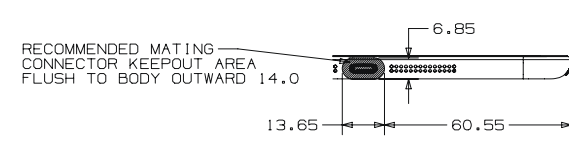
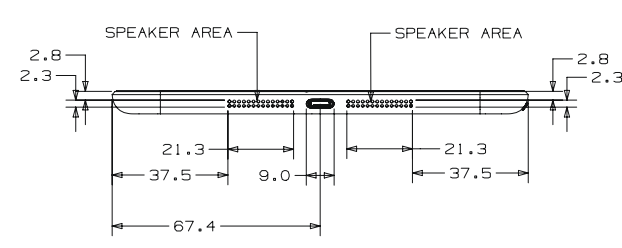
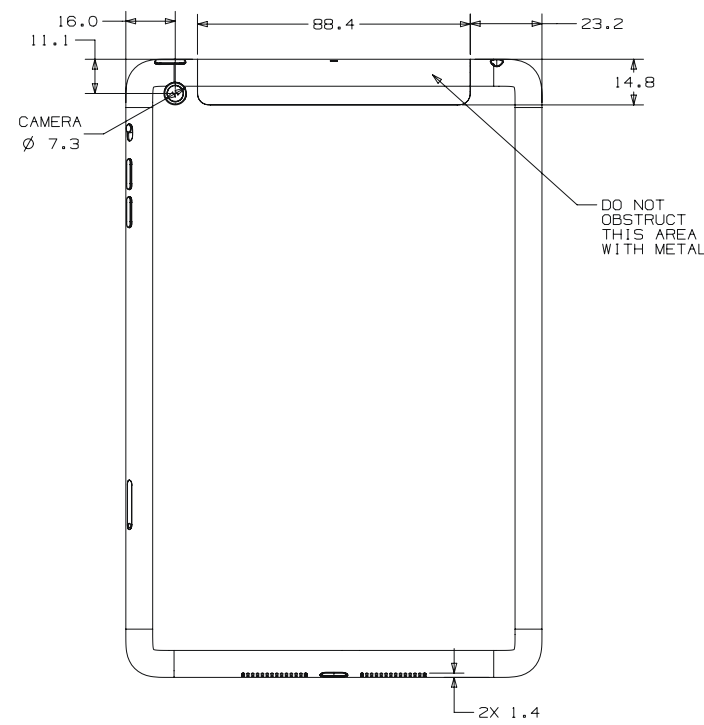
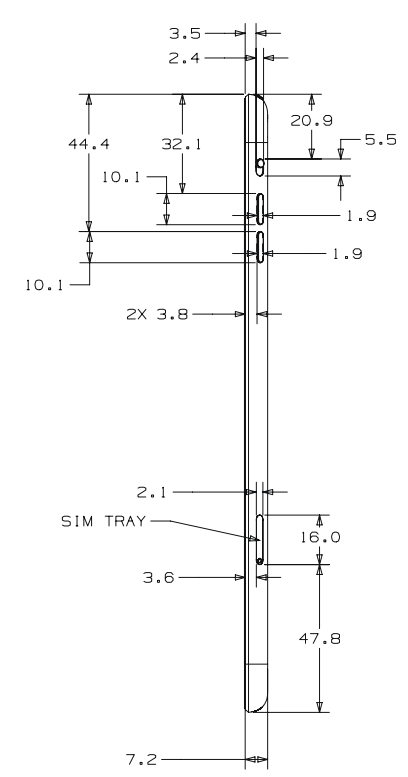
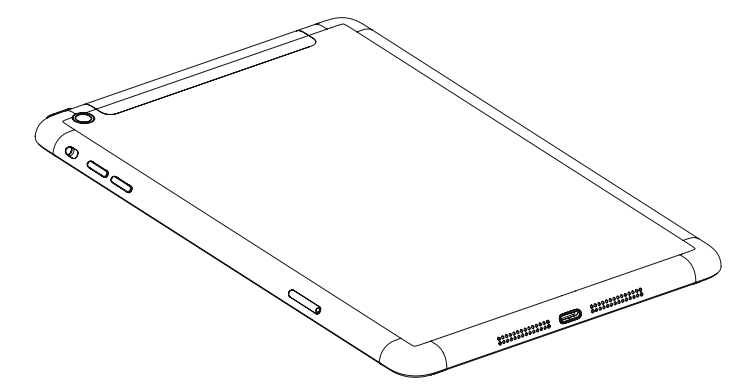
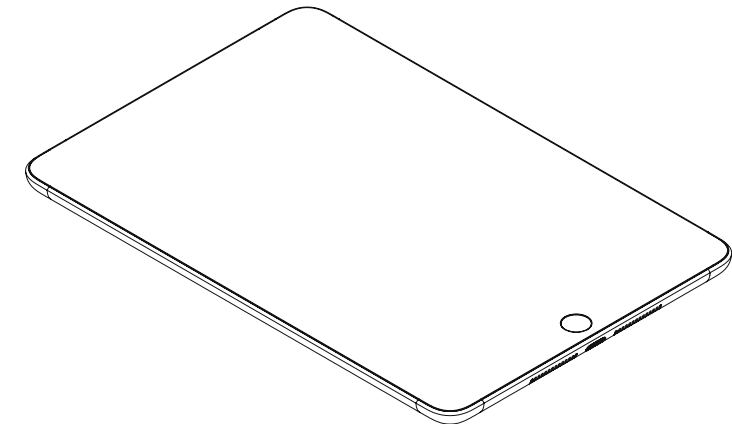
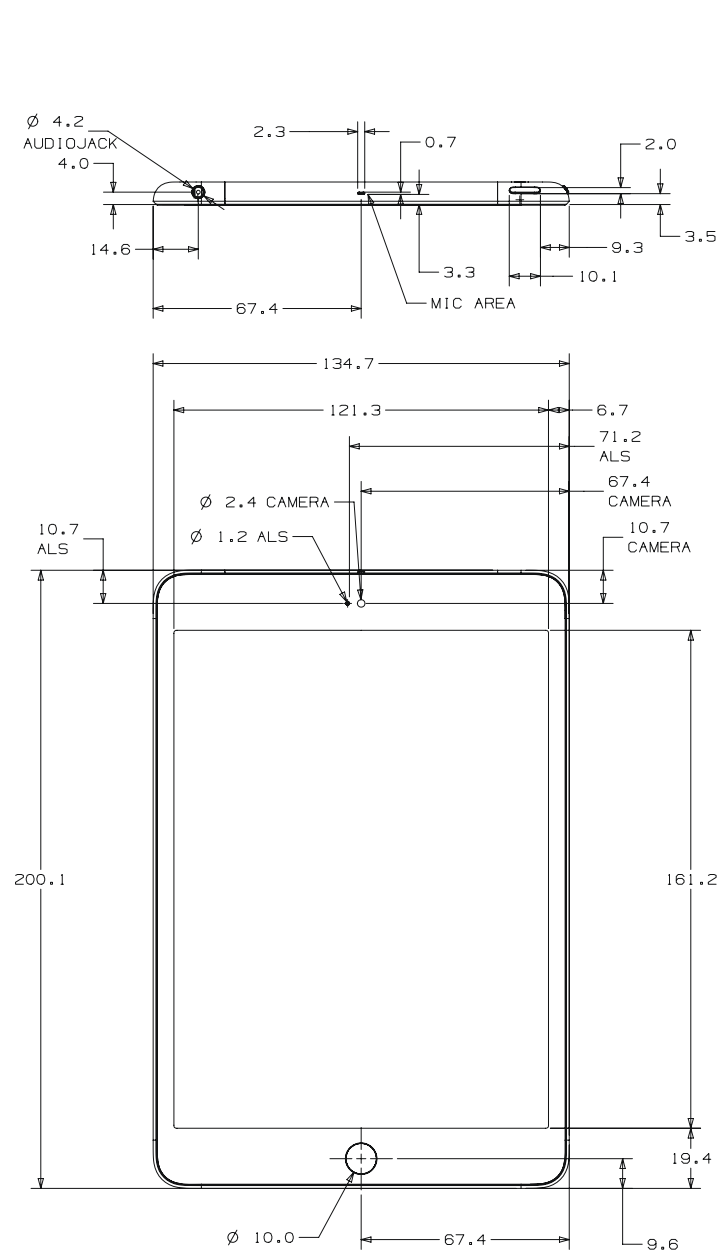


NOTES: (UNLESS OTHERWISE SPECIFIED)

REV	EDD#	DESCRIPTION OF REVISION

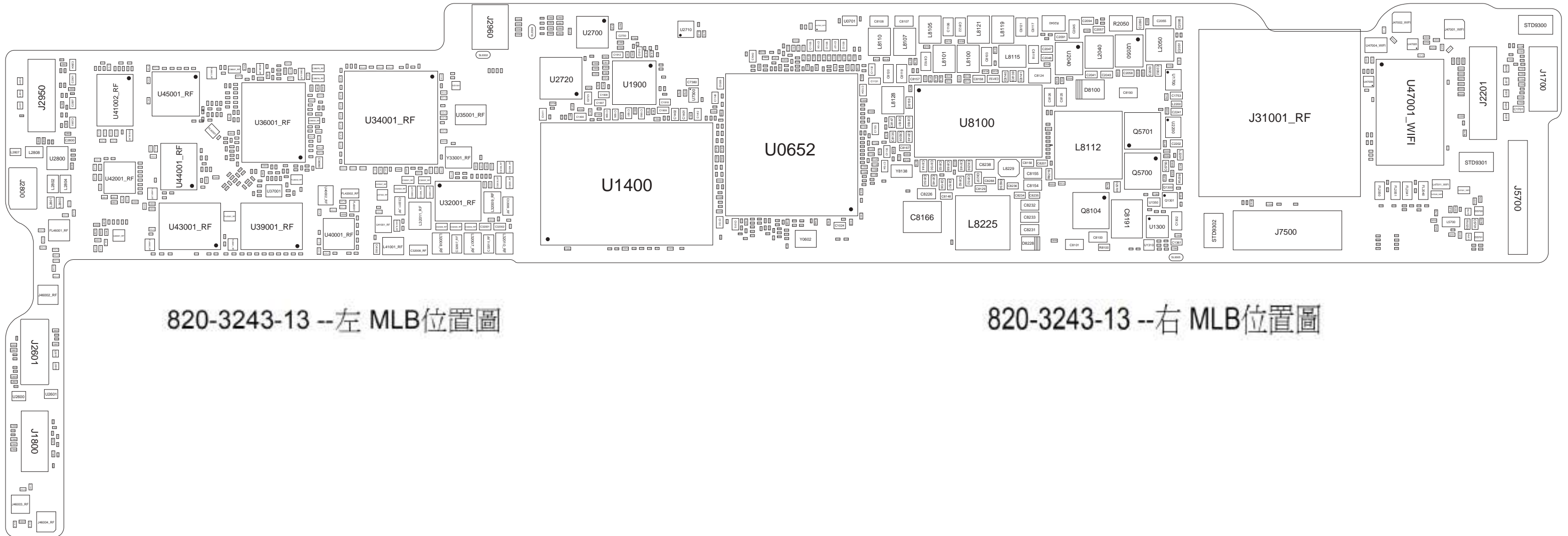


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DESIGNER APPLE INC.	DATE	TITLE IPAD MINI WITH WI-FI + 4G	
DIMENSIONS ARE IN MILLIMETERS		DRAWING NUMBER	
TOLERANCES		REV.	
X.X	±0.2		
X.XX	±0.10		
X.XXX	±0.050		
ANGLES	±0.5°		
DO NOT SCALE DRAWINGS			
THIRD ANGLE PROJECTION	SIZE D	SCALE NONE	SHT 1 OF 1

Diesel157

Diesel157

[www.mobile-files.com](http://www.mobile-files.com)



Diesel157

Diesel157

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
13	0001520462	ENGINEERING RELEASED		2012-07-02

# X123 MAIN LOGIC BOARD

DVT  
 LAST\_MODIFIED=Wed Jun 27 16:39:53 2012

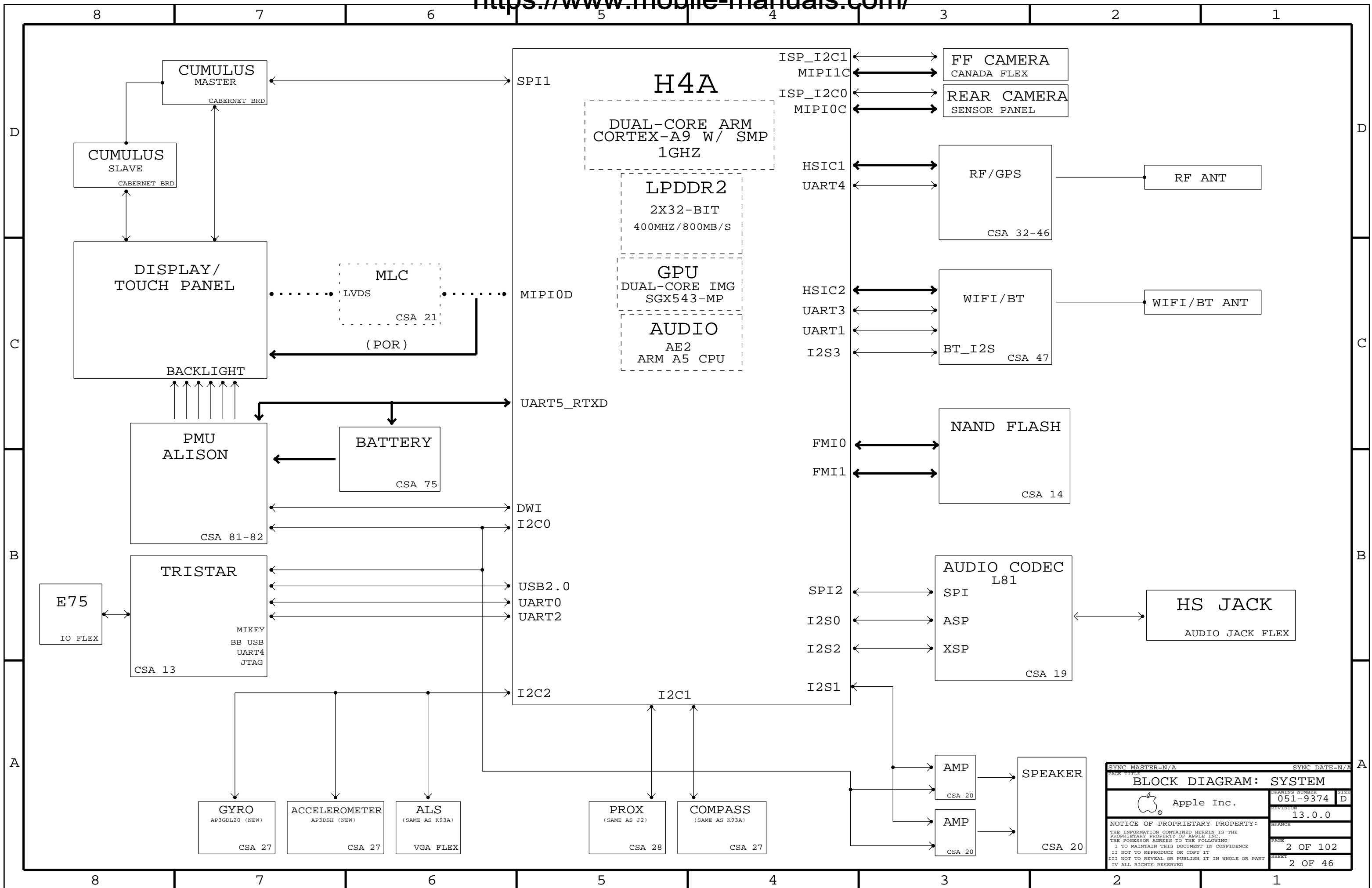
SCH AND BOARD PART NUMBERS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
051-9374	1	SCH,MLB,X123	SCH1	
820-3243	1	PCB,MLB,X123	PCB1	

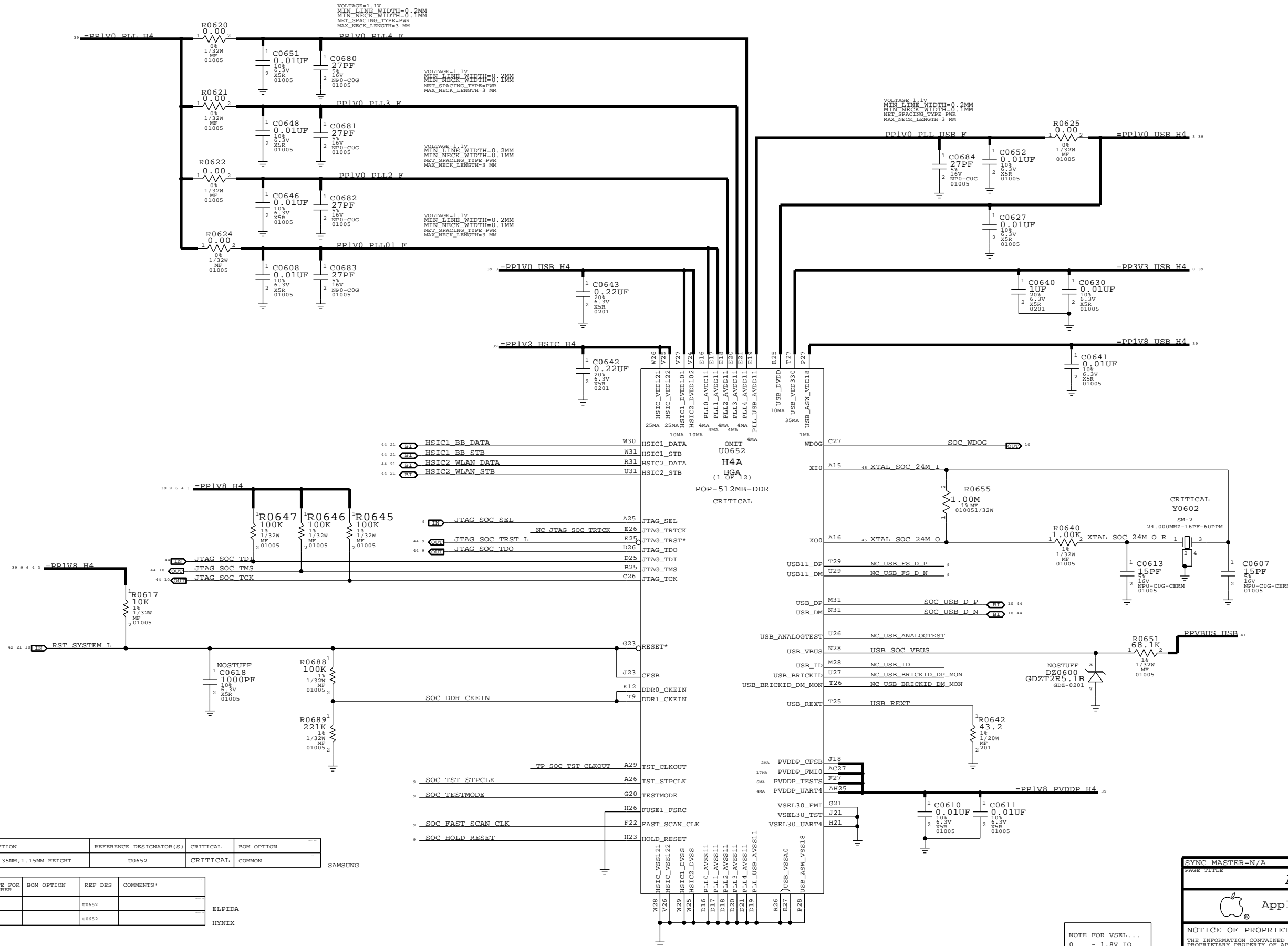
PDF	CSA	CONTENTS	SYNC MASTER	DATE
1	1	TABLE OF CONTENTS	N/A	N/A
2	2	BLOCK DIAGRAM: SYSTEM	N/A	N/A
3	6	AP: MAIN	N/A	04/18/2011
4	7	AP: I/Os	N/A	05/05/2011
5	8	AP: FLASH MEMORY INTERFACE	N/A	04/18/2011
6	9	AP: TV/DP/MIPI/CAMERA	MLB	05/04/2012
7	10	AP: PWR	N/A	04/18/2011
8	11	AP: PWR	N/A	04/18/2011
9	12	AP: MISC & ALIASES	N/A	04/11/2011
10	13	E75 SUPPORT	N/A	N/A
11	14	NAND STORAGE	MLB	05/04/2012
12	17	TOUCH: FLEX CONNECTOR	N/A	06/21/2010
13	18	AUDIO JACK FLEX CONN	N/A	03/31/2011
14	19	AUDIO: L81 CODEC	KAVITHA	01/18/2012
15	20	AUDIO: CS35L19A AMPS	KAVITHA	01/18/2012
16	22	VIDEO: MIPI CONNECTOR	N/A	N/A
17	26	FF CAM & MIC CONNECTORS	N/A	N/A
18	27	INERTIAL SENSORS	N/A	N/A
19	28	PROX SENSOR	N/A	N/A
20	29	BUTTON & REAR CAMERA CONN	N/A	N/A

PDF	CSA	CONTENTS	SYNC MASTER	DATE
21	31	SYSTEM & DEBUG CONNECTORS	JORGE	06/27/2012
22	32	BASEBAND PMU (1 OF 2)	JORGE	06/27/2012
23	33	BASEBAND PMU (2 OF 2)	JORGE	06/27/2012
24	34	BASEBAND (1 OF 2)	JORGE	06/27/2012
25	35	MOBILE DATA MODEM (2 OF 2)	JORGE	06/27/2012
26	36	RF TRANSCEIVER (1 OF 3)	JORGE	06/27/2012
27	37	RF TRANSCEIVER (2 OF 3)	JORGE	06/27/2012
28	38	RF TRANSCEIVER (3 OF 3)	JORGE	06/27/2012
29	39	BAND 5/8 PAD	JORGE	06/27/2012
30	40	BAND 13 PA	JORGE	06/27/2012
31	41	2G PA, DCDC CONVERTER	JORGE	06/27/2012
32	42	DCS RX, ASM	JORGE	06/27/2012
33	43	BAND 1/4 PAD	JORGE	06/27/2012
34	44	BAND2 PAD	JORGE	06/27/2012
35	45	RX DIVERSITY	JORGE	06/27/2012
36	46	GPS	JORGE	06/27/2012
37	47	WIFI/BT	JORGE	06/27/2012
38	57	IO FLEX: DOCK COMPONENTS	N/A	04/18/2011
39	73	Power: Aliases	N/A	N/A
40	75	POWER: BATTERY CONNECTOR	N/A	N/A
41	81	Power: PMU	N/A	N/A
42	82	POWER: PMU	N/A	05/09/2011
43	93	MECHANICAL PARTS	N/A	N/A
44	100	CONSTRAINTS: ASSIGNMENTS	N/A	N/A
45	101	CONSTRAINTS: ASSIGNMENTS	N/A	N/A
46	102	CONSTRAINTS: MLB RULES	N/A	N/A

DRAWING TITLE		SCH,MLB,X123	
Apple Inc.	DRAWING NUMBER	051-9374	SIZE
	REVISION	13.0.0	D
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SYNC MASTER=N/A		SYNC DATE=N/A	
BLOCK DIAGRAM: SYSTEM			
Apple Inc.		DRAWING NUMBER	SIZE
		051-9374	D
		REVISION	
		13.0.0	
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
339S0179	1	H4A B0, 35NM, 1.15MM HEIGHT	U0652	CRITICAL	COMMON

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
339S0187	339S0179		U0652	
339S0188	339S0179		U0652	

SAMSUNG

ELPIDA  
HYNIX

NOTE FOR VSEL...  
0 - 1.8V IO  
1.8V - 3V IO

SYNC MASTER=N/A SYNC DATE=04/18/2011

AP: MAIN

Apple Inc.

DRAWING NUMBER: 051-9374 SIZE: D

REVISION: 13.0.0

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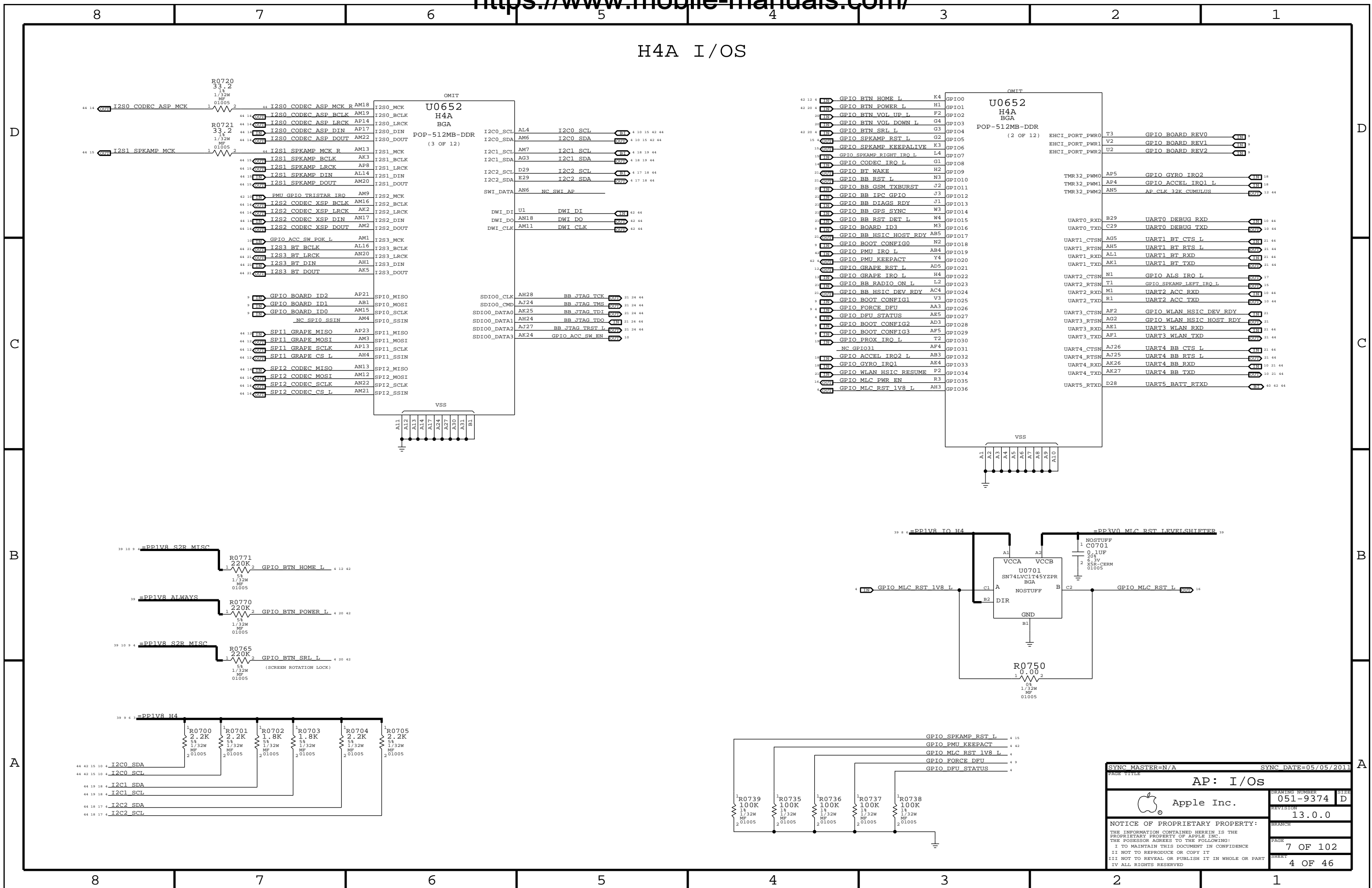
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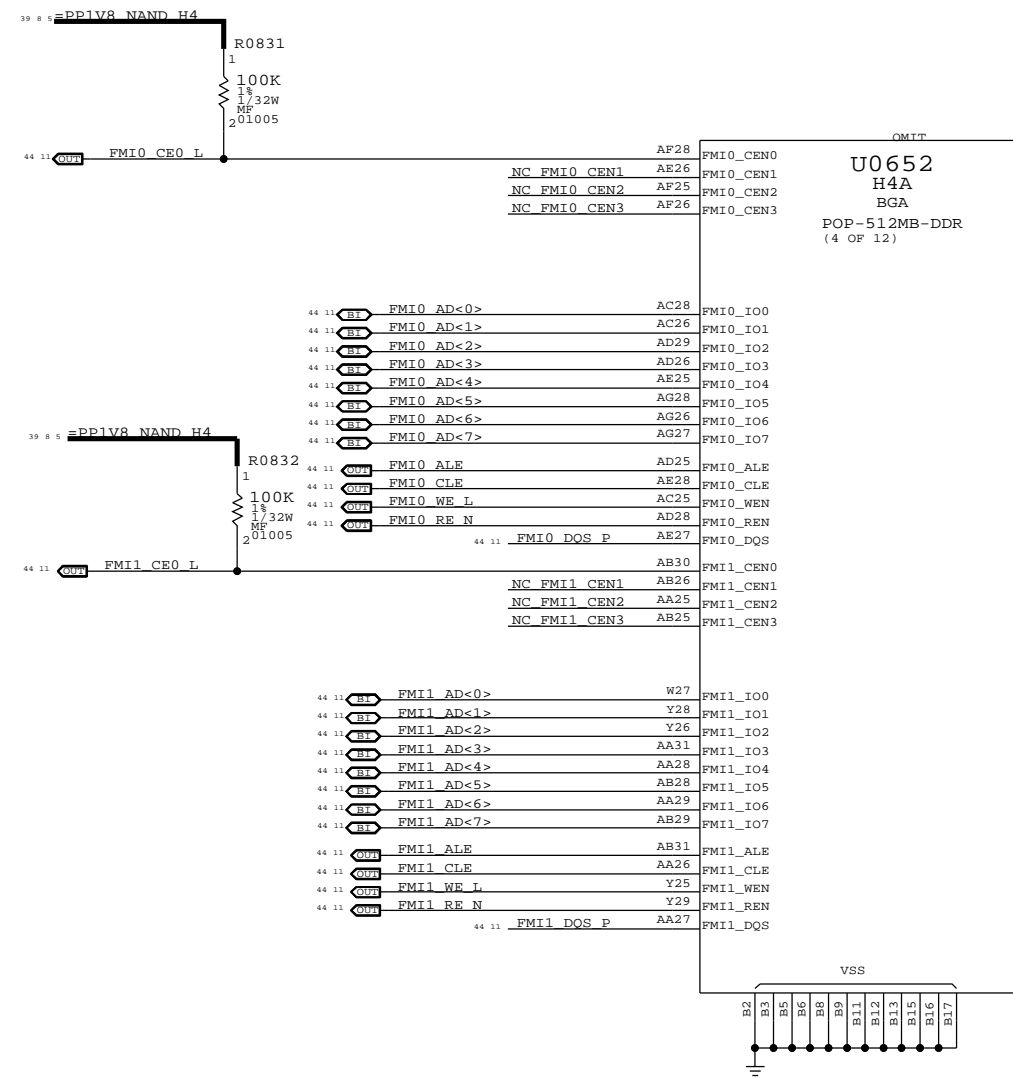
PAGE: 6 OF 102

SHEET: 3 OF 46

### H4A I/OS



SYNC MASTER=N/A		SYNC DATE=05/05/2011	
AP: I/Os			
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		REVISION	13.0.0
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		PAGE	7 OF 102
		SHEET	4 OF 46



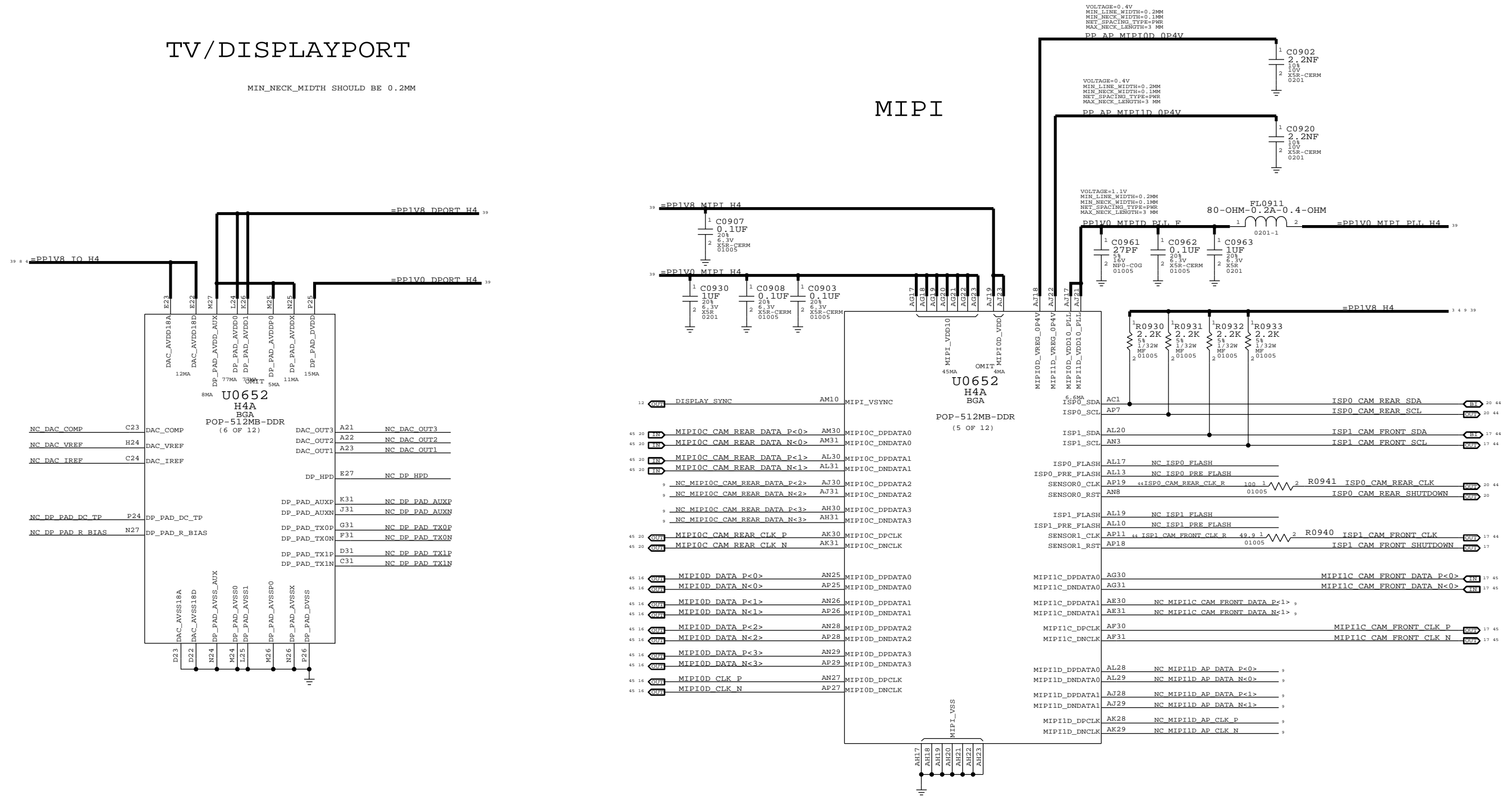
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PAGE TITLE <b>AP: FLASH MEMORY INTERFACE</b>			
DRAWING NUMBER 051-9374		SIZE D	
REVISION 13.0.0		BRANCH	
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PAGE 8 OF 102		SHEET 5 OF 46	

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
15580725	15580359		FL0911	RADAR: 11363497

### TV/DISPLAYPORT

MIN\_NECK\_WIDTH SHOULD BE 0.2MM

### MIPI



8 7 6 5 4 3 2 1

D

D

C

C

B

B

A

A

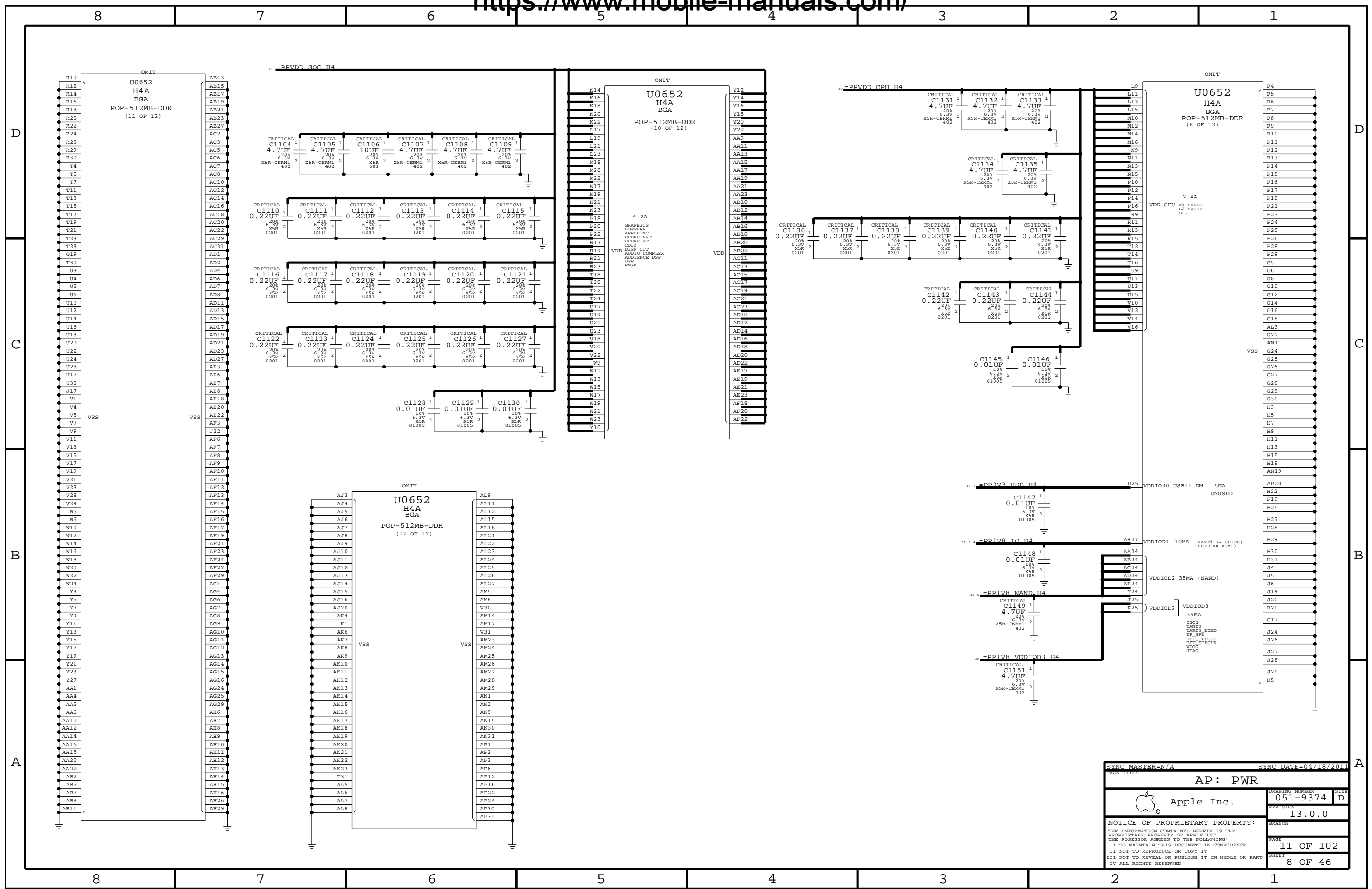
8 7 6 5 4 3 2 1

SYNC MASTER=MLB		SYNC DATE=05/04/2012	
PAGE TITLE			
AP: TV/DP/MIPI/CAMERA			
DRAWING NUMBER		051-9374	
REVISION		13.0.0	
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SYNC MASTER=N/A		SYNC DATE=04/18/2011	
PAGE TITLE			
<b>AP: PWR</b>			
	DRAWING NUMBER	051-9374	SIZE D
	REVISION	13.0.0	
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SHEET	7 OF 46		



SYNC MASTER=N/A SYNC DATE=04/18/2011

AP: PWR

Apple Inc.

DRAWING NUMBER: 051-9374

REVISION: 13.0.0

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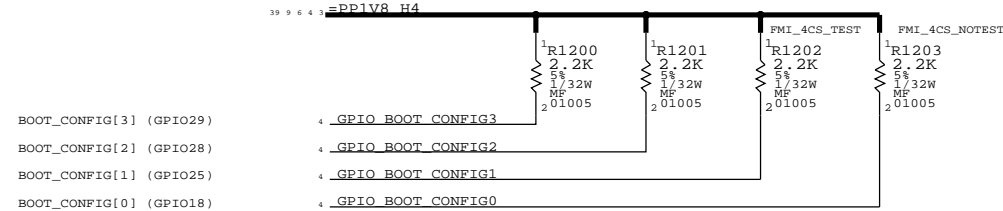
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SHEET: 8 OF 46

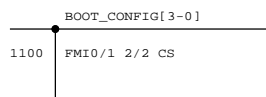
BOOT CONFIG ID



BOOT\_CONFIG[3] (GPIO29)  
 BOOT\_CONFIG[2] (GPIO28)  
 BOOT\_CONFIG[1] (GPIO25)  
 BOOT\_CONFIG[0] (GPIO18)

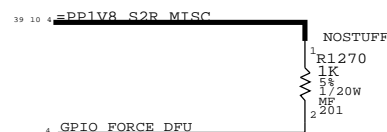
FOR REFERENCE

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	FM11 2 CS
1001	FM11 4 CS
1010	FM11 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

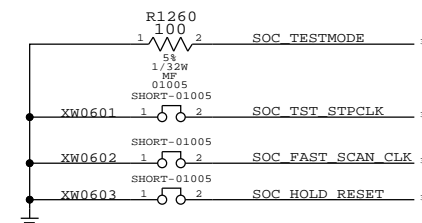
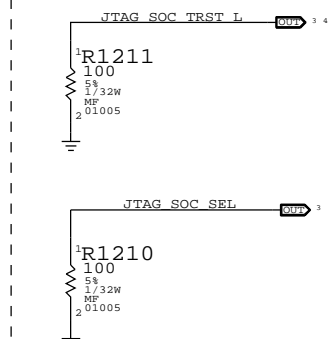


- S/W READ FLOW
1. SET GPIO AS INPUT
  2. DISABLE PU AND ENABLE PD
  3. READ

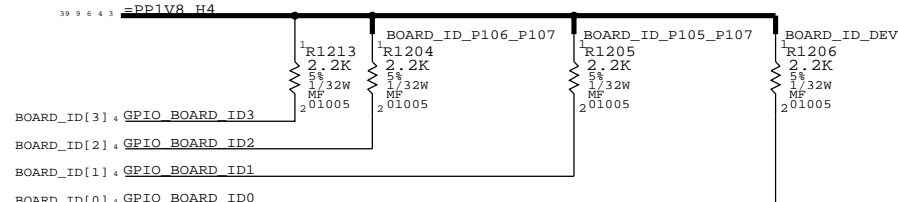
NOTE: PADS USED FOR DEBUG



JTAG



BOARD ID

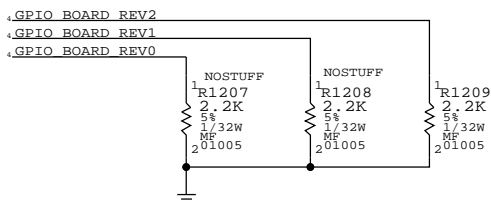


BOARD\_ID[3] (GPIO\_BOARD\_ID3)  
 BOARD\_ID[2] (GPIO\_BOARD\_ID2)  
 BOARD\_ID[1] (GPIO\_BOARD\_ID1)  
 BOARD\_ID[0] (GPIO\_BOARD\_ID0)

ID[3-0]	SYSTEM
1010	P105 AP
1011	P105 DEV
1100	P106 AP
1101	P106 DEV
1110	P107 AP
1111	P107 DEV

- S/W READ FLOW
1. SET GPIO AS INPUT
  2. DISABLE PU AND ENABLE PD
  3. READ

BOARD REVISION



BRD_REV[2-0]	
000	PROTO 0
001	PROTO 1
010	PROTO 2
011	EVT
100	DVT

- S/W READ FLOW
1. SET GPIO AS INPUT
  2. ENABLE PU AND DISABLE PD
  3. READ

SINGLE-PIN NETS

NC_FMIO_DQS_NEG	FMIO_DQS_N
NC_FMIO_RE_POS	FMIO_RE_P
NC_FM11_DQS_NEG	FM11_DQS_N
NC_FM11_RE_POS	FM11_RE_P
NC_PMU_SHDWN	PMU_SHDWN
NC_JTAG_SOC_TDO	JTAG_SOC_TDO
NC_AP_MIPI0C_DPDATA2	NC_MIPI0C_CAM_REAR_DATA_P<2>
NC_AP_MIPI0C_DNDATA2	NC_MIPI0C_CAM_REAR_DATA_N<2>
NC_AP_MIPI0C_DPDATA3	NC_MIPI0C_CAM_REAR_DATA_P<3>
NC_AP_MIPI0C_DNDATA3	NC_MIPI0C_CAM_REAR_DATA_N<3>
NC_AP_MIPI1D_DPCLK	NC_MIPI1D_AP_CLK_P
NC_AP_MIPI1D_DNCLK	NC_MIPI1D_AP_CLK_N
NC_AP_MIPI1D_DPDATA0	NC_MIPI1D_AP_DATA_P<0>
NC_AP_MIPI1D_DNDATA0	NC_MIPI1D_AP_DATA_N<0>
NC_AP_MIPI1D_DPDATA1	NC_MIPI1D_AP_DATA_P<1>
NC_AP_MIPI1D_DNDATA1	NC_MIPI1D_AP_DATA_N<1>
NC_AP_MIPI1C_DPDATA1	NC_MIPI1C_CAM_FRONT_DATA_P<1>
NC_AP_MIPI1C_DNDATA1	NC_MIPI1C_CAM_FRONT_DATA_N<1>
NC_AP_USB11_DPD	NC_USB_FS_D_P
NC_AP_USB11_DND	NC_USB_FS_D_N

SYNC MASTER=N/A SYNC DATE=04/11/2011

AP: MISC & ALIASES



Apple Inc.

DRAWING NUMBER: 051-9374

REVISION: 13.0.0

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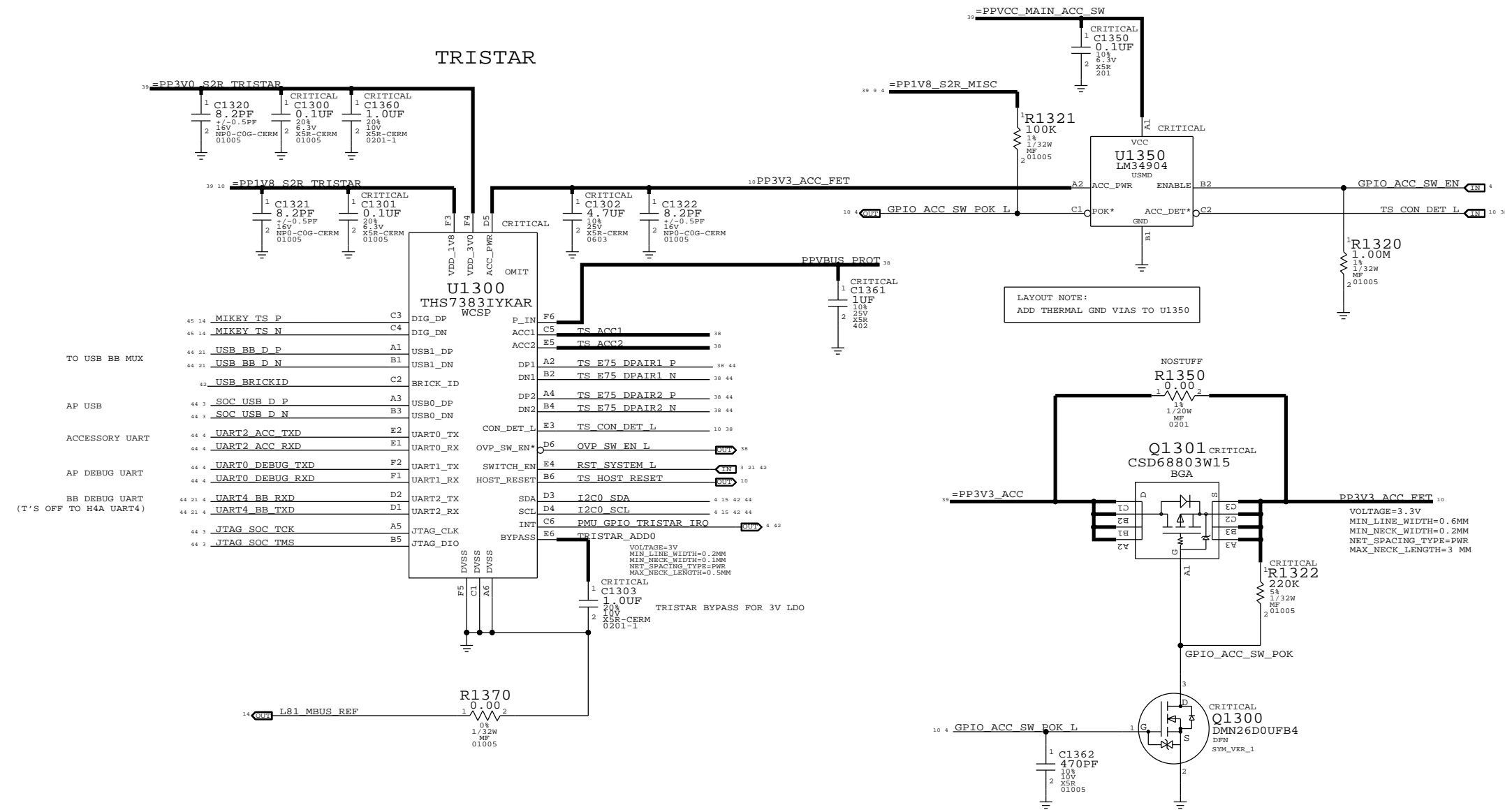
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SHEET: 9 OF 46

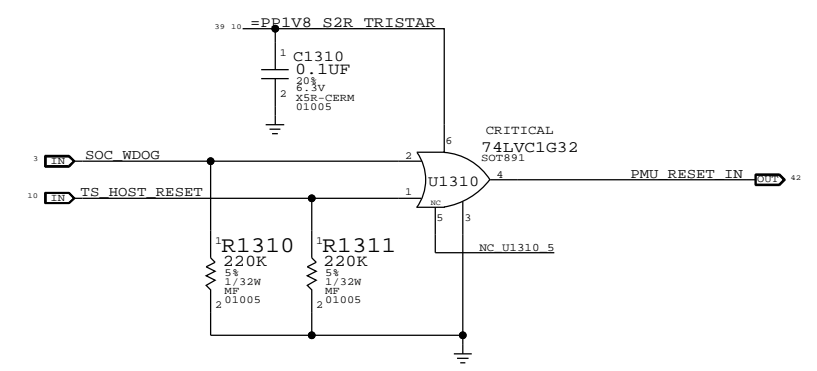
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
NXP 343S0614	1	IC,ASIC,TRISTAR,CBTL1608,A1,MLCSP36	U1300	CRITICAL	COMMON

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
TI 343S0620	343S0614	COMMON	U1300	IC,ASIC,TRISTAR,CBTL1608,A1,MLCSP36



EITHER TRISTAR OR AP CAN RESET PMU

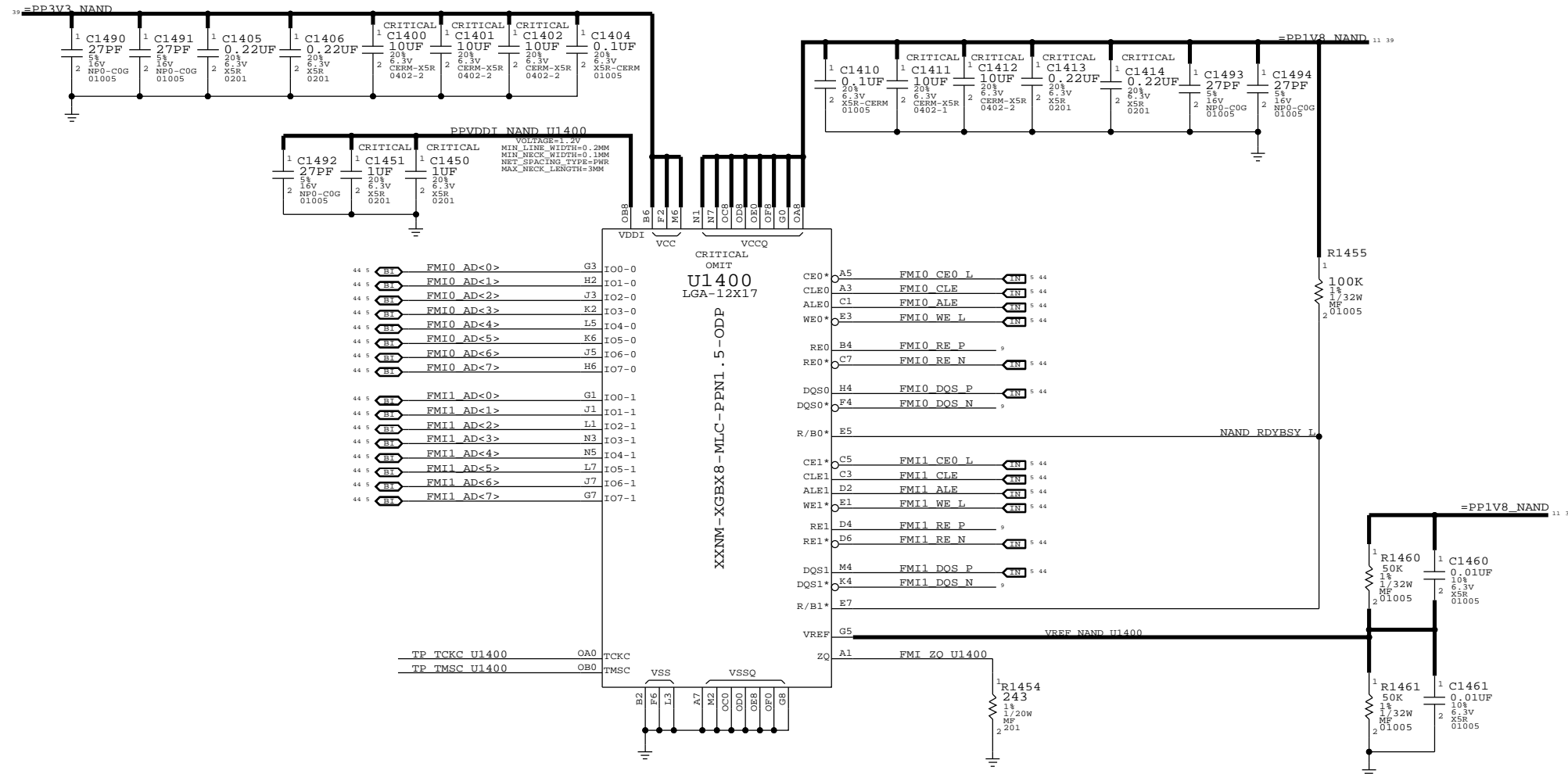


SYNC MASTER=N/A		SYNC DATE=N/A	
<b>E75 SUPPORT</b>			
Apple Inc.		DRAWING NUMBER	SIZE
		051-9374	D
		REVISION	
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		SHEET	10 OF 46

FLASH CONFIGURATIONS

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S0889	335S0890	8GB	U1400	HYNIX 20NM PPN1.5 8GB
335S0871	335S0878	16GB	U1400	HYNIX 20NM PPN1.5 16GB
335S0872	335S0879	32GB	U1400	HYNIX 20NM PPN1.5 32GB
335S0873	335S0880	64GB	U1400	HYNIX 20NM PPN1.5 64GB
335S0900	335S0880	16GB	U1400	SANDISK 19NM PPN1.5 16GB
335S0881	335S0880	16GB	U1400	SAMSUNG 21NM PPN1.5 16GB
335S0882	335S0880	32GB	U1400	SAMSUNG 21NM PPN1.5 32GB
335S0883	335S0880	64GB	U1400	SAMSUNG 21NM PPN1.5 64GB

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
335S0890	1	TOSHIBA 19NM PPN1.5 8GB	U1400	8GB
335S0878	1	TOSHIBA 19NM PPN1.5 16GB	U1400	16GB
335S0879	1	TOSHIBA 19NM PPN1.5 32GB	U1400	32GB
335S0880	1	TOSHIBA 19NM PPN1.5 64GB	U1400	64GB



SYNC MASTER=MLB SYNC DATE=05/04/2012

**NAND STORAGE**

Apple Inc.

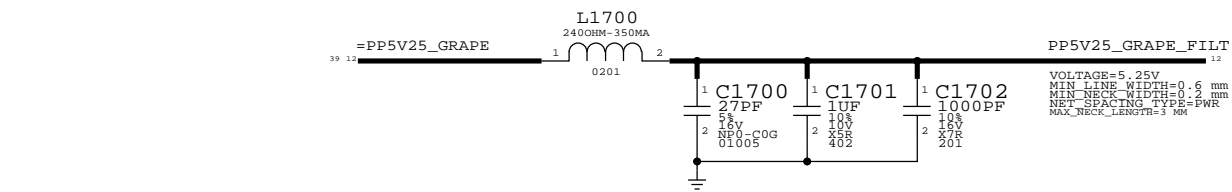
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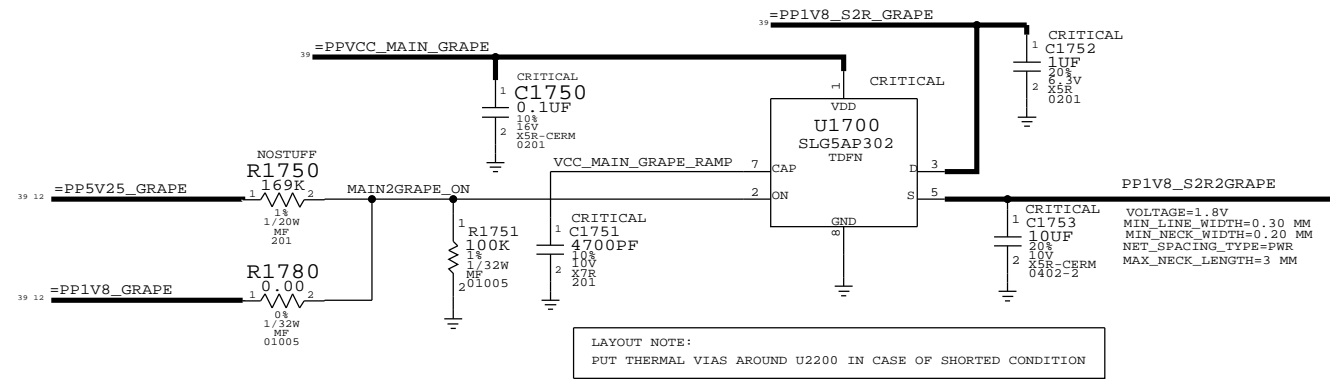
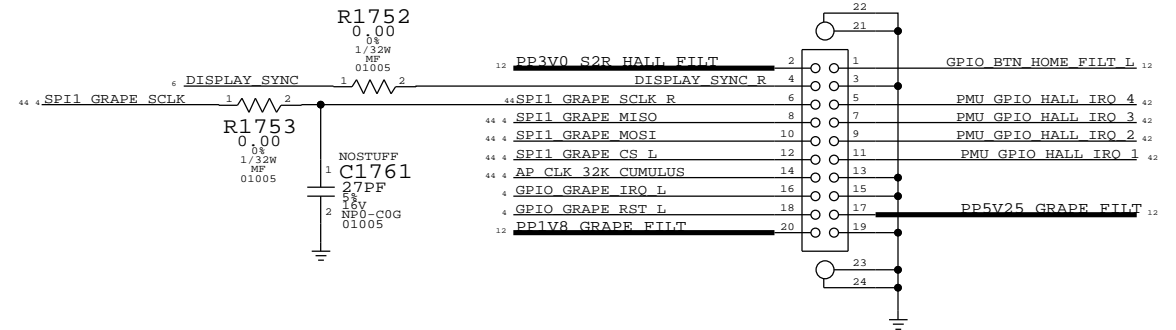
PAGE: 14 OF 102 SHEET: 11 OF 46

# TOUCH SUBSYSTEM

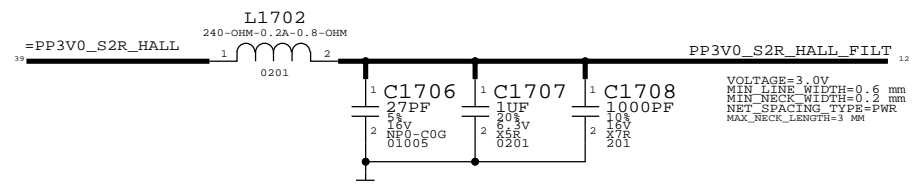
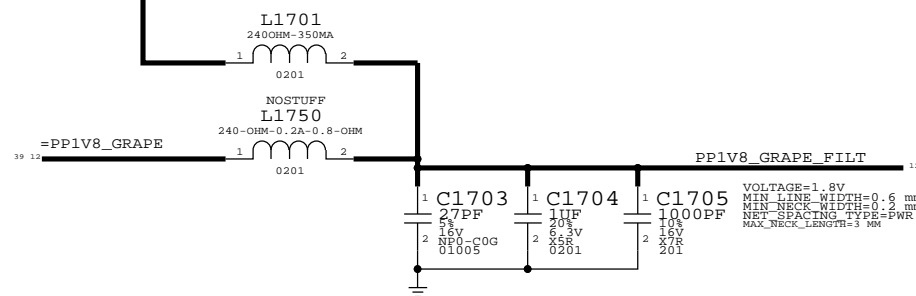
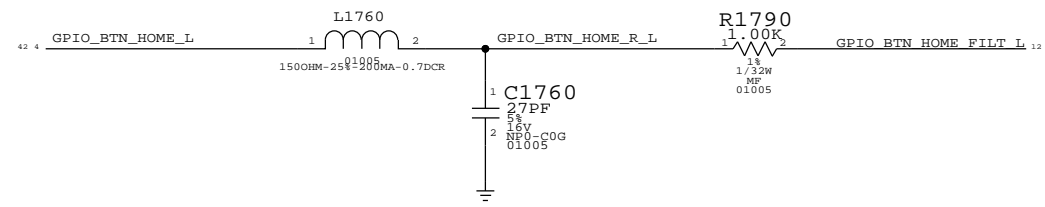


RCPT - MLB 998-4526 -> 516S1054  
(PLUG - FLEX 998-4527)

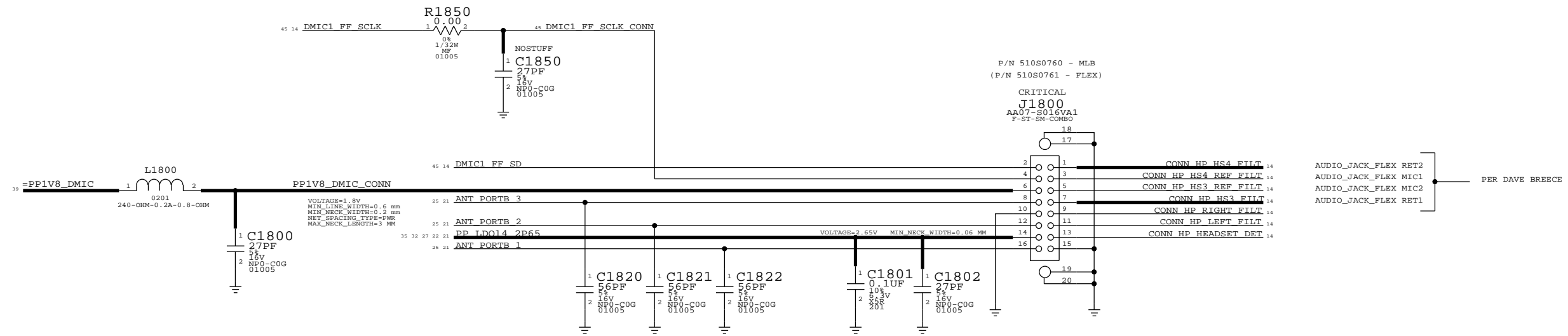
CRITICAL  
J1700  
503304-2010  
F-ST-SM-1



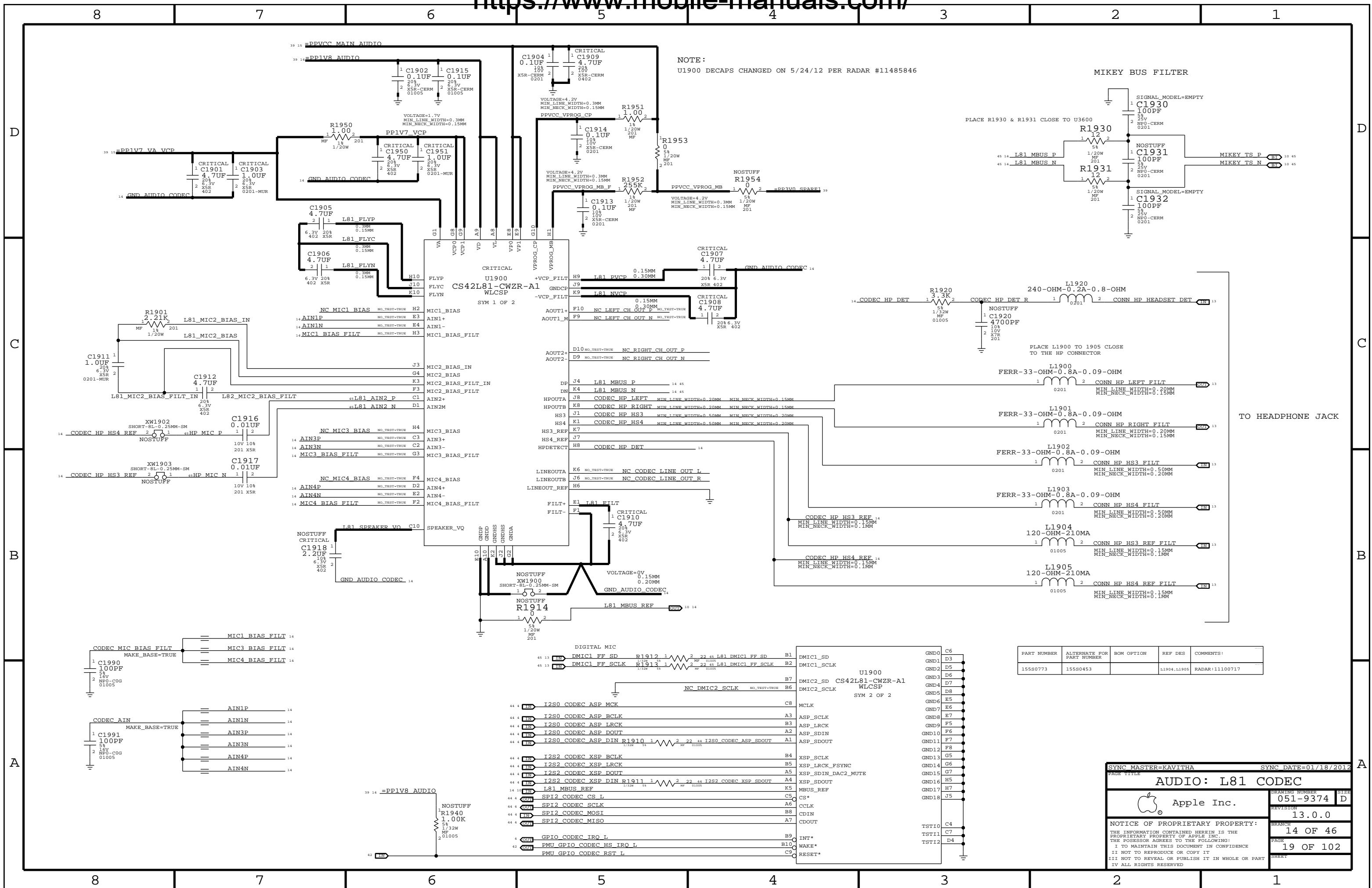
LAYOUT NOTE:  
PUT THERMAL VIAS AROUND U2200 IN CASE OF SHORTED CONDITION



PAGE TITLE		SYNC DATE=06/21/2010	
TOUCH: FLEX CONNECTOR			
Apple Inc.	DRAWING NUMBER	051-9374	SIZE D
	REVISION	13.0.0	
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			PAGE 17 OF 102
			SHEET 12 OF 46

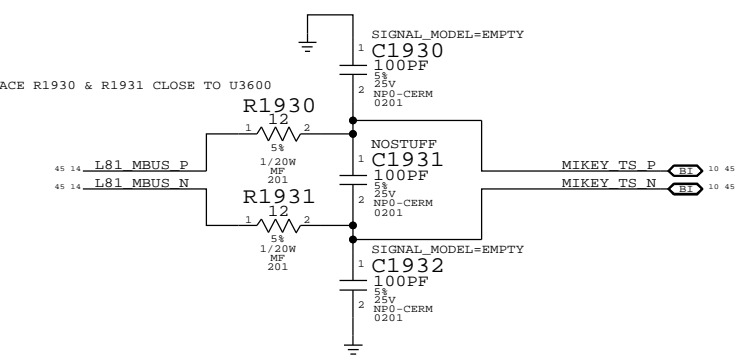


SYNC MASTER=N/A		SYNC DATE=03/31/2011	
<b>AUDIO JACK FLEX CONN</b>			
Apple Inc.		DRAWING NUMBER	051-9374
		REVISION	13.0.0
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		PAGE	18 OF 102
		SHEET	



NOTE:  
U1900 DECAPS CHANGED ON 5/24/12 PER RADAR #11485846

MIKEY BUS FILTER



PLACE R1930 & R1931 CLOSE TO U3600

PLACE L1900 TO L1905 CLOSE TO THE HP CONNECTOR

TO HEADPHONE JACK

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
15580773	15580453		L1904, L1905	RADAR:11100717

SYNC MASTER=KAVITHA SYNC DATE=01/18/2012

**AUDIO: L81 CODEC**

Apple Inc.

DRAWING NUMBER: 051-9374 SIZE: D

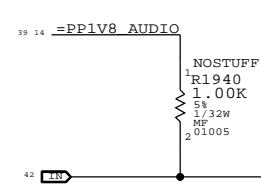
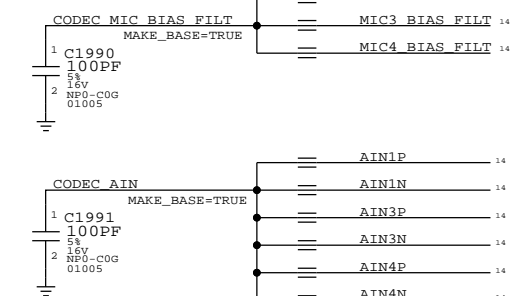
REVISION: 13.0.0

BRANCH: 14 OF 46

PAGE: 19 OF 102

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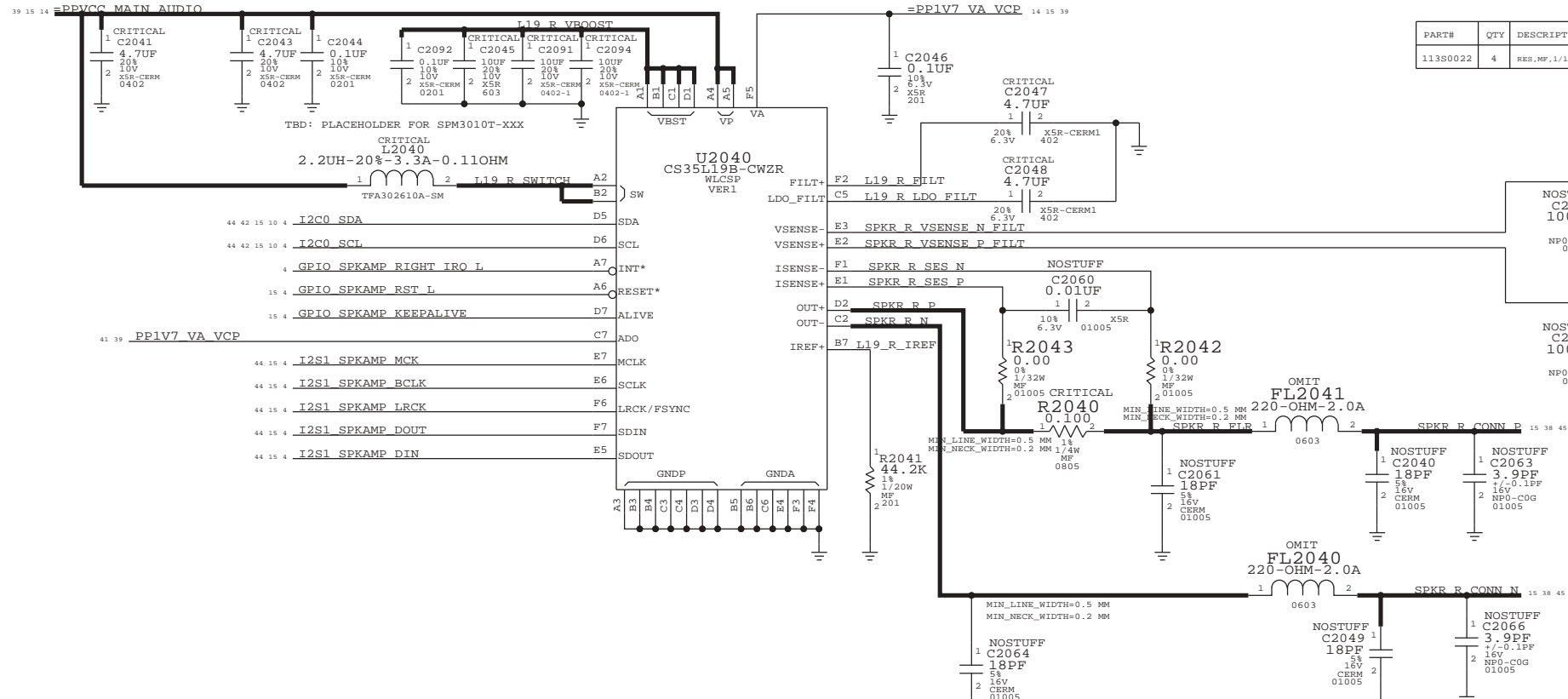
U1900	CS42L81-CWZR-A1	WLCSP	SYM 2 OF 2
B1	DMIC1_SD		
B2	DMIC1_SCLK		
B7	DMIC2_SD		
B6	DMIC2_SCLK		
C8	MCLK		
A3	ASP_SCLK		
B3	ASP_LRCK		
A2	ASP_SDIN		
A1	ASP_SDOUT		
B4	XSP_SCLK		
B5	XSP_LRCK_FSYNC		
A5	XSP_SDIN_DAC2_MUTE		
A4	XSP_SDOUT		
K5	MBUS_REF		
C5	CS*		
A6	CCLK		
B8	CDIN		
A7	CDOUT		
B9	INT*		
B10	WAKE*		
C9	RESET*		
B1	DMIC1_FF_SD		
B2	DMIC1_FF_SCLK		
B7	DMIC2_FF_SD		
B6	DMIC2_FF_SCLK		
C8	I2S0_CODEC_ASP_MCK		
A3	I2S0_CODEC_ASP_BCLK		
B3	I2S0_CODEC_ASP_LRCK		
A2	I2S0_CODEC_ASP_DOUT		
A1	I2S0_CODEC_ASP_DIN		
B4	I2S2_CODEC_XSP_BCLK		
B5	I2S2_CODEC_XSP_LRCK		
A5	I2S2_CODEC_XSP_DOUT		
A4	I2S2_CODEC_XSP_DIN		
K5	L81_MBUS_REF		
C5	SPI2_CODEC_CS_L		
A6	SPI2_CODEC_SCLK		
B8	SPI2_CODEC_MOSI		
A7	SPI2_CODEC_MISO		
B9	GPIO_CODEC_IRQ_L		
B10	PMU_GPIO_CODEC_HS_IRQ_L		
C9	PMU_GPIO_CODEC_RST_L		



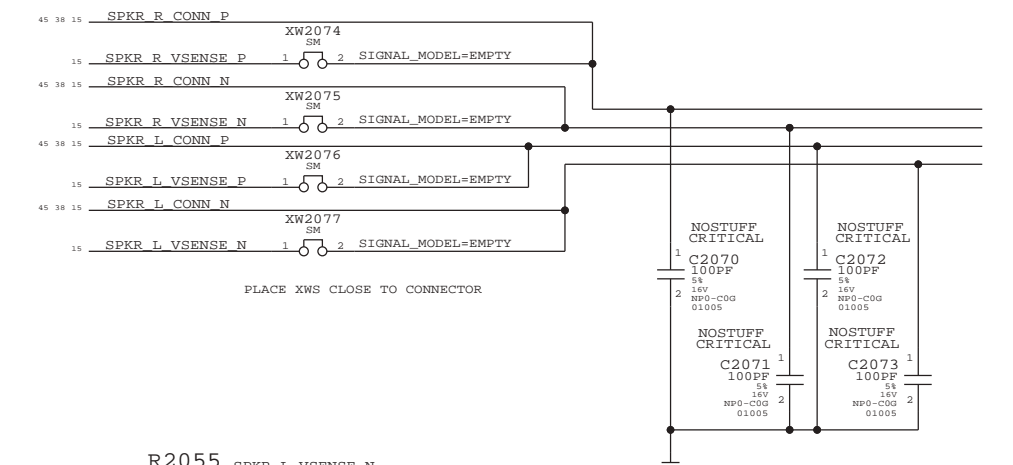


# RIGHT SPEAKER AMP

I2C ADDRESS: 1000001X

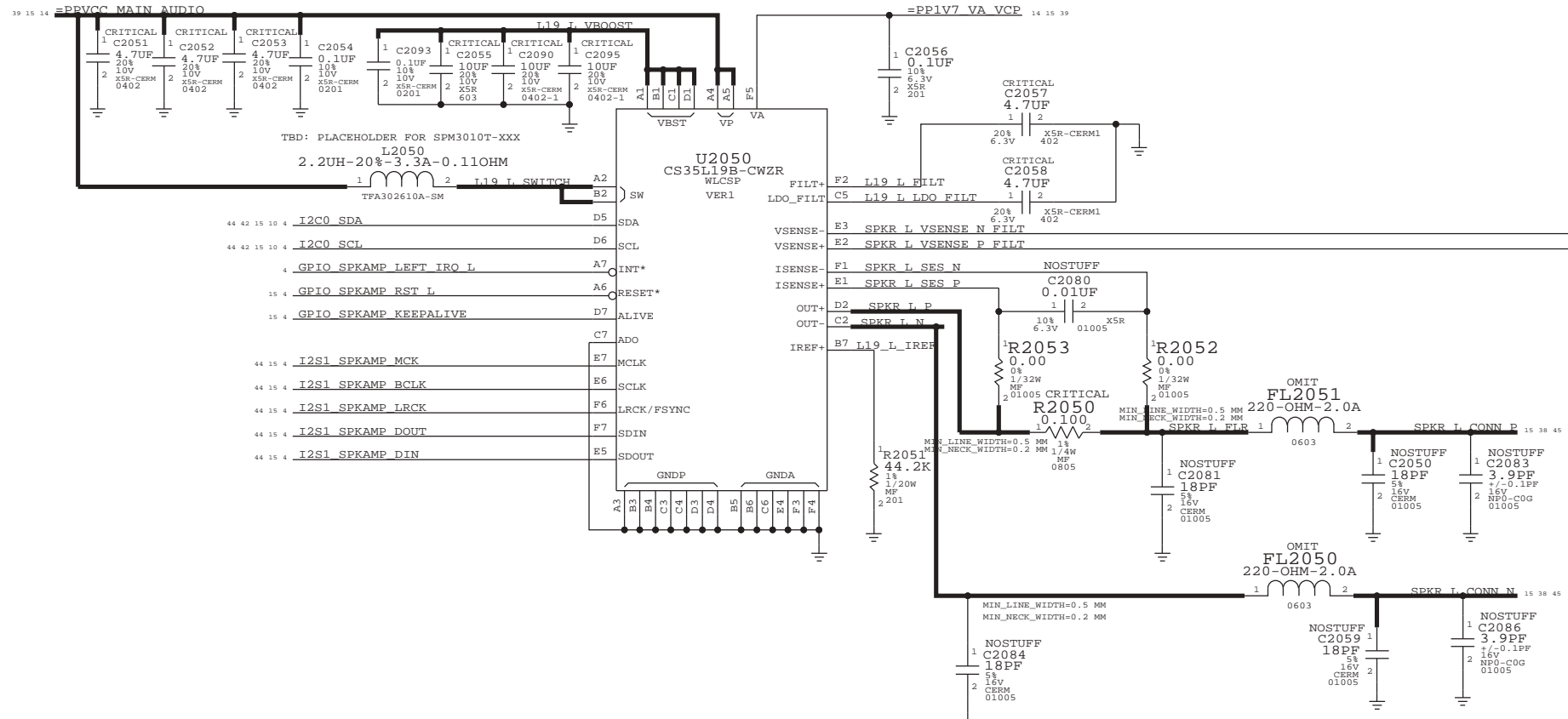


# SPEAKER CONNECTOR



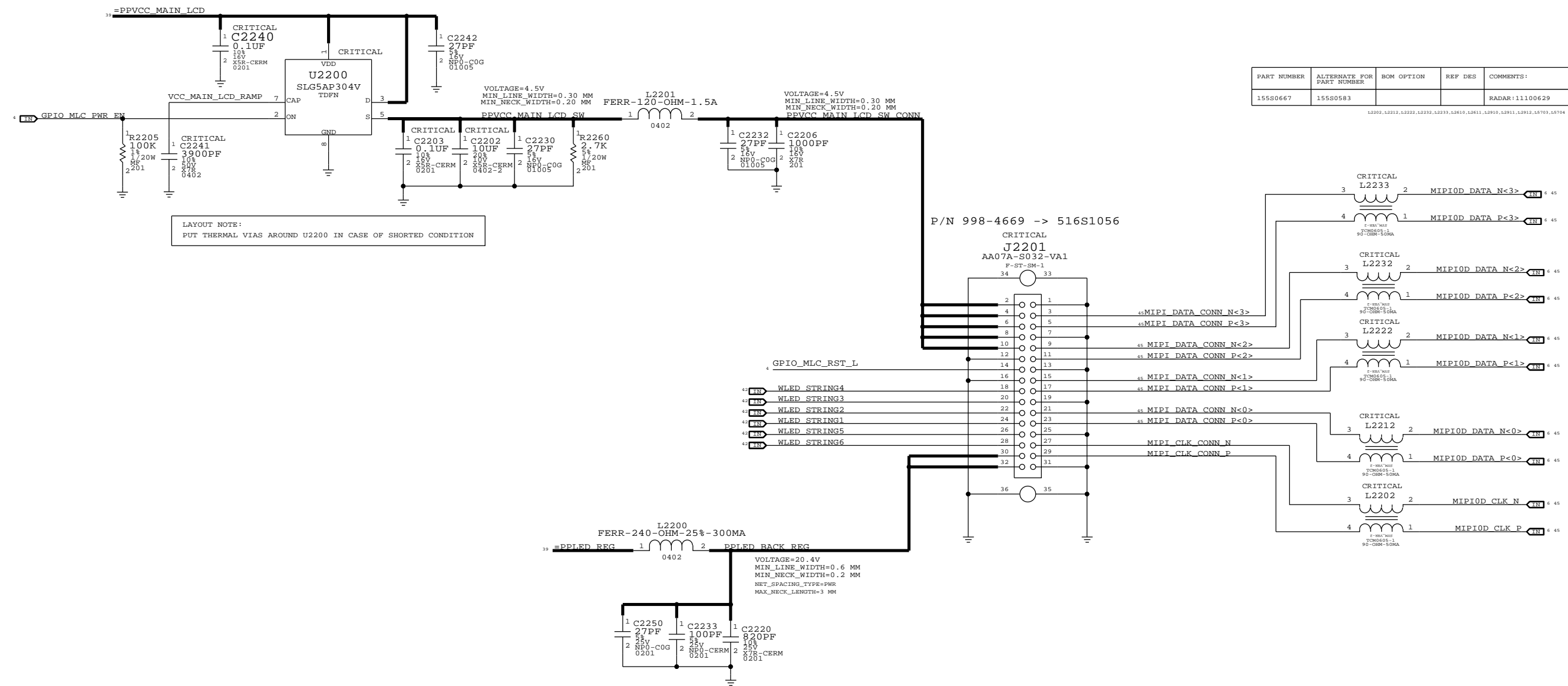
# LEFT SPEAKER AMP

I2C ADDRESS: 1000000X



SYNC MASTER=KAVITHA		SYNC DATE=01/18/2012	
PAGE TITLE			
AUDIO: CS35L19A AMPS		DRAWING NUMBER	SIZE
Apple Inc.		051-9374	D
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		15 OF 46	

# MIPI CONNECTOR



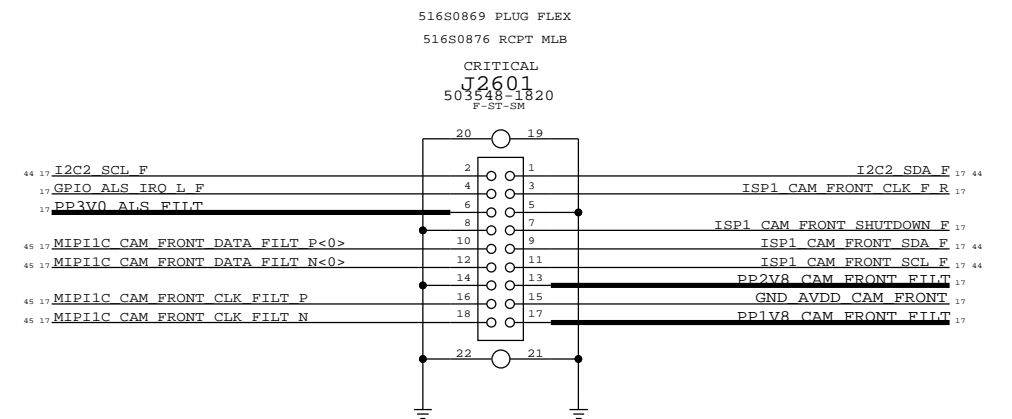
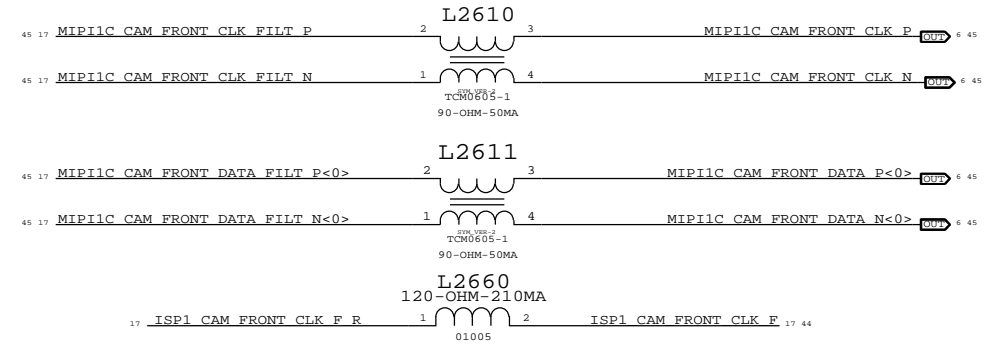
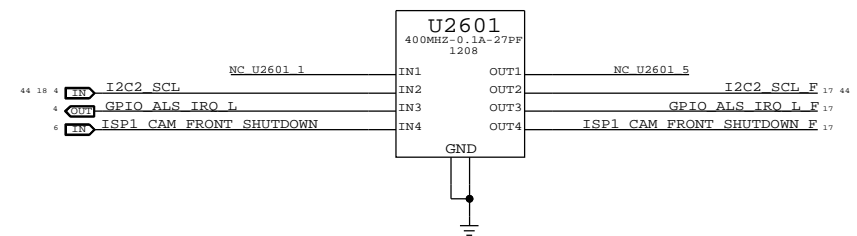
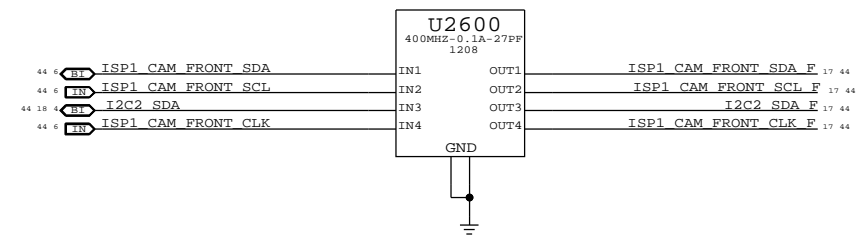
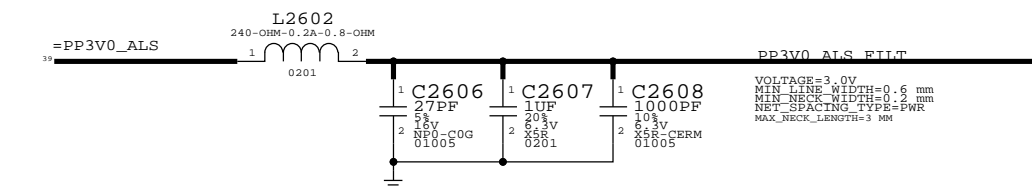
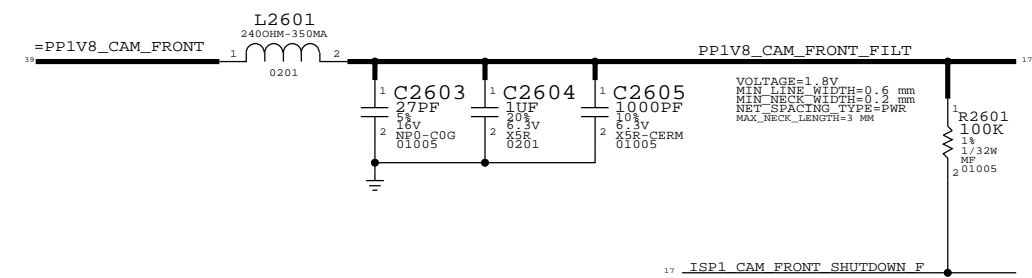
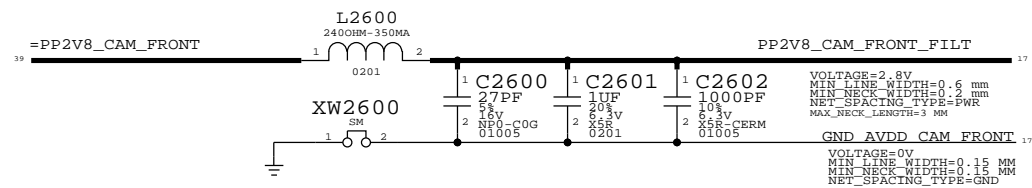
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
155S0667	155S0583			RADAR:11100629

L2202, L2212, L2222, L2232, L2233, L2610, L2611, L2910, L2911, L2912, L2913, L2914

LAYOUT NOTE:  
PUT THERMAL VIAS AROUND U2200 IN CASE OF SHORTED CONDITION

SYNC MASTER=N/A		SYNC DATE=N/A	
VIDEO: MIPI CONNECTOR			
DRAWING NUMBER		SIZE	
051-9374		D	
REVISION		BRANCH	
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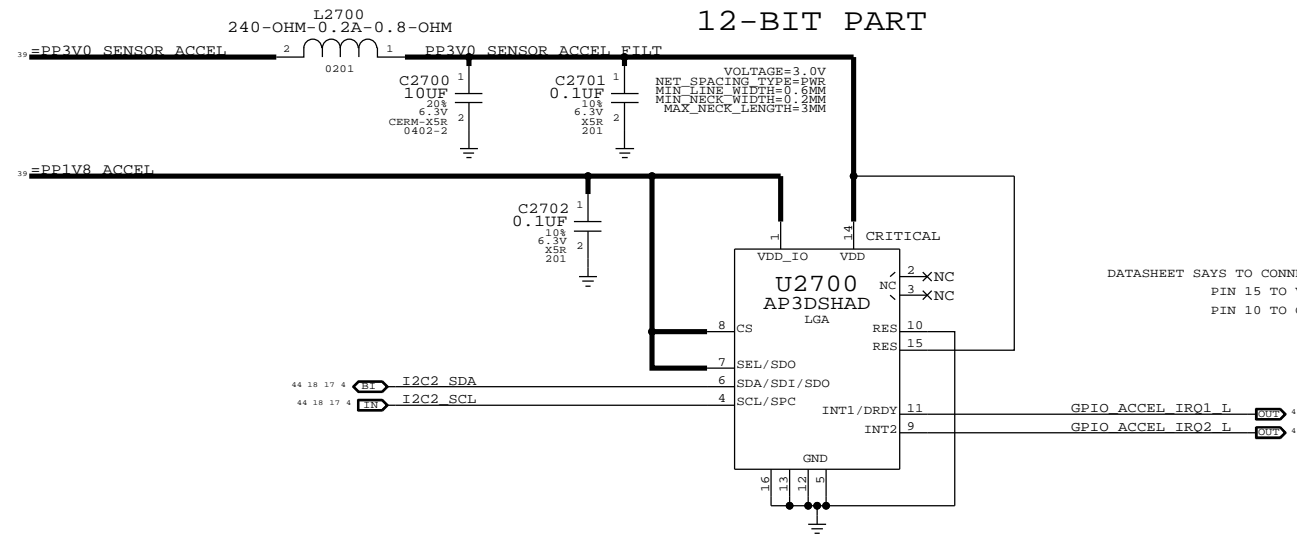
# VGA FRONT CAMERA CONNECTOR



PAGE TITLE		SYNC DATE=N/A	
FF CAM & MIC CONNECTORS			
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REVISION		13.0.0	
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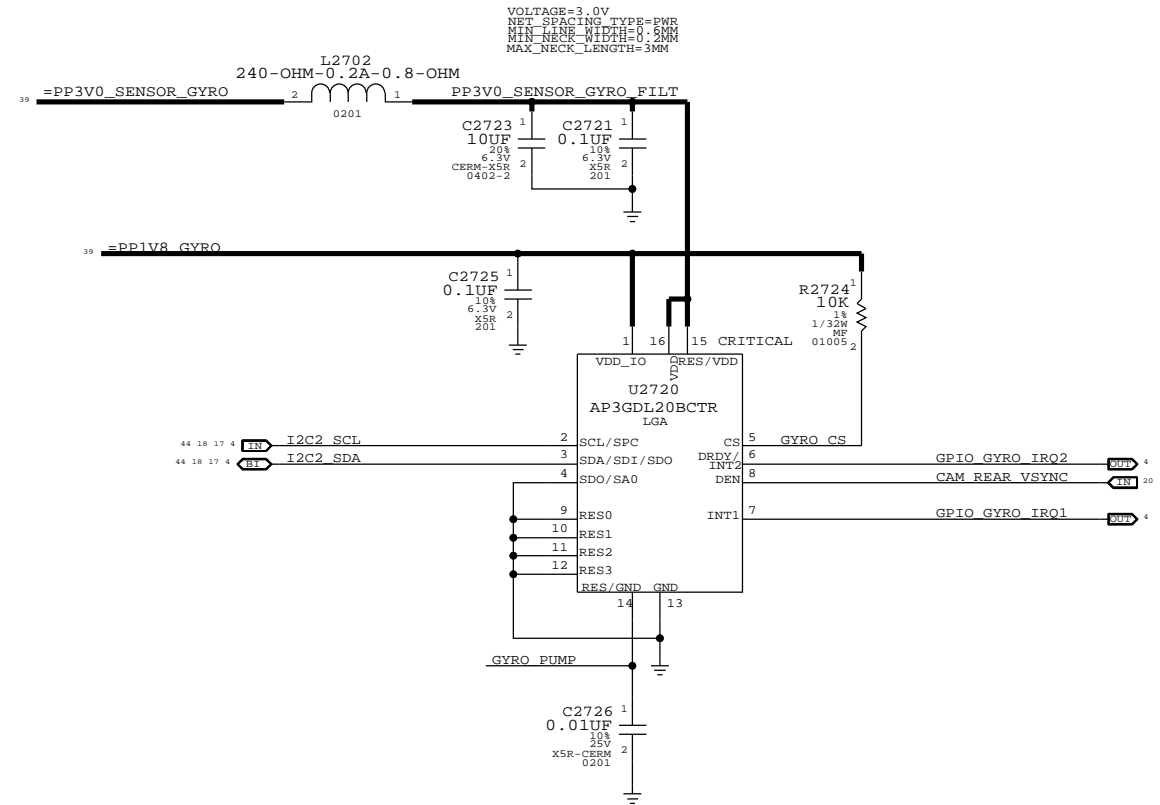
### ACCELEROMETER

(WRITE: 0X3A READ: 0X3B)



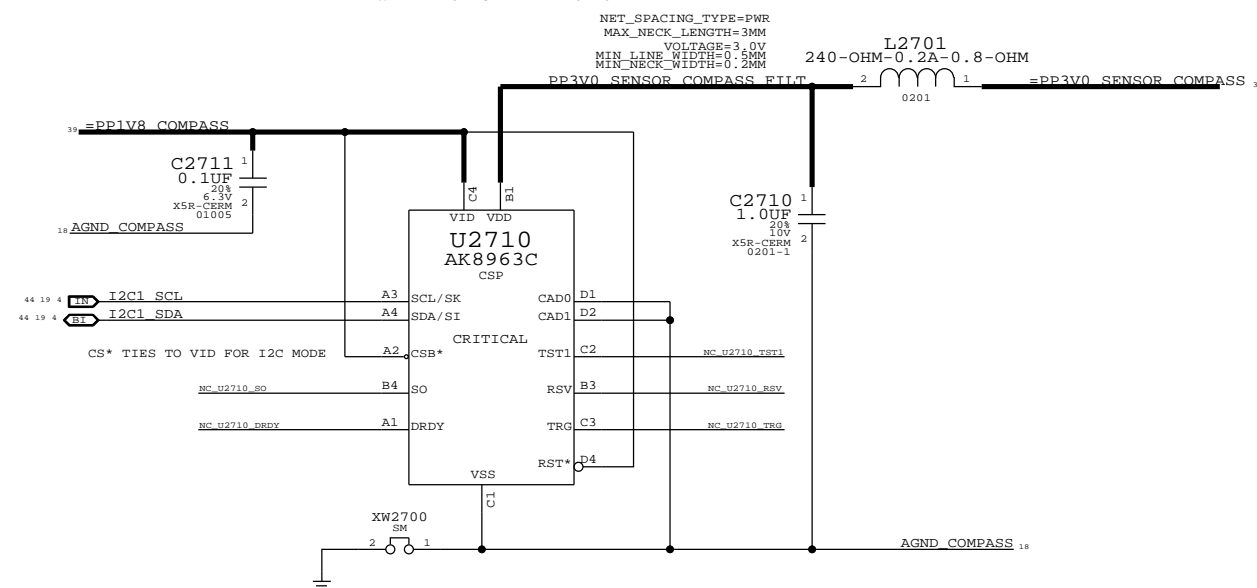
### GYRO

(WRITE: 0XD4 READ: 0XD5)



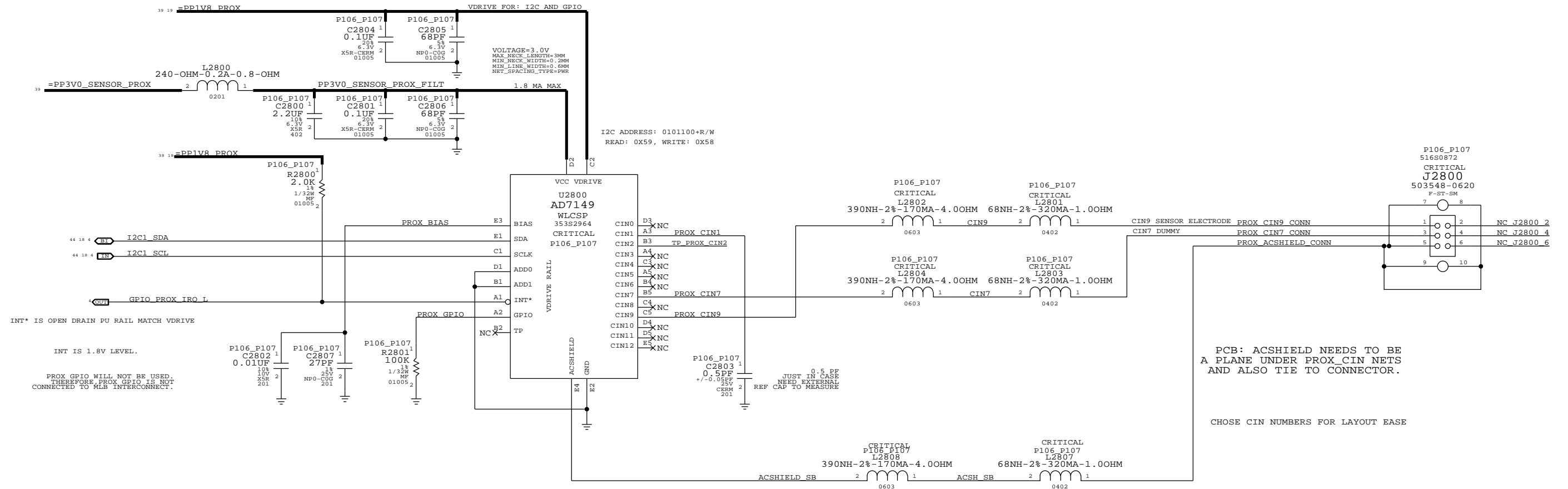
### COMPASS

WRITE: 0X18 READ: 0X19



SYNC MASTER=N/A		SYNC DATE=N/A	
<b>INERTIAL SENSORS</b>			
Apple Inc.		DRAWING NUMBER	SIZE
		051-9374	D
		REVISION	
		13.0.0	
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		SHEET	18 OF 46

# PROX SENSOR



INT\* IS OPEN DRAIN PU RAIL MATCH VDRIVE

INT IS 1.8V LEVEL.

PROX GPIO WILL NOT BE USED.  
THEREFORE, PROX GPIO IS NOT  
CONNECTED TO MLB INTERCONNECT.

PCB: ACSHIELD NEEDS TO BE  
A PLANE UNDER PROX\_CIN NETS  
AND ALSO TIE TO CONNECTOR.

CHOSE CIN NUMBERS FOR LAYOUT EASE

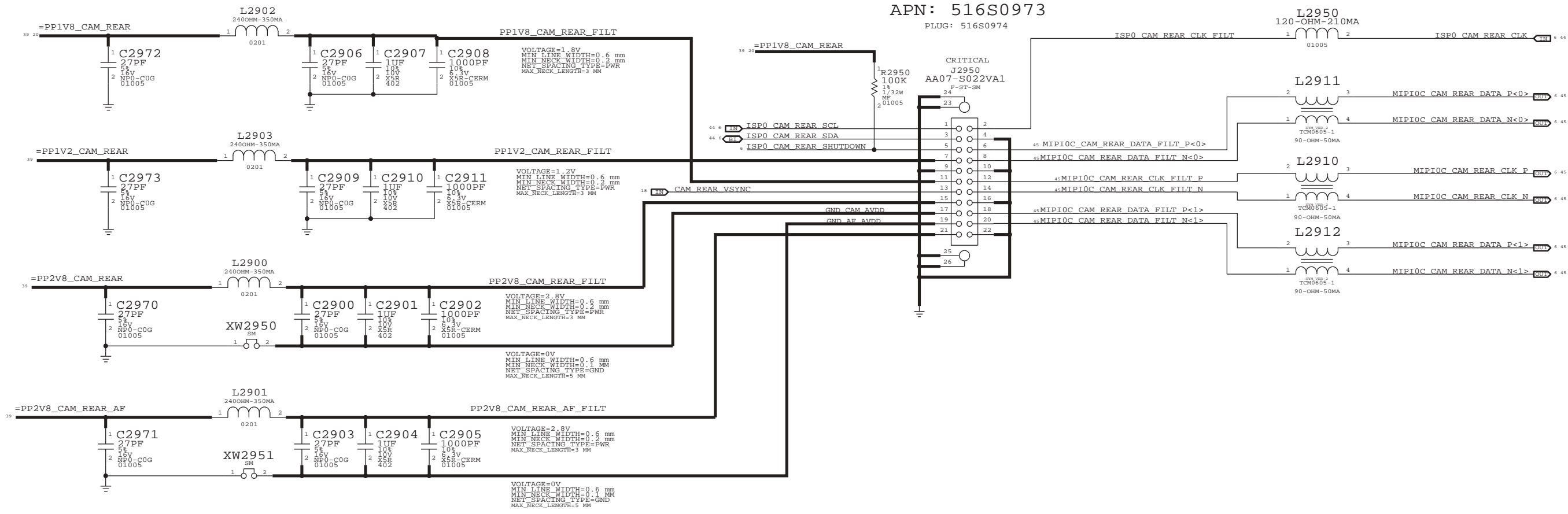
PCB: ENSURE ACSHIELD PLANE UNDER  
U3200, NO GND PLANE NEAR PROX\_CIN NETS..

SYNC MASTER=N/A		SYNC DATE=N/A	
<b>PROX SENSOR</b>			
Apple Inc.		DRAWING NUMBER	051-9374
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		SHEET	19 OF 46
		SIZE	D

# REAR CAMERA CONNECTOR

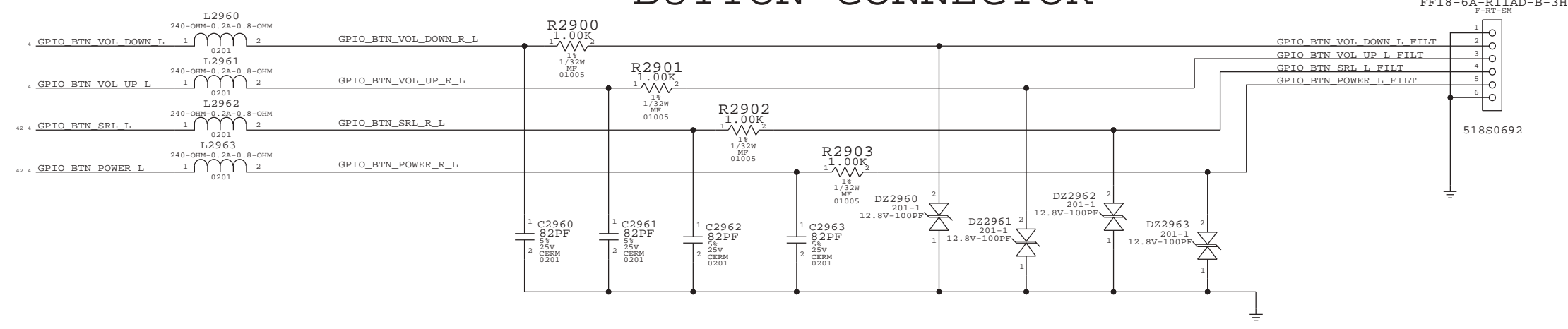
APN: 516S0973

PLUG: 516S0974



# BUTTON CONNECTOR

CRITICAL  
J2960  
FF18-6A-R11AD-B-3H  
F-RT-SM



SYNC MASTER=N/A		SYNC DATE=N/A	
<b>BUTTON &amp; REAR CAMERA CONN</b>			
Apple Inc.		DRAWING NUMBER	051-9374
		REVISION	13.0.0
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		SHEET	20 OF 46

# AP INTERFACE & DEBUG CONNECTOR

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## AP CONNECTIONS

34 33 31 30 29 23 22 21	PP_BATT_VCC_CONN	=	PPBATT_VCC_RF	39
25	TX_GTR_THRESH	=	GPIO_BB_GSM_TXBURST	4
24 21	BB_RST_L	=	GPIO_BB_RST_L	4
21	RESET_DET_L	=	GPIO_BB_RST_DET_L	4
21	RADIO_ON_L	=	GPIO_BB_RADIO_ON_L	4
21	RESET_PMU_L	=	PMU_GPIO_BB_RST_L	42
21	BB_WAKE_HOST	=	PMU_GPIO_BB_WAKE	42
21	RF_RESET_L	=	RST_SYSTEM_L	3 10 42
21	PBL_RUN_BB_HSIC1_RDY	=	GPIO_BB_HSIC_DEV_RDY	4
25	AP_WAKE_MODEM	=	GPIO_BB_IPC_GPIO	4
21	AP_HSIC1_RDY	=	GPIO_BB_HSIC_HOST_RDY	4
24 21	50_HSIC_BB_DATA	=	HSIC1_BB_DATA	3 44
24 21	50_HSIC_BB_STROBE	=	HSIC1_BB_STB	3 44

PP31007_RF	P4HM	SK 1	BB_ERROR_FLAG	25
PP31001_RF	P4HM	SK 1	SLEEP_CLK_32K	23 24
PP31006_RF	P4HM	SK 1	PMIC_SSMI	23 24
PP31005_RF	P4HM	SK 1	RADIO_ON_L	21 23
PP31003_RF	P4HM	SK 1	PBL_RUN_BB_HSIC1_RDY	21 25
PP31004_RF	P4HM	SK 1	AP_HSIC1_RDY	21 25

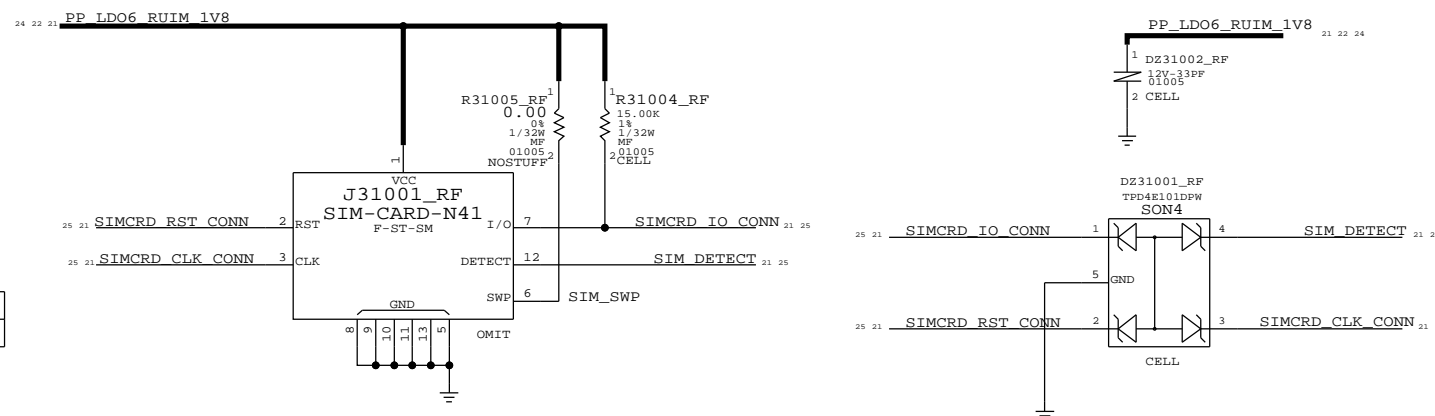
## BT UART

PP31013_RF	P4HM	SK 1	BT_UART_TXD	21 37
PP31014_RF	P4HM	SK 1	BT_UART_RXD	21 37

## BB NOR SPI

PP31015_RF	P4HM	SK 1	SPI_DATA_MOSI	25
PP31016_RF	P4HM	SK 1	SPI_DATA_MISO	25
PP31017_RF	P4HM	SK 1	SPI_CS_L	25
PP31018_RF	P4HM	SK 1	SPI_CLK	25

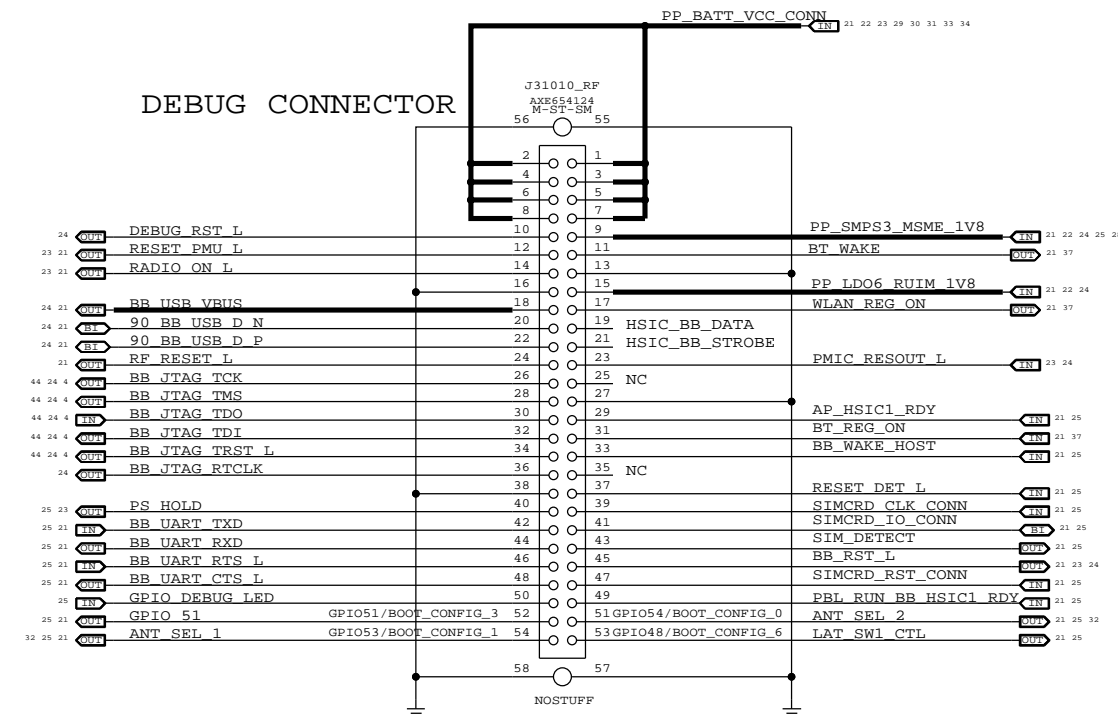
## SIM CARD CONNECTOR



PARTS TABLE FOR P105 SIM CARD, WHILE PINOUT IS BEING FIXED

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
512S0088	1	P105 SIM TRAY	J31001_RF	CELL

## DEBUG CONNECTOR



BOOT OPTIONS	BOOT_CONFIG SW REGISTER VALUE	GPIO/BOOT_CONFIG CONFIGURATION								
		6	5	4	3	2	1	0		
BOOT_DEFAULT_OPTION	0X00	X	0	0	0	0	0	0	0	X
BOOT_NAND_OPTION	0X01	X	1	0	0	0	0	0	1	X
BOOT_HSIC_OPTION	0X02	X	1	0	0	0	0	1	0	X
BOOT_USB_OPTION	0X03	X	1	0	0	0	0	1	1	X
ENABLE_SAHARA_PROTOCOL	0X08	X	1	0	0	1	0	X	X	X

R R104  
C CXXX  
XWXW206  
DZDZ101  
U U101

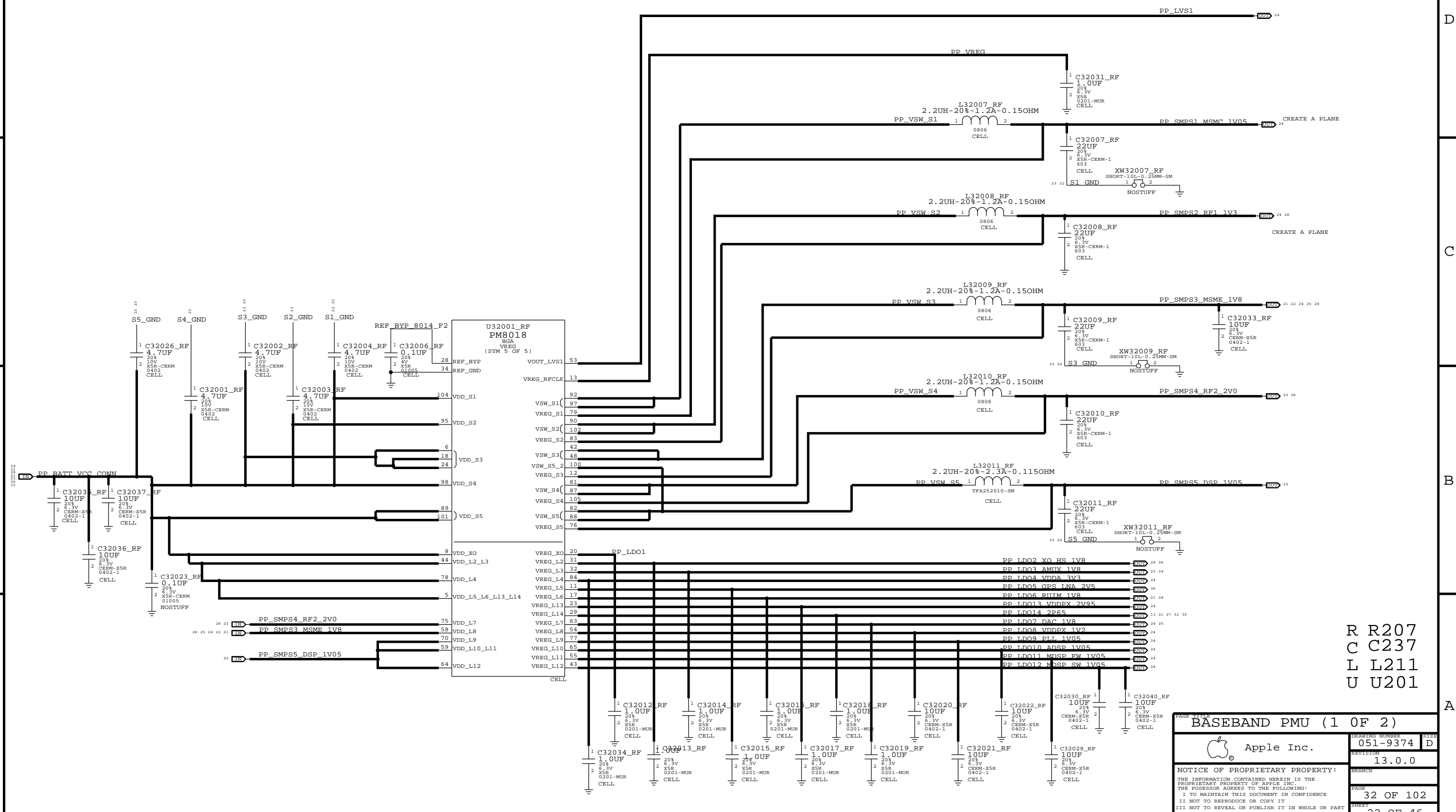
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Apple Inc.		051-9374	D
REVISION		13.0.0	
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D  
C  
B  
A

D  
C  
B  
A



R R207  
 C C237  
 L L211  
 U U201

**BASEBAND PMU (1 OF 2)**

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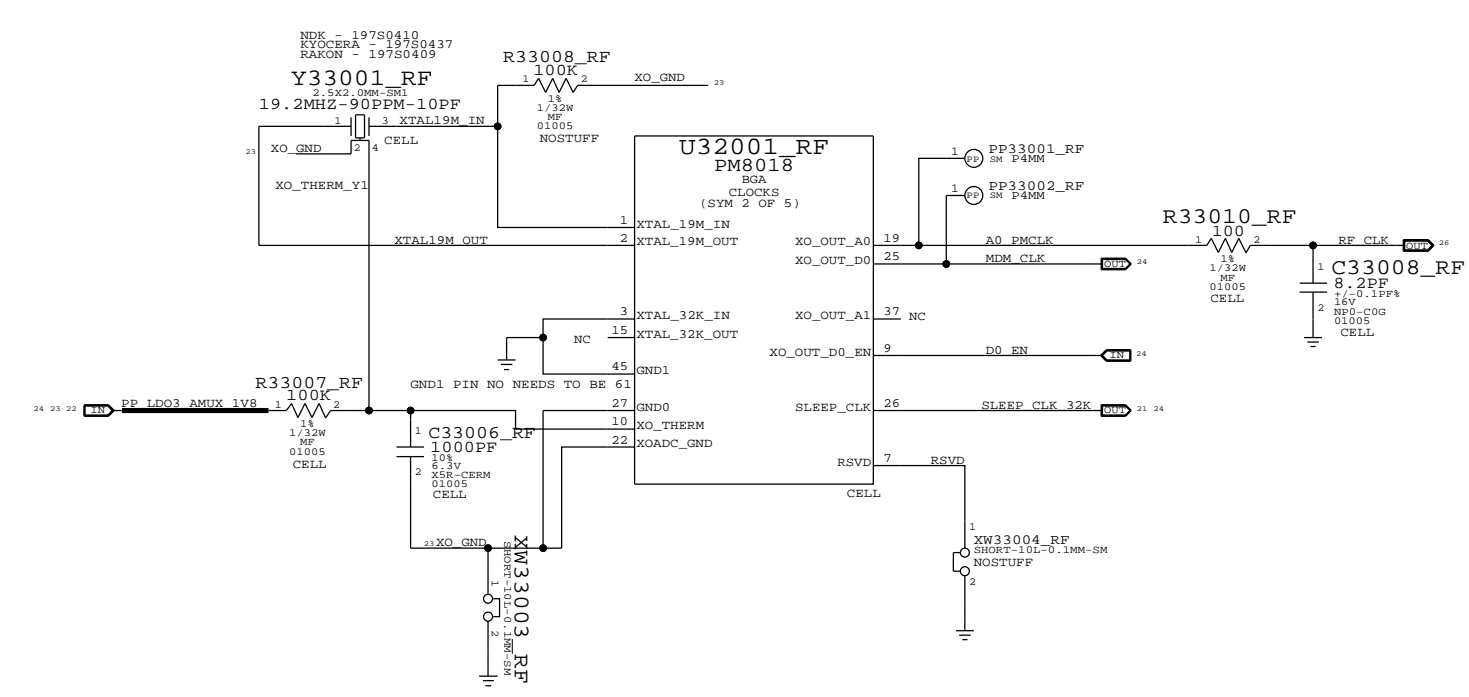
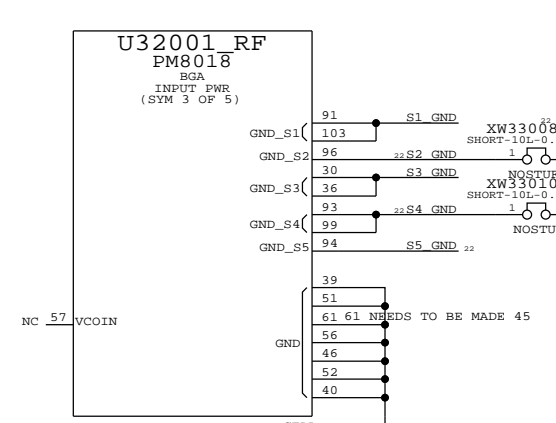
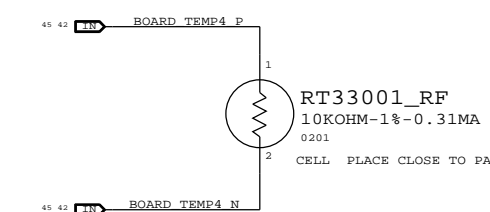
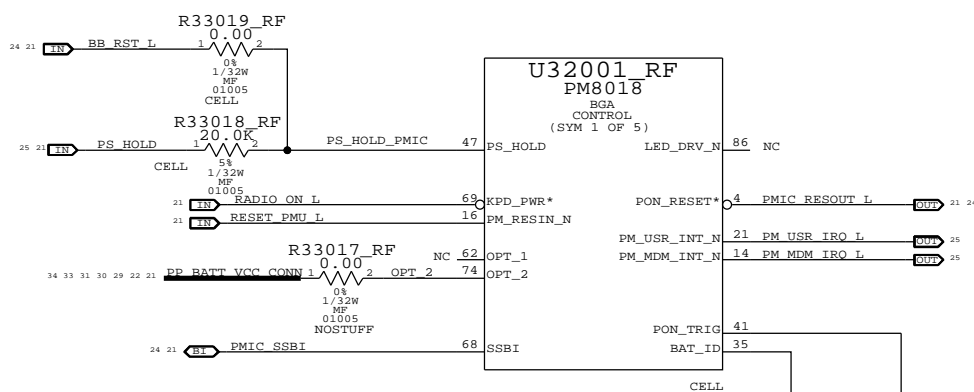
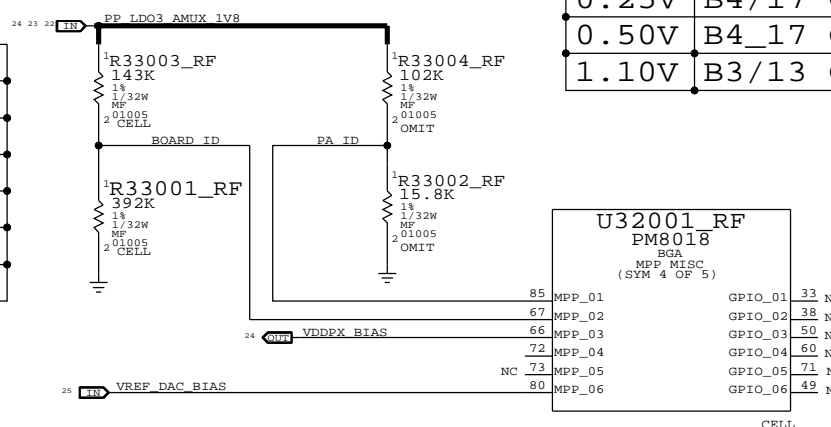


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BOARD_ID	REVISION
0.25V	N41 PROTO 1
0.50V	N41 PROTO 2, X122 RF DEV 1
0.70V	N41 PROTO 3, X122 PROTO 0
0.90V	N41 EVT 1, X122 PROTO 1
1.10V	N41 EVT 2, X122 EVT
1.30V	N41 EVT 3, X122 DVT

PA_ID	PA CONFIG
0.25V	B4/17 CONFIG 0
0.50V	B4_17 CONFIG 1
1.10V	B3/13 CONFIG 0



## ALTERNATES

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
197S0437	197S0410	CELL	Y33001_RF	KYOCERA CRYSTAL
197S0409	197S0410	CELL	Y33001_RF	RAKON CRYSTAL

## BOM OPTIONS

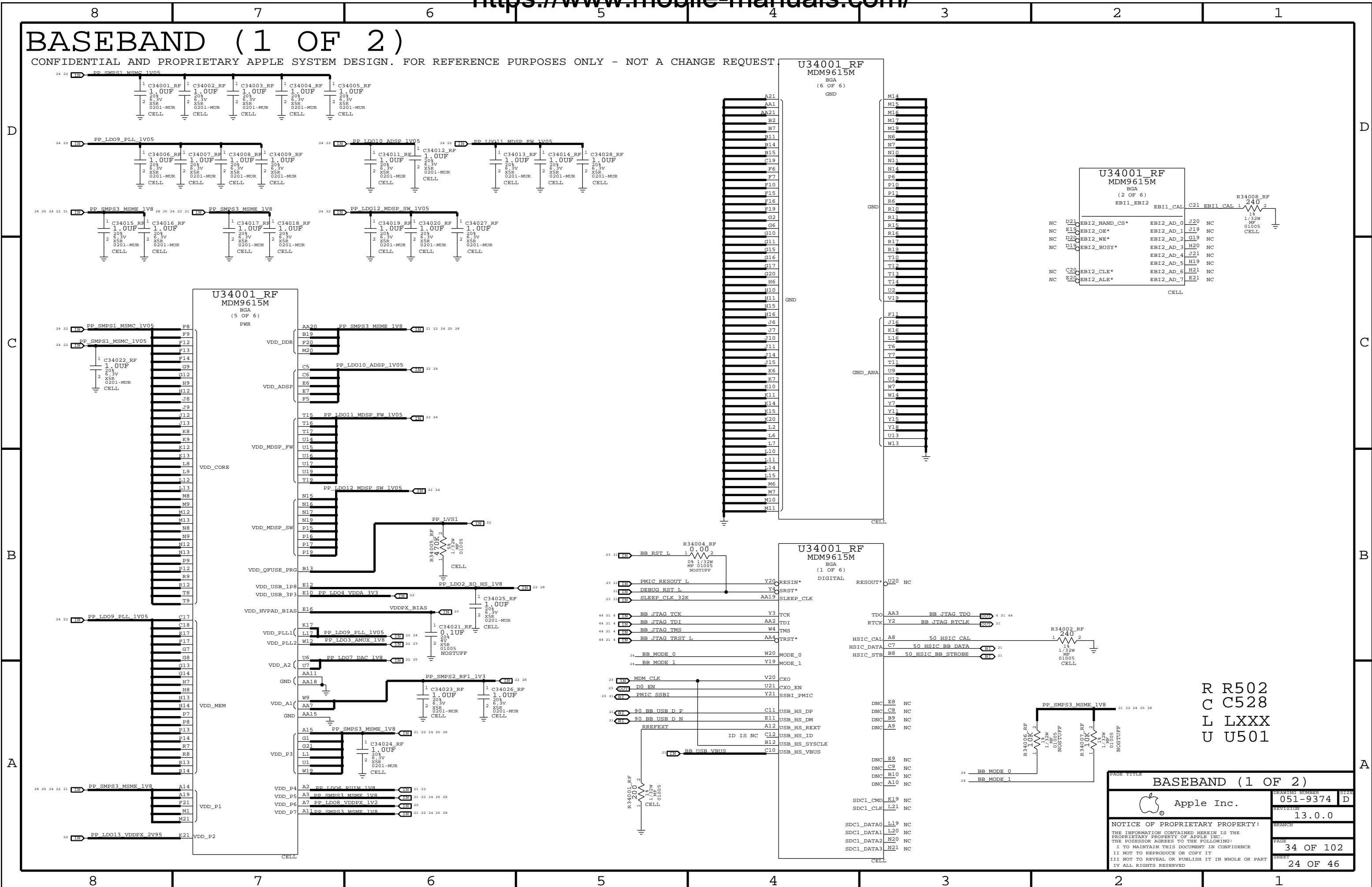
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0685	1	PA_ID RES DIVIDER 102K	R33004_RF	Y	B4_17
118S0656	1	PA_ID RES DIVIDER 61.9K	R33004_RF	Y	B3_13
118S0729	1	PA_ID RES DIVIDER 39K	R33002_RF	Y	B4_17
118S0685	1	PA_ID RES DIVIDER 102K	R33002_RF	Y	B3_13

R R317  
C C309  
L LXXX  
U U301  
XW XW305

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R R502  
 C C528  
 L LXXX  
 U U501

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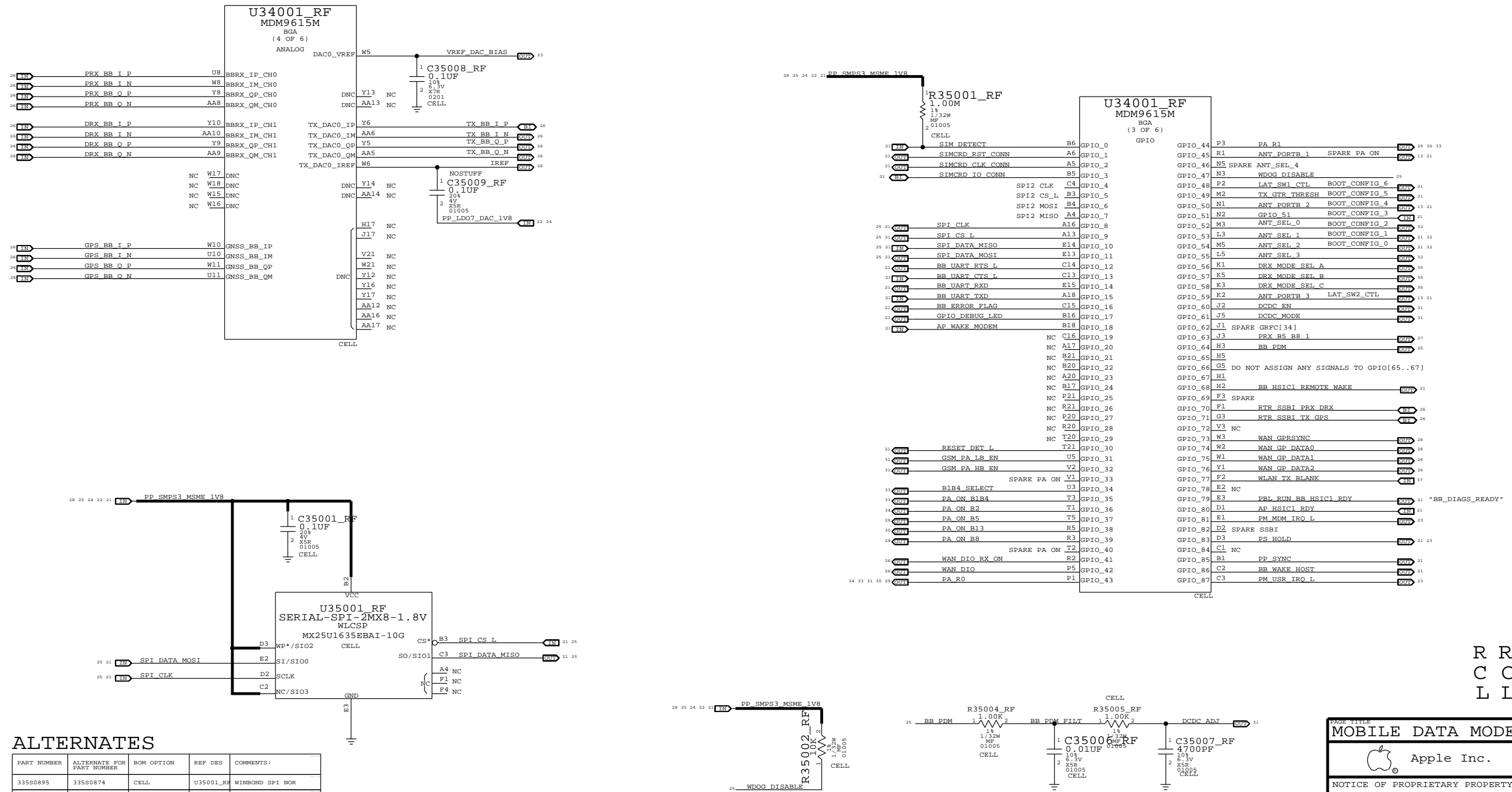
**Apple Inc.**

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ALTERNATES				
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S0895	335S0874	CELL	U35001_RF	WINBOND SPI NOR
335S0899	335S0874	CELL	U35001_RF	MICRON SPI NOR

R R608  
C C609  
L L601

MOBILE DATA MODEM ( 2 OF 2 )		
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		PAGE 35 OF 102
		SHEET 25 OF 46



# RF TRANSCEIVER SWITCHING NETWORKS ( 2 OF 3 )

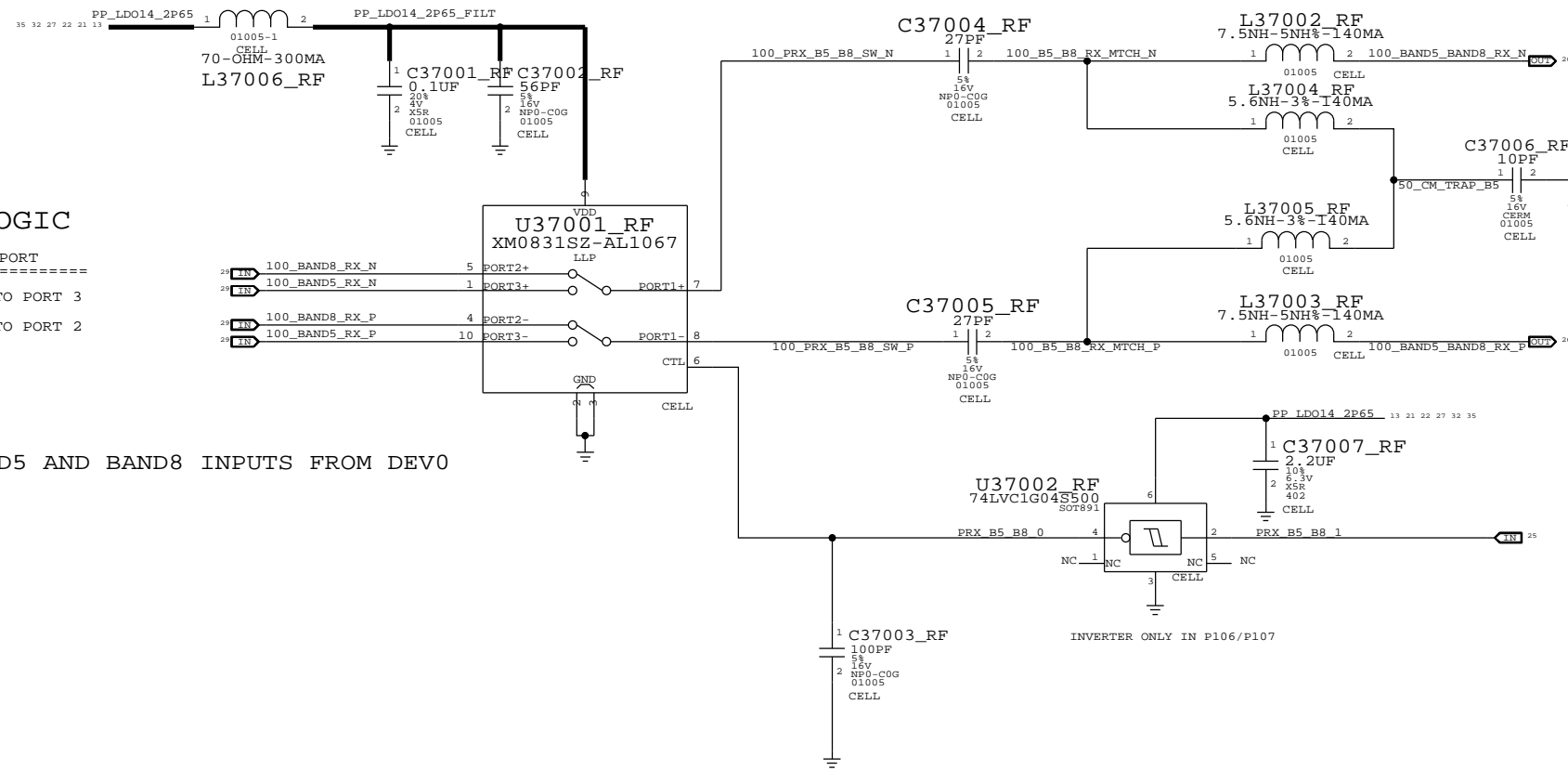
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## BAND 5/BAND 8 PRX TRANSCEIVER SWITCH

### XM0830SZ SWITCH LOGIC

PRX_B5_B8	ACTIVE BAND	PORT
HIGH	5	PORT 1 TO PORT 3
LOW	8	PORT 1 TO PORT 2

SWAPPED BAND5 AND BAND8 INPUTS FROM DEV0



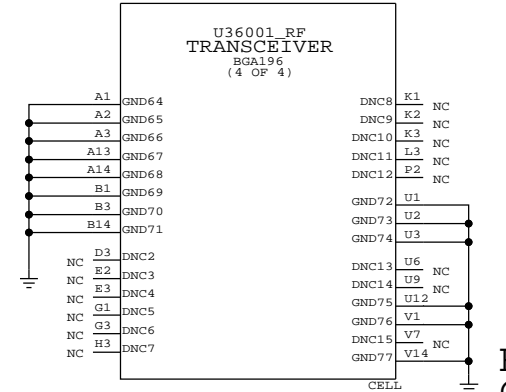
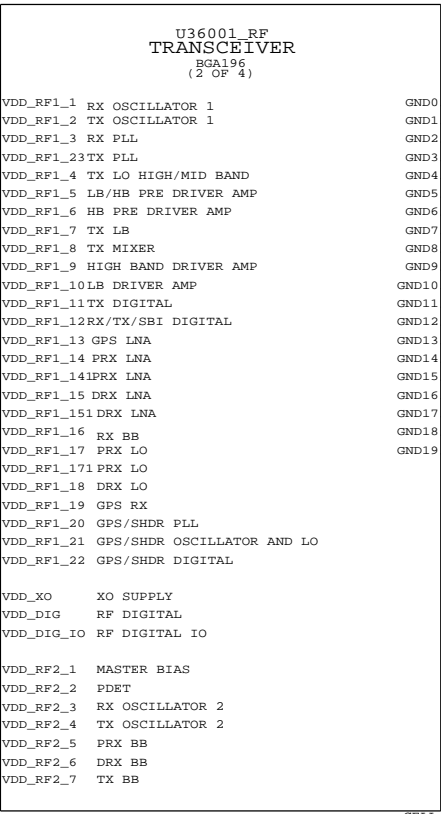
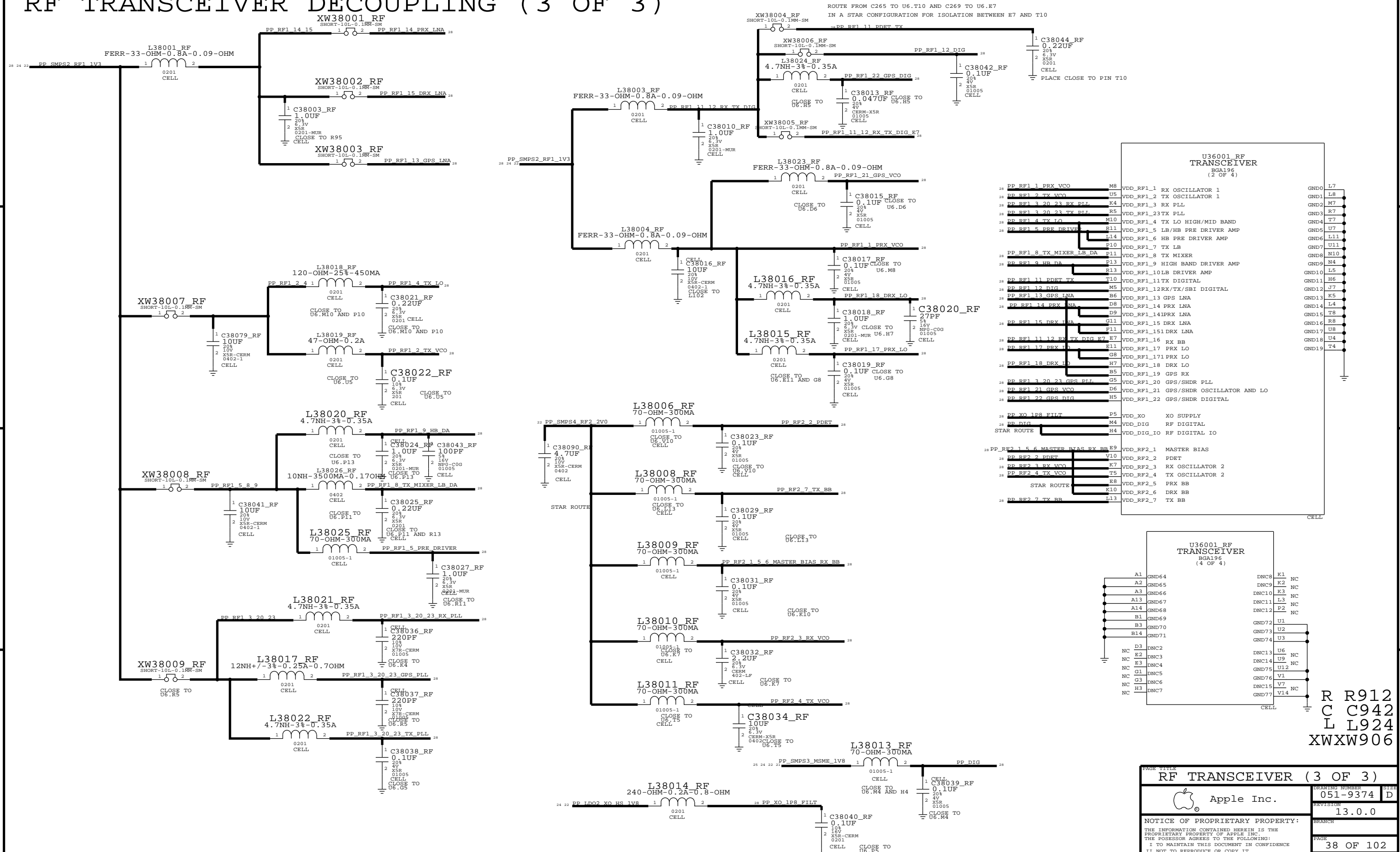
R RXXX  
 C C37007  
 L L803  
 U U801

PAGE TITLE RF TRANSCEIVER ( 2 OF 3 )		
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	SHEET	27 OF 46

# RF TRANSCEIVER DECOUPLING (3 OF 3)

D  
C  
B  
A

D  
C  
B  
A



R R912  
C C942  
L L924  
XWXW906

RF TRANSCEIVER (3 OF 3)

Apple Inc.

051-9374

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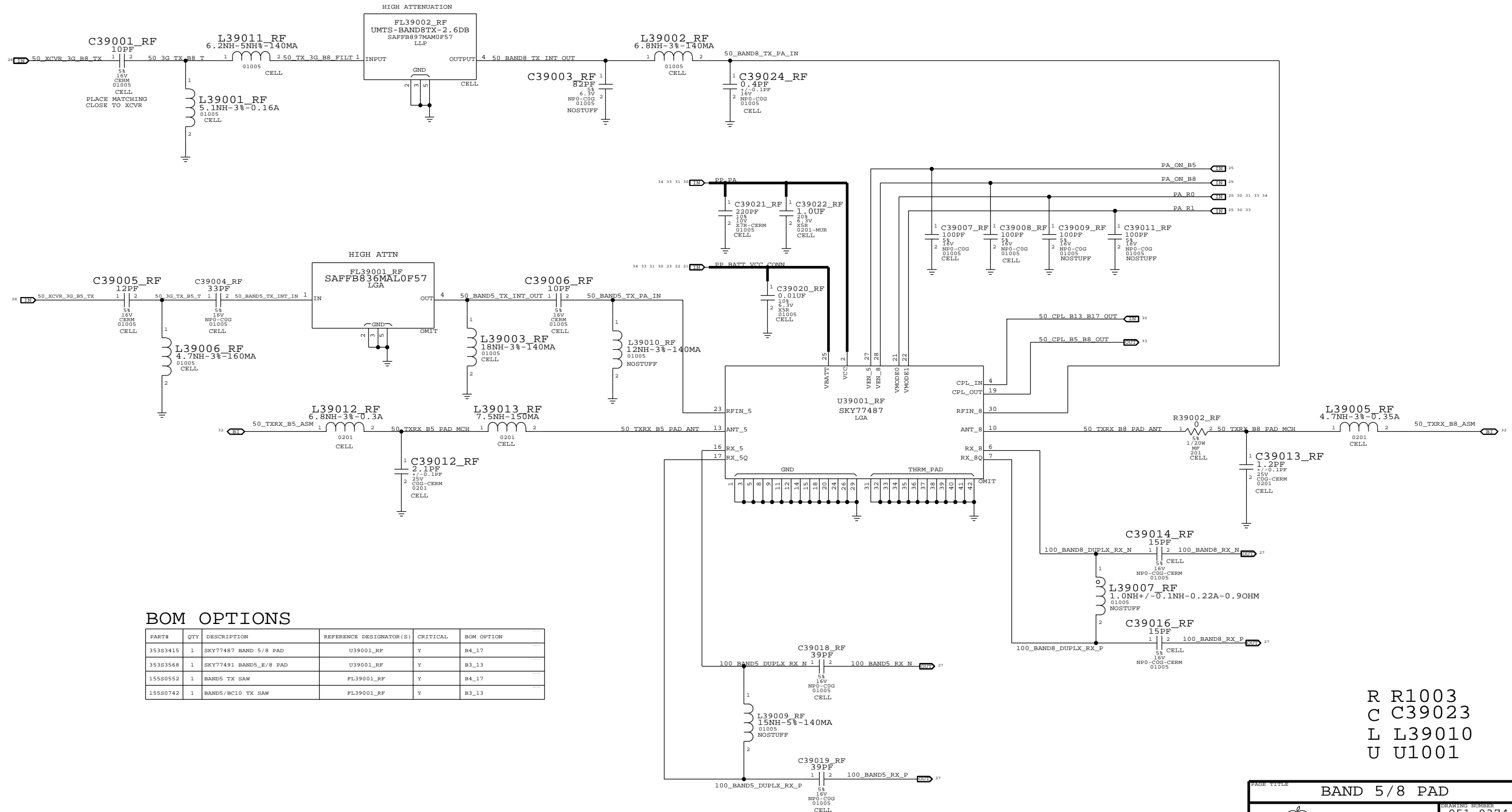
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38 OF 102 SHEETS

28 OF 46

# BAND 5 / 8 PAD

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## BOM OPTIONS

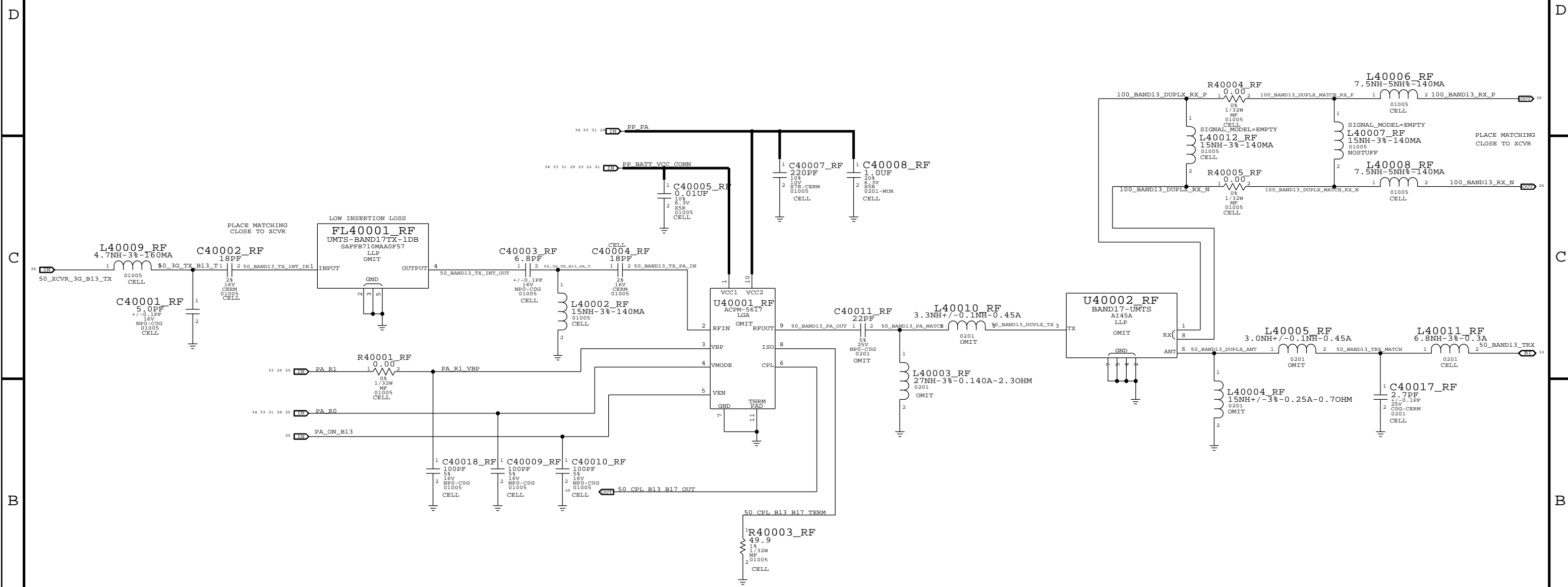
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S3415	1	SKY77487 BAND 5/8 PAD	U39001_RF	Y	B4_17
353S3568	1	SKY77491 BAND5_E/8 PAD	U39001_RF	Y	B3_13
155S0552	1	BAND5 TX SAW	FL39001_RF	Y	B4_17
155S0742	1	BAND5/BC10 TX SAW	FL39001_RF	Y	B3_13

R R1003  
C C39023  
L L39010  
U U1001

PAGE TITLE		
BAND 5/8 PAD		
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# B13/17 INTERSTAGE, PA, AND DUPLEXER

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## BOM OPTIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
155S0620	1	BAND17 TX SAW	FL40001_RF	Y	B4_17
155S0619	1	BAND13 TX SAW	FL40001_RF	Y	B3_13
353S3567	1	BAND17 PAM - SKY77729	U40001_RF	Y	B4_17
353S3441	1	BAND13 PAM - AVAGO ACPM-5613	U40001_RF	Y	B3_13
155S0709	1	BAND17 DUPLEXER	U40002_RF	Y	B4_17
155S0738	1	BAND13 DUPLEXER	U40002_RF	Y	B3_13
152S1280	1	5.1 NH INDUCTOR, 0201	C40011_RF	Y	B4_17
131S0129	1	22 PF CAPACITOR, 0201	C40011_RF	Y	B3_13
131S0198	1	1.8 PF CAPACITOR, 0201	L40003_RF	Y	B4_17
117S0002	1	0 OHMS RESISTOR, 0201	L40010_RF	Y	B4_17
152S1284	1	3.3 NH INDUCTOR, 0201	L40010_RF	Y	B3_13
152S1336	1	8.2 NH INDUCTOR, 0201	L40004_RF	Y	B4_17
152S1342	1	15 NH INDUCTOR, 0201	L40004_RF	Y	B3_13
152S1063	1	2.2 NH INDUCTOR, 0201	L40005_RF	Y	B4_17
152S1222	1	3.0 NH INDUCTOR, 0201	L40005_RF	Y	B3_13

## PA POWER MODES

MODE	PA_R0	PA_R1
LOW	HIGH	HIGH
MEDIUM	LOW	HIGH
HIGH	LOW	LOW

FLFL1101  
R R1102  
C C1118  
L L1108  
U U1102

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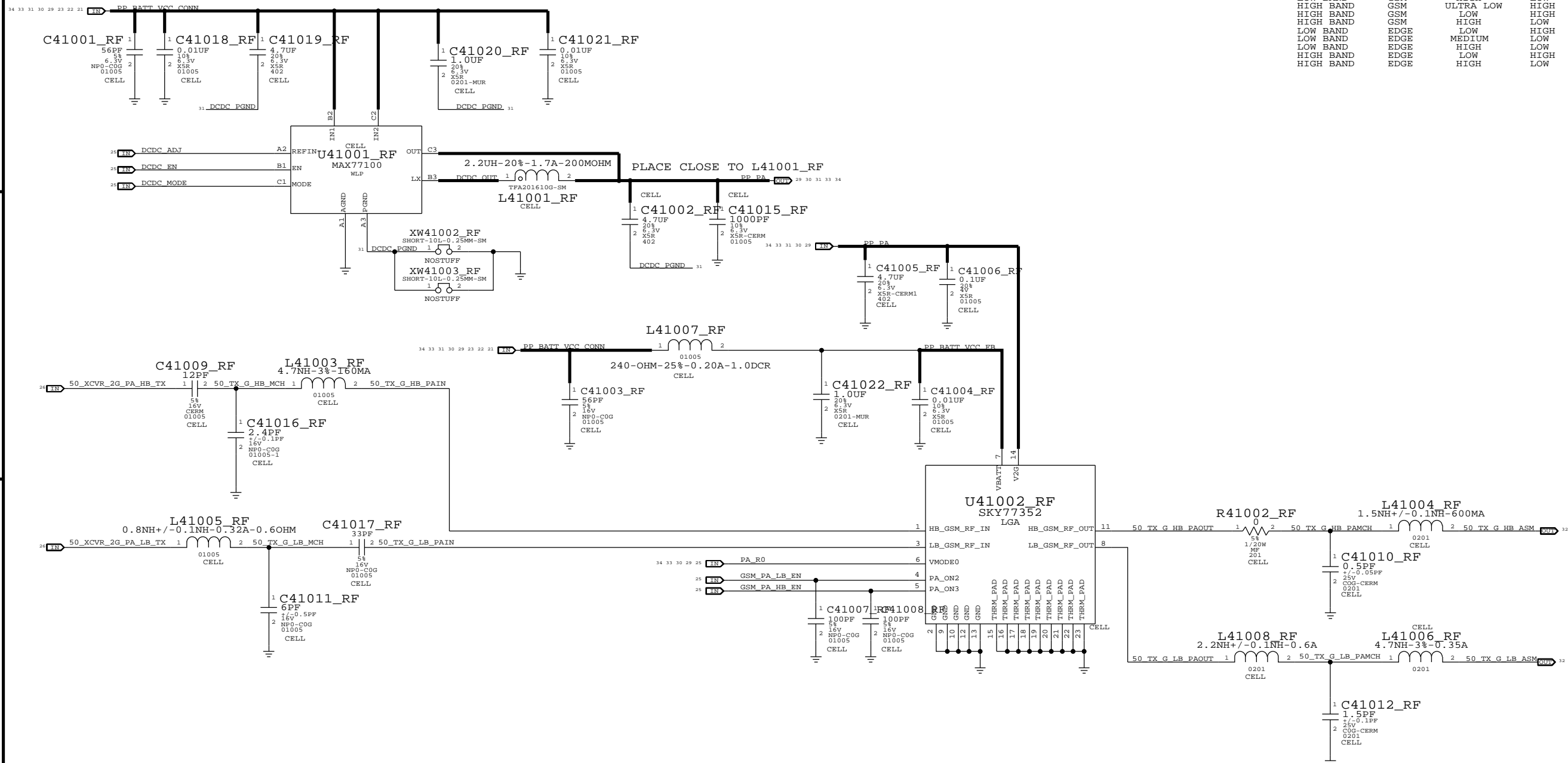


# 2G PA, PA DC/DC CONVERTER

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## 2G PA GAIN MODES

BAND	MODE	GAIN MODE	PA_R1	PCL RANGE
LOW BAND	GSM	ULTRA LOW	HIGH	16 TO 19
LOW BAND	GSM	LOW	HIGH	14 TO 15
LOW BAND	GSM	MEDIUM	LOW	7 TO 13
LOW BAND	GSM	HIGH	LOW	5 TO 6
HIGH BAND	GSM	ULTRA LOW	HIGH	10 TO 15
HIGH BAND	GSM	LOW	HIGH	7 TO 9
HIGH BAND	GSM	HIGH	LOW	0 TO 6
LOW BAND	EDGE	LOW	HIGH	15 TO 19
LOW BAND	EDGE	MEDIUM	LOW	10 TO 14
LOW BAND	EDGE	HIGH	LOW	8 TO 9
HIGH BAND	EDGE	LOW	HIGH	9 TO 15
HIGH BAND	EDGE	HIGH	LOW	2 TO 8

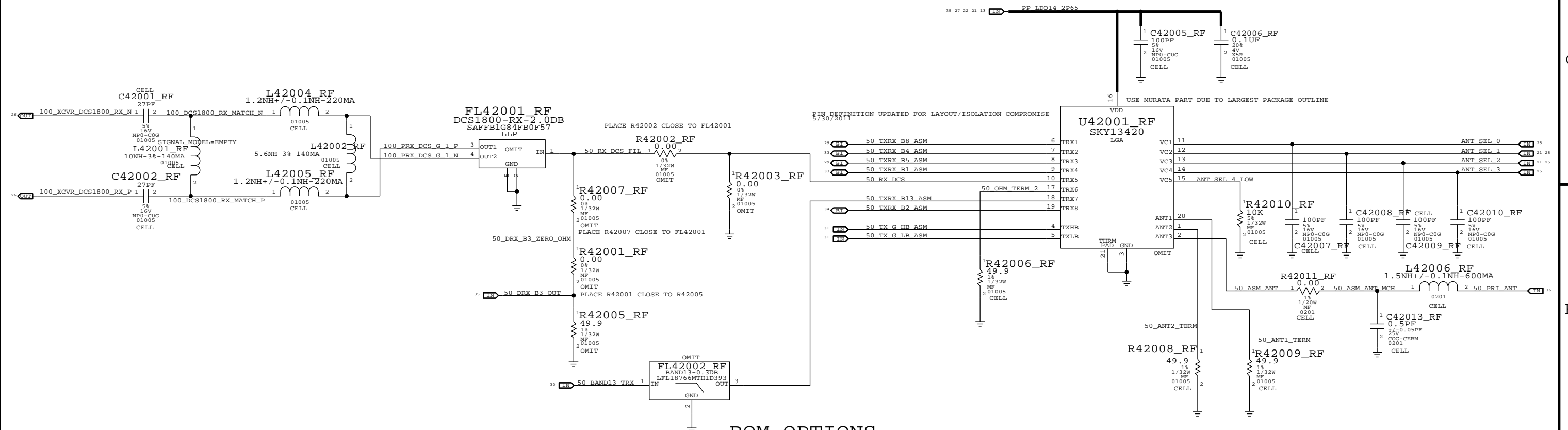


- R R1209
- C C1215
- L L41007
- U U1202

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# ASM, DCS RX

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## BOM OPTIONS

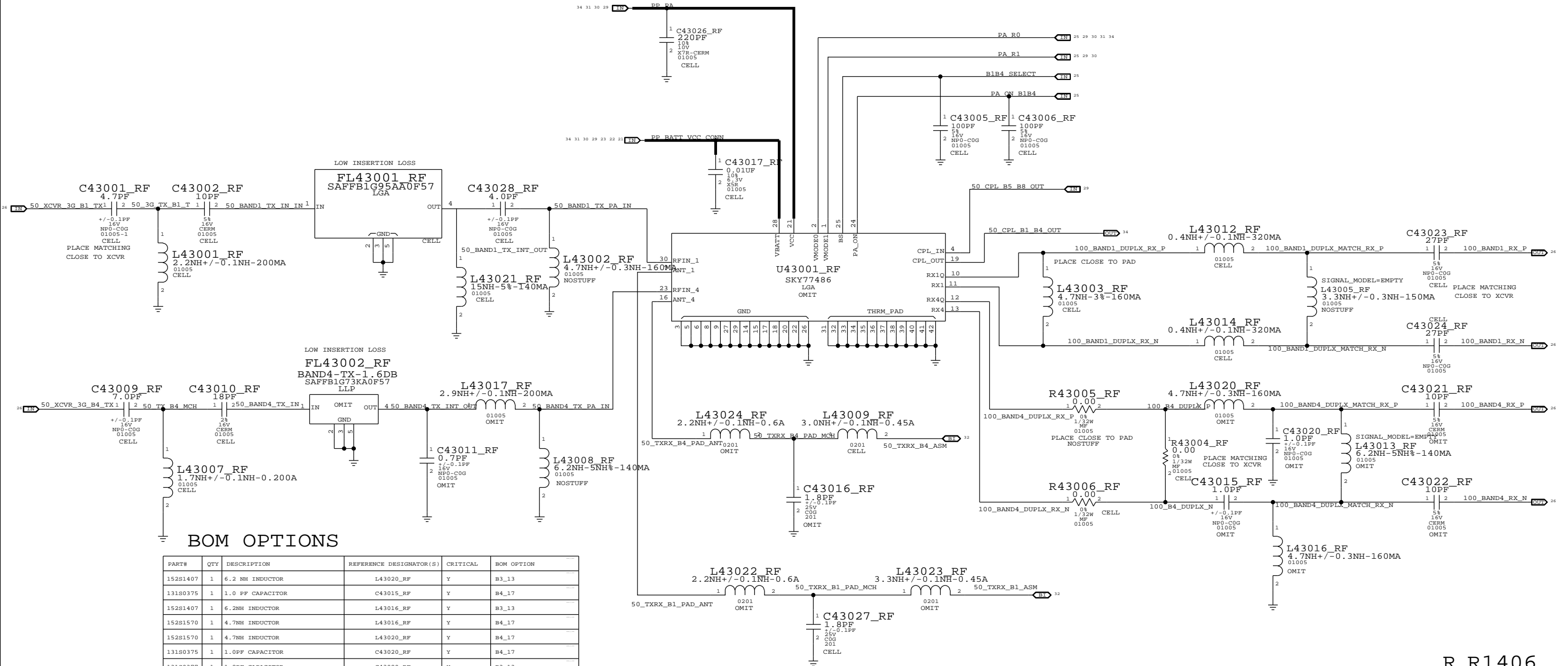
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
15580596	1	DCS1800 RX FIL	FL42001_RF	Y	B4_17
15580729	1	BAND3 RX FIL	FL42001_RF	Y	B3_13
15580695	1	THRU LINE	FL42002_RF	Y	B4_17
15580722	1	BAND13 TX LPP	FL42002_RF	Y	B3_13
11780161	1	0OHM RES	R42001_RF	Y	B3_13
11780161	1	0OHM RES	R42002_RF	Y	B4_17
11880652	1	49.9OHM RES	R42003_RF	Y	B3_13
11880652	1	49.9OHM RES	R42005_RF	Y	B4_17
11780161	1	0OHM RES	R42007_RF	Y	B3_13
35383573	1	ASM, SKYWORKS	U42001_RF	Y	B4_17
35383573	1	ASM, SKYWORKS	U42001_RF	Y	B3_13

R R42011  
C C42013  
L 42006  
U U1301  
FL FL1302

PAGE TITLE		
DCS RX, ASM		
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# BAND 1/4 PAD

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### BOM OPTIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
152S1407	1	6.2 NH INDUCTOR	L43020_RF	Y	B3_13
131S0375	1	1.0 PF CAPACITOR	C43015_RF	Y	B4_17
152S1407	1	6.2NH INDUCTOR	L43016_RF	Y	B3_13
152S1570	1	4.7NH INDUCTOR	L43016_RF	Y	B4_17
152S1570	1	4.7NH INDUCTOR	L43020_RF	Y	B4_17
131S0375	1	1.0PF CAPACITOR	C43020_RF	Y	B4_17
131S0377	1	1.2PF CAPACITOR	C43020_RF	Y	B3_13
131S0377	1	1.2PF CAPACITOR	C43015_RF	Y	B3_13
131S0377	1	1.2 PF CAPACITOR	C43011_RF	Y	B4_17
152S1571	1	5.6 NH INDUCTOR	C43011_RF	Y	B3_13
152S1567	1	3.3 NH INDUCTOR	L43017_RF	Y	B4_17
131S0215	1	22 PF CAPACITOR	L43017_RF	Y	B3_13
131S0198	1	1.8 PF CAPACITOR	C43016_RF	Y	B4_17
131S0337	1	1.5 PF CAPACITOR	C43016_RF	Y	B3_13
152S1407	1	6.2NH INDUCTOR	L43013_RF	Y	B4_17
152S1571	1	5.6NH INDUCTOR	L43013_RF	Y	B3_13
131S0219	1	10PF CAPACITOR	C43021_RF	Y	B4_17
131S0219	1	10PF CAPACITOR	C43022_RF	Y	B4_17
131S0307	1	100PF CAPACITOR	C43021_RF	Y	B3_13
131S0307	1	100PF CAPACITOR	C43022_RF	Y	B3_13

### BOM OPTIONS

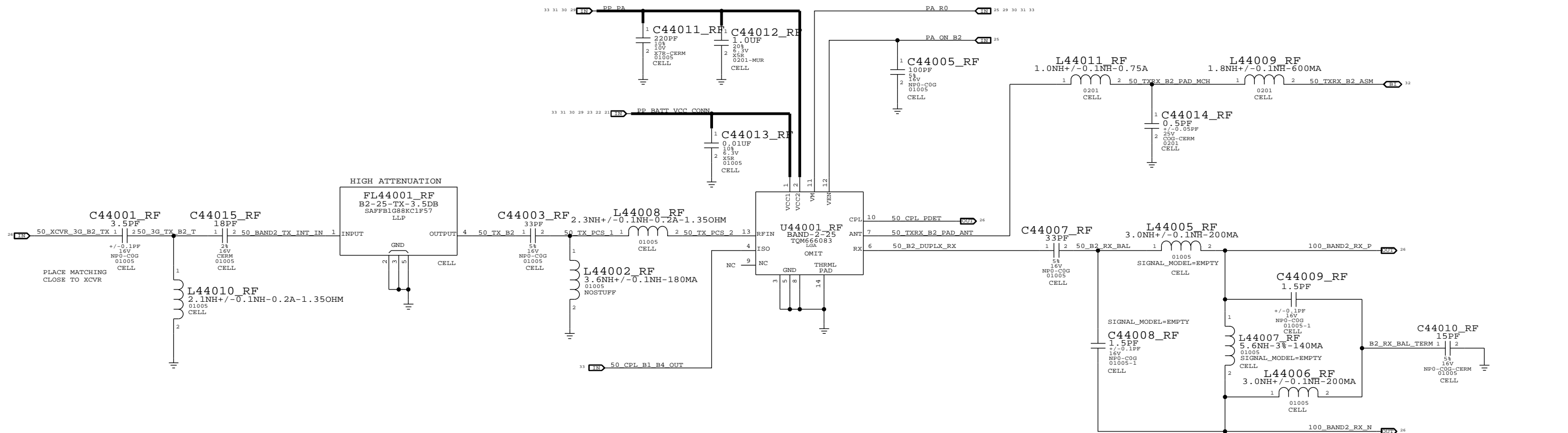
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S3255	1	B1/4 PAD, AVAGO AFEM-7814	U43001_RF	Y	B4_17
353S3443	1	B1/3 PAD, AVAGO AFEM-7813	U43001_RF	Y	B3_13
155S0590	1	B4 TX FIL	FL43002_RF	Y	B4_17
155S0712	1	B3 TX FIL	FL43002_RF	Y	B3_13
152S1063	1	2.2NH INDUCTOR	L43022_RF	Y	B4_17
152S1222	1	3.0NH INDUCTOR	L43022_RF	Y	B3_13
152S1284	1	3.3NH INDUCTOR	L43023_RF	Y	B4_17
152S1222	1	3.0NH INDUCTOR	L43023_RF	Y	B3_13
152S1063	1	2.2NH INDUCTOR	L43024_RF	Y	B4_17
152S1222	1	3.0NH INDUCTOR	L43024_RF	Y	B3_13

R R1406  
C C43027  
L L43018  
U U1401  
FL FL1101

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# BAND2 PAD

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## BOM OPTIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S3715	1	B2 PAD, TRIQUINT B2 PAD	U44001_RF	Y	B4_17
353S3459	1	B2 PAD, TRIQUINT B25 PAD	U44001_RF	Y	B3_13

R R1501  
 C C44014  
 L L1509  
 U U1501  
 FL FL1501

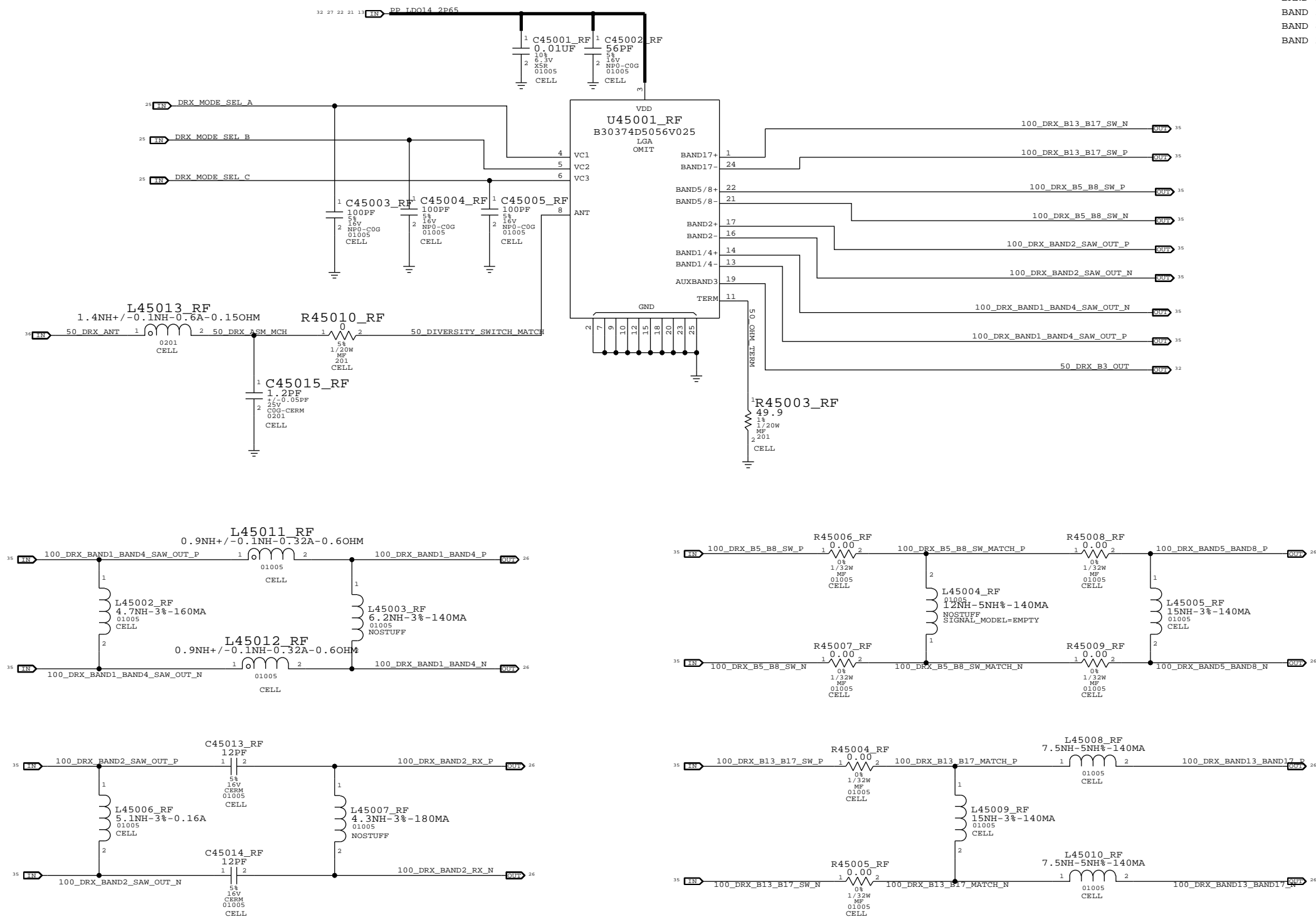
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# RX DIVERSITY

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## DIVERSITY MODULE LOGIC

BAND VC1 VC2 VC3  
 =====  
 BAND 1/4  
 BAND 2  
 BAND 5  
 BAND 8  
 BAND 13/17



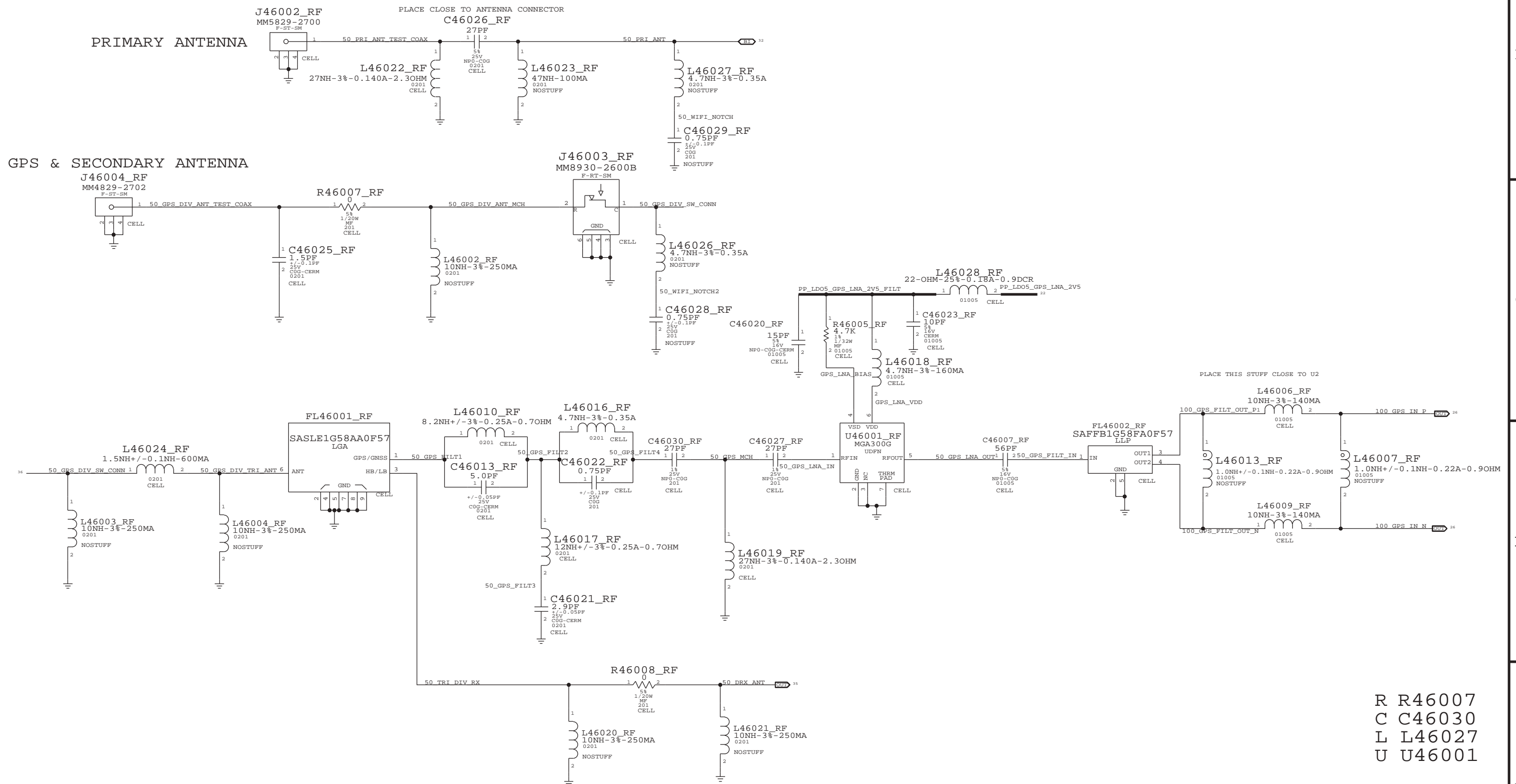
R R1603  
 C C1616  
 L L1610  
 U U1601

### BOM OPTIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353S3538	1	EPCOS B17 DIVERSITY MODULE	U45001_RF	Y	B4_17
353S3537	1	EPCOS B13/Bc10 DIV. MODULE	U45001_RF	Y	B3_13

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# GPS

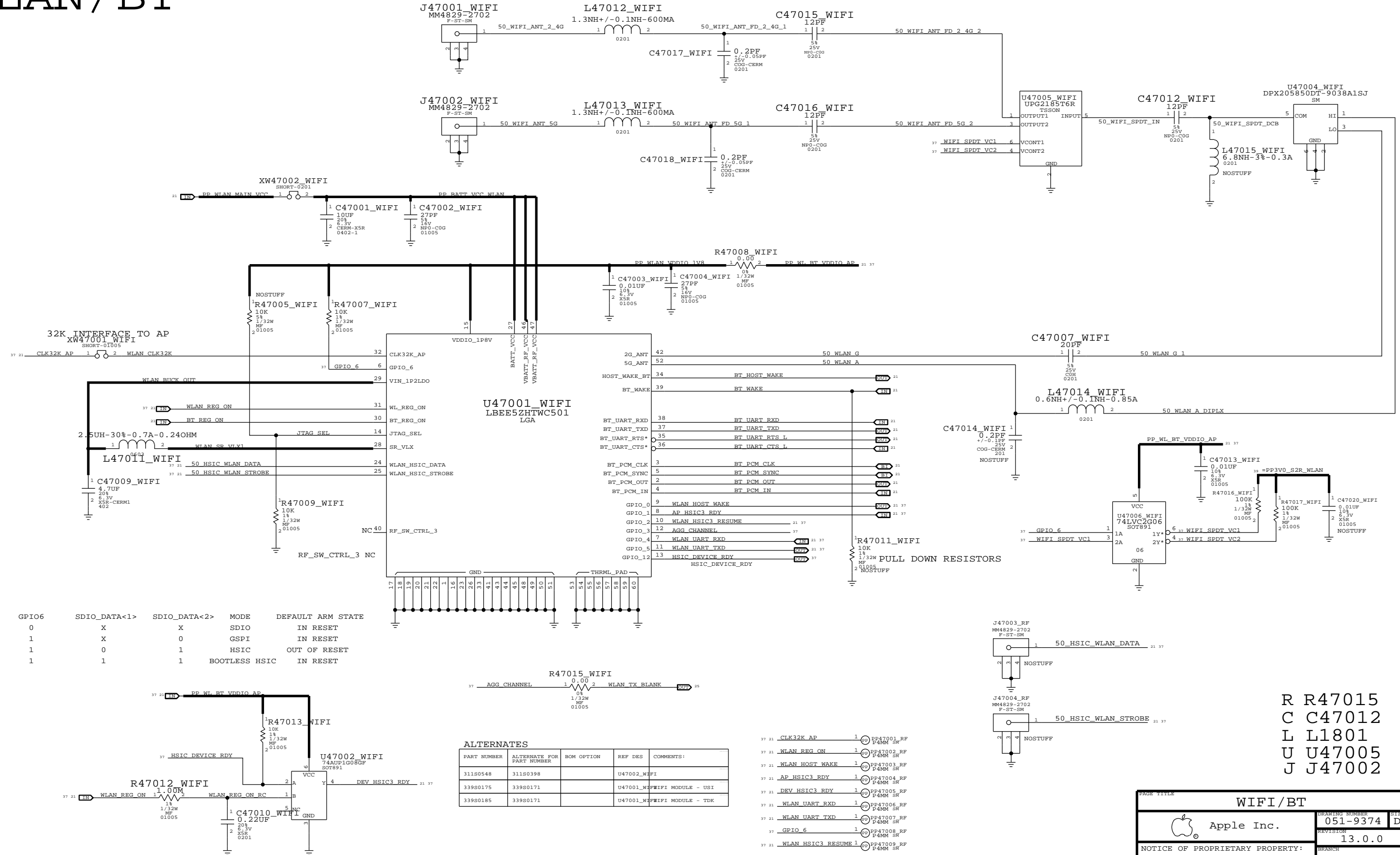


- R R46007
- C C46030
- L L46027
- U U46001

GPS		
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# WLAN/BT

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GPIO6	SDIO_DATA<1>	SDIO_DATA<2>	MODE	DEFAULT ARM STATE
0	X	X	SDIO	IN RESET
1	X	0	GSPI	IN RESET
1	0	1	HSIC	OUT OF RESET
1	1	1	BOOTLESS HSIC	IN RESET

ALTERNATES				
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
31180548	31180398		U47002_WIFI	
339S0175	339S0171		U47001_WIFI	WiFi MODULE - USI
339S0185	339S0171		U47001_WIFI	WiFi MODULE - TDK

- 37 21 CLK32K\_AP 1 PP47001\_RF P4MM SM
- 37 21 WLAN\_REG\_ON 1 PP47002\_RF P4MM SM
- 37 21 WLAN\_HOST\_WAKE 1 PP47003\_RF P4MM SM
- 37 21 AP\_HSIC3\_RDY 1 PP47004\_RF P4MM SM
- 37 21 DEV\_HSIC3\_RDY 1 PP47005\_RF P4MM SM
- 37 21 WLAN\_UART\_RXD 1 PP47006\_RF P4MM SM
- 37 21 WLAN\_UART\_TXD 1 PP47007\_RF P4MM SM
- 37 21 GPIO\_6 1 PP47008\_RF P4MM SM
- 37 21 WLAN\_HSIC3\_RESUME 1 PP47009\_RF P4MM SM

R R47015  
C C47012  
L L1801  
U U47005  
J J47002

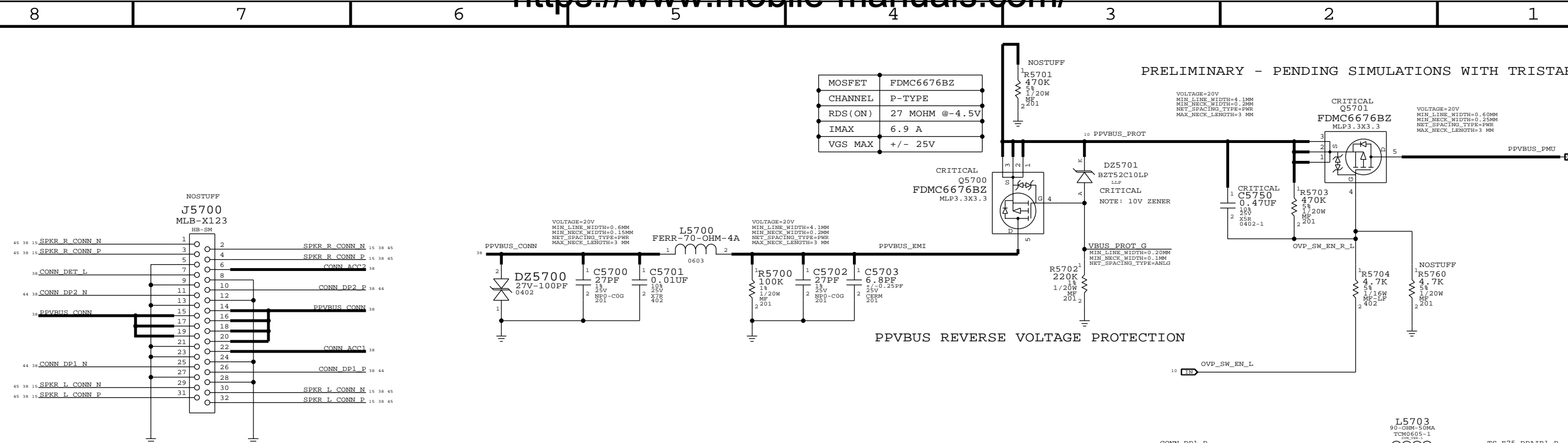
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PRELIMINARY - PENDING SIMULATIONS WITH TRISTAR

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

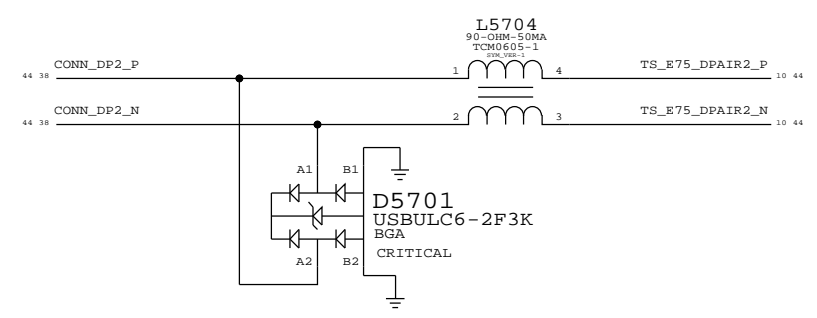
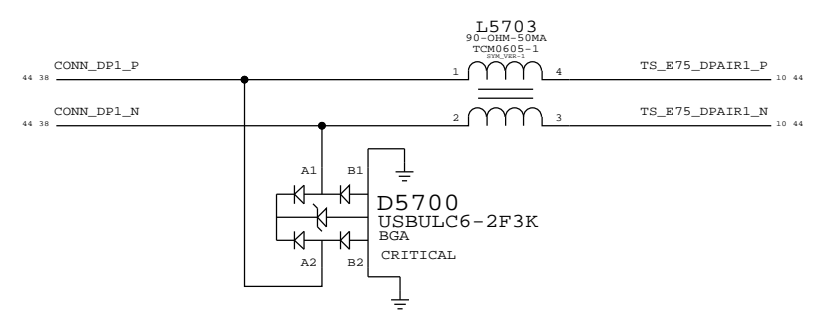
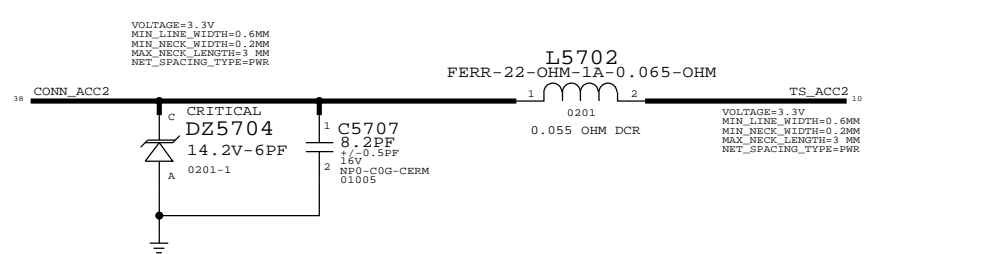
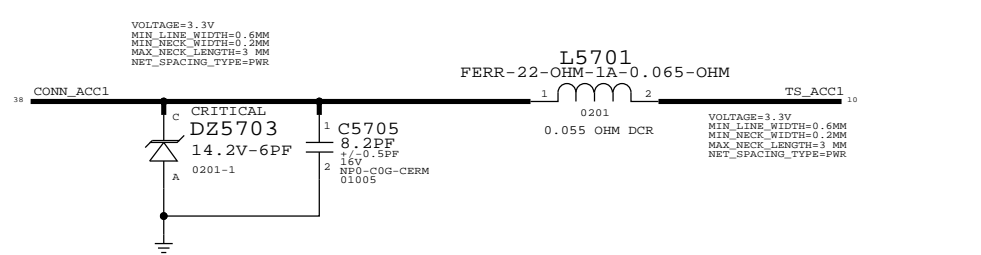
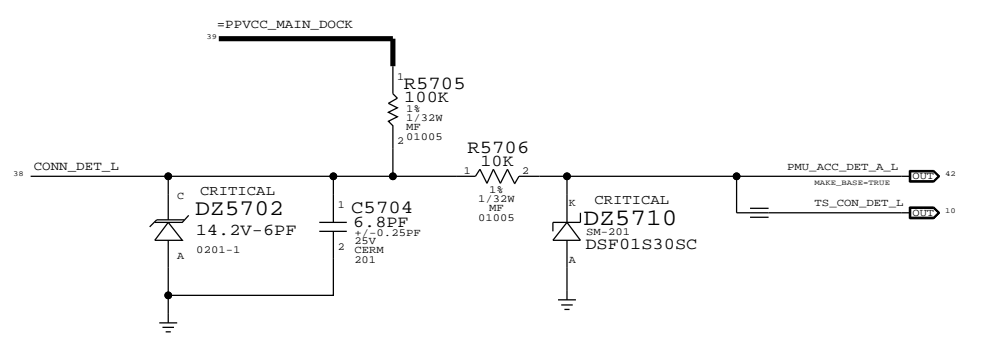
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MIN\_NECK\_WIDTH=0.2MM  
NET\_SPACING\_TYPE=PWR  
MAX\_NECK\_LENGTH=3 MM

VOLTAGE=20V  
MIN\_LINE\_WIDTH=0.6MM  
MIN\_NECK\_WIDTH=0.2MM  
NET\_SPACING\_TYPE=PWR  
MAX\_NECK\_LENGTH=3 MM



PPVBUS REVERSE VOLTAGE PROTECTION

NOTE: SPKR\_L\_CONN\_N AND SPKR\_L\_CONN\_P WERE SWAPPED ON 5/22/12 PER RADAR #11526818



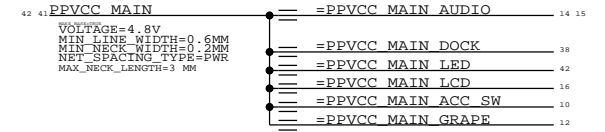
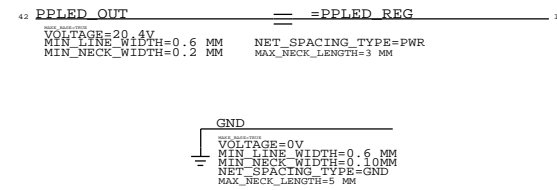
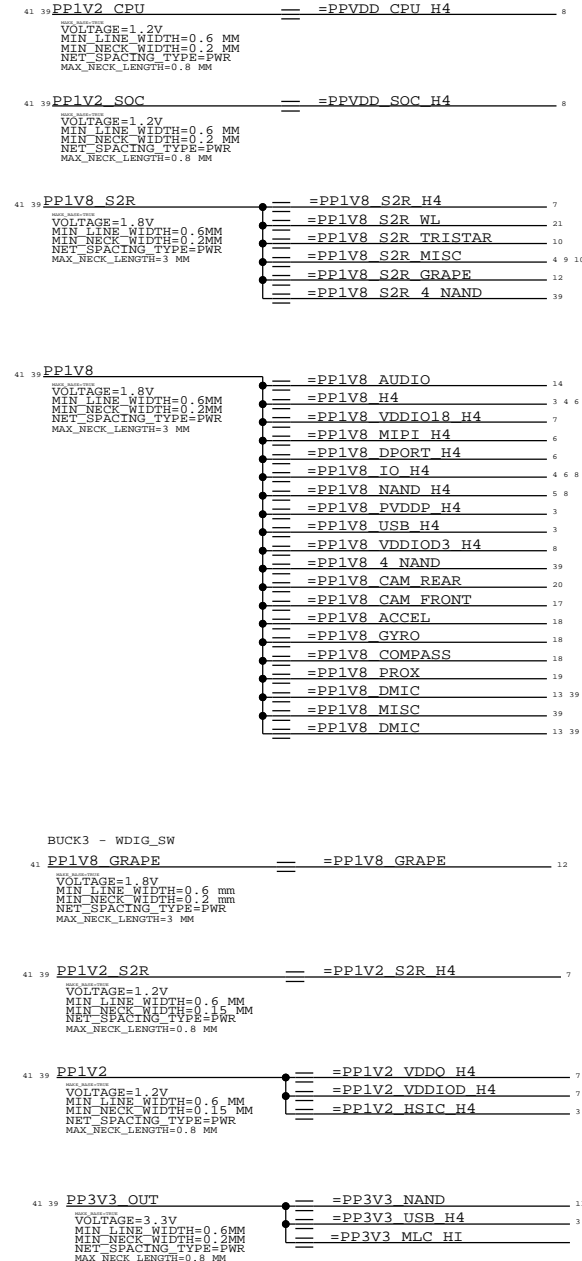
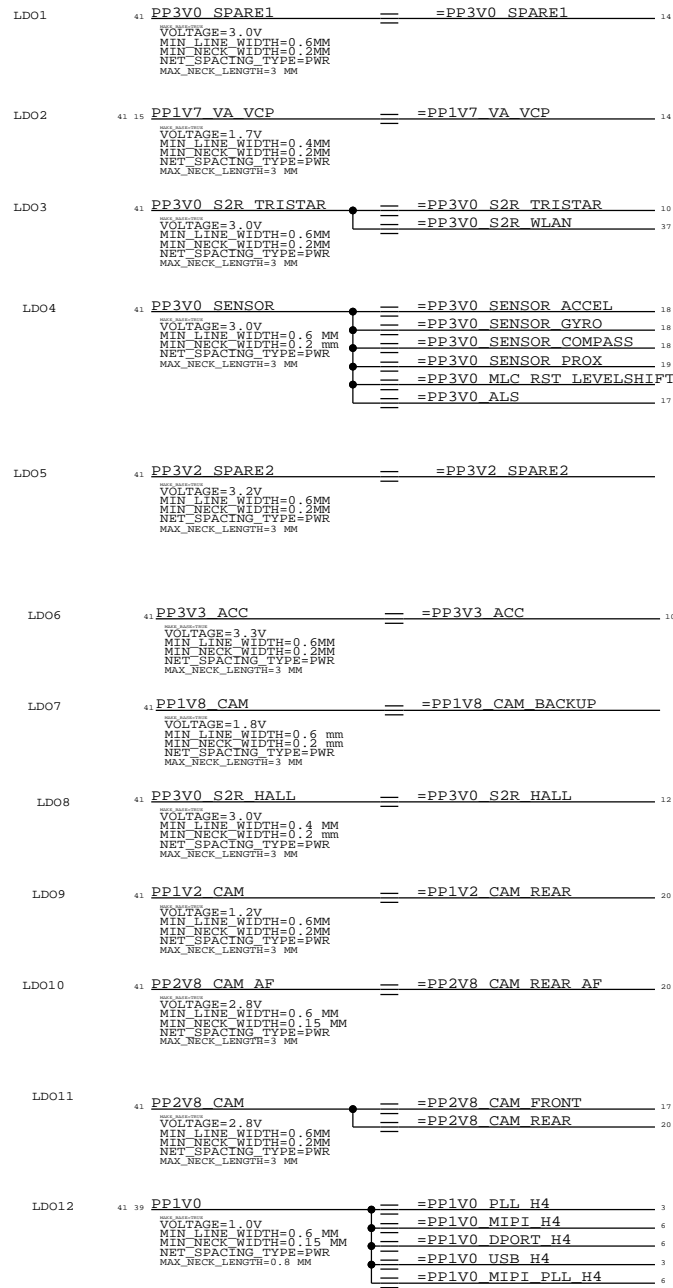
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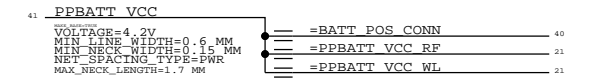
**LDO RAILS**  
PROGRAMMABLE ON/OFF

**BUCK RAILS**

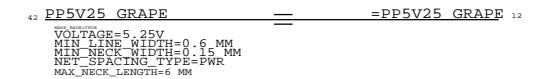
**CHARGER MAIN**



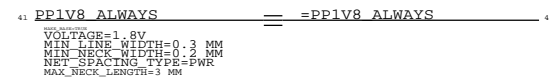
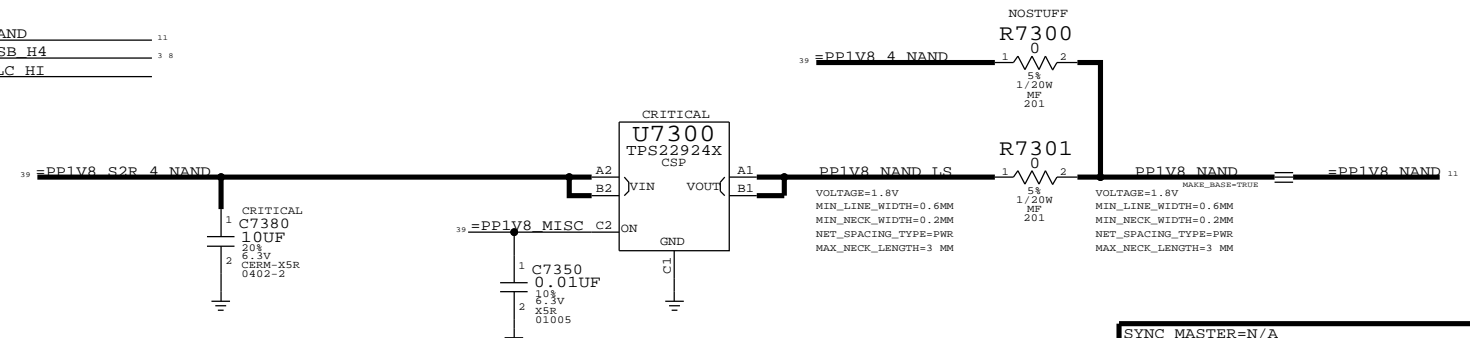
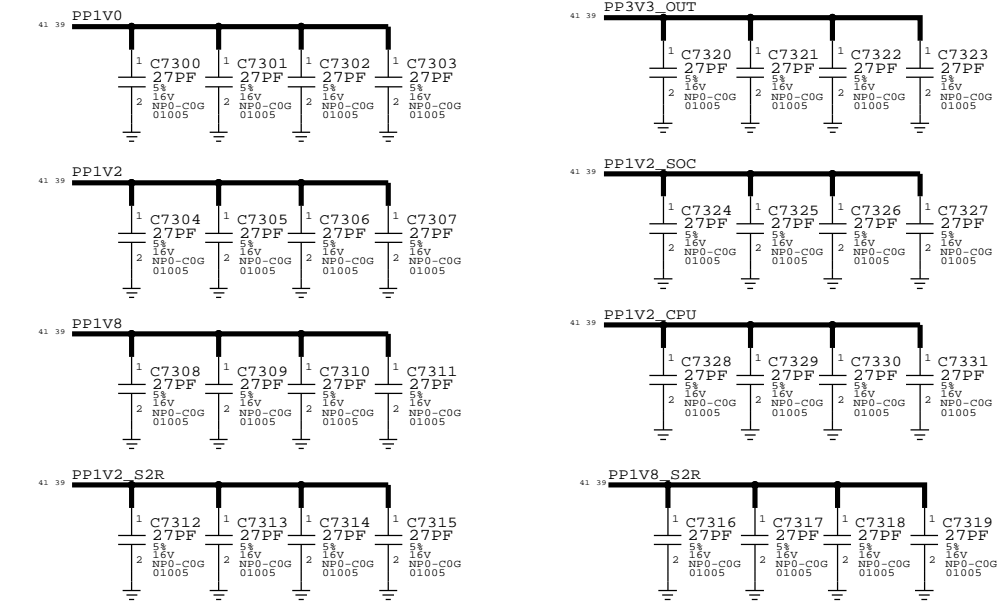
**BATTERY**



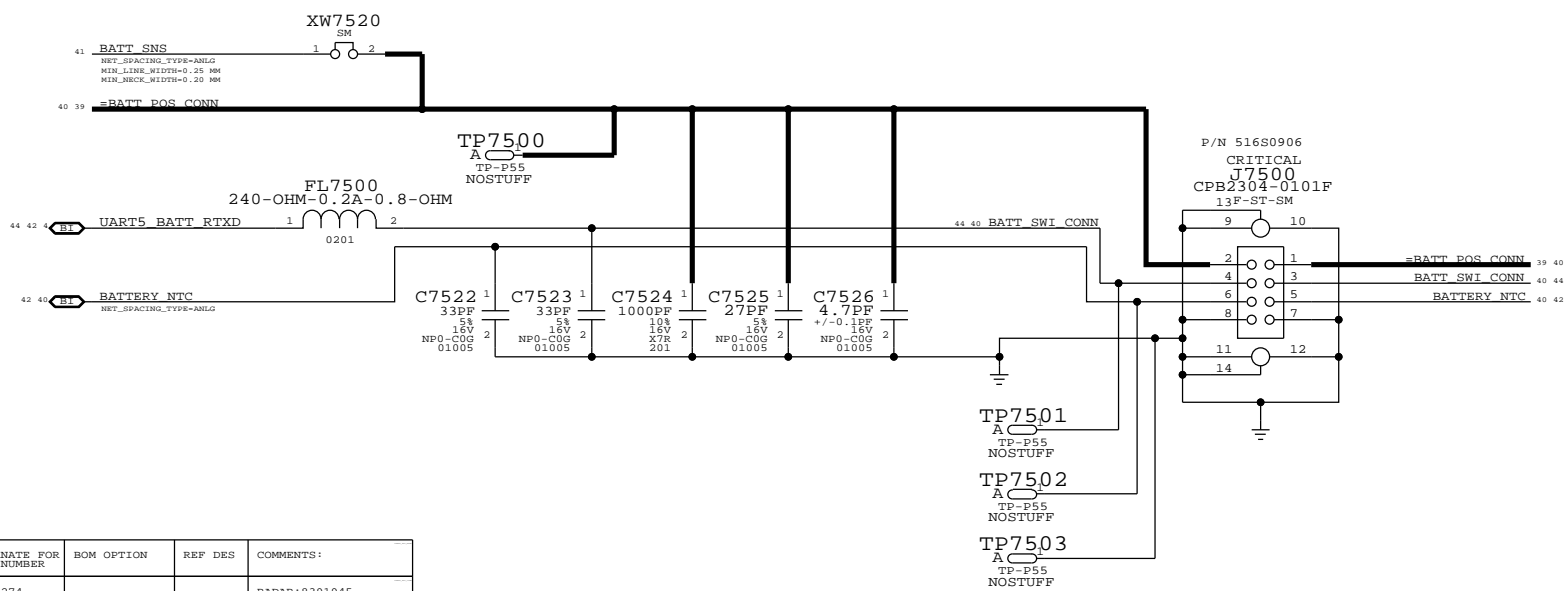
**BOOST->LDOS**



**DESENSE CAPS**



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<b>Power: Aliases</b>			
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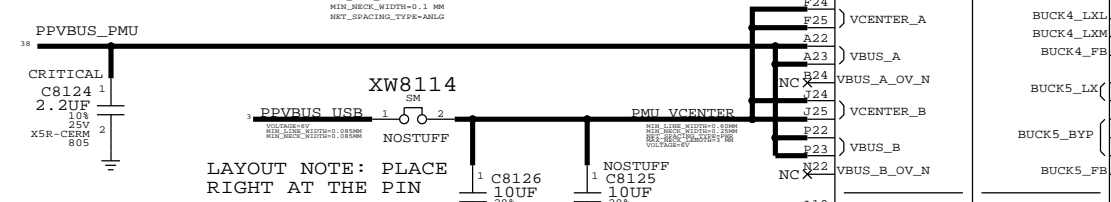
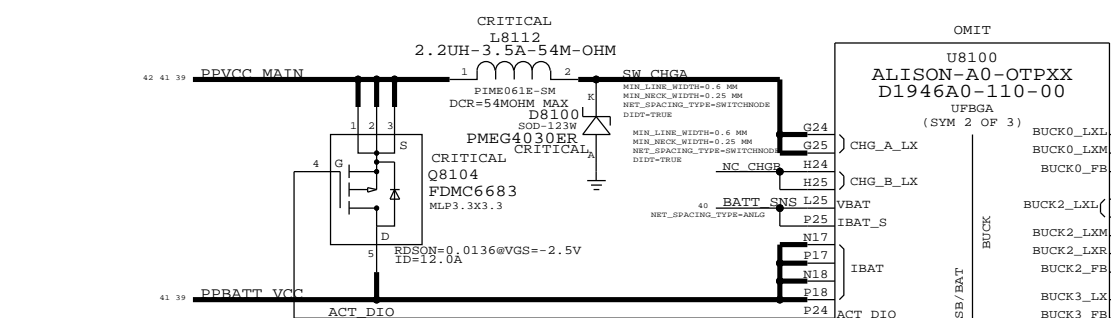
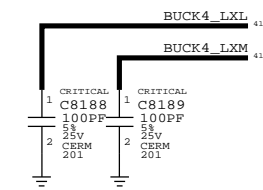
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
155S0644	155S0274			RADAR:8391945

FL7500, L1700, L1701, L1702, L1800, L1920, L2600, L2601, L2602, L2700, L2701, L2702, L2800, L2900, L2901, L2902, L2903, L2960, L2961, L2962, L2963

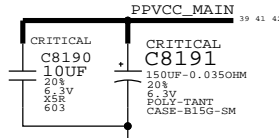
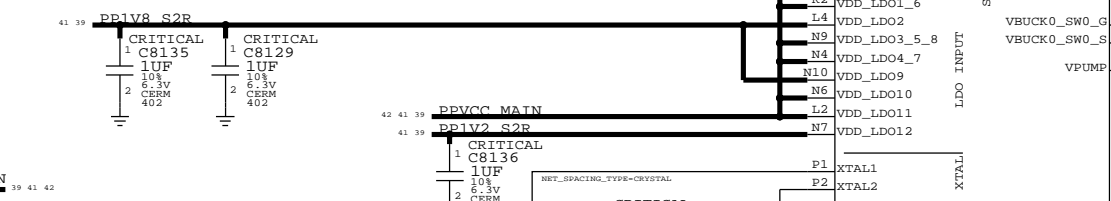
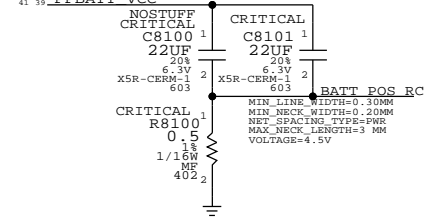
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POWER: BATTERY CONNECTOR			
DRAWING NUMBER 051-9374		SIZE D	
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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
34380593	1	IC, PMU, ALISON, D1946A5, OTPXX, UFBGA292	U8100	CRITICAL	

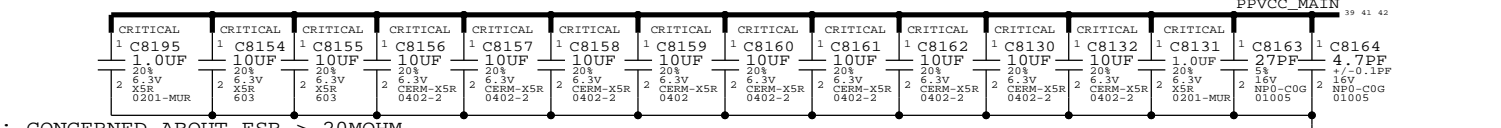
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
19780392	19780299		Y8138	ALT FOUNDRY



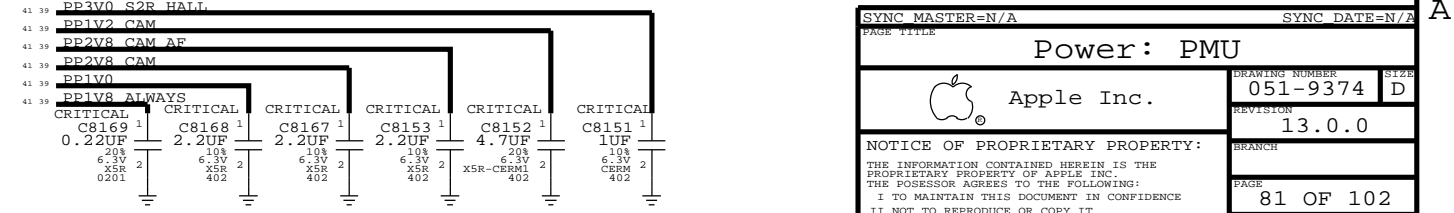
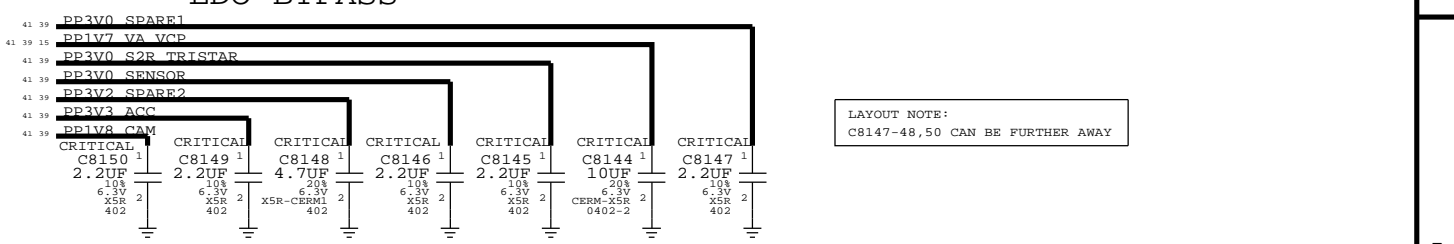
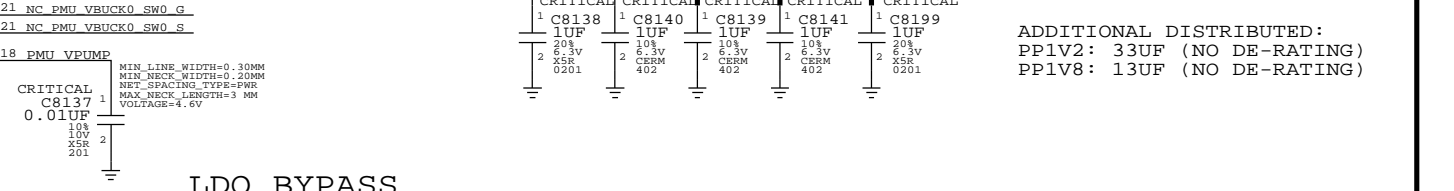
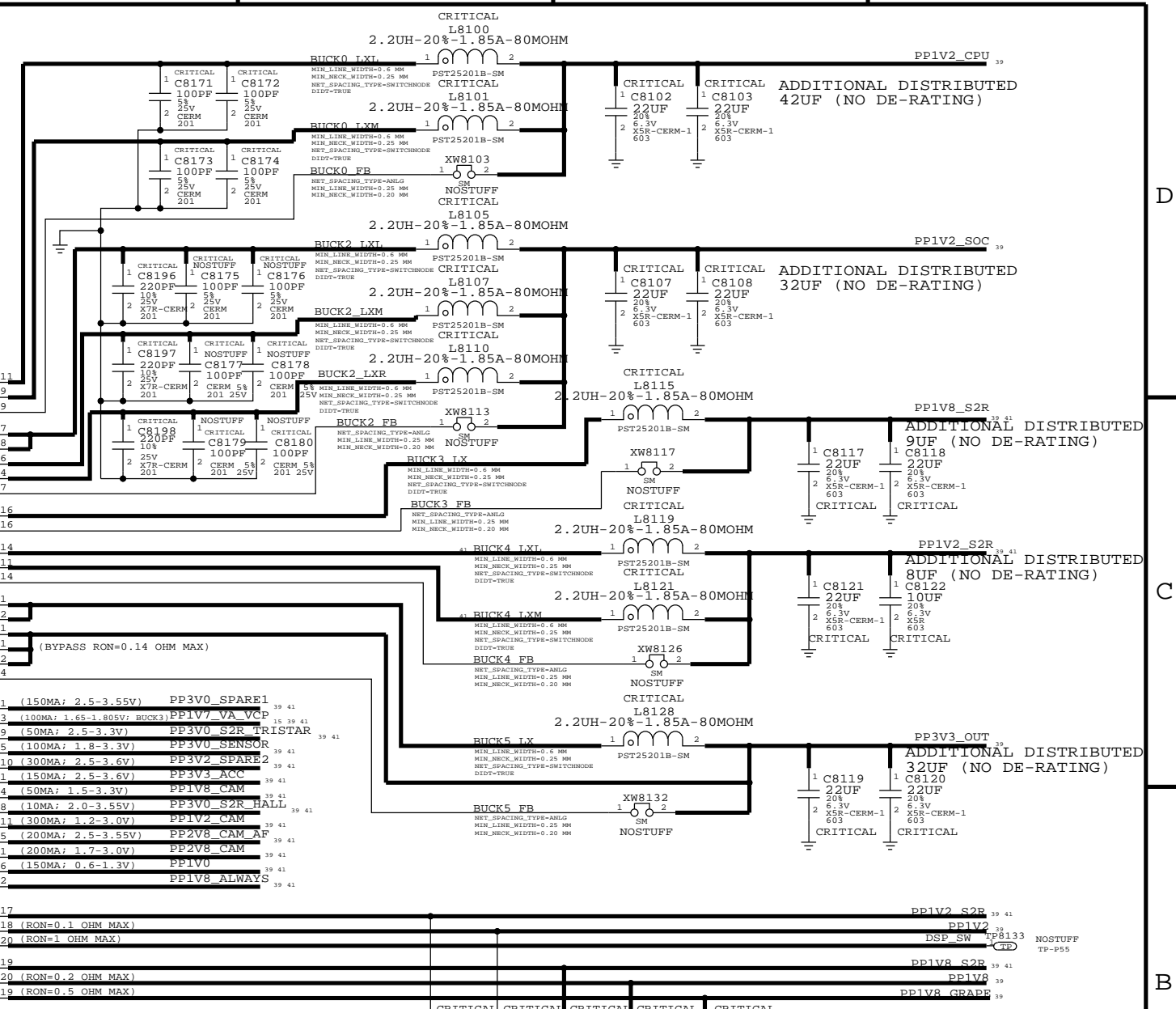
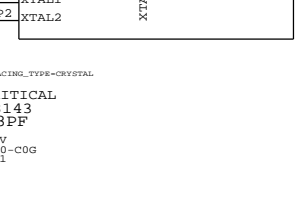
NOTE: FOR NO BATTERY SITUATION



VCC\_MAIN BYPASS  
TOTAL CAPS = ~400UF  
(DISTRIBUTED AND NO DE-RATING)

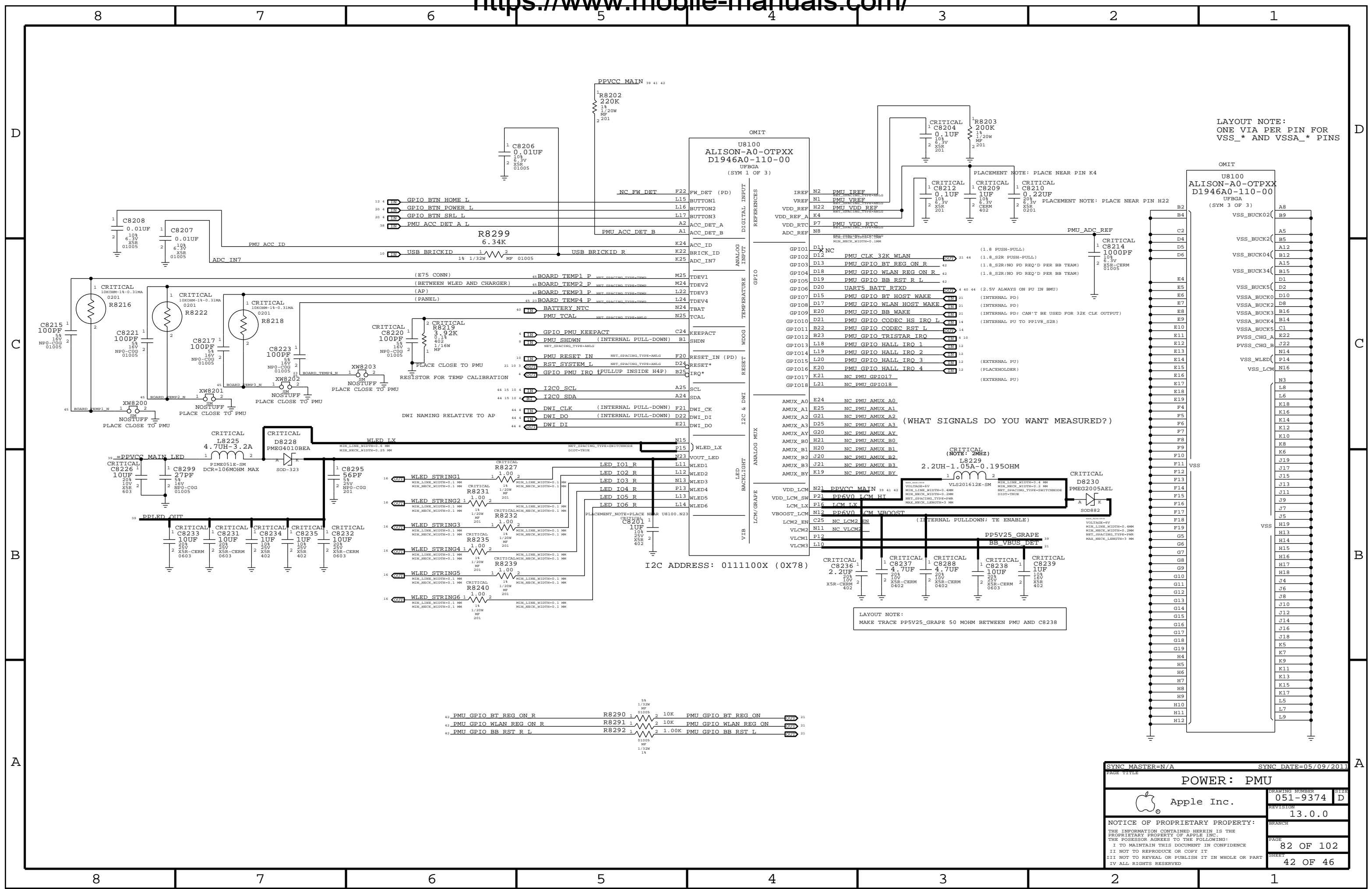


NOTE: CONCERNED ABOUT ESR > 20MOHM



LAYOUT NOTE: C8147-48,50 CAN BE FURTHER AWAY

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Power: PMU			DRAWING NUMBER	SIZE	
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LAYOUT NOTE:  
ONE VIA PER PIN FOR  
VSS\_\* AND VSSA\_\* PINS

(WHAT SIGNALS DO YOU WANT MEASURED?)

LAYOUT NOTE:  
MAKE TRACE PP5V25\_GRAPE 50 MOHM BETWEEN PMU AND C8238

SYNC MASTER=N/A		SYNC DATE=05/09/2011	
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# MECHANICAL PARTS

## PD PARTS

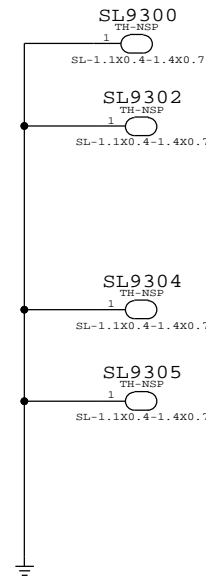
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
806-4017	1	FENCE.MAIN.MLB.YYY	FENCE_MLB	
806-3782	1	CAN.MAIN.MLB.WIFI.YYY	CAN_WIFI	
806-3715	1	FENCE.RADIO.MLB.SWAPPED.YYY	CAN_RADIO	CELL

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

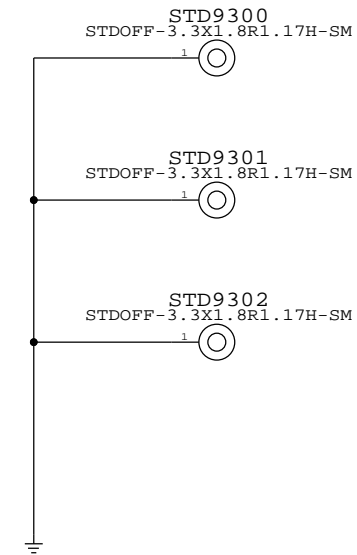
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
825-7639	1	EEEE FOR 639-3251 (X123 ENTRY)	DNVV	CRITICAL	EEEE_X123_ENTRY
825-7639	1	EEEE FOR 639-4129 (X123A ENTRY)	F78H	CRITICAL	EEEE_X123A_ENTRY
825-7639	1	EEEE FOR 639-4130 (X123B ENTRY)	F78J	CRITICAL	EEEE_X123B_ENTRY
825-7639	1	EEEE FOR 639-3923 (X123 GOOD)	F3JV	CRITICAL	EEEE_X123_BETTER
825-7639	1	EEEE FOR 639-3924 (X123 BETTER)	F3JQ	CRITICAL	EEEE_X123_BEST
825-7639	1	EEEE FOR 639-3415 (X123A GOOD)	DY62	CRITICAL	EEEE_X123A_GOOD
825-7639	1	EEEE FOR 639-3925 (X123A BETTER)	F3JN	CRITICAL	EEEE_X123A_BETTER
825-7639	1	EEEE FOR 639-3926 (X123A BEST)	F3JP	CRITICAL	EEEE_X123A_BEST
825-7639	1	EEEE FOR 639-3416 (X123B GOOD)	DY63	CRITICAL	EEEE_X123B_GOOD
825-7639	1	EEEE FOR 639-3927 (X123B BETTER)	F3JR	CRITICAL	EEEE_X123B_BETTER
825-7639	1	EEEE FOR 639-3928 (X123B BEST)	F3JT	CRITICAL	EEEE_X123B_BEST


## PLATED THROUGH HOLES

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



## STANDOFFS: P/N 860-1542



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		13.0.0			
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Clock Signal Constraints

Table with columns: NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, ELECTRICAL\_CONSTRAINT\_SET, PHYSICAL, SPACING, and constraint details like AP CLK 32K CUMULUS.

JTAG constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

I2S constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

NAND constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

I2C constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

UART constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

USB constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

VREF constraint tables including NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

SPI constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

HSIC constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

DWI constraint tables including NET\_PHYSICAL\_TYPE, AREA\_TYPE, PHYSICAL\_RULE\_SET, NET\_SPACING\_TYPE1, NET\_SPACING\_TYPE2, AREA\_TYPE, SPACING\_RULE\_SET, and ELECTRICAL\_CONSTRAINT\_SET with physical and spacing columns.

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MIPI

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
MIPI_90D	*	90_OHM_DIFF

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
MIPI	*	*	3:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
E192	MIPI_90D	MIPI	MIPI0D DATA P<0> 6 16
E193	MIPI_90D	MIPI	MIPI0D DATA N<0> 6 16
E194	MIPI_90D	MIPI	MIPI0D DATA P<1> 6 16
E195	MIPI_90D	MIPI	MIPI0D DATA N<1> 6 16
E196	MIPI_90D	MIPI	MIPI0D DATA P<2> 6 16
E197	MIPI_90D	MIPI	MIPI0D DATA N<2> 6 16
E198	MIPI_90D	MIPI	MIPI0D DATA P<3> 6 16
E199	MIPI_90D	MIPI	MIPI0D DATA N<3> 6 16
E200	MIPI_90D	MIPI	MIPI0D CLK P 6 16
E201	MIPI_90D	MIPI	MIPI0D CLK N 6 16
E202	MIPI_90D	MIPI	MIPI0C CAM REAR DATA P<0> 6 20
E203	MIPI_90D	MIPI	MIPI0C CAM REAR DATA N<0> 6 20
E204	MIPI_90D	MIPI	MIPI0C CAM REAR DATA P<1> 6 20
E205	MIPI_90D	MIPI	MIPI0C CAM REAR DATA N<1> 6 20
E206	MIPI_90D	MIPI	MIPI0C CAM REAR CLK P 6 20
E207	MIPI_90D	MIPI	MIPI0C CAM REAR CLK N 6 20
E208	MIPI_90D	MIPI	MIPI0C CAM REAR DATA FILT P<0> 20
E209	MIPI_90D	MIPI	MIPI0C CAM REAR DATA FILT N<0> 20
E210	MIPI_90D	MIPI	MIPI0C CAM REAR DATA FILT P<1> 20
E211	MIPI_90D	MIPI	MIPI0C CAM REAR DATA FILT N<1> 20
E212	MIPI_90D	MIPI	MIPI0C CAM REAR CLK FILT P 20
E213	MIPI_90D	MIPI	MIPI0C CAM REAR CLK FILT N 20
E214	MIPI_90D	MIPI	MIPI1C CAM FRONT DATA P<0> 6 17
E215	MIPI_90D	MIPI	MIPI1C CAM FRONT DATA N<0> 6 17
E216	MIPI_90D	MIPI	MIPI1C CAM FRONT CLK P 6 17
E217	MIPI_90D	MIPI	MIPI1C CAM FRONT CLK N 6 17
E218	MIPI_90D	MIPI	MIPI1C CAM FRONT DATA FILT P<0> 17
E219	MIPI_90D	MIPI	MIPI1C CAM FRONT DATA FILT N<0> 17
E220	MIPI_90D	MIPI	MIPI1C CAM FRONT CLK FILT P 17
E221	MIPI_90D	MIPI	MIPI1C CAM FRONT CLK FILT N 17

DMIC

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
DMIC_45S	*	45_OHM_SE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
DMIC	*	*	2:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
E326	DMIC_45S	DMIC	L81 DMIC1 FF SCLK 14
E327	DMIC_45S	DMIC	L81 DMIC1 FF SD 14
E328	DMIC_45S	DMIC	DMIC1 FF SCLK 13 14
E329	DMIC_45S	DMIC	DMIC1 FF SD 13 14
E330	DMIC_45S	DMIC	DMIC1 FF SCLK CONN 13

AUDIO

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
AUDIO	*	*	3:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
E331	USR_90D	USR	MIKEY TS P 10 14
E332	USR_90D	USR	MIKEY TS N 10 14
E333	USR_90D	USR	L81 MBUS P 14
E334	USR_90D	USR	L81 MBUS N 14
E335	SPEAKER	AUDIO	SPKR L CONN P 15 38
E336	SPEAKER	AUDIO	SPKR L CONN N 15 38
E337	SPEAKER	AUDIO	SPKR R CONN P 15 38
E338	SPEAKER	AUDIO	SPKR R CONN N 15 38
E339	AUDIO_DIFF	AUDIO	HP_MIC P 14
E340	AUDIO_DIFF	AUDIO	HP_MIC N 14
E341	AUDIO_DIFF	AUDIO	L81 AIN2 P 14
E342	AUDIO_DIFF	AUDIO	L81 AIN2 N 14

LVDS

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
LVDS_90D	*	90_OHM_DIFF

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
LVDS	*	*	3:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
E343	LVDS_90D	LVDS	MIPI DATA CONN P<3..0> 16
E344	LVDS_90D	LVDS	MIPI DATA CONN N<3..0> 16
E345	LVDS_90D	LVDS	MIPI CLK CONN P 16
E346	LVDS_90D	LVDS	MIPI CLK CONN N 16

TEMP SENSORS

NET_PHYSICAL_TYPE	AREA_TYPE	PHYSICAL_RULE_SET
TEMP	*	TEMP_SENSE

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
TEMP	*	*	3:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
E347	TEMP	TEMP	BOARD TEMP1 P 42
E348	TEMP	TEMP	BOARD TEMP1 N 42
E349	TEMP	TEMP	BOARD TEMP2 P 42
E350	TEMP	TEMP	BOARD TEMP2 N 42
E351	TEMP	TEMP	BOARD TEMP3 P 42
E352	TEMP	TEMP	BOARD TEMP3 N 42
E353	TEMP	TEMP	BOARD TEMP4 P 23 42
E354	TEMP	TEMP	BOARD TEMP4 N 23 42

XTAL

NET_SPACING_TYPE1	NET_SPACING_TYPE2	AREA_TYPE	SPACING_RULE_SET
CRYSTAL	*	*	5:1_SPACING

ELECTRICAL_CONSTRAINT_SET	NET_TYPE		
	PHYSICAL	SPACING	
E355	CRYSTAL	CRYSTAL	XTAL SOC 24M I 3
E356	CRYSTAL	CRYSTAL	XTAL SOC 24M O 3
E357	CRYSTAL	CRYSTAL	XTAL SOC 24M O R 3

SYNC MASTER=N/A		SYNC DATE=N/A	
<b>CONSTRAINTS: ASSIGNMENTS</b>			
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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	MM	16.2

## 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, ISL9	Y	0.053 MM	0.053 MM	3.0 MM		
45_OHM_SE	ISL4, ISL6	Y	0.055 MM	0.055 MM	3.0 MM		
45_OHM_SE	*	N	0.055 MM	0.055 MM	3.0 MM		

### 50 OHMS - CLEAR ON LAYER 2 AND 9

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	0.085 MM	0.085 MM	3.0 MM		

### DIFFERENTIAL PAIR PHYSICAL RULES 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	Y	0.089 MM	0.089 MM		0.150 MM	0.150 MM
90_OHM_DIFF	ISL2, ISL9	Y	0.051 MM	0.051 MM	=STANDARD	0.120 MM	0.120 MM
90_OHM_DIFF	ISL4, ISL6	Y	0.052 MM	0.052 MM	=STANDARD	0.120 MM	0.120 MM
90_OHM_DIFF	*	N	0.089 MM	0.089 MM	=STANDARD	0.150 MM	0.150 MM

## SPACING CONSTRAINTS

### DEFAULT/BGA SPACING RULES

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
DEFAULT	*	0.08 MM	?
STANDARD	*	=DEFAULT	?
BGA_SPA	*	0.055 MM	?

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

### REGULAR SPACING RULES

SPACING_RULE_SET	LAYER	LINE-TO-LINE SPACING	WEIGHT
1:1_SPACING	*	0.055 MM	?
0P08_SPACING	*	0.080 MM	?
1.5:1_SPACING	*	0.0825 MM	?
2:1_SPACING	*	0.11 MM	?
2.5:1_SPACING	*	0.137 MM	?
3:1_SPACING	*	0.165 MM	?
4:1_SPACING	*	0.22 MM	?
5:1_SPACING	*	0.275 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	
GND_P1SPACING	*	0.1 MM	
SWITCHNODE	*	0.2 MM	

### 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

### AUDIO/MISC 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	0.5 MM	0.20MM	10 MM	0.10 MM	0.10 MM
AUDIO_DIFF	*	Y	0.1 MM	0.10MM	10 MM	0.10 MM	0.10 MM
TEMP_SENSE	*	Y	0.1 MM	0.10MM	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	0.055 MM	0.055 MM	=STANDARD	0.076 MM	0.075 MM

SYNC MASTER=N/A	SYNC DATE=N/A
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