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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 DATE	ENG APPD DATE
01		?	?	?	?


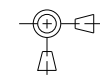
PAGE CONTENTS

1	TITLE PAGE AND CONTENTS
2	PCB NOTES AND HOLES
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4	SPEAKER DRIVER
5	HEADPHONE DRIVER
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9	PART LOCATIONS

SCHEM, SOUND, PB17 "

8/6/03

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
051-6456	1	SCHEM, SOUND, PB17 INCH	SCH1	
820-1523	1	PCBF, SOUND, PB17 INCH	PCB1	

DIMENSIONS ARE IN MILLIMETERS		METRIC		 Apple Computer Inc.	
XX : _____				NOTICE OF PROPRIETARY PROPERTY THE INFORMATION CONTAINED HEREIN IS THE PROPRIETARY PROPERTY OF APPLE COMPUTER, INC. THE POSSESSOR AGREES TO THE FOLLOWING I TO MAINTAIN THE DOCUMENT IN CONFIDENCE II NOT TO REPRODUCE OR COPY IT III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART	
X.XX : _____				TITLE	
X.XXX : _____				SCHEM, SOUND, PB17 INCH	
ANGLES : _____				DRAWING NUMBER 405671	
DO NOT SCALE DRAWING				REV. AA	
 THIRD ANGLE PROJECTION	RELEASE	SCALE	SIZE	SHT 1 OF 9	
		NONE	D		
	MATERIAL/FINISH NOTED AS APPLICABLE				

PCB SPECS

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

IMPEDANCE : 50 OHMS +/- 10%
 DIELECTRIC: FR-4
 LAYER COUNT: 12
 SIGNAL TRACE WIDTH: 4 MILS
 SIGNAL TRACE SPACING: 4 MILS
 PREPREG THICKNESS: 2-3 MILS

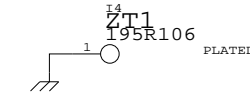
SEE PCB CAD FILES FOR MORE SPECIFIC INFO.

BOARD STACK-UP AND CONSTRUCTION

20R10 TH VIA OR VIA IN PAD

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

BOARD HOLES



PCB BOARD STANDOFFS

BOARD INFORMATION

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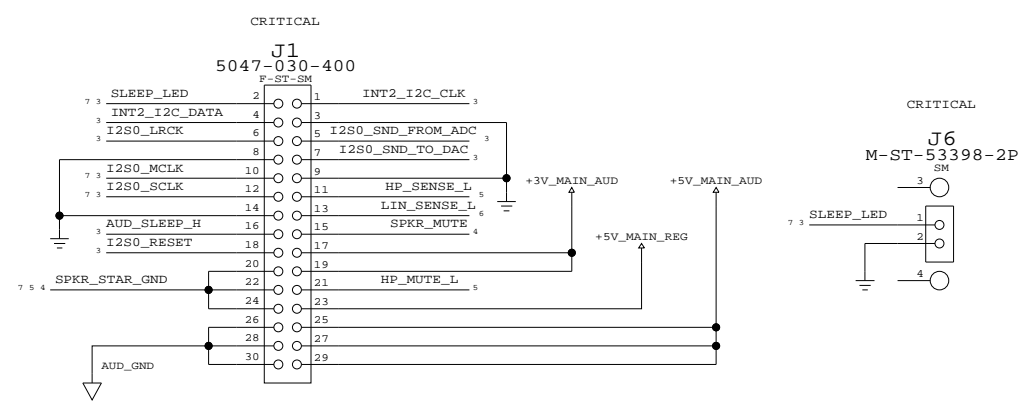
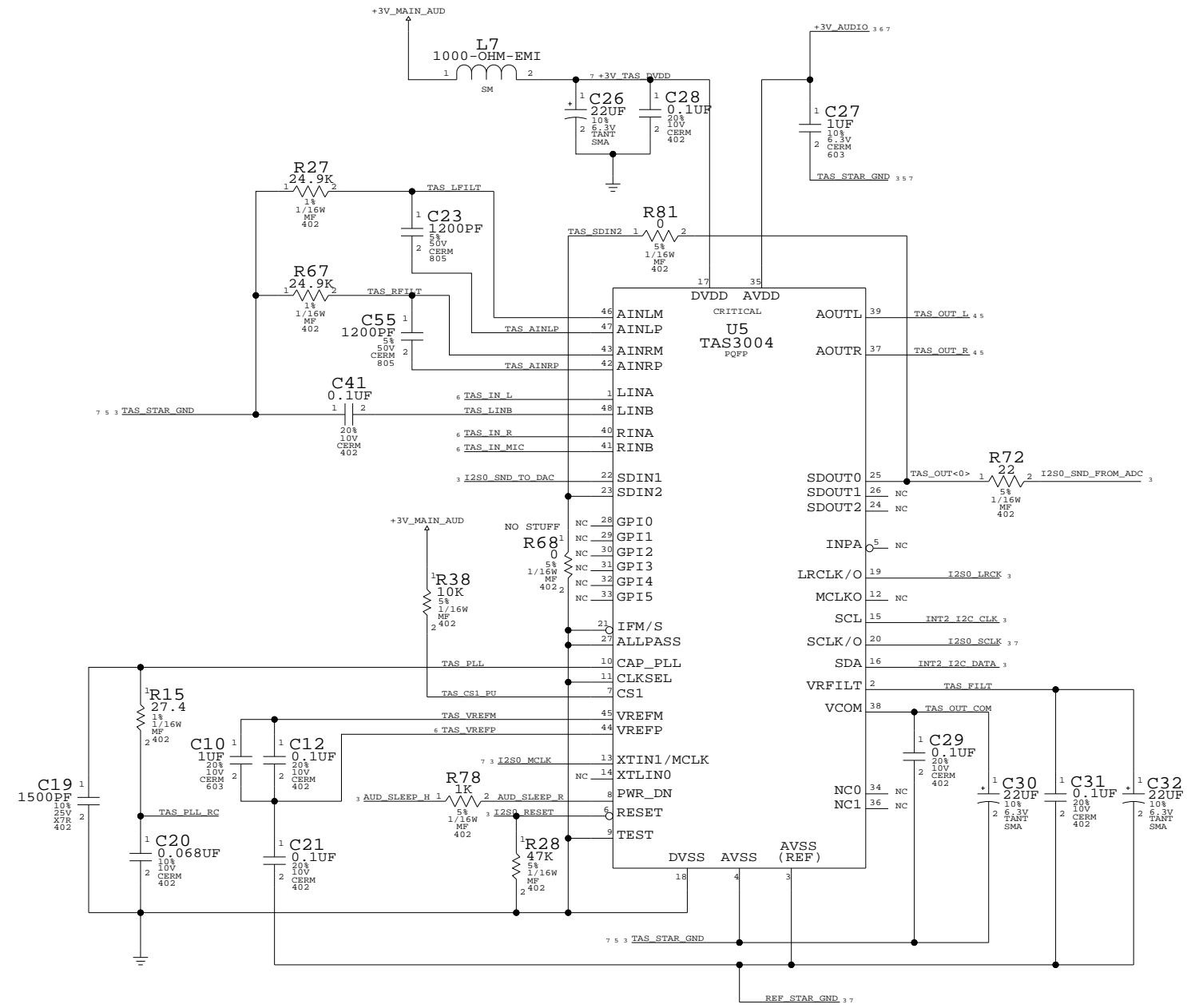
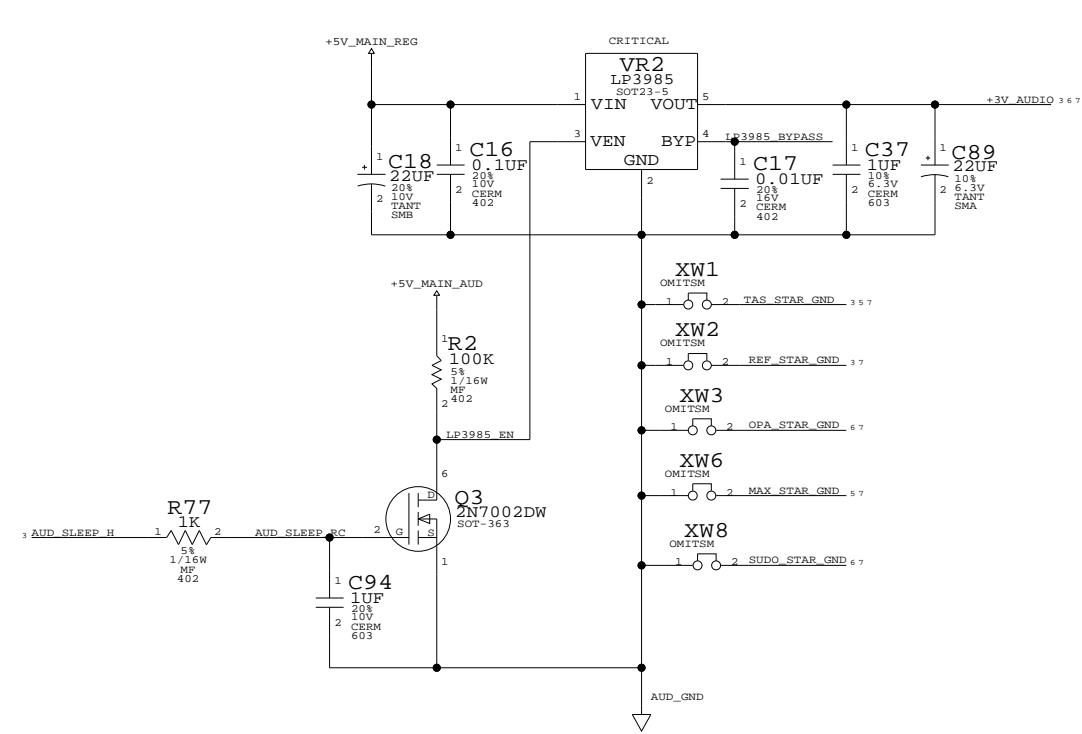
APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	405671	AA
SCALE	SHT	OF	
NONE	2	9	

D

D

3V AUDIO POWER SUPPLY

SNAPPER CONTROL INTERFACE



SNAPPER (AUDIO) CONTROL INTERFACE

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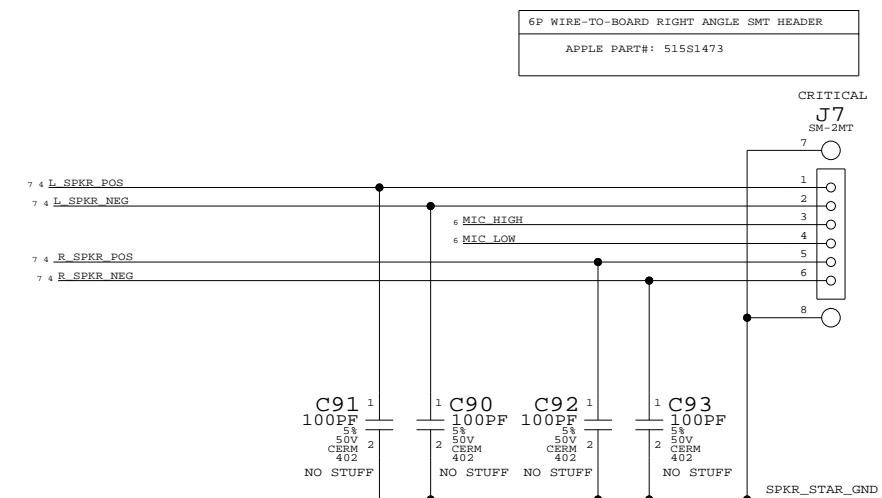
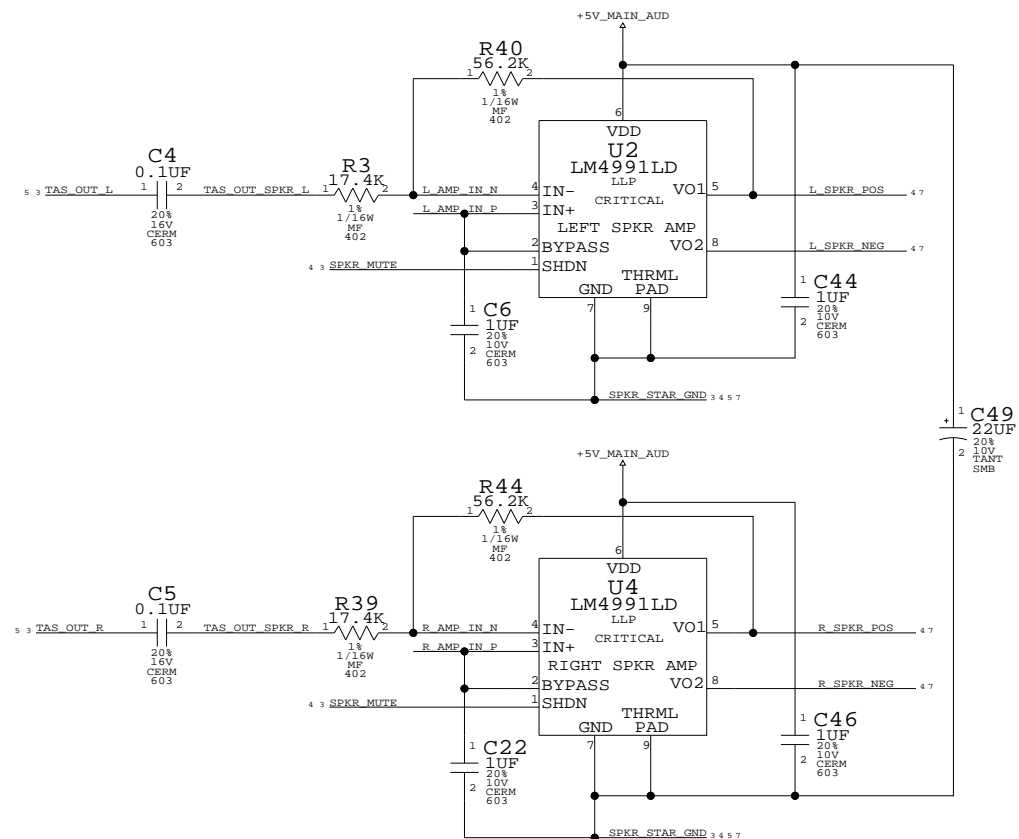
III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.	SIZE	DRAWING NUMBER	REV.
	D	405671	AA
SCALE	NONE	SHT	3 OF 9

A

A

SPEAKER DRIVER

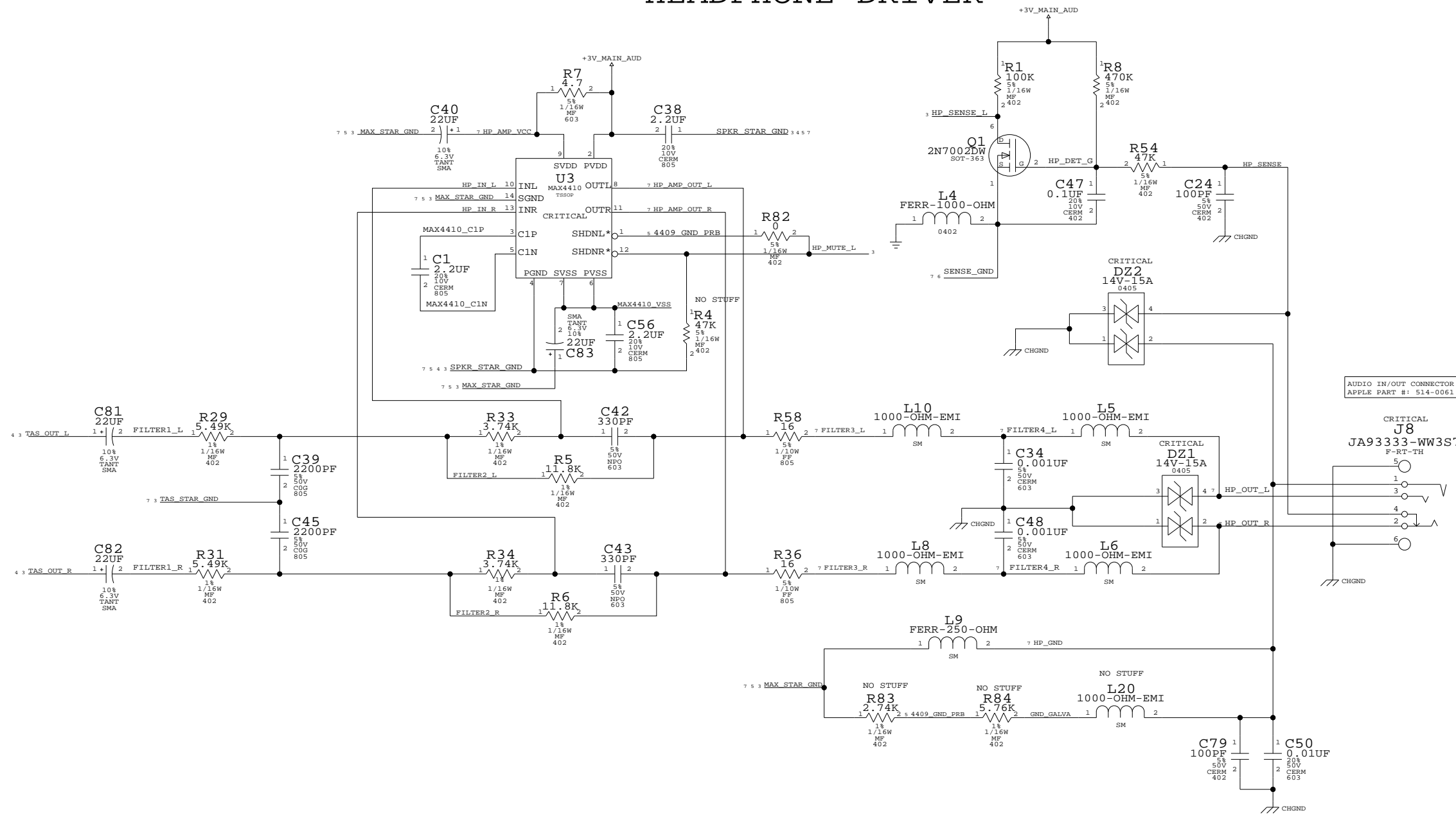


SPEAKER DRIVER

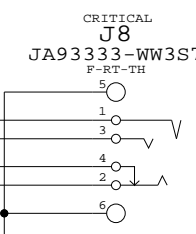
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APPLE COMPUTER INC.	SIZE D	DRAWING NUMBER 405671	REV. AA
	SCALE NONE	SHT 4	OF 9

HEADPHONE DRIVER



AUDIO IN/OUT CONNECTOR
APPLE PART #: 514-0061

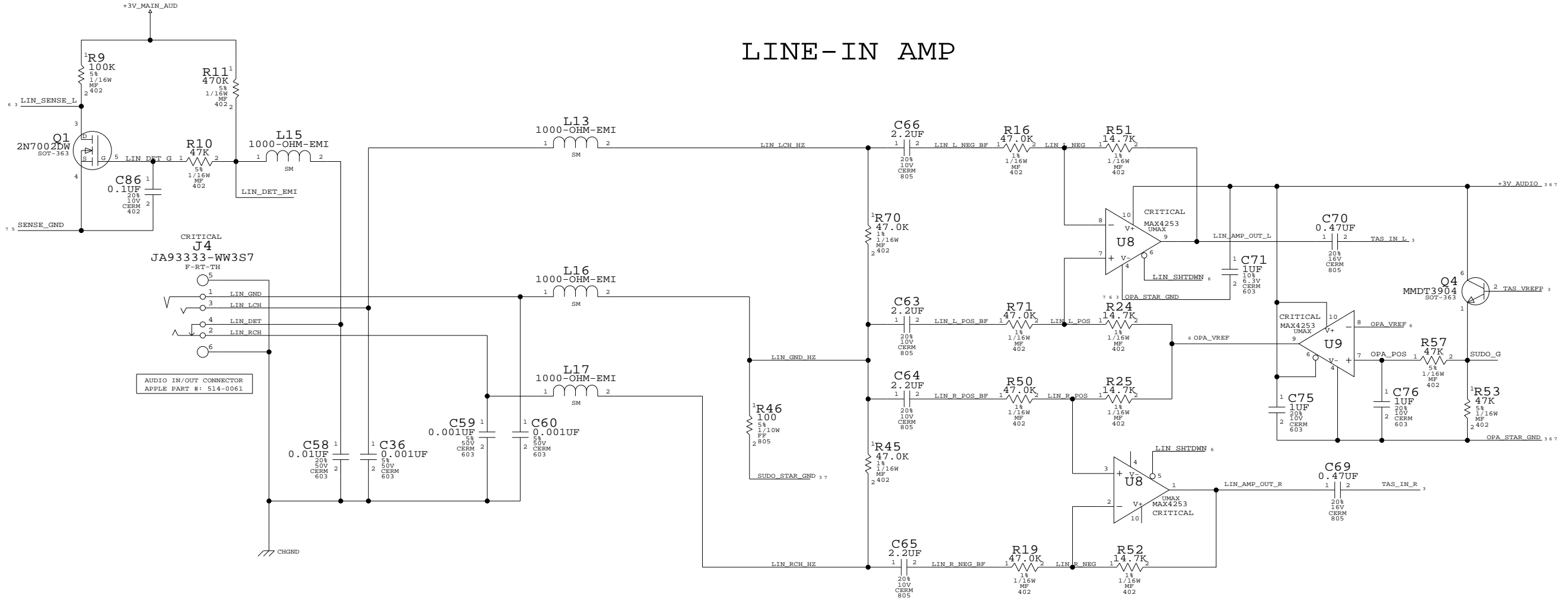


HEADPHONE DRIVER

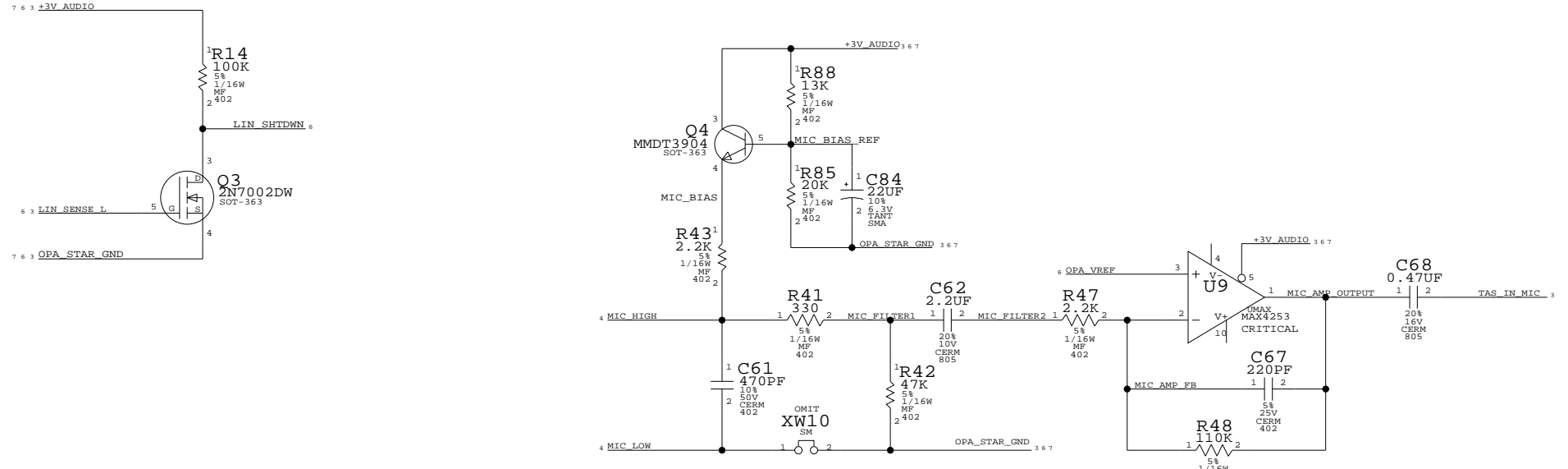
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	SIZE	DRAWING NUMBER	REV.
	D	405671	AA
SCALE	SHT 5 OF 9		
NONE			

LINE-IN AMP



MICROPHONE AMP



MICROPHONE AMP. & LINE-IN AMP.

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APPLE COMPUTER INC.	SIZE	D	DRAWING NUMBER	405671	REV.	AA
	SCALE	NONE	SHT	6	OF	9

D
C
B
A

D
C
B
A

SIGNAL CONSTRAINTS

SIGNAL NAME	DIFF_PAIR	MATCHED_DELAY	MIN_LINE_WIDTH	NET_SPACING_TYPE
I2SD0_MCLK	N/A	N/A	N/A	10 MIL SPACING
I2SD0_SCLK	N/A	N/A	N/A	10 MIL SPACING
HP_AMP_OUT_R			MIN_LINE_WIDTH=10	10 MIL SPACING
HP_AMP_OUT_L			MIN_LINE_WIDTH=10	10 MIL SPACING
FILTER3_R			MIN_LINE_WIDTH=10	10 MIL SPACING
FILTER3_L			MIN_LINE_WIDTH=10	10 MIL SPACING
FILTER4_R			MIN_LINE_WIDTH=10	10 MIL SPACING
FILTER4_L			MIN_LINE_WIDTH=10	10 MIL SPACING
HP_OUT_R			MIN_LINE_WIDTH=10	10 MIL SPACING
HP_OUT_L			MIN_LINE_WIDTH=10	10 MIL SPACING

POWER NET CONSTRAINTS

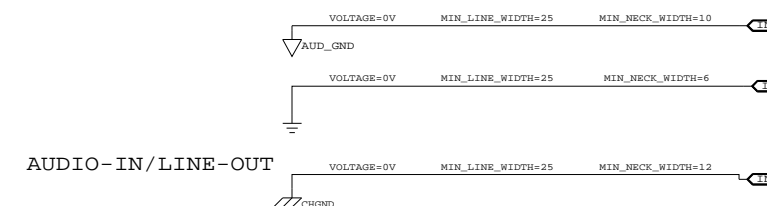
GROUP	SIG_NAME	VOLTAGE	MIN_LINE_WIDTH	MIN_NECK_WIDTH
MAIN/SLEEP	+5V_MAIN_AUD	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10
	+5V_MAIN_REG	VOLTAGE=5V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	+3V_MAIN_AUD	VOLTAGE=3.3V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	+3V_TAS_DVDD	VOLTAGE=3.3V	MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10
	+3V_AUDIO	VOLTAGE=3.3V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	HP_AMP_VCC	VOLTAGE=3.3V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	HP_GND	VOLTAGE=0V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10
	TAS_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10
	REF_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10
	OPA_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10
AUDIO	PMP_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	MAX_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	AUDIO_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=15	MIN_NECK_WIDTH=10
	SPKR_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	SENSE_GND	VOLTAGE=0V	MIN_LINE_WIDTH=20	MIN_NECK_WIDTH=10
	L_SPKR_POS		MIN_LINE_WIDTH=20	
	L_SPKR_NEG		MIN_LINE_WIDTH=20	
	R_SPKR_POS		MIN_LINE_WIDTH=20	
	R_SPKR_NEG		MIN_LINE_WIDTH=20	
	SLEEP_LED		MIN_LINE_WIDTH=20	

CHANGES FROM EVT TO EVT2

- TIED C90 TO L_SPKR_NEG
- TIED HP_OUT_L TO PIN3 AND HP_SENSE TO PIN4 AT J8.
- NO STUFF R4
- CHANGED C20 FROM 0.01 UF TO 0.068UF
- CHANGED C39 AND C45 TO 2200PF, 50V, NPO, 0805
CHANGED R5 AND R6 TO 11.8K, 1%, 0402
CHANGED C81 AND C82 TO 22 UF, 6.3V, 10%, SMA
- EMI CHANGES --
ADDED L4, L5 AND L6
CHANGED TO 0.01 UF AT C34, C48 AND C50
CHANGED TO 0.01 UF AT C36, C58, C59 AND C60
NO STUFF L20

CHANGES FROM EVT2/DVT TO PVT

- CHANGED R40 AND R44 FROM 86.6K TO 56.2K
CHANGED R3 AND R39 FROM 26.7K TO 17.4K
- SWAPPED R39 AND C5
SWAPPED R3 AND C4
- ADDED CONSTRAINTS FOR HEADPHONE OUTPUT SIGNALS
- CHANGED C17 TO 402 16V 0.01UF TO REMOVE OEM NPO PART
- CHANGED L4 TO 0402
- CHANGED CONSTRAINTS
- CHANGED C36, C59 AND C60 FROM 0.01UF TO 0.001UF TO IMPROVE LINE-IN SNR
- CHANGED C34 AND C48 FROM 0.01UF TO 0.001UF TO IMPROVE HEADPHONE SNR
- CHANGED R7 FROM 113S0016 (OEM) TO 113S1470 (APPLE, CHANGE FROM 1/16W TO 1/10W LATER)

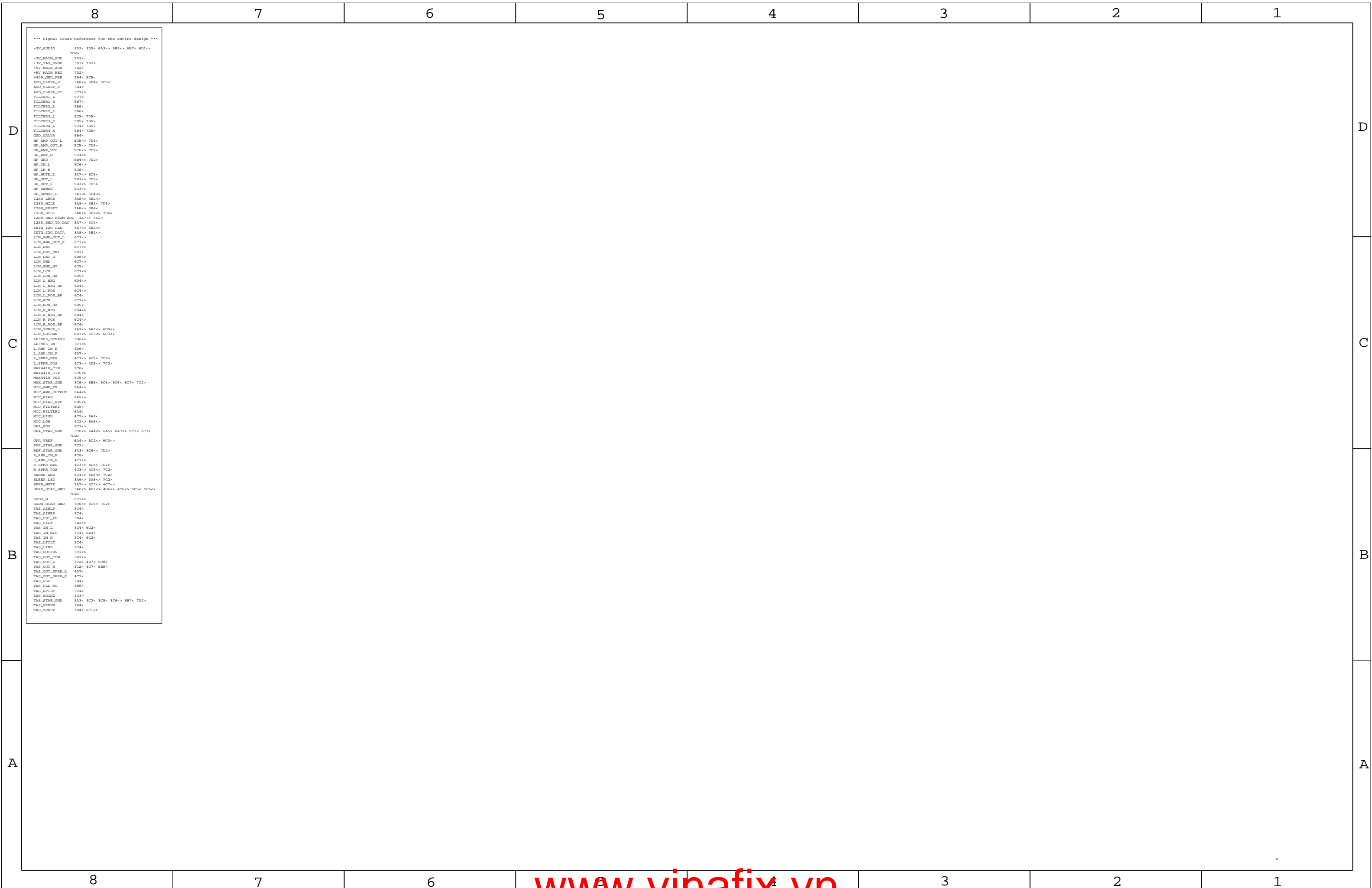


SIGNAL & POWER CONSTRAINTS

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	D	405671	AA
SCALE	SHT		OF
NONE	7		9



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

```

+3V_AUDIO 3D2< 3D5< 6A3< 6B5< 6B7< 6D1<
7D2>
+3V_MAIN_AUD 7D2>
+3V_STAS_DVDD 3D3< 7D2>
+5V_MAIN_AUD 7D2>
+5V_MAIN_BSD 7D2>
4409_GND_PSB 5B4< 5C5<
AUD_SLEEP_R 3A8< 3B4< 3C8<
AUD_SLEEP_R 3B4<
AUD_SLEEP_RC 3C7<
FILTER1_L 5C7<
FILTER1_R 5B7<
FILTER2_L 5B6<
FILTER2_R 5B6<
FILTER3_L 5C5< 7D6>
FILTER3_R 5B5< 7D6>
FILTER4_L 5C4< 7D8>
FILTER4_R 5B4< 7D5>
GND_GALVA 5B4<
HP_AMP_OUT_L 5C5< 7D6>
HP_AMP_OUT_R 5C5< 7D6>
HP_AMP_VCC 5C6< 7D2>
HP_DET_G 5C4<
HP_DET 5B4< 7D2>
HP_IN_L 5C6<
HP_IN_R 5C6<
HP_MUTE_L 3A7< 5C5<
HP_OUT_L 5B3< 7D5>
HP_OUT_R 5B3< 7D5>
HP_SENSE 5C1<
HP_SENSE_L 3A7< 5D4<
I2B0_LRCK 3A8< 3B4< 7D6>
I2B0_MCLK 3A8< 3B4< 7D6>
I2B0_RESET 3A8< 3B4<
I2B0_SCLK 3A8< 3B2< 7D6>
I2B0_SND_FROM_ADC 3A7< 3C2<
I2B0_SND_TO_DAC 3A7< 3C4<
INT2_I2C_CLK 3A7< 3B2<
INT2_I2C_DATA 3A8< 3B2<
LIN_AMP_OUT_L 6C3<
LIN_DET 6C7<
LIN_DET_RMI 6D7<
LIN_DET_G 6D8<
LIN_GND 6C7<
LIN_GND_HZ 6C5<
LIN_LCH 6C7<
LIN_LCH_HZ 6D5<
LIN_L_NEG 6D4<
LIN_L_MUG_SP 6D4<
LIN_L_POS 6C4<
LIN_L_POS_SP 6C4<
LIN_RCH 6C7<
LIN_RCH_HZ 6B5<
LIN_R_NEG 6B4<
LIN_R_MUG_SP 6B4<
LIN_R_POS 6C4<
LIN_R_POS_SP 6C4<
LIN_SENSE_L 3A7< 6A7< 6D8<
LIN_SENSE_R 6B7< 6C1< 6C3<
LP3985_BYPASS 3D6<
L_AMP_IN_N 3C7<
L_AMP_IN_P 4D7<
L_SPER_BSD 4C3< 4C5< 7C2>
L_SPER_POS 4C3< 4C5< 7C2>
MAX4410_CIN 5C6<
MAX4410_CIP 5C6<
MAX4410_VSS 5C5<
MIC_STAP_GND 3C6< 5B5< 5C6< 5C6< 5C7< 7C2>
MIC_AMP_PB 6A4<
MIC_AMP_OUTPUT 6A4<
MIC_BIAS 6A5<
MIC_BIAS_REF 6B5<
MIC_FILTER1 6A5<
MIC_FILTER2 6A4<
MIC_HIGH 4C2< 6A6<
MIC_LOW 4C2< 6A6<
OPA_POS 6C2>
OPA_STAP_GND 3C6< 6A4< 6A5< 6A7< 6C1< 6C3<
7C2>
OPA_VREF 6A4< 6C2< 6C3>
PMP_STAP_GND 7C2>
REF_STAP_GND 3A3< 3C6< 7D2>
R_AMP_IN_N 4C6<
R_AMP_IN_P 4C7<
R_SPER_BSD 4C3< 4C5< 7C2>
R_SPER_POS 4C3< 4C5< 7C2>
SENSE_GND 5C4< 6D8< 7C2>
SLEEP_LED 3A6< 3A8< 7C2>
SPEAKER_MUTE 3A7< 4C7< 4C7>
SPEAKER_STAP_GND 3A8< 4B1< 4B6< 4C6< 5C5< 5C6<
7C2>
SUDDO_G 6C2>
SUDDO_STAP_GND 3C6< 6C5< 7C2>
TAB_AINSP 3C4<
TAB_AINSP 3C4<
TAB_CUI_PU 3B4<
TAB_FILTER 3B2<
TAB_IN_L 3C4< 6C2<
TAB_IN_MIC 3C4< 6A3<
TAB_IN_R 3C4< 6C2<
TAB_LPFILT 3C4<
TAB_LINW 3C4<
TAB_OUT_G 3C2>
TAB_OUT_DCM 3B2>
TAB_OUT_L 3C2> 4D7< 5C8<
TAB_OUT_R 3C2> 4C7< 5B8<
TAB_OUT_SPEAKER_L 4D7<
TAB_OUT_SPEAKER_R 4C7<
TAB_PIL 3B4<
TAB_PIL_RC 3B5<
TAB_SFILT 3C4<
TAB_SINDI 3C3<
TAB_STAP_GND 3A3< 3C2< 3C5< 3C6< 5B7< 7D2>
TAB_VREFPH 3B4<
TAB_VREFP 3B4< 6C1<

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

C1 CAP 5
 C4 CAP 4
 C5 CAP 4
 C6 CAP 4
 C10 CAP 3
 C12 CAP 3
 C16 CAP 3
 C17 CAP 3
 C18 CAP_P 3
 C19 CAP 3
 C20 CAP 3
 C21 CAP 3
 C22 CAP 4
 C23 CAP 3
 C24 CAP 5
 C26 CAP_P 3
 C27 CAP 3
 C28 CAP 3
 C29 CAP 3
 C30 CAP_P 3
 C31 CAP 3
 C32 CAP_P 3
 C34 CAP 5
 C36 CAP 6
 C37 CAP 3
 C38 CAP 5
 C39 CAP 5
 C40 CAP_P 5
 C41 CAP 3
 C42 CAP 5
 C43 CAP 5
 C44 CAP 4
 C45 CAP 5
 C46 CAP 4
 C47 CAP 5
 C48 CAP 5
 C49 CAP_P 4
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 C56 CAP 5
 C58 CAP 6
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 C67 CAP 6
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 C70 CAP 6
 C71 CAP 6
 C75 CAP 6
 C76 CAP 6
 C79 CAP 5
 C81 CAP_P 5
 C82 CAP_P 5
 C83 CAP_P 5
 C84 CAP_P 6
 C86 CAP 6
 C89 CAP_P 3
 C90 CAP 4
 C91 CAP 4
 C92 CAP 4
 C93 CAP 4
 C94 CAP 3
 D01 SUPPR_TRANSIENT_4P1 5
 D02 SUPPR_TRANSIENT_4P1 5
 J1 CON_P30ST_ILSM 3
 J4 CON_PARE_S2MT_TH3 6
 J6 CON_M2ST_S2MT_SM 3
 J7 CON_M2RT_M2IB 4
 J8 CON_PARE_S2MT_TH3 5
 L4 IND 5
 L5 IND 5
 L6 IND 5
 L7 IND 3
 L8 IND 5
 L9 IND 5
 L10 IND 5
 L13 IND 6
 L15 IND 6
 L16 IND 6
 L17 IND 6
 L20 IND 5
 Q1 TRA_287002DM 5 6
 Q3 TRA_287002DM 3 6
 Q4 TRA_28AL_M2OT3804 6
 R1 RES 5
 R2 RES 3
 R3 RES 4
 R4 RES 5
 R5 RES 5
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 R67 RES 3
 R68 RES 3
 R70 RES 6
 R71 RES 6
 R72 RES 3
 R77 RES 3
 R78 RES 3
 R81 RES 3
 R82 RES 5
 R83 RES 5
 R84 RES 5
 R85 RES 6
 R88 RES 6
 U2 AUCDIO_I44991LD 4
 U3 MAX4410 5
 U4 AUCDIO_I44991LD 4
 U5 TAS3004 3
 U8 OSAMP_MAX4253 6
 U9 OSAMP_MAX4253 6
 X02 VERIG_LP1985 3
 X01 SHORT 3
 X02 SHORT 3
 X03 SHORT 3
 X06 SHORT 3
 X08 SHORT 3
 X010 SHORT 6
 X11 WDRUBLE 2

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