

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.

SEEDY

12/07/04

REV	ZONE	ECN	DESCRIPTION OF CHANGE	CK APPD	ENG APPD
04		354713	ENGINEERING RELEASED	DATE	DATE
				12/07/04	?

CSA	PDF	CIRCUIT	BLOCK
1	1	TABLE OF CONTENTS	
2	2	SYSTEM BLOCK DIAGRAM	
3	3	POWER BLOCK DIAGRAM	
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6	6	FUNC TEST	
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8	8	SIGNAL ALIAS	
9	9	2.5V VREG	
10	10	1.2V VREG	
11	11	3.3V/5V PWRON SWITCHING	
12	12	VESTA POWER	
13*	13	SMU	
14	14	CPU LOGIC ANALYZER CONNECTOR	
16	15	FAN 0, 1 AND SYSTEM TEMP SENSOR	
17	16	FAN 2 AND HARD DRIVE TEMP SENSOR	
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21	18	INDICATOR LED / AMBIENT LIGHT SENSOR	
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23	20	SHASTA CORE	
24	21	U3LITE MISC	
25*	22	SHASTA SERIAL	
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27	24	PULSAR CLOCKS	
28	25	U3LITE APPLE PI	
29	26	NEO APPLE PI	
30	27	CPU STRAPS	
31	28	NEO POWER & BYPASS	
32	29	CPU BYPASS	
33	30	CPU VREG	
34	31	CPU VREG	
35	32	CPU VREG OUTPUT CAPS	
36	33	CPU DIODE CONDITIONER	
37	34	U3LITE MEMORY	
38	35	SERIES TERMINATION	
40	36	DIMMS	
44	37	PARALLEL TERMINATION	
45	38	PARALLEL TERMINATION	
46	39	VTT VREG	
48	40	U3LITE AGP	
49	41	GPU AGP	
50	42	GRAPHICS VREGS	

TOP

PROCESSOR

MEMORY

GRAPHICS

CSA	PDF	CIRCUIT	BLOCK
51	43	GPU CORE POWER	
52	44	GPU FRAME BUFFER	
53	45	FRAME BUFFER TERMINATION	
54	46	GRAPHICS DDR SDRAM A	
55	47	GRAPHICS DDR SDRAM B	
56	48	GPU STRAPS	
58	49	GPU DVI & DACS	
59	50	EXT VGA & TMDS	
60	51	U3LITE HYPERTRANSPORT	
62*	52	SHASTA HYPERTRANSPORT	
64	53	HYPERTRANSPORT LA CONNECTORS	
73	54	PCI SERIES TERMINATION	
74*	55	SHASTA PCI	
75*	56	BOOT ROM	
76	57	AIRPORT EXTREME & BLUETOOTH	
77*	58	USB2 PCI	
80*	59	SHASTA DISK	
83	60	DISK CONNECTORS	
84*	61	SHASTA ETHERNET	
86*	62	VESTA ETHERNET PHY	
87	63	ETHERNET CONNECTOR	
88*	64	SHASTA FIREWIRE	
89*	65	VESTA FIREWIRE PHY	
90	66	FIREWIRE CONNECTORS	
91*	67	USB HOST INTERFACE	
92	68	USB DEVICE INTERFACE	
94	69	MODEM CONNECTOR	
95*	70	PCM3052A AUDIO CODEC	
96*	71	LINE IN AMP	
98*	72	LINE OUT AMP	
100*	73	SPEAKER AMP	
101*	74	AUDIO CONNECTORS	
102*	75	AUDIO POWER SUPPLIES	

GRAPHICS

HT

PCI

DISK

ETHERNET

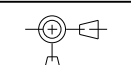
FIREWIRE

USB

MODEM

AUDIO

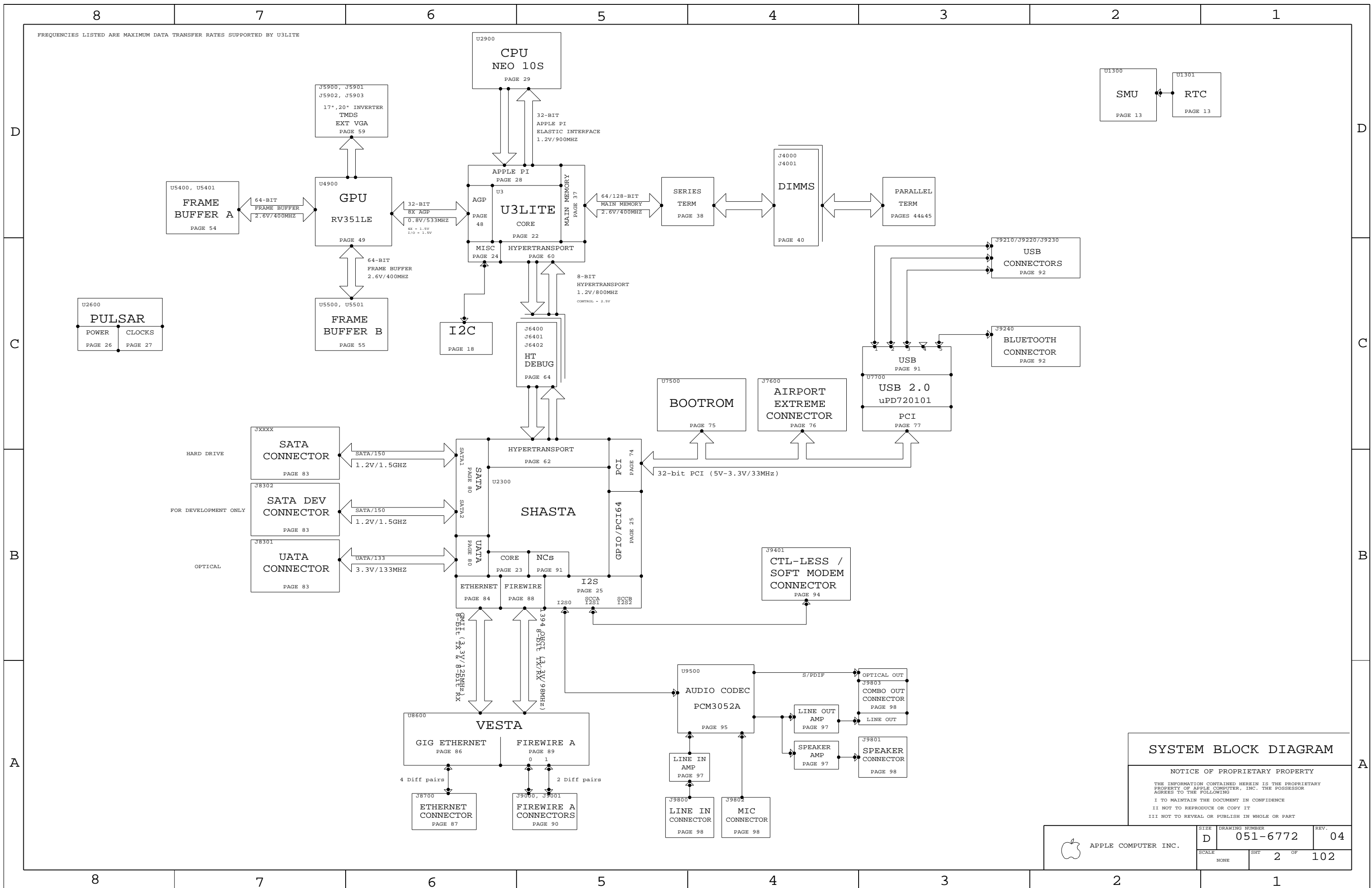
* PAGES WHERE MASTER PAGE IS IN A DIFFERENT SCHEMATIC

DIMENSIONS ARE IN MILLIMETERS		METRIC		Apple Computer Inc.	
xx :	_____	DRAPTER	/	DESIGN CK	/
x.xx :	_____	ENG APPD	/	MFG APPD	/
x.xxx :	_____	QA APPD	/	DESIGNER	/
ANGLES :	_____	RELEASE	/	SCALE	NONE
DO NOT SCALE DRAWING		MATERIAL/FINISH NOTED AS APPLICABLE		SIZE	D
 THIRD ANGLE PROJECTION		DRAWING NUMBER		051-6772	REV. 04
				SHEET 1 OF 102	



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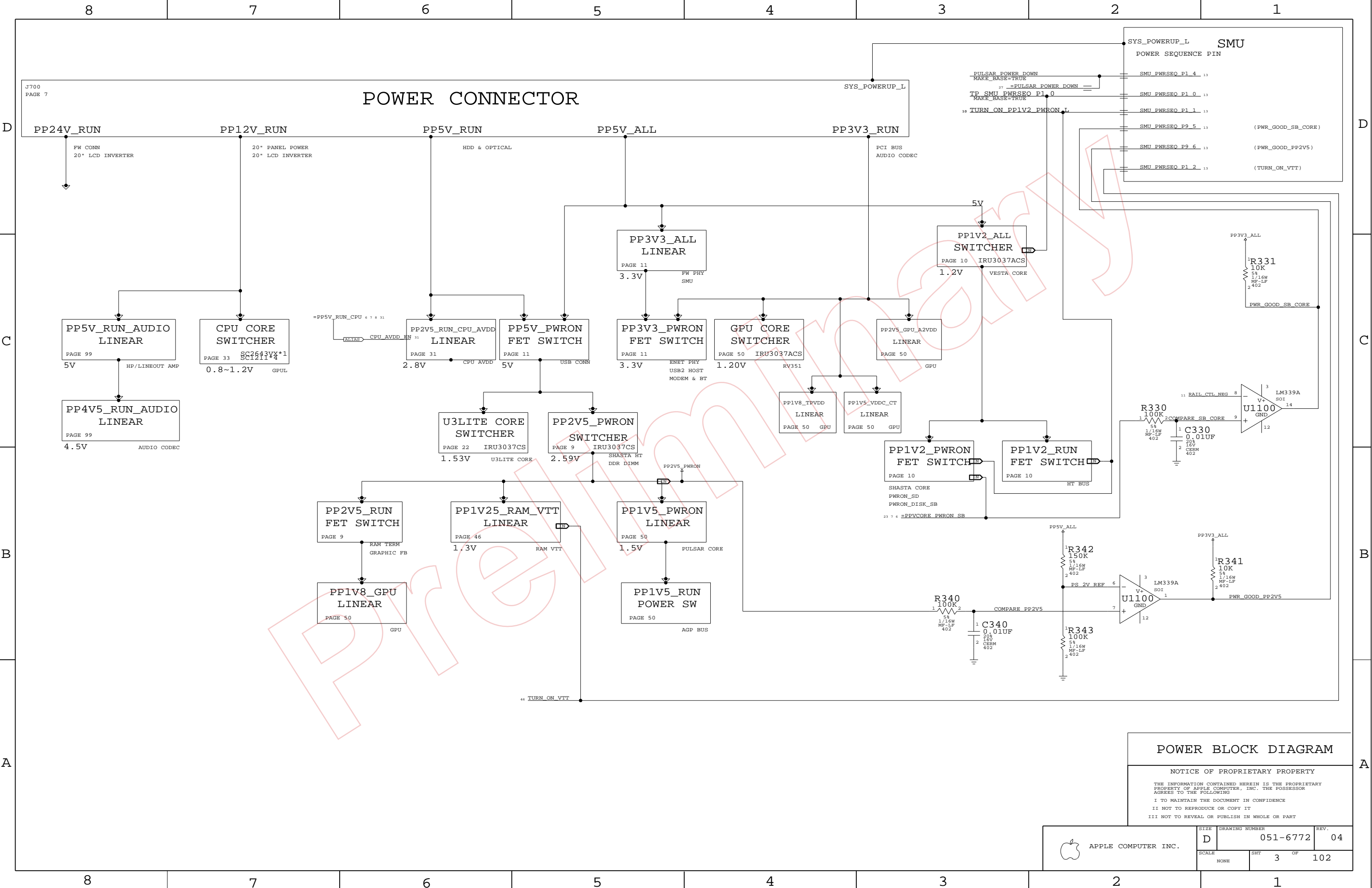
SCH, MLB, SEEDY



SYSTEM BLOCK DIAGRAM

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	D	051-6772	04
SCALE	SHT	OF	
NONE	2	102	



POWER BLOCK DIAGRAM

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SCALE	SHT 3 OF 102		
NONE			

8

7

6

5

4

3

2

1

PROCESSORS

QUALIFIED

PART #	QTY	DEVICE	PACKAGE	DESCRIPTION	VALUE	VOLT.	WATT.	TOL.	REFERENCE DESIGNATOR(S)	BOM OPTION
WAVE3 337S2969	1	PROCESSOR	CBGA-576-1MM	IC, GPUL, 10S, DD3, 1.8G, 85C, BPA	1.8GHZ	1.20V	42W	?	U2900	CPU_DD30_1_8GHZ

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	VOLTAGE
WAVE3 337S2970	337S2969	CPU_DD30_1_8GHZ	U2900	IC, GPUL, DD3, 1.8G, BRA	1.25V
WAVE5 337S2981	337S2969	CPU_DD30_1_8GHZ	U2900	IC, GPUL, DD3, 1.8G, BPL	1.20V
WAVE5 337S2982	337S2969	CPU_DD30_1_8GHZ	U2900	IC, GPUL, DD3, 1.8G, BRL	1.25V

ASICS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
343S0320	1	IC, U3LITE, NEW LAM, 300MM, PBGA	U3	

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
343S0321	343S0320		U3	U3L, NEW LAM, 200MM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
343S0283	1	IC, ASIC, SHASTA, V1.1, PBGA	U2300	

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
343S0324	1	IC, ASIC, VESTA, V1.3	U8600	

MISC PARTS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
062-2082	1	SPEC, VENDOR PACKAGING PROCEDURE	VPP1	
820-1747	1	PCB, FAB, MLB	MLB1	
825-6447	1	BARCODE LABEL, MLB, Q45	LBL1	
051-6772	1	PCB, SCHEM, MLB	SCH1	
341T1667	1	IC, FLASH, 1MX8, 3.3V, 90NS	U7500	
341T1395	1	PURCH ASSY, SMU BIG	U1300	
CRITICAL 603-6015	1	HEAT SINK ASSEMBLY 17 IN	MECH17	17_INCH_LCD
CRITICAL 603-6016	1	HEAT SINK ASSEMBLY 20 IN	MECH20	20_INCH_LCD

ALTERNATES

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
378S0119	378S0114	LED700, LED702, LED5900		KINGBRIGHT LED
376S0204	376S0130	Q3310, Q3320, Q3410		MOSFET, N-CH, VISHAY
376S0207	376S0146	Q3311, Q3321, Q3411		MOSFET, N-CH, VISHAY

Preliminary

TABLE ITEMS

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NONE	5	102	

8

7

6

5

4

3

2

1

Table with multiple columns containing test point names (e.g., NO_TEST=YES, TP RAM_CKE_R<3>), functional test names (e.g., AUD_MIC_IN_N_CONN, FW_VP), and test results (e.g., FUNC_TEST=TRUE, FUNC_TEST=FALSE).

D

C

B

A

D

C

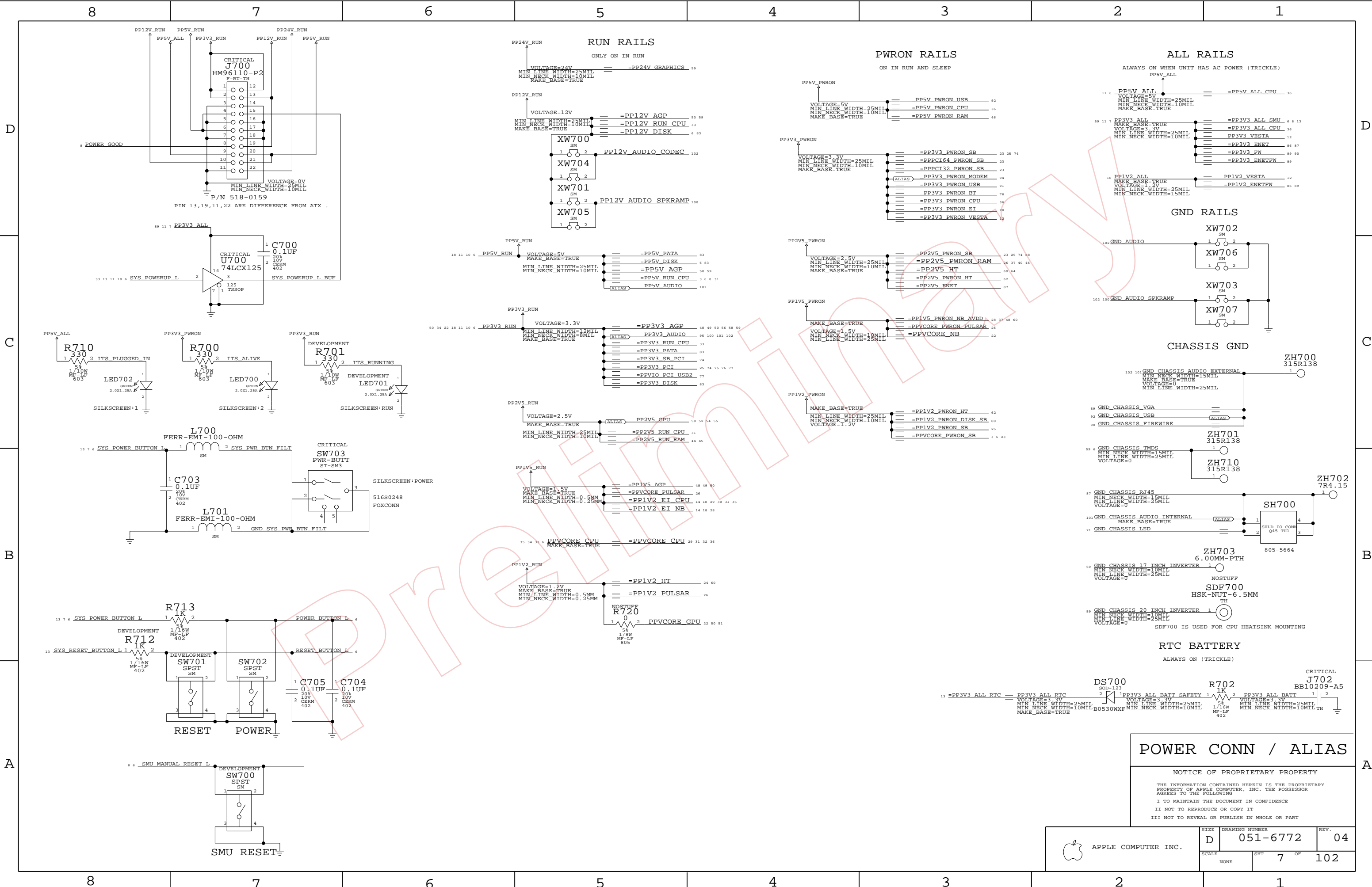
B

A

Large diagonal watermark text reading 'Pre-Flight' across the center of the page.

FUNC TEST
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Apple logo and company name: APPLE COMPUTER INC.
Drawing information: DRAWING NUMBER 051-6772, REV. 04, SCALE NONE, SHEET 6 OF 102.



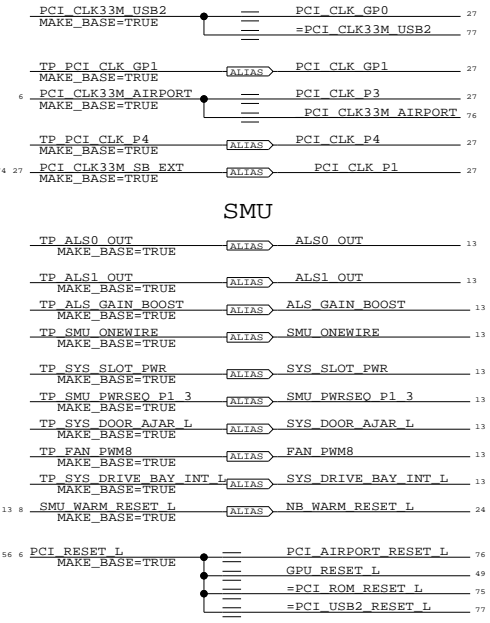
POWER CONN / ALIAS

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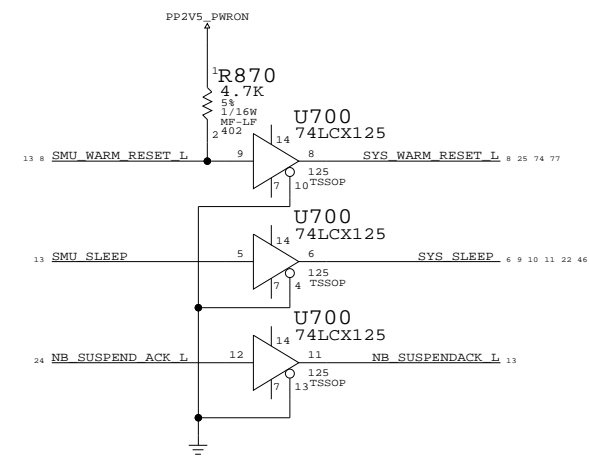
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	7 OF	102
NONE			

PCI CLOCKS

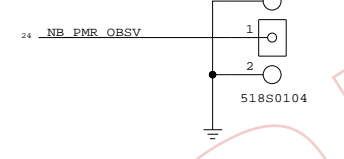
ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
SMU_RESET	10 MIL SPACING	
SMU_RESET	10 MIL SPACING	



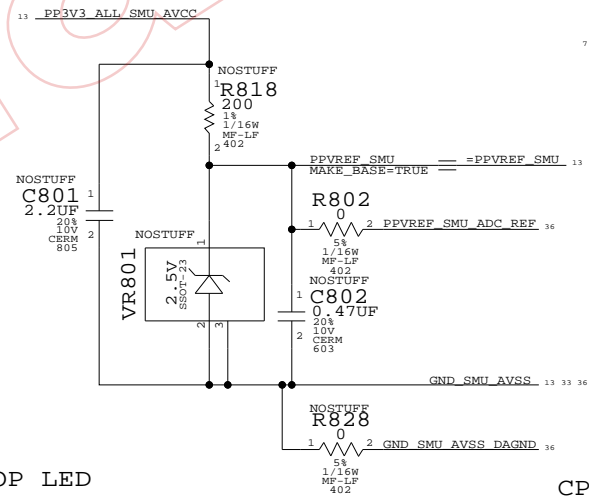
SMU



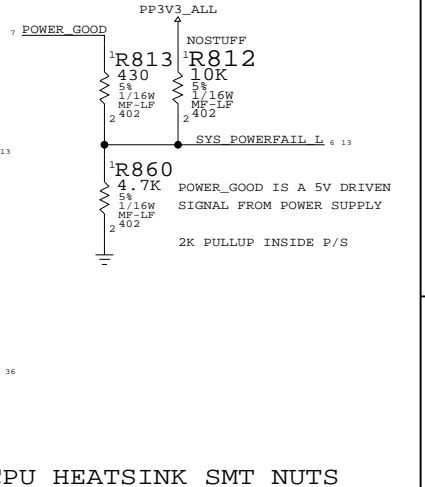
DEVELOPMENT J800 U.FL-R-SMT



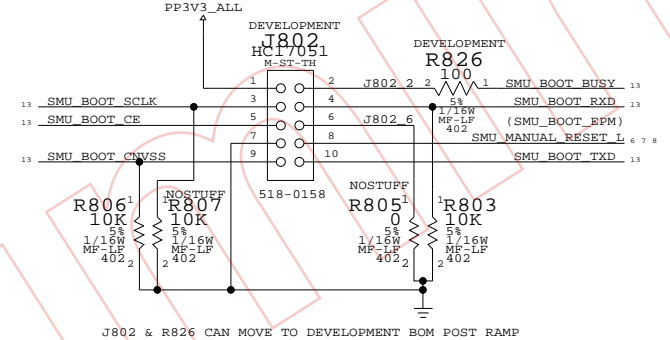
SMU ANALOG VREF



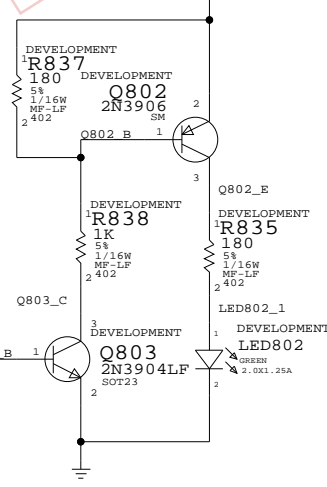
POWER_FAIL_L CONNECTION



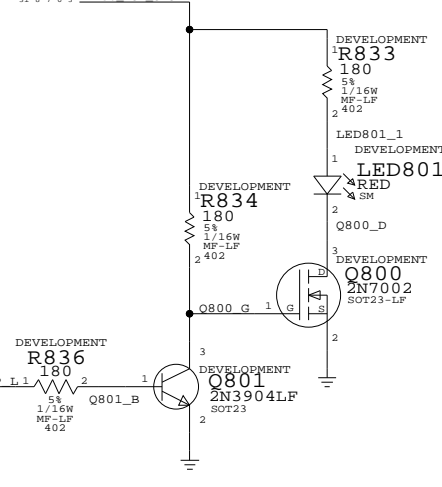
DOWNLOAD CONNECTOR



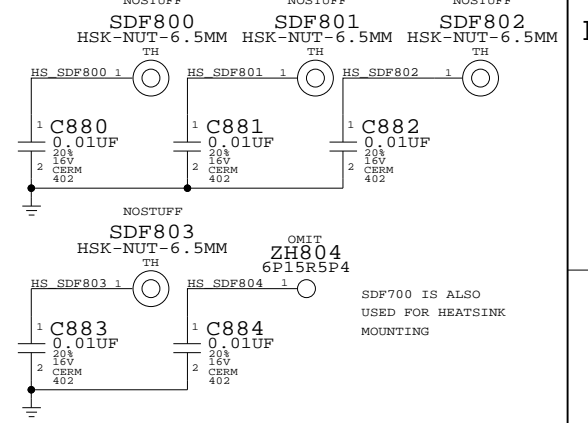
PLL LOCK LED



CHKSTOP LED



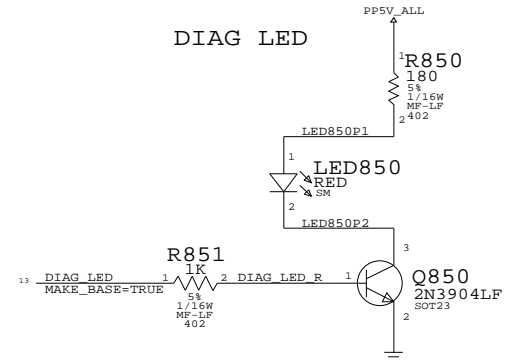
CPU HEATSINK SMT NUTS



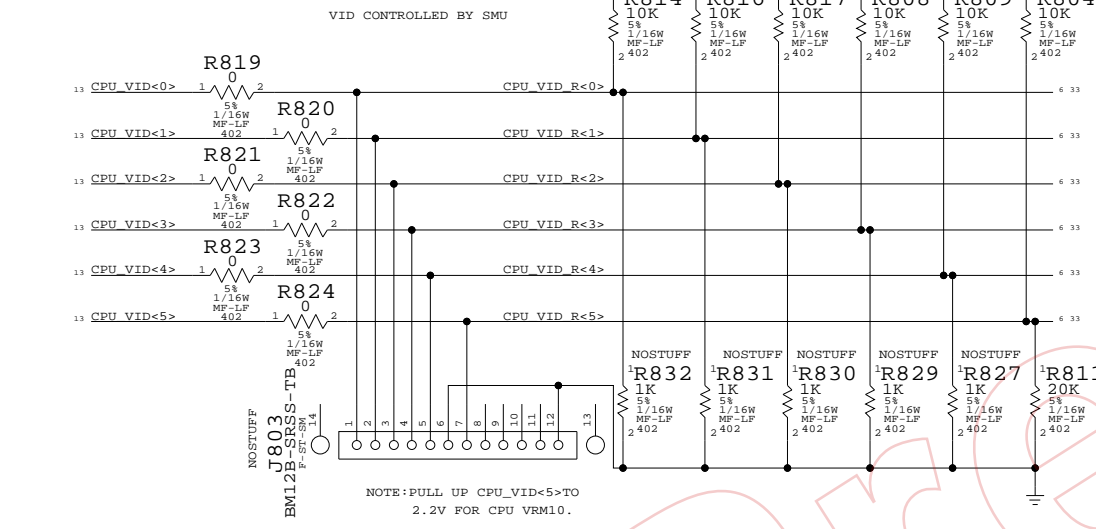
SIGNAL ALIAS

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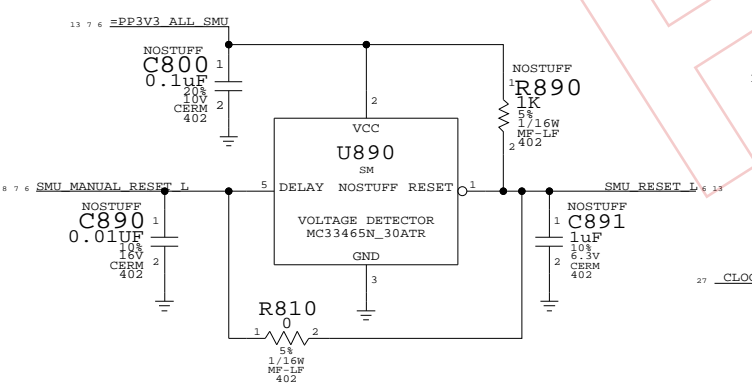
DIAG LED



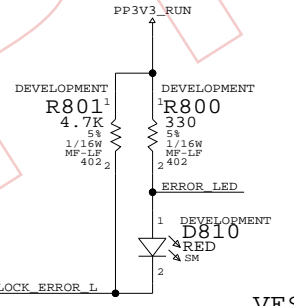
CPU VID<0:5>



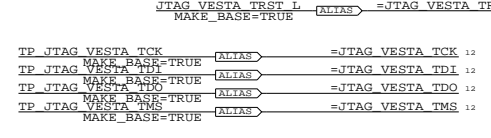
BACKUP SMU RESET CIRCUIT



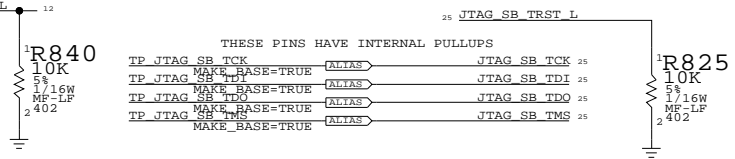
PULSAR ERROR_L LED



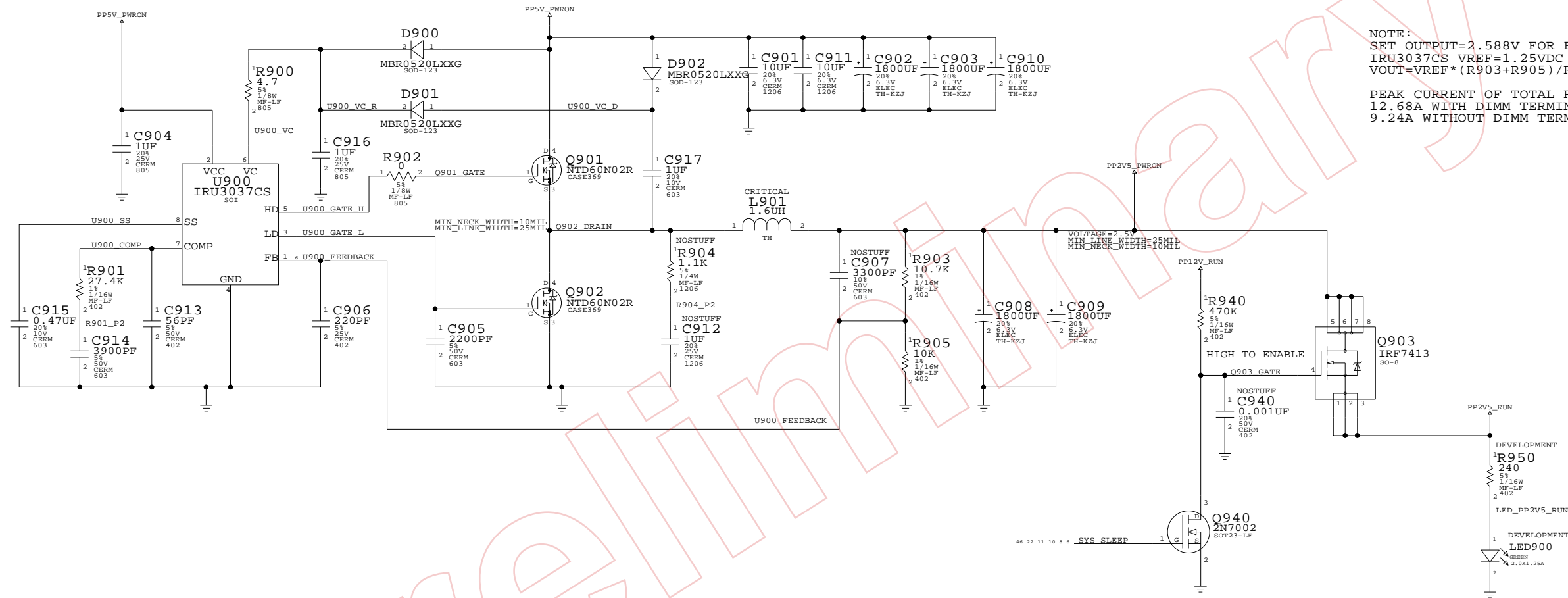
VESTA JTAG



SHASTA JTAG PULL DOWN



2.5V VOLTAGE REGULATOR




NOTE:
 SET OUTPUT=2.588V FOR FRAMEBUFFER.
 IRU3037CS VREF=1.25VDC
 $V_{OUT} = V_{REF} * (R_{903} + R_{905}) / R_{905} = 2.588VDC$

PEAK CURRENT OF TOTAL RAILS
 12.68A WITH DIMM TERMINATION
 9.24A WITHOUT DIMM TERMINATION

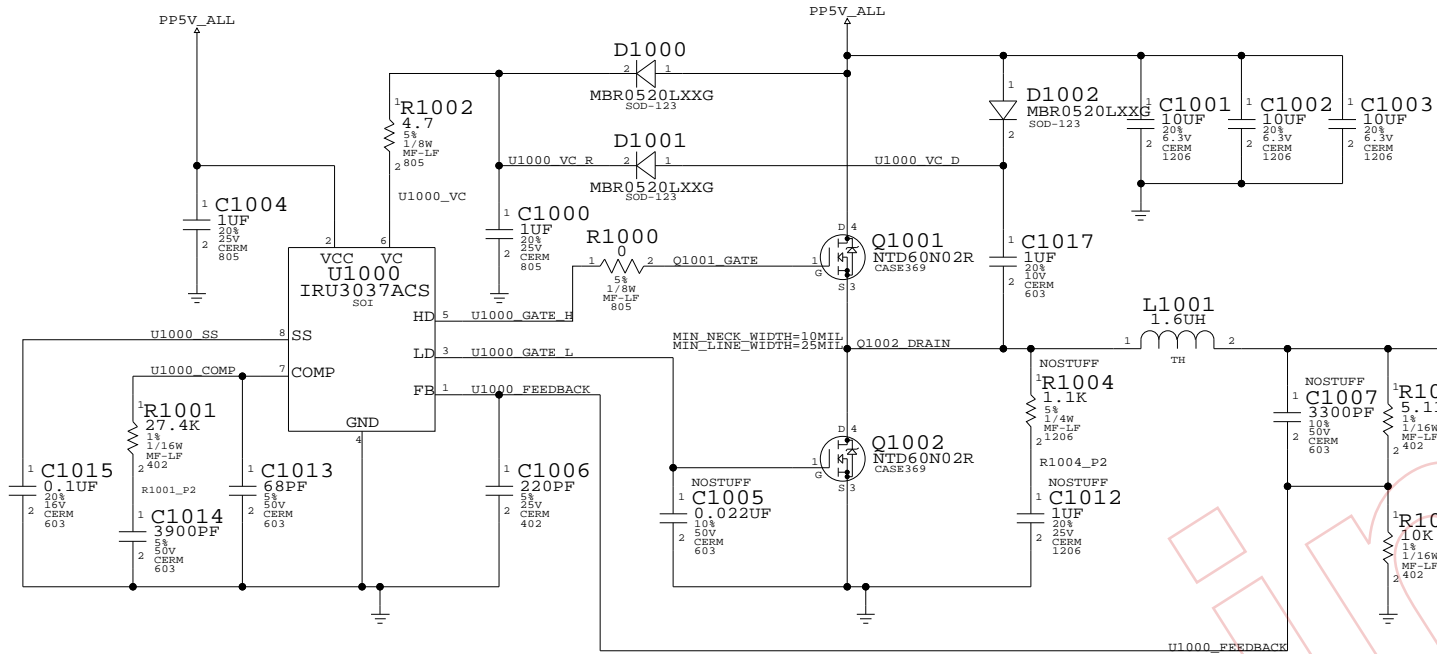
Pre-EMBA

2.5V VREG

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	D	051-6772	04
SCALE	SHT	9 OF	102
NONE			

PP1V2_ALL VOLTAGE REGULATOR



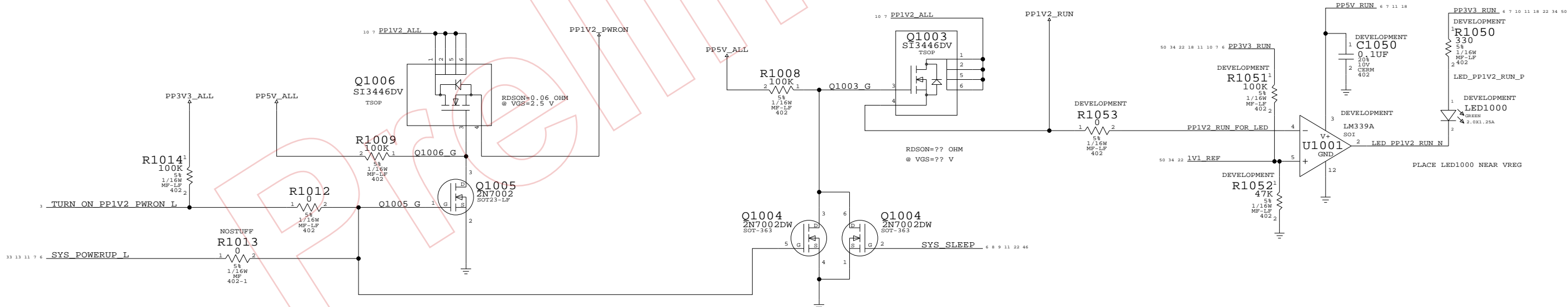
NOTE:
 SET OUTPUT=1.2V
 IRU3037ACS VREF=0.8VDC
 VOUT=VREF*(R1003+R1005)/R1005=1.206VDC
 PEAK CURRENT OF TOTAL RAILS
 ~3A --- NEED TO VERIFY

PP1V2_PWRON FET SWITCH

PEAK CURRENT ??A

PP1V2_RUN FET SWITCH

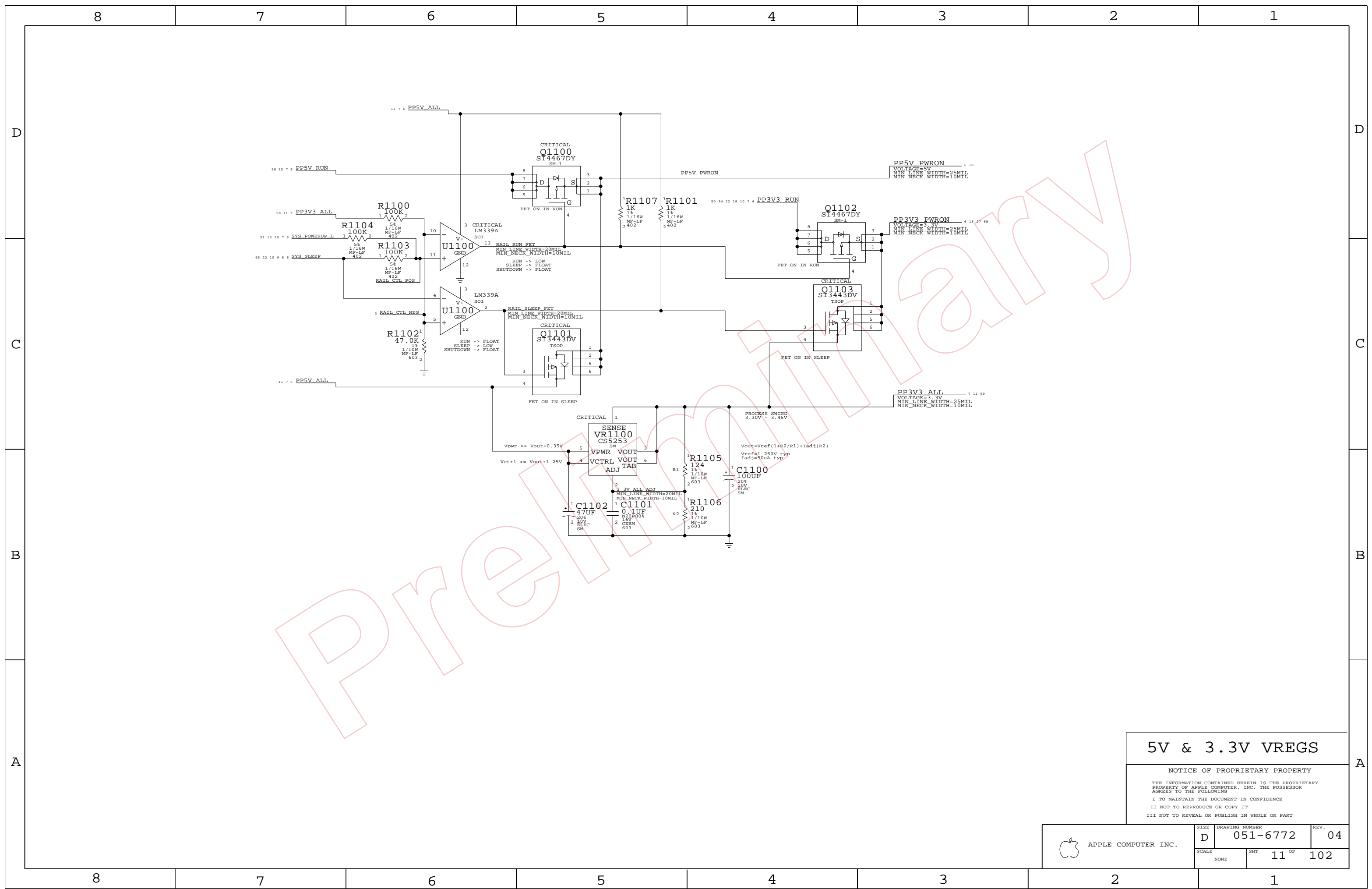
PEAK CURRENT ??A



1.2V VREG

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5V & 3.3V VREGS

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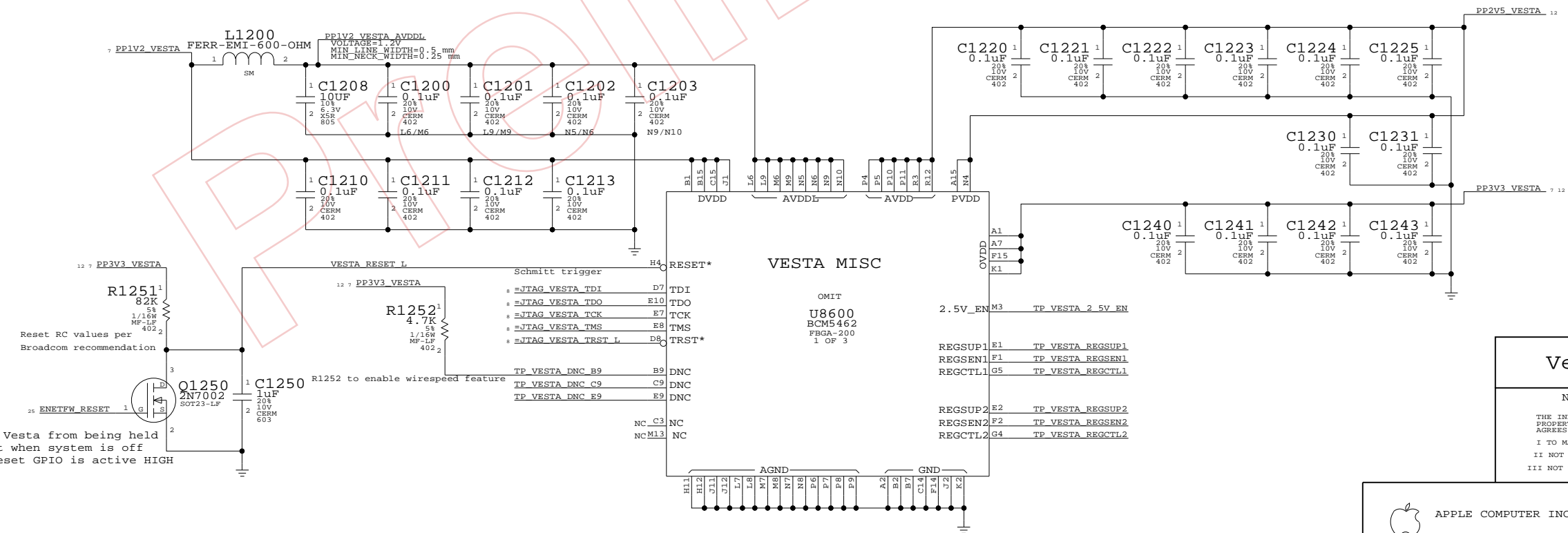
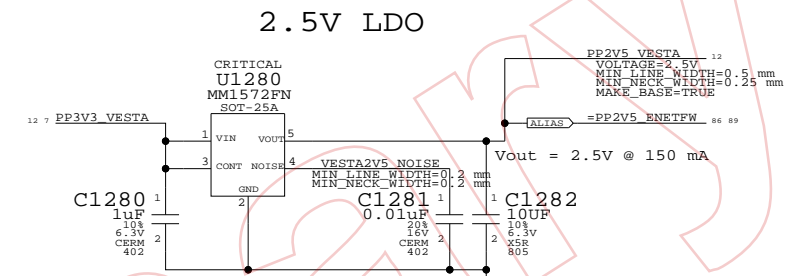
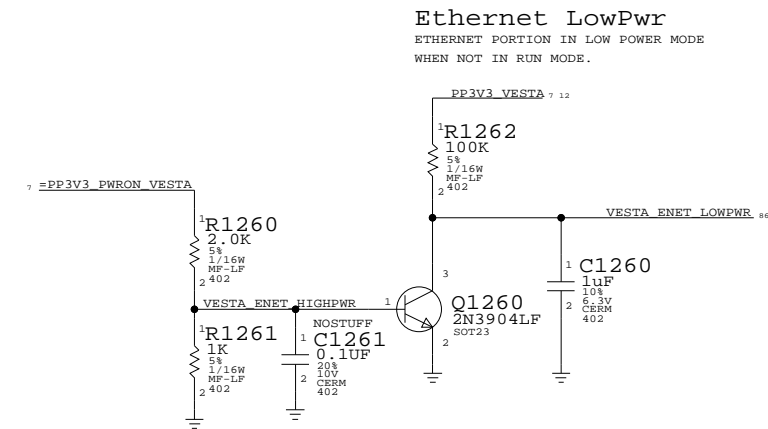
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	11 OF	102
NONE			

Page Notes

Power aliases required by this page:

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
- VESTALV2_BURST / VESTALV2_PULSE
Controls operating mode of Vesta 1.2V regulator. If both options are off the regulator will be in continuous mode.



To keep Vesta from being held in reset when system is off
NOTE: Reset GPIO is active HIGH

Vesta Core / Misc

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	D	051-6772	04
SCALE	SHT		12 102
NONE			

ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
SMU_CLK10M_XTAL	15 MIL SPACING	SMU_CLK10M_XIN
	15 MIL SPACING	SMU_CLK10M_XOUT
	15 MIL SPACING	SMU_CLK10M_XOUT_B
RTC_CLK32K_XTAL	15 MIL SPACING	RTC_CLK32K_X1
	15 MIL SPACING	RTC_CLK32K_X2

Page Notes

Power aliases required by this page:
 - _PP3V3_ALL_SMU
 - _PP3V3_ALL_RTC
 - _PP3V3_PWRON_SMU
 - _PPVREF_SMU (SMU AVCC or 2.5V reference)

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

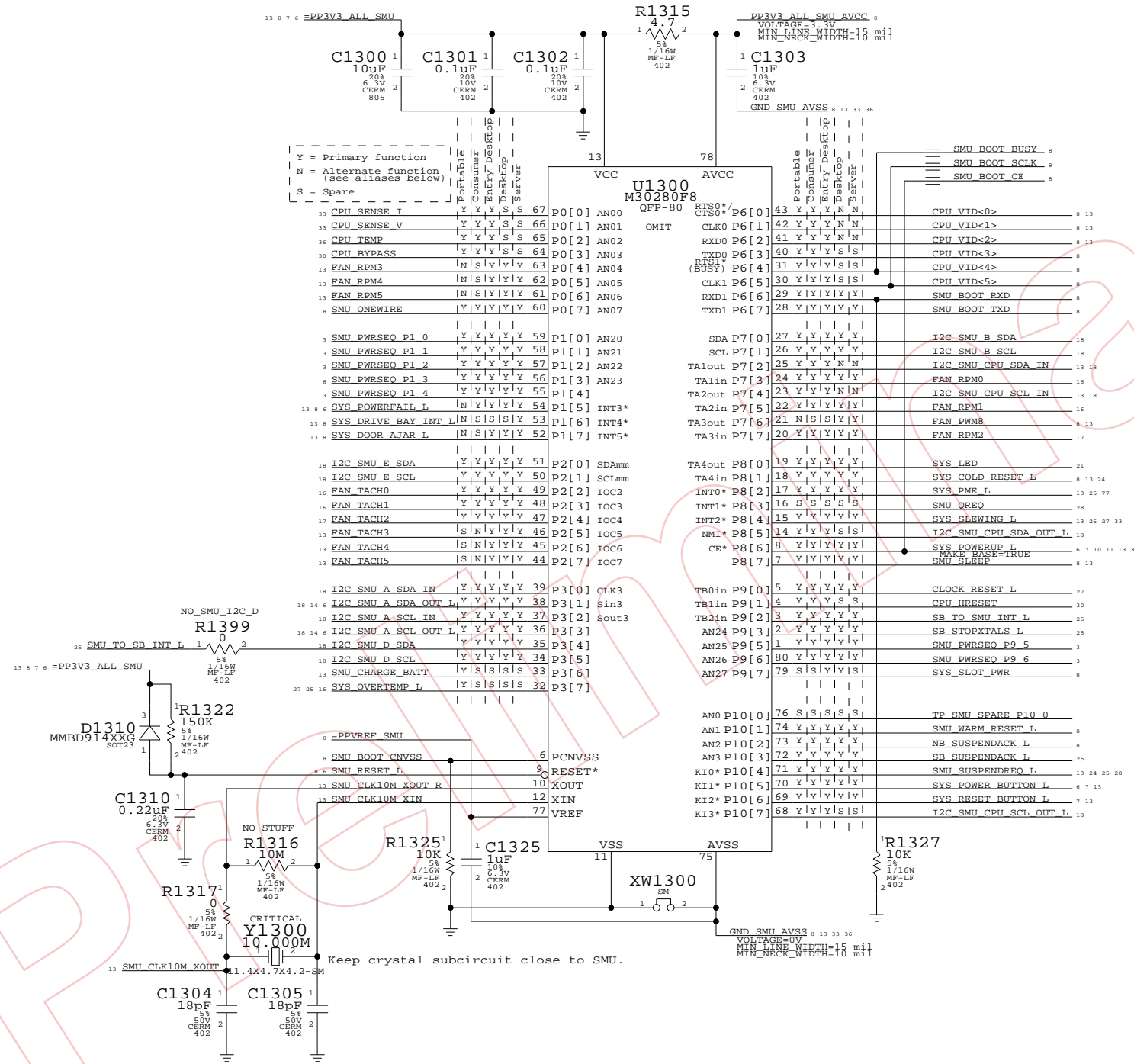
NOTE: CPU current/voltage monitoring (CPU_SENSE_I/CPU_SENSE_V) requires 100K/10uF RC filter at SMU pins. Caps should connect to GND_SMU_AVSS. SMU_VREF should be same signal or reference used by monitoring circuit, but be aware that this will affect other analog inputs such as AC adapter ID.

NOTE: All analog inputs to SMU should have a 100pF capacitor to the SMU AVSS signal (GND_SMU_AVSS). None of those capacitors are provided on this page.

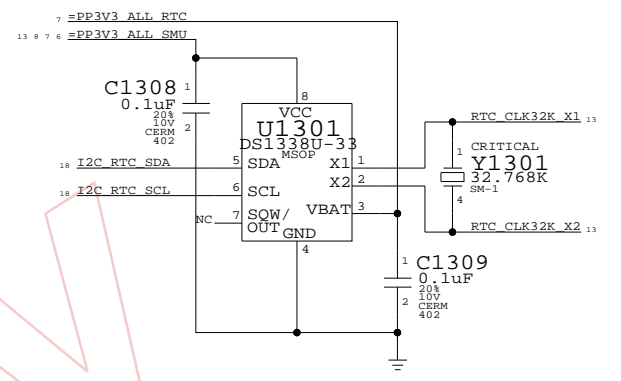
NOTE: Some primary and alternate functions require pull-ups that are not provided on this page. Please review the latest SMU specification to ensure missing pull-ups are provided on another page.

NOTE: Pinout matches SMU pinout v1.51.

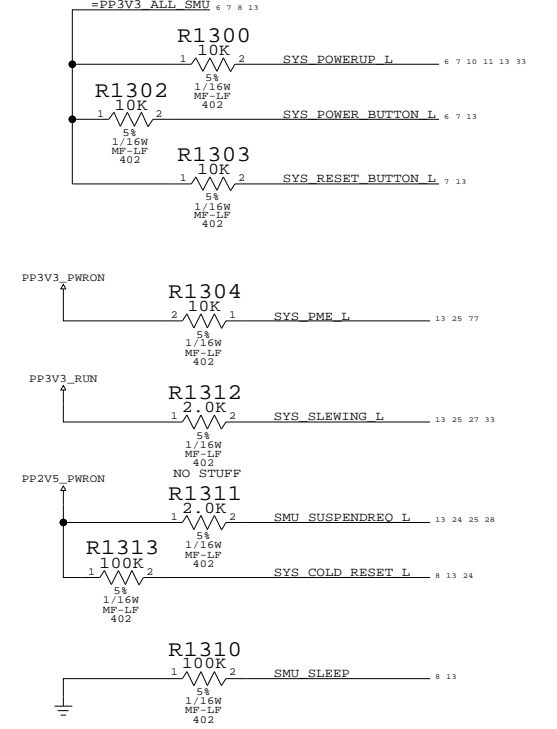
System Management Unit



Real Time Clock



SMU Pull-ups / pull-down



Alternate Functions

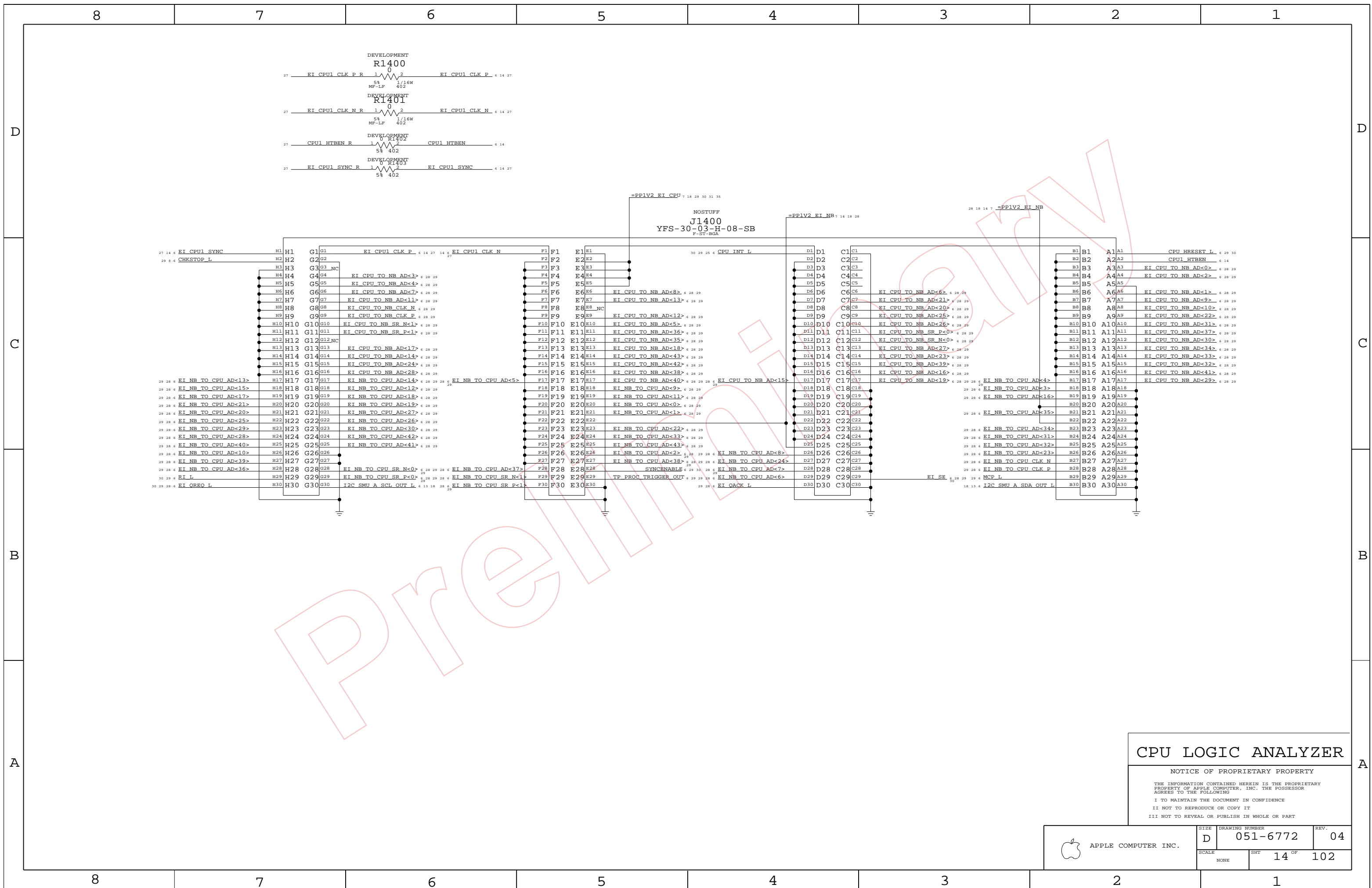
Portable			Consumer			Tower & Server		
Port			Port			Port		
13	FAN_RPM3	0.4	ALSO OUT	13	FAN_TACH3	2.5	SYS_LED_RED	21
13	FAN_RPM4	0.5	ALS1 OUT	13	FAN_TACH4	2.6	SYS_LED_GREEN	21
13	FAN_RPM5	0.6	ALS_GAIN_BOOST	13	FAN_TACH5	2.7	SYS_LED_BLUE	21
13	SYS_POWERFAIL_L	1.5	SMU_ACIN	13	SMU_CHARGE_BATT	3.6	DIAG_LED	8
13	SYS_DRIVE_BAY_INT_L	1.6	SMU_BATT_DET_L					
13	SYS_DOOR_AJAR_L	1.7	SYS_LID_OPEN					
13	FAN_PWM8	7.6	SYS_KBDLED					

MASTER: SEEDY

System Management Unit

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	NONE	D 051-6772	04
SHEET		OF	
13		102	



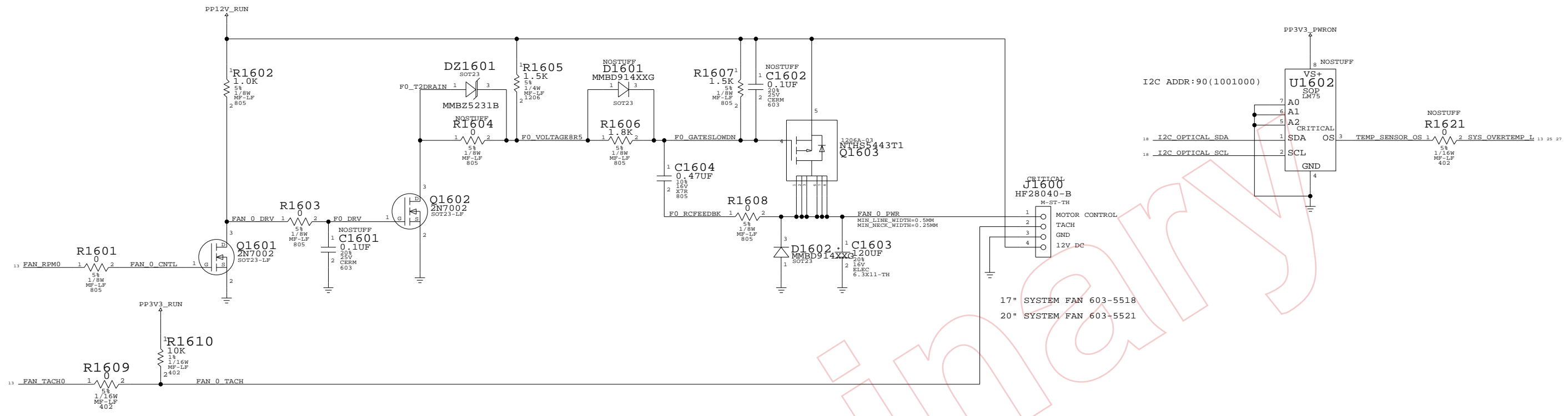
CPU LOGIC ANALYZER

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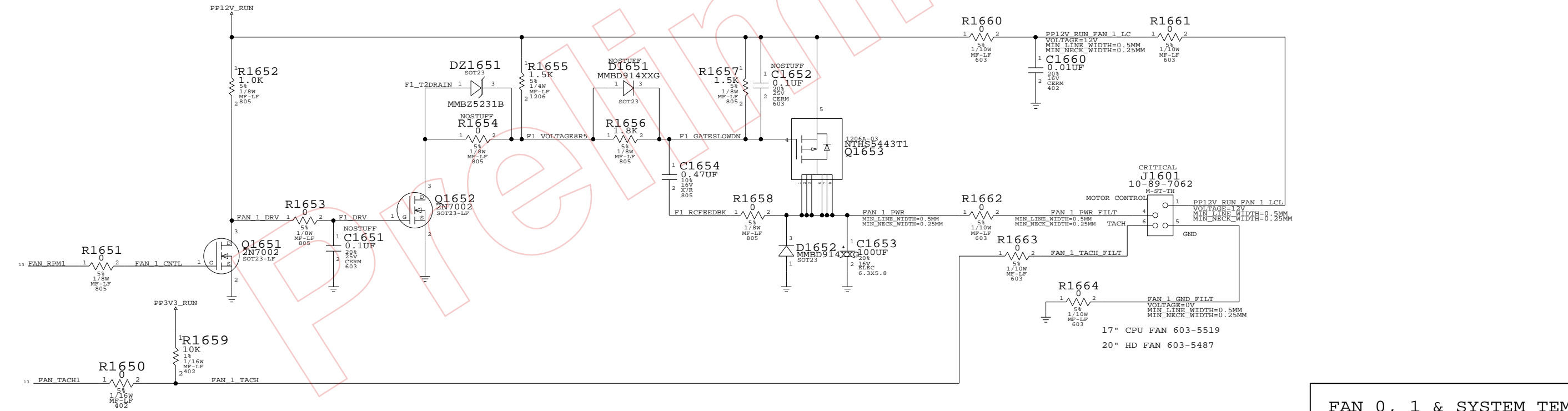
APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6772	REV. 04
	SCALE NONE	SHT 14 OF 102	

FAN 0

OPTICAL TEMP SENSOR



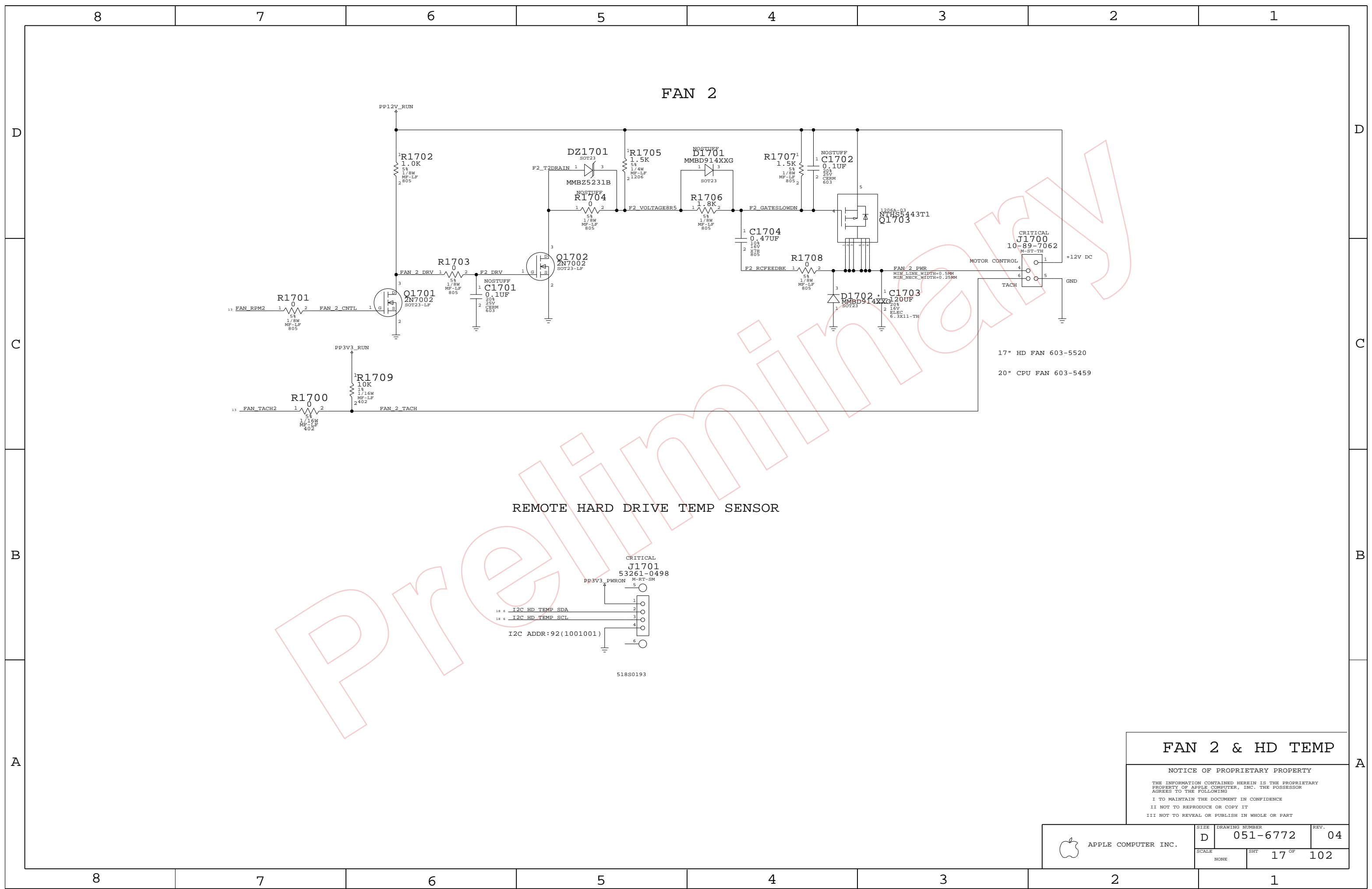
FAN 1



FAN 0, 1 & SYSTEM TEMP

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	D	051-6772	04
SCALE	SHT	OF	
NONE	16	102	



FAN 2

REMOTE HARD DRIVE TEMP SENSOR

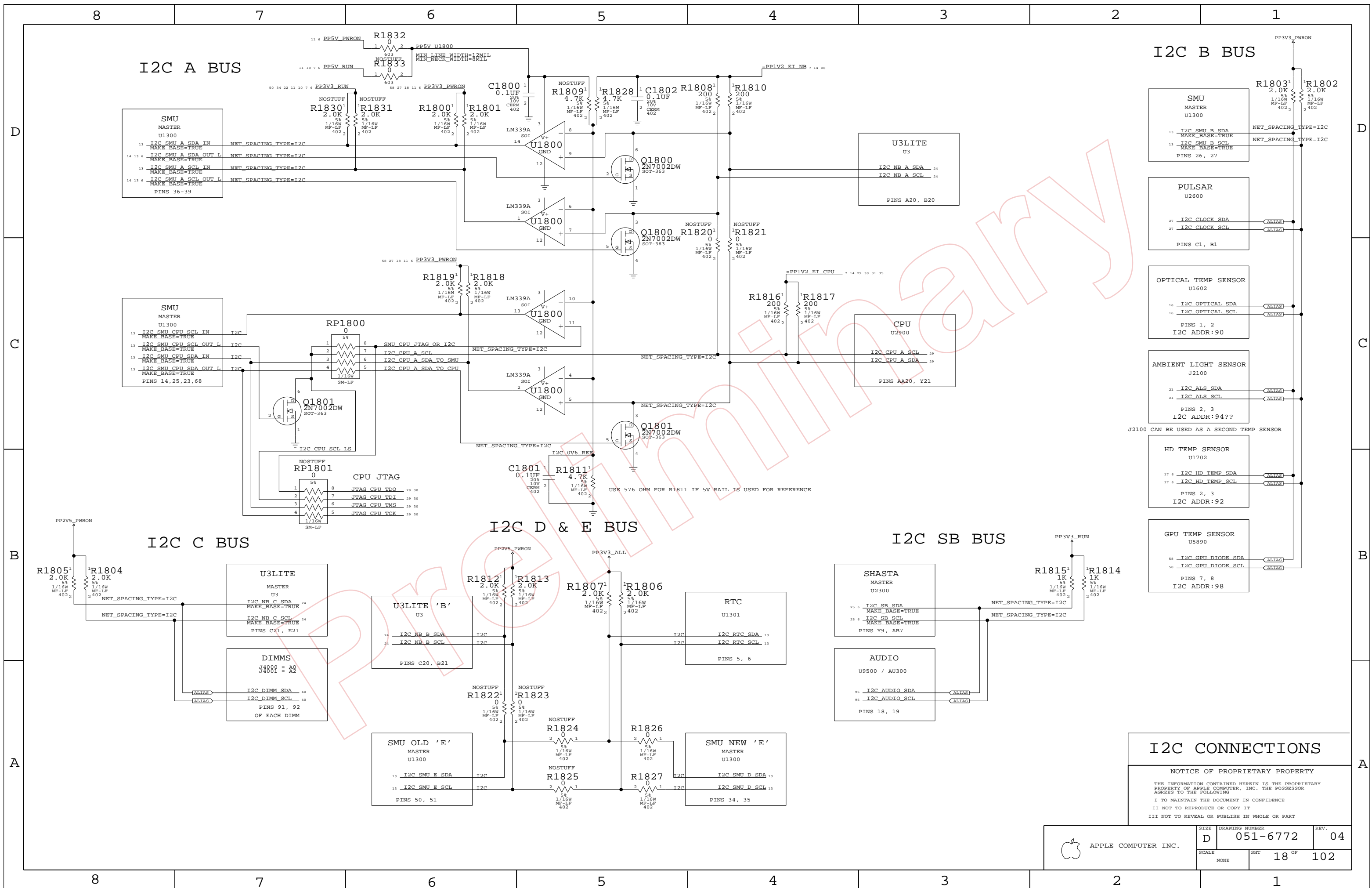
17" HD FAN 603-5520
 20" CPU FAN 603-5459

FAN 2 & HD TEMP

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	D	051-6772	04
SCALE		SHT	17 OF 102
NONE			

518S0193



I2C A BUS

SMU MASTER U1300

- I2C SMU A SDA IN MAKE_BASE=TRUE
- I2C SMU A SDA OUT L MAKE_BASE=TRUE
- I2C SMU A SCH IN MAKE_BASE=TRUE
- I2C SMU A SCH OUT L MAKE_BASE=TRUE
- PINS 36-39

SMU MASTER U1300

- I2C SMU CPU SCL IN MAKE_BASE=TRUE
- I2C SMU CPU SCL OUT L MAKE_BASE=TRUE
- I2C SMU CPU SDA IN MAKE_BASE=TRUE
- I2C SMU CPU SDA OUT L MAKE_BASE=TRUE
- PINS 14, 25, 23, 68

I2C C BUS

U3LITE MASTER U3

- I2C NB C SDA MAKE_BASE=TRUE
- I2C NB C SCL MAKE_BASE=TRUE
- PINS C21, E21

DIMMS

- I2C DIMM SDA
- I2C DIMM SCL
- PINS 91, 92 OF EACH DIMM

SMU OLD 'E' MASTER U1300

- I2C SMU E SDA
- I2C SMU E SCL
- PINS 50, 51

SMU NEW 'E' MASTER U1300

- I2C SMU D SDA
- I2C SMU D SCL
- PINS 34, 35

I2C B BUS

SMU MASTER U1300

- I2C SMU B SDA MAKE_BASE=TRUE
- I2C SMU B SCL MAKE_BASE=TRUE
- PINS 26, 27

PULSAR U2600

- I2C CLOCK SDA
- I2C CLOCK SCL
- PINS C1, B1

OPTICAL TEMP SENSOR U1602

- I2C OPTICAL SDA
- I2C OPTICAL SCL
- PINS 1, 2
- I2C ADDR: 90

AMBIENT LIGHT SENSOR J2100

- I2C ALS SDA
- I2C ALS SCL
- PINS 2, 3
- I2C ADDR: 94??

J2100 CAN BE USED AS A SECOND TEMP SENSOR

HD TEMP SENSOR U1702

- I2C HD TEMP SDA
- I2C HD TEMP SCL
- PINS 2, 3
- I2C ADDR: 92

GPU TEMP SENSOR U5890

- I2C GPU DIODE SDA
- I2C GPU DIODE SCL
- PINS 7, 8
- I2C ADDR: 98

I2C D & E BUS

U3LITE 'B' U3

- I2C NB B SDA
- I2C NB B SCL
- PINS C20, B21

RTC U1301

- I2C RTC SDA
- I2C RTC SCL
- PINS 5, 6

I2C SB BUS

SHASTA MASTER U2300

- I2C SB SDA MAKE_BASE=TRUE
- I2C SB SCL MAKE_BASE=TRUE
- PINS Y9, AB7

AUDIO U9500 / AU300

- I2C AUDIO SDA
- I2C AUDIO SCL
- PINS 18, 19

I2C CONNECTIONS

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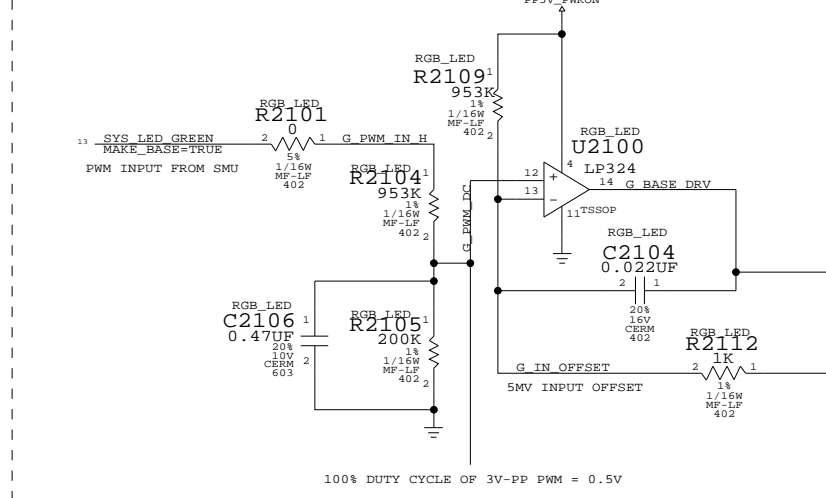
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	18 OF 102	
NONE			

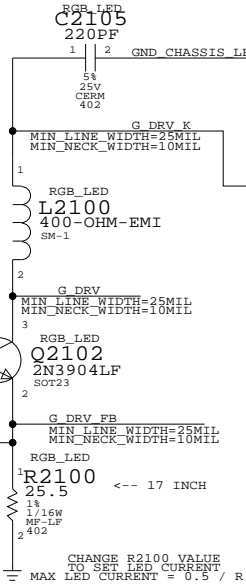
TOTAL CURRENT EXCLUDING LEDS CURRENT < 170 MICRO AMPS

AMBIENT LIGHT SENSOR

PLACE THESE PARTS CLOSE TO SMU IC

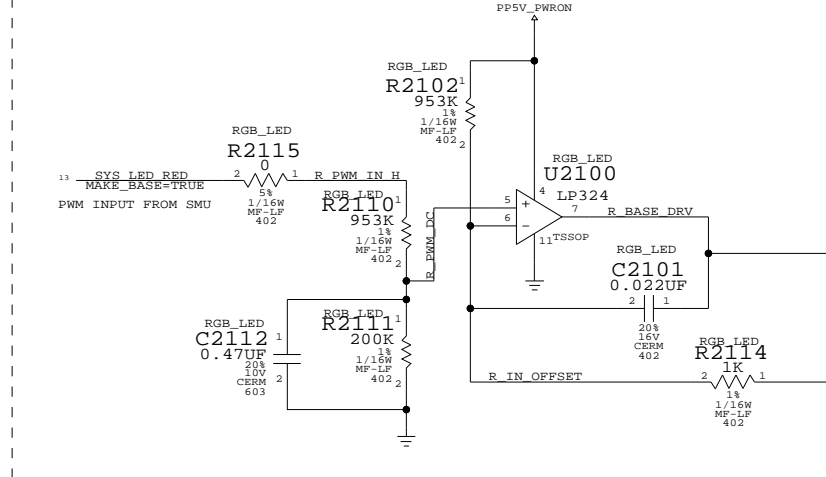


100% DUTY CYCLE OF 3V-PP PWM = 0.5V

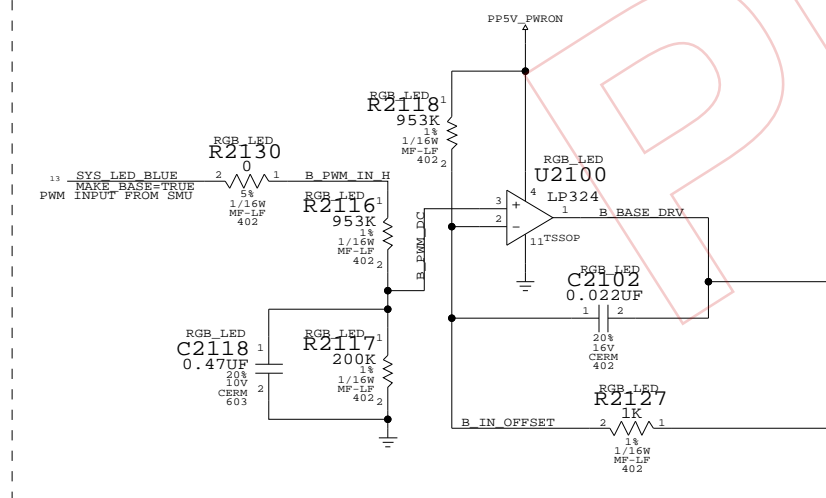


CHANGE R2100 VALUE TO SET LED CURRENT
MAX LED CURRENT = 0.5 / R

PLACE THESE PARTS CLOSE TO SMU IC

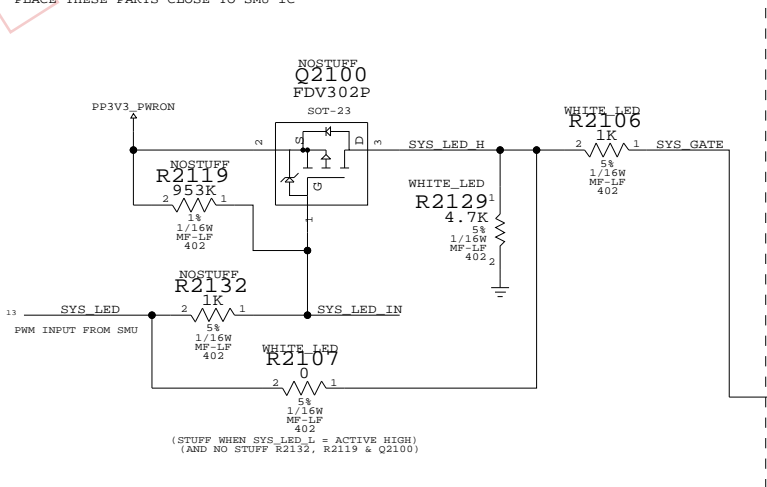


PLACE THESE PARTS CLOSE TO SMU IC



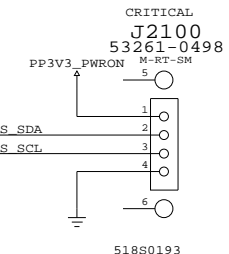
TOTAL CURRENT EXCLUDING LEDS CURRENT < 170 MICRO AMPS

PLACE THESE PARTS CLOSE TO SMU IC



20 INCH -->

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
11483921	1	RES, 39.2 OHM, 1%, 402	R2103	20_INCH_LCD
11481821	3	RES, 18.2 OHM, 1%, 402	R2100,R2113,R2126	NOSTUFF



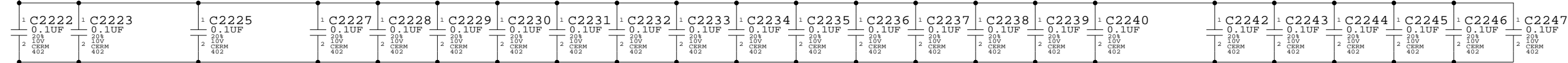
J2100 CAN BE USED AS A SECOND TEMP SENSOR

INDICATOR LED

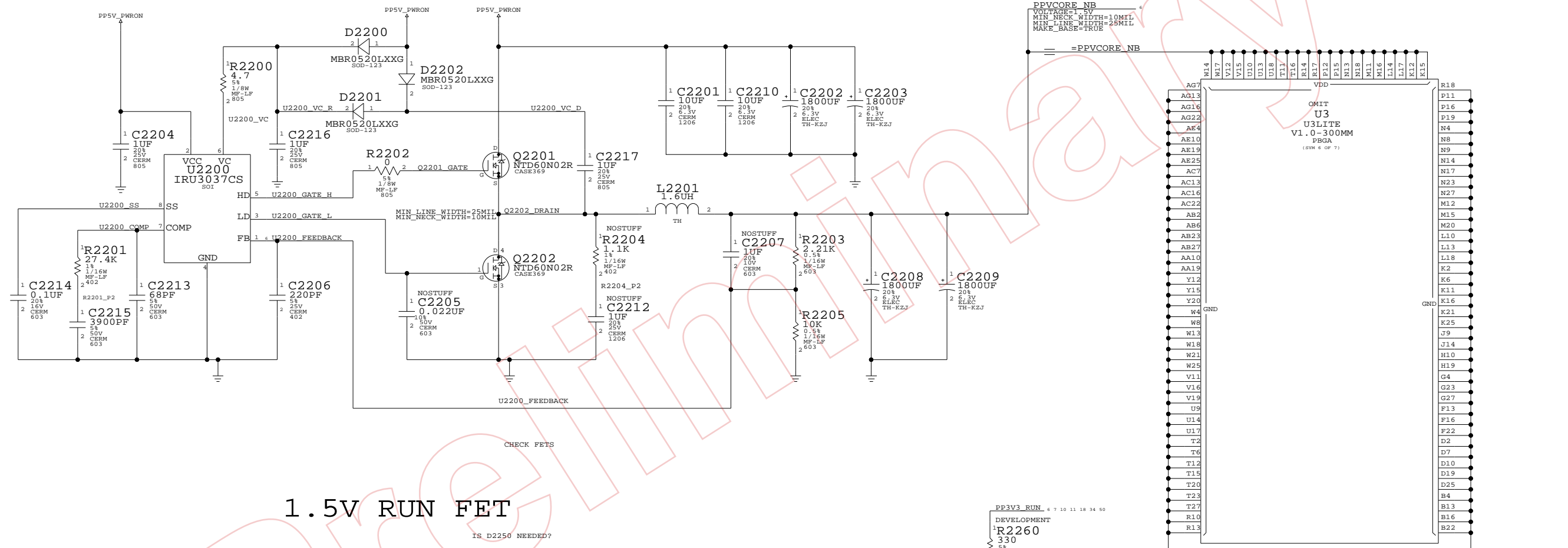
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	OF	102
NONE	21		

22 7 =PPVCORE_NB

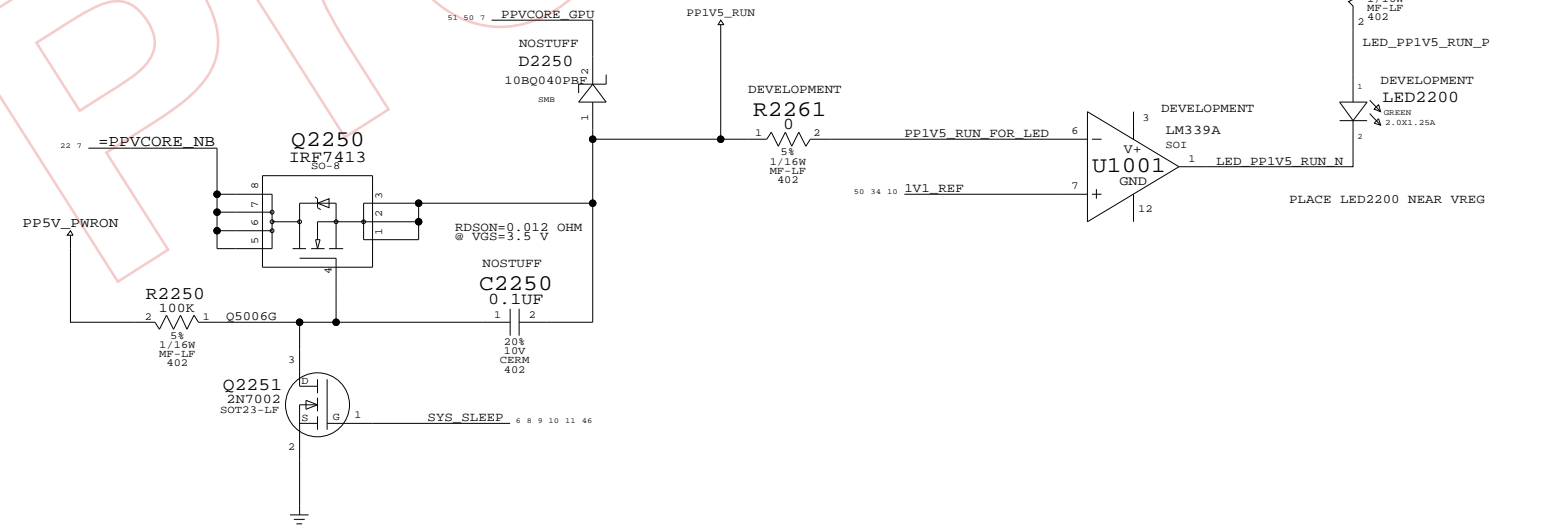


NOTE:
 SET OUTPUT=1.5VDC FOR U3LITE CORE
 IRU3037CS VREF=1.25VDC
 $V_{OUT}=V_{REF} * (R_{2203}+R_{2205}) / R_{2205} = 1.53VDC$
 7.73A OF PEAK CURRENT DRAW ON PCORE_NB

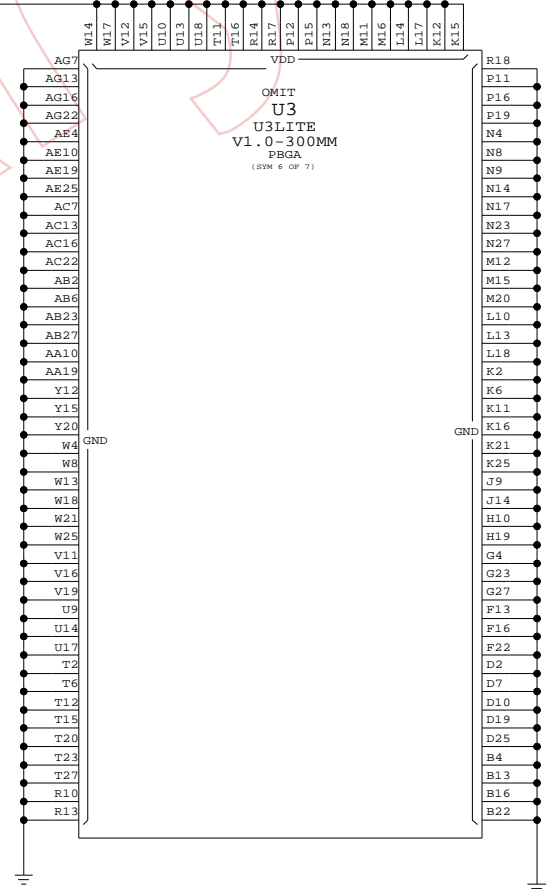


1.5V RUN FET

IS D2250 NEEDED?



PPVCORE_NB
 VOLTAGE=1.5V
 MIN_NECK_WIDTH=10MIL
 MIN_LINE_WIDTH=25MIL
 MAKE_BASE=TRUE



U3LITE CORE POWER

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	22 OF	102
NONE			

Page Notes

Power aliases required by this page:

- _PPPCI164_PWRON_SB (to 5V or 3.3V)
- _PPPCI32_PWRON_SB (to 5V or 3.3V)
- _PP3V3_PWRON_SB
- _PP2V5_PWRON_SB
- _PPVCORE_PWRON_SB (1.2V)

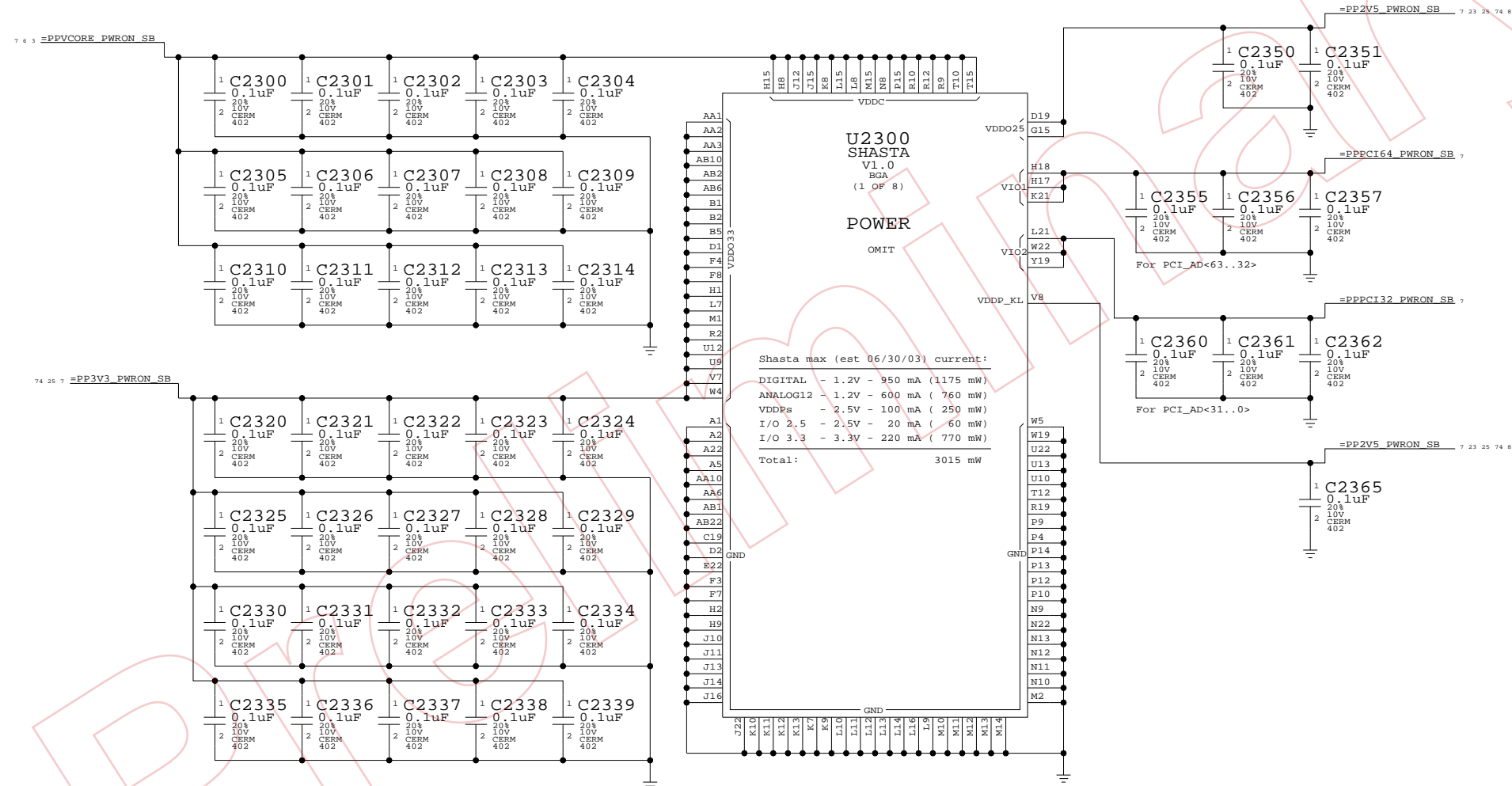
NOTE: PCI pads use the VIO supply to meet different drive timing characteristics required by the PCI spec for 5V vs. 3.3V operation. Connect _PPPCI32_PWRON_SB to appropriate PCI bus voltage and _PPPCI164_PWRON_SB to same if 64-bit PCI, otherwise 3.3V.

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)

Power Sequencing:

Must power Shasta VCore rail before any other Shasta supplies.



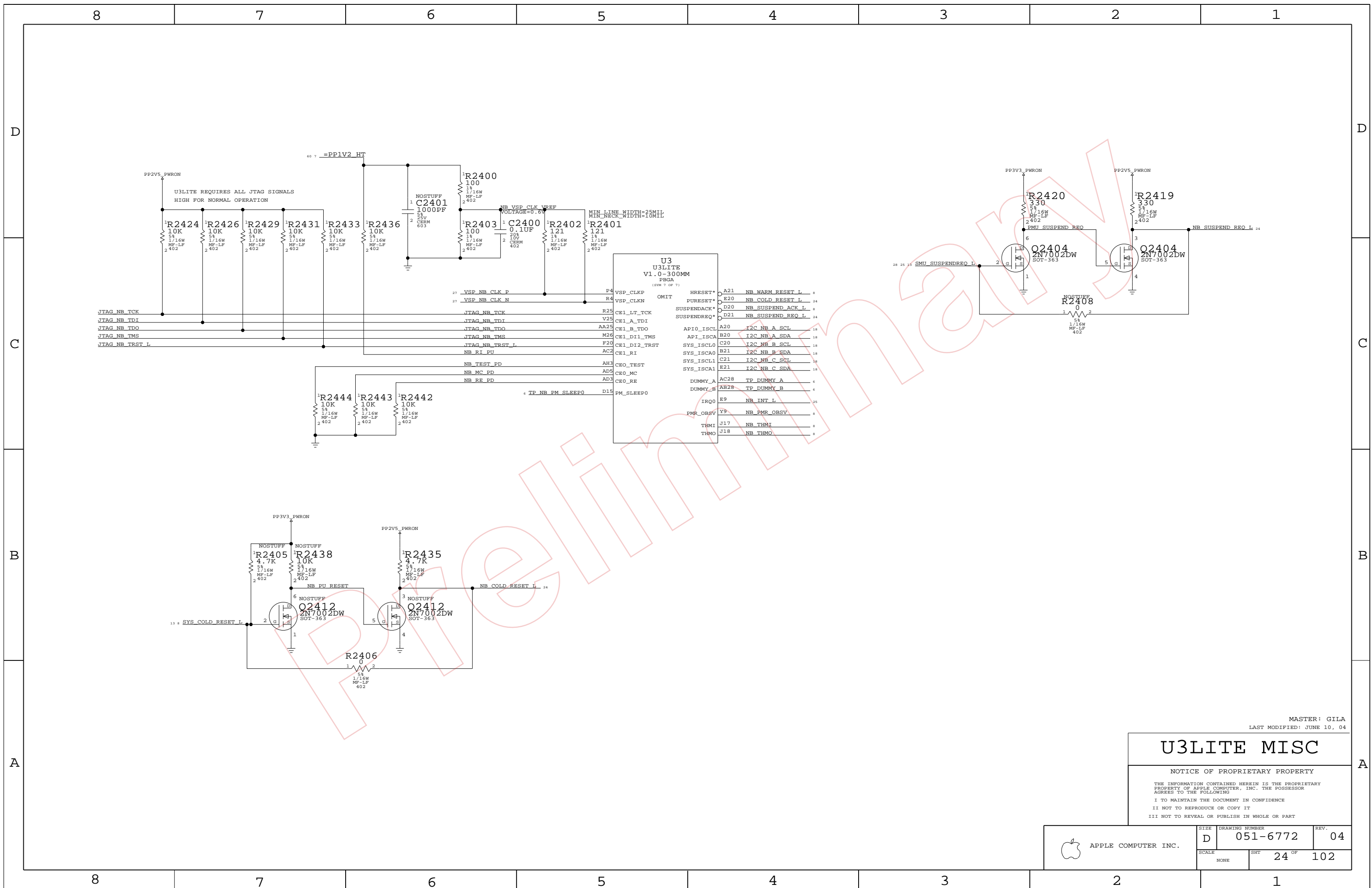
Master: Link

Shasta Core Power

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	D	051-6772	04
SCALE	NONE	SHT	23 OF 102



MASTER: GILA
LAST MODIFIED: JUNE 10, 04

U3LITE MISC

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	D	051-6772	04
SCALE	SHT	24 OF 102	
NONE			

ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
I2S0_TO_SB		I2S0_DEV_TO_SB DTI
I2S0_TO_DEV		I2S0_SB_TO_DEV DTO
I2S0_TO_DEV	AUDIO	I2S0_MCLK
I2S0_BIDIR		I2S0_BITCLK
I2S0_BIDIR		I2S0_SYNC
I2S1_TO_SB		I2S1_DEV_TO_SB DTI
I2S1_TO_DEV		I2S1_SB_TO_DEV DTO
I2S1_TO_DEV	10 MIL SPACING	I2S1_MCLK
I2S1_BIDIR		I2S1_BITCLK
I2S1_BIDIR		I2S1_SYNC
I2S2_TO_SB		I2S2_DEV_TO_SB DTI
I2S2_TO_DEV		I2S2_SB_TO_DEV DTO
I2S2_TO_DEV	10 MIL SPACING	I2S2_MCLK
I2S2_BIDIR		I2S2_BITCLK
I2S2_BIDIR		I2S2_SYNC
SB_CLK18M_XTAL	15 MIL SPACING	SB_CLK18M_XTALI
	15 MIL SPACING	SB_CLK18M_XTALO
	15 MIL SPACING	SB_CLK18M_XTALO_R
SB_CLK25M_ATA	15 MIL SPACING	SB_CLK25M_ATA

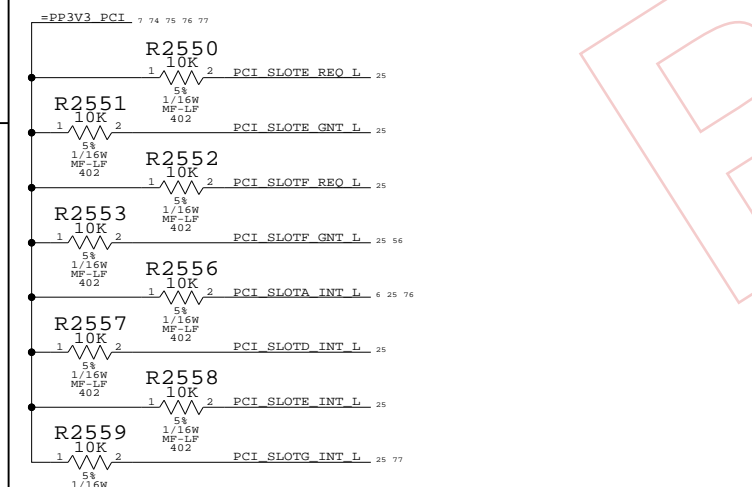
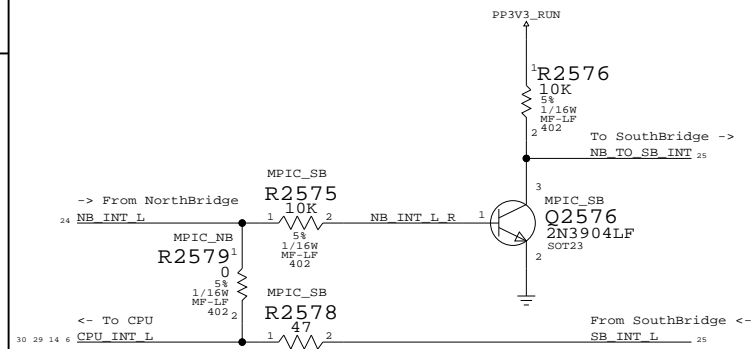
Page Notes

Power aliases required by this page:
 - _PP3V3_PCI
 - _PP3V3_PWRON_SB
 - _PP2V5_PWRON_SB
 - _PP1V2_PWRON_SB

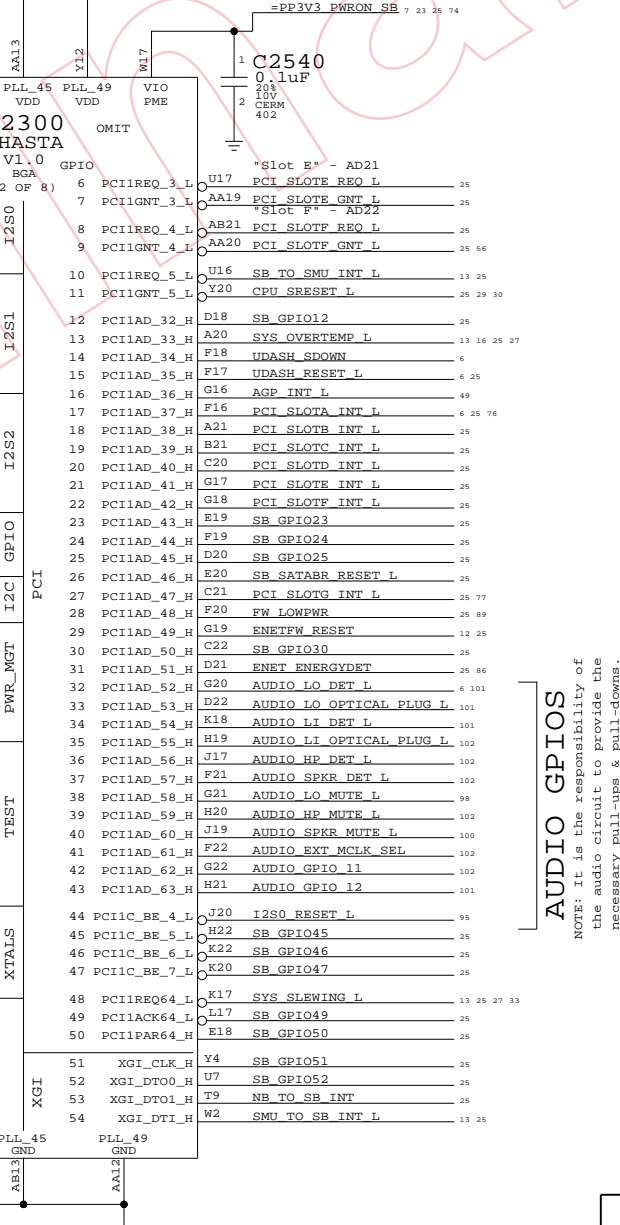
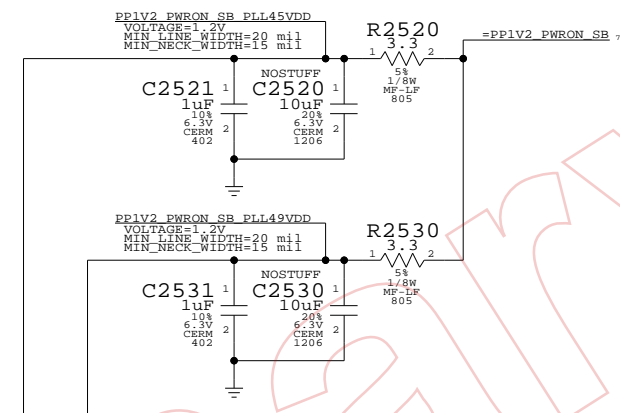
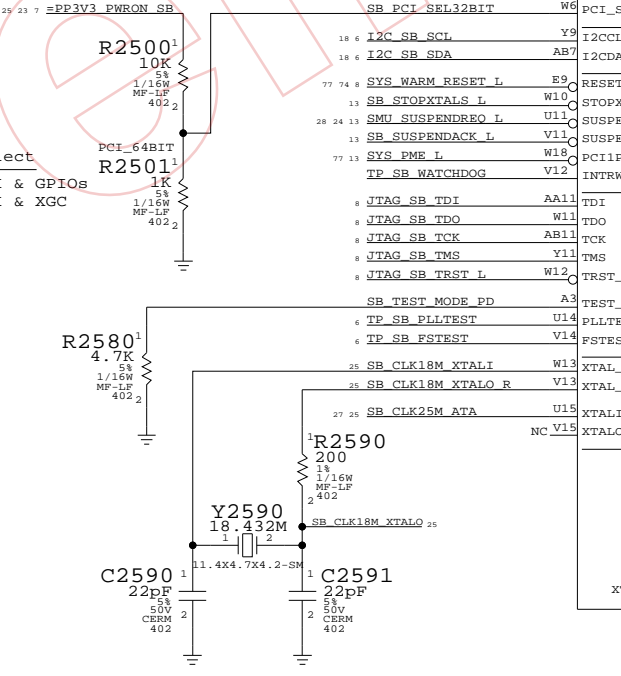
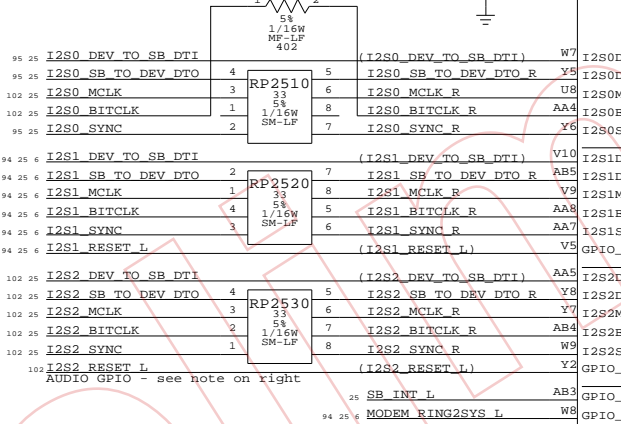
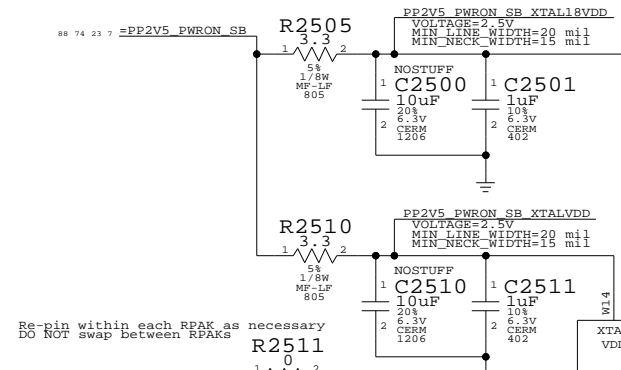
Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 - PCI_64BIT
 Configures Shasta for 64-bit PCI
 NOTE: XGC required for Shasta GPIOs
 - MPIC_NB/MPIC_SB
 Selects whether NorthBridge or SouthBridge MPIC will be used for interrupt controller.

NorthBridge / SouthBridge MPIC Routing



I2S1: Soft Modem
 I2S2: S/P-D/F



AUDIO GPIOs
 NOTE: It is the responsibility of the audio circuit to provide the necessary pull-ups & pull-downs.

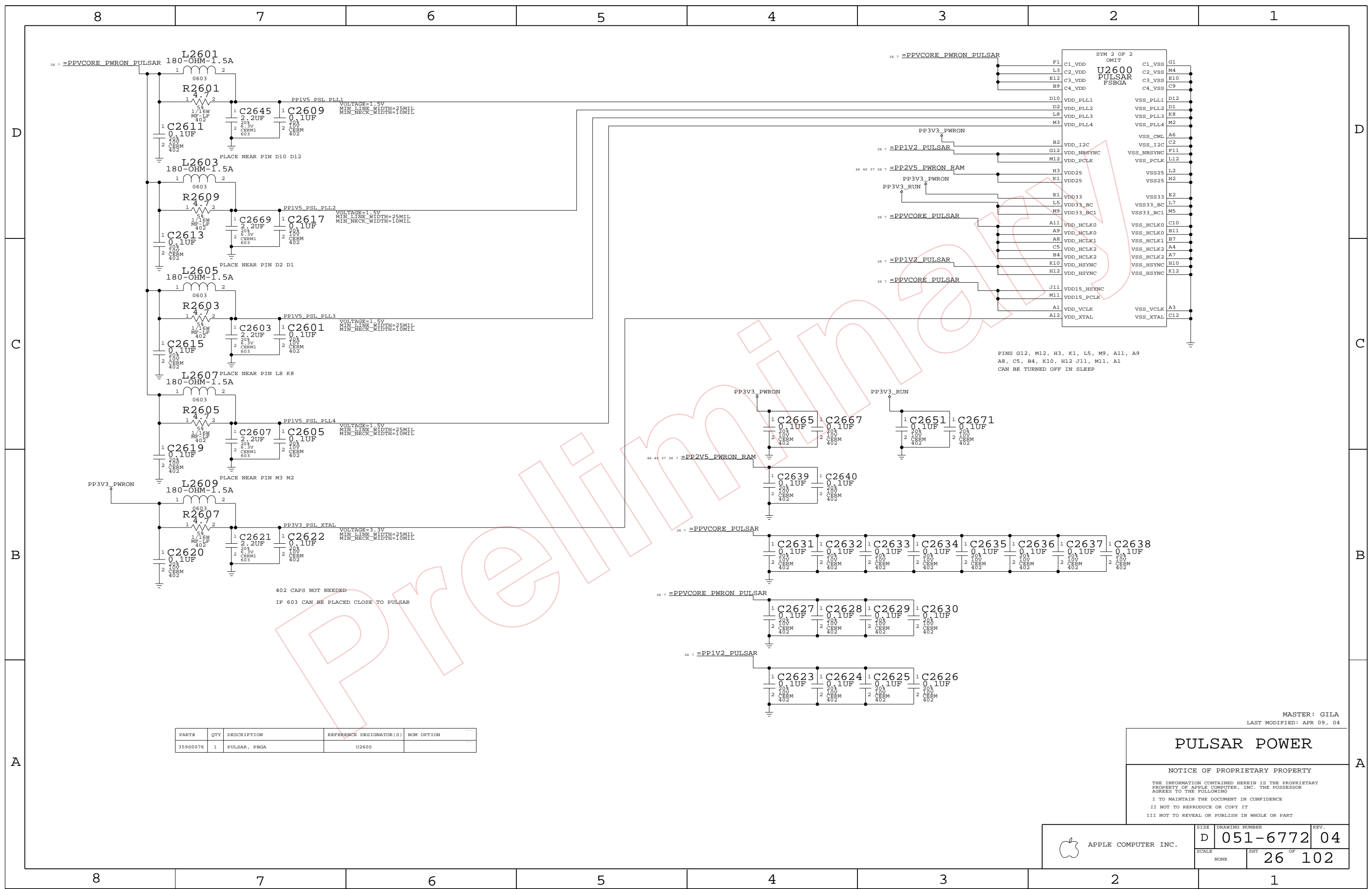
Shasta Serial / Misc

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NONE	25 OF 102	



APPLE COMPUTER INC.



PINS G12, M12, H3, K1, L5, M9, A11, A9, A8, C5, B4, K10, H12, J11, M11, A1 CAN BE TURNED OFF IN SLEEP

402 CAPS NOT NEEDED
IF 603 CAN BE PLACED CLOSE TO PULSAR

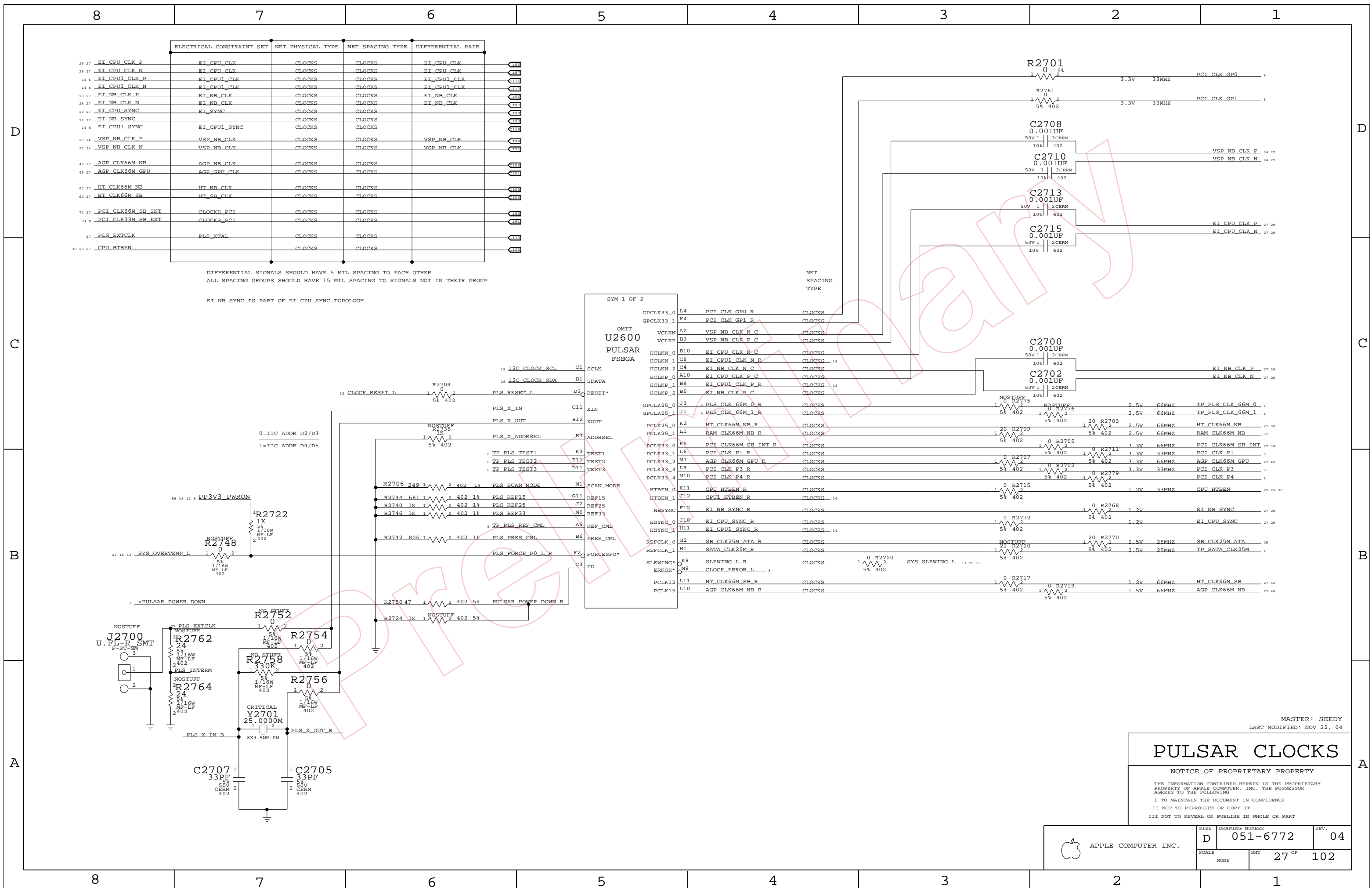
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
359S0076	1	PULSAR, FBGA	U2600	

MASTER: GILA
LAST MODIFIED: APR 09, 04

PULSAR POWER

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	NONE	051-6772	04
		SHT	OF
		26	102



	ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR	
29 27	EI_CPU_CLK_P	EI_CPU_CLK	CLOCKS	CLOCKS	EI_CPU_CLK
29 27	EI_CPU_CLK_N	EI_CPU_CLK	CLOCKS	CLOCKS	EI_CPU_CLK
14 6	EI_CPU1_CLK_P	EI_CPU1_CLK	CLOCKS	CLOCKS	EI_CPU1_CLK
14 6	EI_CPU1_CLK_N	EI_CPU1_CLK	CLOCKS	CLOCKS	EI_CPU1_CLK
28 27	EI_NB_CLK_P	EI_NB_CLK	CLOCKS	CLOCKS	EI_NB_CLK
28 27	EI_NB_CLK_N	EI_NB_CLK	CLOCKS	CLOCKS	EI_NB_CLK
29 27	EI_CPU_SYNC	EI_SYNC	CLOCKS	CLOCKS	EI_CPU_SYNC
28 27	EI_NB_SYNC	EI_SYNC	CLOCKS	CLOCKS	EI_NB_SYNC
14 6	EI_CPU1_SYNC	EI_CPU1_SYNC	CLOCKS	CLOCKS	EI_CPU1_SYNC
27 24	VSP_NB_CLK_P	VSP_NB_CLK	CLOCKS	CLOCKS	VSP_NB_CLK
27 24	VSP_NB_CLK_N	VSP_NB_CLK	CLOCKS	CLOCKS	VSP_NB_CLK
48 27	AGP_CLK66M_NB	AGP_NB_CLK	CLOCKS	CLOCKS	AGP_CLK66M_NB
49 27	AGP_CLK66M_GPU	AGP_GPU_CLK	CLOCKS	CLOCKS	AGP_CLK66M_GPU
60 27	HT_CLK66M_NB	HT_NB_CLK	CLOCKS	CLOCKS	HT_CLK66M_NB
62 27	HT_CLK66M_SB	HT_SB_CLK	CLOCKS	CLOCKS	HT_CLK66M_SB
74 27	PCI_CLK66M_SB_INT	CLOCKS_PCI	CLOCKS	CLOCKS	PCI_CLK66M_SB_INT
74 8	PCI_CLK33M_SB_EXT	CLOCKS_PCI	CLOCKS	CLOCKS	PCI_CLK33M_SB_EXT
27	PLS_EXTCLK	PLS_XTAL	CLOCKS	CLOCKS	PLS_EXTCLK
30 29 27	CPU_HTBEN		CLOCKS	CLOCKS	CPU_HTBEN

DIFFERENTIAL SIGNALS SHOULD HAVE 5 MIL SPACING TO EACH OTHER
 ALL SPACING GROUPS SHOULD HAVE 15 MIL SPACING TO SIGNALS NOT IN THEIR GROUP

EI_NB_SYNC IS PART OF EI_CPU_SYNC TOPOLOGY

SYM 1 OF 2

OMIT
U2600
 PULSAR
 FSBGA

GPCLK33_0	L4	PCI_CLK_GP0_R	CLOCKS
GPCLK33_1	K4	PCI_CLK_GP1_R	CLOCKS
VCLKN	A2	VSP_NB_CLK_N_C	CLOCKS
VCLKP	B3	VSP_NB_CLK_P_C	CLOCKS
HCLKN_0	B10	EI_CPU_CLK_N_C	CLOCKS
HCLKN_1	C8	EI_CPU1_CLK_N_C	CLOCKS
HCLKN_2	C4	EI_NB_CLK_N_C	CLOCKS
HCLKP_0	A10	EI_CPU_CLK_P_C	CLOCKS
HCLKP_1	B8	EI_CPU1_CLK_P_C	CLOCKS
HCLKP_2	B5	EI_NB_CLK_P_C	CLOCKS
GPCLK25_0	J3	PLS_CLK_66M_0_R	CLOCKS
GPCLK25_1	J1	PLS_CLK_66M_1_R	CLOCKS
PCLK25_0	K2	HT_CLK66M_NB_R	CLOCKS
PCLK25_1	L1	RAM_CLK66M_NB_R	CLOCKS
PCLK33_0	R5	PCI_CLK66M_SB_INT_R	CLOCKS
PCLK33_1	L6	PCI_CLK_P1_R	CLOCKS
PCLK33_2	M7	AGP_CLK66M_GPU_R	CLOCKS
PCLK33_3	L9	PCI_CLK_P3_R	CLOCKS
PCLK33_4	M10	PCI_CLK_P4_R	CLOCKS
HTBEN_0	K11	CPU_HTBEN_R	CLOCKS
HTBEN_1	J12	CPU1_HTBEN_R	CLOCKS
NBSYNC	F12	EI_NB_SYNC_R	CLOCKS
HSYNC_0	J10	EI_CPU_SYNC_R	CLOCKS
HSYNC_1	H11	EI_CPU1_SYNC_R	CLOCKS
REFCLK_0	G2	SB_CLK25M_ATA_R	CLOCKS
REFCLK_1	H1	SATA_CLK25M_R	CLOCKS
SLEWING+ ERROR+	K9 M8	SLEWING_L_R CLOCK_ERROR_L	CLOCKS
PCLK12	L11	HT_CLK66M_SB_R	CLOCKS
PCLK15	L10	AGP_CLK66M_NB_R	CLOCKS

MASTER: SEEDY
 LAST MODIFIED: NOV 22, 04

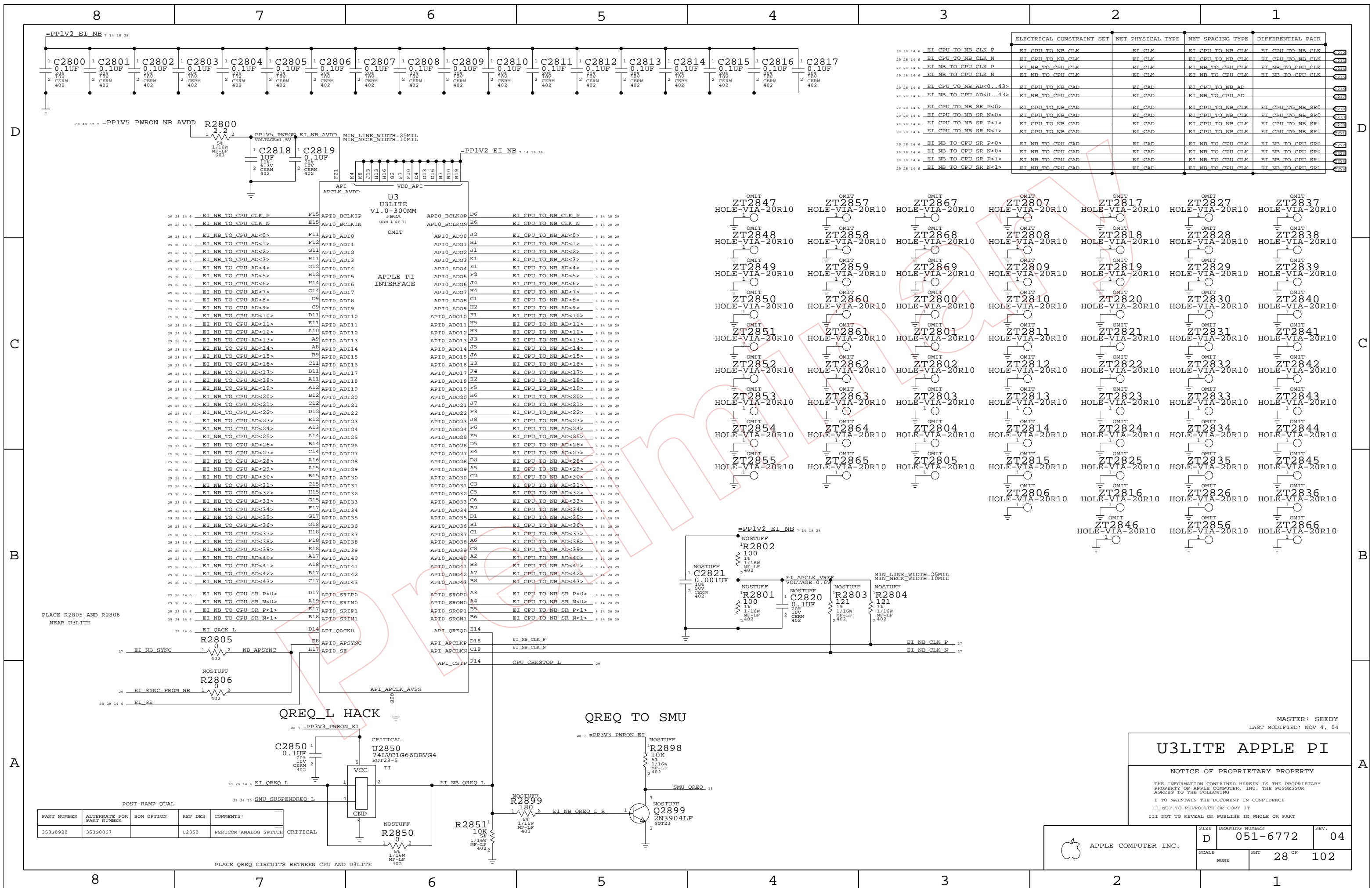
PULSAR CLOCKS

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	D	051-6772	04
SCALE	SHT	27 OF	102
NONE			



	ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
28 14 6	EI CPU TO NB CLK P	EI_CPU_TO_NB_CLK	EI_CLK	EI_CPU_TO_NB_CLK
28 14 6	EI CPU TO NB CLK N	EI_CPU_TO_NB_CLK	EI_CLK	EI_CPU_TO_NB_CLK
28 14 6	EI NB TO CPU CLK P	EI_NB_TO_CPU_CLK	EI_CLK	EI_NB_TO_CPU_CLK
28 14 6	EI NB TO CPU CLK N	EI_NB_TO_CPU_CLK	EI_CLK	EI_NB_TO_CPU_CLK
28 14 6	EI CPU TO NB AD<0..43>	EI_CPU_TO_NB_CAD	EI_CAD	EI_CPU_TO_NB_AD
28 14 6	EI NB TO CPU AD<0..43>	EI_NB_TO_CPU_CAD	EI_CAD	EI_NB_TO_CPU_AD
28 14 6	EI CPU TO NB SR P<0>	EI_CPU_TO_NB_CAD	EI_CAD	EI_CPU_TO_NB_SR0
28 14 6	EI CPU TO NB SR N<0>	EI_CPU_TO_NB_CAD	EI_CAD	EI_CPU_TO_NB_SR0
28 14 6	EI CPU TO NB SR P<1>	EI_CPU_TO_NB_CAD	EI_CAD	EI_CPU_TO_NB_SR1
28 14 6	EI CPU TO NB SR N<1>	EI_CPU_TO_NB_CAD	EI_CAD	EI_CPU_TO_NB_SR1
28 14 6	EI NB TO CPU SR P<0>	EI_NB_TO_CPU_CAD	EI_CAD	EI_NB_TO_CPU_SR0
28 14 6	EI NB TO CPU SR N<0>	EI_NB_TO_CPU_CAD	EI_CAD	EI_NB_TO_CPU_SR0
28 14 6	EI NB TO CPU SR P<1>	EI_NB_TO_CPU_CAD	EI_CAD	EI_NB_TO_CPU_SR1
28 14 6	EI NB TO CPU SR N<1>	EI_NB_TO_CPU_CAD	EI_CAD	EI_NB_TO_CPU_SR1

PLACE R2805 AND R2806 NEAR U3LITE

PLACE QREQ CIRCUITS BETWEEN CPU AND U3LITE

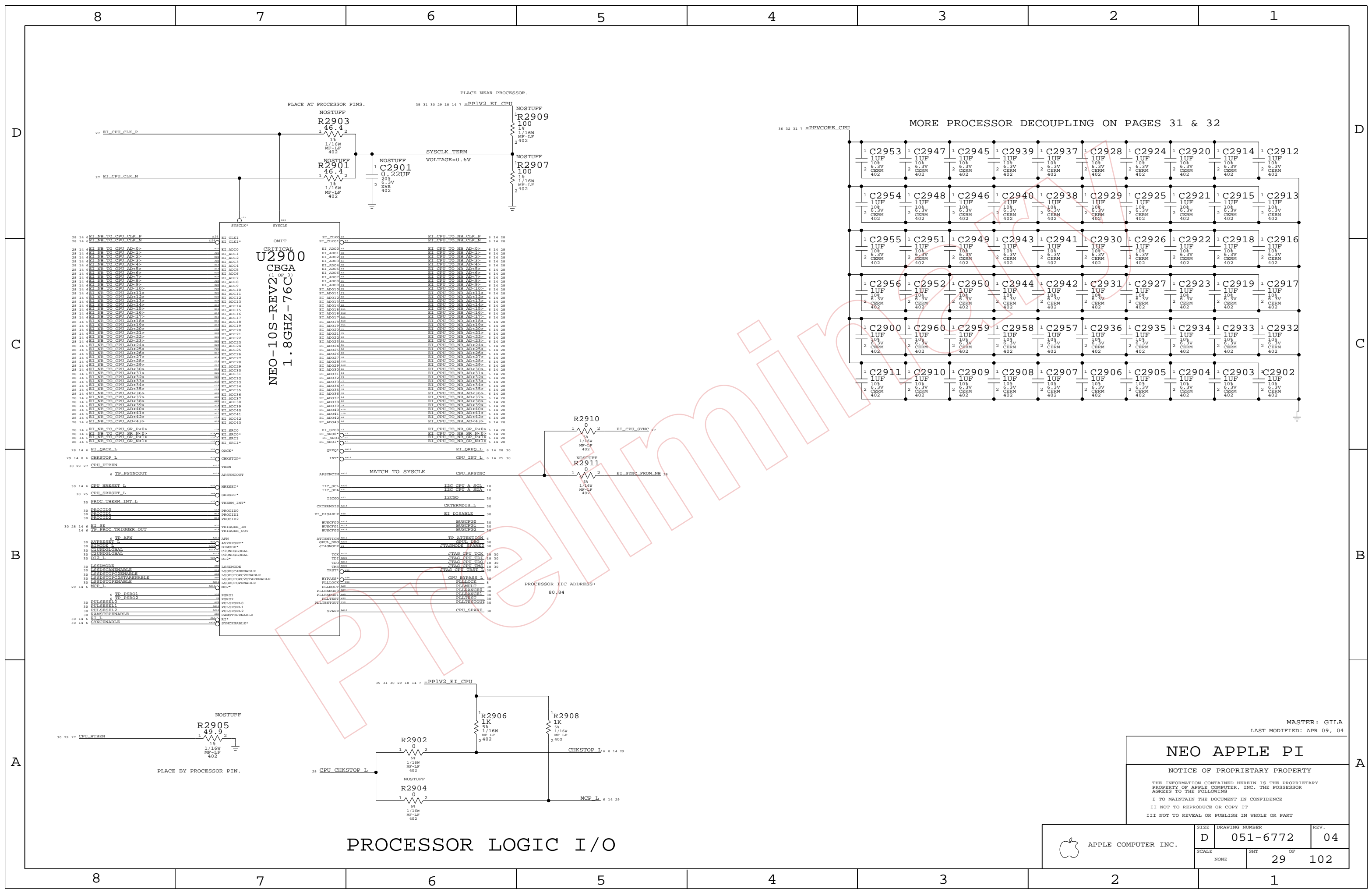
MASTER: SEEDY
LAST MODIFIED: NOV 4, 04

U3LITE APPLE PI

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PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
353S0920	353S0867		U2850	PERICOM ANALOG SWITCH

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	28 OF 102	
NONE			



CRITICAL
U2900
 NEO-10S-REV2
 CBGA
 1.8GHZ - 76C
 (1 OF 2)

MORE PROCESSOR DECOUPLING ON PAGES 31 & 32

PROCESSOR IIC ADDRESS:
 80,84

MASTER: GILA
 LAST MODIFIED: APR 09, 04

NEO APPLE PI

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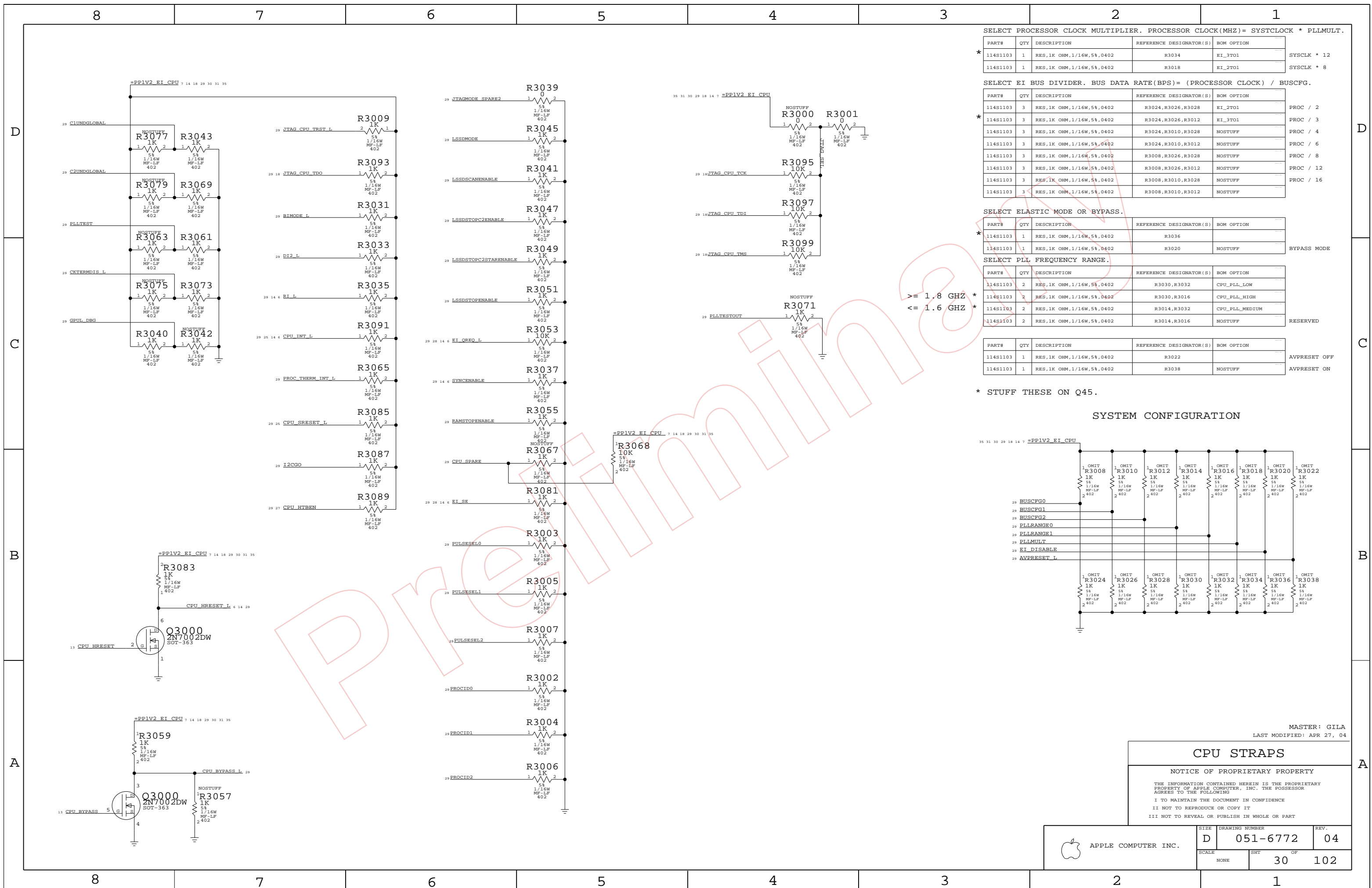
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PROCESSOR LOGIC I/O

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	OF	
NONE	29	102	



SELECT PROCESSOR CLOCK MULTIPLIER. PROCESSOR CLOCK(MHZ)= SYSTCLOCK * PLLMULT.

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION	
114S1103	1	RES,1K OHM,1/16W,5%,0402	R3034	EI_3T01	SYSCLK * 12
114S1103	1	RES,1K OHM,1/16W,5%,0402	R3018	EI_2T01	SYSCLK * 8

SELECT EI BUS DIVIDER. BUS DATA RATE(BPS)= (PROCESSOR CLOCK) / BUSCFG.

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION	
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3024,R3026,R3028	EI_2T01	PROC / 2
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3024,R3026,R3012	EI_3T01	PROC / 3
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3024,R3010,R3028	NOSTUFF	PROC / 4
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3024,R3010,R3012	NOSTUFF	PROC / 6
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3008,R3026,R3028	NOSTUFF	PROC / 8
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3008,R3026,R3012	NOSTUFF	PROC / 12
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3008,R3010,R3028	NOSTUFF	PROC / 16
114S1103	3	RES,1K OHM,1/16W,5%,0402	R3008,R3010,R3012	NOSTUFF	

SELECT ELASTIC MODE OR BYPASS.

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION	
114S1103	1	RES,1K OHM,1/16W,5%,0402	R3036		BYPASS MODE
114S1103	1	RES,1K OHM,1/16W,5%,0402	R3020	NOSTUFF	

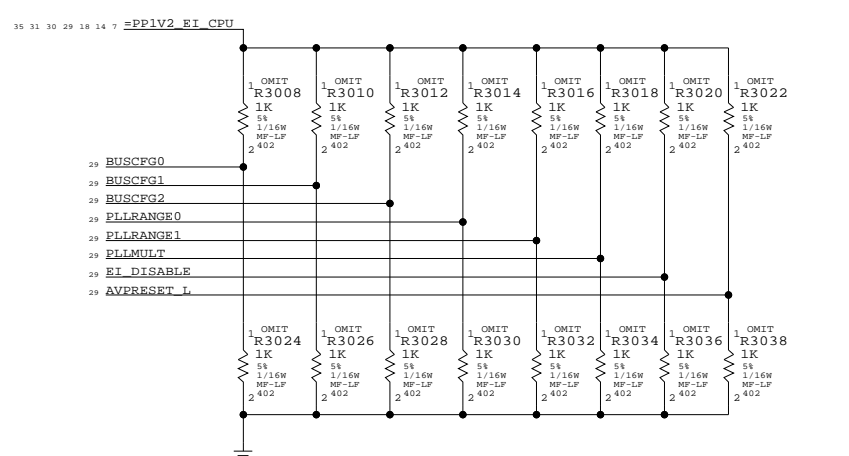
SELECT PLL FREQUENCY RANGE.

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION	
114S1103	2	RES,1K OHM,1/16W,5%,0402	R3030,R3032	CPU_PLL_LOW	
114S1103	2	RES,1K OHM,1/16W,5%,0402	R3030,R3016	CPU_PLL_HIGH	
114S1103	2	RES,1K OHM,1/16W,5%,0402	R3014,R3032	CPU_PLL_MEDIUM	
114S1103	2	RES,1K OHM,1/16W,5%,0402	R3014,R3016	NOSTUFF	RESERVED

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION	
114S1103	1	RES,1K OHM,1/16W,5%,0402	R3022		AVPRESET OFF
114S1103	1	RES,1K OHM,1/16W,5%,0402	R3038	NOSTUFF	AVPRESET ON

* STUFF THESE ON Q45.

SYSTEM CONFIGURATION

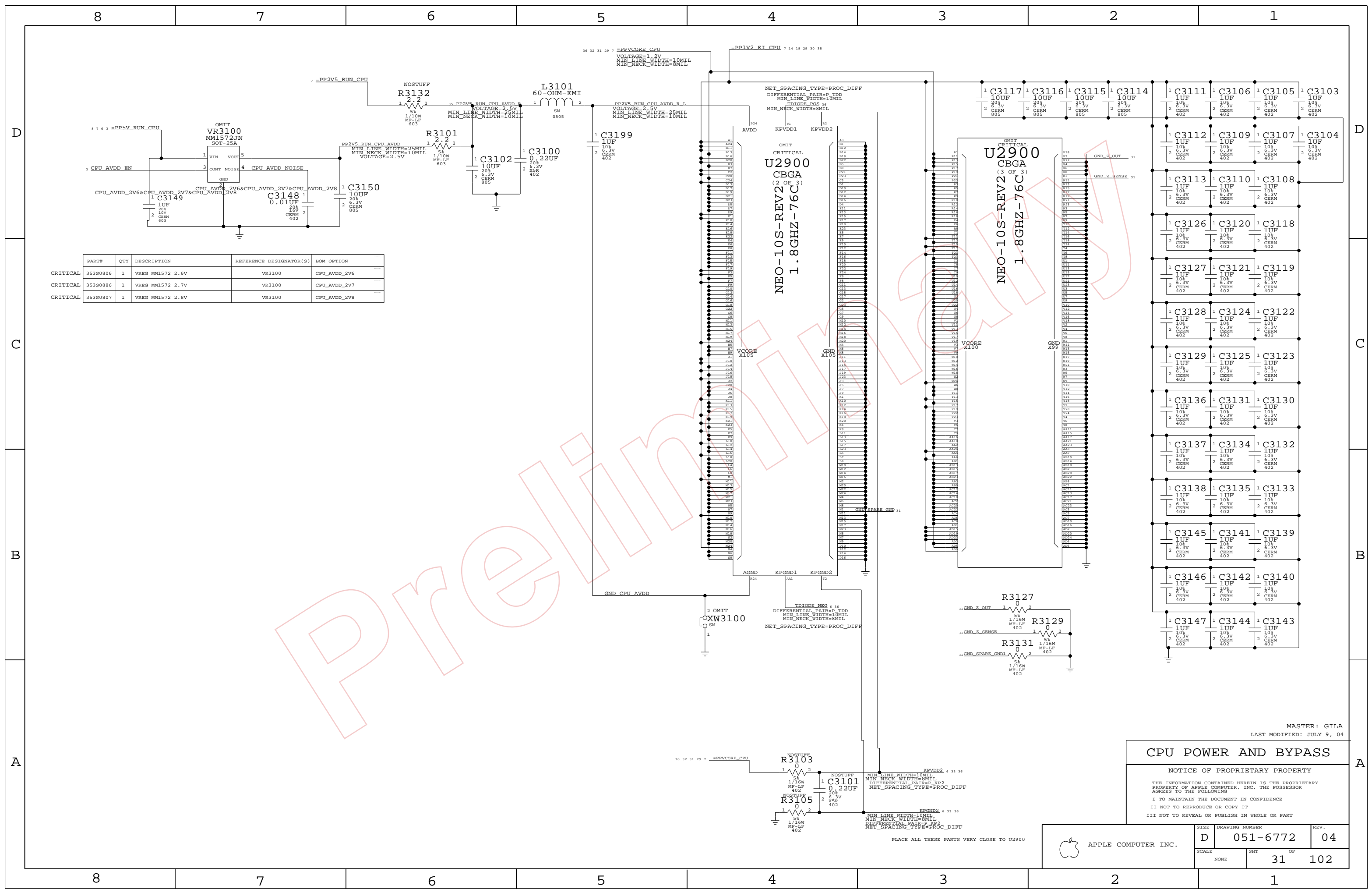


MASTER: GILA
LAST MODIFIED: APR 27, 04

CPU STRAPS

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	OF	
NONE	30	102	



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
CRITICAL 353S0806	1	VREG MM1572 2.6V	VR3100	CPU_AVDD_2V6
CRITICAL 353S0886	1	VREG MM1572 2.7V	VR3100	CPU_AVDD_2V7
CRITICAL 353S0807	1	VREG MM1572 2.8V	VR3100	CPU_AVDD_2V8

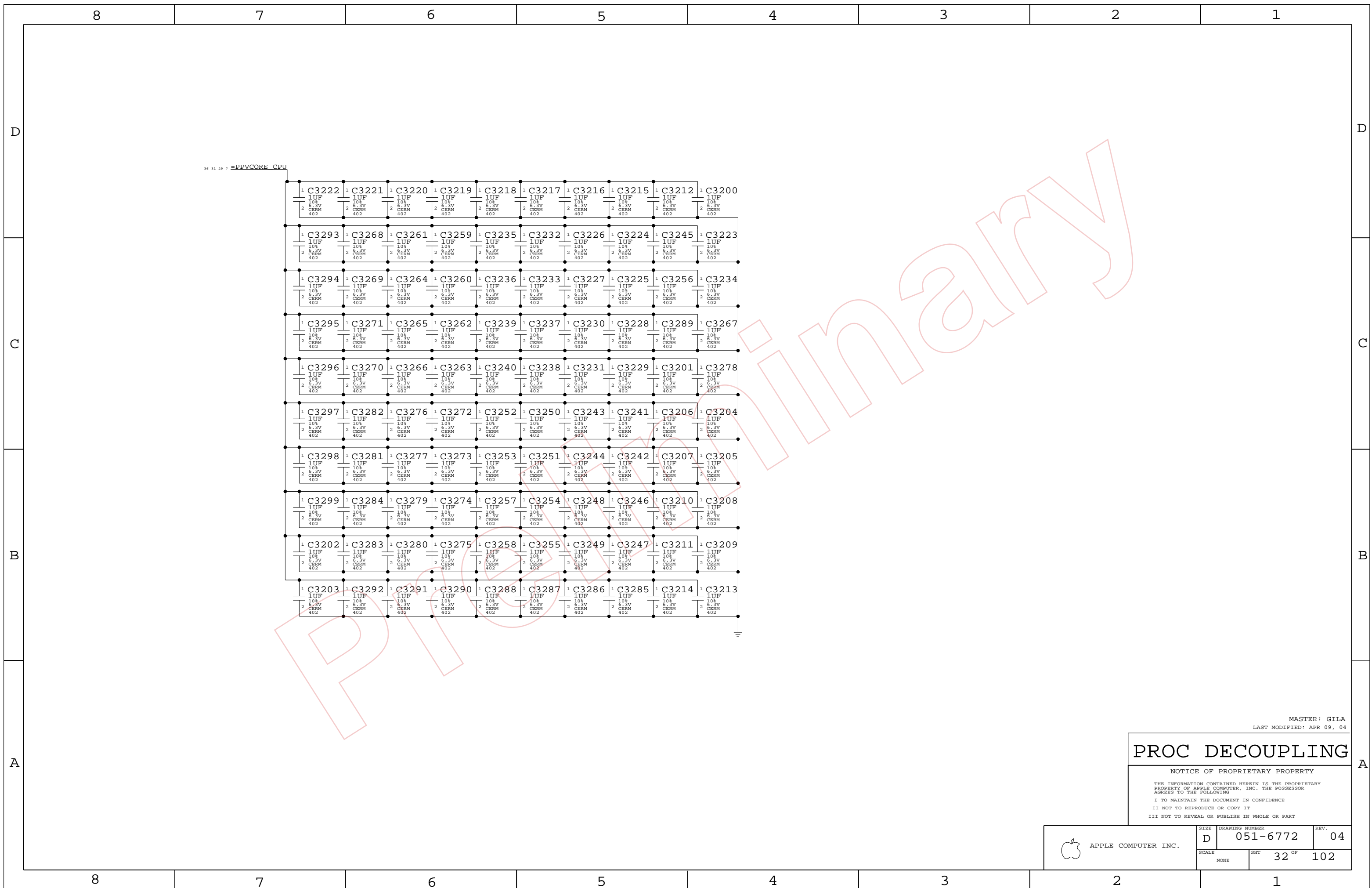
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LAST MODIFIED: JULY 9, 04

CPU POWER AND BYPASS

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT	OF
		31	102

PLACE ALL THESE PARTS VERY CLOSE TO U2900




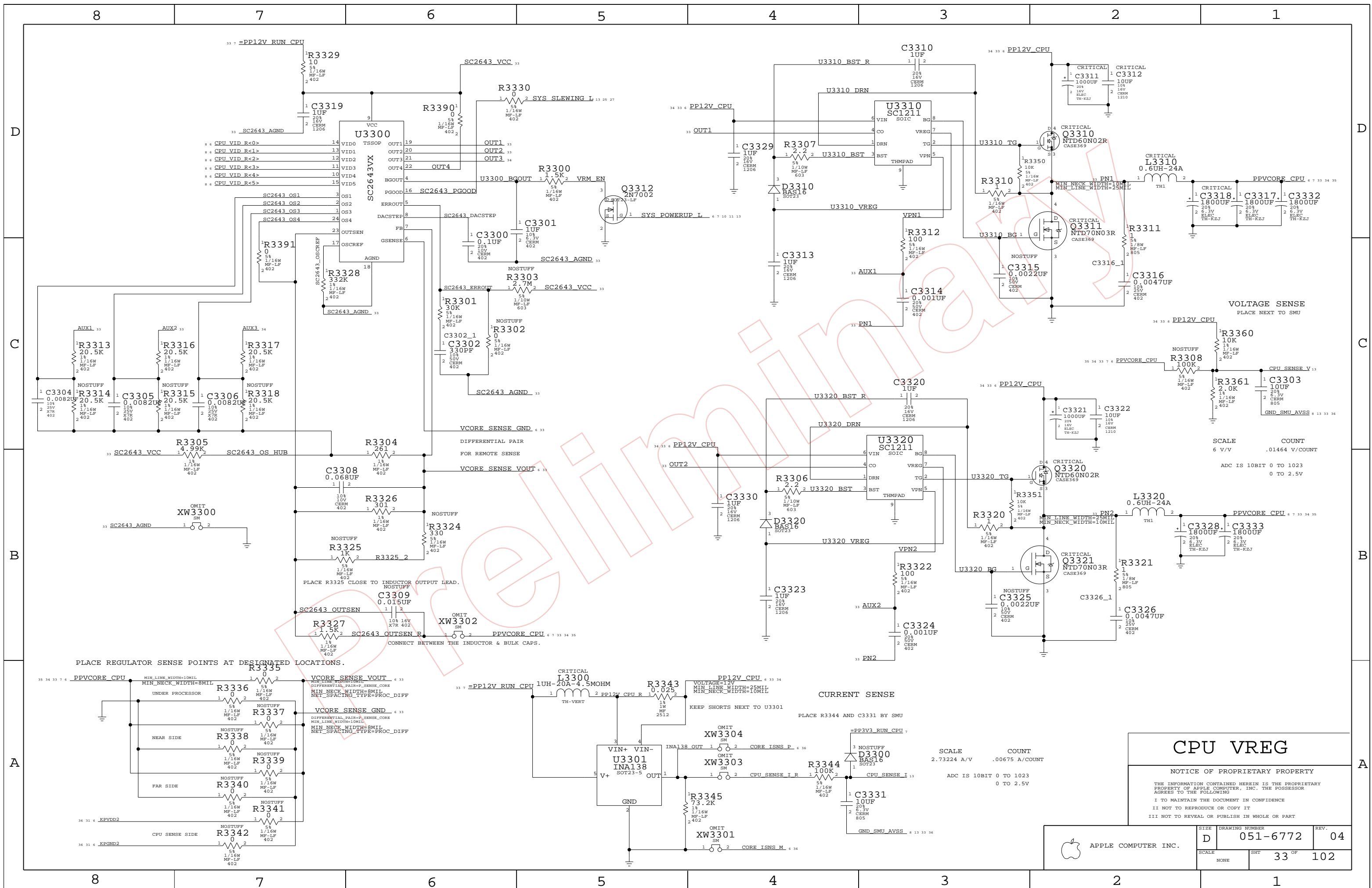
36 31 29 7 =PPVCORE_CPU

MASTER: GILA
LAST MODIFIED: APR 09, 04

PROC DECOUPLING

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 APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	OF	
NONE	32	102	



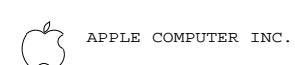
CPU VREG

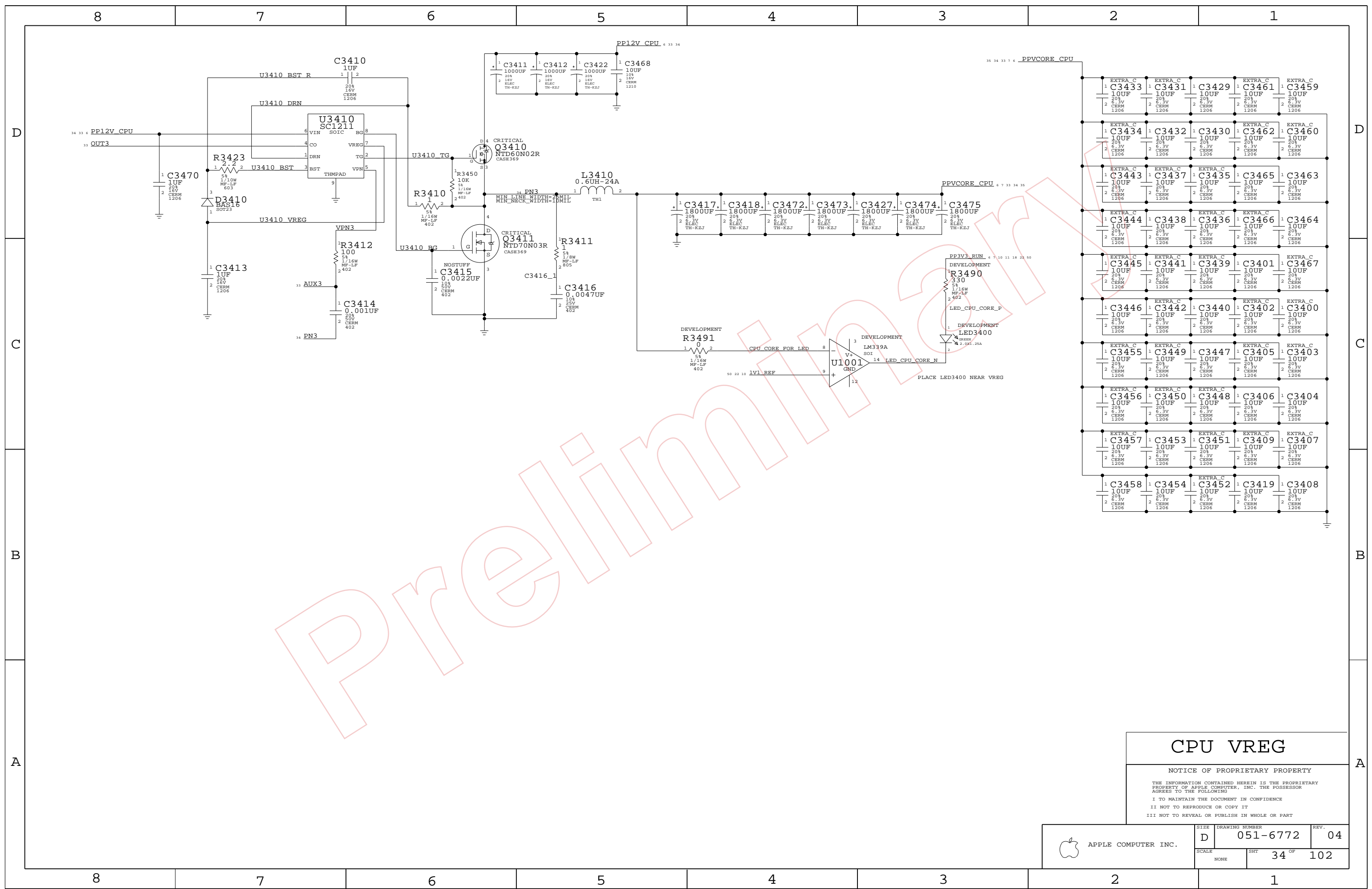
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SCALE 2.73224 A/V
 COUNT .00675 A/COUNT
 ADC IS 10BIT 0 TO 1023
 0 TO 2.5V

SIZE	DRAWING NUMBER	REV.
D	051-6772	04
SCALE	SHT	33 OF 102
NONE		





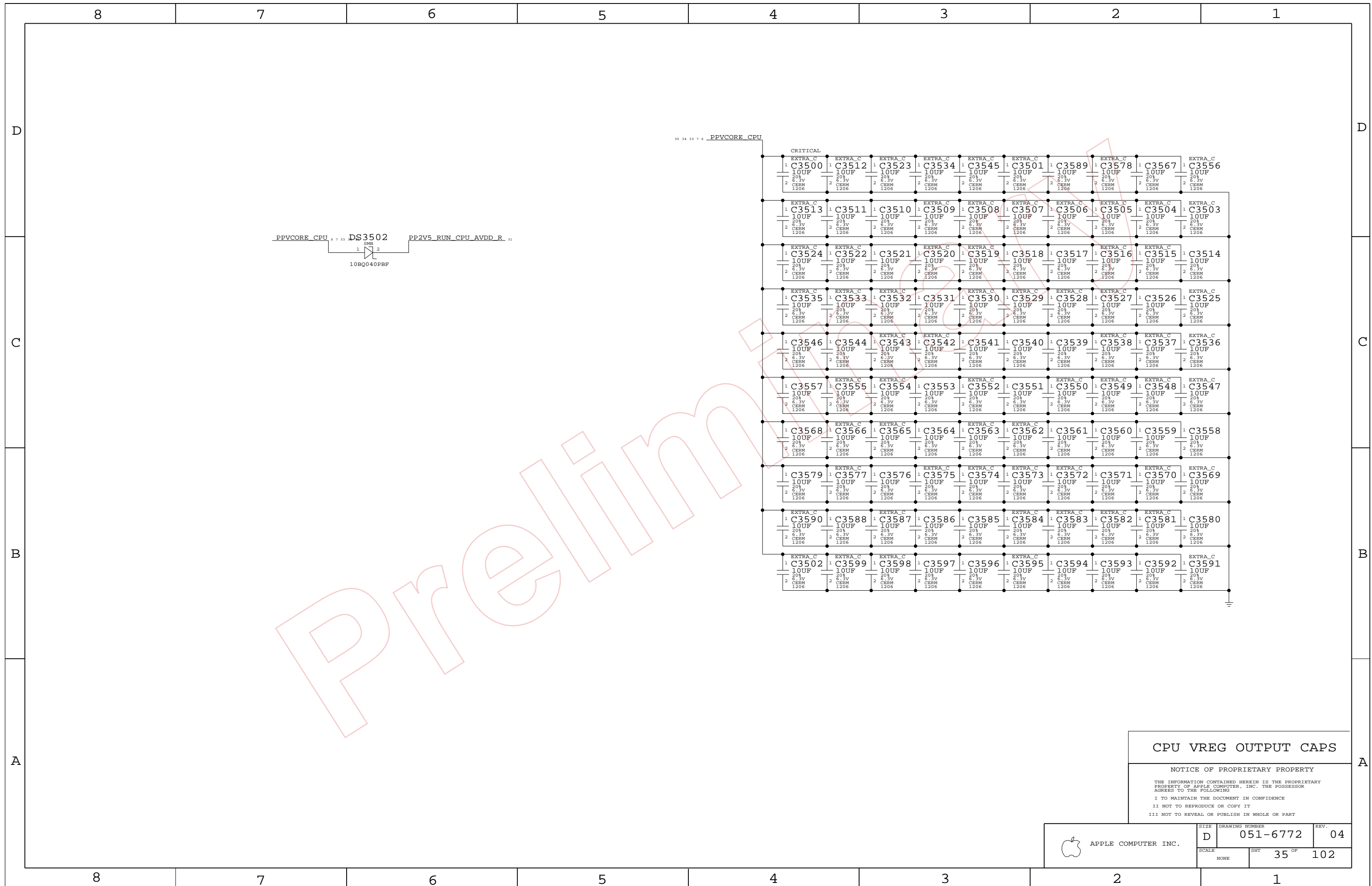
Pre-internal

CPU VREG

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE		SHT	102
NONE		34 OF	



Prelim

CPU VREG OUTPUT CAPS

NOTICE OF PROPRIETARY PROPERTY

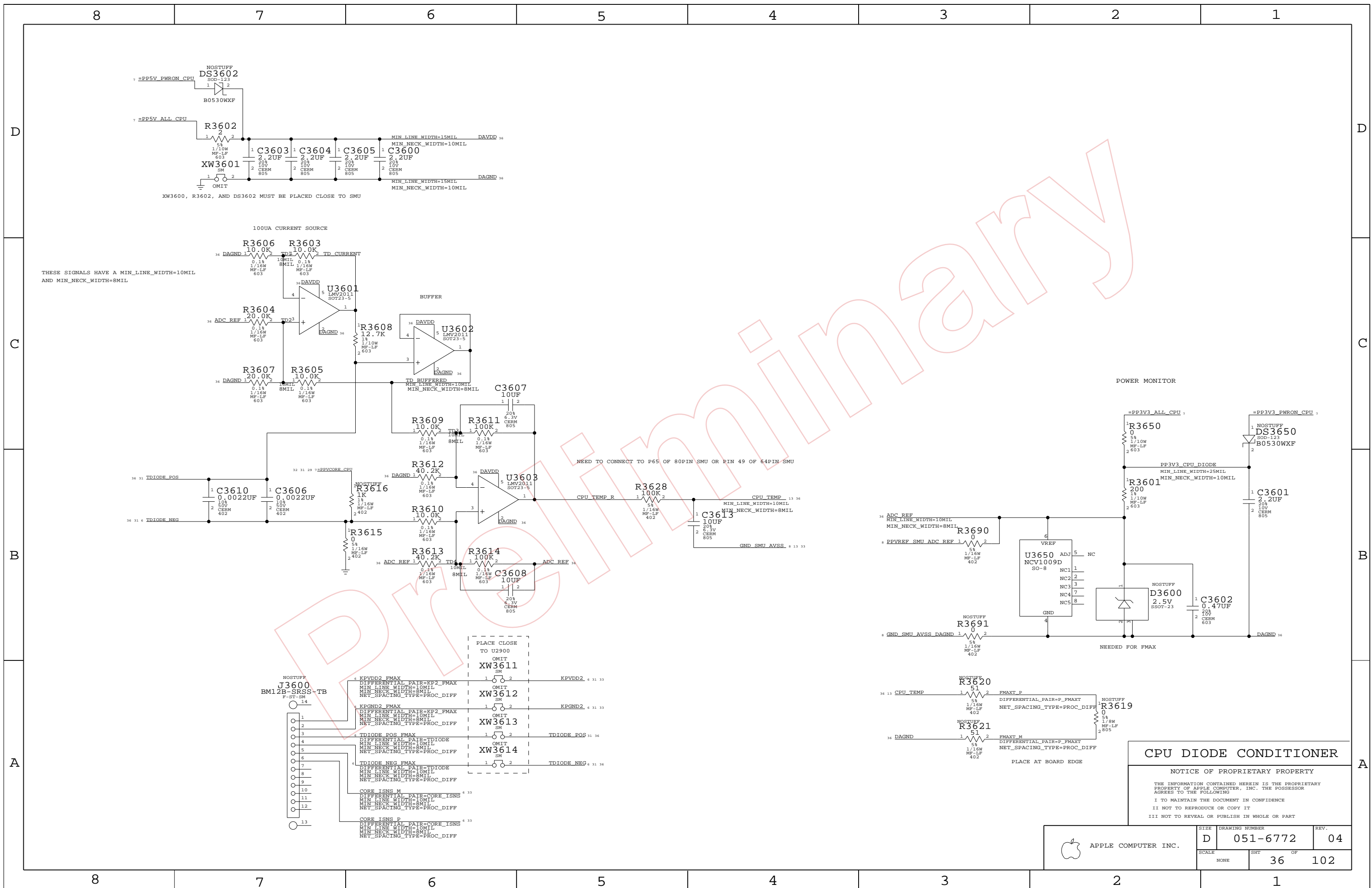
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	D	051-6772	04
SCALE	SHT		OF
NONE	35		102



THESE SIGNALS HAVE A MIN_LINE_WIDTH=10MIL AND MIN_NECK_WIDTH=8MIL

NEED TO CONNECT TO P65 OF 80PIN SMU OR PIN 49 OF 64PIN SMU

POWER MONITOR

NEEDED FOR FMAX

PLACE AT BOARD EDGE

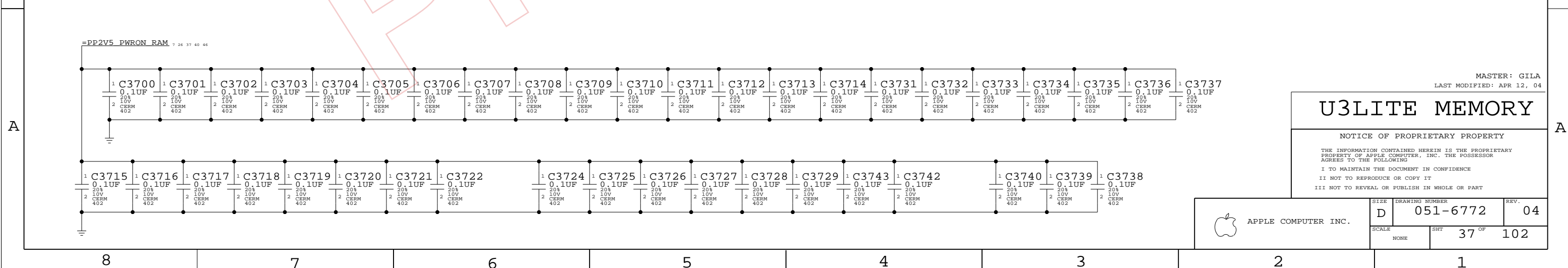
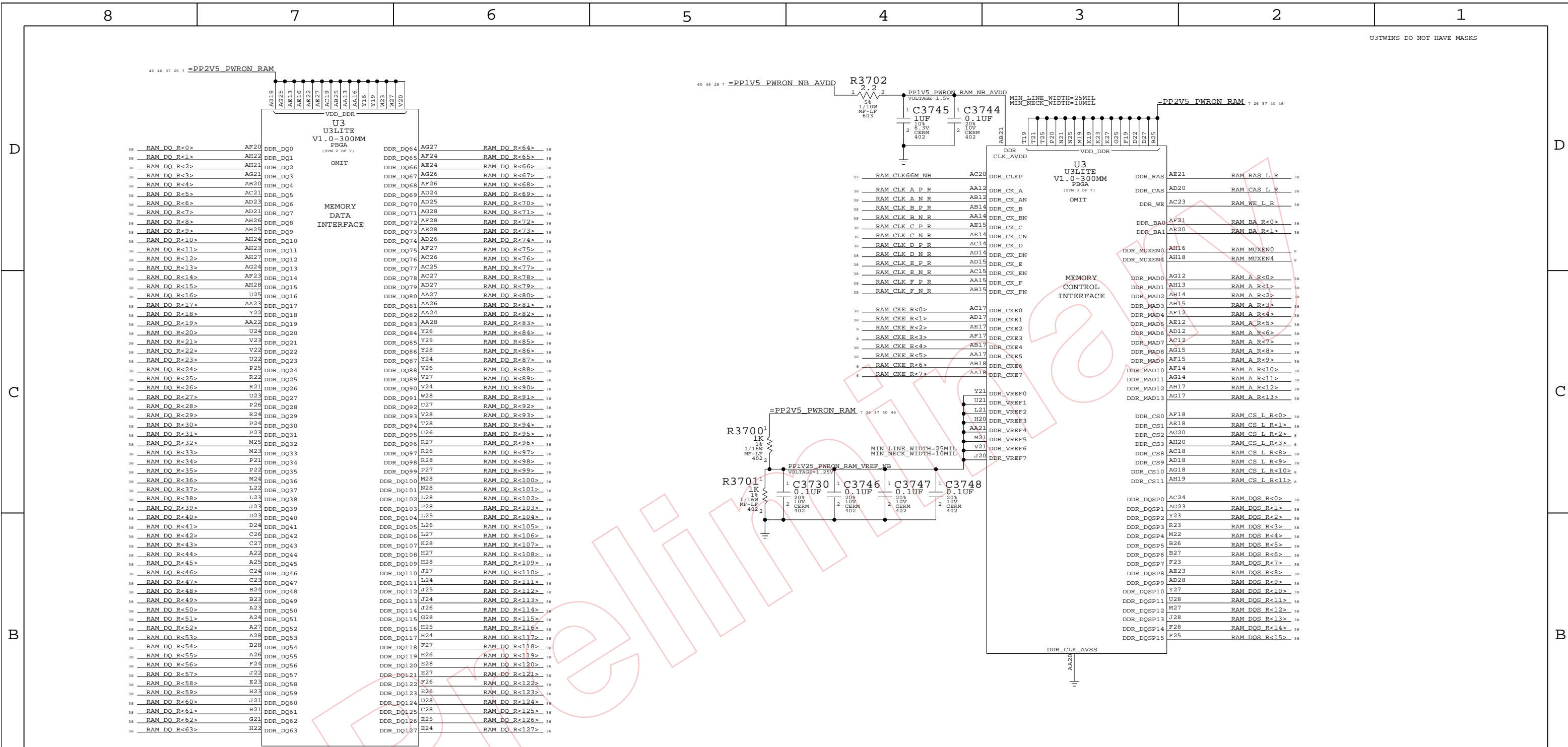
PLACE CLOSE TO U2900

CPU DIODE CONDITIONER

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	OF	
NONE	36	102	



MASTER: GILA
LAST MODIFIED: APR 12, 04

U3LITE MEMORY

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	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE		SHT	
NONE		37 OF	102

ALL R PACKS ARE 1/16W 5%

ELECTRICAL_CONSTRAINT_SET NET_PHYSICAL_TYPE NET_SPACING_TYPE DIFFERENTIAL_PAIR

D

D

C

C

B

B

A

A

Table listing electrical components for column 8, including RAM DO R<7> through RAM DO R<62>.

Table listing electrical components for column 5, including RAM DO R<68> through RAM DO R<127>.

Table listing electrical components for column 3, including RAM CLK A P R through RAM WE L.

Table listing electrical components for column 1, including RAM CLK A R through RAM WE L.

THE FOLLOWING IS A SWAPPABLE GROUP
RAM_CKE R<4> RP3841 3 6 15 RAM_CKE<4>

THE FOLLOWING ARE 0402 5% RESISTORS
RAM_CLK A P R R3816 1 2 15 RAM_CLK A P

THE FOLLOWING IS A SWAPPABLE GROUP
RAM_A R<11> RP3832 3 6 15 RAM_A<11>

RAM_DQS R<0> R3800 1 2 15 RAM_DQS<0>
RAM_DQS R<1> R3801 1 2 15 RAM_DQS<1>

RAM_CAS L R RP3804 1 8 15 RAM_CAS L
RAM_BA R<0> RP3804 4 5 15 RAM_BA<0>

RAM_CLK PRIMARY SPACING SET BASED ON DIFF IMPEDANCE
RAM_CLK LINE-LINE SPACING SET TO 15MIL
TOTAL LENGTH TOLERANCE = 20PS = 2.82MM

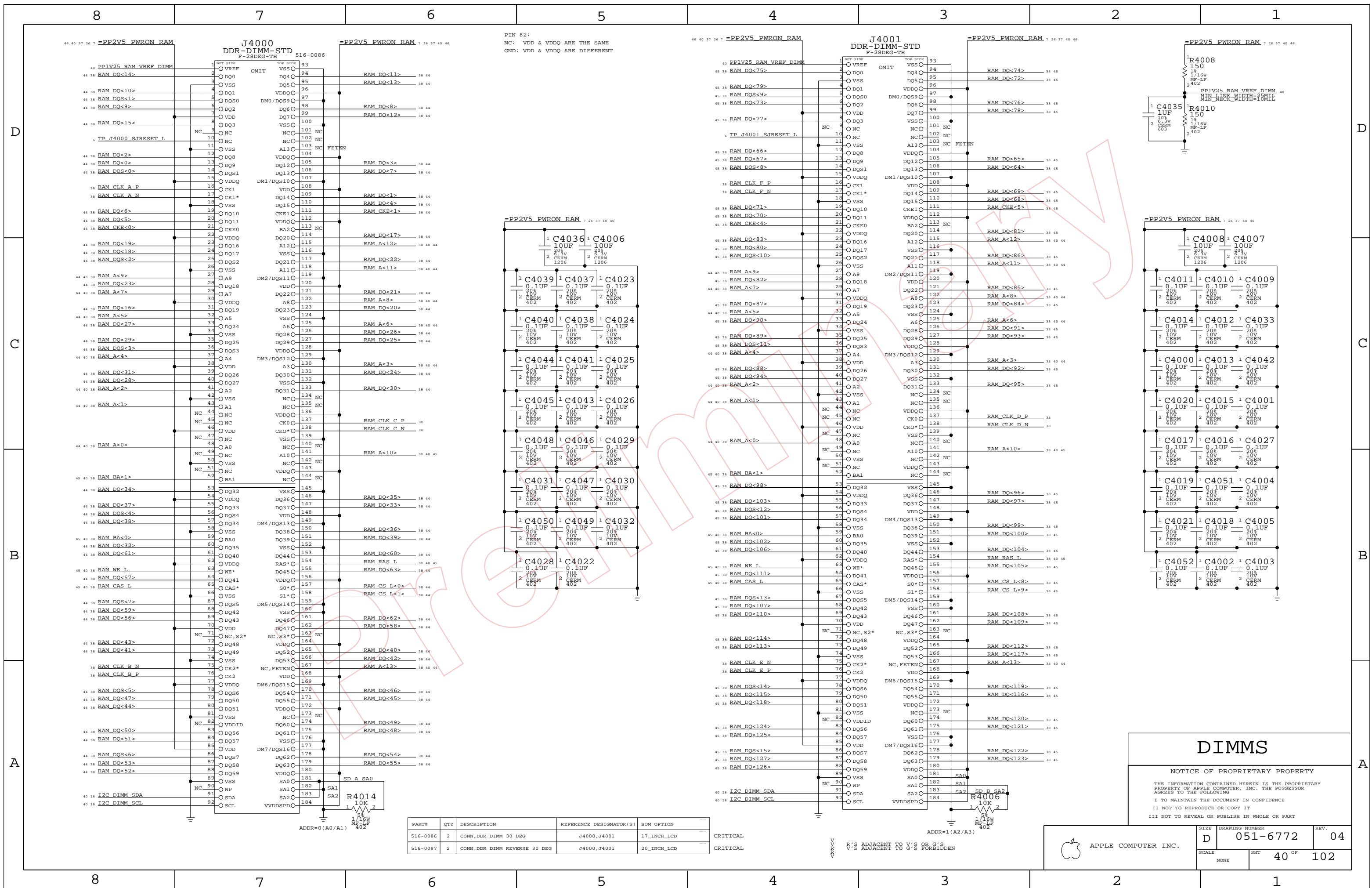
RAM_CAD SPACING IS 10MIL

SERIES TERM

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Table with 3 columns: SIZE (D), DRAWING NUMBER (051-6772), REV. (04). Includes Apple logo and 'APPLE COMPUTER INC.' text.



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
516-0086	2	CONN,DDR DIMM 30 DEG	J4000,J4001	17_INCH_LCD
516-0087	2	CONN,DDR DIMM REVERSE 30 DEG	J4000,J4001	20_INCH_LCD

DIMMS

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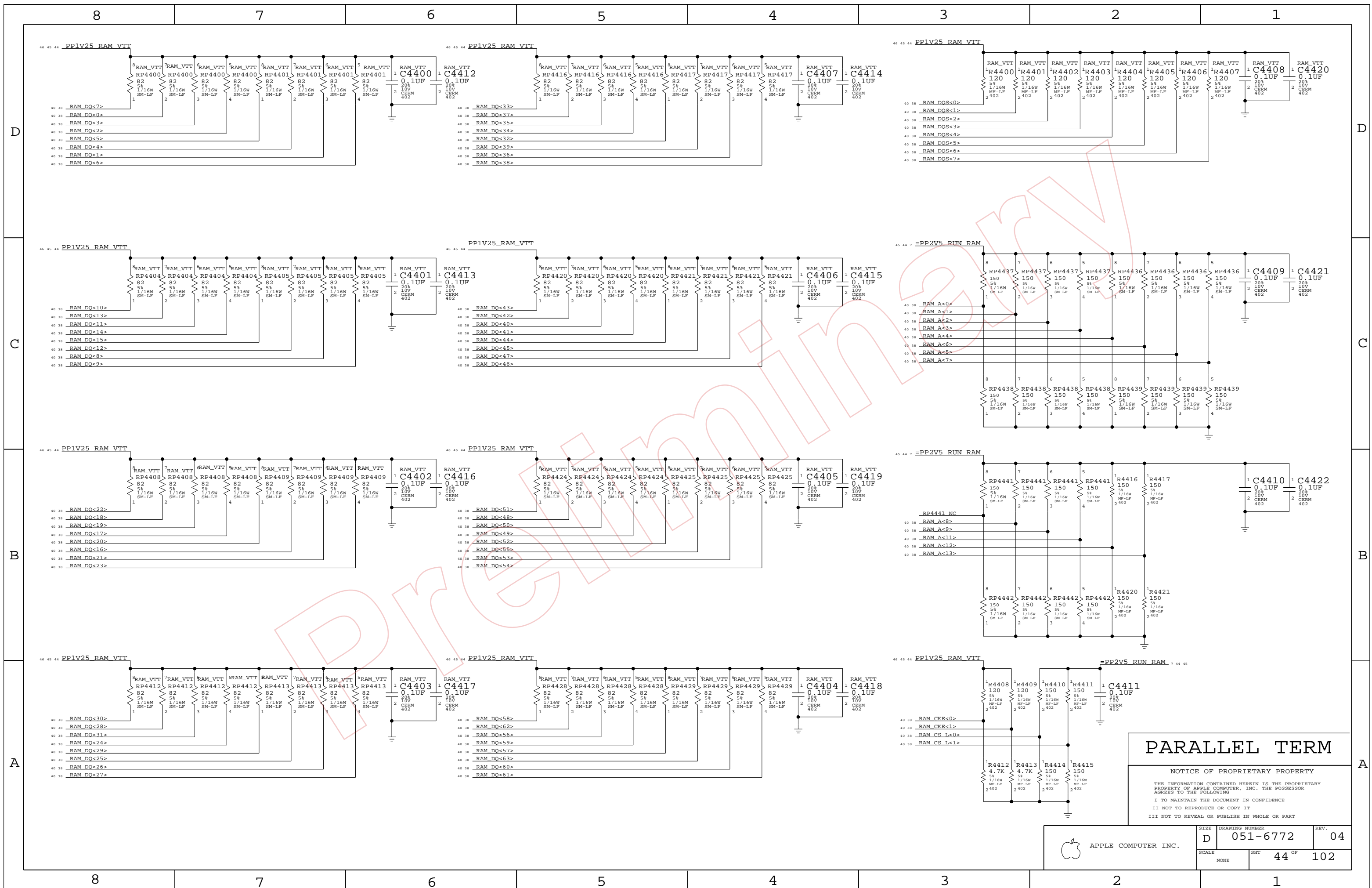
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
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	DRAWING NUMBER		REV.
	D	051-6772	04
SCALE		SHEET	OF
NONE		40	102

CRITICAL

V'S ADJACENT TO V'S OR G'S FORBIDDEN

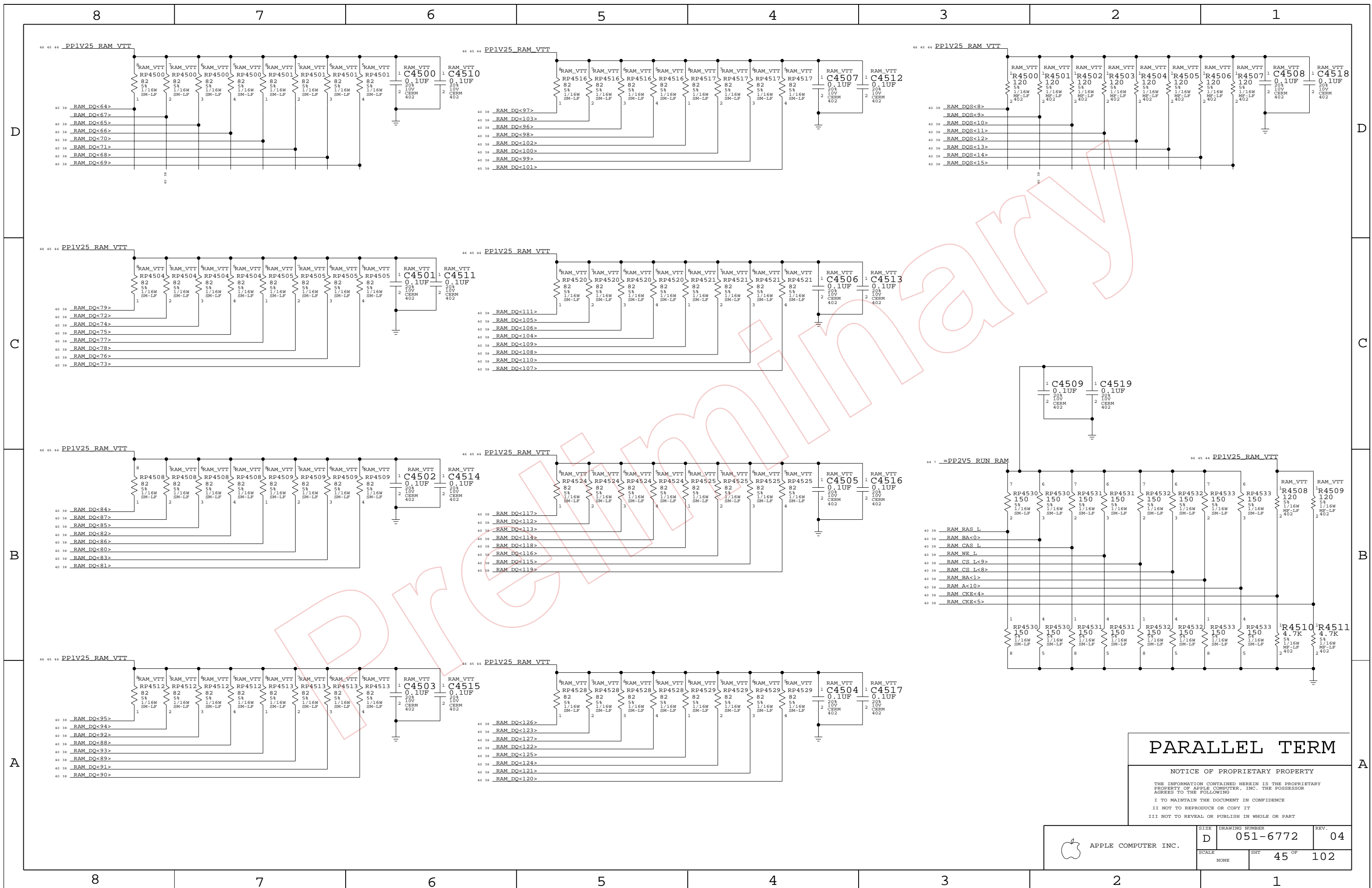
ADDR=1(A2/A3)



PARALLEL TERM

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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6772	REV. 04
	SCALE NONE	SHEET 44 OF 102	

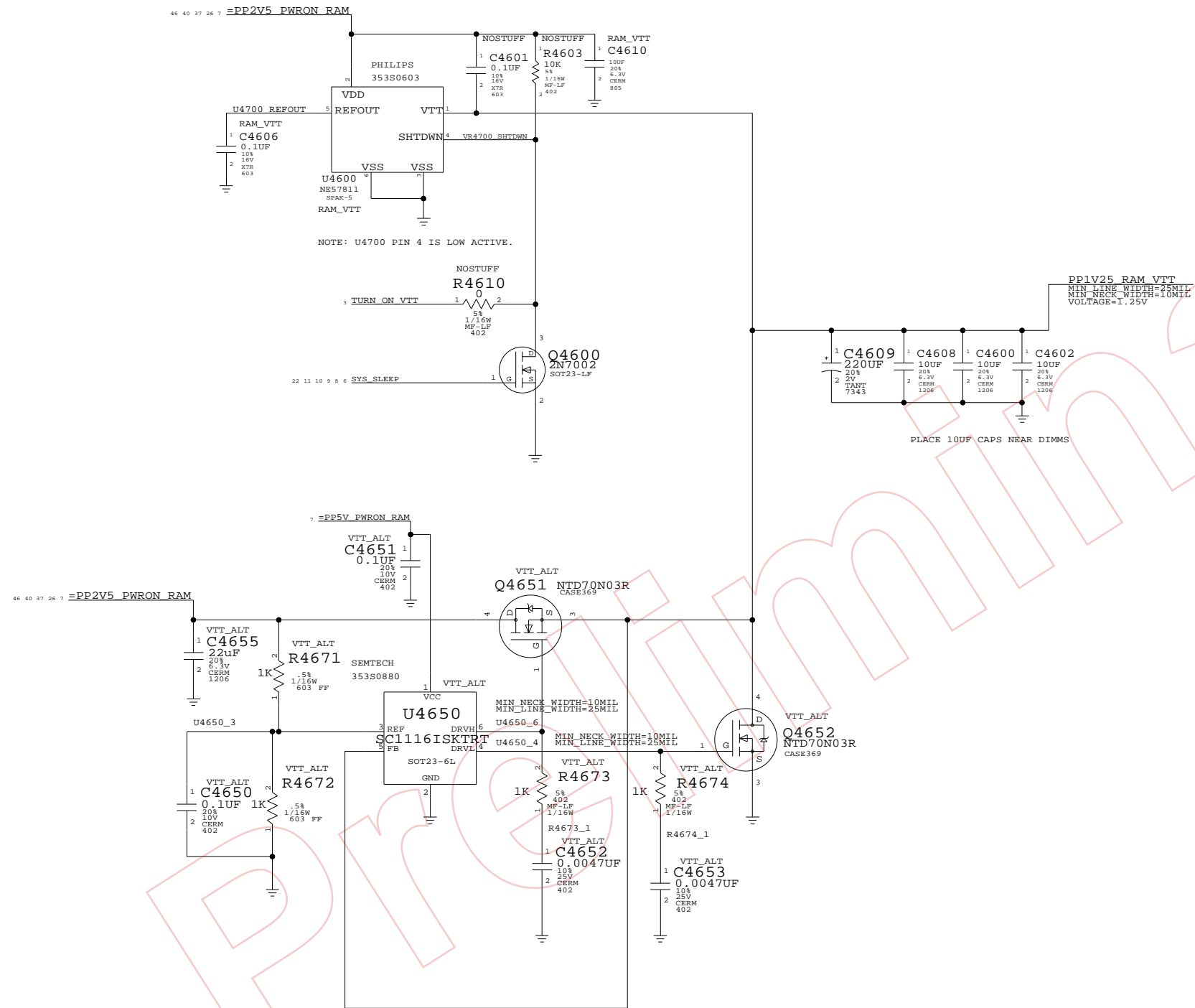


PARALLEL TERM

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	D	051-6772	04
SCALE	SHT	45 OF 102	
NONE			

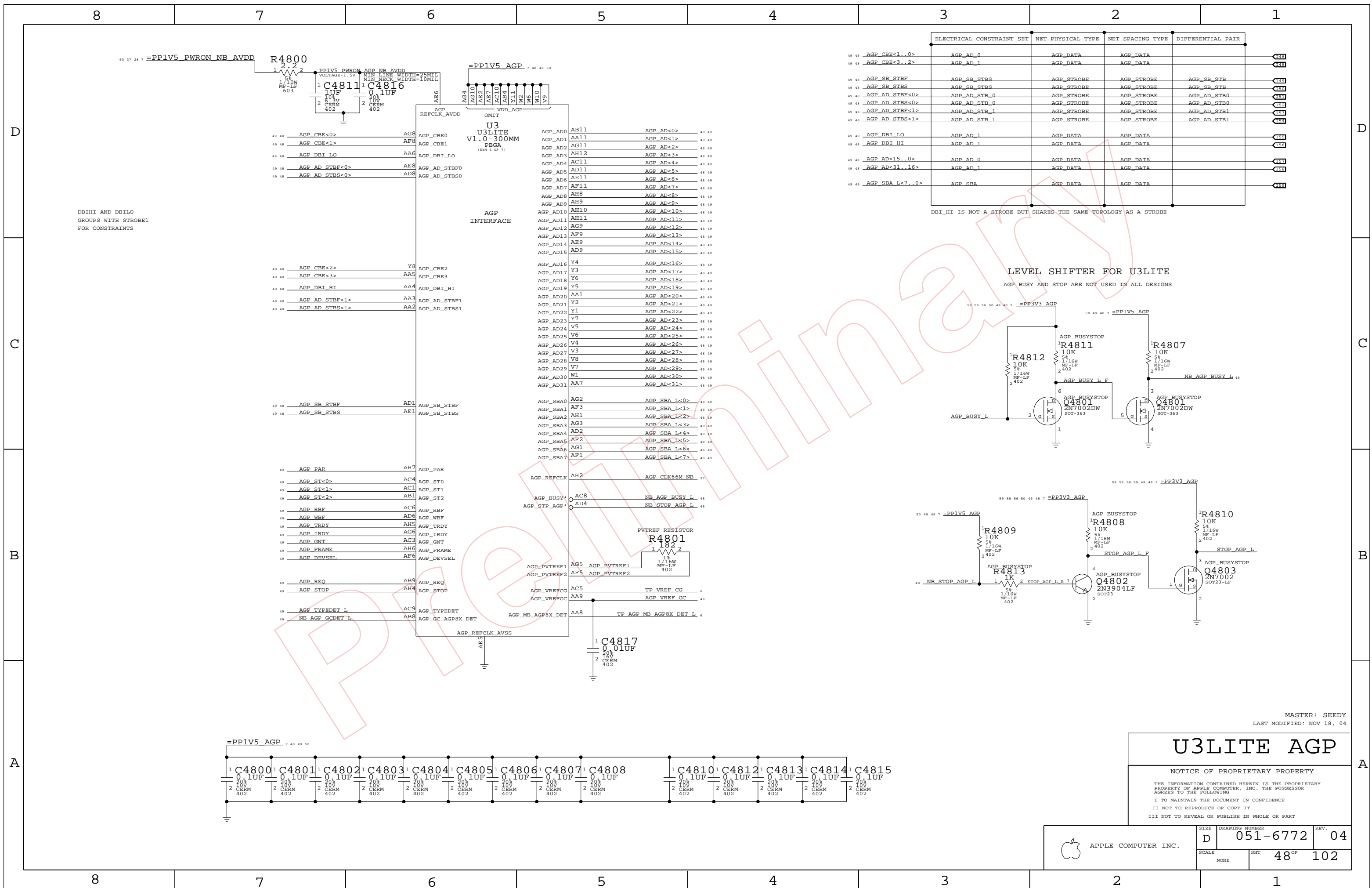
ONLY STUFF ONE VTT VREG



MEM TERM VREGS

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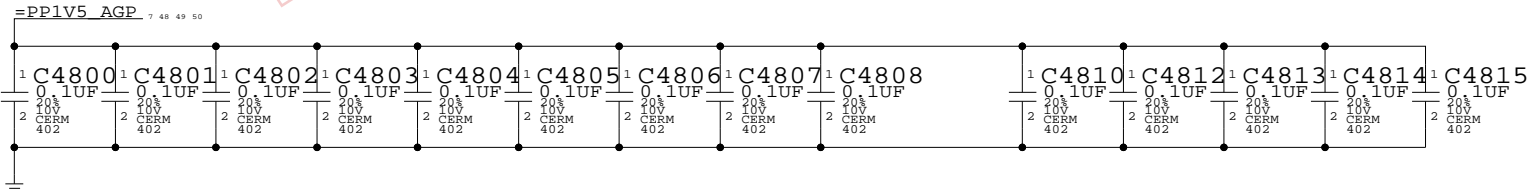
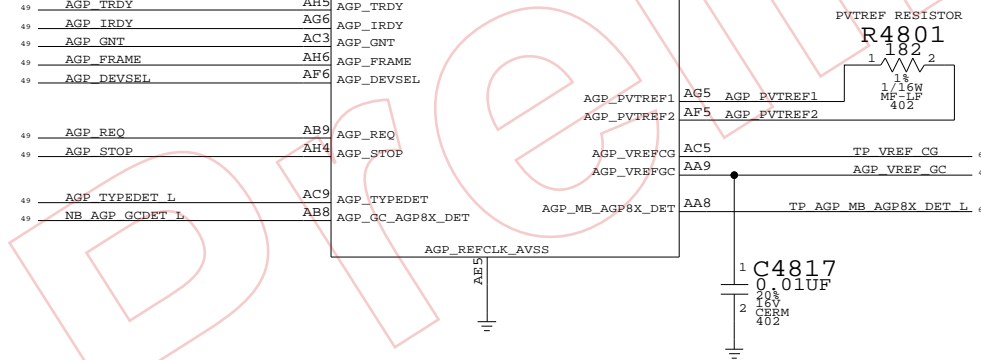
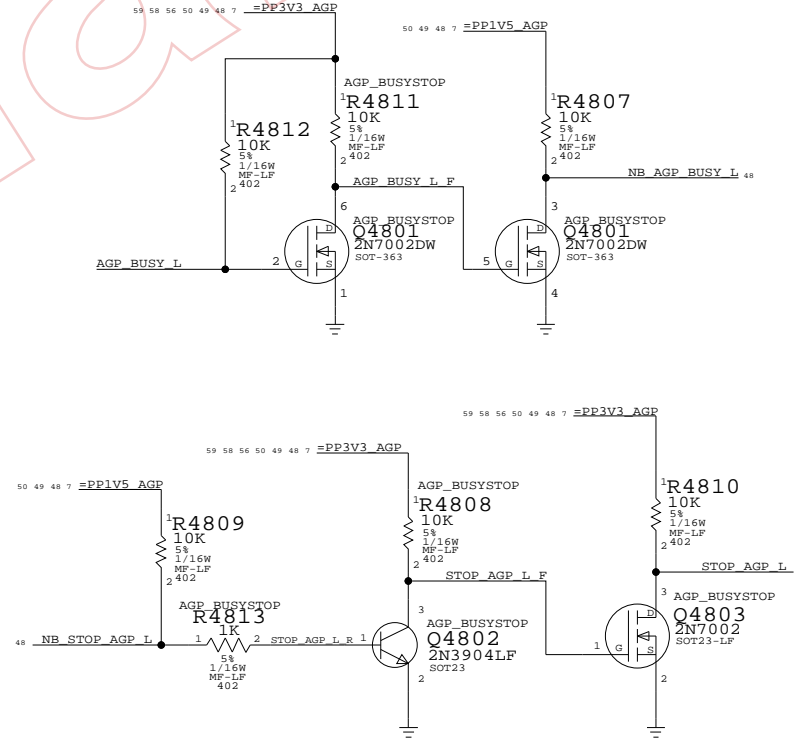
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	46 OF	102
NONE			



	ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR	
48 48	_AGP_CBE<1..0>	AGP_AD_0	AGP_DATA	AGP_DATA	4846
48 48	_AGP_CBE<3..2>	AGP_AD_1	AGP_DATA	AGP_DATA	4848
48 48	_AGP_SB_STBF	AGP_SB_STBS	AGP_STROBE	AGP_STROBE	4849
48 48	_AGP_SB_STBS	AGP_SB_STBS	AGP_STROBE	AGP_STROBE	4850
48 48	_AGP_AD_STBF<0>	AGP_AD_STB_0	AGP_STROBE	AGP_STROBE	4851
48 48	_AGP_AD_STBS<0>	AGP_AD_STB_0	AGP_STROBE	AGP_STROBE	4852
48 48	_AGP_AD_STBF<1>	AGP_AD_STB_1	AGP_STROBE	AGP_STROBE	4853
48 48	_AGP_AD_STBS<1>	AGP_AD_STB_1	AGP_STROBE	AGP_STROBE	4854
48 48	_AGP_DBI_LO	AGP_AD_1	AGP_DATA	AGP_DATA	4855
48 48	_AGP_DBI_HI	AGP_AD_1	AGP_DATA	AGP_DATA	4856
48 48	_AGP_AD<15..0>	AGP_AD_0	AGP_DATA	AGP_DATA	4857
48 48	_AGP_AD<31..16>	AGP_AD_1	AGP_DATA	AGP_DATA	4858
48 48	_AGP_SBA_L<7..0>	AGP_SBA	AGP_DATA	AGP_DATA	4859

DBI_HI IS NOT A STROBE BUT SHARES THE SAME TOPOLOGY AS A STROBE

LEVEL SHIFTER FOR U3LITE
AGP_BUSY AND STOP ARE NOT USED IN ALL DESIGNS



MASTER: SEEDY
LAST MODIFIED: NOV 18, 04

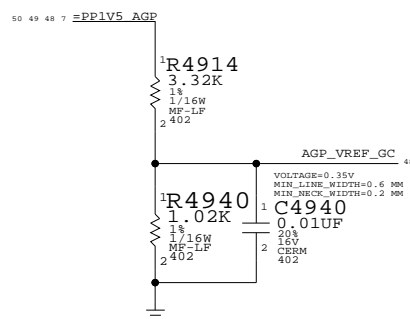
U3LITE AGP

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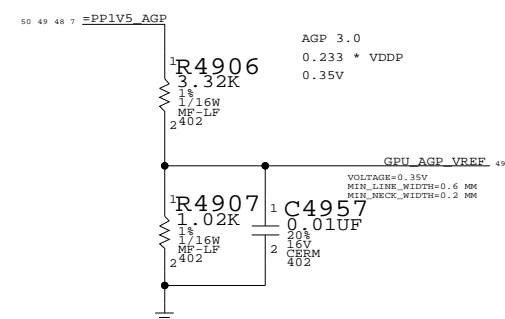
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	48 OF 102	
NONE			

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
338S0231	1	IC,RV351LEP, GRAPHICS CTLR	U4900	

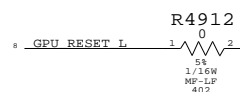
U3LITE AGP I/O REFERENCE
(PLACE CLOSE TO GPU AGP BALL)



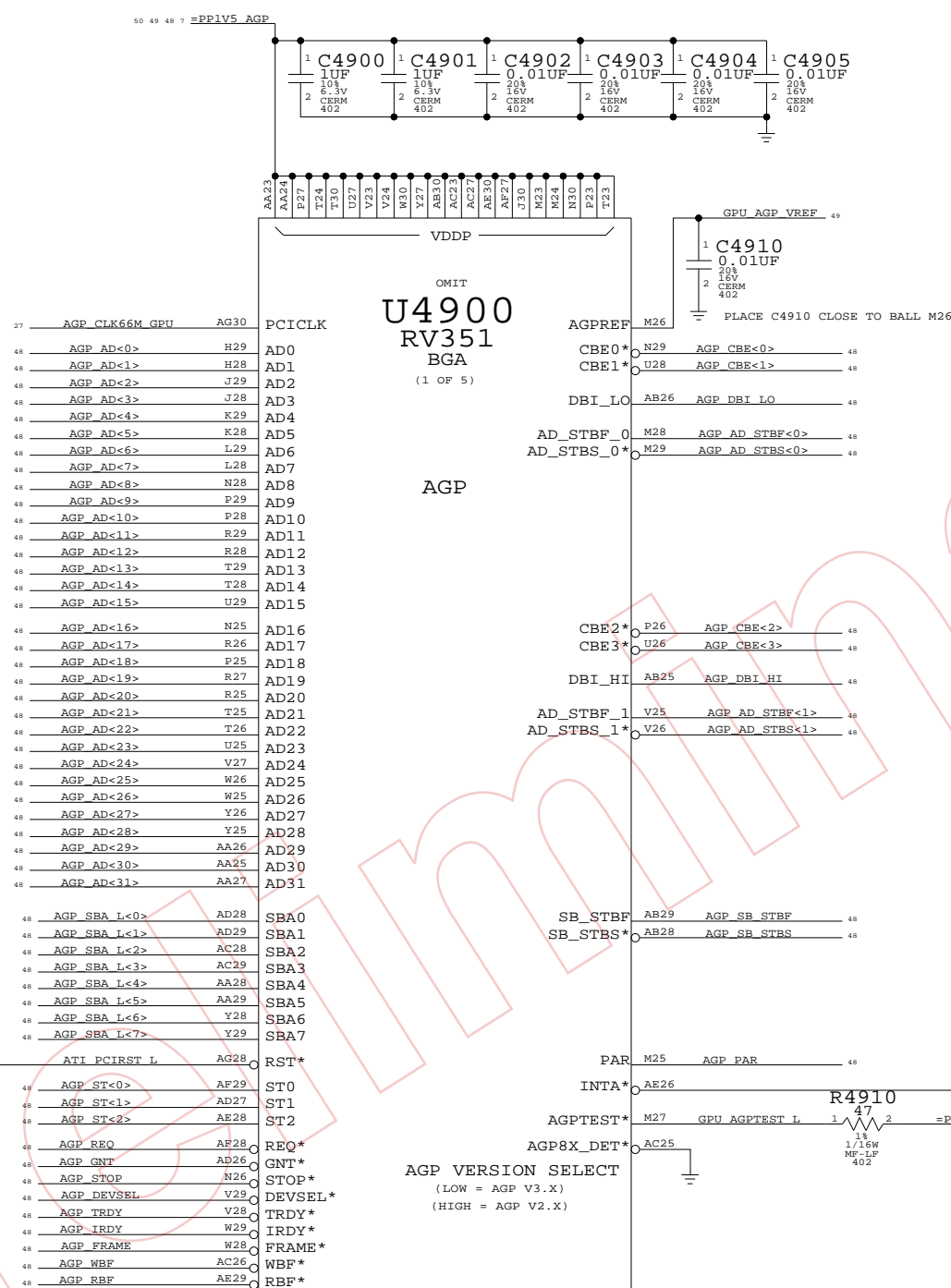
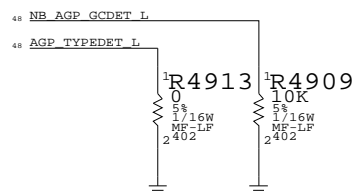
GPU AGP I/O REFERENCE
(PLACE CLOSE TO GPU AGP BALLS)



DO WE NEED THE SERIES R?



U3LITE SIGNALS



GPU AGP

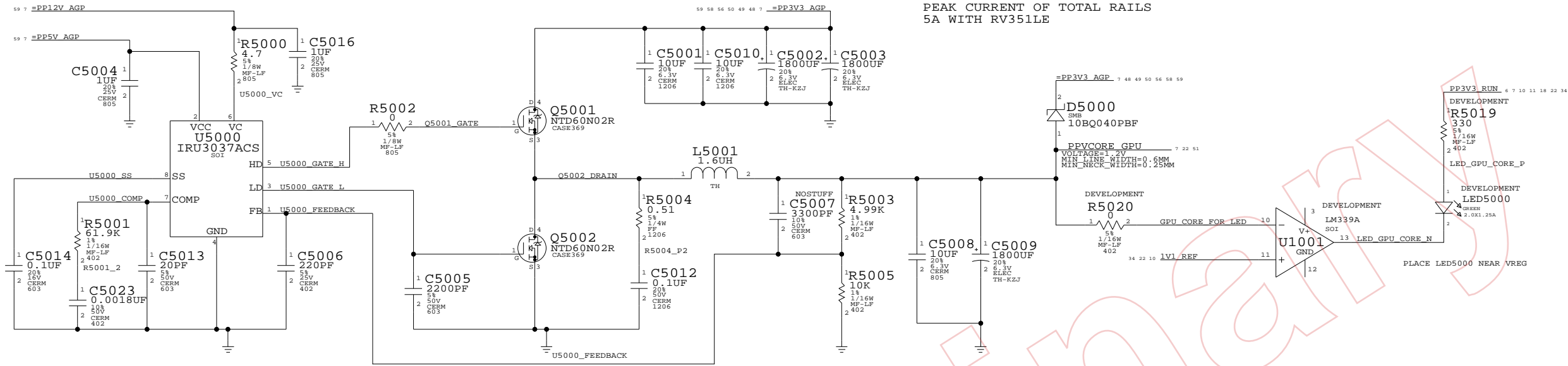
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT OF		
NONE	49 OF		102

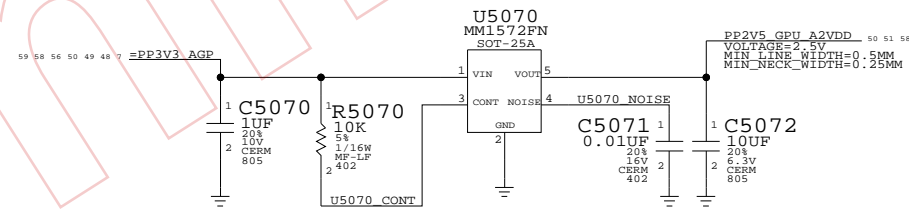
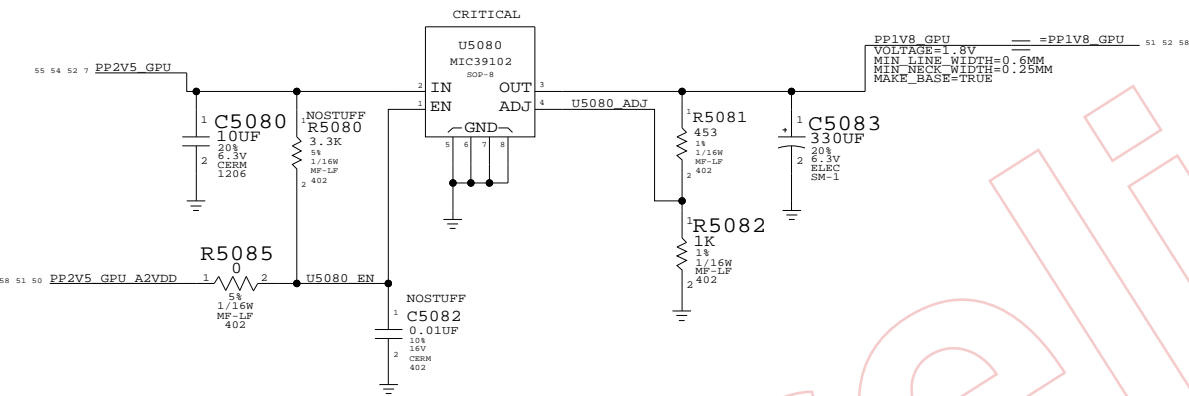
GPU VCORE VREG

NOTE:
 SET OUTPUT = 1.20V +/- 5% FOR RV351LE
 IRU3037ACS VREF = 0.8 VDC
 $V_{OUT} = V_{REF} * (R5003 + R5005) / R5005 = 1.199 \text{ VDC}$
 PEAK CURRENT OF TOTAL RAILS
 5A WITH RV351LE



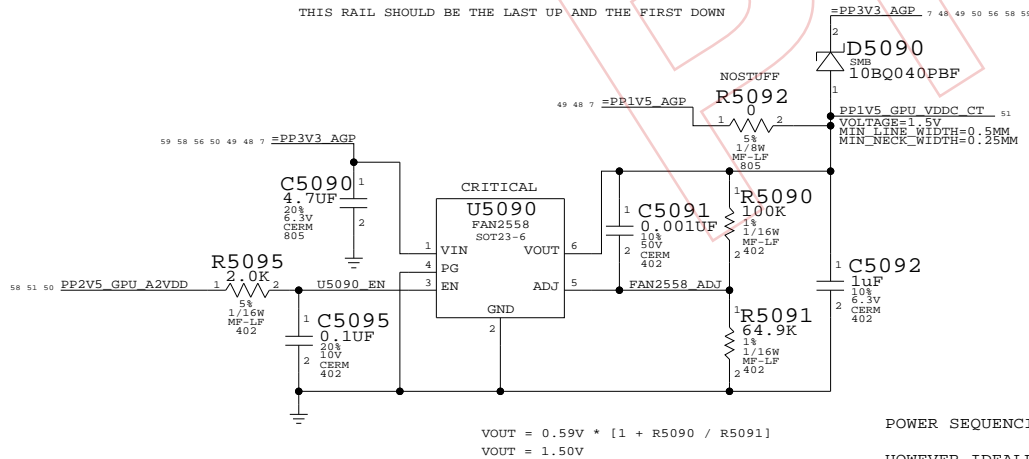
GPU 1.8V VREG

GPU 2.5V A2VDD



GPU 1.50V VDDC_CT

THIS RAIL SHOULD BE THE LAST UP AND THE FIRST DOWN



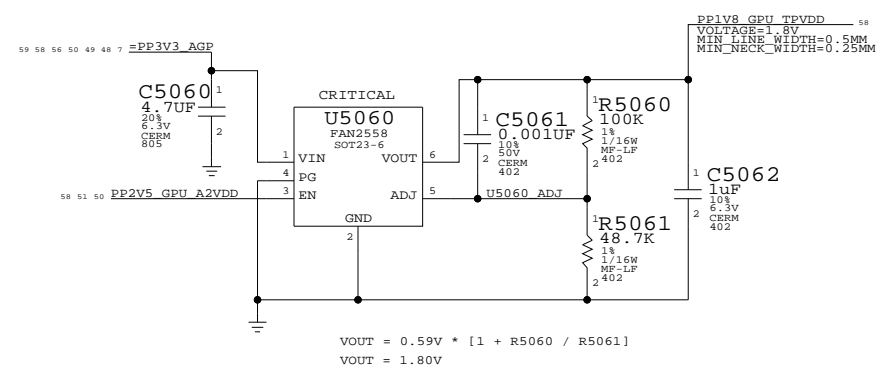
$$V_{OUT} = 0.59V * [1 + R5090 / R5091]$$

$$V_{OUT} = 1.50V$$

POWER SEQUENCING FOR RV351: -PP3V3_AGP > PP2V5_GPU > PPVCORE_GPU > VDDC_CT
 HOWEVER IDEALLY ALL POWER RAILS SHOULD RAMP TOGETHER

POWER DOWN SEQUENCE SHOULD BE IN REVERSE ORDER

GPU 1.80V TPVDD



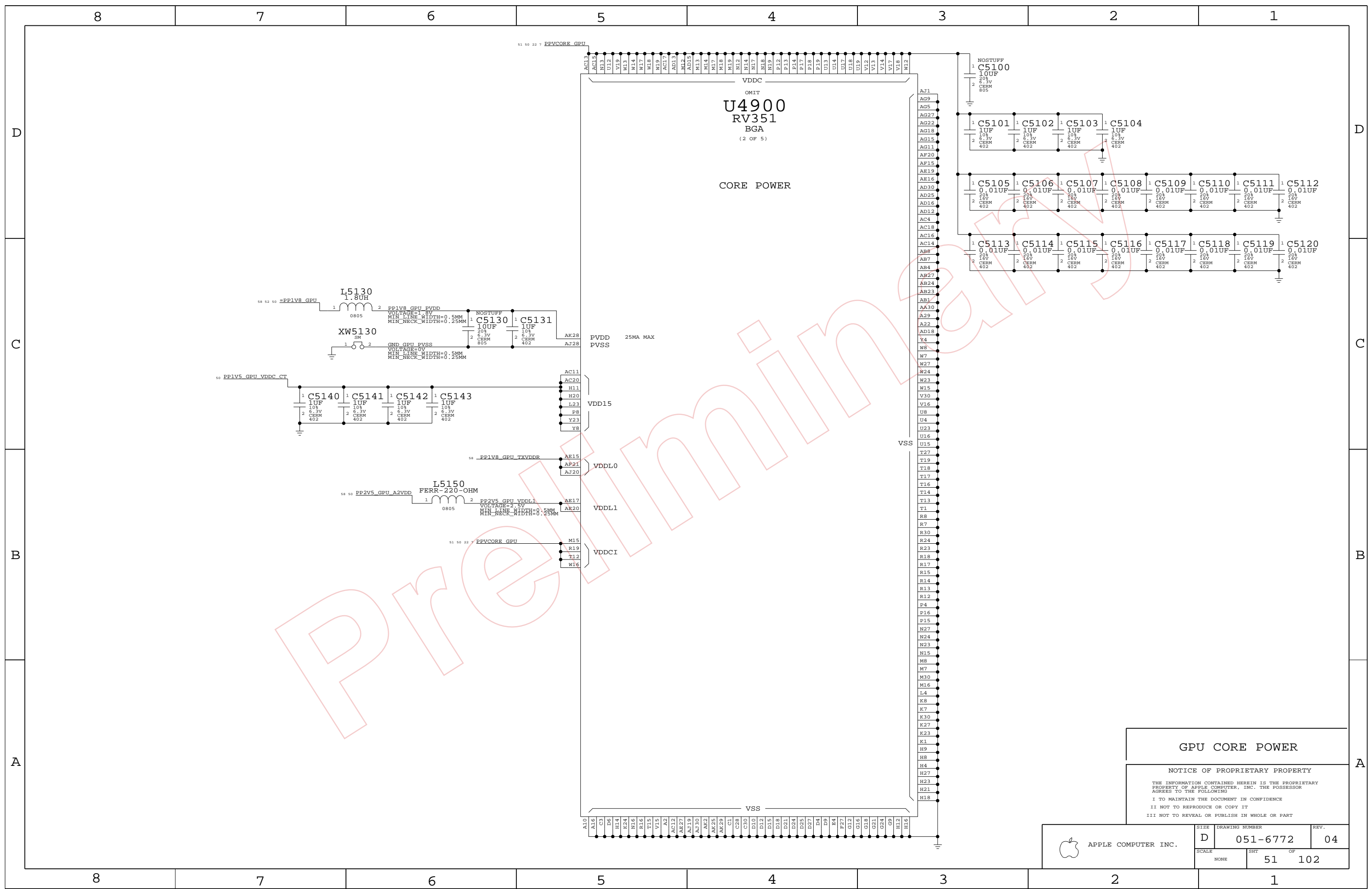
$$V_{OUT} = 0.59V * [1 + R5060 / R5061]$$

$$V_{OUT} = 1.80V$$

GRAPHICS VREGS

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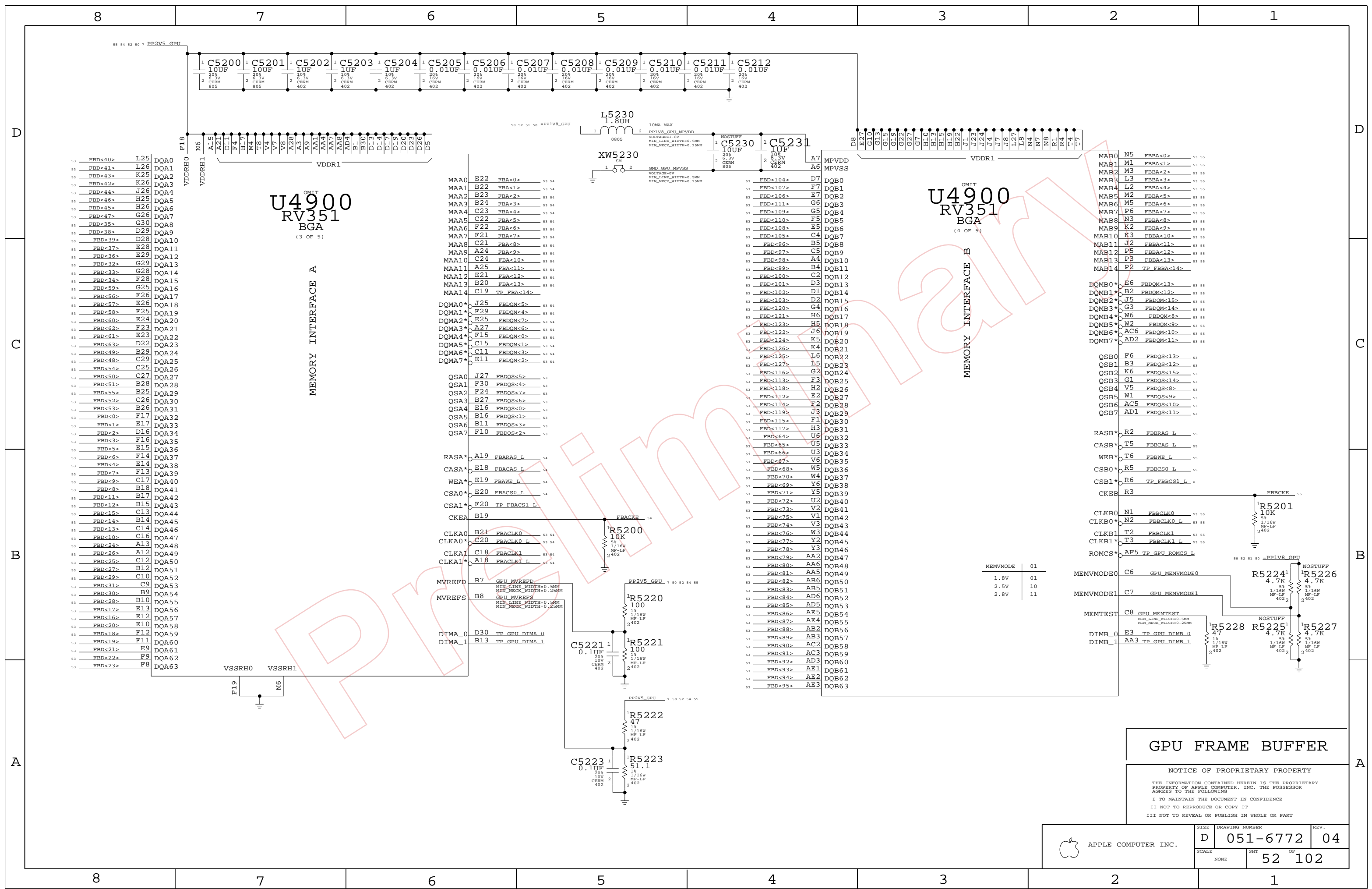
APPLE COMPUTER INC.	SCALE	DRAWING NUMBER	REV.
	NONE	D 051-6772	04
	SHT	OF	
	50	102	



GPU CORE POWER

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NONE	51 OF 102		



GPU FRAME BUFFER

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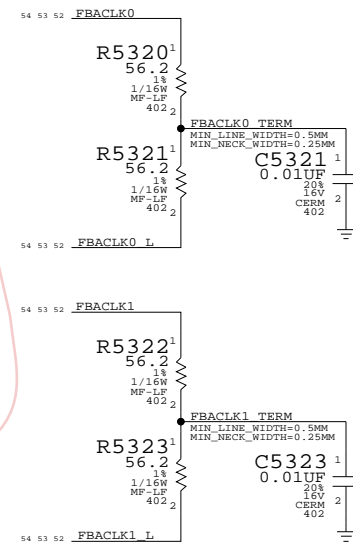
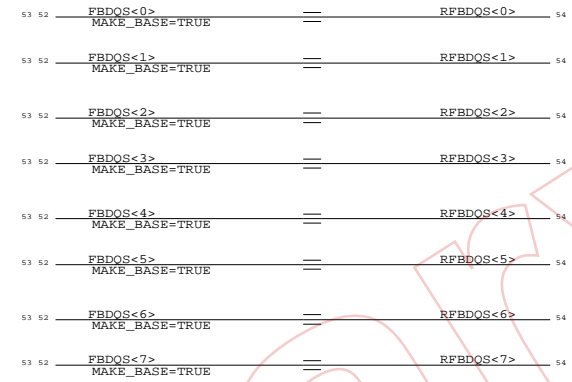
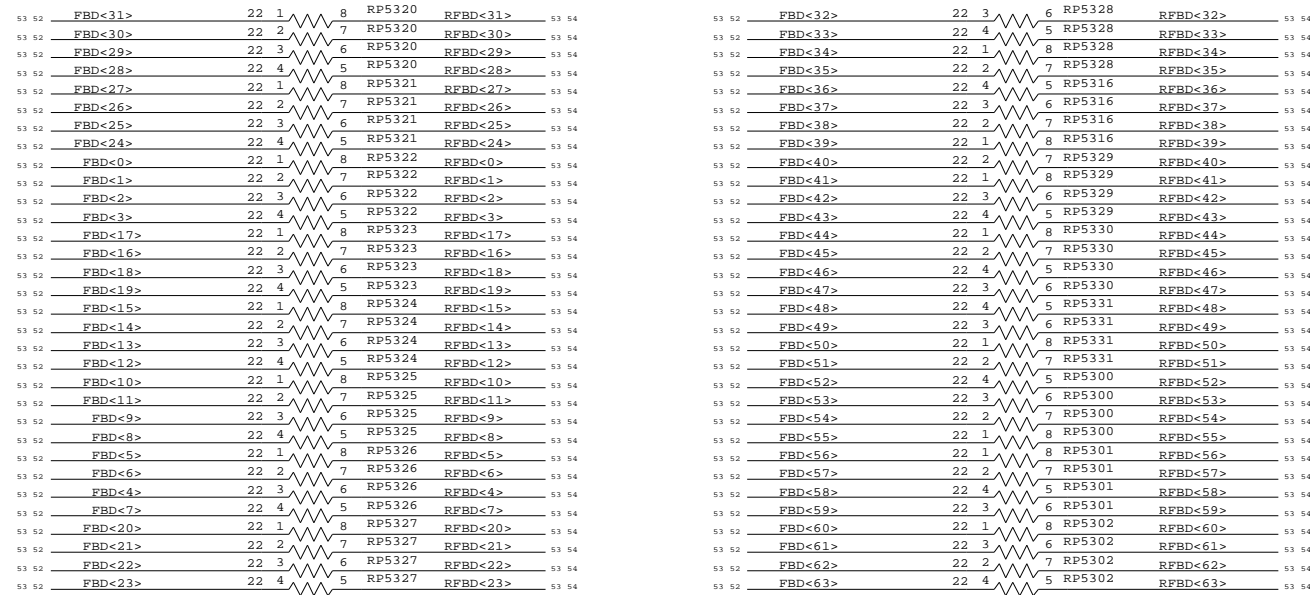
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
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		52	102

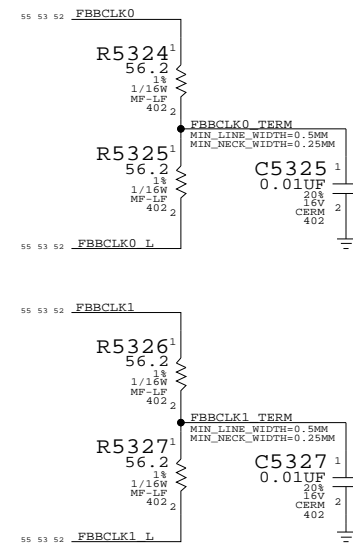
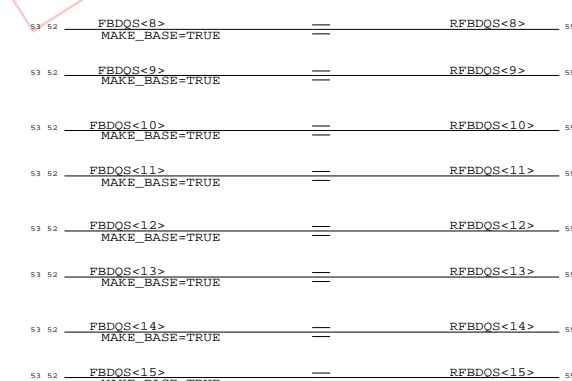
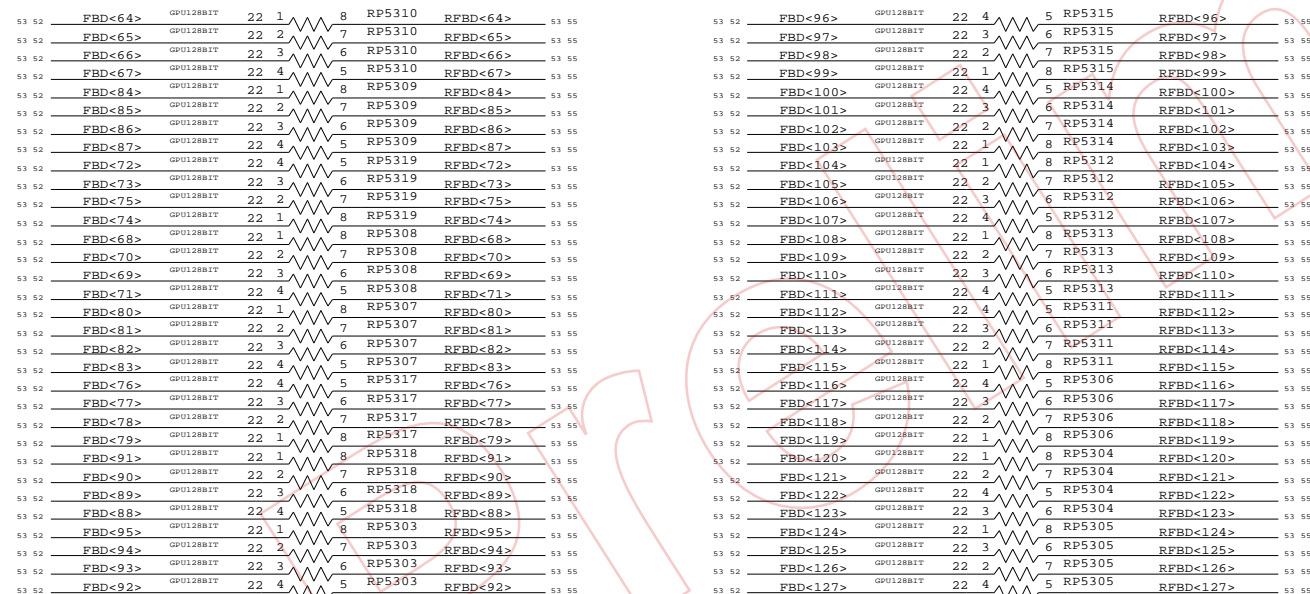
FRAME BUFFER A TERMINATION

PLACE R'S CLOSE TO MEMORY

PLACE CLOCK TERMINATION AFTER MEMORY
GPU -> MEMORY -> TERMINATION



FRAME BUFFER B TERMINATION

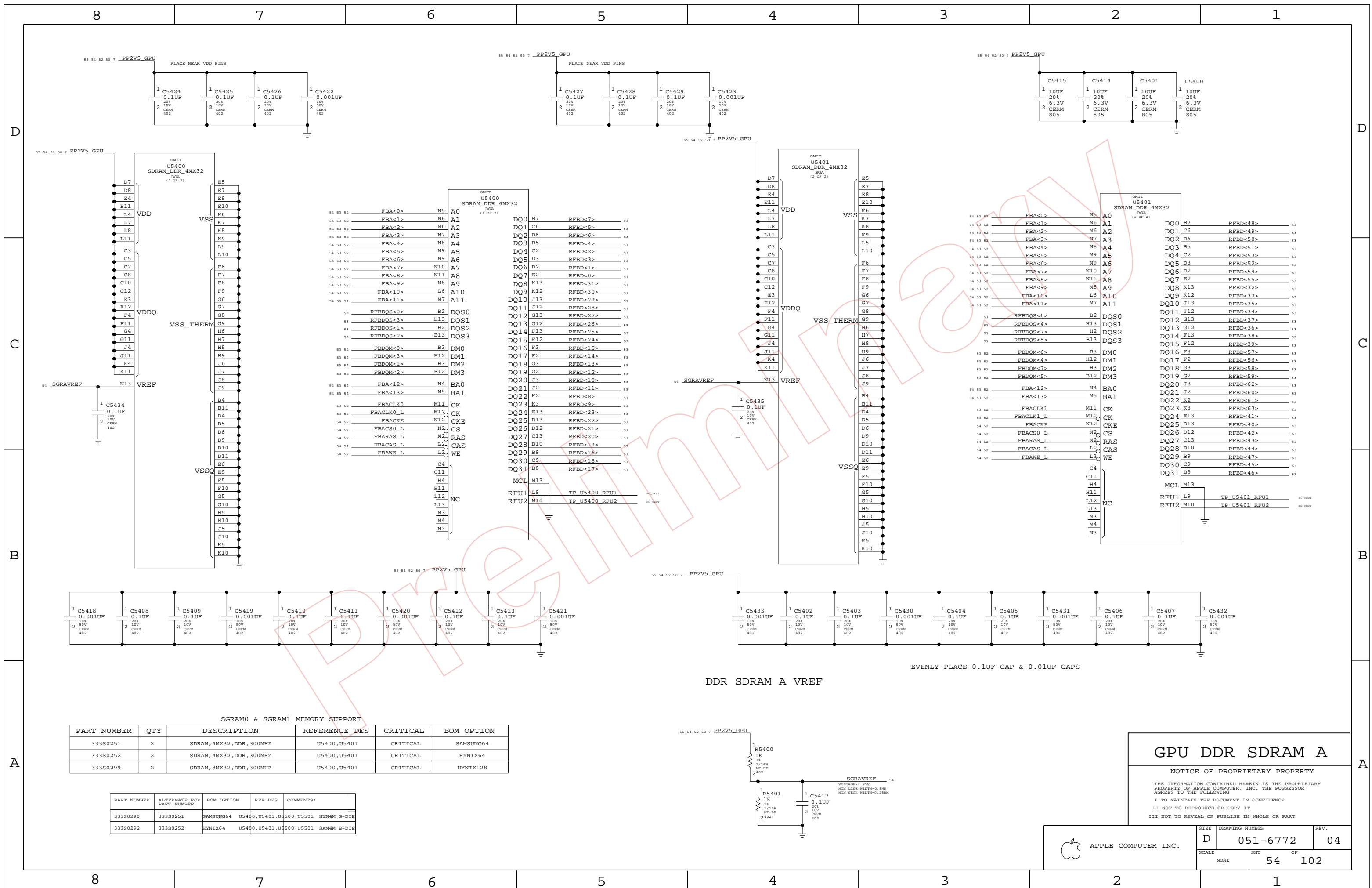


	ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
53 52	FBD<127...0>	GPU_FR	GPU_FR	4990
54 53	RFBD<127...0>	GPU_FR	GPU_FR	4990
54 52	FBA<13...0>	GPU_FR	GPU_FR	4990
55 52	FBBA<13...0>	GPU_FR	GPU_FR	4990
54 52	FBDOQ<15...0>	GPU_FR	GPU_FR	4990
53 52	FBDOQ<15...0>	GPU_FR	GPU_FR	4990
54 53 52	FBACLK0	GPU_FRCLK	GPU_FRCLK	4990
54 53 52	FBACLK0 L	GPU_FRCLK	GPU_FRCLK	4990
54 53 52	FBACLK1	GPU_FRCLK	GPU_FRCLK	4990
54 53 52	FBACLK1 L	GPU_FRCLK	GPU_FRCLK	4990
53 52	FBCLK0	GPU_FRCLK	GPU_FRCLK	4990
53 52	FBCLK0 L	GPU_FRCLK	GPU_FRCLK	4990
53 52	FBCLK1	GPU_FRCLK	GPU_FRCLK	4990
53 52	FBCLK1 L	GPU_FRCLK	GPU_FRCLK	4990

FB TERMINATION

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SCALE	SHT	OF	
NONE	53	102	



SGRAM0 & SGRAM1 MEMORY SUPPORT

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
33380251	2	SDRAM, 4MX32, DDR, 300MHZ	U5400, U5401	CRITICAL	SAMSUNG64
33380252	2	SDRAM, 4MX32, DDR, 300MHZ	U5400, U5401	CRITICAL	HYNIX64
33380299	2	SDRAM, 8MX32, DDR, 300MHZ	U5400, U5401	CRITICAL	HYNIX128

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
33380290	33380251	SAMSUNG64	U5400, U5401, U5500, U5501	HYN4M G-DIE
33380292	33380252	HYNIX64	U5400, U5401, U5500, U5501	SAM4M B-DIE

EVENLY PLACE 0.1UF CAP & 0.01UF CAPS

DDR SDRAM A VREF

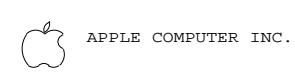
GPU DDR SDRAM A

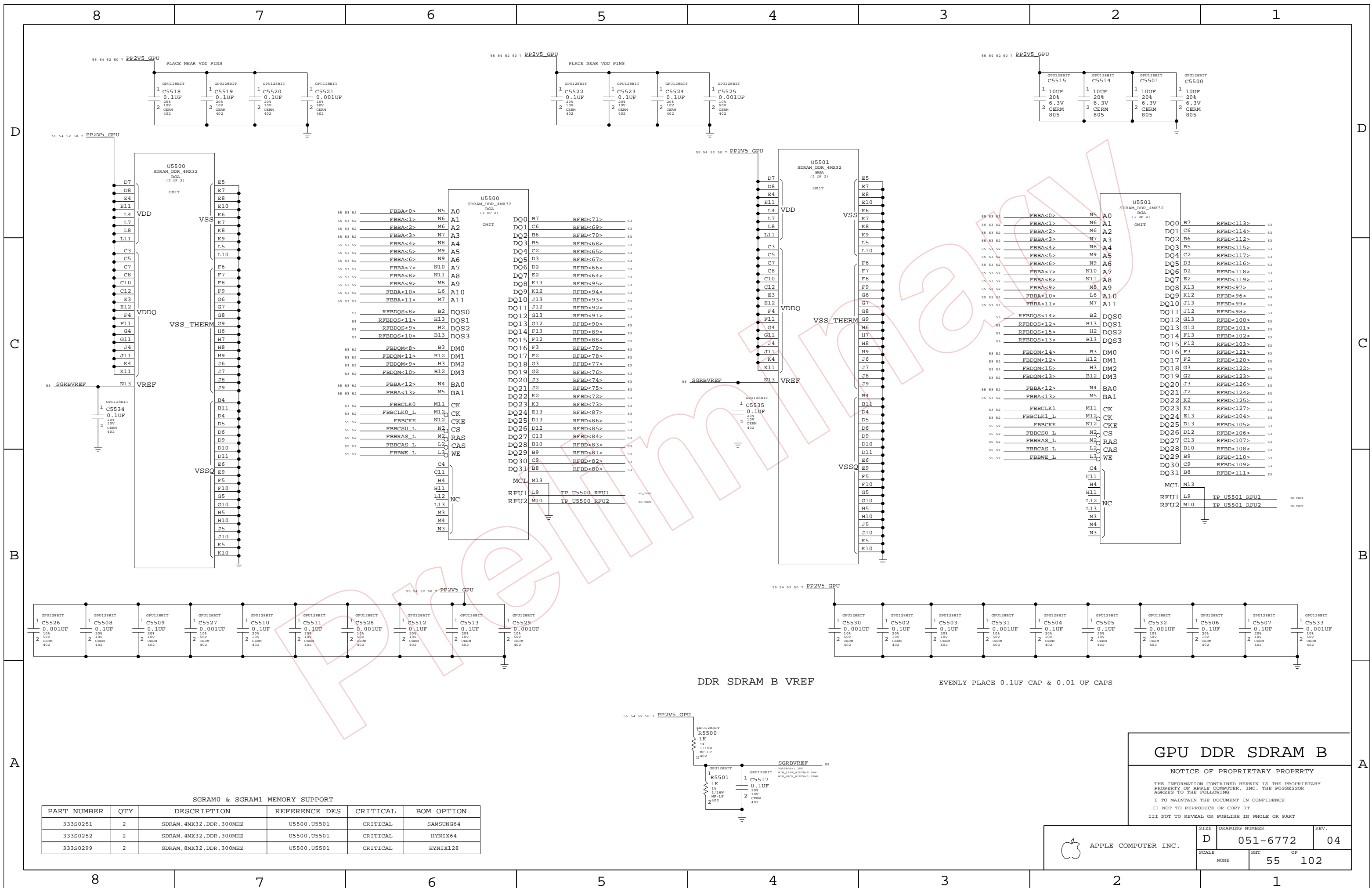
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SCALE NONE	SIZE D	DRAWING NUMBER 051-6772	REV. 04
	SCALE NONE		OF 54 102





SGRAM0 & SGRAM1 MEMORY SUPPORT

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
33380251	2	SDRAM, 4MX32, DDR, 300MHZ	U5500, U5501	CRITICAL	SAMSUNG64
33380252	2	SDRAM, 4MX32, DDR, 300MHZ	U5500, U5501	CRITICAL	HYNIX64
33380299	2	SDRAM, 8MX32, DDR, 300MHZ	U5500, U5501	CRITICAL	HYNIX128

GPU DDR SDRAM B

NOTICE OF PROPRIETARY PROPERTY

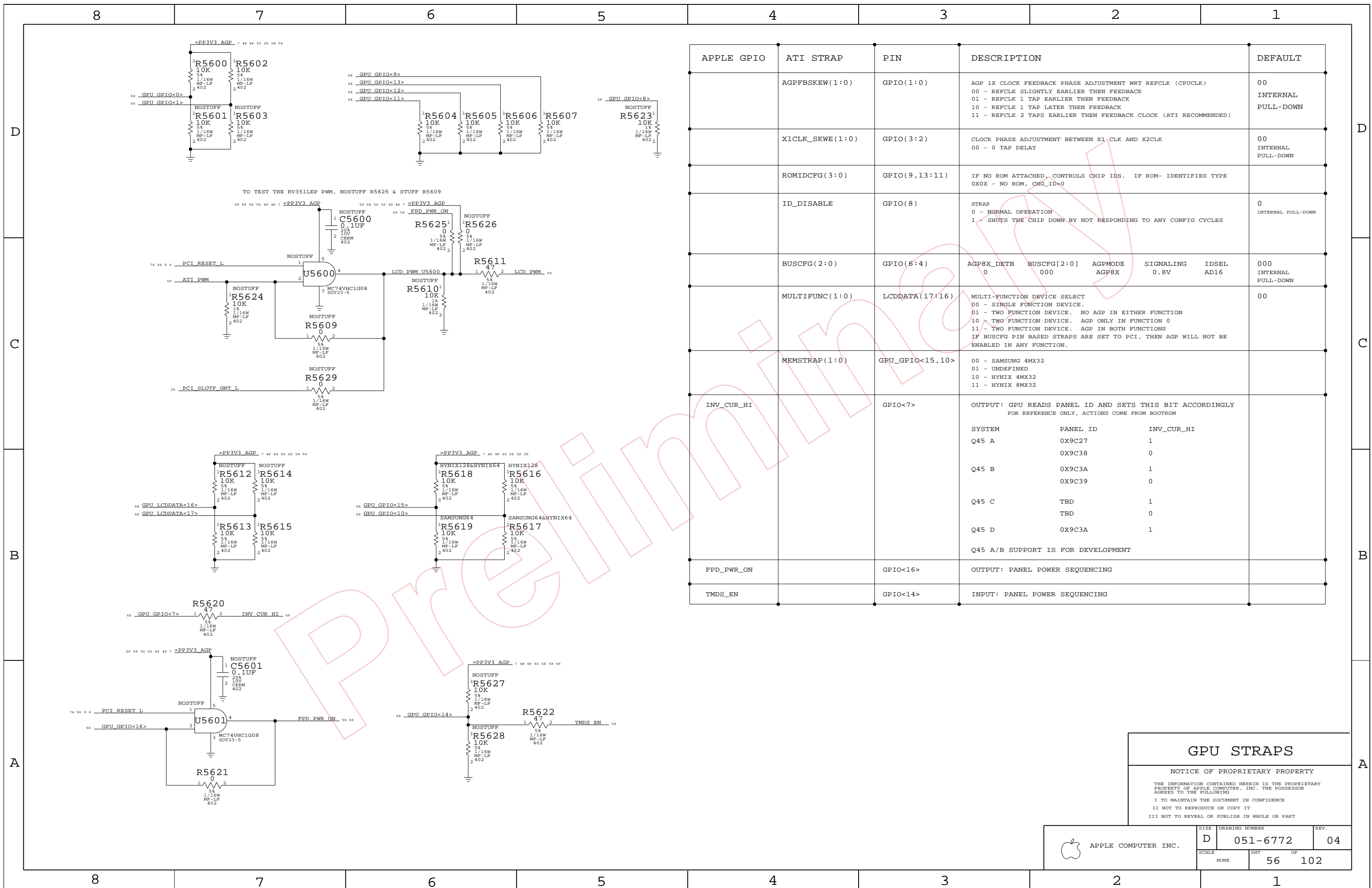
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SCALE	SHEET	OF	
NONE	55	102	



APPLE GPIO	ATI STRAP	PIN	DESCRIPTION	DEFAULT
	AGPFBSKEW(1:0)	GPIO(1:0)	AGP 1X CLOCK FEEDBACK PHASE ADJUSTMENT WRT REFCLK (CPUCLK) 00 - REFCLK SLIGHTLY EARLIER THEN FEEDBACK 01 - REFCLK 1 TAP EARLIER THEN FEEDBACK 10 - REFCLK 1 TAP LATER THEN FEEDBACK 11 - REFCLK 2 TAPS EARLIER THEN FEEDBACK CLOCK (ATI RECOMMENDED)	00 INTERNAL PULL-DOWN
	X1CLK_SKWE(1:0)	GPIO(3:2)	CLOCK PHASE ADJUSTMENT BETWEEN X1_CLK AND X2CLK 00 - 0 TAP DELAY	00 INTERNAL PULL-DOWN
	ROMIDCFG(3:0)	GPIO(9,13:11)	IF NO ROM ATTACHED, CONTROLS CHIP IDS. IF ROM- IDENTIFIES TYPE 0X0X - NO ROM, CHG_ID=0	
	ID_DISABLE	GPIO(8)	STRAP 0 - NORMAL OPERATION 1 - SHUTS THE CHIP DOWN BY NOT RESPONDING TO ANY CONFIG CYCLES	0 INTERNAL PULL-DOWN
	BUSCFG(2:0)	GPIO(6:4)	AGP8X_DET0 BUSCFG[2:0] AGPMODE SIGNALING IDSEL 0 000 AGP8X 0.8V AD16	000 INTERNAL PULL-DOWN
	MULTIFUNC(1:0)	LCDDATA(17:16)	MULTI-FUNCTION DEVICE SELECT 00 - SINGLE FUNCTION DEVICE. 01 - TWO FUNCTION DEVICE. NO AGP IN EITHER FUNCTION 10 - TWO FUNCTION DEVICE. AGP ONLY IN FUNCTION 0 11 - TWO FUNCTION DEVICE. AGP IN BOTH FUNCTIONS IF BUSCFG PIN BASED STRAPS ARE SET TO PCI, THEN AGP WILL NOT BE ENABLED IN ANY FUNCTION.	00
	MEMSTRAP(1:0)	GPU_GPIO<15,10>	00 - SAMSUNG 4MX32 01 - UNDEFINED 10 - HYNIX 4MX32 11 - HYNIX 8MX32	
INV_CUR_HI		GPIO<7>	OUTPUT: GPU READS PANEL ID AND SETS THIS BIT ACCORDINGLY FOR REFERENCE ONLY, ACTIONS COME FROM BOOTROM SYSTEM PANEL ID INV_CUR_HI Q45 A 0X9C27 1 0X9C38 0 Q45 B 0X9C3A 1 0X9C39 0 Q45 C TBD 1 TBD 0 Q45 D 0X9C3A 1 Q45 A/B SUPPORT IS FOR DEVELOPMENT	
FPD_PWR_ON		GPIO<16>	OUTPUT: PANEL POWER SEQUENCING	
TMDS_EN		GPIO<14>	INPUT: PANEL POWER SEQUENCING	

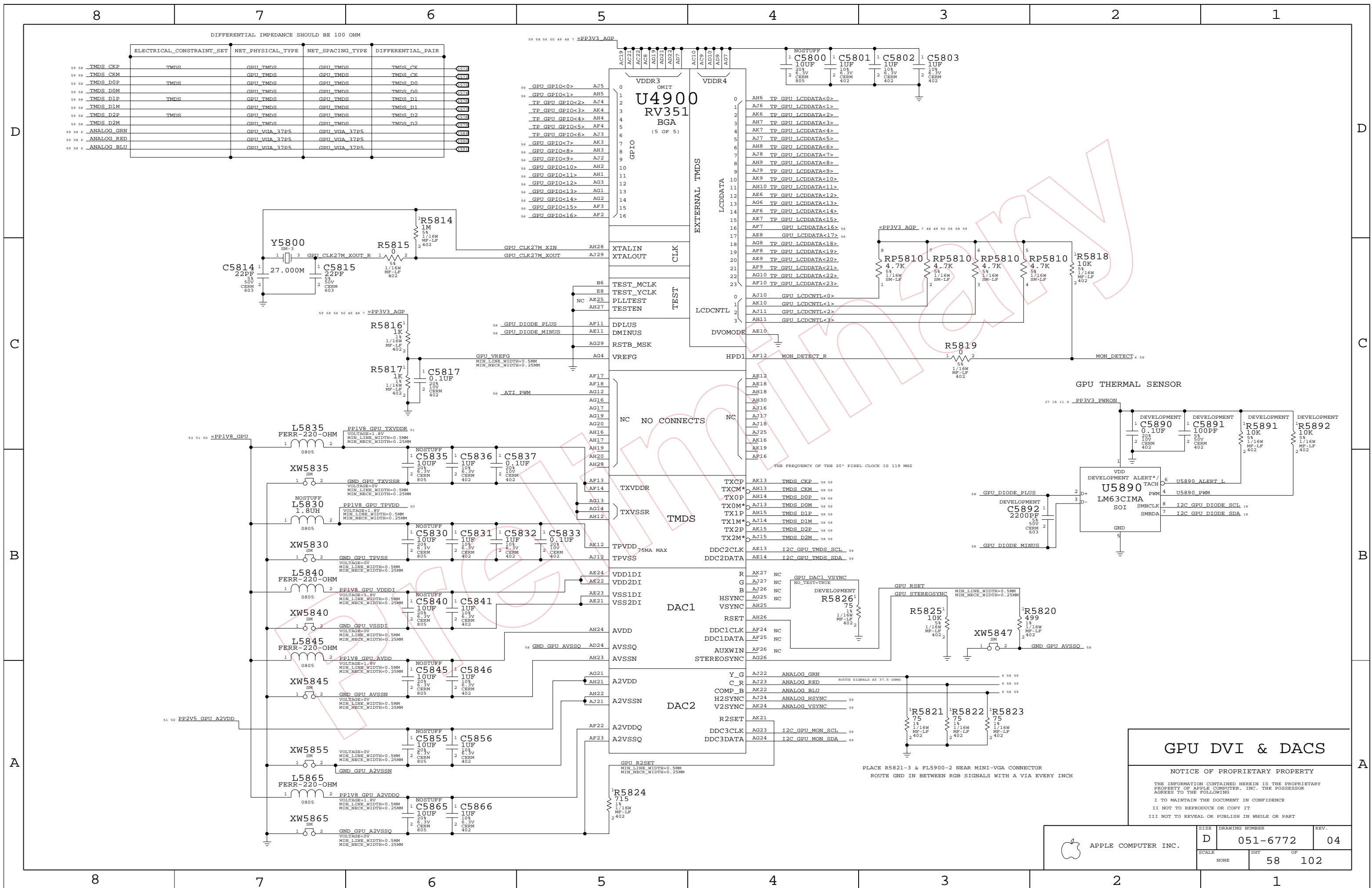
GPU STRAPS

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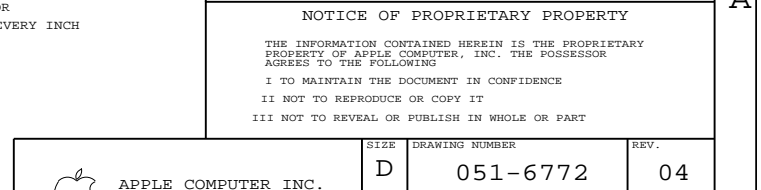
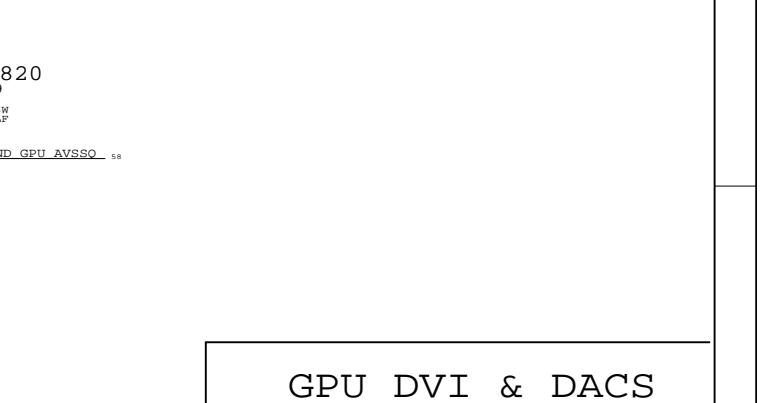
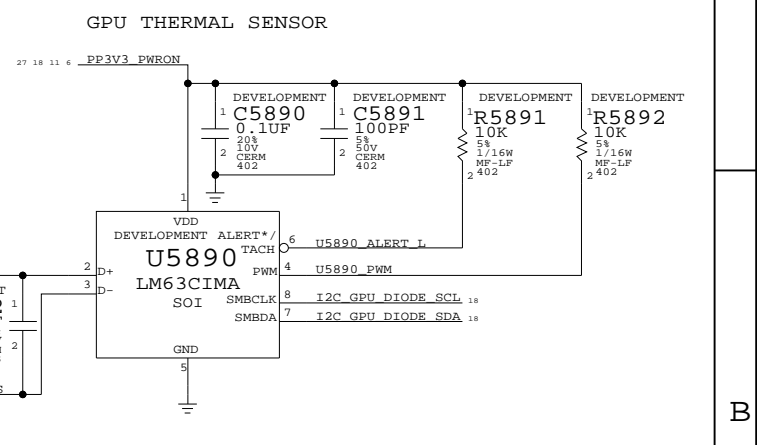
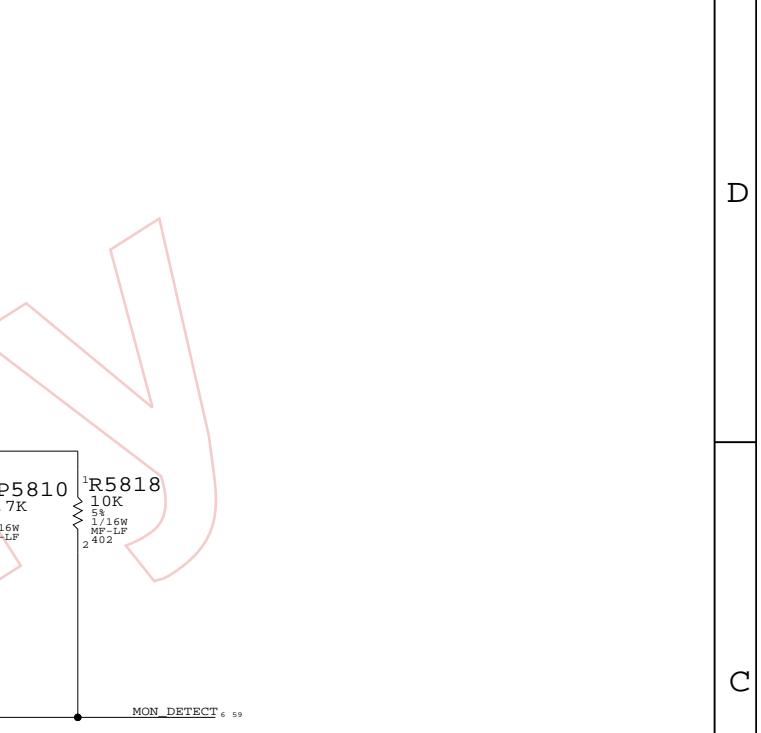
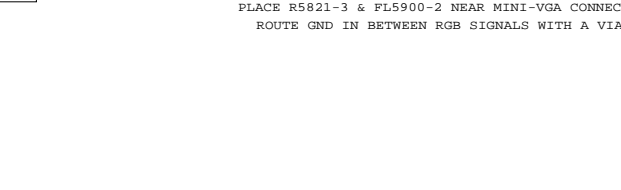
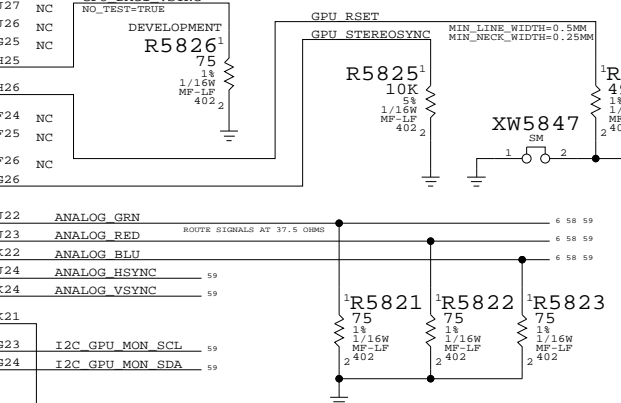
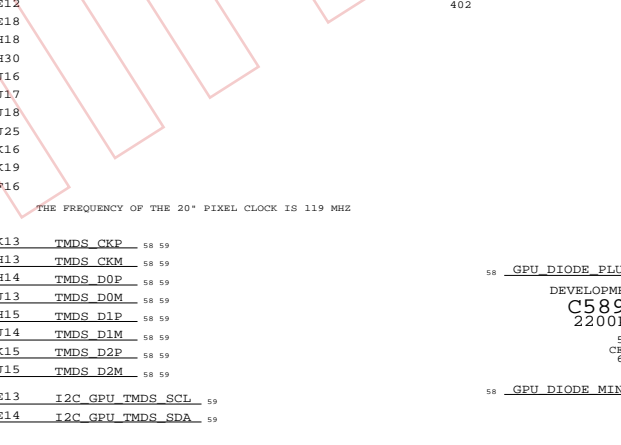
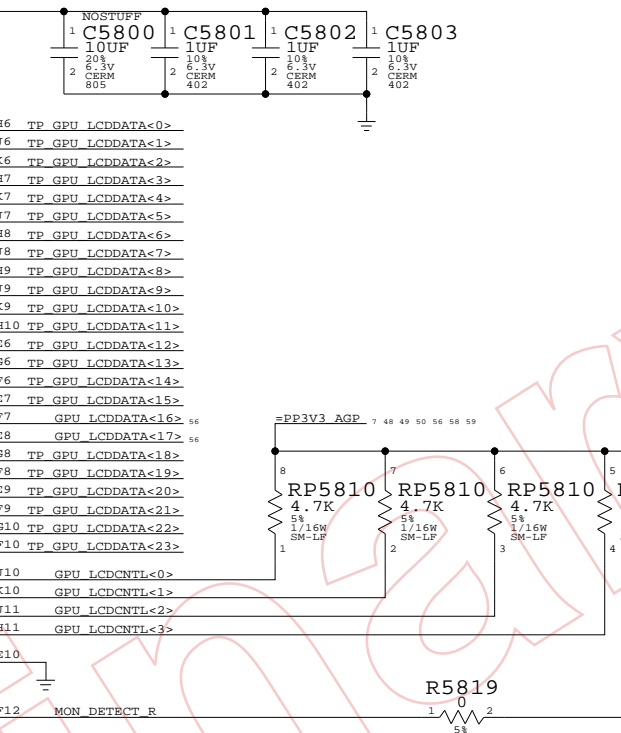
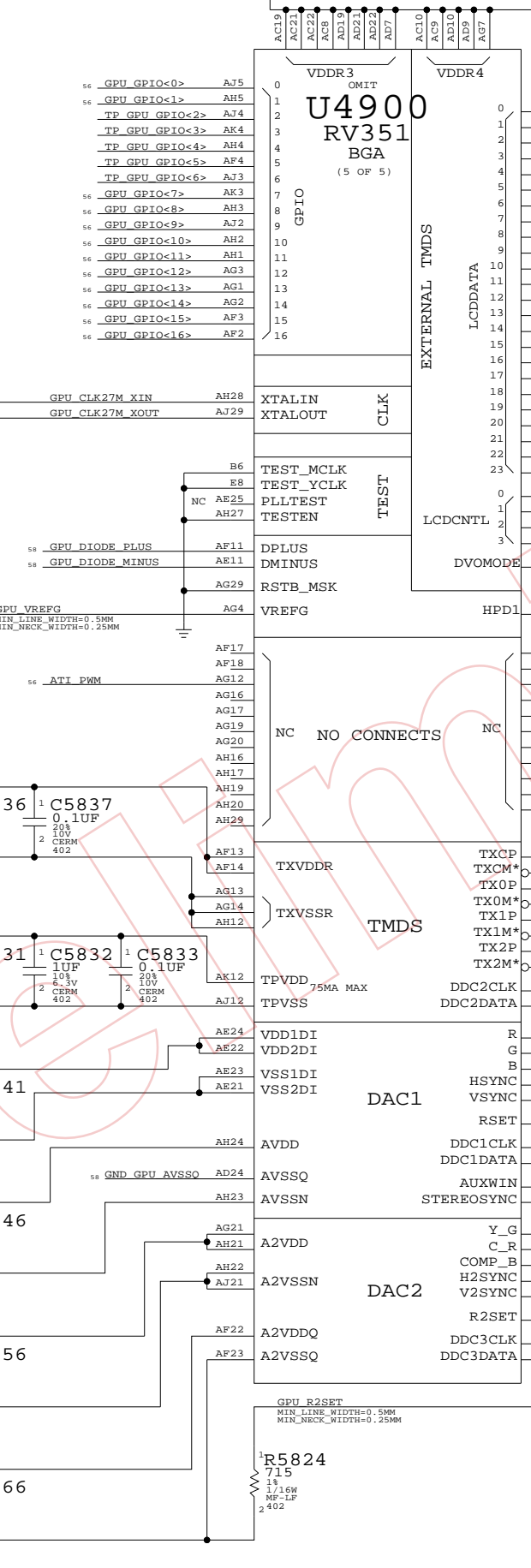
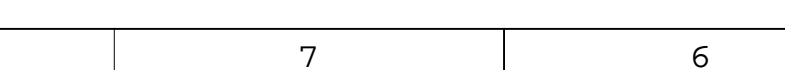
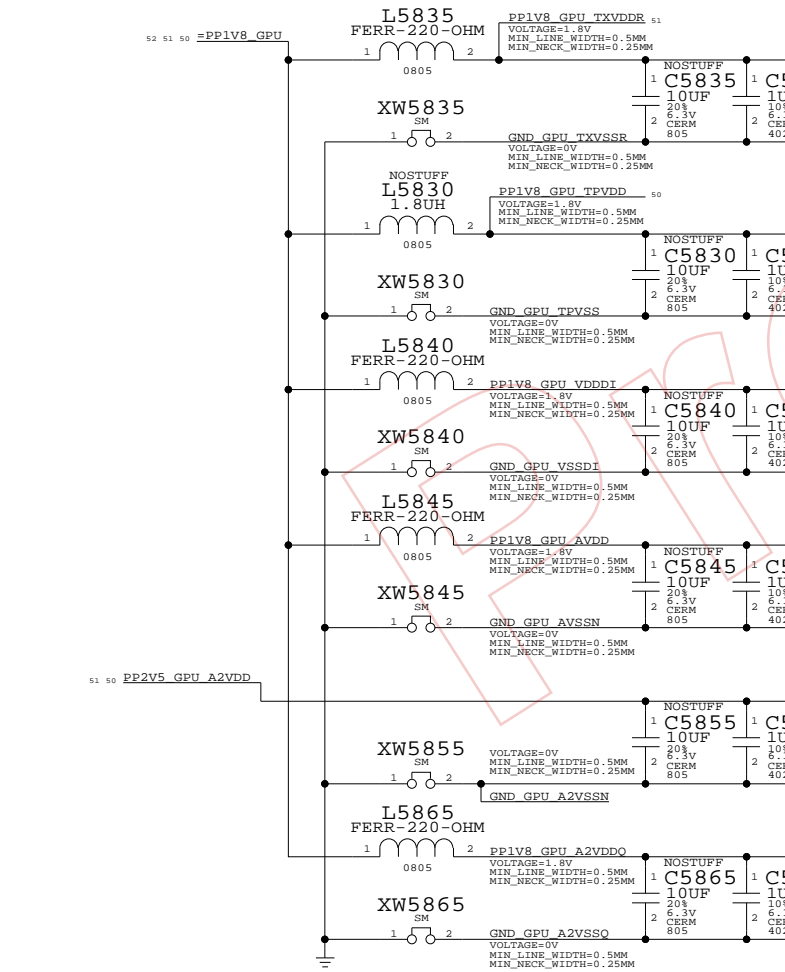
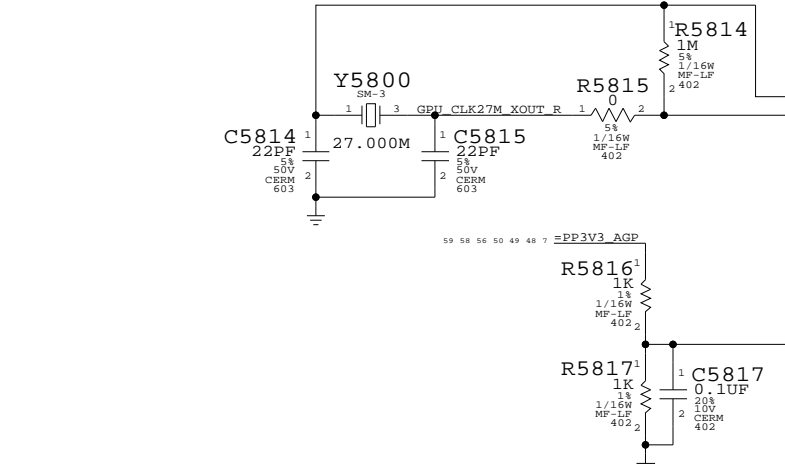
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		56	102



DIFFERENTIAL IMPEDANCE SHOULD BE 100 OHM

ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
59 58 TMD5_CK<P>	TMD5	GPU_TMD5	GPU_TMD5 TMD5_CK
59 58 TMD5_CKM	TMD5	GPU_TMD5	GPU_TMD5 TMD5_CK
59 58 TMD5_D0<P>	TMD5	GPU_TMD5	GPU_TMD5 TMD5_D0
59 58 TMD5_D0M	TMD5	GPU_TMD5	GPU_TMD5 TMD5_D0
59 58 TMD5_D1<P>	TMD5	GPU_TMD5	GPU_TMD5 TMD5_D1
59 58 TMD5_D1M	TMD5	GPU_TMD5	GPU_TMD5 TMD5_D1
59 58 TMD5_D2<P>	TMD5	GPU_TMD5	GPU_TMD5 TMD5_D2
59 58 TMD5_D2M	TMD5	GPU_TMD5	GPU_TMD5 TMD5_D2
59 58 ANALOG_GRN	GPU_VGA_37P5	GPU_VGA_37P5	GPU_VGA_37P5
59 58 ANALOG_RED	GPU_VGA_37P5	GPU_VGA_37P5	GPU_VGA_37P5
59 58 ANALOG_BLU	GPU_VGA_37P5	GPU_VGA_37P5	GPU_VGA_37P5



GPU DVI & DACS

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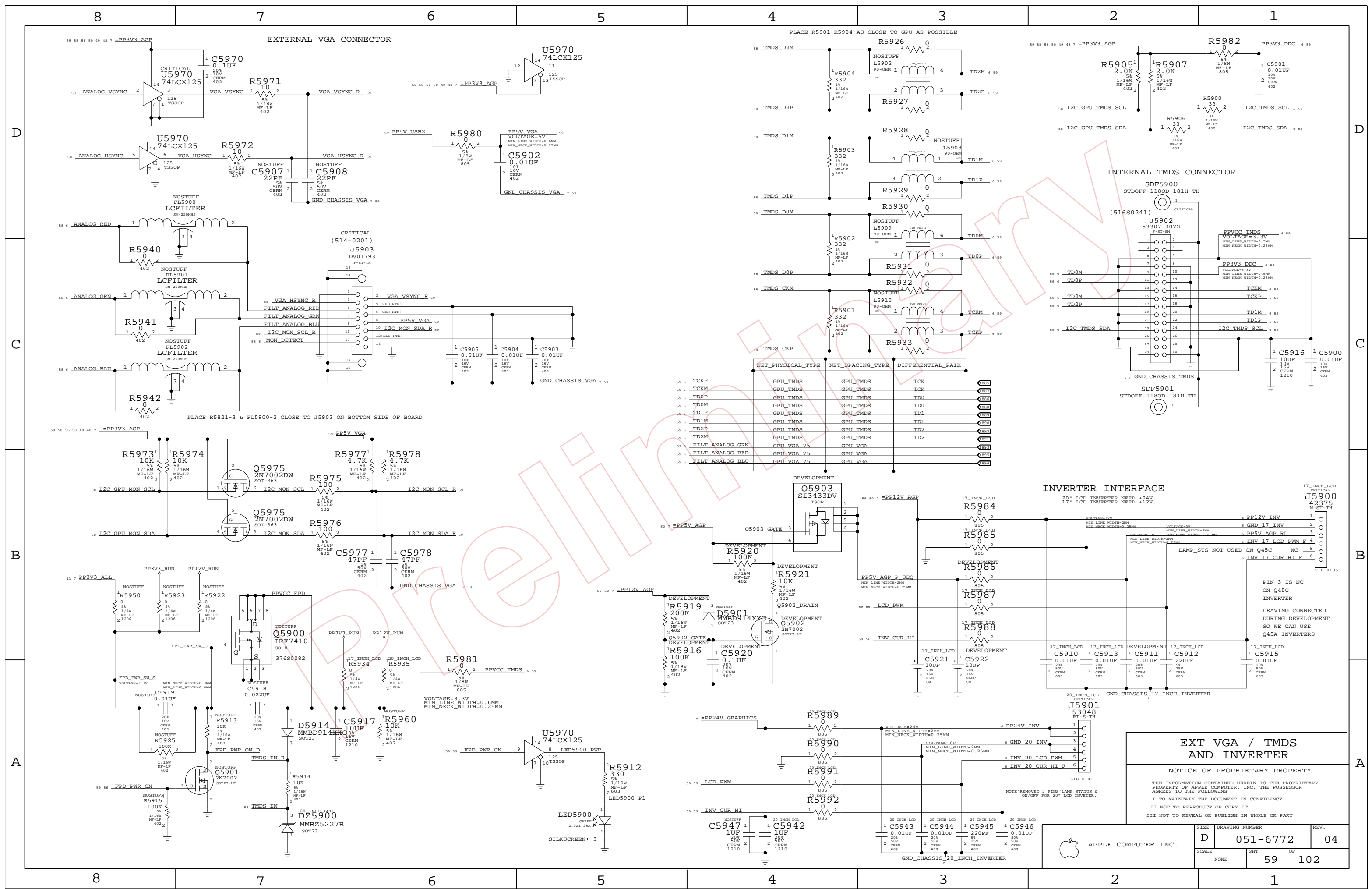
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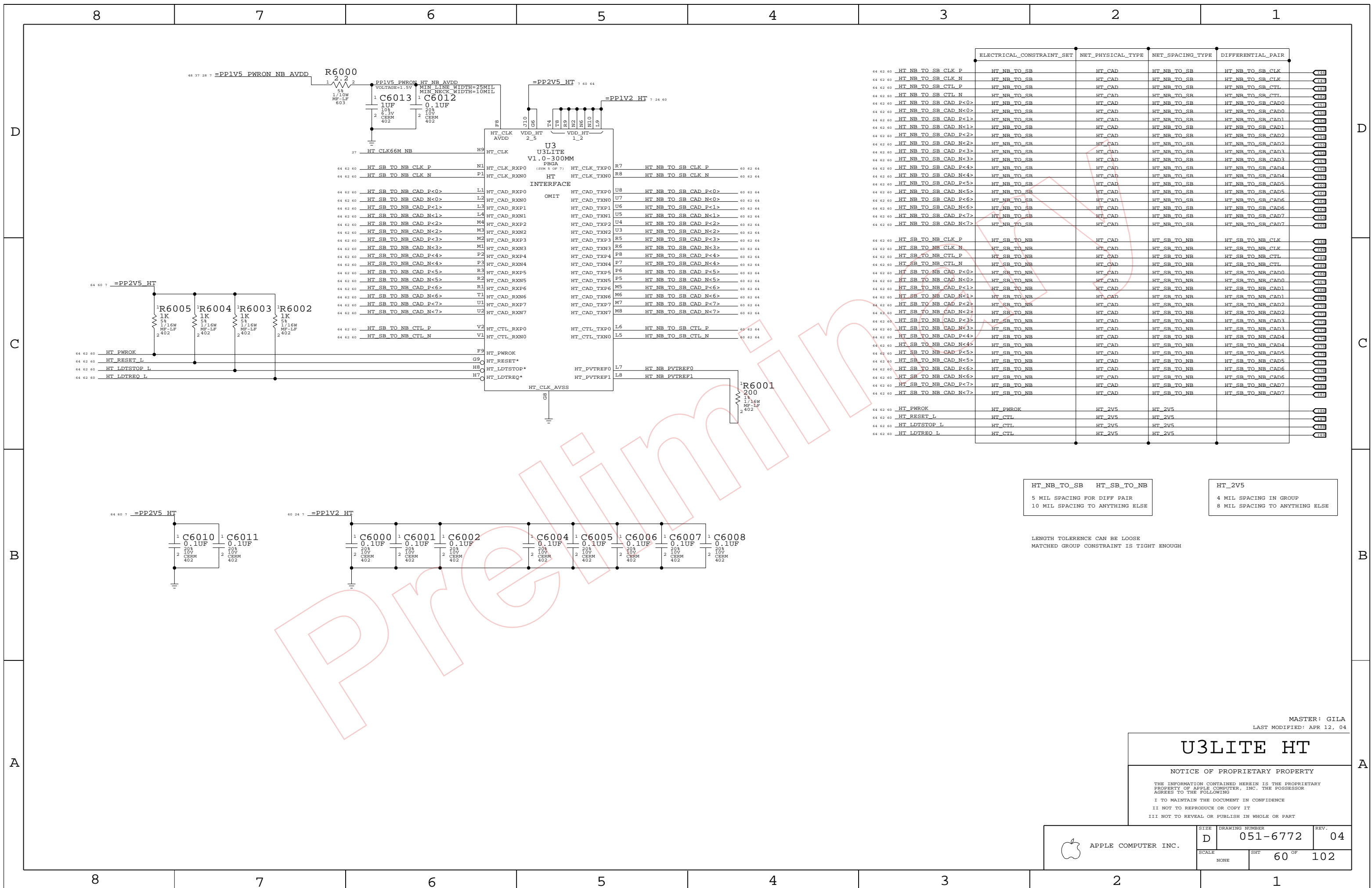
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SCALE	SHEET	OF	
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EXT VGA / TMD5 AND INVERTER

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		SCALE	SHEET	OF
			59	102



	ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR	
64 62 60	HT_NB_TO_SB_CLK_P	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CLK
64 62 60	HT_NB_TO_SB_CLK_N	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CLK
64 62 60	HT_NB_TO_SB_CTL_P	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CTL
64 62 60	HT_NB_TO_SB_CTL_N	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CTL
64 62 60	HT_NB_TO_SB_CAD_P<0>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD0
64 62 60	HT_NB_TO_SB_CAD_P<1>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD1
64 62 60	HT_NB_TO_SB_CAD_P<2>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD2
64 62 60	HT_NB_TO_SB_CAD_P<3>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD3
64 62 60	HT_NB_TO_SB_CAD_P<4>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD4
64 62 60	HT_NB_TO_SB_CAD_P<5>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD5
64 62 60	HT_NB_TO_SB_CAD_P<6>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD6
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64 62 60	HT_NB_TO_SB_CAD_N<1>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD1
64 62 60	HT_NB_TO_SB_CAD_N<2>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD2
64 62 60	HT_NB_TO_SB_CAD_N<3>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD3
64 62 60	HT_NB_TO_SB_CAD_N<4>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD4
64 62 60	HT_NB_TO_SB_CAD_N<5>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD5
64 62 60	HT_NB_TO_SB_CAD_N<6>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD6
64 62 60	HT_NB_TO_SB_CAD_N<7>	HT_NB_TO_SB	HT_CAD	HT_NB_TO_SB	HT_NB_TO_SB_CAD7
64 62 60	HT_SB_TO_NB_CLK_P	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CLK
64 62 60	HT_SB_TO_NB_CLK_N	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CLK
64 62 60	HT_SB_TO_NB_CTL_P	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CTL
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64 62 60	HT_SB_TO_NB_CAD_P<4>	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CAD4
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64 62 60	HT_SB_TO_NB_CAD_N<3>	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CAD3
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64 62 60	HT_SB_TO_NB_CAD_N<6>	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CAD6
64 62 60	HT_SB_TO_NB_CAD_N<7>	HT_SB_TO_NB	HT_CAD	HT_SB_TO_NB	HT_SB_TO_NB_CAD7
64 62 60	HT_PWROK	HT_PWROK	HT_2V5	HT_2V5	HT_2V5
64 62 60	HT_RESET_L	HT_CTL	HT_2V5	HT_2V5	HT_2V5
64 62 60	HT_LDTSTOP_L	HT_CTL	HT_2V5	HT_2V5	HT_2V5
64 62 60	HT_LDTREQ_L	HT_CTL	HT_2V5	HT_2V5	HT_2V5

HT_NB_TO_SB HT_SB_TO_NB
5 MIL SPACING FOR DIFF PAIR
10 MIL SPACING TO ANYTHING ELSE

HT_2V5
4 MIL SPACING IN GROUP
8 MIL SPACING TO ANYTHING ELSE

LENGTH TOLERANCE CAN BE LOOSE
MATCHED GROUP CONSTRAINT IS TIGHT ENOUGH

MASTER: GILA
LAST MODIFIED: APR 12, 04

U3LITE HT

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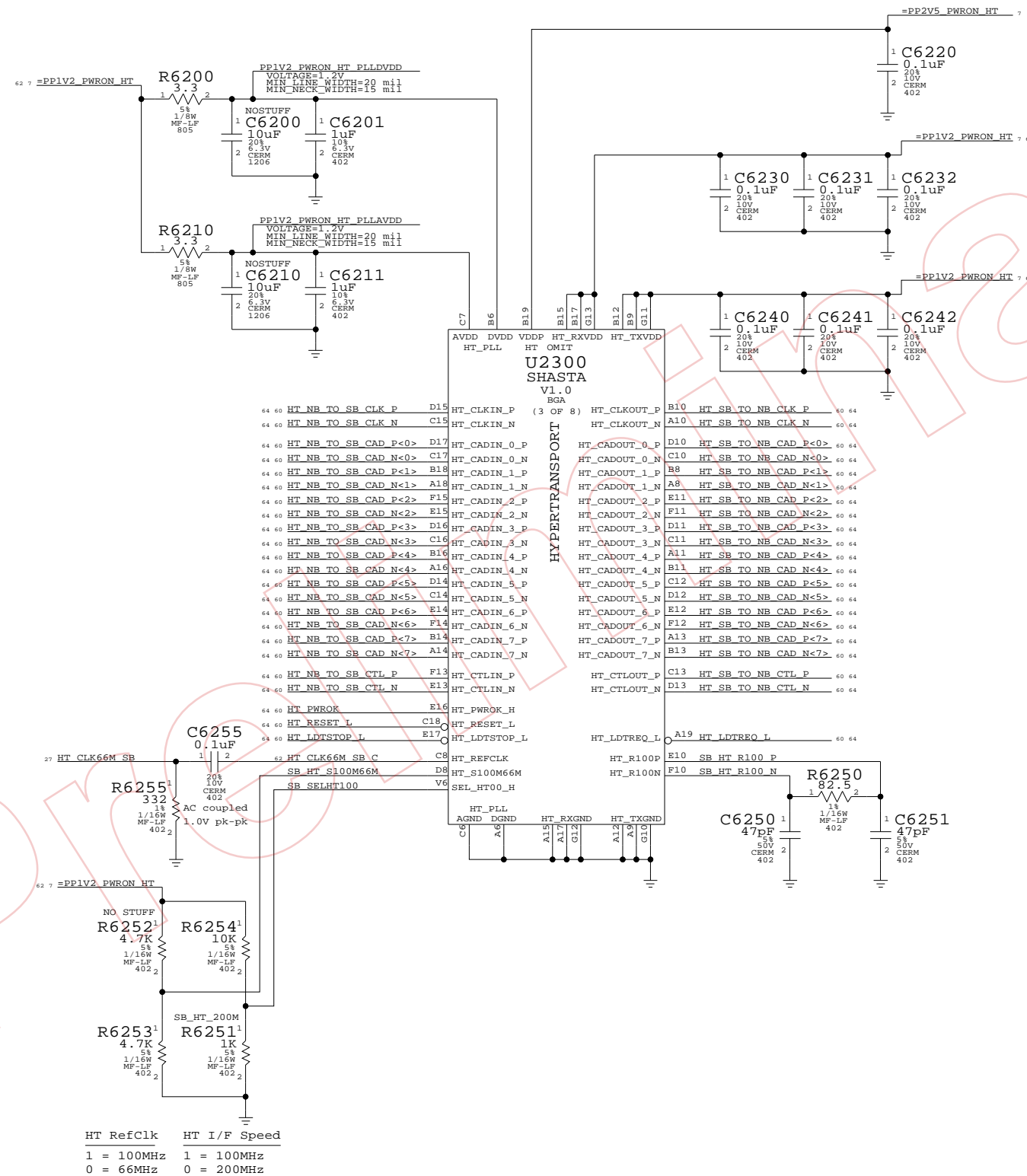
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	60 OF	102
NONE			

Page Notes

Power aliases required by this page:
 - _PP2V5_PWRON_HT
 - _PP1V2_PWRON_HT

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 - SB_HT_200M
 Stuffs resistor to select 200MHz HT I/F.



MASTER: SEEDY

Shasta HyperTransport

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHEET OF		
NONE	62 OF 102		

8

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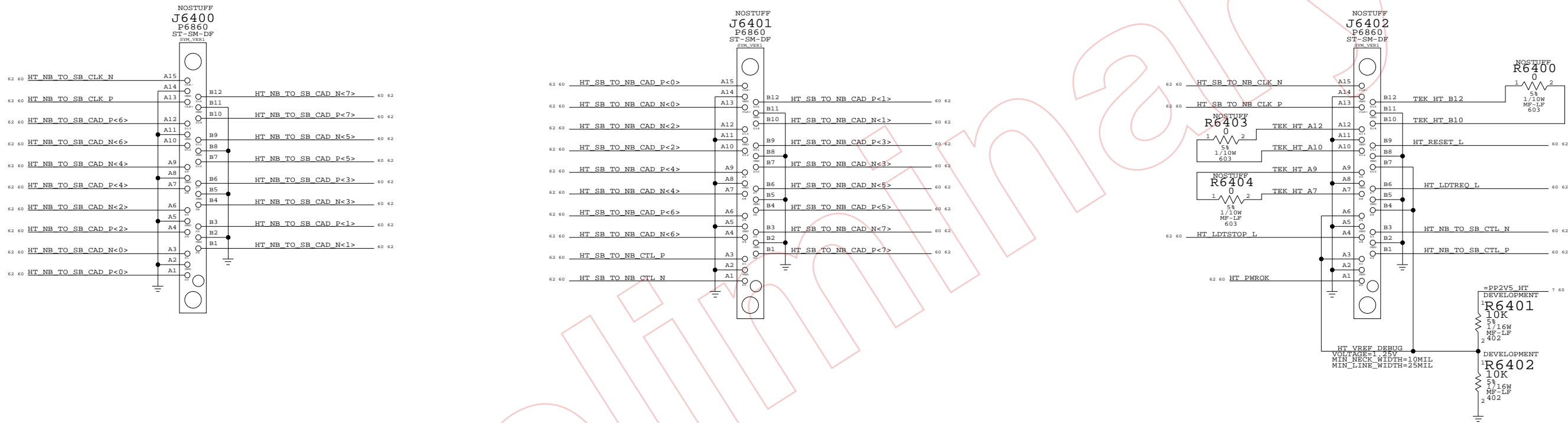
B

B

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A

SAME CONNECTORS & PINOUT AS
Q37 HYPERTRANSPORT BETWEEN GOLEM AND K2



MASTER: GILA
LAST MODIFIED: APR 12, 04

HT DEBUG CONN

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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6772	REV. 04
	SCALE NONE	SHT 64 OF 102	

8

7

6

5

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1

ALL RESISTOR PACKS ARE 47 OHM 1/16W 5%

R PAKS ARE PIN SWAPPABLE ACROSS ALL SIGNALS (EXCEPT IDSELS)

74	PCI_SB_AD<0>	RP7300	2	7	47	PCI_AD<0>	6 74 75 76 77
74	PCI_SB_AD<1>	RP7303	1	8	47	PCI_AD<1>	6 74 75 76 77
74	PCI_SB_AD<2>	RP7303	2	7	47	PCI_AD<2>	6 74 75 76 77
74	PCI_SB_AD<3>	RP7303	4	5	47	PCI_AD<3>	6 74 75 76 77
74	PCI_SB_AD<4>	RP7309	2	7	47	PCI_AD<4>	6 74 75 76 77
74	PCI_SB_AD<5>	RP7300	1	8	47	PCI_AD<5>	6 74 75 76 77
74	PCI_SB_AD<6>	RP7300	3	6	47	PCI_AD<6>	6 74 75 76 77
74	PCI_SB_AD<7>	RP7309	4	5	47	PCI_AD<7>	6 74 75 76 77
74	PCI_SB_AD<8>	RP7300	4	5	47	PCI_AD<8>	6 74 75 76 77
74	PCI_SB_AD<9>	RP7301	2	7	47	PCI_AD<9>	6 74 75 76 77
74	PCI_SB_AD<10>	RP7301	1	8	47	PCI_AD<10>	6 74 75 76 77
74	PCI_SB_AD<11>	RP7309	4	5	47	PCI_AD<11>	6 74 75 76 77
74	PCI_SB_AD<12>	RP7309	1	8	47	PCI_AD<12>	6 74 75 76 77
74	PCI_SB_AD<13>	RP7309	3	6	47	PCI_AD<13>	6 74 75 76 77
74	PCI_SB_AD<14>	RP7301	3	6	47	PCI_AD<14>	6 74 75 76 77
74	PCI_SB_AD<15>	RP7307	1	8	47	PCI_AD<15>	6 74 75 76 77
74	PCI_SB_AD<16>	RP7308	1	8	47	PCI_AD<16>	6 74 75 76 77

74	PCI_SB_AD<17>	R7300	1	47	PCI_AD<17>	6 74 75 76 77	
74	PCI_SB_AD<18>	RP7307	2	7	47	PCI_AD<18>	6 74 75 76 77
74	PCI_SB_AD<19>	RP7306	3	6	47	PCI_AD<19>	6 74 75 76 77
74	PCI_SB_AD<20>	RP7305	1	8	47	PCI_AD<20>	6 74 75 76 77
74	PCI_SB_AD<21>	RP7305	2	7	47	PCI_AD<21>	6 74 76 77
74	PCI_SB_AD<22>	RP7302	1	8	47	PCI_AD<22>	6 74 76 77
74	PCI_SB_AD<23>	RP7302	3	6	47	PCI_AD<23>	6 74 76 77
74	PCI_SB_AD<24>	RP7304	1	8	47	PCI_AD<24>	6 74 75 76 77
74	PCI_SB_AD<25>	RP7306	4	5	47	PCI_AD<25>	6 74 75 76 77
74	PCI_SB_AD<26>	RP7305	3	6	47	PCI_AD<26>	6 74 75 76 77

74	PCI_SB_AD<27>	R7301	1	47	PCI_AD<27>	6 74 75 76 77	
74	PCI_SB_AD<28>	RP7302	2	7	47	PCI_AD<28>	6 74 75 76 77
74	PCI_SB_AD<29>	RP7304	4	5	47	PCI_AD<29>	6 74 75 76 77
74	PCI_SB_AD<30>	RP7302	4	5	47	PCI_AD<30>	6 74 75 76 77
74	PCI_SB_AD<31>	RP7304	2	7	47	PCI_AD<31>	6 74 75 76 77
74	PCI_SB_CBE L<0>	RP7303	3	6	47	PCI_CBE L<0>	6 74 76 77
74	PCI_SB_CBE L<1>	RP7306	2	7	47	PCI_CBE L<1>	6 74 76 77
74	PCI_SB_CBE L<2>	RP7305	4	5	47	PCI_CBE L<2>	6 74 76 77
74	PCI_SB_CBE L<3>	RP7304	3	6	47	PCI_CBE L<3>	6 74 76 77
74	PCI_SB_DEVSEL L	RP7306	1	8	47	PCI_DEVSEL L	6 74 76 77
74	PCI_SB_FRAME L	RP7307	4	5	47	PCI_FRAME L	6 74 76 77
74	PCI_SB_IRDY L	RP7307	3	6	47	PCI_IRDY L	6 74 76 77
74	PCI_SB_TRDY L	RP7308	3	6	47	PCI_TRDY L	6 74 76 77
74	PCI_SB_STOP L	RP7308	4	5	47	PCI_STOP L	6 74 76 77
74	PCI_SB_PAR	RP7308	2	7	47	PCI_PAR	6 74 76 77

PLACE CLOSE TO SHASTA

AD<17> IS IDSEL FOR AIRPORT
AD<27> IS IDSEL FOR USB

PCI SERIES TERMINATION

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	73 OF 102	
NONE			

ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
PCI_AD		
PCI_AD27		
PCI_AD		
PCI_AD23		
PCI_AD22		
PCI_AD21		
PCI_AD20		
PCI_AD		
PCI_AD17		
PCI_AD		
PCI		
PCI		
PCI_CTT1		
PCI_CTT1		
PCI_CTT1		
PCI_CTT1		
PCI_CTT1		

PCI_AD<31..28>	6 73 75 76 77
PCI_AD<27>	6 73 75 76 77
PCI_AD<26..24>	6 73 75 76 77
PCI_AD<23>	6 73 76 77
PCI_AD<22>	6 73 76 77
PCI_AD<21>	6 73 76 77
PCI_AD<20>	6 73 75 76 77
PCI_AD<19..18>	6 73 75 76 77
PCI_AD<17>	6 73 75 76 77
PCI_AD<16..0>	6 73 75 76 77
PCI_CBE L<3..0>	6 73 76 77
PCI_PAR	6 73 76 77
PCI_DEVSEL L	6 73 74 76 77
PCI_FRAME L	6 73 74 76 77
PCI_IRDY L	6 73 74 76 77
PCI_TRDY L	6 73 74 76 77
PCI_STOP L	6 73 74 76 77

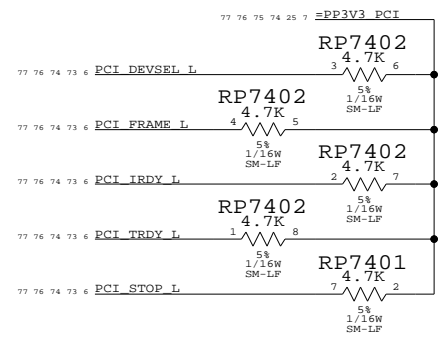
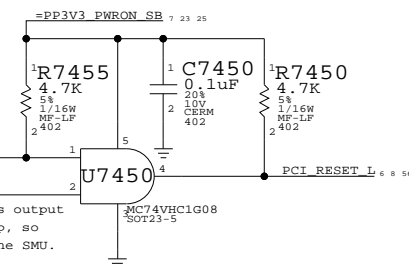
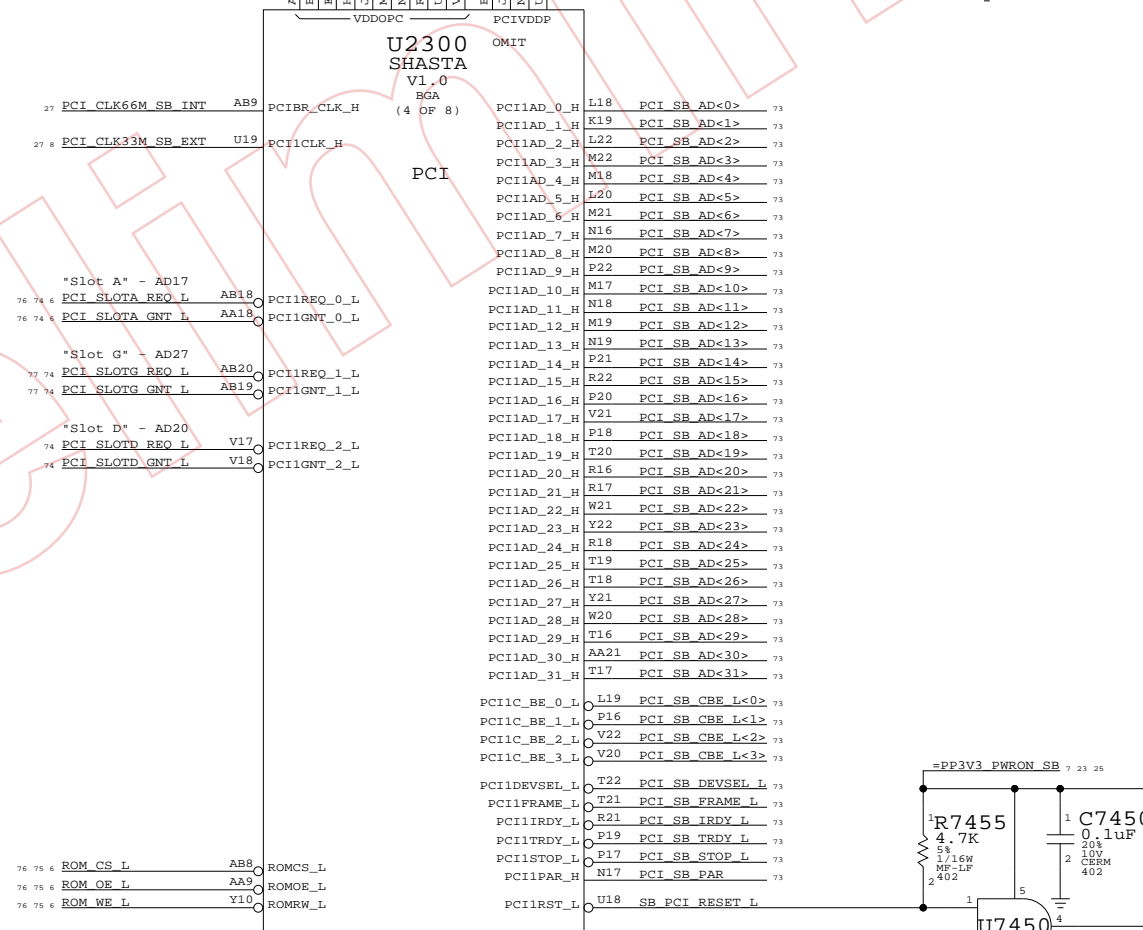
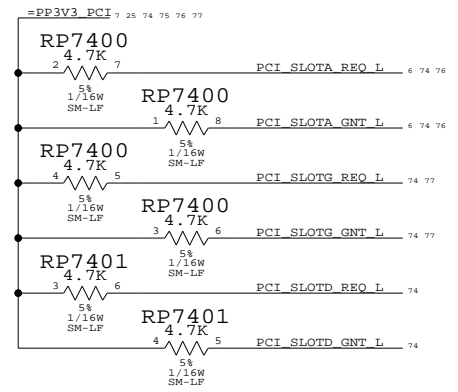
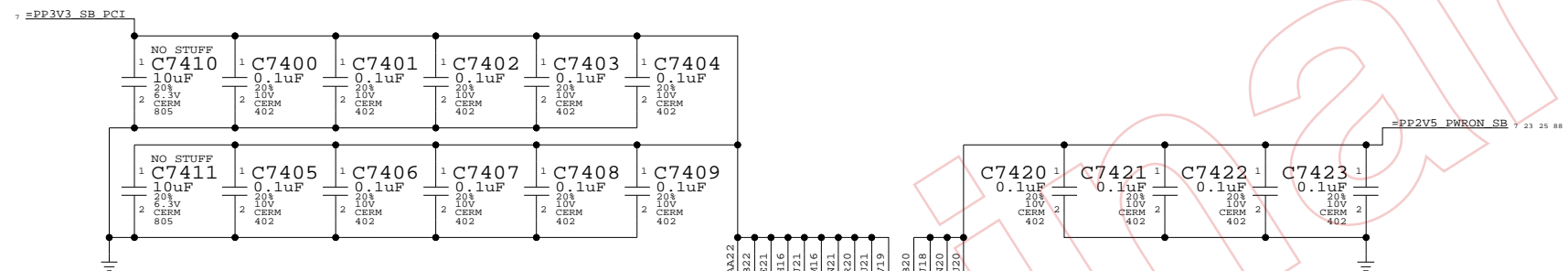
Page Notes

Power aliases required by this page:
 - _PP3V3_PCI
 - _PP3V3_SB_PCI (can be _PP3V3_PCI)
 - _PP3V3_PWRON_SB
 - _PP2V5_PWRON_SB

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

PCI Devices implemented on this page:
 AD11 - PCI0 (0x106B/0x0053)
 AD11 - PCI1 (0x106B/0x0054)
 AD11 - PCI2 (0x106B/0x0055)
 AD23 - KeyLargo (0x106B/0x004F, PCI1)
 AD28 - SATA 150 (0x1166/0x0240, PCI0 or 2)
 AD29 - UATA 133 (0x106B/0x0050, PCI0 or 2)
 AD30 - FireWire (0x106B/0x0052, PCI0 or 2)
 AD31 - Ethernet (0x106B/0x0051, PCI0)



Shasta PCI Interface

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT	74 OF 102

D

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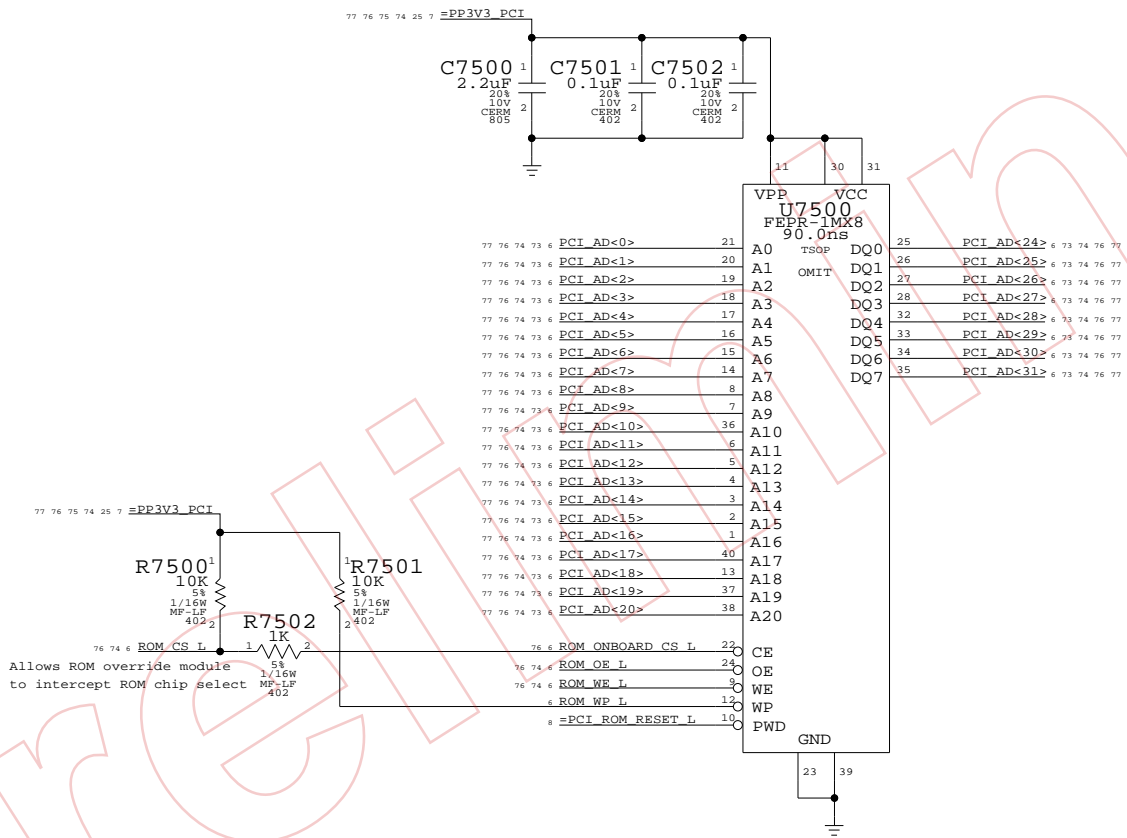
Page Notes

Power aliases required by this page:
 - _PP3V3_PCI

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

NOTE: This page does not specify a BootROM part number. Must use a TABLE_x_ITEM symbol to declare U7500 part number.



Master: Link

BootROM

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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 051-6772	REV. 04
	SCALE NONE	SHEET 75	OF 102

ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
PCI_CLK_AIRPORT	CLOCKS	PCI_CLK33M_AIRPORT

Page Notes

Power aliases required by this page:
 - _PP3V3_PCI

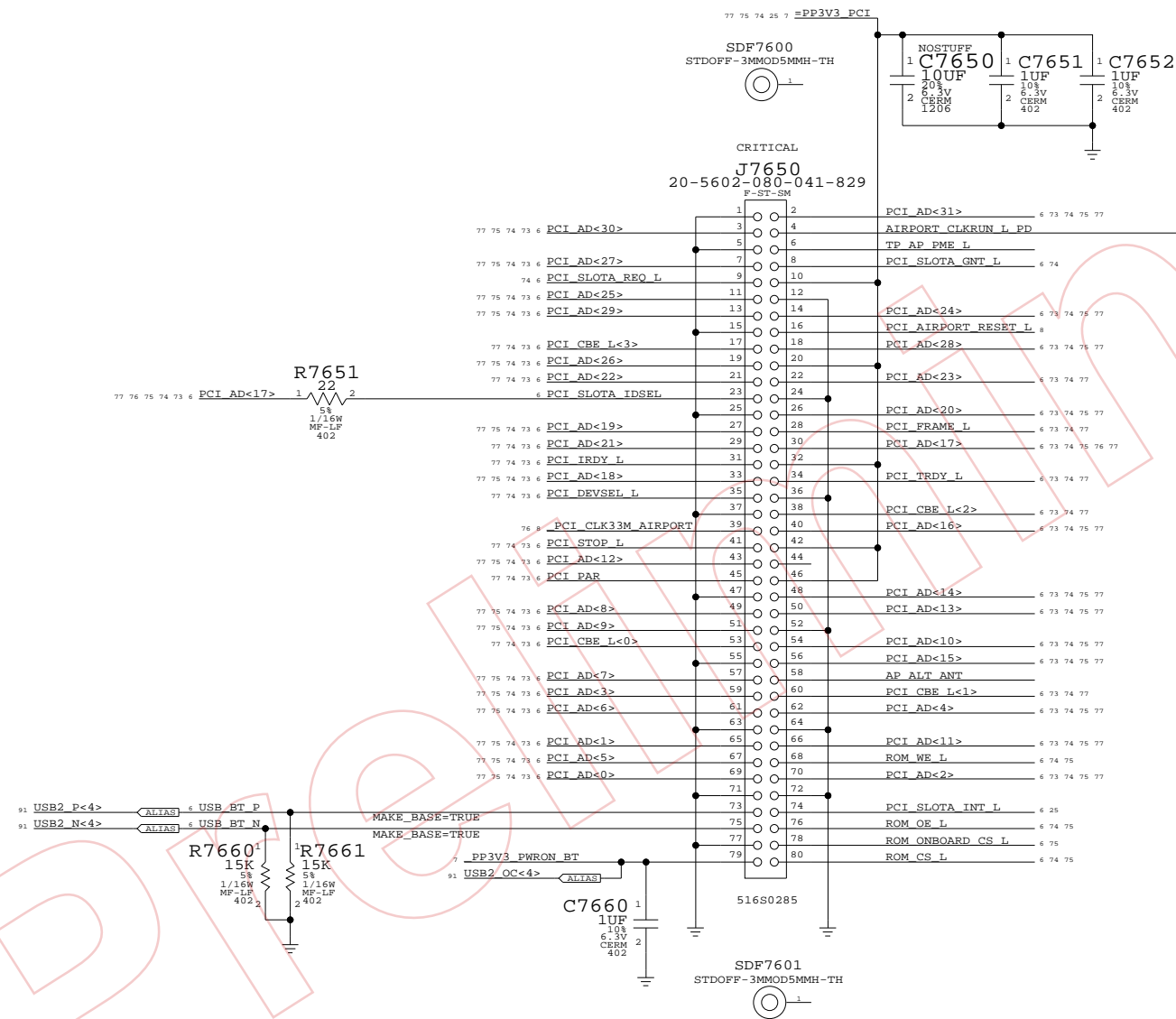
Signal aliases required by this page:
 - _PCI_CLK33M_AIRPORT (33MHz PCI clock)

BOM options provided by this page:
 (NONE)

PCI Devices implemented on this page:
 AD17 (Slot "A") - AirPort (0x????/0x????)

NOTE: This AirPort implementation does not support PME#.

Q85 WIRELESS CONNECTOR



AIRPORT & BLUETOOTH

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT	OF
		76	102

ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
PCI_CLK_USB2	CLOCKS	=PCI_CLK33M_USB2

Page Notes

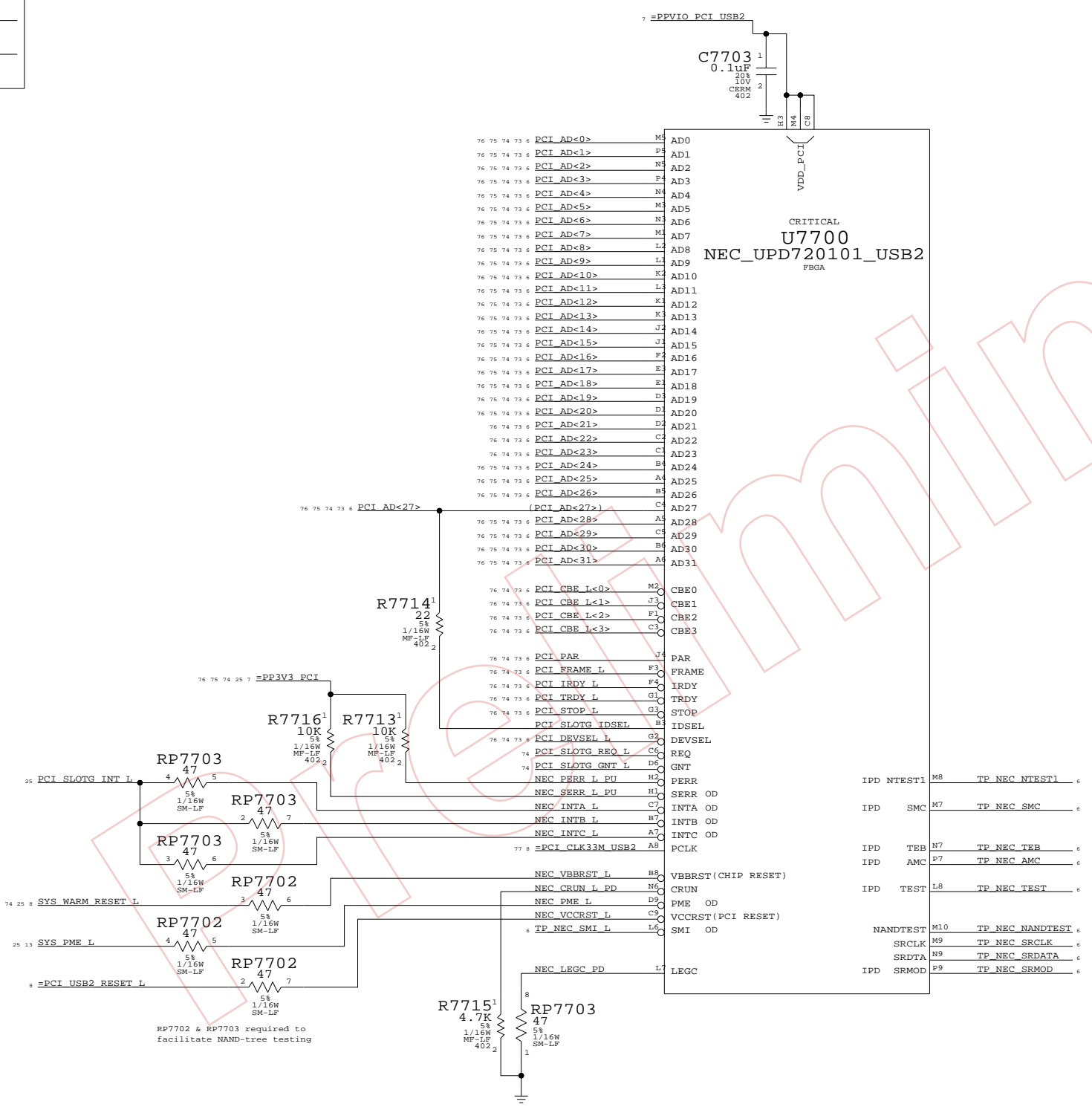
Power aliases required by this page:
 - _PPVIO_PCI (to 3.3V or 5V)

Signal aliases required by this page:
 - _PCI_CLK33M_USB2 (33MHz PCI clock)

BOM options provided by this page:
 (NONE)

PCI Devices implemented on this page:
 AD27 (Slot "G") - USB2 (0x1033/0x0035)

NOTE: This USB2 implementation supports D3cold.



USB 2.0 PCI Interface

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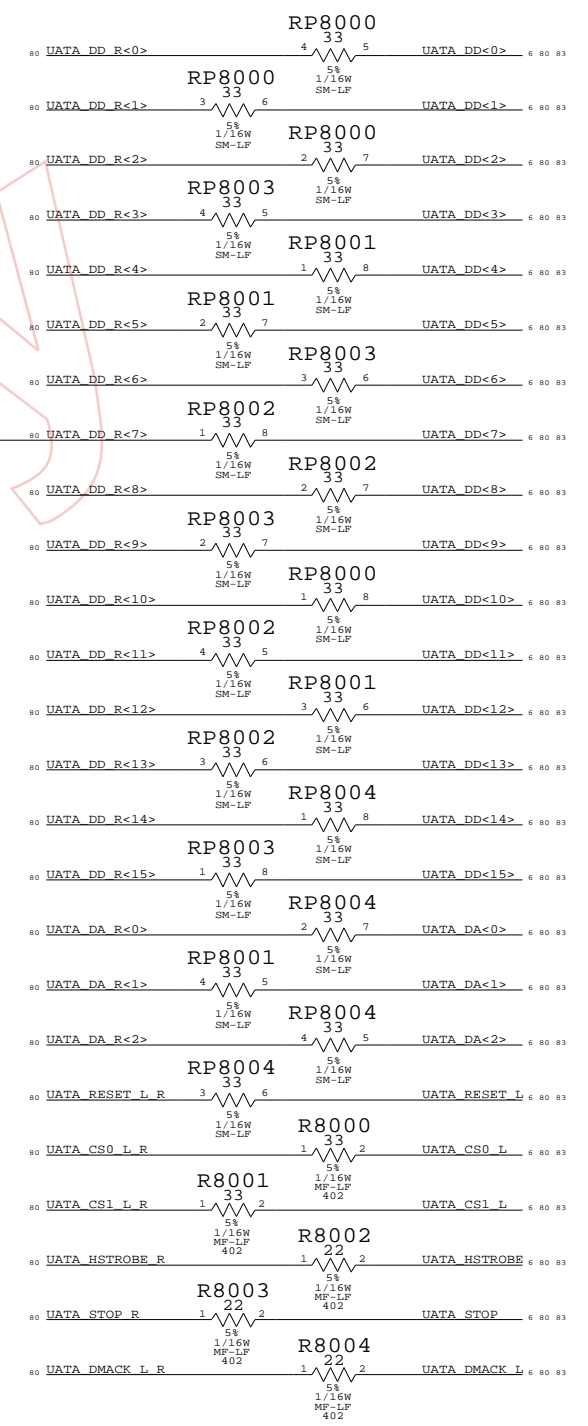
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT OF	77 OF 102

ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
SATA_RXD1	SATA	SATA	SATA_RXD_P1_C
SATA_RXD1	SATA	SATA	SATA_RXD_N1_C
SATA_TXD1	SATA	SATA	SATA_TXD_P1
SATA_TXD1	SATA	SATA	SATA_TXD_N1
SATA_RXD2	SATA	SATA	SATA_RXD_P2_C
SATA_RXD2	SATA	SATA	SATA_RXD_N2_C
SATA_TXD2	SATA	SATA	SATA_TXD_P2
SATA_TXD2	SATA	SATA	SATA_TXD_N2
UATA_DD			UATA_DD<15..8>
UATA_DD7			UATA_DD<7>
UATA_DD			UATA_DD<6..0>
UATA_HOST			UATA_DA<2..0>
UATA_HOST			UATA_CS0_L
UATA_HOST			UATA_CS1_L
UATA_HOST			UATA_HSTROBE
UATA_HOST			UATA_STOP
UATA_HOST_R			UATA_DMACK_L
UATA_HOST_R			UATA_RESET_L
UATA_DEV_R_C			UATA_DSTROBE
UATA_DEV_R			UATA_DMARQ
UATA_DEV_R			UATA_INTRO

UATA Termination



Page Notes

Power aliases required by this page:
 - _PP1V2_PWRON_DISK

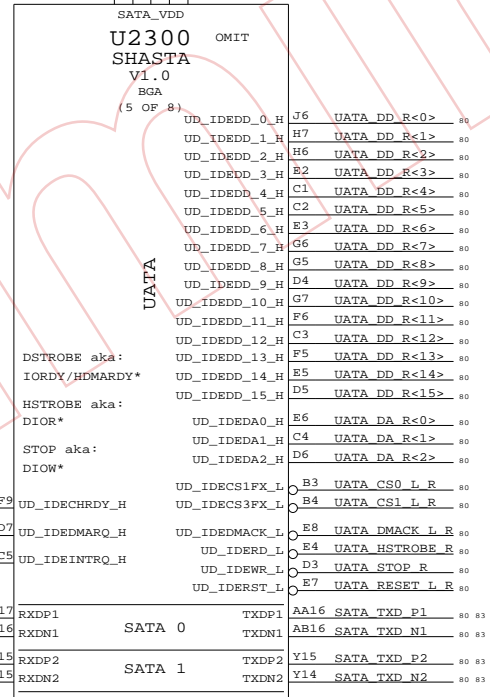
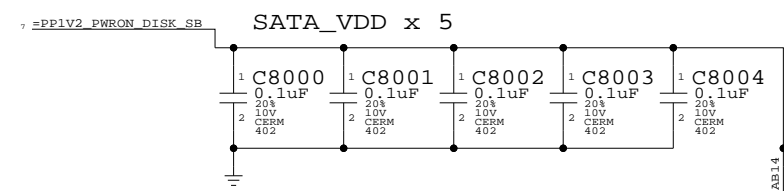
Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

Net Spacing Type: SATA

Line To Line: 15 mils
 Length Tolerance: 50 mils
 Primary Max Sep: 10 mils outer
 Primary Max Sep: 9 mils inner
 Secondary Max Sep: 100 mils
 Secondary Length: 500 mils

NOTE: Target differential impedance for SATA data pairs is 100 ohms.



AC coupling required for any SATA pair used. Recommend 0.1uF cap placed close to Shasta. (Caps provided by device page)

Shasta Disk

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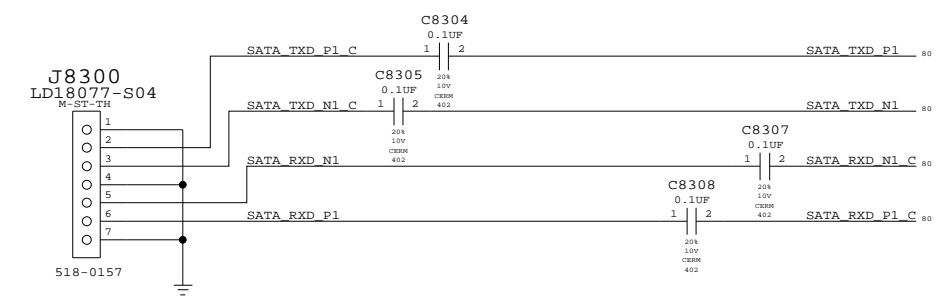
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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	OF	
NONE	80	102	

	ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
83 80 UATA_DD<15..8>		UATA_DD		
83 80 UATA_DD<7>		UATA_DD7		
83 80 UATA_DD<6..0>		UATA_DD		
83 80 UATA_DA<2..0>		UATA_HOST		
83 80 UATA_CS0_L		UATA_HOST		
83 80 UATA_CS1_L		UATA_HOST		
83 80 UATA_HSTROBE		UATA_HOST		
83 80 UATA_STOP		UATA_HOST		
83 80 UATA_DMACK_L		UATA_HOST_R		
83 80 UATA_RESET_L		UATA_HOST_R		
83 80 UATA_DSTROBE		UATA_DEV_R_C		
83 80 UATA_DMARQ		UATA_DEV_R		
83 80 UATA_INTRO		UATA_DEV_R		

SATA CONNECTORS



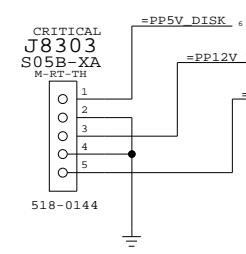
SATA_TXD_P2_80 == TP_SATA_TXD_P2_80
 MAKE_BASE=TRUE

SATA_TXD_N2_80 == TP_SATA_TXD_N2_80
 MAKE_BASE=TRUE

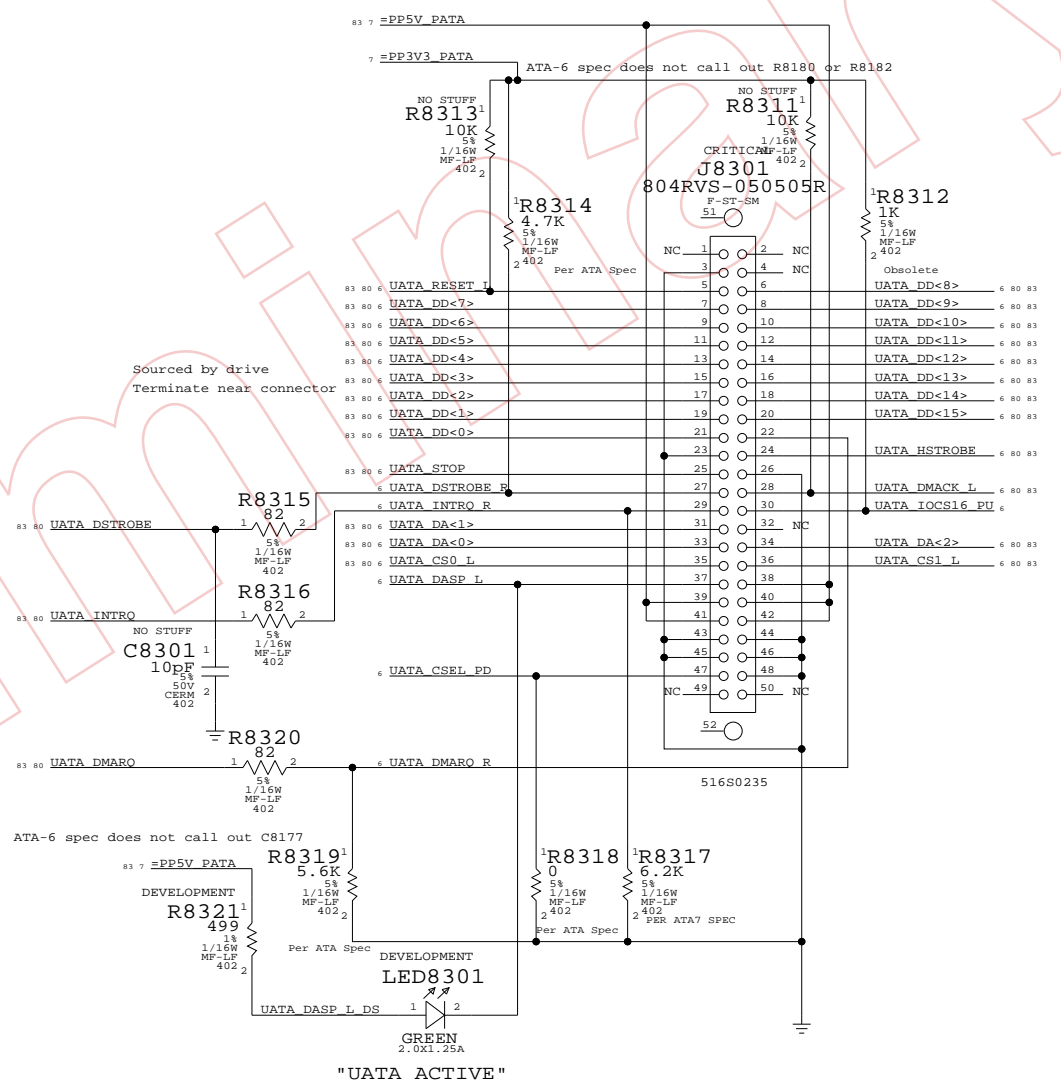
80_SATA_RXD_N2_C == TP_SATA_RXD_N2_C_80
 MAKE_BASE=TRUE

80_SATA_RXD_P2_C == TP_SATA_RXD_P2_C_80
 MAKE_BASE=TRUE

HD POWER



PATA CONNECTOR



Sourced by drive
 Terminate near connector

ATA-6 spec does not call out C8177

"UATA ACTIVE"

DISK CONNECTORS

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	D	051-6772	04
SCALE	SHT OF		
NONE	83		102

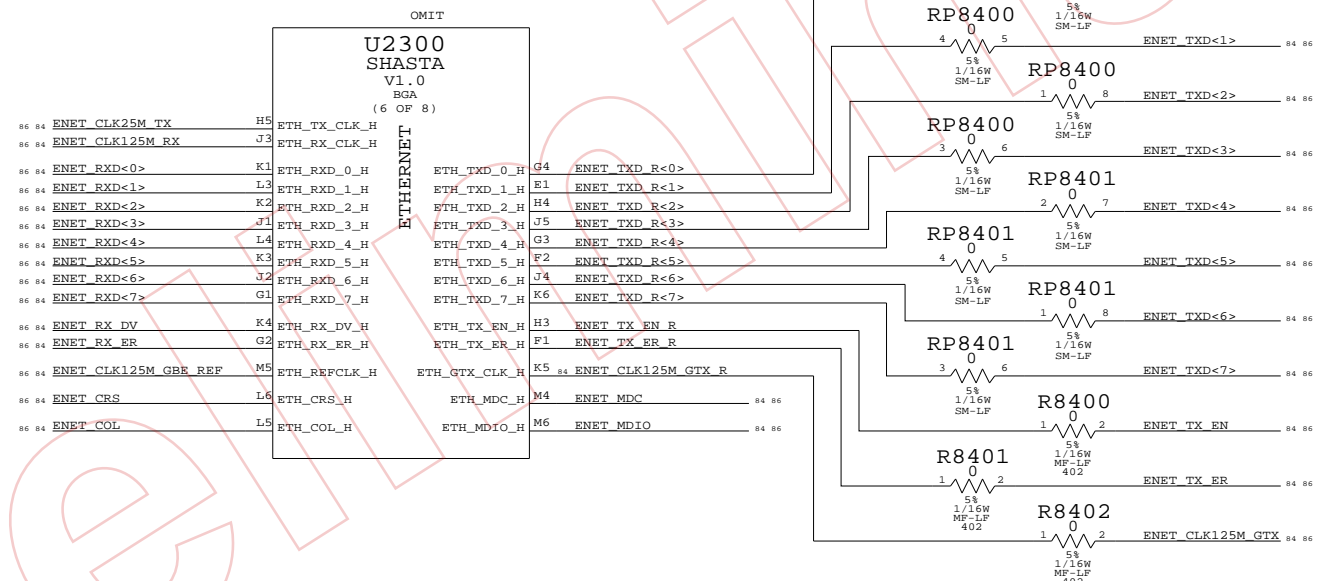
ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
	ENET_RX_CLK	P25MM	ENET_CLK25M_TX
	ENET_RX_CLK	P25MM	ENET_CLK125M_RX
	ENET_GBE_REF	P25MM	ENET_CLK125M_GBE_REF
	ENET_TX_CLK	P25MM	ENET_CLK125M_GTX
			ENET_CLK125M_GTX_R
	ENET_RX		ENET_RXD<7..0>
	ENET_RX_CTL		ENET_RX_DV
	ENET_RX_CTL		ENET_RX_ER
	ENET_TX		ENET_TXD<7..0>
	ENET_TX_CTL		ENET_TX_EN
	ENET_TX_CTL		ENET_TX_ER
	ENET_RX_CTL		ENET_CR_S
	ENET_RX_CTL		ENET_COL
	ENET_MDC		ENET_MDC
	ENET_MDIO		ENET_MDIO

Page Notes

Power aliases required by this page:
(NONE)

Signal aliases required by this page:
(NONE)

BOM options provided by this page:
(NONE)



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Master: Link

Shasta Ethernet

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT	84 OF 102

ELECTRICAL_CONSTRAINT_SET	NET_TYPE	SPACING	PHYSICAL	DIFFERENTIAL_PAIR
	P25MM			ENET_CLK125M_GBE_REF_R
	P25MM			ENET_CLK125M_RX_R
	P25MM			ENET_CLK25M_TX_R
	ENET_MDI	ENET	ENET	ENET_MDI0
	ENET_MDI	ENET	ENET	ENET_MDI_P<0>
	ENET_MDI	ENET	ENET	ENET_MDI_N<0>
	ENET_MDI	ENET	ENET	ENET_MDI_P<1>
	ENET_MDI	ENET	ENET	ENET_MDI_N<1>
	ENET_MDI	ENET	ENET	ENET_MDI_P<2>
	ENET_MDI	ENET	ENET	ENET_MDI_N<2>
	ENET_MDI	ENET	ENET	ENET_MDI_P<3>
	ENET_MDI	ENET	ENET	ENET_MDI_N<3>
	VESTA_CLK25M_XTAL	P25MM		VESTA_CLK25M_XTALI
	P25MM			VESTA_CLK25M_XTALO
	P25MM			VESTA_CLK25M_XTALO_R

Page Notes

Power aliases required by this page:
 - _PP3V3_ENET
 - _PP2V5_ENETFW
 - _PPLV2_ENETFW

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

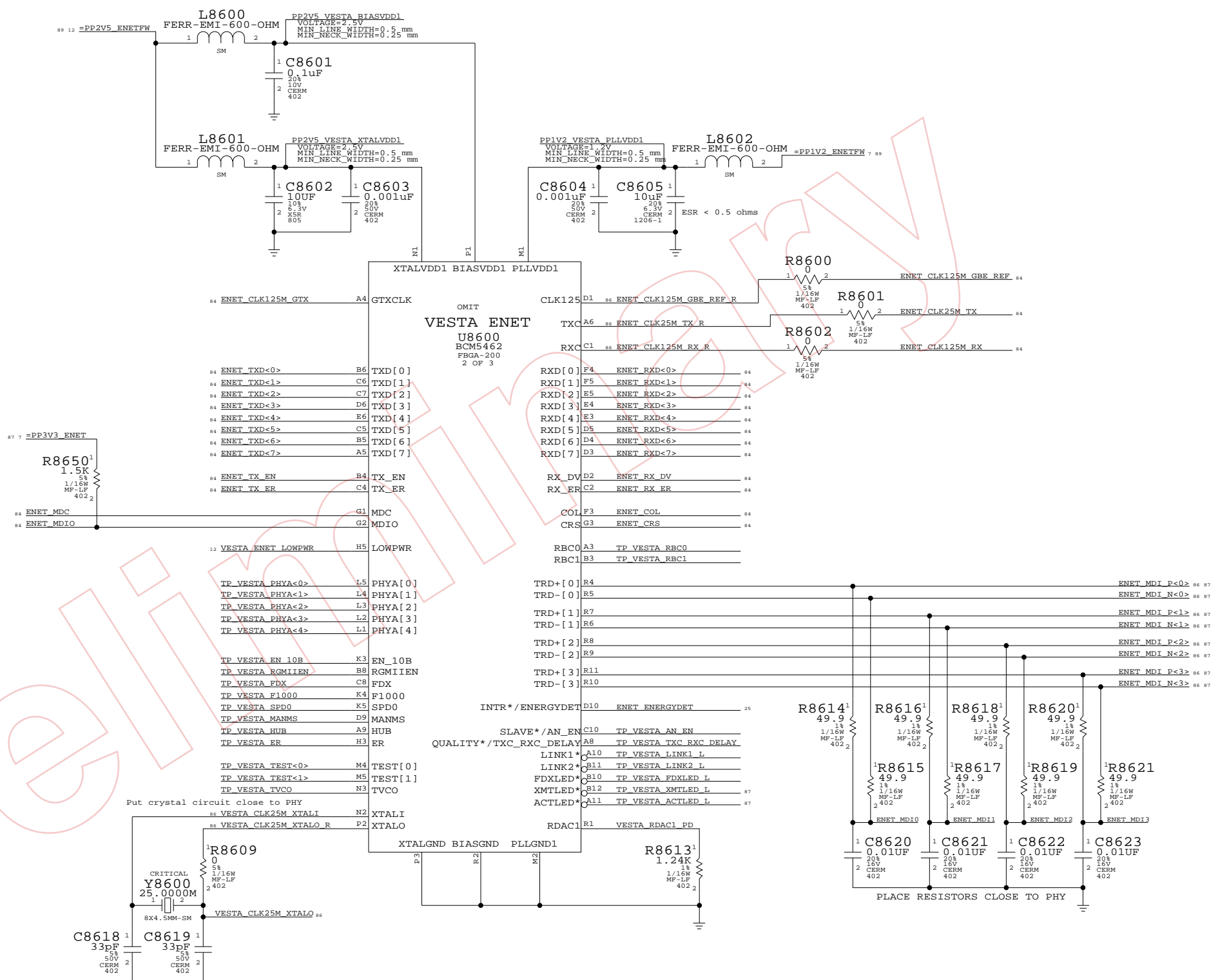
Net Spacing Type: ENET

Line To Line: 0.38 mms
 Length Tolerance: 50 mls
 Primary Max Sep: 5 mls
 Secondary Max Sep: 100 mls
 Secondary Length: 500 mls

NOTE: Target differential impedance for ENET data pairs is 100 ohms.

Vesta Config Straps:

PHYA<4..0>	PHY Address Select (Internal Pull-downs)	MANMS	Manual Master/Slave Configuration Select Sets manual master/slave configuration enable bit (Internal Pull-down)
EN_10B	TBI Interface Select	HUB	Repeater Select Sets Hub/DTE bit and master/slave configuration value bit (Internal Pull-down)
RGMIEN	RGMI Enable	ER	Edge Rate Select
FDX	Pull-Duplex Select	AN_EN	Auto-Negotiation Select
F1000	Speed Select	TXC_RXC_DELAY	TXC and RXC clock delay
SPD0	Speed Select		
AN_EN	Force 10BASE-T		
0	Force 100BASE-TX		
0	Force 1000BASE-T (test use only)		
1	Auto-negotiate advertise 10BASE-T		
1	Auto-negotiate advertise 10/100BASE-TX		
1	Auto-negotiate advertise 10/100/1000BASE-T		
1	Auto-negotiate advertise 1000BASE-T		



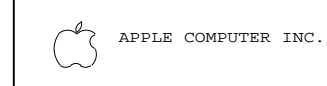
Vesta Ethernet PHY

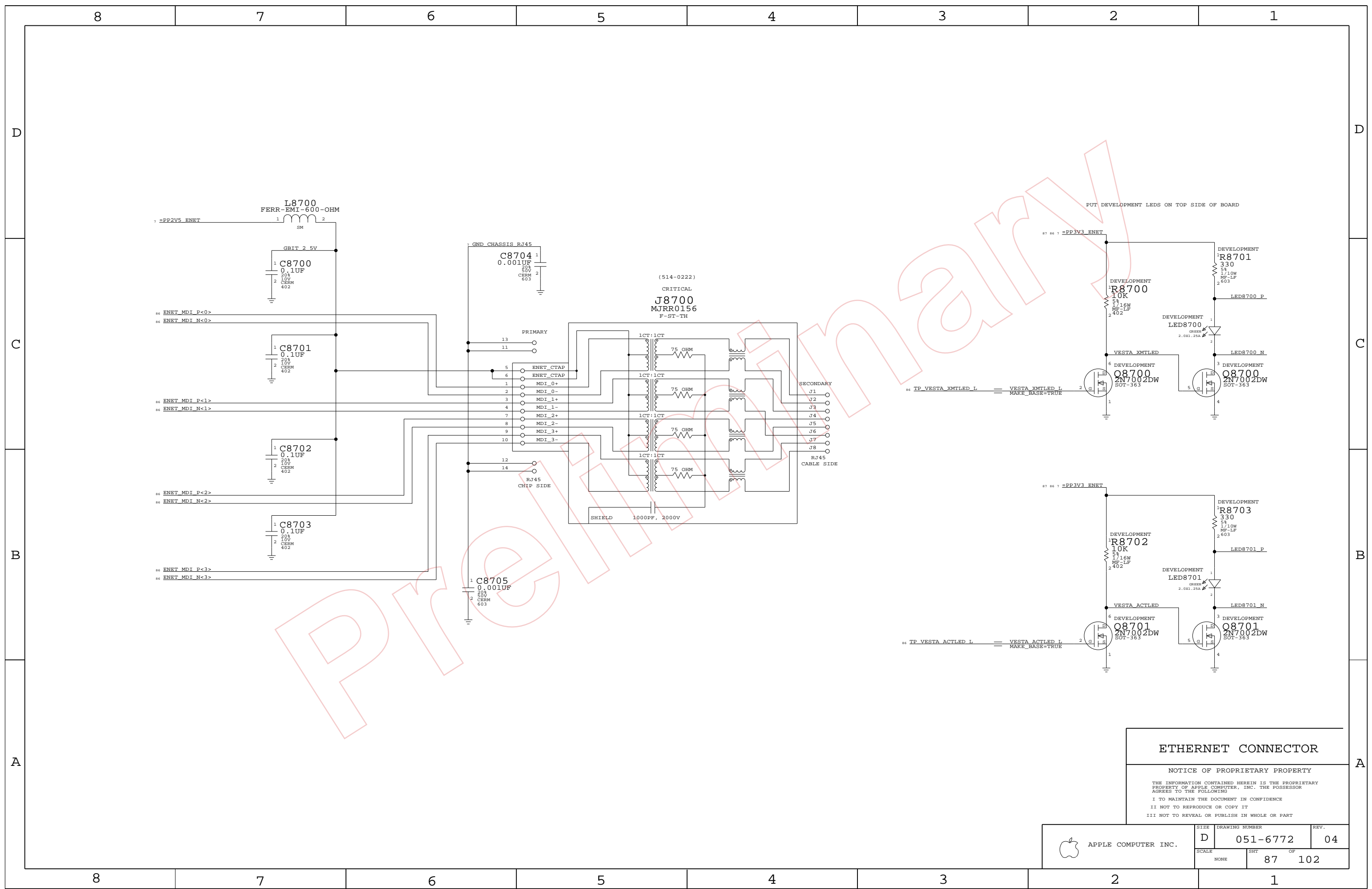
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SCALE	DRAWING NUMBER	REV.
NONE	D 051-6772	04
SHEET		86 OF 102





ETHERNET CONNECTOR

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT OF	87 OF 102

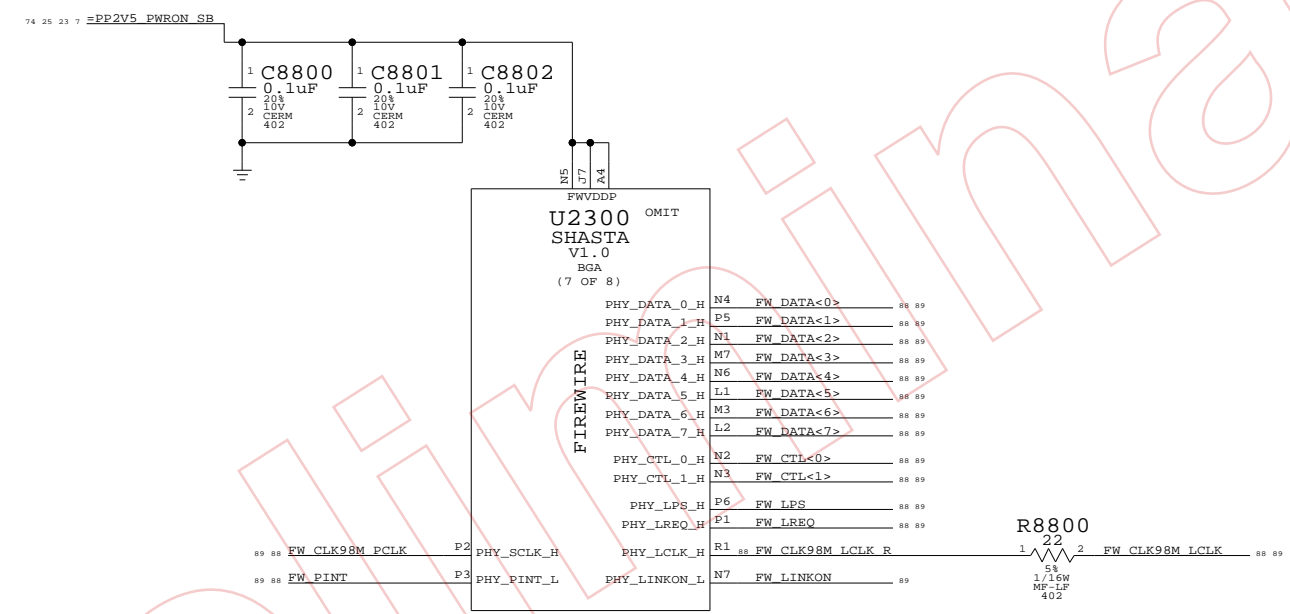
ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
FW			FW_DATA<7..0>
FW			FW_CTL<1..0>
FW_LPS			FW LPS
FW_LREQ			FW LREQ
FW_PINT			FW PINT
FW_LCLK		15 MIL SPACING	FW CLK98M LCLK
FW_PCLK		15 MIL SPACING	FW CLK98M PCLK
		15 MIL SPACING	FW CLK98M LCLK R

Page Notes

Power aliases required by this page:
 - _PP2V5_PWRON_SB

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)



Master: Link

Shasta FireWire

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	D	051-6772	04
SCALE	NONE	SHT	88 OF 102

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			DIFFERENTIAL_PAIR
	SPACING	PHYSICAL		
PROVIDED BY LINK PAGE	P38MM	CLOCKS		FW_CLK98M_PCLK_R
R400	FW_TPA1	FW	FW	FW_TPA0
R400	FW_TPA1	FW	FW	FW_TPA N<0>
R400	FW_TPB1	FW	FW	FW_TPB N<0>
R400	FW_TPB1	FW	FW	FW_TPB N<0>
R400	FW_TPA2	FW	FW	FW_TPA P<1>
R400	FW_TPA2	FW	FW	FW_TPA N<1>
R400	FW_TPB2	FW	FW	FW_TPB P<1>
R400	FW_TPB2	FW	FW	FW_TPB N<1>
R400	FW_TPA3	FW	FW	FW_TPA P<2>
R400	FW_TPA3	FW	FW	FW_TPA N<2>
R400	FW_TPB3	FW	FW	FW_TPB P<2>
R400	FW_TPB3	FW	FW	FW_TPB N<2>
R400	VESTA_CLK24M_XTAL	P38MM	CRYSTAL	VESTA_CLK24M_XTALI
R400		P38MM	CRYSTAL	VESTA_CLK24M_XTALO
R400		P38MM	CRYSTAL	VESTA_CLK24M_XTALO_R

Page Notes

- Power aliases required by this page:
- _PPFW_PHY
 - _PP3V3_FW
 - _PP3V3_ENETFW
 - _PP2V5_ENETFW
 - _PP1V2_ENETFW
- Signal aliases required by this page:
- (NONE)
- BOM options provided by this page:
- VESTA_DS_ONLY_EN0
- If stuffed, adds external pull-up to counter internal pull-down in Vesta. See straps table for more information.
- VESTA_PWR_CLASS_0
- If stuffed, adds external pull-down to counter internal pull-up in Vesta. See straps table for more information.

Net Spacing Type: FW

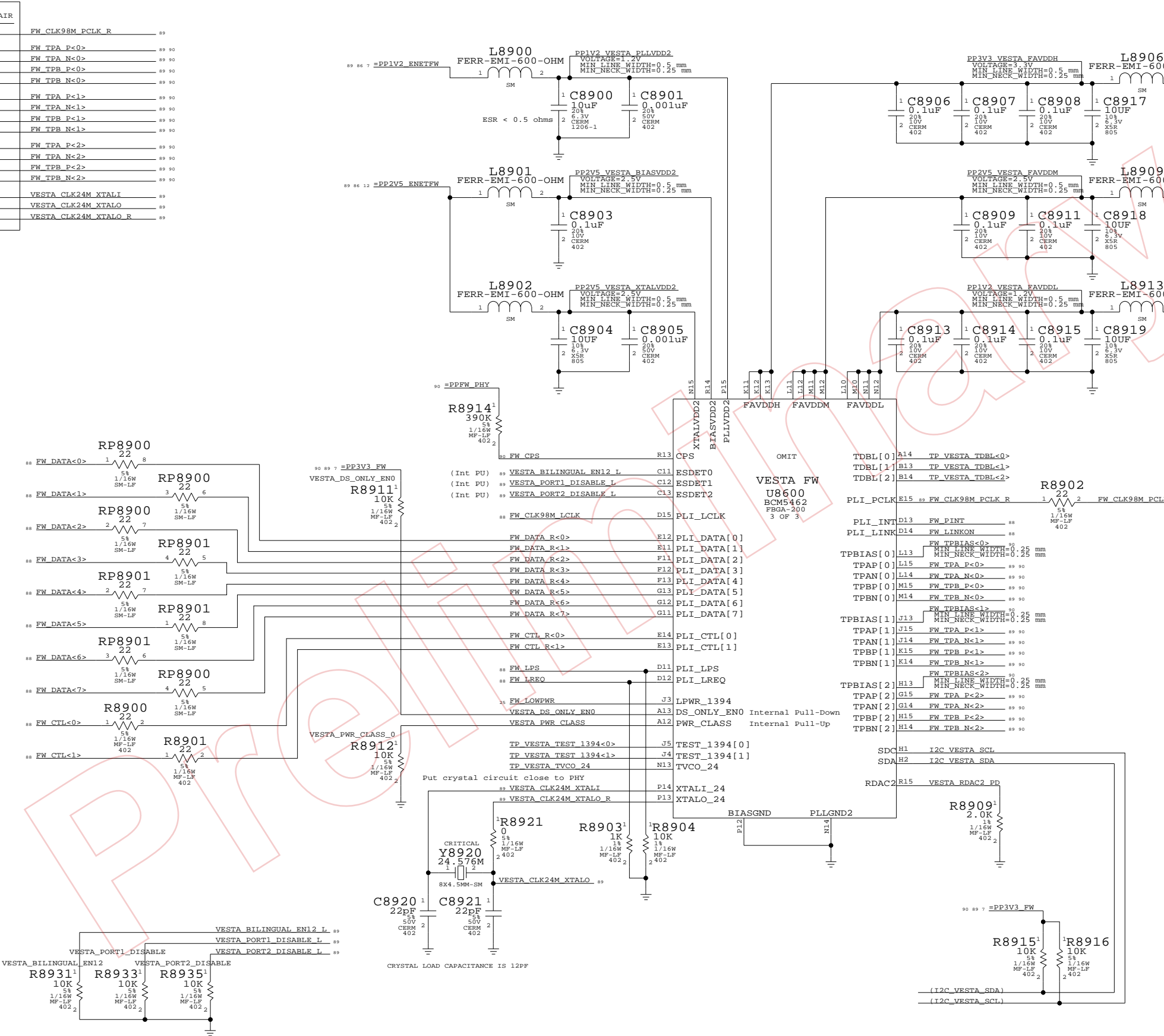
Line To Line: 0.38 mms
 Length Tolerance: 100 mils
 Primary Max Sep: 7.5 mils
 Secondary Max Sep: 100 mils
 Secondary Length: 500 mils

NOTE: Target differential impedance for FW data pairs is 110 ohms.

Vesta Config Straps:

PWR_CLASS - FireWire Power Class
 1 - Sets Power Class to 0x4
 0 - Sets Power Class to 0x0 (Internal Pull-up)

DS_ONLY_EN0 - Port 0 Data/Strobe
 1 - Port 0 Data/Strobe mode only
 0 - Port 0 Bilingual mode (Internal Pull-down)



Vesta FireWire PHY

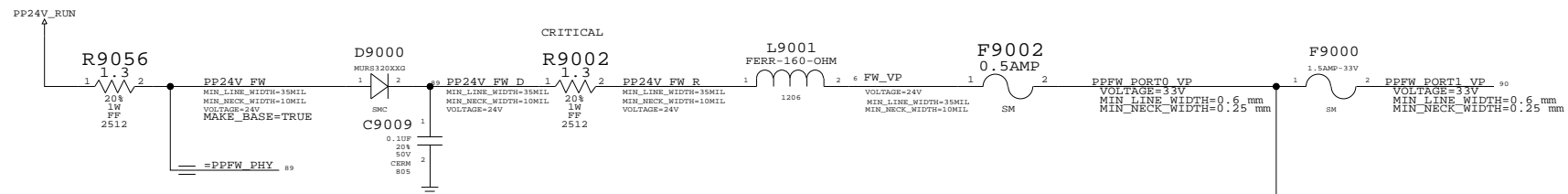
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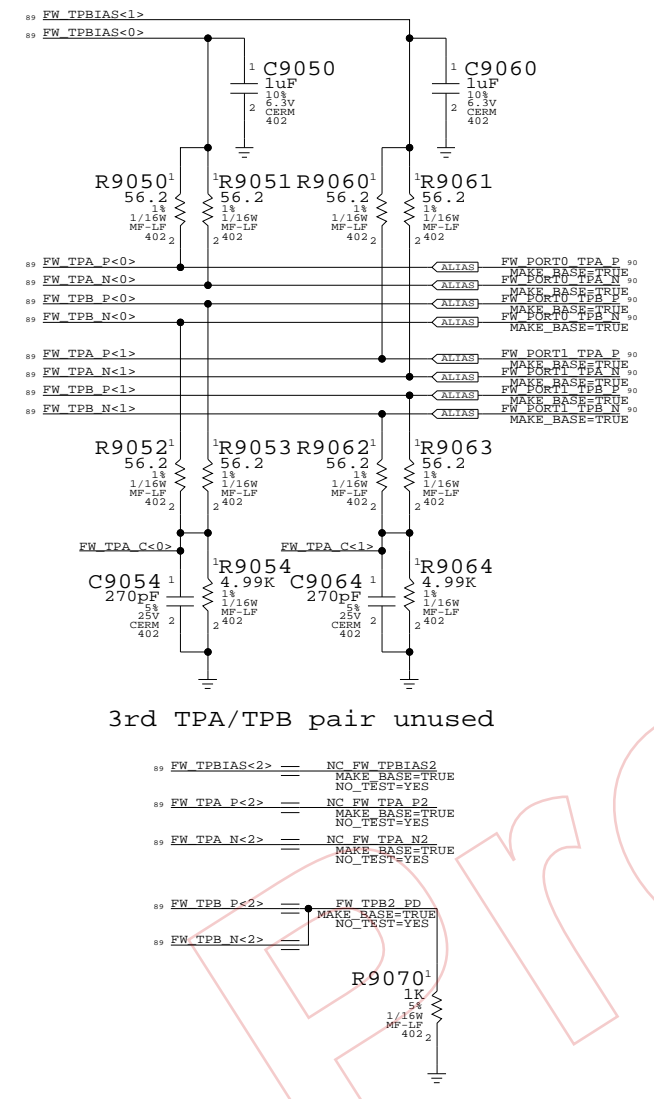
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE
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NET_TYPE		
SPACING	PHYSICAL	DIFFERENTIAL_PAIR
FW	FW	FW_TPA0_FL
FW	FW	FW_TPA0_FR
FW	FW	FW_TPB0_FL
FW	FW	FW_TPB0_FR
FW	FW	FW_TPA1_FL
FW	FW	FW_TPA1_FR
FW	FW	FW_TPB1_FL
FW	FW	FW_TPB1_FR

8 WATTS MAX
24 VOLTS

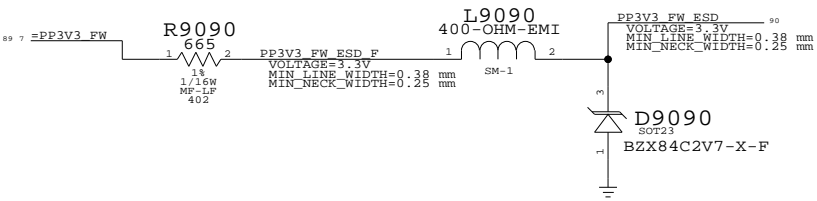


Termination
Place close to FireWire PHY

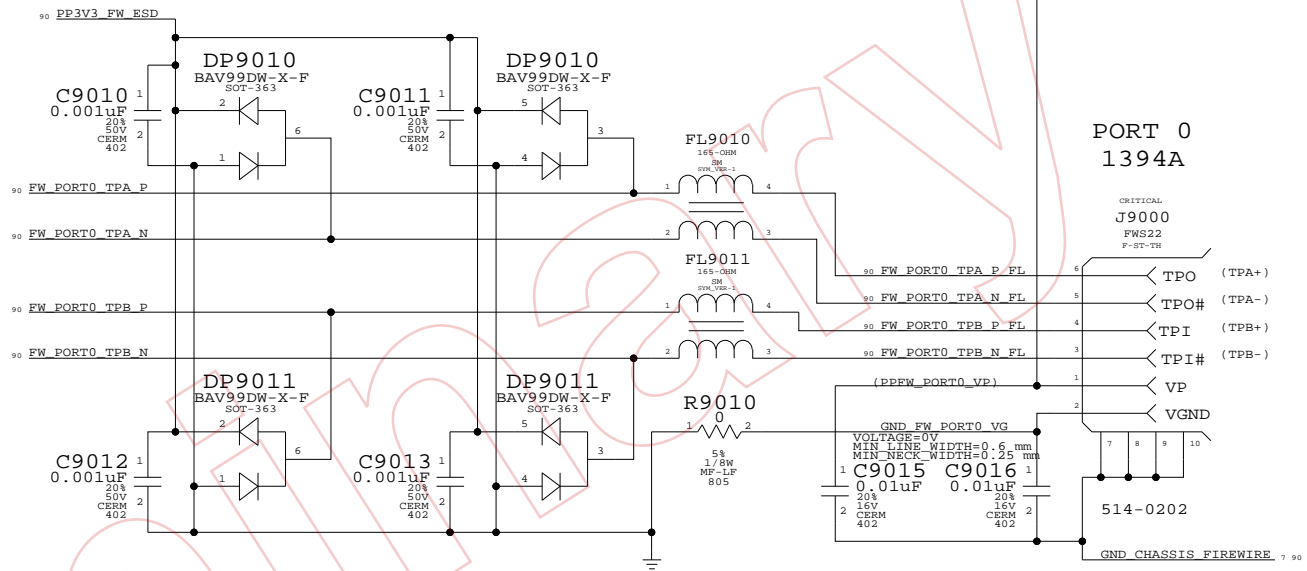


3rd TPA/TPB pair unused

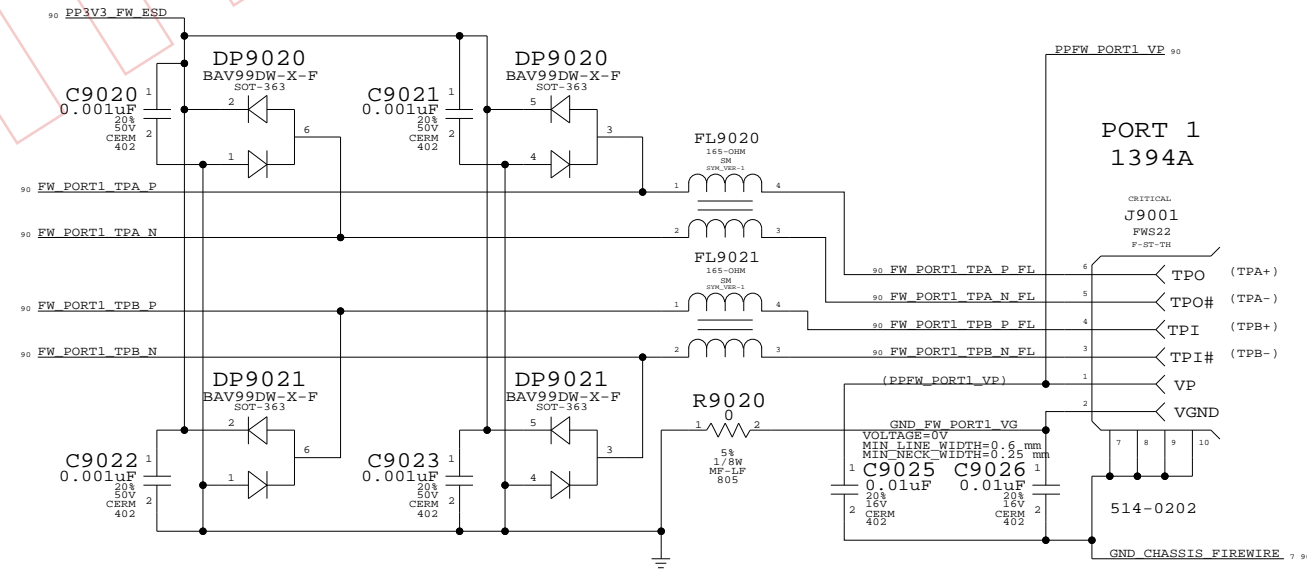
ESD Rail



"Snapback" & "Late VG" Protection



"Snapback" & "Late VG" Protection



PORT 0
1394A

PORT 1
1394A

FIREWIRE CONNECTORS

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	D	051-6772	04
SCALE	SHT OF		
NONE	90 OF 102		

ELECTRICAL_CONSTRAINT_SET	NET_PHYSICAL_TYPE	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
USB2_0	USB2	USB2	USB2_P<0>
USB2_0	USB2	USB2	USB2_N<0>
USB2_1	USB2	USB2	USB2_P<1>
USB2_1	USB2	USB2	USB2_N<1>
USB2_2	USB2	USB2	USB2_P<2>
USB2_2	USB2	USB2	USB2_N<2>
USB2_3	USB2	USB2	USB2_P<3>
USB2_3	USB2	USB2	USB2_N<3>
USB2_4	USB2	USB2	USB2_P<4>
USB2_4	USB2	USB2	USB2_N<4>
USB2_NEC_XTAL	15 MIL SPACING		NEC_CLK30M_XT1
	15 MIL SPACING		NEC_CLK30M_XT2
	15 MIL SPACING		NEC_CLK30M_XT2_R

Page Notes

Power aliases required by this page:
 - _PP3V3_PWRON_USB

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)

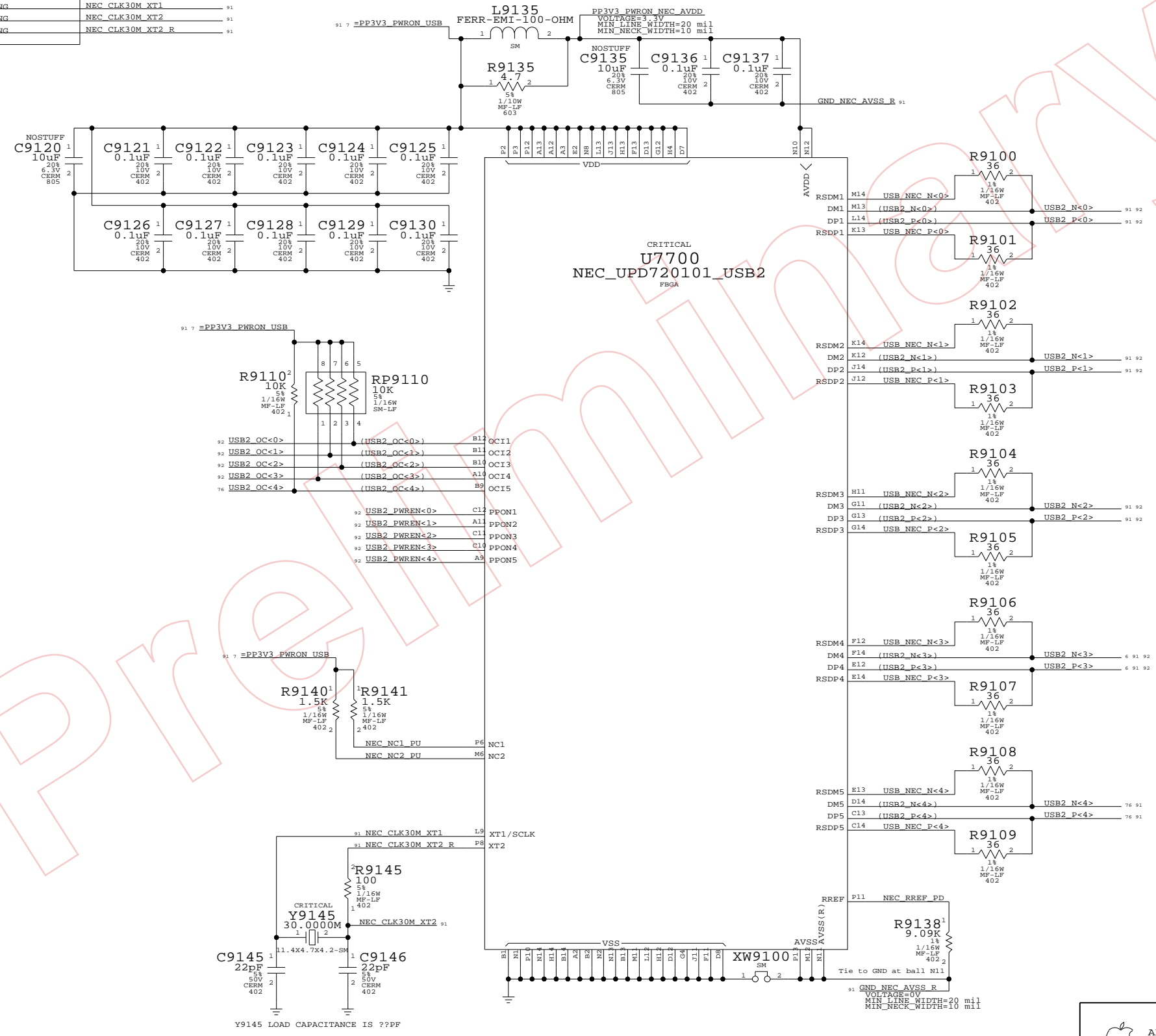
Net Spacing Type: USB2

Line To Line: 19.5 mils
 Length Tolerance: 50 mils
 Primary Max Sep: 7.5 mils
 Secondary Max Sep: 100 mils
 Secondary Length: 500 mils

NOTE: Target differential impedance for USB2 data pairs is 90 ohms.

U2300 SHASTA V1.0 BGA (8 OF 8) OMIT

NC0	P7	TP_SB_NC_P7
NC1	P8	TP_SB_NC_P8
NC2	R3	TP_SB_NC_R3
NC3	R4	TP_SB_NC_R4
NC4	R5	TP_SB_NC_R5
NC5	R6	TP_SB_NC_R6
NC6	R7	TP_SB_NC_R7
NC7	R8	TP_SB_NC_R8
NC8	T1	TP_SB_NC_T1
NC9	T2	TP_SB_NC_T2
NC10	T3	TP_SB_NC_T3
NC11	T4	TP_SB_NC_T4
NC12	T5	TP_SB_NC_T5
NC13	T6	TP_SB_NC_T6
NC14	T7	TP_SB_NC_T7
NC15	T8	TP_SB_NC_T8
NC16	U1	TP_SB_NC_U1
NC17	U2	TP_SB_NC_U2
NC18	U3	TP_SB_NC_U3
NC19	U4	TP_SB_NC_U4
NC20	U5	TP_SB_NC_U5
NC21	U6	TP_SB_NC_U6
NC22	V1	TP_SB_NC_V1
NC23	V2	TP_SB_NC_V2
NC24	V3	TP_SB_NC_V3
NC25	V4	TP_SB_NC_V4
NC26	W1	TP_SB_NC_W1
NC27	W3	TP_SB_NC_W3
NC28	Y1	TP_SB_NC_Y1
NC29	Y3	TP_SB_NC_Y3



MASTER: SEEDY

USB Host Interfaces

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	D	051-6772	04
SCALE	SHT	OF	
NONE	91	102	

ELECTRICAL_CONSTRAINT_SET	NET_SPACING_TYPE	DIFFERENTIAL_PAIR
PROVIDED	USB2	USB2_PORT1_F
BY	USB2	USB2_PORT1_F
USB	USB2	USB2_PORT2_F
CONTROLLER	USB2	USB2_PORT2_F
	USB2	USB2_PORT3_F
	USB2	USB2_PORT3_F

Page Notes

Power aliases required by this page:

- _PP5V_PWRON_USB
- _PP5V_PWRON_UDASH
- _PP3V3_PWRON_UDASH
- _PP3V3_PWRON_BT

Signal aliases required by this page:

(NONE)

NOTE: This page is expected to contain the necessary aliases to map the USB pairs to their appropriate destinations and/or to properly terminate unused signals.

BOM options provided by this page:

(NONE)

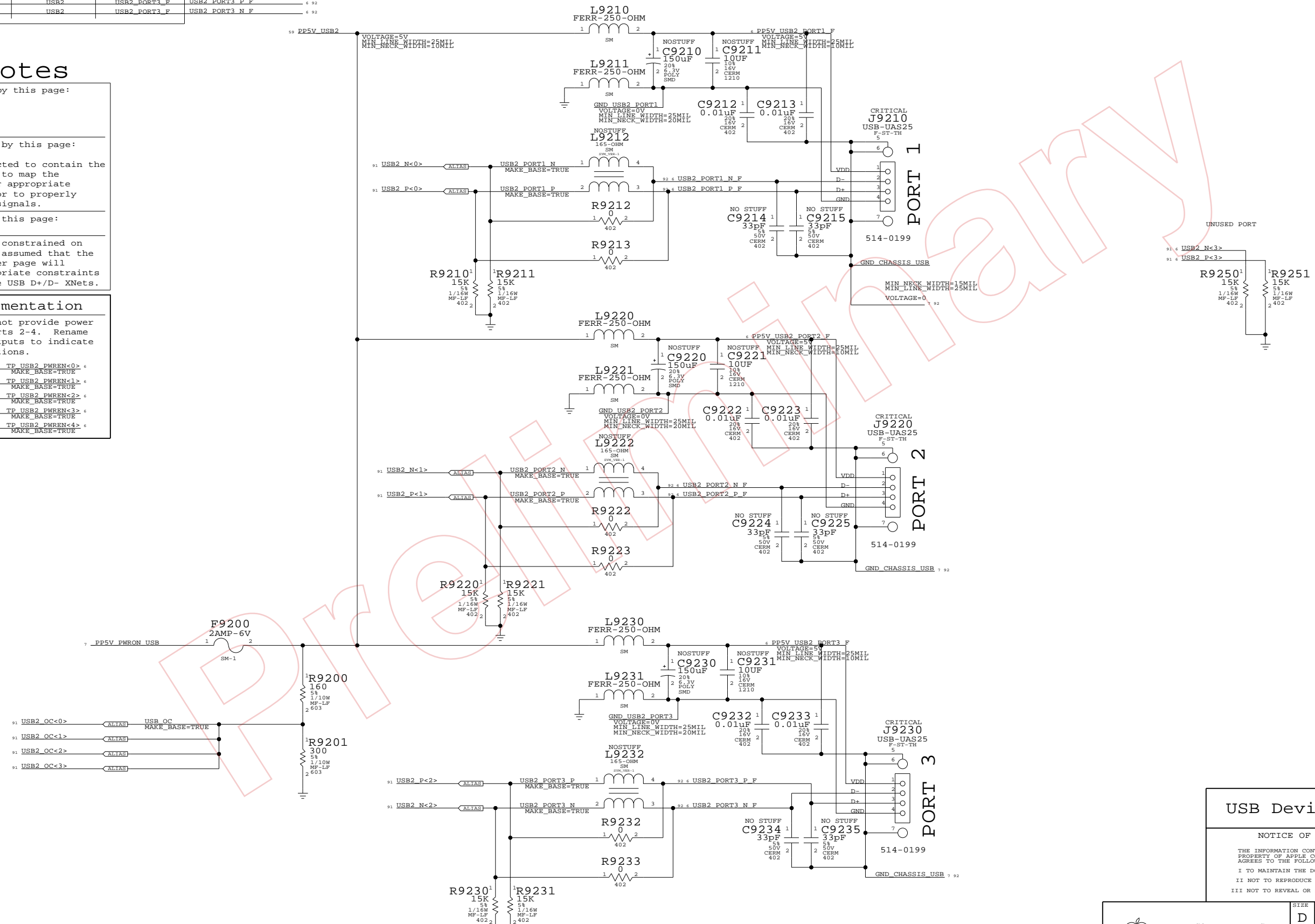
NOTE: USB pairs are NOT constrained on this page. It is assumed that the USB Host Controller page will provide the appropriate constraints to apply to entire USB D+/D- XNets.

neoBorg Implementation

NOTE: This design does not provide power control on USB ports 2-4. Rename USB controller outputs to indicate single-pin connections.

- 91 USB2_PWREN<0> \rightarrow ALIAS TP USB2_PWREN<0> MAKE_BASE=TRUE
- 91 USB2_PWREN<1> \rightarrow ALIAS TP USB2_PWREN<1> MAKE_BASE=TRUE
- 91 USB2_PWREN<2> \rightarrow ALIAS TP USB2_PWREN<2> MAKE_BASE=TRUE
- 91 USB2_PWREN<3> \rightarrow ALIAS TP USB2_PWREN<3> MAKE_BASE=TRUE
- 91 USB2_PWREN<4> \rightarrow ALIAS TP USB2_PWREN<4> MAKE_BASE=TRUE

External USB Ports



USB Device Interfaces

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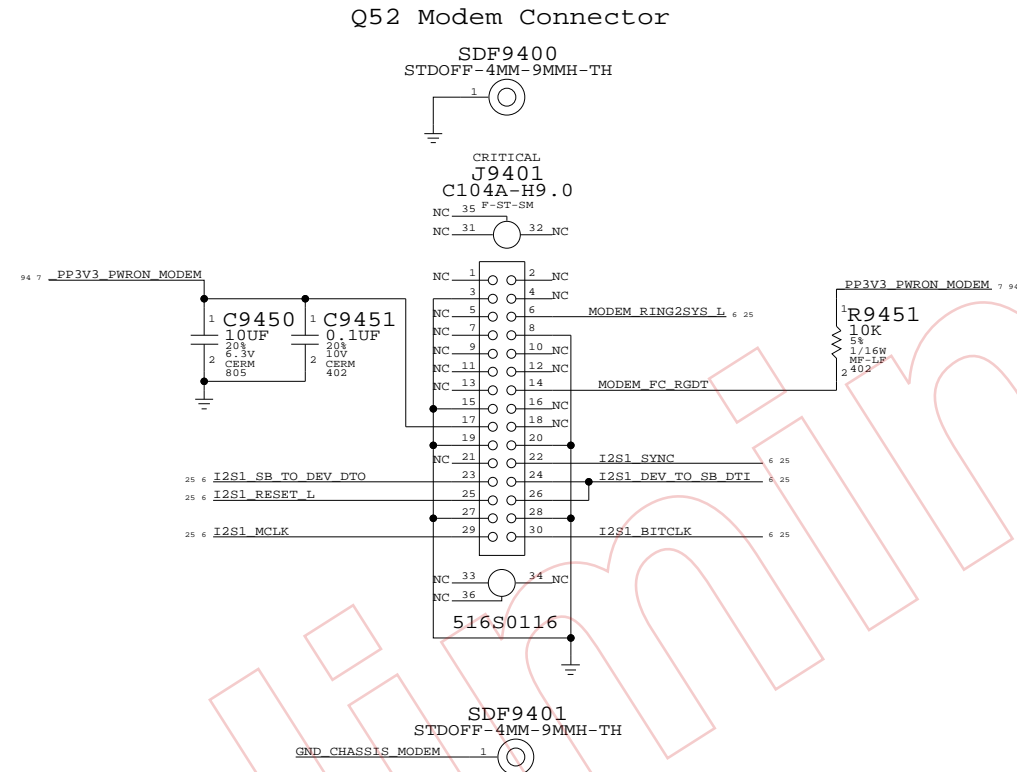
SIZE	DRAWING NUMBER	REV.
D	051-6772	04
SCALE	SHT	OF
NONE	92	102

Page Notes

Power aliases required by this page:
 - _PP3V3_PWRON_MODEM
 Spec Load: 0.5 A active, 3 mA auxiliary

Signal aliases required by this page:
 (NONE)

BOM options provided by this page:
 (NONE)



RJ11 CONNECTOR

STUFFED AT FATP
 SYMBOL USED FOR PLACEMENT

OMIT
J9402
 RJ11-HGT27.5
 ST-TH



514-0205

From Intel Mobile Audio/Modem
 Daughter Card Specification
 Rev 1.0, February 22, 1999

- | | |
|----------------------|---------------------|
| 1 - MONO_OUT/PC_BEEP | 2 - AUDIO_PWRON |
| 3 - GND | 4 - MONO_PHONE |
| 5 - AUXA_RIGHT | 6 - RESERVED |
| 7 - AUXA_LEFT | 8 - GND |
| 9 - CD_GND | 10 - 5Vmain |
| 11 - CD_RIGHT | 12 - RESERVED |
| 13 - CD_LEFT | 14 - RESERVED |
| 15 - GND | 16 - PRIMARY_DN |
| 17 - 3.3Vaux | 18 - 5Vd |
| 19 - GND | 20 - GND |
| 21 - 3.3Vmain | 22 - AC97_SYNC |
| 23 - AC97_SDATA_OUT | 24 - AC97_SDATA_INB |
| 25 - AC97_RESET# | 26 - AC97_SDATA_INA |
| 27 - GND | 28 - GND |
| 29 - AC97_MSTRCLK | 30 - AC97_BITCLK |

Modem Interface

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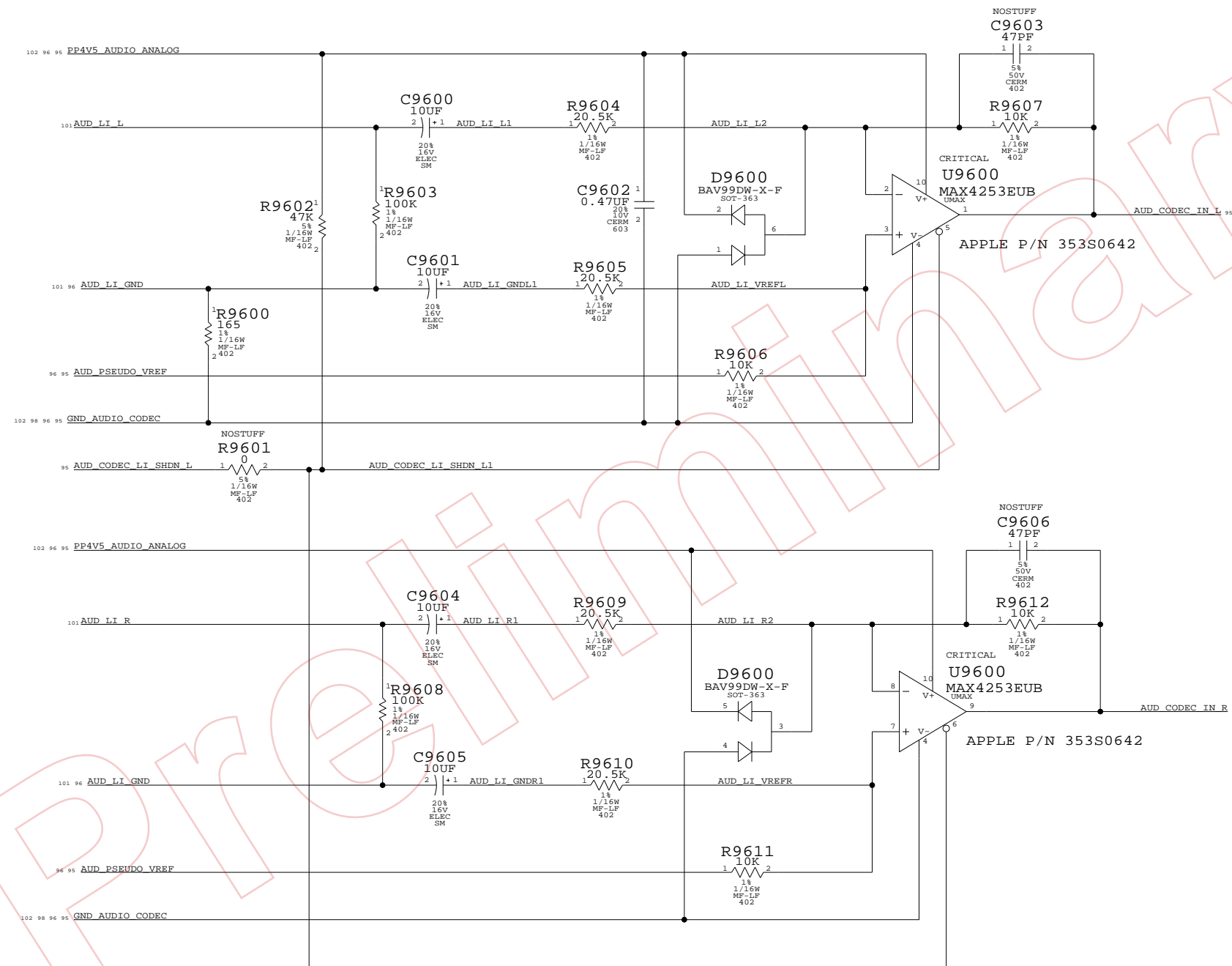
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	D	051-6772	04
SCALE	SHT OF		
NONE	94	102	

LINE IN PSEUDO-DIFFERENTIAL AMP

AV= 0.49



AUDIO: LINE INPUT AMP

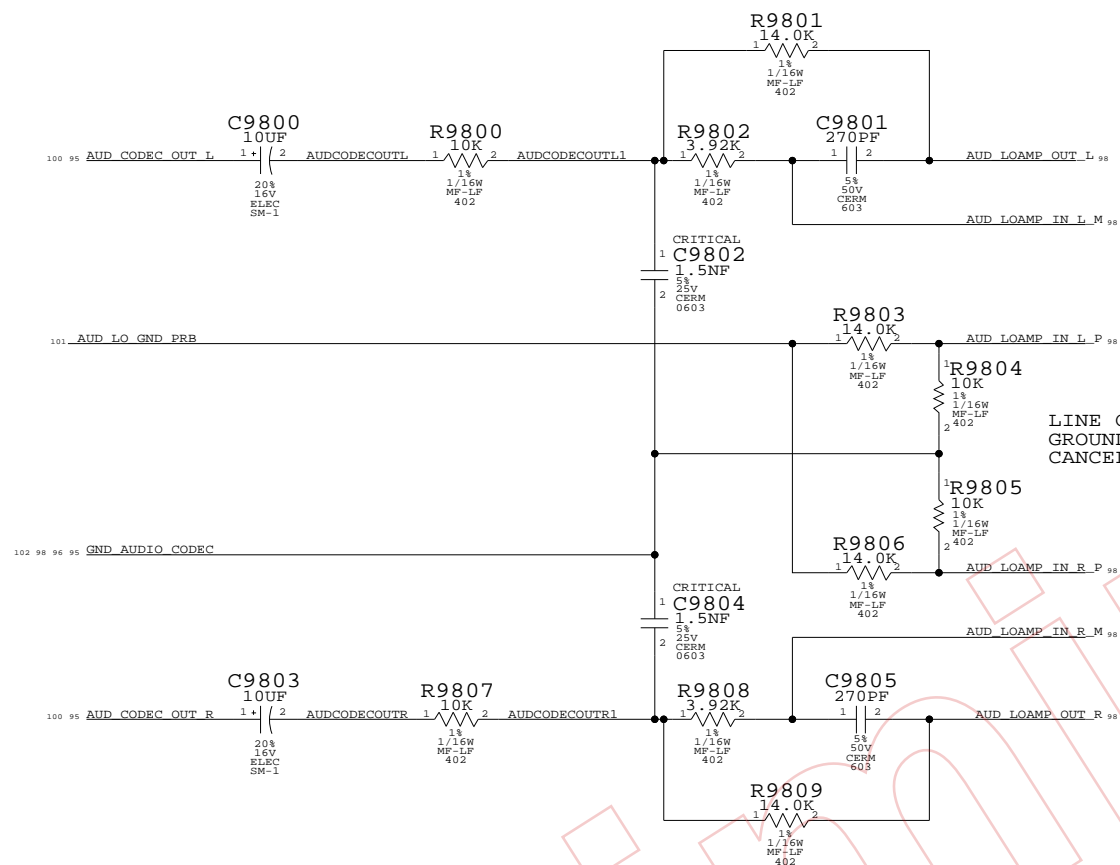
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	D	051-6772	04
SCALE	NONE	SHT	OF
		96	102

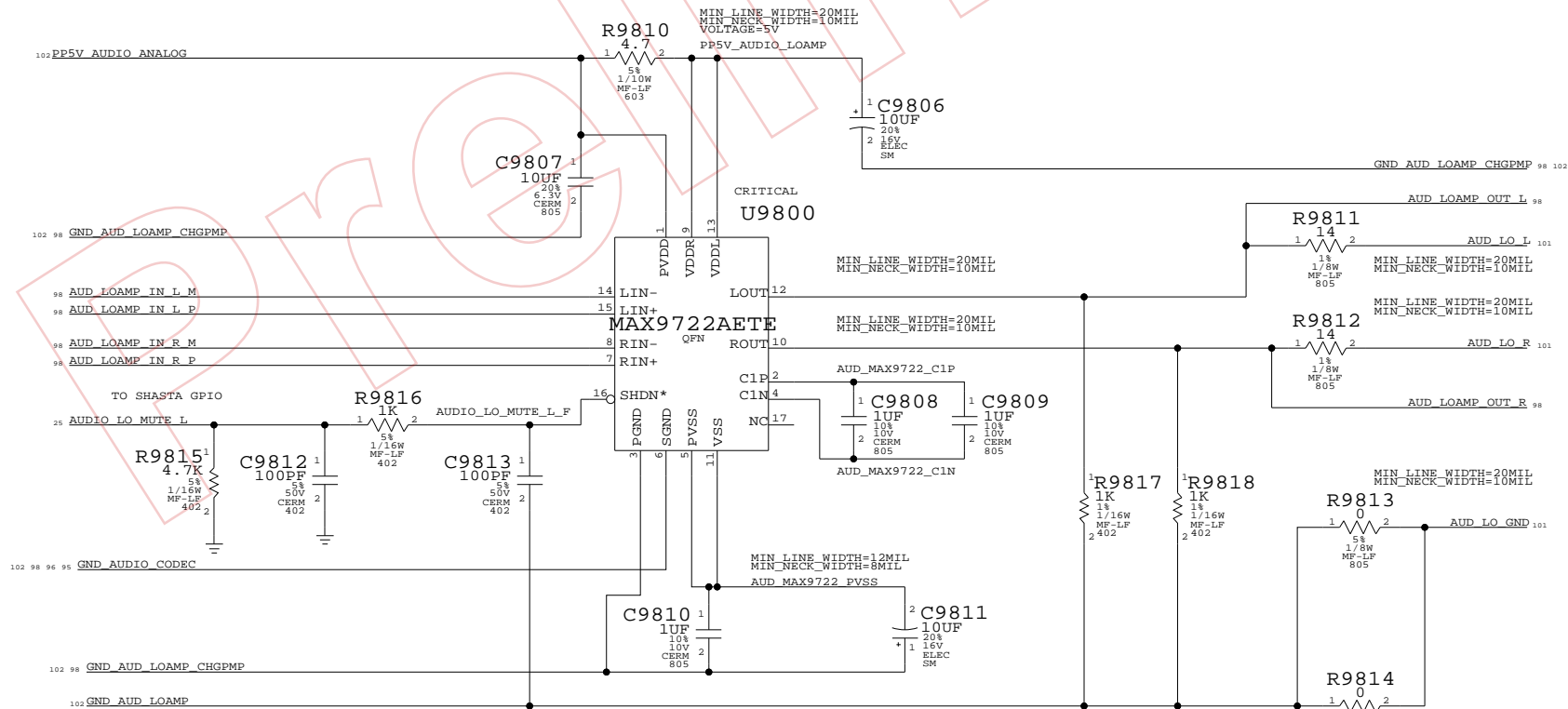
LINE OUT LOW-PASS FILTER

FC = 37 KHZ, HO = -1.4



LINE OUT AMP

APPLE P/N 353S0687



AUDIO: LINE OUT AMP

NOTICE OF PROPRIETARY PROPERTY

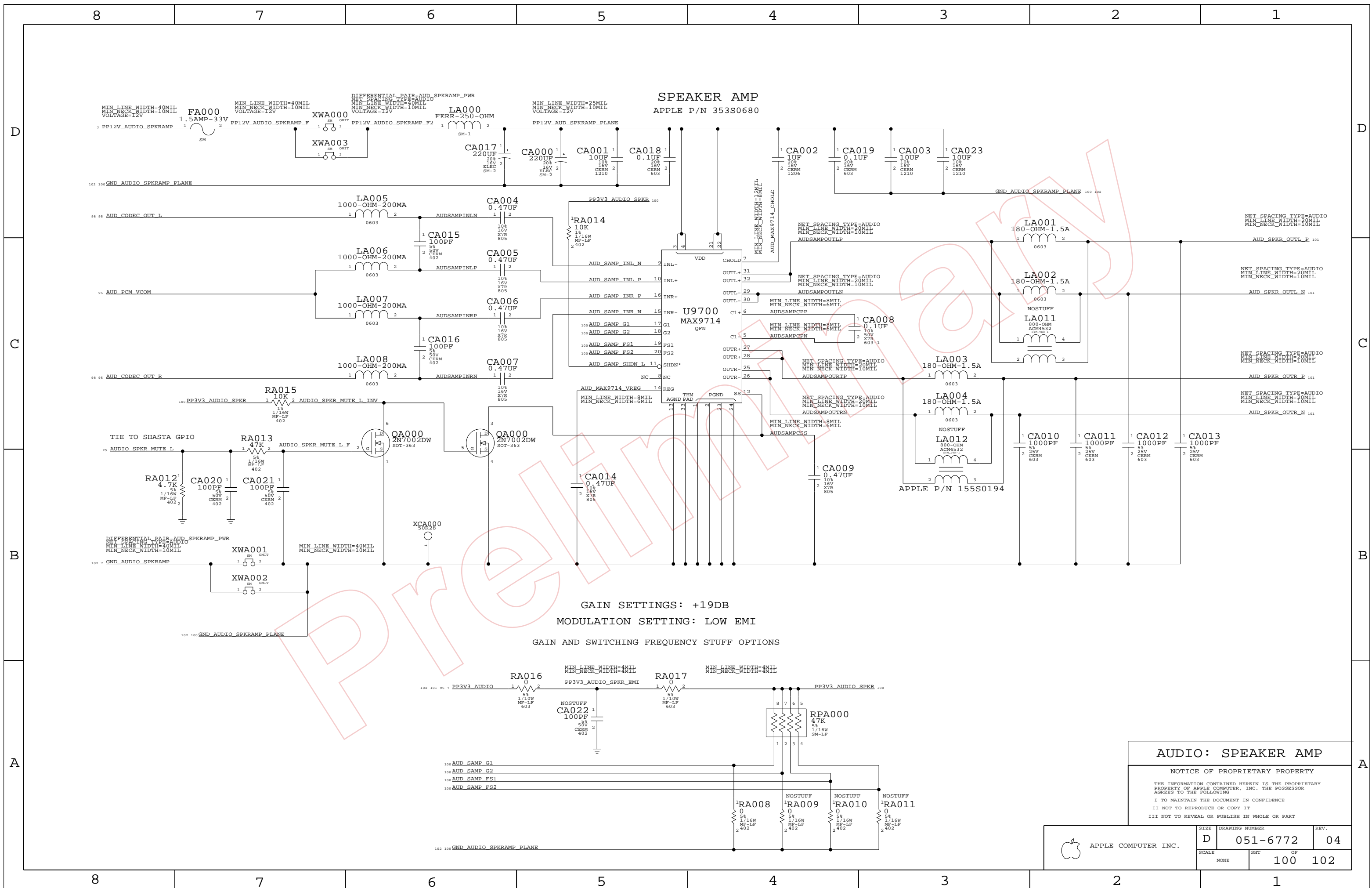
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	D	051-6772	04
SCALE	SHT OF		
NONE	98		102



SPEAKER AMP
APPLE P/N 353S0680

GAIN SETTINGS: +19DB

MODULATION SETTING: LOW EMI

GAIN AND SWITCHING FREQUENCY STUFF OPTIONS

AUDIO: SPEAKER AMP

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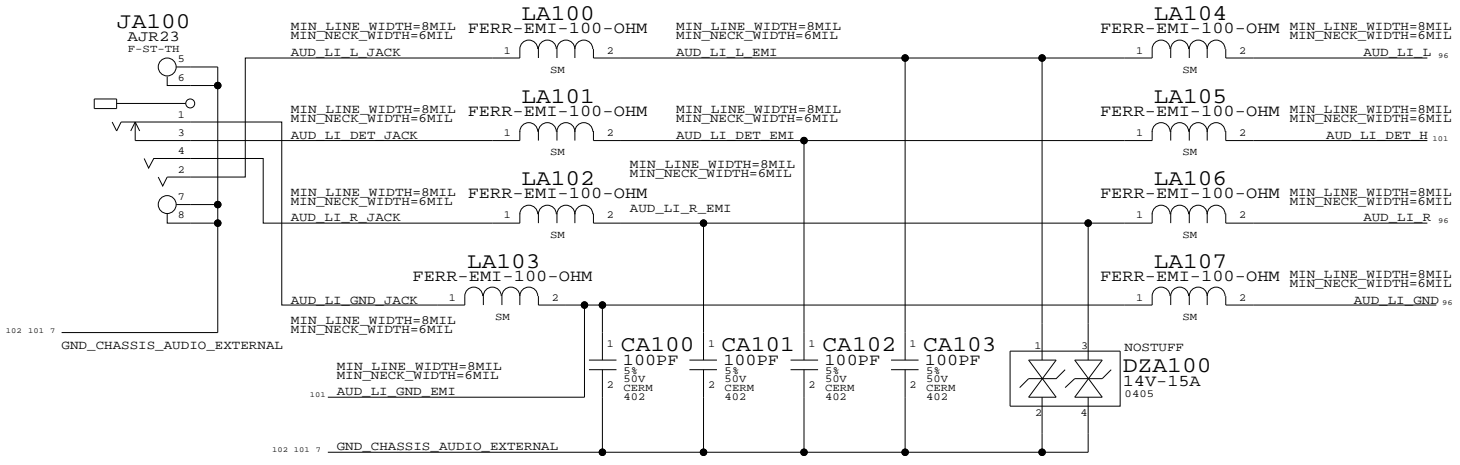
I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

II NOT TO REPRODUCE OR COPY IT

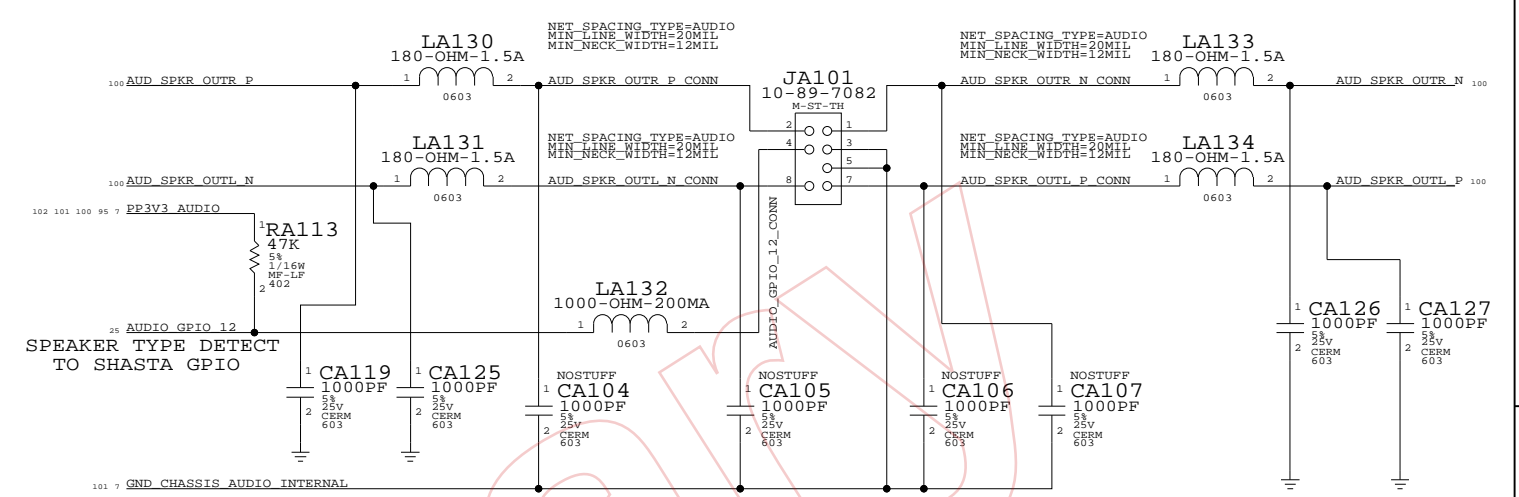
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT	OF
		100	102

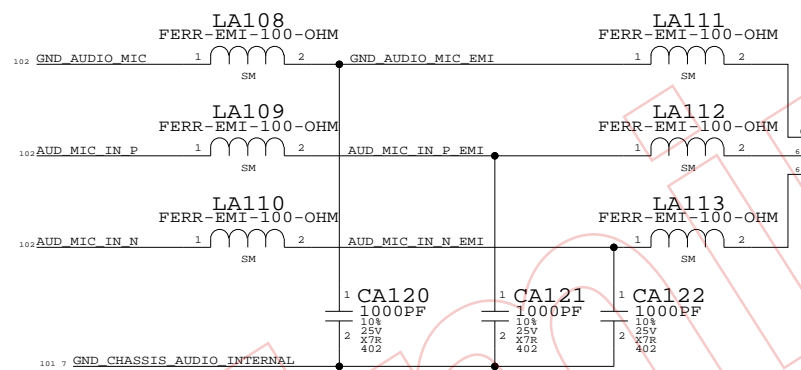
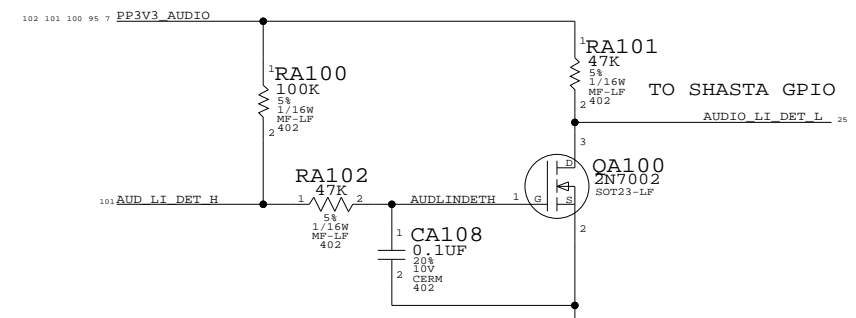
LINE IN JACK
APPLE P/N 514-0203



SPEAKER CABLE CONNECTOR
APPLE P/N 518-0138

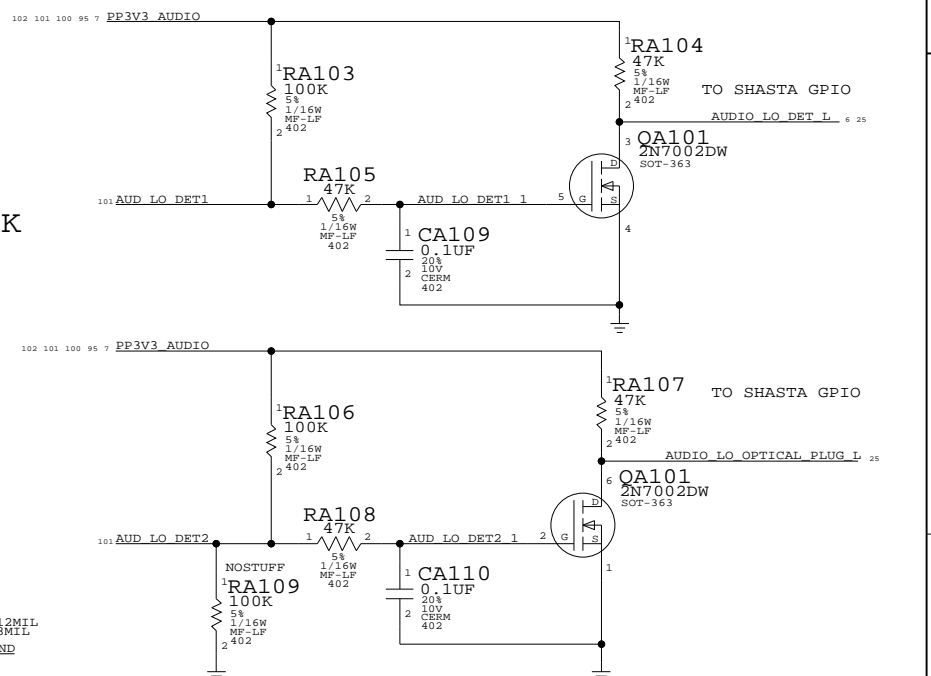


LINE IN PLUG DETECT
AUDIO_IN_DET0_L = LOW: PLUG INSERTED
AUDIO_IN_DET0_L = HIGH: PLUG NOT INSERTED

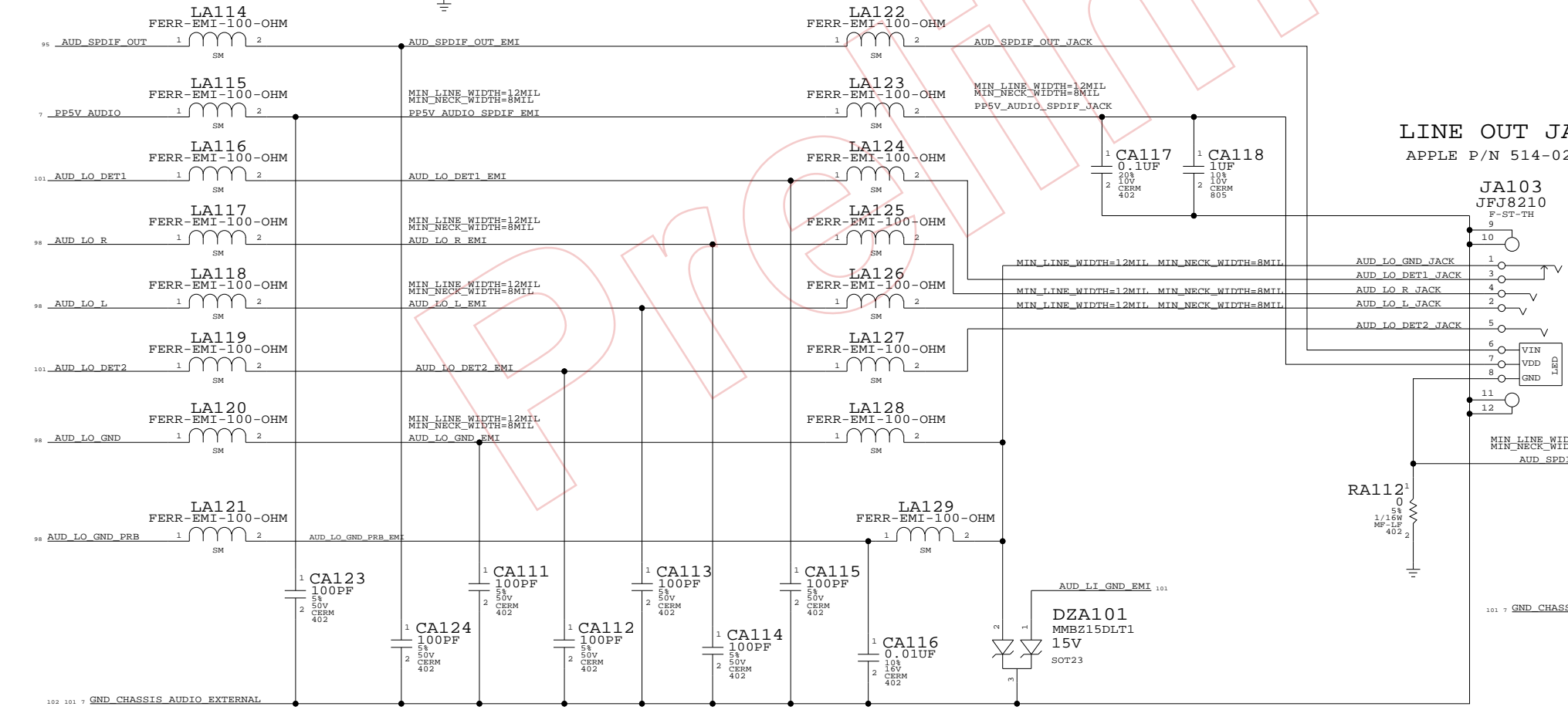


MIC CABLE CONNECTOR
APPLE P/N 518-0034

LINE OUT PLUG DETECTS
AUDIO_LO_DET_L = LOW: PLUG INSERTED
AUDIO_LO_DET_L = HIGH: PLUG NOT INSERTED
AUDIO_LO_OPTICAL_PLUG_L = LOW: OPTICAL DIGITAL AUDIO PLUG INSERTED
AUDIO_LO_OPTICAL_PLUG_L = HIGH: ANALOG AUDIO PLUG INSERTED



LINE OUT JACK
APPLE P/N 514-0204



AUDIO: Q45 CONNECTORS

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	SHT	101	102
NONE			

8

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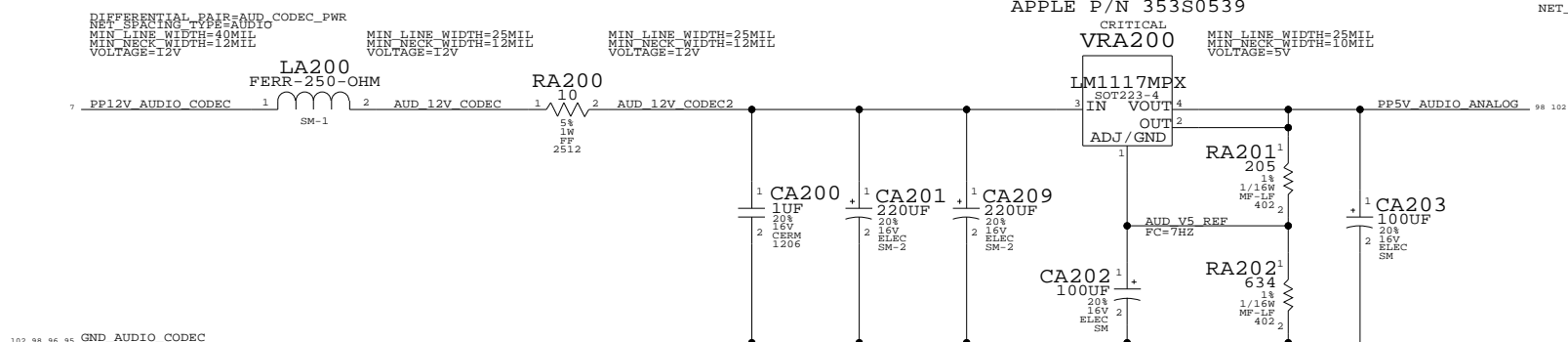
4

3

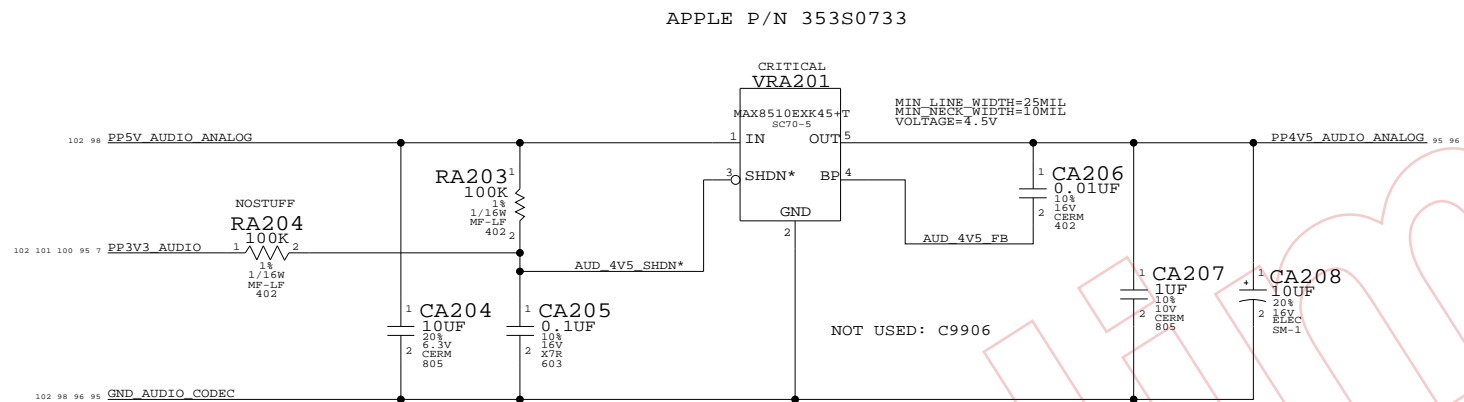
2

1

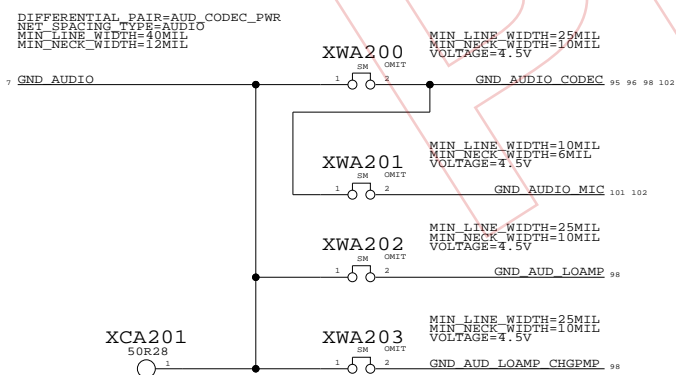
5V POWER SUPPLY FOR THE HEADPHONES/LINE OUT AMP



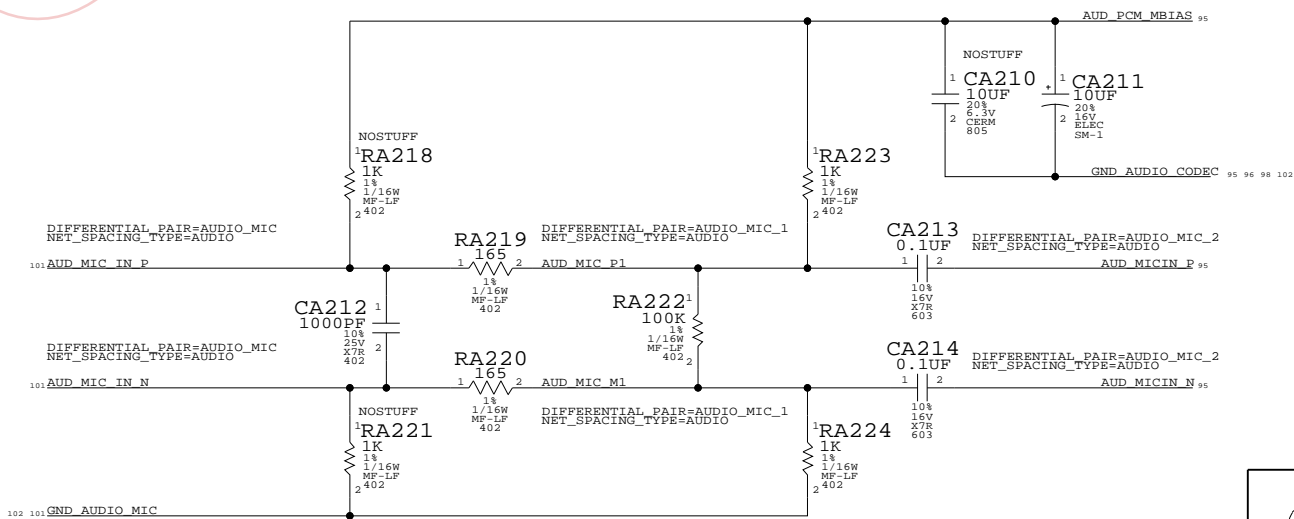
4.5V POWER SUPPLY FOR CODEC AND LINE IN AMP



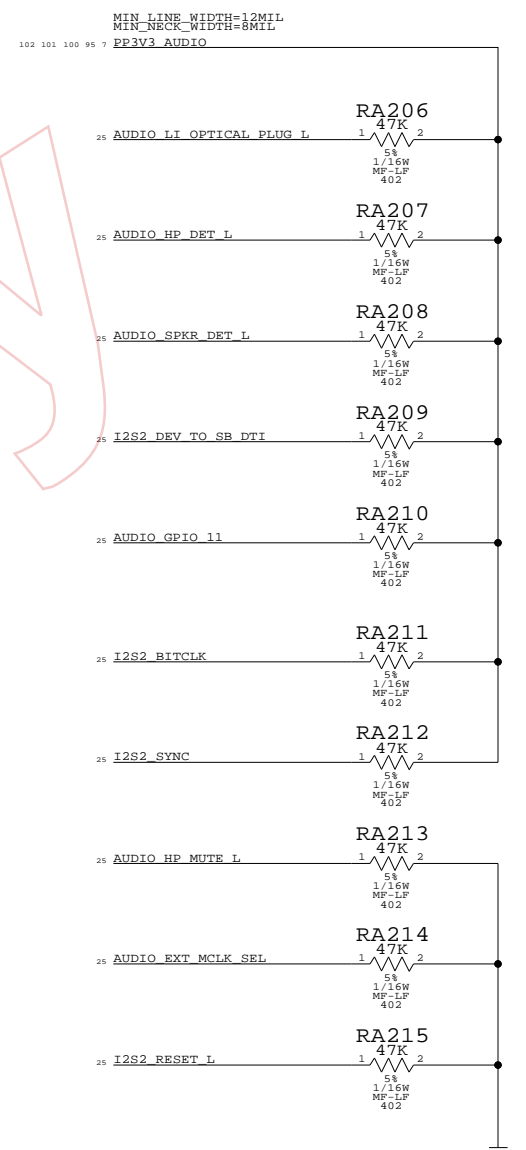
AUDIO GROUND RETURNS



MICROPHONE IMPEDANCE MATCHING CIRCUIT



UNUSED GPIO TERMINATIONS



AUDIO: Q45 POWER SUPPLIES

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APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	051-6772	04
SCALE	NONE	SHT OF	102 102

8

7

6

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1