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.

OROYA

03/20/2007 - DVT

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

Page (.csa)		Contents	Sync Date
1	1	Table of Contents	N/A N/A
2	2	System Block Diagram	(T9_MLB) 08/23/2006
3	3	Power Block Diagram	(T9_MLB) 08/23/2006
4	4	Power Block Diagram	N/A N/A
5	5	BOM Configuration	N/A N/A
6	6	Revision History	N/A N/A
7	7	Functional / ICT Test	(MASTER) (MASTER)
8	8	Power Aliases	(MASTER) (MASTER)
9	9	Signal Aliases	(T9_MLB) 08/23/2006
10	10	CPU FSB	T9_NOME 03/16/2007
11	11	CPU Power & Ground	T9_NOME 03/16/2007
12	12	CPU Decoupling & VID	M76_MLB 03/19/2007
13	13	eXtended Debug Port (XDP)	T9_NOME 12/12/2006
14	14	NB CPU Interface	T9_NOME 03/16/2007
15	15	NB PEG / Video Interfaces	T9_NOME 03/16/2007
16	16	NB Misc Interfaces	T9_NOME 03/16/2007
17	17	NB DDR2 Interfaces	T9_NOME 03/16/2007
18	18	NB Power 1	T9_NOME 03/16/2007
19	19	NB Power 2	T9_NOME 03/16/2007
20	20	NB Grounds	T9_NOME 03/16/2007
21	21	NB Standard Decoupling	T9_NOME 01/17/2007
22	22	NB Graphics Decoupling	M76_MLB 03/12/2007
23	23	SB Enet, Disk, FSB, LPC	T9_NOME 03/16/2007
24	24	SB PCI, PCIe, DMI, USB	T9_NOME 03/16/2007
25	25	SB Pwr Mgt, GPIO, Clink	T9_NOME 03/16/2007
26	26	SB Power & Ground	T9_NOME 03/16/2007
27	27	SB Decoupling	T9_NOME 01/17/2007
28	28	SB Misc	(T9_MLB) 08/24/2006
29	29	Clock (CK505)	T9_NOME 03/16/2007
30	30	Clock Termination	(MASTER) 08/23/2006
31	31	DDR2 SO-DIMM Connector A	(M59_SYNC) 08/24/2006
32	32	DDR2 SO-DIMM Connector B	(M59_SYNC) 08/24/2006
33	33	Memory Active Termination	(T9_NOME) 11/14/2006
34	34	Left I/O Board Connector	(M59_SYNC) 08/24/2006
35	37	Ethernet (Yukon)	T9_NOME 03/16/2007
36	38	Yukon Power Control	T9_NOME 03/16/2007
37	39	Ethernet Connector	M76_MLB 03/19/2007
38	40	FireWire Link (TSB83AA22)	M76_MLB 03/19/2007
39	41	FireWire PHY (TSB83AA22)	M76_MLB 03/19/2007
40	42	FireWire Port Power	M76_MLB 03/19/2007
41	43	FireWire Ports	M76_MLB 03/19/2007
42	44	PATA Connector	(MASTER) (MASTER)
43	46	External USB Connector	M76_MLB 03/19/2007
44	47	Left Clutch Barrel Interconnect	M76_MLB 03/19/2007
45	49	SMC	T9_NOME 01/17/2007
46	50	SMC Support	(MASTER) (MASTER)
47	51	LPC+ Debug Connector	M76_MLB 03/19/2007
48	52	SMBus Connections	(MASTER) (MASTER)
49	53	Current & Voltage Sensing	(MASTER) (MASTER)
50	54	Current Sensing	(MASTER) (MASTER)
51	55	Thermal Sensors	(MASTER) (MASTER)
52	56	Fan Connectors	M76_MLB 03/19/2007
53	58	ALS Support	M76_MLB 03/19/2007
54	59	Sudden Motion Sensor (SMS)	M76_MLB 03/19/2007
55	61	SPI BootROM	T9_NOME 03/16/2007
56	69	PBus-In & Battery Connectors	(M59_SYNC) 09/09/2006
57	70	Power FETs	M76_MLB 03/19/2007
58	71	IMVP6 CPU VCore Regulator	M76_MLB 01/23/2007
59	72	IMVP6 NB Gfx Core Regulator	M76_MLB 03/19/2007
60	73	5V / 3.3V Power Supply	M76_MLB 03/19/2007
61	74	1.25V / 1.05V Power Supply	M76_MLB 03/12/2007
62	75	1.8V DDR2 Supply	M76_MLB 03/19/2007
63	76	1.5V Power Supply	M76_MLB 03/12/2007
64	77	FW PHY Power Supplies	M76_MLB 03/19/2007
65	78	3.425V G3Hot Supply & Power Control	(MASTER) (MASTER)
66	80	NV G84M PCI-E	(MASTER) (MASTER)
67	81	NV G84M Core/FB Power	(MASTER) (MASTER)
68	82	NV G84M Frame Buffer I/F	(MASTER) (MASTER)
69	84	GDDR3 Frame Buffer A	(MASTER) (MASTER)
70	85	GDDR3 Frame Buffer B	(MASTER) (MASTER)
71	86	NV G84M GPIO/MIO/Misc	(MASTER) (MASTER)
72	87	GPU Straps	(MASTER) (MASTER)
73	88	NV G84M Video Interfaces	(MASTER) (MASTER)
74	89	GPU (G84M) Core Supply	(MASTER) (MASTER)
75	90	LVDS Display Connector	(MASTER) (MASTER)
76	94	DVI Display Connector	(MASTER) (MASTER)
77	95	LVDS Interface Mux	(MASTER) (MASTER)
78	96	M75 Specific Connectors	(M59_SYNC) 08/24/2006
79	100	CPU/FSB Constraints	T9_NOME 01/17/2007
80	101	NB Constraints	T9_NOME 01/17/2007
81	102	Memory Constraints	T9_NOME 01/17/2007
82	103	SB Constraints (1 of 2)	T9_NOME 01/17/2007
83	104	SB Constraints (2 of 2)	T9_NOME 01/17/2007
84	105	Clock & SMC Constraints	T9_NOME 01/17/2007
85	106	FireWire Constraints	T9_NOME 01/17/2007
86	107	GPU (G84M) Constraints	(MASTER) (MASTER)
87	108	M75 Specific Constraints	(MASTER) (MASTER)
88	109	M75 Rule Definitions	(MASTER) (MASTER)

ALIASES RESOLVED

Schematic / PCB #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-7225	1	SCHEM,MLB,M75	SCH	CRITICAL	
820-2101	1	PCBF,MLB,M75	PCB	CRITICAL	

DRAWING
TITLE=MLB
ABBREV=DRAWING
LAST_MODIFIED=Tue Mar 20 20:28:27 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,OROYA,M75

DRAWING NUMBER 051-7225
REV 14.0.0
SHT 1 OF 88

T9 Diagram -- Needs to be updated to M75

U1000
CPU
2.? GHz
Core ~1.2V
Pg 10
Pg 9

J1300/JD000
ITP/XDP CONN
Pg 12/103

U2900
CK 505
Clocks Pg 28 | TERMS Pg 29

UC500
ReGen
Clocks Pg 98 | TERMS Pg 98

FSB
64-Bit
800/1066? MHz

J8000
PEG Connector
Pg 77

x16 PCI-E
SDVO

Pg 13
U1400
NB-GMCH
Core
1.05 - 1.25V
Pg 17,18,19

PCI-E Pg 14
TV Out RGB LVDS Pg 14
Main Memory Pg 15/16
Misc Pg 15
DMI Pg 15
CLnk 0 Pg 15

DDR2 - Dual Channel
1.8V - 64 Bits
533/667/800? MHz

J3100
J3200
DIMM
Pg30,31

Parallel Term
Pg 32

J6900/50
DC/Batt Conn
Pg 66

Power Supply
Pg 68-76

J5810/20/90 ALS SENS Pg 55

Temp Sense
CPU U5572 Pg 51
GPU U5500 Pg 52
Right Side U5550 Pg 52
Charger U??? Pg ??

U5920 Sudden Motion Detect Pg 56

Power Sense Pg 51, 115-120

J5600/10/50/60, J5720/30/50
Fan Conn Pg 53, 54

J9400
GPIO
DVI-I
MUX
U9120
Pg 79,81

J9000/10
Int Disp Conn
Pg 78

U9250/60 GPIO Pg 80
MUX
J9200

J9200 Source is the LVDS
from the PEG based GPU.

x4 DMI
2.5 GHz

U6100/50
SPI
Boot ROM
Pg 58

A B,0 BSA BSB ADC Fan Ser Prt
SMC
U4900 Pg 46

U6000
TPM
Pg 57

J5100
LPC Conn
Pg 48

Linda Fnc
Prt 80, Comm 1, SMC, FWH
Pg 124-130

J4510/20/30
SATA Conn
Pg 43

1.2 V / 1.5 GHz

DMI Pg 23
CLnk 0 Pg 24
SPI Pg 23
LPC Pg 22

U2300
SB-ICH8
Core 1.05V

SATA-0 SATA-1 SATA-2
SATA Pg 22
UATA Pg 22
PCI-E Pg 23
GPIOs Pg 24
USB Pg 23 1 2 3 4 5 6 7 8 9
SMB Pg 24

J4400
UATA Conn
Pg 42

3.3 V
100 MHz

6 - x1
2.5 GHz

JB200 JB300 JB400
PCI-E Conns
Pg 93/4/5

UB100
PCI-E MUX
Pg 92

Ln1 Ln2 Ln3 Ln4 Ln5 Ln6

Core Pg 25
E-NET Pg 22
CLnk 1 Pg 24
PCI Pg 23
AZALIA Pg 22

J4630 J4600
USB Connectors
Pg 44

J4710
Camera/IR
Pg 45

J4720
Bluetooth
Pg 45

J4700
Geyser
Trackpad/Keyboard
Pg 45

DIMM's J3100 J3200
Clk Gen U2900 UC500

33 MHz
32-Bit

U4000
TSB82AA2
FW-Link
Pg 38

100 MHz
8-Bit

U4100
TSB81BA3
FW-PHY
Pg 39

U3700
NINEVEH
E-NET
Pg 35

U6200
Audio Codec
Pg 59

U????
MDC
Pg ??

U6300/1
Line In Amp
Pg 60

U6400
Line Out Amp 1
Pg 61

U6500
Line Out Amp 2
Pg 62

U6600/10/20
Speaker Amps
Pg 63

J6800/1/2/3
Audio Conns
Pg 65

J3400
Mini PCI-E AirPort
Pg 33

JB500
PCI-E Conn
Pg 96

J4630
E-NET Conn
Pg 37

J4320 J4330
FireWire Conn
Pg 41

JB000
PCI Conn
Pg 91

System Block Diagram

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

NOTICE OF PROPRIETARY PROPERTY

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 2 OF 88	

Power Block Diagram

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 3 OF 88	

Power Block Diagram

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	4	88

BOM Variants

BOM NUMBER	BOM NAME	BOM OPTIONS
630-7931	PCBA,OROYA1,M75	M75_COMMON,EEE_X5D,CPU_2_2GHZ,FB_128_SAMSUNG
630-7932	PCBA,OROYA2,M75	M75_COMMON,EEE_X5E,CPU_2_4GHZ,FB_256_SAMSUNG
630-8659	PCBA,OROYA1,VRAM-HY,M75	M75_COMMON,EEE_XXS,CPU_2_2GHZ,FB_128_HYNIX
630-8662	PCBA,OROYA2,VRAM-HY,M75	M75_COMMON,EEE_XXT,CPU_2_4GHZ,FB_256_HYNIX

M75 BOM Groups

BOM GROUP	BOM OPTIONS
M75_COMMON	ALTERNATE,COMMON,M75_COMMON1,M75_COMMON2,M75_DEBUG,M75_PROGPARTS
M75_COMMON1	EXTGPU_RST_HW,GPU_TMP401,ISL9504B,LVDS_SEL_RESUME,ONEWIRE_PU
M75_COMMON2	P1V8S3_1V825,SLG2AP101,SMS_MOT_DIS,YUKON_ULTRA,VGA_TERM_CONN
M75_DEBUG	SMC_DEBUG_YES,XDP,XDP_CONN,LPCPLUS
M75_PROGPARTS	BOOTROM_PROG,SMC_PROG

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

Bar Code Labels / EEE #’s

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

Module Parts

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
337S3457	1	IC,MDC,SR,E1,QS,2.2G,35W,800FSB,4M,BGA	U1000	CRITICAL	CPU_2_2GHZ
337S3458	1	IC,MDC,SR,E1,QS,2.4G,35W,800FSB,4M,BGA	U1000	CRITICAL	CPU_2_4GHZ
338S0388	1	IC,GPU,NV G84M,BGA	U8000	CRITICAL	
338S0426	1	IC,NB,CRESTLINE,GM,C0,QS,965PM	U1400	CRITICAL	
338S0427	1	IC,SB,ICH8M,B1,QS,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 CLCK 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
341S2004	1	IC,SMC,DEVELOPMENT,M75	U4900	CRITICAL	SMC_PROG
335S0384	1	IC,16MBIT 8-PIN SPI SERIAL FLASH,SOIC8	U6100	CRITICAL	BOOTROM_BLANK
341S2002	1	IC,EFI ROM,DEVELOPMENT,M75	U6100	CRITICAL	BOOTROM_PROG

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

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

BOM Configuration

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE NONE SHT 5 OF 88

PROTO

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

EVT

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

EVT_SE

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

DVT

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

DVT (cont'd)

12.8.0:
03/08/07 -- Thermal Sensors: Added R5515/R5516 in case low pass filter is needed for EMC1033
13.0.0:
03/12/07 -- Power Control: Corrected alias connections for 5V/3V3 S5 enable signals
13.1.0:
03/13/07 -- BOM Options: Removed HDCP BOM option from stuffing list (feature removed)
03/14/07 -- Constraints: Constrained WWAN_SIM signals to 50 ohms
03/14/07 -- Thermal Sensors/Aliases: Changed mounting pads of Th2H sensor connector to left clutch chassis gnd
13.2.0:
03/16/07 -- Thermal Sensors: Replaced EMC1033 with second EMC1043 for improved noise filtering
03/16/07 -- NB GFX: LVDS_VREFL/VREFH changed to single pin nets to prevent LVDS glitches per Intel
03/16/07 -- Yukon Power Control: Crystal caps changed to 18pF (rdar://4946795 and rdar://4945362)
13.3.0:
03/16/07 -- Thermal Sensors: Moved remote sensor U5500 to SMC SMBus "A" and S3 power rail to clear I2C addr clash
13.4.0:
03/19/07 -- Thermal Sensors: Updated U5500 power alias to indicate device should be on S3 rail
03/19/07 -- Power Control: Added U7858 to level shift PM_G2_EN from 3.42V to 5V
03/19/07 -- Power Supplies: For 1.8, 3.3 and 5V, removed VBST 0-ohm series R (rdar://5070179)
03/19/07 -- Power Supplies: For 1.8, 3.3 and 5V, increased cap size to 0603/0805 on VBST caps (rdar://5070179)
13.5.0:
03/19/07 -- Power Control: Tied all 4 5V/3.3V enables (EN1, EN2, EN3, EN5) together as part of PM_G2_EN
14.0.0:
03/20/07 -- GPU Vcore: Updated setpoints for GPU Vcore based upon Nvidia Vmin (i.e. 1.05V,1.05V,1.05V,1.125V)
03/20/07 -- FB: Changed FB VREF caps to 2x0.0047uF as required in Nvidia PUN 02736-001-v07 (which requests 1x0.01uF)

Revision History

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

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Functional Test Points

Fan Connectors

FUNC_TEST

TRUE	PP5V_S0	7 8 27 42 47 52 57 58 59 65 76 78
TRUE	FAN_LT_PWM	52
TRUE	FAN_LT_TACH	52
TRUE	FAN_RT_PWM	52
TRUE	FAN_RT_TACH	52

Battery Digital Connector

FUNC_TEST

TRUE	SMC_BS_ALRT_L	45 46 56
TRUE	SMBUS_SMC_BSA_SCL	45 48 56 84
TRUE	SMBUS_SMC_BSA_SDA	45 48 56 84
TRUE	GND_BATT	56

LPC+ Debug Connector

FUNC_TEST

TRUE	PP3V42_G3H	6 20 34 43 45 46 47 56 65 78
TRUE	PP5V_S0	7 8 27 42 47 52 57 58 59 65 76 78
TRUE	LPC_AD<0>	23 45 47
TRUE	LPC_AD<1>	23 45 47
TRUE	LPC_FRAME_L	23 45 47
TRUE	PM_CLKRUN_L	25 45 47
TRUE	PCI_FW_GNT_L	24 38 47 83
TRUE	SMC_TMS	45 46 47
TRUE	DEBUG_RESET_L	28 47
TRUE	SMC_TRST_L	45 47
TRUE	SMC_TDO	45 46 47
TRUE	SMC_MD1	45 47
TRUE	SMC_TX_L	43 45 46 47
TRUE	FWH_INIT_L	47
TRUE	PCI_CLK33M_LPCPLUS	30 47 84
TRUE	LPC_AD<2>	23 45 47
TRUE	LPC_AD<3>	23 45 47
TRUE	INT_SERIRQ	25 45 47
TRUE	PM_SUS_STAT_L	25 45 46 47
TRUE	SMC_TDI	45 46 47
TRUE	SMC_TCK	45 46 47
TRUE	SMC_RESET_L	45 46 47
TRUE	SMC_NMI	45 47
TRUE	SMC_RX_L	43 45 46 47
TRUE	LINDACARD_GPIO	25 47

Left I/O Power Connector

FUNC_TEST

TRUE	PPBUS_G3H	8 40 49 56 57 58 59 60 61 62 63 74
TRUE	GND	

Request for at least 10 GND test points

NOTE: 10 additional GND test points are called out separately in these notes.

RTC Battery Connector

FUNC_TEST

TRUE	PPVBATT_G3_RTC	28
TRUE	GND	

Current Sense Calibration

FUNC_TEST

TRUE	ISENSE_CAL_EN	45 49
TRUE	PP5V_S3	7 8 44 46 49 53 57 78
TRUE	PPVCORE_S0_NB_GFX	8 18 22 59
TRUE	PPVCORE_S0_CPU	8 11 12 49 58
TRUE	PPVCORE_GPU	8 49 67 74
TRUE	GND	

2 TPs per

6 TPs, 2 with each of above TP pairs

Left ALS Connector

FUNC_TEST

TRUE	PP3V3_S3	8 36 38 48 50 51 53 54 57 78
TRUE	ALS_GAIN	45 53 78
TRUE	LTALS_OUT	53 78
TRUE	GND	

Left Clutch Barrel Connector

FUNC_TEST

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

Thermal Diode Connectors

FUNC_TEST

TEST	TRUE	HSTHMSNS_D_P	51 87
TEST	TRUE	HSTHMSNS_D_N	51
	TRUE	RSFSTHMSNS_D_P	51 87
	TRUE	RSFSTHMSNS_D_N	51
		CPUTHMSNS_D2_P	51 87
		CPUTHMSNS_D2_N	51

CPUTHMSNS can not be supported due to layout constraints

Other Func Test Points

FUNC_TEST

TRUE	PM_SYSRST_L	25 28 45
TRUE	SMC_ONOFF_L	45 46 78

System Validation TPs

FUNC_TEST

TRUE	CPU_PWRGD	10 13 23 79
TRUE	CPU_DPSLP_L	7 10 23 79
TRUE	PM_DPRSLPVR	16 25 58 79
TRUE	CPU_DPSLP_L	7 10 23 79
TRUE	PM_LAN_ENABLE	25 45
TRUE	PCI_RST_L	24 28
TRUE	PM_RSMRST_L	25 45
TRUE	PM_SB_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 58
TRUE	FSB_CPURST_L	10 13 14 79
TRUE	FSB_CPUSLP_L	10 14 79
	FSB_DPWR_L	10 14 79
TRUE	NB_SB_SYNC_L	16 25

FUNC_TEST

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

ICT Test Points

CPU FSB NO_TESTs

NO_TEST

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

NB NO_TESTs

NO_TEST

TRUE	NC_NB_NC<1..16>	TP_NB_NC<1..16>	16

GPU NO_TESTs

NO_TEST

TEST	TRUE	LVDS_L_DATA_N<1>	73 77 86
TEST	TRUE	LVDS_L_DATA_N<2>	73 77 86
TEST	TRUE	LVDS_L_DATA_P<2>	73 77 86

Functional / ICT Test

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

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"G3Hot" (Always-Present) Rails

PPBUS_G3H
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=12.6V
MAKE_BASE=TRUE

PPDCIN_G3H
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=18.5V
MAKE_BASE=TRUE

PP3V42_G3H
MIN_LINE_WIDTH=0.3 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.42V
MAKE_BASE=TRUE

5V Rails

PP5V_S5
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE

PP5V_S3
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE

PP5V_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
MAKE_BASE=TRUE

Chipset "VCore" Rails

PPVCORE_S0_CPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.3 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE

PPVCORE_S0_NB_GFX
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE

3.3V-2.5V Rails

PP3V3_S5
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.42V
MAKE_BASE=TRUE

PP3V3_S3
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.42V
MAKE_BASE=TRUE

PP3V3_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.42V
MAKE_BASE=TRUE

PP1V25_ENET_ISNS
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE

1.8V-0.9V Rails

PP1V8_S3
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V8_S3_ISNS
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V8_S0
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE

MAX I = 0.36A

PP1V5_S0
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.5V
MAKE_BASE=TRUE

MAX I = ?.??A

PP1V25_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE

PP1V05_S0
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.05V
MAKE_BASE=TRUE

PPVCORE_S0_NB_R
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE

PP0V9_S3_MEM_VREF
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE

PP0V9_S0
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE

"ENET" Rails

PP3V3_ENET
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP1V9_ENET
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V25_ENET
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE

"FW" (FireWire) Rails

PPBUS_FW_FWPWRSW_F
MAKE_BASE=TRUE

PPVP_FW
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.3 mm
VOLTAGE=8.5V
MAKE_BASE=TRUE

PPVP_FW_PORTA_UF
MAKE_BASE=TRUE

PPVP_FW_PORTB_UF
MAKE_BASE=TRUE

PP3V3_FW
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP1V95_FW
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.95V
MAKE_BASE=TRUE

"GPU" Rails

PP3V3_GPU
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP3V3_GPU_TMDS
MIN_LINE_WIDTH=0.4 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=3.3V
MAKE_BASE=TRUE

PP1V8_GPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.8V
MAKE_BASE=TRUE

PP1V25_GPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.25V
MAKE_BASE=TRUE

PPVCORE_GPU
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=0.9V
MAKE_BASE=TRUE

GND
Yukon EC will not be supported

Power Aliases

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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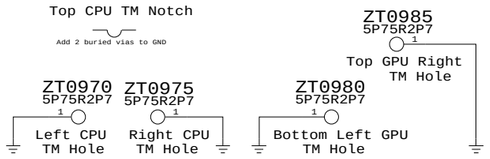
Thermal Module Holes



RAM Door (Torx) Holes

ZT0930 3P7R3P2 — GND

ZT0935 3P7R3P2 — GND

Frame Holes

ZT0920 3P2R2P7 — GND

ZT0940 3P7R3P2 — GND

Board Edge Notches (Can't be PTH)

ZT0945 HOLE-VIA-P5RP25 — GND

ZT0950 HOLE-VIA-P5RP25 — GND

ZT0955 3P2R2P7 — GND

ZT0965 3P2R2P7 — GND

Tooling Holes (Can't be PTH)

ZT0960 HOLE-VIA-P5RP25 — GND

ZT0990 HOLE-VIA-P5RP25 — GND_CHASSIS_DVI_TOP

Chassis GNDs

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

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

OMIT
R0910 1 2
SHORT
NONE
NONE
NONE
402

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

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

SH0925
0G-503040
SHLD-SM-LF

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

PM_SB_PWROK — PM_SB_PWROK
MAKE_BASE=TRUE

VR_PWRGOOD_DELAY — VR_PWRGOOD_DELAY
MAKE_BASE=TRUE

SMC_SMS_INT — SMC_SMS_INT
MAKE_BASE=TRUE

PEG_CLK100M_GPU_P — PEG_CLK100M_GPU_P
MAKE_BASE=TRUE

PEG_CLK100M_GPU_N — PEG_CLK100M_GPU_N
MAKE_BASE=TRUE

PM_ALL_NBGFX_PGOOD — PM_ALL_NBGFX_PGOOD
MAKE_BASE=TRUE

GFX_VR_EN — GFX_VR_EN
MAKE_BASE=TRUE

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

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

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

TP_USB_EXTCP — TP_USB_EXTCP
MAKE_BASE=TRUE

TP_USB_EXTCN — TP_USB_EXTCN
MAKE_BASE=TRUE

XW0900
SM
PP5V_S5 — PP5V_S5_P1V25S0FET — PP5V_S5_P1V25S0FET
MIN_LINE_WIDTH=0.1 mm
MIN_NECK_WIDTH=0.1 mm
VOLTAGE=5V
MAKE_BASE=TRUE
NO_TEST=TRUE

Digital Ground

GND
MIN_LINE_WIDTH=0.6MM
MIN_NECK_WIDTH=0.2MM
VOLTAGE=0V

Signal Aliases

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

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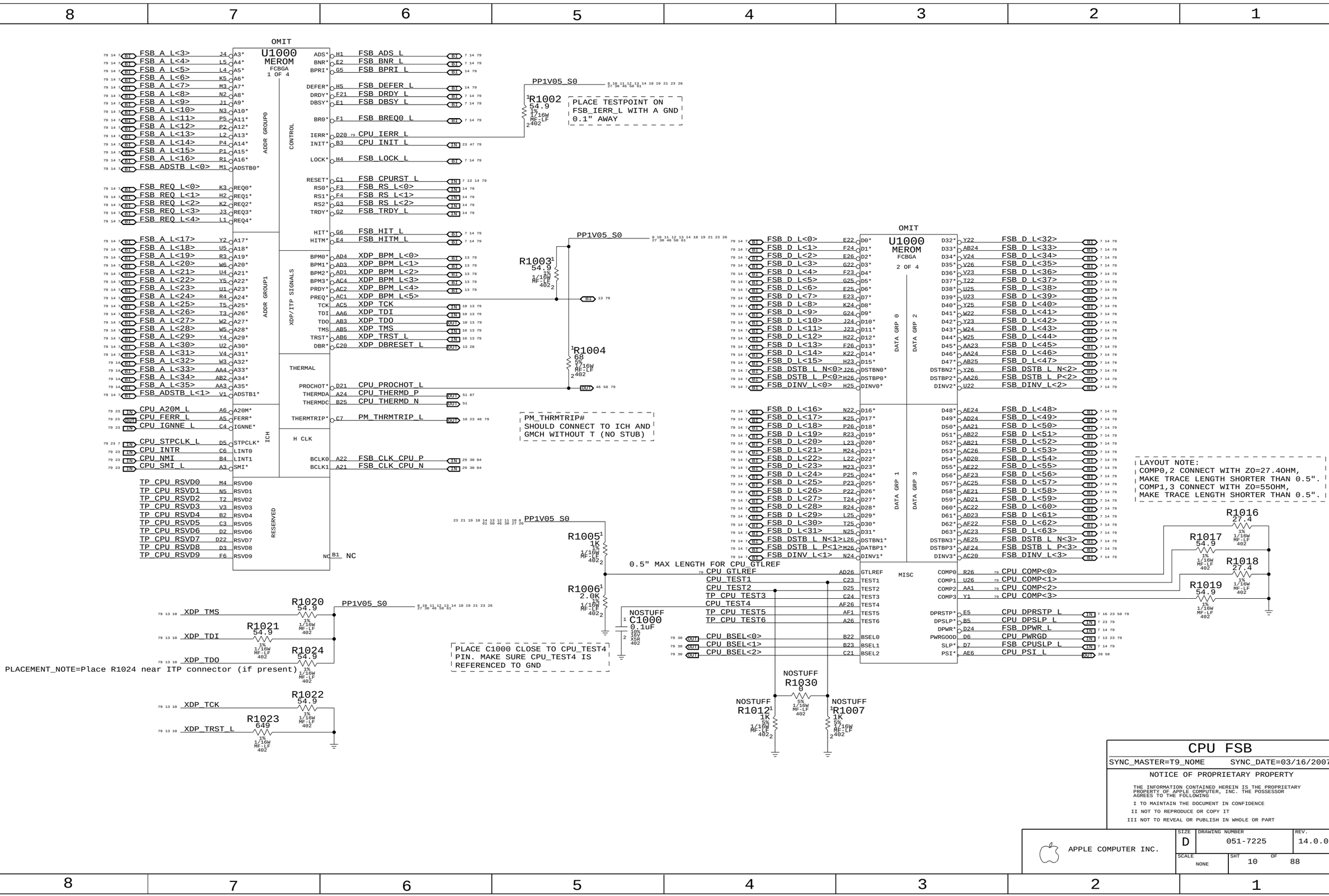
NONE	9	88



CPU FSB

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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(CPU CORE POWER)

PPVCORE_S0_CPU 7 8 11 12 49 58

Standard Voltage:	Low Voltage:	Ultra Low Voltage:
44.0 A (Design Target)	23.0 A (Design Target)	17.0 A (Design Target)
41.0 A (HFM)	21.0 A (HFM)	TBD A (HFM)
30.4 A (LFM)	18.7 A (LFM)	TBD A (LFM)
25.5 A (SuperLFM)	TBD A (SuperLFM)	
27.4 A (Auto-Halt/Stop-Grant HFM)	TBD A (Auto-Halt/Stop-Grant HFM)	TBD A (Auto-Halt/Stop-Grant HFM)
17.0 A (Auto-Halt/Stop-Grant SuperLFM)	TBD A (Auto-Halt/Stop-Grant SuperLFM)	TBD A (Auto-Halt/Stop-Grant LFM)
27.4 A (Sleep HFM)	TBD A (Sleep HFM)	TBD A (Sleep HFM)
16.8 A (Sleep SuperLFM)	TBD A (Sleep SuperLFM)	TBD A (Sleep LFM)
25.0 A (Deep Sleep HFM)	TBD A (Deep Sleep HFM)	TBD A (Deep Sleep HFM)
16.0 A (Deep Sleep SuperLFM)	TBD A (Deep Sleep SuperLFM)	TBD A (Deep Sleep LFM)
11.5 A (Deeper Sleep)	TBD A (Deeper Sleep)	TBD A (Deeper Sleep)
9.4 A (Enhanced Deeper Sleep)	TBD A (Enhanced Deeper Sleep)	TBD A (Enhanced Deeper Sleep)

OMIT
U1000
MEROM
FCBGA
3 OF 4

VCC: A7 A9 A10 A12 A13 A15 A17 A18 A20 B7 B9 B10 B12 B14 B15 B17 B18 B20 C9 C10 C12 C13 C15 C17 C18 D9 D10 D12 D14 D15 D17 D18 E7 E9 E10 E12 E13 E15 E17 E18 E20 F7 F9 F10 F12 F14 F15 F17 F18 F20 AA7 AA9 AA10 AA12 AA13 AA15 AA17 AA18 AA20 AB9 AC10 AB10 AB12 AB14 AB15 AB17 AB18

VCC: AB20 AB7 AC7 AC9 AC12 AC13 AC15 AC17 AC18 AD7 AD9 AD10 AD12 AD14 AD15 AD17 AD18 AE9 AE10 AE12 AE13 AE15 AE17 AE18 AE20 AF9 AF10 AF12 AF14 AF15 AF17 AF18 AE20

VCCP: G21 V6 J6 K6 M6 J21 K21 M21 N21 N6 R21 R6 T21 T6 V21 W21

(CPU IO POWER 1.05V)

PP1V05_S0 6 10 12 13 14 18 19 21 23 26 27 30 46 50 81

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

(CPU INTERNAL PLL POWER 1.5V)

PP1V5_S0 8 12 22 26 27 34 63 87

VCCA: B26 C26

130 mA

VID0	AD6	CPU_VID<0>	OUT 12 79
VID1	AF5	CPU_VID<1>	OUT 12 79
VID2	AE5	CPU_VID<2>	OUT 12 79
VID3	AF4	CPU_VID<3>	OUT 12 79
VID4	AE3	CPU_VID<4>	OUT 12 79
VID5	AF3	CPU_VID<5>	OUT 12 79
VID6	AE2	CPU_VID<6>	OUT 12 79

PPVCORE_S0_CPU 7 8 11 12 49 58

R1100
100
1%
1/16W
MF-LF
402
PLACEMENT_NOTE=Place within 1 inch of CPU, no stub.

VCCSENSE AF7 — CPU_VCCSENSE_P — OUT 58 79

VSSSENSE AE7 — CPU_VCCSENSE_N — OUT 58 79

R1101
100
1%
1/16W
MF-LF
402
PLACEMENT_NOTE=Place within 1 inch of CPU, no stub.

OMIT
U1000
MEROM
FCBGA
4 OF 4

VSS: A4 A8 A11 A14 A16 A19 A23 AF2 B6 B8 B11 B13 B16 B19 B21 B24 C5 C8 C11 C14 C16 C19 C2 C22 C25 D1 D4 D8 D11 D13 D16 D19 D23 D26 E3 E6 E8 E11 E14 E16 E19 E21 E24 F5 F8 F11 F13 F16 F19 F2 F22 F25 G4 G1 G23 G26 H3 H6 H21 H24 J2 J5 J22 J25 K1 K4 K23 K26 L3 L6 L21 L24 M2 M5 M22 M25 N1 N4 N23 N26 P3

VSS: P6 P21 P24 R2 R5 R22 R25 T1 T4 T23 T26 U3 U6 U21 U24 V2 V5 V22 V25 W1 W4 W23 W26 Y3 Y6 Y21 Y24 AA2 AA5 AA8 AA11 AA14 AA16 AA19 AA22 AA25 AB1 AB4 AB8 AB11 AB13 AB16 AB19 AB23 AB26 AC3 AC6 AC8 AC11 AC14 AC16 AC19 AC21 AC24 AD2 AD5 AD8 AD11 AD13 AD16 AD19 AD22 AD25 AE1 AE4 AE8 AE11 AE14 AE16 AE19 AE23 AE26 A2 AF6 AF8 AF11 AF13 AF16 AF19 AF21 A25 AF25

CPU Power & Ground

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

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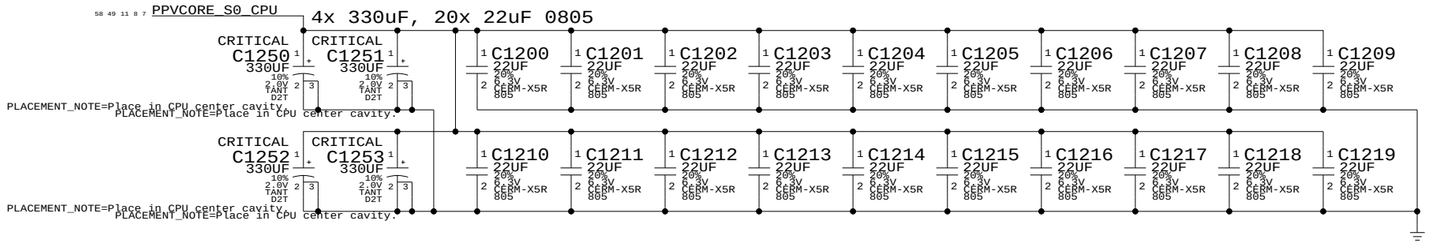
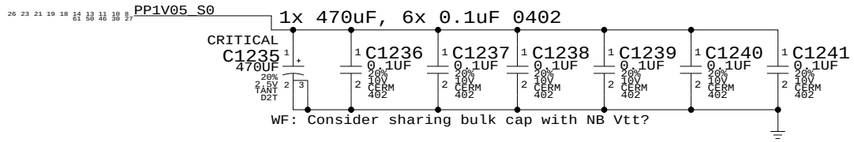
Current numbers from Merom for Santa Rosa EMTS, doc #22221.

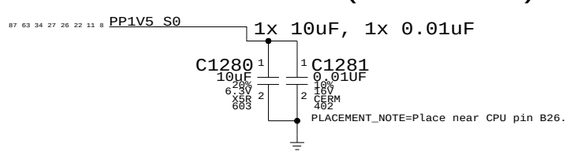
CPU VCORE HF AND BULK DECOUPLING



VCCP (CPU I/O) DECOUPLING



VCCA (CPU AVdd) DECOUPLING



CPU VCORE VID CONNECTIONS

79 11 CPU_VID<0..6> = IMVP6_VID<0..6> 7 58 79
MAKE_BASE=TRUE

CPU Decoupling & VID

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

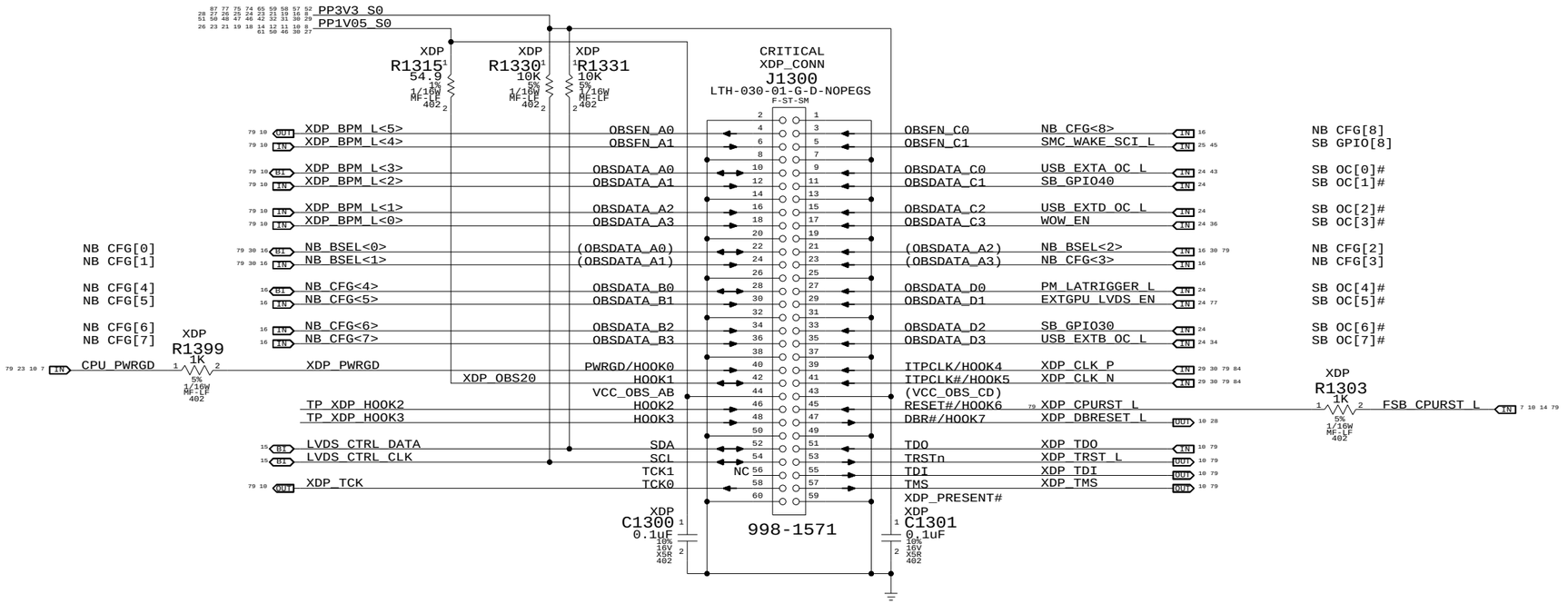
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 12 OF 88	

Mini-XDP Connector

NOTE: This is not the standard XDP pinout.

Use with 920-0451 adapter board to support CPU, NB & SB debugging.



Direction of XDP module

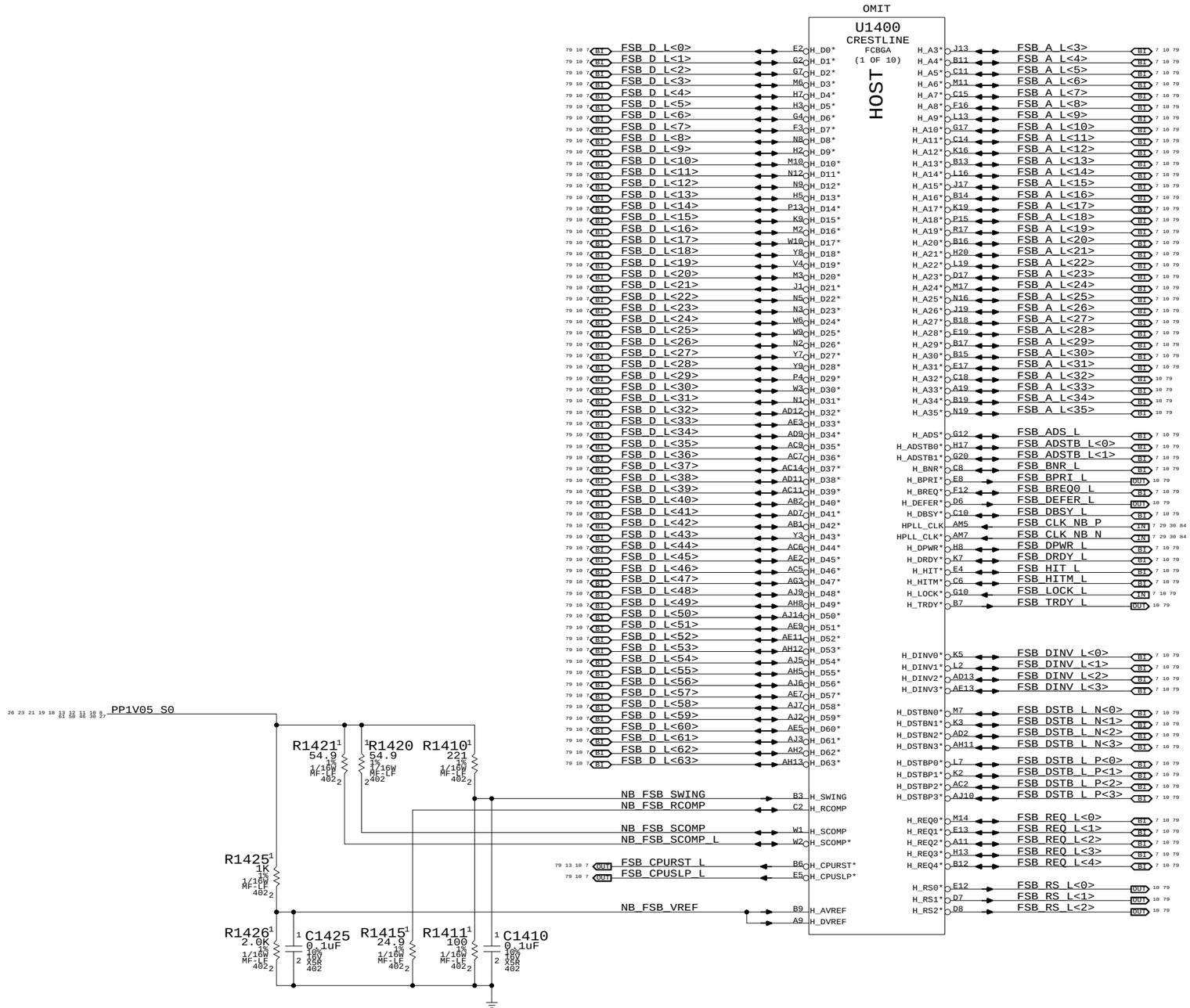
Please avoid any obstructions
on even-numbered side of J1300

eXtended Debug Port (XDP)

SYNC_MASTER=T9_NOME SYNC_DATE=12/12/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 13 OF 88	



NB CPU Interface

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 14 OF 88	

LVDS Disable

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

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

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

TV-Out Signal Usage:

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

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

TV-Out Disable / CRT Enable

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

CRT Disable / TV-Out Enable

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

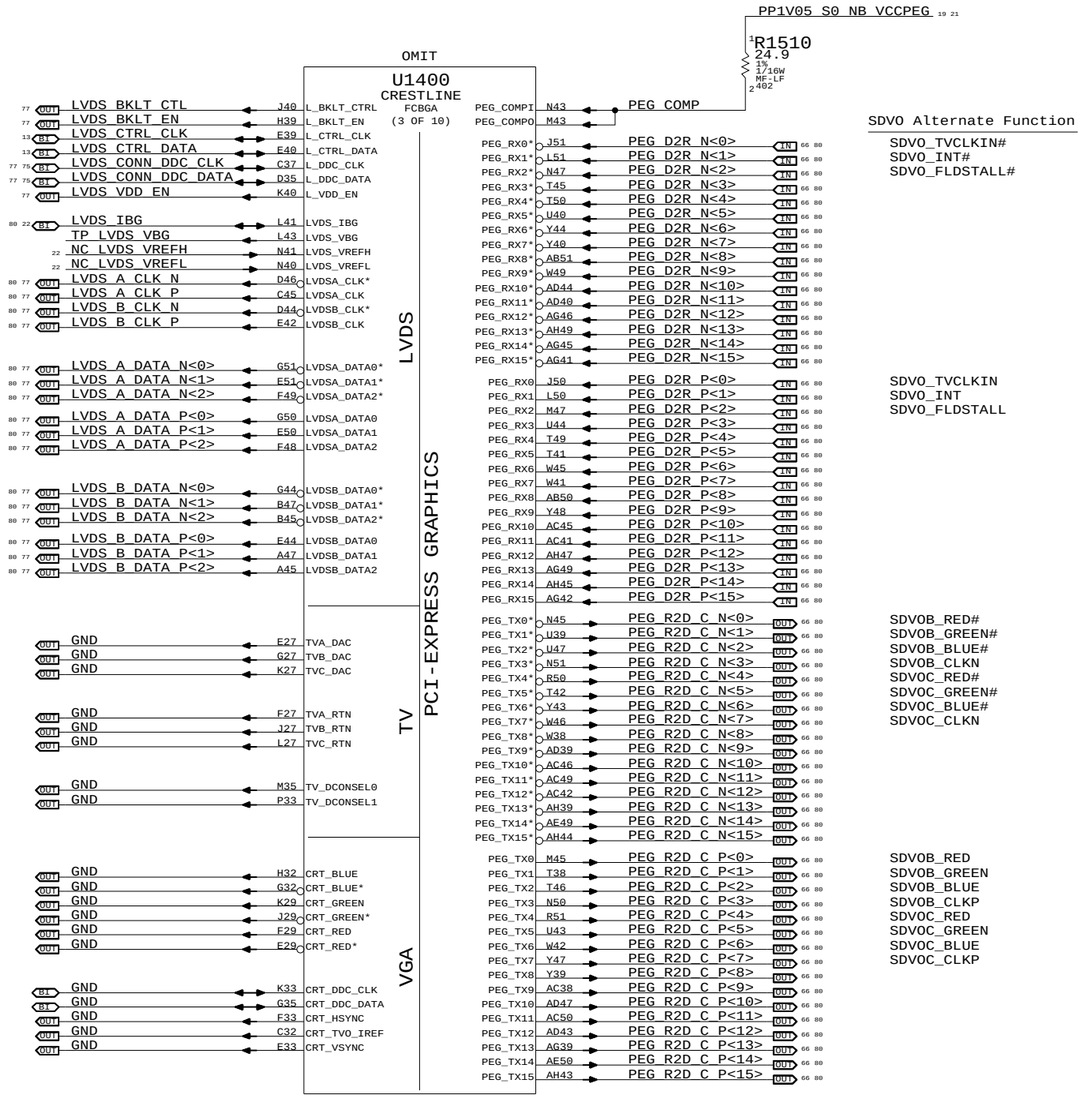
CRT & TV-Out Disable

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

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

Internal Graphics Disable

Follow instructions for LVDS and CRT & TV-Out Disable above.
Can also tie CRT_DDC_*, L_CTRL_*, L_DDC_*, SDVO_CTRL_* and TV_DCONSELx to GND.
Tie DPLL_REF_CLK and DPLL_REF_SSCLK to GND.
Tie DPLL_REF_CLK* and DPLL_REF_SSCLK* to VCC (VCore).
Tie VCCA_DPLLA and VCCA_DPLLB to VCC (VCore).
Tie VCC_AXG and VCC_AXG_NCTF to GND.
Leave GFX_VID<3..0> and GFX_VR_EN as NC.



NB PEG / Video Interfaces

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 15 OF 88	

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> → R1655 3.9K 5% 1/16W MF-LF 402 → 2

NB_CFG<9> → R1659 3.9K 5% 1/16W MF-LF 402 → 2

NB_CFG<16> → R1666 3.9K 5% 1/16W MF-LF 402 → 2

PP3V3_S0 → R1669 3.9K 5% 1/16W MF-LF 402 → 2 → NB_CFG<19>

PP3V3_S0 → R1670 3.9K 5% 1/16W MF-LF 402 → 2 → NB_CFG<20>

NB CFG<8:0> used for debug access

NB CFG<13:12> require ICT access

PP3V3_S0 → R1630 10K 5% 1/10W MF-LF 402 → 2; R1631 10K 5% 1/16W MF-LF 402 → 2

PM_EXTTS_L<0>

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
TP_NB_RSVD<24>	BF19	RSVD24
TP_NB_RSVD<25>	BH20	RSVD25
TP_NB_RSVD<26>	BK18	RSVD26
TP_NB_RSVD<27>	BJ18	RSVD27
TP_MEM_CLKP2	BF23	SM_CK2
TP_MEM_CLKN2	BG23	SM_CK2*
TP_MEM_CLKP5	BC23	SM_CK5
TP_MEM_CLKN5	BD24	SM_CK5*
MEM_A_A<14>	BJ29	SA_MA14
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

NB_BSEL<0>	P27	CFG0	
NB_BSEL<1>	N27	CFG1	
NB_BSEL<2>	N24	CFG2	
NB_CFG<3>	C21	CFG3	IPU
NB_CFG<4>	C23	CFG4	IPU
NB_CFG<5>	F23	CFG5	IPU
NB_CFG<6>	N23	CFG6	IPU
NB_CFG<7>	G23	CFG7	IPU
NB_CFG<8>	J20	CFG8	IPU
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
NB_CFG<16>	M20	CFG16	IPU
TP_NB_CFG<17>	M24	CFG17	IPU
TP_NB_CFG<18>	L32	CFG18	IPD
NB_CFG<19>	N33	CFG19	IPD
NB_CFG<20>	L35	CFG20	IPD

PM

PM_BMBUSY_L	G41	PM_BM_BUSY*
CPU_DPRSTP_L	L39	PM_DPRSTP*
	L36	PM_EXT_TS0*
	J36	PM_EXT_TS1*
VR_PWRGOOD_DELAY	AW49	PWROK
NB_RESET_L	AV20	RSTIN*
PM_THRMTRIP_L	N20	THERMTRIP*
PM_DPRSLPVR	G36	DPRSLPVR

NC

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

DDR MUXING

SM_CK0	AV29	MEM_CLK_P<0>
SM_CK1	BB23	MEM_CLK_P<1>
SM_CK3	BA25	MEM_CLK_P<3>
SM_CK4	AV23	MEM_CLK_P<4>
SM_CK0*	AW30	MEM_CLK_N<0>
SM_CK1*	BA23	MEM_CLK_N<1>
SM_CK3*	AW25	MEM_CLK_N<3>
SM_CK4*	AW23	MEM_CLK_N<4>
SM_CKE0	BE29	MEM_CKE<0>
SM_CKE1	AY32	MEM_CKE<1>
SM_CKE3	BD39	MEM_CKE<3>
SM_CKE4	BG37	MEM_CKE<4>
SM_CS0*	BG20	MEM_CS_L<0>
SM_CS1*	BK16	MEM_CS_L<1>
SM_CS2*	BG16	MEM_CS_L<2>
SM_CS3*	BE13	MEM_CS_L<3>
SM_ODT0	BH18	MEM_ODT<0>
SM_ODT1	BJ15	MEM_ODT<1>
SM_ODT2	BJ14	MEM_ODT<2>
SM_ODT3	BE16	MEM_ODT<3>
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_S3_MEM_VREF
SM_VREF1	AW4	PP0V9_S3_MEM_VREF

CLK

DPLL_REF_CLK	B42	GND
DPLL_REF_CLK*	C42	PPVCORE_S0_NB_R
DPLL_REF_SSCLK	H48	NB_CLK100M_DPLLSS_P
DPLL_REF_SSCLK*	H47	NB_CLK100M_DPLLSS_N
PEG_CLK	K44	NB_CLK100M_PCIE_P
PEG_CLK*	K45	NB_CLK100M_PCIE_N

Clk used for PEG and DMI

DMI

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

GRAPHICS VID

		GND
GFX_VID0	E35	GFX_VID<1>
GFX_VID1	A39	GFX_VID<2>
GFX_VID2	C38	GFX_VID<3>
GFX_VID3	B39	GFX_VID<4>
GFX_VR_EN	E36	GFX_VR_EN

ME

CL_CLK	AM49	CLINK_NB_CLK
CL_DATA	AK50	CLINK_NB_DATA
CL_PWROK	AT43	VR_PWRGOOD_DELAY
CL_RST*	AN49	CLINK_NB_RESET_L
CL_VREF	AM50	NB_CLINK_VREF

MISC

SDVO_CTRL_CLK	H35	GND
SDVO_CTRL_DATA	K36	GND
CLKREQ*	G39	NB_CLKREQ_L
ICH_SYNC*	G40	NB_SB_SYNC_L
TEST1	A37	NB_TEST1
TEST2	R32	NB_TEST2

R1691 20K 5% 1/16W MF-LF 402 → 2; R1690 0 5% 1/16W MF-LF 402 → 2

PP1V8_S3_ISNS → R1610 20 1% 1/10W MF-LF 402 → 2; R1620 1K 1% 1/16W MF-LF 402 → 2

C1623 0.01UF 10% 16V CERM 402; C1622 2.2UF 20% 6.3V CERM1 603

R1622 3.01K 1% 1/16W MF-LF 402 → 2

R1611 20 1% 1/10W MF-LF 402 → 2; R1624 1K 1% 1/16W MF-LF 402 → 2

C1625 0.01UF 10% 16V CERM 402; C1624 2.2UF 20% 6.3V CERM1 603

C1615 0.1UF 20% 10V CERM 402; C1616 0.1UF 20% 10V CERM 402

PP1V25_S0M_NB_VCCAXD → R1640 1K 1% 1/16W MF-LF 402 → 2

C1640 0.1uF 20% 10V CERM 402

R1641 392 1% 1/16W MF-LF 402 → 2

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.

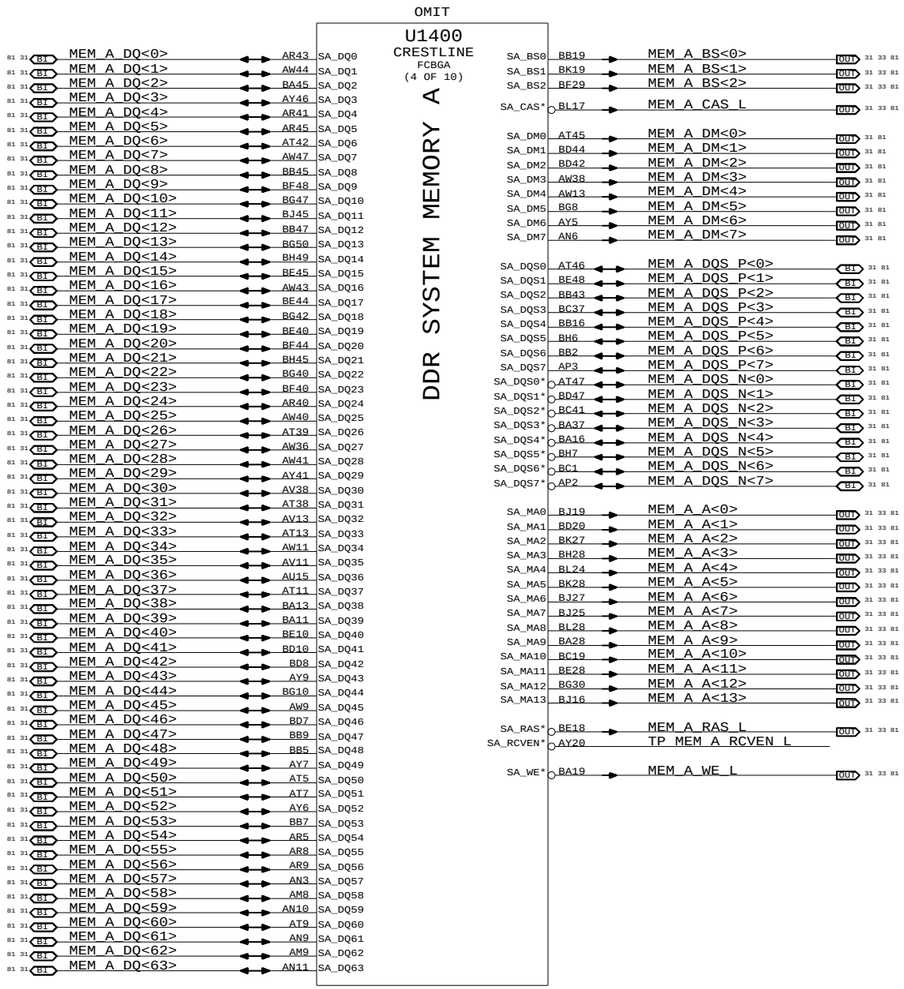
NB Misc Interfaces

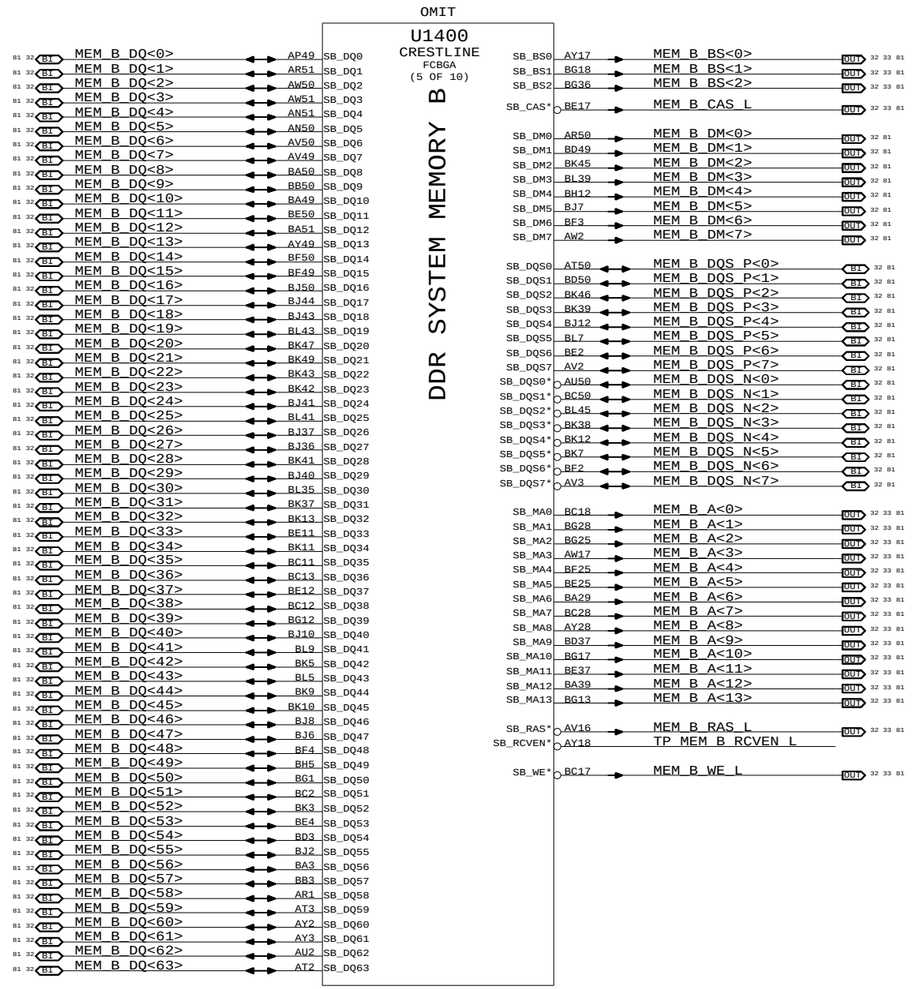
SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE: NONE SHT 16 OF 88



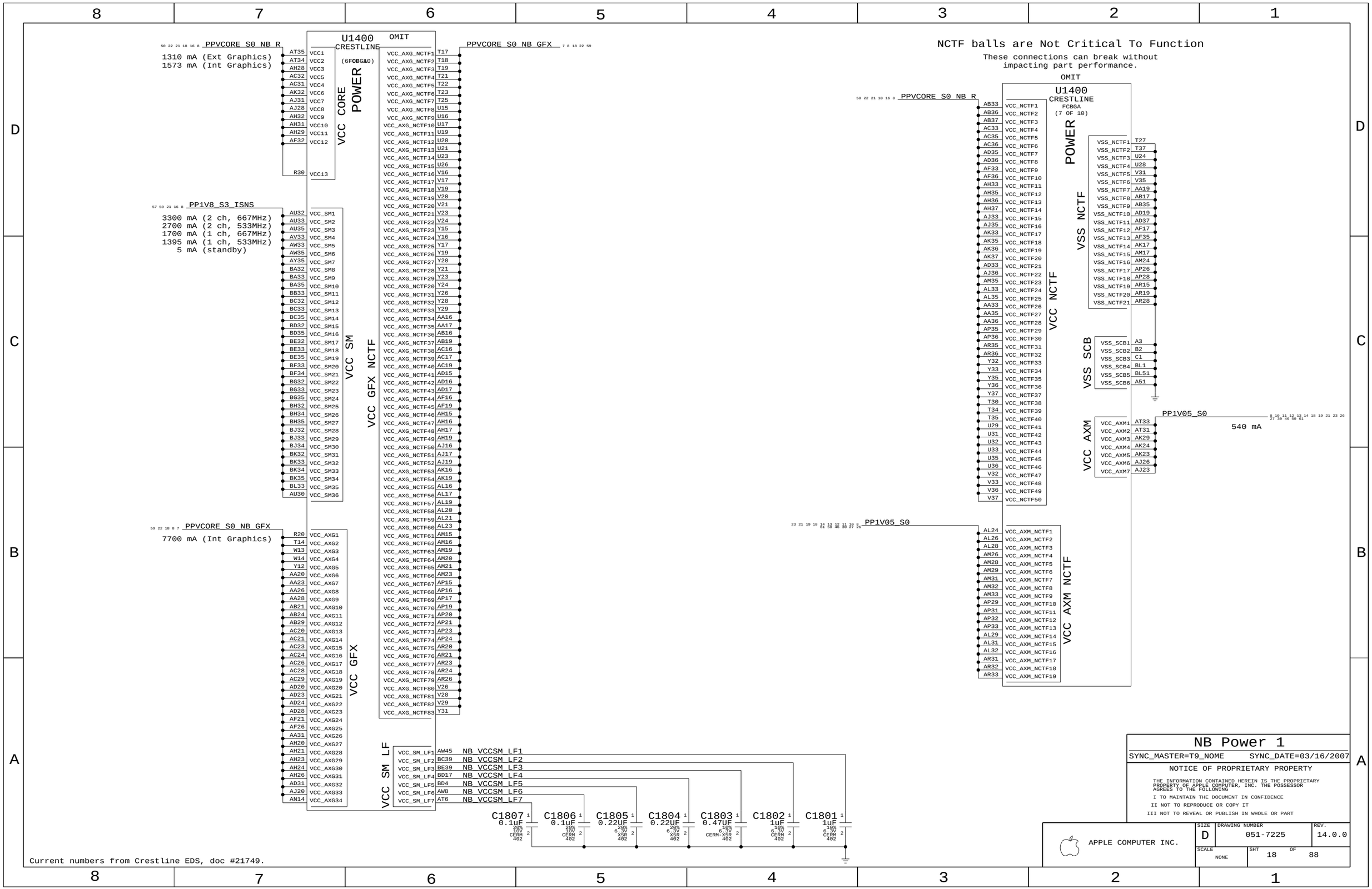


NB DDR2 Interfaces

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 17 OF 88	


U1400
CRESTLINE
(6 OF 10)
FCBGA
OMIT
PPVCORE_S0_NB_R
1310 mA (Ext Graphics)
1573 mA (Int Graphics)
VCC CORE POWER
VCC1 VCC2 VCC3 VCC5 VCC4 VCC6 VCC7 VCC8 VCC9 VCC10 VCC11 VCC12 VCC13
PPVCORE_S0_NB_GFX
VCC_AXG_NCTF1 VCC_AXG_NCTF2 VCC_AXG_NCTF3 VCC_AXG_NCTF4 VCC_AXG_NCTF5 VCC_AXG_NCTF6 VCC_AXG_NCTF7 VCC_AXG_NCTF8 VCC_AXG_NCTF9 VCC_AXG_NCTF10 VCC_AXG_NCTF11 VCC_AXG_NCTF12 VCC_AXG_NCTF13 VCC_AXG_NCTF14 VCC_AXG_NCTF15 VCC_AXG_NCTF16 VCC_AXG_NCTF17 VCC_AXG_NCTF18 VCC_AXG_NCTF19 VCC_AXG_NCTF20 VCC_AXG_NCTF21 VCC_AXG_NCTF22 VCC_AXG_NCTF23 VCC_AXG_NCTF24 VCC_AXG_NCTF25 VCC_AXG_NCTF26 VCC_AXG_NCTF27 VCC_AXG_NCTF28 VCC_AXG_NCTF29 VCC_AXG_NCTF30 VCC_AXG_NCTF31 VCC_AXG_NCTF32 VCC_AXG_NCTF33 VCC_AXG_NCTF34 VCC_AXG_NCTF35 VCC_AXG_NCTF36 VCC_AXG_NCTF37 VCC_AXG_NCTF38 VCC_AXG_NCTF39 VCC_AXG_NCTF40 VCC_AXG_NCTF41 VCC_AXG_NCTF42 VCC_AXG_NCTF43 VCC_AXG_NCTF44 VCC_AXG_NCTF45 VCC_AXG_NCTF46 VCC_AXG_NCTF47 VCC_AXG_NCTF48 VCC_AXG_NCTF49 VCC_AXG_NCTF50 VCC_AXG_NCTF51 VCC_AXG_NCTF52 VCC_AXG_NCTF53 VCC_AXG_NCTF54 VCC_AXG_NCTF55 VCC_AXG_NCTF56 VCC_AXG_NCTF57 VCC_AXG_NCTF58 VCC_AXG_NCTF59 VCC_AXG_NCTF60 VCC_AXG_NCTF61 VCC_AXG_NCTF62 VCC_AXG_NCTF63 VCC_AXG_NCTF64 VCC_AXG_NCTF65 VCC_AXG_NCTF66 VCC_AXG_NCTF67 VCC_AXG_NCTF68 VCC_AXG_NCTF69 VCC_AXG_NCTF70 VCC_AXG_NCTF71 VCC_AXG_NCTF72 VCC_AXG_NCTF73 VCC_AXG_NCTF74 VCC_AXG_NCTF75 VCC_AXG_NCTF76 VCC_AXG_NCTF77 VCC_AXG_NCTF78 VCC_AXG_NCTF79 VCC_AXG_NCTF80 VCC_AXG_NCTF81 VCC_AXG_NCTF82 VCC_AXG_NCTF83
VCC GFX NCTF
PP1V8_S3_ISNS
3300 mA (2 ch, 667MHz)
2700 mA (2 ch, 533MHz)
1700 mA (1 ch, 667MHz)
1395 mA (1 ch, 533MHz)
5 mA (standby)
VCC_SM1 VCC_SM2 VCC_SM3 VCC_SM4 VCC_SM5 VCC_SM6 VCC_SM7 VCC_SM8 VCC_SM9 VCC_SM10 VCC_SM11 VCC_SM12 VCC_SM13 VCC_SM14 VCC_SM15 VCC_SM16 VCC_SM17 VCC_SM18 VCC_SM19 VCC_SM20 VCC_SM21 VCC_SM22 VCC_SM23 VCC_SM24 VCC_SM25 VCC_SM26 VCC_SM27 VCC_SM28 VCC_SM29 VCC_SM30 VCC_SM31 VCC_SM32 VCC_SM33 VCC_SM34 VCC_SM35 VCC_SM36
VCC SM
PPVCORE_S0_NB_GFX
7700 mA (Int Graphics)
VCC_AXG1 VCC_AXG2 VCC_AXG3 VCC_AXG4 VCC_AXG5 VCC_AXG6 VCC_AXG7 VCC_AXG8 VCC_AXG9 VCC_AXG10 VCC_AXG11 VCC_AXG12 VCC_AXG13 VCC_AXG14 VCC_AXG15 VCC_AXG16 VCC_AXG17 VCC_AXG18 VCC_AXG19 VCC_AXG20 VCC_AXG21 VCC_AXG22 VCC_AXG23 VCC_AXG24 VCC_AXG25 VCC_AXG26 VCC_AXG27 VCC_AXG28 VCC_AXG29 VCC_AXG30 VCC_AXG31 VCC_AXG32 VCC_AXG33 VCC_AXG34
VCC GFX
VCC_SM_LF1 VCC_SM_LF2 VCC_SM_LF3 VCC_SM_LF4 VCC_SM_LF5 VCC_SM_LF6 VCC_SM_LF7
VCC SM LF
NB_VCCSM_LF1 NB_VCCSM_LF2 NB_VCCSM_LF3 NB_VCCSM_LF4 NB_VCCSM_LF5 NB_VCCSM_LF6 NB_VCCSM_LF7
C1807 0.1uF 20% 16V CERM 402
C1806 0.1uF 20% 16V CERM 402
C1805 0.22UF 20% 6.3V X5R 402
C1804 0.22UF 20% 6.3V X5R 402
C1803 0.47UF 10% 6.3V CERM-X5R 402
C1802 1uF 10% 6.3V CERM 402
C1801 1uF 10% 6.3V CERM 402
NCTF balls are Not Critical To Function
These connections can break without impacting part performance.
U1400
CRESTLINE
FCBGA
(7 OF 10)
OMIT
PPVCORE_S0_NB_R
VCC_NCTF1 VCC_NCTF2 VCC_NCTF3 VCC_NCTF4 VCC_NCTF5 VCC_NCTF6 VCC_NCTF7 VCC_NCTF8 VCC_NCTF9 VCC_NCTF10 VCC_NCTF11 VCC_NCTF12 VCC_NCTF13 VCC_NCTF14 VCC_NCTF15 VCC_NCTF16 VCC_NCTF17 VCC_NCTF18 VCC_NCTF19 VCC_NCTF20 VCC_NCTF21 VCC_NCTF22 VCC_NCTF23 VCC_NCTF24 VCC_NCTF25 VCC_NCTF26 VCC_NCTF27 VCC_NCTF28 VCC_NCTF29 VCC_NCTF30 VCC_NCTF31 VCC_NCTF32 VCC_NCTF33 VCC_NCTF34 VCC_NCTF35 VCC_NCTF36 VCC_NCTF37 VCC_NCTF38 VCC_NCTF39 VCC_NCTF40 VCC_NCTF41 VCC_NCTF42 VCC_NCTF43 VCC_NCTF44 VCC_NCTF45 VCC_NCTF46 VCC_NCTF47 VCC_NCTF48 VCC_NCTF49 VCC_NCTF50
VCC NCTF
VSS NCTF POWER
VSS_NCTF1 VSS_NCTF2 VSS_NCTF3 VSS_NCTF4 VSS_NCTF5 VSS_NCTF6 VSS_NCTF7 VSS_NCTF8 VSS_NCTF9 VSS_NCTF10 VSS_NCTF11 VSS_NCTF12 VSS_NCTF13 VSS_NCTF14 VSS_NCTF15 VSS_NCTF16 VSS_NCTF17 VSS_NCTF18 VSS_NCTF19 VSS_NCTF20 VSS_NCTF21
VSS SCB
VSS_SCB1 VSS_SCB2 VSS_SCB3 VSS_SCB4 VSS_SCB5 VSS_SCB6
PP1V05_S0
540 mA
VCC AXM
VCC_AXM1 VCC_AXM2 VCC_AXM3 VCC_AXM4 VCC_AXM5 VCC_AXM6 VCC_AXM7
PP1V05_S0
VCC_AXM_NCTF1 VCC_AXM_NCTF2 VCC_AXM_NCTF3 VCC_AXM_NCTF4 VCC_AXM_NCTF5 VCC_AXM_NCTF6 VCC_AXM_NCTF7 VCC_AXM_NCTF8 VCC_AXM_NCTF9 VCC_AXM_NCTF10 VCC_AXM_NCTF11 VCC_AXM_NCTF12 VCC_AXM_NCTF13 VCC_AXM_NCTF14 VCC_AXM_NCTF15 VCC_AXM_NCTF16 VCC_AXM_NCTF17 VCC_AXM_NCTF18 VCC_AXM_NCTF19
VCC AXM NCTF
NB Power 1
SYNC_MASTER=T9_NOME
SYNC_DATE=03/16/2007
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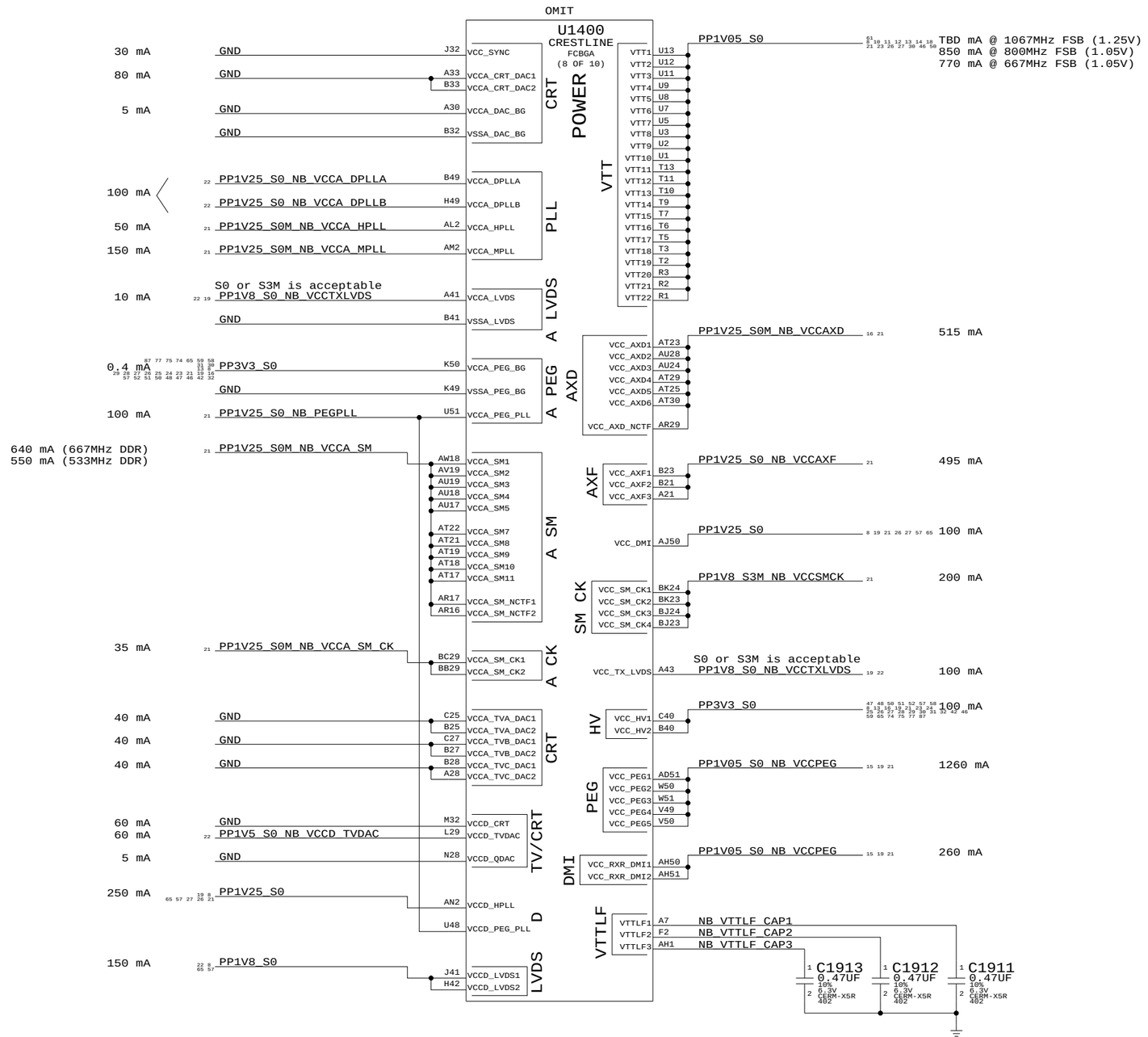
SIZE D
DRAWING NUMBER 051-7225
REV. 14.0.0
SCALE NONE
SHT 18 OF 88
Current numbers from Crestline EDS, doc #21749.



Current numbers from Crestline EDS, doc #21749.

NB Power 2

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 19 OF 88	

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 — GND

NOTE: TDE = _P

TDE_FORCE T31 — GND

TDB_FORCE T33 — GND

NOTE: TDB = _N

TDB_SENSE R28 — GND

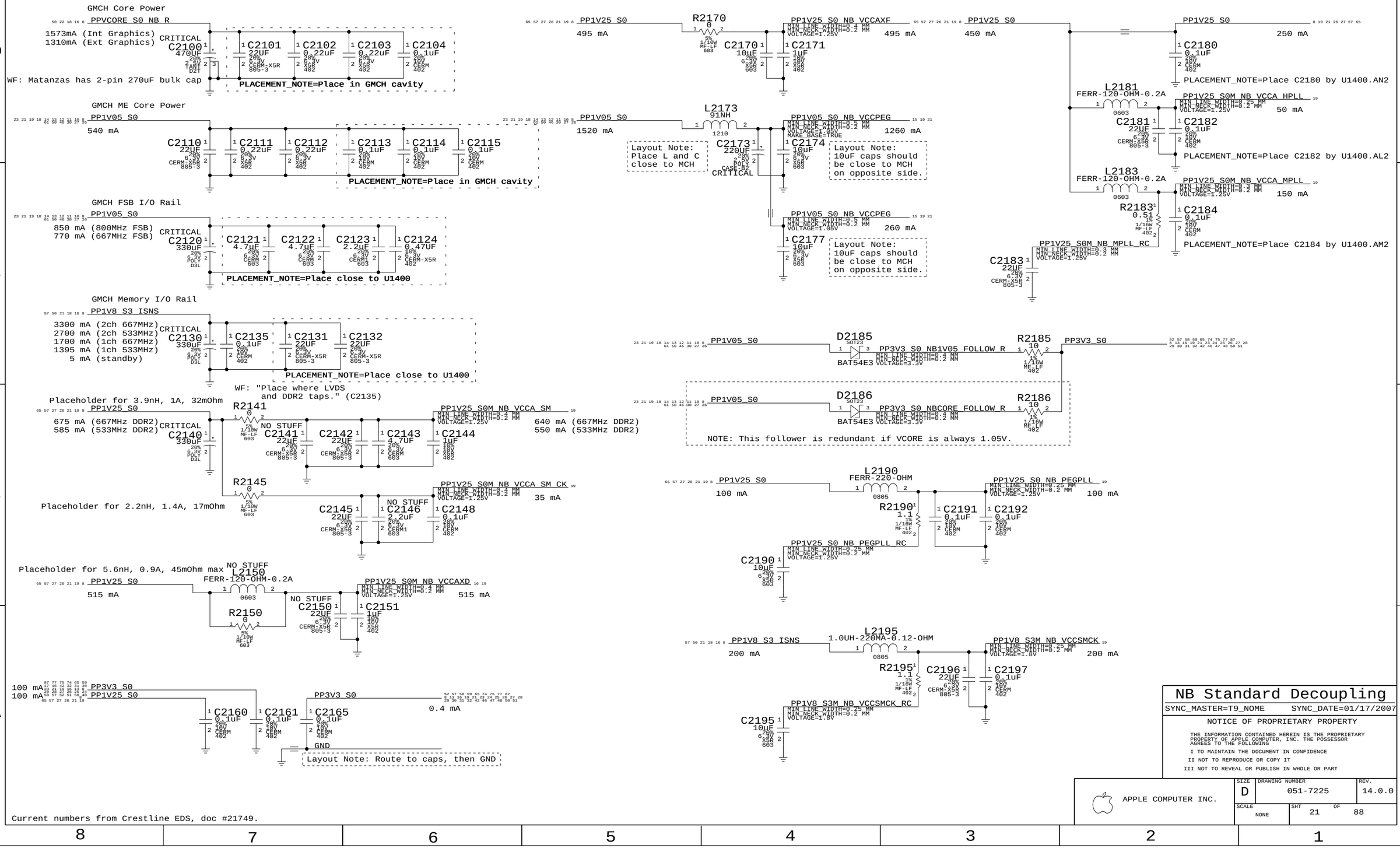
NB Grounds

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 14.0.0

SCALE NONE | SHT 20 OF 88


GMCH Core Power
PPVCORE_S0_NB_R
1573mA (Int Graphics)
1310mA (Ext Graphics)
CRITICAL
C2100 470uF 20% 2.5V POLY D2T
C2101 22UF 20% 6.3V CERM-X5R 805-3
C2102 0.22uF 20% 6.3V CERM 402
C2103 0.22uF 20% 6.3V CERM 402
C2104 0.1uF 20% 10V CERM 402
WF: Matanzas has 2-pin 270uF bulk cap
PLACEMENT_NOTE=Place in GMCH cavity
GMCH ME Core Power
PP1V05_S0
540 mA
C2110 22UF 20% 6.3V CERM-X5R 805-3
C2111 0.22uF 20% 6.3V CERM 402
C2112 0.22uF 20% 6.3V CERM 402
C2113 0.1uF 20% 10V CERM 402
C2114 0.1uF 20% 10V CERM 402
C2115 0.1uF 20% 10V CERM 402
PLACEMENT_NOTE=Place in GMCH cavity
GMCH FSB I/O Rail
PP1V05_S0
850 mA (800MHz FSB)
770 mA (667MHz FSB)
CRITICAL
C2120 330uF 20% 2.5V POLY D3L
C2121 4.7uF 20% 6.3V CERM 603
C2122 4.7uF 20% 6.3V CERM 603
C2123 2.2uF 20% 6.3V CERM 603
C2124 0.47UF 10% 6.3V CERM-X5R 402
PLACEMENT_NOTE=Place close to U1400
GMCH Memory I/O Rail
PP1V8_S3_ISNS
3300 mA (2ch 667MHz)
2700 mA (2ch 533MHz)
1700 mA (1ch 667MHz)
1395 mA (1ch 533MHz)
5 mA (standby)
CRITICAL
C2130 330uF 20% 6.3V POLY D3L
C2135 0.1uF 20% 10V CERM 402
C2131 22UF 20% 6.3V CERM-X5R 805-3
C2132 22UF 20% 6.3V CERM-X5R 805-3
PLACEMENT_NOTE=Place close to U1400
WF: "Place where LVDS and DDR2 taps." (C2135)
Placeholder for 3.9nH, 1A, 32mOhm
R2141 0 5% 1/10W MF-LF 603
PP1V25_S0
675 mA (667MHz DDR2)
585 mA (533MHz DDR2)
CRITICAL
C2140 330uF 20% 6.3V POLY D3L
NO STUFF
C2141 22UF 20% 6.3V CERM-X5R 805-3
C2142 22UF 20% 6.3V CERM-X5R 805-3
C2143 4.7UF 20% 6.3V CERM 603
C2144 1uF 10% 10V X5R 402
PP1V25_S0M_NB_VCCA_SM
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
640 mA (667MHz DDR2)
550 mA (533MHz DDR2)
R2145 0 5% 1/10W MF-LF 603
PP1V25_S0M_NB_VCCA_SM_CK
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
35 mA
Placeholder for 2.2nH, 1.4A, 17mOhm
NO STUFF
C2145 22UF 20% 6.3V CERM-X5R 805-3
C2146 2.2uF 20% 6.3V CERM1 603
C2148 0.1uF 20% 10V CERM 402
Placeholder for 5.6nH, 0.9A, 45mOhm max
NO STUFF
L2150 FERR-120-OHM-0.2A 0603
PP1V25_S0
515 mA
R2150 0 5% 1/10W MF-LF 603
NO STUFF
C2150 22UF 20% 6.3V CERM-X5R 805-3
C2151 1uF 10% 10V X5R 402
PP1V25_S0M_NB_VCCAXD
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
515 mA
100 mA
PP3V3_S0
100 mA
PP1V25_S0
C2160 0.1uF 20% 10V CERM 402
C2161 0.1uF 20% 10V CERM 402
PP3V3_S0
C2165 0.1uF 20% 10V CERM 402
0.4 mA
GND
Layout Note: Route to caps, then GND
PP1V25_S0
495 mA
R2170 0 5% 1/10W MF-LF 603
PP1V25_S0_NB_VCCAXF
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
495 mA
C2170 10uF 20% 6.3V X5R 603
C2171 1uF 10% 10V X5R 402
PP1V05_S0
1520 mA
L2173 91NH 1210
PP1V05_S0_NB_VCCPEG
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
MAKE_BASE=TRUE
1260 mA
Layout Note: Place L and C close to MCH
C2173 220UF 20% 2.5V POLY CASE-B2 CRITICAL
C2174 10uF 20% 6.3V X5R 603
Layout Note: 10uF caps should be close to MCH on opposite side.
PP1V05_S0_NB_VCCPEG
MIN_LINE_WIDTH=0.5 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.05V
260 mA
C2177 10uF 20% 6.3V X5R 603
Layout Note: 10uF caps should be close to MCH on opposite side.
PP1V25_S0
450 mA
PP1V25_S0
250 mA
C2180 0.1uF 20% 10V CERM 402
PLACEMENT_NOTE=Place C2180 by U1400.AN2
L2181 FERR-120-OHM-0.2A 0603
PP1V25_S0M_NB_VCCA_HPLL
MIN_LINE_WIDTH=0.25 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
50 mA
C2181 22UF 20% 6.3V CERM-X5R 805-3
C2182 0.1uF 20% 10V CERM 402
PLACEMENT_NOTE=Place C2182 by U1400.AL2
L2183 FERR-120-OHM-0.2A 0603
PP1V25_S0M_NB_VCCA_MPLL
MIN_LINE_WIDTH=0.2 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
150 mA
R2183 0.51 1% 1/10W MF-LF 402
C2184 0.1uF 20% 10V CERM 402
PLACEMENT_NOTE=Place C2184 by U1400.AM2
PP1V25_S0M_NB_MPLL_RC
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
C2183 22UF 20% 6.3V CERM-X5R 805-3
PP1V05_S0
D2185 SOT23 BAT54E3
PP3V3_S0_NB1V05_FOLLOW_R
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3.3V
R2185 10 1% 1/16W MF-LF 402
PP3V3_S0
PP1V05_S0
D2186 SOT23 BAT54E3
PP3V3_S0_NBCORE_FOLLOW_R
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=3.3V
R2186 10 1% 1/16W MF-LF 402
NOTE: This follower is redundant if VCORE is always 1.05V.
PP1V25_S0
100 mA
L2190 FERR-220-OHM 0805
PP1V25_S0_NB_PEGPLL
MIN_LINE_WIDTH=0.25 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
100 mA
R2190 1.1 1% 1/10W MF-LF 402
C2191 0.1uF 20% 10V CERM 402
C2192 0.1uF 20% 10V CERM 402
PP1V25_S0_NB_PEGPLL_RC
MIN_LINE_WIDTH=0.25 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
C2190 10uF 20% 6.3V X5R 603
PP1V8_S3_ISNS
200 mA
L2195 1.0UH-220MA-0.12-OHM 0805
PP1V8_S3M_NB_VCCSMCK
MIN_LINE_WIDTH=0.25 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.8V
200 mA
R2195 1.1 1% 1/16W MF-LF 402
C2196 22UF 20% 6.3V CERM-X5R 805-3
C2197 0.1uF 20% 10V CERM 402
PP1V8_S3M_NB_VCCSMCK_RC
MIN_LINE_WIDTH=0.25 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.8V
C2195 10uF 20% 6.3V X5R 603
Current numbers from Crestline EDS, doc #21749.
NB Standard Decoupling
SYNC_MASTER=T9_NOME
SYNC_DATE=01/17/2007
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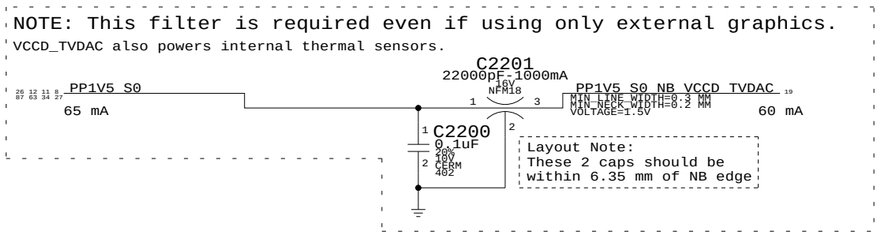
APPLE COMPUTER INC.
SIZE D
DRAWING NUMBER 051-7225
REV. 14.0.0
SCALE NONE
SHT 21 OF 88

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



GND
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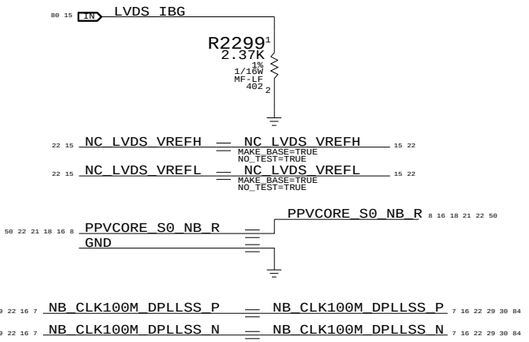
Crestline LVDS Support



GND
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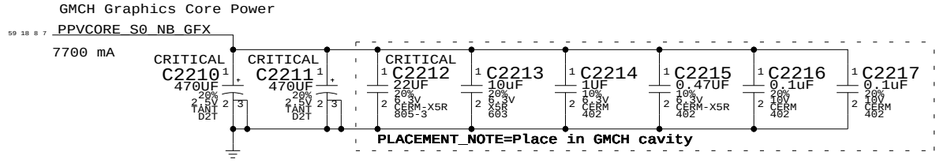
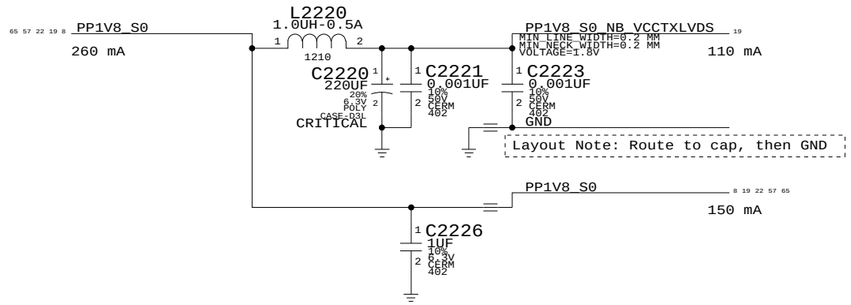
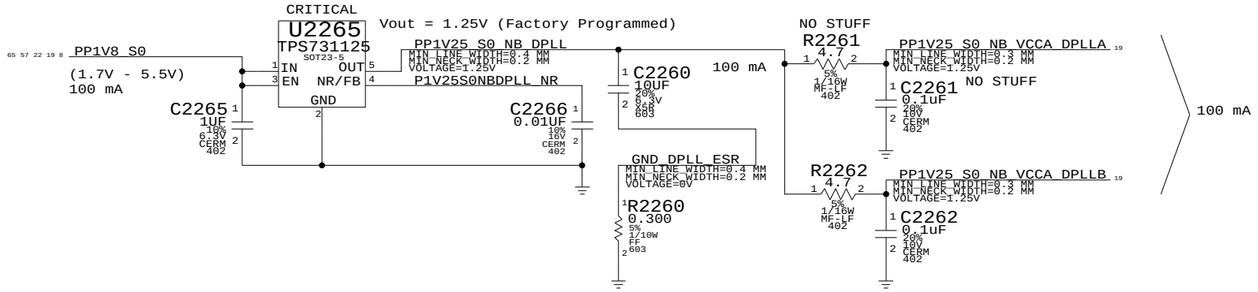
GND
GND

GMCH Graphics Core Power







Current numbers from Crestline EDS Addendum, doc #20127.

NB Graphics Decoupling

SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

APPLE COMPUTER INC.

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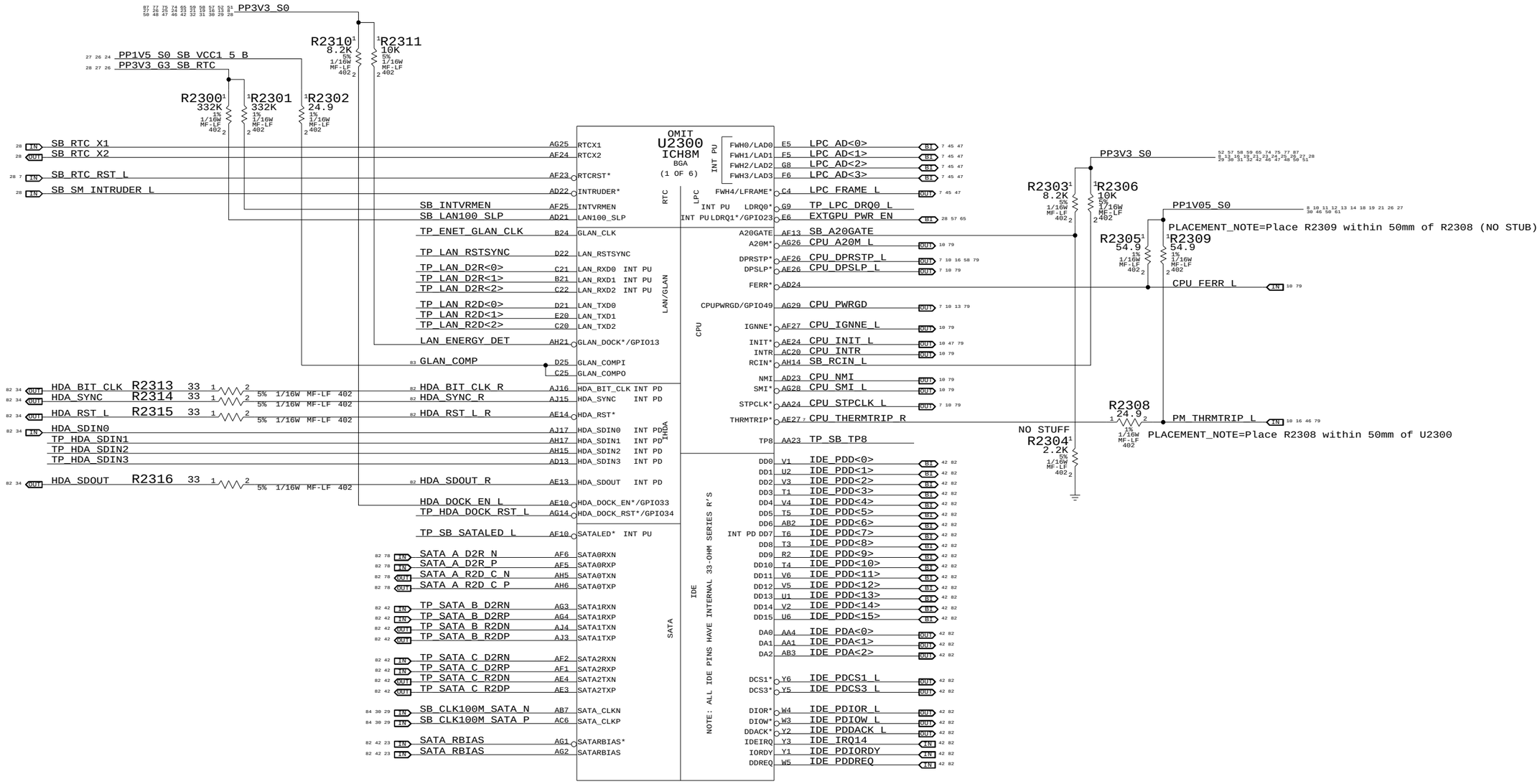
SCALE: NONE	SHT 22 OF 88	



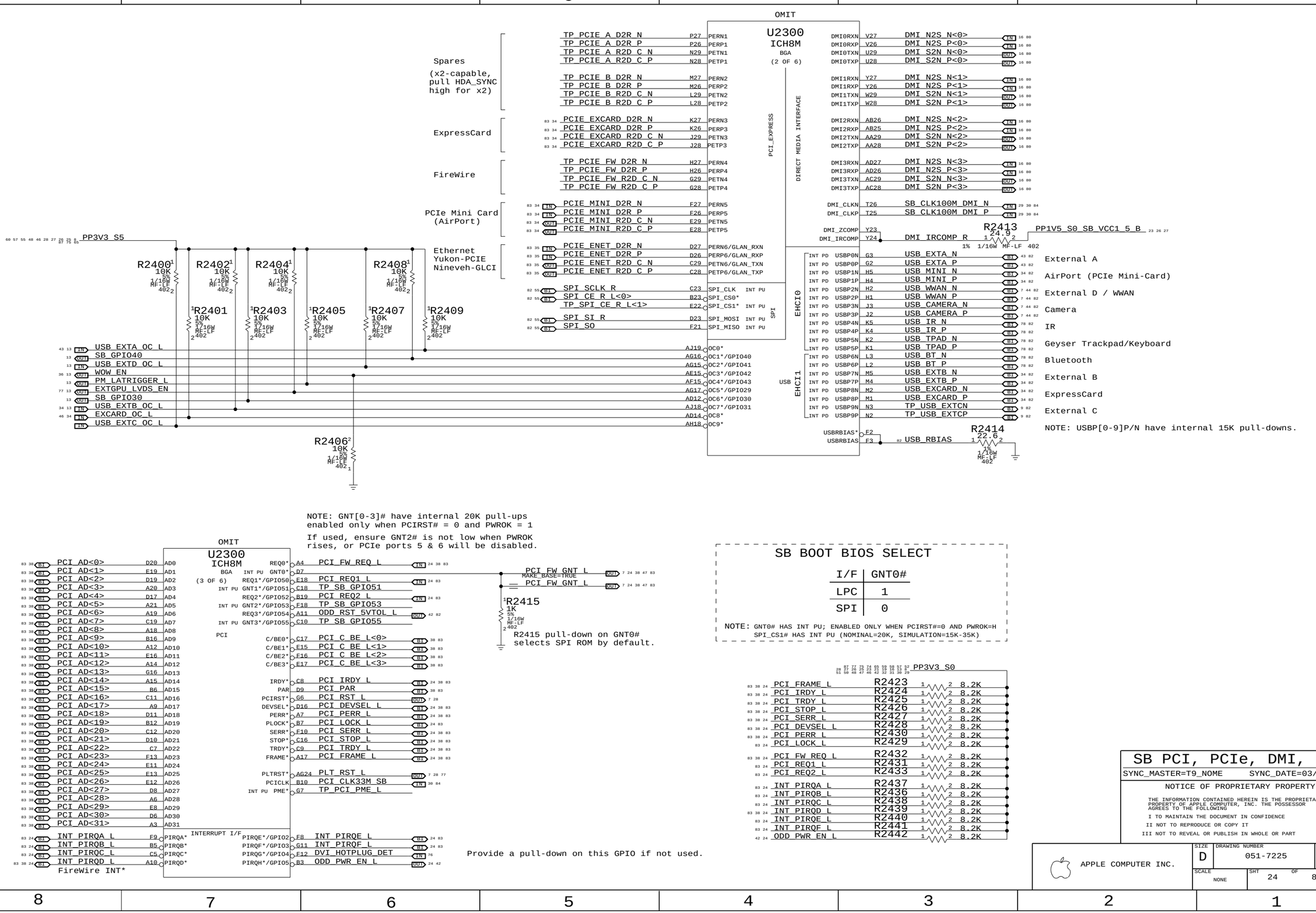
	HDA
HDA_BIT_CLK	24.000MHZ CLOCK W/INTERNAL WEAK PD
HDA_RST#	
HDA_SDIN[0-2]	INTEGRATED PDs
HDA_SDOUT	INTEGRATED PD
ACZ_SYNC	INTEGRATED PD

SB Enet, Disk, FSB, LPC

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 23 OF 88	


OMIT
U2300
ICH8M
BGA
(2 OF 6)
PCI_EXPRESS
DIRECT MEDIA INTERFACE
SPI
EHCI0
EHCI1
USB
Spares
(x2-capable, pull HDA_SYNC high for x2)
ExpressCard
FireWire
PCIe Mini Card (AirPort)
Ethernet Yukon-PCIE Nineveh-GLCI
TP_PCIE_A_D2R_N
TP_PCIE_A_D2R_P
TP_PCIE_A_R2D_C_N
TP_PCIE_A_R2D_C_P
TP_PCIE_B_D2R_N
TP_PCIE_B_D2R_P
TP_PCIE_B_R2D_C_N
TP_PCIE_B_R2D_C_P
PCIE_EXCARD_D2R_N
PCIE_EXCARD_D2R_P
PCIE_EXCARD_R2D_C_N
PCIE_EXCARD_R2D_C_P
TP_PCIE_FW_D2R_N
TP_PCIE_FW_D2R_P
TP_PCIE_FW_R2D_C_N
TP_PCIE_FW_R2D_C_P
PCIE_MINI_D2R_N
PCIE_MINI_D2R_P
PCIE_MINI_R2D_C_N
PCIE_MINI_R2D_C_P
PCIE_ENET_D2R_N
PCIE_ENET_D2R_P
PCIE_ENET_R2D_C_N
PCIE_ENET_R2D_C_P
SPI_SCLK_R
SPI_CE_R_L<0>
TP_SPI_CE_R_L<1>
SPI_SI_R
SPI_SO
DMI0RXN
DMI0RXP
DMI0TXN
DMI0TXP
DMI1RXN
DMI1RXP
DMI1TXN
DMI1TXP
DMI2RXN
DMI2RXP
DMI2TXN
DMI2TXP
DMI3RXN
DMI3RXP
DMI3TXN
DMI3TXP
DMI_CLKN
DMI_CLKP
DMI_ZCOMP
DMI_IRCOMP
DMI_N2S_N<0>
DMI_N2S_P<0>
DMI_S2N_N<0>
DMI_S2N_P<0>
DMI_N2S_N<1>
DMI_N2S_P<1>
DMI_S2N_N<1>
DMI_S2N_P<1>
DMI_N2S_N<2>
DMI_N2S_P<2>
DMI_S2N_N<2>
DMI_S2N_P<2>
DMI_N2S_N<3>
DMI_N2S_P<3>
DMI_S2N_N<3>
DMI_S2N_P<3>
SB_CLK100M_DMI_N
SB_CLK100M_DMI_P
DMI_IRCOMP_R
R2413 24.9 1% 1/16W MF-LF 402
PP1V5_S0_SB_VCC1_5_B
USB_EXTA_N
USB_EXTA_P
USB_MINI_N
USB_MINI_P
USB_WWAN_N
USB_WWAN_P
USB_CAMERA_N
USB_CAMERA_P
USB_IR_N
USB_IR_P
USB_TPAD_N
USB_TPAD_P
USB_BT_N
USB_BT_P
USB_EXTB_N
USB_EXTB_P
USB_EXCARD_N
USB_EXCARD_P
TP_USB_EXTCN
TP_USB_EXTCP
USBRBIAS*
USB_RBIAS
R2414 22.6 1% 1/16W MF-LF 402
External A
AirPort (PCIe Mini-Card)
External D / WWAN
Camera
IR
Geyser Trackpad/Keyboard
Bluetooth
External B
ExpressCard
External C
NOTE: USBP[0-9]P/N have internal 15K pull-downs.
PP3V3_S5
R2400 10K 5% 1/10W MF-LF 402
R2402 10K 5% 1/10W MF-LF 402
R2404 10K 5% 1/10W MF-LF 402
R2408 10K 5% 1/10W MF-LF 402
R2401 10K 5% 1/16W MF-LF 402
R2403 10K 5% 1/16W MF-LF 402
R2405 10K 5% 1/16W MF-LF 402
R2407 10K 5% 1/16W MF-LF 402
R2409 10K 5% 1/16W MF-LF 402
R2406 10K 5% 1/16W MF-LF 402
USB_EXTA_OC_L
SB_GPIO40
USB_EXTD_OC_L
WOW_EN
PM_LATRIGGER_L
EXTGPU_LVDS_EN
SB_GPIO30
USB_EXTB_OC_L
EXCARD_OC_L
USB_EXTC_OC_L
OC0*
OC1*/GPIO40
OC2*/GPIO41
OC3*/GPIO42
OC4*/GPIO43
OC5*/GPIO29
OC6*/GPIO30
OC7*/GPIO31
OC8*
OC9*
NOTE: GNT[0-3]# have internal 20K pull-ups enabled only when PCIRST# = 0 and PWROK = 1
If used, ensure GNT2# is not low when PWROK rises, or PCIe ports 5 & 6 will be disabled.
PCI_AD<0>
PCI_AD<1>
PCI_AD<2>
PCI_AD<3>
PCI_AD<4>
PCI_AD<5>
PCI_AD<6>
PCI_AD<7>
PCI_AD<8>
PCI_AD<9>
PCI_AD<10>
PCI_AD<11>
PCI_AD<12>
PCI_AD<13>
PCI_AD<14>
PCI_AD<15>
PCI_AD<16>
PCI_AD<17>
PCI_AD<18>
PCI_AD<19>
PCI_AD<20>
PCI_AD<21>
PCI_AD<22>
PCI_AD<23>
PCI_AD<24>
PCI_AD<25>
PCI_AD<26>
PCI_AD<27>
PCI_AD<28>
PCI_AD<29>
PCI_AD<30>
PCI_AD<31>
INTERRUPT I/F
INT_PIRQA_L
INT_PIRQB_L
INT_PIRQC_L
INT_PIRQD_L
FireWire INT*
PCI_FW_REQ_L
PCI_REQ1_L
TP_SB_GPIO51
PCI_REQ2_L
TP_SB_GPIO53
ODD_RST_5VTOL_L
TP_SB_GPIO55
PCI_C_BE_L<0>
PCI_C_BE_L<1>
PCI_C_BE_L<2>
PCI_C_BE_L<3>
PCI_IRDY_L
PCI_PAR
PCI_RST_L
PCI_DEVSEL_L
PCI_PERR_L
PCI_LOCK_L
PCI_SERR_L
PCI_STOP_L
PCI_TRDY_L
PCI_FRAME_L
PLT_RST_L
PCI_CLK33M_SB
TP_PCI_PME_L
INT_PIRQE_L
INT_PIRQF_L
DVI_HOTPLUG_DET
ODD_PWR_EN_L
PCI_FW_GNT_L
MAKE_BASE=TRUE
R2415 1K 5% 1/16W MF-LF 402
R2415 pull-down on GNT0# selects SPI ROM by default.
Provide a pull-down on this GPIO if not used.
SB BOOT BIOS SELECT
I/F | GNT0#
LPC | 1
SPI | 0
NOTE: GNT0# HAS INT PU; ENABLED ONLY WHEN PCIRST#=0 AND PWROK=H
SPI_CS1# HAS INT PU (NOMINAL=20K, SIMULATION=15K-35K)
PP3V3_S0
R2423 8.2K
R2424 8.2K
R2425 8.2K
R2426 8.2K
R2427 8.2K
R2428 8.2K
R2430 8.2K
R2429 8.2K
R2432 8.2K
R2431 8.2K
R2433 8.2K
R2437 8.2K
R2436 8.2K
R2438 8.2K
R2439 8.2K
R2440 8.2K
R2441 8.2K
R2442 8.2K
PCI_FRAME_L
PCI_IRDY_L
PCI_TRDY_L
PCI_STOP_L
PCI_SERR_L
PCI_DEVSEL_L
PCI_PERR_L
PCI_LOCK_L
PCI_FW_REQ_L
PCI_REQ1_L
PCI_REQ2_L
INT_PIRQA_L
INT_PIRQB_L
INT_PIRQC_L
INT_PIRQD_L
INT_PIRQE_L
INT_PIRQF_L
ODD_PWR_EN_L
SB PCI, PCIe, DMI, USB
SYNC_MASTER=T9_NOME
SYNC_DATE=03/16/2007
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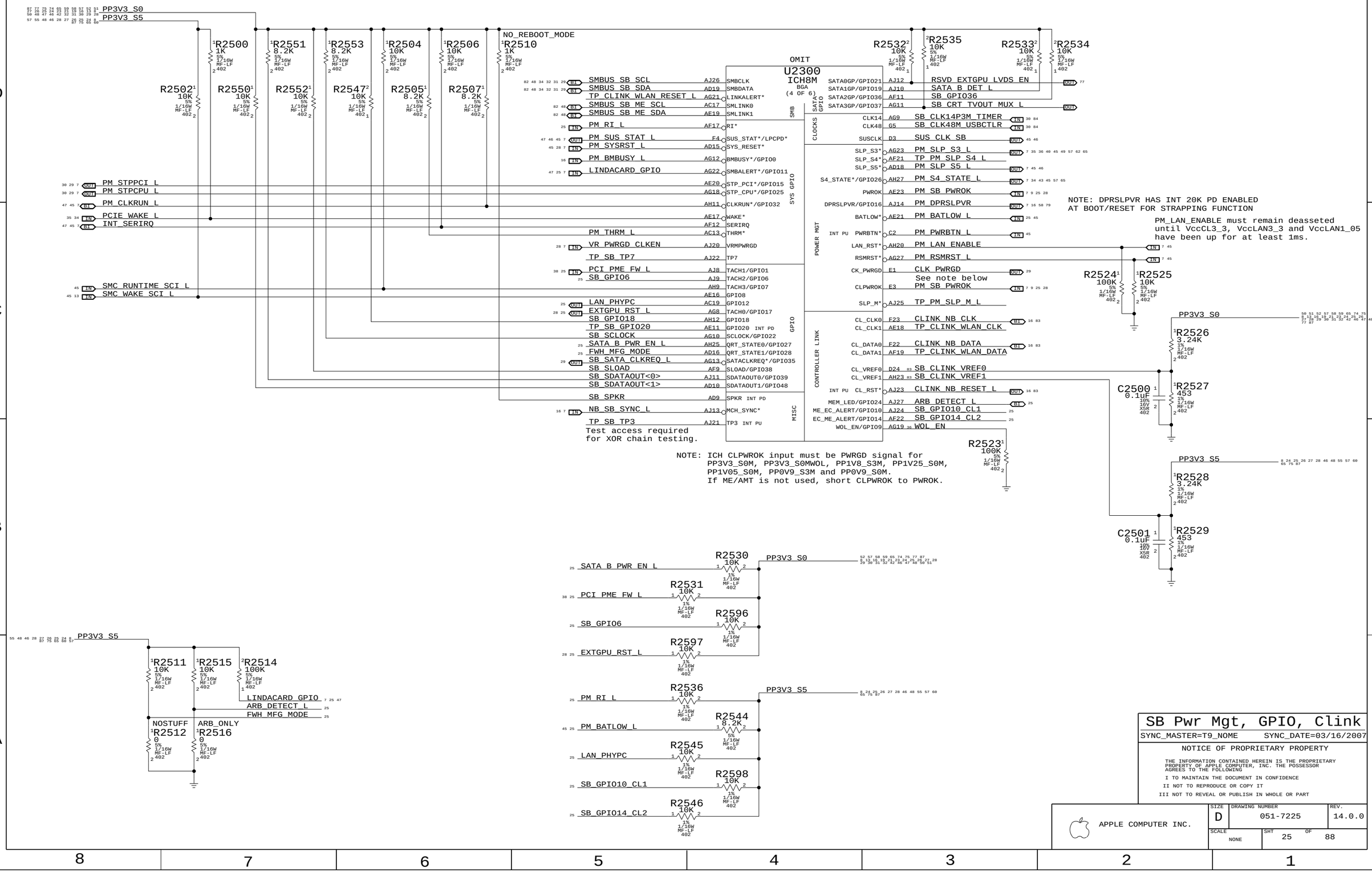
DRAWING NUMBER 051-7225
REV. 14.0.0
SCALE NONE
SHT 24 OF 88

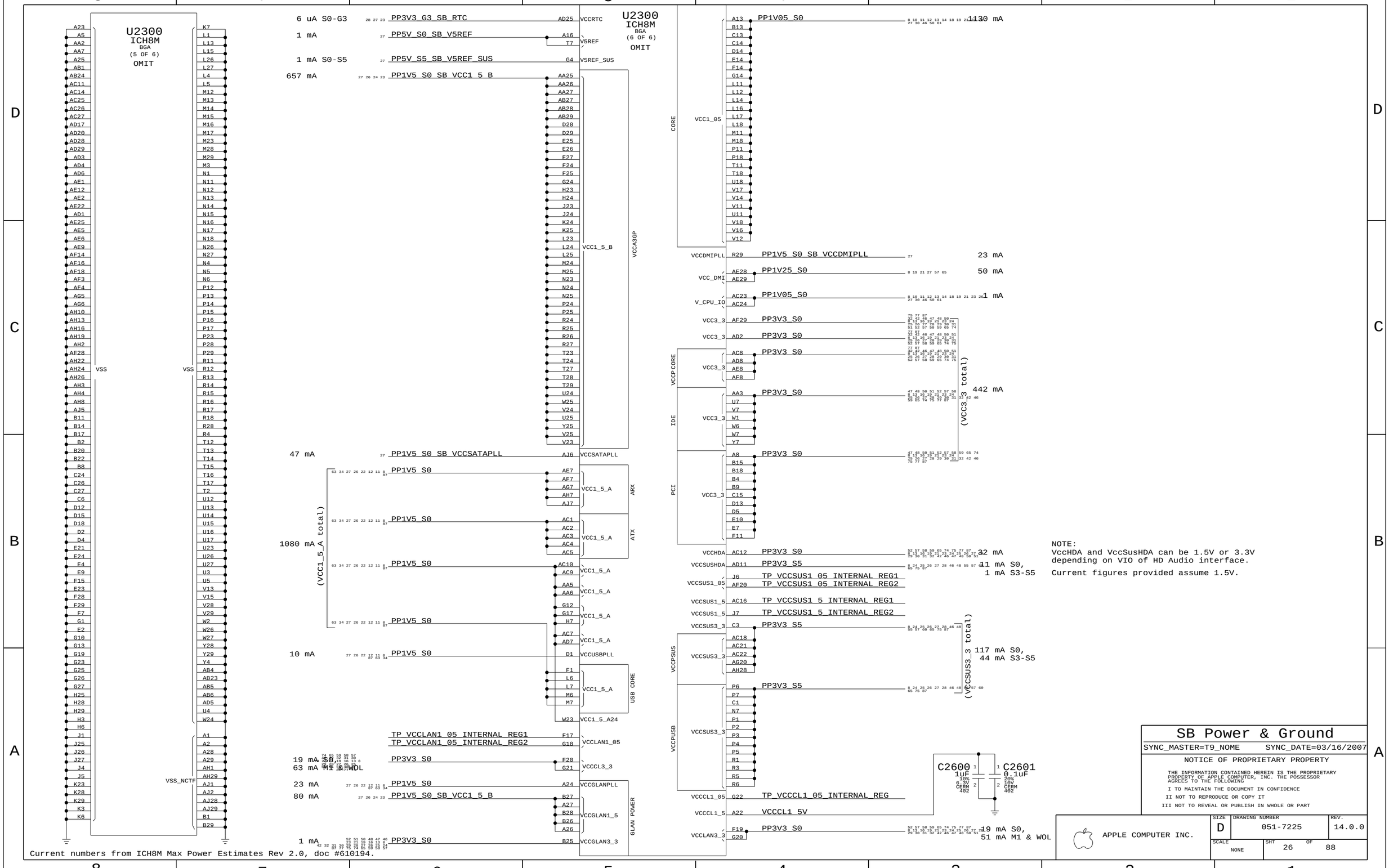


SB Pwr Mgt, GPIO, Clink

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 25 OF 88	


U2300
ICH8M
BGA
(5 OF 6)
OMIT
VSS
VSS_NCTF
U2300
ICH8M
BGA
(6 OF 6)
OMIT
6 uA S0-G3
PP3V3_G3_SB_RTC
VCCRTC
1 mA
PP5V_S0_SB_V5REF
V5REF
1 mA S0-S5
PP5V_S5_SB_V5REF_SUS
V5REF_SUS
657 mA
PP1V5_S0_SB_VCC1_5_B
VCC1_5_B
VCCA3GP
47 mA
PP1V5_S0_SB_VCCSATAPLL
VCCSATAPLL
PP1V5_S0
VCC1_5_A
ARX
ATX
1080 mA
(VCC1_5_A total)
10 mA
PP1V5_S0
VCCUSBPLL
USB CORE
VCC1_5_A24
TP_VCCLAN1_05_INTERNAL_REG1
TP_VCCLAN1_05_INTERNAL_REG2
VCCLAN1_05
19 mA S0,
63 mA M1 & WOL
PP3V3_S0
VCCCL3_3
23 mA
PP1V5_S0
VCCGLANPLL
80 mA
PP1V5_S0_SB_VCC1_5_B
VCCGLAN1_5
GLAN POWER
1 mA
PP3V3_S0
VCCGLAN3_3
Current numbers from ICH8M Max Power Estimates Rev 2.0, doc #610194.
CORE
VCC1_05
1130 mA
VCCDMIPLL
PP1V5_S0_SB_VCCDMIPLL
23 mA
VCC_DMI
PP1V25_S0
50 mA
V_CPU_IO
PP1V05_S0
1 mA
VCCP CORE
VCC3_3
PP3V3_S0
IDE
442 mA
(VCC3_3 total)
PCI
VCCHDA
PP3V3_S0
32 mA
VCCSUSHDA
PP3V3_S5
11 mA S0,
1 mA S3-S5
VCCSUS1_05
TP_VCCSUS1_05_INTERNAL_REG1
TP_VCCSUS1_05_INTERNAL_REG2
VCCSUS1_5
TP_VCCSUS1_5_INTERNAL_REG1
TP_VCCSUS1_5_INTERNAL_REG2
VCCSUS3_3
PP3V3_S5
117 mA S0,
44 mA S3-S5
(VCCSUS3_3 total)
VCCPSUS
VCCPUSB
VCCCL1_05
TP_VCCCL1_05_INTERNAL_REG
VCCCL1_5
VCCCL1_5V
VCCLAN3_3
PP3V3_S0
19 mA S0,
51 mA M1 & WOL
C2600
1uF
10%
6.3V
CERM
402
C2601
0.1uF
20%
10V
CERM
402
NOTE:
VccHDA and VccSusHDA can be 1.5V or 3.3V
depending on VIO of HD Audio interface.
Current figures provided assume 1.5V.
SB Power & Ground
SYNC_MASTER=T9_NOME
SYNC_DATE=03/16/2007
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SIZE
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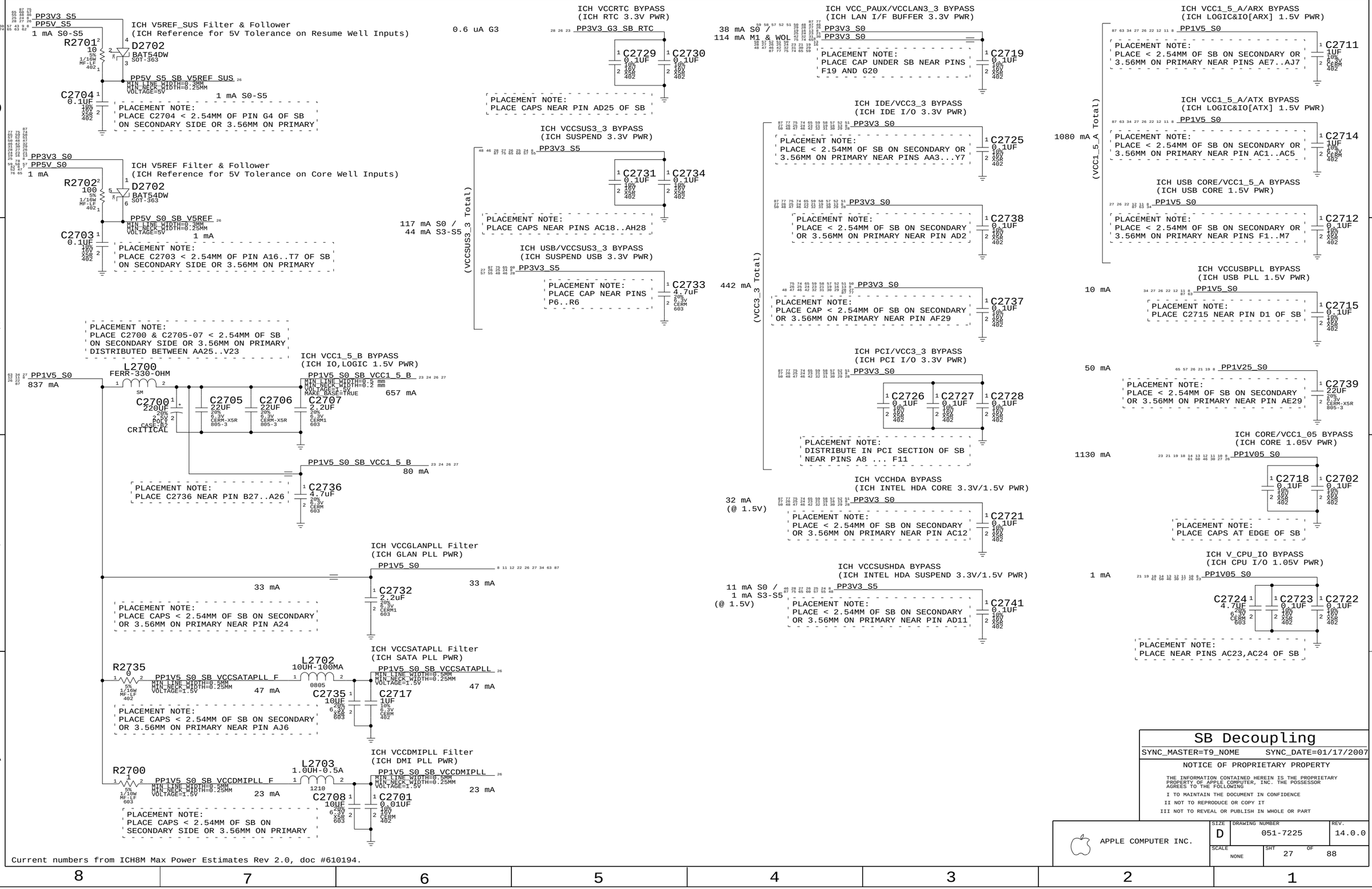
DRAWING NUMBER
051-7225
REV.
14.0.0
SCALE
NONE
SHT
26
OF
88


PP3V3_S5
PP5V_S5
1 mA S0-S5
ICH V5REF_SUS Filter & Follower
(ICH Reference for 5V Tolerance on Resume Well Inputs)
R2701 10 5% 1/16W MF-LF 402
D2702 BAT54DW SOT-363
PP5V_S5_SB_V5REF_SUS
MIN_LINE_WIDTH=0.3MM
MIN_NECK_WIDTH=0.25MM
VOLTAGE=5V
C2704 0.1UF 10% 16V X5R 402
1 mA S0-S5
PLACEMENT NOTE:
PLACE C2704 < 2.54MM OF PIN G4 OF SB
ON SECONDARY SIDE OR 3.56MM ON PRIMARY
PP3V3_S0
PP5V_S0
1 mA
ICH V5REF Filter & Follower
(ICH Reference for 5V Tolerance on Core Well Inputs)
R2702 100 5% 1/16W MF-LF 402
D2702 BAT54DW SOT-363
PP5V_S0_SB_V5REF
MIN_LINE_WIDTH=0.3MM
MIN_NECK_WIDTH=0.25MM
VOLTAGE=5V
C2703 0.1UF 10% 16V X5R 402
1 mA
PLACEMENT NOTE:
PLACE C2703 < 2.54MM OF PIN A16..T7 OF SB
ON SECONDARY SIDE OR 3.56MM ON PRIMARY
PLACEMENT NOTE:
PLACE C2700 & C2705-07 < 2.54MM OF SB
ON SECONDARY SIDE OR 3.56MM ON PRIMARY
DISTRIBUTED BETWEEN AA25..V23
ICH VCC1_5_B BYPASS
(ICH IO,LOGIC 1.5V PWR)
PP1V5_S0
837 mA
L2700 FERR-330-OHM SM
C2700 220UF 20% 6.3V CASE-D2 CRITICAL
C2705 22UF 20% 6.3V CERM-X5R 805-3
C2706 22UF 20% 6.3V CERM-X5R 805-3
C2707 2.2UF 20% 6.3V CERM1 603
PP1V5_S0_SB_VCC1_5_B
MIN_LINE_WIDTH=0.5 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.5V
MAKE_BASE=TRUE
657 mA
PP1V5_S0_SB_VCC1_5_B
80 mA
C2736 4.7UF 20% 6.3V CERM 603
PLACEMENT NOTE:
PLACE C2736 NEAR PIN B27..A26
ICH VCCGLANPLL Filter
(ICH GLAN PLL PWR)
PP1V5_S0
33 mA
C2732 2.2UF 20% 6.3V CERM1 603
33 mA
PLACEMENT NOTE:
PLACE CAPS < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN A24
ICH VCCSATAPLL Filter
(ICH SATA PLL PWR)
R2735 0 5% 1/10W MF-LF 402
PP1V5_S0_SB_VCCSATAPLL_F
MIN_LINE_WIDTH=0.5MM
MIN_NECK_WIDTH=0.25MM
VOLTAGE=1.5V
47 mA
L2702 10UH-100MA 0805
C2735 10UF 20% 6.3V X5R 603
PP1V5_S0_SB_VCCSATAPLL
MIN_LINE_WIDTH=0.5MM
MIN_NECK_WIDTH=0.25MM
VOLTAGE=1.5V
47 mA
C2717 1UF 10% 6.3V CERM 402
PLACEMENT NOTE:
PLACE CAPS < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN AJ6
ICH VCCDMIPLL Filter
(ICH DMI PLL PWR)
R2700 1 5% 1/10W MF-LF 603
PP1V5_S0_SB_VCCDMIPLL_F
MIN_LINE_WIDTH=0.5MM
MIN_NECK_WIDTH=0.25MM
VOLTAGE=1.5V
23 mA
L2703 1.0UH-0.5A 1210
C2708 10UF 20% 6.3V X5R 603
PP1V5_S0_SB_VCCDMIPLL
MIN_LINE_WIDTH=0.5MM
MIN_NECK_WIDTH=0.25MM
VOLTAGE=1.5V
23 mA
C2701 0.01UF 10% 16V CERM 402
PLACEMENT NOTE:
PLACE CAPS < 2.54MM OF SB ON
SECONDARY SIDE OR 3.56MM ON PRIMARY
ICH VCCRTC BYPASS
(ICH RTC 3.3V PWR)
0.6 uA G3
PP3V3_G3_SB_RTC
C2729 0.1UF 10% 16V X5R 402
C2730 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE CAPS NEAR PIN AD25 OF SB
ICH VCCSUS3_3 BYPASS
(ICH SUSPEND 3.3V PWR)
(VCCSUS3_3 Total)
PP3V3_S5
C2731 0.1UF 10% 16V X5R 402
C2734 0.1UF 10% 16V X5R 402
117 mA S0 /
44 mA S3-S5
PLACEMENT NOTE:
PLACE CAPS NEAR PINS AC18..AH28
ICH USB/VCCSUS3_3 BYPASS
(ICH SUSPEND USB 3.3V PWR)
PP3V3_S5
C2733 4.7UF 20% 6.3V CERM 603
PLACEMENT NOTE:
PLACE CAP NEAR PINS
P6..R6
ICH VCC_PAUX/VCCLAN3_3 BYPASS
(ICH LAN I/F BUFFER 3.3V PWR)
38 mA S0 /
114 mA M1 & WOL
PP3V3_S0
PP3V3_S0
C2719 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE CAP UNDER SB NEAR PINS
F19 AND G20
ICH IDE/VCC3_3 BYPASS
(ICH IDE I/O 3.3V PWR)
(VCC3_3 Total)
PP3V3_S0
C2725 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY OR
3.56MM ON PRIMARY NEAR PINS AA3...Y7
PP3V3_S0
C2738 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN AD2
442 mA
PP3V3_S0
C2737 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE CAP < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN AF29
ICH PCI/VCC3_3 BYPASS
(ICH PCI I/O 3.3V PWR)
PP3V3_S0
C2726 0.1UF 10% 16V X5R 402
C2727 0.1UF 10% 16V X5R 402
C2728 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
DISTRIBUTE IN PCI SECTION OF SB
NEAR PINS A8 ... F11
ICH VCCHDA BYPASS
(ICH INTEL HDA CORE 3.3V/1.5V PWR)
32 mA
(@ 1.5V)
PP3V3_S0
C2721 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN AC12
ICH VCCSUSHDA BYPASS
(ICH INTEL HDA SUSPEND 3.3V/1.5V PWR)
11 mA S0 /
1 mA S3-S5
(@ 1.5V)
PP3V3_S5
C2741 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN AD11
ICH VCC1_5_A/ARX BYPASS
(ICH LOGIC&IO[ARX] 1.5V PWR)
(VCC1_5_A Total)
1080 mA
PP1V5_S0
C2711 1UF 10% 6.3V CERM 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY OR
3.56MM ON PRIMARY NEAR PINS AE7..AJ7
ICH VCC1_5_A/ATX BYPASS
(ICH LOGIC&IO[ATX] 1.5V PWR)
PP1V5_S0
C2714 1UF 10% 6.3V CERM 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY OR
3.56MM ON PRIMARY NEAR PIN AC1..AC5
ICH USB CORE/VCC1_5_A BYPASS
(ICH USB CORE 1.5V PWR)
PP1V5_S0
C2712 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY OR
3.56MM ON PRIMARY NEAR PINS F1..M7
ICH VCCUSBPLL BYPASS
(ICH USB PLL 1.5V PWR)
10 mA
PP1V5_S0
C2715 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE C2715 NEAR PIN D1 OF SB
50 mA
PP1V25_S0
C2739 22UF 20% 6.3V CERM-X5R 805-3
PLACEMENT NOTE:
PLACE < 2.54MM OF SB ON SECONDARY
OR 3.56MM ON PRIMARY NEAR PIN AE29
ICH CORE/VCC1_05 BYPASS
(ICH CORE 1.05V PWR)
1130 mA
PP1V05_S0
C2718 0.1UF 10% 16V X5R 402
C2702 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE CAPS AT EDGE OF SB
ICH V_CPU_IO BYPASS
(ICH CPU I/O 1.05V PWR)
1 mA
PP1V05_S0
C2724 4.7UF 20% 6.3V CERM 603
C2723 0.1UF 10% 16V X5R 402
C2722 0.1UF 10% 16V X5R 402
PLACEMENT NOTE:
PLACE NEAR PINS AC23,AC24 OF SB
Current numbers from ICH8M Max Power Estimates Rev 2.0, doc #610194.
SB Decoupling
SYNC_MASTER=T9_NOME
SYNC_DATE=01/17/2007
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SIZE D
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REV. 14.0.0
SCALE NONE
SHT 27 OF 88

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% 1/10W 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.

D2805
BAT54DW
SOT-363

PP3V42_G3H

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

R2806
20K
5% 1/10W MF-LF 402

SB_RTC_RST_L

C2806
1UF
10% 6.3V CERM 402

R2805
1M
5% 1/10W 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

PLT_RST_L

SB RTC Crystal

R2810
0
5% 1/16W MF-LF 402

SB_RTC_X1
SB_RTC_X1_R
SB_RTC_X2

R2811
10M
5% 1/16W MF-LF 402

CRITICAL
Y2810
32.768K
SM-2

C2810
12pF
5% 50V CERM 402

C2811
12pF
5% 50V CERM 402

System Reset "Button"

PP3V3_S5

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

C2883
0.1UF
20% 10V CERM 402

CRITICAL
U2883
74LVC2G132
US8

U2883
74LVC2G132
US8
CRITICAL

R2885
10K
5% 1/16W MF-LF 402

PM_ALL_GPU_PGOOD
GPU_PGOOD_RC

R2886
24.3K
1% 1/10W MF-LF 402

C2885
0.047UF
10% 10V 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

EXTGPU_RST_SW
R2880
0
5% 1/10W MF-LF 402

EXTGPU_RST_L
EXTGPU_RST_QUAL_L

U2880
MC74VHC1G08
SC70

C2880
0.1UF
20% 10V CERM 402

R2881
0
5% 1/10W MF-LF 402

GPU_RESET_R_L
GPU_RESET_L

R2882
1K
5% 1/10W MF-LF 402

GPU_IOENABLE_RC
MAKE_BASE=TRUE
GPU_IOENABLE_RC
GPU_IOENABLE_RC

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% 1/10W 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

C2830
0.1UF
20% 10V CERM 402

U2830
MC74VHC1G00
SC70-5

VR_PWRGD_CLKEN_L
VR_PWRGD_CLKEN

PWROK Circuit

PP3V3_S0

C2840
0.1UF
20% 10V CERM 402

VR_PWRGOOD_DELAY
ALL_SYS_PWRGD

U2840
MC74VHC1G08
SC70

PM_SB_PWROK

R2840
10K
5% 1/16W MF-LF 402

R2841
10K
5% 1/10W MF-LF 402

PCI Reset Connections

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

PCI_RST_L
PCI_FW_RST_L

CPU VCore ForcePSI

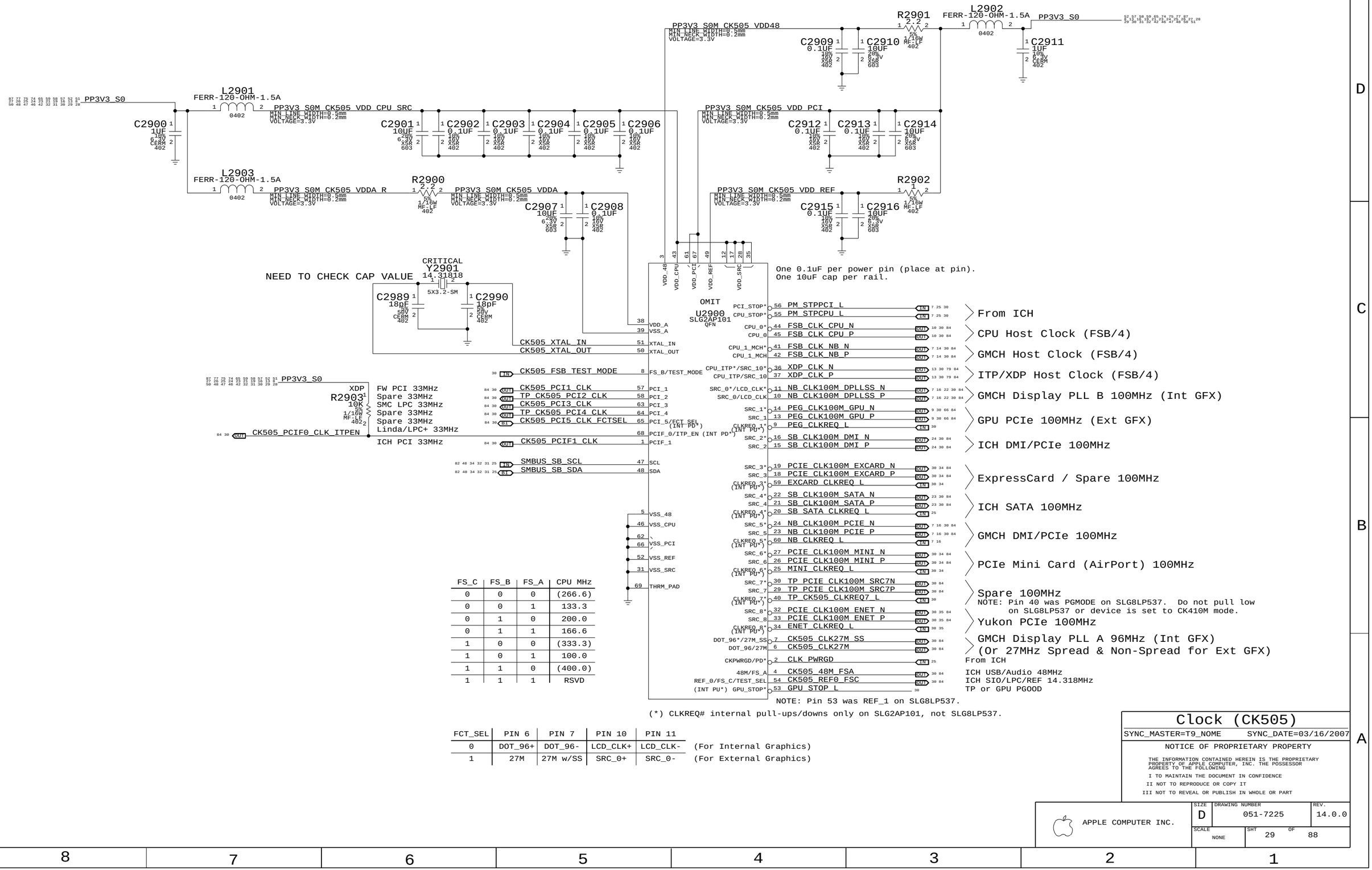
CPU_PSI_L
MAKE_BASE=TRUE
CPU_PSI_L

SB Misc

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 28 OF 88	



Clock (CK505)

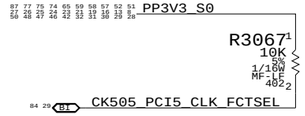
SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

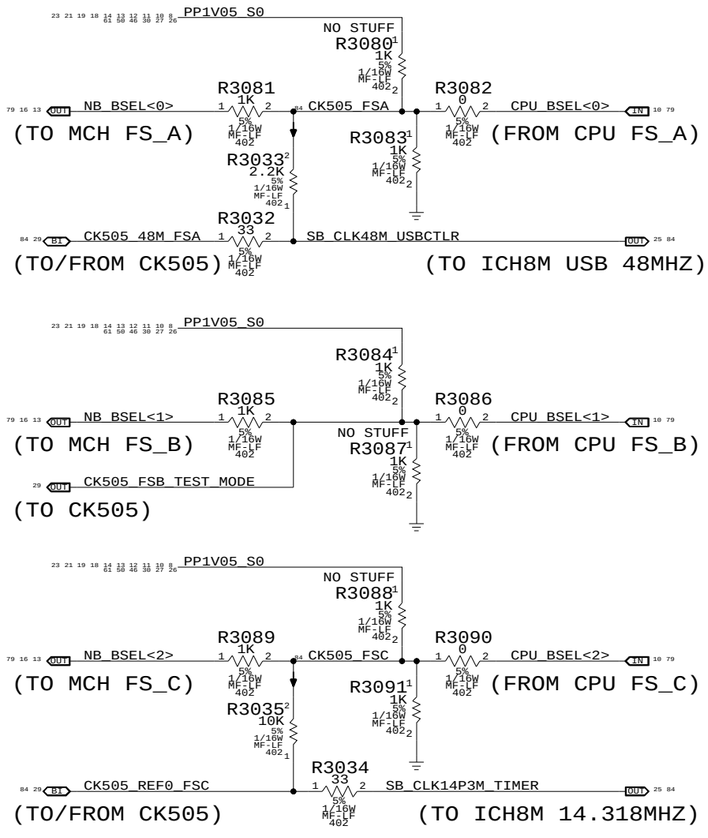
SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 29 OF 88	

CK505 Configuration Straps

FCT_SEL (GFX clock select)



FS_A, FS_B, FS_C (Host clock freq select)



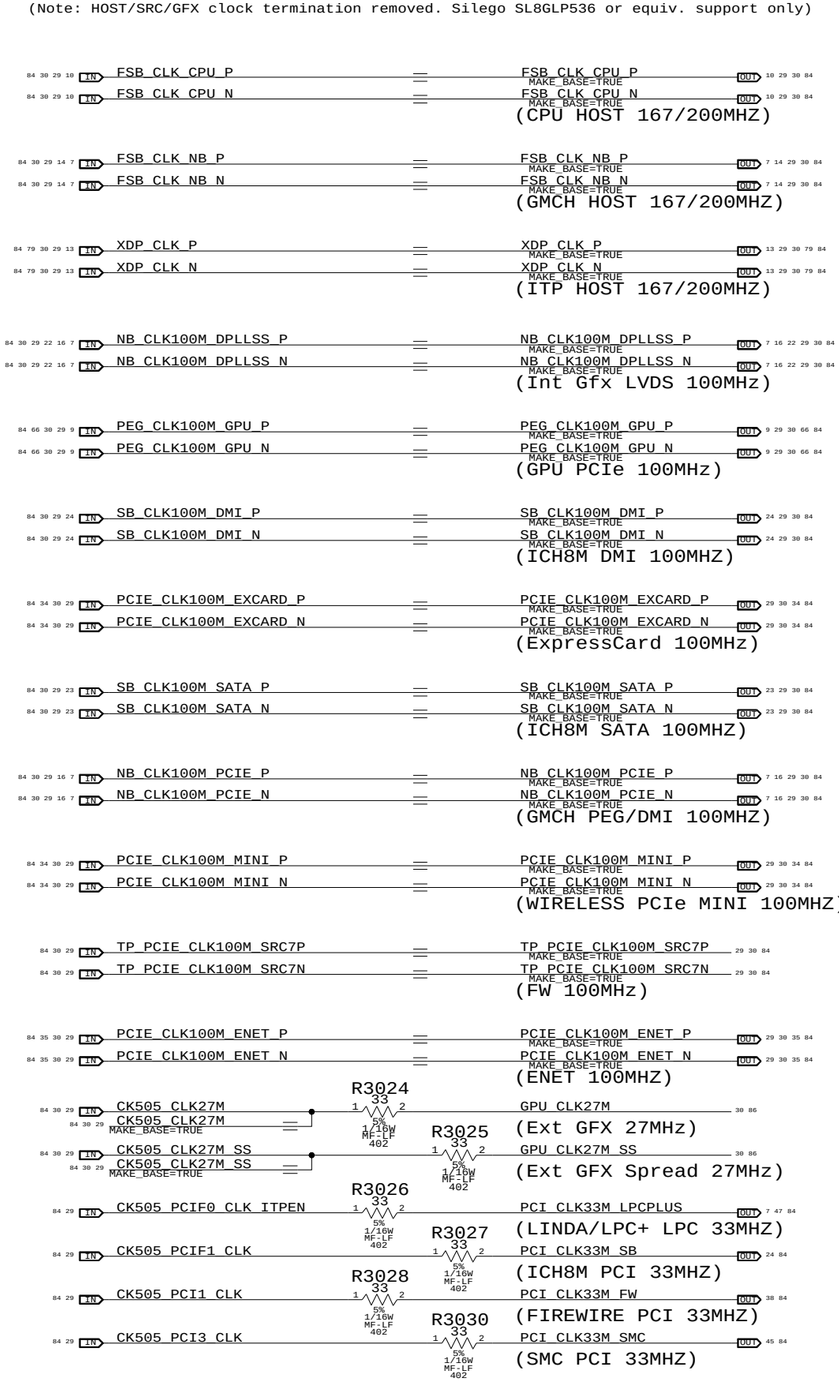
FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

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

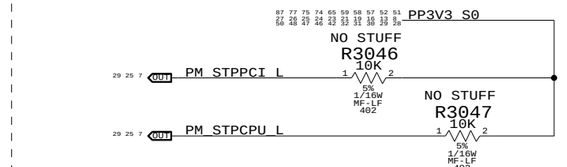
(Only 100-200MHz supported by SLG8LP536 and CY28545-5)

CLK Termination

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



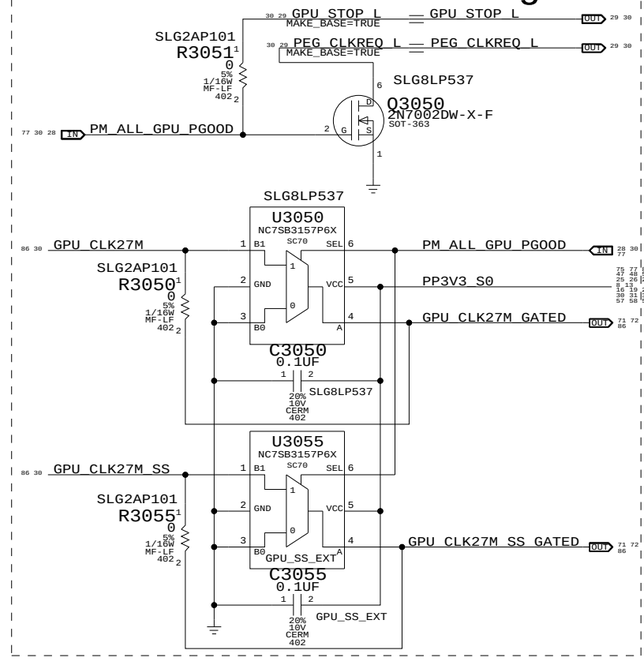
CLKREQ Controls



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).

EXCARD_CLKREQ_L
MINI_CLKREQ_L
ENET_CLKREQ_L
TP_CK505_CLKREQ7_L

GPU Clock Gating



Unused Clocks

TP_CK505_PCI2_CLK
(Reserved for TPM PCI 33MHZ)
TP_CK505_PCI4_CLK
(Spare 33MHZ)

Clock Termination

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 30 OF 88	

Page Notes

Power aliases required by this page:
- =PP1V8_S3M_MEM_A
- =PP0V9_S3M_MEM_DIMMVREFA
- =PPSPD_S0M_MEM_A (2.5V - 3.3V)

Signal aliases required by this page:
- =I2C_SODIMMA_SCL
- =I2C_SODIMMA_SDA

BOM options provided by this page:
(NONE)

"Factory" (thru-hole) slot

PP0V9_S3_MEM_VREF

C3101 2.2uF 20% 6.3V CERM 603

C3100 0.1uF 20% 10V CERM 402

PP1V8_S3

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

	1B	VREF		2B	VSS0		
	3B	VSS1		4B	DQ4	MEM_A_DQ<9>	17 81
MEM_A_DQ<14>	5B	DQ0		6B	DQ5	MEM_A_DQ<15>	17 81
MEM_A_DQ<13>	7B	DQ1		8B	VSS2		
	9B	VSS4		10B	DM0	MEM_A_DM<1>	17 81
MEM_A_DQS_N<1>	11B	DQS0*		12B	VSS5		
MEM_A_DQS_P<1>	13B	DQS0		14B	DQ6	MEM_A_DQ<8>	17 81
	15B	VSS6		16B	DQ7	MEM_A_DQ<12>	17 81
MEM_A_DQ<10>	17B	DQ2		18B	VSS7		
MEM_A_DQ<11>	19B	DQ3		20B	DQ12	MEM_A_DQ<2>	17 81
	21B	VSS8		22B	DQ13	MEM_A_DQ<3>	17 81
MEM_A_DQ<7>	23B	DQ8		24B	VSS9		
MEM_A_DQ<0>	25B	DQ9		26B	DM1	MEM_A_DM<0>	17 81
	27B	VSS10		28B	VSS11		
MEM_A_DQS_N<0>	29B	DQS1*		30B	CK0	MEM_CLK_P<0>	16 81
MEM_A_DQS_P<0>	31B	DQS1		32B	CK0*	MEM_CLK_N<0>	16 81
	33B	VSS12		34B	VSS13		
MEM_A_DQ<6>	35B	DQ10		36B	DQ14	MEM_A_DQ<1>	17 81
MEM_A_DQ<4>	37B	DQ11		38B	DQ15	MEM_A_DQ<5>	17 81
	39B	VSS14		40B	VSS15		
		KEY					
	41B	VSS16		42B	VSS17		
MEM_A_DQ<17>	43B	DQ16		44B	DQ20	MEM_A_DQ<18>	17 81
MEM_A_DQ<21>	45B	DQ17		46B	DQ21	MEM_A_DQ<20>	17 81
	47B	VSS18		48B	VSS19		
MEM_A_DQS_N<2>	49B	DQS2*		50B	NC0	PM_EXTTS_L<0>	16 45
MEM_A_DQS_P<2>	51B	DQS2		52B	DM2	MEM_A_DM<2>	17 81
	53B	VSS21		54B	VSS22		
MEM_A_DQ<23>	55B	DQ18		56B	DQ22	MEM_A_DQ<22>	17 81
MEM_A_DQ<16>	57B	DQ19		58B	DQ23	MEM_A_DQ<19>	17 81
	59B	VSS23		60B	VSS24		
MEM_A_DQ<31>	61B	DQ24		62B	DQ28	MEM_A_DQ<26>	17 81
MEM_A_DQ<27>	63B	DQ25		64B	DQ29	MEM_A_DQ<24>	17 81
	65B	VSS25		66B	VSS26		
MEM_A_DM<3>	67B	DM3		68B	DQS3*	MEM_A_DQS_N<3>	17 81
NC	69B	NC1		70B	DQS3	MEM_A_DQS_P<3>	17 81
	71B	VSS27		72B	VSS28		
MEM_A_DQ<30>	73B	DQ26		74B	DQ30	MEM_A_DQ<25>	17 81
MEM_A_DQ<28>	75B	DQ27		76B	DQ31	MEM_A_DQ<29>	17 81
	77B	VSS29		78B	VSS30		
MEM_CKE<0>	79B	CKE0		80B	NC/CKE1	MEM_CKE<1>	16 33 81
	81B	VDD0		82B	VDD1		
NC	83B	NC2		84B	NC/A15	TP_MEM_A_A<15>	9
MEM_A_BS<2>	85B	BA2		86B	NC/A14	MEM_A_A<14>	16 33 81
	87B	VDD2		88B	VDD3		
MEM_A_A<12>	89B	A12		90B	A11	MEM_A_A<11>	17 33 81
MEM_A_A<9>	91B	A9		92B	A7	MEM_A_A<7>	17 33 81
MEM_A_A<8>	93B	A8		94B	A6	MEM_A_A<6>	17 33 81
	95B	VDD4		96B	VDD5		
MEM_A_A<5>	97B	A5		98B	A4	MEM_A_A<4>	17 33 81
MEM_A_A<3>	99B	A3		100B	A2	MEM_A_A<2>	17 33 81
MEM_A_A<1>	101B	A1		102B	A0	MEM_A_A<0>	17 33 81
	103B	VDD6		104B	VDD7		
MEM_A_A<10>	105B	A10/AP		106B	BA1	MEM_A_BS<1>	17 33 81
MEM_A_BS<0>	107B	BA0		108B	RAS*	MEM_A_RAS_L	17 33 81
MEM_A_WE_L	109B	WE*		110B	S0*	MEM_CS_L<0>	16 33 81
	111B	VDD8		112B	VDD9		
MEM_A_CAS_L	113B	CAS*		114B	ODT0	MEM_ODT<0>	16 33 81
MEM_CS_L<1>	115B	NC/S1*		116B	NC/A13	MEM_A_A<13>	17 33 81
	117B	VDD10		118B	VDD11		
MEM_ODT<1>	119B	NC/ODT1		120B	NC3	NC	
	121B	VSS31		122B	VSS32		
MEM_A_DQ<36>	123B	DQ32		124B	DQ36	MEM_A_DQ<35>	17 81
MEM_A_DQ<38>	125B	DQ33		126B	DQ37	MEM_A_DQ<39>	17 81
	127B	VSS33		128B	VSS34		
MEM_A_DQS_N<4>	129B	DQS4*		130B	DM4	MEM_A_DM<4>	17 81
MEM_A_DQS_P<4>	131B	DQS4		132B	VSS35		
	133B	VSS36		134B	DQ38	MEM_A_DQ<33>	17 81
MEM_A_DQ<37>	135B	DQ34		136B	DQ39	MEM_A_DQ<32>	17 81
MEM_A_DQ<34>	137B	DQ35		138B	VSS37		
	139B	VSS38		140B	DQ44	MEM_A_DQ<63>	17 81
MEM_A_DQ<56>	141B	DQ40		142B	DQ45	MEM_A_DQ<62>	17 81
MEM_A_DQ<59>	143B	DQ41		144B	VSS39		
	145B	VSS40		146B	DQS5*	MEM_A_DQS_N<7>	17 81
MEM_A_DM<7>	147B	DM5		148B	DQS5	MEM_A_DQS_P<7>	17 81
	149B	VSS41		150B	VSS42		
MEM_A_DQ<58>	151B	DQ42		152B	DQ46	MEM_A_DQ<57>	17 81
MEM_A_DQ<60>	153B	DQ43		154B	DQ47	MEM_A_DQ<61>	17 81
	155B	VSS43		156B	VSS44		
MEM_A_DQ<51>	157B	DQ48		158B	DQ52	MEM_A_DQ<55>	17 81
MEM_A_DQ<54>	159B	DQ49		160B	DQ53	MEM_A_DQ<50>	17 81
	161B	VSS45		162B	VSS46		
NC	163B	NC_TEST		164B	CK1	MEM_CLK_P<1>	16 81
	165B	VSS47		166B	CK1*	MEM_CLK_N<1>	16 81
MEM_A_DQS_N<6>	167B	DQS6*		168B	VSS48		
MEM_A_DQS_P<6>	169B	DQS6		170B	DM6	MEM_A_DM<6>	17 81
	171B	VSS49		172B	VSS50		
MEM_A_DQ<48>	173B	DQ50		174B	DQ54	MEM_A_DQ<49>	17 81
MEM_A_DQ<53>	175B	DQ51		176B	DQ55	MEM_A_DQ<52>	17 81
	177B	VSS51		178B	VSS52		
MEM_A_DQ<43>	179B	DQ56		180B	DQ60	MEM_A_DQ<45>	17 81
MEM_A_DQ<42>	181B	DQ57		182B	DQ61	MEM_A_DQ<40>	17 81
	183B	VSS53		184B	VSS54		
MEM_A_DM<5>	185B	DM7		186B	DQS7*	MEM_A_DQS_N<5>	17 81
	187B	VSS55		188B	DQS7	MEM_A_DQS_P<5>	17 81
MEM_A_DQ<46>	189B	DQ58		190B	VSS56		
MEM_A_DQ<41>	191B	DQ59		192B	DQ62	MEM_A_DQ<44>	17 81
PP3V3_S0	193B	VSS57		194B	DQ63	MEM_A_DQ<47>	17 81
SMBUS_SB_SDA	195B	SDA		196B	VSS58		
SMBUS_SB_SCL	197B	SCL		198B	SA0	ADDR=0xA0(WR)/0xA1(RD)	
	199B	VDDSPD		200B	SA1		

516-0140

DDR2 Bypass Caps

(For return current)

PP1V8_S3

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=(M59_SYNC) SYNC_DATE=08/24/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 31 OF 88	

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)

62 31 16 8 PP0V9_S3_MEM_VREF

C3201 2.2uF 20% 6.3V CERM 603

C3200 0.1uF 20% 10V CERM 402

87 62 57 50 38 32 31 8 PP1V8_S3

203 201

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

	1A	VREF	VSS0	2A			
	3A	VSS1	DQ4	4A	MEM_B_DQ<9>	17 81	
81 17	MEM_B_DQ<15>	5A	DQ0	DQ5	6A	MEM_B_DQ<11>	17 81
81 17	MEM_B_DQ<14>	7A	DQ1	VSS2	8A		
	9A	VSS4	DM0	10A	MEM_B_DM<1>	17 81	
81 17	MEM_B_DQS_N<1>	11A	DQS0*	VSS5	12A		
81 17	MEM_B_DQS_P<1>	13A	DQS0	DQ6	14A	MEM_B_DQ<12>	17 81
	15A	VSS6	DQ7	16A	MEM_B_DQ<8>	17 81	
81 17	MEM_B_DQ<10>	17A	DQ2	VSS7	18A		
81 17	MEM_B_DQ<13>	19A	DQ3	DQ12	20A	MEM_B_DQ<3>	17 81
	21A	VSS8	DQ13	22A	MEM_B_DQ<6>	17 81	
81 17	MEM_B_DQ<7>	23A	DQ8	VSS9	24A		
81 17	MEM_B_DQ<2>	25A	DQ9	DM1	26A	MEM_B_DM<0>	17 81
	27A	VSS10	VSS11	28A			
81 17	MEM_B_DQS_N<0>	29A	DQS1*	CK0	30A	MEM_CLK_P<4>	16 81
81 17	MEM_B_DQS_P<0>	31A	DQS1	CK0*	32A	MEM_CLK_N<4>	16 81
	33A	VSS12	VSS13	34A			
81 17	MEM_B_DQ<1>	35A	DQ10	DQ14	36A	MEM_B_DQ<0>	17 81
81 17	MEM_B_DQ<4>	37A	DQ11	DQ15	38A	MEM_B_DQ<5>	17 81
	39A	VSS14	VSS15	40A			
		KEY					
	41A	VSS16	VSS17	42A			
81 17	MEM_B_DQ<21>	43A	DQ16	DQ20	44A	MEM_B_DQ<22>	17 81
81 17	MEM_B_DQ<19>	45A	DQ17	DQ21	46A	MEM_B_DQ<18>	17 81
	47A	VSS18	VSS19	48A			
81 17	MEM_B_DQS_N<2>	49A	DQS2*	NC0	50A	PM_EXTTS_L<1>	16 45
81 17	MEM_B_DQS_P<2>	51A	DQS2	DM2	52A	MEM_B_DM<2>	17 81
	53A	VSS21	VSS22	54A			
81 17	MEM_B_DQ<20>	55A	DQ18	DQ22	56A	MEM_B_DQ<17>	17 81
81 17	MEM_B_DQ<23>	57A	DQ19	DQ23	58A	MEM_B_DQ<16>	17 81
	59A	VSS23	VSS24	60A			
81 17	MEM_B_DQ<29>	61A	DQ24	DQ28	62A	MEM_B_DQ<26>	17 81
81 17	MEM_B_DQ<24>	63A	DQ25	DQ29	64A	MEM_B_DQ<28>	17 81
	65A	VSS25	VSS26	66A			
81 17	MEM_B_DM<3>	67A	DM3	DQS3*	68A	MEM_B_DQS_N<3>	17 81
	NC	69A	NC1	DQS3	70A	MEM_B_DQS_P<3>	17 81
	71A	VSS27	VSS28	72A			
81 17	MEM_B_DQ<27>	73A	DQ26	DQ30	74A	MEM_B_DQ<31>	17 81
81 17	MEM_B_DQ<25>	75A	DQ27	DQ31	76A	MEM_B_DQ<30>	17 81
	77A	VSS29	VSS30	78A			
81 33 16	MEM_CKE<3>	79A	CKE0	NC/CKE1	80A	MEM_CKE<4>	16 33 81
	81A	VDD0	VDD1	82A			
	NC	83A	NC2	NC/A15	84A	TP_MEM_B_A<15>	9
81 33 17	MEM_B_BS<2>	85A	BA2	NC/A14	86A	MEM_B_A<14>	16 33 81
	87A	VDD2	VDD3	88A			
81 33 17	MEM_B_A<12>	89A	A12	A11	90A	MEM_B_A<11>	17 33 81
81 33 17	MEM_B_A<9>	91A	A9	A7	92A	MEM_B_A<7>	17 33 81
81 33 17	MEM_B_A<8>	93A	A8	A6	94A	MEM_B_A<6>	17 33 81
	95A	VDD4	VDD5	96A			
81 33 17	MEM_B_A<5>	97A	A5	A4	98A	MEM_B_A<4>	17 33 81
81 33 17	MEM_B_A<3>	99A	A3	A2	100A	MEM_B_A<2>	17 33 81
81 33 17	MEM_B_A<1>	101A	A1	A0	102A	MEM_B_A<0>	17 33 81
	103A	VDD6	VDD7	104A			
81 33 17	MEM_B_A<10>	105A	A10/AP	BA1	106A	MEM_B_BS<1>	17 33 81
81 33 17	MEM_B_BS<0>	107A	BA0	RAS*	108A	MEM_B_RAS_L	17 33 81
81 33 17	MEM_B_WE_L	109A	WE*	S0*	110A	MEM_CS_L<2>	16 33 81
	111A	VDD8	VDD9	112A			
81 33 17	MEM_B_CAS_L	113A	CAS*	ODT0	114A	MEM_ODT<2>	16 33 81
81 33 16	MEM_CS_L<3>	115A	NC/S1*	NC/A13	116A	MEM_B_A<13>	17 33 81
	117A	VDD10	VDD11	118A			
81 33 16	MEM_ODT<3>	119A	NC/ODT1	NC3	120A	NC	
	121A	VSS31	VSS32	122A			
81 17	MEM_B_DQ<36>	123A	DQ32	DQ36	124A	MEM_B_DQ<32>	17 81
81 17	MEM_B_DQ<33>	125A	DQ33	DQ37	126A	MEM_B_DQ<37>	17 81
	127A	VSS33	VSS34	128A			
81 17	MEM_B_DQS_N<4>	129A	DQS4*	DM4	130A	MEM_B_DM<4>	17 81
81 17	MEM_B_DQS_P<4>	131A	DQS4	VSS35	132A		
	133A	VSS36	DQ38	134A	MEM_B_DQ<38>	17 81	
81 17	MEM_B_DQ<34>	135A	DQ34	DQ39	136A	MEM_B_DQ<39>	17 81
81 17	MEM_B_DQ<35>	137A	DQ35	VSS37	138A		
	139A	VSS38	DQ44	140A	MEM_B_DQ<56>	17 81	
81 17	MEM_B_DQ<57>	141A	DQ40	DQ45	142A	MEM_B_DQ<59>	17 81
81 17	MEM_B_DQ<60>	143A	DQ41	VSS39	144A		
	145A	VSS40	DQS5*	146A	MEM_B_DQS_N<7>	17 81	
81 17	MEM_B_DM<7>	147A	DM5	DQS5	148A	MEM_B_DQS_P<7>	17 81
	149A	VSS41	VSS42	150A			
81 17	MEM_B_DQ<61>	151A	DQ42	DQ46	152A	MEM_B_DQ<63>	17 81
81 17	MEM_B_DQ<62>	153A	DQ43	DQ47	154A	MEM_B_DQ<58>	17 81
	155A	VSS43	VSS44	156A			
81 17	MEM_B_DQ<48>	157A	DQ48	DQ52	158A	MEM_B_DQ<54>	17 81
81 17	MEM_B_DQ<51>	159A	DQ49	DQ53	160A	MEM_B_DQ<53>	17 81
	161A	VSS45	VSS46	162A			
	NC	163A	NC_TEST	CK1	164A	MEM_CLK_P<3>	16 81
	165A	VSS47	CK1*	166A	MEM_CLK_N<3>	16 81	
			VSS48	168A			
81 17	MEM_B_DQS_N<6>	167A	DQS6*	DM6	170A	MEM_B_DM<6>	17 81
81 17	MEM_B_DQS_P<6>	169A	DQS6	VSS50	172A		
	171A	VSS49	DQ54	174A	MEM_B_DQ<52>	17 81	
81 17	MEM_B_DQ<50>	173A	DQ50	DQ55	176A	MEM_B_DQ<49>	17 81
81 17	MEM_B_DQ<55>	175A	DQ51	VSS52	178A		
	177A	VSS51	DQ60	180A	MEM_B_DQ<46>	17 81	
81 17	MEM_B_DQ<40>	179A	DQ56	DQ61	182A	MEM_B_DQ<43>	17 81
81 17	MEM_B_DQ<47>	181A	DQ57	VSS54	184A		
	183A	VSS53	DQS7*	186A	MEM_B_DQS_N<5>	17 81	
81 17	MEM_B_DM<5>	185A	DM7	DQS7	188A	MEM_B_DQS_P<5>	17 81
	187A	VSS55	VSS56	190A			
81 17	MEM_B_DQ<42>	189A	DQ58	DQ62	192A	MEM_B_DQ<41>	17 81
81 17	MEM_B_DQ<45>	191A	DQ59	DQ63	194A	MEM_B_DQ<44>	17 81
	193A	VSS57	VSS58	196A			
77 75 74 65 59 58 57 52 53 27 28 29 24 23 14 13 8 50 48 47 46 44 43 42 41 38 39 36 35 34 33 31 30	PP3V3_S0		SA0	198A	Resistor prevents pwr-gnd short		
82 48 34 31 29 25	SMBUS_SB_SDA	195A	SDA	SA1	200A	SODIMM_B_SA1	
82 48 34 31 29 25	SMBUS_SB_SCL	197A	SCL			ADDR=0xA4(WR)/0xA5(RD)	
		199A	VDDSPD				

202 204

516S0471

"Expansion" (surface-mount) slot

DDR2 Bypass Caps

(For return current)

87 62 57 50 38 32 31 8 PP1V8_S3

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

PP3V3_S0 52 57 58 59 65 74 75 77 87 8 13 16 19 21 23 24 25 26 27 28 29 30 31 32 42 46 47 48 50 51

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

DDR2 SO-DIMM Connector B

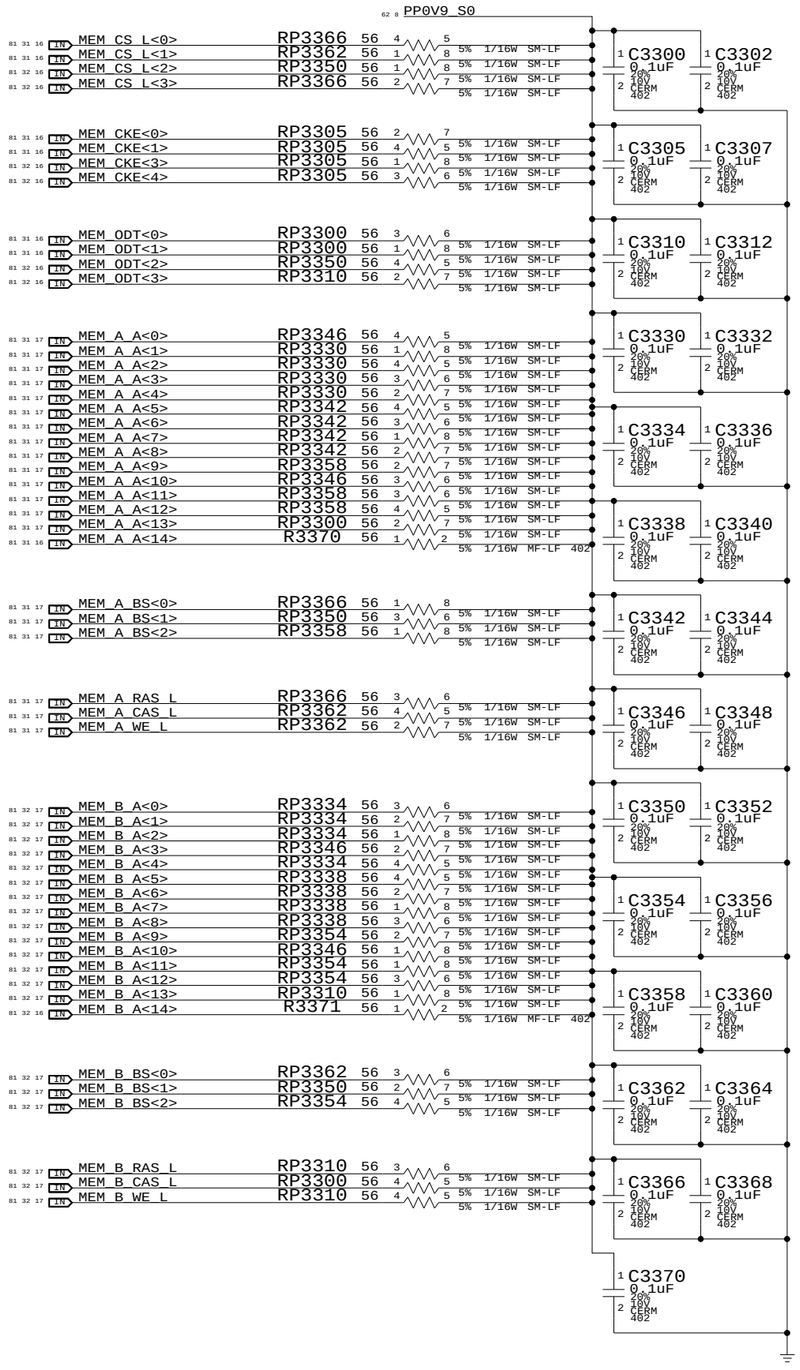
SYNC_MASTER=(M59_SYNC) SYNC_DATE=08/24/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE	SHT 32 OF 88	
NONE		

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

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



Memory Active Termination

SYNC_MASTER=(T9_NOME) SYNC_DATE=11/14/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE NONE

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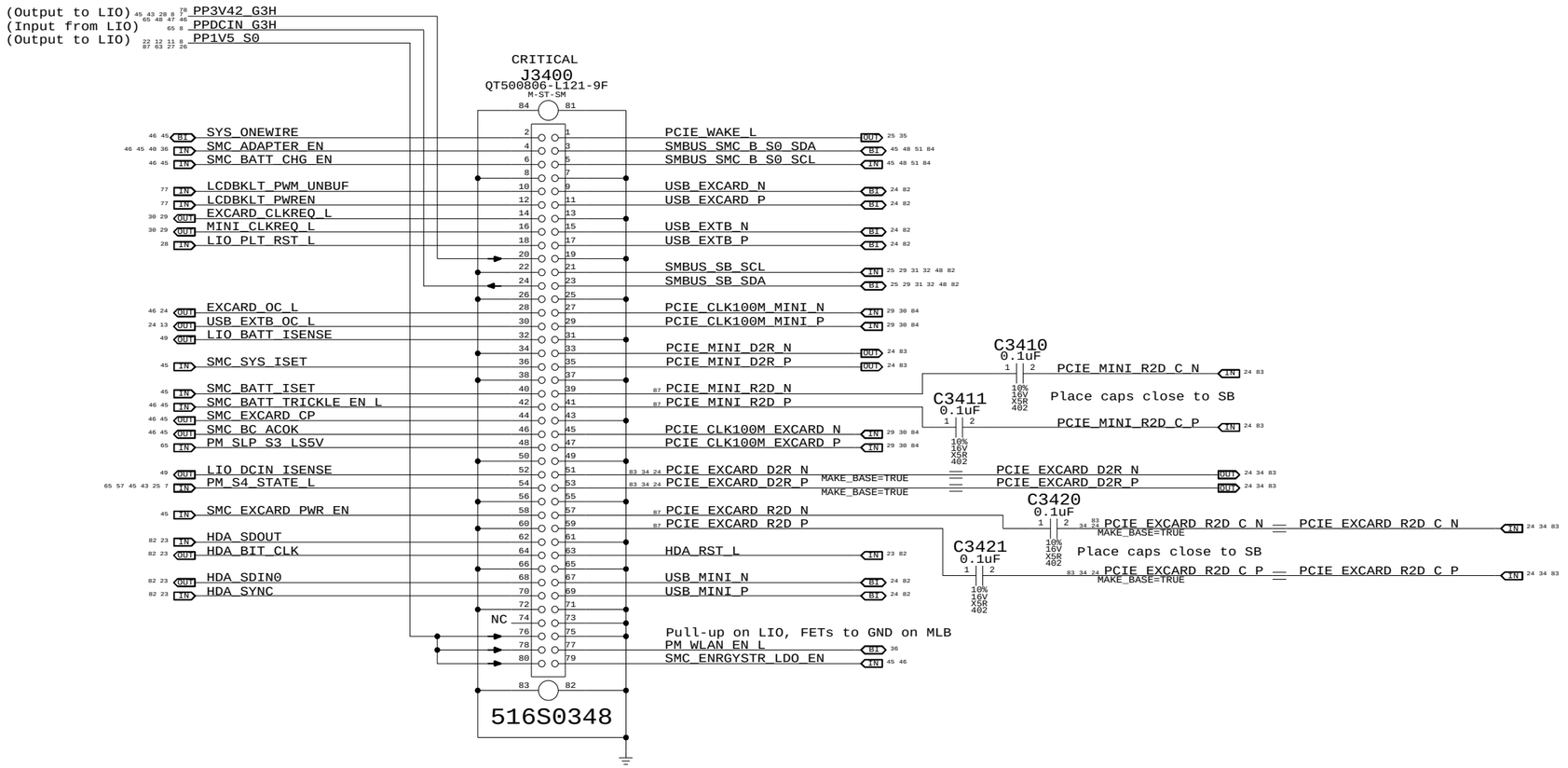
Left I/O Board Connector



Left I/O Board Connector

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE: NONE

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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.

PP1V25_ENET

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

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

PP1V9_ENET — 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

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

(EC:2.5V)

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

GND

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
Yukon EC: Pin 42 should be NC (or TP) net.
ENET_CLKREQ_L
PCIE_WAKE_L
ENET_RESET_L

ENET_MDI_P<0>
ENET_MDI_N<0>
ENET_MDI_P<1>
ENET_MDI_N<1>
ENET_MDI_P<2>
ENET_MDI_N<2>
ENET_MDI_P<3>
ENET_MDI_N<3>

SIGNAL_MODEL=EMPTY
R3740 R3741 49.9 1% 1/16W MF-LF 402
R3742 R3743 49.9 1% 1/16W MF-LF 402
R3744 R3745 49.9 1% 1/16W MF-LF 402
R3746 R3747 49.9 1% 1/16W MF-LF 402

ENET_MDI0: C3740 0.001UF 10% 50V CERM 402
ENET_MDI1: C3742 0.001UF 10% 50V CERM 402
ENET_MDI2: C3744 0.001UF 10% 50V CERM 402
ENET_MDI3: C3746 0.001UF 10% 50V CERM 402

ENET_CLK25M_XTALI
ENET_CLK25M_XTALO

U3700 88E8058 QFN — CRITICAL — OMIT

NC_32	32		
NC_51	51		
NC_52	52		
NC_57	57		
NC_64	64		
AVDD0	19		
AVDD1	22		
AVDD2	23		
AVDD3	28		
		EC:AVDD 2.5V	
VDDO_TTL0	1		
VDDO_TTL1	40		
VDDO_TTL2	45		
VDDO_TTL3	61		
AVDDH	8		
VDD0	2		
VDD1	7		
VDD2	13		
VDD3	33		
VDD4	39		
VDD5	44		
VDD6	48		
VDD7	58		
TX_P	49	PCIE_ENET_D2R_C_P	
TX_N	50	PCIE_ENET_D2R_C_N	
RX_P	54	PCIE_ENET_R2D_P	
RX_N	53	PCIE_ENET_R2D_N	
REFCLKP	55		
REFCLKN	56		
CLKREQ*	42	EC:NO CONNECT	
WAKE*	6		
PERST*	5		
MDIP0	17		
MDIN0	18		
MDIP1	20		
MDIN1	21		
MDIP2	26		
MDIN2	27		
MDIP3	30		
MDIN3	31		
XTALI	15		
XTALO	14		
THRML_PAD	65		

PCI EXPRESS

ANALOG

LOM_DISABLE*	10	ENET_LOM_DIS_L	
VAUX_AVLBL	12		
SWITCH_VAUX	9	NC	
VMAIN_AVLBL	47	PM_SLP_S3_L	Must be high in S0 state (can use PP3V3_S0 as input)
SWITCH_VCC	11	NC	
EC:CTRL25 CTRL18	4	TP_YUKON_CTRL18	
CTRL12	3	TP_YUKON_CTRL12	
RSET	16	YUKON_RSET	

R3760 4.7K 5% 1/10W MF-LF 402

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

LED

LED_ACT*	59	NC
LED_LINK10/100*	60	NC
LED_LINK1000*	62	NC
LED_DUPLEX*	63	NC

SPI

(IPU) SPI_DO	34	NC
(IPU) SPI_DI	35	NC
(IPU) SPI_CLK	37	NC
(IPU) SPI_CS	36	NC

MEDIA

TWSI

(IPU) VPD_CLK	38	YUKON_VPD_CLK
(IPU) VPD_DATA	41	YUKON_VPD_DATA

TEST/RSVD

(IPD) TESTMODE	46	
RSVD_24	24	NC
RSVD_25	25	NC
RSVD_29	29	NC
RSVD_43	43	NC

MAIN CLK

VPD ROM

C3780 0.1UF 10% 16V X5R 402
R3780 4.7K 5% 1/10W MF-LF 402
R3781 4.7K 5% 1/10W MF-LF 402
U3780 M24C08 SO8 — CRITICAL
VCC; E2; NC1; NC0; WC*; SDA; SCL; 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=03/16/2007

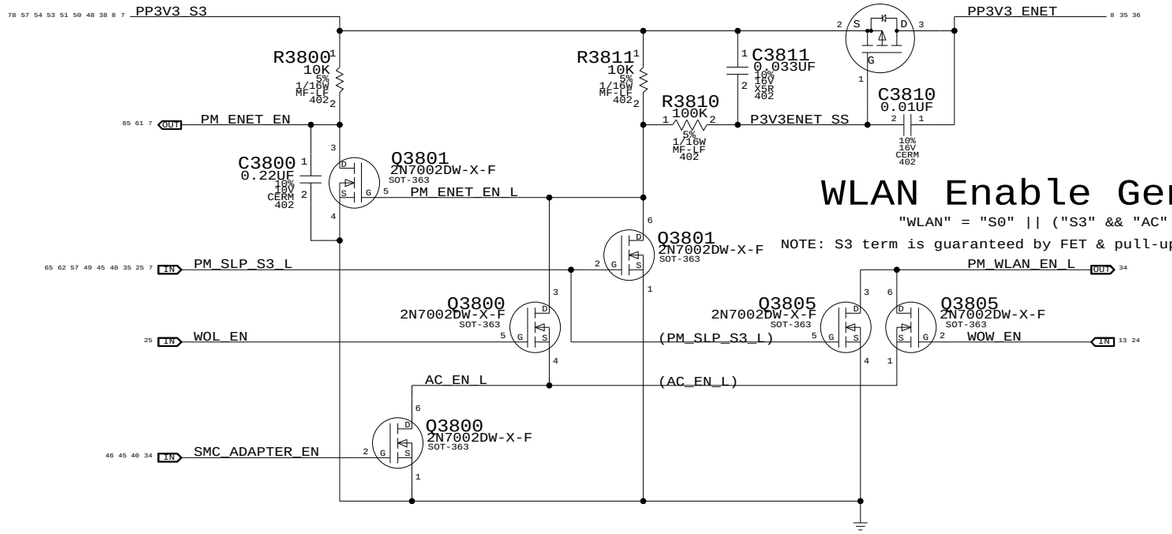
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 35 OF 88	

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")

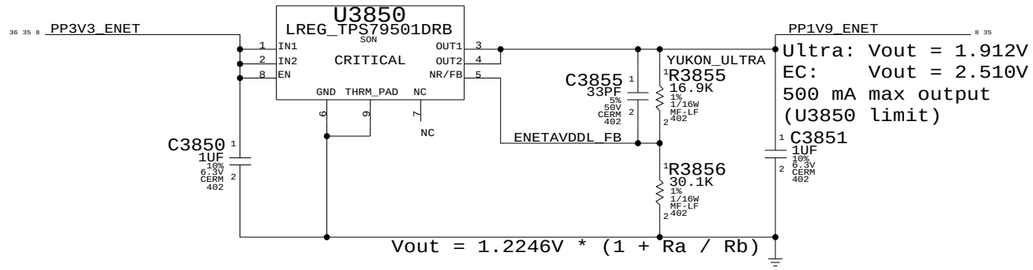
NOTE: S3 term is guaranteed by FET & pull-up source, MUST BE S3 RAIL.

3.3V ENET FET

Yukon AVDDL LDO

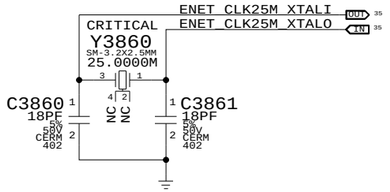
1.9V for Yukon Ultra, 2.5V for Yukon EC

Yukon Ultra requires 1.9V on its magnetics to pass compliance tests



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

Yukon Crystal



Yukon Power Control

SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

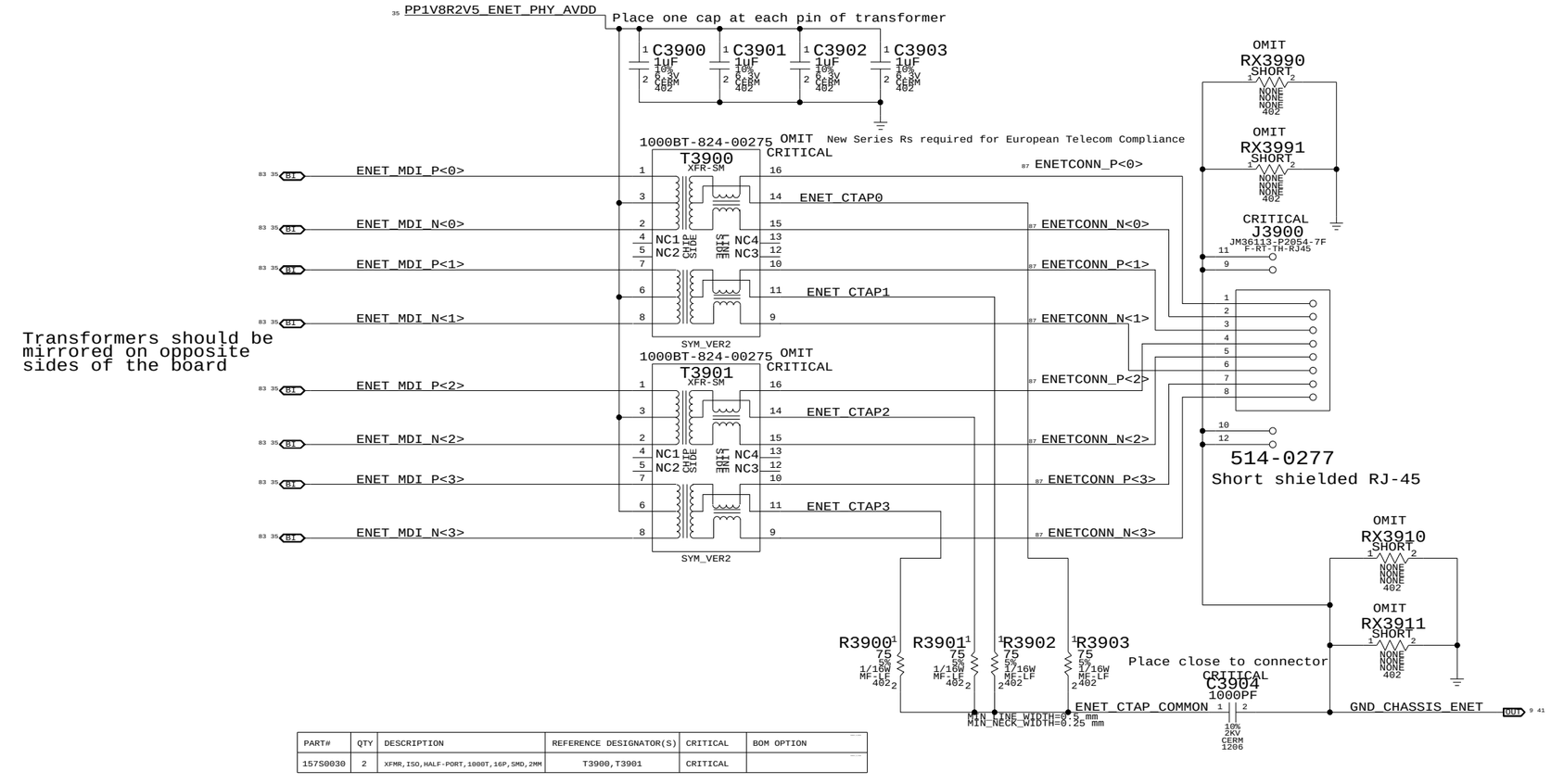
SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 36 OF 88	

Page Notes

Power aliases required by this page:
- =GND_CHASSIS_ENET

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)



Transformers should be mirrored on opposite sides of the board

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=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE: NONE

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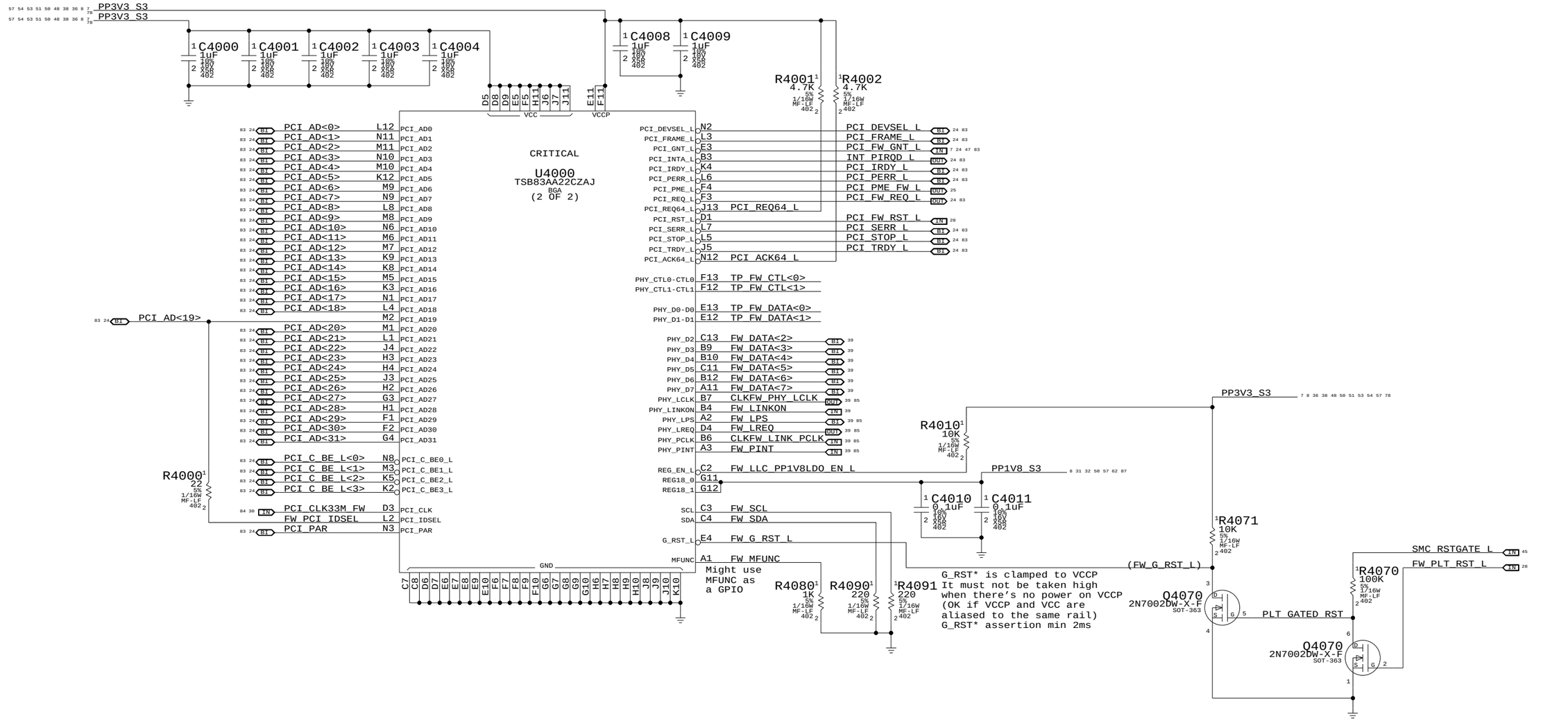


FireWire Link (TSB83AA22)

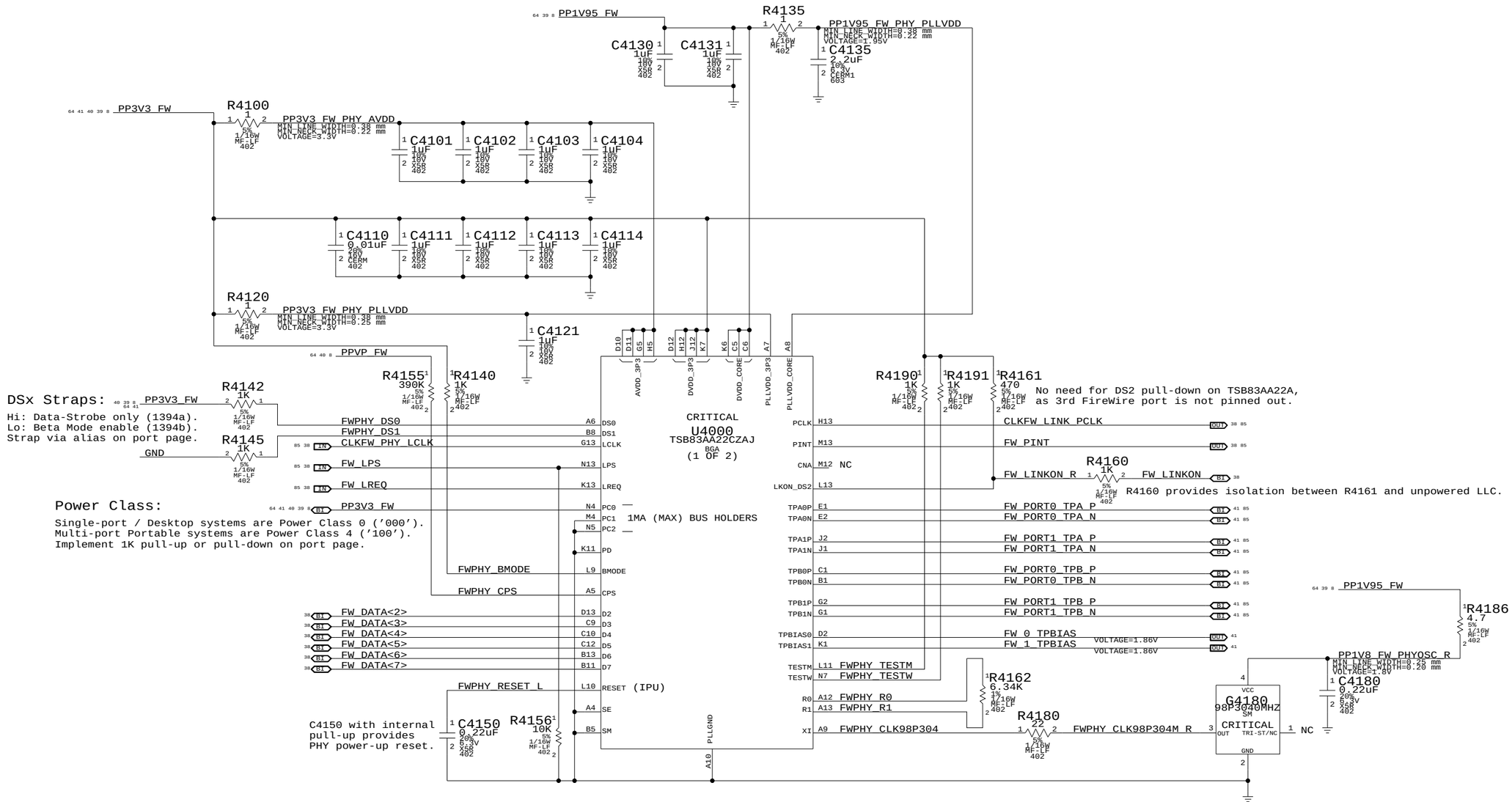
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

NOTICE OF PROPRIETARY PROPERTY

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	38	88



FireWire PHY (TSB83AA22)

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 39 OF 88	

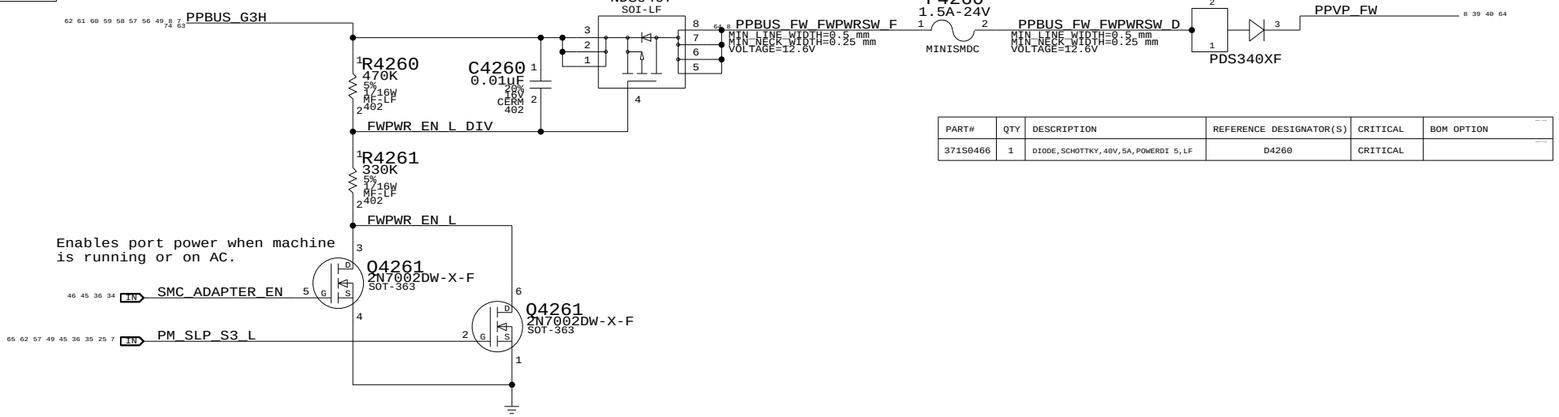
Page Notes

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)

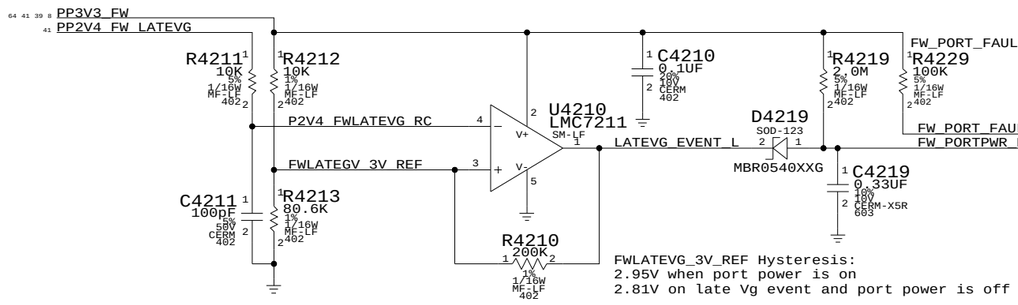
BOM options provided by this page:
- FW_PORT_FAULT_PU

FireWire Port Power Switch



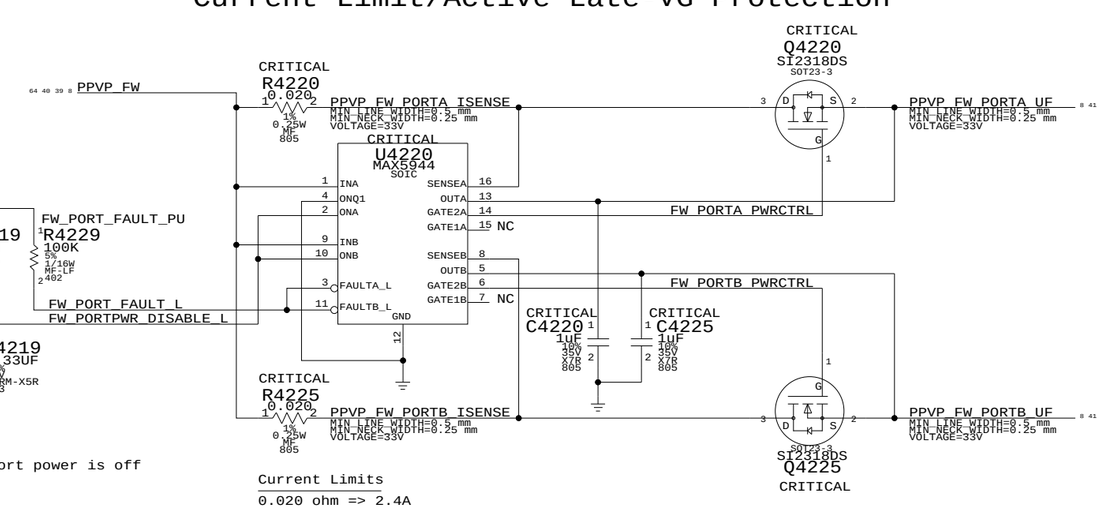
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
371S0466	1	DIODE,SCHOTTKY,40V,5A,POWERDI 5,LF	D4260	CRITICAL	

Late-VG Event Detection



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

Current Limit/Active Late-VG Protection



Current Limits

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

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

FireWire Port Power

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 40 OF 88	

Page Notes

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

Signal aliases required by this page:
(NONE)

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

BOM options provided by this page:
(NONE)

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

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

FireWire PHY Config Straps

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

64 41 40 39 8 PP3V3_FW
41 40 39 8 PP3V3_FW
40 39 34 8 PP3V3_FW
34 8 GND

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

85 41 39 FW_PORT0_TPA_P — MAKE_BASE=TRUE — 39 41 85 FW_PORT0_TPA_P
85 41 39 FW_PORT0_TPA_N — MAKE_BASE=TRUE — 39 41 85 FW_PORT0_TPA_N
85 41 39 FW_PORT0_TPB_P — MAKE_BASE=TRUE — 39 41 85 FW_PORT0_TPB_P
85 41 39 FW_PORT0_TPB_N — MAKE_BASE=TRUE — 39 41 85 FW_PORT0_TPB_N
85 41 39 FW_PORT1_TPA_P — MAKE_BASE=TRUE — 39 41 85 FW_PORT1_TPA_P
85 41 39 FW_PORT1_TPA_N — MAKE_BASE=TRUE — 39 41 85 FW_PORT1_TPA_N
85 41 39 FW_PORT1_TPB_P — MAKE_BASE=TRUE — 39 41 85 FW_PORT1_TPB_P
85 41 39 FW_PORT1_TPB_N — MAKE_BASE=TRUE — 39 41 85 FW_PORT1_TPB_N

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
CRITICAL L4362 18NH-250MA 0402 SIGNAL_MODEL=EMPTY
FW_B_TPB_L_P
CRITICAL L4363 18NH-250MA 0402 SIGNAL_MODEL=EMPTY

FW_PORT0_TPB_C
C4354 220pF 5% 25V CERM 402
R4354 4.99K 1% 1/16W MF-LF 402
FW_PORT1_TPB_C
C4364 220pF 5% 25V CERM 402
R4364 4.99K 1% 1/16W MF-LF 402

Late-VG Protection Power

64 41 40 39 8 PP3V3_FW
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

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

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

Cable Power

CRITICAL L4300 FERR-250-OHM SM
Note: Trace PPVP_FW_PORT0 must handle up to 5A
40 8 PPVP_FW_PORTA_UF
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
DP4301 BAV99DW-X-F SOT-363
C4302 0.01uF 10% 50V X7R 402
C4303 0.01uF 10% 50V X7R 402

85 41 39 FW_PORT0_TPA_P
85 41 39 FW_PORT0_TPA_N
85 41 39 FW_PORT0_TPB_P
85 41 39 FW_PORT0_TPB_N

CRITICAL FL4300 90-OHM-100MA 1210-4SM1
CRITICAL FL4301 90-OHM-100MA 1210-4SM1
87 FW_PORT0_TPA_FL_P
87 FW_PORT0_TPA_FL_N
87 FW_PORT0_TPB_FL_P
87 FW_PORT0_TPB_FL_N

(PPFW_PORT0_VP)
(GND_FW_PORT0_VG)
C4305 0.01uF 20% 50V CERM 603

43 41 9 GND_CHASSIS_RTUSB
OMIT CX4300 SHORT
OMIT CX4301 SHORT

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

GND_CHASSIS_RTUSB
41 37 9 GND_CHASSIS_ENET
OMIT CX4302 SHORT
OMIT CX4303 SHORT

Cable Power

CRITICAL L4310 FERR-250-OHM SM
Note: Trace PPVP_FW_PORT1 must handle up to 5A
40 8 PPVP_FW_PORTB_UF
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
DP4311 BAV99DW-X-F SOT-363
C4312 0.01uF 10% 50V X7R 402
C4313 0.01uF 10% 50V X7R 402

85 41 39 FW_PORT1_TPB_N
85 41 39 FW_PORT1_TPB_P
85 41 39 FW_PORT1_TPA_N
85 41 39 FW_PORT1_TPA_P

(FW_PORT1_BREF)
(PPVP_FW_PORT1)
(GND_FW_PORT1_VG)
FW_PORT1_AREF
C4319 0.1uF 10% 50V X7R 603-1
R4319 1M 5% 1/16W MF-LF 402
NO STUFF C4317 0.01uF 20% 50V CERM 402
C4315 0.01uF 20% 50V CERM 603

PLACEMENT_NOTE=Place C4319 close to connector pin 5.

43 41 9 GND_CHASSIS_ENET
OMIT CX4304 SHORT
OMIT CX4305 SHORT

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

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

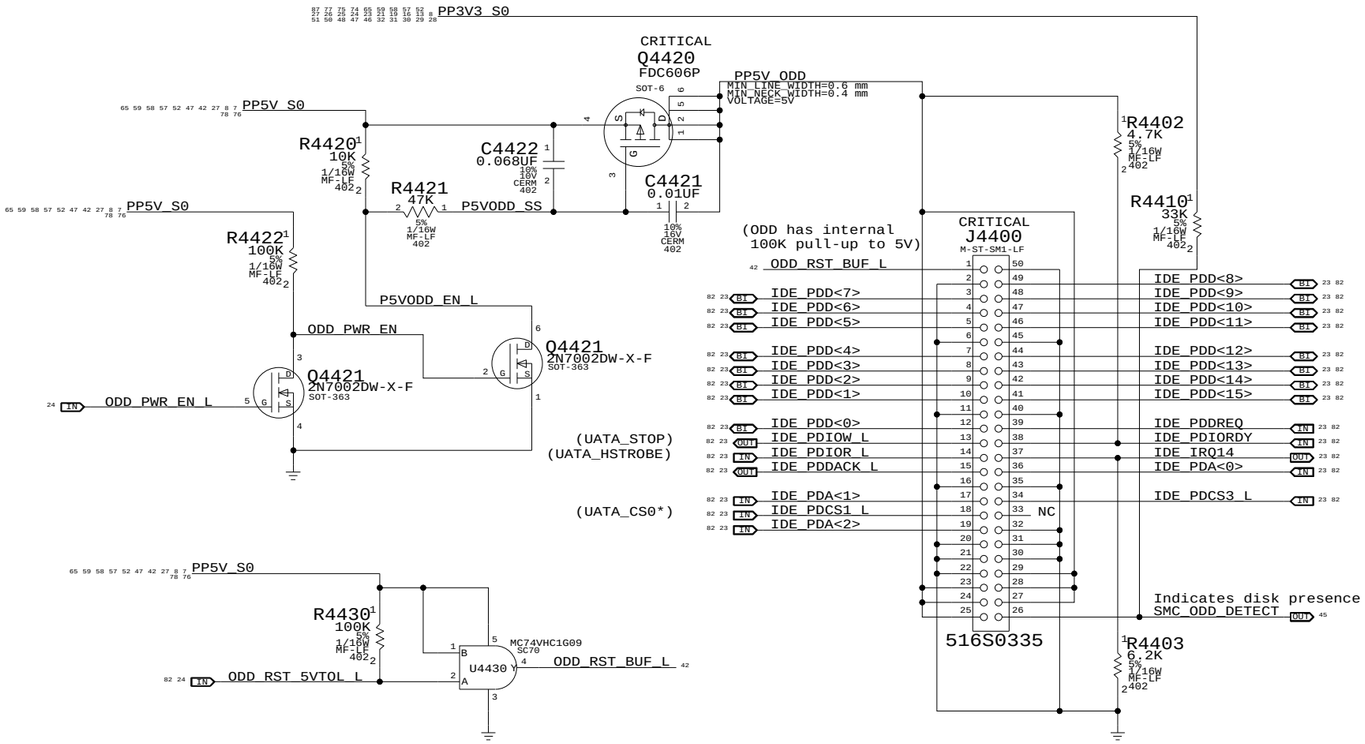
GND_CHASSIS_ENET
OMIT CX4306 SHORT
OMIT CX4307 SHORT

FireWire Ports

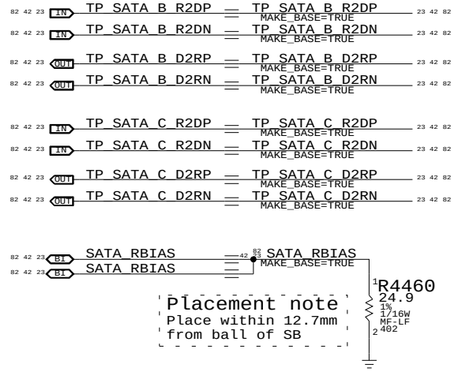
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.
SIZE D
DRAWING NUMBER 051-7225
REV. 14.0.0
SCALE NONE
SHT 41 OF 88

IDE (ODD) Connector



Unused SATA Ports



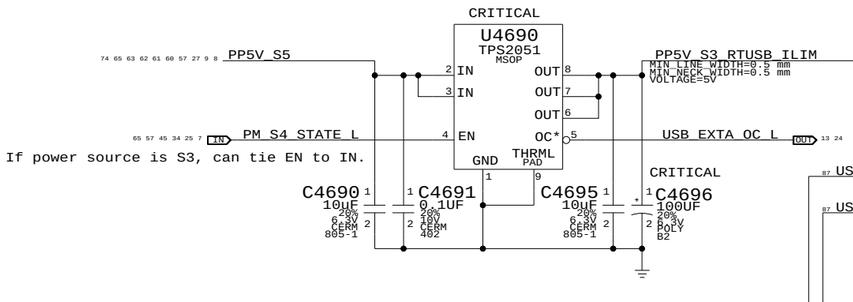
PATA Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

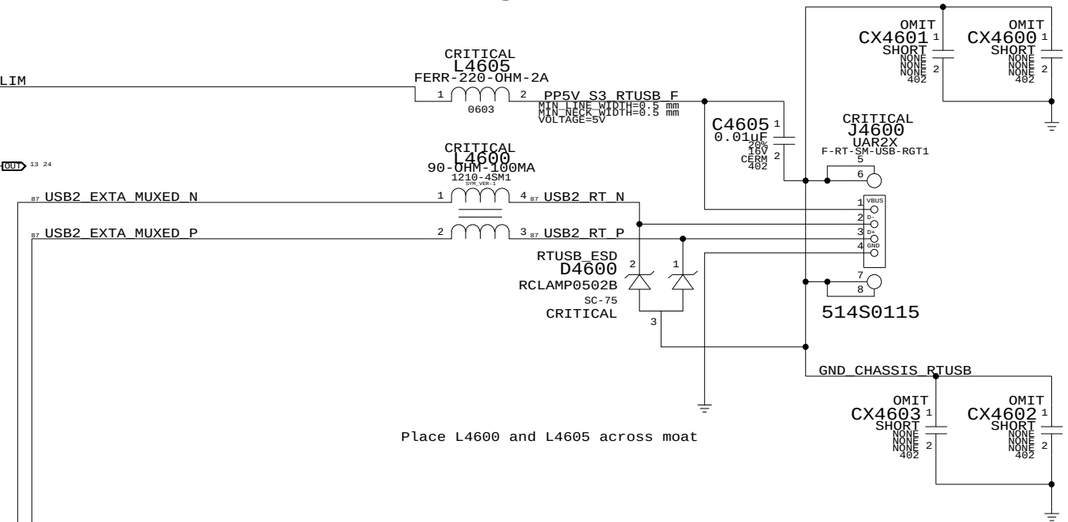
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 42 OF 88	

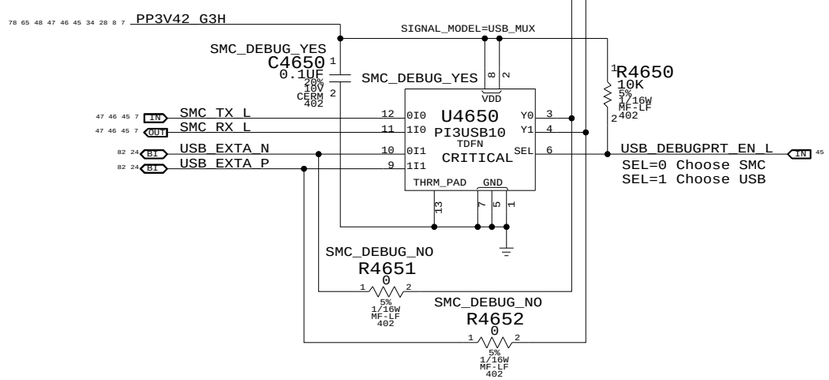
Port Power Switch



Right USB Port



USB/SMC Debug Mux



External USB Connector

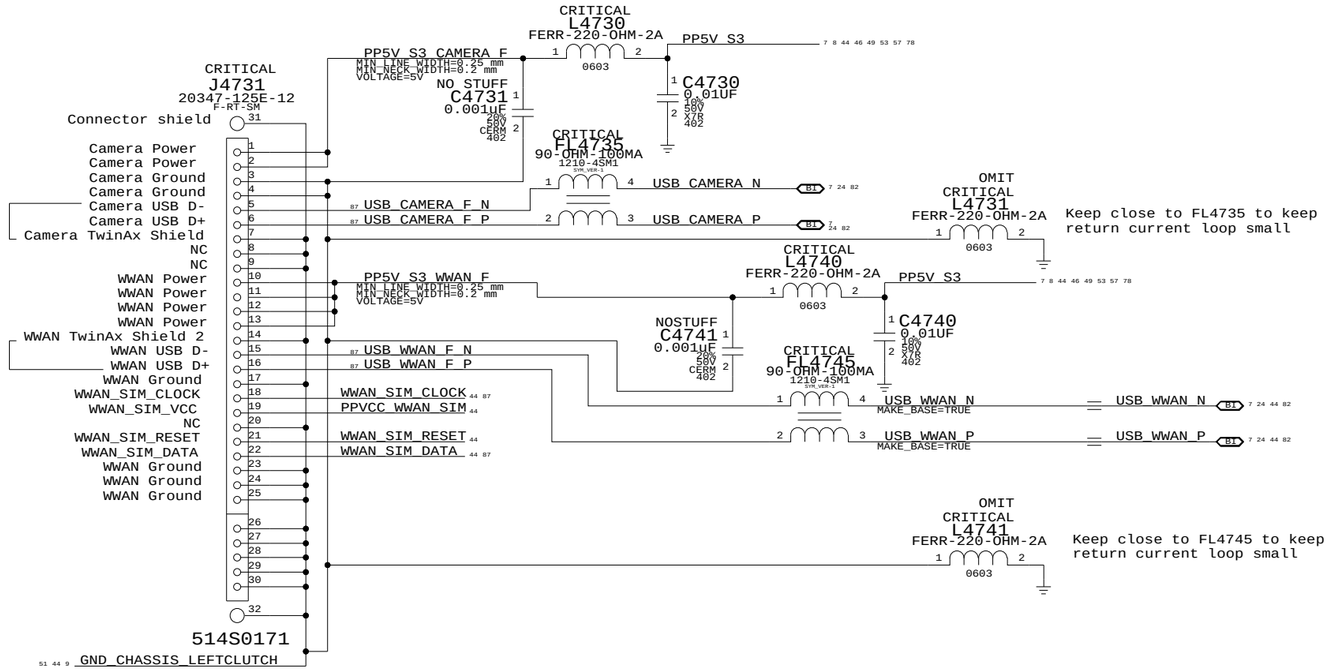
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

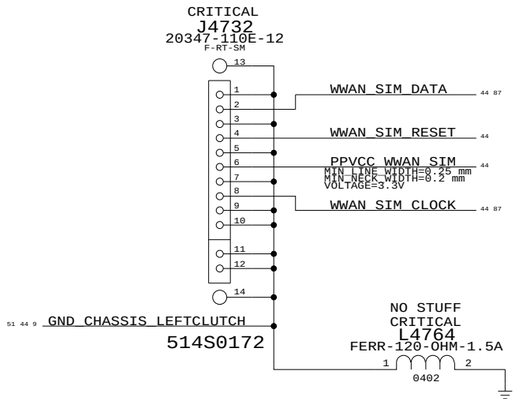
SCALE	SHT	OF
NONE	43	88

Left Clutch Barrel Interconnect



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

SIM Interconnect



Left Clutch Barrel Interconnect

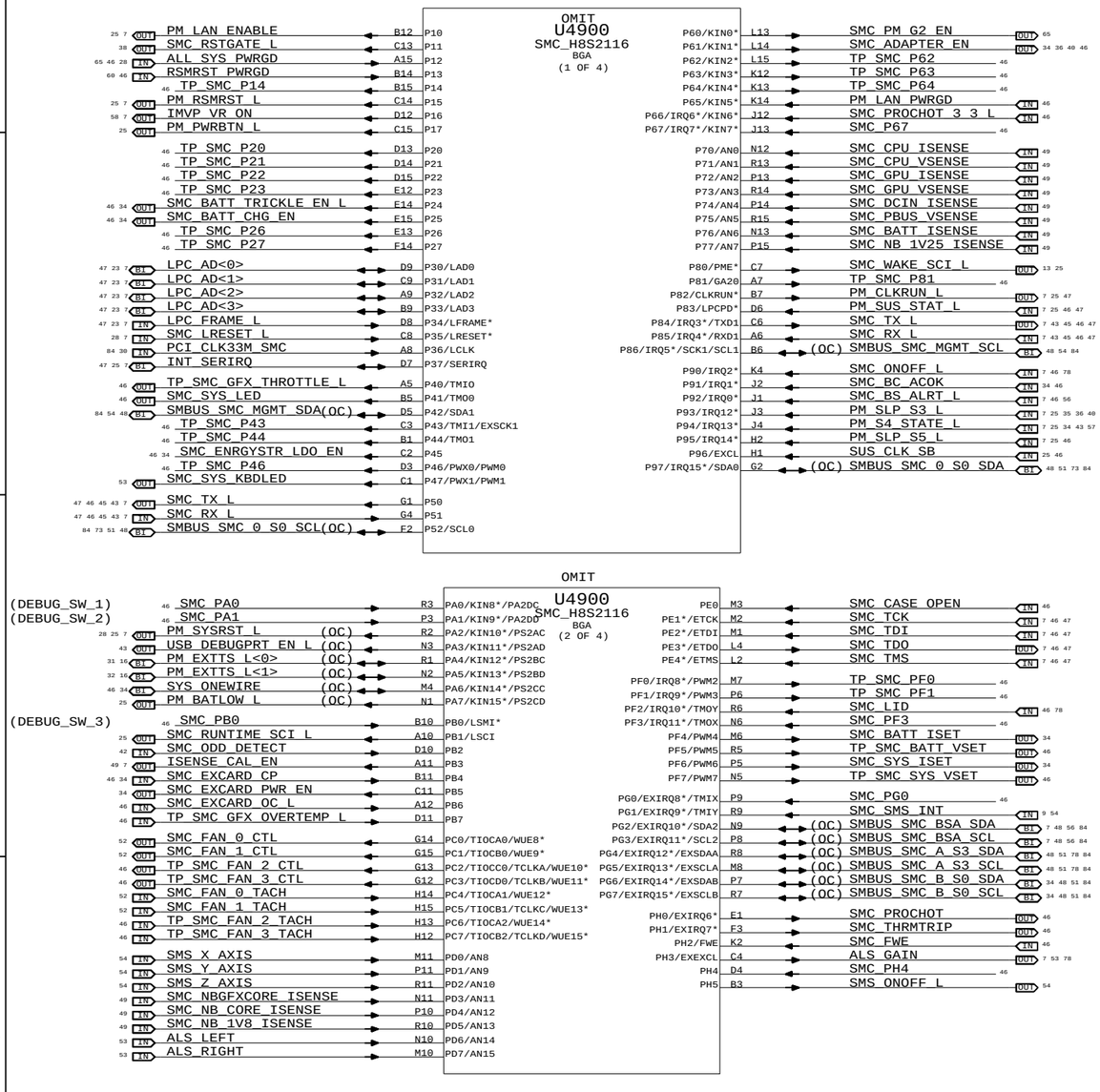
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

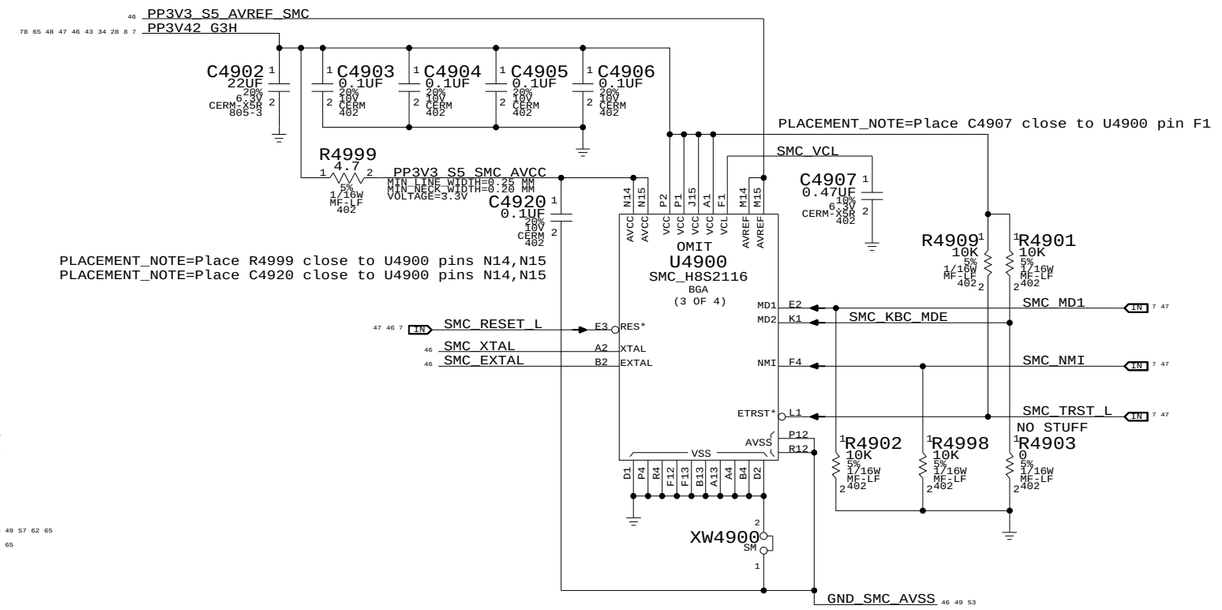
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

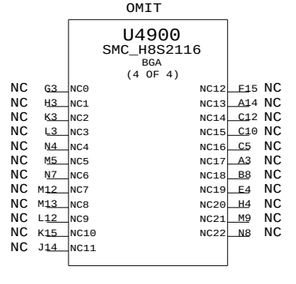
SCALE: NONE SHT 44 OF 88

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





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



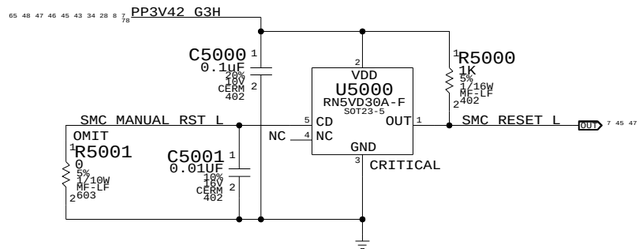
SMC

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

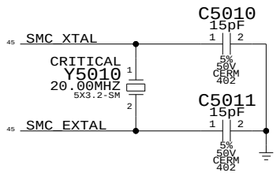
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 45 OF 88	

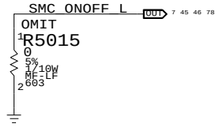
SMC Reset "Button" / Brownout Detect



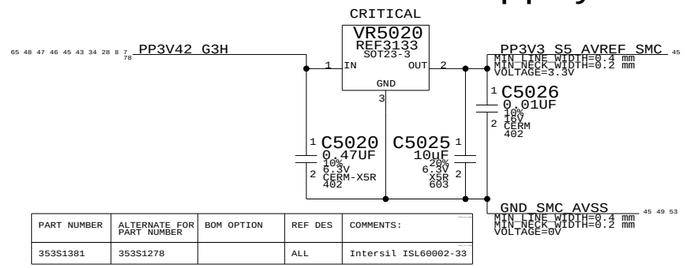
SMC Crystal Circuit



Debug Power "Button"

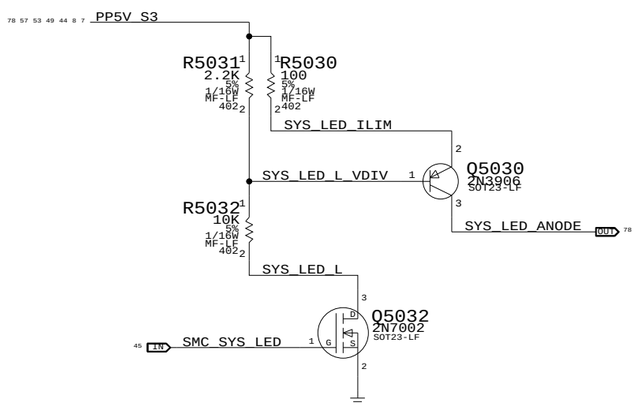


SMC AVREF Supply

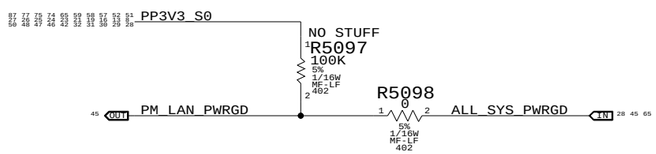


PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
353S1381	353S1278		ALL	Intersil ISL60002-33

System (Sleep) LED Circuit

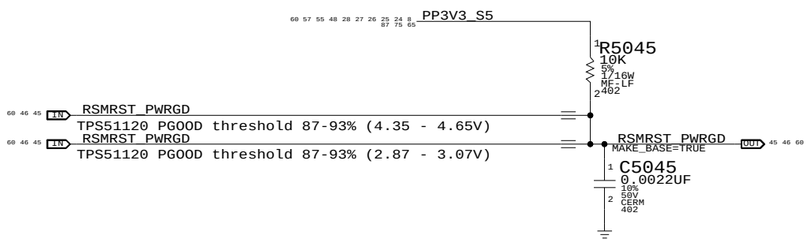


LAN PWRGD Circuit

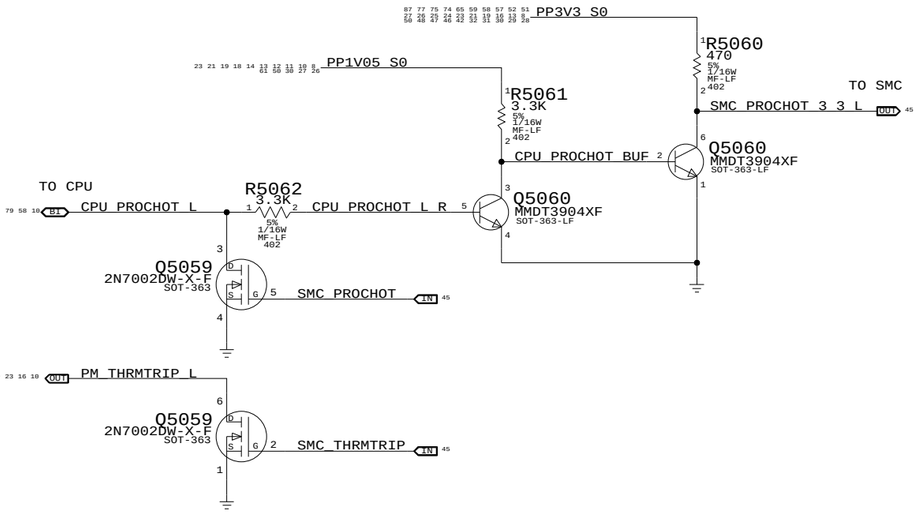


S5 Rail PWRGD Circuit

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



SMC FSB to 3.3V Level Shifting



SMC Support

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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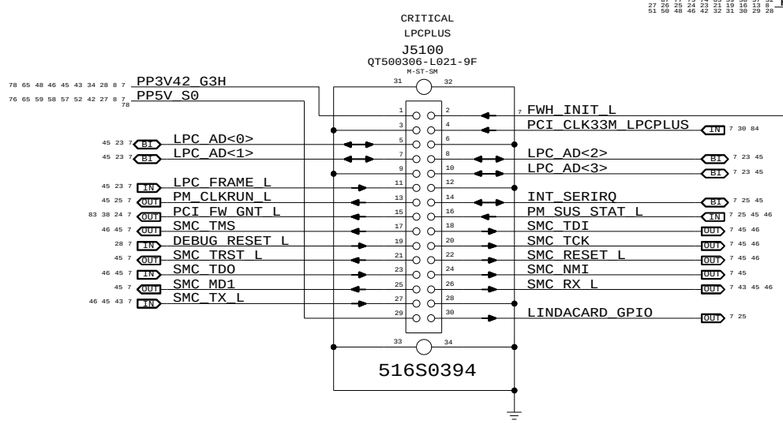
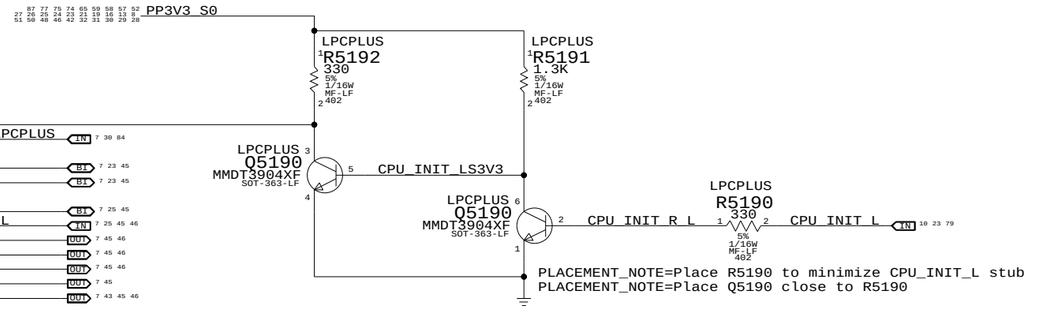
APPLE COMPUTER INC.	SIZE: D	DRAWING NUMBER: 051-7225	REV: 14.0.0
	SCALE: NONE	SHT: 46 OF 88	

LPC+ Connector



FWH_INIT_L Generation



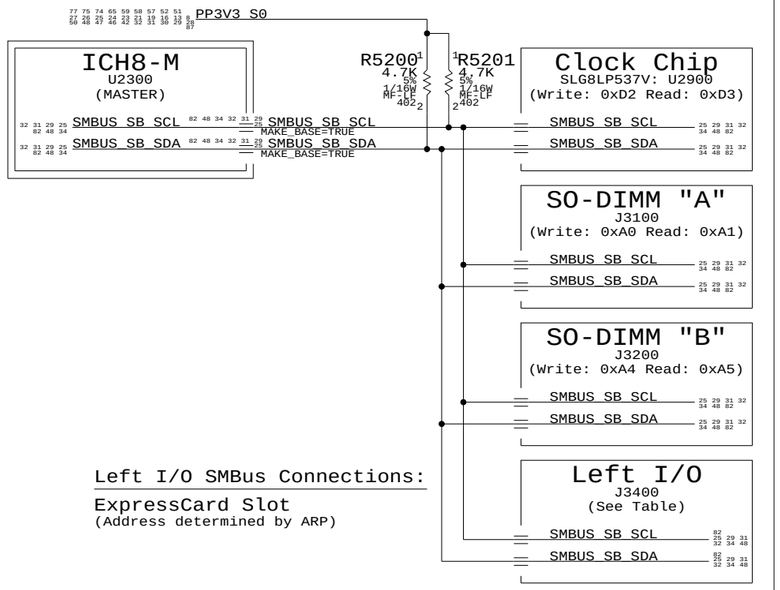
LPC+ Debug Connector

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

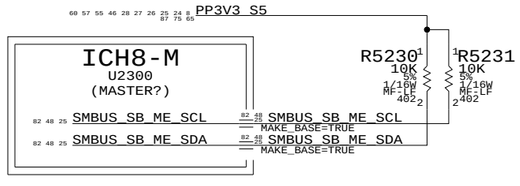
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 47 OF 88	

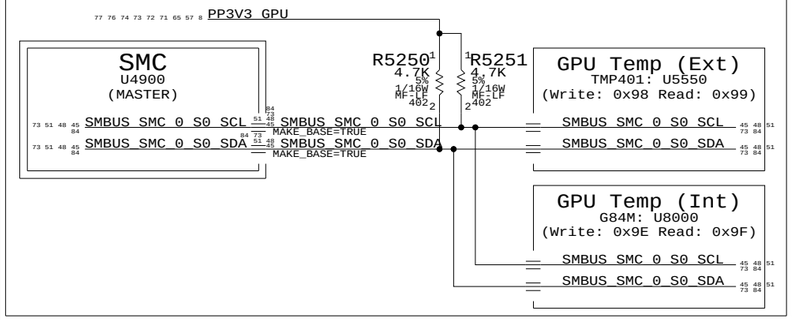
ICH8-M SMBus Connections



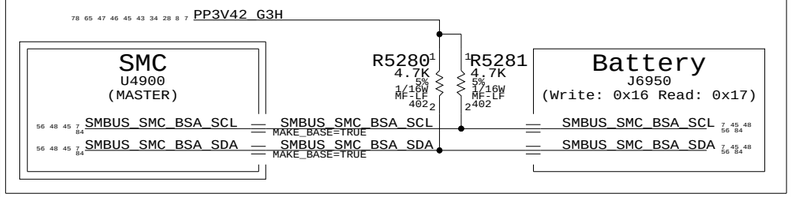
ICH8-M ME SMBus Connections



SMC "0" SMBus Connections

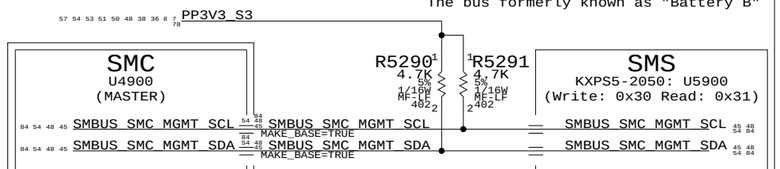


SMC "Battery A" SMBus Connections



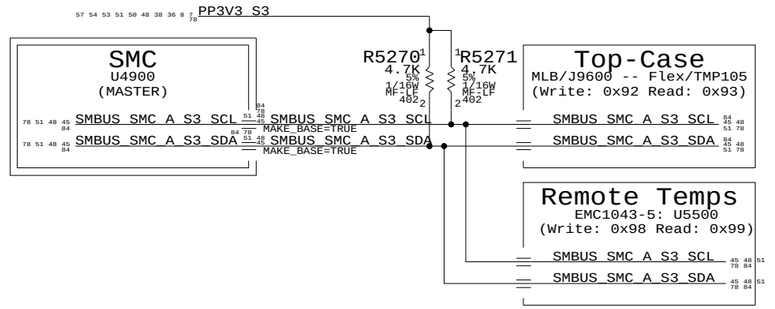
SMC "Management" SMBus Connections

The bus formerly known as "Battery B"

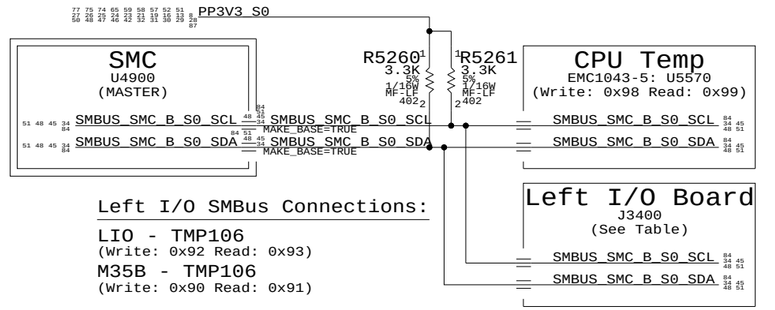


SMC "A" SMBus Connections

NOTE: SMC RMT bus remains powered and may be active in S3 state



SMC "B" SMBus Connections



Left I/O SMBus Connections:

LIO - TMP106
(Write: 0x92 Read: 0x93)

M35B - TMP106
(Write: 0x90 Read: 0x91)

SMBus Connections

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

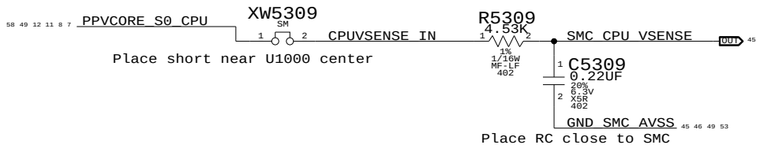
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

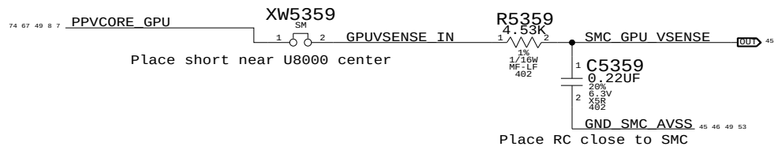
SCALE: NONE

SHT 48 OF 88

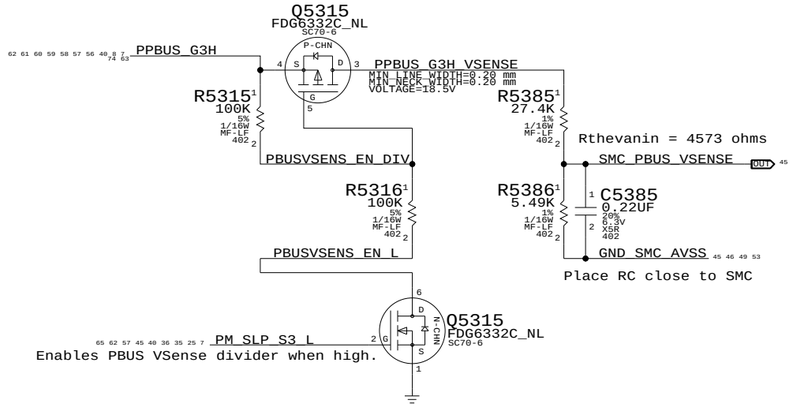
CPU Voltage Sense / Filter



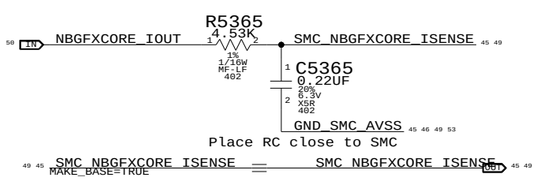
GPU Voltage Sense / Filter



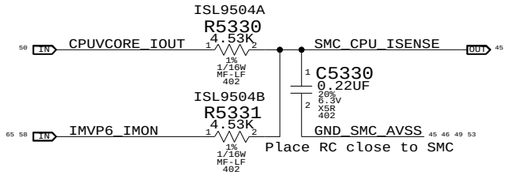
PBUS Voltage Sense & Filter



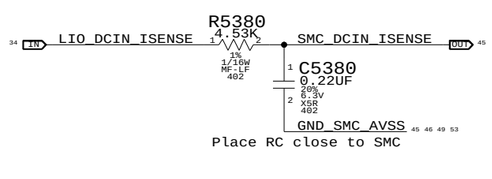
NB GFX Current Sense Filter



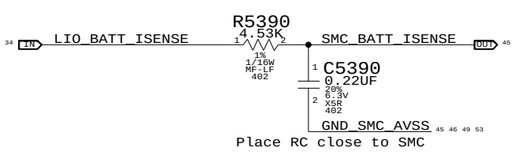
CPU Current Sense Filter



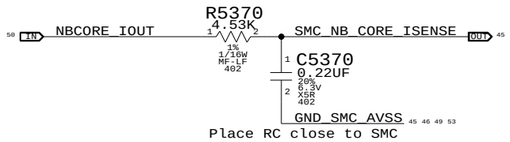
DCIN Current Sense Filter



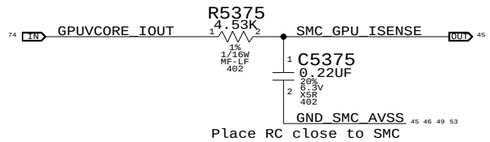
Battery (PBUS) Current Sense Filter



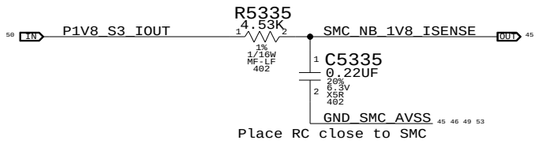
NB Core Current Sense Filter



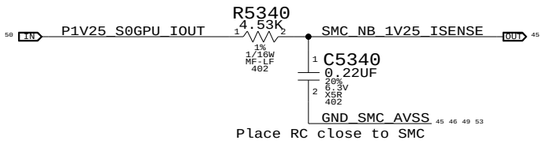
GPU Current Sense Filter



NB 1.8V Current Sense Filter

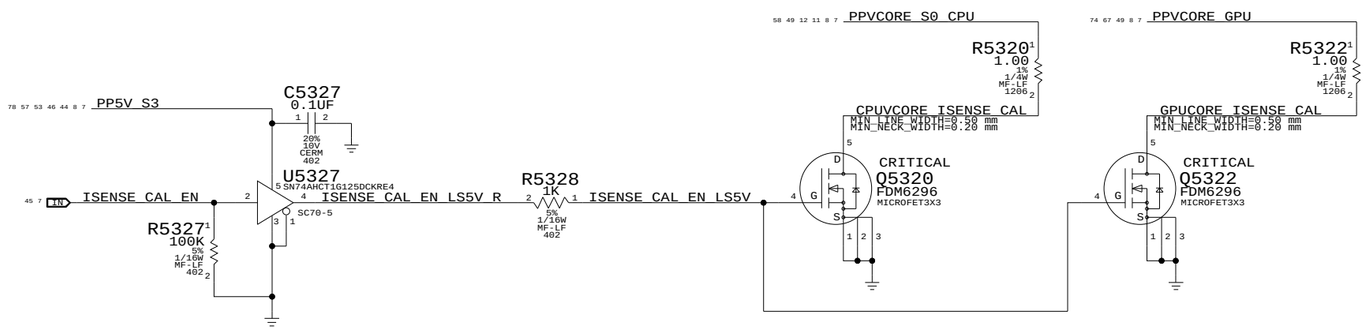


S0/GPU 1.25V Current Sense Filter



Current Sense Calibration Circuit

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



Current & Voltage Sensing		
SYNC_MASTER=(MASTER)	SYNC_DATE=(MASTER)	

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	14.0.0
	SCALE: NONE	SHT 49 OF 88	

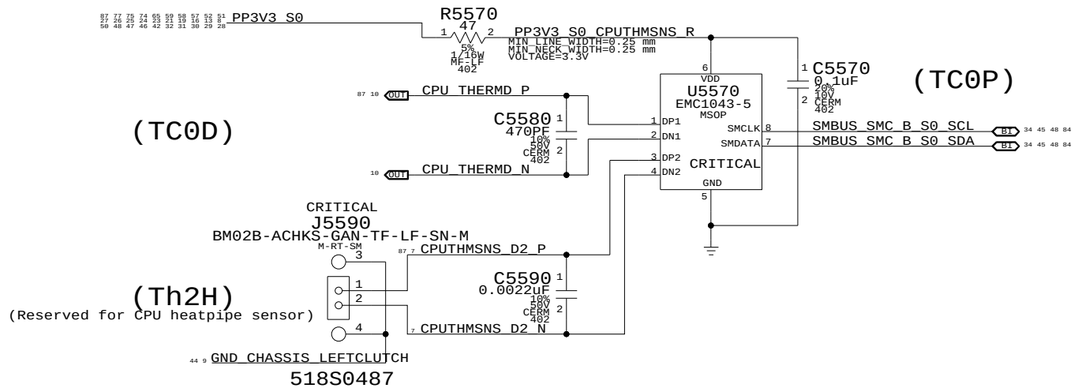
Current Sensing

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

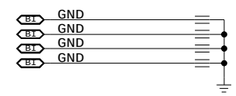
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 50 OF 88	

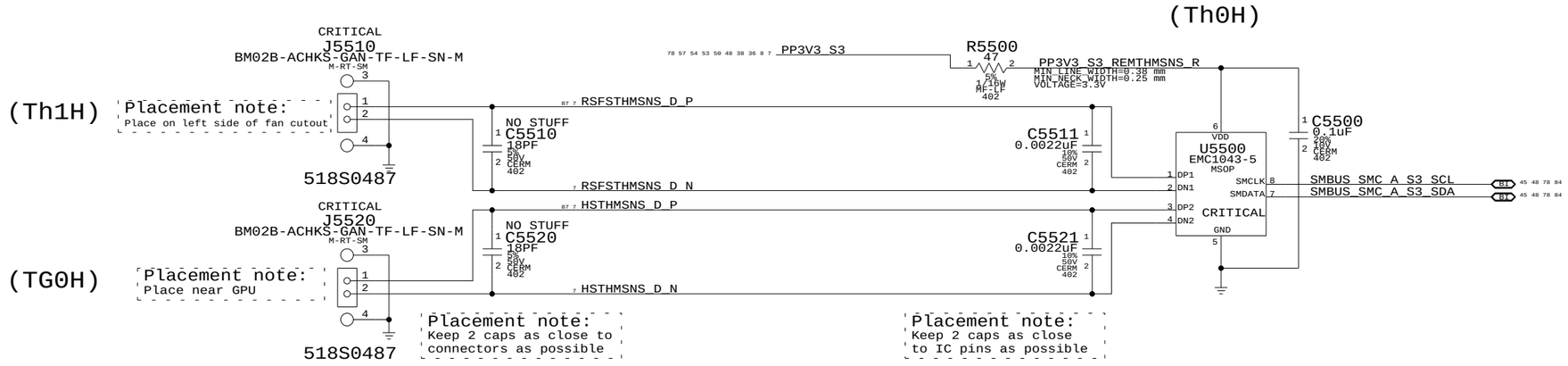
CPU T-Diode Thermal Sensor



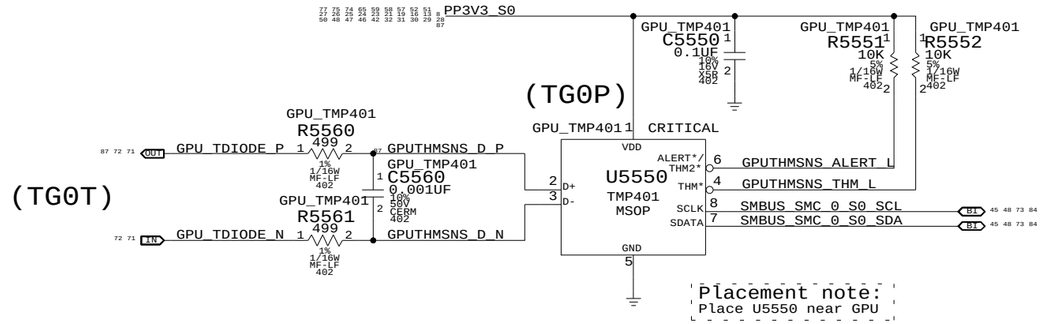
NB Thermal Diodes Not Used



GPU/Heat Pipe & Bottom Case Skin Thermal Sensor



GPU Die Thermal Sensor

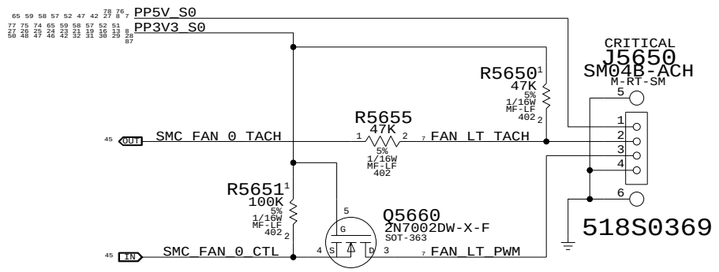


APPLE COMPUTER INC.

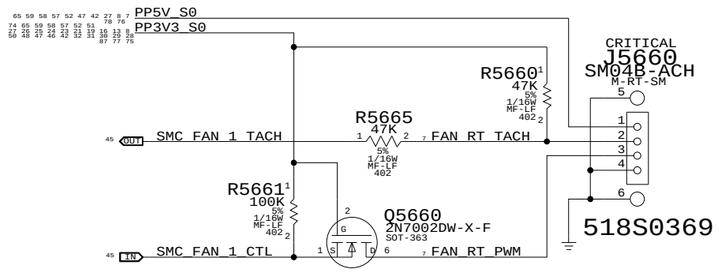
SIZE D | DRAWING NUMBER 051-7225 | REV. 14.0.0

SCALE NONE | SHT 51 OF 88

Left Fan



Right Fan



Fan Connectors

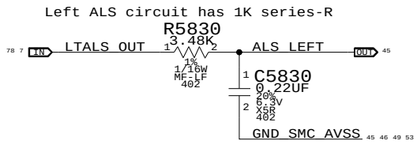
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

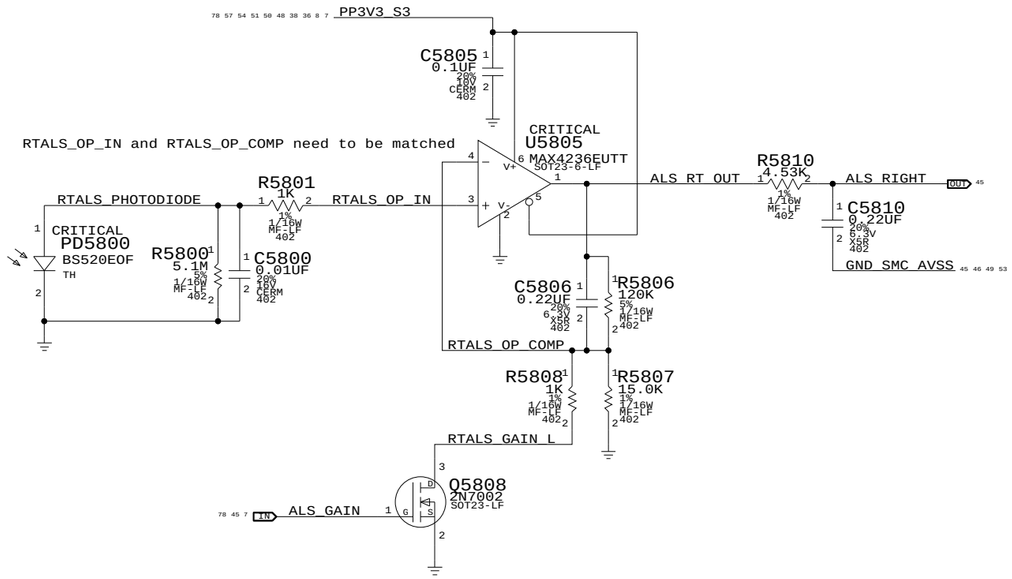
SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	52	88

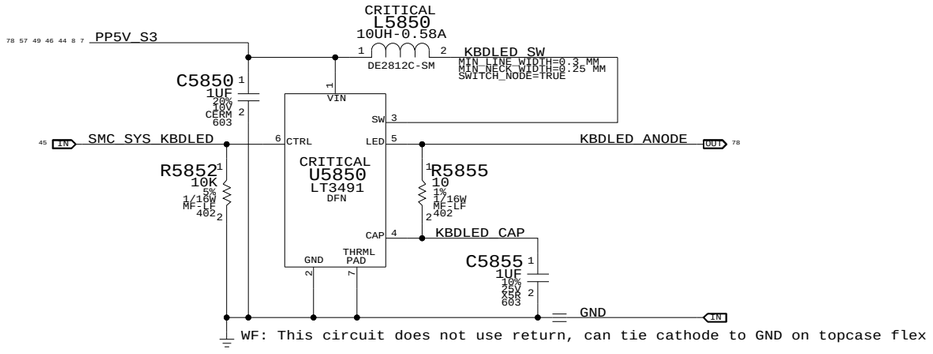
Left ALS Filter



Right ALS Circuit



Keyboard LED Driver



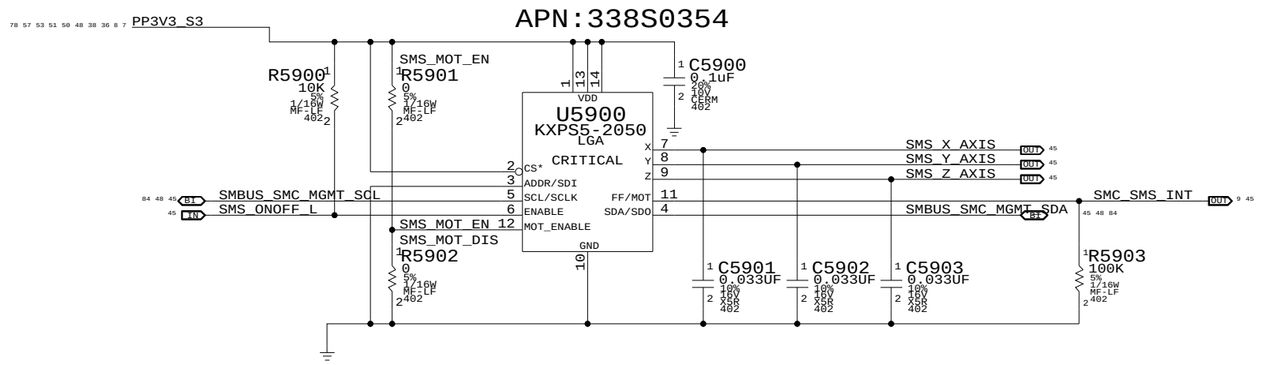
ALS Support

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 53 OF 88	

APN:338S0354



I2C addresses:

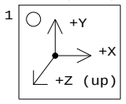
ADDR low => 0x30, 0x31

ADDR high => 0x32, 0x33

Alias SCL/SDA to GND if using analog outputs only

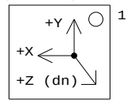
Desired orientation when placed on board top-side:

Package Top



Desired orientation when placed on board bottom-side:

Top-through View



Sudden Motion Sensor (SMS)

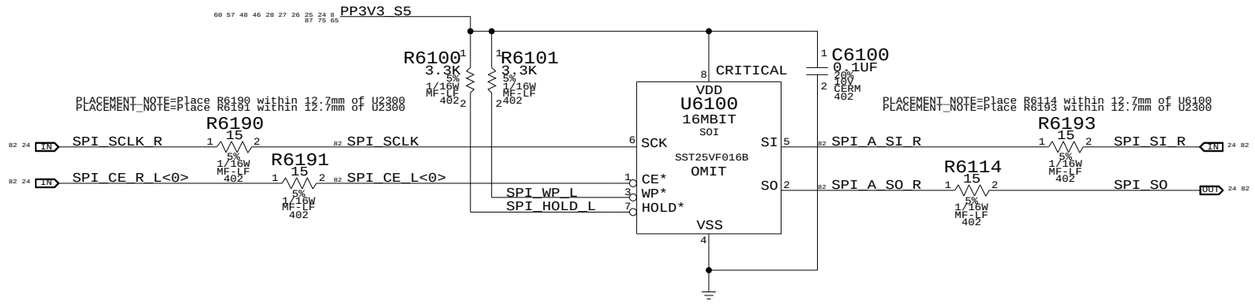
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE: NONE

SHT 54 OF 88



SPI BootROM

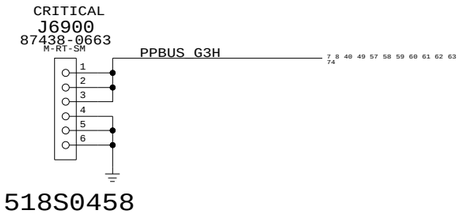
SYNC_MASTER=T9_NOME SYNC_DATE=03/16/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

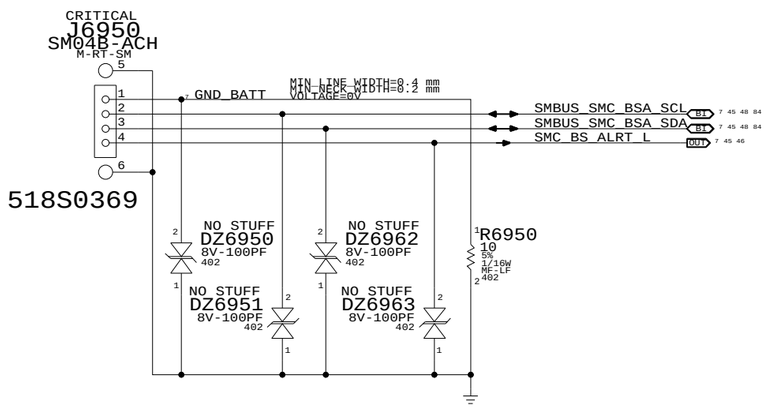
SCALE	SHT	OF
NONE	55	88

Left I/O Power Connector



518S0458

Battery Connector (Digital Signals)



518S0369

PBus-In & Battery Connectors

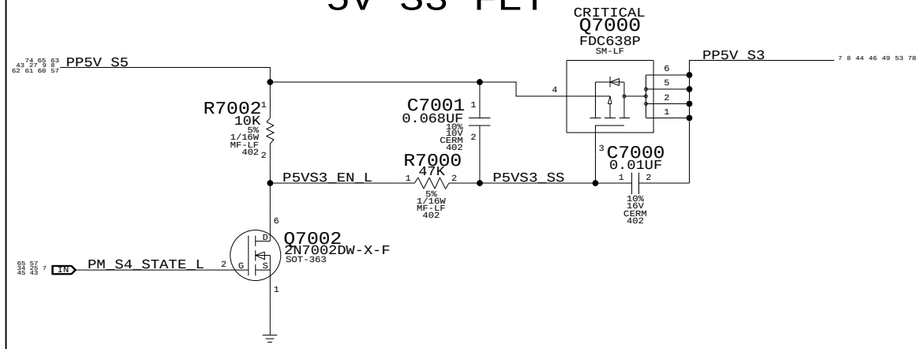
SYNC_MASTER=(M59_SYNC) SYNC_DATE=09/09/2006

APPLE COMPUTER INC.

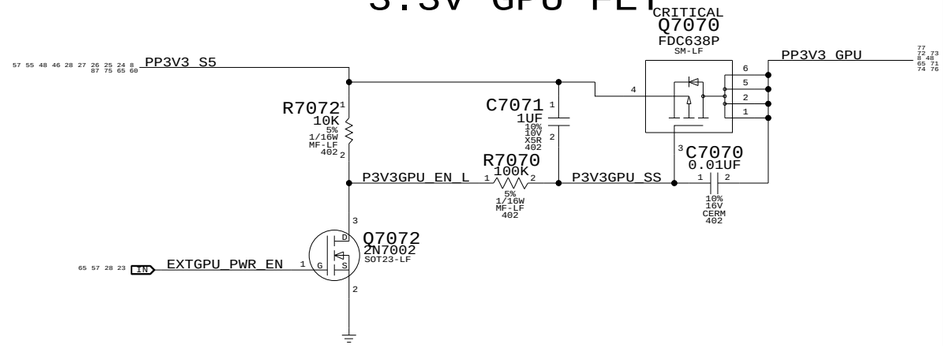
SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	56	88

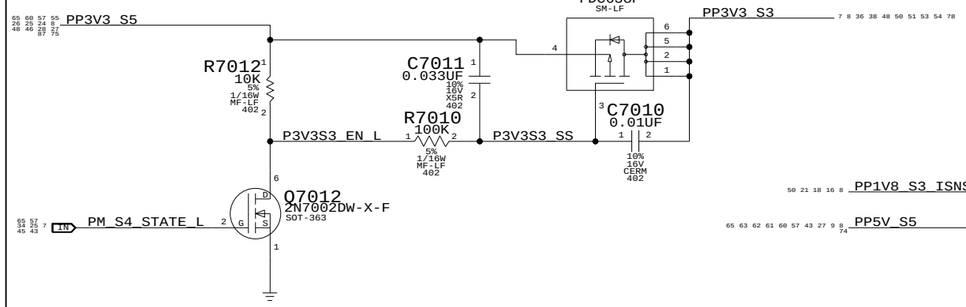
5V S3 FET



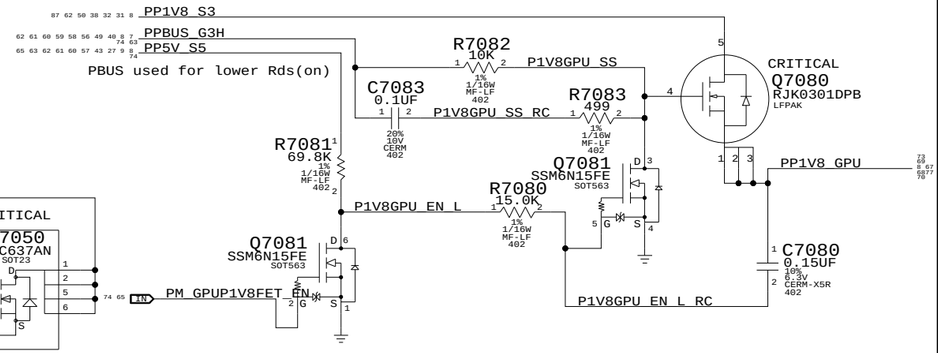
3.3V GPU FET



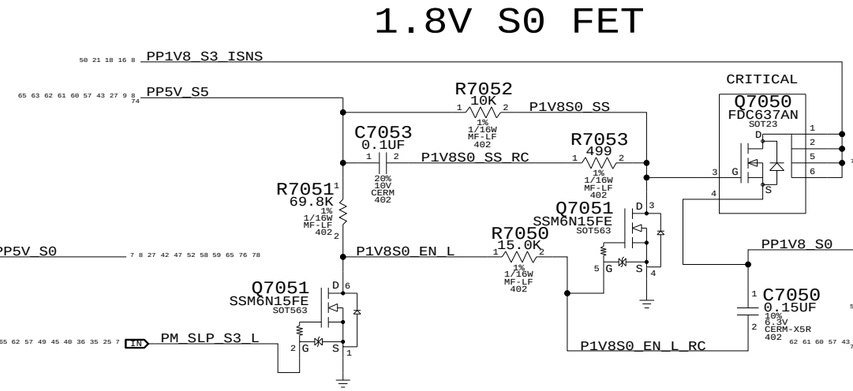
3.3V S3 FET



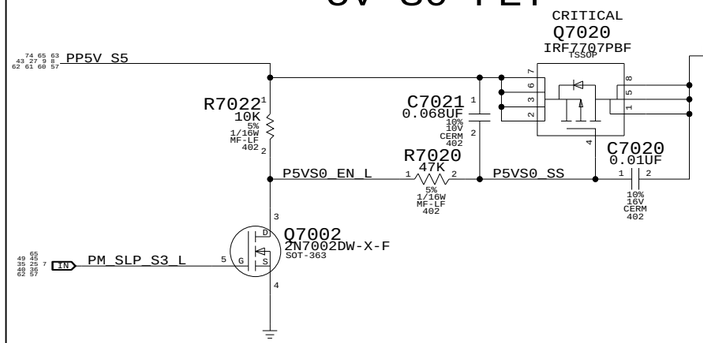
1.8V GPU FET



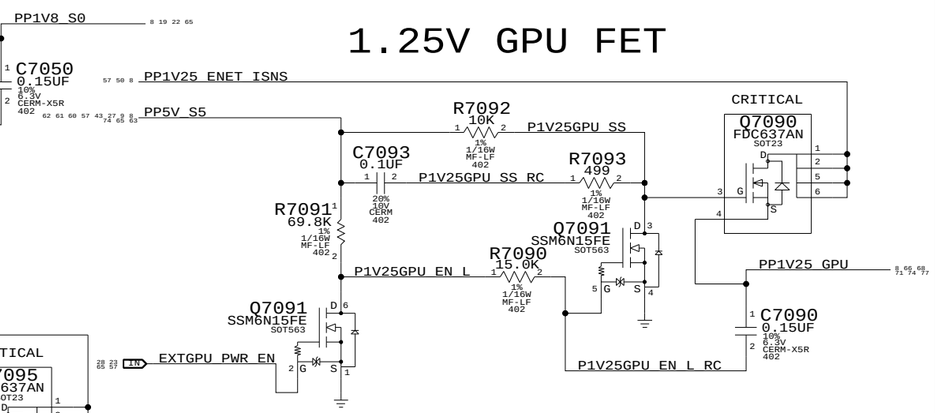
1.8V S0 FET



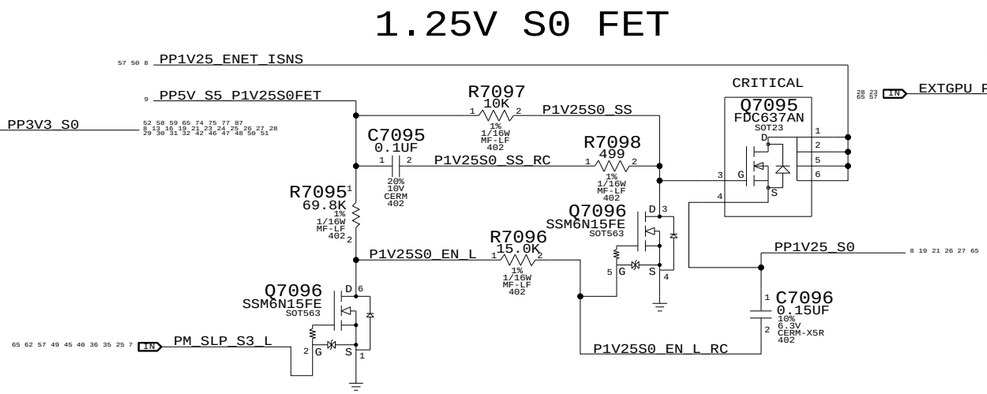
5V S0 FET



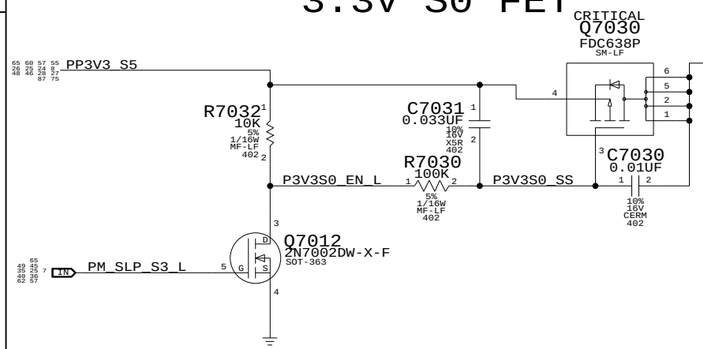
1.25V GPU FET



1.25V S0 FET



3.3V S0 FET



Power FETs

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 57 OF 88	

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

These caps are for Q7100

These caps are for Q7102

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

MIN_LINE_WIDTH	MIN_NECK_WIDTH
IMVP6_OCSET	0.25 MM	0.20 MM
IMVP6_VO	0.25 MM	0.20 MM
IMVP6_DROOP	0.25 MM	0.20 MM
IMVP6_DFB	0.25 MM	0.20 MM
IMVP6_SOFT	0.25 MM	0.20 MM
IMVP6_RBIAS	0.25 MM	0.20 MM
IMVP6_VDIFF	0.25 MM	0.20 MM
IMVP6_FB2	0.25 MM	0.20 MM
IMVP6_FB	0.25 MM	0.20 MM
IMVP6_COMP	0.25 MM	0.20 MM
IMVP6_VW	0.25 MM	0.20 MM

MIN_LINE_WIDTH	MIN_NECK_WIDTH
IMVP6_PHASE1	1.5 MM	0.2 MM
IMVP6_BOOT1	0.25 MM	0.2 MM
IMVP6_UGATE1	0.5 MM	0.2 MM
IMVP6_LGATE1	0.5 MM	0.25 MM
IMVP6_ISEN1	0.25 MM	0.2 MM
IMVP6_VSUM1	0.25 MM	0.25 MM
IMVP6_VO1	0.25 MM	0.25 MM
IMVP6_VSEN_P	0.25 MM	0.2 MM

MIN_LINE_WIDTH	MIN_NECK_WIDTH
IMVP6_PHASE2	1.5 MM	0.2 MM
IMVP6_BOOT2	0.25 MM	0.2 MM
IMVP6_UGATE2	0.5 MM	0.2 MM
IMVP6_LGATE2	0.5 MM	0.25 MM
IMVP6_ISEN2	0.25 MM	0.2 MM
IMVP6_VSUM2	0.25 MM	0.25 MM
IMVP6_VO2	0.25 MM	0.25 MM
IMVP6_VSEN_N	0.25 MM	0.2 MM

IMVP6 CPU VCore Regulator

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

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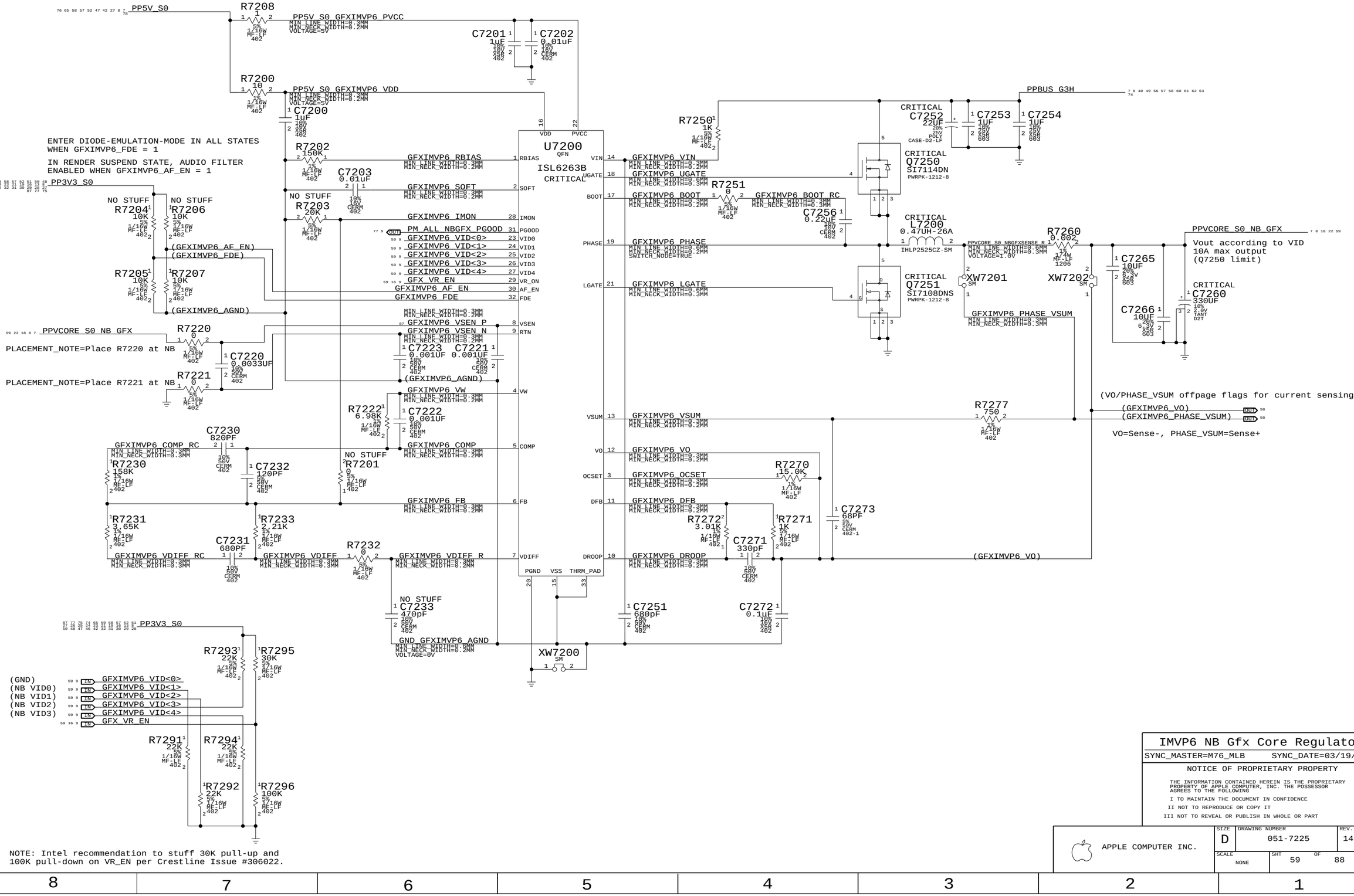
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE: NONE SHT 58 OF 88



IMVP6 NB Gfx Core Regulator

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

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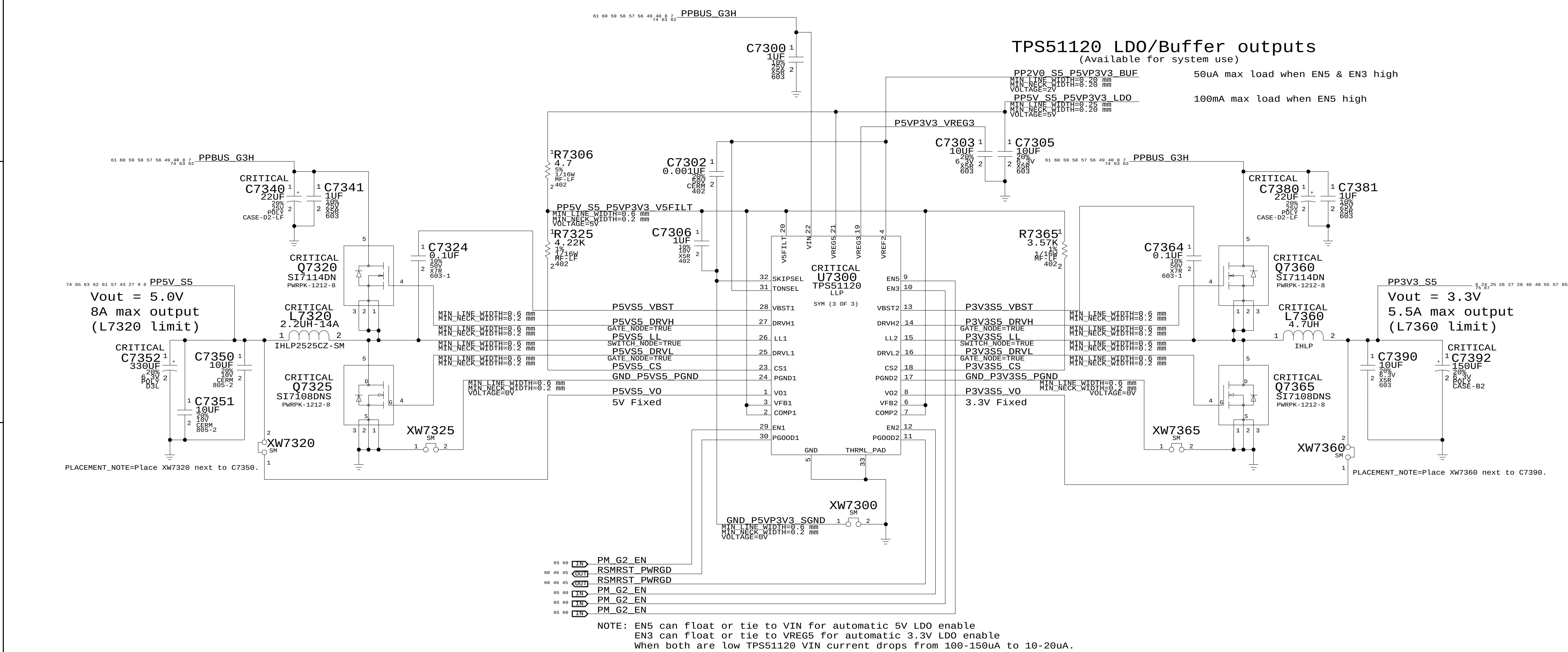
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE: NONE SHT 59 OF 88

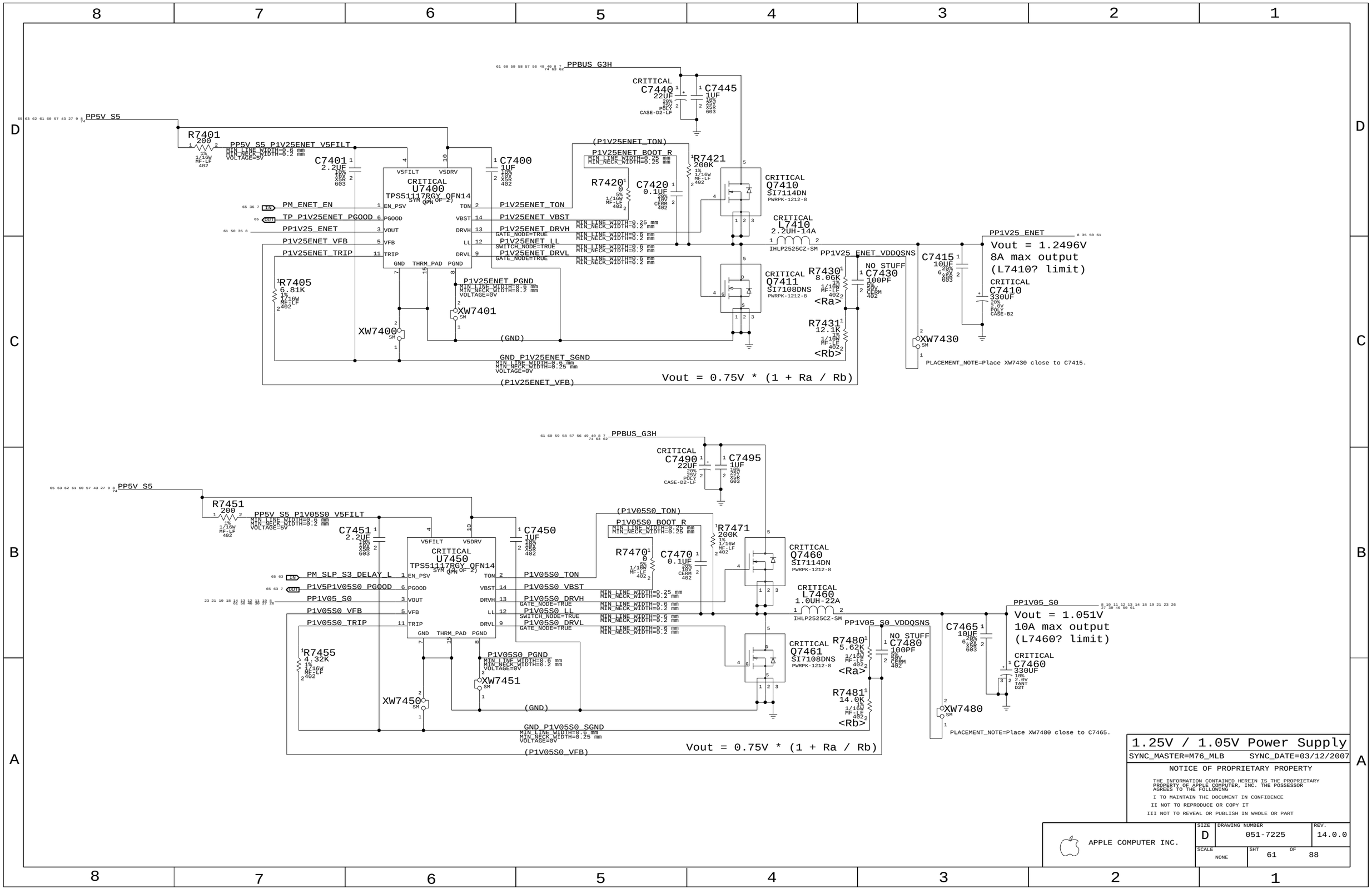


5V / 3.3V Power Supply

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE NONE	SHT 60 OF 88	



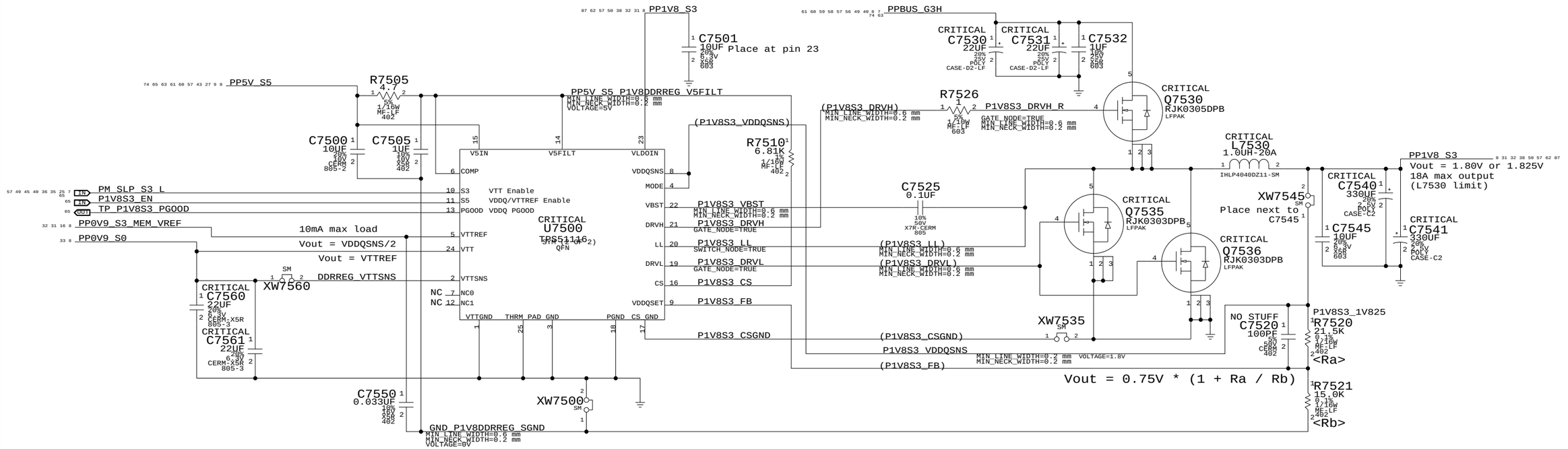
1.25V / 1.05V Power Supply

SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	61	88



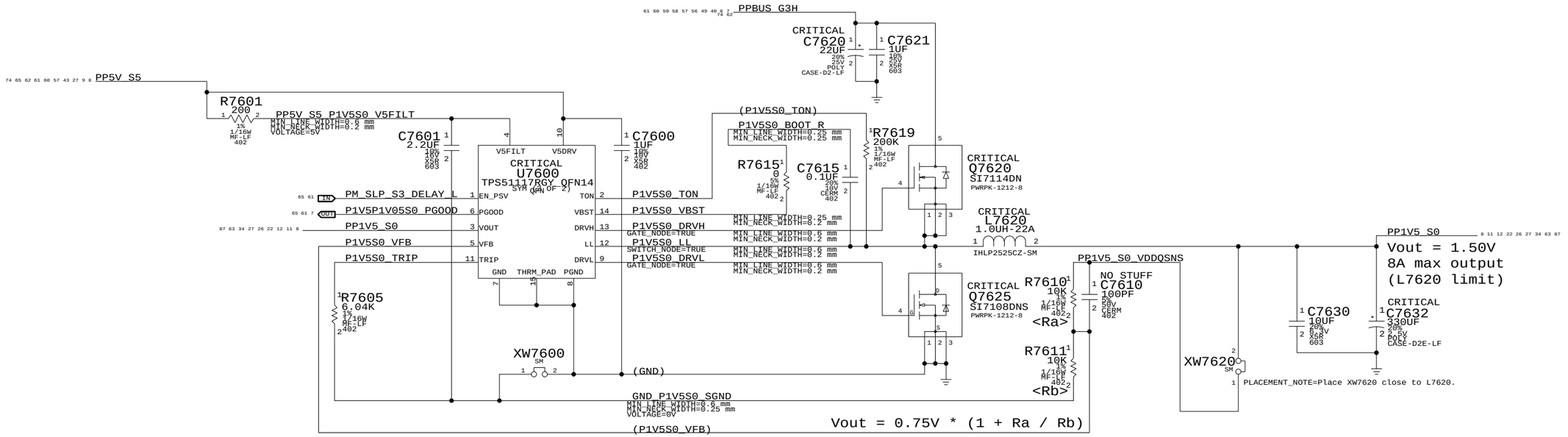
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
103S0192	1	RES,MTL FILM,21K,0.1,0402,SM,LF	R7520	CRITICAL	P1V8S3_1V8

1.8V DDR2 Supply

SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 62 OF 88	



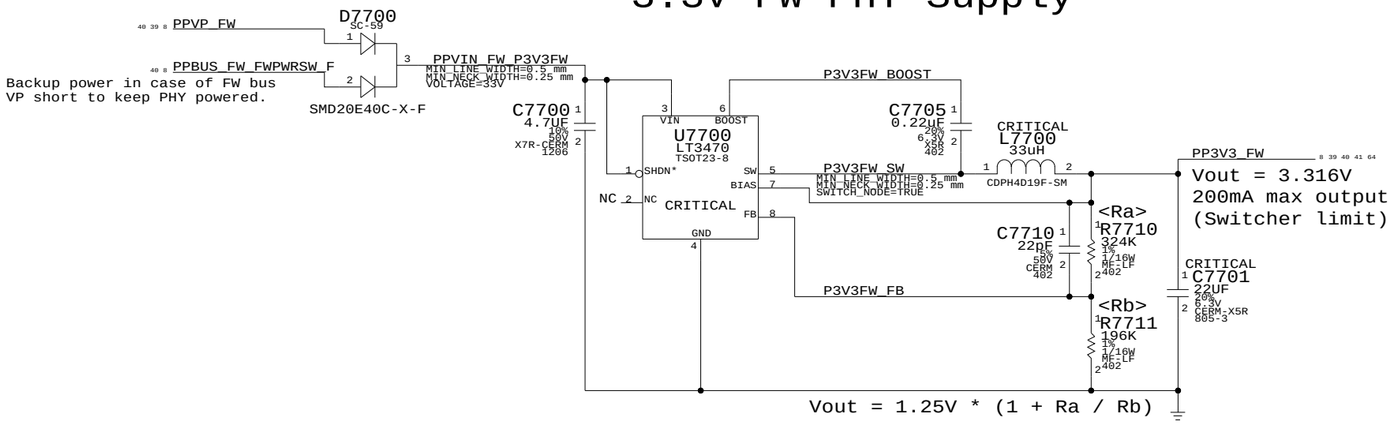
1.5V Power Supply

SYNC_MASTER=M76_MLB SYNC_DATE=03/12/2007

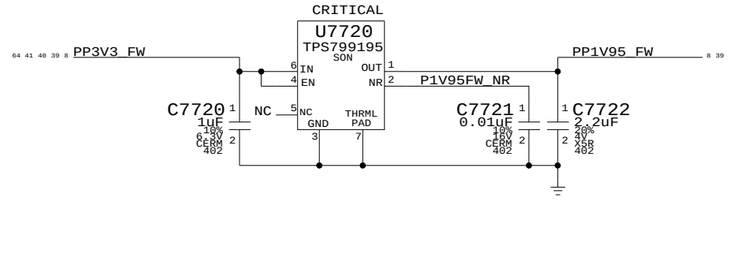
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 63 OF 88	

3.3V FW PHY Supply



1.95V FW PHY Supply



FW PHY Power Supplies

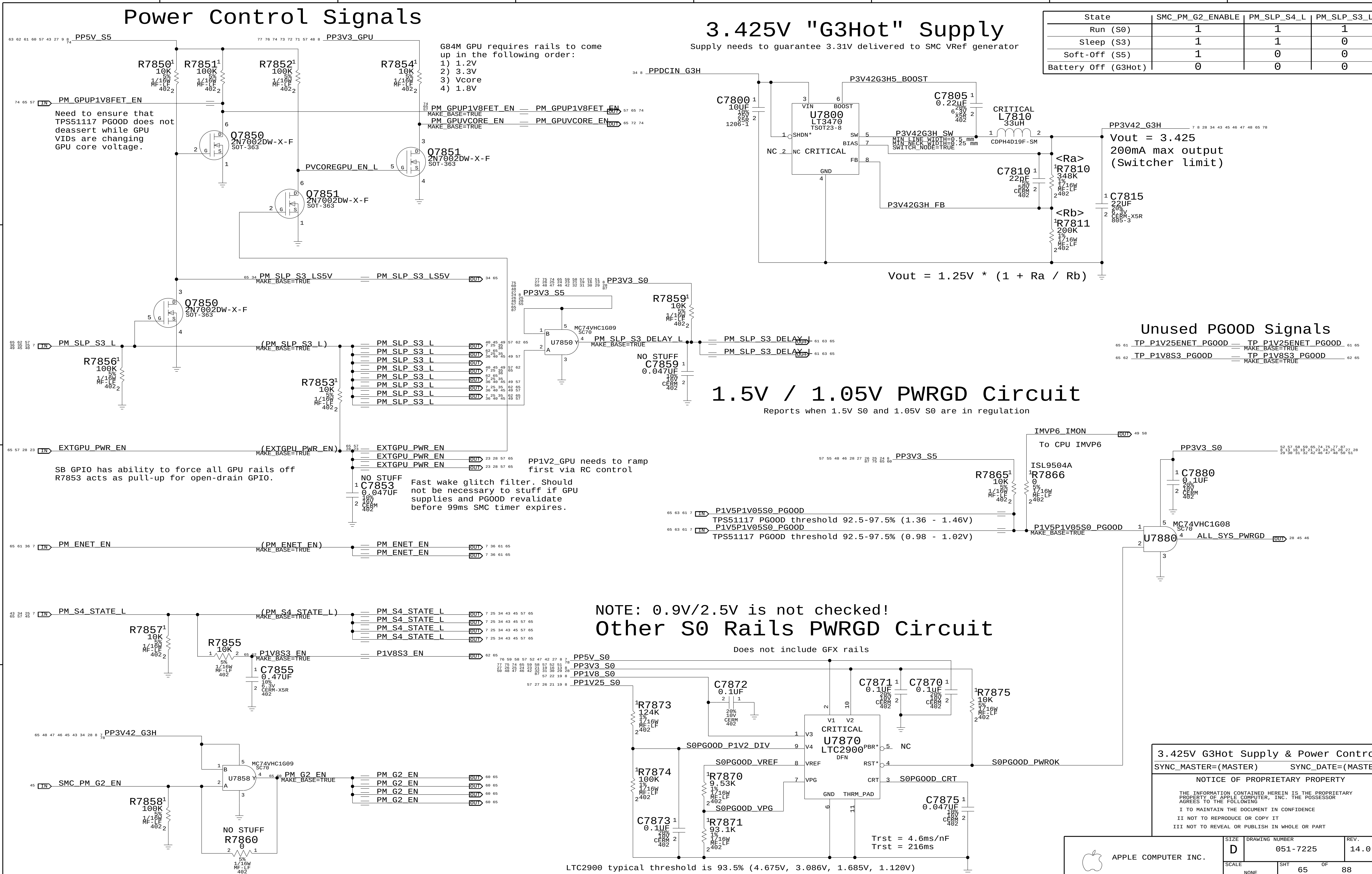
SYNC_MASTER=M76_MLB SYNC_DATE=03/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	64	88

Power Control Signals



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

3.425V G3Hot Supply & Power Control

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE NONE	SHT 65	OF 88

Page Notes

Power aliases required by this page:
- =PP1V2_GPU_PEX_PLLXVDD
- =PP1V2_GPU_PEX_IOVDDQ
- =PP1V2_GPU_PEX_IOVDD

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)

PEX 1.2V Current = 2A

PP1V25_GPU
PP1V25_GPU
PP1V25_GPU

250mA

C8002 1UF 10% 6.3V CERM 402
C8001 4.7UF 20% 6.3V CERM 603
C8000 22UF 20% 6.3V CERM-X5R 805

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

C8003 1UF 10% 6.3V CERM 402
C8004 0.1UF 20% 10V CERM 402
C8005 0.1UF 20% 10V CERM 402

1500mA

C8008 1UF 10% 6.3V CERM 402
C8007 4.7UF 20% 6.3V CERM 603
C8006 22UF 20% 6.3V CERM-X5R 805

C8009 1UF 10% 6.3V CERM 402
C8010 0.1UF 20% 10V CERM 402
C8011 0.1UF 20% 10V CERM 402

A26	PEX_IOVDD_1	AD23	
A28	PEX_IOVDD_2	AF23	
B32	PEX_IOVDD_3	AF24	
D1	PEX_IOVDD_4	AF25	
D31	PEX_IOVDD_5	AG24	
D32	PEX_IOVDD_6	AG25	
F1			
F6			
G8	PEX_IOVDDQ_1	AC16	
M5	PEX_IOVDDQ_2	AC17	
U6	PEX_IOVDDQ_3	AC21	
V1	PEX_IOVDDQ_4	AC22	
V3	PEX_IOVDDQ_5	AE18	
V4	PEX_IOVDDQ_6	AE21	
V5	PEX_IOVDDQ_7	AE22	
V6	NC	PEX_IOVDDQ_8	AF12
W1	PEX_IOVDDQ_9	AF18	
W3	PEX_IOVDDQ_10	AF21	
W4	PEX_IOVDDQ_11	AF22	
W5			
Y5			
Y6	PEX_PLLAVDD	AF15	
AC26	PEX_PLLDVDD	AE15	
AD26	PEX_PLLGND	AE16	
AE26			
AG12			
AH13			
AH31			
AH32			
AM8			
AM9			

180mA

PP1V2_GPU_PEX_PLLAVDD_F
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=1.2V

L8012 10NH-600MA 0603

C8014 0.1UF 20% 10V CERM 402
C8013 4.7UF 20% 6.3V CERM 603
C8012 4.7UF 20% 6.3V CERM 603

20mA

PP1V2_GPU_PEX_PLLDVDD_F
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=1.2V

L8015 10NH-600MA 0603

C8017 0.1UF 20% 10V CERM 402
C8016 4.7UF 20% 6.3V CERM 603
C8015 4.7UF 20% 6.3V CERM 603

OMIT
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PCI-EXPRESS BUS INTERFACE

PEG_R2D_C_P<0>	C8020 0.1uF	PEG_R2D_P<0>	AK13	PEX_RX0	
PEG_R2D_C_N<0>	C8021 0.1uF	PEG_R2D_N<0>	AK14	PEX_RX0_L	
PEG_R2D_C_P<1>	C8022 0.1uF	PEG_R2D_P<1>	AM14	PEX_RX1	
PEG_R2D_C_N<1>	C8023 0.1uF	PEG_R2D_N<1>	AM15	PEX_RX1_L	
PEG_R2D_C_P<2>	C8024 0.1uF	PEG_R2D_P<2>	AL15	PEX_RX2	
PEG_R2D_C_N<2>	C8025 0.1uF	PEG_R2D_N<2>	AL16	PEX_RX2_L	
PEG_R2D_C_P<3>	C8026 0.1uF	PEG_R2D_P<3>	AK16	PEX_RX3	
PEG_R2D_C_N<3>	C8027 0.1uF	PEG_R2D_N<3>	AK17	PEX_RX3_L	
PEG_R2D_C_P<4>	C8028 0.1uF	PEG_R2D_P<4>	AL17	PEX_RX4	
PEG_R2D_C_N<4>	C8029 0.1uF	PEG_R2D_N<4>	AL18	PEX_RX4_L	
PEG_R2D_C_P<5>	C8030 0.1uF	PEG_R2D_P<5>	AM18	PEX_RX5	
PEG_R2D_C_N<5>	C8031 0.1uF	PEG_R2D_N<5>	AM19	PEX_RX5_L	
PEG_R2D_C_P<6>	C8032 0.1uF	PEG_R2D_P<6>	AK19	PEX_RX6	
PEG_R2D_C_N<6>	C8033 0.1uF	PEG_R2D_N<6>	AK20	PEX_RX6_L	
PEG_R2D_C_P<7>	C8034 0.1uF	PEG_R2D_P<7>	AL20	PEX_RX7	
PEG_R2D_C_N<7>	C8035 0.1uF	PEG_R2D_N<7>	AL21	PEX_RX7_L	
PEG_R2D_C_P<8>	C8036 0.1uF	PEG_R2D_P<8>	AM21	PEX_RX8	
PEG_R2D_C_N<8>	C8037 0.1uF	PEG_R2D_N<8>	AM22	PEX_RX8_L	
PEG_R2D_C_P<9>	C8038 0.1uF	PEG_R2D_P<9>	AK22	PEX_RX9	
PEG_R2D_C_N<9>	C8039 0.1uF	PEG_R2D_N<9>	AK23	PEX_RX9_L	
PEG_R2D_C_P<10>	C8040 0.1uF	PEG_R2D_P<10>	AL23	PEX_RX10	
PEG_R2D_C_N<10>	C8041 0.1uF	PEG_R2D_N<10>	AL24	PEX_RX10_L	
PEG_R2D_C_P<11>	C8042 0.1uF	PEG_R2D_P<11>	AM24	PEX_RX11	
PEG_R2D_C_N<11>	C8043 0.1uF	PEG_R2D_N<11>	AM25	PEX_RX11_L	
PEG_R2D_C_P<12>	C8044 0.1uF	PEG_R2D_P<12>	AK25	PEX_RX12	
PEG_R2D_C_N<12>	C8045 0.1uF	PEG_R2D_N<12>	AK26	PEX_RX12_L	
PEG_R2D_C_P<13>	C8046 0.1uF	PEG_R2D_P<13>	AL26	PEX_RX13	
PEG_R2D_C_N<13>	C8047 0.1uF	PEG_R2D_N<13>	AL27	PEX_RX13_L	
PEG_R2D_C_P<14>	C8048 0.1uF	PEG_R2D_P<14>	AM27	PEX_RX14	
PEG_R2D_C_N<14>	C8049 0.1uF	PEG_R2D_N<14>	AM28	PEX_RX14_L	
PEG_R2D_C_P<15>	C8050 0.1uF	PEG_R2D_P<15>	AL28	PEX_RX15	
PEG_R2D_C_N<15>	C8051 0.1uF	PEG_R2D_N<15>	AL29	PEX_RX15_L	
PEG_CLK100M_GPU_P			AH14	PEX_REFCLK	
PEG_CLK100M_GPU_N			AJ14	PEX_REFCLK_L	
GPU_RESET_L			AH15	PEX_RST_L	

PEX_TX0	AJ15	PEG_D2R_C_P<0>	C8055 0.1uF	PEG_D2R_P<0>	OUT
PEX_TX0_L	AK15	PEG_D2R_C_N<0>	C8056 0.1uF	PEG_D2R_N<0>	OUT
PEX_TX1	AH16	PEG_D2R_C_P<1>	C8057 0.1uF	PEG_D2R_P<1>	OUT
PEX_TX1_L	AG16	PEG_D2R_C_N<1>	C8058 0.1uF	PEG_D2R_N<1>	OUT
PEX_TX2	AG17	PEG_D2R_C_P<2>	C8059 0.1uF	PEG_D2R_P<2>	OUT
PEX_TX2_L	AH17	PEG_D2R_C_N<2>	C8060 0.1uF	PEG_D2R_N<2>	OUT
PEX_TX3	AG18	PEG_D2R_C_P<3>	C8061 0.1uF	PEG_D2R_P<3>	OUT
PEX_TX3_L	AH18	PEG_D2R_C_N<3>	C8062 0.1uF	PEG_D2R_N<3>	OUT
PEX_TX4	AK18	PEG_D2R_C_P<4>	C8063 0.1uF	PEG_D2R_P<4>	OUT
PEX_TX4_L	AJ18	PEG_D2R_C_N<4>	C8064 0.1uF	PEG_D2R_N<4>	OUT
PEX_TX5	AJ19	PEG_D2R_C_P<5>	C8065 0.1uF	PEG_D2R_P<5>	OUT
PEX_TX5_L	AH19	PEG_D2R_C_N<5>	C8066 0.1uF	PEG_D2R_N<5>	OUT
PEX_TX6	AG20	PEG_D2R_C_P<6>	C8067 0.1uF	PEG_D2R_P<6>	OUT
PEX_TX6_L	AH20	PEG_D2R_C_N<6>	C8068 0.1uF	PEG_D2R_N<6>	OUT
PEX_TX7	AG21	PEG_D2R_C_P<7>	C8069 0.1uF	PEG_D2R_P<7>	OUT
PEX_TX7_L	AH21	PEG_D2R_C_N<7>	C8070 0.1uF	PEG_D2R_N<7>	OUT
PEX_TX8	AK21	PEG_D2R_C_P<8>	C8071 0.1uF	PEG_D2R_P<8>	OUT
PEX_TX8_L	AJ21	PEG_D2R_C_N<8>	C8072 0.1uF	PEG_D2R_N<8>	OUT
PEX_TX9	AJ22	PEG_D2R_C_P<9>	C8073 0.1uF	PEG_D2R_P<9>	OUT
PEX_TX9_L	AH22	PEG_D2R_C_N<9>	C8074 0.1uF	PEG_D2R_N<9>	OUT
PEX_TX10	AG23	PEG_D2R_C_P<10>	C8075 0.1uF	PEG_D2R_P<10>	OUT
PEX_TX10_L	AH23	PEG_D2R_C_N<10>	C8076 0.1uF	PEG_D2R_N<10>	OUT
PEX_TX11	AK24	PEG_D2R_C_P<11>	C8077 0.1uF	PEG_D2R_P<11>	OUT
PEX_TX11_L	AJ24	PEG_D2R_C_N<11>	C8078 0.1uF	PEG_D2R_N<11>	OUT
PEX_TX12	AJ25	PEG_D2R_C_P<12>	C8079 0.1uF	PEG_D2R_P<12>	OUT
PEX_TX12_L	AH25	PEG_D2R_C_N<12>	C8080 0.1uF	PEG_D2R_N<12>	OUT
PEX_TX13	AH26	PEG_D2R_C_P<13>	C8081 0.1uF	PEG_D2R_P<13>	OUT
PEX_TX13_L	AG26	PEG_D2R_C_N<13>	C8082 0.1uF	PEG_D2R_N<13>	OUT
PEX_TX14	AK27	PEG_D2R_C_P<14>	C8083 0.1uF	PEG_D2R_P<14>	OUT
PEX_TX14_L	AJ27	PEG_D2R_C_N<14>	C8084 0.1uF	PEG_D2R_N<14>	OUT
PEX_TX15	AJ28	PEG_D2R_C_P<15>	C8085 0.1uF	PEG_D2R_P<15>	OUT
PEX_TX15_L	AH27	PEG_D2R_C_N<15>	C8086 0.1uF	PEG_D2R_N<15>	OUT

PEX_TSTCLK_OUT	AM12	TP_GPU_PEXTSTCLK_P
PEX_TSTCLK_OUT_L	AM11	TP_GPU_PEXTSTCLK_N

NV G84M PCI-E

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 66 OF 88	

Page Notes

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

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)

74 49 8 7 PPVCORE_GPU

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

C8100 1UF 20% 10V 6.3V CERM 402
C8101 1UF 20% 10V 6.3V CERM 402
C8102 1UF 20% 10V 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

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K16 K17 N13 N14 N16 N17 N19 P13 P14 P16 P17 P19 R16 R17 T13 T14 T15 T18 T19 U13 VDD
U14 U15 U18 U19 V16 V17 W13 W14 W16 W17 W19 Y13 Y14 Y16 Y17 Y19 Y20
P20 T20 T23 U20 VDD_LP
U23 W20

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

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

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

TP_GPU_VDD_SENSE N20 VDD_SENSE
TP_GPU_GND_SENSE M21 GND_SENSE

77 73 70 69 68 57 8 PP1V8_GPU

???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

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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=(MASTER) SYNC_DATE=(MASTER)

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SIZE	DRAWING NUMBER	REV.
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SCALE: NONE

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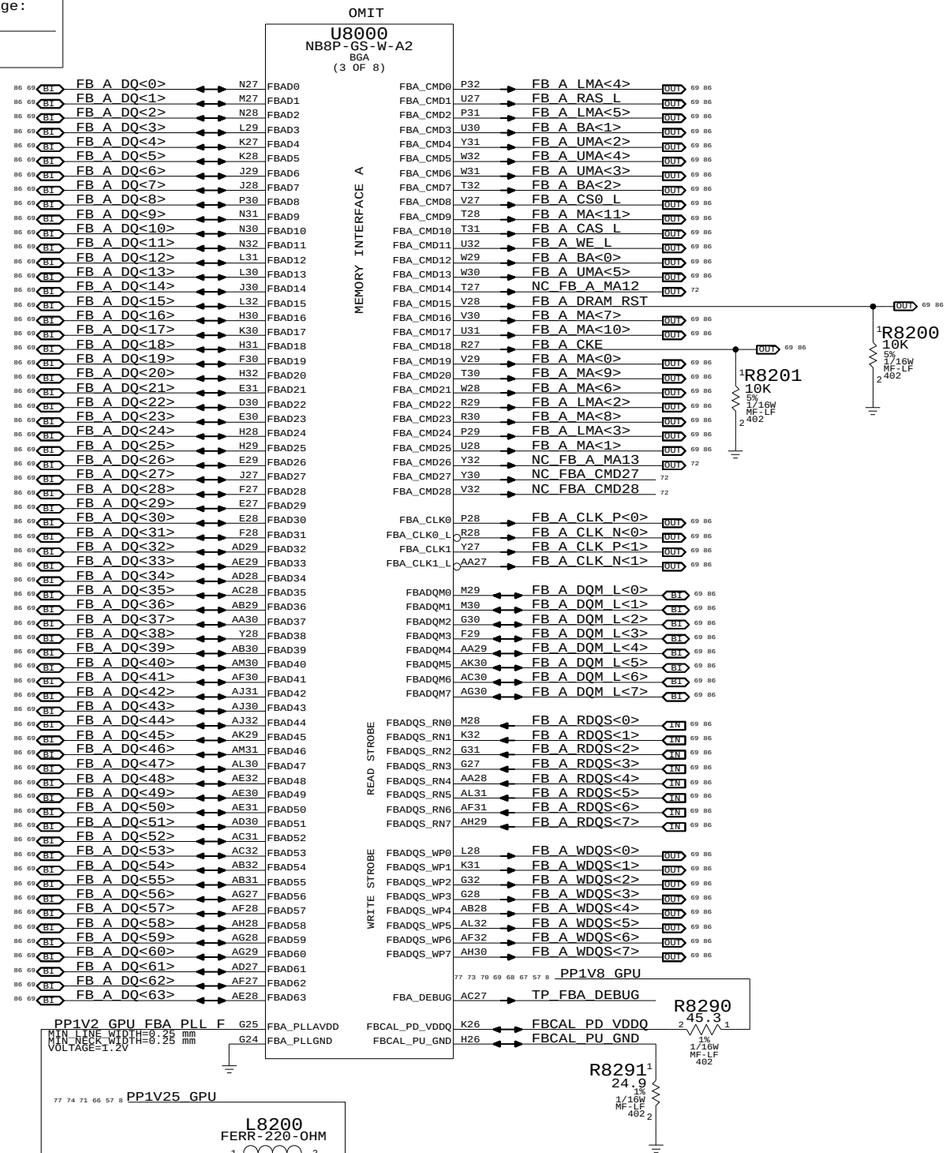
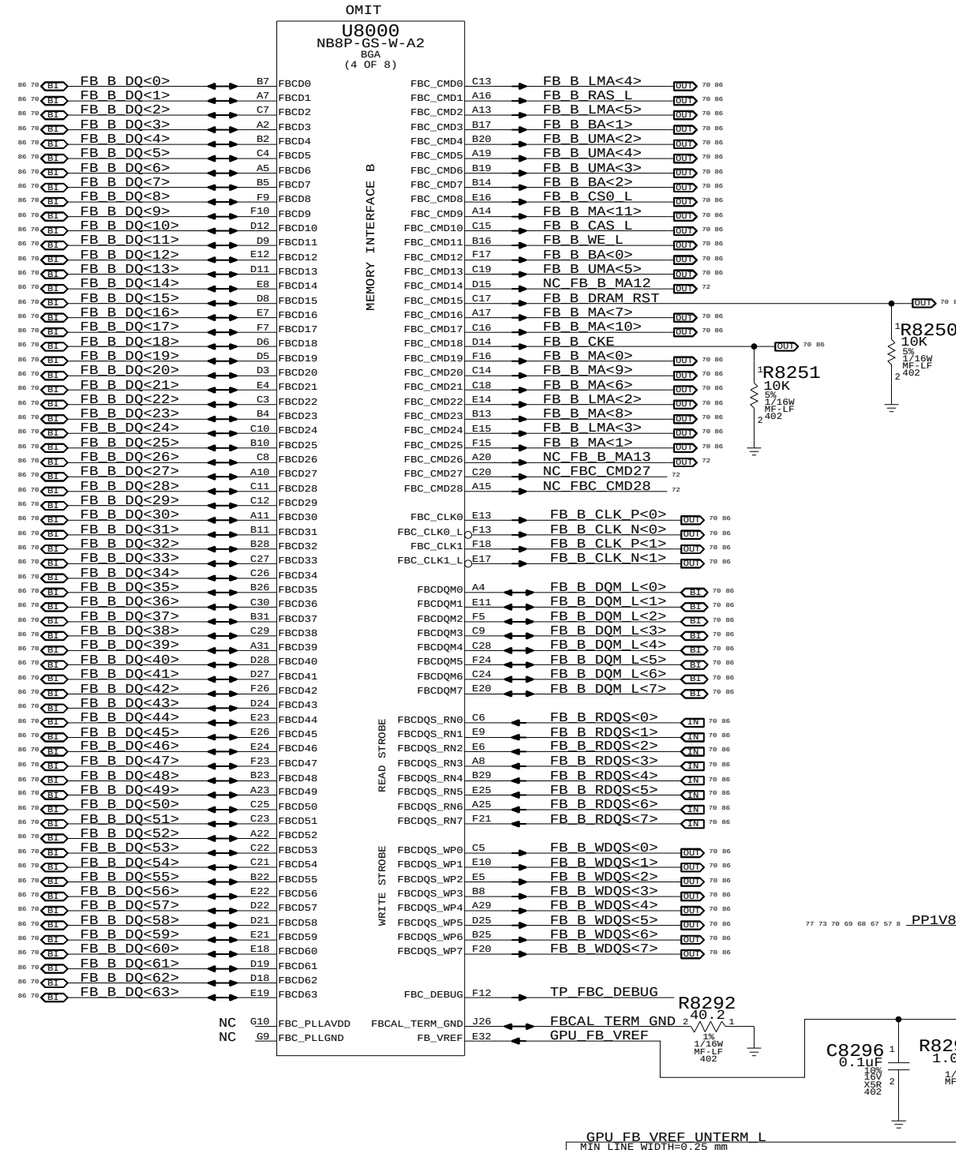
Page Notes

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=(MASTER) SYNC_DATE=(MASTER)

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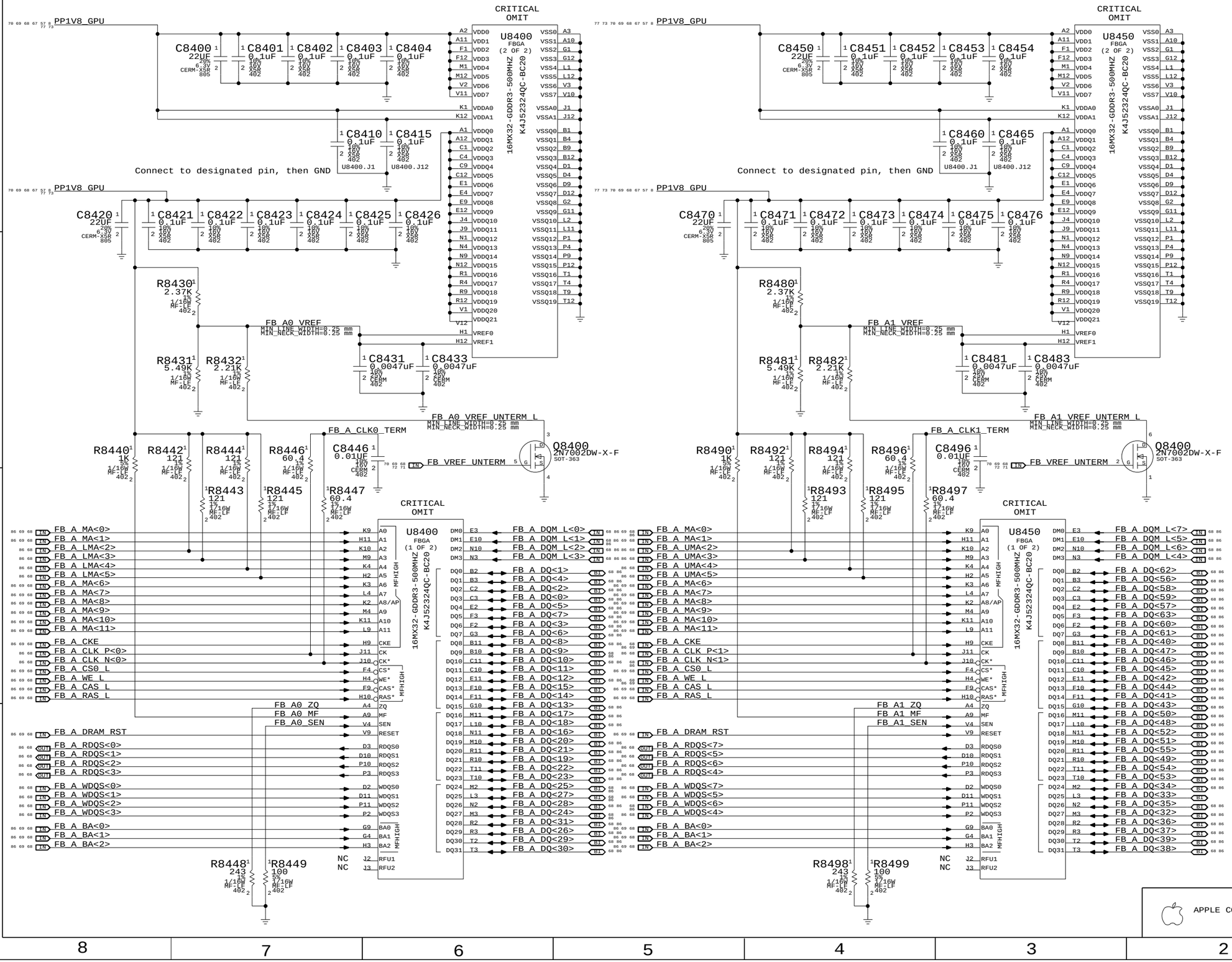
SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 68 OF 88	

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)



GDDR3 Frame Buffer A

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

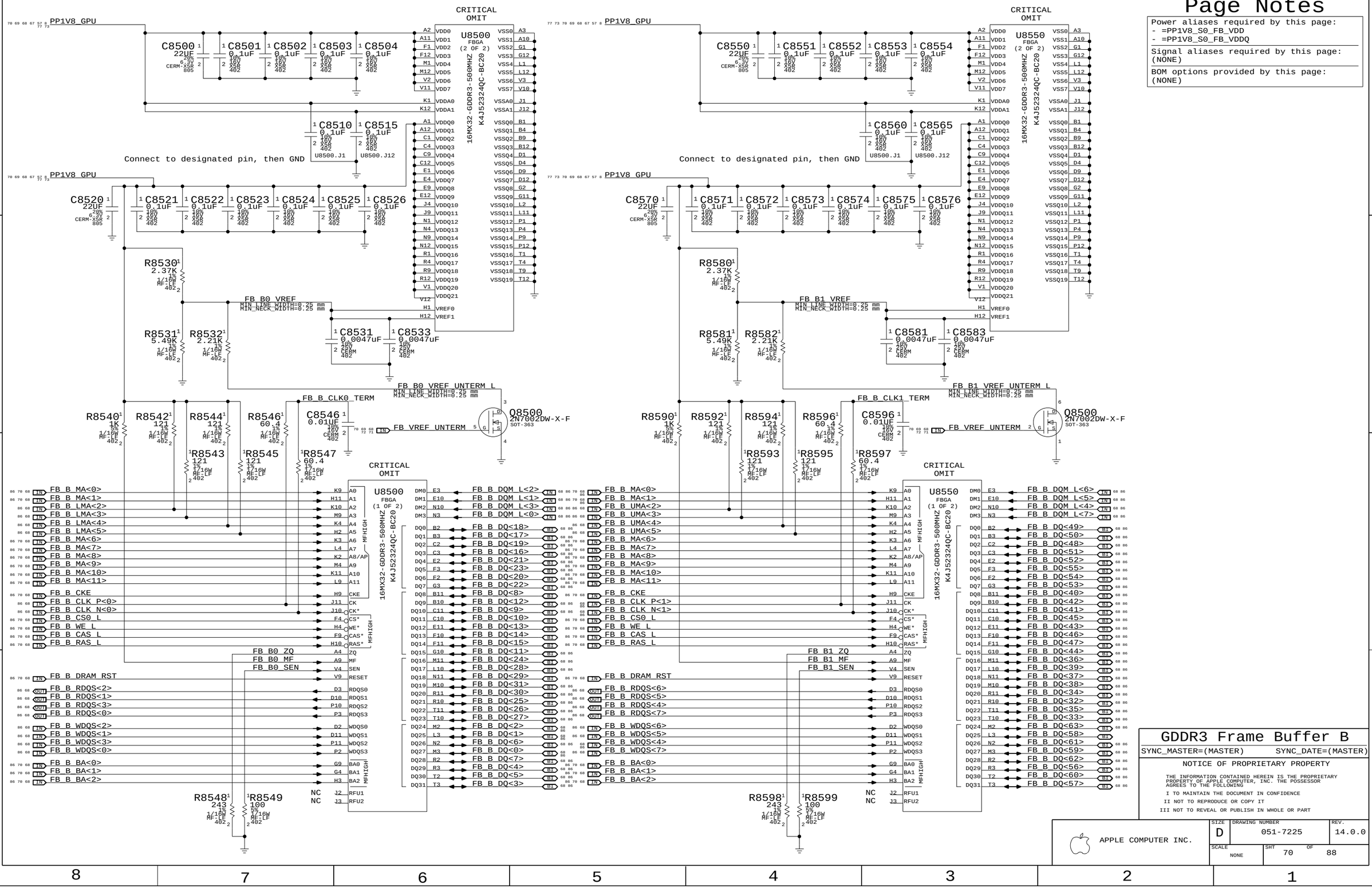
SCALE	SHT	OF
NONE	69	88

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)



GDDR3 Frame Buffer B

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	70	88

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)

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PP3V3_GPU
Typically <??mA
C8600 0.47UF 10% 6.3V CERM-X5R 402
C8601 0.47UF 10% 6.3V CERM-X5R 402
C8602 0.47UF 10% 6.3V CERM-X5R 402

AC11 VDD33_1
AC12 VDD33_2
AC24 VDD33_3
AD24 VDD33_4
AE11 VDD33_5
AE12 VDD33_6
H7 VDD33_7
J7 VDD33_8
K7 VDD33_9
L10 VDD33_10
L7 VDD33_11
L8 VDD33_12
M10 VDD33_13

GPIO0 K3 GPU_HPD
GPIO1 H1 NC_GPU_GPIO_1
GPIO2 K5 GPU_BL_PWM
GPIO3 G5 GPU_PANEL_EN
GPIO4 E2 GPU_BKLT_EN
GPIO5 J5 GPU_VCORE_VID0
GPIO6 G6 GPU_VCORE_VID1
GPIO7 K6 GPU_VGA_EN_L
GPIO8 E1 NC_GPU_GPIO_8
GPIO9 D2 TP_GPU_GSTATE<0>
GPIO10 H5 FB_VREF_UNTERM
GPIO11 F4 GPU_VCORE_VID2
GPIO12 E3 GPU_GPIO_12
GPIO13 U3 GPU_VCORE_PWRCTL0
GPIO14 U4 GPU_VCORE_PWRCTL1

R8695 100K 5% 1/16W MF-LF 402
R8696 10K 5% 1/16W MF-LF 402

NC_GPU_ROM_CS_L AA4 ROMCS_L
NC_GPU_ROM_SCLK AA7 ROM_SCLK
NC_GPU_ROM_SI W2 ROM_SI
NC_GPU_ROM_SO AA6 ROM_SO

SPDIF J6 NC_GPU_SPDIF
STEREO T3 NC_GPU_STEREO
BUFRST_L F3 TP_GPU_BUFRST_L

GPU_TESTMODE_PD H2 TESTMODE
GPU_SWAPRDY_A M6 SWAPRDY_A

JTAG_TCK AJ11 TP_GPU_JTAG_TCK
JTAG_TDI AK12 TP_GPU_JTAG_TDI
JTAG_TDO AL12 TP_GPU_JTAG_TDO
JTAG_TMS AK11 TP_GPU_JTAG_TMS
(IPD) JTAG_TRST_L AL13 TP_GPU_JTAG_TRST_L

PP3V3_GPU
R8620 49.9 1% 1/10W MF-LF 402
R8621 49.9 1% 1/16W MF-LF 402
GPU_MIOA_PD_VDDQ
GPU_MIOB_PD_VDDQ
GPU_MIOA_PU_GND
GPU_MIOB_PU_GND
R8622 49.9 1% 1/10W MF-LF 402
R8623 49.9 1% 1/16W MF-LF 402

R8616 10K 5% 1/16W MF-LF 402
R8618 10K 5% 1/16W MF-LF 402
R8617 10K 5% 1/16W MF-LF 402
R8619 10K 5% 1/16W MF-LF 402
C8617 0.1uF 10% 16V X5R 402
C8619 0.1uF 10% 16V X5R 402

C8610 1UF 10% 6.3V CERM 402
C8611 1UF 10% 6.3V CERM 402

M7 MIOA_VDDQ_1
M8 MIOA_VDDQ_2
R8 MIOA_VDDQ_3
T8 MIOA_VDDQ_4
U9 MIOA_VDDQ_5
AA8 MIOB_VDDQ_1
AB7 MIOB_VDDQ_2
AB8 MIOB_VDDQ_3
AC6 MIOB_VDDQ_4
AC7 MIOB_VDDQ_5

GPU_MIOA_VREF L2 MIOA_VREF
GPU_MIOB_VREF Y2 MIOB_VREF

GPU_MIOA_PD_VDDQ L1 MIOACAL_PD_VDDQ
GPU_MIOA_PU_GND L3 MIOACAL_PU_GND
GPU_MIOB_PD_VDDQ Y1 MIOBCAL_PD_VDDQ
GPU_MIOB_PU_GND Y3 MIOBCAL_PU_GND

MIOA_CLKOUT R4 TP_GPU_MIOA_CLKOUT_P
MIOA_CLKOUT_L P4 TP_GPU_MIOA_CLKOUT_N
MIOA_CTL3 P3 TP_GPU_MIOA_CTL3
MIOA_DE P1 TP_GPU_MIOA_DE
MIOAD0 P2 GPU_MIOA_D<0>
MIOAD1 N2 GPU_MIOA_D<1>
MIOAD2 N1 GPU_MIOA_D<2>
MIOAD3 N3 GPU_MIOA_D<3>
MIOAD4 M1 GPU_MIOA_D<4>
MIOAD5 M3 GPU_MIOA_D<5>
MIOAD6 P5 GPU_MIOA_D<6>
MIOAD7 N6 TP_GPU_MIOA_D<7>
MIOAD8 N5 GPU_MIOA_D<8>
MIOAD9 M4 GPU_MIOA_D<9>
MIOAD10 L4 GPU_MIOA_D<10>
MIOAD11 L5 GPU_MIOA_D<11>
MIOA_HSYNC R3 TP_GPU_MIOA_HSYNC
MIOA_VSYNC R1 TP_GPU_MIOA_VSYNC

MIOB_CLKIN AE4 TP_GPU_MIOB_CLKIN
MIOB_CLKOUT AD4 TP_GPU_MIOB_CLKOUT_P
MIOB_CLKOUT_L AD5 TP_GPU_MIOB_CLKOUT_N
MIOB_CTL3 AD3 TP_GPU_MIOB_CTL3
MIOB_DE AD1 TP_GPU_MIOB_DE
MIOBD0 AC3 GPU_MIOB_D<0>
MIOBD1 AC1 GPU_MIOB_D<1>
MIOBD2 AC2 TP_GPU_MIOB_D<2>
MIOBD3 AB2 TP_GPU_MIOB_D<3>
MIOBD4 AB1 TP_GPU_MIOB_D<4>
MIOBD5 AA1 TP_GPU_MIOB_D<5>
MIOBD6 AB3 TP_GPU_MIOB_D<6>
MIOBD7 AA3 TP_GPU_MIOB_D<7>
MIOBD8 AC5 GPU_MIOB_D<8>
MIOBD9 AB5 GPU_MIOB_D<9>
MIOBD10 AB4 GPU_MIOB_D<10>
MIOBD11 AA5 GPU_MIOB_D<11>
MIOB_HSYNC AF3 GPU_MIOB_HSYNC
MIOB_VSYNC AE3 TP_GPU_MIOB_VSYNC

THERMDP K1 GPU_TDIODE_P
THERMDN J1 GPU_TDIODE_N

L8630 FERR-220-OHM 0402
PP1V25_GPU
PP1V2_GPU_PLLVDD_F
MIN_LINE_WIDTH=0.2 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.2V
40mA
C8633 4.7UF 20% 6.3V CERM 603
C8630 4.7UF 20% 6.3V CERM 603
C8631 0.1uF 10% 16V X5R 402

T9 PLLVDD
U10 PLLGND
G23 H_PLLVDD
T10 VID_PLLVDD

L8635 FERR-220-OHM 0402
PP1V25_GPU
PP1V2_GPU_H_PLLVDD_F
MIN_LINE_WIDTH=0.2 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.2V
40mA
C8637 4.7UF 20% 6.3V CERM 603
C8635 4.7UF 20% 6.3V CERM 603
C8636 0.1uF 10% 16V X5R 402

L8640 FERR-220-OHM 0402
PP1V25_GPU
PP1V2_GPU_VID_PLLVDD_F
MIN_LINE_WIDTH=0.2 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=1.2V
40mA
C8643 4.7UF 20% 6.3V CERM 603
C8640 4.7UF 20% 6.3V CERM 603
C8641 0.1uF 10% 16V X5R 402

GPU_CLK27M_GATED U1 XTALIN
NC_GPU_XTALOUT U2 XTALOUT
GPU_XTALOUTBUFF T2 XTALOUTBUFF
GPU_CLK27M_SS_GATED T1 XTALSSIN

NV G84M GPIO/MIO/Misc

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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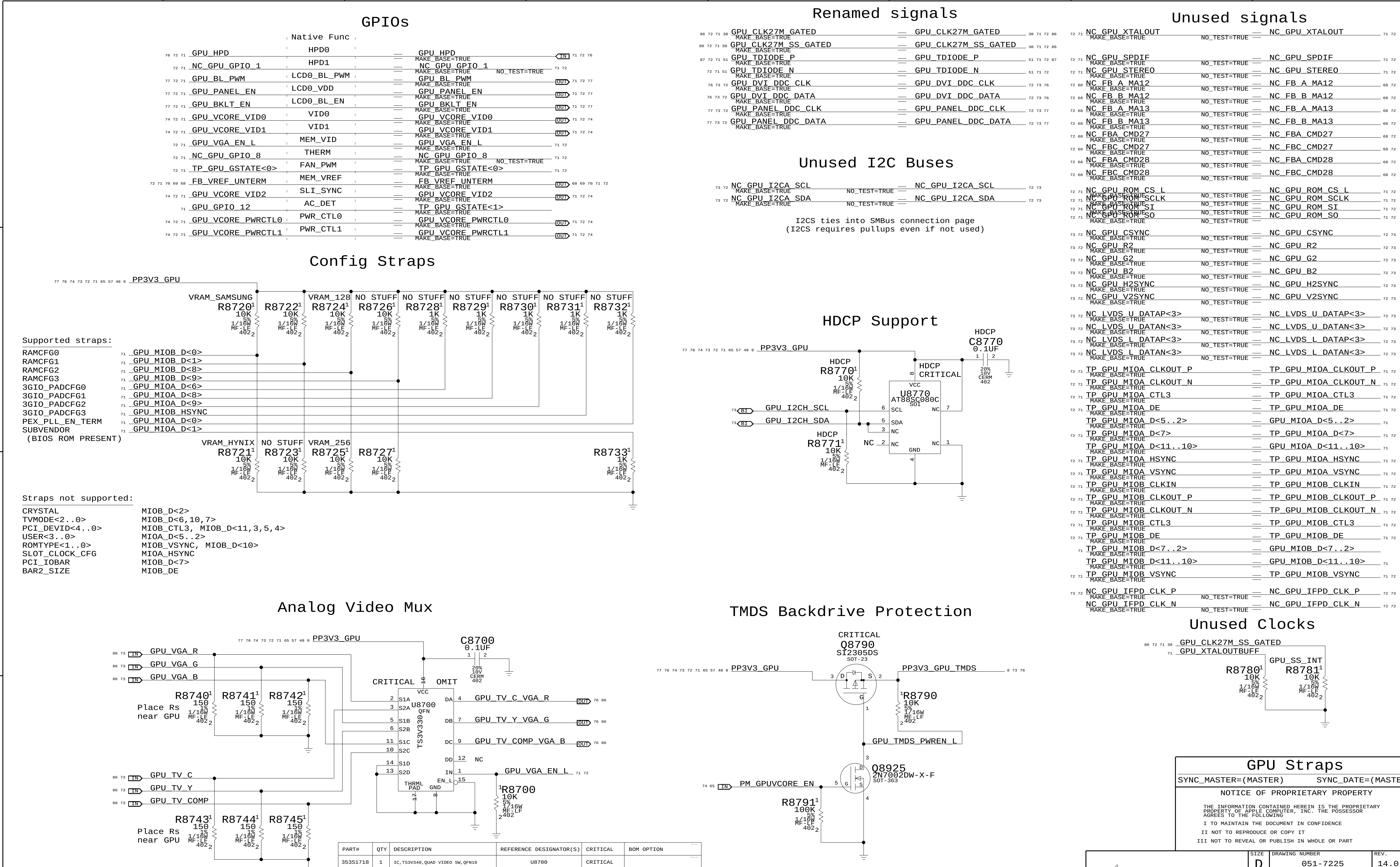

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S1718	1	IC,TS3V340,QUAD VIDEO SW,QFN16	U8700	CRITICAL	

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

GPU Straps

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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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

69 68 67 57 5 77 70 PP1V8_GPU

L8800 FERR-220-OHM 0402
L8805 FERR-220-OHM 0402
L8810 FERR-220-OHM 0402
L8815 FERR-220-OHM 0402

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

20mA peak per diff pair
160mA peak for all pairs

C8805 4.7UF 20% 6.3V CERM 603
C8806 0.1UF 20% 10V CERM 402

40mA peak

76 72 8 PP3V3_GPU_TMDS

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

20mA peak per diff pair
200mA peak for all pairs

C8815 4.7UF 20% 6.3V CERM 603
C8816 0.1UF 20% 10V CERM 402

40mA peak

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

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

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

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

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

AF9	IFPA_IOVDD	IFPA_TXC	AK9
AF8	IFPB_IOVDD	IFPA_TXC_L	AJ9
AC9	IFPAB_PLLVDD	IFPA_TXD0	AH6
AD9	IFPAB_PLLGND	IFPA_TXD0_L	AJ6
73 GPU_IFPAB_VPROBE	AM4	IFPA_TXD1	AH8
73 GPU_IFPAB_RSET	AL5	IFPA_TXD1_L	AH7
		IFPA_TXD2	AJ8
		IFPA_TXD2_L	AK8
		IFPA_TXD3	AJ5
		IFPA_TXD3_L	AH5
		IFPB_TXC	AK4
		IFPB_TXC_L	AL4
		IFPB_TXD4	AM6
		IFPB_TXD4_L	AM5
		IFPB_TXD5	AM7
		IFPB_TXD5_L	AL7
		IFPB_TXD6	AK6
		IFPB_TXD6_L	AK5
		IFPB_TXD7	AK7
		IFPB_TXD7_L	AL8
AD6	IFPC_IOVDD	IFPC_TXC	AM2
AE7	IFPD_IOVDD	IFPC_TXC_L	AM3
AA10	IFPCD_PLLVDD	IFPC_TXD0	AE2
AB10	IFPCD_PLLGND	IFPC_TXD0_L	AE1
73 GPU_IFPCD_VPROBE	AK3	IFPC_TXD1	AF1
73 GPU_IFPCD_RSET	AH3	IFPC_TXD1_L	AF2
		IFPC_TXD2	AG1
		IFPC_TXD2_L	AH1
		IFPD_TXC	AG3
		IFPD_TXC_L	AH2
		IFPD_TXD4	AK1
		IFPD_TXD4_L	AJ1
		IFPD_TXD5	AL2
		IFPD_TXD5_L	AL1
		IFPD_TXD6	AJ2
		IFPD_TXD6_L	AJ3
		DACA_RED	AH11
		DACA_GREEN	AJ12
		DACA_BLUE	AH12
		DACA_HSYNC	AF10
		DACA_VSYNC	AK10
		DACB_RED	R6
		DACB_GREEN	T5
		DACB_BLUE	T6
		DACB_CSYNC	U5
		DACC_RED	AF6
		DACC_GREEN	AG6
		DACC_BLUE	AE5
		DACC_HSYNC	AG7
		DACC_VSYNC	AG5
		I2CA_SCL	K2
		I2CA_SDA	J3
		I2CB_SCL	H4
		I2CB_SDA	J4

LVDS_L_CLK_P
LVDS_L_CLK_N
LVDS_L_DATA_P<0>
LVDS_L_DATA_N<0>
LVDS_L_DATA_P<1>
LVDS_L_DATA_N<1>
LVDS_L_DATA_P<2>
LVDS_L_DATA_N<2>
NC_LVDS_L_DATAP<3>
NC_LVDS_L_DATAN<3>
LVDS_U_CLK_P
LVDS_U_CLK_N
LVDS_U_DATA_P<0>
LVDS_U_DATA_N<0>
LVDS_U_DATA_P<1>
LVDS_U_DATA_N<1>
LVDS_U_DATA_P<2>
LVDS_U_DATA_N<2>
NC_LVDS_U_DATAP<3>
NC_LVDS_U_DATAN<3>
TMDS_CLK_P
TMDS_CLK_N
TMDS_DATA_P<0>
TMDS_DATA_N<0>
TMDS_DATA_P<1>
TMDS_DATA_N<1>
TMDS_DATA_P<2>
TMDS_DATA_N<2>
NC_GPU_IFPD_CLK_P
NC_GPU_IFPD_CLK_N
TMDS_DATA_P<3>
TMDS_DATA_N<3>
TMDS_DATA_P<4>
TMDS_DATA_N<4>
TMDS_DATA_P<5>
TMDS_DATA_N<5>
GPU_VGA_R
GPU_VGA_G
GPU_VGA_B
GPU_VGA_HSYNC
GPU_VGA_VSYNC
GPU_TV_C
GPU_TV_Y
GPU_TV_COMP
NC_GPU_CSYNC
NC_GPU_R2
NC_GPU_G2
NC_GPU_B2
NC_GPU_H2SYNC
NC_GPU_V2SYNC
NC_GPU_I2CA_SCL
NC_GPU_I2CA_SDA
GPU_DVI_DDC_CLK
GPU_DVI_DDC_DATA

Sum of peak currents: 390mA

77 76 74 72 71 65 57 48 8 PP3V3_GPU

L8820 FERR-220-OHM 0402
L8830 FERR-220-OHM 0402
NO STUFF
L8840 FERR-220-OHM 0402

C8820 4.7UF 20% 6.3V CERM 603
C8821 0.1UF 20% 10V CERM 402

120mA peak

C8830 4.7UF 20% 6.3V CERM 603
C8831 0.1UF 20% 10V CERM 402

150mA peak

C8845 4.7UF 20% 6.3V CERM 603
C8840 4.7UF 20% 6.3V CERM 603
C8841 0.1UF 20% 10V CERM 402

120mA peak

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

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

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

AD10	DACA_VDD	73 GPU_DACA_VREF	AH10
AG9	DACA_IDUMP	73 GPU_DACA_RSET	AH9
V8	DACB_VDD	73 GPU_DACB_VREF	R5
V7	DACB_IDUMP	73 GPU_DACB_RSET	R7
AD7	DACC_VDD	73 GPU_DACC_VREF	AH4
AG4	DACC_IDUMP	73 GPU_DACC_RSET	AF5

77 72 B1 GPU_PANEL_DDC_CLK	G2	I2CC_SCL	
77 72 B1 GPU_PANEL_DDC_DATA	G1	I2CC_SDA	
72 B1 GPU_I2CH_SCL	G3	I2CH_SCL	
72 B1 GPU_I2CH_SDA	H3	I2CH_SDA	
84 51 48 45 B1 SMBUS_SMC_0_S0_SCL	C1	I2CS_SCL	
84 51 48 45 B1 SMBUS_SMC_0_S0_SDA	B1	I2CS_SDA	

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

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

GPU_IFPAB_RSET 73
GPU_IFPCD_RSET 73
GPU_DACA_RSET 73
GPU_DACB_RSET 73
GPU_DACC_RSET 73

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

GPU_DACA_VREF 73
GPU_DACB_VREF 73
GPU_DACC_VREF 73

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

GPU_IFPAB_VPROBE 73
GPU_IFPCD_VPROBE 73

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

NV G84M Video Interfaces

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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GPU VCore Regulator

GPU VCore Current Sense

PP5V_S5
PP5V_S5_GPUVCORE_V5FILT
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V

R8901 200 1% 1/16W MF-LF 402
C8901 2.2UF 10% 16V X5R 603
C8900 1UF 10% 16V X5R 603

U8900 CRITICAL
TPS51117RGY QFN14
SYM 1 OF 2
V5FILT V5DRV TON VBST DRVH LL DRVL PGND THRM_PAD GND
EN_PSV PGOOD VOUT VFB TRIP

PM_GPUVCORE_EN
PM_GPUP1V8FET_EN
(=PPVCORE_GPU_REG)
GPUVCORE_VFB
GPUVCORE_TRIP

R8905 10.5K 1% 1/16W MF-LF 402

XW8900 SM
(GND)

(GPUVCORE_TON)
GPUVCORE_BOOT_R
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm
R8919 200K 1% 1/16W MF-LF 402
R8915 0 5% 1/16W MF-LF 402
C8915 0.1UF 20% 16V CERM 402

GPUVCORE_TON
GPUVCORE_VBST
GPUVCORE_DRVH
GPUVCORE_LL
GPUVCORE_DRVL
GATE_NODE=TRUE
SWITCH_NODE=TRUE
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm

PPBUS_G3H
C8931 CRITICAL 22UF 20% 25V POLY CASE-D2-LF
C8930 CRITICAL 22UF 20% 25V POLY CASE-D2-LF
C8932 1UF 10% 25V X5R 603

Q8920 CRITICAL RJK0305DPB LFPAK
Q8922 CRITICAL RJK0301DPB LFPAK
Q8921 CRITICAL RJK0301DPB LFPAK
C8921 NO STUFF 1000PF 10% 25V X7R 402

L8920 CRITICAL 1.0UH-20A IHLP4040DZ11-SM

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
C8991 0.22UF 10% 6.3V CERM-X5R 402
R8990 649 1% 1/16W MF-LF 402

GPUISENS_NTC
GPUISENS_NEG
GPUISENS_RC
GPUISENS_POS
PVCORE_GPU_NTC

R8993 20.0K 1% 1/16W MF-LF 402
R8991 20.0K 1% 1/16W MF-LF 402
XW8901 SM

PP3V3_S0
C8998 470PF 10% 50V CERM 402
R8998 1M 1% 1/16W MF-LF 402
C8995 1UF 10% 6.3V CERM 402
U8995 HPA00141AIDCKR SC70-5 CRITICAL
R8992 1M 1% 1/16W MF-LF 402
C8992 470PF 10% 50V CERM 402
GPUVCORE_IOUT

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

PPVCORE_GPU
Vout = 1.25V - 0.96V
18A max output
(L8920 limit)

Place near C8940 2
XW8920 SM
C8942 CRITICAL 330UF 10% 2.0V TANT D2T
C8940 10UF 20% 6.3V X5R 603
C8943 CRITICAL 330UF 10% 2.0V TANT D2T

PPVCORE_GPU_XW
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.20 mm
VOLTAGE=1.25V

<Ra> R8921 2.87K 1% 1/16W MF-LF 402
C8920 100PF 5% 50V CERM 402
<Rb> R8922 7.15K 1% 1/16W MF-LF 402

(GPUVCORE_VFB)
R8923 NO STUFF 61.9K 1% 1/16W MF-LF 402 <Rc>
R8924 NO STUFF 30.1K 1% 1/16W MF-LF 402 <Rd>
R8925 28K 1% 1/16W MF-LF 402 <Re>
R8926 NO STUFF 53.6K 1% 1/16W MF-LF 402
R8927 NO STUFF 53.6K 1% 1/16W MF-LF 402
GPUVCORE_VFB_PC1
GPUVCORE_VFB_PC0

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)

PP1V25_GPU
PP3V3_GPU

GPU_VCORE_PWRCTL0
PC0_DIV
PC0_BIAS
PC0_BIAS_B
R8960 4.99K 1% 1/16W MF-LF 402
R8961 NO STUFF 1K 5% 1/16W MF-LF 402
C8961 NO STUFF 0.01UF 10% 16V CERM 402
R8962 NO STUFF 1K 5% 1/16W MF-LF 402
R8963 NO STUFF 1.5K 5% 1/16W MF-LF 402
R8964 NO STUFF 10K 5% 1/16W MF-LF 402
Q8927 MMDT3904XF SOT-363-LF
GPUVCORE_VFB_PC0
GND_GPUVCORE_SGND

GPU_VCORE_PWRCTL1
PC1_DIV
PC1_BIAS
PC1_BIAS_B
R8965 4.99K 1% 1/16W MF-LF 402
R8966 NO STUFF 1K 5% 1/16W MF-LF 402
C8966 NO STUFF 0.01UF 10% 16V CERM 402
R8967 NO STUFF 1.5K 5% 1/16W MF-LF 402
R8968 NO STUFF 1K 5% 1/16W MF-LF 402
R8969 NO STUFF 10K 5% 1/16W MF-LF 402
Q8927 MMDT3904XF SOT-363-LF
GPUVCORE_VFB_PC1
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
GPU_VCORE_VID1
GPU_VCORE_VID2

R8973 7.5K 5% 1/16W MF-LF 402
R8974 7.5K 5% 1/16W MF-LF 402
R8975 7.5K 5% 1/16W MF-LF 402
C8973 0.1UF 20% 10V CERM 402
C8974 0.1UF 20% 10V CERM 402
C8975 0.1UF 20% 10V CERM 402

GPU_VCORE_VID0_RC
GPU_VCORE_VID1_RC
GPU_VCORE_VID2_RC

Q8923 2N7002DW-X-F SOT-363
Q8925 2N7002DW-X-F SOT-363

GPUVCORE_VFB_C
GPUVCORE_VFB_D
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 -	1.050V (balanced)
1	1	1	Y Y Y	1.125V (max perf)

All other states not defined

GPU (G84M) Core Supply

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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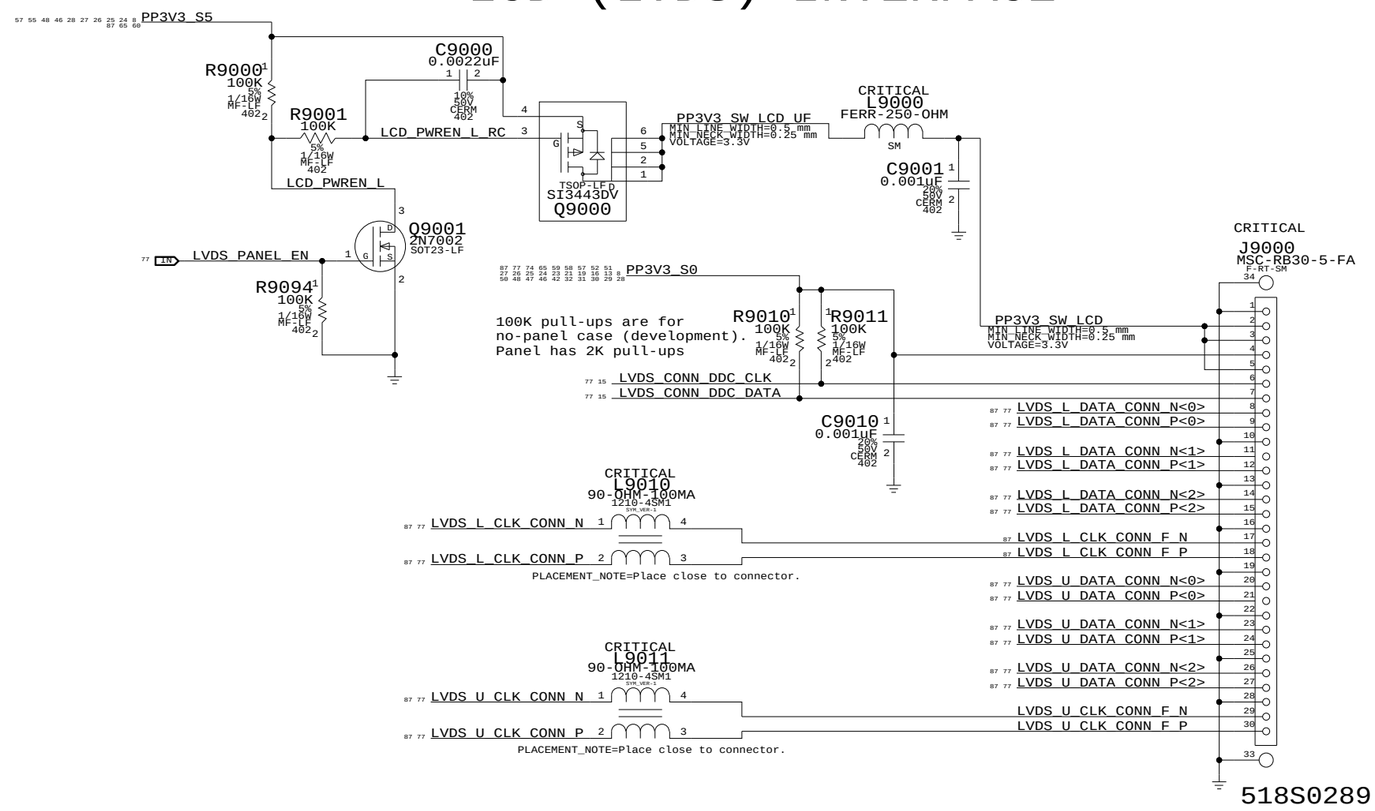
LCD (LVDS) INTERFACE



LVDS Display Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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TMDS Filtering

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

TMDS_DATA_N<0> → NO STUFF R9462 49.9 1% 1/16W MF-LF 402 → CRITICAL L9460 90-OHM-100MA 1210-4SM1 → TMDS_DATA_F_N<0>
TMDS_DATA_P<0> → NO STUFF R9463 49.9 1% 1/16W MF-LF 402 → CRITICAL L9460 → TMDS_DATA_F_P<0>
PP3V3_GPU_TMDS: NO STUFF C9462 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<1> → NO STUFF R9466 49.9 1% 1/16W MF-LF 402 → CRITICAL L9464 90-OHM-100MA 1210-4SM1 → TMDS_DATA_F_N<1>
TMDS_DATA_P<1> → NO STUFF R9467 49.9 1% 1/16W MF-LF 402 → CRITICAL L9464 → TMDS_DATA_F_P<1>
PP3V3_GPU_TMDS: NO STUFF C9466 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<2> → NO STUFF R9470 49.9 1% 1/16W MF-LF 402 → CRITICAL L9468 90-OHM-100MA 1210-4SM1 → TMDS_DATA_F_N<2>
TMDS_DATA_P<2> → NO STUFF R9471 49.9 1% 1/16W MF-LF 402 → CRITICAL L9468 → TMDS_DATA_F_P<2>
PP3V3_GPU_TMDS: NO STUFF C9470 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS
PLACEMENT_NOTE=Place close to connector.

TMDS_CLK_N → R9472 0 5% 1/16W MF-LF 402 → TMDS_CLK_R_N → CRITICAL L9472 370-OHM SM → TMDS_CLK_F_N
TMDS_CLK_P → R9473 0 5% 1/16W MF-LF 402 → TMDS_CLK_R_P → CRITICAL L9472 → TMDS_CLK_F_P
PP3V3_GPU_TMDS: NO STUFF C9474 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS; NO STUFF R9475 49.9 1% 1/16W MF-LF 402
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<3> → NO STUFF R9478 49.9 1% 1/16W MF-LF 402 → CRITICAL L9476 90-OHM-100MA 1210-4SM1 → TMDS_DATA_F_N<3>
TMDS_DATA_P<3> → NO STUFF R9479 49.9 1% 1/16W MF-LF 402 → CRITICAL L9476 → TMDS_DATA_F_P<3>
PP3V3_GPU_TMDS: NO STUFF C9478 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<4> → NO STUFF R9482 49.9 1% 1/16W MF-LF 402 → CRITICAL L9480 90-OHM-100MA 1210-4SM1 → TMDS_DATA_F_N<4>
TMDS_DATA_P<4> → NO STUFF R9483 49.9 1% 1/16W MF-LF 402 → CRITICAL L9480 → TMDS_DATA_F_P<4>
PP3V3_GPU_TMDS: NO STUFF C9482 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS
PLACEMENT_NOTE=Place close to connector.

TMDS_DATA_N<5> → NO STUFF R9486 49.9 1% 1/16W MF-LF 402 → CRITICAL L9484 90-OHM-100MA 1210-4SM1 → TMDS_DATA_F_N<5>
TMDS_DATA_P<5> → NO STUFF R9487 49.9 1% 1/16W MF-LF 402 → CRITICAL L9484 → TMDS_DATA_F_P<5>
PP3V3_GPU_TMDS: NO STUFF C9486 0.01UF 10% 16V CERM 402; SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS
PLACEMENT_NOTE=Place close to connector.

VGA SYNC Buffers

PP3V3_GPU → C9450 0.1UF 20% 16V CERM 402
GPU_VGA_VSYNC → U9450 MC74VHC1G08 SC70 → VGA_VSYNC_R → R9450 33 5% 1/16W MF-LF 402 → VGA_VSYNC
PLACEMENT_NOTE=Place close to connector.

PP3V3_GPU → C9451 0.1UF 20% 16V CERM 402
GPU_VGA_HSYNC → U9451 MC74VHC1G08 SC70 → VGA_HSYNC_R → R9451 33 5% 1/16W MF-LF 402 → VGA_HSYNC
PLACEMENT_NOTE=Place close to connector.

ANALOG FILTERING
PLACE CLOSE TO CONNECTOR

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

DVI INTERFACE

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

PP5V_S0 → 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)
GND_CHASSIS_DVI_BOT → CRITICAL J9400 QH11121-RIG02-4F F-RT-TH-DVI

J9400 pin 17 ← TMDS_DATA_F_N<0>
J9400 pin 18 ← TMDS_DATA_F_P<0>
J9400 pin 19 ← TMDS_DATA_F_N<5>
J9400 pin 20 ← TMDS_DATA_F_P<5>
J9400 pin 21 ← TMDS_CLK_F_P
J9400 pin 22 ← TMDS_CLK_F_N
J9400 pin C3 ← VGA_B
J9400 pin C4 ← VGA_HSYNC
J9400 pin C5B
J9400 pin 34 → 514-0278
J9400 pin 1 → TMDS_DATA_F_N<2>
J9400 pin 9 → TMDS_DATA_F_N<1>
J9400 pin 2 → TMDS_DATA_F_P<2>
J9400 pin 10 → TMDS_DATA_F_P<1>
J9400 pin 3
J9400 pin 11
J9400 pin 4 → TMDS_DATA_F_N<4>
J9400 pin 12 → TMDS_DATA_F_N<3>
J9400 pin 5 → TMDS_DATA_F_P<4>
J9400 pin 13 → TMDS_DATA_F_P<3>
J9400 pin 6 → DVI_DDC_CLK_R
J9400 pin 14 → (PP5V_S0_DDC)
J9400 pin 7 → DVI_DDC_DATA_R
J9400 pin 15
J9400 pin 8 → VGA_VSYNC
J9400 pin 16 → DVI_HPD_R
J9400 pin C1 → VGA_R
J9400 pin C2 → VGA_G
J9400 pin 31 → PP5V_S0_DDC_PULLUPS
J9400 pin 33 → GND_CHASSIS_DVI_TOP
J9400 pin 32 → GND_CHASSIS_DVI_BOT

VGA_R: VGA_TERM_CONN R9445 150 1% 1/16W MF-LF 402
VGA_G: VGA_TERM_CONN R9443 150 1% 1/16W MF-LF 402
VGA_B: VGA_TERM_CONN R9444 150 1% 1/16W MF-LF 402
C9410 0.01UF 10% 50V CERM 603

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

Isolation required for DVI->ADC Adapter
D9410 SOD-123 B0530WXF

PP5V_S0_DDC_PULLUPS → R9410 4.7K 5% 1/16W MF-LF 402 → PP3V3_GPU
PP5V_S0_DDC_PULLUPS → R9412 4.7K 5% 1/16W MF-LF 402 → PP3V3_GPU
DVI_DDC_CLK → R9411 100 5% 1/16W MF-LF 402
DVI_DDC_DATA → R9413 100 5% 1/16W MF-LF 402
DVI_HPD → R9414 100 5% 1/16W MF-LF 402
C9411 100pF 5% 50V CERM 402
C9413 100pF 5% 50V CERM 402
C9414 100pF 5% 50V CERM 402

GPU Isolation / Level-Shift

PP3V3_GPU
Q9411 2N7002DW-X-F SOT-363: DVI_DDC_CLK → GPU_DVI_DDC_CLK (OUT); R9420 10K 5% 1/16W MF-LF 402
Q9411 2N7002DW-X-F SOT-363: DVI_DDC_DATA → GPU_DVI_DDC_DATA (OUT); R9421 10K 5% 1/16W MF-LF 402
GPU_HPD_BILAT
Q9414 2N7002DW-X-F SOT-363: GPU_IOENABLE_RC (IN); R9422 270K 5% 1/16W MF-LF 402; DVI_HPD → GPU_HPD (OUT)
PP5V_S0
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=(MASTER) SYNC_DATE=(MASTER)

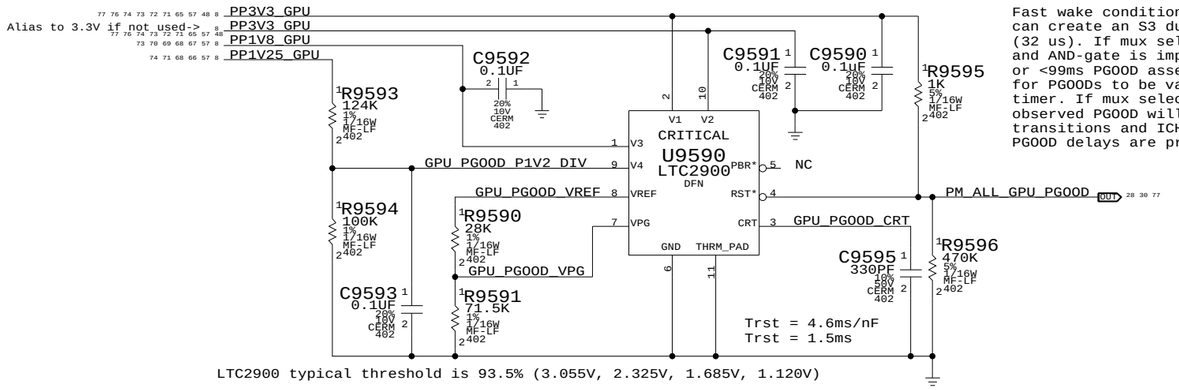
APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 14.0.0

SCALE NONE | SHT 76 OF 88

PGOOD Monitor for GPU Rails

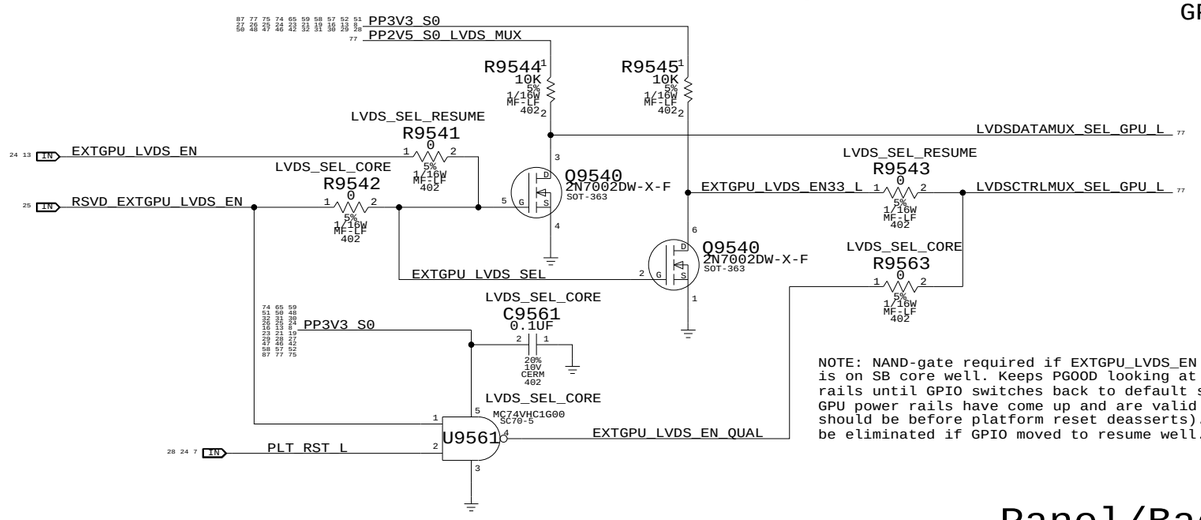
LTC2900 provides programmable reset delay which is required to play nice with ICHx PGOOD circuit



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

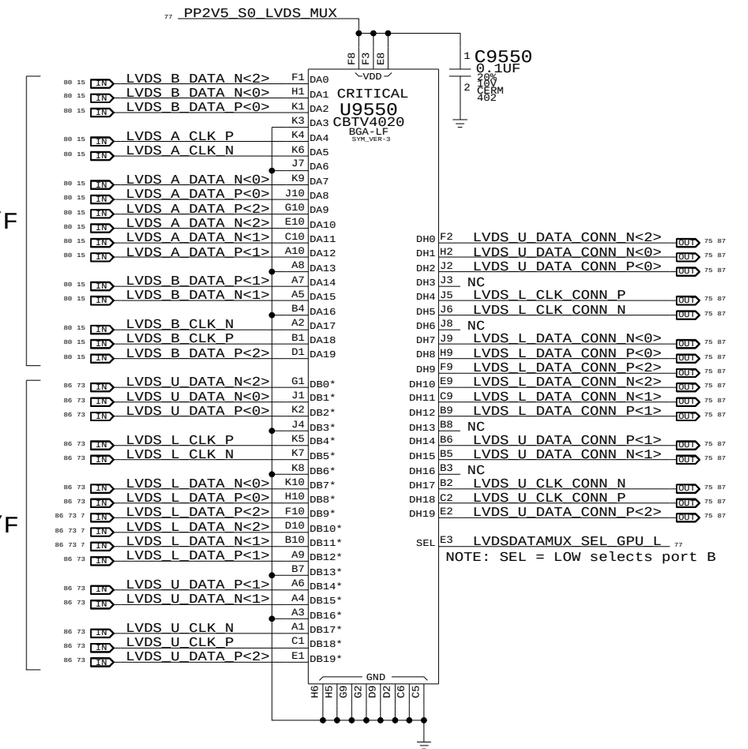
LTC2900 typical threshold is 93.5% (3.055V, 2.325V, 1.685V, 1.120V)

Mux Select Conditioning



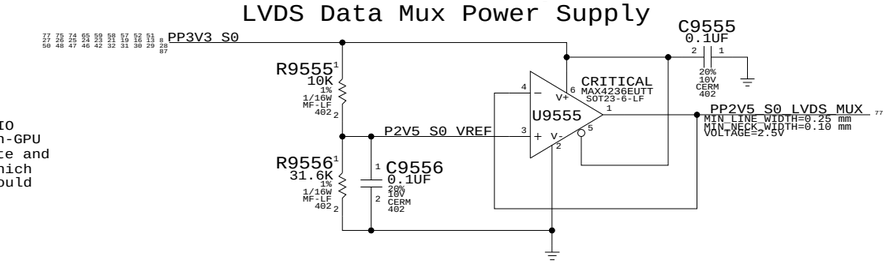
NOTE: NAND-gate required if EXTGPU_LVDS_EN GPIO is on SB core well. Keeps PGOOD looking at non-GPU rails until GPIO switches back to default state and GPU power rails have come up and are valid (which should be before platform reset deasserts). Could be eliminated if GPIO moved to resume well.

LVDS I/F Mux

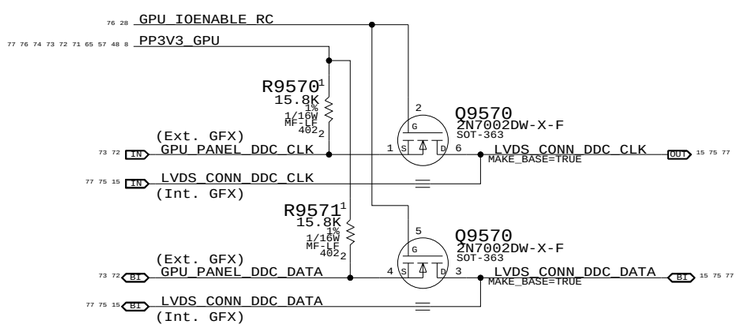


NOTE: SEL = LOW selects port B

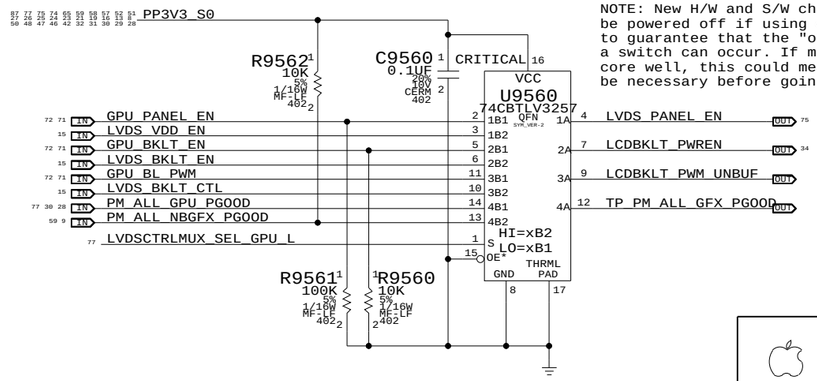
LVDS Data Mux Power Supply



GPU DDC Pass FETs



Panel/Backlight Control Mux



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

LVDS Interface Mux

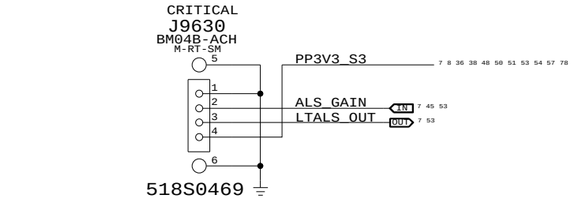
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

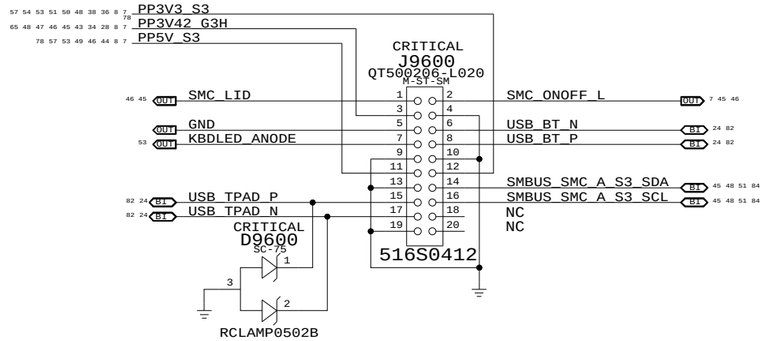
SCALE: NONE SHT: 77 OF: 88

Left ALS Connector

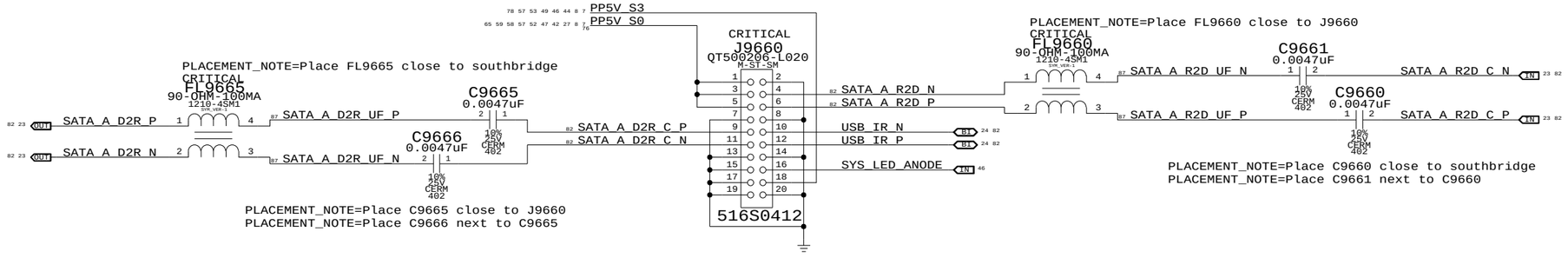


White colored version of 518S0369

Top-Case Connector



SATA HDD & IR & SIL Flex Connector



PLACEMENT_NOTE=Place C9665 close to J9660
PLACEMENT_NOTE=Place C9666 next to C9665

PLACEMENT_NOTE=Place C9660 close to southbridge
PLACEMENT_NOTE=Place C9661 next to C9660

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

M75 Specific Connectors

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 78 OF 88	

FSB (Front-Side Bus) Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
FSB_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
FSB_DSTB_55S	*	=1:1_DIFFPAIR	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=1:1_DIFFPAIR	=1:1_DIFFPAIR

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

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

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

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

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

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

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

SOURCE: Santa Rosa Platform DG, Rev 0.9 (#20517), Sections 4.2 & 4.3

CPU Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CPU_27P4S	*	Y	=27P4_OHM_SE	=27P4_OHM_SE	=27P4_OHM_SE	7 MIL	7 MIL
CPU_55S	*	Y	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

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 58
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 58
(See above)	CPU_55S	CPU_2TO1	IMVP_DPRSLPVR	7 58
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 58
CPU_GTLREF	CPU_55S	CPU_GTLREF	CPU_GTLREF	10
CPU_COMP	CPU_55S	CPU_COMP	CPU_COMP<3>	10
CPU_COMP	CPU_27P4S	CPU_COMP	CPU_COMP<2>	10
CPU_COMP	CPU_55S	CPU_COMP	CPU_COMP<1>	10
CPU_COMP	CPU_27P4S	CPU_COMP	CPU_COMP<0>	10
XDP_TDI	CPU_55S	CPU_ITP	XDP_TDI	10 13
XDP_TDO	CPU_55S	CPU_ITP	XDP_TDO	10 13
XDP_TMS	CPU_55S	CPU_ITP	XDP_TMS	10 13
XDP_TCK	CPU_55S	CPU_ITP	XDP_TCK	10 13
XDP_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 29 30 84
	CLK_FSB_100D	CLK_FSB	XDP_CLK_N	13 29 30 84
(FSB_CPURST_L)	CPU_55S	CPU_ITP	XDP_CPURST_L	13
	CPU_55S	CPU_2TO1	CPU_VID<6..0>	11 12
	CPU_55S	CPU_2TO1	IMVP6_VID<6..0>	7 12 58
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCSENSE_P	11 58
CPU_VCCSENSE	CPU_27P4S	CPU_VCCSENSE	CPU_VCCSENSE_N	11 58
	CPU_27P4S	CPU_VCCSENSE	IMVP6_VSEN_P	58
	CPU_27P4S	CPU_VCCSENSE	IMVP6_VSEN_N	58

CPU/FSB Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE NONE SHT 79 OF 88

PCI-Express / DMI Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
PCIE_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
DMI_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PCIE	*	20 MIL	?
DMI	*	20 MIL	?

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

Video Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
LVDS_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
CRT_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
CRT_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT	
LVDS	*	20 MIL	?	
CRT	*	25 MIL	?	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>	66
	PCIE_100D	PCIE	PEG_R2D_N<15..0>	66
	PCIE_100D	PCIE	PEG_R2D_C_P<15..0>	15 66
	PCIE_100D	PCIE	PEG_R2D_C_N<15..0>	15 66
PEG_D2R	PCIE_100D	PCIE	PEG_D2R_P<15..0>	15 66
	PCIE_100D	PCIE	PEG_D2R_N<15..0>	15 66
	PCIE_100D	PCIE	PEG_D2R_C_P<15..0>	66
	PCIE_100D	PCIE	PEG_D2R_C_N<15..0>	66
DMI_N2S	DMI_100D	DMI	DMI_N2S_P<3..0>	16 24
	DMI_100D	DMI	DMI_N2S_N<3..0>	16 24
DMI_S2N	DMI_100D	DMI	DMI_S2N_P<3..0>	16 24
	DMI_100D	DMI	DMI_S2N_N<3..0>	16 24
LVDS_A_CLK	LVDS_100D	LVDS	LVDS_A_CLK_P	15 77
LVDS_A_CLK	LVDS_100D	LVDS	LVDS_A_CLK_N	15 77
LVDS_A_DATA	LVDS_100D	LVDS	LVDS_A_DATA_P<2..0>	15 77
LVDS_A_DATA	LVDS_100D	LVDS	LVDS_A_DATA_N<2..0>	15 77
LVDS_A_DATA3	LVDS_100D	LVDS	LVDS_A_DATA_P<3>	
LVDS_A_DATA3	LVDS_100D	LVDS	LVDS_A_DATA_N<3>	
LVDS_B_CLK	LVDS_100D	LVDS	LVDS_B_CLK_P	15 77
LVDS_B_CLK	LVDS_100D	LVDS	LVDS_B_CLK_N	15 77
LVDS_B_DATA	LVDS_100D	LVDS	LVDS_B_DATA_P<2..0>	15 77
LVDS_B_DATA	LVDS_100D	LVDS	LVDS_B_DATA_N<2..0>	15 77
LVDS_B_DATA3	LVDS_100D	LVDS	LVDS_B_DATA_P<3>	
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=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE NONE SHT 80 OF 88

DDR2 Memory Bus Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
MEM_45S	*	=45_OHM_SE	=45_OHM_SE	=45_OHM_SE	=45_OHM_SE	=STANDARD	=STANDARD
MEM_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
MEM_70D	*	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF	=70_OHM_DIFF
MEM_85D	*	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF	=85_OHM_DIFF

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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CLK	MEM_CLK	*	MEM_CLK2MEM
MEM_CLK	MEM_CTRL	*	MEM_CLK2MEM
MEM_CLK	MEM_CMD	*	MEM_CLK2MEM
MEM_CLK	MEM_DATA	*	MEM_CLK2MEM
MEM_CLK	MEM_DQS	*	MEM_CLK2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CMD	MEM_CLK	*	MEM_CMD2MEM
MEM_CMD	MEM_CTRL	*	MEM_CMD2MEM
MEM_CMD	MEM_CMD	*	MEM_CMD2CMD
MEM_CMD	MEM_DATA	*	MEM_CMD2MEM
MEM_CMD	MEM_DQS	*	MEM_CMD2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_CTRL	MEM_CLK	*	MEM_CTRL2MEM
MEM_CTRL	MEM_CTRL	*	MEM_CTRL2CTRL
MEM_CTRL	MEM_CMD	*	MEM_CTRL2MEM
MEM_CTRL	MEM_DATA	*	MEM_CTRL2MEM
MEM_CTRL	MEM_DQS	*	MEM_CTRL2MEM

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_DATA	MEM_CLK	*	MEM_DATA2MEM
MEM_DATA	MEM_CTRL	*	MEM_DATA2MEM
MEM_DATA	MEM_CMD	*	MEM_DATA2MEM
MEM_DATA	MEM_DATA	*	MEM_DATA2DATA
MEM_DATA	MEM_DQS	*	MEM_DATA2MEM

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

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MEM_DQS	MEM_CLK	*	MEM_DQS2MEM
MEM_DQS	MEM_CTRL	*	MEM_DQS2MEM
MEM_DQS	MEM_CMD	*	MEM_DQS2MEM
MEM_DQS	MEM_DATA	*	MEM_DQS2MEM
MEM_DQS	MEM_DQS	*	MEM_DQS2MEM

Need to support MEM_*-style wildcards!

SOURCE: Santa Rosa Platform DG, Rev 1.0 (#21112), Section 6.2

Memory Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	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=01/17/2007

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 14.0.0

SCALE NONE | SHT 81 OF 88

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 78
	SATA_100D	SATA	SATA_A_R2D_C_N	23 78
	SATA_100D	SATA	SATA_A_R2D_P	78
	SATA_100D	SATA	SATA_A_R2D_N	78
SATA_A_D2R	SATA_100D	SATA	SATA_A_D2R_P	23 78
	SATA_100D	SATA	SATA_A_D2R_N	23 78
	SATA_100D	SATA	SATA_A_D2R_C_P	78
	SATA_100D	SATA	SATA_A_D2R_C_N	78
SATA_B_R2D	SATA_100D	SATA	TP_SATA_B_R2DP	23 42
	SATA_100D	SATA	TP_SATA_B_R2DN	23 42
	SATA_100D	SATA	SATA_B_R2D_P	
	SATA_100D	SATA	SATA_B_R2D_N	
SATA_B_D2R	SATA_100D	SATA	TP_SATA_B_D2RP	23 42
	SATA_100D	SATA	TP_SATA_B_D2RN	23 42
	SATA_100D	SATA	SATA_B_D2R_C_P	
	SATA_100D	SATA	SATA_B_D2R_C_N	
SATA_C_R2D	SATA_100D	SATA	TP_SATA_C_R2DP	23 42
	SATA_100D	SATA	TP_SATA_C_R2DN	23 42
	SATA_100D	SATA	SATA_C_R2D_P	
	SATA_100D	SATA	SATA_C_R2D_N	
SATA_C_D2R	SATA_100D	SATA	TP_SATA_C_D2RP	23 42
	SATA_100D	SATA	TP_SATA_C_D2RN	23 42
	SATA_100D	SATA	SATA_C_D2R_C_P	
	SATA_100D	SATA	SATA_C_D2R_C_N	
SATA_RBIAS	SATA_55S		SATA_RBIAS	23 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_WWAN_P	7 24 44
	USB_90D	USB	USB_WWAN_N	7 24 44
USB_CAMERA	USB_90D	USB	USB_CAMERA_P	7 24 44
	USB_90D	USB	USB_CAMERA_N	7 24 44
USB_BT	USB_90D	USB	USB_BT_P	24 78
	USB_90D	USB	USB_BT_N	24 78
USB_TPAD	USB_90D	USB	USB_TPAD_P	24 78
	USB_90D	USB	USB_TPAD_N	24 78
USB_IR	USB_90D	USB	USB_IR_P	24 78
	USB_90D	USB	USB_IR_N	24 78
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	TP_USB_EXTCP	9 24
	USB_90D	USB	TP_USB_EXTCN	9 24
USB_RBIAS	USB_60S		USB_RBIAS	24
SMB_SB_SCL	SMB_55S	SMB	SMBUS_SB_SCL	25 29 31 32 34 48
SMB_SB_SDA	SMB_55S	SMB	SMBUS_SB_SDA	25 29 31 32 34 48
SMB_SB_ME_SCL	SMB_55S	SMB	SMBUS_SB_ME_SCL	25 48
SMB_SB_ME_SDA	SMB_55S	SMB	SMBUS_SB_ME_SDA	25 48
SPI_SCLK	SPI_55S	SPI	SPI_SCLK_R	24 55
	SPI_55S	SPI	SPI_SCLK	55
	SPI_55S	SPI	SPI_A_SCLK_R	
	SPI_55S	SPI	SPI_B_SCLK_R	
SPI_SI	SPI_55S	SPI	SPI_SI_R	24 55
	SPI_55S	SPI	SPI_SI	
	SPI_55S	SPI	SPI_A_SI_R	55
	SPI_55S	SPI	SPI_B_SI_R	
SPI_SO	SPI_55S	SPI	SPI_SO	24 55
	SPI_55S	SPI	SPI_A_SO_R	55
	SPI_55S	SPI	SPI_B_SO	
	SPI_55S	SPI	SPI_B_SO_R	
SPI_CE_I0	SPI_55S	SPI	SPI_CE_R_L<0>	24 55
	SPI_55S	SPI	SPI_CE_L<0>	55
SPI_CE_I1	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=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

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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	7 24 38 47
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	24 34
	PCIE_100D	PCIE	PCIE_EXCARD_R2D_C_N	24 34
PCIE_EXCARD_D2R	PCIE_100D	PCIE	PCIE_EXCARD_D2R_P	24 34
	PCIE_100D	PCIE	PCIE_EXCARD_D2R_N	24 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=01/17/2007

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 14.0.0

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Clock Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
CLK_FSB_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
CLK_PCIE_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
CLK_MED_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
CLK_SLOW_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
CLK_FSB	*	25 MIL	?
CLK_PCIE	*	20 MIL	?
CLK_MED	*	20 MIL	?
CLK_SLOW	*	10 MIL	?

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

Clock Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	SPACING		
CK505_CPU	CLK_FSB_100D	CLK_FSB	FSB_CLK_CPU_P	10 29 30 84
CK505_CPU	CLK_FSB_100D	CLK_FSB	FSB_CLK_CPU_N	10 29 30 84
CK505_NB	CLK_FSB_100D	CLK_FSB	FSB_CLK_NB_P	7 14 29 30 84
CK505_NB	CLK_FSB_100D	CLK_FSB	FSB_CLK_NB_N	7 14 29 30 84
CK505_ITP	CLK_FSB_100D	CLK_FSB	XDP_CLK_P	13 29 30 79 84
CK505_ITP	CLK_FSB_100D	CLK_FSB	XDP_CLK_N	13 29 30 79 84
CK505_PCIF0	CLK_MED_55S	CLK_MED	CK505_PCIF0_CLK_ITPEN	29 30
CK505_PCIF1	CLK_MED_55S	CLK_MED	CK505_PCIF1_CLK	29 30
CK505_PCI1	CLK_MED_55S	CLK_MED	CK505_PCI1_CLK	29 30
CK505_PCI2	CLK_MED_55S	CLK_MED	TP_CK505_PCI2_CLK	29 30
CK505_PCI3	CLK_MED_55S	CLK_MED	CK505_PCI3_CLK	29 30
CK505_PCI4	CLK_MED_55S	CLK_MED	TP_CK505_PCI4_CLK	29 30
CK505_PCI5	CLK_MED_55S	CLK_MED	CK505_PCI5_CLK_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_CLK27M	29 30
	CLK_PCIE_100D	CLK_PCIE	CK505_CLK27M_SS	29 30
CK505_LVDS	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_DPLLSS_P	7 16 22 29 30 84
	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_DPLLSS_N	7 16 22 29 30 84
CK505_SRC1	CLK_PCIE_100D	CLK_PCIE	PEG_CLK100M_GPU_P	9 29 30 66 84
	CLK_PCIE_100D	CLK_PCIE	PEG_CLK100M_GPU_N	9 29 30 66 84
CK505_SRC2	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_DMI_P	24 29 30 84
	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_DMI_N	24 29 30 84
CK505_SRC3	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_EXCARD_P	29 30 34 84
	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_EXCARD_N	29 30 34 84
CK505_SRC4	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_SATA_P	23 29 30 84
	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_SATA_N	23 29 30 84
CK505_SRC5	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_PCIE_P	7 16 29 30 84
	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_PCIE_N	7 16 29 30 84
CK505_SRC6	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_MINI_P	29 30 34 84
	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_MINI_N	29 30 34 84
CK505_SRC7	CLK_PCIE_100D	CLK_PCIE	TP_PCIE_CLK100M_SRC7P	29 30
	CLK_PCIE_100D	CLK_PCIE	TP_PCIE_CLK100M_SRC7N	29 30
CK505_SRC8	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_ENET_P	29 30 35 84
	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_ENET_N	29 30 35 84
(CK505_CPU)	CLK_FSB_100D	CLK_FSB	FSB_CLK_CPU_P	10 29 30 84
(CK505_CPU)	CLK_FSB_100D	CLK_FSB	FSB_CLK_CPU_N	10 29 30 84
(CK505_NB)	CLK_FSB_100D	CLK_FSB	FSB_CLK_NB_P	7 14 29 30 84
(CK505_NB)	CLK_FSB_100D	CLK_FSB	FSB_CLK_NB_N	7 14 29 30 84
(CK505_ITP)	CLK_FSB_100D	CLK_FSB	XDP_CLK_P	13 29 30 79 84
(CK505_ITP)	CLK_FSB_100D	CLK_FSB	XDP_CLK_N	13 29 30 79 84
(CK505_PCIF0)	CLK_MED_55S	CLK_MED	PCI_CLK33M_LPCPLUS	7 30 47
(CK505_PCIF1)	CLK_MED_55S	CLK_MED	PCI_CLK33M_SB	24 30
(CK505_PCI1)	CLK_MED_55S	CLK_MED	PCI_CLK33M_FW	30 38
(CK505_PCI2)	CLK_MED_55S	CLK_MED	PCI_CLK33M_TPM	
(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 16 22 29 30 84
(CK505_LVDS)	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_DPLLSS_N	7 16 22 29 30 84
(CK505_SRC1)	CLK_PCIE_100D	CLK_PCIE	PEG_CLK100M_GPU_P	9 29 30 66 84
(CK505_SRC1)	CLK_PCIE_100D	CLK_PCIE	PEG_CLK100M_GPU_N	9 29 30 66 84
(CK505_SRC2)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_DMI_P	24 29 30 84
(CK505_SRC2)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_DMI_N	24 29 30 84
(CK505_SRC3)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_EXCARD_P	29 30 34 84
(CK505_SRC3)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_EXCARD_N	29 30 34 84
(CK505_SRC4)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_SATA_P	23 29 30 84
(CK505_SRC4)	CLK_PCIE_100D	CLK_PCIE	SB_CLK100M_SATA_N	23 29 30 84
(CK505_SRC5)	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_PCIE_P	7 16 29 30 84
(CK505_SRC5)	CLK_PCIE_100D	CLK_PCIE	NB_CLK100M_PCIE_N	7 16 29 30 84
(CK505_SRC6)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_MINI_P	29 30 34 84
(CK505_SRC6)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_MINI_N	29 30 34 84
			CK505 SRC7 is project-specific	
(CK505_SRC8)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_ENET_P	29 30 35 84
(CK505_SRC8)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_ENET_N	29 30 35 84

SMC SMBus Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	SPACING		
SMBUS_SMC_A_S3_SCL	SMB_55S	SMB	SMBUS_SMC_A_S3_SCL	45 48 51 78
SMBUS_SMC_A_S3_SDA	SMB_55S	SMB	SMBUS_SMC_A_S3_SDA	45 48 51 78
SMBUS_SMC_B_S0_SCL	SMB_55S	SMB	SMBUS_SMC_B_S0_SCL	34 45 48 51
SMBUS_SMC_B_S0_SDA	SMB_55S	SMB	SMBUS_SMC_B_S0_SDA	34 45 48 51
SMBUS_SMC_0_S0_SCL	SMB_55S	SMB	SMBUS_SMC_0_S0_SCL	45 48 51 73
SMBUS_SMC_0_S0_SDA	SMB_55S	SMB	SMBUS_SMC_0_S0_SDA	45 48 51 73
SMBUS_SMC_BSA_SCL	SMB_55S	SMB	SMBUS_SMC_BSA_SCL	7 45 48 56
SMBUS_SMC_BSA_SDA	SMB_55S	SMB	SMBUS_SMC_BSA_SDA	7 45 48 56
SMBUS_SMC_MGMT_SCL	SMB_55S	SMB	SMBUS_SMC_MGMT_SCL	45 48 54
SMBUS_SMC_MGMT_SDA	SMB_55S	SMB	SMBUS_SMC_MGMT_SDA	45 48 54

Clock & SMC Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 84 OF 88	

FireWire Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
FW_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
FW_110D	*	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF	=110_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
FW	*	=2:1_SPACING	?
FW_TP	*	=3:1_SPACING	?

FireWire Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	SPACING		
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_PORT0_TPA_P	39 41
FW_0_TPA	FW_110D	FW_TP	FW_PORT0_TPA_N	39 41
FW_0_TPB	FW_110D	FW_TP	FW_PORT0_TPB_P	39 41
FW_0_TPB	FW_110D	FW_TP	FW_PORT0_TPB_N	39 41
FW_1_TPA	FW_110D	FW_TP	FW_PORT1_TPA_P	39 41
FW_1_TPA	FW_110D	FW_TP	FW_PORT1_TPA_N	39 41
FW_1_TPB	FW_110D	FW_TP	FW_PORT1_TPB_P	39 41
FW_1_TPB	FW_110D	FW_TP	FW_PORT1_TPB_N	39 41

Port 2 Not Used

FireWire Constraints

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	85	88

GDDR3 Frame Buffer Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
GDDR3_40R50SE	*	=50_OHM_SE	=40_OHM_SE	=50_OHM_SE	12.7 MM	=STANDARD	=STANDARD
GDDR3_50SE	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
GDDR3_80D	*	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF	=80_OHM_DIFF

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

Video Signal Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
TMDS_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF
VGA_50S	*	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD
VGA_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

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

GDDR3 FB A/B Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING	
FB_A_CLK_P	GDDR3_80D	GDDR3_CLK	FB_A_CLK_P<0> 68 69
	GDDR3_80D	GDDR3_CLK	FB_A_CLK_N<0> 68 69
FB_B_CLK_P	GDDR3_80D	GDDR3_CLK	FB_A_CLK_P<1> 68 69
	GDDR3_80D	GDDR3_CLK	FB_A_CLK_N<1> 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_MA<1..0> 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_MA<11..6> 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_BA<2..0> 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_RAS_L 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_CAS_L 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_WE_L 68 69
FB_AB_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_A_CKE 68 69
FB_AB_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_A_CS0_L 68 69
FB_AB_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_A_DRAM_RST 68 69
FB_A_CMD	GDDR3_50SE	GDDR3_CMD	FB_A_LMA<5..2> 68 69
FB_B_CMD	GDDR3_50SE	GDDR3_CMD	FB_A_UMA<5..2> 68 69
FB_A_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<0> 68 69
FB_A_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<1> 68 69
FB_A_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<2> 68 69
FB_A_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<3> 68 69
FB_A_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<0> 68 69
FB_A_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<1> 68 69
FB_A_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<2> 68 69
FB_A_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<3> 68 69
FB_A_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<7..0> 68 69
FB_A_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<15..8> 68 69
FB_A_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<23..16> 68 69
FB_A_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<31..24> 68 69
FB_A_DQM0	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<0> 68 69
FB_A_DQM1	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<1> 68 69
FB_A_DQM2	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<2> 68 69
FB_A_DQM3	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<3> 68 69
FB_B_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<4> 68 69
FB_B_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<5> 68 69
FB_B_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<6> 68 69
FB_B_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_WDQS<7> 68 69
FB_B_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<4> 68 69
FB_B_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<5> 68 69
FB_B_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<6> 68 69
FB_B_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_A_RDQS<7> 68 69
FB_B_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<39..32> 68 69
FB_B_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<47..40> 68 69
FB_B_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<55..48> 68 69
FB_B_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_A_DQ<63..56> 68 69
FB_B_DQM0	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<4> 68 69
FB_B_DQM1	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<5> 68 69
FB_B_DQM2	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<6> 68 69
FB_B_DQM3	GDDR3_50SE	GDDR3_DATA	FB_A_DQM_L<7> 68 69

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 71 72
CK505_CLK27MSS	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS 30
	CLK_SLOW_55S	CLK_SLOW	GPU_CLK27M_SS_GATED 30 71 72
	LVDS_100D	LVDS	LVDS_L_CLK_P 73 77
	LVDS_100D	LVDS	LVDS_L_CLK_N 73 77
	LVDS_100D	LVDS	LVDS_L_DATA_P<3..0> 7 73 77
	LVDS_100D	LVDS	LVDS_L_DATA_N<3..0> 7 73 77
	LVDS_100D	LVDS	LVDS_U_CLK_P 73 77
	LVDS_100D	LVDS	LVDS_U_CLK_N 73 77
	LVDS_100D	LVDS	LVDS_U_DATA_P<3..0> 73 77
	LVDS_100D	LVDS	LVDS_U_DATA_N<3..0> 73 77
TMDS_CLK	TMDS_100D	TMDS	TMDS_CLK_P 73 76
TMDS_CLK	TMDS_100D	TMDS	TMDS_CLK_N 73 76
TMDS_DATA	TMDS_100D	TMDS	TMDS_DATA_P<5..0> 73 76
TMDS_DATA	TMDS_100D	TMDS	TMDS_DATA_N<5..0> 73 76
VGA_R_TV_C	VGA_50S	VGA	GPU_TV_C_VGA_R 72 76
VGA_G_TV_Y	VGA_50S	VGA	GPU_TV_Y_VGA_G 72 76
VGA_B_TV_COMP	VGA_50S	VGA	GPU_TV_COMP_VGA_B 72 76
	VGA_50S	VGA	GPU_VGA_R 72 73
	VGA_50S	VGA	GPU_VGA_G 72 73
	VGA_50S	VGA	GPU_VGA_B 72 73
	VGA_50S	VGA	GPU_TV_C 72 73
	VGA_50S	VGA	GPU_TV_Y 72 73
	VGA_50S	VGA	GPU_TV_COMP 72 73
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_HSYNC 73 76
VGA_SYNC	VGA_55S	VGA_SYNC	GPU_VGA_VSYNC 73 76

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> 68 70
	GDDR3_80D	GDDR3_CLK	FB_B_CLK_N<0> 68 70
FB_D_CLK_P	GDDR3_80D	GDDR3_CLK	FB_B_CLK_P<1> 68 70
	GDDR3_80D	GDDR3_CLK	FB_B_CLK_N<1> 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_MA<1..0> 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_MA<11..6> 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_BA<2..0> 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_RAS_L 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_CAS_L 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_WE_L 68 70
FB_CD_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_B_CKE 68 70
FB_CD_CMD	GDDR3_40R50SE	GDDR3_CMD	FB_B_CS0_L 68 70
FB_CD_CMD_PD	GDDR3_40R50SE	GDDR3_CMD	FB_B_DRAM_RST 68 70
FB_C_CMD	GDDR3_50SE	GDDR3_CMD	FB_B_LMA<5..2> 68 70
FB_D_CMD	GDDR3_50SE	GDDR3_CMD	FB_B_UMA<5..2> 68 70
FB_C_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<0> 68 70
FB_C_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<1> 68 70
FB_C_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<2> 68 70
FB_C_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<3> 68 70
FB_C_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<0> 68 70
FB_C_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<1> 68 70
FB_C_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<2> 68 70
FB_C_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<3> 68 70
FB_C_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<7..0> 68 70
FB_C_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<15..8> 68 70
FB_C_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<23..16> 68 70
FB_C_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<31..24> 68 70
FB_C_DQM0	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<0> 68 70
FB_C_DQM1	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<1> 68 70
FB_C_DQM2	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<2> 68 70
FB_C_DQM3	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<3> 68 70
FB_D_WDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<4> 68 70
FB_D_WDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<5> 68 70
FB_D_WDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<6> 68 70
FB_D_WDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_WDQS<7> 68 70
FB_D_RDQS0	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<4> 68 70
FB_D_RDQS1	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<5> 68 70
FB_D_RDQS2	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<6> 68 70
FB_D_RDQS3	GDDR3_50SE	GDDR3_DQS	FB_B_RDQS<7> 68 70
FB_D_DQ_BYTE0	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<39..32> 68 70
FB_D_DQ_BYTE1	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<47..40> 68 70
FB_D_DQ_BYTE2	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<55..48> 68 70
FB_D_DQ_BYTE3	GDDR3_50SE	GDDR3_DATA	FB_B_DQ<63..56> 68 70
FB_D_DQM0	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<4> 68 70
FB_D_DQM1	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<5> 68 70
FB_D_DQM2	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<6> 68 70
FB_D_DQM3	GDDR3_50SE	GDDR3_DATA	FB_B_DQM_L<7> 68 70

GPU (G84M) Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0
SCALE: NONE	SHT 86 OF 88	

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SENSE_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
LVDS_100D	BGA	100_DIFF_BGA
TMDS_100D	BGA	100_DIFF_BGA

SIM Card Constraints

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

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

M75 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	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 78
(SATA_A_R2D)	SATA_100D	SATA	SATA_A_R2D_UF_N 78
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_P 78
(SATA_A_D2R)	SATA_100D	SATA	SATA_A_D2R_UF_N 78
(USB_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 44
(USB_EXTD)	USB_90D	USB	USB_WWAN_F_N 44
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_P 44
(USB_CAMERA)	USB_90D	USB	USB_CAMERA_F_N 44
SENSE_DIFFPAIR	SENSE_1TO1_55S	SENSE	GFXIMVP6_VSEN_P 59
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 71 72
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 75
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_F_N 75
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_P 75 77
	LVDS_100D	LVDS	LVDS_L_CLK_CONN_N 75 77
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_P<3..0> 75 77
	LVDS_100D	LVDS	LVDS_L_DATA_CONN_N<3..0> 75 77
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_P 75 77
	LVDS_100D	LVDS	LVDS_U_CLK_CONN_N 75 77
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_P<3..0> 75 77
	LVDS_100D	LVDS	LVDS_U_DATA_CONN_N<3..0> 75 77
	TMDS_100D	TMDS	TMDS_CLK_R_P 76
	TMDS_100D	TMDS	TMDS_CLK_R_N 76
	TMDS_100D	TMDS	TMDS_CLK_F_P 76
	TMDS_100D	TMDS	TMDS_CLK_F_N 76
	TMDS_100D	TMDS	TMDS_DATA_F_P<5..0> 76
	TMDS_100D	TMDS	TMDS_DATA_F_N<5..0> 76
(VGA_R_TV_Y)	VGA_50S	VGA	VGA_R 76
(VGA_G_TV_C)	VGA_50S	VGA	VGA_G 76
(VGA_B_TV_COMP)	VGA_50S	VGA	VGA_B 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC_R 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC_R 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_HSYNC 76
(VGA_SYNC)	VGA_55S	VGA_SYNC	VGA_VSYNC 76
		PP1V8_MEM	PP1V8_S3 8 31 32 38 50 57 62 87
		PP1V8_MEM	PP1V8_S3 8 31 32 38 50 57 62 87
		GND	GND
		SB_POWER	PP3V3_S5 8 24 25 26 27 28 46 48 55 57 60 65 74 75 77
		SB_POWER	PP3V3_S0 8 13 16 19 21 23 24 25 26 27 28 29 30 31 32 42 46 47 48 50 51
		SB_POWER	PP1V5_S0 8 11 12 22 26 27 34 63
(1:1)	WWAN_SIM	WWAN_SIM	WWAN_SIM_CLOCK 44
(1:1)	WWAN_SIM	WWAN_SIM	WWAN_SIM_DATA 44

M75 Specific Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 14.0.0

SCALE NONE | SHT 87 OF 88

M75 Board-Specific Spacing & Physical Constraints

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

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
DEFAULT	*	Y	=55_OHM_SE	=55_OHM_SE	30 MM	0 MM	0 MM
STANDARD	*	Y	=DEFAULT	=DEFAULT	12.7 MM	=DEFAULT	=DEFAULT

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
55_OHM_SE	TOP,BOTTOM	Y	0.100 MM	0.100 MM			
55_OHM_SE	ISL2,ISL11	Y	0.250 MM	0.076 MM			
55_OHM_SE	*	Y	0.076 MM	0.076 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
50_OHM_SE	TOP,BOTTOM	Y	0.125 MM	0.125 MM			
50_OHM_SE	*	Y	0.090 MM	0.090 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
45_OHM_SE	TOP,BOTTOM	Y	0.150 MM	0.150 MM			
45_OHM_SE	*	Y	0.105 MM	0.105 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
40_OHM_SE	TOP,BOTTOM	Y	0.185 MM	0.185 MM			
40_OHM_SE	*	Y	0.131 MM	0.131 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
27P4_OHM_SE	TOP,BOTTOM	Y	0.335 MM	0.335 MM			
27P4_OHM_SE	*	Y	0.240 MM	0.240 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
70_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
70_OHM_DIFF	ISL3,ISL4	Y	0.149 MM	0.149 MM		0.125 MM	0.125 MM
70_OHM_DIFF	ISL9,ISL10	Y	0.149 MM	0.149 MM		0.125 MM	0.125 MM
70_OHM_DIFF	ISL2,ISL11	Y	0.185 MM	0.185 MM		0.125 MM	0.125 MM
70_OHM_DIFF	TOP,BOTTOM	Y	0.185 MM	0.185 MM		0.125 MM	0.125 MM

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

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
85_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
85_OHM_DIFF	ISL3,ISL4	Y	0.101 MM	0.101 MM		0.125 MM	0.125 MM
85_OHM_DIFF	ISL9,ISL10	Y	0.101 MM	0.101 MM		0.125 MM	0.125 MM
85_OHM_DIFF	ISL2,ISL11	Y	0.125 MM	0.125 MM		0.125 MM	0.125 MM
85_OHM_DIFF	TOP,BOTTOM	Y	0.125 MM	0.125 MM		0.125 MM	0.125 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
90_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
90_OHM_DIFF	ISL3,ISL4	Y	0.102 MM	0.102 MM		0.220 MM	0.220 MM
90_OHM_DIFF	ISL9,ISL10	Y	0.102 MM	0.102 MM		0.220 MM	0.220 MM
90_OHM_DIFF	ISL2,ISL11	Y	0.130 MM	0.130 MM		0.220 MM	0.220 MM
90_OHM_DIFF	TOP,BOTTOM	Y	0.130 MM	0.130 MM		0.220 MM	0.220 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
100_OHM_DIFF	ISL3,ISL4	Y	0.080 MM	0.080 MM		0.200 MM	0.200 MM
100_OHM_DIFF	ISL9,ISL10	Y	0.080 MM	0.080 MM		0.200 MM	0.200 MM
100_OHM_DIFF	ISL2,ISL11	Y	0.099 MM	0.099 MM		0.200 MM	0.200 MM
100_OHM_DIFF	TOP,BOTTOM	Y	0.099 MM	0.099 MM		0.200 MM	0.200 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
110_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
110_OHM_DIFF	ISL3,ISL4	Y	0.077 MM	0.077 MM		0.330 MM	0.330 MM
110_OHM_DIFF	ISL9,ISL10	Y	0.077 MM	0.077 MM		0.330 MM	0.330 MM
110_OHM_DIFF	ISL2,ISL11	Y	0.089 MM	0.089 MM		0.330 MM	0.330 MM
110_OHM_DIFF	TOP,BOTTOM	Y	0.089 MM	0.089 MM		0.330 MM	0.330 MM

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1.5:1_SPACING	*	0.15 MM	?
1.8:1_SPACING	*	0.18 MM	?
2:1_SPACING	*	0.2 MM	?
2.5:1_SPACING	*	0.25 MM	?
3:1_SPACING	*	0.3 MM	?
4:1_SPACING	*	0.4 MM	?

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

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

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

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

M75 Rule Definitions

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	14.0.0

SCALE	SHT	OF
NONE	88	88