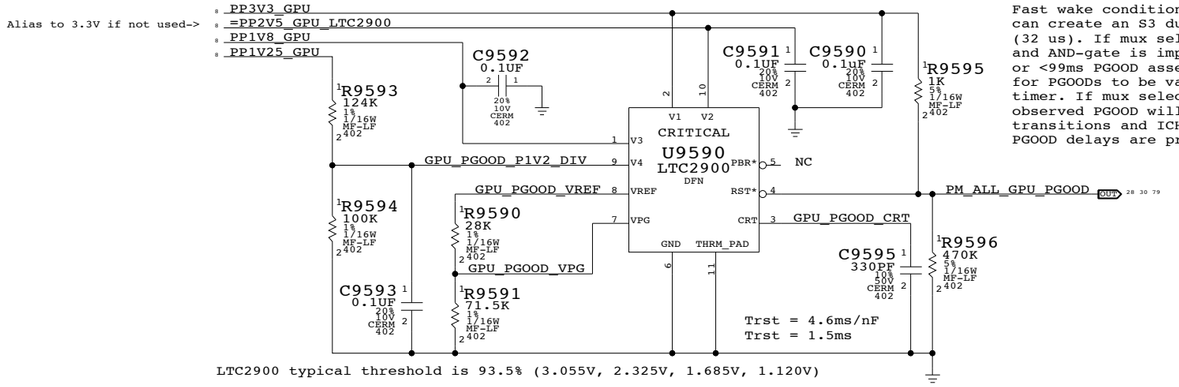
SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 78 OF 92	

PGOOD Monitor for GPU Rails

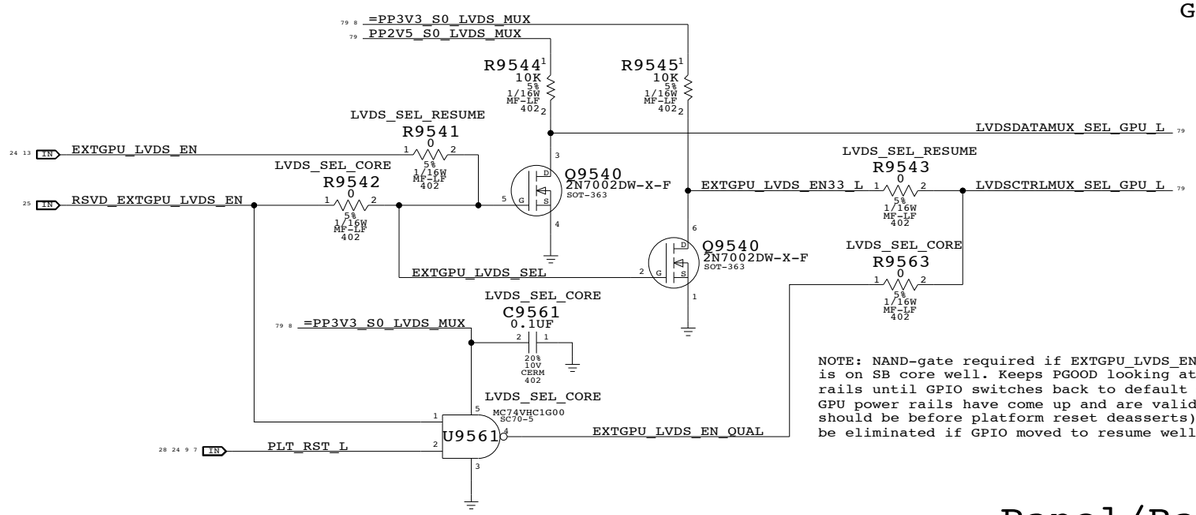
LTC2900 provides programmable reset delay which is required to play nice with ICHx PGOOD circuit



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

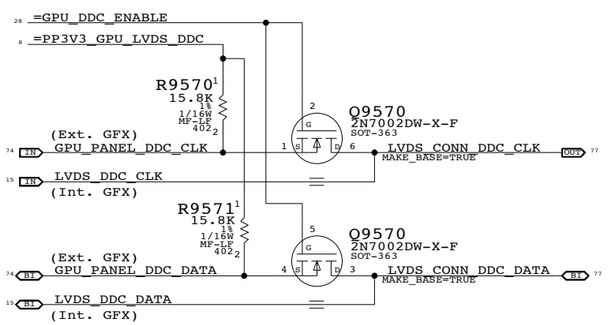
LTC2900 typical threshold is 93.5% (3.055V, 2.325V, 1.685V, 1.120V)

Mux Select Conditioning

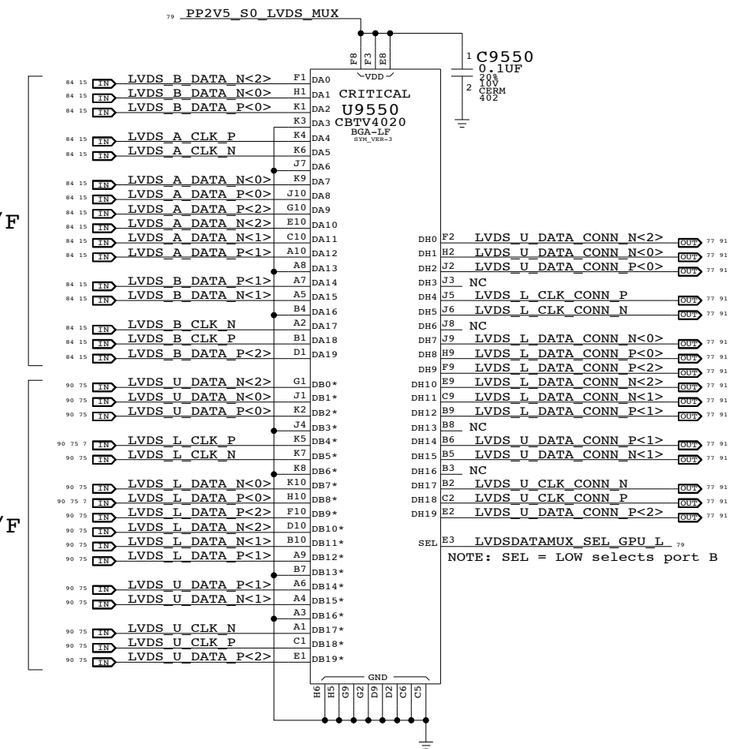


NOTE: NAND-gate required if EXTGPU_LVDS_EN GPIO is on SB core well. Keeps PGOOD looking at non-GPU rails until GPIO switches back to default state and GPU power rails have come up and are valid (which should be before platform reset deasserts). Could be eliminated if GPIO moved to resume well.

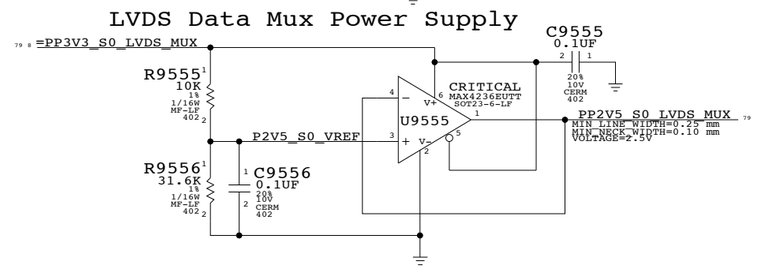
GPU DDC Pass FETs



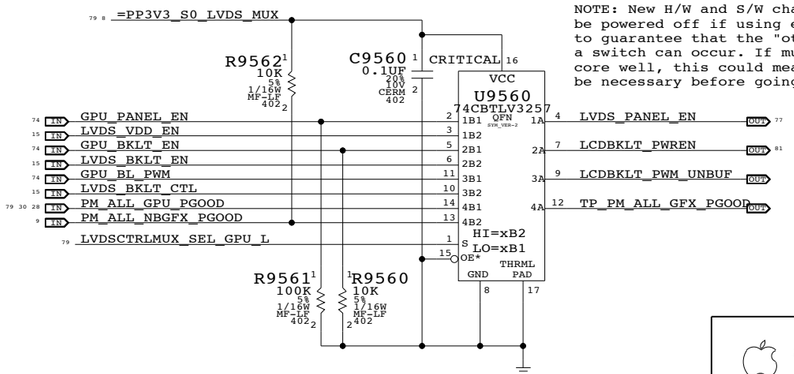
LVDS I/F Mux



LVDS Data Mux Power Supply



Panel/Backlight Control Mux



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

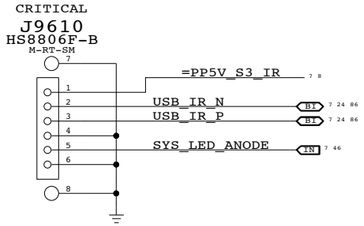
LVDS Interface Mux

SYNC_MASTER=M75_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

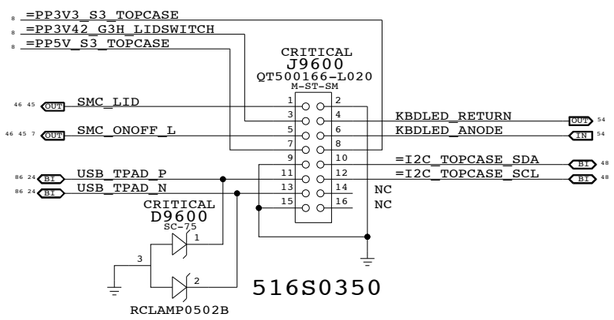
SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 79 OF 92	

IR & Sleep LED Connector



518S0474

Top-Case Connector



516S0350

Inverter Connectors

518S0369

BOM Options:

INV_SPLIT	INV_BYPASS
INV_15INCH	
INV_17INCH?	

J9650
SM04B-ACH
M-RT-SM

Split Inverter	Classic Inverter
INV_PWR_HV	Bridge 2	PBUS
INV_GND_HV	Bridge 1	GND
INV_P5V_HV_IFB	IFB (Current Sense)	+5V
INV_PWM_HV_VFB	VFB (Voltage Sense)	PWM

=GND_CHASSIS_LEFTCLUTCH

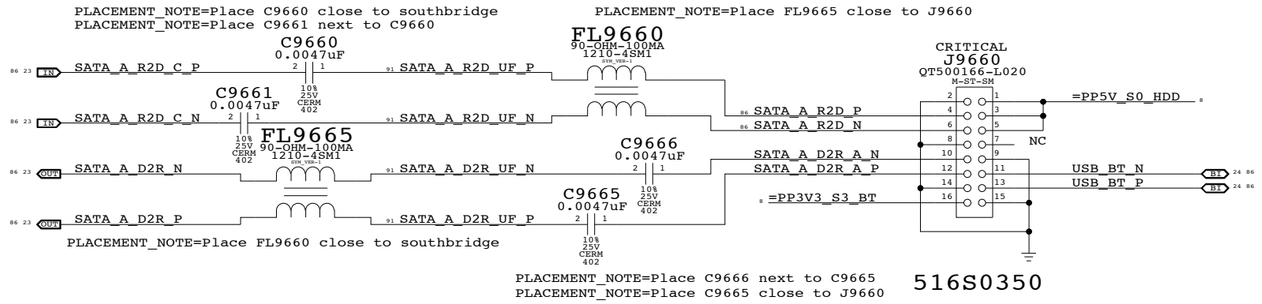
INV_SPLIT
J9655
BM02B-ACHKS-GAN-TF-LF-SN-M
M-RT-SM

Split Inverter	Classic Inverter
INV_HV_PIN5	"Antenna" Pad	No Connect
NC	No Connect	No Connect

=GND_CHASSIS_LEFTCLUTCH

518S0487

Bluetooth (M13P) & SATA HDD Flex Connector



516S0350

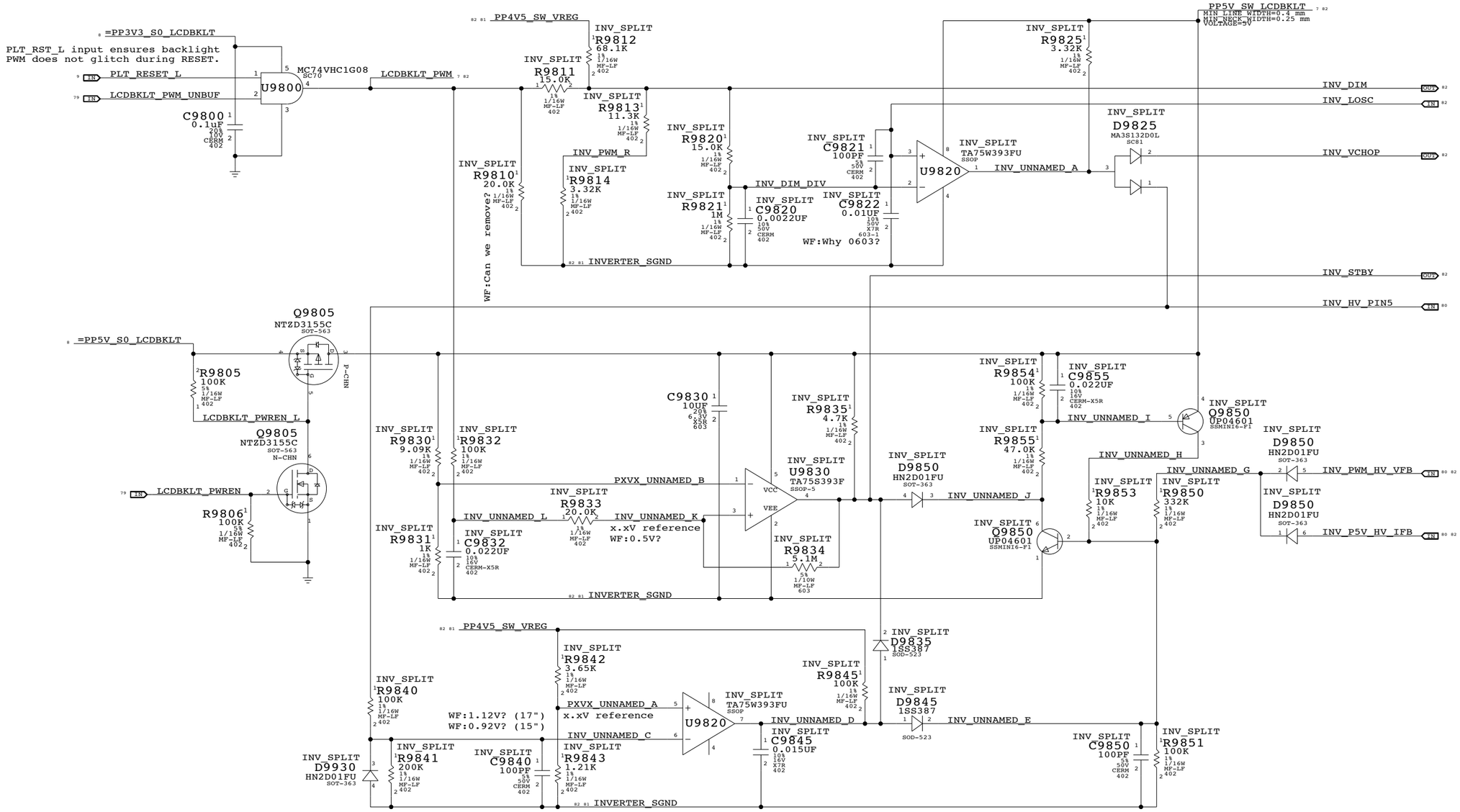
M76 Specific Connectors

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	80	92



Inverter Support

SYNC_MASTER=M75_LIO SYNC_DATE=01/23/2007

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
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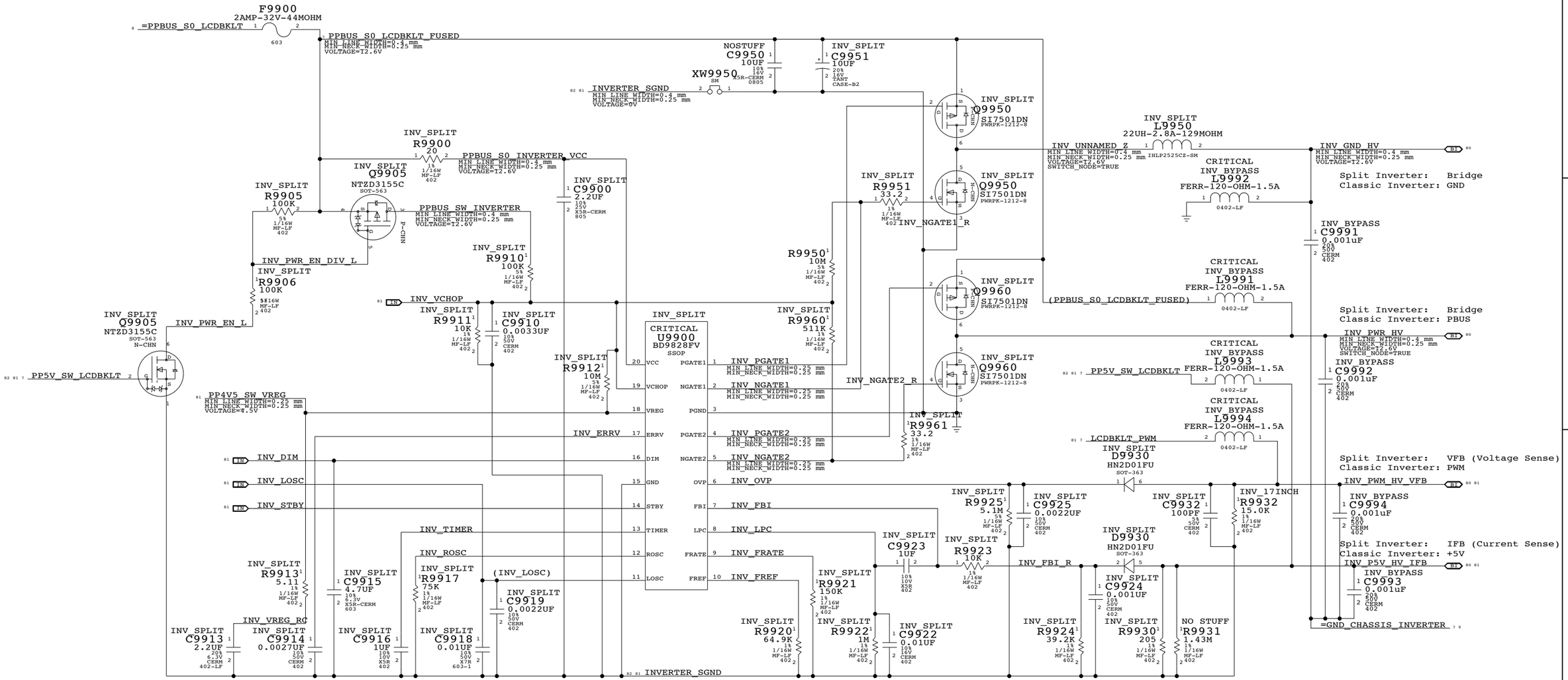
SCALE: NONE	SHT 81 OF 92	



Inverter Control IC

SYNC_MASTER=M75_LIO SYNC_DATE=01/23/2007

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PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
114S0319	1	RES,11.3K,1%,1/16W,MF,402,LF	R9932		INV_15INCH

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 82 OF 92	

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

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CPU_2TO1	*	=2:1_SPACING	?
CPU_COMP	*	25 MIL	?
CPU_GTLREF	*	25 MIL	?
CPU_ITP	*	=2:1_SPACING	?
CPU_VCCSENSE	*	25 MIL	?

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	NET_TYPE 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_BREQ0_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_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_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_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_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_2TO1	CPU_PROCHOT_L	10 46 59
CPU_PWRGD	CPU_55S		CPU_PWRGD	7 10 13 23
CPU_FROM_SB	CPU_55S		CPU_INTR	10 23
CPU_FROM_SB	CPU_55S		CPU_NMI	10 23
CPU_FROM_SB	CPU_55S		CPU_A20M_L	10 23
CPU_FROM_SB	CPU_55S		CPU_DPSLP_L	7 10 23
CPU_FROM_SB	CPU_55S		CPU_IGNNE_L	10 23
CPU_INIT_L	CPU_55S		CPU_INIT_L	10 23 47
CPU_FROM_SB	CPU_55S		CPU_SMI_L	10 23
CPU_FROM_SB	CPU_55S		CPU_STPCLK_L	7 10 23
PM_THRMTRIP_L	CPU_55S	CPU_2TO1	PM_THRMTRIP_L	10 16 23 46
FSB_CPUSLP_L	CPU_55S		FSB_CPUSLP_L	7 10 14
PM_DPRSLPVR	CPU_55S	CPU_2TO1	PM_DPRSLPVR	7 16 25 59
(See above)	CPU_55S	CPU_2TO1	IMVP_DPRSLPVR	7 59
CPU_BSEL0	CPU_55S	CPU_2TO1	CPU_BSEL<0>	10 30
(See above)	CPU_55S	CPU_2TO1	NB_BSEL<0>	13 16 30
CPU_BSEL1	CPU_55S	CPU_2TO1	CPU_BSEL<1>	10 30
(See above)	CPU_55S	CPU_2TO1	NB_BSEL<1>	13 16 30
CPU_BSEL2	CPU_55S	CPU_2TO1	CPU_BSEL<2>	10 30
(See above)	CPU_55S	CPU_2TO1	NB_BSEL<2>	13 16 30
CPU_DPRSTP_L	CPU_55S	CPU_2TO1	CPU_DPRSTP_L	7 10 16 23 59
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_TRST_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	XDP_CLK_P	13 30 88
	CLK_FSB_100D	CLK_FSB	XDP_CLK_N	13 30 88
(FSB_CPURST_L)	CPU_55S	CPU_ITP	XDP_CPURST_L	13
	CPU_55S	CPU_2TO1	CPU_VID<6..0>	11 12
	CPU_55S	CPU_2TO1	IMVP6_VID<6..0>	7 12 59
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCSENSE_P	11 59
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCSENSE_N	11 59
	CPU_27P4S	CPU_VCCSENSE	IMVP6_VSEN_P	59
	CPU_27P4S	CPU_VCCSENSE	IMVP6_VSEN_N	59

CPU/FSB Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE: NONE SHT 83 OF 92

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	?	DG Says 40 mil spacing minimum
CRT_2CRT	*	20 MIL	?	
CRT_SYNC	*	25 MIL	?	DG Says 30 mil spacing minimum
CRT_SYNC2SYNC	*	20 MIL	?	
TVDAC	*	25 MIL	?	DG Says 40 mil spacing minimum
TVDAC_2TVDAC	*	20 MIL	?	

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 impedence.
CRT & TVDAC signal single-ended impedence 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 impedence.

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

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
PEG_R2D	PCIE_100D	PCIE	PEG_R2D_P<15..0>	68
	PCIE_100D	PCIE	PEG_R2D_N<15..0>	68
	PCIE_100D	PCIE	PEG_R2D_C_P<15..0>	15 68
	PCIE_100D	PCIE	PEG_R2D_C_N<15..0>	15 68
PEG_D2R	PCIE_100D	PCIE	PEG_D2R_P<15..0>	15 68
	PCIE_100D	PCIE	PEG_D2R_N<15..0>	15 68
	PCIE_100D	PCIE	PEG_D2R_C_P<15..0>	68
	PCIE_100D	PCIE	PEG_D2R_C_N<15..0>	68
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 79
LVDS_A_CLK	LVDS_100D	LVDS	LVDS_A_CLK_N	15 79
LVDS_A_DATA	LVDS_100D	LVDS	LVDS_A_DATA_P<2..0>	15 79
LVDS_A_DATA	LVDS_100D	LVDS	LVDS_A_DATA_N<2..0>	15 79
LVDS_A_DATA3	LVDS_100D	LVDS	LVDS_A_DATA_P<3>	
LVDS_A_DATA3	LVDS_100D	LVDS	LVDS_A_DATA_N<3>	
LVDS_B_CLK	LVDS_100D	LVDS	LVDS_B_CLK_P	15 79
LVDS_B_CLK	LVDS_100D	LVDS	LVDS_B_CLK_N	15 79
LVDS_B_DATA	LVDS_100D	LVDS	LVDS_B_DATA_P<2..0>	15 79
LVDS_B_DATA	LVDS_100D	LVDS	LVDS_B_DATA_N<2..0>	15 79
LVDS_B_DATA3	LVDS_100D	LVDS	LVDS_B_DATA_P<3>	
LVDS_B_DATA3	LVDS_100D	LVDS	LVDS_B_DATA_N<3>	
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=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 84 OF 92	

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	NET_TYPE 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_CNTL	MEM_45S	MEM_CTRL	MEM_CKE<1..0> 16 31 33
MEM_A_CNTL	MEM_45S	MEM_CTRL	MEM_CS_L<1..0> 16 31 33
MEM_A_CNTL	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_CNTL	MEM_45S	MEM_CTRL	MEM_CKE<4..3> 16 32 33
MEM_B_CNTL	MEM_45S	MEM_CTRL	MEM_CS_L<3..2> 16 32 33
MEM_B_CNTL	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=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 85 OF 92	

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	NET_TYPE 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_CNTL	IDE_55S	IDE	IDE_PDIOW_L 23 42
IDE_PDIOR_L	IDE_55S	IDE	IDE_PDIOR_L 23 42
IDE_CNTL	IDE_55S	IDE	IDE_PDDACK_L 23 42
IDE_CNTL	IDE_55S	IDE	IDE_PDDREQ 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 80
	SATA_100D	SATA	SATA_A_R2D_C_N 23 80
	SATA_100D	SATA	SATA_A_R2D_P 80
	SATA_100D	SATA	SATA_A_R2D_N 80
SATA_A_D2R	SATA_100D	SATA	SATA_A_D2R_P 23 80
	SATA_100D	SATA	SATA_A_D2R_N 23 80
	SATA_100D	SATA	SATA_A_D2R_C_P
	SATA_100D	SATA	SATA_A_D2R_C_N
SATA_B_R2D	SATA_100D	SATA	SATA_B_R2D_C_P 23 42
	SATA_100D	SATA	SATA_B_R2D_C_N 23 42
	SATA_100D	SATA	SATA_B_R2D_P
	SATA_100D	SATA	SATA_B_R2D_N
SATA_B_D2R	SATA_100D	SATA	SATA_B_D2R_P 23 42
	SATA_100D	SATA	SATA_B_D2R_N 23 42
	SATA_100D	SATA	SATA_B_D2R_C_P
	SATA_100D	SATA	SATA_B_D2R_C_N
SATA_C_R2D	SATA_100D	SATA	SATA_C_R2D_C_P 23 42
	SATA_100D	SATA	SATA_C_R2D_C_N 23 42
	SATA_100D	SATA	SATA_C_R2D_P
	SATA_100D	SATA	SATA_C_R2D_N
SATA_C_D2R	SATA_100D	SATA	SATA_C_D2R_P 23 42
	SATA_100D	SATA	SATA_C_D2R_N 23 42
	SATA_100D	SATA	SATA_C_D2R_C_P
	SATA_100D	SATA	SATA_C_D2R_C_N
SATA_RBIAS	SATA_55S		SATA_RBIAS 42
HDA_BIT_CLK	HDA_55S	HDA	HDA_BIT_CLK 23 34
	HDA_55S	HDA	HDA_BIT_CLK_R 23
HDA_SYNC	HDA_55S	HDA	HDA_SYNC 23 34
	HDA_55S	HDA	HDA_SYNC_R 23
HDA_RST_L	HDA_55S	HDA	HDA_RST_L 23 34
	HDA_55S	HDA	HDA_RST_L_R 23
HDA_SDIN0	HDA_55S	HDA	HDA_SDIN0 23 34
	HDA_55S	HDA	HDA_SDIN_CODEC
HDA_SDOUT	HDA_55S	HDA	HDA_SDOUT 23 34
	HDA_55S	HDA	HDA_SDOUT_R 23
USB_EXTA	USB_90D	USB	USB_EXTA_P 24 43
	USB_90D	USB	USB_EXTA_N 24 43
	USB_90D	USB	USB_EXTA_MUXED_P
	USB_90D	USB	USB_EXTA_MUXED_N
USB_MINI	USB_90D	USB	USB_MINI_P 24 34
	USB_90D	USB	USB_MINI_N 24 34
USB_EXTD	USB_90D	USB	USB_EXTD_P 24 44
	USB_90D	USB	USB_EXTD_N 24 44
USB_CAMERA	USB_90D	USB	USB_CAMERA_P 24 44
	USB_90D	USB	USB_CAMERA_N 24 44
USB_BT	USB_90D	USB	USB_BT_P 24 80
	USB_90D	USB	USB_BT_N 24 80
USB_TPAD	USB_90D	USB	USB_TPAD_P 24 80
	USB_90D	USB	USB_TPAD_N 24 80
USB_IR	USB_90D	USB	USB_IR_P 7 24 80
	USB_90D	USB	USB_IR_N 7 24 80
USB_EXTB	USB_90D	USB	USB_EXTB_P 24 34
	USB_90D	USB	USB_EXTB_N 24 34
USB_EXCARD	USB_90D	USB	USB_EXCARD_P 24 34
	USB_90D	USB	USB_EXCARD_N 24 34
USB_EXTC	USB_90D	USB	USB_EXTC_P 24 34
	USB_90D	USB	USB_EXTC_N 24 34
USB_RBIAS	USB_60S		USB_RBIAS 24
SMB_SB_SCL	SMB_55S	SMB	SMB_CLK 25 48
SMB_SB_SDA	SMB_55S	SMB	SMB_DATA 25 48
SMB_SB_ME_SCL	SMB_55S	SMB	SMB_ME_CLK 25 48
SMB_SB_ME_SDA	SMB_55S	SMB	SMB_ME_DATA 25 48
SPI_SCLK	SPI_55S	SPI	SPI_SCLK_R 24 56
	SPI_55S	SPI	SPI_SCLK 56
	SPI_55S	SPI	SPI_A_SCLK_R
	SPI_55S	SPI	SPI_B_SCLK_R
SPI_SI	SPI_55S	SPI	SPI_SI_R 24 56
	SPI_55S	SPI	SPI_SI
	SPI_55S	SPI	SPI_A_SI_R 56
	SPI_55S	SPI	SPI_B_SI_R
SPI_SO	SPI_55S	SPI	SPI_SO 24 56
	SPI_55S	SPI	SPI_A_SO_R 56
	SPI_55S	SPI	SPI_B_SO
	SPI_55S	SPI	SPI_B_SO_R
SPI_CE_L0	SPI_55S	SPI	SPI_CE_R_L<0> 24 56
	SPI_55S	SPI	SPI_CE_L<0> 56
SPI_CE_L1	SPI_55S	SPI	SPI_CE_R_L<1>
	SPI_55S	SPI	SPI_CE_L<1>

SB Constraints (1 of 2)

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 86 OF 92	

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	NET_TYPE 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_CNTL	PCI_55S	PCI	PCI_IRDY_L 24 38
PCI_CNTL	PCI_55S	PCI	PCI_DEVSEL_L 24 38
PCI_CNTL	PCI_55S	PCI	PCI_PERR_L 24 38
PCI_LOCK_L	PCI_55S	PCI	PCI_LOCK_L 24
PCI_CNTL	PCI_55S	PCI	PCI_SERR_L 24 38
PCI_CNTL	PCI_55S	PCI	PCI_STOP_L 24 38
PCI_CNTL	PCI_55S	PCI	PCI_TRDY_L 24 38
PCI_CNTL	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 24 38
PCI_REQ1_L	PCI_55S	PCI	PCI_REQ1_L 24
PCI_GNT1_L	PCI_55S	PCI	PCI_GNT1_L
PCI_REQ2_L	PCI_55S	PCI	PCI_REQ2_L 24
PCI_GNT2_L	PCI_55S	PCI	PCI_GNT2_L
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_PIRQE_L	PCI_55S	PCI	INT_PIRQE_L 24
INT_PIRQF_L	PCI_55S	PCI	INT_PIRQF_L 24
PCIE_A_R2D	PCIE_100D	PCIE	PCIE_A_R2D_C_P
	PCIE_100D	PCIE	PCIE_A_R2D_C_N
PCIE_A_D2R	PCIE_100D	PCIE	PCIE_A_D2R_P
	PCIE_100D	PCIE	PCIE_A_D2R_N
PCIE_B_R2D	PCIE_100D	PCIE	PCIE_B_R2D_C_P
	PCIE_100D	PCIE	PCIE_B_R2D_C_N
PCIE_B_D2R	PCIE_100D	PCIE	PCIE_B_D2R_P
	PCIE_100D	PCIE	PCIE_B_D2R_N
PCIE_EXCARD_R2D	PCIE_100D	PCIE	PCIE_EXCARD_R2D_C_P 34
	PCIE_100D	PCIE	PCIE_EXCARD_R2D_C_N 34
PCIE_EXCARD_D2R	PCIE_100D	PCIE	PCIE_EXCARD_D2R_P 34
	PCIE_100D	PCIE	PCIE_EXCARD_D2R_N 34
PCIE_FW_R2D	PCIE_100D	PCIE	PCIE_FW_R2D_C_P
	PCIE_100D	PCIE	PCIE_FW_R2D_C_N
PCIE_FW_D2R	PCIE_100D	PCIE	PCIE_FW_D2R_P
	PCIE_100D	PCIE	PCIE_FW_D2R_N
PCIE_MINI_R2D	PCIE_100D	PCIE	PCIE_MINI_R2D_C_P 24 34
	PCIE_100D	PCIE	PCIE_MINI_R2D_C_N 24 34
PCIE_MINI_D2R	PCIE_100D	PCIE	PCIE_MINI_D2R_P 24 34
	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_100D	PCIE	PCIE_ENET_R2D_C_N 24 35
	PCIE_100D	PCIE	PCIE_ENET_R2D_P 35
	PCIE_100D	PCIE	PCIE_ENET_R2D_N 35
PCIE_ENET_D2R	PCIE_100D	PCIE	PCIE_ENET_D2R_P 24 35
	PCIE_100D	PCIE	PCIE_ENET_D2R_N 24 35
	PCIE_100D	PCIE	PCIE_ENET_D2R_C_P 35
	PCIE_100D	PCIE	PCIE_ENET_D2R_C_N 35
ENET_MDI	ENET_100D	ENET_MDI	ENET_MDI_P<0> 35 37
	ENET_100D	ENET_MDI	ENET_MDI_N<0> 35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET_MDI_P<1> 35 37
	ENET_100D	ENET_MDI	ENET_MDI_N<1> 35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET_MDI_P<2> 35 37
	ENET_100D	ENET_MDI	ENET_MDI_N<2> 35 37
ENET_MDI	ENET_100D	ENET_MDI	ENET_MDI_P<3> 35 37
	ENET_100D	ENET_MDI	ENET_MDI_N<3> 35 37

SB Constraints (2 of 2)

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	87	92

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

NET_TYPE ELECTRICAL_CONSTRAINT_SET	PHYSICAL	SPACING		
CK505_CPU	CLK_FSB_100D	CLK_FSB	CK505_CPU0_P	29 30
CK505_CPU	CLK_FSB_100D	CLK_FSB	CK505_CPU0_N	29 30
CK505_NB	CLK_FSB_100D	CLK_FSB	CK505_CPU1_P	29 30
CK505_NB	CLK_FSB_100D	CLK_FSB	CK505_CPU1_N	29 30
CK505_ITP	CLK_FSB_100D	CLK_FSB	CK505_CPU2_ITP_SRC10_P	29 30
CK505_ITP	CLK_FSB_100D	CLK_FSB	CK505_CPU2_ITP_SRC10_N	29 30
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	CK505_PCI2_CLK	29 30
CK505_PCI3	CLK_MED_55S	CLK_MED	CK505_PCI3_CLK	29 30
CK505_PCI4	CLK_MED_55S	CLK_MED	CK505_PCI4_CLK	29 30
CK505_PCI5	CLK_MED_55S	CLK_MED	CK505_PCI5_CLK_FCTSEL	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_DOT96_27M_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_DOT96_27M_N	29 30
CK505_LVDS	CLK_PCIE_100D	CLK_PCIE	CK505_LVDS_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_LVDS_N	29 30
CK505_SRC1	CLK_PCIE_100D	CLK_PCIE	CK505_SRC1_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC1_N	29 30
CK505_SRC2	CLK_PCIE_100D	CLK_PCIE	CK505_SRC2_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC2_N	29 30
CK505_SRC3	CLK_PCIE_100D	CLK_PCIE	CK505_SRC3_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC3_N	29 30
CK505_SRC4	CLK_PCIE_100D	CLK_PCIE	CK505_SRC4_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC4_N	29 30
CK505_SRC5	CLK_PCIE_100D	CLK_PCIE	CK505_SRC5_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC5_N	29 30
CK505_SRC6	CLK_PCIE_100D	CLK_PCIE	CK505_SRC6_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC6_N	29 30
CK505_SRC7	CLK_PCIE_100D	CLK_PCIE	CK505_SRC7_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC7_N	29 30
CK505_SRC8	CLK_PCIE_100D	CLK_PCIE	CK505_SRC8_P	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_SRC8_N	29 30
(CK505_CPU)	CLK_FSB_100D	CLK_FSB	FSB_CLK_CPU_P	7 10 30
(CK505_CPU)	CLK_FSB_100D	CLK_FSB	FSB_CLK_CPU_N	7 10 30
(CK505_NB)	CLK_FSB_100D	CLK_FSB	FSB_CLK_NB_P	7 14 30
(CK505_NB)	CLK_FSB_100D	CLK_FSB	FSB_CLK_NB_N	7 14 30
(CK505_ITP)	CLK_FSB_100D	CLK_FSB	XDP_CLK_P	13 30 83
(CK505_ITP)	CLK_FSB_100D	CLK_FSB	XDP_CLK_N	13 30 83
(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	
(CK505_PCI3)	CLK_MED_55S	CLK_MED	PCI_CLK33M_SMC	30 45
			CK505 PCI4 is project-specific	
			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 22 30
(CK505_LVDS)	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_DPLLSS_N	7 22 30
(CK505_SRC1)	CLK_PCIE_100D	CLK_PCIE	PEG_CLK100M_P	9
(CK505_SRC1)	CLK_PCIE_100D	CLK_PCIE	PEG_CLK100M_N	9
(CK505_SRC2)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_DMI_P	24 30
(CK505_SRC2)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_DMI_N	24 30
(CK505_SRC3)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_EXCARD_P	30 34
(CK505_SRC3)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_EXCARD_N	30 34
(CK505_SRC4)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_SATA_P	23 30
(CK505_SRC4)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_SATA_N	23 30
(CK505_SRC5)	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_PCIE_P	7 16 30
(CK505_SRC5)	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_PCIE_N	7 16 30
(CK505_SRC6)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_MINI_P	30 34
(CK505_SRC6)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_MINI_N	30 34
			CK505 SRC7 is project-specific	
(CK505_SRC8)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_ENET_P	30 35
(CK505_SRC8)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_ENET_N	30 35

SMC SMBus Net Properties

NET_TYPE ELECTRICAL_CONSTRAINT_SET	PHYSICAL	SPACING		
SMBUS_SMC_A_S3_SCL	SMB_55S	SMB	SMBUS_SMC_A_S3_SCL	48
SMBUS_SMC_A_S3_SDA	SMB_55S	SMB	SMBUS_SMC_A_S3_SDA	48
SMBUS_SMC_B_S0_SCL	SMB_55S	SMB	SMBUS_SMC_B_S0_SCL	48
SMBUS_SMC_B_S0_SDA	SMB_55S	SMB	SMBUS_SMC_B_S0_SDA	48
SMBUS_SMC_0_S0_SCL	SMB_55S	SMB	SMBUS_SMC_0_S0_SCL	48
SMBUS_SMC_0_S0_SDA	SMB_55S	SMB	SMBUS_SMC_0_S0_SDA	48
SMBUS_SMC_BSA_SCL	SMB_55S	SMB	SMBUS_SMC_BSA_SCL	48
SMBUS_SMC_BSA_SDA	SMB_55S	SMB	SMBUS_SMC_BSA_SDA	48
SMBUS_SMC_MGMT_SCL	SMB_55S	SMB	SMBUS_SMC_MGMT_SCL	48
SMBUS_SMC_MGMT_SDA	SMB_55S	SMB	SMBUS_SMC_MGMT_SDA	48

Clock & SMC Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE NONE	SHT 88 OF 92	

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

NET_TYPE ELECTRICAL_CONSTRAINT_SET	PHYSICAL	SPACING		
FW_D_CTL	FW_55S	FW	FW_LINK<7..0>	
FW_D_CTL	FW_55S	FW	FW_CTL<1..0>	
FW_LCLK	CLK_MED_55S	CLK_MED	CLKFW_LINK_LCLK	
	CLK_MED_55S	CLK_MED	CLKFW_PHY_LCLK	38 39
FW_PCLK	CLK_MED_55S	CLK_MED	CLKFW_LINK_PCLK	38 39
	CLK_MED_55S	CLK_MED	CLKFW_PHY_PCLK	
FW_LKON	FW_55S	FW	FW_LKON	
	FW_55S	FW	FW_LKON_R	
FW_LPS	FW_55S	FW	FW_LPS	38 39
FW_LREQ	FW_55S	FW	FW_LREQ	38 39
FW_PINT	FW_55S	FW	FW_PINT	38 39
FWPHY_CLK98P304M_XI	CLK_MED_55S	CLK_MED	CLK98P304M_FW_XI_R	
	CLK_MED_55S	CLK_MED	CLK98P304M_FW_XI	
FW_0_TPA	FW_110D	FW_TP	FW_0_TPA_P	39 41
FW_0_TPA	FW_110D	FW_TP	FW_0_TPA_N	39 41
FW_0_TPB	FW_110D	FW_TP	FW_0_TPB_P	39 41
FW_0_TPB	FW_110D	FW_TP	FW_0_TPB_N	39 41
FW_1_TPA	FW_110D	FW_TP	FW_1_TPA_P	39 41
FW_1_TPA	FW_110D	FW_TP	FW_1_TPA_N	39 41
FW_1_TPB	FW_110D	FW_TP	FW_1_TPB_P	39 41
FW_1_TPB	FW_110D	FW_TP	FW_1_TPB_N	39 41

Port 2 Not Used

FireWire Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/25/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE NONE	SHT 89 OF 92	

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	NET_TYPE SPACING	
FB_A_CLK_P	GDDR3_80D	GDDR3_CLK	FB_A_CLK_P<0> 70 71
	GDDR3_80D	GDDR3_CLK	FB_A_CLK_N<0> 70 71
FB_B_CLK_P	GDDR3_80D	GDDR3_CLK	FB_A_CLK_P<1> 70 71
	GDDR3_80D	GDDR3_CLK	FB_A_CLK_N<1> 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_MA<1..0> 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_MA<11..6> 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_BA<2..0> 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_RAS_L 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_CAS_L 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_WE_L 70 71
FB_AB_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_A_CKE 70 71
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_CS0_L 70 71
FB_AB_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_A_DRAM_RST 70 71
FB_A_CMD	GDDR3_50SE	GDDR3_CMD	FB_A_LMA<5..2> 70 71
FB_B_CMD	GDDR3_50SE	GDDR3_CMD	FB_A_UMA<5..2> 70 71
FB_A_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<0> 70 71
FB_A_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<1> 70 71
FB_A_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<2> 70 71
FB_A_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<3> 70 71
FB_A_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<0> 70 71
FB_A_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<1> 70 71
FB_A_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<2> 70 71
FB_A_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<3> 70 71
FB_A_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<7..0> 70 71
FB_A_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<15..8> 70 71
FB_A_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<23..16> 70 71
FB_A_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<31..24> 70 71
FB_A_DQM0	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<0> 70 71
FB_A_DQM1	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<1> 70 71
FB_A_DQM2	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<2> 70 71
FB_A_DQM3	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<3> 70 71
FB_B_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<4> 70 71
FB_B_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<5> 70 71
FB_B_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<6> 70 71
FB_B_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<7> 70 71
FB_B_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<4> 70 71
FB_B_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<5> 70 71
FB_B_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<6> 70 71
FB_B_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<7> 70 71
FB_B_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<39..32> 70 71
FB_B_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<47..40> 70 71
FB_B_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<55..48> 70 71
FB_B_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<63..56> 70 71
FB_B_DQM0	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<4> 70 71
FB_B_DQM1	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<5> 70 71
FB_B_DQM2	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<6> 70 71
FB_B_DQM3	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<7> 70 71

G84M Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING	
(CK505_DOT96)	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M 30
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_GATED 30 74
CK505_CLK27MSS	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS 30
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS_GATED 30 74
	LVDS_100D	LVDS	LVDS_L_CLK_P 7 75 79
	LVDS_100D	LVDS	LVDS_L_CLK_N 75 79
	LVDS_100D	LVDS	LVDS_L_DATA_P<3..0> 7 74 75 79
	LVDS_100D	LVDS	LVDS_L_DATA_N<3..0> 74 75 79
	LVDS_100D	LVDS	LVDS_U_CLK_P 75 79
	LVDS_100D	LVDS	LVDS_U_CLK_N 75 79
	LVDS_100D	LVDS	LVDS_U_DATA_P<3..0> 74 75 79
	LVDS_100D	LVDS	LVDS_U_DATA_N<3..0> 74 75 79
TMDS_CLK	TMDS_100D	TMDS	TMDS_CLK_P 75 78
TMDS_CLK	TMDS_100D	TMDS	TMDS_CLK_N 75 78
TMDS_DATA	TMDS_100D	TMDS	TMDS_DATA_P<5..0> 75 78
TMDS_DATA	TMDS_100D	TMDS	TMDS_DATA_N<5..0> 75 78
VGA_R_TV_C	VGA_50S	VGA	GPU_TV_C_VGA_R 74 78
VGA_G_TV_Y	VGA_50S	VGA	GPU_TV_Y_VGA_G 74 78
VGA_B_TV_COMP	VGA_50S	VGA	GPU_TV_COMP_VGA_B 74 78
	VGA_50S	VGA	GPU_VGA_R 74 75
	VGA_50S	VGA	GPU_VGA_G 74 75
	VGA_50S	VGA	GPU_VGA_B 74 75
	VGA_50S	VGA	GPU_TV_C 74 75
	VGA_50S	VGA	GPU_TV_Y 74 75
	VGA_50S	VGA	GPU_TV_COMP 74 75
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_HSYNC 75 78
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_VSYNC 75 78

GDDR3 FB C/D Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING	
FB_C_CLK_P	GDDR3_80D	GDDR3_CLK	FB_B_CLK_P<0> 70 72
	GDDR3_80D	GDDR3_CLK	FB_B_CLK_N<0> 70 72
FB_D_CLK_P	GDDR3_80D	GDDR3_CLK	FB_B_CLK_P<1> 70 72
	GDDR3_80D	GDDR3_CLK	FB_B_CLK_N<1> 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_MA<1..0> 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_MA<11..6> 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_BA<2..0> 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_RAS_L 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_CAS_L 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_WE_L 70 72
FB_CD_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_B_CKE 70 72
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_CS0_L 70 72
FB_CD_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_B_DRAM_RST 70 72
FB_C_CMD	GDDR3_50SE	GDDR3_CMD	FB_B_LMA<5..2> 70 72
FB_D_CMD	GDDR3_50SE	GDDR3_CMD	FB_B_UMA<5..2> 70 72
FB_C_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<0> 70 72
FB_C_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<1> 70 72
FB_C_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<2> 70 72
FB_C_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<3> 70 72
FB_C_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<0> 70 72
FB_C_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<1> 70 72
FB_C_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<2> 70 72
FB_C_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<3> 70 72
FB_C_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<7..0> 70 72
FB_C_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<15..8> 70 72
FB_C_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<23..16> 70 72
FB_C_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<31..24> 70 72
FB_C_DQM0	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<0> 70 72
FB_C_DQM1	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<1> 70 72
FB_C_DQM2	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<2> 70 72
FB_C_DQM3	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<3> 70 72
FB_D_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<4> 70 72
FB_D_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<5> 70 72
FB_D_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<6> 70 72
FB_D_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<7> 70 72
FB_D_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<4> 70 72
FB_D_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<5> 70 72
FB_D_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<6> 70 72
FB_D_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<7> 70 72
FB_D_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<39..32> 70 72
FB_D_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<47..40> 70 72
FB_D_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<55..48> 70 72
FB_D_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<63..56> 70 72
FB_D_DQM0	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<4> 70 72
FB_D_DQM1	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<5> 70 72
FB_D_DQM2	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<6> 70 72
FB_D_DQM3	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<7> 70 72

GPU (G84M) Constraints

SYNC_MASTER=M75_MLB SYNC_DATE=01/26/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 90 OF 92	

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SENSE_1TO1_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR
THERM_1TO1_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR

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

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

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

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

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

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

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

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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CLK_MED	FW_POWER	*	GND_P2MM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
LVDS	GND	*	GND_P2MM

Memory Constraint Relaxations

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

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

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

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_45S OVERRIDE	* OVERRIDE	OVERRIDE	OVERRIDE	0.100 MM OVERRIDE	2.54 MM OVERRIDE	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
PCIE_100D	*	100_DIFF_BGA
LVDS_100D	*	100_DIFF_BGA
TMDS_100D	*	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	?

M76 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE 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 80
(SATA_A_R2D)	SATA_100D	SATA	SATA_A_R2D_UF_N 80
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_P 80
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_N 80
(USB_EXTA)	USB_90D	USB	USB2_EXTA_MUXED_P 43
(USB_EXTA)	USB_90D	USB	USB2_EXTA_MUXED_N 43
(USB_EXTA)	USB_90D	USB	USB2_RT_P 43
(USB_EXTA)	USB_90D	USB	USB2_RT_N 43
(USB_EXTD)	USB_90D	USB	USB_WWAN_F_P 7 44
(USB_EXTD)	USB_90D	USB	USB_WWAN_F_N 7 44
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_P 7 44
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_N 7 44
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	GFXIMVP6_VSEN_P 60
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	NBCOREISNS_P 50
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	P1V8ISNS_P 50
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	P1V25ISNS_P 50
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	CPUTHMSNS_D2_P 7 51
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	CPU_THERMD_P 10 51
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	GPUTHMSNS_D_P 51
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	GPU_TDIODE_P 51 74
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	HSTHMSNS_D_P 7 51
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	REMTHMSNS_DX_P
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	RSFSTHMSNS_D_P 7 51
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_P 77
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_N 77
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_P 77 79
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_N 77 79
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_P<3..0> 77 79
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_N<3..0> 77 79
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_P 77 79
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_N 77 79
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_P<3..0> 77 79
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_N<3..0> 77 79
	TMDS_100D	TMDS	TMDS_CLK_R_P 78
	TMDS_100D	TMDS	TMDS_CLK_R_N 78
	TMDS_100D	TMDS	TMDS_CLK_F_P 78
	TMDS_100D	TMDS	TMDS_CLK_F_N 78
	TMDS_100D	TMDS	TMDS_DATA_F_P<5..0> 78
	TMDS_100D	TMDS	TMDS_DATA_F_N<5..0> 78
(VGA_R_TV_Y)	VGA_50S	VGA	VGA_R 78
(VGA_G_TV_C)	VGA_50S	VGA	VGA_G 78
(VGA_B_TV_COMP)	VGA_50S	VGA	VGA_B 78
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC_R 78
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC_R 78
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC 78
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC 78
		PP1V8_MEM	=PP1V8_S3M_MEM_A 8 31
		PP1V8_MEM	=PP1V8_S3M_MEM_B 8 32
		GND	GND
		SB_POWER	PP3V3_S5 8
		SB_POWER	PP3V3_S0 8 66
		SB_POWER	PP1V5_S0 8
1113	WWAN_SIM	WWAN_SIM	WWAN_SIM_CLOCK 44
1113	WWAN_SIM	WWAN_SIM	WWAN_SIM_DATA 44

ENET_POWER

FW_POWER

M76 Specific Constraints

SYNC_MASTER=M76_MLB SYNC_DATE=02/02/2007

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SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0
SCALE: NONE	SHT 91 OF 92	

M75/M76 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			0.125 MM
100_DIFF_BGA	ISL9,ISL10	Y		0.075 MM			0.125 MM
100_DIFF_BGA	ISL2,ISL11	Y		0.085 MM			0.140 MM
100_DIFF_BGA	TOP,BOTTOM	Y		0.085 MM			0.140 MM

NOTE: 100_DIFF_BGA is for select 100-ohm differential pairs with routing difficulties through BGAs.
Default width/spacing is 100-ohm differential, but pairs can neck to 95-ohms without DRC.

M75/M76 Rule Definitions

SYNC_MASTER=M76_MLB SYNC_DATE=02/02/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7261	A.0.0

SCALE	SHT	OF
NONE	92	92