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		?	?	?	?

SCHEM,SOUND,PB 17"
2/4/03

PAGE CONTENTS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
051-6428	1	SCHEM,SOUND,PB 17 INCH	SCH1	
820-1373	1	PCBF,SOUND,PB 17 INCH	PCB1	

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

METRIC

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

MATERIAL/FINISH NOTED AS APPLICABLE
SIZE D

Apple Computer Inc.

TITLE
SCHEM,TUBA,P84

DRAWING NUMBER 405599
REV. AA
SHT 1 OF 9

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

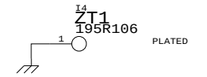
SEE PCB CAD FILES FOR MORE SPECIFIC INFO.

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

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	405599	AA

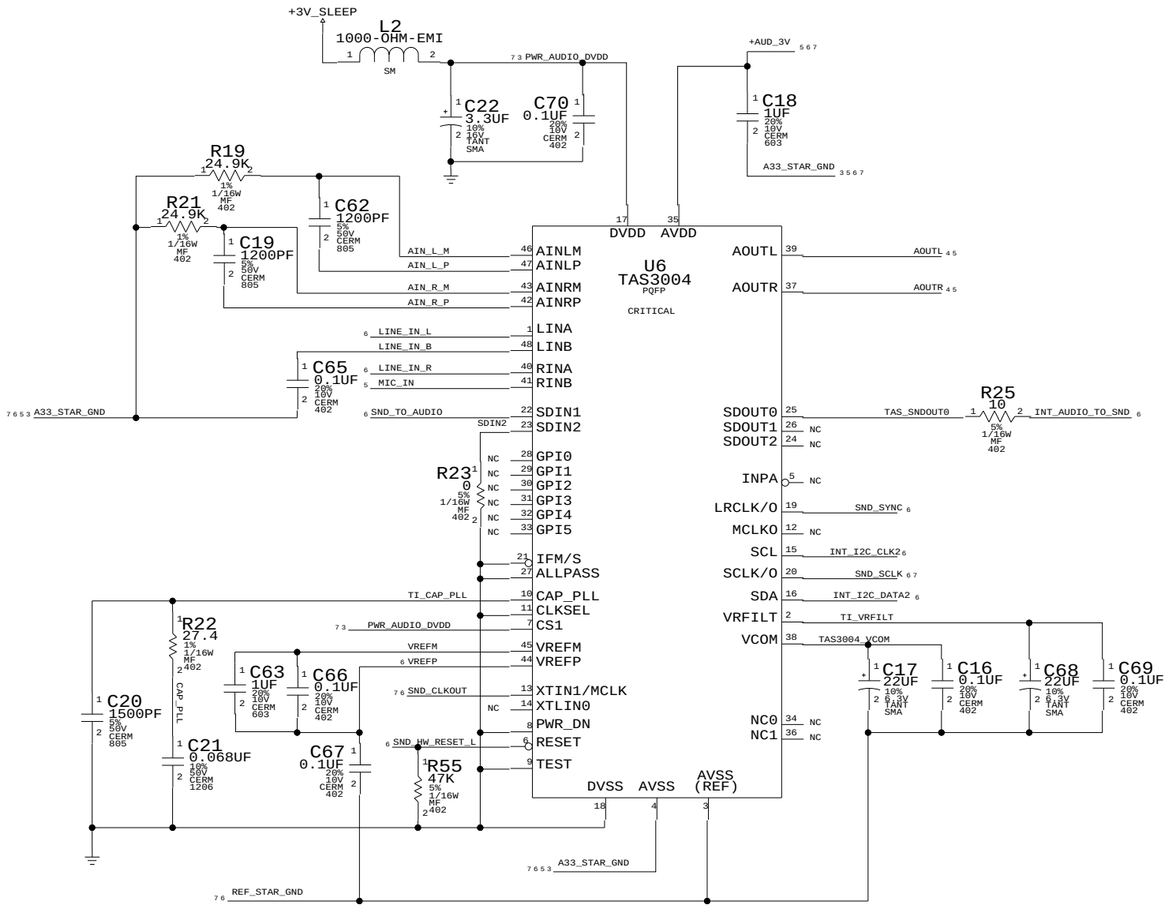
SCALE NONE

SHT 2 OF 9

CR-3

SNAPPER (AUDIO CODEC W/ EQ)

PLACE THESE CAPS NEAR TAS3004



SNAPPER CONTROL

NOTICE OF PROPRIETARY PROPERTY

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I TO MAINTAIN THE DOCUMENT IN CONFIDENCE

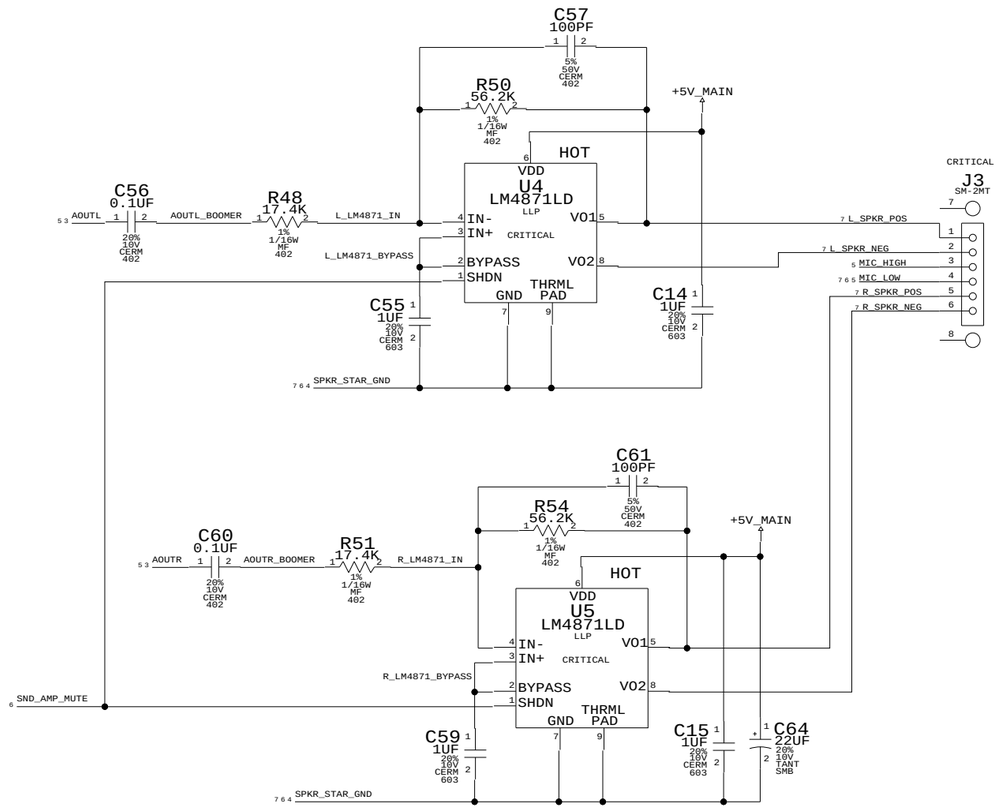
II NOT TO REPRODUCE OR COPY IT

III NOT TO REVEAL OR PUBLISH IN WHOLE OR PART

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	405599	AA
SCALE: NONE	SHT 3 OF 9	

BOOMER SPEAKER AMP



PLACE C64 CLOSE TO PIN 6 AT U4 AND U5

SPEAKERS

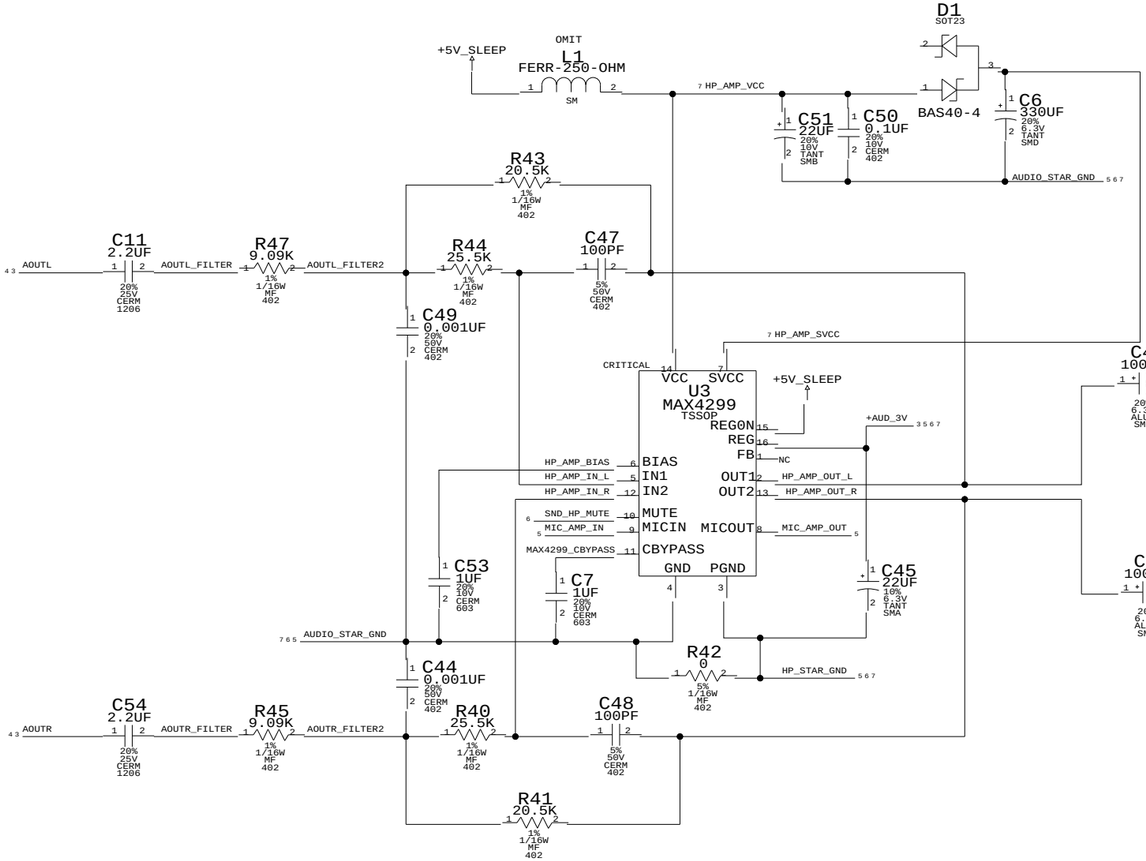
NOTICE OF PROPRIETARY PROPERTY

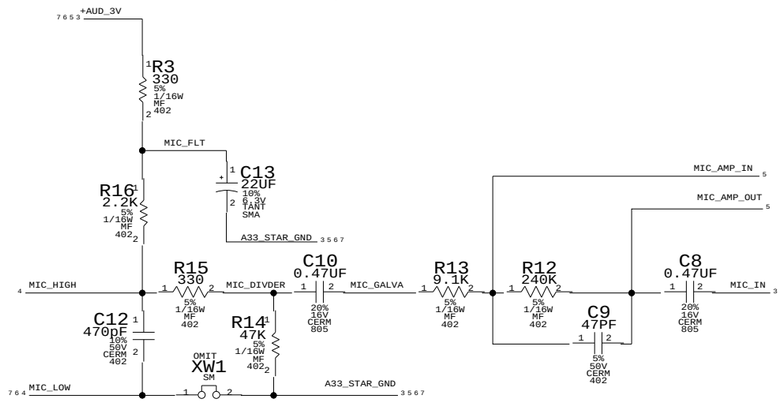
APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	405599	AA

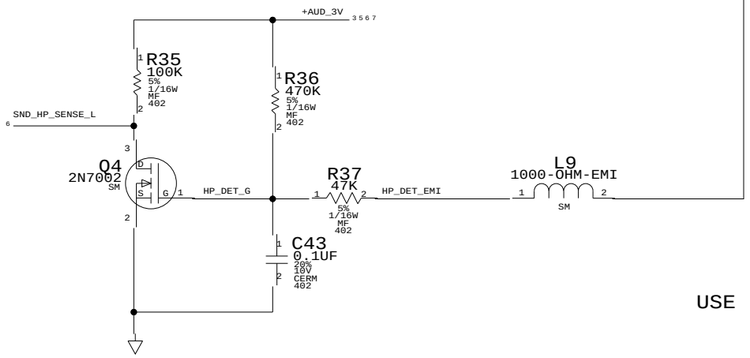
SCALE	SHT	OF
NONE	4	9

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
106S3920	1	RES,FF,3.92 OHM,1%,0.1W,SMD	L1	?





MICROPHONE



HEADPHONE DETECTION

USE 10 MIL TRACES FOR ANALOG SIGNALS.

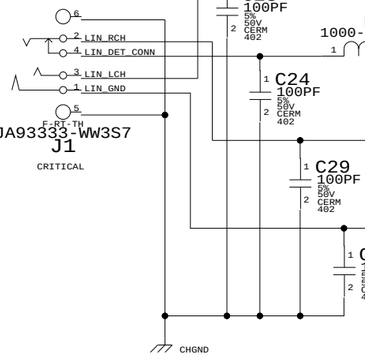
MIC $ HEADPHONE

APPLE COMPUTER INC.

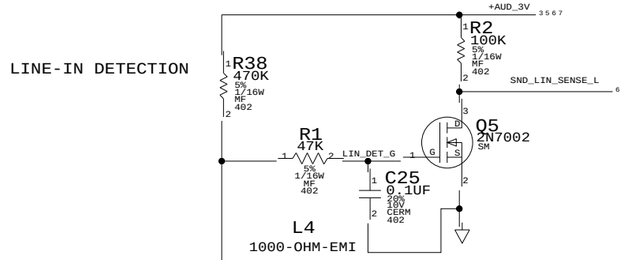
SIZE	DRAWING NUMBER	REV.
D	405599	AA
SCALE: NONE	SHT 5 OF 9	

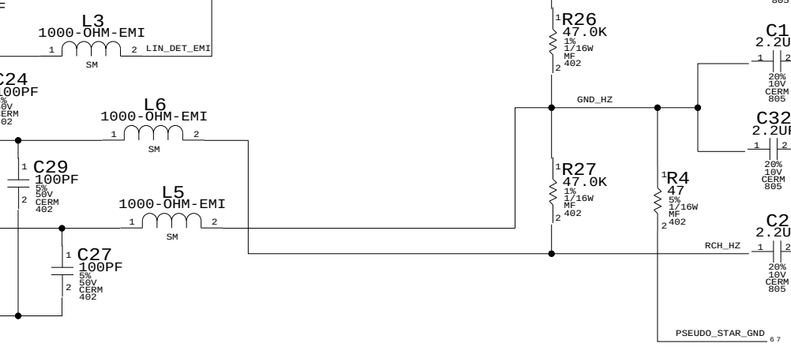
LINE IN AMPLIFIER

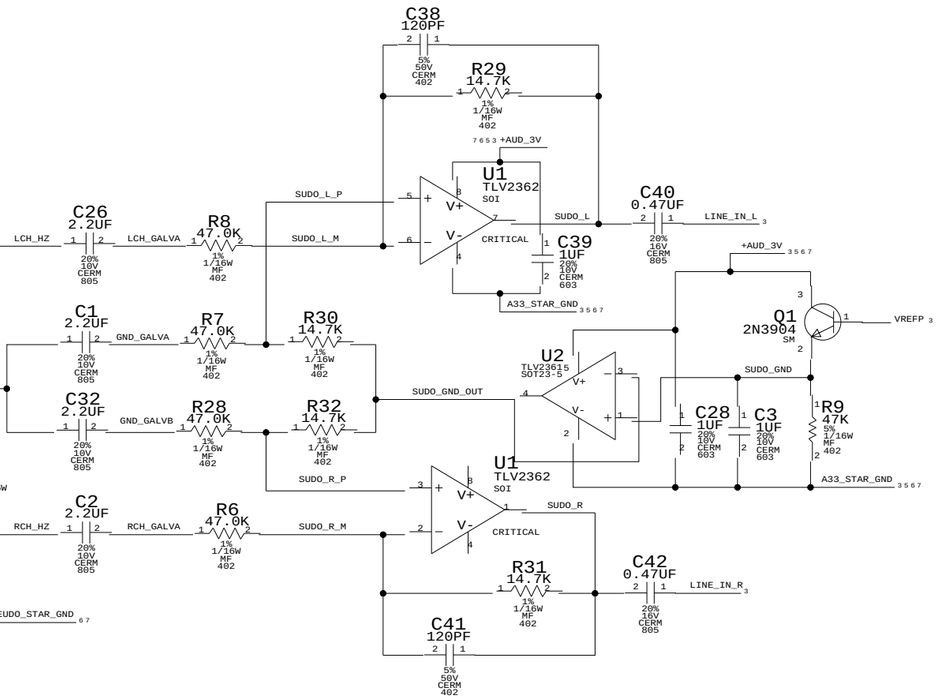
LINE IN CONNECTOR



LINE-IN DETECTION

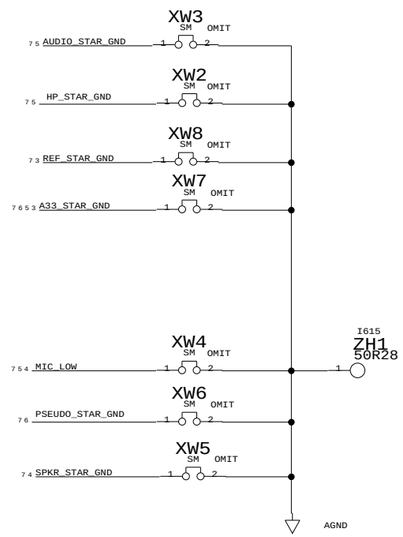




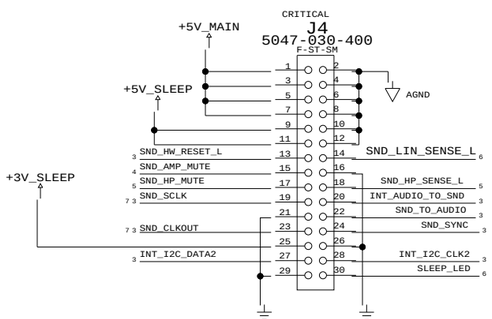


USE 10 MIL TRACES FOR ANALOG SIGNALS.

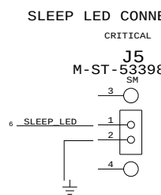
AUDIO STAR GROUND



SOUND BOARD CONNECTOR



SLEEP LED CONNECTOR



APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	405599	AA
SCALE: NONE	SHT 6 OF 9	

CR-7

GROUP	SIG_NAME	VOLTAGE	MIN_LINE_WIDTH	MIN_NECK_WIDTH	
AUDIO	L_SPKR_POS		MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	4
	L_SPKR_NEG		MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	4
	R_SPKR_POS		MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	4
	R_SPKR_NEG		MIN_LINE_WIDTH=10	MIN_NECK_WIDTH=10	4
	HP_COM		MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5
	+3V_SLEEP	VOLTAGE=3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+5V_MAIN	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+5V_SLEEP	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	+AUD_3V	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	3 5 6
	PWR_AUDIO_DVDD	VOLTAGE=3.3V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	3
	HP_AMP_VCC	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5
	HP_AMP_SVCC	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5
	L_LM4871_FILTER	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	R_LM4871_FILTER	VOLTAGE=5V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	
	A33_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	3 5 6
	REF_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	3 6
	MIC_LOW	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	4 5 6
	SPKR_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	4 6
	AUDIO_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5 6
	HP_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	5 6
	PSEUDO_STAR_GND	VOLTAGE=0V	MIN_LINE_WIDTH=25	MIN_NECK_WIDTH=10	6

	SIG_NAME		MIN_LINE_WIDTH	NET_SPACING_TYPE	
	SND_CLKOUT			NET_SPACING_TYPE=10	3 6
	SND_SCLK			NET_SPACING_TYPE=10	3 6

VOLTAGE=0V MIN_LINE_WIDTH=25 MIN_NECK_WIDTH=6 /AGND

VOLTAGE=0V MIN_LINE_WIDTH=25 MIN_NECK_WIDTH=6 /GND

VOLTAGE=0V MIN_LINE_WIDTH=25 MIN_NECK_WIDTH=12 /CHGND

REVISION HISTORY

RELEASED FOR EVT
- REPLACED LINE-OUT CONNECTOR WITH LINE CONNECTOR
- REPINED OUT THE 30-PIN CONNECTOR

RELEASED FOR DVT
- CHANGED LINE-IN AND LINE-OUT SENSE TO ACTIVE LOW
- CORRECTED NET NAME, I.E. +AUD_3V
- ADDED OP-AMP IN LINE-IN CIRCUIT
- SWAPPED RIGHT AND LEFT CHANNEL ON LINE-IN AND LINE-OUT CONNECTOR
- REPINNED OUT 30-PIN CONNECTOR
- FIXED OVER_SENSITIVE TO 60 HZ NOISE FOR LINE-IN CIRCUIT
- CHANGED OP-AMP GAIN FOR SPEAKER

RELEASED FOR PVT
- CORRECTED U2 POWER/GND PINS
- CHANGED MUTE POLARITIES ON SPEAKER AND HEADPHONE AMP
- REDUCED TURN-ON POP (R55/R59)

SIGNAL CONSTRAINTS

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	405599	AA

SCALE	SHT	OF
NONE	7	9

CR-0

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

+3V_SLEEP	7D4
+5V_MAIN	7D4
+5V_SLEEP	7D4
+AUD_3V	3D5 5B4 5B7 5C5 6D2 6D3 6D5 7D4
/AGND	7A4
/CHGND	7A4
/GND	7A4
A33_STAR_GND	3A6 3C5 3C8 5A6 5A7 6B8 6C2 6C3 7C4
AIN_L_M	3C6
AIN_L_P	3C6
AIN_R_M	3C6
AIN_R_P	3C6
AOUTL	3C5 4D6 5C8
AOUTL_BOOMER	4D6
AOUTL_FILTER	5C8
AOUTL_FILTER2	5C7
AOUTR	3C5 4C6 5B8
AOUTR_BOOMER	4C6
AOUTR_FILTER	5B8
AOUTR_FILTER2	5B7
AUDIO_STAR_GND	5B7 5D5 6B8 7C4
CAP_PLL	3B7
FILTER2_OUT_L	5C4
FILTER2_OUT_R	5C4
FILTER3_OUT_L	5C3
FILTER3_OUT_R	5C3
FILTER_OUT_L	5C4
FILTER_OUT_R	5C4
GND_GALVA	6C5
GND_GALVB	6C5
GND_HZ	6C5
HP_AMP_BIAS	5C7
HP_AMP_IN_L	5C7
HP_AMP_IN_R	5C7
HP_AMP_OUT_L	5C6
HP_AMP_OUT_R	5C6
HP_AMP_SVCC	5C6 7C4
HP_AMP_VCC	5D6 7D4
HP_COM	5C2 7D4
HP_DET_CONN	5C2
HP_DET_EMI	5B3
HP_DET_G	5B4
HP_OUT_L	5C2
HP_OUT_R	5C2
HP_STAR_GND	5B6 5C3 5C4 6B8 7C4
INT_AUDIO_TO_SND	3C4 6A4
INT_I2C_CLK2	3B5 6A4
INT_I2C_DATA2	3B5 6A5
LCH_GALVA	6D5
LCH_HZ	6D5
LINE_IN_B	3C7
LINE_IN_L	3C7 6D3
LINE_IN_R	3C7 6C3
LIN_DET_CONN	6C8
LIN_DET_EMI	6C7
LIN_DET_G	6D6
LIN_GND	6C8
LIN_LCH	6C8
LIN_RCH	6C8
L_LM4871_BYPASS	4C5
L_LM4871_FILTER	7C4
L_LM4871_IN	4D5
L_SPKR_NEG	4C4 7D4
L_SPKR_POS	4D4 7D4
MAX4299_CBYPASS	5C7
MIC_AMP_IN	5A5 5C7
MIC_AMP_OUT	5A5 5C6
MIC_DIVDER	5A7
MIC_FLT	5B7
MIC_GALVA	5A7
MIC_HIGH	4C4 5A8
MIC_IN	3C7 5A5
MIC_LOW	4C4 5A8 6A8 7C4
PSEUDO_STAR_GND	6A8 6C5 7C4
PWR_AUDIO_DVDD	3B7 3D6 7D4
RCH_GALVA	6C5
RCH_HZ	6C5
REF_STAR_GND	3A7 6B8 7C4
R_LM4871_BYPASS	4B5
R_LM4871_FILTER	7C4
R_LM4871_IN	4C5
R_SPKR_NEG	4C4 7D4
R_SPKR_POS	4C4 7D4
SDIN2	3C6
SLEEP_LED	6A3 6A4
SND_AMP_MUTE	4B6 6A5
SND_CLKOUT	3B6 6A5 7B4
SND_HP_MUTE	5C7 6A5
SND_HP_SENSE_L	5B5 6A4
SND_HW_RESET_L	3B6 6A5
SND_LIN_SENSE_L	6A4 6D5
SND_SCLK	3B5 6A5 7B4
SND_SYNC	3B5 6A4
SND_TO_AUDIO	3C7 6A4
SPKR_STAR_GND	4B6 4C6 6A8 7C4
SUDO_GND	6C3
SUDO_GND_OUT	6C4
SUDO_L	6D3
SUDO_L_M	6D4
SUDO_L_P	6D4
SUDO_R	6C3
SUDO_R_M	6C4
SUDO_R_P	6C4
TAS3004_VCOM	3B5
TAS_SNDOUT0	3C5
TI_CAP_PLL	3B6
TI_VRFILT	3B5
VREFM	3B6
VREFP	3B6 6C2

APPLE COMPUTER INC.

SIZE	DRAWING NUMBER	REV.
D	405599	AA

SCALE	SHT	OF
NONE	8	9

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

C1	CAP	6C5
C2	CAP	6C5
C3	CAP	6C3
C4	CAP_P	5C5
C5	CAP_P	5C5
C6	CAP_P	5D5
C7	CAP	5C6
C8	CAP	5A5
C9	CAP	5A6
C10	CAP	5A7
C11	CAP	5D8
C12	CAP	5A7
C13	CAP_P	5A7
C14	CAP	4C4
C15	CAP	4B4
C16	CAP	3B5
C17	CAP_P	3B5
C18	CAP	3C5
C19	CAP	3C7
C20	CAP	3B7
C21	CAP	3B7
C22	CAP_P	3C6
C23	CAP	6D7
C24	CAP	6C7
C25	CAP	6D6
C26	CAP	6D5
C27	CAP	6C7
C28	CAP	6C3
C29	CAP	6C7
C30	CAP	5C3
C32	CAP	6C5
C33	CAP	5D2
C34	CAP	5C2
C35	CAP	5D3
C37	CAP	5C3
C38	CAP	6D4
C39	CAP	6D3
C40	CAP	6D3
C41	CAP	6C4
C42	CAP	6C3
C43	CAP	5A4
C44	CAP	5B7
C45	CAP_P	5C5
C47	CAP	5D6
C48	CAP	5B6
C49	CAP	5C7
C50	CAP	5D6
C51	CAP_P	5D6
C53	CAP	5C7
C54	CAP	5B8
C55	CAP	4C5
C56	CAP	4D6
C57	CAP	4D5
C59	CAP	4B5
C60	CAP	4C6
C61	CAP	4C4
C62	CAP	3C7
C63	CAP	3B7
C64	CAP_P	4B4
C65	CAP	3C7
C66	CAP	3B7
C67	CAP	3B7
C68	CAP_P	3B4
C69	CAP	3B4
C70	CAP	3C6
D1	DIODE_SCHOT_3P	5D5
DZ1	SUPPR_TRANSIENT_4P1	5D2
DZ2	SUPPR_TRANSIENT_4P1	5C3
J1	CON_F4RT_S2MT_TH3	6C8
J2	CON_F4RT_S2MT_TH3	5C1
J3	CON_M6RT_WR1B	4D3
J4	CON_F30ST_D_SM	6B4
J5	CON_M2ST_S2MT_SM	6A3
L1	IND	5D6
L2	IND	3D6
L3	IND	6C7
L4	IND	6D6
L5	IND	6C7
L6	IND	6C7
L7	IND	5C3
L8	IND	5C3
L9	IND	5B3
L10	IND	5C3
L11	IND	5C3
L12	IND	5D3
Q1	TRA_2N3904	6C2
Q4	TRA_2N7002	5B4
Q5	TRA_2N7002	6D6
R1	RES	6D6
R2	RES	6D6
R3	RES	5B7
R4	RES	6C5
R6	RES	6C4
R7	RES	6C4
R8	RES	6D4
R9	RES	6C2
R10	RES	5C4
R11	RES	5C4
R12	RES	5A6
R13	RES	5A6
R14	RES	5A7
R15	RES	5A7
R16	RES	5A7
R19	RES	3C7
R21	RES	3C7
R22	RES	3B7
R23	RES	3B6
R25	RES	3C5
R26	RES	6C5
R27	RES	6C5
R28	RES	6C4
R29	RES	6D3
R30	RES	6C4
R31	RES	6C3
R32	RES	6C4
R33	RES	5C4
R34	RES	5C4
R35	RES	5B4
R36	RES	5B4
R37	RES	5B4
R38	RES	6D6
R40	RES	5B7
R41	RES	5B7
R42	RES	5B6
R43	RES	5D7
R44	RES	5D7
R45	RES	5B7
R47	RES	5D7
R48	RES	4D6
R50	RES	4D5
R51	RES	4C5
R54	RES	4C5
R55	RES	3B6
U1	OPAMP_TLV2362	6C3 6D3
U2	OPAMP_TLV2361	6C3
U3	MAX4299	5C6
U4	AUDIO_LM4871LD	4D5
U5	AUDIO_LM4871LD	4C5
U6	TAS3004	3C6
XW1	SHORT	5A7
XW2	SHORT	6B8
XW3	SHORT	6B8
XW4	SHORT	6A8
XW5	SHORT	6A8
XW6	SHORT	6A8
XW7	SHORT	6B8
XW8	SHORT	6B8
ZH1	MTGHOLE	6A7
ZT1	MTGHOLE	2D2

APPLE COMPUTER INC.

SIZE D | DRAWING NUMBER 405599 | REV. AA

SCALE NONE | SHT 9 OF 9