

- 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	ECN	DESCRIPTION OF REVISION	CK APPD	DATE
				2011-04-18

SCHEM, PCB, LIO, K21

EVT, 2011-4-14

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ALTERNATIVE PARTS

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
155S0660	155S0513		ALL	TDK ALT TO MURATA
155S0661	155S0511		ALL	TDK ALT TO MURATA
155S0694	155S0387		ALL	TDK ALT TO MURATA

Schematic / PCB #'s

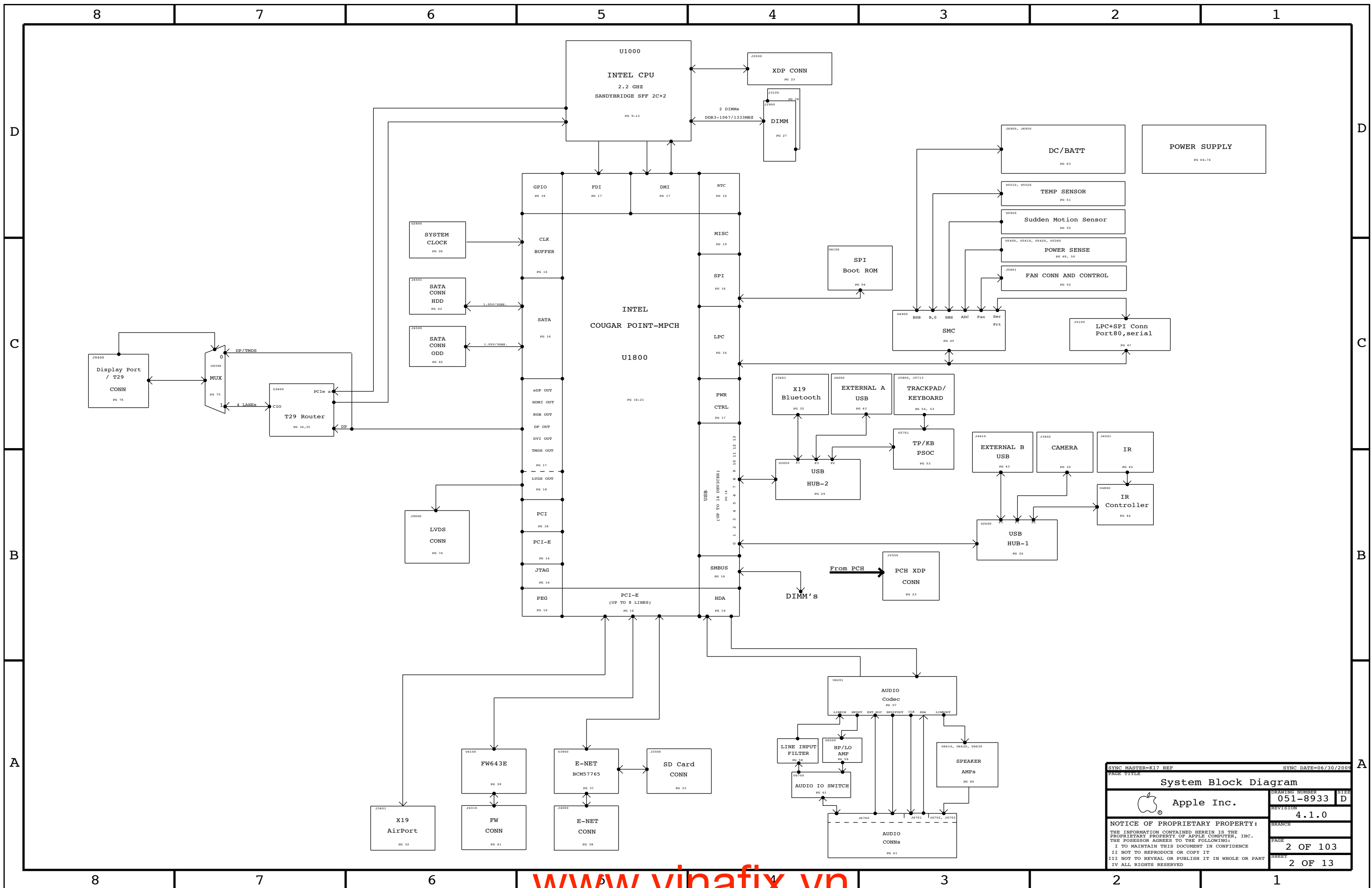
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
051-8933	1	SCHEM, PCB, LIO, K21	SCH	CRITICAL	
820-3057	1	PCBF, LIO, K21	PCB	CRITICAL	
825-7563	1	LABEL, LIO, K21/K78	[EEEE_DK6V]	CRITICAL	
946-3092	1	LIO LOCTITE UV EB 0.07, K21	UV_GLUE	CRITICAL	

BOM: 639-1796 PCBA, LIO, K21
 MCO: 056-4170 MCO, LIO, K21

PRODUCT SAFETY REQUIREMENTS:

PCB, UL RECOGNIZED, MIN. 130-C TEMP. RATING AND V-0 FLAME RATING PER UL 796 & UL 94.
 PCB TO BE SILK-SCREENED WITH UL/CUL RECOGNITION MARK, MANUFACTURER'S UL FILE NUMBER, UL PCB MATERIAL DESIGNATION, 130-C TEMP. RATING AND V-0 FLAME RATING.





DRAWING TITLE		SCHEM, PCB, LIO, K21	
DRAWING NUMBER		051-8933	SIZE D
REVISION		4.1.0	
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
SYNC MASTER=K17 REF		SYNC DATE=04/30/2009	
System Block Diagram			
Apple Inc.		DRAWING NUMBER	SIZE
		051-8933	D
		REVISION	
		4.1.0	
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Functional Test Points


AUDIO

	TRUE	BI_MIC_HI	10	(PLACE BOTH NEAR J4701)
	TRUE	BI_MIC_LO	10	(UNFILTERED SIDE IS OK)
	TRUE	SPKRAMP_L_P_OUT	9 10	(PLACE BOTH NEAR J4702)
	TRUE	SPKRAMP_L_N_OUT	9 10	



I2C

	TRUE	I2C_LIO_SCL	4 13
	TRUE	I2C_LIO_SDA	4 13


POWER


	TRUE	PP5V_S3	4	(NEED 1 TP NEAR J4720 (PP5V_S3_CAMERA_F))
				(UNFILTERED SIDE IS OK)

USB

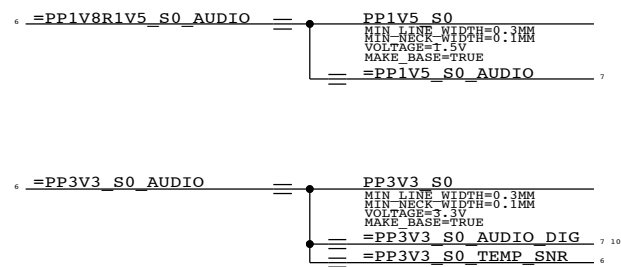
	TRUE	USB_CAMERA_N	4 13	(PLACE BOTH NEAR J4720)
	TRUE	USB_CAMERA_P	4 13	

GROUND

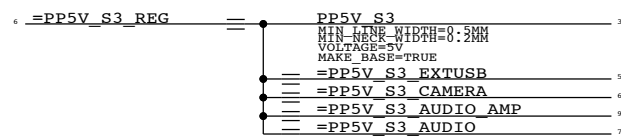
	TRUE	GND		(NEED 2 TP NEAR J4720)
				(NEED 2 TP NEAR J6701)
				(NEED 2 TP NEAR J6702)

SYNC MASTER=(K6 MLB)		SYNC DATE=(12/11/2009)	
FUNC TEST			
 Apple Inc.		DRAWING NUMBER	051-8933
		REVISION	4.1.0
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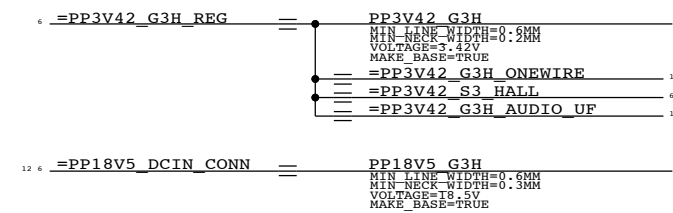
"S0,S0M" RAILS



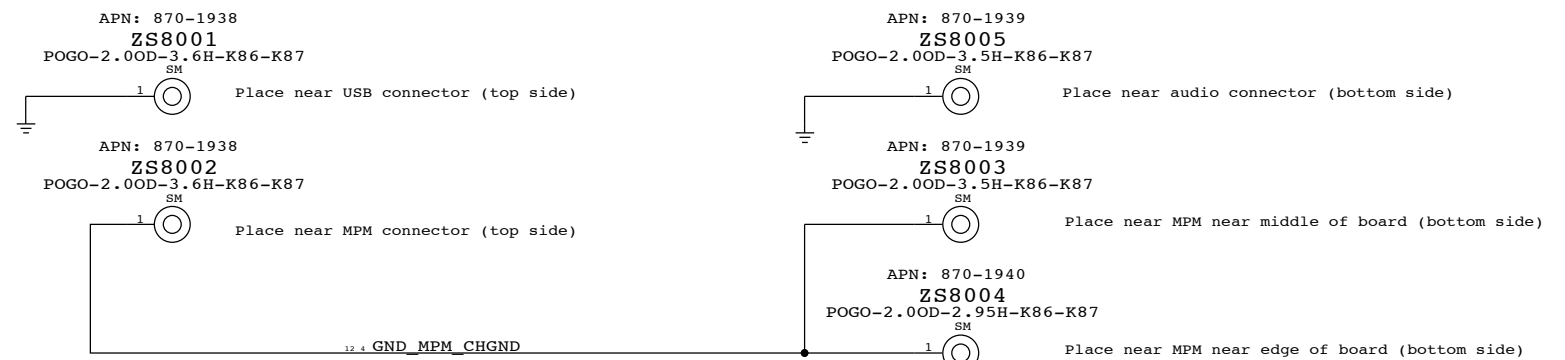
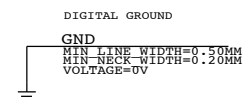
"S3" RAILS



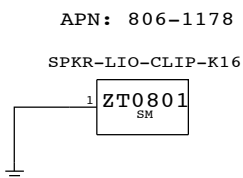
"G3H" RAILS



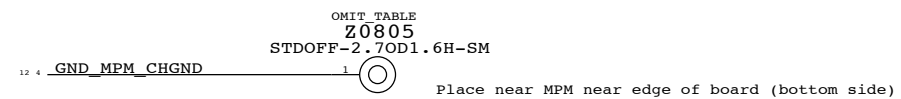
Pogo pins



Speaker clip



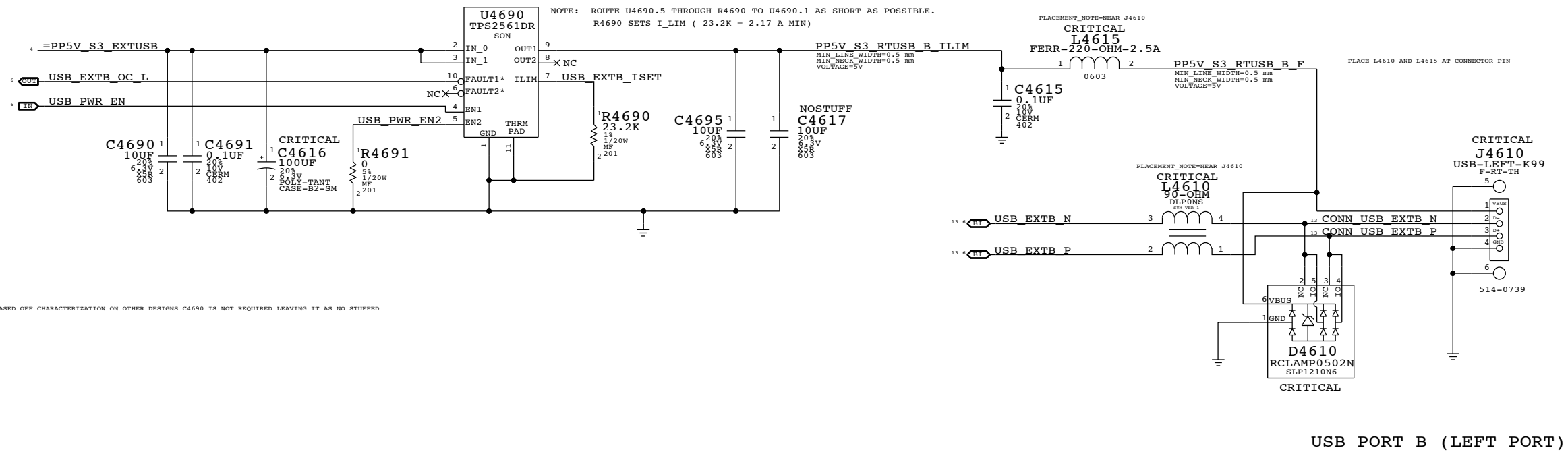
ESD BOSS



PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
860-1427	1	ESD STANDOFF, K21/78	Z0805		

SYNC MASTER=(K24 MLB)		SYNC DATE=(02/04/2009)	
Power Aliases			
Apple Inc.		DRAWING NUMBER 051-8933	SIZE D
		REVISION 4.1.0	BRANCH
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		PAGE 8 OF 103	SHEET 4 OF 13

Port Power Switch

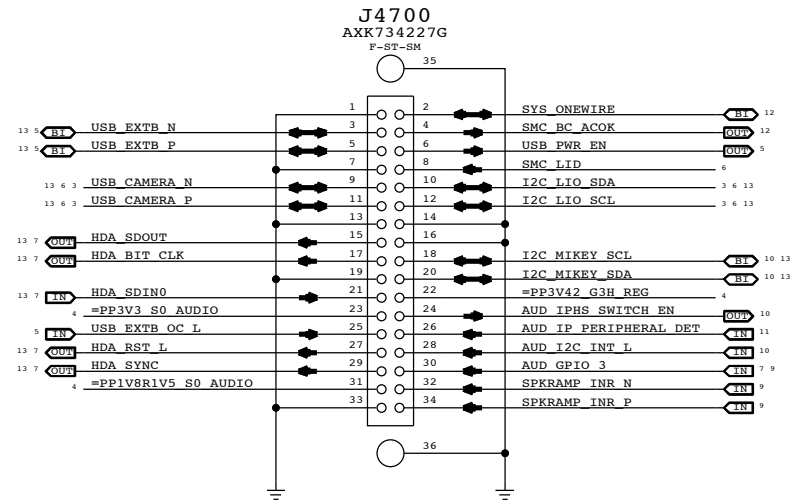


BASED OFF CHARACTERIZATION ON OTHER DESIGNS C4690 IS NOT REQUIRED LEAVING IT AS NO STUFFED

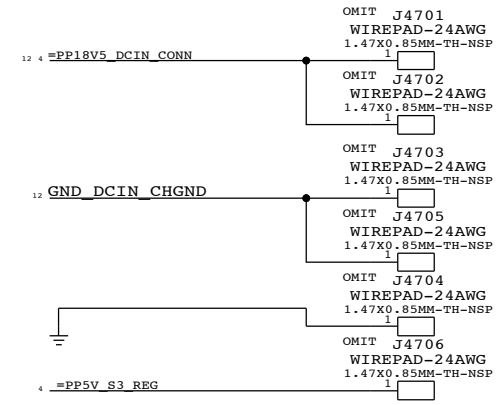
USB PORT B (LEFT PORT)

SYNC MASTER=(K84 MLB)		SYNC DATE=(11/09/2009)	
External USB Connectors			
Apple Inc.		DRAWING NUMBER	051-8933
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34 PIN LIO FLEX CONNECTOR
APN: 516S0870 3.0 MM RECEPTACLE

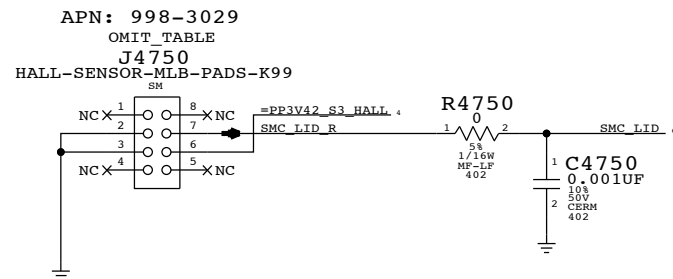


LIO POWER



SPACE THE HOLES 2MM APART CENTER TO CENTER

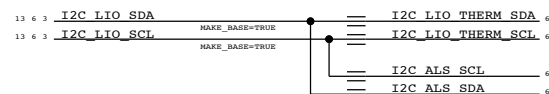
Hall Effect pads



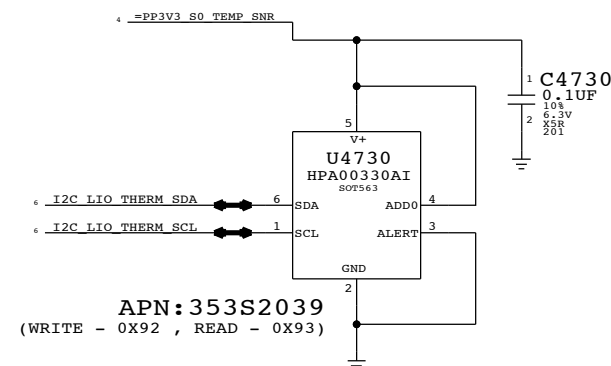
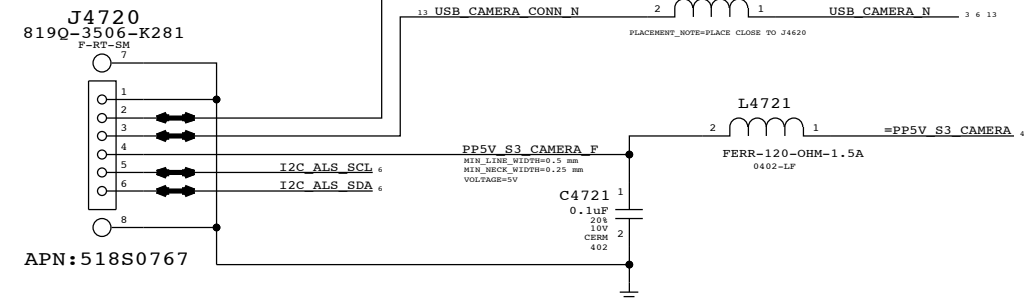
PART NUMBER	QTY	DESCRIPTION	REFERENCE DES	CRITICAL	BOM OPTION
607-6812	1	SUBASSY,PCBA HALL EFFECT,K16	J4750	CRITICAL	

639-1017 (K16 Hall effect board) reports to 607-6812

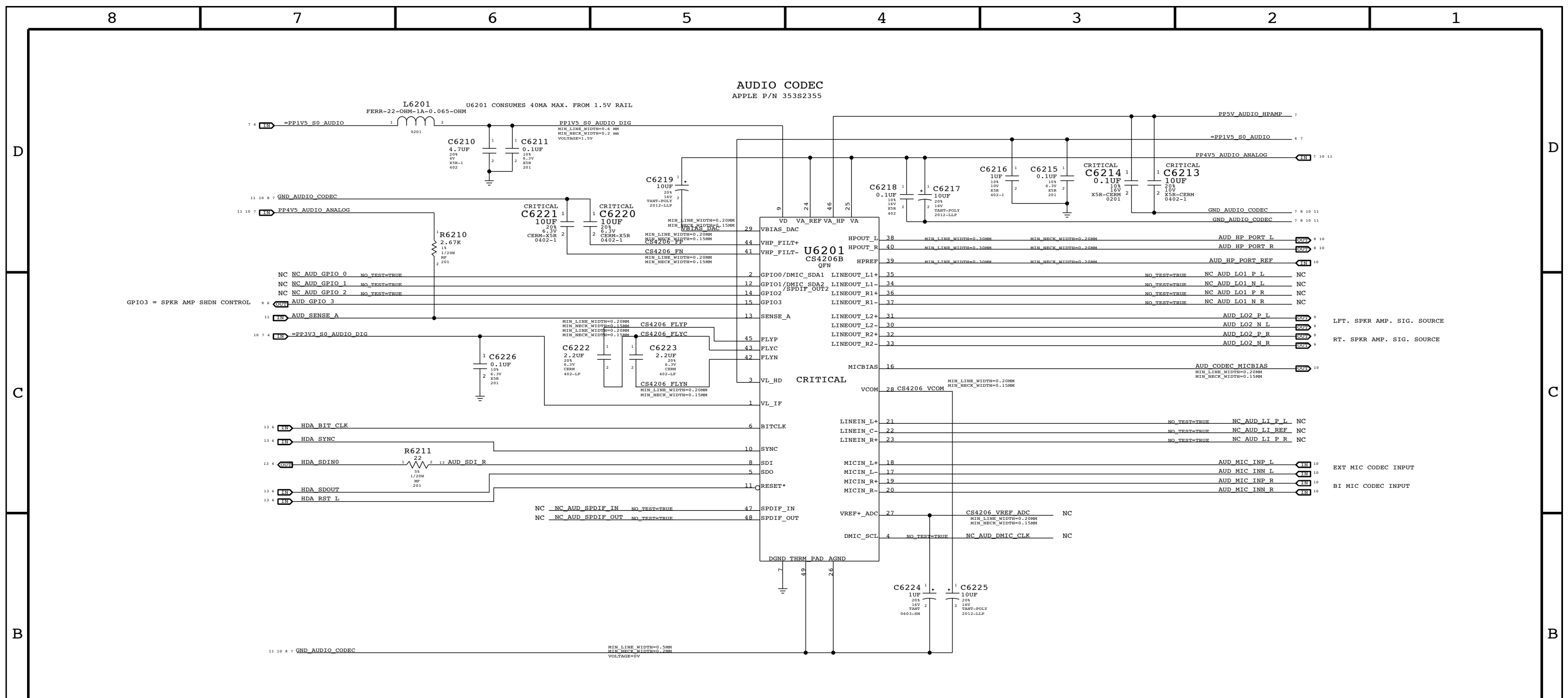
I2C aliases



CAMERA/ALS

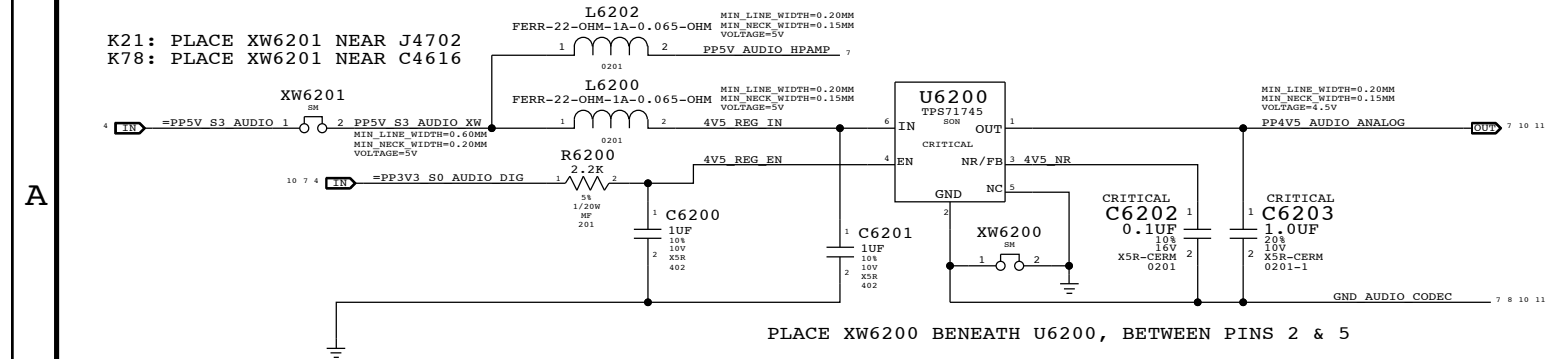


SYNC MASTER=MASTER		SYNC DATE=MASTER	
PAGE TITLE			
LIO CONNECTORS			
Apple Inc.		DRAWING NUMBER	051-8933
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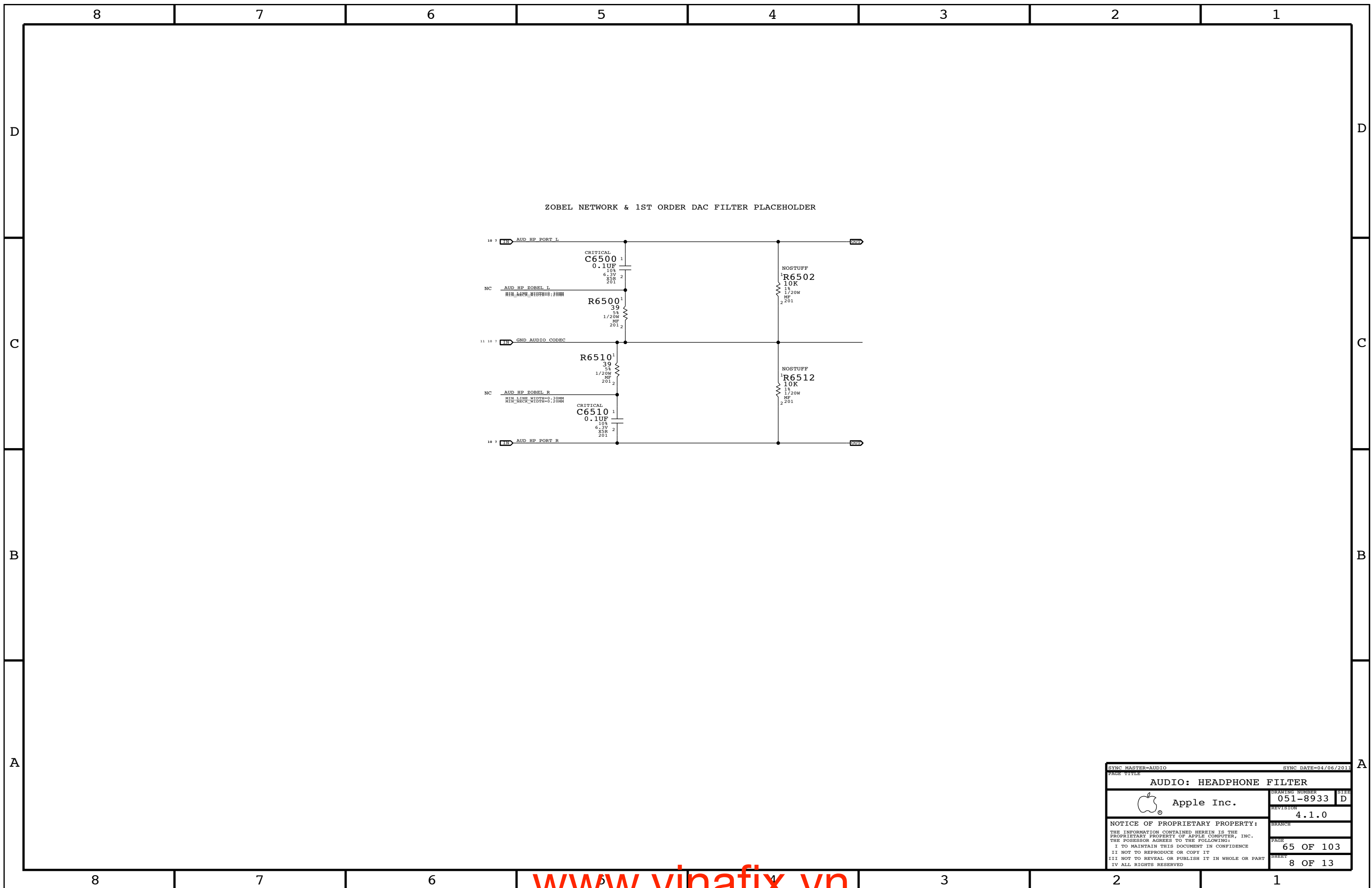
4.5V POWER SUPPLY FOR CODEC
APPLE P/N 353S2456

NOTES ON CODEC I/O
DIFF FSINPUT= 2.45VRMS
SE FSINPUT= 1.22VRMS
DAC1 FSOUTPUT= 1.34VRMS
DAC2/3 FSOUTPUTDIFF= 2.67VRMS
DAC2/3 FSOUTPUTSE= 1.34VRMS



PLACE XW6200 BENEATH U6200, BETWEEN PINS 2 & 5

PAGE TITLE		SYNC DATE=04/06/2011	
AUDIO: CODEC/REGULATOR			
Apple Inc.		DRAWING NUMBER	051-8933
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SYNC MASTER=AUDIO		SYNC DATE=04/06/2011	
PAGE TITLE AUDIO: HEADPHONE FILTER			
	DRAWING NUMBER 051-8933		SIZE D
	REVISION 4.1.0		
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		PAGE	65 OF 103
		SHEET	8 OF 13

8

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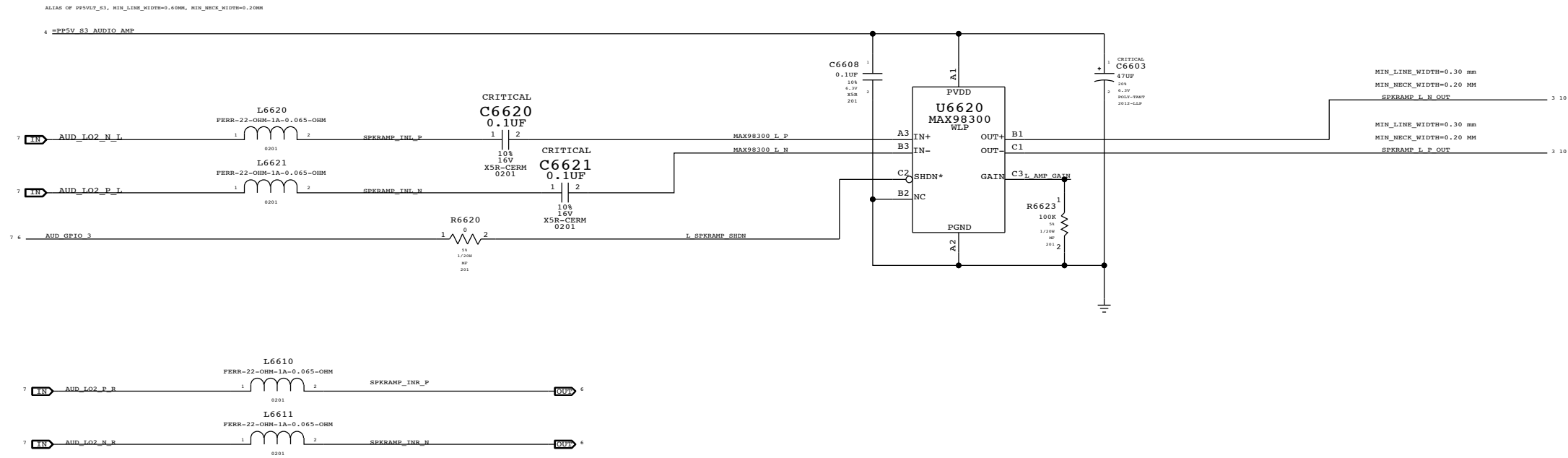
1

SPEAKER AMPLIFIERS

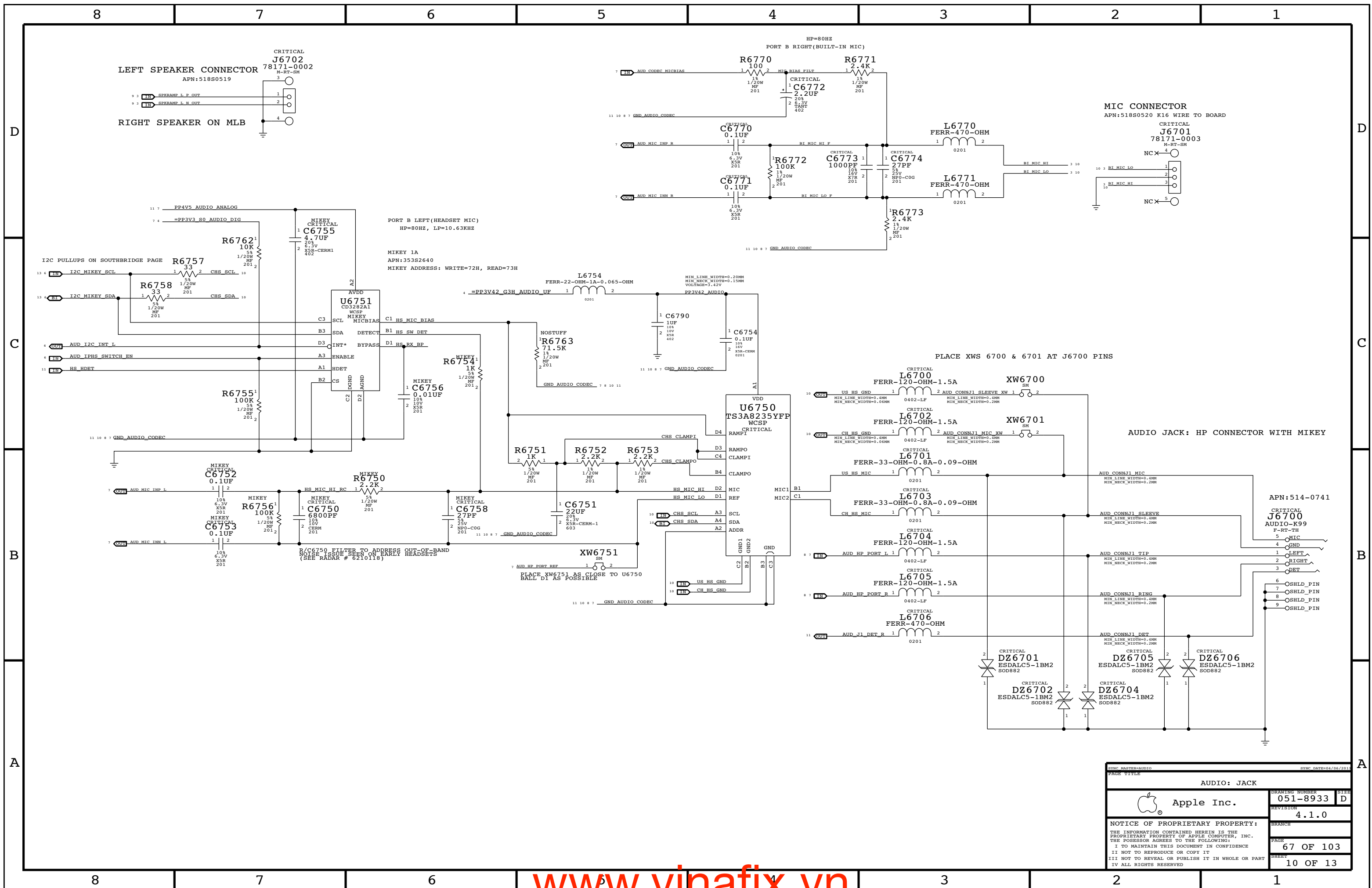
APN:353S2888

SPEAKER LOWPASS 80 HZ < FC < 132 HZ

GAIN 6DB



SYMC MASTER:AUDIO		SYMC DATE:04/06/2011	
PAGE TITLE			
AUDIO: SPEAKER AMP			
 Apple Inc.	DRAWING NUMBER	051-8933	SIZE
	REVISION	4.1.0	D
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AUDIO: JACK	
Apple Inc.	DRAWING NUMBER: 051-8933
REVISION: 4.1.0	SIZE: D
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CODEC OUTPUT SIGNAL PATHS

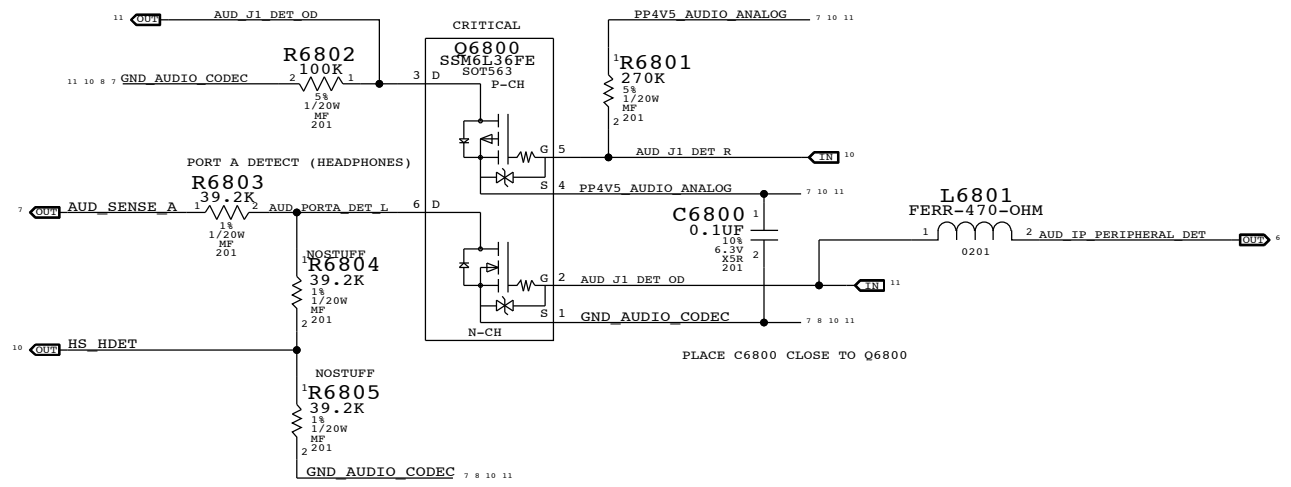
FUNCTION	VOLUME	CONVERTER	PIN COMPLEX	MUTE CONTROL	DET ASSIGNMENT
HP/LINE OUT	0X02 (2)	0X02 (2)	0X09 (9,A)	GPIO_0 AND GPIO_1	0X09 (A)
SPEAKERS	0X04 (4)	0X04 (4)	0X0B (11)	GPIO_3	N/A

CODEC INPUT SIGNAL PATHS

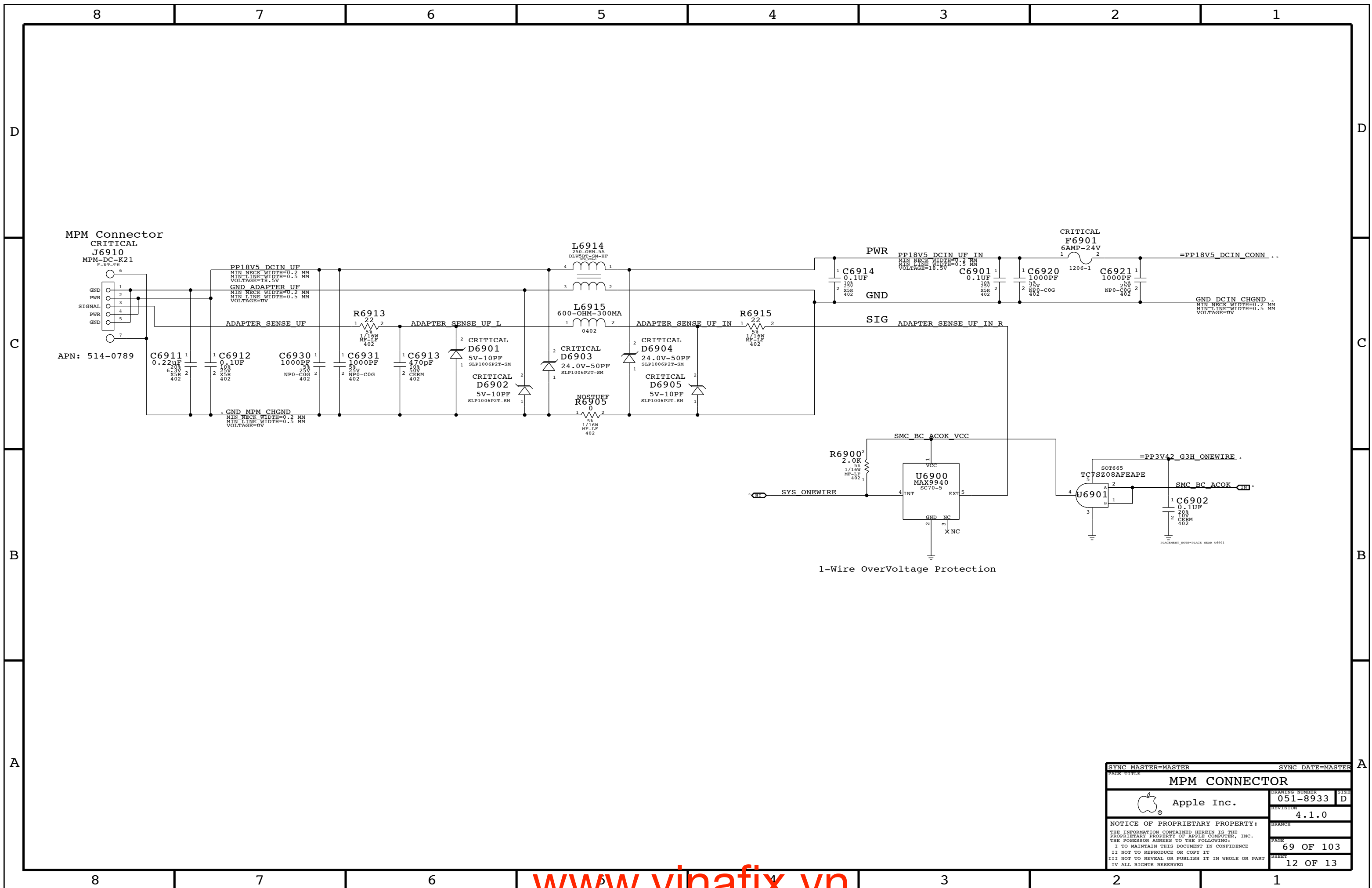
FUNCTION	CONVERTER	PIN COMPLEX	VREF	DET ASSIGNMENT
BUILT-IN MIC	0X06 (6)	0X0D (13,B,RIGHT)	MIC_BIAS (80%)	N/A
HEADSET MIC	0X06 (6)	0X0D (13,V22,B,LEFT)	MIKEY	MIKEY

SOUTHBRIDGE RESOURCE/PIN ALLOCATIONS

FUNCTION	NET NAME	SB GPIO/INT
PERIPHERAL/EXTRACTION DETECT	AUD_IP_PERIPHERAL_DET	GPIO 38
MIKEY INTERRUPT	AUD_I2C_INT_L	GPIO 55
MIKEY ENABLE	AUD_IPHS_SWITCH_EN	GPIO 7
MIKEY I2C BUS	I2C_MIKEY_SDA/SCL	MCP89 SMBUS 0



SYNC MASTER=AUDIO		SYNC DATE=04/06/2011	
AUDIO: JACK TRANSLATORS			
Apple Inc.	DRAWING NUMBER	051-8933	SIZE
	REVISION	4.1.0	D
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SYNC MASTER=MASTER		SYNC DATE=MASTER	
MPM CONNECTOR			
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		REVISION	
		4.1.0	
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K21 LIO BOARD-SPECIFIC SPACING & PHYSICAL CONSTRAINTS

BOARD LAYERS	BOARD AREAS	BOARD UNITS (MIL OR MM)	ALLEGRO VERSION
TOP, ISL2, ISL3, ISL4, ISL5, BOTTOM	NO_TYPE, SGA_P1MM	MM	15.5.1

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
DEFAULT	*	Y	=50_OHM_SE	0.100MM	30 MM	0 MM	0 MM
STANDARD	*	Y	=DEFAULT	=DEFAULT	12.7 MM	=DEFAULT	=DEFAULT

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
55_OHM_SE	TOP, BOTTOM	Y	0.12 MM	0.12 MM			
55_OHM_SE	*	Y	0.110 MM	0.110 MM	=STANDARD	=STANDARD	=STANDARD

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
90_OHM_DIFF	*	N	=STANDARD	=STANDARD	=STANDARD	=STANDARD	=STANDARD
90_OHM_DIFF	ISL3, ISL4	Y	0.115 MM	0.115 MM		0.130 MM	0.130 MM
90_OHM_DIFF	TOP, BOTTOM	Y	0.125 MM	0.125 MM		0.11 MM	0.11 MM

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
50_OHM_SE	TOP, BOTTOM	Y	0.090 MM	0.090 MM			
50_OHM_SE	*	Y	0.076 MM	0.076 MM	=STANDARD	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
IS_SIGNALTRACE	TOP, BOTTOM	0.150 MM	?
IS_SIGNALTRACE	TOP, BOTTOM	0.150 MM	?
IS_SIGNALTRACE	-	0.254 MM	?
IS_SIGNALTRACE	-	0.305 MM	?

USB 2.0 INTERFACE CONSTRAINTS

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
USB_90D	*	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF	=90_OHM_DIFF

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT	SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
USB	*	=2X_DIELECTRIC	?	USB	TOP, BOTTOM	=4X_DIELECTRIC	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.10.1.

SMBus Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
SMB_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
SMB	*	=2X_DIELECTRIC	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.11.1.

HD Audio Interface Constraints

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
HDA_55S	*	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=55_OHM_SE	=STANDARD	=STANDARD

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
HDA	*	=2X_DIELECTRIC	?

SOURCE: MCP79 Interface DG (DG-03328-001_v0D), Section 2.12.1.

ELECTRICAL_CONSTRAINT_SET	NET_TYPE			
	PHYSICAL	SPACING		
USB_EXTB_N	USB_90D	USB	CONN_USB_EXTB_N	5
USB_EXTB_P	USB_90D	USB	CONN_USB_EXTB_P	5
USB_EXTB_N	USB_90D	USB	USB_EXTB_N	5 6
USB_EXTB_P	USB_90D	USB	USB_EXTB_P	5 6
USB_CAMERA_P	USB_90D	USB	USB_CAMERA_P	3 6
USB_CAMERA_N	USB_90D	USB	USB_CAMERA_N	3 6
USB_CAMERA_CONN_P	USB_90D	USB	USB_CAMERA_CONN_P	6
USB_CAMERA_CONN_N	USB_90D	USB	USB_CAMERA_CONN_N	6
I2C_LIO_SDA	SMB_55S	SMB	I2C_LIO_SDA	3 6
I2C_LIO_SCL	SMB_55S	SMB	I2C_LIO_SCL	3 6
I2C_MIKEY_SCL	SMB_55S	SMB	I2C_MIKEY_SCL	6 10
I2C_MIKEY_SDA	SMB_55S	SMB	I2C_MIKEY_SDA	6 10
HDA_BIT_CLK	HDA_55S	HDA	HDA_BIT_CLK	6 7
HDA_SYNC	HDA_55S	HDA	HDA_SYNC	6 7
HDA_RST_L	HDA_55S	HDA	HDA_RST_L	6 7
HDA_SDIN0	HDA_55S	HDA	HDA_SDIN0	6 7
AUD_SDI_R	HDA_55S	HDA	AUD_SDI_R	7
HDA_SDOUT	HDA_55S	HDA	HDA_SDOUT	6 7

SYNC MASTER=(K24 MLB) SYNC DATE=(04/06/2009)

PAGE TITLE: COUGAR POINT CONSTRAINTS 2

DRAWING NUMBER: 051-8933 SIZE: D

REVISION: 4.1.0

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