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.

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD DATE	ENG APPD DATE
B		358902	PRODUCTION RELEASED	01/07/05	?

SCHEM,MLB,PB15"
01/07/2005

BOM OPTIONS (IN COMMON PARTS)

STUFF	NO STUFF
1_8V_MAXBUS	1_5V_MAXBUS
NO_SSCG	SSCG
5V_HD_LOGIC	3V_HD_LOGIC
NO_BBANG	BBANG
INT_2_5V_COLD	INT_2_5V_HOT
ATI_MEMIO_HI	ATI_MEMIO_LO
SOFT_MODEM	USB_MODEM
GPU_PWRMSR	EMI
GPU_SS	EXT_TMDS (BETTER/BEST)
VGA_BUFFER_RES	INT_TMDS (BEST128)
MMM	SUPERCAP
INT_TMDS (BETTER/BEST)	ADT7460
EXT_TMDS (BEST128)	
BACKUP_BATT	
ADT7467	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
051-6680	1	SCHEM,MLB,PB15	SCH1	
820-1679	1	PCBF,MLB,PB15	PCB1	

DIMENSIONS ARE IN MILLIMETERS
XX ±
X.XX ±
X.XXX ±
ANGLES °
DO NOT SCALE DRAWING
THIRD ANGLE PROJECTION

METRIC

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

MATERIAL/FINISH NOTED AS APPLICABLE
SIZE D

Apple Computer Inc.

TITLE
SCHEM,MLB,PB15

DRAWING NUMBER 051-6680 REV. B

SHT 1 OF 46

U51 INTREPID

J23 Ethernet Connector P.28
4 DATA PAIRS
U43 Ethernet PHY P.28
G/MII
3.3V
10/100/1000
8BIT TX
8BIT RX
125MHZ

J24 FW - A Connector P.30
2 DATA PAIRS @ 200MHZ
J20 FW - B Connector P.30
2 DATA PAIRS @ 400MHZ
U36 FireWire PHY P.29
1394 OHCI
3.3V
8BIT TX/RX
50MHZ

J13 ODD Connector P.26
EIDE
J12 HDD Connector P.26
UIDE

J15 SW MODEM Connector P.27
J3 LIO/Audio Connector P.27
I2S
I2C
I2C
U53/J1/J18 Fan Circuit P.27

J2 RUX Board Connector P.24
J19 ALS BOARD Connector P.24
J16 BACKUP BATTERY CONNECTOR P.33
C692 SUPERCAP P.33
J26 Battery Connector P.32
Power Supply & Charger P.32-36
J27 DC-In Connector P.32
J8 SLEEP LED P.24
SMBUS
3.3V
U28 PMU P.31
SERIAL
5V
J5 CARDBUS Connector P.18
33MHZ
16/32 BITS
3.3V/5V
U8 TI PCI1510 CardBus Controller P.18

U15/U20/U58 MMM P.25
U41 BATTERY CURRENT SENSOR P.25

NOT USED

ETHERNET 10/100/1000 P.13	FIREWIRE 400 MB/S P.13	UATA 100 P.13	EIDE P.13	CARDSLOT P.13	I2S P.14	I2C P.13 P.14
USB PORT A P.14					SCCA P.14	
USB PORT B P.14					VIA/PMU P.14	
USB PORT C P.14					BOOTROM P.12	
USB PORT D P.14					PCI 64BITS 33MHZ P.12	
USB PORT E P.14						
USB PORT F P.14						
MAXBUS P.8					4X AGP P.12	

J28 Serial Debug Connector P.27
U11 BOOT ROM 1M X 8 P.9
J6 AIRPORT Connector P.26
PCI BUS
32BITS
33MHZ
3.3V

J3 BlueTooth (LIO) P.27
J10 SPIDEY P.24

AGP BUS
1.5V/3.3V
32BITS
66MHZ
U47 ATI M11 64MB P.19-22
MEMORY CH. A (INTERNAL MEM)
MEMORY CH. C (INTERNAL MEM)
MEMORY CH. B (INTERNAL MEM)
MEMORY CH. D (INTERNAL MEM)
U17 NEC USB2.0 EHCI HC P.17
J3 LEFT USB (VIA LIO) P.27
J17 RIGHT USB (VIA STATLER) P.27

MAXBUS
1.8V
167MHZ
32BIT ADDRESS
64BIT DATA
U56 APOLLO CPU (MPC7447) P.5-6
CPU PLL Config P.7
PMU

DDR MEMORY P.9
MEMORY BUS
2.5V
167MHZ
64BITS
U16/U18/U28/U27 2:1 DDR MUXES P.10
J25 DDR SDRAM DIMM 0
DDR SDRAM DIMM 1 SO-DIMM Connector P.11

J4 Inverter Connector P.23
LVDS
EDID (I2C)
S-VIDEO
COMPOSITE
TMDS (VIA SIL1162)
RGB
DDC
J14 LCD Panel Connector P.23
J21 S-Video Connector P.23
J22 DVI-I Connector P.23

SYSTEM BLOCK DIAGRAM

APPLE COMPUTER INC.
SIZE D | DRAWING NUMBER 051-6680 | REV. B
SCALE NONE | SHT 2 OF 46

POWER SYSTEM ARCHITECTURE

AC ADAPTER IN PG 32

INRUSH LIMITER PG 32

+24V_PBUS

1V20_REF - PG 33
>~13.44V TURNS-ON
<~13.44V SHUTS-OFF

RUN/SS
BUCK VCC REGULATOR (LTC1625) PG 33
AC: 12.8V
NO AC: BATTERY VOLTAGE
1625 NOT RUNNING
SHUTDOWN: RUNNING
SLEEP: RUNNING
RUN: RUNNING

+PBUS

RC AT 1M*0.047UF @ 24V
STARTS 2.0MSEC AFTER DCDC_EN_L BECOMES LOW

14V_PBUS

+3V_PMU LDO PG 33

+BATT

+5V_MAIN
+3V_PMU
+4_6V_BU

RUN/SS - 5V
TURNS ON AT >1V
<100UA ALLOWED
INTERNAL ZENER CLAMP TO 6V

MAIN 3V/5V DC/DC (LTC3707) PG 34

VCC STBYMD PGOOD

SHUTDOWN: STOPPED
SLEEP: RUNNING
RUN: RUNNING

INTERNAL ZENER CLAMP TO 6V
<100UA ALLOWED
TURNS ON AT >1V
RUN/SS - 3V

+5V_MAIN
3V_5V_OK

HOLDS BOTH RUN/SS AT GND WHEN IT'S CONNECTED TO GND
TURNS CONTROL TO RUN/SS WHEN IT'S OPEN

+3.3V_MAIN

RC AT 1M*0.1UF @ 24V
STARTS ~4.25MSEC AFTER DCDC_EN_L BECOMES LOW

NO INRUSH PROTECTION
WHEN ONLY BATTERY IS CONNECTED

+24V_PBUS

BACKUP BATTERY

14V_PBUS

14V CHARGES BACKUP BATTERY

24V IS OUTPUT ONLY FROM BACKUP BATTERY

CHARGER INPUT & BOOST OUTPUT PG 33

BACKUP BATTERY CIRCUIT CHARGES OFF +PBUS AND PREVENTS +PBUS AND +24V_PBUS FROM DROPPING BELOW 6V (UNTIL DRAINED)

BATTERY CHARGER (MAX1772) PG 32

DC/DC (LTC3411)

SHUTDOWN: STOPPED
SLEEP: STOPPED
RUN: RUNNING

PG 36

+1.8V_MAIN
MAXBUS

+BATT

3S 2P 18650 CELLS

NO INRUSH PROTECTION
WHEN ONLY BATTERY IS CONNECTED

BATTERY VOLTAGE FEED-IN PATH PG 32

+PBUS

BACKLIGHT INVERTER

+5V_MAIN

VCC
MAIN 2.5V/1.5V DC/DC (MAX1715) PG 36

SHUTDOWN: STOPPED
SLEEP: RUNNING
RUN: RUNNING

PGOOD

TURNS ON OUTPUT @ 2.4V ON1/ON2

MAP31 DDR CORE
MAP31 DDR I/O
DDR POWER

+2.5V_MAIN
1_5V_2_5V_OK
+1.5V_MAIN

INTREPID CORE
AGP I/O

+5V_MAIN

DCDC_EN_L

AFTER PMU IS UP AND RUNNING DCDC_EN_L WILL PULL ON1/ON2 LOW IN SHUTDOWN

+PBUS

+5V_MAIN

EXT_VCC
VCC
DC/DC (LTC1778)

SHUTDOWN: STOPPED
SLEEP: D3COLD
RUN: RUNNING

TURNS ON AS LOW AS 0.8V/TYP 1.5V
INTERNAL 1.2UA CURRENT SOURCE

RUN/SS PG 20

GPU_VCORE +1.2V

DCDC_EN
SLEEP
D3_COLD

GPU_VCORE SEQUENCING

1M & 0.1UF @14V, IT TAKES ~5.88MS TO START SWITCHER

1_5V_2_5V_OK
D3_HOT

DCDC_EN_L
D3_HOT

1_5V_2_5V_OK WILL NOT PULL LOW UNTIL +5V_MAIN TURNS ON
HOWEVER, 5V SHOULD TURN ON ~2.23MS AFTER DCDC_EN_L OR PMU_POWERUP_L BECOMES '1'; MUCH LESS THAN THE RC CHARGING AT INT_VCC (5V)

+PBUS

DCDC_EN
SLEEP

MAXBUS SEQUENCING

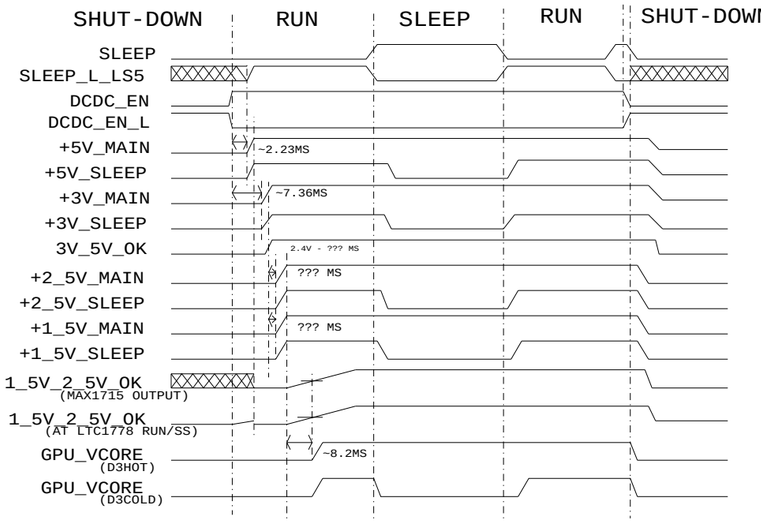
+5V_MAIN

VCC SHDN
DC/DC (MAX1717)

SHUTDOWN: STOPPED
SLEEP: STOPPED
RUN: RUNNING

PG 35

CPU_VCORE (+1.385V)



POWER BLOCK DIAGRAM

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE	SHT	OF
NONE	3	46

PCB SPECS

THICKNESS : 1.2 MM / 0.047 IN
1/2 OZ CU THICKNESS: 0.7 MILS
1.0 OZ CU THICKNESS: 1.4 MILS

IMPEDANCE : 50 OHMS +/- 10%
DIELECTRIC: FR-4
LAYER COUNT: 10
SIGNAL TRACE WIDTH: 4 MILS
SIGNAL TRACE SPACING: 4 MILS
PREPREG THICKNESS: 2-3 MILS

SEE PCB CAD FILES FOR MORE SPECIFIC INFO.

BOARD STACK-UP AND CONSTRUCTION

1-8-1 BLIND MICROVIA/20R10 BURIED VIA/20R10 TH VIA

1		SIGNAL (1/2 OZ + COPPER PLATING)
2	PREPREG (3 MIL)	SIGNAL (1/2 OZ)
3	PREPREG (3 MIL)	GROUND (1/2 OZ)
4	CORE (3 MIL)	SIGNAL (1/2 OZ)
5	PREPREG (5 MIL)	CUT POWER PLANE (1 OZ)
6	CORE (5 MIL)	CUT POWER PLANE (1 OZ)
7	PREPREG (5 MIL)	SIGNAL (1/2 OZ)
8	CORE (3 MIL)	GROUND (1/2 OZ)
9	PREPREG (3 MIL)	SIGNAL (1/2 OZ)
10	PREPREG (3 MIL)	SIGNAL (1/2 OZ + COPPER PLATING)

BOARD HOLES

CHASSIS MOUNTS

ASICS HEATSINK MOUNTS
ZT7 HOLE-VIA-20R10 LEFT CPU
ZT21 HOLE-VIA-20R10 UPPER RT GPU
ZT58 HOLE-VIA-20R10 LWR CPU
ZT59 HOLE-VIA-20R10 LWR RT GPU

I/O AREA
ZT85 HOLE-VIA-20R10 DVI — CHGND2
ZT86 HOLE-VIA-20R10 DVI 1394 — CHGND1
ZT16 HOLE-VIA-20R10 BATT. CHRGR — CHGND5

INVERTER
SH1 QG-583040 SHLD-SM — CHGND3

MECH. HOLES
ZT74 HOLE-VIA-20R10
ZT36 HOLE-VIA-20R10 — ZT301 SPN NO_TEST=TRUE
ZT23 HOLE-VIA-20R10 — ZT302 SPN NO_TEST=TRUE
ZT42 HOLE-VIA-20R10 — ZT10 SPN NO_TEST=TRUE

GROUND VIAS

ZT76 ZT28 ZT72 ZT69 ZT68 ZT64 ZT61 ZT38 ZT39 ZT40 ZT41 ZT46 ZT71 ZT78 ZT80
ZT50 ZT51 ZT52 ZT53 ZT57 ZT60 ZT82 ZT22 ZT17 ZT35 ZT45 ZT79 ZT81 ZT83 ZT49
ZT48 ZT47 ZT54 ZT55 ZT56 ZT84 ZT5 ZT15 ZT44 ZT4 ZT8 ZT6 ZT32 ZT3 ZT10
ZT11 ZT34 ZT20 ZT43 ZT70 ZT2 ZT9 ZT75 ZT73 ZT63 ZT77 ZT66 ZT62 ZT65 ZT13
ZT25 ZT19 ZT24 ZT67 ZT37 ZT29 ZT31 ZT1 ZT14 ZT12 ZT27 ZT26 ZT30 ZT33 ZT18

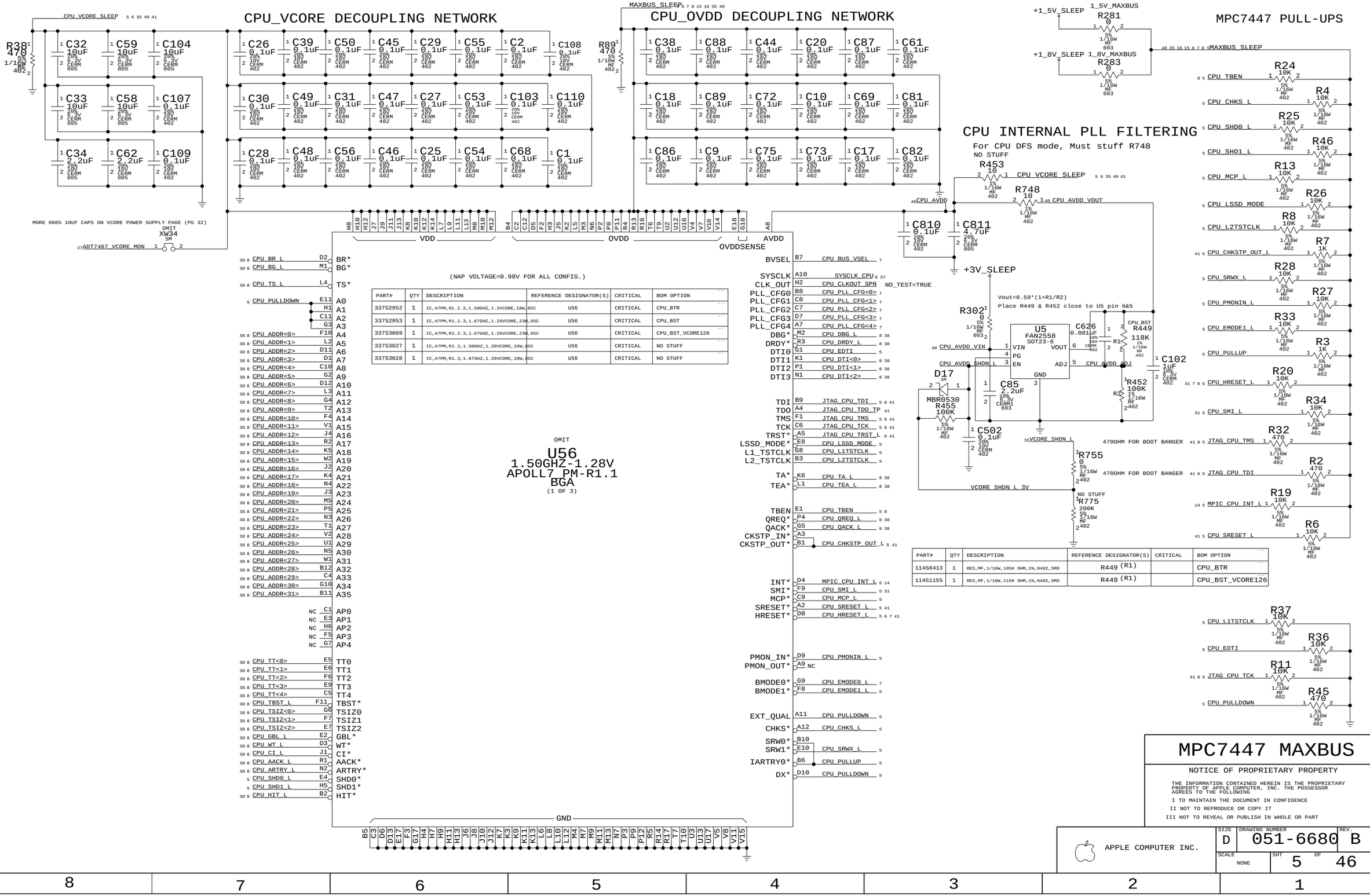
All: HOLE-VIA-20R10

BOARD INFORMATION

APPLE COMPUTER INC.

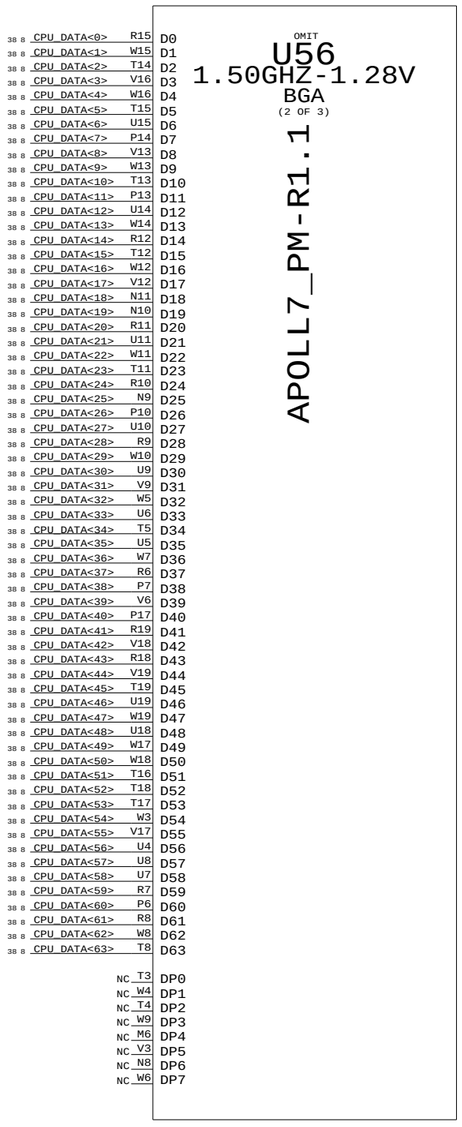
SIZE	DRAWING NUMBER	REV.
D	051-6680	B

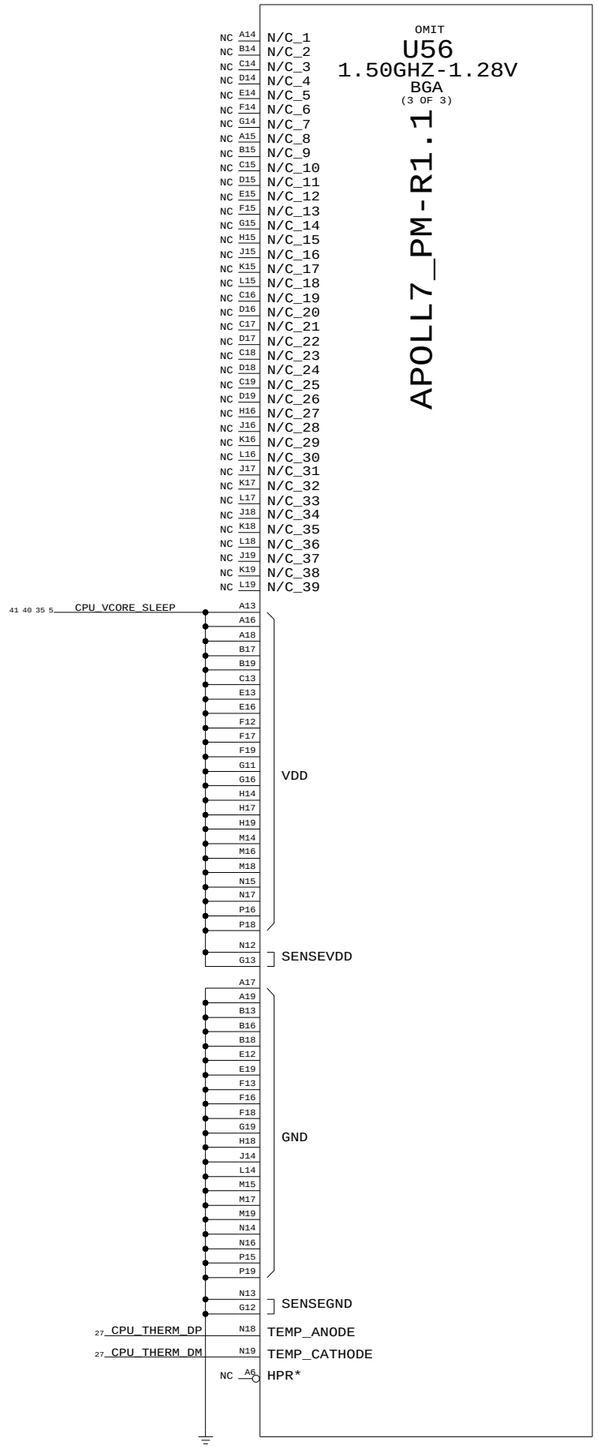
SCALE: NONE — SHT 4 OF 46



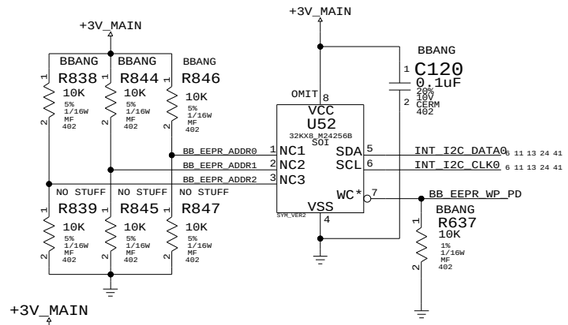
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
337S2952	1	IC,A7PM,R1.2.3,1.50GHZ,1.2VCORE,18W,85C	U56	CRITICAL	CPU_BTR
337S2953	1	IC,A7PM,R1.2.3,1.67GHZ,1.28VCORE,23W,85C	U56	CRITICAL	CPU_BST
337S3069	1	IC,A7PM,R1.2.3,1.67GHZ,1.26VCORE,23W,85C	U56	CRITICAL	CPU_BST_VCORE126
337S3027	1	IC,A7PM,R1.3,1.50GHZ,1.20VCORE,18W,85C	U56	CRITICAL	NO STUFF
337S3028	1	IC,A7PM,R1.3,1.67GHZ,1.29VCORE,18W,85C	U56	CRITICAL	NO STUFF

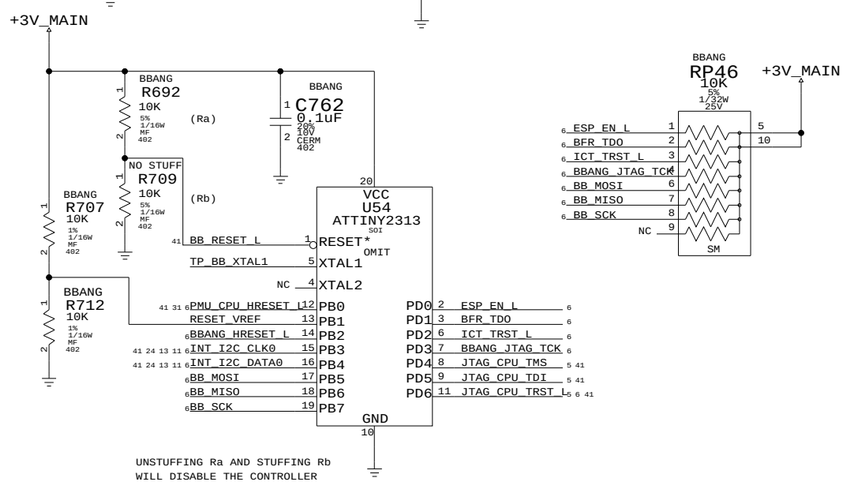
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
114S0413	1	RES,MF,1/16W,105K OHM,1%,0402,SMD	R449 (R1)		CPU_BTR
114S1155	1	RES,MF,1/16W,115K OHM,1%,0402,SMD	R449 (R1)		CPU_BST_VCORE126





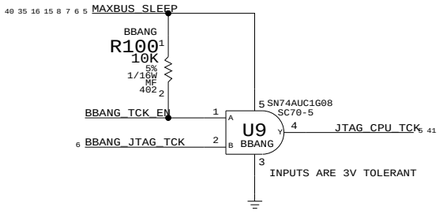
BOOT BANGER - TWEAK PROCESSOR BITS AFTER POWER-ON

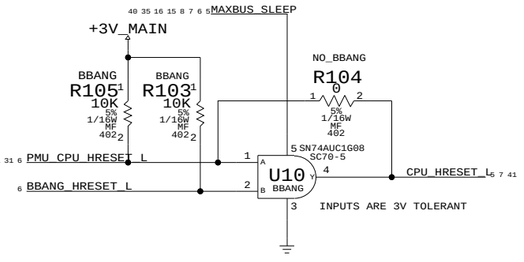


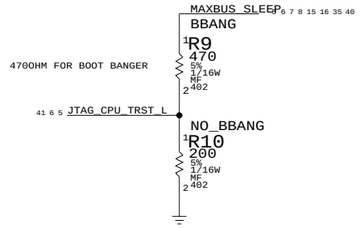


UNSTUFFING Ra AND STUFFING Rb
WILL DISABLE THE CONTROLLER

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
341S1660	1	MCU,PROGRAMMED W/ BBANGER	U54	BBANG
341S1661	1	I2C EEPROM,PROGRAMMED W/ BBANGER	U52	BBANG







MPC7447/BBANG

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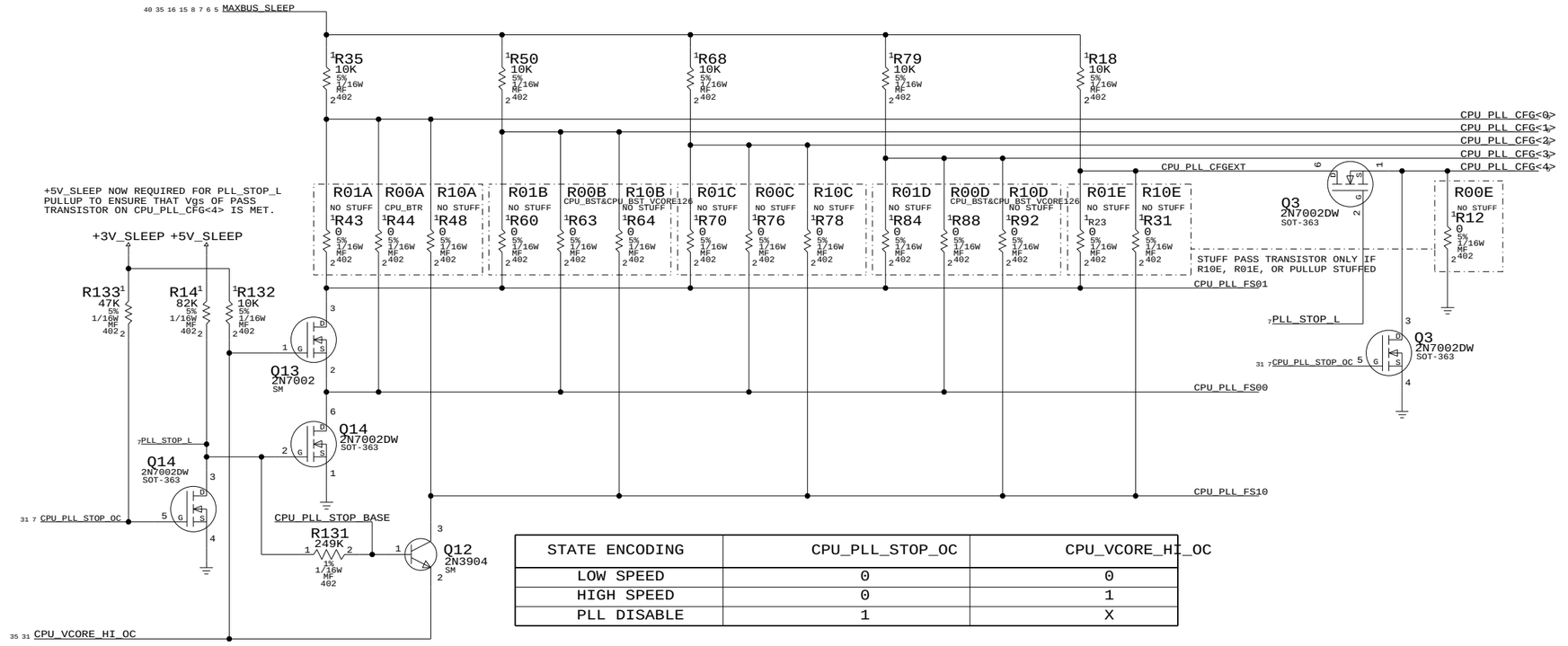
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 6 OF 46	

CPU PLL CONFIG CIRCUITRY



STATE ENCODING	CPU_PLL_STOP_OC	CPU_VCORE_HI_OC
LOW SPEED	0	0
HIGH SPEED	0	1
PLL DISABLE	1	X

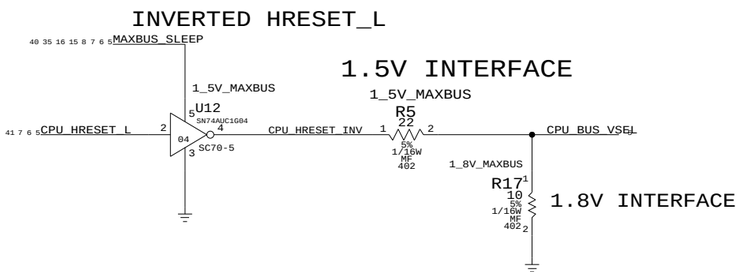
CPU FREQUENCY CONFIGURATION

APOLLO 7PM

MULTIPLIER (Bus-to-Core)	CORE FREQUENCY (AT BUS FREQUENCY) 167MHZ (MHZ)	133MHZ (MHZ)	CPU_PLL_CFG 4 E	0123 ABCD HEX
0.0X	PLL OFF		0	1111 0F
1.0X	PLL BYPASS		0	0011 03
2.0X	333	267	0	0100 04
3.0X	500	400	0	1000 08
4.0X	667	533	0	1010 0A
5.0X	833	667	0	1011 0B
5.5X	917	733	0	1001 09
6.0X	1000	800	0	1101 0D
6.5X	1083	867	0	0101 05
7.0X	1167	933	0	0010 02
7.5X	1250	1000	0	0001 01
8.0X	1333	1067	0	1100 0C
8.5X	1417	1133	0	0110 06
9.0X	1500	1200	1	0111 17
9.5X	1583	1267	0	0111 07
10.0X	1667	1333	1	1010 1A
10.5X	1750	1400	1	1000 18
11.0X	1833	1467	1	1001 19
11.5X	1917	1533	0	0000 00
12.0X	2000	1600	1	1011 1B
12.5X	2083	1667	1	1111 1F
13.0X	2167	1733	1	0101 15
13.5X	2250	1800	0	1110 0E
14.0X	2333	1867	1	1100 1C
15.0X	2500	2000	1	0001 11
16.0X	2667	2133	1	1101 1D
17.0X	2833	2267	1	0000 10
18.0X	3000	2400	1	0010 12
20.0X	3333	2667	1	0011 13
21.0X	3500	2800	1	0100 14
24.0X	4000	3200	1	0110 16
28.0X	4667	3733	1	1110 1E

CPU CONFIGURATION

MAXBUS VSEL



BUSTYPE SELECT

APOLLO ONLY SUPPORTS MAXBUS

DESKTOP HAD PROBLEM USING INVERTER TO INVERT HRESET_L NEED TO CHARACTERIZE

SIGNAL	TIED	APPLICATION
CPU_EMODE0_L (PROCESSOR)	HIGH	60X BUS MODE
	CPU_HRESET_L	MAX BUS MODE
CPU_BUS_VSEL (PROCESSOR)	CPU_HRESET_L	2.5V INTERFACE
	LOW	1.8V INTERFACE
	CPU_HRESET_INV	1.5V INTERFACE

CPU CONFIGURATION

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 7 OF 46	

INTREPID BOOT STRAPS

BIT 32 TO 39

40 35 16 15 8 7 6 5 MAXBUS_SLEEP

NO STUFF R640[1] 10K	NO STUFF R639[1] 10K	NO STUFF R638[1] 10K	R666[1] 10K				
R622[1] 10K	R619[1] 10K	R618[1] 10K	NO STUFF R653[1] 10K	R621[1] 10K	R620[1] 10K	R652[1] 10K	R650[1] 10K

38 8 6 CPU_DATA<32>
38 8 6 CPU_DATA<33>
38 8 6 CPU_DATA<34>
38 8 6 CPU_DATA<35>
38 8 6 CPU_DATA<36>
38 8 6 CPU_DATA<37>
38 8 6 CPU_DATA<38>
38 8 6 CPU_DATA<39>

0: DDR TRPMODEEnable_h
1: HDI output

0: Analyzer Clk_En_h Active
1: Active

0: DDR_TPEN Pol Active High
1: Active Low

0: Expl Slow Pol Active High
1: Active Low

Spare Spare Spare Spare

BIT 40 TO 47

40 35 16 15 8 7 6 5 MAXBUS_SLEEP

NO STUFF R641[1] 10K	SSCG R665[1] 10K	NO STUFF R664[1] 10K	NO_SSCG R693[1] 10K	NO STUFF R694[1] 10K	NO STUFF R699[1] 10K	
R648[1] 10K	R677[1] 10K	R623[1] 10K	NO_SSCG R651[1] 10K	R649[1] 10K	SSCG R678[1] 10K	R679[1] 10K	R684[1] 10K

38 8 6 CPU_DATA<40>
38 8 6 CPU_DATA<41>
38 8 6 CPU_DATA<42>
38 8 6 CPU_DATA<43>
38 8 6 CPU_DATA<44>
38 8 6 CPU_DATA<45>
38 8 6 CPU_DATA<46>
38 8 6 CPU_DATA<47>

Spare Spare BIT2 BIT1 BIT0 Spare

PLL4MODESEL_NXT[2:0]
000: 166.4MHZ (2.5X)
001: 149.76MHZ
010: 133.12MHZ (2.0X)
011: 99.84MHZ (1.5X)
100: 83.20MHZ

MODE A (2.5X) IS FOR STATIC OPERATION
MODE C (2.0X) IS FOR CLOCK SLEW OPERATION

0: Pci10_PLL4 Source (Clock Spread)
1: Pci10_PLL4 Source (no spread)

0: Pci10_PLL4 Activate (SW CNTL ONLY)
1: Pci10_PLL4 Activate (Default)

BIT 48 TO 55

40 35 16 15 8 7 6 5 MAXBUS_SLEEP

SSCG R696[1] 10K	SSCG R695[1] 10K	R667[1] 10K	NO STUFF R668[1] 10K	NO STUFF R643[1] 10K	NO STUFF R642[1] 10K	R698[1] 10K	
R681[1] 10K	NO_SSCG R680[1] 10K	NO STUFF R654[1] 10K	R655[1] 10K	R625[1] 10K	R624[1] 10K	NO STUFF R683[1] 10K	R626[1] 10K

38 8 6 CPU_DATA<48>
38 8 6 CPU_DATA<49>
38 8 6 CPU_DATA<50>
38 8 6 CPU_DATA<51>
38 8 6 CPU_DATA<52>
38 8 6 CPU_DATA<53>
38 8 6 CPU_DATA<54>
38 8 6 CPU_DATA<55>

BIT2 BIT1 BIT0 Spare

MaxBus output impedance
111: 28.6 ohm
011: 33.3 ohm
101: 40 ohm
001: 50 ohm
110: 66.6 ohm
010: 100 ohm
100: 200 ohm
000: 200 ohm

0: 100ohm workaround
1: 180ohm workaround
for PHY workaround

0: Boot ROM on PCI
1: Boot ROM on IDE/CardSlot

OBSOLETE (Should remain high)

0: PLL5
1: external source

BUF_REF CLK OUTEnable_h
0: TRISTATE
1: Active

R159

40 14 12 +1_5V_INTREPID_PLL — R159 4.7 5% 1/16W MF 402 — 40 +1_5V_INTREPID_PLL7

C187 0.22uF 20% 6.3V CERM 402

H26 VDD15A_7 (PLL6)

OMIT
U51
INTREPID-REV2.1
BGA

38 8 5 CPU_BR_L	E29	BR	INPUT
38 8 5 CPU_BG_L	E26	BG	NO BUS KEEPER
38 8 5 CPU_TS_L	B27	TS	NO BUS KEEPER
38 8 5 CPU_ADDR<0>	D24	A_0	
38 8 5 CPU_ADDR<1>	D25	A_1	
38 8 5 CPU_ADDR<2>	A27	A_2	
38 8 5 CPU_ADDR<3>	E24	A_3	
38 8 5 CPU_ADDR<4>	G23	A_4	
38 8 5 CPU_ADDR<5>	B26	A_5	
38 8 5 CPU_ADDR<6>	A26	A_6	
38 8 5 CPU_ADDR<7>	D23	A_7	
38 8 5 CPU_ADDR<8>	A25	A_8	
38 8 5 CPU_ADDR<9>	E23	A_9	
38 8 5 CPU_ADDR<10>	J22	A_10	
38 8 5 CPU_ADDR<11>	B25	A_11	
38 8 5 CPU_ADDR<12>	H22	A_12	
38 8 5 CPU_ADDR<13>	G22	A_13	
38 8 5 CPU_ADDR<14>	D22	A_14	
38 8 5 CPU_ADDR<15>	B24	A_15	
38 8 5 CPU_ADDR<16>	B23	A_16	
38 8 5 CPU_ADDR<17>	E22	A_17	
38 8 5 CPU_ADDR<18>	J21	A_18	
38 8 5 CPU_ADDR<19>	G21	A_19	
38 8 5 CPU_ADDR<20>	E21	A_20	
38 8 5 CPU_ADDR<21>	A24	A_21	
38 8 5 CPU_ADDR<22>	D21	A_22	
38 8 5 CPU_ADDR<23>	A23	A_23	
38 8 5 CPU_ADDR<24>	H20	A_24	
38 8 5 CPU_ADDR<25>	B22	A_25	
38 8 5 CPU_ADDR<26>	H21	A_26	
38 8 5 CPU_ADDR<27>	A22	A_27	
38 8 5 CPU_ADDR<28>	E20	A_28	
38 8 5 CPU_ADDR<29>	B21	A_29	
38 8 5 CPU_ADDR<30>	D20	A_30	
38 8 5 CPU_ADDR<31>	A21	A_31	
38 8 5 CPU_CI_L	G26	CI	
38 8 5 CPU_GBL_L	A29	GBL	
38 8 5 CPU_TBST_L	A28	TBST	
38 8 5 CPU_TSIZ<0>	G24	TSIZ_0	
38 8 5 CPU_TSIZ<1>	H24	TSIZ_1	
38 8 5 CPU_TSIZ<2>	D26	TSIZ_2	
38 8 5 CPU_TT<0>	E25	TT_0	
38 8 5 CPU_TT<1>	G25	TT_1	
38 8 5 CPU_TT<2>	B28	TT_2	
38 8 5 CPU_TT<3>	D27	TT_3	
38 8 5 CPU_TT<4>	J25	TT_4	
38 8 5 CPU_WT_L	D28	WT	
38 8 5 CPU_AACK_L	B29	AACK	NO BUS KEEPER - PU
38 8 5 CPU_ARTRY_L	H23	ARTRY	NO BUS KEEPER - PU
38 8 5 CPU_HIT_L	B31	HIT	INPUT - PU
38 8 5 CPU_QREQ_L	A32	QREQ	INPUT - PD
38 8 5 CPU_QACK_L	G27	QACK	NO BUS KEEPER - ?
31 INT_SUSPEND_REQ_L	AK9	SUSPENDREQ	
31 INT_SUSPEND_ACK_L	AM8	SUSPENDACK	
37 8 INT_CPUFB_IN	J24	CPU_FB_IN	
37 8 INT_CPUFB_OUT	H16	CPU_FB_OUT	NO BUS KEEPER - PU
SYSCLK_LA_TP	G8	ANALYZER_CLK	
31 CPU_CLK_EN	AH9	STOPCPUCLK	INPUT - PU
INTREPID_ACS_REF	H13	ACS_REF	NO BUS KEEPER - ?
37 SYSCLK_CPU_UF	J15	CPU_CLK	NO BUS KEEPER - PU
5 CPU_TBEN	A31	TBEN	NO BUS KEEPER - PU

(1 OF 9)
CRITCAL

MAXBUS INTERFACE

INTREPID OUTPUTS HIGH BY DEFAULT

Vin = Intrepid Vcore (1.5V)
Vout = MaxBus rail (1.8V)

VSSA_7 (PLL6) H25

FB BUFFER HAS 50 OHM OUTPUT IMPEDANCE

R169[1] 511 1% 1/16W MF 402

R168 0 5% 1/16W MF 402 — 37 5 SYSCLK_CPU — 37 SYSCLK_CPU_UF

R161[1] 1K 1% 1/16W MF 402

SHORT = 1" SHORTER THAN MATCHED LENGTH

R155 0 5% 1/16W MF 402 — 37 8 INT_CPUFB_OUT

R140 0 5% 1/16W MF 402 — 37 INT_CPUFB_OUT_SHORT

NO STUFF R146[1] 0 5% 1/16W MF 402

R147 0 5% 1/16W MF 402 — 37 8 INT_CPUFB_IN

LONG = 1" LONGER THAN MATCHED LENGTH

NO STUFF R128 0 5% 1/16W MF 402 — 37 INT_CPUFB_OUT_NORM — 37 INT_CPUFB_LONG

NO STUFF R141[1] 0 5% 1/16W MF 402

R136 0 5% 1/16W MF 402 — 37 INT_CPUFB_IN_NORM

THE FOLLOWING STRAP BITS CAN BE CHANGED BY SOFTWARE:

1/ D47 - SELAGPSPREADCLK - SLEEP/WAKE CYCLE REQUIRED
2/ D46 - SELPCI1SPREADCLK - SLEEP/WAKE CYCLE REQUIRED
3/ D44 - PLL4MODESEL_NXT<0> - SLEEP/WAKE CYCLE REQUIRED
4/ D43 - PLL4MODESEL_NXT<1> - SLEEP/WAKE CYCLE REQUIRED
5/ D42 - PLL4MODESEL_NXT<2> - SLEEP/WAKE CYCLE REQUIRED
6/ D33 - ANALYZERCLK_EN_H - IMMEDIATE EFFECT

IF A STRAP IS NOT LISTED, THEN
IT CANNOT BE CHANGED BY SOFTWARE

D_0	D10	CPU_DATA<0>	6 38
D_1	G12	CPU_DATA<1>	6 38
D_2	E11	CPU_DATA<2>	6 38
D_3	H11	CPU_DATA<3>	6 38
D_4	B9	CPU_DATA<4>	6 38
D_5	B8	CPU_DATA<5>	6 38
D_6	A9	CPU_DATA<6>	6 38
D_7	A8	CPU_DATA<7>	6 38
D_8	E12	CPU_DATA<8>	6 38
D_9	D11	CPU_DATA<9>	6 38
D_10	B10	CPU_DATA<10>	6 38
D_11	J13	CPU_DATA<11>	6 38
D_12	A10	CPU_DATA<12>	6 38
D_13	D12	CPU_DATA<13>	6 38
D_14	E13	CPU_DATA<14>	6 38
D_15	G13	CPU_DATA<15>	6 38
D_16	B11	CPU_DATA<16>	6 38
D_17	D13	CPU_DATA<17>	6 38
D_18	A11	CPU_DATA<18>	6 38
D_19	G14	CPU_DATA<19>	6 38
D_20	H14	CPU_DATA<20>	6 38
D_21	E14	CPU_DATA<21>	6 38
D_22	B12	CPU_DATA<22>	6 38
D_23	G15	CPU_DATA<23>	6 38
D_24	B13	CPU_DATA<24>	6 38
D_25	H15	CPU_DATA<25>	6 38
D_26	D14	CPU_DATA<26>	6 38
D_27	B14	CPU_DATA<27>	6 38
D_28	A12	CPU_DATA<28>	6 38
D_29	G16	CPU_DATA<29>	6 38
D_30	E15	CPU_DATA<30>	6 38
D_31	J16	CPU_DATA<31>	6 38
D_32	D15	CPU_DATA<32>	6 8 38
D_33	A14	CPU_DATA<33>	6 8 38
D_34	A13	CPU_DATA<34>	6 8 38
D_35	D16	CPU_DATA<35>	6 8 38
D_36	E16	CPU_DATA<36>	6 8 38
D_37	G17	CPU_DATA<37>	6 8 38
D_38	B15	CPU_DATA<38>	6 8 38
D_39	H17	CPU_DATA<39>	6 8 38
D_40	A15	CPU_DATA<40>	6 8 38
D_41	B16	CPU_DATA<41>	6 8 38
D_42	E17	CPU_DATA<42>	6 8 38
D_43	A16	CPU_DATA<43>	6 8 38
D_44	J18	CPU_DATA<44>	6 8 38
D_45	H18	CPU_DATA<45>	6 8 38
D_46	D17	CPU_DATA<46>	6 8 38
D_47	G18	CPU_DATA<47>	6 8 38
D_48	A17	CPU_DATA<48>	6 8 38
D_49	B17	CPU_DATA<49>	6 8 38
D_50	E18	CPU_DATA<50>	6 8 38
D_51	B18	CPU_DATA<51>	6 8 38
D_52	D18	CPU_DATA<52>	6 8 38
D_53	A18	CPU_DATA<53>	6 8 38
D_54	A19	CPU_DATA<54>	6 8 38
D_55	H19	CPU_DATA<55>	6 8 38
D_56	B19	CPU_DATA<56>	6 8 38
D_57	J19	CPU_DATA<57>	6 8 38
D_58	A20	CPU_DATA<58>	6 8 38
D_59	D19	CPU_DATA<59>	6 8 38
D_60	E19	CPU_DATA<60>	6 8 38
D_61	G19	CPU_DATA<61>	6 8 38
D_62	B20	CPU_DATA<62>	6 8 38
D_63	G20	CPU_DATA<63>	6 8 38
DBG	A30	CPU_DBG_L	5 8 38
DRDY	G28	CPU_DRDY_L	5 8 38
DTI_0	K25	CPU_DTI<0>	5 38
DTI_1	D29	CPU_DTI<1>	5 38
DTI_2	B30	CPU_DTI<2>	5 38
TA	E27	CPU_TA_L	5 8 38
TEA	E28	CPU_TEA_L	5 8 38

MAXBUS PULL-UPS

MAXBUS_SLEEP 6 7 8 15 16 35 40

38 8 5 CPU_TS_L	RP3 10K 5% 1/16W SM1	2 7
38 8 5 CPU_TA_L	RP3 10K 5% 1/16W SM1	1 8
38 8 5 CPU_ARTRY_L	RP3 10K 5% 1/16W SM1	4 5
38 8 5 CPU_BR_L	RP2 10K 5% 1/16W SM1	1 8
38 8 5 CPU_HIT_L	R152 10K 5% 1/16W MF 402	1 2
38 8 5 CPU_DRDY_L	RP2 10K 5% 1/16W SM1	3 6
38 8 5 CPU_TEA_L	RP2 10K 5% 1/16W SM1	4 5
38 8 5 CPU_AACK_L	RP2 10K 5% 1/16W SM1	2 7
38 8 5 CPU_DBG_L	R150 10K 5% 1/16W MF 402	1 2
38 8 5 CPU_BG_L	RP3 10K 5% 1/16W SM1	3 6
38 8 5 CPU_QREQ_L	R151 10K 5% 1/16W MF 402	1 2

INTREPID BOOT STRAPS

BIT 56 TO 63

40 35 16 15 8 7 6 5 MAXBUS_SLEEP

NO STUFF R669[1] 10K	NO STUFF R645[1] 10K	NO STUFF R697[1] 10K	NO STUFF R670[1] 10K	R644[1] 10K	NO STUFF R646[1] 10K		
R656[1] 10K	R685[1] 10K	R657[1] 10K	R628[1] 10K	R682[1] 10K	R658[1] 10K	NO STUFF R627[1] 10K	R629[1] 10K

38 8 6 CPU_DATA<56>
38 8 6 CPU_DATA<57>
38 8 6 CPU_DATA<58>
38 8 6 CPU_DATA<59>
38 8 6 CPU_DATA<60>
38 8 6 CPU_DATA<61>
38 8 6 CPU_DATA<62>
38 8 6 CPU_DATA<63>

Spare Spare

OBSOLETE
ROM Overlay_R90
1: 0-1 IDE / 2-3 PCI1

PCI1_REQ2_L / PCI1_GNT2_L
0: REQ/GNT
1: GPIOs

PCI1_REQ1_L / PCI1_GNT1_L
0: REQ/GNT
1: GPIOs

PCI1_REQ0_L / PCI1_GNT0_L
0: REQ/GNT
1: GPIOs

Firewire PHY interface
0: A-mode
1: B-mode interface

Processor Bus Mode
0: 64x bus (G4)
1: 60x bus

Intrepid MaxBus

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 8 OF 46	

SERIES RESISTORS FOR CLOCK/CONTROL SIGNALS

PINS ARE SWAPABLE FOR RPAKS

OMIT
U51
INTREPID-REV2.1
BGA
(2 OF 9)
CRITICAL

DDR_DATA_0	AK32	MEM_DATA<0>	H35	DDR_A_0
DDR_DATA_1	AK33	MEM_DATA<1>	G35	DDR_A_1
DDR_DATA_2	AK31	MEM_DATA<2>	G36	DDR_A_2
DDR_DATA_3	AK35	MEM_DATA<3>	F36	DDR_A_3
DDR_DATA_4	AK36	MEM_DATA<4>	F35	DDR_A_4
DDR_DATA_5	AJ32	MEM_DATA<5>	E35	DDR_A_5
DDR_DATA_6	AJ35	MEM_DATA<6>	E36	DDR_A_6
DDR_DATA_7	AJ36	MEM_DATA<7>	G32	DDR_A_7
DDR_DATA_8	AG33	MEM_DATA<8>	D36	DDR_A_8
DDR_DATA_9	AG35	MEM_DATA<9>	H36	DDR_A_9
DDR_DATA_10	AH35	MEM_DATA<10>	G33	DDR_A_10
DDR_DATA_11	AG36	MEM_DATA<11>	H33	DDR_A_11
DDR_DATA_12	AH36	MEM_DATA<12>	D35	DDR_A_12
DDR_DATA_13	AH32	MEM_DATA<13>	L30	DDR_BA_0
DDR_DATA_14	AG32	MEM_DATA<14>	M29	DDR_BA_1
DDR_DATA_15	AG31	MEM_DATA<15>		
DDR_DATA_16	AE32	MEM_DATA<16>	AN34	DDRCS_0
DDR_DATA_17	AF35	MEM_DATA<17>	AN36	DDRCS_1
DDR_DATA_18	AF36	MEM_DATA<18>	AL35	DDRCS_2
DDR_DATA_19	AE36	MEM_DATA<19>	AL33	DDRCS_3
DDR_DATA_20	AE35	MEM_DATA<20>		
DDR_DATA_21	AE33	MEM_DATA<21>	AJ31	DDR_DQS_0
DDR_DATA_22	AD36	MEM_DATA<22>	AH31	DDR_DQS_1
DDR_DATA_23	AD35	MEM_DATA<23>	AD32	DDR_DQS_2
DDR_DATA_24	AA36	MEM_DATA<24>	AB30	DDR_DQS_3
DDR_DATA_25	AA35	MEM_DATA<25>	V30	DDR_DQS_4
DDR_DATA_26	AA33	MEM_DATA<26>	P32	DDR_DQS_5
DDR_DATA_27	AB36	MEM_DATA<27>	N29	DDR_DQS_6
DDR_DATA_28	AB35	MEM_DATA<28>	L32	DDR_DQS_7
DDR_DATA_29	AC36	MEM_DATA<29>		
DDR_DATA_30	AA32	MEM_DATA<30>	AJ33	DDR_DM_0
DDR_DATA_31	AB33	MEM_DATA<31>	AH33	DDR_DM_1
DDR_DATA_32	V36	MEM_DATA<32>	AD33	DDR_DM_2
DDR_DATA_33	U33	MEM_DATA<33>	AC35	DDR_DM_3
DDR_DATA_34	U32	MEM_DATA<34>	T35	DDR_DM_4
DDR_DATA_35	V35	MEM_DATA<35>	T33	DDR_DM_5
DDR_DATA_36	T36	MEM_DATA<36>	N32	DDR_DM_6
DDR_DATA_37	U36	MEM_DATA<37>	L33	DDR_DM_7
DDR_DATA_38	U35	MEM_DATA<38>		
DDR_DATA_39	T36	MEM_DATA<39>	L29	DDRRAS
DDR_DATA_40	P33	MEM_DATA<40>	H32	DDRCAS
DDR_DATA_41	R36	MEM_DATA<41>	K30	DDRWE
DDR_DATA_42	P35	MEM_DATA<42>	AN35	DDRCKE0
DDR_DATA_43	P36	MEM_DATA<43>	AM35	DDRCKE1
DDR_DATA_44	R36	MEM_DATA<44>	AM36	DDRCKE2
DDR_DATA_45	R35	MEM_DATA<45>	AL36	DDRCKE3
DDR_DATA_46	R33	MEM_DATA<46>		
DDR_DATA_47	R32	MEM_DATA<47>	AB32	DDR_SELHI_0
DDR_DATA_48	N35	MEM_DATA<48>	AE29	DDR_SELHI_1
DDR_DATA_49	M36	MEM_DATA<49>	N30	DDR_SELLO_0
DDR_DATA_50	L35	MEM_DATA<50>	T32	DDR_SELLO_1
DDR_DATA_51	M35	MEM_DATA<51>		
DDR_DATA_52	M33	MEM_DATA<52>	Y32	DDR_MCLK_0_P
DDR_DATA_53	L36	MEM_DATA<53>	Y33	DDR_MCLK_0_N
DDR_DATA_54	N33	MEM_DATA<54>	Y35	DDR_MCLK_1_P
DDR_DATA_55	M30	MEM_DATA<55>	Y36	DDR_MCLK_1_N
DDR_DATA_56	J32	MEM_DATA<56>	Y30	DDR_MCLK_2_P
DDR_DATA_57	J33	MEM_DATA<57>	W30	DDR_MCLK_2_N
DDR_DATA_58	J35	MEM_DATA<58>	W32	DDR_MCLK_3_P
DDR_DATA_59	K32	MEM_DATA<59>	W33	DDR_MCLK_3_N
DDR_DATA_60	K33	MEM_DATA<60>	V33	DDR_MCLK_4_P
DDR_DATA_61	J36	MEM_DATA<61>	V32	DDR_MCLK_4_N
DDR_DATA_62	K36	MEM_DATA<62>	W35	DDR_MCLK_5_P
DDR_DATA_63	K35	MEM_DATA<63>	W36	DDR_MCLK_5_N
			AA22	DDR_REF
			Y22	DDR_VREF_0
			T22	DDR_VREF_1

DDR MEMORY INTERFACE

'0' & '1' GO TO SLOT A
'2' & '3' GO TO SLOT B

'0' & '1' GO TO SLOT A
'2' & '3' GO TO SLOT B

MEM_MUXSEL_MSB_L_TP
MEM_MUXSEL_MSB
MEM_MUXSEL_LSB_L_TP
MEM_MUXSEL_LSB

'0'S ARE SAME POLARITY (ACTIVE-LO)
'1'S ARE SAME POLARITY (ACTIVE-HI)

SYSCLK_DDRCLK_A0_UF
SYSCLK_DDRCLK_A0_L_UF
SYSCLK_DDRCLK_A1_UF
SYSCLK_DDRCLK_A1_L_UF
INT_DDRCLK2_P_TP
INT_DDRCLK2_N_TP
SYSCLK_DDRCLK_B0_UF
SYSCLK_DDRCLK_B0_L_UF
SYSCLK_DDRCLK_B1_UF
SYSCLK_DDRCLK_B1_L_UF
INT_DDRCLK5_P_TP
INT_DDRCLK5_N_TP

INT_MEM_REF_H
INT_MEM_VREF

R209 1K 1% 1/16W MF 402

MEM_VREF

+2.5V_INTREPID

R208 10K 1% 1/16W MF 402
R202 10K 1% 1/16W MF 402
C249 0.1uF 5% 10V CERM 402

CLOCKS

SYSCLK_DDRCLK_A1_UF	RP20	4	5
SYSCLK_DDRCLK_A1_L_UF	RP20	6	7
SYSCLK_DDRCLK_A0_UF	RP22	1	8
SYSCLK_DDRCLK_A0_L_UF	RP22	7	6
SYSCLK_DDRCLK_B1_UF	RP20	2	7
SYSCLK_DDRCLK_B1_L_UF	RP20	8	1
SYSCLK_DDRCLK_B0_UF	RP22	3	6
SYSCLK_DDRCLK_B0_L_UF	RP22	5	4

CS

MEM_CS_L<0>	RP31	3	6
MEM_CS_L<1>	RP31	2	7
MEM_CS_L<2>	RP29	3	6
MEM_CS_L<3>	RP29	4	5

CKE

MEM_CKE<0>	RP31	1	8
MEM_CKE<1>	RP31	4	5
MEM_CKE<2>	RP29	1	8
MEM_CKE<3>	RP29	2	7

ADDR

MEM_ADDR<0>	RP14	3	6
MEM_ADDR<1>	RP12	2	7
MEM_ADDR<2>	RP12	1	8
MEM_ADDR<3>	RP12	4	5
MEM_ADDR<4>	RP12	3	6
MEM_ADDR<5>	RP9	2	7
MEM_ADDR<6>	RP9	1	8
MEM_ADDR<7>	RP14	2	7
MEM_ADDR<8>	RP9	4	5
MEM_ADDR<9>	RP14	4	5
MEM_ADDR<10>	RP14	1	8
MEM_ADDR<11>	RP17	4	5
MEM_ADDR<12>	RP9	3	6

BA

MEM_BA<0>	RP17	2	7
MEM_BA<1>	RP17	1	8

CNTL

MEM_WE_L	RP17	3	6
MEM_CAS_L	R162	1	2
MEM_RAS_L	R176	1	2

RAM_CS_L<0>	RP31	3	6
RAM_CS_L<1>	RP31	2	7
RAM_CS_L<2>	RP29	3	6
RAM_CS_L<3>	RP29	4	5
RAM_CKE<0>	RP31	1	8
RAM_CKE<1>	RP31	4	5
RAM_CKE<2>	RP29	1	8
RAM_CKE<3>	RP29	2	7
RAM_ADDR<0>	RP14	3	6
RAM_ADDR<1>	RP12	2	7
RAM_ADDR<2>	RP12	1	8
RAM_ADDR<3>	RP12	4	5
RAM_ADDR<4>	RP12	3	6
RAM_ADDR<5>	RP9	2	7
RAM_ADDR<6>	RP9	1	8
RAM_ADDR<7>	RP14	2	7
RAM_ADDR<8>	RP9	4	5
RAM_ADDR<9>	RP14	4	5
RAM_ADDR<10>	RP14	1	8
RAM_ADDR<11>	RP17	4	5
RAM_ADDR<12>	RP9	3	6
RAM_BA<0>	RP17	2	7
RAM_BA<1>	RP17	1	8
RAM_WE_L	RP17	3	6
RAM_CAS_L	R162	1	2
RAM_RAS_L	R176	1	2

1MB BOOT ROM

+3V_MAIN

C125 2.2uF 10% 10V CERM 805
C773 0.1uF 5% 10V CERM 402
C122 0.1uF 5% 10V CERM 402

U11
FEPR-1MX8
1MX8-3.3V
TSOP

A0	21	PCI_AD<0>	DQ0
A1	20	PCI_AD<1>	DQ1
A2	19	PCI_AD<2>	DQ2
A3	18	PCI_AD<3>	DQ3
A4	17	PCI_AD<4>	DQ4
A5	16	PCI_AD<5>	DQ5
A6	15	PCI_AD<6>	DQ6
A7	14	PCI_AD<7>	DQ7
A8	8	PCI_AD<8>	
A9	7	PCI_AD<9>	
A10	36	PCI_AD<10>	
A11	6	PCI_AD<11>	
A12	5	PCI_AD<12>	
A13	4	PCI_AD<13>	
A14	3	PCI_AD<14>	
A15	2	PCI_AD<15>	
A16	1	PCI_AD<16>	
A17	40	PCI_AD<17>	
A18	13	PCI_AD<18>	
A19	37	PCI_AD<19>	
A20	38	PCI_AD<20>	
CE	22	ROM_ONBOARD_CS_L	
OE	24	ROM_OE_L	
WE	9	ROM_RW_L	
WP	12	ROM_WP_L	
PWD	10	INT_RESET_L	
GND	23, 39		

VPP, OMIT, VCC: 11, 30, 31

+3V_MAIN

ROM_CS_TP_L
R236 0 NO STUFF 5% 1/16W MF 402
R691 10K 5% 1/16W MF 402
R112 10K 5% 1/16W MF 402
ROM_CS_L
R674 1K 5% 1/16W MF 402
R1 0 NO STUFF 5% 1/16W MF 402
ROM_ONBOARD_CS_TP_L
R271 0 NO STUFF 5% 1/16W MF 402
ROM_OE_TP_L
R194 0 NO STUFF 5% 1/16W MF 402
ROM_RW_TP_L

OVERRIDE ROM MODULE
INTERCEPTS ROM CHIP SELECT

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
341S1555	1	IC,BOOTROM Q16B	U11	CRITICAL	?

Weak pulldowns ensure CKEs stay low
after 2.5V I/O to Intrepid shuts off.

RAM_CKE<0>
RAM_CKE<1>
RAM_CKE<2>
RAM_CKE<3>

R247 10K 5% 1/16W MF 402 INT_2_5V_COLD
R257 10K 5% 1/16W MF 402 INT_2_5V_COLD
R260 10K 5% 1/16W MF 402 INT_2_5V_COLD
R265 10K 5% 1/16W MF 402 INT_2_5V_COLD

INT - DDR/BOOTROM

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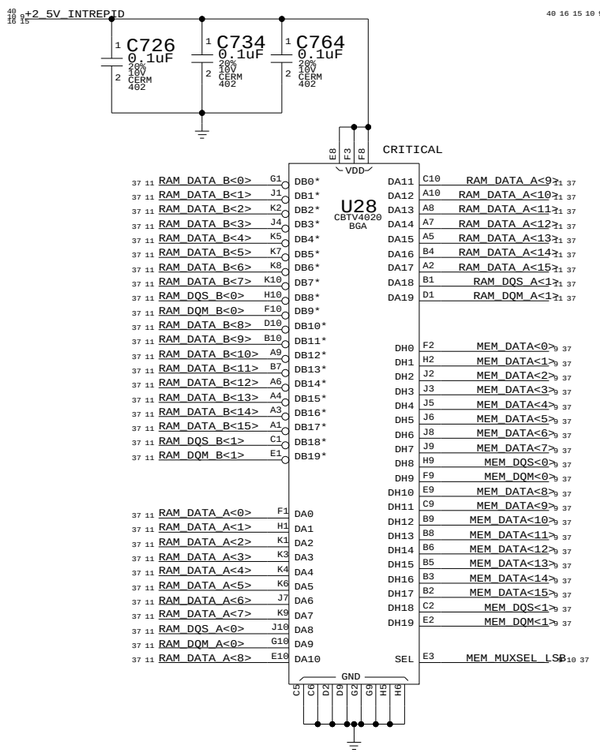
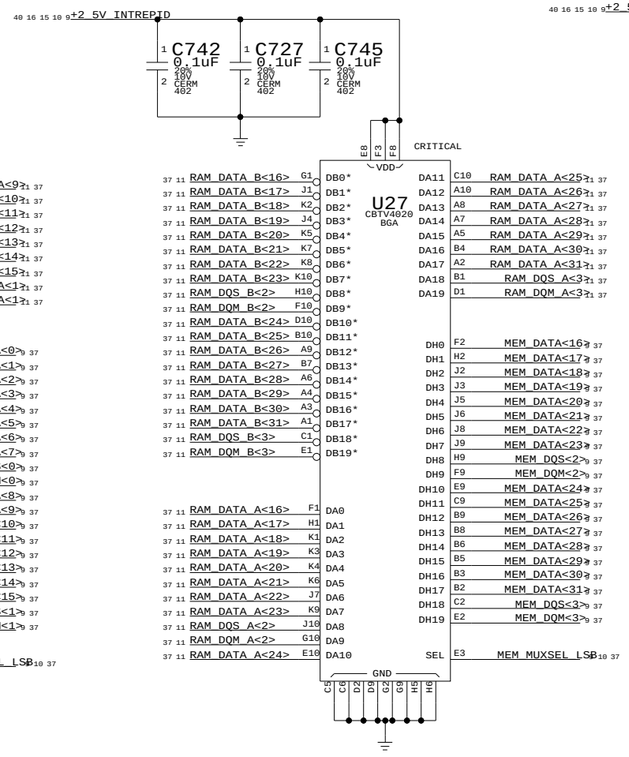
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 9 OF 46	

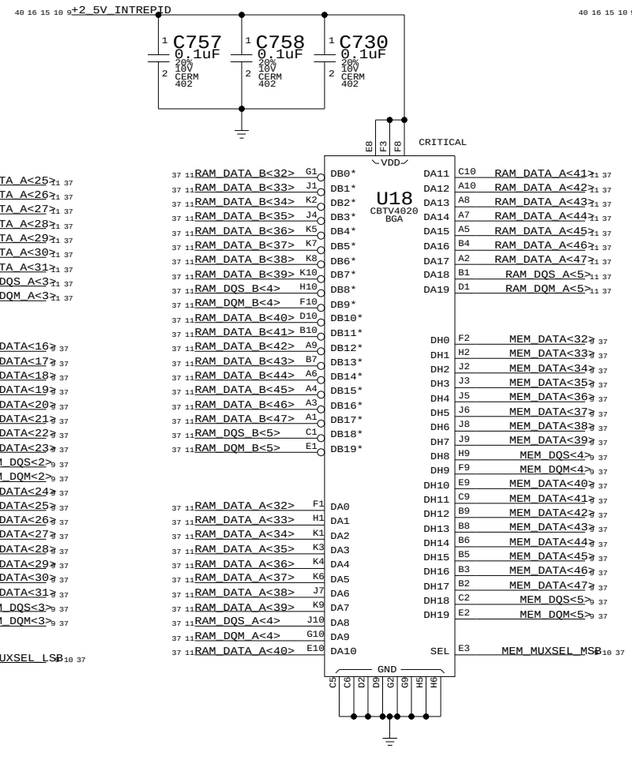
BIT 0..15



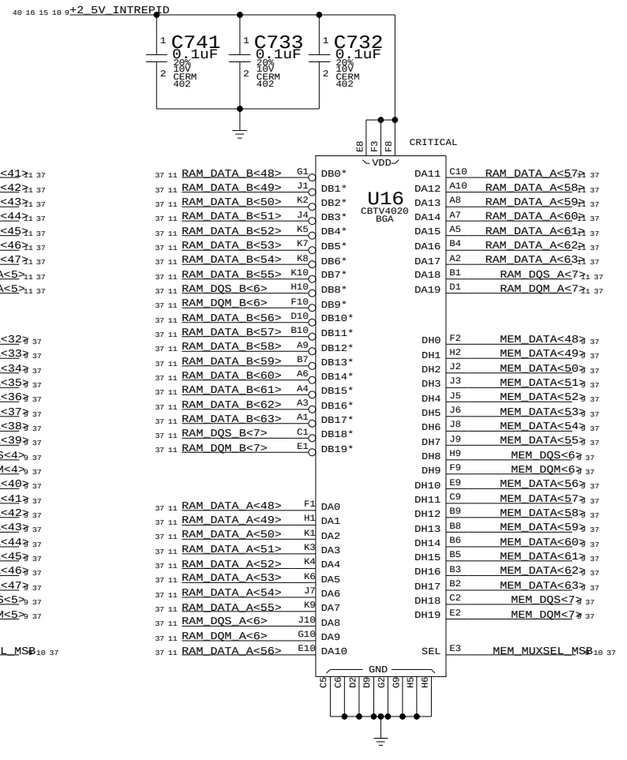
BIT 16..31



BIT 32..47



BIT 48..63



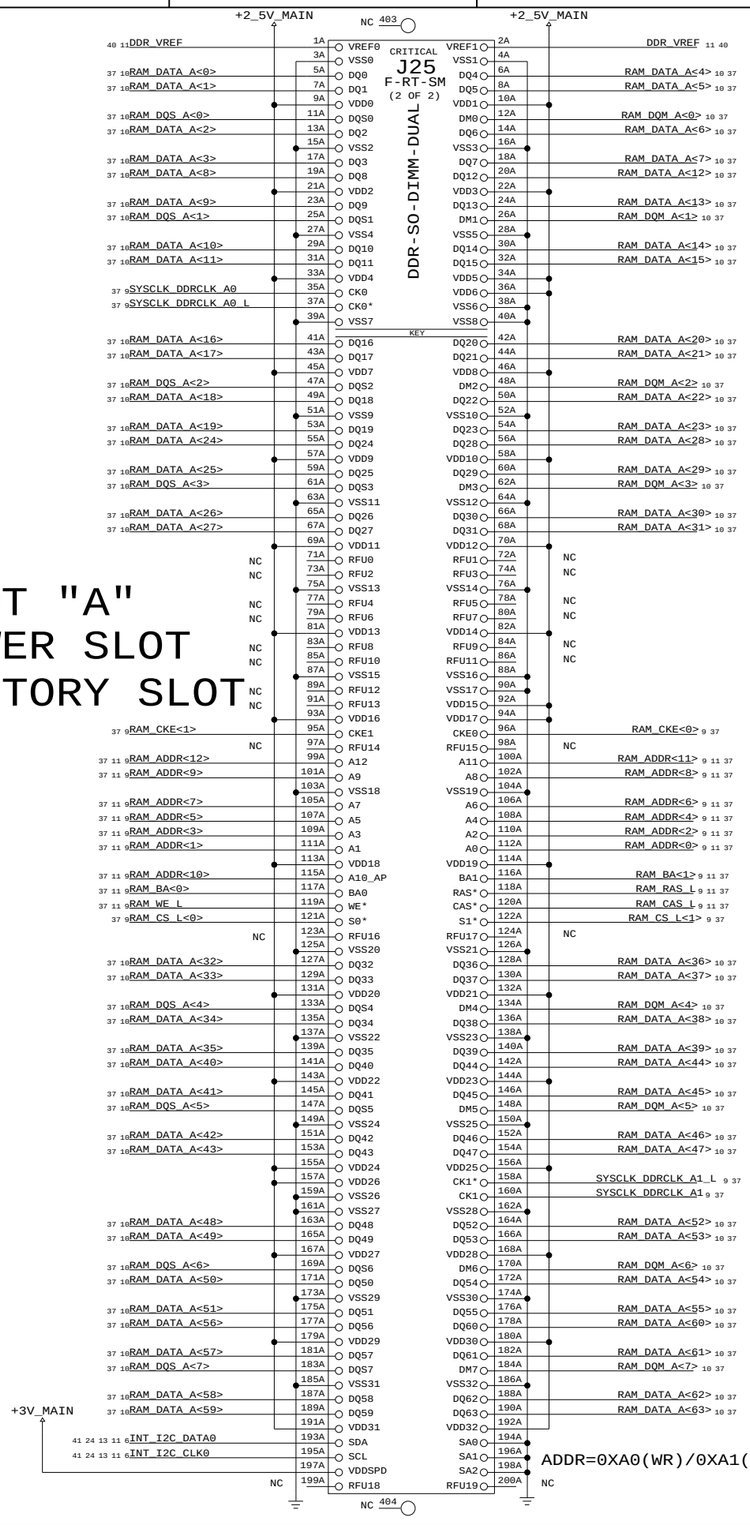
SEL = LOW; HOST = B PORT; A PORT = 100OHM TO GND
SEL = HIGH; HOST = A PORT; B PORT = 100OHM TO GND

16BIT 2:1 DDR MUXES

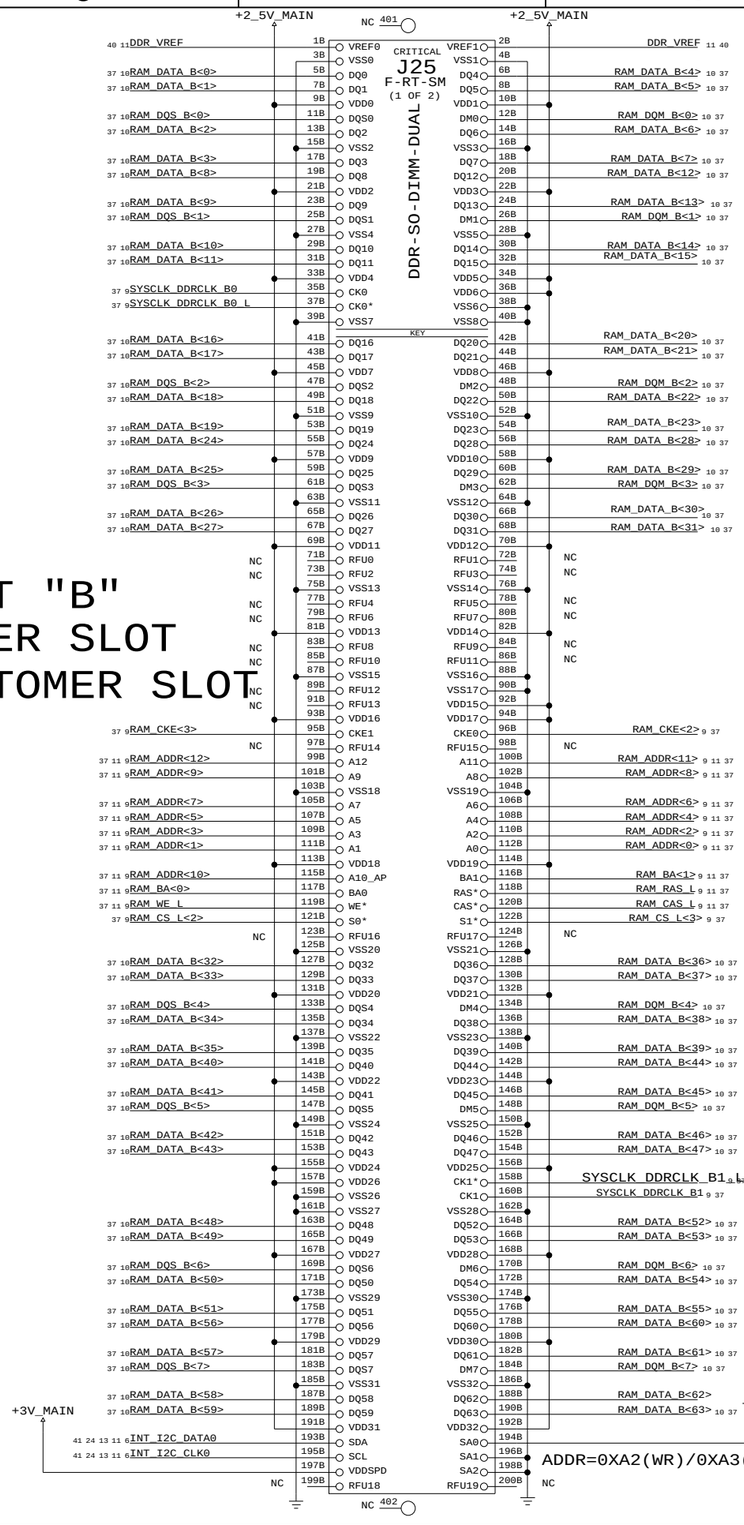
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE	SHT OF
NONE	10 46

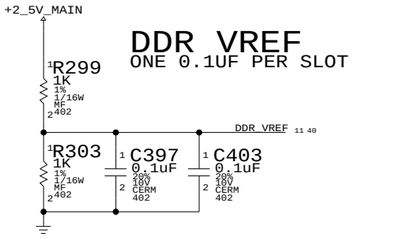


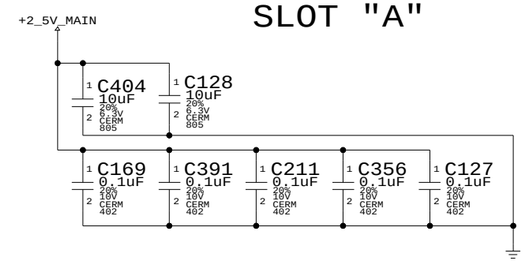
SLOT "A"
LOWER SLOT
FACTORY SLOT

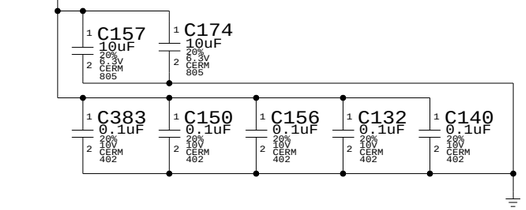


SLOT "B"
UPPER SLOT
CUSTOMER SLOT

NOTE: The SODIMM connector footprint has a through-hole slot on the PCB for additional mounting



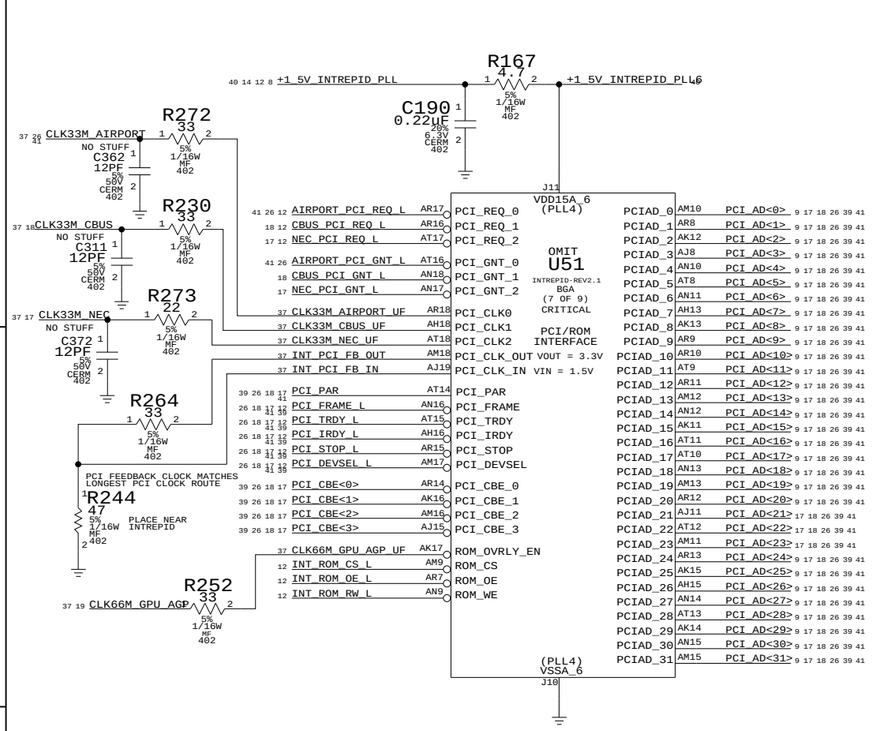


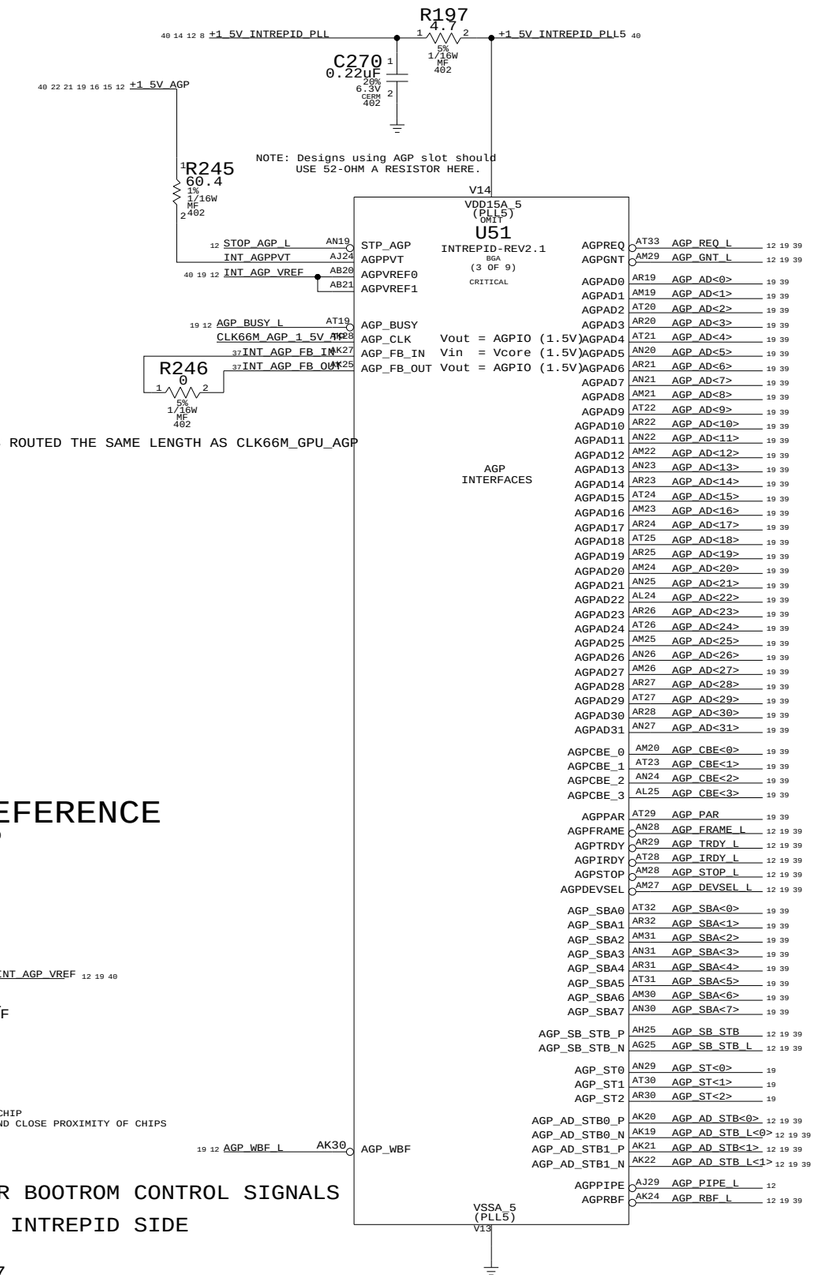


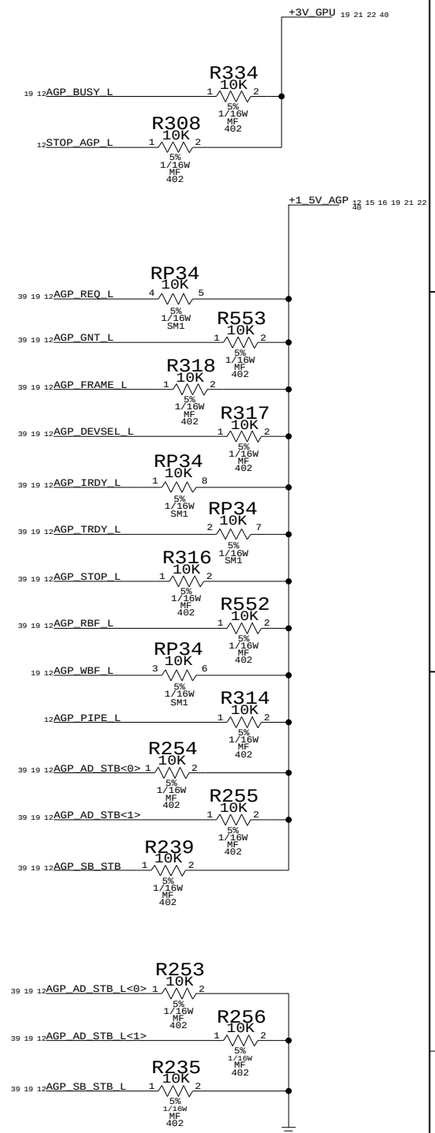
DDR SODIMM CONNS

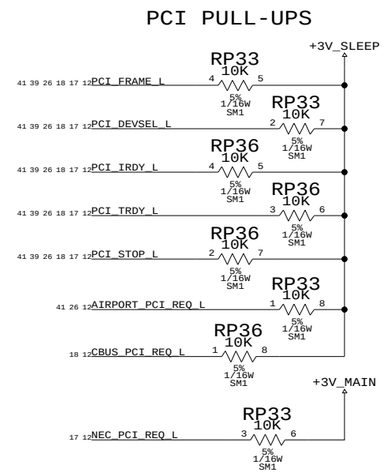
APPLE COMPUTER INC.

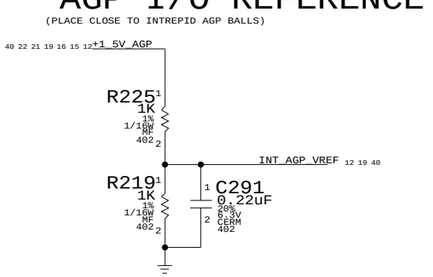
SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 11 OF 46	

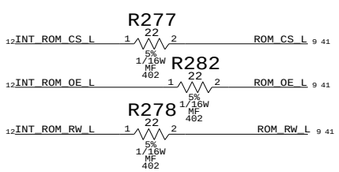












INTREPID AGP/PCI

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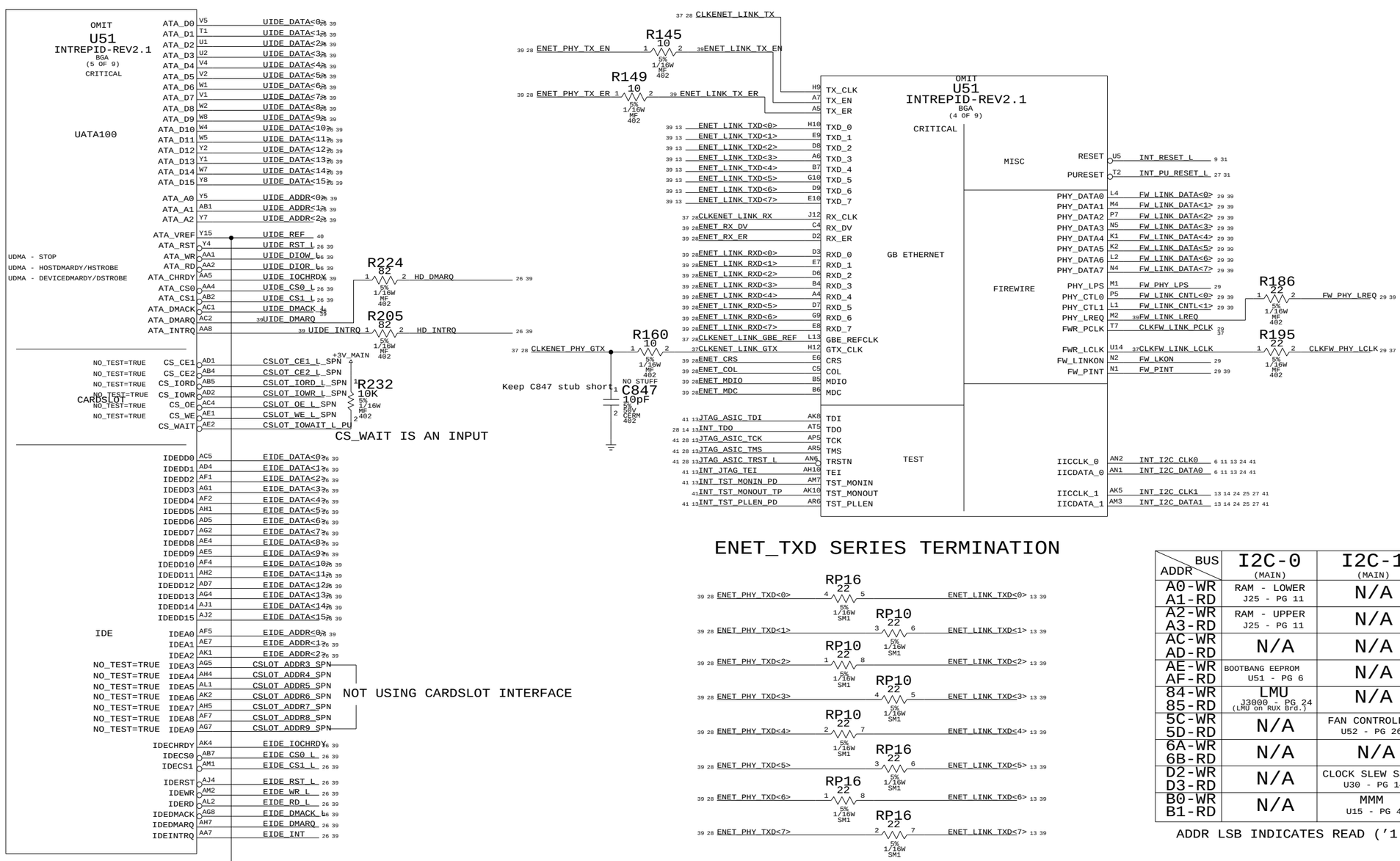
SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE	SHT	OF
NONE	12	46



BUS / ADDR	I2C-0 (MAIN)	I2C-1 (MAIN)	I2C-2 (SLEEP)	PMU (SLEEP)
A0-WR A1-RD	RAM - LOWER J25 - PG 11	N/A	N/A	N/A
A2-WR A3-RD	RAM - UPPER J25 - PG 11	N/A	N/A	N/A
AC-WR AD-RD	N/A	N/A	SOFT MODEM J14 - PG 26	N/A
AE-WR AF-RD	BOOTBANG EEPROM U51 - PG 6	N/A	N/A	N/A
84-WR 85-RD	LMU J3000 - PG 24 (LMU on RUX Brd.)	N/A	N/A	N/A
5C-WR 5D-RD	N/A	FAN CONTROLLER U52 - PG 26	N/A	N/A
6A-WR 6B-RD	N/A	N/A	SNAPPER SOUND J2 - PG 26	N/A
D2-WR D3-RD	N/A	CLOCK SLEW SSCG U30 - PG 14	N/A	N/A
B0-WR B1-RD	N/A	MMM U15 - PG 42	N/A	N/A

JTG_RSTN_L	TST_TEI_H	JTG_TDO_H (I/O)	JTG_TDI_H (I/O)	TST_PLLEN_H	ANALYZER_CLK	DESCRIPTION
1	X	X	X	X	X	JTAG MODE
0	0	EXTPLL SHUTDOWN (OUTPUT)	DDR_ TPDENABLE (OUTPUT)	0	(OUTPUT)	NORMAL OPERATION
0	0	(OUTPUT)	0(I)	1	SELECTED PLL OUTPUTS	VIEW PLLS (SOFTWARE)
0	0	HWPLL_ TESTSEL5 (INPUT)	1(I)	1	SELECTED PLL OUTPUTS	VIEW PLLS (HARDWARE)
0	1	0(I)	0(I)	MEMWE	SYNC/MEM DATA BYPASS	ATPG NORMAL
0	1	0(I)	1(I)	0	X(I)	ATPG IDDQ
0	1	0(I)	1(I)	1	X(I)	TEST TRI-STATE
0	1	1(I)	0(I)	0	X(I)	FUNCTIONAL TEST WITHOUT POSTSCALAR BYPASS
0	1	1(I)	0(I)	1	X(I)	FUNCTIONAL TEST WITH POSTSCALAR BYPASS
0	1	1(I)	1(I)	X	X(I)	FUNCTIONAL TEST IDDQ

USB PORT ASSIGNMENTS

PORT A B C D/UNUSED

R181 10K — USB_DAM
R183 10K — USB_DAP
R123 10K — USB_DBP
R121 10K — USB_DBM
R164 10K — USB_DCM
R165 10K — USB_DCP
R182 10K — USB_DDM
R180 10K — USB_DDP

PORT E/BLUETOOTH

R174 22 — USB_DEP → BT_USB_DP
R179 22 — USB_DEM → BT_USB_DM
R178 15K, R175 15K

PORT F/TRACKPAD

R635 22 — USB_DFP → USB_TPAD_P
R603 22 — USB_DFM → USB_TPAD_N
R129 15K, R125 15K

+2_5V_MAIN — NO STUFF R568 0 — +1_8V_MAIN — R565 0

U49 LT1962-ADJ MSOP: IN ← LTC1962_INT_VIN; OUT → +1_5V_INTREPID_PLL (-> 1.55V OUTPUT); ADJ ← LTC1962_INT_ADJ; BYP → LTC1962_INT_BYP; SHDN ← +3V_SLEEP; NC NC NC

C721 1uF 10V CERM 603 — C392 0.01uF 20% 16V CERM 402 — R574 18.7K 1% 1/16W MF 402 — C723 10uF 20% 6.3V CERM 805 — R567 68.1K 1% 1/16W MF 402

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
359S0086	1	IC,CY28512-2	U31	CRITICAL	SSCG

PCI INTERRUPTS

+3V_SLEEP — R148 10K — CBUS_INT_L
+3V_MAIN — R746 10K — AIRPORT_PCI_INT_L
+3V_MAIN — R158 10K — NEC_PCI_INT_L

GPIO/EXTINT PULLUPS

+3V_MAIN
R187 10K — USB_PWREN_EF_L
R191 10K — USB_OC_EF_L
RP11 10K — USB_OC_AB_L
RP11 10K — USB_PWREN_CD_L
RP8 10K — USB_PWREN_AB_L
RP11 10K — USB_OC_CD_L
RP8 10K — INT_EXTINT14_PU
RP5 10K — INT_EXTINT8_PU
RP6 10K — COMM_RING_DET_L
RP11 10K — INT_GPIO15_PU
RP6 10K — PMU_INT_NMI
RP6 10K — PMU_INT_L
R250 10K — PMU_REQ_L
RP7 10K — INT_GPIO12_PU
RP7 10K — INT_EXTINT13_PU
RP4 10K — INT_EXTINT16_PU
RP6 10K — INT_EXTINT10_PU
RP8 10K — INT_GPIO9_PU
RP8 10K — INT_GPIO1_PU
R153 10K — INT_EXTINT3_PU
USB_MODEM RP15 10K — INT_MOD_DTO_UF
USB_MODEM RP15 10K — INT_MOD_CLKOUT_UF
RP5 10K — NC EXTINT11
RP4 10K — NC EXTINT12
USB_MODEM RP15 10K — INT_MOD_DTI
USB_MODEM RP15 10K — INT_MOD_SYNC_UF
USB_MODEM R206 10K — INT_MOD_BITCLK_UF
R166 100K — SND_HW_RESET_L

+3V_MAIN — SSCG L15 400-OHM-EMI SM-1 — +3V_CG_PLL_MAIN
+2_5V_MAIN — SSCG L14 400-OHM-EMI SM-1

MAIN_RESET_L
NO STUFF R286 0 — SSCG R287 10K — SSCG R288 10K — NO STUFF R295 10K
SSCG C400 0.1uF — SSCG C402 1uF — SSCG C399 0.1uF — SSCG C394 0.1uF

CRITICAL U31 CY28512D TSSOP OMIT — INTERNAL 250K PULL-UP; OUTPUT IMPEDANCE ~18-20 OHMS

20	CLKIN	INT_REF_CLK_OUT
3	FSEL	CG_FSEL
9	SCLK	INT_I2C_CLK1
8	SDATA	INT_I2C_DATA1
14	ADDRSEL (INTERNAL 250K PULL-DOWN)	CG_ADDRSEL
17	RESET*	CG_RESET_L
13	PD*	CG_SYSCLK_EN
2	LOCK (OPEN DRAIN OUTPUT)	CG_LOCK
4	ODSEL (INTERNAL 250K PULL-UP)	NC
16	CPU0	CG_CLKOUT
7	VDD0	
19	VDD1	
10	VDD2	
12	VDDA	
5	VDDC	
18	VDD3	
1	VSS0	
11	VSS1	
6	VSSA	
15	VSSC	

SSCG R293 33 — INT_REF_CLK_IN
SSCG R292 75 — PLACE NEAR INTREPID TO MINIMIZE OVERSHOOT
SSCG R142 0 — VCORE_VGATE
NO STUFF R284 0 — VCORE_VGATE
NO STUFF R296 10K

NO STUFF R467 0 — SYSTEM_CLK_EN
R457 0 — INT_TDO → CG_SYSCLK_EN
NO STUFF J9 U.FL-R-SMT — CLK18M_INT_EXT
NO STUFF R134 0 — CLK18M_INT_XOUT
NO STUFF R113 51
NO STUFF R144 10M — R143 0 — CRITICAL Y2 OMIT 18.432M 8X4.5MM-SM — CLK18M_XTAL_IN
C152 22pF — C151 22pF
R218 — INT_REF_CLK_OUT
+3V_MAIN — R802 10K NO STUFF MMM_SIRQ_L — R801 10K NO STUFF MMM_FFIRQ_L

CRYSTAL LOAD CAPACITANCE IS 16PF

HWPLL_TESTMUXSEL	SIGNAL NAME
5	MOD_BITCLK_B_H
4	MOD_CLKOUT_B_H
3	MOD_DTO_B_H
2	MOD_SYNC_B_H
1	MOD_DTI_B_H
0	JTG_TDO_H

R240 4.7 — C337 0.22uF — +1_5V_INTREPID_PLL
R280 4.7 — C389 0.22uF — +1_5V_INTREPID_PLL
R279 4.7 — C388 0.22uF — +1_5V_INTREPID_PLL
R243 4.7 — C386 0.22uF — +1_5V_INTREPID_PLL
R201 4.7 — C387 0.22uF — +1_5V_INTREPID_PLL

+3V_MAIN — L13 FERR-EMI-100-OHM SM — +3V_INTREPID_USB
C235 0.01uF — C246 0.1uF — C256 10uF 20% 6.3V CERM 805

U51 INTREPID-REV2.1 BGA CRITICAL (6 OF 9)

OMIT

PCI VDD15A_1 (PLL1)	AA16	
PCI VDD15A_2 (PLL2)	AJ12	
PCI VDD15A_3 (PLL3)	AJ17	
PCI VDD15A_4 (PLL7)	AJ18	
VDD15A_8 (PLL9)	AG29	
VDDU33_1	T8	
VDDU33_2	U8	

GPIO0 VCORE A/B SEL; GPIO1 INT_GPIO1_PU E1; NC J7; GPIO2 COMM_RESET_L F2; GPIO3 FW_PHY_PD J8; GPIO4 SND_HP_MUTE_L H5; GPIO5 SND_AMP_MUTE_L L9; GPIO6 INT_GPIO9_PU H4; GPIO9 SND_HW_RESET_L J5; GPIO11 INT_GPIO12_PU K8; GPIO12 INT_GPIO15_PU F1; GPIO15 INT_ENET_RST_L K7; GPIO16

GENERAL PURPOSE I/O'S

EXTINT0 COMM_RING_DET_L F33; EXTINT1 PMU_INT_L E34; EXTINT2 AGP_ATI_INT_L C33; EXTINT3 INT_EXTINT3_PU D34; EXTINT4 SND_LIN_SENSE_L B33; EXTINT5 ENET_ENERGY_DET A33; EXTINT6 AIRPORT_PCI_INT_L E31; EXTINT7 CBUS_INT_L G30; EXTINT8 INT_EXTINT8_PU D31; EXTINT9 PMU_INT_NMI C32; EXTINT10 INT_EXTINT10_PU B32; EXTINT11 MMM_FFIRQ_L E30; EXTINT12 MMM_SIRQ_L J9; EXTINT13 INT_EXTINT13_PU F4; EXTINT14 INT_EXTINT14_PU D1; EXTINT15 SND_HP_SENSE_L E2; EXTINT16 INT_EXTINT16_PU H7; EXTINT17 NEC_PCI_INT_L G4; CPU_INT MPIC_CPU_INT_L D30

INTERRUPTS

POWERBOOK SPARE: EXTINT8, EXTINT9

CBUS_REG_L (EXTINT10); CBUS_IREQ_L (EXTINT11)

PCIPME AJ7; PROCSLEEPREQ AT6; PENDPROCINT AN8

XTAL_IN U4; XTAL_OUT V1; STOPXTAL AN7; WATCHDOG AT7

CLOCKS

BUF_REF_CLK_OUT U15; SS_REF_CLK_IN K9

IICCLK_2 AL4; IICDATA_2 AH8

IIC

VSSA1 (PLL1) AA15; VSSA2 (PLL2) AJ13; VSSA3 (PLL3) AJ16; VSSA4 (PLL7) AK18; VSSA_8 (PLL9) AH29; VSSU_1 R9; VSSU_2 R8

USB

USB_VD0_P		
USB_VD0_N		
USB_VD1_P	G2	USB_DBP
USB_VD1_N	G1	USB_DBM
USB_PRTPWR0	J4	USB_PWREN_AB_L
USB_PWRFLT0	K4	USB_OC_AB_L
USB_VD2_P	H2	USB_DCP
USB_VD2_N	H1	USB_DCM
USB_VD3_P	M7	USB_DDP
USB_VD3_N	M8	USB_DDM
USB_PRTPWR1	J2	USB_PWREN_CD_L
USB_PWRFLT1	J1	USB_OC_CD_L
USB_VD4_P	K5	USB_DEP
USB_VD4_N	L5	USB_DEM
USB_VD5_P	P8	USB_DFP
USB_VD5_N	N8	USB_DFM
USB_PRTPWR2	M5	USB_PWREN_EF_L
USB_PWRFLT2	N7	USB_OC_EF_L

AUDIO/I2S

AUD_DTO	R4	INT_I2S0_SND_TO_DAC_UF
AUD_DTI	R7	INT_I2S0_SND_FROM_ADC
AUD_SYNC	T5	INT_I2S0_SND_LRCLK_UF
AUD_BITCLK	P2	INT_I2S0_SND_SCLK_UF
AUD_CLKOUT	R5	INT_I2S0_SND_MCLK_UF
MOD_DTO	R2	INT_MOD_DTO_UF
(SIGNAL FROM MODEM) MOD_DTI	T4	INT_MOD_DTI
MOD_SYNC	R1	INT_MOD_SYNC_UF
MOD_BITCLK	V8	INT_MOD_BITCLK_UF
MOD_CLKOUT	P1	INT_MOD_CLKOUT_UF

VIA	SCCTXCA	COMM_TRXC
MISO	SCCTXDB	PMU_FROM_INT
REQ*	SCCRTSB	PMU_REQ_L
MOSI	SCCRXDB	PMU_TO_INT
ACK*	SCCGPIOB	PMU_ACK_L
SCK	SCCTRXCB	PMU_CLK
	SCCTXDA	COMM_TXD_L
	SCCRTSA	COMM_RTS_L
	SCCDTRA	COMM_DTR_L
	SCCRXDA	COMM_RXD
	SCCGPIOA	COMM_GPIO_L

RP13 47 — INT_I2S0_SND_TO_DAC
RP13 47 — INT_I2S0_SND_LRCLK
RP13 47 — INT_I2S0_SND_SCLK
RP13 47 — INT_I2S0_SND_MCLK

SOFT_MODEM RP47 0K — INT_MOD_DTO
SOFT_MODEM RP47 0K — INT_MOD_SYNC
SOFT_MODEM RP47 0K — INT_MOD_BITCLK
SOFT_MODEM RP47 0K — INT_MOD_CLKOUT

+3V_SLEEP — R258 1K — R241 1K — INT_I2C_CLK2 — INT_I2C_DATA2

INT - USB/GPIOS/I2S

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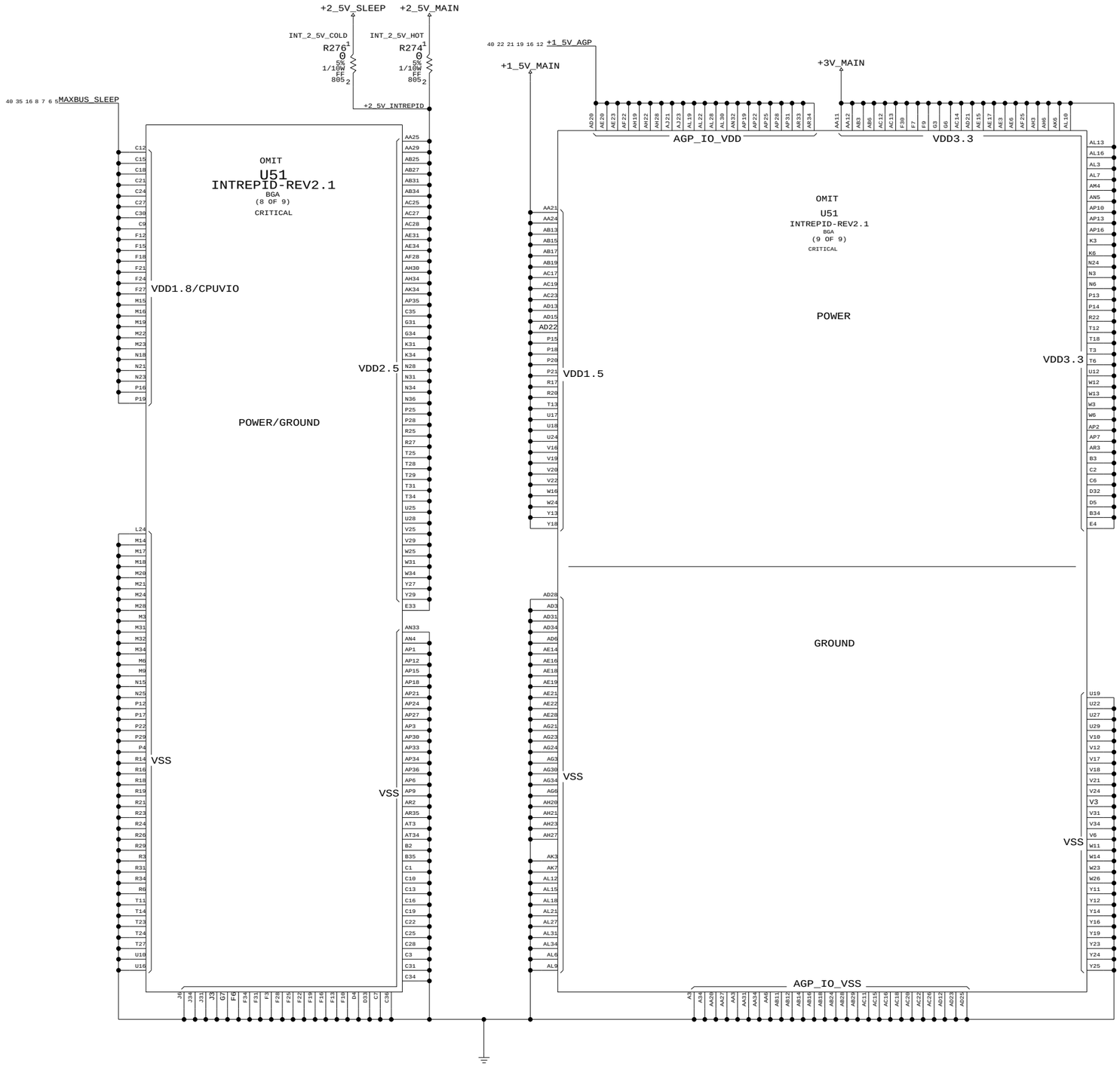
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
197S0090	1	XTAL,CER,LOW PROF,18,432MHZ,8X4.5MM,SMD	Y2	CRITICAL	?

PART #	QTY	DEVICE	PACKAGE	DESCRIPTION	VALUE	VOLT.	WATT.	TOL.	REFERENCE DESIGNATOR(S)	BOM OPTION
116S1104	1	RES	RES-0402-V2	RESISTOR	10K		1/16W	5%	R292	NO_SSCG

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 14 OF 46	



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
343S0305	1	IC,ASIC,INTREPID,REV2.1,974 BGA,FAST	U51	CRITICAL	?

Intrepid Power

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 15 OF 46	

INTREPID MAXBUS DECOUPLING

35 15 8 7 6 5 MAXBUS_SLEEP 40

24 Balls
4 X 10UF (0805)
28 X 0.22UF (0402)

C148 10uF 20% 6.3V CERM 805 · C142 10uF 20% 6.3V CERM 805 · C144 10uF 20% 6.3V CERM 805 · C146 10uF 20% 6.3V CERM 805

C182 C178 C141 C145 C214 C163 C164 C225 C160 C159
C204 C166 C205 C223 C229 C181 C207 C208 C183 C180
C165 C206 C147 C149 C179 C162 C161 C213

0.22uF 20% 6.3V CERM 402

INTREPID CORE DECOUPLING

+1_5V_MAIN

30 Balls
4 X 10UF (0805)
29 X 0.22UF (0402)

C324 10uF 20% 6.3V CERM 805 · C325 10uF 20% 6.3V CERM 805 · C201 10uF 20% 6.3V CERM 805 · C200 10uF 20% 6.3V CERM 805

C299 C279 C262 C292 C248 C302 C300 C290 C272 C259
C301 C278 C226 C238 C250 C263 C224 C222 C261 C227
C271 C310 C288 C260 C303 C287 C258 C236 C289

0.22uF 20% 6.3V CERM 402

INTREPID AGP I/O DECOUPLING

40 22 21 19 15 12 +1_5V_AGP

21 Balls
4 X 10UF (0805)
21 X 0.22UF (0402)

C381 10uF 20% 6.3V CERM 805 · C380 10uF 20% 6.3V CERM 805 · C382 10uF 20% 6.3V CERM 805 · C379 10uF 20% 6.3V CERM 805

C367 C319 C330 C363 C366 C332 C361 C320 C328 C364
C365 C329 C345 C346 C373 C344 C331 C312 C354 C347
C321

0.22uF 20% 6.3V CERM 402

INTREPID 3.3V DECOUPLING

+3V_MAIN

57 Balls
4 X 10UF (0805)
40 X 0.22UF (0402)

C378 10uF 20% 6.3V CERM 805 · C376 10uF 20% 6.3V CERM 805 · C377 10uF 20% 6.3V CERM 805 · C375 10uF 20% 6.3V CERM 805

C170 C358 C268 C327 C342 C215 C352 C171 C158 C309
C175 C357 C351 C350 C286 C176 C189 C167 C371 C359
C285 C283 C269 C221 C234 C247 C257 C343 C313 C228
C360 C308 C318 C237 C317 C341 C177 C212 C349 C184

0.22uF 20% 6.3V CERM 402

INTREPID DDR DECOUPLING

40 15 10 9 +2_5V_INTREPID

44 Balls
4 X 10UF (0805)
46 X 0.22UF (0402)

C314 10uF 20% 6.3V CERM 805 · C322 10uF 20% 6.3V CERM 805 · C191 10uF 20% 6.3V CERM 805 · C202 10uF 20% 6.3V CERM 805

C304 C266 C172 C281 C243 C253 C334 C241 C348 C192
C306 C252 C275 C297 C240 C218 C274 C369 C368 C168
C265 C251 C216 C254 C305 C186 C219 C315 C264 C294
C323 C273 C242 C203 C333 C217 C230 C293 C231 C296
C239 C316 C185 C282 C295 C280

0.22uF 20% 6.3V CERM 402

INTREPID/MAIN 2.5V DECOUPLING

+2_5V_MAIN

10 X 0.22UF (0402)

C770 C139 C335 C735 C245 C736 C739 C395 C374 C385

0.22uF 20% 6.3V CERM 402

Place these 2.5V Decoupling Caps near the Edge of +2.5V_MAIN and +2.5V_INTREPID split

Intrepid Decoupling

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 16 OF 46	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
197S0087	1	XTAL,CER,LW PROF,30.0000MHZ,8X4.5MM,SMD	Y1	CRITICAL	?

+3V_NEC_VDD 17 40

C749 0.1uF 20% 10V CERM 402
C746 0.1uF 20% 10V CERM 402
C761 0.1uF 20% 10V CERM 402
C750 0.1uF 20% 10V CERM 402
C756 0.1uF 20% 10V CERM 402
C748 0.1uF 20% 10V CERM 402
C769 0.1uF 20% 10V CERM 402
C752 0.1uF 20% 10V CERM 402
C747 0.1uF 20% 10V CERM 402
C197 10uF 20% 6.3V CERM 805
C765 0.1uF 20% 10V CERM 402
C768 0.1uF 20% 10V CERM 402

+3V_MAIN

L7 FERR-EMI-100-OHM SM

R172 0 5% 1/16W MF 603

C760 0.1uF 20% 10V CERM 402
C751 0.1uF 20% 10V CERM 402
C173 10uF 20% 6.3V CERM 805

40 NEC_AVDD

40 17 +3V_NEC_VDD

H3 M4 C8 P2 P3 P12 A13 A12 A3 E2 N8 L13 J13 H13 F13 D13 G12 H4 D7 — VDD
N10 M12 — AVDD

Y1's LOAD CAPACITANCE = 16 pF

OMIT CRITICAL
Y1 30.0000M 8X4.5MM-SM

NEC_XT2_R

C759 27pF 5% 50V CERM 402
C136 27pF 5% 50V CERM 402
R124 100 5% 1/16W MF 402

CRITICAL
U17
NEC_uPD720101_USB2
FBGA

41 39 26 18 12 9 PCI_AD<0>	M5	AD0	
41 39 26 18 12 9 PCI_AD<1>	P5	AD1	
41 39 26 18 12 9 PCI_AD<2>	N5	AD2	
41 39 26 18 12 9 PCI_AD<3>	P4	AD3	
41 39 26 18 12 9 PCI_AD<4>	N4	AD4	
41 39 26 18 12 9 PCI_AD<5>	M3	AD5	
41 39 26 18 12 9 PCI_AD<6>	N3	AD6	
41 39 26 18 12 9 PCI_AD<7>	M1	AD7	
41 39 26 18 12 9 PCI_AD<8>	L2	AD8	
41 39 26 18 12 9 PCI_AD<9>	L1	AD9	
41 39 26 18 12 9 PCI_AD<10>	K2	AD10	
41 39 26 18 12 9 PCI_AD<11>	L3	AD11	
41 39 26 18 12 9 PCI_AD<12>	K1	AD12	
41 39 26 18 12 9 PCI_AD<13>	K3	AD13	
41 39 26 18 12 9 PCI_AD<14>	J2	AD14	
41 39 26 18 12 9 PCI_AD<15>	J1	AD15	
41 39 26 18 12 9 PCI_AD<16>	F2	AD16	
41 39 26 18 12 9 PCI_AD<17>	E3	AD17	
41 39 26 18 12 9 PCI_AD<18>	E1	AD18	
41 39 26 18 12 9 PCI_AD<19>	D3	AD19	
41 39 26 18 12 9 PCI_AD<20>	D1	AD20	
41 39 26 18 12 PCI_AD<21>	D2	AD21	
41 39 26 18 12 PCI_AD<22>	C2	AD22	
41 39 26 18 12 PCI_AD<23>	C1	AD23	
41 39 26 18 12 9 PCI_AD<24>	B4	AD24	
41 39 26 18 12 9 PCI_AD<25>	A4	AD25	
41 39 26 18 12 9 PCI_AD<26>	B5	AD26	
(PCI_AD<27>)	C4	AD27	
41 39 26 18 12 9 PCI_AD<28>	A5	AD28	
41 39 26 18 12 9 PCI_AD<29>	C5	AD29	
41 39 26 18 12 9 PCI_AD<30>	B6	AD30	
41 39 26 18 12 9 PCI_AD<31>	A6	AD31	
39 26 18 12 PCI_CBE<0>	M2	CBE0	
39 26 18 12 PCI_CBE<1>	J3	CBE1	
39 26 18 12 PCI_CBE<2>	F1	CBE2	
39 26 18 12 PCI_CBE<3>	C3	CBE3	
41 39 26 18 12 PCI_PAR	J4	PAR	
41 39 26 18 12 PCI_FRAME_L	F3	FRAME	
41 39 26 18 12 PCI_IRDY_L	F4	IRDY	
41 39 26 18 12 PCI_TRDY_L	G1	TRDY	
41 39 26 18 12 PCI_STOP_L	G3	STOP	
NEC_IDSEL	B3	IDSEL	
41 39 26 18 12 PCI_DEVSEL_L	G2	DEVSEL	
12 NEC_PCI_REQ_L	C6	REQ	
12 NEC_PCI_GNT_L	D6	GNT	
18 PCI_PERR_L	H2	PERR	
18 PCI_SERR_L	H1	SERR	OD
NEC_PCI_INTA_L	C7	INTA	OD
NEC_PCI_INTB_L	B7	INTB	OD
NEC_PCI_INTC_L	A7	INTC	OD
37 12 CLK33M_NEC	A8	PCLK	
17 NEC_IO_RESET_L	B8	VBRRST	
NEC_CRUN_L	N6	CRUN	
17 NEC_PME_L	D8	PME	OD
17 NEC_MAIN_RESET_L	C8	VCCRST	
NEC_SMI_L_TP	L6	SMI	OD
17 NEC_LEGC	L7	LEGC	

VSS
B1 N1 P10 N14 H14 B14 A2 B2 N2 N13 B13 M11 L12 D12 G4 J11 F11 D8

XT1/SCLK L9 NEC_XT1
XT2 P8 NEC_XT2

RSDM1 M14 NEC_USB_RSDM1
DM1 M13 (NEC_USB_DAM)
DP1 L14 (NEC_USB_DAP)
RSDP1 K13 NEC_USB_RSDP1
RSDM2 K14 NEC_USB_RSDM2
DM2 K12 (NEC_USB_DBM)
DP2 J14 (NEC_USB_DBP)
RSDP2 J12 NEC_USB_RSDP2

R613 43.2 1% 1/16W MF 402 — NEC_USB_DAM 27 39 41
R612 43.2 1% 1/16W MF 402 — NEC_USB_DAP 27 39 41
R609 43.2 1% 1/16W MF 402 — NEC_USB_DBM 27 39 41
R610 43.2 1% 1/16W MF 402 — NEC_USB_DBP 27 39 41

Low/Full/High Speed (External)
Low/Full/High Speed (External)

RSDM3 H11 NC
DM3 G11
DP3 G13
RSDP3 G14 NC
RSDM4 F12 NC
DM4 F14
DP4 E12
RSDP4 E14 NC
RSDM5 E13 NC
DM5 D14
DP5 C13
RSDP5 C14 NC

RREF P11 NEC_RREF — R614 9.09K 1% 1/16W MF 402 — NEC_AVSS_F 17

Tie to GND (NEC_AVSS_F) at ball N11

OCI1 B12 NEC_LUSB_OCI
OCI2 B11 NEC_RUSB_OCI
OCI3 B10 NEC_OCI<3>
OCI4 A10 NEC_OCI<4>
OCI5 B9 NEC_OCI<5>

RP43 10K 5% 1/16W SM1 — +3V_NEC_VDD 17 40
RP43 10K 5% 1/16W SM1
R606 10K 5% 1/16W MF 402
R615 1K 5% 1/16W MF 402
R632 1K 5% 1/16W MF 402

PPON1 C12 OUT NEC_LUSB_PPON 41
PPON2 A11 OUT NEC_RUSB_PPON 41
PPON3 C11 OUT NEC_PPON3_TP
PPON4 C10 OUT NEC_PPON4_TP
PPON5 A9 OUT NEC_PPON5_TP

NC1 P6 NEC_NC<1>
NC2 M6 NEC_NC<2>

NEC documentation indicates that NCs must be tied high.

NTEST1 M8 IPD NC
SMC M7 IPD NC
TEB N7 IPD NC
AMC P7 IPD NEC_AMC_TP
TEST L8 IPD NC

NANDTEST M10 NEC_NANDTESTEN_TP
SRCLK M9 NC
SRDTA N9 NEC_NANDTESTOUT_TP
SRMOD P9 IPD NC
AVSS

AVSS(R) N11 P13 M12

R798 0 5% 1/16W MF 603 — NEC_AVSS_F 1

R636 22 5% 1/16W MF 402 — PCI_AD<27>

Series Rpaks required to facilitate NAND-tree testing

RP45 47 5% 1/16W SM1
NC 1 — 8 NC
14 NEC_PCI_INT 2 — 7 NEC_PCI_INTA_L
3 — 6 NEC_PCI_INTB_L
4 — 5 NEC_PCI_INTC_L

R617 4.7k 5% 1/16W MF 402

RP44 47 5% 1/16W SM1
31 28 25 24 IO_RESET_L 1 — 8 NEC_IO_RESET_L 17
41 31 26 14 PMU_PME_L 2 — 7 NEC_PME_L 17
41 31 26 20 19 18 14 MAIN_RESET_L 3 — 6 NEC_MAIN_RESET_L 17
17 NEC_LEGC 4 — 5

+3V_MAIN

R607 0 5% 1/16W MF 402
17 NEC_LUSB_OCI — NEC_LUSB_OCI_UF 27 41

R608 0 5% 1/16W MF 402
17 NEC_RUSB_OCI — NEC_RUSB_OCI_UF 27 41

RP43 10K 5% 1/16W SM1
RP43 10K 5% 1/16W SM1

C743 0.1uF 20% 10V CERM 402 NO STUFF
C744 0.1uF 20% 10V CERM 402 NO STUFF

USB 2.0

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 17 OF 46	

PCI1510 PULL-UPS

+3V_SLEEP_PCCARD

R718 10K 5% 1/16W MF 402 — PCI_PERR_L (17 18)

R714 10K 5% 1/16W MF 402 — PCI_SERR_L (17 18)

R722 10K 5% 1/16W MF 402 — CBUS_SUSPEND_PU (18)

+2_5V_SLEEP

C787 4.7uF 20% 6.3V CERM 805

C786 0.22uF 20% 6.3V CERM 402

+3V_SLEEP

R756 0 5% 1/16W MF 603 — +3V_SLEEP_PCCARD (40)

C60 10uF 20% 6.3V CERM 805

C776 10uF 20% 6.3V CERM 805

C789 0.22uF 20% 6.3V CERM 402

C791 0.22uF 20% 6.3V CERM 402

C784 0.22uF 20% 6.3V CERM 402

C782 0.22uF 20% 6.3V CERM 402

C783 0.22uF 20% 6.3V CERM 402

C778 0.22uF 20% 6.3V CERM 402

C775 0.22uF 20% 6.3V CERM 402

R721 10K 5% 1/16W MF 402

A7 C13 D5 E1 M1 N7 N11 — VCC

PCI1510_VR_EN_L (24)

U8 PCI1510GGU BGA

CRITICAL CLAMP FOR PC-CARD CLAMP FOR PCI

NC	H10	CLK_48_RSVD/NC
	A4	VR_EN*
	L8	VR_PORT
PCI_AD<0>	N8	AD0
PCI_AD<1>	M7	AD1
PCI_AD<2>	L7	AD2
PCI_AD<3>	N6	AD3
PCI_AD<4>	K4	AD4
PCI_AD<5>	M6	AD5
PCI_AD<6>	L6	AD6
PCI_AD<7>	N5	AD7
PCI_AD<8>	N4	AD8
PCI_AD<9>	M2	AD9
PCI_AD<10>	M5	AD10
PCI_AD<11>	L4	AD11
PCI_AD<12>	N3	AD12
PCI_AD<13>	K5	AD13
PCI_AD<14>	L5	AD14
PCI_AD<15>	M4	AD15
PCI_AD<16>	J4	AD16
PCI_AD<17>	H1	AD17
PCI_AD<18>	H3	AD18
(PCI_AD<19>)	H2	AD19
PCI_AD<20>	G2	AD20
PCI_AD<21>	G4	AD21
PCI_AD<22>	F1	AD22
PCI_AD<23>	C3	AD23
PCI_AD<24>	F3	AD24
PCI_AD<25>	E2	AD25
PCI_AD<26>	F4	AD26
PCI_AD<27>	B1	AD27
PCI_AD<28>	D2	AD28
PCI_AD<29>	E4	AD29
PCI_AD<30>	D3	AD30
PCI_AD<31>	E3	AD31
PCI_CBE<0>	K6	C/BE0*
PCI_CBE<1>	M3	C/BE1*
PCI_CBE<2>	J2	C/BE2*
PCI_CBE<3>	A1	C/BE3*
PCI_PAR	N1	PAR
PCI_IRDY_L	K1	IRDY
PCI_SERR_L	L2	SERR
CBUS_PCI_IDSEL	F2	IDSEL
PCI_PERR_L	K3	PERR
PCI_FRAME_L	J1	FRAME
PCI_STOP_L	L1	STOP
PCI_TRDY_L	J3	TRDY
PCI_DEVSEL_L	K2	DEVSEL
CBUS_PCI_RESET_L	G3	PRST
CBUS_PCI_REQ_L	C2	REQ
CBUS_PCI_GNT_L	C1	GNT
CLK33M_CBUS	G1	PCLK
NC	M9	SPKROUT
NC	M8	RI_OUT/PME
CBUS_SUSPEND_PU	M10	SUSPEND
CBUS_INT_L	K7	MFUNC0
CBUS_MFUNC1_PD	N9	MFUNC1
CBUS_MFUNC2_PD	L9	MFUNC2
CBUS_MFUNC3_PD	K10	MFUNC3
CBUS_MFUNC4_PD	M10	MFUNC4
CBUS_MFUNC5_PD	N12	MFUNC5
CBUS_MFUNC6_PD	L10	MFUNC6
	L11	GRST

R719 22 5% 1/16W MF 402

R723 47 5% 1/16W MF 402 — MAIN_RESET_L (31 41)

RP1 10K 5% 1/32W 25V SM

5	CBUS_MFUNC1_PD
10	CBUS_MFUNC2_PD
6	CBUS_MFUNC3_PD
4	CBUS_MFUNC4_PD
7	CBUS_MFUNC5_PD
3	CBUS_MFUNC6_PD
9	NC
8	NC
2	
1	

GND

A2 A11 D1 F13 H4 K8 M13 N2

INTEGRATED PULL-UP

VCCB	B11	
VCCP	L3	
VCCD0*	N13	CBUS_VCCD0_L
VCCD1*	L12	CBUS_VCCD1_L
VPPD0	K9	CBUS_VPPD0
VPPD1	M11	CBUS_VPPD1
CD1*/CCD1*	L13	CBUS_DET_1_L (18 41)
CD2*/CCD2*	B5	CBUS_DET_2_L (18 41)
IORD*/CAD13	F12	CBUS_IORD_L (18)
IOWR*/CAD15	C11	CBUS_IOWR_L (18)
OE*/CAD11	G10	CBUS_OE_L (18)
CE1*/CC/BE0*	H13	CBUS_CE1_L (18)
VS1*/CVS1	B2	CBUS_VS1 (18)
VS2*/CVS2	A9	CBUS_VS2 (18)
WE*/CGNT*	D13	CBUS_WE_L (18)
RDY/IREQ*/CINT*	A6	CBUS_READY (18)
RESET/CRST*	D8	CBUS_RESET_L (18)
REG*/CC/BE3*	A8	CBUS_REG_L (18)
BVD1/CSTSCHG/STSCHG*/RI*	C6	CBUS_BVD1_L (18)
BVD2/SPKR*/CAUDIO	D6	CBUS_BVD2_L (18)
WP/IOIS16*/CCLKRUN*	A5	CBUS_WP_L (18)
CE2/CAD10*	G13	CBUS_CE2_L (18)
INPACK/CREQ*	B8	CBUS_INPACK_L (18)
WAIT/CSERR*	B6	CBUS_WAIT_L (18)
A0/CAD26	C7	CBUS_ADDR<0> (18)
A1/CAD25	D7	CBUS_ADDR<1> (18)
A2/CAD24	B7	CBUS_ADDR<2> (18)
A3/CAD23	D10	CBUS_ADDR<3> (18)
A4/CAD22	B12	CBUS_ADDR<4> (18)
A5/CAD21	C8	CBUS_ADDR<5> (18)
A6/CAD20	C9	CBUS_ADDR<6> (18)
A7/CAD18	A12	CBUS_ADDR<7> (18)
A8/CC/BE1*	E11	CBUS_ADDR<8> (18)
A9/CAD14	F11	CBUS_ADDR<9> (18)
A10/CAD9	G11	CBUS_ADDR<10> (18)
A11/CAD12	G12	CBUS_ADDR<11> (18)
A12/CC/BE2*	D9	CBUS_ADDR<12> (18)
A13/CPAR	E12	CBUS_ADDR<13> (18)
A14/CPERR*	D12	CBUS_ADDR<14> (18)
A15/CIRDY*	C10	CBUS_ADDR<15> (18)
A16/CCLK	B13	CBUS_ADDR_16_UF (18)
A17/CAD16	F10	CBUS_ADDR<17> (18)
A18/RSVD	E13	CBUS_ADDR<18> (18)
A19/CBLOCK*	A13	CBUS_ADDR<19> (18)
A20/CSTOP*	E10	CBUS_ADDR<20> (18)
A21/CDEVSEL*	D11	CBUS_ADDR<21> (18)
A22/CTRDY*	C12	CBUS_ADDR<22> (18)
A23/CFRAME*	A10	CBUS_ADDR<23> (18)
A24/CAD17	B10	CBUS_ADDR<24> (18)
A25/CAD19	B9	CBUS_ADDR<25> (18)
D0/CAD27	A4	CBUS_DATA<0> (18)
D1/CAD29	C4	CBUS_DATA<1> (18)
D2/RSVD	A3	CBUS_DATA<2> (18)
D3/CAD0	K11	CBUS_DATA<3> (18)
D4/CAD1	K12	CBUS_DATA<4> (18)
D5/CAD3	J13	CBUS_DATA<5> (18)
D6/CAD5	J10	CBUS_DATA<6> (18)
D7/CAD7	H12	CBUS_DATA<7> (18)
D8/CAD28	C5	CBUS_DATA<8> (18)
D9/CAD30	B4	CBUS_DATA<9> (18)
D10/CAD31	B3	CBUS_DATA<10> (18)
D11/CAD2	M12	CBUS_DATA<11> (18)
D12/CAD4	J11	CBUS_DATA<12> (18)
D13/CAD6	K13	CBUS_DATA<13> (18)
D14/RSVD	J12	CBUS_DATA<14> (18)
D15/CAD8	H11	CBUS_DATA<15> (18)

R724 47 5% 1/16W MF 402 — CBUS_ADDR<16> (18)

+3V_MAIN

+5V_MAIN

SLEEP_L_LS5 (36 38 44)

R726 0 5% 1/16W MF 402 — TPS2211_SHTDWN_L

U4 TPS2211 SSOI

NC	9	
V_12	5	AVPP
V_5_1	6	
V_5_2	3	AVCC0
V_3_1	4	AVCC1
V_3_2	1	AVCC2
VCCD0	2	
VCCD1	15	
VPPD0	14	
VPPD1	16	
SHTDWN	7	
GND		OC (8 NC)
	10	+VPP_CBUS_SW (18 40)
	11	+VCC_CBUS_SW (18 40)
	12	
	13	

C40 0.1uF 20% 10V CERM 402

C37 0.1uF 20% 10V CERM 402

MAKE SURE VCC AND VPP ARE WIDE PLANE/TRACES TO MINIMIZE INDUCTANCE!

0.1UF ARE USED TO INCREASE ESD DISCHARGES OF UP TO 10KV

TI REFERENCE SCHEMATIC DID NOT HAVE BULK ON +VCC_CBUS_SW

C796 2.2uF 20% 6.3V CERM 805

C800 2.2uF 20% 6.3V CERM 805

PC CARD/CARDBUS CONNECTOR

CRITICAL

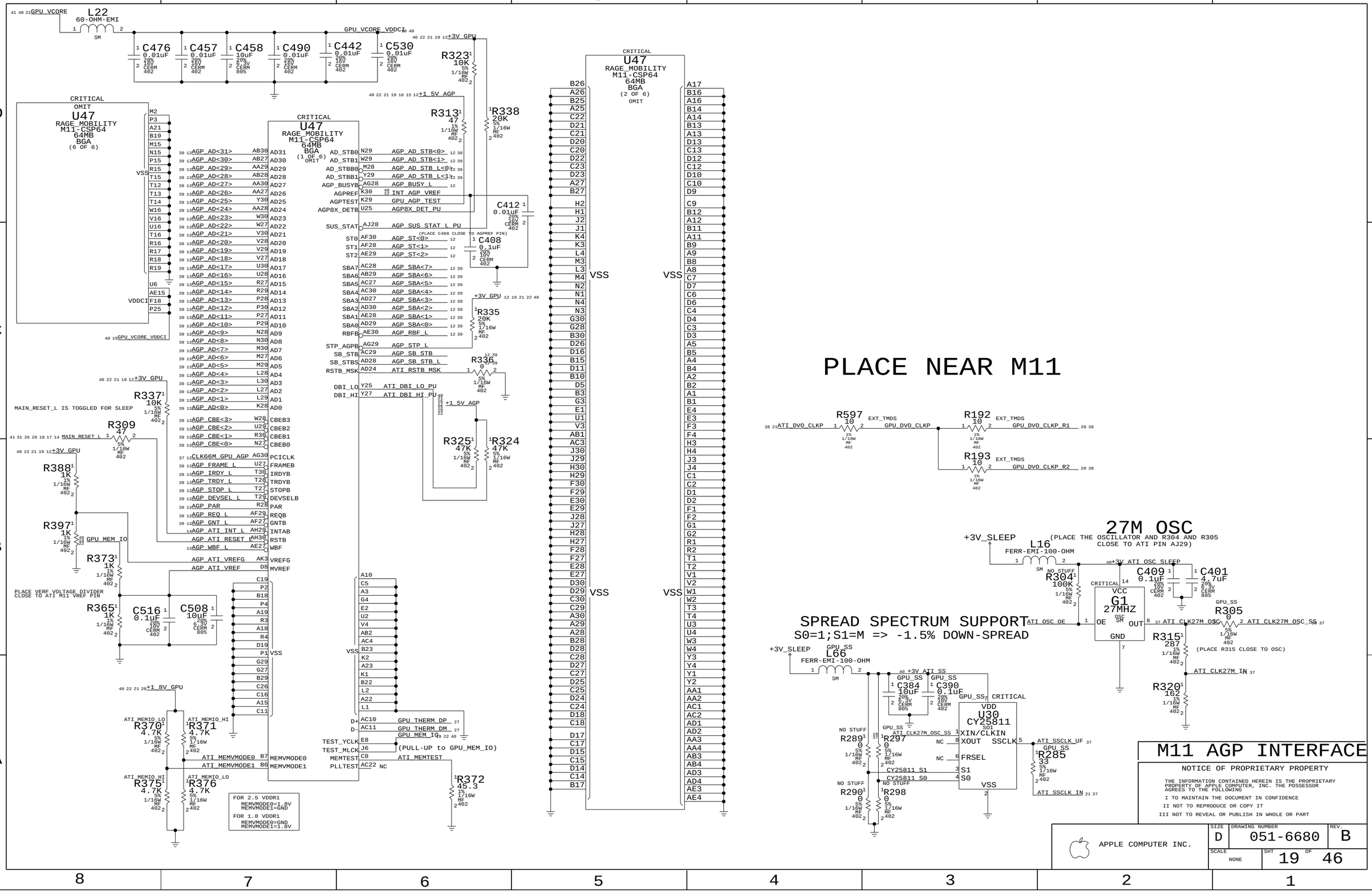
J5 QT500806-L111 M-ST-SM1

		2	CBUS_DATA<3> (18)
CBUS_DET_1_L (18 41)		4	CBUS_DATA<4> (18)
CBUS_DATA<11> (18)		6	CBUS_DATA<5> (18)
CBUS_DATA<12> (18)		8	CBUS_DATA<6> (18)
CBUS_DATA<13> (18)		10	
		12	CBUS_DATA<7> (18)
CBUS_DATA<14> (18)		14	CBUS_CE1_L (18)
CBUS_DATA<15> (18)		16	CBUS_ADDR<10> (18)
CBUS_CE2_L (18)		18	CBUS_OE_L (18)
CBUS_VS1 (18)		20	
		22	CBUS_ADDR<11> (18)
CBUS_IORD_L (18)		24	CBUS_ADDR<9> (18)
CBUS_IOWR_L (18)		26	CBUS_ADDR<8> (18)
CBUS_ADDR<17> (18)		28	CBUS_ADDR<13> (18)
CBUS_ADDR<18> (18)		30	
		32	CBUS_ADDR<14> (18)
CBUS_ADDR<19> (18)		34	CBUS_WE_L (18)
CBUS_ADDR<20> (18)		36	CBUS_READY (18)
CBUS_ADDR<21> (18)		38	+VCC_CBUS_SW (18 40)
+VCC_CBUS_SW (18 40)		40	
		42	+VPP_CBUS_SW (18 40)
+VPP_CBUS_SW (18 40)		44	CBUS_ADDR<16> (18)
CBUS_ADDR<22> (18)		46	CBUS_ADDR<15> (18)
CBUS_ADDR<23> (18)		48	CBUS_ADDR<12> (18)
CBUS_ADDR<24> (18)		50	
		52	CBUS_ADDR<7> (18)
CBUS_ADDR<25> (18)		54	CBUS_ADDR<6> (18)
CBUS_VS2 (18)		56	CBUS_ADDR<5> (18)
CBUS_RESET_L (18)		58	CBUS_ADDR<4> (18)
CBUS_WAIT_L (18)		60	
		62	CBUS_ADDR<3> (18)
CBUS_INPACK_L (18)		64	CBUS_ADDR<2> (18)
CBUS_REG_L (18)		66	CBUS_ADDR<1> (18)
CBUS_BVD2_L (18)		68	CBUS_ADDR<0> (18)
CBUS_BVD1_L (18)		70	
		72	CBUS_DATA<0> (18)
CBUS_DATA<8> (18)		74	CBUS_DATA<1> (18)
CBUS_DATA<9> (18)		76	CBUS_DATA<2> (18)
CBUS_DATA<10> (18)		78	CBUS_WP_L (18)
CBUS_DET_2_L (18)		80	
	84	81	
	83	82	

CARDBUS

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 18 OF 46	


GPU_VCORE
L22
60-OHM-EMI
SM
GPU_VCORE_VDDCI
C476 0.01uF 20% 16V CERM 402
C457 0.01uF 20% 16V CERM 402
C458 10uF 20% 6.3V CERM 805
C490 0.01uF 20% 16V CERM 402
C442 0.01uF 20% 16V CERM 402
C530 0.01uF 20% 16V CERM 402
+3V_GPU
R323 10K 5% 1/16W MF 402
+1.5V_AGP
R313 47 1% 1/16W MF 402
R338 20K 5% 1/16W MF 402
CRITICAL
OMIT
U47
RAGE_MOBILITY
M11-CSP64
64MB
BGA
(6 OF 6)
VSS
VDDCI
U6
CRITICAL
U47
RAGE_MOBILITY
M11-CSP64
64MB
BGA
(1 OF 6)
OMIT
AGP_AD<31:0>
AD_STB0
AD_STB1
AD_STBB0
AD_STBB1
AGP_BUSY_L
AGPREF
INT_AGP_VREF
AGPTEST
GPU_AGP_TEST
AGP8X_DET
AGP8X_DET_PU
SUS_STAT
AGP_SUS_STAT_L_PU
(PLACE C408 CLOSE TO AGPREF PIN)
C408 0.1uF 20% 10V CERM 402
C412 0.01uF 20% 16V CERM 402
ST0
ST1
ST2
AGP_ST<0>
AGP_ST<1>
AGP_ST<2>
SBA7
SBA6
SBA5
SBA4
SBA3
SBA2
SBA1
SBA0
RBF
AGP_SBA<7>
AGP_SBA<6>
AGP_SBA<5>
AGP_SBA<4>
AGP_SBA<3>
AGP_SBA<2>
AGP_SBA<1>
AGP_SBA<0>
AGP_RBF_L
+3V_GPU
R335 20K 5% 1/16W MF 402
STP_AGPB
SB_STB
SB_STBS
RSTB_MSK
AGP_STP_L
AGP_SB_STB
AGP_SB_STB_L
ATI_RSTB_MSK
R336 0 5% 1/16W MF 402
DBI_LO
DBI_HI
ATI_DBI_LO_PU
ATI_DBI_HI_PU
+1.5V_AGP
R325 47K 5% 1/16W MF 402
R324 47K 5% 1/16W MF 402
CRITICAL
RAGE_MOBILITY
M11-CSP64
64MB
BGA
(2 OF 6)
OMIT
VSS
PLACE NEAR M11
R597 10 1% 1/16W MF 402
EXT_TMDS
ATI_DVO_CLKP
GPU_DVO_CLKP
R192 10 1% 1/16W MF 402
GPU_DVO_CLKP_R1
R193 10 1% 1/16W MF 402
GPU_DVO_CLKP_R2
MAIN_RESET_L IS TOGGLED FOR SLEEP
R337 10K 5% 1/16W MF 402
R309 47 5% 1/16W MF 402
MAIN_RESET_L
R388 1K 1% 1/16W MF 402
R397 1K 1% 1/16W MF 402
GPU_MEM_IO
R373 1K 1% 1/16W MF 402
PLACE VERF VOLTAGE DIVIDER CLOSE TO ATI M11 VREF PIN
R365 1K 1% 1/16W MF 402
C516 0.1uF 20% 10V CERM 402
C508 10uF 20% 6.3V CERM 805
AGP_ATI_RESET_L
AGP_WBF_L
AGP_ATI_VREFG
AGP_ATI_VREF
AGP_CBE<3:0>
CLK66M_GPU_AGP
AGP_FRAME_L
AGP_IRDY_L
AGP_TRDY_L
AGP_STOP_L
AGP_DEVSEL_L
AGP_PAR
AGP_REQ_L
AGP_GNT_L
AGP_ATI_INT_L
PCICLK
FRAMEB
IRDYB
TRDYB
STOPB
DEVSELB
PAR
REQB
GNTB
INTAB
RSTB
WBF
VREFG
MVREF
+1.8V_GPU
R370 4.7K 5% 1/16W MF 402
R371 4.7K 5% 1/16W MF 402
R375 4.7K 5% 1/16W MF 402
R376 4.7K 5% 1/16W MF 402
ATI_MEMVMODE0
ATI_MEMVMODE1
MEMVMODE0
MEMVMODE1
FOR 2.5 VDDR1
MEMVMODE0=1.8V
MEMVMODE1=GND
FOR 1.8 VDDR1
MEMVMODE0=GND
MEMVMODE1=1.8V
TEST_YCLK
TEST_MLCK
MEMTEST
PLLTEST
(PULL-UP to GPU_MEM_IO)
ATI_MEMTEST
R372 45.3 1% 1/16W MF 402
GPU_THERM_DP
GPU_THERM_DM
GPU_MEM_IO
27M OSC
+3V_SLEEP
(PLACE THE OSCILLATOR AND R304 AND R305 CLOSE TO ATI PIN AJ29)
L16
FERR-EMI-100-OHM
+3V_ATI_OSC_SLEEP
R304 100K 5% 1/16W MF 402
C409 0.1uF 20% 16V CERM 402
C401 4.7uF 20% 6.3V CERM 805
G1 27MHZ
VCC
OSC
OE
OUT
GND
ATI_OSC_OE
ATI_CLK27M_OSC
R305 0 5% 1/16W MF 402
ATI_CLK27M_OSC_SS
R315 287 1% 1/16W MF 402
(PLACE R315 CLOSE TO OSC)
R320 162 1% 1/16W MF 402
ATI_CLK27M_IN
SPREAD SPECTRUM SUPPORT
S0=1;S1=M => -1.5% DOWN-SPREAD
+3V_SLEEP
L66
FERR-EMI-100-OHM
+3V_ATI_SS
C384 10uF 20% 6.3V CERM 805
C390 0.1uF 20% 16V CERM 402
U30
CY25811
SOI
XIN/CLKIN
XOUT
SSCLK
NC
FRSEL
S1
S0
VDD
VSS
R289 0 5% 1/16W MF 402
R297 0 5% 1/16W MF 402
R290 0 5% 1/16W MF 402
R298 0 5% 1/16W MF 402
CY25811_S1
CY25811_S0
ATI_SSCLK_UF
R285 33 5% 1/16W MF 402
ATI_SSCLK_IN
M11 AGP INTERFACE
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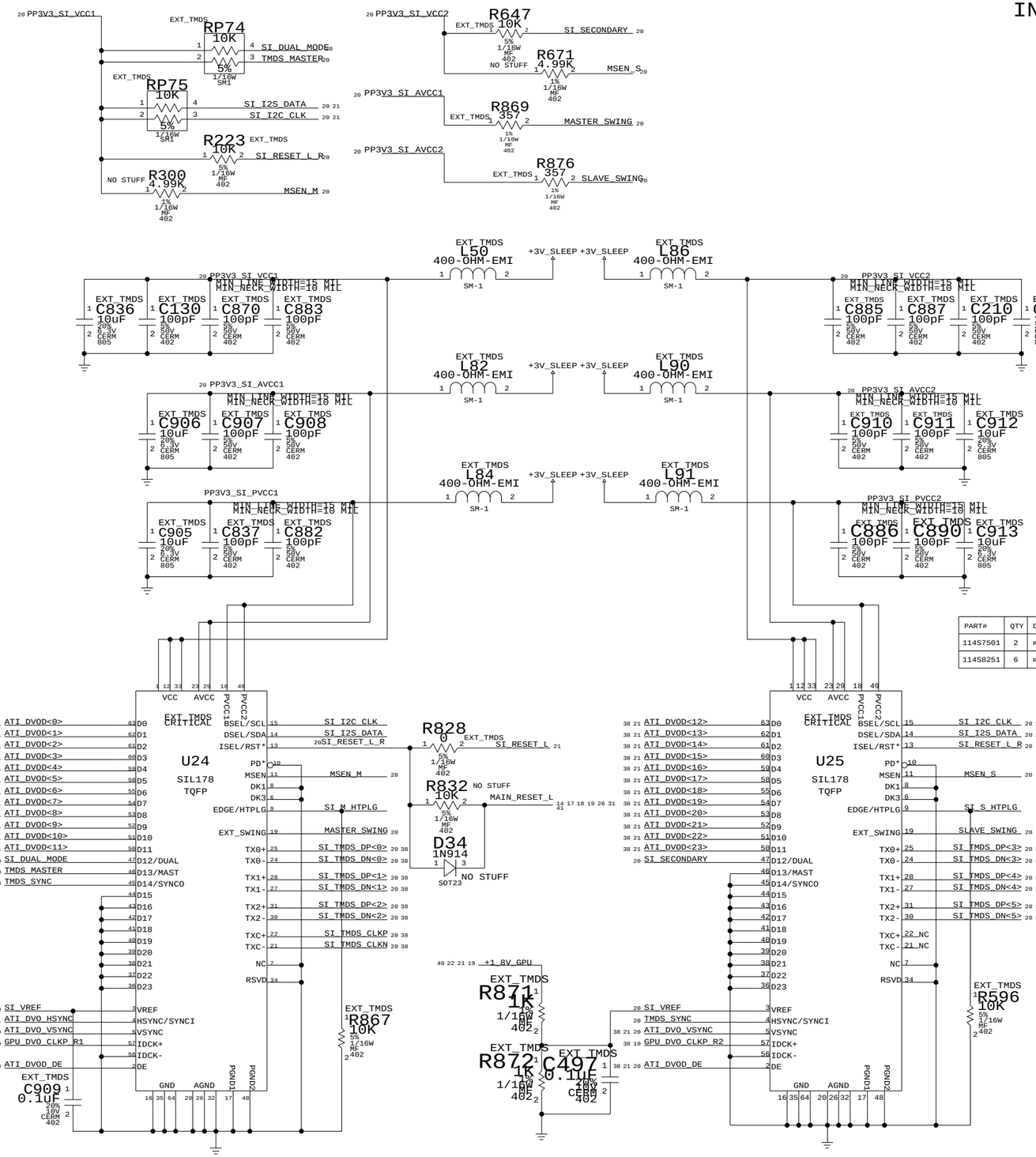
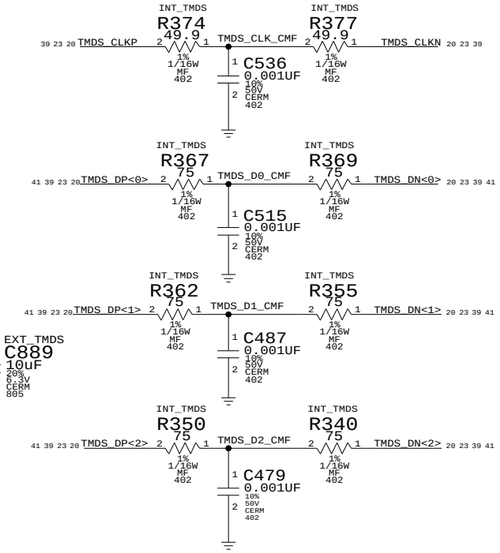
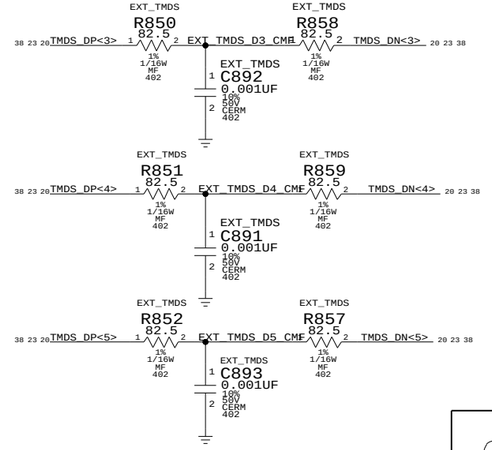
APPLE COMPUTER INC.
SIZE D
DRAWING NUMBER 051-6680
REV. B
SCALE NONE
SHT 19 OF 46



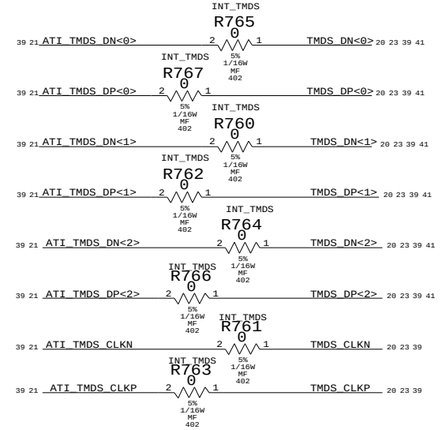
INT/EXT TMDS D<0:2> TERMINATION



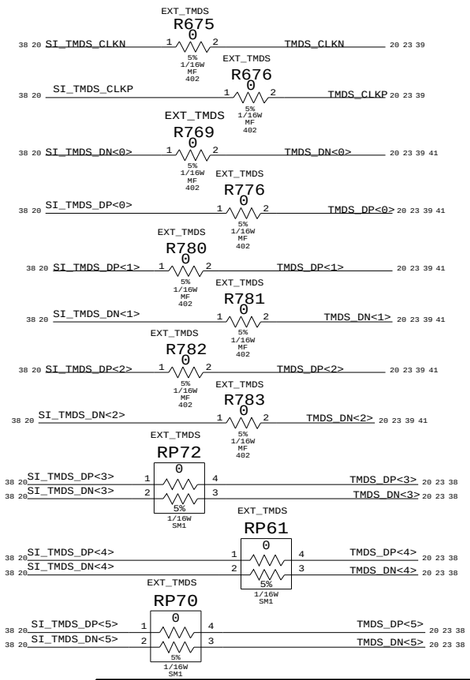
EXT TMDS D<3:5> TERMINATION



ATI INTERNAL TMDS SERIES TERMINATION



SILICON IMAGE TMDS SERIES TERMINATION



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
114S7501	2	RES, MF, 1/16W, 75 OHM, 1%, 0402, SMD	R374, R377		EXT_TMDS
114S8251	6	RES, MF, 1/16W, 82.5 OHM, 1%, 0402, SMD	R340, R350, R355, R362, R367, R369		EXT_TMDS

INT/EXT TMDS

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 20 OF 46	

GPU VCORE - 1.2V

(PUT ALL CAPs BELOW ATI ASIC)

GPU VCORE SUPPLY

M10 Power Shut down Sequencing

PLACE ALL TMDS 0 OHMS close to GPU

WHEN VCORE_CNTL HIGH => 1.2V
1.2V = 0.8V * (1 + R329 / (R328//R330))

WHEN VCORE_CNTL LOW => 1.0V
1.0V = 0.8V * (1 + R329 / R330)

M11 CORE PWR/LVDS/TMDS

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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE: NONE

SHT 21 OF 46

GPU PLL - 1.8V

+2_5V_SLEEP
U34 MM1571J SOT-25A (150mA MAX) CRITICAL
VIN VOUT CONT NOISE GND
GPU_CORE_OK
ATI_PVDD_BYP
C830 1uF 20% 10V CERM 603
C553 0.01uF 20% 10V CERM 402
1_8V_PVDD_STD
+1_8V_ATI_PVDD
R787 0 5% 1/16W MF 402
L20 FERR-220-OHM 0402
+1_8V_GPU_PLL
C418 10uF 20% 6.3V CERM 805
C414 0.1uF 20% 10V CERM 402
C413 0.01uF 20% 10V CERM 402 (21mA)
C552 10uF 20% 6.3V CERM 805
+1_8V_GPU
L19 FERR-220-OHM 0402
+1_8V_GPU_AVDD (AVDD+VDDDI=75mA)
C427 10uF 20% 6.3V CERM 805
C453 0.01uF 20% 10V CERM 402
C450 0.01uF 20% 10V CERM 402
+2_5V_SLEEP
L23 FERR-220-OHM 0402
+2_5V_GPU_A2VDD (140mA)
C459 10uF 20% 6.3V CERM 805
C460 0.01uF 20% 10V CERM 402
C461 0.01uF 20% 10V CERM 402
+1_8V_GPU
L21 FERR-220-OHM 0402
+1_8V_GPU_AVDDQ (2mA)
C464 10uF 20% 6.3V CERM 805
C463 0.01uF 20% 10V CERM 402
+1_8V_GPU
L24 FERR-220-OHM 0402
+1_8V_GPU_VDDDI (AVDD+VDDDI=75mA)
C478 10uF 20% 6.3V CERM 805
C462 0.01uF 20% 10V CERM 402
C454 0.01uF 20% 10V CERM 402
+2_5V_SLEEP
L28 FERR-220-OHM 0402
+2_5V_GPU_MCLK
C511 10uF 20% 6.3V CERM 805
C527 0.01uF 20% 10V CERM 402
C472 0.01uF 20% 10V CERM 402

AK29 PVDD
AF23 AVDD0
AF24 AVDD1
A2VDD0 +2_5V_GPU_A2VDD
A2VDD1
A2VDDQ +1_8V_GPU_AVDDQ
AH23 VDD1DI +1_8V_GPU_VDDDI
AF20 VDD2DI
VDDRH0 +2_5V_GPU_MCLK
VDDRH1

PVSS AK30
AVSSQ AF22
A2VSSQ AJ22
AVSSN0 AE22
AVSSN1 AE23
A2VSSN0 AE19
A2VSSN1 AE20
VSS1DI AG23
VSS2DI AF19
VSSRH0 F20
VSSRH1 M6

AGP 4X I/O - 1.5V

+1_5V_AGP
L18 FERR-10-OHM-500MA SM
C438 0.1uF 20% 10V CERM 402
C444 0.1uF 20% 10V CERM 402
C423 0.1uF 20% 10V CERM 402
C424 0.1uF 20% 10V CERM 402
C422 10uF 20% 6.3V CERM 805 (20mA)
C439 0.01uF 20% 10V CERM 402
C447 0.01uF 20% 10V CERM 402
C425 0.01uF 20% 10V CERM 402
C417 0.01uF 20% 10V CERM 402

K25 L25 T25 Y28 K27 AA25 K26 L26 M26 N26 P26 R26 T26 U26 V26 Y26 AA26 AB26 AC26 VDDP

MEMORY CORE - 2.5V

+2_5V_SLEEP
L25 FERR-220-OHM 0805
+2_5V_GPU_MEMCORE (1800mA)
C470 0.1uF 20% 10V CERM 402
C539 0.1uF 20% 10V CERM 402
C475 0.1uF 20% 10V CERM 402
C419 0.1uF 20% 10V CERM 402
C483 10uF 20% 6.3V CERM 805
C471 0.01uF 20% 10V CERM 402
C538 0.01uF 20% 10V CERM 402
C504 0.01uF 20% 10V CERM 402
C420 0.01uF 20% 10V CERM 402

E5 E6 E12 E13 E18 E19 E20 E26 F26 VDDM

LVDS PLL - 1.8V

+1_8V_ATI_PVDD
L32 FERR-220-OHM 0402
+1_8V_GPU_PNLPLL (40mA)
C493 10uF 20% 6.3V CERM 805
C468 0.01uF 20% 10V CERM 402
GPU_MEM_IO

E7 H26 E9 E10 E11 E14 E15 E16 E17 E21 E22 E23 E24 E25 VDDR1

MEMORY PLL - 1.8V

+1_8V_ATI_PVDD
L30 FERR-220-OHM 0402
+1_8V_GPU_MEMPLL
C537 10uF 20% 6.3V CERM 805
C523 0.01uF 20% 10V CERM 402
+1_8V_GPU_TP_PLL
C831 10uF 20% 6.3V CERM 805
C832 0.01uF 20% 10V CERM 402 (20mA)

AK21 LPVDD
AK11 TPVDD
A7 MPVDD

LVDS - 2.5V

+2_5V_SLEEP
L26 FERR-10-OHM-500MA SM
+2_5V_GPU_PNLIO (350mA)
C499 10uF 20% 6.3V CERM 805
C500 0.01uF 20% 10V CERM 402
C473 0.01uF 20% 10V CERM 402

AE16 LVDDR_18
AF16 LVDDR_18
AG16 LVDDR_25
AF17 LVDDR_25
AG12 TXVDDR0
AG13 TXVDDR1
AG14 TXVDDR2
AG15 TXVDDR3

LVDS/TMDS - 1.8V

+1_8V_GPU
L29 FERR-220-OHM 0402
+1_8V_GPU_PNLIO (180mA)
C514 10uF 20% 6.3V CERM 805
C492 0.1uF 20% 10V CERM 402
C496 0.1uF 20% 10V CERM 402
C489 0.1uF 20% 10V CERM 402
C491 0.1uF 20% 10V CERM 402
C501 0.01uF 20% 10V CERM 402
C506 0.01uF 20% 10V CERM 402

OMIT
CRITICAL
U47
RAGE_MOBILITY
M11-CSP64
64MB
BGA
(4 OF 6)

VDDR1 AA5 AB5 AC5 AD5 G26 K6 R6 Y6 AA6 F8 F9 F15 F16 F21 F22 H25 J25 J26
VDDR4 AF6 AE7 AF7 AE8
VDDR3 AF8 AE9 AF9 AF10 AD25 AE25 AE26 AF26
LPVSS AJ21
TPVSS AJ11
MPVSS A6
LVSSR0 AH16
LVSSR1 AG17
LVSSR2 AH17
LVSSR3 AF18
DVOVMODE AH12
TXVSSR1 AH13
TXVSSR2 AH14
TXVSSR3 AH15
F5 G5 H5 J5 K5 L5 M5 N5 P5 R5 T5 U5 V5 W5 Y5 AA5 AB5 AC5 AD5 G26 K6 R6 Y6 AA6 F8 F9 F15 F16 F21 F22 H25 J25 J26 AF6 AE7 AF7 AE8 AF8 AE9 AF9 AF10 AD25 AE25 AE26 AF26 AJ21 AJ11 A6 AH16 AG17 AH17 AF18 AH12 AH13 AH14 AH15

MEMORY I/O

+2_5V_SLEEP
(150mA MAX) U60 MM1571J SOT-25A CRITICAL
VIN VOUT CONT NOISE GND
GPU_CORE_OK
ATI_TPVDD_BYP
C833 1uF 20% 10V CERM 603
C834 0.01uF 20% 10V CERM 402
L75 FERR-220-OHM 0402
+1_8V_ATI_TPVDD
R788 0 5% 1/16W MF 402
1_8V_TPVDD_STD
C835 10uF 20% 6.3V CERM 805
GPU_MEM_IO
L31 FERR-220-OHM 0805
+1_8V_GPU
C551 10uF 20% 6.3V CERM 805 (1200mA)
C421 0.1uF 20% 10V CERM 402
C456 0.1uF 20% 10V CERM 402
C488 0.1uF 20% 10V CERM 402
C517 0.1uF 20% 10V CERM 402
C546 0.1uF 20% 10V CERM 402
C545 0.1uF 20% 10V CERM 402
C544 0.1uF 20% 10V CERM 402
C543 0.1uF 20% 10V CERM 402
C541 0.1uF 20% 10V CERM 402
C436 0.1uF 20% 10V CERM 402
C437 0.1uF 20% 10V CERM 402
C540 0.1uF 20% 10V CERM 402
C547 0.1uF 20% 10V CERM 402
C542 0.01uF 20% 10V CERM 402

1.8V DVO POWER (EXT.TMDS)

+1_8V_GPU
EXT_TMDS
L81 FERR-10-OHM-500MA SM
+1_8V_GPU_DVO
C535 10uF 20% 6.3V CERM 805
C519 0.1uF 20% 10V CERM 402
C534 0.1uF 20% 10V CERM 402
C521 0.1uF 20% 10V CERM 402
INT_TMDS
R843 0 5% 1/16W MF 603
+3V_GPU
L33 FERR-10-OHM-500MA SM
+3V_GPU_FLT
C550 10uF 20% 6.3V CERM 805
C518 0.1uF 20% 10V CERM 402
C520 0.1uF 20% 10V CERM 402
C430 0.1uF 20% 10V CERM 402
C880 0.1uF 20% 10V CERM 402
C881 0.1uF 20% 10V CERM 402
C426 0.1uF 20% 10V CERM 402
EXT_TMDS
R842 0 5% 1/16W MF 402
+1_8V_GPU
ATI_DVOVMODE
INT_TMDS
R841 0 5% 1/10W MF 402

3.3V IO SUPPLY

(Max Current varies, depends on usage)

+1_5V_SLEEP
R275 0 5% 1/10W FF 805
+1_5V_AGP
1.5V

+1_8V_SLEEP
R363 0 5% 1/10W FF 805
+1_8V_GPU
1.8V

+1_8V_SLEEP +2_5V_SLEEP
ATI_MEMIO_LO
R312 0 5% 1/10W FF 805
ATI_MEMIO_HI
R319 0 5% 1/10W FF 805
GPU_MEM_IO
1.8V 2.5V

+3V_SLEEP
R379 0 5% 1/10W FF 805
+3V_GPU
3.3V

GPU POWER SOURCES - 1.5V, 1.8V, 2.5V & 3.3V

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
338S0214	1	IC,ATI,M11-CSP128,GRAPHICTLR,667BGA,HYNIX GC	U47	CRITICAL	ATI_128MB
338S0207	1	IC,ATI,M11-CSP64,GRAPHICTLR,667BGA,HYNIX MEM	U47	CRITICAL	ATI_64MB

M11 POWER

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SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 22 OF 46	

EXTERNAL VIDEO (DVI) INTERFACE

VGA SYNC BUFFERS

+3V_MAIN
74AHC1G32 U40 (OMIT) L38 FERR-60-OHM-0.1A 0402
ATI_VSYNC → ATI_VSYNC_BUF → VGA_VSYNC
PLACE L1002 & L1003 CLOSE TO DVI CONNECTOR
+3V_MAIN
74AHC1G32 U39 (OMIT) L36 FERR-60-OHM-0.1A 0402
ATI_HSYNC → ATI_HSYNC_BUF → VGA_HSYNC

TMDS FILTERING
PLACE CLOSE TO CONNECTOR

L37 370-OHM
TMDS_CLKP
TMDS_CLKN
TMDS CONN CLKP
TMDS CONN CLKN

ANALOG FILTERING
PLACE CLOSE TO CONNECTOR

FL1 LCFILTER SM-220MHZ CRITICAL — GPU_B → VGA_B
FL2 LCFILTER SM-220MHZ CRITICAL — GPU_G → VGA_G
FL3 LCFILTER SM-220MHZ CRITICAL — GPU_R → VGA_R

C641 3.3pF 0.25pF 50V CERM 402
C634 3.3pF 0.25pF 50V CERM 402
C631 3.3pF 0.25pF 50V CERM 402

R462 75 1% 1/16W MF 402 NO STUFF
R458 75 1% 1/16W MF 402 NO STUFF
R456 75 1% 1/16W MF 402 NO STUFF

DVI DDC CURRENT LIMIT
(55mA requirement per DVI spec)

+5V_SLEEP → F2 0.5AMP-13.2V CRITICAL SM → +5V_DDC_SLEEP_UF
L42 400-OHM-EMI SM-1 → +5V_DDC_SLEEP

CRITICAL J22 QHI112 F-RT-TH

L45 90-OHM-200mA 2012H CRITICAL
TMDS_DN<0> → TMDS_CONN_DN<0>
TMDS_DP<0> → TMDS_CONN_DP<0>

TMDS_CONN_DN<5>
TMDS_CONN_DP<5>
TMDS_CONN_CLKP
TMDS_CONN_CLKN
VGA_B
VGA_HSYNC

CHGND1 / CHGND2

TMDS_CONN_DN<2> TMDS_CONN_DN<1> TMDS_CONN_DP<2> TMDS_CONN_DP<1>
TMDS_CONN_DN<4> TMDS_CONN_DN<3> TMDS_CONN_DP<4> TMDS_CONN_DP<3>
(+5V_DDC SLEEP)
DVI_DDC_CLK_UF
DVI_DDC_DATA_UF
VGA_VSYNC
DVI_HPD_UF
VGA_R
VGA_G

C667 0.01uF 20% 50V CERM 603
PLACE NEAR C5A & C5B
R464 0 5% 1/16W MF 402
R463 0 5% 1/16W MF 402
PLACE NEAR 3, 11 & 19

Isolation required for DVI power switch

D19 MBR0530 SM
DDC_CLK_ISO
R476 4.7K 5% 1/16W MF 402
R478 4.7K 5% 1/16W MF 402
R479 100 5% 1/16W MF 402
C654 100pF 5% 25V CERM 201
C655 100pF 5% 25V CERM 201
C653 100pF 5% 25V CERM 201

3V LEVEL SHIFTERS

+3V_SLEEP
Q39 2N7002DW SOT-363
Q39 2N7002DW SOT-363
Q40 2N7002DW SOT-363
R480 10K 5% 1/16W MF 402
R474 10K 5% 1/16W MF 402
R481 100K 5% 1/16W MF 402
DVI_DDC_CLK → GPU_DVI_DDC_CLK
2 DVI_DDC_DATA → GPU_DVI_DDC_DATA
DVI_HPD → GPU_HPD
NOTE: Pulldown for DVI_HPD provided by DVI power switch interface

CRITICAL L47 90-OHM-300mA 2012H
TMDS_CONN_DN<2> TMDS_CONN_DP<2>
CRITICAL L46 90-OHM-300mA 2012H
TMDS_CONN_DN<1> TMDS_CONN_DP<1>
CRITICAL L44 90-OHM-300mA 2012H EXT_TMDS
TMDS_DN<3> TMDS_CONN_DN<3>
TMDS_DP<3> TMDS_CONN_DP<3>

DVI POWER SWITCH

Power key detect path when system is shutdown or asleep.. DDC CLK is isolated from NV17M DURING SHUTDOWN. WHEN power key on remote device is pressed, 5V will be driven into DDC CLK. Since most rails will be low, TP0610 will turn on, giving SOFT_PWR_ON is low. As most rails rise, TP0610 will turn off, and DDC CLK remote device path will be disabled as well.

Q38 TP0610 SM
DVI_DDC_CLK_UF
DVI_TURN_ON
+5V_DDC_SLEEP
R473 680 5% 1/16W MF 402
R460 10K 5% 1/16W MF 402
Q35 MMDT3904 SOT-363
DVI_TURN_ON_TLM
DVI_TURN_ON_BASE
SOFT_PWR_ON_L
R459 330 5% 1/16W MF 402
Pulldown prevents 3904 from turning on when DVI monitor has active, self-powered DDC clock puttup.

+3V_SLEEP
Power key detect path when system is running. HPD normally driven to 3.3V. When power key on remote device pressed, HPD will be driven to 5V. COMPARATOR ENABLED BY NV17MAP
R485 68.1K 1% 1/16W MF 402
C668 0.1uF 20% 10V CERM 402
HPD_4V_REF
U42 LMC7211 SM
GPIO.
R472 10K 1% 1/16W MF 402
DVI_HPD_UF
DVI_HPD_DIV
R475 10K 5% 1/16W MF 402
HPD_PWR_SW_BASE
Q35 MMDT3904 SOT-363
HPD_PWR_SW
R484 100K 1% 1/16W MF 402
R482 10K 1% 1/16W MF 402
R470 330 5% 1/16W MF 402
HPD_REF_EN_L
Q40 2N7002DW SOT-363
HPD_PWR_SNS_EN
R483 470K 5% 1/16W MF 402

CRITICAL L49 90-OHM-300mA 2012H EXT_TMDS
TMDS_DN<4> TMDS_CONN_DN<4>
TMDS_DP<4> TMDS_CONN_DP<4>
CRITICAL L85 90-OHM-300mA 2012H EXT_TMDS
TMDS_DN<5> TMDS_CONN_DN<5>
TMDS_DP<5> TMDS_CONN_DP<5>

LCD INTERFACE
LVDS INTERFACE

+3V_MAIN
LCD POWER SWITCH
R347 100K 5% 1/16W MF 402
C474 2200pF 10% 50V CERM 603
R354 100K 5% 1/16W MF 402
LCD_PWREN_L
LCD_DIGON_L
Q28 2N7002 SM
FP_PWR_EN
Q29 SI3443DV TSOP
+3V_LCD_SW
+3V_SLEEP
L27 FERR-250-OHM SM
+3V_LCD (LVDS DDC POWER)
C548 0.001uF 20% 50V CERM 402
C503 0.001uF 20% 50V CERM 402
C701 0.001uF 20% 50V CERM 402
C702 0.001uF 20% 50V CERM 402 NO STUFF
C549 0.001uF 20% 50V CERM 402
R543 100K 1% 1/16W MF 402
R544 100K 1% 1/16W MF 402

CRITICAL J14 G-501973 F-RT-SM
LVDS_DDC_CLK
LVDS_DDC_DATA
LVDS_L0N
LVDS_L0P
LVDS_L1N
LVDS_L1P
LVDS_L2N
LVDS_L2P
CLKLVDS_LN
CLKLVDS_LP
LVDS_DDC_CLK
LVDS_DDC_DATA
100K pull-ups are for no-panel case (development) Panel has 2K pull-ups

INVERTER INTERFACE

+PBUS
L73 FERR-1K-OHM-EMI SM
+14V_INV
+5V_MAIN
Q76 FDG6324L SC70-6
+5V_INV_UF_SW
L74 400-OHM-EMI SM-1
+5V_INV_SW
R750 100K 5% 1/16W MF 402
FP_PWR_EN_L
Q76 FDG6324L SC70-6
FP_PWR_EN
C812 0.001uF 20% 50V CERM 402
C813 10uF 20% 6.3V CERM 805
C815 0.001uF 20% 50V CERM 402
C816 0.001uF 20% 50V CERM 402
L72 400-OHM-EMI SM-1
BRIGHT_PWM
INV_GND
C19 0.001uF 20% 50V CERM 402
L1 FERR-250-OHM SM
+3V_MAIN
C22 0.1uF 10% 16V CERM 402
INV_ON_PWM
U2 NC7S32 SC70
BRIGHT_PWM_UF
INVERTER EXPECTS ACTIVE HIGH SIGNAL

CRITICAL J4 SM-2MT

R753 0 5% 1/16W MF 402
C819 0.01uF 20% 25V CERM 603

S-VIDEO/COMP OUT INTERFACE

Place GND shorts at graphics controller

XW15 SM — GPU_TV_GND1 → L54 FERR-10-OHM-500MA SM → TV_GND1
GPU_Y → L53 3.3uH 0603
GPU_C → L57 3.3uH 0603
GPU_COMP → L55 3.3uH 0603
XW14 SM — GPU_TV_GND2 → L56 FERR-10-OHM-500MA SM → TV_GND2

C663 560pF 10% 50V CERM 402
C656 560pF 10% 50V CERM 402
C661 560pF 10% 50V CERM 402
C660 560pF 10% 50V CERM 402
C664 560pF 10% 50V CERM 402
C658 560pF 10% 50V CERM 402
C657 0.01uF 20% 50V CERM 603
C659 0.01uF 20% 50V CERM 603

CRITICAL J21 MINIDIN RT-TH MH11773-WMR8A
TV_C
TV_Y
TV_COMP

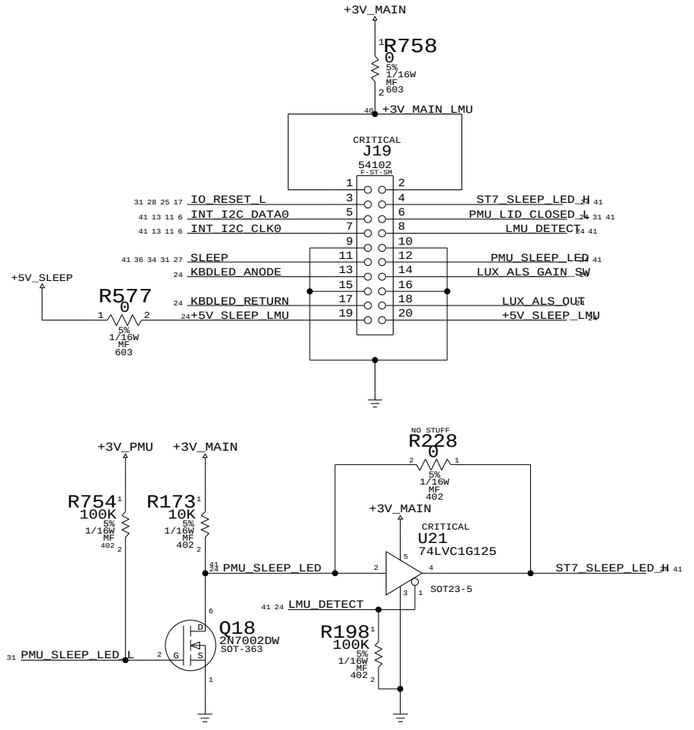
Place GND shorts at graphics controller

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
116S1331	2	DISCRETE,RES,33OHM,0402	L36,L38		VGA_BUFFER_RES

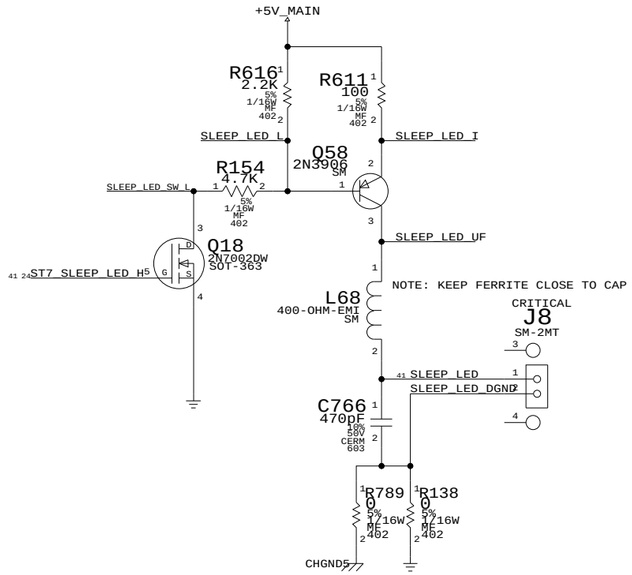
VIDEO CONNECTORS

APPLE COMPUTER INC.
SIZE D | DRAWING NUMBER 051-6680 | REV. B
SCALE NONE | SHT 23 OF 46

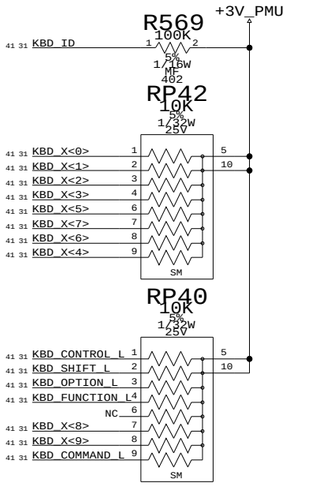
LMU/RIGHT SENSOR CONNECTOR



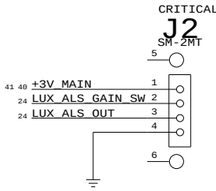
SLEEP LED



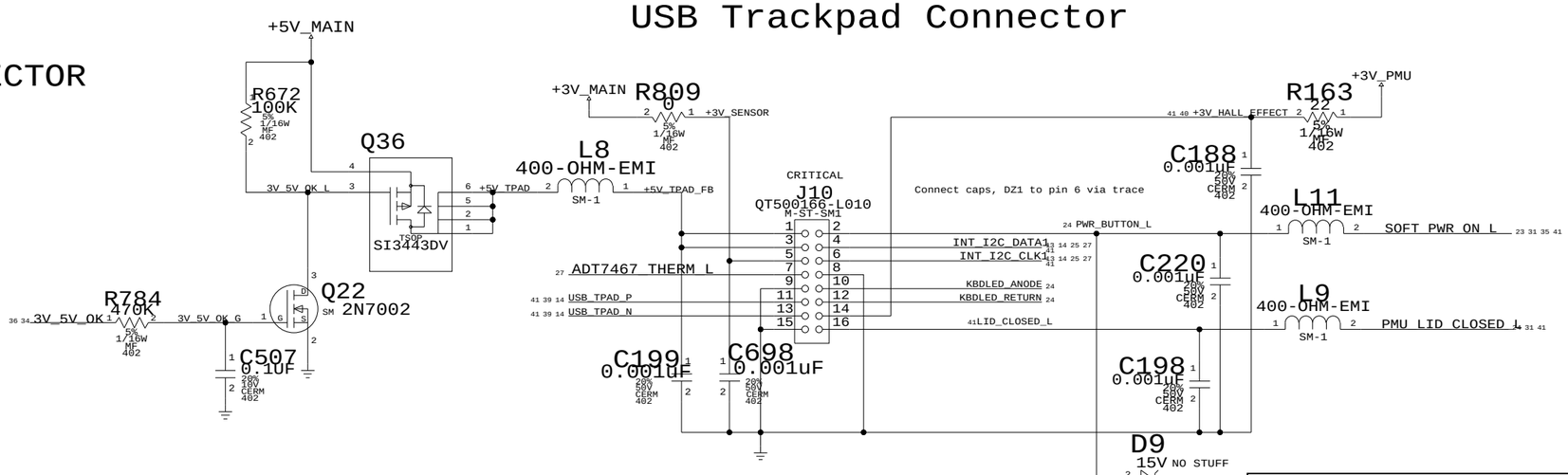
KEYBOARD PULLUPS



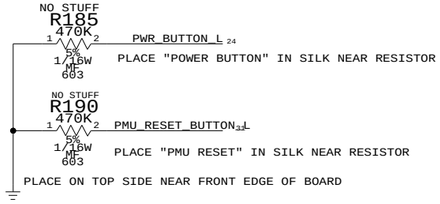
LEFT LIGHT SENSOR CONNECTOR



USB Trackpad Connector



DEBUG HELPERS



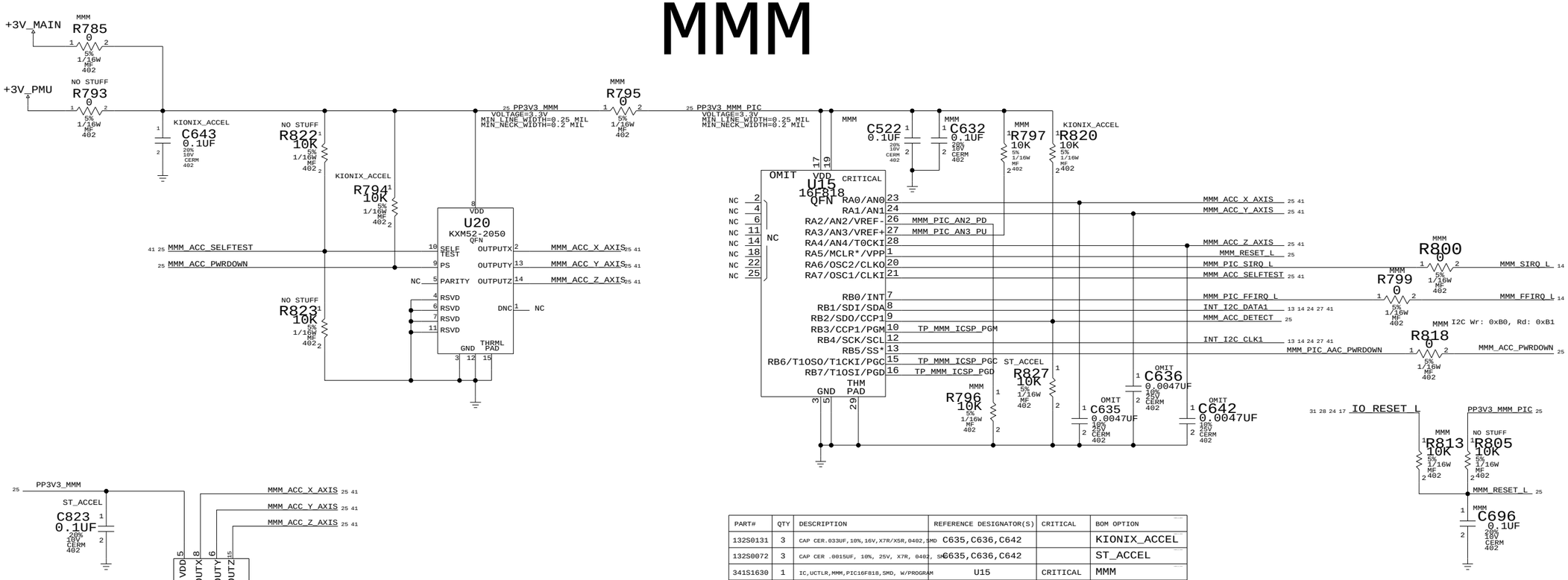
KEYBOARD/TPAD/SLEEP LED

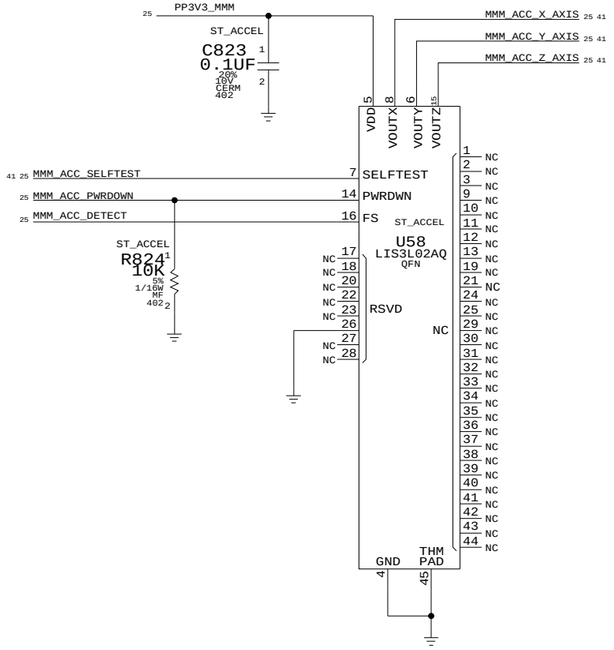
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE	SHT	OF
NONE	24	46

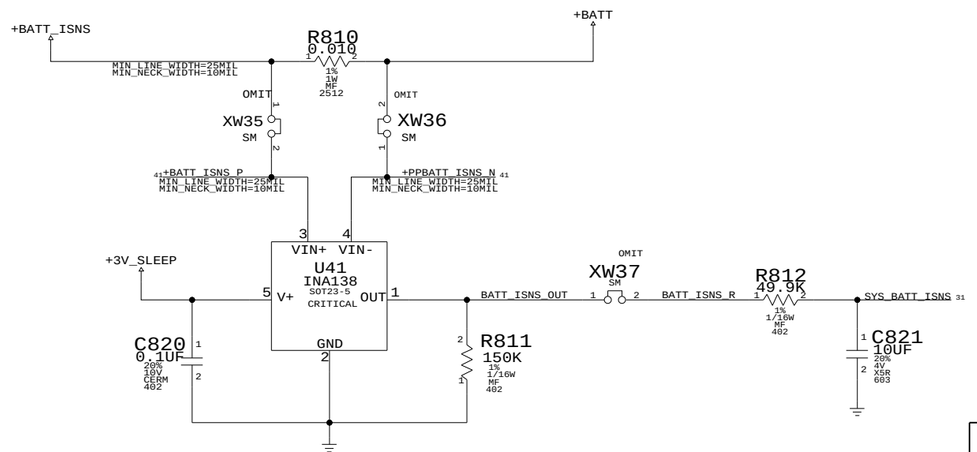
MMM





PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
132S0131	3	CAP CER.033UF,10%,16V,X7R/X5R,0402,SMD	C635,C636,C642		KIONIX_ACCEL
132S0072	3	CAP CER .0015UF, 10%, 25V, X7R, 0402, SM	C635,C636,C642		ST_ACCEL
341S1630	1	IC,UCTLR,MMM,PIC16F818,SMD, W/PROGRAM	U15	CRITICAL	MMM

BATTERY CURRENT SENSE



MMM & BATTERY CURRENT SENSOR

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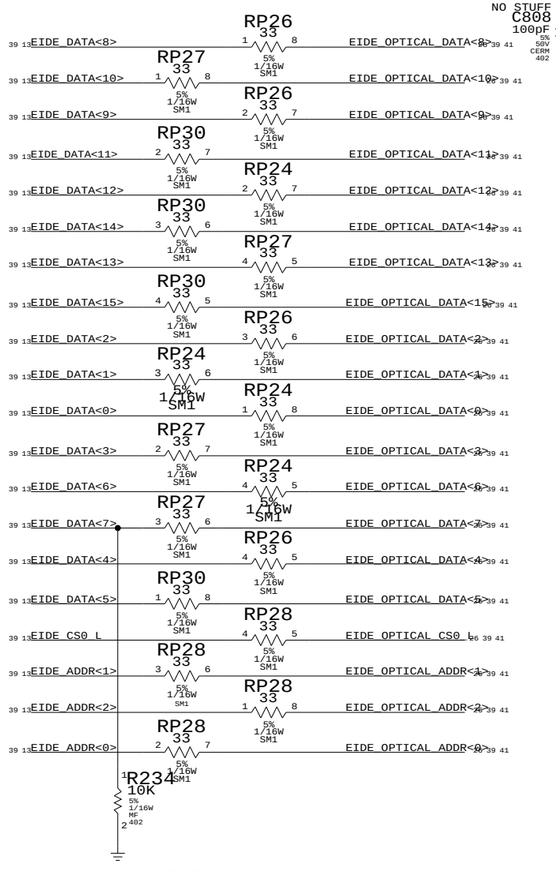
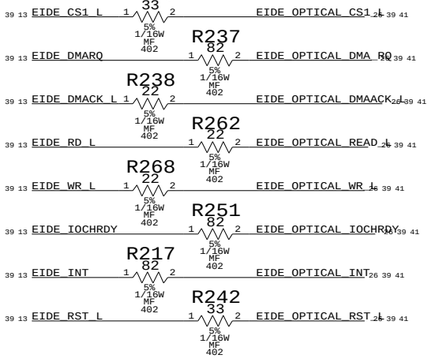
APPLE COMPUTER INC.

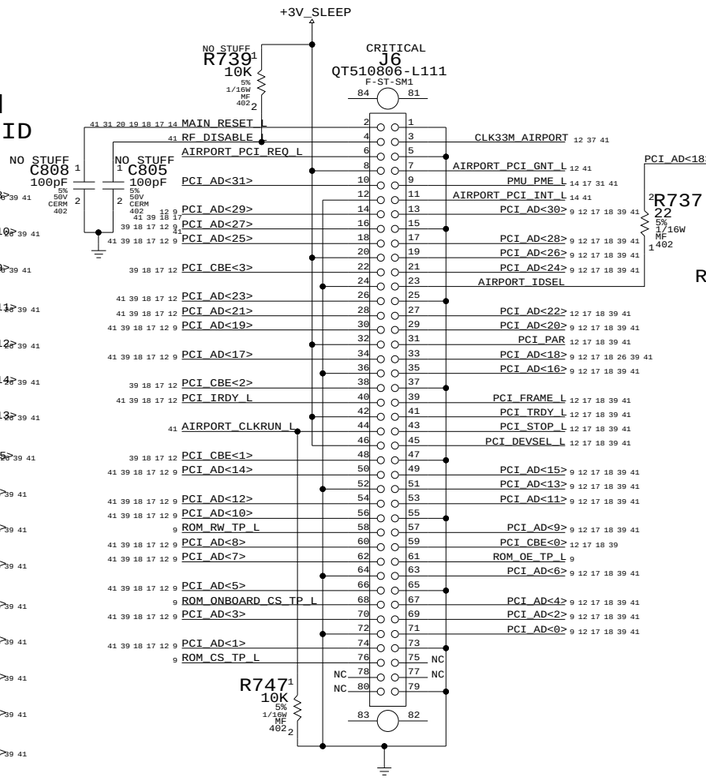
SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 25 OF 46	

WIRELESS INTERFACE

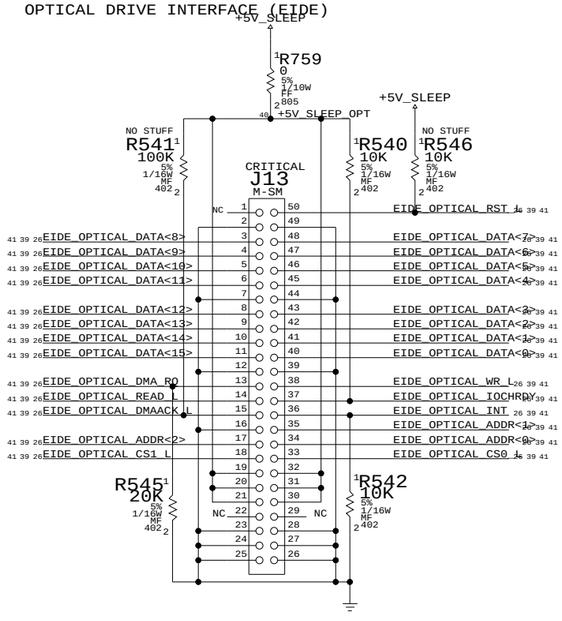
EIDE SERIES TERMINATION
PLACE TERMINATORS NEAR INTREPID





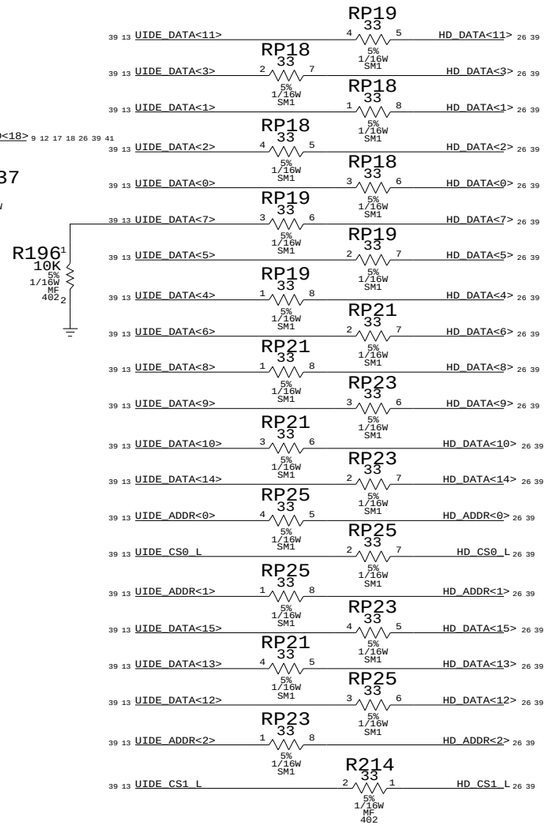


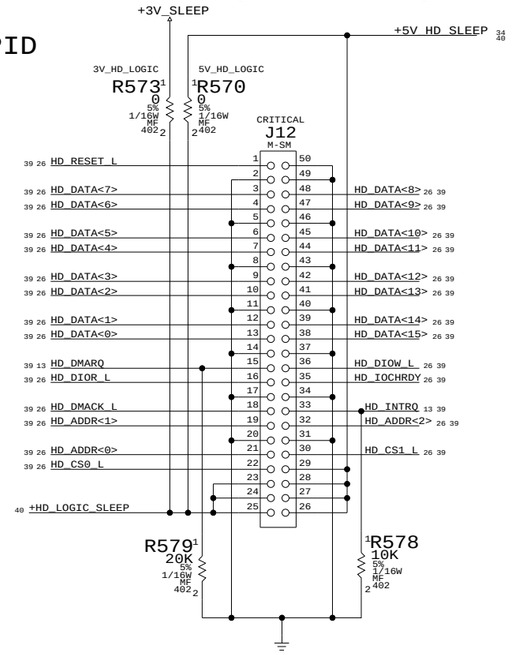
OPTICAL DRIVE INTERFACE (EIDE)



HARD DRIVE INTERFACE (UATA100)

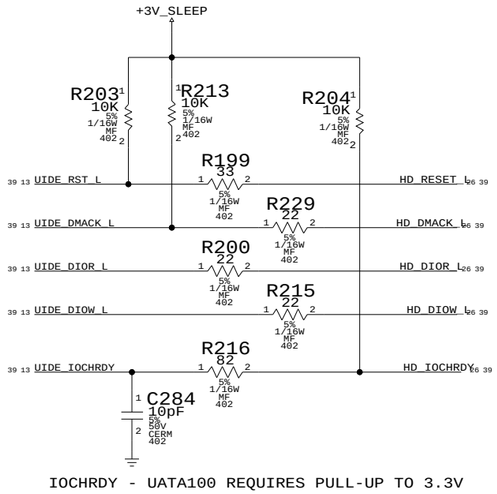
PLACE SERIES R CLOSE TO INTERPID





ANY SEQUENCING REQUIREMENT BETWEEN +5V_HD_SLEEP AND +3V_SLEEP

PLACE PULLUP RESISTORS CLOSE TO INTREPID



IOCHRDY - UATA100 REQUIRES PULL-UP TO 3.3V

INTERNAL I/O CONNECTORS

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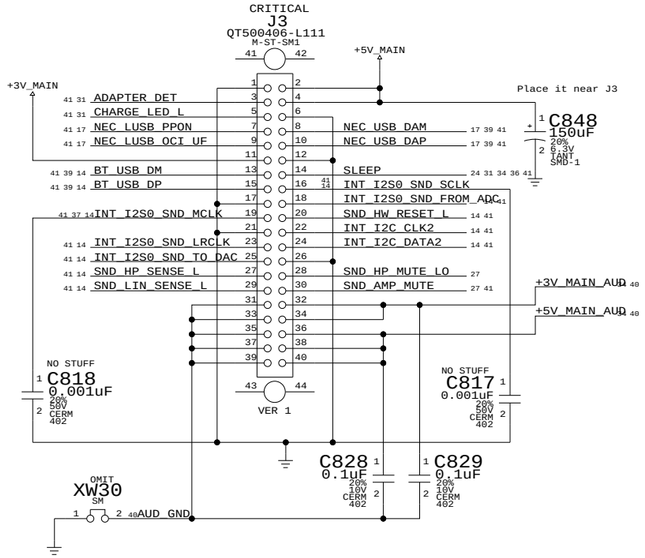
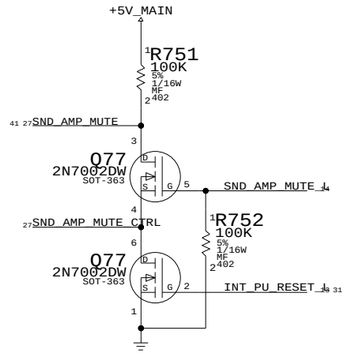
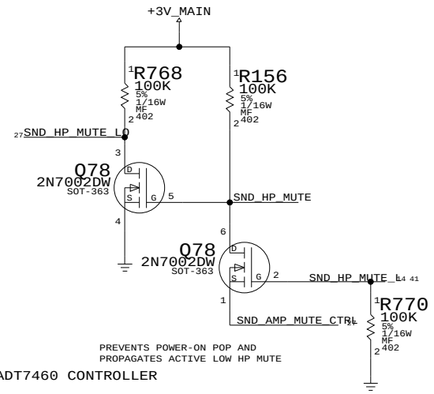
SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 26 OF 46	

LEFT I/O & AUDIO BOARD (LIO)



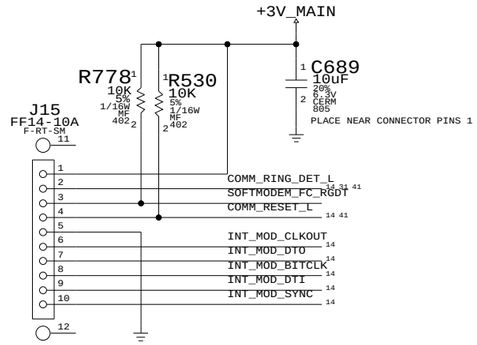


PREVENTS POWER-ON POP AND
GENERATES ACTIVE HIGH SPKR MUTE



PREVENTS POWER-ON POP AND
PROPAGATES ACTIVE LOW HP MUTE

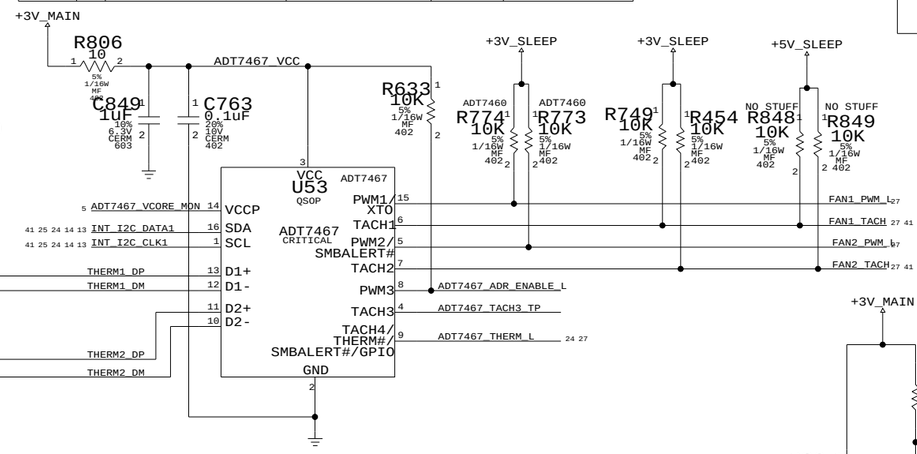
SOFT MODEM CONN



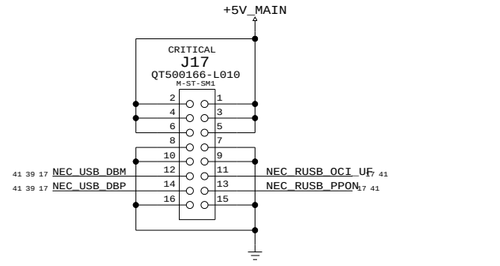
FAN INTERFACE

FAN CONTROLLER

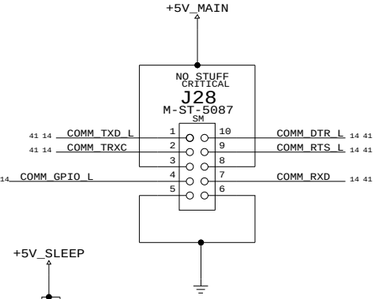
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S0608	1	IC,ADT7460,FAN CTLR,16P QSOP	U53	CRITICAL	ADT7460



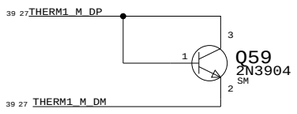
RIGHT USB BOARD



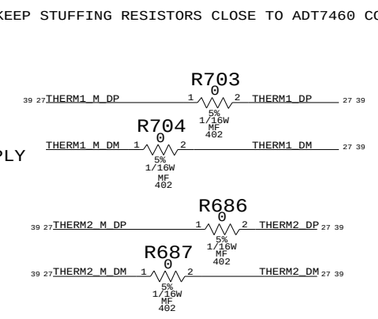
SERIAL DEBUG INTERFACE



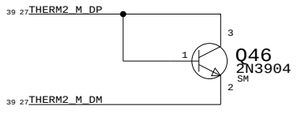
PLACE CLOSE TO CPU
MAIN1



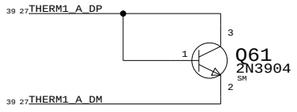
KEEP STUFFING RESISTORS CLOSE TO ADT7460 CONTROLLER



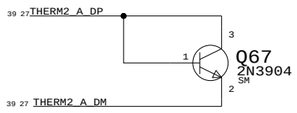
PLACE IN BETWEEN 3/5/1.5/2.5V PWR SUPPLY
MAIN2



PLACE UNDERNEATH UPPER RAM
ALTERNATE1

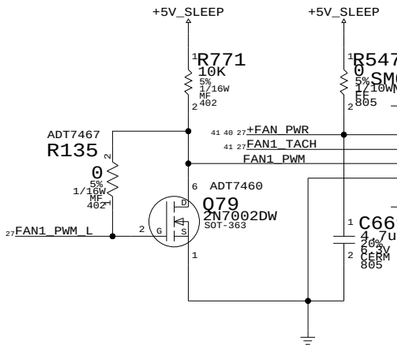


PLACE CLOSE TO BATTERY CHARGER/VCORE
ALTERNATE2

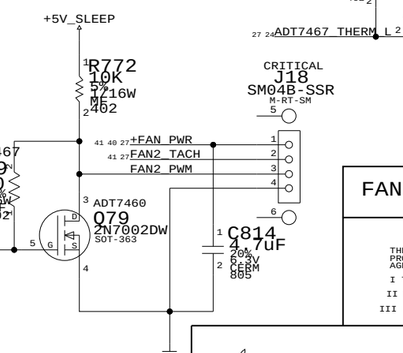


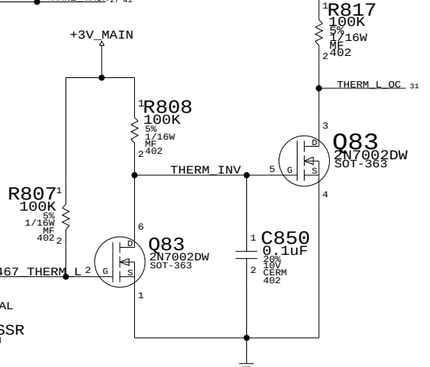
KEEP STUFFING RESISTORS CLOSE TO ADT7460 CONTROLLER

CPU FAN



GPU FAN





FAN/MODEM/SOUND/BACKUP BATT.

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 27 OF 46	

Ethernet routing priority:
1. Decoupling caps
2. TX SERIES TERMINATION - LOCATE NEAR LINK
3. RX SERIES TERMINATION - LOCATE NEAR PHY

All differential signals should be close, parallel, matched lengths, with minimum via count, and short if possible

Must maintain 50-ohms trace impedance on all MDI pairs and all RJ45 pairs

Sandwich each RJ54 pair between chassis grounds

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
338S0223	338S0079		U43	MARVELL 88E1111 B1 DIE

PLACE ALL SERIES RES CLOSE TO PHY

Keep C851 & C852 Stubs short

PLACES PHY IN "COMA" MODE WHEN ASLEEP ON BATTERY (SAVES POWER)

PUT CRYSTAL CIRCUIT CLOSE TO PHY

Y6 LOAD CAPACITANCE IS 16PF

VOUT = 0.8V*(1+R2EQV/R1)
R2EQV = R2A||R2B

PLACE CAPS (IN ORDER) ON PINS 1, 6, 10/15, 57/62, 67/71, 85

PLACE CAPS (IN ORDER) ON PINS 5, 21/26, 48/52, 66/72, 88, 96

PLACE CAPS (IN ORDER) ON PINS 32/35, 36/40, 45 & 78

PLACE CAPS AT CONNECTOR PINS 5 & 6

PLACE RESISTORS CLOSE TO PHY

SEE CONFIG TABLES (BELOW)

CONFIG DEFINITIONS	
PIN	BIT[2:0]
VDDO	111
LED_LINK10	110
LED_LINK100	101
LED_LINK1000	100
LED_DUPLEX	011
LED_RX	010
LED_TX	001
VSS	000

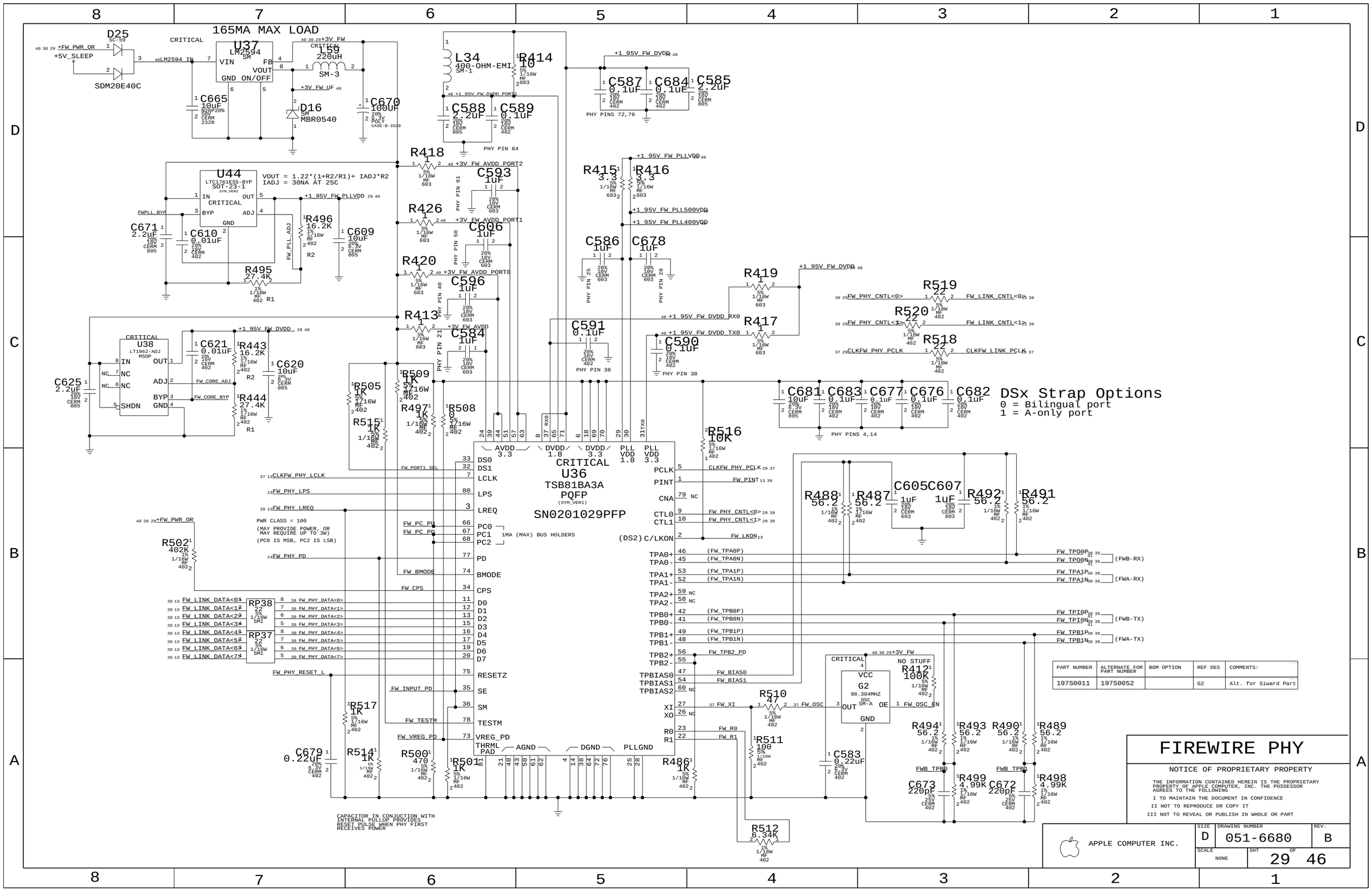
CONFIG INPUTS			
PIN	BIT[2]	BIT[1]	BIT[0]
CONFIG<0>	PHYADR[2]	PHYADR[1]	PHYADR[0]
CONFIG<1>	ENA_PAUSE	PHYADR[4]	PHYADR[3]
CONFIG<2>	ANEG[3]	ANEG[2]	ANEG[1]
CONFIG<3>	ANEG[0]	ENA_XC	DIS_125
CONFIG<4>	MODE[2]	MODE[1]	MODE[0]
CONFIG<5>	DIS_FC	DIS_SLEEP	MODE[3]
CONFIG<6>	SEL_BDT	INT_POL	75/50 OHM

MARVELL 88E1111

10/100/1000 ETHERNET

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 28 OF 46	


165MA MAX LOAD
D25
SC-59
SDM20E40C
+FW_PWR_OR
+5V_SLEEP
CRITICAL
U37
LM2594
SM
VIN
FB
VOUT
GND ON/OFF
LM2594_IN
+3V_FW
L59
220uH
SM-3
+3V_FW_UF
D16
SM
MBR0540
C665
10uF
C670
100uF
6.3V
POLY
CASE-B-3528
L34
400-OHM-EMI
SM-1
R414
10
+1.95V_FW_DVDD
C587
0.1uF
C684
0.1uF
C585
2.2uF
PHY PINS 72,76
C588
2.2uF
C589
0.1uF
PHY PIN 64
R418
+3V_FW_AVDD_PORT2
C593
1uF
PHY PIN 61
U44
LTC1761ES5-BYP
SOT-23-1
VOUT = 1.22*(1+R2/R1)+ IADJ*R2
IADJ = 30NA AT 25C
IN
OUT
BYP
ADJ
GND
FWPLL_BYP
+1.95V_FW_PLLVDD
R496
16.2K
R2
R495
27.4K
R1
C671
2.2uF
C610
0.01uF
C609
10uF
FW_PLL_ADJ
R426
+3V_FW_AVDD_PORT1
C606
1uF
PHY PIN 50
R420
+3V_FW_AVDD_PORT0
C596
1uF
PHY PIN 40
R413
+3V_FW_AVDD
C584
1uF
PHY PIN 21
R415
3.3
R416
3.3
+1.95V_FW_PLL500VDD
+1.95V_FW_PLL400VDD
C586
1uF
C678
1uF
PHY PIN 25
PHY PIN 28
R419
+1.95V_FW_DVDD
R417
+1.95V_FW_DVDD_RX0
+1.95V_FW_DVDD_TX0
C591
0.1uF
C590
0.1uF
PHY PIN 38
R519
22
FW_PHY_CNTL<0>
FW_LINK_CNTL<0>
R520
22
FW_PHY_CNTL<1>
FW_LINK_CNTL<1>
R518
22
CLKFW_PHY_PCLK
CLKFW_LINK_PCLK
CRITICAL
U38
LT1962-ADJ
MSOP
IN
OUT
NC
NC
ADJ
BYP
SHDN
GND
C621
0.01uF
R443
16.2K
R2
C620
10uF
C625
2.2uF
FW_CORE_ADJ
FW_CORE_BYP
R444
27.4K
R1
R509
1K
R505
1K
R497
1K
R508
0
R515
1K
C681
10uF
C683
0.1uF
C677
0.1uF
C676
0.1uF
C682
0.1uF
PHY PINS 4,14
DSx Strap Options
0 = Bilingual port
1 = A-only port
AVDD 3.3
DVDD 1.8
DVDD 3.3
PLL VDD 1.8
PLL VDD 3.3
CRITICAL
U36
TSB81BA3A
PQFP
(SYM_VER1)
SN0201029PFP
DS0
DS1
LCLK
LPS
LREQ
PWR CLASS = 100
(MAY PROVIDE POWER, OR
MAY REQUIRE UP TO 5W)
(PC0 IS MSB, PC2 IS LSB)
PC0
PC1
PC2
1MA (MAX) BUS HOLDERS
PD
BMODE
CPS
D0
D1
D2
D3
D4
D5
D6
D7
RESETZ
SE
SM
TESTM
VREG_PD
THRML PAD
AGND
DGND
PLLGND
PCLK
PINT
CNA
CTL0
CTL1
(DS2) C/LKON
TPA0+
TPA0-
TPA1+
TPA1-
TPA2+
TPA2-
TPB0+
TPB0-
TPB1+
TPB1-
TPB2+
TPB2-
TPBIAS0
TPBIAS1
TPBIAS2
XI
XO
R0
R1
31TX0
37 RX0
FW_PORT1_SEL
CLKFW_PHY_LCLK
FW_PHY_LPS
FW_PHY_LREQ
FW_PC_PU
FW_PC_PD
FW_PHY_PD
FW_BMODE
FW_CPS
FW_LINK_DATA<0>
FW_LINK_DATA<1>
FW_LINK_DATA<2>
FW_LINK_DATA<3>
FW_LINK_DATA<4>
FW_LINK_DATA<5>
FW_LINK_DATA<6>
FW_LINK_DATA<7>
FW_PHY_DATA<0>
FW_PHY_DATA<1>
FW_PHY_DATA<2>
FW_PHY_DATA<3>
FW_PHY_DATA<4>
FW_PHY_DATA<5>
FW_PHY_DATA<6>
FW_PHY_DATA<7>
RP38
RP37
FW_PHY_RESET_L
FW_INPUT_PD
FW_TESTM
FW_VREG_PD
CLKFW_PHY_PCLK
FW_PINT
FW_PHY_CNTL<0>
FW_PHY_CNTL<1>
FW_LKON
FW_TPA0P
FW_TPA0N
FW_TPA1P
FW_TPA1N
FW_TPB0P
FW_TPB0N
FW_TPB1P
FW_TPB1N
FW_TPB2_PD
FW_BIAS0
FW_BIAS1
FW_XI
FW_OSC
FW_R0
FW_R1
R505
1K
R515
1K
R517
1K
R514
1K
R500
470
R501
1K
R497
1K
R508
0
R509
1K
R511
100
R512
6.34K
R516
10K
R486
1K
C679
0.22uF
C583
0.22uF
CRITICAL
VCC
G2
98.304MHZ
OSC
SM-A
OUT
OE
GND
FW_OSC_EN
NO STUFF
R412
100K
+3V_FW
R488
56.2
R487
56.2
C605C607
1uF
1uF
R492
56.2
R491
56.2
R494
56.2
R493
56.2
R490
56.2
R489
56.2
FWB_TPB0
FWB_TPB1
C673
220pF
C672
220pF
R499
4.99K
R498
4.99K
FW_TPO0P
FW_TPO0N
FW_TPA1P
FW_TPA1N
FW_TPI0P
FW_TPI0N
FW_TPB1P
FW_TPB1N
(FWB-RX)
(FWA-RX)
(FWB-TX)
(FWA-TX)
CAPACITOR IN CONJUCTION WITH
INTERNAL PULLUP PROVIDES
RESET PULSE WHEN PHY FIRST
RECEIVES POWER
PART NUMBER
ALTERNATE FOR PART NUMBER
BOM OPTION
REF DES
COMMENTS:
197S0011
197S0052
G2
Alt. for Siward Part
FIREWIRE PHY
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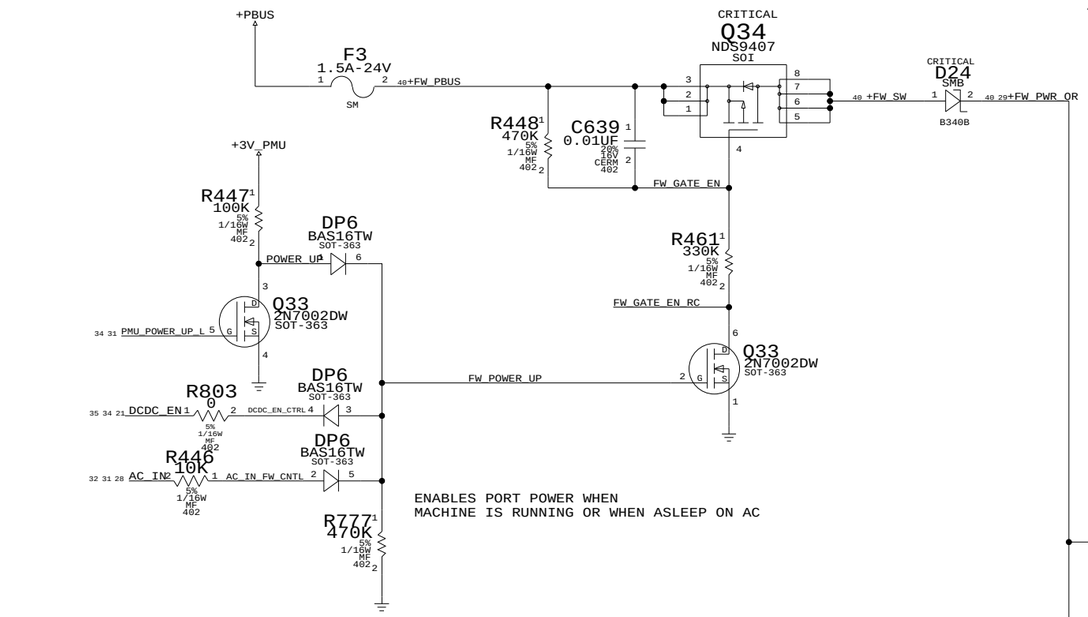
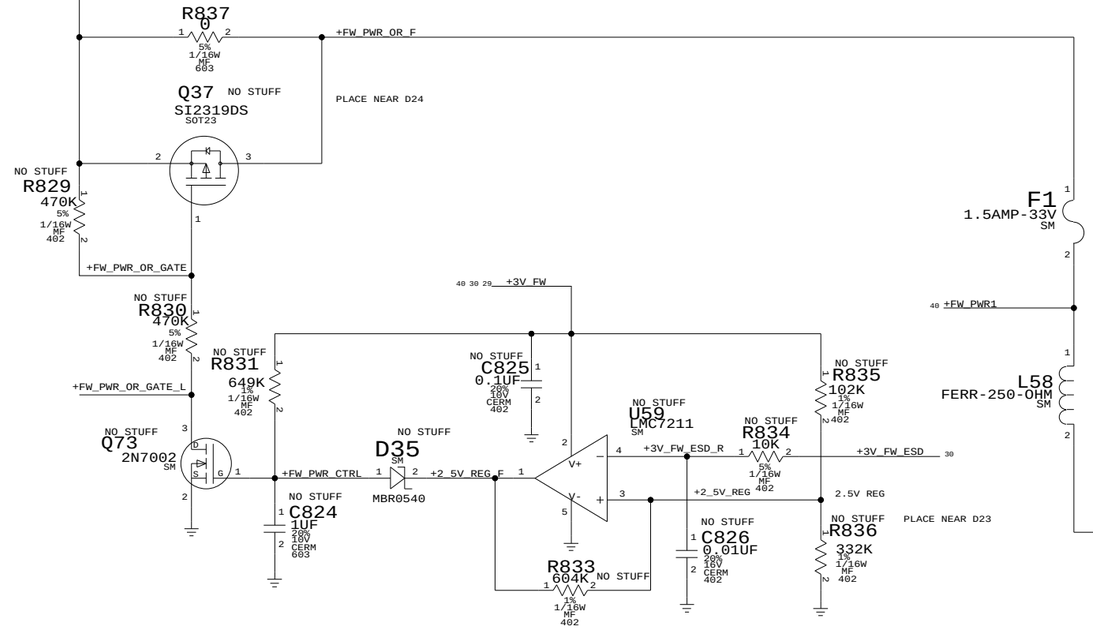
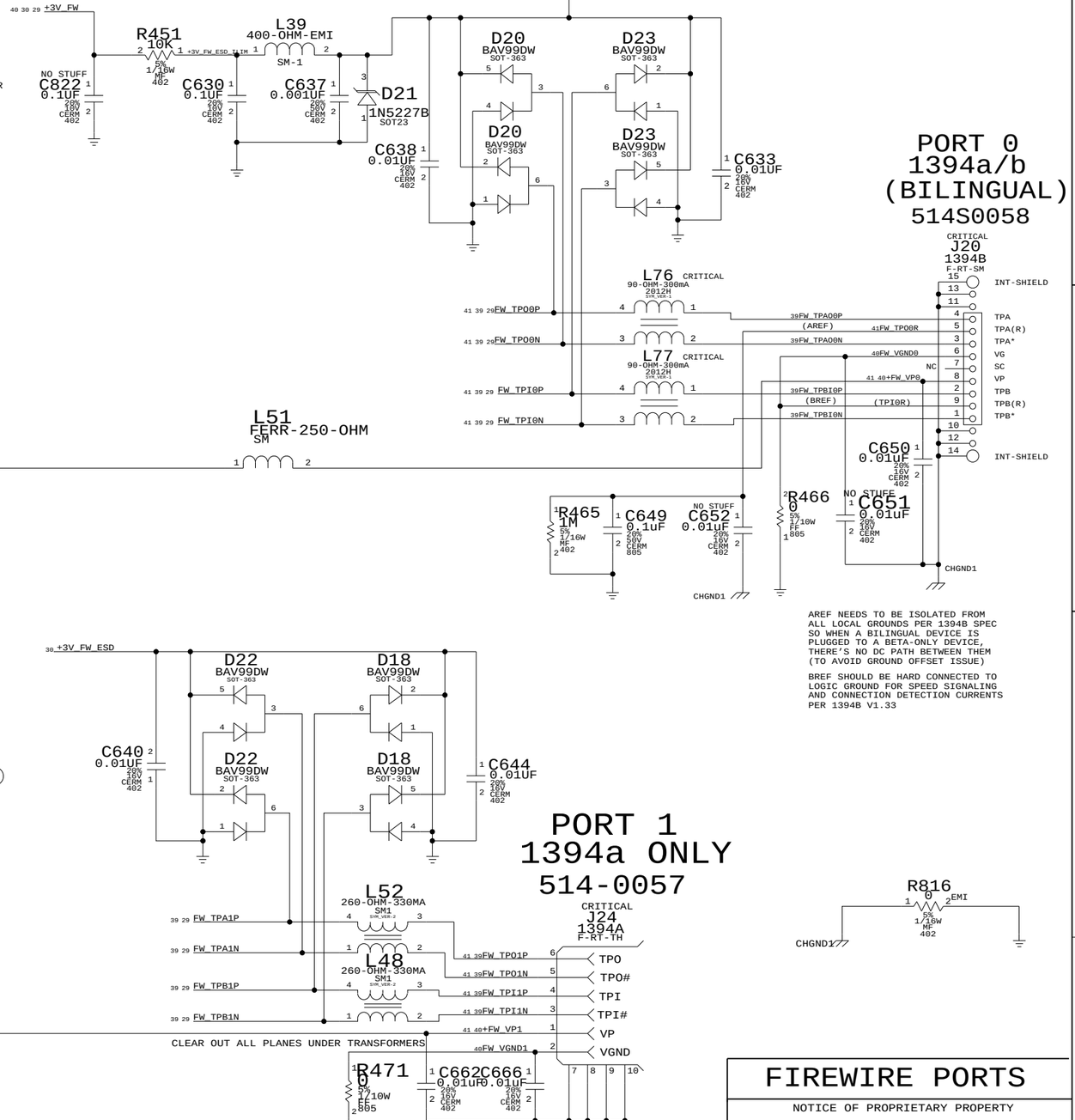
SIZE D
DRAWING NUMBER 051-6680
REV. B
SCALE NONE
SHT 29 OF 46

PORT POWER SWITCH







FIREWIRE PORTS

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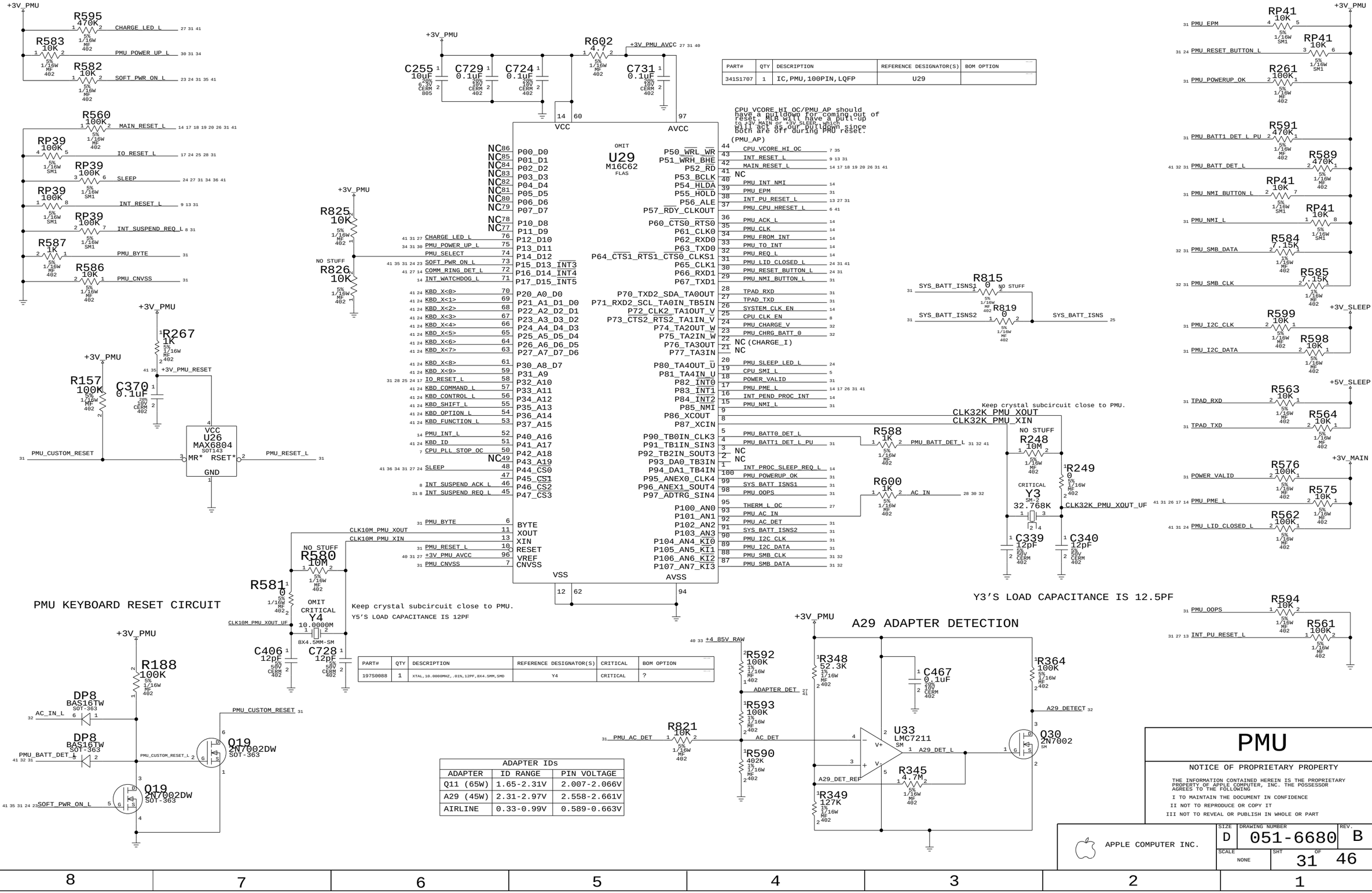
SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 30 OF 46	


+3V_PMU
R595 470K CHARGE_LED_L 27 31 41
R583 10K
PMU_POWER_UP_L 30 31 34
R582 10K SOFT_PWR_ON_L 23 24 31 35 41
R560 100K MAIN_RESET_L 14 17 18 19 20 26 31 41
RP39 100K IO_RESET_L 17 24 25 28 31
RP39 100K SLEEP 24 27 31 34 36 41
RP39 100K INT_RESET_L 9 13 31
RP39 100K INT_SUSPEND_REQ_L 8 31
R587 1K PMU_BYTE 31
R586 10K PMU_CNVSS 31
+3V_PMU
R267 1K
+3V_PMU_RESET 35 41
R157 100K
C370 0.1uF
VCC
U26
MAX6804
SOT143
MR* RSET* GND
PMU_CUSTOM_RESET 31
PMU_RESET_L 31
+3V_PMU
C255 10uF 20% 6.3V CERM 805
C729 0.1uF 20% 10V CERM 402
C724 0.1uF 20% 10V CERM 402
R602 4.7
+3V_PMU_AVCC 27 31 40
C731 0.1uF 20% 10V CERM 402
14 60 VCC
97 AVCC
VSS 12 62
94 AVSS
OMIT
U29
M16C62
FLAS
NC86 P00_D0
NC85 P01_D1
NC84 P02_D2
NC83 P03_D3
NC82 P04_D4
NC81 P05_D5
NC80 P06_D6
NC79 P07_D7
NC78 P10_D8
NC77 P11_D9
P12_D10
P13_D11
P14_D12
P15_D13_INT3
P16_D14_INT4
P17_D15_INT5
P20_A0_D0
P21_A1_D1_D0
P22_A2_D2_D1
P23_A3_D3_D2
P24_A4_D4_D3
P25_A5_D5_D4
P26_A6_D6_D5
P27_A7_D7_D6
P30_A8_D7
P31_A9
P32_A10
P33_A11
P34_A12
P35_A13
P36_A14
P37_A15
P40_A16
P41_A17
P42_A18
P43_A19
P44_CS0
P45_CS1
P46_CS2
P47_CS3
BYTE
XOUT
XIN
RESET
VREF
CNVSS
P50_WRL_WR
P51_WRH_BHE
P52_RD
P53_BCLK
P54_HLDA
P55_HOLD
P56_ALE
P57_RDY_CLKOUT
P60_CTS0_RTS0
P61_CLK0
P62_RXD0
P63_TXD0
P64_CTS1_RTS1_CTS0_CLKS1
P65_CLK1
P66_RXD1
P67_TXD1
P70_TXD2_SDA_TA0OUT
P71_RXD2_SCL_TA0IN_TB5IN
P72_CLK2_TA1OUT_V
P73_CTS2_RTS2_TA1IN_V
P74_TA2OUT_W
P75_TA2IN_W
P76_TA3OUT
P77_TA3IN
P80_TA4OUT_U
P81_TA4IN_U
P82_INT0
P83_INT1
P84_INT2
P85_NMI
P86_XCOUT
P87_XCIN
P90_TB0IN_CLK3
P91_TB1IN_SIN3
P92_TB2IN_SOUT3
P93_DA0_TB3IN
P94_DA1_TB4IN
P95_ANEX0_CLK4
P96_ANEX1_SOUT4
P97_ADTRG_SIN4
P100_AN0
P101_AN1
P102_AN2
P103_AN3
P104_AN4_KI0
P105_AN5_KI1
P106_AN6_KI2
P107_AN7_KI3
(PMU_AP)
CPU_VCORE_HI_OC 7 35
INT_RESET_L 9 13 31
MAIN_RESET_L 14 17 18 19 20 26 31 41
PMU_INT_NMI 14
PMU_EPM 31
INT_PU_RESET_L 13 27 31
PMU_CPU_HRESET_L 6 41
PMU_ACK_L 14
PMU_CLK 14
PMU_FROM_INT 14
PMU_TO_INT 14
PMU_REQ_L 14
PMU_LID_CLOSED_L 24 31 41
PMU_RESET_BUTTON_L 24 31
PMU_NMI_BUTTON_L 31
TPAD_RXD 31
TPAD_TXD 31
SYSTEM_CLK_EN 14
CPU_CLK_EN 8
PMU_CHARGE_V 32
PMU_CHRG_BATT_0 32
NC (CHARGE_I)
NC
PMU_SLEEP_LED_L 24
CPU_SMI_L 5
POWER_VALID 31
PMU_PME_L 14 17 26 31 41
INT_PEND_PROC_INT 14
PMU_NMI_L 31
PMU_BATT0_DET_L
PMU_BATT1_DET_L_PU 31
NC
NC
INT_PROC_SLEEP_REQ_L 14
PMU_POWERUP_OK 31
SYS_BATT_ISNS1 31
PMU_OOPS 31
THERM_L_OC 27
PMU_AC_IN 31
PMU_AC_DET 31
SYS_BATT_ISNS2 31
PMU_I2C_CLK 31
PMU_I2C_DATA 31
PMU_SMB_CLK 31 32
PMU_SMB_DATA 31 32
CPU_VCORE_HI_OC/PMU_AP should have a pulldown for coming out of reset. HLB will have a pull-up to +3V_MAIN or +3V_SLEEP which will act as our pulldown since both are off during PMU reset.
R588 1K PMU_BATT_DET_L 31 32 41
R600 1K AC_IN 28 30 32
R825 10K
R826 10K
NO STUFF
CHARGE_LED_L 76
PMU_POWER_UP_L 75
PMU_SELECT 74
SOFT_PWR_ON_L 73
COMM_RING_DET_L 72
INT_WATCHDOG_L 71
KBD_X<0> 70
KBD_X<1> 69
KBD_X<2> 68
KBD_X<3> 67
KBD_X<4> 66
KBD_X<5> 65
KBD_X<6> 64
KBD_X<7> 63
KBD_X<8> 61
KBD_X<9> 59
IO_RESET_L 58
KBD_COMMAND_L 57
KBD_CONTROL_L 56
KBD_SHIFT_L 55
KBD_OPTION_L 54
KBD_FUNCTION_L 53
PMU_INT_L 52
KBD_ID 51
CPU_PLL_STOP_OC 50
SLEEP 49
INT_SUSPEND_ACK_L 48
INT_SUSPEND_REQ_L 47
PMU_BYTE 46
PMU_RESET_L 45
+3V_PMU_AVCC 10
PMU_CNVSS 13
CLK10M_PMU_XOUT 6
CLK10M_PMU_XIN 7
R815 0 NO STUFF
SYS_BATT_ISNS1
SYS_BATT_ISNS2
R819 0
SYS_BATT_ISNS 25
Keep crystal subcircuit close to PMU.
CLK32K_PMU_XOUT
CLK32K_PMU_XIN
NO STUFF
R248 10M
R249 0
CRITICAL
Y3
SM-2
32.768K
CLK32K_PMU_XOUT_UF
C339 12pF
C340 12pF
Y3'S LOAD CAPACITANCE IS 12.5PF
PMU KEYBOARD RESET CIRCUIT
NO STUFF
R580 10M
R581 0
OMIT
CRITICAL
Y4
10.0000M
8X4.5MM-SM
CLK10M_PMU_XOUT_UF
C406 12pF
C728 12pF
Keep crystal subcircuit close to PMU.
Y5'S LOAD CAPACITANCE IS 12PF
PART# | QTY | DESCRIPTION | REFERENCE DESIGNATOR(S) | CRITICAL | BOM OPTION
341S1707 | 1 | IC,PMU,100PIN,LQFP | U29 |
197S0088 | 1 | XTAL,10.0000MHZ,.01%,12PF,8X4.5MM,SMD | Y4 | CRITICAL | ?
A29 ADAPTER DETECTION
+4.85V_RAW 33 40
R592 100K
ADAPTER_DET 27 41
R593 100K
R590 402K
R821 10K
PMU_AC_DET 31
R348 52.3K
C467 0.1uF
R364 100K
A29_DETECT 32
U33
LMC7211
SM
A29_DET_L
R345 4.7M
A29_DET_REF
R349 127K
Q30 2N7002
SM
ADAPTER IDs
ADAPTER | ID RANGE | PIN VOLTAGE
Q11 (65W) | 1.65-2.31V | 2.007-2.066V
A29 (45W) | 2.31-2.97V | 2.558-2.661V
AIRLINE | 0.33-0.99V | 0.589-0.663V
DP8 BAS16TW SOT-363
AC_IN_L 32
PMU_BATT_DET_L 31 32 41
R188 100K
PMU_CUSTOM_RESET 31
PMU_CUSTOM_RESET_L
Q19 2N7002DW SOT-363
SOFT_PWR_ON_L 23 24 31 35 41
RP41 10K PMU_EPM 31
RP41 10K PMU_RESET_BUTTON_L 24 31
R261 100K PMU_POWERUP_OK 31
R591 470K PMU_BATT1_DET_L_PU 31
R589 470K PMU_BATT_DET_L 31 32 41
RP41 10K PMU_NMI_BUTTON_L 31
RP41 10K PMU_NMI_L 31
R584 7.15K PMU_SMB_DATA 31 32
R585 7.15K PMU_SMB_CLK 31 32
+3V_SLEEP
R599 10K PMU_I2C_CLK 31
R598 10K PMU_I2C_DATA 31
+5V_SLEEP
R563 10K TPAD_RXD 31
R564 10K TPAD_TXD 31
+3V_MAIN
R576 100K POWER_VALID 31
R575 10K PMU_PME_L 31 32 26 17 14 41
R562 100K PMU_LID_CLOSED_L 24 31 41
R594 10K PMU_OOPS 31
R561 100K INT_PU_RESET_L 27 13 31
PMU
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DRAWING NUMBER 051-6680
REV. B
SCALE NONE
SHT 31 OF 46

DC POWER INPUT

(POWER JACK, ETC. ON SEPARATE BOARD)

CRITICAL
J27
87438-0433
M-RT-SM

41 40 33 +ADAPTER

C35 0.1uF 100V CERM X7R 603-1

DC INRUSH LIMITER

Q68 SI4435DY SOI

R21 330K 5% 1/16W MF 402

C11 0.1uF 20% 50V CERM 805

AC_ENABLE_GATE

R51 20K 1% 1/16W MF 402

+3V_PMU

R40 97.6K 1% 1/16W MF 402

R16 100K 1% 1/16W MF 402

C801 0.01uF 20% 16V CERM 402

R15 10K 5% 1/16W MF 402

40 33 1V20_REF

U1 LMC7211 SM

AC_DIV

R42 10K 1% 1/16W MF 402

R30 57.6K 1% 1/16W MF 402

R41 1M 5% 1/16W MF 402

AC_IN_L 31 32

Q1 2N7002DW SOT-363

R22 470K 5% 1/16W MF 402

R29 470K 5% 1/16W MF 402

AC_ENABLE_L

Q1 2N7002DW SOT-363

AC_IN 28 30 31 32

GREATER THAN 13.1V DETECT

BACKFEED PROTECTION

40 +ADAPTER_SW

Q69 SI4435DY SOI

+ADAPTER_SENSE 40

BKFD_PROT_GATE

C803 0.01UF 20% 16V CERM 603

R734 68K 1% 1/16W MF 402

BKFD_PROT_EN_L

32 31 30 28 AC_IN

Q9 2N7002DW SOT-363

CRITICAL
U3 MAX4172 TSSOP
RS+ RS- PG OUT GND V+
NC NC1 NC2

MAX4172_OUT 2

CRITICAL
R77 2.21K 0.1% 1/16W MF 603

+24V_PBUS

C36 0.01uF 20% 50V CERM 603

C233 0.1uF 10% 50V X7R 603-1

Place close to RS-

PLACE U24 NEXT TO R382

CRITICAL
R61 0.025 1% 1W MF 2512

R57 100K 1% 1/16W MF 402

D4 1N914 SOT23

R82 4.7 5% 1/16W MF 402

R87 4.7 5% 1/16W MF 402

39 1772_CSSP

39 1772_CSSN

C67 1uF 20% 50V CERM 1210

C71 0.47uF 20% 50V CERM 1206

C95 0.47uF 20% 50V CERM 1206

R49 12.7K 1% 1/16W MF 402

40 1772_DCIN

32 1772_ACOK_L

U6 MAX1772 QSOP

CSSP CSSN DCIN ACIN ACOK RFIN VCTL ICTL ICHG IINP CCV CCI CCS REF CLS GND CELLS LDO DLOV BST DHI LX DLO PGND CSIP CSIN BATT

1772_CELLS

1772_DLOV

1772_BST

1772_DHI

40 1772_LX

1772_DLO

(GND)

39 1772_CSIP

39 1772_CSIN

C41 1uF 20% 25V CERM 1206

C98 0.1uF 20% 25V CERM 603

C99 0.1uF 20% 25V CERM 603

+PBUS CURRENT LIMIT

R728 1K 1% 1/16W MF 402

1772_IAC_RC_COMP

C798 0.1uF 20% 16V CERM 402

+3V_PMU

C794 0.1uF 20% 16V CERM 402

R745 47.2K 0.1% 1/16W PF 603

IAC_FB

U55 LMC7111 SOT23-5

PLACE R383 CLOSE TO LTC1625
ROUTE LTC1625_ITH CAREFULLY

LTC1625_ITH

R727 10K 1% 1/16W MF 402

DP1 BAS16TW SOT-363

R119 150 1% 1/16W MF 402

1625_COMP 33

ADAPTER_I_REG

CURRENT_THRESHOLD

R736 42.2K 0.1% 1/16W PF 603

R738 82.5K 0.1% 1/16W PF 603

R742 51.1K 0.1% 1/16W PF 603

A29_CURRENT_ADJ

OVER_18V_ADJ

R744 100K 5% 1/16W MF 402

32 31 A29_DETECT 2

Q2 2N7002DW SOT-363

Q74 2N7002DW SOT-363

AC_GTR_18V

C809 1uF 20% 25V CERM 603

32 1772_ACOK_L 2

Q74 2N7002DW SOT-363

BATTERY SWITCH-OVER CIRCUIT

+BATT

+24V_PBUS

F5 5AMP-125V SM-2

+PBUS

F4 5AMP-125V SM-2

40 32 +BATT_24V_FUSE

40 +BATT_14V_FUSE

CRITICAL
Q6 SI4435DY SOI

CRITICAL
Q7 SUD45P03 TO-252

R716 47K 5% 1/16W MF 402

R710 47K 5% 1/16W MF 402

BATT_24V_GATE

BATT_14V_GATE

R717 10K 5% 1/16W MF 402

R711 10K 5% 1/16W MF 402

DP1 BAS16TW SOT-363

BATT_24PBUS_EN 5

2 BATT_14PBUS_EN

32 31 AC_IN_L

DP1 BAS16TW SOT-363

R102 158K 1% 1/16W MF 402

Q9 2N7002DW SOT-363

AC_IN_L_RC

C118 10uF 20% 6.3V CERM 805

WHEN AC IS IN, P-CHANNEL FETS ARE QUICKLY (DIODE) TURNED OFF
WHEN AC IS NOT PLUGGED, P-CHANNEL FETS ARE ON
RC TIME IS 480K*10uF @ +3V_PMU

SWITCHER VOLTAGE CONTROL

PMU SELECTS BETWEEN TWO VOLTAGES

+3V_PMU

R73 27.4K 1% 1/16W MF 402

R62 10K 1% 1/16W MF 402

R58 10K 1% 1/16W MF 402

SWITCHER CURRENT CONTROL

CHARGE DISABLED BY PMU OR INPUT VOLTAGE <18V
CHARGE THROTTLED BY LOW BATTERY VOLTAGE

OD OUTPUT LOW - WHEN AC GREATER THAN 18V

R74 4.12K 1% 1/16W MF 402

R733 20K 1% 1/16W MF 402

R731 1K 1% 1/16W MF 402

BATT_LOW_L

R56 1K 1% 1/16W MF 402

BATTV_HIGH

R59 100K 5% 1/16W MF 402

R75 5.23K 1% 1/16W MF 402

Q4 2N7002DW SOT-363

BATTV_LOW 2

Q71 2N7002DW SOT-363

Q71 2N7002DW SOT-363

R55 1K 1% 1/16W MF 402

C43 0.01uF 20% 16V CERM 402

C42 0.01uF 20% 16V CERM 402

1772_CCV_RC

1772_REF

R54 10K 1% 1/16W MF 402

R53 4.12K 1% 1/16W MF 402

1772_CLS

R83 1K 1% 1/16W MF 402

C24 0.1uF 20% 16V CERM 402

C23 1uF 20% 10V CERM 603

R94 100K 5% 1/16W MF 402

XW1 SM

C853 1000pF 20% 25V X7R 402

NO STUFF

CRITICAL
Q64 IRF7811W SO-8

CRITICAL
D36 SM MBRS140T3

CRITICAL
L70 10uH SM1

+BATT_RSNS 30

R715 0.05 1% 1W MF 2512

+BATT_24V_FUSE 2 40

R720 1 5% 1/16W MF 603

R713 1 5% 1/16W MF 603

C780 4.7uF 20% 25V CERM 1206

C777 4.7uF 20% 25V CERM 1206

C795 4.7uF 20% 25V CERM 1206

C792 4.7uF 20% 25V CERM 1206

C790 4.7uF 20% 25V CERM 1206

C785 4.7uF 20% 25V CERM 1206

C779 33uF 20% 25V SPEC SM1

+3V_PMU

R741 100K 5% 1/16W MF 402

CHARGE_DISABLE 2

Q72 2N7002DW SOT-363

Q72 2N7002DW SOT-363

31 PMU_CHRG_BATT_0 5

+3V_PMU

C799 0.1uF 20% 16V CERM 402

U57 LMC7211 SM

BATT_LOW 1

R729 100K 1% 1/16W MF 402

R740 499K 1% 1/16W MF 402

BATT_DIV

1V65_REF

R730 100K 1% 1/16W MF 402

R735 100K 1% 1/16W MF 402

C807 0.047uF 10% 16V CERM 402

R47 6.34K 1% 1/16W MF 402

A29_CLS_ADJ

32 31 A29_DETECT 5

Q2 2N7002DW SOT-363

40 +BATT_VSNS

BATTERY CONNECTOR

CRITICAL
J26
87438-0833
M-RT-SM

41 40 +BATT_POS

(BATT_IN_PD)

41 BATT_CLK

41 BATT_DATA

PMU_BATT_DET_L 41

41 40 BATT_NEG

L5 FERR-EMI-100-OHM SM

L2 FERR-50-OHM SM

+BATT_ISNS

L6 FERR-50-OHM SM

L4 FERR-EMI-100-OHM SM

PMU_SMB_CLK 41

L3 FERR-EMI-100-OHM SM

PMU_SMB_DATA 41

1772_LDO

R725 33 1% 1/10W FF 1206

D6 1N914 SOT23

1772_BST_ESR

R52 100K 5% 1/16W MF 402

C97 0.1uF 20% 25V CERM 603

R96 4.7 5% 1/16W MF 603

C96 0.1uF 20% 50V CERM 805

C112 2.2UF 10% 50V X7R 1206

C117 2.2UF 10% 50V X7R 1206

C113 2.2UF 10% 50V X7R 1206

C115 2.2UF 10% 50V X7R 1206

C116 2.2UF 10% 50V X7R 1206

CRITICAL
Q70 IRF7805 SM

$V_{BATT} = CELLS \times (4.096 + (0.4096 * V_{VCTL} / V_{REFIN}))$

For 4.15V cells, VCTL = 0.123 REFIN

For 4.20V cells, VCTL = 0.245 REFIN

$I_{CHG} = (0.2048/R_{62}) * (V_{ICTL} / V_{REFIN})$

BATTERY CHARGER

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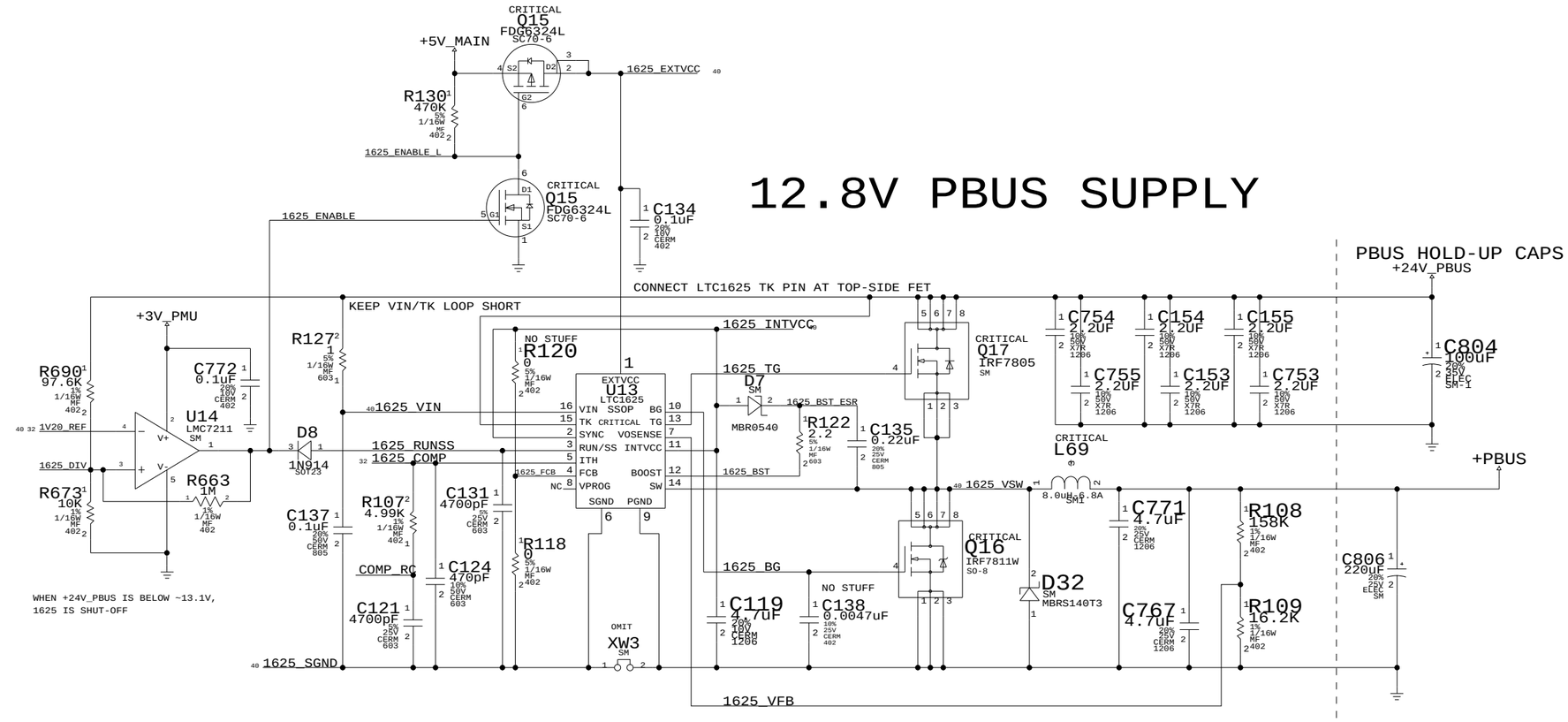
APPLE COMPUTER INC.

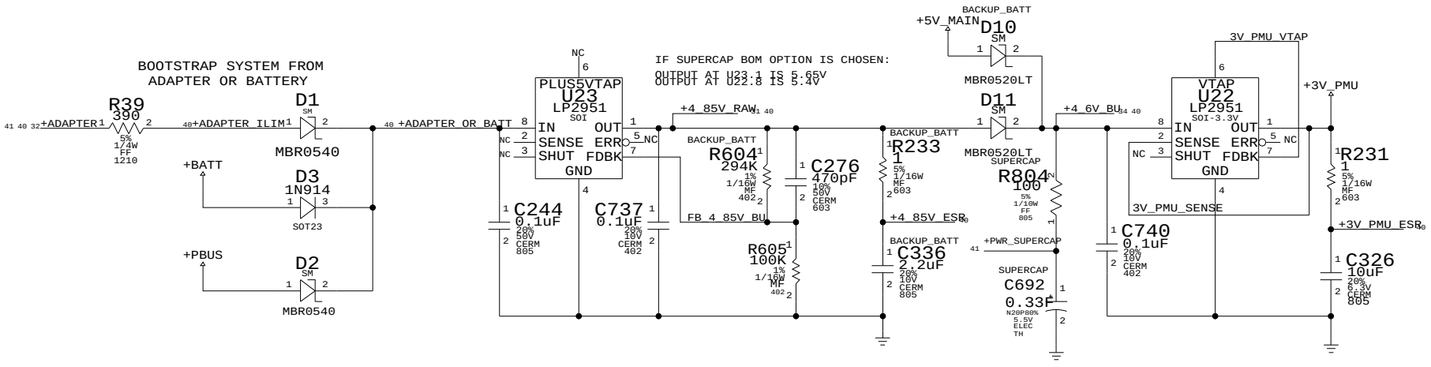
SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE	SHT	OF
NONE	32	46

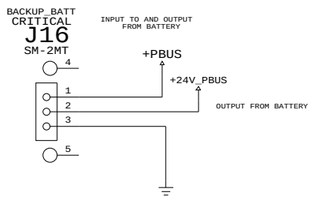
12.8V PBUS SUPPLY



PMU SUPPLY



BACKUP BATTERY



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
114S3575	1	RES,MF,1/16W,357K OHM,1%,0402,SMD	R604	?	SUPERCAP

12.8V REGULATOR

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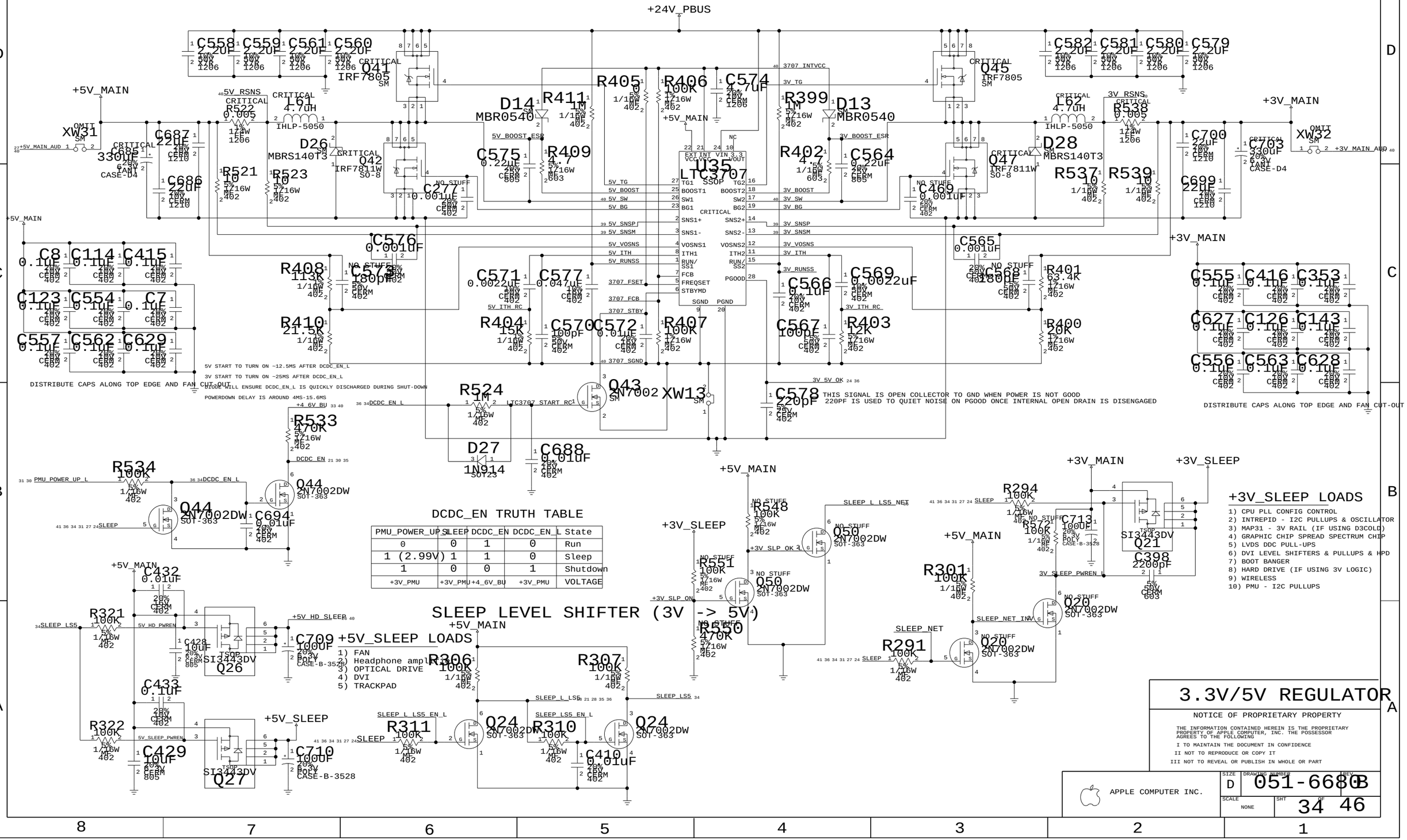
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 33 OF 46	

3.3V/5V MAIN SUPPLY



3.3V/5V REGULATOR

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV
D	051-6680	B
SCALE: NONE	SHT 34 OF 46	

VCORE POWER SEQUENCING

CPU core follows CPU I/O voltage
(approx. 7ms delay)

1.67GHZ (1.28VCORE) 1.300V->0.975V

1.50GHZ 1.200V->0.975V

1.67GHZ (1.26VCORE) 1.300V->0.975V

(VALUE WITHOUT OFFSET)

MAX1717 VID INPUTS ARE 3.3-5V TOLERANT

Note:No stuff R67 to set skip mode of core

OUTPUT VOLTAGE

V_{DAC} D4=0	V_{DAC} D4=1	D3	D2	D1	D0
2.00	1.275	0	0	0	0
1.95	1.250	0	0	0	1
1.90	1.225	0	0	1	0
1.85	1.200	0	0	1	1
1.80	1.175	0	1	0	0
1.75	1.150	0	1	0	1
1.70	1.125	0	1	1	0
1.65	1.100	0	1	1	1
1.60	1.075	1	0	0	0
1.55	1.050	1	0	0	1
1.50	1.025	1	0	1	0
1.45	1.000	1	0	1	1
1.40	0.975	1	1	0	0
1.35	0.950	1	1	0	1
1.30	0.925	1	1	1	0
NO CPU	NO CPU	1	1	1	1

FOR V-STEP:

D<4..0>	A/B_ = Hi/Fast	A/B_ = Lo/Slow
<= 1K PU	1	0
>= 100K PU	1	1
>= 100K PD	0	1
<= 1K PD	0	0

When A/B_ is high (fast): D4-D0 read as-is
When A/B_ is low (slow): <=1K-ohm -> 0
>=100K-ohm -> 1

If all pull-ups are >=100K and all pull-downs are <=1K, V = VA. B

GROUND SENSE VOLTAGE DIVIDER

This allows for an offset to the ground sense to adjust the output voltage.
VREF = 2.0V, HENCE VOFFSET = 2.0V*0.85*(Rb / Ra) AND VCORE = VDAC + VOFFSET.
NOTE: Ra NO STUFFED FOR NO OFFSET CASE

(CPU Vcore value with offset)

1.67GHZ 1.320V->0.990V (CPU SPEC: 1.280V -> 0.980V)

1.50GHZ 1.240V->0.990V (CPU SPEC: 1.200V -> 0.980V)

1.67GHZ(1.26VCORE) 1.300V->0.990V (CPU SPEC: 1.260V -> 0.980V)

(R93&R97 CPU_BTR BOM OPTION SEE BOM TABLE)

Keep trace fat (40-100 mils) and short!!

Keep trace fat and short!!

Connect MAX1717 GND pin 13 to GND at bottom-side FET

ROUTE AS DIFFERENTIAL PAIR

Fmax Test Connections

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
126S0036	7	CAP,AL,POLY,8.2uF,20%,16V,V CASE,SMD	C51,C52,C77,C78,C91,C92,C111	CRITICAL	
152S0242	1	IND,PWR,1.0UH,20,20.5A,SMD	L71	CRITICAL	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
114S2493	1	RES,MF,1/16W,2.49K OHM,1%,0402,SMD	R93	?	CPU_BTR
114S4023	1	RES,MF,1/16W,4.02K OHM,1%,0402,SMD	R97	?	CPU_BTR
116S1000	1	RES,MF,1/16W,0 OHM,5%,0402,SMD	R93	?	CPU_BST_VCORE126
114S1503	1	RES,MF,1/16W,1.5K OHM,1%,0402,SMD	R97	?	CPU_BST_VCORE126

VCORE SUPPLY

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SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 35 OF 46	

1.5V/2.5V SWITCHER

+1_5V_SLEEP LOADS

1) AGP I/O - IF USING D3COLD
2) MAXBUS I/O - IF 1.5V INTERFACE

+1_5V_MAIN LOADS

1) INTREPID CORE

+2_5V_MAIN LOADS

1) MAP31 - FBCORE/FBIO IF USING D3HOT
2) GIGABIT ETHERNET - AVDDL
3) DDR SODIMMS - CORE/IO
4) DDR MUXES

M11 Power Shut down Sequencing

+2_5V_SLEEP LOADS

1) FBCORE/FBIO IF USING D3COLD

1.8V SWITCHER

+1_8V_MAIN LOADS

1) INTREPID PLLS

+1_8V_SLEEP LOADS

1) MPC7447 - MAXBUS I/O - IF 1.8V INTERFACE
2) CPU JTAG & MaxBus Pull-ups
3) CPU PLL Config Straps

1.5V/1.8V/2.5V SUPPLIES

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 36 OF 46	

DIGITAL SIGNALS

GROUP	SIG_NAME	PROPAGATION_DELAY	MAX_VIAS	MAX_EXPOSED_LENGTH	STUB_LENGTH	NET_SPACING_TYPE	NO_TEST	PULSE_PARAM
				STUB_LENGTH OF 200 MILS NEEDED WHEN WE CONVERT TO 14.2				
GROUP 0	MEM_DATA<7..0>	L:S:1602:1700	7	500	(200)			167 MHZ
	MEM_DQM<0>	L:S:1602 MIL:1700 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<0>	L:S:1602 MIL:1700 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<7..0>	L:S:1903:2000	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<0>	L:S:1903 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<0>	L:S:1903 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<7..0>	L:S:2000:2100	7	500	(200)			167 MHZ
	RAM_DQM_B<0>	L:S:2000 MIL:2100 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<0>	L:S:2000 MIL:2100 MIL	7	500.0000	(200)			167.0 MHz
GROUP 1	MEM_DATA<15..8>	L:S:1344:1660	7	500	(200)			167 MHZ
	MEM_DQM<1>	L:S:1344 MIL:1660 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<1>	L:S:1344 MIL:1660 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<15..8>	L:S:1905:2000	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<1>	L:S:1905 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<1>	L:S:1905 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<15..8>	L:S:2004:2412	7	500	(200)			167 MHZ
	RAM_DQM_B<1>	L:S:2004 MIL:2412 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<1>	L:S:2004 MIL:2412 MIL	7	500.0000	(200)			167.0 MHz
GROUP 2	MEM_DATA<23..16>	L:S:1435:1500	7	500	(200)			167 MHZ
	MEM_DQM<2>	L:S:1435 MIL:1500 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<2>	L:S:1435 MIL:1500 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<23..16>	L:S:1707:1800	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<2>	L:S:1707 MIL:1800 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<2>	L:S:1707 MIL:1800 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<23..16>	L:S:1900:2000	7	500	(200)			167 MHZ
	RAM_DQM_B<2>	L:S:1900 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<2>	L:S:1900 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
GROUP 3	MEM_DATA<31..24>	L:S:1233:1485	7	500	(200)			167 MHZ
	MEM_DQM<3>	L:S:1233 MIL:1485 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<3>	L:S:1233 MIL:1485 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<31..24>	L:S:1700:2165	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<3>	L:S:1700 MIL:2165 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<3>	L:S:1700 MIL:2165 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<25..24>	L:S:1907:2356	7	500	(200)			167 MHZ
	RAM_DATA_B<26>	L:S:1907 MIL:2356 MIL	7		(200)			167.0 MHz
	RAM_DATA_B<31..27>	L:S:1907:2356	7	500	(200)			167 MHZ
	RAM_DQM_B<3>	L:S:1907 MIL:2356 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<3>	L:S:1907 MIL:2356 MIL	7	500.0000	(200)			167.0 MHz
GROUP 4	MEM_DATA<39..32>	L:S:1915:2000	7	500	(200)			167 MHZ
	MEM_DQM<4>	L:S:1915 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<4>	L:S:1915 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<39..32>	L:S:1205:1387	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
DDR RAM	RAM_DQM_A<4>	L:S:1205 MIL:1387 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<4>	L:S:1205 MIL:1387 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<39..32>	L:S:1404:1686	7	500	(200)			167 MHZ
	RAM_DQM_B<4>	L:S:1404 MIL:1686 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<4>	L:S:1404 MIL:1686 MIL	7	500.0000	(200)			167.0 MHz
GROUP 5	MEM_DATA<47..40>	L:S:1719:1893	7	500	(200)			167 MHZ
	MEM_DQM<5>	L:S:1719 MIL:1893 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<5>	L:S:1719 MIL:1893 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<47..40>	L:S:1607:1898	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<5>	L:S:1607 MIL:1898 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<5>	L:S:1607 MIL:1898 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<47..40>	L:S:1716:2102	7	500	(200)			167 MHZ
	RAM_DQM_B<5>	L:S:1716 MIL:2102 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<5>	L:S:1716 MIL:2102 MIL	7	500.0000	(200)			167.0 MHz
GROUP 6	MEM_DATA<55..48>	L:S:2101:2170	7	500	(200)			167 MHZ
	MEM_DQM<6>	L:S:2101 MIL:2170 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<6>	L:S:2101 MIL:2170 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<55..48>	L:S:1204:1357	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<6>	L:S:1204 MIL:1357 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<6>	L:S:1204 MIL:1357 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<55..48>	L:S:1400:1546	7	500	(200)			167 MHZ
	RAM_DQM_B<6>	L:S:1400 MIL:1546 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<6>	L:S:1400 MIL:1546 MIL	7	500.0000	(200)			167.0 MHz
GROUP 7	MEM_DATA<63..56>	L:S:1903:2000	7	500	(200)			167 MHZ
	MEM_DQM<7>	L:S:1903 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	MEM_DQS<7>	L:S:1903 MIL:2000 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_A<63..56>	L:S:1611:1696	7	500	(200)	TOTAL LENGTH CONTROLLED BY SPREADSHEET		167 MHZ
	RAM_DQM_A<7>	L:S:1611 MIL:1696 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_A<7>	L:S:1611 MIL:1696 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DATA_B<63..56>	L:S:1809:1887	7	500	(200)			167 MHZ
	RAM_DQM_B<7>	L:S:1809 MIL:1887 MIL	7	500.0000	(200)			167.0 MHz
	RAM_DQS_B<7>	L:S:1809 MIL:1887 MIL	7	500.0000	(200)			167.0 MHz
ADDR	MEM_ADDR<12..0>	L:S::500	4					83 MHZ
	RAM_ADDR<12..0>	L:S:2000:3000	10		(200)			
	MEM_BA<1..0>	L:S::500	4					
	RAM_BA<1..0>	L:S:2000:3300	8		(200)			
CONTROL	MEM_CS_L<3..0>	L:S::500	4					
	RAM_CS_L<3..0>	L:S:2500:3200	7		(200)			
	MEM_CKE<3..0>	L:S::500	4					
	RAM_CKE<3..0>	L:S:2500:3200	7		(200)			
	MEM_RAS_L	L:S::500 MIL	4					
	RAM_RAS_L	L:S:2000 MIL:4100 MIL	7		(200)			
	MEM_CAS_L	L:S::500 MIL	4					
	RAM_CAS_L	L:S:2000 MIL:4100 MIL	7		(200)			
	MEM_WE_L	L:S::500 MIL	4					
	RAM_WE_L	L:S:2000 MIL:3100 MIL	8		(200)			
	MEM_MUXSEL_MSB	L:S:1700 MIL:3000 MIL	8					
	MEM_MUXSEL_LSB	L:S:1700 MIL:3000 MIL	7					

PRIORITY: 2
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9
GOAL: MINIMIZE
EXPOSED ROUTES
MINIMIZE VIAS

CLOCK LINE CONSTRAINTS

GROUP	SIG_NAME	PROPAGATION_DELAY	MATCHED_DELAY	MAX VIAS	MAX EXPOSED LENGTH	STUB_LENGTH	NET_SPACING_TYPE	PULSE PARAM
INTREPID CLOCKS	SYSCLK CPU_UF	L:S::150 MIL					10 MIL SPACING	167.0 MHz
	SYSCLK_CPU	L:S:2650 MIL:2750 MIL		5	250.0000	(200)	10 MIL SPACING	167.0 MHz
	INT_CPUFB_OUT	L:S::150 MIL		5	250.0000		10 MIL SPACING	167.0 MHz
	INT_CPUFB_OUT_SHORT	L:S:700 MIL:850 MIL		5	250.0000		10 MIL SPACING	167.0 MHz
	INT_CPUFB_OUT_NORM	L:S:500 MIL:600 MIL		5	250.0000		10 MIL SPACING	167.0 MHz
	INT_CPUFB_IN_NORM	L:S:500 MIL:600 MIL		5	250.0000		10 MIL SPACING	167.0 MHz
	INT_CPUFB_LONG	L:S:1050 MIL:1150 MIL		5	250.0000		10 MIL SPACING	167.0 MHz
	INT_CPUFB_IN	L:S:700 MIL:800 MIL		5	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A0_UF	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_A0_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A0	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_A0_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A1_UF	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_A1_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A1	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_A1_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B0_UF	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_B0_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B0	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_B0_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B1_UF	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_B1_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B1	L:S:300 MIL:350 MIL	SYSCLK_DDRCLK_B1_UF:G:L:S:0 MIL:25 MIL			(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A0	L:S:2900 MIL:3000 MIL	SYSCLK_DDRCLK_A0:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A0	L:S:2900 MIL:3000 MIL	SYSCLK_DDRCLK_A0:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A1	L:S:2900 MIL:3000 MIL	SYSCLK_DDRCLK_A1:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_A1	L:S:2900 MIL:3000 MIL	SYSCLK_DDRCLK_A1:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B0	L:S:3100 MIL:3200 MIL	SYSCLK_DDRCLK_B0:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B0	L:S:3100 MIL:3200 MIL	SYSCLK_DDRCLK_B0:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B1	L:S:3100 MIL:3200 MIL	SYSCLK_DDRCLK_B1:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	SYSCLK_DDRCLK_B1	L:S:3100 MIL:3200 MIL	SYSCLK_DDRCLK_B1:G:L:S:0 MIL:25 MIL	7	250.0000	(200)	10 MIL SPACING	167.0 MHz
	INT_REF_CLK_OUT_UF	L:S::400 MIL				(200)	10 MIL SPACING	49.92 MHz
	INT_REF_CLK_OUT	L:S:1000 MIL:1150 MIL		5	250.0000	(200)	10 MIL SPACING	49.92 MHz
	INT_REF_CLK_IN	L:S:1900 MIL:2000 MIL		5	250.0000	(200)	10 MIL SPACING	167.0 MHz
	CLK66M_GPU_AGP_UF	L:S::150 MIL				(200)	10 MIL SPACING	66.00 MHz
	CLK66M_GPU_AGP	L:S:1800 MIL:1900 MIL		6	400.0000	(200)	10 MIL SPACING	66.00 MHz
	INT_AGP_FB_OUT	L:S::150 MIL				(200)	10 MIL SPACING	66.00 MHz
	INT_AGP_FB_IN	L:S:1450 MIL:1550 MIL		6	500.0000	(200)	10 MIL SPACING	66.00 MHz
	CLK33M_CBUS_UF	L:S::250 MIL				(200)	10 MIL SPACING	33.00 MHz
	CLK33M_CBUS	L:S:5000 MIL:6000 MIL		9	500.0000	(200)	10 MIL SPACING	33.00 MHz
	CLK33M_AIRPORT_UF	L:S::250 MIL				(200)	10 MIL SPACING	33.00 MHz
	CLK33M_AIRPORT	L:S:9500 MIL:10500 MIL		6	500.0000	(200)	10 MIL SPACING	33.00 MHz
	CLK33M_NEC_UF	L:S::250 MIL				(200)	10 MIL SPACING	33.00 MHz
	CLK33M_NEC	L:S:4000 MIL:6000 MIL		7	500.0000	(200)	10 MIL SPACING	33.00 MHz
	INT_PCI_FB_OUT	L:S::300 MIL				(200)	10 MIL SPACING	33.00 MHz
	INT_PCI_FB_IN	L:S:6500 MIL:7500 MIL		7	500.0000	(200)	10 MIL SPACING	33.00 MHz
M11 & OSC	ATI_CLK27M_OSC	L:S::400 MIL		5		(200)	10 MIL SPACING	
	ATI_CLK27M_OSC_SS	L:S::400 MIL		5		(200)	10 MIL SPACING	
	ATI_CLK27M_IN	L:S::200 MIL		5		(200)	10 MIL SPACING	
	ATI_SSCLK_UF	L:S::200 MIL		5		(200)	10 MIL SPACING	
	ATI_SSCLK_IN	L:S::1800 MIL		5	500.0000	(200)	10 MIL SPACING	
CRYSTALS	CLK18M_INT_XIN	L:S:1400 MIL:1500 MIL					10 MIL SPACING	
	CLK18M_INT_XOUT	L:S:1250 MIL:1350 MIL					10 MIL SPACING	
	CLK18M_XTAL_IN	L:S::300 MIL					10 MIL SPACING	
	CLK18M_INT_EXT	L:S::400 MIL					10 MIL SPACING	
SOUND	INT_I2S0_SND_MCLK			6	500.0000	(200)	10 MIL SPACING	
ETHERNET	CLKENET_PHY_RX	L:S::300 MIL				(200)		125.0 MHz
	CLKENET_LINK_RX	L:S:8000 MIL:9000 MIL		6	800.0000	(200)	10 MIL SPACING	125.0 MHz
	CLKENET_PHY_GBE_REF	L:S::300 MIL				(200)		125.0 MHz
	CLKENET_LINK_GBE_REF	L:S:8000 MIL:9000 MIL		6	500.0000	(200)	10 MIL SPACING	125.0 MHz
	CLKENET_PHY_TX	L:S::300 MIL				(200)		25.00 MHz
	CLKENET_LINK_TX	L:S:8000 MIL:9000 MIL		6	500.0000	(200)	10 MIL SPACING	25.00 MHz
	CLKENET_LINK_GTX	L:S::300 MIL				(200)		125.0 MHz
	CLKENET_PHY_GTX	L:S:8000 MIL:9000 MIL		6	600.0000	(200)	10 MIL SPACING	125.0 MHz
FIREWIRE	CLKFW_PHY_PCLK	L:S::300 MIL				(200)		49.15 MHz
	CLKFW_LINK_PCLK	L:S:7500 MIL:8000 MIL		5	500.0000	(200)	10 MIL SPACING	49.15 MHz
	CLKFW_PHY_LCLK	L:S:7500 MIL:8000 MIL		5	500.0000	(200)	10 MIL SPACING	49.15 MHz
	CLKFW_LINK_LCLK	L:S::300 MIL				(200)		49.15 MHz
	FW_XI	L:S::500 MIL				(200)	10 MIL SPACING	98.03 MHz
	FW_OSC	L:S::300 MIL				(200)	10 MIL SPACING	98.03 MHz

PRIORITY: 1
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9
GOAL: MINIMIZE EXPOSURE ON LONG NETS

SIGNAL CONSTRAINTS - PAGE 1

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-6680 | REV. B

SCALE NONE | SHT 37 OF 46

DIGITAL SIGNALS

GROUP	SIG_NAME	PROPAGATION_DELAY	MAX_VIAS	MAX_EXPOSED_LENGTH	STUB_LENGTH	NET_SPACING_TYPE	NO_TEST	PULSE_PARAM
MAXBUS0	CPU_AACK_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_ADDR<0..31>	L:S:1500:3100	7		(250)		TRUE	83 MHZ
	CPU_ARTRY_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_BG_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_BR_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_CI_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_DATA<0..31>	L:S:1100:2700	7		(250)		TRUE	83 MHZ
	CPU_DATA<32..63>	L:S:1100:2700	8		(250)			83 MHZ
	CPU_DBG_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_DTI<0..2>	L:S:1500:2950	7		(250)			
	CPU_DRDY_L	L:S:1500 MIL:3200	MIL7		(250)			
	CPU_GBL_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_HIT_L	L:S:1500 MIL:2800	MIL7		(250)			
	CPU_OACK_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_OREQ_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_TA_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_TBST_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_TEA_L	L:S:1500 MIL:3000	MIL7		(250)			
	CPU_TS_L	L:S:1500 MIL:2700	MIL7		(250)			
	CPU_TSIZ<0..2>	L:S:1500:3500	7		(250)			
	CPU_TT<0..4>	L:S:1500:3400	7		(250)			
	CPU_WT_L	L:S:1500 MIL:3100	MIL7		(250)			

PRIORITY: 4
PRIMARY LAYERS: 9
SECONDARY LAYERS: 4,7
GOAL: MINIMIZE TH VIAS

STUB_LENGTH OF 250 MILS NEEDED WHEN DESIGN SWITCHED TO 14.2

TMDS/DVO SIGNAL CONSTRAINTS

ALL TMDS GROUP SIGNALS ROUTE AT LAYER 4 OR 7 AND HAVE SAME WIDTH SPACING RULE AS OTHER TMDS SIGNALES

SI_TMDS_CLKN	SI_CLKTMDS	SITMDS:G:L:S:0 MIL:300 MIL	100 OHM SPACING FOR TMDS	
SI_TMDS_CLKP	SI_CLKTMDS	SITMDS:G:L:S:0 MIL:300 MIL	100 OHM SPACING FOR TMDS	
SI_TMDS_DN<0>	SI_TMDS_D0		100 OHM SPACING FOR TMDS	
SI_TMDS_DP<0>	SI_TMDS_D0		100 OHM SPACING FOR TMDS	
SI_TMDS_DN<1>	SI_TMDS_D1		100 OHM SPACING FOR TMDS	
SI_TMDS_DP<1>	SI_TMDS_D1		100 OHM SPACING FOR TMDS	
SI_TMDS_DN<2>	SI_TMDS_D2		100 OHM SPACING FOR TMDS	
SI_TMDS_DP<2>	SI_TMDS_D2		100 OHM SPACING FOR TMDS	
SI_TMDS_DN<3>	SI_TMDS_D3		100 OHM SPACING FOR TMDS	
SI_TMDS_DP<3>	SI_TMDS_D3		100 OHM SPACING FOR TMDS	
SI_TMDS_DN<4>	SI_TMDS_D4		100 OHM SPACING FOR TMDS	
SI_TMDS_DP<4>	SI_TMDS_D4		100 OHM SPACING FOR TMDS	
SI_TMDS_DN<5>	SI_TMDS_D5		100 OHM SPACING FOR TMDS	
SI_TMDS_DP<5>	SI_TMDS_D5		100 OHM SPACING FOR TMDS	

ALL THE DVOD GROUP SIGNALS ROUTE AT LAYER 4 OR 7 AND ROUTE AS STANDARD 50OHM SIGNALS AT 4 MILS

ATI_DVOD<23..0>	ATIDVOD:G:L:S:1600 MIL:1700 MIL	6	610		
ATI_DVOD_DE	ATIDVOD:G:L:S:1600 MIL:1700 MIL	6	610.0000		
ATI_DVO_HSYNC	ATIDVOD:G:L:S:1600 MIL:1700 MIL	6	610.0000		
ATI_DVO_VSYNC	ATIDVOD:G:L:S:1600 MIL:1700 MIL	6	610.0000		
ATI_DVO_CLKP	ATIDVOD:G:L:S:0 MIL:500 MIL	6	610.0000	165.0 MHz:::	
GPU_DVO_CLKP_R1	ATIDVOD:G:L:S:0 MIL:1100 MIL	6	610.0000	165.0 MHz:::	
GPU_DVO_CLKP_R2	ATIDVOD:G:L:S:0 MIL:1100 MIL	6	610.0000	165.0 MHz:::	

TMDS_CONN_CLKN	CLKCONN_TMDS	TMDS_CONN:G:L:S:0 MIL:50 MIL	500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_CLKP	CLKCONN_TMDS	TMDS_CONN:G:L:S:0 MIL:50 MIL	500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DN<0>	CONN_TMDS_D0		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DP<0>	CONN_TMDS_D0		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DN<1>	CONN_TMDS_D1		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DP<1>	CONN_TMDS_D1		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DN<2>	CONN_TMDS_D2		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DP<2>	CONN_TMDS_D2		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DN<3>	CONN_TMDS_D3		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DP<3>	CONN_TMDS_D3		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DN<4>	CONN_TMDS_D4		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DP<4>	CONN_TMDS_D4		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DN<5>	CONN_TMDS_D5		500.0000	100 OHM SPACING FOR TMDS
TMDS_CONN_DP<5>	CONN_TMDS_D5		500.0000	100 OHM SPACING FOR TMDS

GPU_R	GPU_R	500.0000	100 OHM SPACING
GPU_G	GPU_G	500.0000	100 OHM SPACING
GPU_B	GPU_B	500.0000	100 OHM SPACING

SIGNAL CONSTRAINTS - PAGE 1

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE: NONE

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Digital Signals (cont'd)

GROUP	SIG_NAME	PROPAGATION_DELAY	MAX_VIAS	MAX_EXPOSED_LENGTH	STUB_LENGTH	NET_SPACING_TYPE	NO_TEST	PULSE_PARAM
AGP	AGP_AD<15..0>	L:S:1050:1450	7					66 MHZ
AGP BYTES 0-1	AGP_CBE<1..0>	L:S:1050:1450	7					66 MHZ
	AGP_AD_STB<0>	L:S:1050 MIL:1450 MIL	4		(250)	8 MIL SPACING		133.0 MHZ
	AGP_AD_STB_L<0>	L:S:1050 MIL:1450 MIL	4		(250)	8 MIL SPACING		133.0 MHZ
AGP BYTES 2-3	AGP_AD<31..16>	L:S:1050:1450	7					66 MHZ
	AGP_CBE<3..2>	L:S:1050:1450	7					66 MHZ
	AGP_AD_STB<1>	L:S:1050 MIL:1450 MIL	4		(250)	8 MIL SPACING		133.0 MHZ
	AGP_AD_STB_L<1>	L:S:1050 MIL:1450 MIL	4		(250)	8 MIL SPACING		133.0 MHZ
AGP SIDEBAND	AGP_SBA<7..0>	L:S:1050:1450	7					66 MHZ
	AGP_SB_STB	L:S:1050 MIL:1450 MIL	4		(350)	8 MIL SPACING		66.00 MHZ
	AGP_SB_STB_L	L:S:1050 MIL:1450 MIL	4		(350)	8 MIL SPACING		66.00 MHZ
AGP CONTROL	AGP_FRAME_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_IRDY_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_TRDY_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_DEVSEL_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_STOP_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_PAR	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_REQ_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_GNT_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
	AGP_RBF_L	L:S:1250 MIL:1950 MIL	4					66.00 MHZ
PCI	PCI_AD<31..0>	L:S:6000:12500				MIN_DAISY_CHAIN		33 MHZ
	PCI_CBE<3..0>	L:S:6000:12500				MIN_DAISY_CHAIN		33 MHZ
	PCI_FRAME_L	L:S:6000 MIL:12500 MIL				MIN_DAISY_CHAIN		33.00 MHZ
	PCI_IRDY_L	L:S:6000 MIL:12500 MIL				MIN_DAISY_CHAIN		33.00 MHZ
	PCI_TRDY_L	L:S:6000 MIL:12500 MIL				MIN_DAISY_CHAIN		33.00 MHZ
	PCI_DEVSEL_L	L:S:6000 MIL:12500 MIL				MIN_DAISY_CHAIN		33.00 MHZ
	PCI_STOP_L	L:S:6000 MIL:12500 MIL				MIN_DAISY_CHAIN		33.00 MHZ
	PCI_PAR	L:S:6000 MIL:12500 MIL				MIN_DAISY_CHAIN		33.00 MHZ
ULTRA ATA-100	UIDE_DATA<15..8>	L:S::710				(200)		100 MHZ
	UIDE_DATA<7>	U51.V1:RP19.3::600 MIL				(200)		100.0 MHZ
	UIDE_DATA<6..0>	L:S::600				(200)		100 MHZ
	UIDE_ADDR<2..0>	L:S::650			(200)	NEED TO MATCH DELAY TO 250		100 MHZ
	UIDE_RST_L	L:S::400 MIL				(200)		100.0 MHZ
	UIDE_DIOW_L	L:S::400 MIL				(200)		100.0 MHZ
	UIDE_DIOR_L	L:S::600 MIL		10 MIL SPACING		(200)		100.0 MHZ
	UIDE_DMACK_L	L:S::400 MIL				(200)		100.0 MHZ
	UIDE_CS0_L	L:S::500 MIL				(200)		100.0 MHZ
	UIDE_CS1_L	L:S::500 MIL				(200)		100.0 MHZ
	UIDE_DMARQ	L:S::400 MIL				(200)		100.0 MHZ
	UIDE_IOCHRDY	L:S::600 MIL		10 MIL SPACING		(200)		100.0 MHZ
	UIDE_INTRQ	L:S::400 MIL				(200)		100.0 MHZ
	HD_DATA<15..0>	L:S:5000:6500	7			(200)		100 MHZ
	HD_ADDR<2..0>	L:S:5000:6500	7			(200)		100 MHZ
	HD_RESET_L	L:S:4000 MIL:6000 MIL	4		(200)	TOTAL UIDE+HD SKEW <500MIL		100.0 MHZ
	HD_DIOW_L	L:S:3000 MIL:5200 MIL	4			(200)		100.0 MHZ
	HD_DIOR_L	L:S:6100 MIL:6150 MIL	4	10 MIL SPACING		(200)		100.0 MHZ
	HD_DMACK_L	L:S:4500 MIL:6000 MIL	4			(200)		100.0 MHZ
	HD_CS0_L	L:S:3000 MIL:6000 MIL	4			(200)		100.0 MHZ
	HD_CS1_L	L:S:3000 MIL:6000 MIL	4			(200)		100.0 MHZ
	HD_DMARQ	L:S:4500 MIL:6000 MIL	4			(200)		100.0 MHZ
	HD_IOCHRDY	L:S:6200 MIL:6300 MIL	4	10 MIL SPACING		(200)		100.0 MHZ
	HD_INTRQ	L:S:3000 MIL:5000 MIL	4					100.0 MHZ
EIDE INTREPID	EIDE_DATA<15..0>	L:S::850						33 MHZ
	EIDE_ADDR<2..0>	L:S::850						33 MHZ
	EIDE_CS0_L	L:S::850 MIL						33.00 MHZ
	EIDE_CS1_L	L:S::850 MIL						33.00 MHZ
	EIDE_RD_L	L:S::500 MIL						33.00 MHZ
	EIDE_WR_L	L:S::500 MIL						33.00 MHZ
	EIDE_IOCHRDY	L:S::500 MIL						33.00 MHZ
	EIDE_INT	L:S::500 MIL						33.00 MHZ
	EIDE_RST_L	L:S::500 MIL						33.00 MHZ
	EIDE_DMACK_L	L:S::500 MIL						33.00 MHZ
	EIDE_DMARQ	L:S::500 MIL						33.00 MHZ
OPTICAL	EIDE_OPTICAL_DATA<15..0>	L:S:4000:6000						33 MHZ
	EIDE_OPTICAL_ADDR<2..0>	L:S:4000:6000						33 MHZ
	EIDE_OPTICAL_CS0_L	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_CS1_L	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_READ_L	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_WR_L	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_IOCHRDY	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_INT	L:S:5000 MIL:7000 MIL						33.00 MHZ
	EIDE_OPTICAL_RST_L	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_DMAACK_L	L:S:4500 MIL:6500 MIL						33.00 MHZ
	EIDE_OPTICAL_DMA_RQ	L:S:4500 MIL:6500 MIL						33.00 MHZ
ETHERNET MII	ENET_LINK_RXD<7..0>	L:S:8000:9000	7	(400)		(400)		
	ENET_RX_DV	L:S:8000 MIL:9000 MIL						
	ENET_RX_ER	L:S:8000 MIL:9000 MIL						
	ENET_PHY_TXD<7..0>	L:S:8000:9000	7	(400)		(400)		
	ENET_LINK_TXD<7..0>	L:S::600						
	ENET_PHY_TX_ER	L:S:8000 MIL:9000 MIL	4					
	ENET_LINK_TX_ER	L:S::400 MIL						
	ENET_PHY_TX_EN	L:S:8000 MIL:9000 MIL	4					
	ENET_LINK_TX_EN	L:S::400 MIL						
	ENET_MDIO	L:S:8000 MIL:9000 MIL						
	ENET_MDC	L:S:8000 MIL:9000 MIL						
	ENET_COL	L:S:8000 MIL:9000 MIL						
	ENET_CRS	L:S:8000 MIL:9000 MIL						
FIREWIRE MII	FW_LINK_DATA<7..0>	L:S:2700:3500	7	(400)		(400)		
	FW_PHY_DATA<7..0>	L:S:4700:5500	7	(400)		(400)		
	FW_LINK_CNTL<1..0>	L:S:9000:10000						
	FW_PHY_CNTL<1..0>	L:S::300						
	FW_LINK_LREQ	L:S::300 MIL						
	FW_PHY_LREQ	L:S:8500 MIL:9500 MIL						
	FW_PINT	L:S:8500 MIL:9500 MIL						

PRIORITY: 4
PRIMARY LAYERS: 9
SECONDARY LAYERS: 4,7
GOAL: MINIMIZE TH VIAS

PRIORITY: 7
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9

PRIORITY: 6
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9

PRIORITY: 8
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9

PRIORITY: 5
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9

PRIORITY: 5
PRIMARY LAYERS: 4,7
SECONDARY LAYERS: 2,9

Differential Signals

GROUP	SIG_NAME	DIFFERENTIAL_PAIR	RELATIVE_PROPAGATION_DELAY	MAX_EXPOSED_LENGTH	NET_SPACING_TYPE	MAX_VIAS
FIREWIRE Zo = 110	FW_TPI0N	FW_TPI0	FW_TPI0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPI0P	FW_TPI0	FW_TPI0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPO0N	FW_TPO0	FW_TPO0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPO0P	FW_TPO0	FW_TPO0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPBI0N	FW_TPBI0	FW_TPBI0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPBI0P	FW_TPBI0	FW_TPBI0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPAO0N	FW_TPAO0	FW_TPAO0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPAO0P	FW_TPAO0	FW_TPAO0:G:L:S:0 MIL:5 MIL	500.0000	110 OHM SPACING	
	FW_TPA1N	FW_TPA1	FW_TPA1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPA1P	FW_TPA1	FW_TPA1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPB1N	FW_TPB1	FW_TPB1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPB1P	FW_TPB1	FW_TPB1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPI1N	FW_TPI1	FW_TPI1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPI1P	FW_TPI1	FW_TPI1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPO1N	FW_TPO1	FW_TPO1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
	FW_TPO1P	FW_TPO1	FW_TPO1:G:L:S:0 MIL:4%	500.0000	110 OHM SPACING	
ETHERNET Zo = 100	MDI_P<0>	ENET_MDI0	ENET_MDI0:G:U43.29:J23.1:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_M<0>	ENET_MDI0	ENET_MDI0:G:U43.31:J23.2:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_P<1>	ENET_MDI1	ENET_MDI1:G:U43.33:J23.3:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_M<1>	ENET_MDI1	ENET_MDI1:G:U43.34:J23.4:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_P<2>	ENET_MDI2	ENET_MDI2:G:U43.39:J23.7:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_M<2>	ENET_MDI2	ENET_MDI2:G:U43.41:J23.8:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_P<3>	ENET_MDI3	ENET_MDI3:G:U43.42:J23.9:0 MIL:100 MIL		ENET 11 MIL SPACING	
	MDI_M<3>	ENET_MDI3	ENET_MDI3:G:U43.43:J23.10:0 MIL:100 MIL		ENET 11 MIL SPACING	
LVDS Zo = 100 LOWER	CLKLVDS_LN	CLKLVDS_L	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	4
	CLKLVDS_LP	CLKLVDS_L	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	4
	LVDS_L0N	LVDS_L0	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_L0P	LVDS_L0	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_L1N	LVDS_L1	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_L1P	LVDS_L1	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_L2N	LVDS_L2	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_L2P	LVDS_L2	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
UPPER	CLKLVDS_UN	CLKLVDS_U	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	4
	CLKLVDS_UP	CLKLVDS_U	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	4
	LVDS_U0N	LVDS_U0	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_U0P	LVDS_U0	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_U1N	LVDS_U1	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_U1P	LVDS_U1	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_U2N	LVDS_U2	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
	LVDS_U2P	LVDS_U2	LVDS:G:L:S:0 MIL:110 MIL	500.0000	100 OHM SPACING	
TMDS Zo = 100	TMDS_CLKN	CLKTMDS	TMDS:G:L:S:0 MIL:50 MIL	500.0000	100 OHM SPACING	5
	TMDS_CLKP	CLKTMDS	TMDS:G:L:S:0 MIL:50 MIL	500.0000	100 OHM SPACING	5
	TMDS_DN<0>	TMDS_D0		500.0000	100 OHM SPACING	8
	TMDS_DP<0>	TMDS_D0		500.0000	100 OHM SPACING	8
	TMDS_DN<1>	TMDS_D1		500.0000	100 OHM SPACING	8
	TMDS_DP<1>	TMDS_D1		500.0000	100 OHM SPACING	8
	TMDS_DN<2>	TMDS_D2		500.0000	100 OHM SPACING	8
	TMDS_DP<2>	TMDS_D2		500.0000	100 OHM SPACING	8
	ATI_TMDS_CLKN	ATI_CLKTMDS	ATITMDS:G:L:S:0 MIL:50 MIL	200.0000	100 OHM SPACING	5
	ATI_TMDS_CLKP	ATI_CLKTMDS	ATITMDS:G:L:S:0 MIL:50 MIL	200.0000	100 OHM SPACING	5
	ATI_TMDS_DN<0>	ATI_TMDS_D0		200.0000	100 OHM SPACING	8
	ATI_TMDS_DP<0>	ATI_TMDS_D0		200.0000	100 OHM SPACING	8
	ATI_TMDS_DN<1>	ATI_TMDS_D1		200.0000	100 OHM SPACING	8
	ATI_TMDS_DP<1>	ATI_TMDS_D1		200.0000	100 OHM SPACING	8
	ATI_TMDS_DN<2>	ATI_TMDS_D2		500.0000	100 OHM SPACING	8
	ATI_TMDS_DP<2>	ATI_TMDS_D2		500.0000	100 OHM SPACING	8
USB 1.1 Zo = 90	USB_DEM	USB_DE	USB_DE:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	USB_DEP	USB_DE	USB_DE:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	USB_DFM	USB_DF	USB_DF:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	USB_DFP	USB_DF	USB_DF:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	BT_USB_DM	BT_USB_D	BT_USB:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	BT_USB_DP	BT_USB_D	BT_USB:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	USB_TPAD_N	USB_TPAD_N	TPAD_USB:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
	USB_TPAD_P	USB_TPAD_P	TPAD_USB:G:L:S:0 MIL:200 MIL		5.6 MIL SPACING	
USB 2.0 Zo = 90	NEC_USB_DAM	USB_D1	USB_D1:G:L:S:0 MIL:20 MIL	500.0000	90 OHM SPACING	
	NEC_USB_DAP	USB_D1	USB_D1:G:L:S:0 MIL:20 MIL	500.0000	90 OHM SPACING	
	NEC_USB_DBM	USB_D2	USB_D2:G:L:S:0 MIL:20 MIL	500.0000	90 OHM SPACING	
	NEC_USB_DBP	USB_D2	USB_D2:G:L:S:0 MIL:20 MIL	500.0000	90 OHM SPACING	
THERMOSTAT	THERM1_DM		THERM1:G:L:S:0 MIL:100 MIL			
	THERM1_DP		THERM1:G:L:S:0 MIL:100 MIL			
	THERM2_DM		THERM2:G:L:S:0 MIL:100 MIL			
	THERM2_DP		THERM2:G:L:S:0 MIL:100 MIL			
	REMOVE CONSTRAIN TO AVOID DRC OCCUR					
	1772_CSSN					
	1772_CSSP					
	1772_CSIN					
	1772_CSIP					
	3V_SNSM					
	3V_SNSP					
	5V_SNSM					
	5V_SNSP					
	THERM1_M_DM					
	THERM1_M_DP					
	THERM2_M_DM					
	THERM2_M_DP					
	THERM1_A_DM					
	THERM1_A_DP					
	THERM2_A_DM					
	THERM2_A_DP					

PRIORITY: 3
PRIMARY LAYERS: 4,7 FOR CONTROLLED IMPEDANCE DIFF PAIRS
SECONDARY LAYERS: 2,9 FOR UNCONTROLLED IMPEDANCE DIFF PAIRS

LAYERS 4 OR 7
Er = 4.3 (DIELECTRIC CONSTANT)
W = 3MIL (TRACE WIDTH)
S = 11MIL (TRACE SEPERATION)
H = 16.8MIL (DIST BETW PLANES)
T = 0.6MIL (TRACE THICKNESS)

Zo(diff) = 106.2 OHMS
Zo(single) = 55.4 OHMS

Clear adjacent power plane!
Zo will be lower due to asymmetric stackup.

LAYERS 4 OR 7
Er = 4.3 (DIELECTRIC CONSTANT)
W = 3.1MIL (TRACE WIDTH)
S = 4.9MIL (TRACE SEPERATION)
H = 9.6MIL (DIST BETW PLANES)
T = 0.6MIL (TRACE THICKNESS)

Zo(diff) = 94 OHMS
Zo(single) = 50 OHMS

LAYERS 4 OR 7
Er = 4.3 (DIELECTRIC CONSTANT)
W = 3.9MIL (TRACE WIDTH)
S = 5.6MIL (TRACE SEPERATION)
H = 9.6MIL (DIST BETW PLANES)
T = 0.6MIL (TRACE THICKNESS)

Zo(diff) = 89.8 OHMS
Zo(single) = 46.6 OHMS

LAYERS 2 OR 9

SIGNAL CONSTRAINTS - PAGE 2

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 39 OF 46	

POWER NET CONSTRAINTS

GROUP	SIG_NAME	VOLTAGE	MIN_LINE_WIDTH	MIN_NECK_WIDTH	
MAIN/SLEEP	+24V_PBUS	VOLTAGE=24V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	+BATT	VOLTAGE=12.8V	MIN_LINE_WIDTH=10MIL	MIN_NECK_WIDTH=25MIL	
	+PBUS	VOLTAGE=12.8V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	+5V_MAIN	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	+5V_SLEEP	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	+3V_MAIN	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	24 41
	+3V_SLEEP	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=6	41
	+3V_PMU	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	+2_5V_MAIN	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	+2_5V_SLEEP	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+1_8V_MAIN	VOLTAGE=1.8V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=6	41
	+1_8V_SLEEP	VOLTAGE=1.8V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+1_5V_MAIN	VOLTAGE=1.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+1_5V_SLEEP	VOLTAGE=1.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+1_5V_LDO	VOLTAGE=1.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+1_5V_SLEEP_VIN	VOLTAGE=1.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
ADAPTER	+ADAPTER	VOLTAGE=24V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	32 33 41
	I486 +ADAPTER_SW	VOLTAGE=24V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	32 40
	+ADAPTER_SW	VOLTAGE=24V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	32 40
	+ADAPTER_SENSE	VOLTAGE=24V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	32
BATTERY CHARGER	+BATT_POS	VOLTAGE=16.8V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	32 41
	BATT_NEG	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	32 41
	1772_DCIN	VOLTAGE=24V	MIN_LINE_WIDTH=10		32
	1772_LX	VOLTAGE=12.6V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	32
	+BATT_14V_FUSE	VOLTAGE=12.6V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	32
	+BATT_24V_FUSE	VOLTAGE=12.6V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	32
	+BATT_RSNS	VOLTAGE=12.6V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	32
	+BATT_VSNS	VOLTAGE=12.6V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	32
	1772_LDO	VOLTAGE=5.4V	MIN_LINE_WIDTH=10		32
	1772_DLOV	VOLTAGE=5.4V	MIN_LINE_WIDTH=10		32
	1772_GND	VOLTAGE=0V	MIN_LINE_WIDTH=10		32
PMU	+ADAPTER_ILIM	VOLTAGE=24V	MIN_LINE_WIDTH=10		33
	+ADAPTER_OR_BATT	VOLTAGE=24V	MIN_LINE_WIDTH=10		33
	+4_85V_RAW	VOLTAGE=4.85V	MIN_LINE_WIDTH=10		31 33
	+4_6V_BU	VOLTAGE=4.6V	MIN_LINE_WIDTH=10		33 34
	+4_85V_ESR	VOLTAGE=4.85V	MIN_LINE_WIDTH=10		33
	+3V_PMU_ESR	VOLTAGE=3.3V	MIN_LINE_WIDTH=10		33
	+3V_PMU_AVCC	VOLTAGE=3.3V	MIN_LINE_WIDTH=10		27 31
MISC HD	+5V_HD_SLEEP	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	26 34
	+HD_LOGIC_SLEEP	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	26
TRACKPAD	+5V_TPAD_SLEEP	VOLTAGE=5V	MIN_LINE_WIDTH=10		41
HALL EFFECT	+3V_HALL_EFFECT	VOLTAGE=3.3V	MIN_LINE_WIDTH=10		24 41
VIDEO	+14V_INV	VOLTAGE=14V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	23 41
	+5V_INV_UF_SW	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	23
	+5V_INV_SW	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	23 41
	+5V_DDC_SLEEP	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	23 41
	+5V_DDC_SLEEP_UF	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	23
	+3V_LCD	VOLTAGE=3.3V	MIN_LINE_WIDTH=12	MIN_NECK_WIDTH=10	23 41
	+3V_LCD_SW	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	23
	GPU_TV_GND1	VOLTAGE=0V	MIN_LINE_WIDTH=25		23
	GPU_TV_GND2	VOLTAGE=0V	MIN_LINE_WIDTH=25		23
	TV_GND1	VOLTAGE=0V	MIN_LINE_WIDTH=25		23 41
	TV_GND2	VOLTAGE=0V	MIN_LINE_WIDTH=25		23 41
AUDIO	I435 +5V_MAIN_AUD	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	27 34
	I435 +3V_MAIN_AUD	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	27 34
	I435 AUD_GND	VOLTAGE=0V	MIN_LINE_WIDTH=50		27
FAN	I438 +FAN_PWR	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	27 41
	FAN1_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
	FAN2_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41

I/O AREA
INVERTER
TRACKPAD
LVDS

CHGND1	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=6	IN
CHGND2	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=12	IN
CHGND3	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=12	IN
CHGND4	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=12	IN

ENET_CTAP_CHGND VOLTAGE=0V MIN_LINE_WIDTH=25 MIN_NECK_WIDTH=12

GROUP	SIG_NAME	VOLTAGE	MIN_LINE_WIDTH	MIN_NECK_WIDTH	
CPU	CPU_VCORE_SLEEP	VOLTAGE=1.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5 6 35 41
	CPU_AVDD	VOLTAGE=1.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5
	MAXBUS_SLEEP	VOLTAGE=1.8V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5 6 7 8 15 16 35
	I486 CPU_AVDD_VIN	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5
	I486 CPU_AVDD_VOUT	VOLTAGE=1.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5
DDR RAM	DDR_VREF	VOLTAGE=1.25V	MIN_LINE_WIDTH=10		11
INTREPID	I434 +2_5V_INTREPID	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	9 10 15 16
	+3V_INTREPID_USB	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	14
PLLS	+1_5V_INTREPID_PLL	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	8 12 14
	+1_5V_INTREPID_PLL1	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=6	14
	+1_5V_INTREPID_PLL2	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=6	14
	+1_5V_INTREPID_PLL3	VOLTAGE=1.5V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=6	14
	+1_5V_INTREPID_PLL4	VOLTAGE=1.5V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=6	14
	+1_5V_INTREPID_PLL5	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=6	12
	+1_5V_INTREPID_PLL6	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=6	12
	+1_5V_INTREPID_PLL7	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=6	8
	+1_5V_INTREPID_PLL8	VOLTAGE=1.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=6	14
REFERENCE	INT_MEM_VREF	VOLTAGE=1.25V	MIN_LINE_WIDTH=10		9
	INT_AGP_VREF	VOLTAGE=1.25V	MIN_LINE_WIDTH=10		12 19
	INT_MEM_REF_H	VOLTAGE=0V	MIN_LINE_WIDTH=10		9
	VIDE_REF	VOLTAGE=0V	MIN_LINE_WIDTH=8		13
AIRPORT	+3V_AIRPORT	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	41
CARDBUS	I486 +3V_SLEEP_PCCARD	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	18
	+VCC_CBUS_SW	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	18
	+VPP_CBUS_SW	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	18
ATI M11	GPU_VCORE	VOLTAGE=1.2V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	19 21 41
	+3V_GPU	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	12 19 21 22
	+3V_GPU_FLT	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	22
	+2_5V_GPU	VOLTAGE=2.5V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	22
	GPU_MEM_IO	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	19 22
	GPU_MEM_IO_FLT	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	22
	+2_5V_GPU_MEMCORE	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	22
	+1_8V_GPU	VOLTAGE=1.8V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	19 20 21 22
	+1_5V_AGP	VOLTAGE=1.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	12 15 16 19 21 22
	+2_5V_GPU_PNLIO	VOLTAGE=2.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	22
	+1_8V_ATI_PVDD	VOLTAGE=1.8V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21 22
	+1_5V_AGP_GPU	VOLTAGE=1.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	22
	+1_5V_GPU_VDD15	VOLTAGE=1.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21
	+1_8V_GPU_PLL	VOLTAGE=1.8V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
	+1_8V_GPU_VDDDI	VOLTAGE=1.8V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
	GPU_VCORE_VDDCI	VOLTAGE=1.2V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	19
	+2_5V_GPU_A2VDD	VOLTAGE=2.5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
	+1_8V_GPU_AVDD	VOLTAGE=1.8V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
	+1_8V_GPU_PNLPLL	VOLTAGE=1.8V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
	+1_8V_GPU_PNLIO	VOLTAGE=1.8V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
	+2_5V_GPU_MCLK	VOLTAGE=2.5V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	22
	+1_8V_GPU_AVDDQ	VOLTAGE=1.8V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	22
	+1_8V_GPU_MEMPLL	VOLTAGE=1.8V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	22
	+3V_ATI_OSC_SLEEP	VOLTAGE=3.3V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	19
	+3V_ATI_SS	VOLTAGE=3.3V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	19
	I446 +GPU_VDD15_UF	VOLTAGE=1.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21
	I434 +2_5V_SLEEP_NECK1	VOLTAGE=2.5V	MIN_LINE_WIDTH=10		21
	I446 +3V_SLEEP_NECK	VOLTAGE=3V	MIN_LINE_WIDTH=10		36
	I446 +1_5V_AGP_NECK	VOLTAGE=1.5V	MIN_LINE_WIDTH=10		21
	I456 +1_8V_PVDD_NECK	VOLTAGE=1.8V	MIN_LINE_WIDTH=10		21
	I456 GPU_VCORE_NECK	VOLTAGE=1.2V	MIN_LINE_WIDTH=10		21
	I456 +GPU_VDD15_NECK	VOLTAGE=1.5V	MIN_LINE_WIDTH=10		21
	I456 +2_5V_SLEEP_NECK2	VOLTAGE=2.5V	MIN_LINE_WIDTH=10		36
	I456 +1_8V_SLEEP_NECK	VOLTAGE=1.8V	MIN_LINE_WIDTH=10		36
	I456 +1_5V_SLEEP_NECK	VOLTAGE=1.5V	MIN_LINE_WIDTH=10		36
	I456 +1_8V_ATI_TPVDD	VOLTAGE=1.8V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	22
	I464 +1_8V_GPU_TP_PLL	VOLTAGE=1.8V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	22
ETHERNET 88E1111 NEC USB2.0	+2_5V_MARVELL	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	28
	+2_5V_MARVELL_AVDD	VOLTAGE=2.5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	28
	+1_0V_MARVELL	VOLTAGE=1.0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	28
	LTC3405_SW	VOLTAGE=1.0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	28
	+3V_NEC_VDD	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	17
	I411 NEC_AVDD	VOLTAGE=3.3V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	17
FW	I432 LM2594_IN	VOLTAGE=33V	MIN_LINE_WIDTH=40	MIN_NECK_WIDTH=12	29
	I412 +FW_PBUS	VOLTAGE=12.8V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30
	+FW_SW	VOLTAGE=12.8V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30
	I446 +FW_AMP_SENSE	VOLTAGE=12.8V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	
	+FW_PWR_OR	VOLTAGE=33V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	29 30
	I410 +FW_PWR1	VOLTAGE=33V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30
	+FW_VP0	VOLTAGE=33V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30 41
	+FW_VP1	VOLTAGE=33V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30 41
	+3V_FW	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29 30
	+3V_FW_UF	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+3V_FW_AVDD_PORT2	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+3V_FW_AVDD_PORT1	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+3V_FW_AVDD_PORT0	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+3V_FW_AVDD	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_DVDD	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_DVDD_RX0	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_DVDD_TX0	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_DVDD_PORT1	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_PLLVDD	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_PLL400VDD	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	+1_95V_FW_PLL500VDD	VOLTAGE=1.95V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	29
	FW_VGND0	VOLTAGE=0V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30
	I410 FW_VGND1	VOLTAGE=0V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	30
	I456 FW_VDD_ON	VOLTAGE=12.8V	MIN_LINE_WIDTH=100	MIN_NECK_WIDTH=12	

GROUP	SIG_NAME	VOLTAGE	MIN_LINE_WIDTH	MIN_NECK_WIDTH	
LTC1625 14V SWITCHER	1625_VIN	VOLTAGE=24V	MIN_LINE_WIDTH=10		33
	1625_VSW	VOLTAGE=14V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	33
	+PBUS_JUMPER	VOLTAGE=14V	MIN_LINE_WIDTH=10		33
	1625_EXTVCC	VOLTAGE=5V	MIN_LINE_WIDTH=10		33
	1625_INTVCC	VOLTAGE=5V	MIN_LINE_WIDTH=10		33
	1625_SGND	VOLTAGE=0V	MIN_LINE_WIDTH=10		33
	1V20_REF	VOLTAGE=1.2V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	32 33
LTC3707 5V SWITCHER	3707_INTVCC	VOLTAGE=5V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	34
	5V_SW	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	34
	5V_RSNS	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	34
	+5V_MAIN_JUMPER	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	34
3V SWITCHER	3V_SW	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	34
	3V_RSNS	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	34
	+3V_MAIN_JUMPER	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	34
	3707_SGND	VOLTAGE=0V	MIN_LINE_WIDTH=10		34
MAX1715 2.5V SWITCHER	2_5V_LX	VOLTAGE=2.5V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	36
	2_5V_LX_F	VOLTAGE=2.5V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	36
	2_5V_BST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	36
	2_5V_BOOST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	36
	2_5V_DH	VOLTAGE=2.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	36
	2_5V_DL	VOLTAGE=2.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	36
1.65V SWITCHER	1_5V_FB	VOLTAGE=1.5V	MIN_LINE_WIDTH=8		36
	1_5V_LX	VOLTAGE=1.5V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	36
	1_5V_LX_F	VOLTAGE=1.5V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	36
	1_5V_BST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	36
	1_5V_BOOST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	36
	1_5V_DH	VOLTAGE=1.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	36
	1_5V_DL	VOLTAGE=1.5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	36
CONTROL	1_5V_ILIM		MIN_LINE_WIDTH=8		36
	2_5V_ILIM		MIN_LINE_WIDTH=8		36
	MAX1715_TON		MIN_LINE_WIDTH=8		36
	MAX1715_SKIP		MIN_LINE_WIDTH=8		36
	MAX1715_REF	VOLTAGE=2.0V	MIN_LINE_WIDTH=8		36
	MAX1715_VCC	VOLTAGE=5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	36
	MAX1715_GND	VOLTAGE=0V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	36
MAX1717	VCORE_VCC	VOLTAGE=5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	35
	VCORE_LX	VOLTAGE=1.4V	MIN_LINE_WIDTH=200	MIN_NECK_WIDTH=10	35
	VCORE_DH		MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	35
	VCORE_DL		MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	35
	VCORE_BOOST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	35
	VCORE_BST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	35
	VCORE_ILIM		MIN_LINE_WIDTH=8		35
	VCORE_REF		MIN_LINE_WIDTH=8		35
	VCORE_TON	VOLTAGE=5V	MIN_LINE_WIDTH=8		35
	VCORE_CC		MIN_LINE_WIDTH=8		35
	VCORE_FB	VOLTAGE=1.4V	MIN_LINE_WIDTH=8		35 41
	VCORE_TIME		MIN_LINE_WIDTH=8		35
	VCORE_VGATE		MIN_LINE_WIDTH=8		14 35
	VCORE_GND	VOLTAGE=0V	MIN_LINE_WIDTH=30		35
	VCORE_GNDSNS	VOLTAGE=0V	MIN_LINE_WIDTH=8		35
	VCORE_SNS	VOLTAGE=1.4V	MIN_LINE_WIDTH=8		35
	VCORE_GNDDIV	VOLTAGE=0V	MIN_LINE_WIDTH=8		35
	I434 VCORE_GNDA	VOLTAGE=0V	MIN_LINE_WIDTH=10		35
LTC1778	1778_VIN	VOLTAGE=14V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21
	1778_VCC	VOLTAGE=5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21
	1778_GND	VOLTAGE=0V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	21
	1778_BST	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	21
	1778_BST_RC	VOLTAGE=5V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10	21
	1778_TG		MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21
	1778_BG		MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	21
	GPU_VCORE_SW	VOLTAGE=1.2V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	21
	GPU_VCORE_SW_F	VOLTAGE=1.2V	MIN_LINE_WIDTH=50	MIN_NECK_WIDTH=10	21
	1778_ION		MIN_LINE_WIDTH=8		21
	1778_ITH		MIN_LINE_WIDTH=8		21
	1778_ITH_RC		MIN_LINE_WIDTH=8		21
	1778_VFB		MIN_LINE_WIDTH=8		21 41
	1778_FCB		MIN_LINE_WIDTH=8		21
	1778_VRNG		MIN_LINE_WIDTH=8		21
LTC3411	LTC3411_VCC	VOLTAGE=3.3V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	36
	LTC3411_GND	VOLTAGE=0V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	36
	1_8V_SW	VOLTAGE=1.8V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	36
	1_8V_SW_F	VOLTAGE=1.8V	MIN_LINE_WIDTH=30	MIN_NECK_WIDTH=10	36
	1_8V_VFB		MIN_LINE_WIDTH=8		36
	LTC3411_ITH_RC		MIN_LINE_WIDTH=8		36
	LTC3411_ITH		MIN_LINE_WIDTH=8		36
	LTC3411_SYNC		MIN_LINE_WIDTH=8		36
	LTC3411_SHDN		MIN_LINE_WIDTH=8		36
LTC1962 INT PLLS	LTC1962_INT_VIN		MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10	14
CY28512D LMU CONN	I436 +3V_MAIN_SSCG	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	I436 +3V_MAIN_LMU	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	24
OPT DRIVER	I436 +5V_SLEEP_OPT	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	26

SIGNAL CONSTRAINTS - PAGE 3

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B

SCALE	SHT	OF
NONE	40	46

FUNCTIONAL TEST POINTS

PROBES ARE ON BOTTOM SIDE. MINIMUM PAD/HOLE SIZE IS 25 MIL.
FUNC TEST IS ONLY PROPERTY USED BY THE TOOLS. FUNC_QTY IS FOR REFERENCE AND LISTS THE NUMBER OF TEST POINTS ON THAT NET AND WITHIN THAT GROUP/CONNECTOR.
FUNC_DIST IS SIMILARLY USED TO DEFINE MAXIMUM DISTANCE FROM A CONNECTOR.

GROUP		SIG_NAME	FUNC_TEST	FUNC_QTY	FUNC_DIST	
SCAN/TEST	I2	JTAG_ASIC_TMS	TRUE			13 28
	I3	JTAG_ASIC_TDI	TRUE			13
	I1	JTAG_ASIC_TDO_TP	TRUE			28
	I4	JTAG_ASIC_TCK	TRUE			13 28
	I6	JTAG_ASIC_TRST_L	TRUE			13 28
	I5	CPU_CHKSTP_OUT_L	TRUE			5
	I7	CPU_SRESET_L	TRUE			5
	I9	CPU_HRESET_L	TRUE			5 6 7
	I8	JTAG_CPU_TMS	TRUE			5 6
	I10	JTAG_CPU_TDI	TRUE			5 6
	I12	JTAG_CPU_TDO_TP	TRUE			5
	I11	JTAG_CPU_TCK	TRUE			5 6
	I13	JTAG_CPU_TRST_L	TRUE			5 6
	I18	INT_JTAG_TEI	TRUE			13
	I20	INT_TST_MONIN_PD	TRUE			13
	I19	INT_TST_MONOUT_TP	TRUE			13
	I21	INT_TST_PLLEN_PD	TRUE			13
INT I2C	I15	INT_I2C_CLK0	TRUE			6 11 13 24
	I14	INT_I2C_DATA0	TRUE			6 11 13 24
	I16	INT_I2C_CLK1	TRUE			13 14 24 25 27
	I17	INT_I2C_DATA1	TRUE			13 14 24 25 27
PWR/GND	I21	+PBUS	TRUE			40
	I216	+24V_PBUS	TRUE			40
	I25	GPU_VCORE	TRUE			19 21 40
	I24	1778_VFB	TRUE			21 40
	I27	CPU_VCORE_SLEEP	TRUE			5 6 35 40
	I26	VCORE_FB	TRUE			35 40
	I23	+1_8V_MAIN	TRUE			40
	I218	+2_5V_MAIN	TRUE			40
	I219	+5V_MAIN	TRUE	2		40 41
	I220	+5V_SLEEP	TRUE	2		40 41
	I221	+3V_MAIN	TRUE	4		24 40
			TRUE		1000	IN
	I222	+3V_PMU	TRUE			40
CARDBUS DVI	I136	CBUS_DET_1_L	TRUE		2000	18
	I135	CBUS_DET_2_L	TRUE		2000	18
	I140	TMDS_CONN_CLKN	TRUE		1000	23 38
	I139	TMDS_CONN_CLKP	TRUE		1000	23 38
	I142	VGA_R	TRUE		1000	23
	I141	VGA_G	TRUE		1000	23
	I144	VGA_B	TRUE		1000	23
	I143	VGA_HSYNC	TRUE		1000	23
	I146	VGA_VSYNC	TRUE		1000	23
	I145	DVI_DDC_CLK_UF	TRUE		1000	23
	I147	DVI_DDC_DATA_UF	TRUE		1000	23
	I148	DVI_HPD_UF	TRUE		1000	23
	I149	+5V_DDC_SLEEP	TRUE		2000	23 40
			TRUE	2	2000	IN
			TRUE	6	1000	IN
CHGND1 LVDS	I152	LVDS_L0N			1000	21 23 39
	I151	LVDS_L0P			1000	21 23 39
	I153	LVDS_L1N			1000	21 23 39
	I155	LVDS_L1P			1000	21 23 39
	I154	LVDS_L2N			1000	21 23 39
	I157	LVDS_L2P			1000	21 23 39
	I156	CLKLVDS_LN	TRUE		1000	21 23 39
	I158	CLKLVDS_LP	TRUE		1000	21 23 39
	I159	LVDS_DDC_CLK	TRUE		1000	21 23
	I160	LVDS_DDC_DATA	TRUE		1000	21 23
	I162	+3V_LCD	TRUE	2	2000	23 40
	I223	+3V_SLEEP	TRUE		2000	40 41
			TRUE	2	2000	IN
CHGND4 INVERTER			TRUE	6	1000	IN
	I167	+14V_INV	TRUE		2000	23 40
	I166	+5V_INV_SW	TRUE		2000	23 40
	I168	BRIGHT_PWM	TRUE		2000	23
	I224	INV_GND	TRUE		2000	23
			TRUE		1000	IN
S-VIDEO	I170	TV_C	TRUE		2000	23
	I172	TV_Y	TRUE		2000	23
	I171	TV_COMP	TRUE		2000	23
	I173	TV_GND1	TRUE		2000	23 40
	I174	TV_GND2	TRUE		2000	23 40
LIO	I176	INT_I2S0_SND_TO_DAC	TRUE		1000	14 27
	I175	INT_I2S0_SND_LRCLK	TRUE		1000	14 27
	I178	INT_I2S0_SND_MCLK	TRUE		1000	14 27 37
	I183	INT_I2S0_SND_SCLK	TRUE		1000	14 27
	I182	INT_I2S0_SND_FROM_ADC	TRUE		1000	14 27
	I177	SND_HP_MUTE_L	TRUE		1000	14 27
	I179	SND_AMP_MUTE	TRUE		1000	27
	I184	SND_HW_RESET_L	TRUE		1000	14 27
	I185	SND_HP_SENSE_L	TRUE		1000	14 27
	I186	SND_LIN_SENSE_L	TRUE		1000	14 27
	I181	INT_I2C_CLK2	TRUE		1000	14 27
	I180	INT_I2C_DATA2	TRUE		1000	14 27
	I187	ADAPTER_DET	TRUE		1000	27 31
	I188	CHARGE_LED_L	TRUE		1000	27 31
	I189	NEC_LUSB_OCI_UF	TRUE		1000	17 27
	I190	NEC_LUSB_PPON	TRUE		1000	17 27
	I222	+5V_MAIN	TRUE	2	2000	40 41
	I223	+5V_SLEEP	TRUE	2	3000	40 41
	I221	+3V_SLEEP	TRUE		2000	40 41

GROUP		SIG_NAME	FUNC_TEST	FUNC_QTY	FUNC_DIST	
USB	I194	NEC_USB_DAM	TRUE			17 27 39
	I195	NEC_USB_DAP	TRUE			17 27 39
	I196	NEC_USB_DBM	TRUE			17 27 39
	I197	NEC_USB_DBP	TRUE			17 27 39
	I198	BT_USB_DM	TRUE			14 27 39
	I199	BT_USB_DP	TRUE			14 27 39
	I167	USB_TPAD_N	TRUE			14 24 39
	I168	USB_TPAD_P	TRUE			14 24 39
RT. USB	I192	NEC_RUSB_PPON	TRUE			17 27
	I191	NEC_RUSB_OCI_UF	TRUE			17 27
WIRELESS	I165	PCI_AD<0..31>	TRUE		1000	9 12 17 18 26 39
	I166	PCI_FRAME_L	TRUE		1000	12 17 18 26 39
	I169	PCI_TRDY_L	TRUE		1000	12 17 18 26 39
	I170	PCI_IRDY_L	TRUE		1000	12 17 18 26 39
	I193	PCI_DEVSEL_L	TRUE		1000	12 17 18 26 39
	I163	PCI_STOP_L	TRUE		1000	12 17 18 26 39
	I164	PCI_PAR	TRUE		1000	12 17 18 26 39
	I161	AIRPORT_PCI_REQ_L	TRUE		1000	12 26
	I162	AIRPORT_PCI_GNT_L	TRUE		1000	12 26
	I163	AIRPORT_PCI_INT_L	TRUE		1000	14 26
	I171	MAIN_RESET_L	TRUE		1000	14 17 18 19 20 26 31
	I172	CLK33M_AIRPORT	TRUE		1000	12 26 37
	I173	PMU_PME_L	TRUE		1000	14 17 26 31
	I174	ROM_ONBOARD_CS_L	TRUE		1000	9
	I175	ROM_OE_L	TRUE		1000	9 12
	I176	ROM_CS_L	TRUE		1000	9 12
	I177	ROM_RW_L	TRUE		1000	9 12
	I227	RF_DISABLE_L	TRUE		1000	26
	I228	AIRPORT_CLKRUN_L	TRUE		1000	26
	I229	+3V_AIRPORT	TRUE	4	2000	40
	I224		TRUE	6	1000	IN
OPTICAL	I126	EIDE_OPTICAL_DATA<0..15>	TRUE		2000	26 39
	I127	EIDE_OPTICAL_DMA_RQ	TRUE		2000	26 39
	I128	EIDE_OPTICAL_READ_L	TRUE		2000	26 39
	I129	EIDE_OPTICAL_DMAACK_L	TRUE		2000	26 39
	I130	EIDE_OPTICAL_ADDR<0..2>	TRUE		2000	26 39
	I131	EIDE_OPTICAL_CS0_L	TRUE		2000	26 39
	I132	EIDE_OPTICAL_CS1_L	TRUE		2000	26 39
	I133	EIDE_OPTICAL_RST_L	TRUE		2000	26 39
	I134	EIDE_OPTICAL_WR_L	TRUE		2000	26 39
	I135	EIDE_OPTICAL_IOCHRDY	TRUE		2000	26 39
	I136	EIDE_OPTICAL_INT	TRUE		2000	26 39
TRACKPAD	I137	+5V_TPAD_SLEEP	TRUE		3000	40
	I138	TPAD_F_TXD	TRUE		3000	
	I139	TPAD_F_RXD	TRUE		3000	
	I138	SOFT_PWR_ON_L	TRUE		3000	23 24 31 35
MODEM/ SERIAL	I154	COMM_RESET_L	TRUE		4000	14 27
	I150	COMM_SHUTDOWN	TRUE		4000	
	I142	COMM_RING_DET_L	TRUE		4000	14 27 31
	I143	COMM_TXD_L	TRUE		4000	14 27
	I144	COMM_TRXC	TRUE		4000	14 27
	I145	COMM_GPIO_L	TRUE		4000	14 27
	I146	COMM_DTR_L	TRUE		4000	14 27
	I147	COMM_RTS_L	TRUE		4000	14 27
	I148	COMM_RXD	TRUE		4000	14 27
KEYBOARD	I149	KBD_ID	TRUE		3000	24 31
	I155	KBD_INTL	TRUE		3000	
	I156	KBD_JIS	TRUE		3000	
	I152	KBD_CAPSLOCK_LED	TRUE		3000	
	I153	KBD_NUMLOCK_LED	TRUE		3000	
	I154	KBD_FUNCTION_L			3000	24 31
	I155	KBD_COMMAND_L			3000	24 31
	I157	KBD_OPTION_L			3000	24 31
	I156	KBD_CONTROL_L			3000	24 31
	I158	KBD_SHIFT_L			3000	24 31
	I159	KBD_X<0..9>			3000	24 31
	I160	KBD_Y<0..7>	TRUE		3000	
BATTERY	I165	+BATT_POS	TRUE	(100 MIL PROBE PREFERRED)	1000	32 40
	I167	BATT_NEG	TRUE	(100 MIL PROBE PREFERRED)	1000	32 40
	I162	BATT_CLK	TRUE		1000	32
	I163	BATT_DATA	TRUE		1000	32
	I166	PMU_BATT_DET_L	TRUE		1000	31 32
FANS	I167	+FAN_PWR	TRUE		3000	27 40
	I168	FAN1_TACH	TRUE		3000	27
	I169	FAN2_TACH	TRUE		3000	27
	I170	FAN1_GND	TRUE		3000	40
	I171	FAN2_GND	TRUE		3000	40
ETHERNET	I172	MDI_P<0..3>	TRUE		1000	28 39
	I173	MDI_M<0..3>	TRUE		1000	28 39
FIREWIRE	I197	FW_TPO0P	TRUE		1000	29 30 39
	I196	FW_TPO0N	TRUE		1000	29 30 39
	I195	FW_TPO0R	TRUE		1000	30
	I177	FW_TPI0P	TRUE		1000	29 30 39
	I180	FW_TPI0N	TRUE		1000	29 30 39
	I182	+FW_VP0	TRUE		1000	30 40
	I183	FW_VGND	TRUE		1000	41

GROUP		SIG_NAME	FUNC_TEST	FUNC_QTY	FUNC_DIST	
FIREWIRE (CONT.)	I181	FW_TPO1P	TRUE		1000	30 39
	I185	FW_TPO1N	TRUE		1000	30 39
	I184	FW_TPI1P	TRUE		1000	30 39
	I186	FW_TPI1N	TRUE		1000	30 39
	I187	+FW_VP1	TRUE		1000	30 40
	I188	FW_VGND	TRUE		1000	41
DC PWR IN	I189	+ADAPTER	TRUE	3 (100 MIL PROBE PREFERRED)	1000	32 33 40
LMU/ALS	I295	ST7_SLEEP_LED_H	TRUE			24
	I296	PMU_SLEEP_LED	TRUE			24
	I298	PMU_LID_CLOSED_L	TRUE			24 31
	I297	LMU_DETECT	TRUE			24
			TRUE	6	1000	IN
MISC.				(100 MIL PROBE PREFERRED)		
	I192	SLEEP_LED	TRUE			24
	I193	PMU_KB_RESET_L	TRUE			
	I190	SLEEP	TRUE			24 27 31 34 36
	I191	PMU_CPU_HRESET_L	TRUE			6 31
	I192	BB_RESET_L	TRUE			6
	I224	+3V_PMU_RESET	TRUE			31 35
	I265	MMM_ACC_X_AXIS	TRUE			25
	I266	MMM_ACC_Y_AXIS	TRUE			25
	I267	MMM_ACC_Z_AXIS	TRUE			25
	I268	MMM_ACC_SELFTEST	TRUE			25
	I257	+BATT_ISNS_P	TRUE			25
	I258	+PPBATT_ISNS_N	TRUE			25
	I259	+PWR_SUPERCAP	TRUE			33
		REMOVE CONSTRAIN FOR UNUSED FUNCTIONAL TP				
	I128	+3V_HALL_EFFECT				24 40
	I129	LID_CLOSED_L				24
	I126	TMDS_DN<0..2>				20 23 39
	I246	TMDS_DP<0..2>				20 23 39

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 41 OF 46	

REVISION HISTORY

EVT2 RELEASE

08/13/04 - 1. CHANGE EXT TMDS SWING RESISTORS TO 510 OHM (R869, R876), REMOVE SI_RESET PULL HIGH
2. CHANGE RGB SIGNAL INPEDENCE (R341, R342, R346, R456, R458, R462)
3. ADD 2 RESISTORS (NO STUFF) BETWEEN FAN_PWM AND FAN_PWM_L OF FAN1 AND FAN2
4. CHANGE 2 CAPS (C233, C803) TO IMPROVE FEEDBACK PROTECTION AND PBUS CURRENT LIMIT CIRCUIT
5. MODIFY CPU_VCORE VID AND CPU_VCORE SETTING

08/16/04 - 1. MODIFY CPU_AVDD SETTING
08/20/04 - 1. ADD TRACKPAD POWER +5V_TPAD CONTROL CIRCUIT
09/01/04 - 1. CHANGE ALL FONTS INTO SMALL ONES
09/02/04 - 1. MODIFT CPU_VCORE VID AND CPU_VCORE SEETING AGAIN
2. MODIFY CPU_AVDD SEETING AGAIN
3. CHANGE INT TMDS DAMPING RESISTERS (R760-R767) TO 0 OHM
09/03/04 - 1. ADD MMM CIRCUIT, ARRANGE 2 INTREPID GPIOS FOR MM_FFIRQ_L, MM_SIRQ_L AND PULL UP RESISTORS R801, R802
2. ADD R803 BETWEEN DP6 AND DCDC_IN
3. ADD R804 AND SUPERCAP C692 ON +4_6V_BU
4. CHANGE TRACKPAD CONNECTOR J10 AND PIN OUT

09/06/04 - 1. ADD EMI SOLUTION L12
09/07/04 - 1. CHANGE TRACKPAD CONNECTOR PIN OUT
09/08/04 - 1. ADD BATTERY CURRENT SENSOR CIRCUIT
09/09/04 - 1. ADD EMI SOLUTION R816; ADD MMM RESET CIRCUIT
09/10/04 - 1. MODIFY FIREWIRE PORT0 POWER CIRCUIT
2. ADD NET FROM BATTERY CURRENT SENSOR CIRCUIT TO PMU
09/13/04 - 1. ADD CURRENT LIMITER R821 BETWEEN PMU(U29) AND U33
2. ADD PULL UP AND PULL DOWN RESISTORS FOR MMM SENSOR

DVT RELEASE

09/27/04 - 1. ADD ST MMM SENSOR CIRCUIT
10/14/04 - 2. ADD FIREWIRE POWER PROTECT CIRCUIT
10/15/04 - 3. CHANGE EXT_TMDS TERMINAL RESISTERS AND V SWINING RESISTOR
10/22/04 - 4. CHANGE FAN CONTROLLER FROM ADT7460 TO ADT7467
11/02/04 - 5. CHANGE BBANG IC TO ATTINY2313

PVT RELEASE

12/17/04 - 1. REMOVE ALL OPEN JUMPER
12/17/04 - 2. SCHEMATIC RELEASE FOR PRODUCTION

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 051-6680 | REV. B

SCALE NONE | SHT 42 OF 46

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*** Signal Cross-Reference for the entire design ***

+1_0V_MARVELL    28D2< 40B3>
+1_5V_AGP        12B5< 12D1< 12D4< 15D6< 16C8<
                19C6< 19D6< 21A8< 21B4<> 21D5<>
                22B8< 22D6< 40C3>
+1_5V_AGP_GPU    22C5< 40C3>
+1_5V_AGP_NECK   21B4<> 40B3>
+1_5V_GPU_VDD15  21D3< 40C3>
+1_5V_INTREPID_PLL  8D6< 12D4< 12D8< 14D6<> 40D3>
+1_5V_INTREPID_PLL1  14C3< 40D3>
+1_5V_INTREPID_PLL2  14D3< 40D3>
+1_5V_INTREPID_PLL3  14D3< 40D3>
+1_5V_INTREPID_PLL4  14D3< 40D3>
+1_5V_INTREPID_PLL5  12D3< 40D3>
+1_5V_INTREPID_PLL6  12D6< 40D3>
+1_5V_INTREPID_PLL7  8D5< 40D3>
+1_5V_INTREPID_PLL8  14D3< 40C3>
+1_5V_LDO        40D6>
+1_5V_MAIN       40D6>
+1_5V_SLEEP      40D6>
+1_5V_SLEEP_NECK  36D2<> 40B3>
+1_5V_SLEEP_VIN  40D6>
+1_8V_ATI_PVDD   21C5<> 22B6< 22B6< 22D6<> 40C3>
+1_8V_ATI_TPVDD  22D2<> 40B3>
+1_8V_GPU        19A8< 20A6< 21D7< 22A2< 22A6<
                22B1< 22B6< 22C8< 22D6< 22D8< 40C3>
+1_8V_GPU_AVDD   22D5< 40B3>
+1_8V_GPU_AVDDQ  22D4< 22D7< 40B3>
+1_8V_GPU_DVO    22B2<
+1_8V_GPU_MEMPLL  22B5< 40B3>
+1_8V_GPU_PLL    22D5< 40C3>
+1_8V_GPU_PNLIO  22A5< 40B3>
+1_8V_GPU_PNLPLL  22B5< 40B3>
+1_8V_GPU_TP_PLL  22B5< 22D1< 40B3>
```

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PCI_STOP_L       12A7< 12C7<> 17B7<> 18B7<> 26C5<>
                 39C5> 41C3>
PCI_TRDY_L       12B7< 12C7<> 17B7<> 18A7<> 26C5<>
                 39C5> 41D3>
PLL_STOP_L        7C4<> 7C8<>
PMU_ACK_L        14C2< 31C4<>
PMU_AC_DET       31A5< 31B4<>
PMU_AC_IN        31B4<>
PMU_BATT0_DET_L  31B4<>
PMU_BATT1_DET_L_PU  31B4<> 31D2<
PMU_BATT_DET_L   31A8<> 31B3< 31D2< 32A4<> 41A3>
PMU_BYTE         31B6< 31C7<
PMU_CHARGE_V     31C4<> 32B8<>
PMU_CHRG_BATT_B  31C4<> 32A8<>
PMU_CLK          14C2<> 31C4<>
PMU_CNVSS        31B6< 31C7<
PMU_CPU_HRESET_L  6A2< 6C3<> 31C4<> 41C1>
PMU_CUSTOM_RESET  31A7<> 31B8<
PMU_CUSTOM_RESET_L  31A8<>
PMU_EPM          31C4<> 31D2<
PMU_FROM_INT     14C2<> 31C4<>
PMU_I2C_CLK      31B4<> 31C2<
PMU_I2C_DATA     31B4<> 31C2<
PMU_INT_L        14B5<> 14B7< 31B6<>
PMU_INT_NMI      14B5<> 14B7< 31D4<>
PMU_KB_RESET_L   41C1>
PMU_LID_CLOSED_L  24A1< 24D6<> 31B2< 31C4<> 41D1>
PMU_NMI_BUTTON_L  31C2< 31C4<>
PMU_NMI_L        31C2< 31C4<>
PMU_OOPS         31B2< 31B4<>
PMU_PME_L        14A5<> 17A8< 26D5<> 31B2< 31C4<>
                 41C3>
PMU_POWERUP_OK   31B4<> 31D2<
PMU_POWER_UP_L   30C8<> 31C6<> 31D7< 34B8<
PMU_RFQ_L        14B7< 14C2> 31C4<>
PMU_RESET_BUTTON_L  24A7< 31C4<> 31D2<
PMU_RESET_L      31B6< 31B7>
PMU_SELECT       31C6<>
PMU_SLEEP_LED    24C7<> 24D6<> 41D1>
PMU_SLEEP_LED_L  24C8<> 31C4<>
PMU_SMB_CLK      31B4<> 31C2< 32A3<
PMU_SMB_DATA     31B4<> 31C2< 32A2<
PMU_TO_INT       14C2<> 31C4<>
POWER_UP         30D7<>
POWER_VALID      31B2< 31C4<>
PP3V3_MMM        25C8< 25D5<
PP3V3_MMM_PIC    25C1< 25D5<
PP3V3_SI_AVCC1   20C7< 20D7<
PP3V3_SI_AVCC2   20C5< 20D7<
PP3V3_SI_PVCC1   20C7<
PP3V3_SI_PVCC2   20C5<
PP3V3_SI_VCC1    20C7< 20D8<
PP3V3_SI_VCC2    20C5< 20D7<
PWR_BUTTON_L     24A7< 24B3<>
RAM_ADDR<0>      9B4< 11B3<> 11B6<>
RAM_ADDR<12..0>  37A5>
RAM_ADDR<1>      9B4< 11B5<> 11B8<>
RAM_ADDR<2>      9B4< 11B3<> 11B6<>
RAM_ADDR<3>      9B4< 11B5<> 11B8<>
RAM_ADDR<4>      9B4< 11B3<> 11B6<>
RAM_ADDR<5>      9B4< 11B5<> 11B8<>
RAM_ADDR<6>      9B4< 11B3<> 11B6<>
RAM_ADDR<7>      9B4< 11B5<> 11B8<>
RAM_ADDR<8>      9B4< 11B3<> 11B6<>
RAM_ADDR<9>      9A4< 11B5<> 11B8<>
RAM_ADDR<10>     9A4< 11B5<> 11B8<>
RAM_ADDR<11>     9A4< 11B3<> 11B6<>
RAM_ADDR<12>     9A4< 11B5<> 11B8<>
RAM_BA<0>        9A4< 11B5<> 11B8<>
RAM_BA<1..0>     37A5>
RAM_BA<1>        9A4< 11B3<> 11B6<>
RAM_CAS_L        9A4< 11B3<> 11B6<> 37A5>
RAM_CKE<0>       9A4< 9C4< 11C6<>
RAM_CKE<3..0>    37A5>
RAM_CKE<1>       9A4< 9C4< 11C8<>
RAM_CKE<2>       9A4< 9C4< 11C3<>
RAM_CKE<3>       9A4< 9C4< 11C5<>
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RAM_CS_L<3..0>   37A5>
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RAM_DATA_B<8>    10C8<> 11D5<>
RAM_DATA_B<15..8>  37C5>
RAM_DATA_B<9>    10C8<> 11D5<>
RAM_DATA_B<10>   10C8<> 11D5<>
RAM_DATA_B<11>   10C8<> 11D5<>
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RAM_DQS_A<1>     10C7<> 11D6<> 37C5>
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RAM_DQS_A<3>     10C5<> 11C6<> 37C5>
RAM_DQS_A<4>     10B4<> 11B8<> 37B5>
RAM_DQS_A<5>     10C3<> 11B8<> 37B5>
RAM_DQS_A<6>     10B2<> 11A8<> 37B5>
RAM_DQS_A<7>     10C1<> 11A8<> 37A5>
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RAM_DQS_B<2>     10C6<> 11C5<> 37C5>
RAM_DQS_B<3>     10C6<> 11C5<> 37C5>
RAM_DQS_B<4>     10C4<> 11B5<> 37B5>
RAM_DQS_B<5>     10C4<> 11B5<> 37B5>
RAM_DQS_B<6>     10C2<> 11A5<> 37B5>
RAM_DQS_B<7>     10C2<> 11A5<> 37A5>
RAM_RAS_L        9A4< 11B3<> 11B6<> 37A5>
RAM_WE_L         9A4< 11B5<> 11B8<> 37A5>
RESET_VREF       6C3<>
RF_DISABLE_L     26D6<> 41C3>
ROM_CS_L         9B3< 12A4< 41C3>
ROM_CS_TP_L      9C4< 26E6<>
ROM_OE_L         9B3< 12A4< 41C3>
ROM_OE_TP_L      9B3< 26C5<>
ROM_ONBOARD_CS_L  9B3< 41C3>
ROM_ONBOARD_CS_TP_L  9B3< 26C6<>
ROM_RW_L         9B3< 12A4< 41C3>
ROM_RW_TP_L      9B3< 26C6<>
ROM_WP_L         9B3<
SI_DUAL_MODE     20A8< 20D7<
SI_I2C_CLK       20B4< 20B7< 20D7< 21C5<>
SI_I2S_DATA      20B4<> 20B7<> 20D7< 21C5<>
SI_M_HTPLG       20B7<
SI_RESET_L       20B6< 21C7<>
SI_RESET_L_R     20B4< 20B7< 20D7<
SI_SECONDARY     20A8< 20D5<>
SI_S_HTPLG       20B4<
SI_TMDS_CLKN     20A7< 20C2< 38D1>
SI_TMDS_CLKP     20A7< 20C2< 38D1>
SI_TMDS_DN<0>    20A7< 20B2< 38D1>
SI_TMDS_DN<1>    20A7< 20B2< 38D1>
SI_TMDS_DN<2>    20A7< 20B2< 38D1>
SI_TMDS_DN<3>    20A4< 20B2< 38D1>
SI_TMDS_DN<4>    20A2< 20A4< 38D1>
SI_TMDS_DN<5>    20A2< 20A4< 38D1>
SI_TMDS_DP<0>    20A7< 20B2< 38D1>
SI_TMDS_DP<1>    20A7< 20B2< 38D1>
SI_TMDS_DP<2>    20A7< 20B2< 38D1>
SI_TMDS_DP<3>    20A4< 20B2< 38D1>
SI_TMDS_DP<4>    20A2< 20A4< 38D1>
SI_TMDS_DP<5>    20A2< 20A4< 38C1>
SI_VREF          20A6< 20A8<
SLAVE_SWING      20B4< 20D6<
SLEEP            24D7<> 27D7<> 31B6<> 31D7< 34A4<
                 34A6< 34B3< 34B8<> 36B3< 36C2< 41C1>
SLEEP_LED        24C3<> 41C1>
SLEEP_LED_DGND   24C3<>
SLEEP_LED_I      24D3<
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SND_HP_MUTE_L    14C5<> 27C5<> 41A6>
SND_HP_MUTE_LO   27C6<> 27C7<>
SND_HP_SENSE_L   14B5<> 27C8<> 41A6>
SND_HW_RESET_L   14A8< 14B5<> 27D7<> 41A6>
SND_LIN_SENSE_L  14B5<> 27C8<> 41A6>
SOFTMODEM_FC_RGDT  27D3<
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ST7_SLEEP_LED_H  24C5<> 24C6<> 24D6<> 41D1>
STOP_AGP_L       12D2< 12D4<>
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SYSCLK_CPU_UF    8A5<> 37D1>
SYSCLK_DDRCLK_A0  9D4< 11D8<> 37D1>
SYSCLK_DDRCLK_A0_L  9D4< 11D8<> 37C1>
SYSCLK_DDRCLK_A0_L_UF  9B6<> 9D5< 37D1>
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SYSCLK_DDRCLK_A1  9D4< 11A6<> 37C1>
SYSCLK_DDRCLK_A1_L  9D4< 11A6<> 37C1>
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SYSCLK_DDRCLK_B0_L  9C4< 11D5<> 37C1>
SYSCLK_DDRCLK_B0_L_UF  9B6<> 9C5< 37D1>
SYSCLK_DDRCLK_B0_UF  9B6<> 9D5< 37D1>
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SYSCLK_DDRCLK_B1_L  9D4< 11A3<> 37C1>
SYSCLK_DDRCLK_B1_L_UF  9B6<> 9D5< 37D1>
SYSCLK_DDRCLK_B1_UF  9B6<> 9D5< 37D1>
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TP_MMM_ICSP_PGD  25C3<>
TP_MMM_ICSP_PGM  25C3<>
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TV_GND2          23A6<> 40B6> 41A6>
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VCORE_GNDSNS     35A1<> 35A5< 40B1>
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VGA_VSYNC        23C5<> 23D7< 41B6>
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APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	051-6680	B
SCALE: NONE	SHT 44 OF 46	

*** Part Cross-Reference for the entire design ***

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J4	CON_4RT_WRIB	23
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J7	CON_12	35
J8	CON_2RTSM_125	24
J9	CON_F1ST_S2MT_SM	14
J10	CON_M16ST_D_SMA	24
J12	CON_M50SM_5MM	26
J13	CON_M50SM_5MM	26
J14	CON_F30RT_S2MT_SM	23
J15	CON_F10RT_S2MT_SM	27
J16	CON_3RTSM_125	33
J17	CON_M16ST_D_SMA	27
J18	CON_M4RT_S2MT_SM	27
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J24	CON_F6RT_S4MT_TH1	30
J25	CON_F400RT_DDRDIMM_SM3	11
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J27	CON_M4RT_S_SM	32
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U12	SN74AUC1G04	7
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