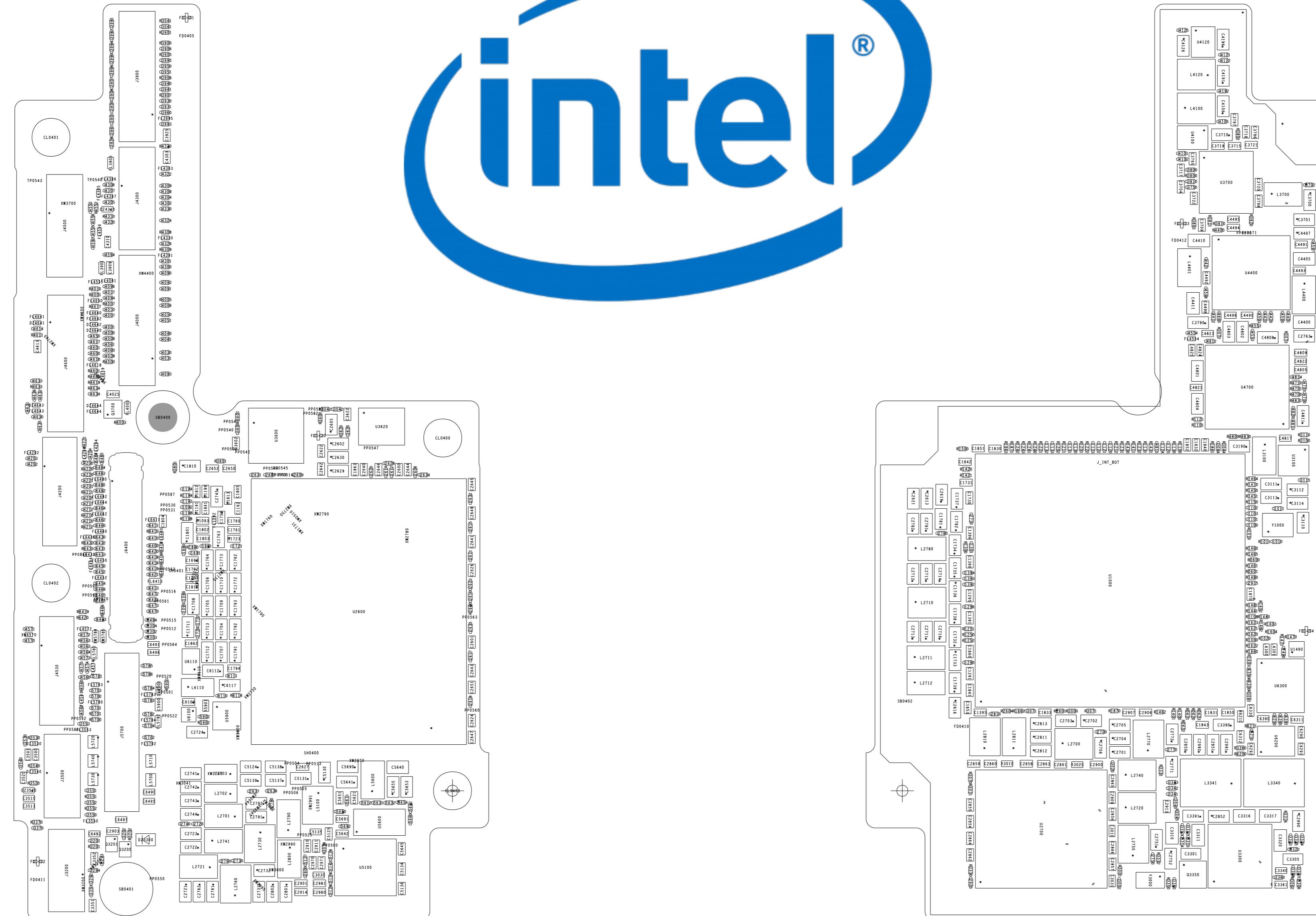


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PCB 820-00863-09 X891 Intel Edition TOP MLB

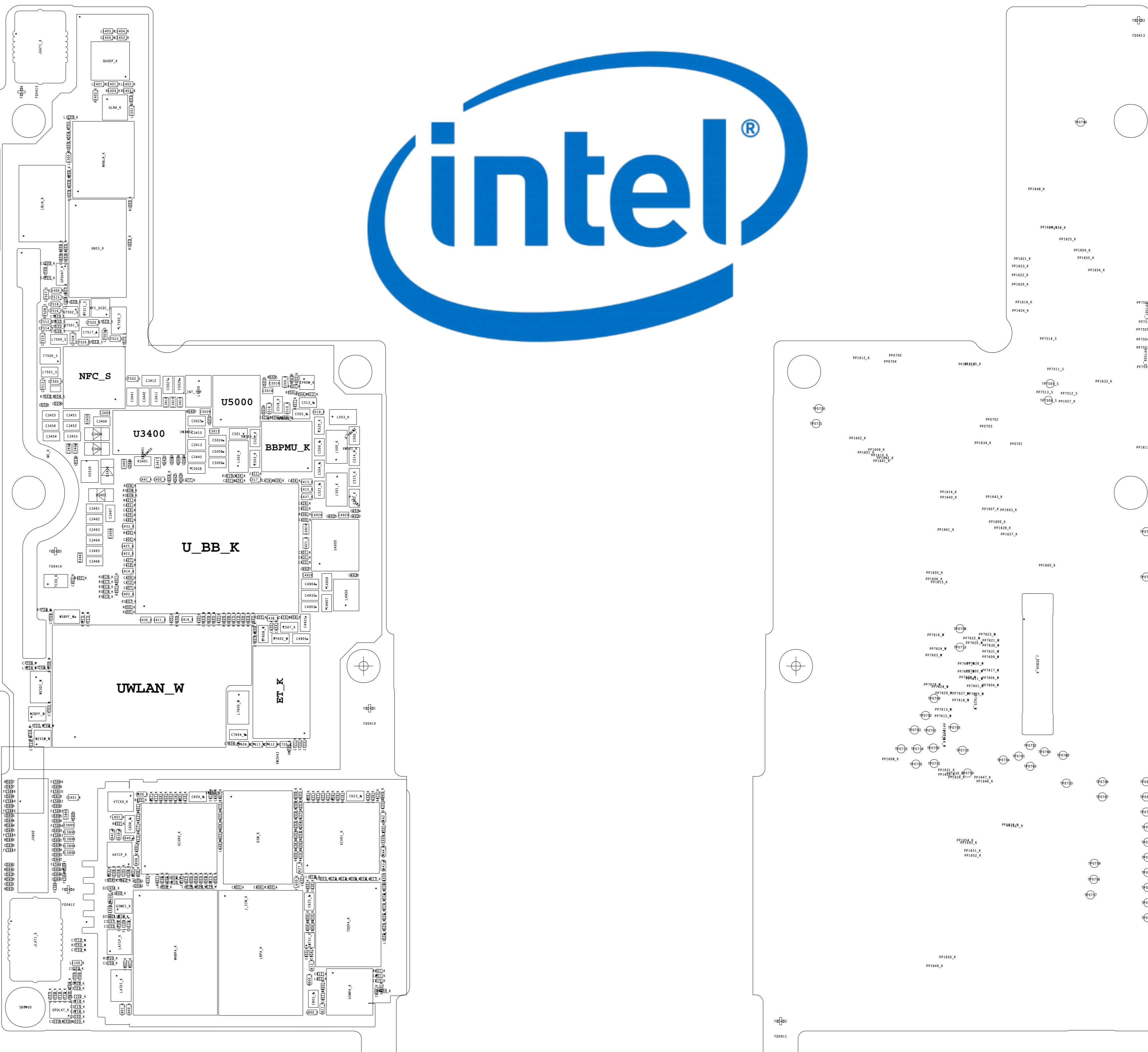


TOP BOTTOM SIDE ASSEMBLY

APPLE				TITLE PCB, X891 TOP MLB	
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ORIG DIV	DESIGNER	DATE	SCALE		
KEN KIPLINGER 03/31/17 1:1				DRAWING NUMBER 820-00863-09	
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PCB 820-00869-06 X893 Intel Edition TOP MLB



TOP BOTTOM SIDE ASSEMBLY

APPLE				TITLE PCB, X893 MLB BOT	
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ORIG DIV	DESIGNER	DATE	SCALE		
	TIM REID	04/06/17	1:1		
<small>NOTES: ARTWORK VIEWED FROM COMPONENT SIDE. PCB SHALL CONFORM TO STANDARDS AS DEFINED IN APPLE SPECIFICATION DOCUMENTATION. PRINTING TOLERANCE +/- 0.005MM. 062-0073 (MULTI-LAYER BOARDS) AS APPLICABLE.</small>					
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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
9	0008409760	ENGINEERING RELEASED	2017-04-05

X891/X893 MLB Top: EVT

LAST_MODIFICATION=Mon Apr 3 13:03:06 2017

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18	28	SYSTEM POWER: PMU Bucks (2/4)	test_mlb 10/13/2016
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50	65	I/O: Interposer (Bottom)	test_mlb 10/13/2016
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SYNC DATE

BOM:639-04583 (Ultimate)

BOM:639-03409 (Extreme)

MCO:056-04077

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION	---
051-02221	1	SCH_MLB_TOP_X891	SCH	NO	COMMON	---
820-00863	1	PCB_MLB_TOP_X891	PCB	NO	COMMON	---

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DRAWING TITLE	DRAWING NUMBER	SIZE
SCH_MLB_TOP_X891	051-02221	D
Apple Inc.	REVISION	9.0.0
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	SHEET	1 OF 51

EEEE Codes

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
825-7691	1	EEEEE FOR (MLB_TOP,639-04583,ULTIMATE)	EEEEE_J2WJ	NO	ULTIMATE
825-7691	1	EEEEE FOR (MLB_TOP,639-03409,EXTREME)	EEEEE_HP26	NO	EXTREME

SOC

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
339S00358	1	SKYE+3GB, B0, M, DEV	U1000	CRITICAL	COMMON
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
339S00359	339S00358	BOM_TABLE_ALTS	U1000	DDR-H,3G, B0	
339S00360	339S00358	BOM_TABLE_ALTS	U1000	DDR-S-20,3G, B0	
339S00361	339S00358	BOM_TABLE_ALTS	U1000	DDR-S-18,3G, B0	

NAND Ultimate

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
335S00287	1	HYNIX, 3DV3, ULTIMATE	U2600	CRITICAL	ULTIMATE
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
335S00284	335S00287	BOM_TABLE_ALTS	U2600	TOSHIBA, 1Z, ULTIMATE	
335S00285	335S00287	BOM_TABLE_ALTS	U2600	TOSHIBA, BICS3, ULTIMATE	
335S00286	335S00287	BOM_TABLE_ALTS	U2600	SANDISK, BICS3, ULTIMATE	
335S00288	335S00287	BOM_TABLE_ALTS	U2600	SAMSUNG, 3DV4, ULTIMATE	

Extreme

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
335S00240	1	HYNIX, 3DV3, EXTREME	U2600	CRITICAL	EXTREME
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
335S00228	335S00240	BOM_TABLE_ALTS	U2600	TOSHIBA, BICS3, EXTREME	
335S00247	335S00240	BOM_TABLE_ALTS	U2600	SANDISK, BICS3, EXTREME	
335S00276	335S00240	BOM_TABLE_ALTS	U2600	SAMSUNG, 3DV4, EXTREME	

Global Capacitors

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00148	138S00149	BOM_TABLE_ALTS	ALL	0402-3T,10.5uF@1V, Kyocera
138S00150	138S00149	BOM_TABLE_ALTS	ALL	0402-3T,10.5uF@1V, SEMCO
138S00151	138S00149	BOM_TABLE_ALTS	ALL	0402-3T,10.5uF@1V, TY
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00143	138S00144	BOM_TABLE_ALTS	ALL	0402,16uF@1V, Kyocera
138S00163	138S00144	BOM_TABLE_ALTS	ALL	0402,16uF@1V, Taiyo
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00138	138S00139	BOM_TABLE_ALTS	ALL	0201,3uF@1V, Kyocera
138S00164	138S00139	BOM_TABLE_ALTS	ALL	0201,3uF@1V, Taiyo
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00145	138S00146	BOM_TABLE_ALTS	ALL	0402,5.1uF@3V, Kyocera
138S00165	138S00146	BOM_TABLE_ALTS	ALL	0402,5.1uF@3V, Taiyo
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00140	138S00141	BOM_TABLE_ALTS	ALL	0201,1.1uF@3V, Kyocera
138S00142	138S00141	BOM_TABLE_ALTS	ALL	0201,1.1uF@3V, SEMCO
138S00166	138S00141	BOM_TABLE_ALTS	ALL	0201,1.1uF@3V, Taiyo

Global Ferrites

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
155S00194	155S0610	BOM_TABLE_ALTS	ALL	FERR BD, 1500MH, TDK
155S00200	155S0610	BOM_TABLE_ALTS	ALL	FERR BD, 1500MH, TY

Global R/C Alternates

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
118S0764	118S0717	BOM_TABLE_ALTS	ALL	XRS, 3.92K, 0.1%, 0201
138S0648	138S0652	BOM_TABLE_ALTS	ALL	CAP,X5R,4.7UF,4,3V,0.45MH,0402,TAYO
138S0739	138S0706	BOM_TABLE_ALTS	ALL	CAP,X5R,2.2UF,4,3V,0.45MH,0402,TAYO
132S0436	132S0400	BOM_TABLE_ALTS	ALL	CAP,X5R,2.2UF,4,3V,0.45MH,0402,TAYO
138S0049	138S0831	BOM_TABLE_ALTS	ALL	CAP,X5R,2.2UF,4,3V,0.45MH,0201

Global Inductors

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
152S00710	152S00617	BOM_TABLE_ALTS	ALL	IND,MLD,0.1UF,208,6.1A,29MHMH,H=65,1608
152S00712	152S00620	BOM_TABLE_ALTS	ALL	IND,MLD,0.1UF,208,7.2A,17MHMH,H=8,2012
152S00713	152S00621	BOM_TABLE_ALTS	ALL	IND,MLD,0.47UF,219,3.5A,53MH,H=65,2012
152S00714	152S00622	BOM_TABLE_ALTS	ALL	IND,MLD,0.5UF,219,3.5A,53MH,H=65,2012
152S00716	152S00626	BOM_TABLE_ALTS	ALL	IND,MLD,1.5UF,208,1.1A,160MH,H=65,2012
152S00717	152S00631	BOM_TABLE_ALTS	ALL	IND,MLD,1.0UF,208,2.5A,78MH,H=8,2012
152S00718	152S00632	BOM_TABLE_ALTS	ALL	IND,MLD,1.0UF,219,3.5A,53MH,H=8,2012
152S00720	152S00640	BOM_TABLE_ALTS	ALL	IND,MLD,0.47UF,219,3.5A,53MH,H=8,2012
152S00721	152S00641	BOM_TABLE_ALTS	ALL	IND,MLD,1.4UF,219,4.4A,48MH,H=0.8MM,2012
152S00715	152S00623	BOM_TABLE_ALTS	ALL	IND,MLD,1.4UF,219,4.4A,48MH,H=0.8MM,2012
152S00653	152S00651	BOM_TABLE_ALTS	ALL	IND,1.2UF,3A,2016,0.65Z
152S00649	152S00650	BOM_TABLE_ALTS	L3340,L3341	IND,0.47UF,6.6A,3225,0.8Z

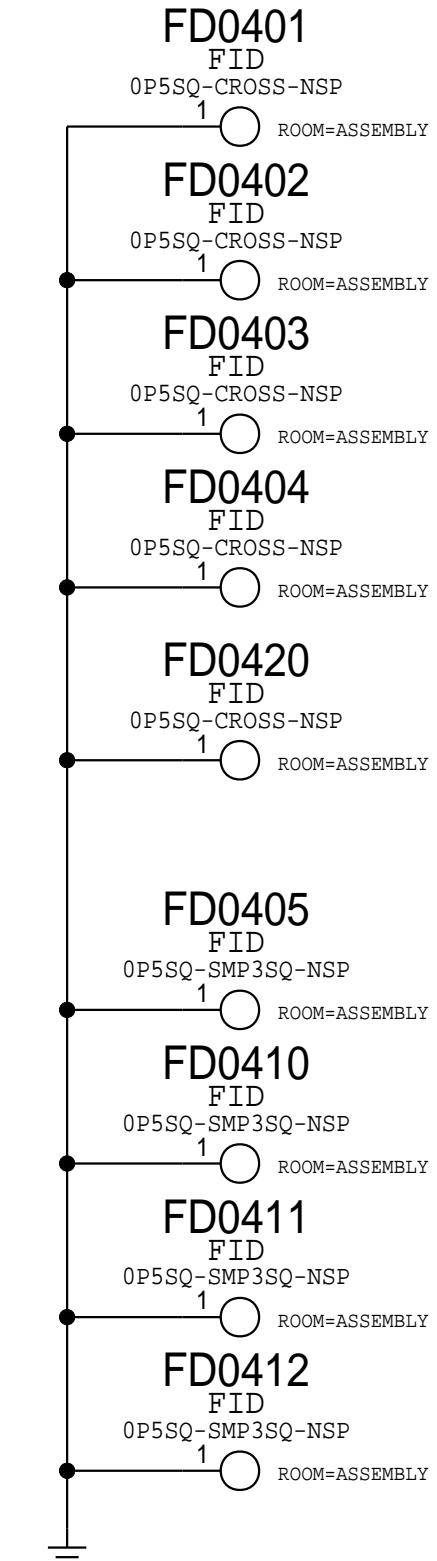
XTAL Alternate

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
197S0612	197S0446	BOM_TABLE_ALTS	Y1000	XTAL, 24M, 1612

Multi-Vendor Criticals

Critical Part#	Comment
377S0106	SUPFR,TRANS,VARISTOR,12V,33PF,01005
197S0446	XTAL,24MHz,30PPM,9.5PF,60 OHM MAX,1612
155S0576	FERR BD,10 OHM,504,750MA,0.07 DCR,01005
155S00168	FLTR,NOISE,65 OHMZ,3.4QHM,0.7-2QHZ,0605
138S0979	CAP,CER,X5R,10UF,20%,10V,0.020H,0.65MM
138S0692	CAP,CER,X5R,10UF,20%,6.3V,0201
138S0683	CAP,CER,X5R,10UF,10A,25V,0402
138S0652	CAP,CER,X5R,4.7UF,20%,6.3V,H=0.65MM,0402
131S0883	CAP,CER,NP0/COG,220PF,2%,50V,0201
138S0070	CAP,X5R,4.7UF,20%,25V,0402

FIDUCIALS



D

D

C

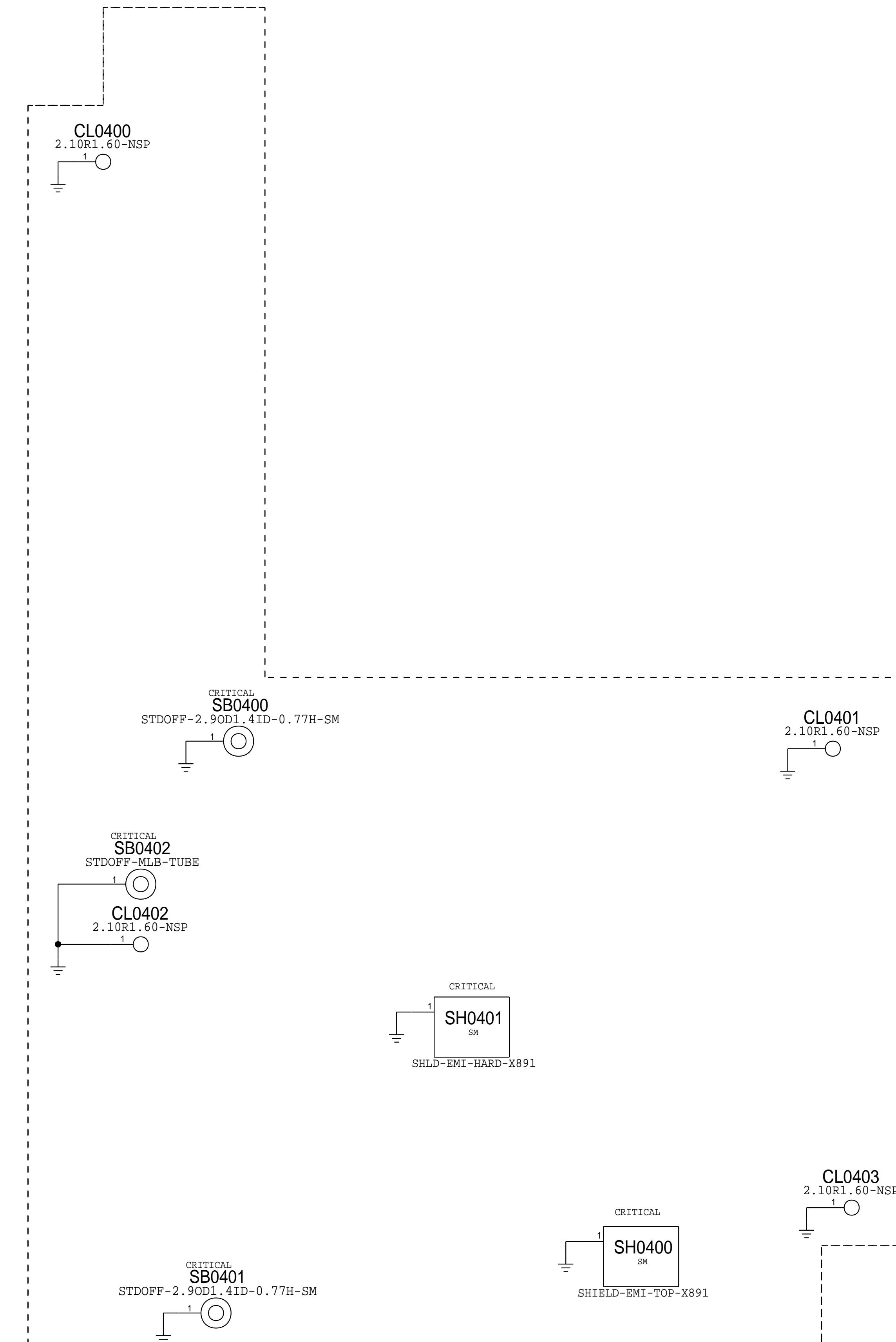
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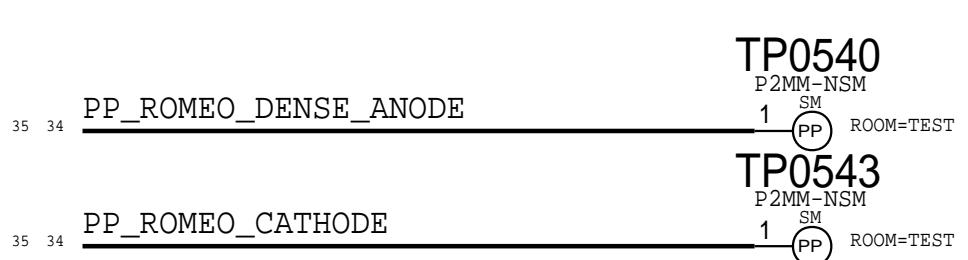
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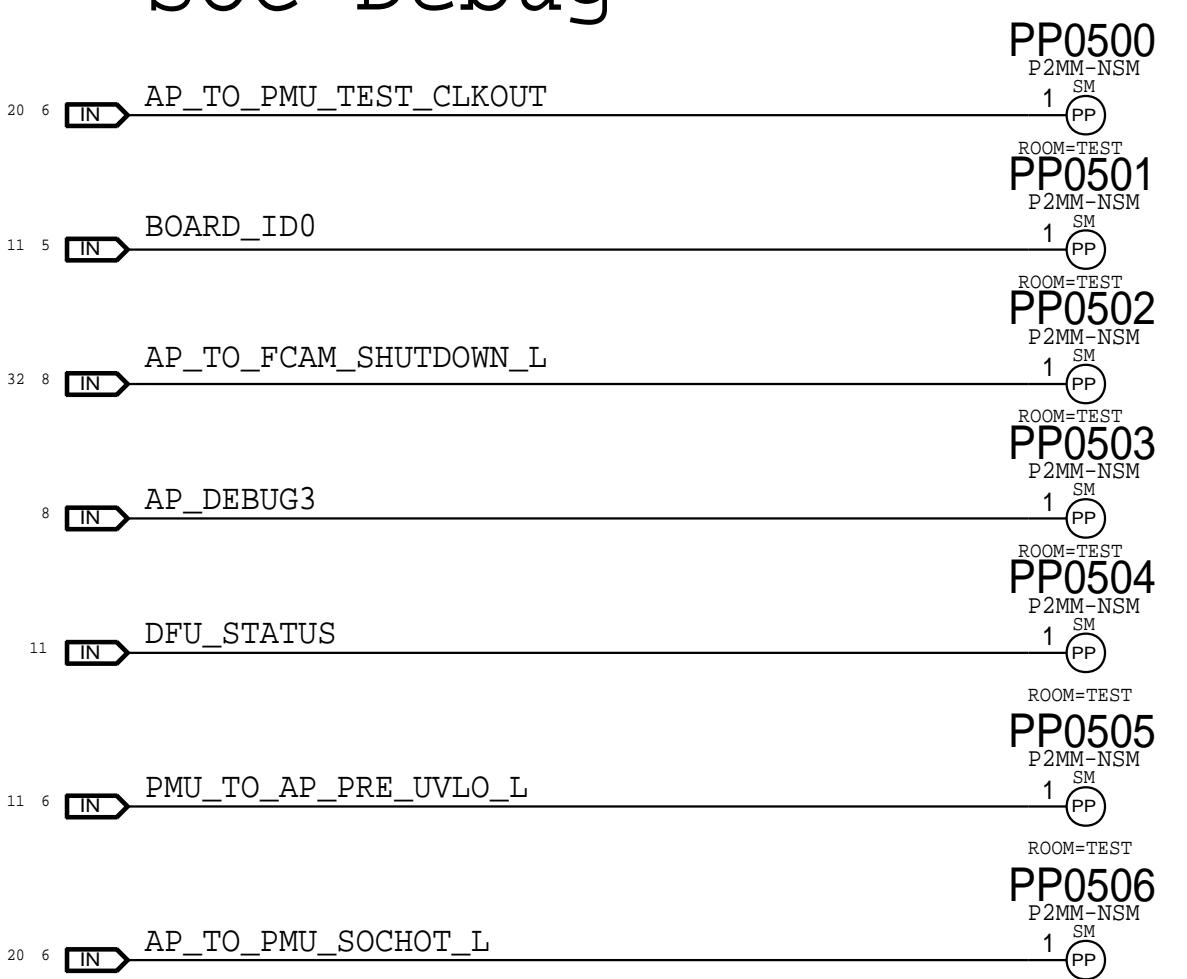
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Test Points

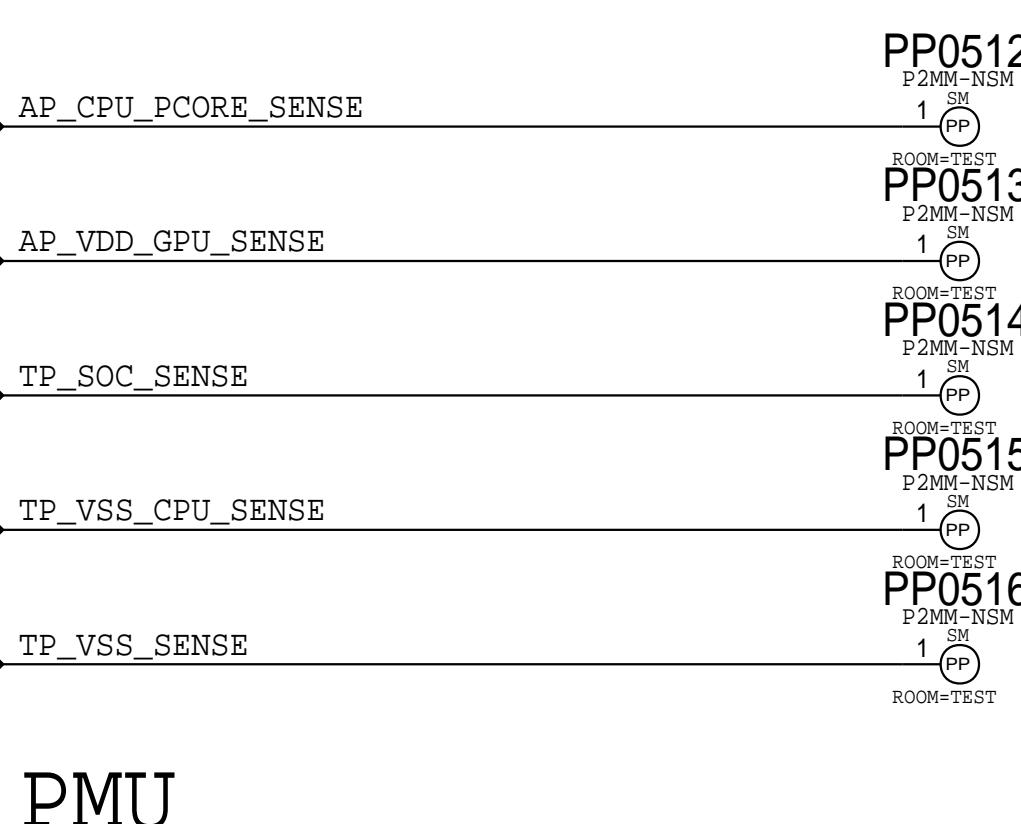
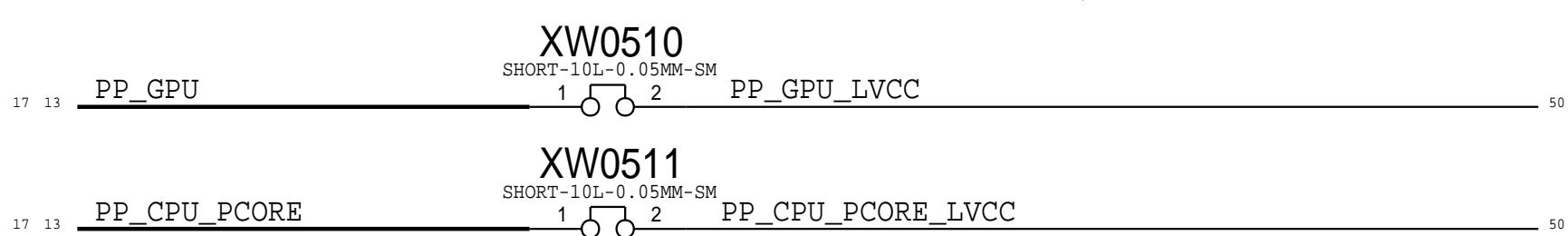
POWER



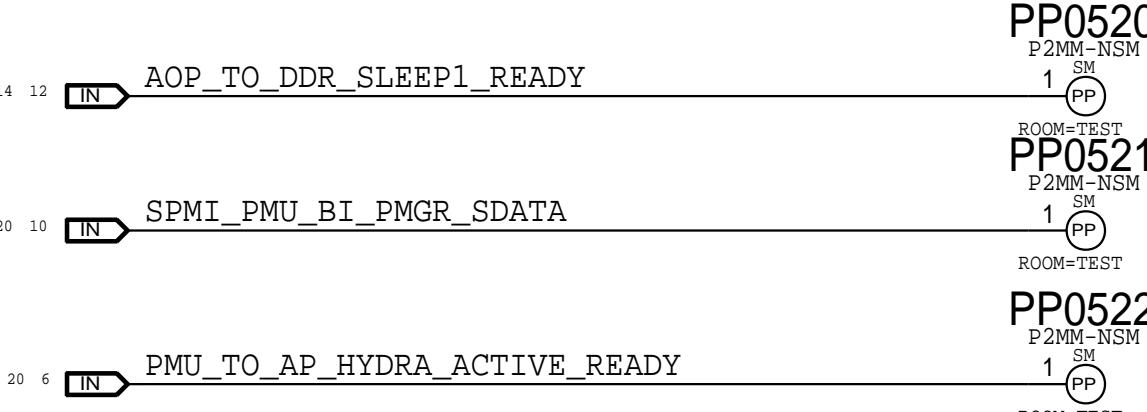
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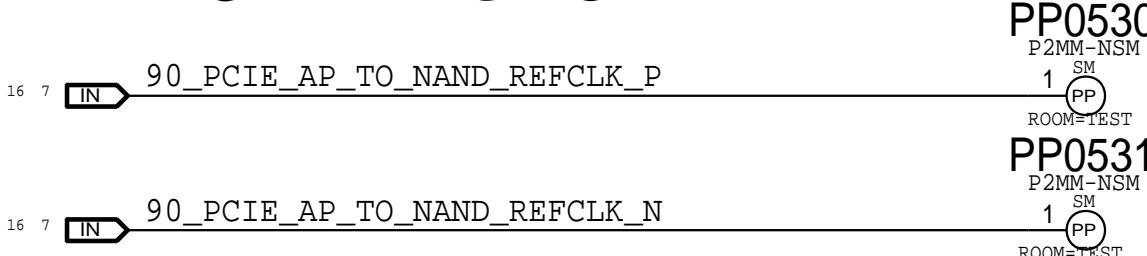
SOC CPU/GPU



PMU

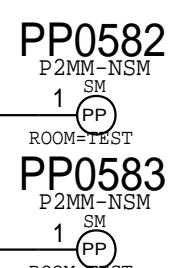
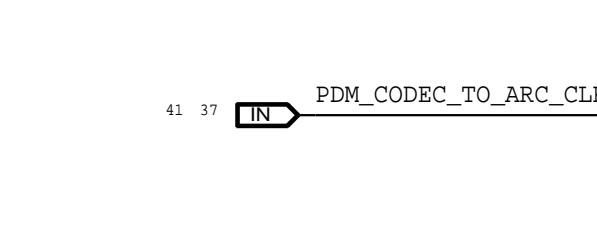
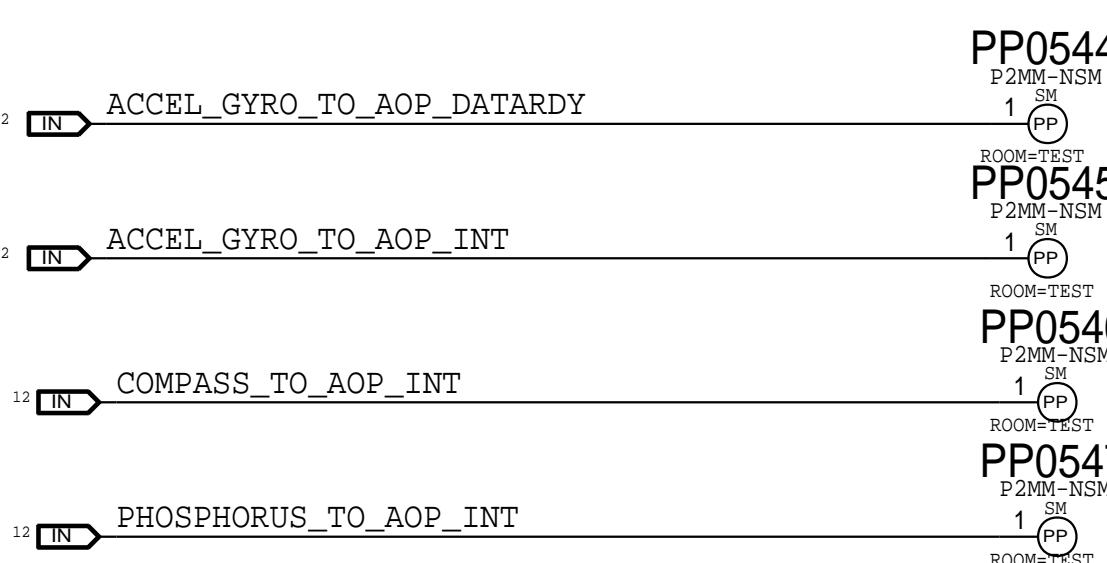
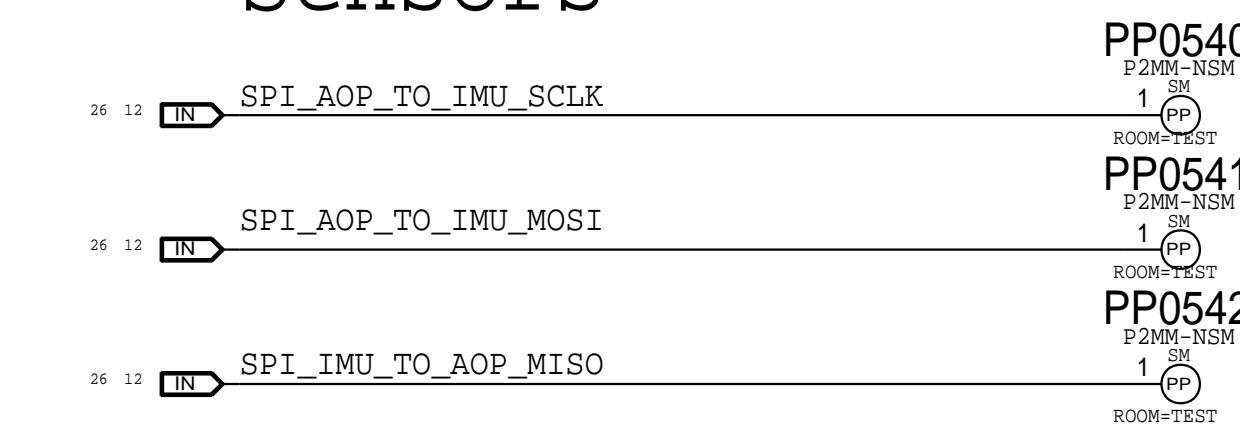


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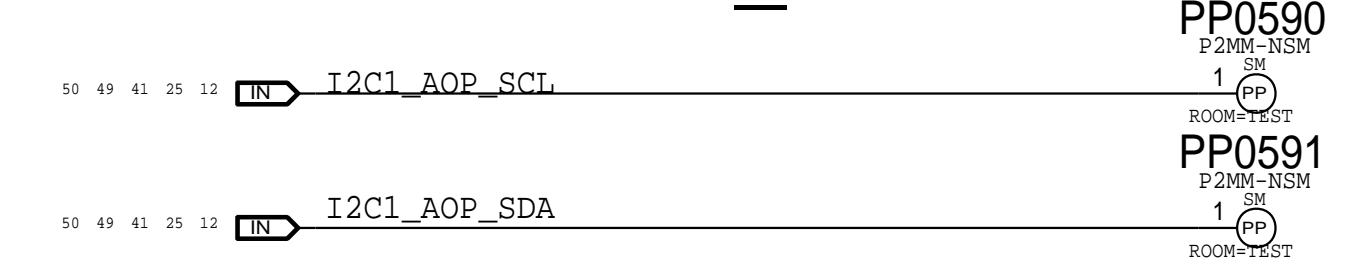


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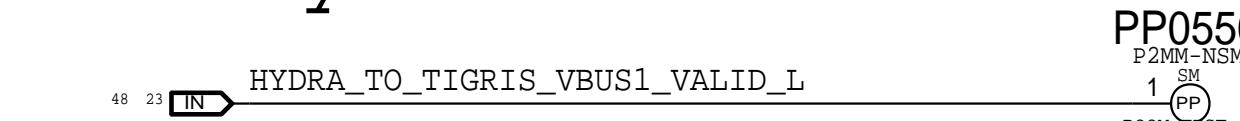
Sensors



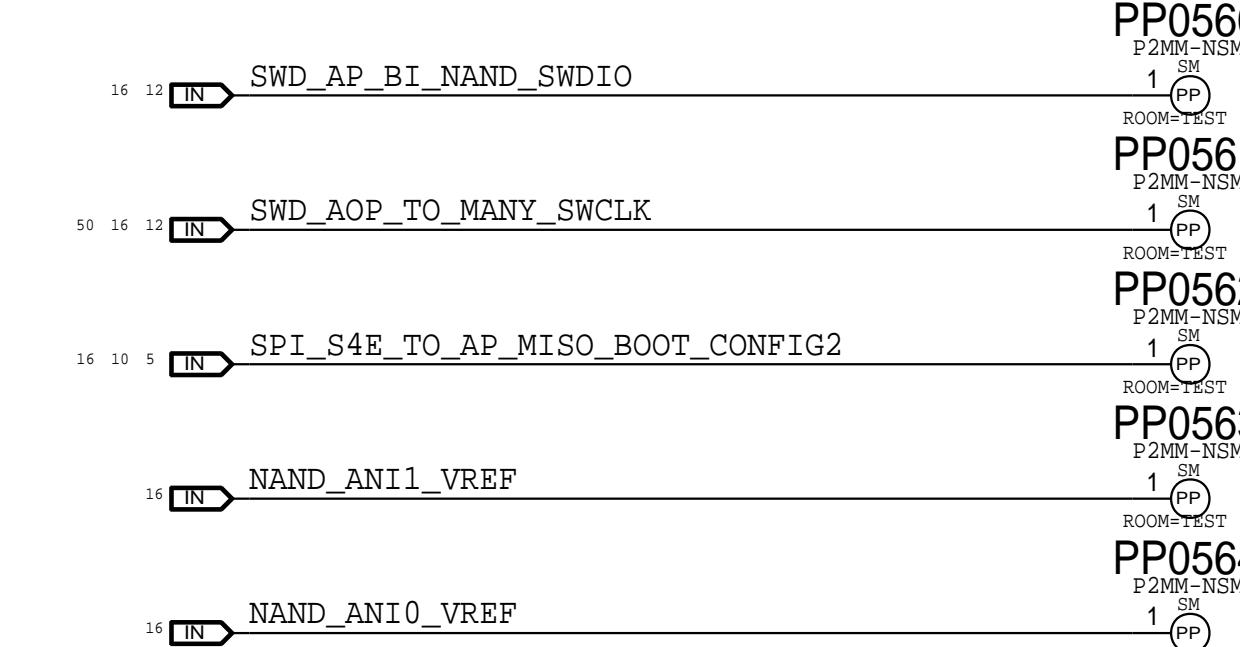
SOC I2C1_AOP



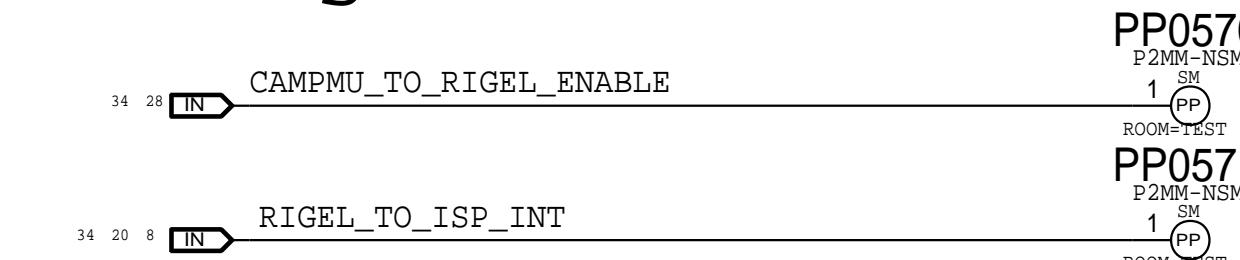
Hydra VBUS



NAND



Rigel

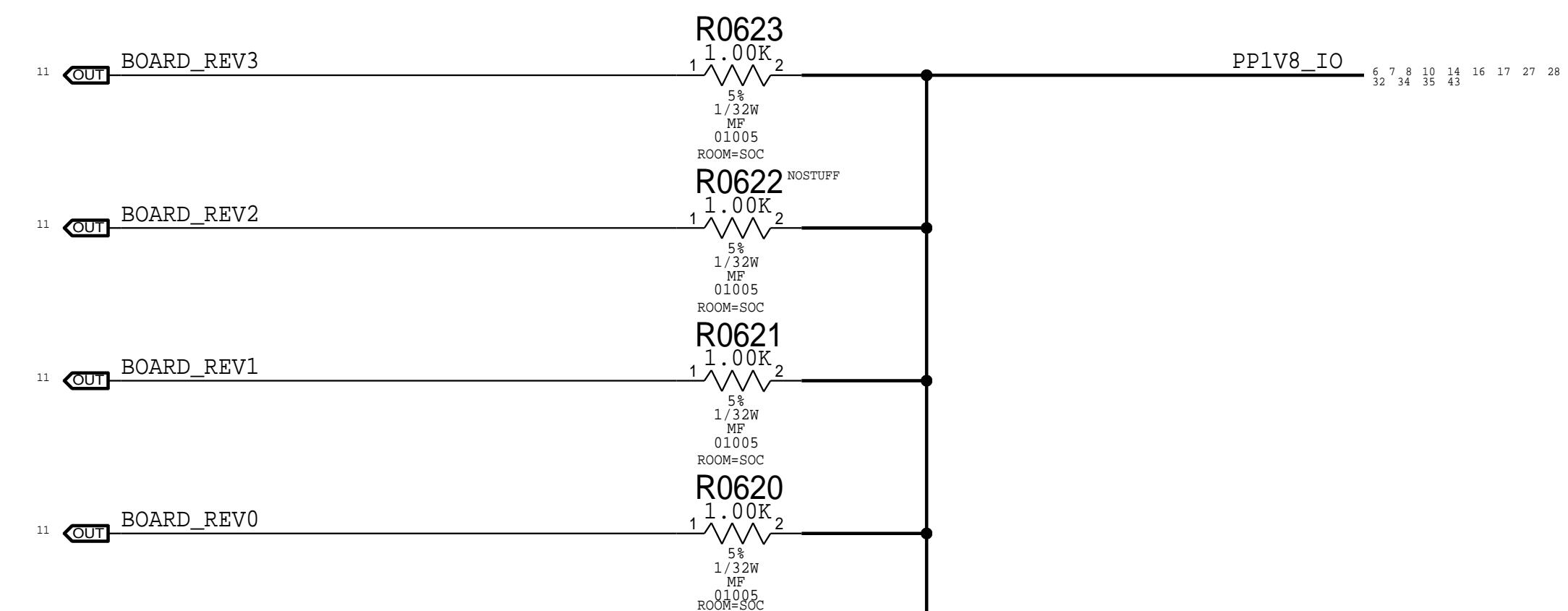


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Apple Inc.	DRAWING NUMBER 051-02221	SIZE D
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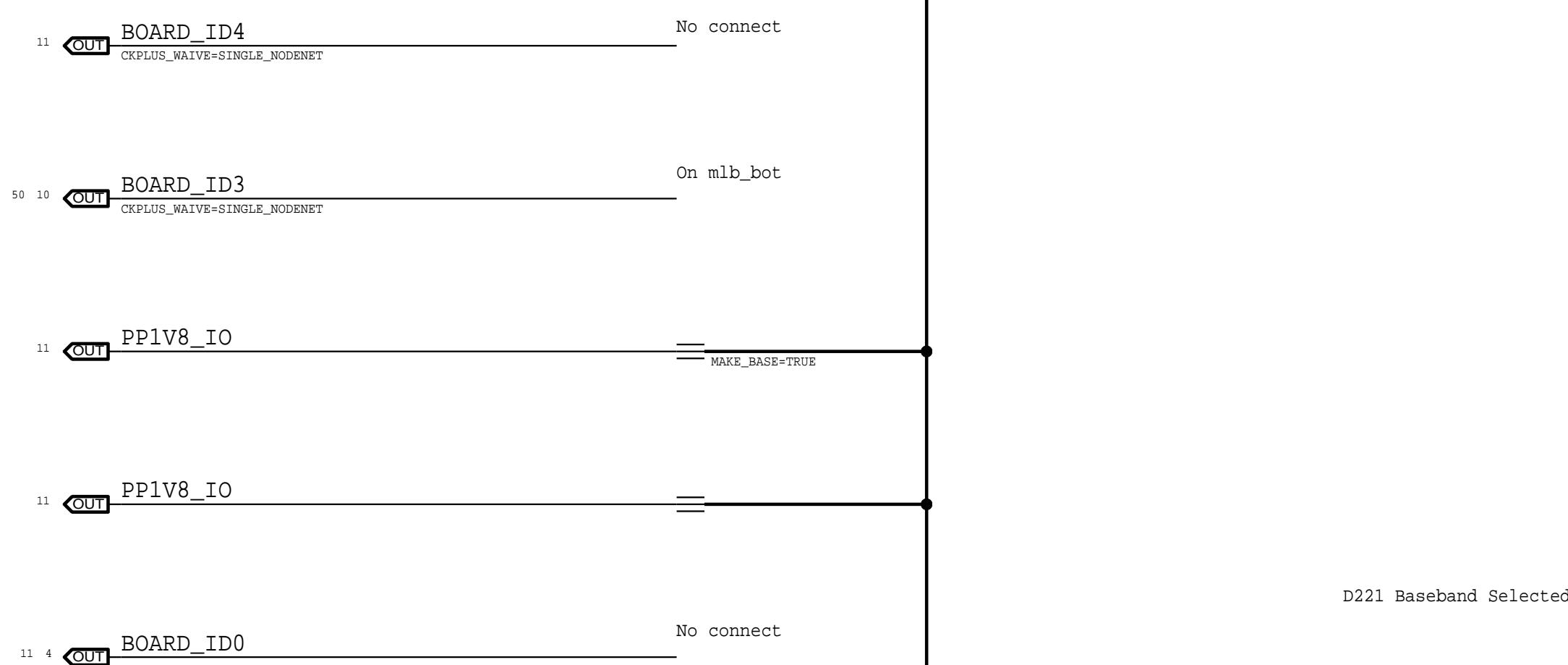
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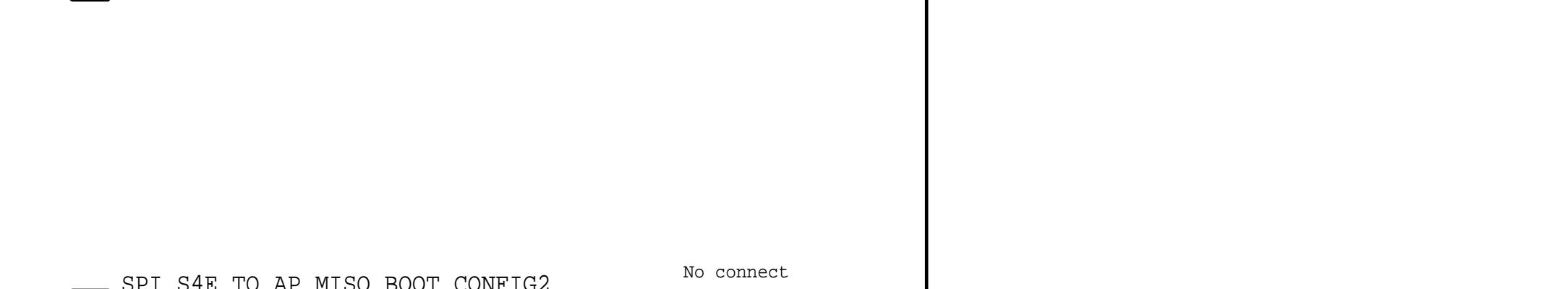
BOOTSTRAPPING: BOARD REV
BOARD ID
BOOT CONFIG



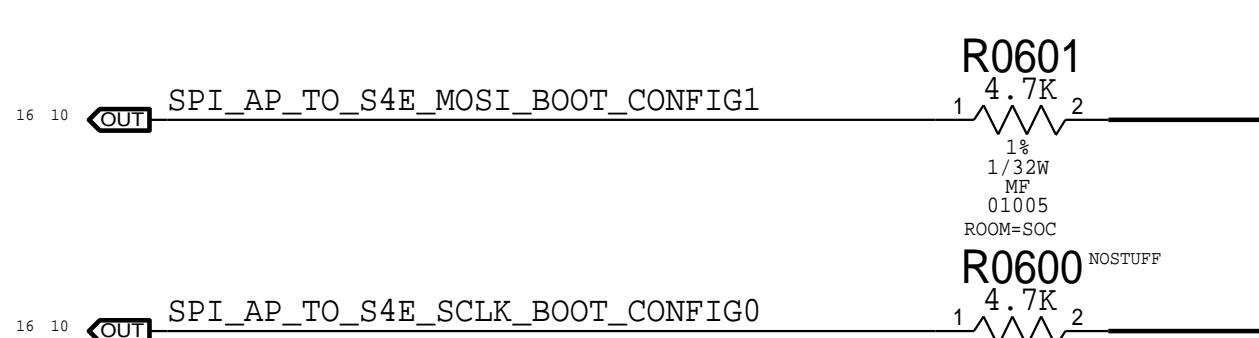
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Proto 2	1	1	0	1
Proto 3	1	1	0	0
EVT	1	0	1	1
(Spare)	1	0	1	0
Carrier	0	1	1	1
(Spare)	0	1	1	0
DVT	0	0	1	1
(Spare)	0	0	1	0
(Spare)	0	0	0	1
PVT	0	0	0	0



Board ID[4:0]					
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D20 Dev	0	0	0	1	1
D21 MLB	0	0	1	0	0
D21 Dev	0	0	1	0	1
D22 MLB	0	0	1	1	0
D22 Dev	0	0	1	1	1
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D201 Dev	0	1	0	1	1
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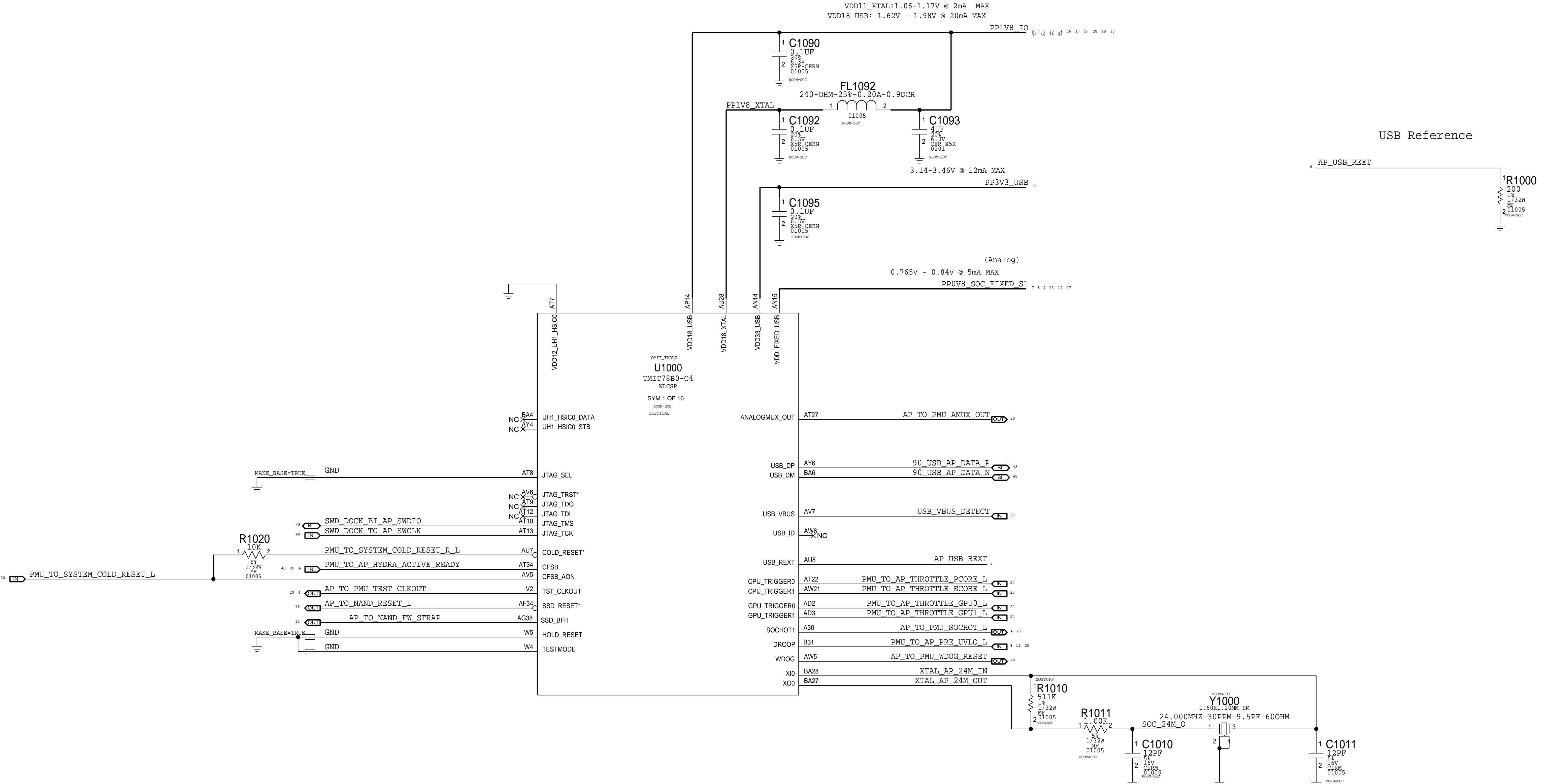


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SPI0 NAND	0	1	0
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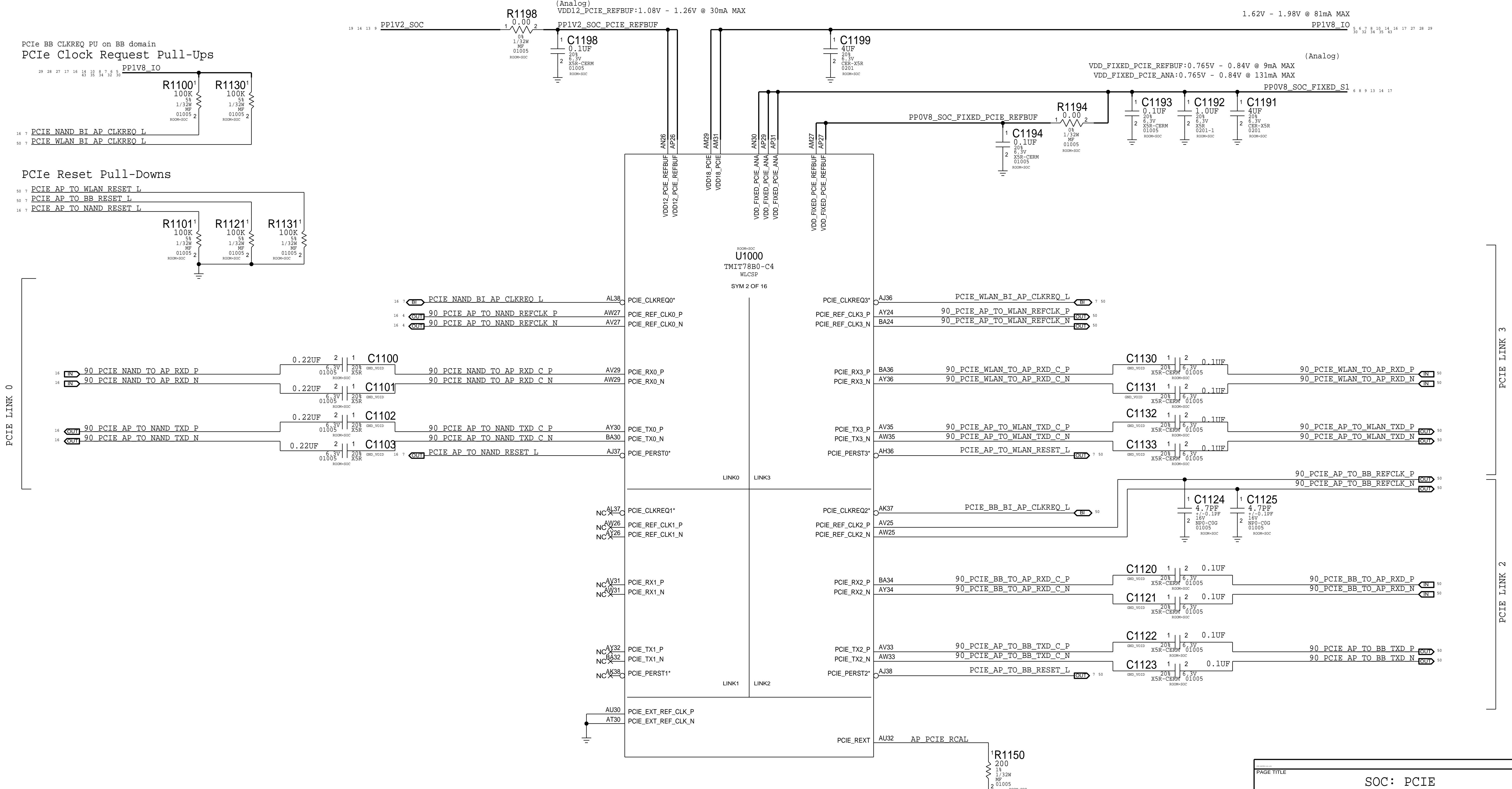


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SOC - USB, JTAG, XTAL



SOC - PCIE INTERFACES

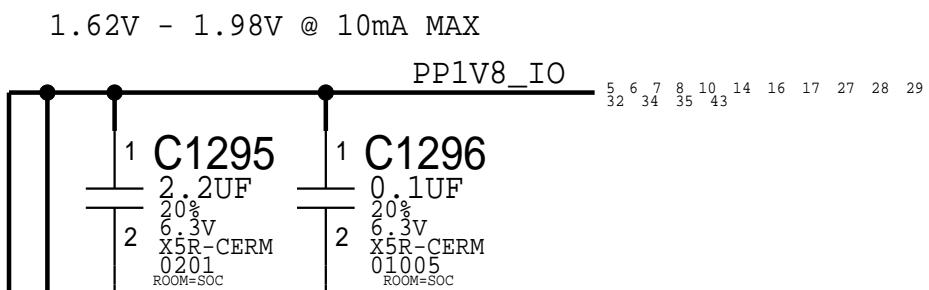
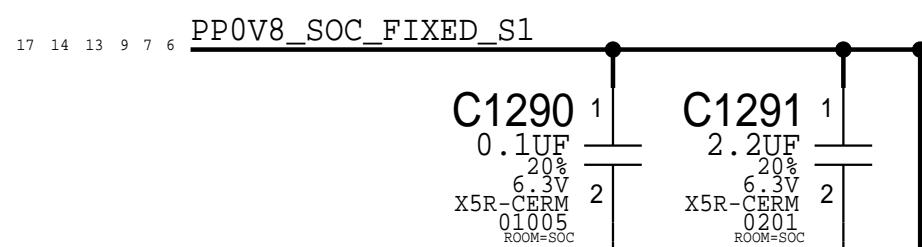


SOC - MIPI & ISP INTERFACES

MIPI Lane & Polarity Swapping

Program	Function	SOC LANE	DISTAL LANE	Lane Swap	Polarity Swap	
X891	Display	Clock_P	Clock_N	✓		
	Clock_N	Clock_P				
	Lane_0_P	Lane_0_N				
	Lane_0_N	Lane_0_P				
	Lane_1_P	Lane_1_N				
	Lane_1_N	Lane_1_P				
	Lane_2_P	Lane_3_P	✓			
	Lane_2_N	Lane_3_N	✓			
	Lane_3_P	Lane_2_N	✓			
	Lane_3_N	Lane_2_P	✓			
JULIET	Clock_P	Clock_N				
Clock_N	Clock_P					
Lane_0_P	Lane_0_N					
Lane_0_N	Lane_0_P					
Lane_1_P	Lane_1_N					
Lane_1_N	Lane_1_P					

(Analog)
0.765V - 0.84V @ 40mA MAX



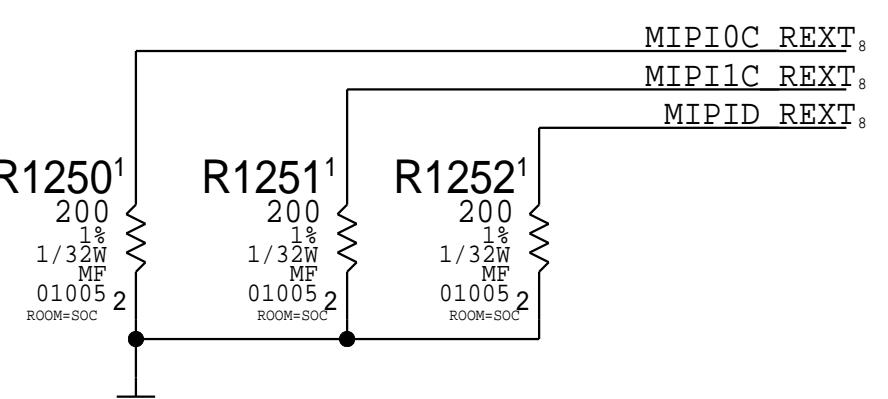
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Juliet MIPI

FCAM MIPI

Display MIPI

MIPI Reference



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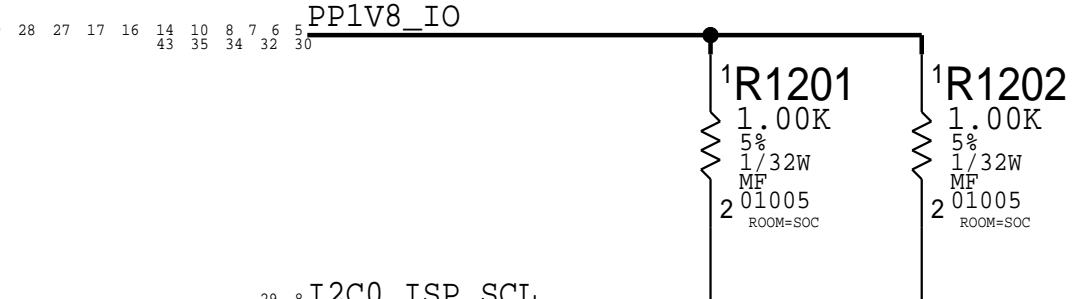
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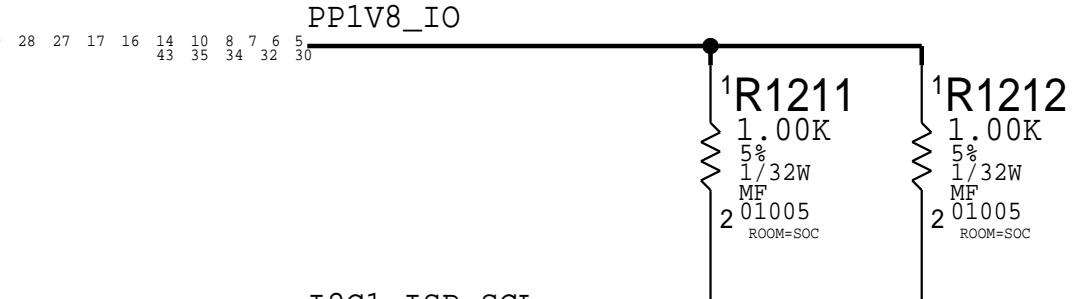
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1

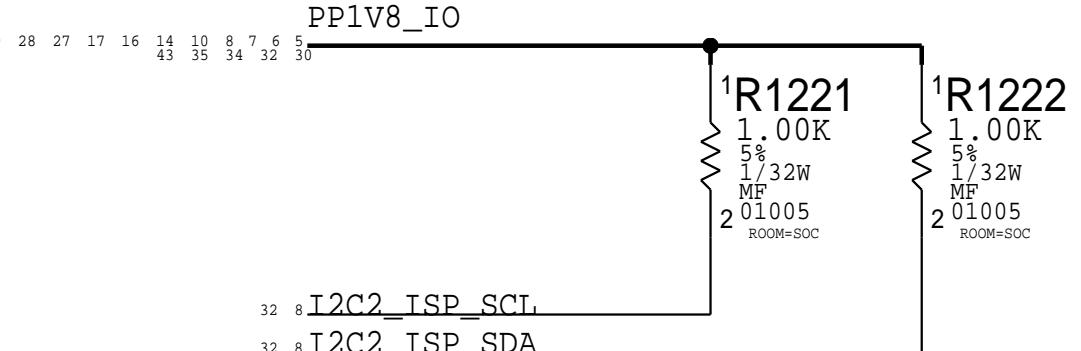
ISP I2C0



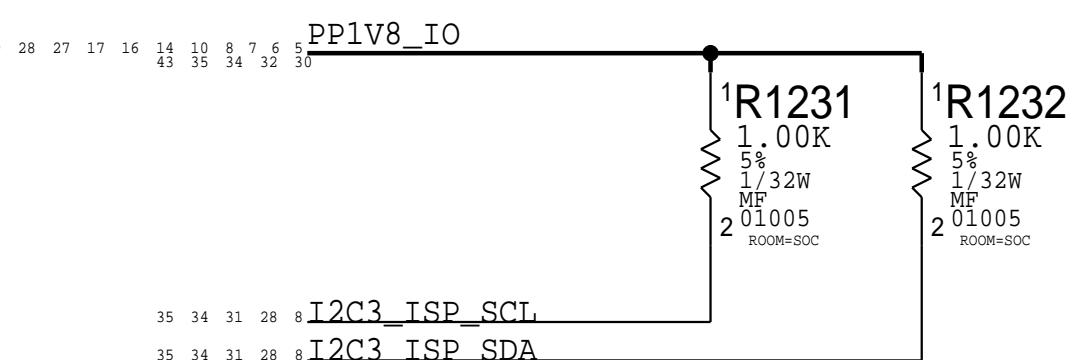
ISP I2C1



ISP I2C2



ISP I2C3



A

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Apple Inc.	DRAWING NUMBER	051-02221 D
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SOC - LPDP

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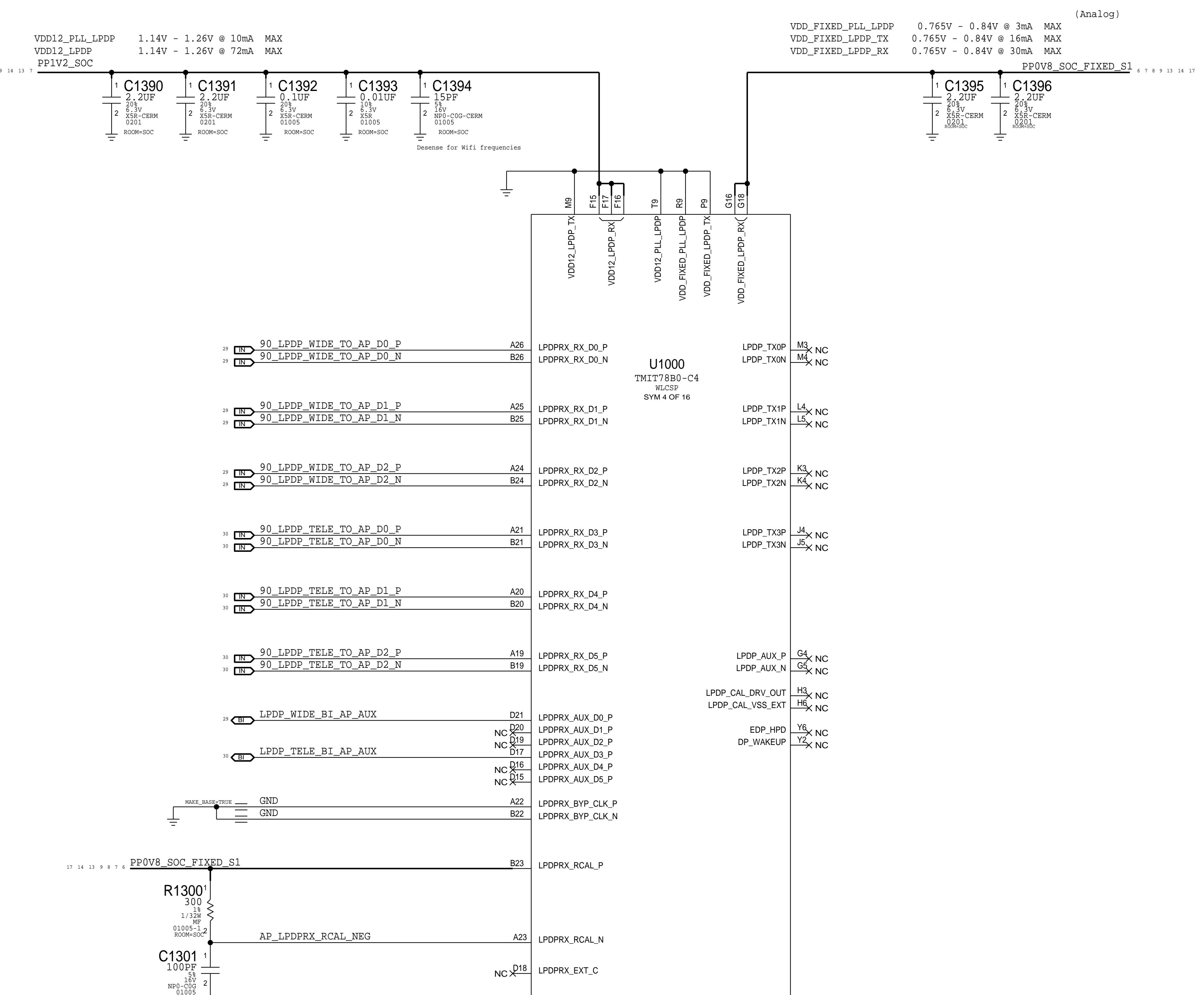
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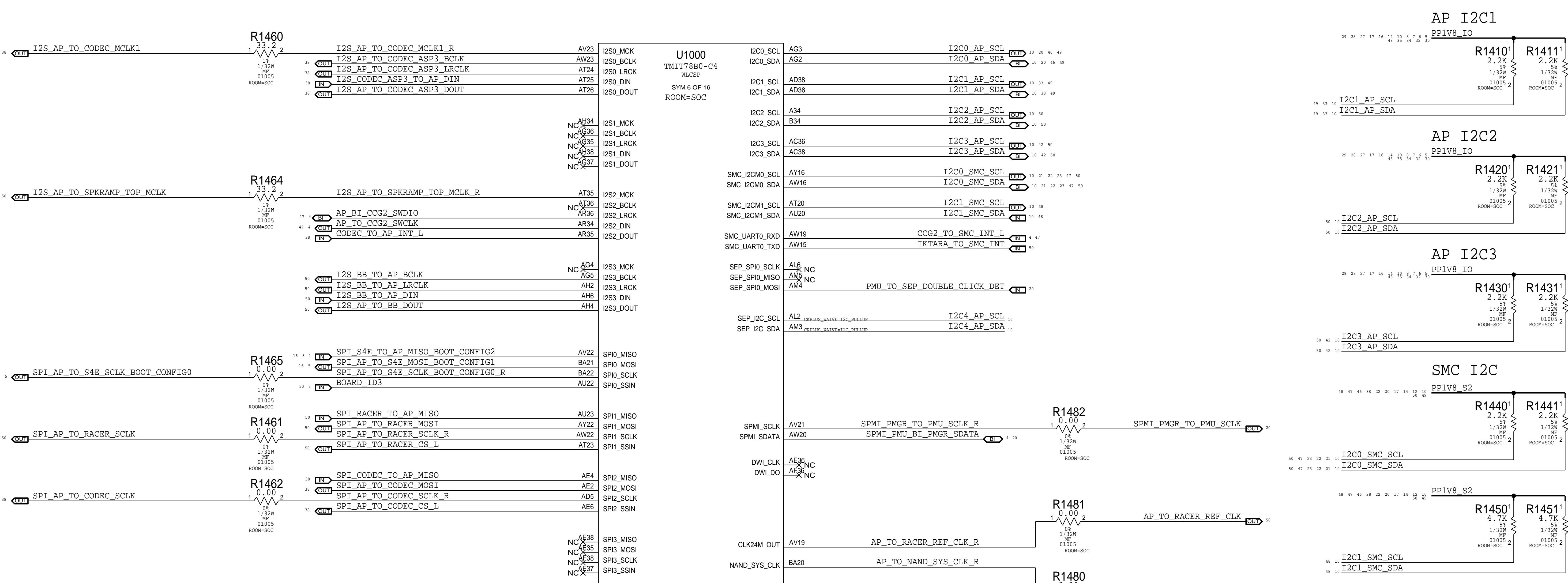
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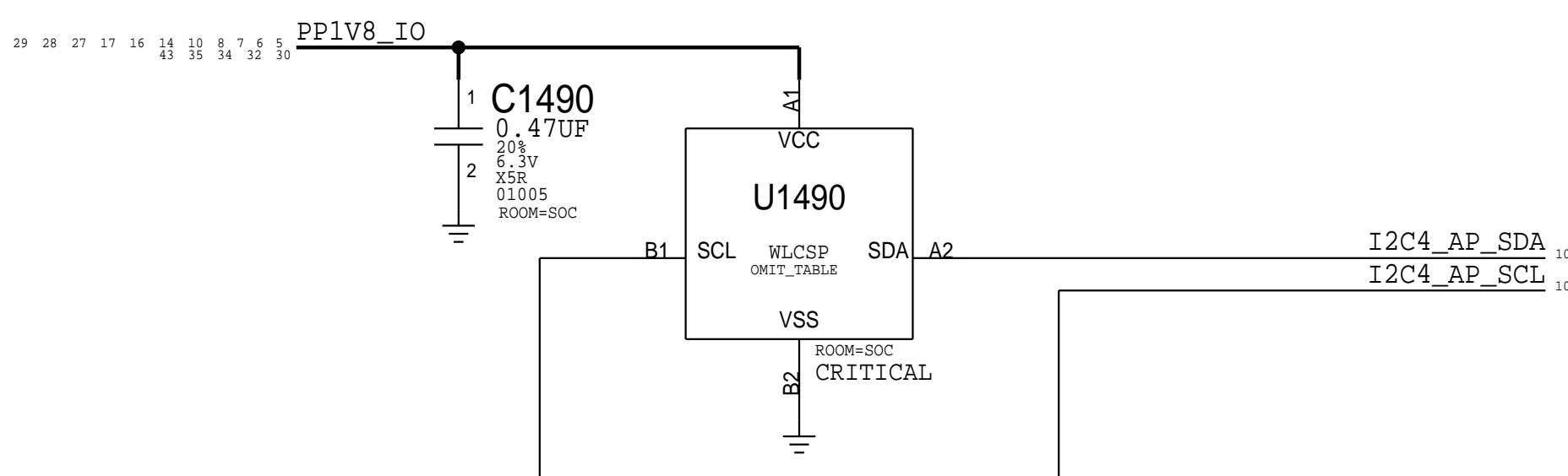
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Apple Inc.	DRAWING NUMBER	SIZE
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BRANCH	evt-1	
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SOC - SERIAL INTERFACES



SPI: Route as Daisy-Chain. No T's Allowed
Place series terminations close to SoC Pins

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
335S00234	1	WLCSP	U1490	CRITICAL	COMMON
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:	
335S00234	335S00234	BOM_TABLE_ALTS	U1490	U1490	

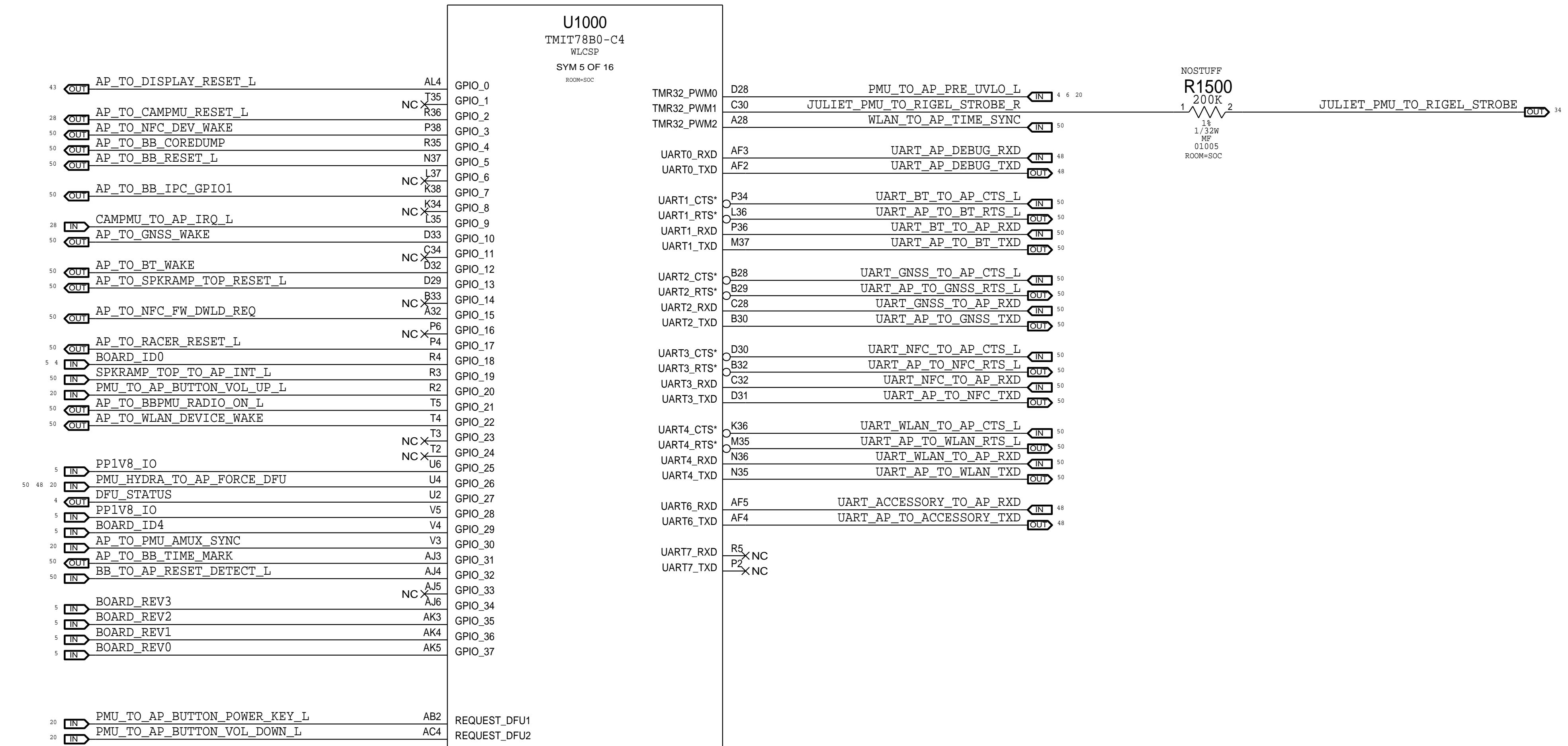


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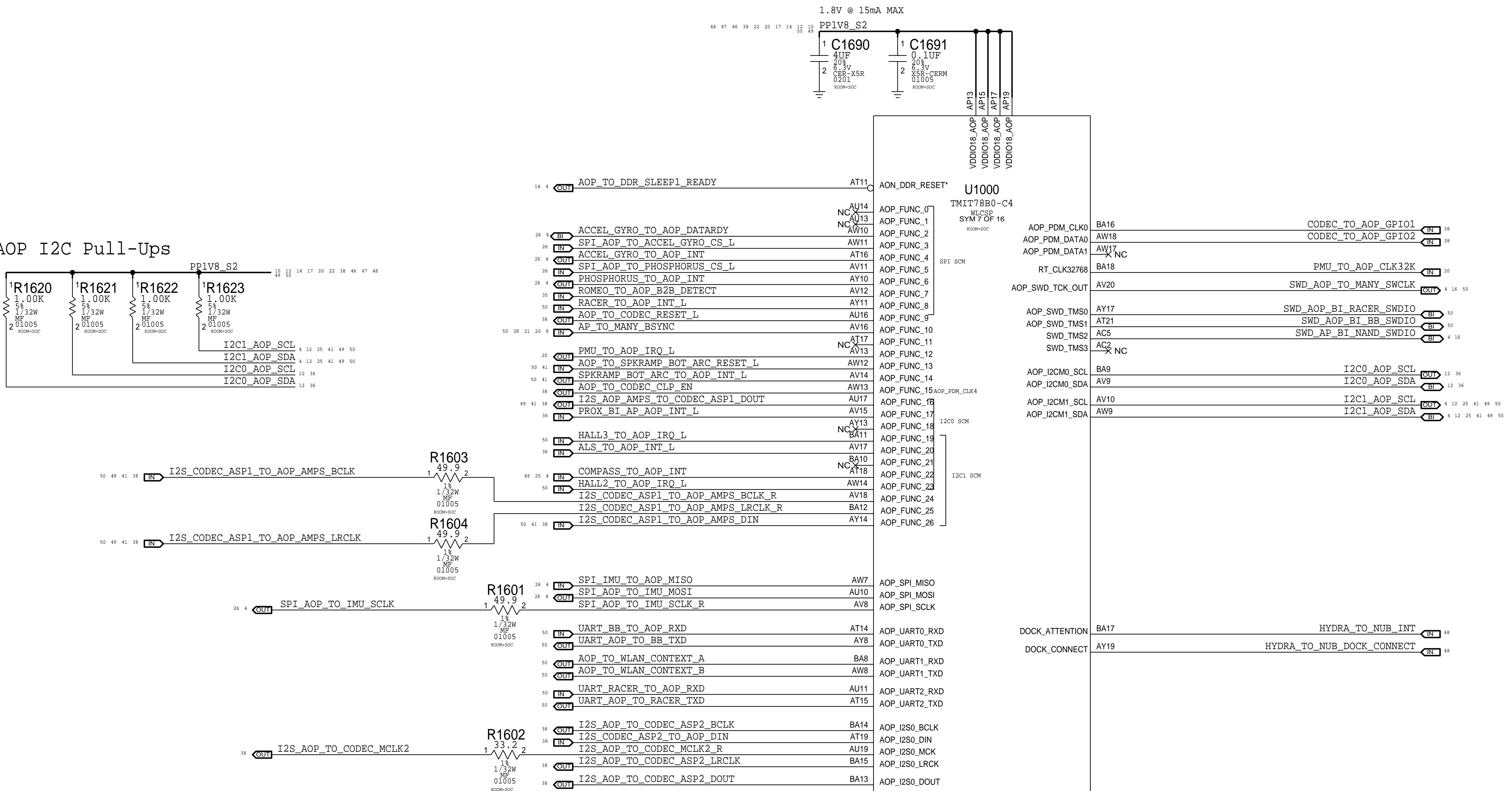
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SOC - GPIO INTERFACES



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SOC: GPIO & UART	051-02221	D
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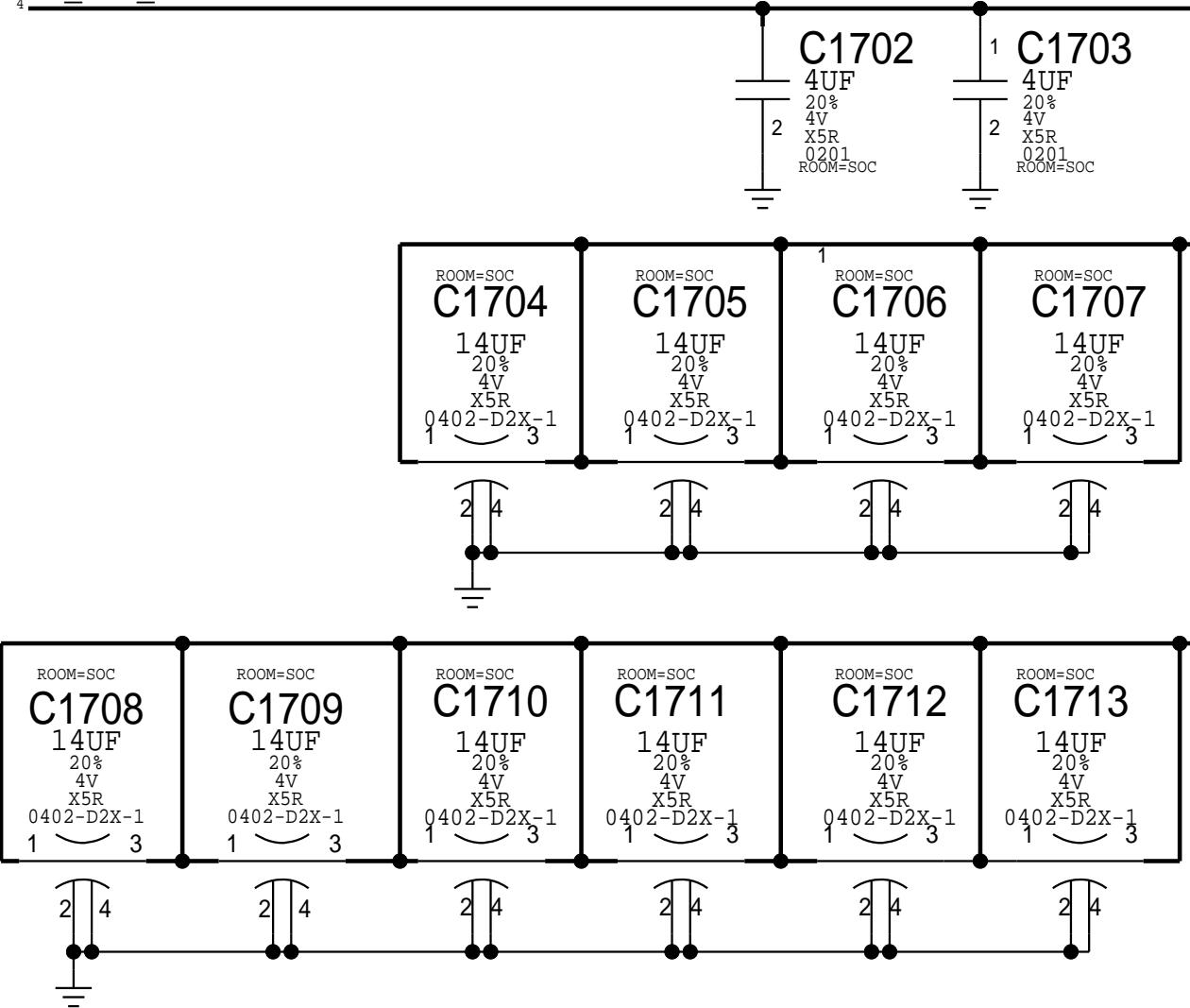
SOC - AOP



SOC - CPU, GPU & SOC RAILS

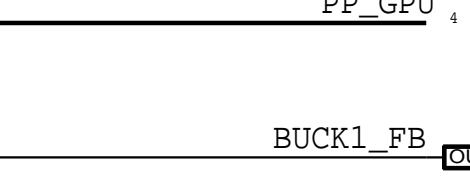
1.06V @ 11.0A MAX
0.8V @ 6A MAX
0.575V @ 2.7A MAX

PP_CPU_PCORE



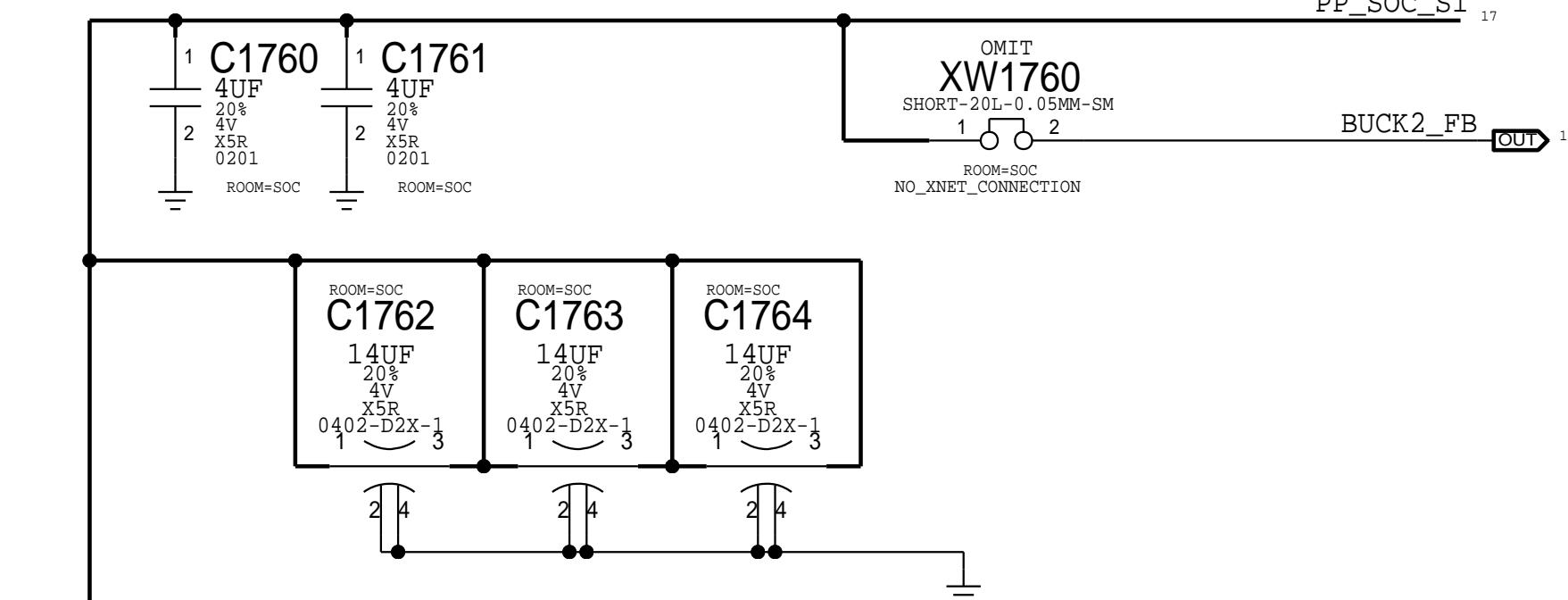
1.06V @ 18.3A MAX
0.8V @ 10.6A MAX
0.575V @ 3.4A MAX

PP_GPU



0.765V @ 4.9A MAX
0.635V @ 2.6A MAX

PP_SOC_S1



0.7V @ 75mA MAX
PP0V7_VDD_LOW_S2

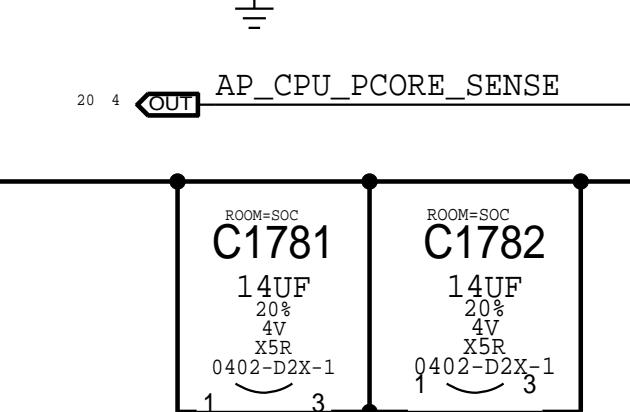
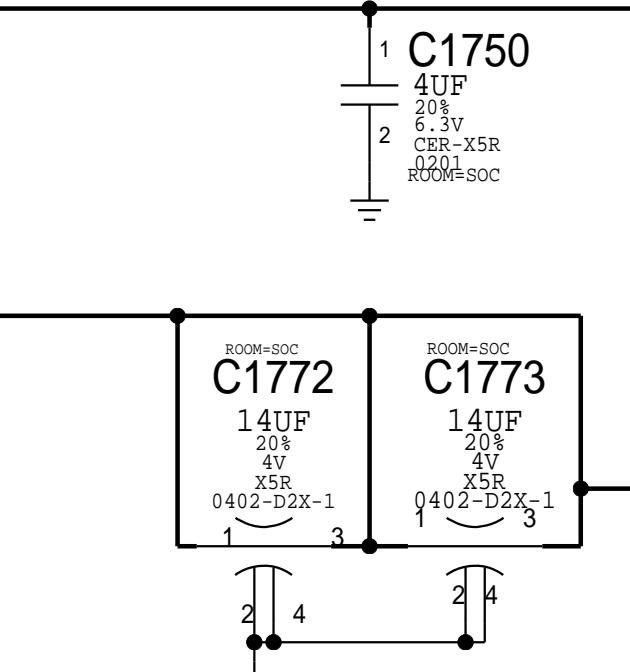
PP_CPU_SRAM

1.01V @ 2.1A MAX
0.735V @ 0.6A MAX

PP_CPU_SRAM

1.06V @ 1.1A MAX
0.80V @ 0.63A MAX
0.675V @ 0.19A MAX

PP_GPU_SRAM



1.06V @ 4.3A MAX
0.8V @ 2.8A MAX
0.575V @ 1.4A MAX

PP_CPU_ECORE

PP1V2_SOC

PP0V8_SOC_FIXED_S1

PP1V2_SOC

PP

SOC - POWER SUPPLIES

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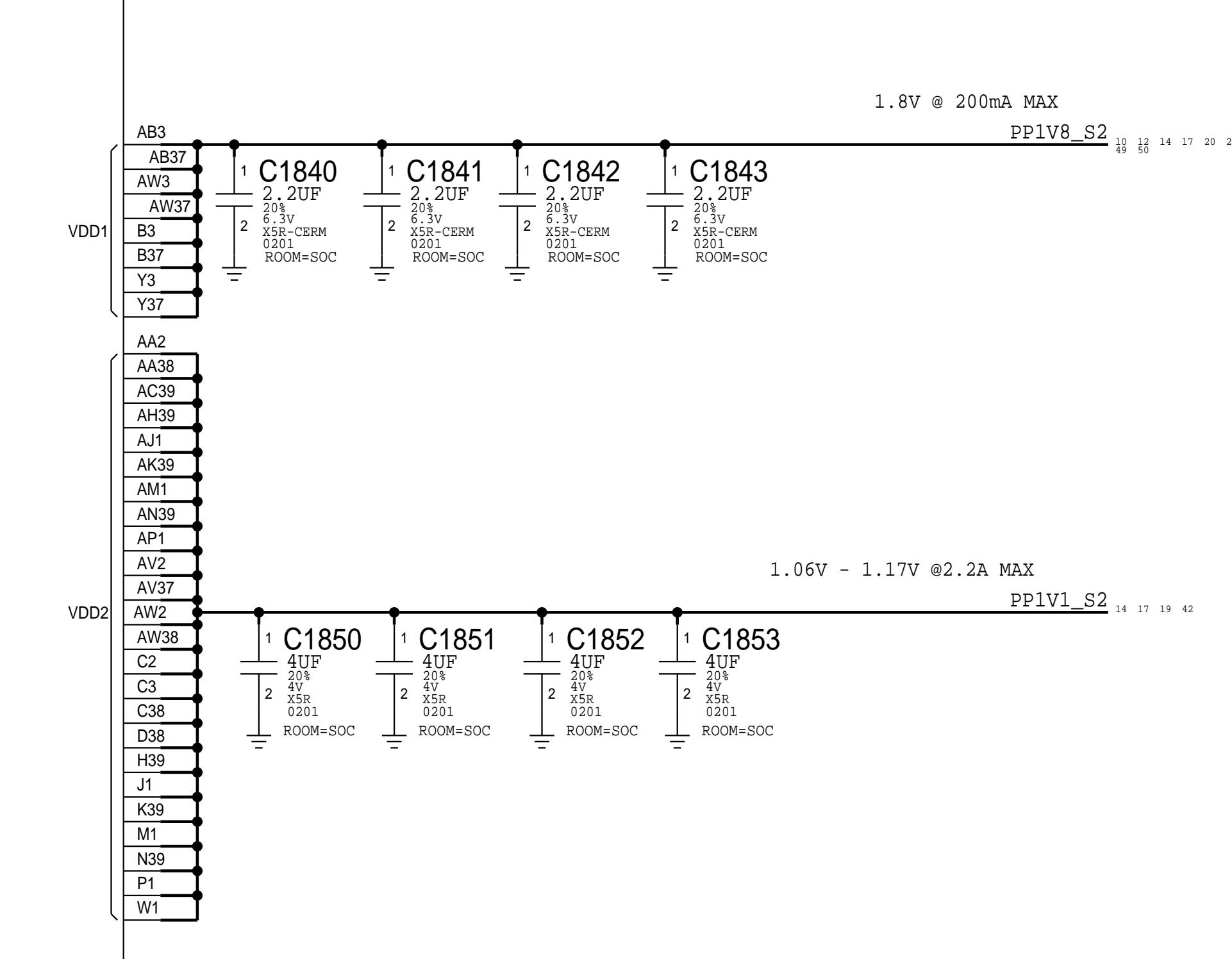
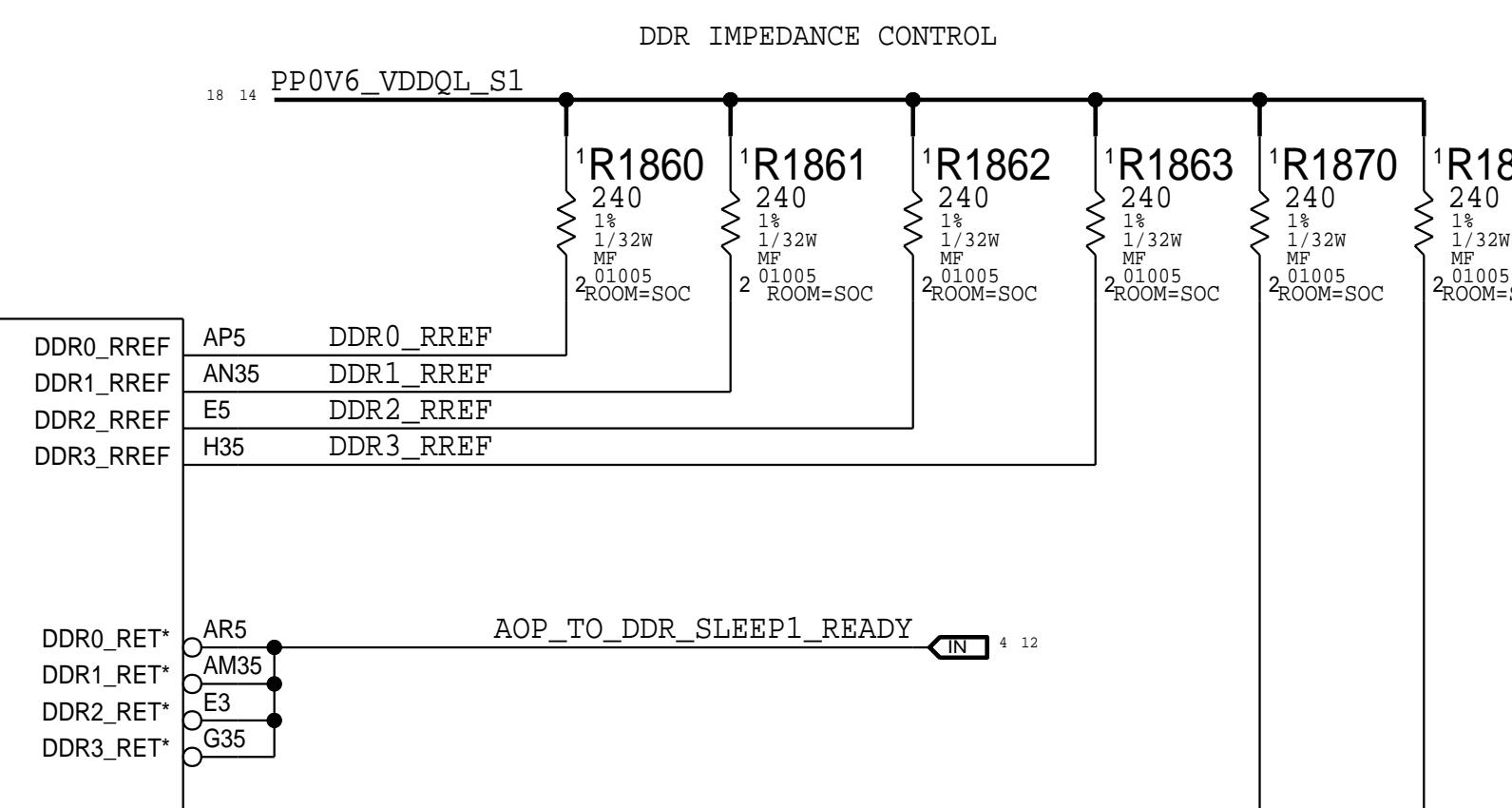
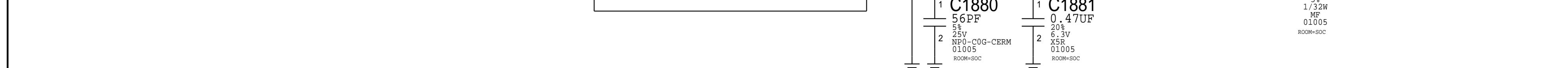
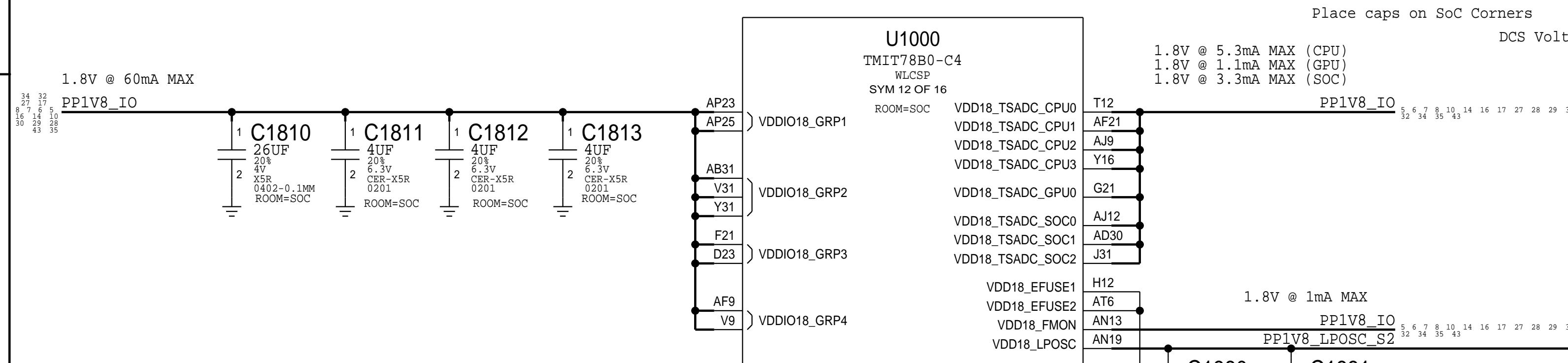
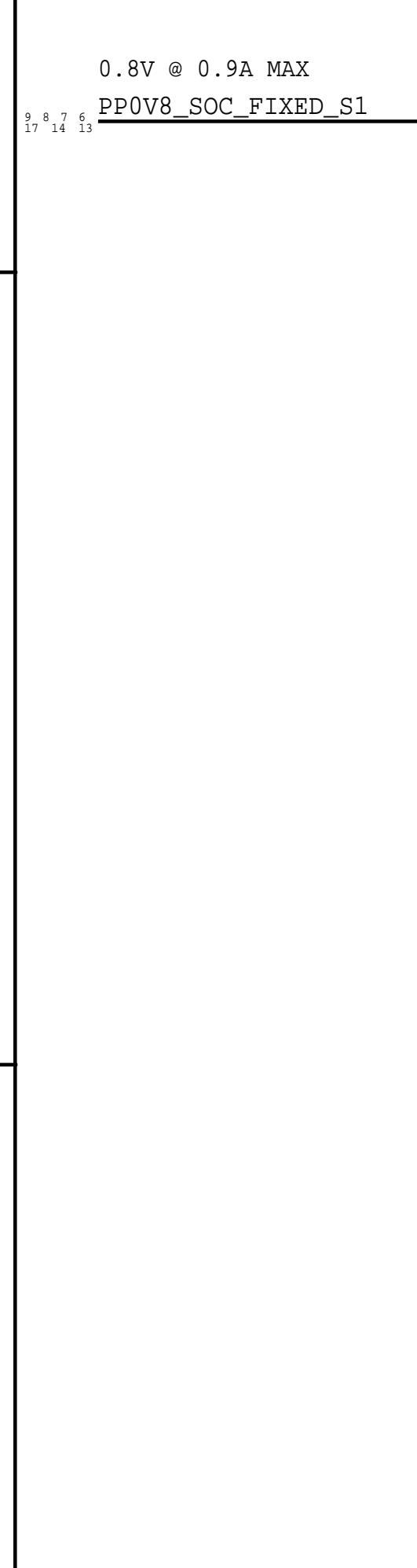
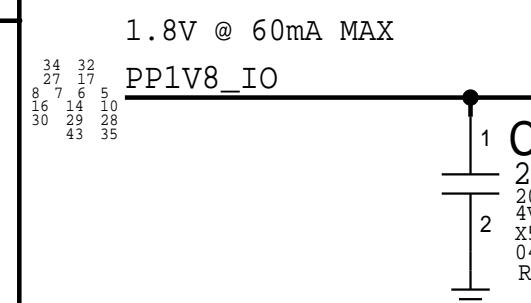
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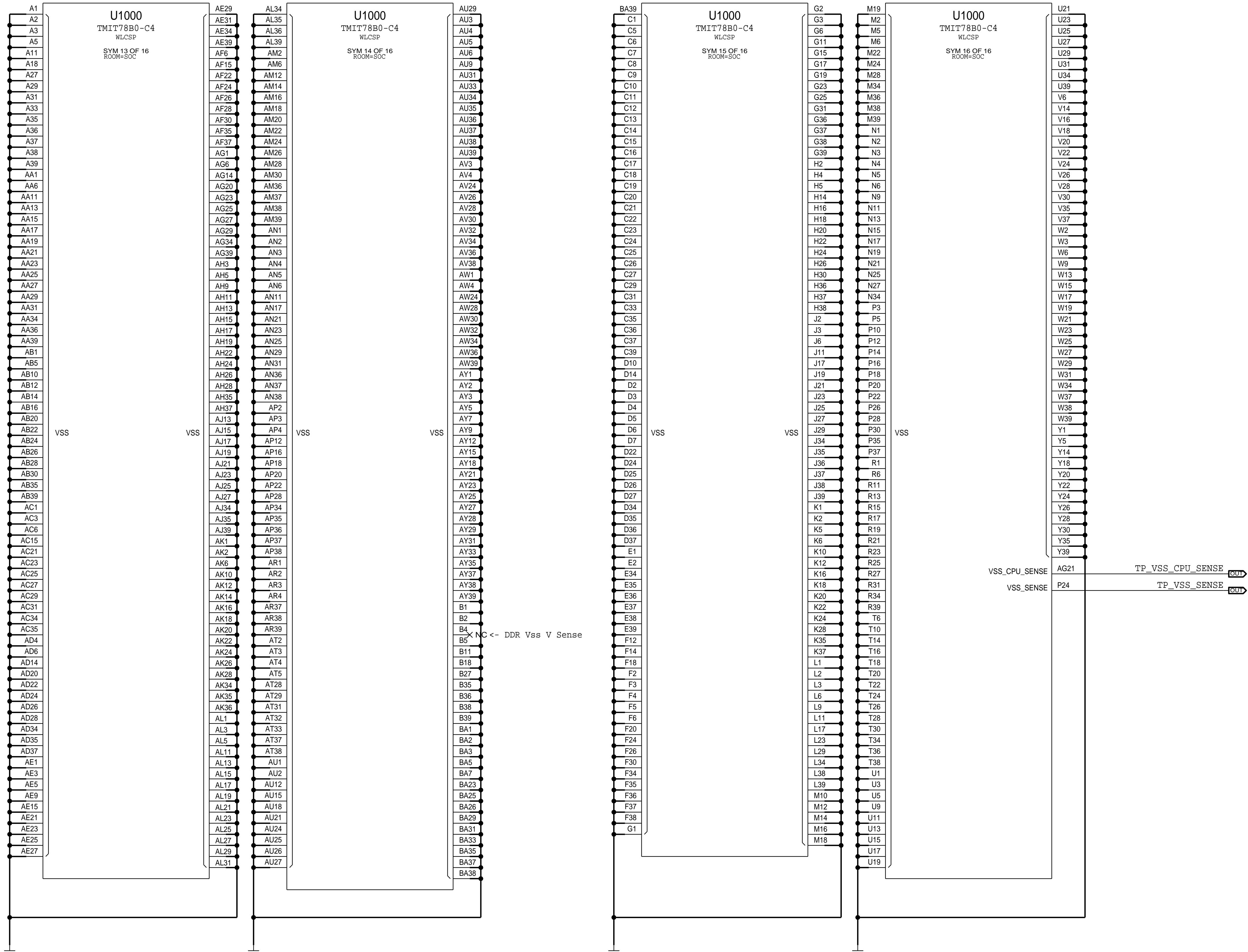
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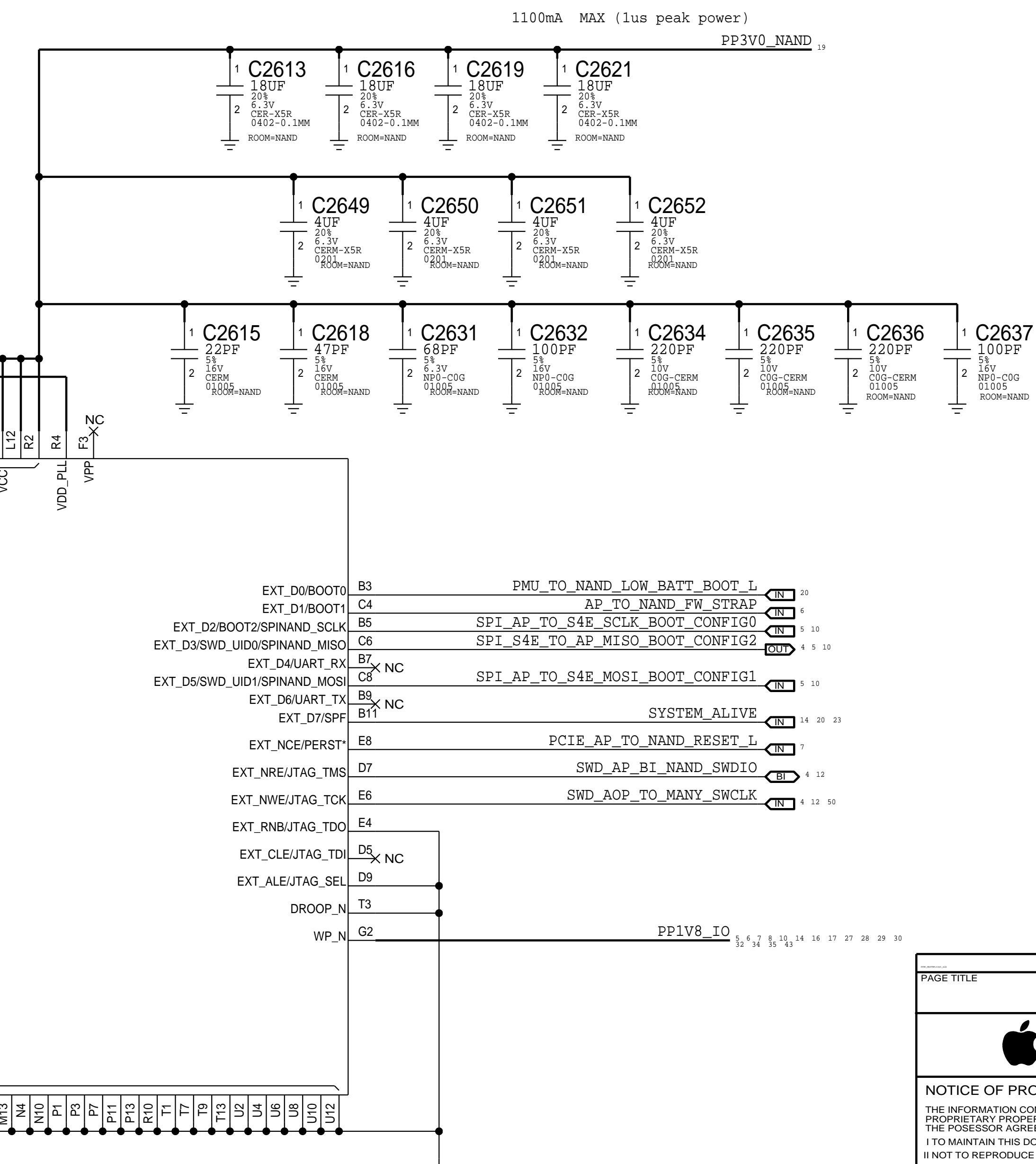
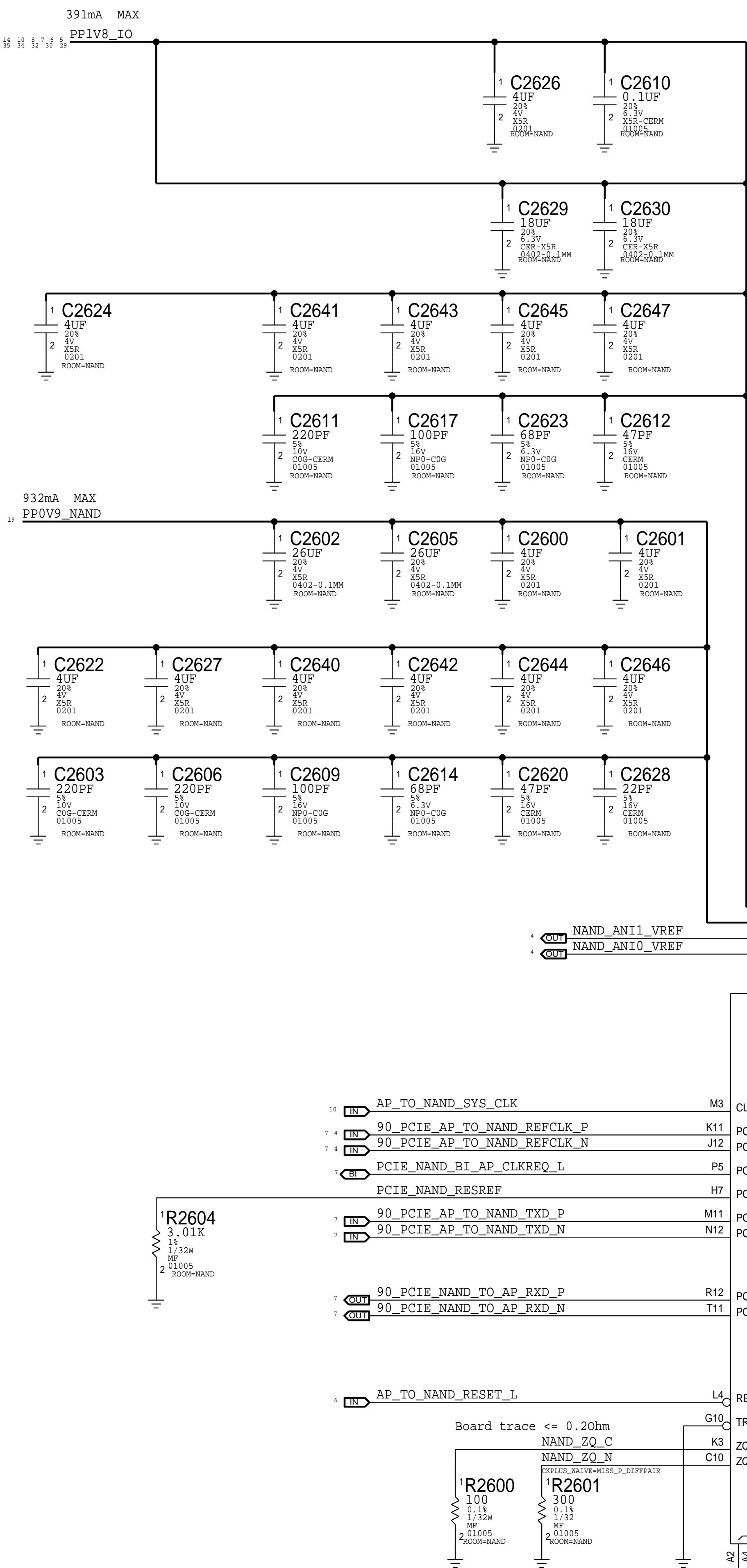
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SOC - POWER SUPPLIES



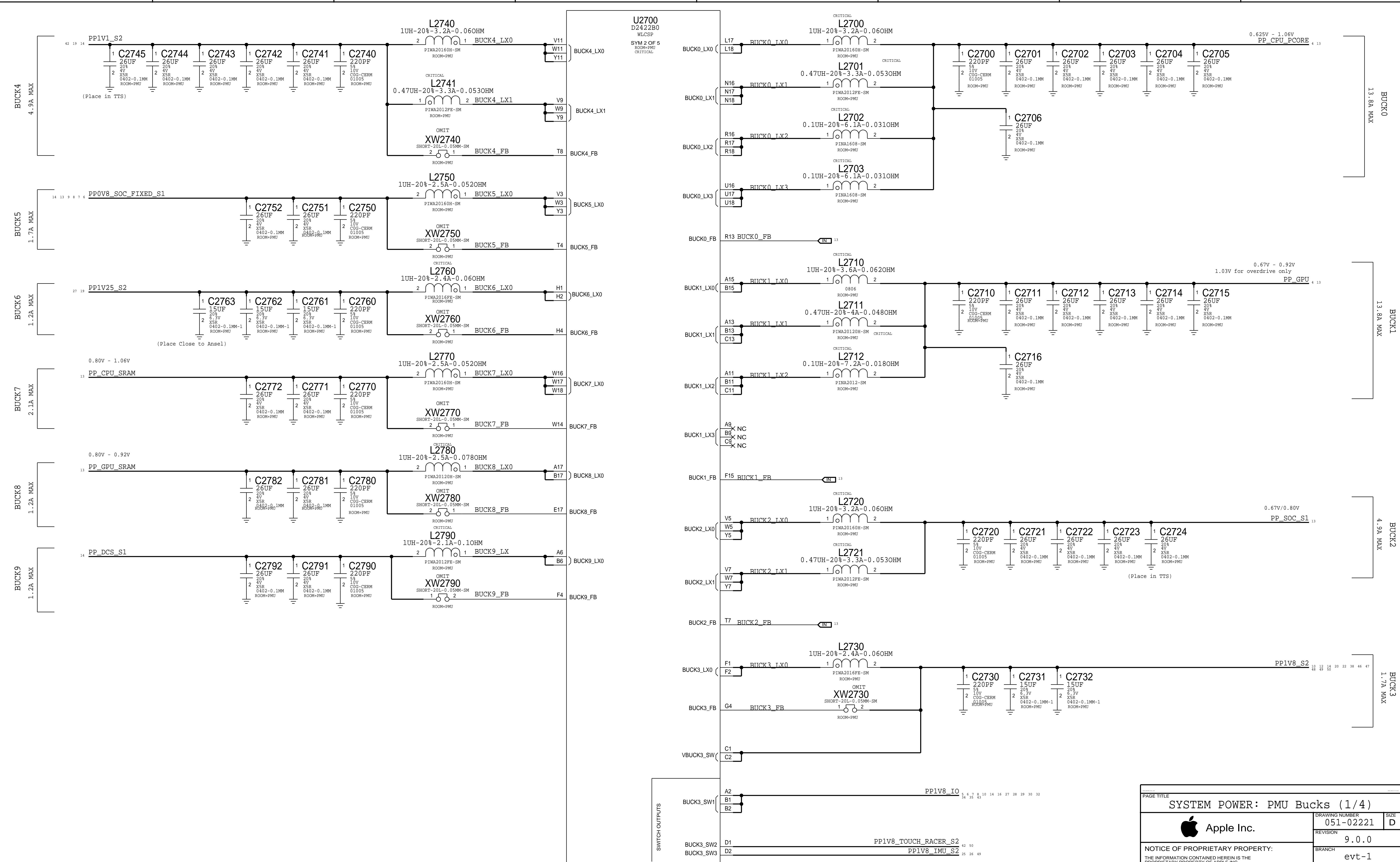
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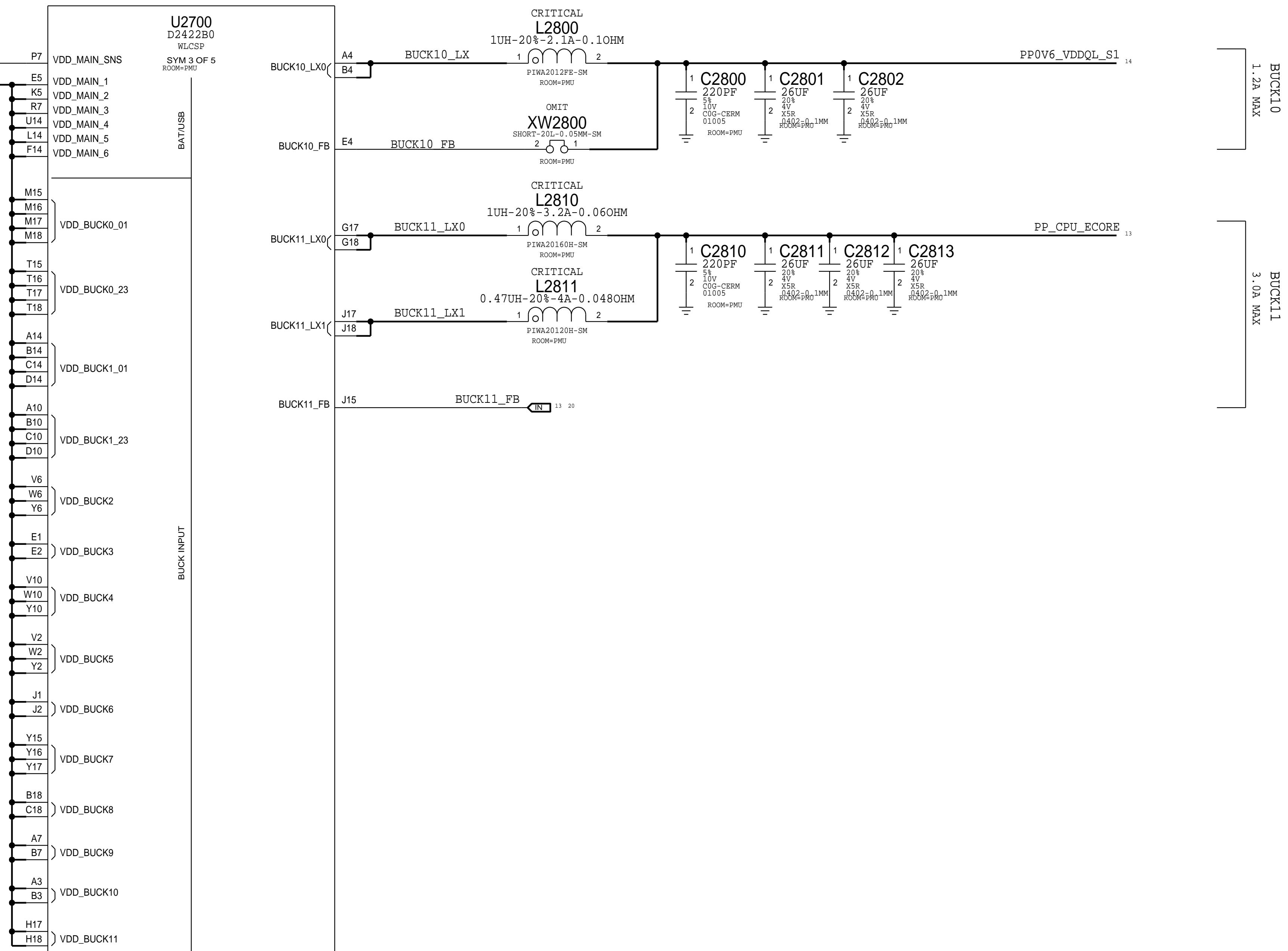
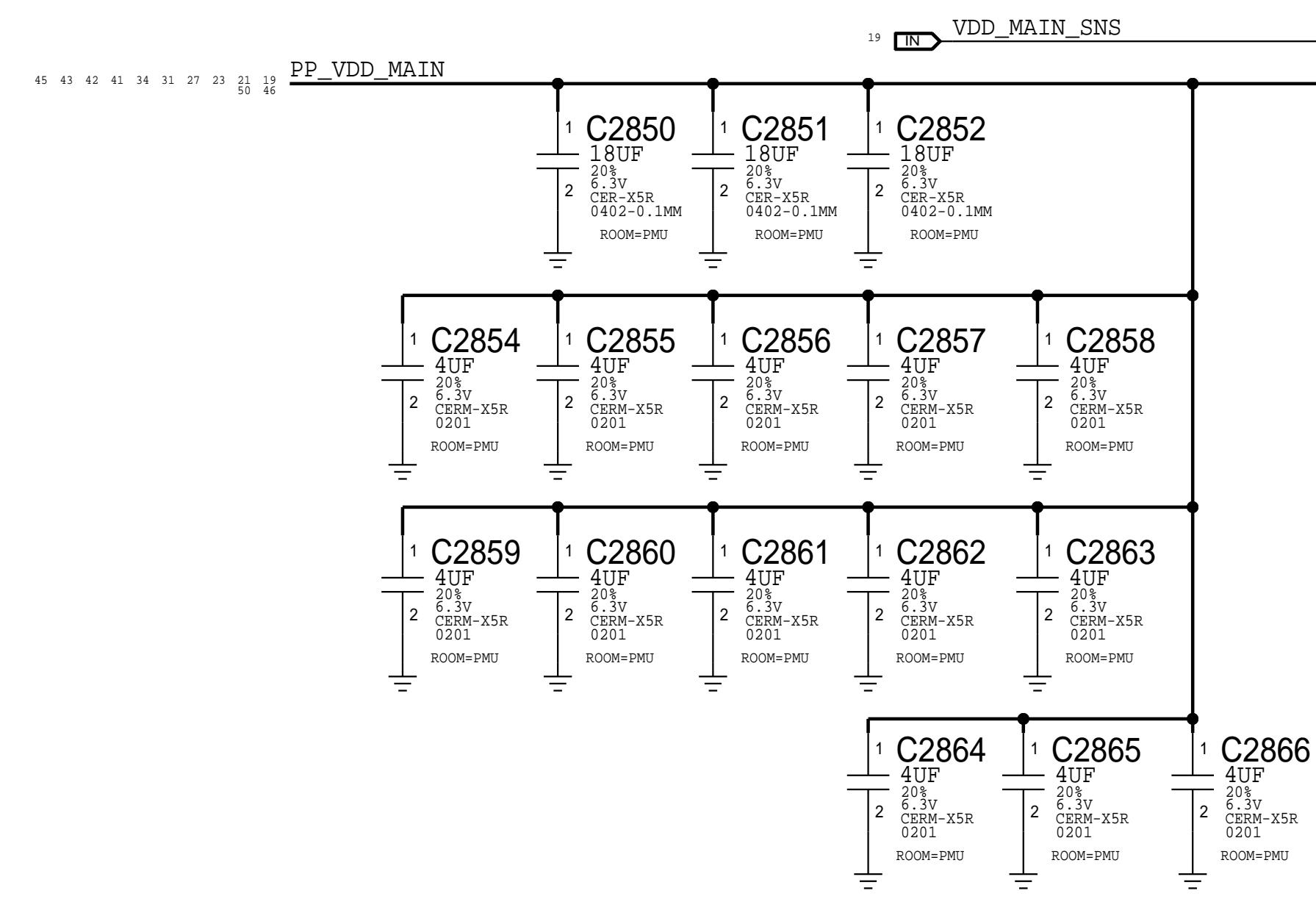
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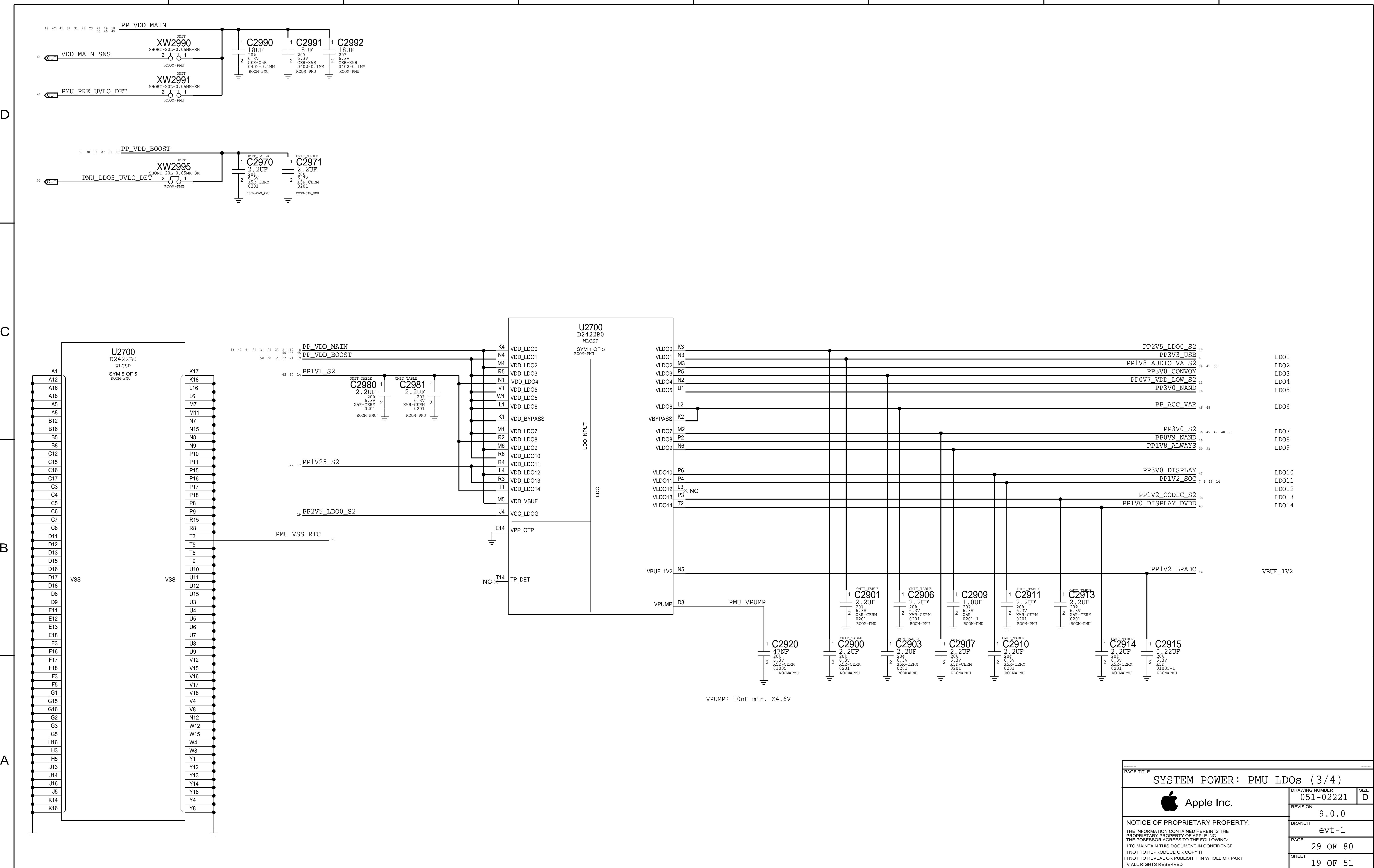
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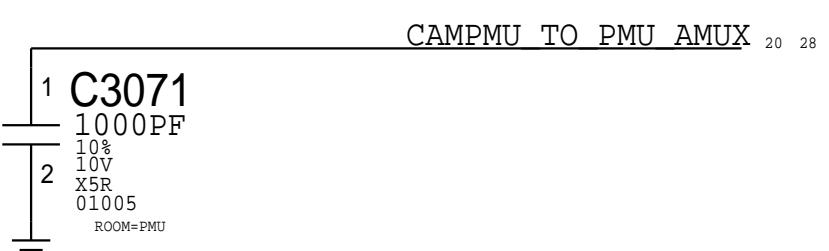
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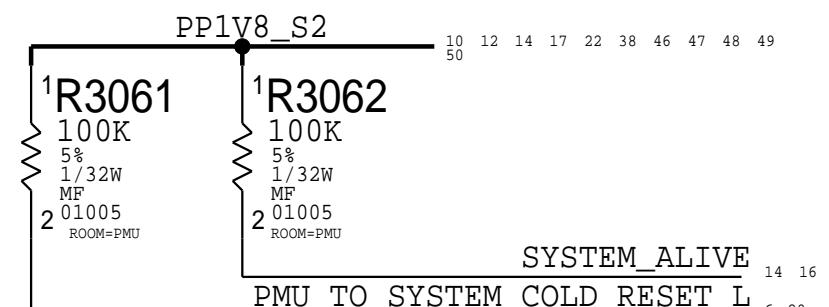
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Ansel AMUX

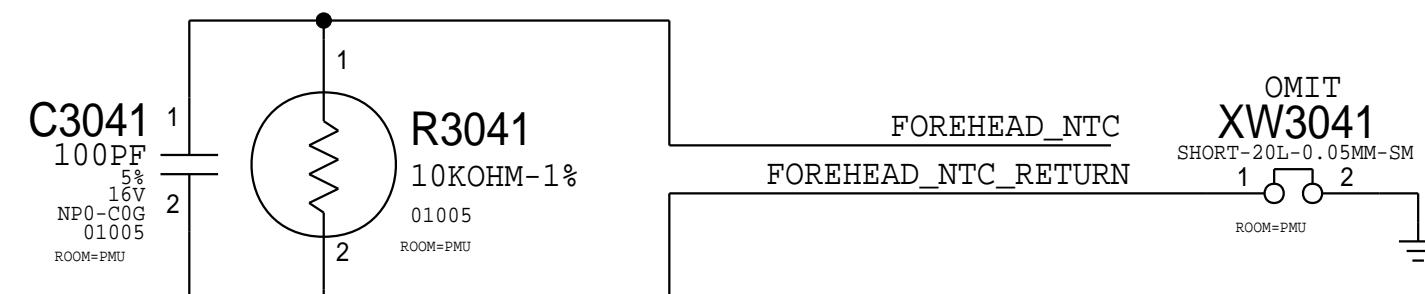


COLD_RESET & SYSTEM_ALIVE

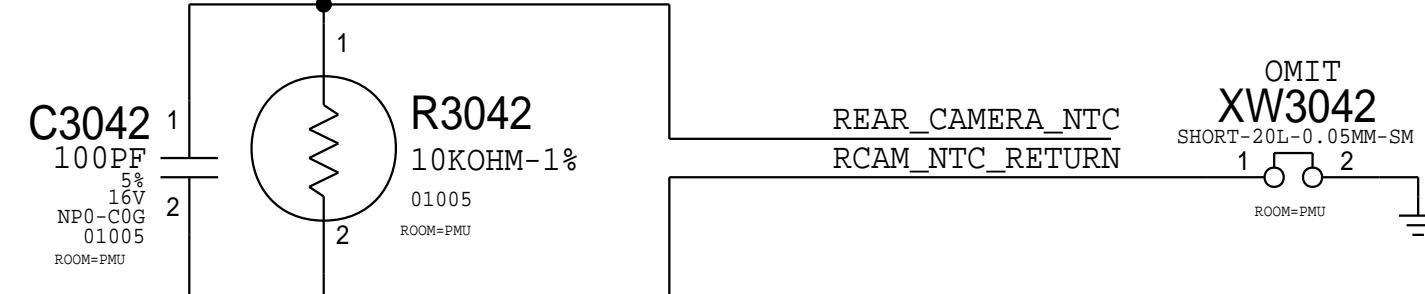


NTCs

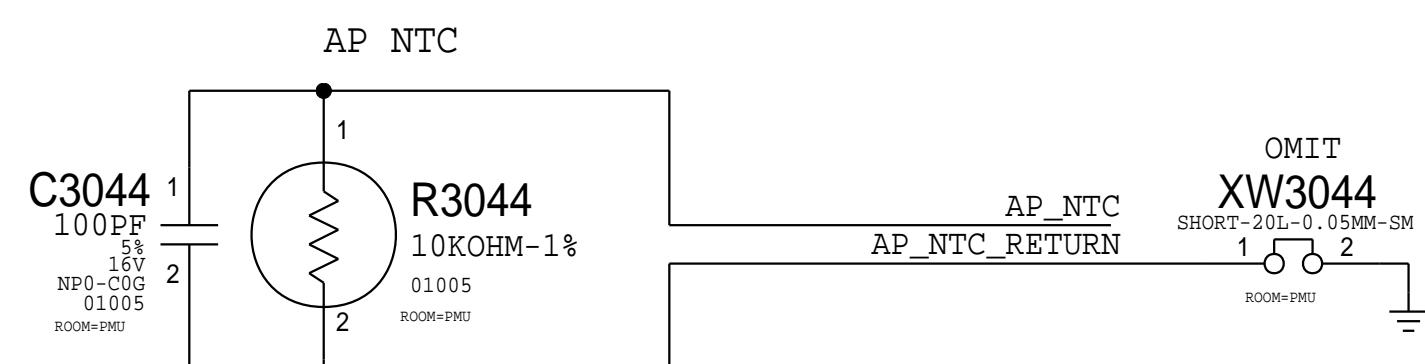
FOREHEAD NTC



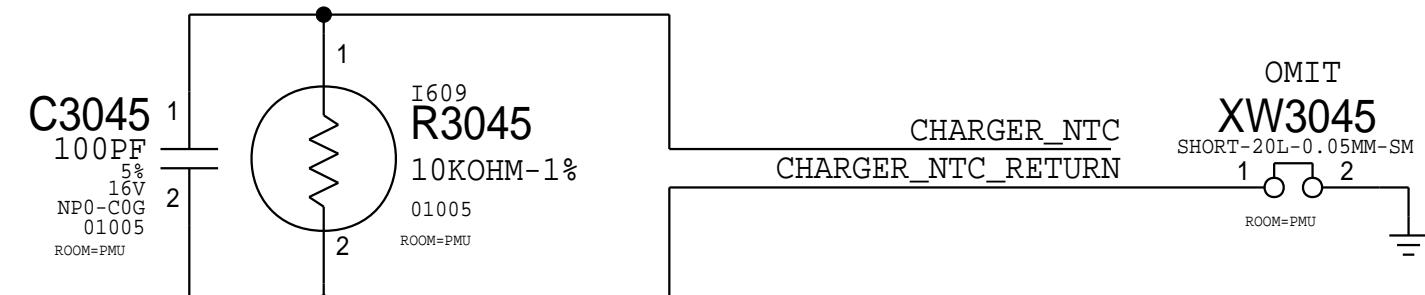
REAR CAMERA NTC



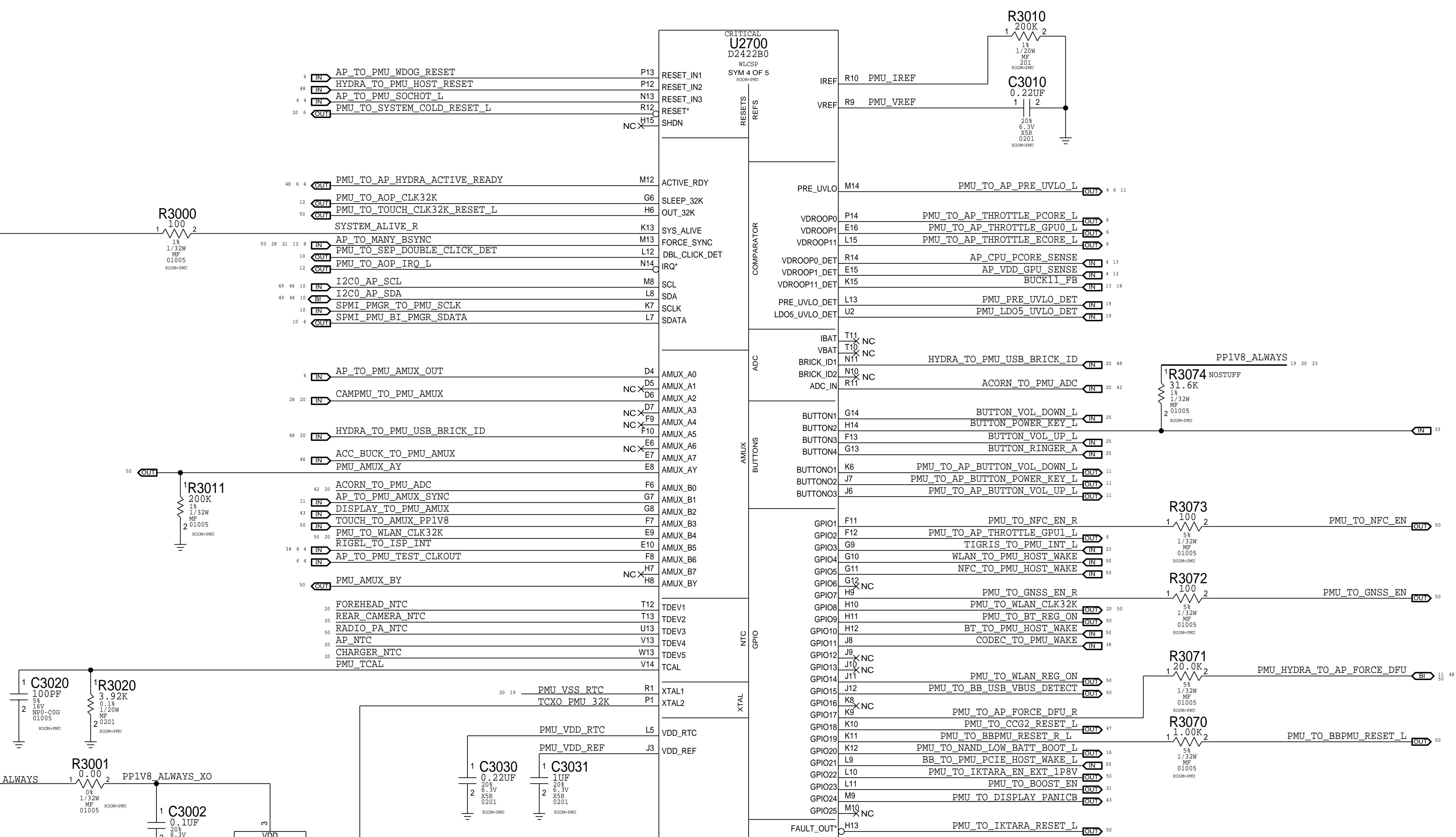
RADIO PA NTC on MLB Bottom



CHARGER NTC



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

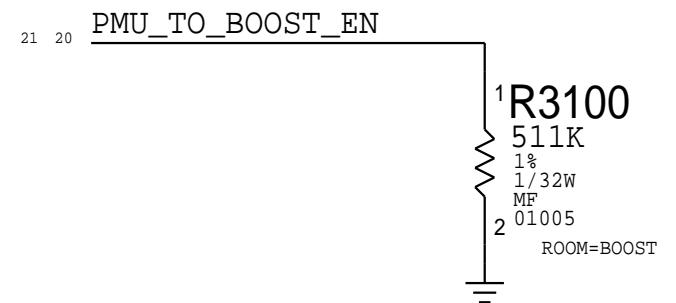


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Boost Enable Pull

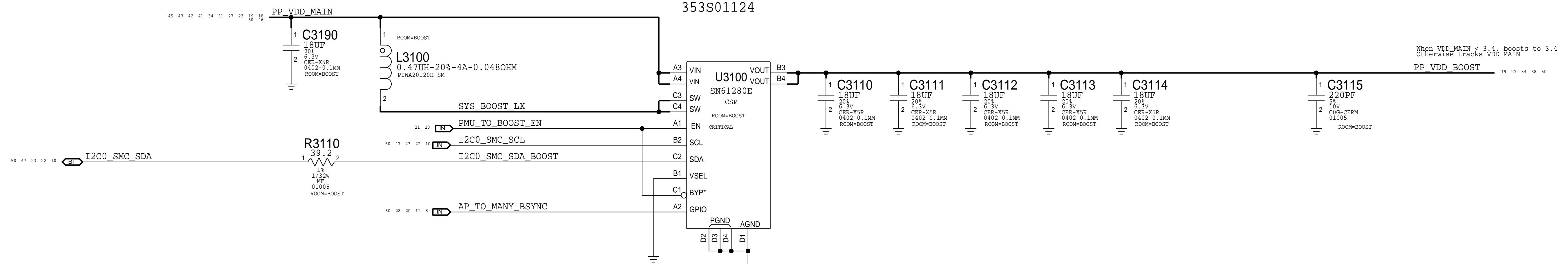


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BOOST

353S01124



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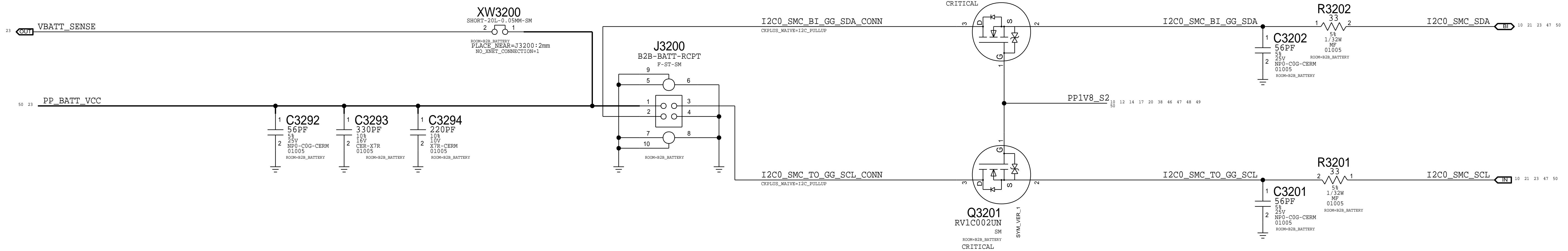
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BATTERY CONNECTOR

Rcpt: 516S00232
Plug: 516S00233

<-- This one on MLB



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TIGRIS2 CHARGER

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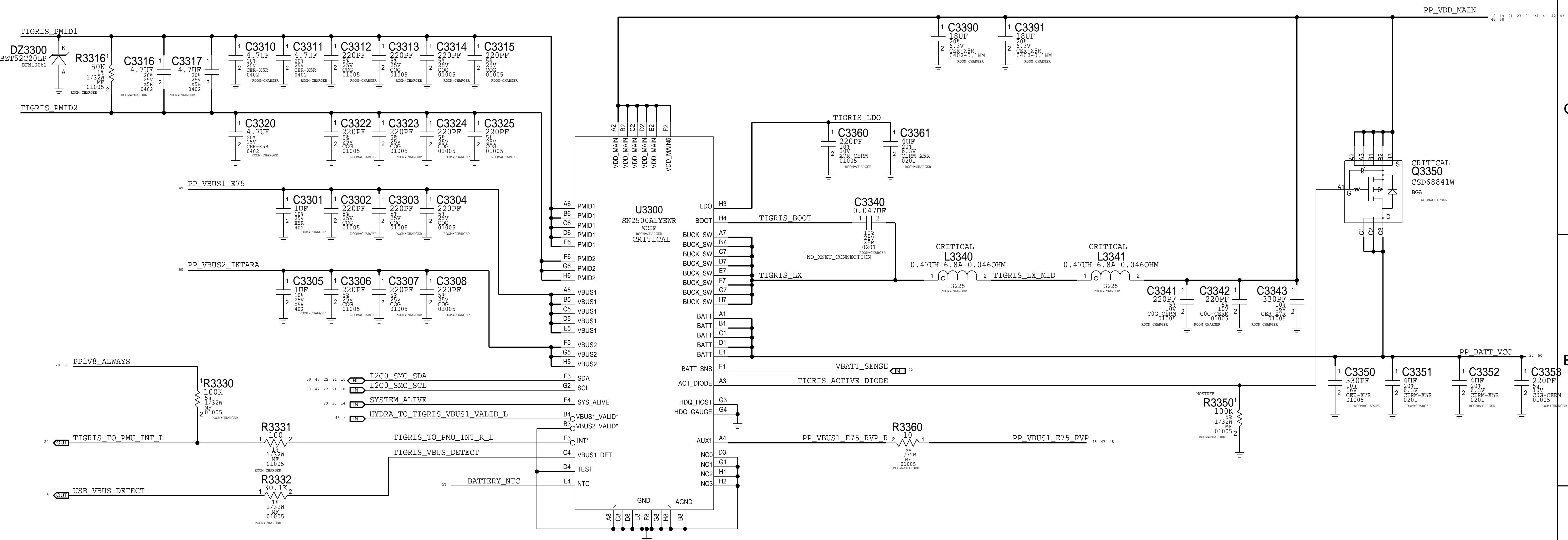
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PAGE TITLE	SYSTEM POWER: Charger		
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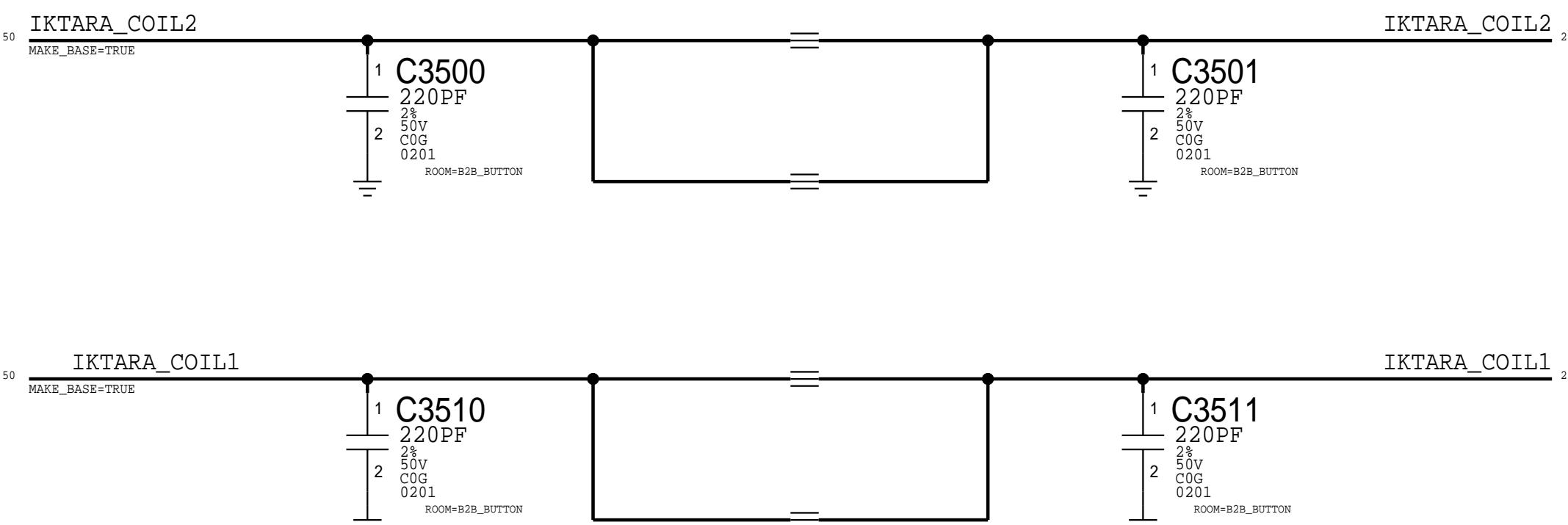
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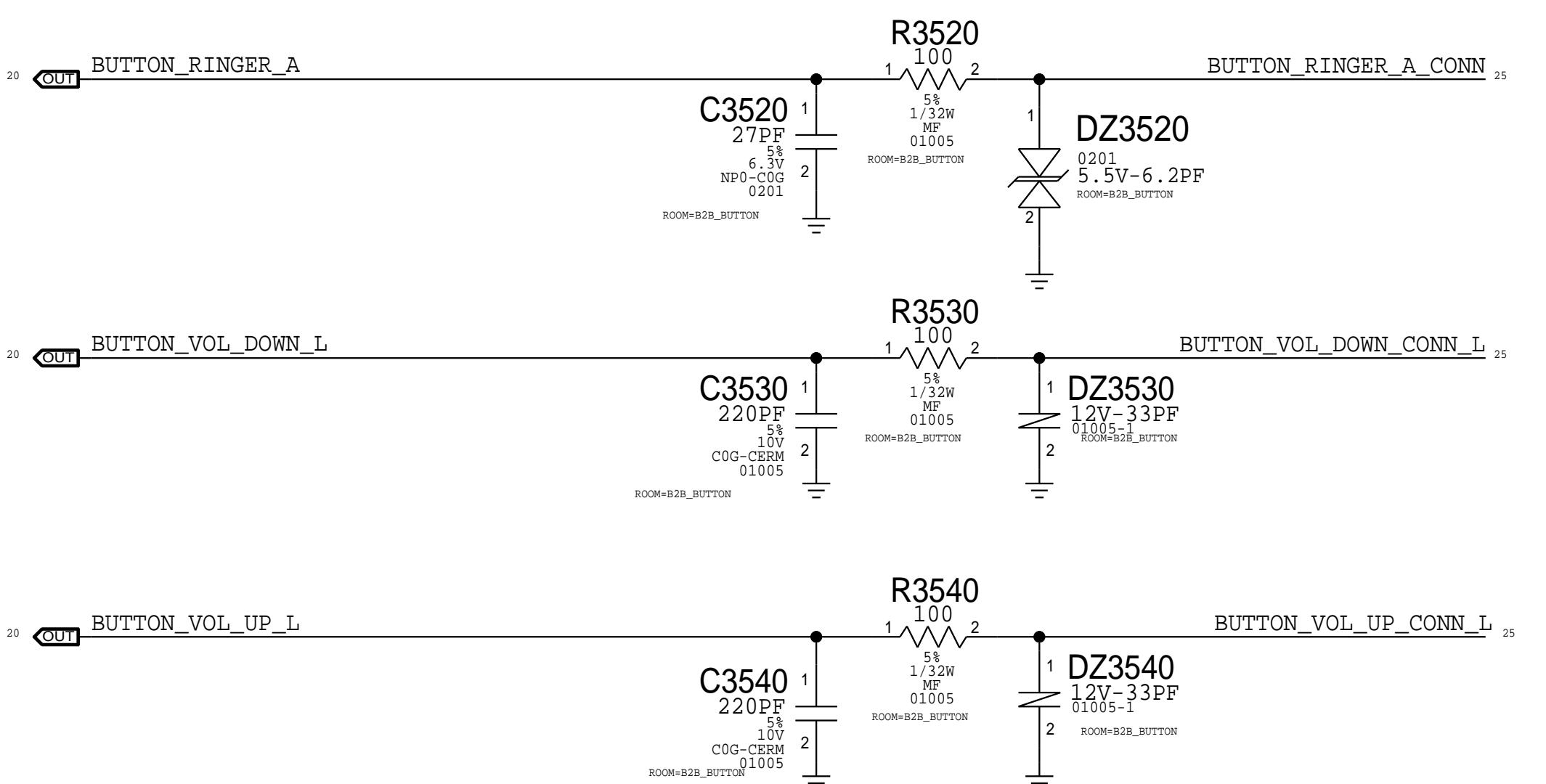
Iktara Components on MLB Bottom

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<small>BRANCH evt-1</small>			PAGE 34 OF 80
<small>SHEET 24 OF 51</small>			

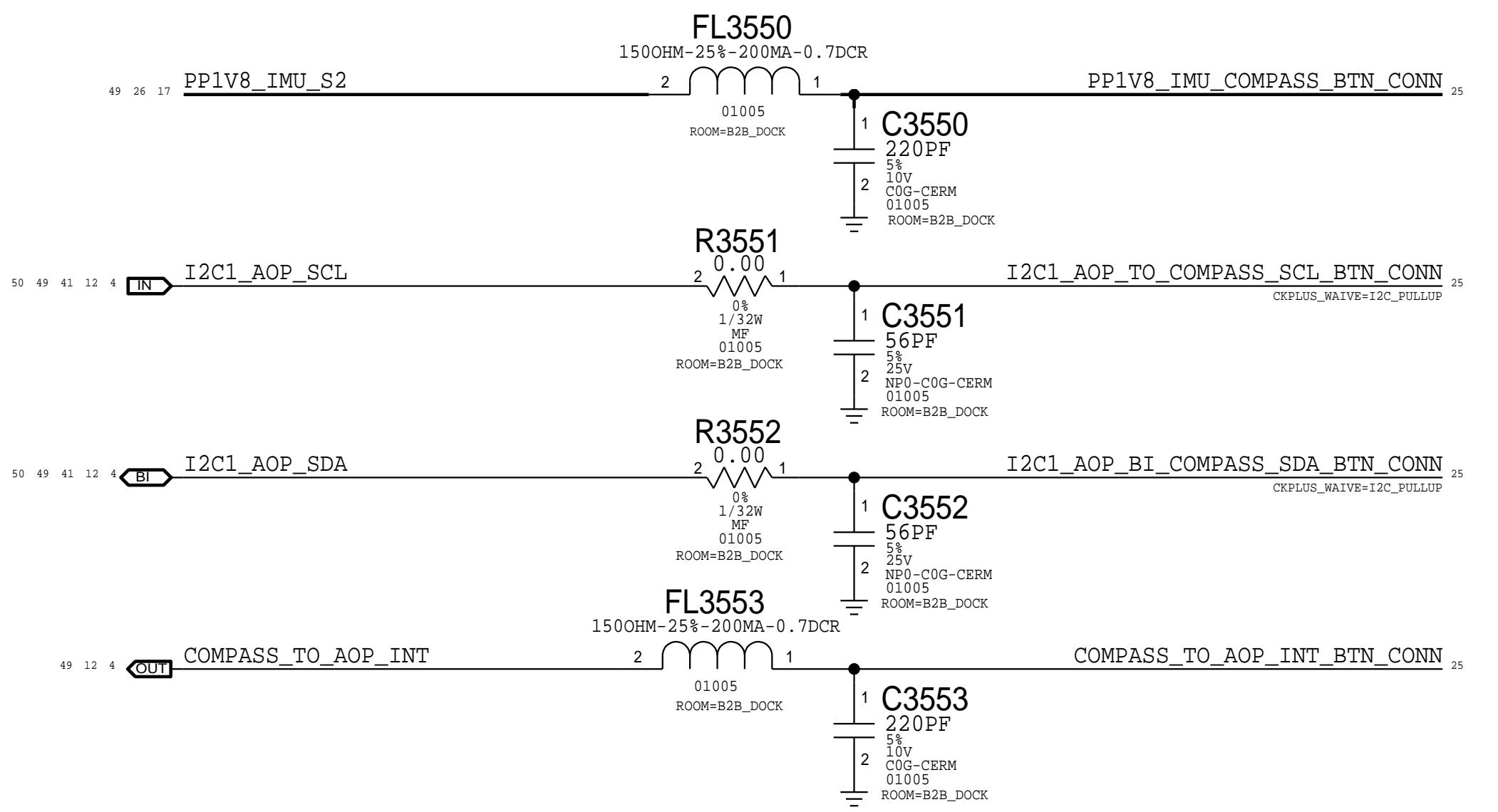
Cyclone Filtering



BUTTONS

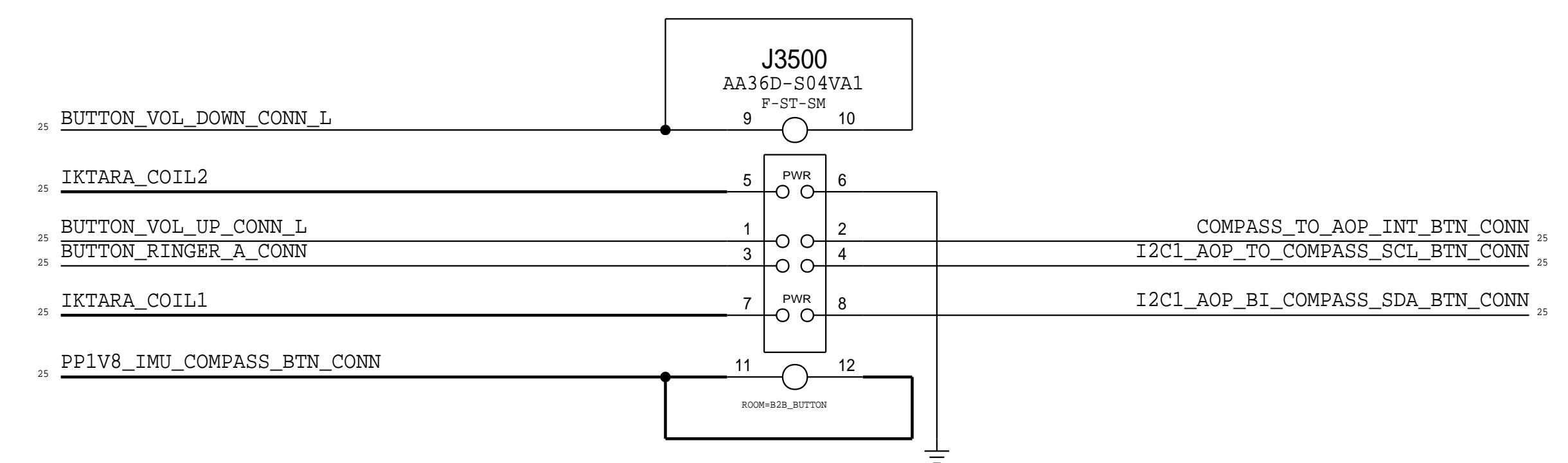


Compass (Button Flex Location)



Cyclone + Button Connector

Rcpt: 516S00289 <-- This one on MLB
Plug: 516S00290



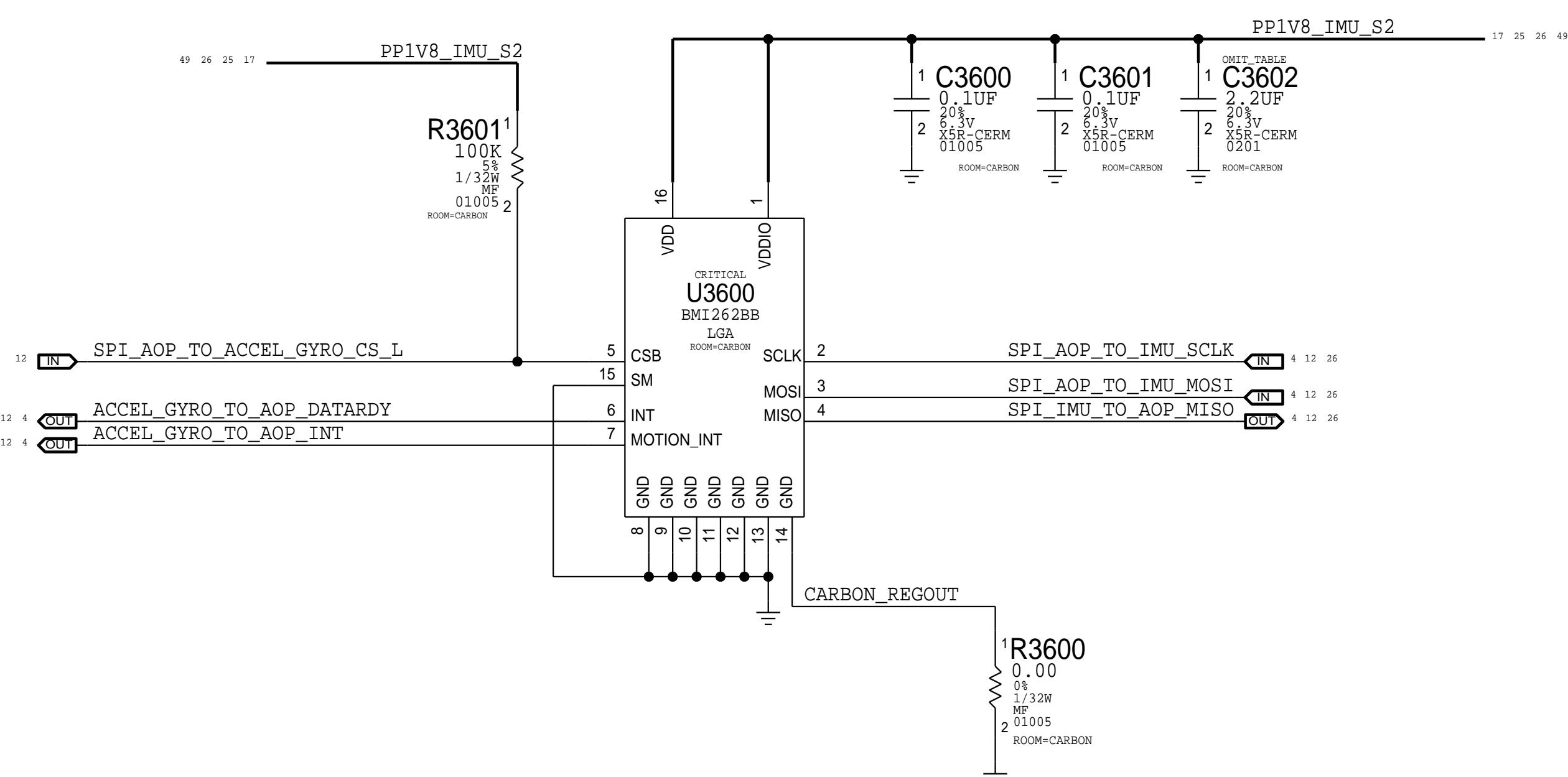
PAGE TITLE		SYSTEM POWER: B2B Cyclone + Button	
 Apple Inc.		DRAWING NUMBER	SIZE
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Graphite - Accel & Gyro

APN: 338S00304

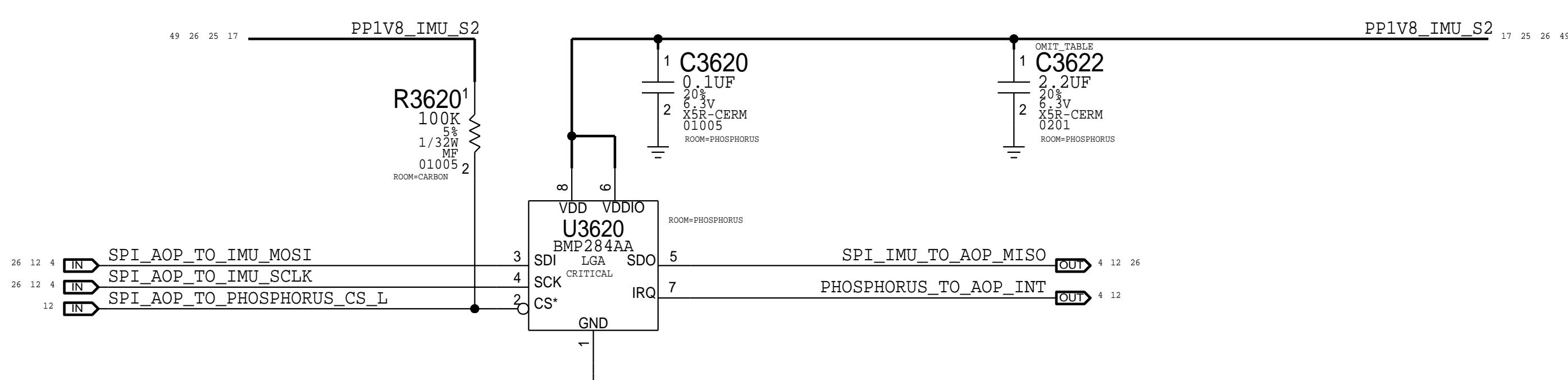
Magnesium - Compass

(On Dock or Button Flex)



Phosphorus

BOSCH (APN:338S00188)
ST (APN:338S00230)



PAGE TITLE	SENSORS	
 Apple Inc.	DRAWING NUMBER 051-02221	SIZE D
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Camera PMU

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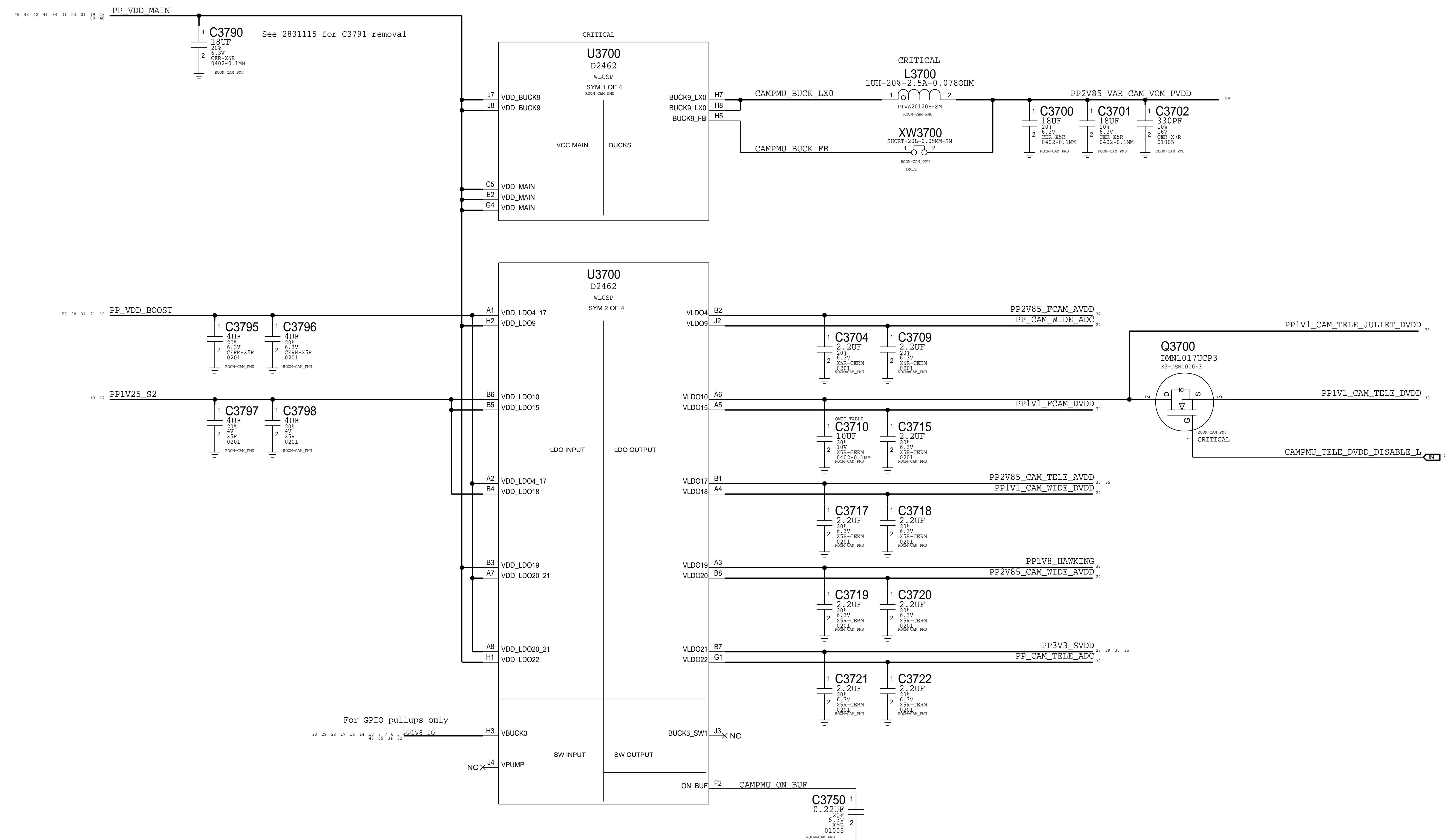
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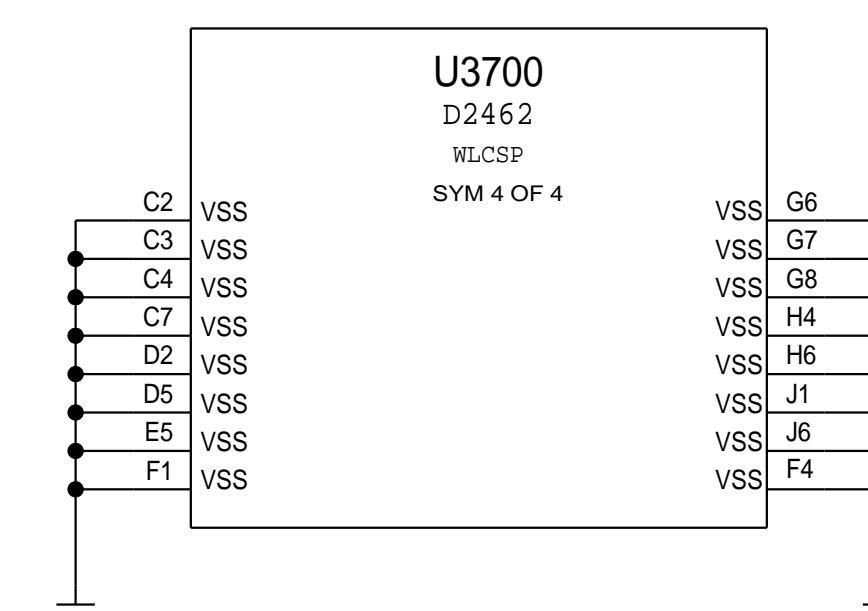
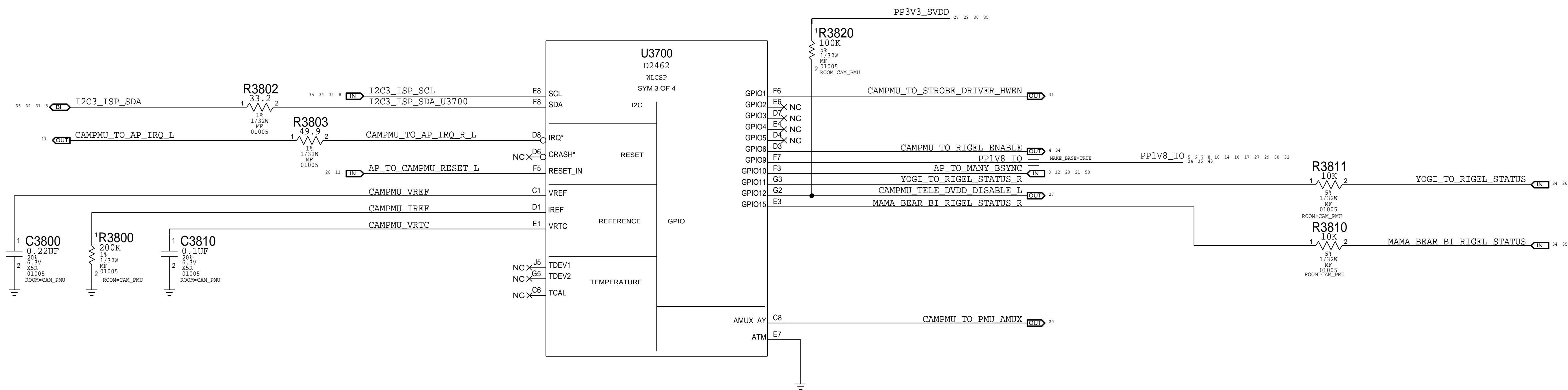


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Apple Inc.	DRAWING NUMBER 051-02221	SIZE D
REVISION 9.0.0		
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	SHEET 27 OF 51	

Pull Downs

AP_TO_CAMPMU_RESET_L 11 28

'R3801
100K
5%
1/32W
MF
01005
2 ROOM=CAM_PMU

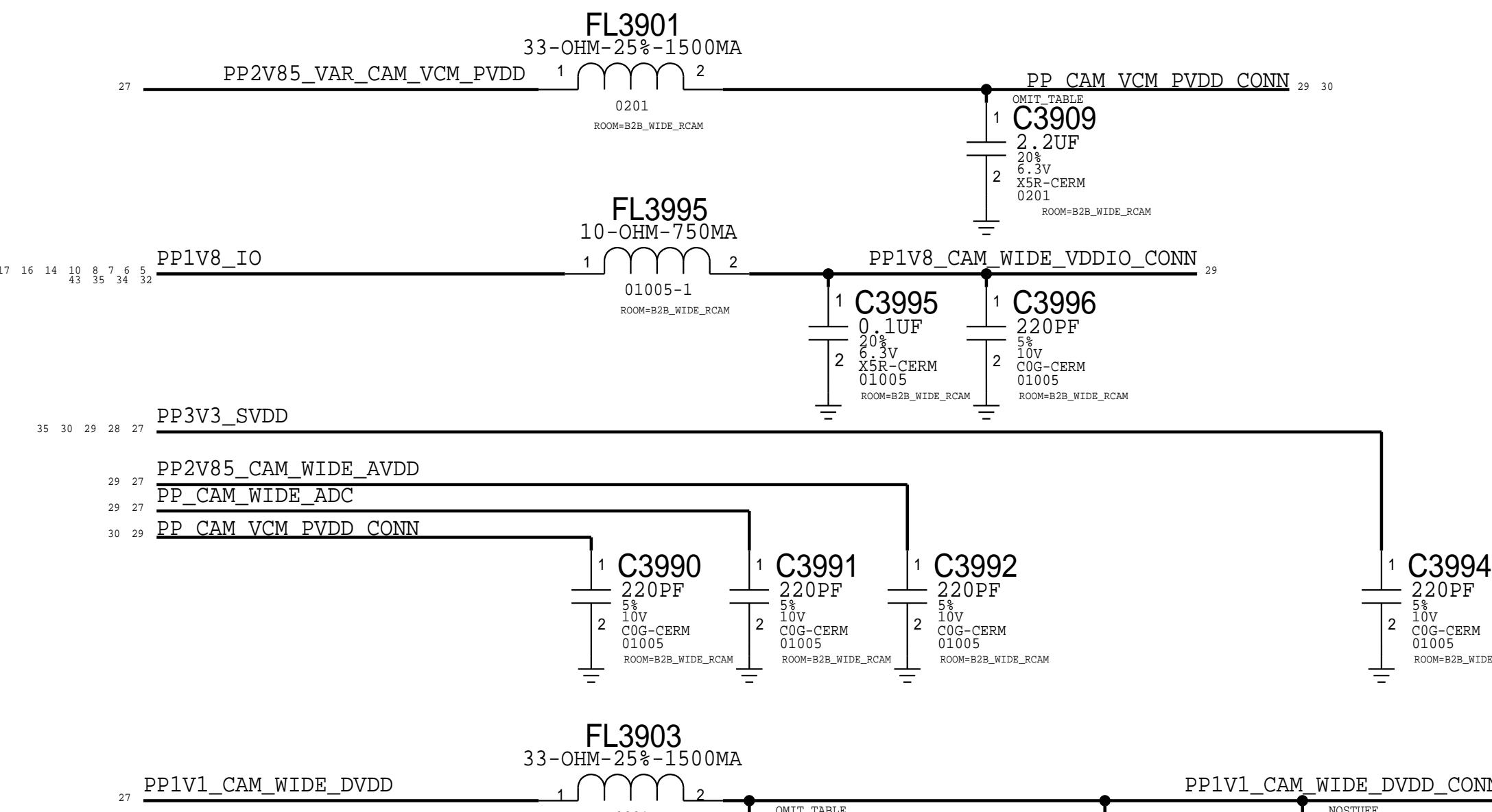
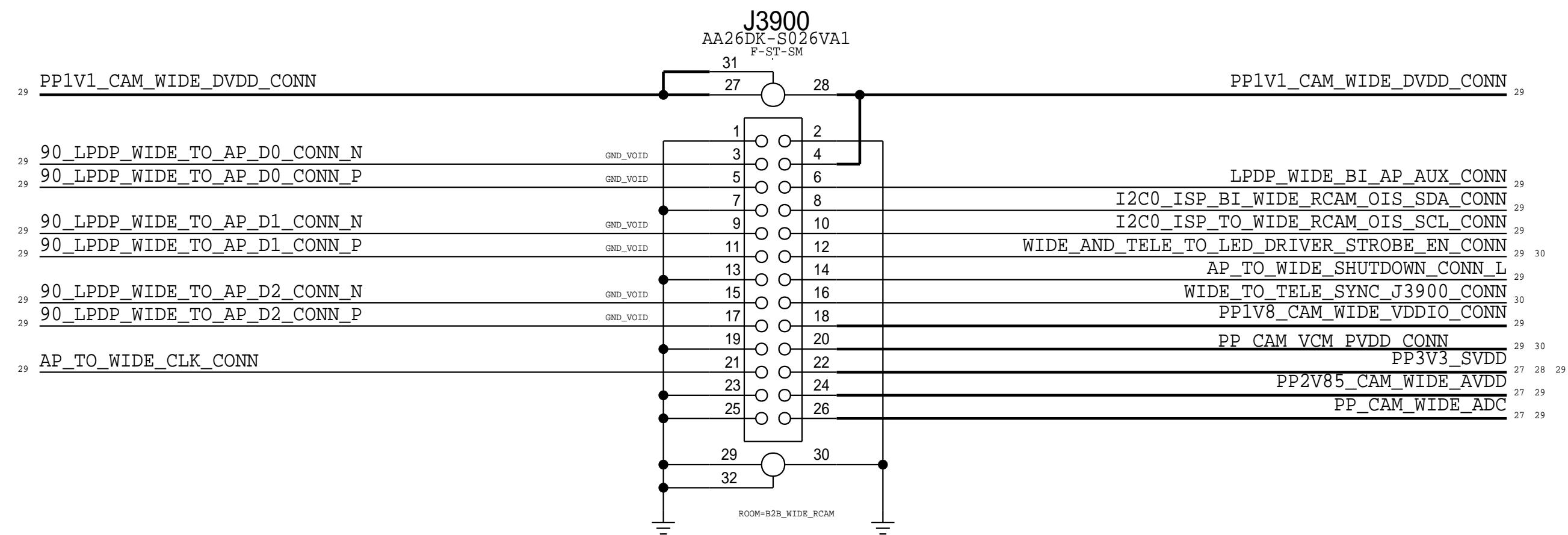


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BRANCH evt-1	PAGE 38 OF 80	SHEET 28 OF 51

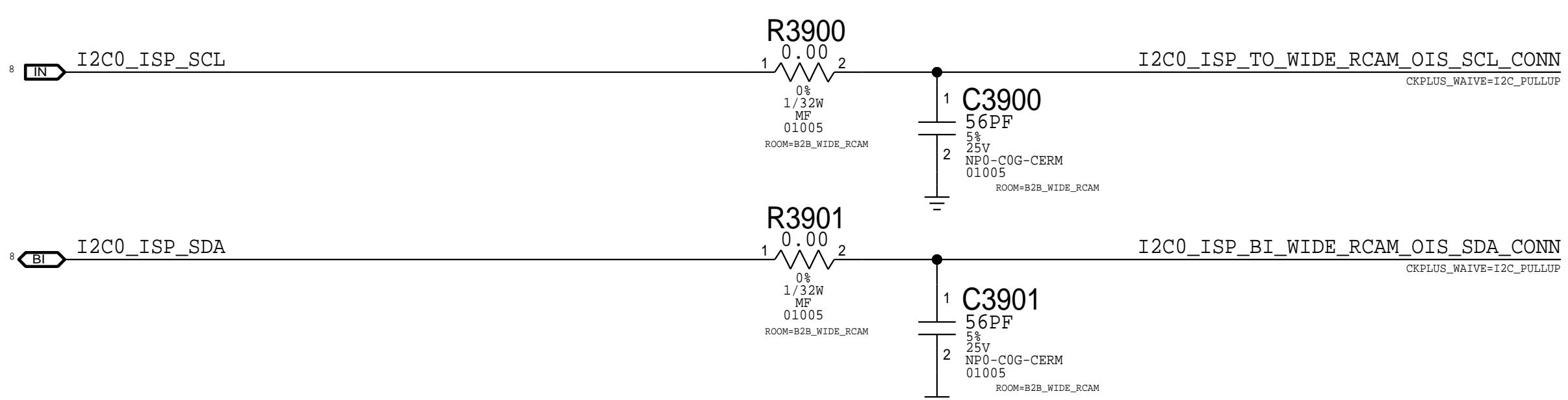
Power Filtering

Wide Camera Connector

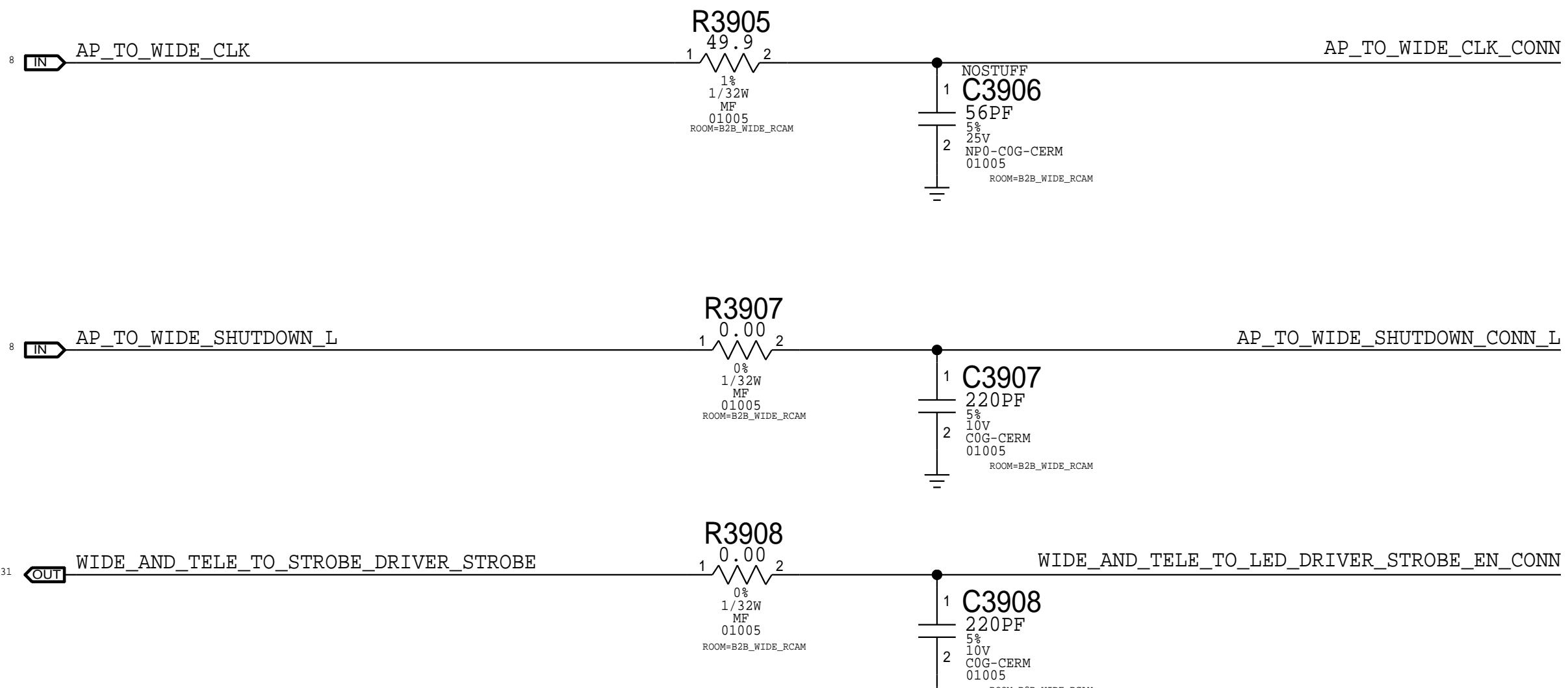
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Plug: 516S00314
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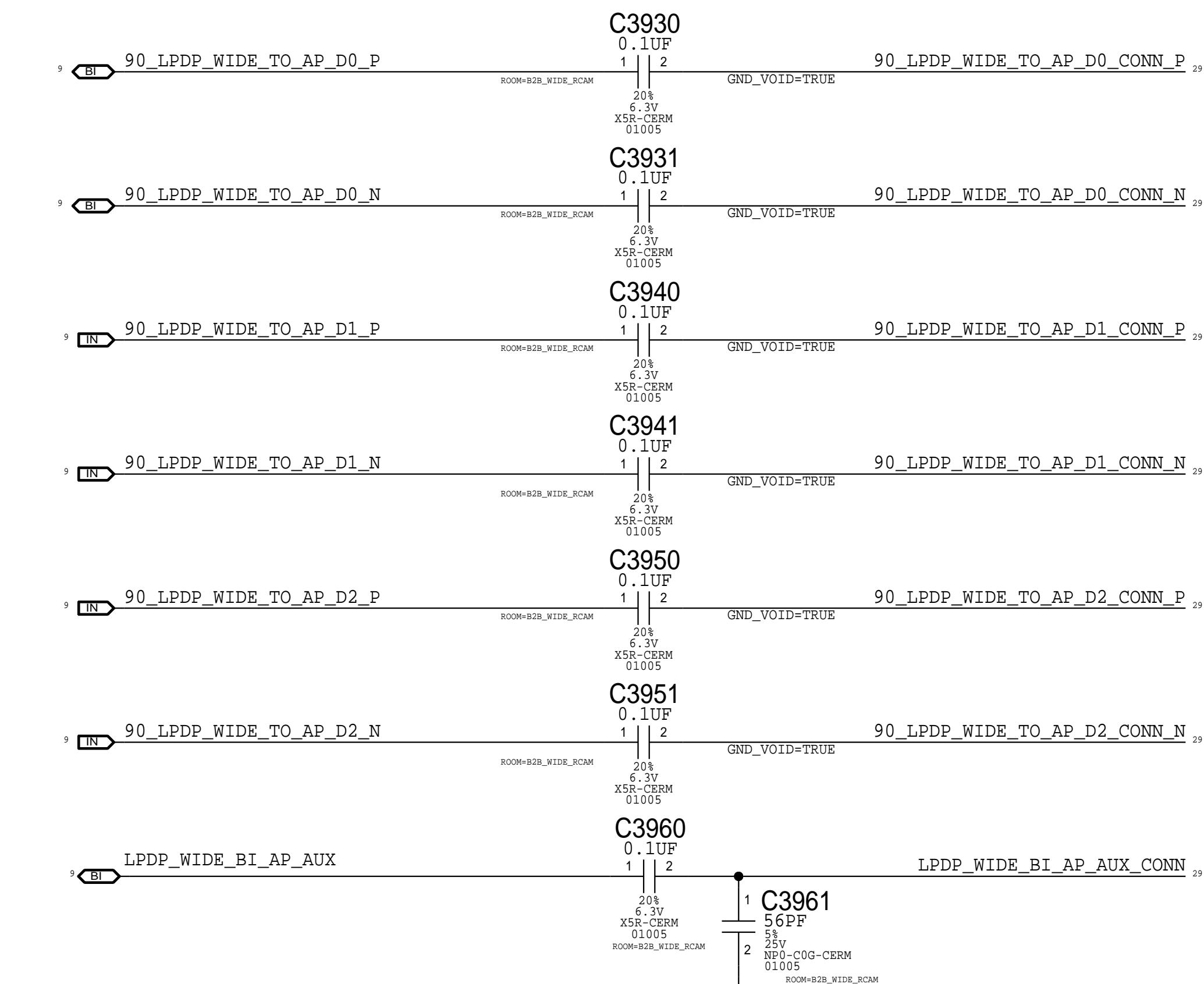
ISP I2C



IO Filters



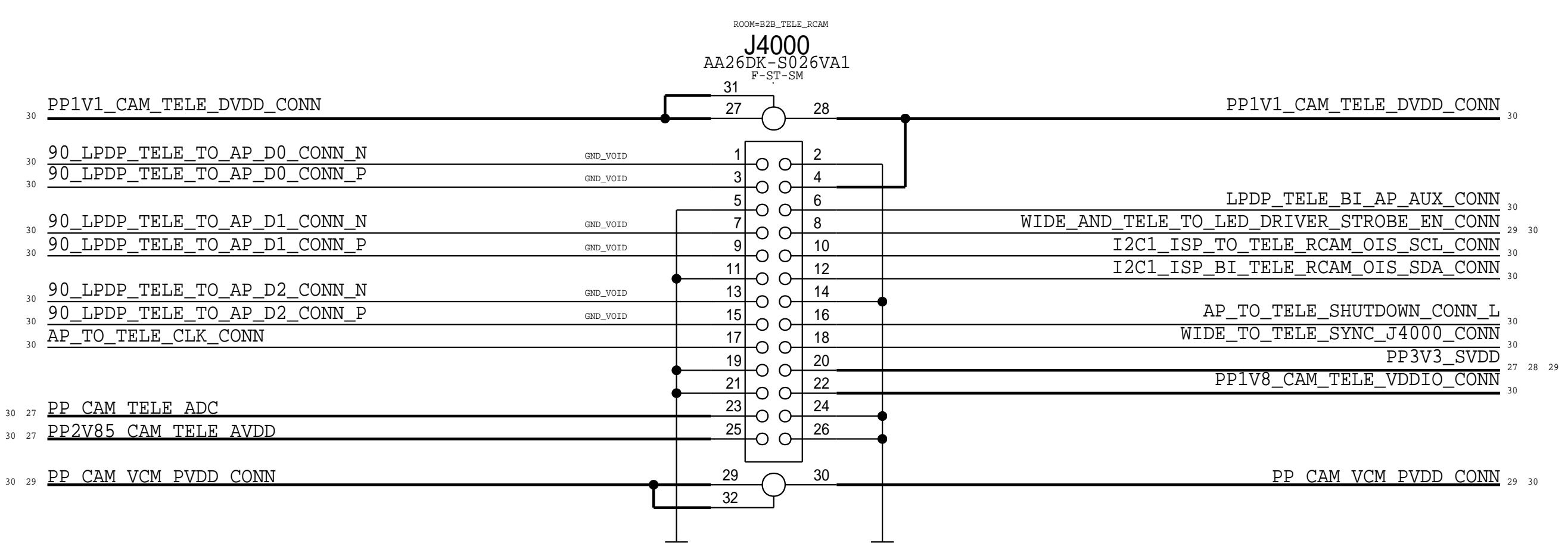
LPDP Filters



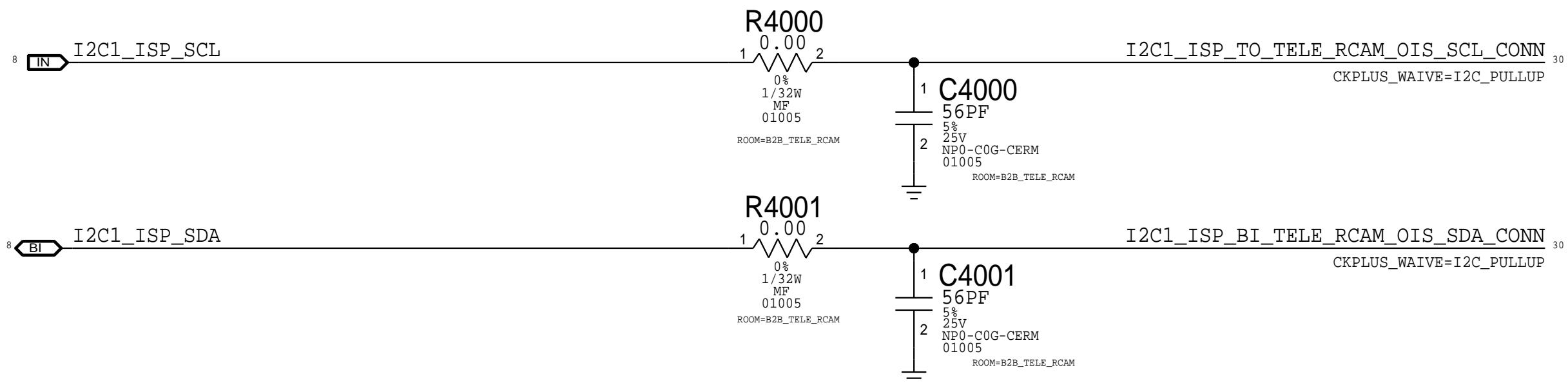
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 Apple Inc.		DRAWING NUMBER	051-02221
REVISION	9.0.0	SIZE	D
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Tele Camera Connector

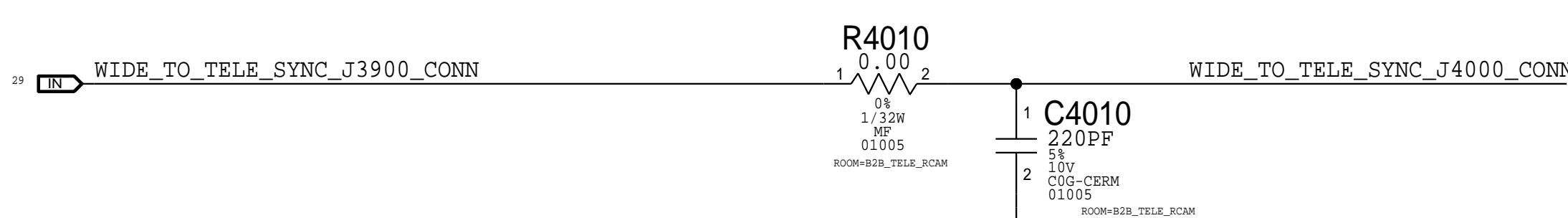
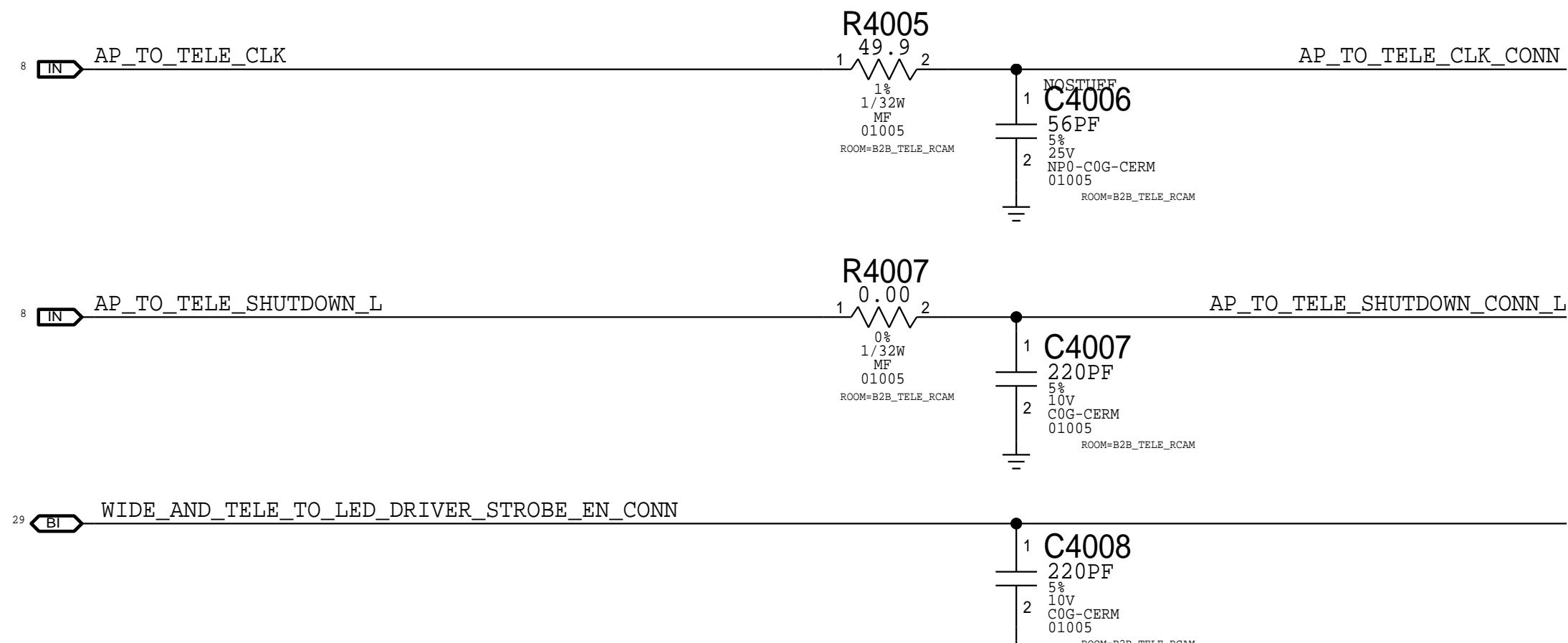
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Plug: 516S00314



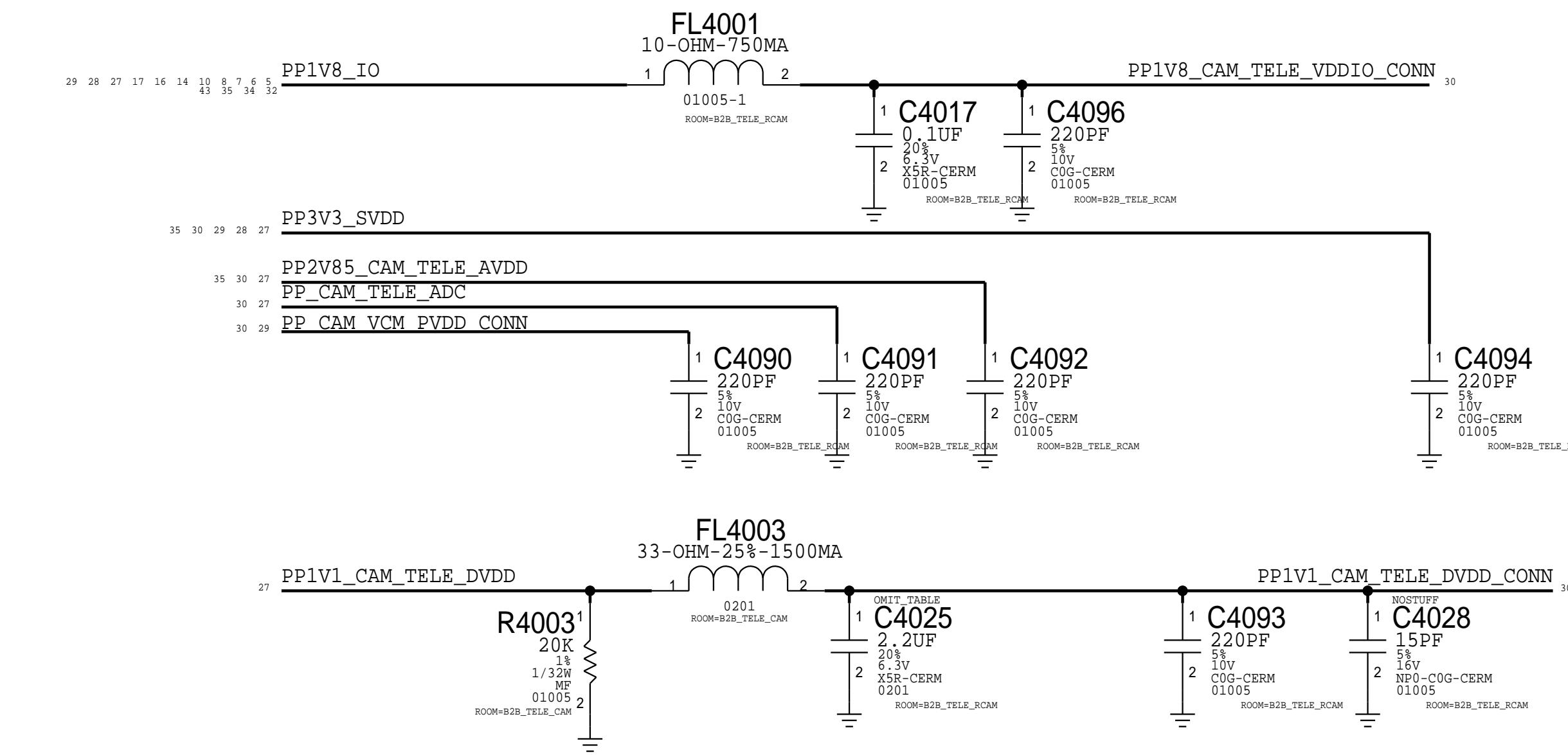
ISP I2C



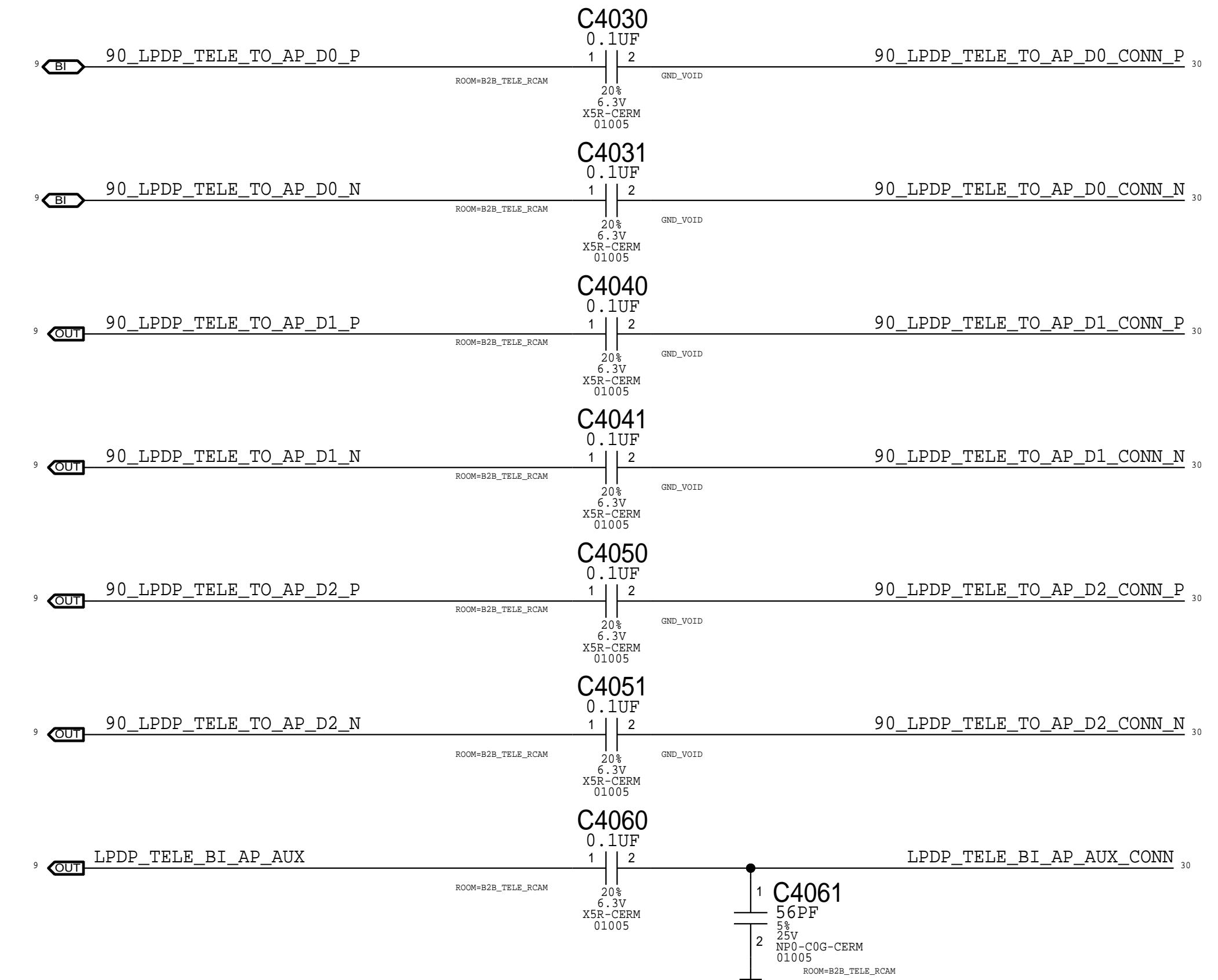
IO Filters



Power Filtering



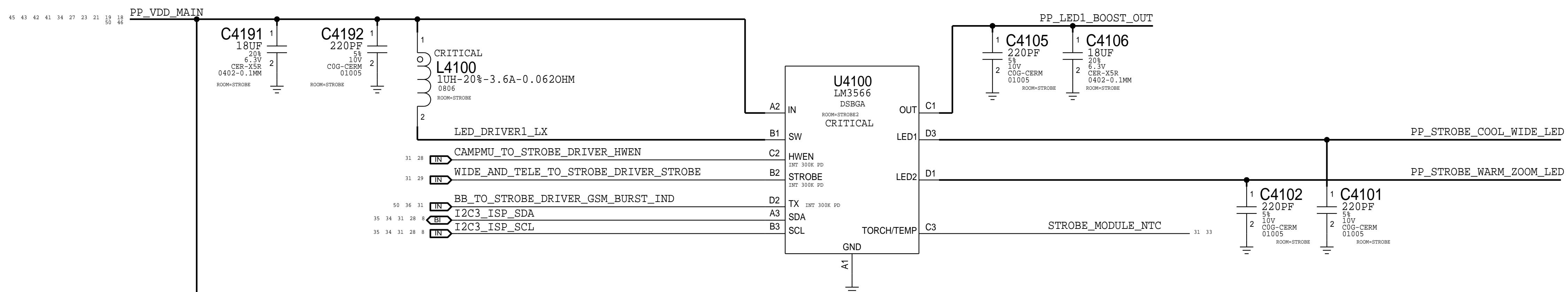
LPD



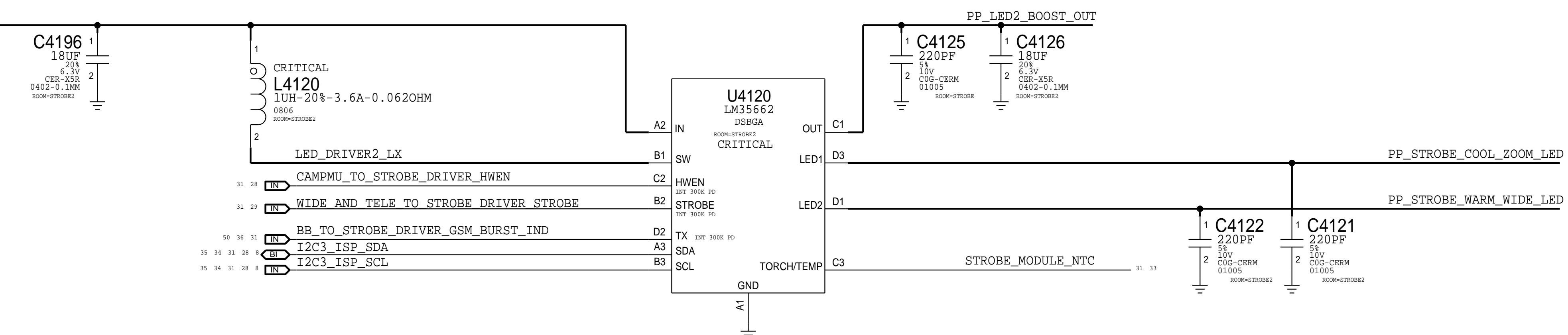
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 Apple Inc.		DRAWING NUMBER 051-02221
		SIZE D
		REVISION 9.0.0
		BRANCH evt-1
		PAGE 40 OF 80
		SHEET 30 OF 51
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LED STROBE DRIVERS (NEON)

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I2C Address (7-bit): 0x63

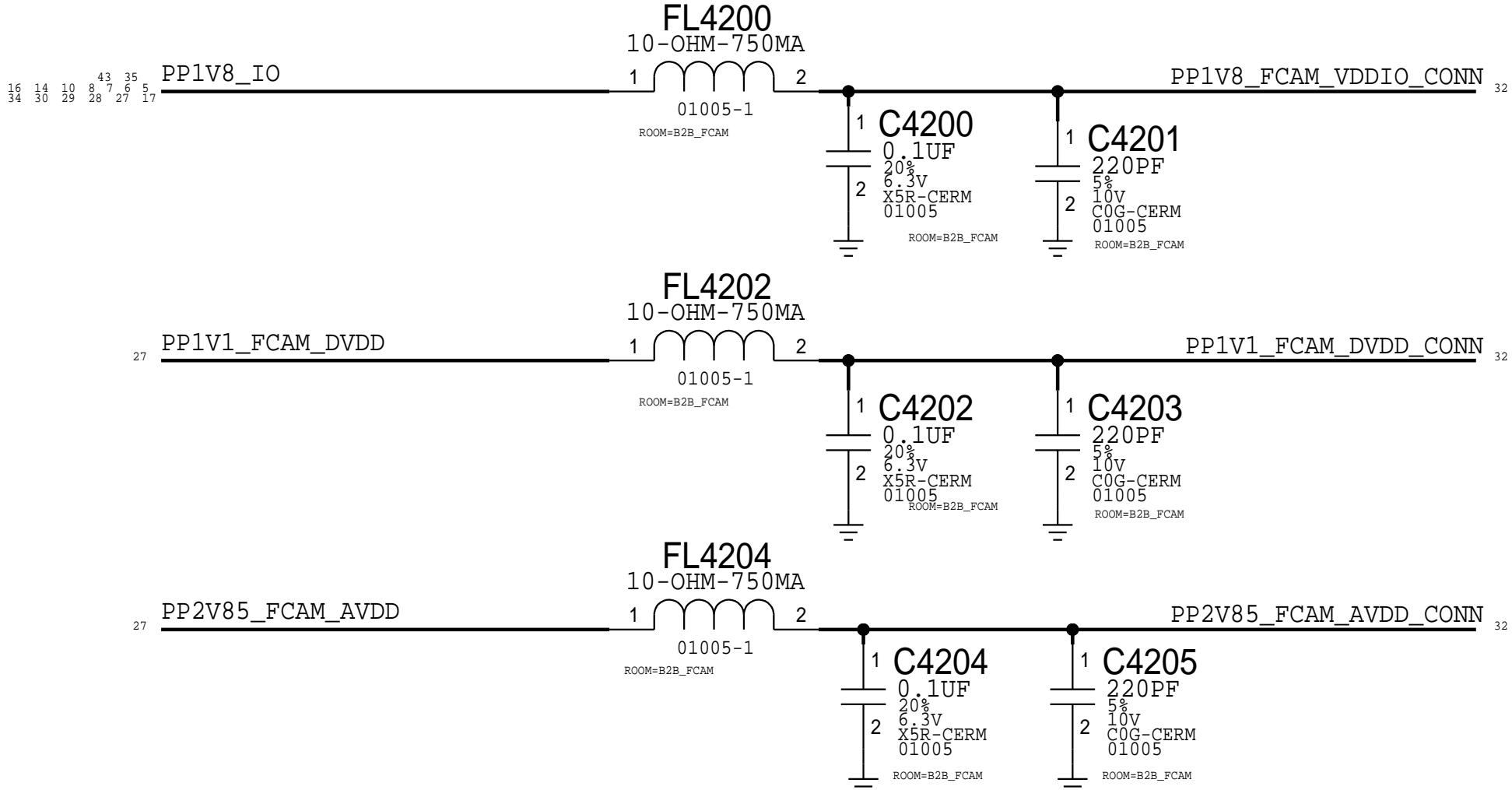


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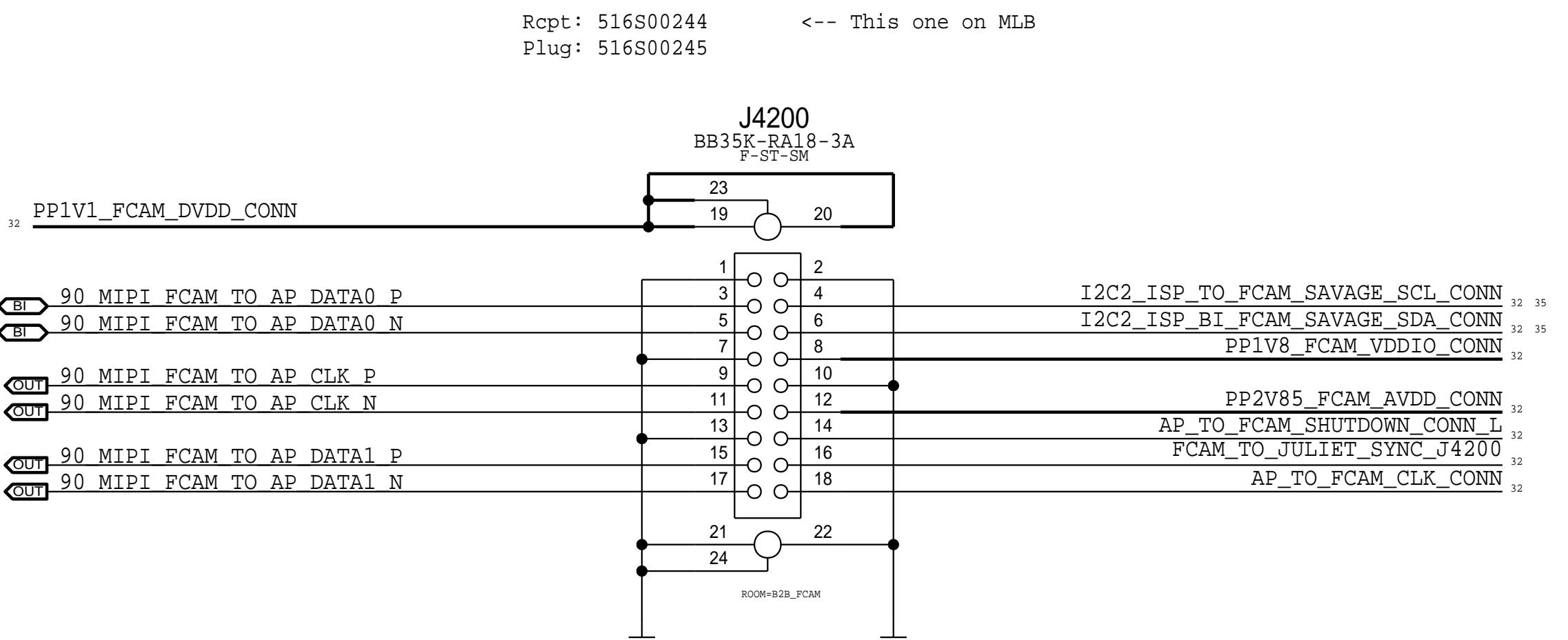


PAGE TITLE	DRAWING NUMBER	SIZE
CAMERA: Strobe Drivers	051-02221	D
Apple Inc.	REVISION	9.0.0
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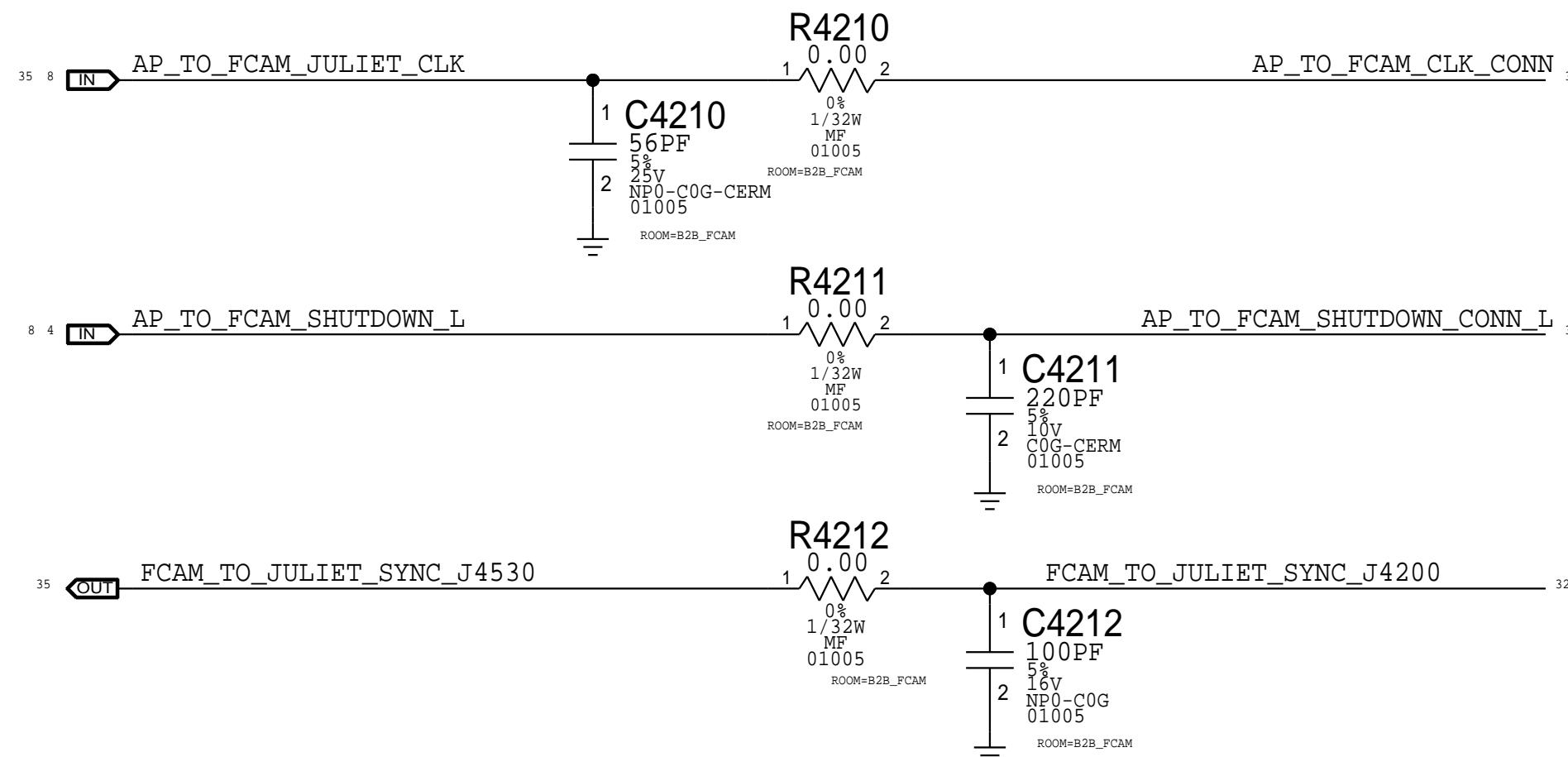
NEW HAMPSHIRE POWER



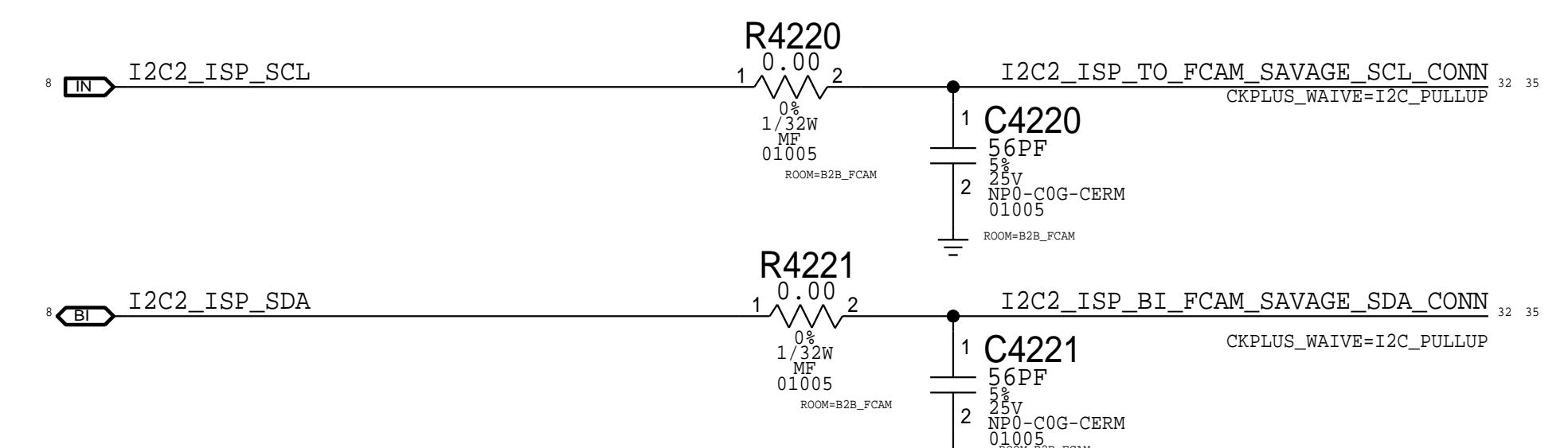
FCAM Connector



FCAM I/O

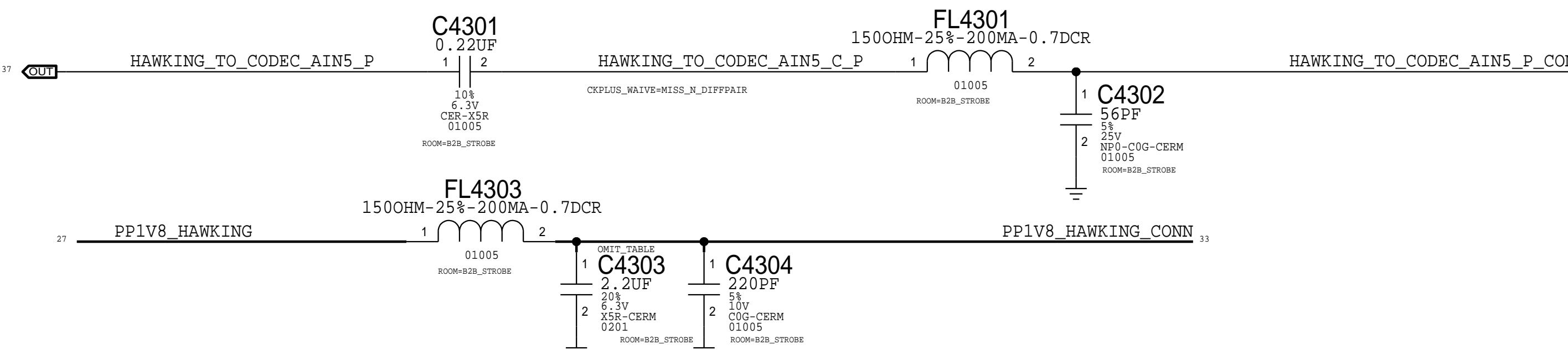


ISP I2C2

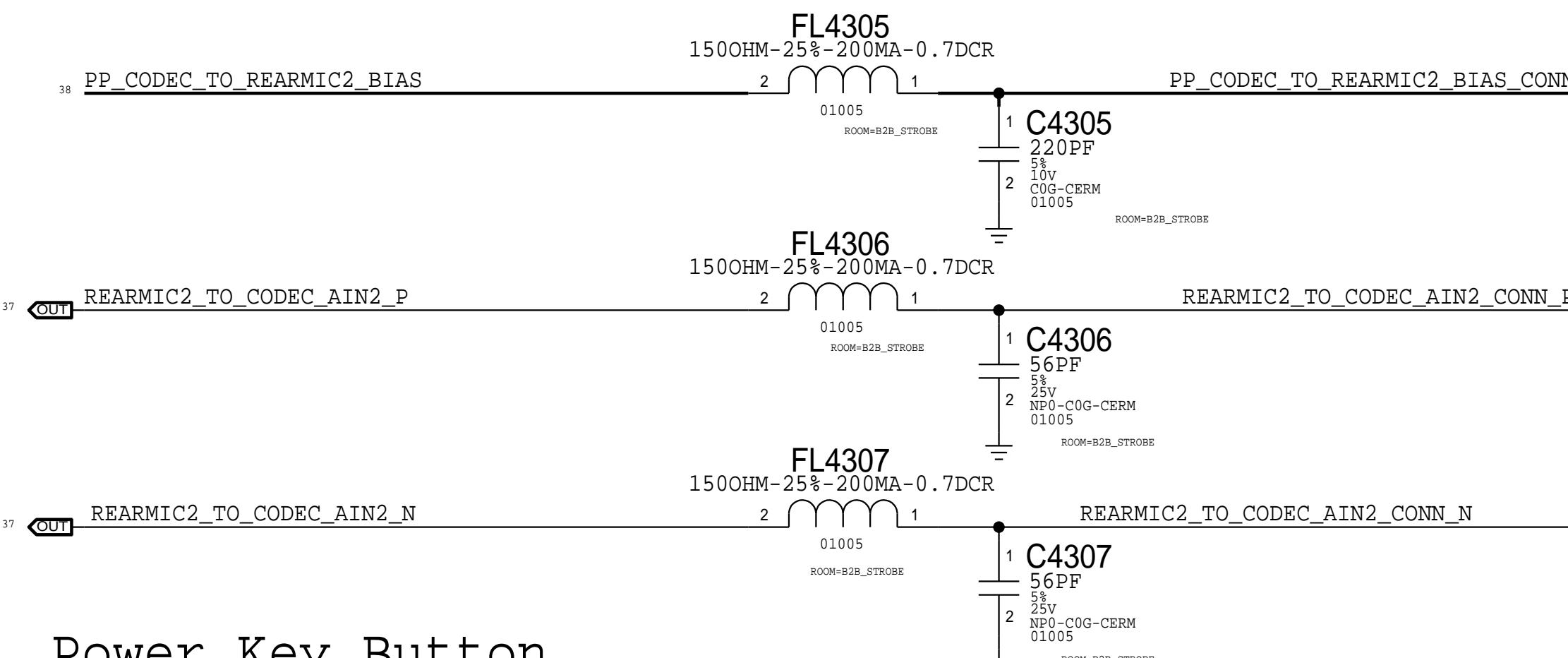


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SHEET	32 OF 51	

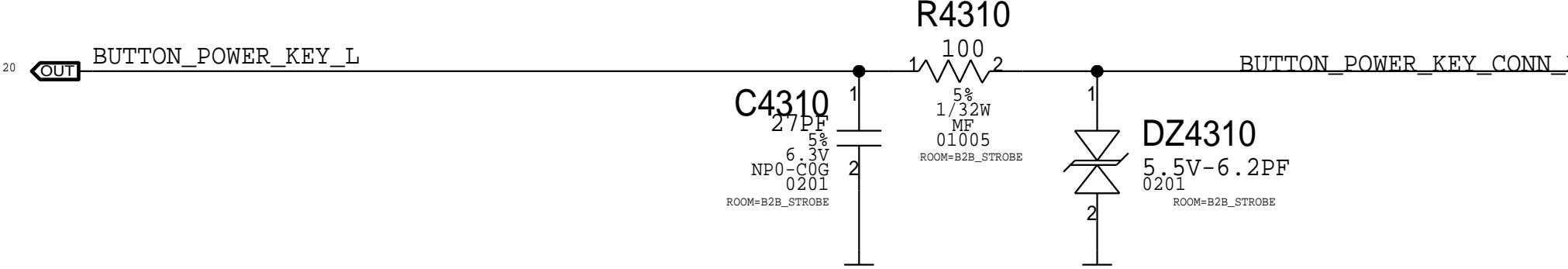
HAWKING



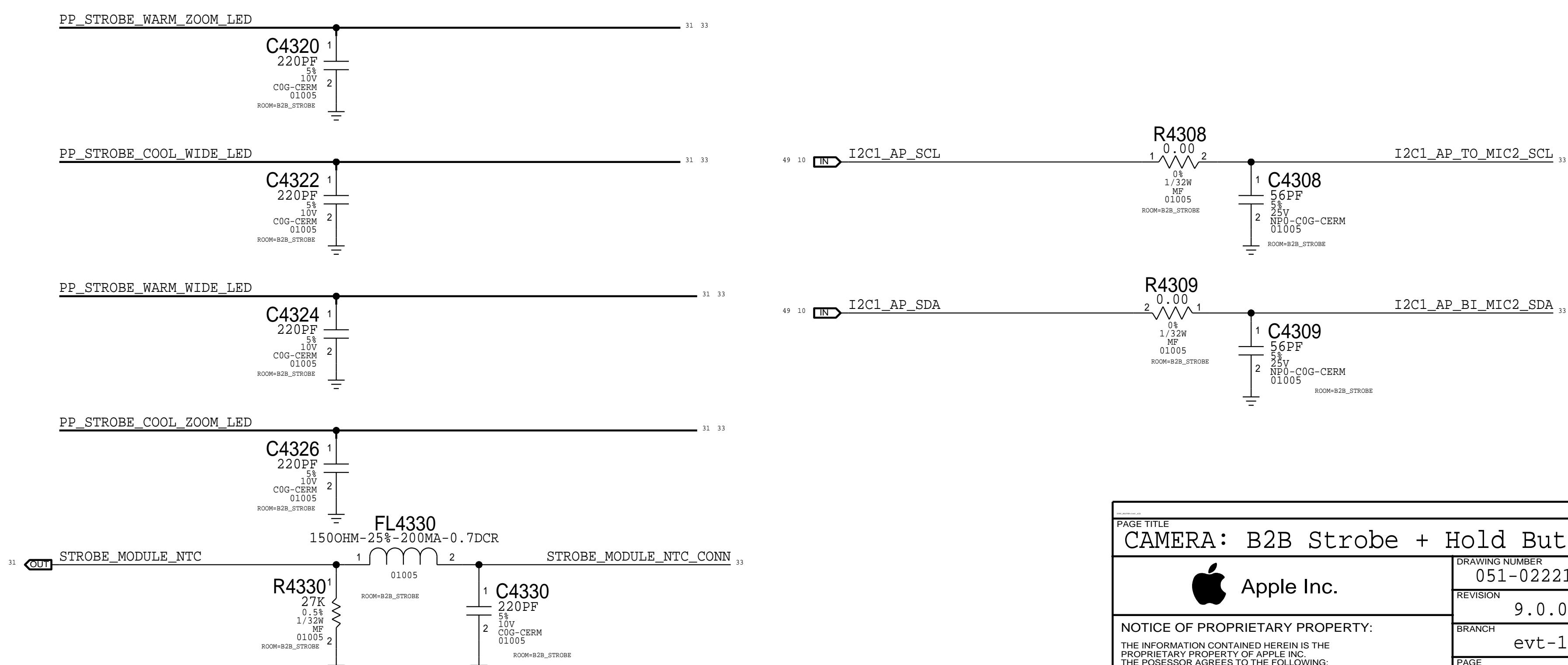
MIC2 (ANC REF)



Power Key Button

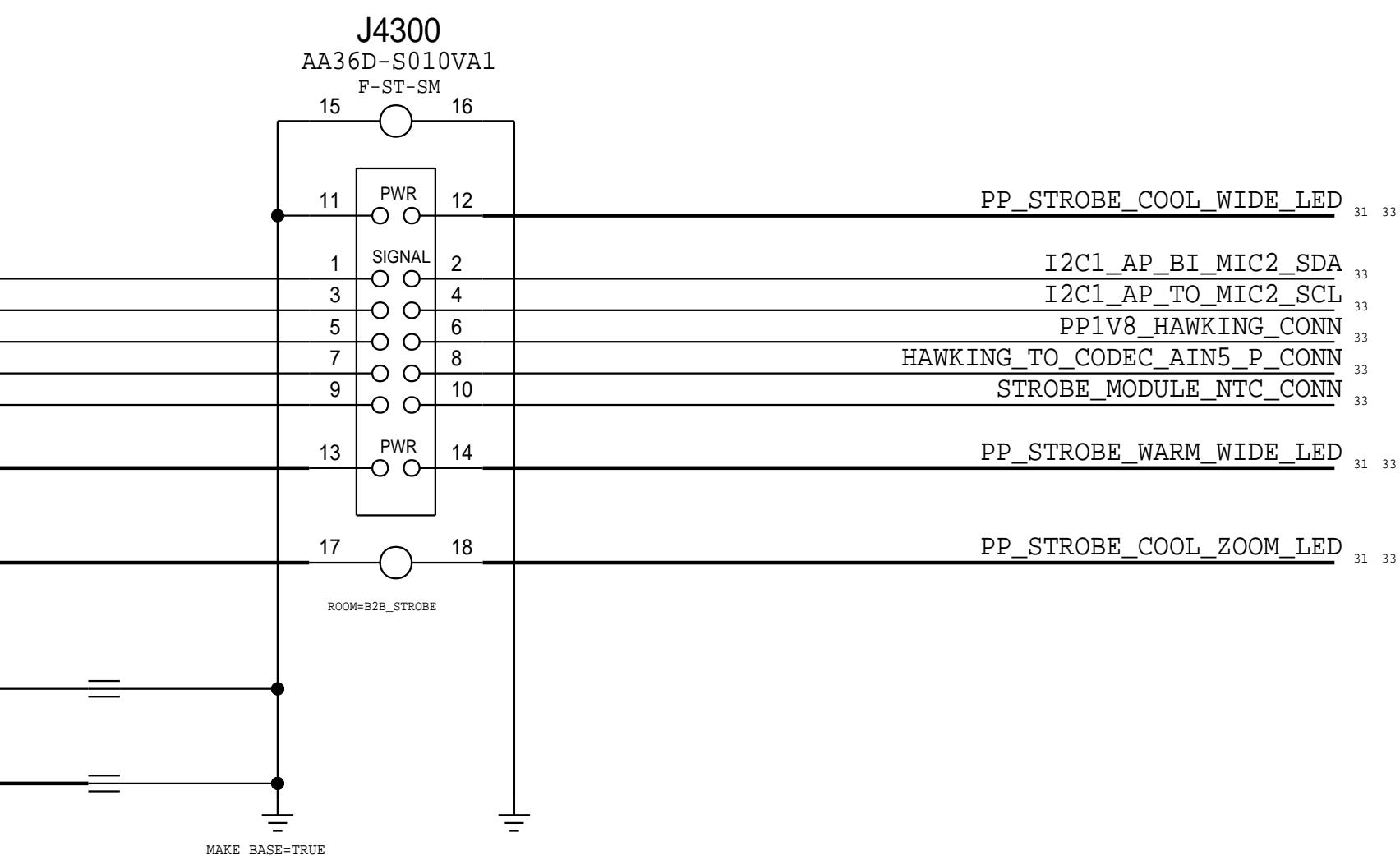


Strobe Filtering



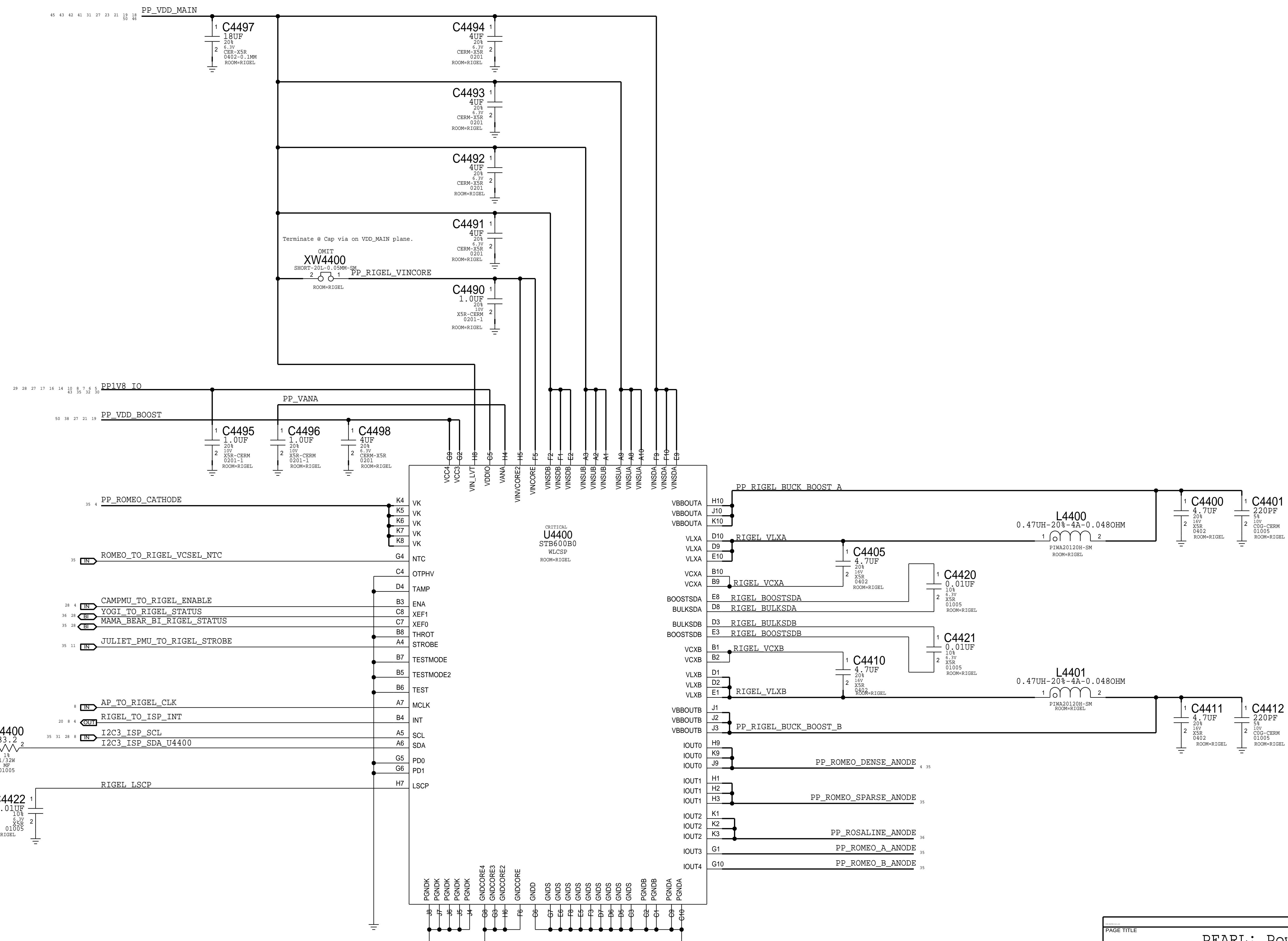
Strobe Connector

Rept: 516S00267
 Plug: 516S00268
 <-- This one on MLB



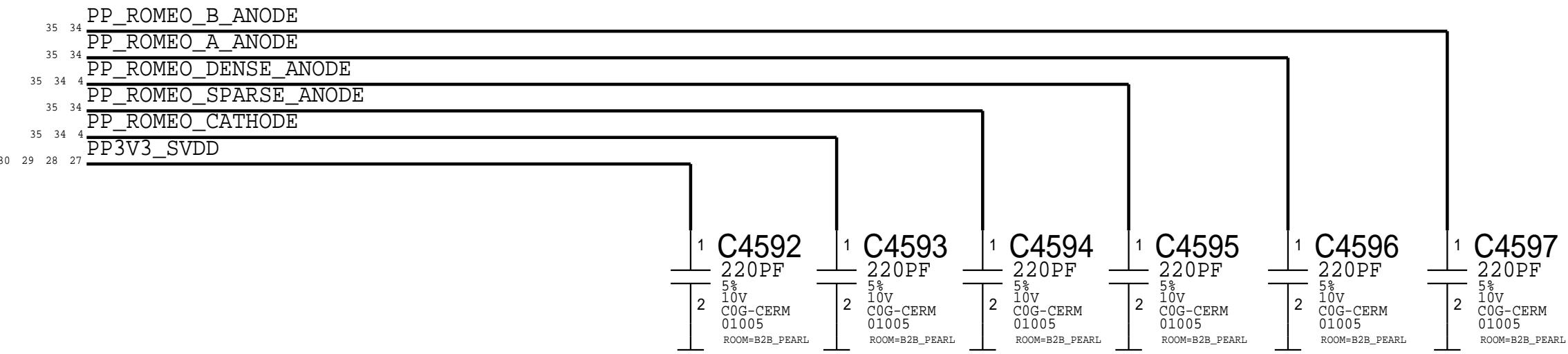
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Apple Inc.		REVISION	9.0.0			
NOTICE OF PROPRIETARY PROPERTY:		BRANCH	evt-1			
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Rigel Driver

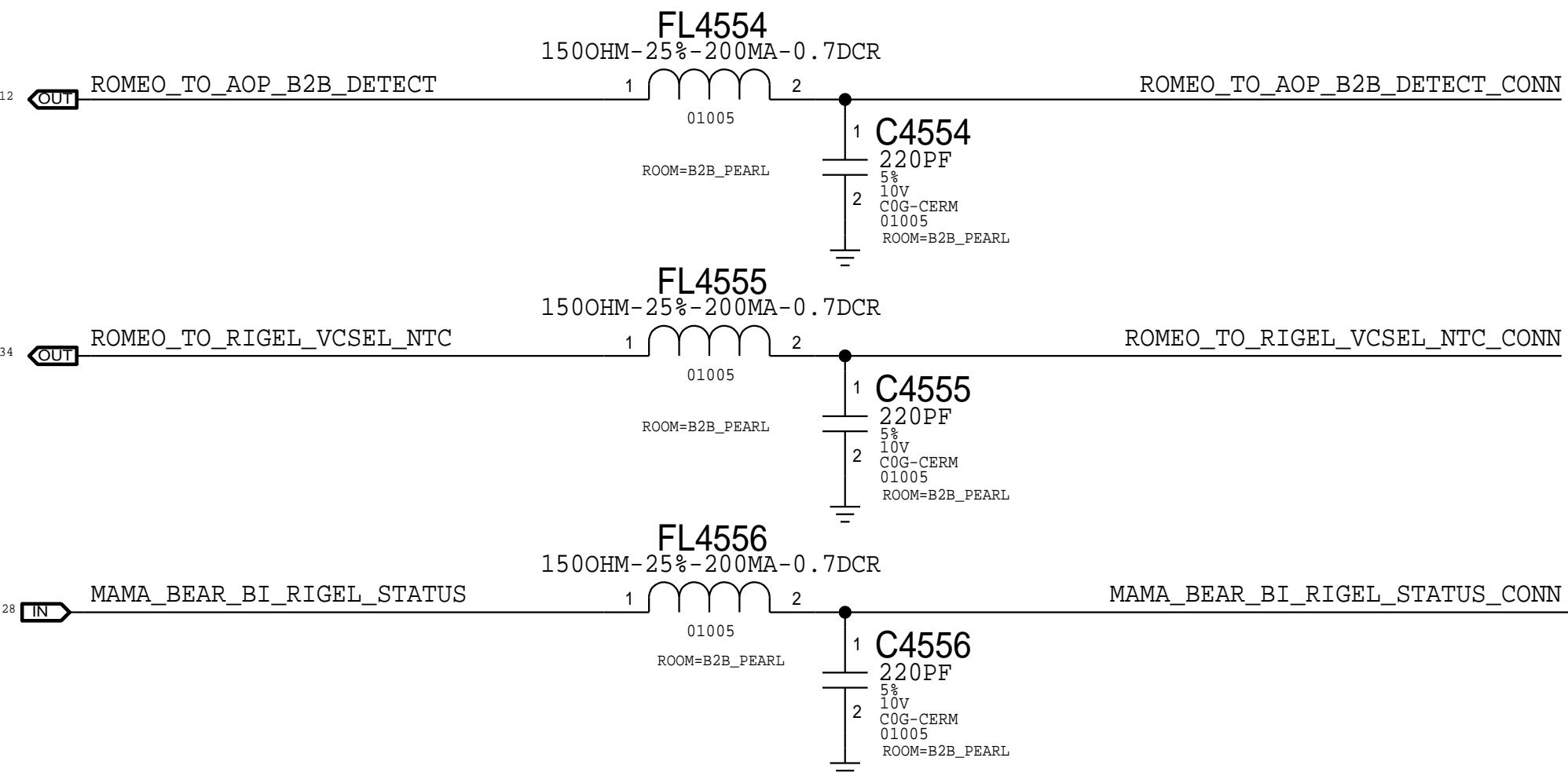


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Apple Inc.	DRAWING NUMBER 051-02221	SIZE D
REVISION 9.0.0		
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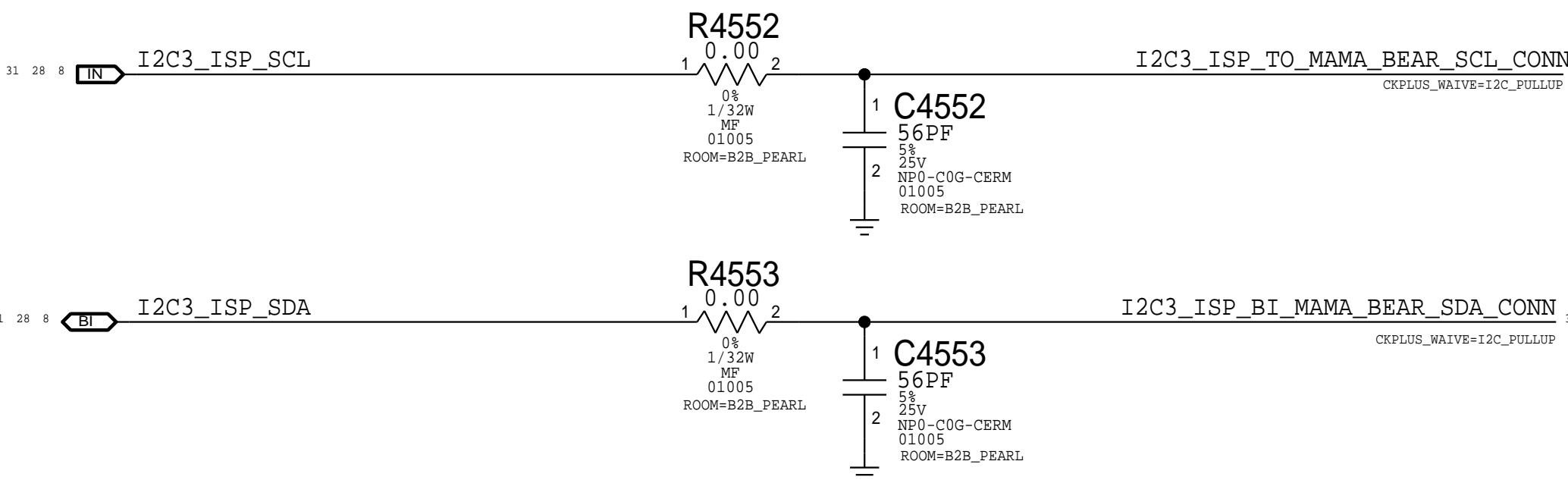
Romeo Power Filtering



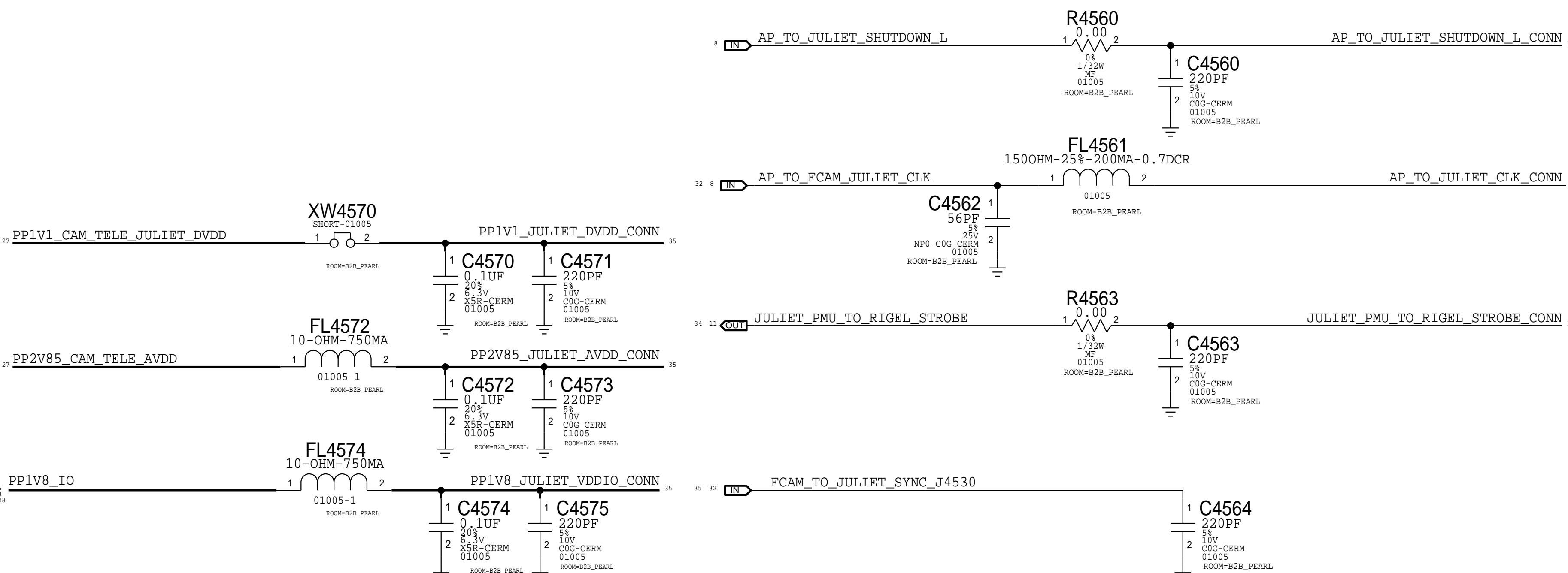
Romeo I/O



ISP I2C3

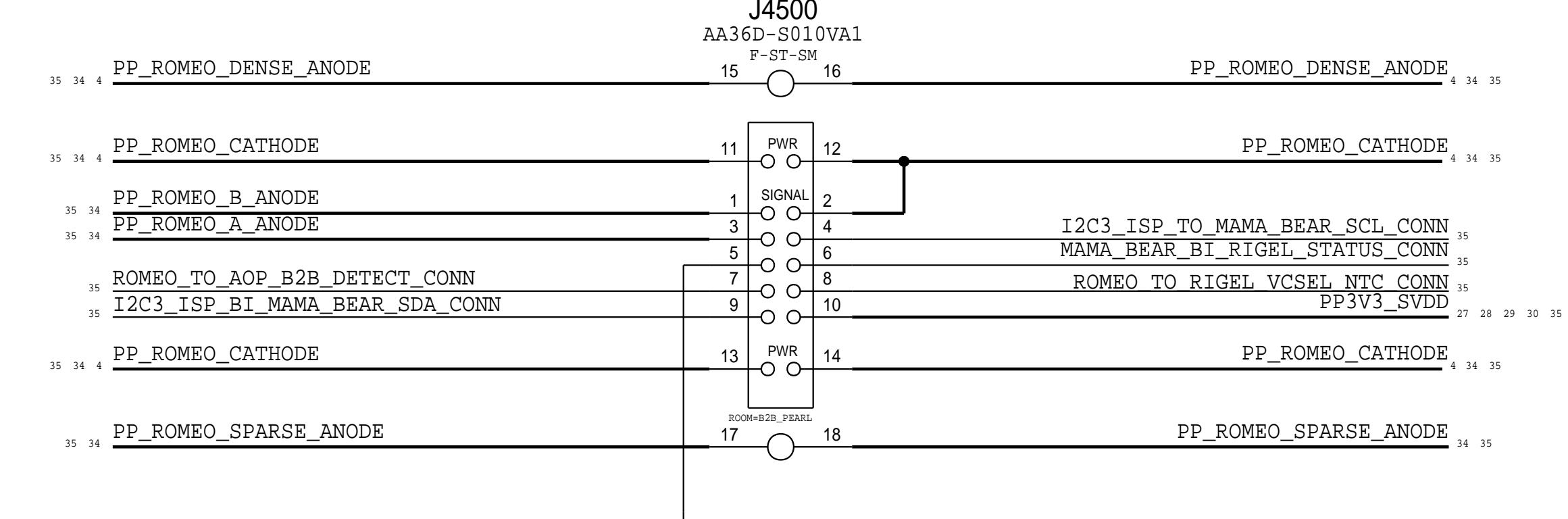


Juliet Power and I/O



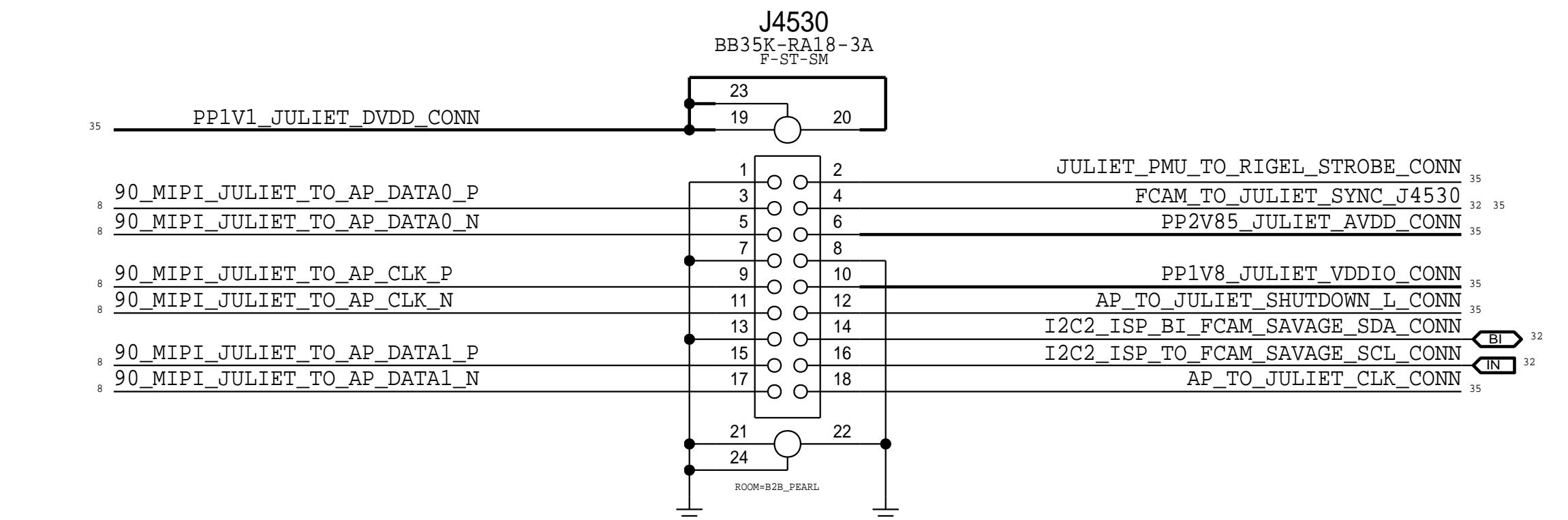
Romeo Connector

Rcpt: 516S00267
Plug: 516S00268
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Juliet Connector

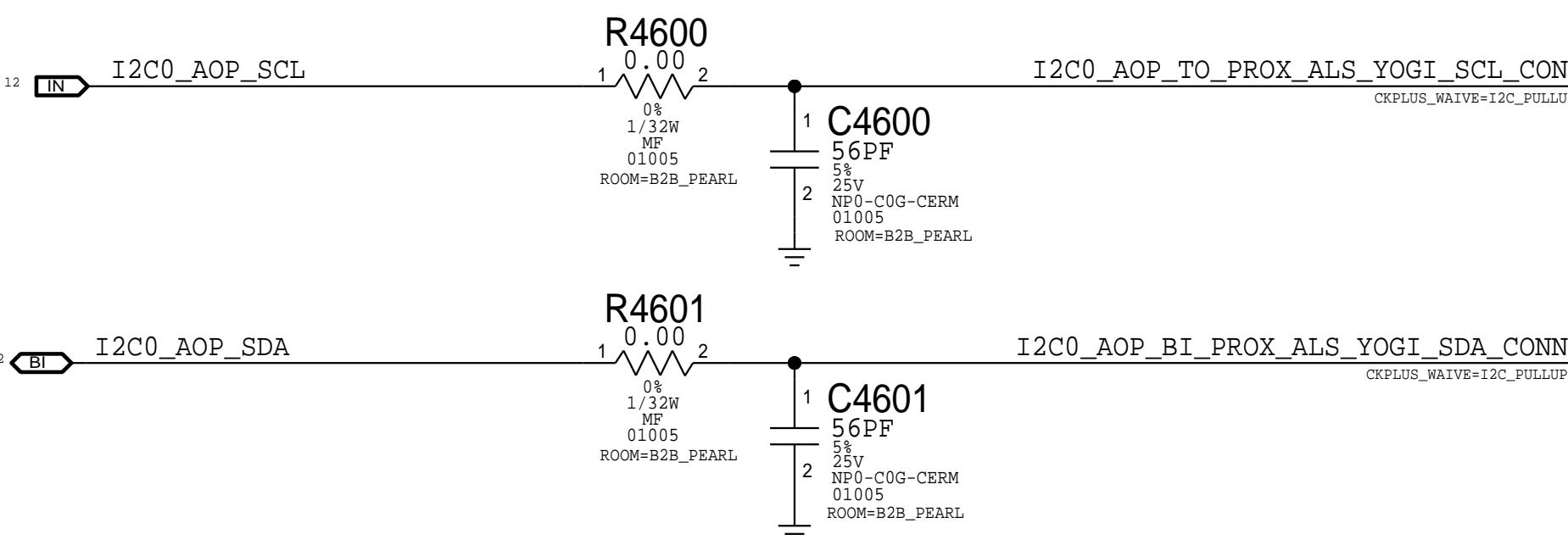
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Plug: 516S00245
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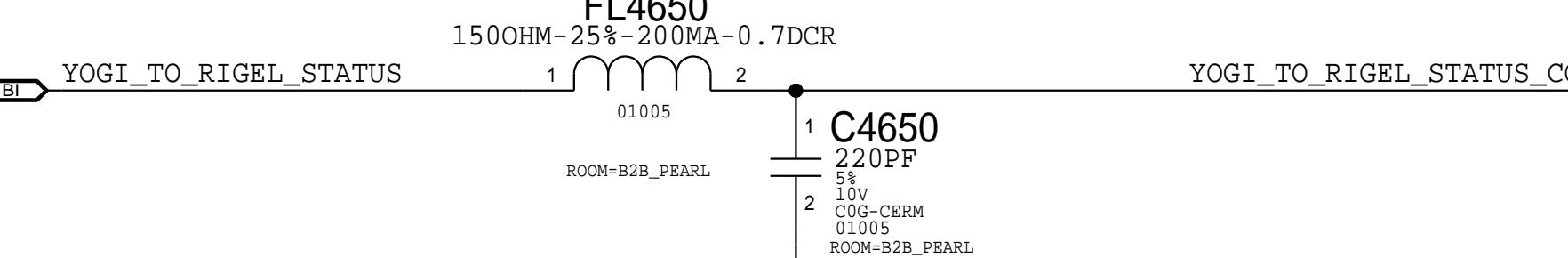
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Apple Inc.	DRAWING NUMBER	SIZE
	051-02221	D
REVISION	9.0.0	
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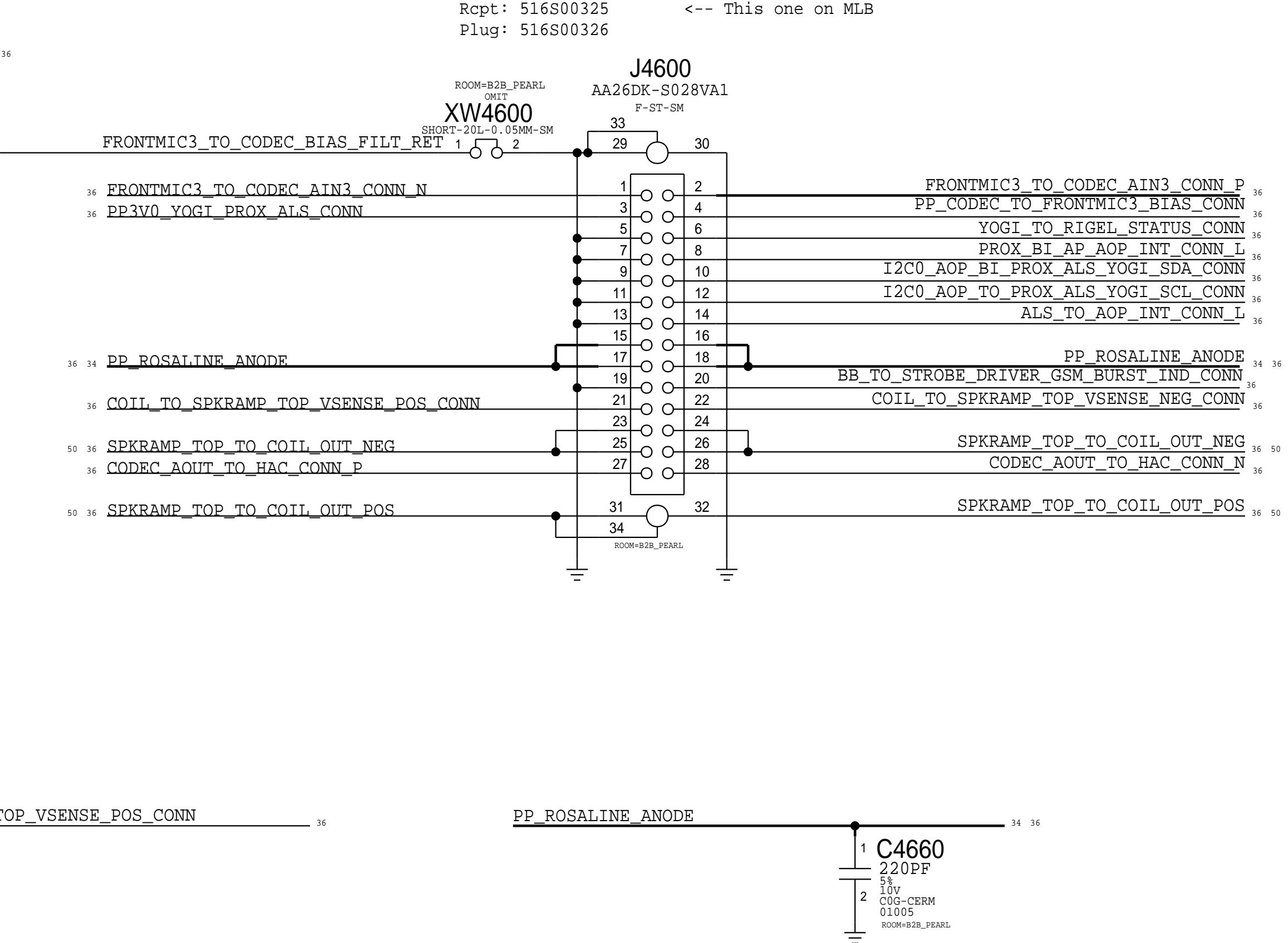
AOP I2C



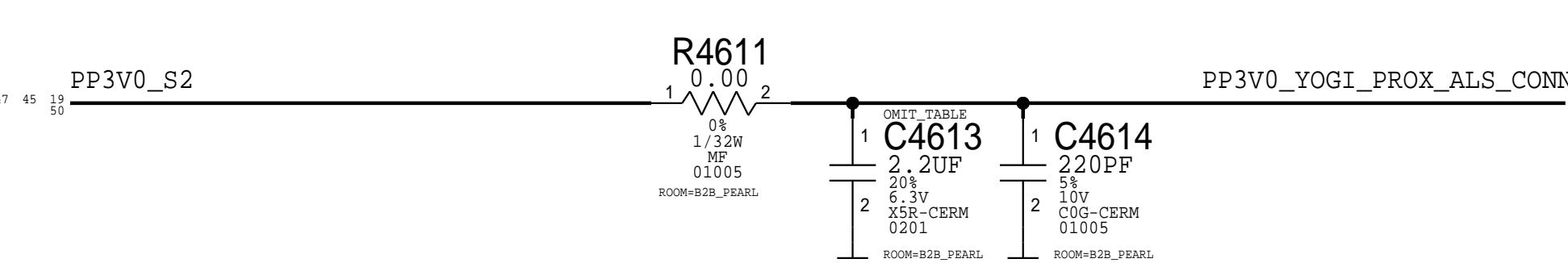
Yogi Signals



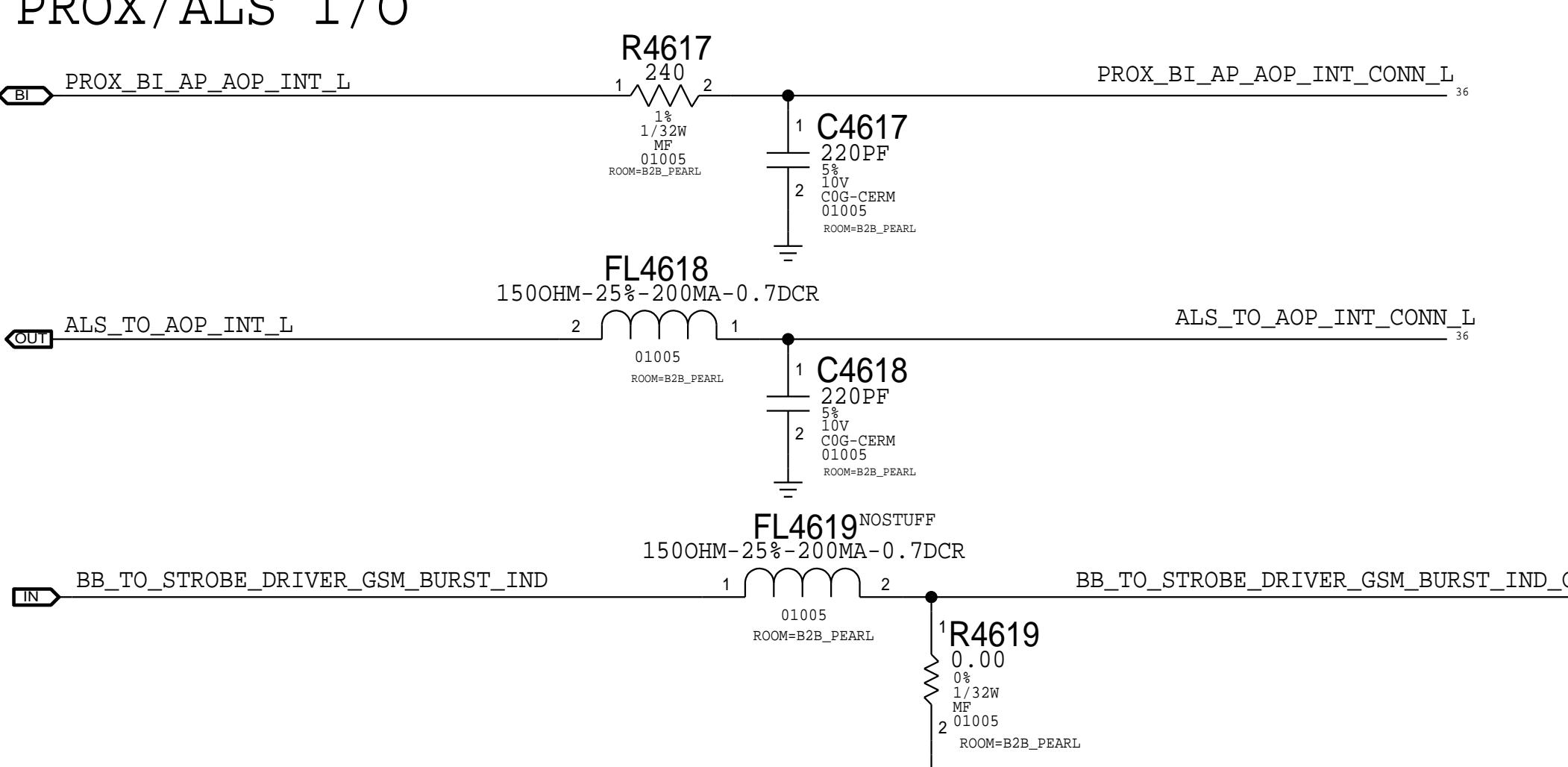
Rosaline + Misc Connector



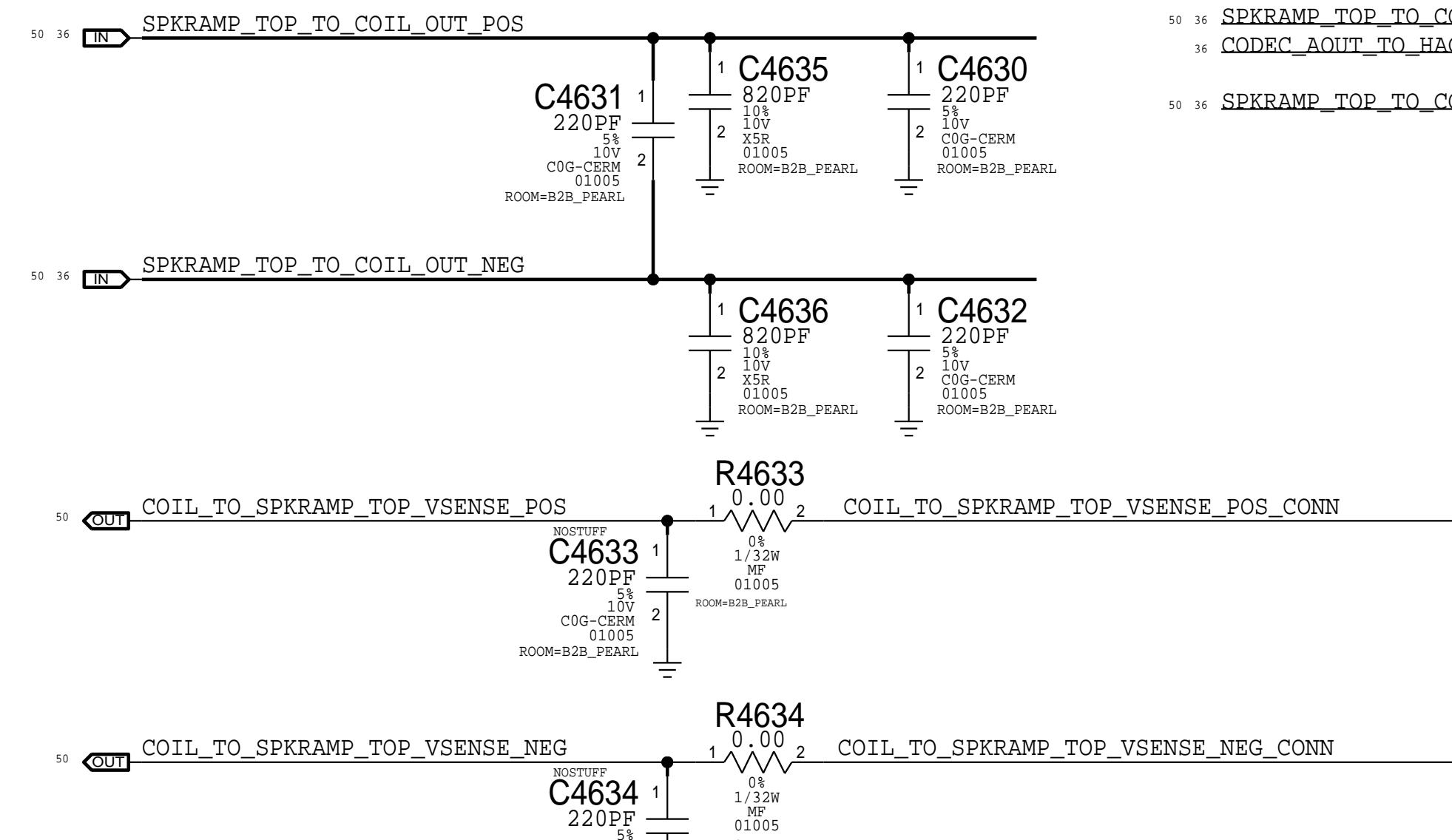
PROX & ALS POWER



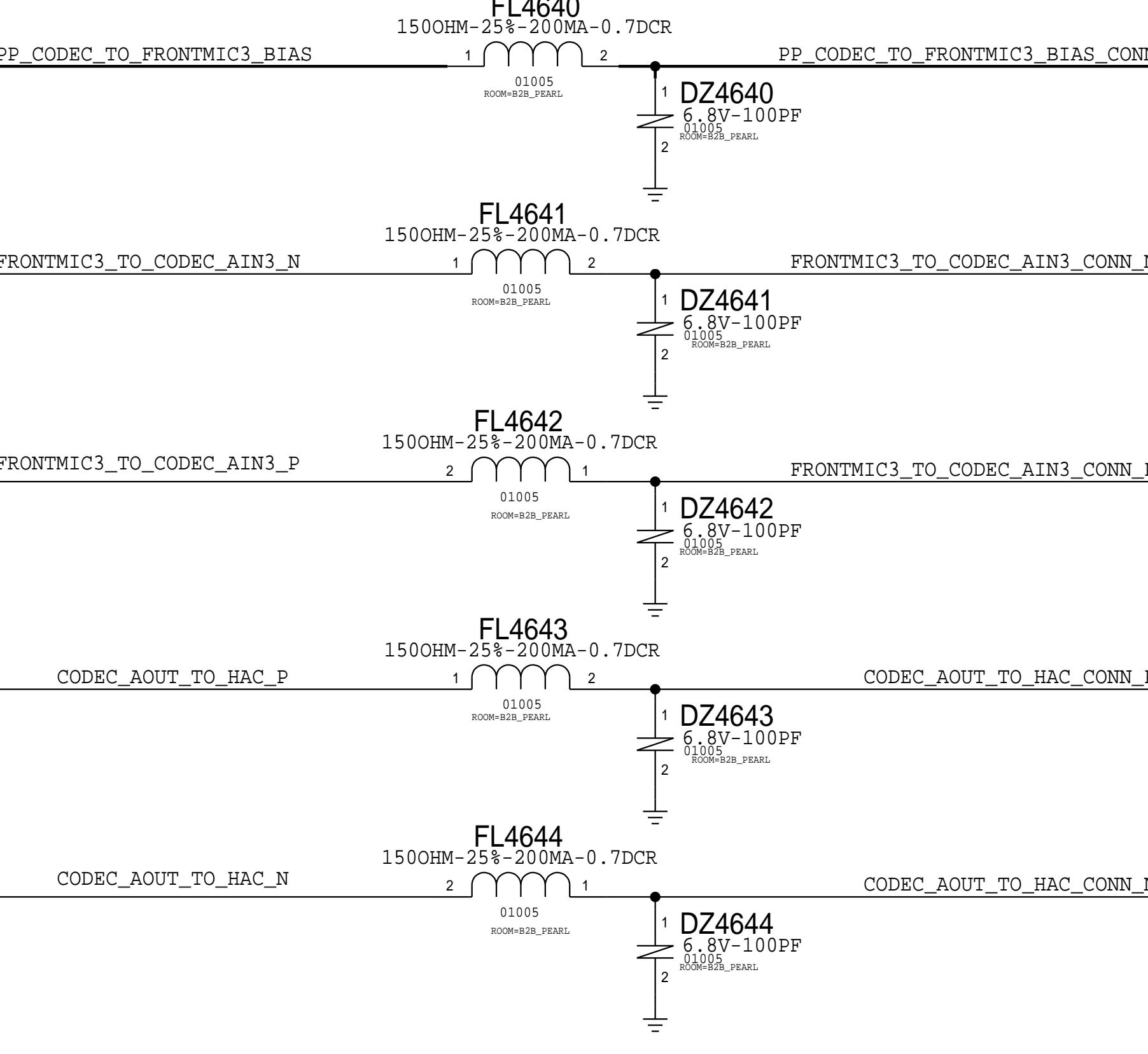
PROX/ALS I/O



SPEAKER2



MIC3



PAGE TITLE	PEARL: B2B Rosaline + Misc	
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CALLAN AUDIO CODEC (ANALOG INPUTS & OUTPUTS)

D

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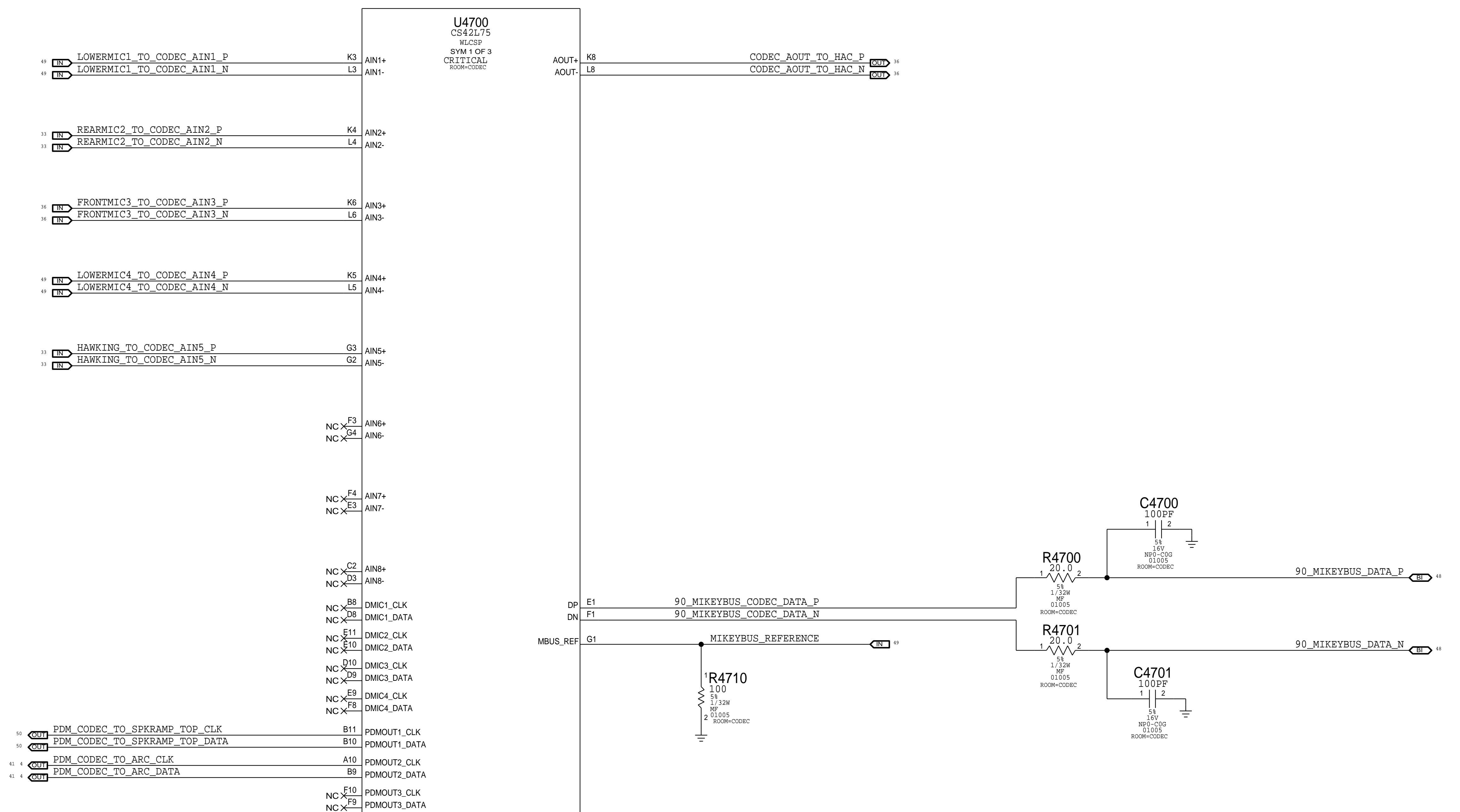
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CALLAN AUDIO CODEC (POWER & I/O)

D

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C

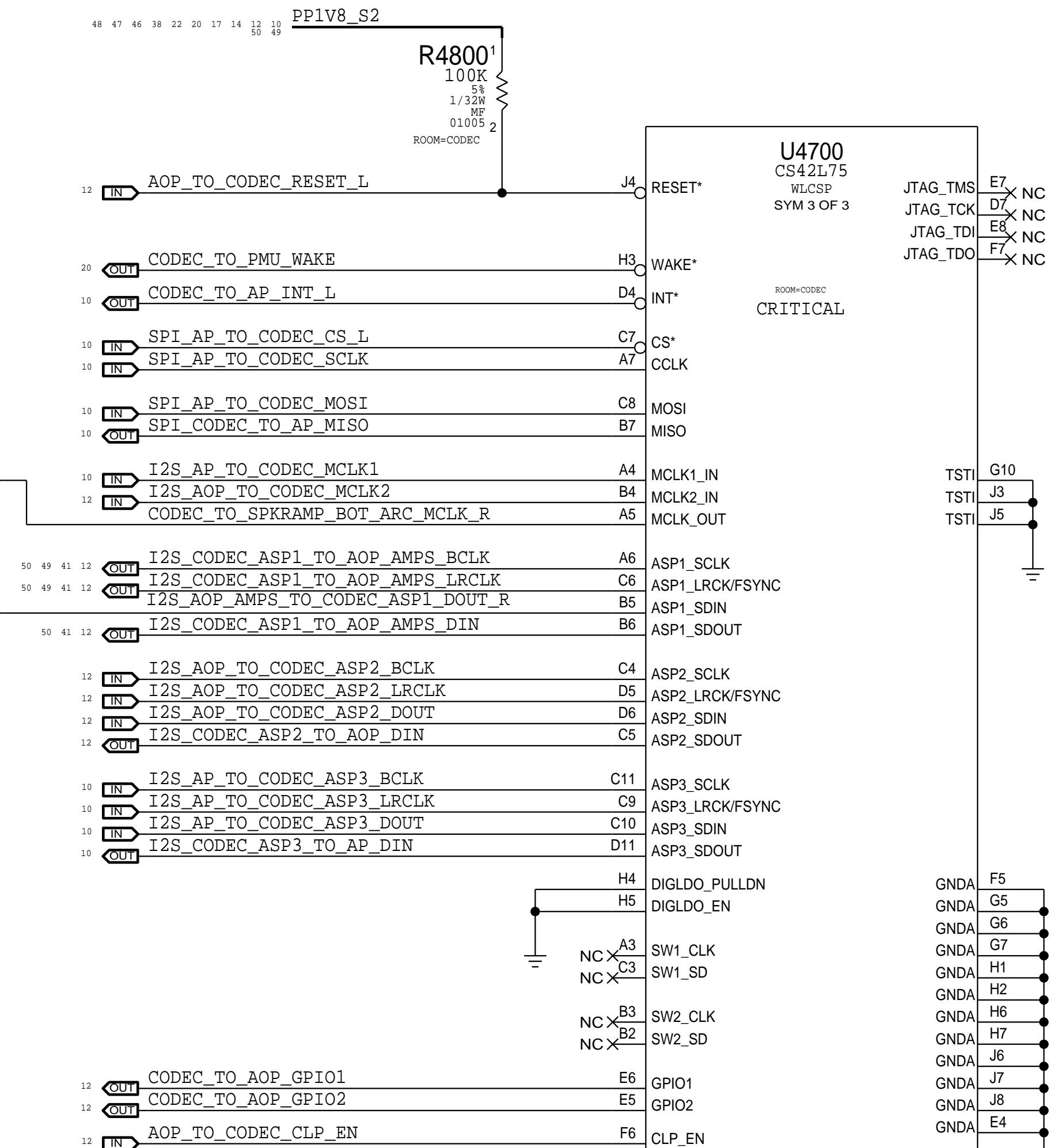
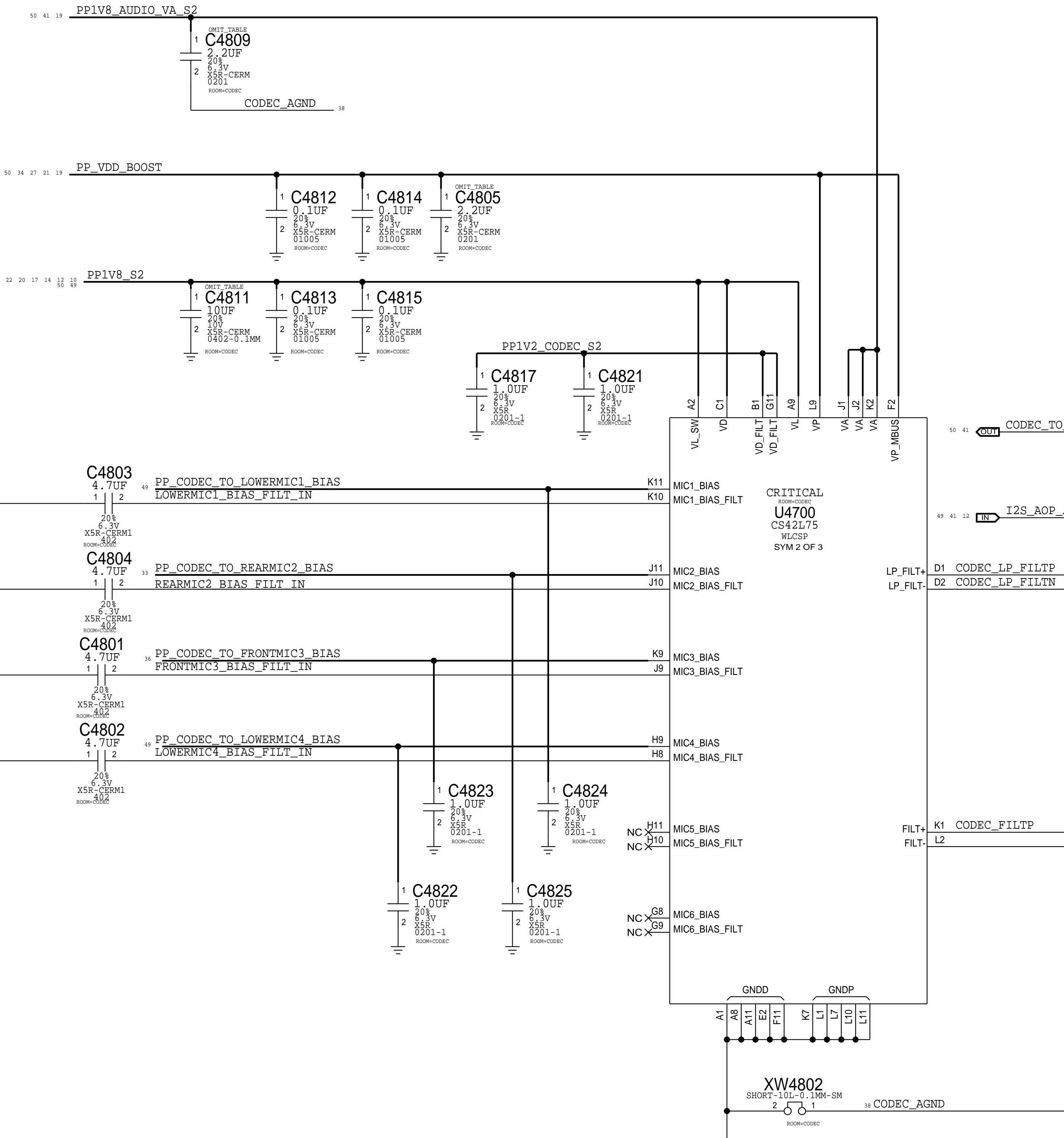
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South Speaker Amplifier on MLB Bottom

PAGE TITLE	AUDIO: Speaker Amp Bottom	
DRAWING NUMBER	051-02221	SIZE D
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North Speaker Amplifier on MLB Bottom

PAGE TITLE		DRAWING NUMBER		SYNC_DATE=08/25/2015
	Apple Inc.	051-02221	D	
REVISION	9.0.0			
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		SHEET	40 OF 51	

Pull Downs

AOP TO SPKRAMP BOT ABC RESET L

10

ARC DRIVER

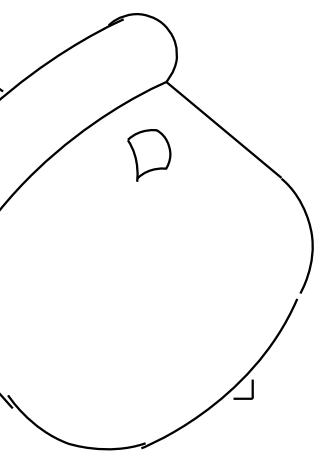
APN: 338S00296
I2C ADDRESS: 1000 001x
0x82

This schematic diagram illustrates the power supply and control circuitry for a speaker system. Key components include:

- Power Supply:** A main power rail (PP_VDD_MAIN) is connected through capacitors C5130, C5131, and C5125. A feedback line from the output stage (U5100) provides regulation.
- Control and Interface:** The U5100 IC (CS35L26C-A1) handles digital audio (I2C, SPI), analog audio (PDM, ADC), and control signals (RESET*, ALIVE/SYNC).
- Filtering and Decoupling:** Numerous capacitors (C5127, C5134, C5126, C5135, C5137, C5124, C5138, C5139, C5128, C5129, C5142, C5136) are used for noise reduction and component decoupling.
- Output Stage:** The U5101 IC (CS35L26C-A2) drives the speaker load, with its output connected to the speaker terminals.

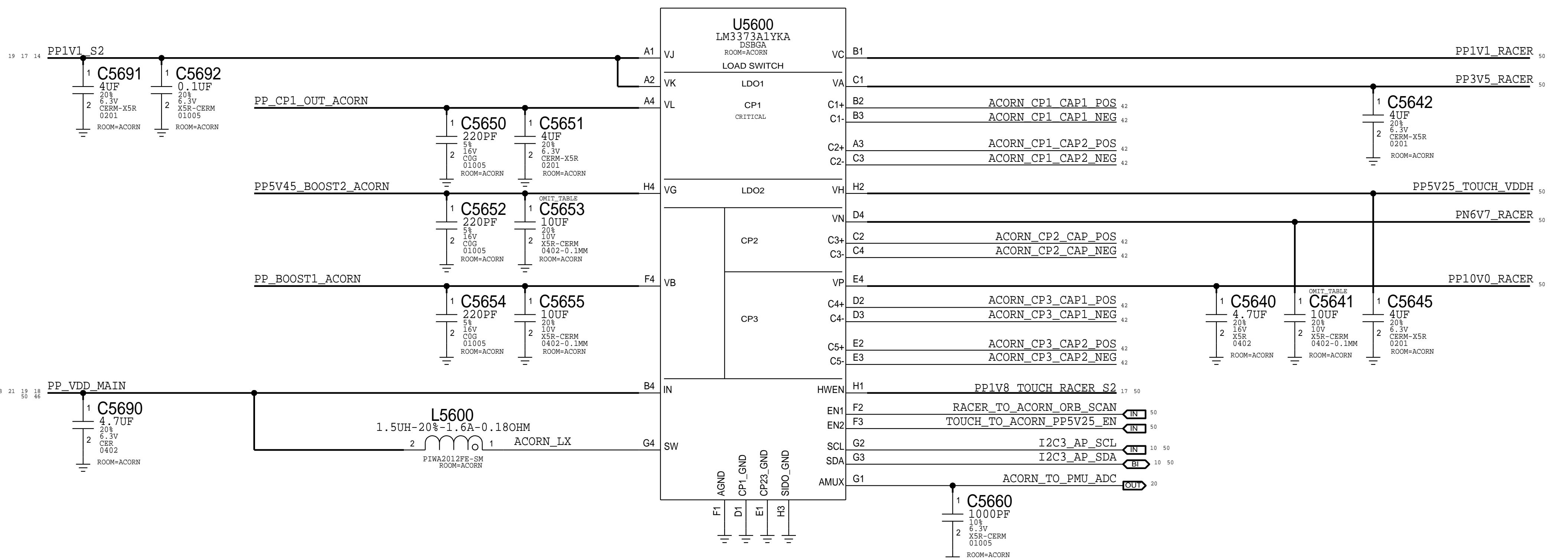
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Acorn PMU

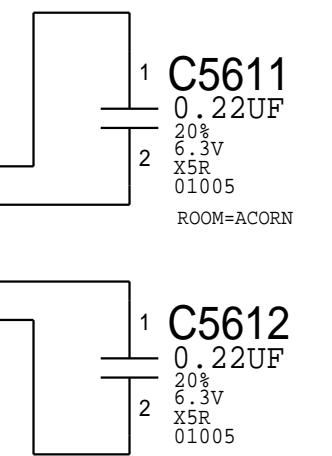


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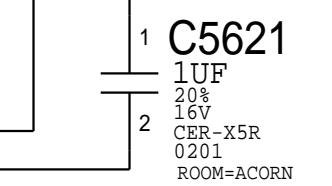
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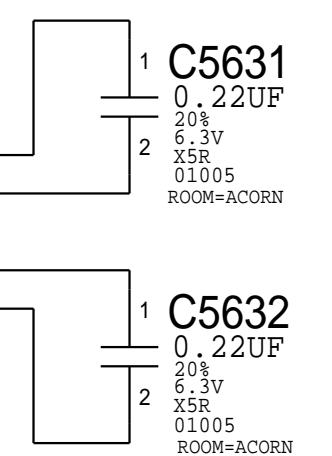
Charge Pump 1 Caps



Charge Pump 2 Caps

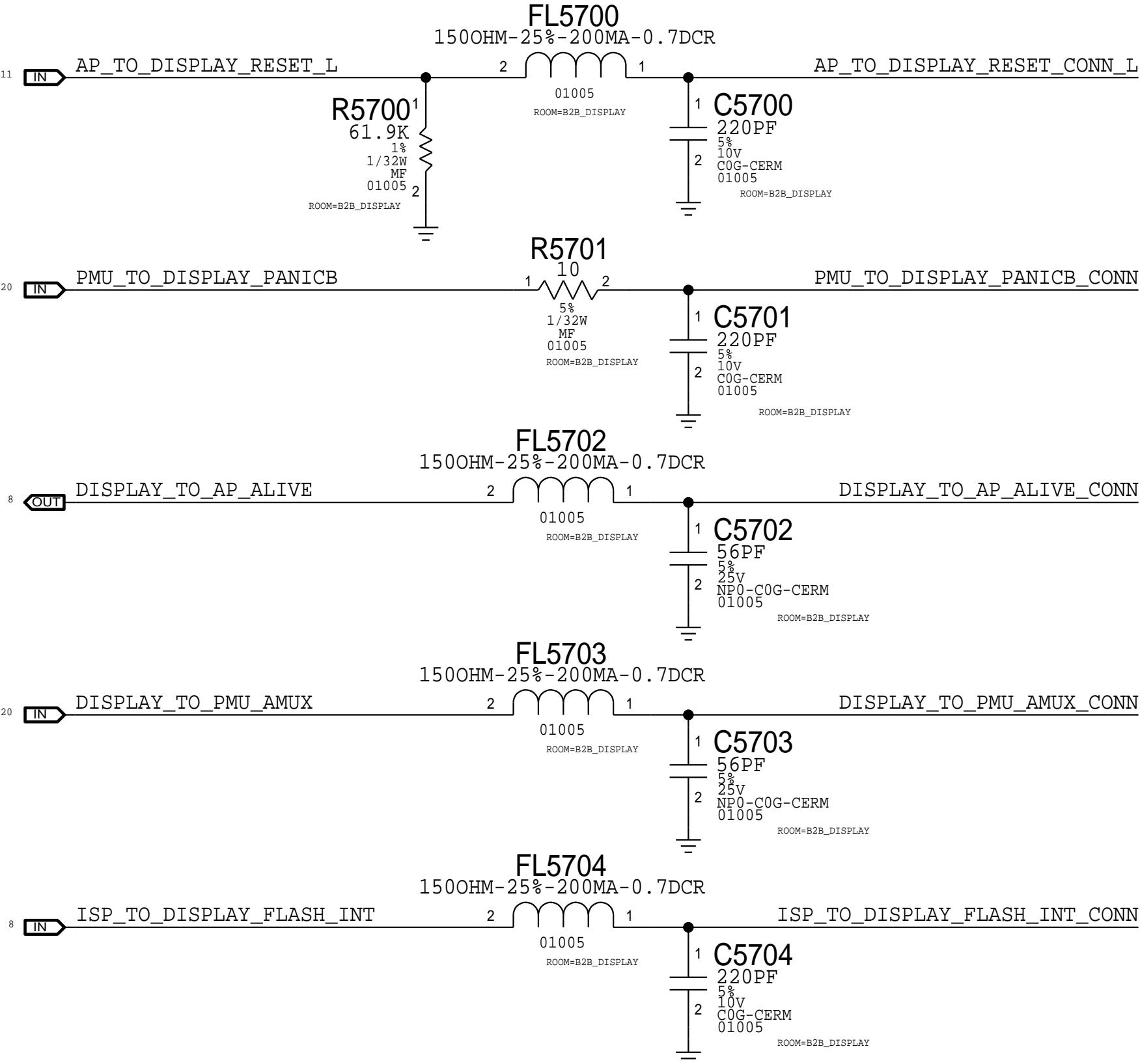


Charge Pump 3 Caps



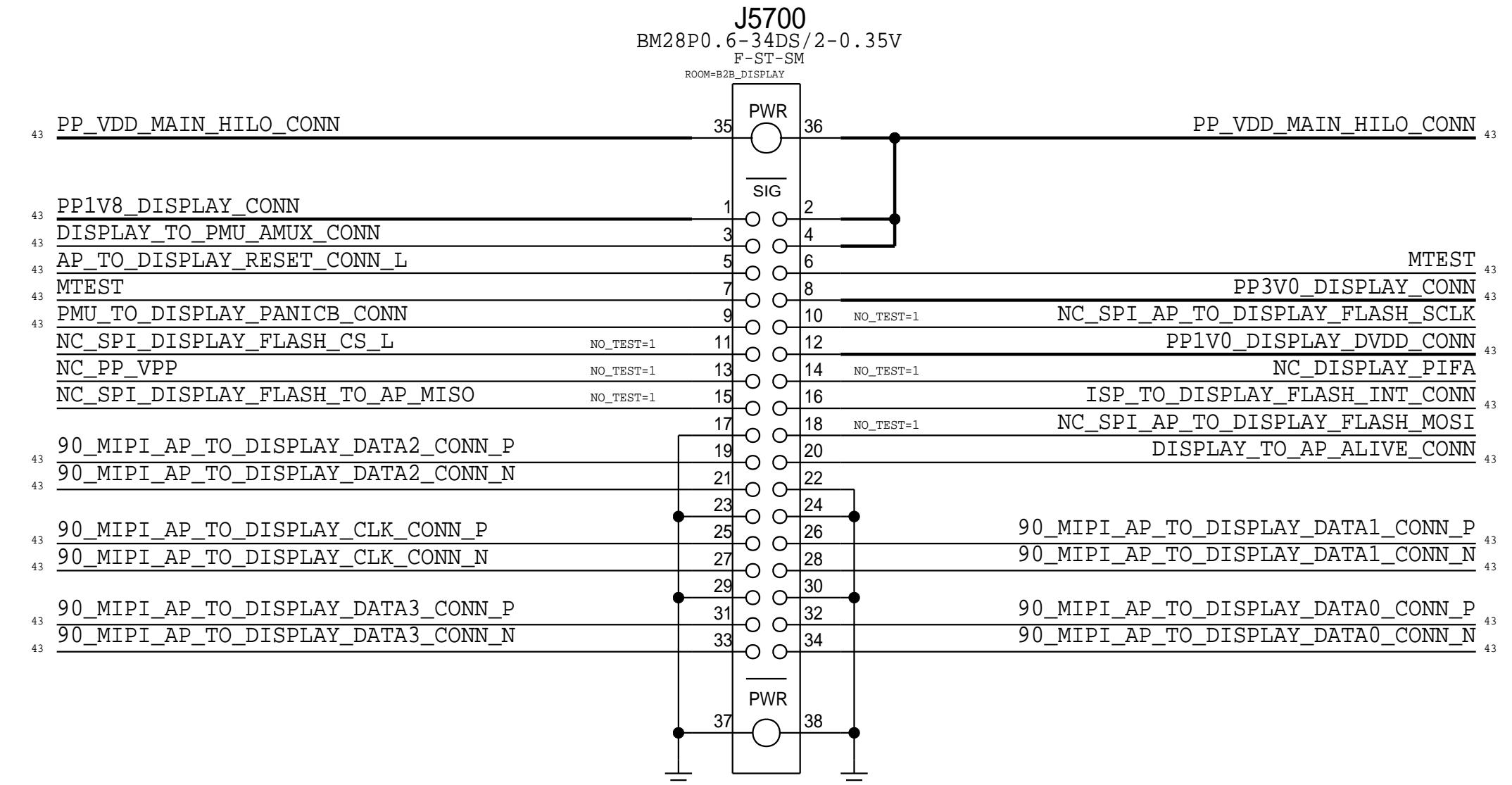
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Display Control Signals

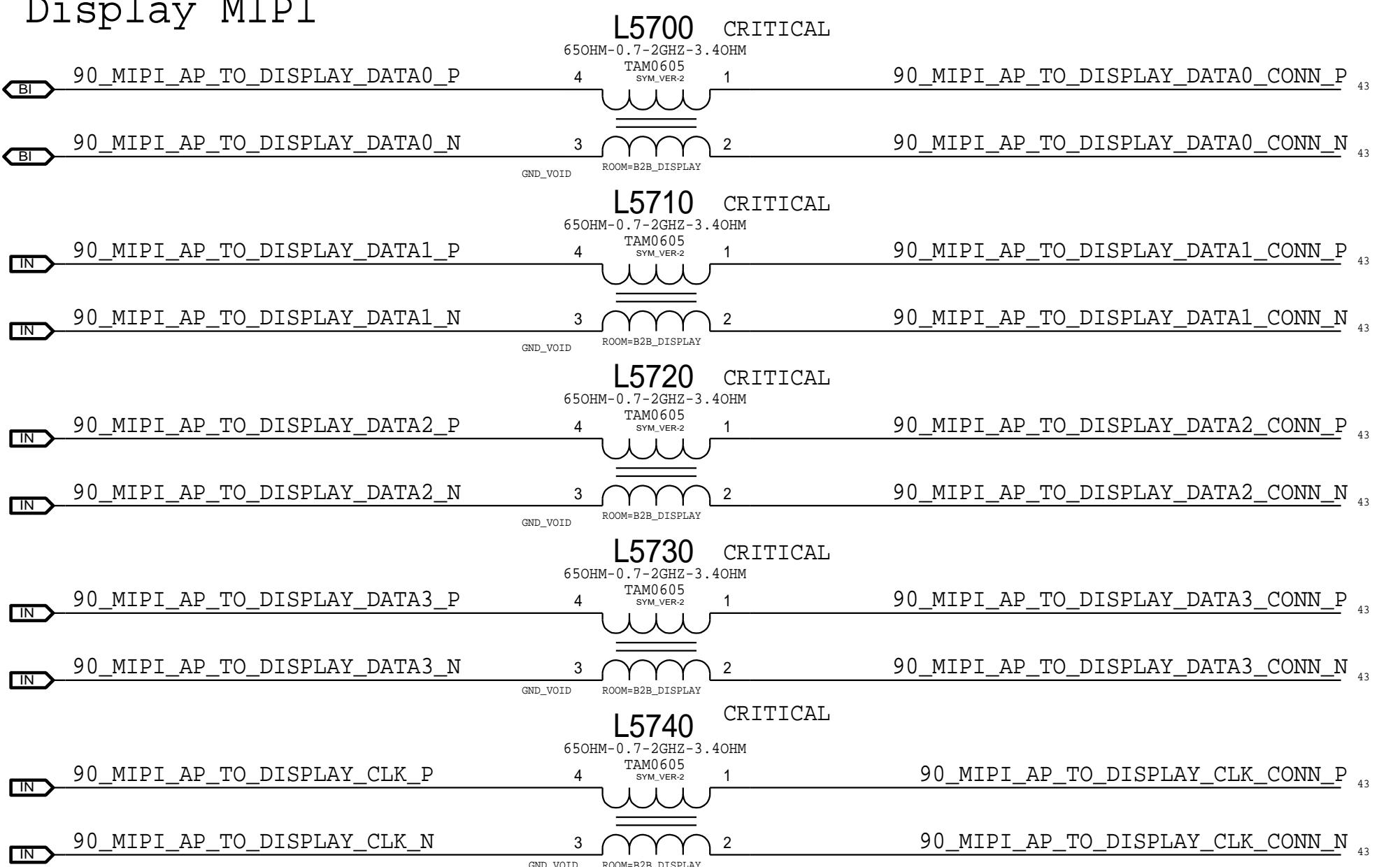


Display Flex Connector

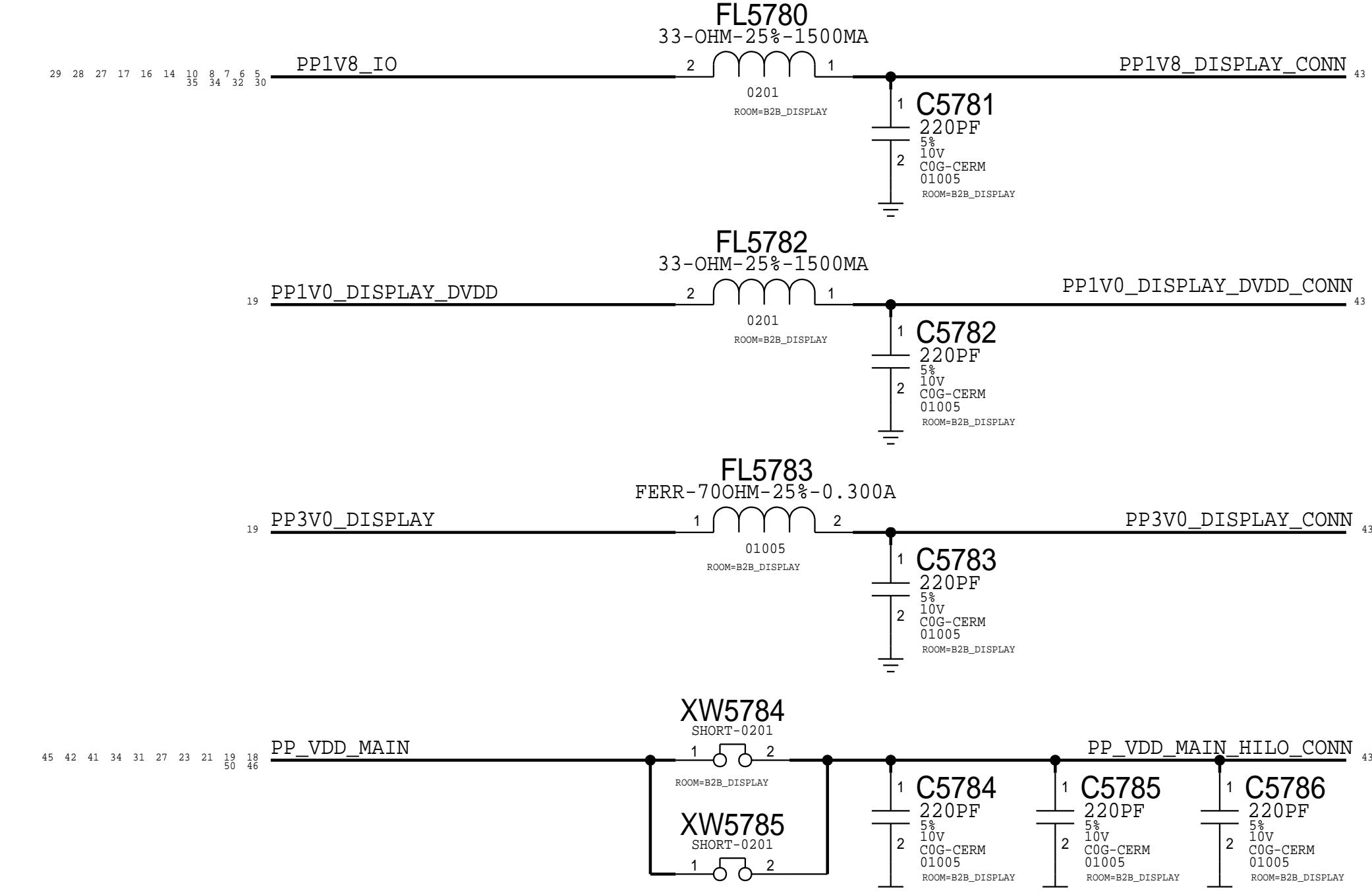
Rcpt: 516S00210 --- This one on MLB
Plug: 516S00211



Display MIPI



Display Power



PAGE TITLE	Apple Inc.	DRAWING NUMBER
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D

D

C

C

B

B

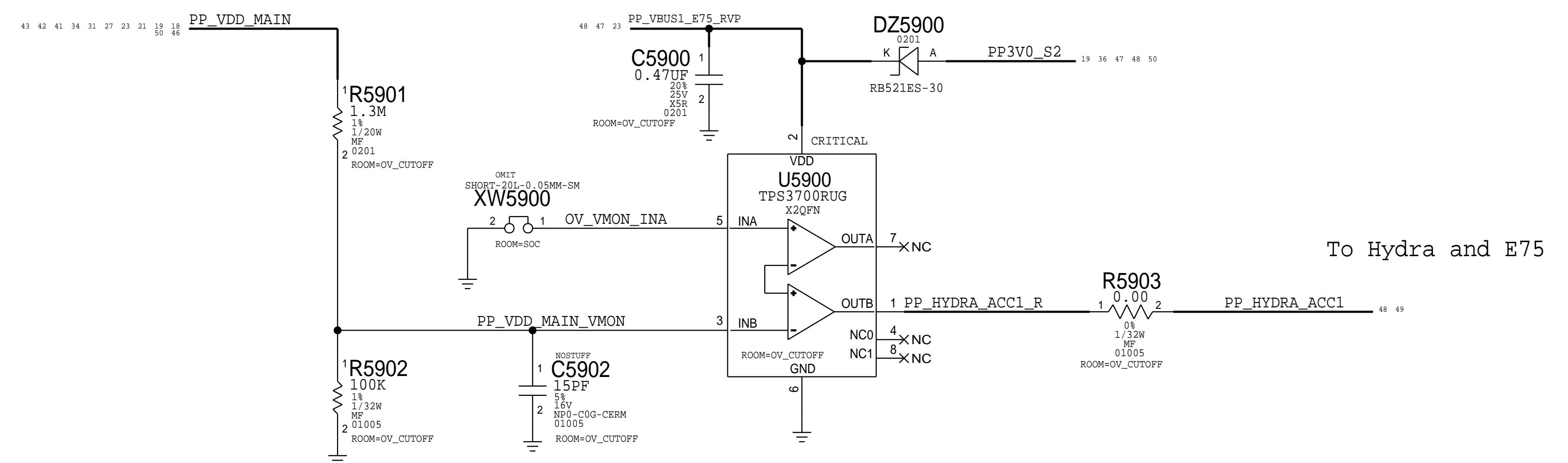
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Orb + Touch Connector on MLB Bottom

PAGE TITLE	CG: B2B Orb & Touch		
DRAWING NUMBER	051-02221	SIZE	D
Apple Inc.	 Apple Inc.		
REVISION	9.0.0		
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PAGE	58 OF 80		
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VDD_MAIN OV CUT-OFF CIRCUIT



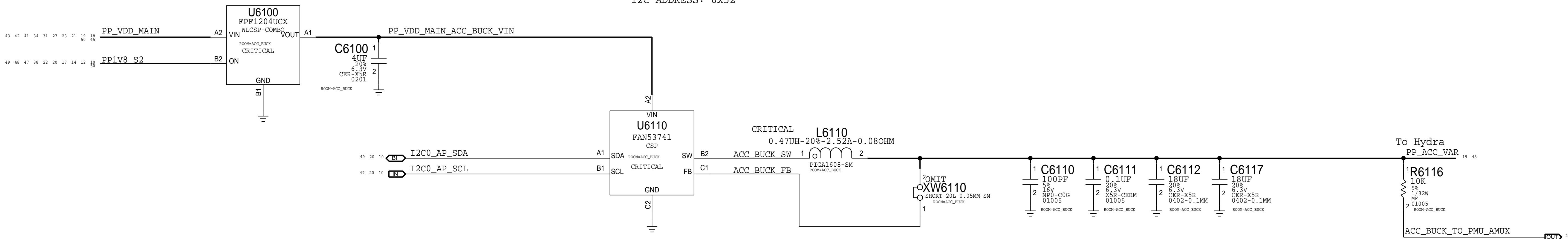
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Apple Inc.	DRAWING NUMBER 051-02221	SIZE D
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ACCESSORY BUCK

I2C ADDRESS: 0x52



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PAGE TITLE	I/O: Accessory Buck	
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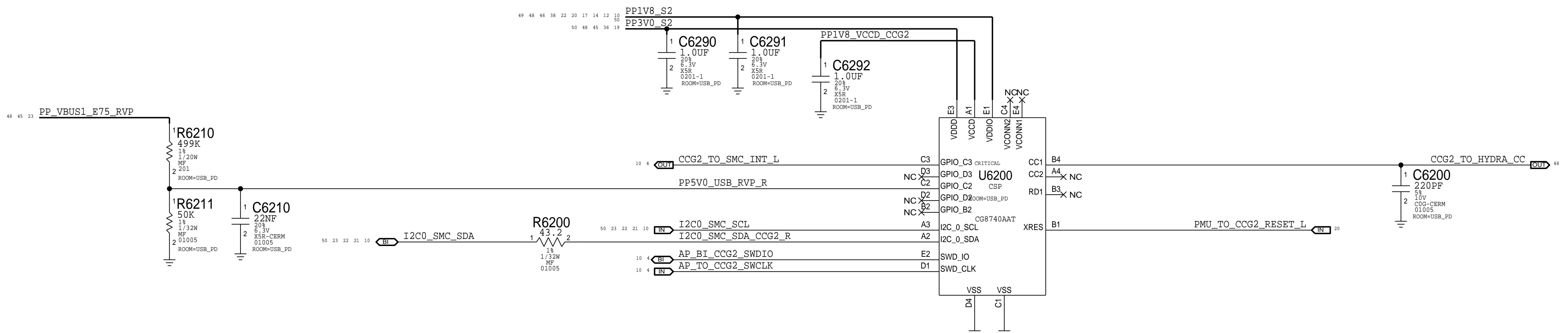
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USB-PD



PAGE TITLE	I/O: USB PD	
	Apple Inc.	DRAWING NUMBER 051-02221 SIZE D
REVISION 9.0.0		
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		SHEET 47 OF 51

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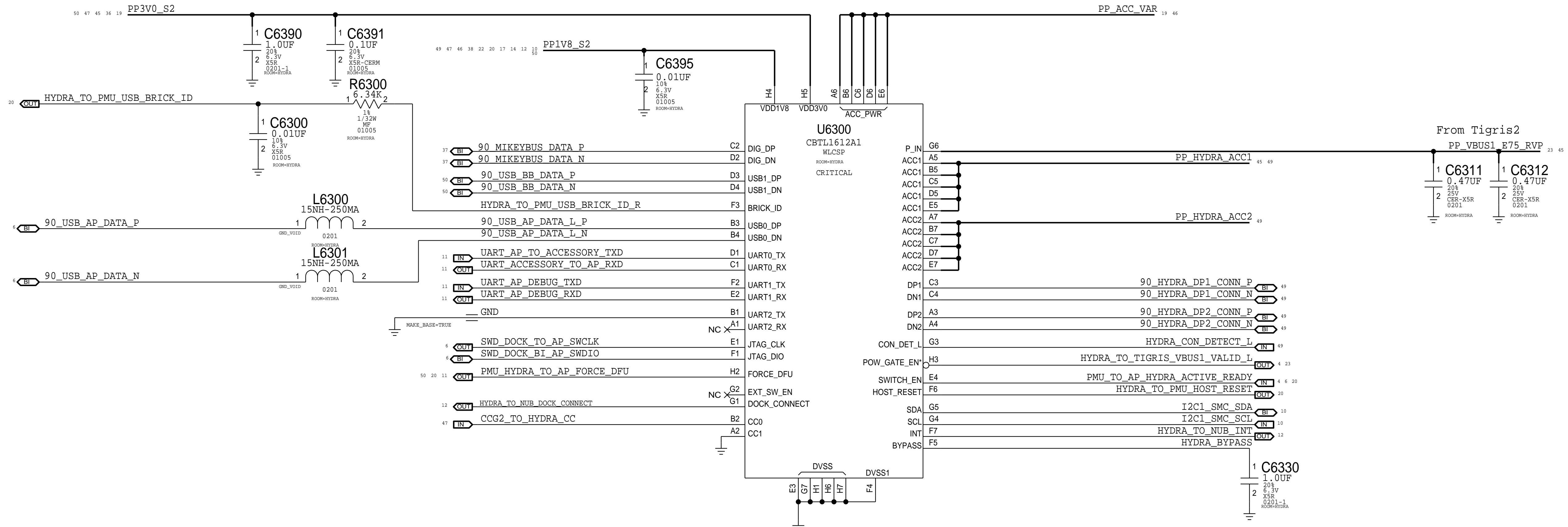
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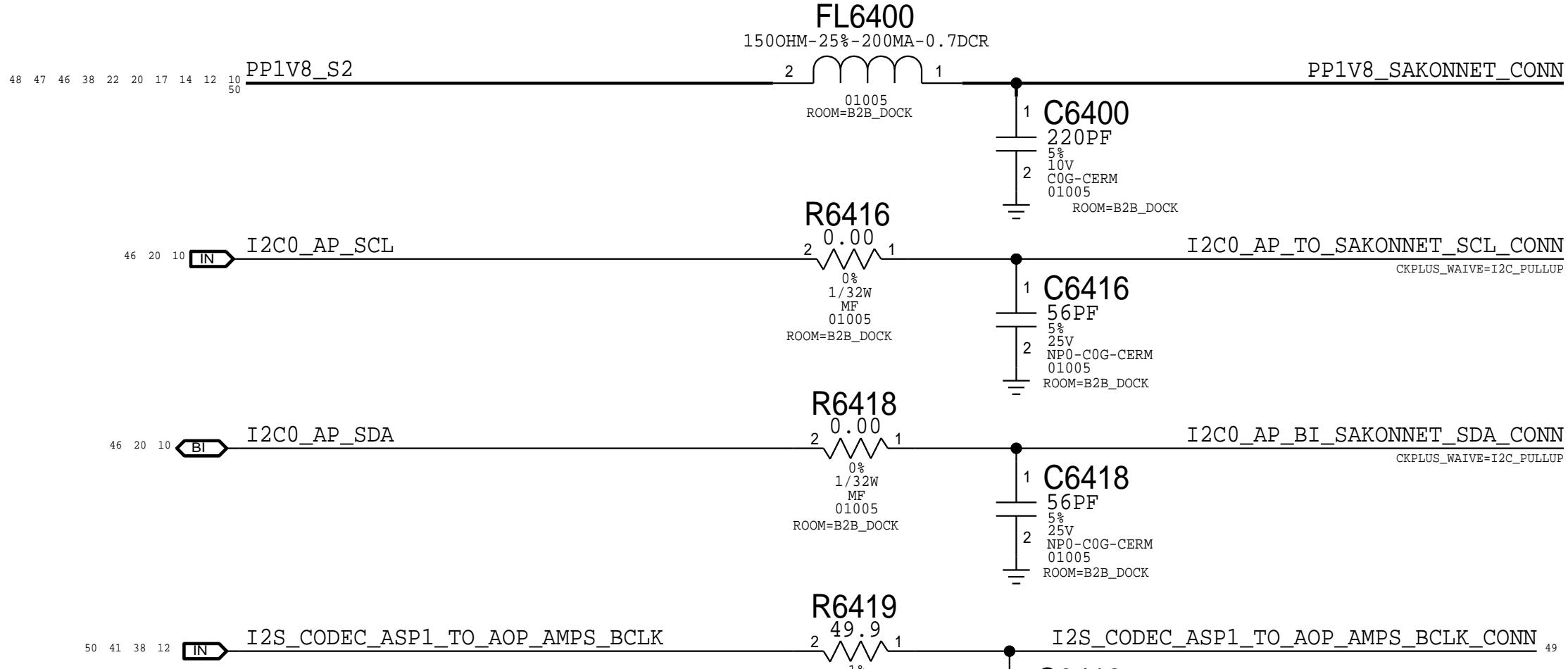
Hydra

I2C Address: 0011010X

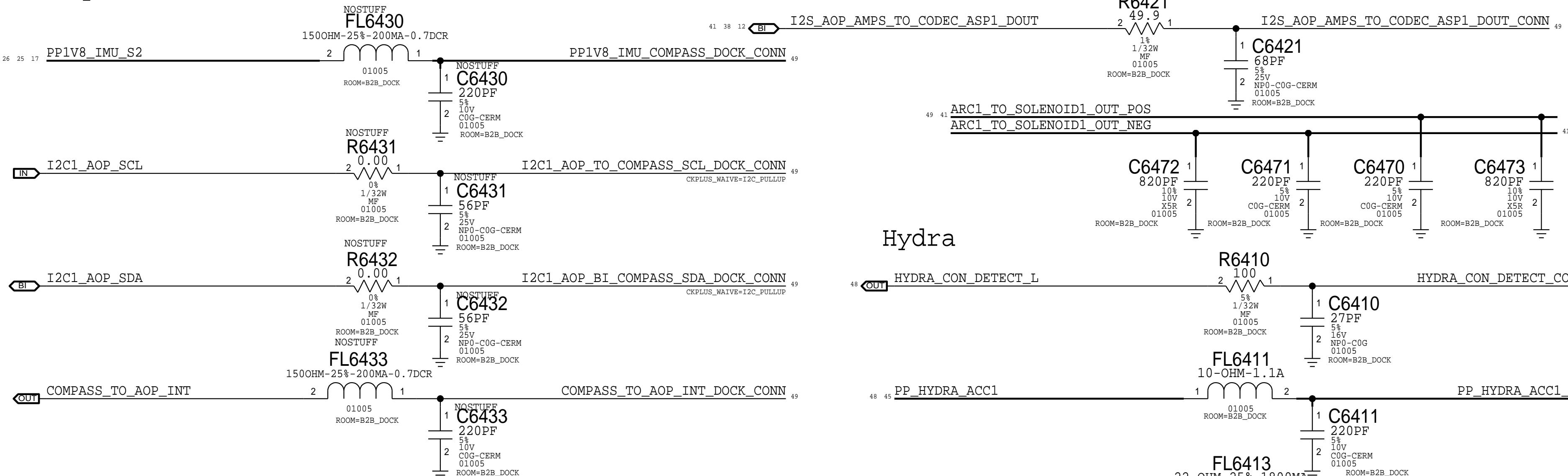


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Apple Inc.	DRAWING NUMBER 051-02221	SIZE D
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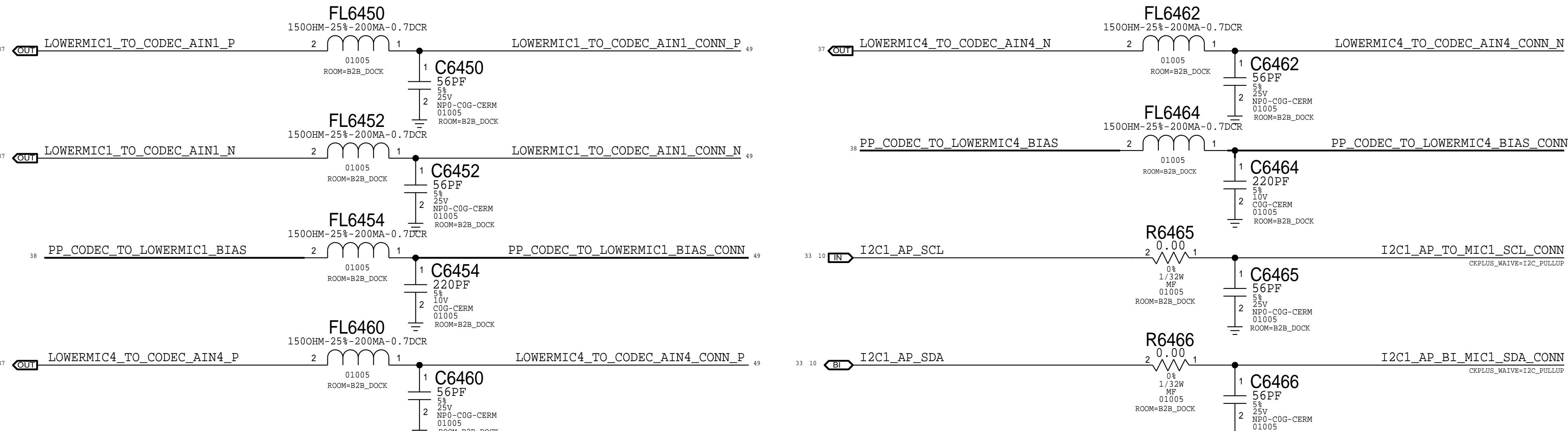
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Compass (Dock Flex Location)

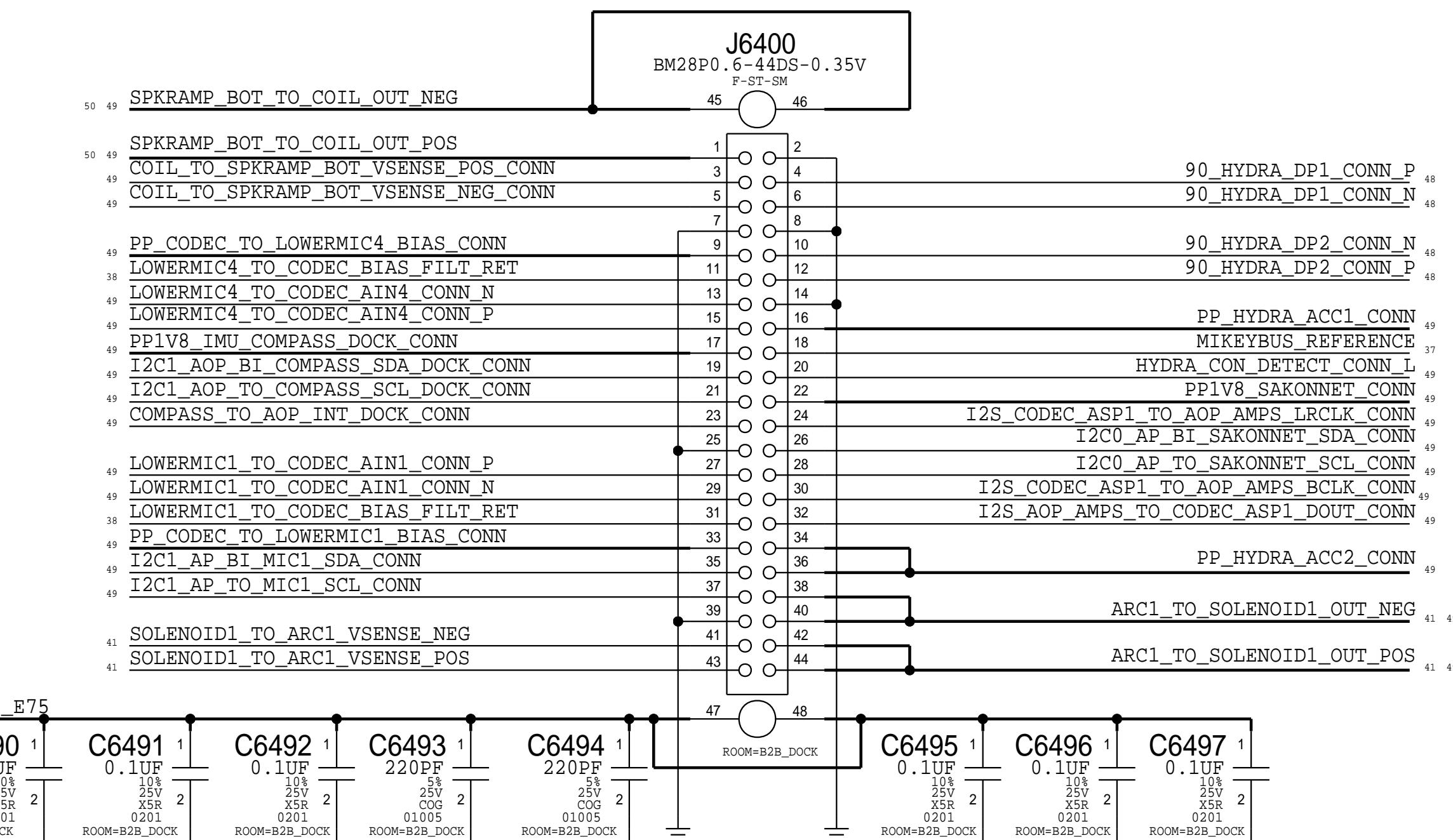


LOWER MIC1 + LOWER MIC4

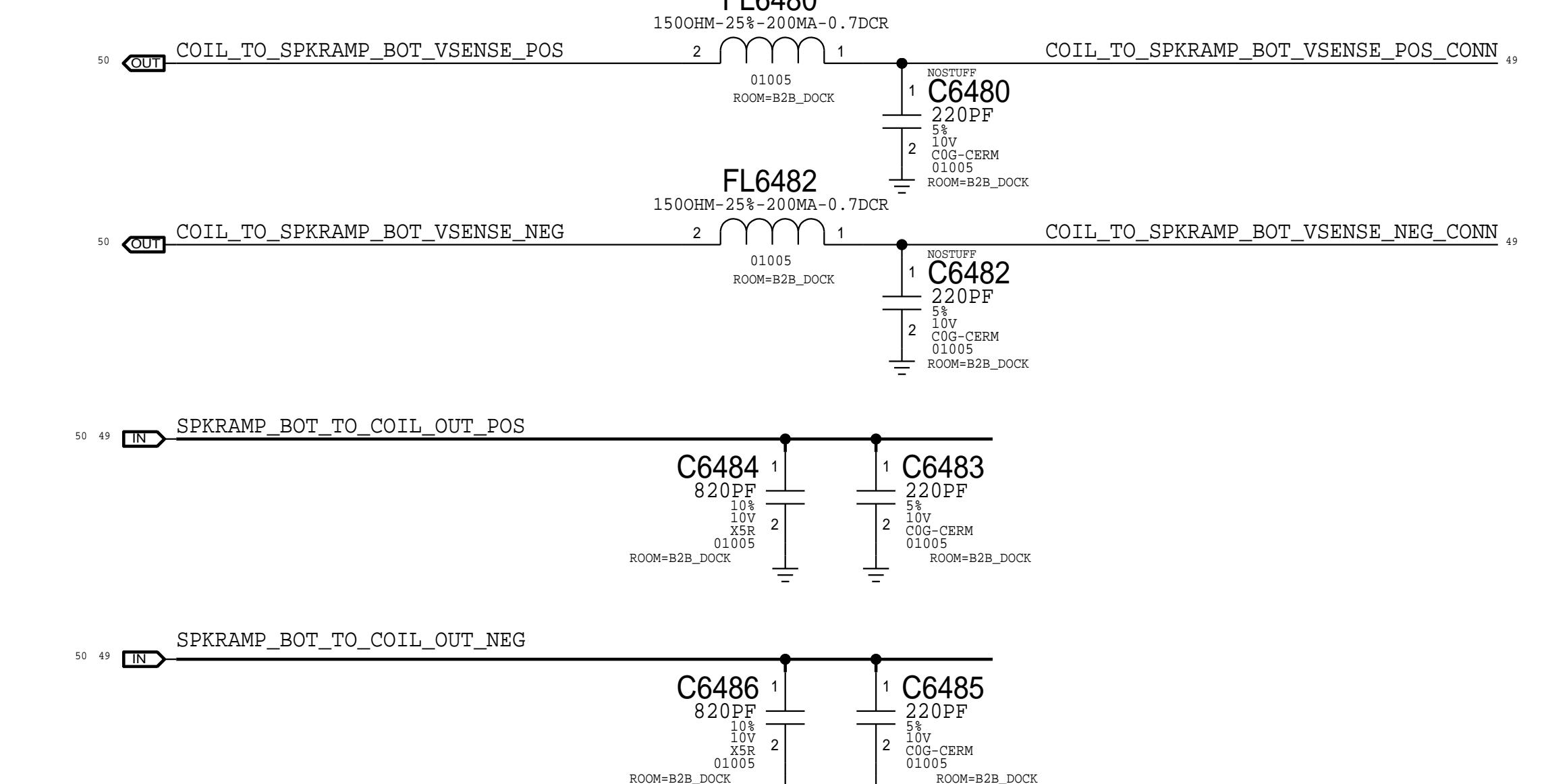


DOCK FLEX CONNECTOR

Rcpt: 516S00038 <-- This one on MLB
Plug: 516S00037



SOUTH SPEAKER



PAGE TITLE	I/O: B2B Dock	
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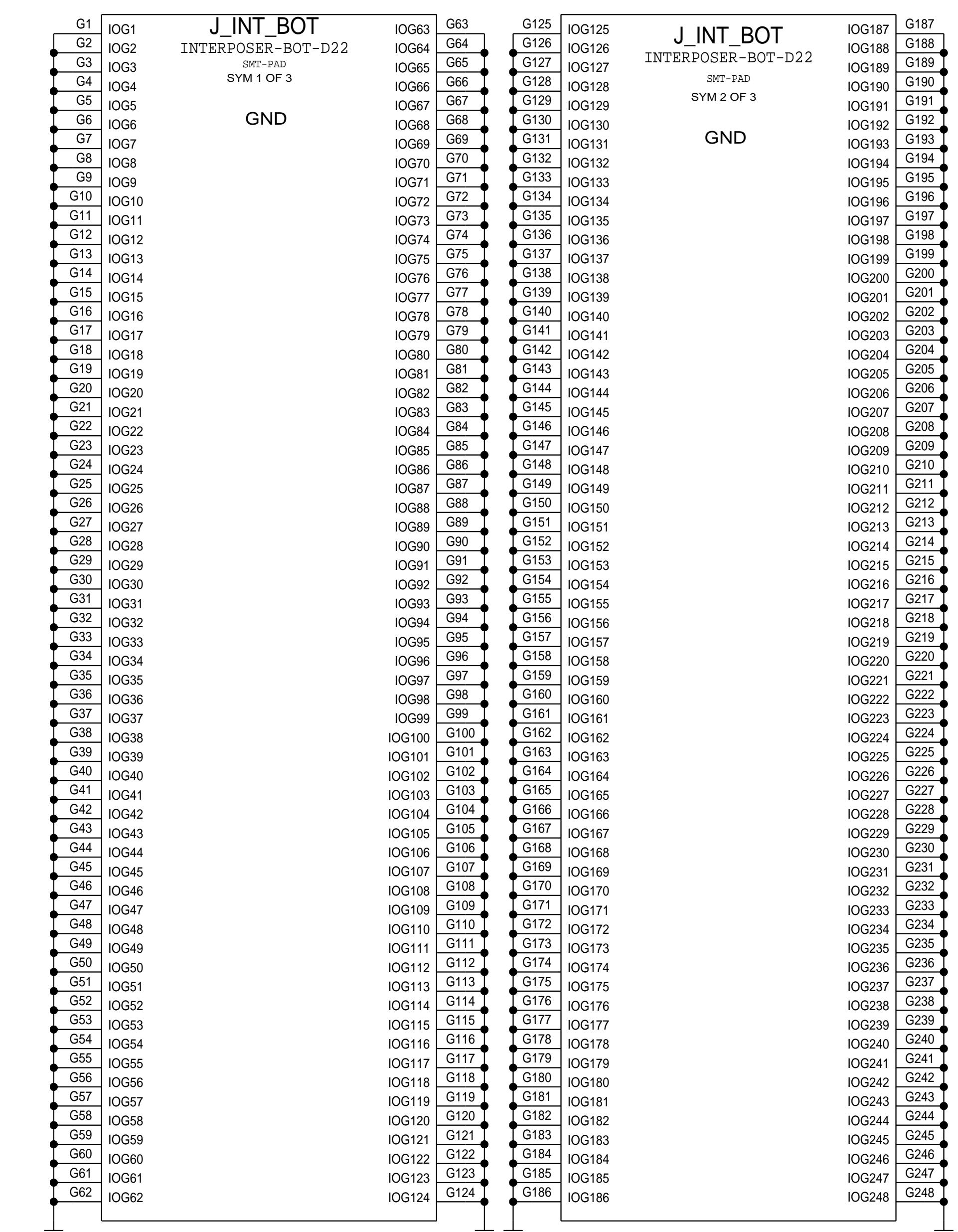
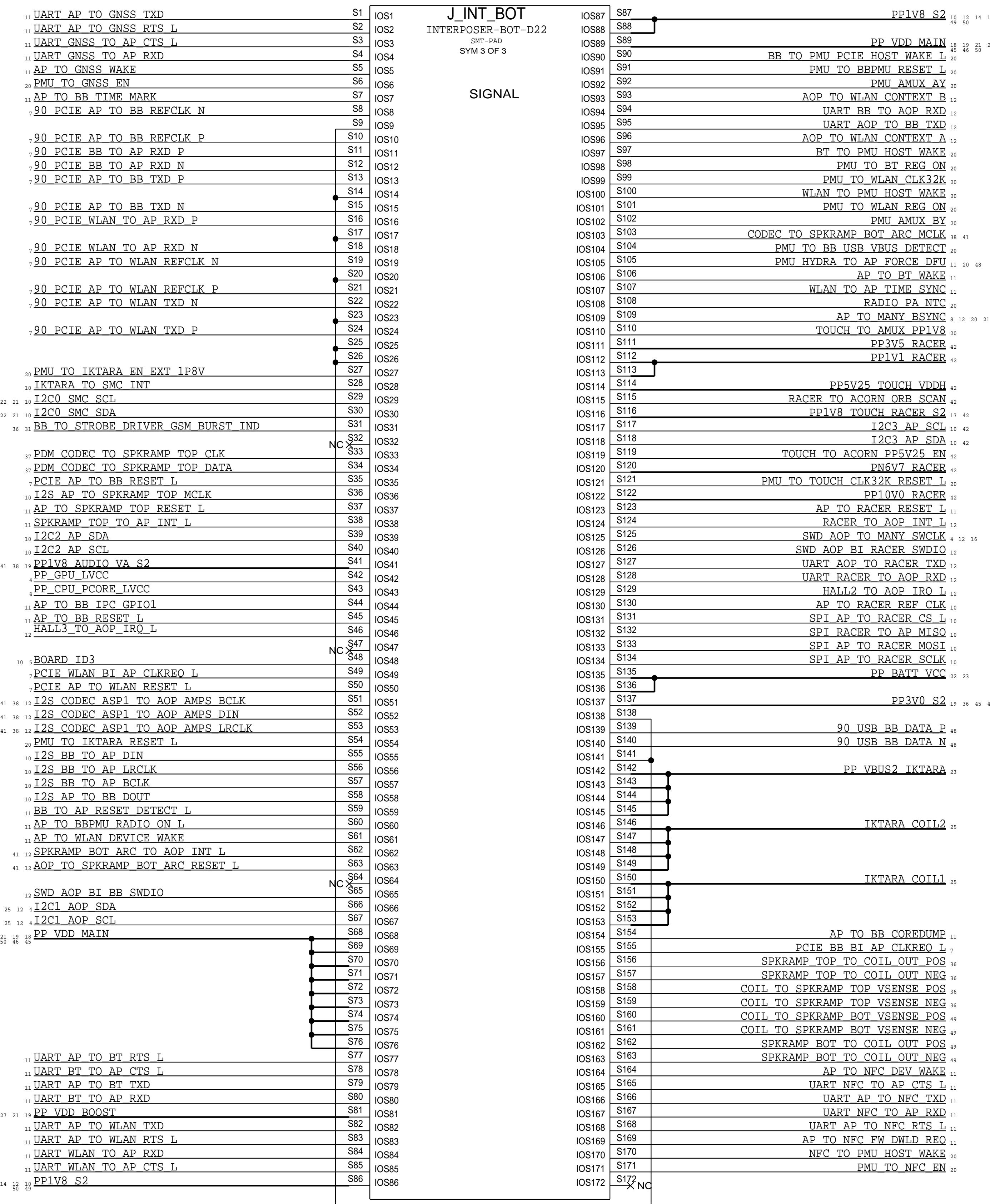
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PAGE TITLE		DRAWING NUMBER	
I/O: Interposer (Bottom)		051-02221	
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Radios on MLB Bottom

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		SHEET	51 OF 51

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
7	0008448938	ENGINEERING RELEASED	DATE 2017-04-11

X893 MLB Bottom: EVT

LAST_MODIFICATION=Tue Apr 11 16:10:11 2011

PAGE	CSA	CONTENTS	SYNC	DATE
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3	4	SYSTEM: Mechanical Components		12/01/2016
4	6	BOOTSTRAPPING		11/03/2016
5	7	SYSTEM: Testpoints (Bottom)	test_mlb	01/17/2017
6	34	SYSTEM POWER: Iktara	mlb_bot	04/04/2017
7	49	AUDIO: Speaker Amp Bottom	mlb_bot	04/04/2017
8	50	AUDIO: Speaker Amp Top	mlb_bot	04/04/2017
9	55	HALL EFFECT	mlb_bot	04/04/2017
10	58	CG: B2B Luna & Touch	mlb_bot	04/04/2017
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12	80	RADIOS		07/29/2016
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22	10	PRIMARY RECEIVE		
23	11	LOWER ANTENNA & COUPLERS		
24	12	DIVERSITY RECEIVE ASM'S		
25	13	DIVERSITY RECEIVE LNA'S		
26	14	UPPER ANTENNA FEEDS		
27	15	GNSS		
28	16	TEST POINTS & SIM		
29	17	RF CONNECTORS AND MC		
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31	4	Guinness	WIFI	01/30/2014
32	5	WiFiANTFeeds		
33	1	page1		
34	75	NFC		

PAGE CSA CONTENTS

SYNC

DATE

Sub Designs

SOURCE PROJECT	SUB-DESIGN NAME	VERSION	HARD/ SOFT	SYNC_DATE/TIME
D221	RADIO_MLB	0.115.0	S	2017_04_05_18:48:43
D22	NFC_MLB	0.22.0	S	2017_03_22_22:11:23
D22	WIFI_MLB	0.20.0	S	2017_04_04_09:54:33

TABLE OF CONTENTS		SYNC_DATE=07/29/2016
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SCH , MLB , BOT , X893		
 Apple Inc.	DRAWING NUMBER	051-02247
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BOM: 639-03229
MCO: 056-04080

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
051-02247	1	SCH,MLB_BOT,X893	SCH	NO	COMMON
820-00869	1	PCB,MLB_BOT,X893	PCB	NO	COMMON

EEEE Codes

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
825-7691	1	EEEE FOR (MLB_BOT, 639-03229)	EEEE_HM07	NO	COMMON

Global Capacitors

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00148	138S00149	BOM_TABLE_ALTS	ALL	0402-3T,10.5uF@1V, Kyocera
138S00150	138S00149	BOM_TABLE_ALTS	ALL	0402-3T,10.5uF@1V, SEMCO
138S00151	138S00149	BOM_TABLE_ALTS	ALL	0402-3T,10.5uF@1V, TY

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00143	138S00144	BOM_TABLE_ALTS	ALL	0402,16uF@1V, Kyocera
138S00163	138S00144	BOM_TABLE_ALTS	ALL	0402,16uF@1V, Taiyo

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00138	138S00139	BOM_TABLE_ALTS	ALL	0201,3uF@1V, Kyocera
138S00164	138S00139	BOM_TABLE_ALTS	ALL	0201,3uF@1V, Taiyo

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00145	138S00146	BOM_TABLE_ALTS	ALL	0402,5.1uF@3V, Kyocera
138S00165	138S00146	BOM_TABLE_ALTS	ALL	0402,5.1uF@3V, Taiyo

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00140	138S00141	BOM_TABLE_ALTS	ALL	0201,1.luF@3V, Kyocera
138S00142	138S00141	BOM_TABLE_ALTS	ALL	0201,1.luF@3V, SEMCO

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00166	138S00141	BOM_TABLE_ALTS	ALL	0201,1.luF@3V, Taiyo

Global Ferrites

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
152S00558	152S00557	BOM_TABLE_ALTS	ALL	IND_MLD,0.47UH,20%,2.5A,80MΩ,1608
155S00194	155S0610	BOM_TABLE_ALTS	ALL	FERR BD,150 OHM,25%,200MA,0.7 DCR,01005
155S00200	155S0610	BOM_TABLE_ALTS	ALL	FERR BD,150 OHM,25%,200MA,0.7 DCR,01005

Global R/C Alternates

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S0648	138S0652	BOM_TABLE_ALTS	ALL	CAP_XSR,4.7UF,6.3V,0.65MM,0402,TAIYO
138S00024	138S0986	BOM_TABLE_ALTS	ALL	CAP_XSR,3.3UF,6.3V,0.65MM,0402,TAIYO/TDK
138S0706	138S0739	BOM_TABLE_ALTS	ALL	CAP_XSR,100PF,10V,XSR_0201,MURATA
138S0945	138S0739	BOM_TABLE_ALTS	ALL	CAP_XSR,100PF,10V,XSR_0201,KYOCERA
138S0739	138S0706	BOM_TABLE_ALTS	ALL	CAP_XSR,100PF,10V,XSR_0201
132S0436	132S0400	BOM_TABLE_ALTS	ALL	CAP_XSR,0.120PF,10V,XSR_01005
138S0049	138S0831	BOM_TABLE_ALTS	ALL	CAP_XSR,0.120PF,10V,XSR_0201

Global Inductors

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
152S00653	152S00651	BOM_TABLE_ALTS	ALL	IND,1.2UH,3A,2016,0.65Z
152S00654	152S00652	BOM_TABLE_ALTS	ALL	IND,1.2UH,3A,2016,0.8Z

Multi-Vendor Criticals

Critical Part#	Comment
138S0979	CAP,CER,XSR,10UF,20%,10V,0402,H=0.65MM
138S0683	CAP,CER,XSR,1UF,0.25V,0402
132S0663	CAP,CER,XSR,1UF,10V,0402
132S0288	CAP,CER,XSR,0.1UF,10V,10V,0201
132S0275	CAP,CER,XSR,470PF,10V,10V,01005
132S0245	CAP,CER,XSR,0.01UF,10V,6.3V,01005

Iktara

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
132S00021	8	CAP,CER,0.082UF,10%,50V,XTR,0402	C1452,C1453,C1454,C1455,C1456,C1457,C1458,C1459	NO	COMMON
132S0423	2	CAP,CER,0.022UF,50V,XTR,10%,0402	C3451,C3465	CRITICAL	COMMON
132S0423	2	CAP,CER,0.022UF,50V,XTR,10%,0402	C3455,C3466	CRITICAL	NOSTUFF

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00149				0402-3T,10.5uF@1V

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
685-00185	685-00184	BOM_TABLE_ALTS	SUBBOM_DS	SUBBOM_MLB_BOT,DIODES,0402,TAIYO

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
685-00184	1	SUBBOM_MLB_BOT,DIODES,0402,TAIYO	SUBBOM_DS	CRITICAL	COMMON
371S00133	4	DIODES,SHOTKY DIODE,30V,2A,0603	D3400,D3401,D3402,D3403	CRITICAL	DIODES_DS

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
371S00132	371S00133	BOM_TABLE_ALTS	D3400,D3401,D3402,D3403	CRITICAL

Soft-Term Cap Sub BOMs

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION
685-00159	1	SUBBOM_MLB_BOT,CAP,TYPICAL,X893	SUBBOM_CAP	CRITICAL	COMMON

Touch/Luna B2B

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	Critical	BOM OPTION

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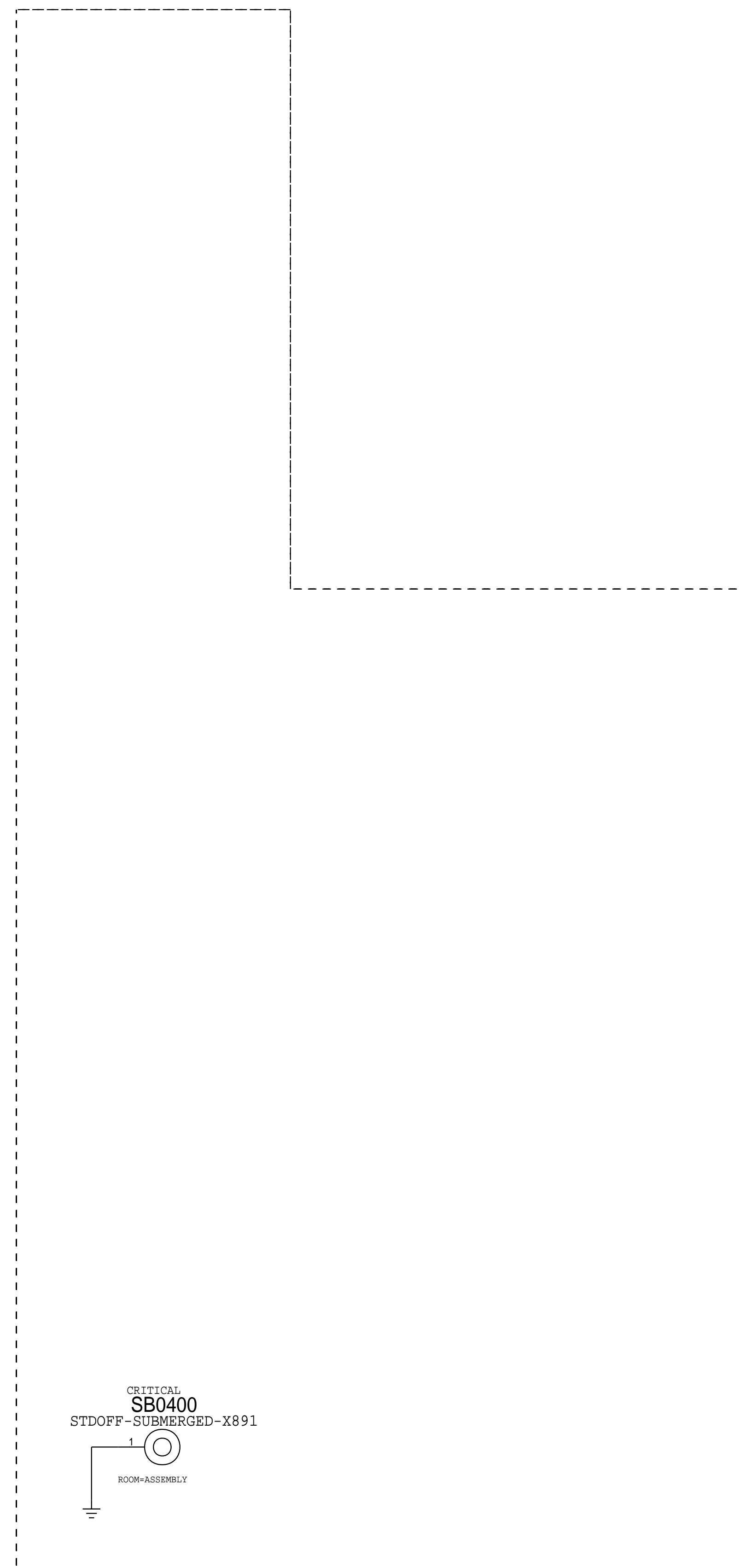
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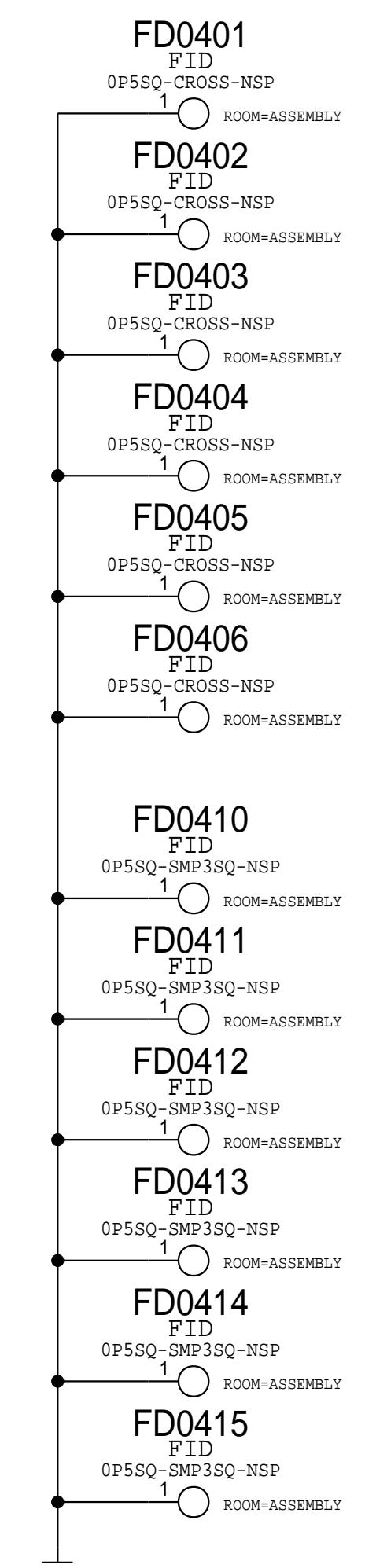
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FIDUCIALS



PAGE TITLE	SYSTEM: Mechanical Components	
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BOOTSTRAPPING: BOARD ID[3]

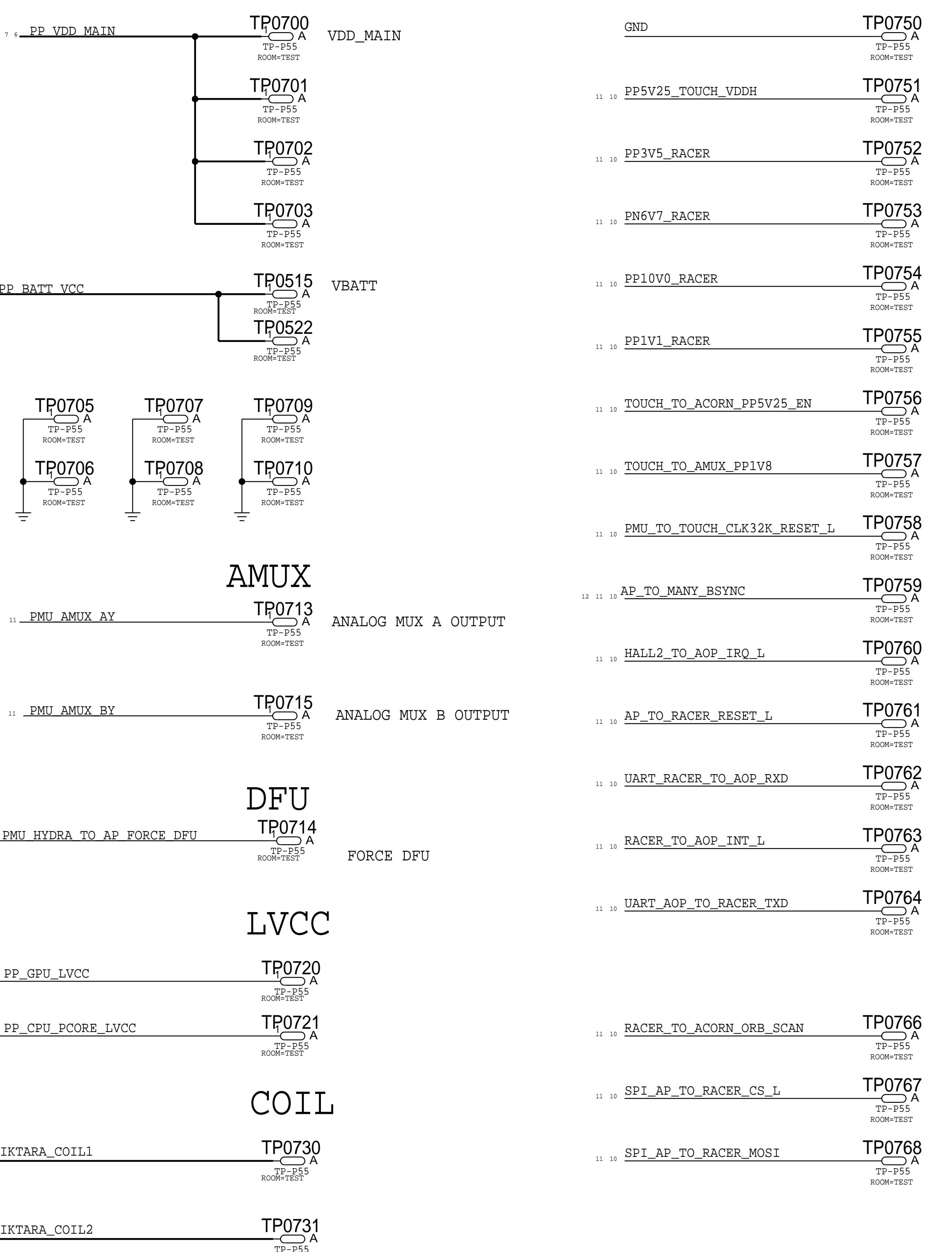
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Board Rev[3:0]				
Float=Low PU=High		Build Major		Build Minor
3	2	1	0	
Proto 1	1	1	1	1
Proto 2	1	1	1	0
Proto 3	1	1	0	1
(Spare)	1	1	0	0
EVT	1	0	1	1
(Spare)	1	0	1	0
Carrier	0	1	1	1
(Spare)	0	1	1	0
DVT	0	0	1	1
(Spare)	0	0	1	0
(Spare)	0	0	0	1
PVT	0	0	0	0
Board ID[4:0]				
Float=Low PU=High		Form Factor		MLB/Dev
4	3	2	1	0
X	Baseband	Form Factor	MLB/Dev	
D20 MLB	0	0	0	1
D20 Dev	0	0	0	1
D21 MLB	0	0	1	0
D21 Dev	0	0	1	0
D22 MLB	0	0	1	1
D22 Dev	0	0	1	1
D201 MLB	0	1	0	1
D201 Dev	0	1	0	1
D211 MLB	0	1	1	0
D211 Dev	0	1	1	0
D221 MLB	0	1	1	0
D221 Dev	0	1	1	1
Boot Config[2:0]				
Float=Low PU=High		2 1 0		
2	1	0		
SPI0	0	0	0	
SPI0 Test Mode	0	0	1	
SPI0 NAND	0	1	0	
SPI0 NAND Test	0	1	1	
Slow SPI0 Test	1	1	0	

D221 Selected (BOARD_ID3) ->



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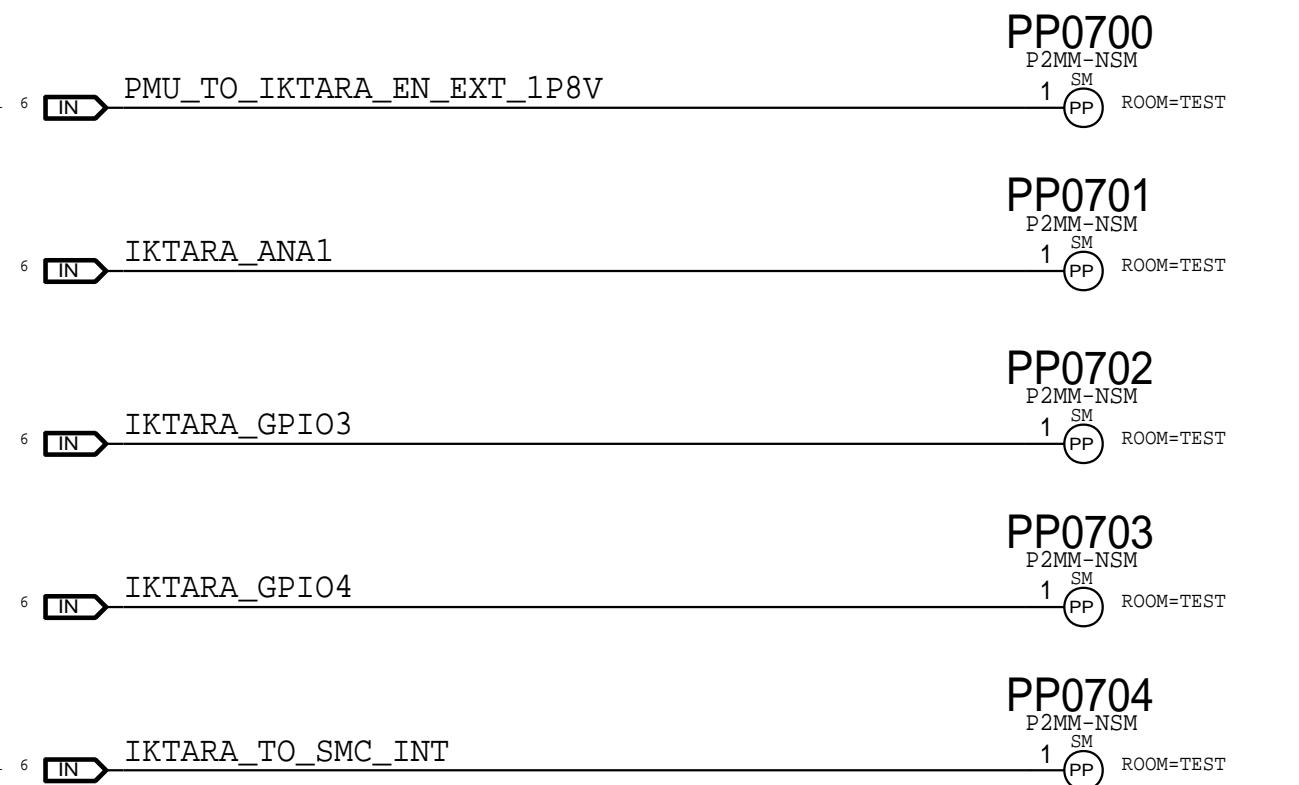
Test Points



Probe Points



Iktara Debug



SYNC_MASTER=	test.mlb	DRAWING NUMBER	051-02247	SIZE
PAGE TITLE	SYSTEM: Testpoints (Bottom)			
Apple Inc.	D			
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Iktara

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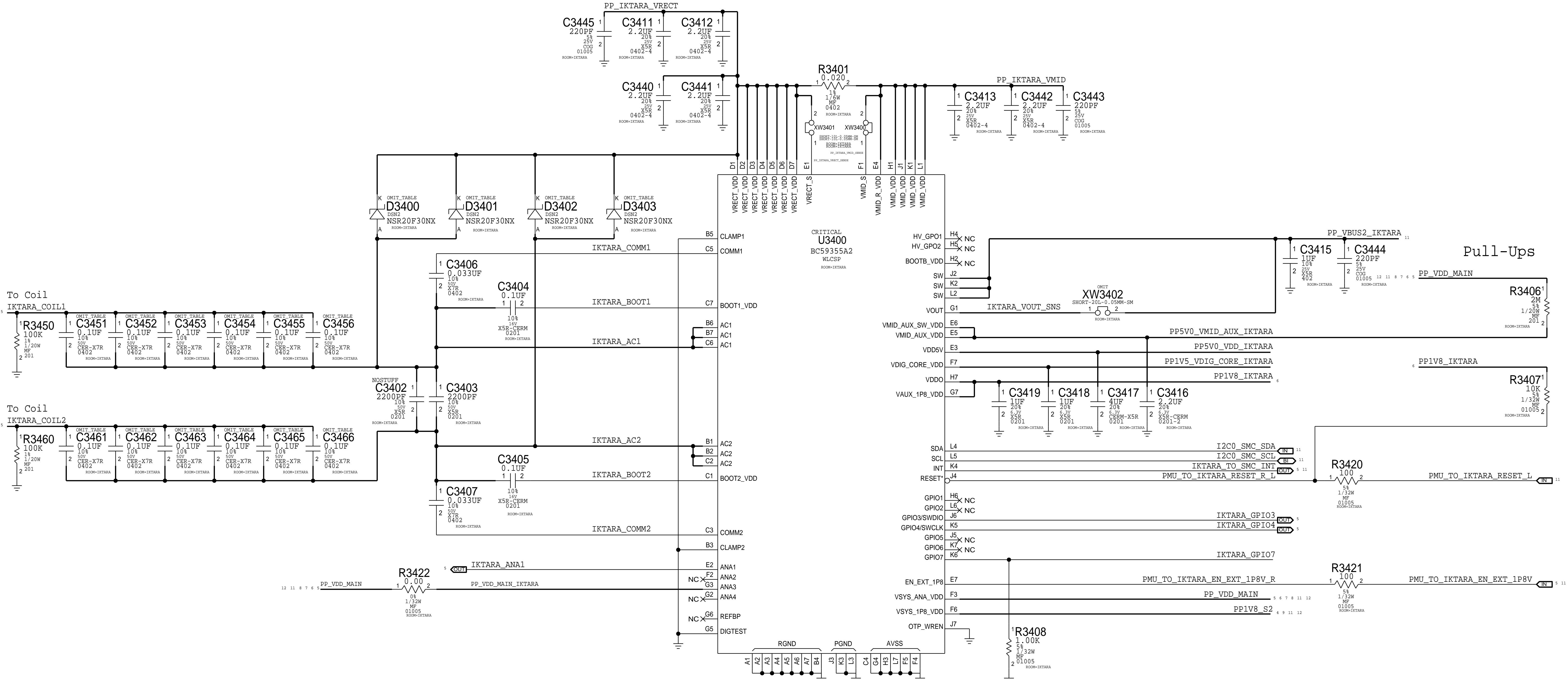
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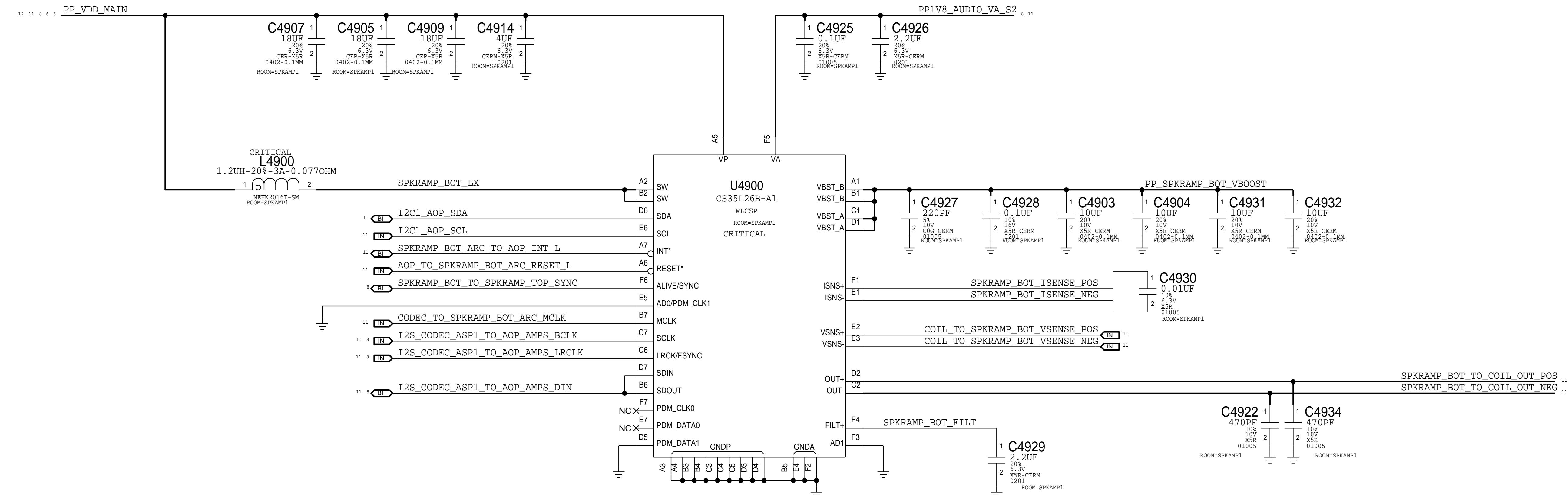
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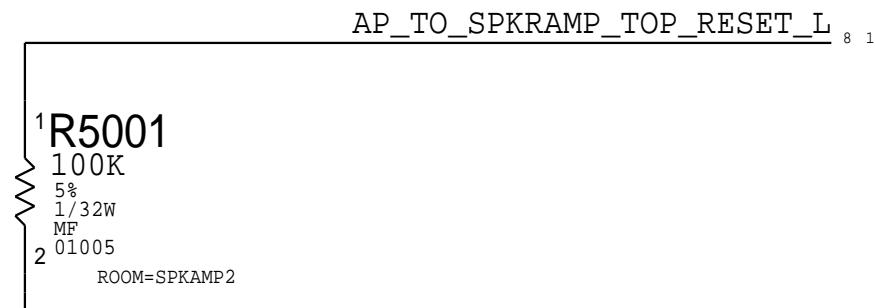
South Speaker Amplifier

APN: 338S00295

I2C ADDRESS: 1000 000x
0x80

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Pull Downs

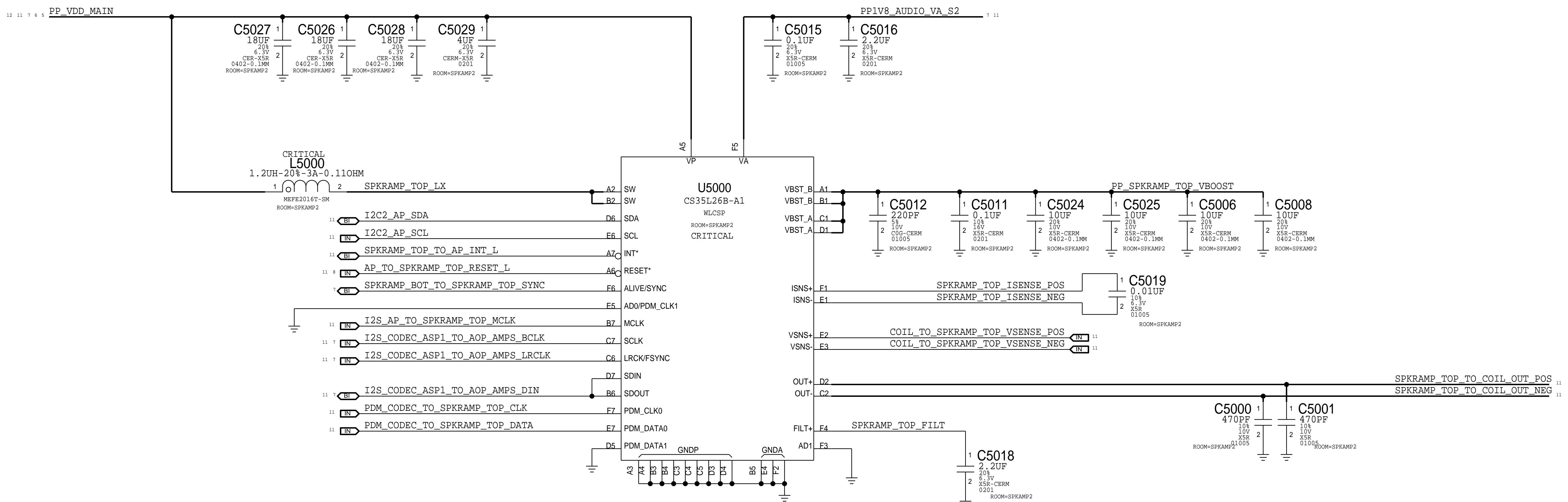


North Speaker Amplifier

APN: 338S00295

I2C ADDRESS: 1000 000x

0x80



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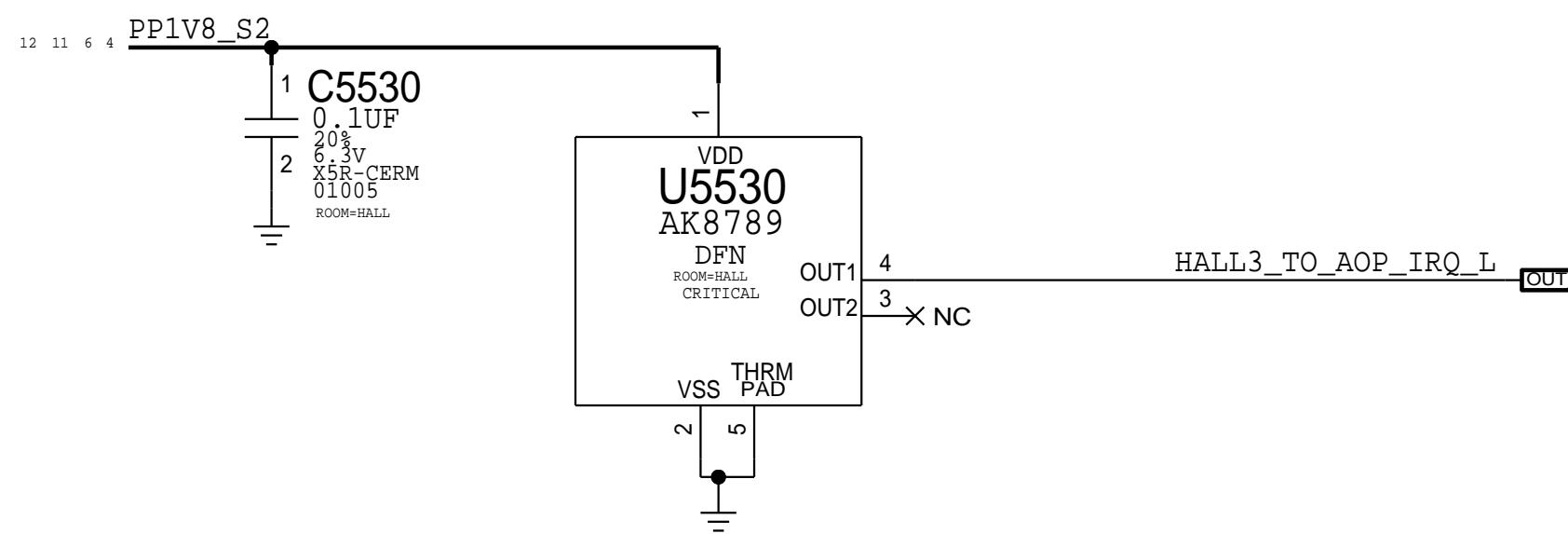
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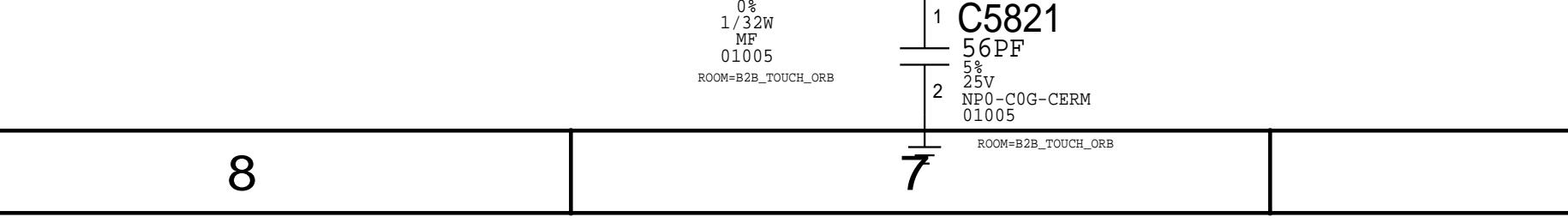
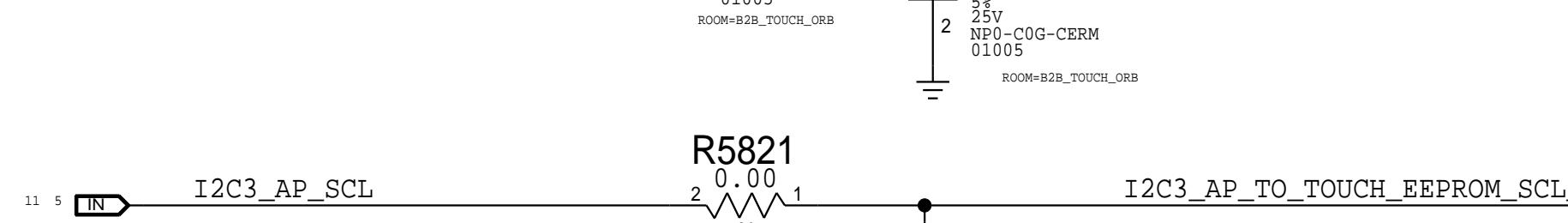
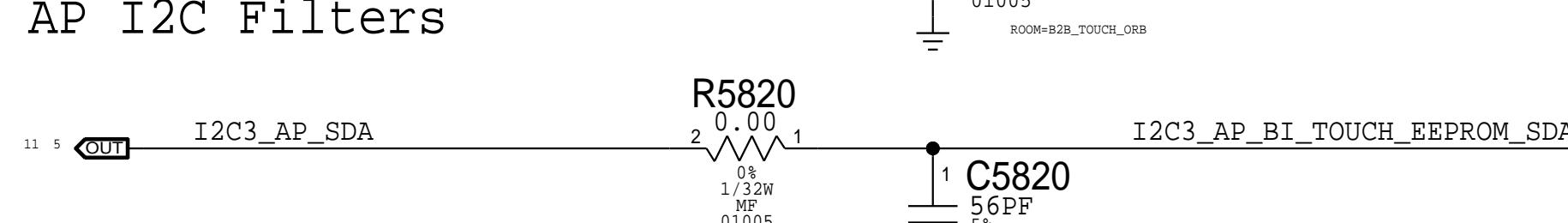
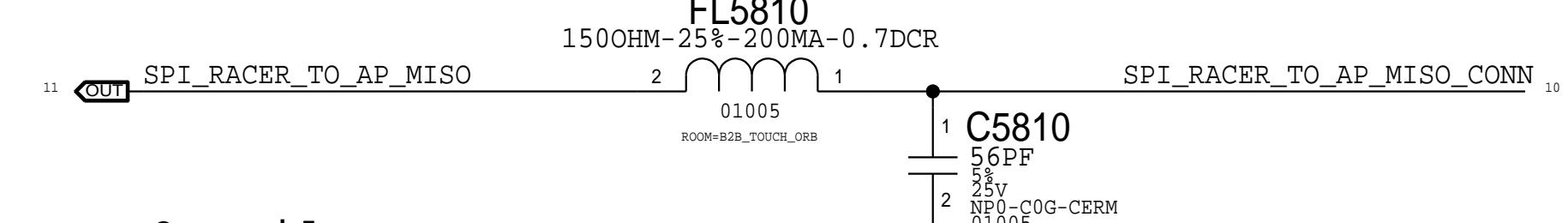
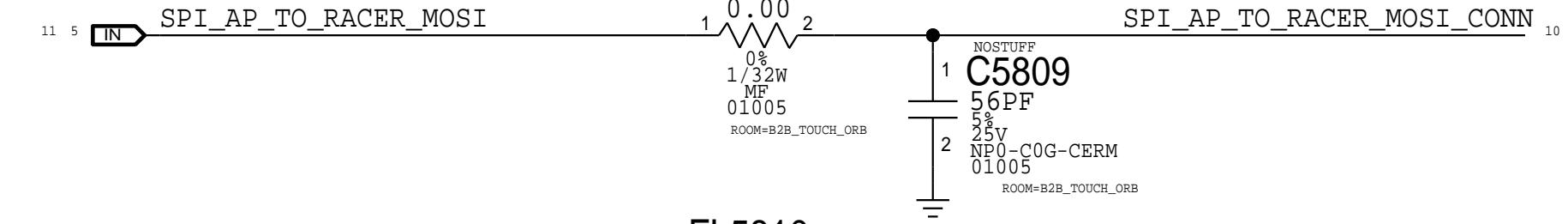
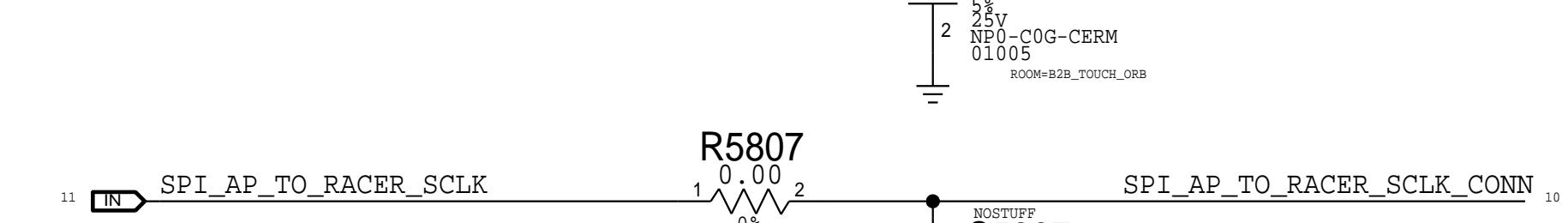
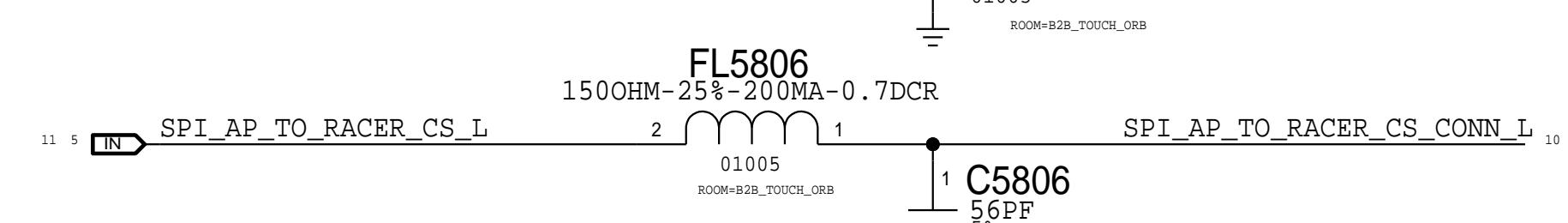
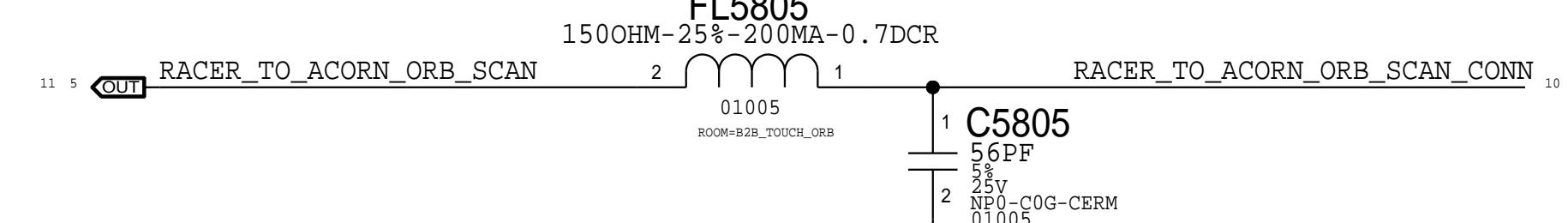
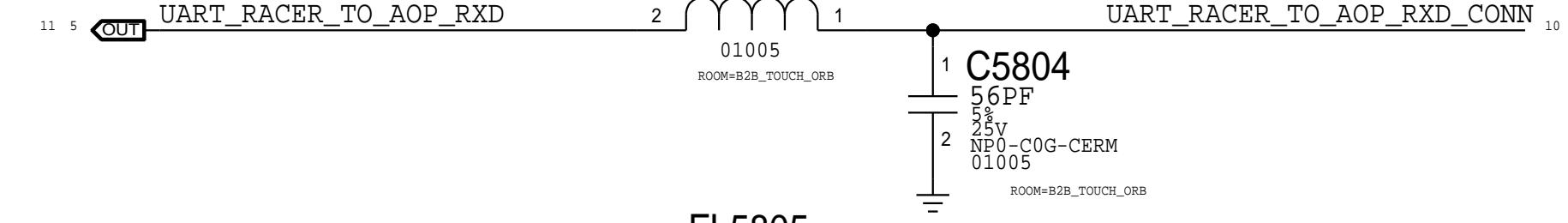
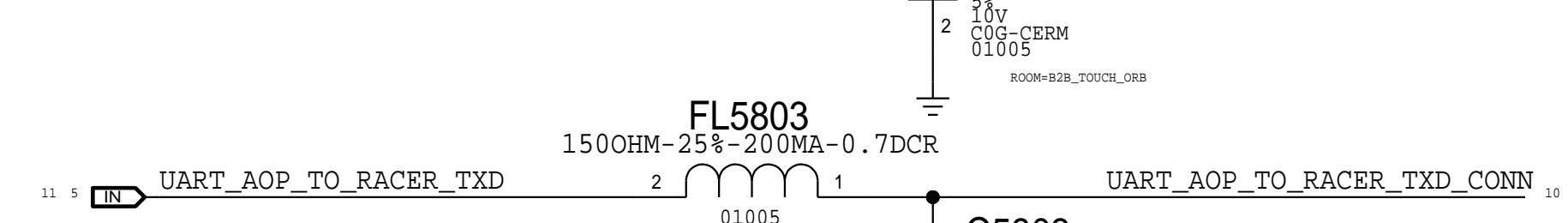
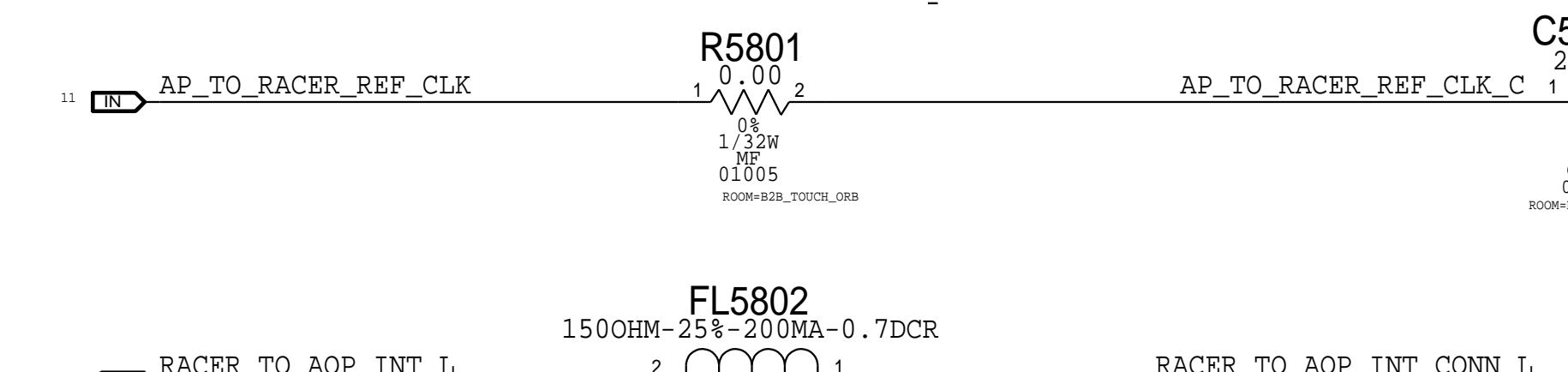
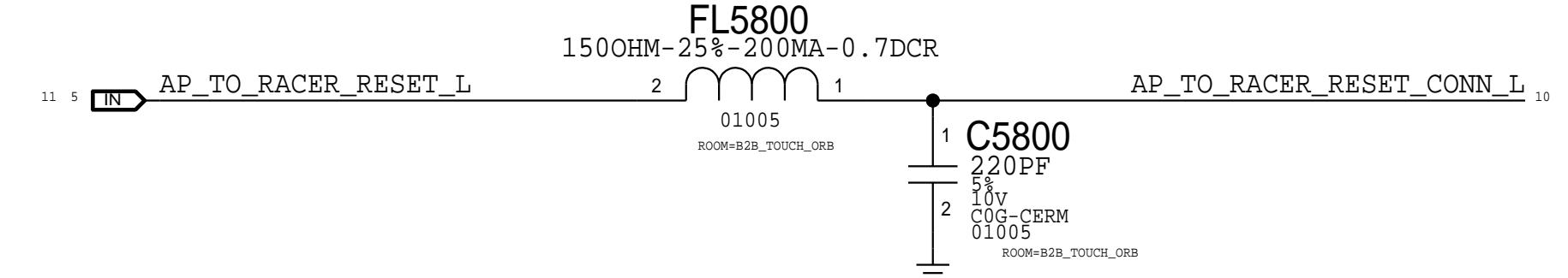
Hall Effect

APN:353S3697



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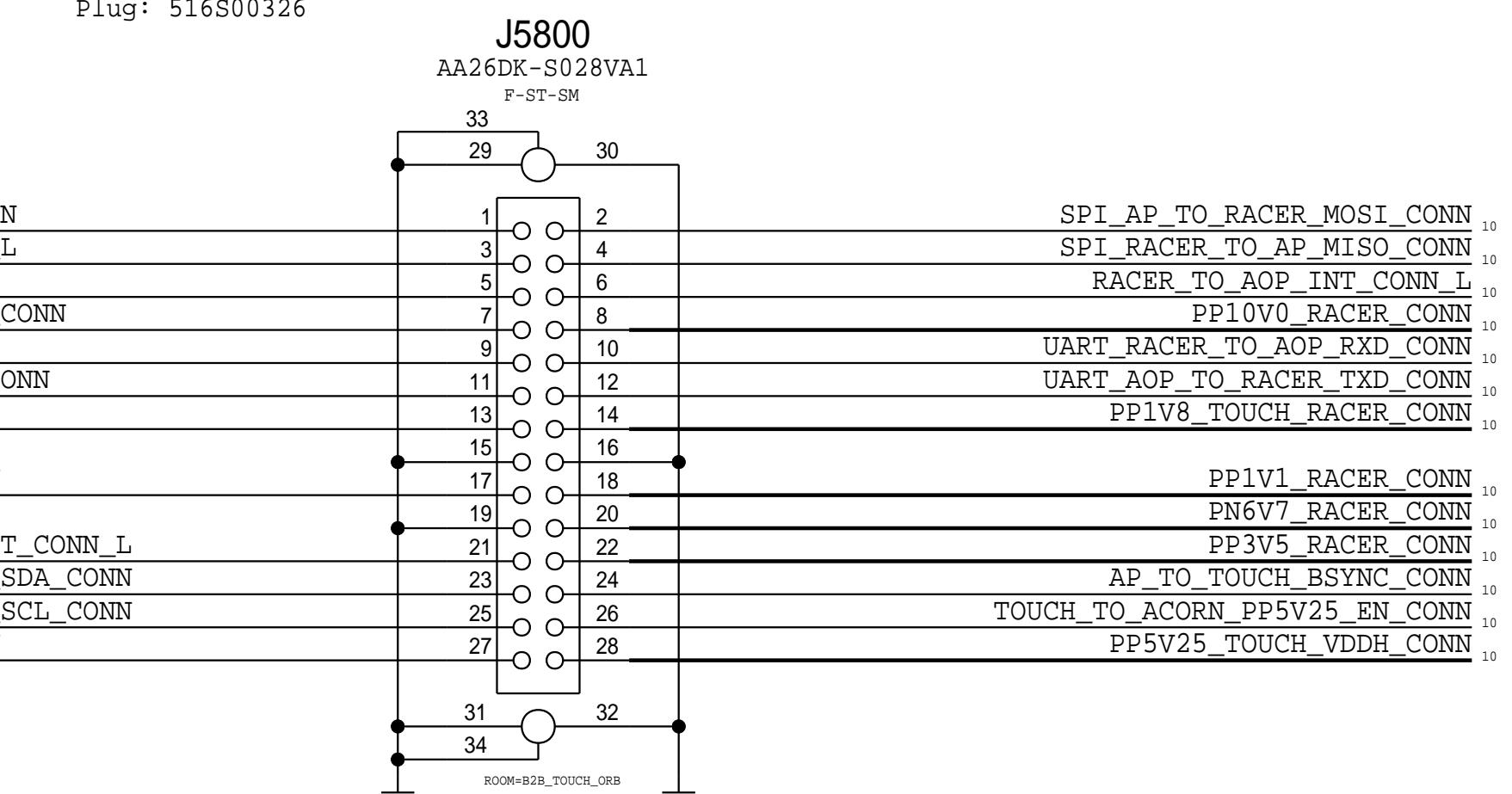
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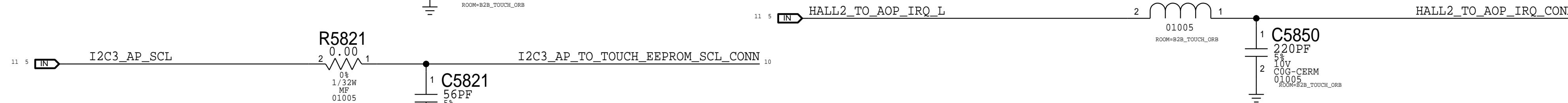
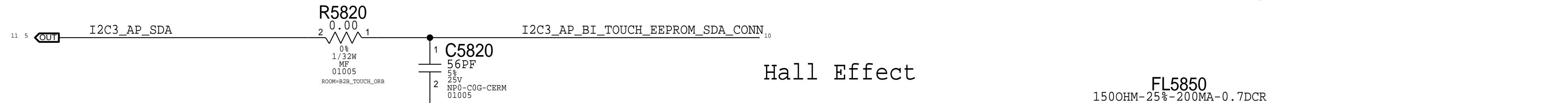
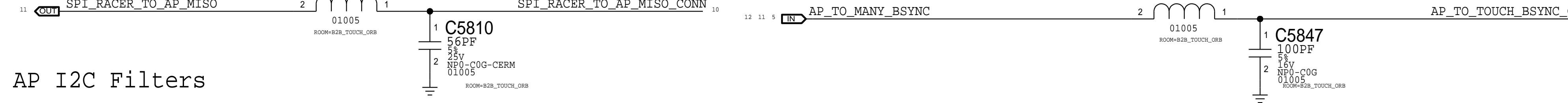
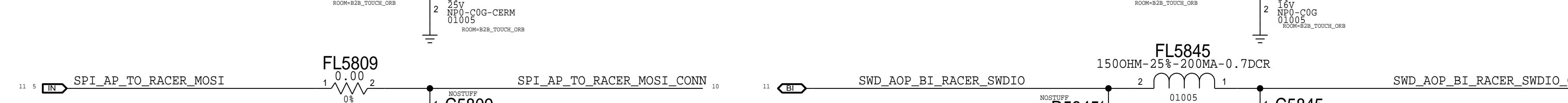
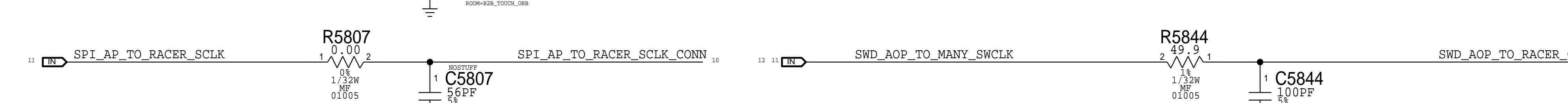
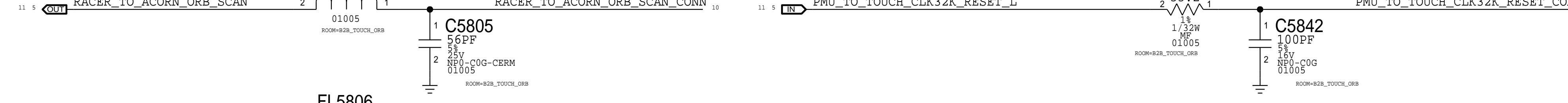
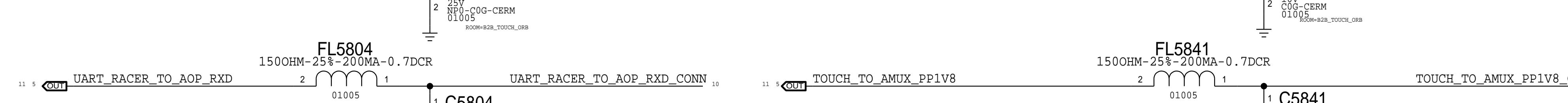
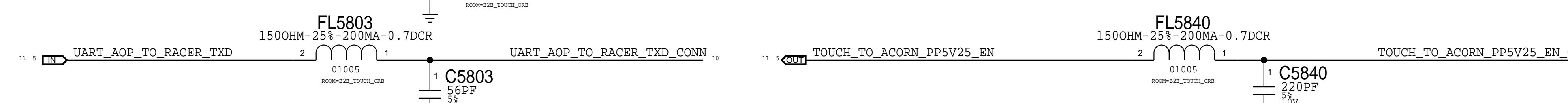
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 Plug: 516S00326

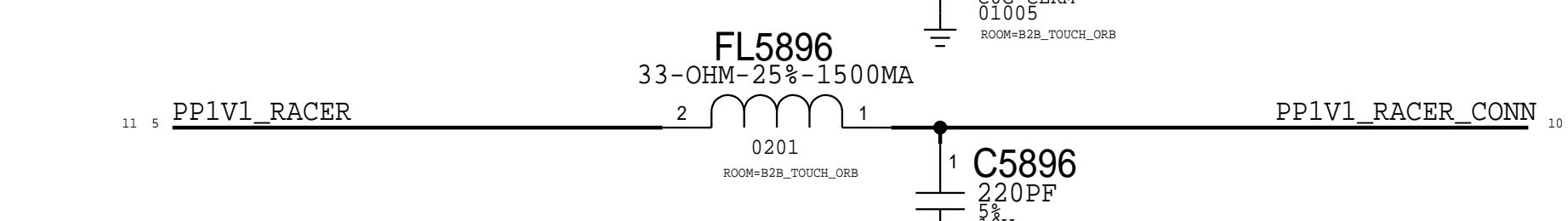
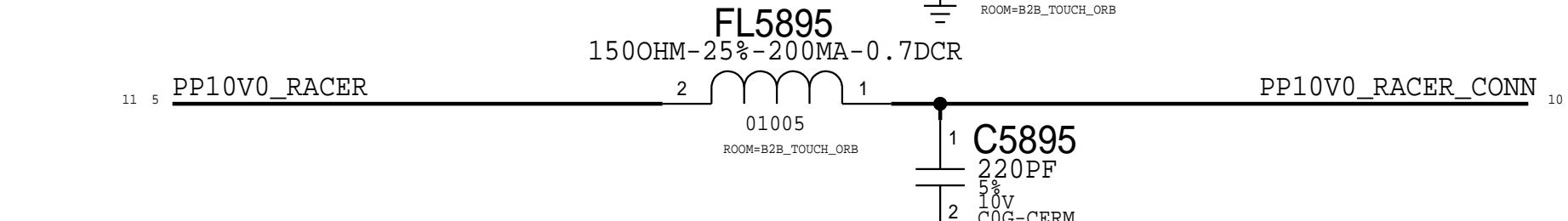
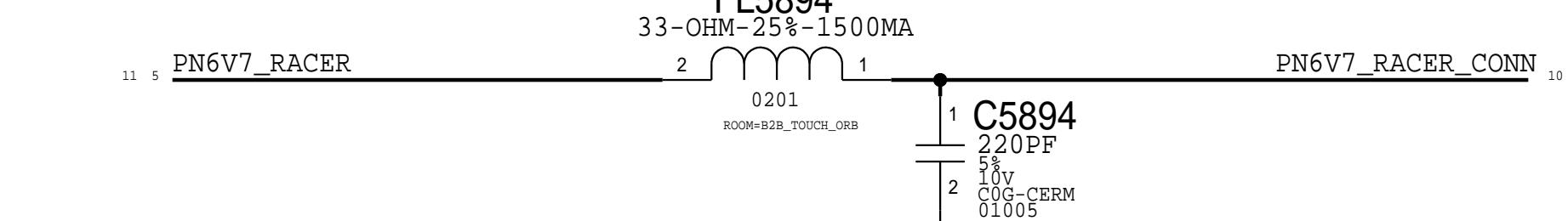
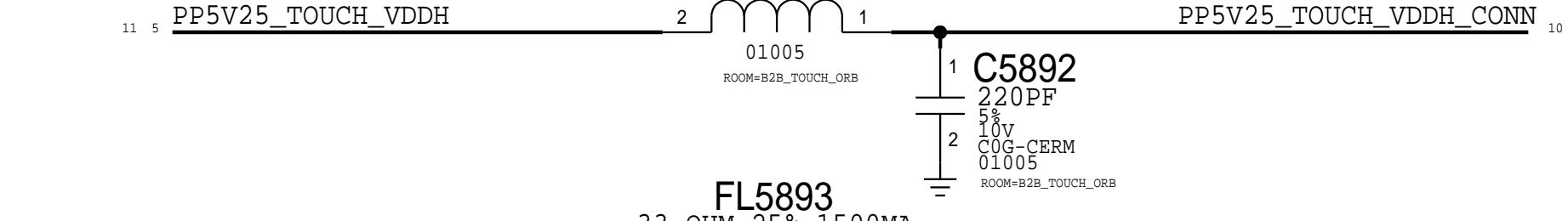
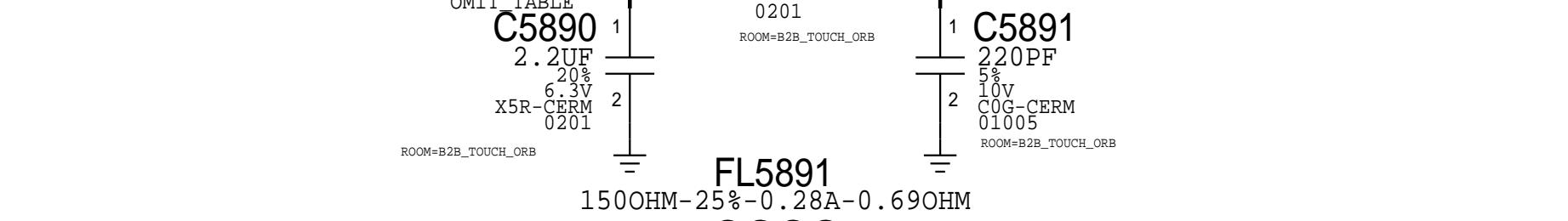
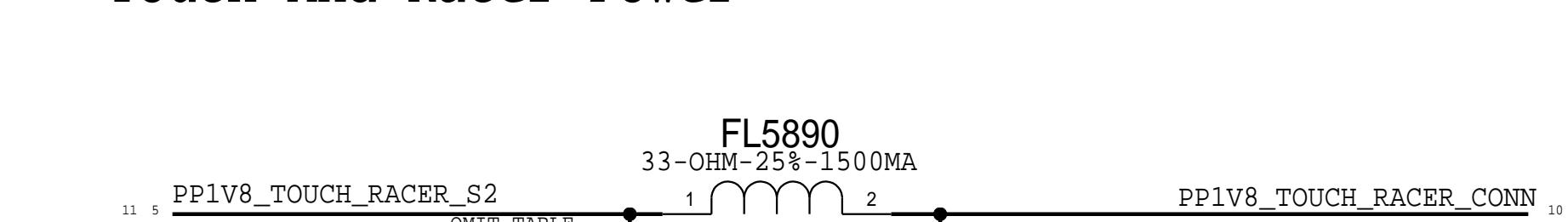
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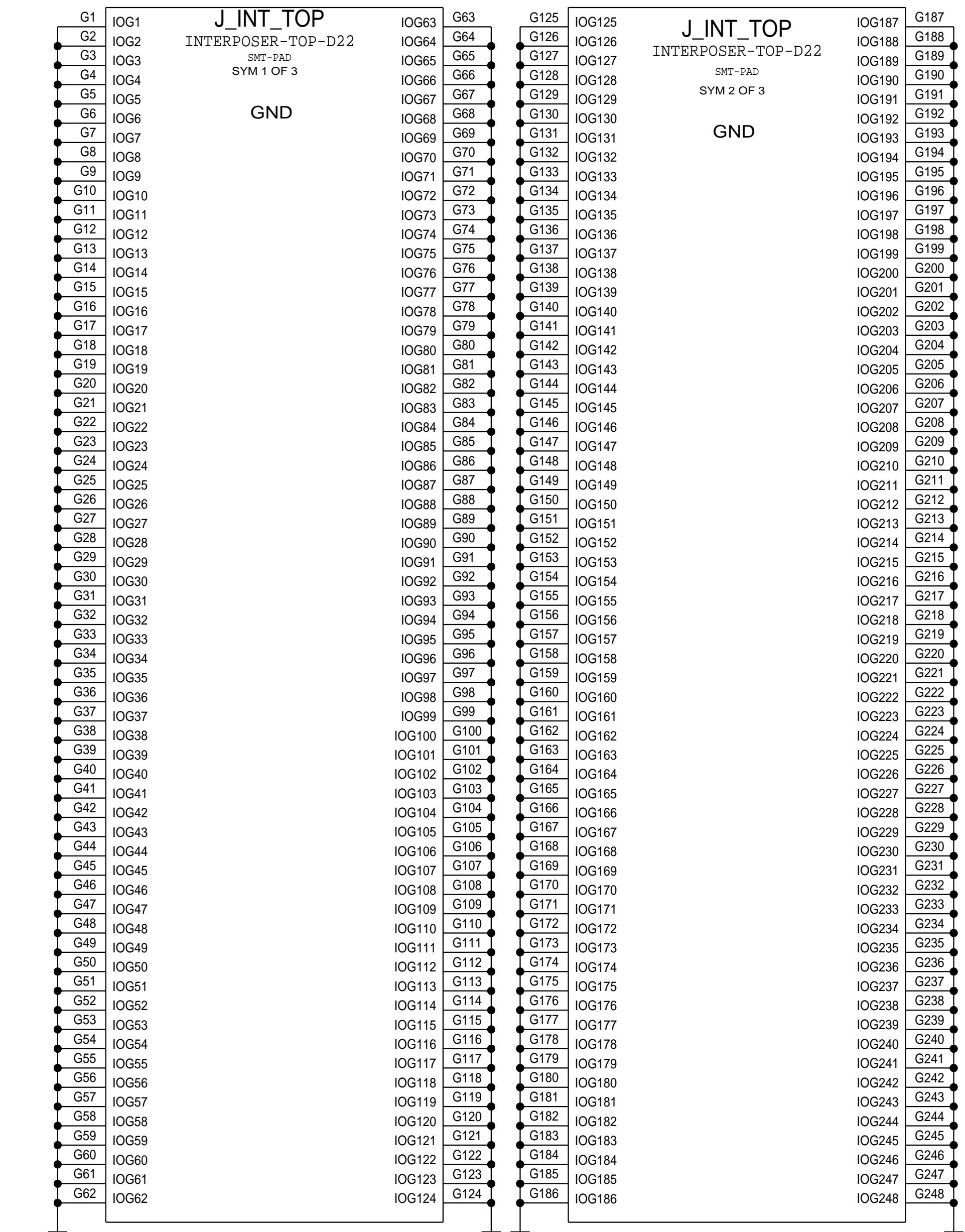
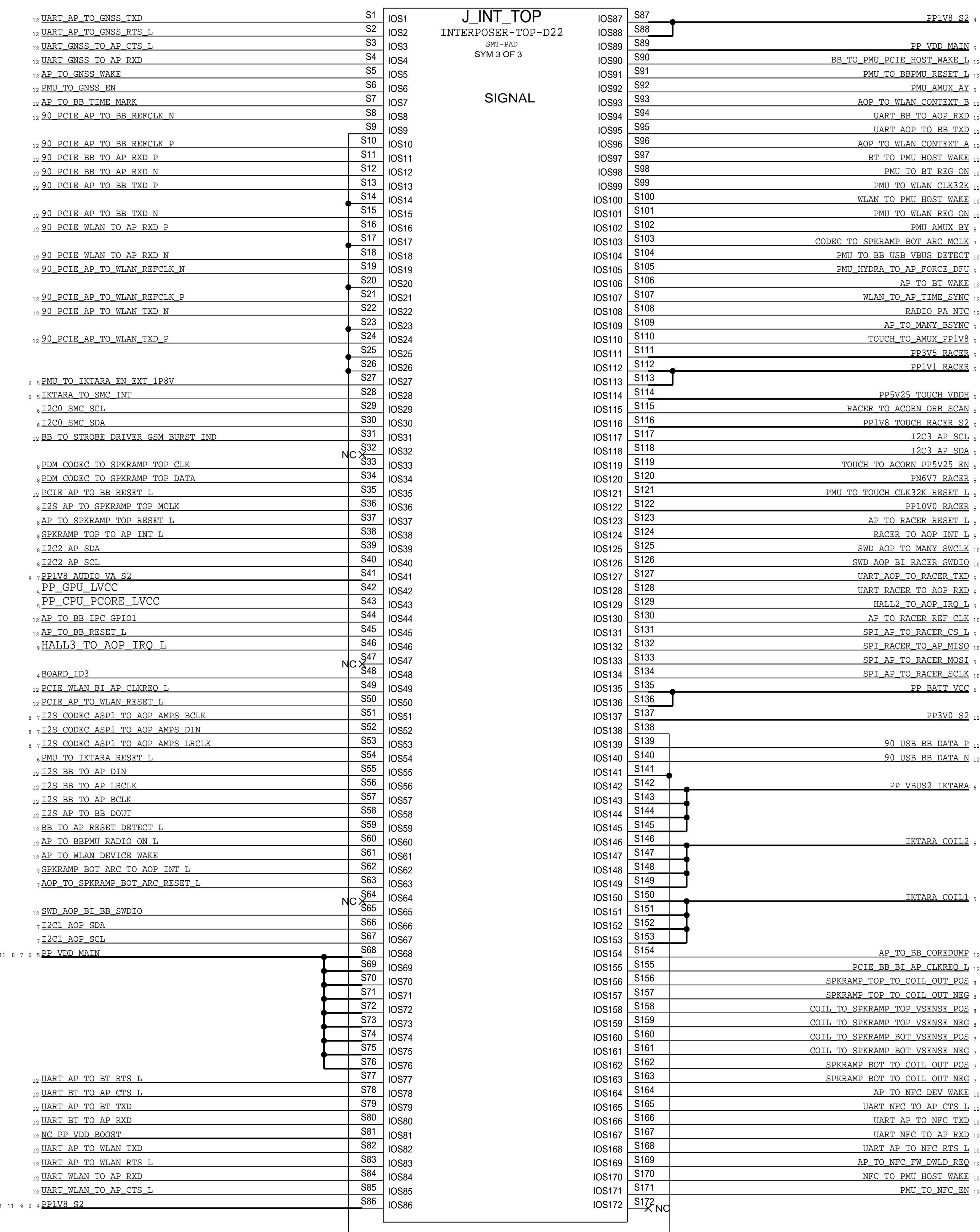
Touch and Misc I/O



Touch And Racer Power



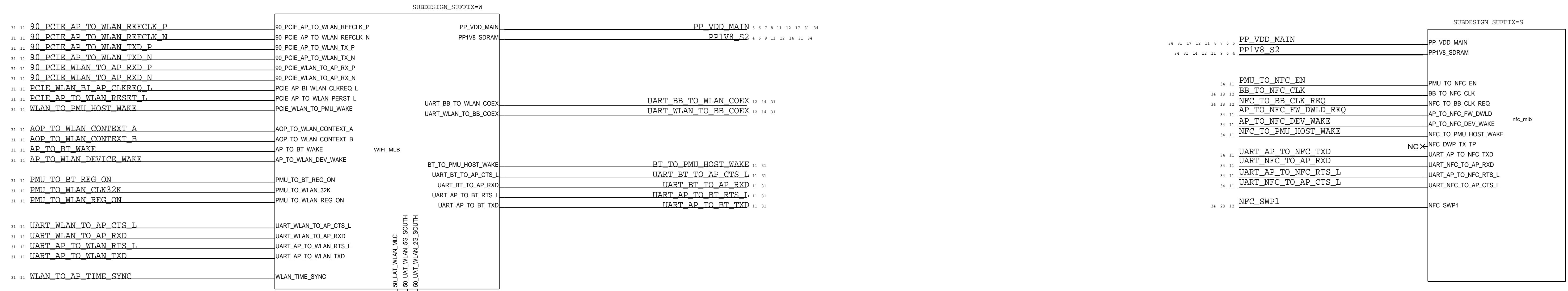
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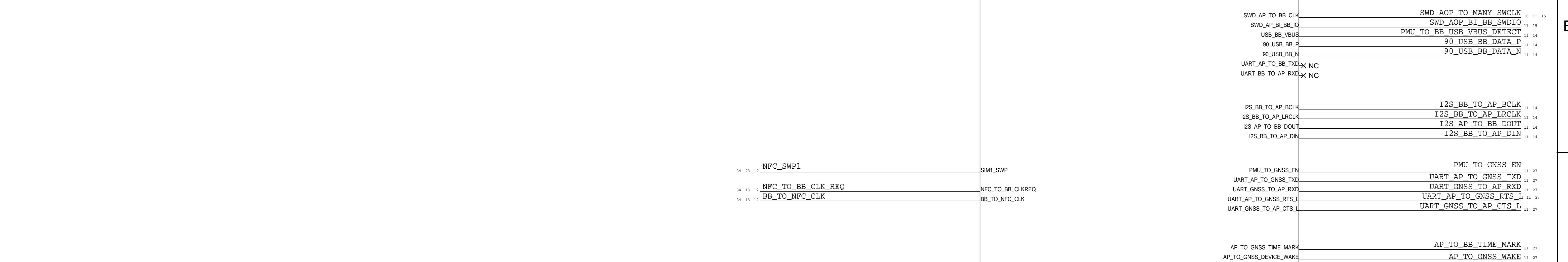
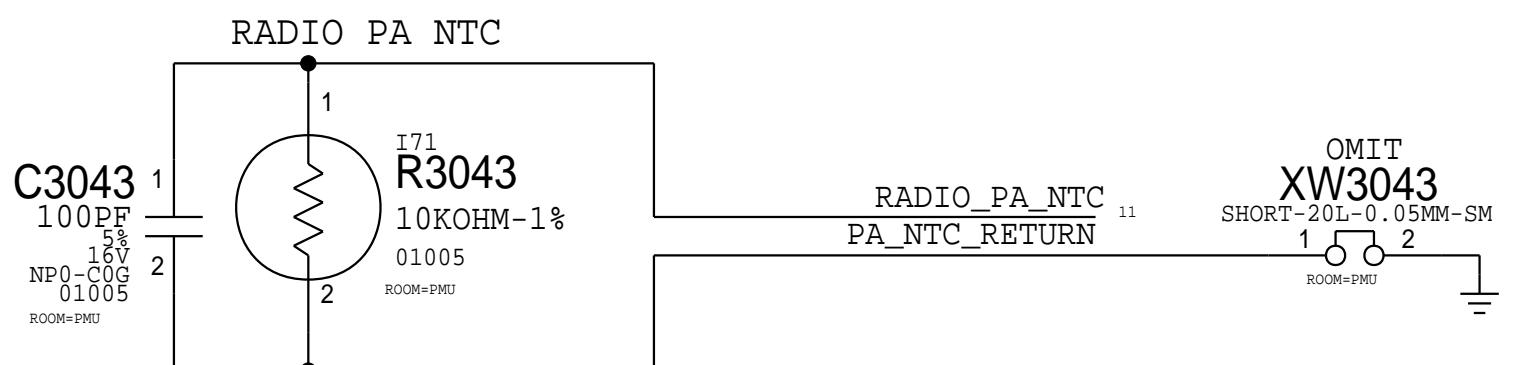
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SYNC_DATE=07/29/2016

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
7	0008448938	ENGINEERING RELEASED	DATE 2017-04-11

ICE17.2 RADIO_MLB

Tue Apr 11 16:10:08 2017

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13	13	DIVERSITY RECEIVE LNA'S
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15	15	GNSS
16	16	TEST POINTS & SIM

ALTERNATES

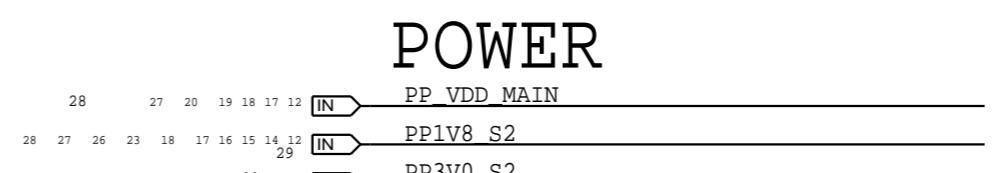
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197S00040	197S00044	VTCXO_K	AVX VC-TCXO	?
197S00042	197S00044	VTCXO_K	NDK VC-TCXO	?
335S00013	335S0894	EPROM_K	ON SEMI EEPROM	?
138S0719	138S1103	C522_K	MURATA	?
138S00133	138S00128	C509_K, C523_K, C605_K, C624_K, C626_K, C1114_K, C1116_K	MURATA	?
138S00049	138S00032	C402_K, C433_K, C437_K, C510_K, C720_K	MURATA	?
138S0831	138S00032	C402_K, C433_K, C437_K, C510_K, C720_K	MURATA	?
138S00086	138S0884	C500_K, C501_K, C502_K, C514_K, C515_K	MURATA	?
339S00363	339S00353	GNSSL_K	PILSNER STATS	?

BOM OPTIONS

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
998-05780	1	BASEBAND, UNFUSED	U_BB_K	CRITICAL	BB_UNFUSED
998-05781	1	BASEBAND, LOCAL FUSED	U_BB_K	CRITICAL	BB_LOCAL_FUSED
998-05782	1	BASEBAND, DEV FUSED	U_BB_K	CRITICAL	BB_DEV_FUSED
337S00244	1	BASEBAND, PRODUCTION FUSED	U_BB_K	CRITICAL	BB_PROD_FUSED
138S00159	7	CAP,SOFT-TERM,2.2uF,6.3V,0201, KYOCERA	0402_K,0402_X,0402_Y,0402_Z,0402_A,0402_B		SOFT_CAP
138S0831	7	CAP,TYPICAL,2.2uF,6.3V,0201,MURATA	0402_K,0402_X,0402_Y,0402_Z,0402_A,0402_B		TYPICAL_CAP

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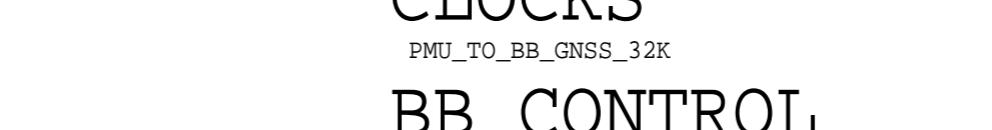
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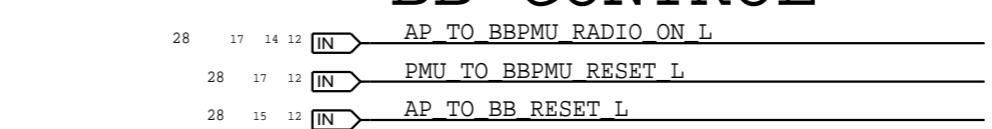
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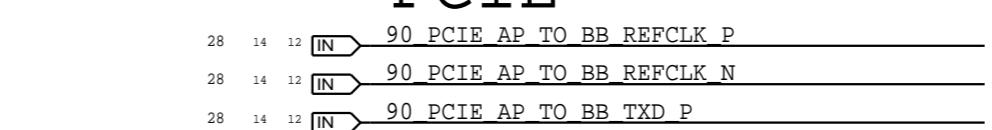
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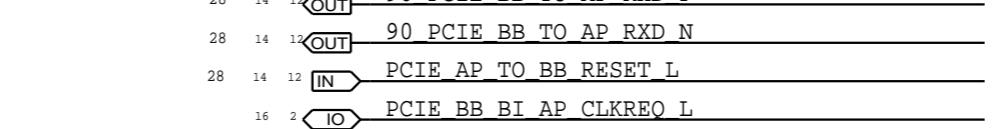
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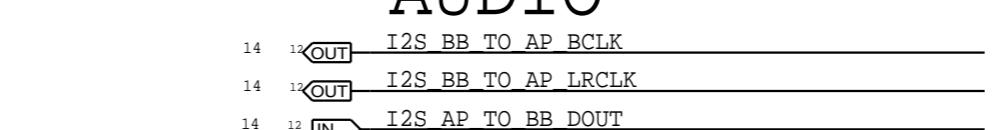
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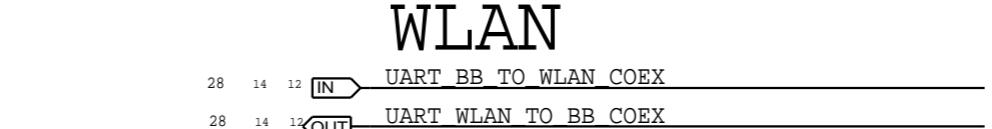
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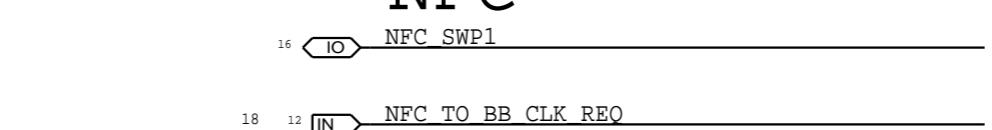
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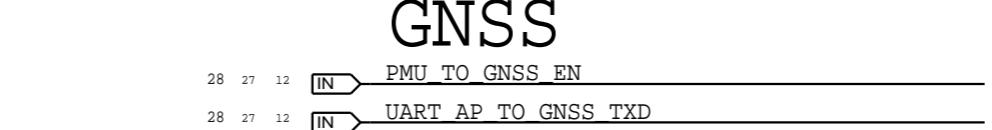
WLAN



NFC



GNSS



DEBUG

RADIO_MLB

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BASEBAND

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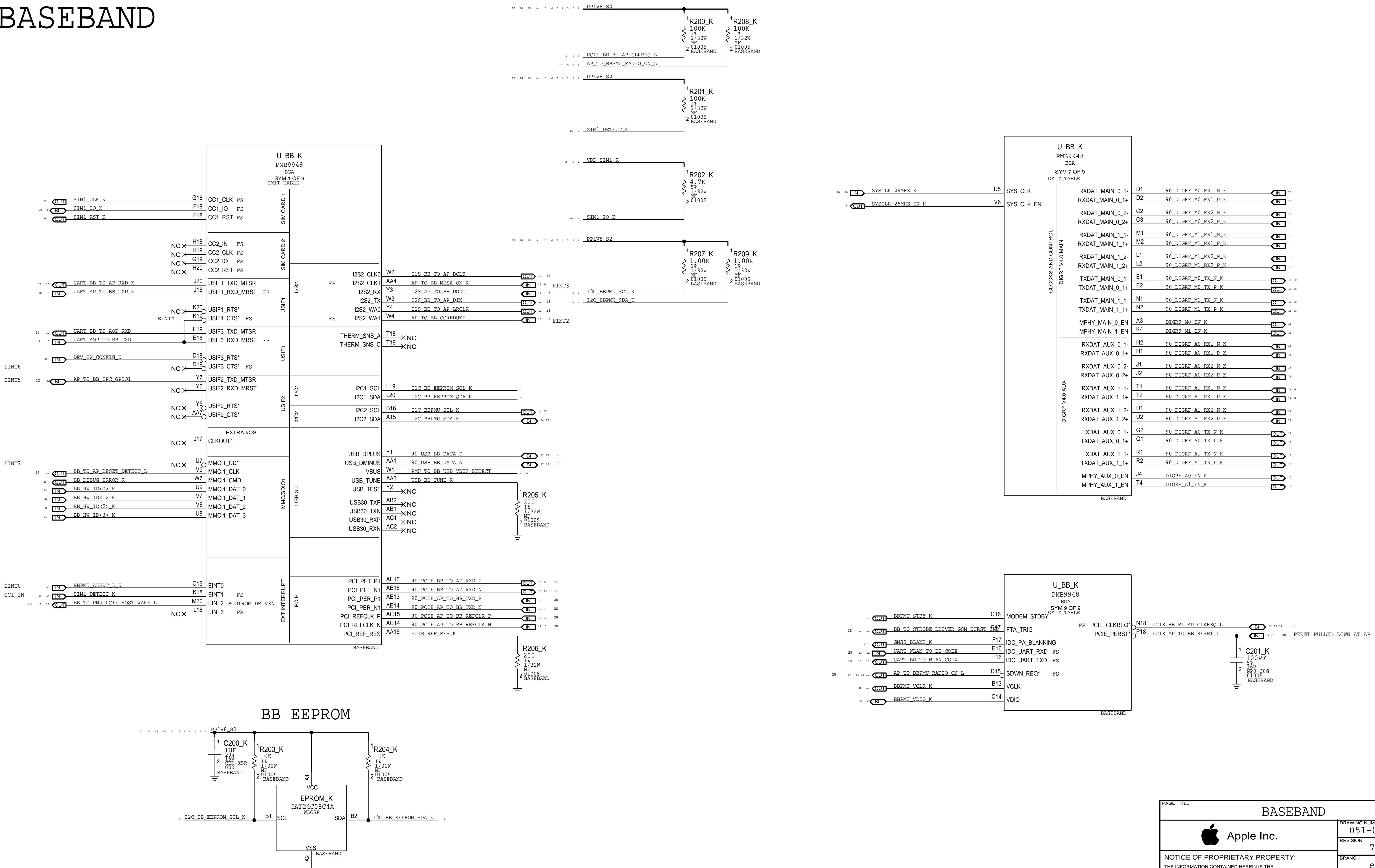
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BASEBAND MEMORY/DEBUG

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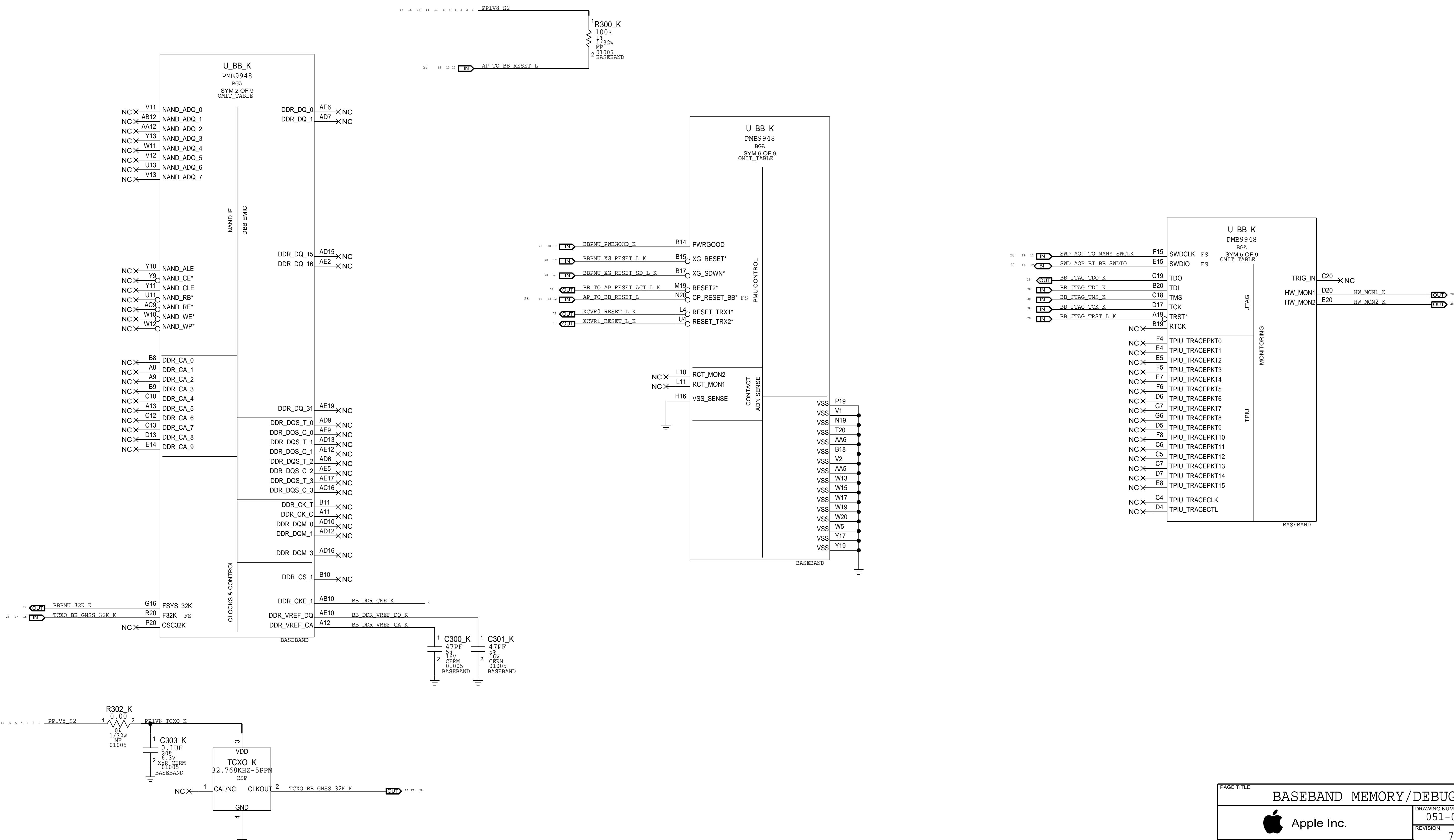
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BASEBAND POWER

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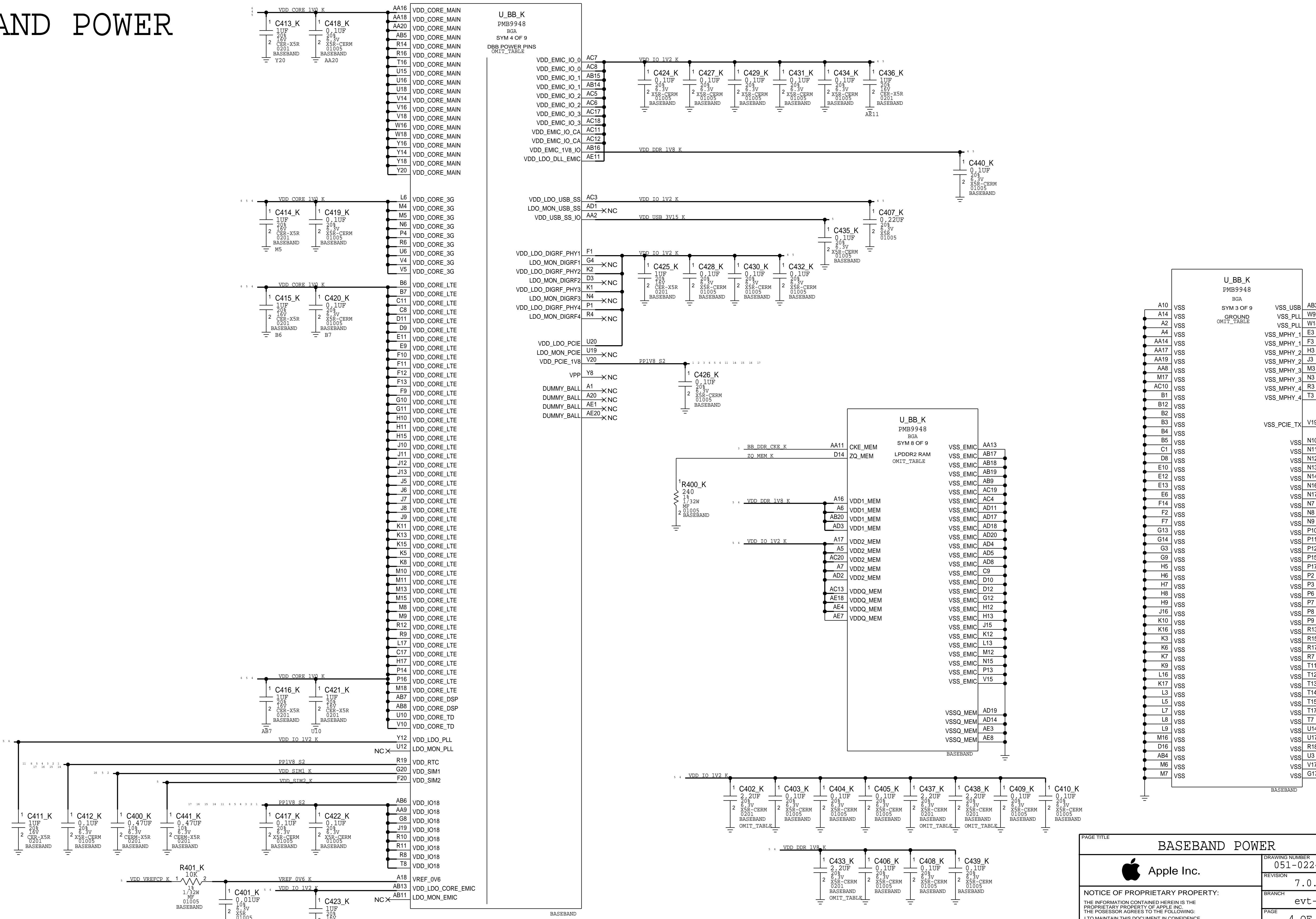
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BASEBAND PMIC

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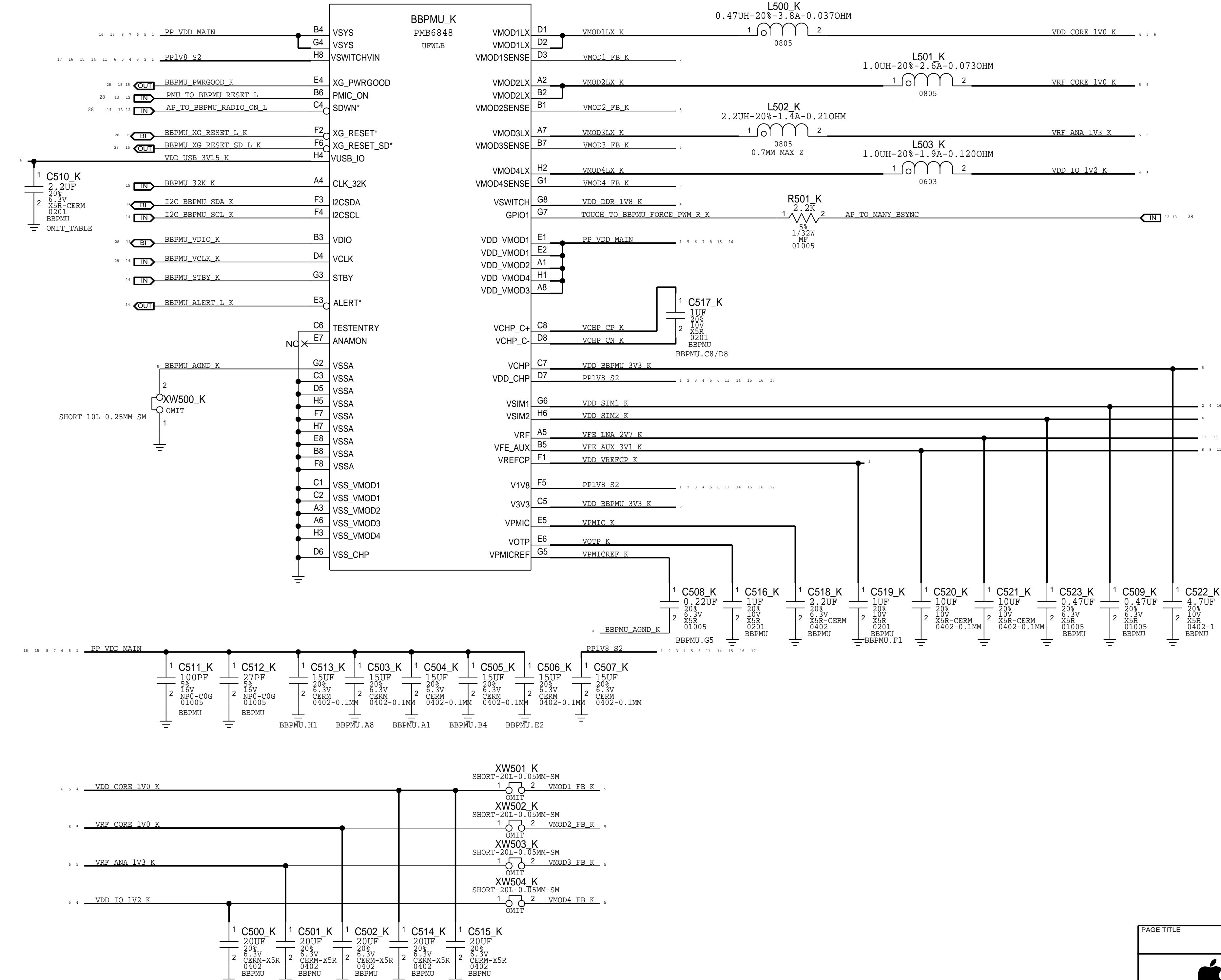
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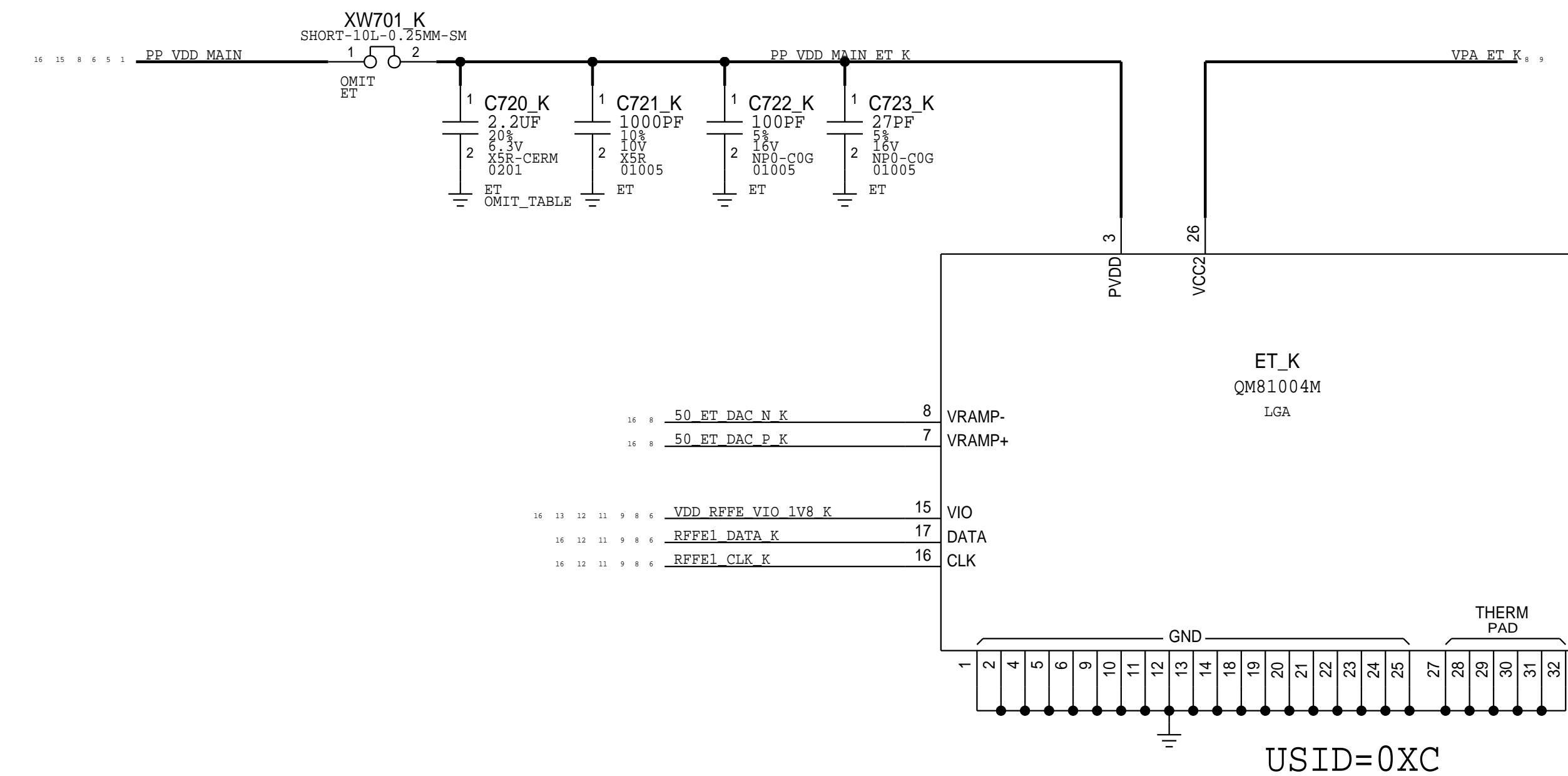


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ET MODULATOR

ALPES II MODULE



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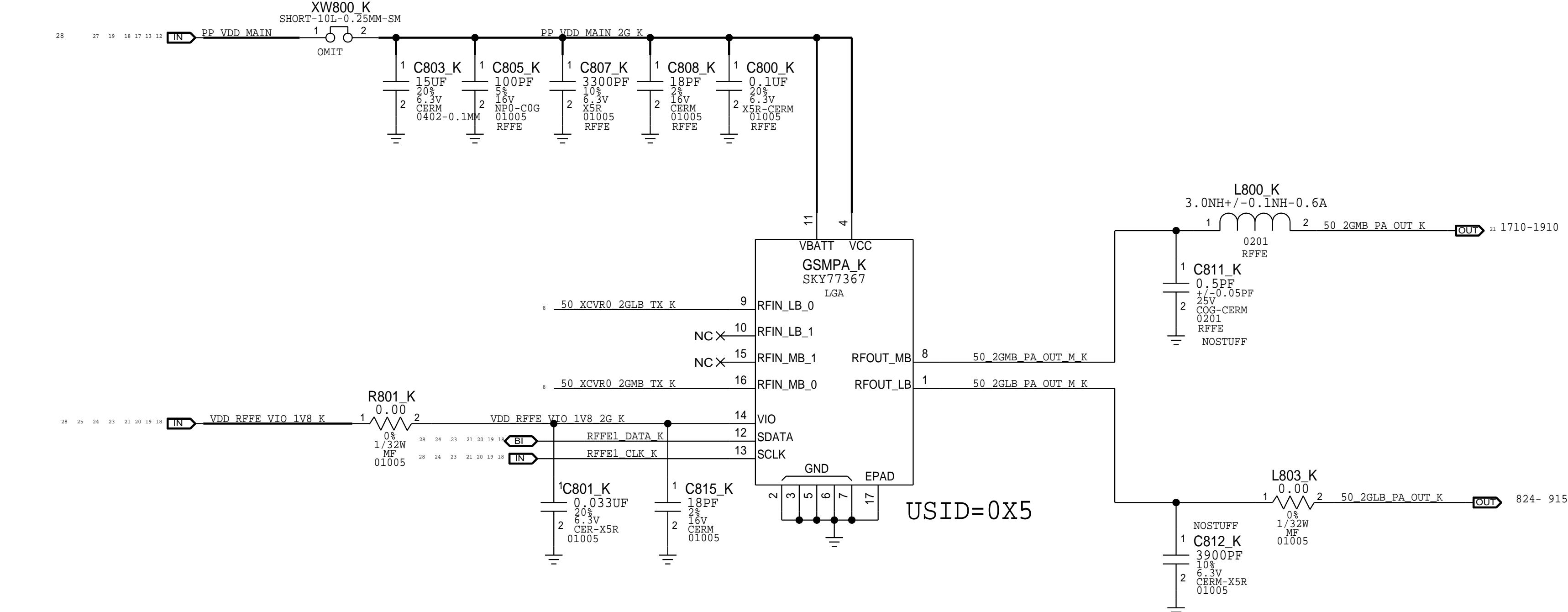
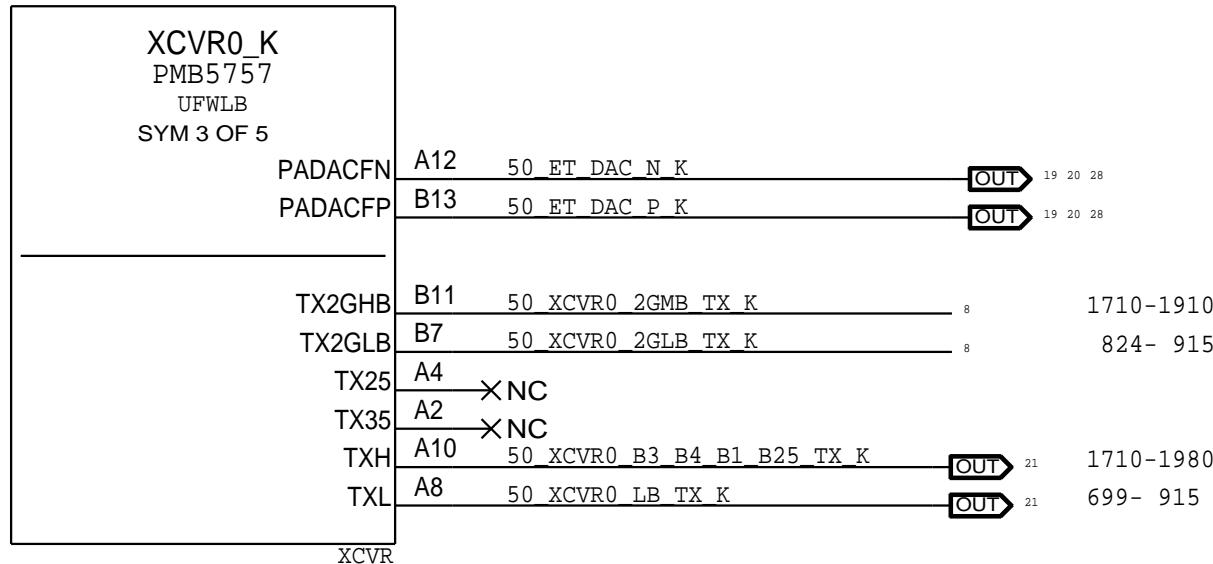
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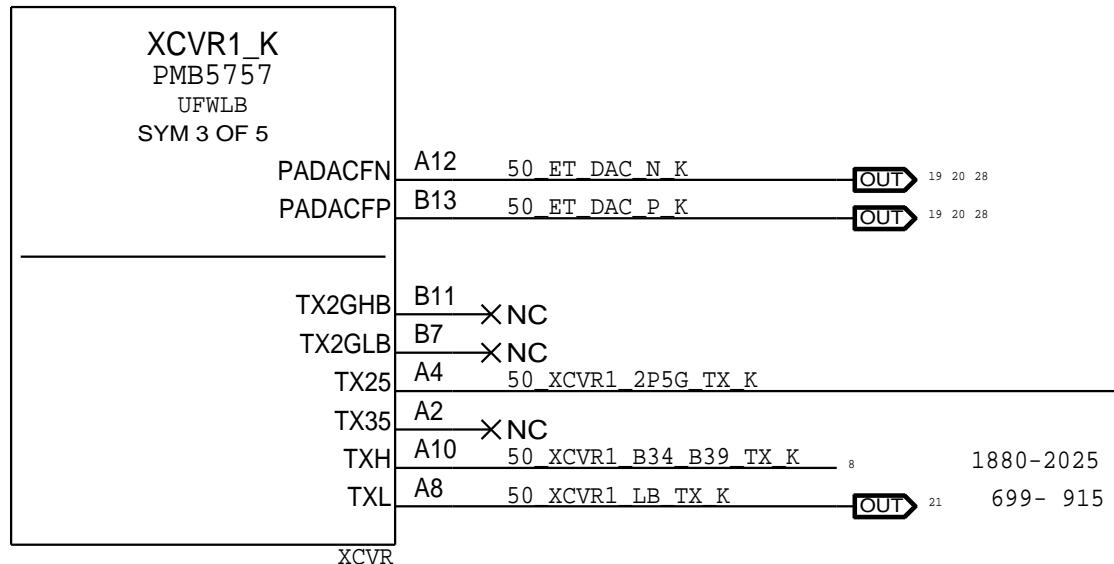
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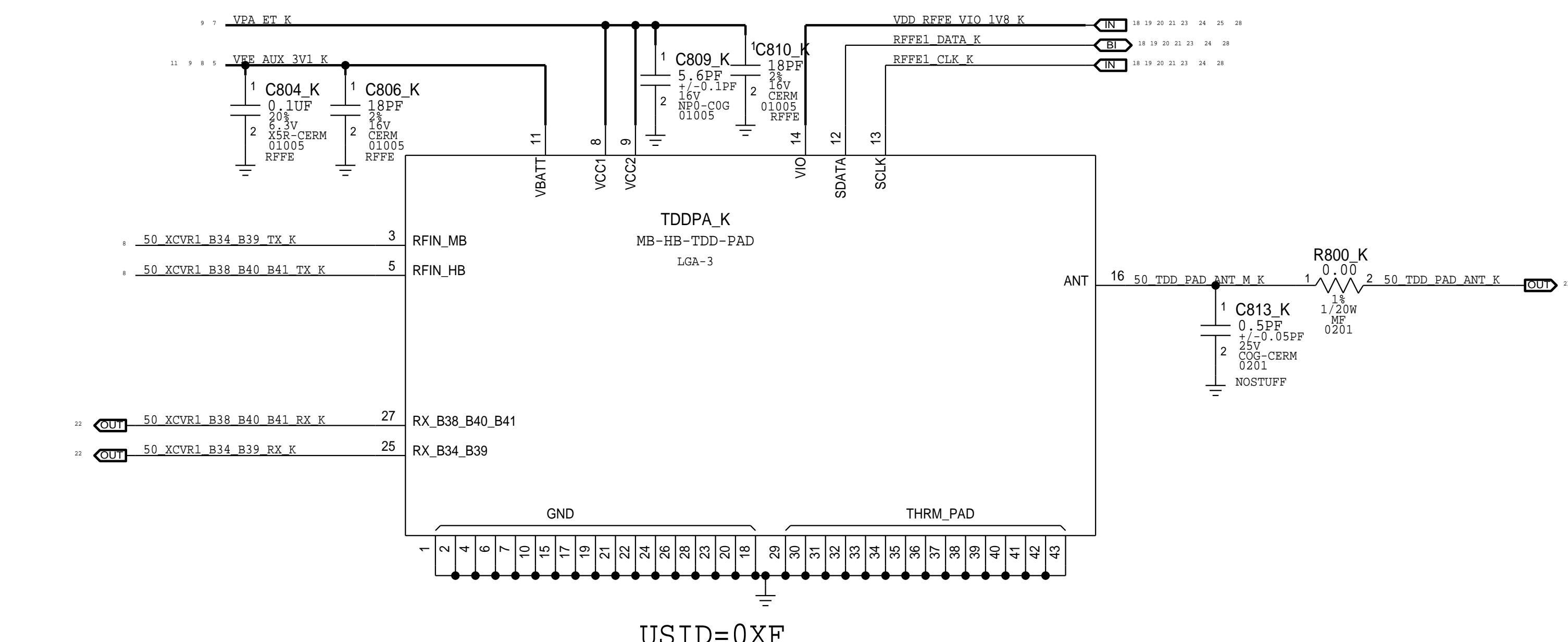
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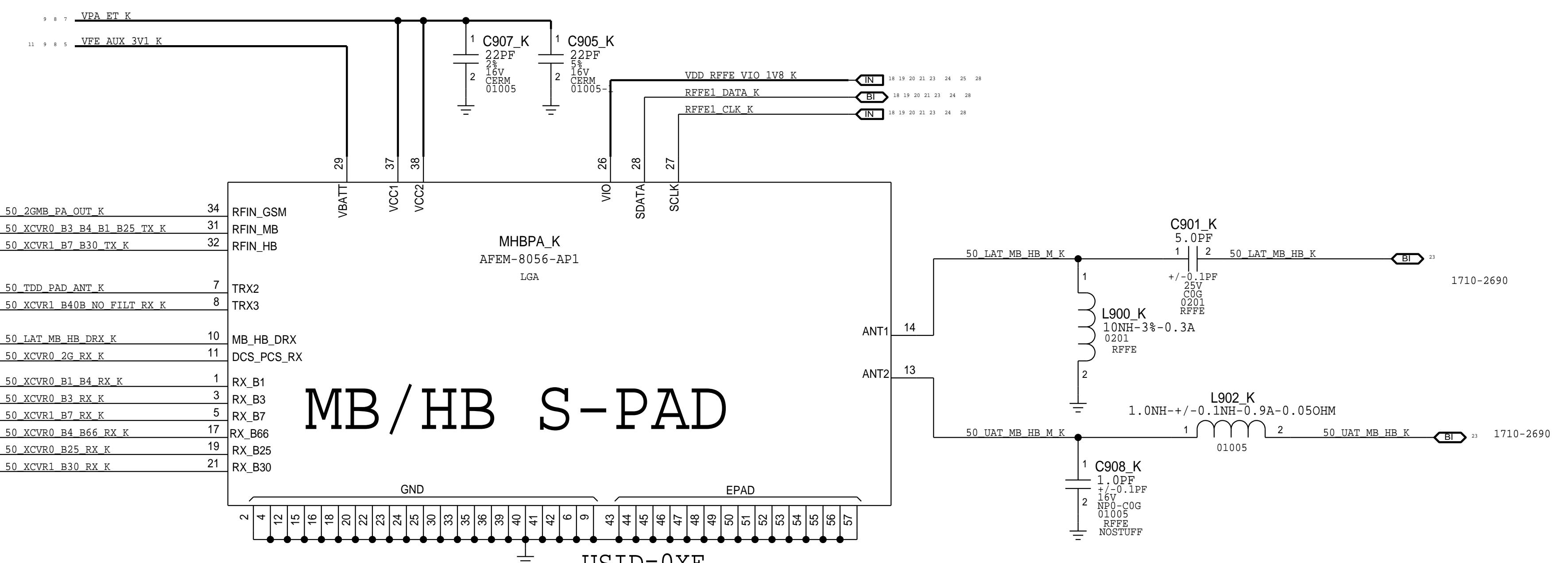
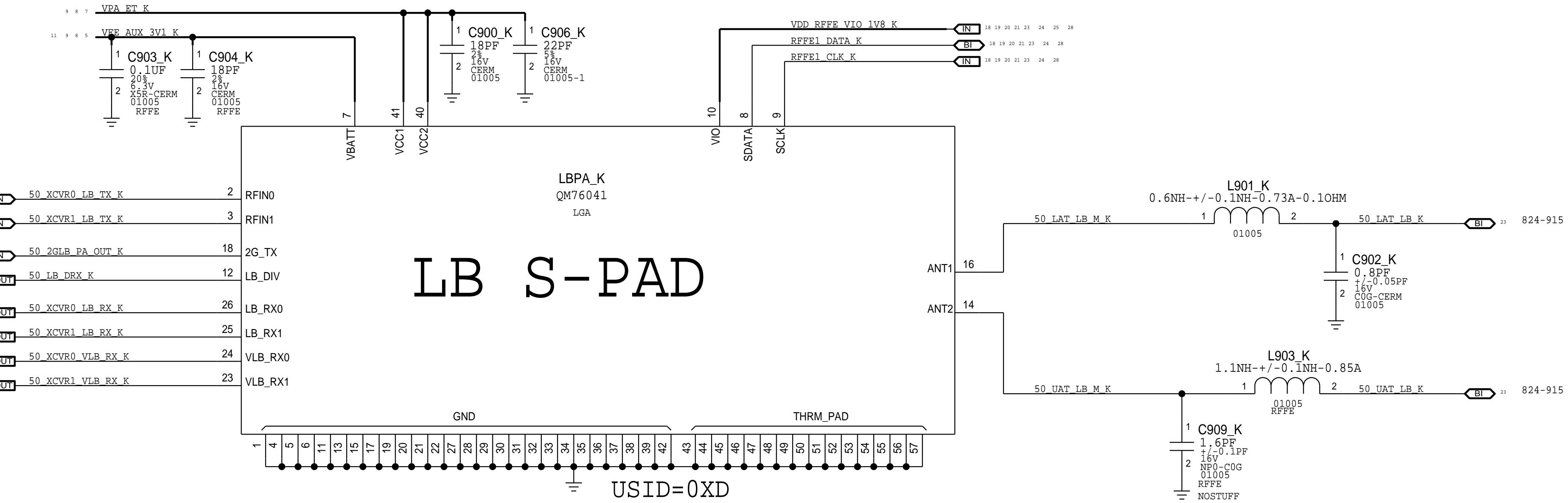
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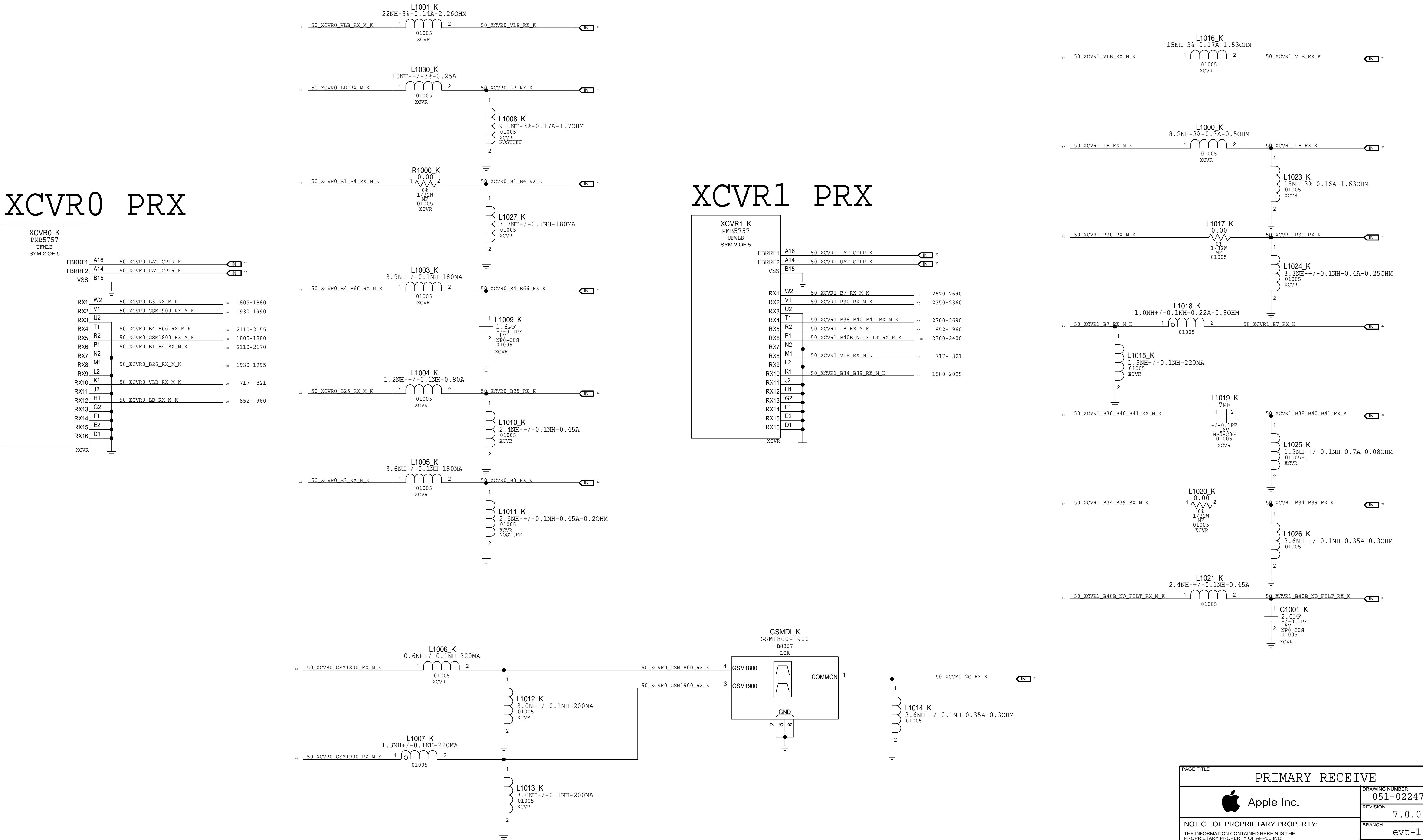
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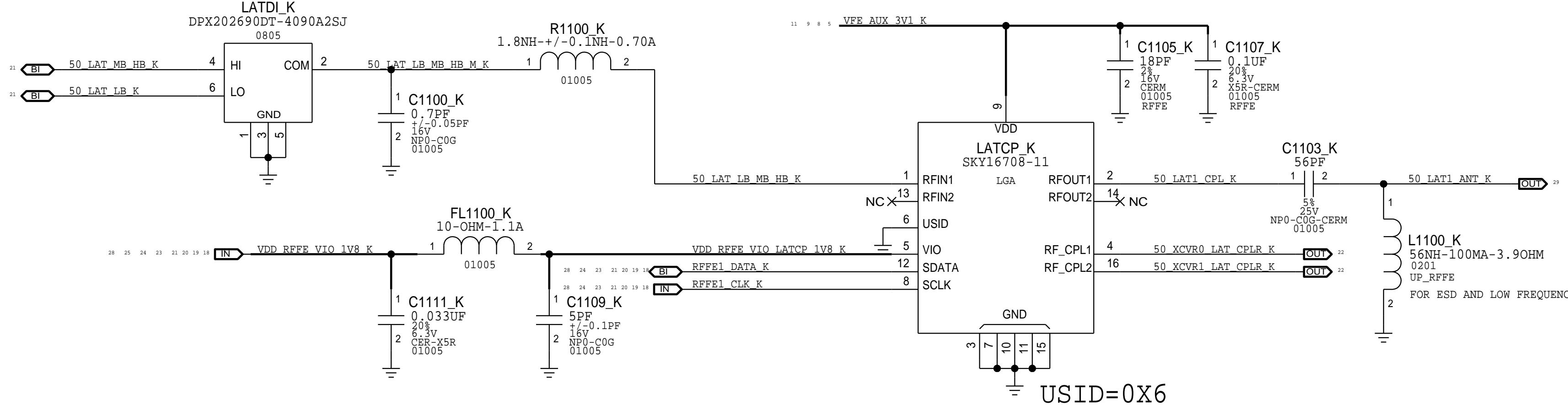


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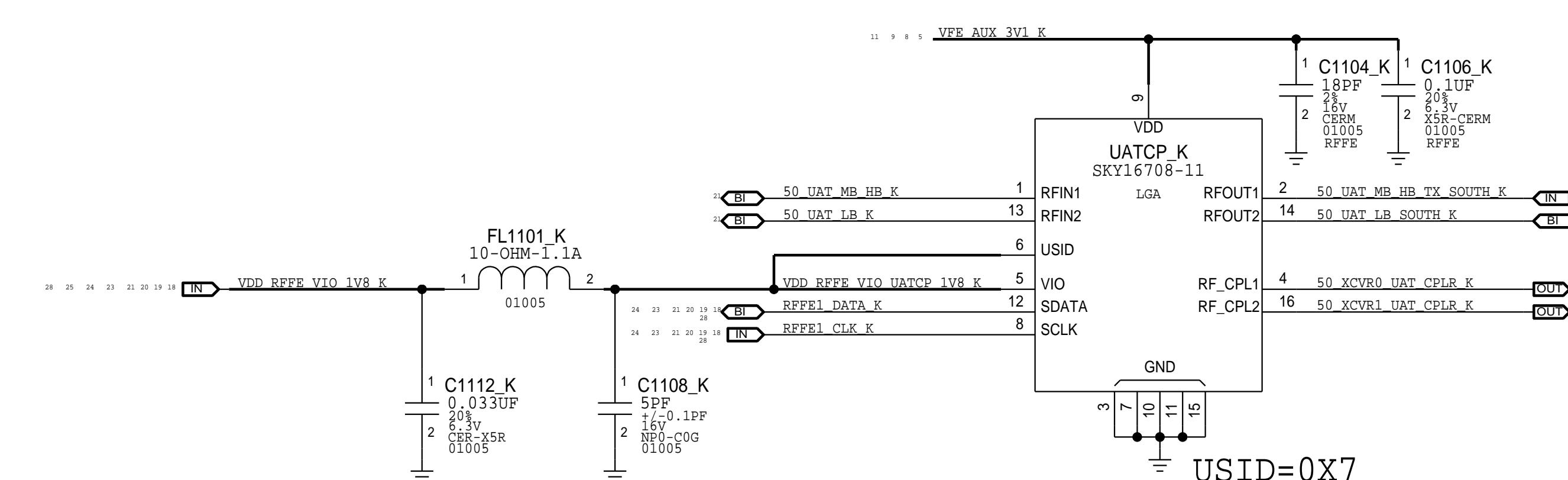
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LOWER ANTENNA AND COUPLER

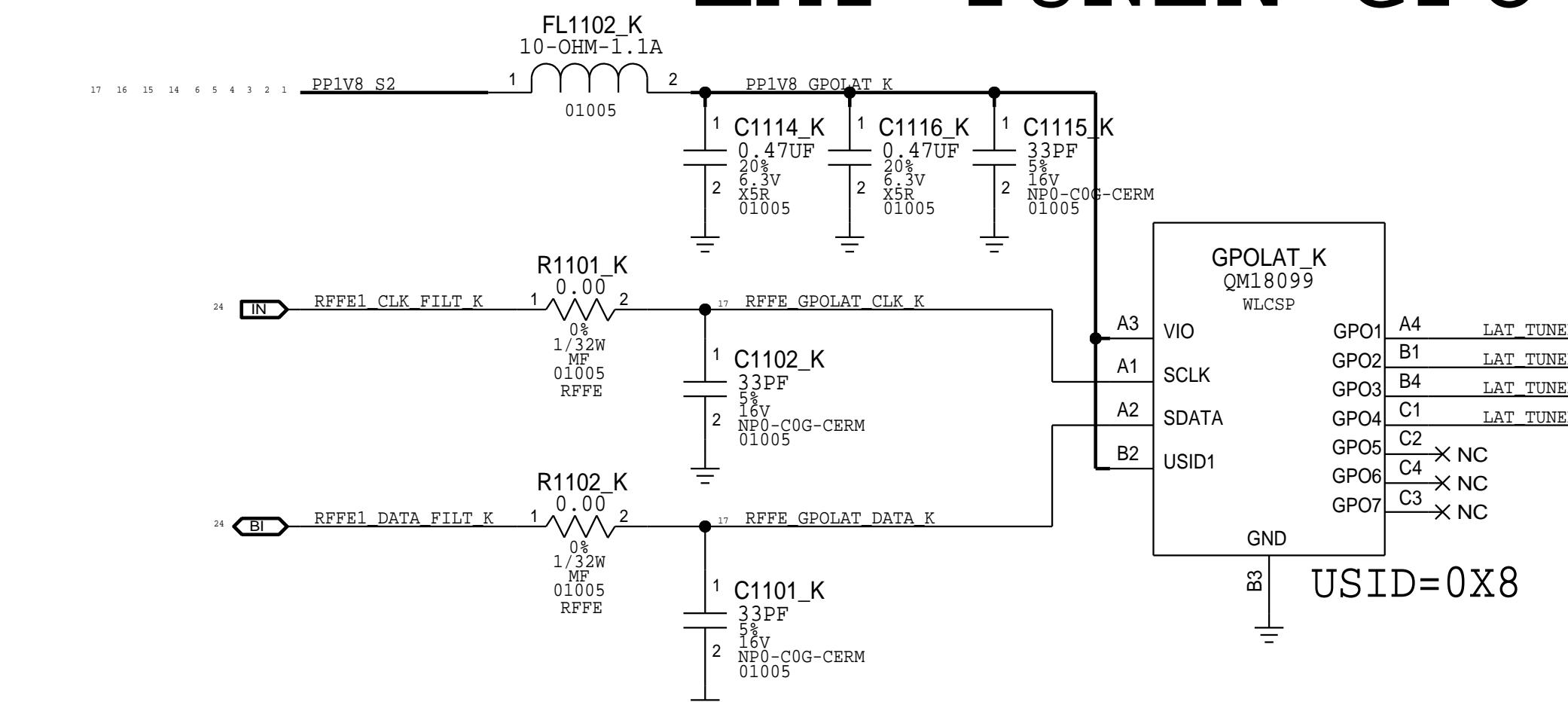
LOWER ANTENNA COUPLER



UPPER ANTENNA COUPLER



LAT TUNER GPO



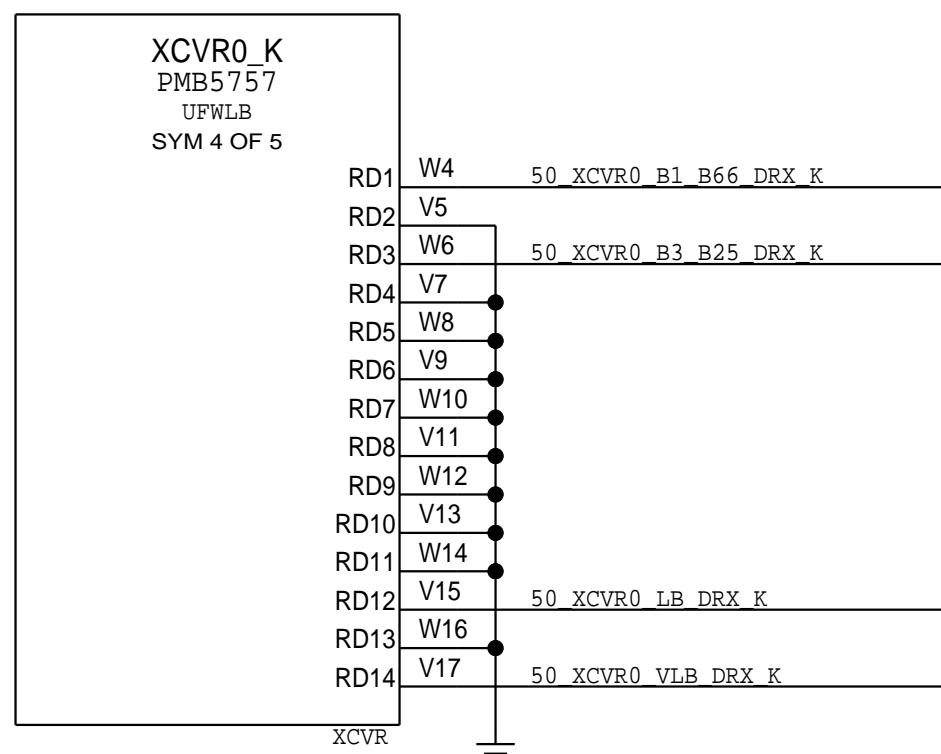
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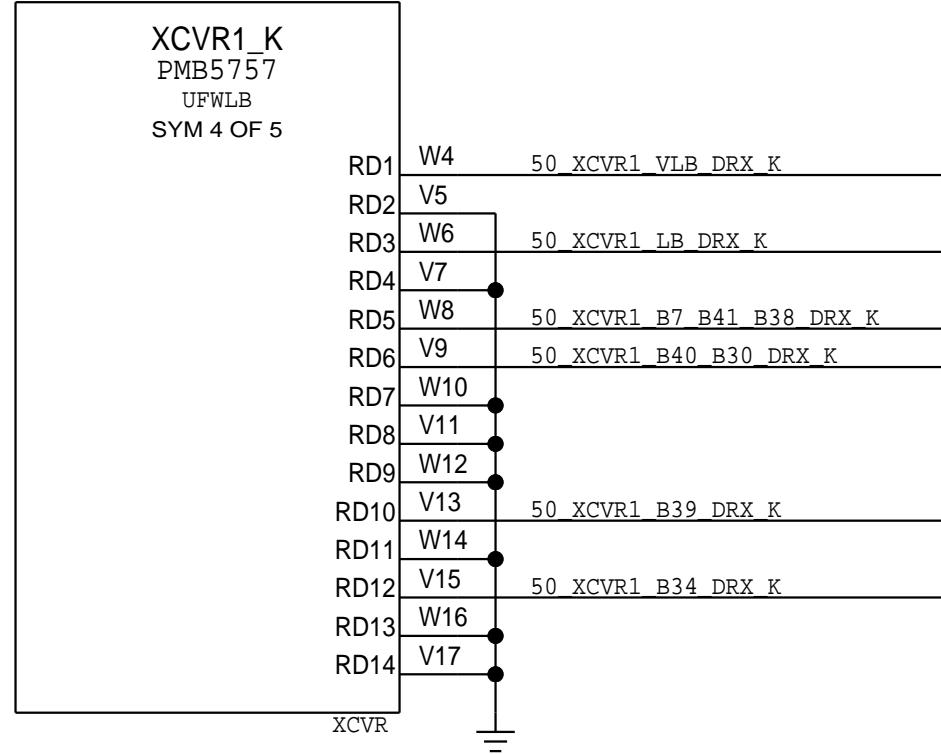
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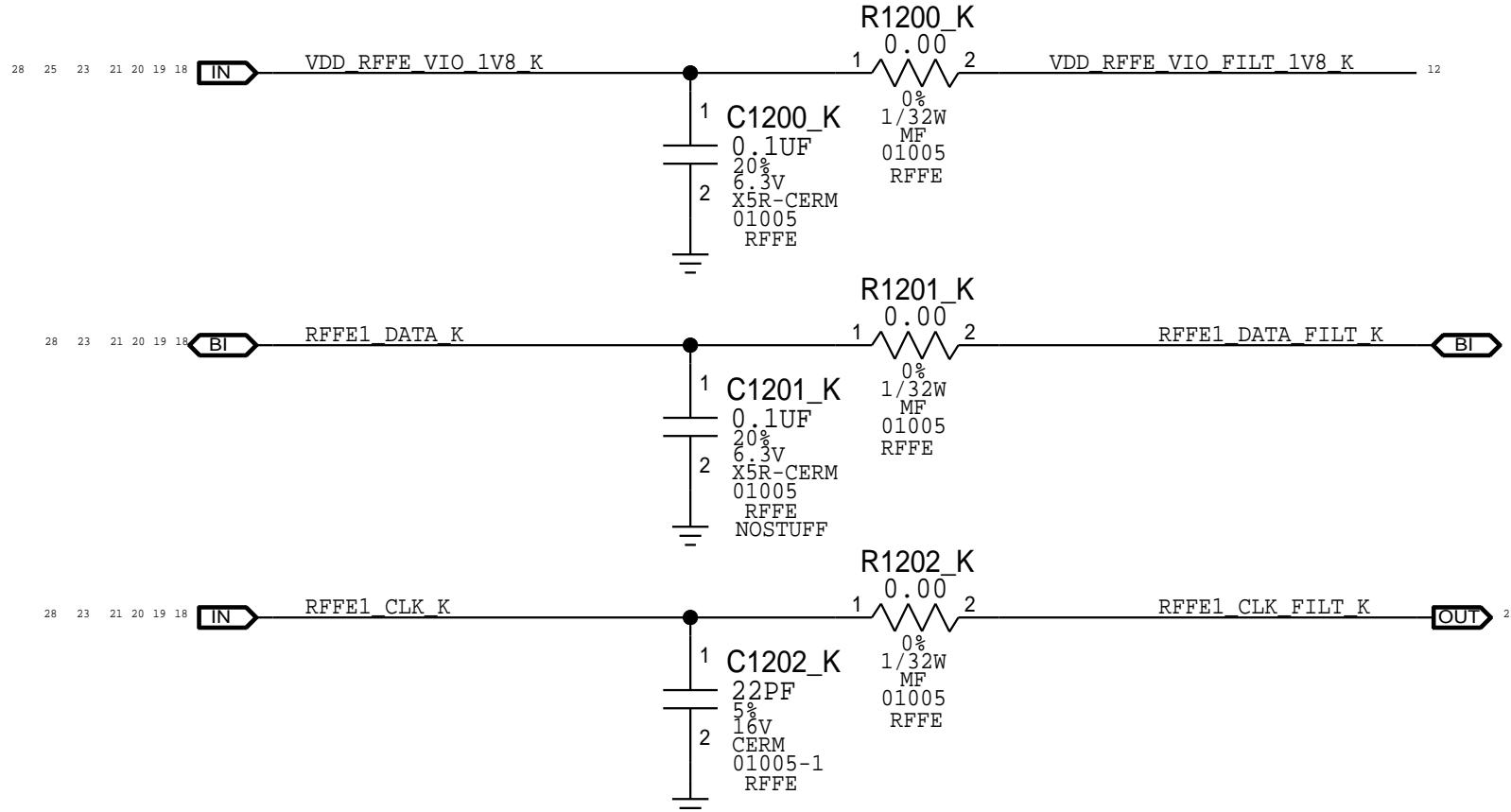
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XCVR1 DRX

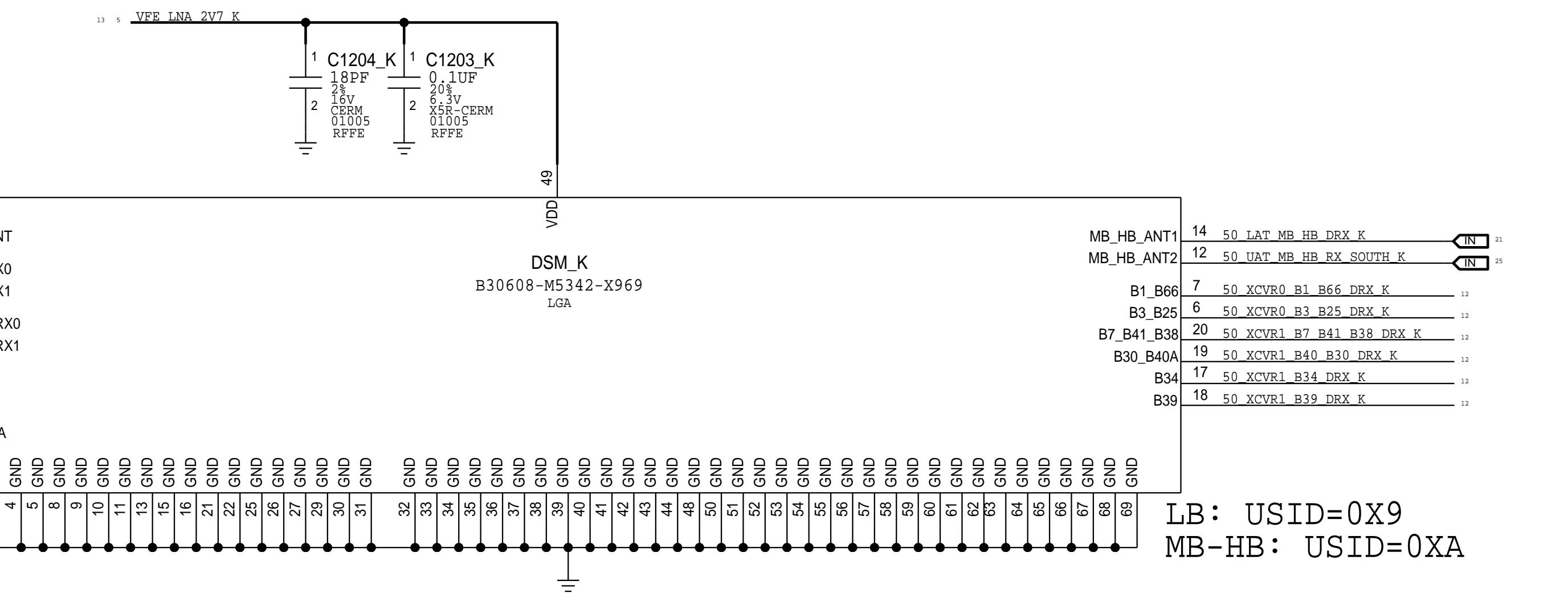


RFFE FILTERING



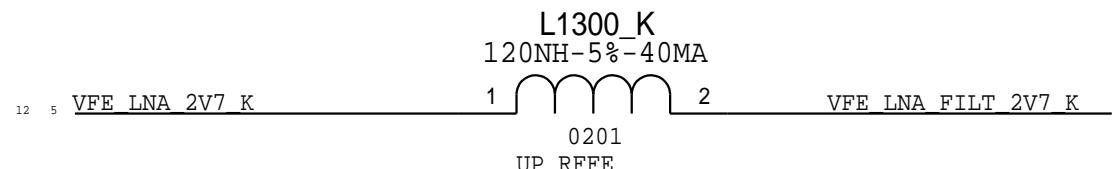
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DRX DSM

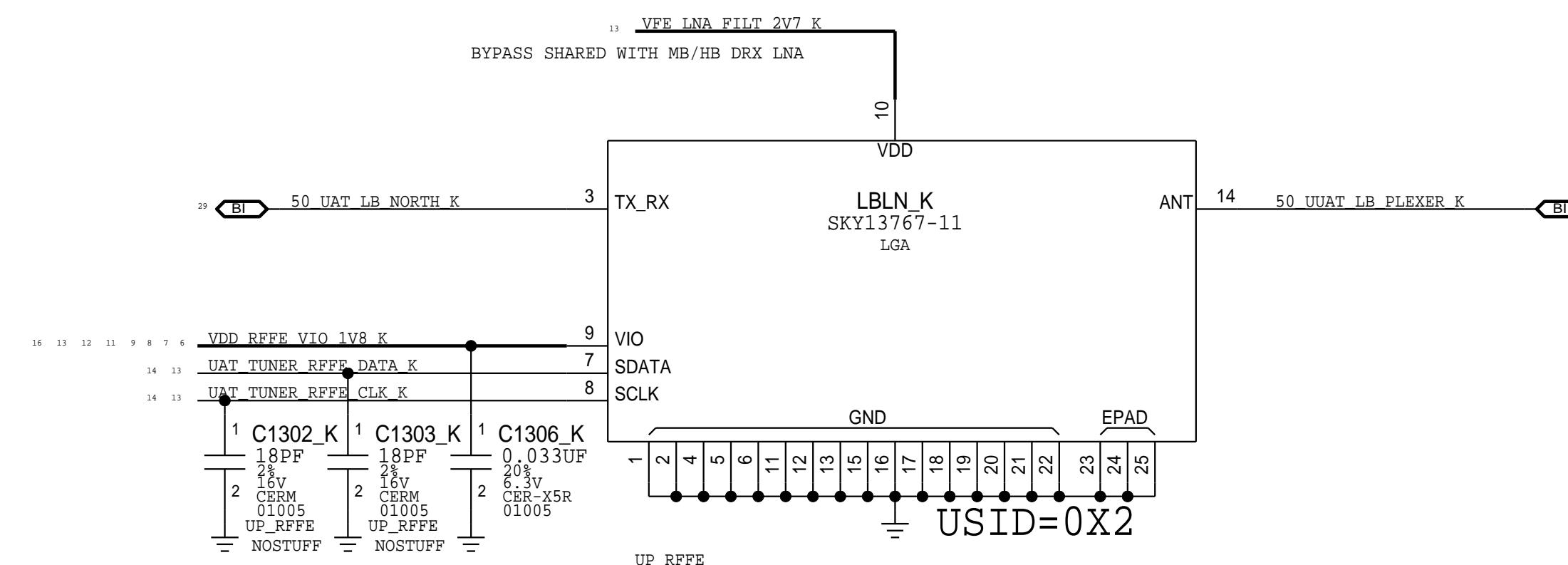


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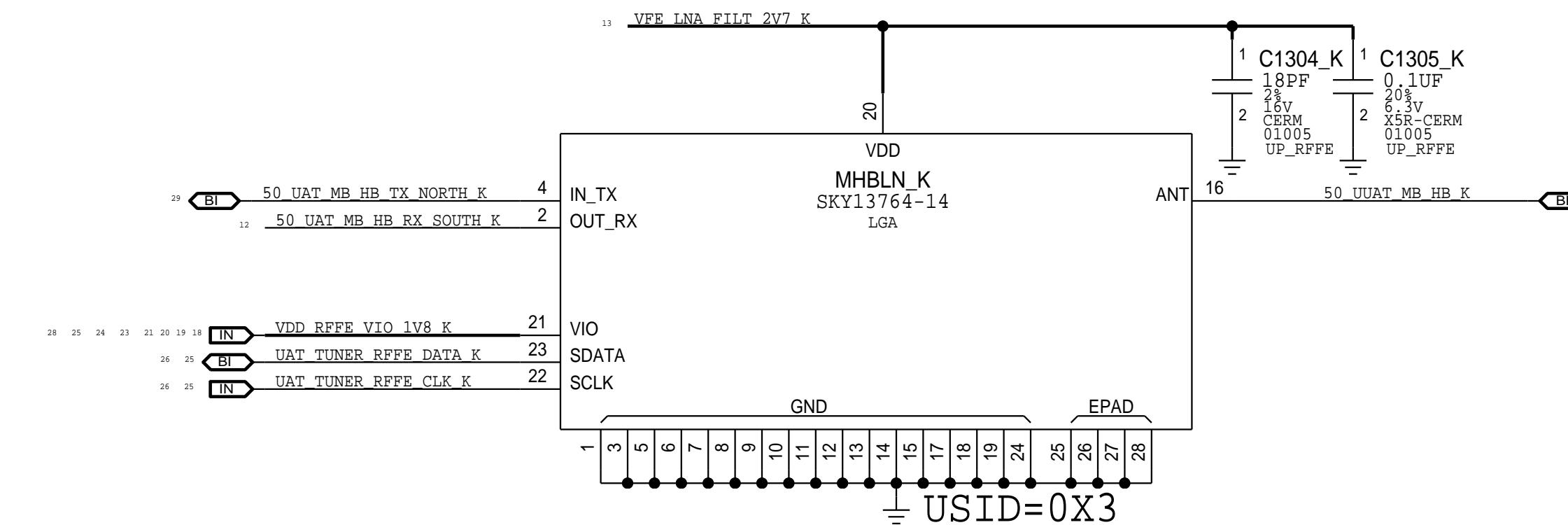
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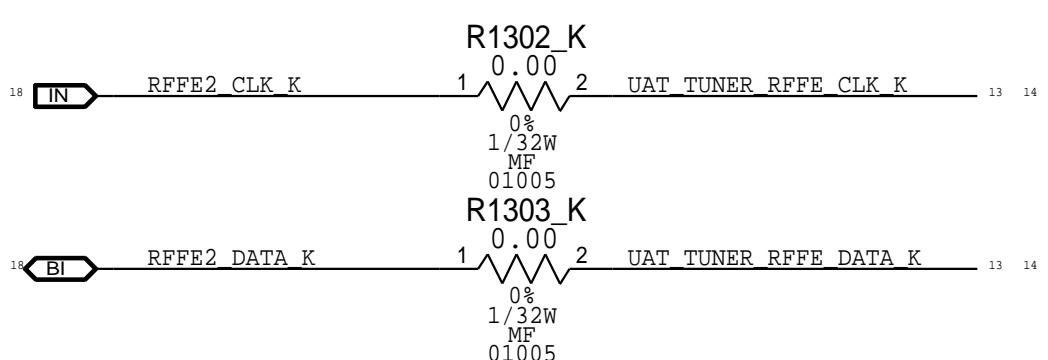
LB DRX LNA



MB / HB DRX LNA



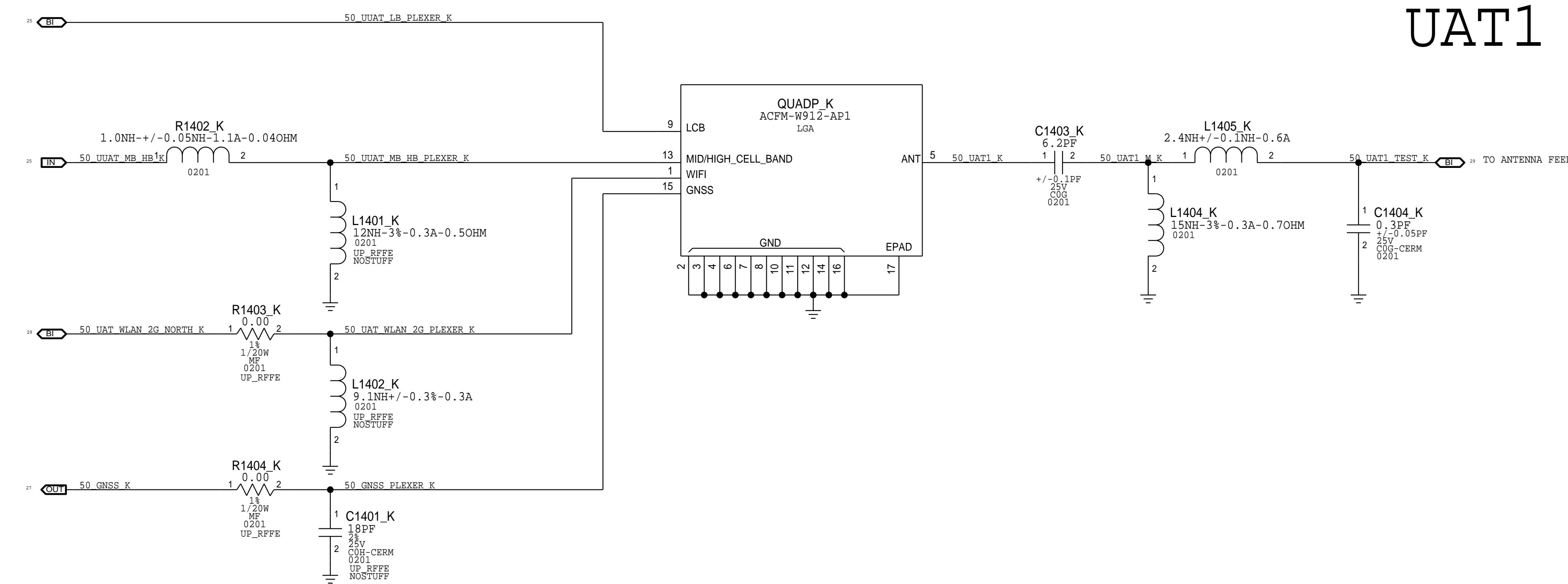
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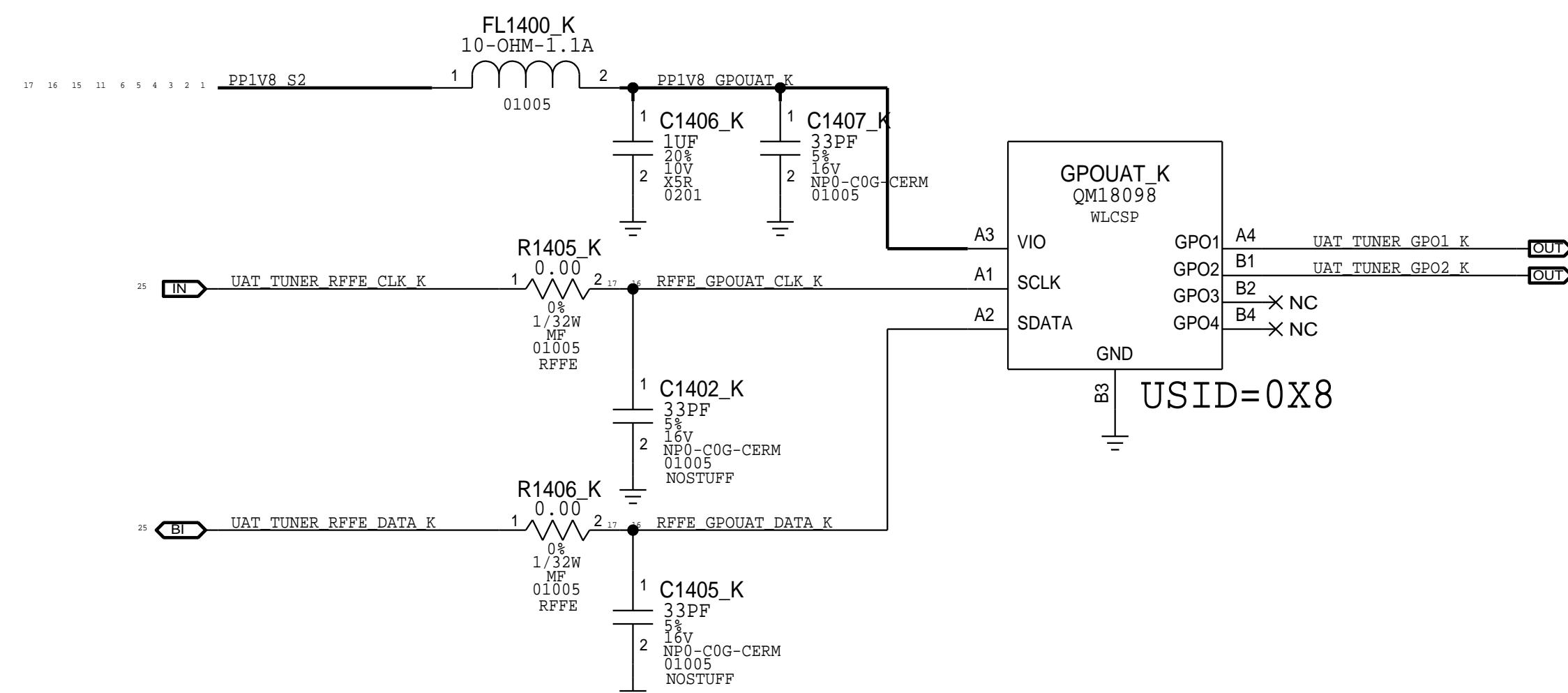
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UPPER ANTENNA FEEDS



UAT TUNER GPO



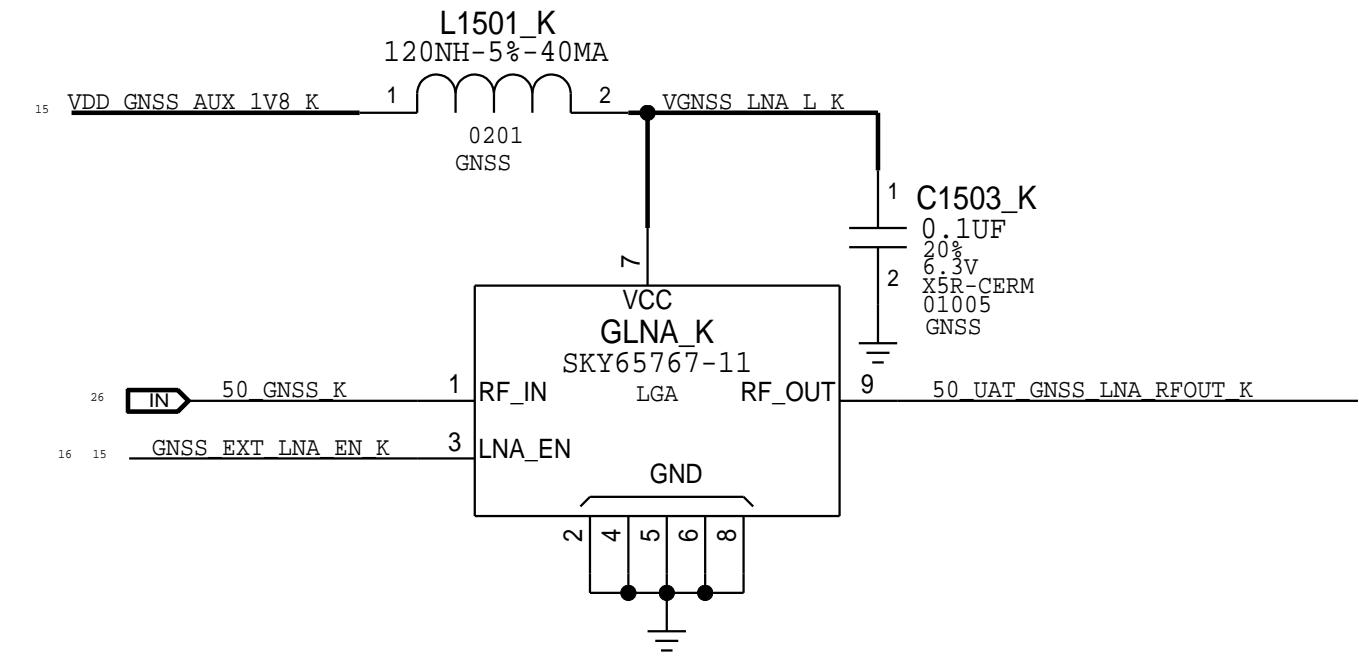
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GNSS LNA + RECEIVER

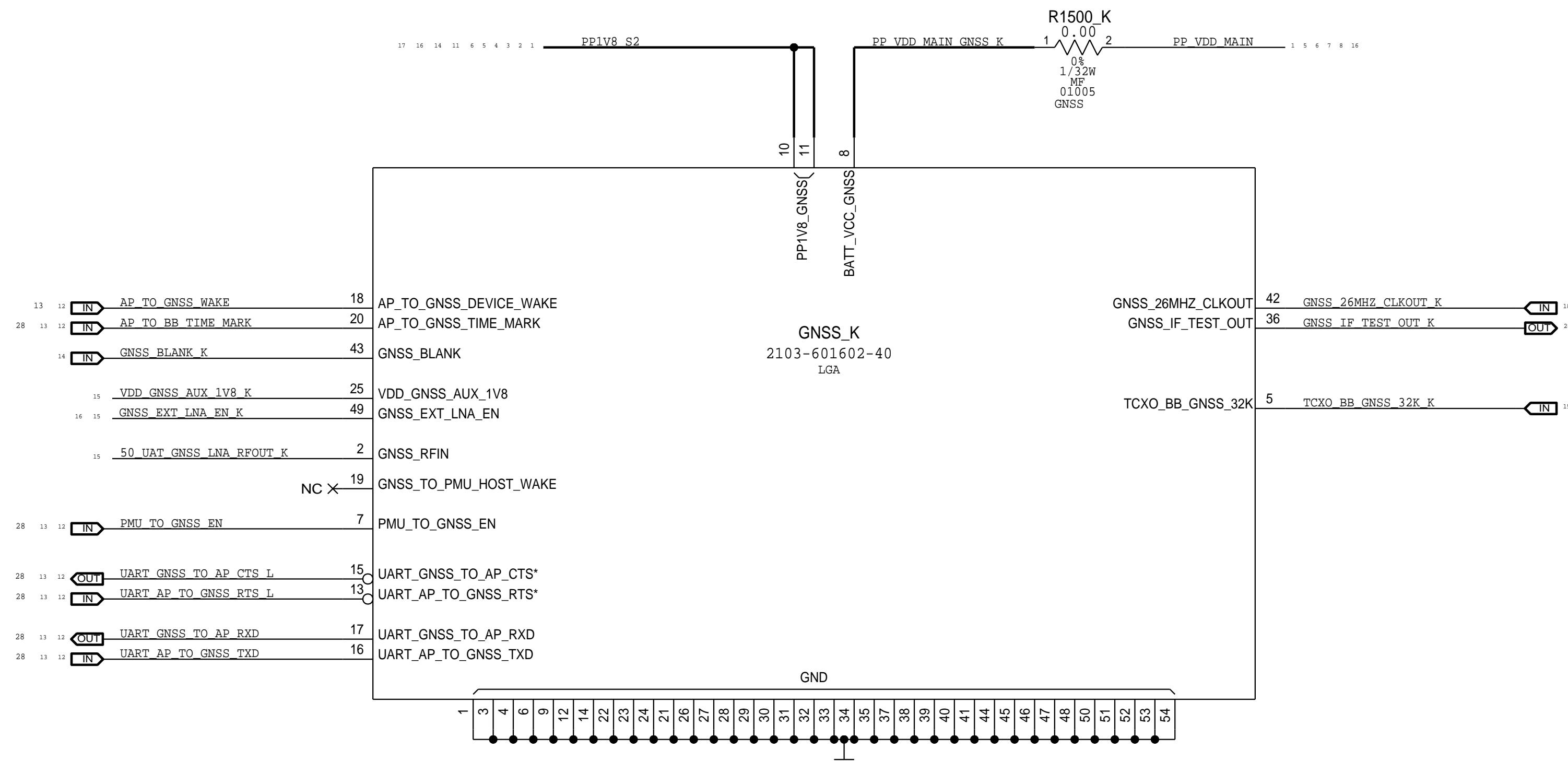
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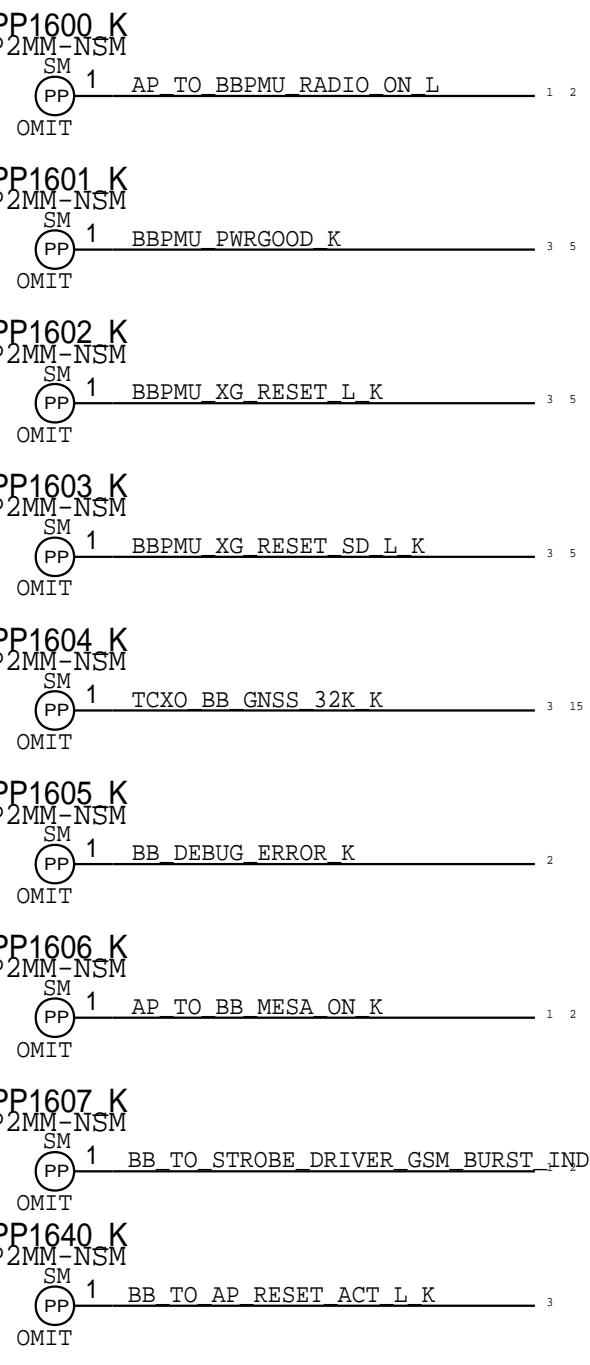
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MLB TEST POINTS

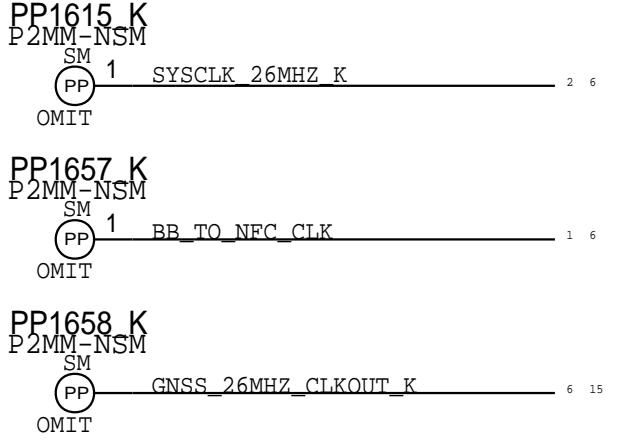
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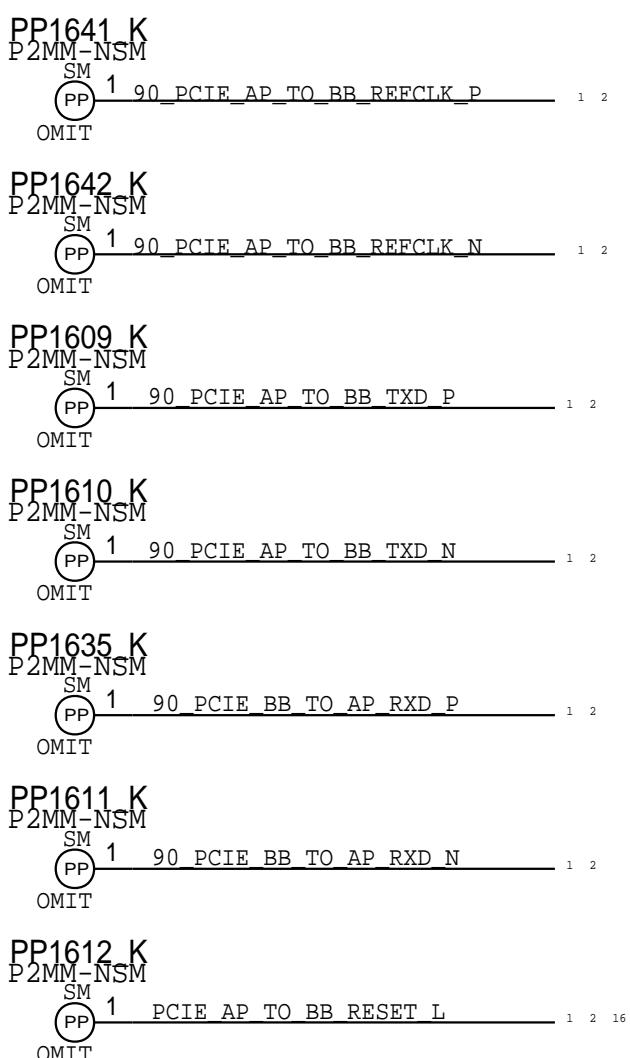
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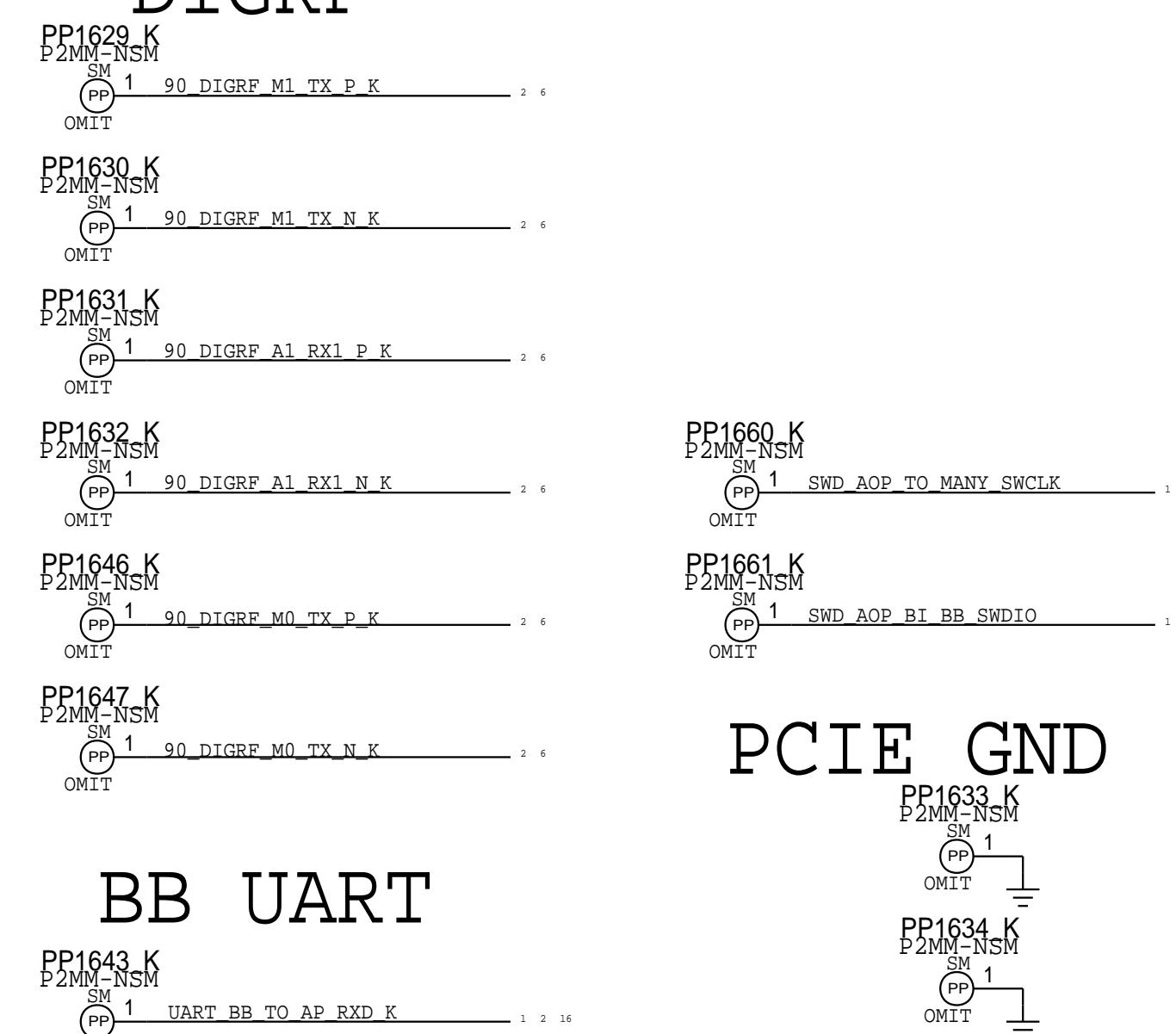
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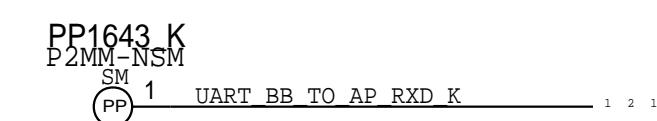
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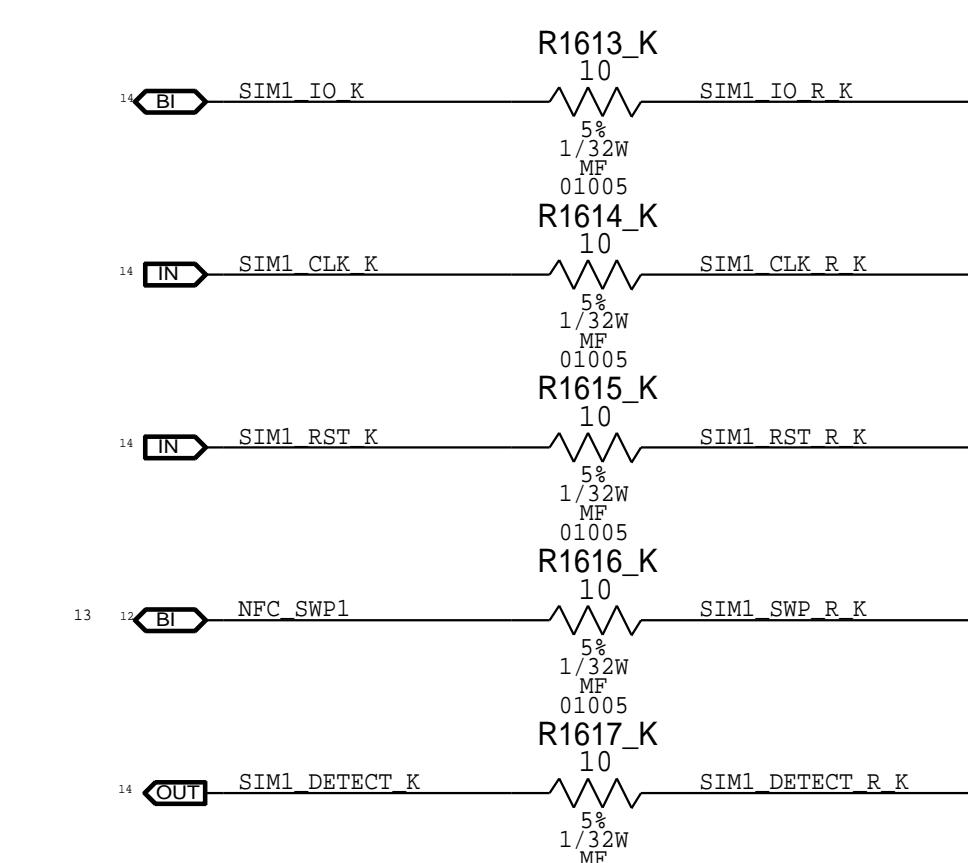
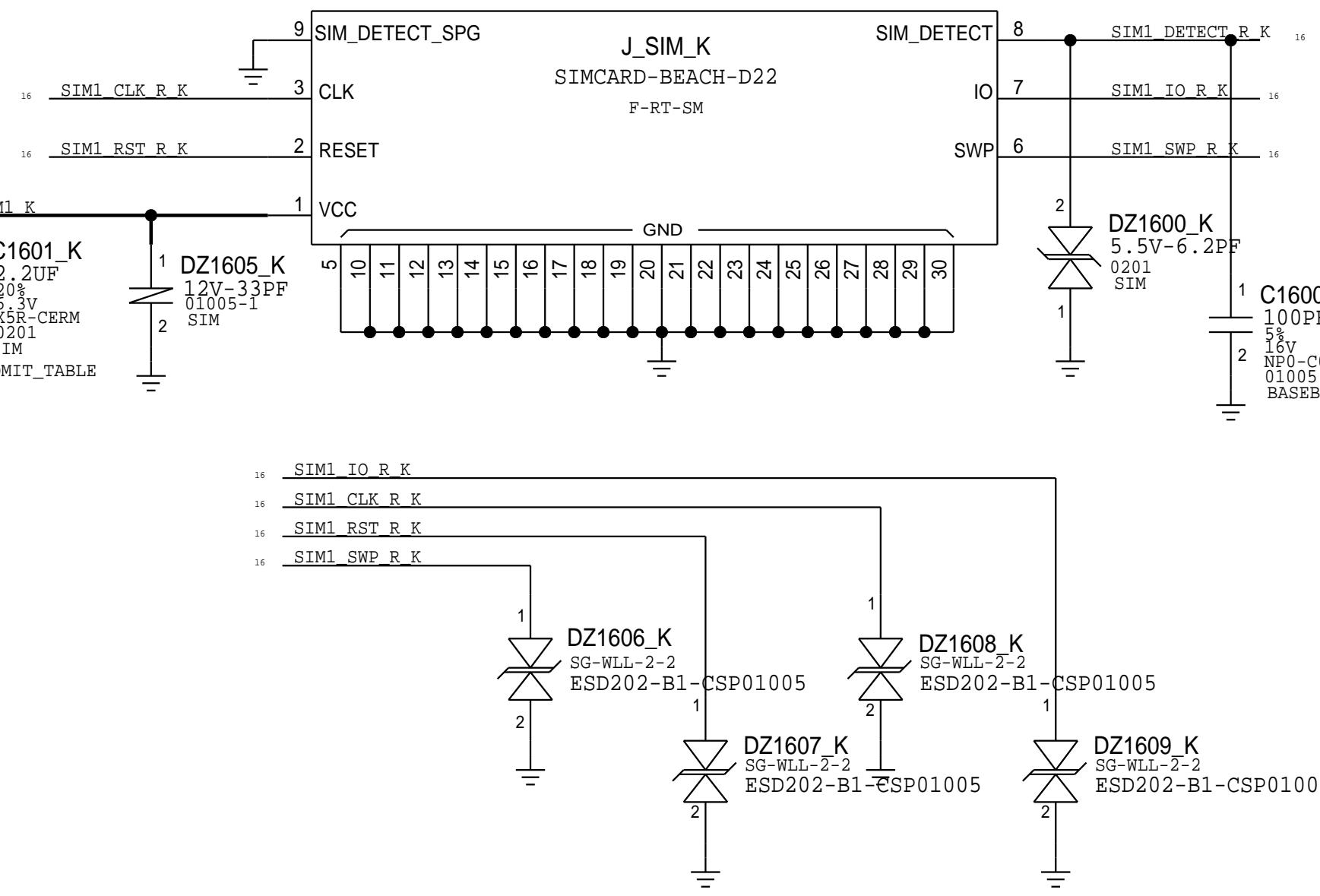
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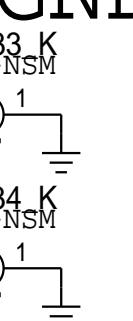
BB UART



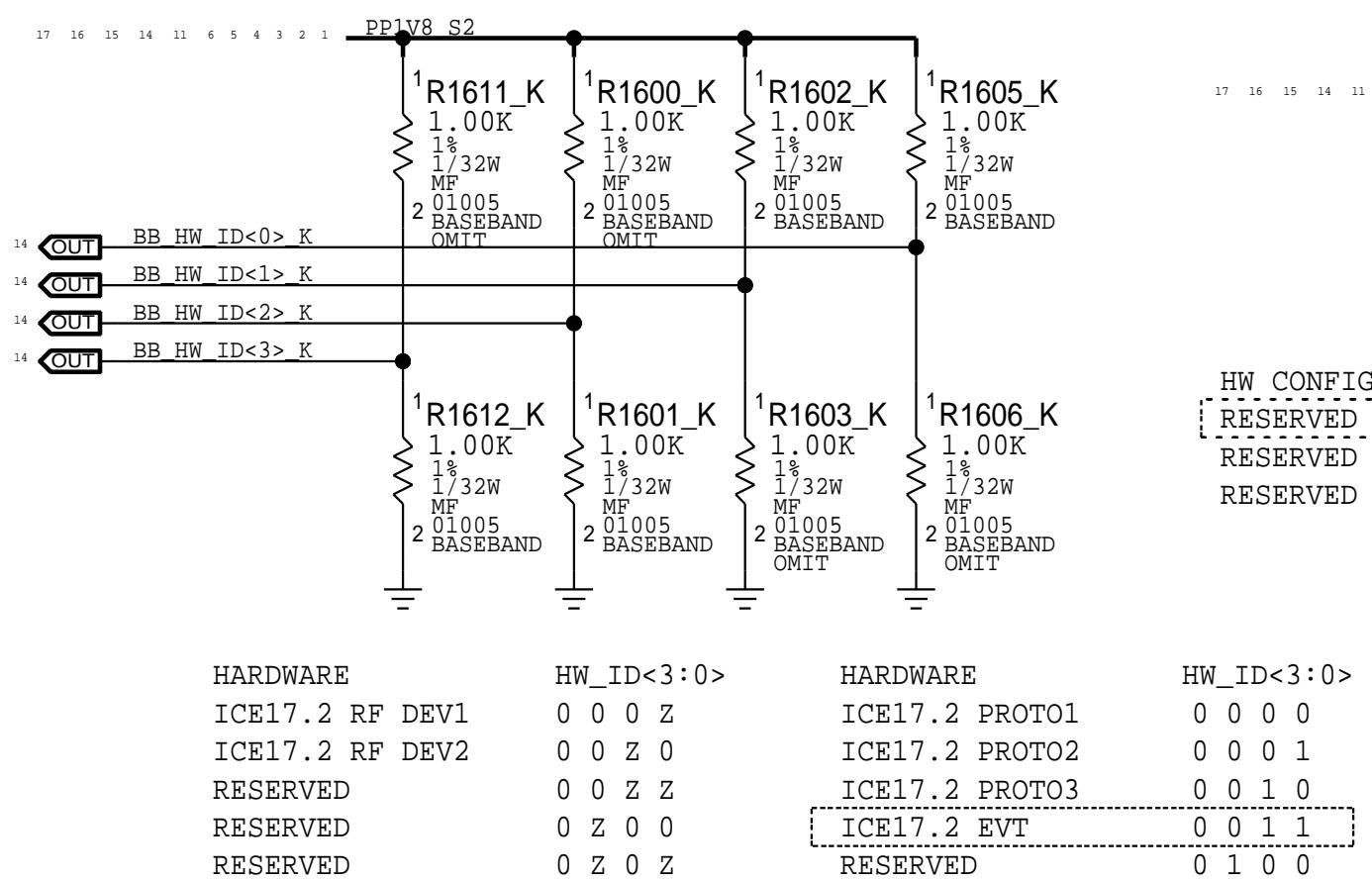
SIM CARD CONNECTOR



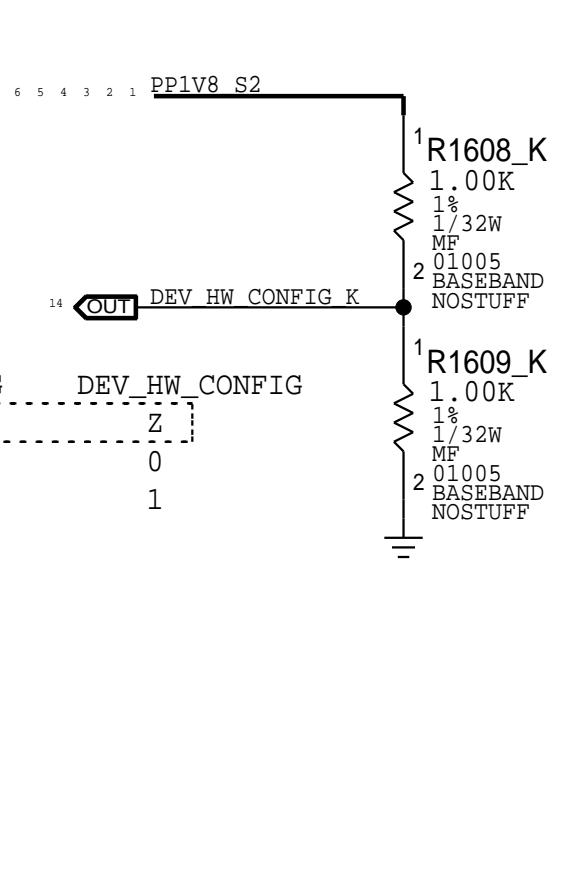
PCIE GND



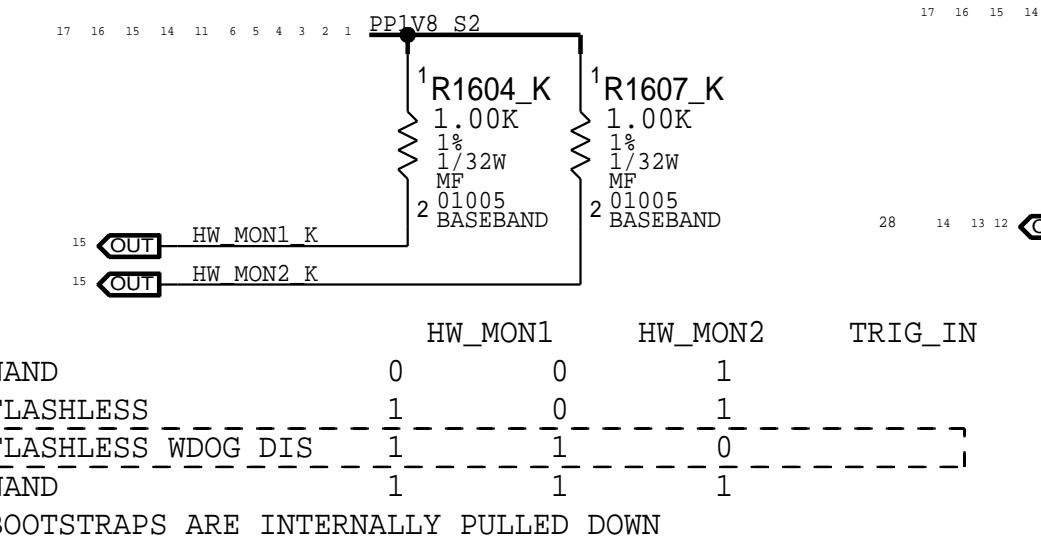
HARDWARE ID



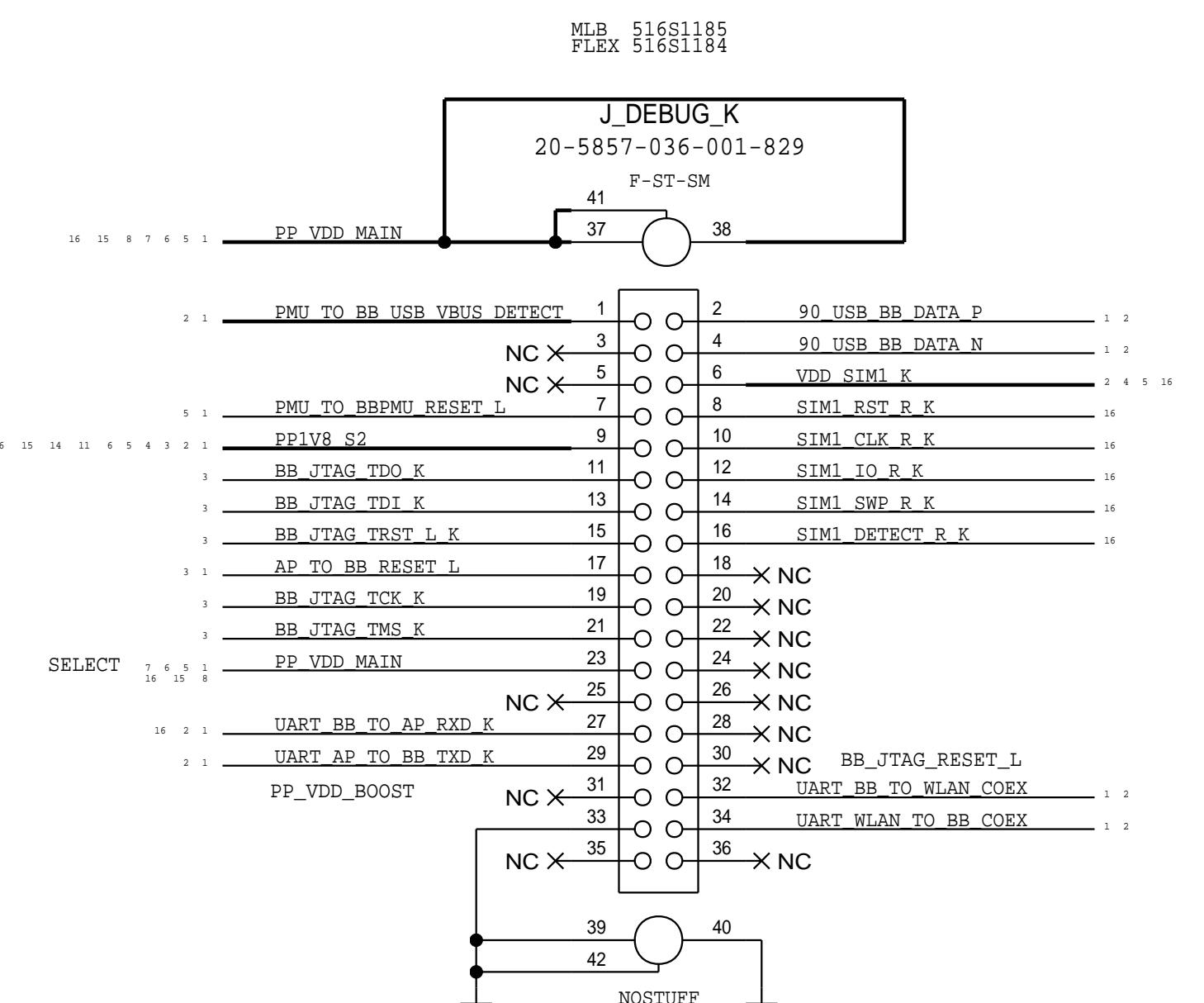
DEV CONFIG



BOOTCFG



DEBUG CONNECTOR

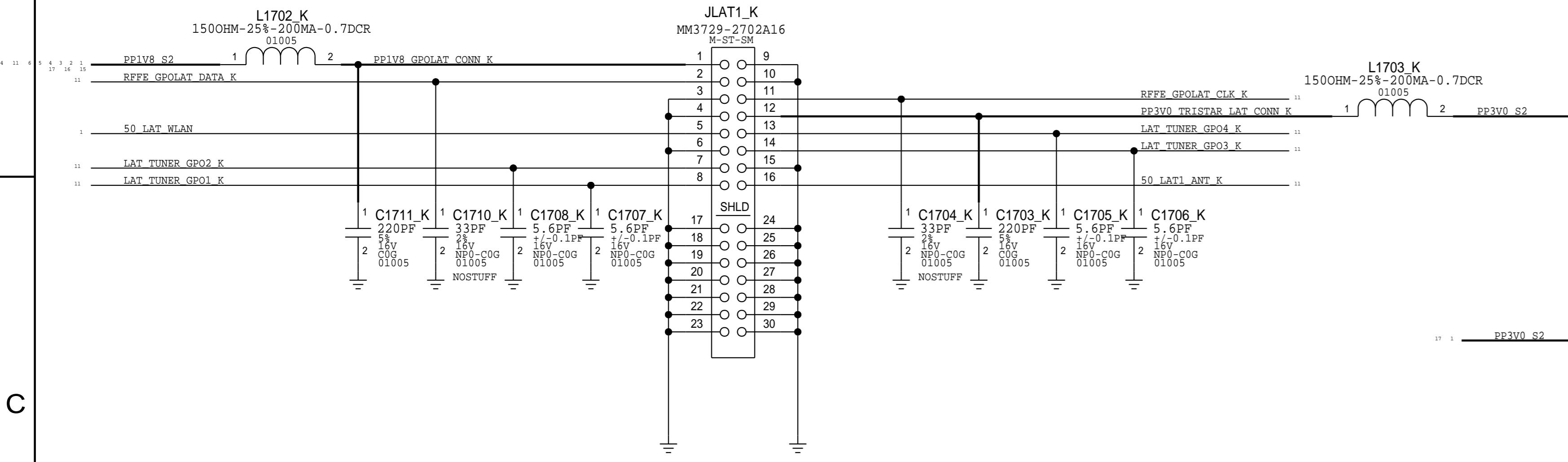


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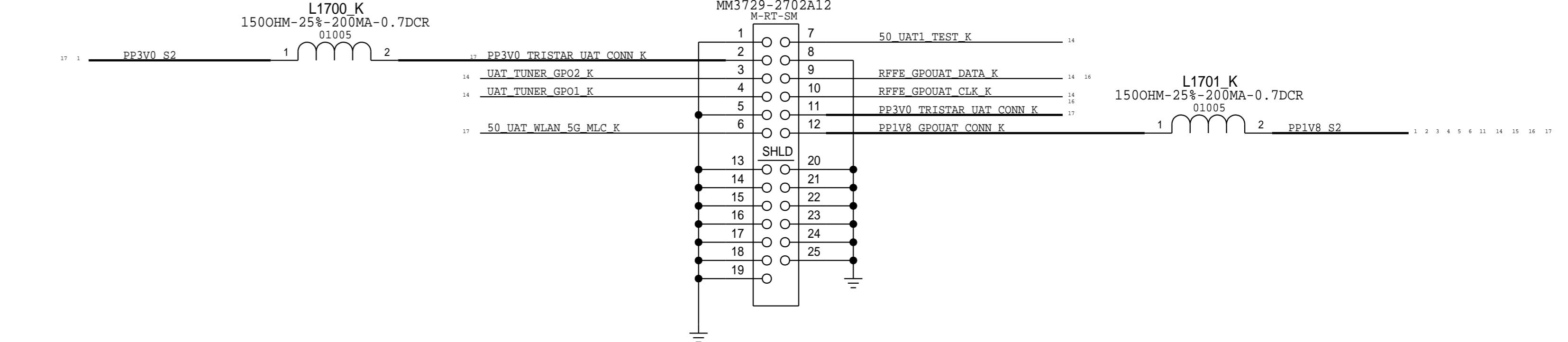
RF CONNECTORS AND METROCIRC

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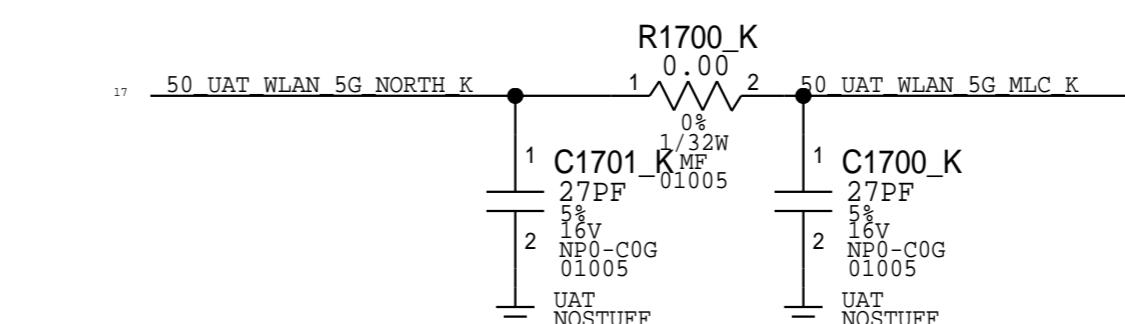
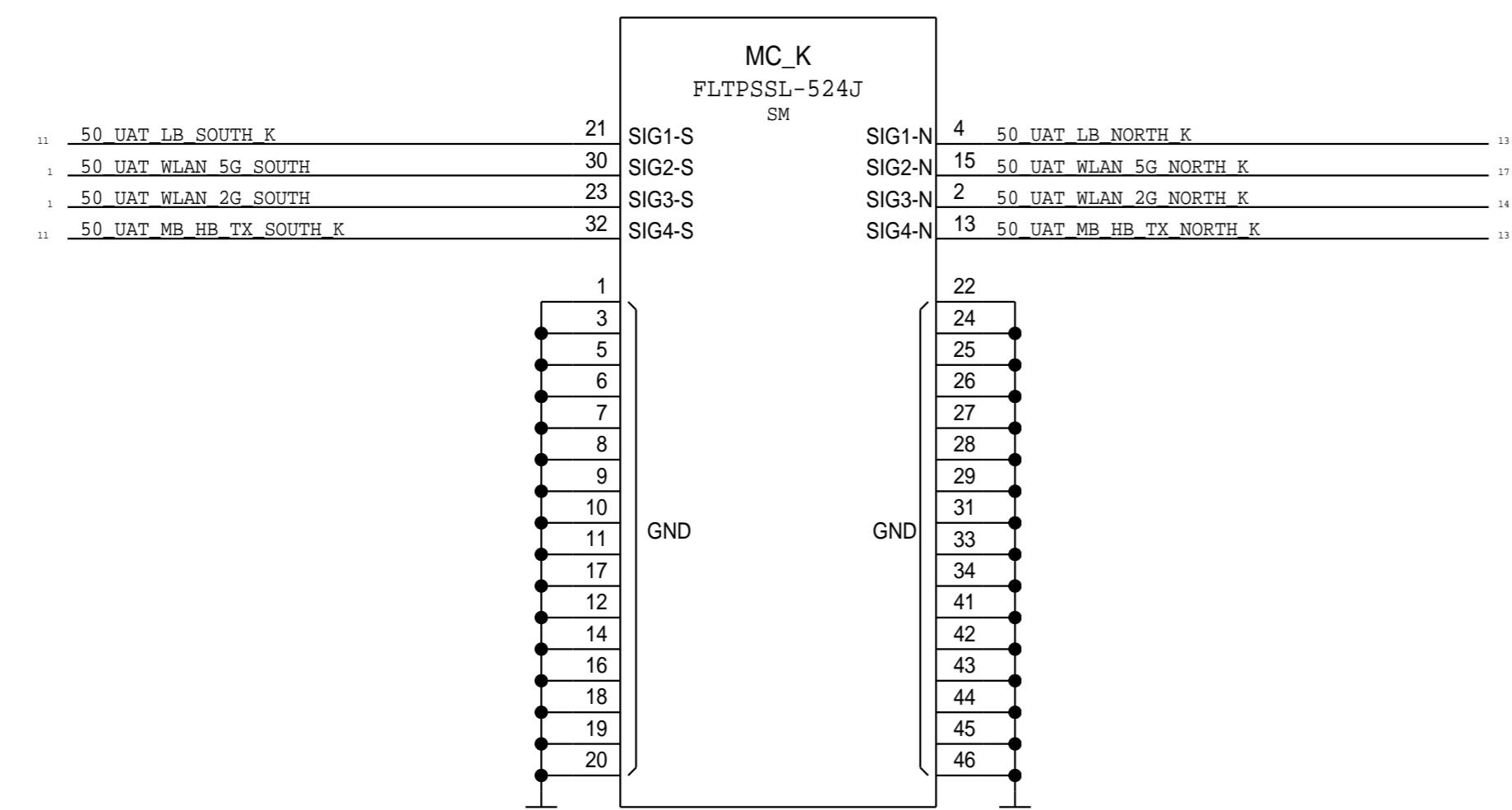
LAT MLC



UAT1 MLC



4-IN-1 METROCIRC CABLE



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REV	ECN	DESCRIPTION OF REVISION	CK APPD DATE
7	0008448938	ENGINEERING RELEASED	2017-04-11

D22/D221 WIFI_MLB (GUINNESS)

APR 03, 2017

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 31 12 WLAN_TO_AP_TIME_SYNC

CONTROL

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 31 1 UART_WLAN_TO_AP_CTS_L
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COEX

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 31 12 UART_WLAN_TO_BB_COEX
 31 1

ANTENNA

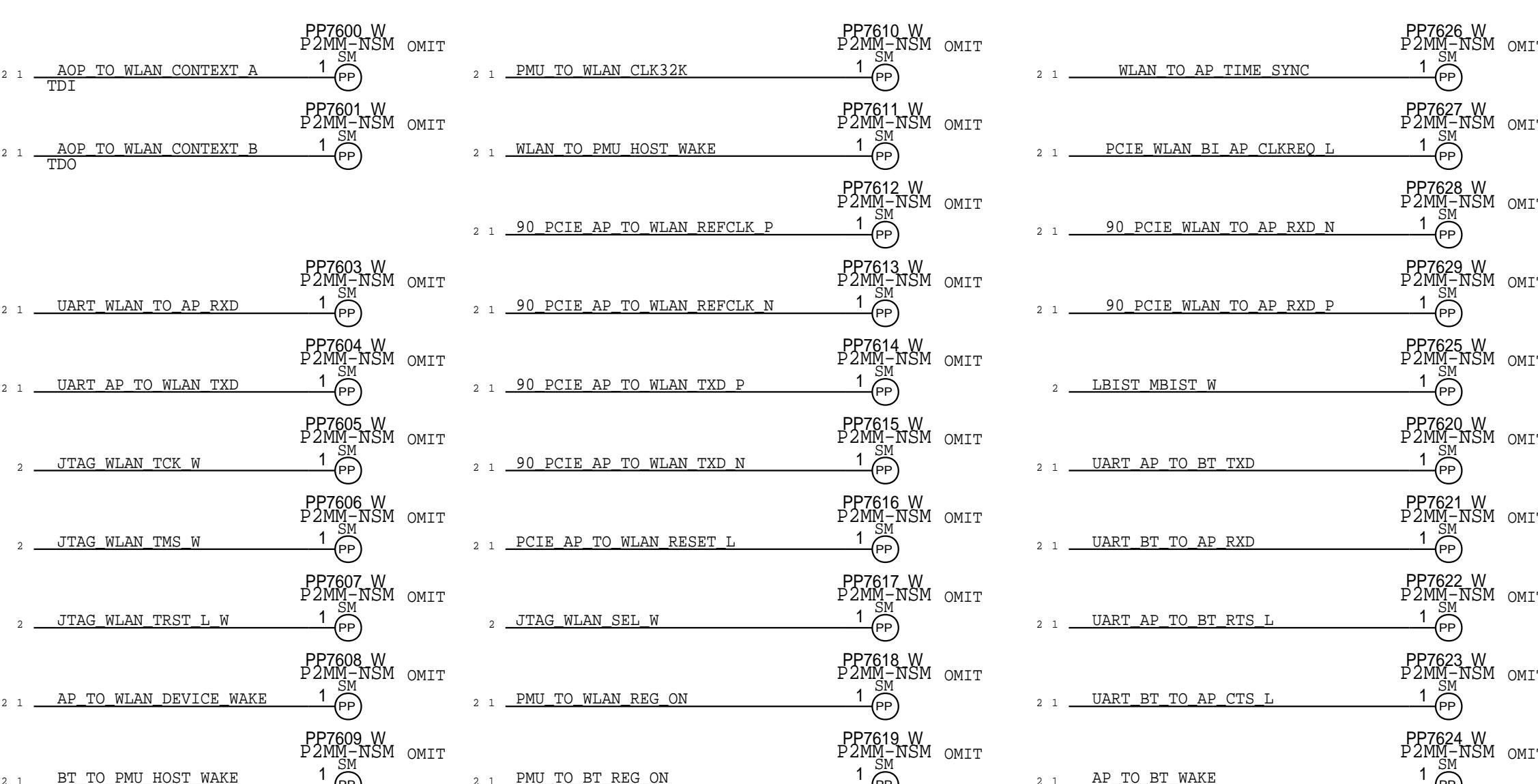
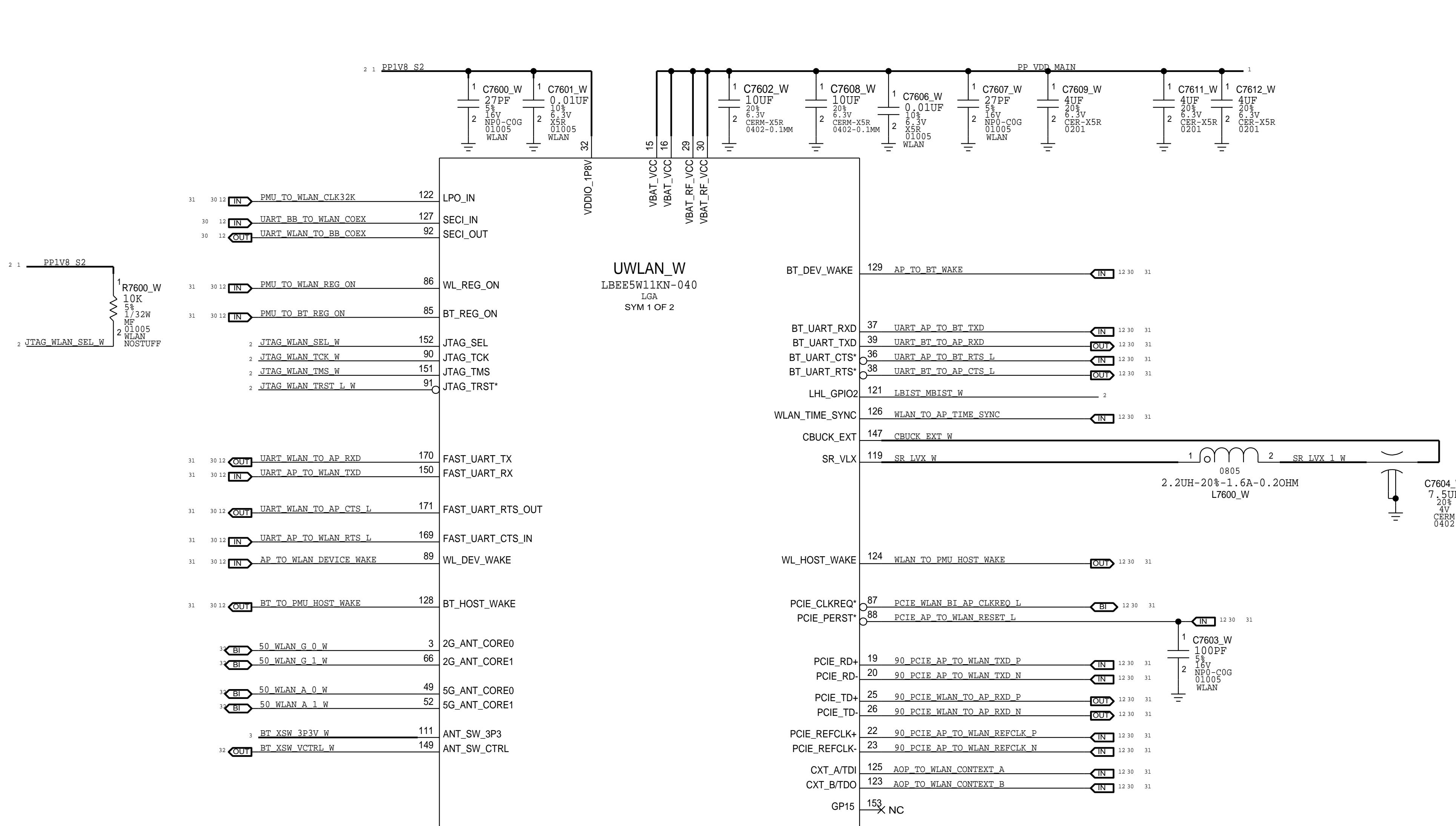
3 50_UAT_WLAN_2G_SOUTH
 3 50_UAT_WLAN_5G_SOUTH
 3 50_LAT_WLAN

SymbolPorts

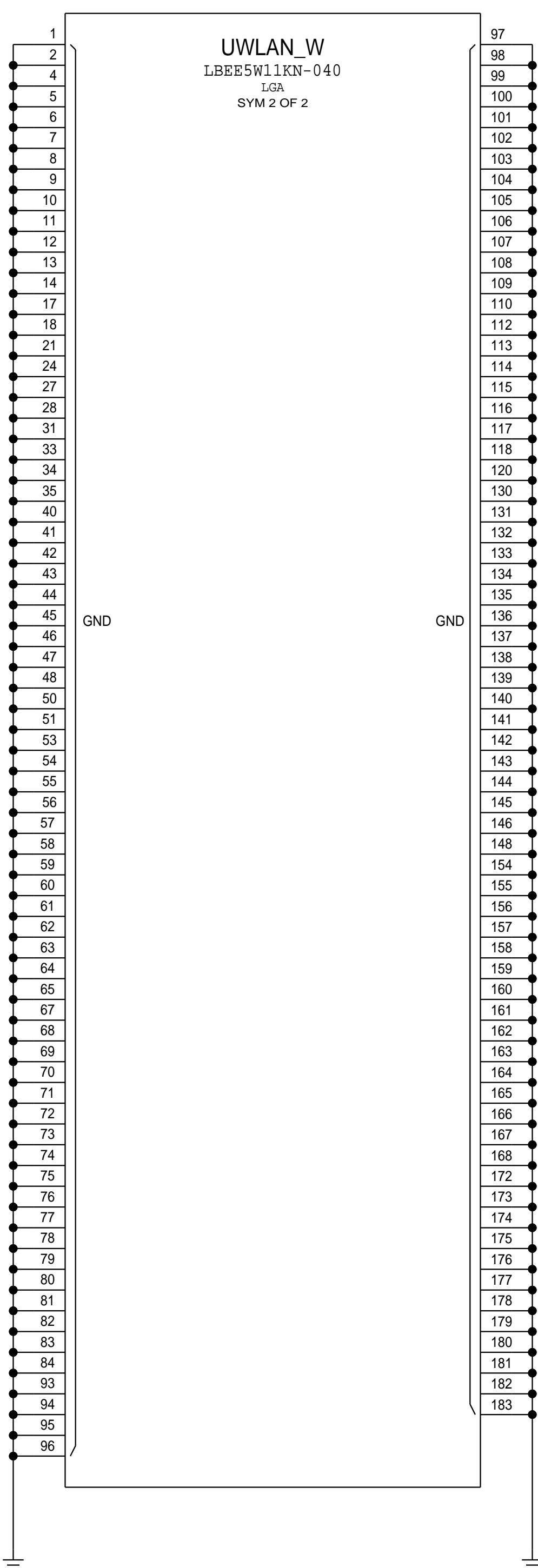
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WIFI / BT

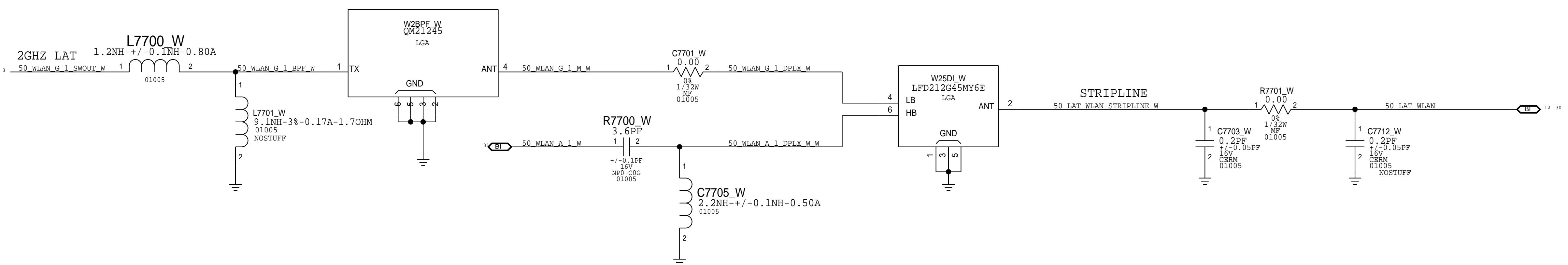


PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
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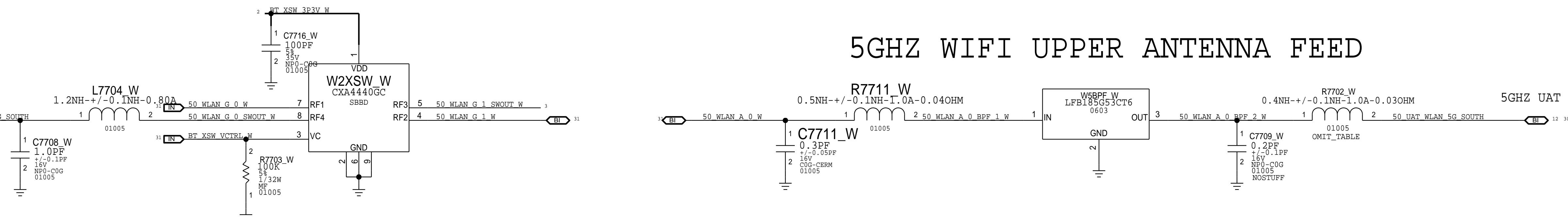


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WIFI LOWER ANTENNA FEED



5GHZ WIFI UPPER ANTENNA FEED



PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
117S0161	1	5GHz CO BPF OUTPUT MATCH	R7702_W	CRITICAL	D221
152S00498	1	5GHz CO BPF OUTPUT MATCH	R7702_W	CRITICAL	ROW
152S00498	1	5GHz CO BPF OUTPUT MATCH	R7702_W	CRITICAL	JPN

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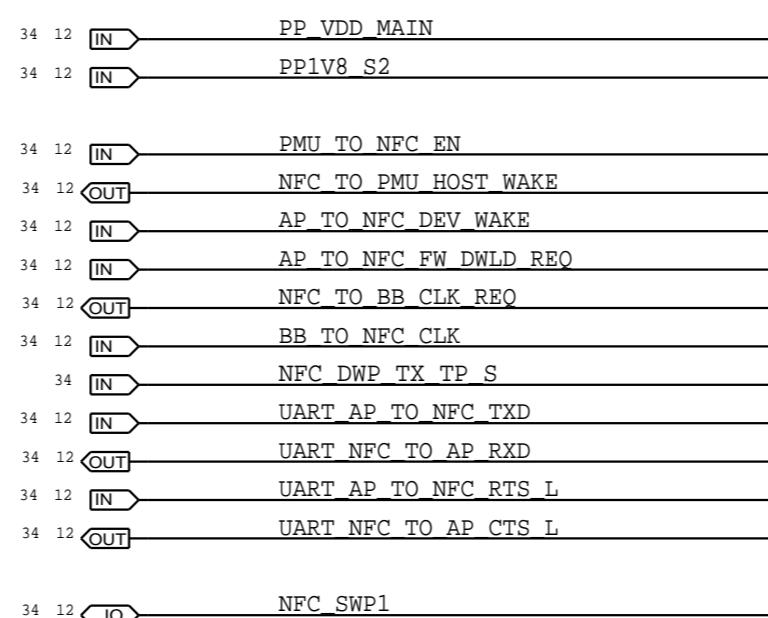
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D22 NFC_MLB

MARCH 22, 2017



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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
138S0831	3	CAP,TYPICAL,2.2UF,6.3V,0201	C7500_S,C7502_S,C7505_S	CRITICAL	TYPICAL_CAP

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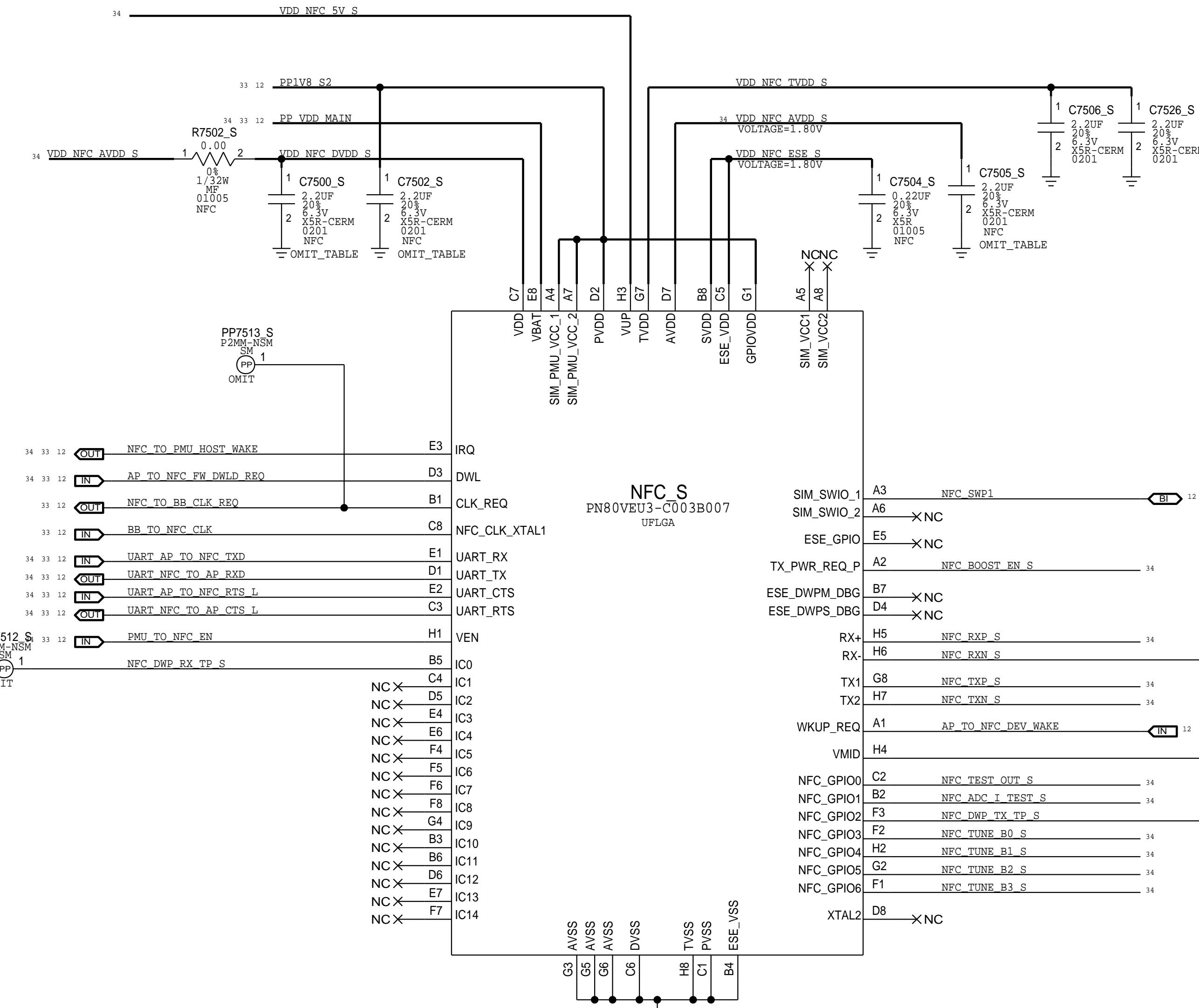
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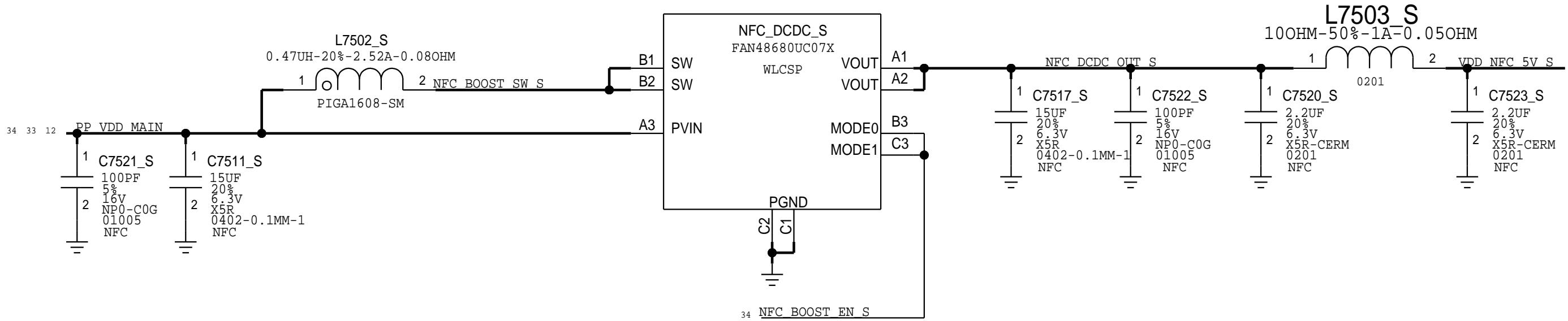
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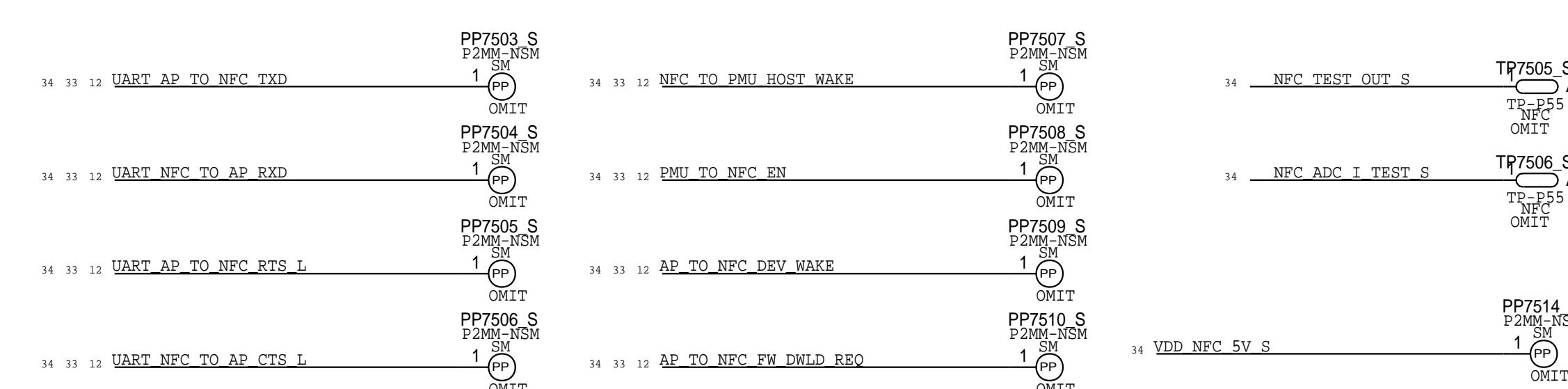
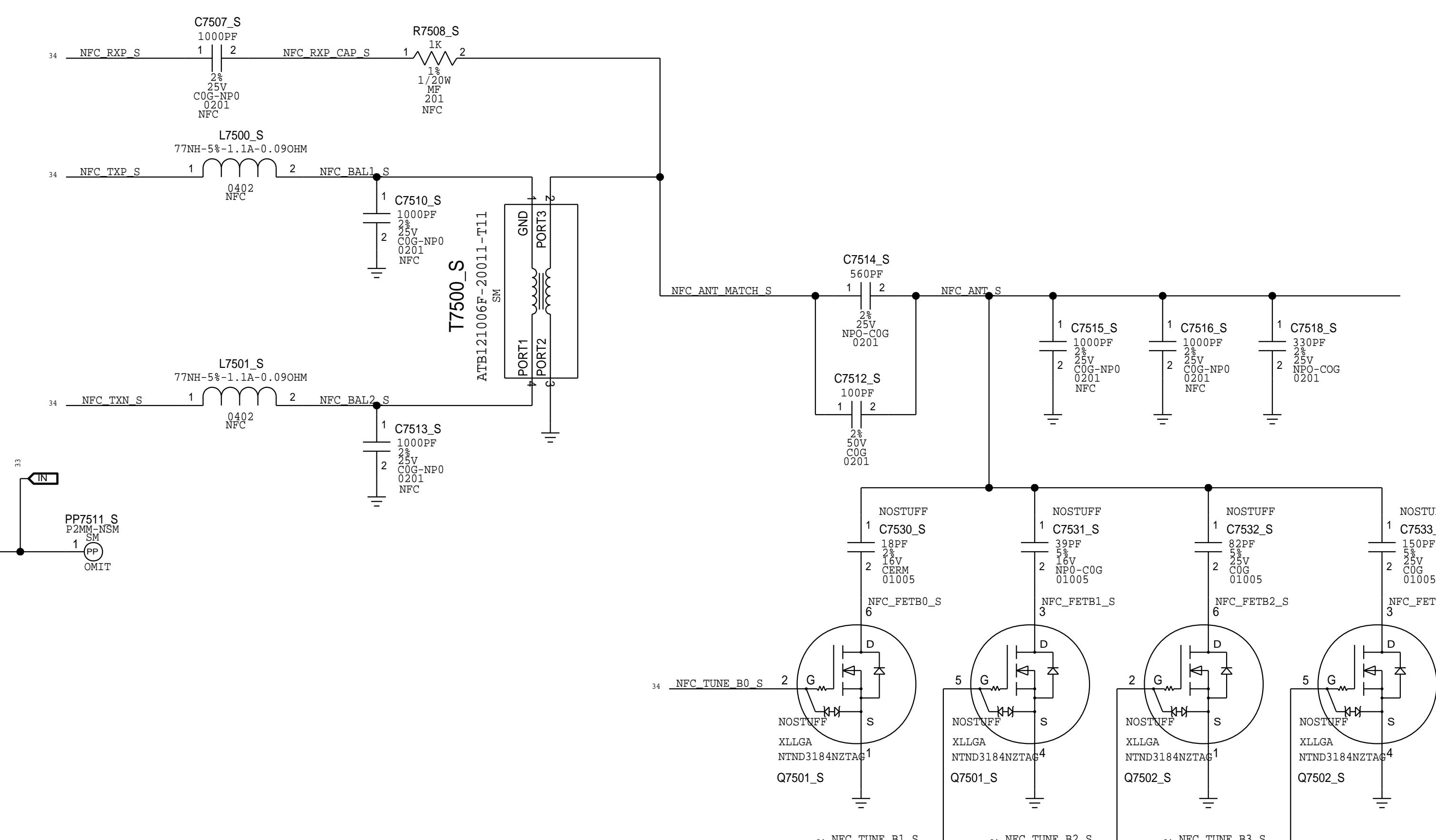
NFC CONTROLLER



5V BOOSTER



NFC FRONT END



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