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

01/23/2007 - EVT

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

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 Jan 23 15:38:53 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

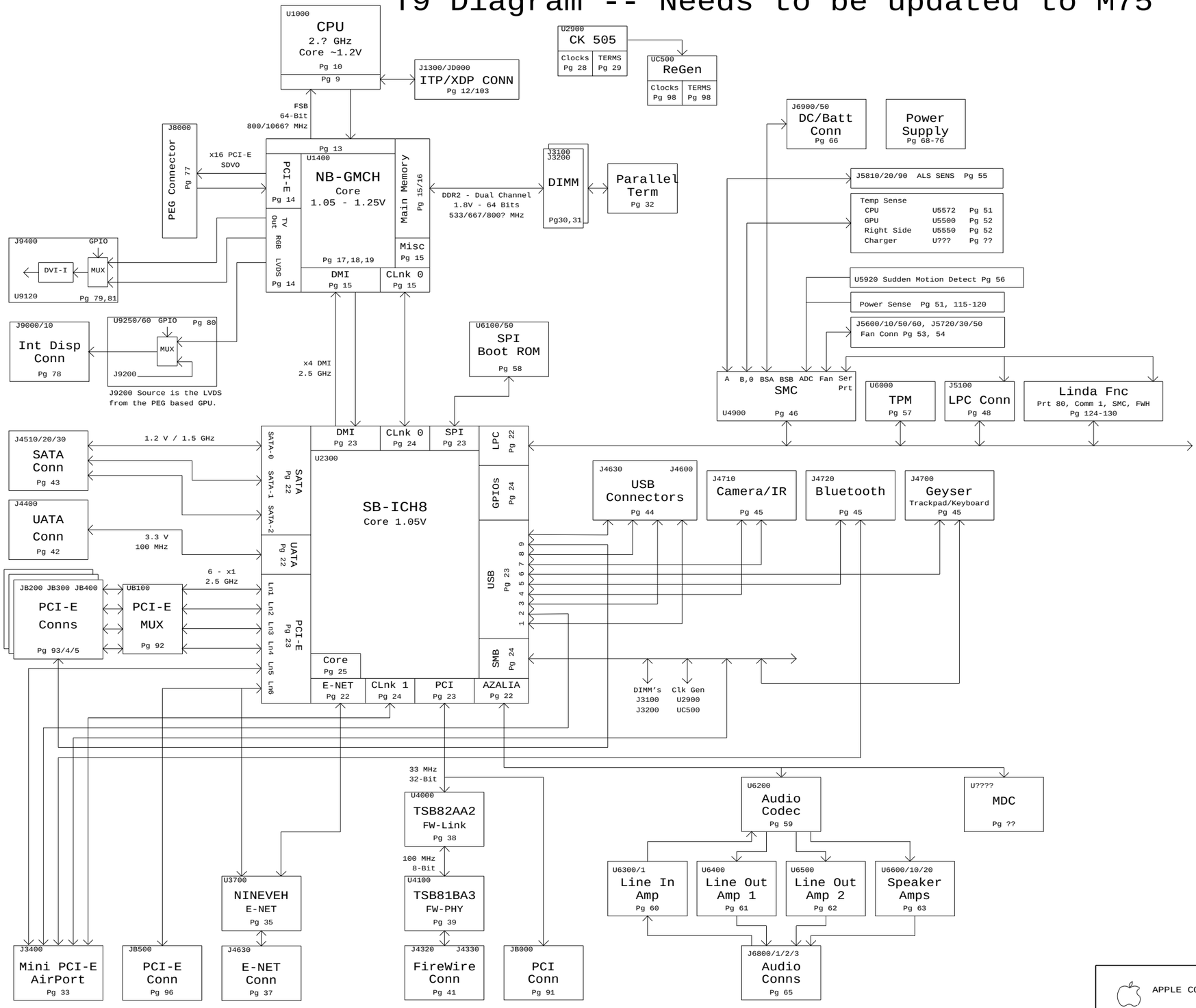
SIZE D

Apple Computer Inc.

TITLE
SCHEM,OROYA,M75

DRAWING NUMBER 051-7225
REV 10.0.0
SHT 1 OF 88

T9 Diagram -- Needs to be updated to M75



System Block Diagram

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

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	OF
NONE	2	88

Power Block Diagram

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

APPLE COMPUTER INC.

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Power Block Diagram

SYNC_MASTER=N/A SYNC_DATE=N/A

APPLE COMPUTER INC.

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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_YES,GPU_TMP401,HDCP,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
337S3427	1	IC,MDC,SR,E0,ES2,2.0G,800FSB,4M,BGA	U1000	CRITICAL	CPU_2_0GHZ
337S3428	1	IC,MDC,SR,E0,ES2,2.2G,800FSB,4M,BGA	U1000	CRITICAL	CPU_2_2GHZ
337S3429	1	IC,MDC,SR,E0,ES2,2.4G,800FSB,4M,BGA	U1000	CRITICAL	CPU_2_4GHZ
338S0388	1	IC,GPU,NV G84M,BGA	U8000	CRITICAL	
338S0381	1	IC,NB,CRESTLINE,965PM,B0,ES2	U1400	CRITICAL	
338S0335	1	IC,SB,ICH8M,B0,ES1,ES2,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.

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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)

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 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

TRUE	REMTHMSNS_DX_P	51 87
TRUE	REMTHMSNS_DX_N	51
TRUE	CPUTHMSNS_D2_P	51 87
TRUE	CPUTHMSNS_D2_N	51

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
TRUE	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

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

Functional / ICT Test

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
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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

PP2V5_S0
MAX I = ?.??A

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=0.6 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
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=1.25V
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=1.9V
MAKE_BASE=TRUE

GND
Yukon EC will not be supported

"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=1.25V
MAKE_BASE=TRUE

Power Aliases

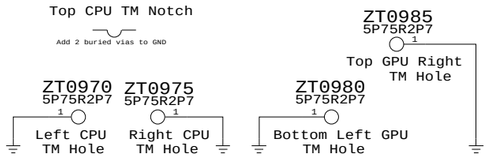
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 10.0.0

SCALE NONE | SHT 8 OF 88

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_TOP

GND_CHASSIS_DVI_BOT (MIN_LINE_WIDTH=0.5 mm, MIN_NECK_WIDTH=0.25 mm, VOLTAGE=0V, MAKE_BASE=TRUE) — GND_CHASSIS_DVI_BOT

OMIT R0910 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_ENET ×3

GND_CHASSIS_RTUSB (MIN_LINE_WIDTH=0.5 mm, MIN_NECK_WIDTH=0.25 mm, VOLTAGE=0V, MAKE_BASE=TRUE) — GND_CHASSIS_RTUSB ×2

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) — GND_CHASSIS_LEFTCLUTCH

PM_SB_PWROK (MAKE_BASE=TRUE) — PM_SB_PWROK
VR_PWRGOOD_DELAY (MAKE_BASE=TRUE) — VR_PWRGOOD_DELAY
SMC_SMS_INT (MAKE_BASE=TRUE) — SMC_SMS_INT
PEG_CLK100M_GPU_P (MAKE_BASE=TRUE) — PEG_CLK100M_GPU_P
PEG_CLK100M_GPU_N (MAKE_BASE=TRUE) — PEG_CLK100M_GPU_N
PM_ALL_NBGFX_PGOOD (MAKE_BASE=TRUE) — PM_ALL_NBGFX_PGOOD
GFX_VR_EN (MAKE_BASE=TRUE) — GFX_VR_EN
GFXIMVP6_VID<4..0> (MAKE_BASE=TRUE) — GFX_VID<4..0>
TP_MEM_A_A<15> (MAKE_BASE=TRUE) — TP_MEM_A_A<15>
TP_MEM_B_A<15> (MAKE_BASE=TRUE) — TP_MEM_B_A<15>
TP_USB_EXTCP (MAKE_BASE=TRUE) — TP_USB_EXTCP
TP_USB_EXTCN (MAKE_BASE=TRUE) — TP_USB_EXTCN

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

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	10.0.0
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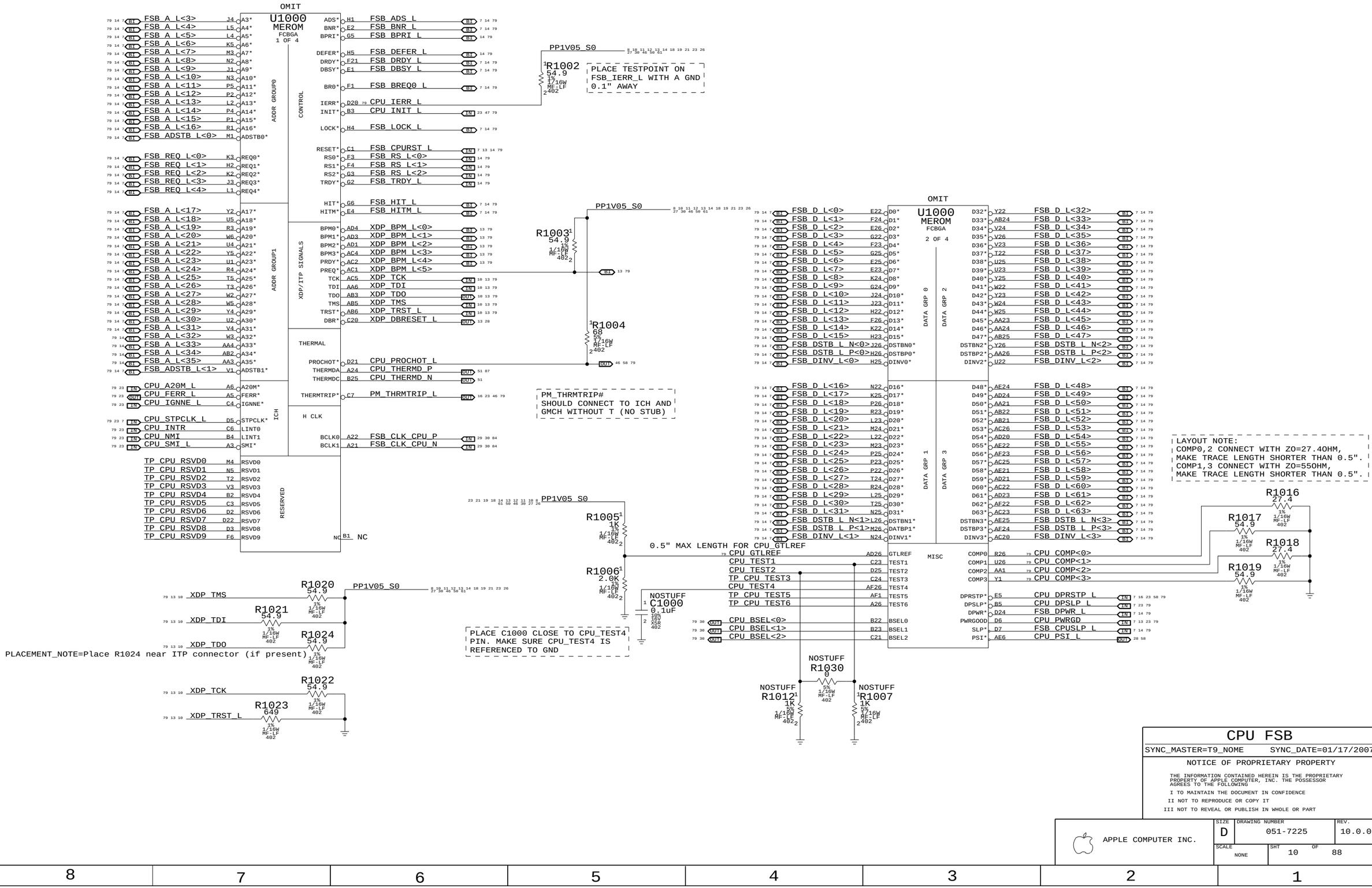

CPU FSB

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

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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
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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

(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)

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

(CPU INTERNAL PLL POWER 1.5V)

PP1V5_S0 8 12 19 22 26 27 34 63 87

130 mA

VCCA: B26 C26

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

VCCSENSE AF7 — CPU_VCCSENSE_P — OUT 58 79

VSSSENSE AF7 — CPU_VCCSENSE_N — OUT 58 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.

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

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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=01/17/2007

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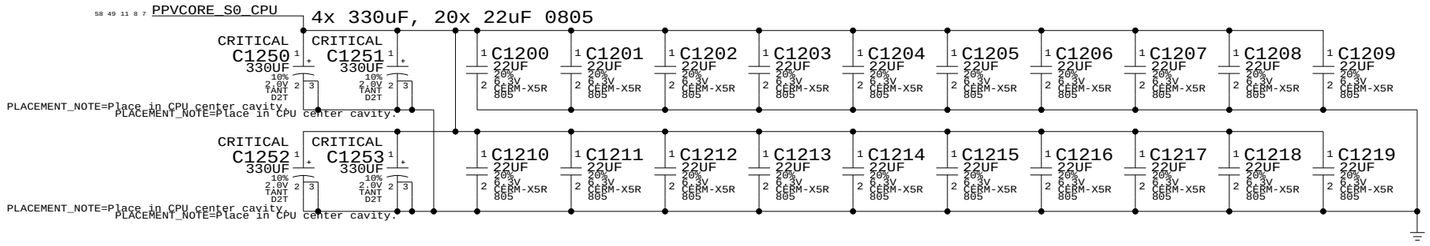
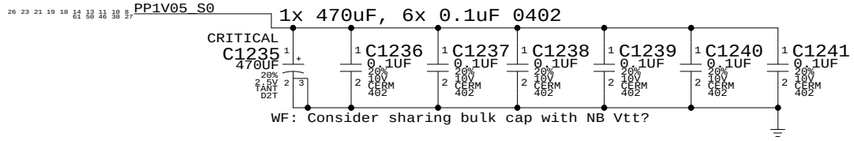
Current numbers from Merom for Santa Rosa EMTS, doc #22221.

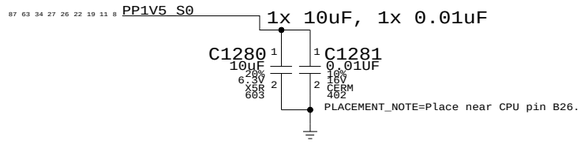
CPU VCORE HF AND BULK DECOUPLING



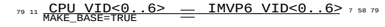
VCCP (CPU I/O) DECOUPLING



VCCA (CPU AVdd) DECOUPLING



CPU VCORE VID CONNECTIONS



CPU Decoupling & VID

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

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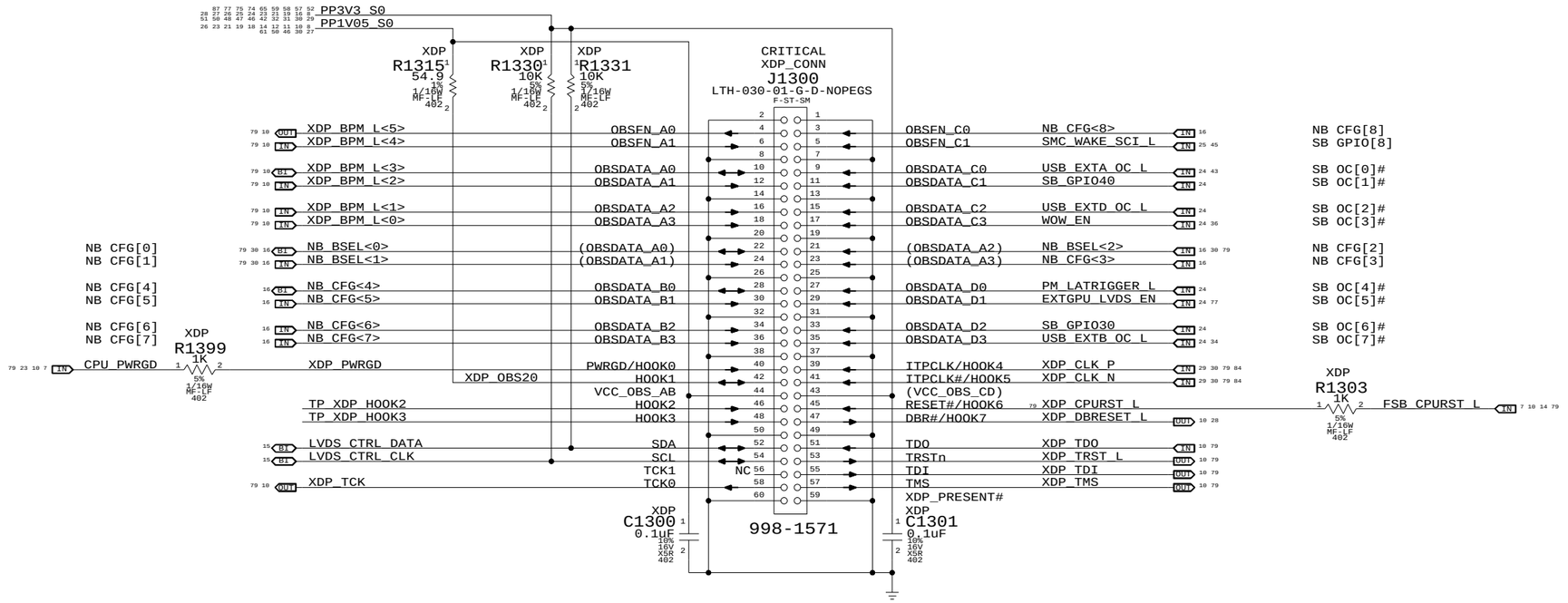
Mini-XDP Connector

NOTE: This is not the standard XDP pinout.

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



Direction of XDP module

Please avoid any obstructions
on even-numbered side of J1300

eXtended Debug Port (XDP)

SYNC_MASTER=T9_NOME SYNC_DATE=12/12/2006

APPLE COMPUTER INC.

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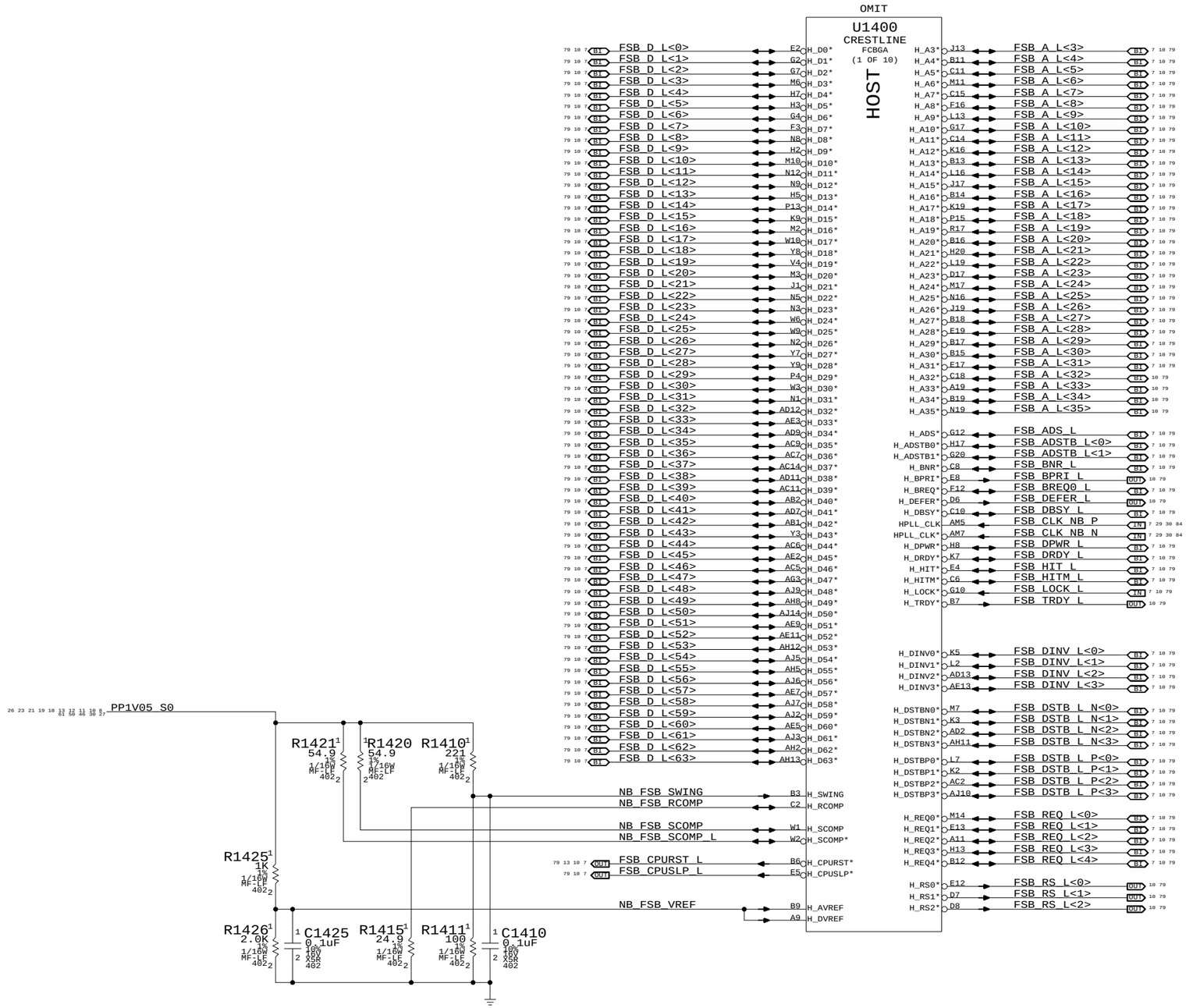

NB CPU Interface

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

NOTICE OF PROPRIETARY PROPERTY

APPLE COMPUTER INC.

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LVDS Disable

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

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

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.

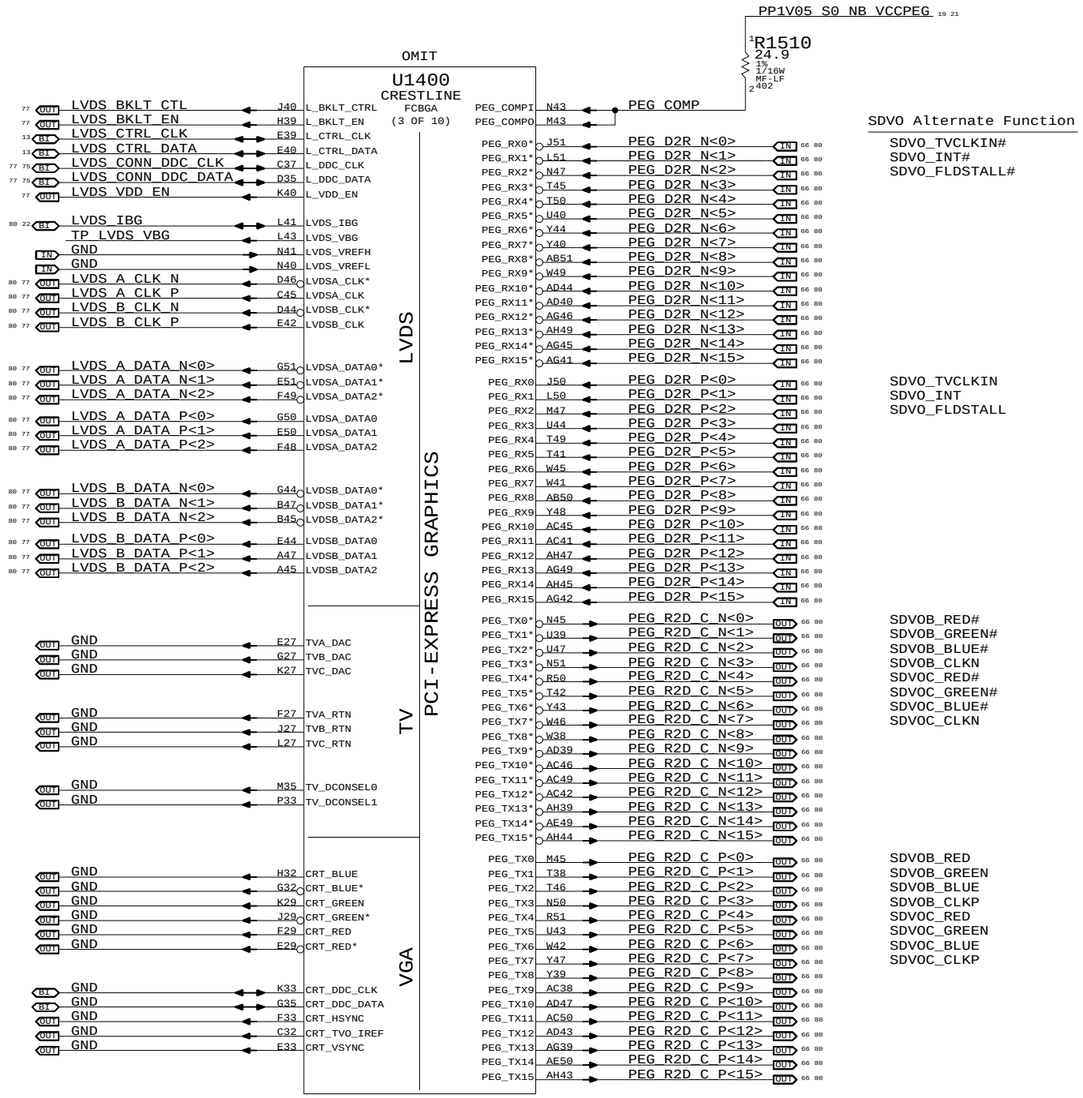
CRT & TV-Out Disable

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=01/17/2007

APPLE COMPUTER INC.

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NB_CFG<3>	RESERVED
NB_CFG<4>	RESERVED
NB_CFG<5> DMI x2 Select	High = DMIx4 Low = DMIx2
NB_CFG<6>	RESERVED
NB_CFG<7>	RESERVED
NB_CFG<8>	RESERVED
NB_CFG<9> PCIe Graphics Lane Reversal	High = Normal Low = Reversed
NB_CFG<10>	RESERVED
NB_CFG<11>	RESERVED
NB_CFG<12>	See Below
NB_CFG<13>	See Below
NB_CFG<14>	RESERVED
NB_CFG<15>	RESERVED
NB_CFG<16> FSB Dynamic ODT	High = Enabled Low = Disabled
NB_CFG<17>	RESERVED
NB_CFG<18>	RESERVED
NB_CFG<19> DMI Lane Reversal	High = Reversed Low = Normal
NB_CFG<20> Concurrent SDVO/PCIe x1	High = Both active Low = Only SDVO or PCIe x16

NB_CFG<13:12>

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

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

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

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

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

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

NB CFG<8:0> used for debug access

NB CFG<13:12> require ICT access

PP3V3_S0 97 77 76 74 65 59 58 57 55 31 56 48 47 46 42 32 31 30 29 28
R1630 10K 5% 1/16W MF-LF 402
R1631 10K 5% 1/16W MF-LF 402
45 31 IN PM_EXTTS_L<0>
45 32 IN PM_EXTTS_L<1>

OMIT

U1400
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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

MISC

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

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

PP1V8_S3_ISNS 57 50 21 18 8
R1610 20 1% 1/10W MF-LF 402
R1620 1K 1% 1/16W MF-LF 402
C1623 0.01UF 10% 16V CERM 402
C1622 2.2UF 20% 6.3V CERM1 603
R1622 3.01K 1% 1/16W MF-LF 402
R1611 20 1% 1/10W MF-LF 402
C1625 0.01UF 10% 16V CERM 402
C1624 2.2UF 20% 6.3V CERM1 603
R1624 1K 1% 1/16W MF-LF 402

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

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

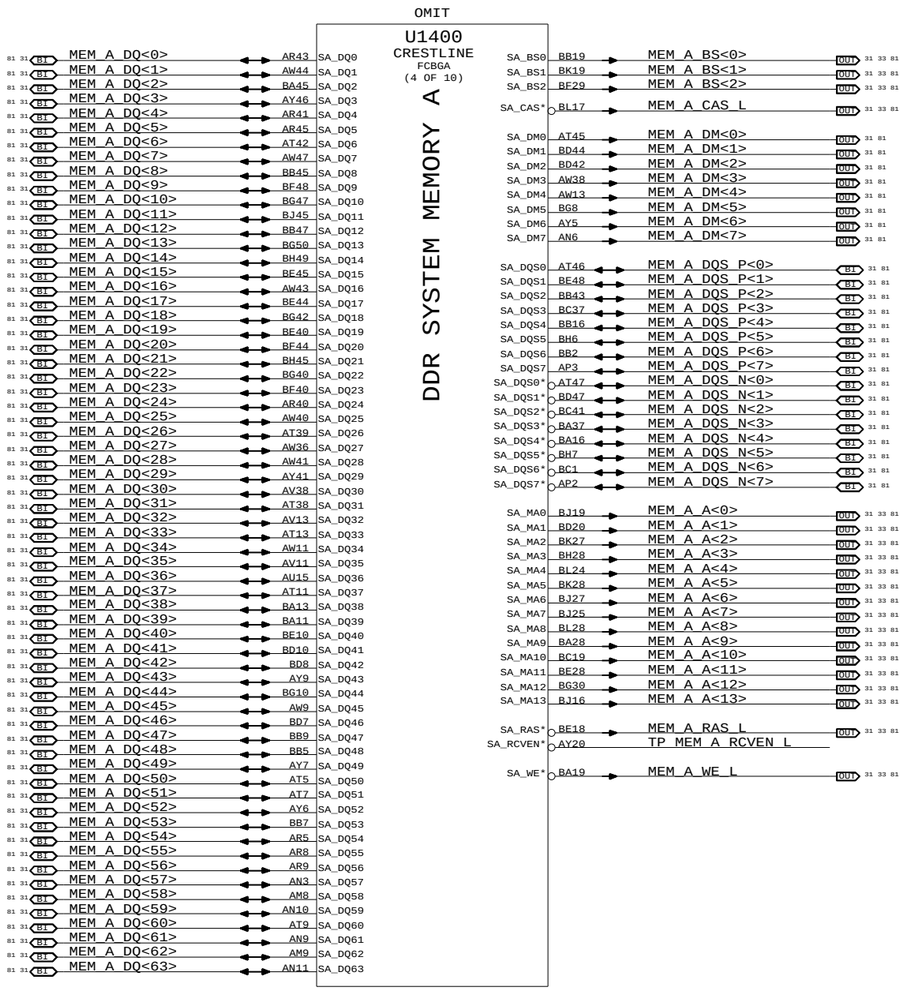
NB Misc Interfaces

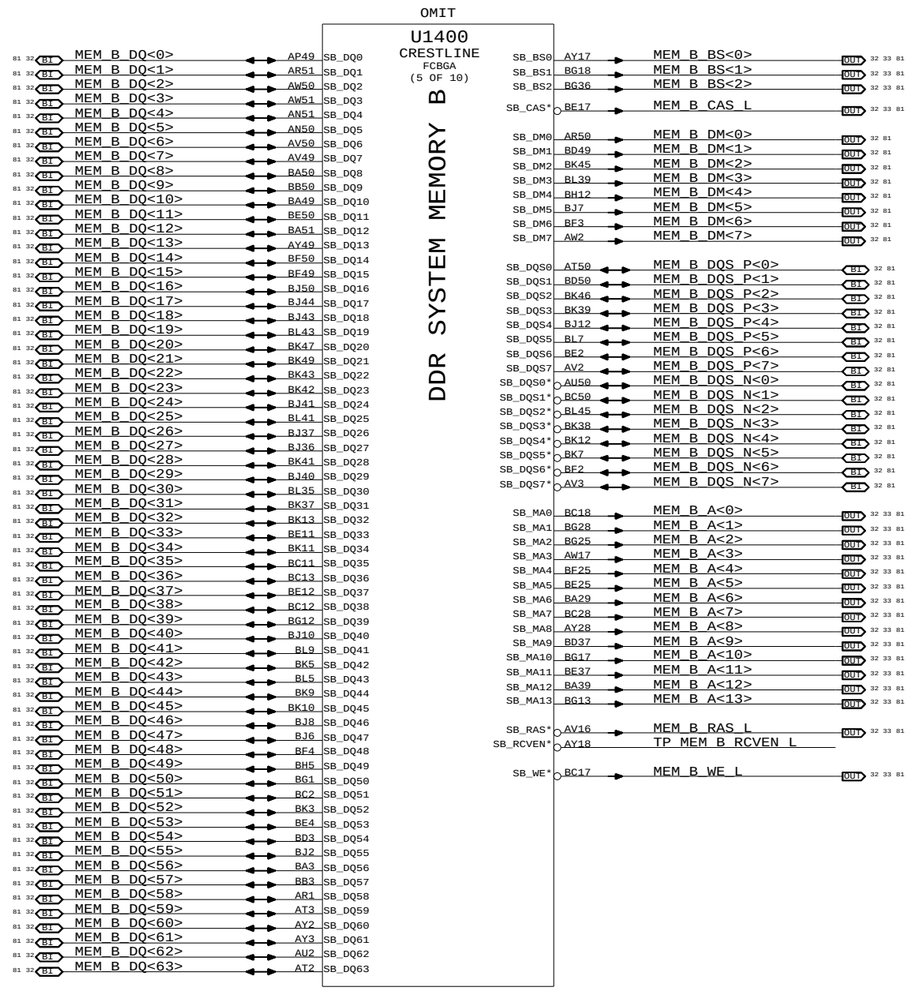
SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE SHT 16 OF 88



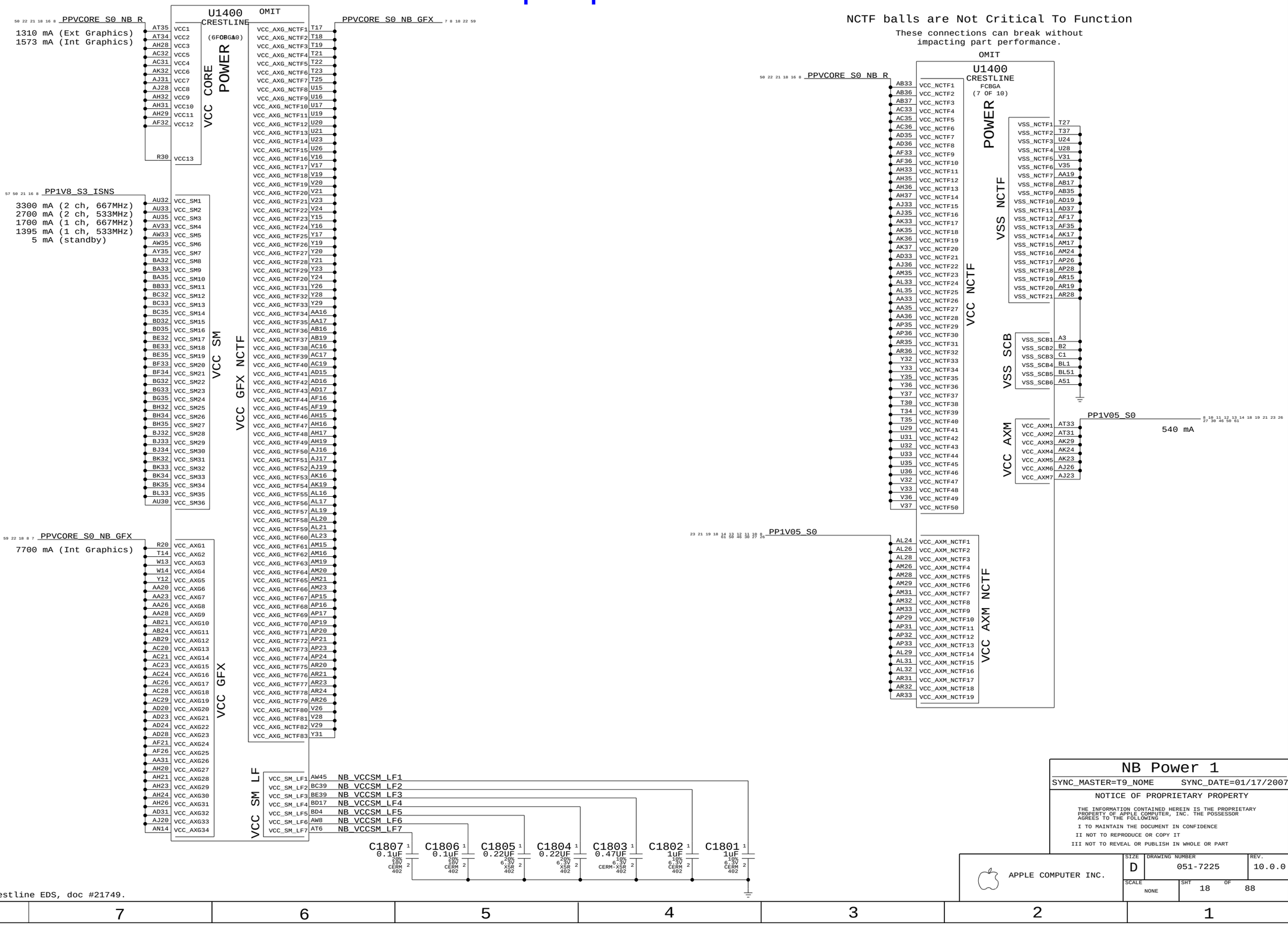


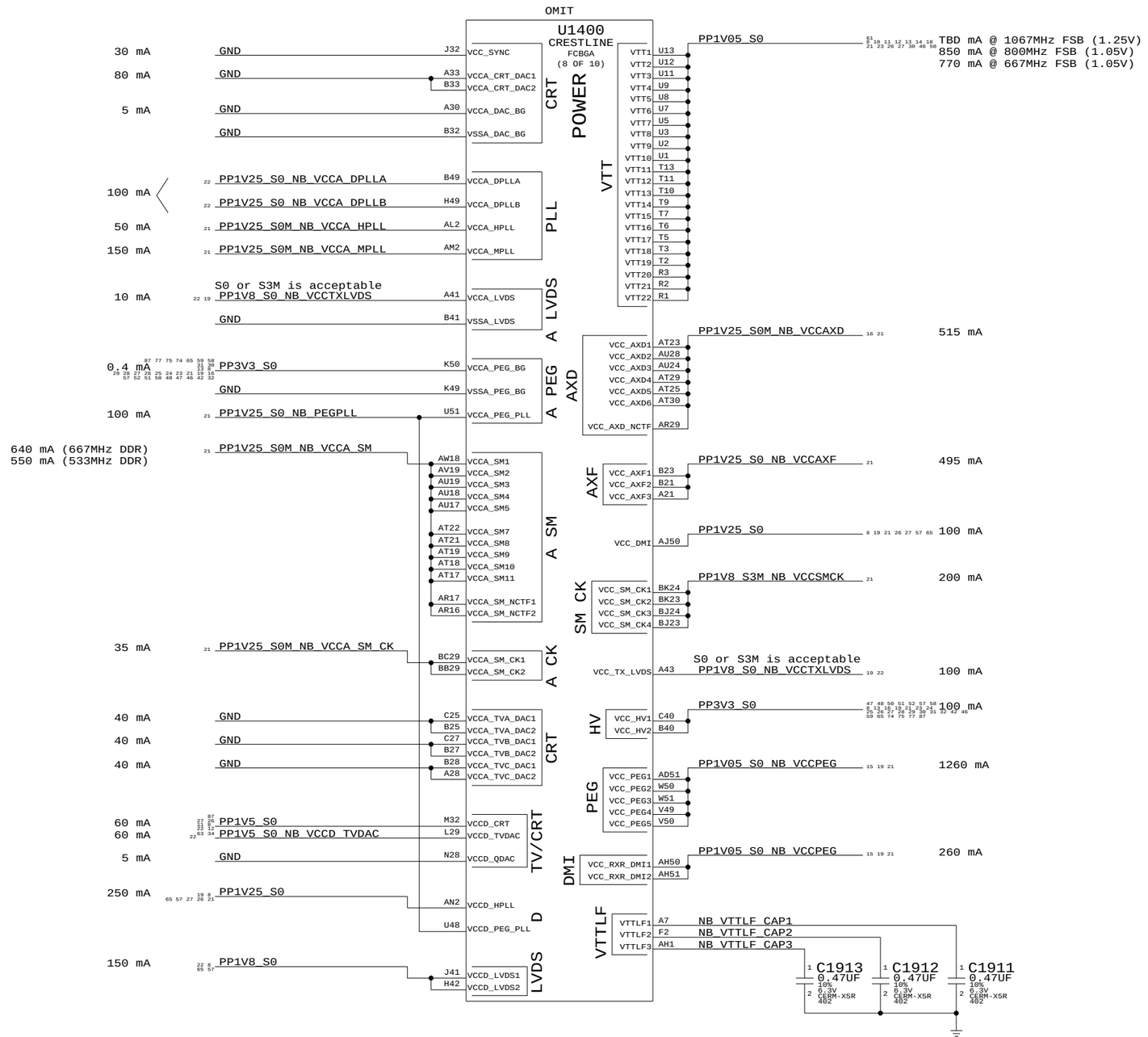
NB DDR2 Interfaces

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 17 OF 88	





Current numbers from Crestline EDS, doc #21749.

NB Power 2

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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

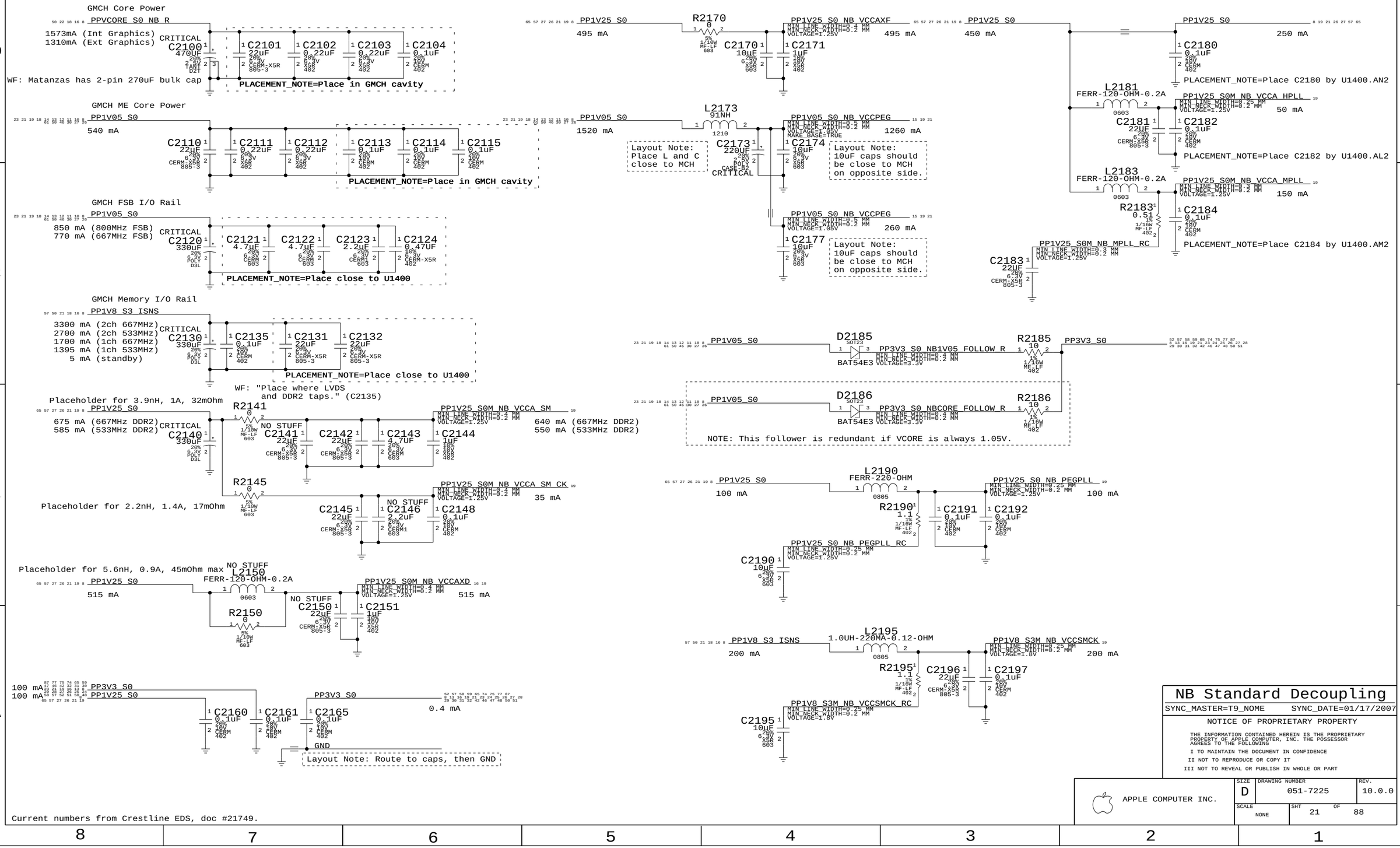
NB Grounds

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE	SHT	OF
NONE	20	88



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

PP1V5_S0 (65 mA) → C2201 22000pF 1000mA 10V NFM18 → PP1V5_S0_NB_VCCD_TVDAC (60 mA)
MIN_LINE_WIDTH=8.3 MM
MIN_NECK_WIDTH=8.2 MM
VOLTAGE=1.5V

C2200 0.1uF 20% 10V CERM 402

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

GND ×19

Crestline LVDS Support

LVDS_IBG → R2299 2.37K 1% 1/10W MF-LF 402 → GND, GND

GND ×8

PPVCORE_S0_NB_R → PPVCORE_S0_NB_R
GND

NB_CLK100M_DPLLSS_P — NB_CLK100M_DPLLSS_P
NB_CLK100M_DPLLSS_N — NB_CLK100M_DPLLSS_N

GMCH Graphics Core Power

PPVCORE_S0_NB_GFX
7700 mA

CRITICAL C2210 470UF 20% 2.5V TANT D2T
CRITICAL C2211 470UF 20% 2.5V TANT D2T
C2212 22UF 20% 6.3V CERM-X5R 805-3
C2213 10UF 20% 6.3V X5R 603
C2214 1UF 10% 6.3V CERM 402
C2215 0.47UF 10% 6.3V CERM-X5R 402
C2216 0.1UF 20% 10V CERM 402
C2217 0.1UF 20% 10V CERM 402

PLACEMENT_NOTE=Place in GMCH cavity

PP1V8_S0 (260 mA) → L2220 1.0UH-0.5A 1210 → PP1V8_S0_NB_VCCTXLVDS (110 mA)
MIN_LINE_WIDTH=0.2 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.8V

C2220 220UF 20% 6.3V POLY CASE-D3L CRITICAL
C2221 0.001UF 10% 50V CERM 402
C2223 0.001UF 10% 50V CERM 402
GND

Layout Note: Route to cap, then GND

PP1V8_S0 (150 mA)
C2226 1UF 10% 6.3V CERM 402

CRITICAL
U2265 TPS731125 SOT23-5
IN, EN, GND, NR/FB, OUT
Vout = 1.25V (Factory Programmed)

PP1V8_S0 (1.7V - 5.5V) 100 mA
C2265 1UF 10% 6.3V CERM 402
C2266 0.01UF 10% 16V CERM 402

PP1V25_S0_NB_DPLL
MIN_LINE_WIDTH=0.4 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
P1V25S0NBDPLL_NR

100 mA

NO STUFF R2261 4.7 5% 1/16W MF-LF 402
PP1V25_S0_NB_VCCA_DPLLA
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
NO STUFF C2261 0.1UF 20% 10V CERM 402

R2262 4.7 5% 1/16W MF-LF 402
PP1V25_S0_NB_VCCA_DPLLB
MIN_LINE_WIDTH=0.3 MM
MIN_NECK_WIDTH=0.2 MM
VOLTAGE=1.25V
C2260 10UF 20% 6.3V X5S 603
C2262 0.1UF 20% 10V CERM 402

100 mA

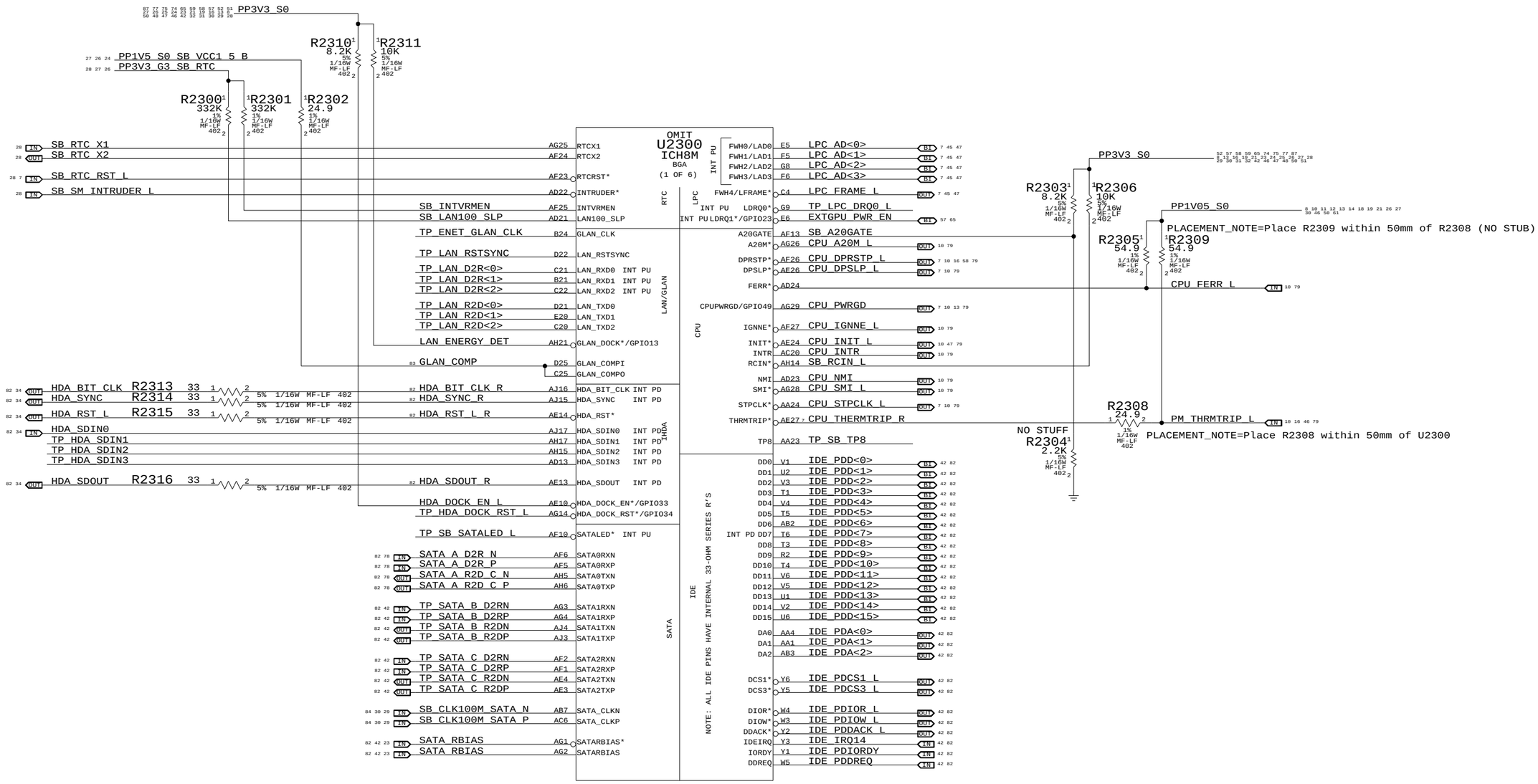
Current numbers from Crestline EDS Addendum, doc #20127.

NB Graphics Decoupling

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 22 OF 88	



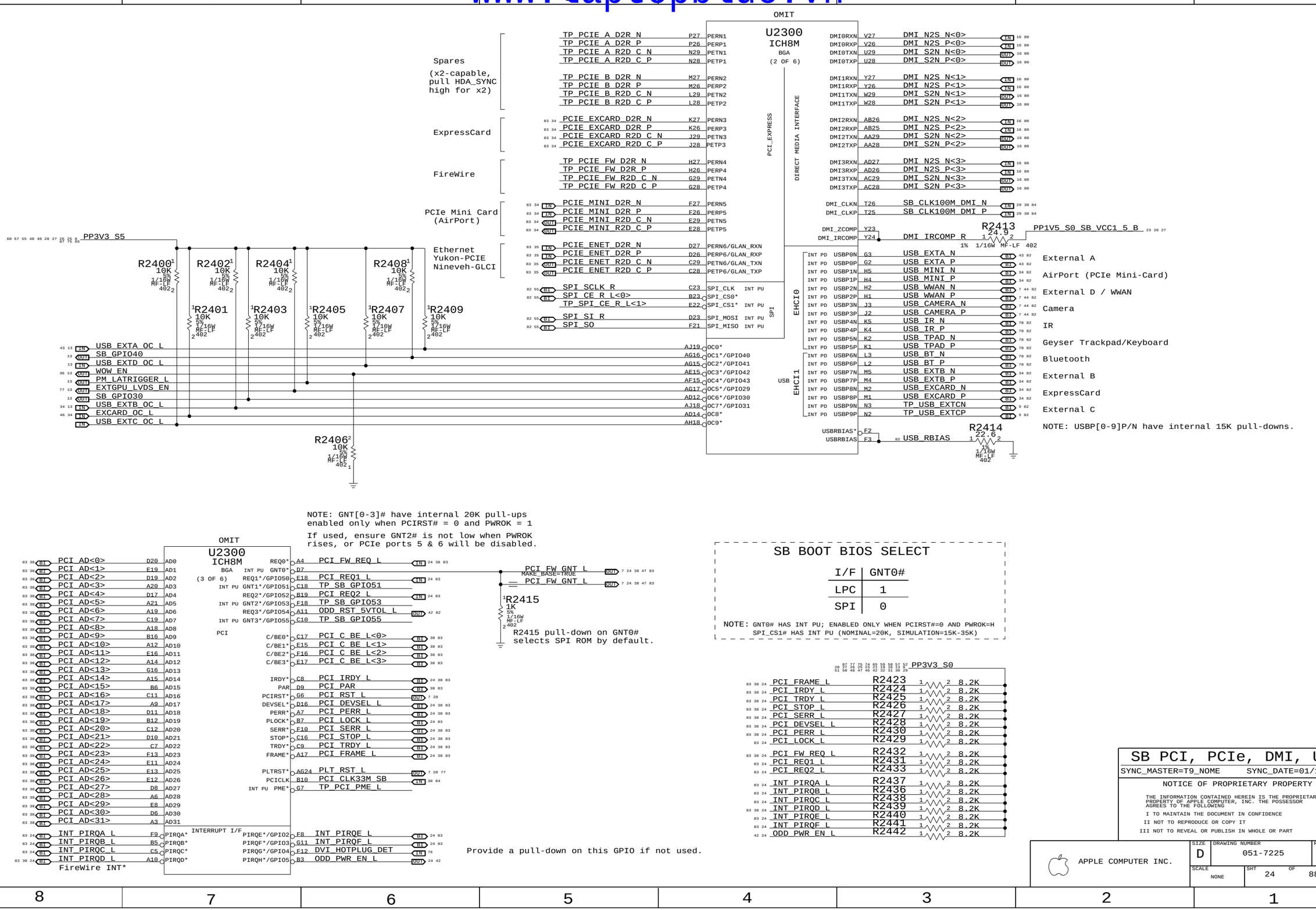
	HDA
HDA_BIT_CLK	24.000MHZ CLOCK W/INTERNAL WEAK PD
HDA_RST#	
HDA_SDIN[0-2]	INTEGRATED PDs
HDA_SDOUT	INTEGRATED PD
ACZ_SYNC	INTEGRATED PD

SB Enet, Disk, FSB, LPC

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 23 OF 88	



SB PCI, PCIe, DMI, USB

SYNC_MASTER=T9_NOME SYNC_DATE=01/19/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 24 OF 88	

PP3V3_S0
PP3V3_S5

R2500 1K 5% 1/16W MF-LF 402
R2551 8.2K 5% 1/16W MF-LF 402
R2553 8.2K 5% 1/16W MF-LF 402
R2504 10K 5% 1/16W MF-LF 402
R2506 10K 5% 1/16W MF-LF 402
R2510 1K 5% 1/16W MF-LF 402
NO_REBOOT_MODE

R2502 10K 5% 1/16W MF-LF 402
R2550 10K 5% 1/16W MF-LF 402
R2552 10K 5% 1/16W MF-LF 402
R2547 10K 5% 1/16W MF-LF 402
R2505 8.2K 5% 1/16W MF-LF 402
R2507 8.2K 5% 1/16W MF-LF 402

R2532 10K 5% 1/16W MF-LF 402
R2535 10K 5% 1/16W MF-LF 402
R2533 10K 5% 1/16W MF-LF 402
R2534 10K 5% 1/16W MF-LF 402

OMIT
U2300
ICH8M
BGA
(4 OF 6)

SMBUS_SB_SCL	AJ26	SMBCLK	SMB
SMBUS_SB_SDA	AD19	SMBDATA	SMB
TP_CLINK_WLAN_RESET_L	AG21	CLINKALERT*	SMB
SMBUS_SB_ME_SCL	AC17	SMLINK0	SMB
SMBUS_SB_ME_SDA	AE19	SMLINK1	SMB
PM_RI_L	AF17	RI*	SYS GPIO
PM_SUS_STAT_L	F4	SUS_STAT*/LPCPD*	SYS GPIO
PM_SYSRST_L	AD15	SYS_RESET*	SYS GPIO
PM_BMBUSY_L	AG12	BMBUSY*/GPIO0	SYS GPIO
LINDACARD_GPIO	AG22	SMBALERT*/GPIO11	SYS GPIO
	AE20	STP_PCI*/GPIO15	SYS GPIO
	AG18	STP_CPU*/GPIO25	SYS GPIO
	AH11	CLKRUN*/GPIO32	SYS GPIO
	AE17	WAKE*	SYS GPIO
	AF12	SERIRQ	SYS GPIO
PM_THRM_L	AC13	THERM*	SYS GPIO
VR_PWRGD_CLKEN	AJ20	VRMPWRGD	SYS GPIO
TP_SB_TP7	AJ22	TP7	SYS GPIO
PCI_PME_FW_L	AJ8	TACH1/GPIO1 INT PU	GPIO
TP_SB_GPIO6	AJ9	TACH2/GPIO6 INT PU	GPIO
	AH9	TACH3/GPIO7 INT PU	GPIO
	AE16	GPIO8	GPIO
LAN_PHYPC	AC19	GPIO12	GPIO
EXTGPU_RST_L	AG8	TACH0/GPIO17 INT PU	GPIO
SB_GPIO18	AH12	GPIO18	GPIO
TP_SB_GPIO20	AE11	GPIO20 INT PD	GPIO
SB_SCLOCK	AG10	SCLOCK/GPIO22	GPIO
SATA_B_PWR_EN_L	AH25	QRT_STATE0/GPIO27	GPIO
FWH_MFG_MODE	AD16	QRT_STATE1/GPIO28	GPIO
SB_SATA_CLKREQ_L	AG13	SATACLKREQ*/GPIO35	GPIO
SB_SLOAD	AF9	SLOAD/GPIO38	GPIO
SB_SDATAOUT<0>	AJ11	SDATAOUT0/GPIO39	GPIO
SB_SDATAOUT<1>	AD10	SDATAOUT1/GPIO48	GPIO
SB_SPKR	AD9	SPKR INT PD	MISC
NB_SB_SYNC_L	AJ13	MCH_SYNC*	MISC
TP_SB_TP3	AJ21	TP3 INT PU	MISC

SATA0GP/GPIO21	AJ12	RSVD_EXTGPU_LVDS_EN	SATA GPIO
SATA1GP/GPIO19	AJ10	SATA_B_DET_L	SATA GPIO
SATA2GP/GPIO36	AF11	SB_GPIO36	SATA GPIO
SATA3GP/GPIO37	AG11	SB_CRT_TVOUT_MUX_L	SATA GPIO
CLK14	AG9	SB_CLK14P3M_TIMER	CLOCKS
CLK48	G5	SB_CLK48M_USBCTLR	CLOCKS
SUSCLK	D3	SUS_CLK_SB	CLOCKS
SLP_S3*	AG23	PM_SLP_S3_L	POWER MGT
SLP_S4*	AF21	TP_PM_SLP_S4_L	POWER MGT
SLP_S5*	AD18	PM_SLP_S5_L	POWER MGT
S4_STATE*/GPIO26	AH27	PM_S4_STATE_L	POWER MGT
PWROK	AE23	PM_SB_PWROK	POWER MGT
DPRSLPVR/GPIO16	AJ14	PM_DPRSLPVR	POWER MGT
BATLOW*	AE21	PM_BATLOW_L	POWER MGT
PWRBTN*	C2	PM_PWRBTN_L	POWER MGT
LAN_RST*	AH20	PM_LAN_ENABLE	POWER MGT
RSMRST*	AG27	PM_RSMRST_L	POWER MGT
CK_PWRGD	E1	CLK_PWRGD	POWER MGT
CLPWROK	E3	PM_SB_PWROK	POWER MGT
SLP_M*	AJ25	TP_PM_SLP_M_L	POWER MGT
CL_CLK0	F23	CLINK_NB_CLK	CONTROLLER LINK
CL_CLK1	AE18	TP_CLINK_WLAN_CLK	CONTROLLER LINK
CL_DATA0	F22	CLINK_NB_DATA	CONTROLLER LINK
CL_DATA1	AF19	TP_CLINK_WLAN_DATA	CONTROLLER LINK
CL_VREF0	D24	SB_CLINK_VREF0	CONTROLLER LINK
CL_VREF1	AH23	SB_CLINK_VREF1	CONTROLLER LINK
CL_RST*	AJ23	CLINK_NB_RESET_L	CONTROLLER LINK
MEM_LED/GPIO24	AJ27	ARB_DETECT_L	GPIO
ME_EC_ALERT/GPIO10	AJ24	SB_GPIO10_CL1	GPIO
EC_ME_ALERT/GPIO14	AF22	SB_GPIO14_CL2	GPIO
WOL_EN/GPIO9	AG19	WOL_EN	GPIO

Test access required for XOR chain testing.

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

NOTE: DPRSLPVR HAS INT 20K PD ENABLED AT BOOT/RESET FOR STRAPPING FUNCTION

PM_LAN_ENABLE must remain deasseted until VccCL3_3, VccLAN3_3 and VccLAN1_05 have been up for at least 1ms.

R2524 100K 5% 1/16W MF-LF 402
R2525 10K 5% 1/16W MF-LF 402

See note below

R2523 100K 5% 1/16W MF-LF 402

PP3V3_S0
R2526 3.24K 1% 1/16W MF-LF 402
C2500 0.1uF 10% 16V X5R 402
R2527 453 1% 1/16W MF-LF 402

PP3V3_S5
R2528 3.24K 1% 1/16W MF-LF 402
C2501 0.1uF 10% 16V X5R 402
R2529 453 1% 1/16W MF-LF 402

LAYOUT NOTE:
PLACE R2511-16 WHERE PHYSICALLY ACCESSIBLE

PP3V3_S5
R2511 10K 5% 1/16W MF-LF 402
R2515 10K 5% 1/16W MF-LF 402
FWH_MFG_MODE
LINDACARD_GPIO
ARB_DETECT_L
NOSTUFF R2512 0 5% 1/16W MF-LF 402
R2514 100K 5% 1/16W MF-LF 402
ARB_ONLY R2516 0 5% 1/16W MF-LF 402

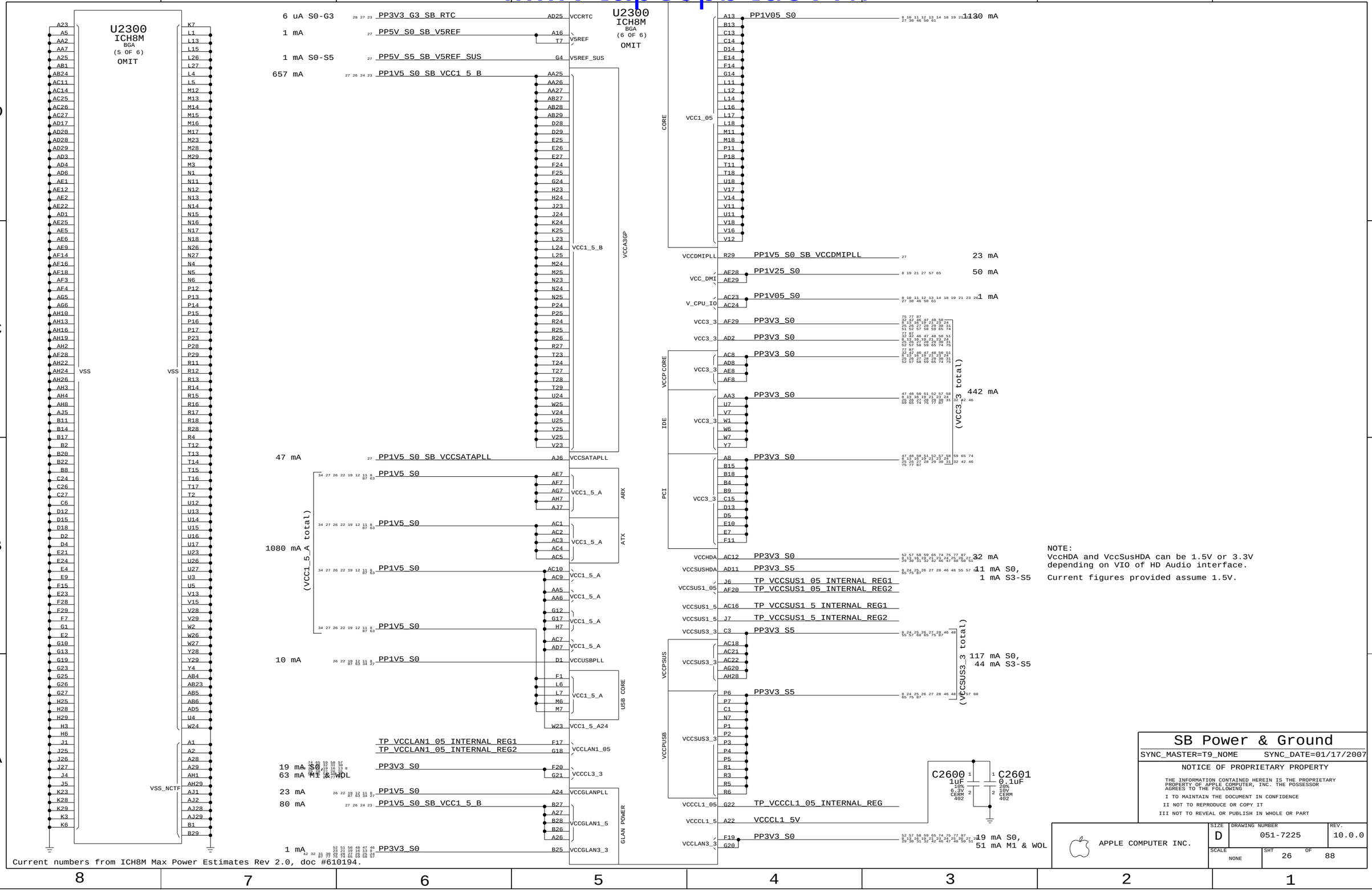
SATA_B_PWR_EN_L — R2530 10K 1% 1/16W MF-LF 402 — PP3V3_S0
PCI_PME_FW_L — R2531 10K 1% 1/16W MF-LF 402
PM_RI_L — R2536 10K 1% 1/16W MF-LF 402 — PP3V3_S5
PM_BATLOW_L — R2544 8.2K 5% 1/16W MF-LF 402
LAN_PHYPC — R2545 10K 1% 1/16W MF-LF 402
SB_GPIO10_CL1 — R2598 10K 1% 1/16W MF-LF 402
SB_GPIO14_CL2 — R2546 10K 1% 1/16W MF-LF 402

SB Pwr Mgt, GPIO, Clink

SYNC_MASTER=T9_NOME SYNC_DATE=01/22/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 25 OF 88	



SB Power & Ground

SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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
MARK_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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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

PP3V42_G3H

D2805
BAT54DW
SOT-363
NC NC NC

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

R2806 20K 5% 1/10W 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

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

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

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

CRITICAL
Y2810
32.768K
SM-2
NC NC

C2810 12pF 5% 50V CERM 402

C2811 12pF 5% 50V CERM 402

SB_RTC_X2

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

PM_ALL_GPU_PGOOD

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

GPU_PGOOD_RC

R2886 24.3K 1% 1/16W MF-LF 402

C2885 0.1UF 20% 10V CERM 402

RST_L_AND_GPU_PGOOD_L

This delay ensures that GPU clocks run before GPU is released from reset (RC should reach schmitt trigger threshold at approx 1.65ms nominal w/ 1K pullup on PM_ALL_GPU_PGOOD)

RST_L_AND_GPU_PGOOD

PP3V3_S0

EXTGPU_RST_NO

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

EXTGPU_RST_YES
MC74VHC1G08
SC70
U2880

R2881 0 5% 1/16W MF-LF 402

GPU_RESET_R_L — GPU_RESET_L

EXTGPU_RST_L
EXTGPU_RST_YES

C2880 0.1UF 20% 10V CERM 402

R2880 100K 5% 1/16W MF-LF 402

R2882 1K 5% 1/16W 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 allows reset to get clocked into chip and prevents glitch that would otherwise be injected due to sharp reset edge and isolating FET Cgs.

VRMPWRGD Inverter

PP3V3_S0

C2830 0.1UF 20% 10V CERM 402

MC74VHC1G00
SC70-5
U2830

VR_PWRGD_CLKEN_L — VR_PWRGD_CLKEN

PWROK Circuit

PP3V3_S0

C2840 0.1UF 20% 10V CERM 402

MC74VHC1G08
SC70
U2840

VR_PWRGOOD_DELAY
ALL_SYS_PWRGD — PM_SB_PWROK

R2841 10K 5% 1/16W MF-LF 402

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

PCI Reset Connections

PCI_RST_L

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

CPU VCore ForcePSI

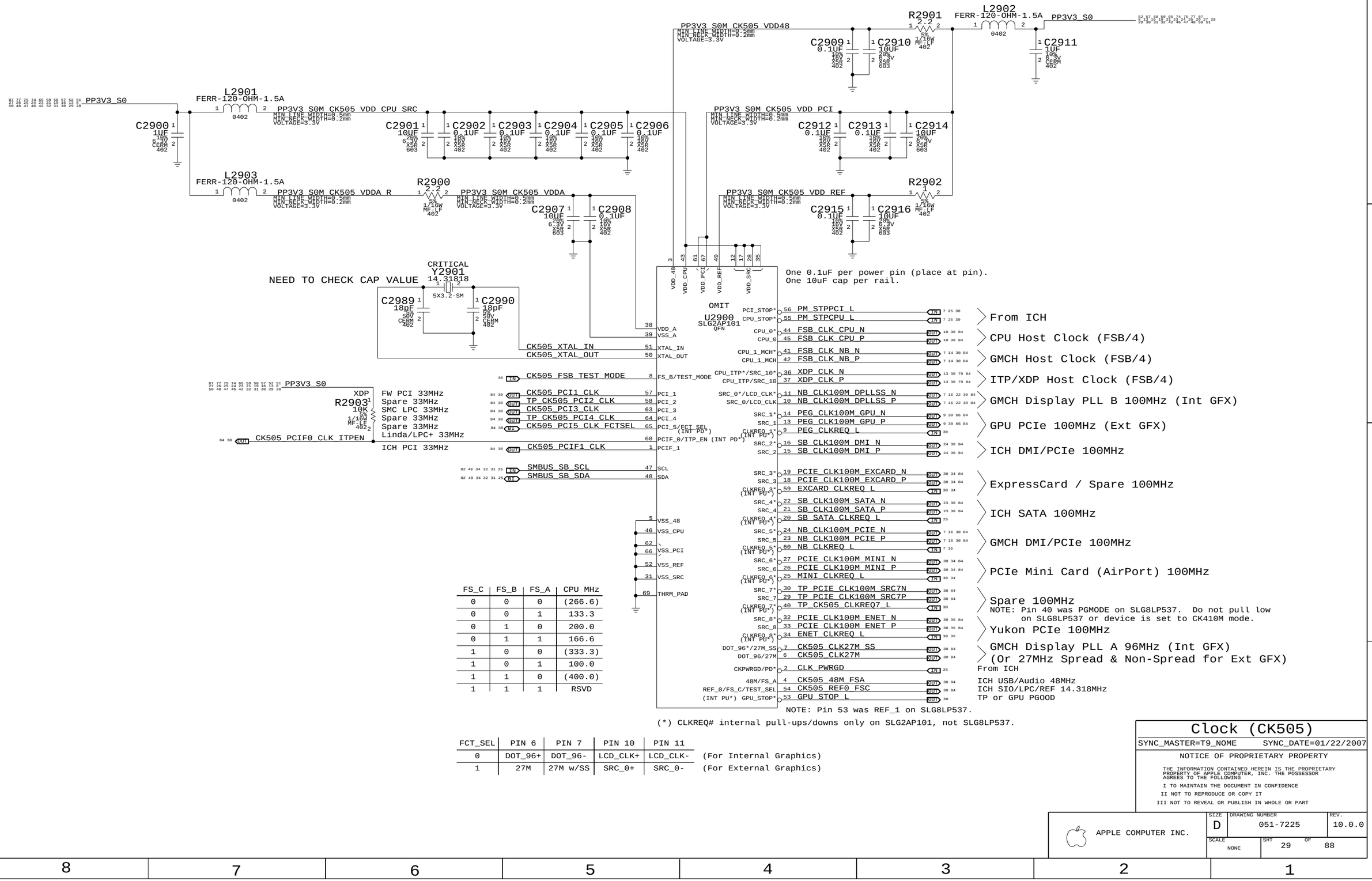
CPU_PSI_L
MAKE_BASE=TRUE
CPU_PSI_L

SB Misc

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 28 OF 88	



Clock (CK505)

SYNC_MASTER=T9_NOME SYNC_DATE=01/22/2007

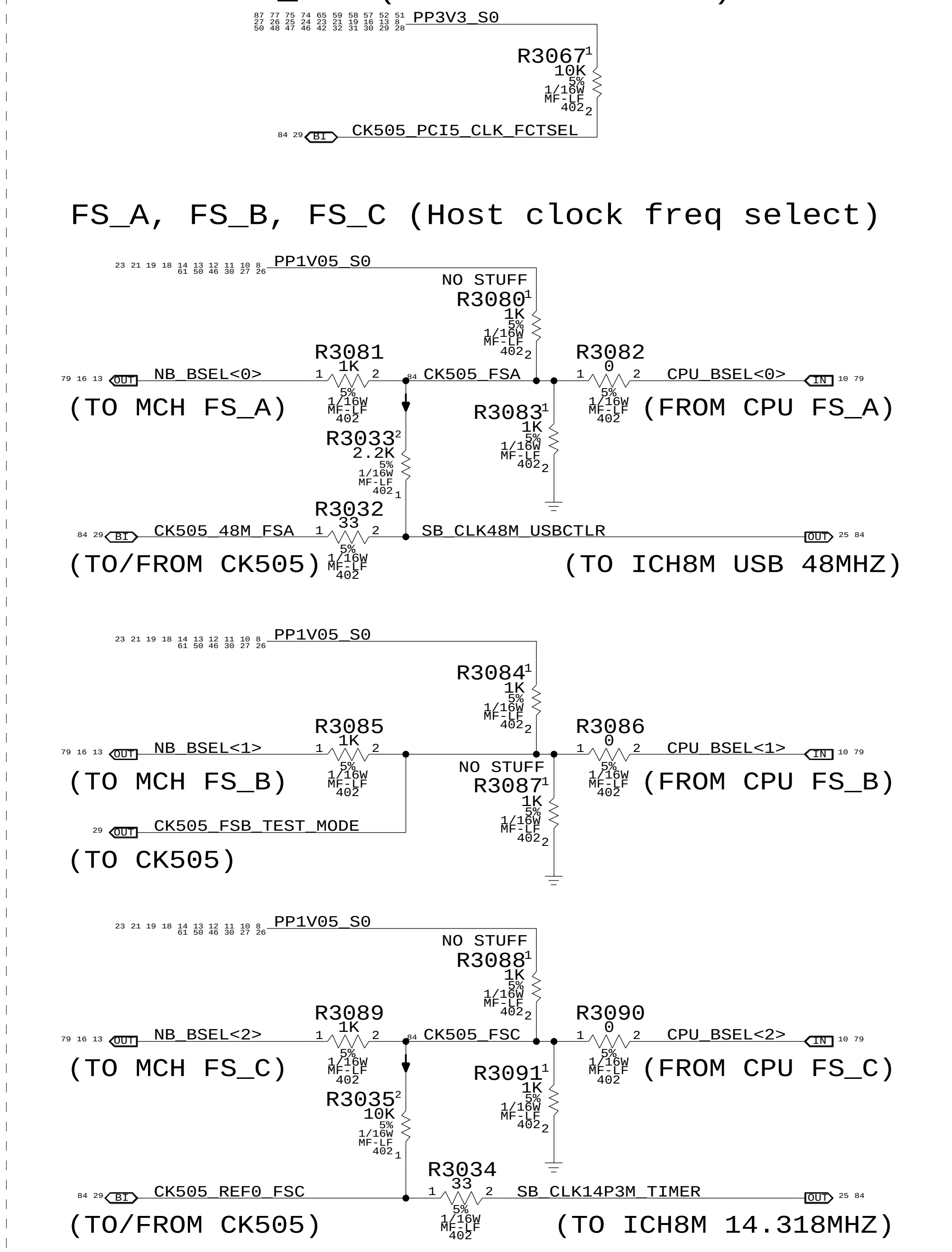
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 29 OF 88	

CLK Termination

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

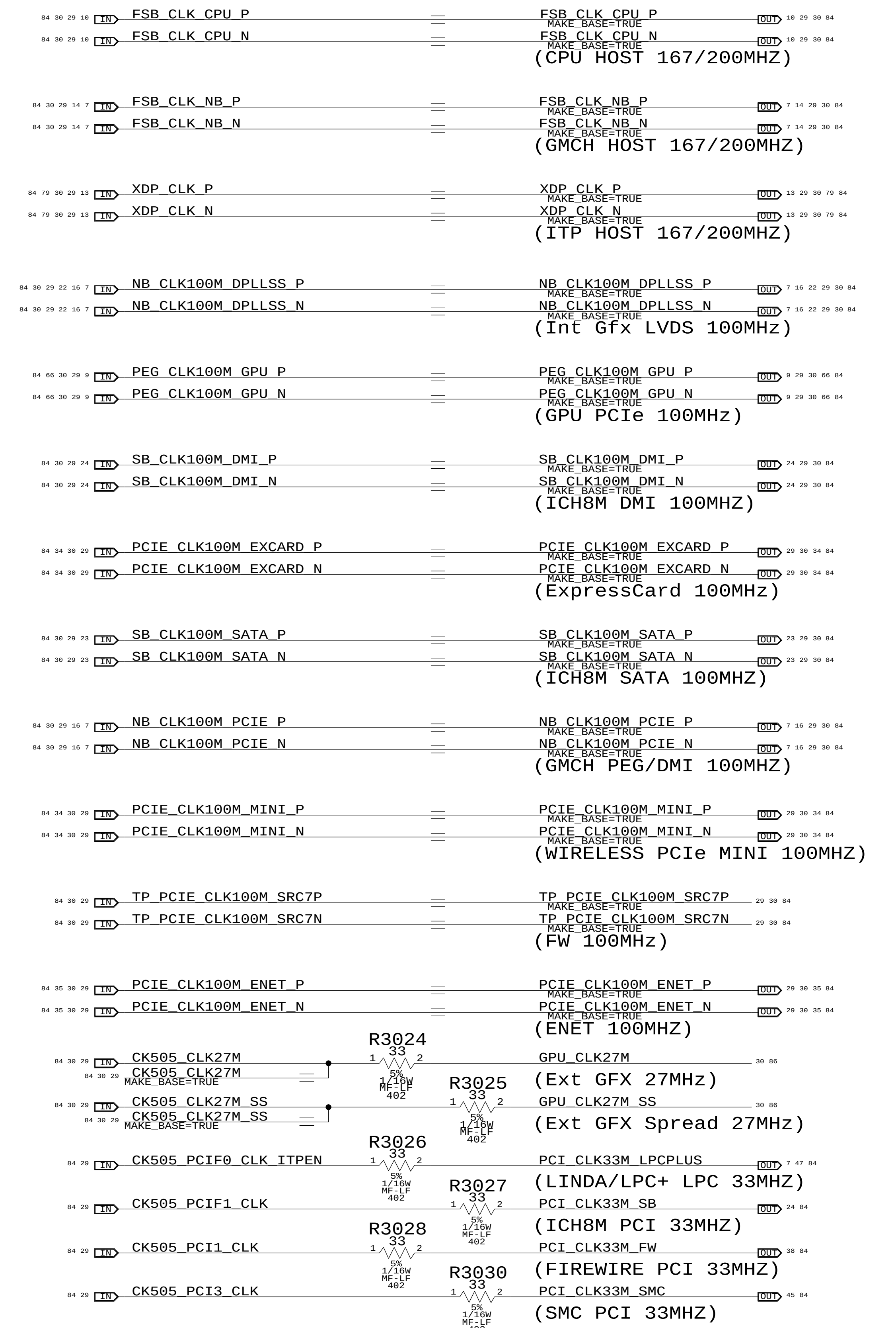
CK505 Configuration Straps



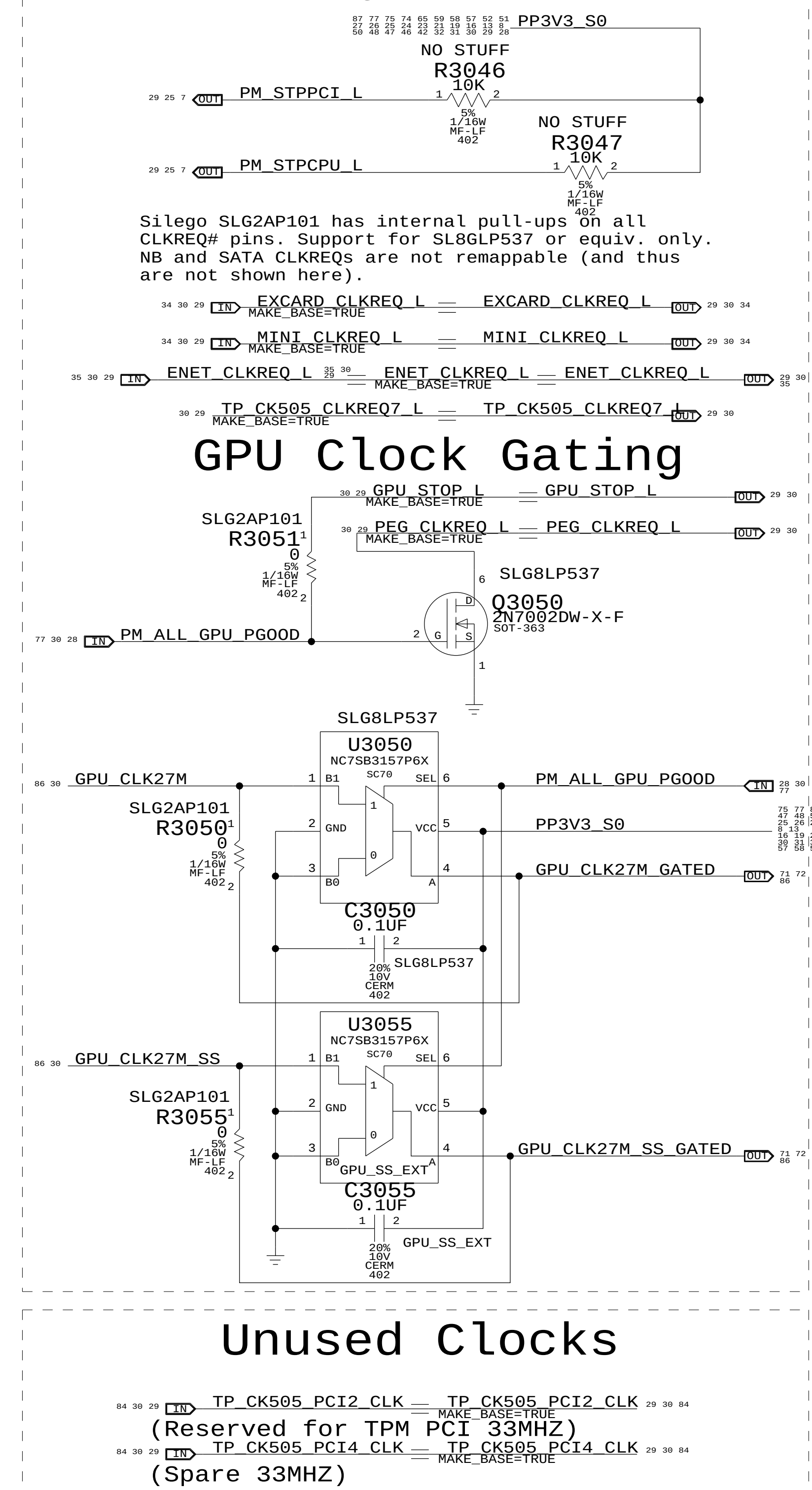
FS_C	FS_B	FS_A	CPU MHz
0	0	0	(266.6)
0	0	1	133.3
0	1	0	200.0
0	1	1	166.6
1	0	0	(333.3)
1	0	1	100.0
1	1	0	(400.0)
1	1	1	RSVD

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

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



CLKREQ Controls



Clock Termination

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

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-7225 | REV. 10.0.0
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	10.0.0
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)

"Expansion" (surface-mount) slot

PP0V9_S3_MEM_VREF

C3201 2.2uF 20% 6.3V CERM 603

C3200 0.1uF 20% 10V CERM 402

PP1V8_S3

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

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

PP3V3_S0

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

Resistor prevents pwr-gnd short

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

516S0471

DDR2 Bypass Caps

(For return current)

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

DDR2 SO-DIMM Connector B

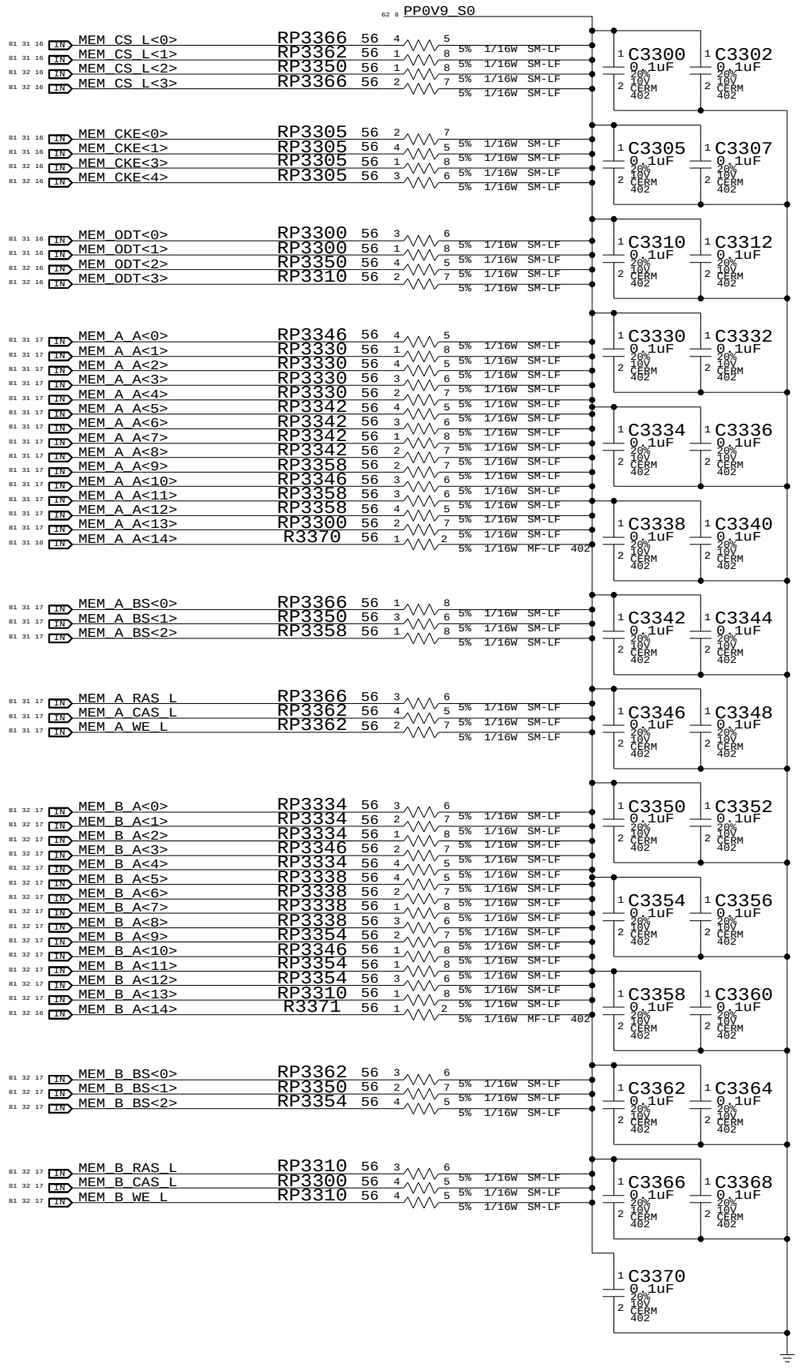
SYNC_MASTER=(M59_SYNC) SYNC_DATE=08/24/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 32 OF 88	

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

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



Memory Active Termination

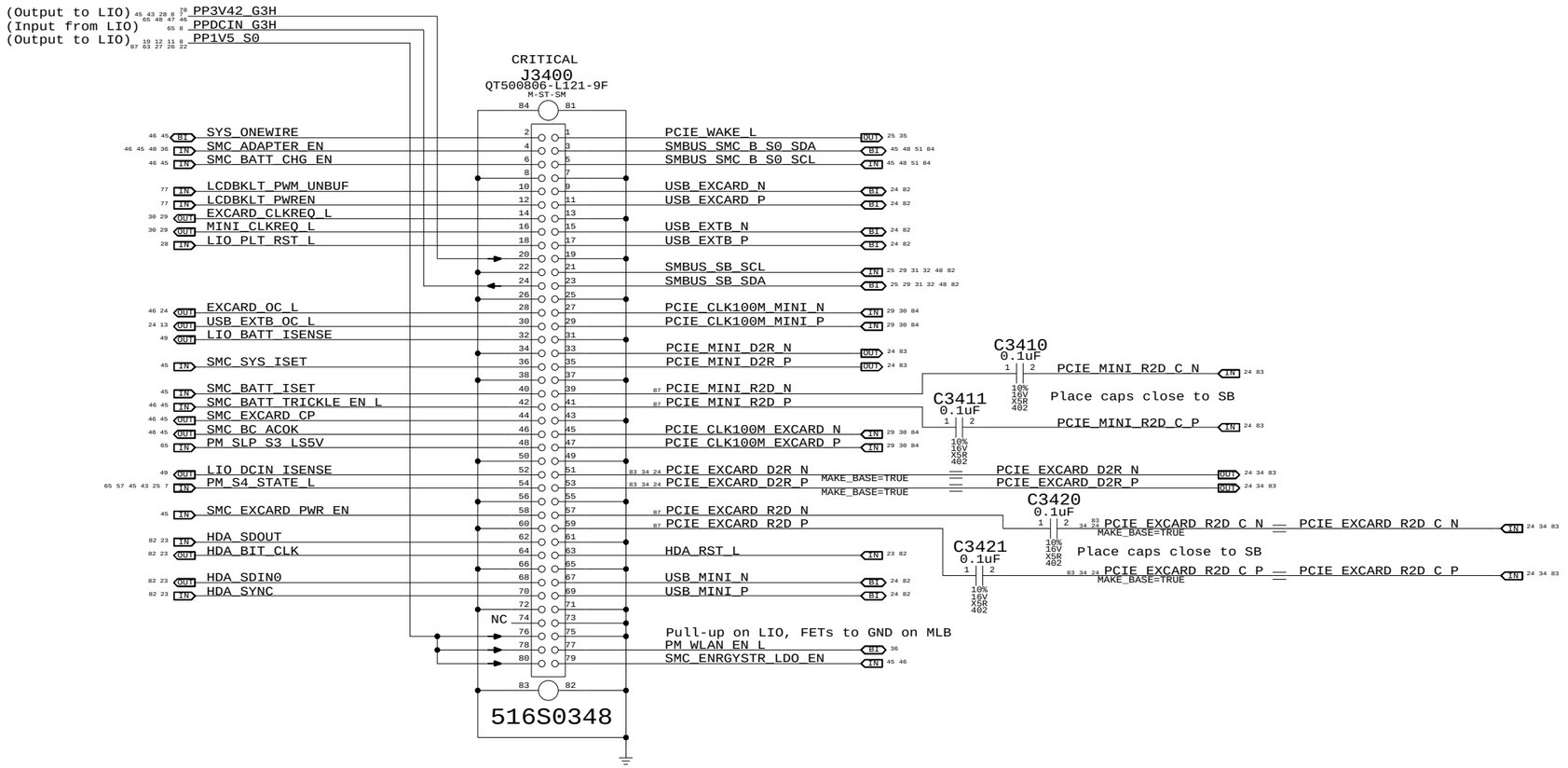
SYNC_MASTER=(T9_NOME) SYNC_DATE=11/14/2006

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE	SHT	OF
NONE	33	88

Left I/O Board Connector



Left I/O Board Connector

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

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

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 C3702 C3703 C3704 C3705 0.1UF 10% 16V X5R 402; C3706 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 C3712 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
(EC:2.5V)

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

C3720 4.7UF 20% 6.3V CERM 603; C3721 C3722 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
ENET_CLKREQ_L
Yukon EC: Pin 42 should be NC (or TP) net.
PCIE_WAKE_L
ENET_RESET_L
ENET_MDI_P<0>
ENET_MDI_N<0>
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 R3742 R3743 R3744 R3745 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	
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 — ENET_LOM_DIS_L
Must be high in S0 state (can use PP3V3_S0 as input)
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=01/17/2007

APPLE COMPUTER INC.

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D	051-7225	10.0.0
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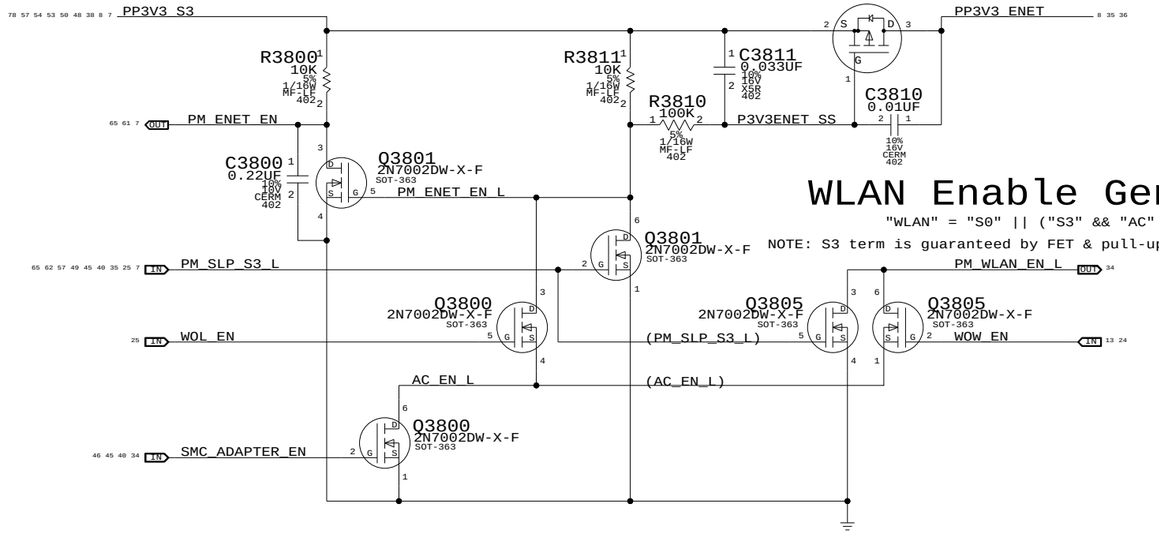
ENET Enable Generation

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

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



3.3V ENET FET

WLAN Enable Generation

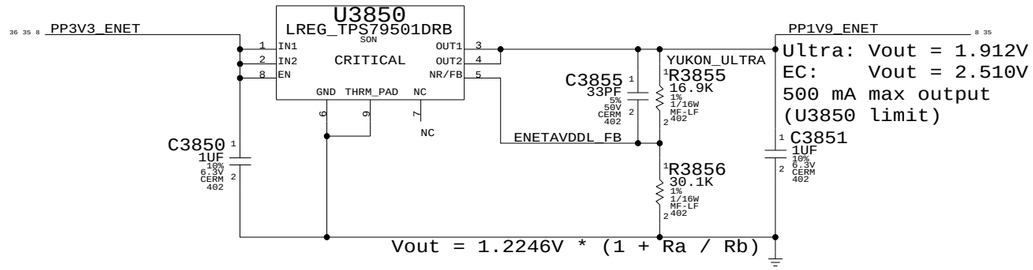
"WLAN" = "S0" || ("S3" && "AC" && "WOW_EN")

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

Yukon AVDDL LDO

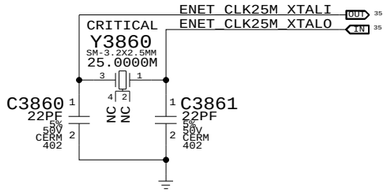
1.9V for Yukon Ultra, 2.5V for Yukon EC

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



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

Yukon Crystal



Yukon Power Control

SYNC_MASTER=T9_NOME SYNC_DATE=01/23/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 36 OF 88	

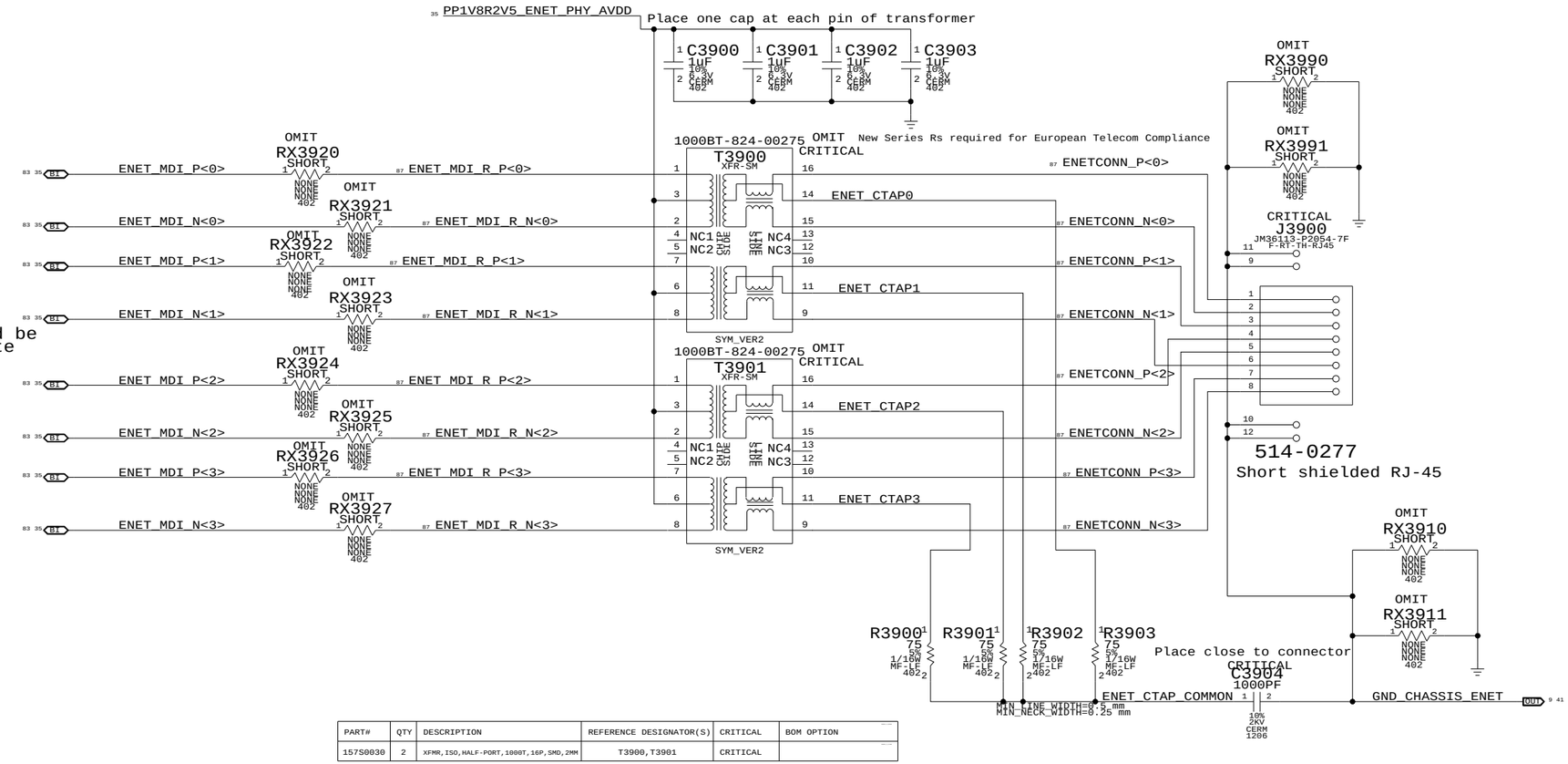
Page Notes

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



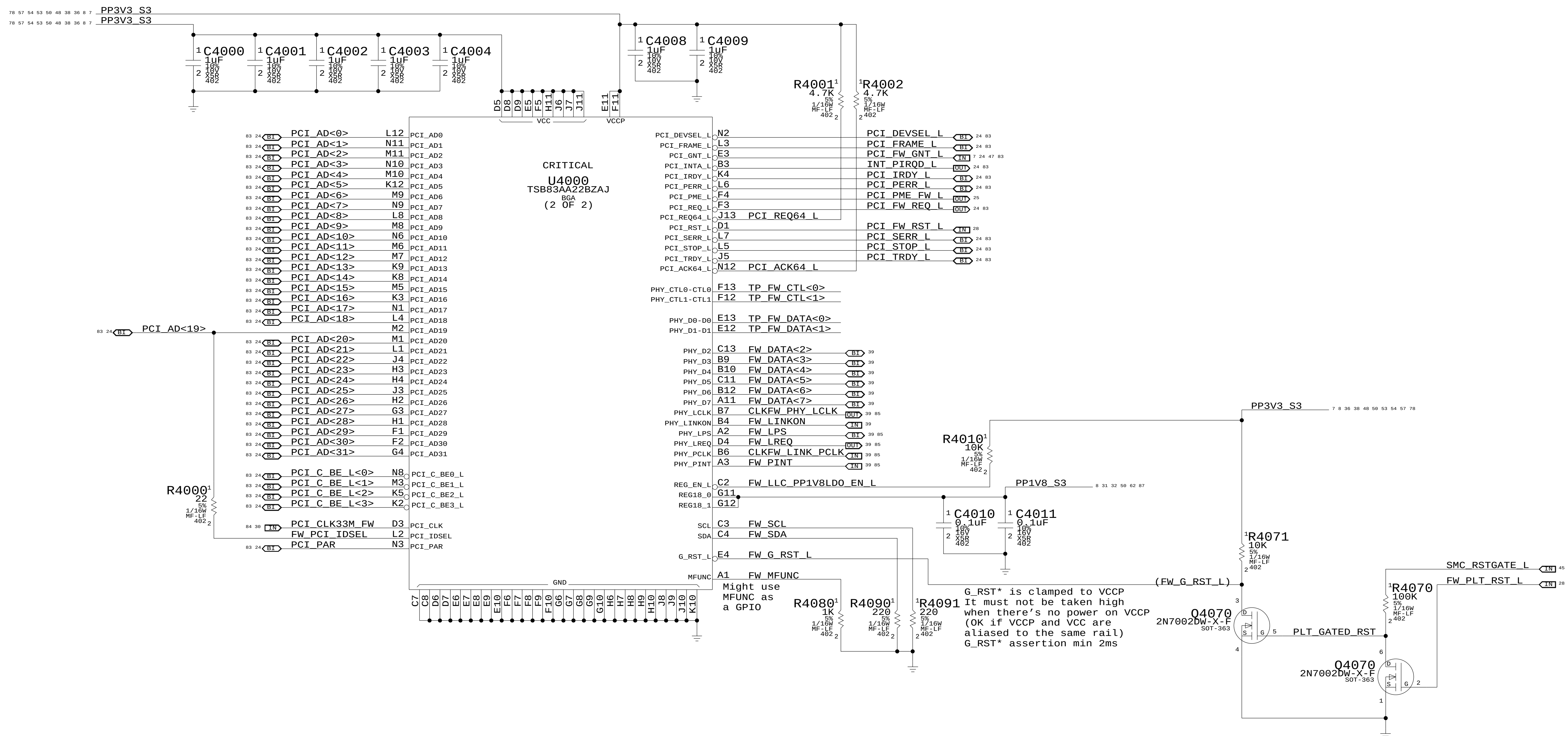
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
157S0030	2	XFMR,ISO,HALF-PORT,1000T,16P,SMD,2MM	T3900,T3901	CRITICAL	

Ethernet Connector

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 37 OF 88	



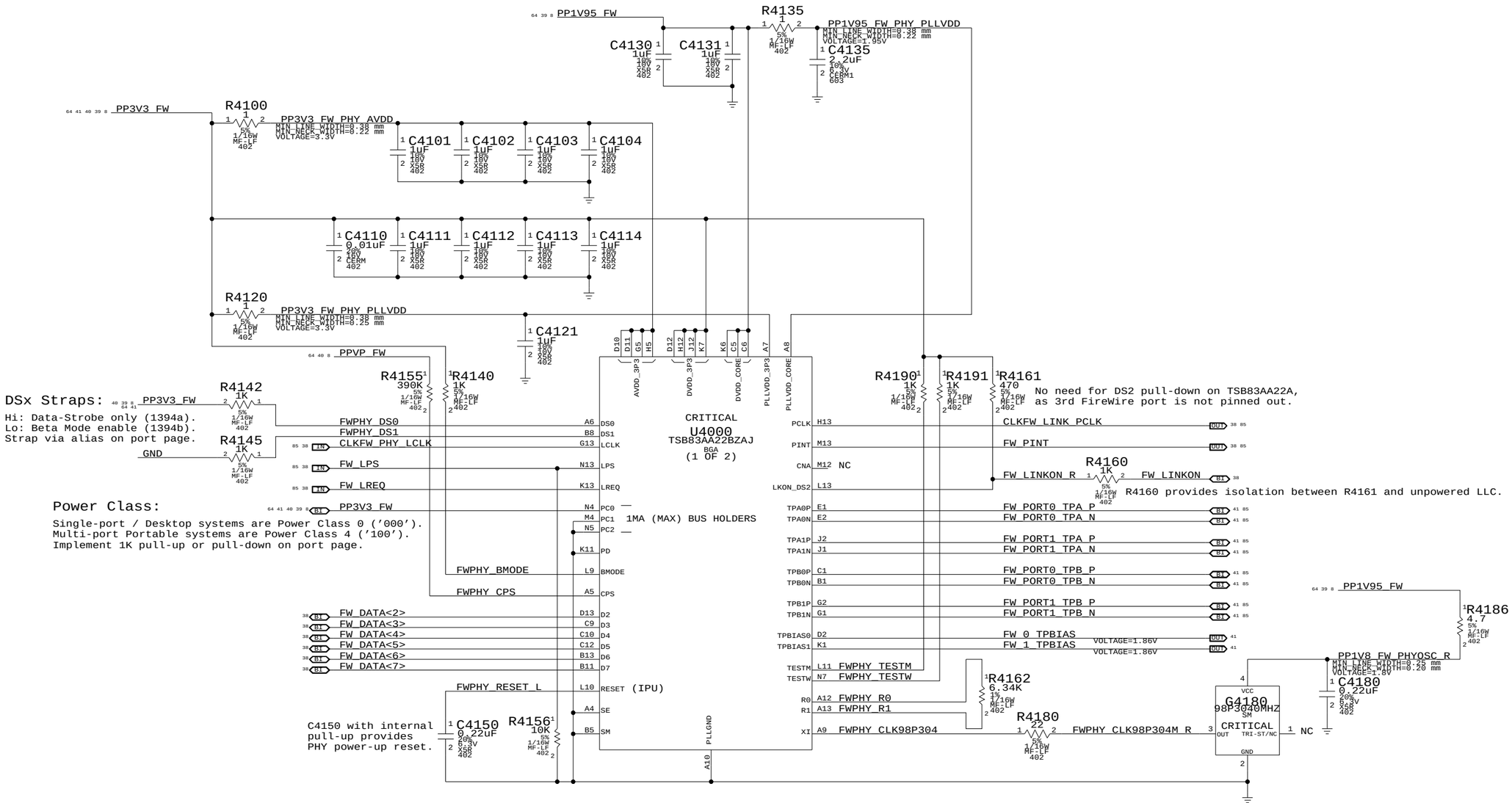
FireWire Link (TSB83AA22)

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

NOTICE OF PROPRIETARY PROPERTY

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE NONE	SHT 38	OF 88



FireWire PHY (TSB83AA22)

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 39 OF 88	

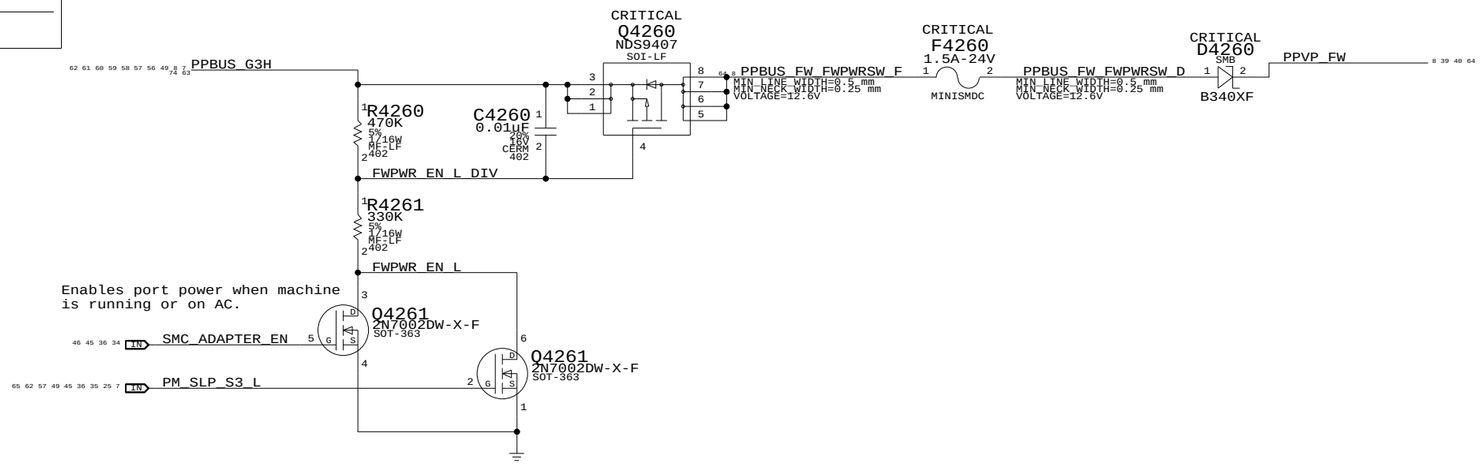
Page Notes

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)

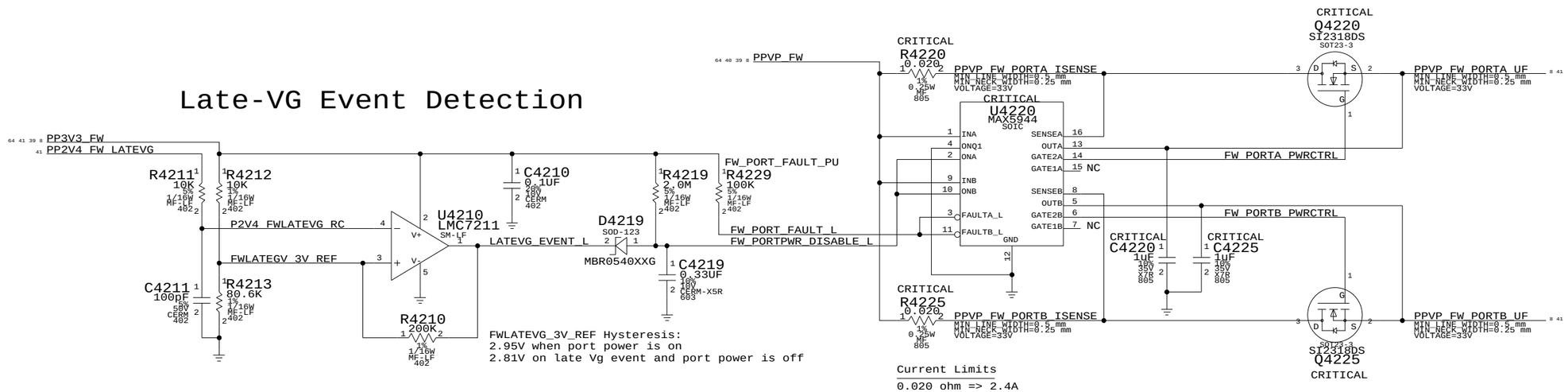
Signal aliases required by this page:
(NONE)

BOM options provided by this page:
- FW_PORT_FAULT_PU

FireWire Port Power Switch



Current Limit/Active Late-VG Protection



Late-VG Event Detection

Current Limits

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

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

FireWire Port Power

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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 23 8 PP3V3_FW
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
FW_B_TPB_L_P
CRITICAL L4362 18NH-250MA 0402 SIGNAL_MODEL=EMPTY
CRITICAL L4363 18NH-250MA 0402 SIGNAL_MODEL=EMPTY
FW_PORT0_TPB_C
FW_PORT1_TPB_C
C4354 220pF 5% 25V CERM 402
R4354 4.99K 1% 1/16W MF-LF 402
C4364 220pF 5% 25V CERM 402
R4364 4.99K 1% 1/16W MF-LF 402

Late-VG Protection Power

64 41 40 39 8 PP3V3_FW
R4390 332 1% 1/16W MF-LF 402
PP2V4_FW_LATEVG MIN_LINE_WIDTH=0.38 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=2.4V 40 41
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 Note: Trace PPVP_FW_PORT0 must handle up to 5A
40 8 PPVP_FW_PORTA_UF
CRITICAL L4300 FERR-250-OHM SM
C4304 0.001uF 20% 50V CERM 402
PPVP_FW_PORT0 MIN_LINE_WIDTH=0.5 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=33V

"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
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
DP4301 BAV99DW-X-F SOT-363
C4302 0.01uF 10% 50V X7R 402
C4303 0.01uF 10% 50V X7R 402
CRITICAL FL4300 90-OHM-100MA 1210-4SM1
CRITICAL FL4301 90-OHM-100MA 1210-4SM1
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 402
OMIT CX4301 SHORT 402

PORT 0
1394A
CRITICAL J4300 1394A F-RT-TH-LF
TPO (TPA+)
TPO# (TPA-)
TPI (TPB+)
TPI# (TPB-)
VP
VGND
514-0255

GND_CHASSIS_RTUSB
41 37 9 GND_CHASSIS_ENET
OMIT CX4302 SHORT 402
OMIT CX4303 SHORT 402

Cable Power

CRITICAL Note: Trace PPVP_FW_PORT1 must handle up to 5A
40 8 PPVP_FW_PORTB_UF
CRITICAL L4310 FERR-250-OHM SM
C4314 0.001uF 20% 50V CERM 402
PPVP_FW_PORT1 MIN_LINE_WIDTH=0.5 mm MIN_NECK_WIDTH=0.25 mm VOLTAGE=33V

"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
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
DP4311 BAV99DW-X-F SOT-363
C4312 0.01uF 10% 50V X7R 402
C4313 0.01uF 10% 50V X7R 402
(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

43 41 9 GND_CHASSIS_ENET
OMIT CX4304 SHORT 402
OMIT CX4305 SHORT 402

PORT 1
BILINGUAL
CRITICAL J4310 1394B-UG31903 F-RT-SM1
TPB- / TPB<R> / TPB+ / VP / NC / VG / TPA- / TPA<R> / TPA+ — OUTPUT / INPUT
514S0133

GND_CHASSIS_ENET
OMIT CX4306 SHORT 402
OMIT CX4307 SHORT 402

PLACEMENT_NOTE=Place C4319 close to connector pin 5.

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

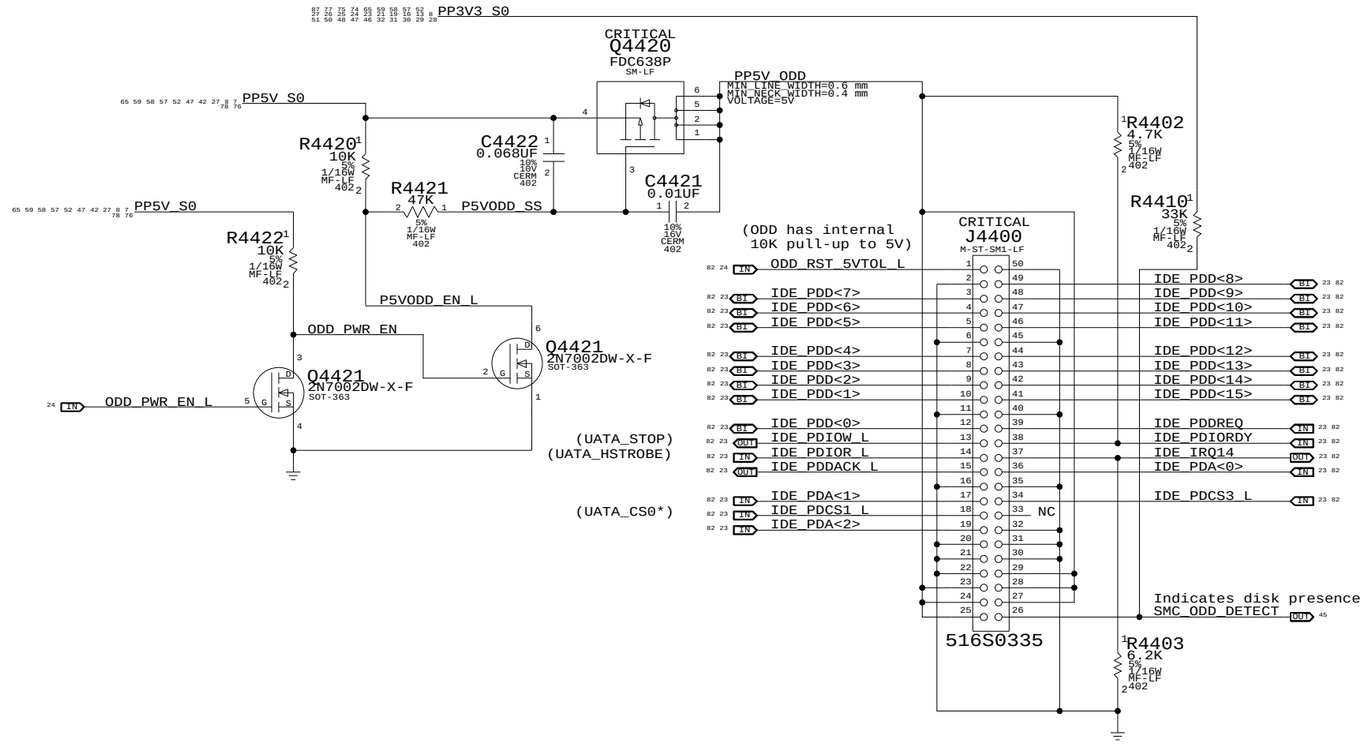
FireWire Ports

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

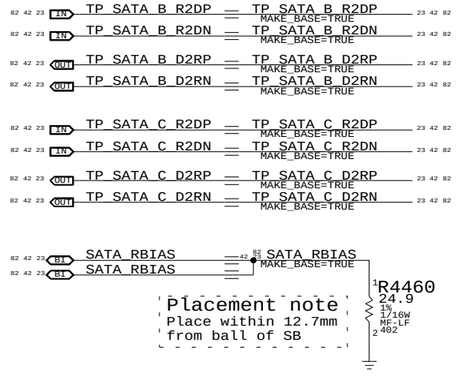
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 41 OF 88	

IDE (ODD) Connector



Unused SATA Ports



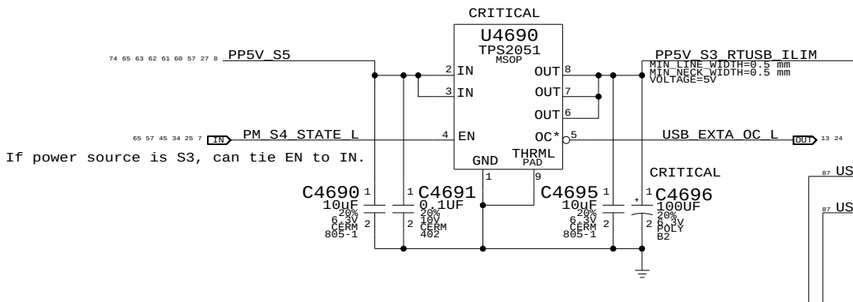
PATA Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

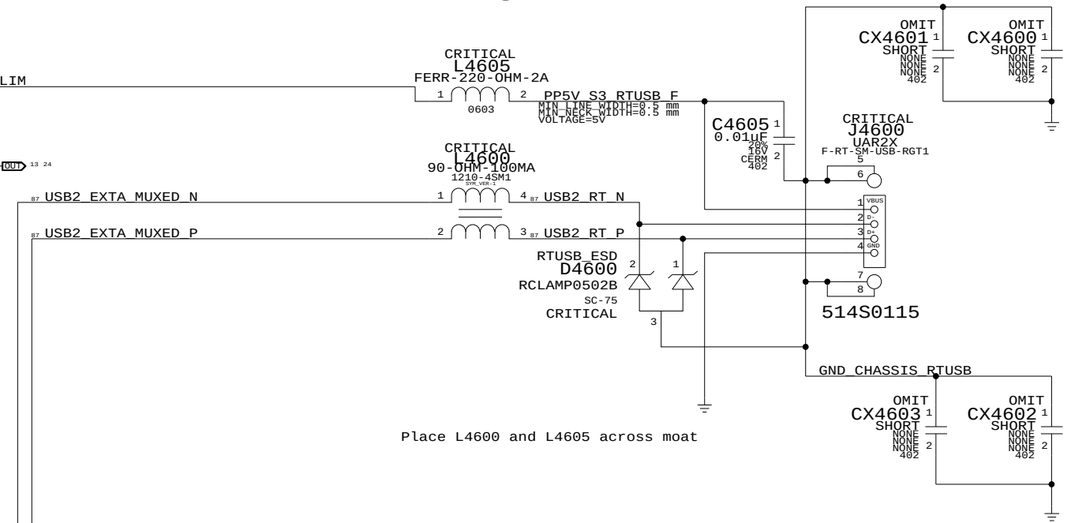
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 42 OF 88	

Port Power Switch

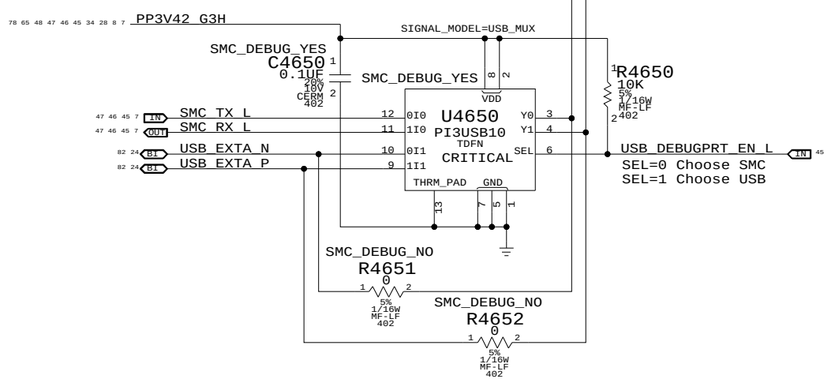


Right USB Port



Place L4600 and L4605 across moat

USB/SMC Debug Mux



External USB Connector

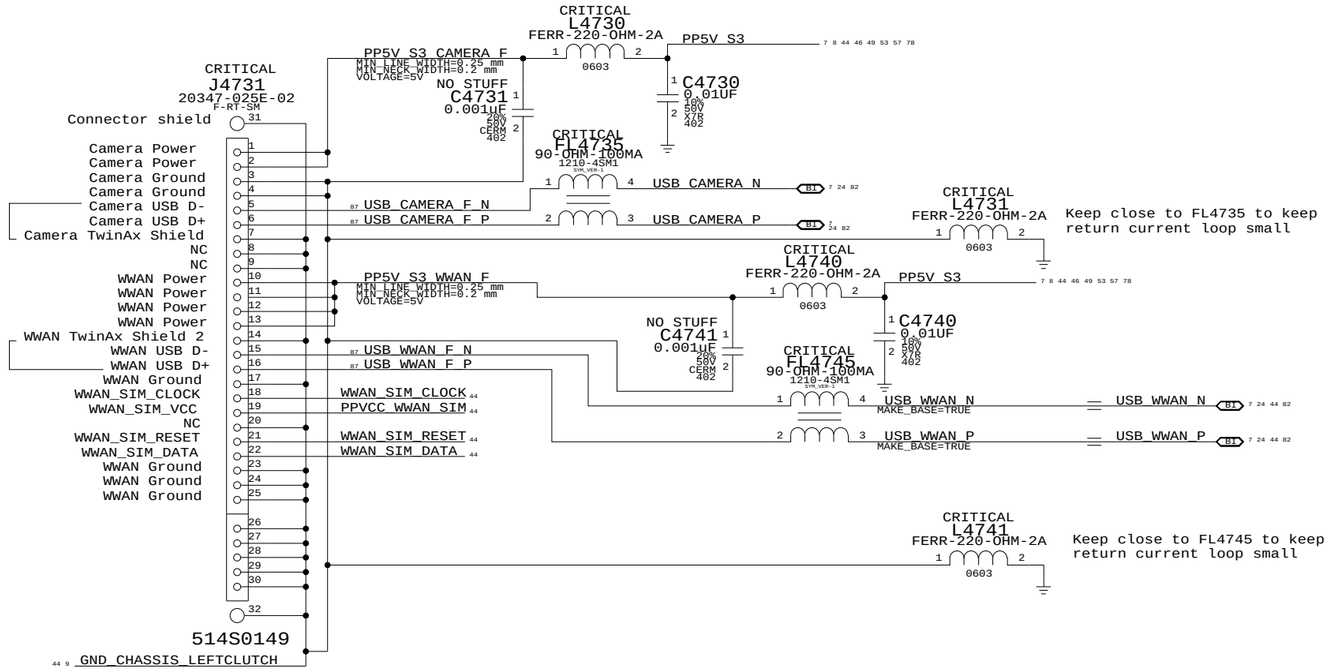
SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

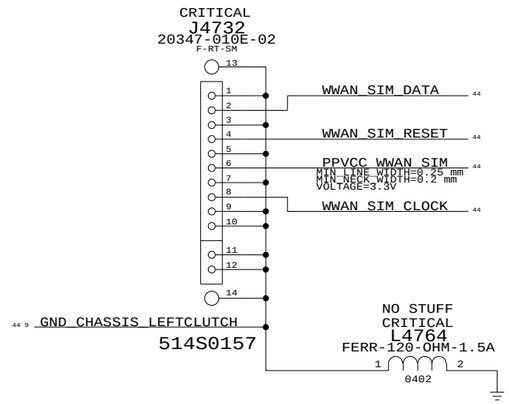
SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE	SHT	OF
NONE	43	88

Left Clutch Barrel Interconnect



SIM Interconnect

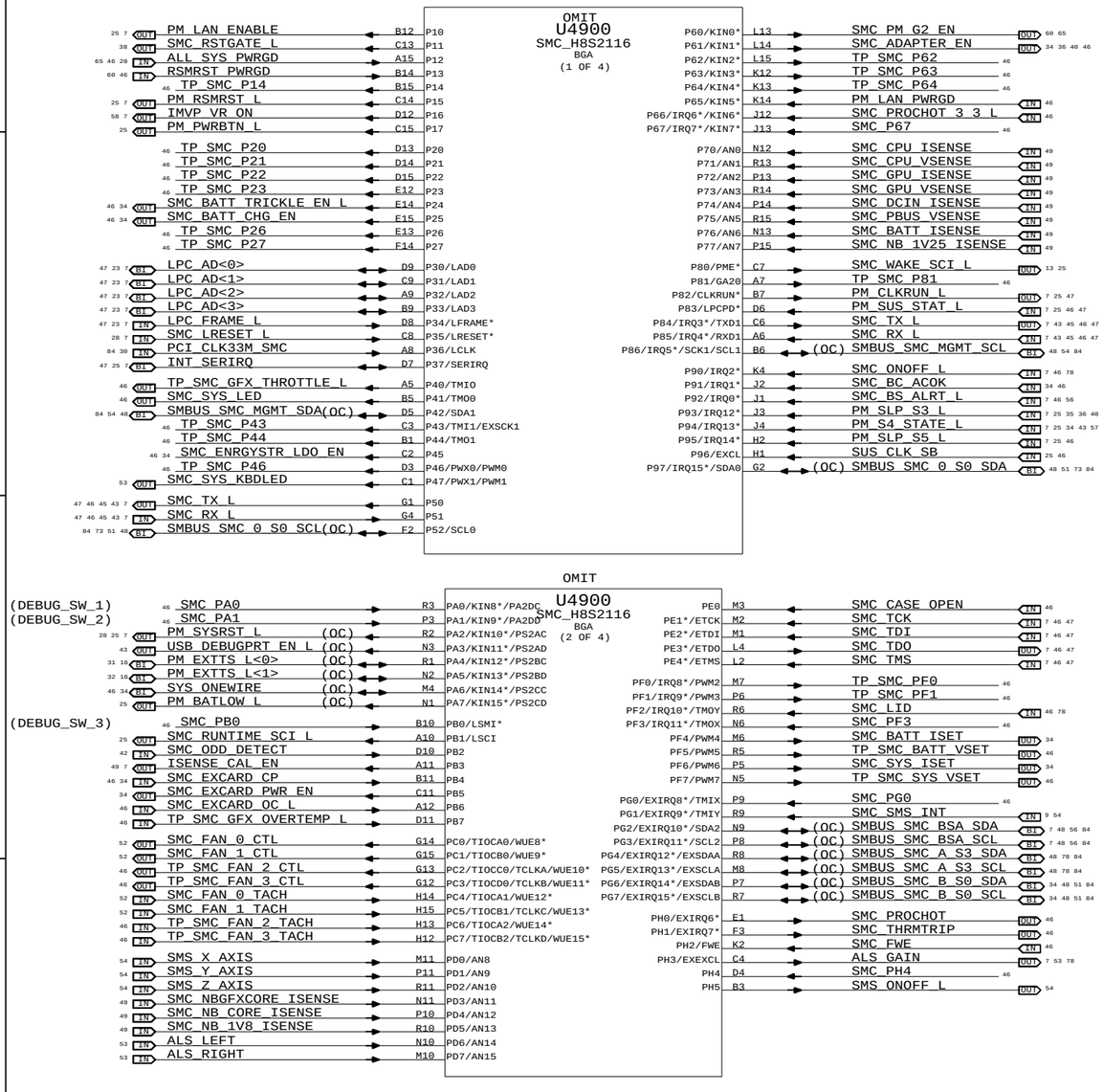


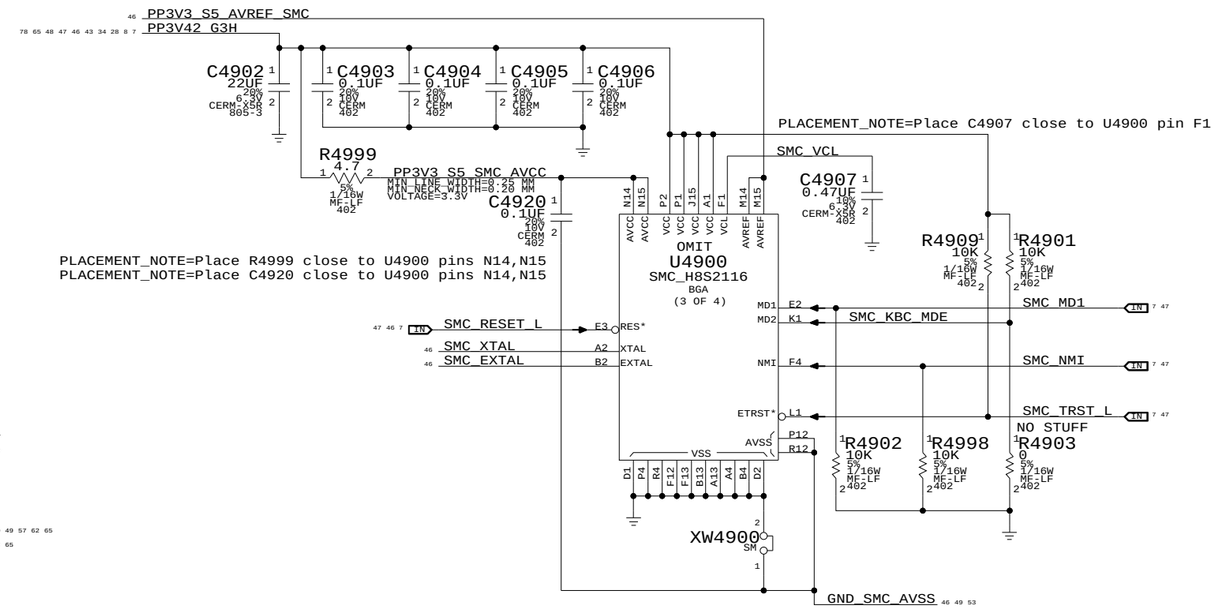
Left Clutch Barrel Interconnect	
SYNC_MASTER=M76_MLB	SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

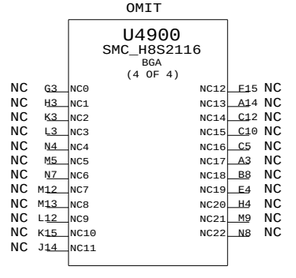
SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 44 OF 88	

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



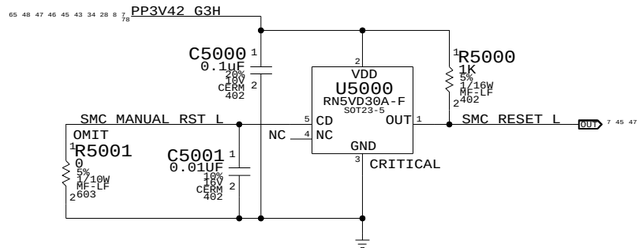


NOTE: SMS Interrupt can be active high or low, rename net accordingly.
If SMS interrupt is not used, pull up to SMC rail.

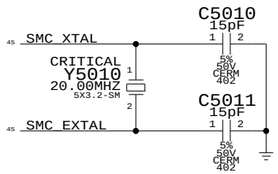


SMC			
SYNC_MASTER=T9_NOME	SYNC_DATE=01/17/2007		
NOTICE OF PROPRIETARY PROPERTY			
THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING I TO MAINTAIN THE DOCUMENT IN CONFIDENCE II NOT TO REPRODUCE OR COPY IT III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART			
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-7225	REV. 10.0.0
	SCALE NONE	SHT 45 OF 88	

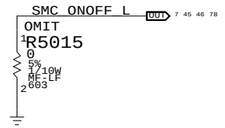
SMC Reset "Button" / Brownout Detect



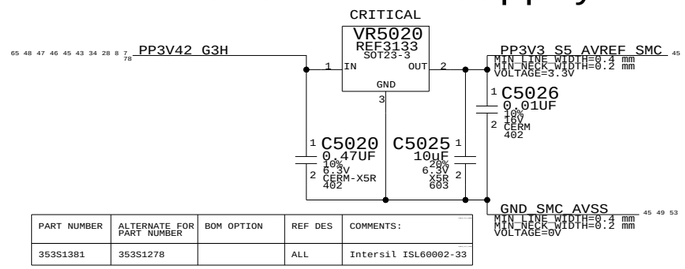
SMC Crystal Circuit



Debug Power "Button"

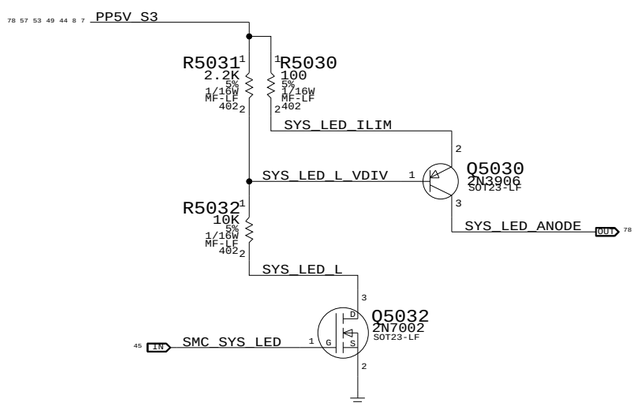


SMC AVREF Supply

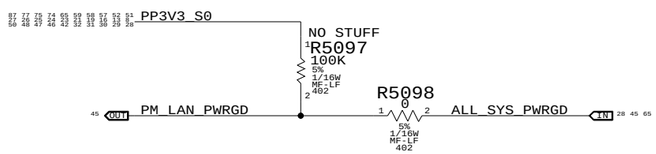


PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
353S1381	353S1278		ALL	Intersil ISL60002-33

System (Sleep) LED Circuit

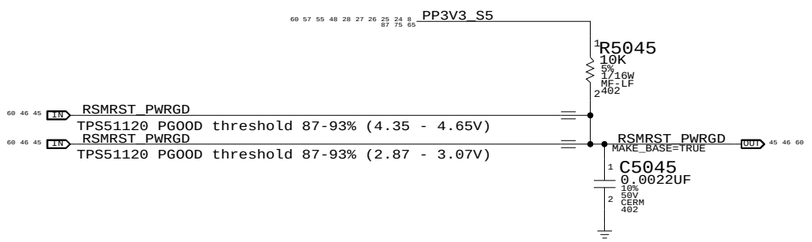


LAN PWRGD Circuit

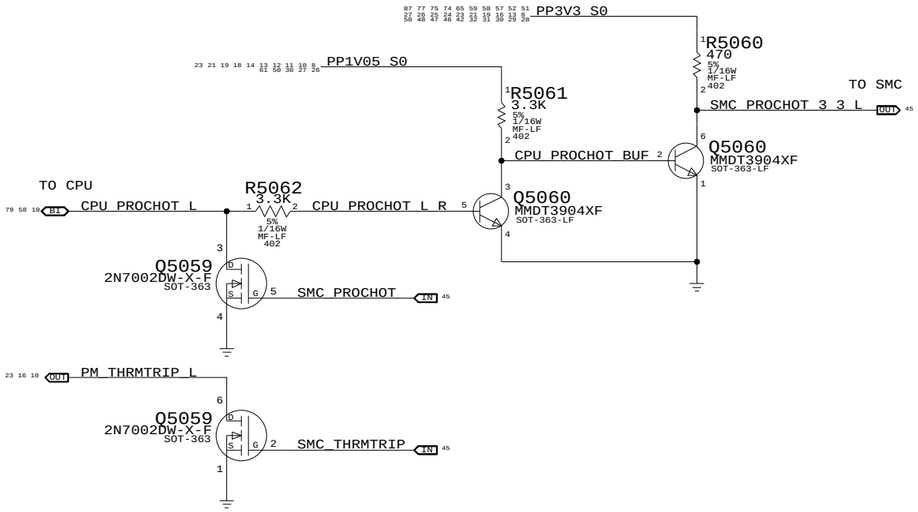


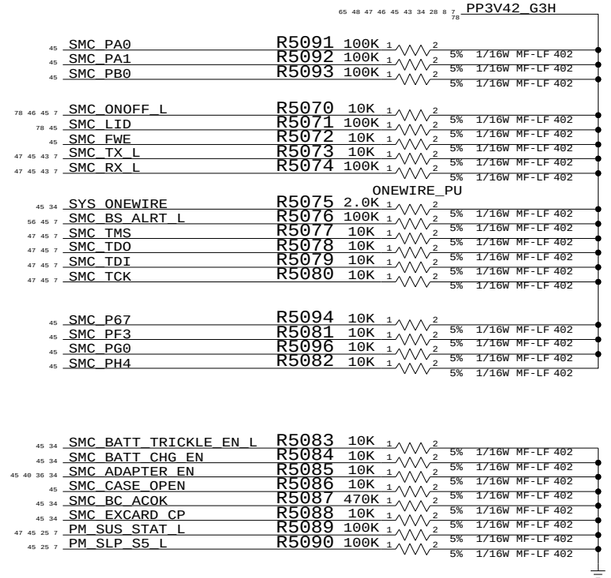
S5 Rail PWRGD Circuit

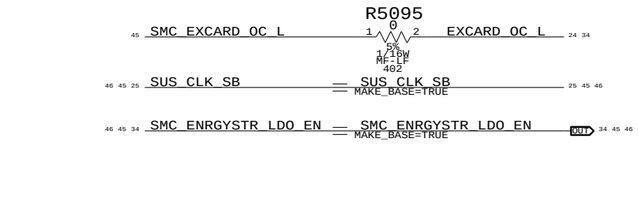
Reports when 5V S5 and 3.3V S5 are in regulation



SMC FSB to 3.3V Level Shifting







SMC Support

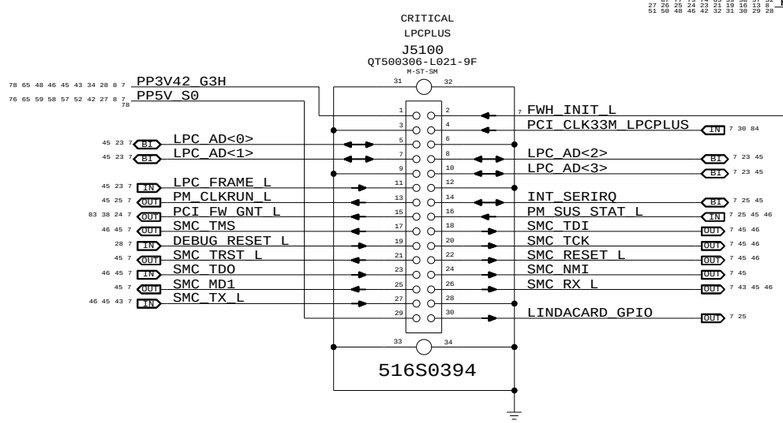
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

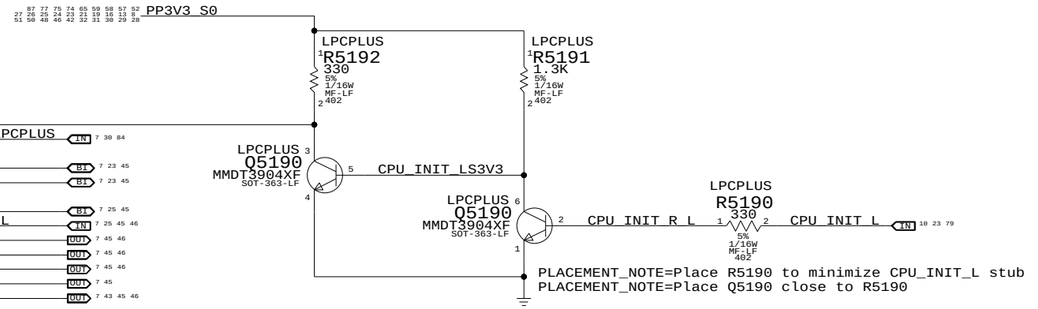
SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE	SHT	OF
NONE	46	88

LPC+ Connector



FWH_INIT_L Generation



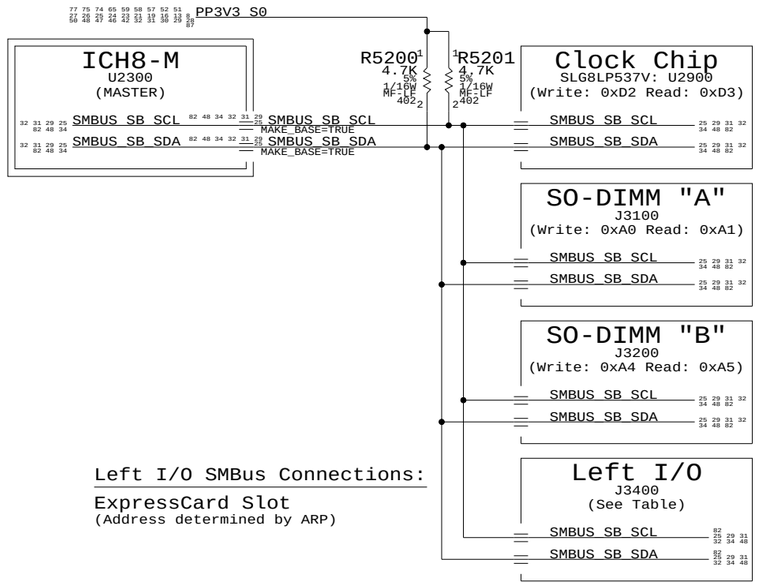
LPC+ Debug Connector

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 47 OF 88	

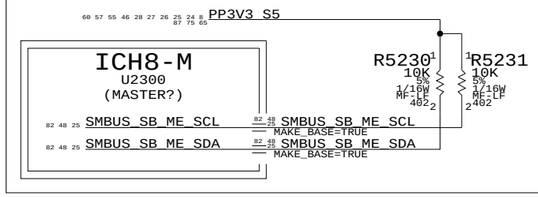
ICH8-M SMBus Connections



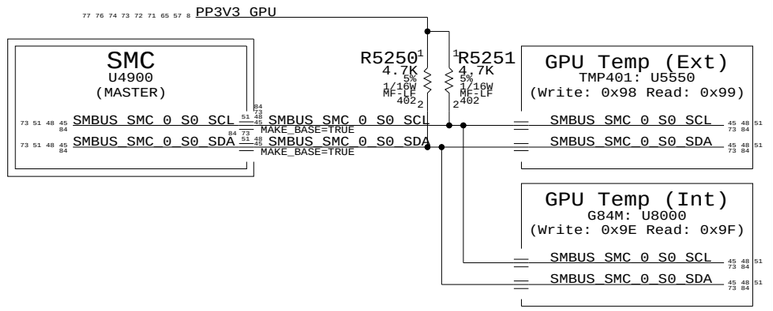
Left I/O SMBus Connections:

ExpressCard Slot
(Address determined by ARP)

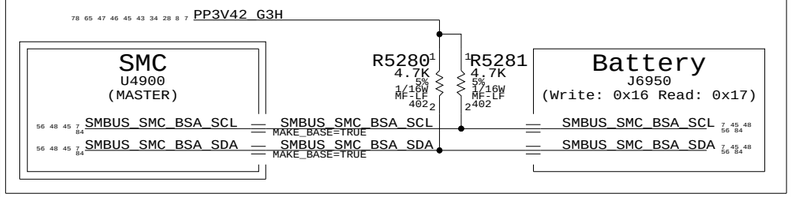
ICH8-M ME SMBus Connections



SMC "0" SMBus Connections

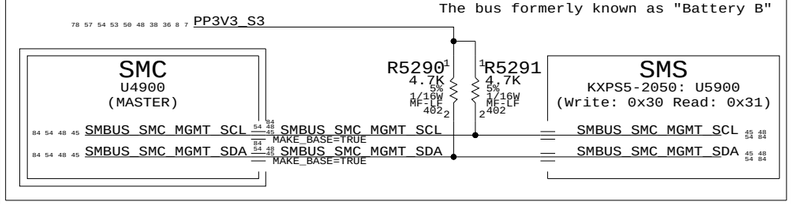


SMC "Battery A" SMBus Connections



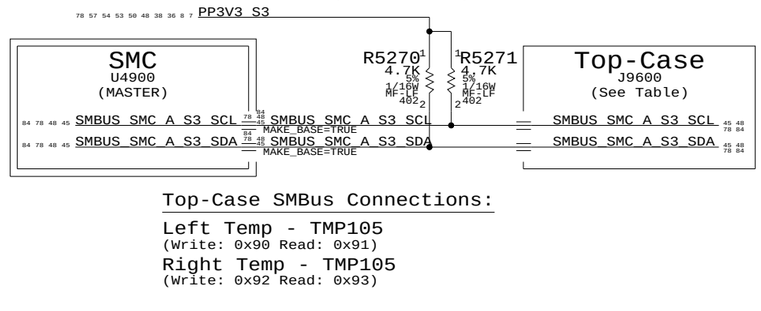
SMC "Management" SMBus Connections

The bus formerly known as "Battery B"



SMC "A" SMBus Connections

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

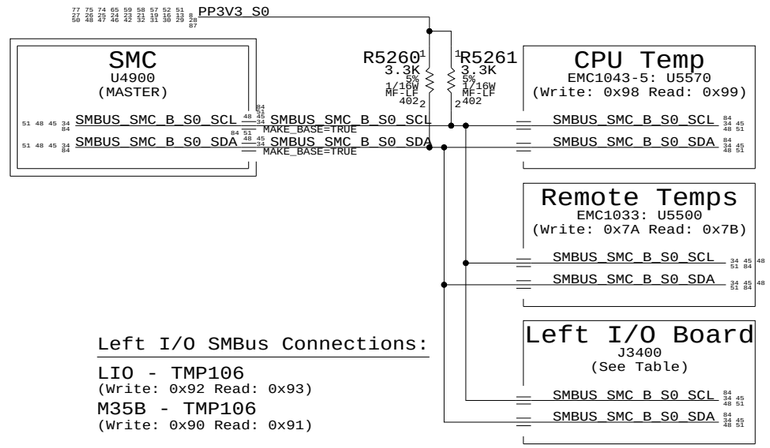


Top-Case SMBus Connections:

Left Temp - TMP105
(Write: 0x90 Read: 0x91)

Right Temp - TMP105
(Write: 0x92 Read: 0x93)

SMC "B" SMBus Connections



Left I/O SMBus Connections:

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

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

SMBus Connections

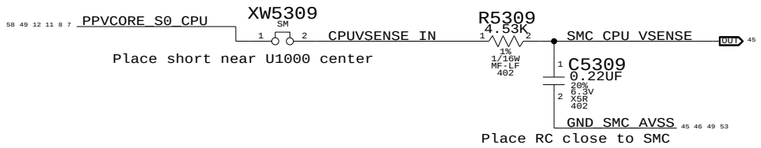
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

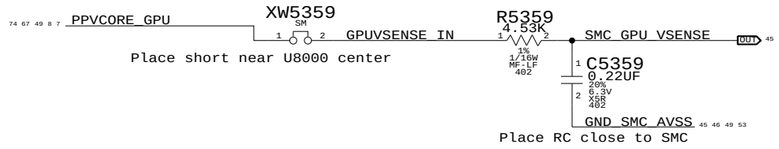
SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE	SHT	OF
NONE	48	88

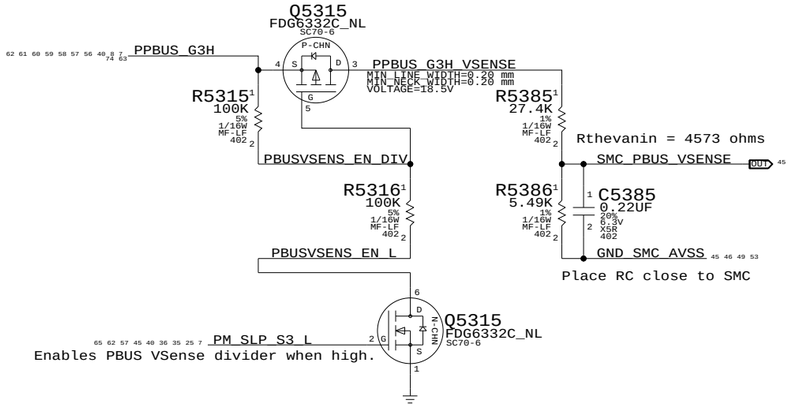
CPU Voltage Sense / Filter



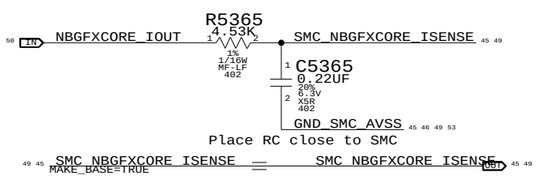
GPU Voltage Sense / Filter



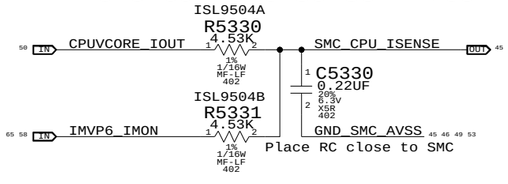
PBUS Voltage Sense & Filter



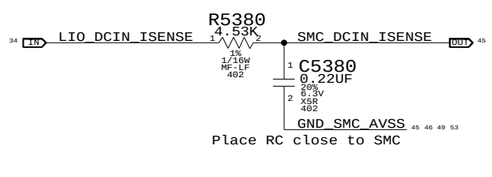
NB GFX Current Sense Filter



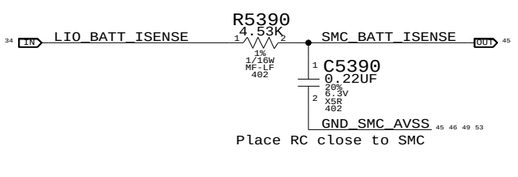
CPU Current Sense Filter



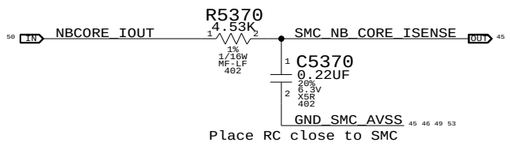
DCIN Current Sense Filter



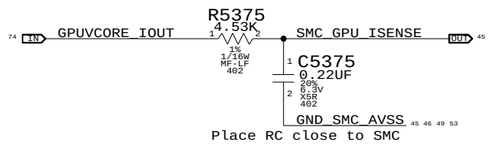
Battery (PBUS) Current Sense Filter



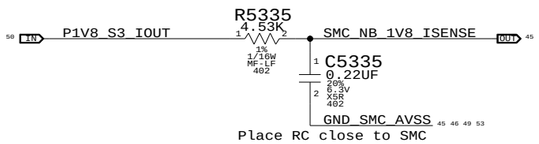
NB Core Current Sense Filter



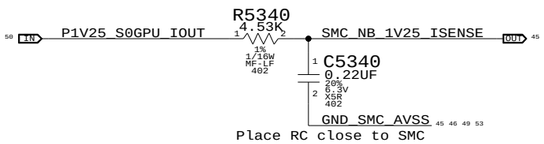
GPU Current Sense Filter



NB 1.8V Current Sense Filter

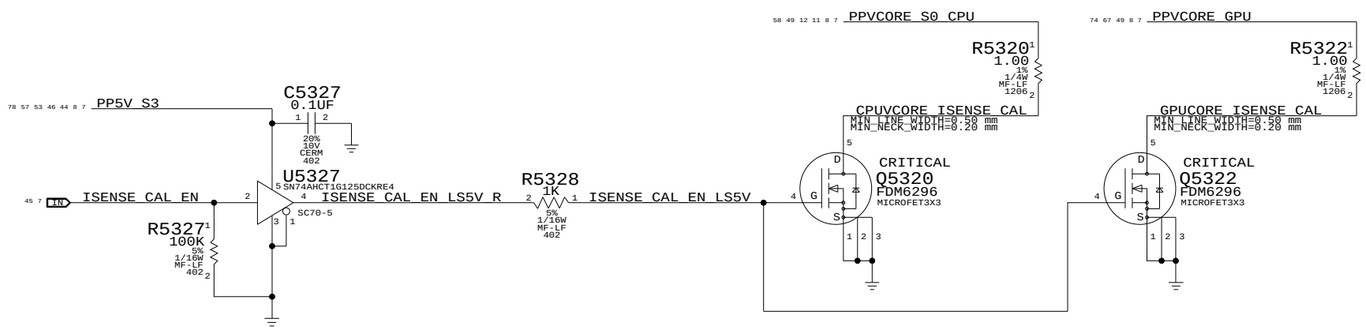


S0/GPU 1.25V Current Sense Filter



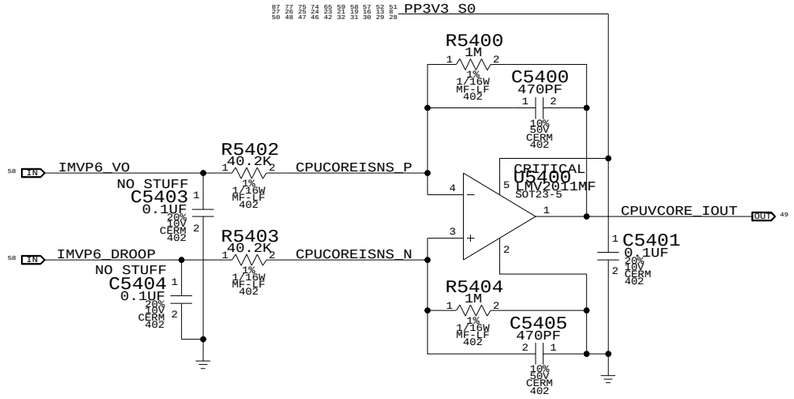
Current Sense Calibration Circuit

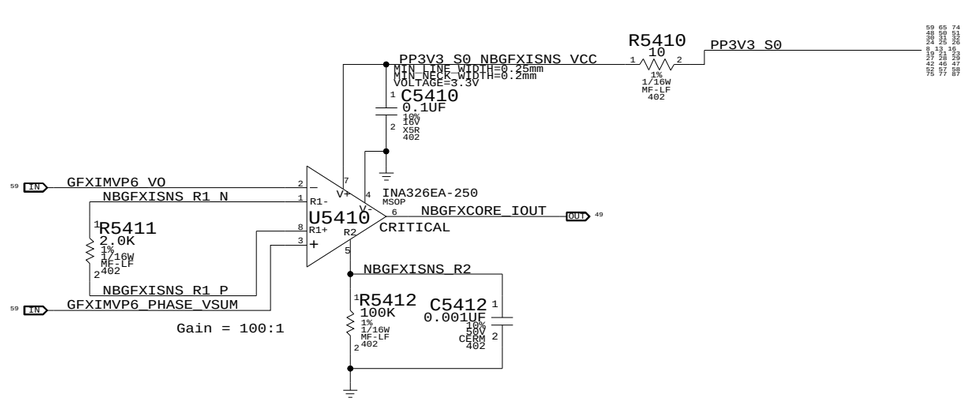
Switches in fixed load on power supplies to calibrate current sense circuits

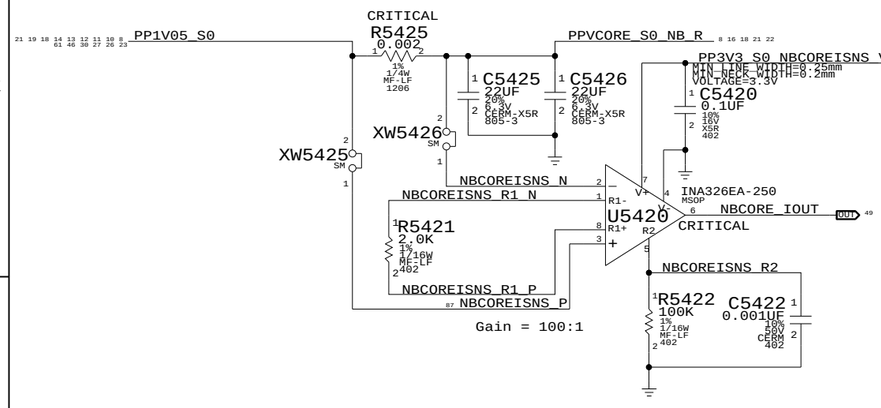


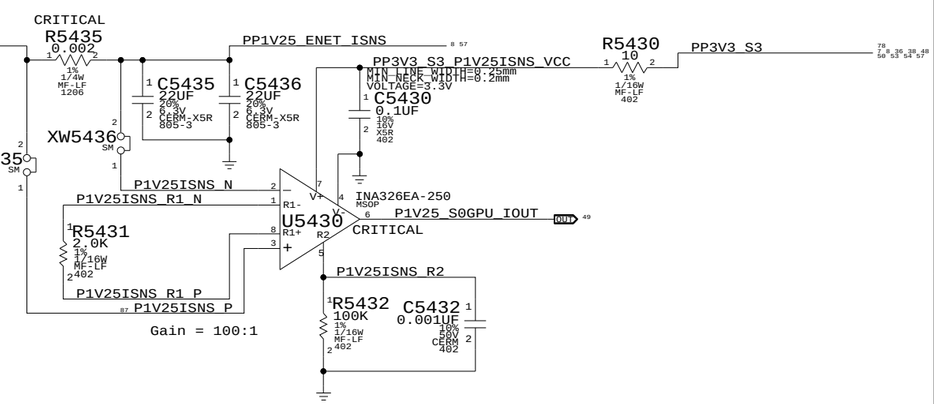
Current & Voltage Sensing		
SYNC_MASTER=(MASTER)	SYNC_DATE=(MASTER)	

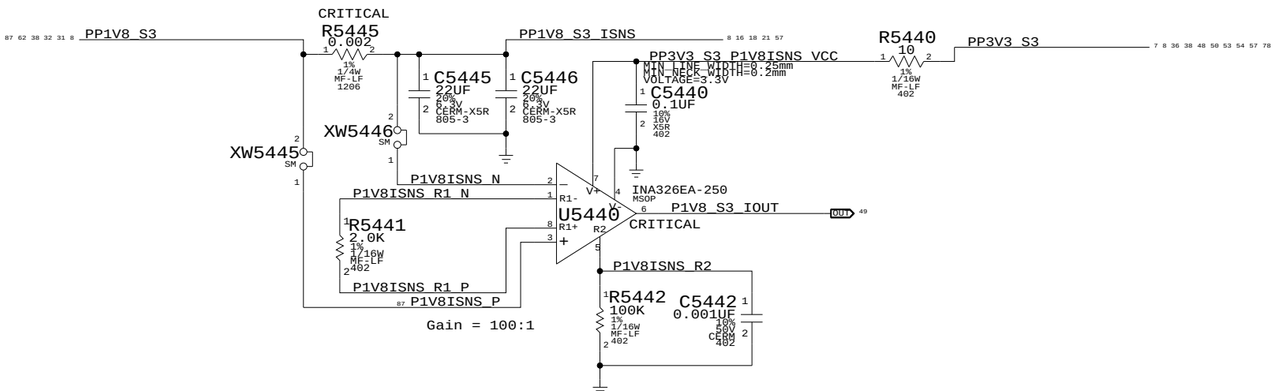
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7225	10.0.0
	SCALE: NONE	SHT 49 OF 88	











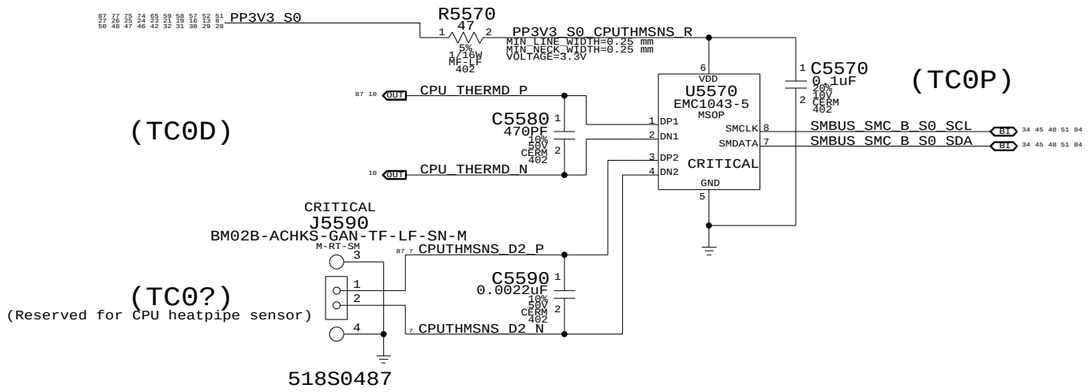
Current Sensing

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

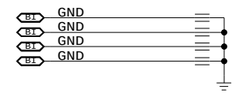
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 50 OF 88	

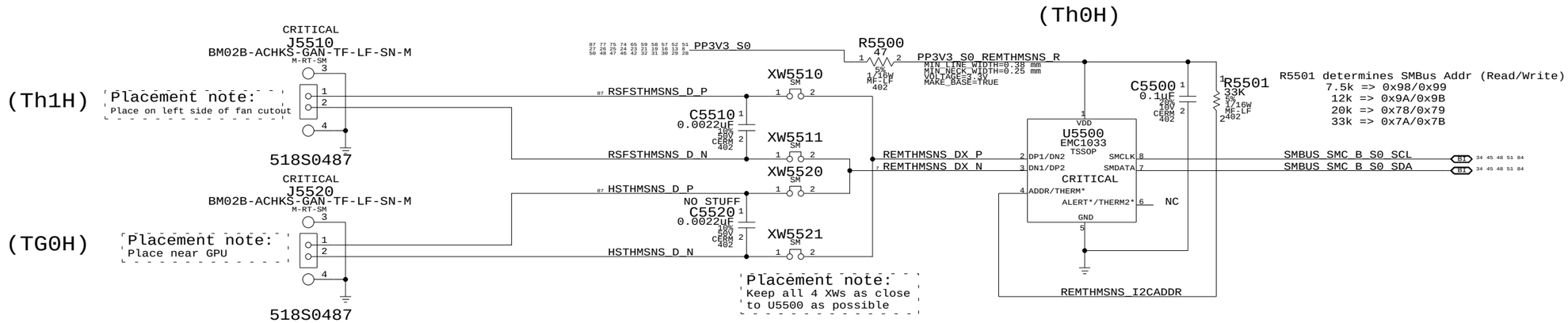
CPU T-Diode Thermal Sensor



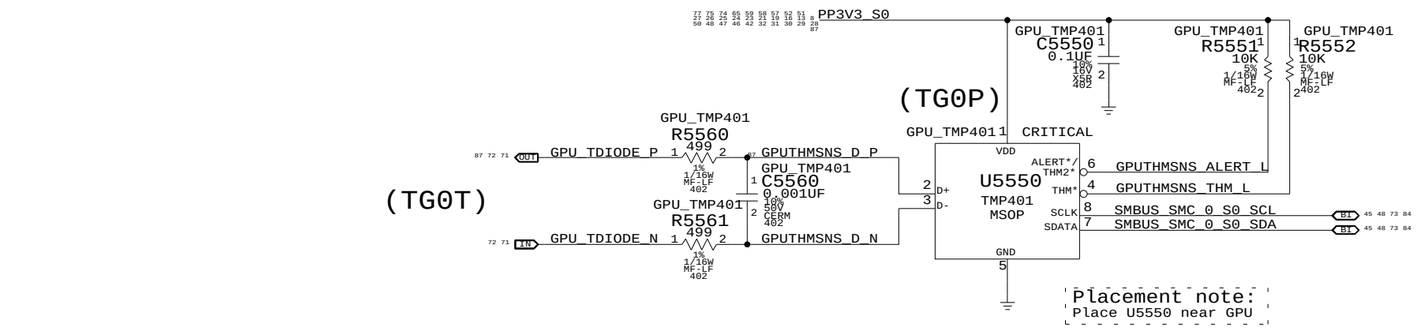
NB Thermal Diodes Not Used



GPU/Heat Pipe & Bottom Case Skin Thermal Sensor



GPU Die Thermal Sensor



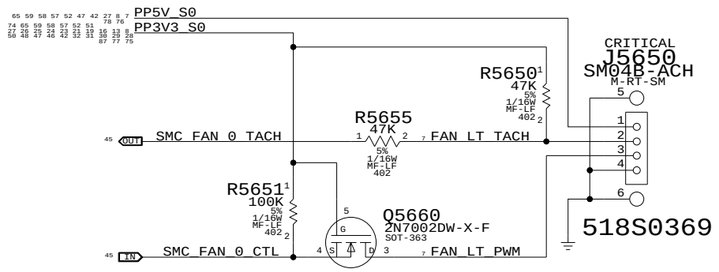
Thermal Sensors

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

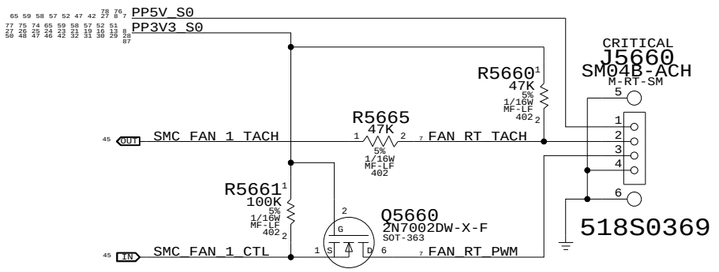
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 51 OF 88	

Left Fan



Right Fan



Fan Connectors

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

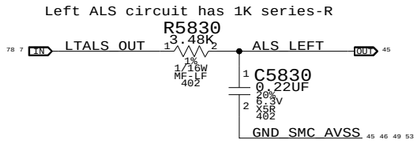
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

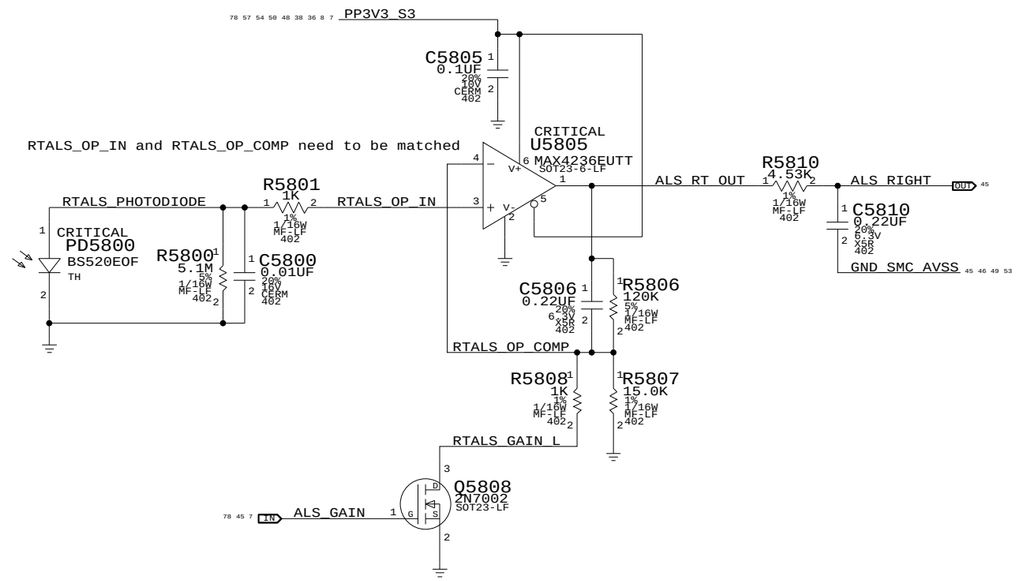
SCALE: NONE

SHT 52 OF 88

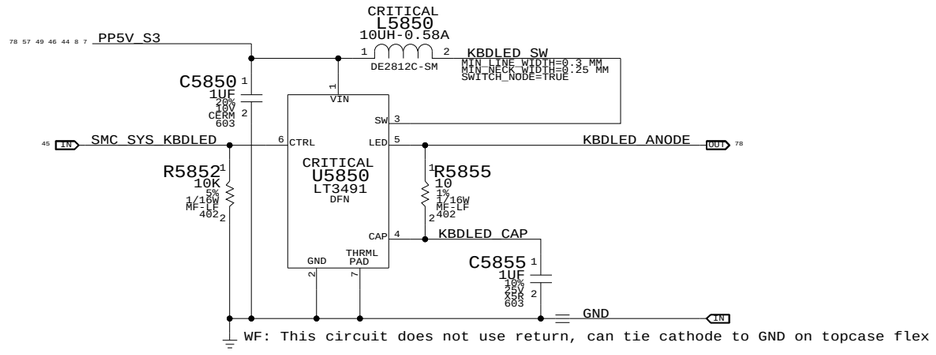
Left ALS Filter



Right ALS Circuit



Keyboard LED Driver



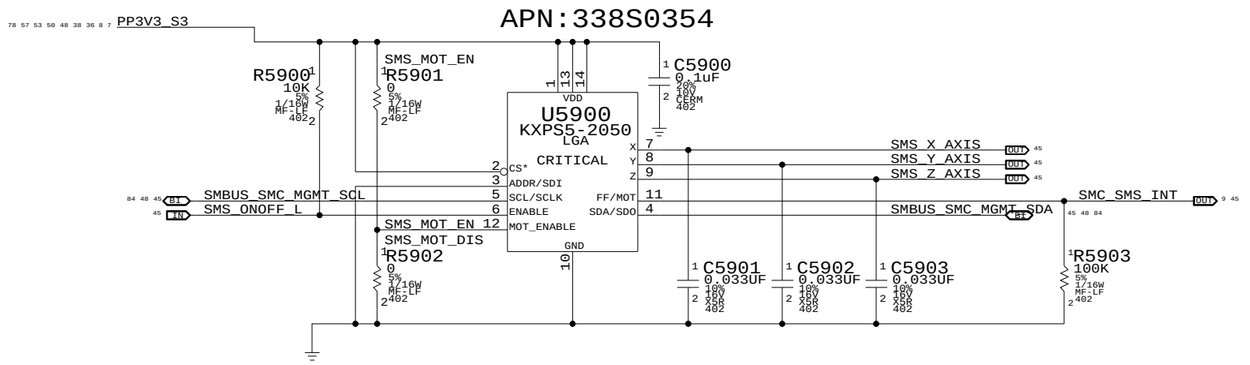
ALS Support

SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 53 OF 88	

APN:338S0354

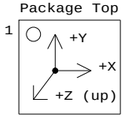


I2C addresses:

ADDR low => 0x30, 0x31
ADDR high => 0x32, 0x33
Alias SCL/SDA to GND if using analog outputs only

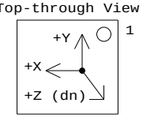
Desired orientation when placed on board top-side:

Package Top



Desired orientation when placed on board bottom-side:

Top-through View



Sudden Motion Sensor (SMS)

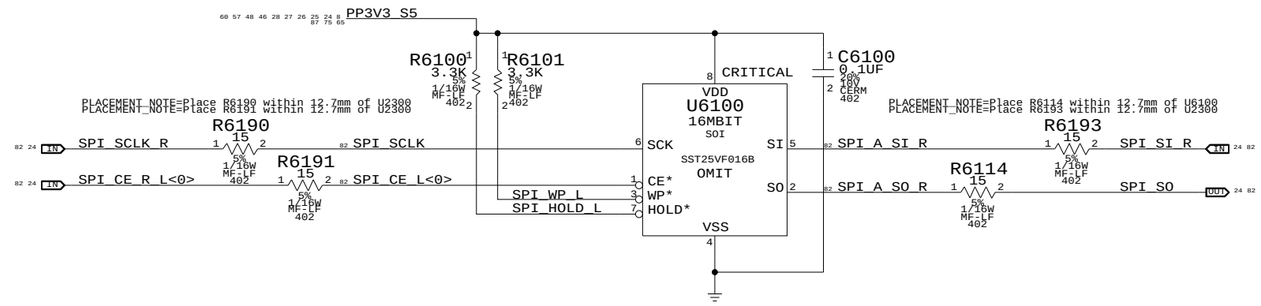
SYNC_MASTER=M76_MLB SYNC_DATE=01/18/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE

SHT 54 OF 88



SPI BootROM

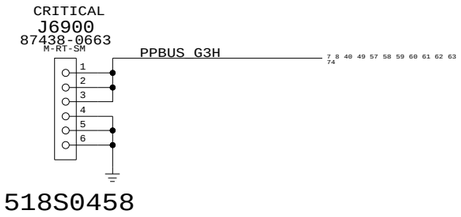
SYNC_MASTER=T9_NOME SYNC_DATE=01/17/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

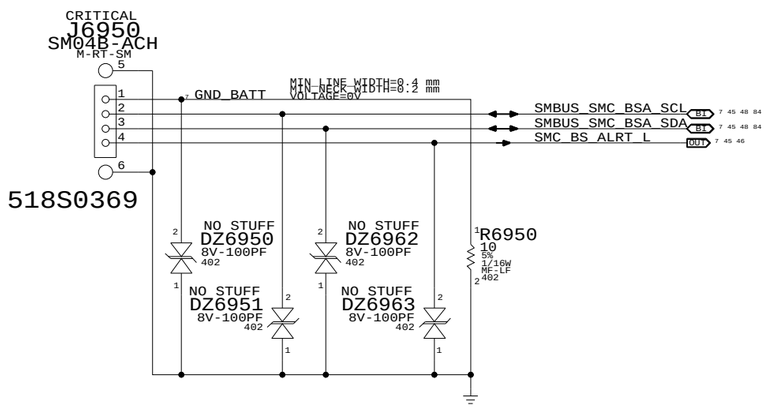
SCALE	SHT	OF
NONE	55	88

Left I/O Power Connector



518S0458

Battery Connector (Digital Signals)



518S0369

PBus-In & Battery Connectors

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

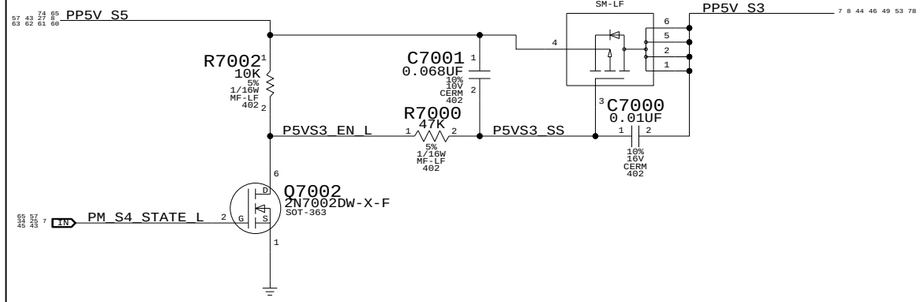
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

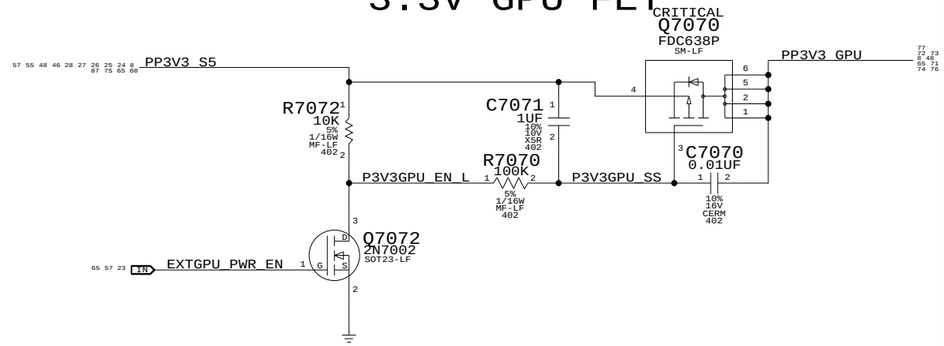
SCALE: NONE

SHT 56 OF 88

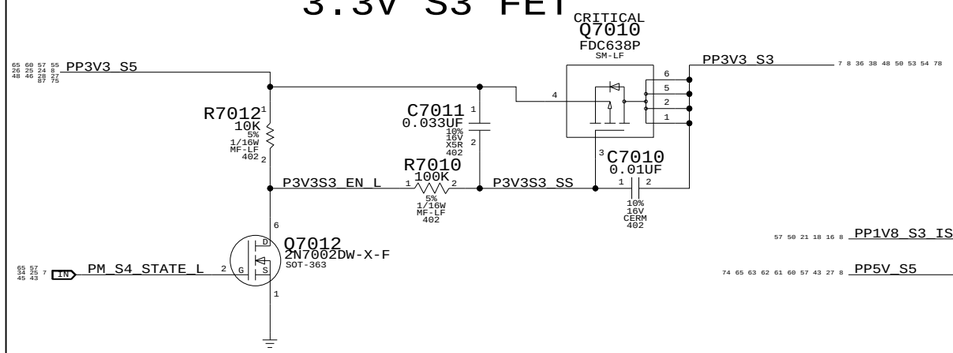
5V S3 FET



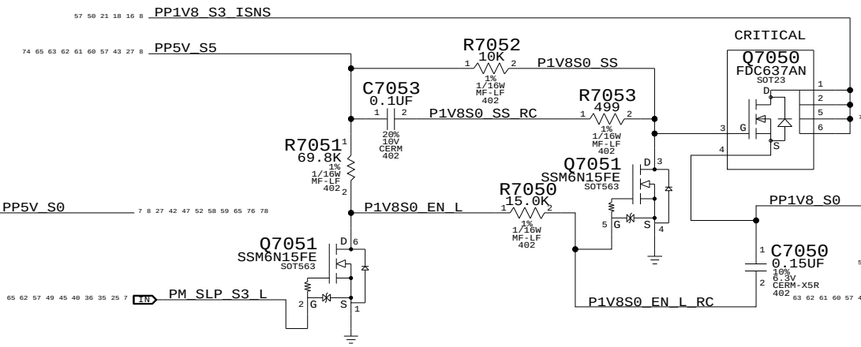
3.3V GPU FET



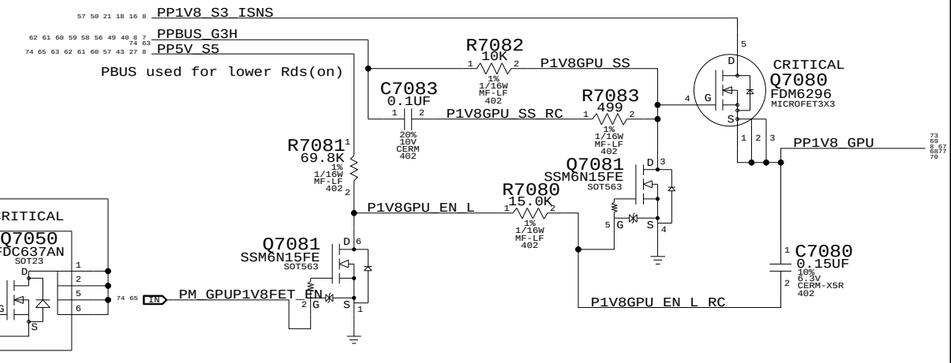
3.3V S3 FET



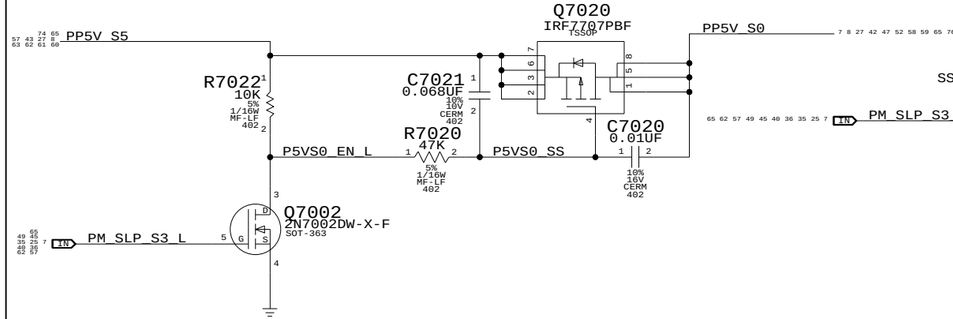
1.8V S0 FET



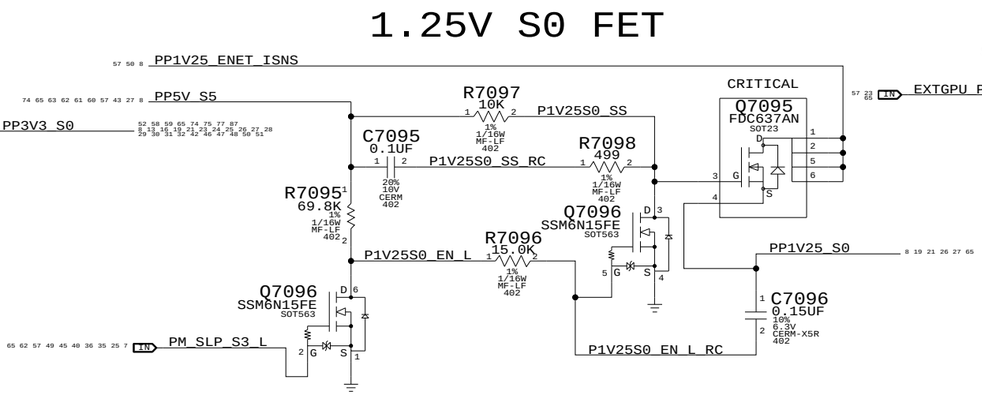
1.8V GPU FET



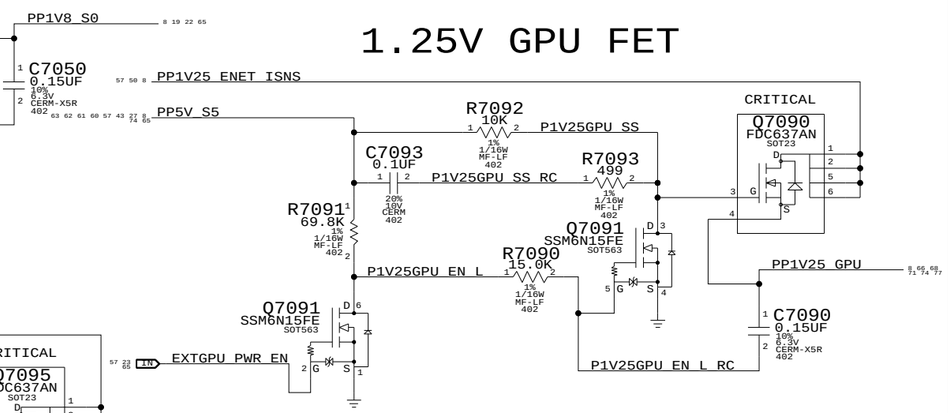
5V S0 FET



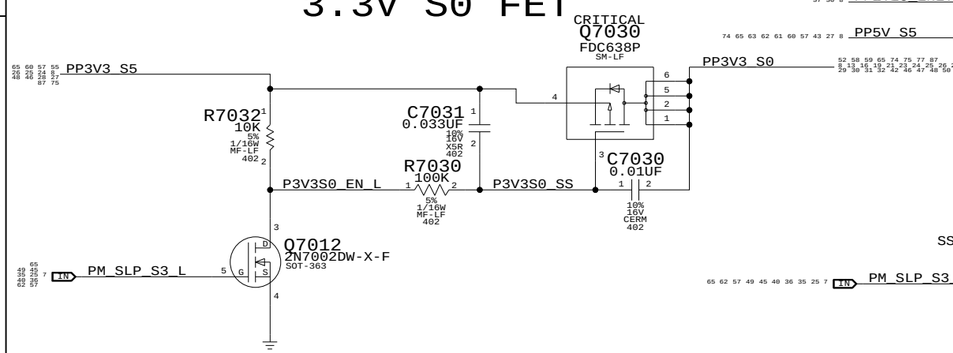
1.25V S0 FET



1.25V GPU FET



3.3V S0 FET



Power FETs

SYNC_MASTER=M76_MLB SYNC_DATE=01/12/2007

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SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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.

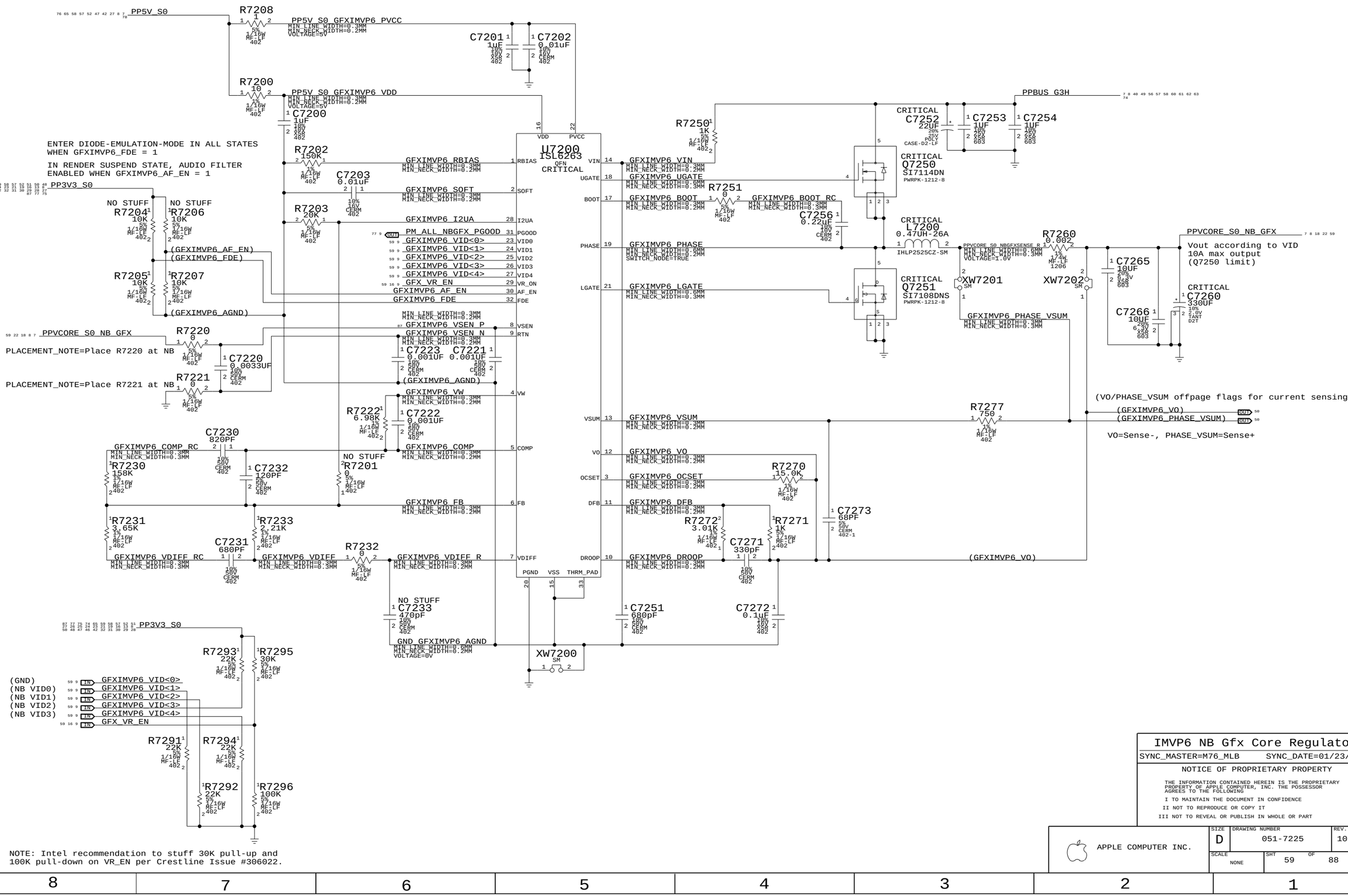
IMVP6 CPU VCore Regulator

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE SHT 58 OF 88



IMVP6 NB Gfx Core Regulator

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

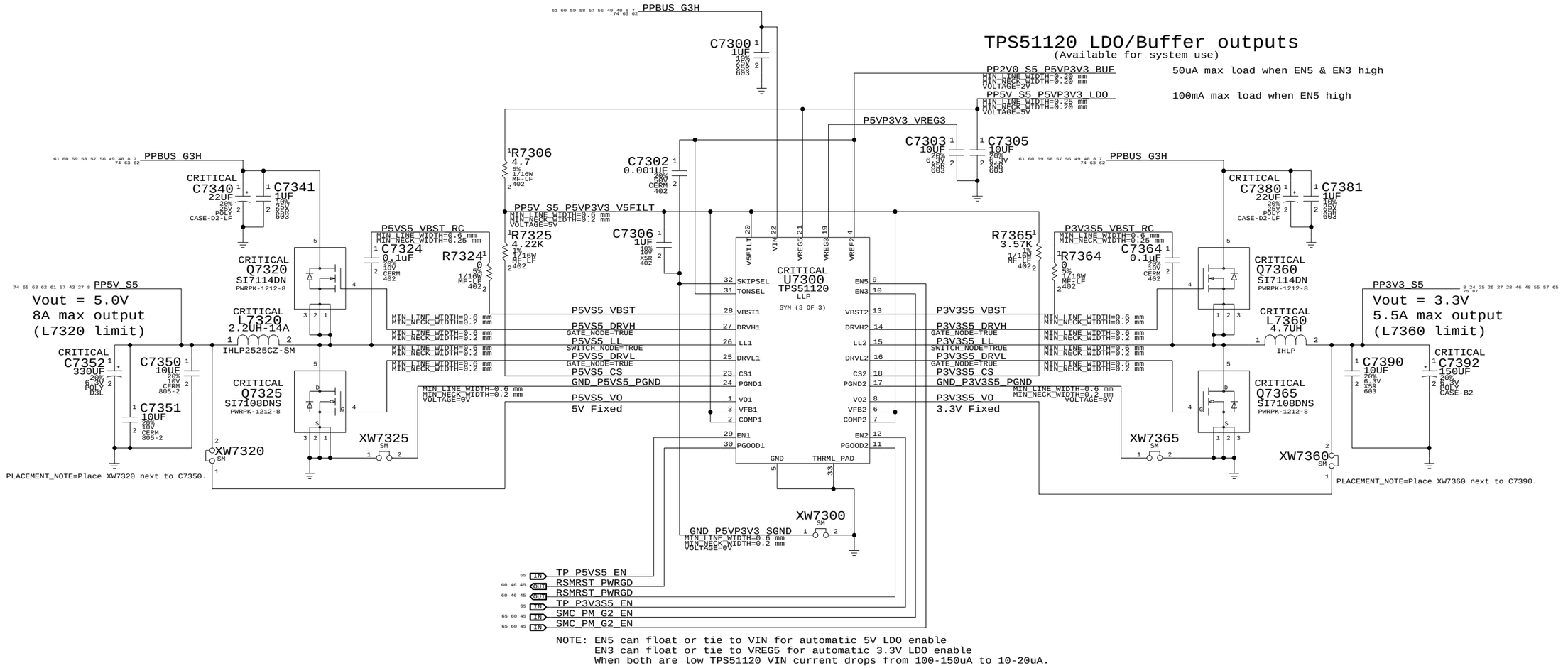
SCALE	SHT	OF
NONE	59	88

TPS51120 LDO/Buffer outputs

(Available for system use)

PP2V0_S5_P5VP3V3_BUF — 50uA max load when EN5 & EN3 high

PP5V_S5_P5VP3V3_LDO — 100mA max load when EN5 high



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

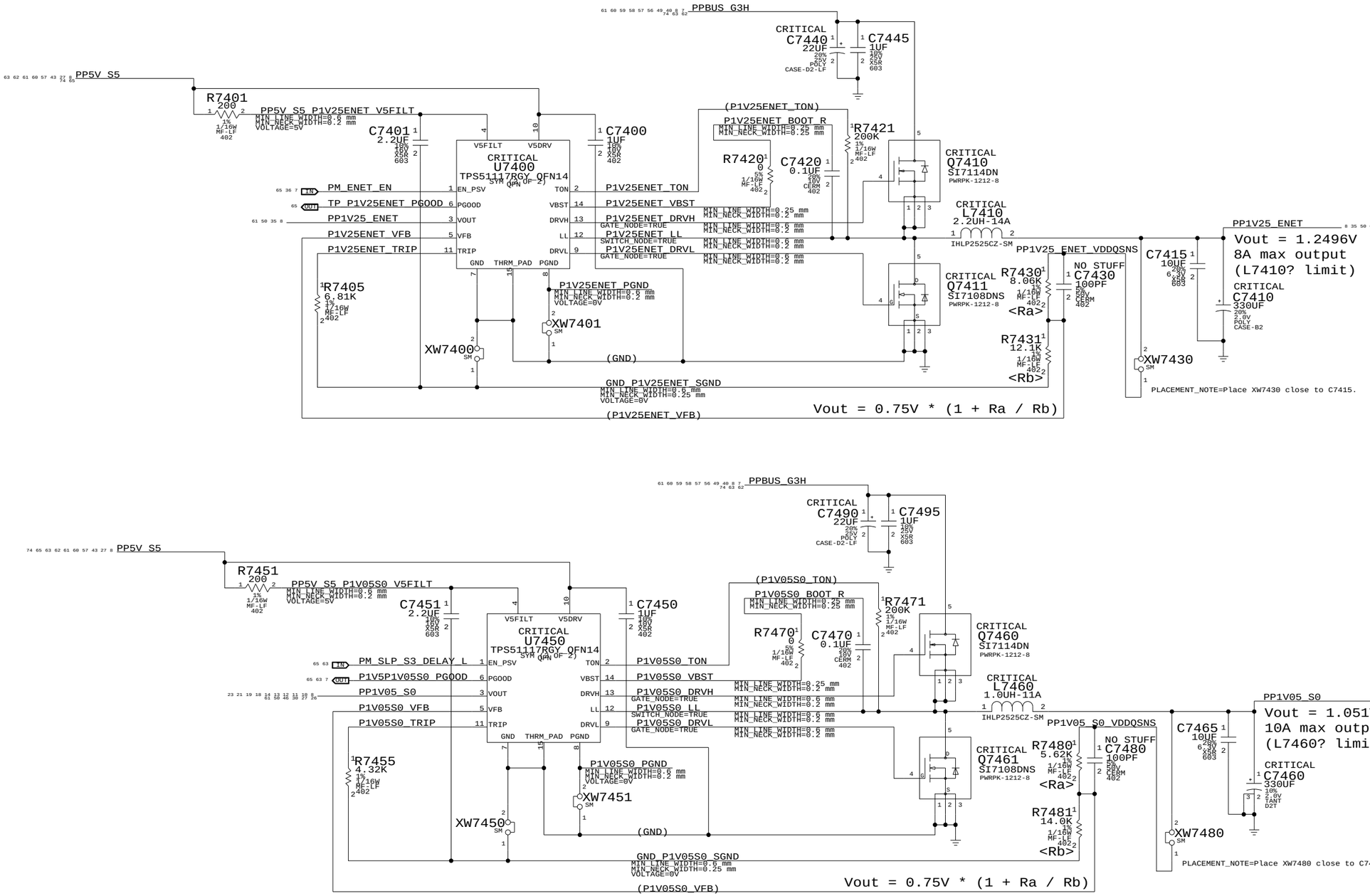
5V / 3.3V Power Supply

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE SHT 60 OF 88

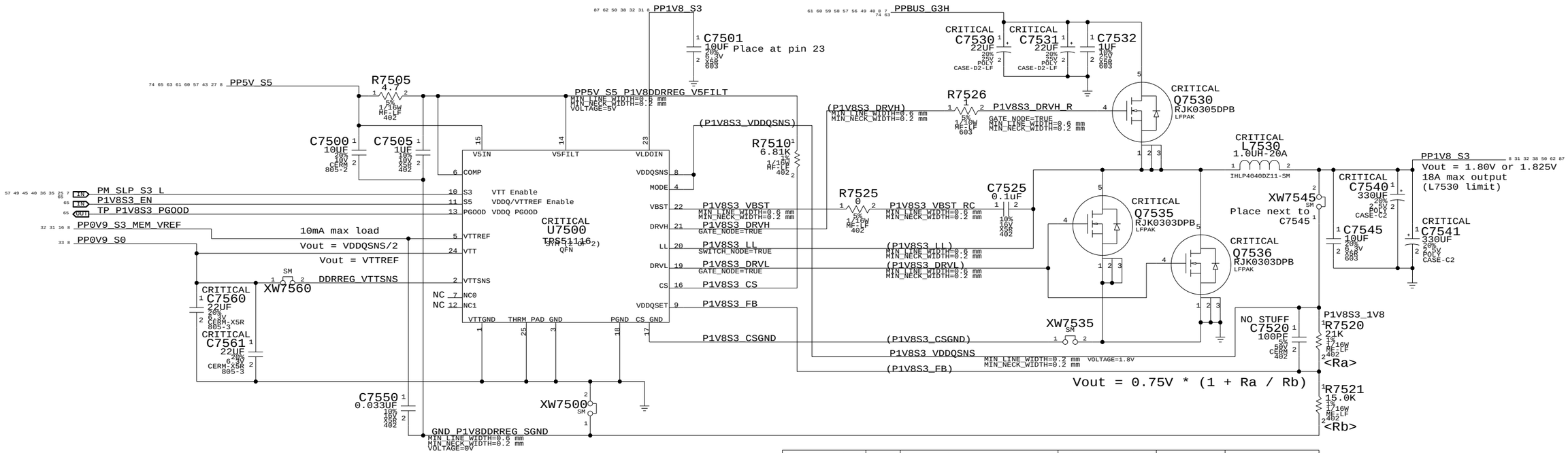


1.25V / 1.05V Power Supply

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 61 OF 88	



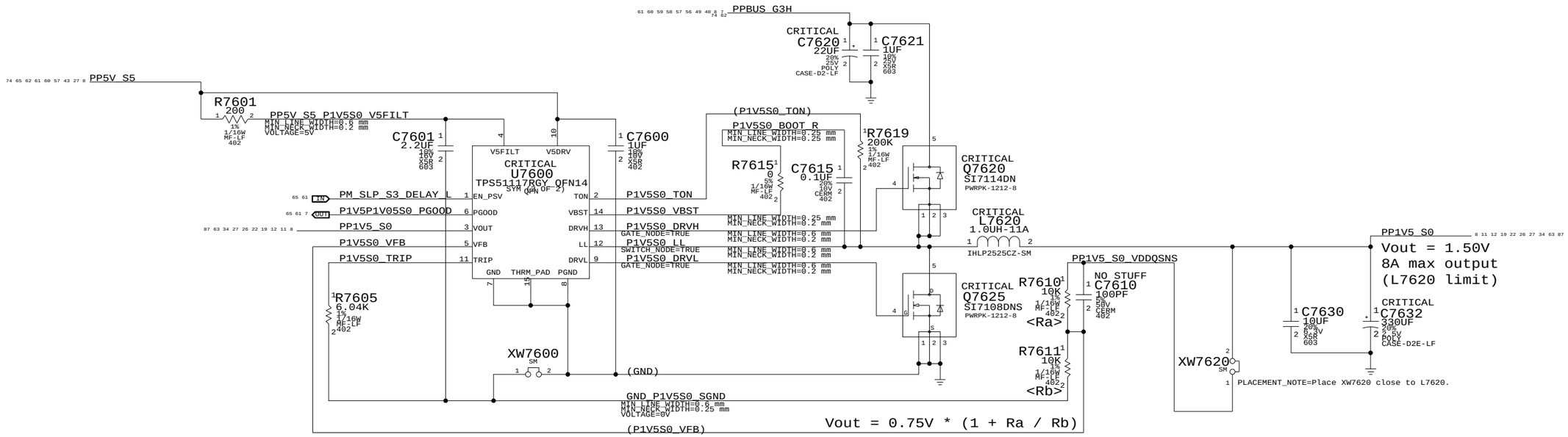
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
114S0346	1	RES,21.5K,1%,1/16W,402,LF	R7520		P1V8S3_1V825

1.8V DDR2 Supply

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 62 OF 88	



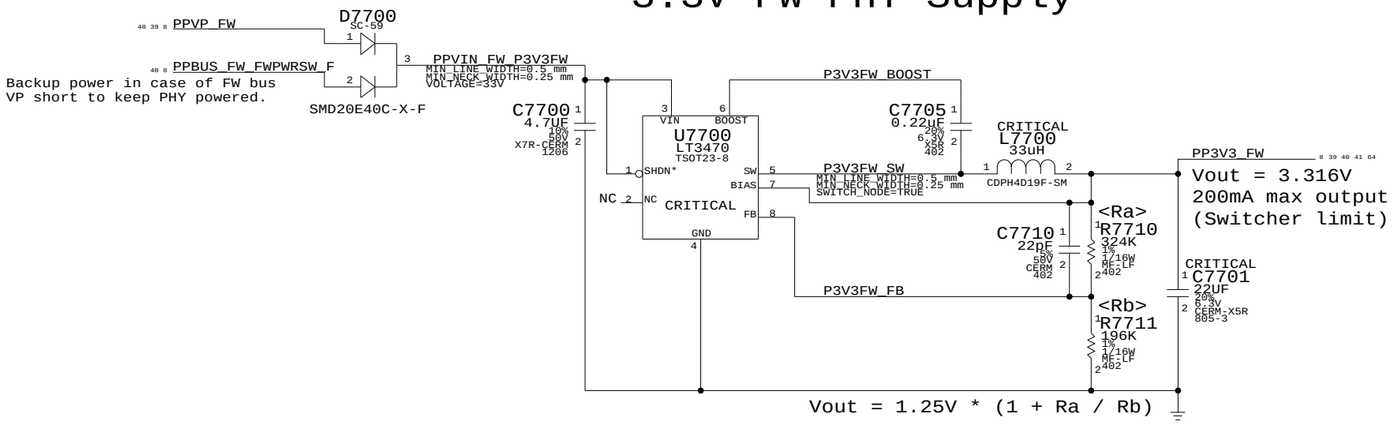
1.5V Power Supply

SYNC_MASTER=M76_MLB SYNC_DATE=01/23/2007

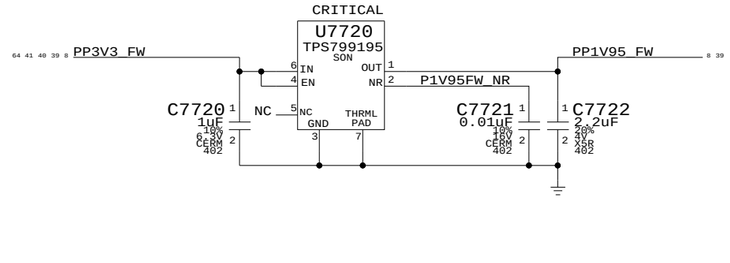
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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=01/23/2007

APPLE COMPUTER INC.

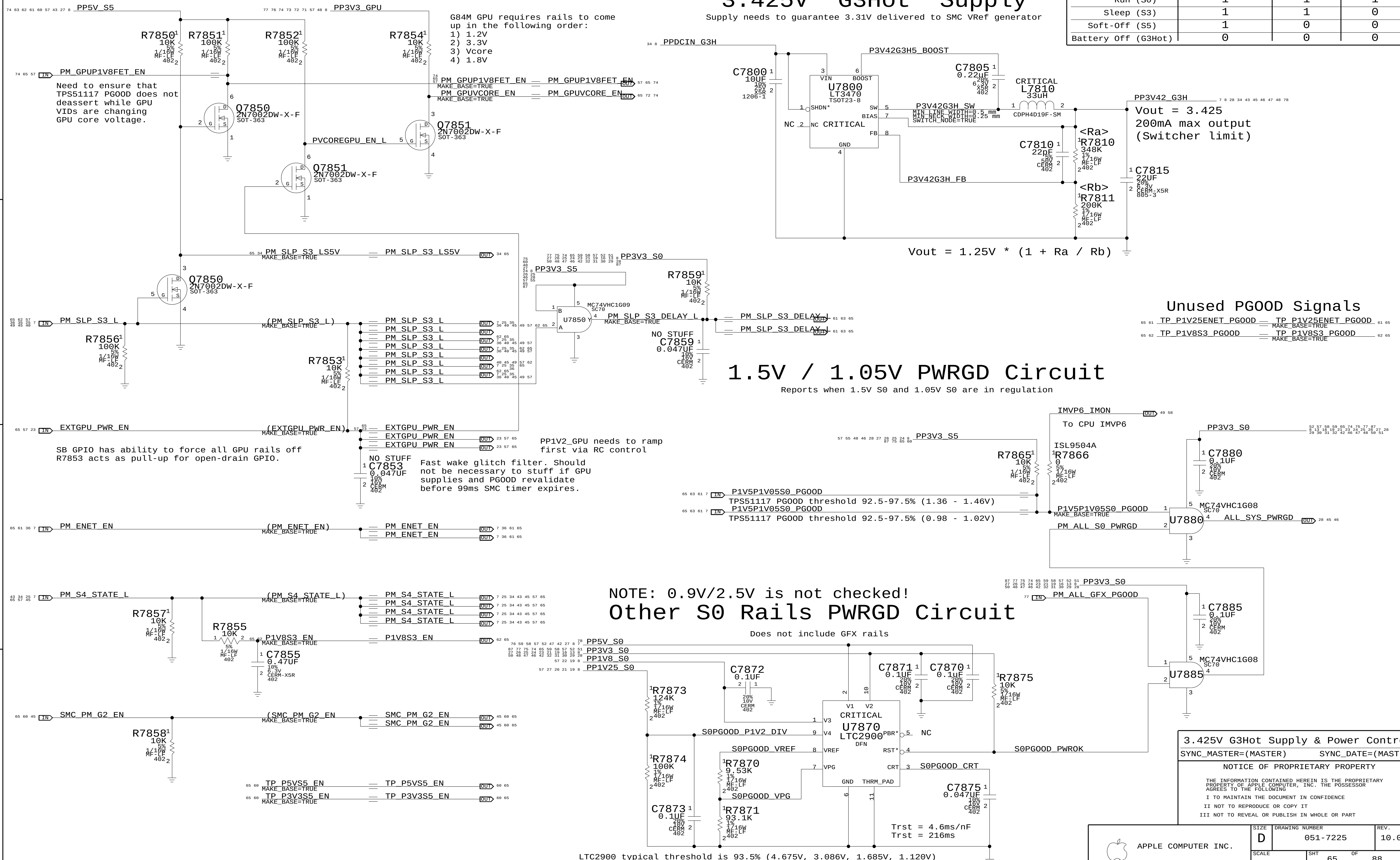
SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 64 OF 88	

Power Control Signals

3.425V "G3Hot" Supply

Supply needs to guarantee 3.31V delivered to SMC VRef generator

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



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

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

Vout = 3.425
200mA max output
(Switcher limit)

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

Unused PGOOD Signals

1.5V / 1.05V PWRGD Circuit

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

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

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

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

PP1V2_GPU needs to ramp first via RC control

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

NOTE: 0.9V/2.5V is not checked!

Other S0 Rails PWRGD Circuit

Does not include GFX rails

Trst = 4.6ms/nF
Trst = 216ms

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

3.425V G3Hot Supply & Power Control
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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

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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

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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>	
PEX_TX0_L	AK15	PEG_D2R_C_N<0>	C8056 0.1uF	PEG_D2R_N<0>	
PEX_TX1	AH16	PEG_D2R_C_P<1>	C8057 0.1uF	PEG_D2R_P<1>	
PEX_TX1_L	AG16	PEG_D2R_C_N<1>	C8058 0.1uF	PEG_D2R_N<1>	
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PEX_TX2_L	AH17	PEG_D2R_C_N<2>	C8060 0.1uF	PEG_D2R_N<2>	
PEX_TX3	AG18	PEG_D2R_C_P<3>	C8061 0.1uF	PEG_D2R_P<3>	
PEX_TX3_L	AH18	PEG_D2R_C_N<3>	C8062 0.1uF	PEG_D2R_N<3>	
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PEX_TX6	AG20	PEG_D2R_C_P<6>	C8067 0.1uF	PEG_D2R_P<6>	
PEX_TX6_L	AH20	PEG_D2R_C_N<6>	C8068 0.1uF	PEG_D2R_N<6>	
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PEX_TX8_L	AJ21	PEG_D2R_C_N<8>	C8072 0.1uF	PEG_D2R_N<8>	
PEX_TX9	AJ22	PEG_D2R_C_P<9>	C8073 0.1uF	PEG_D2R_P<9>	
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PEX_TX10	AG23	PEG_D2R_C_P<10>	C8075 0.1uF	PEG_D2R_P<10>	
PEX_TX10_L	AH23	PEG_D2R_C_N<10>	C8076 0.1uF	PEG_D2R_N<10>	
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PEX_TX11_L	AJ24	PEG_D2R_C_N<11>	C8078 0.1uF	PEG_D2R_N<11>	
PEX_TX12	AJ25	PEG_D2R_C_P<12>	C8079 0.1uF	PEG_D2R_P<12>	
PEX_TX12_L	AH25	PEG_D2R_C_N<12>	C8080 0.1uF	PEG_D2R_N<12>	
PEX_TX13	AH26	PEG_D2R_C_P<13>	C8081 0.1uF	PEG_D2R_P<13>	
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PEX_TX15_L	AH27	PEG_D2R_C_N<15>	C8086 0.1uF	PEG_D2R_N<15>	

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	10.0.0
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

TP_GPU_VDD_SENSE N20 VDD_SENSE
TP_GPU_GND_SENSE M21 GND_SENSE

77 73 70 69 68 57 8 PP1V8_GPU

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

???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

AA25 AA26 AB25 AB26 G11 G12 G15 G18 G21 G22 H11 FBVDDQ H12 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 FBVTT K12 NC K21 NC K22 NC K24 NC K9 NC L23 NC M23 NC T25 NC U25 NC

OMIT
U8000
NB8P-GS-A1
BGA
(8 OF 8)

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

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

NV G84M Core/FB Power

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

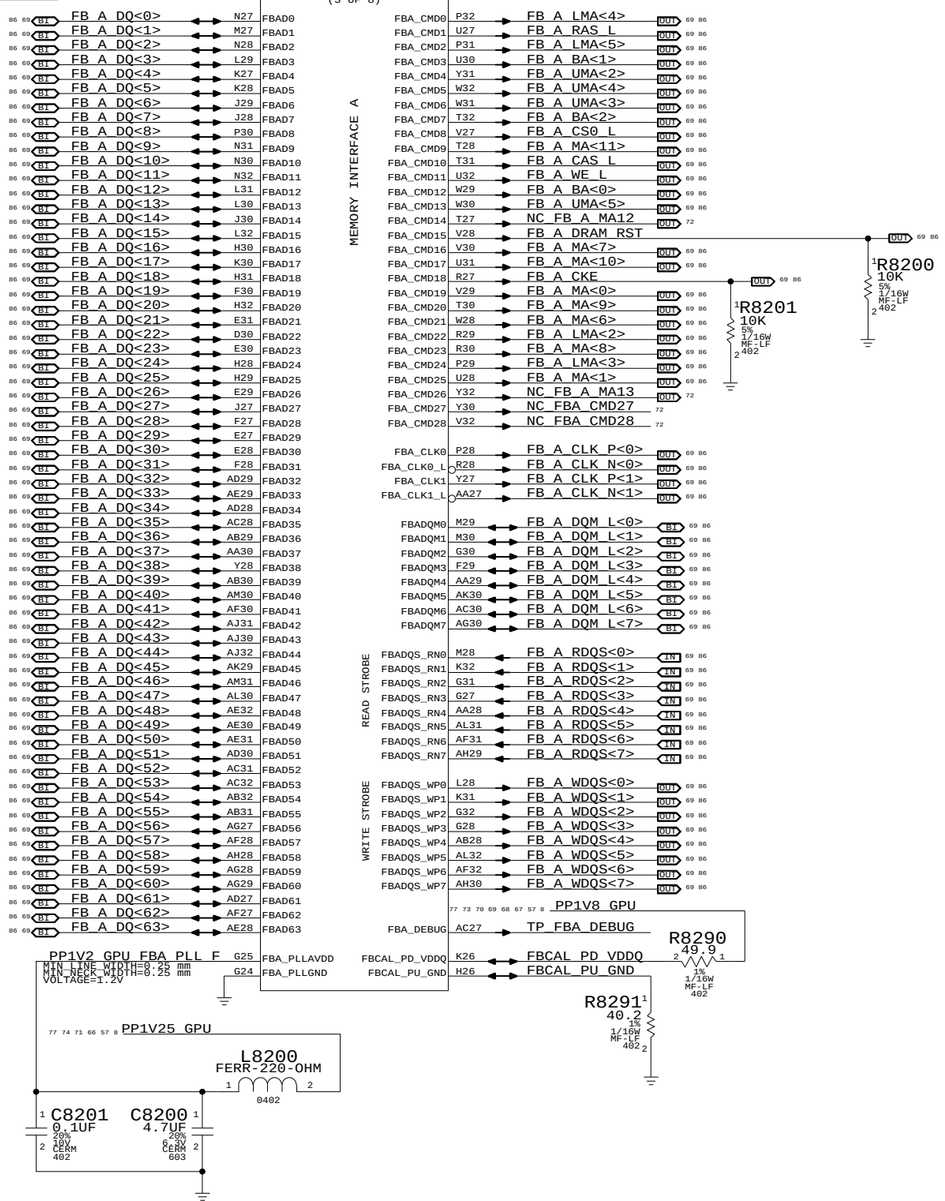
SCALE: NONE SHT 67 OF 88

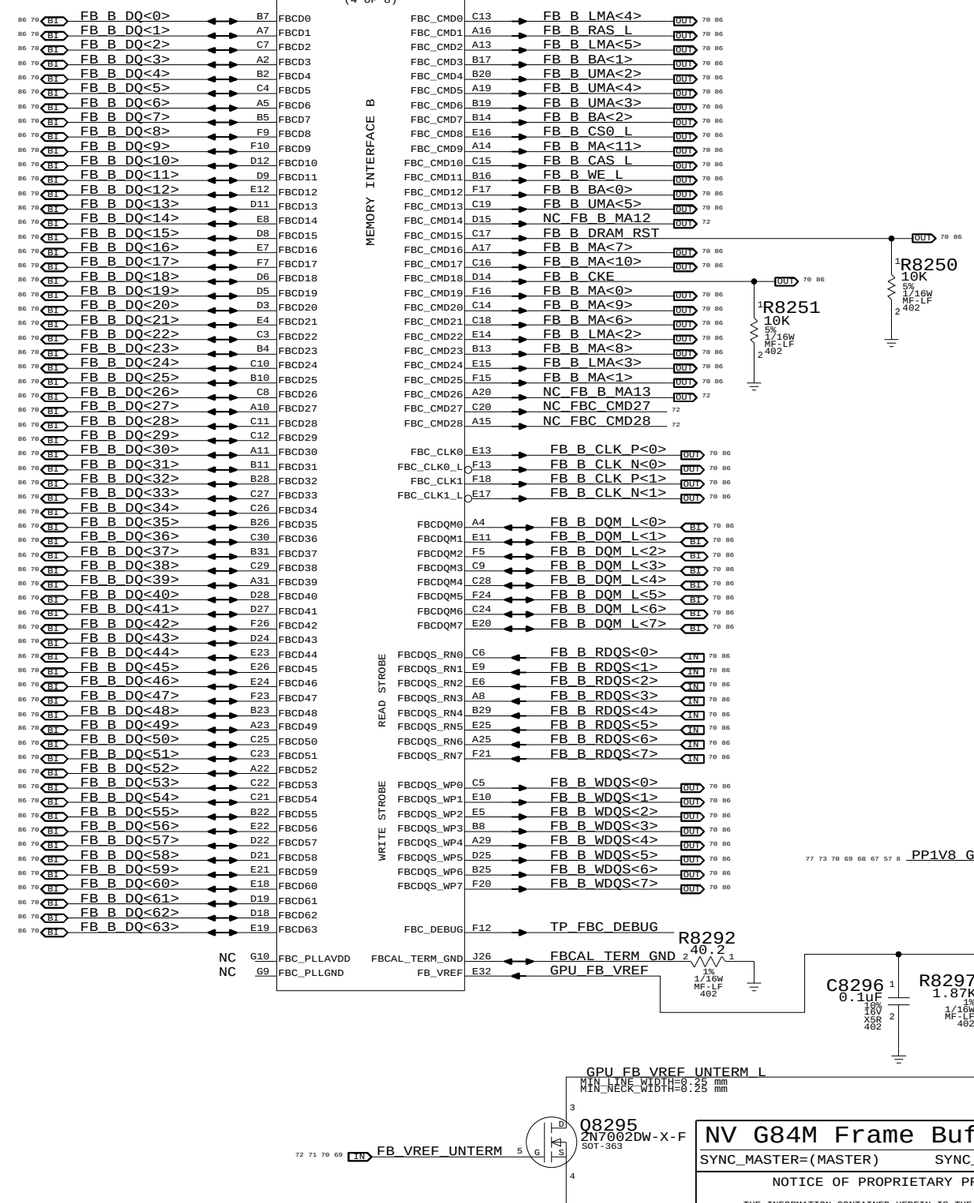
Page Notes

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)



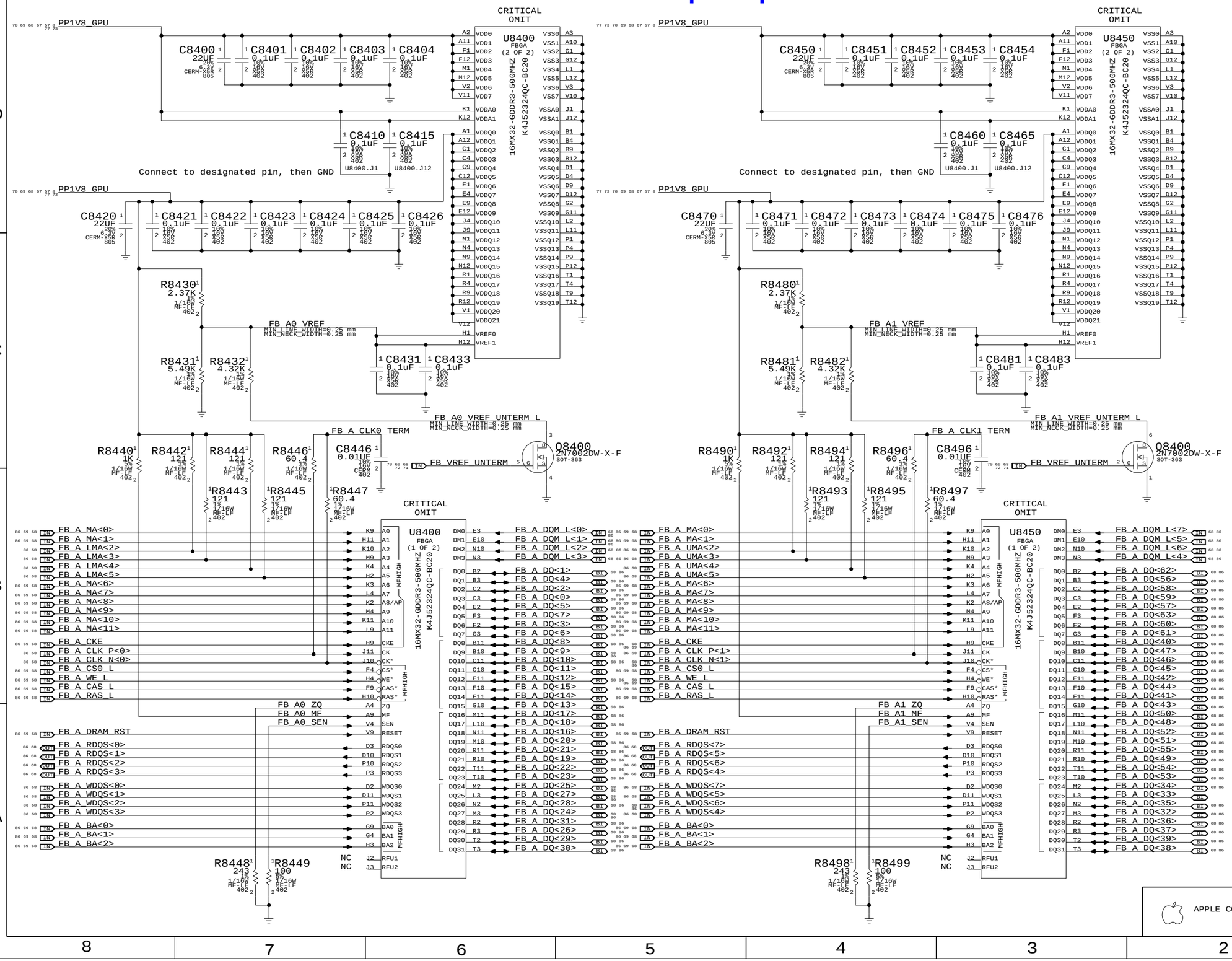


NV G84M Frame Buffer I/F

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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)

NOTICE OF PROPRIETARY PROPERTY

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE

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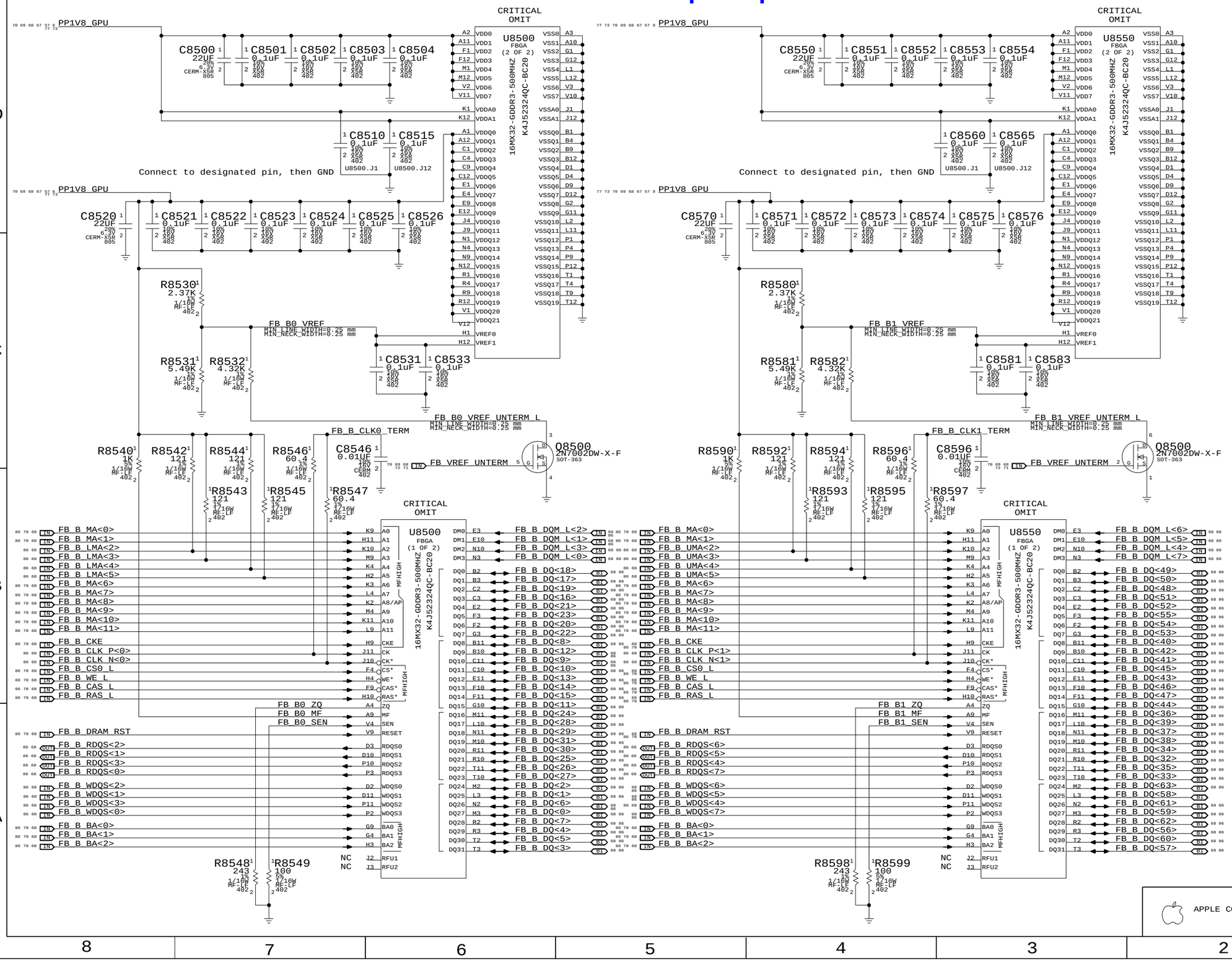

Page Notes

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)

NOTICE OF PROPRIETARY PROPERTY

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE

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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)

OMIT
U8000
NB8P-GS-A1
BGA
(6 OF 8)

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
GPU_TESTMODE_PD H2 TESTMODE
GPU_SWAPRDY_A M6 SWAPRDY_A

SPDIF J6 NC_GPU_SPDIF
STEREO T3 NC_GPU_STEREO
BUFRST_L F3 TP_GPU_BUFRST_L

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
C8610 1UF 10% 6.3V CERM 402
C8611 1UF 10% 6.3V CERM 402
C8617 0.1UF 10% 16V X5R 402
C8619 0.1UF 10% 16V X5R 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

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

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

NV G84M GPIO/MIO/Misc

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE

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GPIOs

	Native Func		
GPU_HPD	HPD0	GPU_HPD	IN
NC_GPU_GPIO_1	HPD1	NC_GPU_GPIO_1	
GPU_BL_PWM	LCD0_BL_PWM	GPU_BL_PWM	OUT
GPU_PANEL_EN	LCD0_VDD	GPU_PANEL_EN	OUT
GPU_BKLT_EN	LCD0_BL_EN	GPU_BKLT_EN	OUT
GPU_VCORE_VID0	VID0	GPU_VCORE_VID0	OUT
GPU_VCORE_VID1	VID1	GPU_VCORE_VID1	OUT
GPU_VGA_EN_L	MEM_VID	GPU_VGA_EN_L	
NC_GPU_GPIO_8	THERM	NC_GPU_GPIO_8	
TP_GPU_GSTATE<0>	FAN_PWM	TP_GPU_GSTATE<0>	
FB_VREF_UNTERM	MEM_VREF	FB_VREF_UNTERM	OUT
GPU_VCORE_VID2	SLI_SYNC	GPU_VCORE_VID2	OUT
GPU_GPIO_12	AC_DET	TP_GPU_GSTATE<1>	
GPU_VCORE_PWRCTL0	PWR_CTL0	GPU_VCORE_PWRCTL0	OUT
GPU_VCORE_PWRCTL1	PWR_CTL1	GPU_VCORE_PWRCTL1	OUT

Config Straps

PP3V3_GPU

	VRAM_SAMSUNG		VRAM_128	NO STUFF	NO STUFF	NO STUFF	NO STUFF	NO STUFF	NO STUFF
	R8720	R8722	R8724	R8726	R8728	R8729	R8730	R8731	R8732
	10K	10K	10K	10K	1K	1K	1K	1K	1K
	5% 1/10W MF-LF 402								

Supported straps:

RAMCFG0	GPU_MIOB_D<0>
RAMCFG1	GPU_MIOB_D<1>
RAMCFG2	GPU_MIOB_D<8>
RAMCFG3	GPU_MIOB_D<9>
3GIO_PADCFG0	GPU_MIOA_D<6>
3GIO_PADCFG1	GPU_MIOA_D<8>
3GIO_PADCFG2	GPU_MIOA_D<9>
3GIO_PADCFG3	GPU_MIOB_HSYNC
PEX_PLL_EN_TERM	GPU_MIOA_D<0>
SUBVENDOR (BIOS ROM PRESENT)	GPU_MIOA_D<1>

	VRAM_HYNIX	NO STUFF	VRAM_256		
	R8721	R8723	R8725	R8727	R8733
	10K	10K	10K	10K	1K
	5% 1/10W MF-LF 402				

Straps not supported:

CRYSTAL	MIOB_D<2>
TVMODE<2..0>	MIOB_D<6,10,7>
PCI_DEVID<4..0>	MIOB_CTL3, MIOB_D<11,3,5,4>
USER<3..0>	MIOA_D<5..2>
ROMTYPE<1..0>	MIOB_VSYNC, MIOB_D<10>
SLOT_CLOCK_CFG	MIOA_HSYNC
PCI_IOBAR	MIOB_D<7>
BAR2_SIZE	MIOB_DE

Renamed signals

GPU_CLK27M_GATED	GPU_CLK27M_GATED
GPU_CLK27M_SS_GATED	GPU_CLK27M_SS_GATED
GPU_TDIODE_P	GPU_TDIODE_P
GPU_TDIODE_N	GPU_TDIODE_N
GPU_DVI_DDC_CLK	GPU_DVI_DDC_CLK
GPU_DVI_DDC_DATA	GPU_DVI_DDC_DATA
GPU_PANEL_DDC_CLK	GPU_PANEL_DDC_CLK
GPU_PANEL_DDC_DATA	GPU_PANEL_DDC_DATA

Unused I2C Buses

NC_GPU_I2CA_SCL	NC_GPU_I2CA_SCL
NC_GPU_I2CA_SDA	NC_GPU_I2CA_SDA

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

Unused signals

NC_GPU_XTALOUT	NC_GPU_XTALOUT
NC_GPU_SPDIF	NC_GPU_SPDIF
NC_GPU_STEREO	NC_GPU_STEREO
NC_FB_A_MA12	NC_FB_A_MA12
NC_FB_B_MA12	NC_FB_B_MA12
NC_FB_A_MA13	NC_FB_A_MA13
NC_FB_B_MA13	NC_FB_B_MA13
NC_FBA_CMD27	NC_FBA_CMD27
NC_FBC_CMD27	NC_FBC_CMD27
NC_FBA_CMD28	NC_FBA_CMD28
NC_FBC_CMD28	NC_FBC_CMD28
NC_GPU_ROM_CS_L	NC_GPU_ROM_CS_L
NC_GPU_ROM_SCLK	NC_GPU_ROM_SCLK
NC_GPU_ROM_SI	NC_GPU_ROM_SI
NC_GPU_ROM_SO	NC_GPU_ROM_SO
NC_GPU_CSYNC	NC_GPU_CSYNC
NC_GPU_R2	NC_GPU_R2
NC_GPU_G2	NC_GPU_G2
NC_GPU_B2	NC_GPU_B2
NC_GPU_H2SYNC	NC_GPU_H2SYNC
NC_GPU_V2SYNC	NC_GPU_V2SYNC
NC_LVDS_U_DATAP<3>	NC_LVDS_U_DATAP<3>
NC_LVDS_U_DATAN<3>	NC_LVDS_U_DATAN<3>
NC_LVDS_L_DATAP<3>	NC_LVDS_L_DATAP<3>
NC_LVDS_L_DATAN<3>	NC_LVDS_L_DATAN<3>
TP_GPU_MIOA_CLKOUT_P	TP_GPU_MIOA_CLKOUT_P
TP_GPU_MIOA_CLKOUT_N	TP_GPU_MIOA_CLKOUT_N
TP_GPU_MIOA_CTL3	TP_GPU_MIOA_CTL3
TP_GPU_MIOA_DE	TP_GPU_MIOA_DE
TP_GPU_MIOA_D<5..2>	GPU_MIOA_D<5..2>
TP_GPU_MIOA_D<7>	TP_GPU_MIOA_D<7>
TP_GPU_MIOA_D<11..10>	GPU_MIOA_D<11..10>
TP_GPU_MIOA_HSYNC	TP_GPU_MIOA_HSYNC
TP_GPU_MIOA_VSYNC	TP_GPU_MIOA_VSYNC
TP_GPU_MIOB_CLKIN	TP_GPU_MIOB_CLKIN
TP_GPU_MIOB_CLKOUT_P	TP_GPU_MIOB_CLKOUT_P
TP_GPU_MIOB_CLKOUT_N	TP_GPU_MIOB_CLKOUT_N
TP_GPU_MIOB_CTL3	TP_GPU_MIOB_CTL3
TP_GPU_MIOB_DE	TP_GPU_MIOB_DE
TP_GPU_MIOB_D<7..2>	GPU_MIOB_D<7..2>
TP_GPU_MIOB_D<11..10>	GPU_MIOB_D<11..10>
TP_GPU_MIOB_VSYNC	TP_GPU_MIOB_VSYNC
NC_GPU_IFPD_CLK_P	NC_GPU_IFPD_CLK_P
NC_GPU_IFPD_CLK_N	NC_GPU_IFPD_CLK_N

HDCP Support

PP3V3_GPU

HDCP C8770 0.1UF 20% 10V CERM 402

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

HDCP CRITICAL

U8770 AT88SC080C SO1

GPU_I2CH_SCL

GPU_I2CH_SDA

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

NC

Analog Video Mux

PP3V3_GPU

C8700 0.1UF 20% 10V CERM 402

CRITICAL OMIT

U8700 QFN TS3V330

GPU_VGA_R	GPU_TV_C_VGA_R
GPU_VGA_G	GPU_TV_Y_VGA_G
GPU_VGA_B	GPU_TV_COMP_VGA_B

R8740 R8741 R8742 150 1% 1/10W MF-LF 402

Place Rs near GPU

GPU_TV_C	
GPU_TV_Y	
GPU_TV_COMP	

R8743 R8744 R8745 150 1% 1/10W MF-LF 402

Place Rs near GPU

S1A S2A S1B S2B S1C S2C S1D S2D DA DB DC DD IN EN_L THRML PAD GND VCC

DD: NC

IN: GPU_VGA_EN_L

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

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

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

TMDS Backdrive Protection

CRITICAL Q8790 SI2305DS SOT-23

PP3V3_GPU

PP3V3_GPU_TMDS

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

GPU_TMDS_PWREN_L

Q8925 2N7002DW-X-F SOT-363

PM_GPUVCORE_EN

R8791 100K 5% 1/10W MF-LF 402

Unused Clocks

GPU_CLK27M_SS_GATED

GPU_XTALOUTBUFF

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

GPU_SS_INT

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

GPU Straps

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0
SCALE: NONE	SHT 72 OF 88	

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
C8805 4.7UF 20% 6.3V CERM 603
C8806 0.1UF 20% 10V CERM 402
C8810 4.7UF 20% 6.3V CERM 603
C8811 0.1UF 20% 10V CERM 402
C8813 0.1UF 20% 10V CERM 402
C8815 4.7UF 20% 6.3V CERM 603
C8816 0.1UF 20% 10V CERM 402

20mA peak per diff pair
160mA peak for all pairs
Place at AF9 Place at AF8
40mA peak
20mA peak per diff pair
200mA peak for all pairs
Place at AD6 Place at AE7
40mA peak

76 72 8 PP3V3_GPU_TMDS

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

73 GPU_IFPAB_VPROBE
73 GPU_IFPAB_RSET
73 GPU_IFPCD_VPROBE
73 GPU_IFPCD_RSET

OMIT
U8000
NB8P-GS-A1
BGA
(5 OF 8)

AF9 IFPA_IOVDD
AF8 IFPB_IOVDD
AC9 IFPAB_PLLVDD
AD9 IFPAB_PLLGND
AM4 IFPAB_VPROBE
AL5 IFPAB_RSET
AD6 IFPC_IOVDD
AE7 IFPD_IOVDD
AA10 IFPCD_PLLVDD
AB10 IFPCD_PLLGND
AK3 IFPCD_VPROBE
AH3 IFPCD_RSET

IFPA_TXC AK9 LVDS_L_CLK_P
IFPA_TXC_L AJ9 LVDS_L_CLK_N
IFPA_TXD0 AH6 LVDS_L_DATA_P<0>
IFPA_TXD0_L AJ6 LVDS_L_DATA_N<0>
IFPA_TXD1 AH8 LVDS_L_DATA_P<1>
IFPA_TXD1_L AH7 LVDS_L_DATA_N<1>
IFPA_TXD2 AJ8 LVDS_L_DATA_P<2>
IFPA_TXD2_L AK8 LVDS_L_DATA_N<2>
IFPA_TXD3 AJ5 NC_LVDS_L_DATAP<3>
IFPA_TXD3_L AH5 NC_LVDS_L_DATAN<3>
IFPB_TXC AK4 LVDS_U_CLK_P
IFPB_TXC_L AL4 LVDS_U_CLK_N
IFPB_TXD4 AM6 LVDS_U_DATA_P<0>
IFPB_TXD4_L AM5 LVDS_U_DATA_N<0>
IFPB_TXD5 AM7 LVDS_U_DATA_P<1>
IFPB_TXD5_L AL7 LVDS_U_DATA_N<1>
IFPB_TXD6 AK6 LVDS_U_DATA_P<2>
IFPB_TXD6_L AK5 LVDS_U_DATA_N<2>
IFPB_TXD7 AK7 NC_LVDS_U_DATAP<3>
IFPB_TXD7_L AL8 NC_LVDS_U_DATAN<3>
IFPC_TXC AM2 TMDS_CLK_P
IFPC_TXC_L AM3 TMDS_CLK_N
IFPC_TXD0 AE2 TMDS_DATA_P<0>
IFPC_TXD0_L AE1 TMDS_DATA_N<0>
IFPC_TXD1 AF1 TMDS_DATA_P<1>
IFPC_TXD1_L AF2 TMDS_DATA_N<1>
IFPC_TXD2 AG1 TMDS_DATA_P<2>
IFPC_TXD2_L AH1 TMDS_DATA_N<2>
IFPD_TXC AG3 NC_GPU_IFPD_CLK_P
IFPD_TXC_L AH2 NC_GPU_IFPD_CLK_N
IFPD_TXD4 AK1 TMDS_DATA_P<3>
IFPD_TXD4_L AJ1 TMDS_DATA_N<3>
IFPD_TXD5 AL2 TMDS_DATA_P<4>
IFPD_TXD5_L AL1 TMDS_DATA_N<4>
IFPD_TXD6 AJ2 TMDS_DATA_P<5>
IFPD_TXD6_L AJ3 TMDS_DATA_N<5>
DACA_RED AH11 GPU_VGA_R
DACA_GREEN AJ12 GPU_VGA_G
DACA_BLUE AH12 GPU_VGA_B
DACA_HSYNC AF10 GPU_VGA_HSYNC
DACA_VSYNC AK10 GPU_VGA_VSYNC
DACB_RED R6 GPU_TV_C
DACB_GREEN T5 GPU_TV_Y
DACB_BLUE T6 GPU_TV_COMP
DACB_CSYNC U5 NC_GPU_CSYNC
DACC_RED AF6 NC_GPU_R2
DACC_GREEN AG6 NC_GPU_G2
DACC_BLUE AE5 NC_GPU_B2
DACC_HSYNC AG7 NC_GPU_H2SYNC
DACC_VSYNC AG5 NC_GPU_V2SYNC
I2CA_SCL K2 NC_GPU_I2CA_SCL
I2CA_SDA J3 NC_GPU_I2CA_SDA
I2CB_SCL H4 GPU_DVI_DDC_CLK
I2CB_SDA J4 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
C8830 4.7UF 20% 6.3V CERM 603
C8831 0.1UF 20% 10V CERM 402
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
150mA peak
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

73 GPU_DACA_VREF
73 GPU_DACA_RSET
73 GPU_DACB_VREF
73 GPU_DACB_RSET
73 GPU_DACC_VREF
73 GPU_DACC_RSET

77 72 B1 GPU_PANEL_DDC_CLK
77 72 B1 GPU_PANEL_DDC_DATA
72 B1 GPU_I2CH_SCL
72 B1 GPU_I2CH_SDA
84 51 48 45 B1 SMBUS_SMC_0_S0_SCL
84 51 48 45 B1 SMBUS_SMC_0_S0_SDA

AD10 DACA_VDD
AG9 DACA_IDUMP
AH10 DACA_VREF
AH9 DACA_RSET
V8 DACB_VDD
V7 DACB_IDUMP
R5 DACB_VREF
R7 DACB_RSET
AD7 DACC_VDD
AG4 DACC_IDUMP
AH4 DACC_VREF
AF5 DACC_RSET
G2 I2CC_SCL
G1 I2CC_SDA
G3 I2CH_SCL
H3 I2CH_SDA
C1 I2CS_SCL
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)

APPLE COMPUTER INC.

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GPU VCore Regulator

GPU VCore Current Sense

PP5V_S5
R8901 200 1% 1/16W MF-LF 402
PP5V_S5_GPUVCORE_V5FILT
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
VOLTAGE=5V
C8901 2.2UF 10% 16V X5R 603
C8900 1UF 10% 16V X5R 603
U8900 CRITICAL
TPS51117RGY_QFN14
SYM_1 OF 2
V5FILT V5DRV TON VBST DRVH LL DRVL PGOOD VOUT VFB TRIP GND THRM_PAD PGND
PM_GPUVCORE_EN
PM_GPUP1V8FET_EN
(=PPVCORE_GPU_REG)
GPUVCORE_VFB
GPUVCORE_TRIP
GPUVCORE_TON
GPUVCORE_VBST
GPUVCORE_DRVH
GPUVCORE_LL
GPUVCORE_DRVL
R8905 10.5K 1% 1/16W MF-LF 402
XW8900 SM
(GND)
GND_GPUVCORE_SGND
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.25 mm
VOLTAGE=0V
(GPUVCORE_VFB)
(=PPVCORE_GPU_REG)
PPBUS_G3H
(GPUVCORE_TON)
GPUVCORE_BOOT_R
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.25 mm
R8915 0 5% 1/16W MF-LF 402
C8915 0.1UF 20% 16V CERM 402
R8919 200K 1% 1/16W MF-LF 402
C8931 CRITICAL 22UF 20% 16V POLY CASE-D2-LF
C8930 CRITICAL 22UF 20% 16V POLY CASE-D2-LF
C8932 1UF 20% 25V X5R 603
Q8920 CRITICAL RJK0305DPB LFPAK
Q8922 CRITICAL RJK0301DPB LFPAK
Q8921 CRITICAL RJK0301DPB LFPAK
NO STUFF C8921 1000PF 10% 25V X7R 402
MIN_LINE_WIDTH=0.25 mm
MIN_NECK_WIDTH=0.2 mm
MIN_LINE_WIDTH=0.6 mm
MIN_NECK_WIDTH=0.2 mm
GATE_NODE=TRUE
SWITCH_NODE=TRUE
Vout = 0.75V * (1 + Ra / Reg)
Vout(min) = 0.75V * (1 + Ra / Rb)
Reg = Rb || Rc || Rd || Re
GPUVISENS_NTC
R8996 1K 1% 1/16W MF-LF 402
CRITICAL R8997 10KOHM-5% 0603-LF
NO STUFF R8994 1K 1% 1/16W MF-LF 402
C8990 0.47UF 10% 6.3V CERM-X5R 402
R8993 20.0K 1% 1/16W MF-LF 402
GPUISENS_NEG
C8991 0.22UF 10% 6.3V CERM-X5R 402
PVCORE_GPU_NTC
GPUISENS_RC
R8991 20.0K 1% 1/16W MF-LF 402
GPUISENS_POS
R8990 649 1% 1/16W MF-LF 402
CRITICAL L8920 1.0UH-20A IHLP4040DZ11-SM
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
V+ V- CRITICAL
GPUVCORE_IOUT
R8992 1M 1% 1/16W MF-LF 402
C8992 470PF 10% 50V CERM 402
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
NO STUFF C8920 100PF 5% 50V CERM 402
<Ra> R8921 2.87K 1% 1/16W MF-LF 402
<Rb> R8922 10K 1% 1/16W MF-LF 402
<Rc> R8923 22.6K 1% 1/16W MF-LF 402
<Rd> R8924 22.6K 1% 1/16W MF-LF 402
<Re> R8925 22.6K 1% 1/16W MF-LF 402
R8926 53.6K 1% 1/16W MF-LF 402
R8927 53.6K 1% 1/16W MF-LF 402
(GPUVCORE_VFB)
GPUVCORE_VFB_PC1
GPUVCORE_VFB_PC0

PP1V25_GPU
R8962 1K 5% 1/16W MF-LF 402
R8960 4.99K 1% 1/16W MF-LF 402
C8961 0.01UF 10% 16V CERM 402
R8961 1K 5% 1/16W MF-LF 402
R8963 1.5K 5% 1/16W MF-LF 402
R8964 10K 5% 1/16W MF-LF 402
GPU_VCORE_PWRCTL0
PC0_DIV
PC0_BIAS
PC0_BIAS_B
Q8927 MMDT3904XF SOT-363-LF
GPUVCORE_VFB_PC0
GND_GPUVCORE_SGND
R8967 1.5K 5% 1/16W MF-LF 402
R8965 4.99K 1% 1/16W MF-LF 402
C8966 0.01UF 10% 16V CERM 402
R8966 1K 5% 1/16W MF-LF 402
R8968 1K 5% 1/16W MF-LF 402
R8969 10K 5% 1/16W MF-LF 402
GPU_VCORE_PWRCTL1
PC1_DIV
PC1_BIAS
PC1_BIAS_B
Q8927 MMDT3904XF SOT-363-LF
GPUVCORE_VFB_PC1
GND_GPUVCORE_SGND

PP3V3_GPU
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
GPUVCORE_VFB_C
GPUVCORE_VFB_D
GPUVCORE_VFB_E
Q8923 2N7002DW-X-F SOT-363
Q8925 2N7002DW-X-F SOT-363
GND_GPUVCORE_SGND

GPU VCore Setpoints

VID2	VID1	VID0	C D E	Vout
0	0	0	- - -	0.965 (rsvd state)
0	0	1	Y - -	1.060 (max batt)
0	1	1	Y Y -	1.156 (balanced)
1	1	1	Y Y Y	1.251 (max perf)

All other states not defined

GPU (G84M) Core Supply

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

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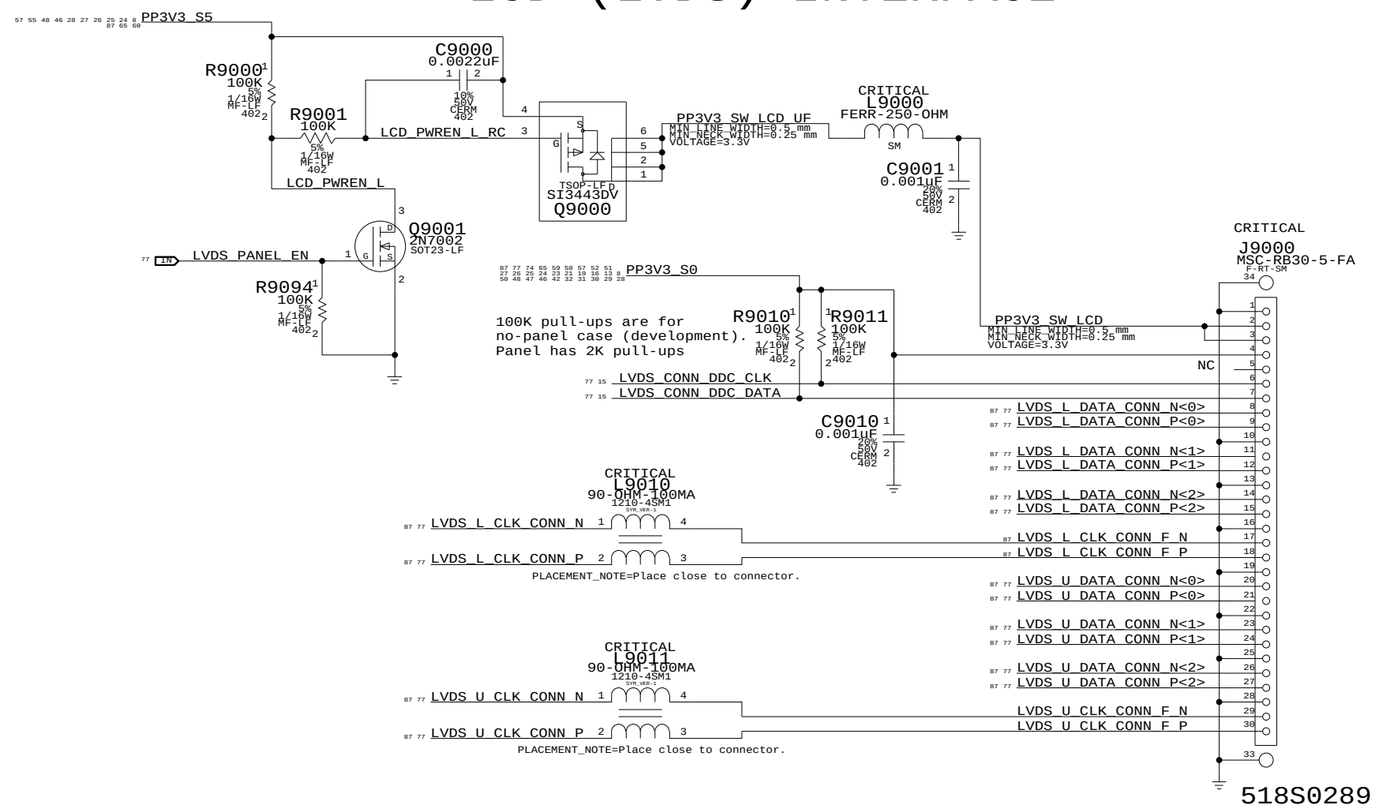
LCD (LVDS) INTERFACE



LVDS Display Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE: NONE SHT 75 OF 88

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>
PP3V3_GPU_TMDS — NO STUFF C9462 0.01UF 10% 16V CERM 402
SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS — NO STUFF R9463 49.9 1% 1/16W MF-LF 402
TMDS_DATA_P<0> — TMDS_DATA_F_P<0>
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>
PP3V3_GPU_TMDS — NO STUFF C9466 0.01UF 10% 16V CERM 402
SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS — NO STUFF R9467 49.9 1% 1/16W MF-LF 402
TMDS_DATA_P<1> — TMDS_DATA_F_P<1>
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>
PP3V3_GPU_TMDS — NO STUFF C9470 0.01UF 10% 16V CERM 402
SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS — NO STUFF R9471 49.9 1% 1/16W MF-LF 402
TMDS_DATA_P<2> — TMDS_DATA_F_P<2>
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
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
TMDS_CLK_P — R9473 0 5% 1/16W MF-LF 402 — TMDS_CLK_R_P — TMDS_CLK_F_P
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>
PP3V3_GPU_TMDS — NO STUFF C9478 0.01UF 10% 16V CERM 402
SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS — NO STUFF R9479 49.9 1% 1/16W MF-LF 402
TMDS_DATA_P<3> — TMDS_DATA_F_P<3>
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>
PP3V3_GPU_TMDS — NO STUFF C9482 0.01UF 10% 16V CERM 402
SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS — NO STUFF R9483 49.9 1% 1/16W MF-LF 402
TMDS_DATA_P<4> — TMDS_DATA_F_P<4>
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>
PP3V3_GPU_TMDS — NO STUFF C9486 0.01UF 10% 16V CERM 402
SIGNAL_MODEL=EMPTY PP3V3_GPU_TMDS — NO STUFF R9487 49.9 1% 1/16W MF-LF 402
TMDS_DATA_P<5> — TMDS_DATA_F_P<5>
PLACEMENT_NOTE=Place close to connector.

VGA SYNC Buffers

PP3V3_GPU — U9450 MC74VHC1G08 SC70 — PLACEMENT_NOTE=Place close to connector.
GPU_VGA_VSYNC — C9450 0.1UF 10% 16V CERM 402 — VGA_VSYNC_R — R9450 33 5% 1/16W MF-LF 402 — VGA_VSYNC

PP3V3_GPU — U9451 MC74VHC1G08 SC70 — PLACEMENT_NOTE=Place close to connector.
GPU_VGA_HSYNC — C9451 0.1UF 10% 16V CERM 402 — VGA_HSYNC_R — R9451 33 5% 1/16W MF-LF 402 — VGA_HSYNC

ANALOG FILTERING
PLACE CLOSE TO CONNECTOR

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

DVI INTERFACE

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

PP5V_S0 — 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

TMDS_DATA_F_N<0> — TMDS_DATA_F_N<2>
TMDS_DATA_F_N<1>
TMDS_DATA_F_P<0> — TMDS_DATA_F_P<2>
TMDS_DATA_F_P<1>
TMDS_DATA_F_N<5> — TMDS_DATA_F_N<4>
TMDS_DATA_F_N<3>
TMDS_DATA_F_P<5> — TMDS_DATA_F_P<4>
TMDS_DATA_F_P<3>
TMDS_CLK_F_P — DVI_DDC_CLK_R
TMDS_CLK_F_N — (PP5V_S0_DDC) — C9411 100pF 50V CERM 402
DVI_DDC_DATA_R — C9413 100pF 50V CERM 402
VGA_VSYNC — DVI_HPD_R — C9414 100pF 50V CERM 402
VGA_B — VGA_R
VGA_HSYNC — VGA_G
VGA_TERM_CONN R9445 150 1% 1/16W MF-LF 402
VGA_TERM_CONN R9443 150 1% 1/16W MF-LF 402
VGA_TERM_CONN R9444 150 1% 1/16W MF-LF 402
C9410 0.01UF 50V CERM 603
514-0278

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

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

GPU Isolation / Level-Shift

PP3V3_GPU
R9410 4.7K 5% 1/16W MF-LF 402
R9412 4.7K 5% 1/16W MF-LF 402
R9411 100 5% 1/16W MF-LF 402 — DVI_DDC_CLK — Q9411 2N7002DW-X-F SOT-363 — R9420 10K 5% 1/16W MF-LF 402 — GPU_DVI_DDC_CLK (OUT)
R9413 100 5% 1/16W MF-LF 402 — DVI_DDC_DATA — Q9411 2N7002DW-X-F SOT-363 — R9421 10K 5% 1/16W MF-LF 402 — GPU_DVI_DDC_DATA (OUT)
GPU_HPD_BILAT — GPU_IOENABLE_RC (IN)
R9414 100 5% 1/16W MF-LF 402 — DVI_HPD — Q9414 2N7002DW-X-F SOT-363 — R9422 270K 5% 1/16W MF-LF 402 — GPU_HPD (OUT)
PP5V_S0 — R9423 270K 5% 1/16W MF-LF 402
Q9415 2N7002DW-X-F SOT-363 — DVI_HOTPLUG_DET (OUT)
R9415 20K 5% 1/16W MF-LF 402

DVI Display Connector

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

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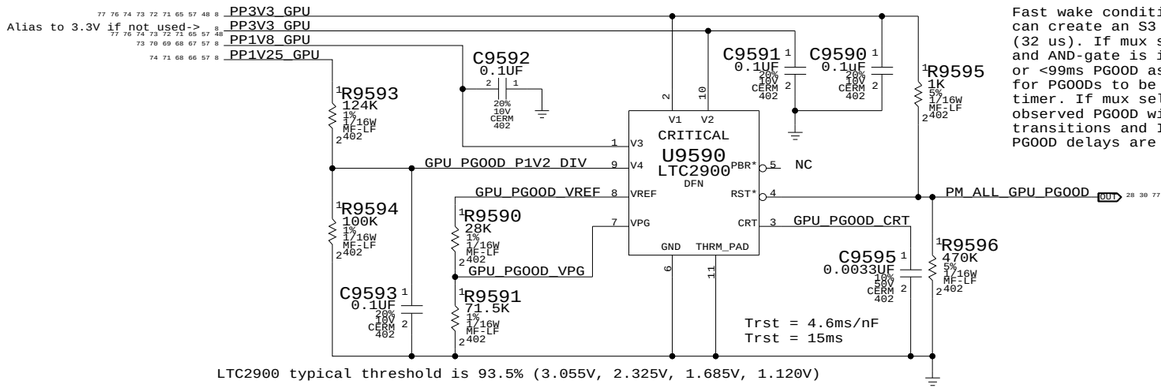
SCALE: NONE	SHT 76 OF 88	

PGOOD Monitor for GPU Rails

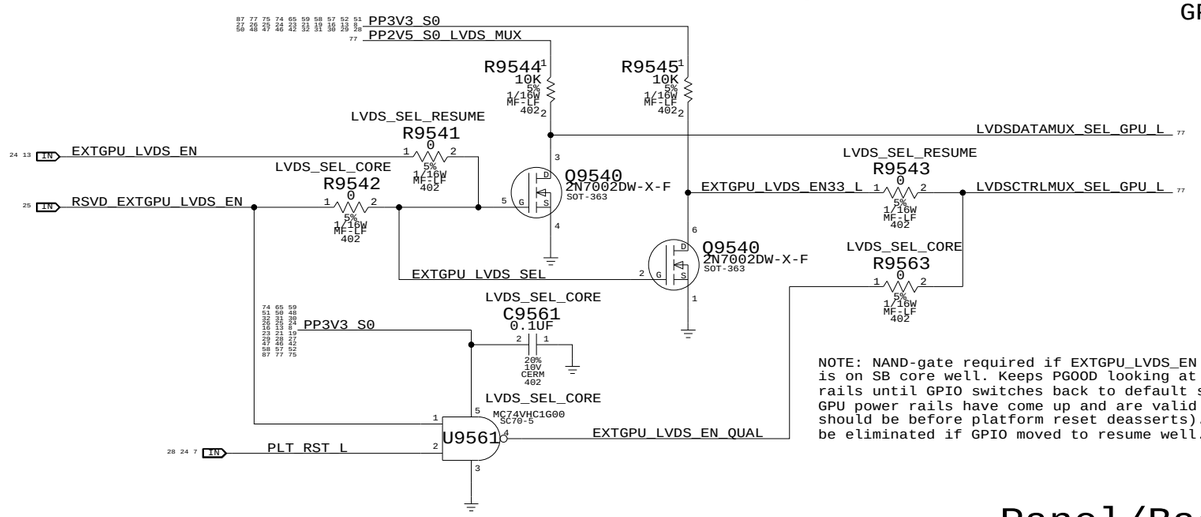
LTC2900 provides programmable reset delay which is required to play nice with ICHx PGOOD circuit



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

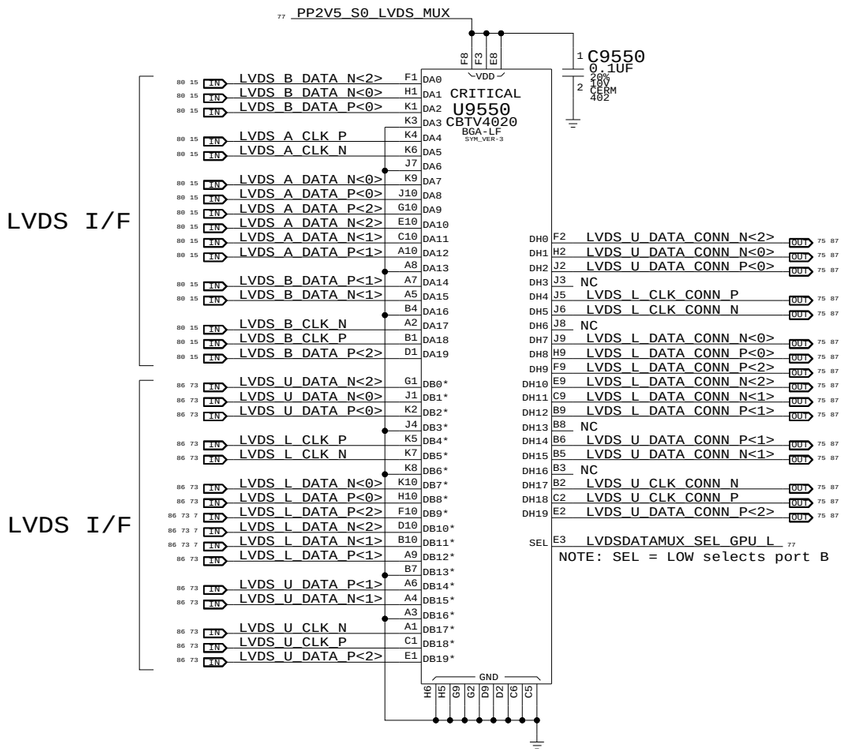
Fast wake condition is worst case. ICHx can create an S3 duration of 1 RTC clock (32 us). If mux select on resume well, then observed PGOOD will not change during S3 transitions and ICHx will honor whatever PGOOD delays are provided.

Mux Select Conditioning

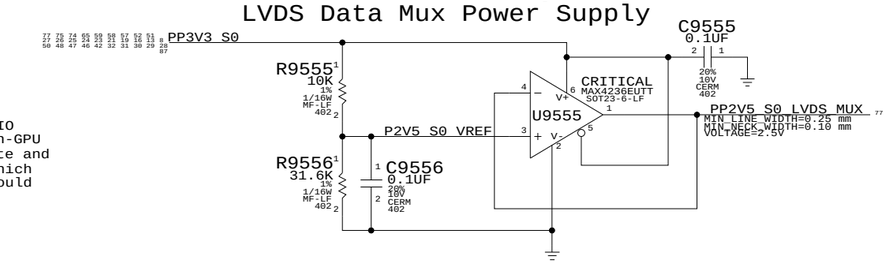


NOTE: NAND-gate required if EXTGPU_LVDS_EN GPIO is on SB core well. Keeps PGOOD looking at non-GPU rails until GPIO switches back to default state and GPU power rails have come up and are valid (which should be before platform reset deasserts). Could be eliminated if GPIO moved to resume well.

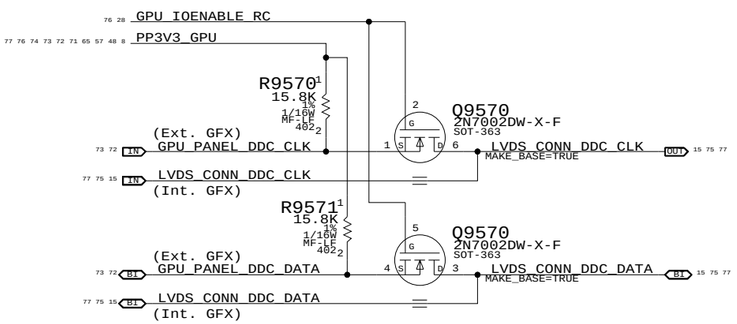
LVDS I/F Mux



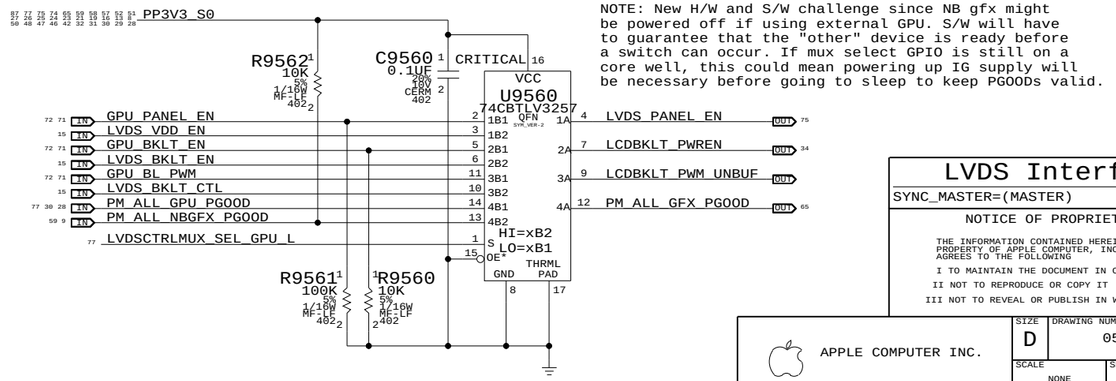
LVDS Data Mux Power Supply



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

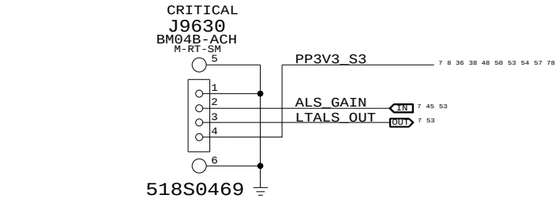
SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

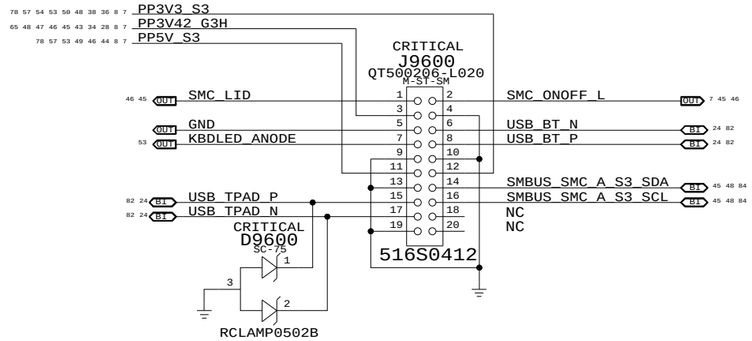
SCALE: NONE SHT: 77 OF: 88

Left ALS Connector

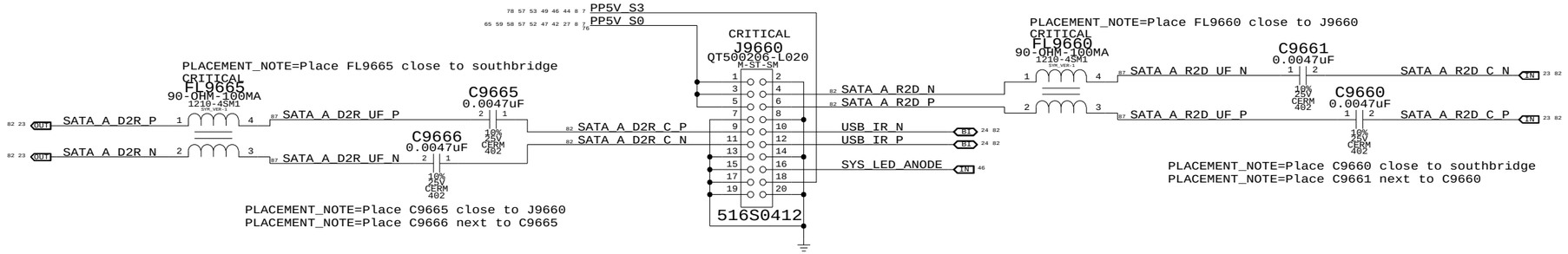


White colored version of 518S0369

Top-Case Connector



SATA HDD & IR & SIL Flex Connector



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	10.0.0
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 & 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	10.0.0
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	10.0.0

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	DRAWING NUMBER	REV.
D	051-7225	10.0.0
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Disk Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
IDE_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
SATA_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
SATA_100D	*	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF	=100_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
IDE	*	=1.8:1_SPACING	?
SATA	*	20 MIL	?

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

HD Audio Interface Constraints

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
HDA	*	=1.8:1_SPACING	?

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

USB 2.0 Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
USB_60S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
USB_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	*	20 MIL	?
USB_2CLK	*	25 MIL	?

DG says minimum spacing 50 mils to clocks

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

Internal Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SMB_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD
SPI_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SMB	*	=3:1_SPACING	?
SPI	*	=1.8:1_SPACING	?

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

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	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	10.0.0

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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	DRAWING NUMBER	REV.
D	051-7225	10.0.0

SCALE	SHT	OF
NONE	83	88

Clock Signal Constraints

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

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

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

Clock Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	SPACING		
CK505_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 78
SMBUS_SMC_A_S3_SDA	SMB_55S	SMB	SMBUS_SMC_A_S3_SDA	45 48 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	10.0.0
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	NET_TYPE 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	10.0.0

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

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

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

GPU (G84M) Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

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D	051-7225	10.0.0
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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
LVDS	GND	*	GND_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

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		

M75 Specific Net Properties

ELECTRICAL_CONSTRAINT_SET	NET_TYPE PHYSICAL	NET_TYPE SPACING		
(CK505_SRC7)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_XDP_P	
(CK505_SRC7)	CLK_PCIE_100D	CLK_PCIE	PCIE_CLK100M_XDP_N	
(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
(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
	ENET_100D	ENET_MDI	ENET_MDI_R_P<3..0>	37
	ENET_100D	ENET_MDI	ENET_MDI_R_N<3..0>	37
	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
(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	51
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	REMTHMSNS_DX_P	7 51
THERM_DIFFPAIR	THERM_1TO1_55S	THERM	RSFSTHMSNS_D_P	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 62 87
		PP1V8_MEM	PP1V8_S3	8 31 32 38 50 62 87
		GND	GND	
		SB_POWER	PP3V3_S5	8 24 25 26 27 28 46 48 55 57 60
		SB_POWER	PP3V3_S0	52 57 58 59 65 74 75 77 78 8 24 25 26 27 28 29 30 31 32 42 46 47 48 50 51
		SB_POWER	PP1V5_S0	8 11 12 19 22 26 27 34 63
		SB_POWER	PP1V25_S0_SB_DMI	
		ENET_POWER	PP1V05_ENET_SRC	
		FW_POWER	LCL_FW_1V8	

M75 Specific Constraints

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

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D	051-7225	10.0.0
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	*	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

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

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

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1.5:1_SPACING	*	0.15 MM	?
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

M75 Rule Definitions

SYNC_MASTER=(MASTER) SYNC_DATE=(MASTER)

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-7225	10.0.0

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