

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
10	0008927012	ENGINEERING RELEASED		2017-06-06

D21 MLB - DVT (OK2FAB)

LAST_MODIFICATION= Tue Jun 6 18:57:04 2017

PAGE	CSA	CONTENTS	SYNC	DATE	PAGE	CSA	CONTENTS	SYNC	DATE
1	1	TABLE OF CONTENTS	sync	06/19/2016	46	62	I/O: USB PD	sync	04/14/2017
2	2	SYSTEM: BOM TABLES (1/2)	sync	02/24/2017	47	63	I/O: Hydra	sync	04/14/2017
3	3	SYSTEM: BOM TABLES (2/2)	test_mlb	03/17/2017	48	64	I/O: B2B DOCK	sync	10/10/2016
4	4	SYSTEM: MECH COMPONENTS	sync	04/14/2017	49	65	SYSTEM: I2C MAP	sync	04/14/2017
5	5	SYSTEM: Testpoints	sync	04/14/2017	50	80	RADIOS	D21_MLB_DOE	07/18/2016
6	6	BOOTSTRAPPING	sync	09/19/2016	51	1	page1		
7	10	SOC: JTAG, USB, XTAL	sync	04/14/2017	52	75	NFC		
8	11	SOC: PCIE	sync	04/14/2017	53	1	FRONT PAGE		
9	12	SOC: MIPI + ISP	sync	04/14/2017	54	2	HIERARCHY		
10	13	SOC: LPDP	sync	04/14/2017	55	3	PMIC: BUCKS & LDOS		
11	14	SOC: SERIAL + SMC	sync	04/14/2017	56	4	PMIC: CLOCKS & CONTROL		
12	15	SOC: GPIO + UART	sync	04/14/2017	57	5	BB: POWER		
13	16	SOC: AOP	sync	04/14/2017	58	6	BB: CONTROL & HS PERIPHERALS [6]		
14	17	SOC: Power (1/3)	sync	04/14/2017	59	7	BB: GPIOs & QLINK		
15	18	SOC: Power (2/3)	sync	04/14/2017	60	8	XCVR		
16	19	SOC: Power (3/3)	sync	04/14/2017	61	9	XCVR		
17	26	NAND	sync	04/14/2017	62	10	QPOET MODULE		
18	27	SYSTEM POWER: PMU Bucks (1/4)	sync	04/14/2017	63	11	LB PAD		
19	28	SYSTEM POWER: PMU Bucks (2/4)	sync	04/14/2017	64	12	HB PAD		
20	29	SYSTEM POWER: PMU LDOS (3/4)	sync	04/14/2017	65	13	UHB PAD		
21	30	SYSTEM POWER: PMU (4/4)	sync	04/14/2017	66	14	2G PA		
22	31	SYSTEM POWER: Boost	sync	04/14/2017	67	15	LB DSM		
23	32	SYSTEM POWER: B2B Battery	sync	04/14/2017	68	16	HB DSM		
24	33	SYSTEM POWER: Charger	sync	04/14/2017	69	17	COUPLER2		
25	34	SYSTEM POWER: Iktara	sync	04/14/2017	70	18	LOWER ANTENNA		
26	35	SYSTEM POWER: B2B Cyclone	sync	04/14/2017	71	19	UPPER ANTENNA		
27	36	SENSORS	sync	04/14/2017	72	20	GNSS		
28	37	CAMERA: PMU (1/2)	sync	04/14/2017	73	21	SIM, DEBUG CONN		
29	38	CAMERA: PMU (2/2)	sync	04/14/2017	74	22	TEST POINTS	PROBE POINTS	07/18/2016
30	39	CAMERA: B2B Wide (KY)	sync	04/14/2017	75	1	FRONT PAGE		
31	40	CAMERA: B2B Tele (TN)	sync	04/14/2017	76	2	METROCIRC		
32	41	CAMERA: Strobe Drivers	sync	04/14/2017	77	3	UAT MATCH AND TUNER		
33	42	CAMERA: FCAM + FOREHEAD	sync	04/14/2017	78	4	RFPE TO GPO TRANSLATOR		
34	43	CAMERA: B2B Strobe + Buttons	sync	04/14/2017	79	1	SymbolPorts		
35	47	AUDIO: CODEC (1/2)	sync	04/14/2017	80	4	Guinness	WIFI	11/28/2016
36	48	AUDIO: CODEC (2/2)	sync	04/14/2017	81	5	WiFiANTFeeds		11/28/2016
37	49	AUDIO: Speaker Amp Bottom	sync	04/14/2017					
38	50	AUDIO: Speaker Amp Top	sync	04/14/2017					
39	51	ARC: Driver	sync	04/14/2017					
40	55	CG: Niki	sync	04/14/2017					
41	56	CG: PMUs	sync	04/14/2017					
42	57	CG: B2B DISPLAY + TOUCH	sync	04/14/2017					
43	58	CG: B2B ORB + MESA	sync	04/14/2017					
44	59	I/O: Overvoltage Cut-Off Circuit	sync	04/14/2017					
45	61	I/O: Accessory Buck	sync	04/14/2017					

Sub Designs

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
051-02159	1	SCH_MLB_D21	SCH	?
820-00846	1	PCBF_MLB_D21	PCB	?

SOURCE PROJECT	SUB-DESIGN NAME	VERSION	HARD/ SOFT	SYNC_DATE/TIME
D21	RADIO_MLB	0.122.0	S	2017_06_06_17:14:31
D20	NFC_MLB	0.50.0	S	2017_05_26_07:54:42
D21	WIFI_MLB	0.20.0	S	2017_05_16_02:56:32
D21	RADIO_MLB_FF	0.35.0	S	2017_06_02_14:56:02

DRAWING TITLE		DRAWING NUMBER		SIZE
SCH, MLB, D21		051-02159		D
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EEEE Codes

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
825-7691	1	EEEE FOR (MLB, 639-04441, JP, ULTRA)	EEEE_008R	CRITICAL	EEEE_ULTIMATE
825-7691	1	EEEE FOR (MLB, 639-03377, JP, EXTREME)	EEEE_HNV8	CRITICAL	EEEE_EXTREME
825-7691	1	EEEE FOR (MLB, 639-04442, ROM, ULTRA)	EEEE_008X	CRITICAL	EEEE_ULTIMATE_ROW
825-7691	1	EEEE FOR (MLB, 639-03388, ROM, EXTREME)	EEEE_HNVF	CRITICAL	EEEE_EXTREME_ROW

D21x Specific
D21x Specific
D21x Specific
D21x Specific

SOC

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
339S00416	1	SoC, H, 3GB 21nm T309, B1	U1000	CRITICAL	COMMON

D21x Specific

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
339S00415	339S00416	BOM_TABLE_ALTS	U1000	SoC, M, 3GB 20nm DDR, B1
339S00417	339S00416	BOM_TABLE_ALTS	U1000	SoC, S, 3GB 20nm DDR, B1
339S00418	339S00416	BOM_TABLE_ALTS	U1000	SoC, S, 3GB 1xnm DDR, B1
339S00429	339S00416	BOM_TABLE_ALTS	U1000	SoC, H, 3GB 20nm DDR, B1
339S00430	339S00416	BOM_TABLE_ALTS	U1000	SoC, M, 3GB 20nm DDR, B1
339S00431	339S00416	BOM_TABLE_ALTS	U1000	SoC, S, 3GB 20nm DDR, B1
339S00432	339S00416	BOM_TABLE_ALTS	U1000	SoC, S, 3GB 18nm DDR, B1

SIPs

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
339M00011	339M00010	BOM_TABLE_ALTS	M5500	NIKI, STATS SIP
339M00013	339M00012	BOM_TABLE_ALTS	M4100	HUNT, STATS SIP

D21x Specific

SOFT-TERM CAP SUB BOMS

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
685-00152	685-00151	BOM_TABLE_ALTS	SUBBOM_CAP	SUBBOM_MLB_CAP_SOFT_D21
138S00049	138S0831	TYPICAL_CAP	ALL	CAP_0201_2.2UF_6.3V_KYOCERA

To enable alt in SUBBOM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
685-00151	1	SUBBOM_MLB_SOFT-TERM_D21	SUBBOM_CAP		
138S00159	9	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3911, C3911, C3911, C3911, C3911, C3911		SOFT_CAP
138S0831	9	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3911, C3911, C3911, C3911, C3911, C3911		TYPICAL_CAP
138S00159	15	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3602, C3602, C3602, C3602, C3602, C3602		SOFT_CAP
138S0831	15	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3602, C3602, C3602, C3602, C3602, C3602		TYPICAL_CAP
138S00159	10	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3791, C3791, C3791, C3791, C3791, C3791		SOFT_CAP
138S0831	10	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3791, C3791, C3791, C3791, C3791, C3791		TYPICAL_CAP
138S00159	2	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3351, C3352		SOFT_CAP
138S0831	2	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3351, C3352		TYPICAL_CAP
138S00159	3	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3602, C3611, C3622		SOFT_CAP
138S0831	3	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3602, C3611, C3622		TYPICAL_CAP
138S00159	5	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3791, C3795, C3798		SOFT_CAP
138S0831	5	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3791, C3795, C3798		TYPICAL_CAP
138S00159	3	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C3909, C3925, C3926		SOFT_CAP
138S0831	3	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C3909, C3925, C3926		TYPICAL_CAP
138S00159	2	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C4250, C4261		SOFT_CAP
138S0831	2	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C4250, C4261		TYPICAL_CAP
138S00159	1	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C4303		SOFT_CAP
138S0831	1	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C4303		TYPICAL_CAP
138S00159	5	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C4805, C4809, C4814, C4926, C4929		SOFT_CAP
138S0831	5	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C4805, C4809, C4814, C4926, C4929		TYPICAL_CAP
138S00159	5	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C5016, C5018, C5134, C5029, C5136		SOFT_CAP
138S0831	5	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C5016, C5018, C5134, C5029, C5136		TYPICAL_CAP
138S00159	1	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C5611		SOFT_CAP
138S0831	1	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C5611		TYPICAL_CAP
138S00159	4	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C5700, C5705, C5716, C5721		SOFT_CAP
138S0831	4	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C5700, C5705, C5716, C5721		TYPICAL_CAP
138S00159	5	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C5802, C5804, C5811, C5880		SOFT_CAP
138S0831	5	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C5802, C5804, C5811, C5880		TYPICAL_CAP
138S00159	1	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C5890		SOFT_CAP
138S0831	1	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C5890		TYPICAL_CAP
138S00159	5	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C6320, C6321, C6322, C6323, C6324		SOFT_CAP
138S0831	5	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C6320, C6321, C6322, C6323, C6324		TYPICAL_CAP
138S00160	4	CAP_SOFT-TERM, 10UF, 10V, 0402, MUR/KYO	C4907, C4903, C4904, C4931		SOFT_CAP
138S0979	4	CAP_TYPICAL, 10UF, 10V, 0402, MUR/KYO	C4907, C4903, C4904, C4931		TYPICAL_CAP
138S00160	5	CAP_SOFT-TERM, 10UF, 10V, 0402, MURATA	C5600, C5602, C5603, C5702, C5703		SOFT_CAP
138S0979	5	CAP_TYPICAL, 10UF, 10V, 0402, MUR/KYO	C5600, C5602, C5603, C5702, C5703		TYPICAL_CAP
138S00159	2	CAP_SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C4025, C4026		SOFT_CAP
138S0831	2	CAP_TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C4025, C4026		TYPICAL_CAP

Default is typical

D21x Specific
D21x Specific


IKTARA DIODES SUB BOMS

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
685-00172	685-00171	BOM_TABLE_ALTS	SUBBOM_DS	SUBBOM_MLB_SHOTTEY DIODES_ONSEMI_D21

#3152872: Update Iktara Diodes APNs

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
685-00171	1	SUBBOM_MLB_SHOTTEY DIODES, DIODES, D21	SUBBOM_DS		
371S00133	4	DIODES, SHOTTEY DIODE, 30V, 2A, 0603	D3400, D3401, D3402, D3403		DIODES_DS
371S00132	4	ONSEMI, SHOTTEY DIODE, 30V, 2A, 0603	D3400, D3401, D3402, D3403		ONSEMI_DS

Footprint is ONSEMI
Primary is DIODES

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		PAGE	2 OF 80
		SHEET	2 OF 81

NAND BOM Options

Table with 5 columns: PART#, QTY, DESCRIPTION, REFERENCE DESIGNATOR(S), CRITICAL, BOM OPTION. Rows include NAND, N. ULTRA, TLC and NAND, N. EXTREME, TLC.

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Rows include various NAND part numbers and their alternatives.

Isolator Switch

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Row includes part number 311S00126.

Mamba LDO

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Row includes part number 353S00932.

Load Switch

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Rows include part numbers 353S00999 and 353S01007.

Crystal Alts

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Rows include crystal part numbers and their alternatives.

PMID1 Zener Diode

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Row includes part number 371S00121.

ZRB Caps

Table with 6 columns: PART#, QTY, DESCRIPTION, REFERENCE DESIGNATOR(S), CRITICAL, BOM OPTION. Row includes part number 138S0683.

Table with 2 columns: CRITICAL PART#, COMMENT. Rows include part numbers 138S00185 and 138S00186.

Global R/C Alternates

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Multiple rows listing various capacitor and resistor part numbers and their alternatives.

Global Ferrites Alternates

Table with 5 columns: PART NUMBER, ALTERNATE FOR PART NUMBER, BOM OPTION, REF DES, COMMENTS. Multiple rows listing various ferrite part numbers and their alternatives.

Multi-Vendor Criticals

Table with 4 columns: CRITICAL PART#, COMMENT, CRITICAL PART#, COMMENT. Multiple rows listing critical parts from different vendors.

Table with 2 columns: CRITICAL PART#, COMMENT. Rows include part numbers 118S0717 and 138S0652.

Table with 2 columns: CRITICAL PART#, COMMENT. Row includes part number 138S00149.

Table with 2 columns: CRITICAL PART#, COMMENT. Row includes part number 138S00144.

Table with 2 columns: CRITICAL PART#, COMMENT. Row includes part number 138S00139.

Table with 2 columns: CRITICAL PART#, COMMENT. Row includes part number 138S00146.

Table with 2 columns: CRITICAL PART#, COMMENT. Row includes part number 138S00141.

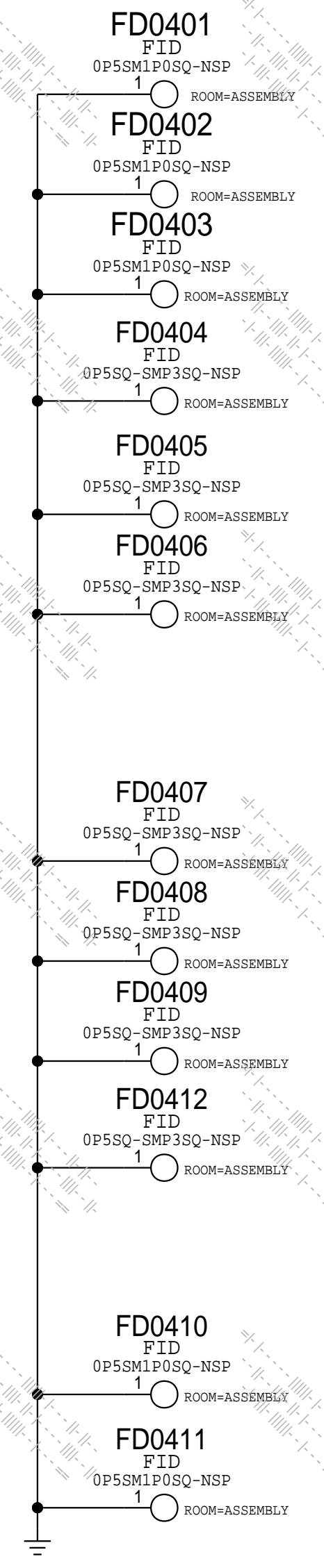
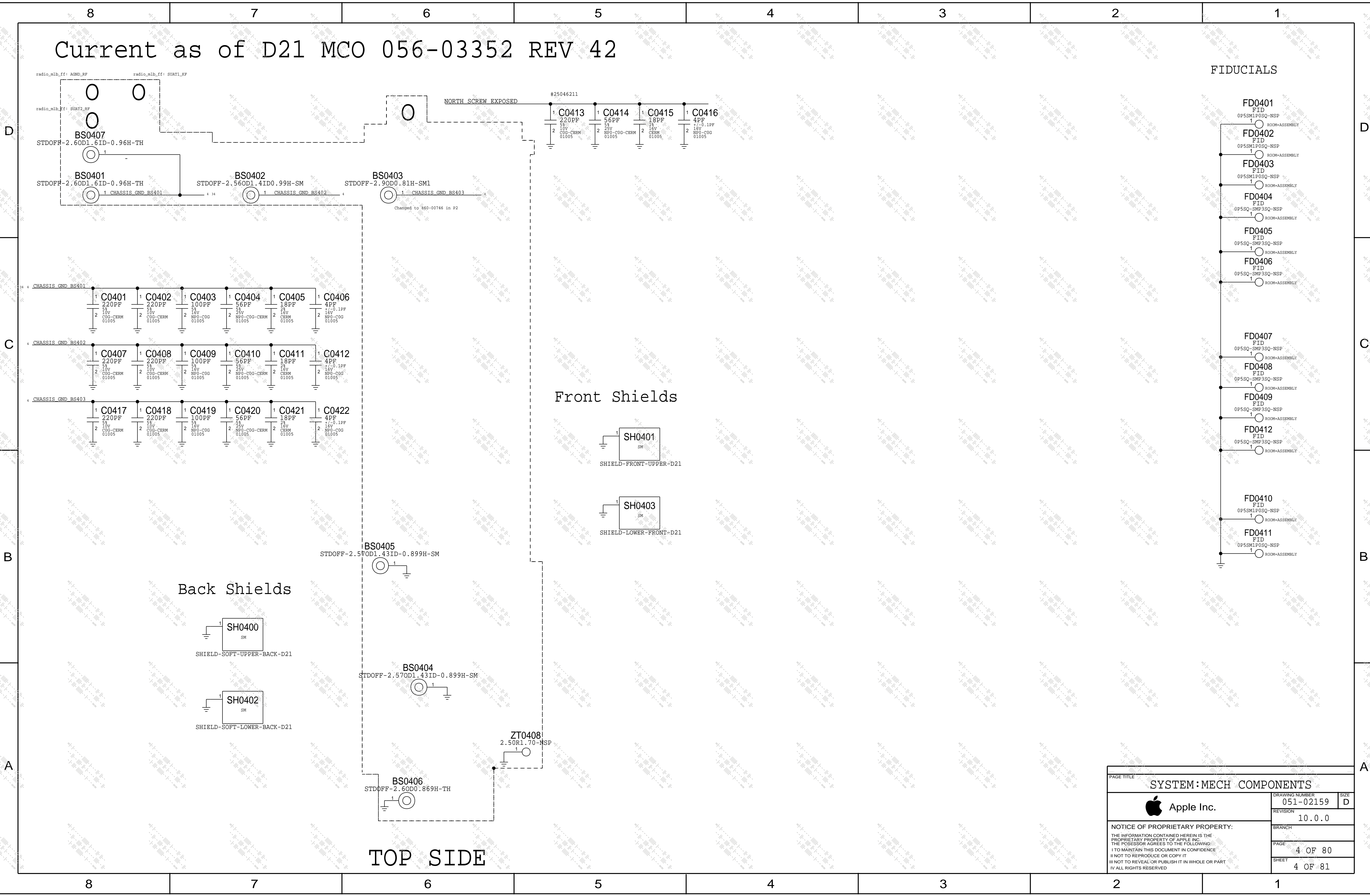
Table with 2 columns: CRITICAL PART#, COMMENT. Row includes part number 155S0610.

Table with 2 columns: CRITICAL PART#, COMMENT. Multiple rows listing critical ferrite part numbers and comments.

Page header and footer information including: SYSTEM: BOM TABLES (2/2), Apple Inc. logo, DRAWING NUMBER 051-02159, REVISION 10.0.0, PAGE 3 OF 80, SHEET 3 OF 81, and a NOTICE OF PROPRIETARY PROPERTY.

Current as of D21 MCO 056-03352 REV 42

FIDUCIALS



Front Shields

Back Shields

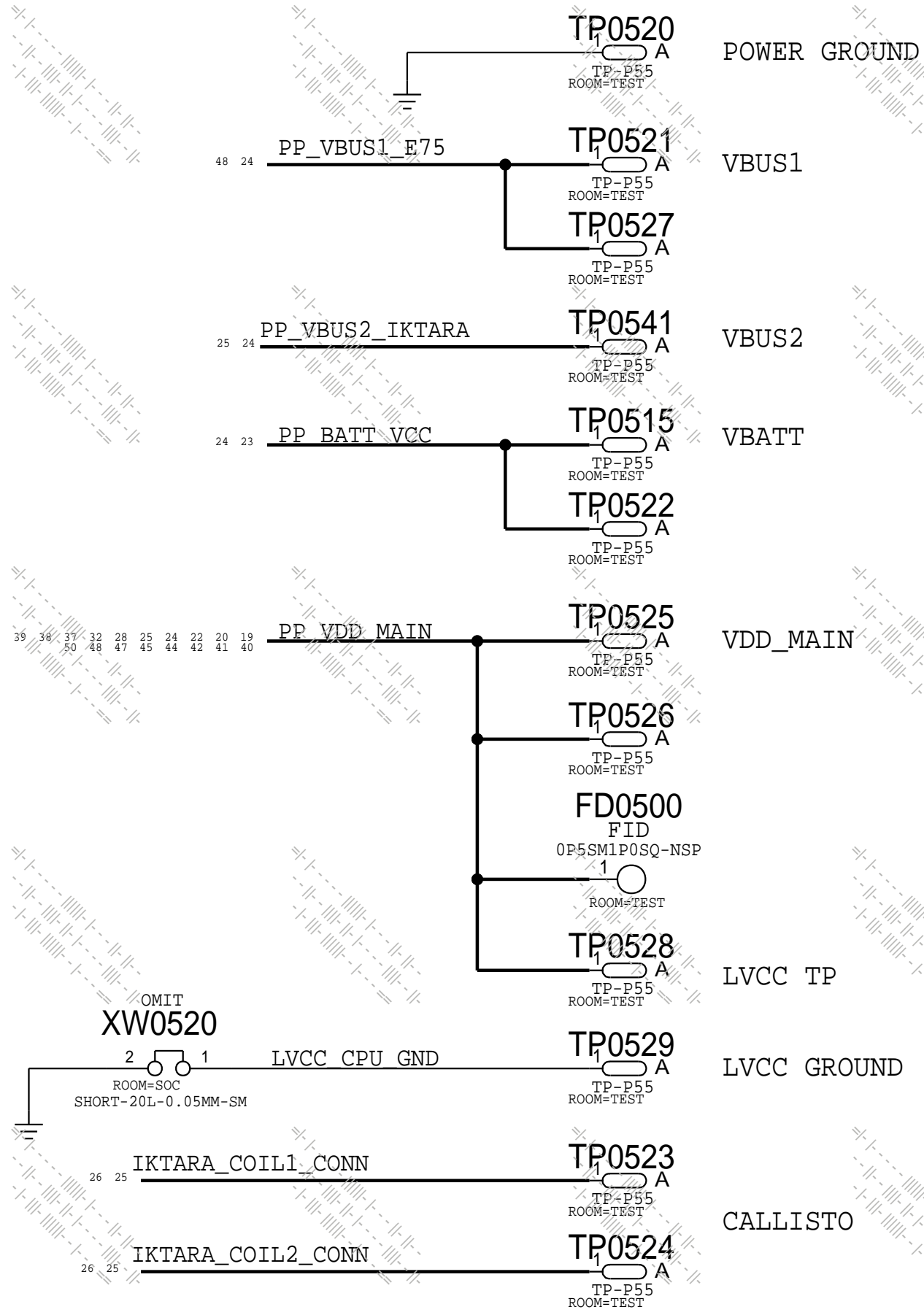
TOP SIDE

PAGE TITLE			SYSTEM:MECH COMPONENTS	
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			PAGE	4 OF 80
			SHEET	4 OF 81

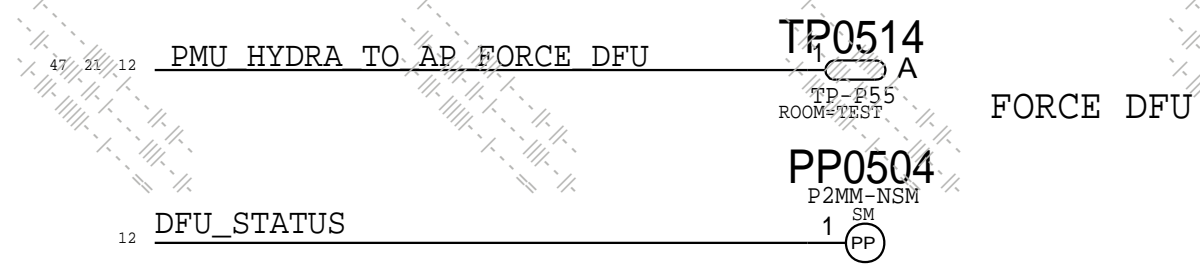
Test Points

Probe Points

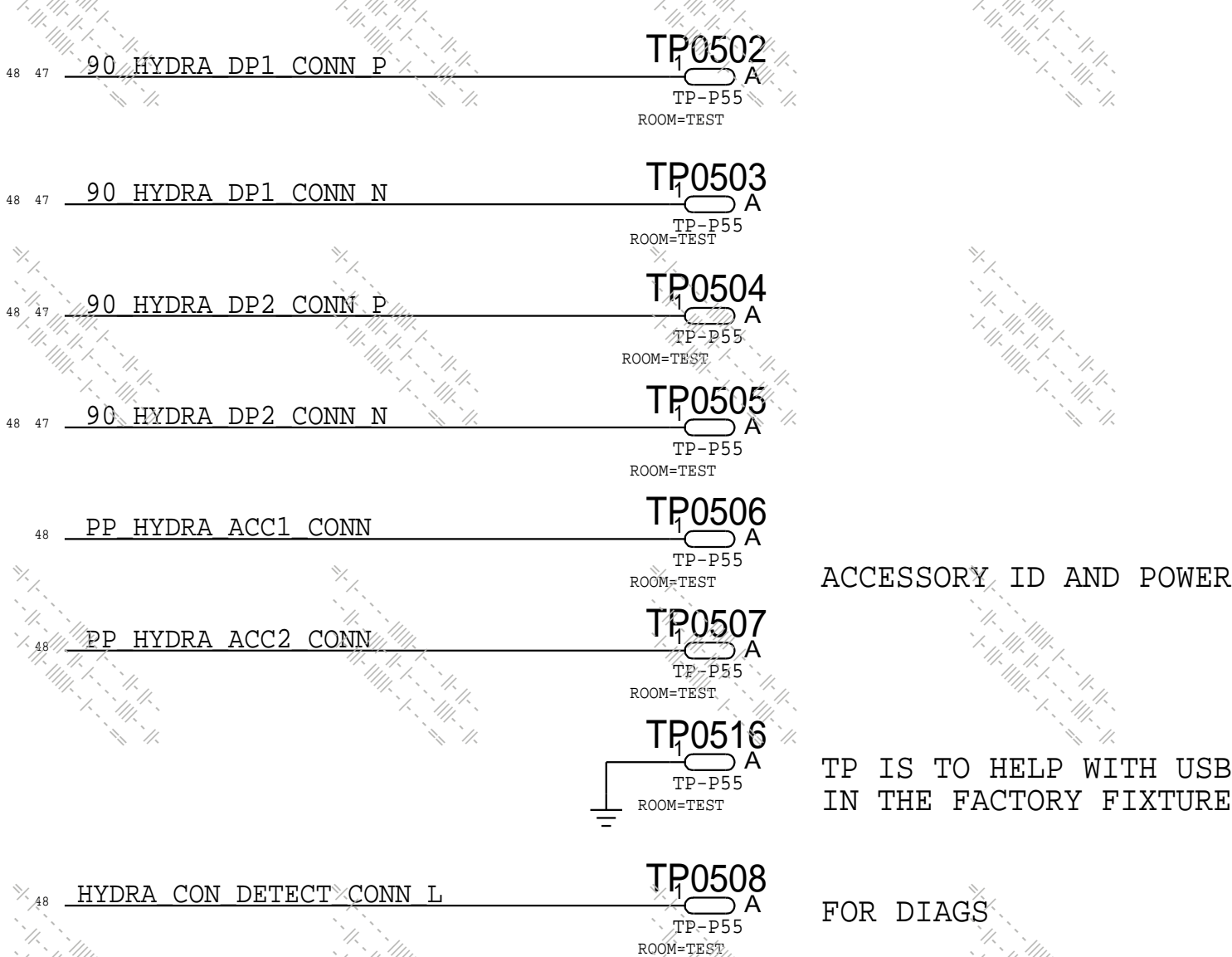
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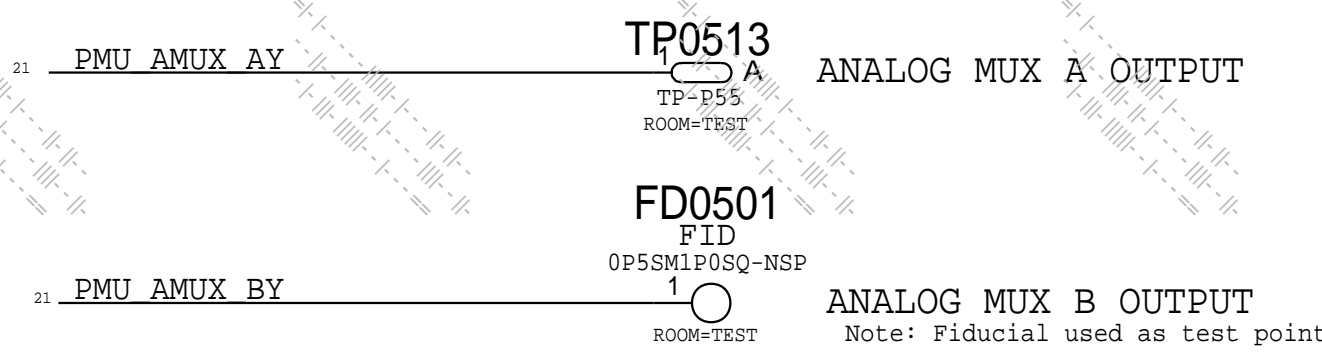
DFU



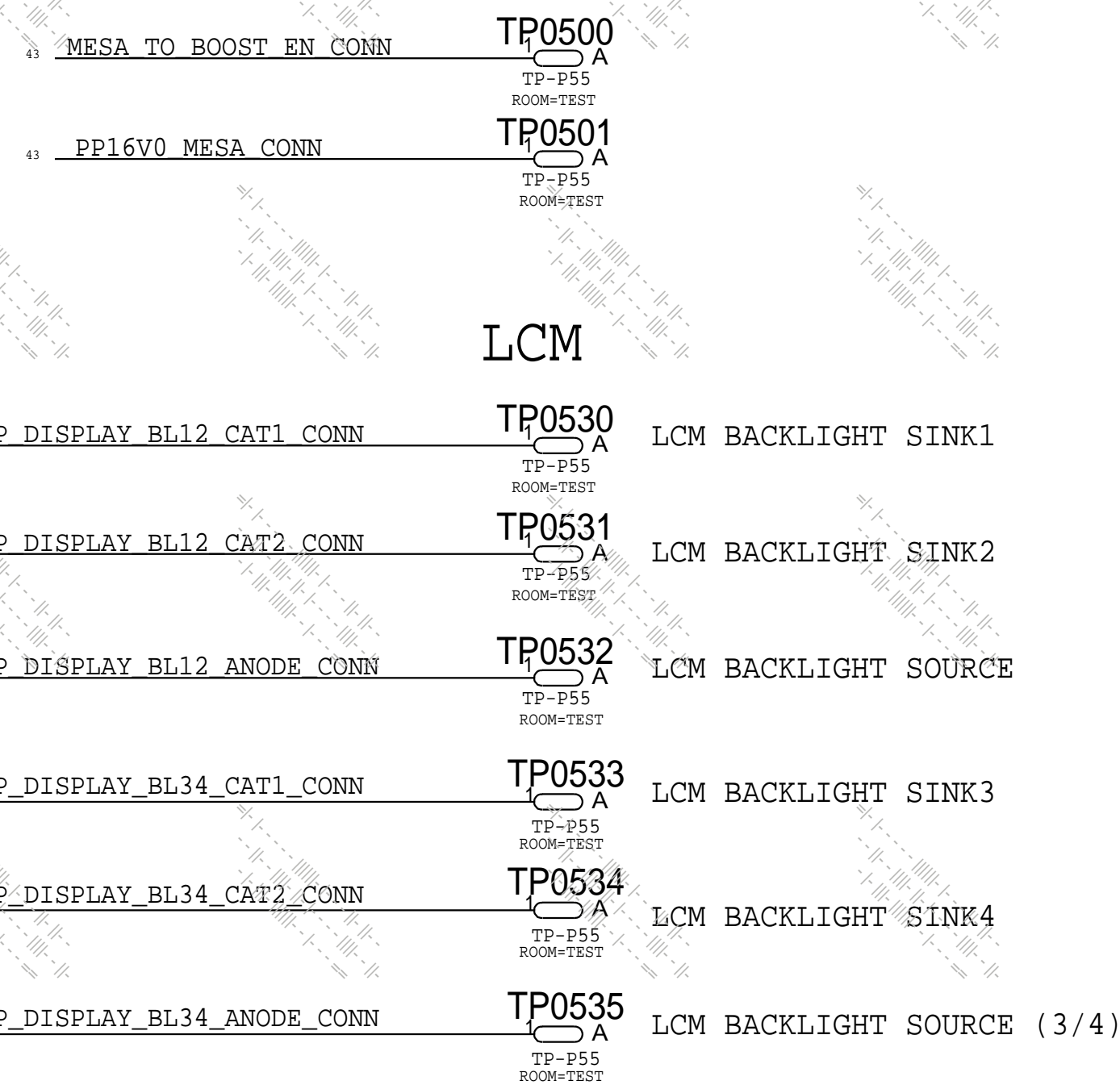
E75



AMUX



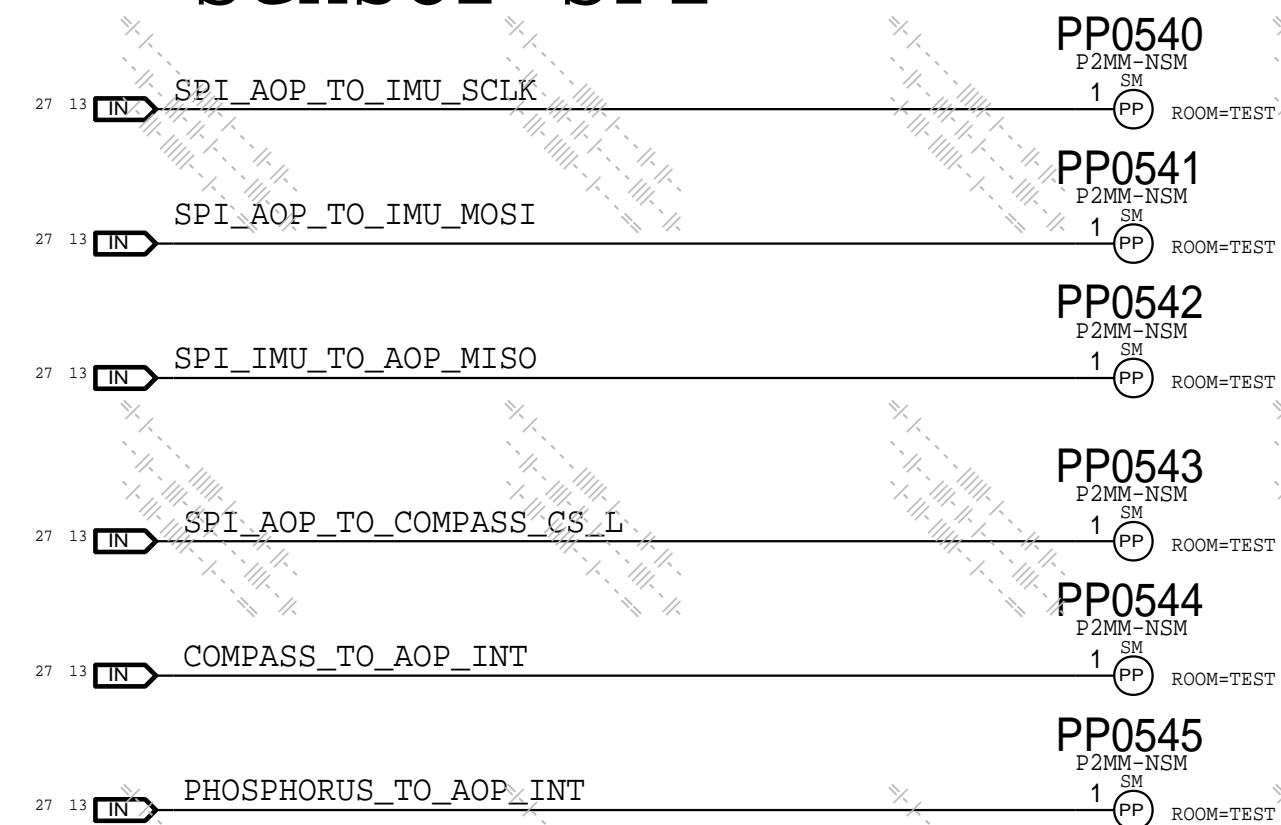
MOJAVE



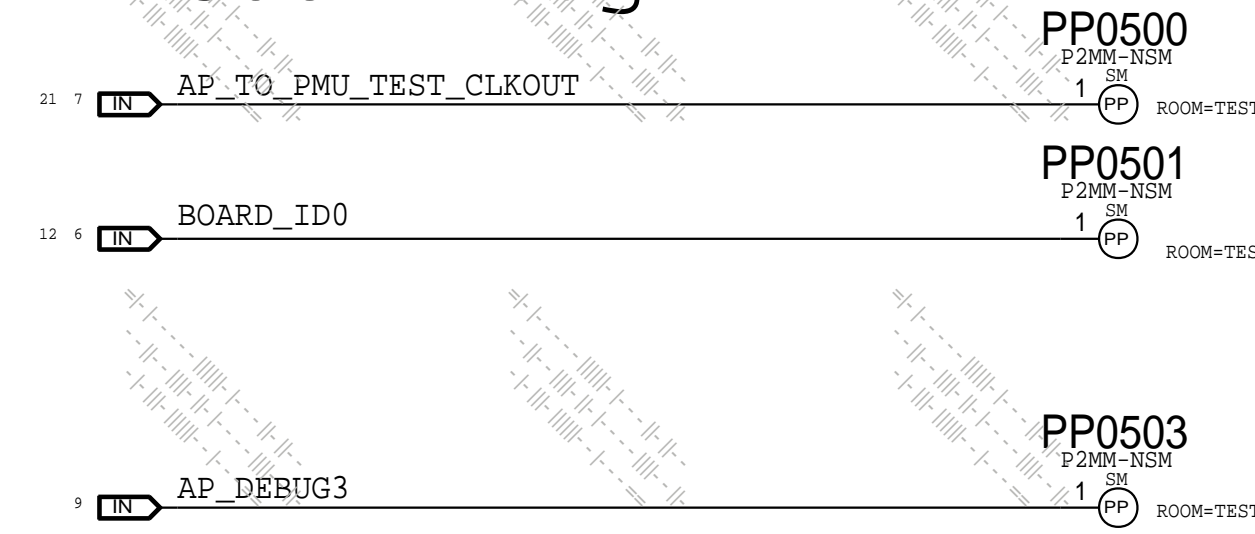
SENSE TP



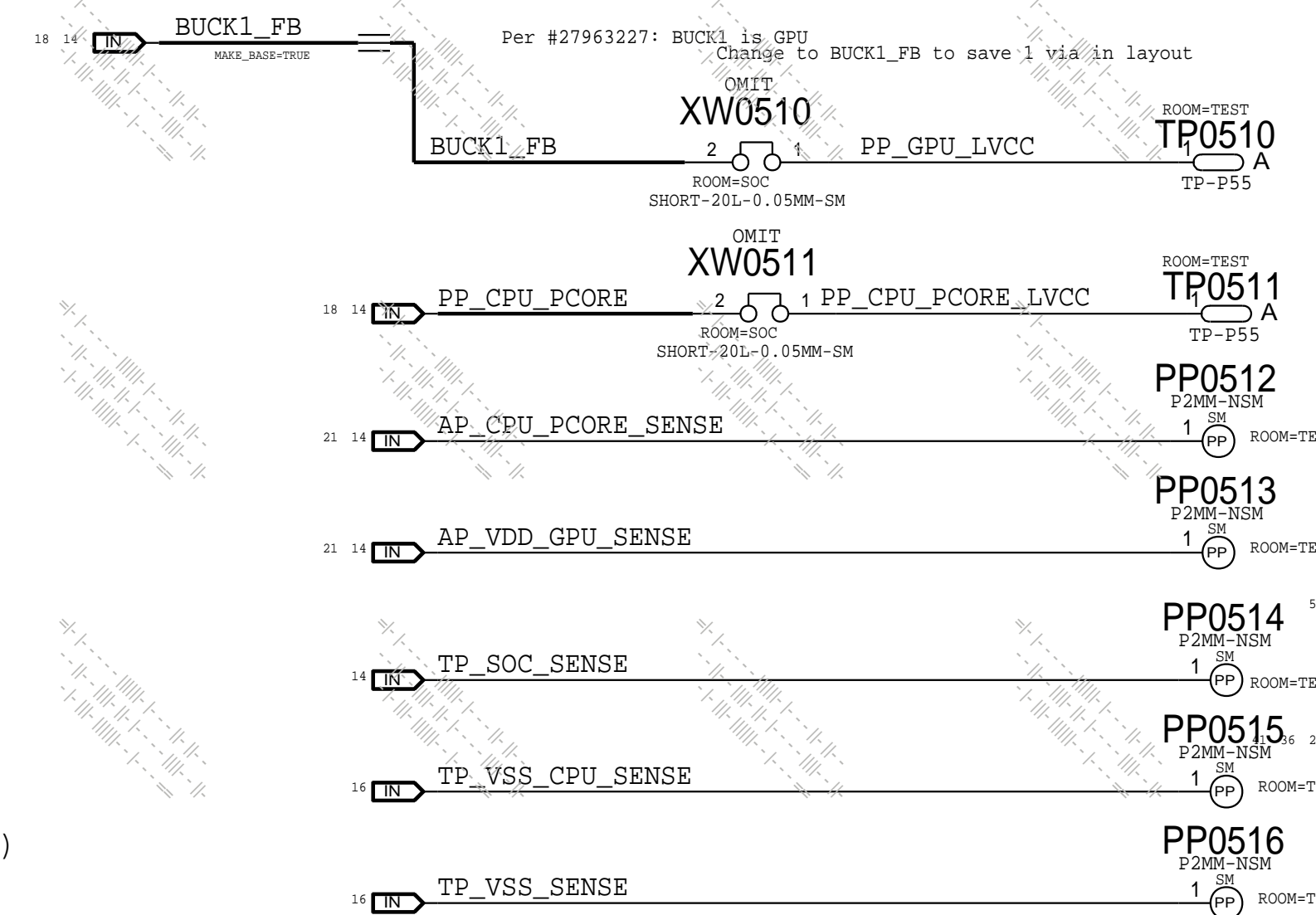
Sensor SPI



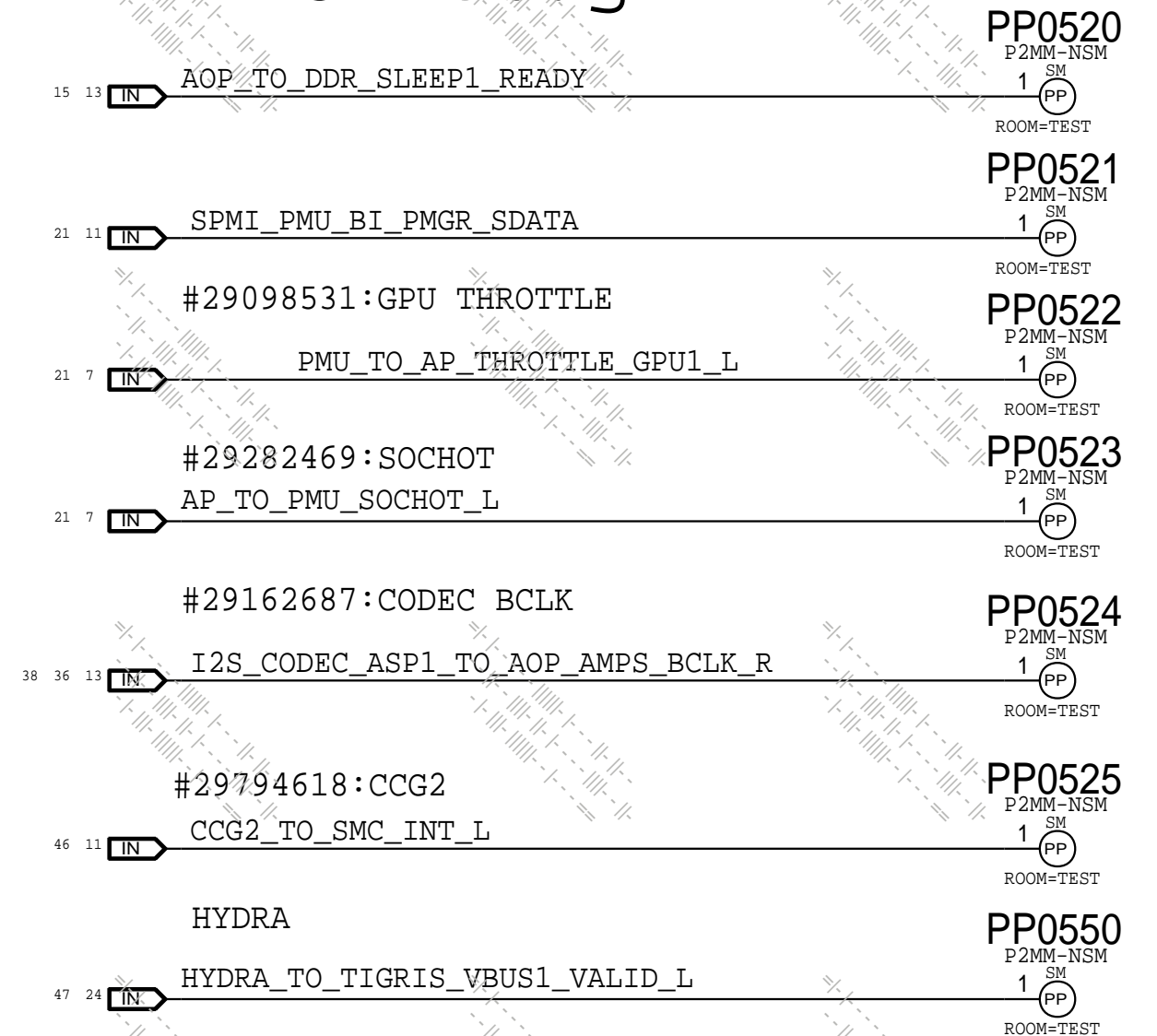
SOC Debug



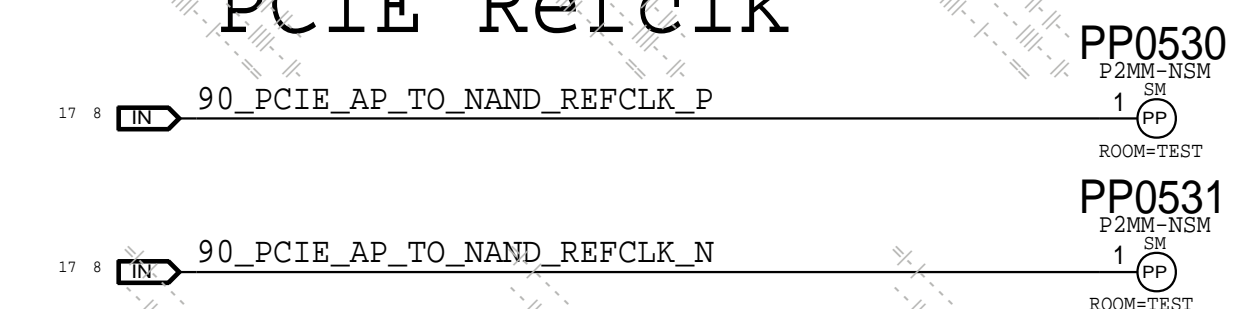
SOC CPU/GPU



PMU Debug



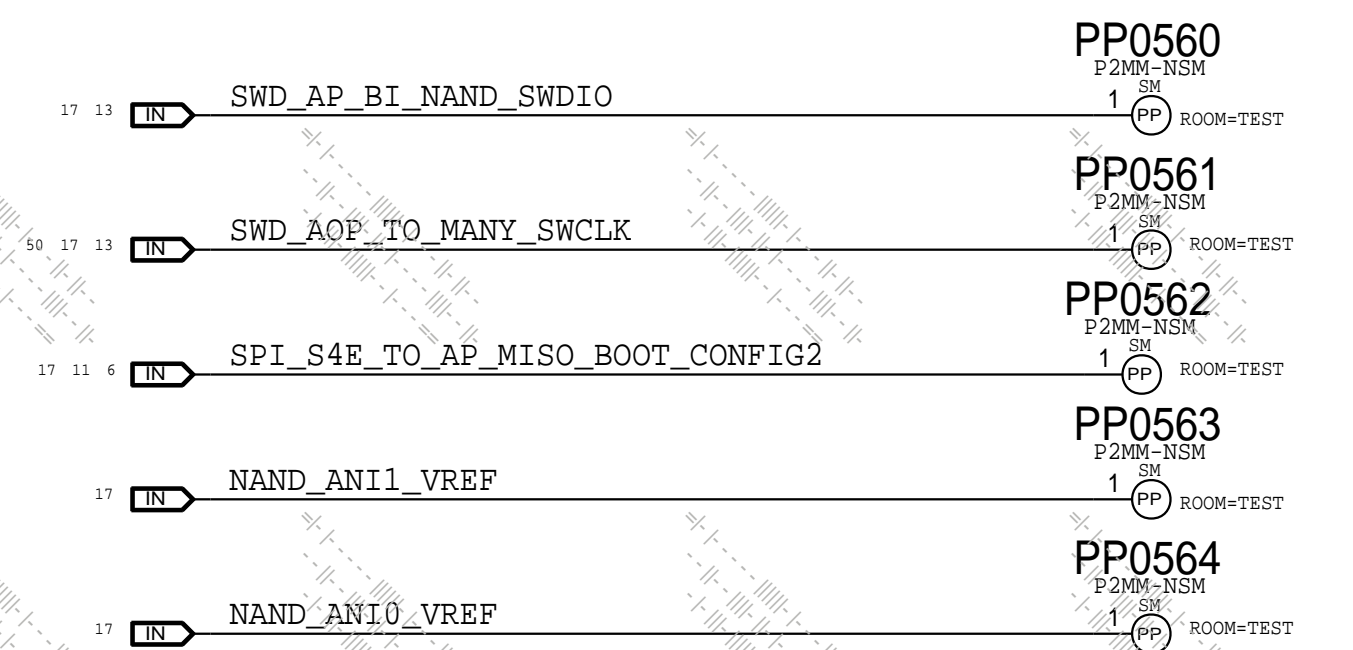
PCIE Refclk



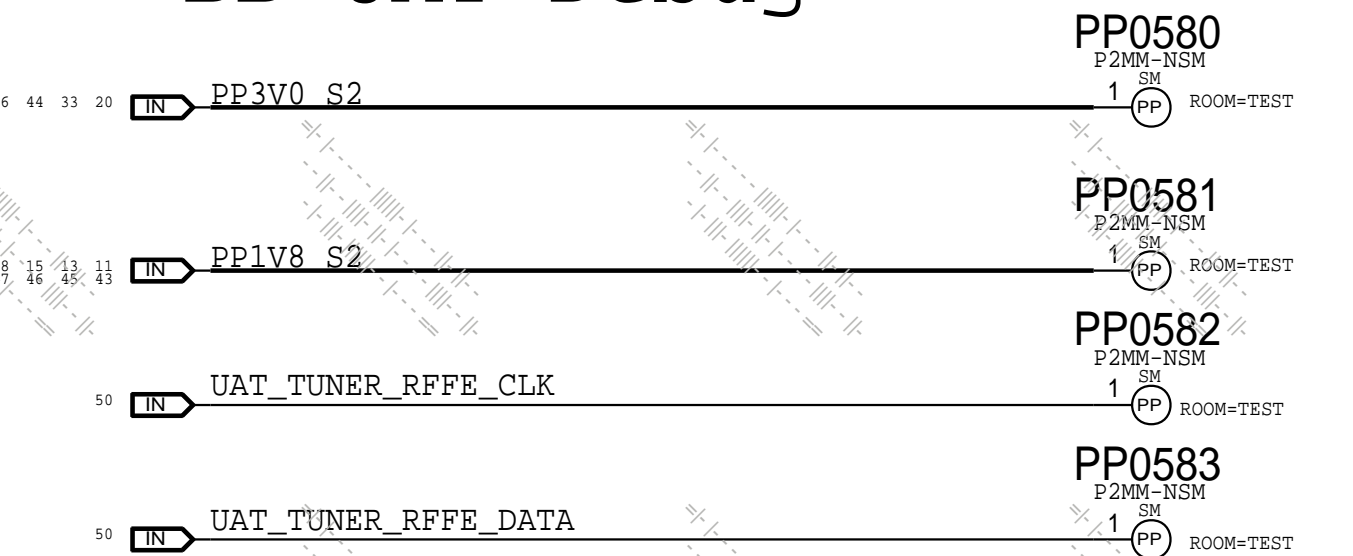
SOC DDR



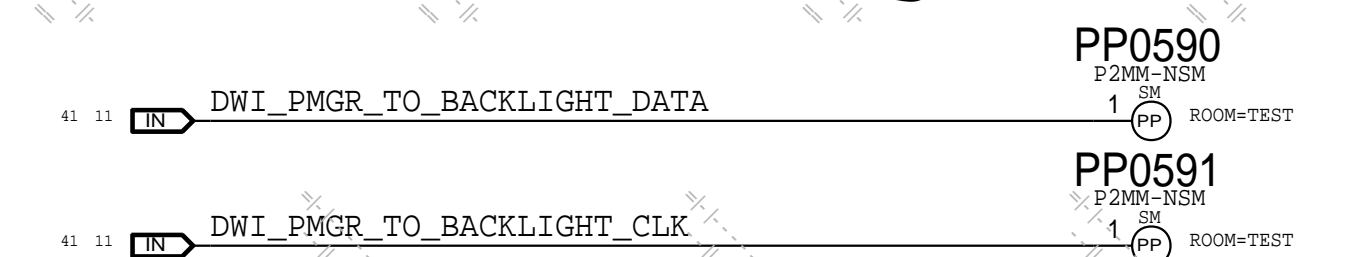
NAND Debug



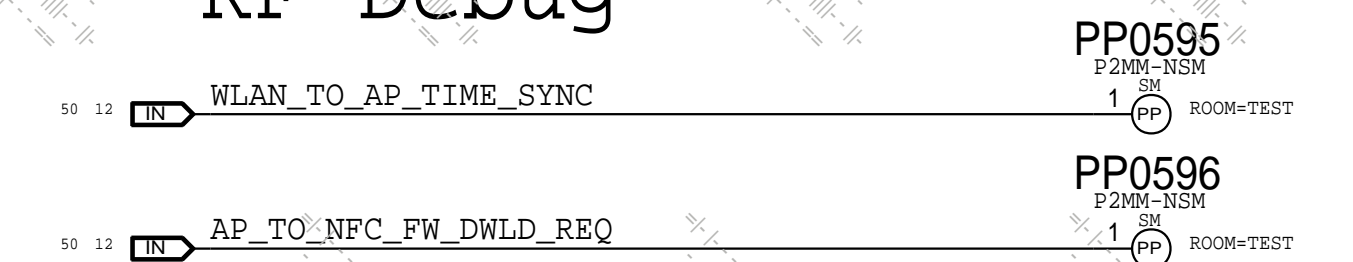
BB UAT Debug



BACKLIGHT Debug

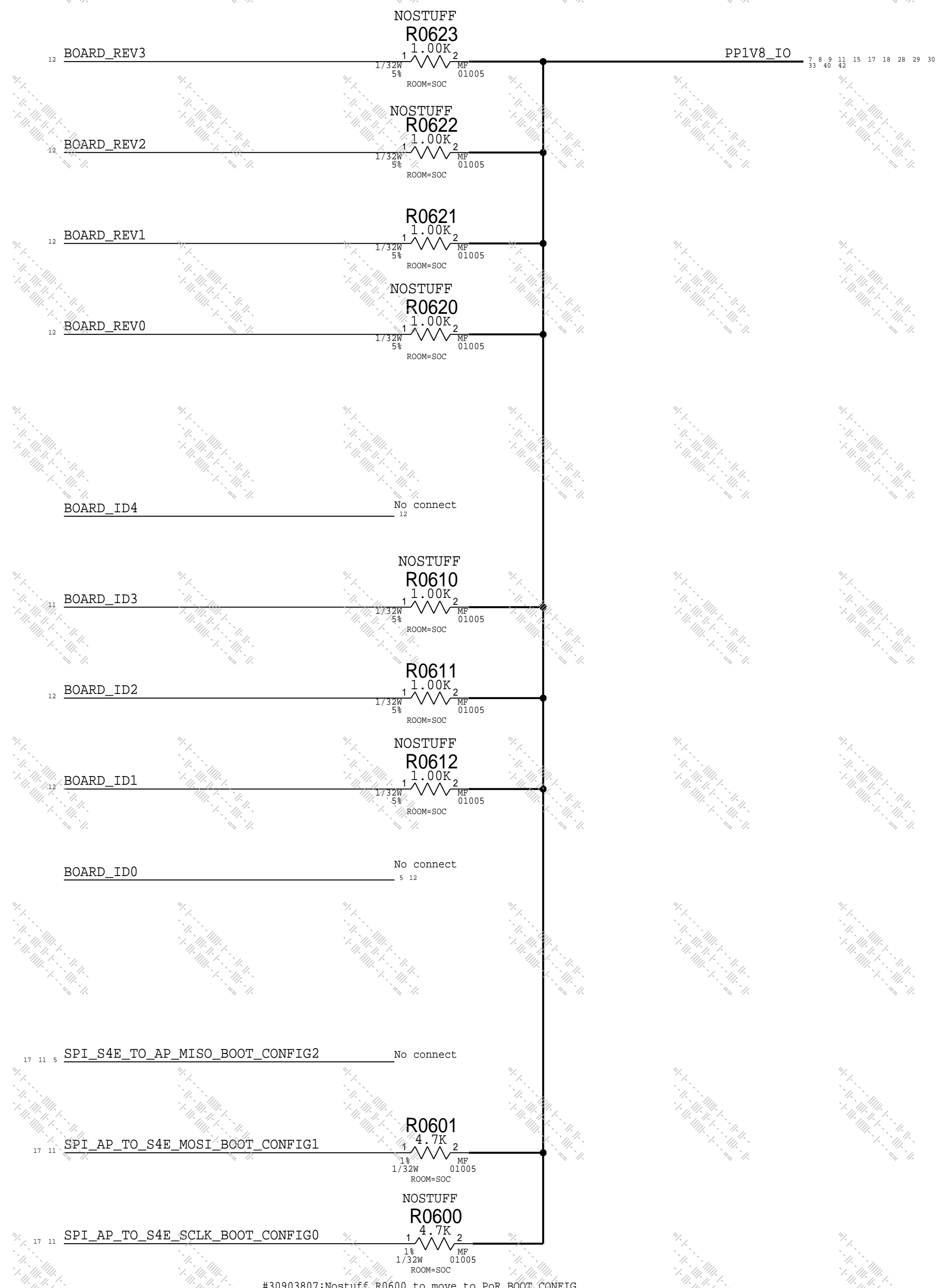


RF Debug



PAGE TITLE		
SYSTEM: Testpoints		
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	PAGE	5 OF 80
	SHEET	5 OF 81

BOOTSTRAPPING: BOARD REV BOARD ID BOOT CONFIG



BOARD_REV[3:0]
 FLOAT=LOW, PULLUP=HIGH

1111	Pre-Proto (Placeholder)
1110	PROTO1
1101	SPARE
1100	PROTO2
1011	PROTO2 (HALOGEN DOE)
1001	PROTO2v5
xxxx	SPARES
1000	EVT
xxxx	SPARES
0100	CARRIER
xxxx	SPARE
0010	DVT
xxxx	SPARE
0000	PVT

Note: Future board revs TBD

BOARD_ID[4:0]
 FLOAT=LOW, PULLUP=HIGH

00010	D20 MLB
00011	D20 DEV
00100	D21 MLB
00101	D21 DEV
01010	D201 MLB
01011	D201 DEV
01100	D211 MLB
01101	D211 DEV

Legend:
 0=MLB, 1=DEV
 01=D20x, 10=D21x
 0=EUREKA, 1=KAROO

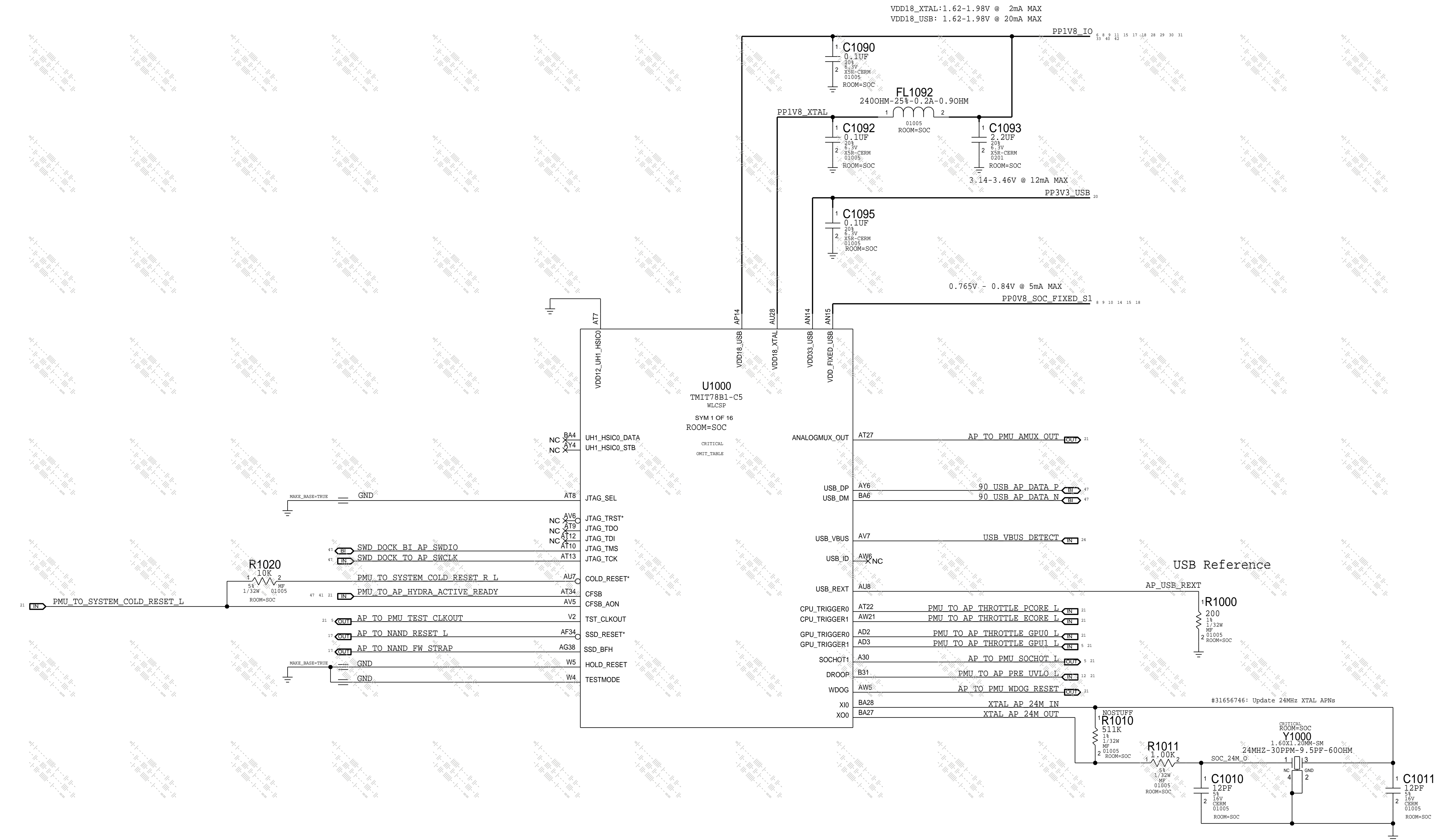
BOOT_CONFIG[2:0]
 FLOAT=LOW, PULLUP=HIGH

000	SPI0
001	SPI0 TEST MODE
010	SPI0 NAND
011	SPI0 NAND TEST
100	n/a
101	n/a
110	SLOW SPI0 TEST
111	FAST SPI0 TEST

#30903807:Nostuff R0600 to move to PoR BOOT_CONFIG

BOOTSTRAPPING		
	DRAWING NUMBER 051-02159	SIZE D
REVISION 10.0.0		
BRANCH		
PAGE 6 OF 80		
SHEET 6 OF 81		
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SOC - USB, JTAG, XTAL



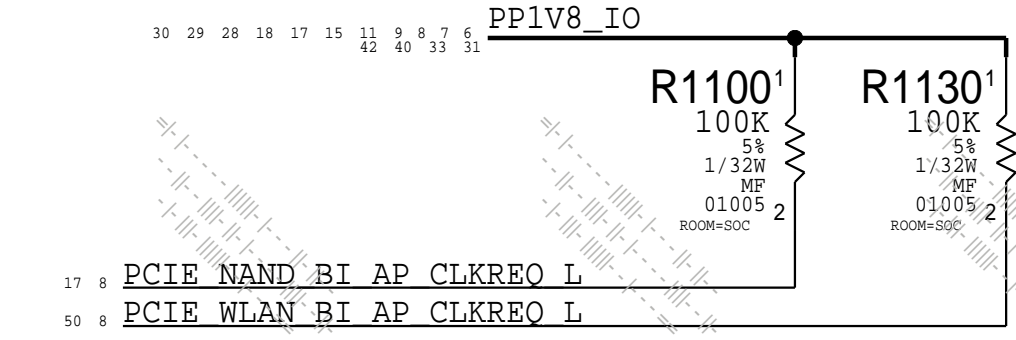
PAGE TITLE		
SOC: JTAG, USB, XTAL		
DRAWING NUMBER	051-02159	SIZE
		D
REVISION	10.0.0	
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IV ALL RIGHTS RESERVED		
BRANCH		
PAGE	10 OF 80	
SHEET	7 OF 81	

SOC - PCIE INTERFACES

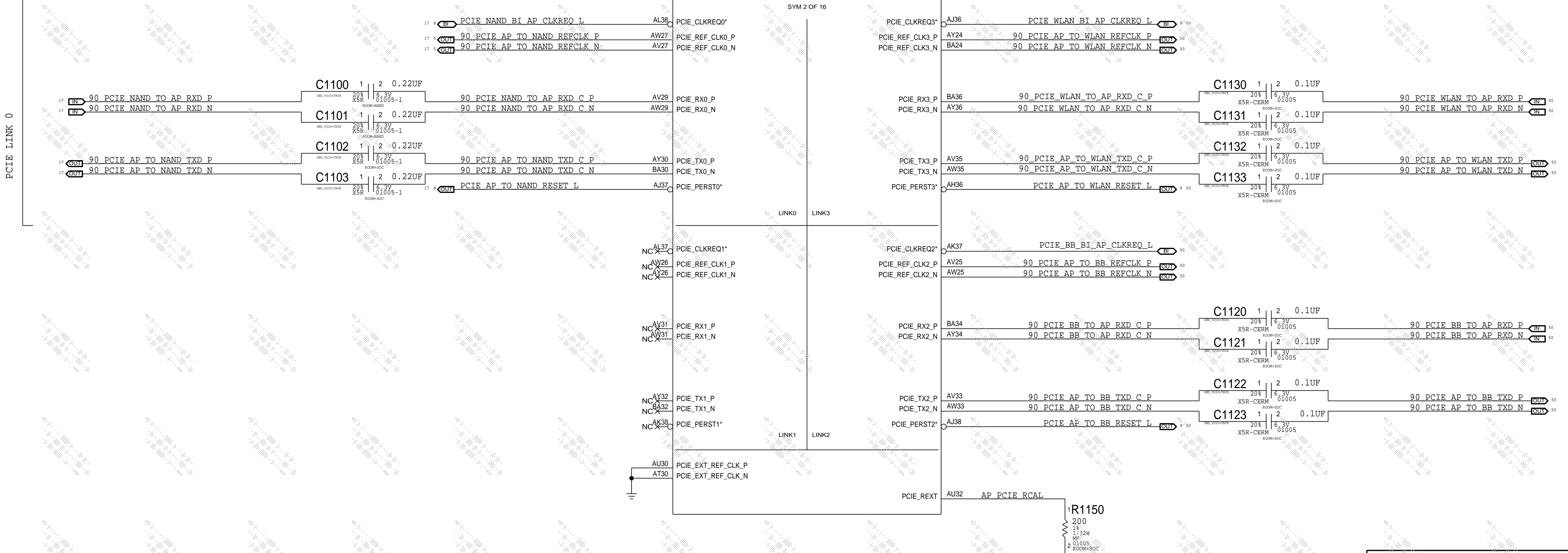
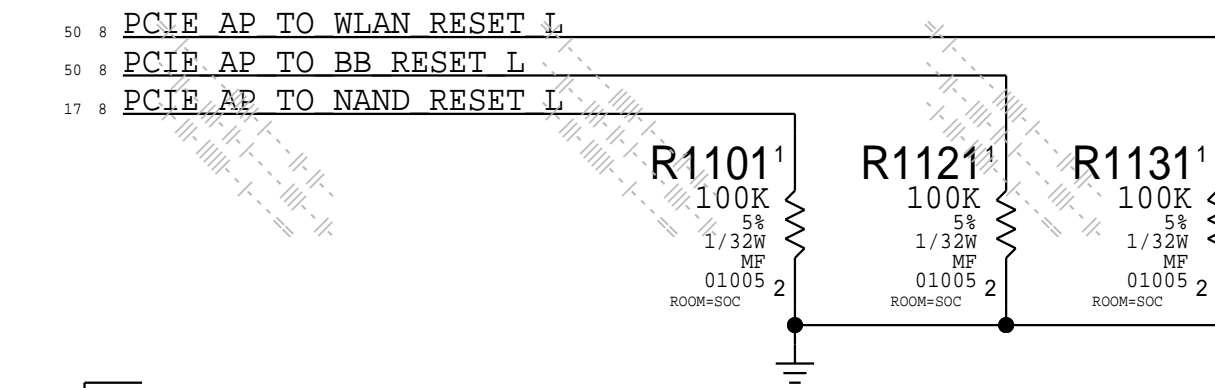
VDD12_PCIE_REFBUF:1.08V - 1.26V @ 30mA MAX

VDD18_PCIE:1.62V - 1.98V @ 81mA MAX

PCie Clock Request Pull-Ups



PCie Reset Pull-Downs



PAGE TITLE			SOC: PCIE		
Apple Inc.		DRAWING NUMBER	051-02159	SIZE	D
		REVISION	10.0.0		
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		PAGE	11 OF 80		
		SHEET	8 OF 81		

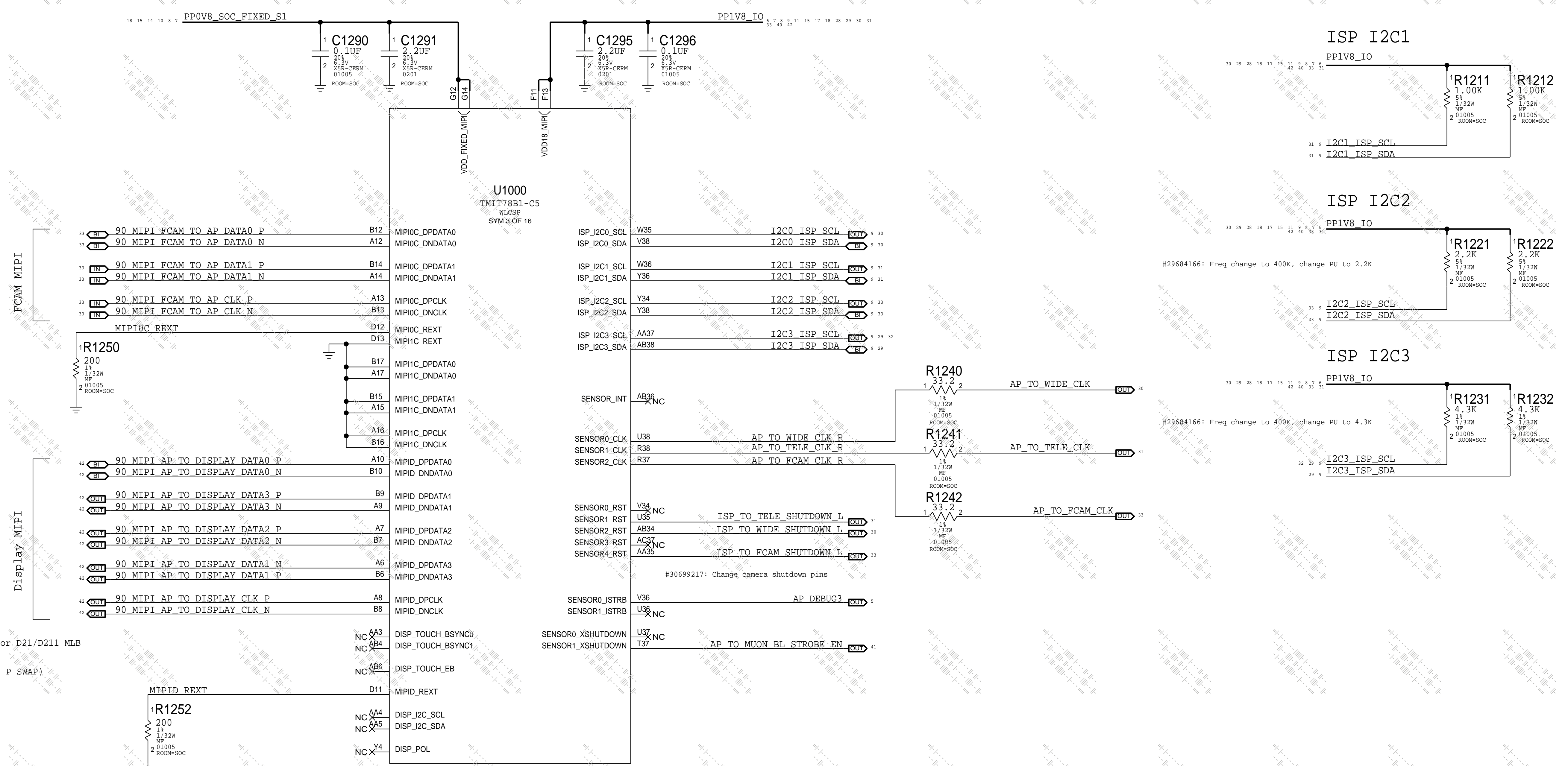
SOC - MIPI & ISP INTERFACES

VDD_FIXED_MIPI: 0.765V - 0.84V @ 40mA MAX

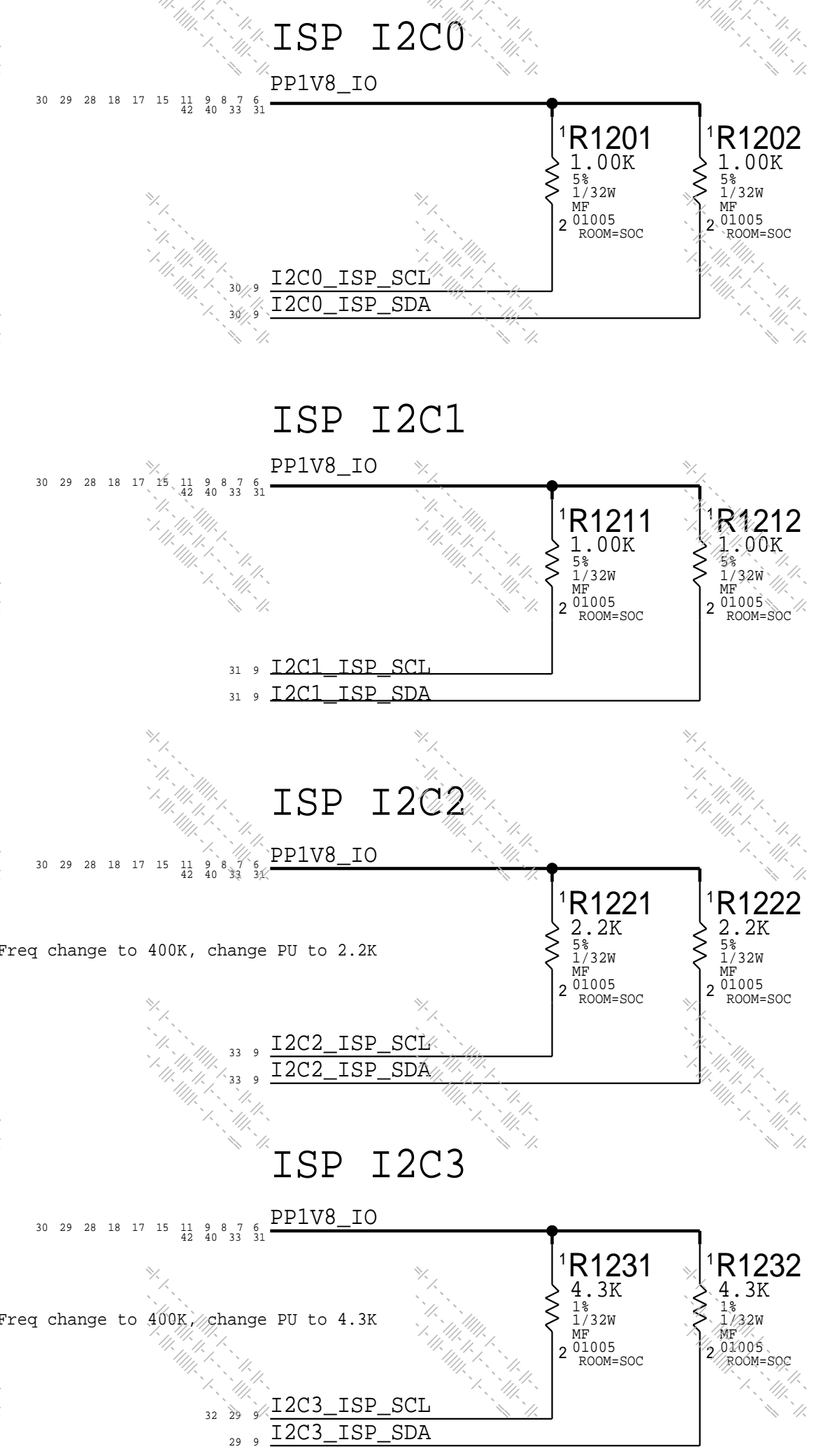
VDD18_MIPI: 1.62V - 1.98V @ 10mA MAX

PP0V8_SOC_FIXED_S1

PPIV8_IO

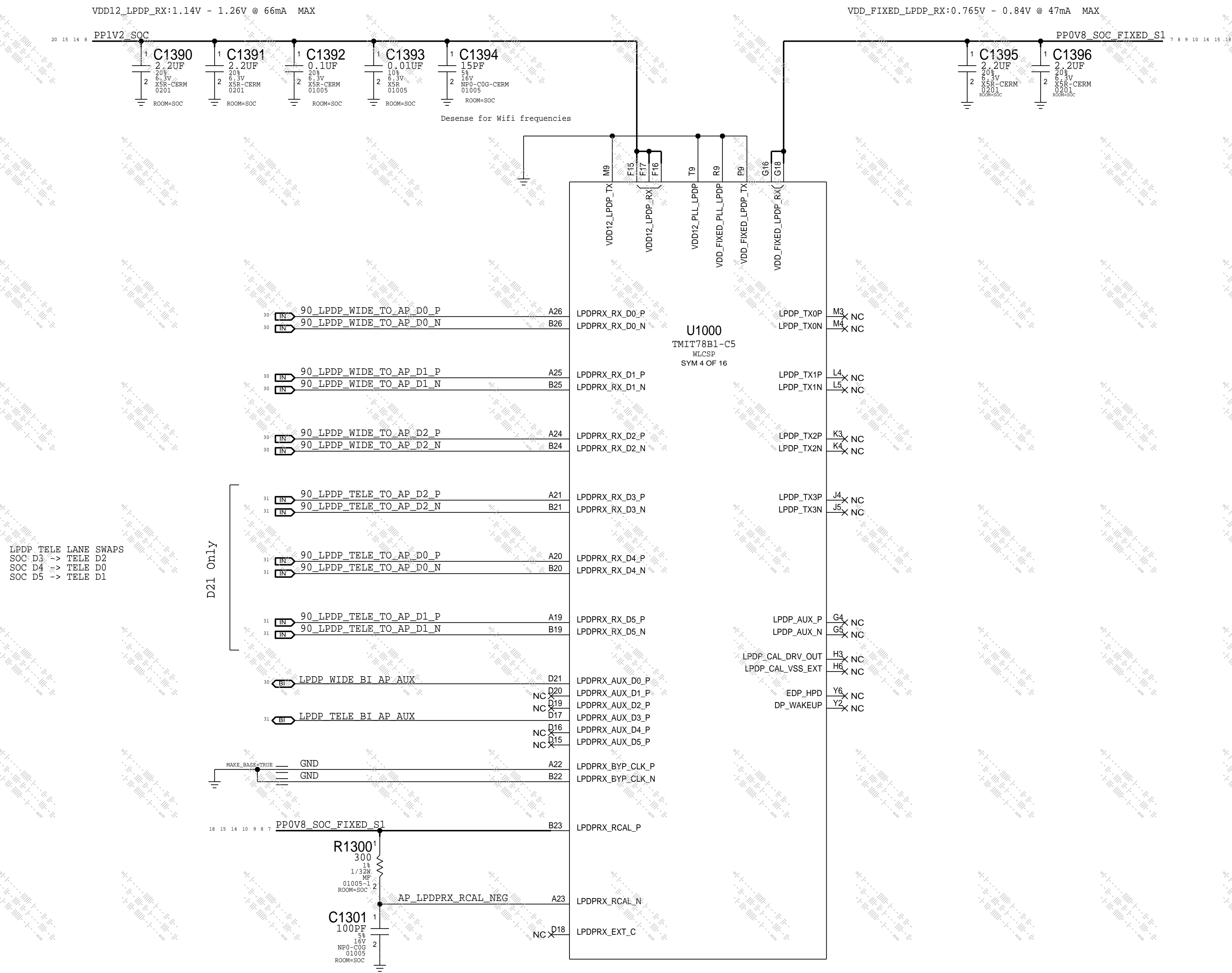


Pin assignment optimized for D21/D211 MLB
 DISPLAY MIPI LANE SWAPS
 SOC D1 -> DISPLAY D3
 SOC D3 -> DISPLAY D1 (N & P SWAP)



PAGE TITLE		
SOC: MIPI + ISP		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	12 OF 80
	SHEET	9 OF 81

SOC - LPDP INTERFACES

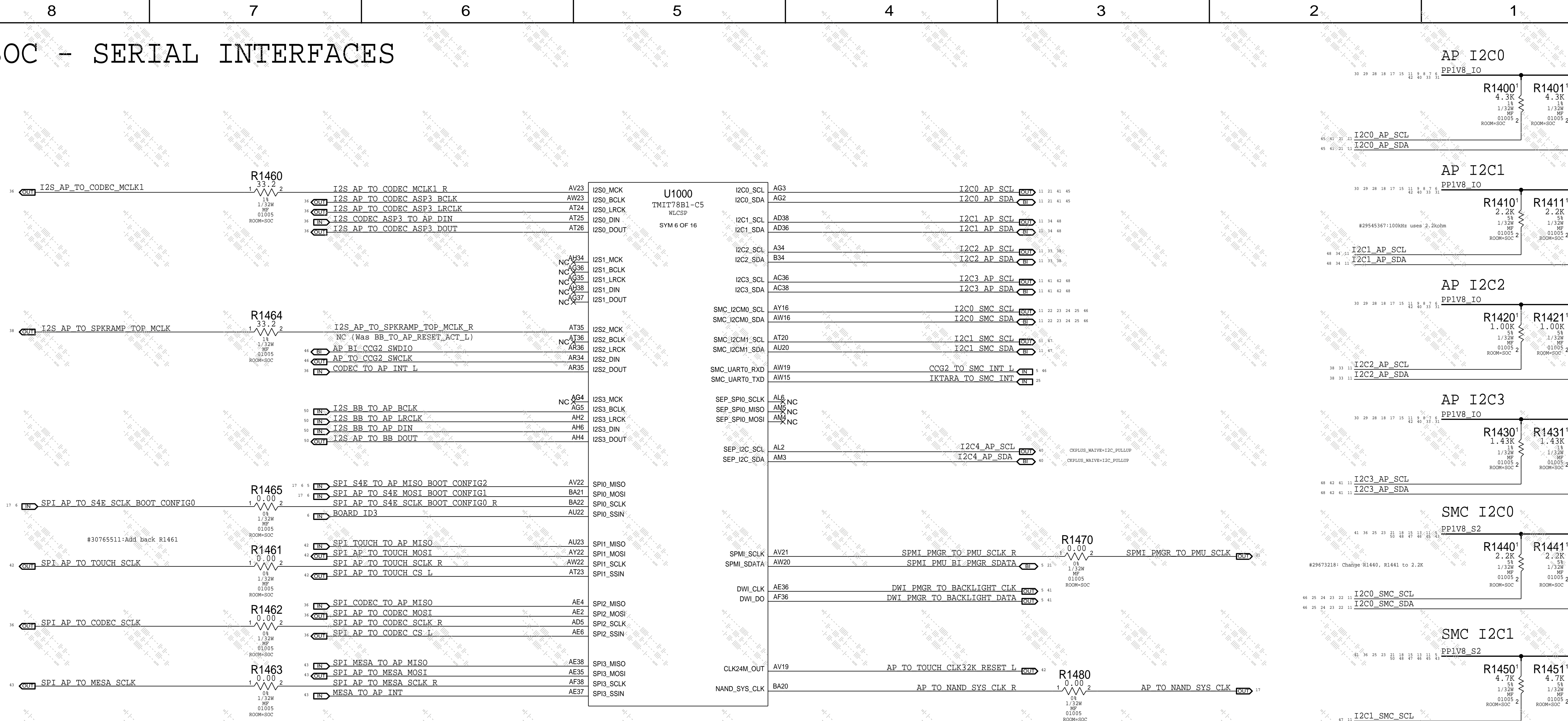


LPDP TELE LANE SWAPS
SOC D3 -> TELE D2
SOC D4 -> TELE D0
SOC D5 -> TELE D1

D21 Only

PAGE TITLE			SOC: LPDP			
		DRAWING NUMBER	051-02159	SIZE	D	
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			PAGE	13 OF 80		
			SHEET	10 OF 81		

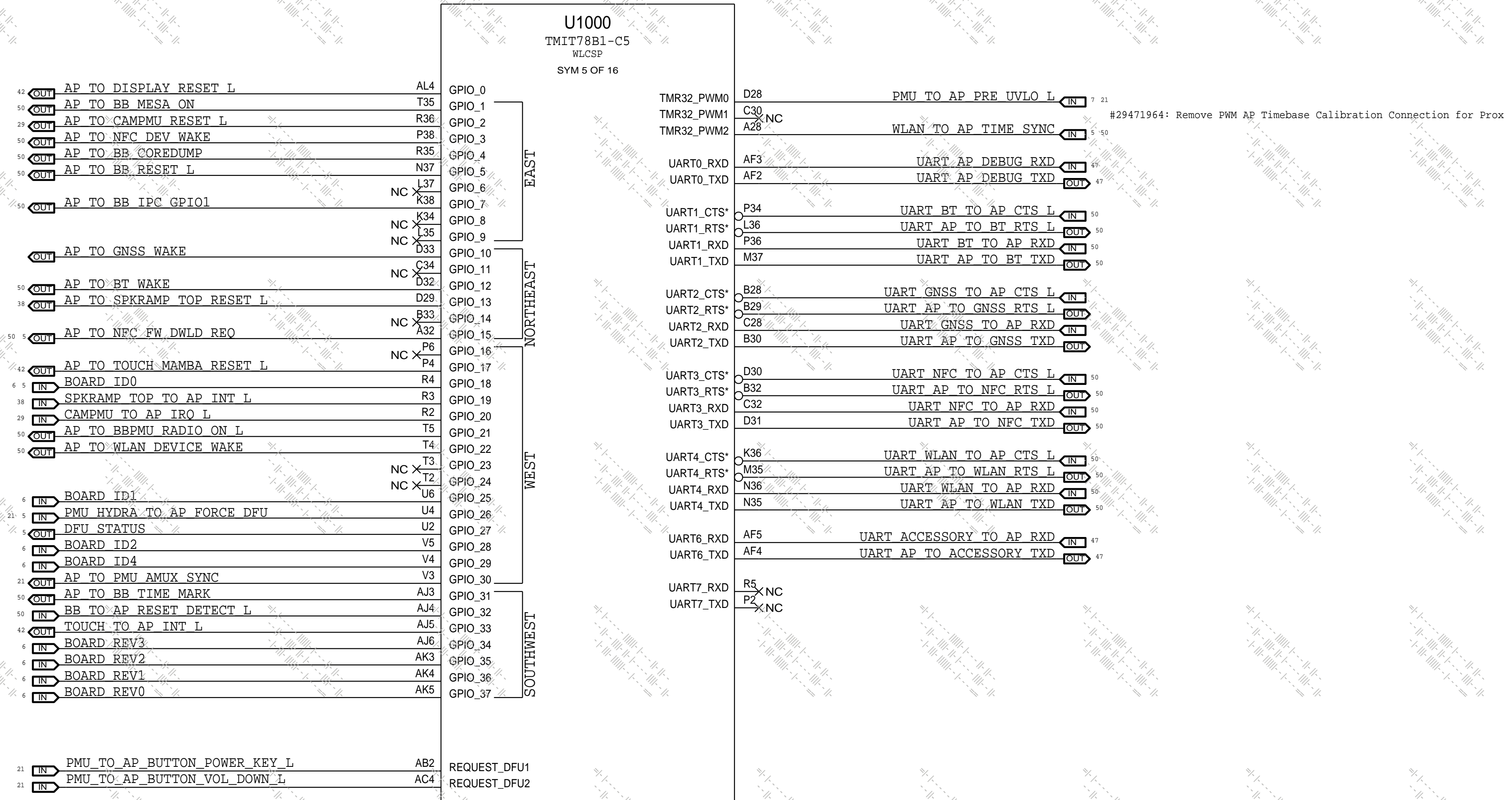
SOC - SERIAL INTERFACES



SPI: Route as Daisy-Chain (No T's Allowed)

PAGE TITLE			SOC: SERIAL + SMC		
		DRAWING NUMBER	051-02159		SIZE
		REVISION	10.0.0		D
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			PAGE	14 OF 80	
			SHEET	11 OF 81	

SOC - GPIO INTERFACES



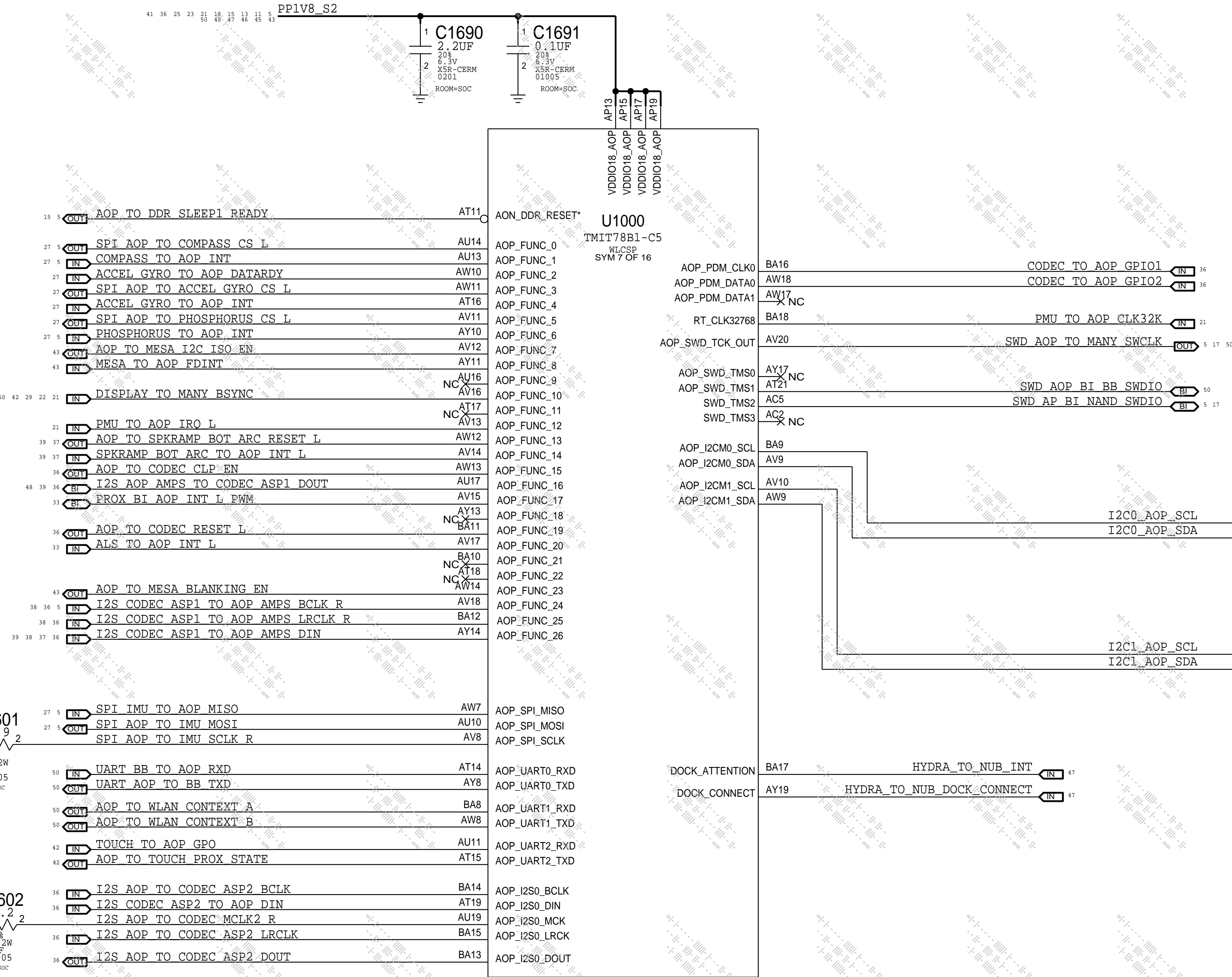
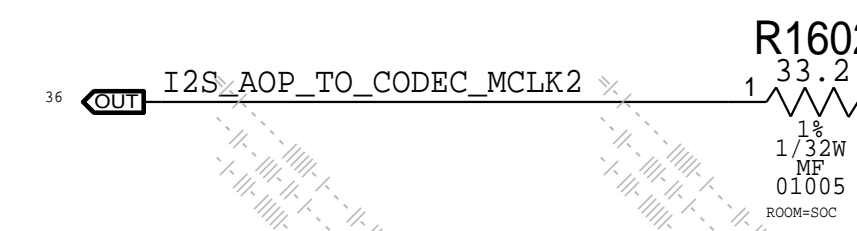
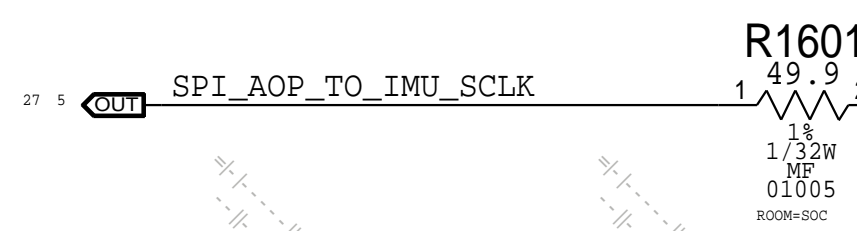
PAGE TITLE			SOC: GPIO + UART		
Apple Inc.	DRAWING NUMBER	051-02159	SIZE	D	
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			PAGE	15 OF 80	
			SHEET	12 OF 81	

SOC - AOP

VDDIO18_AOP:1.8V @ 15mA MAX

PP1V8_S2

#30638490: Route U1000/US000.ASP1 BCLK, LRCLK with _R

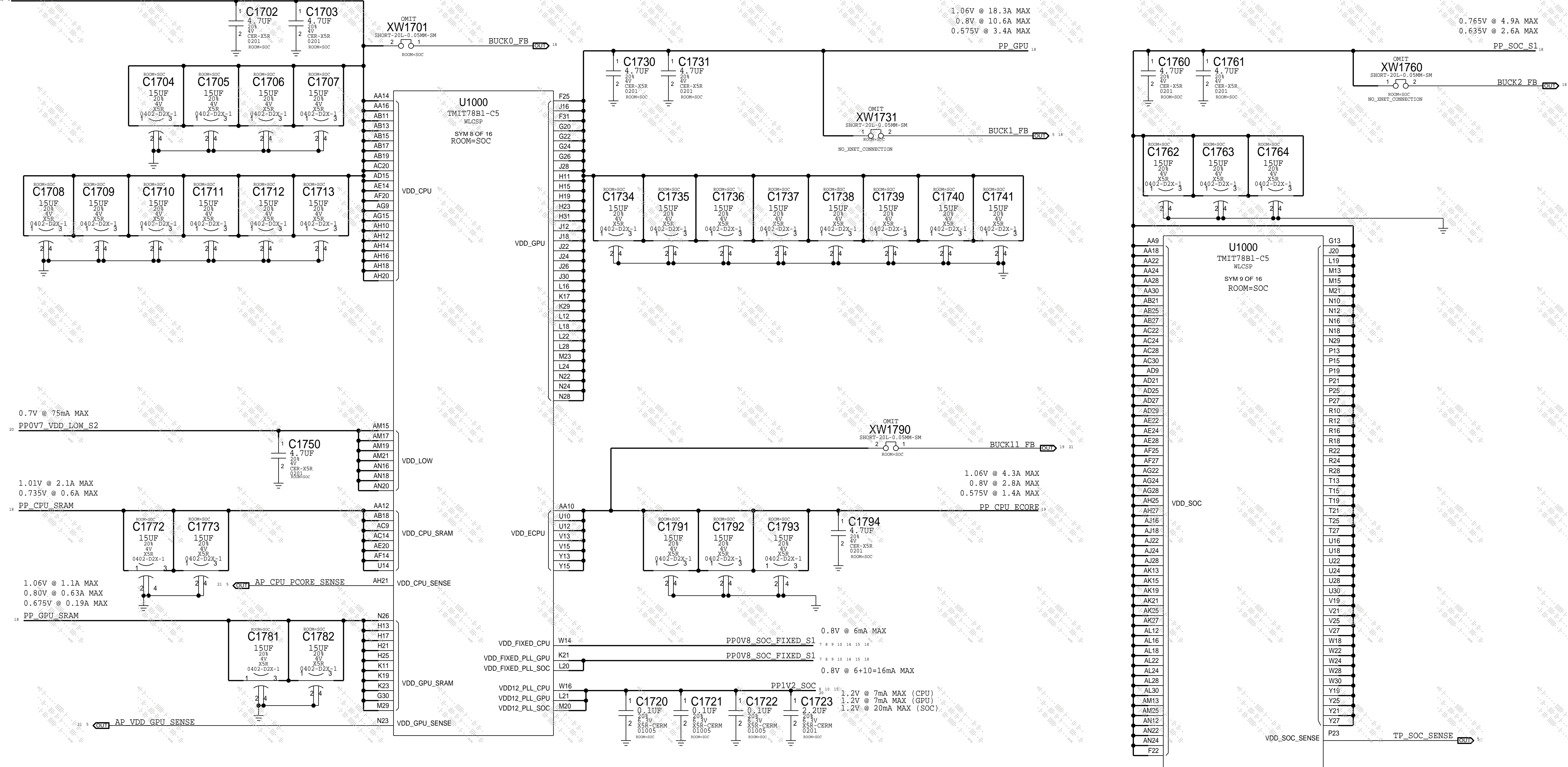


PAGE TITLE			SOC: AOP		
		DRAWING NUMBER	051-02159	SIZE	D
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			PAGE	16 OF 80	
			SHEET	13 OF 81	

SOC - CPU, GPU & SOC RAILS

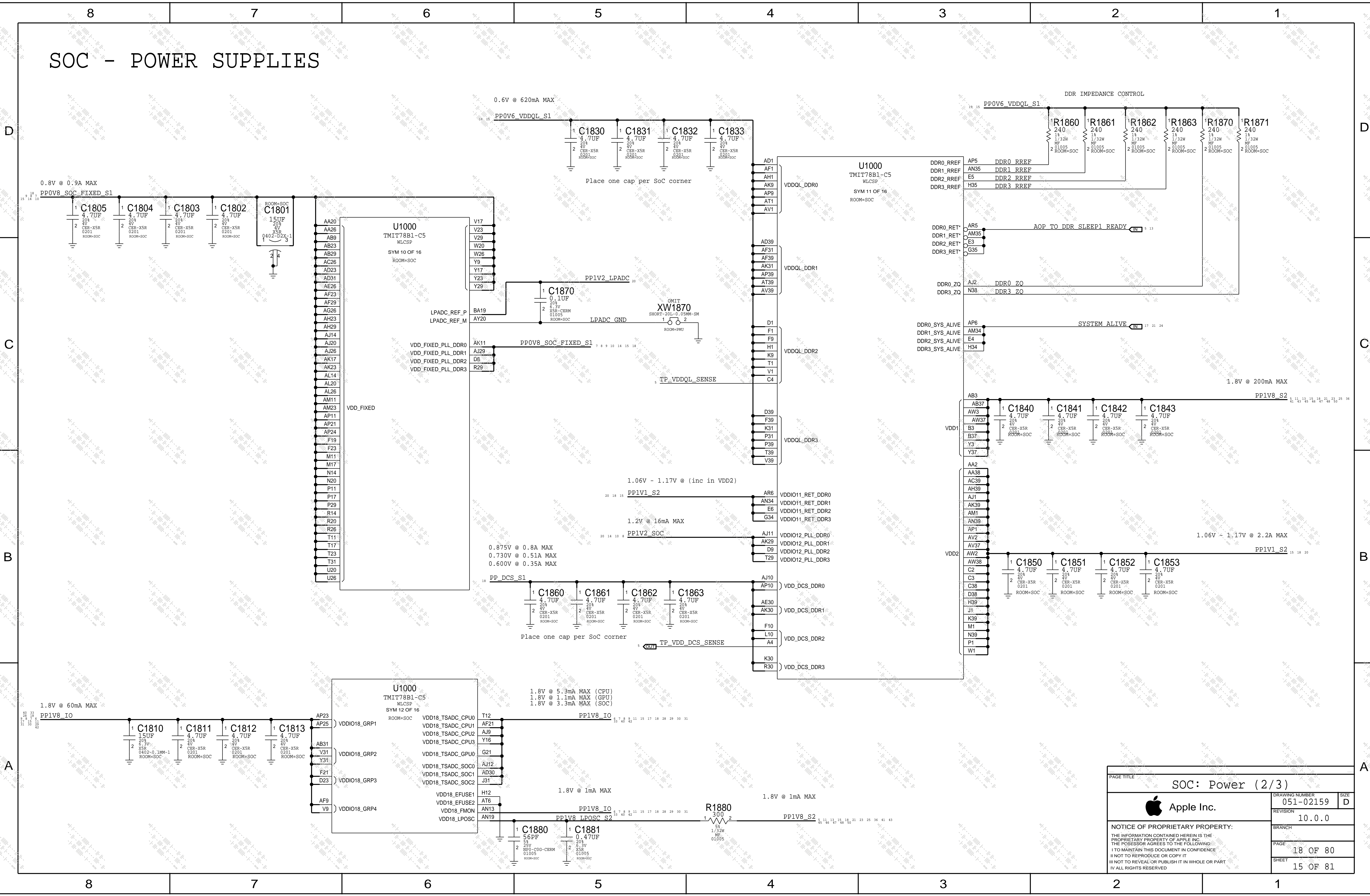
1.06V @ 11.0A MAX
 0.8V @ 6A MAX
 0.575V @ 2.7A MAX

PP_CPU_PCORE



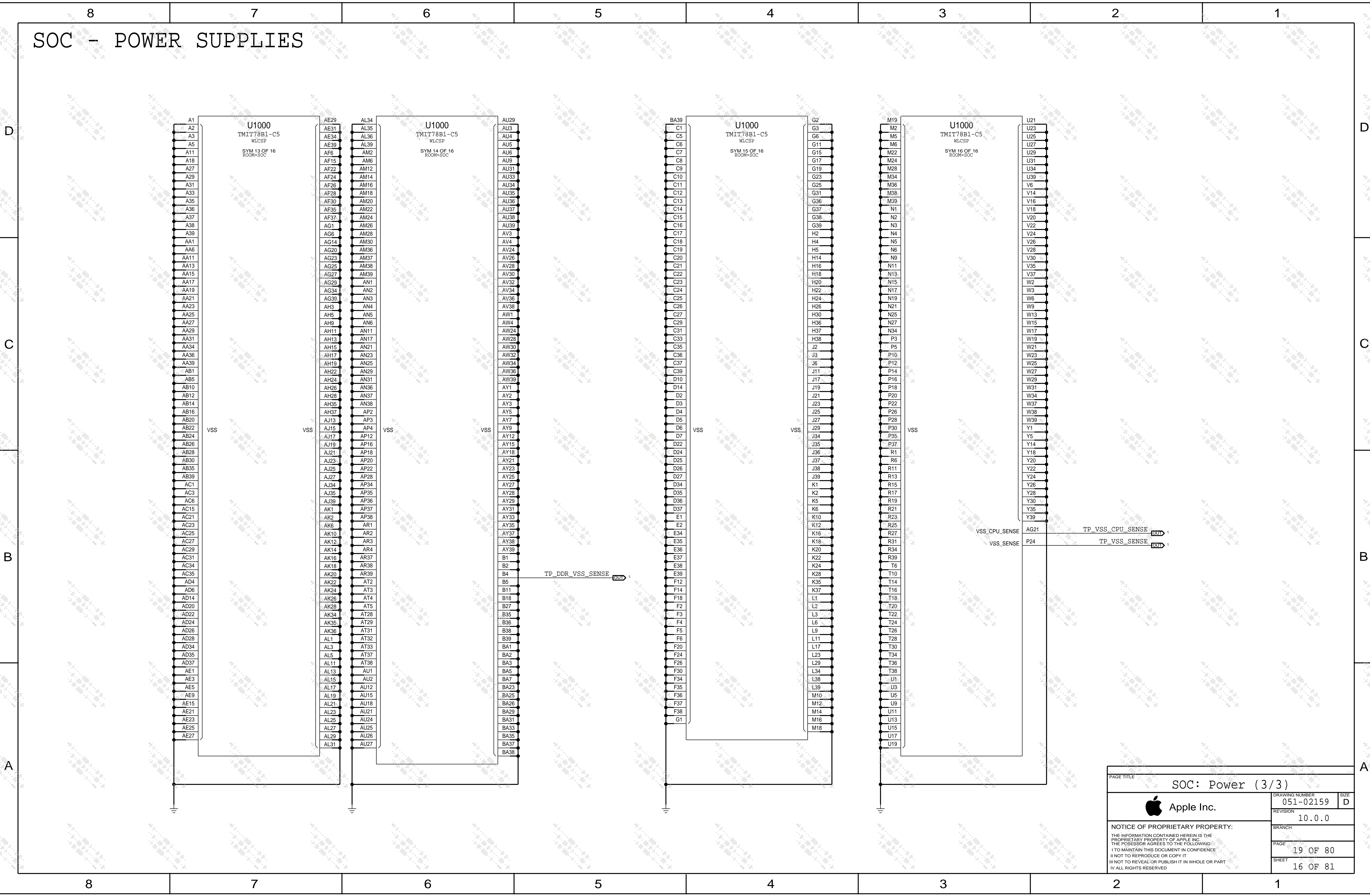
PAGE TITLE		
SOC: Power (1/3)		
Apple Inc.	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	17 OF 80
	SHEET	14 OF 81

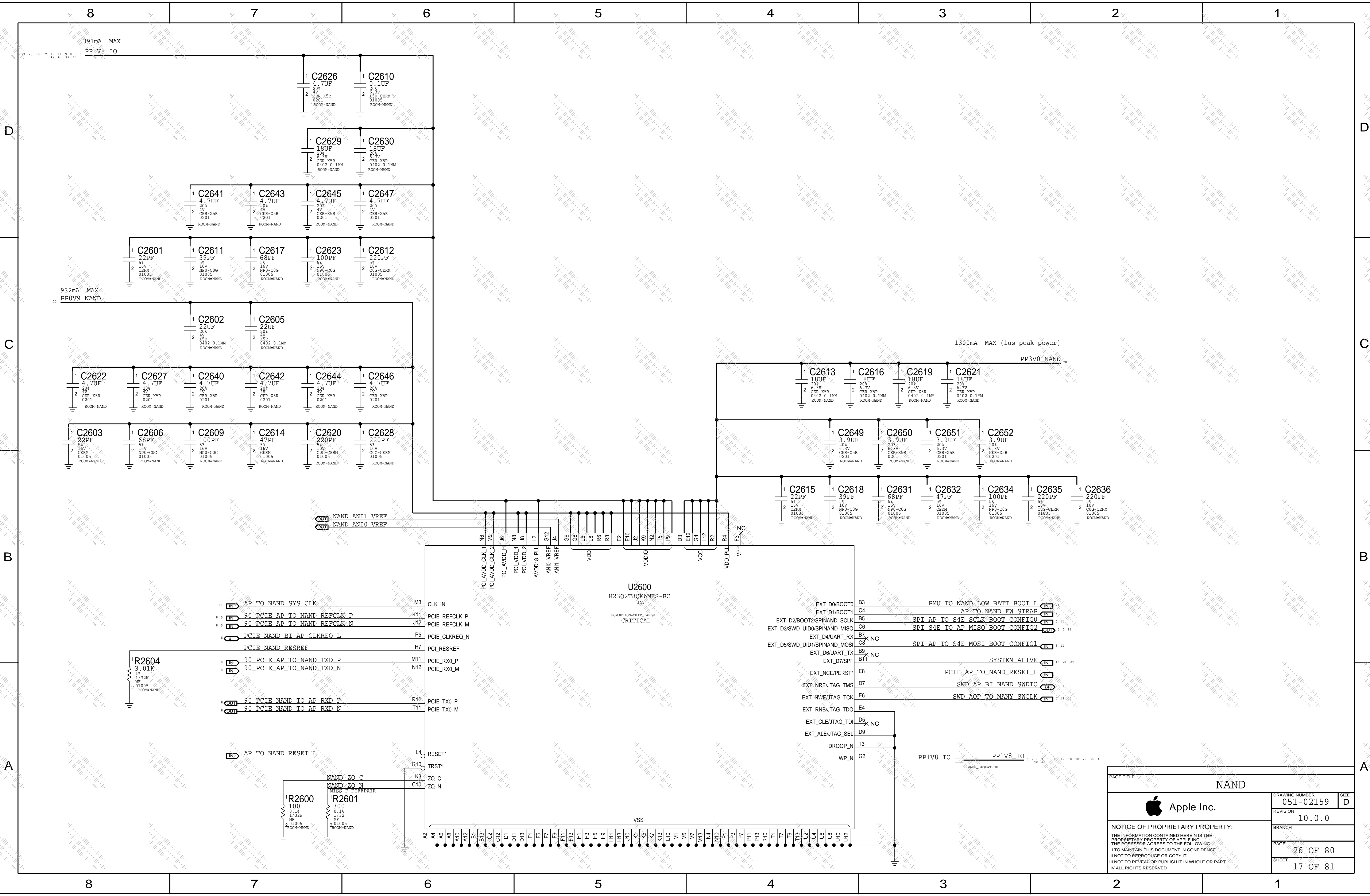
SOC - POWER SUPPLIES



PAGE TITLE		SOC: Power (2/3)	
		DRAWING NUMBER	051-02159
		REVISION	10.0.0
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		PAGE	18 OF 80
		SHEET	15 OF 81

SOC - POWER SUPPLIES





R2604
3.01K
1 1/32W
MF
2 01005
ROOM=NAND

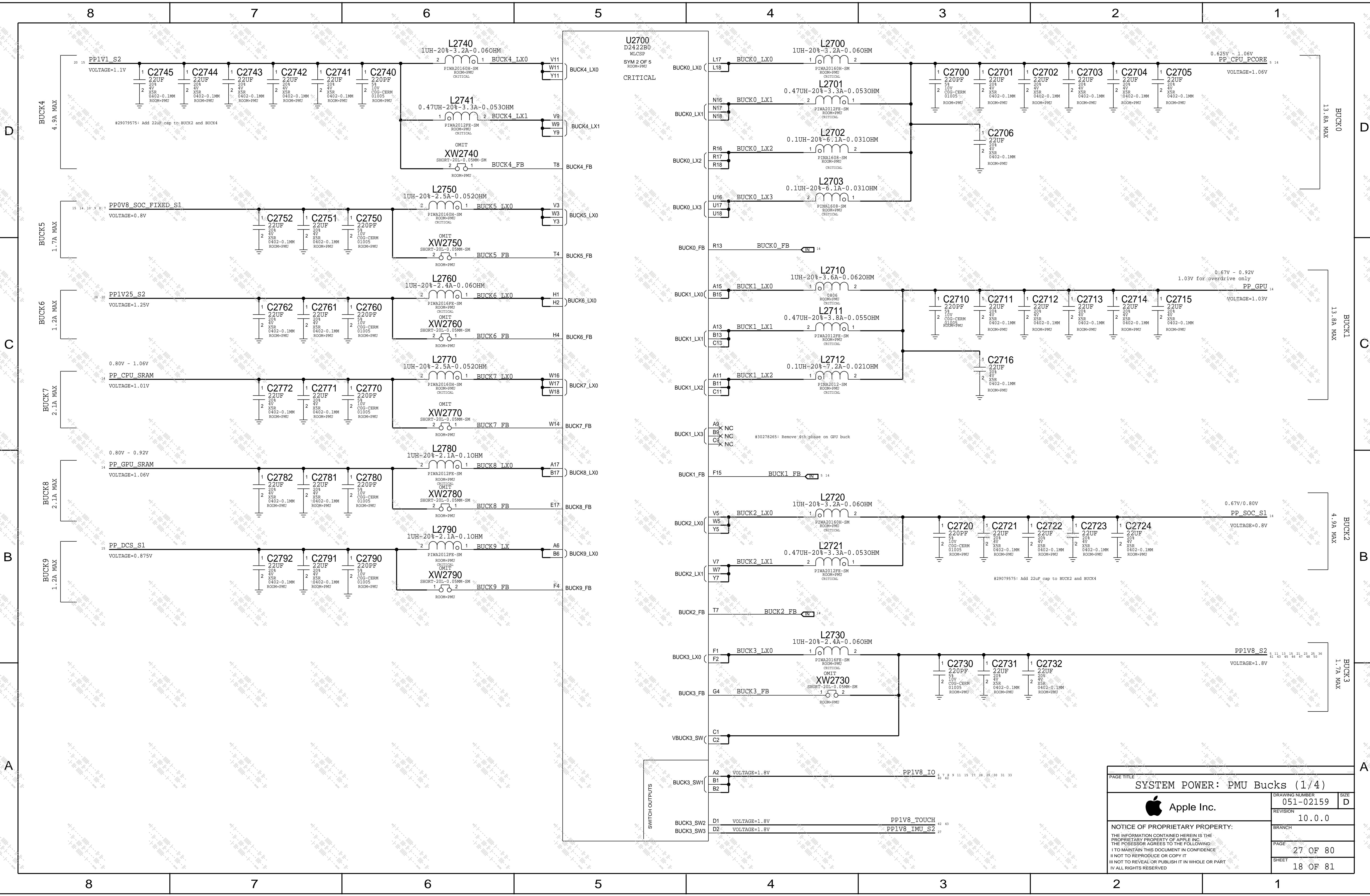
NAND_ZO_C
NAND_ZO_N
WISS_P_DIFFFAIR
R2600
100
0.18
1/32W
MF
2 01005
ROOM=NAND

R2601
300
0.18
1/32
MF
2 01005
ROOM=NAND

U2600
H23Q2T8QK6MES-BC
LGA
BOMOPTION=OMIT_TABLE
CRITICAL

EXT_D0/BOOT0	B3	PMU TO NAND LOW BATT BOOT L	8
EXT_D1/BOOT1	C4	AP TO NAND FW STRAP	7
EXT_D2/BOOT2/SPINAND_SCLK	B5	SPI AP TO S4E SCLK BOOT CONFIG0	6, 11
EXT_D3/SWD_UID0/SPINAND_MISO	C6	SPI S4E TO AP MISO BOOT CONFIG2	5, 6, 11
EXT_D4/UART_RX	B7	NC	
EXT_D5/SWD_UID1/SPINAND_MOSI	C8	SPI AP TO S4E MOSI BOOT CONFIG1	6, 11
EXT_D6/UART_TX	B8	NC	
EXT_D7/SPF	B11	SYSTEM ALIVE	15, 21, 24
EXT_NCE/PERST*	E8	PCIE AP TO NAND RESET L	8
EXT_NRE/JTAG_TMS	D7	SWD AP BI NAND SWDIO	5, 13
EXT_NWE/JTAG_TCK	E6	SWD AOP TO MANY SWCLK	5, 13, 20
EXT_RNB/JTAG_TDO	E4		
EXT_CLE/JTAG_TDI	D5	NC	
EXT_ALE/JTAG_SEL	D9		
DROOP_N	T3		
WP_N	G2	PP1V8_IO	6, 7, 8, 9, 11, 15, 17, 18, 28, 29, 30, 31

PAGE TITLE		
NAND		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	26 OF 80
	SHEET	17 OF 81



PAGE TITLE		
SYSTEM POWER: PMU Bucks (1/4)		
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	PAGE	27 OF 80
	SHEET	18 OF 81

8 7 6 5 4 3 2 1

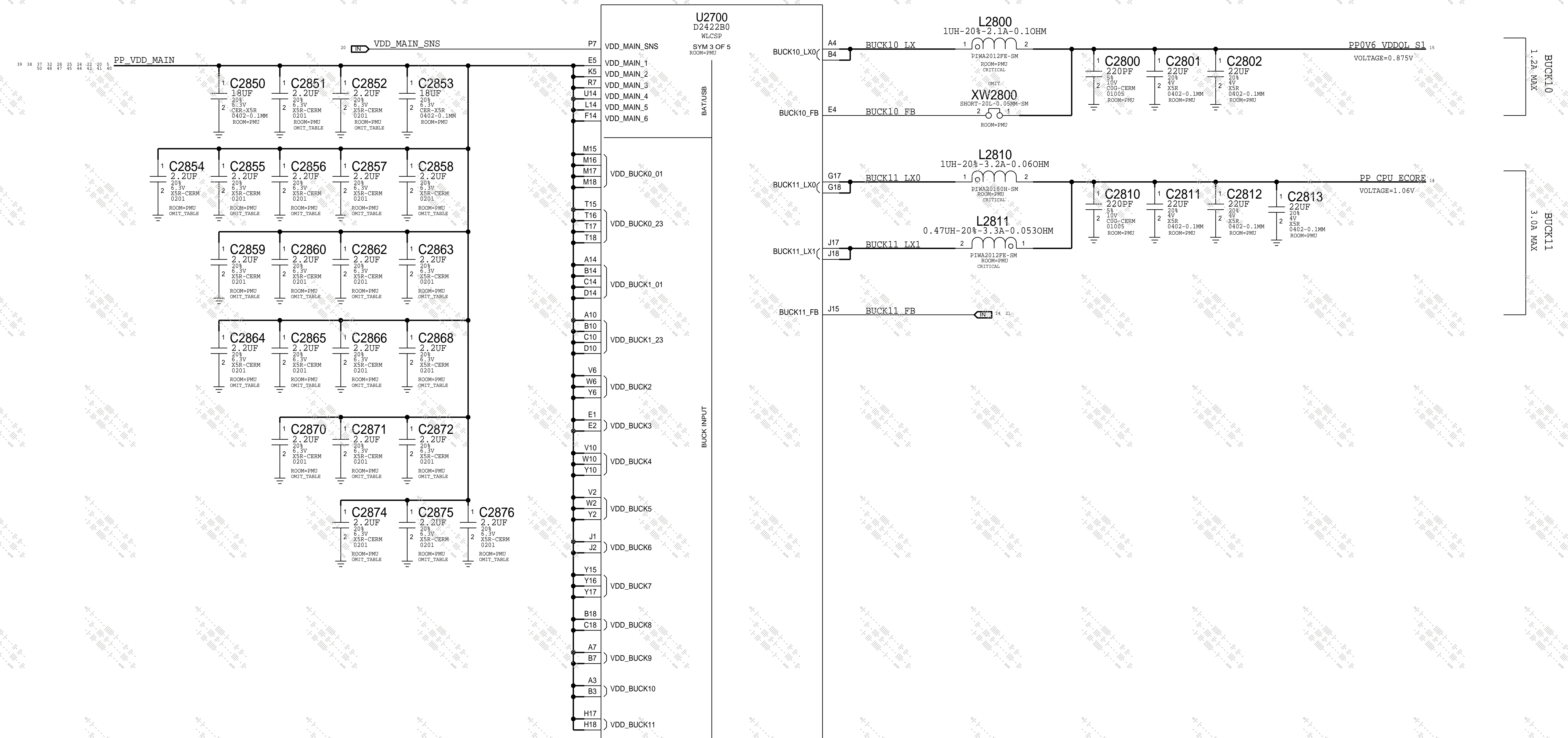
D

C

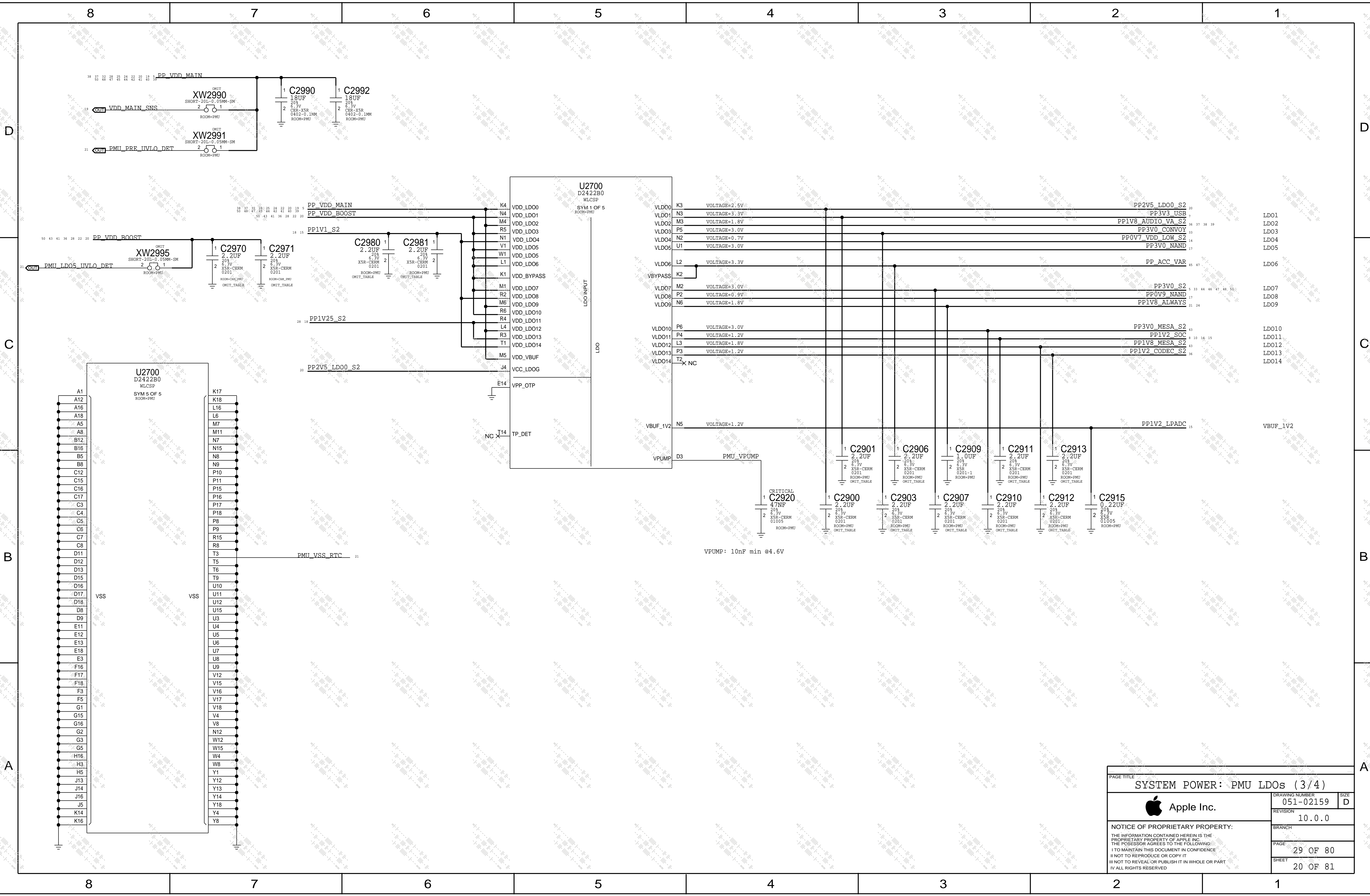
B

A

8 7 6 5 4 3 2 1



PAGE TITLE SYSTEM POWER: PMU Bucks (2/4)		
	DRAWING NUMBER 051-02159	SIZE D
	REVISION 10.0.0	
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BRANCH	PAGE 28 OF 80	
SHEET 19 OF 81		

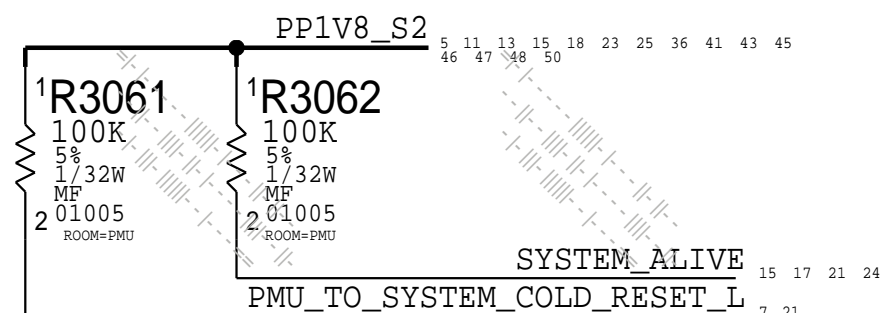


U2700 D2422B0 WLCSP SYM 5 OF 5 ROOM=PMU

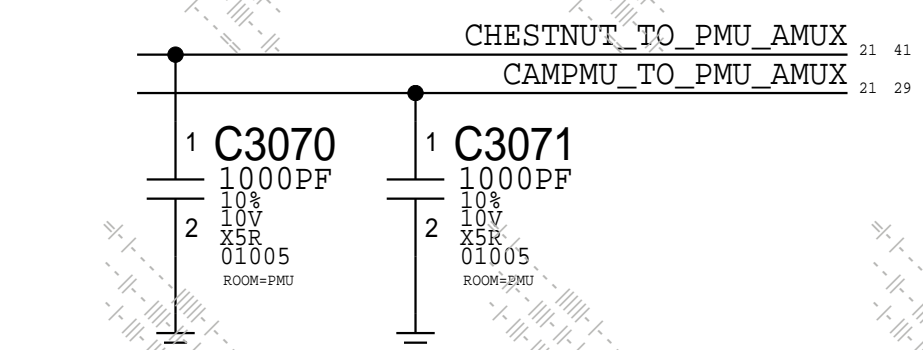
A1	K17
A12	K18
A16	L16
A18	L6
A5	M7
A8	M11
B12	N7
B16	N15
B5	N8
B8	N9
C12	P10
C15	P11
C16	P15
C17	P16
C3	P17
C4	P18
C5	P8
C6	P9
C7	R15
C8	R8
D11	T3
D12	T5
D13	T6
D15	T9
D16	U10
D17	U11
D18	U12
D8	U15
D9	U3
E11	U4
E12	U5
E13	U6
E18	U7
E3	U8
F16	U9
F17	V12
F18	V15
F3	V16
F5	V17
G1	V18
G15	V4
G16	V8
G2	N12
G3	W12
G5	W15
H16	W4
H3	W8
H5	Y1
J13	Y12
J14	Y13
J16	Y14
J5	Y18
K14	Y4
K16	Y8

PAGE TITLE SYSTEM POWER: PMU LDOs (3/4)		
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BRANCH		PAGE 29 OF 80
SHEET		20 OF 81

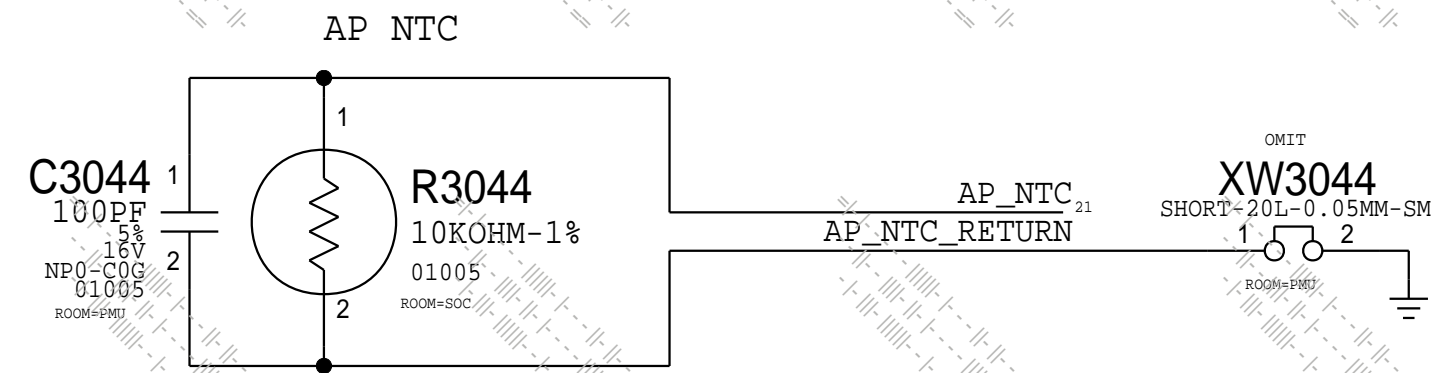
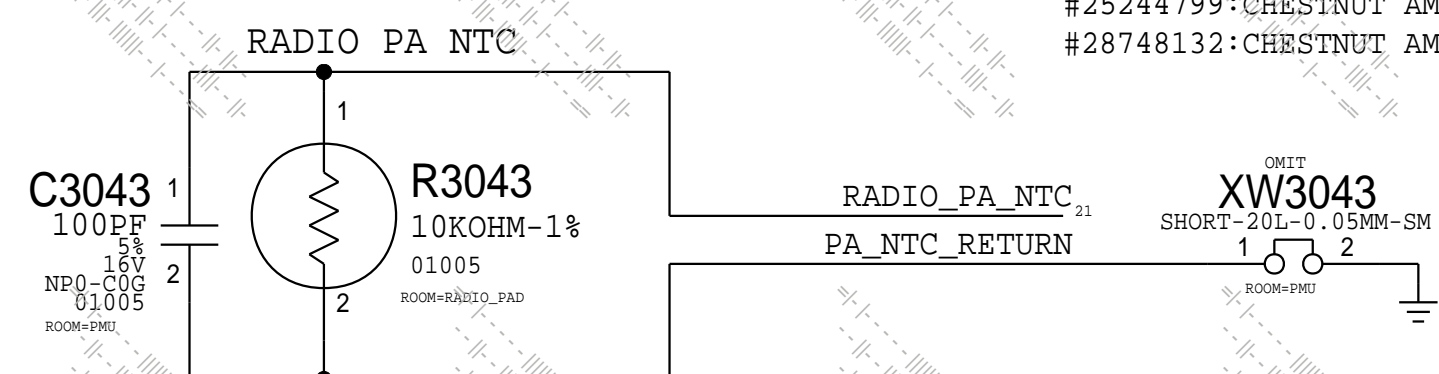
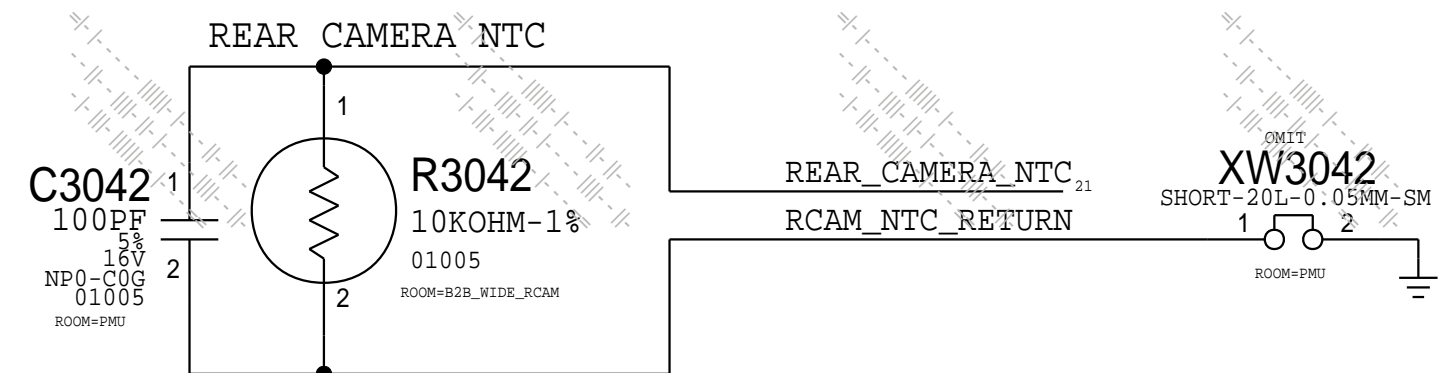
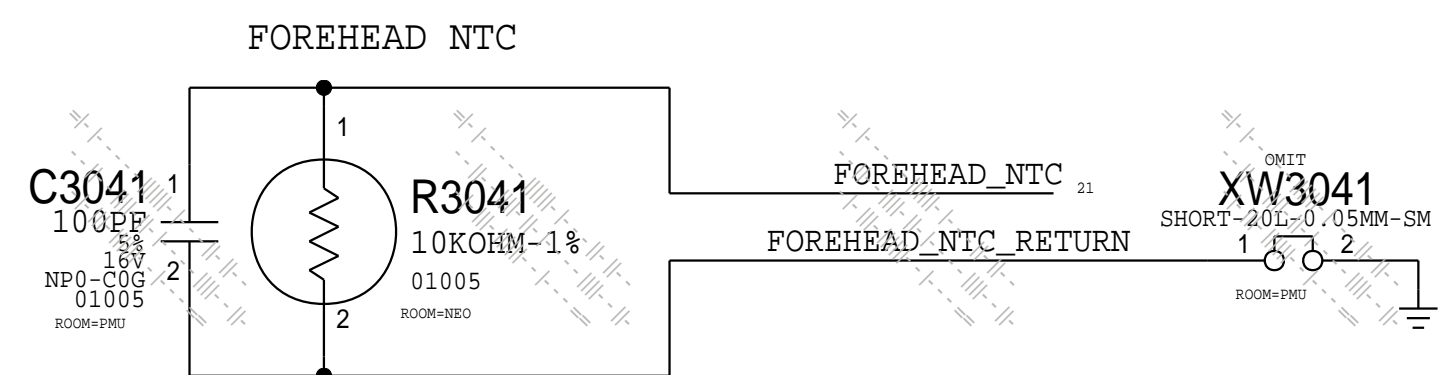
COLD_RESET & SYSTEM_ALIVE



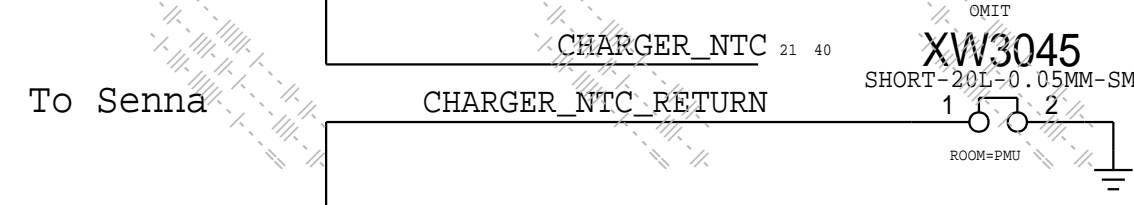
#28476673:1000PF CAP ON ANSEL AMUX
Chestnut / Ansel AMUX



NTCs



CHARGER NTC (IN SIP)



NOTE:100PF CAPS ARE THE SAMPLING CAPS FOR PMU ADC

#29404057:Damping R for ACTIVE_RDY

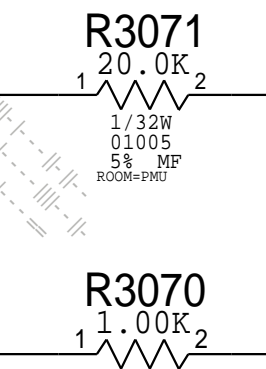
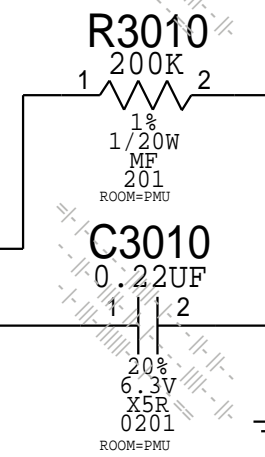
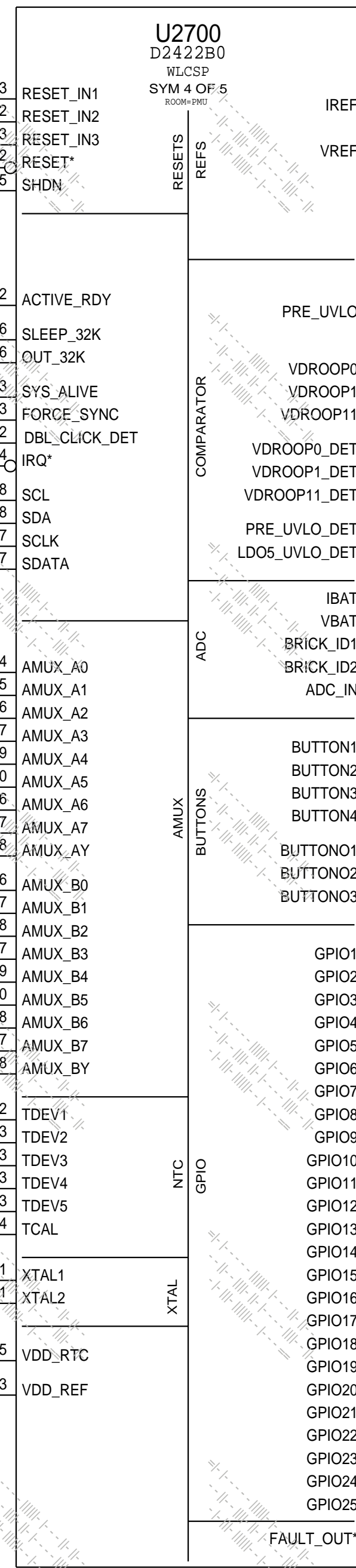
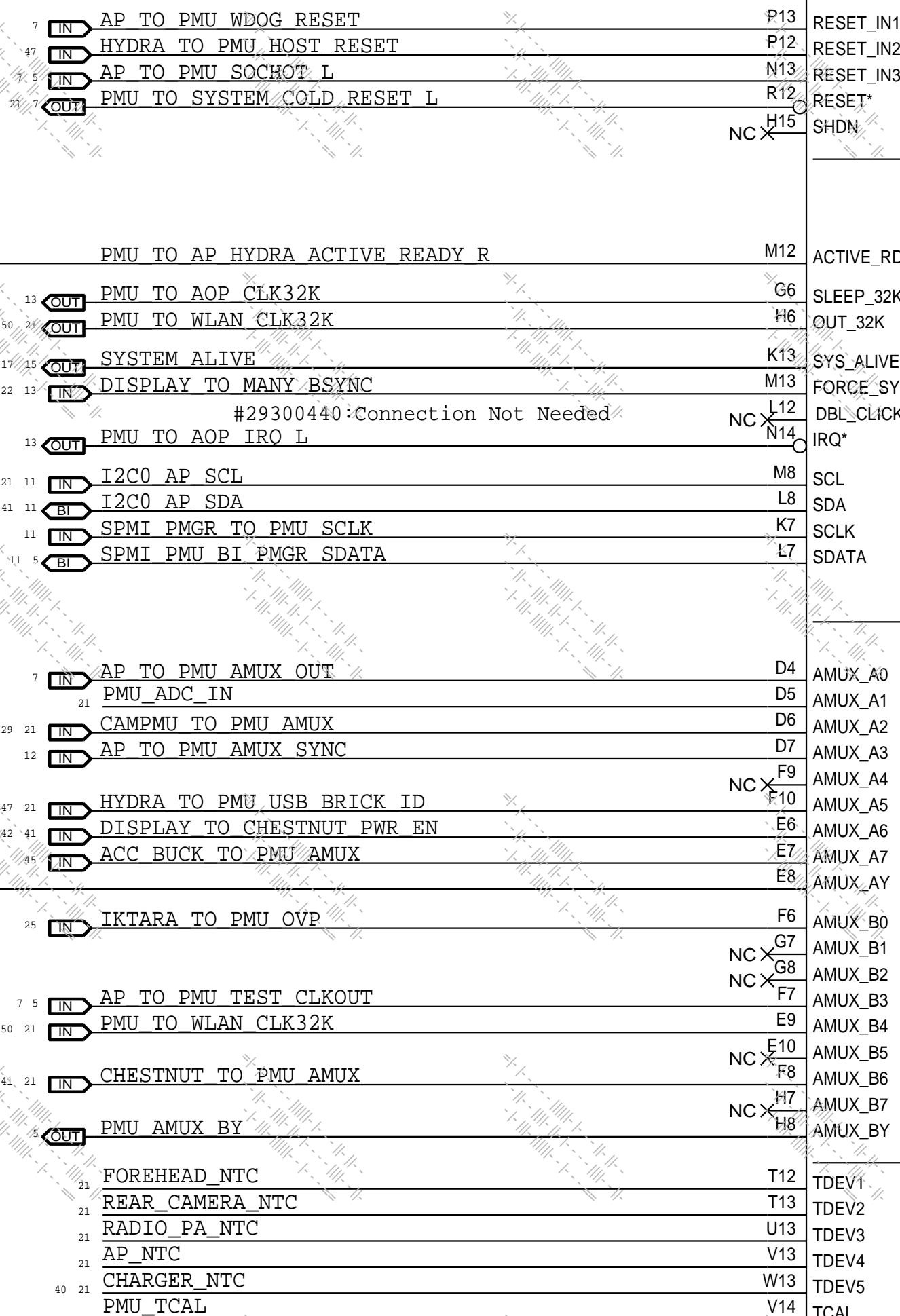
#29300440:Connect PMU crash to SoC

#27852679:No SDA R, PoR is SPMI

#25244799:CHESTNUT AMUX AND PWR_EN ON SAME CHANNEL
#28748132:CHESTNUT AMUX AND PWR_EN SWAP BETWEEN A6/B6

#25244799:OTP-AJ Connects XTAL1 to GND

#29312542:REPLACE PMU XTAL WITH XO



PAGE TITLE SYSTEM POWER: PMU (4/4)		
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8 7 6 5 4 3 2 1

D

C

B

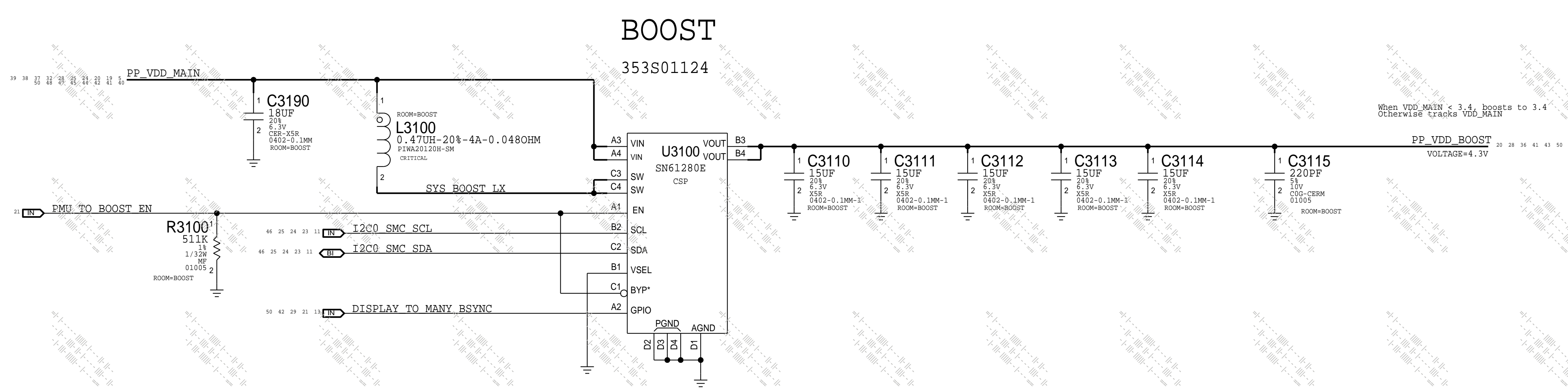
A

D

C

B

A

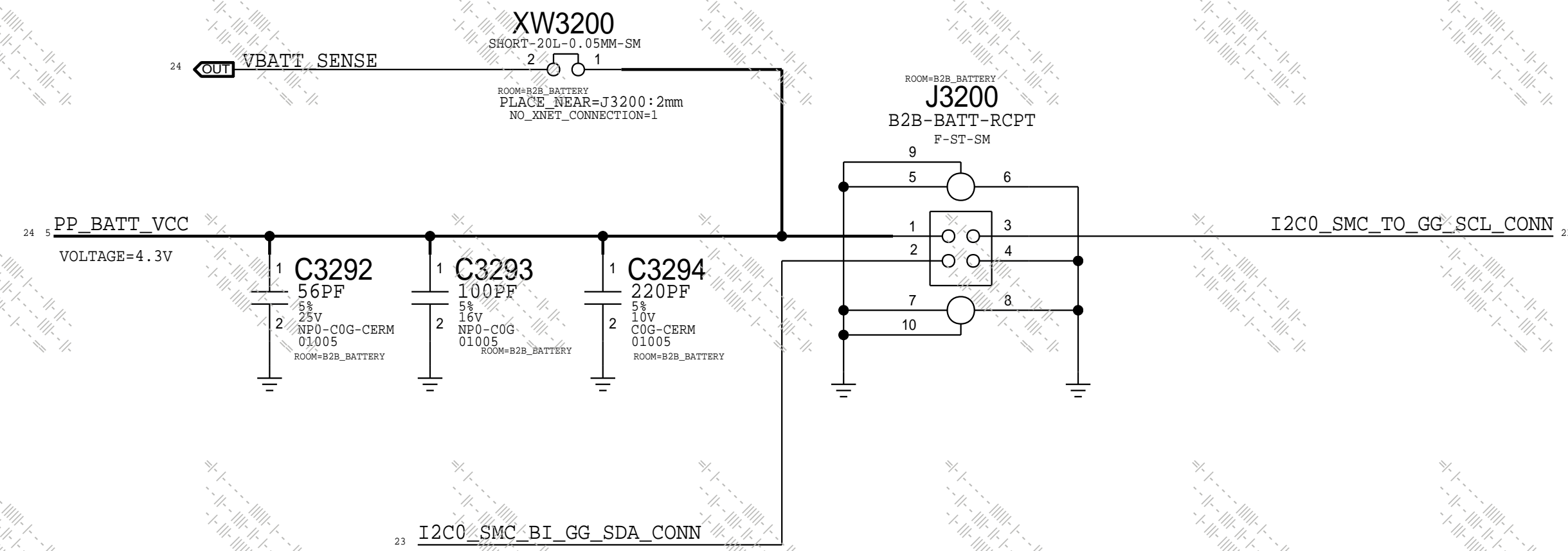


PAGE TITLE			SYSTEM POWER: Boost		
DRAWING NUMBER		051-02159	SIZE	D	
REVISION		10.0.0	BRANCH		
PAGE		31 OF 80	SHEET		
SHEET		22 OF 81	NOTICE OF PROPRIETARY PROPERTY:		
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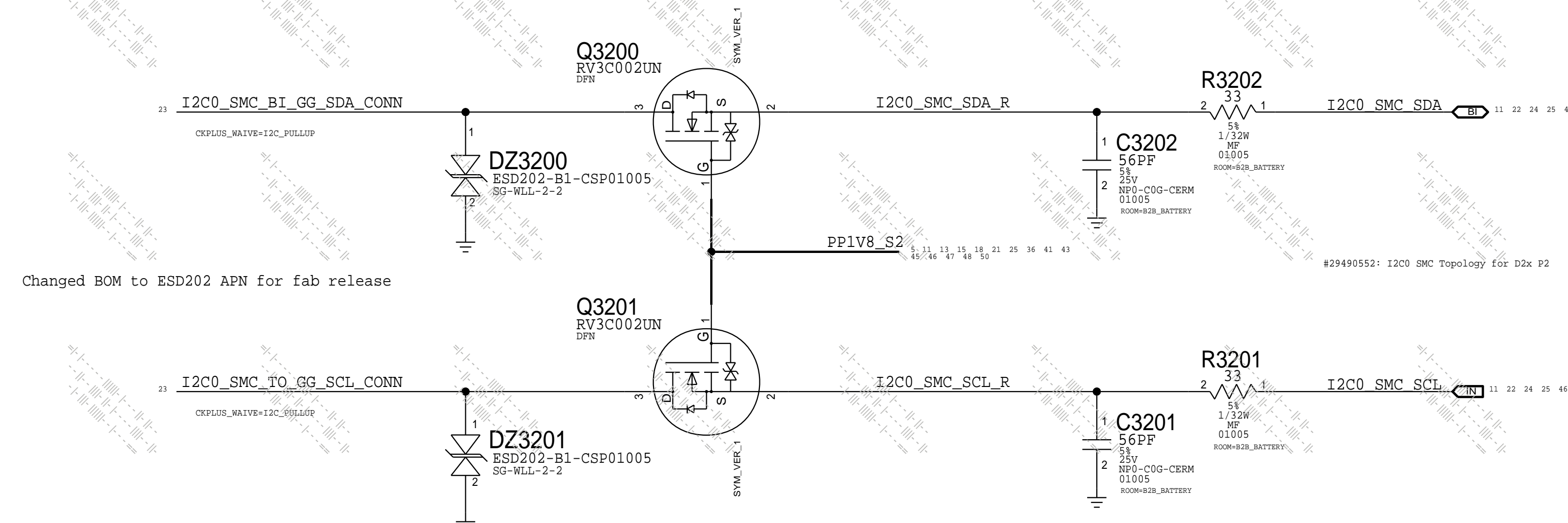
8 7 6 5 4 3 2 1

Battery Connector

THIS ONE ON MLB ---> 516S00232



#32515053: Add DZ3200/DZ3201 on I2C CONN with 377S00001
 #31734657: Replace battery I2C FETs with 376S00134
 Gas gauge I2C level translator



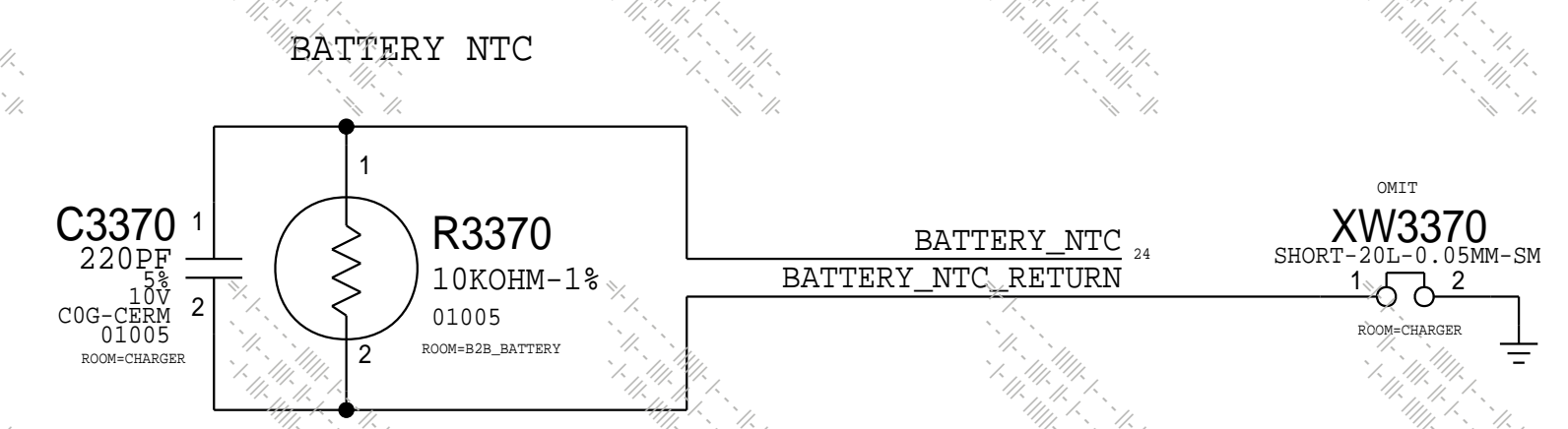
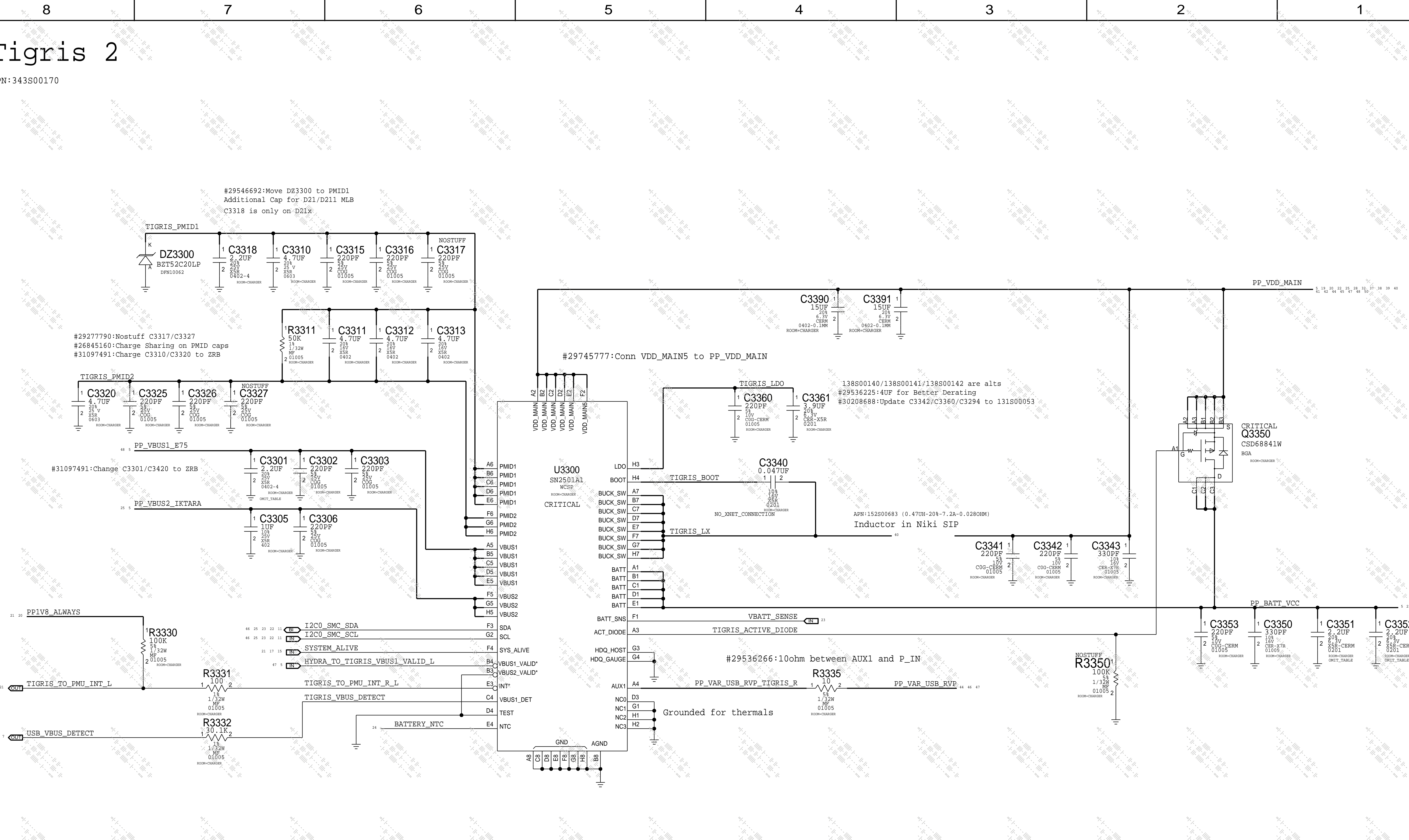
Changed BOM to ESD202 APN for fab release

#29490552: I2C0 SMC Topology for D2x P2

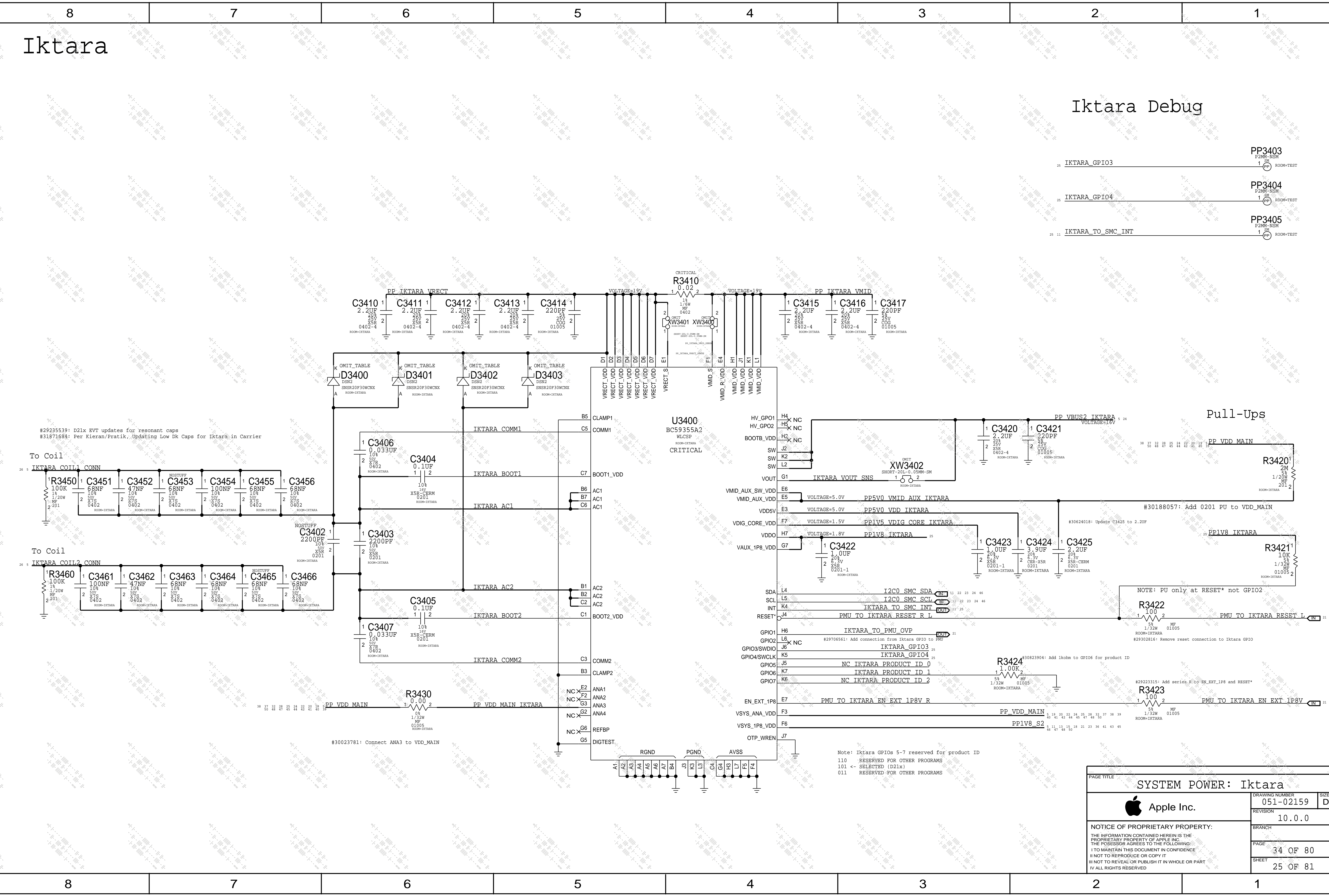
PAGE TITLE		
SYSTEM POWER: B2B Battery		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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BRANCH	PAGE	32 OF 80
SHEET		23 OF 81

Tigris 2

APN:343S00170



PAGE TITLE		SYSTEM POWER: Charger	
DRAWING NUMBER		051-02159	SIZE
REVISION		10.0.0	D
BRANCH			
PAGE		33 OF 80	
SHEET		24 OF 81	
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25	IKTARA_GPIO3	PP3403	P2MM-NSM	1	ROOM-TEST
25	IKTARA_GPIO4	PP3404	P2MM-NSM	1	ROOM-TEST
25	IKTARA_TO_SMC_INT	PP3405	P2MM-NSM	1	ROOM-TEST

Pull-Ups

NOTE: PU only at RESET* not GPIO2

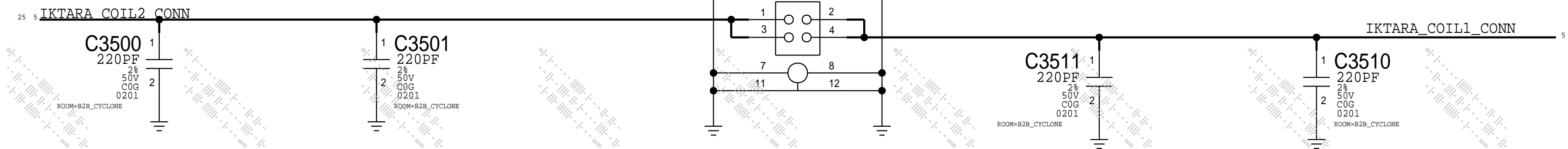
Note: Iktara GPIOs 5-7 reserved for product ID
 110 RESERVED FOR OTHER PROGRAMS
 101 <- SELECTED (D21x)
 011 RESERVED FOR OTHER PROGRAMS

PAGE TITLE		
SYSTEM POWER: Iktara		
Apple Inc.	DRAWING NUMBER	SIZE
	051-02159	D
REVISION		
10.0.0		
BRANCH		
PAGE		
34 OF 80		
SHEET		
25 OF 81		
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Cyclone connector

THIS ONE ON MLB ----> 516S00311

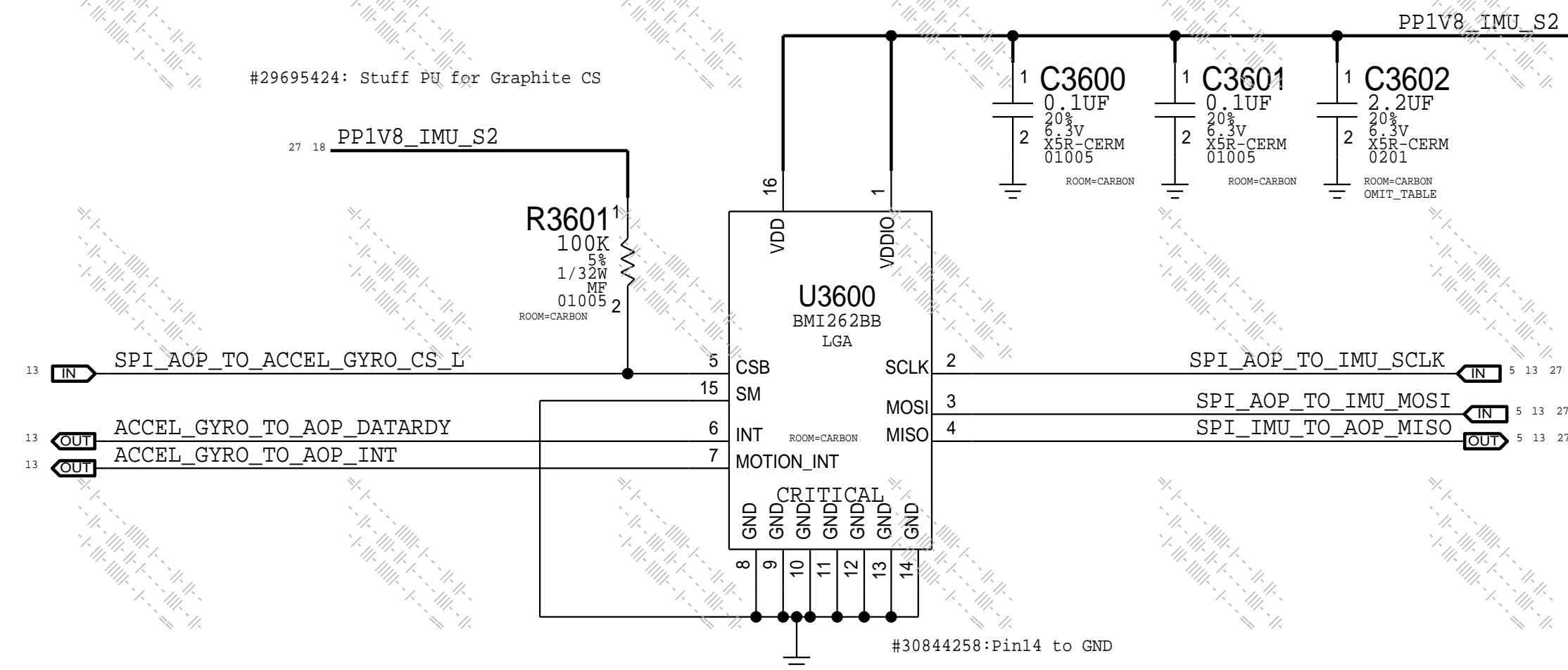
#31690340:Remove XWs on Iktara Coil Paths



PAGE TITLE		
SYSTEM POWER: B2B Cyclone		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	35 OF 80
	SHEET	26 OF 81
	SIZE	D

Graphite - Accel & Gyro

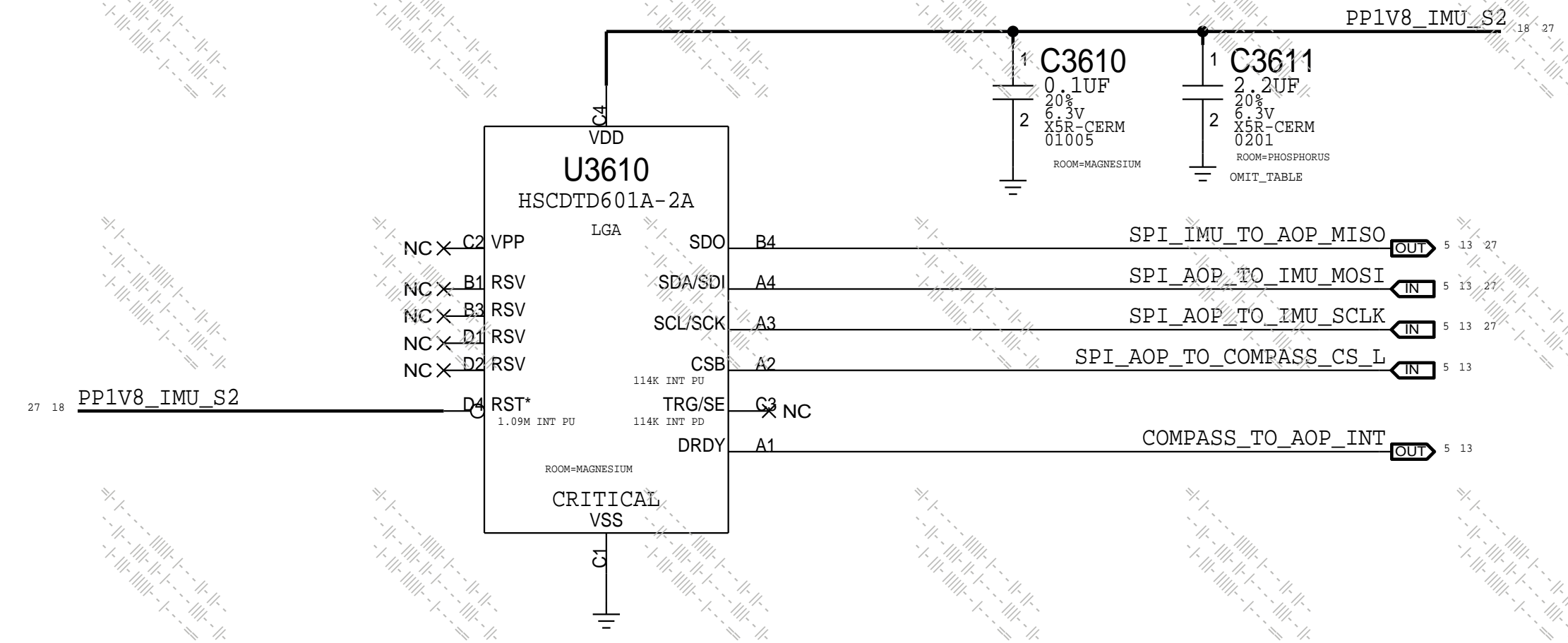
APN: 338S00304 (A1)



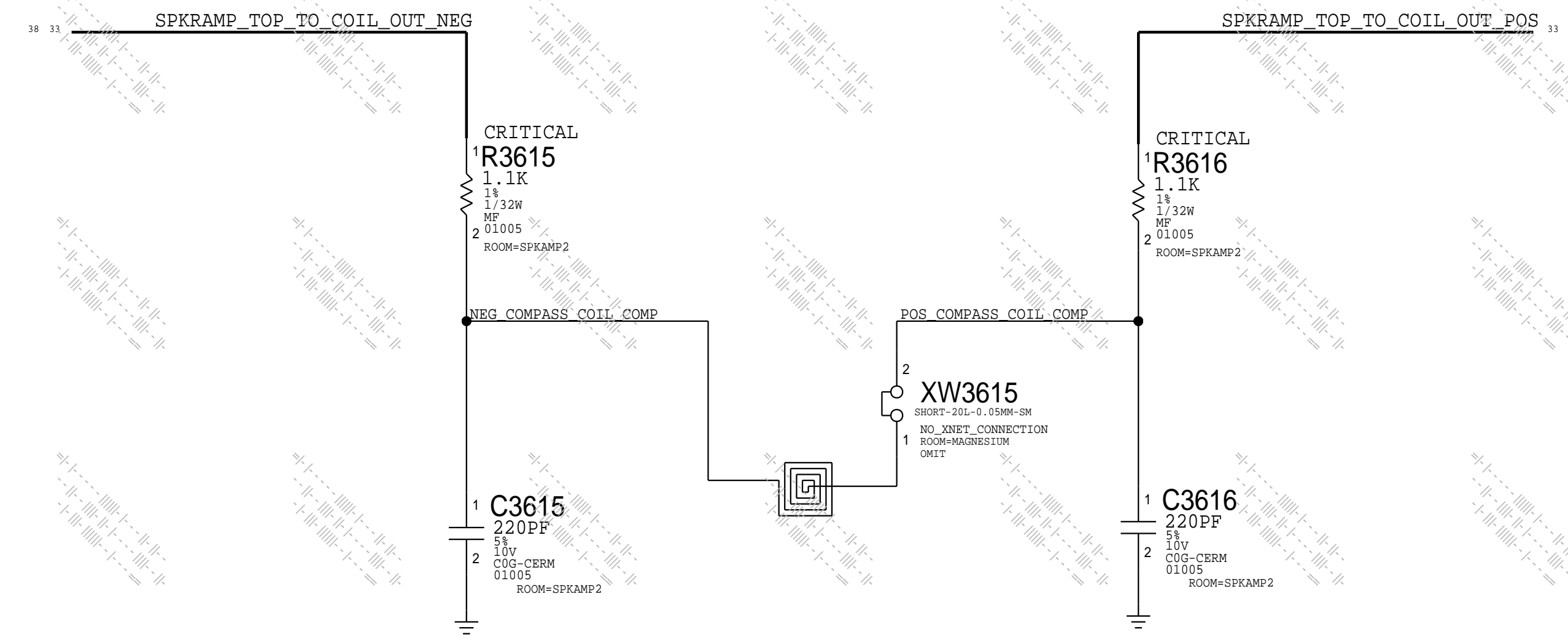
Magnesium - Compass

APN: 338S00084

Shared decoupling with Phosphorus

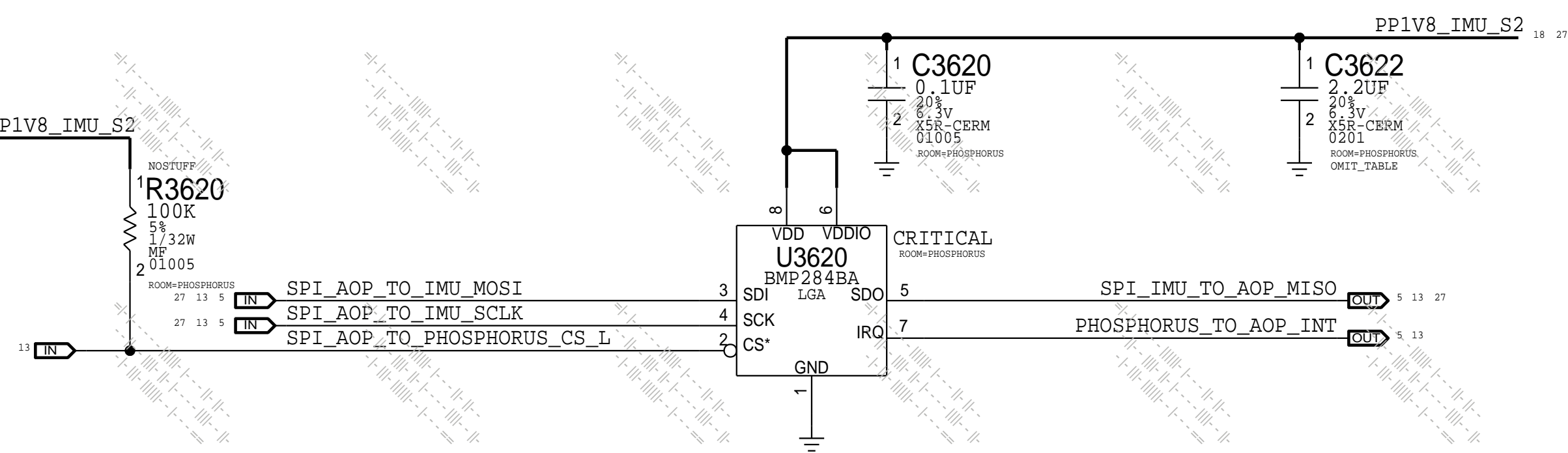


North Speaker Compass Compensation Coil



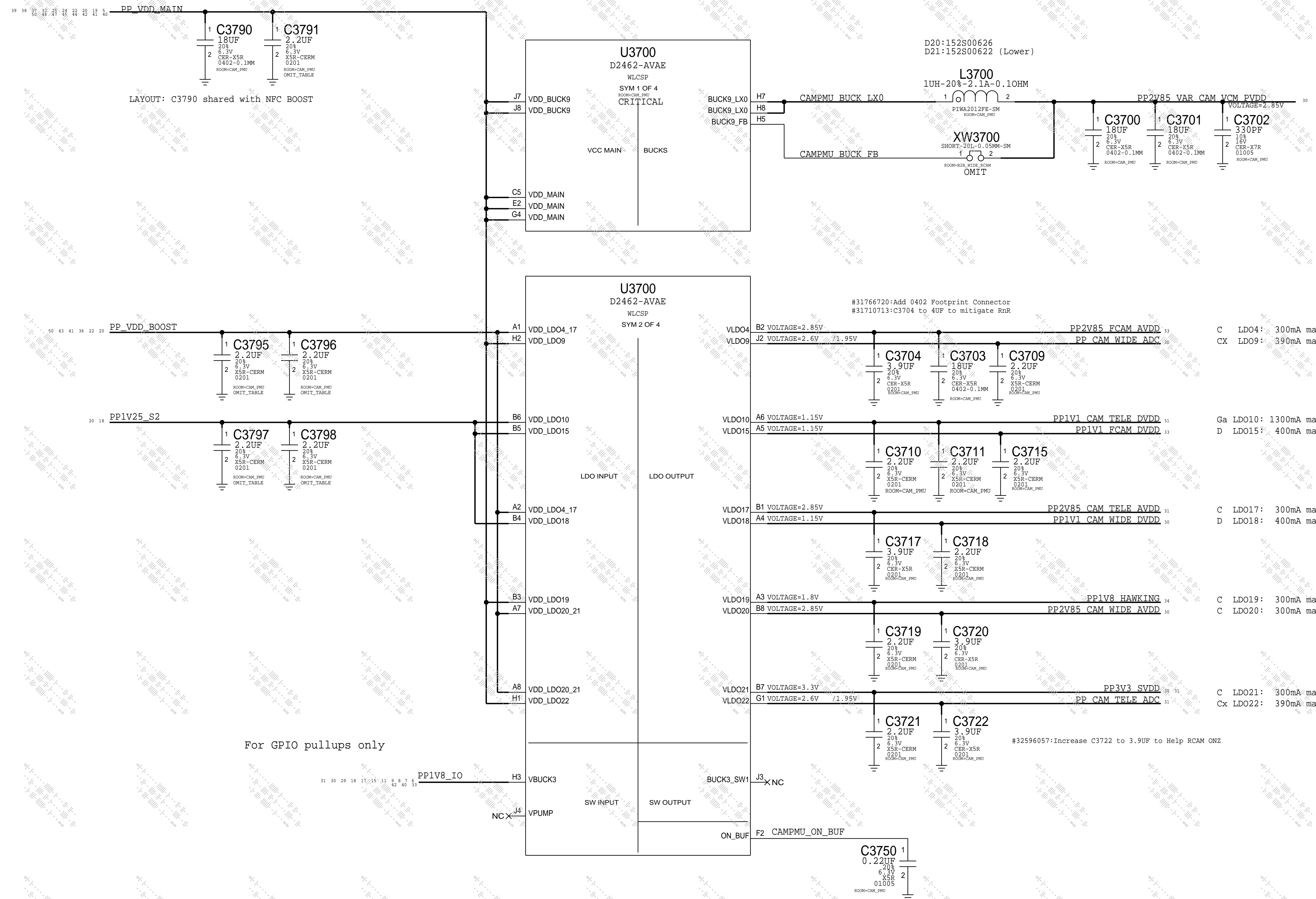
Phosphorus

APN: 338S00334

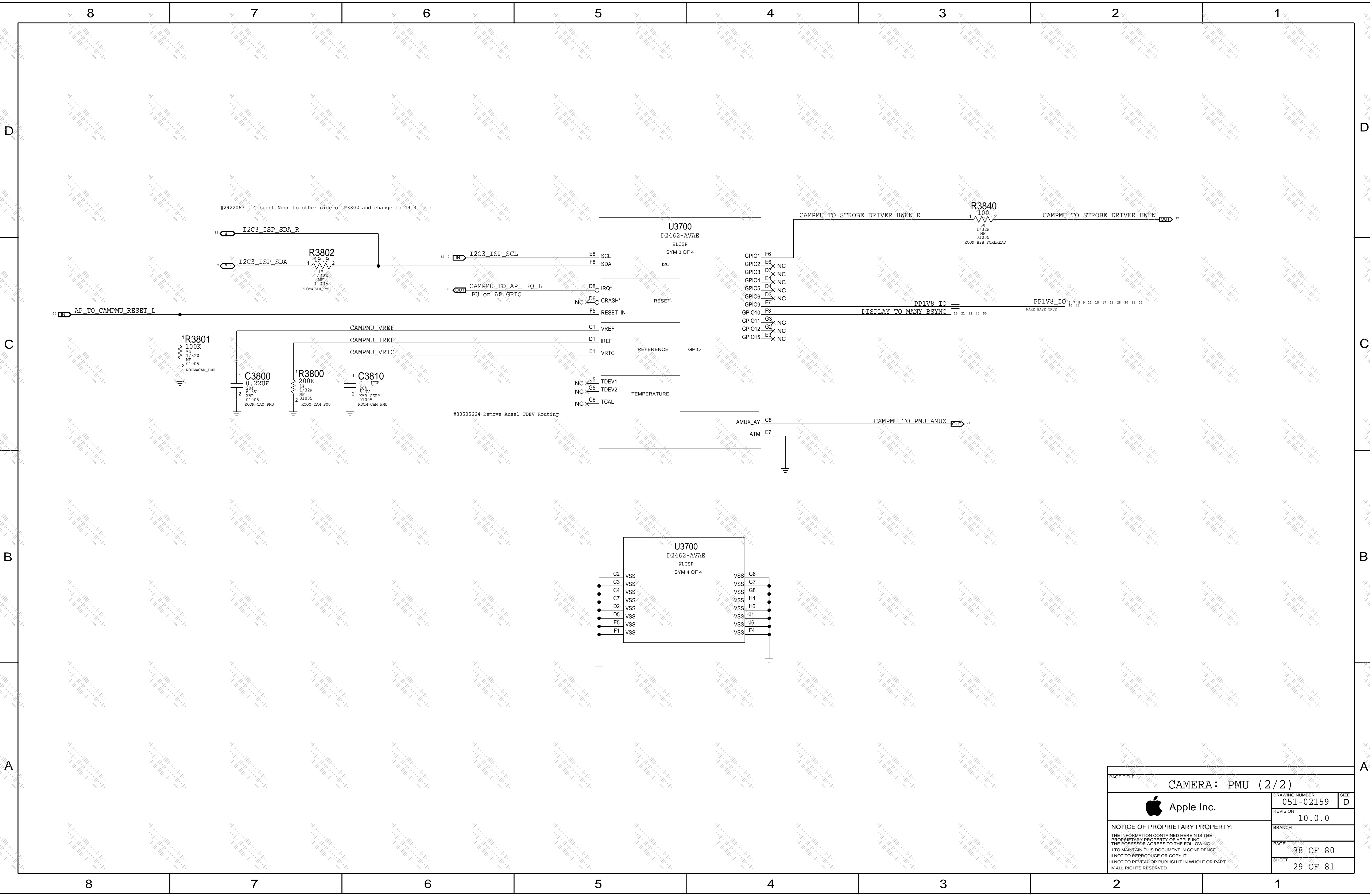


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SENSORS		
	DRAWING NUMBER	051-02159
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	PAGE	36 OF 80
	SHEET	27 OF 81

Camera PMU



PAGE TITLE			CAMERA: PMU (1/2)		
		DRAWING NUMBER	051-02159	SIZE	D
		REVISION	10.0.0		
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			PAGE	37 OF 80	
			SHEET	28 OF 81	

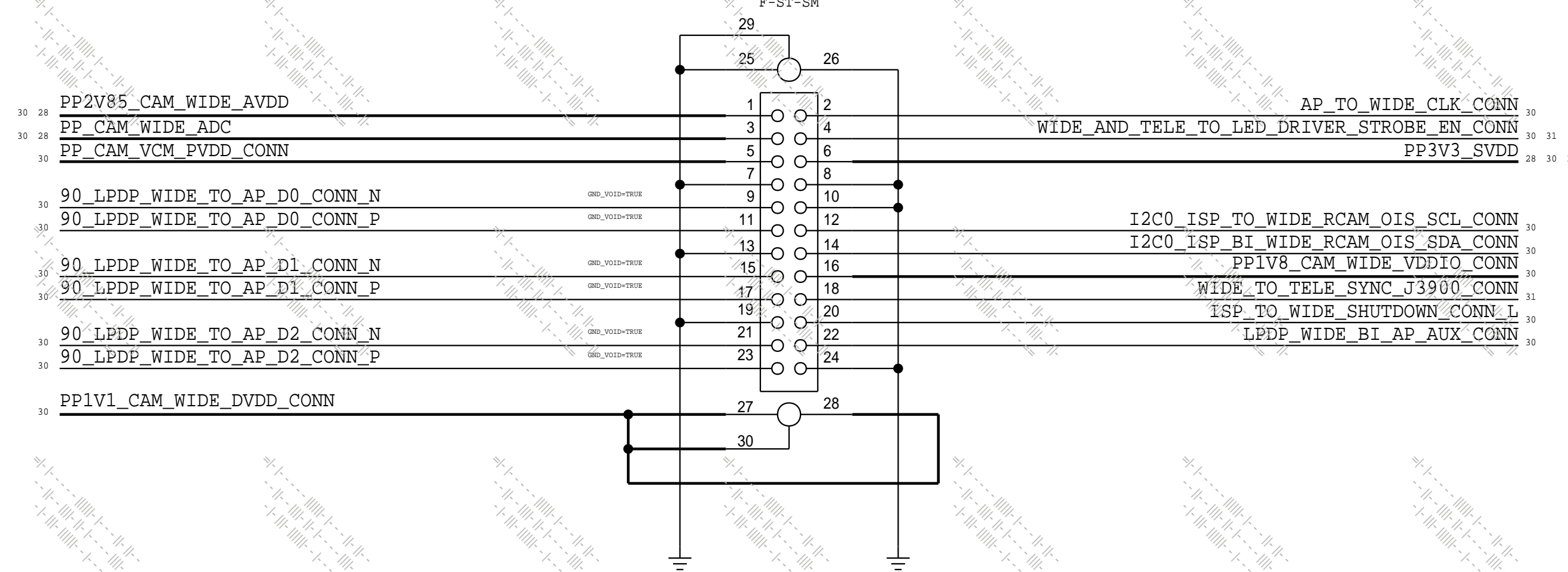


PAGE TITLE			CAMERA: PMU (2/2)		
		DRAWING NUMBER	051-02159	SIZE	D
		REVISION	10.0.0		
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		PAGE	38 OF 80		
		SHEET	29 OF 81		

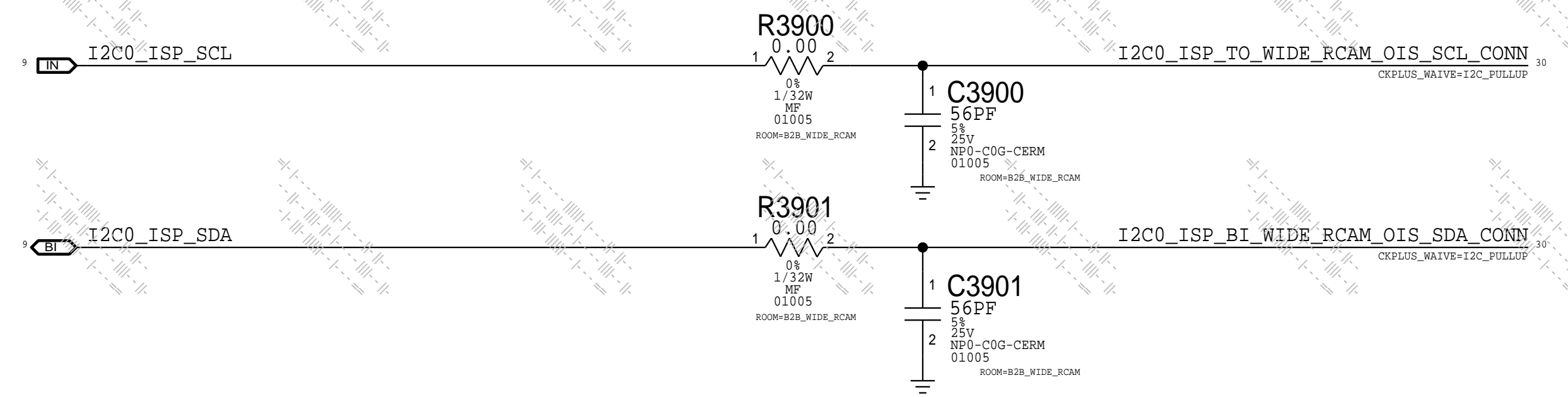
Wide Camera Connector

THIS ONE ----> 516S00310/P2 RCPT (USED ON MLB)
516S00309/P2 PLUG (USED ON FLEX)

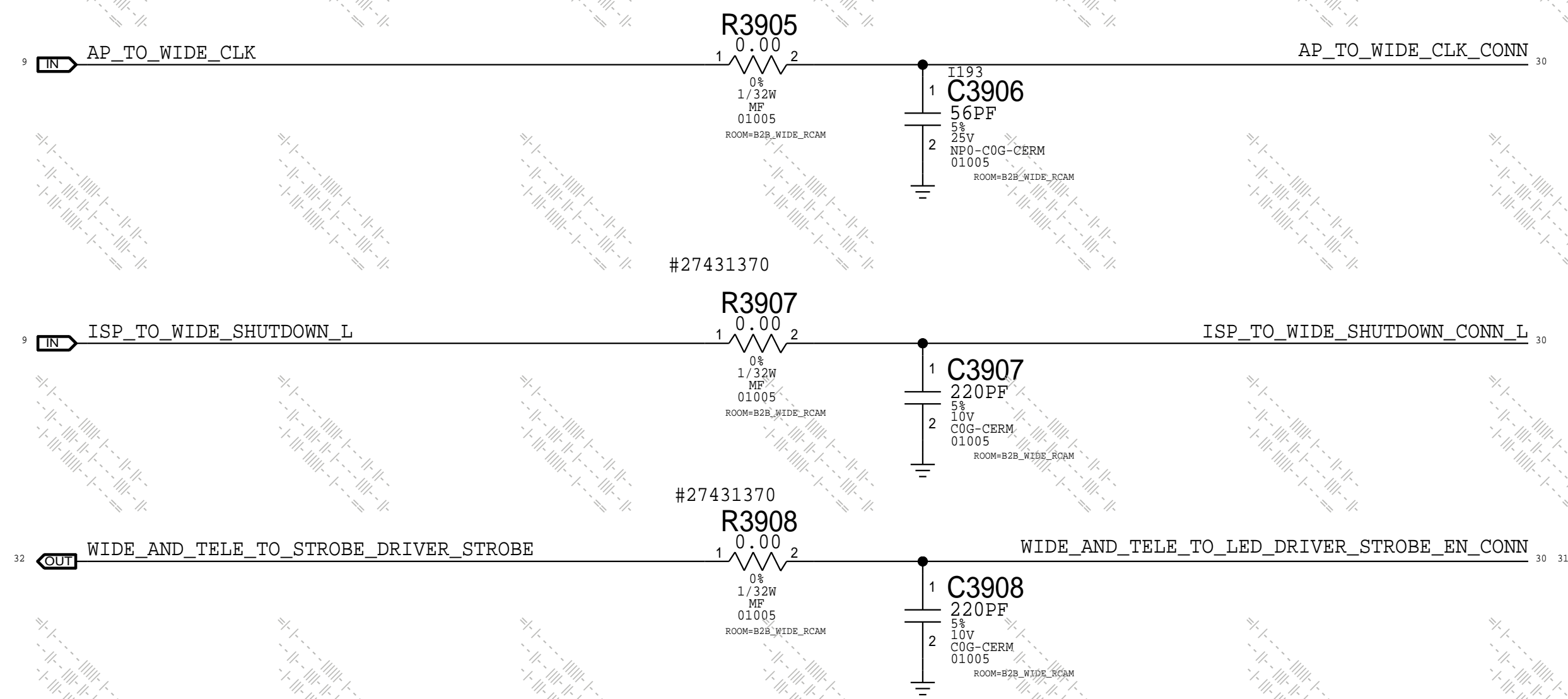
J3900
AA27DK-S024VA1
F-ST-SM



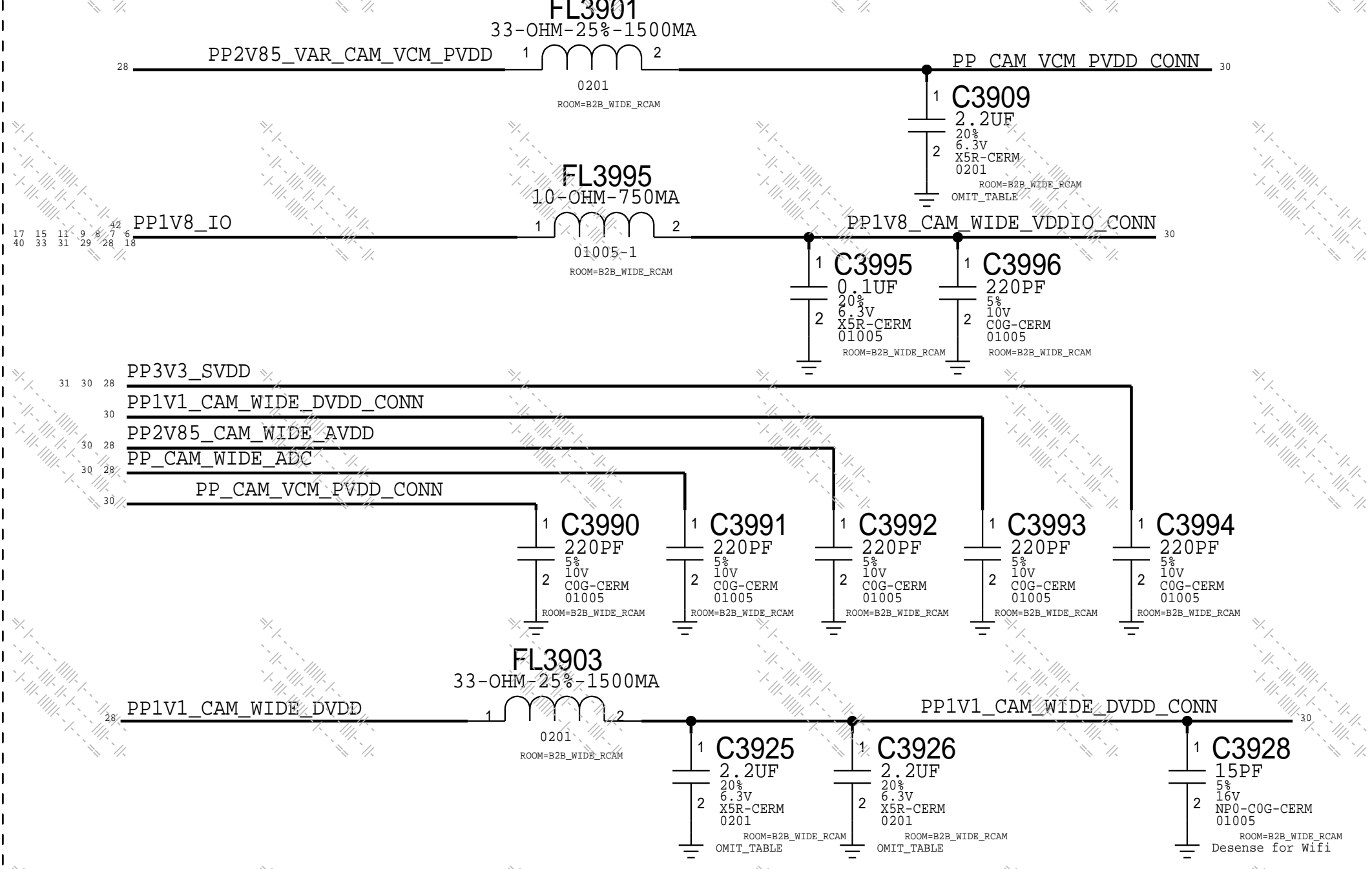
ISP I2C



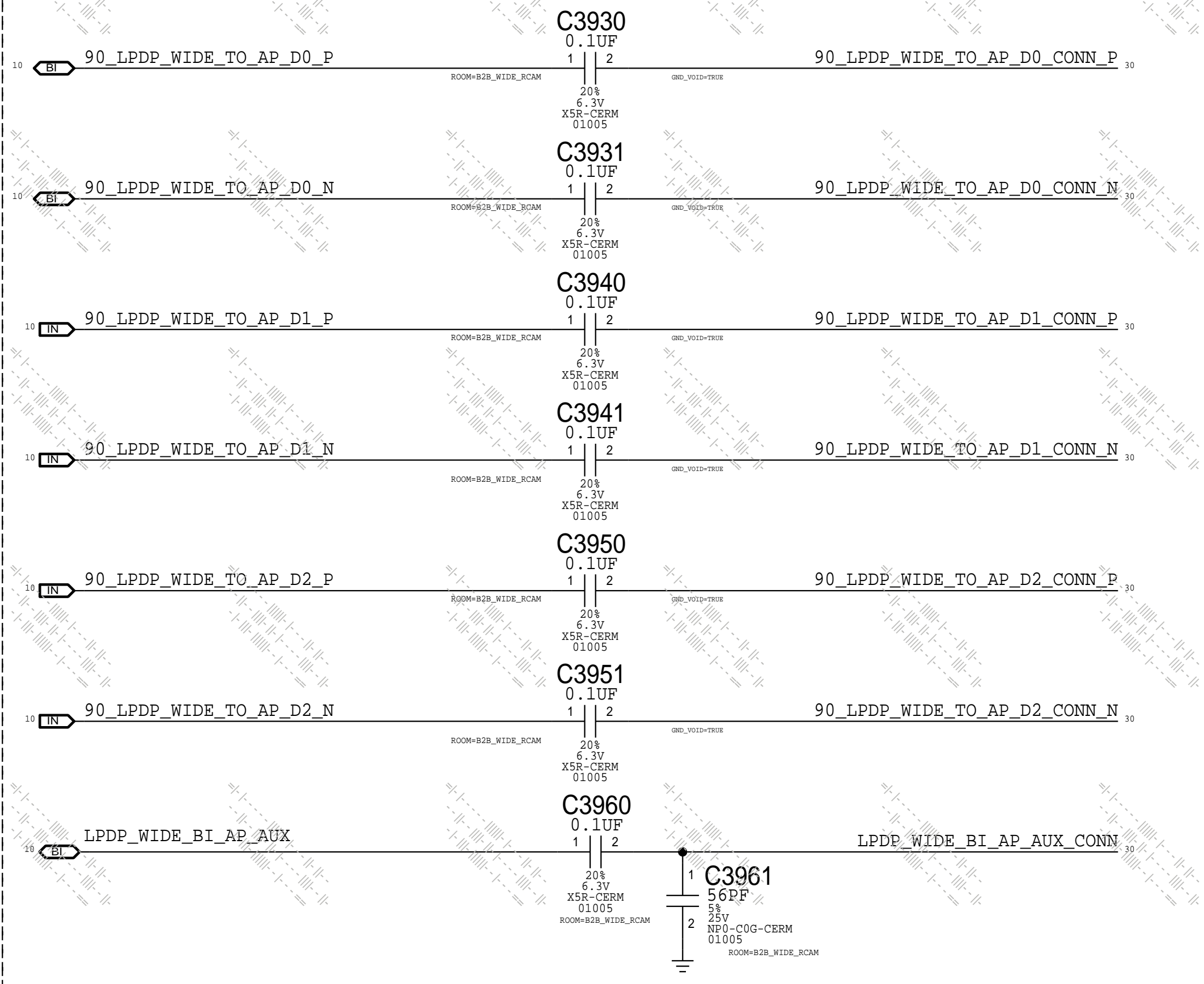
IO Filters



Power Filtering



LPDP Filters

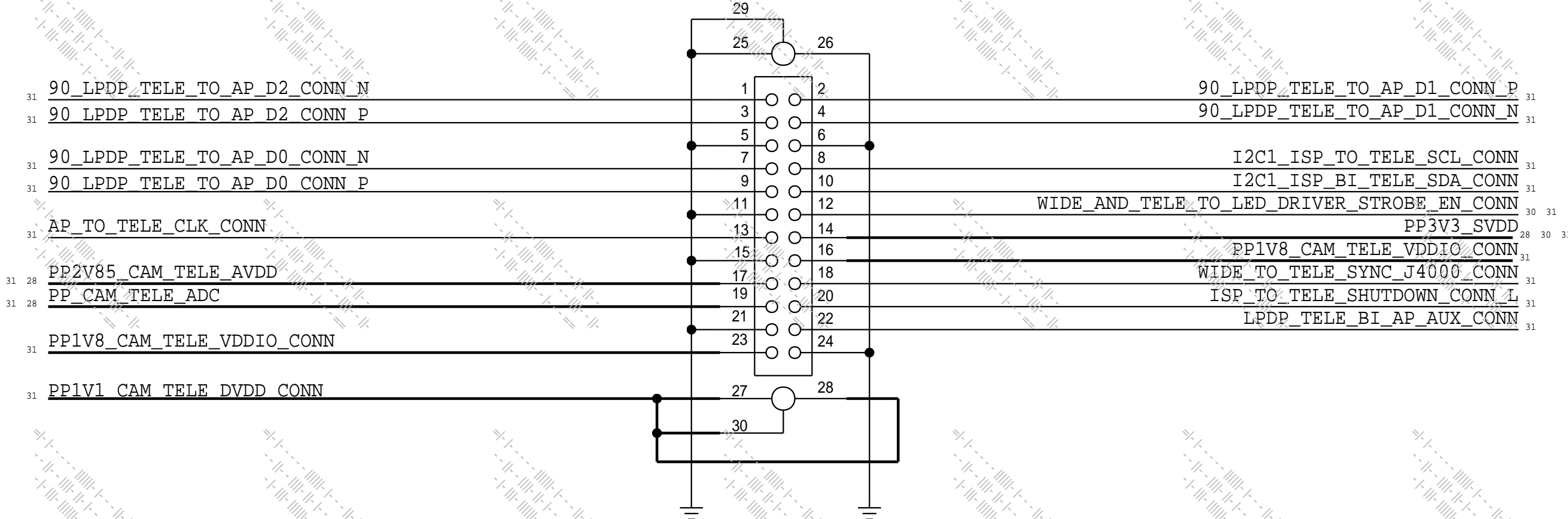


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REVISION	10.0.0	D
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BRANCH		
PAGE	39 OF 80	
SHEET	30 OF 81	

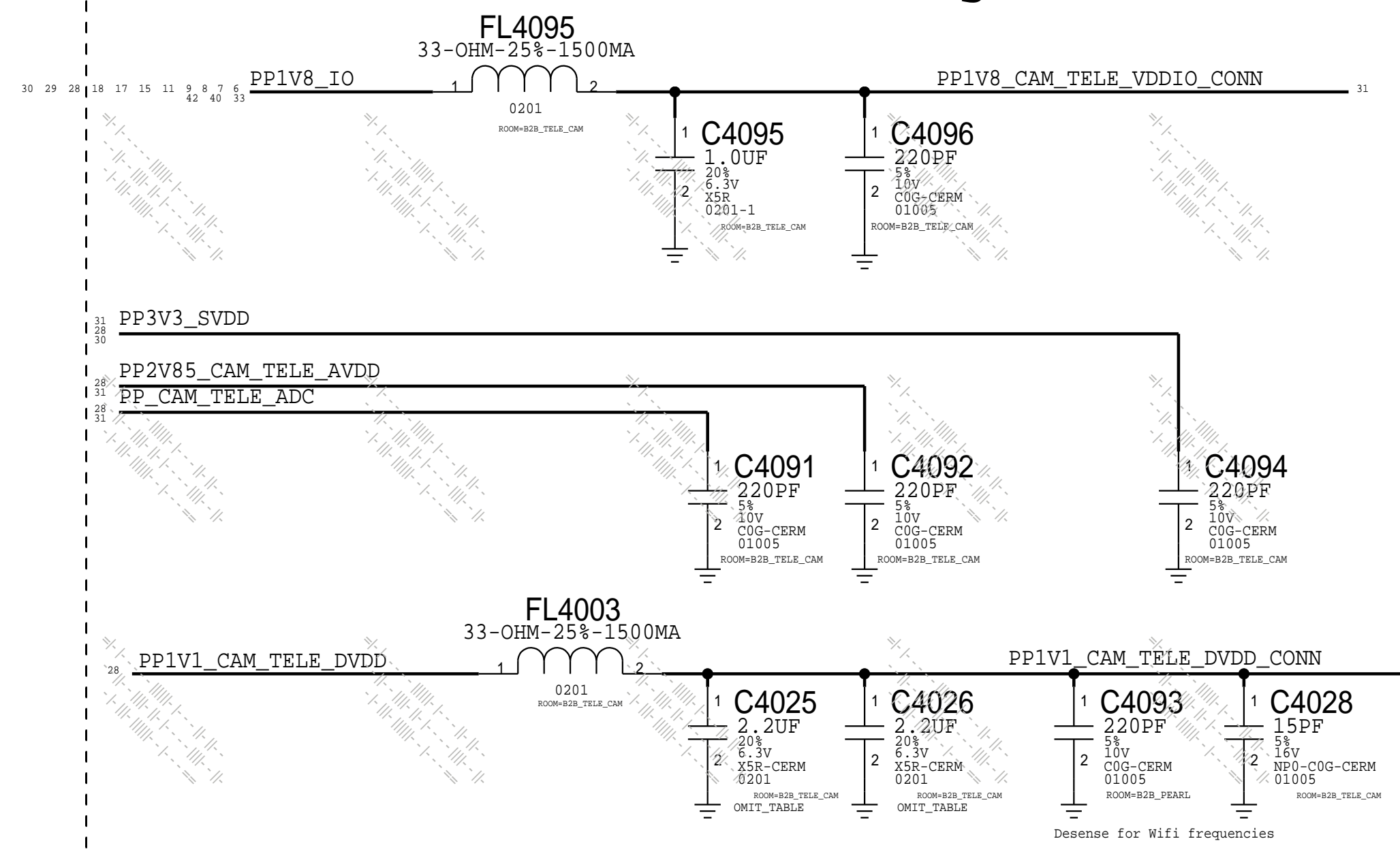
Tele Camera Connector

THIS ONE ----> 516S00310/P2 RCPT (USED ON MLB)
516S00309/P2 PLUG (USED ON FLEX)

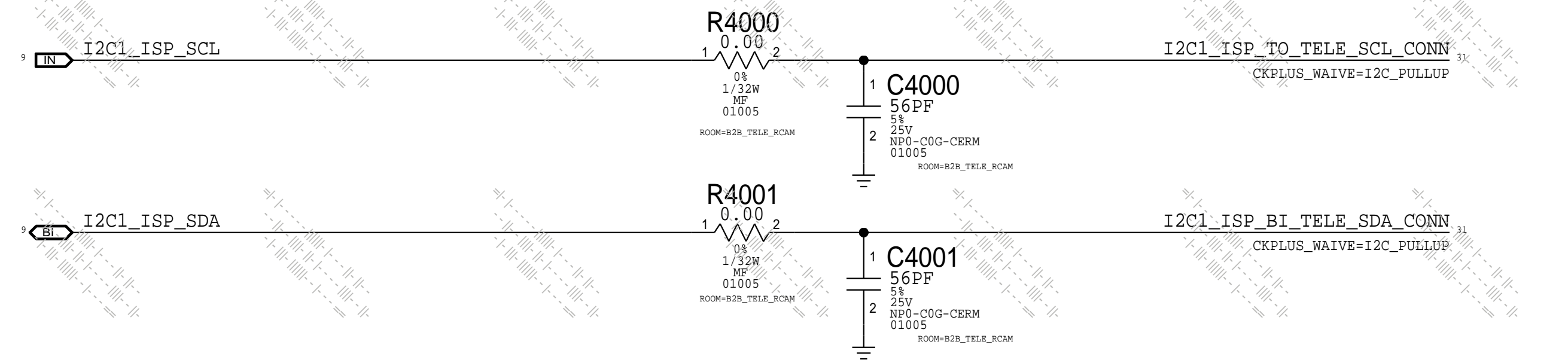
J4000
AA27DR-S024VA1
F-ST-SM



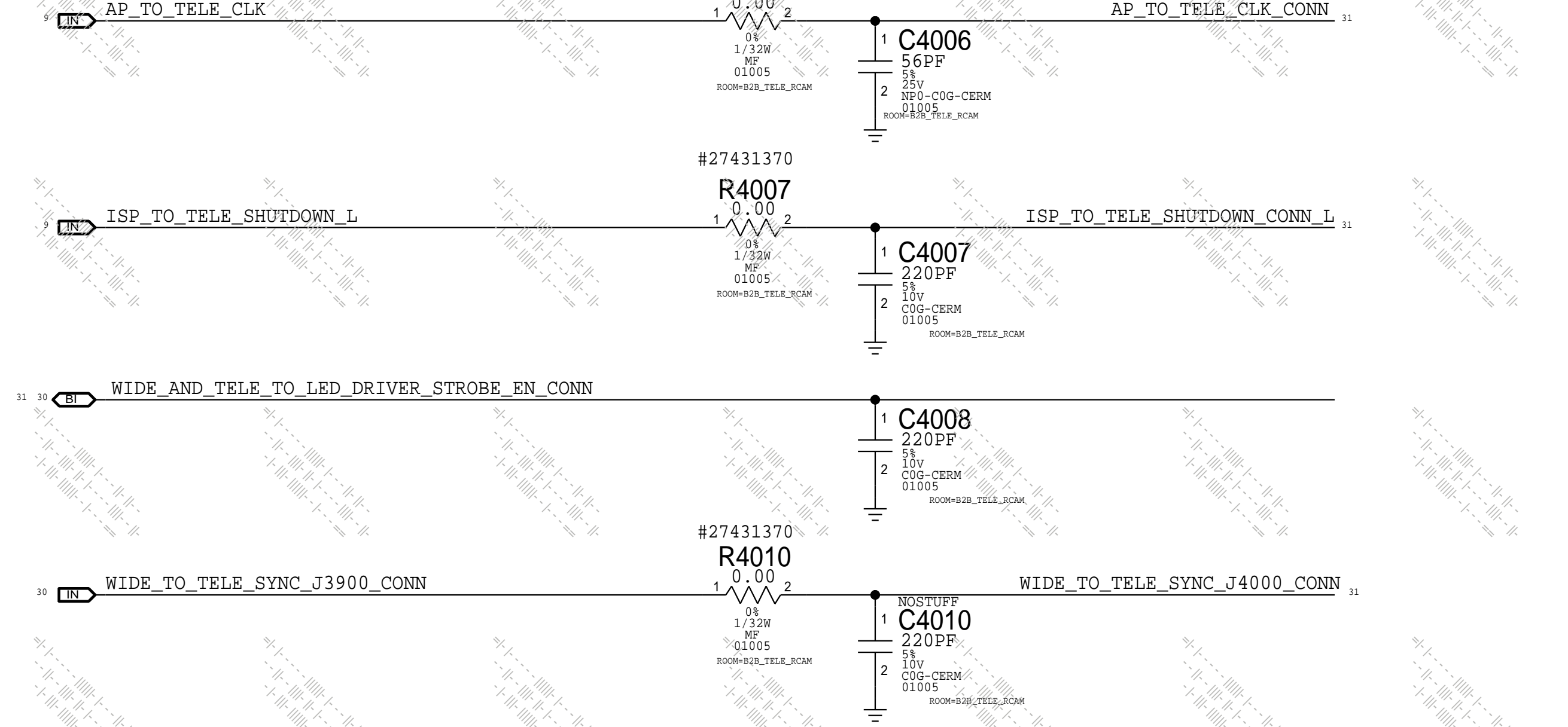
Power Filtering



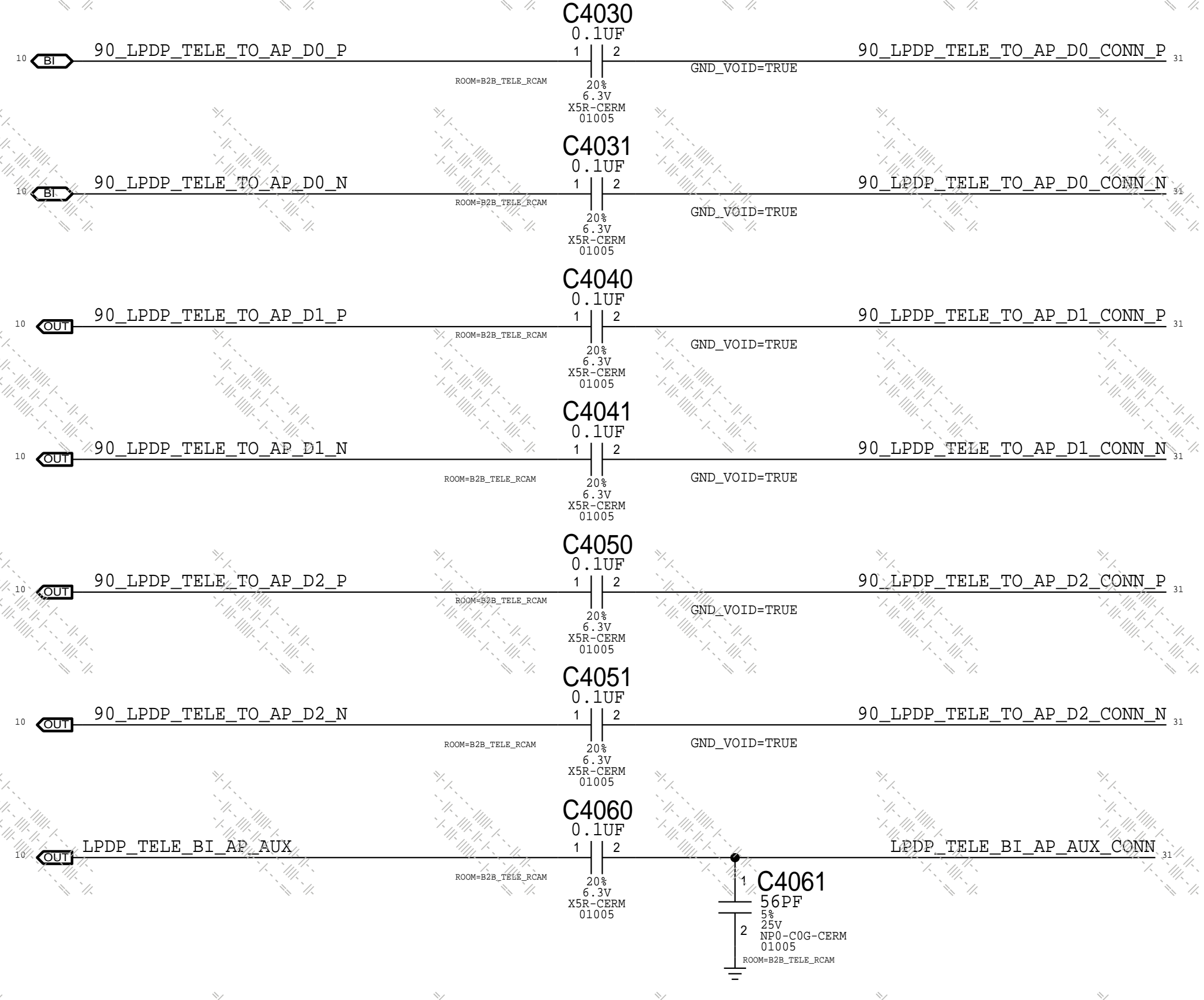
ISP I2C



IO Filters

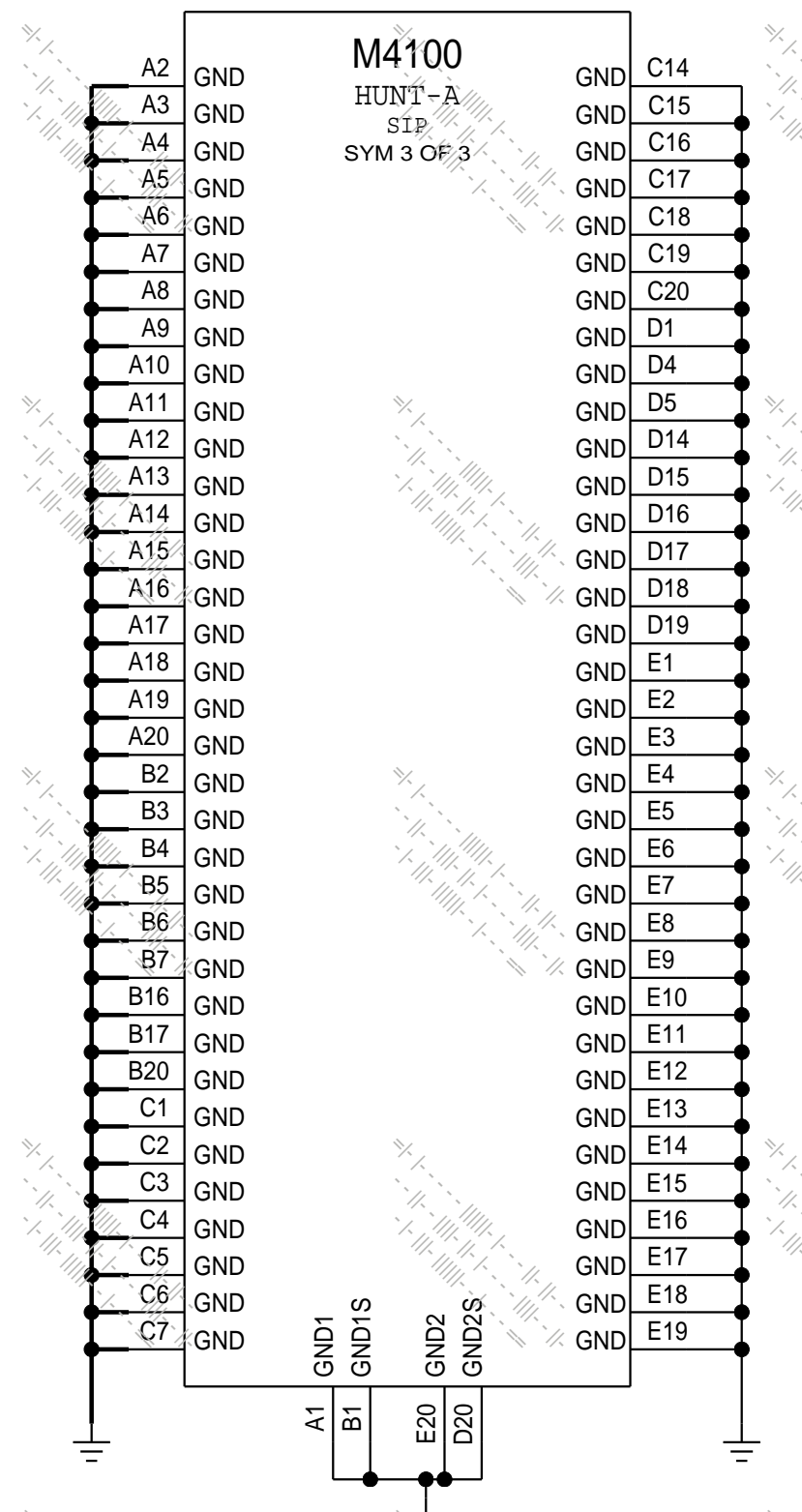
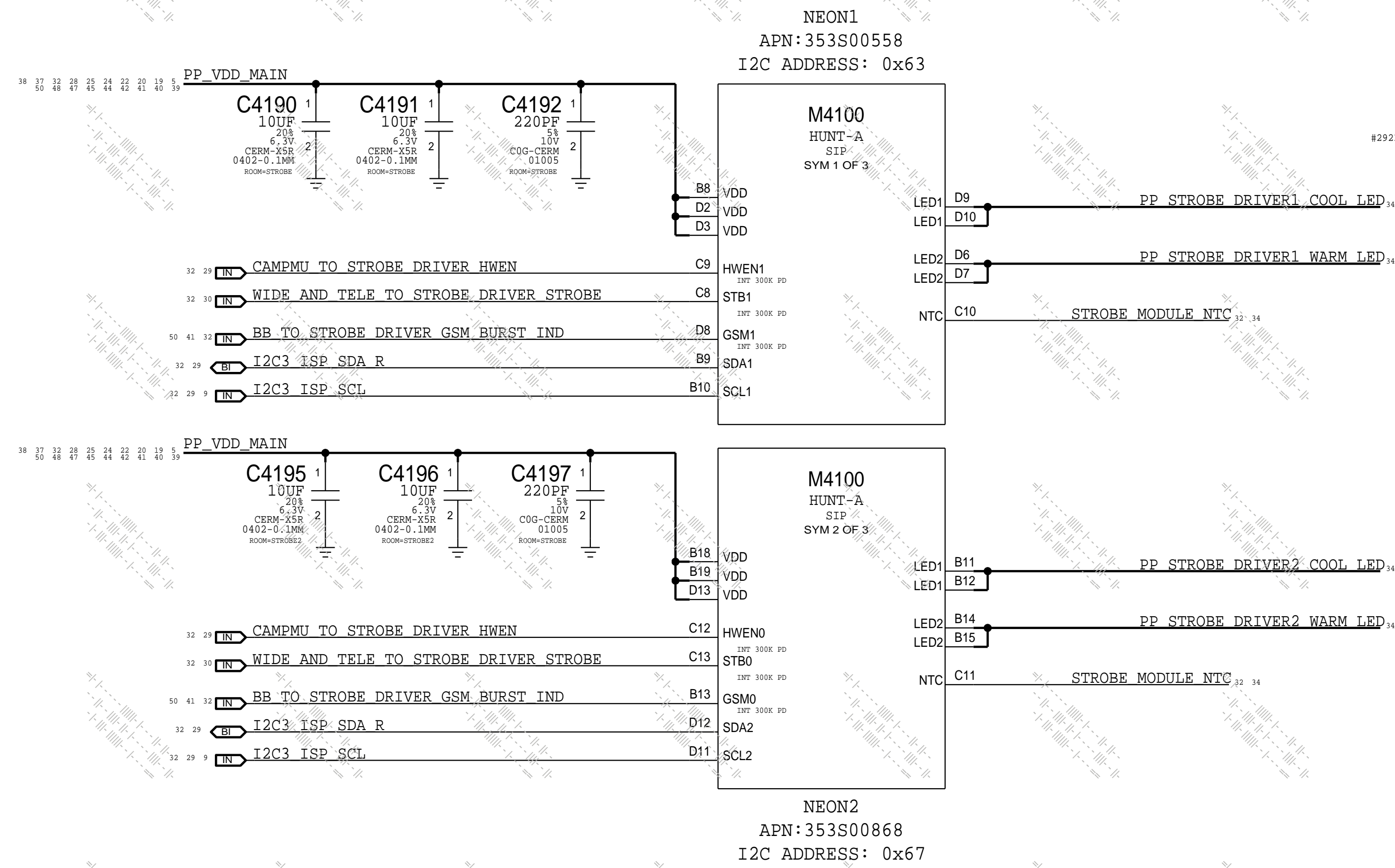


LPDP

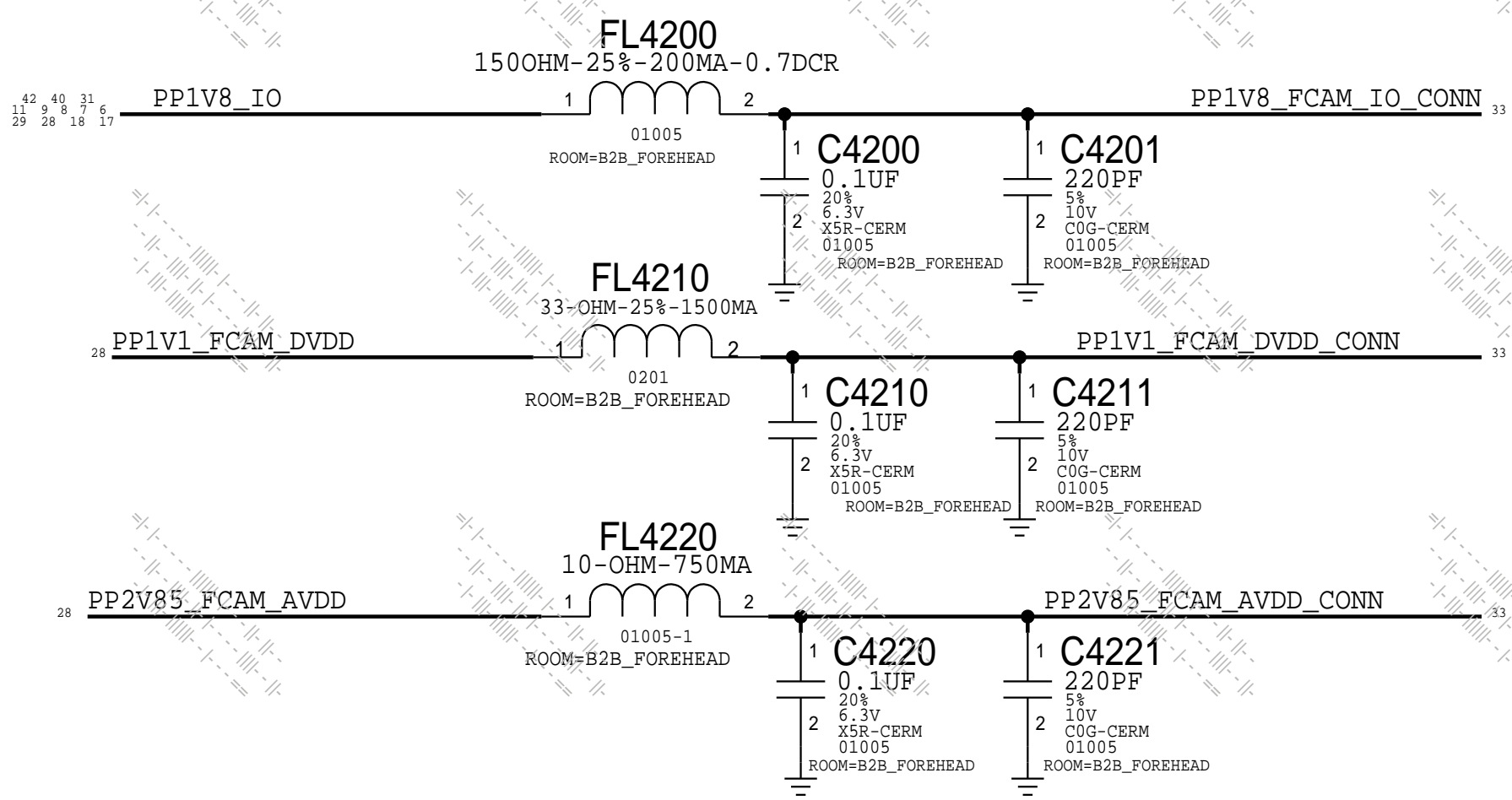


PAGE TITLE		
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Apple Inc.	DRAWING NUMBER	SIZE
	051-02159	D
	REVISION	
	10.0.0	
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BRANCH	PAGE	
	40 OF 80	
SHEET		
	31 OF 81	

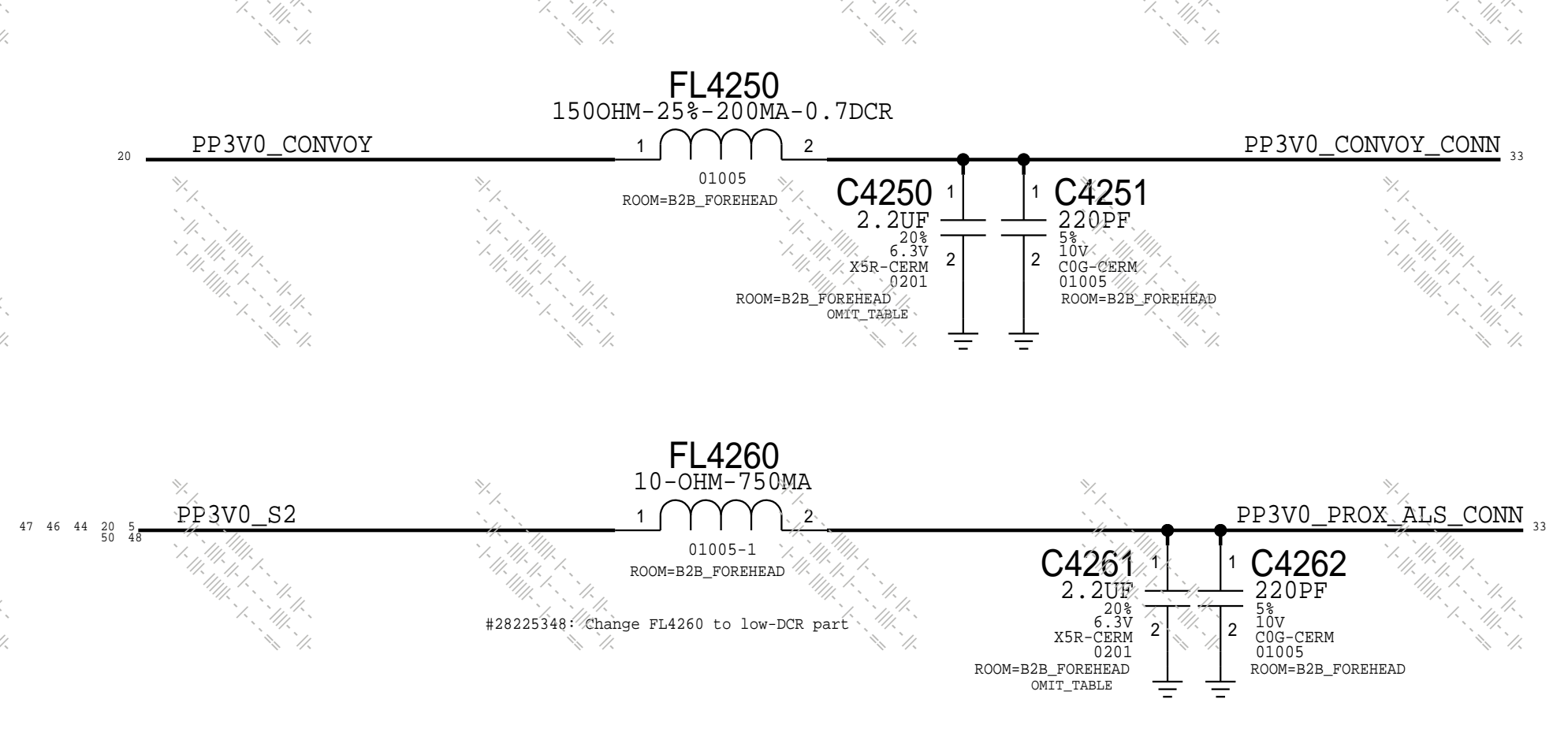
LED STROBE DRIVERS (NEON)



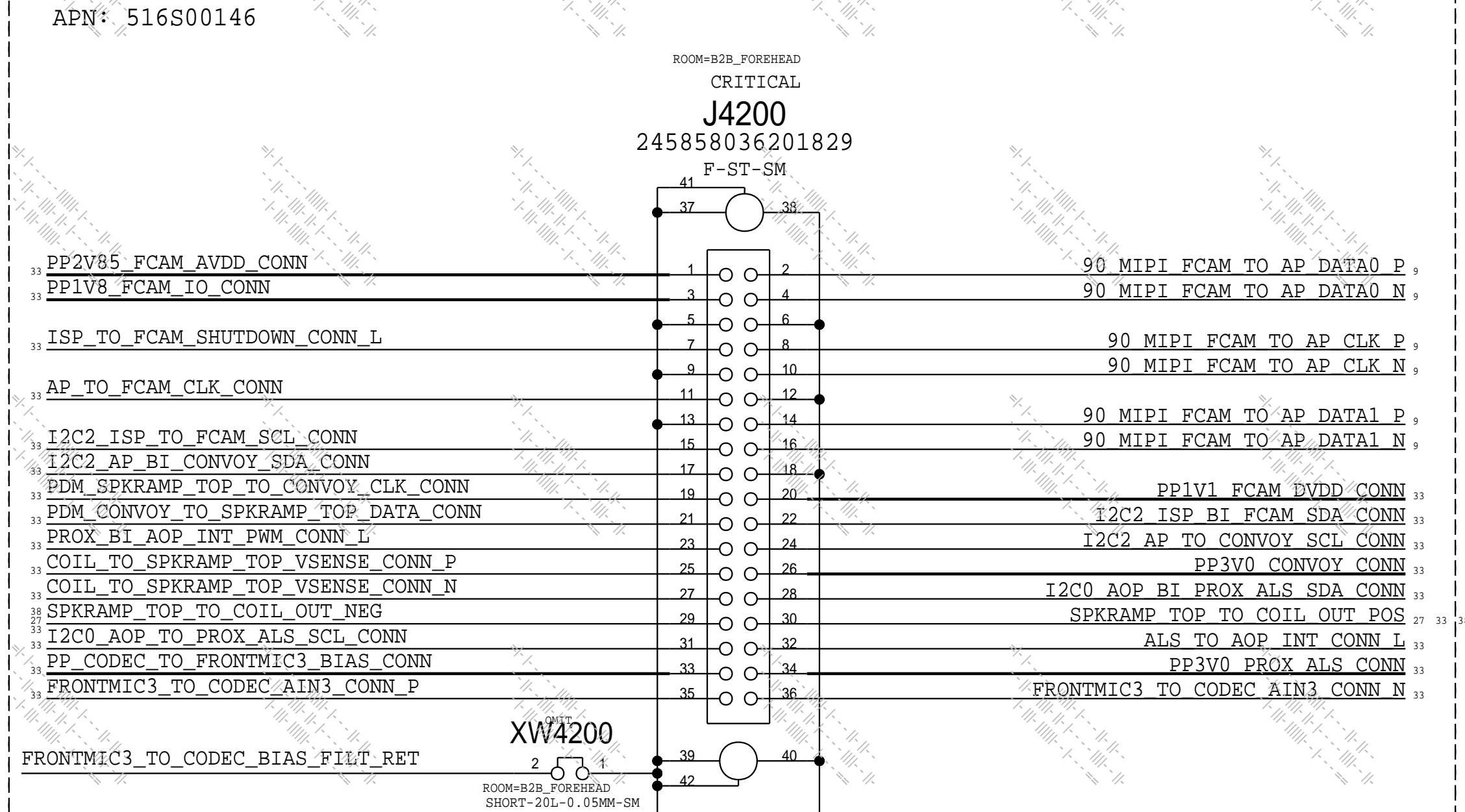
FCAM POWER



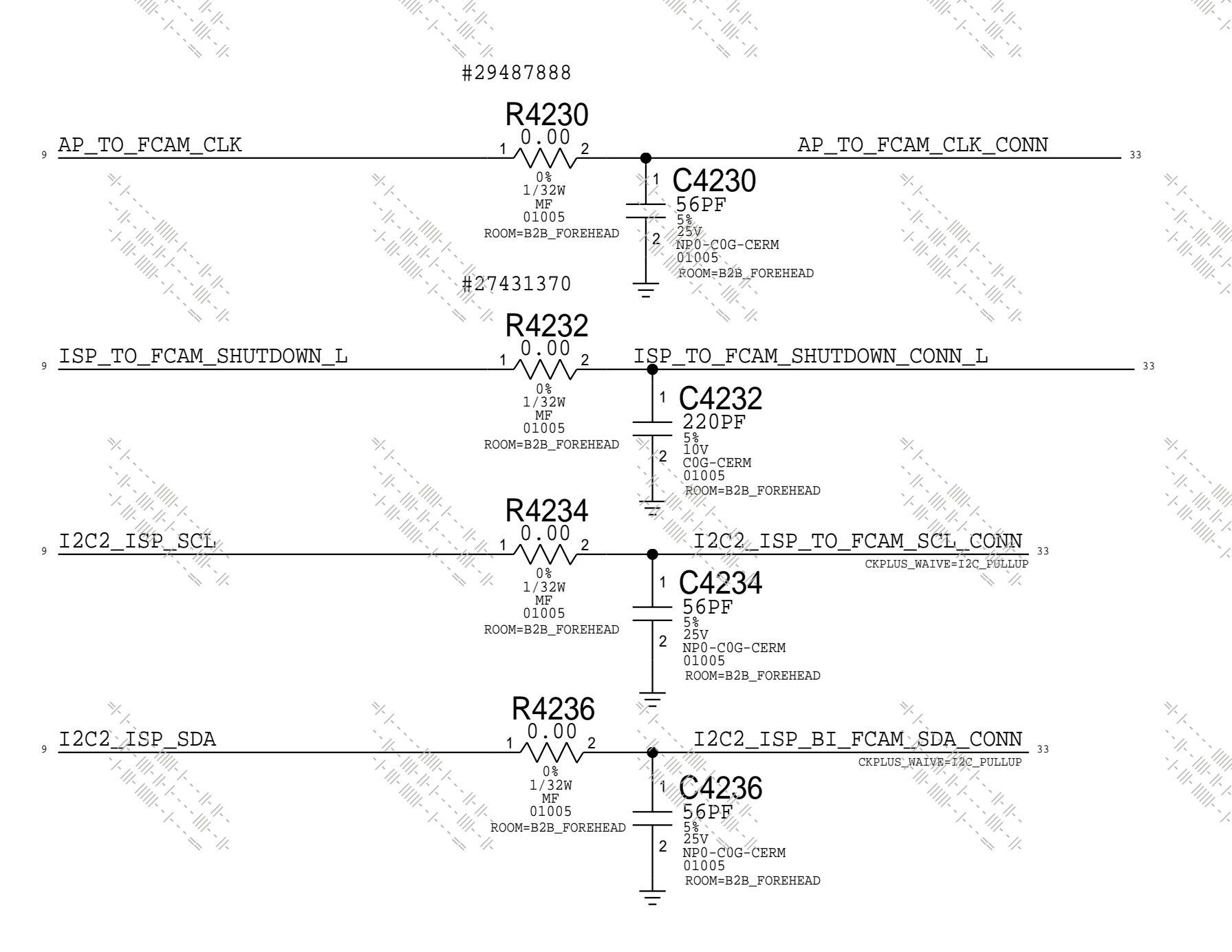
PROX + ALS + CONVOY POWER



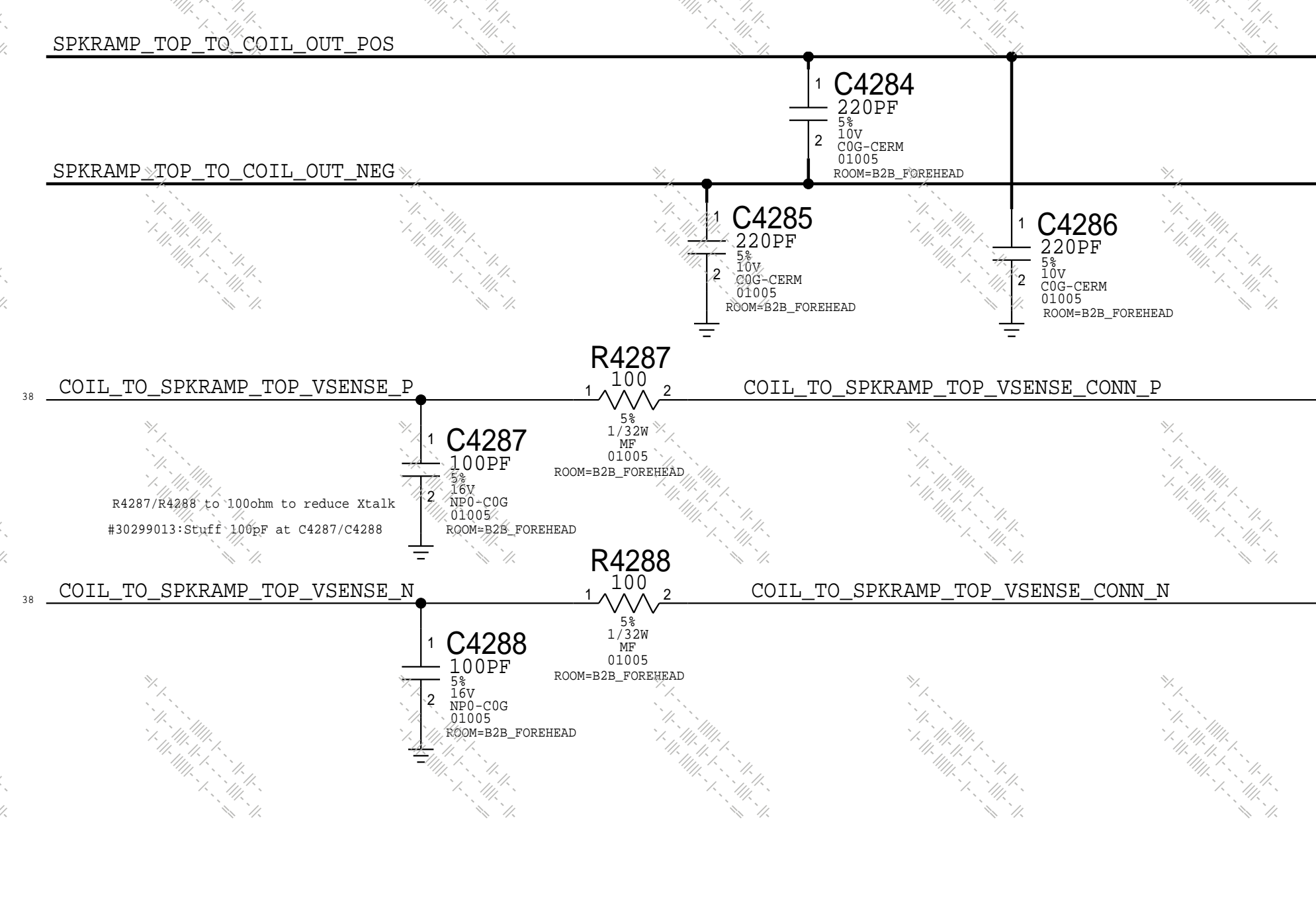
FOREHEAD CONNECTOR



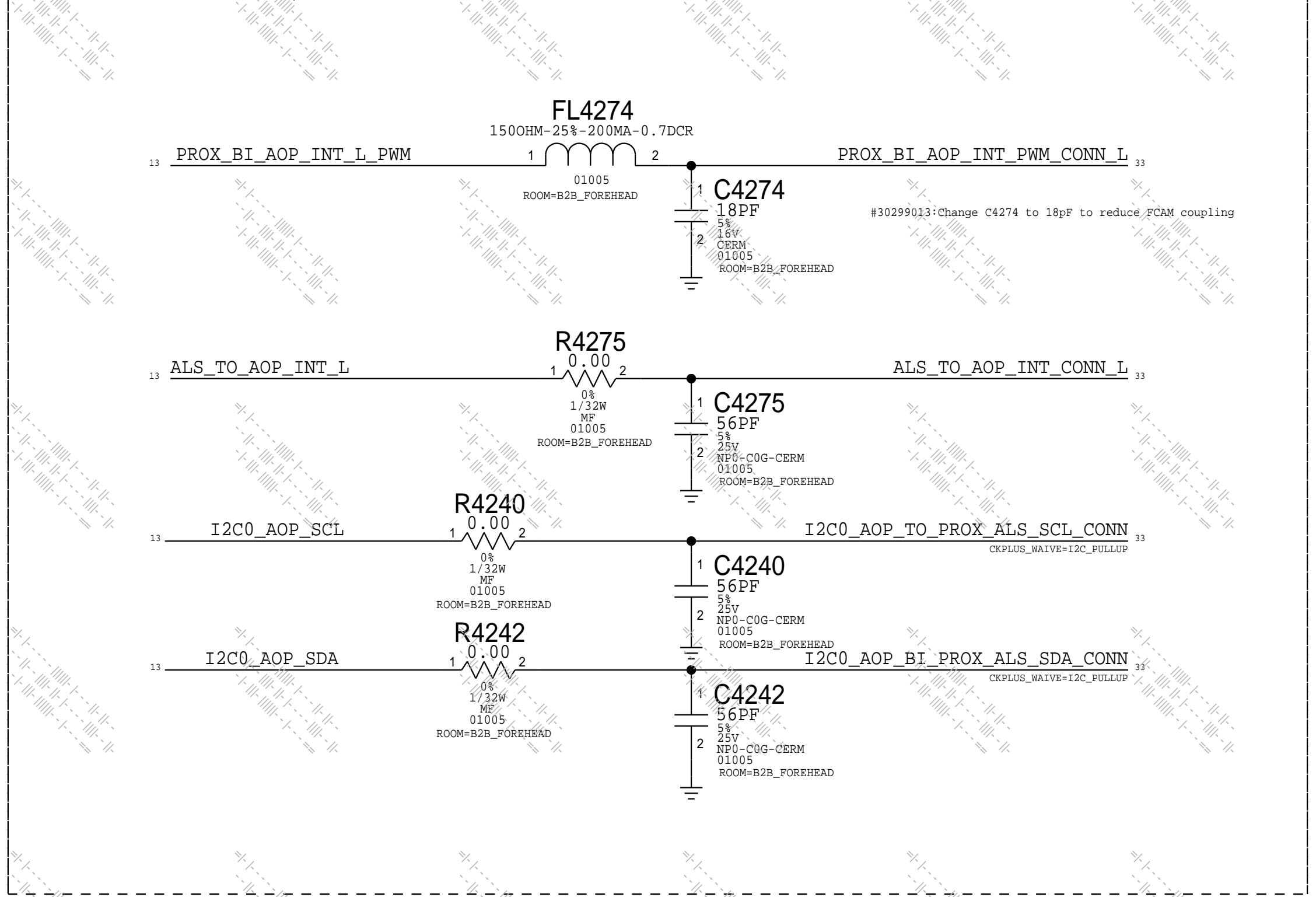
FCAM I/O



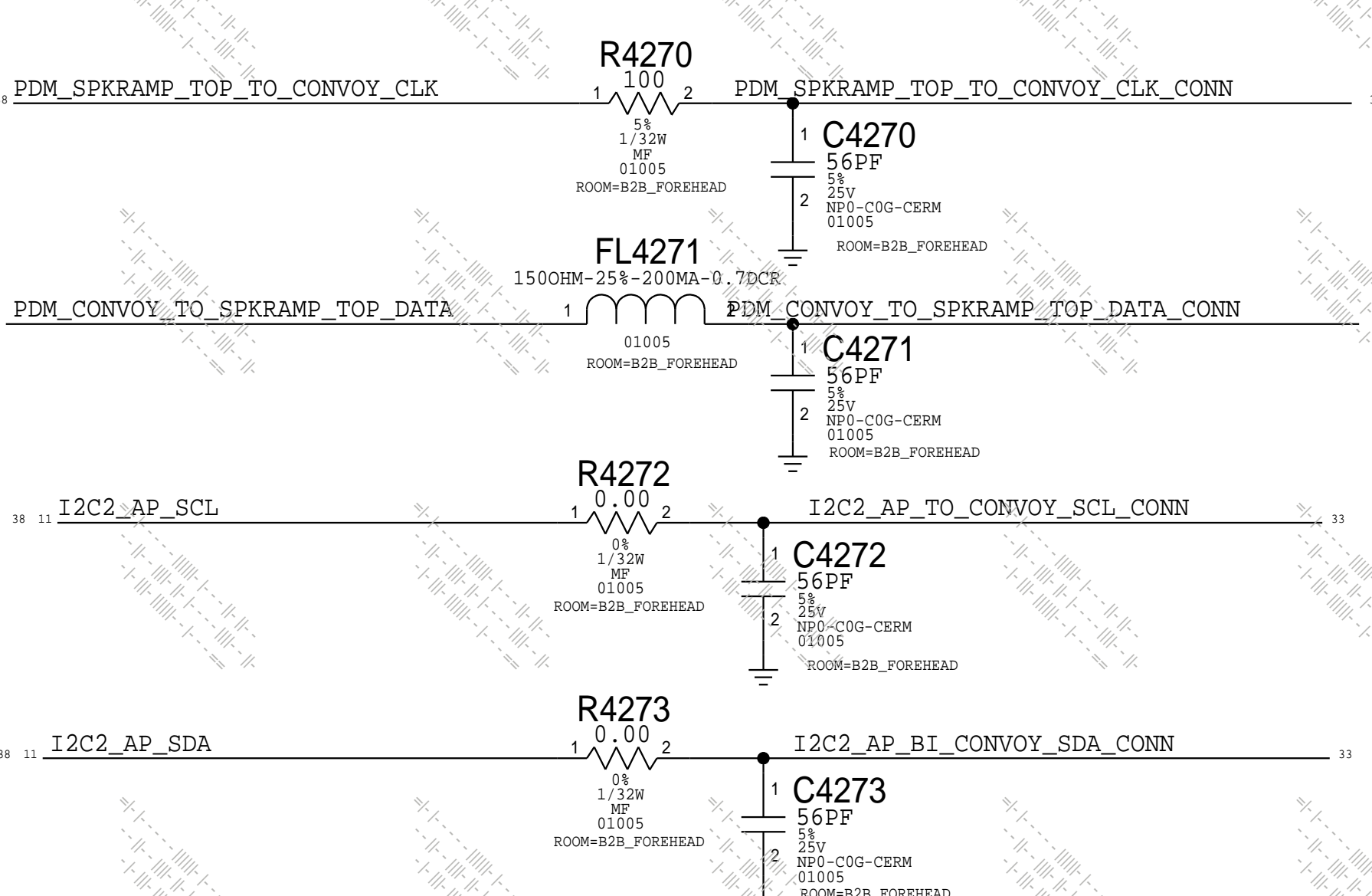
NORTH SPEAKER



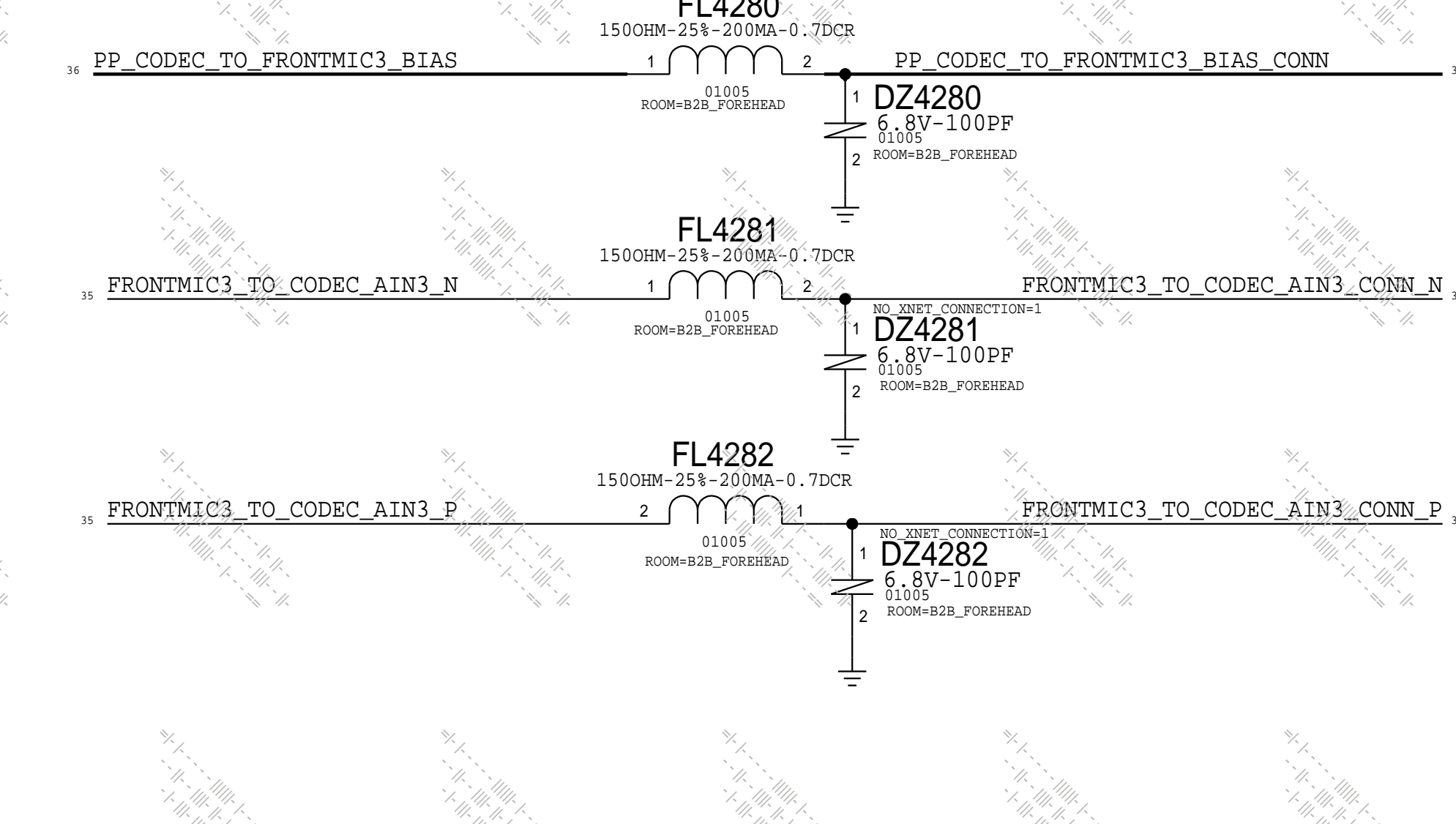
PROX + ALS I/O



CONVOY I/O

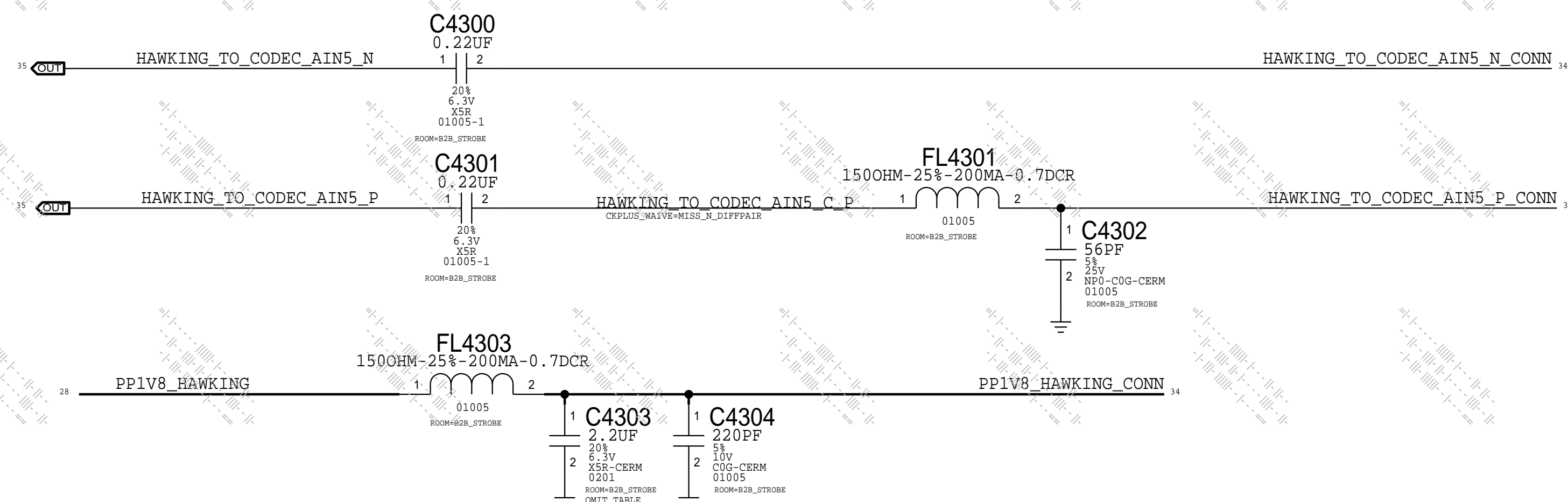


MIC3

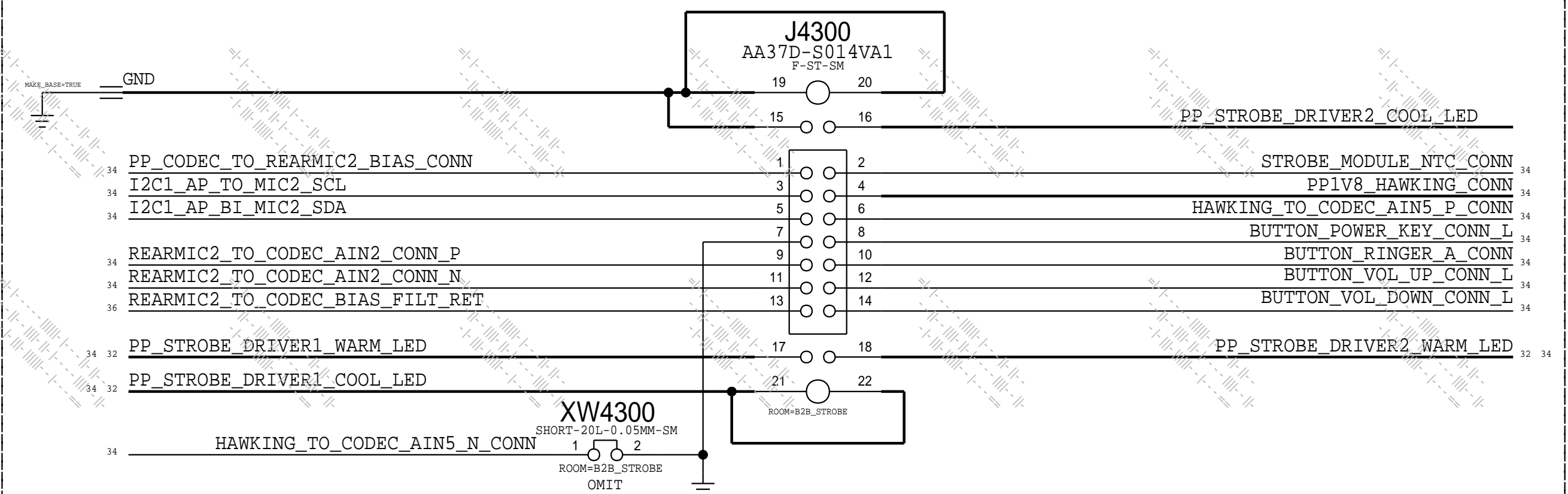


PAGE TITLE		
CAMERA: FCAM + FOREHEAD		
Apple Inc.	DRAWING NUMBER	SIZE
	051-02159	D
REVISION		
10.0.0		
BRANCH		
PAGE		
42 OF 80		
SHEET		
33 OF 81		
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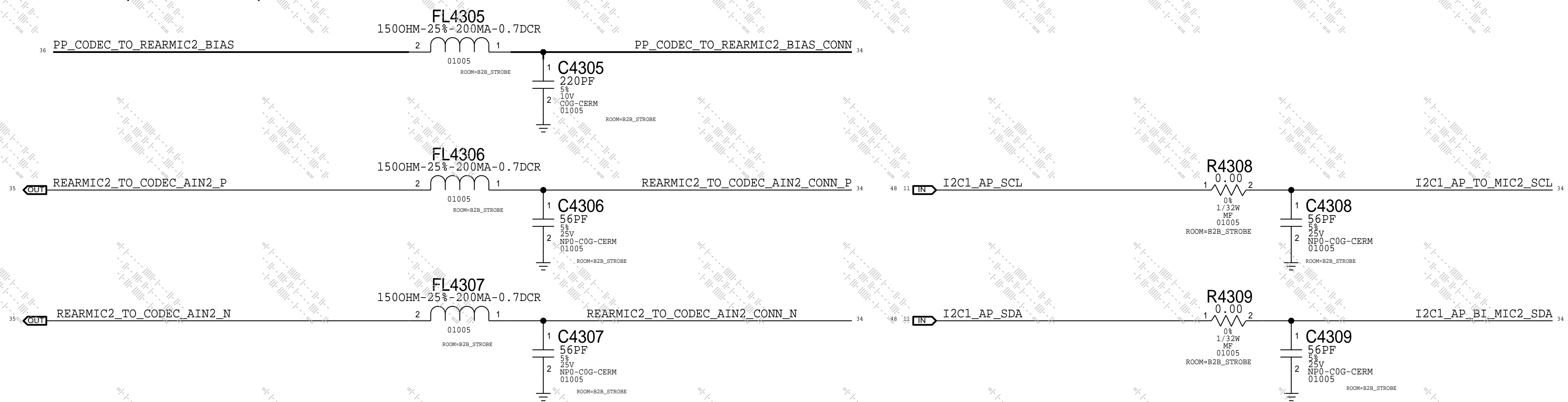
HAWKING



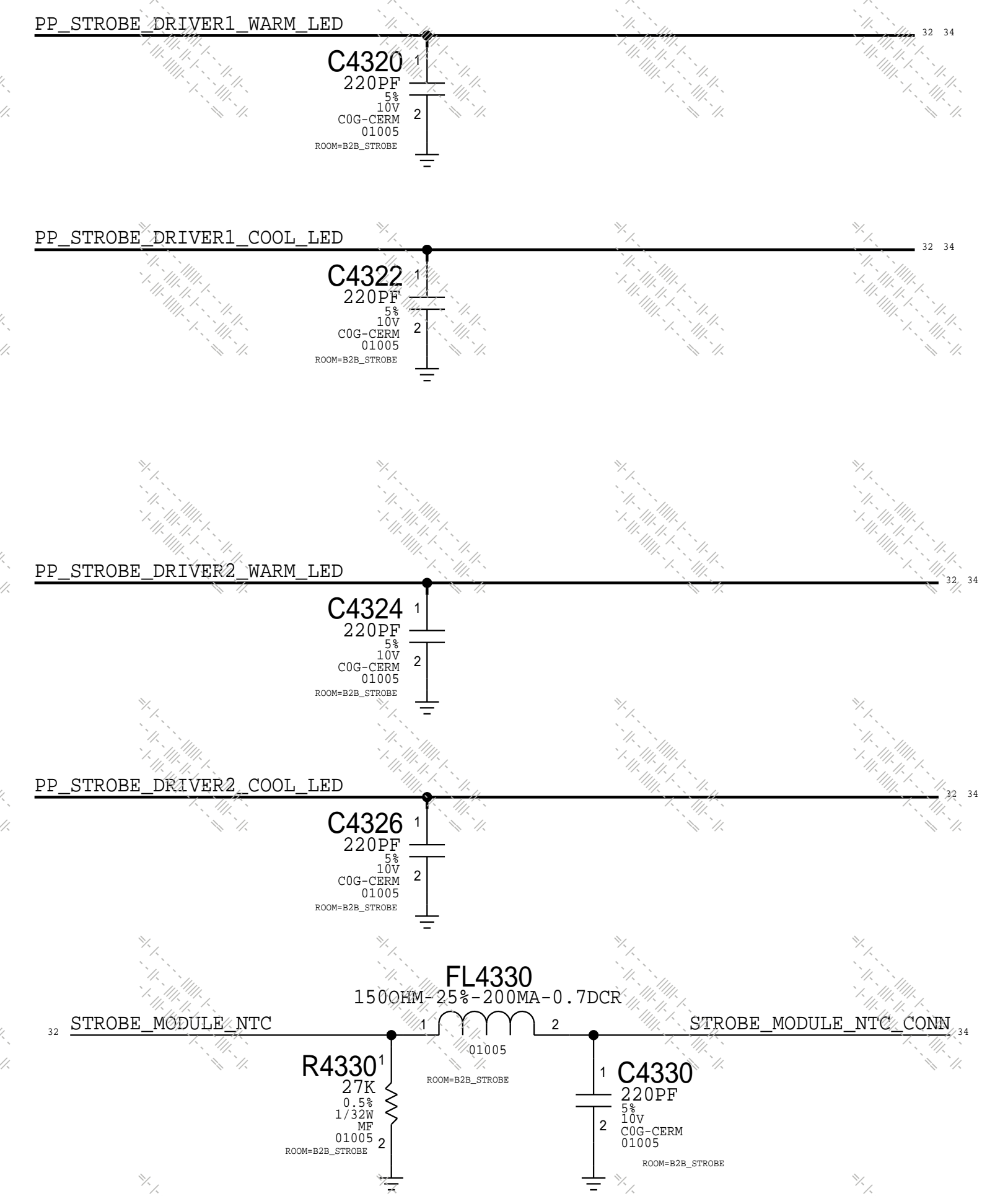
Strobe Connector



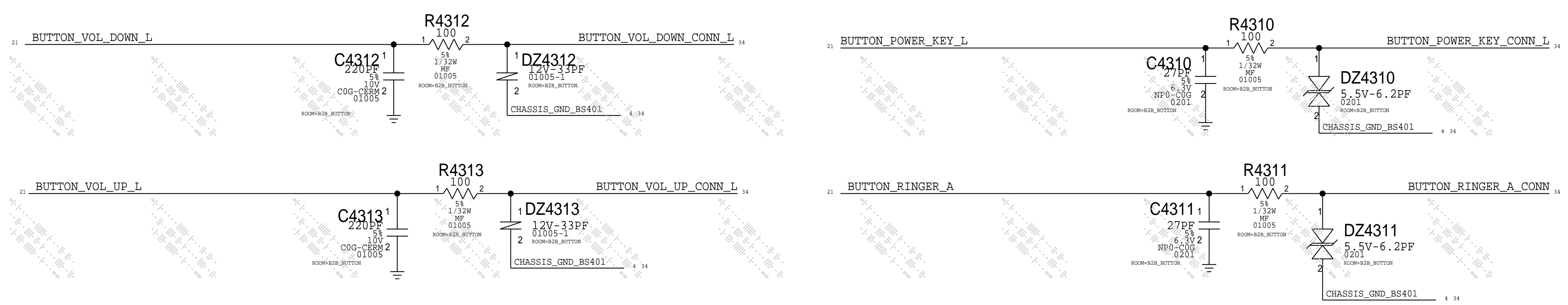
MIC2 (ANC REF)



Strobe Filtering

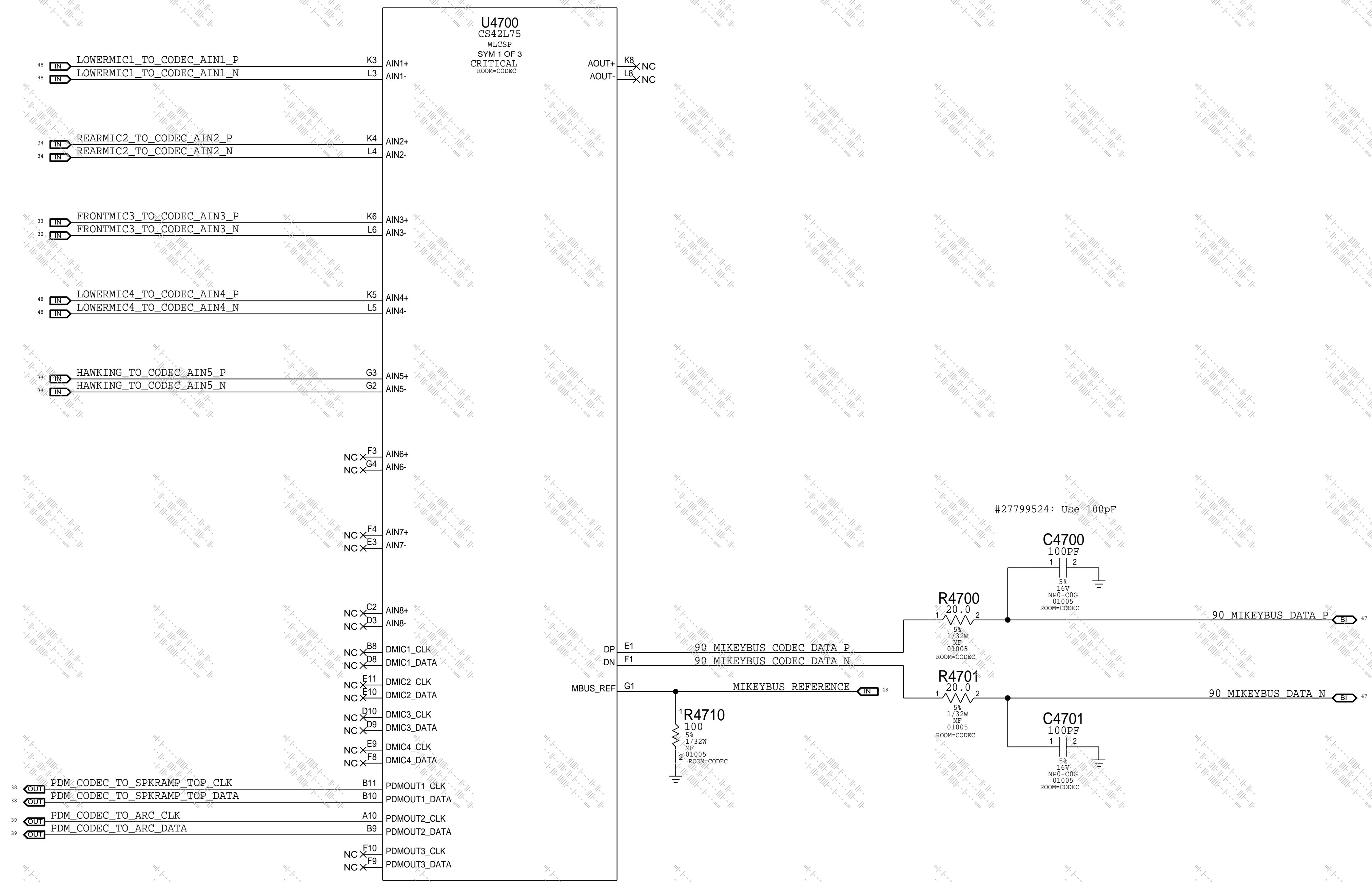


BUTTON



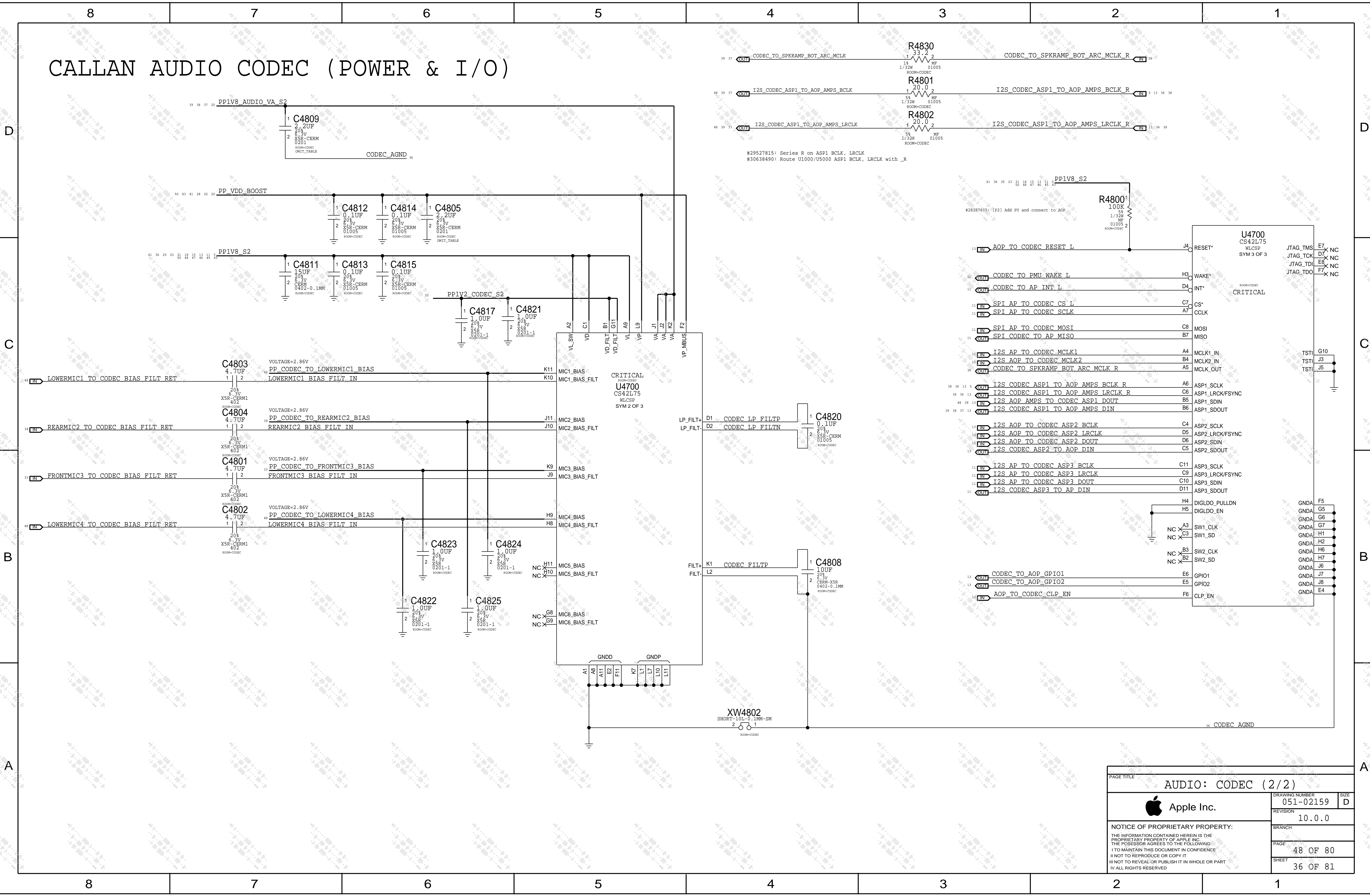
PAGE TITLE		
CAMERA: B2B Strobe + Buttons		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	43 OF 80
	SHEET	34 OF 81

CALLAN AUDIO CODEC (ANALOG INPUTS & OUTPUTS)



PAGE TITLE			AUDIO: CODEC (1/2)		
		DRAWING NUMBER	051-02159	SIZE	D
		REVISION	10.0.0		
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		PAGE	47 OF 80		
		SHEET	35 OF 81		

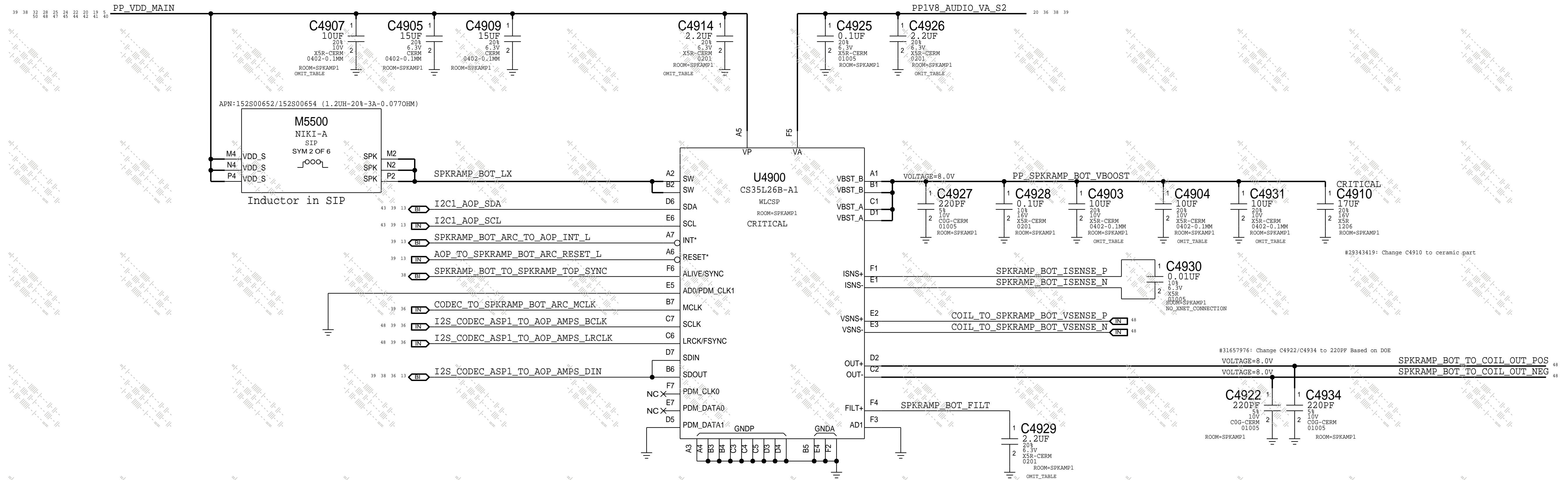
CALLAN AUDIO CODEC (POWER & I/O)



PAGE TITLE			AUDIO: CODEC (2/2)		
DRAWING NUMBER		051-02159	SIZE	D	
REVISION		10.0.0	BRANCH		
PAGE		48 OF 80	SHEET		
SHEET		36 OF 81	NOTICE OF PROPRIETARY PROPERTY:		
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South Speaker Amplifier

APN: 338S00143
 I2C ADDRESS: 1000 000x
 0x80

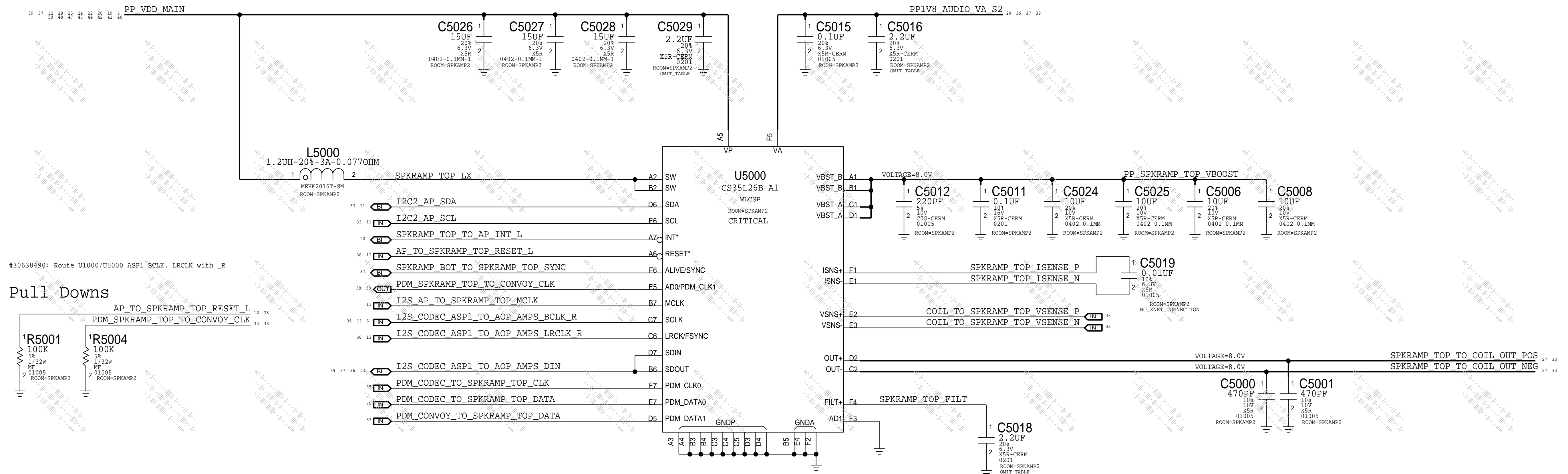


PAGE TITLE		
AUDIO: Speaker Amp Bottom		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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BRANCH	PAGE	49 OF 80
SHEET		37 OF 81

North Speaker Amplifier

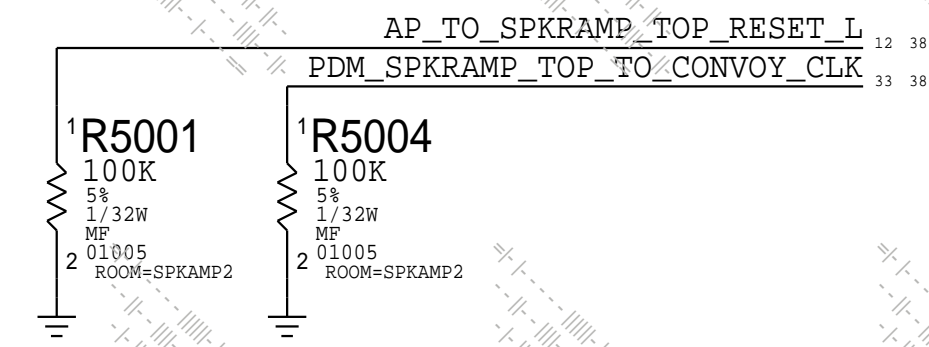
APN: 338S00295

I2C ADDRESS: 1000 000x (0x80)



#30638490: Route U1000/U5000 ASP1 *BCLK, LRCLK with _R

Pull Downs

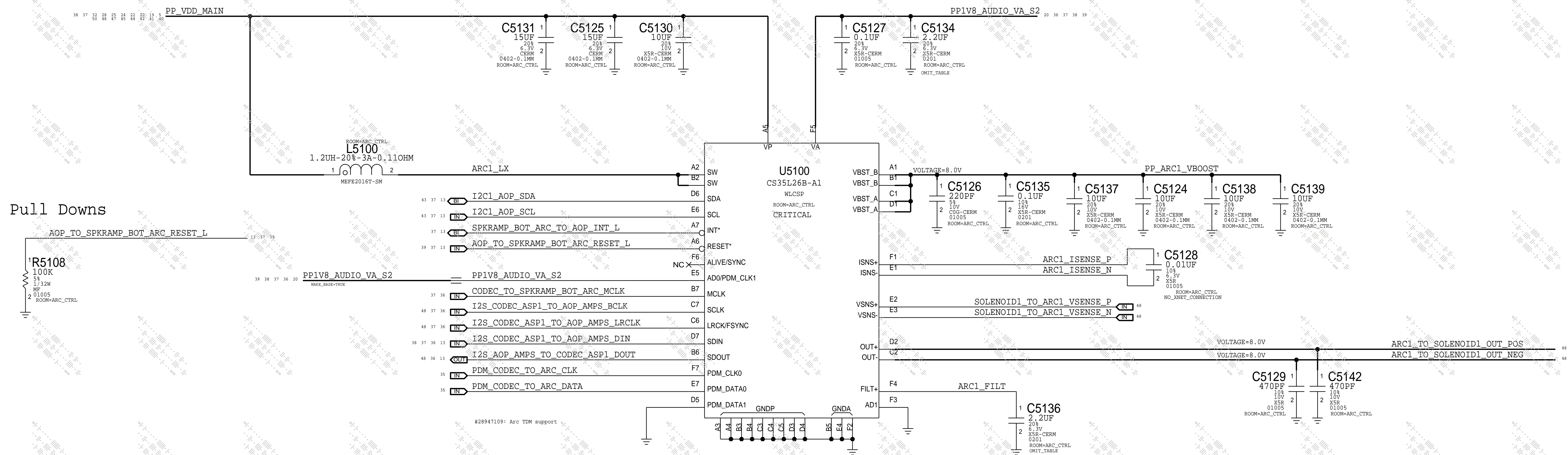


PAGE TITLE		
AUDIO: Speaker Amp Top		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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BRANCH		
PAGE	50 OF 80	
SHEET	38 OF 81	

ARC DRIVER

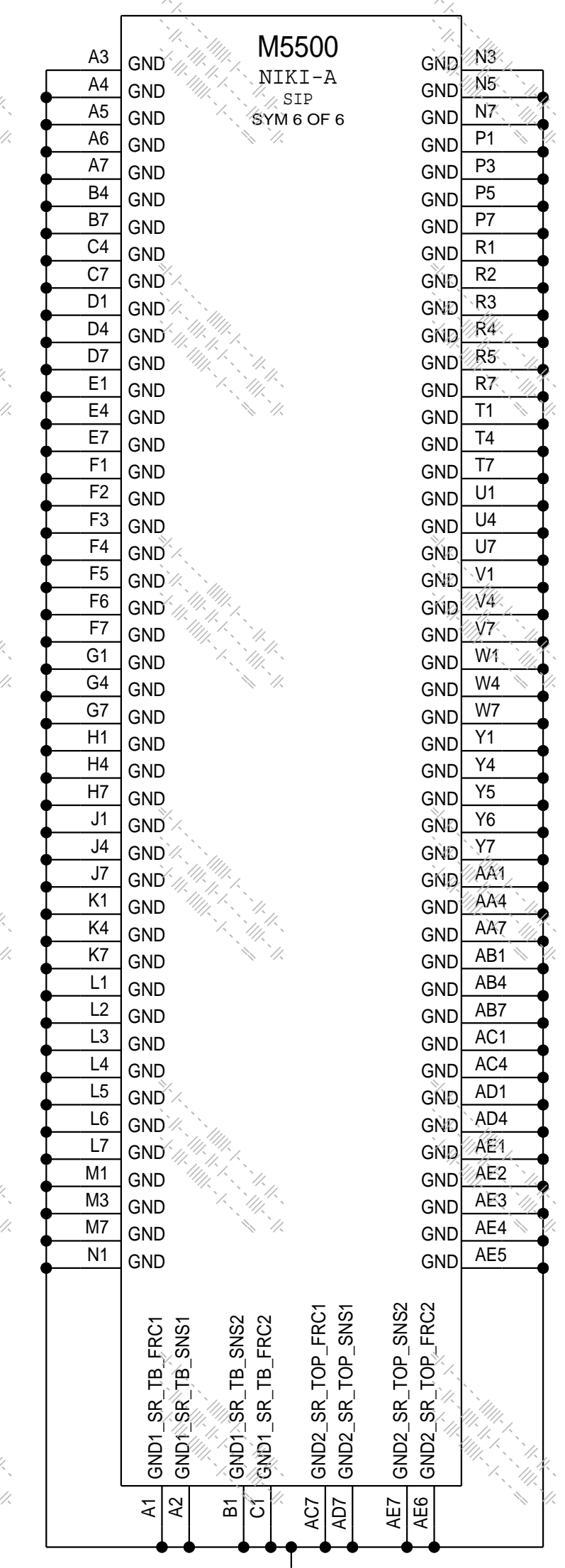
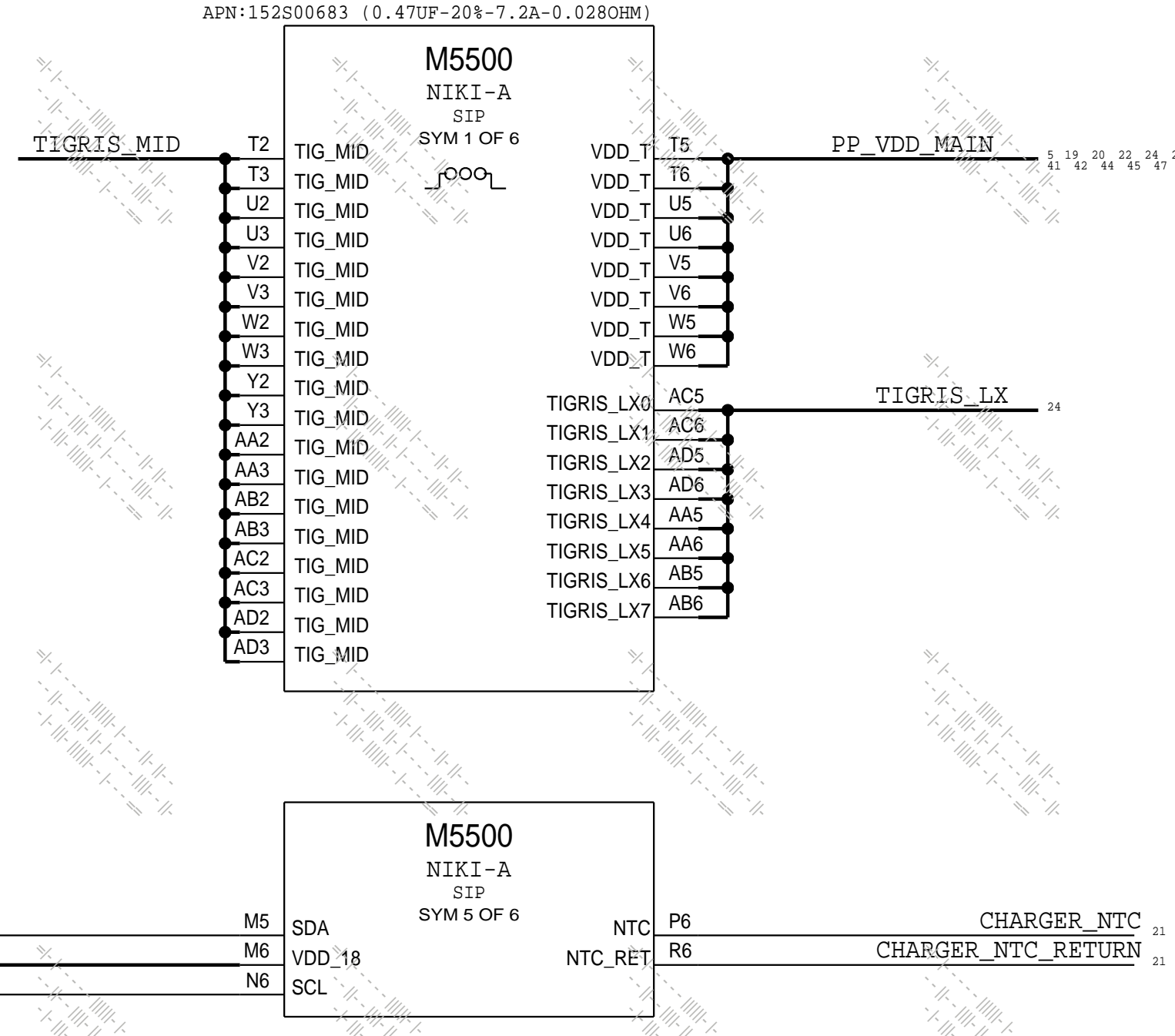
APN: 338S00295

I2C ADDRESS: 1000 001x (0x82)



PAGE TITLE		
ARC: Driver		
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	REVISION	10.0.0
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BRANCH		
PAGE	51 OF 80	
SHEET	39 OF 81	

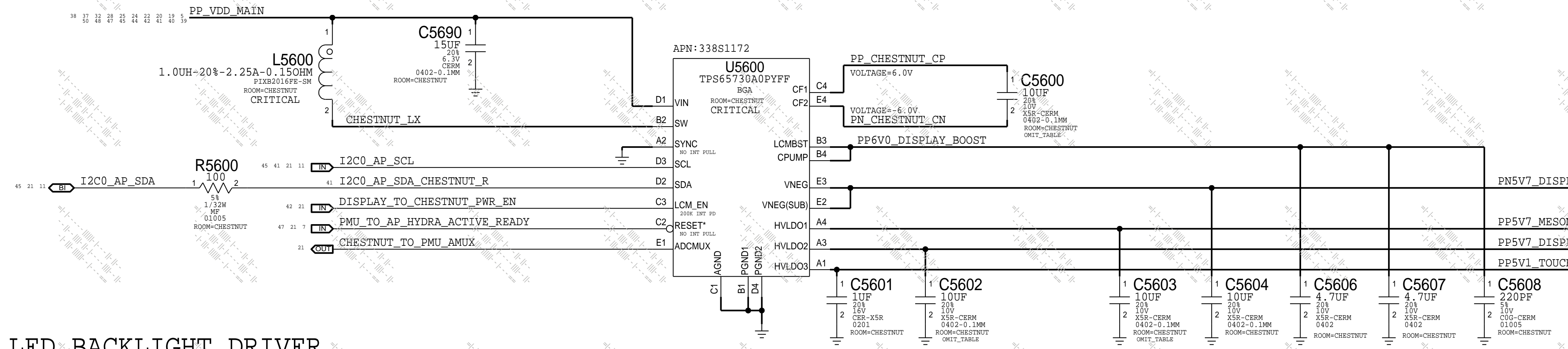
Niki SIP



Note: inductors in SIP used for bottom speaker amplifier and backlight
See pages 49, and 56

PAGE TITLE		CG: Niki	
Apple Inc.	DRAWING NUMBER	051-02159	SIZE D
	REVISION	10.0.0	
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		PAGE	55 OF 80
		SHEET	40 OF 81

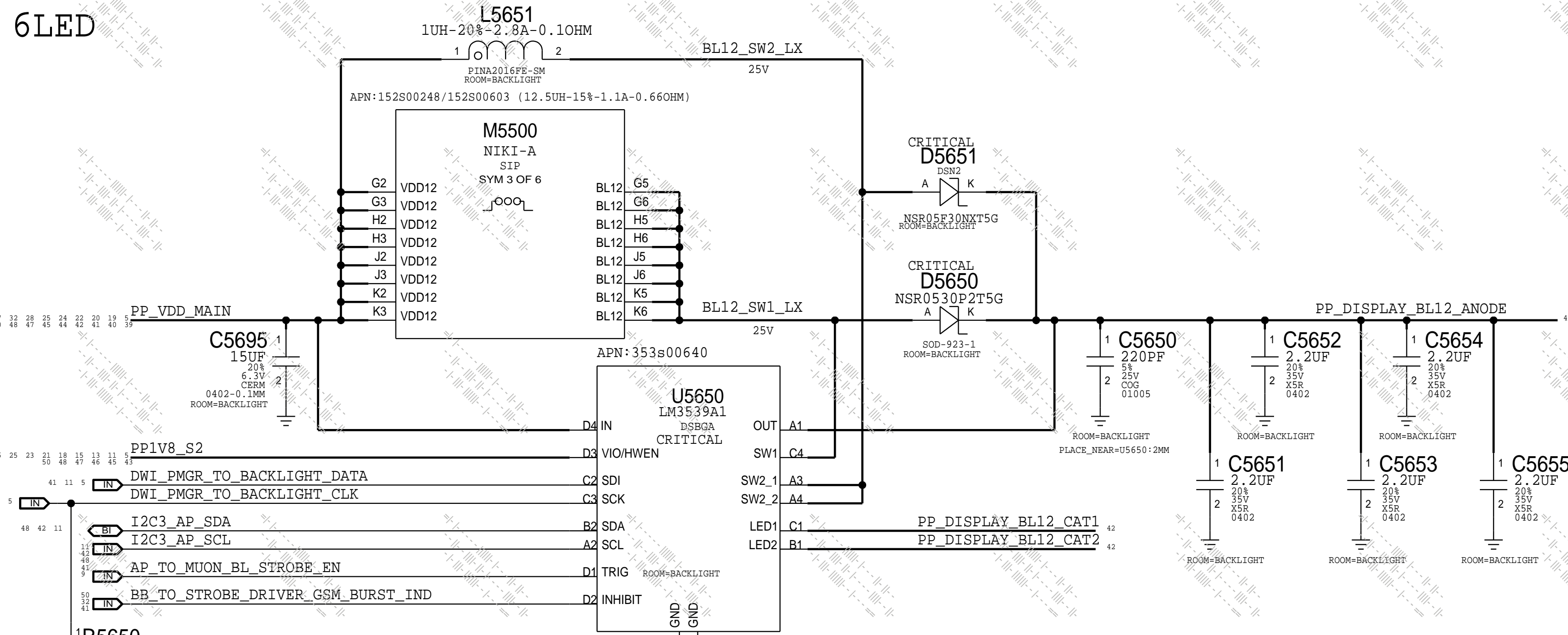
CHESTNUT DISPLAY PMU



#28282573: Update C5606/C5607 to match Dlx

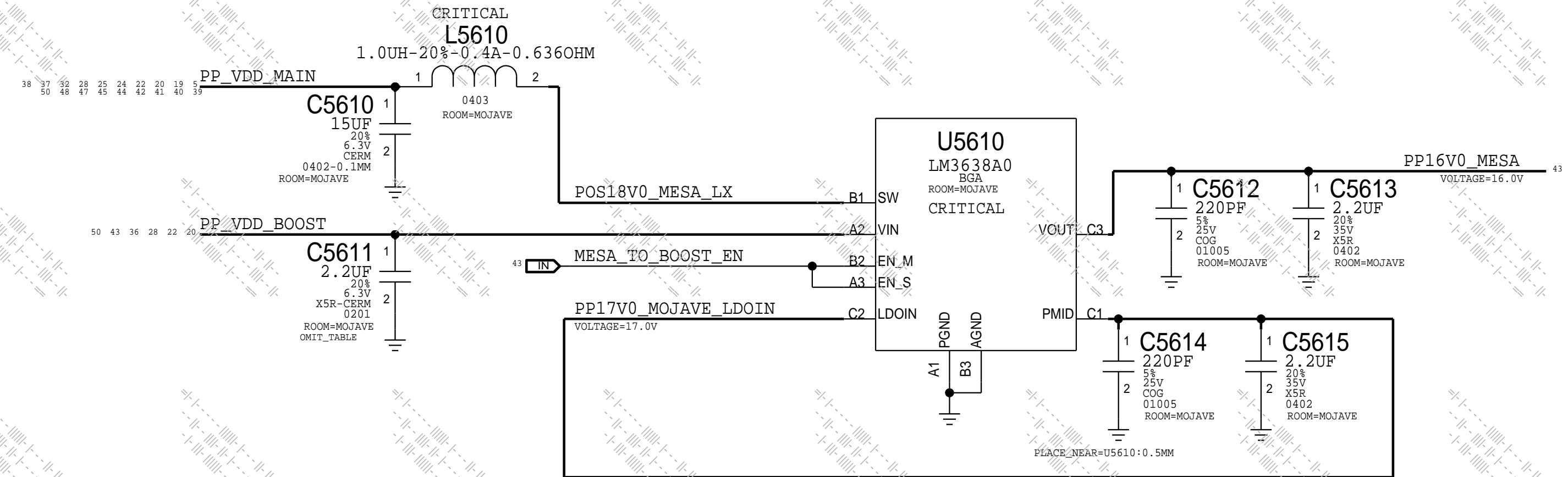
LED BACKLIGHT DRIVER

6LED

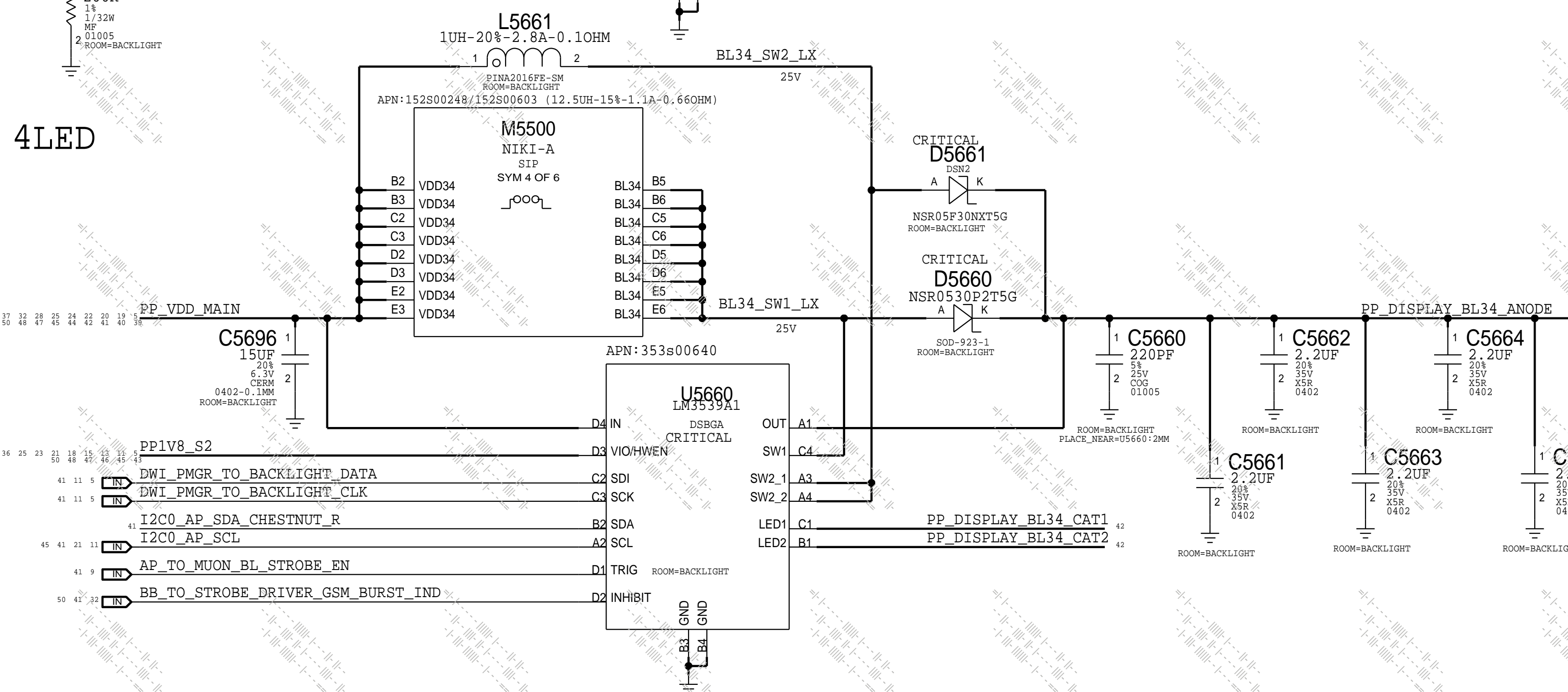


MOJAVE MESA BOOST

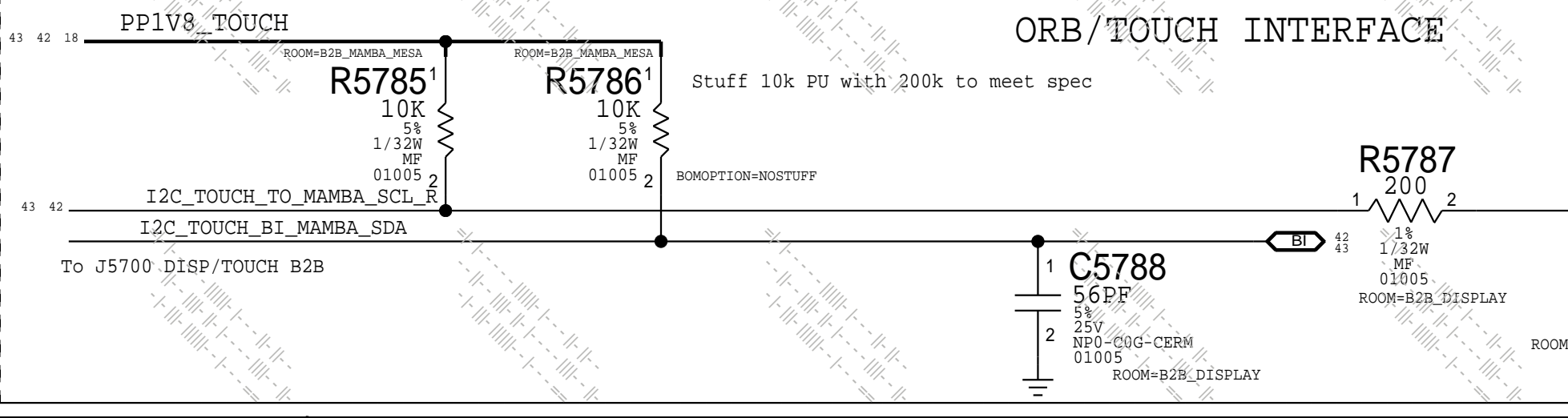
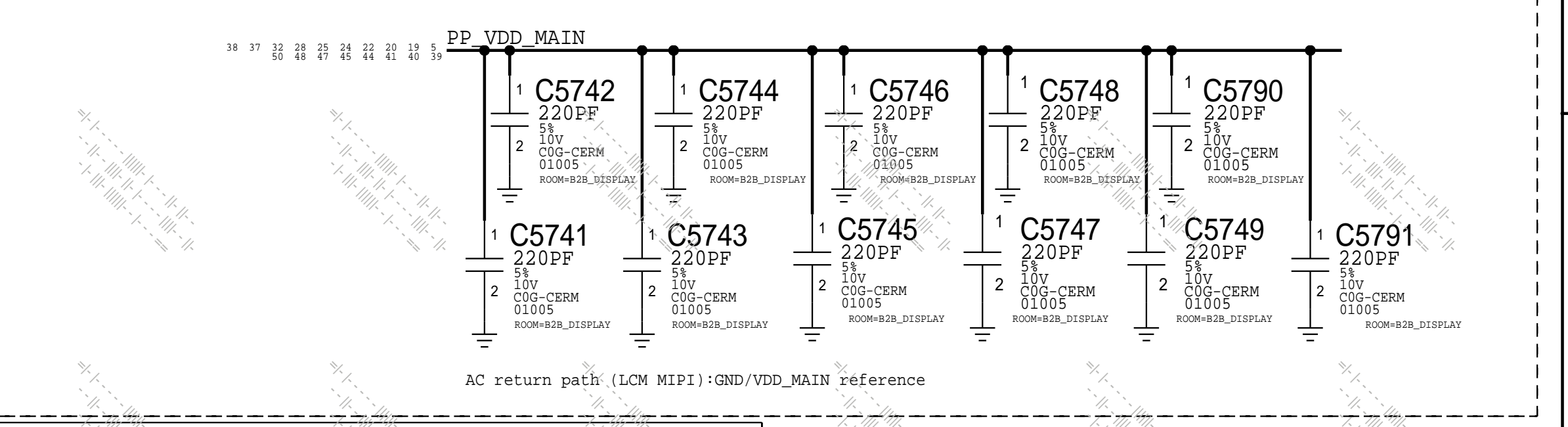
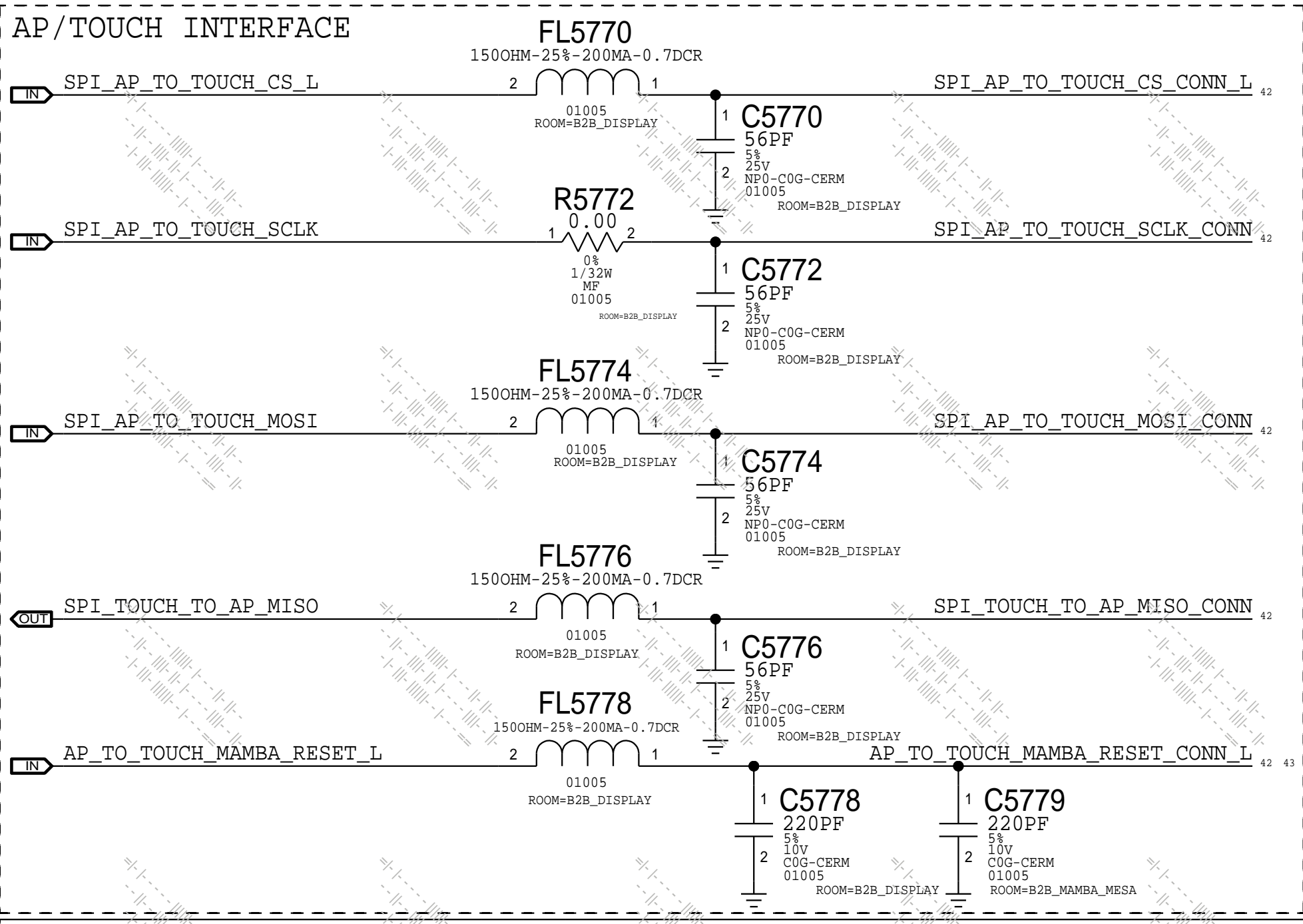
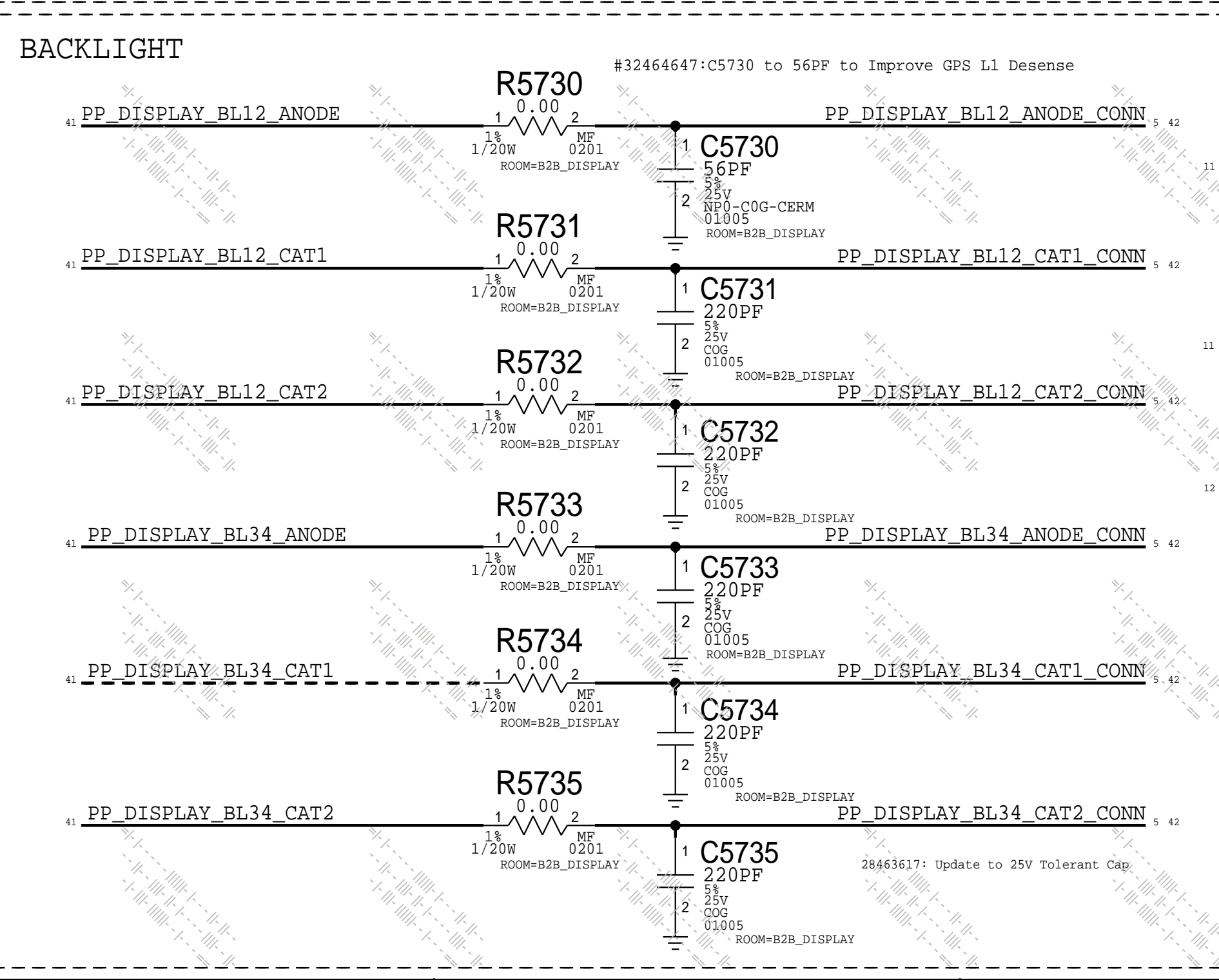
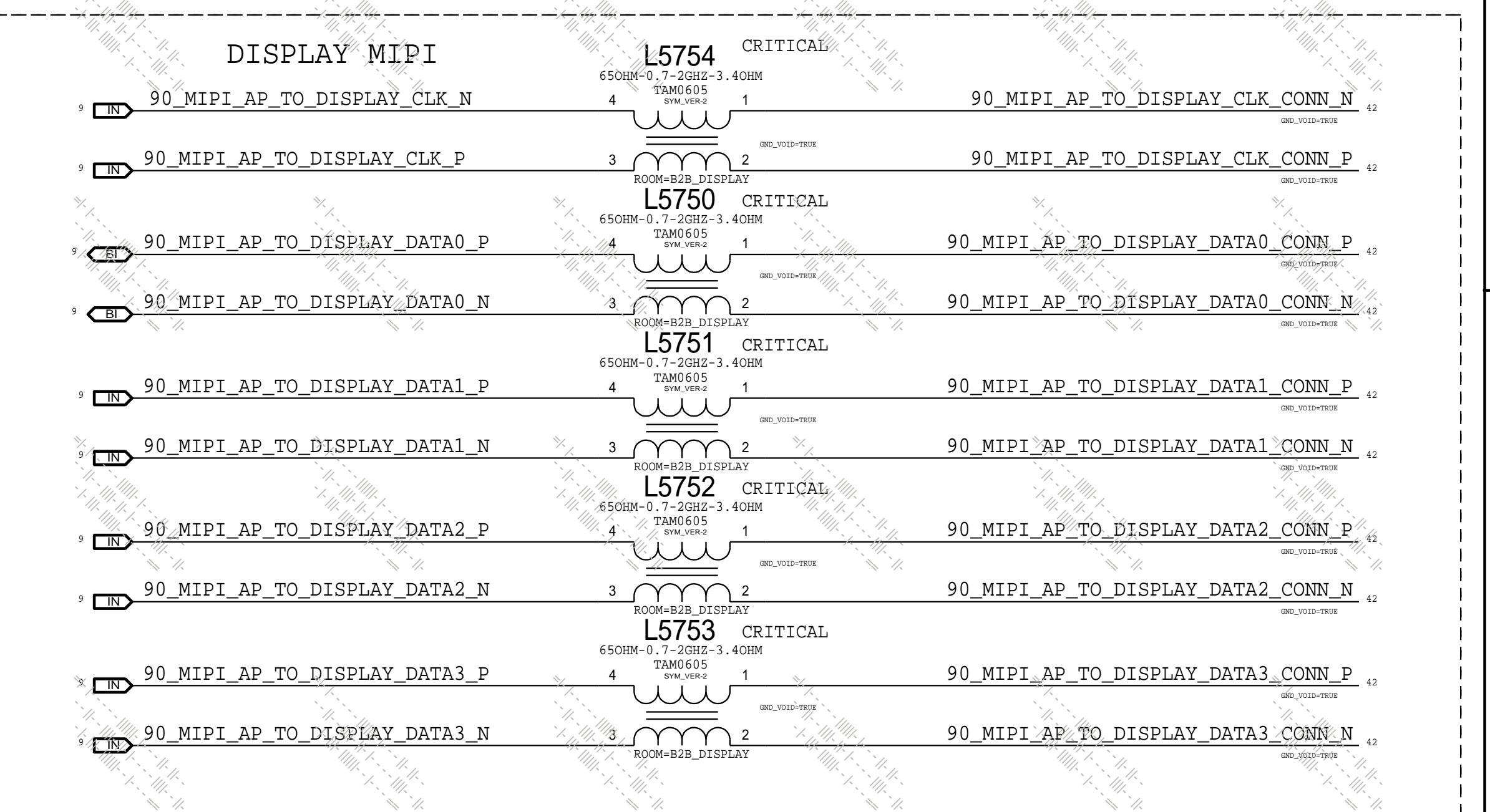
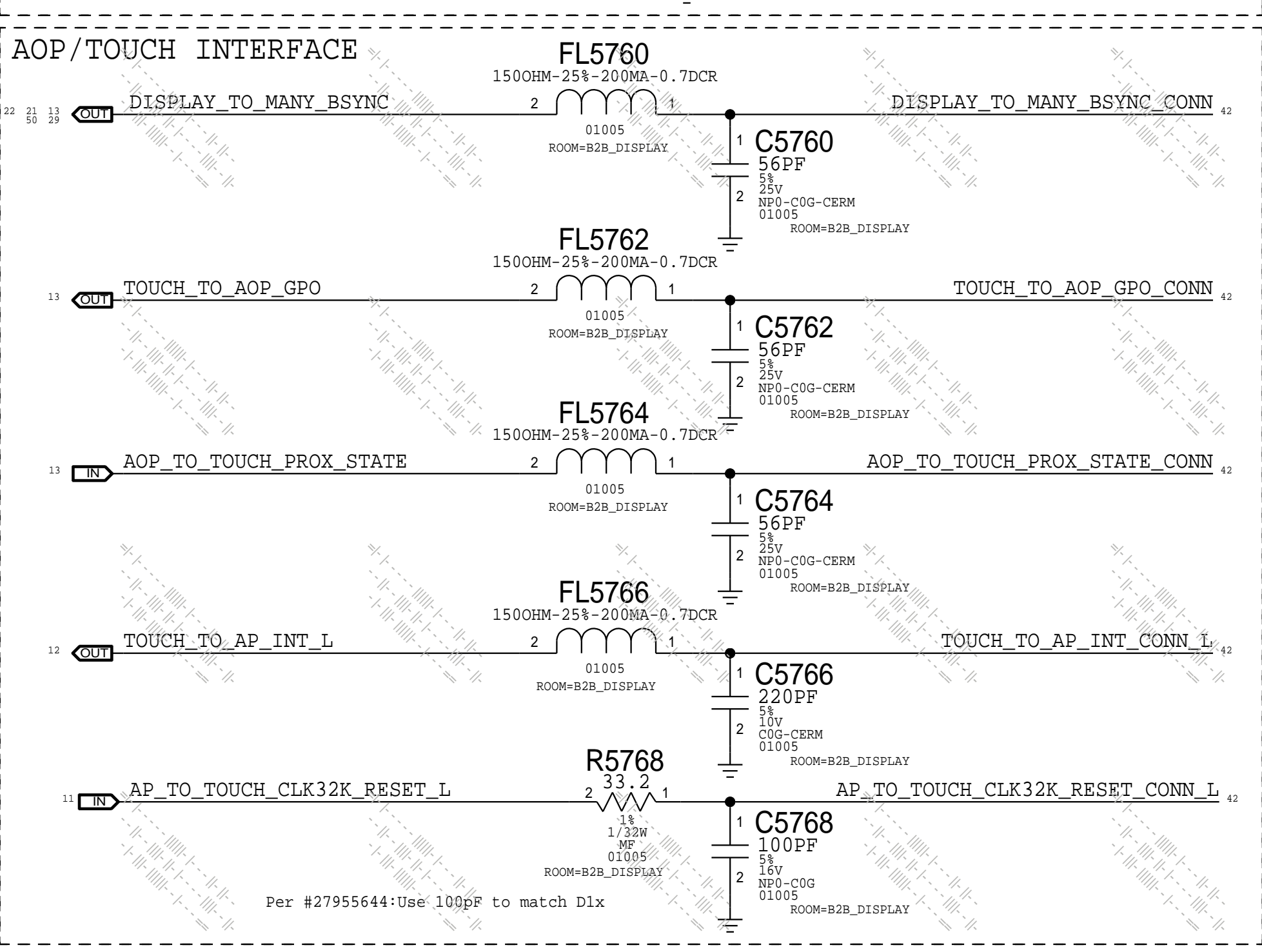
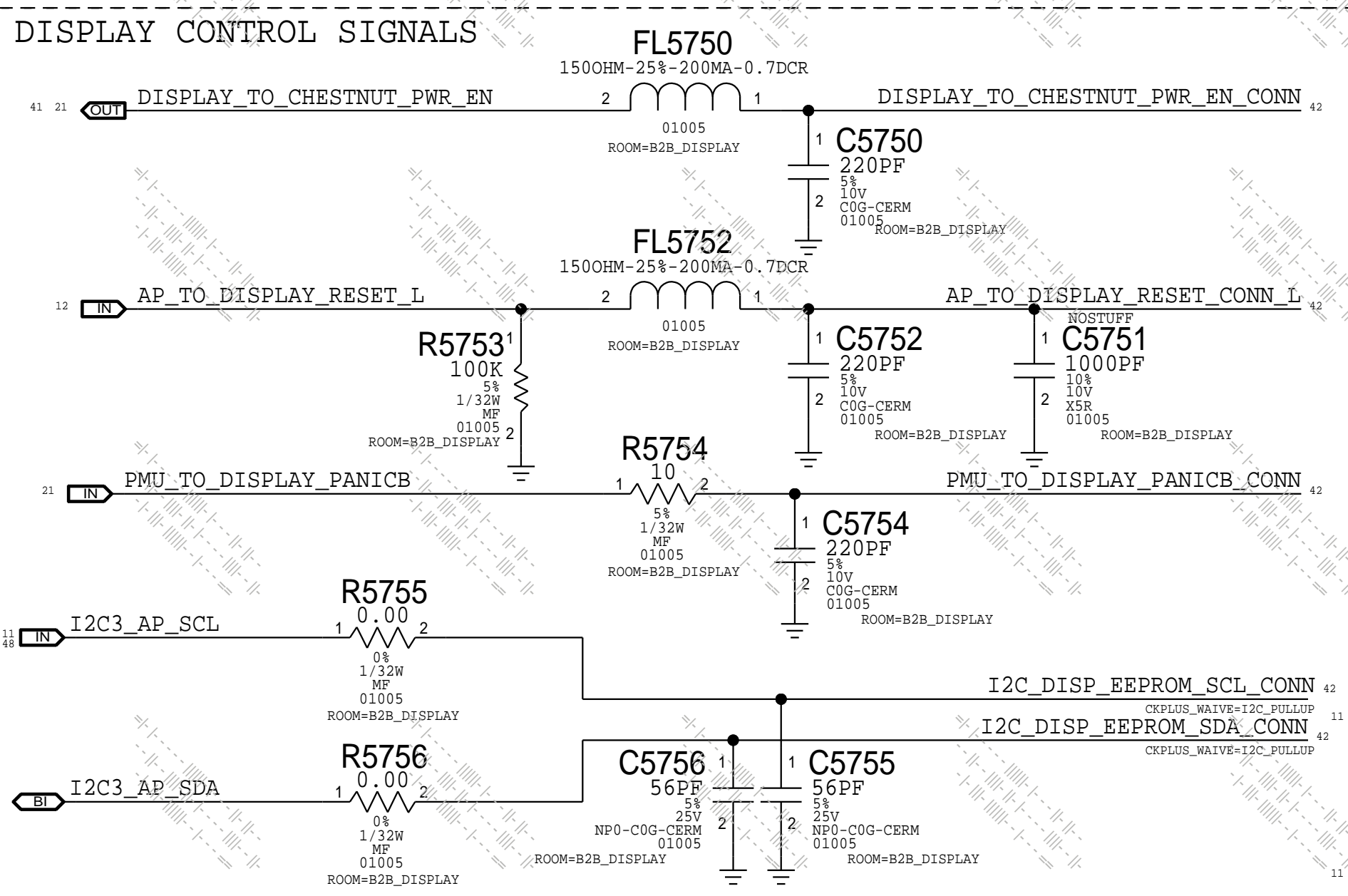
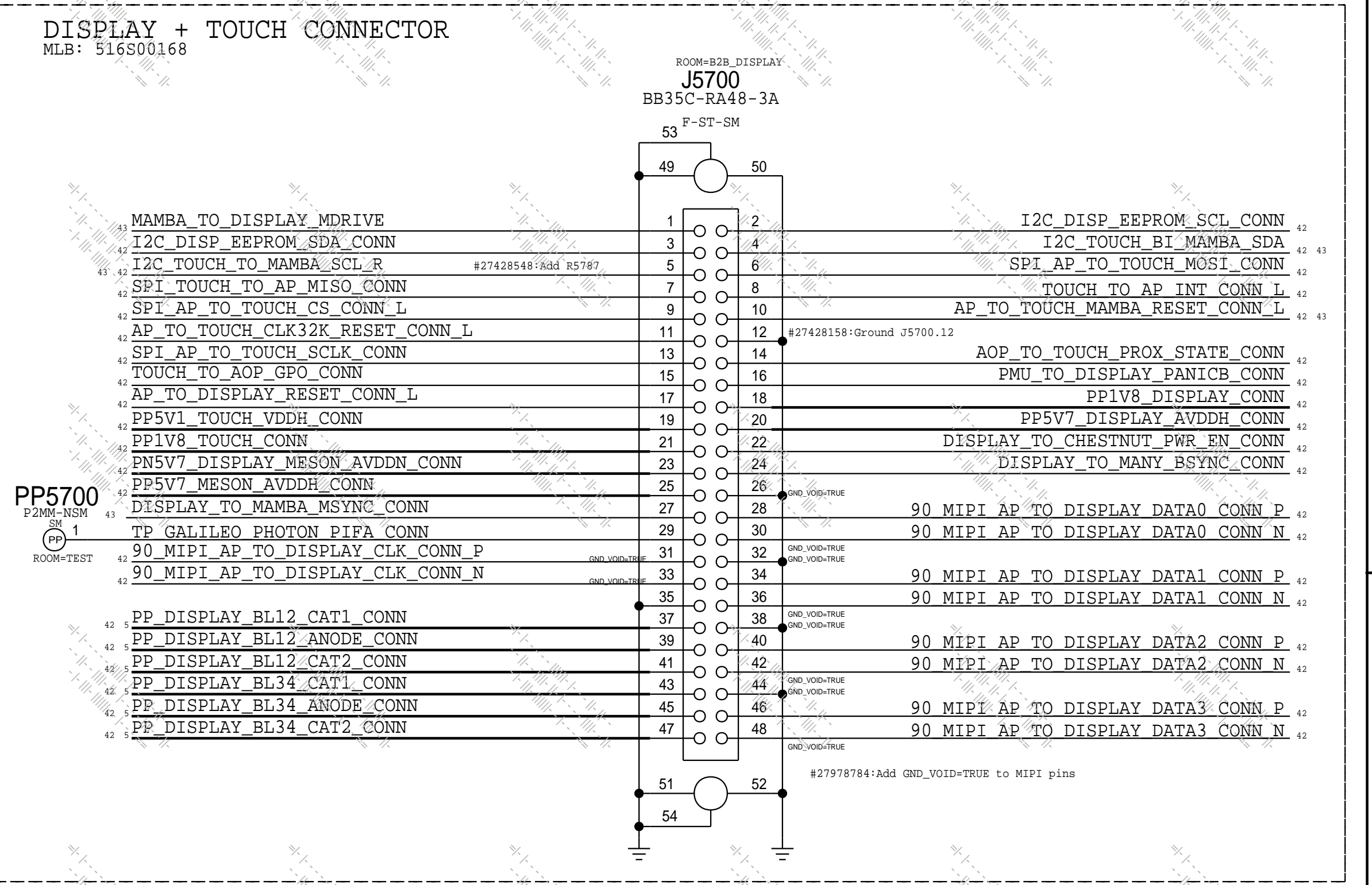
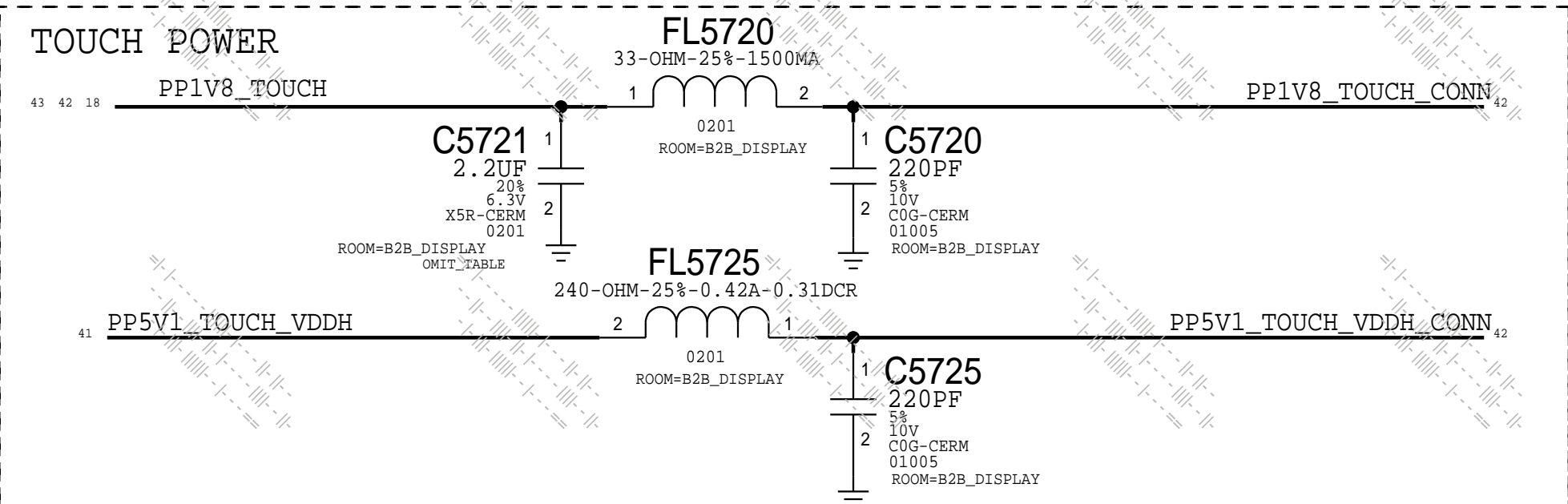
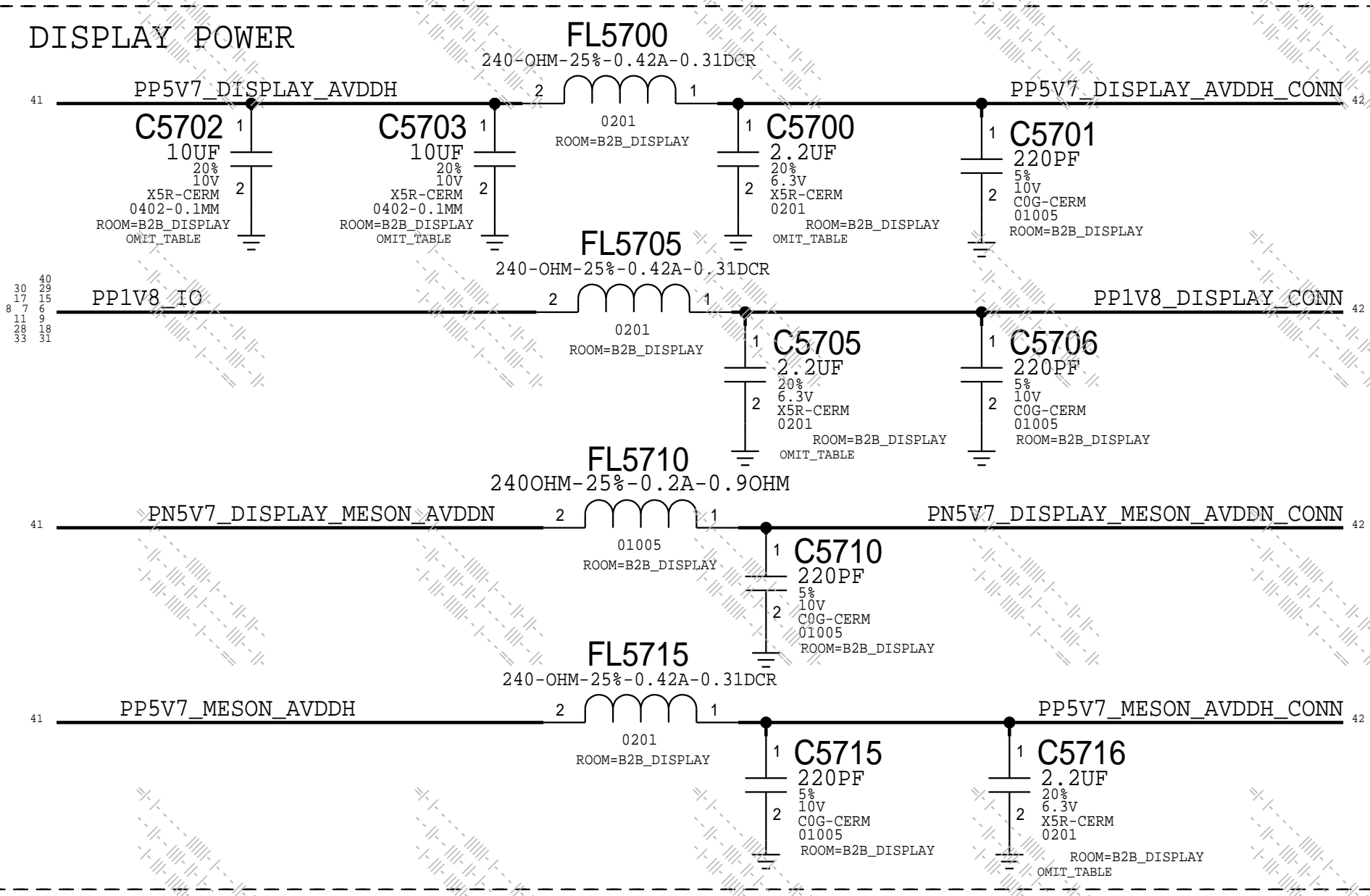
APN:353S00671



4LED



PAGE TITLE		CG: PMUs	
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		PAGE	56 OF 80
		SHEET	41 OF 81



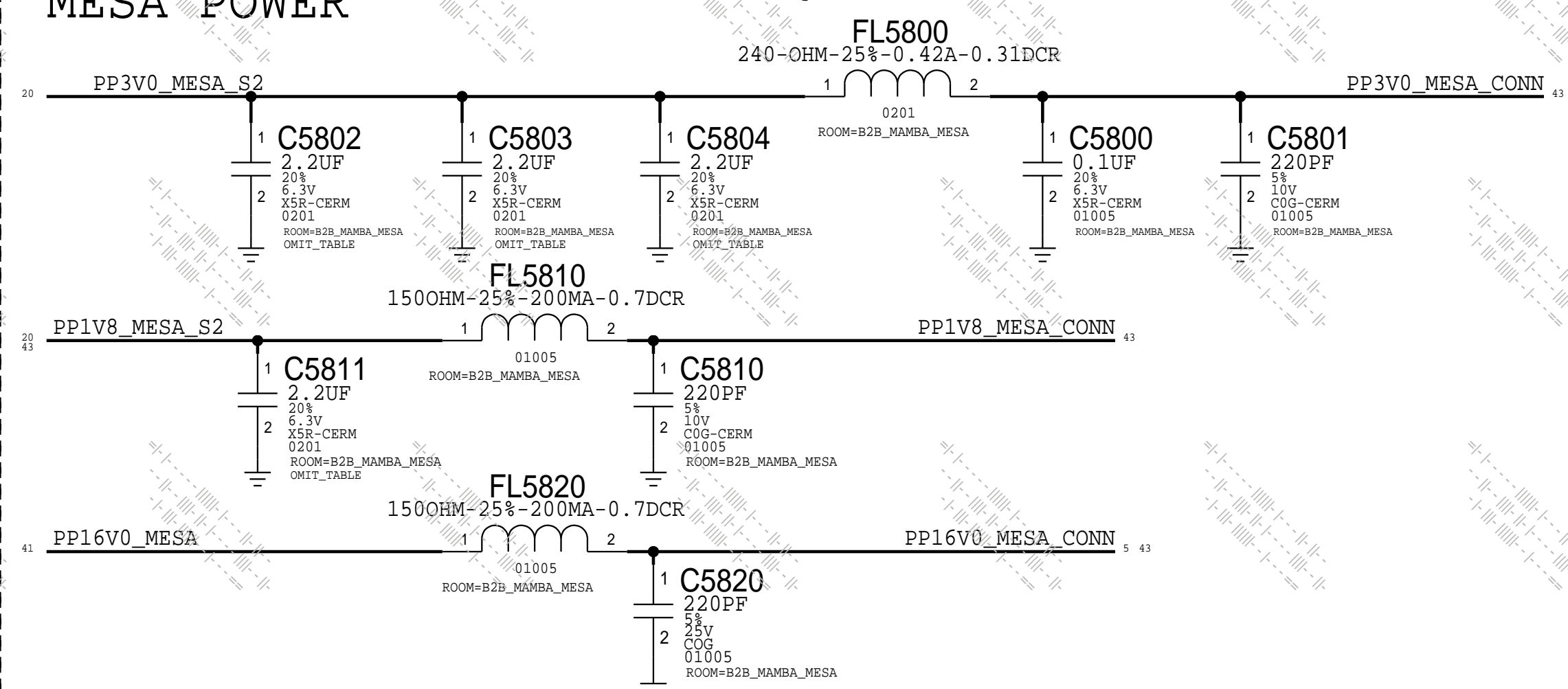
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B
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D
C
B
A

PAGE TITLE		
CG: B2B DISPLAY + TOUCH		
Apple Inc.	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	57 OF 80
	SHEET	42 OF 81

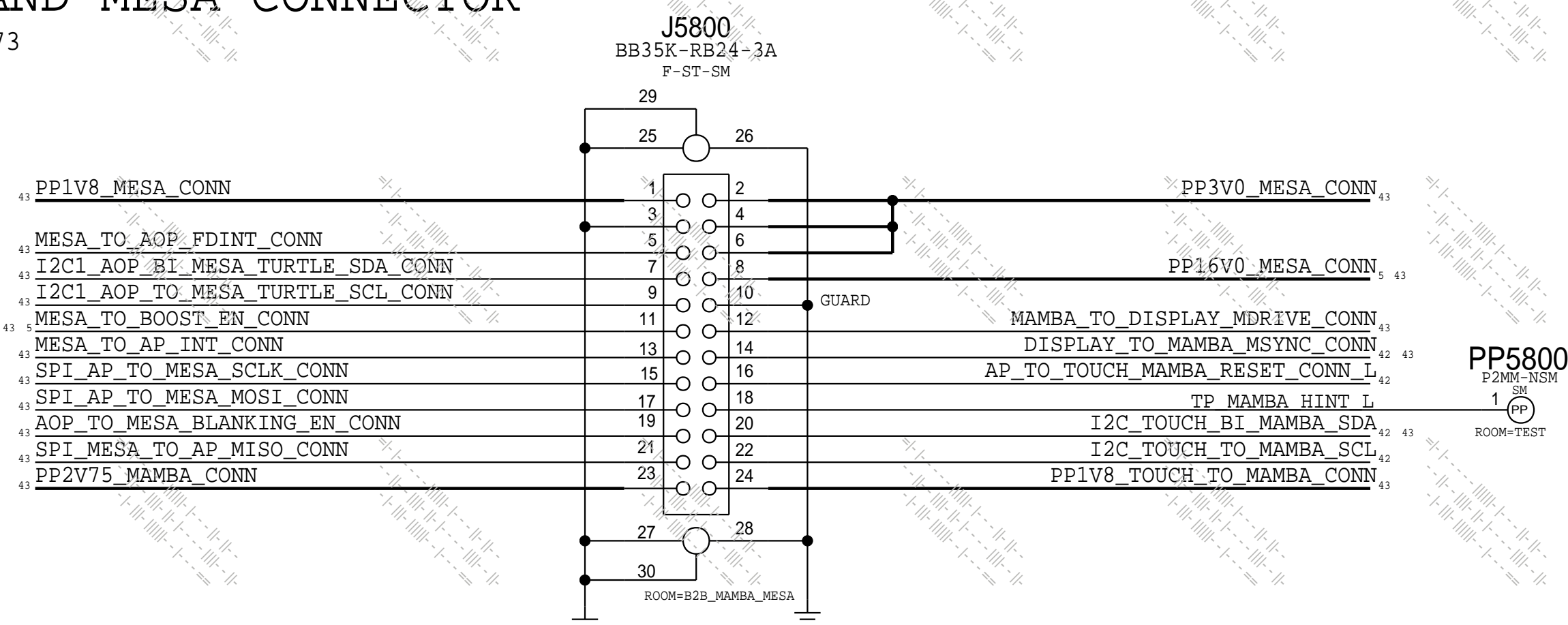
MESA POWER

#30272427: Change FL5800 to 155S00067

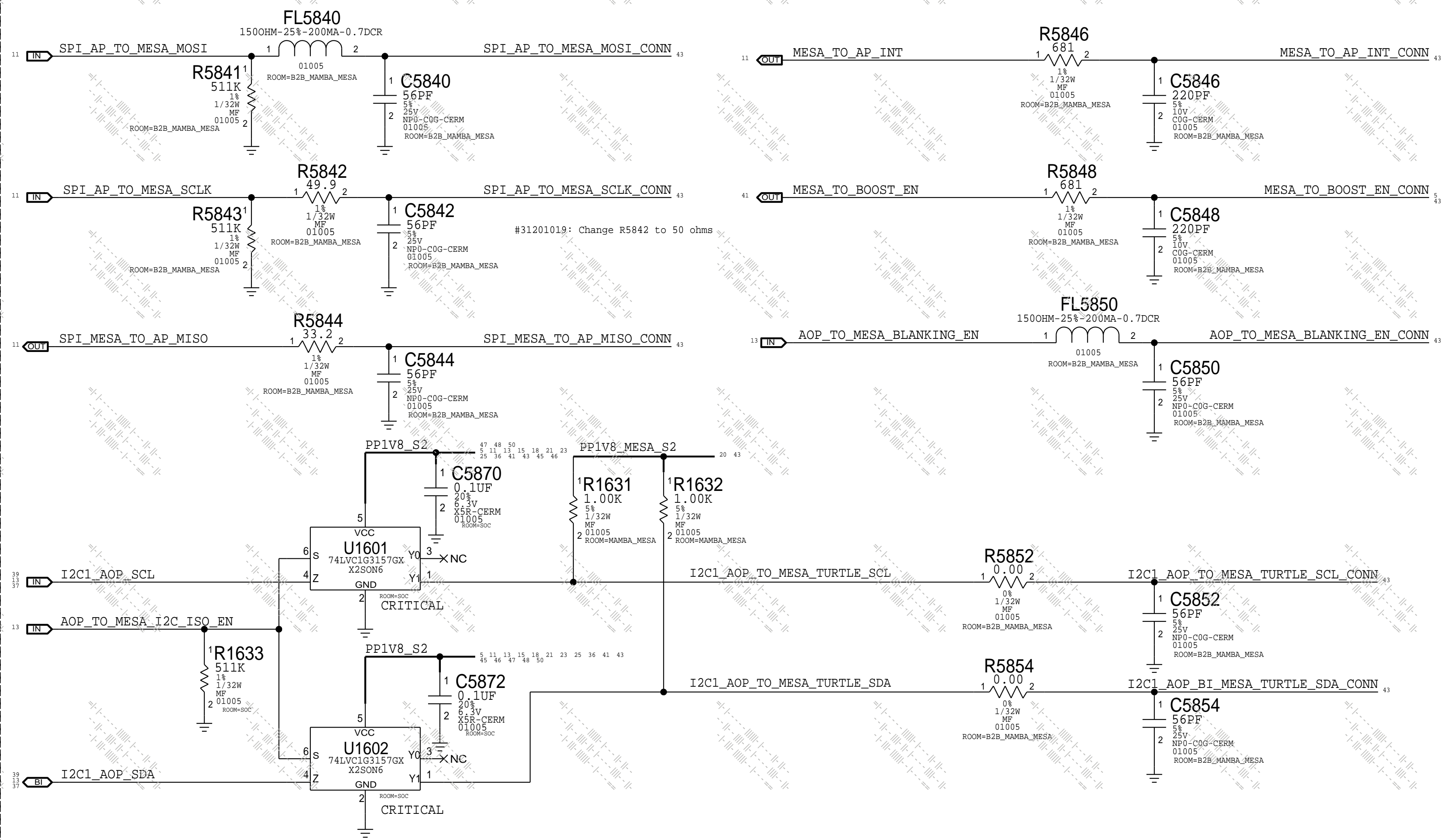


MAMBA AND MESA CONNECTOR

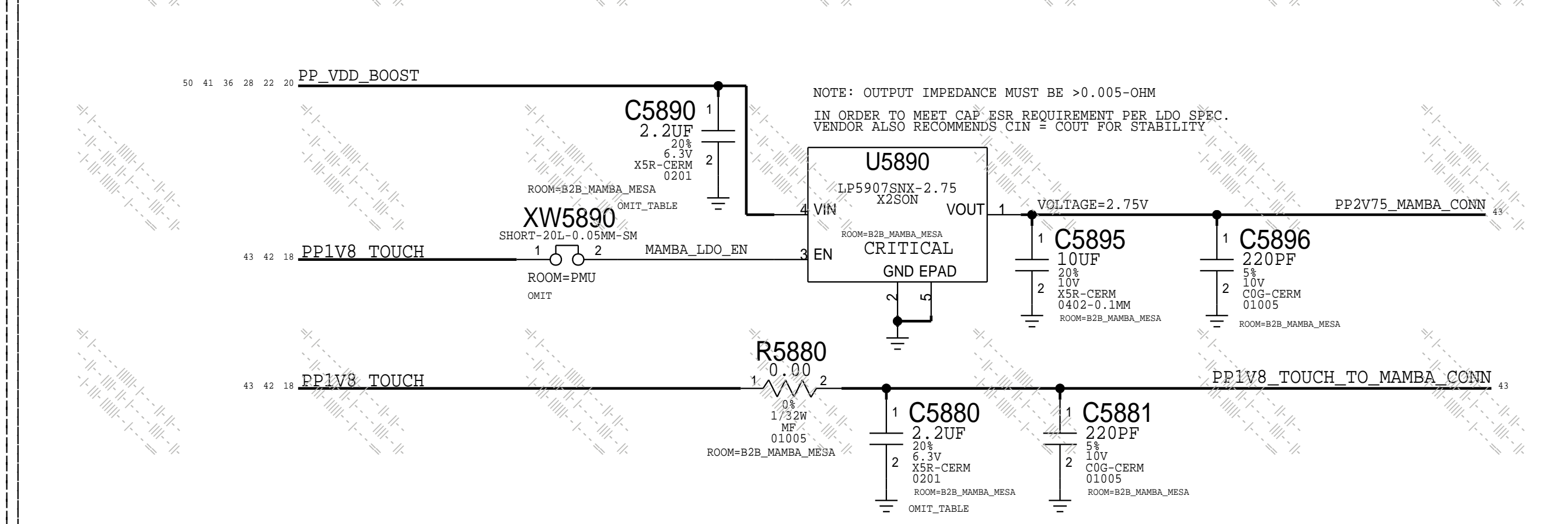
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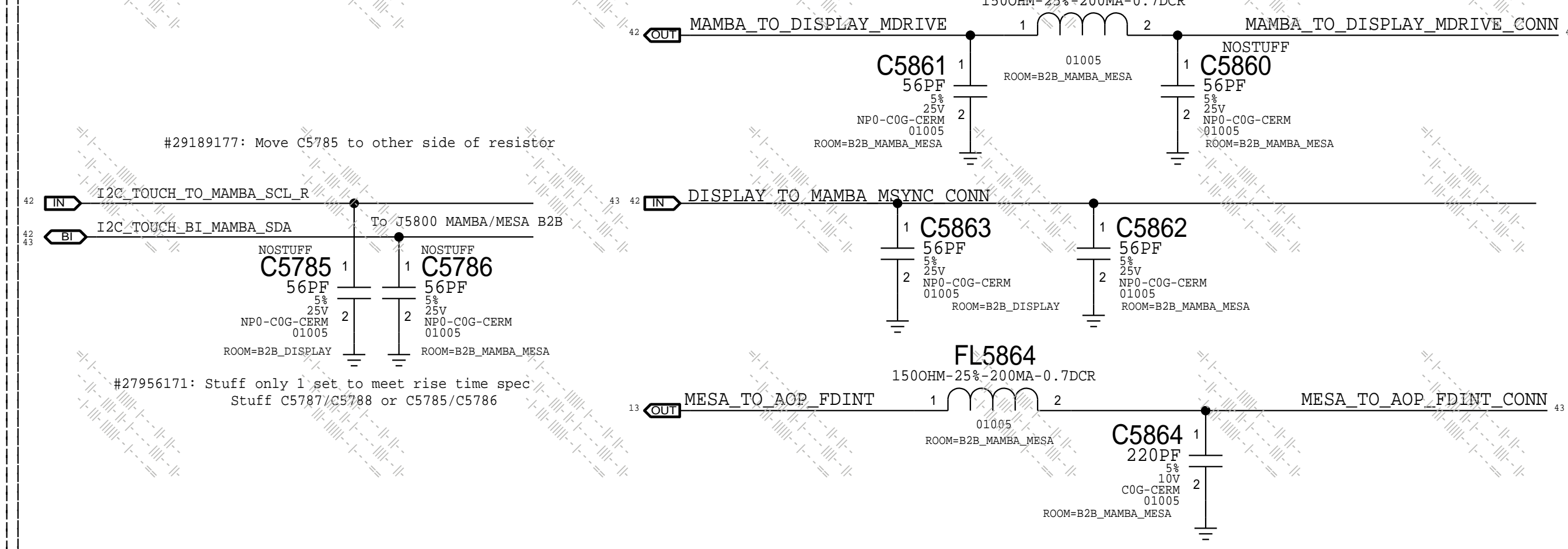
MESA DIGITAL I/O



MAMBA POWER

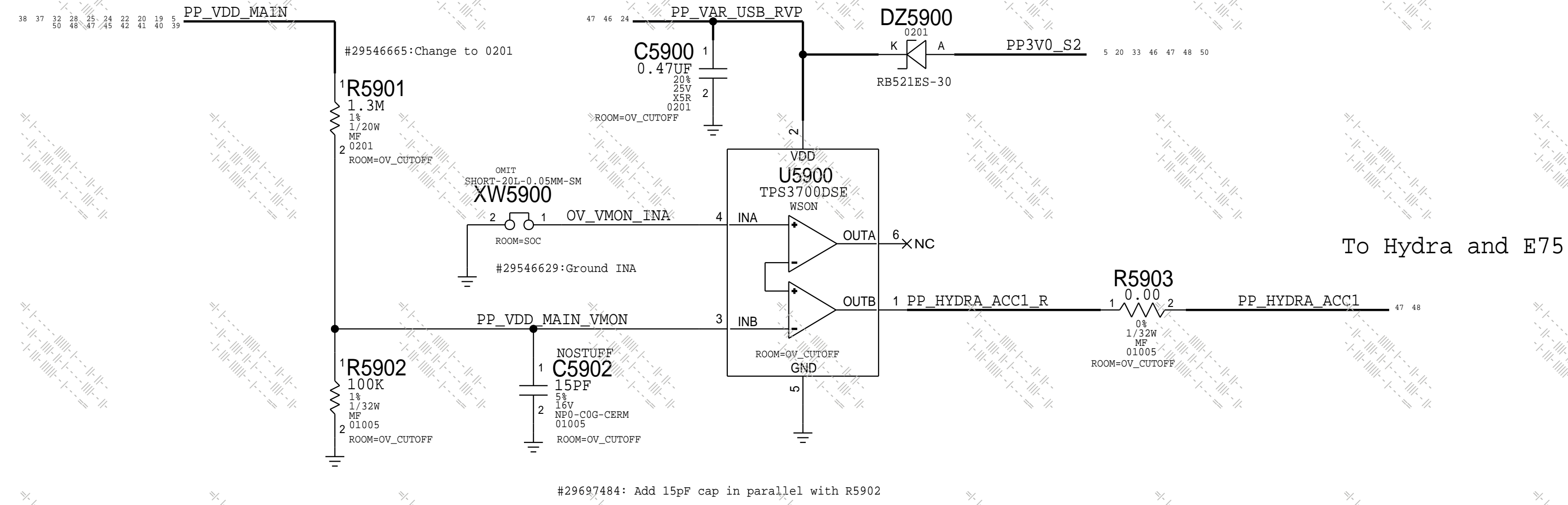


MAMBA DIGITAL I/O



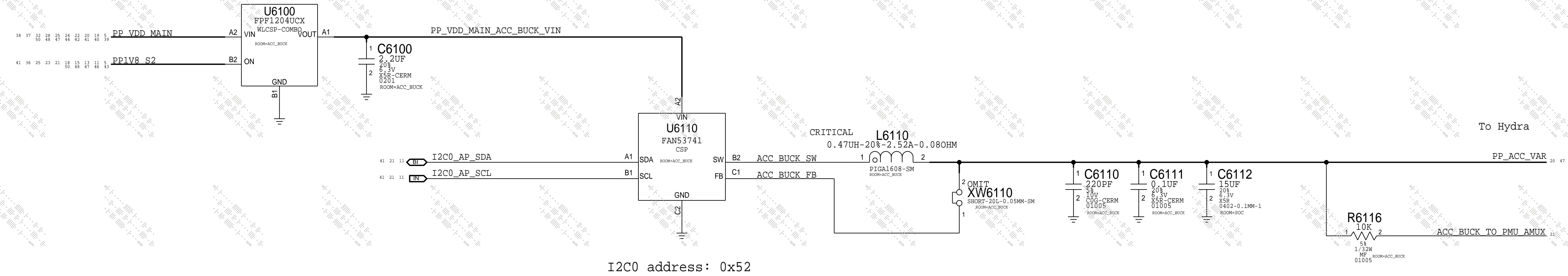
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		PAGE	58 OF 80
		SHEET	43 OF 81

VDD_MAIN OV CUT-OFF CIRCUIT



PAGE TITLE		
I/O: Overvoltage Cut-Off Circuit		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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BRANCH	PAGE	59 OF 80
SHEET		44 OF 81

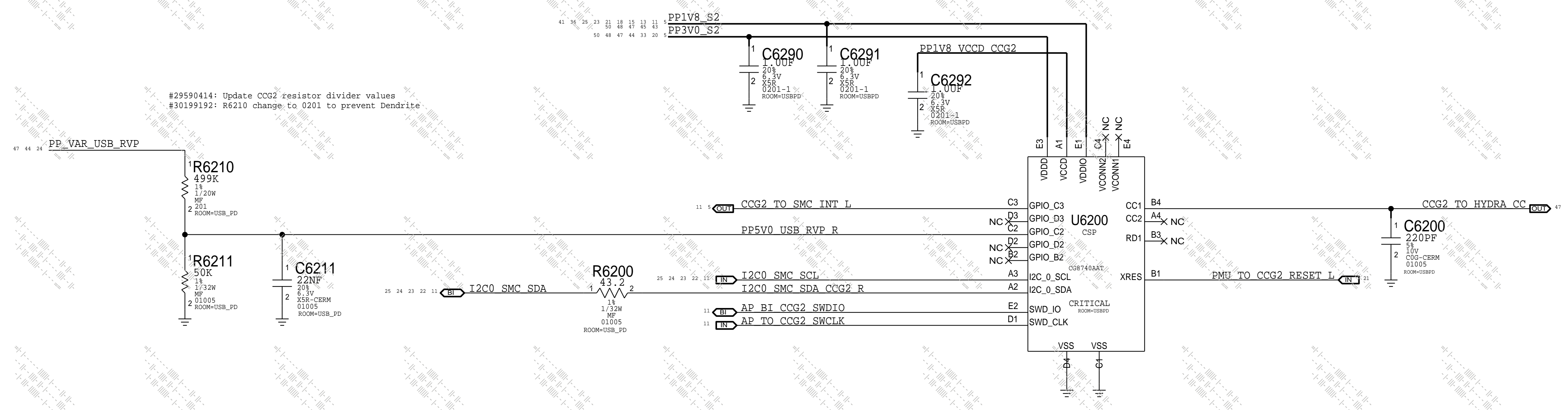
ACCESSORY BUCK



I2C0 address: 0x52

PAGE TITLE			I/O: Accessory Buck		
DRAWING NUMBER		051-02159	SIZE	D	
REVISION		10.0.0			
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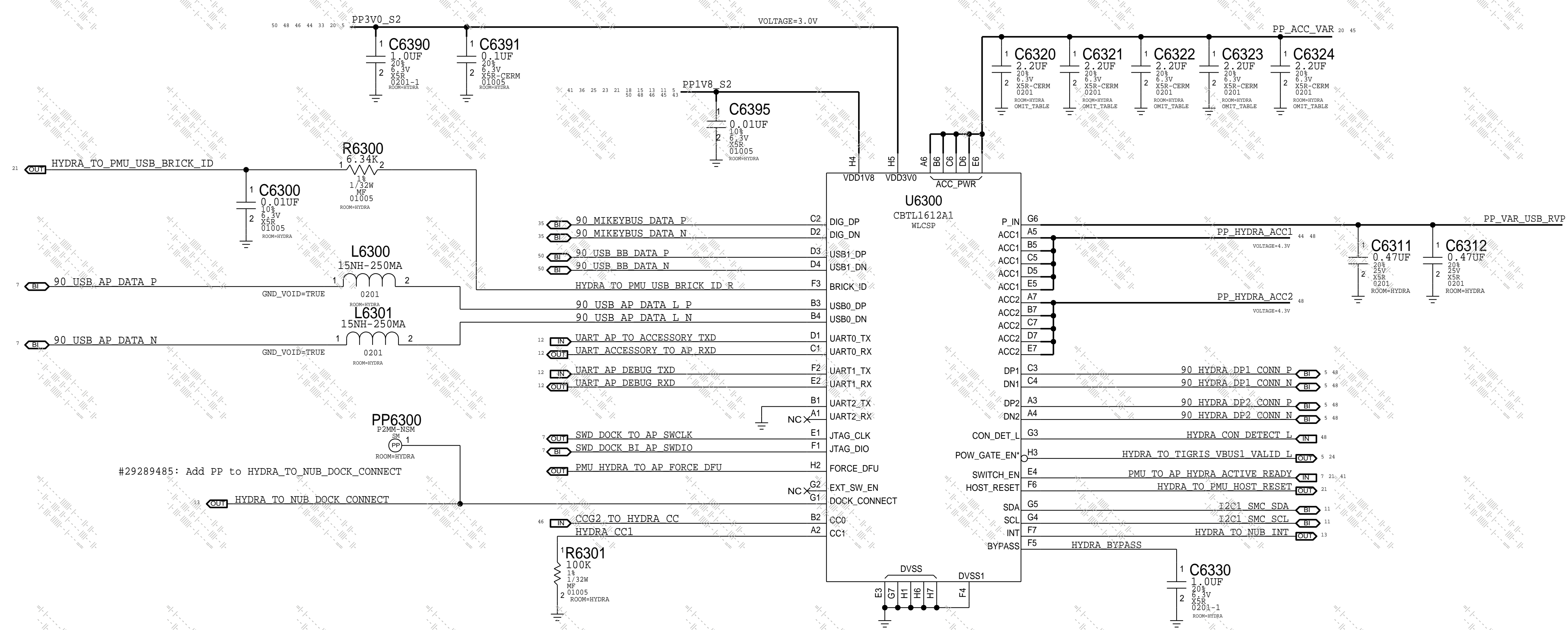
USB-PD



PAGE TITLE			I/O: USB PD		
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		REVISION	10.0.0		
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		SHEET	46 OF 81		

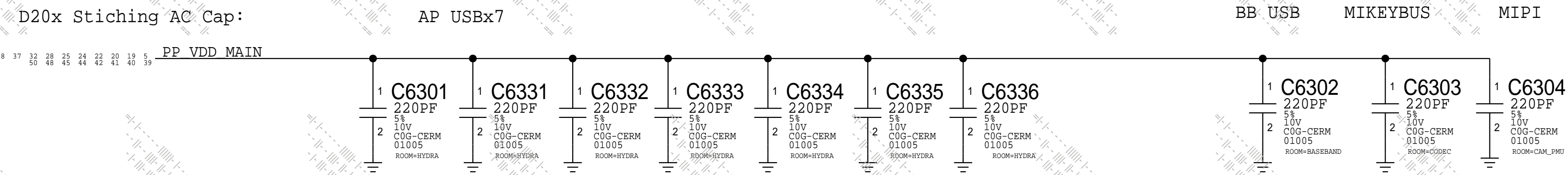
HYDRA

I2C ADDRESS: 0011010X

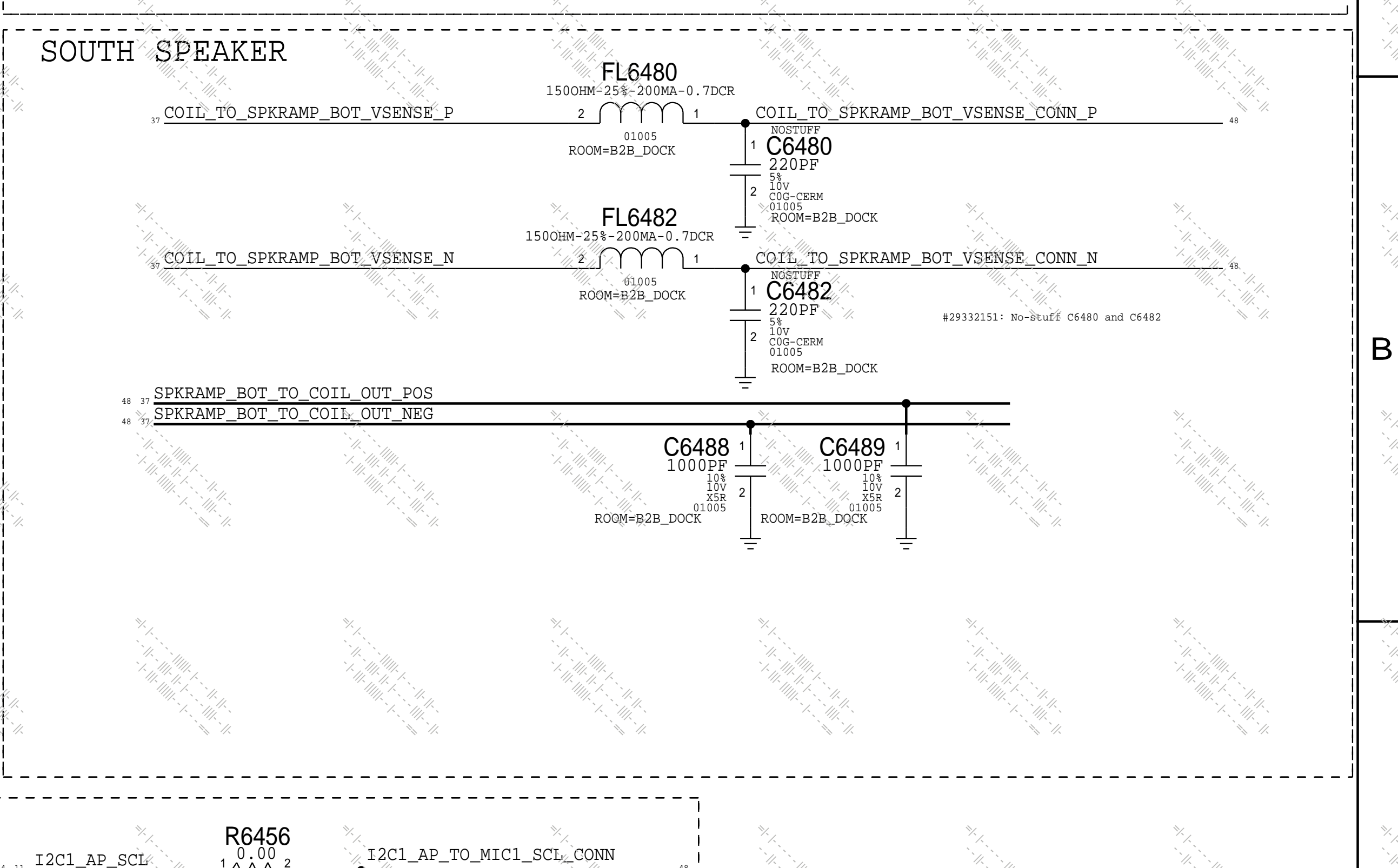
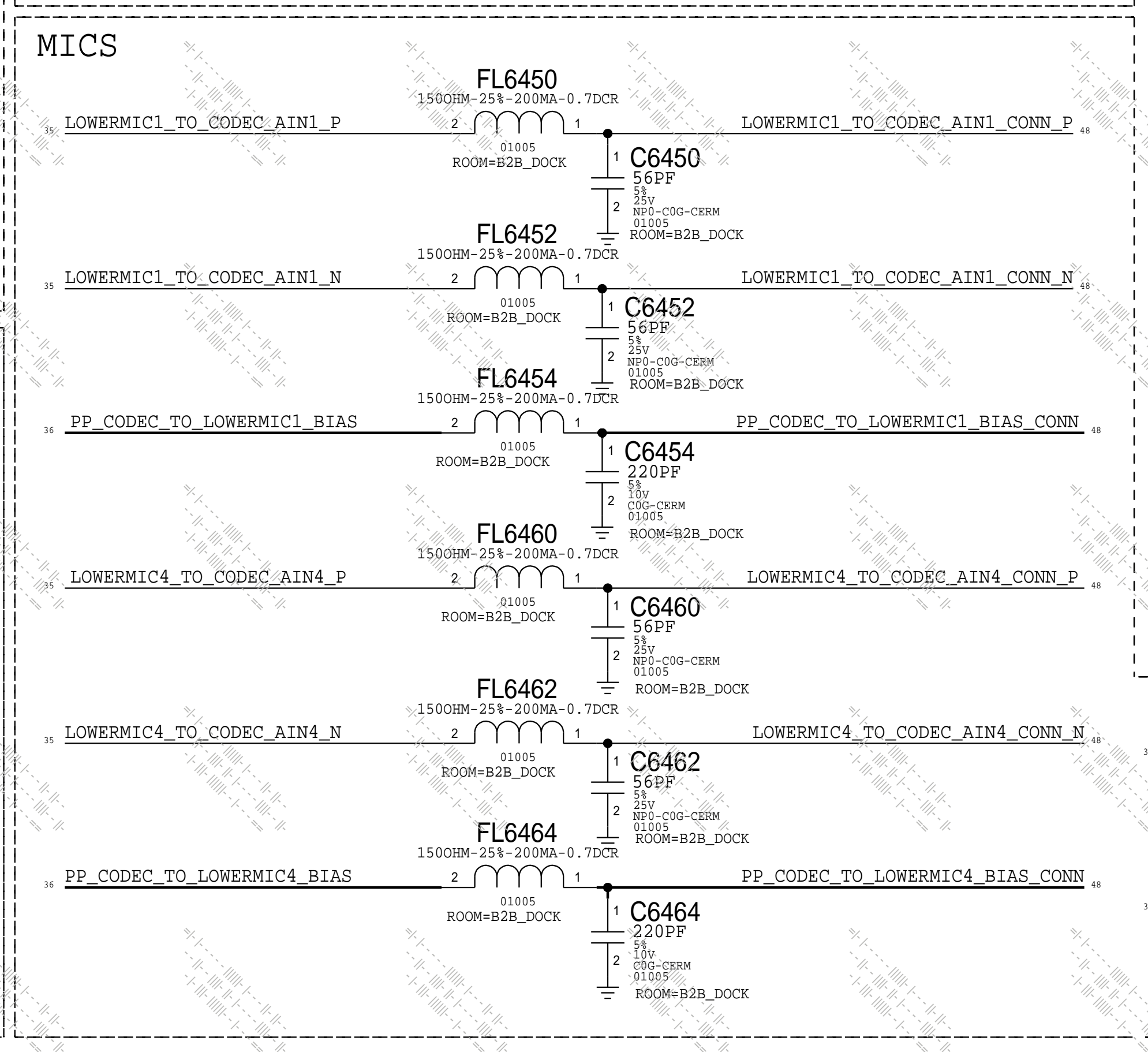
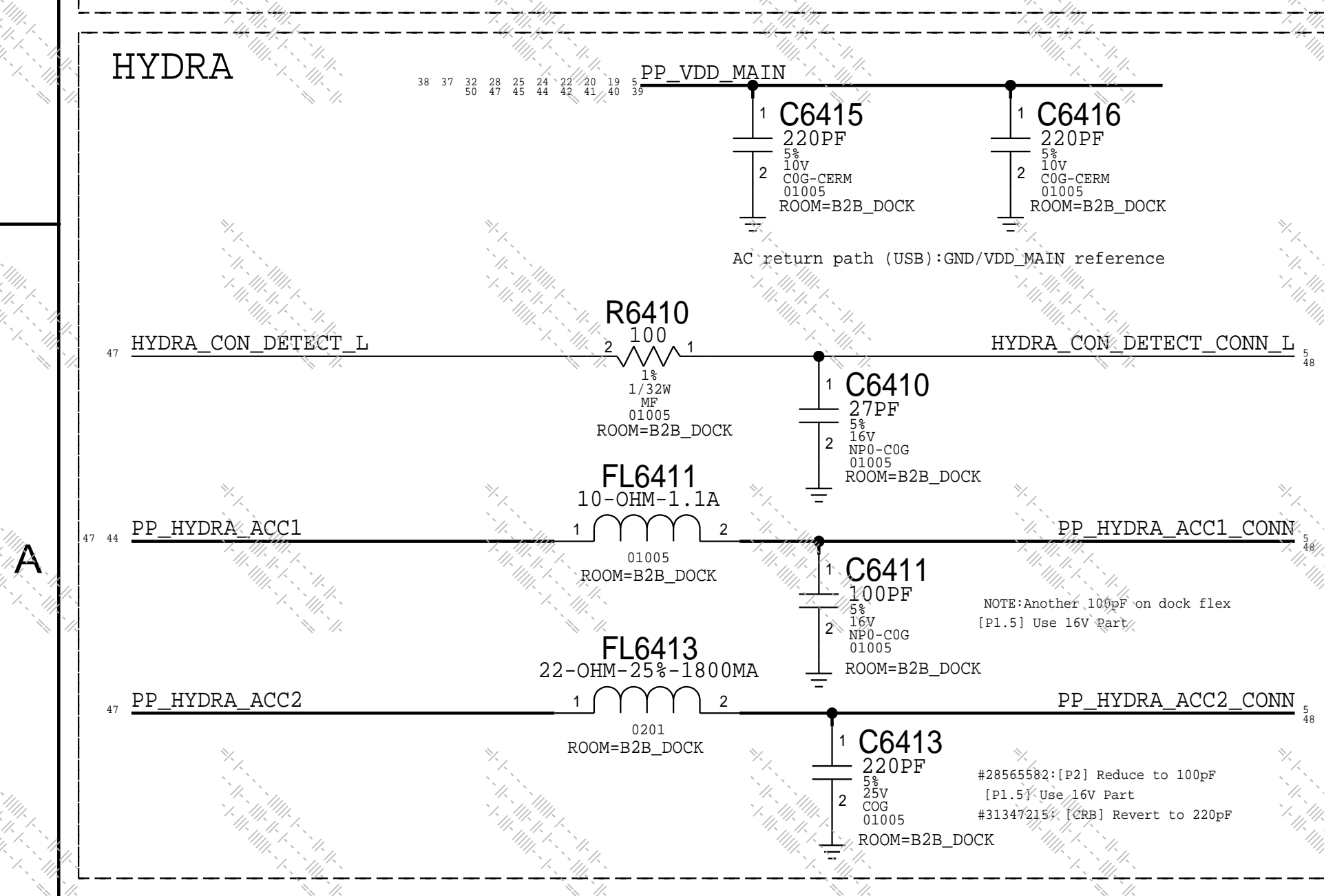
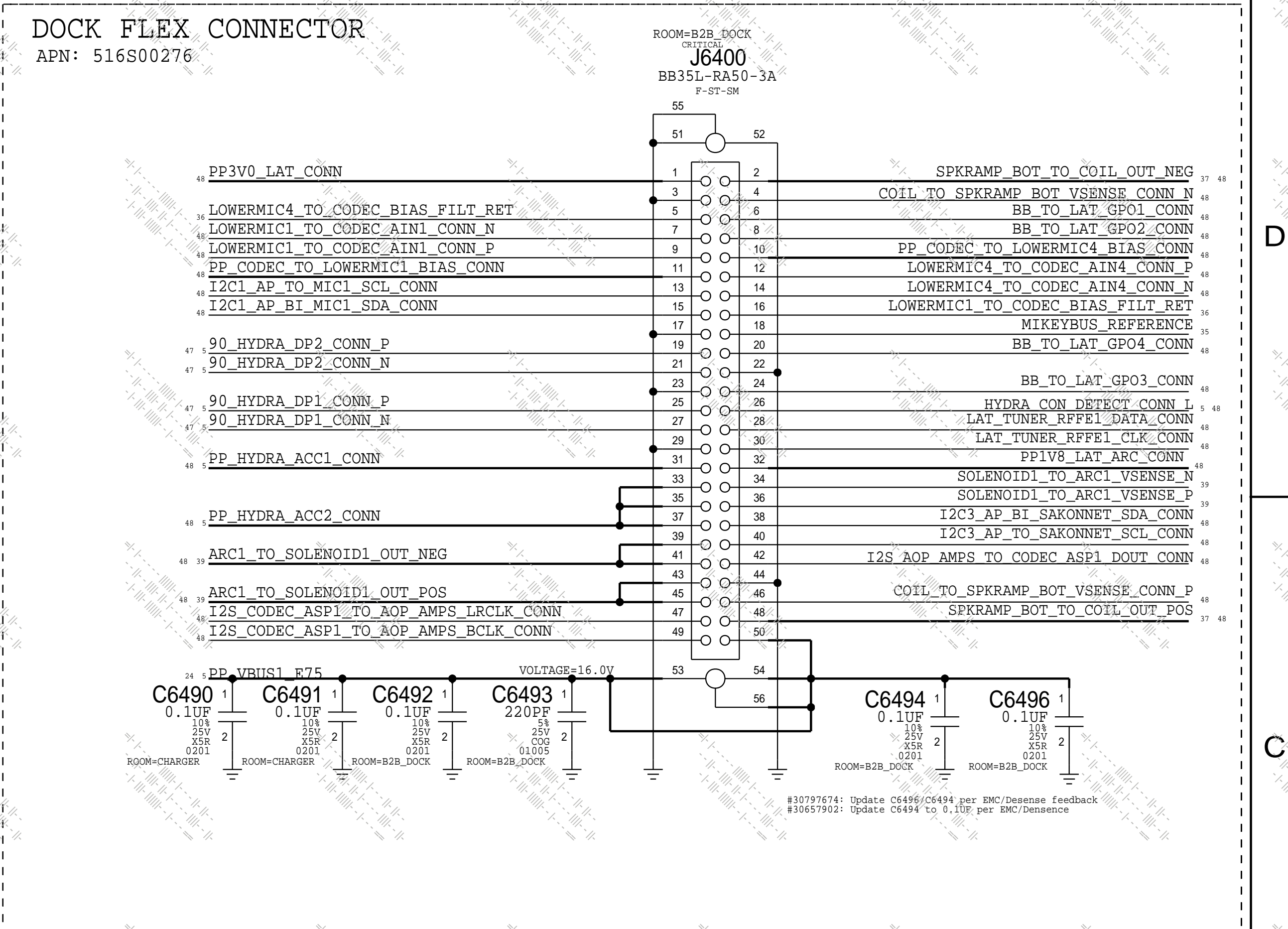
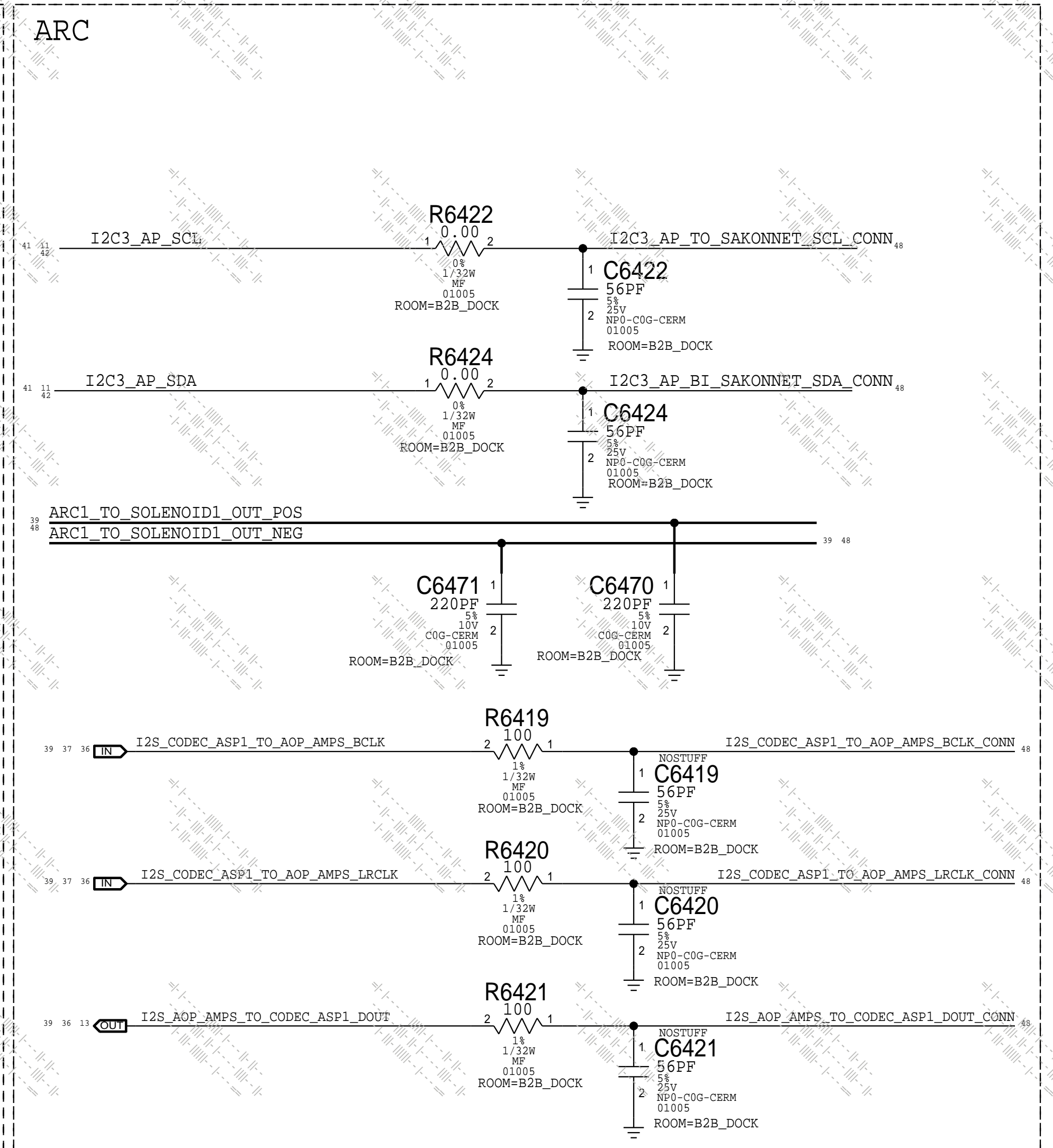
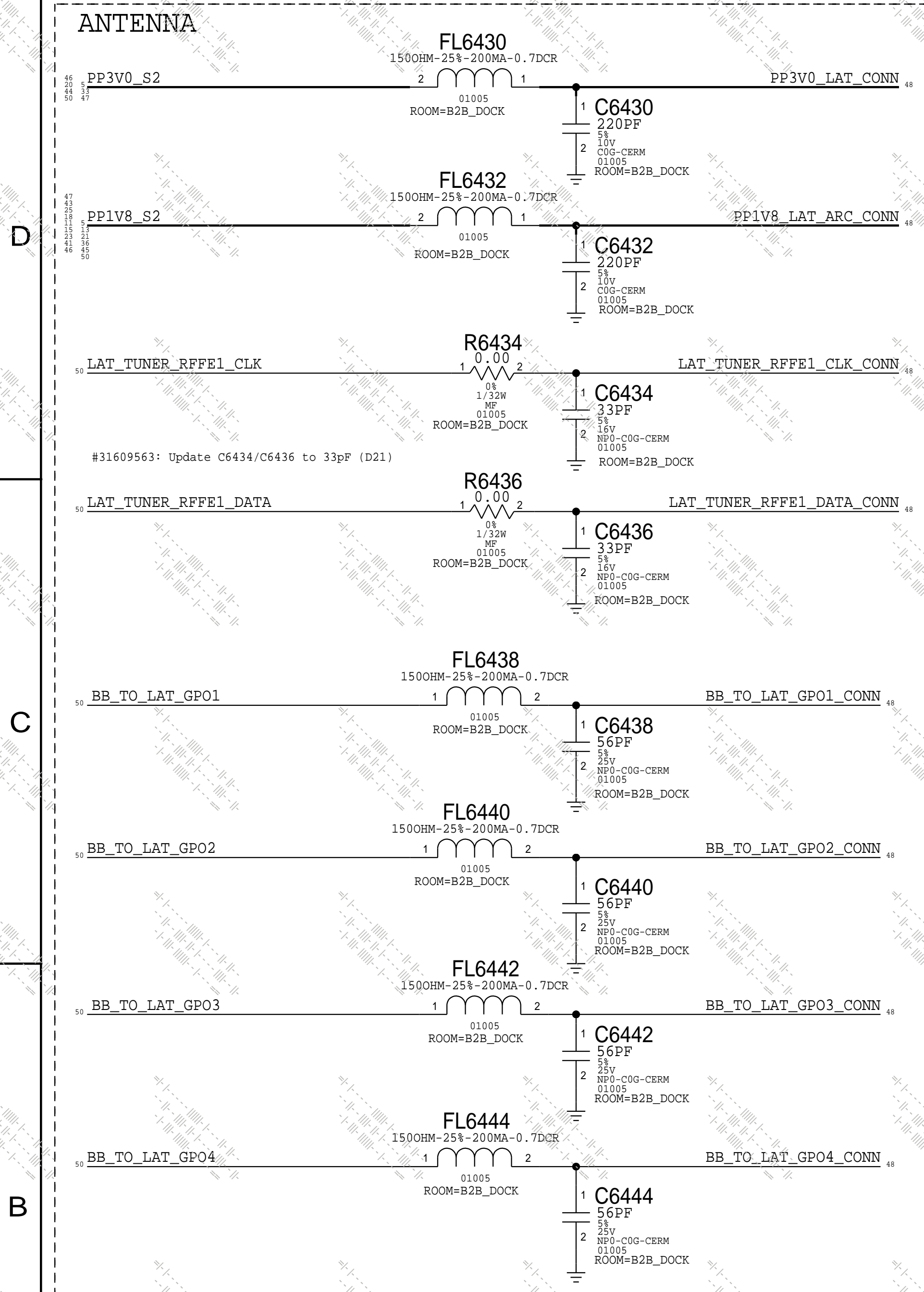


#29289485: Add PP to HYDRA_TO_NUB_DOCK_CONNECT

UART TX/RX pin names on Hydra match signal names (i.e. TX pin is input and connects to TX signal)



PAGE TITLE		I/O: Hydra	
		DRAWING NUMBER	051-02159
		REVISION	10.0.0
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		PAGE	63 OF 80
		SHEET	47 OF 81



I/O: B2B DOCK

Apple Inc.


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		REVISION	10.0.0		
		BRANCH			
		PAGE	64 OF 80		
		SHEET	48 OF 81		

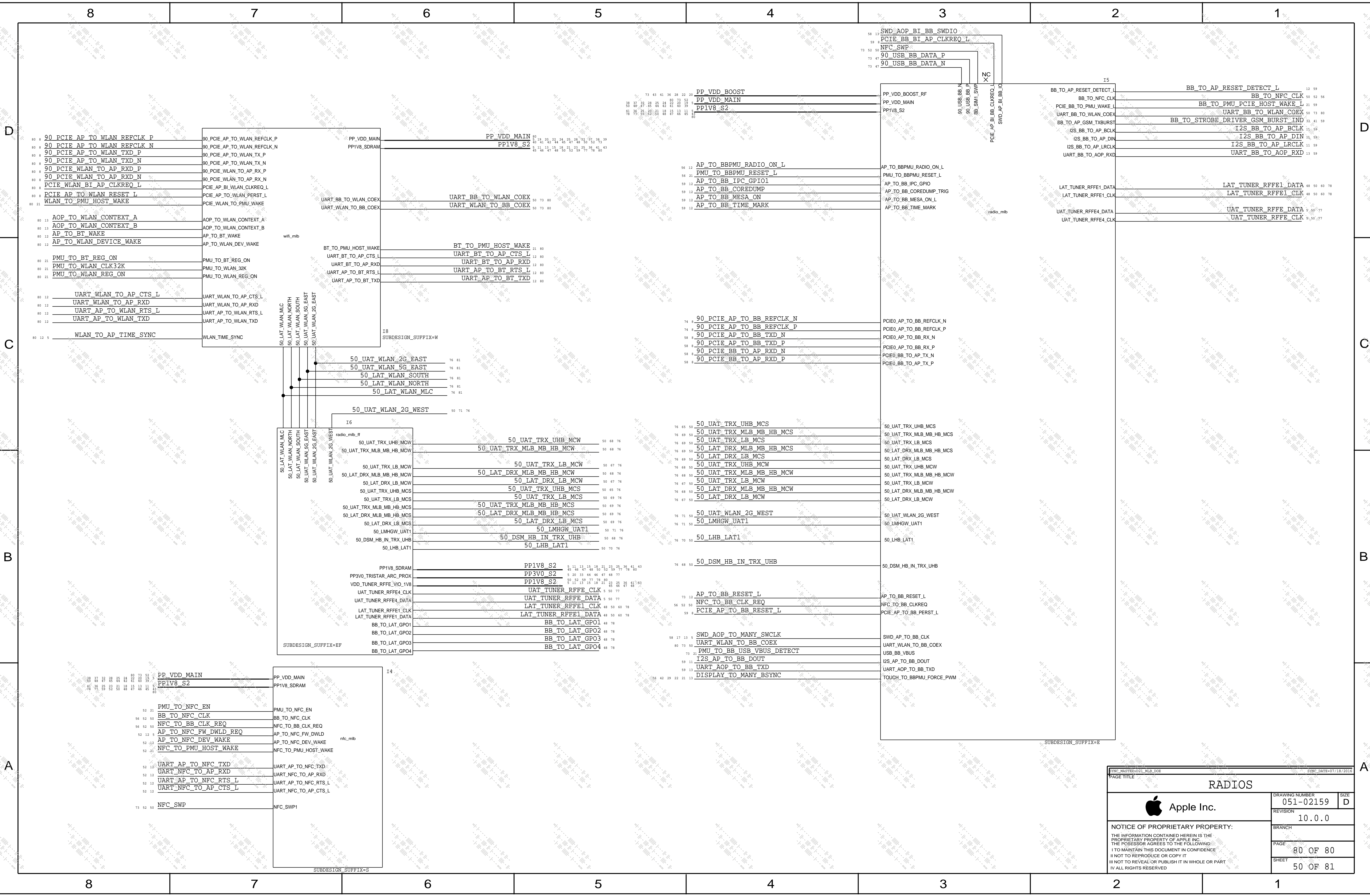
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I2C MAP

(see #28857723 updates)

Diags ID	Bus	Device	7-Bit Address	8-Bit Address	Device Max Speed	Operating Speed	Net Name
0	AP I2C0	Agnes (System PMU)	0x74	0xE8	400 Kbps	400 Kbps	I2C0_AP
		Chestnut (Display PMU)	0x27	0x4E	400 Kbps		
		AccessoryBuck	0x52	0xA4	400 Kbps		
		Muon (Backlight Controller 2)	0x62	0xC4	1 Mbps		
1	AP I2C1	MIC1 Temp Sensor (South)	0x54	0xA8	1 Mbps	100 Kbps	I2C1_AP
		MIC2 Temp Sensor (North Rear)	0x56	0xAC	1 Mbps		
2	AP I2C2	Adare (Top Speaker Amp)	0x40	0x80	1 Mbps	1 Mbps	I2C2_AP
		Convoy (Top Speaker Cap Sense)	0x21	0x42	1 Mbps		
3	AP I2C3	EEPROM	0x51	0xA2	400 Kbps	400 Kbps	I2C3_AP
		Muon (Backlight Controller 1)	0x62	0xC4	400 Kbps		
		Sakonnet (Arc: Hall Effect Sensor)	0x08	0x10	1 Mbps		
		EEPROM	0x50	0xA0	400 Kbps		
ISP I2C0		Casper (Rear Wide Camera)	0x10	0x20	1 Mbps	1 Mbps	I2C0_ISP
		Grunberg+ (AF/OIS Wide Camera)	0x3C	0x78	1 Mbps		
ISP I2C1		Billings (Rear Tele Camera)	0x20	0x40	1 Mbps	1 Mbps	I2C1_ISP
		Edwin (AF Tele Camera)	0x0D	0x1A	1 Mbps		
ISP I2C2		Concord (Front Camera)	0x10	0x20	1 Mbps	400 Kbps	I2C2_ISP
ISP I2C3		Neon (Strobe - CW : LM3566)	0x63	0xC6	1 Mbps	400 Kbps	I2C3_ISP
		Ansel (Camera PMU)	0x40	0x80	1 Mbps		
		Neon (Strobe - AM : LM35662)	0x67	0xCE	1 Mbps		
SEP I2C		EEPROM	0x51	0xA2	400 Kbps	400 Kbps	I2C4_AP
4	AOP I2C0	Doppler (Prox Sensor)	0x58	0xB0	1 Mbps	400 Kbps	I2C0_AOP
		CT709 (ALS : Firefish)	0x29	0x52	400 Kbps		
5	AOP I2C1	Adare (Bottom Speaker Amp)	0x40	0x80	1 Mbps	1 Mbps	I2C1_AOP
		Adare (Arc: Driver)	0x41	0x82	1 Mbps		
		Apache3 (Mesa Power Supply)	0x61	0xC2	1 Mbps		I2C1_AOP_ISO
		Turtle	0x2C	0x58	1 Mbps		
6	SMC I2C0	Tigris2 (Charger)	0x71	0xE2	400 Kbps	400 Kbps	I2C0_SMC
		TPS61280 (VDD Boost)	0x75	0xEA	400 Kbps		
		CCG2 (USB PD)	0x12 (0x08)	0x24 (0x10)	1 Mbps		
		Iktara	0x39	0x72	400 Kbps		
		SN45546 (Gas Gauge)	0x55	0xAA	400 Kbps		
7	SMC I2C1	Hydra	0x1A	0x34	400 Kbps	400 Kbps	I2C1_SMC

PAGE TITLE		SYSTEM: I2C MAP	
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		65 OF 80	
		SHEET	
		49 OF 81	



		RADIOS	
DRAWING NUMBER 051-02159		SIZE D	
REVISION 10.0.0		BRANCH	
PAGE 80 OF 80		SHEET 50 OF 81	
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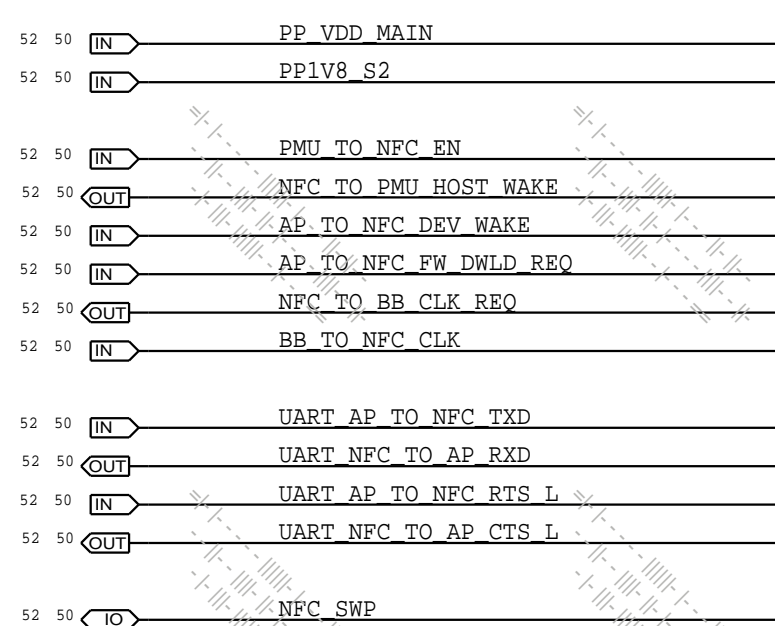
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- 2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
- 3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV	ECN	DESCRIPTION OF REVISION	CK APPD	DATE
10	0008927012	ENGINEERING RELEASED		2017-06-06

NFC_MLB D20/D21

MAY 15, 2017

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
138S00159	3	CAP,SOFT TERM,2.2UF,6.3V,0201	C7500_S,C7502_S,C7505_S	CRITICAL	SOFT_CAP
138S00831	3	CAP,TYPICAL,2.2UF,6.3V,0201	C7500_S,C7502_S,C7505_S	CRITICAL	TYPICAL_CAP



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
131S00882	1	390PF, 0201, 2%, 25V	C7514_S	D20_JFN
131S00026	1	820PF, 0201, 2%, 25V	C7515_S	D20_JFN
131S00033	1	680PF, 0201, 2%, 25V	C7516_S	D20_JFN
131S00883	1	220PF, 0201, 2%, 50V	C7518_S	D20_JFN
131S00025	1	1000PF, 0201, 2%, 25V	C7510_S	D20_JFN
131S00025	1	1000PF, 0201, 2%, 25V	C7513_S	D20_JFN
157S00022	1	TDK, BALUN, 11T	T7500_S	D20_JFN

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
131S00138	1	39PF, 0201, 2%, 50V	C7512_S	D21_JFN
131S00081	1	270PF, 0201, 2%, 25V	C7514_S	D21_JFN
131S00025	1	1000PF, 0201, 2%, 25V	C7515_S	D21_JFN
131S00033	1	680PF, 0201, 2%, 25V	C7516_S	D21_JFN
131S00019	1	150PF, 0201, 2%, 50V	C7518_S	D21_JFN
131S00033	1	680PF, 0201, 2%, 25V	C7510_S	D21_JFN
131S00033	1	680PF, 0201, 2%, 25V	C7513_S	D21_JFN
157S00023	1	MURATA, BALUN, 11T	T7500_S	D21_JFN

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
131S00138	1	39PF, 0201, 2%, 50V	C7512_S	D20_ROW
131S00016	1	470PF, 0201, 2%, 25V	C7514_S	D20_ROW
131S00025	1	1000PF, 0201, 2%, 25V	C7515_S	D20_ROW
131S00825	1	560PF, 0201, 2%, 25V	C7516_S	D20_ROW
131S00883	1	220PF, 0201, 2%, 50V	C7518_S	D20_ROW
131S00026	1	820PF, 0201, 2%, 25V	C7510_S	D20_ROW
131S00026	1	820PF, 0201, 2%, 25V	C7513_S	D20_ROW
157S00022	1	TDK, BALUN, 11T	T7500_S	D20_ROW

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
131S00138	1	39PF, 0201, 2%, 50V	C7512_S	D21_ROW
131S00081	1	270PF, 0201, 2%, 25V	C7514_S	D21_ROW
131S00025	1	1000PF, 0201, 2%, 25V	C7515_S	D21_ROW
131S00033	1	680PF, 0201, 2%, 25V	C7516_S	D21_ROW
131S00019	1	150PF, 0201, 2%, 50V	C7518_S	D21_ROW
131S00033	1	680PF, 0201, 2%, 25V	C7510_S	D21_ROW
131S00033	1	680PF, 0201, 2%, 25V	C7513_S	D21_ROW
157S00023	1	MURATA, BALUN, 11T	T7500_S	D21_ROW

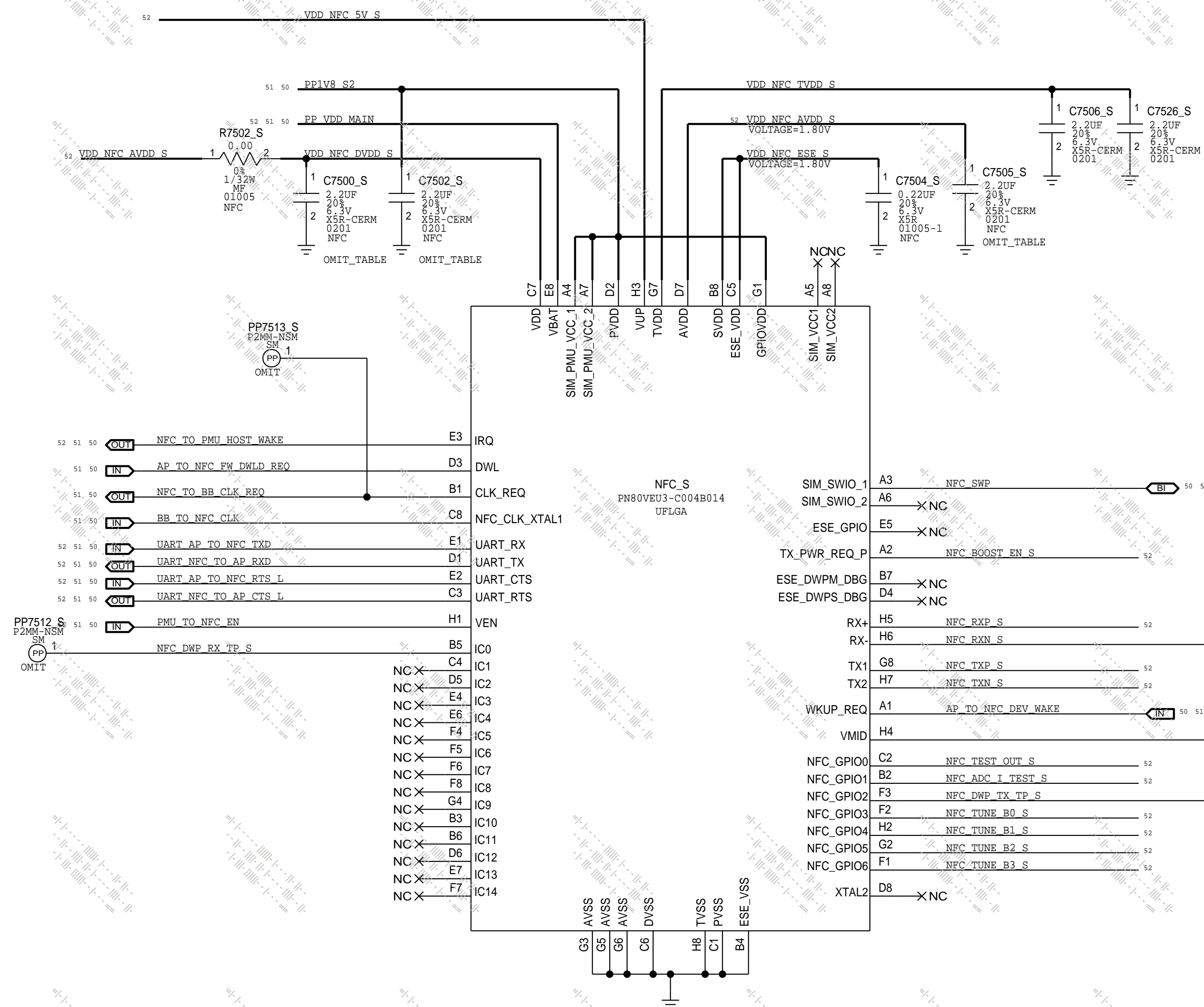
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131S00025	1	1000PF, 0201, 2%, 25V	C7515_S	D201
131S00825	1	560PF, 0201, 2%, 25V	C7516_S	D201
131S00883	1	220PF, 0201, 2%, 50V	C7518_S	D201
131S00026	1	820PF, 0201, 2%, 25V	C7510_S	D201
131S00026	1	820PF, 0201, 2%, 25V	C7513_S	D201
157S00022	1	TDK, BALUN, 11T	T7500_S	D201

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
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131S00081	1	270PF, 0201, 2%, 25V	C7514_S	D211
131S00025	1	1000PF, 0201, 2%, 25V	C7515_S	D211
131S00033	1	680PF, 0201, 2%, 25V	C7516_S	D211
131S00019	1	150PF, 0201, 2%, 50V	C7518_S	D211
131S00033	1	680PF, 0201, 2%, 25V	C7510_S	D211
131S00033	1	680PF, 0201, 2%, 25V	C7513_S	D211
157S00023	1	MURATA, BALUN, 11T	T7500_S	D211

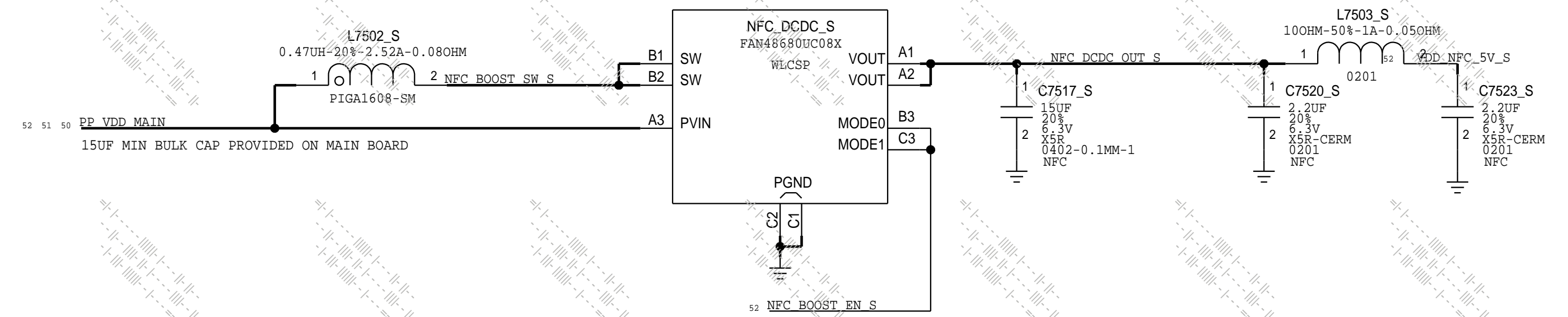
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		PAGE	1 OF 75
		SHEET	51 OF 81

STOCKHOLM

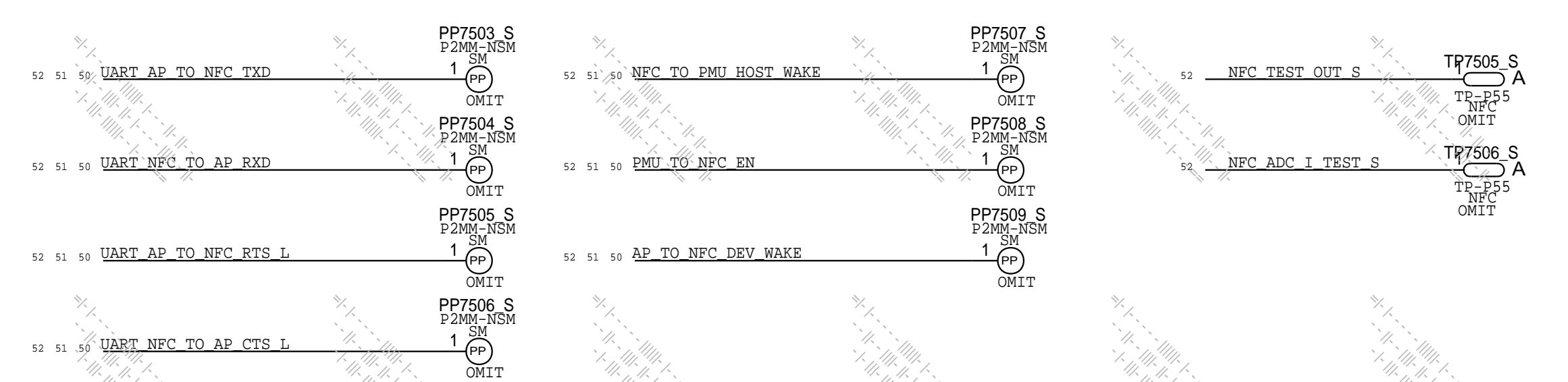
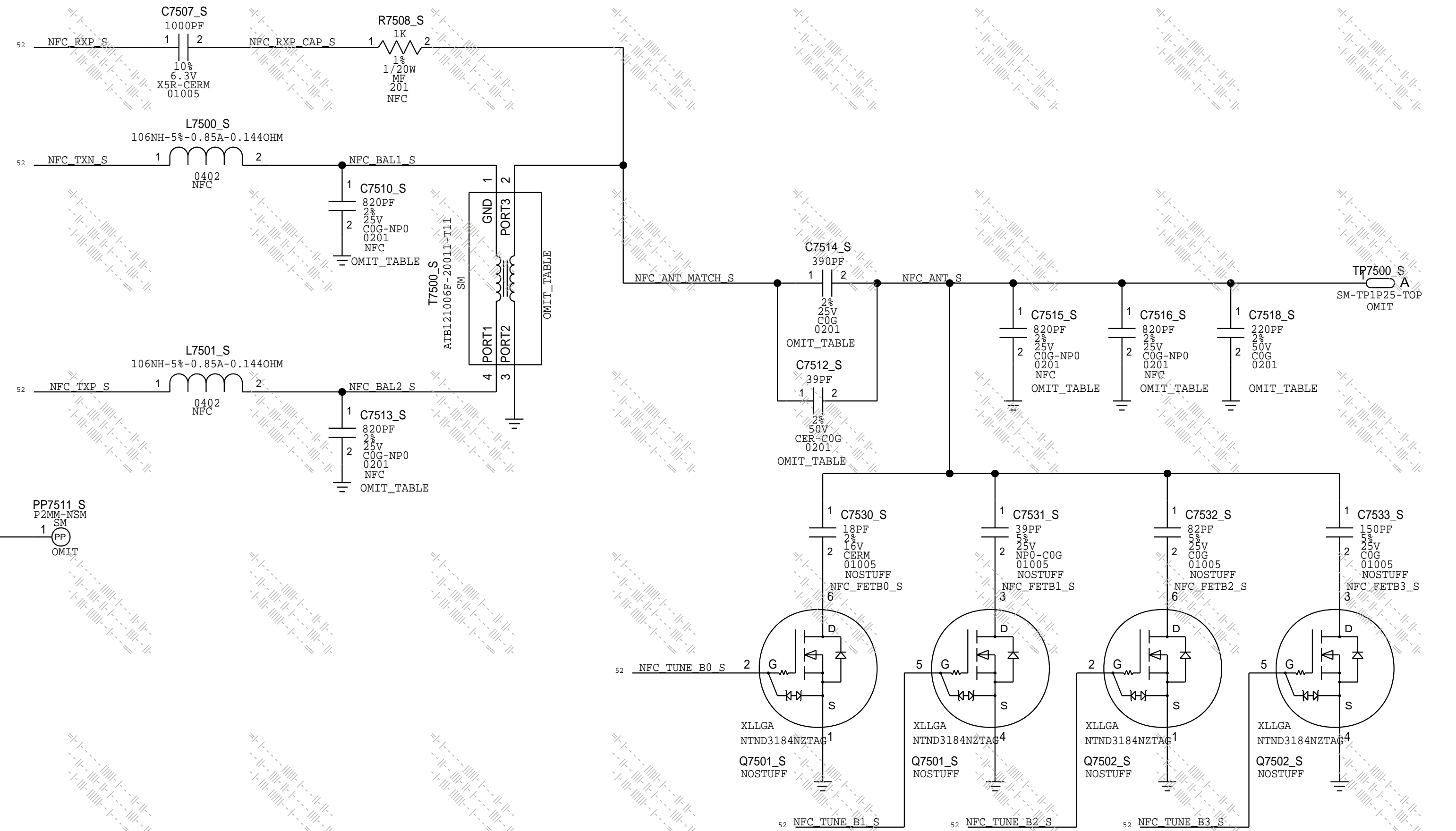
NFC CONTROLLER



5V BOOSTER



NFC FRONT END



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		PAGE	75 OF 75
		SHEET	52 OF 81

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REV	ECN	DESCRIPTION OF REVISION	CK APPD	DATE
10	0008927012	ENGINEERING RELEASED		2017-06-06

(MAV17.2/3)

D21 RADIO_MLB

06/06/2017

0.122.0

LAST_MODIFICATION= Tue Jun 6 18:57:01 2017


PAGE	CSA	CONTENTS	SYNC	DATE
53	1	FRONT PAGE		
54	2	HIERARCHY		
55	3	PMIC: BUCKS & LDOS		
56	4	PMIC: CLOCKS & CONTROL		
57	5	BB: POWER		
58	6	BB: CONTROL & HS PERIPHERALS [6]		
59	7	BB: GPIOs & QLINK		
60	8	XCVR		
61	9	XCVR		
62	10	QPOET MODULE		
63	11	LB PAD		
64	12	HB PAD		
65	13	UHB PAD		
66	14	2G PA		
67	15	LB DSM		
68	16	HB DSM		
69	17	COUPLER2		
70	18	LOWER ANTENNA		
71	19	UPPER ANTENNA		
72	20	GNSS		
73	21	SIM, DEBUG CONN		
74	22	TEST POINTS	PROBE POINTS	07/18/2016

ALTERNATES

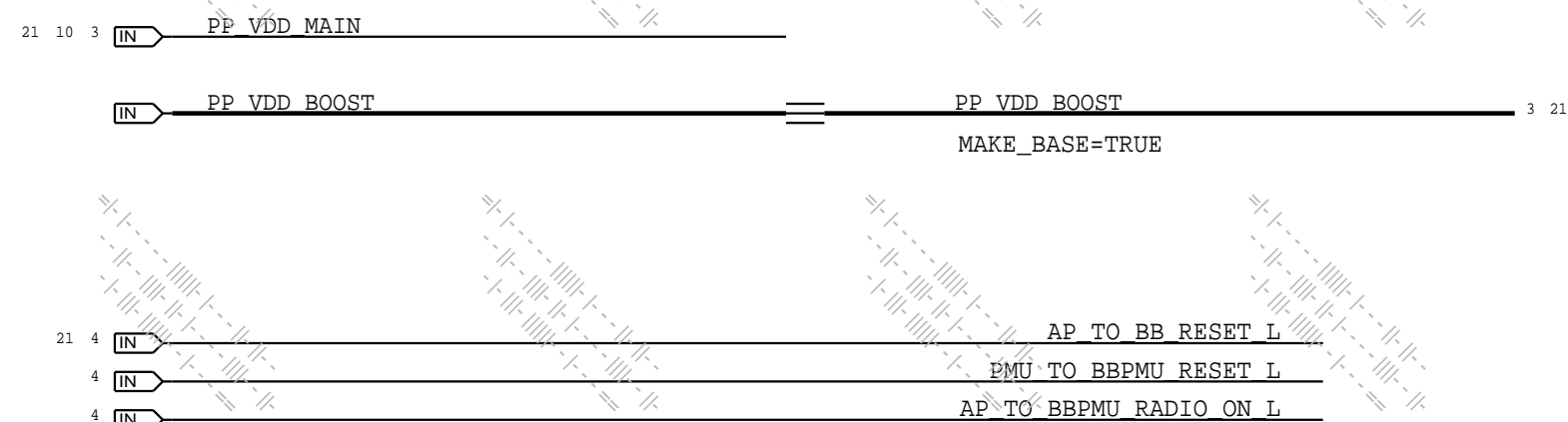
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335S00013	335S0894	U_EEPROM_E	IC, EEPROM	BOM_TABLE_ALTS
197S00093	197S00065	Y401_E	XTAL, 38P4MHZ	BOM_TABLE_ALTS
197S00067	197S00065	Y401_E	XTAL, 38P4MHZ	BOM_TABLE_ALTS
353S01287	353S01109	U_QET_E	ET MODULE, QPOET	BOM_TABLE_ALTS

SCH # : 951-03059
 PCB # : 920-02293
 BOM # : 939-02493

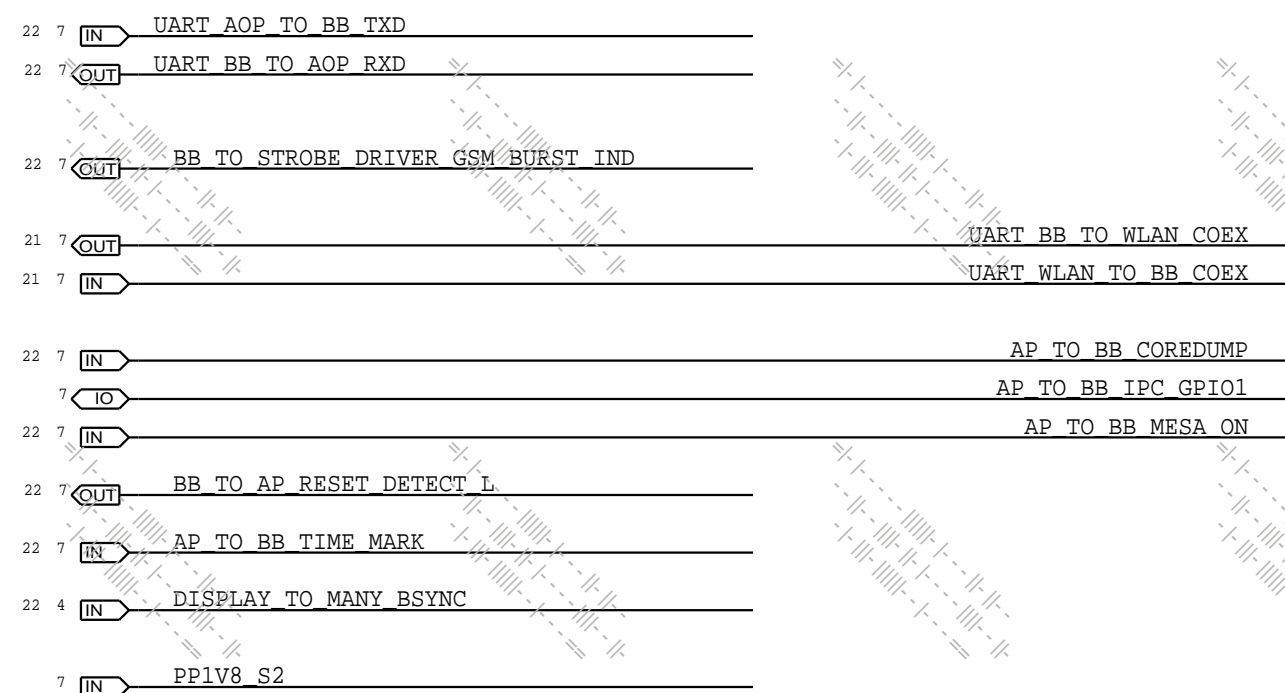
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		SHEET	53 OF 81

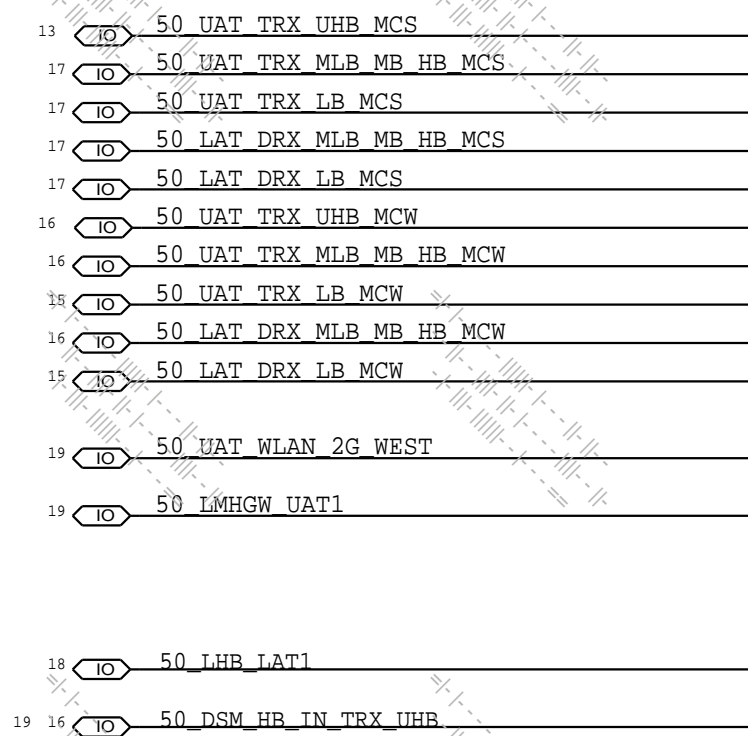
POWER



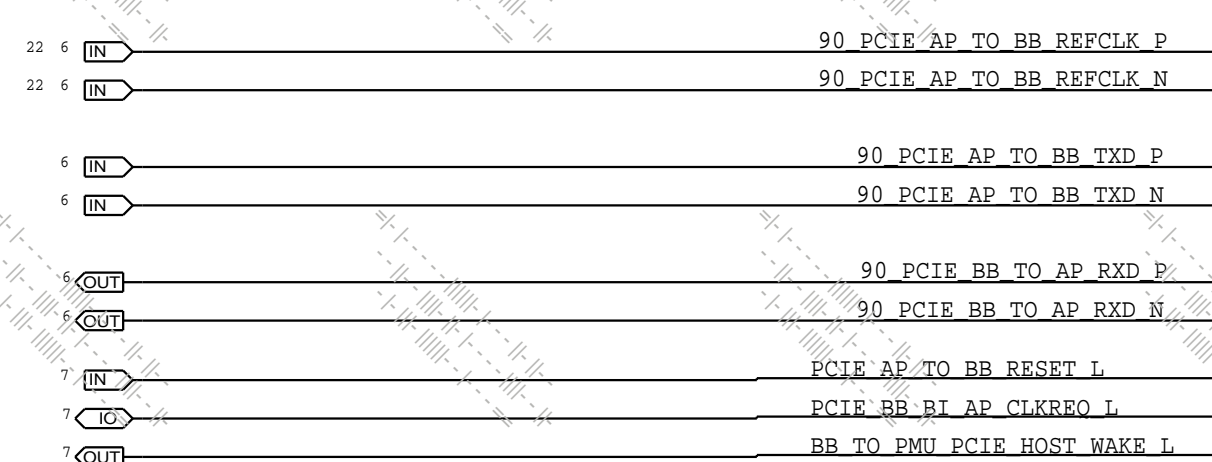
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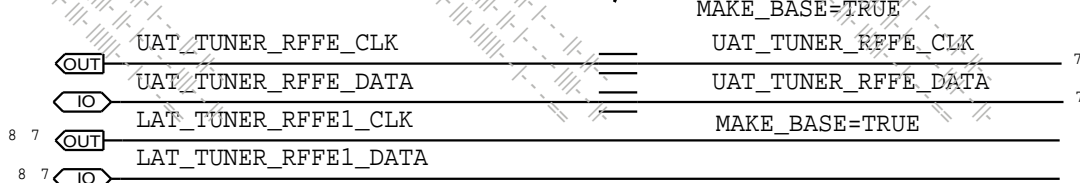
RF SIGNALS



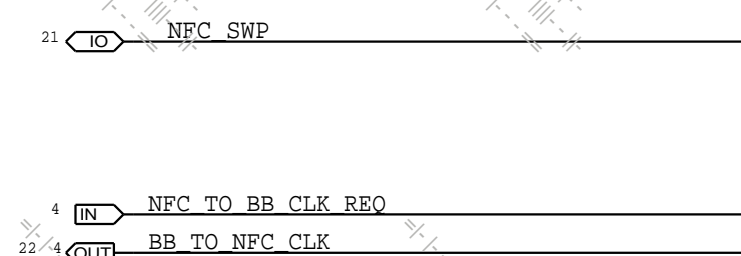
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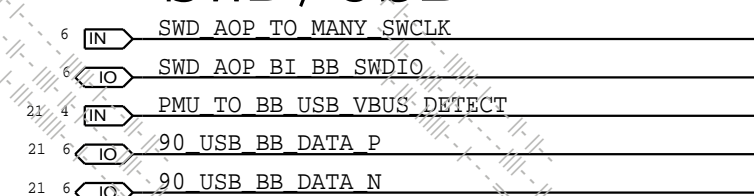
TUNER/DOCK



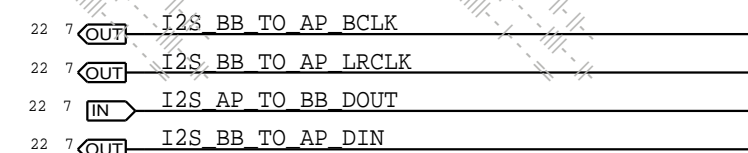
STOCKHOLM



SWD/USB

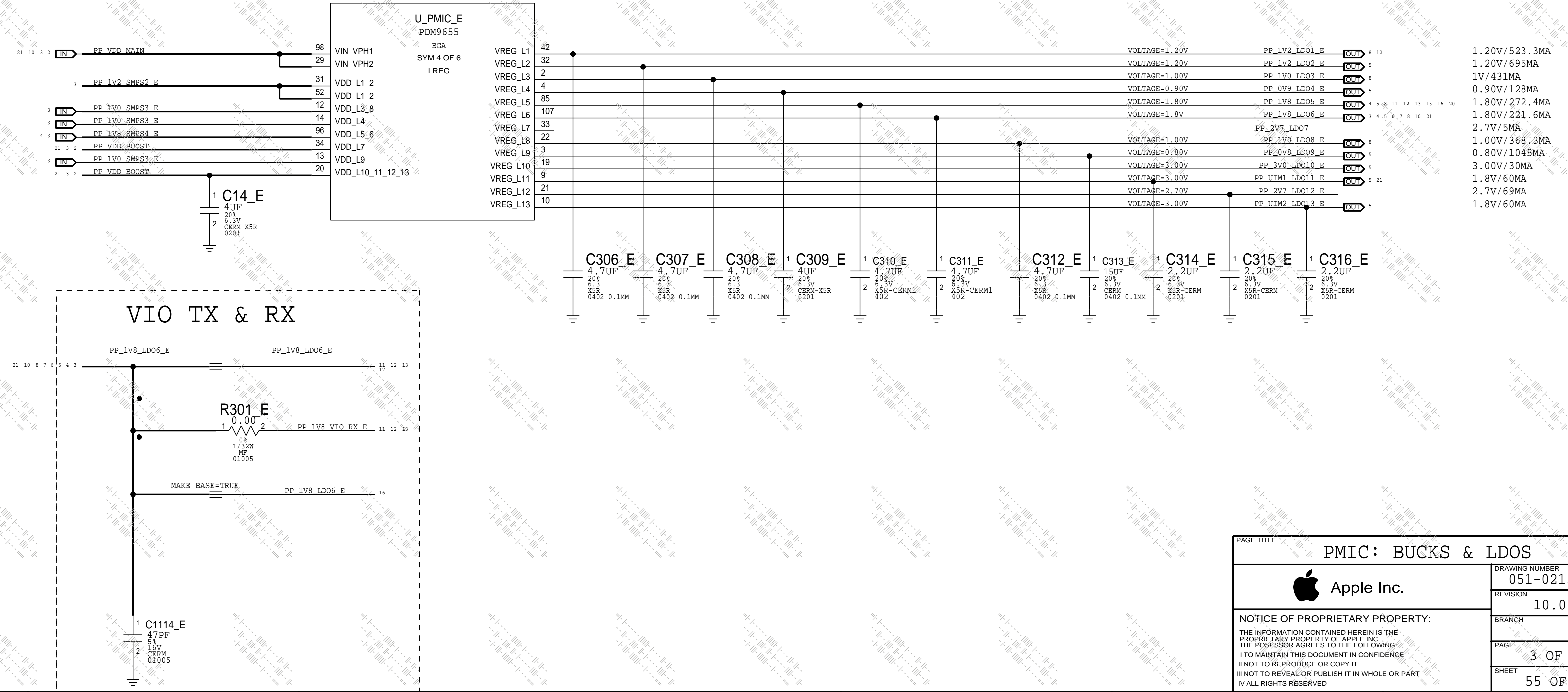
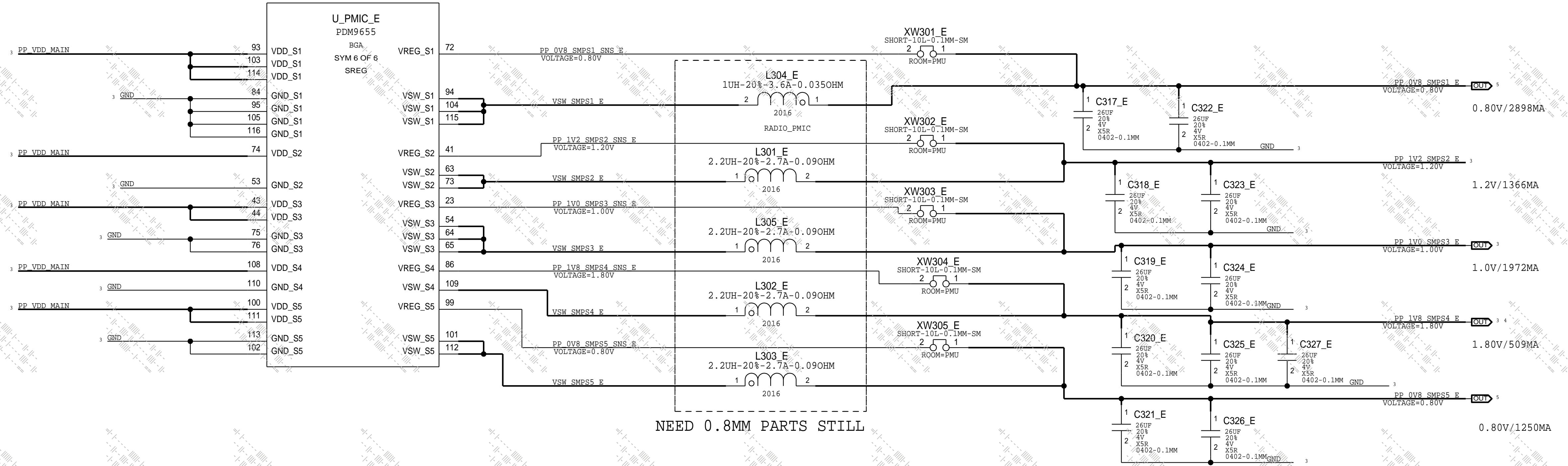
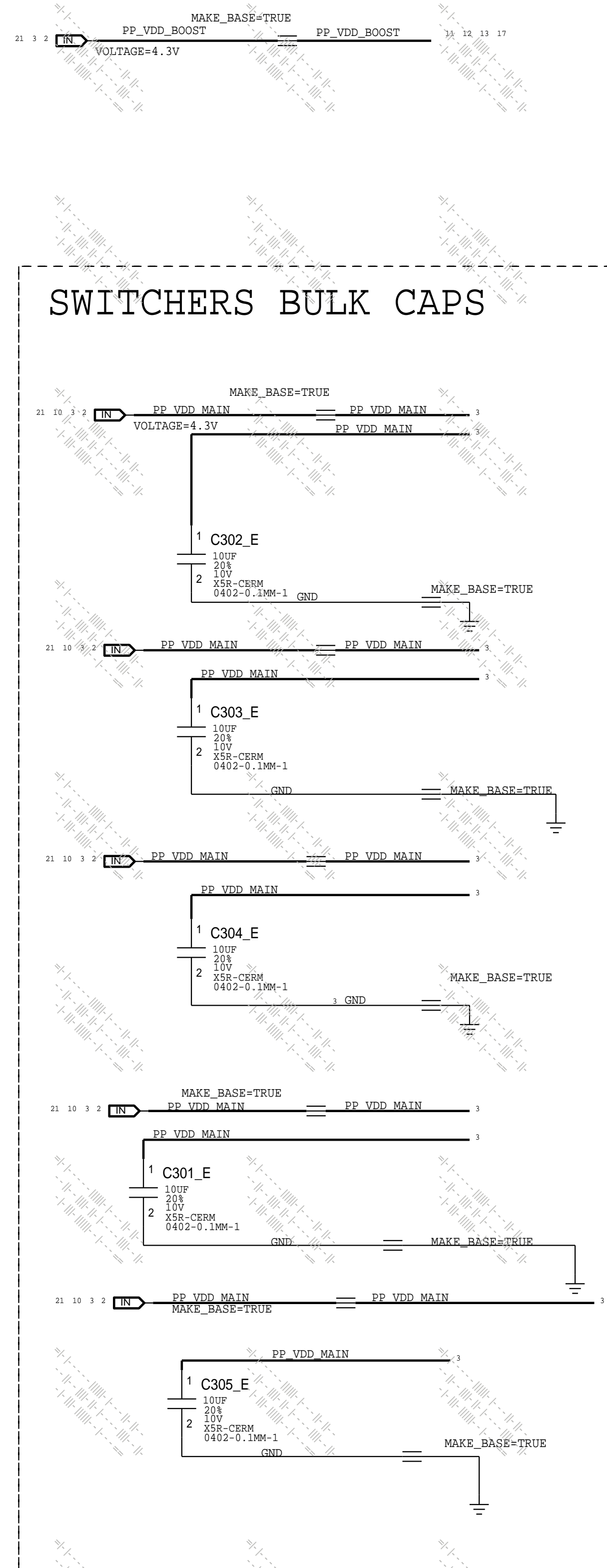


AUDIO

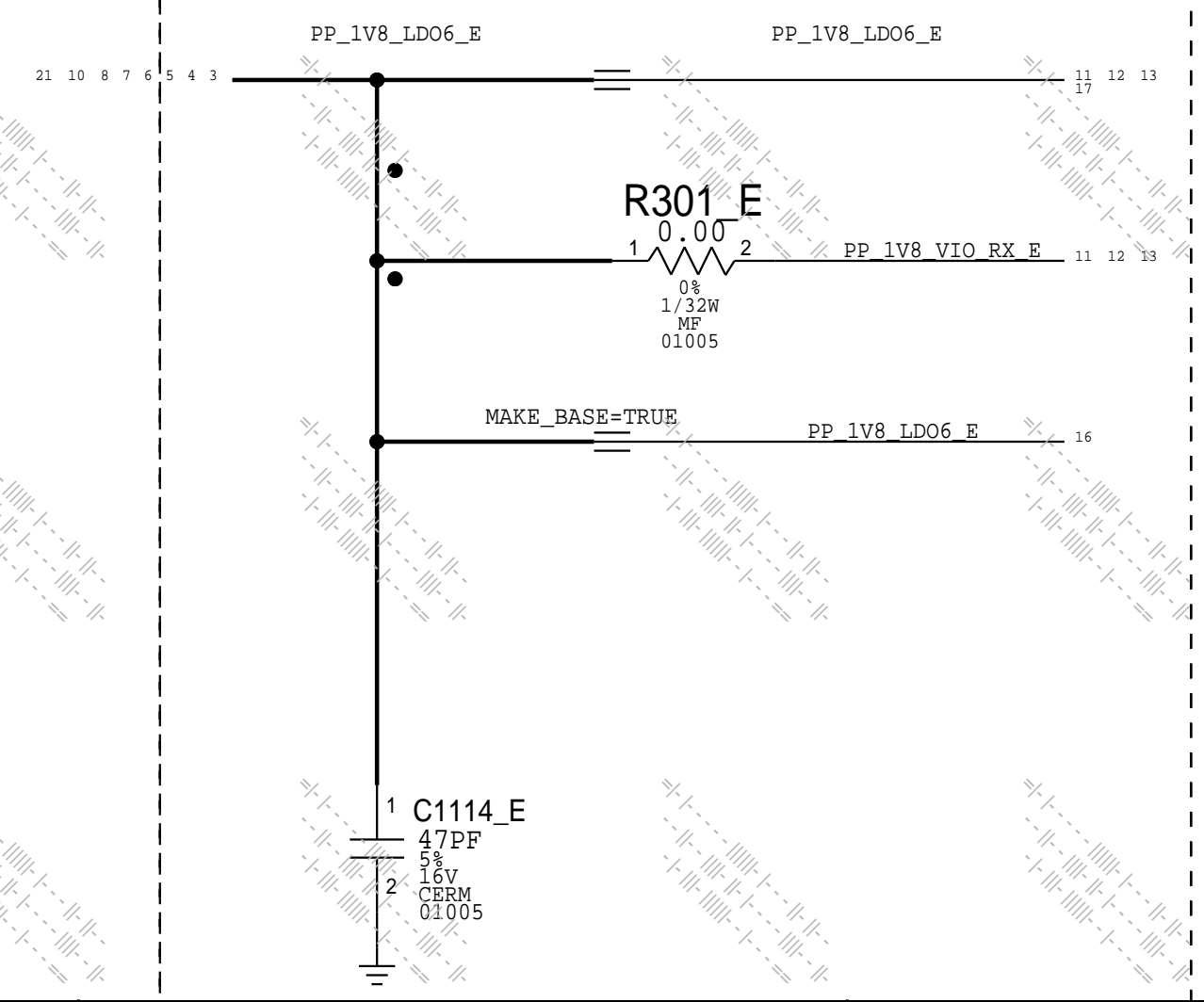


RF PMIC: SWITCHERS & LDOS

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VIO TX & RX



PP_V2_LDO1_E	1.20V/523.3MA
PP_V2_LDO2_E	1.20V/695MA
PP_V0_LDO3_E	1V/431MA
PP_V09_LDO4_E	0.90V/128MA
PP_V8_LDO5_E	1.80V/272.4MA
PP_V8_LDO6_E	1.80V/221.6MA
PP_V27_LDO7	2.7V/5MA
PP_V08_LDO8_E	1.00V/368.3MA
PP_V08_LDO9_E	0.80V/1045MA
PP_V0_LDO10_E	3.00V/30MA
PP_UIM1_LDO11_E	1.8V/60MA
PP_V27_LDO12_E	2.7V/69MA
PP_UIM2_LDO13_E	1.8V/60MA

PAGE TITLE		
PMIC: BUCKS & LDOS		
DRAWING NUMBER		SIZE
051-02159		D
REVISION		
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BRANCH		
PAGE		
3 OF 22		
SHEET		
55 OF 81		

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RF PMIC: XTAL, CLOCKS AND MISCELLANEOUS

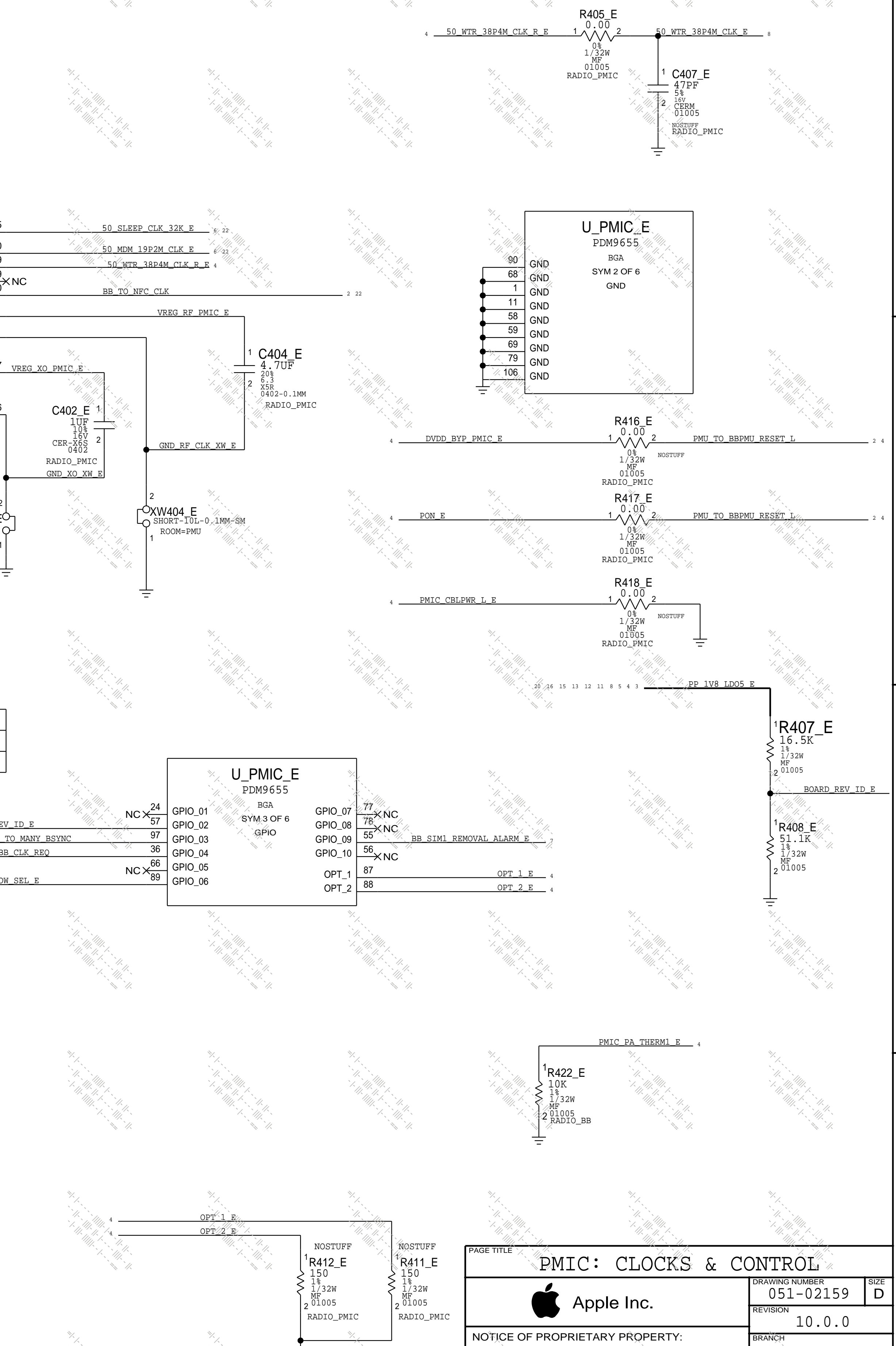
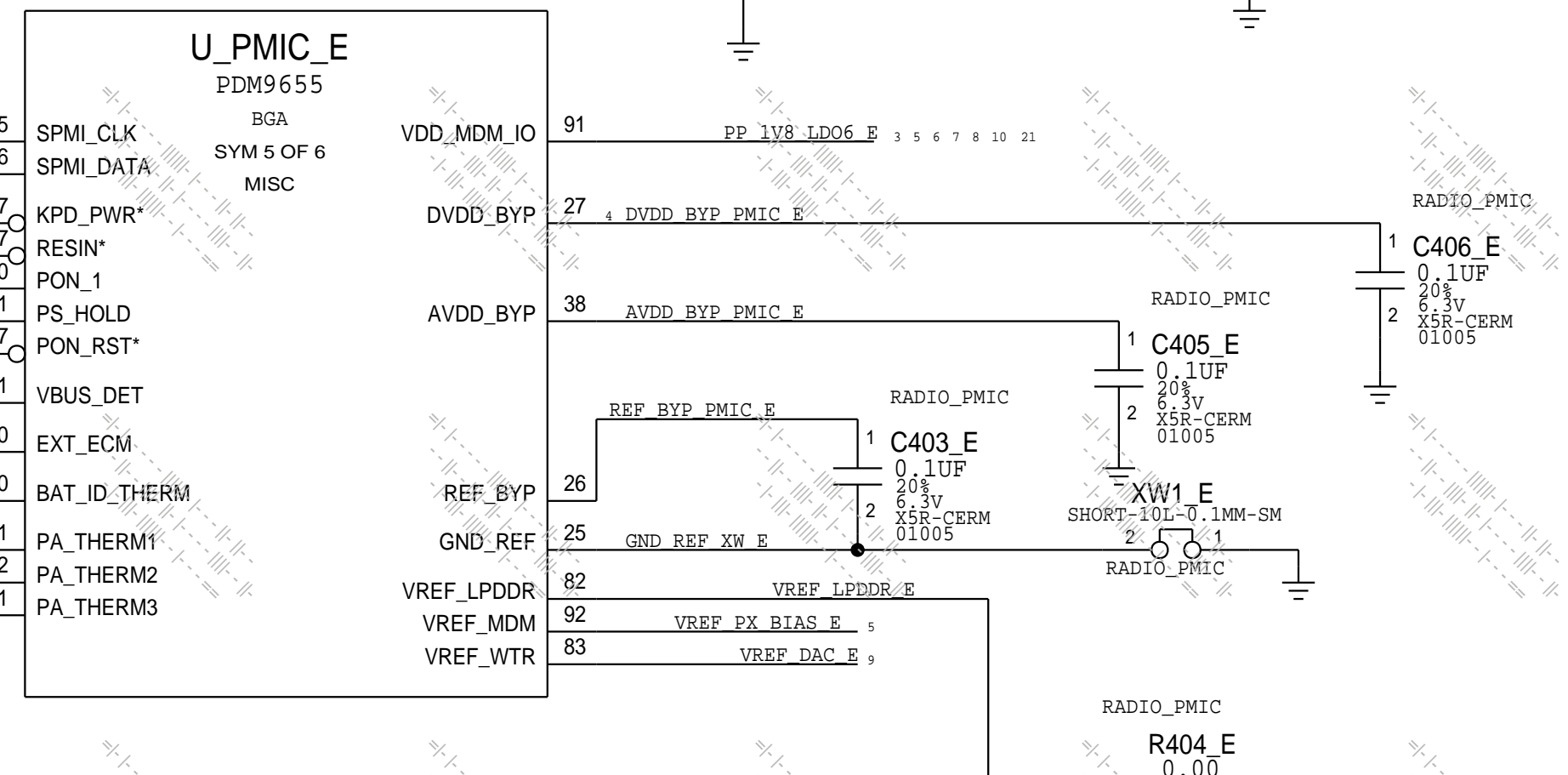
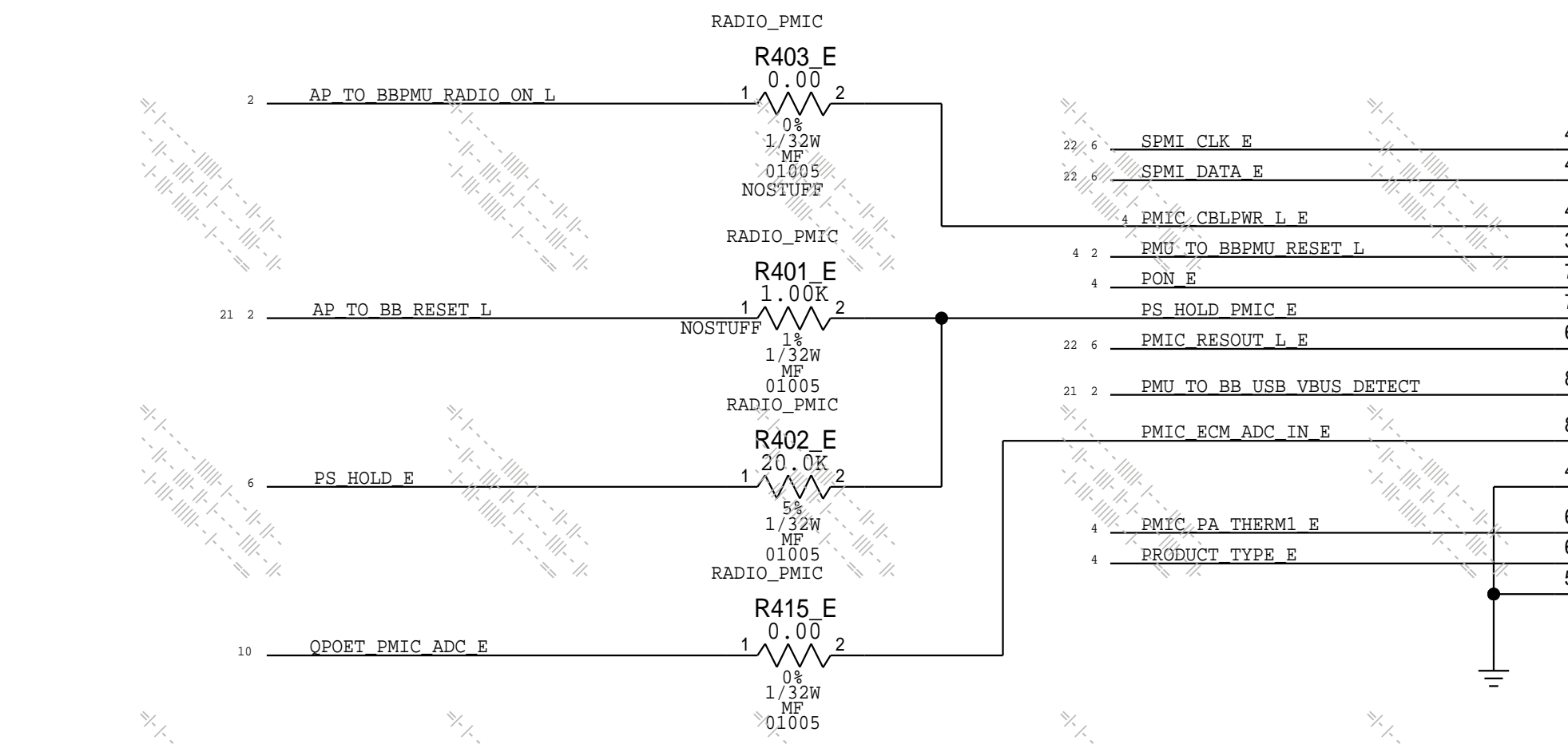
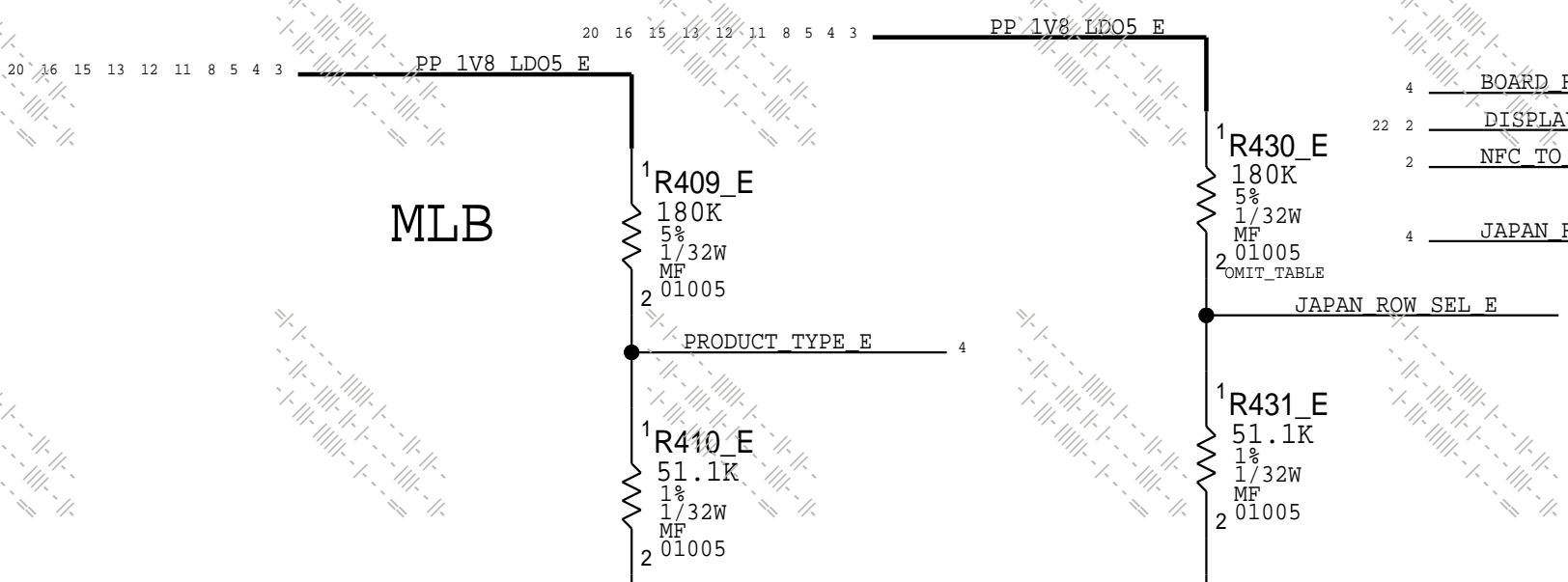
HW_REV_ID	R407	R408	MLB/RADIO_DEV
<0.10V	NOSTUFF	51.1K	T500/DEV1
0.15V-0.25V	422K	51.1K	PROTO1.5
0.35V-0.45V	180K	51.1K	PROTO2.5/DEV2
0.55V-0.65V	105K	51.1K	PROTO1/DEV3
0.75V-0.85V	66.5K	51.1K	PROTO2/DEV4
0.95V-1.05V	44.2K	51.1K	EVT
1.15V-1.25V	28K	51.1K	CARRIER/DEV5
1.35V-1.45V	16.5K	51.1K	DVT/DEV6
1.55V-1.65V	7.87K	51.1K	PVT/DEV7
1.75V-1.85V	10K	NOSTUFF	SPARE

NOTE XTAL SYMBOL MIRRORED COMPARED TO PREVIOUS SCH

PA_THERM2	R409	R410	PRODUCT TYPE	Y
0.00V-0.10V	NOSTUFF	51.1K	RADIO DEV	1
0.15V-0.25V	422K	51.1K	3RD TYPE	2
0.35V-0.45V	180K	51.1K	POR MLB (FF)	3
0.55V-0.65V	105K	51.1K	SPARE	4
0.75V-0.85V	66.5K	51.1K	SPARE	5
0.95V-1.05V	44.2K	51.1K	SPARE	6
1.15V-1.25V	28K	51.1K	SPARE	7
1.35V-1.45V	16.5K	51.1K	SPARE	8
1.55V-1.65V	7.87K	51.1K	SPARE	9
1.75V-1.85V	10K	NOSTUFF	SPARE	A

JPN_ROW_SEL	R430	R431	MAV PLATFORM	Y	SKU
<0.10V	NOSTUFF	51.1K	MAV17.0	0	ROW
0.15V-0.25V	422K	51.1K	MAV17.1	1	JPN
0.35V-0.45V	180K	51.1K	MAV17.2	2	ROW
0.55V-0.65V	105K	51.1K	MAV17.3	3	JPN
0.75V-0.85V	66.5K	51.1K	MAV17.4	4	ROW
0.95V-1.05V	44.2K	51.1K	MAV17.5	5	JPN
1.15V-1.25V	28K	51.1K	MAV17.6	6	ROW
1.35V-1.45V	16.5K	51.1K	MAV17.7	7	JPN
1.55V-1.65V	7.87K	51.1K	MAV17.8	8	ROW
1.75V-1.85V	10K	NOSTUFF	MAV17.9	9	JPN

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
11880686	1	RESISTOR, 01005, 105K OHMS	R430_E	CRITICAL	JPN
11780197	1	RESISTOR, 01005, 180K OHMS	R430_E	CRITICAL	ROW



PAGE TITLE: **PMIC: CLOCKS & CONTROL**

Apple Inc.

DRAWING NUMBER: 051-02159

REVISION: 10.0.0

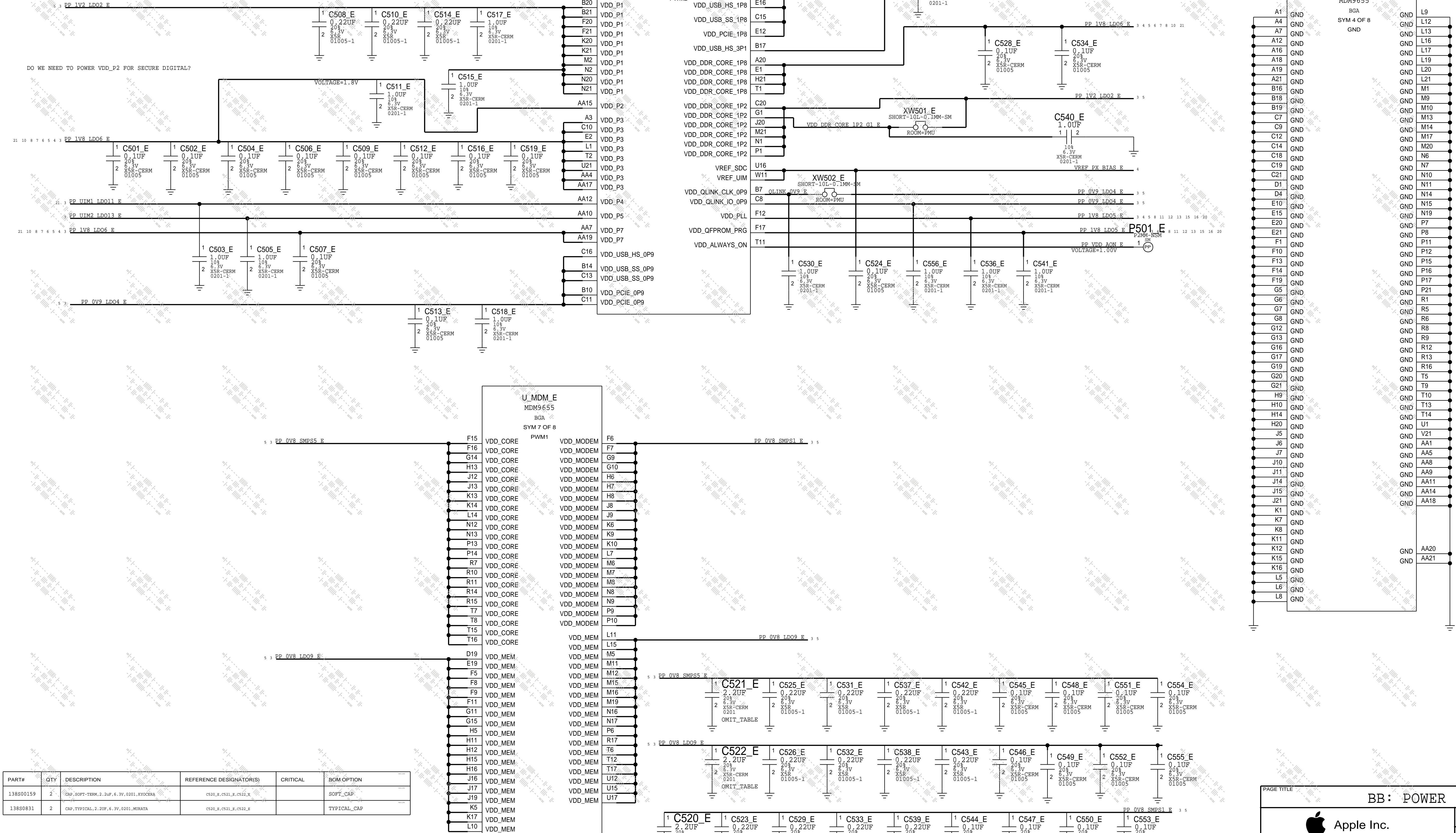
BRANCH:

PAGE: 4 OF 22

SHEET: 56 OF 81

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BB: POWER



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
138S00159	2	CAP, SOFT-TERM, 2.2UF, 6.3V, 0201, KYOCERA	C520_E, C521_E, C522_E		SOFT_CAP
138S0831	2	CAP, TYPICAL, 2.2UF, 6.3V, 0201, MURATA	C520_E, C521_E, C522_E		TYPICAL_CAP

PAGE TITLE

BB: POWER

Apple Inc.

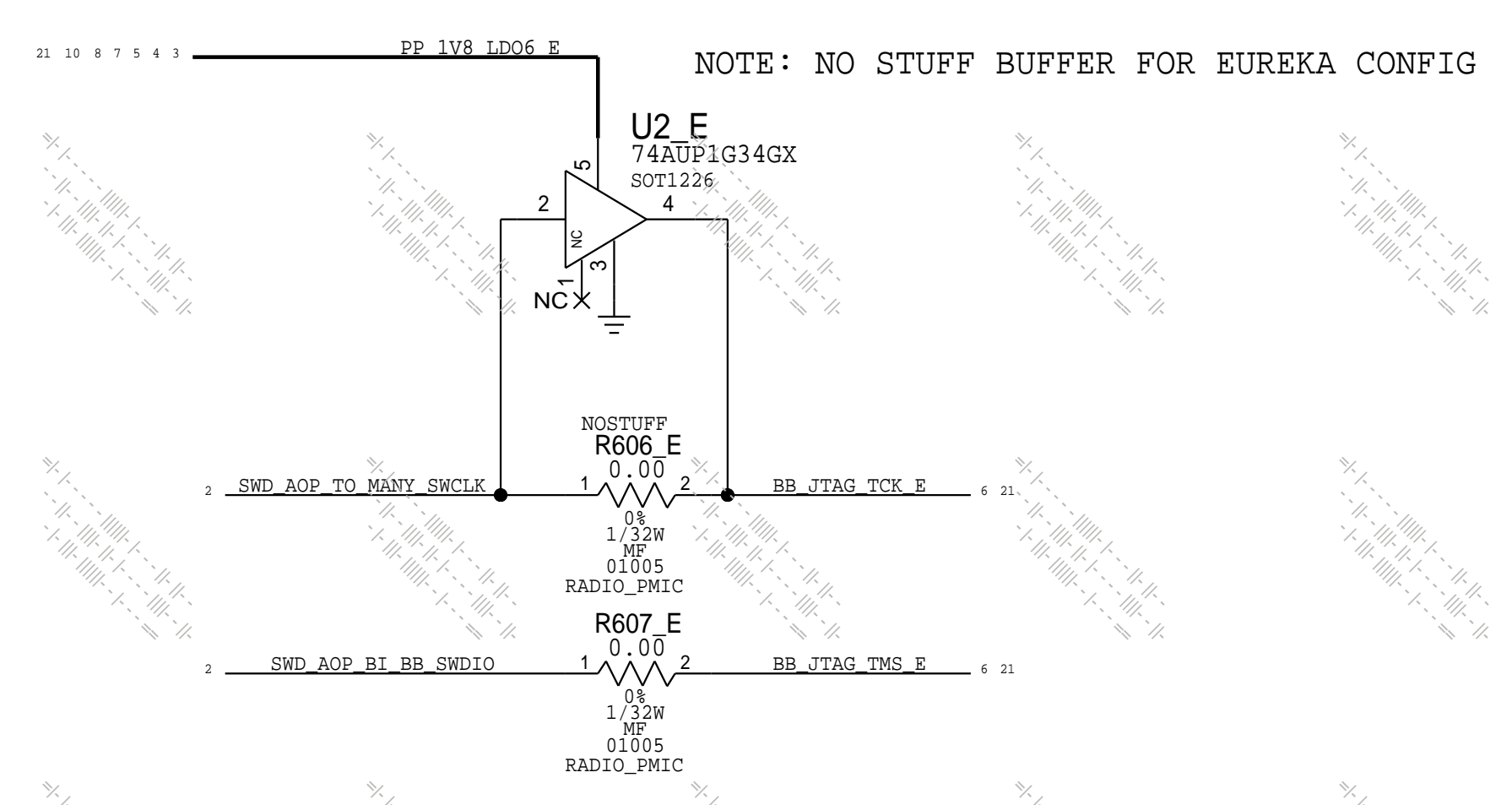
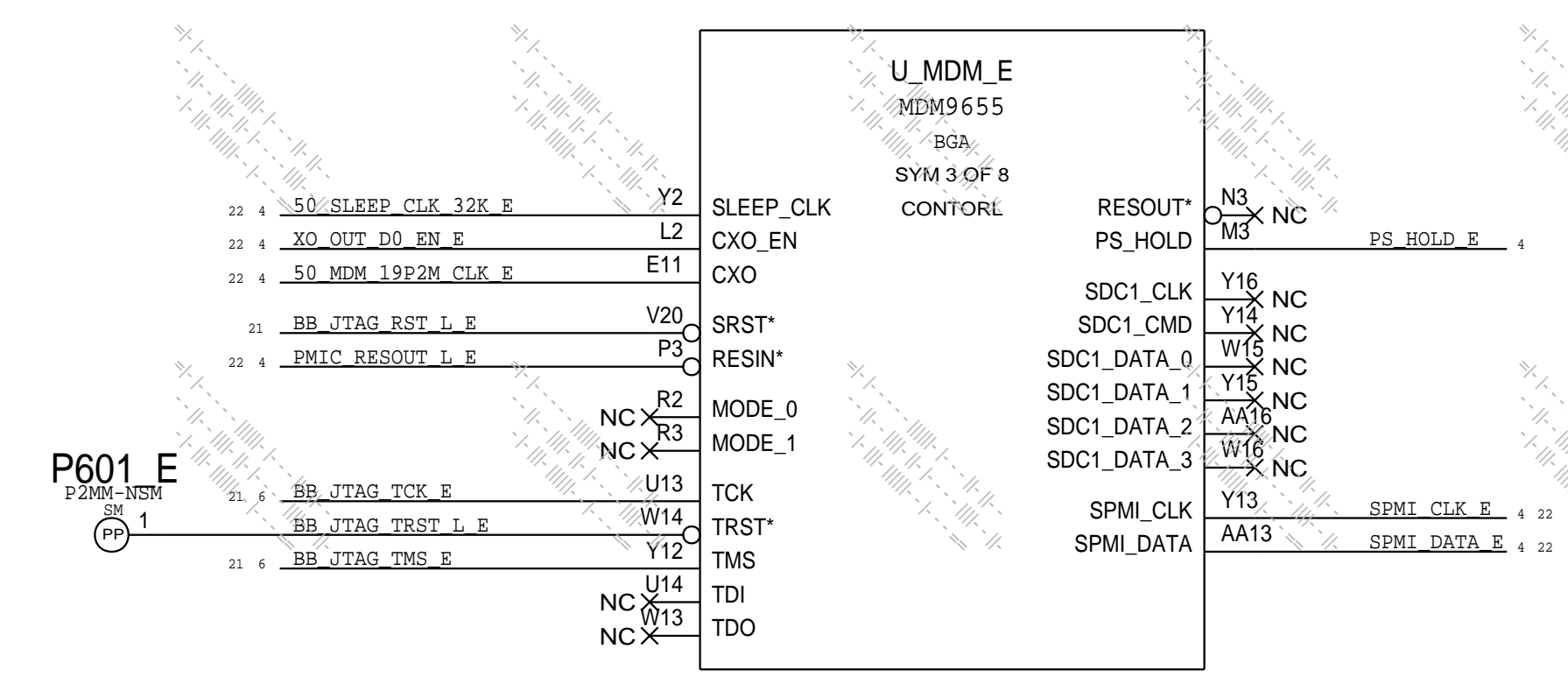
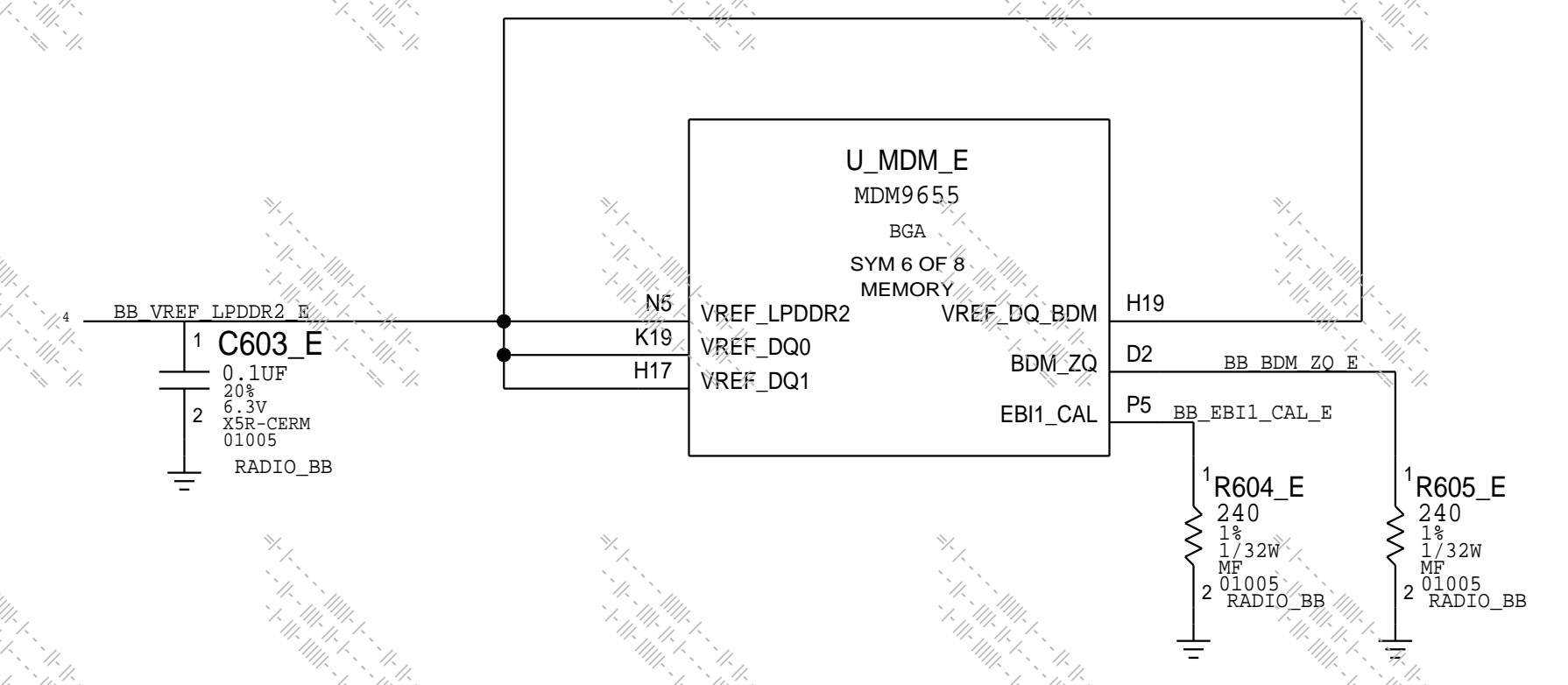
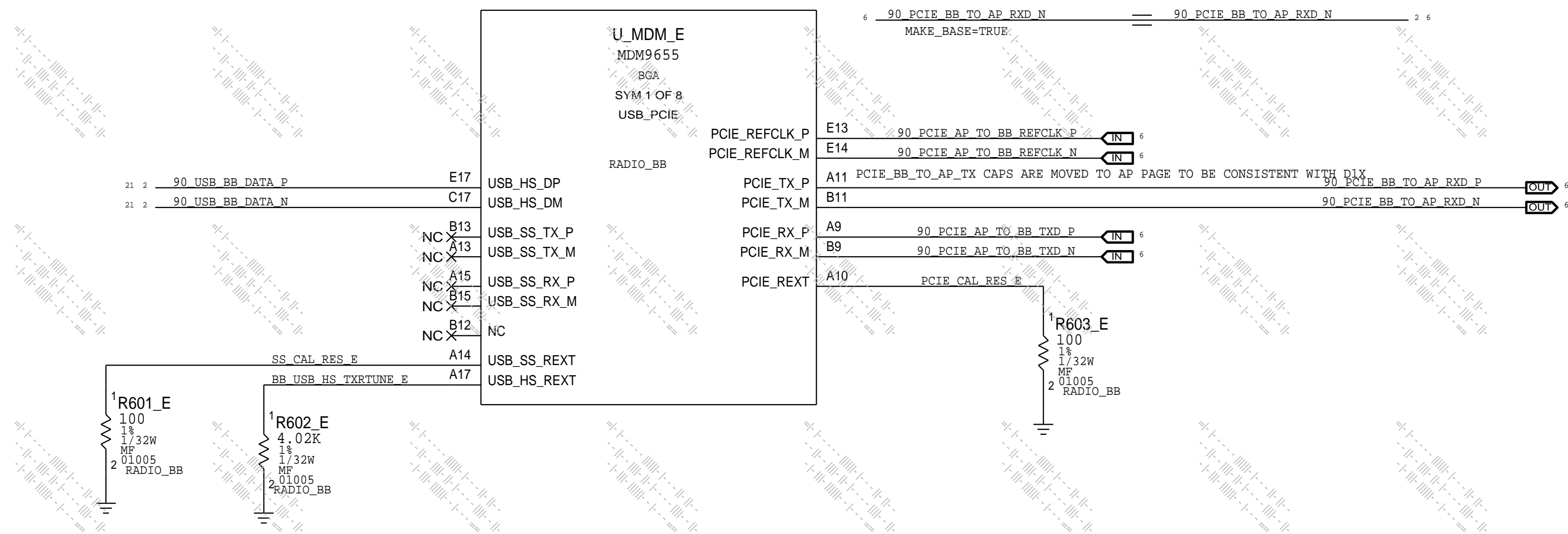
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BRANCH			
PAGE	5	OF 22	
SHEET	57 OF 81		

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BB: CONTROL & HS PERIPHERALS

- 90_PCIE_AP_TO_BB_REFCLK_P **OUT** 2 6 22
- 90_PCIE_AP_TO_BB_REFCLK_N **OUT** 2 6 22
- 90_PCIE_AP_TO_BB_TXD_P **OUT** 2 6
- 90_PCIE_AP_TO_BB_TXD_N **OUT** 2 6
- 90_PCIE_BB_TO_AP_RXD_P **OUT** 2 6
- 90_PCIE_BB_TO_AP_RXD_N **OUT** 2 6

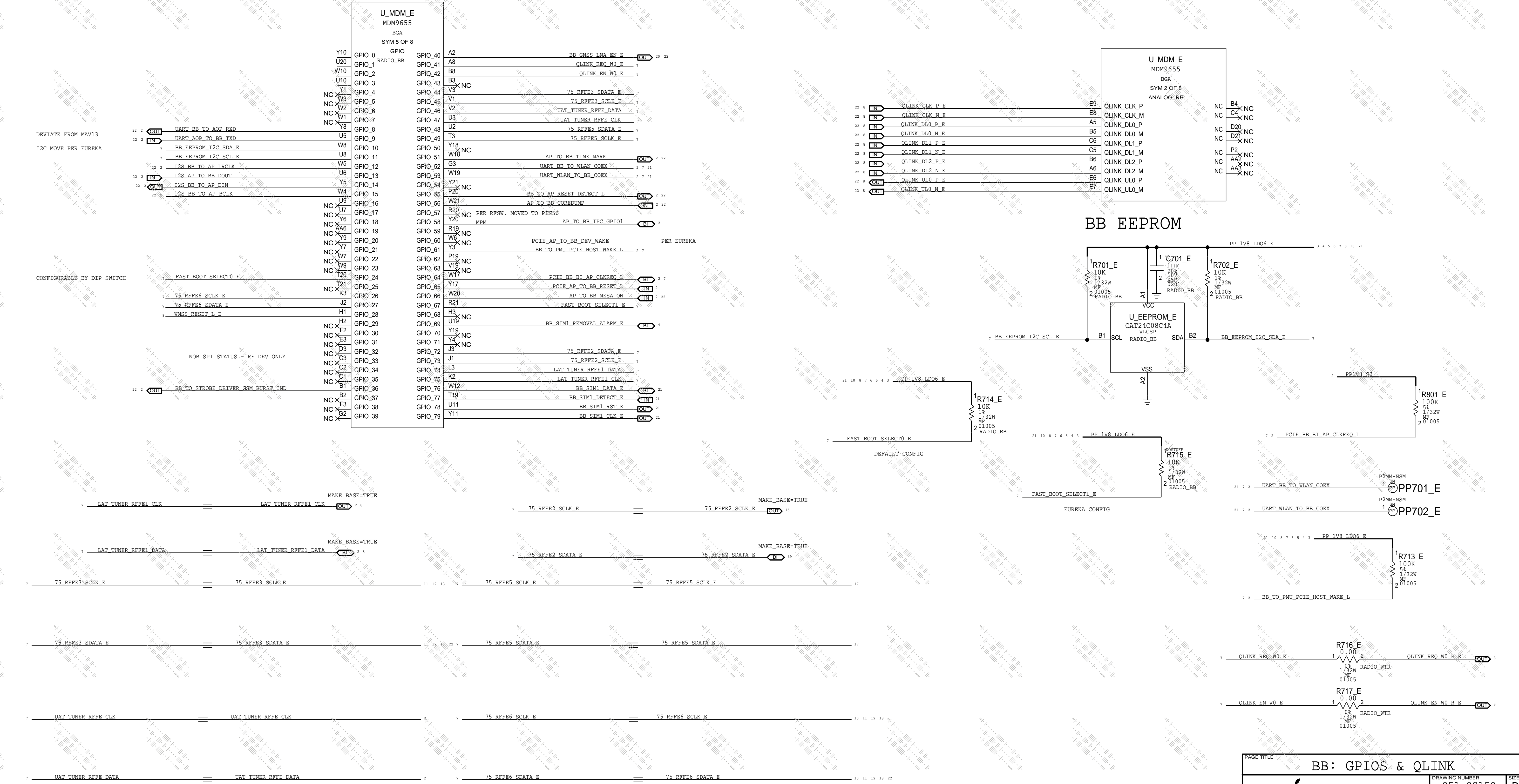
- 90_PCIE_AP_TO_BB_REFCLK_P MAKE_BASE=TRUE
- 90_PCIE_AP_TO_BB_REFCLK_N MAKE_BASE=TRUE
- 90_PCIE_AP_TO_BB_TXD_P MAKE_BASE=TRUE
- 90_PCIE_AP_TO_BB_TXD_N MAKE_BASE=TRUE
- 90_PCIE_BB_TO_AP_RXD_P MAKE_BASE=TRUE
- 90_PCIE_BB_TO_AP_RXD_N MAKE_BASE=TRUE



PAGE TITLE BB: CONTROL & HS PERIPHERALS [6]		
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	REVISION 10.0.0	
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BRANCH	PAGE 6 OF 22	
SHEET		58 OF 81

BB: GPIOs & QLINK

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TRANSCEIVER: QLINK & POWER

8 7 6 5 4 3 2 1

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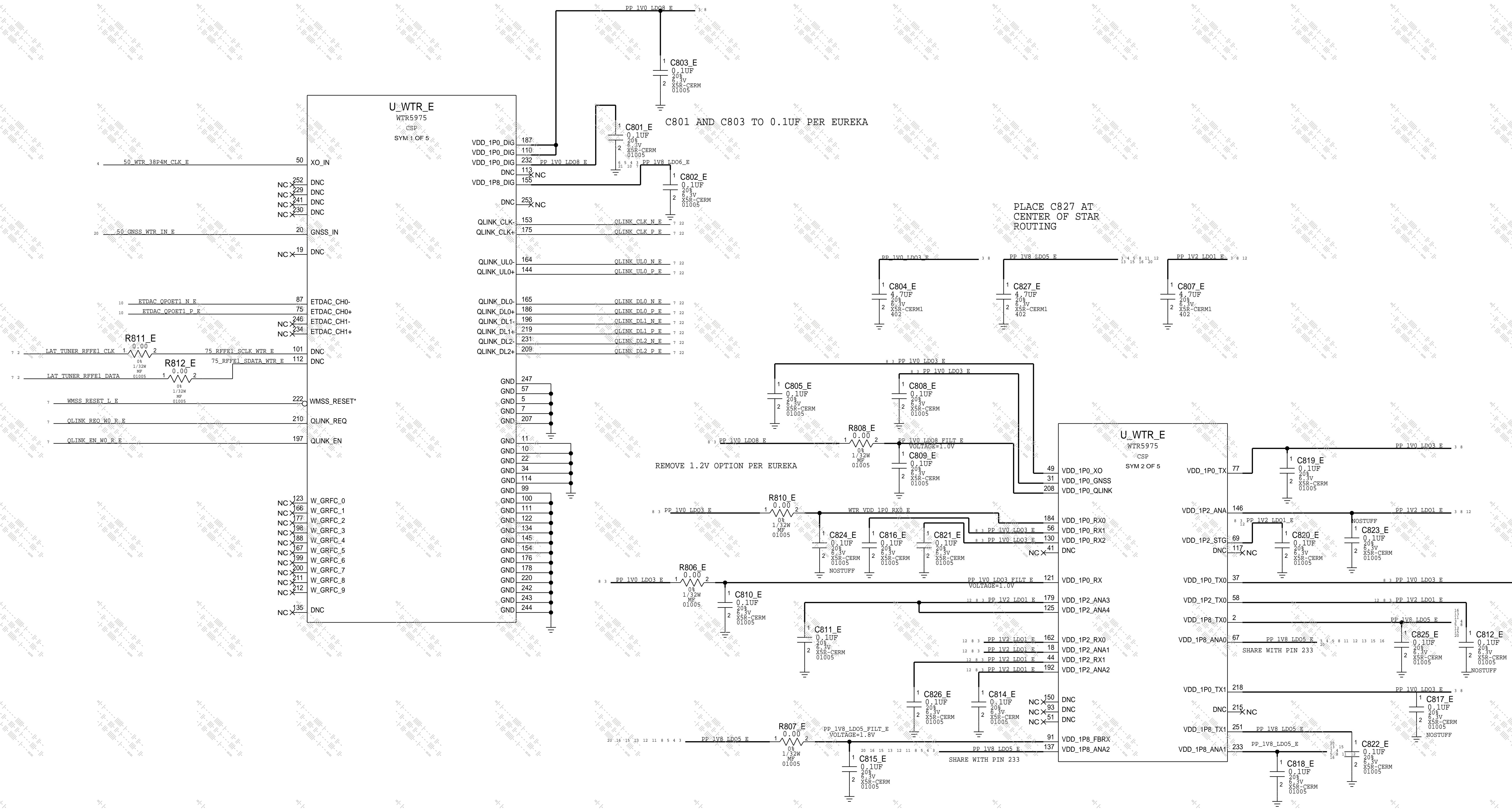
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		PAGE	8 OF 22		
		SHEET	60 OF 81		

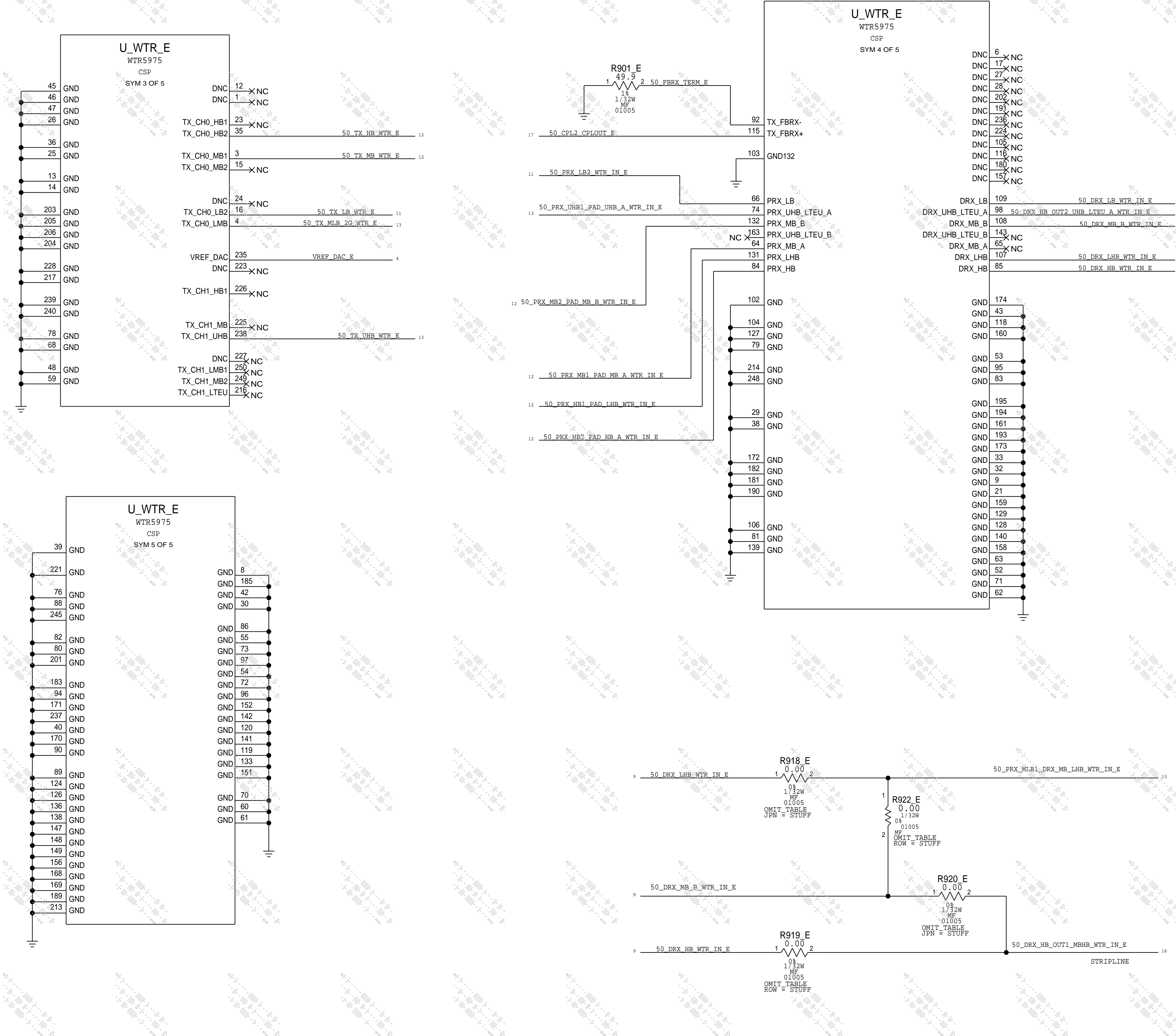
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TRANSCEIVER: TX & RX

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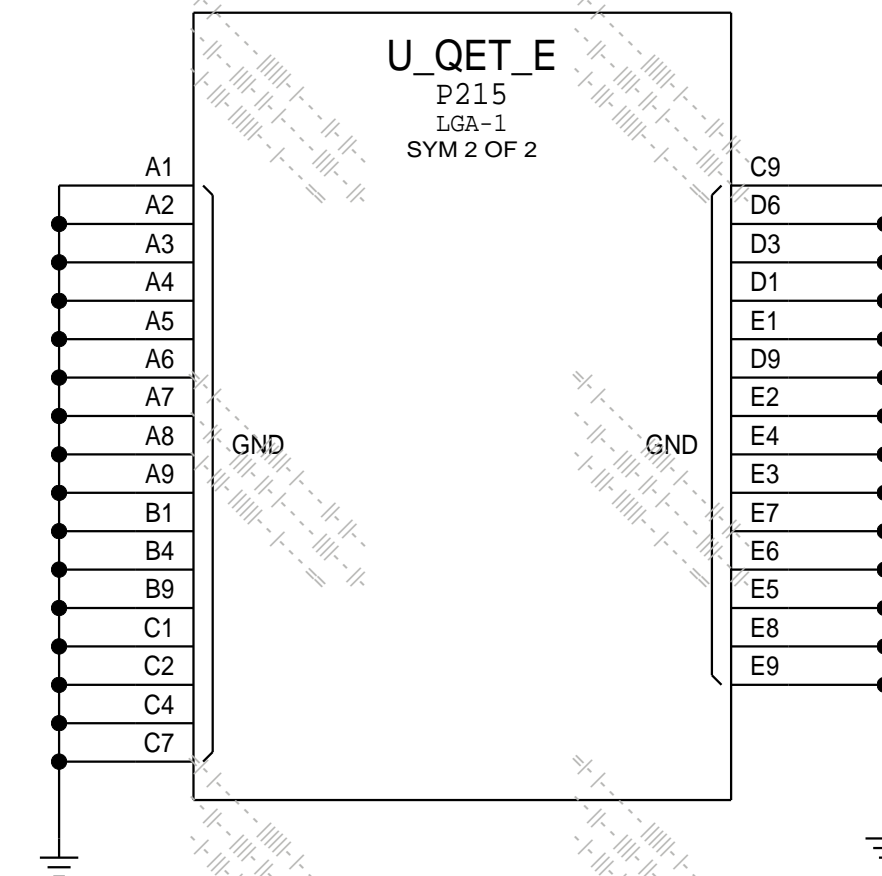
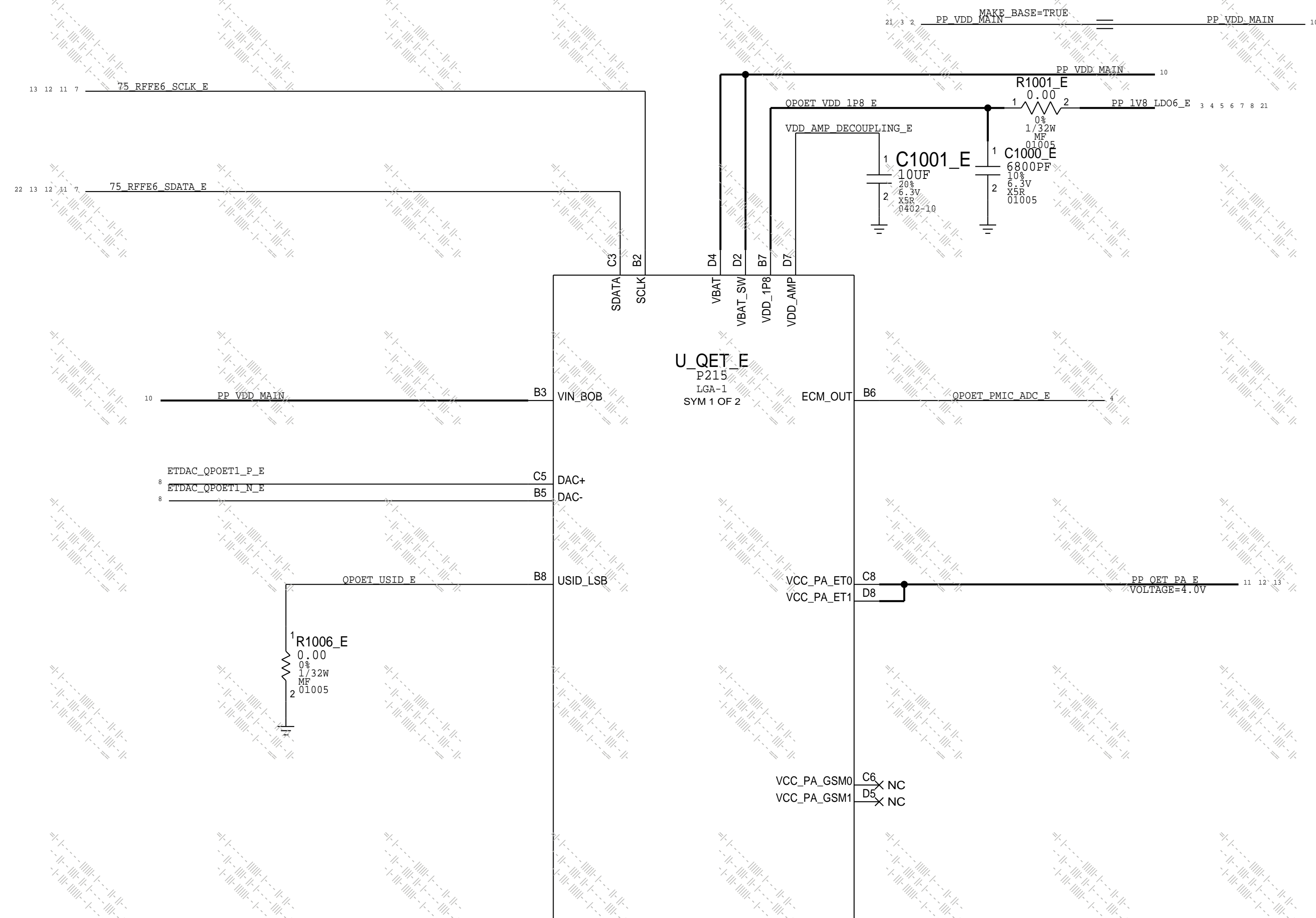
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11780161	1	01005 OR	R919_E	CRITICAL	ROW
11780161	1	01005 OR	R922_E	CRITICAL	ROW

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
11780161	1	01005 OR	R918_E	CRITICAL	JFN
11780161	1	01005 OR	R920_E	CRITICAL	JFN



PAGE TITLE			XCVR		
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		PAGE	9 OF 22		
		SHEET	61 OF 81		

QET:MODULE



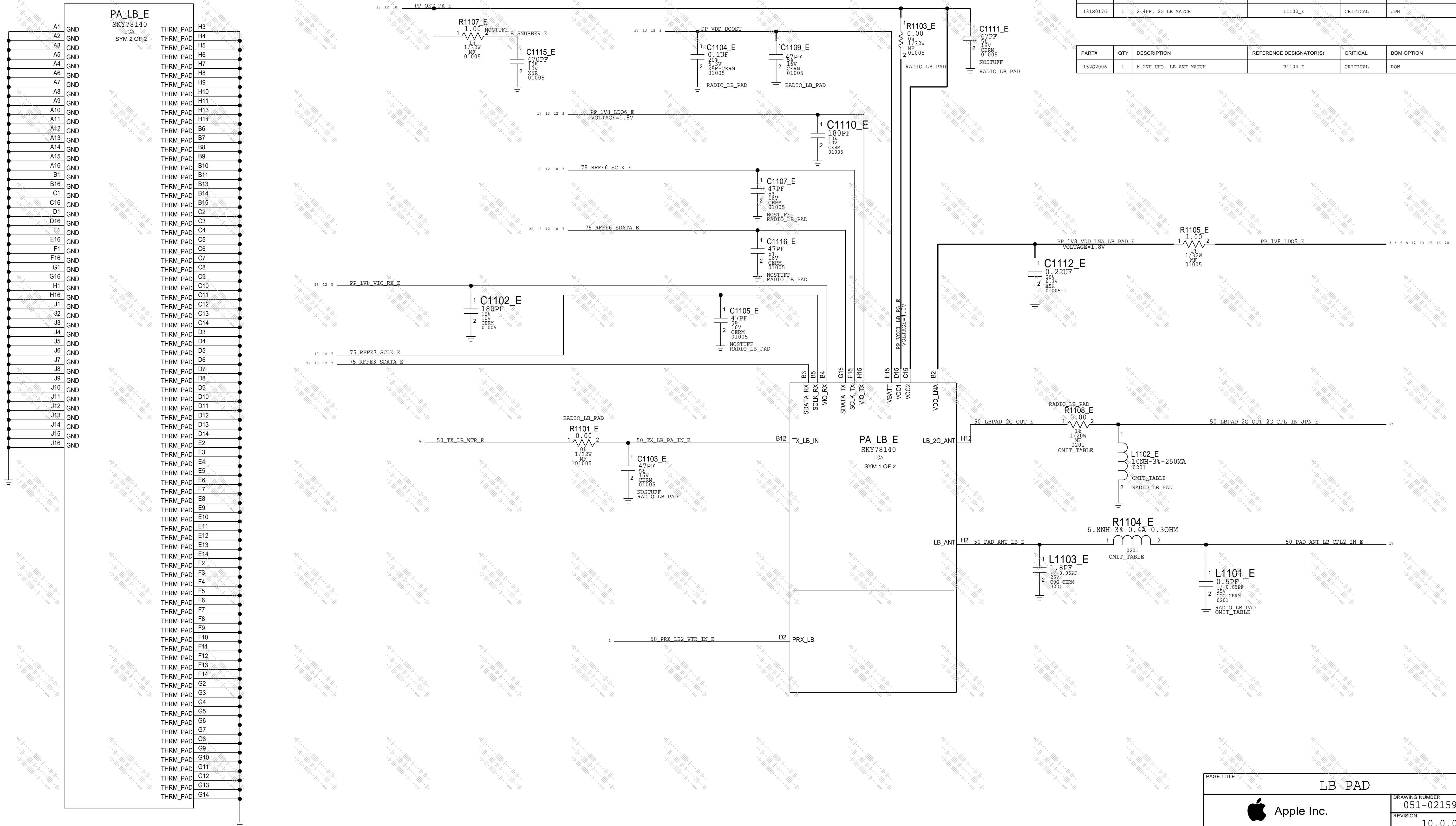
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			PAGE	10 OF 22	
			SHEET	62 OF 81	

LB PAD

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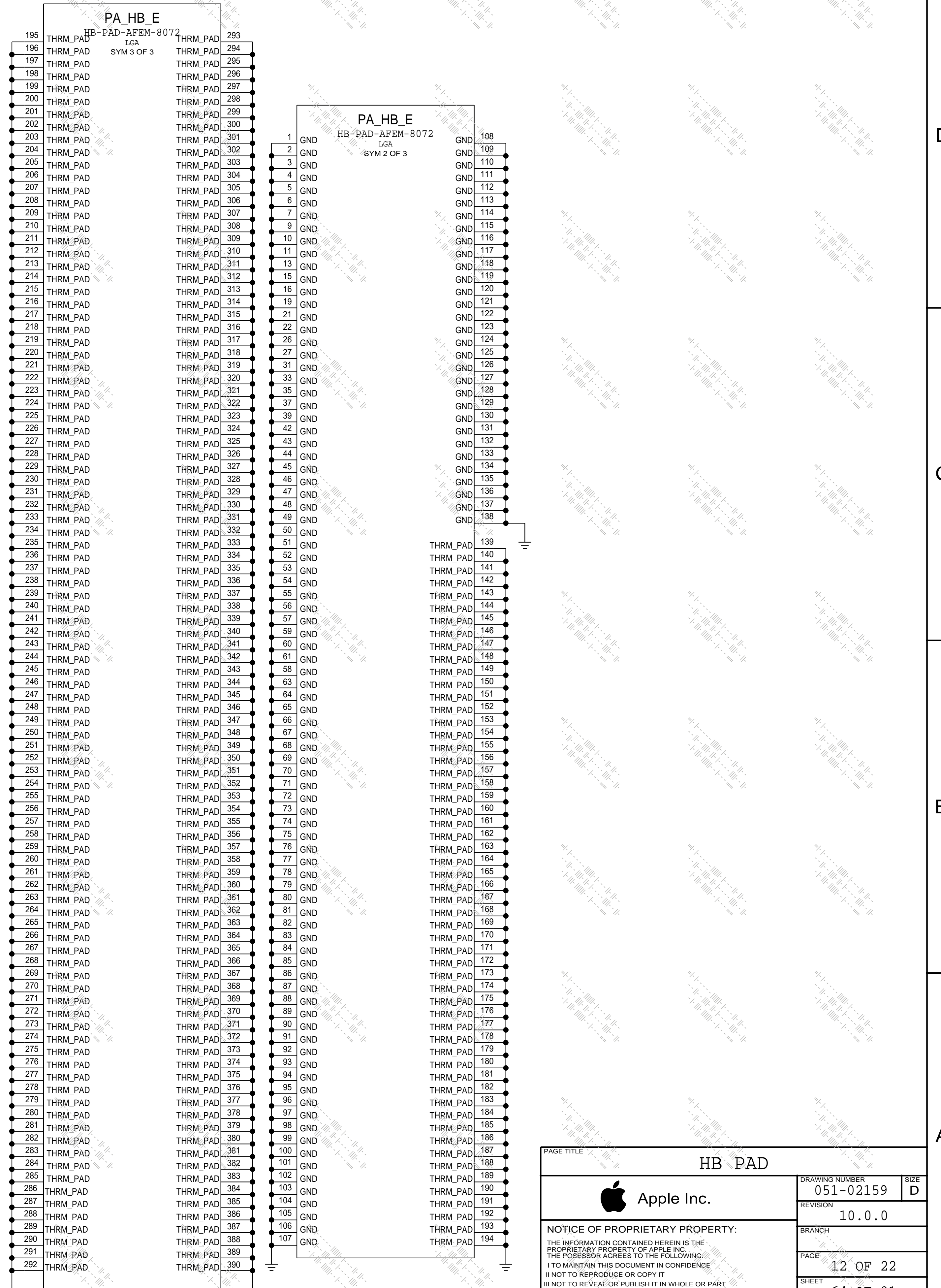
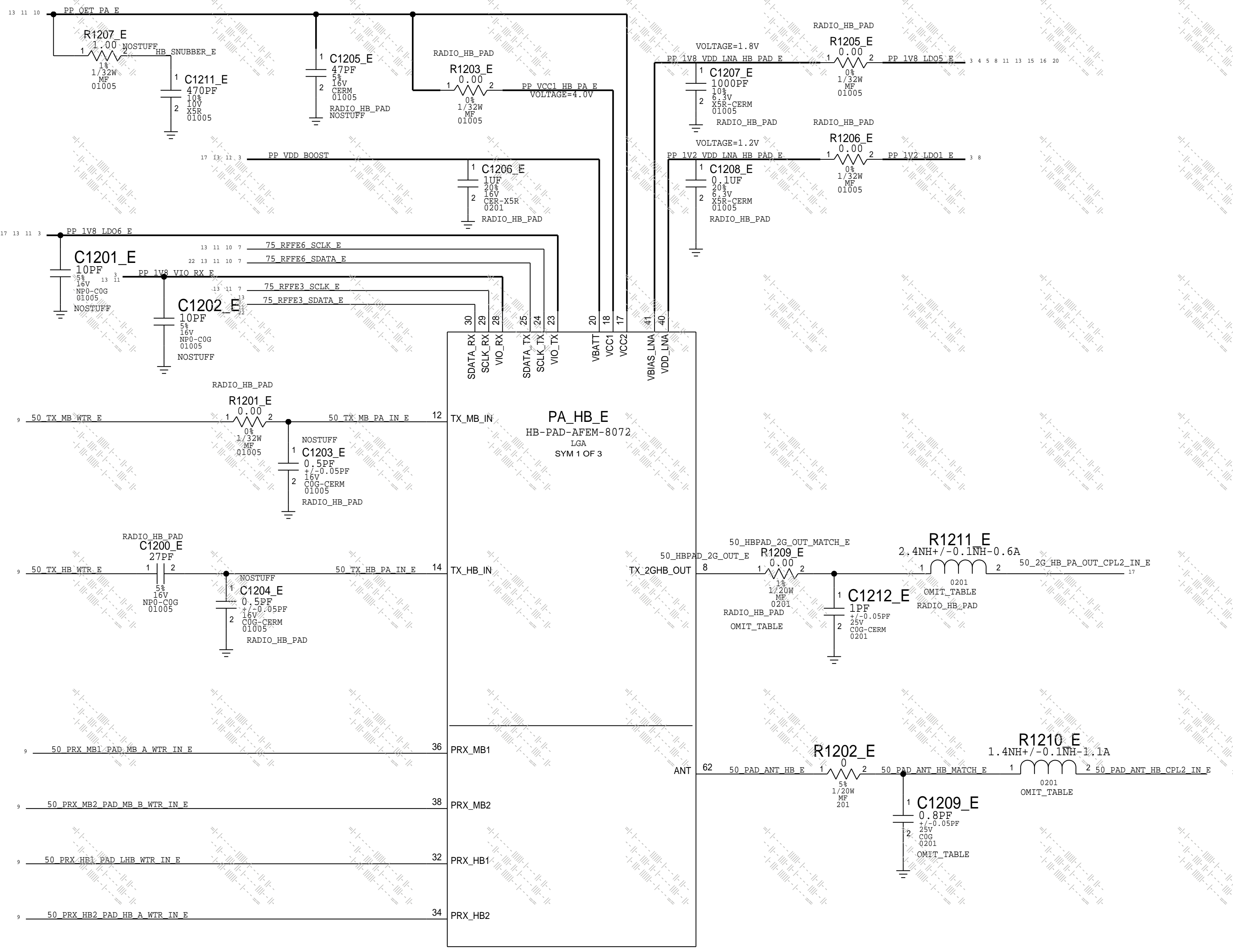
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0724	1	2G LB MATCH, 0 OHMS	R1108_E	CRITICAL	JPN
152S00021	1	6.8NH UHQ, LB ANT MATCH	R1104_E	CRITICAL	JPN
131S0555	1	1PF, LB ANT MATCH	L1101_E	CRITICAL	JPN
131S0176	1	2.4PF, 2G LB MATCH	L1102_E	CRITICAL	JPN

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
152S2006	1	6.2NH UHQ, LB ANT MATCH	R1104_E	CRITICAL	ROW



PAGE TITLE		
LB PAD		
	DRAWING NUMBER	051-02159
	REVISION	10.0.0
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	PAGE	11 OF 22
	SHEET	63 OF 81

HB PAD



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
15282023	1	3.2NH UHQ, 2G HB-PAD MATCH	R1209_E	CRITICAL	JFN
152800153	1	1NH UHQ, 2G HB-PAD MATCH	R1211_E	CRITICAL	JFN
13180425	1	0.5PF, HB ANT MATCH	C1209_E	CRITICAL	JFN
15282042	1	1.8NH UHQ, HB ANT MATCH	R1210_E	CRITICAL	JFN

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
13180329	1	0.4PF, HB ANT MATCH	C1209_E	CRITICAL	ROW
15282000	1	2.0NH UHQ, HB ANT MATCH	R1210_E	CRITICAL	ROW

PAGE TITLE: **HB PAD**

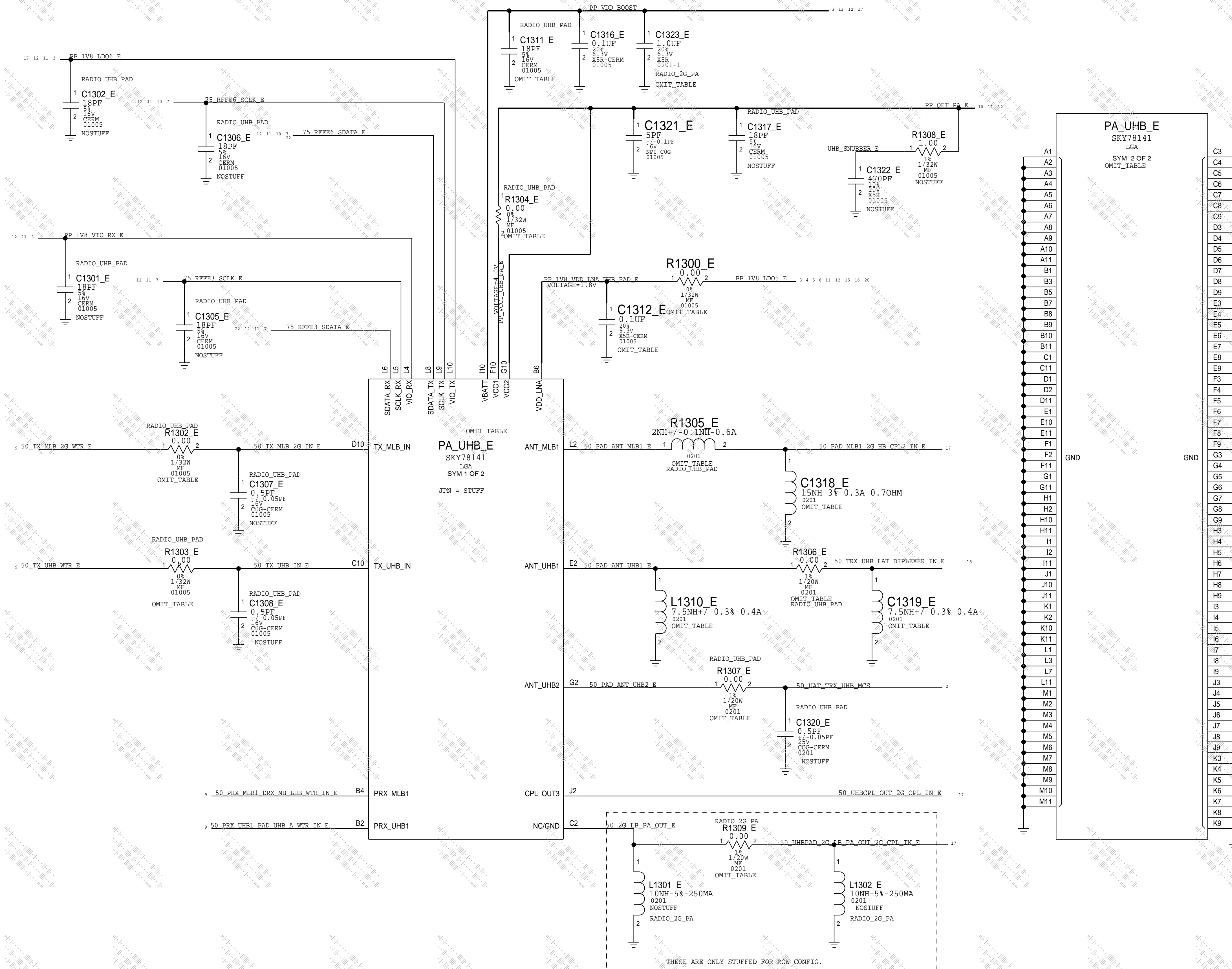
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REVISION	10.0.0		
BRANCH			
PAGE	12 OF 22		
SHEET	64 OF 81		

UHB / 2G PAD - JPN

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353801243	1	UHB PAD	PA_UHB_E	CRITICAL	JPN
11780161	1	MLB/2GTX IN MCH2, 0 OHMS	R1302_E	CRITICAL	JPN
11780161	1	UHB INPVT MCH1, 0 OHMS	R1303_E	CRITICAL	JPN
11780002	1	MLB/2G MB OUT MCH1, 0 OHMS	R1305_E	CRITICAL	JPN
13180552	1	2.7PF UHQ, UHB1 ANT MATCH	R1306_E	CRITICAL	JPN
11780002	1	0 OHMS UHB2 OUT/DRX BP MCH1	R1307_E	CRITICAL	JPN
13280316	1	UHB LNA DECOUPLING, 0.1UF	C1312_E	CRITICAL	JPN
11780161	1	UHB LNA SUPPLY FILTER, 0OHMS	R1300_E	CRITICAL	JPN
13180214	1	VBAT DECOUPLING,18PF	C1311_E	CRITICAL	JPN
13880692	1	VBAT DECOUPLING, 1UF	C1323_E	CRITICAL	JPN
11780161	1	VCC2/VCC1 RESISTOR OPTION, 0 OHM	R1304_E	CRITICAL	JPN
15281999	1	22NH, MLB1 ANT MATCH	C1318_E	CRITICAL	JPN
15281698	1	3.5NH, UHB1 ANT MATCH	L1310_E	CRITICAL	JPN
13180431	1	0.2PF, UHB TO METROCIRC	C1320_E	CRITICAL	JPN




PAGE TITLE		UHB PAD	
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		PAGE	13 OF 22
		SHEET	65 OF 81
		SIZE	D

2G PA - ROW

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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
353801247	1	2G PA	PA_UHB_E	CRITICAL	ROW
11780161	1	MLB/2GTX IN MCH2, 0 OHMS	R1302_E	CRITICAL	ROW
11780161	1	UHB INPUT MCH1, 0 OHMS	R1303_E	CRITICAL	ROW
11880724	1	MLB/2G MB OUT MCH1, 0 OHMS	R1305_E	CRITICAL	ROW
11880724	1	UHB2 OUT/DRX BP MCH1, 0 OHMS	R1307_E	CRITICAL	ROW
15282053	1	4.7NH UHQ, 2G LB OUTPUT MCH2	R1309_E	CRITICAL	ROW
13180214	1	VBAT DECOUPLING, 18PF	C1311_E	CRITICAL	ROW
13880692	1	VBAT DECOUPLING, 1UF	C1323_E	CRITICAL	ROW
11780161	1	VCC2/VCC1 RESISTOR OPTION, 0 OHM	R1304_E	CRITICAL	ROW
103800089	1	50 OHM TERMINATION FOR ROW ONLY	C1319_E	CRITICAL	ROW

PAGE TITLE		2G PA	
 Apple Inc.	DRAWING NUMBER	051-02159	SIZE
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		PAGE	14 OF 22
		SHEET	66 OF 81

LB DSM

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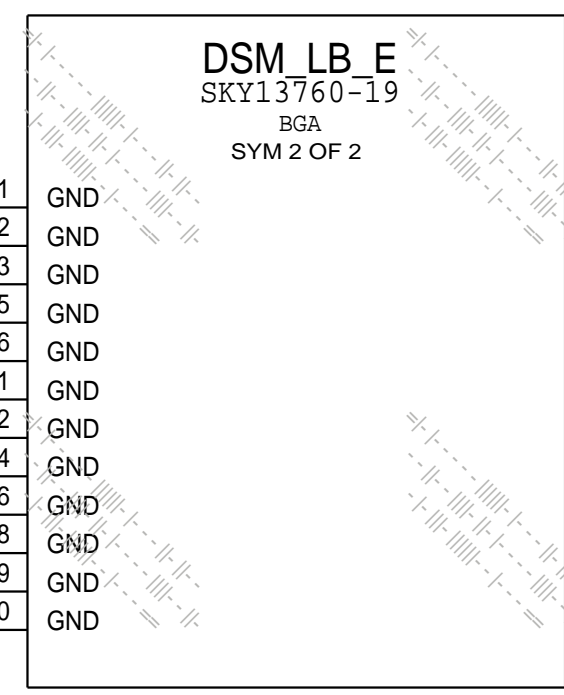
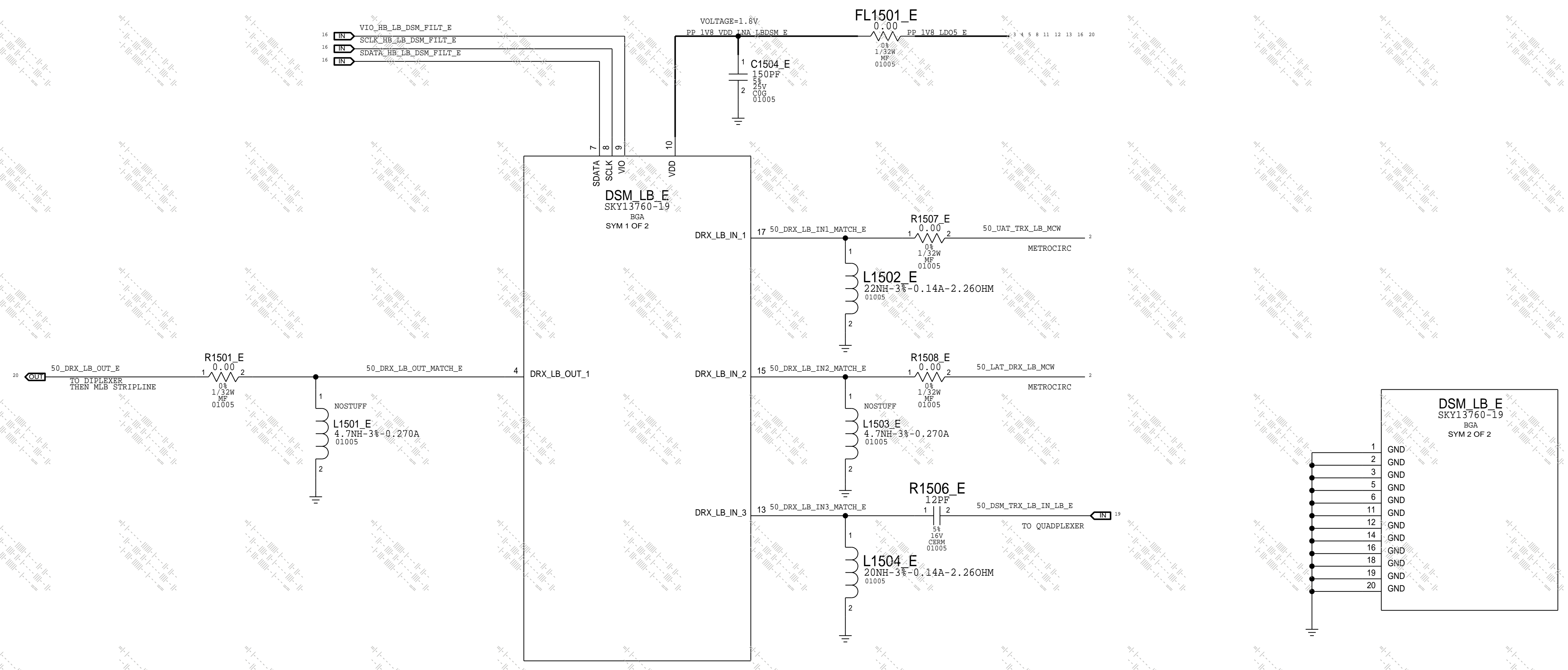
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			PAGE	15 OF 22
			SHEET	67 OF 81

HB DSM

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DECOUPLING SHARED WITH LB DSM

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
117S0161	1	01005 0R	R1600_E	CRITICAL	ROW
117S0161	1	01005 0R	R1602_E	CRITICAL	ROW
117S0161	1	01005 0R	R1617_E	CRITICAL	ROW
131S0639	1	01005 0.8PF	L1606_E	CRITICAL	ROW

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
117S0161	1	01005 0R	R1603_E	CRITICAL	JPN
152S1985	1	01005 1.7NH SHQ	R1612_E	CRITICAL	JPN
131S0616	1	01005 0.6PF	L1606_E	CRITICAL	JPN

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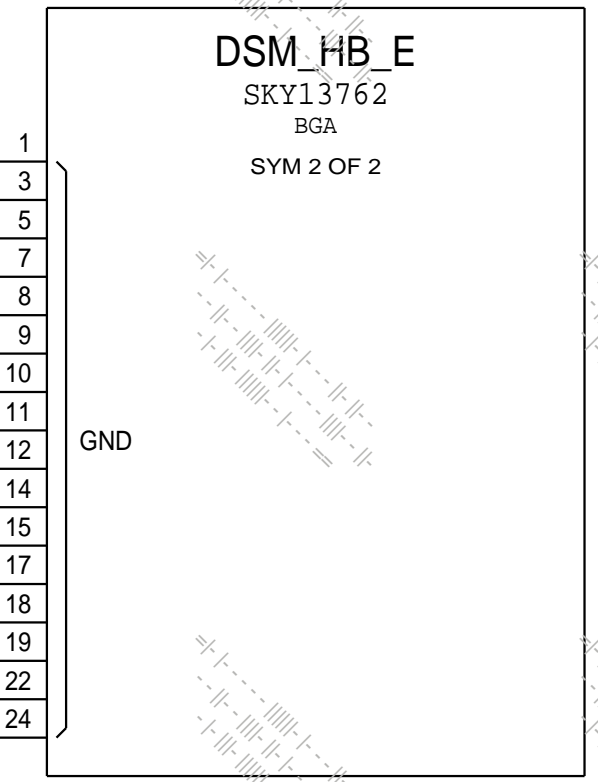
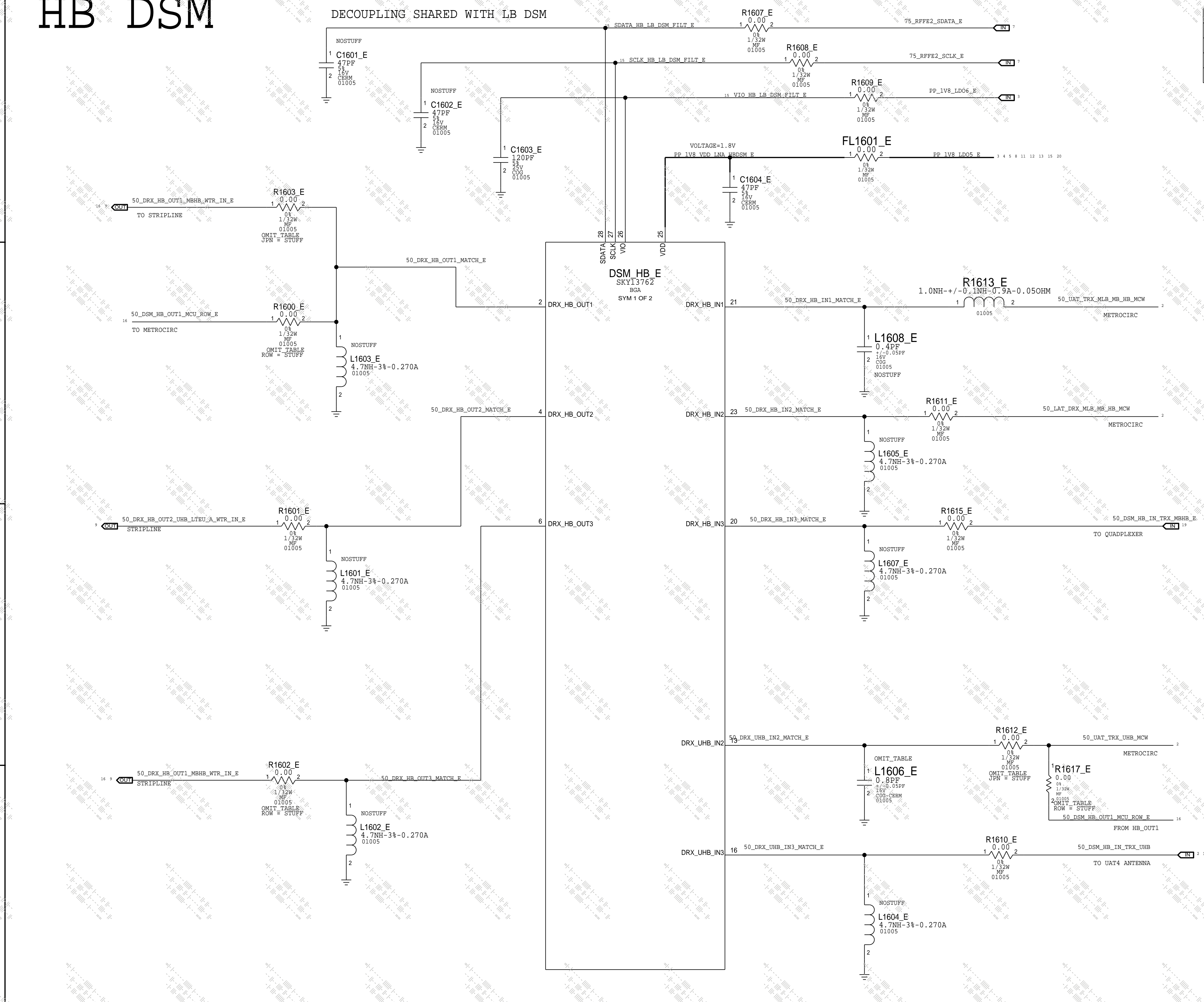
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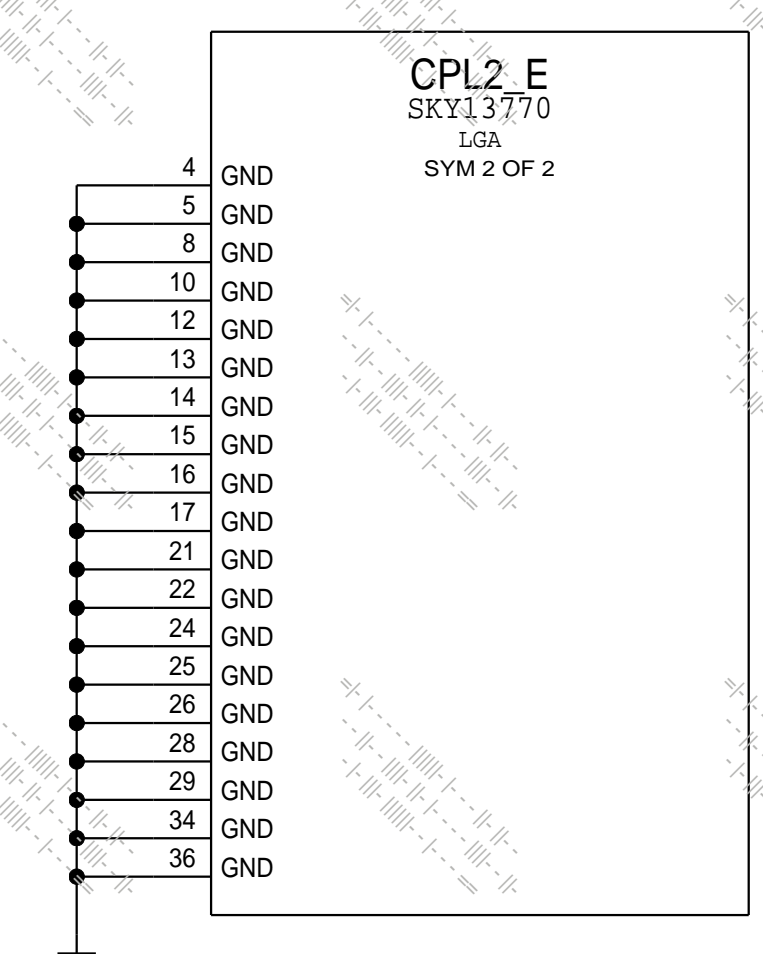
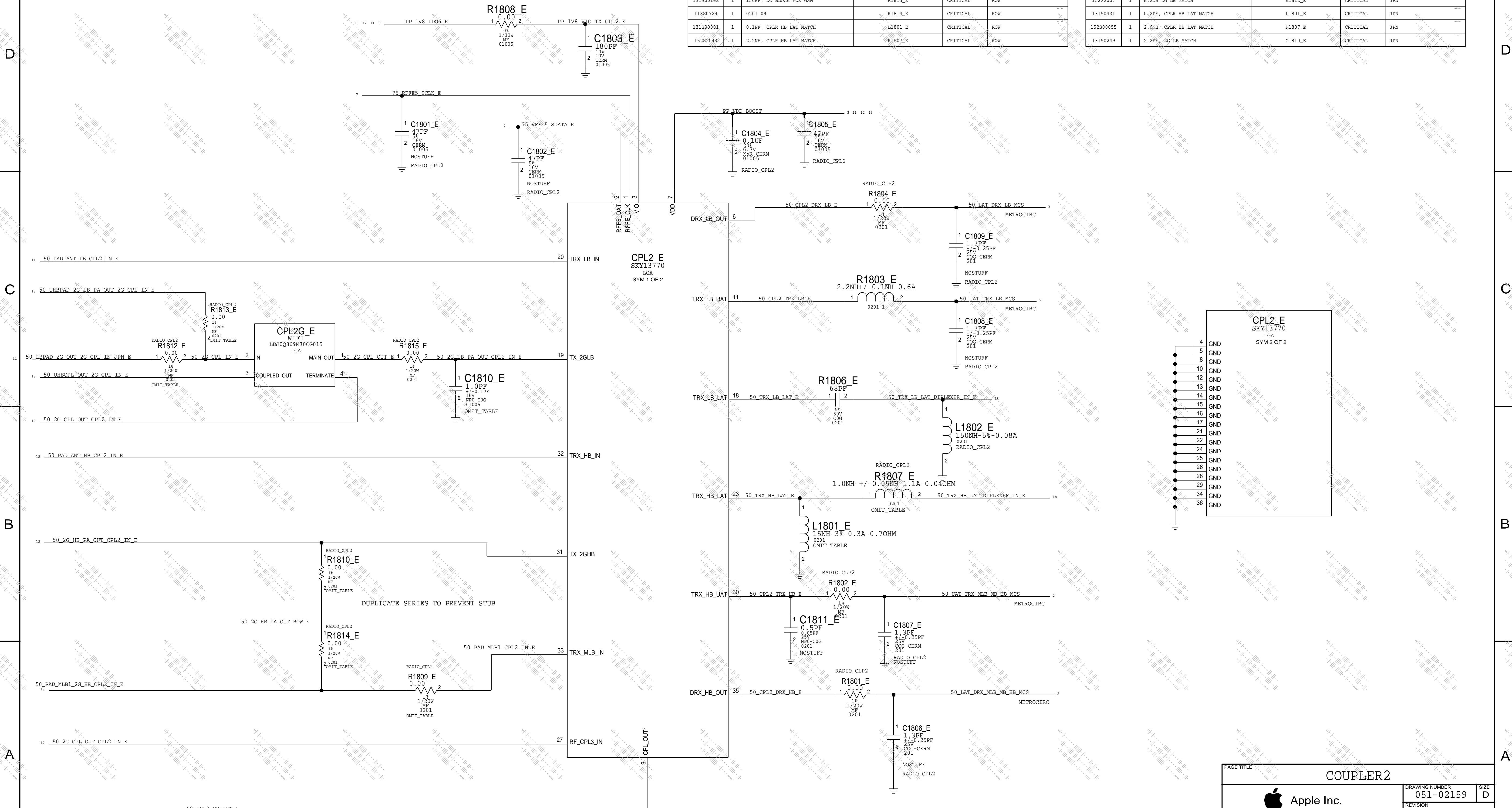
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			PAGE	16 OF 22
			SHEET	68 OF 81

COUPLER2

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PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0724	1	0201 OR	R1810_E	CRITICAL	ROW
131S00142	1	150PF, DC BLOCK FOR GSM	R1813_E	CRITICAL	ROW
118S0724	1	0201 OR	R1814_E	CRITICAL	ROW
131S00001	1	0.1PF, CPLR HB LAT MATCH	L1801_E	CRITICAL	ROW
152S2044	1	2.2NH, CPLR HB LAT MATCH	R1807_E	CRITICAL	ROW

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
118S0724	1	0201 OR	R1809_E	CRITICAL	JFN
152S2007	1	8.2NH 2G LB MATCH	R1812_E	CRITICAL	JFN
131S0431	1	0.2PF, CPLR HB LAT MATCH	L1801_E	CRITICAL	JFN
152S00055	1	2.6NH, CPLR HB LAT MATCH	R1807_E	CRITICAL	JFN
131S0249	1	2.2PF, 2G LB MATCH	C1810_E	CRITICAL	JFN



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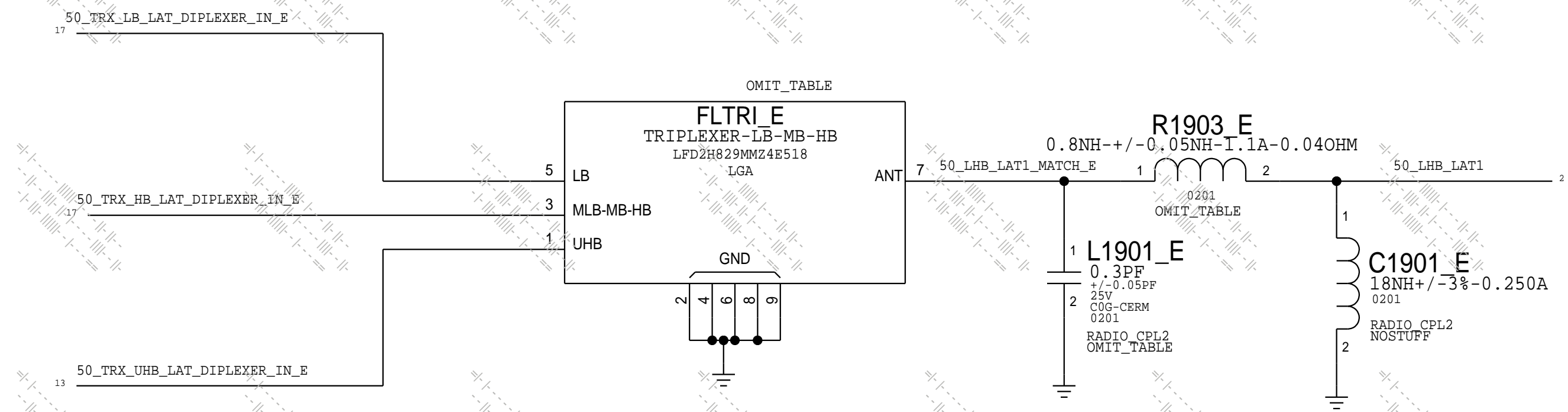
Apple Inc.

DRAWING NUMBER	051-02159	SIZE	D
REVISION	10.0.0		
BRANCH			
PAGE	17 OF 22		
SHEET	69 OF 81		

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LOWER ANTENNA

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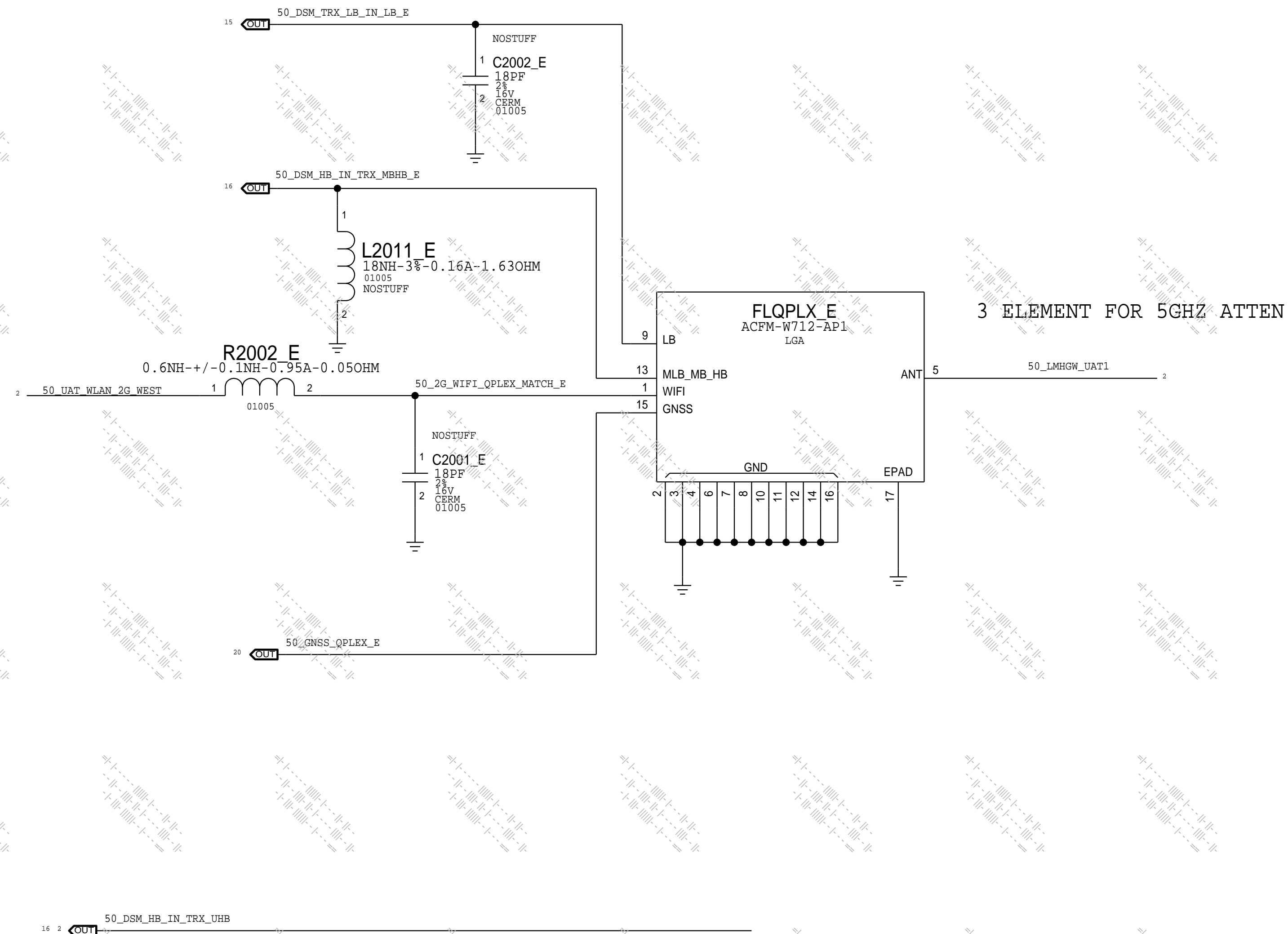


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155S00298	1	TRIPLEXER, L+MLBMB+UHB	FLTRI_E	CRITICAL	JFN
155S00297	1	DIPLEXER, L+MLBMB	FLTRI_E	CRITICAL	ROW
152S00147	1	0.6NH UHQ, TRI ANT MATCH	R1903_E	CRITICAL	JFN
152S00151	1	0.8NH UHQ, TRI ANT MATCH	R1903_E	CRITICAL	ROW
131S00001	1	0.1PF, TRI ANT MATCH	L1901_E	CRITICAL	ROW

PAGE TITLE			LOWER ANTENNA		
	DRAWING NUMBER	051-02159	SIZE	D	
	REVISION	10.0.0			
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			PAGE	18 OF 22	
			SHEET	70 OF 81	

UAT & LB/UHB DIPLEXER

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PAGE TITLE			UPPER ANTENNA		
		DRAWING NUMBER	051-02159	SIZE	D
		REVISION	10.0.0		
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		PAGE	19 OF 22		
		SHEET	71 OF 81		

GPS & GPS/LB DIPLEXER

8 7 6 5 4 3 2 1

D

C

B

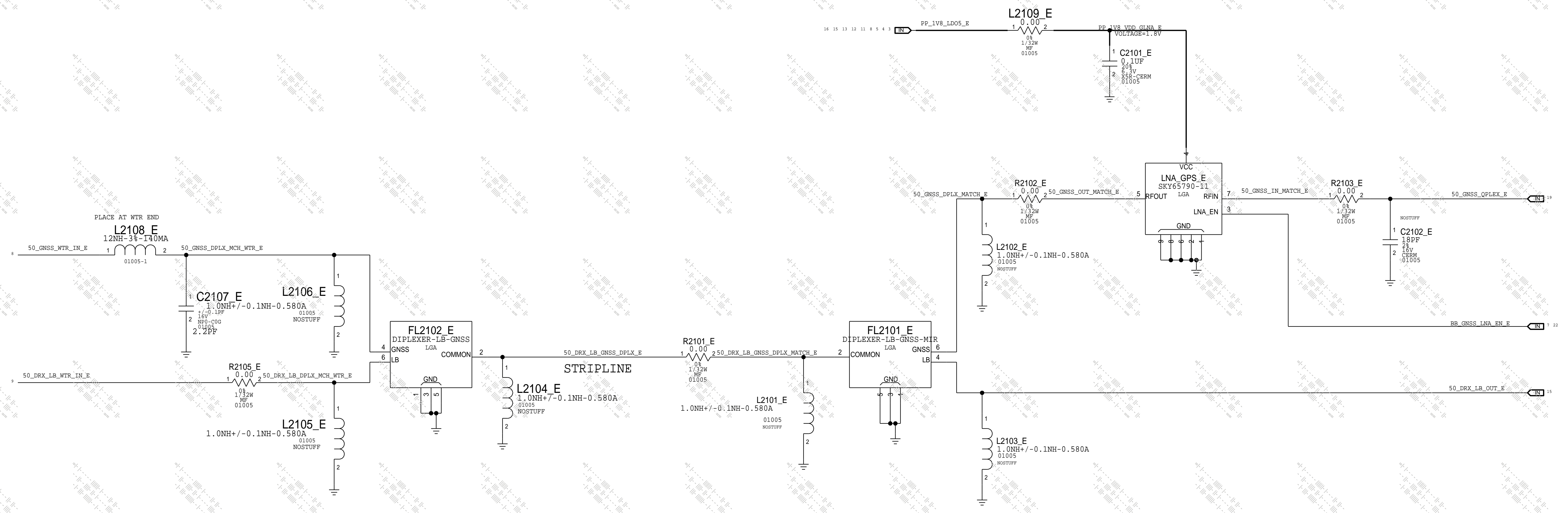
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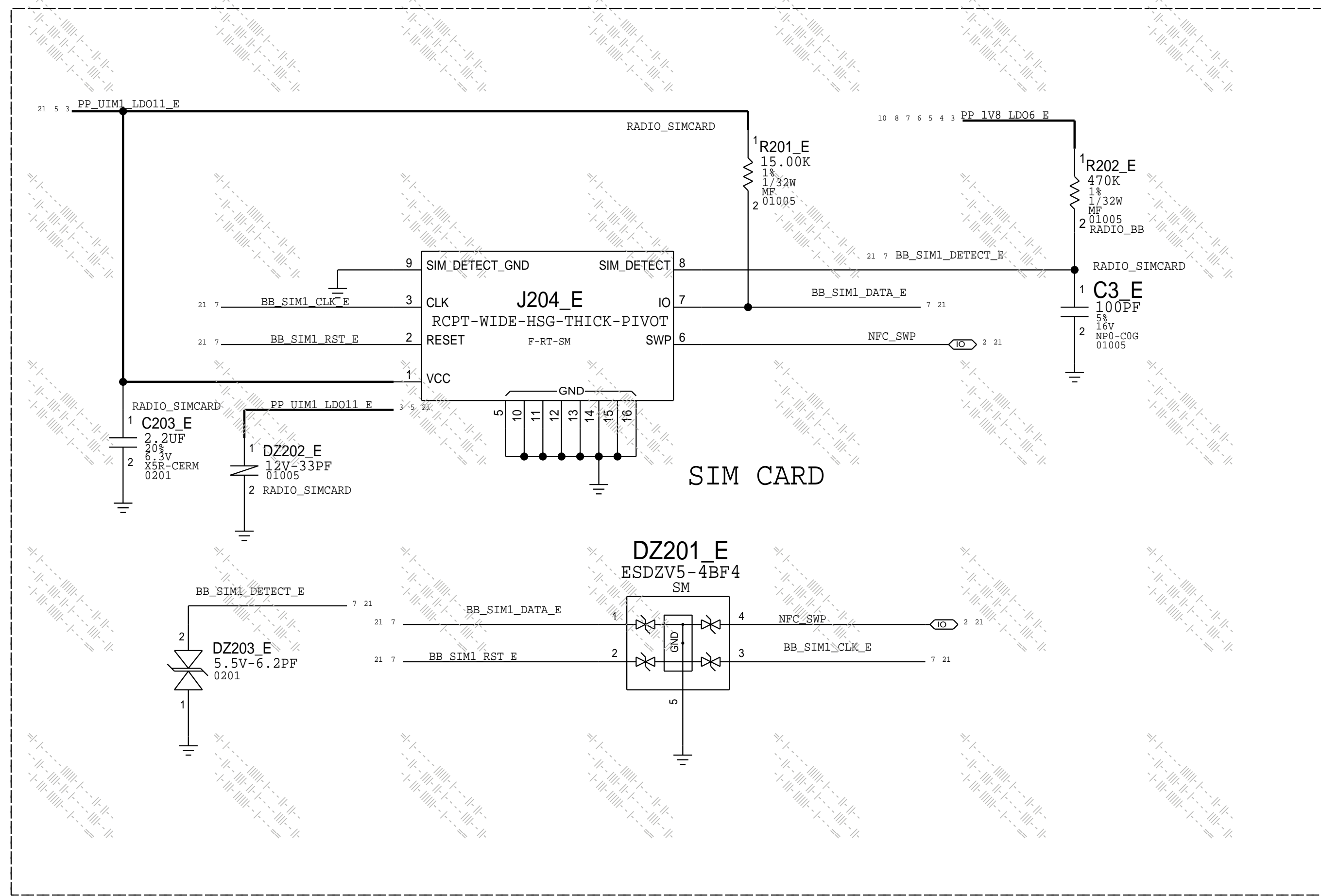
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			PAGE	20 OF 22
			SHEET	72 OF 81

8 7 6 5 4 3 2 1

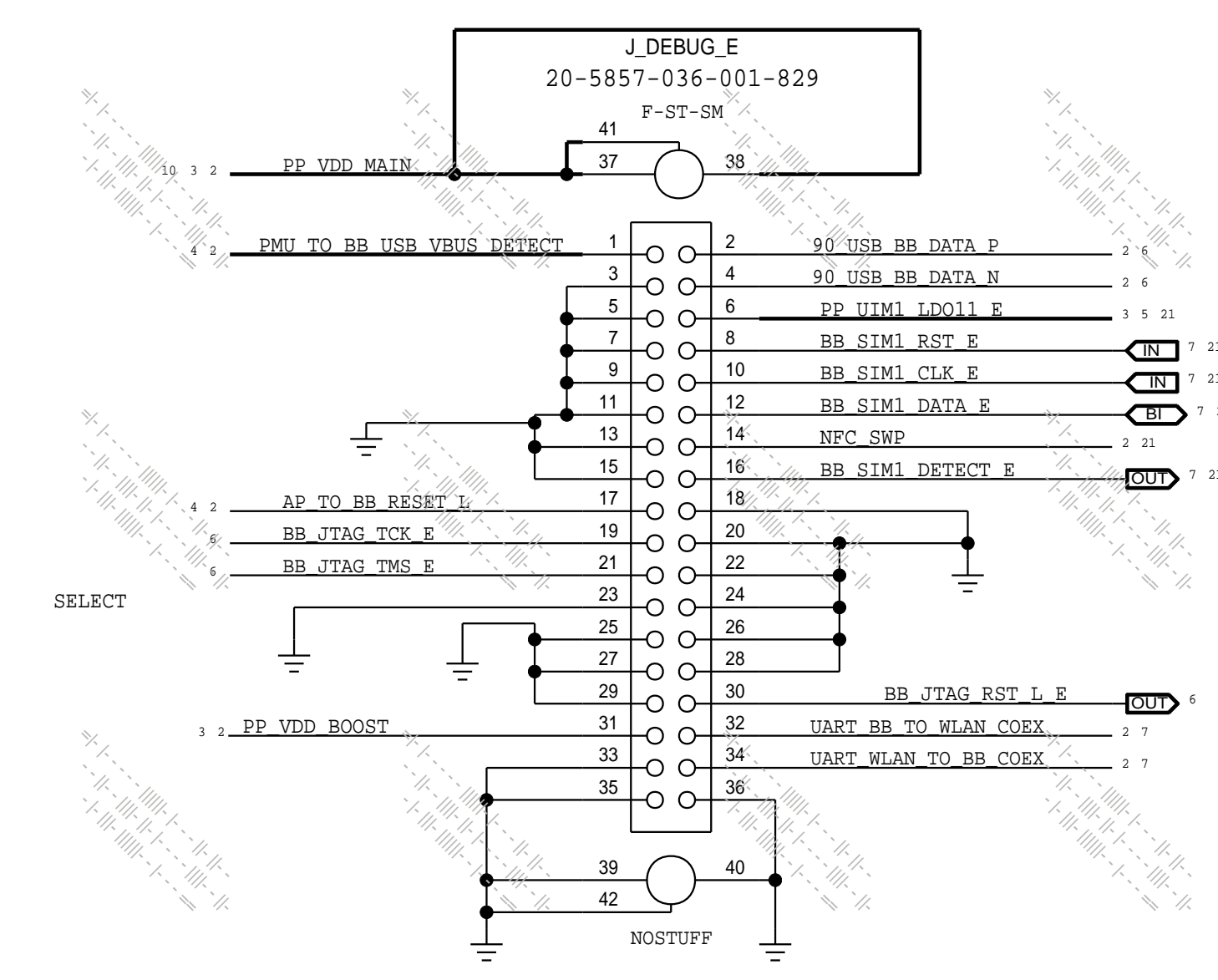
SIM CARD: CONNECTOR

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PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS
51280026	51280017	BOM_TABLE_ALTS	*2204_E	SIMCARD_KEYCERA



DEBUG CONNECTOR



PAGE TITLE SIM, DEBUG CONN		
	DRAWING NUMBER 051-02159	SIZE D
	REVISION 10.0.0	
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BRANCH		PAGE 21 OF 22
SHEET		73 OF 81

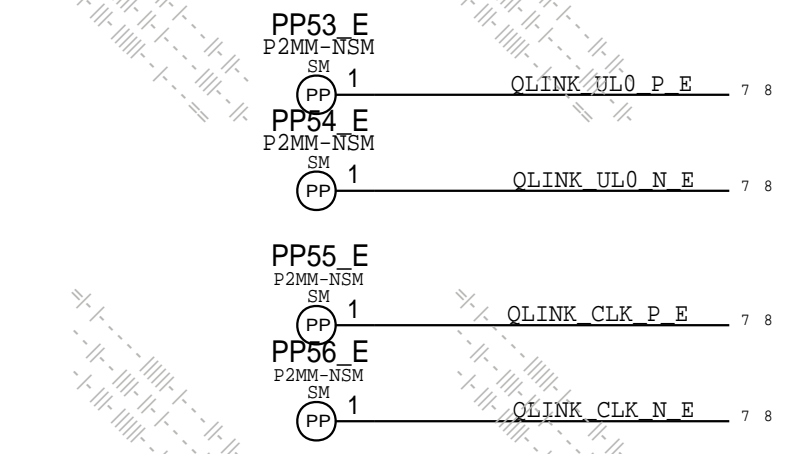
BB PROBE POINTS

QLINK

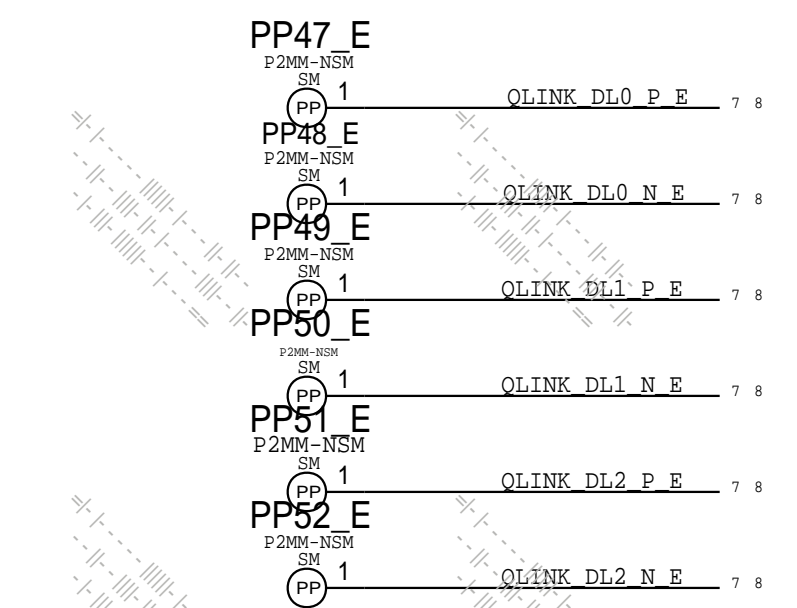
BASEBAND

LAYOUT: VIA STUB AT WTR PINS

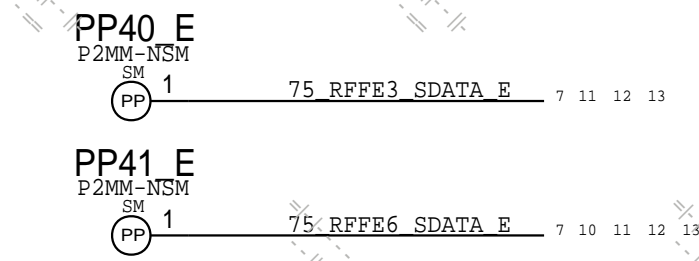
CLK



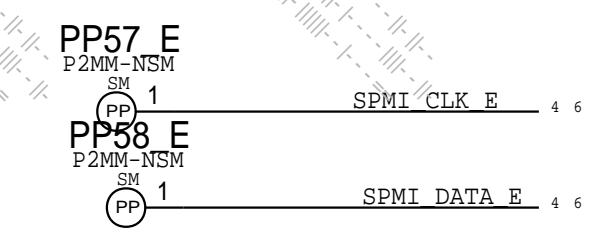
LAYOUT: VIA STUB AT BB PINS



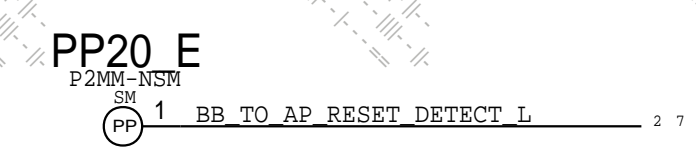
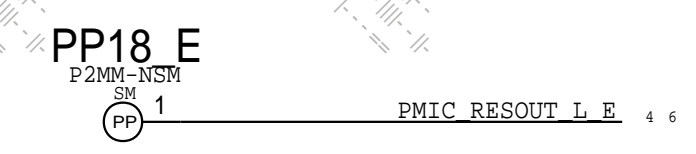
RFFE



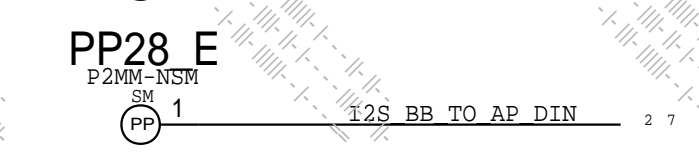
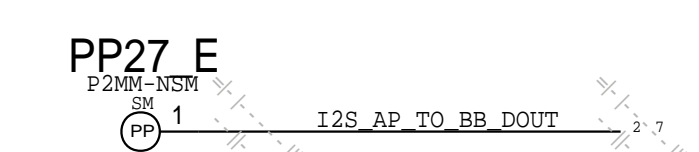
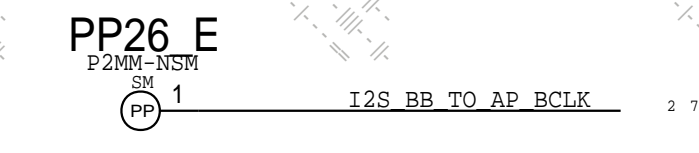
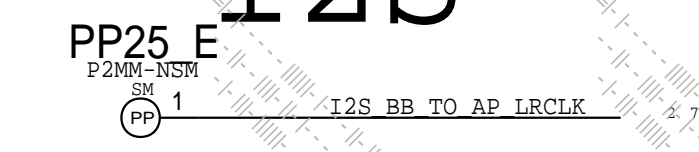
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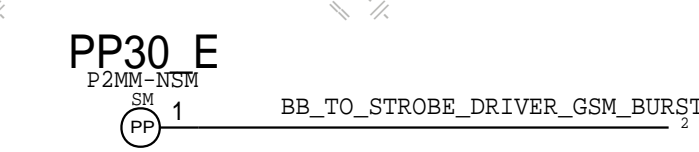
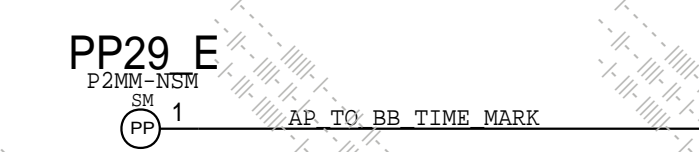
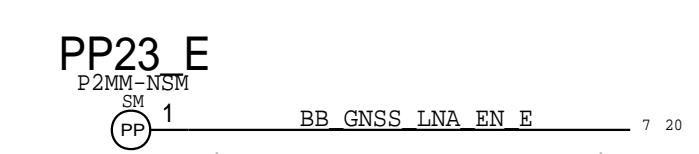
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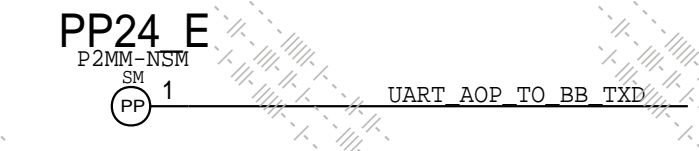
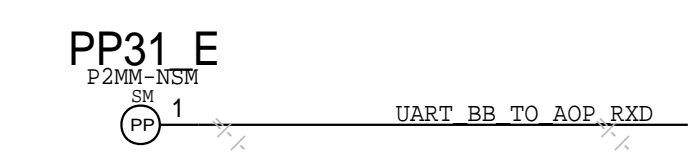
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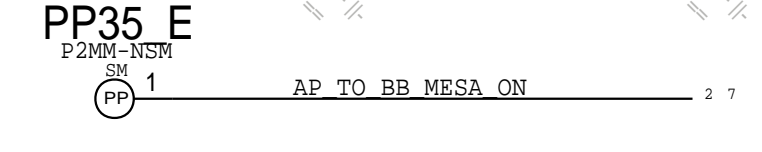
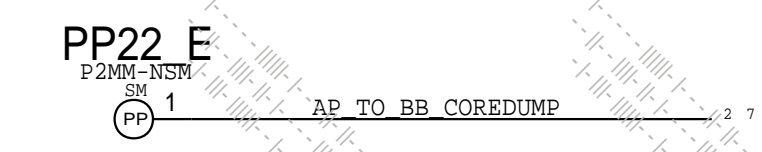
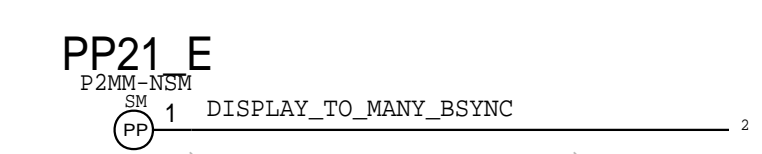
CTRL



UART

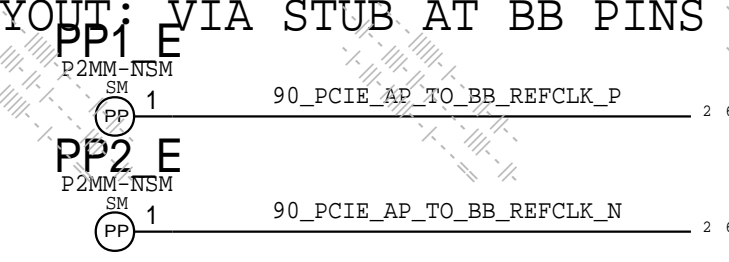


OTHERS



PCIE

LAYOUT: VIA STUB AT BB PINS



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TEST POINTS			
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	REVISION	10.0.0	D
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		PAGE	22 OF 22
		SHEET	74 OF 81

8

7

6

5

4

3

2

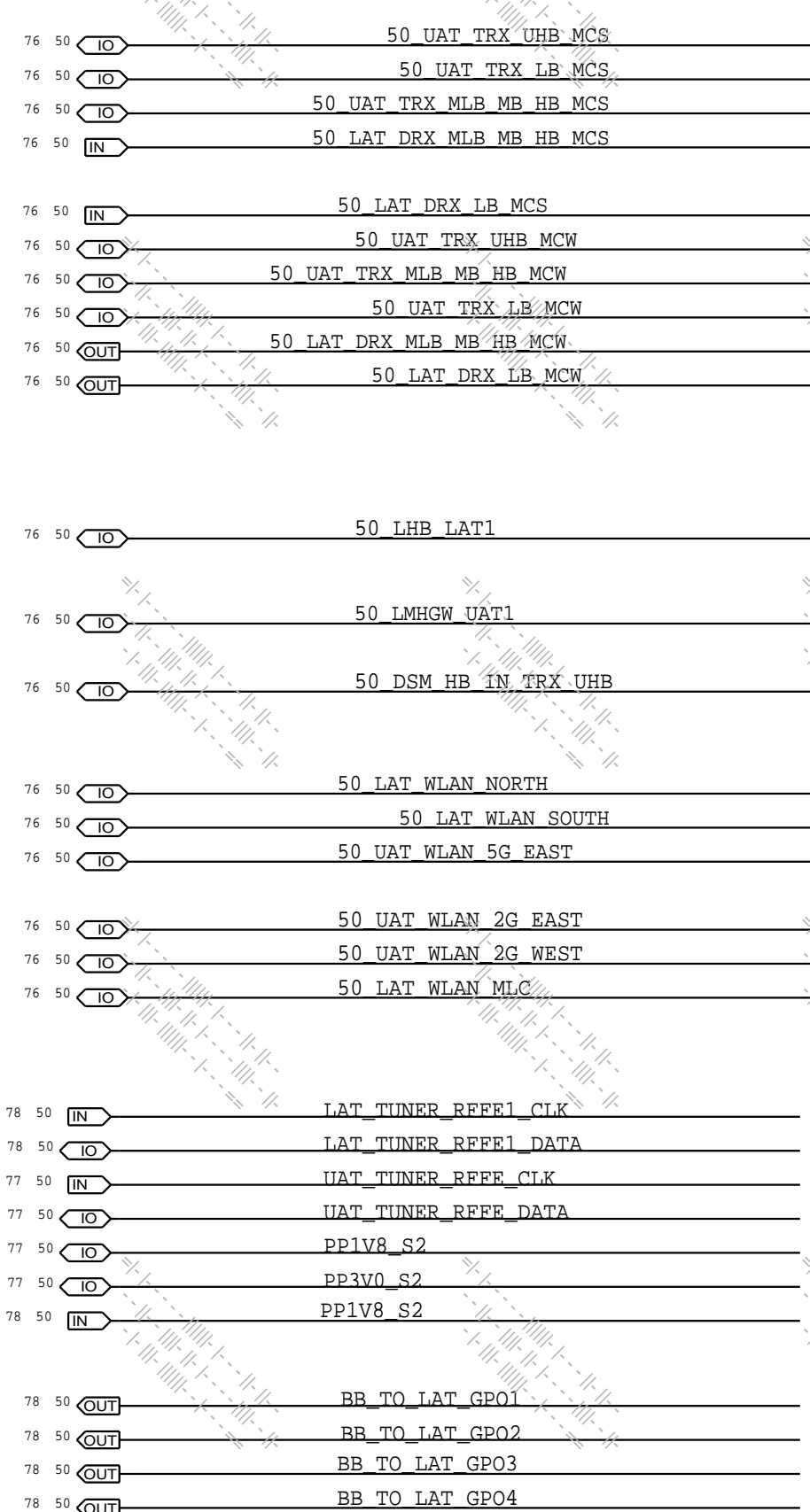
1

- 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
10	0008927012	ENGINEERING RELEASED		2017-06-06

D21 RADIO_MLB_FF

5/22/2017



FRONT PAGE

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	DRAWING NUMBER	051-02159	SIZE D
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		PAGE	1 OF 4
		SHEET	75 OF 81

8

7

6

5

4

3

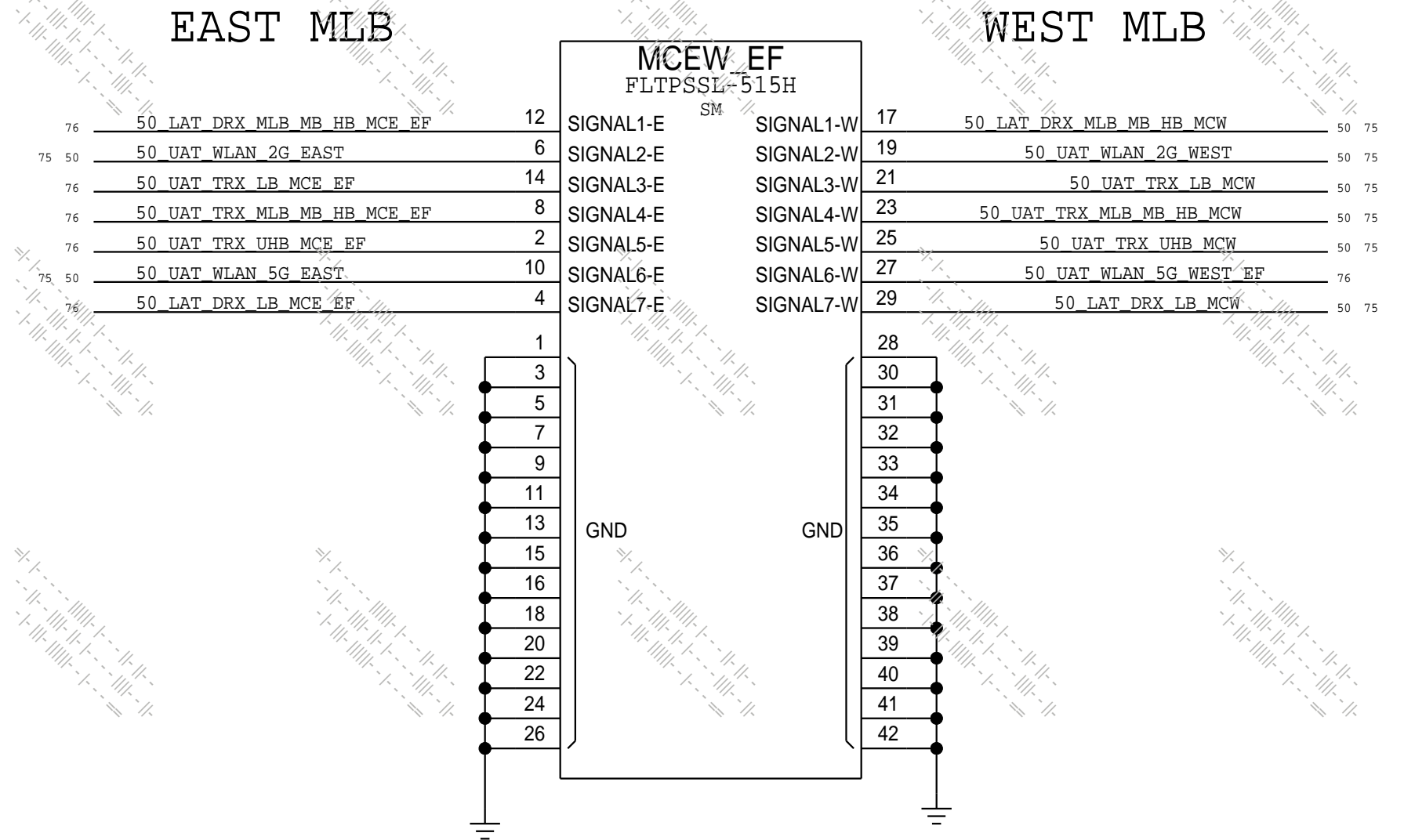
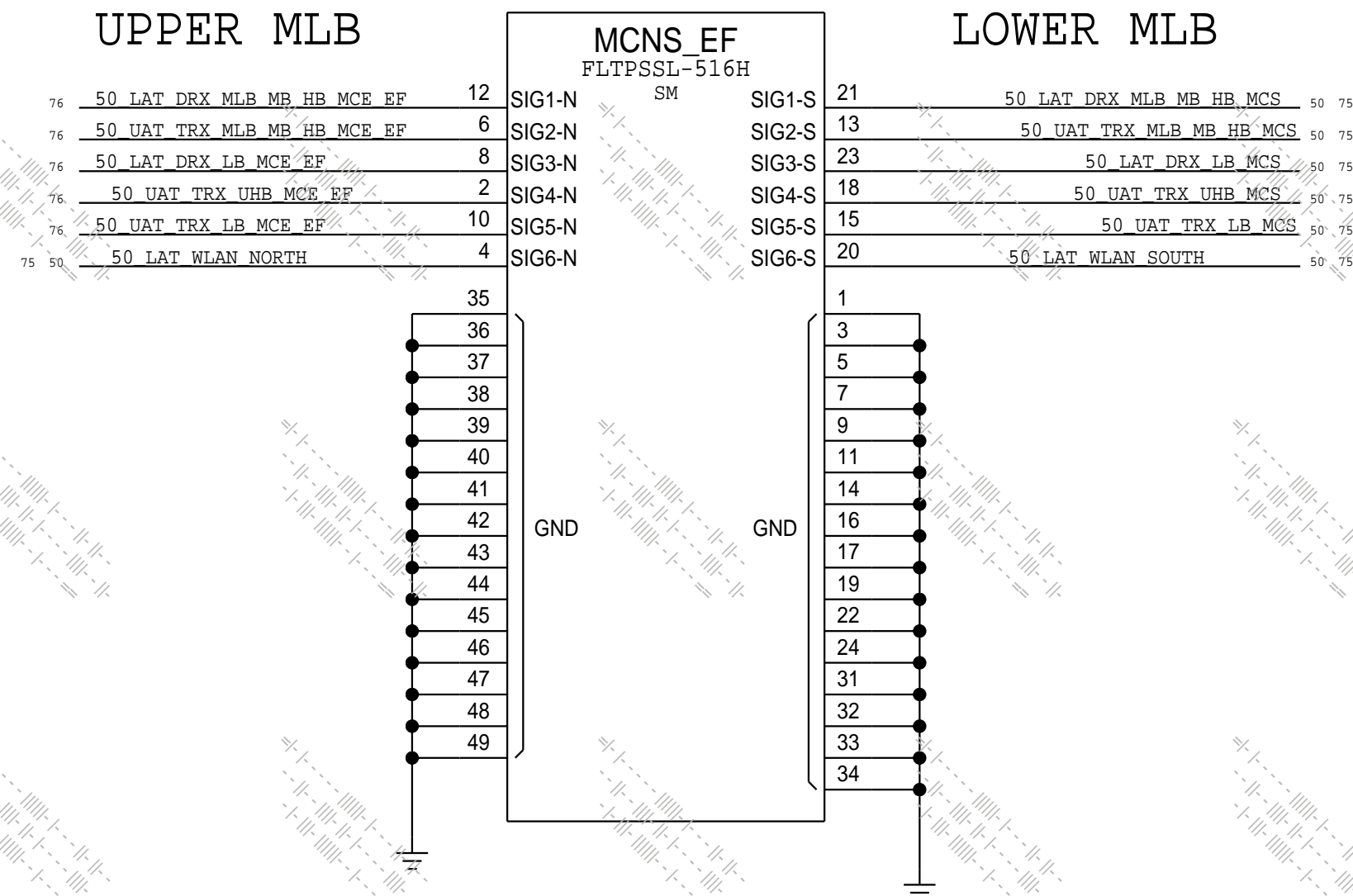
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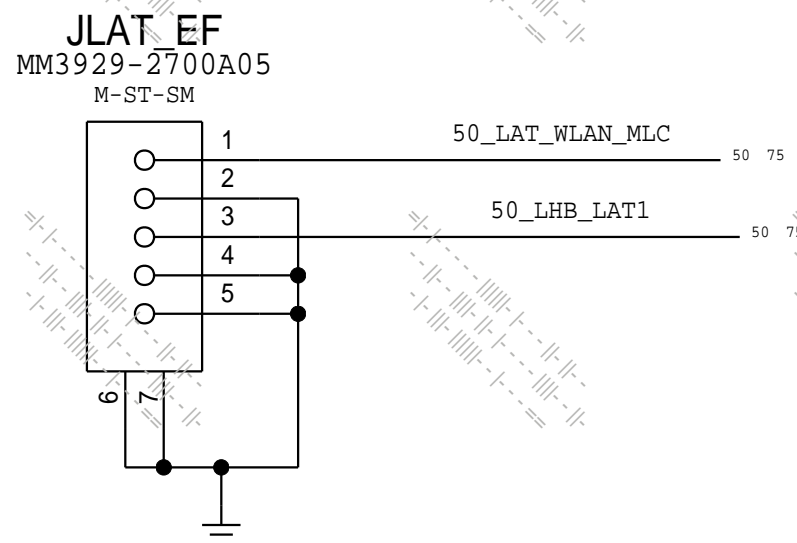
METROCIRC

NORTH-SOUTH METROCIRC 339S00297

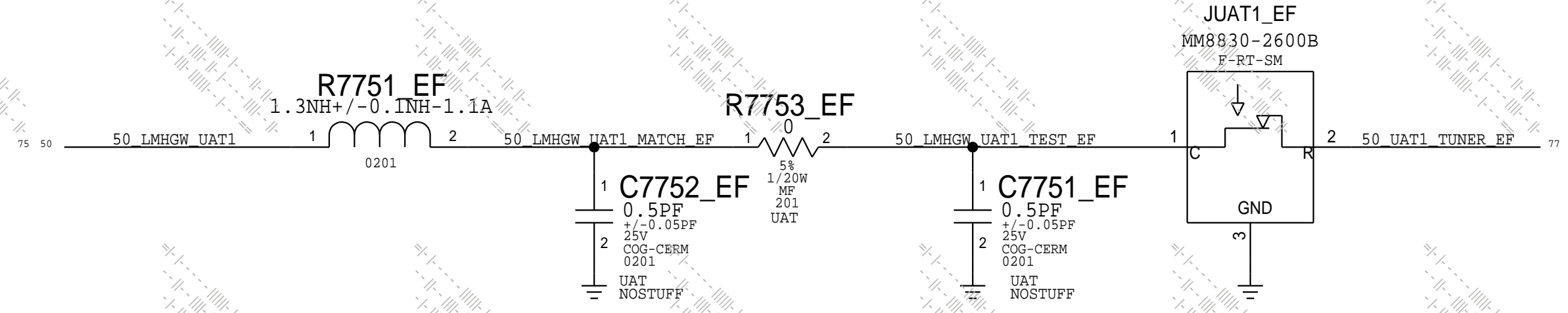
EAST-WEST METROCIRC 339S00296



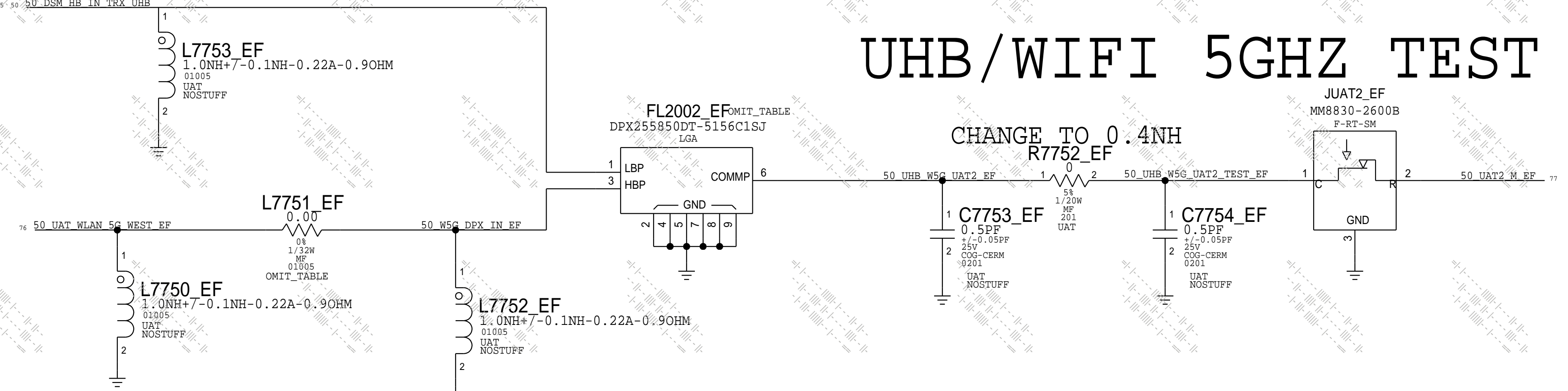
LAT MLC



LB/MLB/MB/HB WIFI 2.4GHZ TEST



UHB/WIFI 5GHZ TEST



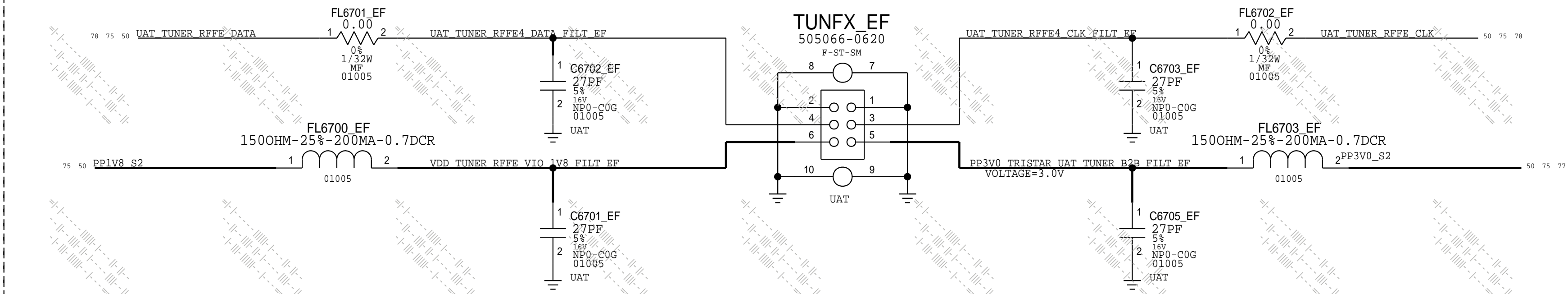
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
155800274	1	B42/5G DIPLEXER	FL2002_EF	CRITICAL	JPN
155800275	1	5G PASSTHROUGH	FL2002_EF	CRITICAL	ROW
13180598	1	B42/5G DIPLEXER 5G_IN MATCH	L7751_EF	CRITICAL	JPN
13180385	1	5G PASSTHROUGH INPUT MATCH	L7751_EF	CRITICAL	ROW

PAGE TITLE METROCIRC		
	DRAWING NUMBER 051-02159	SIZE D
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BRANCH	PAGE 2 OF 4	
SHEET	76 OF 81	

UAT TUNER FLEX

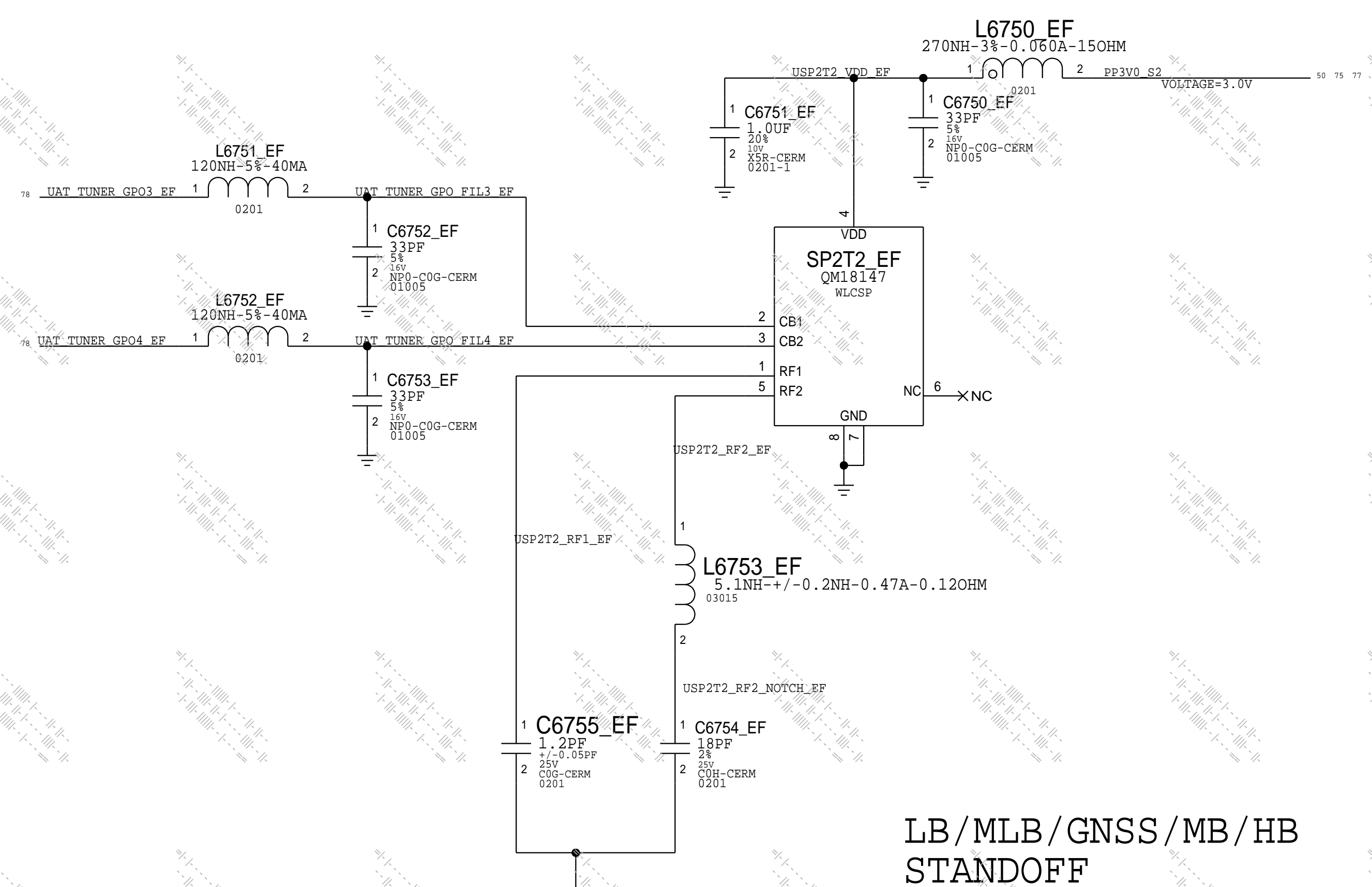
PLEASE CONTACT ANTENNA (MATT MOW)
FOR ANY COMPONENT CHANGE.

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
15281240	1	4.3NH 03015 WW INDUCTOR	L8005_EF	CRITICAL	JPN
152800749	1	3.6NH 03015 WW INDUCTOR	L8005_EF	CRITICAL	ROW



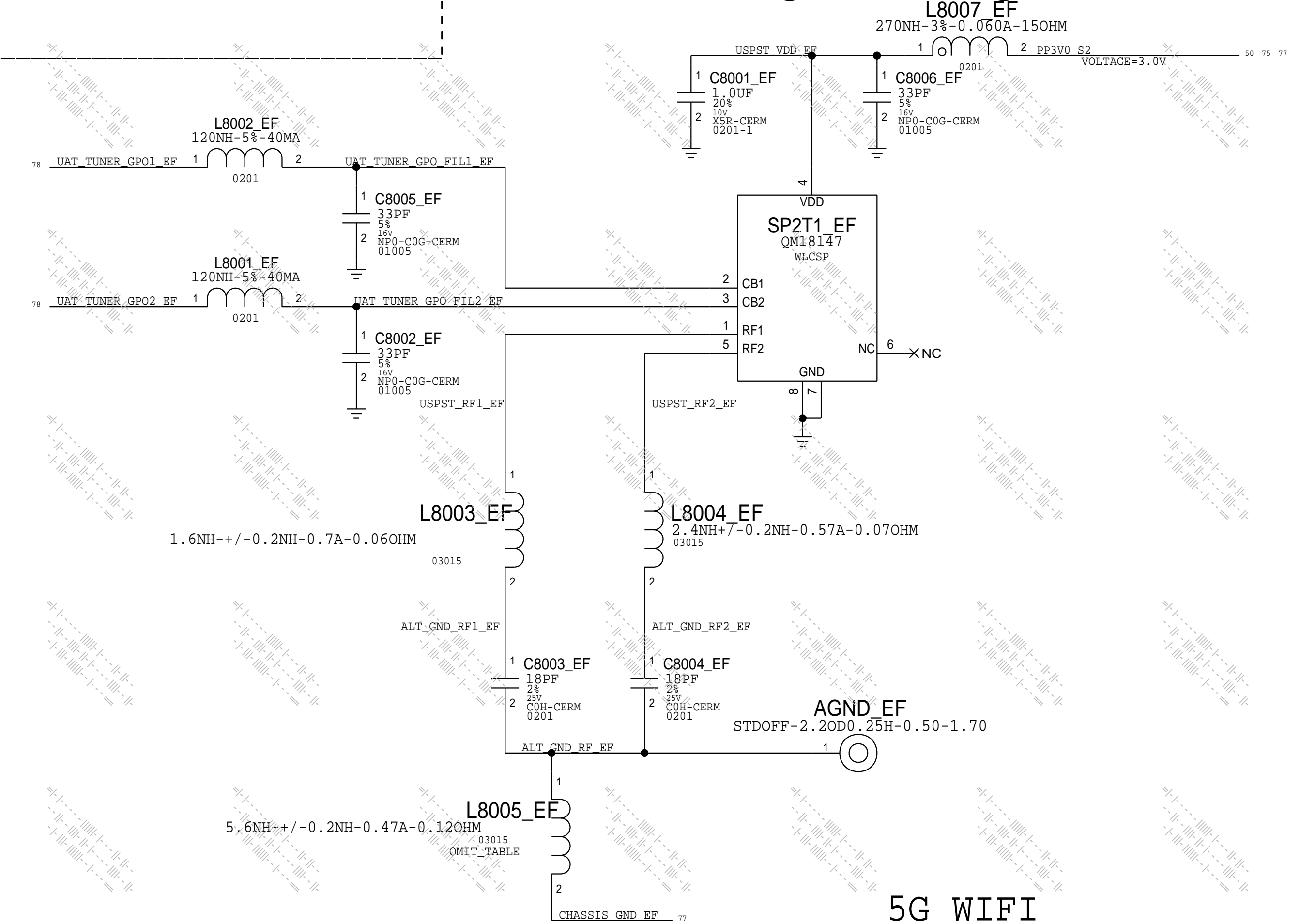
PINOUT IS ROTATED 180
COMPARED TO D20 & D201

UAT TUNER

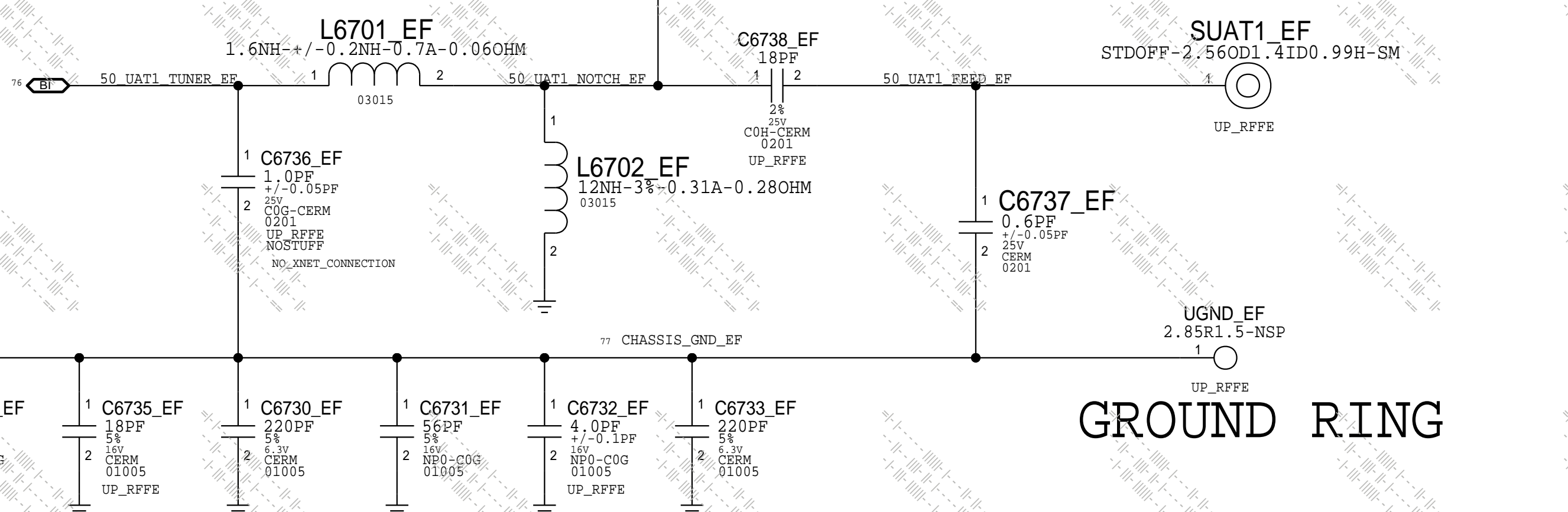


LB/MLB/GNSS/MB/HB
STANDOFF

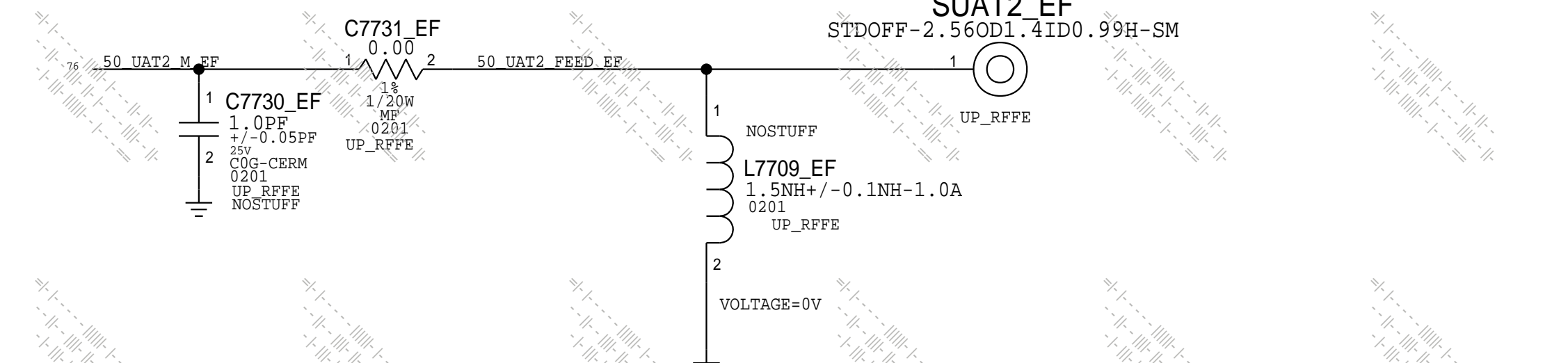
ALT UAT1 GND



5G WIFI
STANDOFF



GROUND RING



PAGE TITLE		
UAT MATCH AND TUNER		
Apple Inc.	DRAWING NUMBER	051-02159
	REVISION	10.0.0
	BRANCH	
	PAGE	3 OF 4
	SHEET	77 OF 81

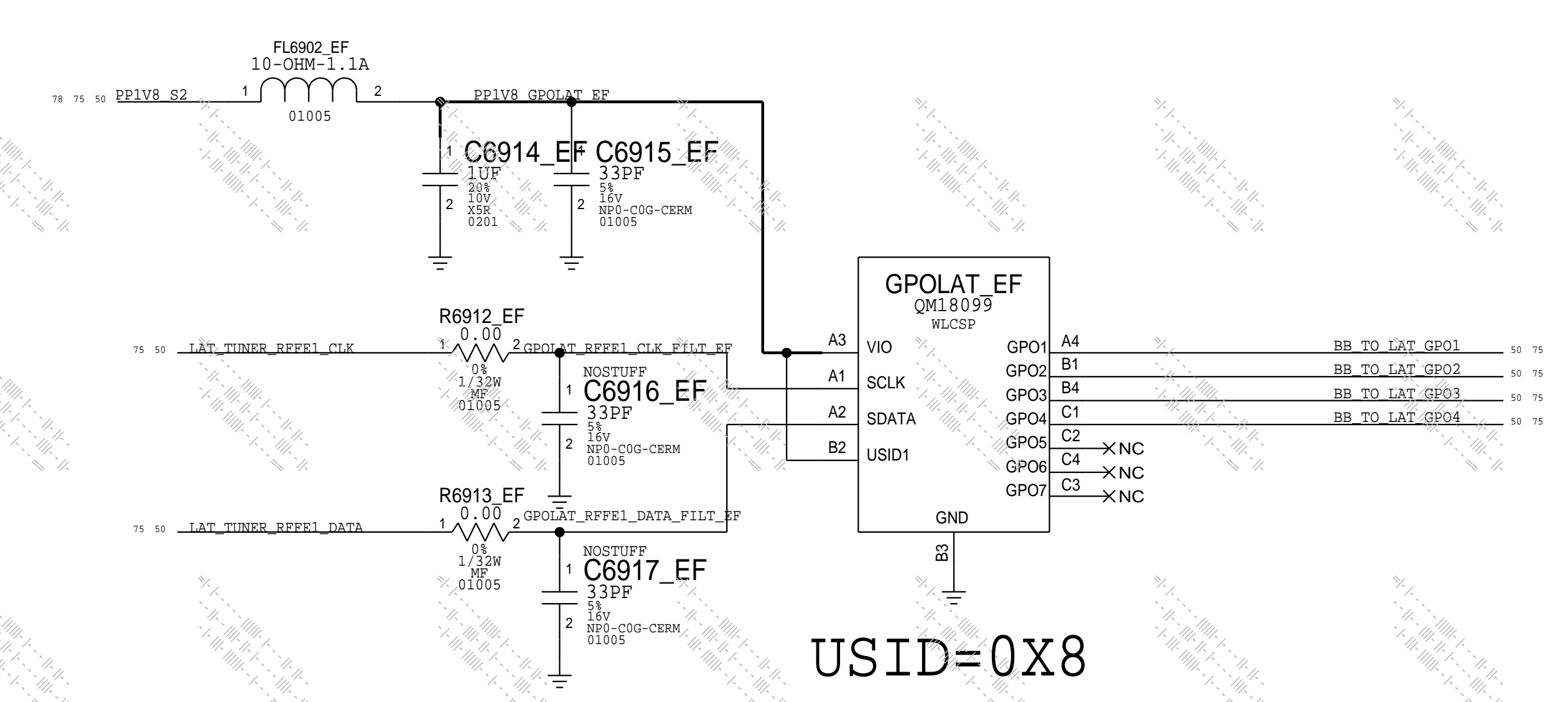
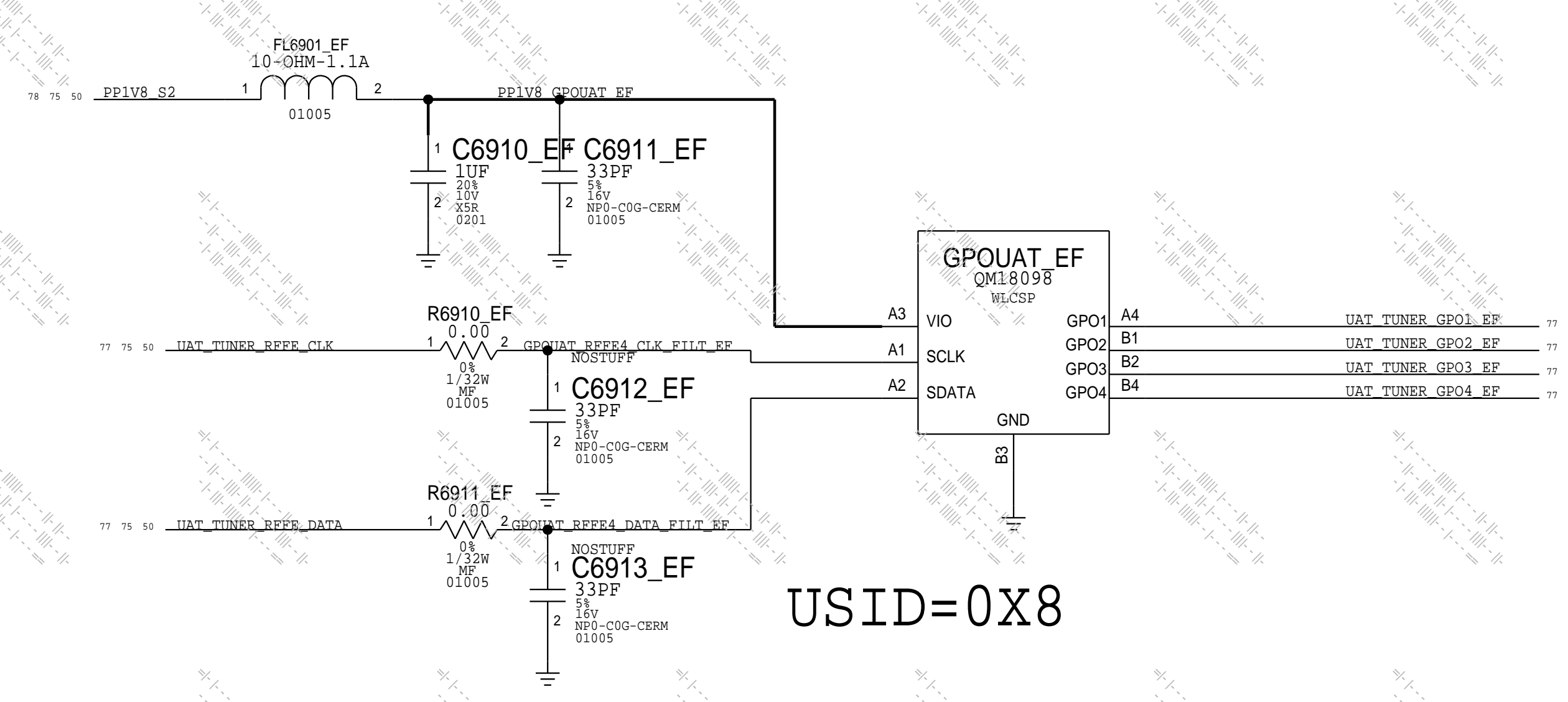
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PAGE TITLE		
RFFE TO GPO TRANSLATOR		
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		4 OF 4 78 OF 81

1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%.
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 3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.

REV	ECN	DESCRIPTION OF REVISION	CK APPD	DATE
10	0008927012	ENGINEERING RELEASED		2017-06-06

D21X WIFI_MLB (GUINNESS)

NOV 28, 2016

PDF PAGE	CSA PAGE	CONTENTS
2	76	GUINNESS
3	77	WIFI FRONT-END

POWER

80 50 (IN) PP_VDD_MAIN
 80 50 (IN) PEIVR_S2

CLOCKS

80 50 (IN) PMU_TO_WLAN_CLK32K
 80 50 (OUT) WLAN_TO_AP_TIME_SYNC

CONTROL

80 50 (IN) PMU_TO_WLAN_REG_ON
 80 50 (IN) PMU_TO_BT_REG_ON
 80 50 (OUT) BT_TO_PMU_HOST_WAKE
 80 50 (IN) AP_TO_BT_WAKE

WLAN PCIE

80 50 (IN) 90_PCIE_AP_TO_WLAN_EFCLK_P
 80 50 (IN) 90_PCIE_AP_TO_WLAN_EFCLK_N
 80 50 (IN) 90_PCIE_AP_TO_WLAN_TXD_P
 80 50 (IN) 90_PCIE_AP_TO_WLAN_TXD_N
 80 50 (OUT) 90_PCIE_WLAN_TO_AP_RXD_P
 80 50 (OUT) 90_PCIE_WLAN_TO_AP_RXD_N
 80 50 (IN) PCIE_AP_TO_WLAN_RESET_L
 80 50 (TO) PCIE_WLAN_BI_AP_CLKREQ_L
 80 50 (OUT) WLAN_TO_PMU_HOST_WAKE
 80 50 (IN) AP_TO_WLAN_DEVICE_WAKE

WLAN UART

80 50 (OUT) UART_WLAN_TO_AP_RXD
 80 50 (IN) UART_AP_TO_WLAN_TXD
 80 50 (OUT) UART_WLAN_TO_AP_CTS_L
 80 50 (IN) UART_AP_TO_WLAN_RTS_L

BLUETOOTH UART

80 50 (IN) UART_AP_TO_BT_TXD
 80 50 (OUT) UART_BT_TO_AP_RXD
 80 50 (IN) UART_AP_TO_BT_RTS_L
 80 50 (OUT) UART_BT_TO_AP_CTS_L

AOP

80 50 (IN) AOP_TO_WLAN_CONTEXT_A
 80 50 (IN) AOP_TO_WLAN_CONTEXT_B


COEX

80 50 (IN) UART_BB_TO_WLAN_COEX
 80 50 (OUT) UART_WLAN_TO_BB_COEX

ANTENNA

81 50 (TO) 50_UAT_WLAN_2G_EAST
 81 50 (TO) 50_UAT_WLAN_5G_EAST
 81 50 (TO) 50_LAT_WLAN_NORTH
 81 50 (TO) 50_LAT_WLAN_SOUTH
 81 50 (TO) 50_LAT_WLAN_MLC

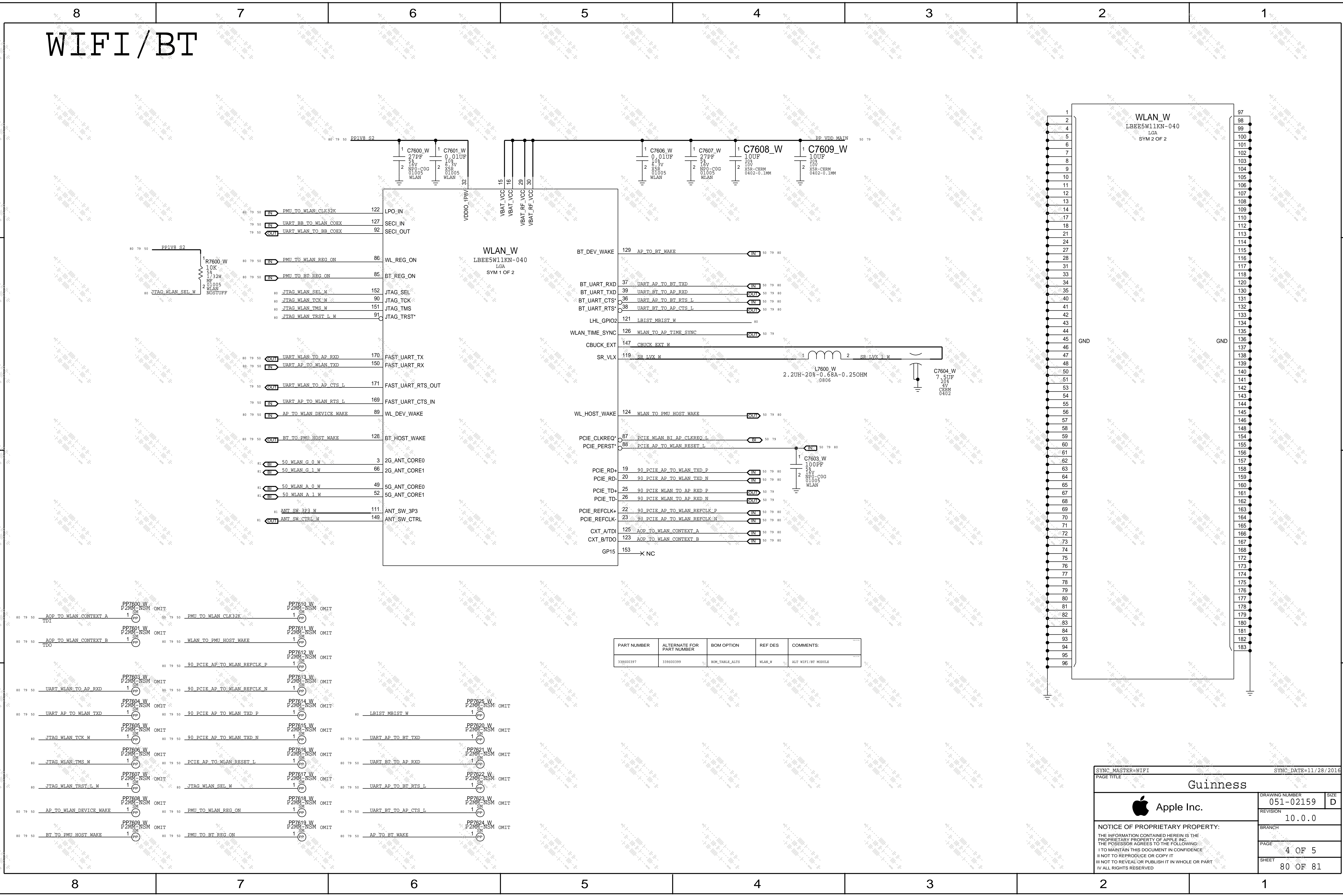
SymbolPorts

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	REVISION	10.0.0	D
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		PAGE	1 OF 5
		SHEET	79 OF 81

WIFI/BT

D
C
B
A

D
C
B
A



PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
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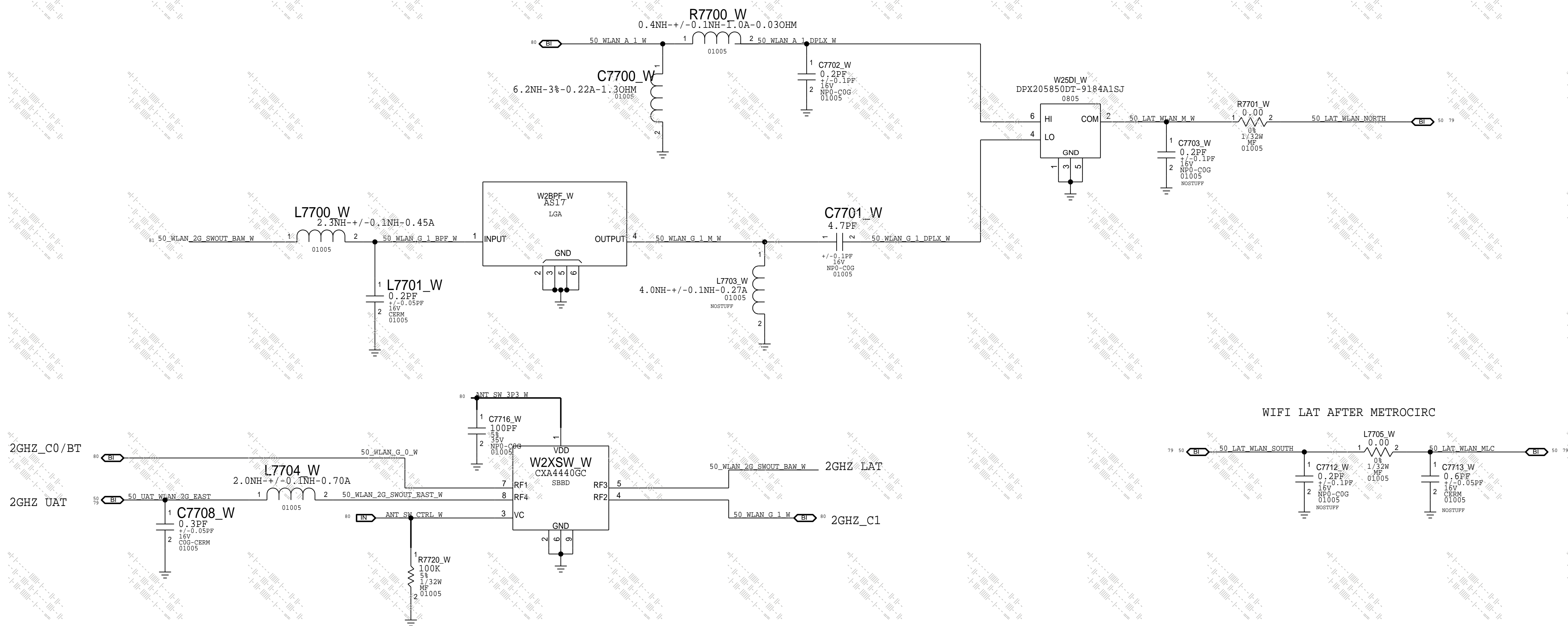
Guinness

Apple Inc.

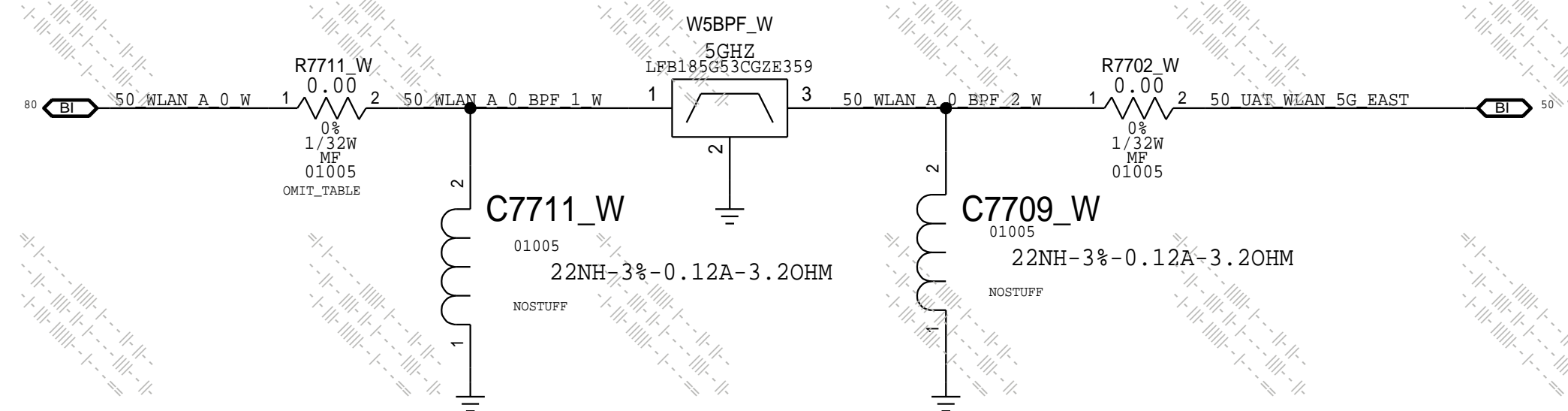
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REVISION	10.0.0		
BRANCH			
PAGE	4 OF 5		
SHEET	80 OF 81		

WIFI LOWER ANTENNA FEED



WIFI UPPER ANTENNA FEED



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
152800498	1	5G CORED BPF MATCH	R7711_W	CRITICAL	D211
11780161	1	5G CORED BPF MATCH	R7711_W	CRITICAL	JPN
11780161	1	5G CORED BPF MATCH	R7711_W	CRITICAL	ROW

SYNC_DATE=11/28/2016

PAGE TITLE \$PAGE_TITLE=WifiAntFeeds

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		5 OF 5		
		SHEET		
		81 OF 81		