

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.

K94 CHOPIN MLB

REV	ECN	DESCRIPTION OF REVISION	CK APPD	DATE
A	0001052699	PRODUCTION RELEASED		2011-01-10

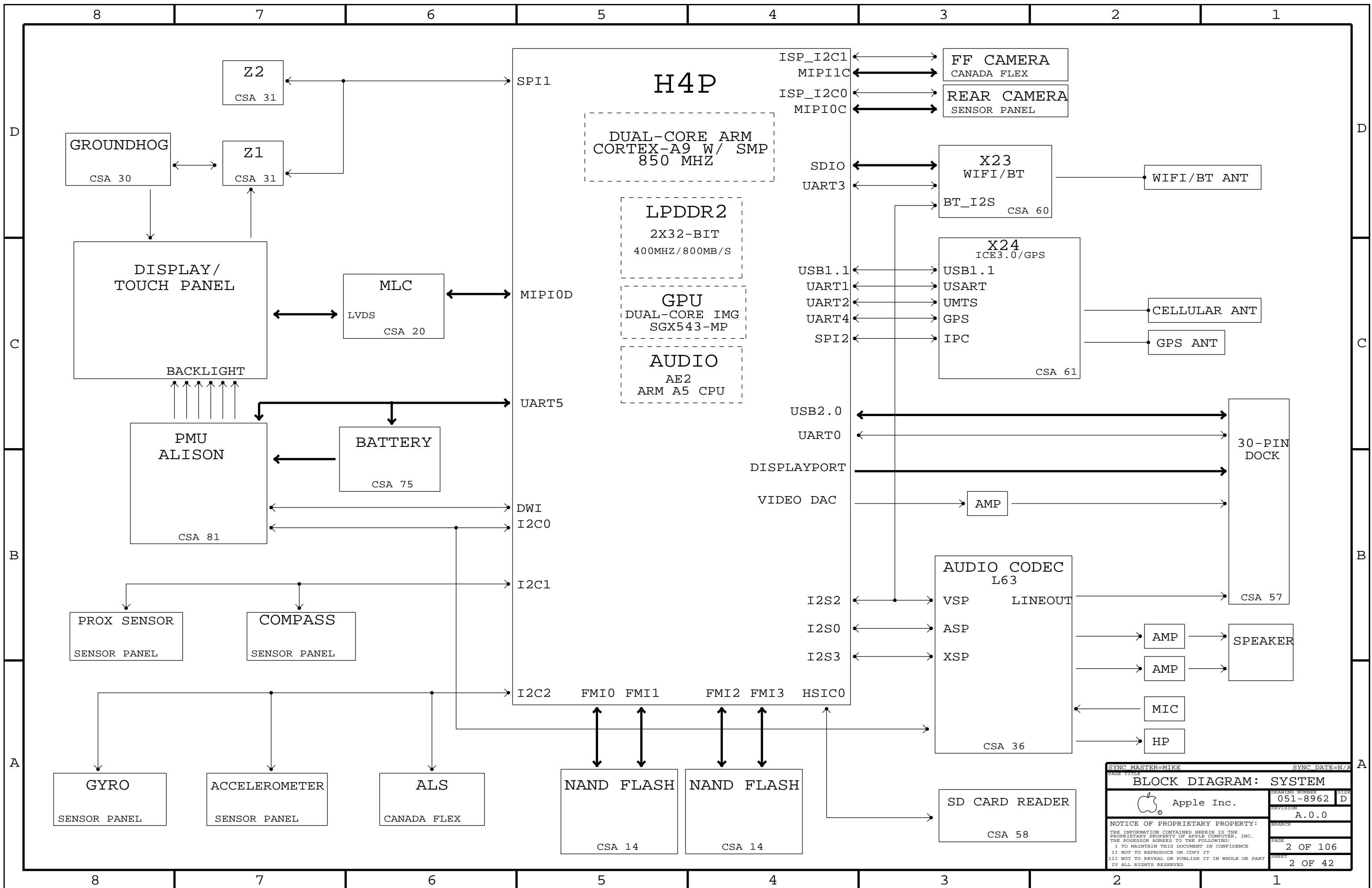
PVT
REV. A

LAST_MODIFIED=Mon Jan 10 13:11:06 2011

PDF	CSA	CONTENTS	SYNC	MASTER	DATE	PDF	CSA	CONTENTS	SYNC	MASTER	DATE
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3	5	BOM TABLE		MIKE	N/A	34	81	POWER: PMU		YOSH	N/A
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5	7	AP: I/Os		JAMES	N/A	36	83	POWER: 3.3V VR		YOSH	N/A
6	8	AP: NAND		JAMES	N/A	37	90	DEBUG AND MISC		MIKE	N/A
7	9	AP: TV,DP,MIPI		JAMES	N/A	38	93	FCT/ICT TEST/BRACKETS		MIKE	N/A
8	10	AP: PWR		JAMES	N/A	39	100	CONSTRAINTS: ASSIGNMENTS		MIKE	N/A
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12	14	NAND		JONATHAN	N/A						
13	17	VIDEO: DISPLAY PORT		JAMES	N/A						
14	20	VIDEO: MLC		MIKE	N/A						
15	21	VIDEO: MLC ALIASES		MIKE	N/A						
16	22	VIDEO: LVDS CONNECTOR		ALEX	N/A						
17	30	GRAPE: GROUNDHOG,CONN,BOOST		RAMSIN	N/A						
18	31	GRAPE: Z1, Z2		RAMSIN	N/A						
19	36	AUDIO: L63 CODEC		LENG	N/A						
20	37	AUDIO: SPEAKER AMP		LENG	N/A						
21	38	AUDIO: HEADPHONE OUT		LENG	N/A						
22	39	AUDIO: BLANK		LENG	N/A						
23	42	AUDIO: DETECT/MIC BIAS		LENG	N/A						
24	43	AUDIO: HP/MIC FILTERS		LENG	N/A						
25	54	CONNECTOR: CANADA FLEX CONN,SENSOR PANEL ALIASES		MARK B.	N/A						
26	55	CONNECTOR: CANADA FLEX FILTERS		MARK B.	N/A						
27	56	CONNECTOR: SENSOR PANEL CONNECTOR		MARK B.	N/A						
28	57	IO FLEX: DOCK COMPONENTS		JAMES	N/A						
29	59	IO FELX: B2B Connector		JAMES	N/A						
30	60	CONNECTOR: X23 WIFI/BT		MIKE	N/A						
31	61	CONNECTOR: X24 CELLULAR/GPS		MIKE	N/A						

DRAWING
TITLE=BACH
ABBREV=DRAWING

DRAWING TITLE		CHOPIN MLB	
DRAWING NUMBER		051-8962	SIZE D
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BLOCK DIAGRAM: SYSTEM			
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Page Notes

Power aliases required by this page:
(NONE)

Signal aliases required by this page:
(NONE)

BOM options provided by this page:

ALL AVAIL BOM OPTIONS

COMMON
ALTERNATE
16GB_PROD
32GB_PROD
64GB_PROD
BKLT_PLL
DEVELOPMENT_JTAG
DEVELOPMENT_JTAG_TAP
JTAG_DAP
JTAG_TAP_NOT
SPEAKER
INTERNAL_MIC
PORTRAIT_DOCK
MLC_DEV
MLC_PROD
K93
K94

BOM GROUP	BOM OPTIONS
BASIC	COMMON, ALTERNATE

ADD DEVELOPMENT AND OTHER BOMS ONCE YOU GET BOM NUMBERS

BOM OPTIONS

PROGRAMMABLE PARTS

SCH AND BOARD P/N

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
051-8962	1	SCH, CHOPIN_AUDIO, MLB, K94	SCH1	
820-3069	1	PCBF, CHOPIN_AUDIO, MLB, K94	PCB1	

PD PARTS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
806-1396	1	FENCE, GRAPE, MLB, K93/K94	FENCE1	
806-1397	1	CAN, GRAPE, MLB, K93/K94	CAN1	NOSTUFF
806-1398	1	FENCE, CPU, MLB, K93/K94	FENCE2	
806-1399	1	CAN, CPU, MLB, K93/K94	CAN2	NOSTUFF
806-1400	1	FENCE, MAND, MLB, K93/K94	FENCE3	
806-1401	1	CAN, MAND, MLB, K93/K94	CAN3	NOSTUFF

TOP BARCODE LABEL/EEE CODES (ONLY ONE IS USED PER BOM)


PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
825-7651	1	EEEE FOR 639-1180 (K93 16G)	DH36	CRITICAL	EEEE_K93_16G
825-7651	1	EEEE FOR 639-1426 (K93 32G)	DH37	CRITICAL	EEEE_K93_32G
825-7651	1	EEEE FOR 639-1428 (K93 64G)	DG99	CRITICAL	EEEE_K93_64G
825-7651	1	EEEE FOR 639-1112 (K94 16G)	DFC4	CRITICAL	EEEE_K94_16G
825-7651	1	EEEE FOR 639-1181 (K94 32G)	DFC5	CRITICAL	EEEE_K94_32G
825-7651	1	EEEE FOR 639-1182 (K94 64G)	DFC6	CRITICAL	EEEE_K94_64G
825-7651	1	EEEE FOR 639-1430 (K95 16G)	DH3C	CRITICAL	EEEE_K95_16G
825-7651	1	EEEE FOR 639-1427 (K95 32G)	DH3D	CRITICAL	EEEE_K95_32G
825-7651	1	EEEE FOR 639-1429 (K95 64G)	DG9C	CRITICAL	EEEE_K95_64G

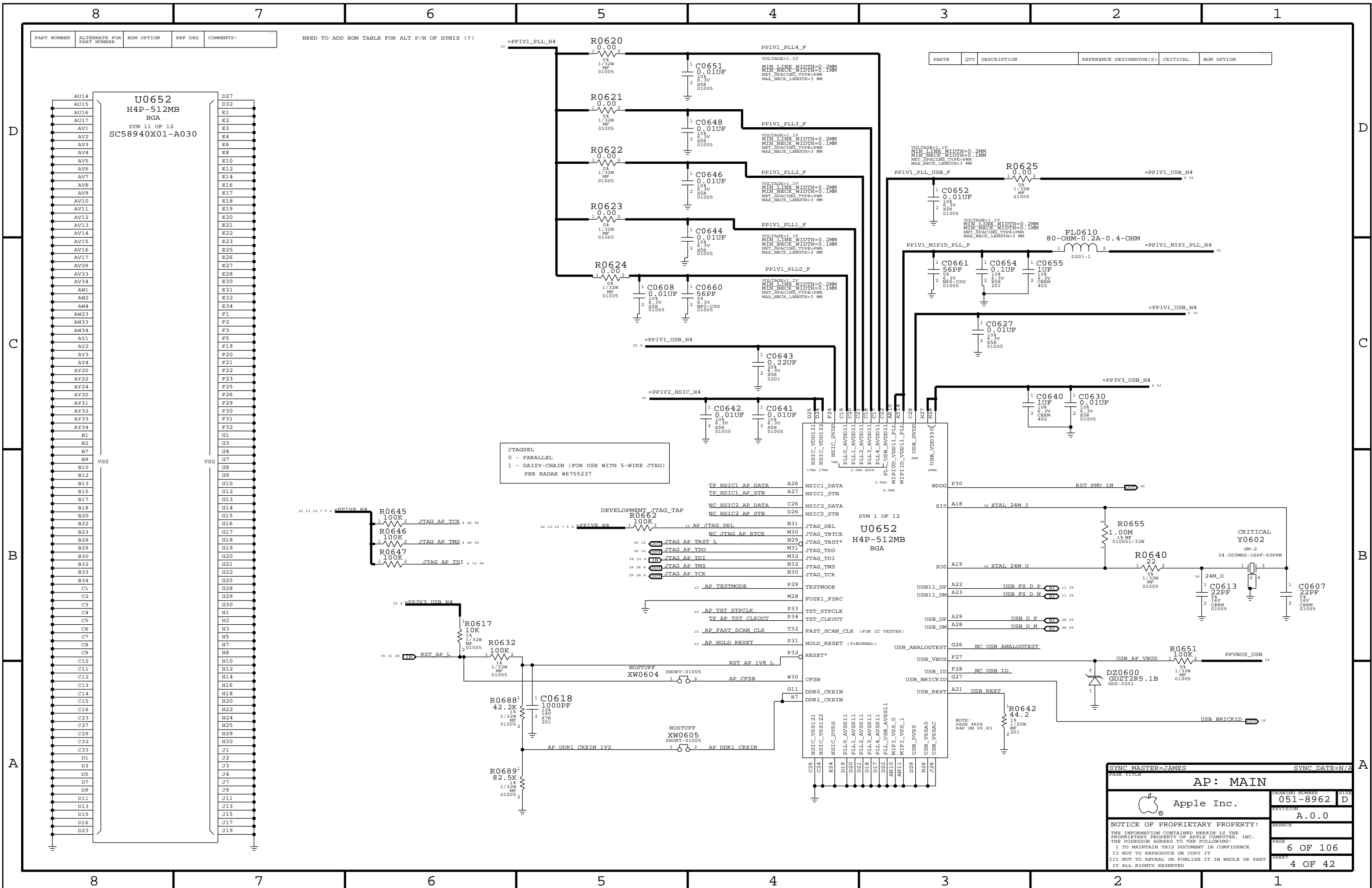
BOTTOM LABEL TYPE 1

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
825-7639	1	631- B/C LABEL	LBL1	CRITICAL	
825-7639	1	639- B/C LABEL	LBL2	CRITICAL	

BOTTOM LABEL TYPE 2

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
825-7640	1	MATRIX LABEL	LBL3	CRITICAL	
825-7640	1	631- MATRIX LABEL	LBL4	CRITICAL	

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PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
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NEED TO ADD BOM TABLE FOR ALT P/N OF HYNIX (?)

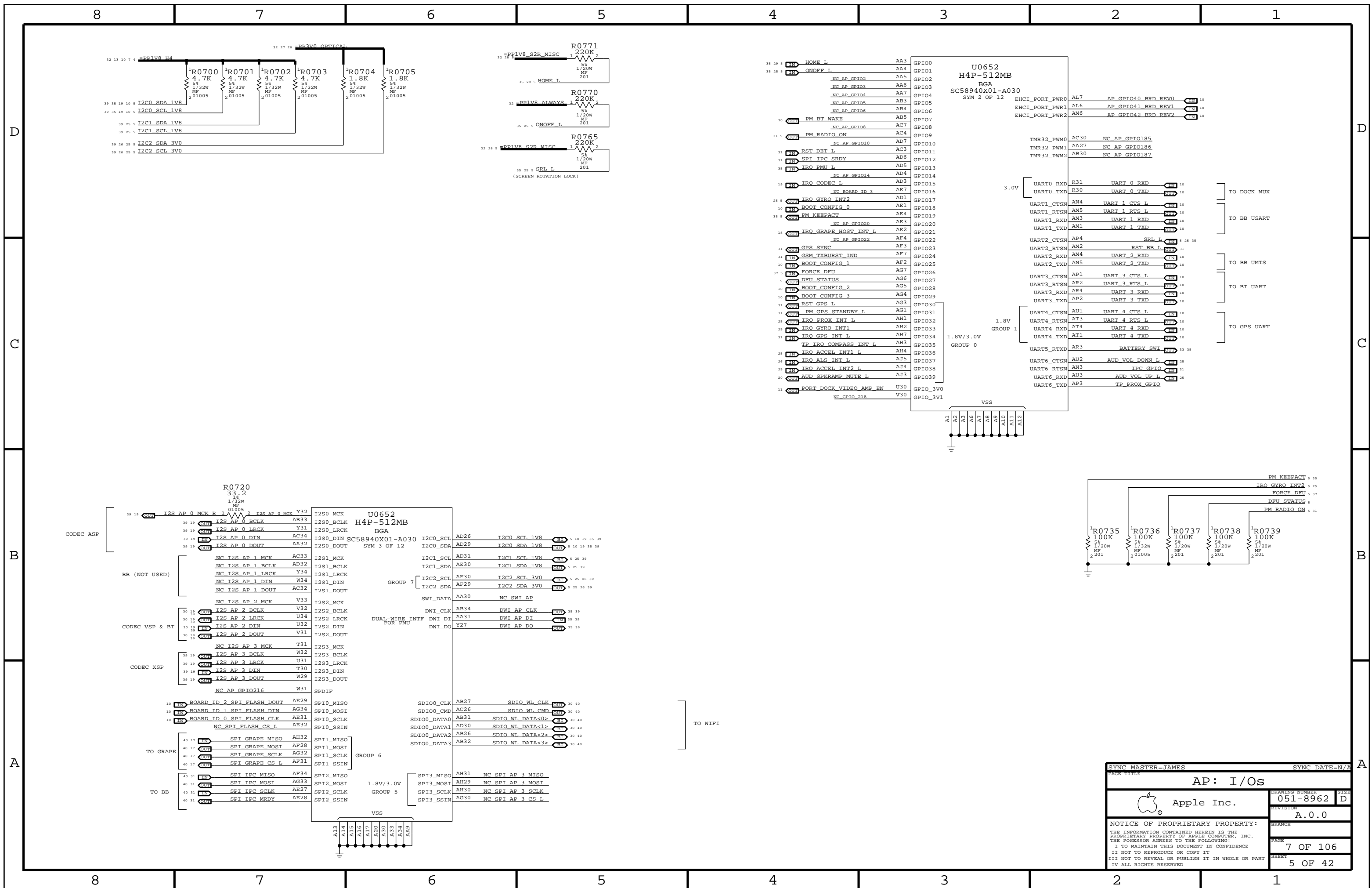
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U0652
H4P-512MB
BGA
SYM 11 OF 12
SC58940X01-A030

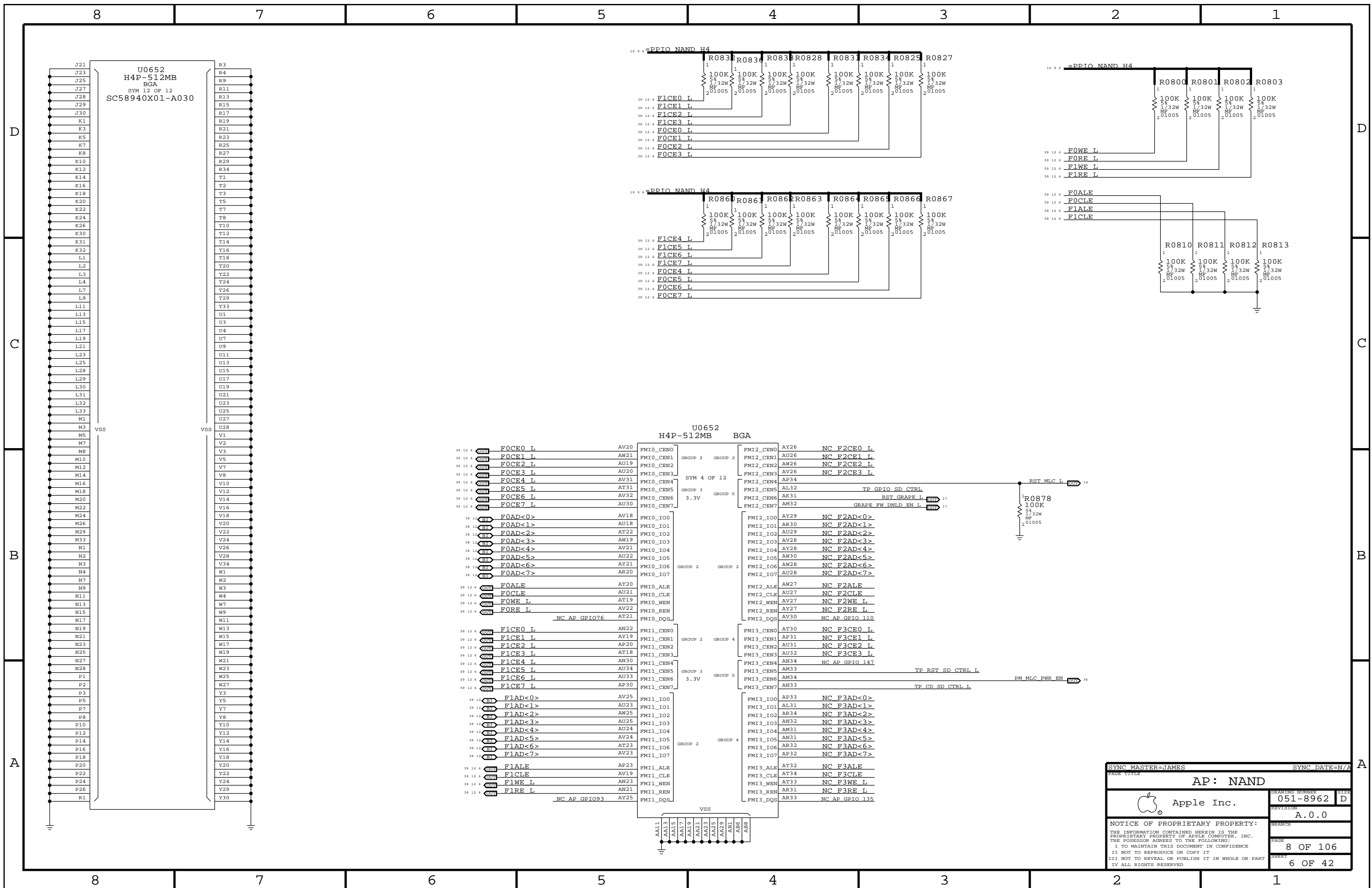
JTAGSEL
0 - PARALLEL
1 - DAISY-CHAIN (FOR USE WITH 5-WIRE JTAG)
PER RADAR #6755237

SYM 11 OF 12
U0652
H4P-512MB
BGA

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AP: I/Os			
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SHEET		5 OF 42	



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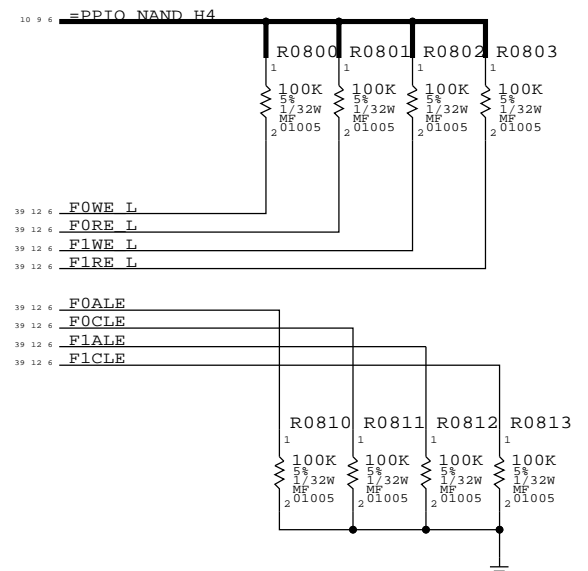
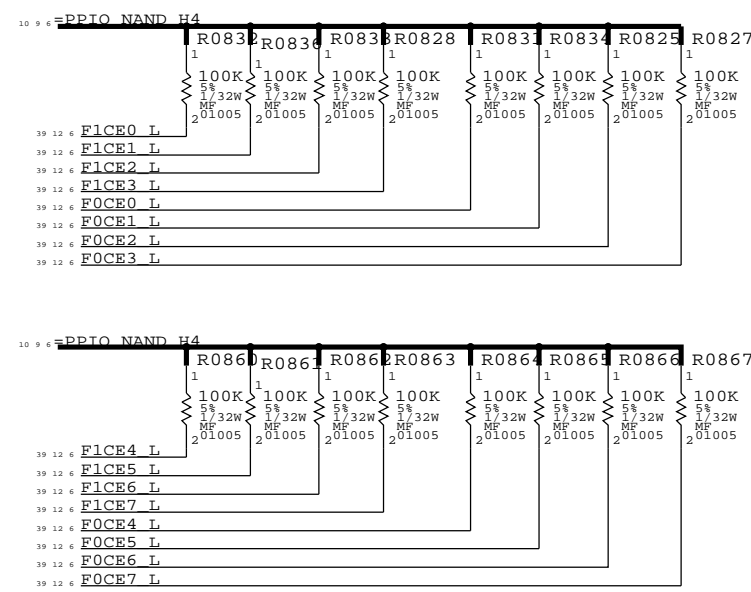
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A

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8 7 6 5 4 3 2 1

U0652
H4P-512MB
BGA
SYM 12 OF 12
SC58940X01-A030



U0652 H4P-512MB BGA

SYM 4 OF 12

39 12 6	F0CE0 L	AV20	FMIO_CEN0	GROUP 2	GROUP 2	FMIO_CEN0	AY26	NC F2CE0 L
39 12 6	F0CE1 L	AU21	FMIO_CEN1	GROUP 2	GROUP 2	FMIO_CEN1	AU26	NC F2CE1 L
39 12 6	F0CE2 L	AU19	FMIO_CEN2	GROUP 2	GROUP 2	FMIO_CEN2	AW26	NC F2CE2 L
39 12 6	F0CE3 L	AU20	FMIO_CEN3	GROUP 2	GROUP 2	FMIO_CEN3	AV26	NC F2CE3 L
39 12 6	F0CE4 L	AV31	FMIO_CEN4	GROUP 2	GROUP 2	FMIO_CEN4	AP34	NC F2CE4 L
39 12 6	F0CE5 L	AT31	FMIO_CEN5	GROUP 3	GROUP 5	FMIO_CEN5	AL32	TP GPIO SD_CTRL
39 12 6	F0CE6 L	AV32	FMIO_CEN6	GROUP 3	GROUP 5	FMIO_CEN6	AK31	RST GRAPE L
39 12 6	F0CE7 L	AU30	FMIO_CEN7	GROUP 3	GROUP 5	FMIO_CEN7	AM32	GRAPE FW DNLD_EN L
39 12 6	F0AD<0>	AV18	FMIO_IO0	GROUP 2	GROUP 2	FMIO_IO0	AY29	NC F2AD<0>
39 12 6	F0AD<1>	AU18	FMIO_IO1	GROUP 2	GROUP 2	FMIO_IO1	AR30	NC F2AD<1>
39 12 6	F0AD<2>	AT22	FMIO_IO2	GROUP 2	GROUP 2	FMIO_IO2	AU29	NC F2AD<2>
39 12 6	F0AD<3>	AW19	FMIO_IO3	GROUP 2	GROUP 2	FMIO_IO3	AV28	NC F2AD<3>
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39 12 6	F0AD<7>	AR20	FMIO_IO7	GROUP 2	GROUP 2	FMIO_IO7	AU28	NC F2AD<7>
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39 12 6	F0CLE	AU21	FMIO_CLE	GROUP 2	GROUP 2	FMIO_CLE	AU27	NC F2CLE
39 12 6	F0WE L	AT19	FMIO_WEN	GROUP 2	GROUP 2	FMIO_WEN	AV27	NC F2WE L
39 12 6	F0RE L	AV22	FMIO_REN	GROUP 2	GROUP 2	FMIO_REN	AY27	NC F2RE L
39 12 6		AT21	FMIO_DQS	GROUP 2	GROUP 2	FMIO_DQS	AV30	NC AP GPIO 110
39 12 6	F1CE0 L	AN22	FMIO_CEN0	GROUP 2	GROUP 4	FMIO_CEN0	AT30	NC F3CE0 L
39 12 6	F1CE1 L	AY19	FMIO_CEN1	GROUP 2	GROUP 4	FMIO_CEN1	AP31	NC F3CE1 L
39 12 6	F1CE2 L	AP20	FMIO_CEN2	GROUP 2	GROUP 4	FMIO_CEN2	AU31	NC F3CE2 L
39 12 6	F1CE3 L	AT18	FMIO_CEN3	GROUP 2	GROUP 4	FMIO_CEN3	AU32	NC F3CE3 L
39 12 6	F1CE4 L	AN30	FMIO_CEN4	GROUP 2	GROUP 4	FMIO_CEN4	AN34	NC AP GPIO 147
39 12 6	F1CE5 L	AU34	FMIO_CEN5	GROUP 3	GROUP 5	FMIO_CEN5	AM33	TP RST_SD_CTRL L
39 12 6	F1CE6 L	AU33	FMIO_CEN6	GROUP 3	GROUP 5	FMIO_CEN6	AM34	PM_MLC_PWR_EN
39 12 6	F1CE7 L	AP30	FMIO_CEN7	GROUP 3	GROUP 5	FMIO_CEN7	AN33	TP_CD_SD_CTRL L
39 12 6	F1AD<0>	AV25	FMIO_IO0	GROUP 2	GROUP 4	FMIO_IO0	AP33	NC F3AD<0>
39 12 6	F1AD<1>	AU23	FMIO_IO1	GROUP 2	GROUP 4	FMIO_IO1	AL31	NC F3AD<1>
39 12 6	F1AD<2>	AW25	FMIO_IO2	GROUP 2	GROUP 4	FMIO_IO2	AR34	NC F3AD<2>
39 12 6	F1AD<3>	AU25	FMIO_IO3	GROUP 2	GROUP 4	FMIO_IO3	AN32	NC F3AD<3>
39 12 6	F1AD<4>	AU24	FMIO_IO4	GROUP 2	GROUP 4	FMIO_IO4	AM31	NC F3AD<4>
39 12 6	F1AD<5>	AU24	FMIO_IO5	GROUP 2	GROUP 4	FMIO_IO5	AN31	NC F3AD<5>
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39 12 6	F1ALE	AP23	FMIO_ALE	GROUP 2	GROUP 4	FMIO_ALE	AT32	NC F3ALE
39 12 6	F1CLE	AV19	FMIO_CLE	GROUP 2	GROUP 4	FMIO_CLE	AT34	NC F3CLE
39 12 6	F1WE L	AN23	FMIO_WEN	GROUP 2	GROUP 4	FMIO_WEN	AT33	NC F3WE L
39 12 6	F1RE L	AN21	FMIO_REN	GROUP 2	GROUP 4	FMIO_REN	AR31	NC F3RE L
39 12 6		AY25	FMIO_DQS	GROUP 2	GROUP 4	FMIO_DQS	AR33	NC AP GPIO 135

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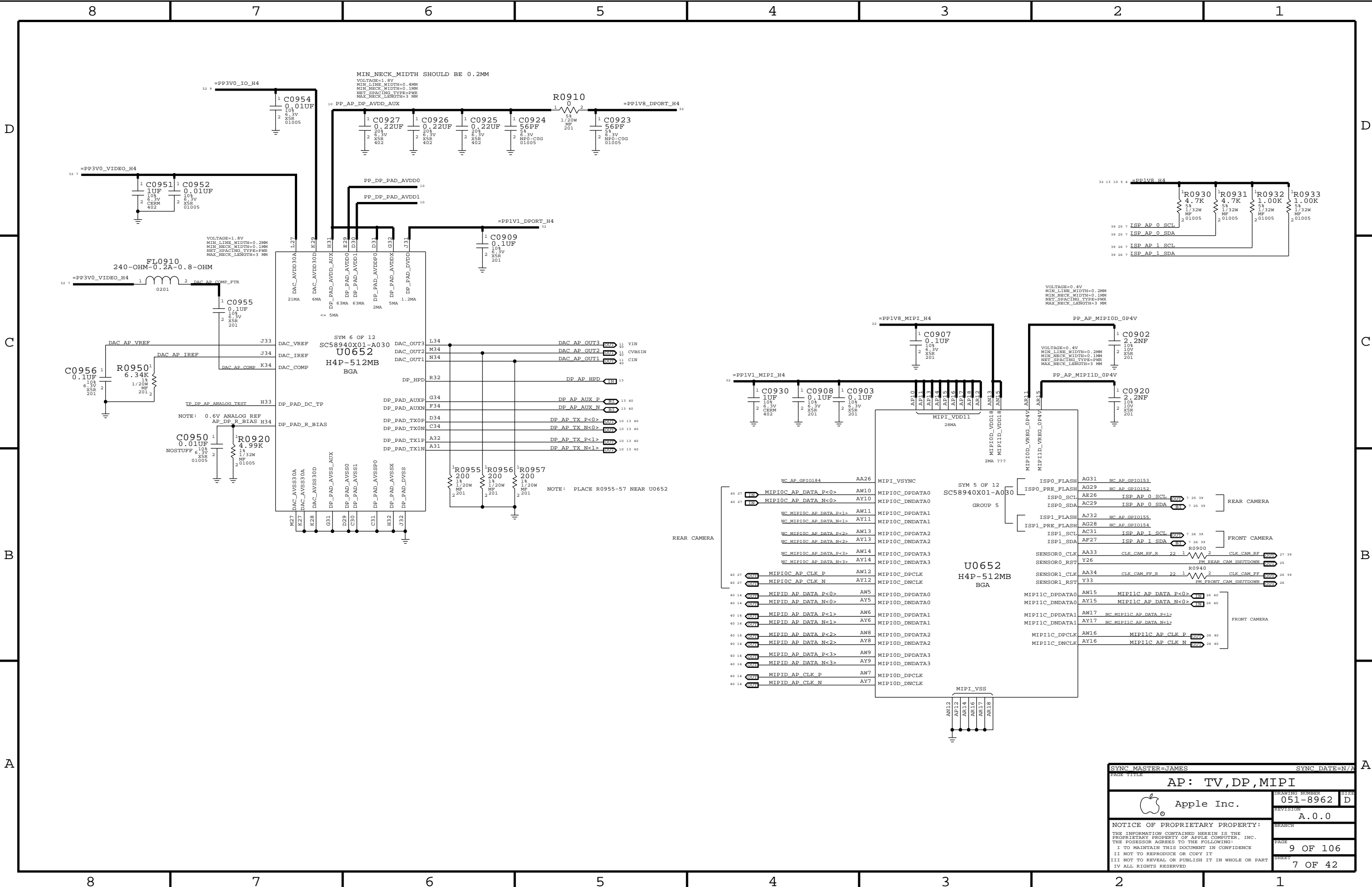
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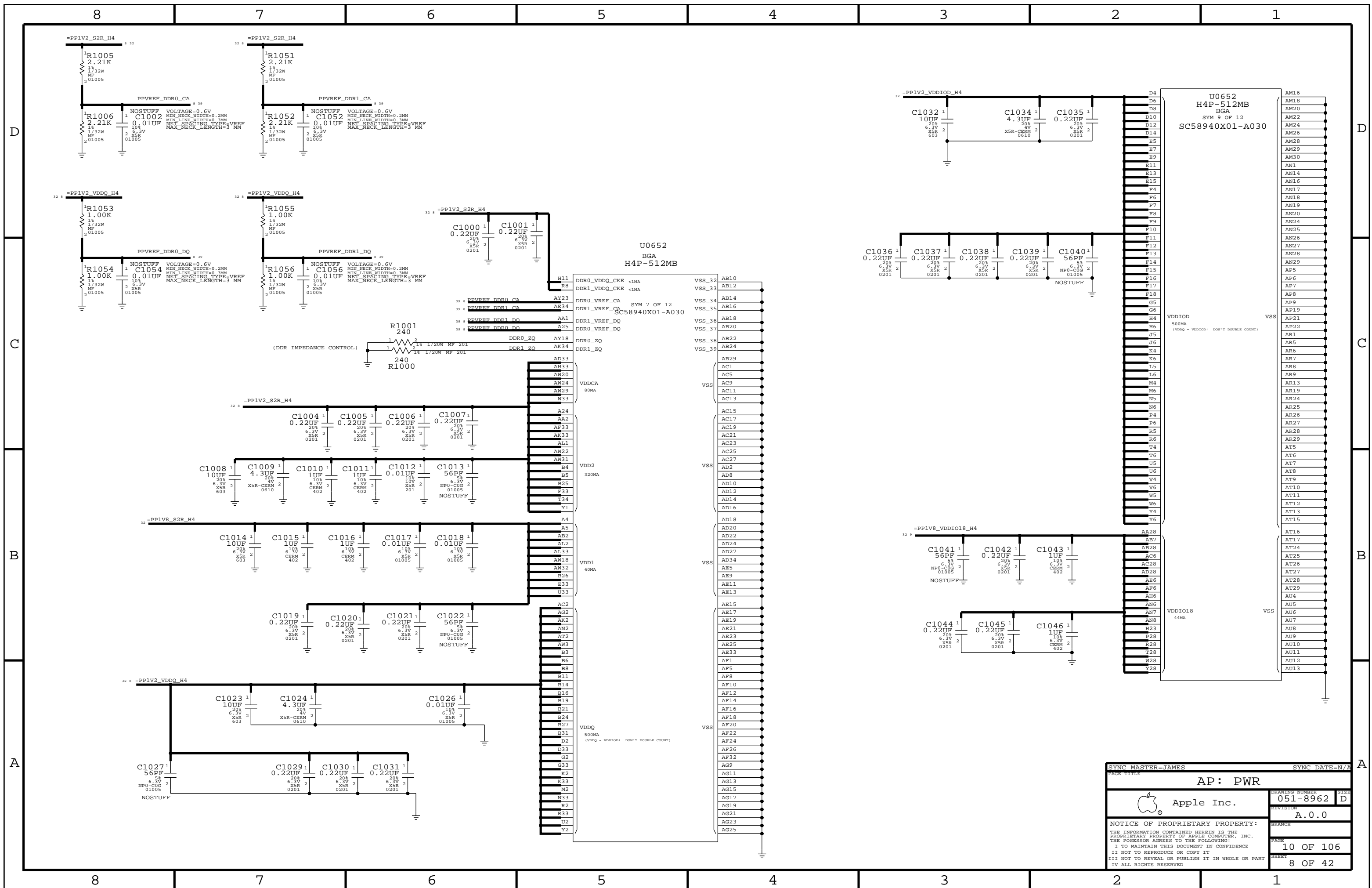
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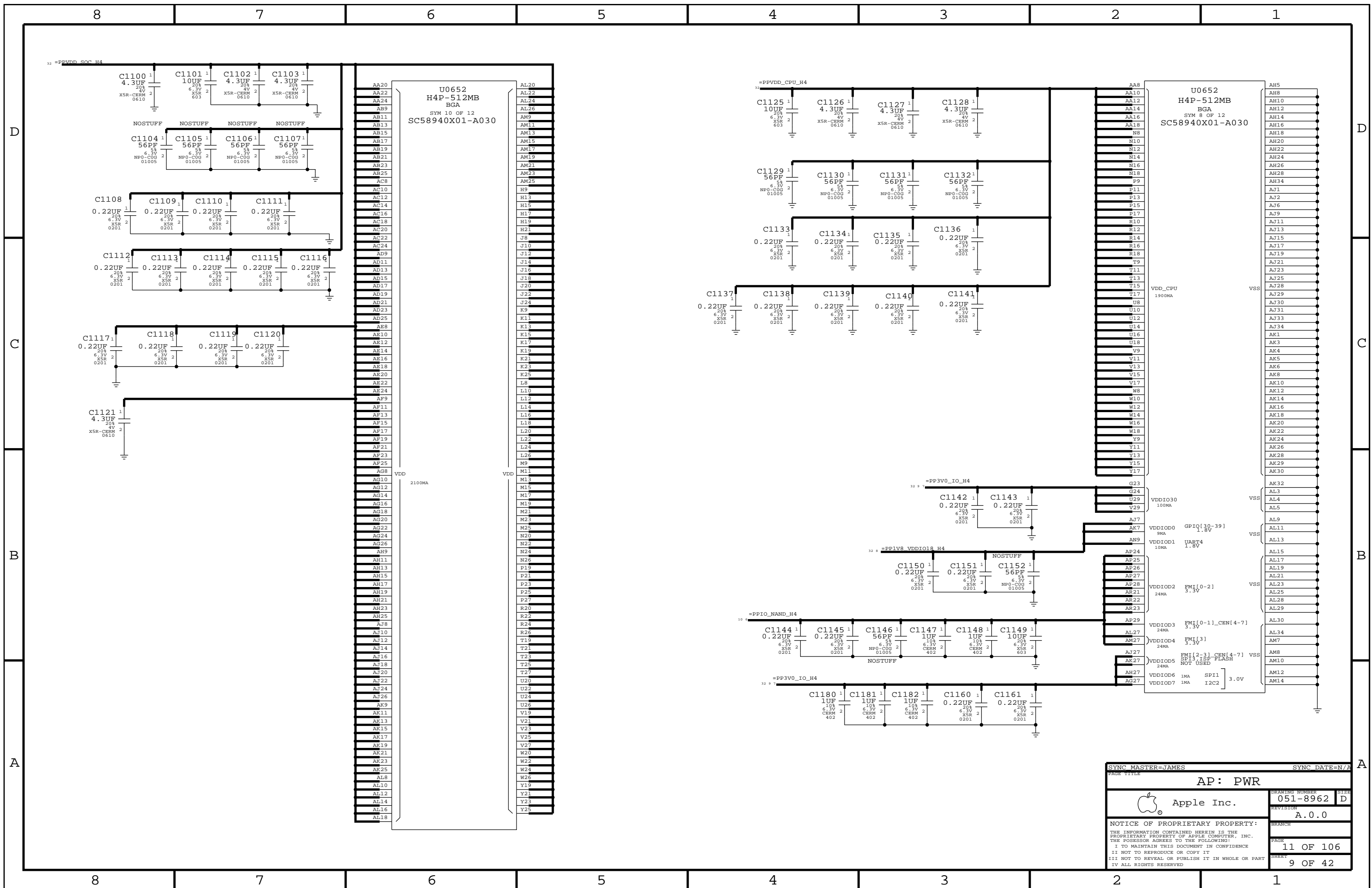
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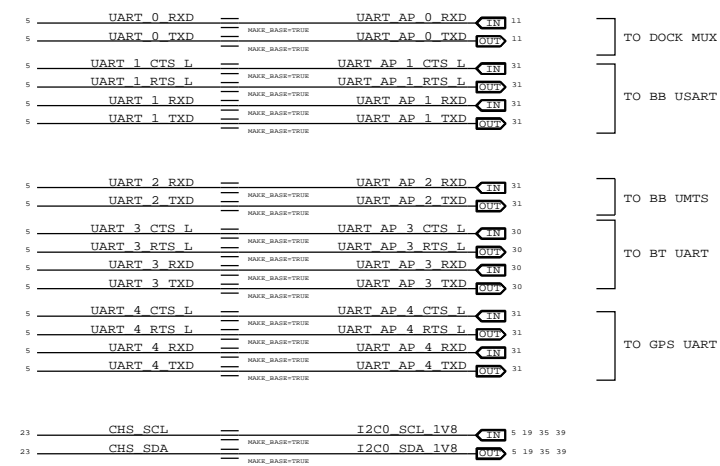
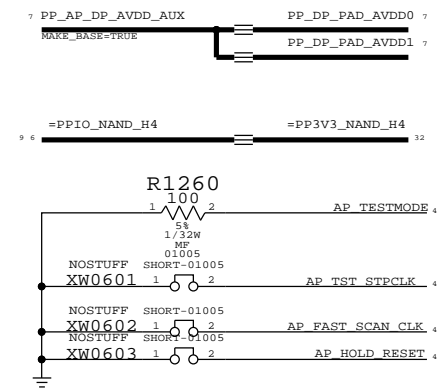
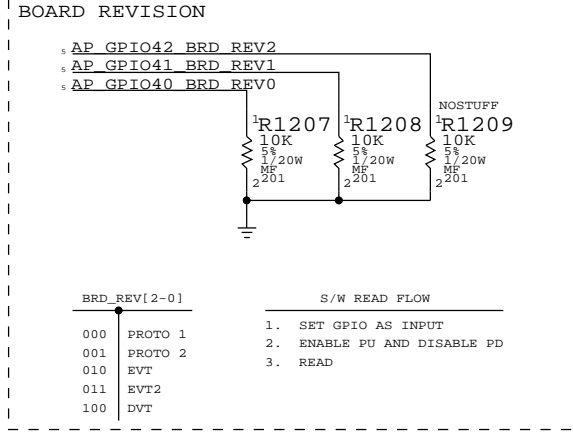
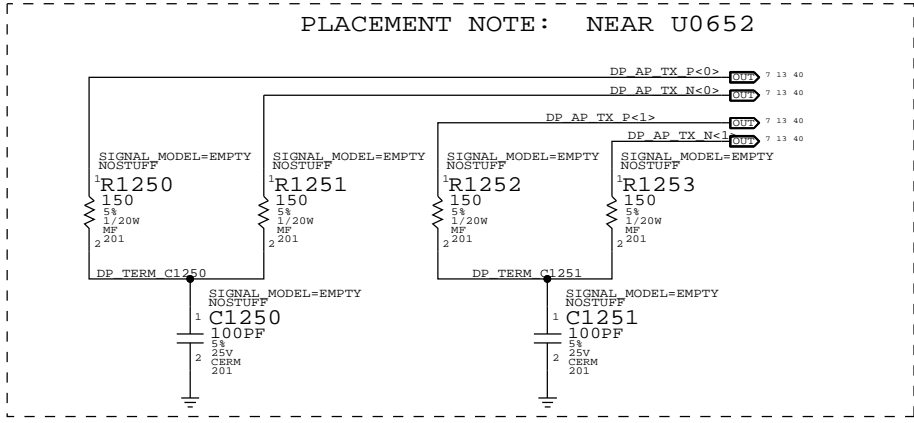
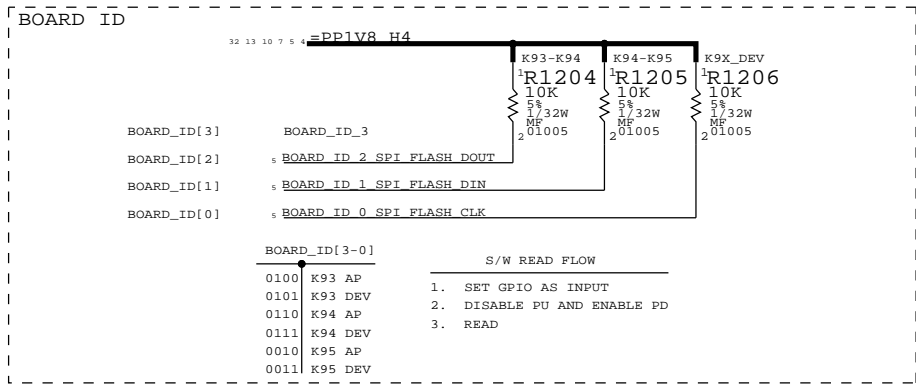
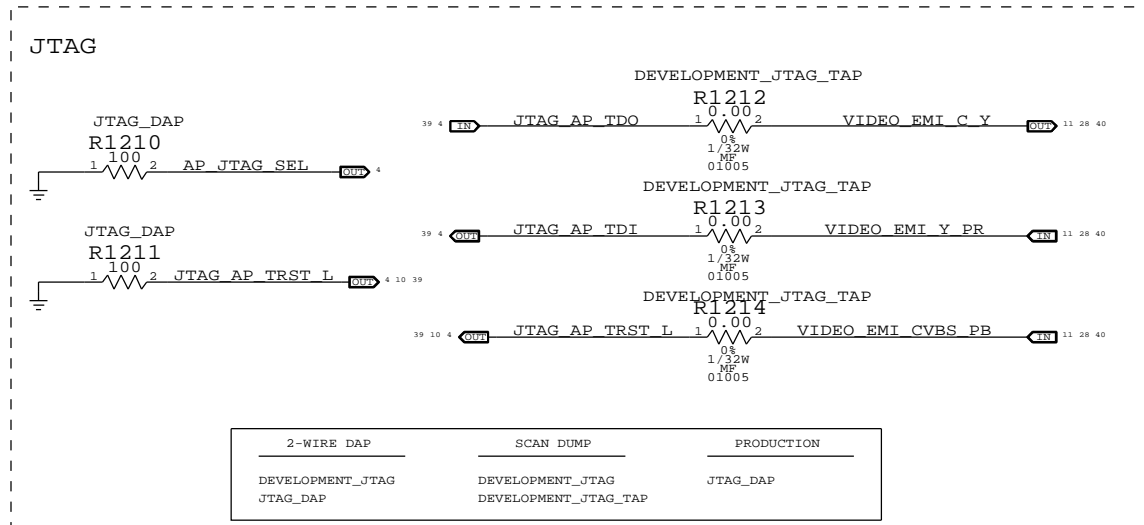
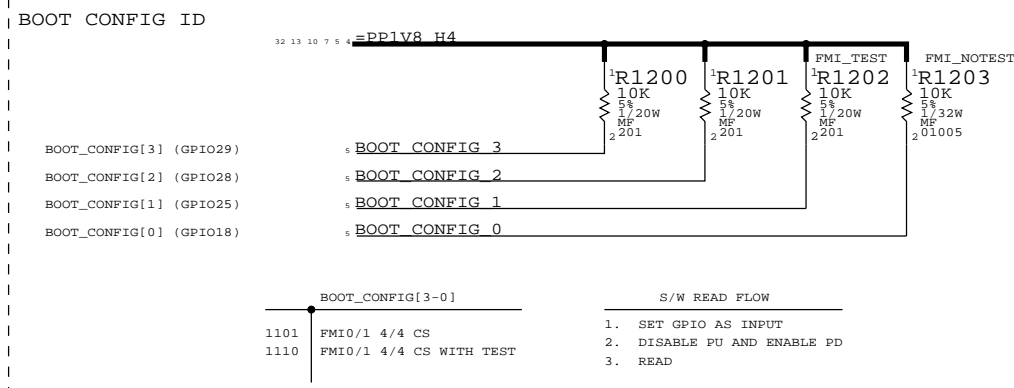
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FOR REFERENCE

- BOOT_CONFIG[3:0]
- 0000 SPI0
 - 0001 SPI3
 - 0010 SPI0 W/TEST
 - 0011 SPI3 W/TEST
 - 0100 FMIO 2CS
 - 0101 FMIO 4CS
 - 0110 FMIO 4CS W/TEST
 - 0111 RESERVED
 - 1000 FMIO 2 CS
 - 1001 FMIO 4 CS
 - 1010 FMIO 4CS W/TEST
 - 1011 RESERVED
 - 1100 FMIO/1 2/2 CS
 - 1101 FMIO/1 4/4 CS
 - 1110 FMIO/1 4/4 CS W/TEST
 - 1111 RESERVED
- CURRENT SETTING ->

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AP: MISC & ALIASES

Apple Inc.

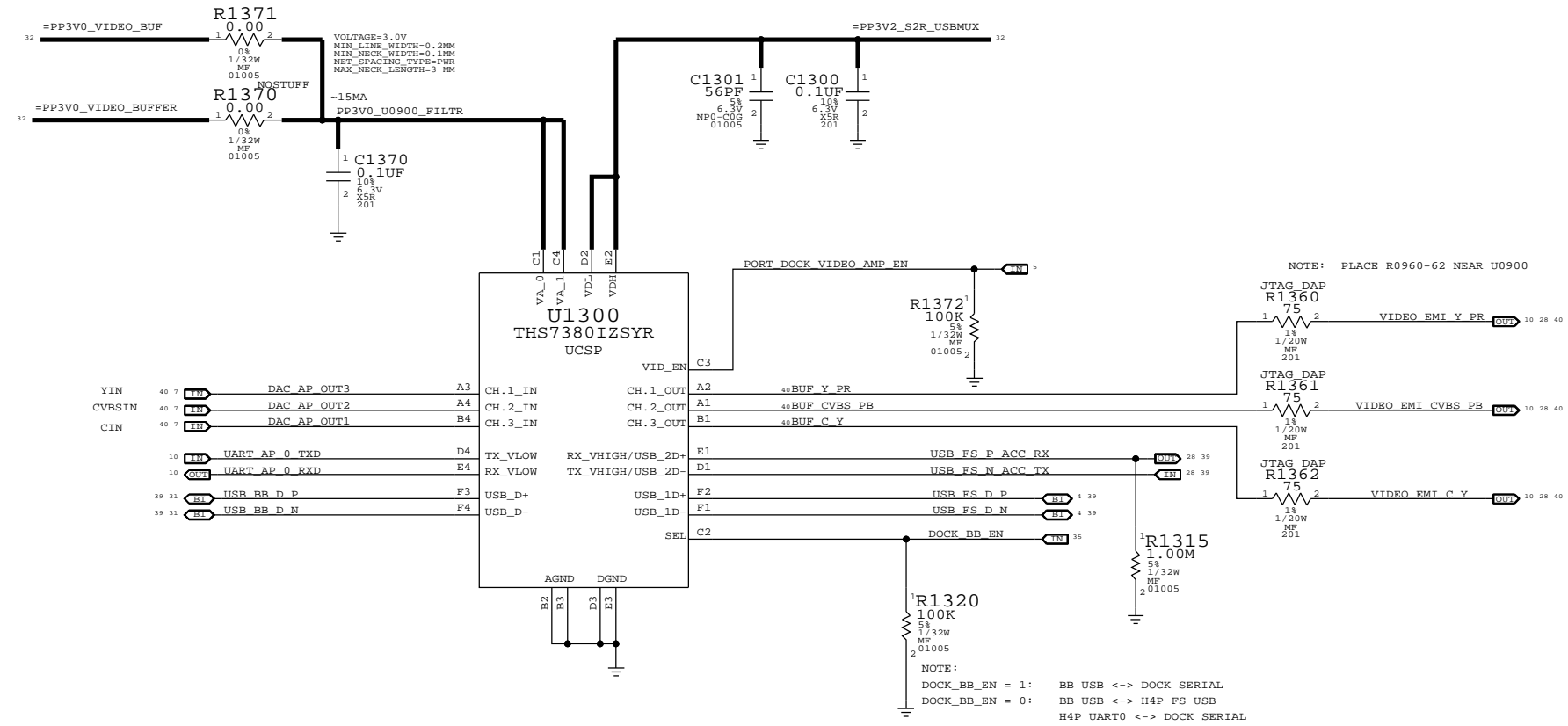
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NOTE:
LDO3 PROVIDES 50MA TO BOTH H4P AND U1300
IF THAT'S NOT ENOUGH, STUFF R1371 AND NOSTUFF R1370



SYNC MASTER=JAMES		SYNC DATE=N/A	
PAGE TITLE AP: VIDEO BUFFER, BB USB MUXES			
DRAWING NUMBER 051-8962		SIZE D	
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1

16GB FLASH CONFIGURATIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
335S0701	1	TOSHIBA 32NM 16GB RAW	U1400	16GB_PROD

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S0682	335S0701	16GB_PROD	U1400	SAMSUNG 35NM 16GB RAW
335S0790	335S0701	16GB_PROD	U1400	SAMSUNG 27NM 16GB RAW
335S0781	335S0701	16GB_PROD	U1400	HYNIX 26NM 16GB PPN

64GB FLASH CONFIGURATIONS

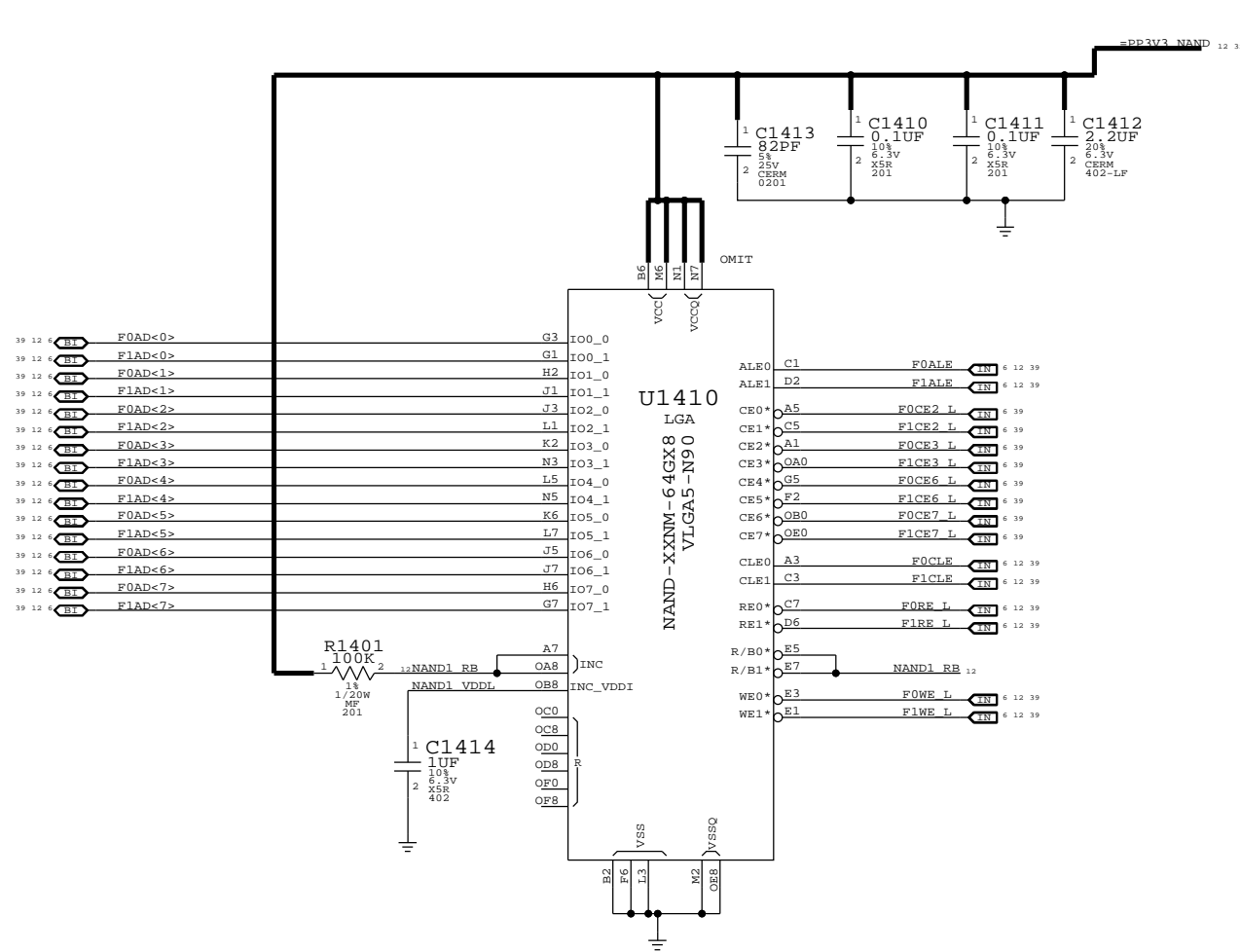
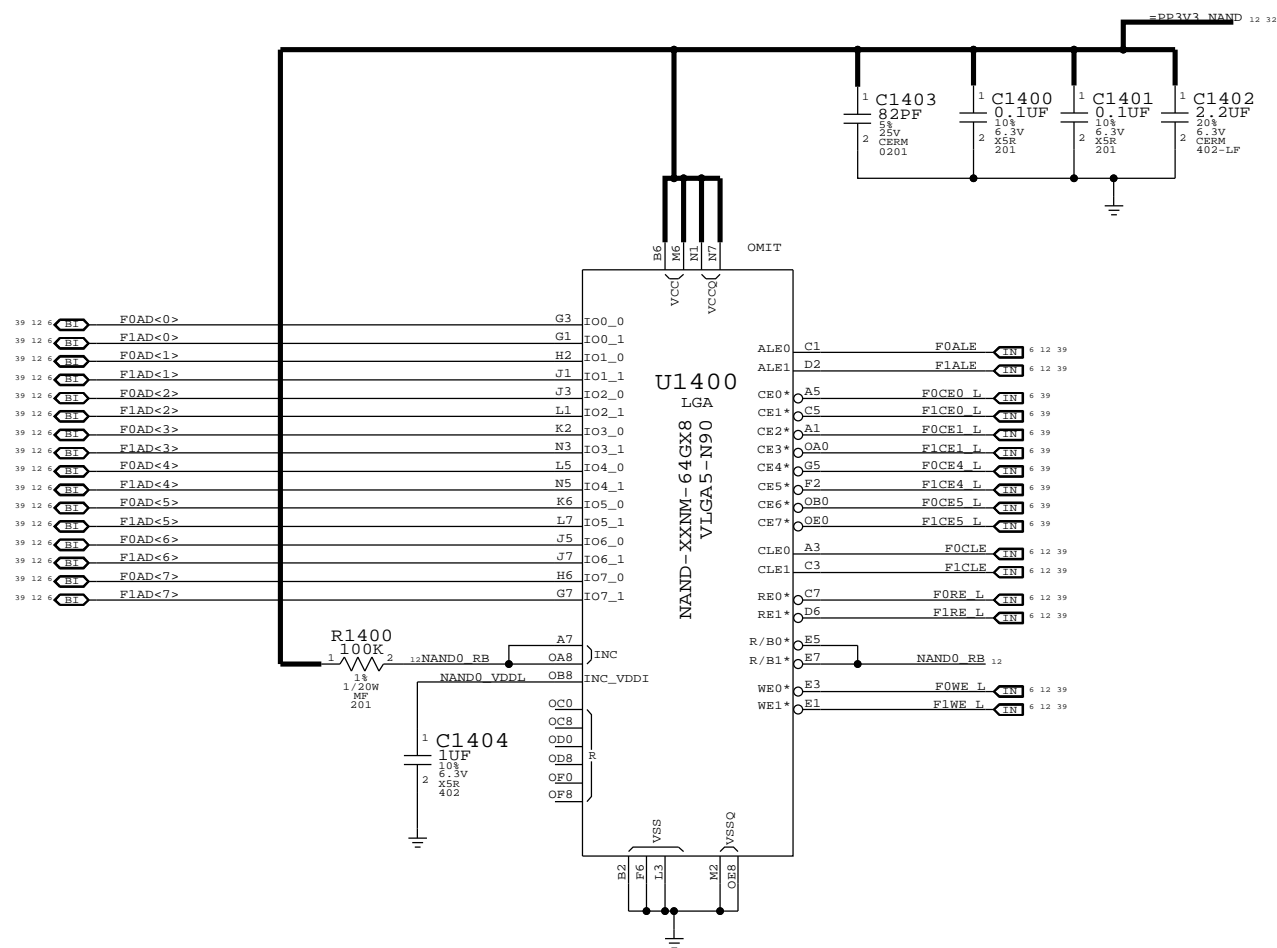
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
335S0702	2	TOSHIBA 32NM 32GB RAW	U1400,U1410	64GB_PROD

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S0665	335S0702	64GB_PROD	U1400,U1410	SAMSUNG 35NM 32GB RAW
335S0791	335S0702	64GB_PROD	U1400,U1410	SAMSUNG 27NM 32GB RAW
335S0722	335S0702	64GB_PROD	U1400,U1410	SANDISK 32NM 32GB RAW
335S0782	335S0702	64GB_PROD	U1400,U1410	HYNIX 26NM 32GB PPN

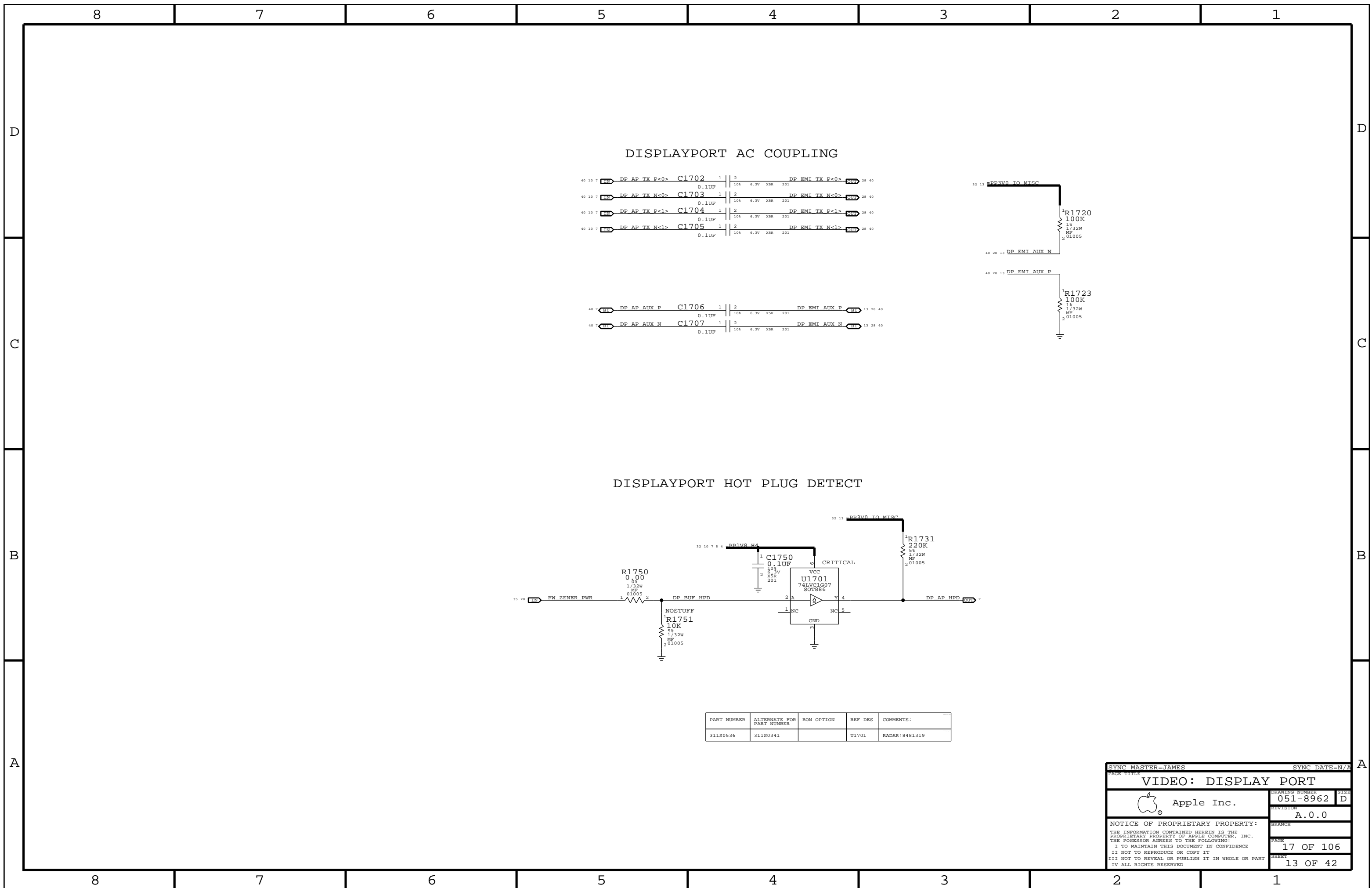
32GB FLASH CONFIGURATIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
335S0701	2	TOSHIBA 32NM 16GB RAW	U1400,U1410	32GB_PROD

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S0682	335S0701	32GB_PROD	U1400,U1410	SAMSUNG 35NM 16GB RAW
335S0790	335S0701	32GB_PROD	U1400,U1410	SAMSUNG 27NM 16GB RAW
335S0781	335S0701	32GB_PROD	U1400,U1410	HYNIX 26NM 16GB PPN



SYNC MASTER=JONATHAN		SYNC DATE=N/A	
NAND			
		DRAWING NUMBER	051-8962
		REVISION	A.0.0
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		PAGE	14 OF 106
		SHEET	12 OF 42



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
311S0536	311S0341		U1701	RADAR:8481319

SYNC MASTER=JAMES SYNC DATE=N/A

VIDEO: DISPLAY PORT

Apple Inc.

DRAWING NUMBER: 051-8962 SIZE: D

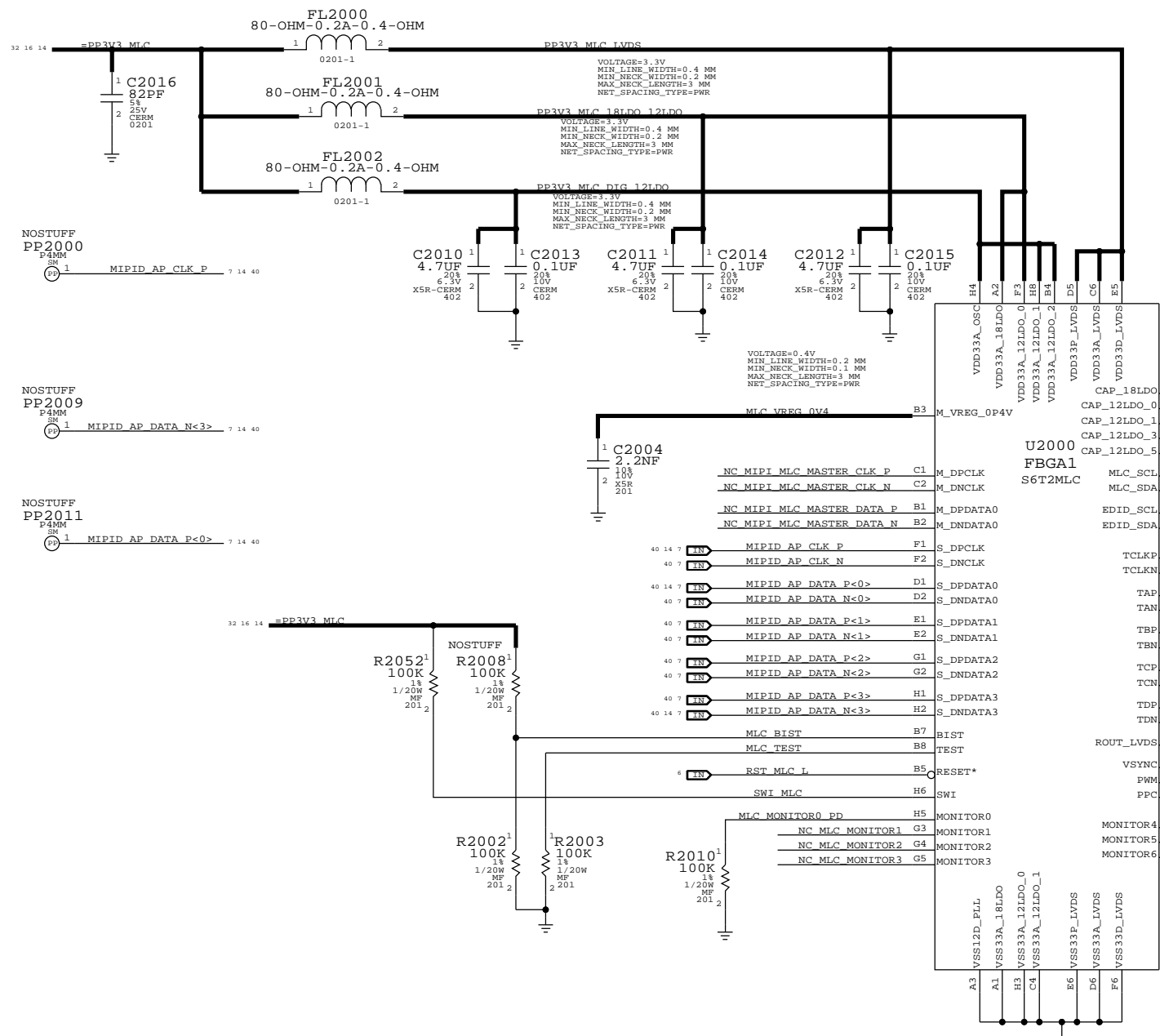
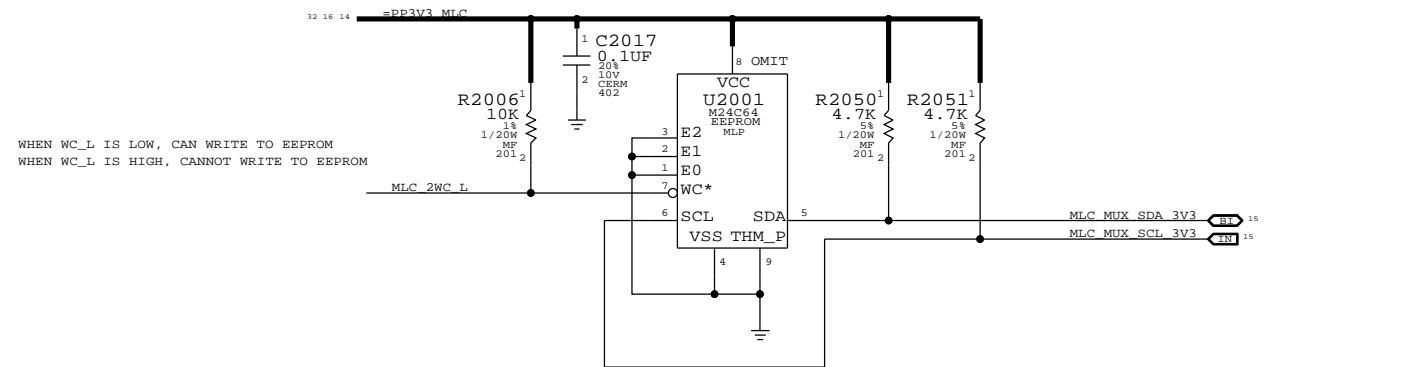
REVISION: A.0.0

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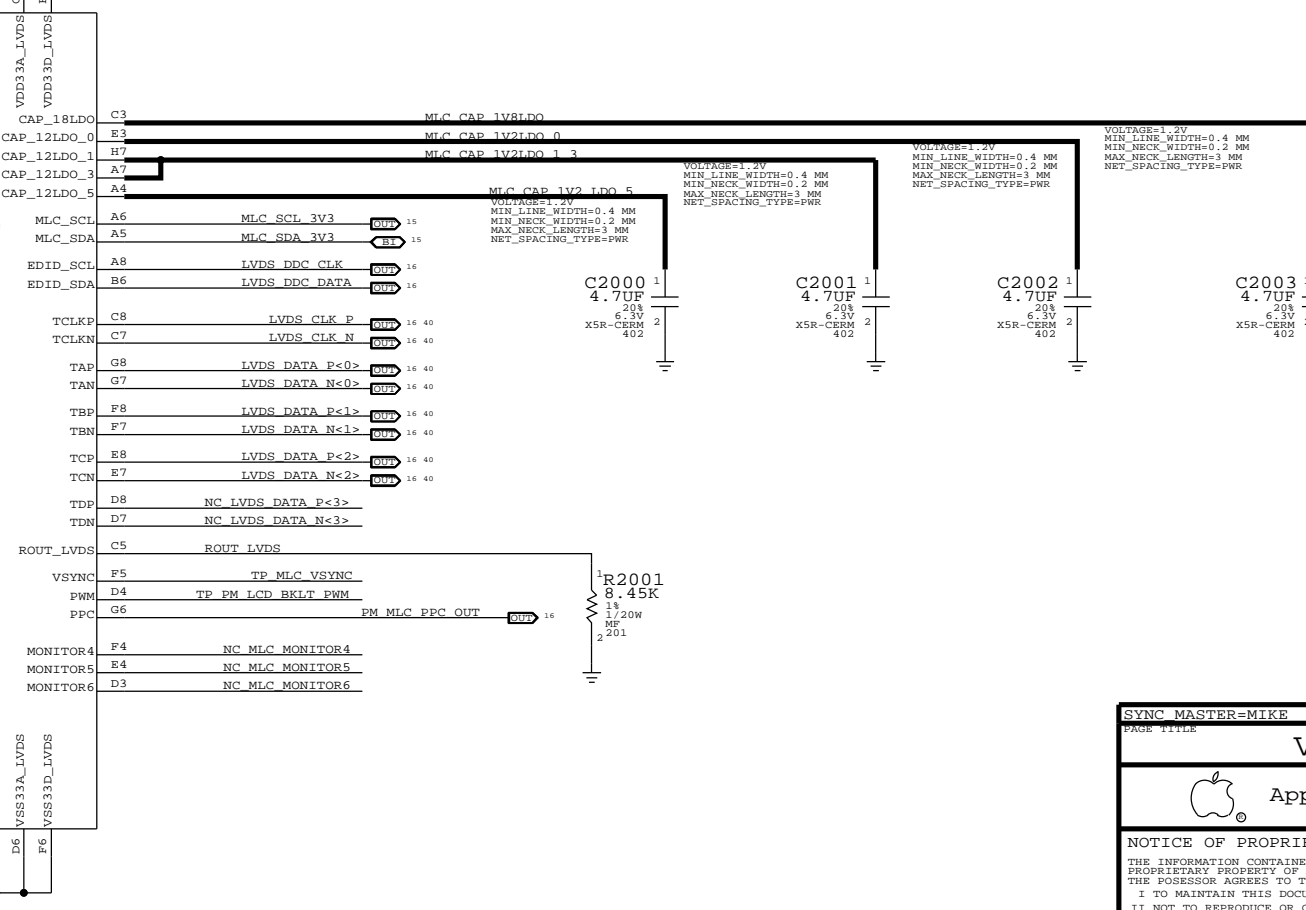
PAGE: 17 OF 106
 SHEET: 13 OF 42

MLC EEPROM:RAW APN 335S0661

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
341S2799	1	MLC EPROM 100MHZ LVDS,2MHZ SWI	U2001	CRITICAL	100MHZ_PANEL



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S0652	138S0618			RADAR:8377307



VIDEO: MLC

Apple Inc.

DRAWING NUMBER: 051-8962
REVISION: A.0.0

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14	MLC_SDA_3V3	---	MLC_MUX_SDA_3V3	14
14	MLC_SCL_3V3	---	MLC_MUX_SCL_3V3	14

SYNC MASTER=MIKE		SYNC DATE=N/A	
VIDEO: MLC ALIASES			
 Apple Inc.		DRAWING NUMBER	051-8962
		REVISION	A.0.0
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		SHEET	15 OF 42

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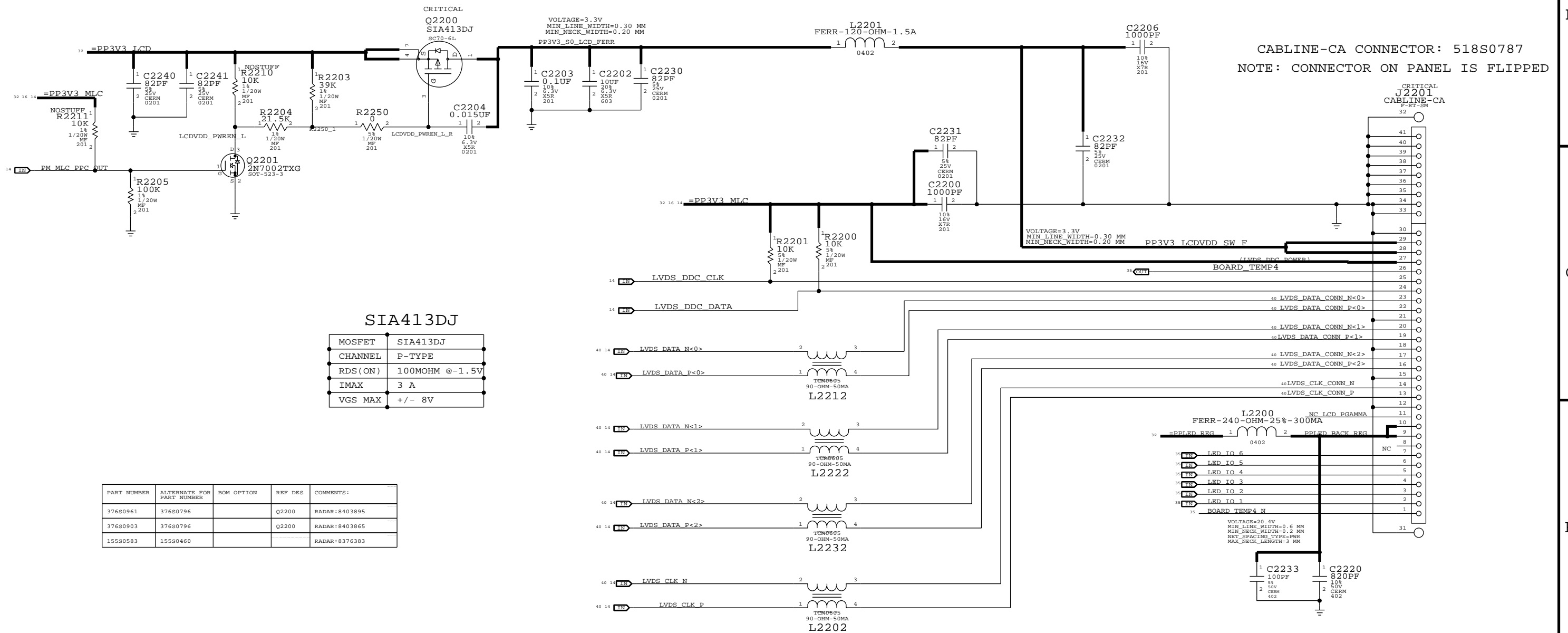
4

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1

LVDS CONNECTOR



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
376S0961	376S0796		Q2200	RADAR:8403895
376S0903	376S0796		Q2200	RADAR:8403865
155S0583	155S0460			RADAR:8376383

NOSTUFF RESISTORS ARE THERE TO INVESTIGATE POSSIBILITY OF REMOVING THE CHOKE

SYNC MASTER=ALEX		SYNC DATE=N/A	
PAGE TITLE VIDEO: LVDS CONNECTOR			
Apple Inc.		DRAWING NUMBER 051-8962	SIZE D
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		PAGE 22 OF 106	SHEET 16 OF 42

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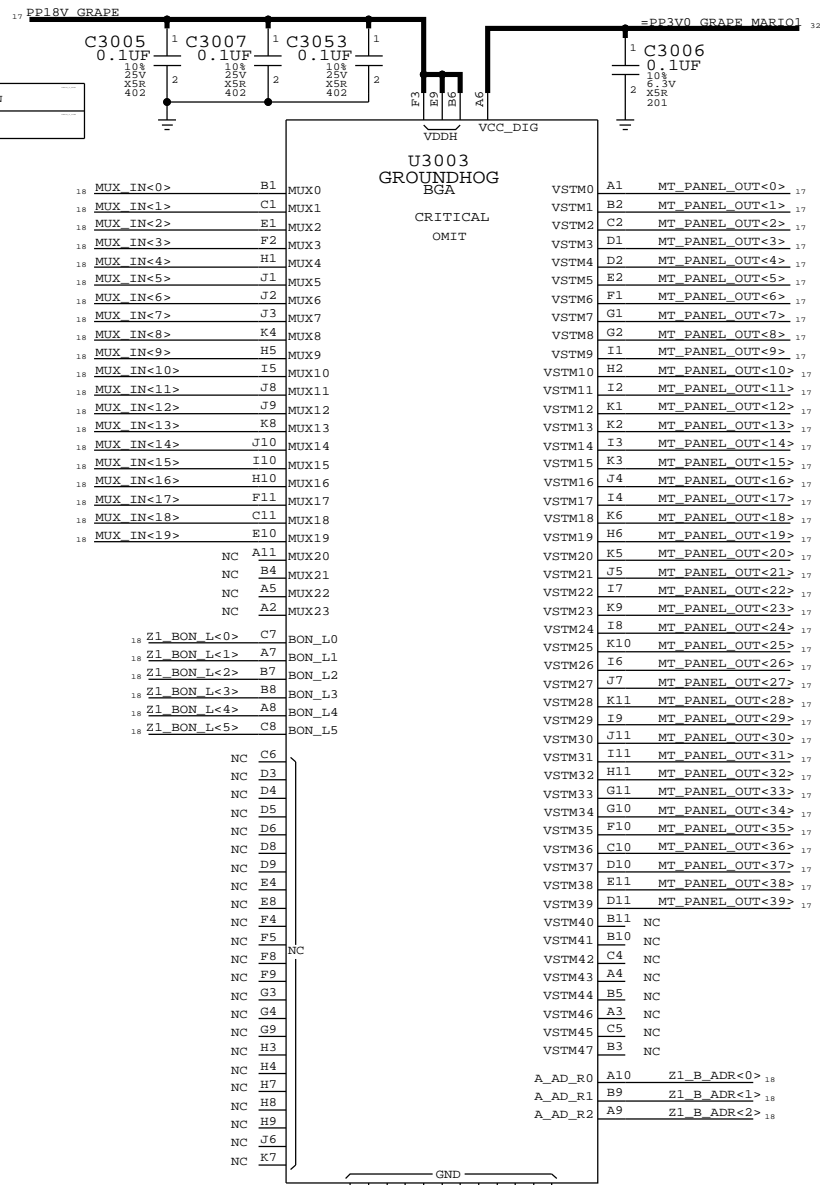
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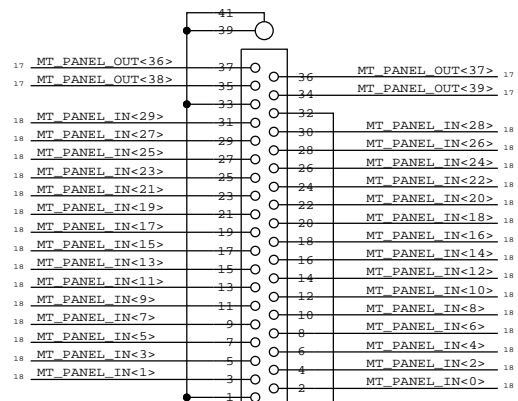
1

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
34380525	1	IC,ASIC,GROUNDHOG B0,120B BGA	U3003	CRITICAL	



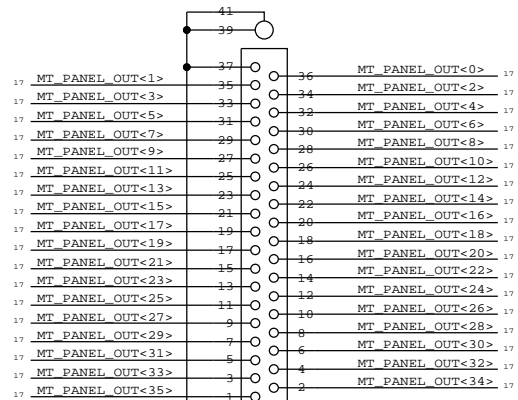
CONNECTORS TO GRAPE FLEX

P/N 518S0817



F-RT-SM
502250-8237
J3010

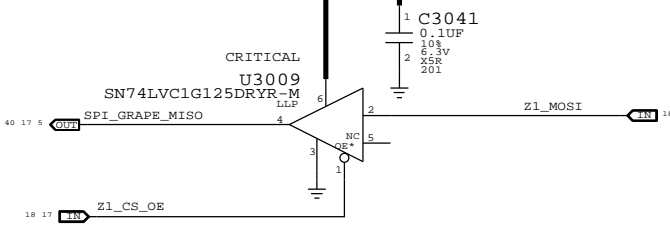
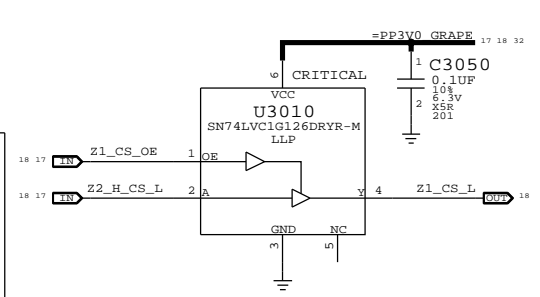
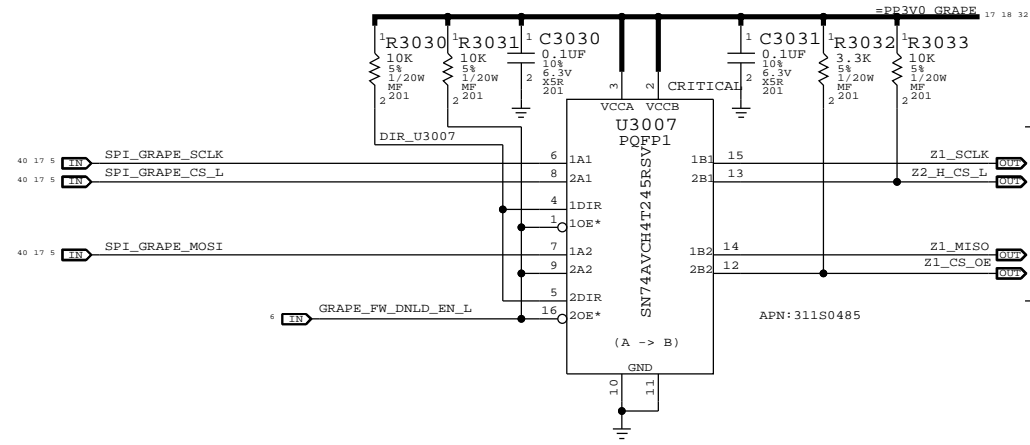
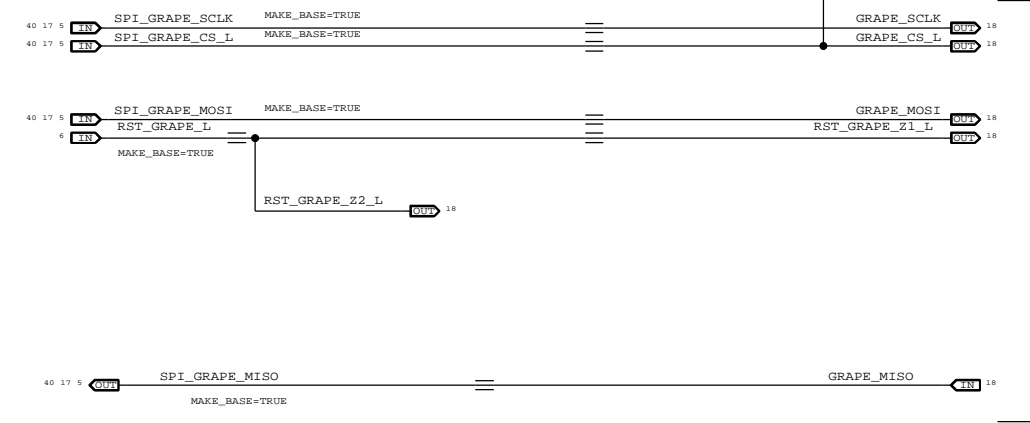
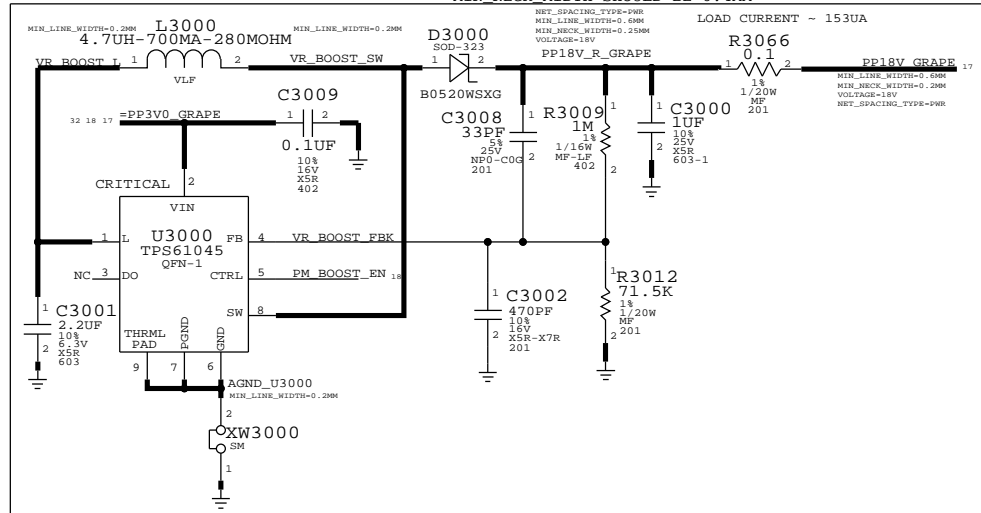
MATES WITH LEFTMOST GRAPE FLEX TAIL



F-RT-SM
502250-8237
J3011

MATES WITH RIGHTMOST GRAPE FLEX TAIL

BOOST CONVERTOR



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
31150523	31150485		U3007	
31150524	31150533		U3009	
31150525	31150532		U3010	

SYNC MASTER=RAMSIN SYNC DATE=N/A

GRAPE: GROUNDHOG, CONN, BOOST

Apple Inc.

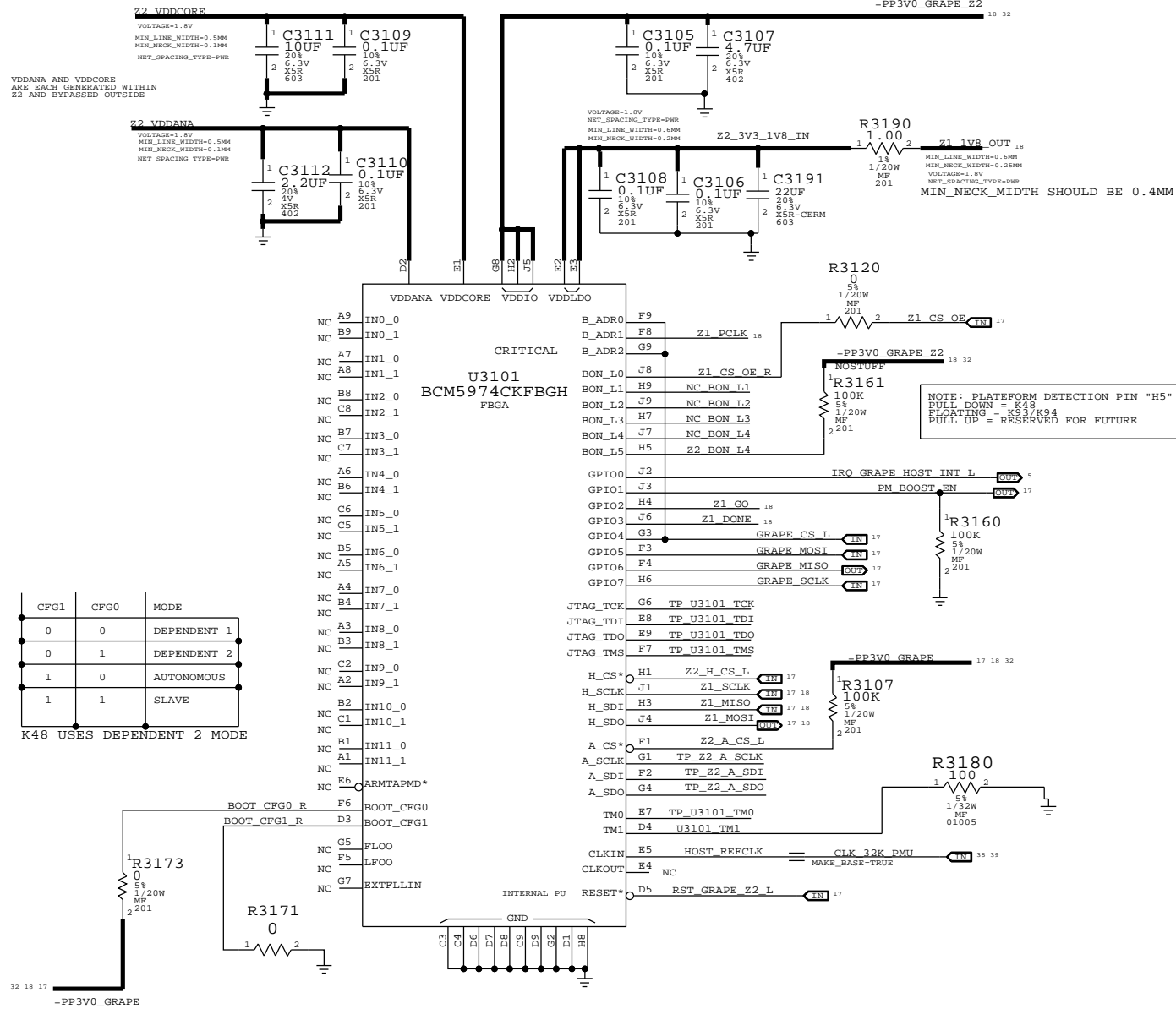
DRAWING NUMBER: 051-8962 SIZE: D

REVISION: A.0.0

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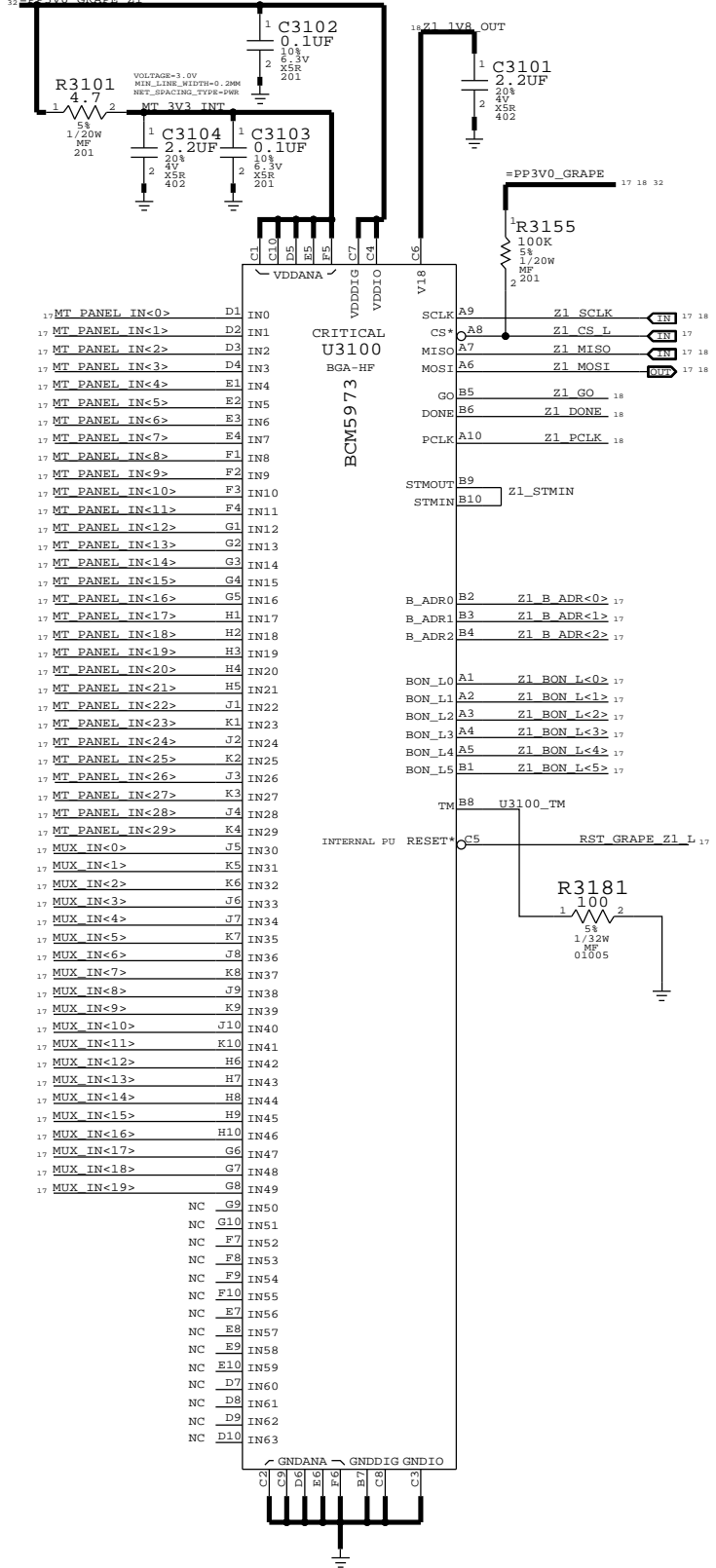
PAGE: 30 OF 106 SHEET: 17 OF 42

ARM9 MCU (Z2 BASED)



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S0652	138S0648		C3107	RADAR: 8392120
138S0618	138S0648		C3107	BOM CONSOLIDATION

ZEPHYR 1+ ASIC



SYNC MASTER=RAMSIN SYNC DATE=N/A

GRAPE: Z1, Z2

Apple Inc.

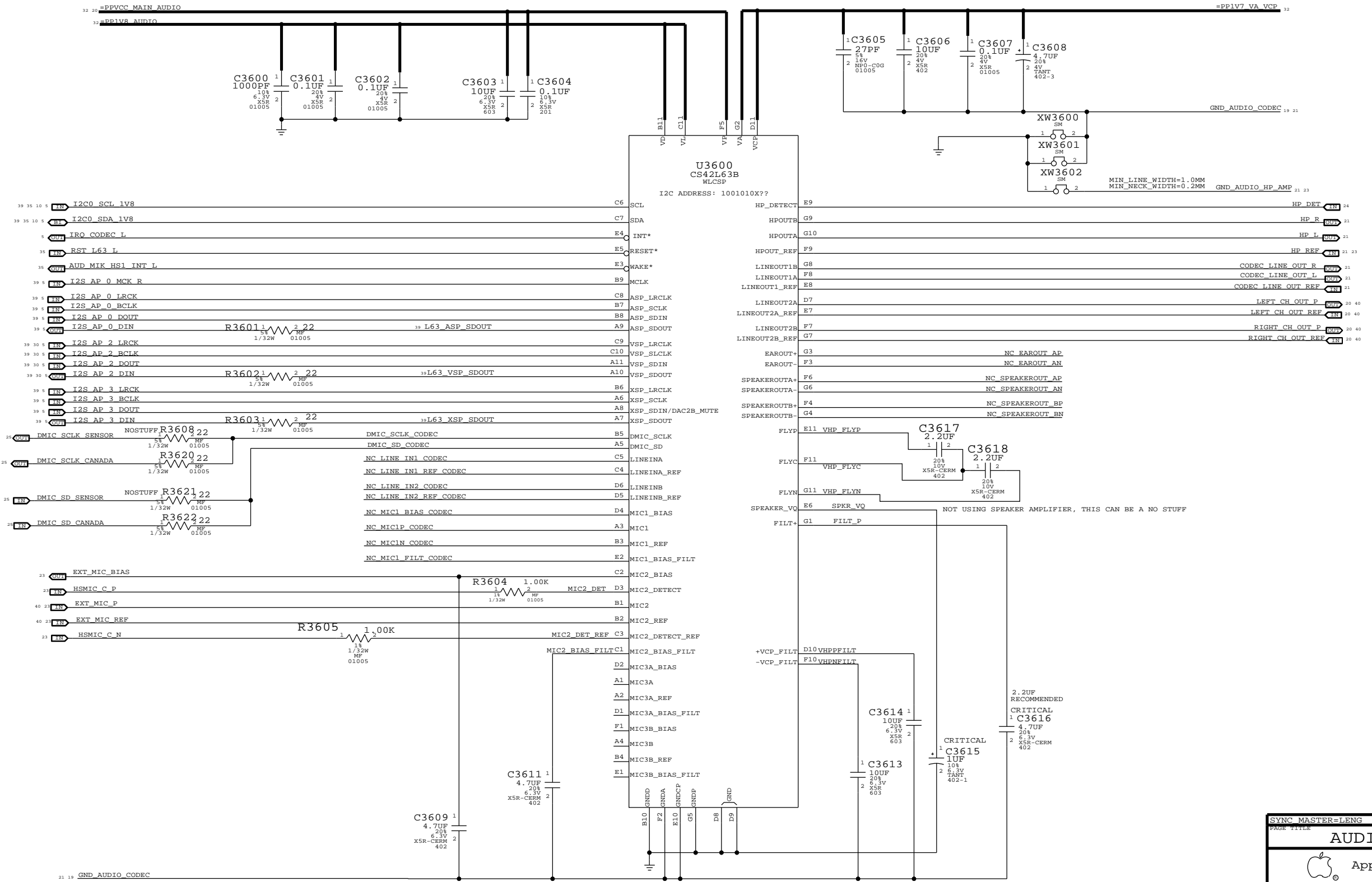
051-8962
REVISION: A.0.0

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L63 AUDIO CODEC

APN: 338S0940



MIN LINE WIDTH=0.6MM
MIN NECK WIDTH=0.2MM
MAX NECK LENGTH=75 MM

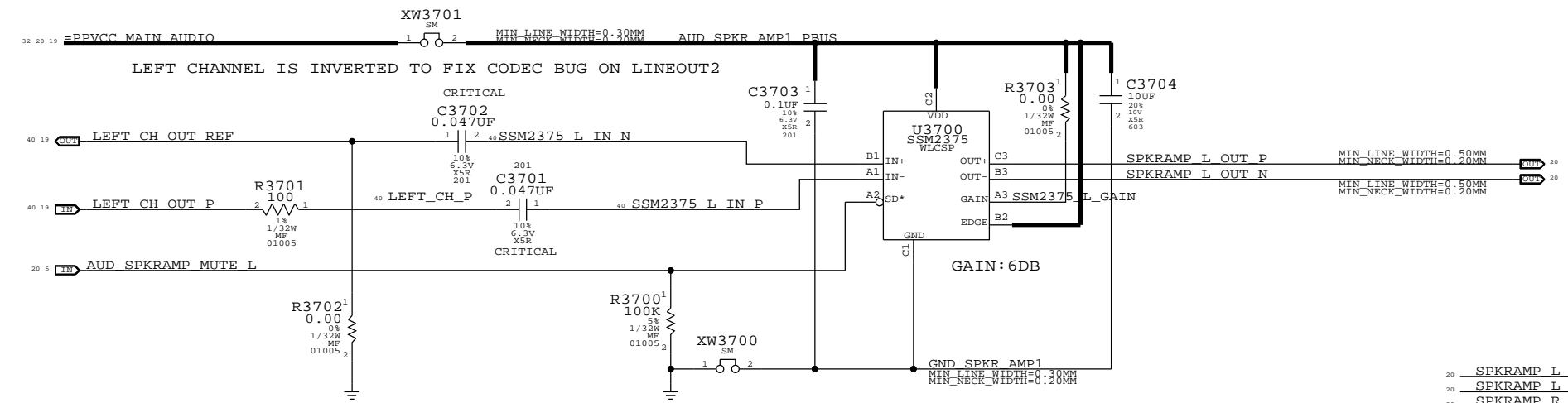
SYNC MASTER=LENG		SYNC DATE=N/A	
AUDIO: L63 CODEC			
Apple Inc.		DRAWING NUMBER	SIZE
		051-8962	D
		REVISION	
		A.0.0	
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SPEAKER AMPLIFIER

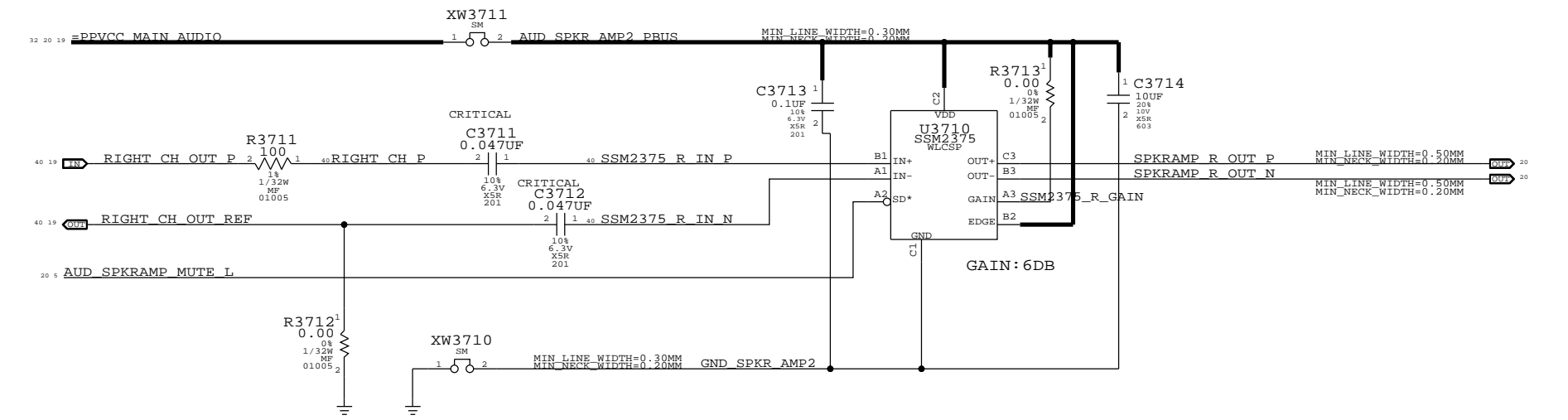
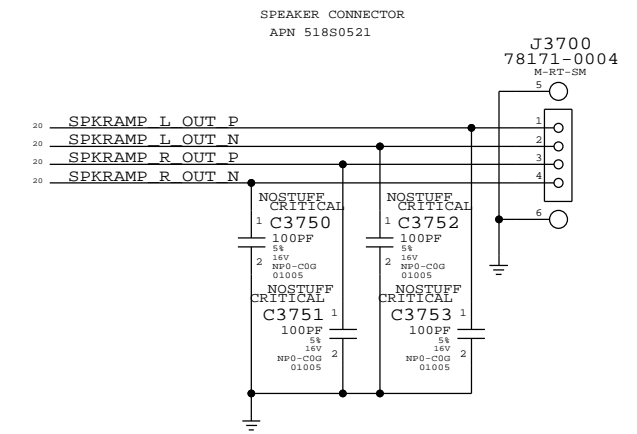
APN:353S2958

80HZ +/- XXX% TURN ON TIME: 7.5MS
 TURN ON DELAY: 20MS

GAIN	VDD	GND
12DB	47K	NC
9DB	NC	47K
6DB	SHORT	NC
3DB	NC	NC
0DB	NC	SHORT

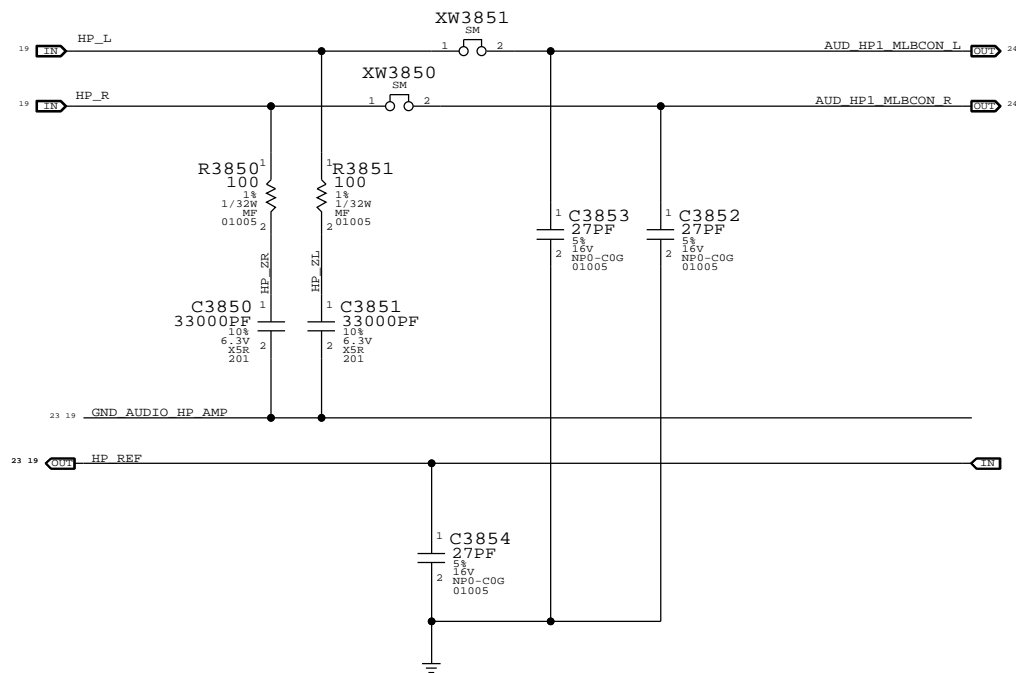


L63 LINEOUT2A IS CONNECTED TO U3700
 L63 LINEOUT2B IS CONNECTED TO U3710

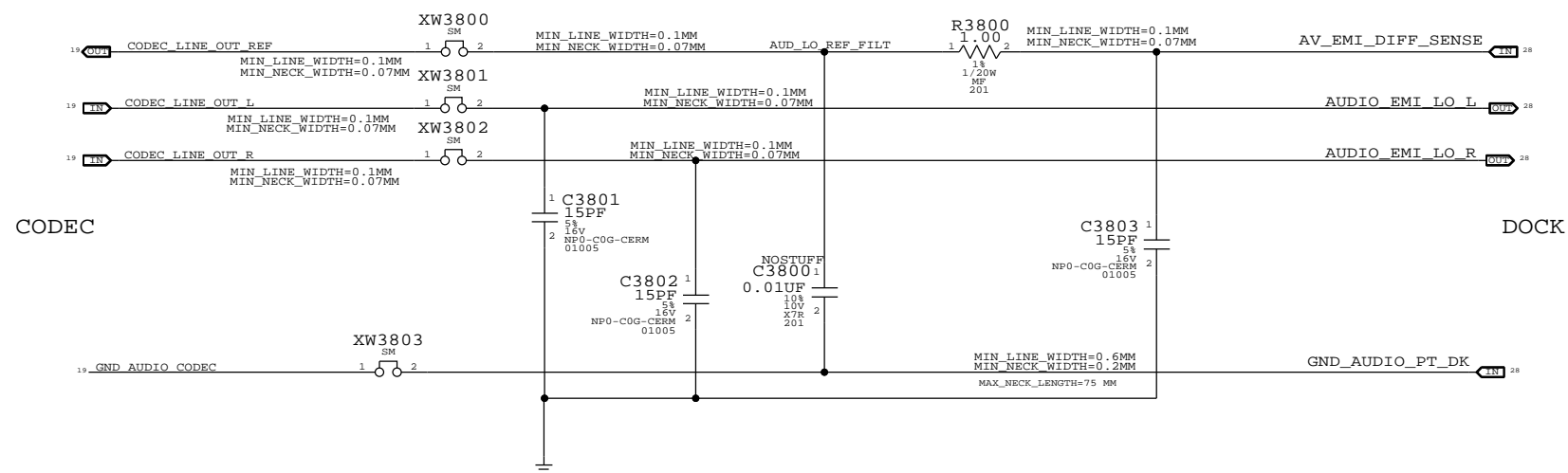


SYNC MASTER=LENG		SYNC DATE=N/A	
AUDIO: SPEAKER AMP			
Apple Inc.		DRAWING NUMBER	SIZE
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		REVISION	
		A.0.0	
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HEADPHONE OUTPUT ZOBEL NETWORK



DOCK LINE OUTPUT



SYNC MASTER=LENG		SYNC DATE=N/A	
PAGE TITLE AUDIO: HEADPHONE OUT			
DRAWING NUMBER 051-8962		SIZE D	
REVISION A.0.0		BRANCH	
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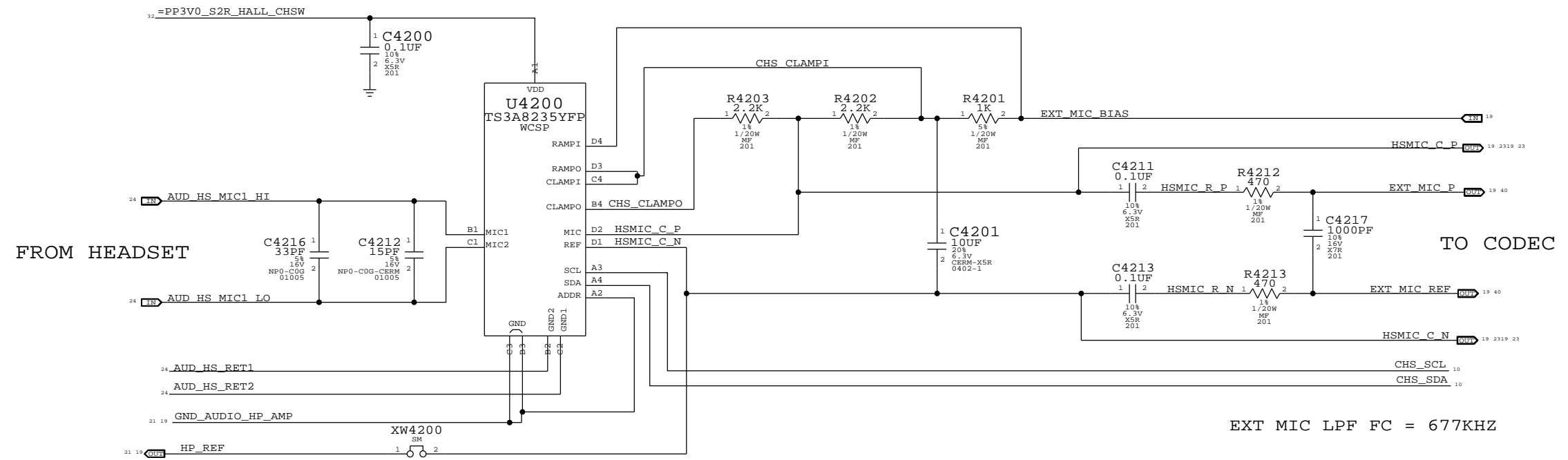
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SYNC MASTER=LENG		SYNC DATE=N/A	
AUDIO: BLANK			
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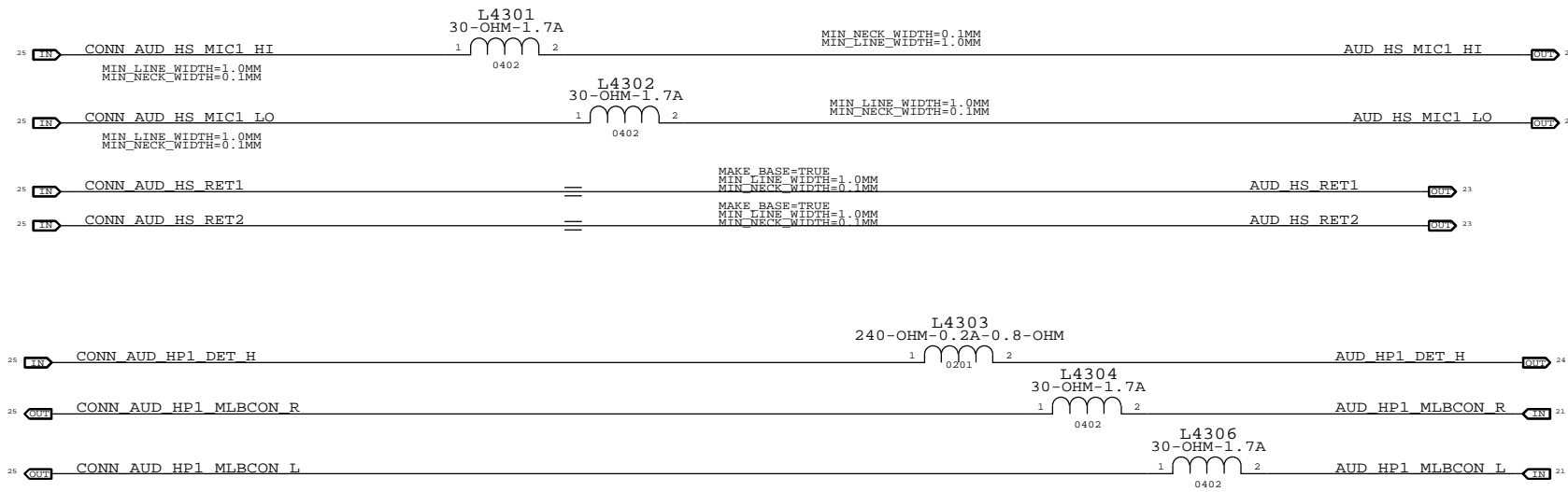
EXTERNAL (HEADSET) MIC INPUT CIRCUITRY



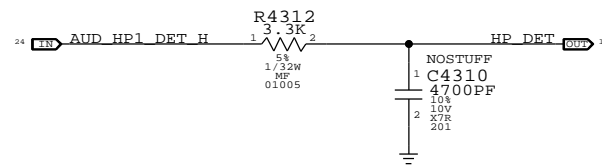
EXT MIC LPF FC = 677KHZ

SYNC MASTER=LENG		SYNC DATE=N/A	
AUDIO: DETECT/MIC BIAS			
Apple Inc.		DRAWING NUMBER	SIZE
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		REVISION	
		A.0.0	
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HEADPHONE JACK CONNECTION IS ON FRONT PANEL FLEX, CSA 55/PDF 29
 PLACE ALL COMPONENTS NEAR J5501



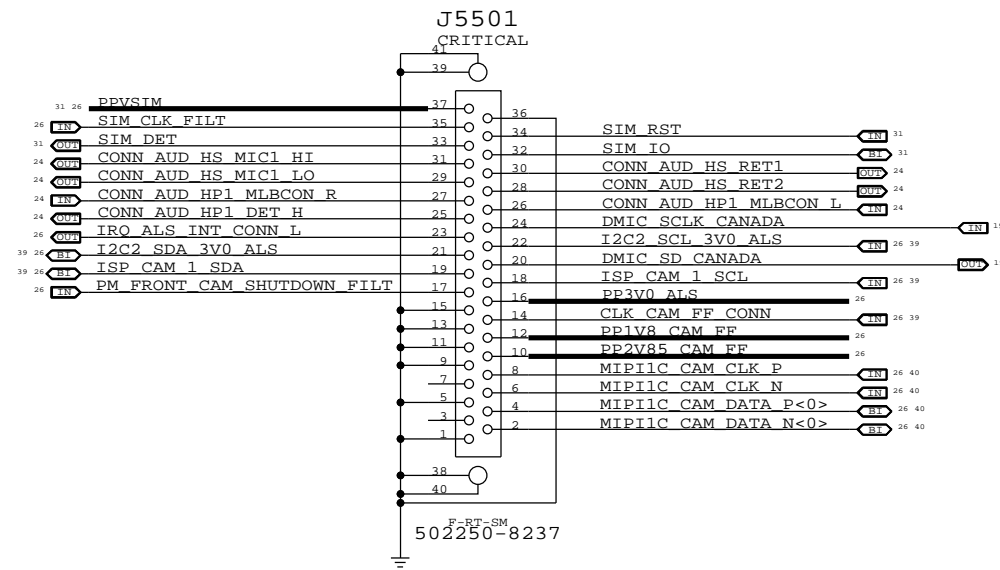
HEADSET JACK INSERTION DETECT



SYNC MASTER=LENG		SYNC DATE=N/A	
AUDIO: HP/MIC FILTERS			
DRAWING NUMBER		SIZE	
051-8962		D	
REVISION		BRANCH	
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CANADA FLEXES CONN.

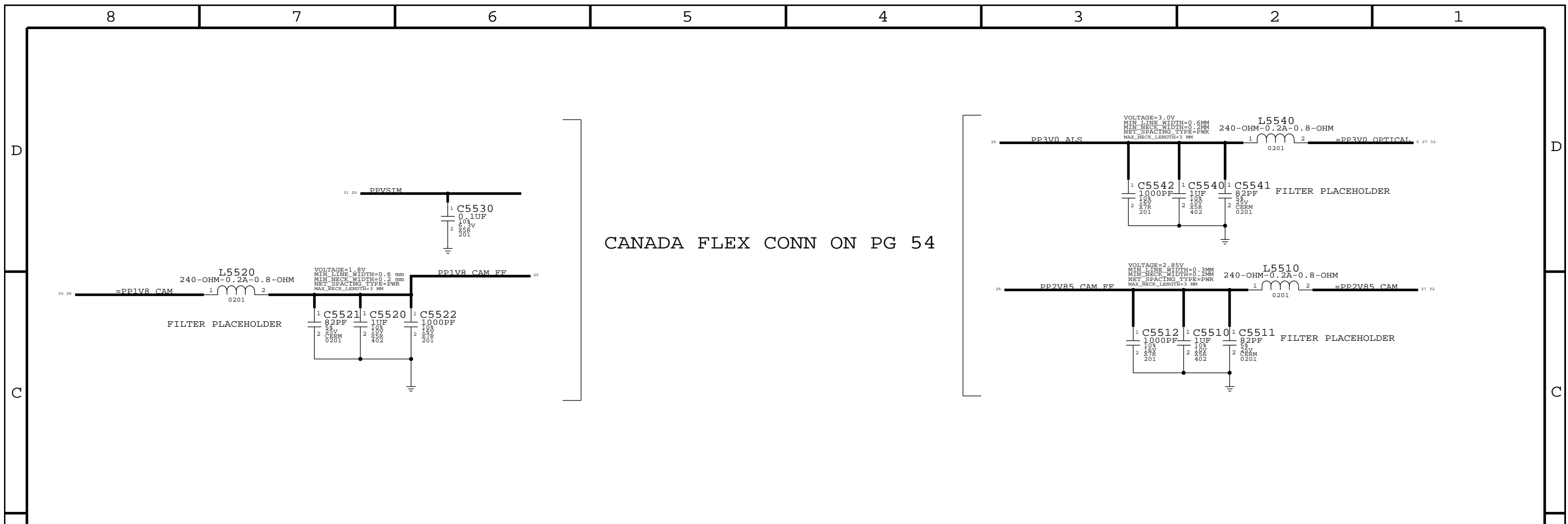
APN: 518S0817



SENSOR BOARD CONN ALIASES

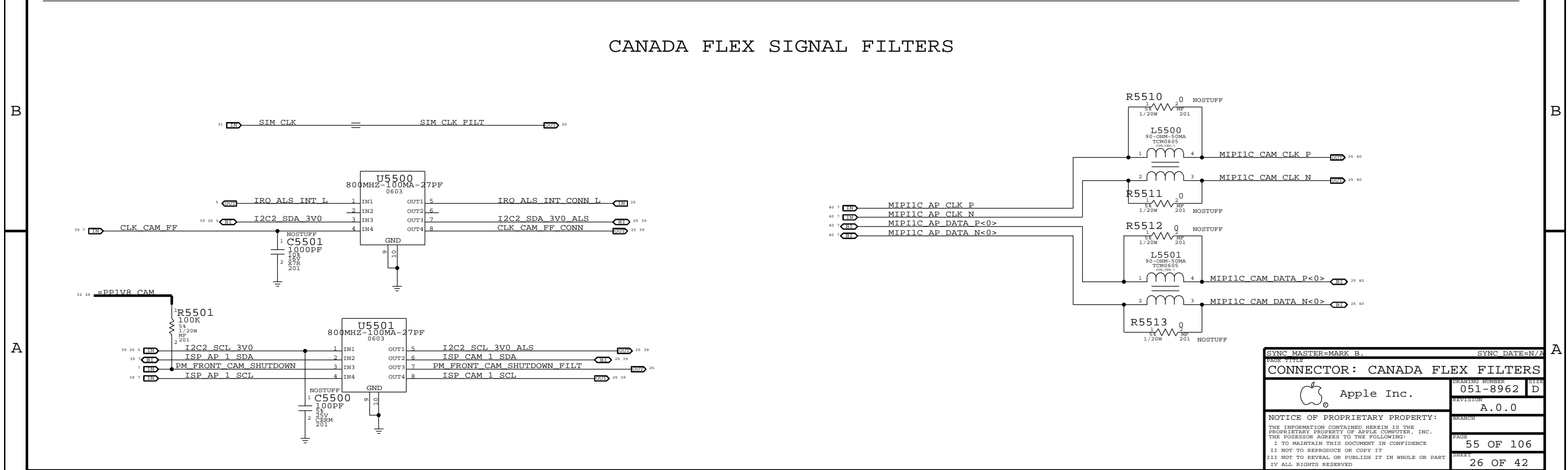
39	CLK CAM RF FILT	==	CONN CLK CAM RF FILT	27
40	MIP11C CAM DATA N<0>	MAKE_BASE-TWIR	CONN MIP11C CAM DATA N<0>	27
40	MIP11C CAM DATA P<0>	MAKE_BASE-TWIR	CONN MIP11C CAM DATA P<0>	27
40	MIP11C CAM CLK N	MAKE_BASE-TWIR	CONN MIP11C CAM CLK N	27
40	MIP11C CAM CLK P	MAKE_BASE-TWIR	CONN MIP11C CAM CLK P	27
7	PM REAR CAM SHUTDOWN	MAKE_BASE-TWIR	CONN PM REAR CAM SHUTDOWN	27
27	PP1V8 SENSOR FILT	MAKE_BASE-TWIR	CONN PP1V8 SENSOR FILT	27
27	PP2V85 CAM REAR	MAKE_BASE-TWIR	CONN PP2V85 CAM REAR	27
19	DMIC SD SENSOR	MAKE_BASE-TWIR	CONN DMIC SD SENSOR	27
19	DMIC SCLK SENSOR	MAKE_BASE-TWIR	CONN DMIC SCLK SENSOR	27
19	ISP AP 0 SCL	MAKE_BASE-TWIR	CONN ISP AP 0 SCL	27
19	ISP AP 0 SDA	MAKE_BASE-TWIR	CONN ISP AP 0 SDA	27
19	I2C2 SCL 3V0	MAKE_BASE-TWIR	CONN I2C2 SCL 3V0	27
19	I2C2 SDA 3V0	MAKE_BASE-TWIR	CONN I2C2 SDA 3V0	27
5	IRO ACCEL INT1 L	MAKE_BASE-TWIR	CONN IRO ACCEL INT1 L	27
5	IRO ACCEL INT2 L	MAKE_BASE-TWIR	CONN IRO ACCEL INT2 L	27
5	IRO GYRO INT1	MAKE_BASE-TWIR	CONN IRO GYRO INT1	27
5	IRO GYRO INT2	MAKE_BASE-TWIR	CONN IRO GYRO INT2	27
19	I2C1 SCL 1V8	MAKE_BASE-TWIR	CONN I2C1 SCL 1V8	27
19	I2C1 SDA 1V8	MAKE_BASE-TWIR	CONN I2C1 SDA 1V8	27
5	IRO HALL	MAKE_BASE-TWIR	CONN IRO HALL	27
5	IRO PROX INT L	MAKE_BASE-TWIR	CONN IRO PROX INT L	27
27	PP3V0 S2R HALL FILT	MAKE_BASE-TWIR	CONN PP3V0 S2R HALL	27
15	ONOFF L	MAKE_BASE-TWIR	CONN ONOFF FTR L	27
15	SRL L	MAKE_BASE-TWIR	CONN SRL FTR L	27
15	AUD VOL UP L	MAKE_BASE-TWIR	CONN AUD VOL UP FTR L	27
15	AUD VOL DOWN L	MAKE_BASE-TWIR	CONN AUD VOL DOWN FTR L	27
27	PP3V0 OPTICAL SENS	MAKE_BASE-TWIR	CONN PP3V0 OPTICAL SENS	27

SYNC MASTER=MARK B.		SYNC DATE=N/A	
CONNECTOR: CANADA FLEX CONN, SENSOR PANEL ALIASES			
Apple Inc.	DRAWING NUMBER	051-8962	SIZE
	REVISION	A.0.0	D
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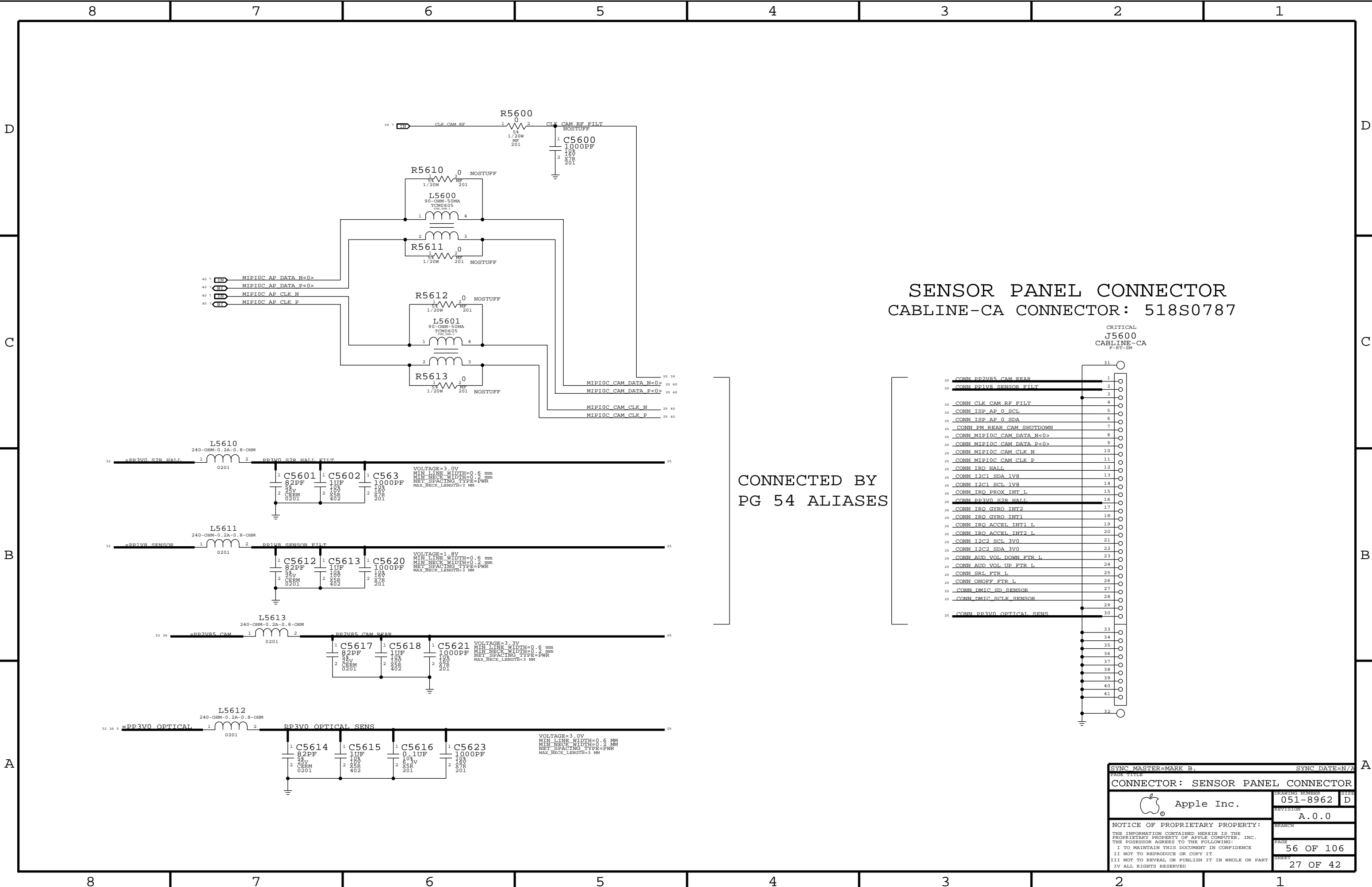


CANADA FLEX CONN ON PG 54

CANADA FLEX SIGNAL FILTERS



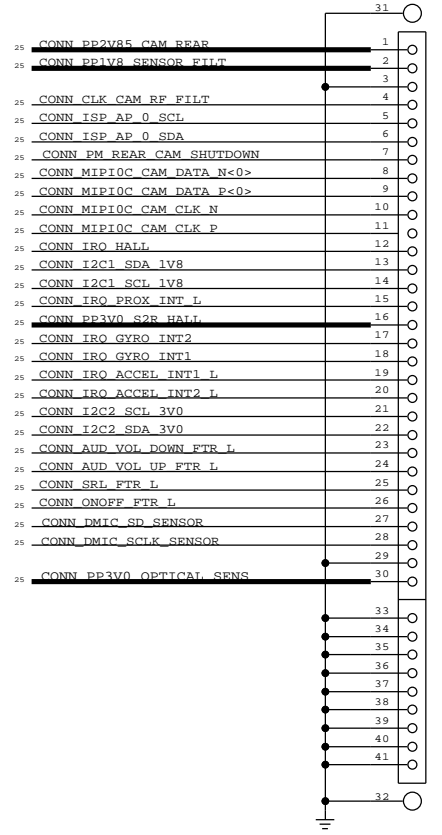
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CONNECTOR: CANADA FLEX FILTERS			
Apple Inc.	DRAWING NUMBER	051-8962	SIZE D
	REVISION	A.0.0	
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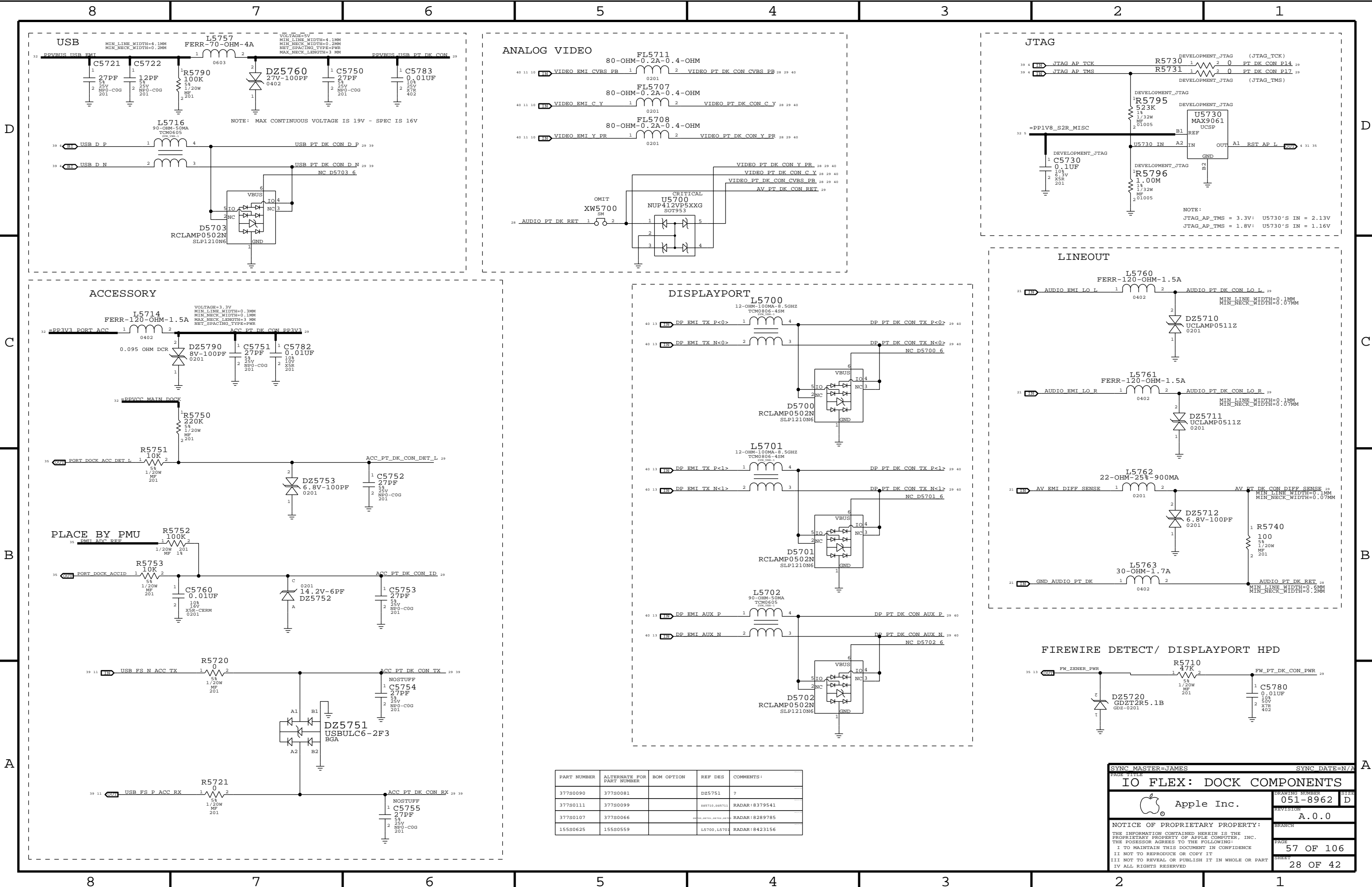
SENSOR PANEL CONNECTOR CABLINE-CA CONNECTOR: 518S0787

CRITICAL
J5600
CABLINE-CA
F-RT-SM

CONNECTED BY
PG 54 ALIASES



PAGE TITLE		SYNC DATE=N/A	
CONNECTOR: SENSOR PANEL CONNECTOR			
Apple Inc.	DRAWING NUMBER	051-8962	SIZE
	REVISION	A.0.0	D
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PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
377S0090	377S0081		DZ5751	?
377S0111	377S0099		085710,028711	RADAR:8379541
377S0107	377S0066		085710,028711	RADAR:8289785
155S0625	155S0559		L5700,L5708	RADAR:8423156

SYNC MASTER=JAMES SYNC DATE=N/A

IO FLEX: DOCK COMPONENTS

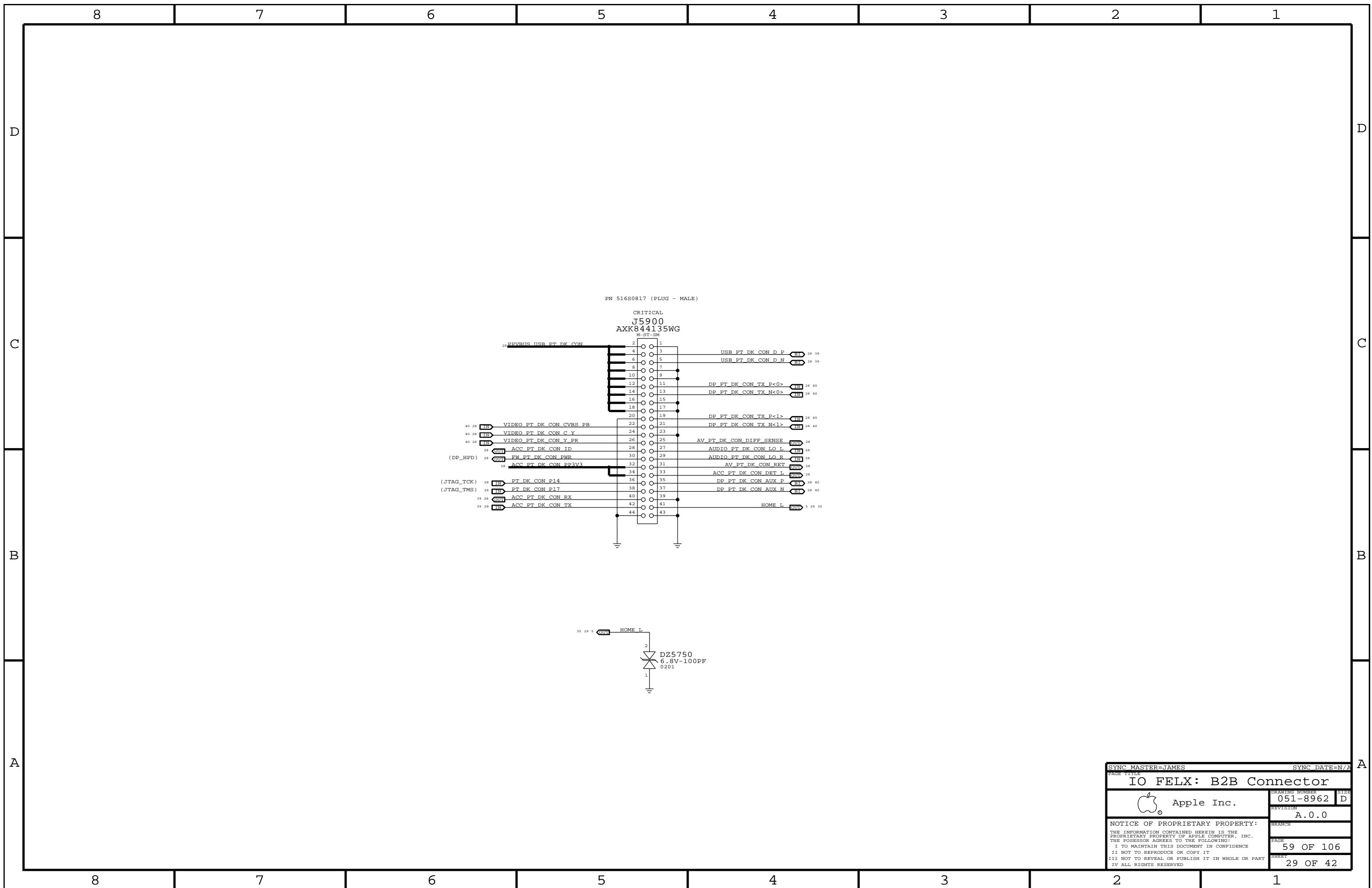
Apple Inc.

DRAWING NUMBER: 051-8962 SIZE: D

REVISION: A.0.0

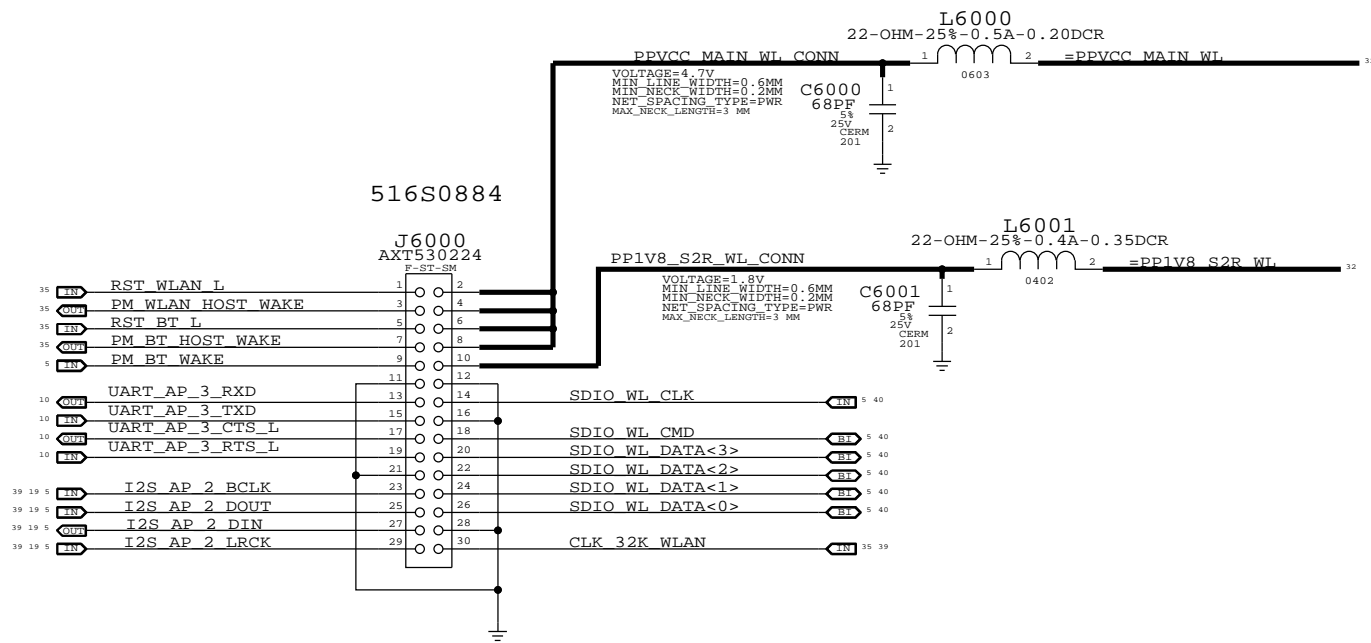
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SYNC MASTER=JAMES		SYNC DATE=N/A	
PAGE TITLE IO FELX: B2B Connector			
DRAWING NUMBER 051-8962		SIZE D	
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X23 WIFI/BT CONNECTOR



SYNC MASTER=MIKE		SYNC DATE=N/A	
CONNECTOR: X23 WIFI/BT			
Apple Inc.		DRAWING NUMBER	SIZE
		051-8962	D
		REVISION	
		A.0.0	
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X24 CELLULAR/GPS CONNECTOR



SYNC MASTER=MIKE		SYNC DATE=N/A	
CONNECTOR: X24 CELLULAR/GPS			
Apple Inc.		DRAWING NUMBER	SIZE
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		REVISION	
		A.0.0	
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POWER CONN / ALIAS

LDO RAILS

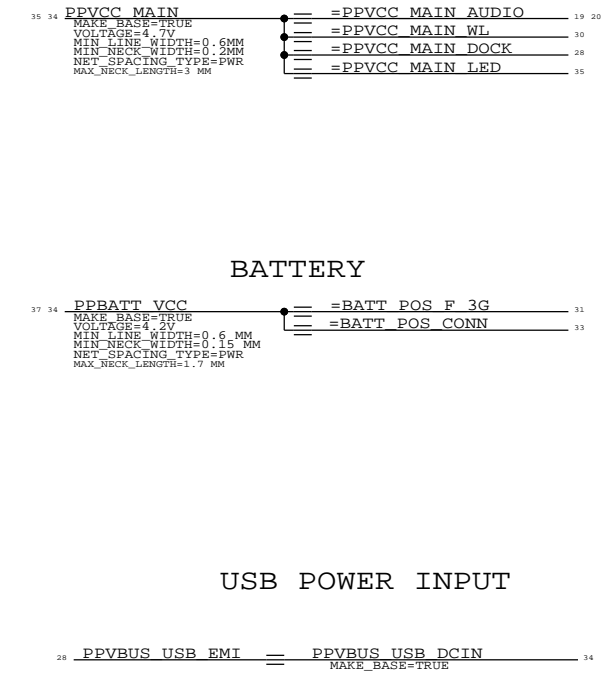
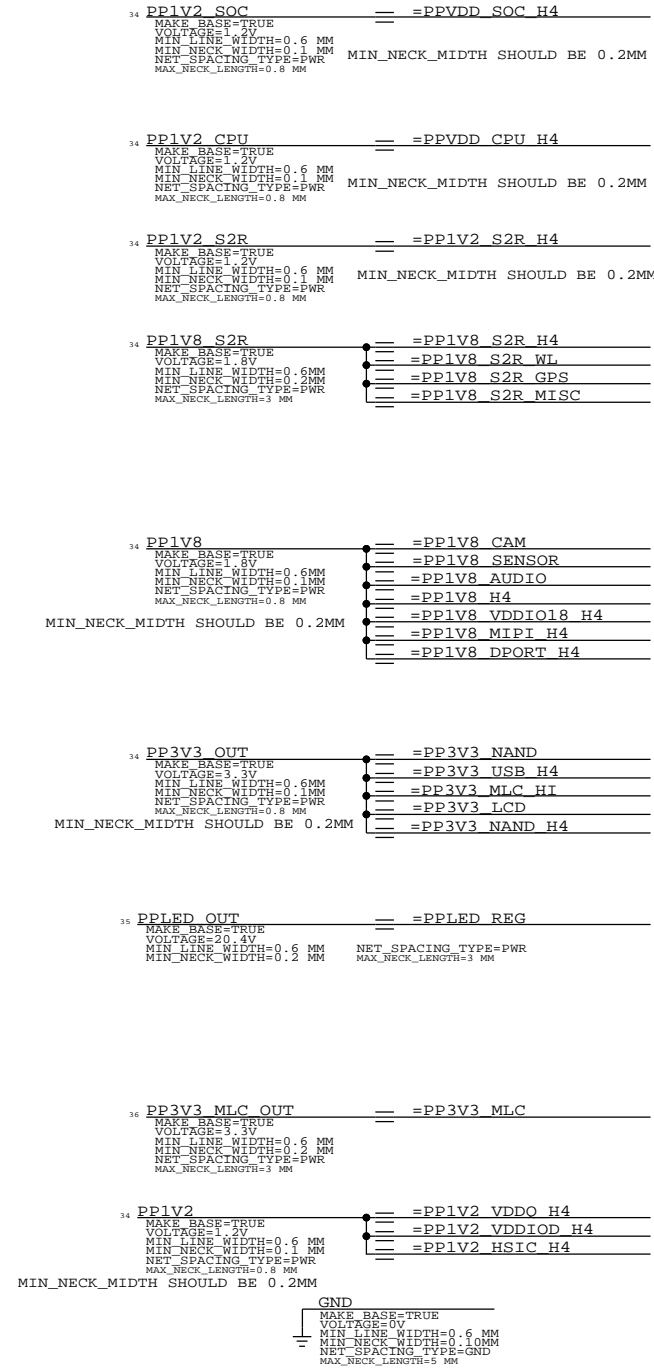
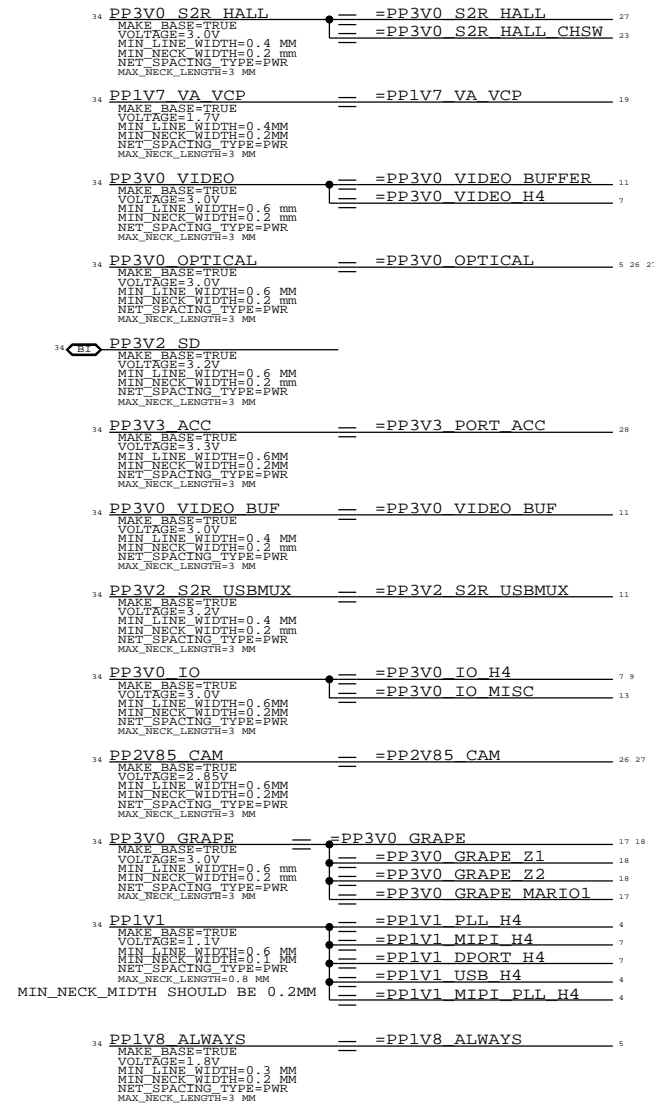
PROGRAMMABLE ON/OFF

BUCK RAILS

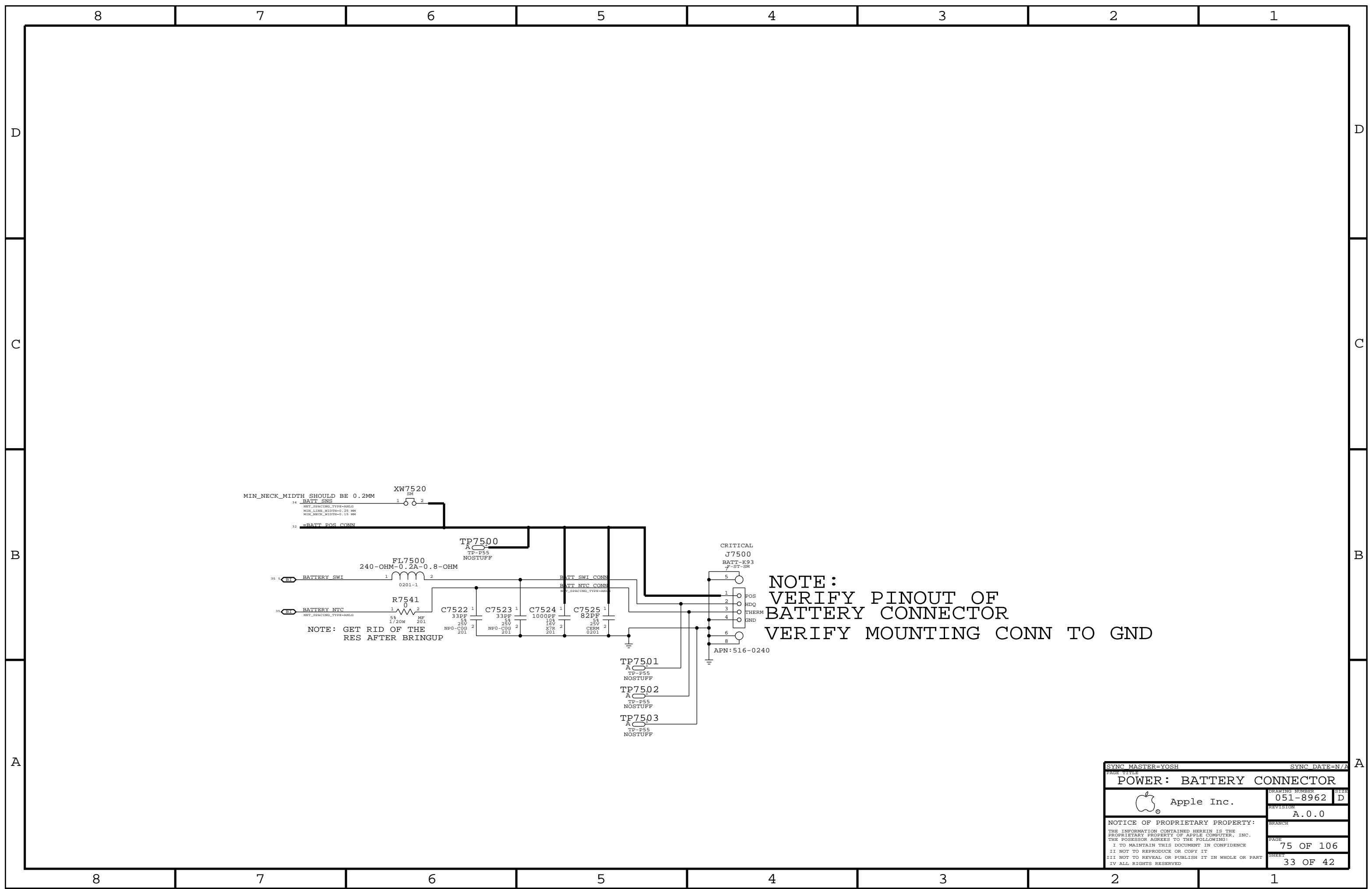
CHARGER MAIN

BATTERY

USB POWER INPUT



SYNC MASTER=YOSH		SYNC DATE=N/A	
PAGE TITLE POWER: ALIASES			
Apple Inc.		DRAWING NUMBER 051-8962	SIZE D
		REVISION A.0.0	
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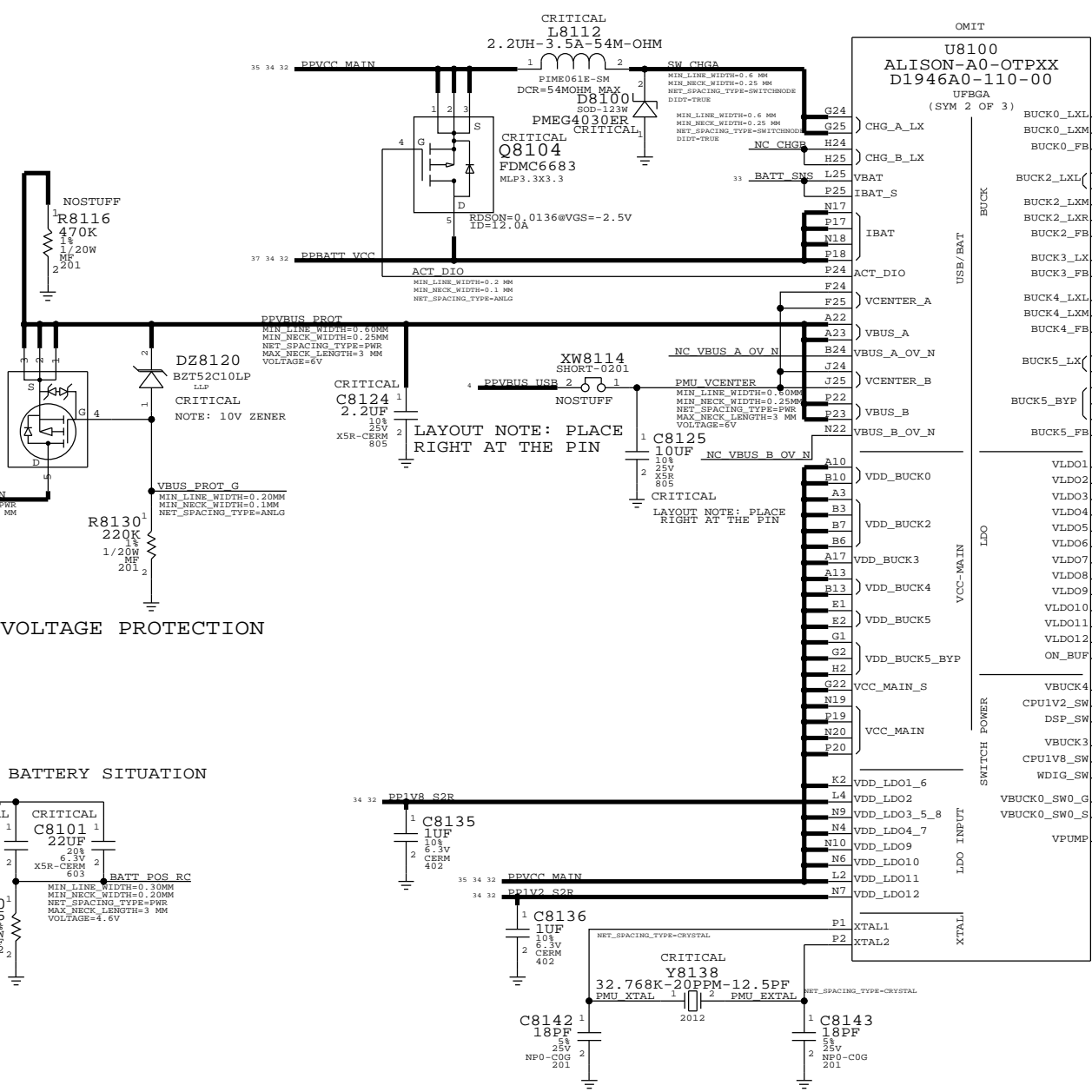
NOTE:
 VERIFY PINOUT OF
 BATTERY CONNECTOR
 VERIFY MOUNTING CONN TO GND

SYNC MASTER=YOSH		SYNC DATE=N/A	
PAGE TITLE POWER: BATTERY CONNECTOR			
DRAWING NUMBER 051-8962		SIZE D	
REVISION A.0.0		BRANCH	
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
34380542	1	IC, PMU, ALISON, D1946A2, OTPXX, UFBGA292	U8100	CRITICAL	

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
19780392	19780299		Y8138	ALT FOUNDRY

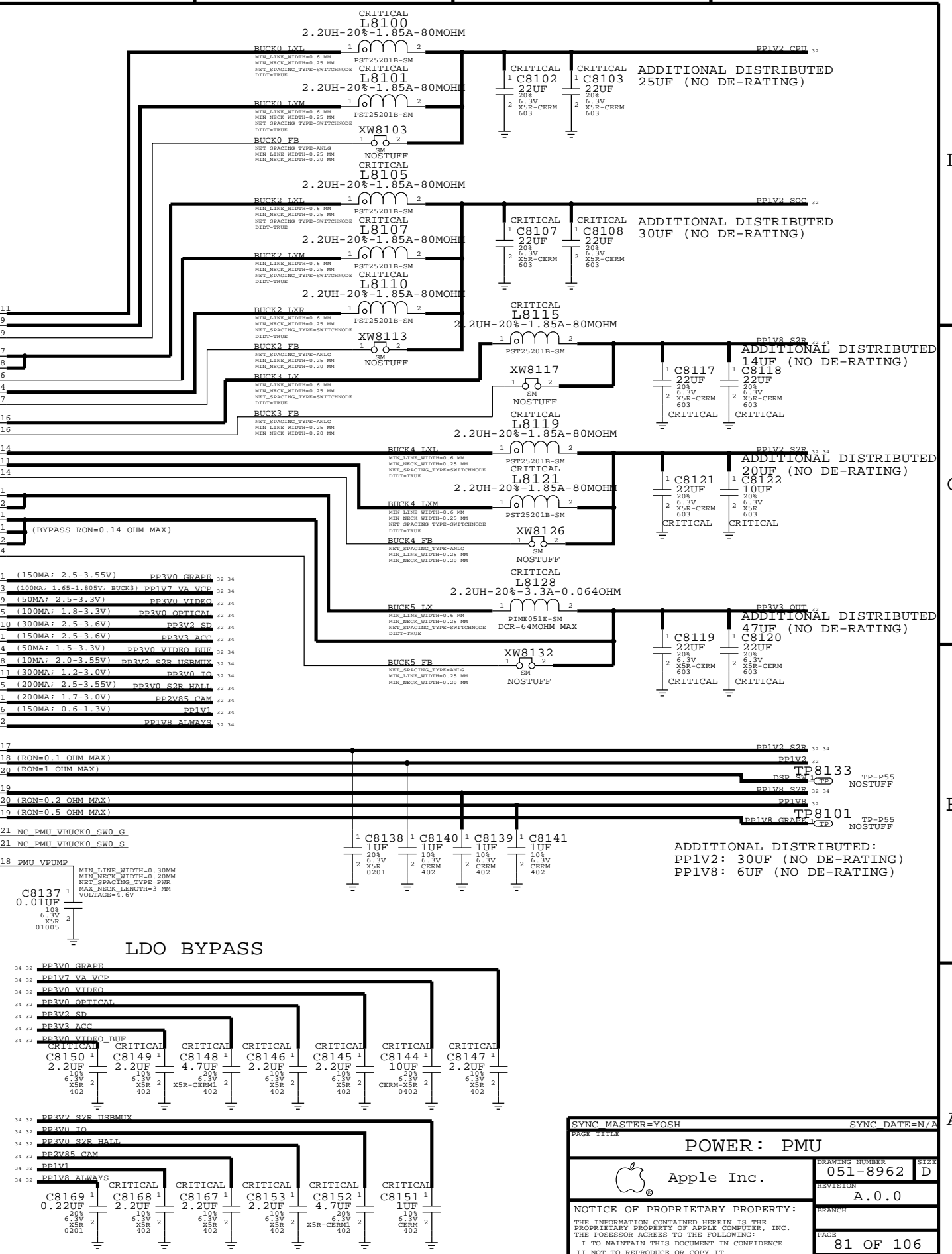
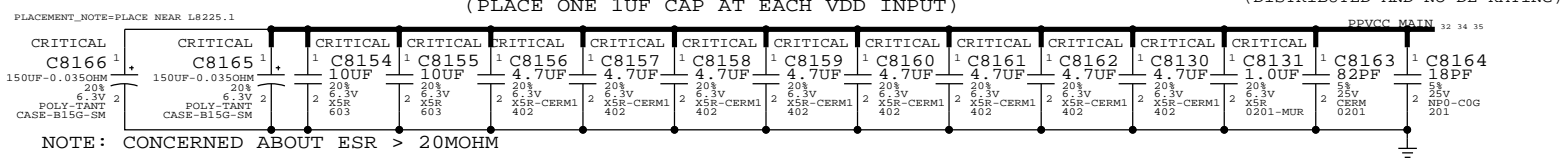
MOSFET	FDMC6676BZ
CHANNEL	P-TYPE
RDS(ON)	27 MOHM @-4.5V
IMAX	6.9 A
VGS MAX	+/- 25V



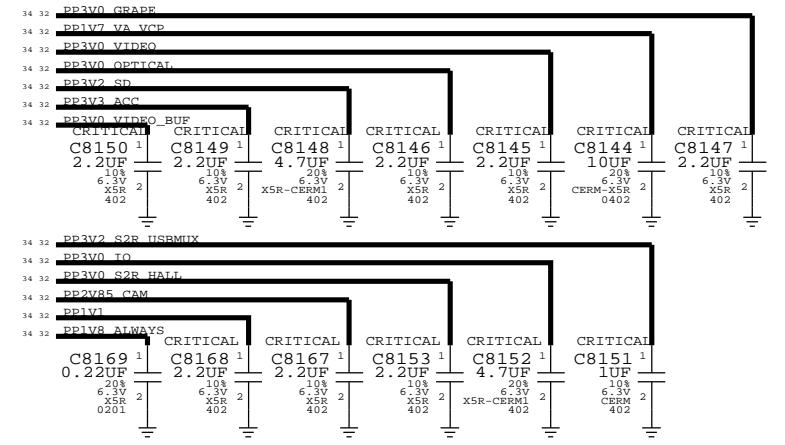
USB REVERSE VOLTAGE PROTECTION

NOTE: FOR NO BATTERY SITUATION

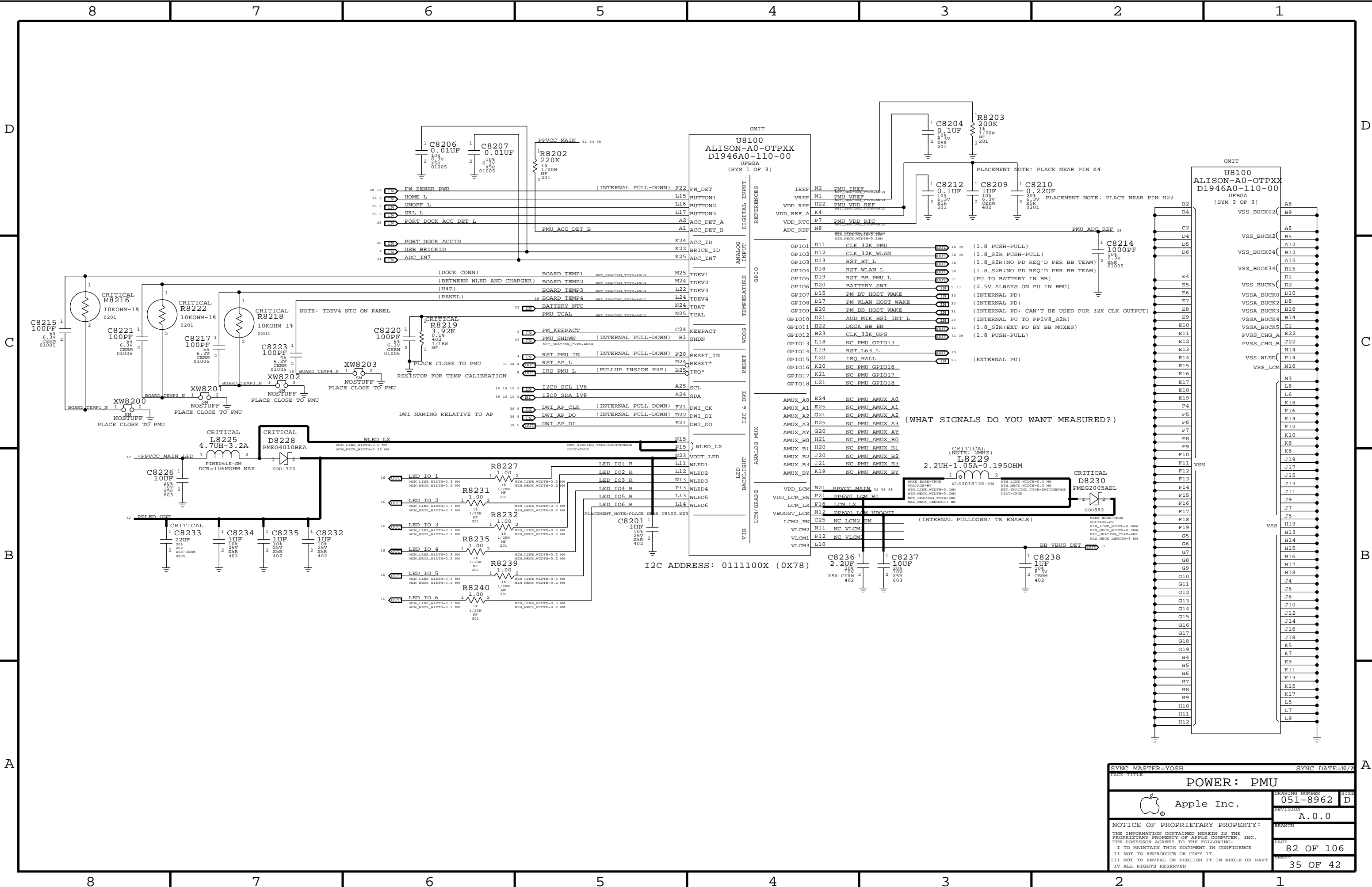
VCC_MAIN BYPASS
TOTAL CAPS = ~400UF
(DISTRIBUTED AND NO DE-RATING)



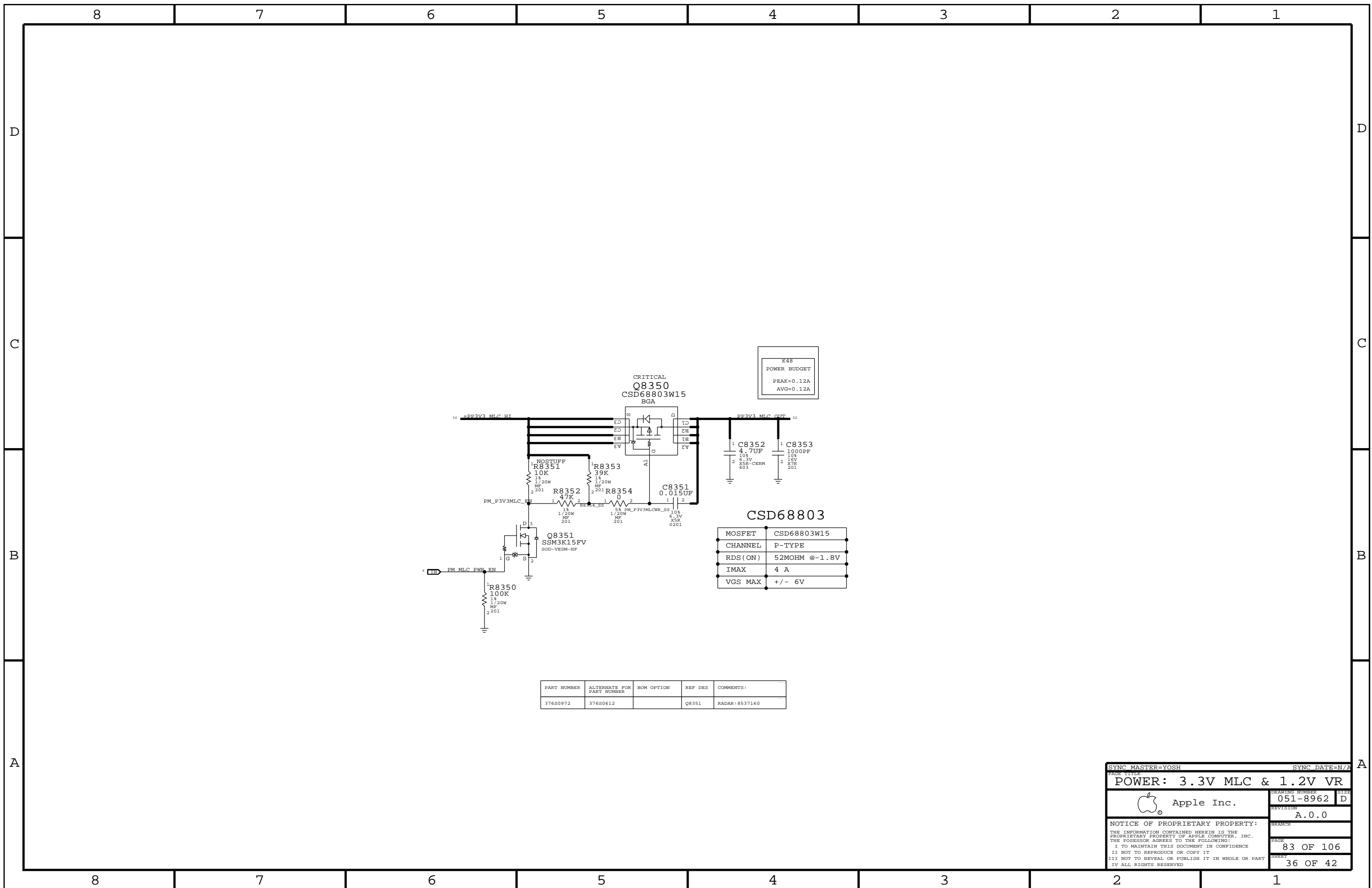
LDO BYPASS



SYNC MASTER=YOSH	SYNC DATE=N/A
POWER: PMU	
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POWER: PMU			
Apple Inc.		DRAWING NUMBER	SIZE
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		REVISION	
		PAGE	82 OF 106
		SHEET	35 OF 42



K48
POWER BUDGET
PEAK=0.12A
AVG=0.12A

CSD68803

MOSFET	CSD68803W15
CHANNEL	P-TYPE
RDS (ON)	52MOHM @-1.8V
IMAX	4 A
VGS MAX	+/- 6V

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
376S0972	376S0612		Q8351	RADAR: 8537160

SYNC MASTER=YOSH SYNC DATE=N/A

POWER: 3.3V MLC & 1.2V VR

Apple Inc.

051-8962 D

REVISION A.0.0

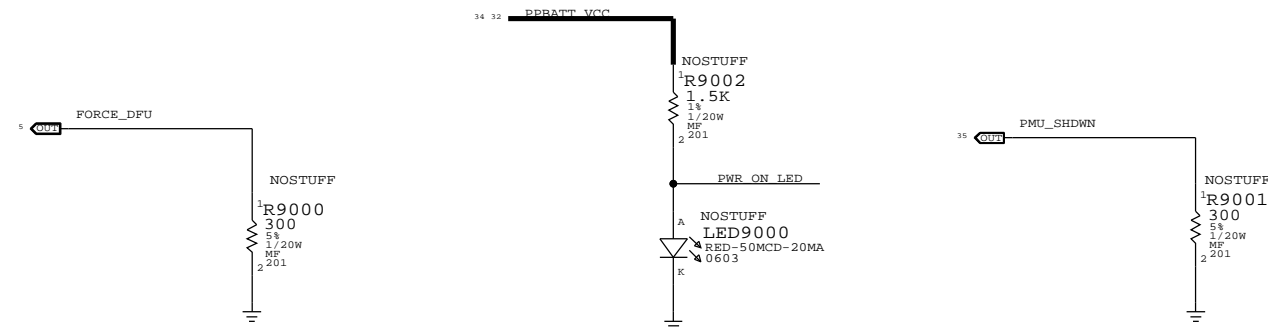
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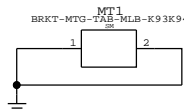
36 OF 42

DEBUG RESET ACCESS

PLACE OUTSIDE OF CAN?



LEFT AND RIGHT MOUNTING TABS



SYNC MASTER=MIKE		SYNC DATE=N/A	
PAGE TITLE DEBUG AND MISC			
DRAWING NUMBER 051-8962		SIZE D	
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8

7

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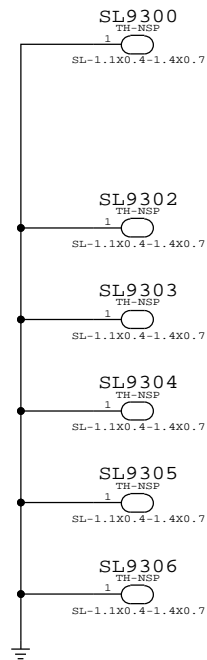
3

2

1

PLATED THROUGH HOLES

DRILL SIZE: 1.1MM X 0.4MM
PLATING SIZE: 1.4MM X 0.7MM



SYNC MASTER=MIKE		SYNC DATE=N/A	
PAGE TITLE FCT/ICT TEST/BRACKETS			
Apple Inc.		DRAWING NUMBER 051-8962	SIZE D
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		PAGE	93 OF 106
		SHEET	38 OF 42

Clock Signal Constraints

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
CLK_50S	*	50_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CLK	*	*	5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	CLK_50S	CLK	CLK		CLK 32K PMU 18 35
HE1	CLK_50S	CLK	CLK		CLK 32K WLAN 30 35
HE2	CLK_50S	CLK	CLK		CLK 32K GPS 31 35
HE3	CLK_50S	CLK	CLK		CLK CAM FF 7 26
HE4	CLK_50S	CLK	CLK		CLK CAM FF FILT 7 26
HE5	CLK_50S	CLK	CLK		CLK CAM FF CONN 25 26
HE6	CLK_50S	CLK	CLK		CLK CAM RF 7 27
HE7	CLK_50S	CLK	CLK		CLK CAM RF FILT 25 27
HE8	CLK_50S	CLK	CLK		I2S AP 0 MCK 5
HE9	CLK_50S	CLK	CLK		I2S AP 0 MCK R 5 19
HE10	CLK_50S	CLK	CLK		CLK CAM FF R 7
HE11	CLK_50S	CLK	CLK		CLK CAM RF R 7

NAND

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
NAND_50S	*	50_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
NAND	*	*	2:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	NAND_50S	NAND	NAND		F0AD<7..0> 6 12
HE1	NAND_50S	NAND	NAND		F0CE0 L 6 12
HE2	NAND_50S	NAND	NAND		F0CE1 L 6 12
HE3	NAND_50S	NAND	NAND		F0CE2 L 6 12
HE4	NAND_50S	NAND	NAND		F0CE3 L 6 12
HE5	NAND_50S	NAND	NAND		F0CE4 L 6 12
HE6	NAND_50S	NAND	NAND		F0CE5 L 6 12
HE7	NAND_50S	NAND	NAND		F0CE6 L 6 12
HE8	NAND_50S	NAND	NAND		F0CE7 L 6 12
HE9	NAND_50S	NAND	NAND		F0CLE 6 12
HE10	NAND_50S	NAND	NAND		F0ALE 6 12
HE11	NAND_50S	NAND	NAND		FORE L 6 12
HE12	NAND_50S	NAND	NAND		F0WE L 6 12
HE13	NAND_50S	NAND	NAND		F0WP L 6 12
HE14	NAND_50S	NAND	NAND		F1AD<7..0> 6 12
HE15	NAND_50S	NAND	NAND		F1CE0 L 6 12
HE16	NAND_50S	NAND	NAND		F1CE1 L 6 12
HE17	NAND_50S	NAND	NAND		F1CE2 L 6 12
HE18	NAND_50S	NAND	NAND		F1CE3 L 6 12
HE19	NAND_50S	NAND	NAND		F1CE4 L 6 12
HE20	NAND_50S	NAND	NAND		F1CE5 L 6 12
HE21	NAND_50S	NAND	NAND		F1CE6 L 6 12
HE22	NAND_50S	NAND	NAND		F1CE7 L 6 12
HE23	NAND_50S	NAND	NAND		F1CLE 6 12
HE24	NAND_50S	NAND	NAND		F1ALE 6 12
HE25	NAND_50S	NAND	NAND		F1RE L 6 12
HE26	NAND_50S	NAND	NAND		F1WE L 6 12
HE27	NAND_50S	NAND	NAND		F1WP L 6 12
HE28	NAND_50S	NAND	NAND		F2AD<7..0>
HE29	NAND_50S	NAND	NAND		F2CE0 L
HE30	NAND_50S	NAND	NAND		F2CE1 L
HE31	NAND_50S	NAND	NAND		F2CE2 L
HE32	NAND_50S	NAND	NAND		F2CE3 L
HE33	NAND_50S	NAND	NAND		F2CLE
HE34	NAND_50S	NAND	NAND		F2ALE
HE35	NAND_50S	NAND	NAND		F2RE L
HE36	NAND_50S	NAND	NAND		F2WE L
HE37	NAND_50S	NAND	NAND		F2WP L
HE38	NAND_50S	NAND	NAND		F3AD<7..0>
HE39	NAND_50S	NAND	NAND		F3CE0 L
HE40	NAND_50S	NAND	NAND		F3CE1 L
HE41	NAND_50S	NAND	NAND		F3CE2 L
HE42	NAND_50S	NAND	NAND		F3CE3 L
HE43	NAND_50S	NAND	NAND		F3CLE
HE44	NAND_50S	NAND	NAND		F3ALE
HE45	NAND_50S	NAND	NAND		F3RE L
HE46	NAND_50S	NAND	NAND		F3WE L
HE47	NAND_50S	NAND	NAND		F3WP L

JTAG

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
JTAG	*	*	2:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	JTAG	JTAG	JTAG		JTAG AP TCK 4 28
HE1	JTAG	JTAG	JTAG		JTAG AP TMS 4 28
HE2	JTAG	JTAG	JTAG		JTAG AP TDI 4 10
HE3	JTAG	JTAG	JTAG		JTAG AP TDO 4 10
HE4	JTAG	JTAG	JTAG		JTAG AP TRST L 4 10

I2C

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
I2C_50S	*	50_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
I2C	*	*	1.5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	I2C_50S	I2C	I2C		I2C1 SDA 1V8 5 25
HE1	I2C_50S	I2C	I2C		I2C1 SCL 1V8 5 25
HE2	I2C_50S	I2C	I2C		I2C0 SDA 1V8 5 10 19 35
HE3	I2C_50S	I2C	I2C		I2C0 SCL 1V8 5 10 19 35
HE4	I2C_50S	I2C	I2C		I2C2 SDA 3V0 5 25 26
HE5	I2C_50S	I2C	I2C		I2C2 SCL 3V0 5 25 26
HE6	I2C_50S	I2C	I2C		ISP AP 0 SCL 7 25
HE7	I2C_50S	I2C	I2C		ISP AP 0 SDA 7 25
HE8	I2C_50S	I2C	I2C		ISP AP 1 SCL 7 26
HE9	I2C_50S	I2C	I2C		ISP AP 1 SDA 7 26
HE10	I2C_50S	I2C	I2C		I2C2 SCL 3V0 ALS 25 26
HE11	I2C_50S	I2C	I2C		I2C2 SDA 3V0 ALS 25 26
HE12	I2C_50S	I2C	I2C		ISP CAM 1 SCL 25 26
HE13	I2C_50S	I2C	I2C		ISP CAM 1 SDA 25 26

XTAL

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CRYSTAL	*	*	5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	CRYSTAL	CRYSTAL	CRYSTAL		XTAL 24M I 4
HE1	CRYSTAL	CRYSTAL	CRYSTAL		XTAL 24M O 4
HE2	CRYSTAL	CRYSTAL	CRYSTAL		24M_O 4

VREF

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
VREF	*	*	5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	VREF	VREF	VREF		PPVREF DDR0 CA 8
HE1	VREF	VREF	VREF		PPVREF DDR0 DO 8
HE2	VREF	VREF	VREF		PPVREF DDR1 CA 8
HE3	VREF	VREF	VREF		PPVREF DDR1 DO 8

USB

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
USB_90D	*	90_OHM_DIFP

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
USB	*	*	5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	USB_90D	USB	USB		USB D P 4 28
HE1	USB_90D	USB	USB		USB D N 4 28
HE2	USB_90D	USB	USB		USB PT DK CON D P 28 29
HE3	USB_90D	USB	USB		USB PT DK CON D N 28 29
HE4	USB_90D	USB	USB		USB BB D P 11 31
HE5	USB_90D	USB	USB		USB BB D N 11 31
HE6	USB_90D	USB	USB		USB FS D P 4 11
HE7	USB_90D	USB	USB		USB FS D N 4 11
HE8	USB_90D	USB	USB		USB FS N ACC TX 11 28
HE9	USB_90D	USB	USB		USB FS P ACC RX 11 28
HE10	USB_90D	USB	USB		ACC PT DK CON TX 28 29
HE11	USB_90D	USB	USB		ACC PT DK CON RX 28 29

I2S

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
I2S_90S	*	45_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
I2S	*	*	3:1_SPACING
I2S	I2S	*	2:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	I2S_50S	I2S	I2S		I2S AP 0 BCLK 5 19
HE1	I2S_50S	I2S	I2S		I2S AP 0 LRCK 5 19
HE2	I2S_50S	I2S	I2S		I2S AP 0 DIN 5 19
HE3	I2S_50S	I2S	I2S		I2S AP 0 DOUT 5 19
HE4	I2S_50S	I2S	I2S		I63 ASP SDOUT 19
HE5	I2S_50S	I2S	I2S		I2S AP 2 BCLK 5 19 30
HE6	I2S_50S	I2S	I2S		I2S AP 2 LRCK 5 19 30
HE7	I2S_50S	I2S	I2S		I2S AP 2 DIN 5 19 30
HE8	I2S_50S	I2S	I2S		I2S AP 2 DOUT 5 19 30
HE9	I2S_50S	I2S	I2S		I63 VSP SDOUT 19
HE10	I2S_50S	I2S	I2S		I2S AP 3 BCLK 5 19
HE11	I2S_50S	I2S	I2S		I2S AP 3 LRCK 5 19
HE12	I2S_50S	I2S	I2S		I2S AP 3 DIN 5 19
HE13	I2S_50S	I2S	I2S		I2S AP 3 DOUT 5 19
HE14	I2S_50S	I2S	I2S		I63 XSP SDOUT 19

DWI

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
DWI	*	*	2:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		PHYSICAL	SPACING	
	PHYSICAL	SPACING			
HE0	DWI	DWI	DWI		DWI AP CLK 5 35
HE1	DWI	DWI	DWI		DWI AP DI 5 35
HE2	DWI	DWI	DWI		DWI AP DO 5 35

SYNC MASTER=MIKE		SYNC DATE=N/A	
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ANALOG VIDEO CONSTRAINTS

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
VID_50S	*	Y	=50_OHM_SE	=50_OHM_SE	=50_OHM_SE	=STANDARD	=STANDARD

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
ANALOG_VIDEO	*	*	5:1_SPACING
ANALOG_VIDEO	ANALOG_VIDEO	*	3:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E230	VID_50S	ANALOG_VIDEO	DAC AP OUT1	7 11		
E230	VID_50S	ANALOG_VIDEO	DAC AP OUT2	7 11		
E230	VID_50S	ANALOG_VIDEO	DAC AP OUT3	7 11		
E230	VID_50S	ANALOG_VIDEO	BUF C Y	11		
E230	VID_50S	ANALOG_VIDEO	BUF CVBS PB	11		
E230	VID_50S	ANALOG_VIDEO	BUF Y PR	11		
E230	VID_50S	ANALOG_VIDEO	VIDEO EMI CVBS_PB	10 11 28		
E230	VID_50S	ANALOG_VIDEO	VIDEO EMI C Y	10 11 28		
E230	VID_50S	ANALOG_VIDEO	VIDEO EMI Y PR	10 11 28		
E230	VID_50S	ANALOG_VIDEO	VIDEO PT DK CON CVBS_PB	28 29		
E230	VID_50S	ANALOG_VIDEO	VIDEO PT DK CON C Y	28 29		
E230	VID_50S	ANALOG_VIDEO	VIDEO PT DK CON Y PR	28 29		

LVDS

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
LVDS_100D	*	90_OHM_DIFF

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
LVDS	*	*	4:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E240	LVDS_100D	LVDS	LVDS DATA P<2..0>	14 16		
E240	LVDS_100D	LVDS	LVDS DATA N<2..0>	14 16		
E240	LVDS_100D	LVDS	LVDS DATA CONN_P<2..0>	16		
E240	LVDS_100D	LVDS	LVDS DATA CONN_N<2..0>	16		
E240	LVDS_100D	LVDS	LVDS CLK P	14 16		
E240	LVDS_100D	LVDS	LVDS CLK N	14 16		
E240	LVDS_100D	LVDS	LVDS CLK CONN_P	16		
E240	LVDS_100D	LVDS	LVDS CLK CONN_N	16		

DISPLAYPORT

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
DP_100D	*	90_OHM_DIFF

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
DP	*	*	5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E244	DP_100D	DP	DP AP TX P<0>	7 10 13		
E244	DP_100D	DP	DP AP TX N<0>	7 10 13		
E244	DP_100D	DP	DP AP TX P<1>	7 10 13		
E244	DP_100D	DP	DP AP TX N<1>	7 10 13		
E244	DP_100D	DP	DP AP AUX P	7 13		
E244	DP_100D	DP	DP AP AUX N	7 13		
E244	DP_100D	DP	DP EMI TX P<0>	13 28		
E244	DP_100D	DP	DP EMI TX N<0>	13 28		
E244	DP_100D	DP	DP EMI TX P<1>	13 28		
E244	DP_100D	DP	DP EMI TX N<1>	13 28		
E244	DP_100D	DP	DP EMI AUX P	13 28		
E244	DP_100D	DP	DP EMI AUX N	13 28		
E244	DP_100D	DP	DP PT DK CON_TX_P<0>	28 29		
E244	DP_100D	DP	DP PT DK CON_TX_N<0>	28 29		
E244	DP_100D	DP	DP PT DK CON_TX_P<1>	28 29		
E244	DP_100D	DP	DP PT DK CON_TX_N<1>	28 29		
E244	DP_100D	DP	DP PT DK CON_AUX_P	28 29		
E244	DP_100D	DP	DP PT DK CON_AUX_N	28 29		

MIPI

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
MIPI_100D	*	90_OHM_DIFF

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MIPI	*	*	4:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E248	MIPI_100D	MIPI	MIPI AP DATA P<0>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA N<0>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA P<1>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA N<1>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA P<2>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA N<2>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA P<3>	7 14		
E248	MIPI_100D	MIPI	MIPI AP DATA N<3>	7 14		
E248	MIPI_100D	MIPI	MIPI AP CLK P	7 14		
E248	MIPI_100D	MIPI	MIPI AP CLK N	7 14		
E248	MIPI_100D	MIPI	MIPI OC AP DATA P<0>	7 27		
E248	MIPI_100D	MIPI	MIPI OC AP DATA N<0>	7 27		
E248	MIPI_100D	MIPI	MIPI OC AP CLK P	7 27		
E248	MIPI_100D	MIPI	MIPI OC AP CLK N	7 27		
E248	MIPI_100D	MIPI	MIPI OC CAM DATA P<0>	25 27		
E248	MIPI_100D	MIPI	MIPI OC CAM DATA N<0>	25 27		
E248	MIPI_100D	MIPI	MIPI OC CAM CLK P	25 27		
E248	MIPI_100D	MIPI	MIPI OC CAM CLK N	25 27		
E248	MIPI_100D	MIPI	MIPI IC AP DATA P<0>	7 26		
E248	MIPI_100D	MIPI	MIPI IC AP DATA N<0>	7 26		
E248	MIPI_100D	MIPI	MIPI IC AP CLK P	7 26		
E248	MIPI_100D	MIPI	MIPI IC AP CLK N	7 26		
E248	MIPI_100D	MIPI	MIPI IC CAM DATA P<0>	25 26		
E248	MIPI_100D	MIPI	MIPI IC CAM DATA N<0>	25 26		
E248	MIPI_100D	MIPI	MIPI IC CAM CLK P	25 26		
E248	MIPI_100D	MIPI	MIPI IC CAM CLK N	25 26		

AUDIO/SPEAKER

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
AUDIO	*	1:1_DIFFPAIR
SPEAKER	*	SPEAKER

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
AUDIO	*	*	3:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E250	AUDIO	AUDIO	LEFT CH OUT P	19 20		
E250	AUDIO	AUDIO	LEFT CH OUT REF	19 20		
E250	AUDIO	AUDIO	LEFT CH P	20		
E250	AUDIO	AUDIO	SSM2375 L IN P	20		
E250	AUDIO	AUDIO	SSM2375 L IN N	20		
E250	AUDIO	AUDIO	RIGHT CH OUT P	19 20		
E250	AUDIO	AUDIO	RIGHT CH OUT REF	19 20		
E250	AUDIO	AUDIO	RIGHT CH P	20		
E250	AUDIO	AUDIO	SSM2375 R IN P	20		
E250	AUDIO	AUDIO	SSM2375 R IN N	20		
E250	AUDIO	AUDIO	EXT MIC P	19 23		
E250	AUDIO	AUDIO	EXT MIC REF	19 23		

SDIO

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
SDIO_50S	*	50_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
SDIO	*	*	2:1_SPACING
SDIO_CLK	*	*	4:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E252	SDIO_50S	SDIO	SDIO WL CLK	5 30		
E252	SDIO_50S	SDIO	SDIO WL CLK R	5 30		
E252	SDIO_50S	SDIO	SDIO WL CMD	5 30		
E252	SDIO_50S	SDIO	SDIO WL DATA<3..0>	5 30		

SPI

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
SPI_50S	*	45_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
SPI	*	*	2:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		SPACING	PHYSICAL	NET_TYPE	SPACING
	PHYSICAL	SPACING				
E254	SPI_50S	SPT	SPI GRAPE MISO	5 17		
E254	SPI_50S	SPT	SPI GRAPE MOSI	5 17		
E254	SPI_50S	SPT	SPI GRAPE SCLK	5 17		
E254	SPI_50S	SPT	SPI GRAPE CS L	5 17		
E254	SPI_50S	SPT	SPI IPC MISO	5 31		
E254	SPI_50S	SPT	SPI IPC MOSI	5 31		
E254	SPI_50S	SPT	SPI IPC SCLK	5 31		
E254	SPI_50S	SPT	SPI IPC MRDY	5 31		

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MLB CONSTRAINTS

BOARD LAYERS	BOARD AREAS	BOARD UNITS (MIL OR MM)	ALLEGRO VERSION
TOP, ISL2, ISL3, ISL4, ISL5, ISL6, ISL7, ISL8, ISL9, BOTTOM	NO_TYPE, BGA, BGA06-06	MM	15.2

PHYSICAL CONSTRAINTS

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	=45_OHM_SE	=45_OHM_SE	30 MM	0 MM	0 MM
STANDARD	*	Y	=DEFAULT	=DEFAULT	12.7 MM	=DEFAULT	=DEFAULT

SINGLE-ENDED PHYSICAL RULES 45 OHMS

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
45_OHM_SE	ISL2, ISL3, ISL8, ISL9	Y	0.055 MM	0.055 MM	3.0 MM		
45_OHM_SE	ISL4, ISL5, ISL6, ISL7	Y	0.060 MM	0.060 MM	3.0 MM		
45_OHM_SE	*	N	0.060 MM	0.060 MM	3.0 MM		

50 OHMS

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	0.085 MM	0.085 MM	3.0 MM		
50_OHM_SE	*	N	0.050 MM	0.050 MM	3.0 MM		

50 OHMS - CLEAR ON LAYER 2 AND 5

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_RF	TOP	Y	0.240 MM	0.240 MM	3.0 MM		
50_OHM_SE	ISL4	Y	0.060 MM	0.060 MM	3.0 MM		

50 OHMS - CLEAR ON TOP AND BOTTOM

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	ISL2, ISL9	Y	0.090 MM	0.090 MM	3.0 MM		

DIFFERENTIAL PAIR PHYSICAL RULES

100 OHMS

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
100_OHM_DIFF	TOP, BOTTOM	Y	0.076 MM	0.076 MM		0.210 MM	0.210 MM
100_OHM_DIFF	N	Y	0.057 MM	0.057 MM	=STANDARD	0.300 MM	0.300 MM

90 OHMS

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	TOP, BOTTOM	Y	0.095 MM	0.095 MM		0.200 MM	0.200 MM
90_OHM_DIFF	ISL2, ISL3, ISL8, ISL9	Y	0.054 MM	0.054 MM	=STANDARD	0.200 MM	0.100 MM
90_OHM_DIFF	ISL4, ISL5, ISL6, ISL7	Y	0.060 MM	0.060 MM	=STANDARD	0.200 MM	0.100 MM

AUDIO PHYSICAL RULES

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
1:1_DIFFPAIR	*	Y	=STANDARD	=STANDARD	=STANDARD	0.08 MM	0.08 MM
SPEAKER	*	Y	0.3 MM	0.19MM	10 MM	0.08 MM	0.08 MM

BGA AREA PHYSICAL RULES

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
*	BGA	BGA_PHY

PHYSICAL_RULE_SET	LAYER	ALLOW ROUTE ON LAYER?	MINIMUM LINE WIDTH	MINIMUM NECK WIDTH	MAXIMUM NECK LENGTH	DIFFPAIR PRIMARY GAP	DIFFPAIR NECK GAP
BGA_PHY	*	Y	0.060 MM	0.060 MM	=STANDARD	0.076 MM	0.075 MM

SPACING CONSTRAINTS

DEFAULT/BGA SPACING RULES

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DEFAULT	*	0.08 MM	?
STANDARD	*	=DEFAULT	?
BGA_SPA	*	=DEFAULT	?

REGULAR SPACING RULES

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1:1_SPACING	*	0.060 MM	?
0P08_SPACING	*	0.080 MM	?
1.5:1_SPACING	*	0.090 MM	?
2:1_SPACING	*	0.120 MM	?
2.5:1_SPACING	*	0.150 MM	?
3:1_SPACING	*	0.180 MM	?
4:1_SPACING	*	0.240 MM	?
5:1_SPACING	*	0.300 MM	?
0P5MM_SPACING	*	0.5 MM	?
0P64MM_SPACING	*	0.64 MM	?

*NOTE: ASSUMING 0.060MM DIELECTRIC THICKNESS

POWER/GND SPACING RULES

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
PWR_P1SPACING	*	0.1 MM	900
GND_P1SPACING	*	0.1 MM	950
SWITCHNODE	*	0.5 MM	1000
SWITCHNODE	TOP, BOTTOM	0.2 MM	1000

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
*	*	BGA	BGA_SPA
CLK	*	BGA	BGA_SPA
PWR	*	*	PWR_P1SPACING
GND	*	*	GND_P1SPACING
SWITCHNODE	*	*	SWITCHNODE
ANLG	*	*	3:1_SPACING

NOTES:

- 0.075 MM ~ 3 MIL
- 0.089 MM ~ 3.5 MIL
- 0.102 MM ~ 4 MIL
- 0.114 MM ~ 4.5 MIL
- 0.125 MM ~ 5 MIL
- 0.140 MM ~ 5.5 MIL
- 0.15 MM ~ 6 MIL
- 0.18 MM ~ 7 MIL
- 0.2 MM ~ 8 MIL
- 0.25 MM ~ 10 MIL
- 0.3 MM ~ 12 MIL
- 0.33 MM ~ 13 MIL
- 0.4 MM ~ 16 MIL
- 1.0 MM = 39.37 MIL

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