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- 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	ENG APPD
				DATE	DATE
A		554161	PRODUCTION RELEASED	12/18/07	?

SCHEM, LIO, M87, MBP15

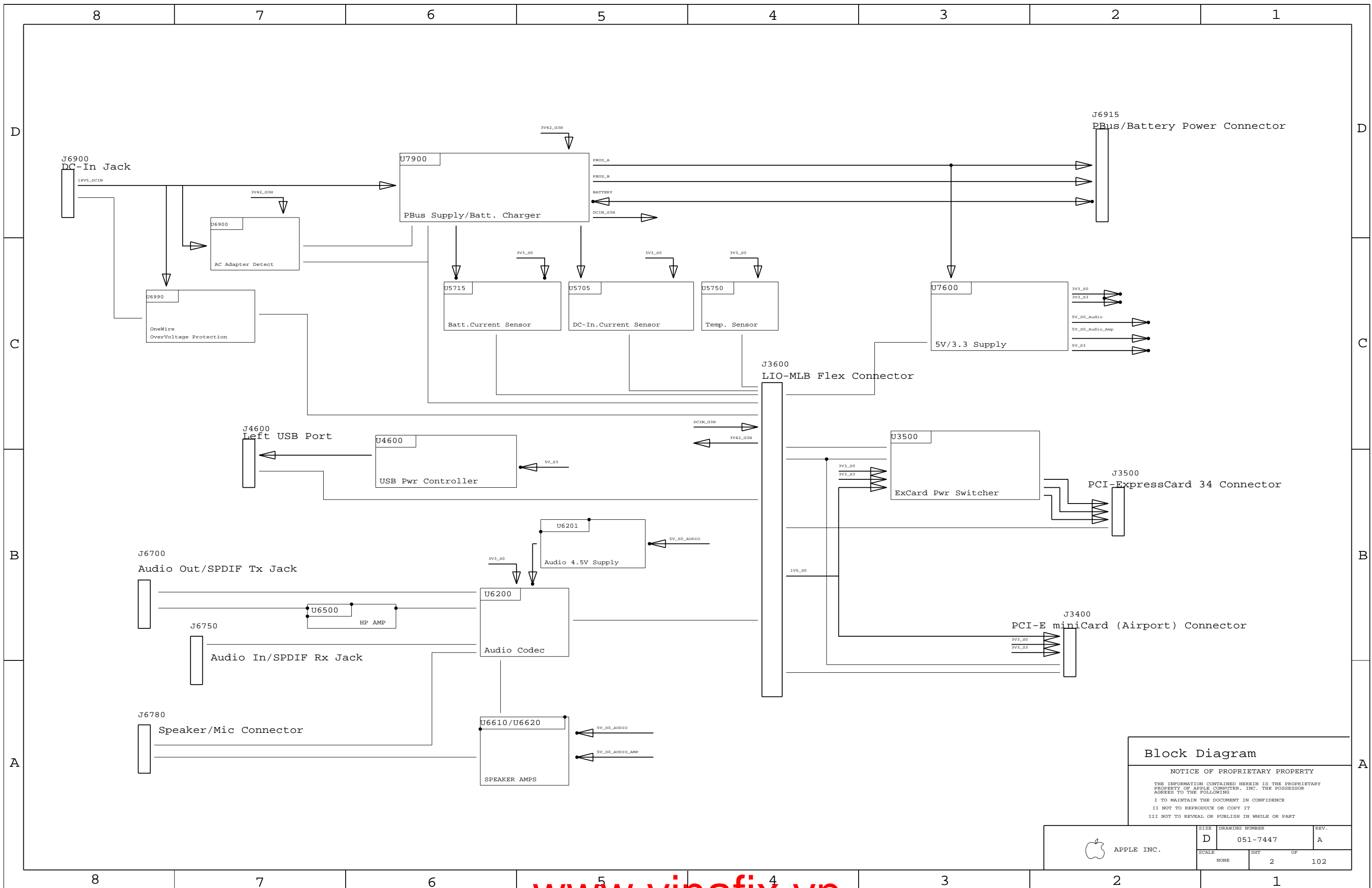
12/18/07

PVT

PDF PAGE	CSA PAGE	CONTENTS	SYNC MASTER	DATE
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4	9	Aliases	(Master)	(Master)
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8	46	Left USB Port	(Master)	(Master)
9	57	Current & Thermal Sensors	(Master)	(Master)
10	62	AUDIO:CODEC	LENGO_M87_AUDIO	11/01/2007
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12	66	AUDIO:SPEAKER AMP	LENGO_M87_AUDIO	11/01/2007
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16	76	5V/3.3V SUPPLY	<MASTER>	<MASTER>
17	79	PBus Supply & Batt. Charger	(Master)	(Master)
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20	99	Cross Reference Page		
21	100	Cross Reference Page		
22	101	Cross Reference Page		
23	102	Cross Reference Page		

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
051-7447	1	SCHEM, DUBLIN, M87	SCH1	CRITICAL	
820-2273	1	PCBF, DUBLIN, M87	PCB1	CRITICAL	

DIMENSIONS ARE IN MILLIMETERS		METRIC		APPLE 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		051-7447	REV. A
SHEET 1 OF 102					



Block Diagram

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APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT	OF	
NONE	2	102	

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BOM NUMBER	BOM NAME	BOM OPTIONS
630-9094	PCBA,DUBLIN,M87	ALTERNATE,COMMON,M87_COMMON,EEE_Z3M

BOM GROUP	BOM OPTIONS
M87_COMMON	BKLT_3V_SIG,COMBOJACK

Bar Code Label / EEE #'s

PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
000-0041	1	PLACEHOLDER FOR EEE/CCC INFO	[EEE:Z3M]	CRITICAL	EEE_Z3M

Alternate Parts

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
37650448	37650445		ALL	SI7806ADM for FDM6296
12850081	12850061		ALL	150UF,6.3V,25MCRM,C2
12850093	12850092		ALL	33UF,16V,45MCRM,D2E
35351717	35351297		ALL	LM397,COMPARATOR
37650560	37650532		ALL	SI7905DN for SI7913DN

D

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BOM Configuration	
SYNC_MASTER=(Master)	SYNC_DATE=(Master)
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	D	051-7447	A
SCALE	SHT	OF	
NONE	4	102	

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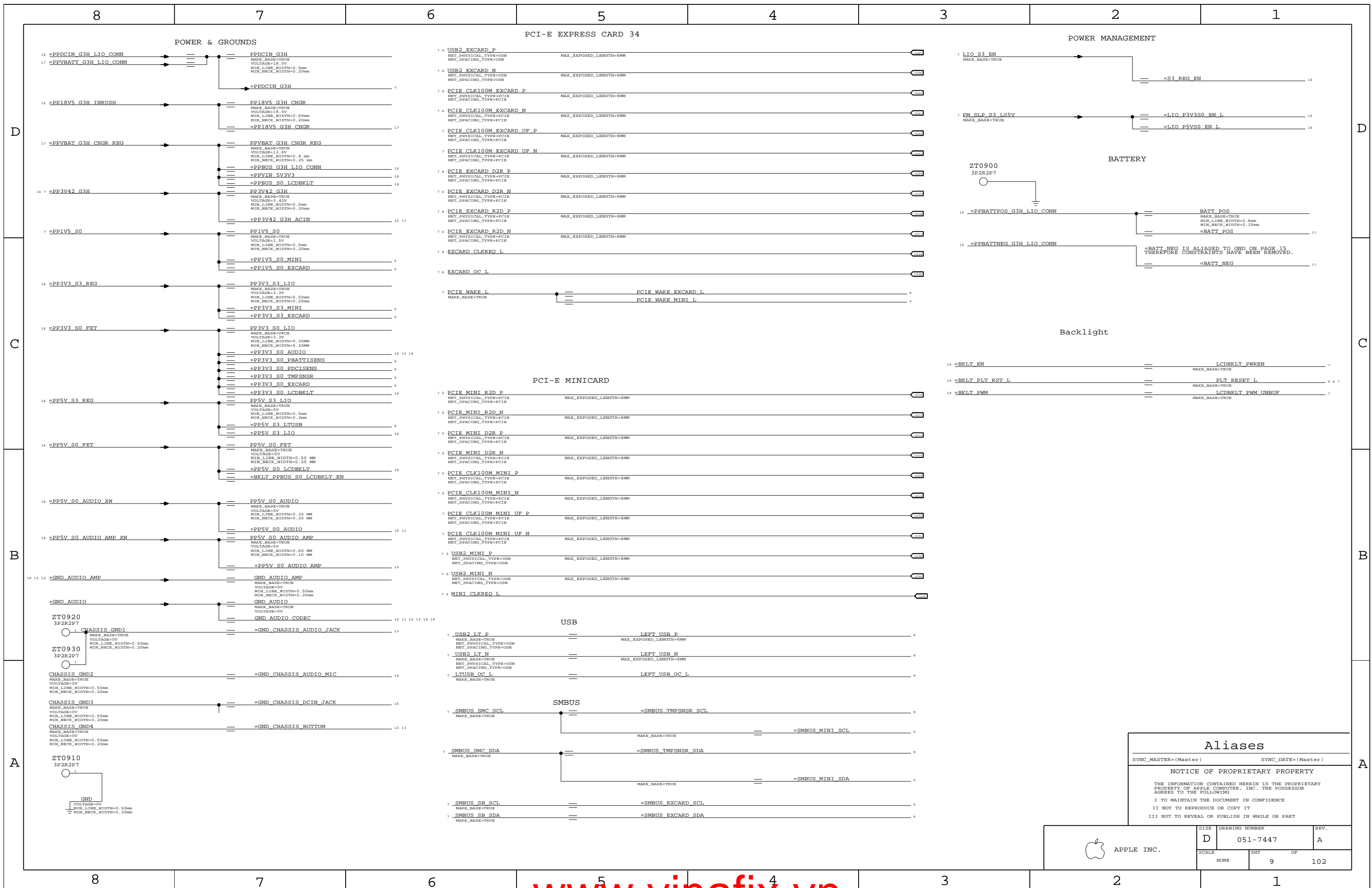
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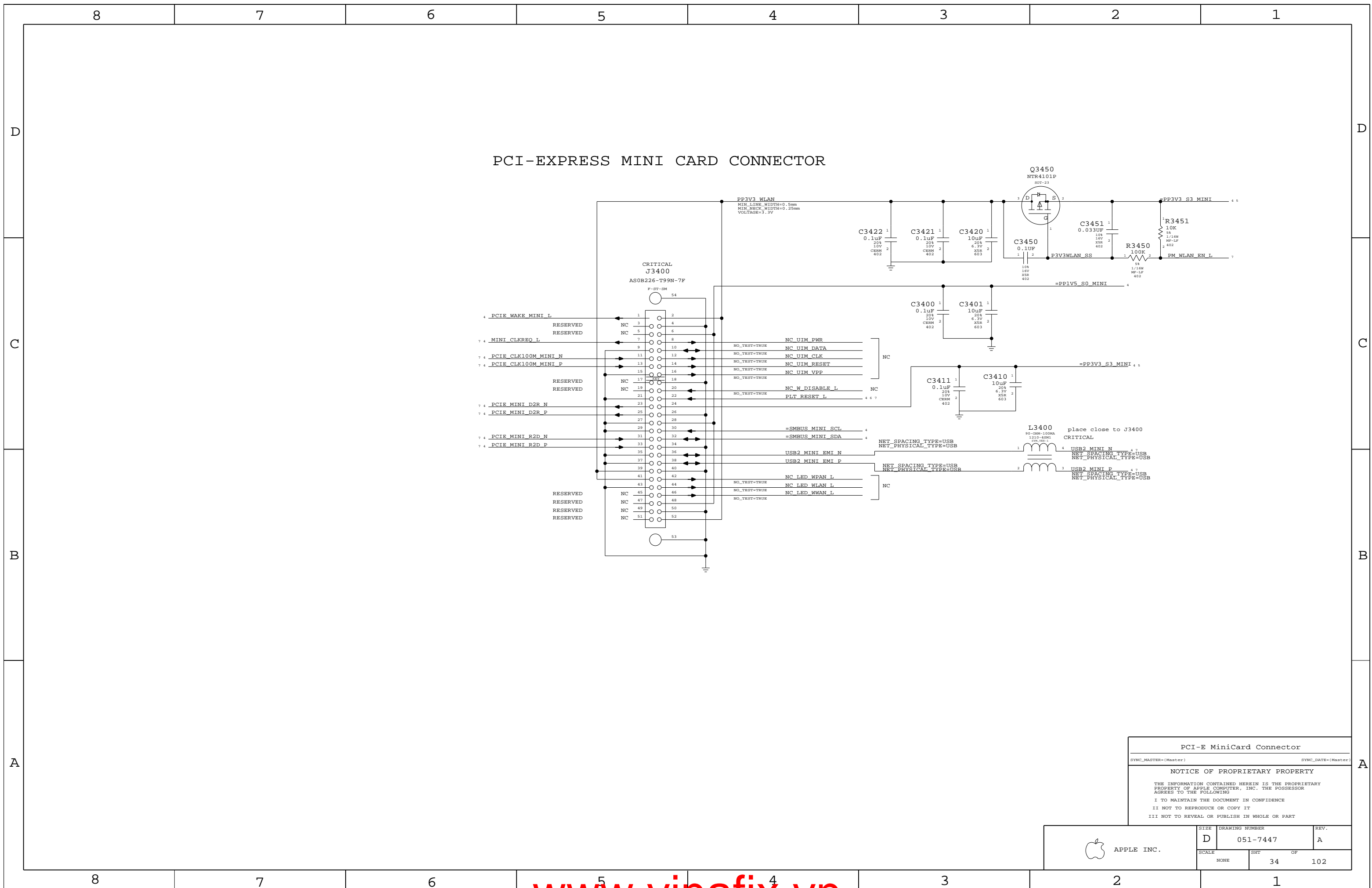
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Aliases		
SYNC_MASTER=(Master)	SYNC_DATE=(Master)	
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	D	051-7447	A
SCALE	SHT	OF	
NONE	9		102



PCI-EXPRESS MINI CARD CONNECTOR

PCI-E MiniCard Connector

SYNC_MASTER=(Master) SYNC_DATA=(Master)

NOTICE OF PROPRIETARY PROPERTY

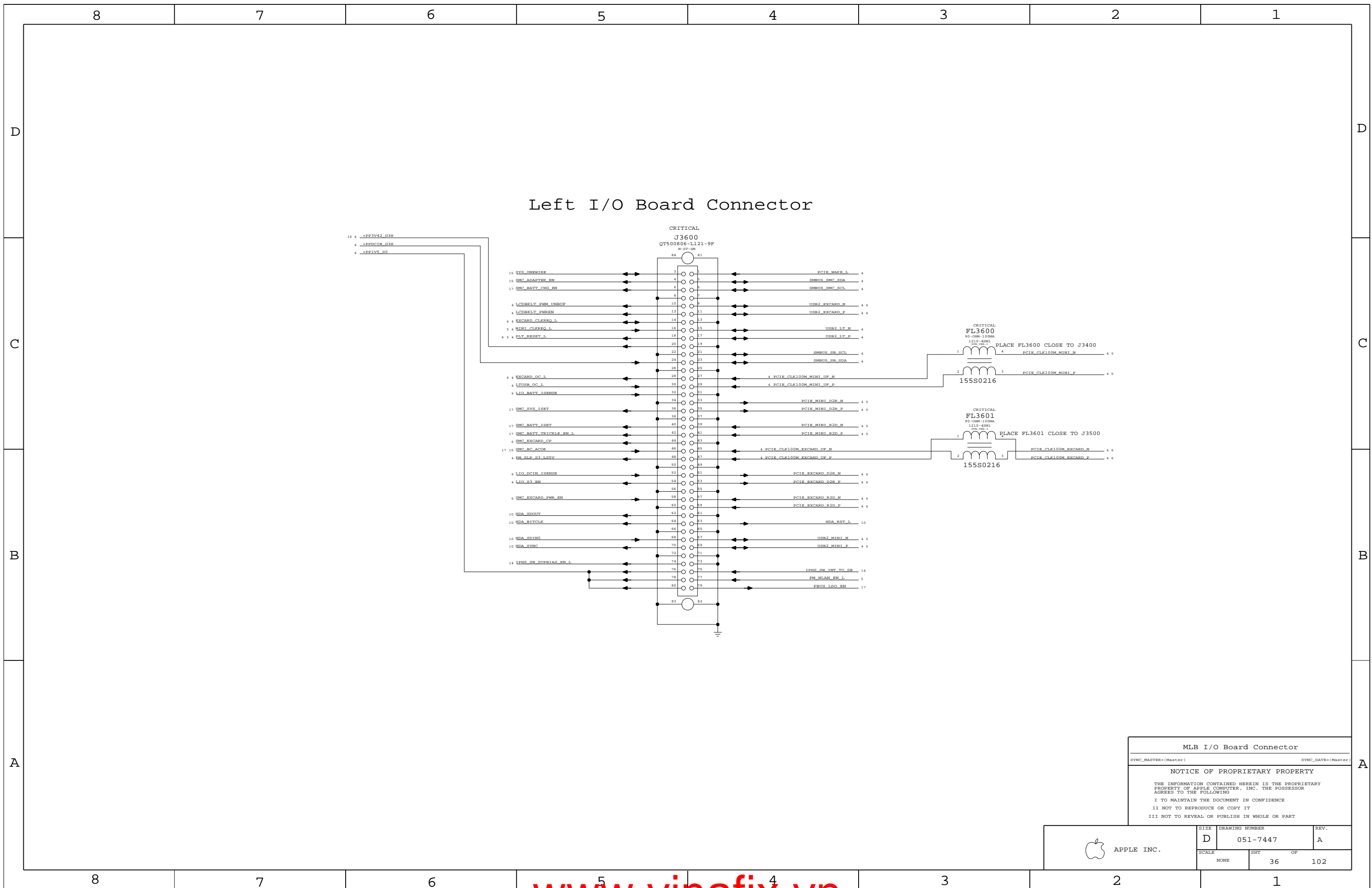
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APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT OF		
NONE	34 OF		102



MLB I/O Board Connector

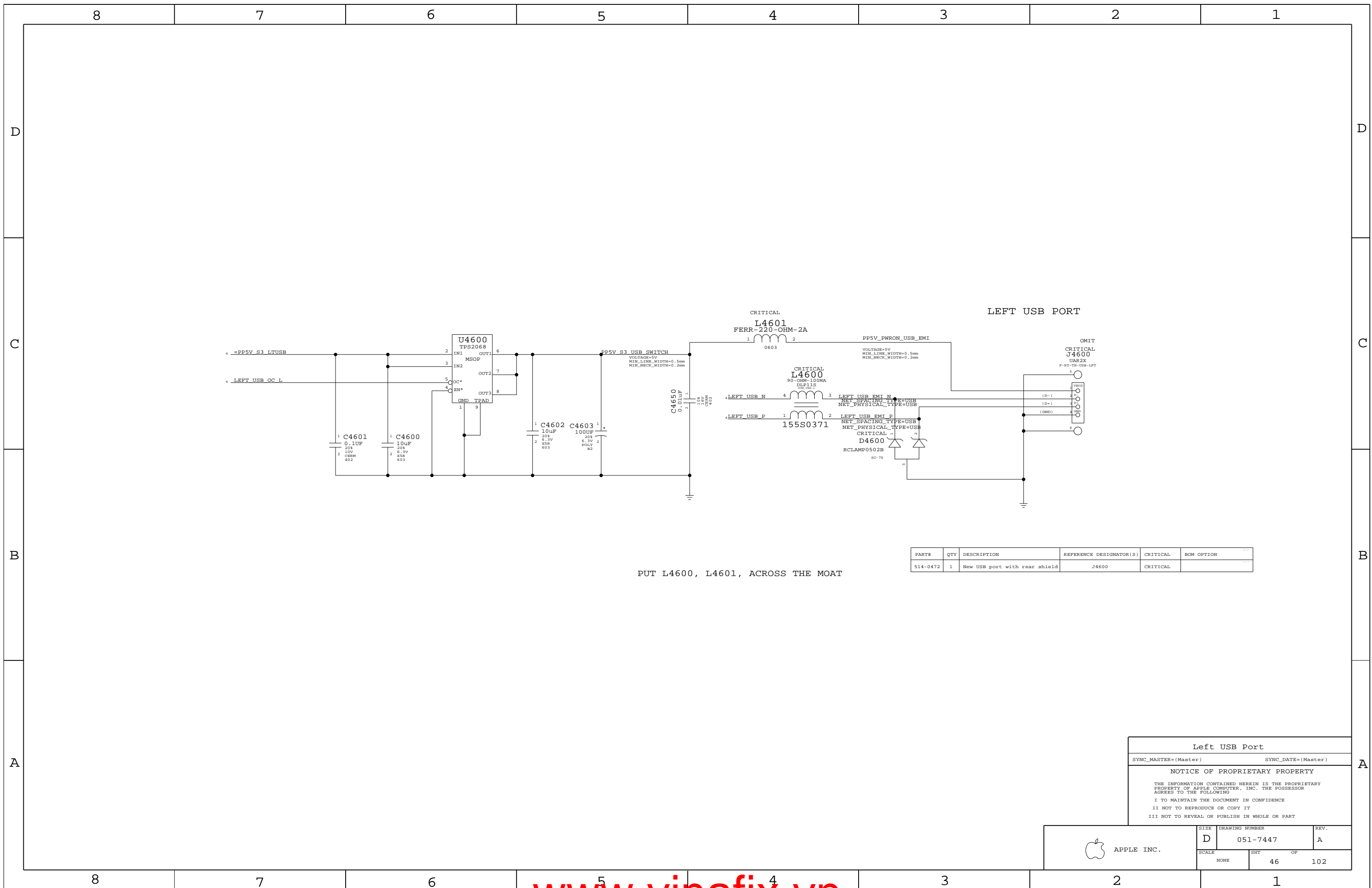
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	D	051-7447	A
SCALE	SHT OF		
NONE	36		102



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0472	1	New USB port with rear shield	J4600	CRITICAL	

PUT L4600, L4601, ACROSS THE MOAT

Left USB Port

SYNC_MASTER=(Master) SYNC_DATE=(Master)

NOTICE OF PROPRIETARY PROPERTY

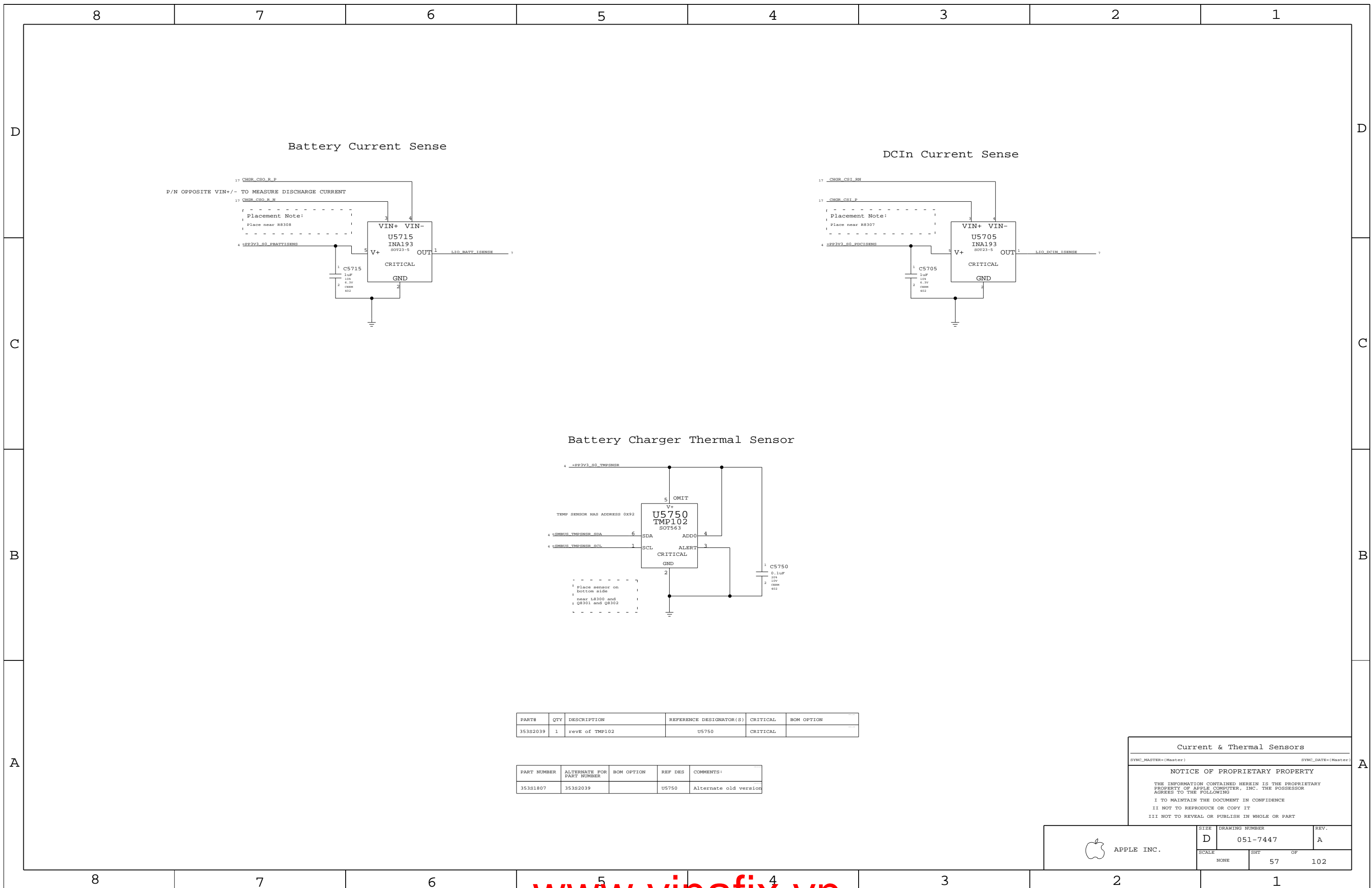
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APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT OF		
NONE	46		102



Battery Current Sense

DCIn Current Sense

Battery Charger Thermal Sensor

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
35382039	1	revE of TMP102	U5750	CRITICAL	

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
35381807	35382039		U5750	Alternate old version

Current & Thermal Sensors

SYNC_MASTER=(Master) SYNC_DATE=(Master)

NOTICE OF PROPRIETARY PROPERTY

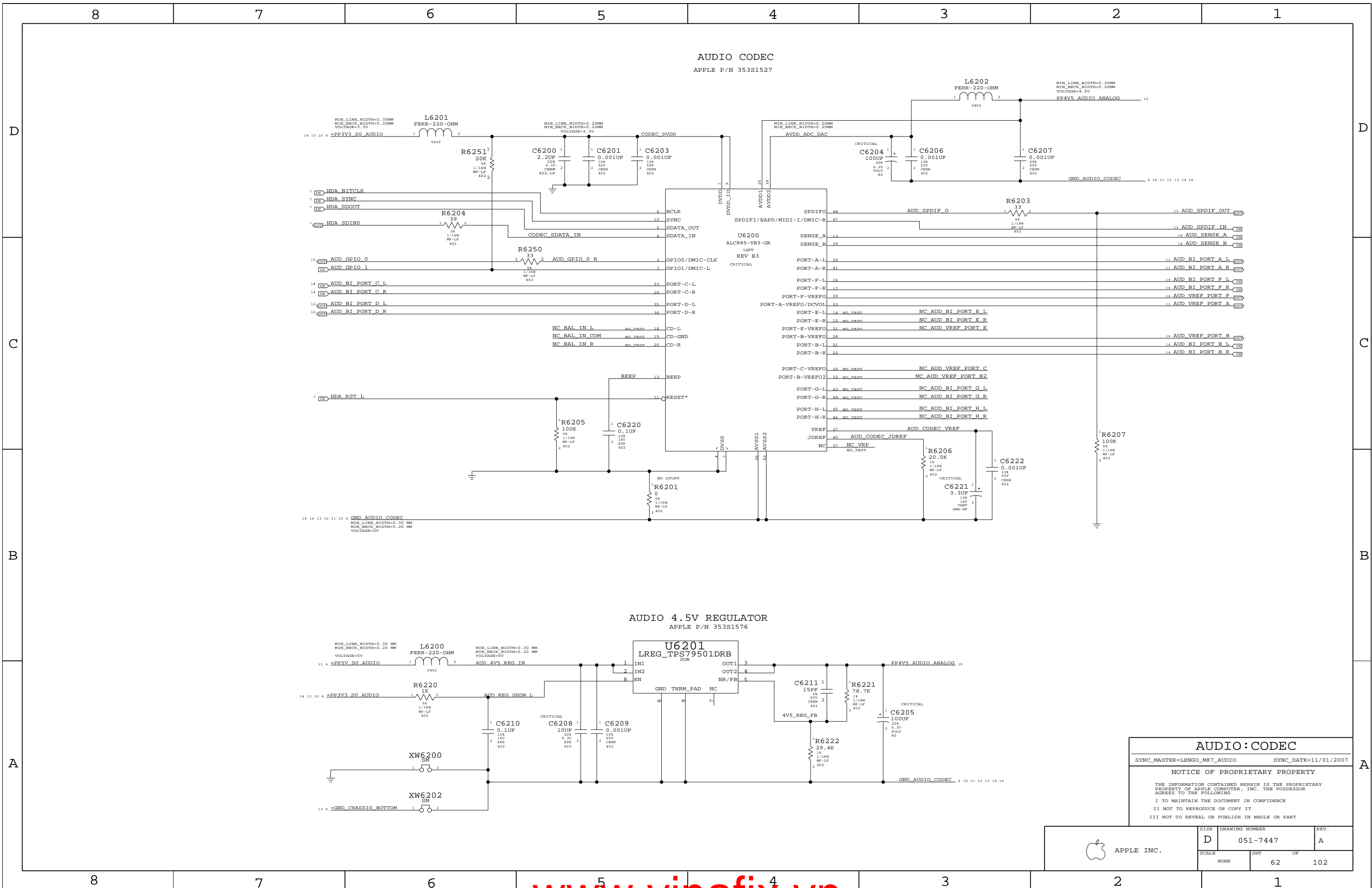
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	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT	OF	
NONE	57	102	



AUDIO CODEC
APPLE P/N 353S1527

AUDIO 4.5V REGULATOR
APPLE P/N 353S1576

AUDIO: CODEC

SYNC_MASTER=LENGO_M87_AUDIO SYNC_DATE=11/01/2007

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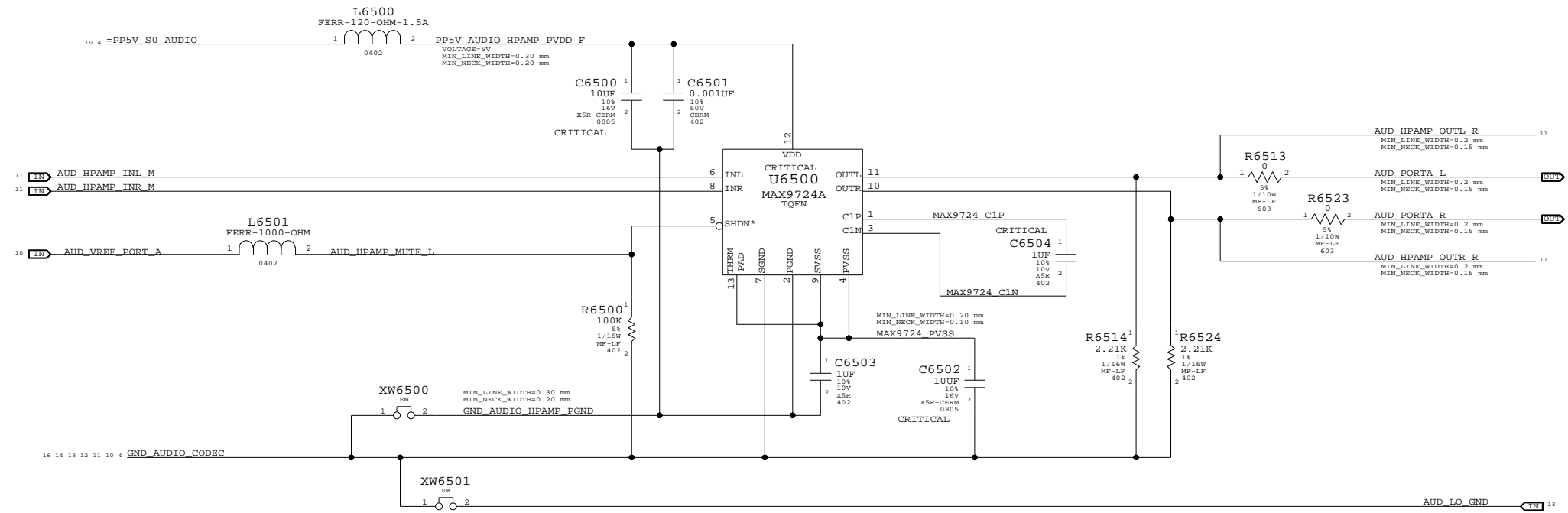
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II NOT TO REPRODUCE OR COPY IT

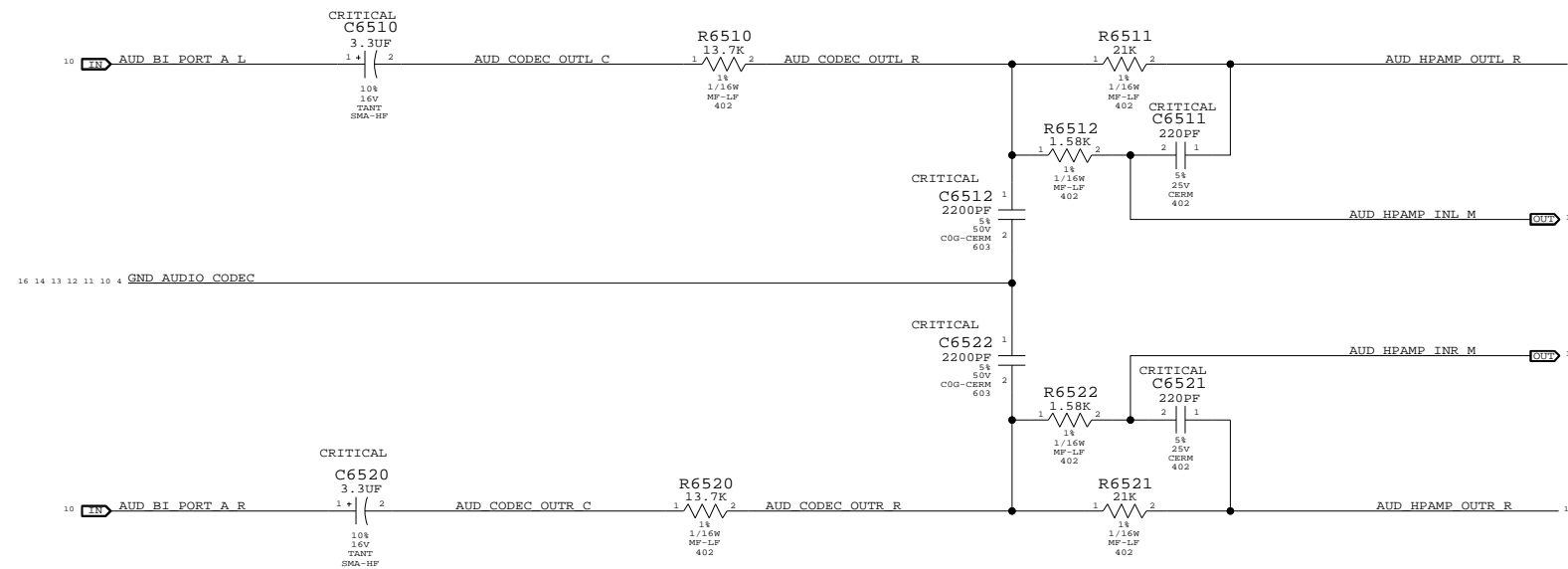
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE INC.	SIZE D	DRAWING NUMBER 051-7447	REV. A
	SCALE NONE	SHEET 62	OF 102

Headphone Amplifier (MAX9724A)
 APN: 353S1637
 VOLTAGE GAIN: 1.53



2nd Order DAC Filter
 HP: 3.52 HZ LP: 39 KHZ



AUDIO: HEADPHONE AMP
 SYNC_MASTER=LENGO_M87_AUDIO SYNC_DATE=11/01/2007
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APPLE INC.	SIZE	DRAWING NUMBER	REV.
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SCALE	SHT	OF	
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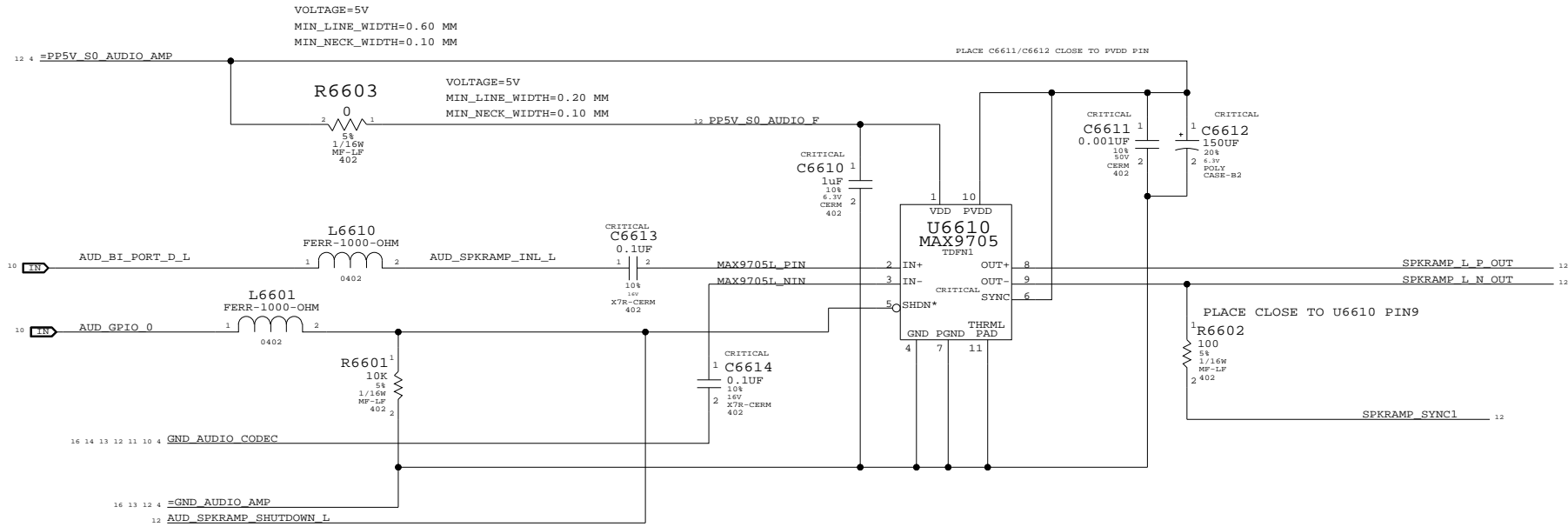
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2X MONO SPEAKER AMPLIFIERS (MAX9705B)

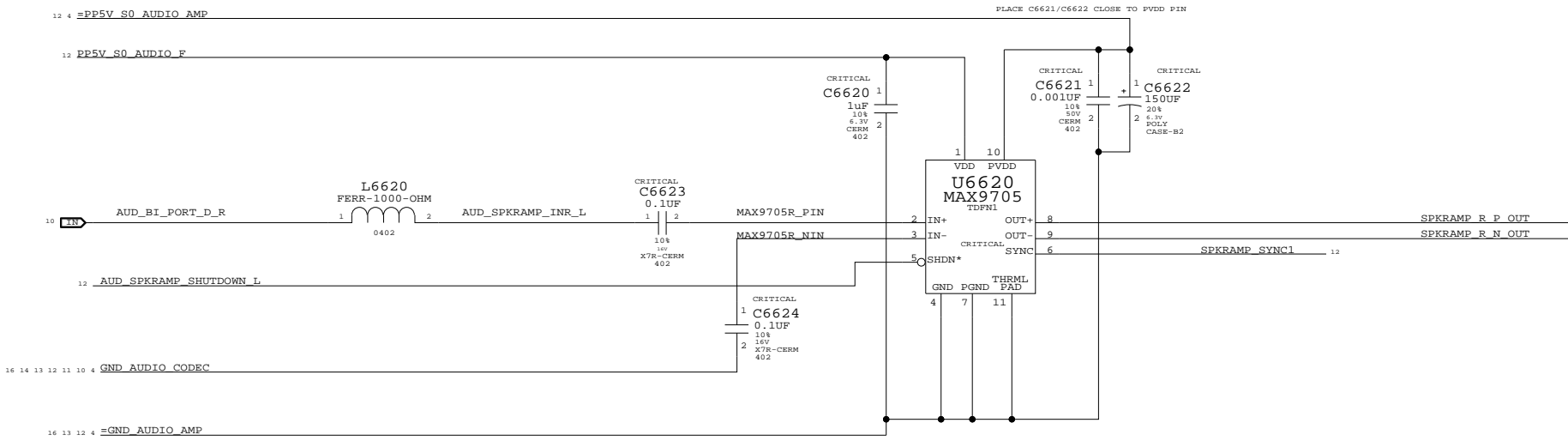
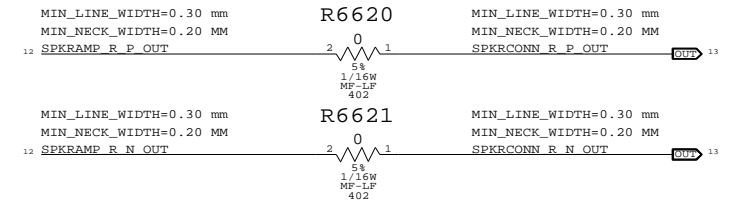
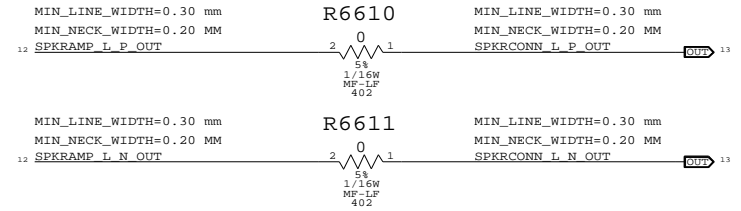
APN: 353S1595

GAIN = 12DB

79Hz < FC < 132Hz



FANCY SPEAKER TESTPOINTS

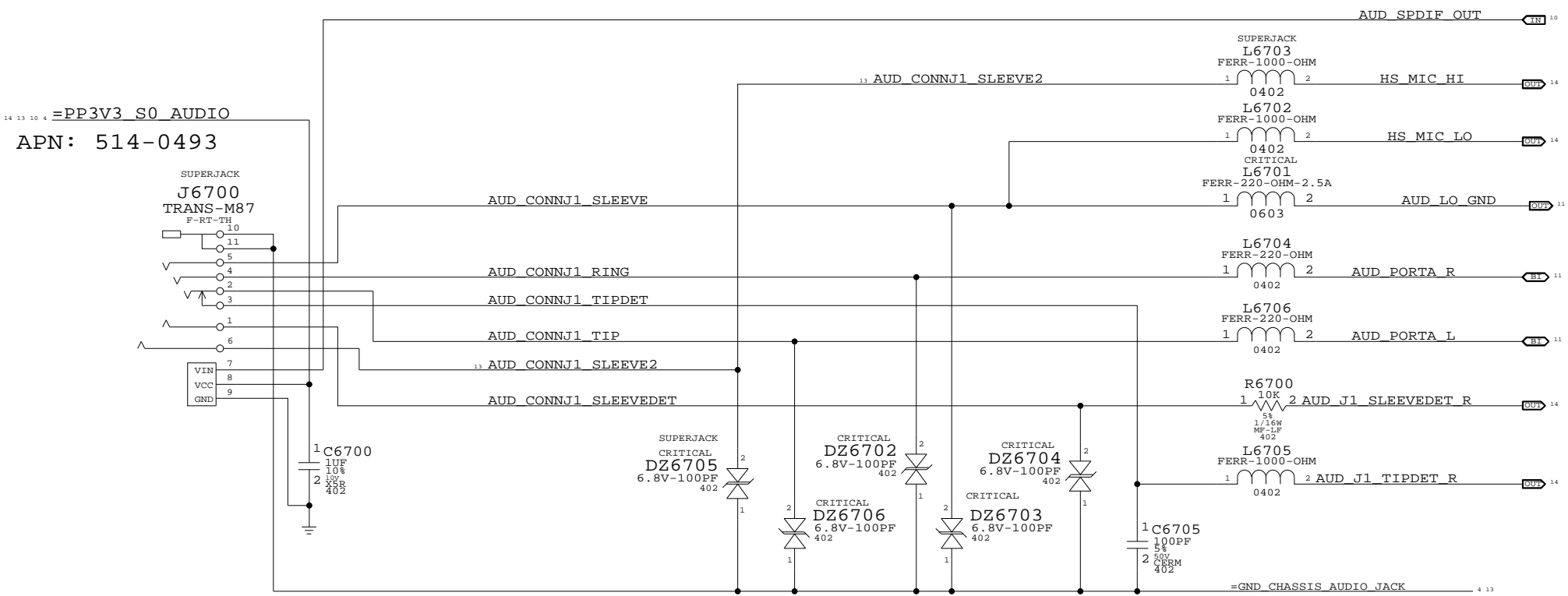


AUDIO: SPEAKER AMP
 SYNC_MASTER=LENGO_M87_AUDIO SYNC_DATE=11/01/2007
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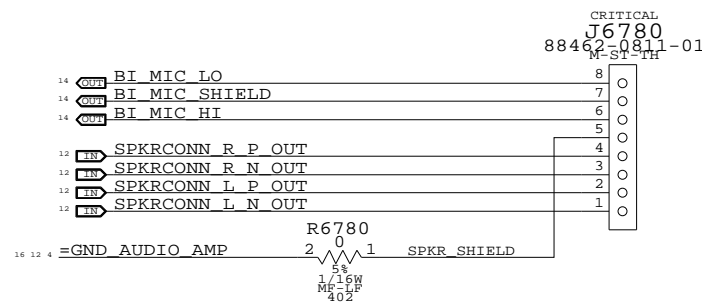
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT	OF	
NONE	66		102

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
514-0406	1	CONN, RCPT, OPTICAL-COPPER	J6700	?	COMBOJACK

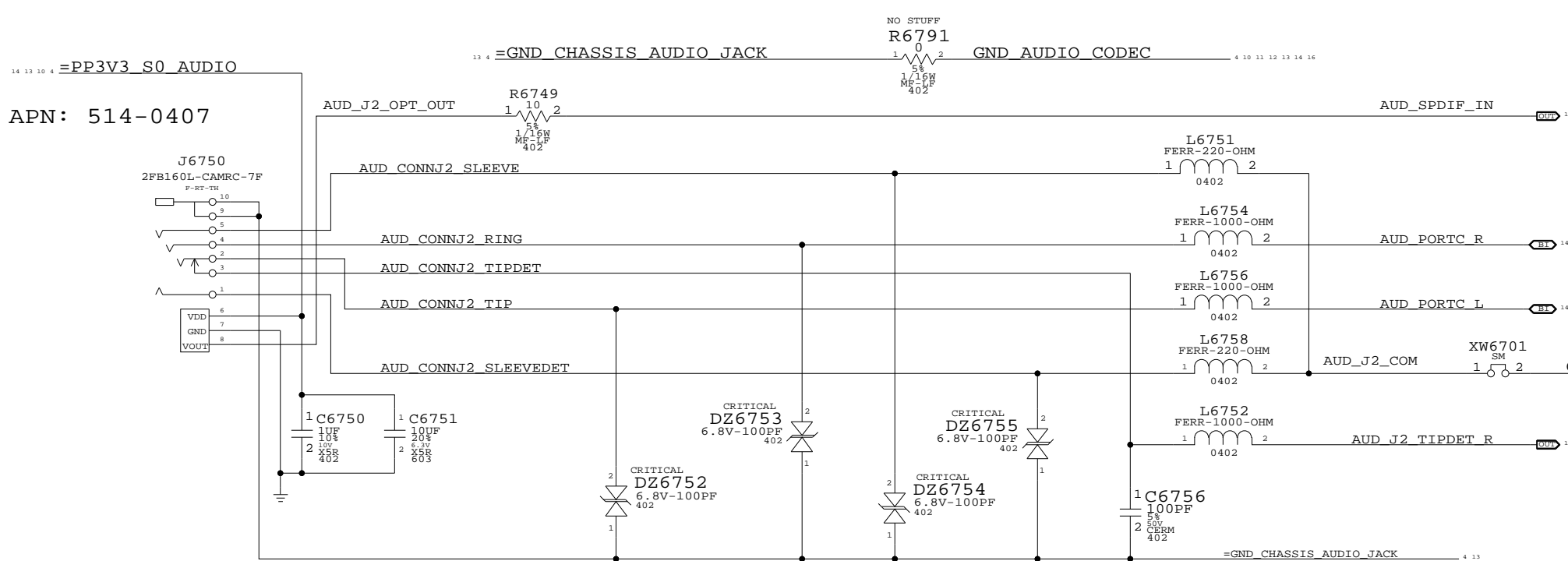
AUDIO JACK 1 LO/HP JACK, SPDIF TX



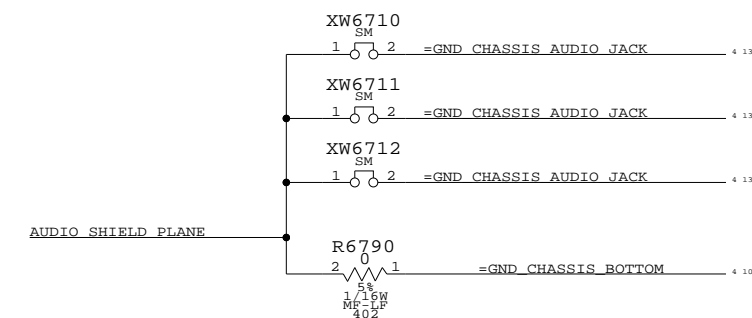
SPEAKER/MIC CONNECTOR
APN: 518-0262



PLACE AT GROUND MOAT



AUDIO SHIELD
(FILLED SHAPE)



AUDIO JACK 2 LINE IN JACK, SPDIF RX

AUDIO: JACKS		
SYNC_MASTER=LENGO_M87_AUDIO	SYNC_DATE=11/01/2007	
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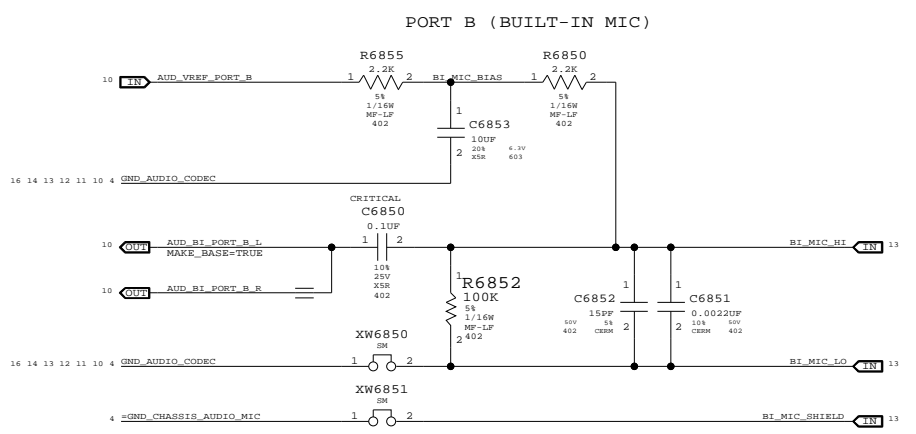
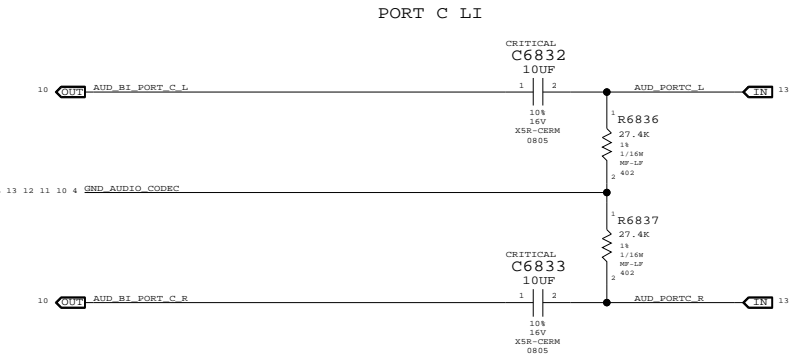
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT	OF	
NONE	67		102

CODEC OUTPUT SIGNAL PATHS

FUNCTION	VOLUME	CONVERTER	PIN COMPLEX	MUTE CONTROL	DET ASSIGNMENT
HP/LINE OUT	0X0D (15)	0X03 (3)	0X15 (21,A)	VREF_A	0X15 (21,A)
SPEAKER	0X26 (38)	0X25 (37)	0X14 (20,D)	GPIO_0	N/A
SPDIF OUT	N/A	0X06 (6)	0X1E (SPDIF OUT)	N/A	0X1B (27,E)

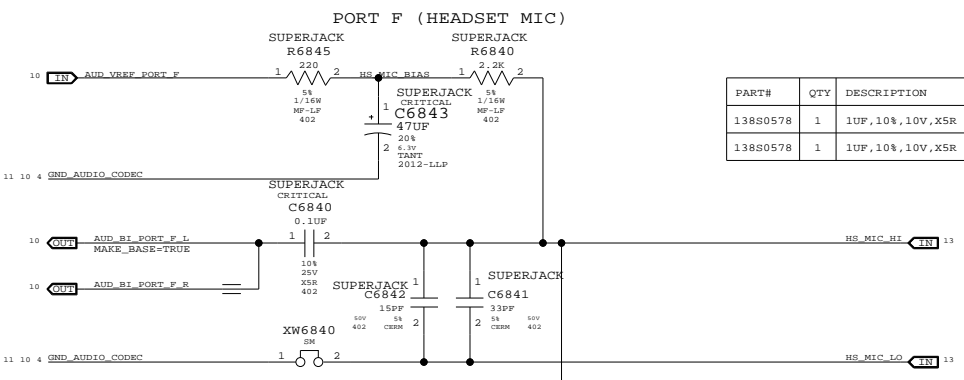
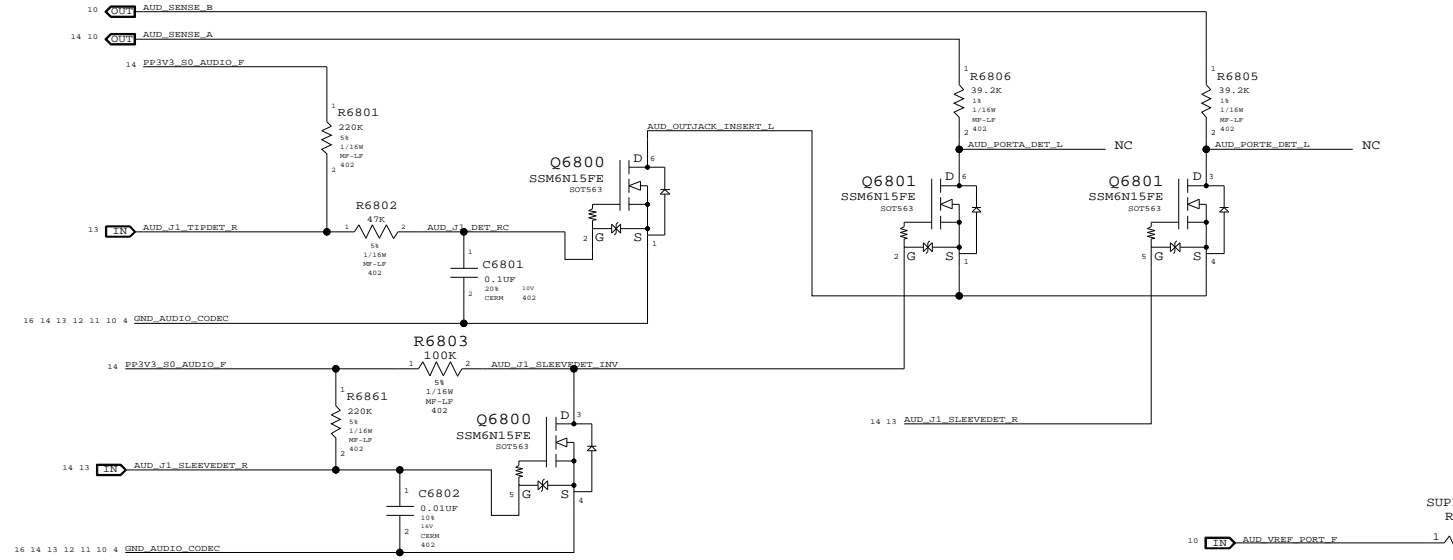
CODEC INPUT SIGNAL PATHS

FUNCTION	MIXER (INPUT)	CONVERTER	PIN COMPLEX	VREF	DET ASSIGNMENT
LINE IN	0X23 (35)	0X08 (8)	0X1A (26,C)	N/A	0X1A (26,C)
SPDIF IN	N/A	0X0A (10)	0X1F (SPDIF IN)	N/A	N/A
MIC (BUILT IN)	0X24 (36)	0X07 (7)	0X18 (24,B)	B (80%)	N/A
MIC (HEADSET)	0X24 (36)	0X07 (7)	0X19 (25,F)	F (80%)	SOUTHBRIDGE

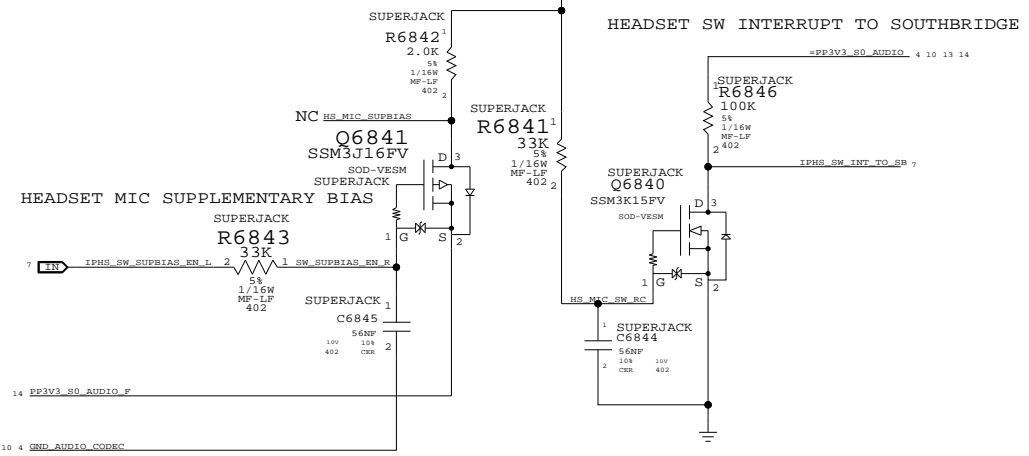
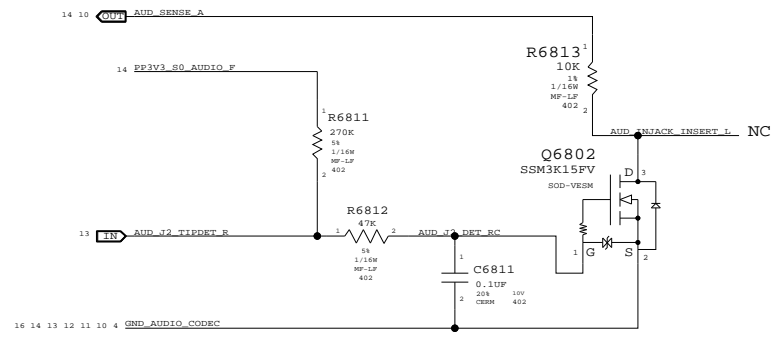


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
138S0578	1	1UF,10%,10V,XSR	C6842	CRITICAL	COMBOJACK
138S0578	1	1UF,10%,10V,XSR	C6840	CRITICAL	COMBOJACK

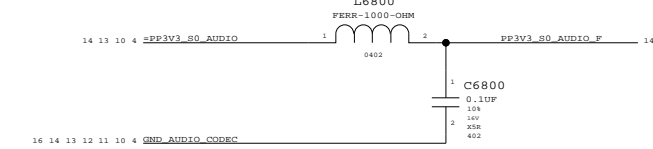
PORT A DETECT PORT E DETECT (SPDIF DELEGATE)



Line-in (PORT C) DETECT



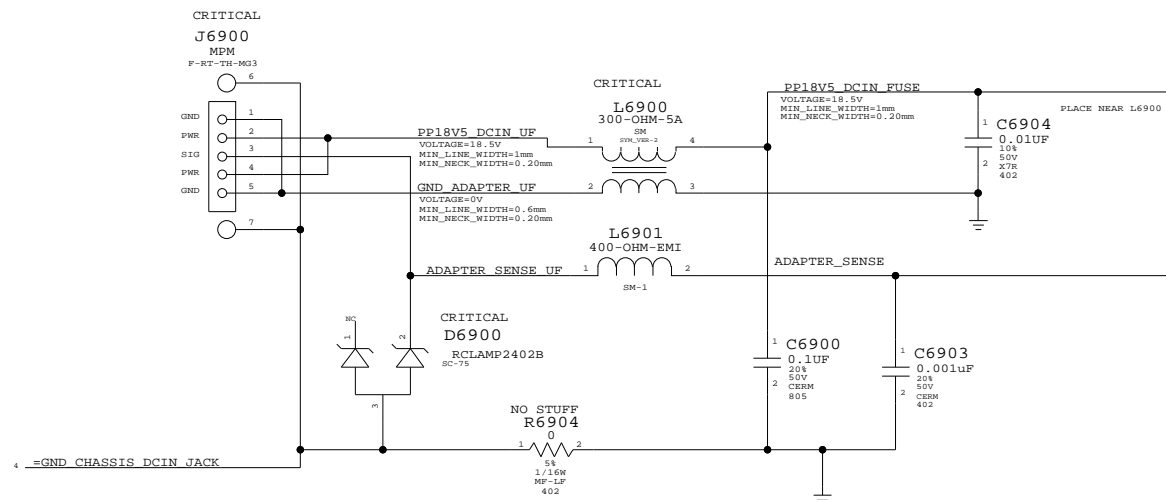
PLACE L6800/C6800 CLOSE TO Q6800/01/02



AUDIO: JACK TRANSLATORS
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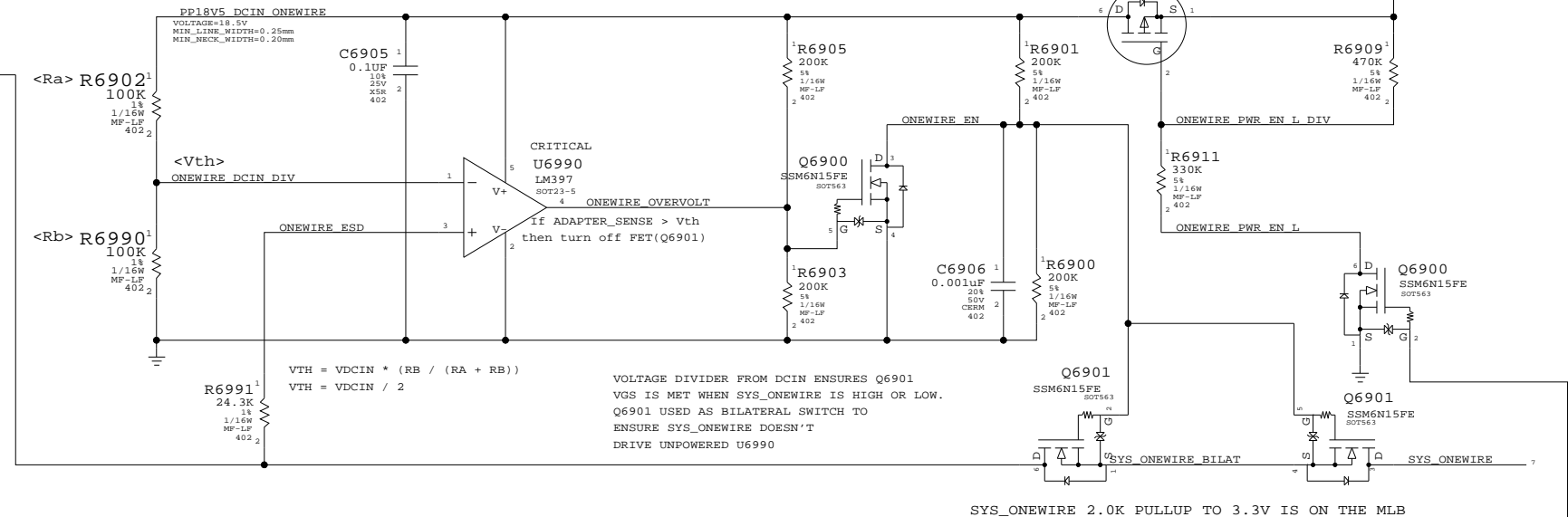
APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	NONE	SHT	OF
		68	102

DC Power Jack



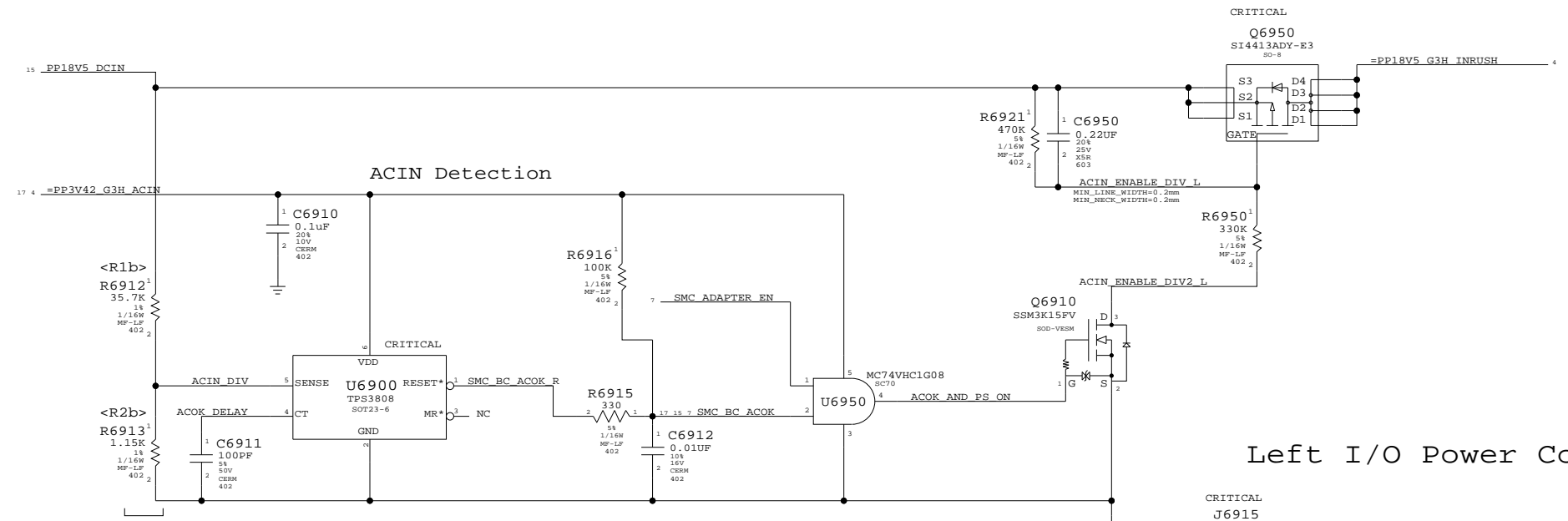
R6904 should be stuffed if GND_CHASSIS_DCIN_JACK does not have another connection to digital GND in the system, such as in an acrylic. The chassis ground will otherwise float and can send transients onto ADAPTER_SENSE when AC is connected.

1-Wire OverVoltage Protection



Q6909 restricts system load to 10K-70K window until adapter detects system and enables 16.5V output.

Inrush Limiter



System must provide 10K-70K impedance to A52 adapter for system load detection. REQ OF R6912 & R6913 IS 36.9K.

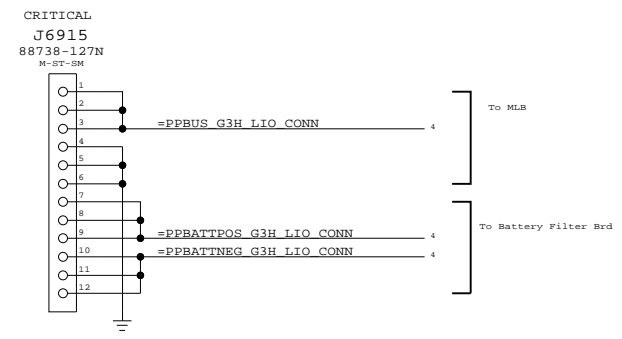
$$V_{th} = (V_{ref} / (R_{2b} / (R_{1b} + R_{2b})))$$

$$V_{REF} = 0.405V$$

$$V_{TH} = 13.0V$$

Assuming 1% variance for R6912-R6913 and 3.42V:
Worst case Vth: min: 12.47V, max: 13.54V

Left I/O Power Connector



DC-In & Battery Connectors

SYNC_MASTER=(Master) SYNC_DATA=(Master)

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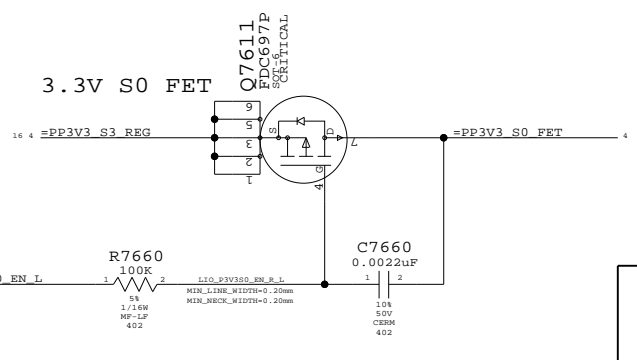
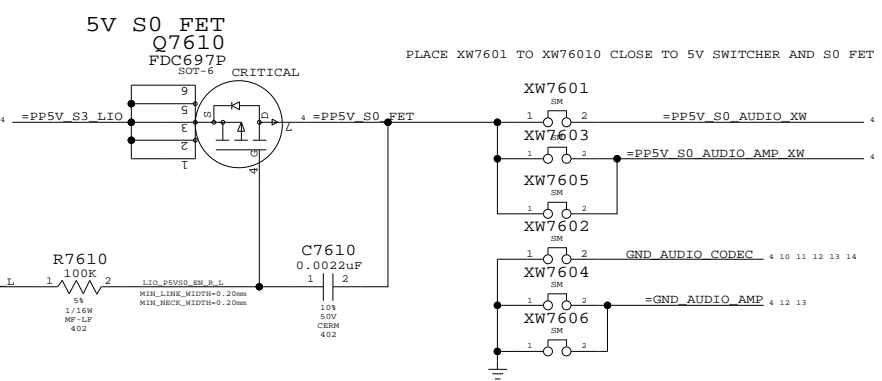
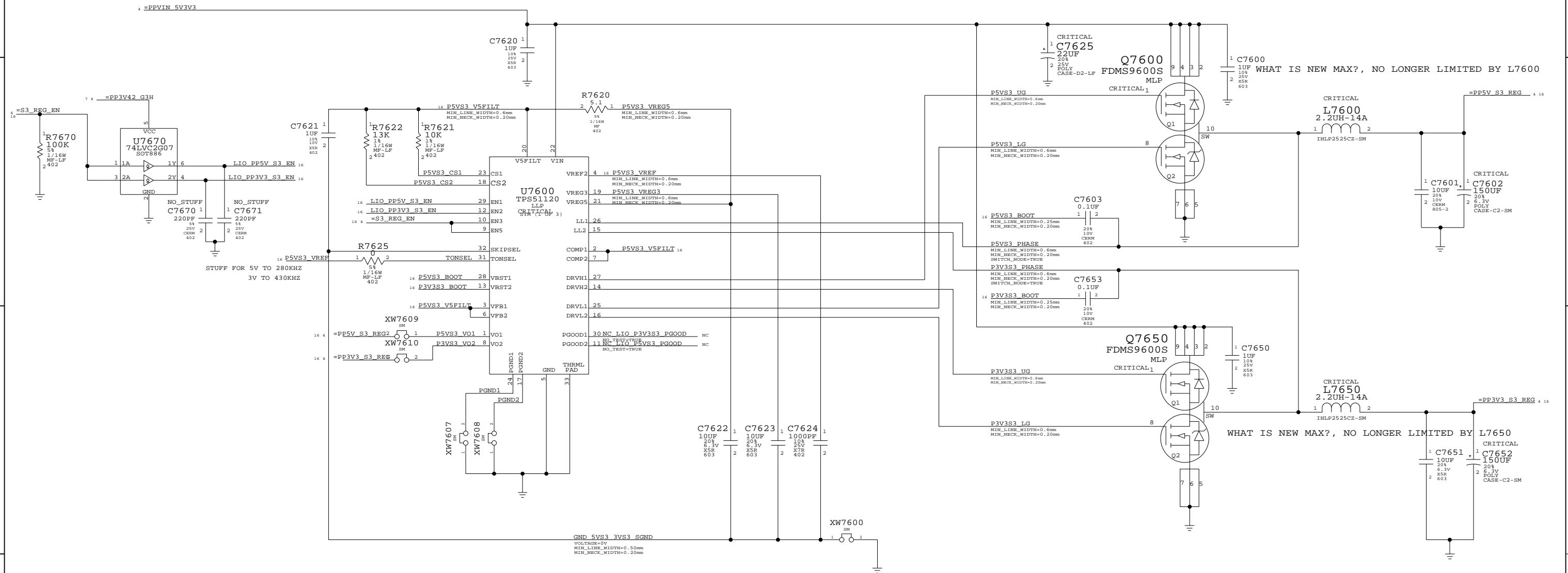
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APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	NONE	SHT	OF
		69	102

5V/3.3V POWER SUPPLY



5V/3.3V SUPPLY

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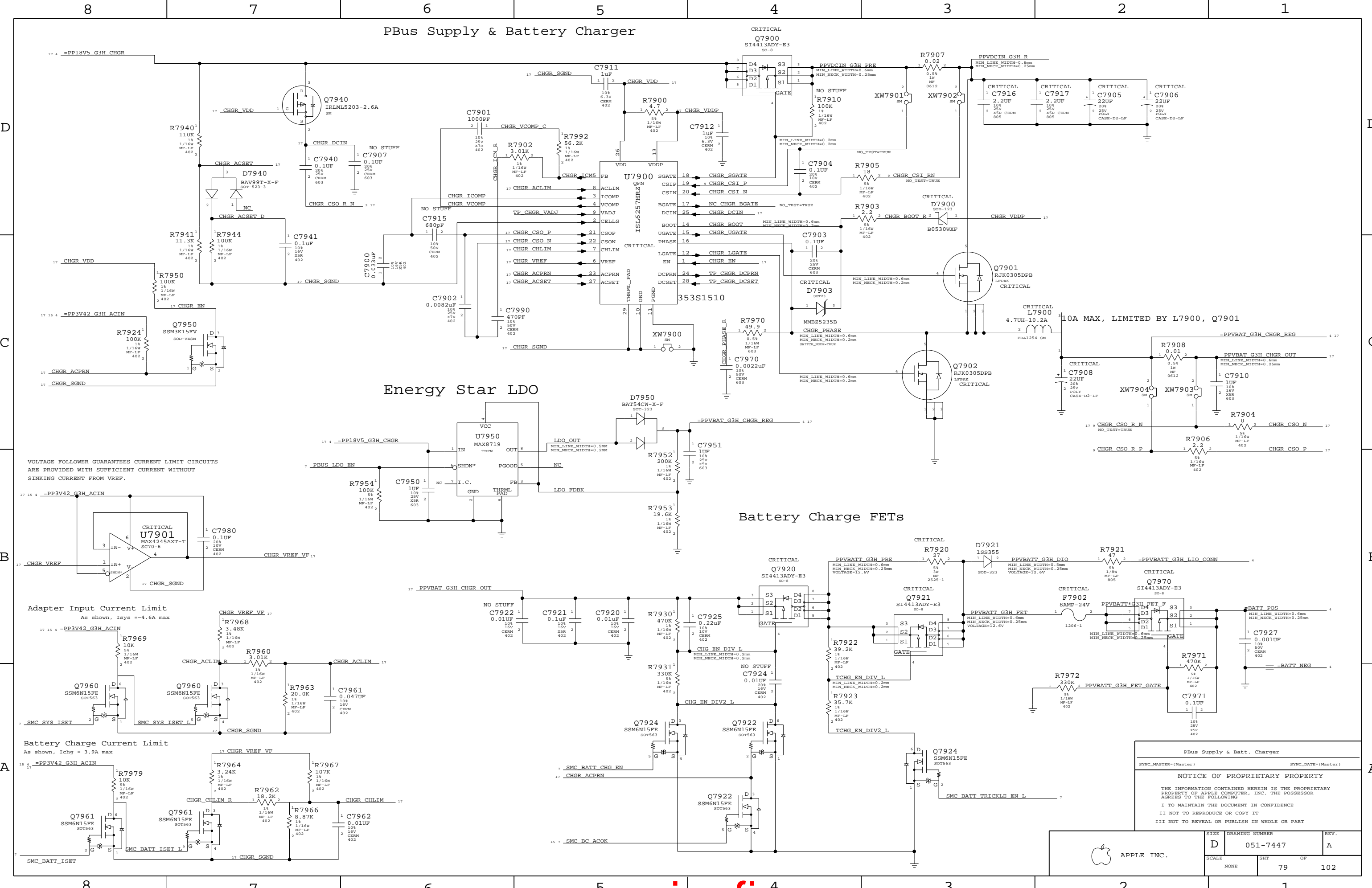
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III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

SIZE	DRAWING NUMBER	REV.
D	051-7447	A
SCALE	SHT	OF
NONE	76	102

PBus Supply & Battery Charger



FBus Supply & Batt. Charger
 SYNC_MASTER=(Master) SYNC_DATE=(Master)
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APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHEET	OF	
NONE	79	102	

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C

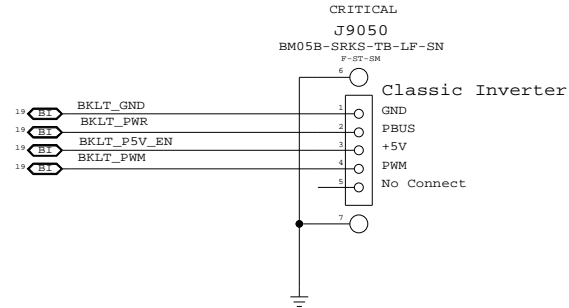
B

B

A

A

Inverter Connector



Inverter Connector

SYNC_MASTER=SPLIT_INVERTER SYNC_DATE=12/06/2006

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APPLE INC.

SIZE	DRAWING NUMBER	REV.
D	051-7447	A
SCALE	SHT	OF
NONE	90	102

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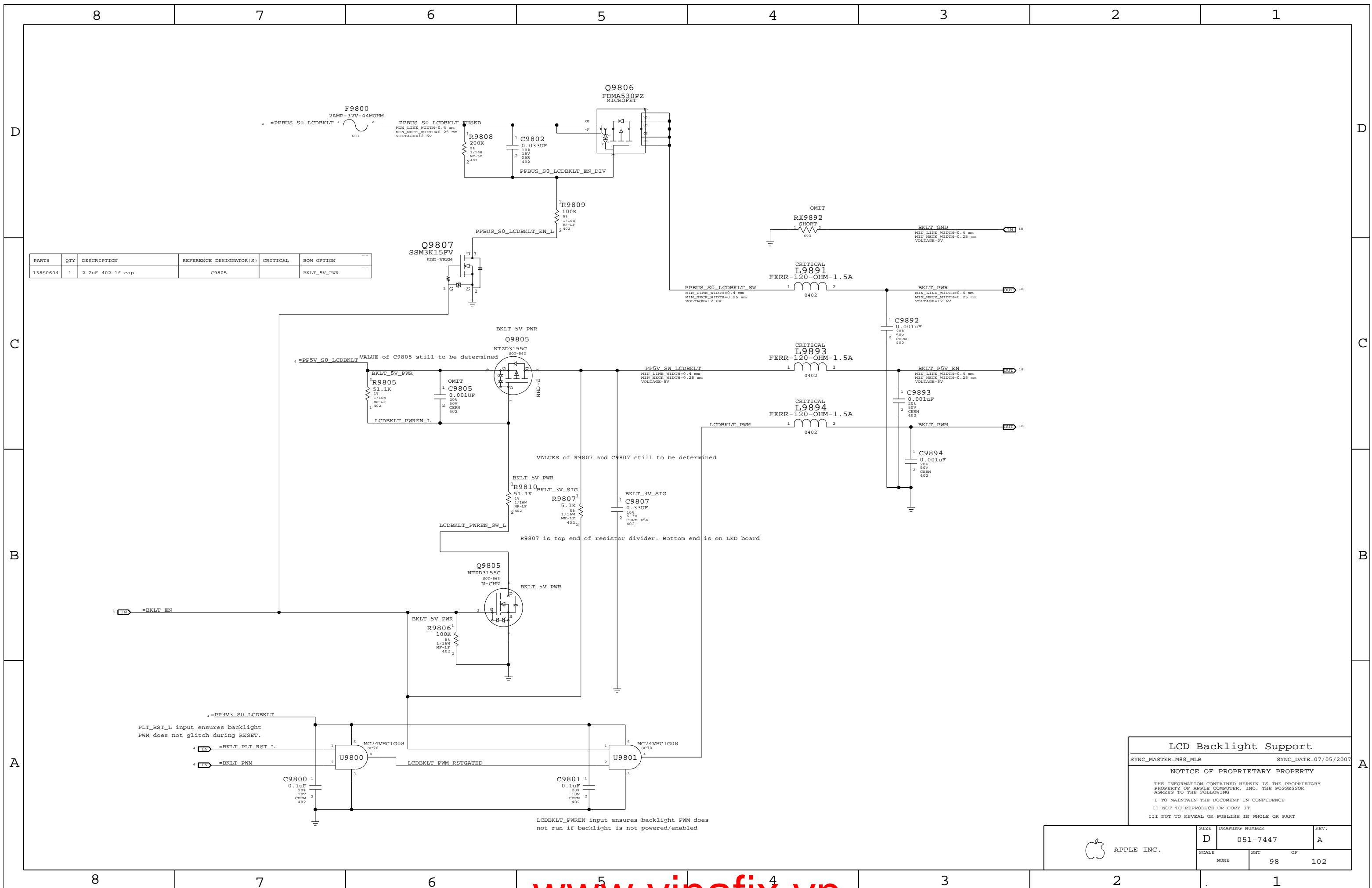
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
138S0604	1	2.2uF 402-1f cap	C9805		BKLT_5V_PWR

LCD Backlight Support		
SYNC_MASTER=M88_MLB	SYNC_DATE=07/05/2007	
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 APPLE INC.	SIZE	DRAWING NUMBER	REV.
	D	051-7447	A
SCALE	SHT	OF	
NONE	98	102	

8	7	6	5	4	3	2	1
Title: Cref Part Report Design: lio Date: Oct 5 17:43:38 2007		C7907 CAP_603 lio[17D6] C7908 CAP_P_CASE-D2-LF lio[17C2] C7910 CAP_603 lio[17C1] C7911 CAP_402 lio[17D5] C7912 CAP_402 lio[17D4] C7915 CAP_402 lio[17C6] C7916 CAP_805 lio[17D3] C7917 CAP_805 lio[17D2] C7920 CAP_402 lio[17B5] C7921 CAP_402 lio[17B5] C7922 CAP_402 lio[17B5] C7924 CAP_402 lio[17A4] C7925 CAP_402 lio[17B4] C7927 CAP_402 lio[17B1] C7940 CAP_603 lio[17D7] C7941 CAP_402 lio[17C7] C7950 CAP_603 lio[17B6] C7951 CAP_603 lio[17B4] C7961 CAP_402 lio[17A7] C7962 CAP_402 lio[17A7] C7970 CAP_603 lio[17C4] C7971 CAP_402 lio[17A2] C7980 CAP_402 lio[17B7] C7990 CAP_402 lio[17C6] C9800 CAP_402 lio[19A7] C9801 CAP_402 lio[19A5] C9802 CAP_402 lio[19D6] C9805 CAP_402 lio[19C6] C9807 CAP_402 lio[19B5] C9892 CAP_402 lio[19C3] C9893 CAP_402 lio[19C3] C9894 CAP_402 lio[19B3] D4600 DIODE_SCHOT_3P_A_SC- lio[8B3] 75 D6900 RCLAMP2402B_SC-75 lio[15C7] D6901 DIODE_SOD-323 lio[15D5] D7900 DIODE_SCHOT_SOD-123 lio[17C3] D7903 ZENER_SOT23 lio[17C4] D7921 DIODE_SOD-323 lio[17B3] D7940 DIODE_3P_CA_SOT-523- lio[17D7] 3 D7950 DIODE_3P_CL_SOT-323 lio[17B5] D26702 SUPPR_TRANSIENT1_402 lio[13C5] D26703 SUPPR_TRANSIENT1_402 lio[13C5] D26704 SUPPR_TRANSIENT1_402 lio[13C5] D26705 SUPPR_TRANSIENT1_402 lio[13C6] D26706 SUPPR_TRANSIENT1_402 lio[13C6] D26752 SUPPR_TRANSIENT1_402 lio[13A6] D26753 SUPPR_TRANSIENT1_402 lio[13A6] D26754 SUPPR_TRANSIENT1_402 lio[13A5] D26755 SUPPR_TRANSIENT1_402 lio[13A5] F6900 FUSE_1206-1 lio[15D5] F7902 FUSE_1206-1 lio[17B2] F9800 FUSE_603 lio[19D6] FL3600 FILTER_4P_1210-4SM1 lio[7C3] FL3601 FILTER_4P_1210-4SM1 lio[7B3] J3400 CON_F52RT_D2MT_SM_F- lio[9C5] ST-SM J3500 CON_F26RT_S4MT_SM_M7 lio[6D2] 5_F-RT-SM J3600 CON_M80ST_D4MT_SM_M- lio[7C4] ST-SM J4600 CON_F4RT_USB_S2MT_TH lio[8C2] _F-RT-TH-USB-LFT J6700 CON_F9RT_SPDIFTRAN_T lio[13C8] H_F-RT-TH J6750 CON_F4RT_SPDIFRCVR_T lio[13B8] H2_P-RT-TH J6780 CON_MBST_S_TH_M-ST-T lio[13C1] H J6900 CON_F5RT_S2MT_TH3_F- lio[15D8] RT-TH-M3 J6915 CON_M12ST_S_SM_M-ST- lio[15A4] SM J9050 CON_FSST_S2MT_SM_F-S lio[18C5] T-SM L3400 FILTER_4P_1210-4SM1 lio[5B2] L4600 FILTER_4P2_DLP11S lio[8C4] L4601 IND_0603 lio[8C4] L6200 IND_0402 lio[10A6] L6201 IND_0402 lio[10D6] L6202 IND_0402 lio[10D3] L6500 IND_0402 lio[11D6] L6501 IND_0402 lio[11C6] L6601 IND_0402 lio[12C7] L6610 IND_0402 lio[12C7] L6620 IND_0402 lio[12A7] L6701 IND_0603 lio[13C4] L6702 IND_0402 lio[13D4] L6703 IND_0402 lio[13D4] L6704 IND_0402 lio[13C4] L6705 IND_0402 lio[13C4] L6706 IND_0402 lio[13C4] L6751 IND_0402 lio[13B4] L6752 IND_0402 lio[13A4] L6754 IND_0402 lio[13B4] L6756 IND_0402 lio[13A4] L6758 IND_0402 lio[13A4] L6800 IND_0402 lio[14A7] L6900 FILTER_4P_SM lio[15D7] L6901 IND_SM-1 lio[15D7] L7600 IND_IHLP2525C2-SM lio[16C2] L7650 IND_IHLP2525C2-SM lio[16B2] L7900 IND_3P_FDA1254-SM lio[17C2] L9891 IND_0402 lio[19C4] L9893 IND_0402 lio[19C4] L9894 IND_0402 lio[19C4] Q3450 TRA_SINGLE_MOSFET_PC lio[5D2] HN_SOT-23 Q6800 TRA_DUAL_SSM6N15FE_S lio[14B7 14C7] OT563 Q6801 TRA_DUAL_SSM6N15FE_S lio[14C5 14C6] OT563 Q6802 TRA_SSM3K15FV_SOD-VE lio[14B7] SM Q6840 TRA_SSM3K15FV_SOD-VE lio[14A3] SM Q6841 TRA_SSM3J16FV_SOD-VE lio[14A4] SM Q6900 TRA_DUAL_SSM6N15FE_S lio[15C1 15C3] OT563 Q6901 TRA_DUAL_SSM6N15FE_S lio[15C1 15C2] OT563 Q6909 TRA_DUAL_BSS84V_SOT- lio[15D2]	563 Q6910 TRA_SSM3K15FV_SOD-VE lio[15B4] SM Q6950 TRA_S14413ADY_SO-8 lio[15B4] Q7600 TRA_FDM9600S_MLP lio[16C3] Q7610 TRA_FDC697E_SOT-6 lio[16A7] Q7611 TRA_FDC697E_SOT-6 lio[16A3] Q7650 TRA_FDM9600S_MLP lio[16B2] Q7900 TRA_S14413ADY_SO-8 lio[17B4] Q7901 TRA_RJK_LFPAK lio[17C3] Q7902 TRA_RJK_LFPAK lio[17C3] Q7920 TRA_S14413ADY_SO-8 lio[17B4] Q7921 TRA_S14413ADY_SO-8 lio[17B3] Q7922 TRA_DUAL_SSM6N15FE_S lio[17A4 17A4] OT563 Q7924 TRA_DUAL_SSM6N15FE_S lio[17A3 17A5] OT563 Q7940 TRA_IHL5203_SM lio[17D7] Q7950 TRA_SSM3K15FV_SOD-VE lio[17C7] SM Q7960 TRA_DUAL_SSM6N15FE_S lio[17A7 17A8] OT563 Q7961 TRA_DUAL_SSM6N15FE_S lio[17A7 17A8] OT563 Q7970 TRA_S14413ADY_SO-8 lio[17B2] Q9805 TRA_DUAL_NPCH_NTZD31 lio[19B6 19C6] S5C1_SOT-563 Q9806 TRA_FDMAS30PZ_MICROP lio[19D5] ET Q9807 TRA_SSM3K15FV_SOD-VE lio[19C6] SM R3450 RES_402 lio[5C2] R3451 RES_402 lio[5C2] R3500 RES_402 lio[6C6] R3561 RES_402 lio[6B3] R6201 RES_402 lio[10B5] R6203 RES_402 lio[10D5] R6204 RES_402 lio[10C6] R6205 RES_402 lio[10B5] R6206 RES_402 lio[10B3] R6207 RES_402 lio[10B2] R6220 RES_402 lio[10A6] R6221 RES_402 lio[10A4] R6222 RES_402 lio[10A4] R6250 RES_402 lio[10C5] R6251 RES_402 lio[10D6] R6500 RES_402 lio[11C5] R6510 RES_402 lio[11B5] R6511 RES_402 lio[11B4] R6512 RES_402 lio[11B4] R6513 RES_603 lio[11C3] R6514 RES_402 lio[11C4] R6520 RES_402 lio[11A5] R6521 RES_402 lio[11A4] R6522 RES_402 lio[11A4] R6523 RES_603 lio[11C3] R6524 RES_402 lio[11C3] R6601 RES_402 lio[12C7] R6602 RES_402 lio[12C4] R6603 RES_402 lio[12C7] R6610 RES_402 lio[12C2] R6611 RES_402 lio[12C2] R6620 RES_402 lio[12B2] R6621 RES_402 lio[12B2] R6700 RES_402 lio[13C4] R6749 RES_402 lio[13B7] R6780 RES_402 lio[13C2] R6790 RES_402 lio[13B2] R6791 RES_402 lio[13B5] 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lio[13B2] XW6711 SHORT_SM lio[13B2] XW6712 SHORT_SM lio[13B2] XW6840 SHORT_SM lio[14B4] XW6850 SHORT_SM lio[14C3] XW6851 SHORT_SM lio[14B3] XW7600 SHORT_SM lio[16A4] XW7601 SHORT_SM lio[16A6] XW7602 SHORT_SM lio[16A6] XW7603 SHORT_SM lio[16A6] XW7604 SHORT_SM lio[16A6] XW7605 SHORT_SM lio[16A6] XW7606 SHORT_SM lio[16A6] XW7607 SHORT_SM lio[16B6] XW7608 SHORT_SM lio[16B6] XW7609 SHORT_SM lio[16B6] XW7610 SHORT_SM lio[16B6] XW7900 SHORT_SM lio[17C5] XW7901 SHORT_SM lio[17D3] XW7902 SHORT_SM lio[17D3] XW7903 SHORT_SM lio[17C2] XW7904 SHORT_SM lio[17C2] Z70900 MTHOLE lio[4D3] Z70910 MTHOLE lio[4A8] Z70920 MTHOLE lio[4B8] Z70930 MTHOLE lio[4A8]			

