


8		7		6		5		4		3		2		1	
1. ALL RESISTANCE VALUES ARE IN OHMS, 0.1 WATT +/- 5%. 2. ALL CAPACITANCE VALUES ARE IN MICROFARADS. 3. ALL CRYSTALS & OSCILLATOR VALUES ARE IN HERTZ.												REV	ECN	DESCRIPTION OF REVISION	CK APPD DATE
												4	0011669799	ENGINEERING RELEASED	2018-03-16
D33 MLB Bottom Ice : EVT															
LAST_MODIFICATION=Fri Mar 16 10:21:05 2018															
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25	10	BB: DIGITAL PWR													
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27	12	XCVR: INTERFACE & PWR													
28	13	XCVR: PRX DRX													
29	14	HW CONFIG OPTIONS													
30	15	ET													
31	16	LB SPAD													
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33	18	UHB LMB SPAD													
34	19	LB DIVERSITY RECEIVE LNA													
35	20	HB DIVERSITY RECEIVE LNA													
36	21	MIMO RECEIVE LNAS													
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41	26	TEST POINTS													
42	27	SYMBOL: WIFI													
43	1	WIFI: TABLE OF CONTENTS													
44	2	DIETCOKE													
45	3	FEM MODULES													
MCO:056-04080 SS ROW:639-04880 SS JP:639-04881 SS NA:639-05085 SSV ROW:639-05086 SSV JP:639-05496 SSV NA:639-05497 DS ROW:639-05640															
PART#		QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION									
051-02695		1	SCH_MLB_BOT_ICE,D33	SCH	CRITICAL	?									
820-01063		1	PCB_MLB_BOT_ICE,D33	PCB	CRITICAL	?									
8		7		6		5		4		3		2		1	
Sub Designs															
SOURCE PROJECT		SUB-DESIGN NAME			VERSION	HARD/ SOFT	SYNC_DATE/TIME								
D32		HIER_NPC			0.43.2	S	2018_03_12_10:49:29								
D33		HIER_RADIO_ICE			0.46.17	S	2018_03_12_16:55:29								
TABLE OF CONTENTS SYNC_DATE=07/29/2016															
DRAWING TITLE SCH,MLB,BOT,ICE,D33												DRAWING NUMBER 051-02695		SIZE D	
 Apple Inc.												REVISION 4.0.0			
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# EEEE Codes

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
825-7691	1	EEEE (MLB_BOT_ICE,SS,ROW,639-04880)	EEEE_J90J	CRITICAL	SSROW
825-7691	1	EEEE (MLB_BOT_ICE,SS,JP,639-04881)	EEEE_J90K	CRITICAL	SSJP
825-7691	1	EEEE (MLB_BOT_ICE,SS,NA,639-05085)	EEEE_J058	CRITICAL	SSNA
825-7691	1	EEEE (MLB_BOT_ICE,SSV,ROW,639-05086)	EEEE_J059	CRITICAL	SSVROW
825-7691	1	EEEE (MLB_BOT_ICE,SSV,JP,639-05496)	EEEE_JM18	CRITICAL	SSVJP
825-7691	1	EEEE (MLB_BOT_ICE,SSV,NA,639-05497)	EEEE_JM19	CRITICAL	SSVNA
825-7691	1	EEEE (MLB_BOT_ICE,DS,ROW,639-05640)	EEEE_JN5M	CRITICAL	DSROW

# 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

CRITICAL PART#	COMMENT
138S00149	0402-3T,10.5uF@1V

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
685-00243	685-00182	BOM_TABLE_ALTS	SUBBOM_DS	OTBOM,MLB,BOT,DIODES,DIODES,2891

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
685-00242	1	SUBBOM,MLB,BOT,DIODES,DIODES,X891	SUBBOM_DS	CRITICAL	COMMON
371S00133	4	DIODES,SHOTKEY DIODE,30V,2A,0603	D3400,D3401,D3402,D3403	CRITICAL	DIODES_DS
371S00189	4	ONSEMI,SHOTKEY DIODE,30V,2A,0603	D3400,D3401,D3402,D3403	CRITICAL	ONSEMI_DS

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

CRITICAL PART#	COMMENT
138S00144	0402,16uF@1V

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

CRITICAL PART#	COMMENT
138S00139	0201,3uF@1V

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00221	138S00146	BOM_TABLE_ALTS	ALL	0402,5.1uF@3V, Kyocera

CRITICAL PART#	COMMENT
138S00146	0402,5.1uF@3V

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

CRITICAL PART#	COMMENT
138S00141	0201,1.1uF@3V

# 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,80MD,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
155S00338	155S0661	BOM_TABLE_ALTS	ALL	FERR,BD,33 OHM,25%,1.5A,55MOHM DCR,0201

CRITICAL PART#	COMMENT
152S00557	IND,MLD,0.47UH,20%,2.5A,80MD,1608
155S0610	FERR,BD,150 OHM,25%,200MA,0.7 DCR,01005

CRITICAL PART#	COMMENT
155S0661	FERR,BD,33 OHM,25%,1.5A,55MOHM DCR,0201

# 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,CER,3-TERRM,7.5UF,25V,4V,0402,TAIYO/TEK
138S0706	138S0739	BOM_TABLE_ALTS	ALL	CAP,CER,1UF,20%,10V,XSR,0201,MURATA
138S0945	138S0739	BOM_TABLE_ALTS	ALL	CAP,CER,1UF,20%,10V,XSR,0201,MURATA
138S0739	138S0706	BOM_TABLE_ALTS	ALL	CAP,CER,XSR,0.22UF,20%,6.3V,01005
138S00049	138S0831	BOM_TABLE_ALTS	ALL	CAP,CER,XSR,2.2UF,20%,6.3V,01005
138S00133	138S00128	BOM_TABLE_ALTS	ALL	CAP,XSR,3.47UF,20%,4.7V,40V,01005
138S00116	138S00071	BOM_TABLE_ALTS	ALL	CAP,XSR,47UF,20%,4.7V,0201,010.0000
138S00117	138S00071	BOM_TABLE_ALTS	ALL	CAP,XSR,47UF,20%,4.7V,0201,010.0000
138S00048	138S00003	BOM_TABLE_ALTS	ALL	CAP,XSR,150UF,20%,6.3V,0.65MM,MR22TL,0402
131S00172	131S00164	BOM_TABLE_ALTS	ALL	CAP,CER,C0G,220PF,5%,16V,01005
131S00173	131S00164	BOM_TABLE_ALTS	ALL	CAP,CER,C0G,220PF,5%,16V,01005
131S00185	131S0316	BOM_TABLE_ALTS	ALL	CAP,CER,XSR,15uF,20%,4.7V,01005
138S00048	138S00003	BOM_TABLE_ALTS	ALL	CAP,CER,XSR,15uF,20%,4.7V,01005
132S00185	132S0316	BOM_TABLE_ALTS	ALL	CAP,CER,XSR,15uF,20%,4.7V,01005

CRITICAL PART#	COMMENT
138S0652	CAP,XSR,4.7UF,6.3V,0.65MM,0402,TAIYO
138S0986	CAP,CER,3-TERRM,7.5UF,25V,4V,0402,TAIYO/TEK
138S0739	CAP,CER,1UF,20%,10V,XSR,0201,MURATA

CRITICAL PART#	COMMENT
138S0706	CAP,CER,XSR,0.22UF,20%,6.3V,01005
132S0400	CAP,CER,XSR,0.22UF,20%,6.3V,01005
138S0831	CAP,CER,XSR,2.2UF,20%,6.3V,0201
138S00128	CAP,XSR,0.47UF,20%,6.3V,KYO,01005
138S00071	CAP,XSR,40UF,20%,6.3V,0201,T=0.55MM

CRITICAL PART#	COMMENT
138S00003	CAP,XSR,150UF,20%,6.3V,0.65MM,MR22TL,0402
131S00164	CAP,CER,C0G,220PF,5%,16V,01005

# 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

CRITICAL PART#	COMMENT
152S00651	IND,1.2UH,3A,2016,0.65Z
152S00652	IND,1.2UH,3A,2016,0.8Z

# Hall Effect Alts

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
353S01327	353S3697	BOM_TABLE_ALTS	ALL	ROHM,RES


# IKTARA

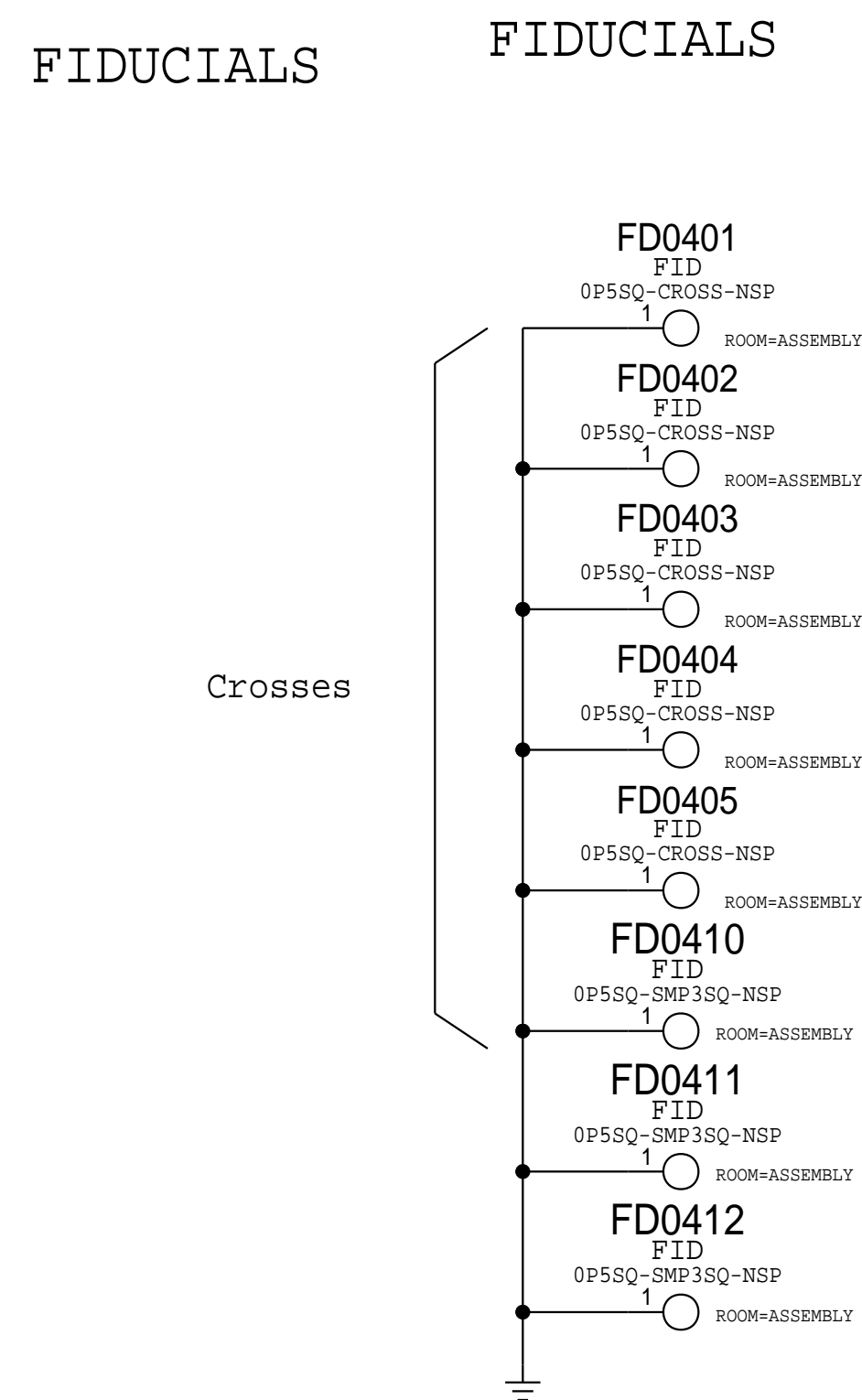
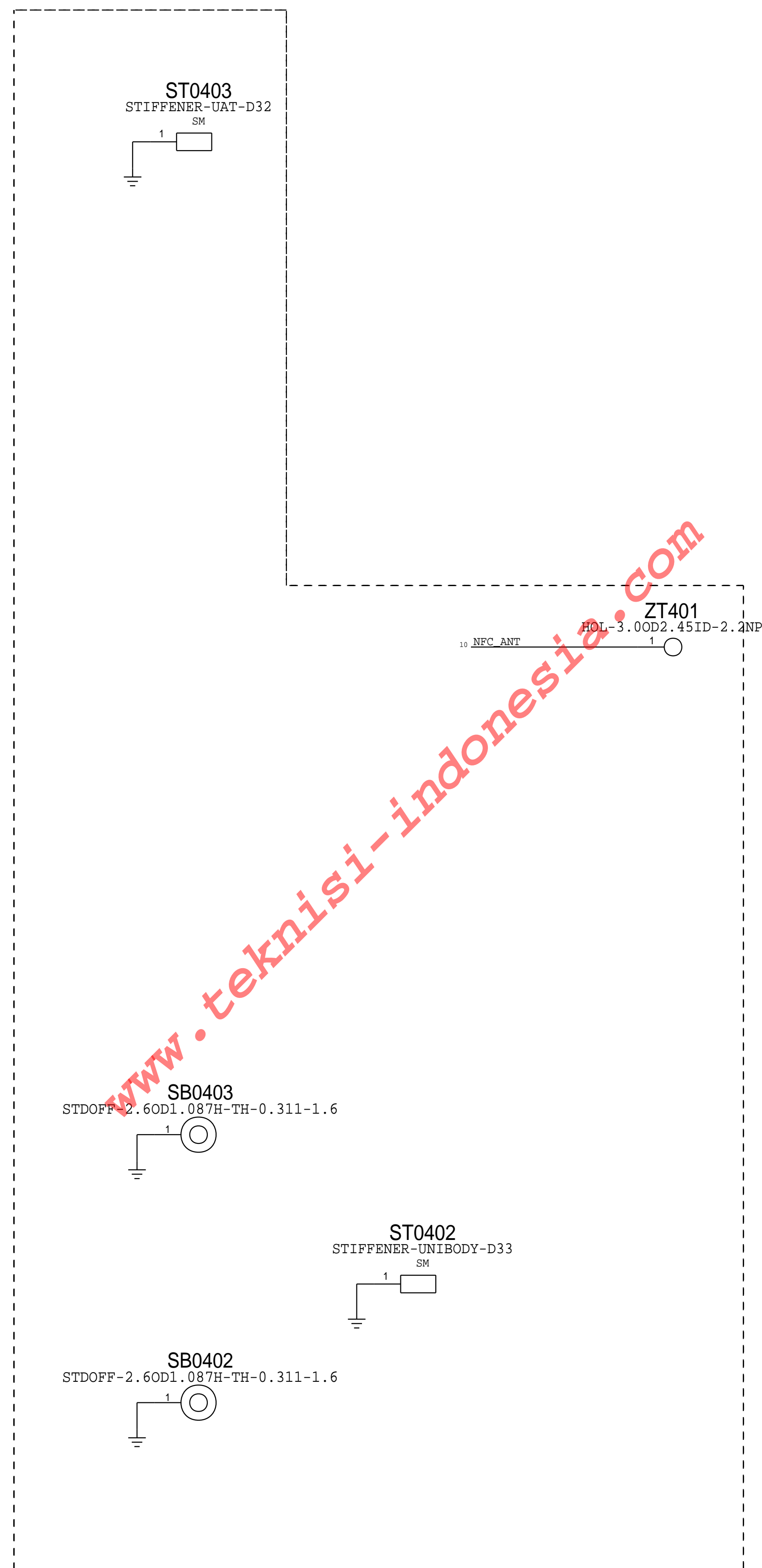
PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	CRITICAL	BOM OPTION
116S00002	6	RES, High Current 0 Ohm	C3461,C3462,C3463,C3464,C3465,C3466	CRITICAL	UNBALNACED CAPS
132S00186	1	CAP, 0.033uF, 10%, 100V, XSR	C3451	CRITICAL	UNBALNACED CAPS
132S00187	3	CAP, 0.047uF, 10%, 100V, XSR	C3452,C3453,C3456	CRITICAL	UNBALNACED CAPS


# Multi-Vendor Criticals

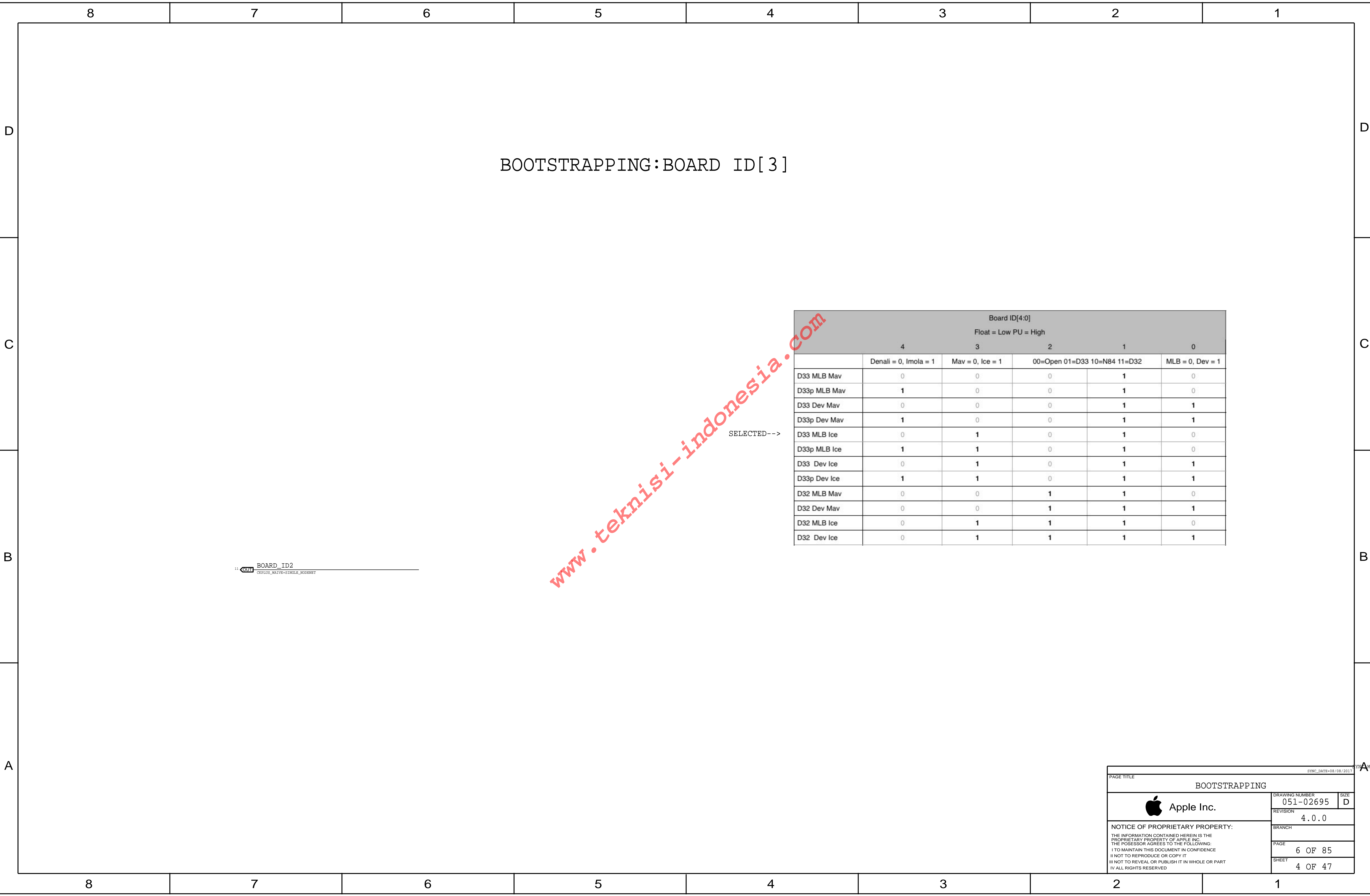
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138S0979	CAP,CER,XSR,10UF,20%,10V,0402,H=0.65MM
138S0683	CAP,CER,XSR,1UF,10%,25V,0402
132S0663	CAP,CER,XSR,1UF,10%,25V,0402
132S0288	CAP,CER,XSR,0.1UF,10%,16V,0201
132S0275	CAP,CER,XSR,470PF,10%,10V,01005
132S0245	CAP,CER,XSR,0.01UF,10%,6.3V,01005
138S0692	CAP,CER,XSR,1UF,20%,6.3V,0201

CRITICAL PART#	COMMENT
132S00008	CAP,CER,0.1UF,10%,50V,XTR,0402
131S0804	CAP,CER,27PF,5%,C0G,25V,0201
131S0307	CAP,CER,NPO/C0G,100PF,5%,16V,01005
131S00053	CAP,CER,C0G,220PF,5%,10V,01005
117S0055	RES,MP,1/20W,2M OHM,5,0201,SMD
107S0257	THERMISTOR,NTC,10K OHM,1%,B=3435,01005
131S00170	CAP,CER,C0G,220PF,5%,25V,01005
131S0643	CAP,CER,NPO/C0G,56PF,5%,25V,01005
131S0316	CAP,CER,XSR,0.1UF,20%,6.3V,01005

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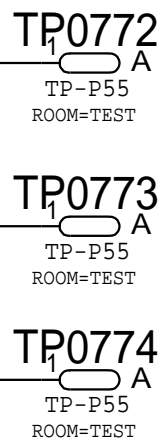
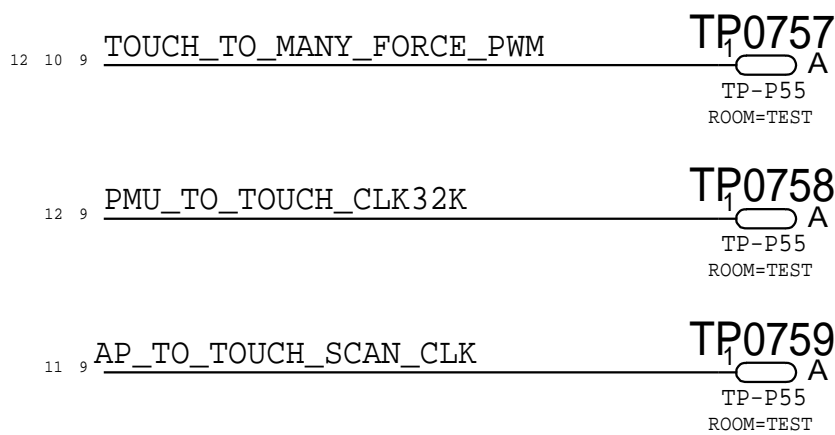
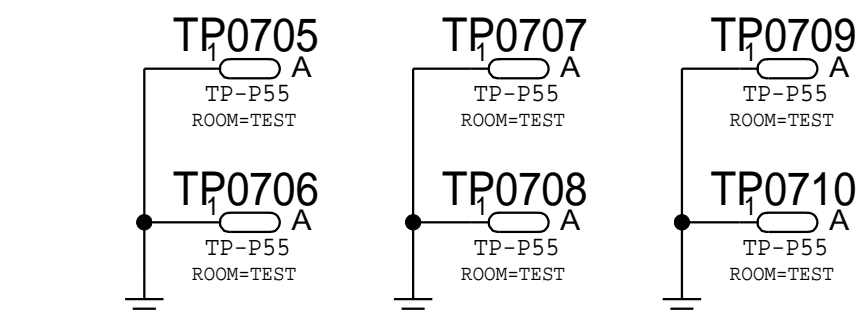
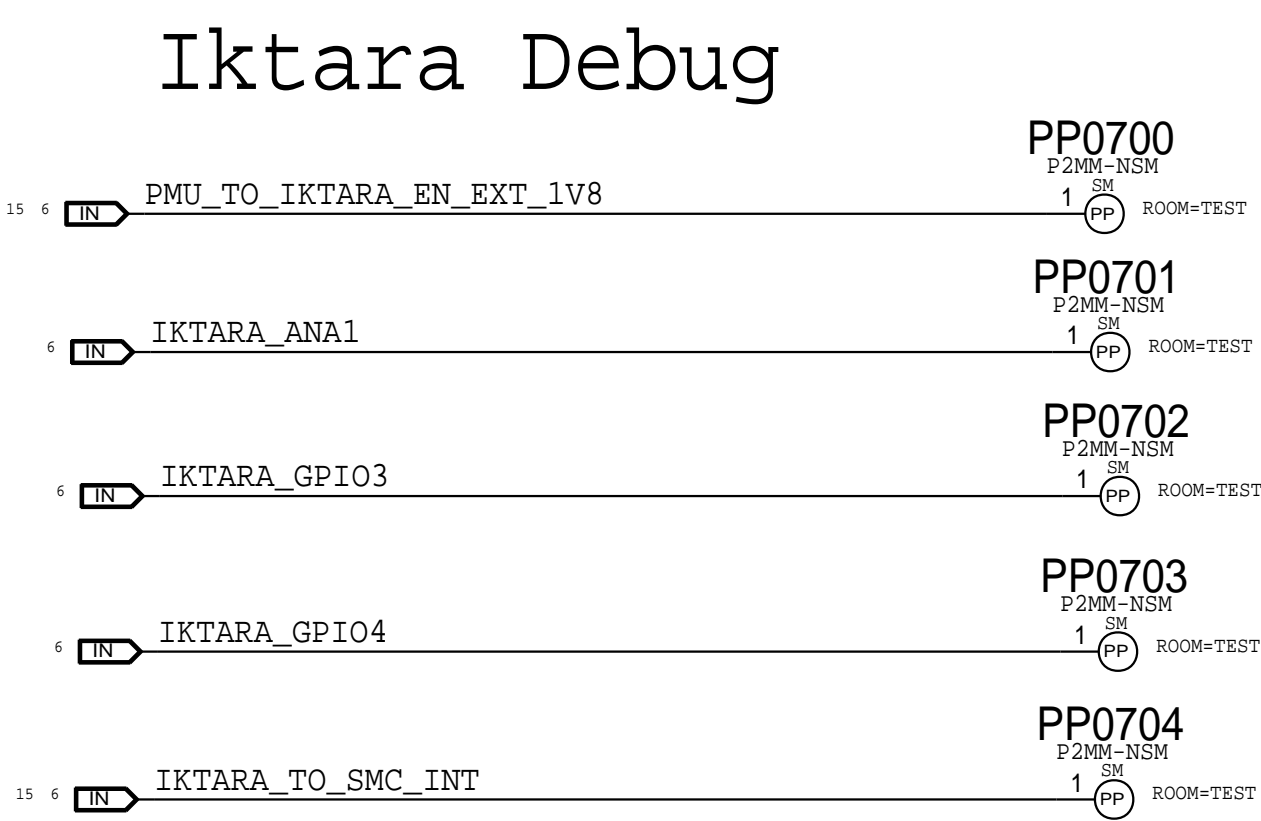
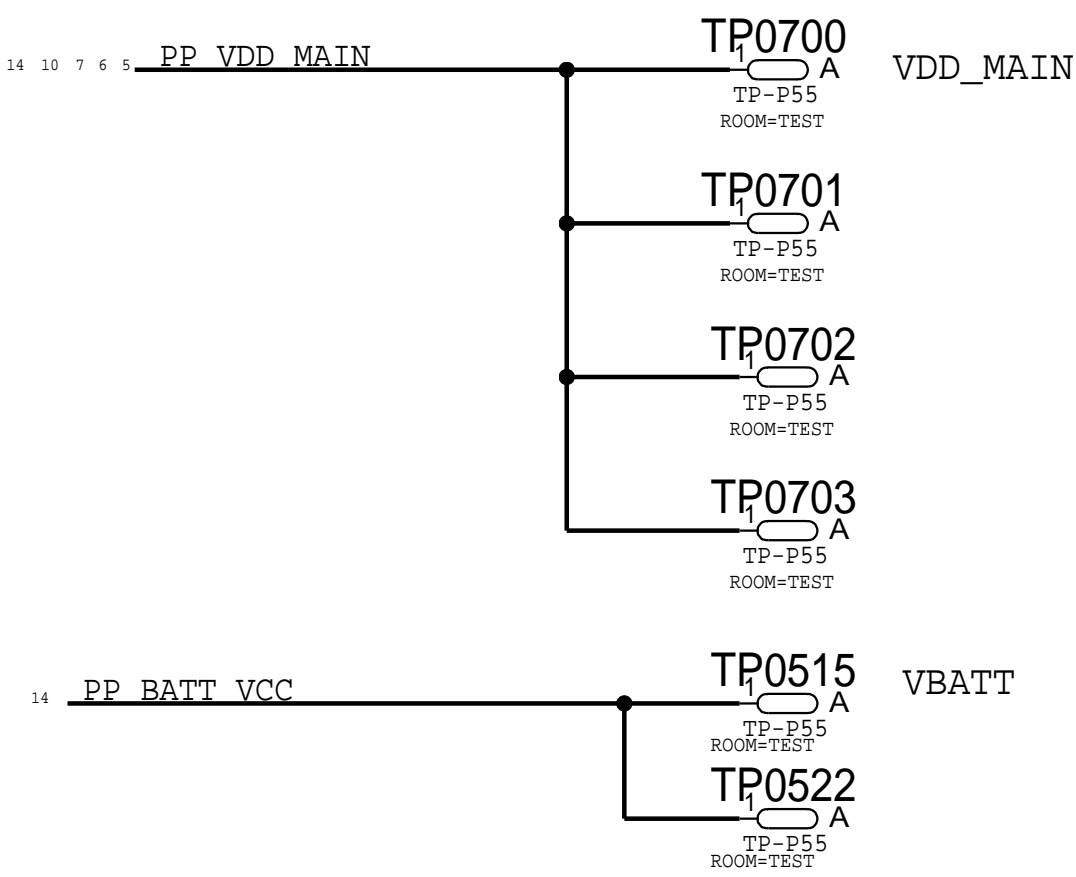
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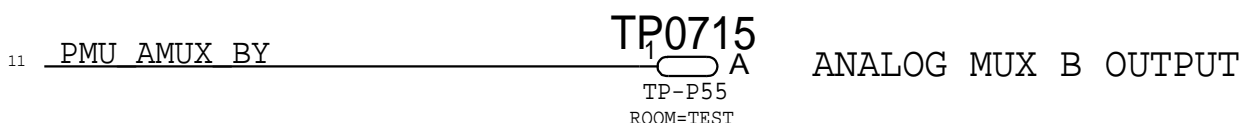


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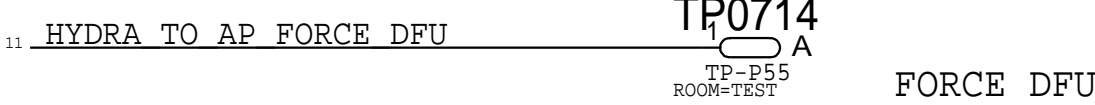
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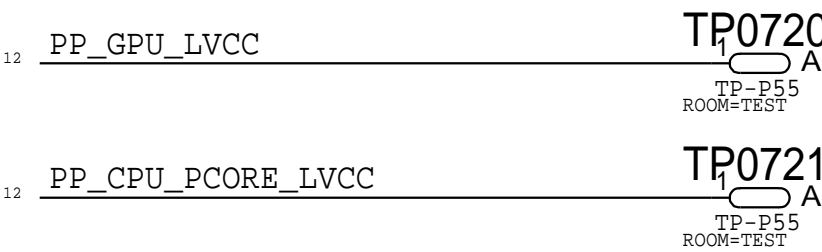
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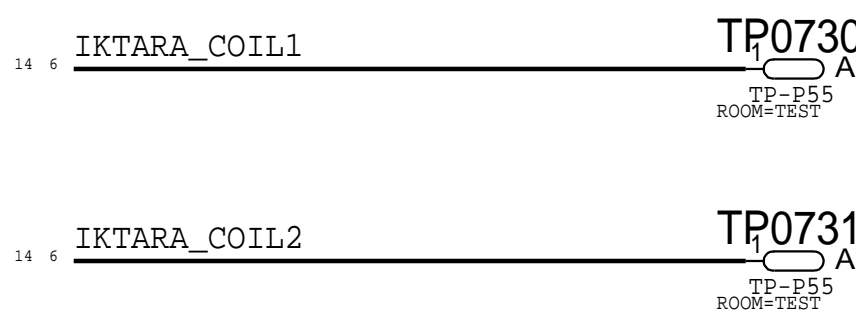
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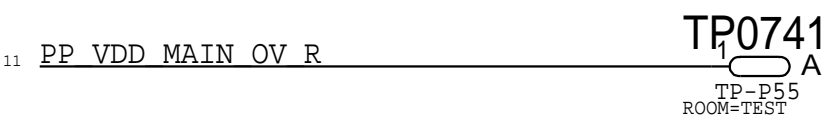
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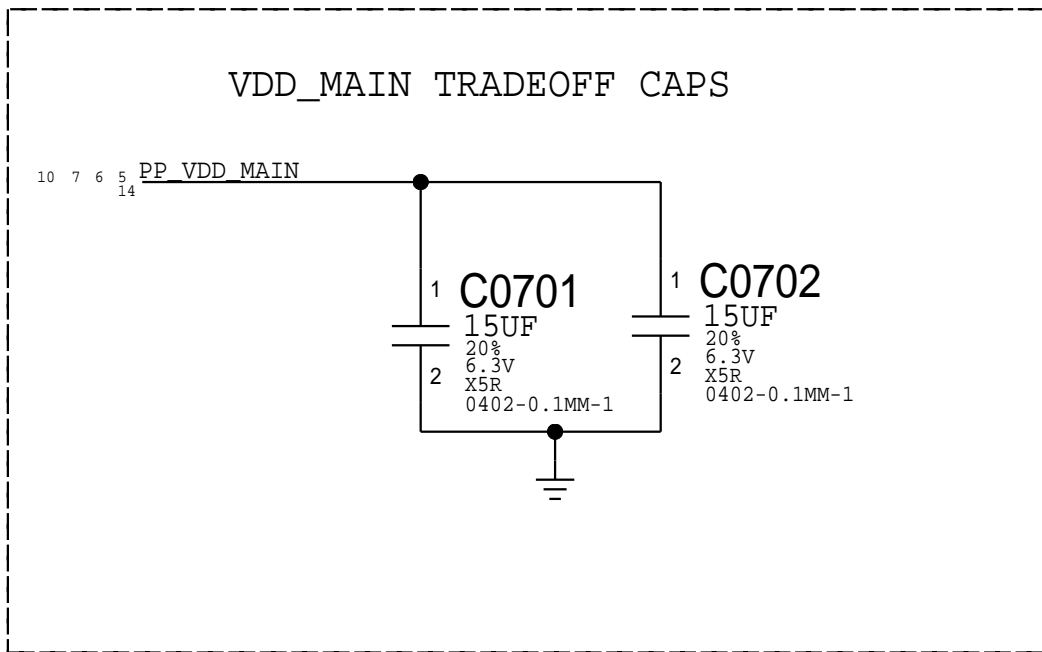
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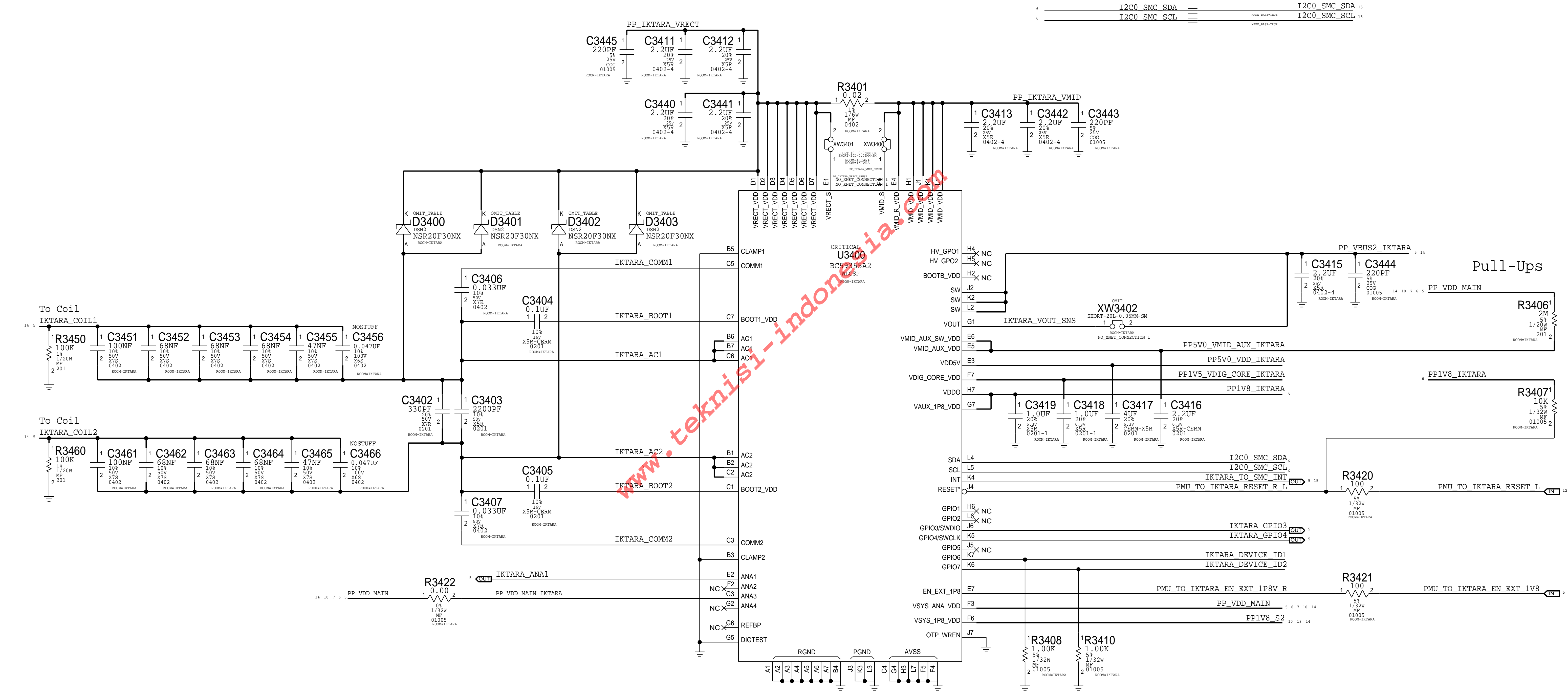


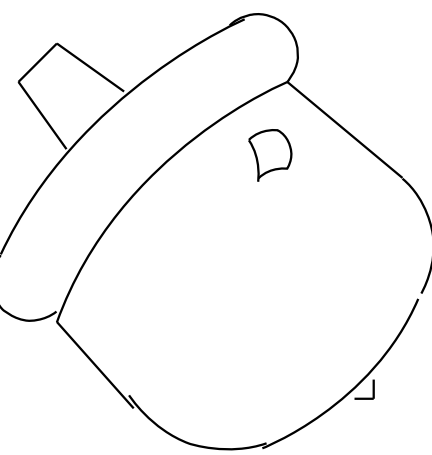
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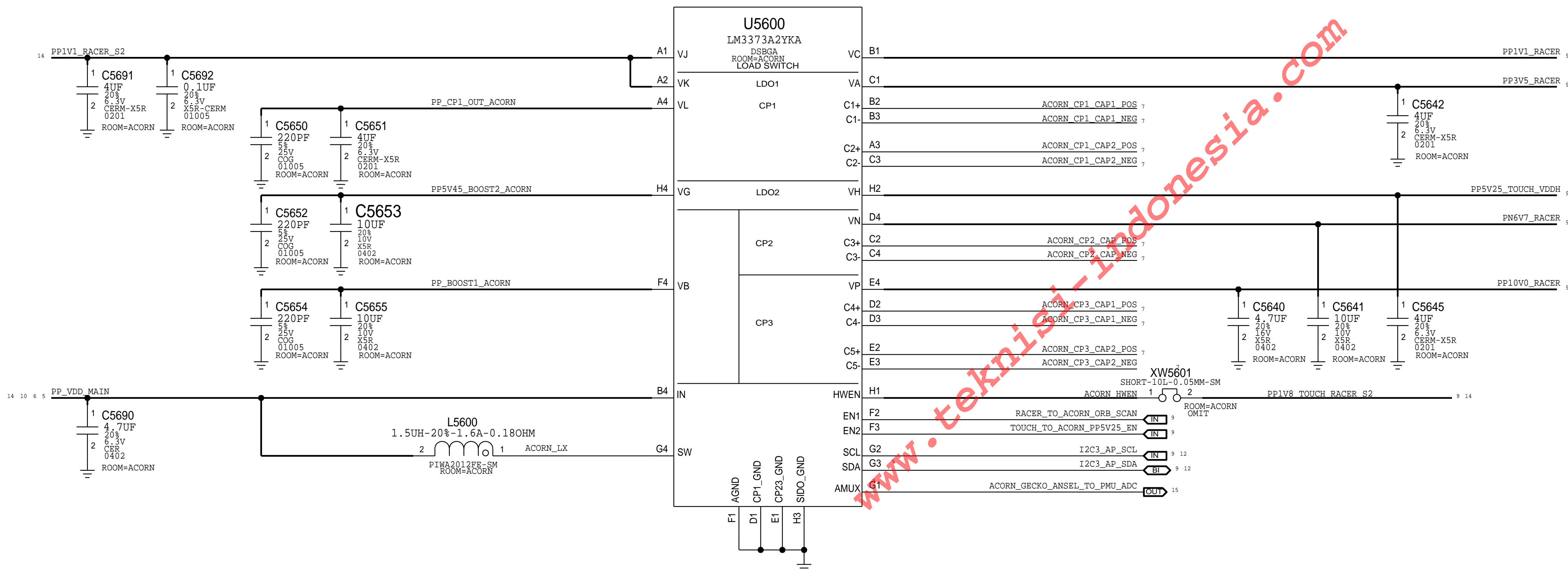
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Iktara

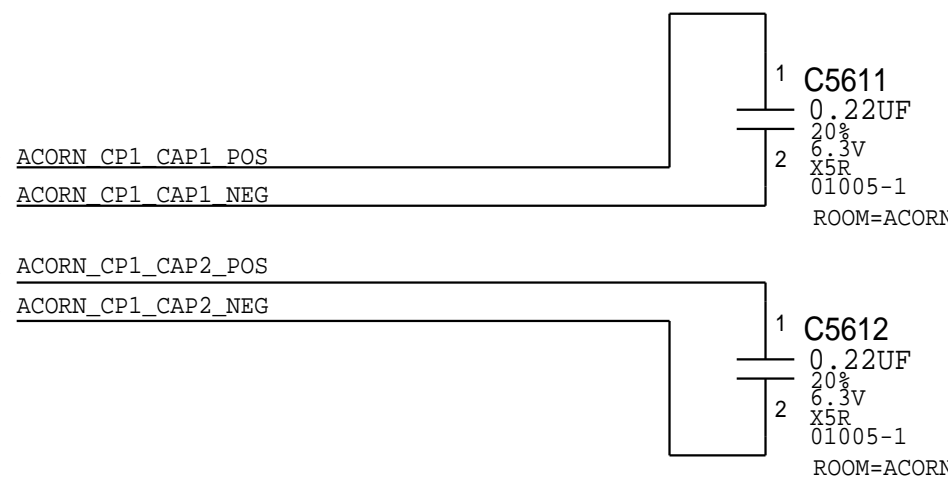




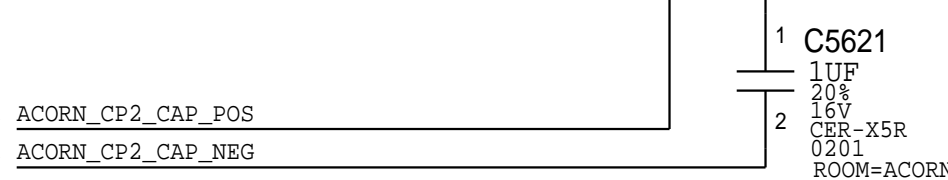
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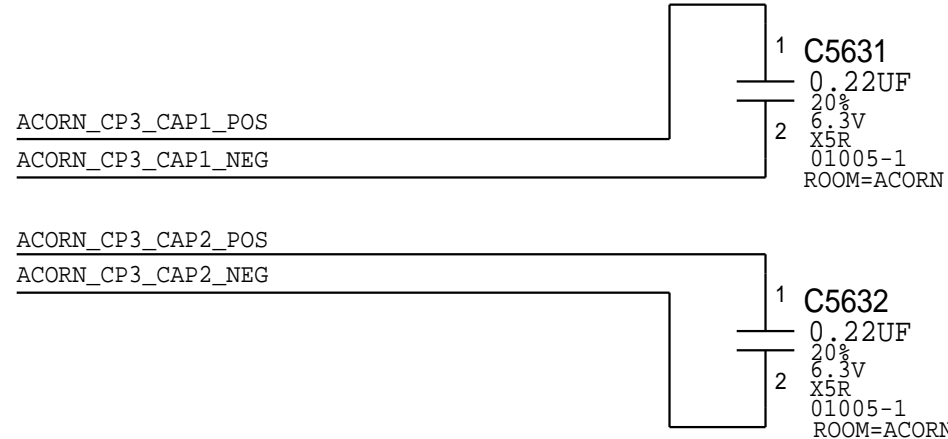
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Charge Pump 2 Caps

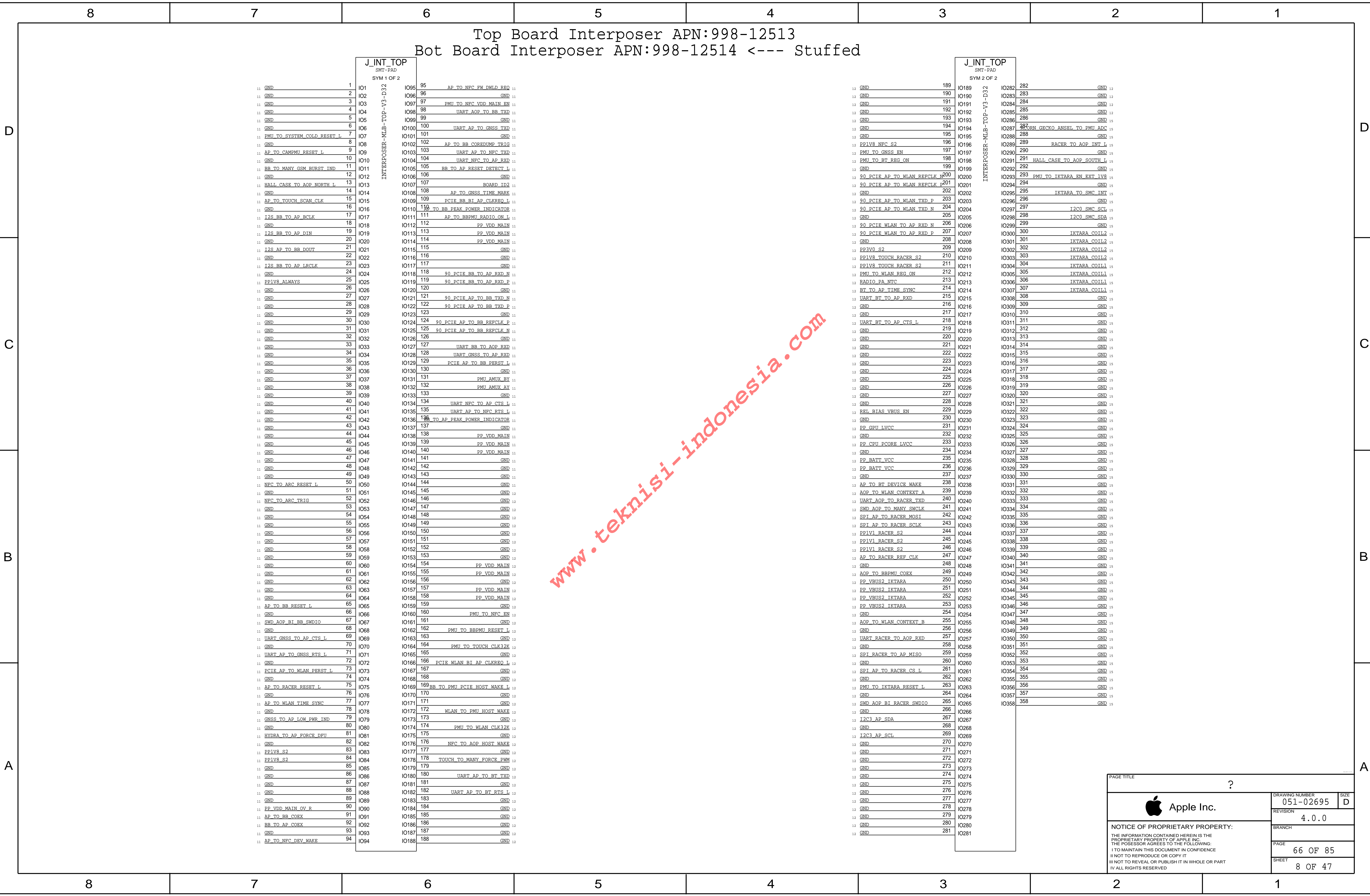


Charge Pump 3 Caps



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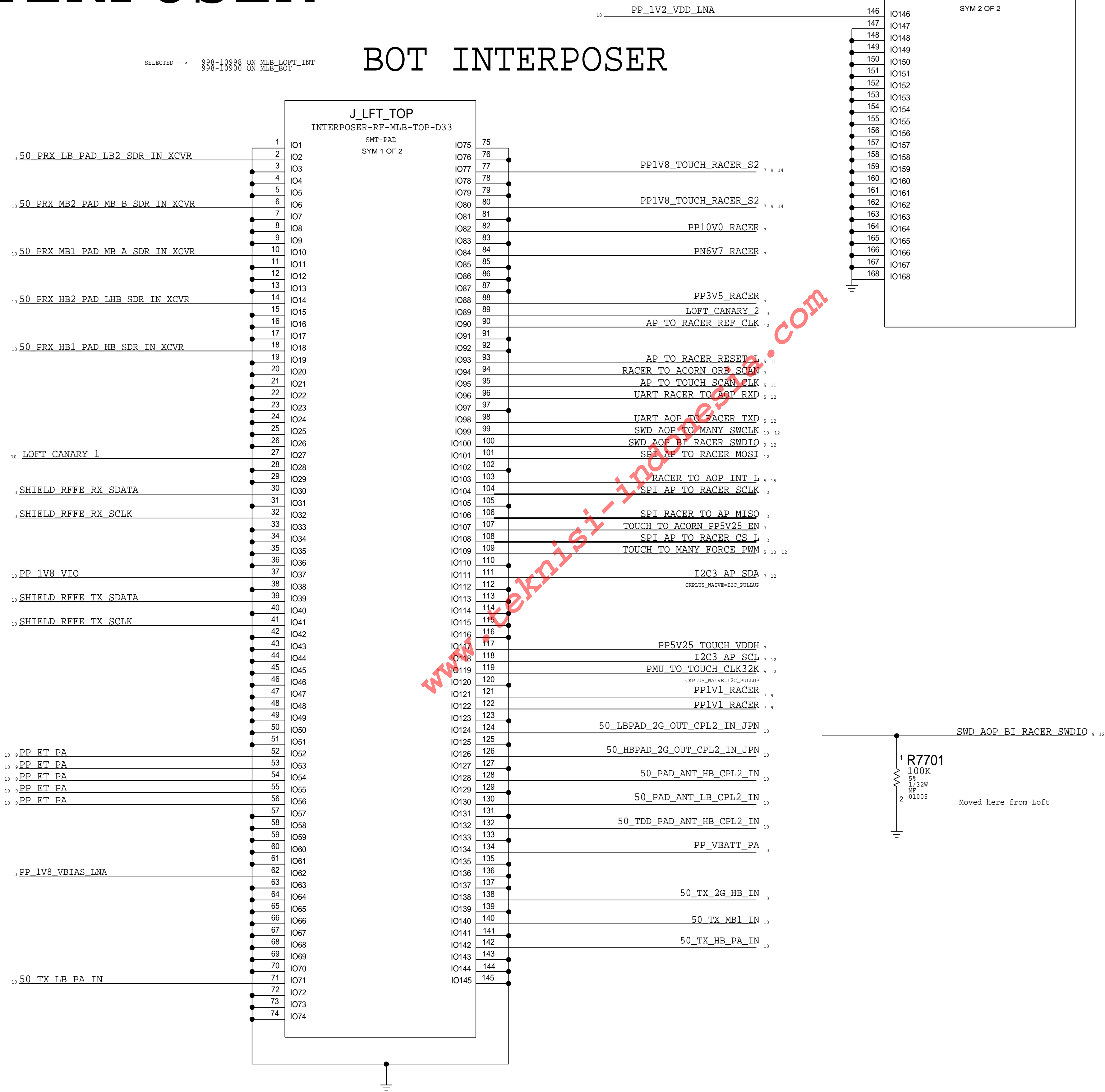





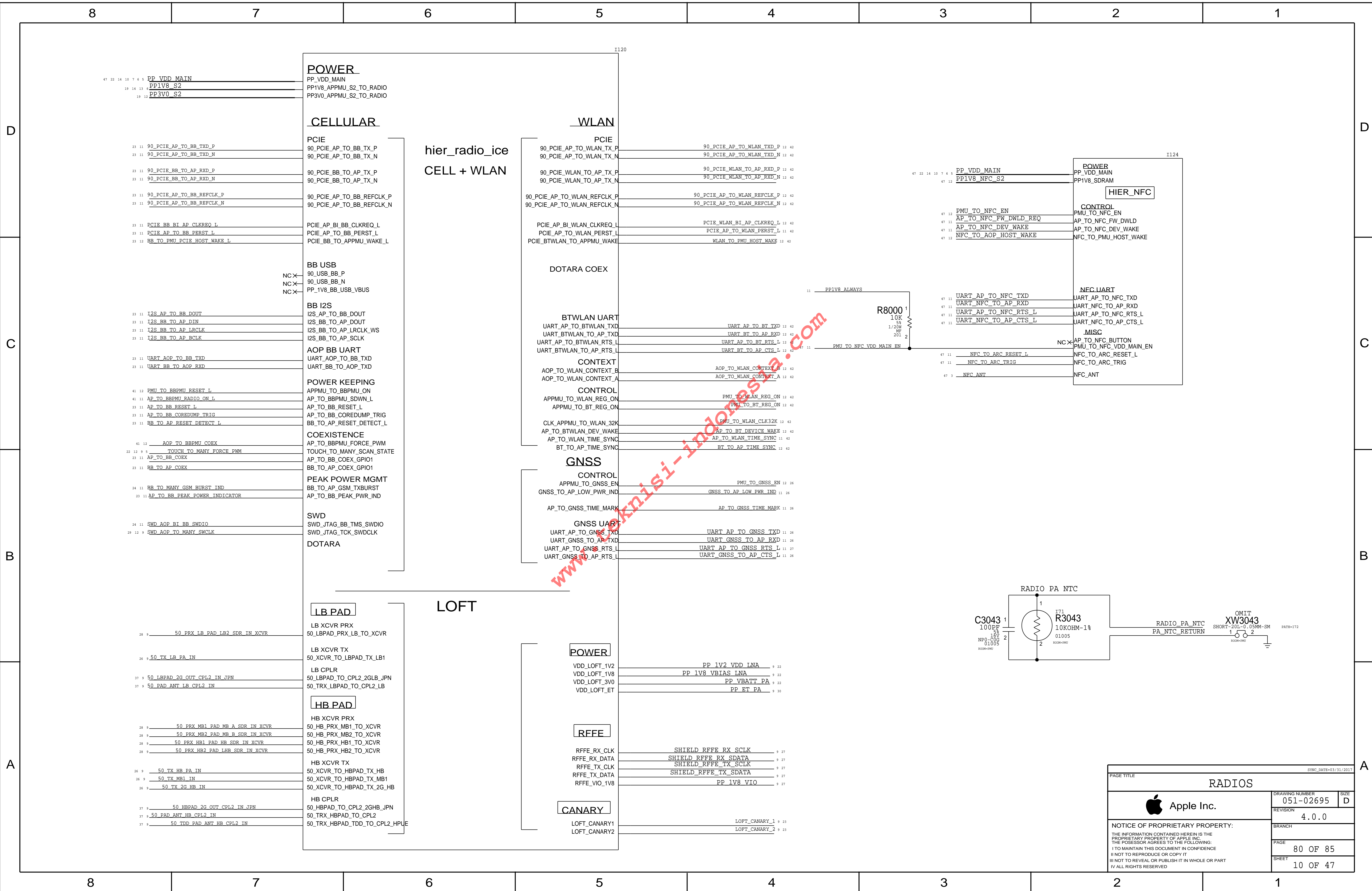


# LOFT INTERPOSER

## BOT INTERPOSER



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# Interposer Aliases: Pins 1-144


THIS SIDE HAS ATTRIBUTE  
MAKE\_BASE=TRUE

8	GND			GND	11 12 14 15
8	GND			GND	11 12 14 15
8	GND			GND	11 12 14 15
8	GND			GND	11 12 14 15
8	GND			GND	11 12 14 15
8	PMU TO SYSTEM COLD RESET L			PMU TO SYSTEM COLD RESET L	5
8	GND			GND	11 12 14 15
8	AP TO CAMPMU RESET L			AP TO CAMPMU RESET L	5
8	GND			GND	11 12 14 15
8	BB TO MANY GSM BURST IND			BB TO MANY GSM BURST IND	10
8	GND			GND	11 12 14 15
8	HALL CASE TO AOP NORTH L			HALL CASE TO AOP NORTH L	11
8	GND			GND	11 12 14 15
8	AP TO TOUCH_SCAN_CLK			AP TO TOUCH_SCAN_CLK	5 9
8	GND			GND	11 12 14 15
8	I2S_BB TO AP_BCLK			I2S_BB TO AP_BCLK	10
8	GND			GND	11 12 14 15
8	I2S_BB TO AP_DIN			I2S_BB TO AP_DIN	10
8	GND			GND	11 12 14 15
8	I2S_AP TO BB_DOUT			I2S_AP TO BB_DOUT	10
8	GND			GND	11 12 14 15
8	I2S_BB TO AP_LRCLK			I2S_BB TO AP_LRCLK	10
8	GND			GND	11 12 14 15
8	PPIV8_ALWAYS			PPIV8_ALWAYS	10
8	GND			GND	11 12 14 15
8	GND			GND	11 12 14 15
8	GND			GND	14
8	GND			GND	14
8	GND			GND	14
8	GND			GND	11 14
8	GND			GND	11 14
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8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	NFC TO ARC_RESET L			NFC TO ARC_RESET L	10
8	GND			GND	11 14
8	NFC TO ARC_TRIG			NFC TO ARC_TRIG	10
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	11 14
8	GND			GND	14
8	AP TO BB_RESET L			AP TO BB_RESET L	10
8	GND			GND	11 14
8	SWD_AOP_BI_BB_SWDIO			SWD_AOP_BI_BB_SWDIO	10
8	GND			GND	11 14
8	UART_GNSS TO AP_CTS L			UART_GNSS TO AP_CTS L	10
8	GND			GND	11 14
8	UART_AP TO GNSS_RTS L			UART_AP TO GNSS_RTS L	10
8	GND			GND	11 14

THIS SIDE HAS ATTRIBUTE  
MAKE\_BASE=TRUE

8	PCIE AP TO WLAN_PERST L			PCIE AP TO WLAN_PERST L	10
8	GND			GND	11 14
8	AP TO RACER_RESET L			AP TO RACER_RESET L	5 9
8	GND			GND	11 14
8	AP TO WLAN_TIME_SYNC			AP TO WLAN_TIME_SYNC	10
8	GND			GND	11 14
8				GNSS TO AP_LOW_PWR_IND	10
8	GND			GND	11 14
8	HYDRA TO AP_FORCE_DFU			HYDRA TO AP_FORCE_DFU	5
8	GND			GND	11 14
8	PPIV8_S2			PPIV8_S2	14
8	PPIV8_S2			PPIV8_S2	14
8	GND			GND	11 14
8	GND			GND	14
8	GND			GND	14
8	GND			GND	14
8	GND			GND	11 12 14
8	PP_VDD_MAIN_OV_R			PP_VDD_MAIN_OV_R	5
8	AP TO BB_COEX			AP TO BB_COEX	10
8	BB TO AP_COEX			BB TO AP_COEX	10
8	GND			GND	14
8	AP TO NFC_DEV_WAKE			AP TO NFC_DEV_WAKE	10
8	AP TO NFC_FW_DWLD_REQ			AP TO NFC_FW_DWLD_REQ	10
8	GND			GND	14
8	PMU TO NFC_VDD_MAIN_EN			PMU TO NFC_VDD_MAIN_EN	10
8	UART_AOP TO BB_TXD			UART_AOP TO BB_TXD	10
8	GND			GND	14
8	UART_AP TO GNSS_TXD			UART_AP TO GNSS_TXD	10
8	GND			GND	14
8	AP TO BB_COREDUMP_TRIG			AP TO BB_COREDUMP_TRIG	10
8	UART_AP TO NFC_TXD			UART_AP TO NFC_TXD	10
8	UART_NFC TO AP_RXD			UART_NFC TO AP_RXD	10
8	BB TO AP_RESET_DETECT L			BB TO AP_RESET_DETECT L	10
8	GND			GND	14
8	BOARD_ID2			BOARD_ID2	4
8	AP TO GNSS_TIME_MARK			AP TO GNSS_TIME_MARK	10
8	PCIE_BB_BI_AP_CLKREQ L			PCIE_BB_BI_AP_CLKREQ L	10
8	AP TO BB_PRAK_POWER_INDICATOR			AP TO BB_PRAK_POWER_INDICATOR	10
8	AP TO BBPMU_RADIO_ON L			AP TO BBPMU_RADIO_ON L	10
8	PP_VDD_MAIN			PP_VDD_MAIN	14
8	PP_VDD_MAIN			PP_VDD_MAIN	14
8	PP_VDD_MAIN			PP_VDD_MAIN	14
8	GND			GND	11 12 14
8	GND			GND	11 14
8	GND			GND	11 14
8	90_PCIE_BB_TO_AP_RXD_N			90_PCIE_BB_TO_AP_RXD_N	10
8	90_PCIE_BB_TO_AP_RXD_P			90_PCIE_BB_TO_AP_RXD_P	10
8	GND			GND	11 14
8	90_PCIE_AP_TO_BB_TXD_N			90_PCIE_AP_TO_BB_TXD_N	10
8	90_PCIE_AP_TO_BB_TXD_P			90_PCIE_AP_TO_BB_TXD_P	10
8	GND			GND	11 14
8	90_PCIE_AP_TO_BB_REFCLK_P			90_PCIE_AP_TO_BB_REFCLK_P	10
8	90_PCIE_AP_TO_BB_REFCLK_N			90_PCIE_AP_TO_BB_REFCLK_N	10
8	GND			GND	11 14
8	UART_BB_TO_AOP_RXD			UART_BB_TO_AOP_RXD	10
8	UART_GNSS_TO_AP_RXD			UART_GNSS_TO_AP_RXD	10
8	PCIE_AP_TO_BB_PERST L			PCIE_AP_TO_BB_PERST L	10
8	GND			GND	11 14
8	PMU_AMUX_BY			PMU_AMUX_BY	5
8	PMU_AMUX_AY			PMU_AMUX_AY	5
8	GND			GND	11 14
8	UART_NFC_TO_AP_CTS L			UART_NFC_TO_AP_CTS L	10
8	UART_AP_TO_NFC_RTS L			UART_AP_TO_NFC_RTS L	10
8	BB_TO_AP_PRAK_POWER_INDICATOR			BB_TO_AP_PRAK_POWER_INDICATOR	10
8	GND			GND	11 14
8	PP_VDD_MAIN			PP_VDD_MAIN	14
8	PP_VDD_MAIN			PP_VDD_MAIN	14
8	PP_VDD_MAIN			SIG_NAME=PP_VDD_MAIN	14
8	GND			GND	11 12 14
8	GND			GND	11 12 14
8	GND			GND	11 12 14
8	GND			GND	11 12 14

051-02695-1 (02/2011)

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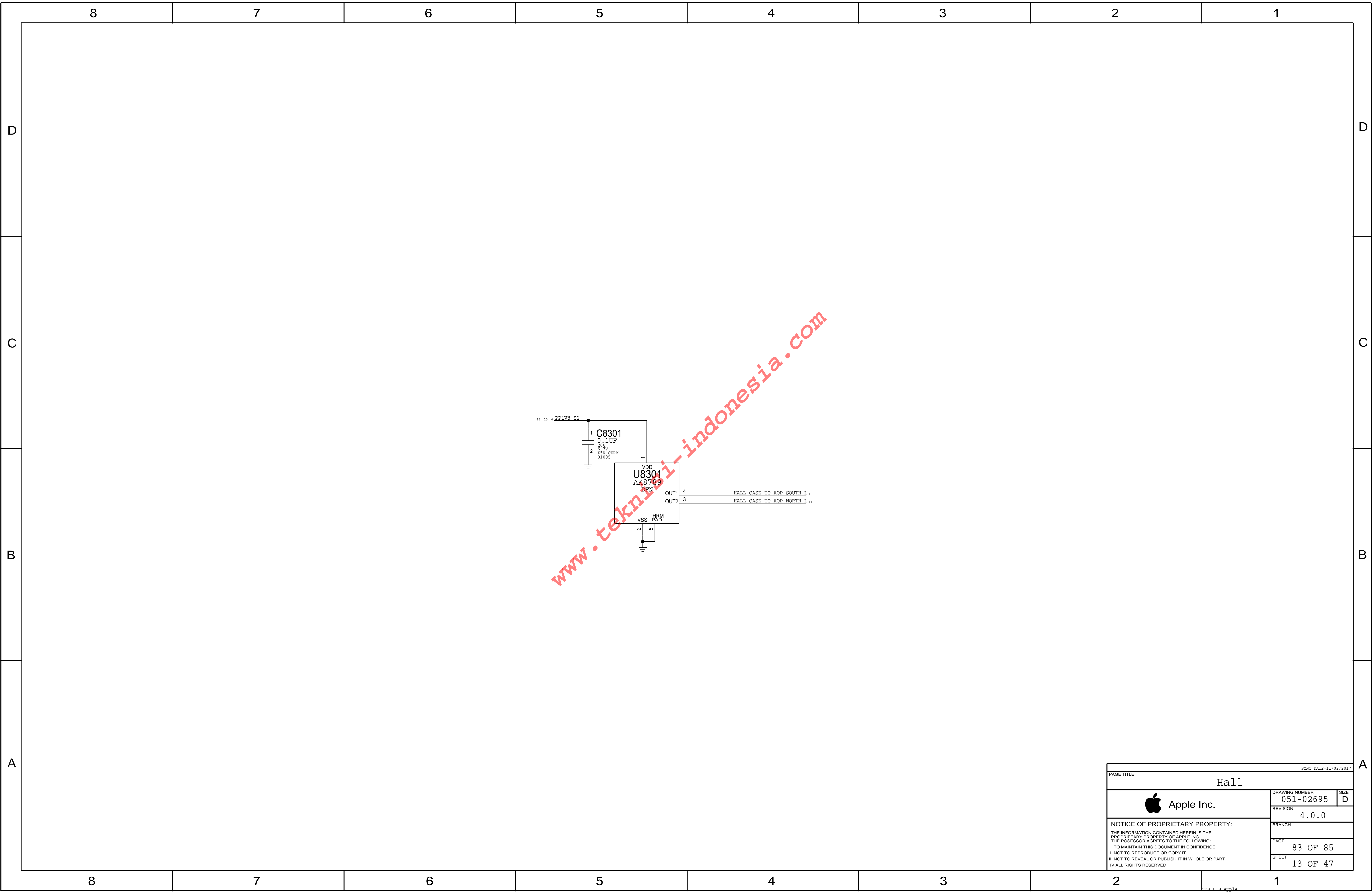
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## D



## A





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MAKE\_BASE=TRUE

THIS SIDE HAS ATTRIBUTE  
MAKE\_BASE=TRUE

[illegible]

8 GND MAKE\_BAG=TRUE GND 11 12 14 15

8 GND MAKE\_BAG=TRUE GND 11 12 14 15

SCH:951-04720

PCB:920-03588

87654321

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

40011669799ENGINEERING RELEASED2018-03-16

# BOM TABLES

## RF SKU

### ROW SKU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
118S0724	1	RES,MF,0.0 OHM,1/20W,0201,HIGH FREQ	R2003_K	ROW
118S0724	1	RES,MF,0.0 OHM,1/20W,0201,HIGH FREQ	R2015_K	ROW
118S00072	1	RES,MF,8.2K OHM,1/32W,01005	R312_K	ROW
197S00155	1	XTL,THERM,38.4MHz,12PFM,6PP,1612	Y301_K	ROW
353S01647	1	20PA, SKYWORKS, 78208, REV13	PA_UHB_K	ROW
353S01301	1	SKYWORKS, LB DSM, 13765, REV16	DSM_LB_K	ROW

### JP SKU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
118S0724	1	RES,MF,0.0 OHM,1/20W,0201,HIGH FREQ	R2002_K	JP
118S0724	1	RES,MF,0.0 OHM,1/20W,0201,HIGH FREQ	R1403_K	JP
118S00120	1	RES,MF,6.8K OHM,1/32W,01005	R312_K	JP
197S00179	1	XTL,THERM,38.4MHz,12PFM,6PP,1612	Y301_K	JP
353S01662	1	SKYWORKS, UHB PA, REV13	PA_UHB_K	JP
353S01301	1	SKYWORKS, LB DSM, 13765, REV16	DSM_LB_K	JP

### NA SKU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
118S0724	1	RES,MF,0.0 OHM,1/20W,0201,HIGH FREQ	R2003_K	NA
118S0724	1	RES,MF,0.0 OHM,1/20W,0201,HIGH FREQ	R2015_K	NA
118S00073	1	RES,MF,56K OHM,1/32W,01005	R312_K	NA
197S00156	1	XTL,THERM,38.4MHz,12PFM,6PP,1612	Y301_K	NA
353S01647	1	20PA, SKYWORKS, 78208, REV13	PA_UHB_K	NA
353S01472	1	SKYWORKS, LB DSM, 13765, REV13	DSM_LB_K	NA

## SIM SKU

### SINGLE 4FF SKU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
512S00038	1	SIM,TALL,PTH,4X3,D33	J_SIM	SINGLE
117S0158	1	RES,MF,100K OHM,1/32W,01005	R11_SIM	SINGLE

### DUAL 4FF SKU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
512S00039	1	SIM,DUAL,BUNK,PTH,4X3,D33	J_SIM	DUAL
117S0161	1	RES,MF,0.0 OHM,1/32W,01005	R31_SIM	DUAL
117S0166	1	RES,MF,100 OHM,1/32W,01005	R27_SIM	DUAL
117S0185	1	RES,MF,47 OHM,1/32W,01005	R26_SIM	DUAL
117S0166	1	RES,MF,100 OHM,1/32W,01005	R29_SIM	DUAL

### SINGLE 4FF + VINYL SKU

PART#	QTY	DESCRIPTION	REFERENCE DESIGNATOR(S)	BOM OPTION
512S00038	1	SIM,TALL,PTH,4X3,D33	J_SIM	VINYL
998-12938	1	VINYL,N10,BIRCH 4.0	U_SIM	VINYL
117S0158	1	RES,MF,100K OHM,1/32W,01005	R10_SIM	VINYL
118S0636	1	RES,MF,4.7K OHM,1/32W,01005	R12_SIM	VINYL

RULER_RULE_SET=MSAP_2017		MANUFACTURING CONFIGURATION					TABLE_REV_NUMBER=6	
DIELECTRIC BASED SPACING RULES					DEFAULT SPACING MULTIPLES		VOID SPACE RATIO	
MULTIPLES		SMDPIN MAX(UM)	MVIA MAX(UM)	SMDPIN2SMDPIN MAX(UM)				
1	1.65, 2, 2D, 3.2D, 4D		120	120	100	2		
LAYERS			MINIMUM CU WIDTH RATIO		MINIMUM CU SPACING RATIO		MINIMUM TO DEFAULT RATIO	
TOP, BOTTOM, ISL4, ISL5			1.0		1.0		1.0	
ISL2, ISL3, ISL6, ISL7			1.0		1.0		1.0	

POWER RULE DEFINITIONS			
LOAD CURRENT(MA)	CURRENT DENSITY(A/SQMM)	MIN NECK WIDTH(MM)	MAX NECK LENGTH(MM)
50	50	0.08	10
100	50	0.08	10
200	50	0.08	10
300	50	0.08	10
500	50	0.08	10
1000	50	0.08	10
3000	50	0.08	10

TABLE_IMPEDANCE_HYBRID=50_HYBRID	
LAYERS	IMPEDANCE RULE
TOP	50_OHM_SE
ISL3	50_OHM_SE
ISL6	50_OHM_SE_6R4R8
ISL7	50_OHM_SE
ISL5	50_OHM_SE

TABLE_IMPEDANCE_HYBRID=50_HYBRID_WIDE	
LAYERS	IMPEDANCE RULE
TOP	50_OHM_SE_1R3
ISL3	50_OHM_SE
ISL6	50_OHM_SE_6R4R8
ISL7	50_OHM_SE
ISL5	50_OHM_SE

## FERRITE ALTERNATES

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
155S00131	155S00341	BOM_TABLE_ALTS	FL900_K	FERR BD, 2400HM
155S00414	155S0876	BOM_TABLE_ALTS	ALL	FERR BD, 100HM
155S00200	155S00400	BOM_TABLE_ALTS	ALL	FERR BD, 1500HM
155S00194	155S00400	BOM_TABLE_ALTS	ALL	FERR BD, 1500HM

## ETIC CAP ALTERNATES

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00237	138S00167	BOM_TABLE_ALTS	C1204_K	CAP,2.2UF
138S00237	138S00167	BOM_TABLE_ALTS	C1205_K	CAP,2.2UF
138S00237	138S00167	BOM_TABLE_ALTS	C1206_K	CAP,2.2UF

## CAP ALTERNATES


PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
138S00086	138S0884	BOM_TABLE_ALTS	ALL	CAP,20UF
138S0719	138S1103	BOM_TABLE_ALTS	ALL	CAP,4.7UF
138S00128	138S00133	BOM_TABLE_ALTS	ALL	CAP,0.47UF

## VARISTOR ALTERNATES

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
377S00130	377S0106	BOM_TABLE_ALTS	ALL	VARISTOR,12V,33PF

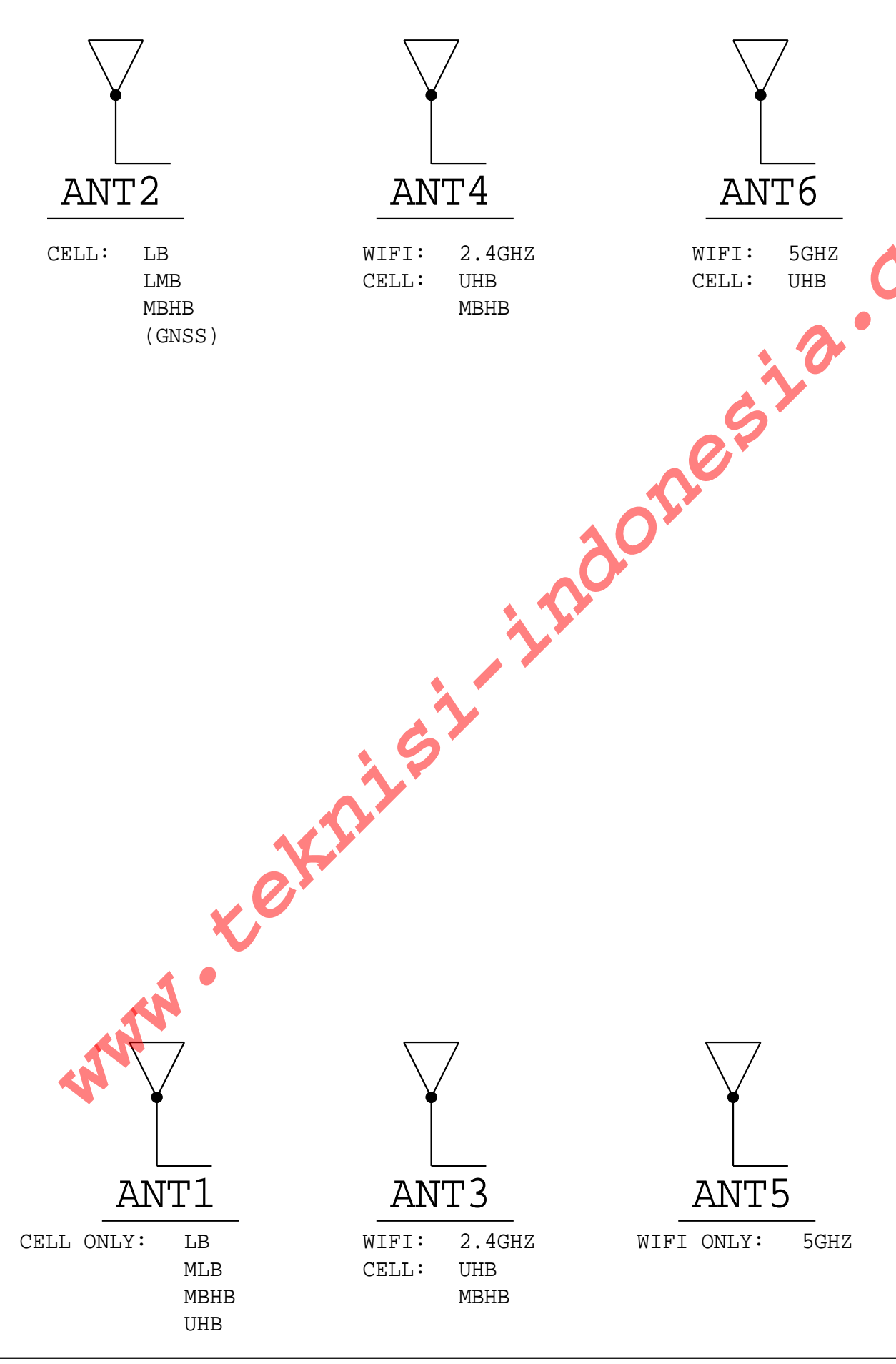
## EEPROM ALTERNATES

PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
335S00013	335S0894	BOM_TABLE_ALTS	EEPROM_K	EEPROM,8KBIT,12C

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		SHEET	17	OF 47




# RADIO ANTENNAS



# UAT

# LAT

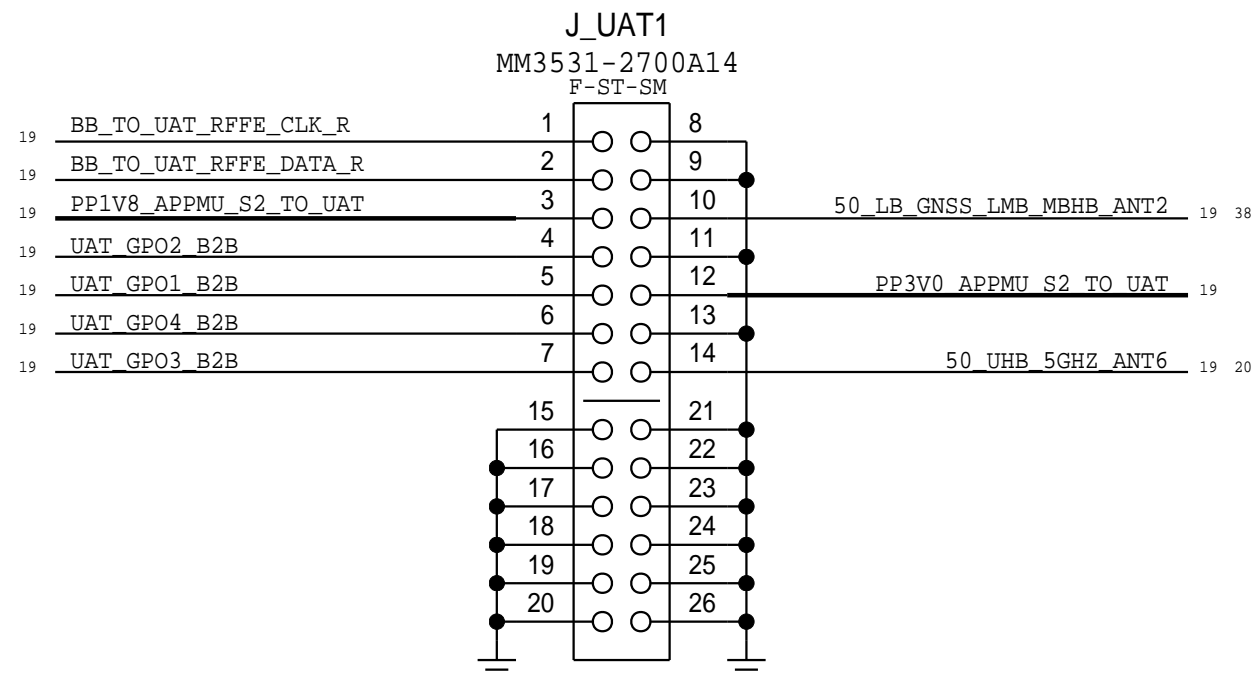
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# ANTENNA B2BS

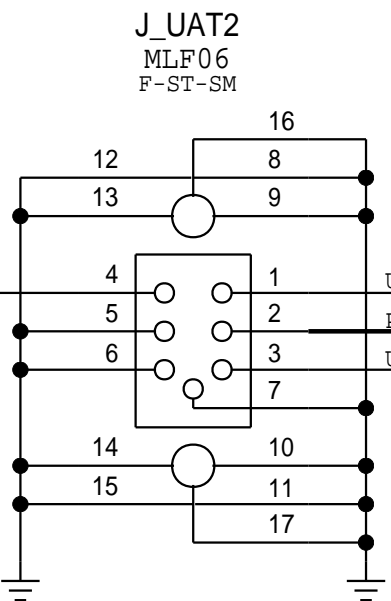
# UAT

## UAT B2BS

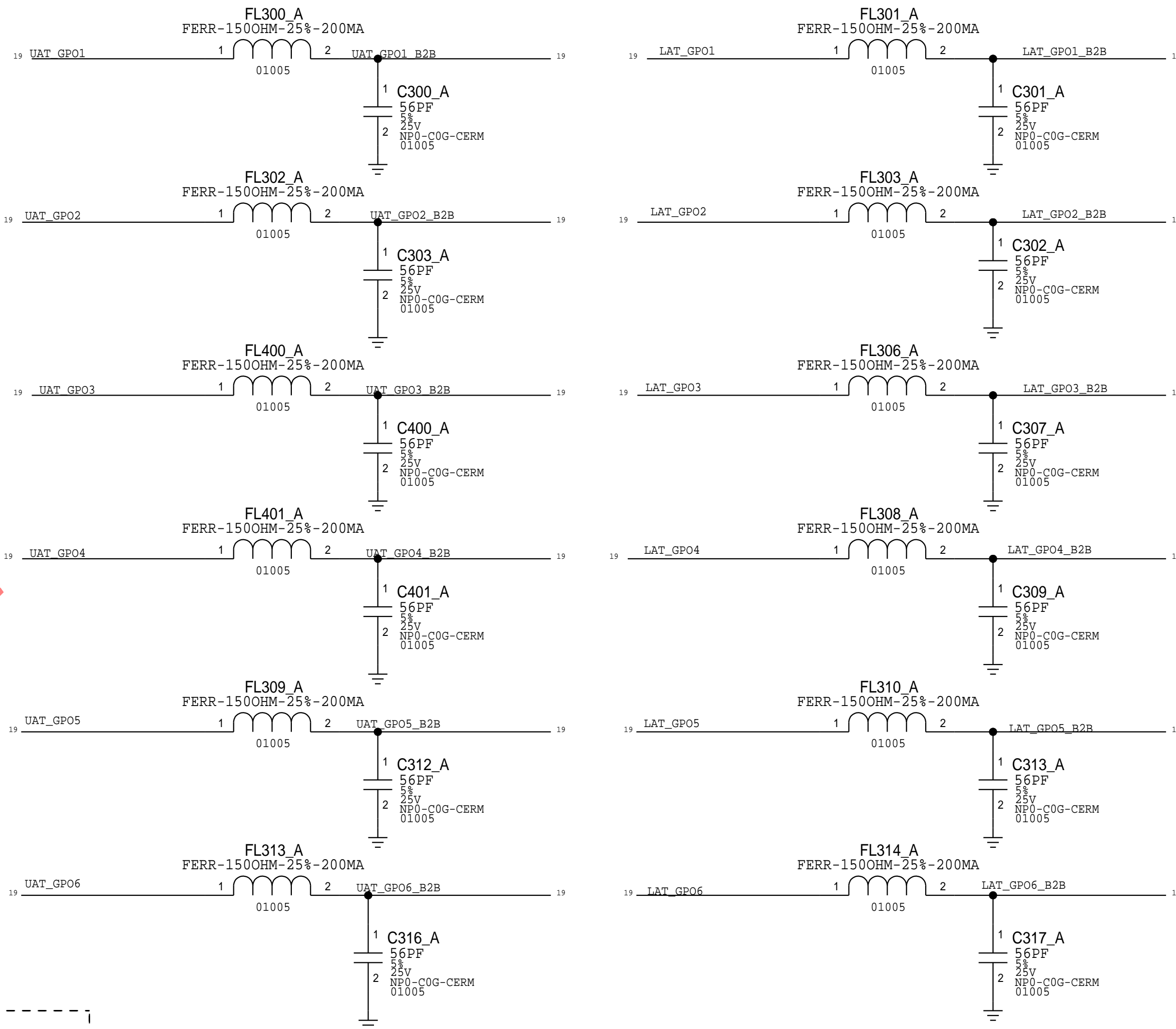
RCPT ON MLB BOT (518S00167)  
PLUG ON FLEX (518S00166)



RCPT ON MLB BOT (516S00434)  
PLUG ON FLEX (516S00435)



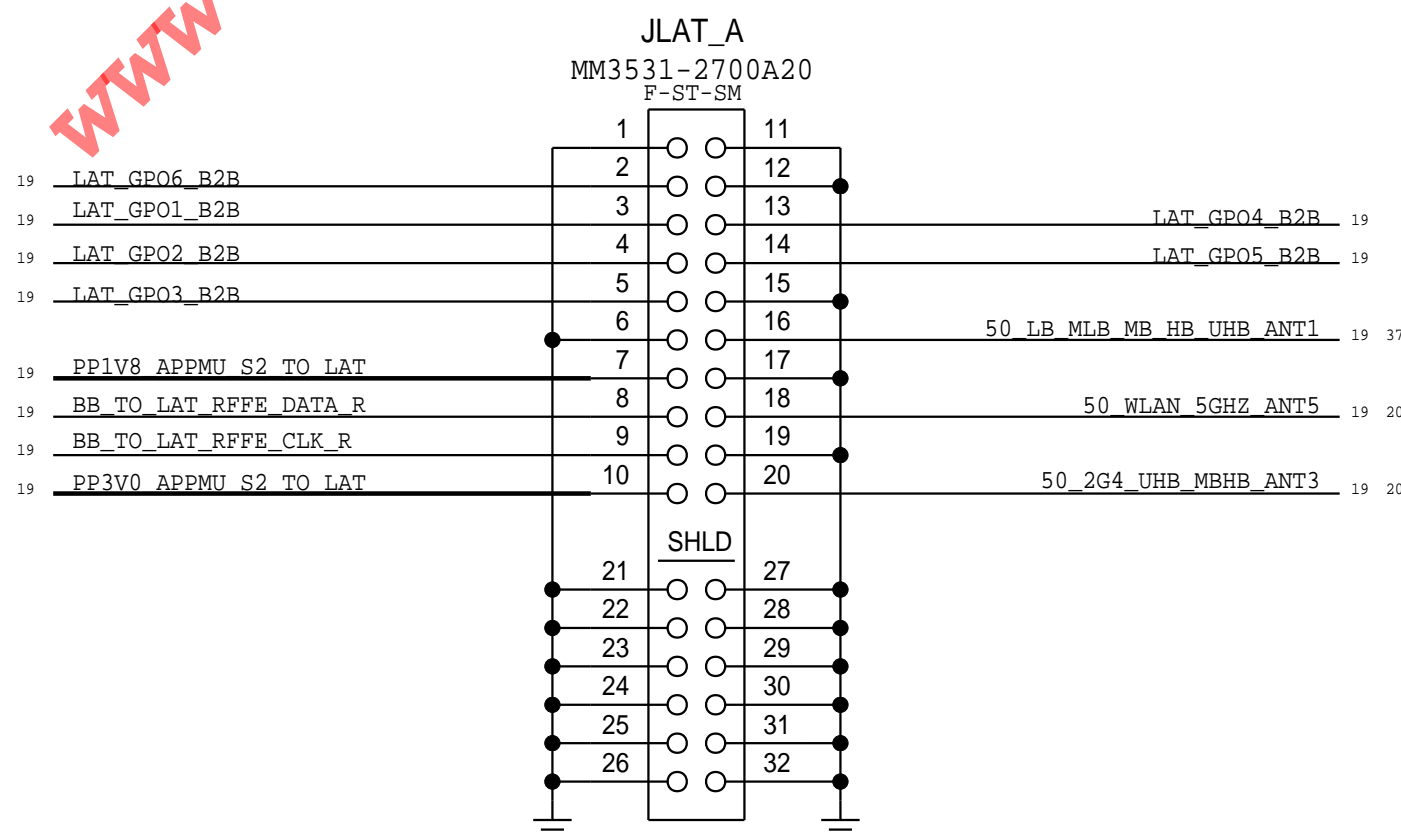
## GPO FILTERS



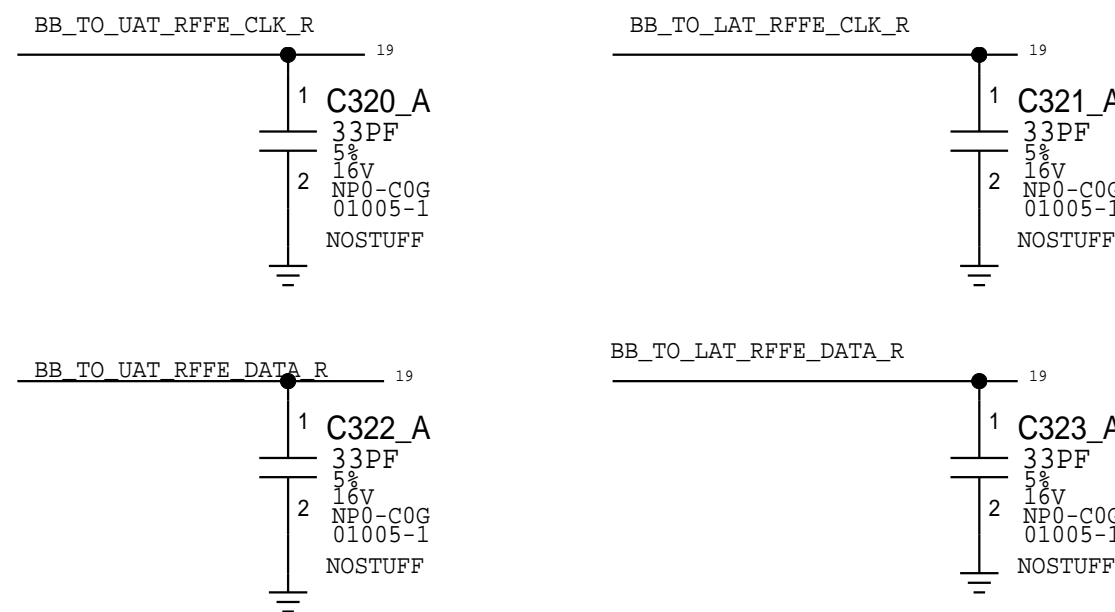
# LAT

## LAT B2B

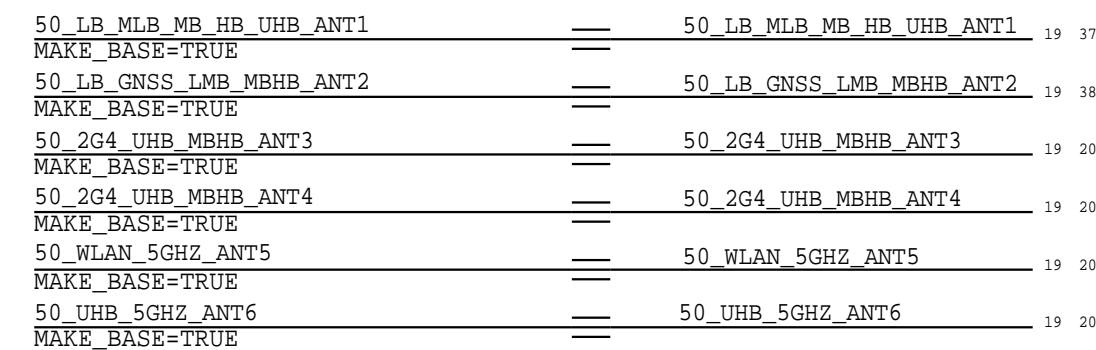
RCPT ON MLB BOT (518S00149)  
PLUG ON FLEX (518S00150)



## RFFE FILTERS



## ANTENNA CONNECTIONS



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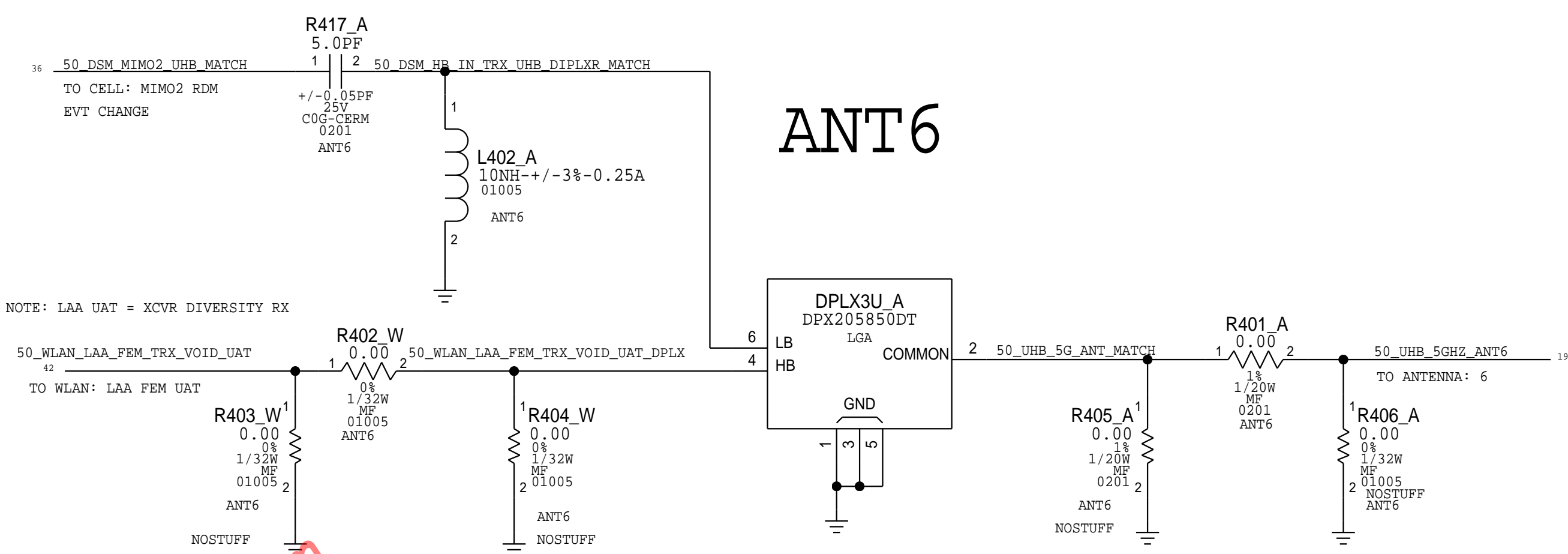
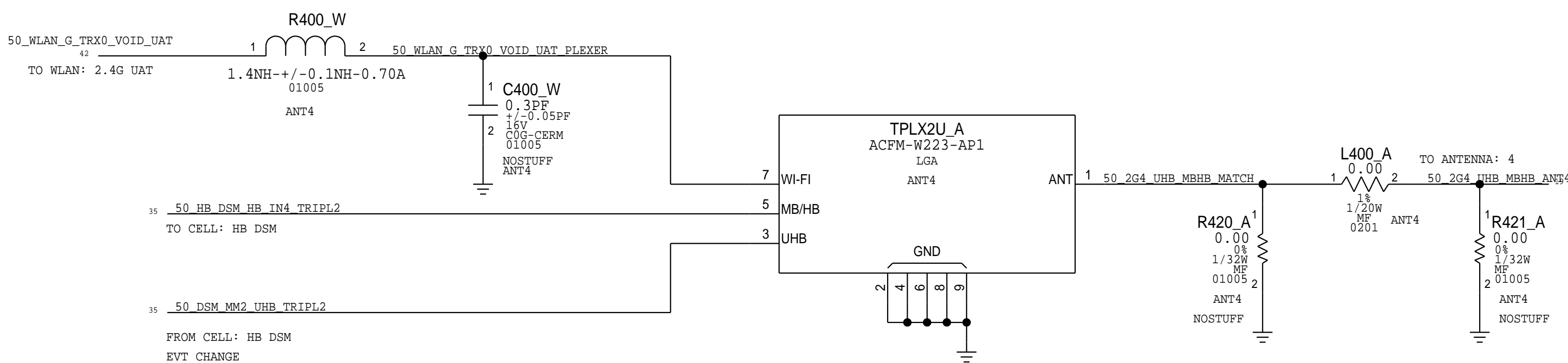
# SHARED N-PLEXERS

D

## UAT

ANT4

ANT6



MHB-UHB/2.4G WLAN TRIPLEXER2

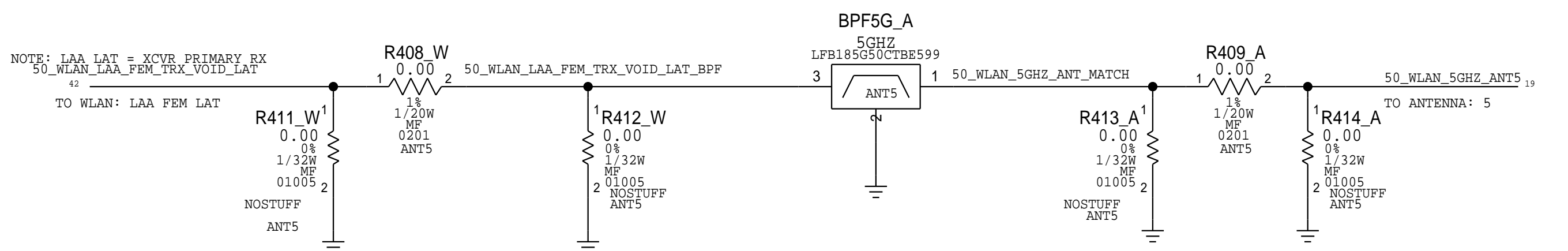
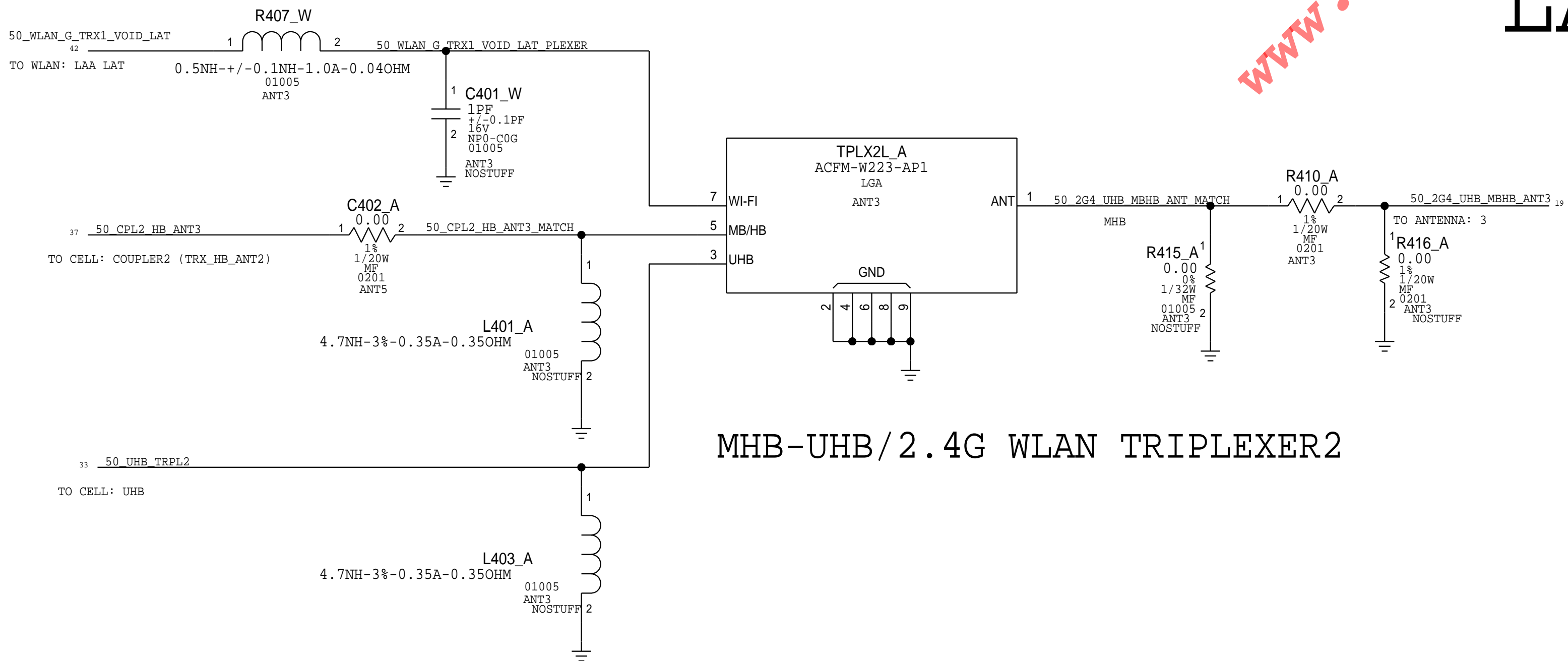
UHB-5G WLAN DIPLEXER3

B

## LAT

ANT3

ANT5



MHB-UHB/2.4G WLAN TRIPLEXER2

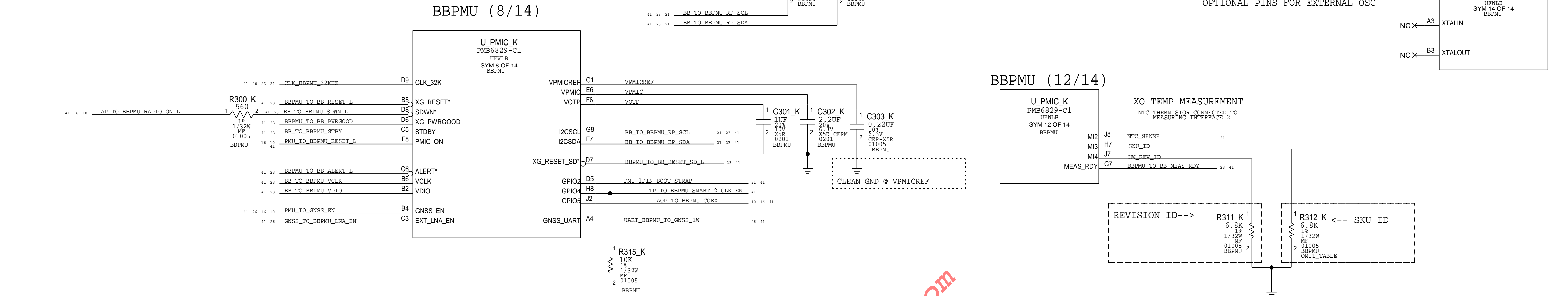
5GHZ WLAN BPF

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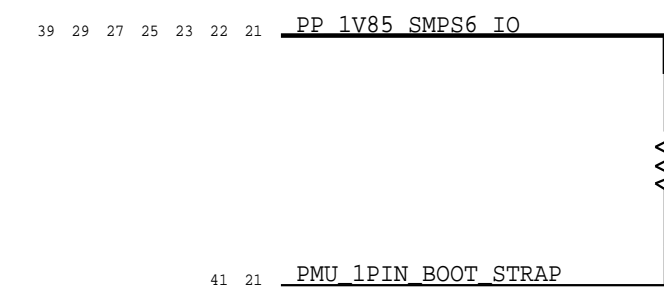
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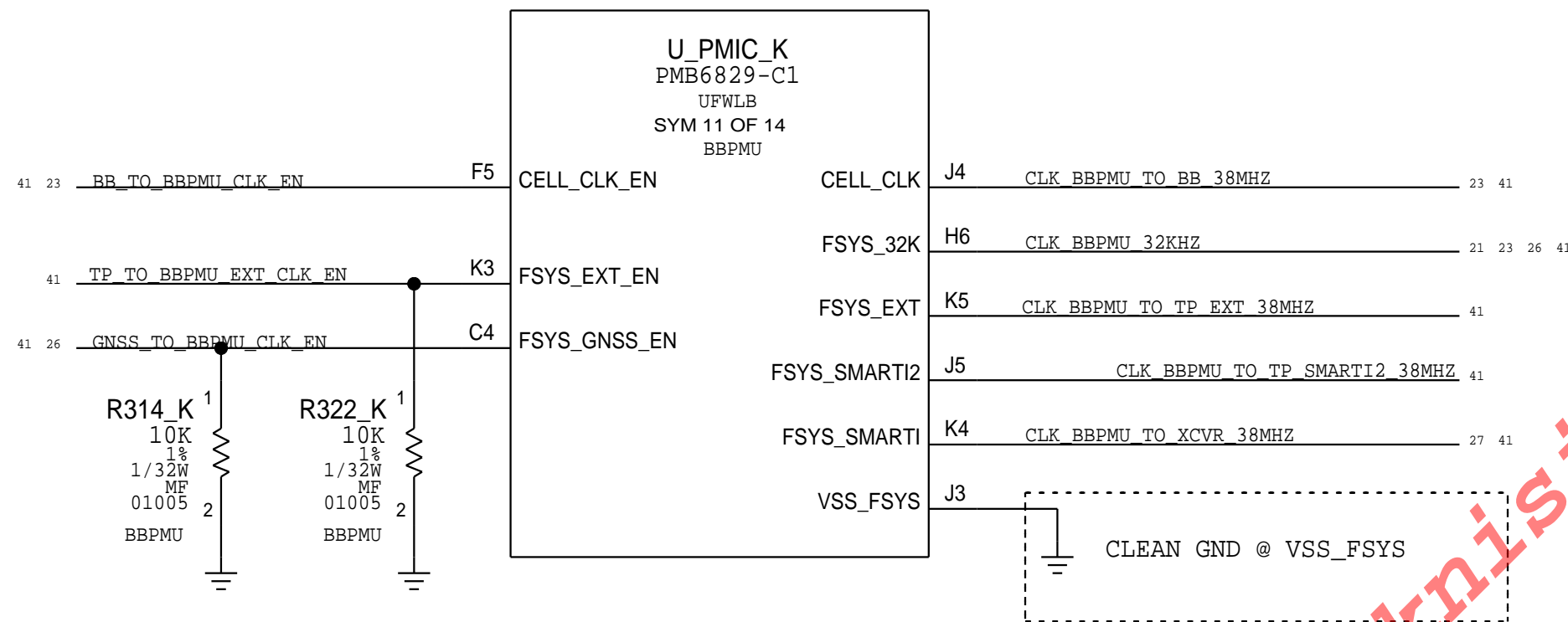
# BBPMU: CONTROL



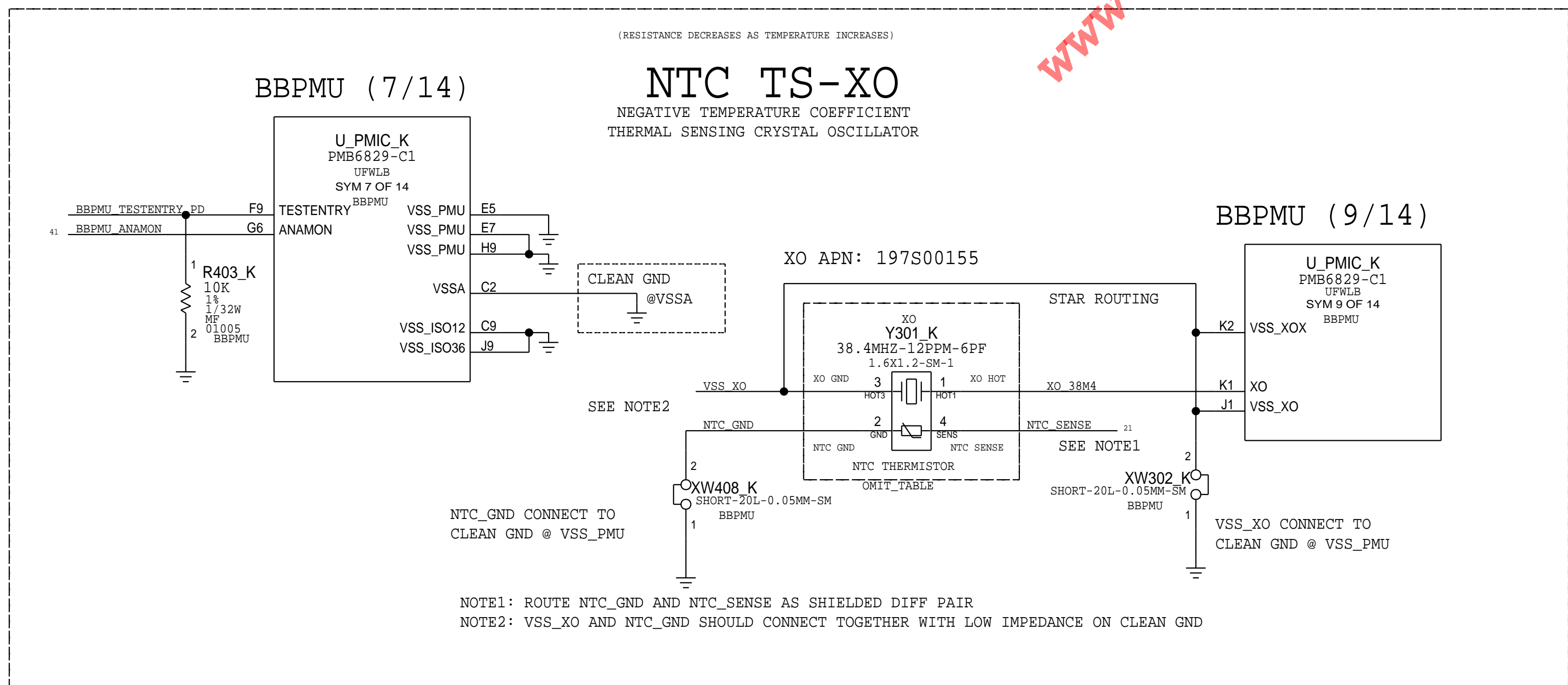
CAN BE REMOVED  
WITH XPMU C0



BBPMU (11/14)



BBPMU (9/14)



NOTE1: ROUTE NTC\_GND AND NTC\_SENSE AS SHIELDED DIFF PAIR  
NOTE2: VSS\_XO AND NTC\_GND SHOULD CONNECT TOGETHER WITH LOW IMPEDANCE ON CLEAN GND

REVISION

R311_K	REVISION	
	MLB	RF DEV
0.0	T/POC/PRE-PROTO0	1.0
1.2K	P0	1.1
2.2K	P1	2.0
3.3K	P2	2.1
4.7K		3.0
6.8K	EVT	
8.2K	EVT 1.5	4.0
10K	CARRIER	
12K	DVT	5.0
15K	PVT	5.1
18K		
22K		
27K		6.0
33K		6.0
39K		
47K		
56K	DARWIN	
68K	JP_SKWS	
82K		
100K	P1 DOE2, TXC	
120K	P1 DOE1, S7 B1	
150K		

SKU/CATEGORY

R312_K	HW REVISION	X-CODE
0.0	RFDEV JP	
1.2K	ICE 18.0 JP	X1344
2.2K	ICE 18.0 ROW	(ICE 18.0)
3.3K	ICE 18.1 JP	
4.7K	ICE 18.1 ROW	X1049
6.8K	ICE 18.2 JP	(ICE 18.1)
8.2K	ICE 18.2 ROW	X1210
10K	RFDEV ROW	(ICE 18.2)
12K	ICE 18.5 JP	
15K	ICE 18.6 JP	X1170
18K		X1176
22K	ICE 18.5 US	
27K	ICE 18.6 US	X1170
33K	ICE 18.0 NA	X1176
39K	RFDEV NA	X1344
47K	ICE 18.1 NA	
56K	ICE 18.2 NA	X1049
68K		X1210
82K	KAROO INTERNAL	
100K	KAROO INTERNAL	
120K	KAROO INTERNAL	
150K		

HWID TABLE RDAR:///32880011  
ADC TABLE RDAR:///27081897

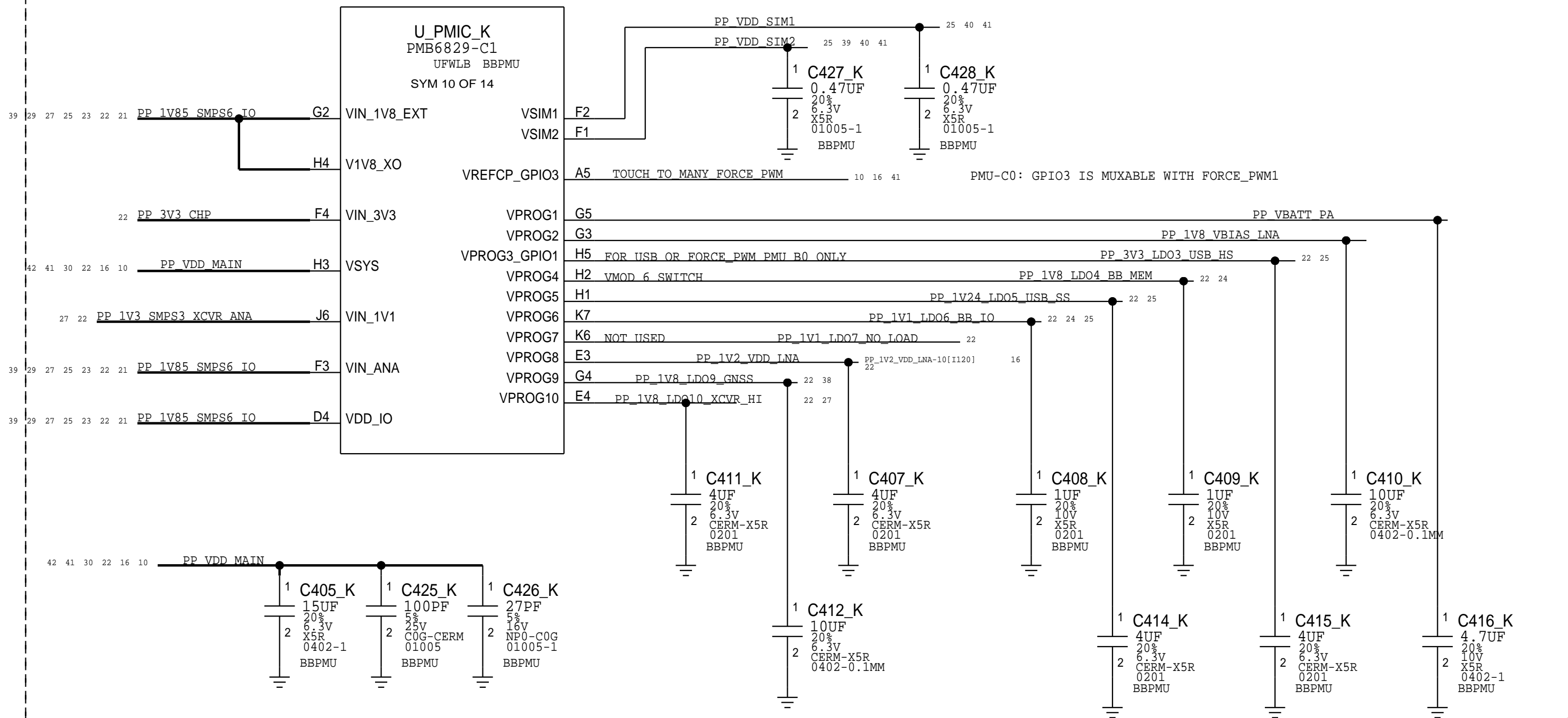
BBPMU ADC TABLES

PAGE TITLE		
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	DRAWING NUMBER	051-02695
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# BBPMU: RAILS

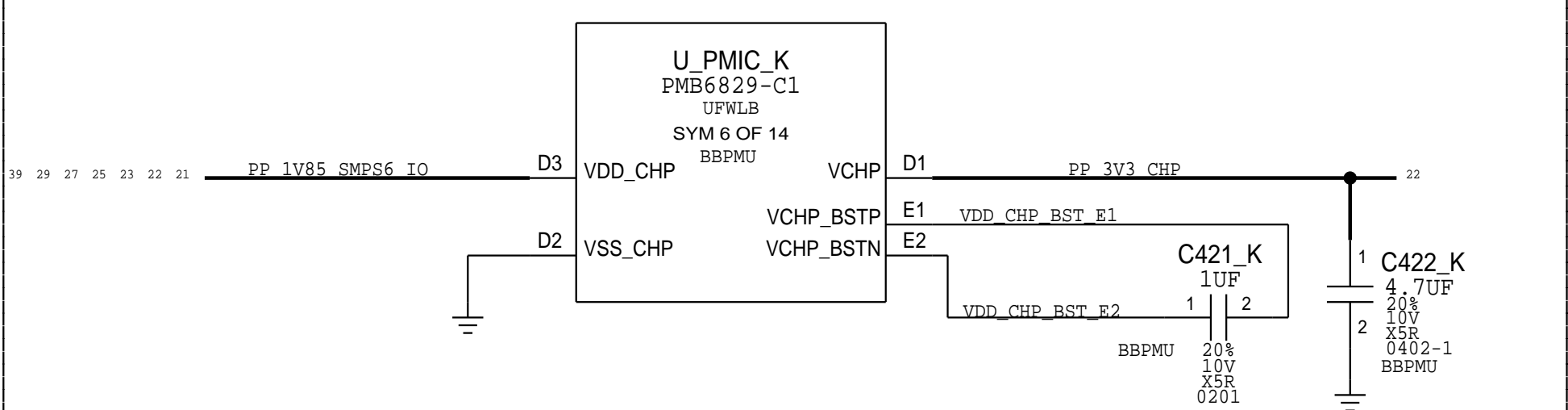
## PROGRAMMABLE LDOS

BBPMU (10/14)



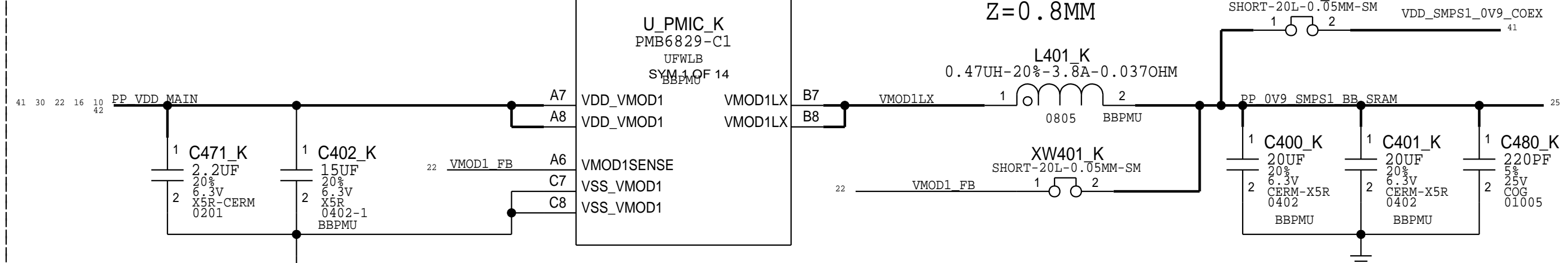
## CHARGE PUMP

BBPMU (6/14)

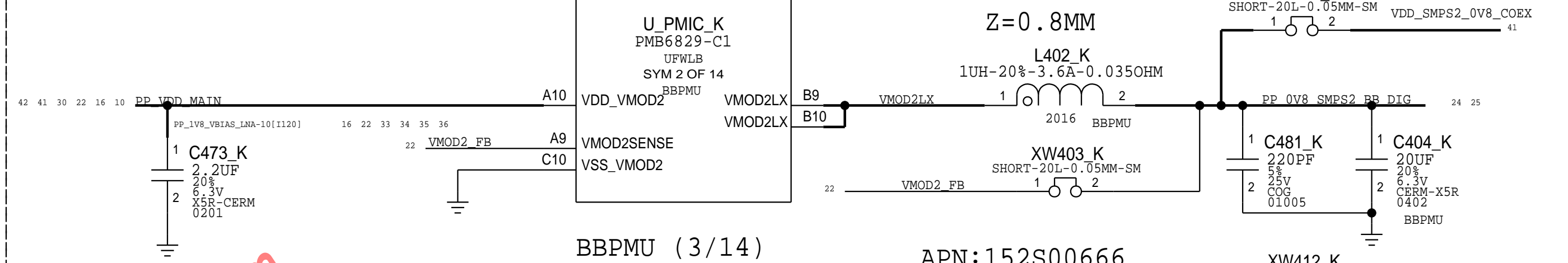


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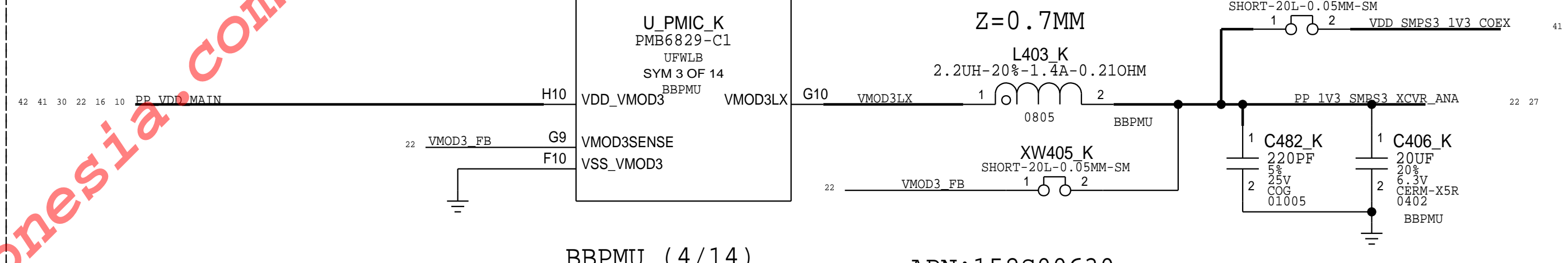
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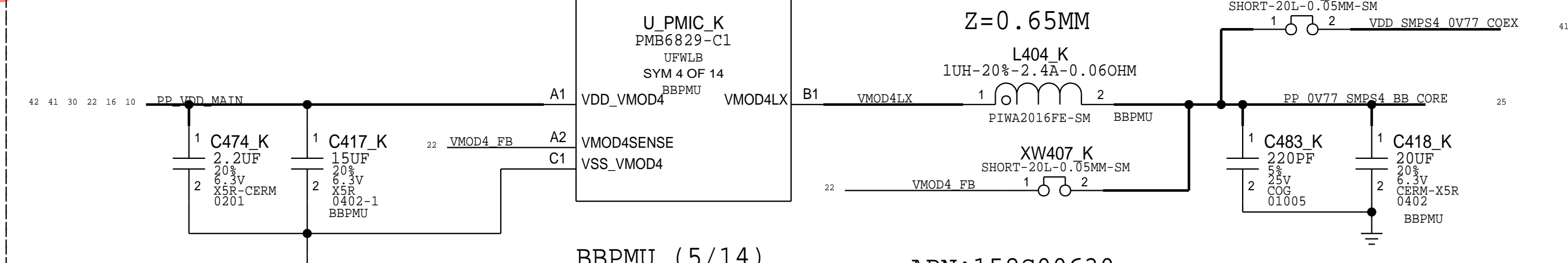
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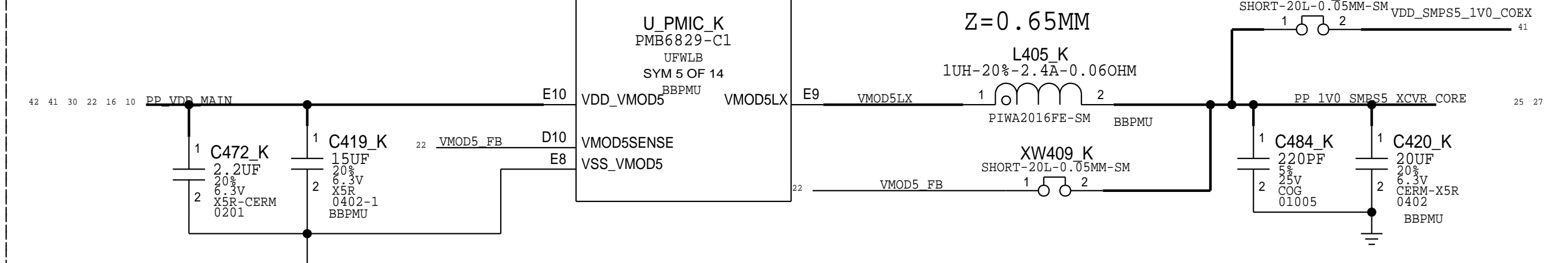
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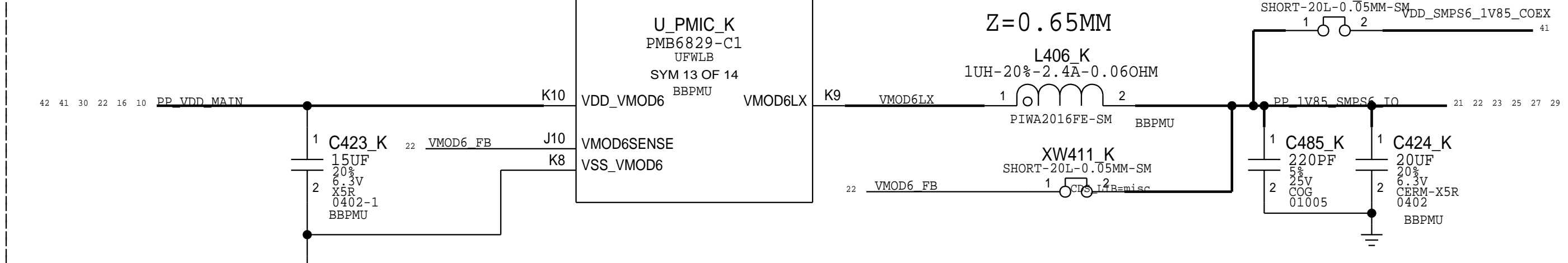
BBPMU (4/14)




BBPMU (5/14)



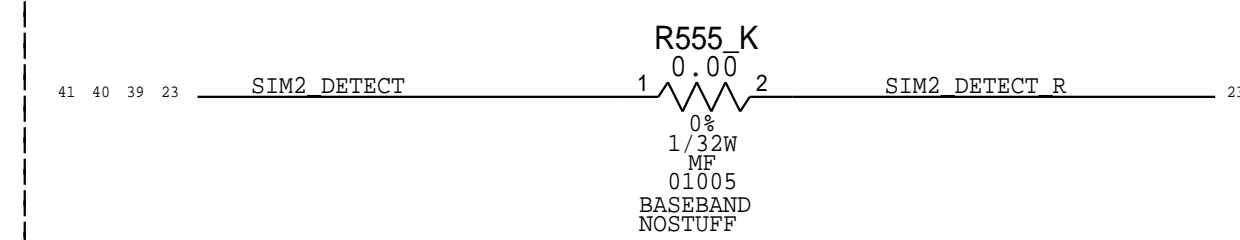
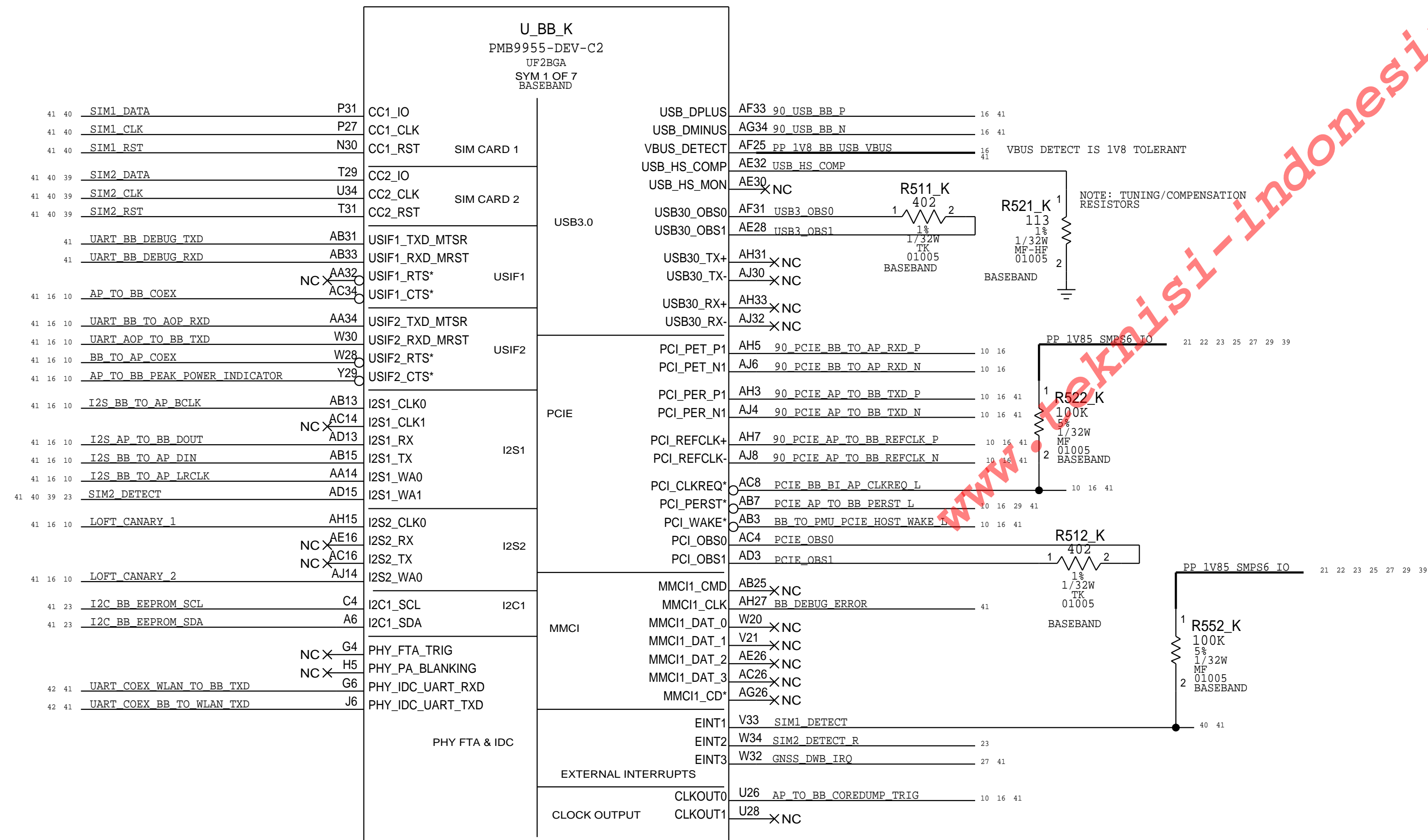
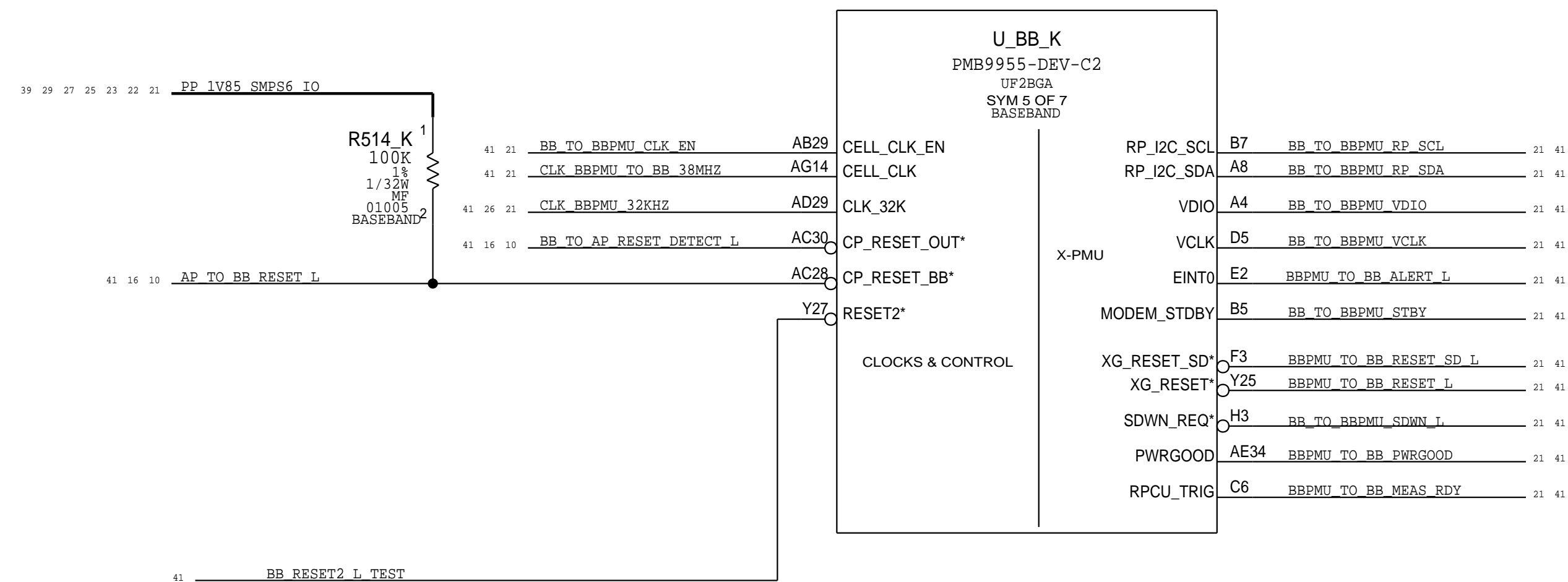
BBPMU (13/14)



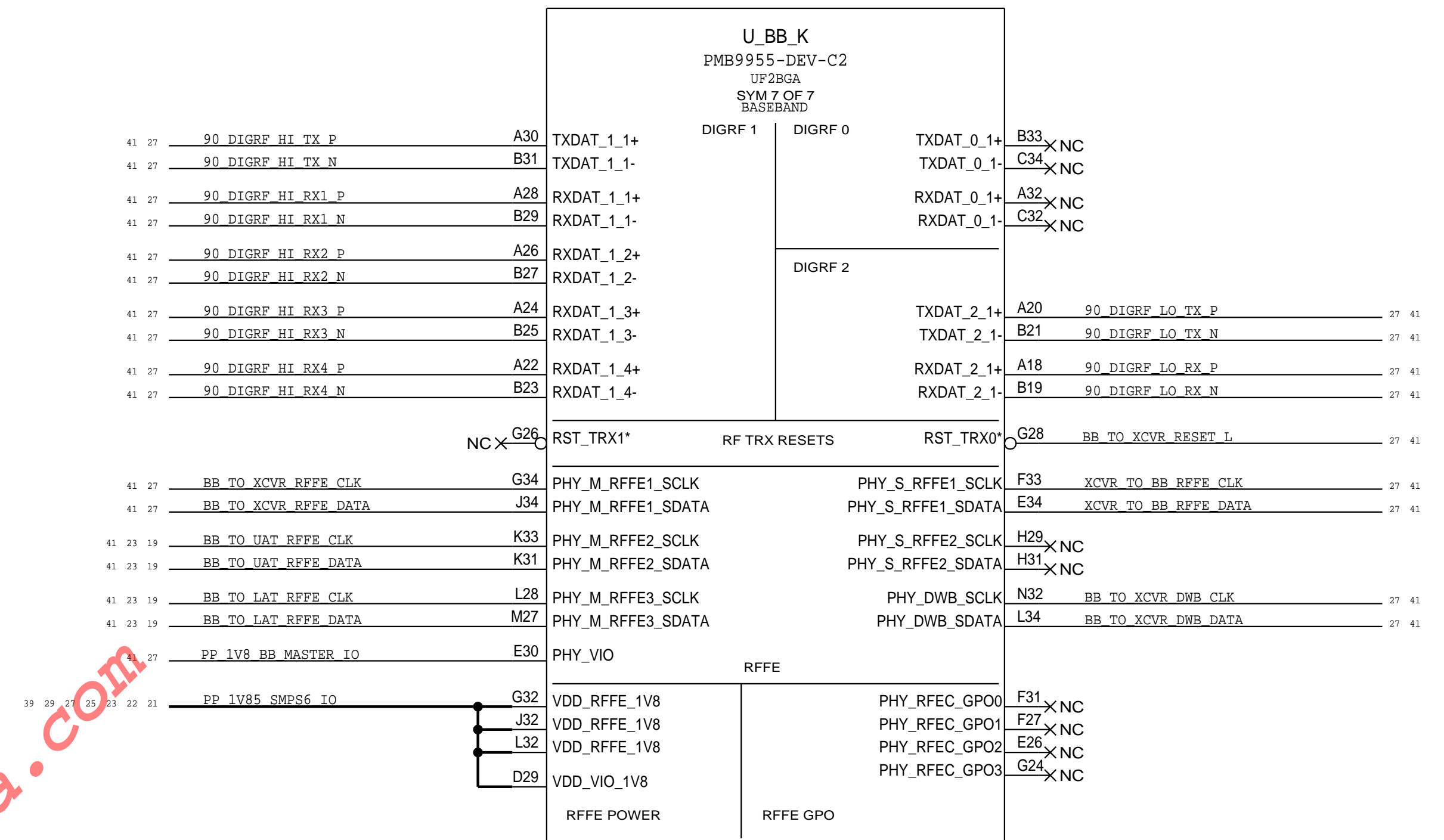
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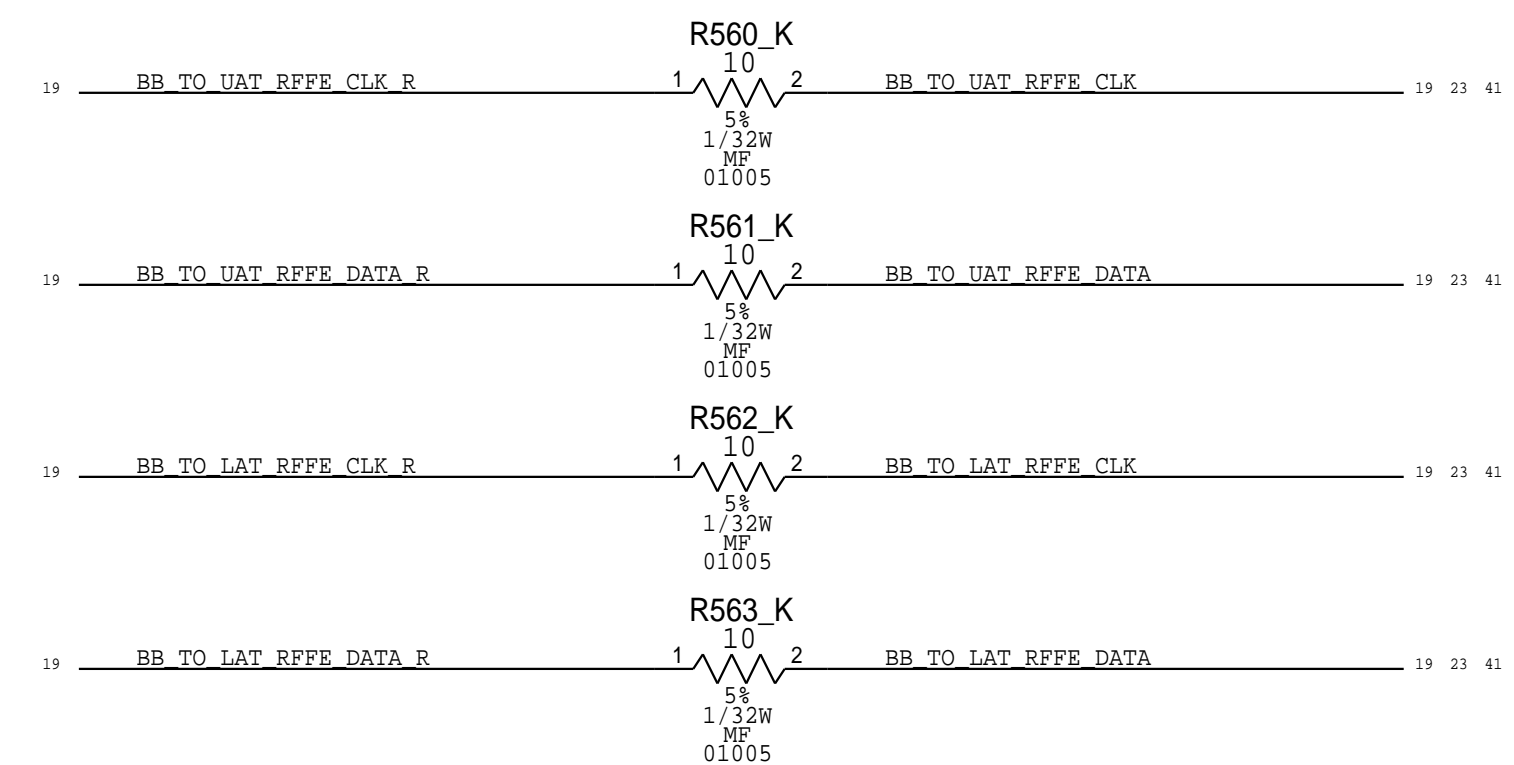
## BB: INTERFACE



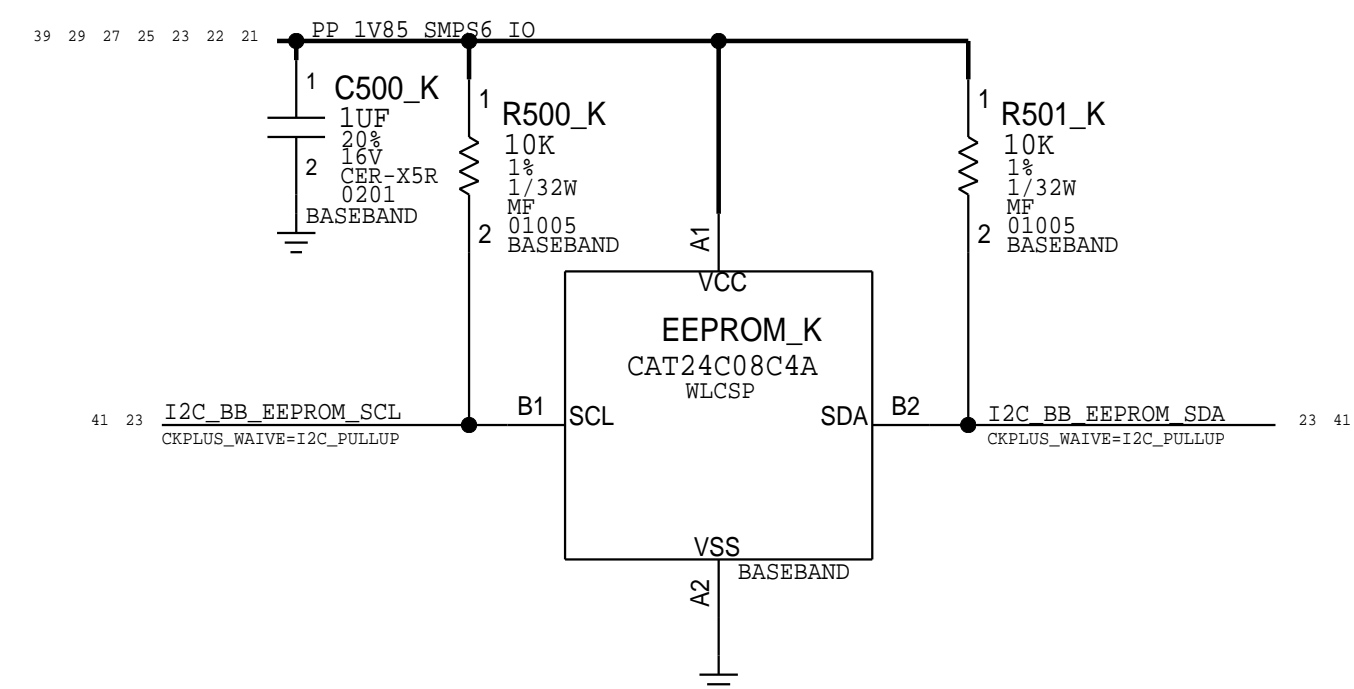
XG756 (7/7)



BB RFFE SOURCE TERMINATIONS

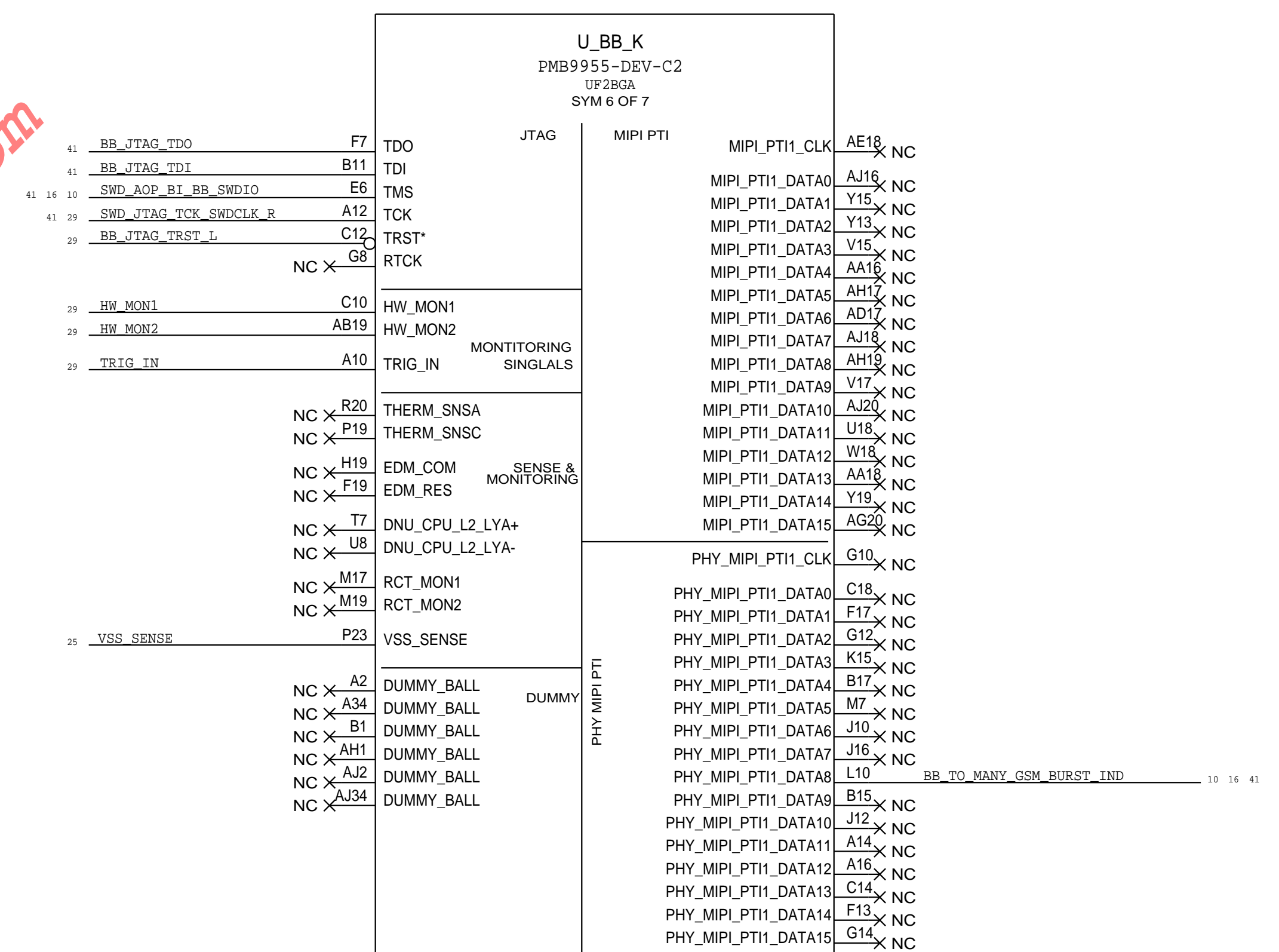
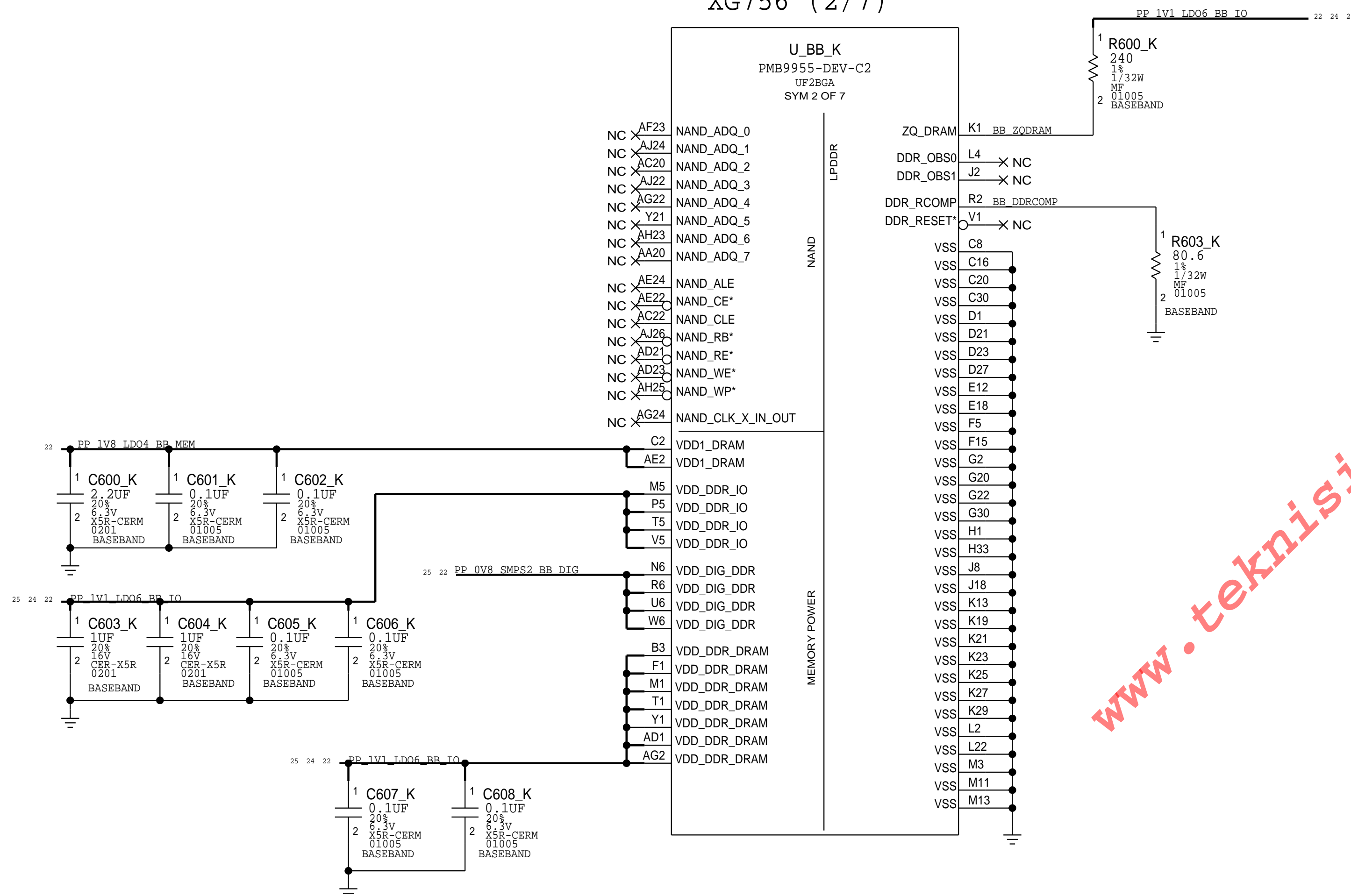


BB EEPROM






# BB: DDR PWR & JTAG



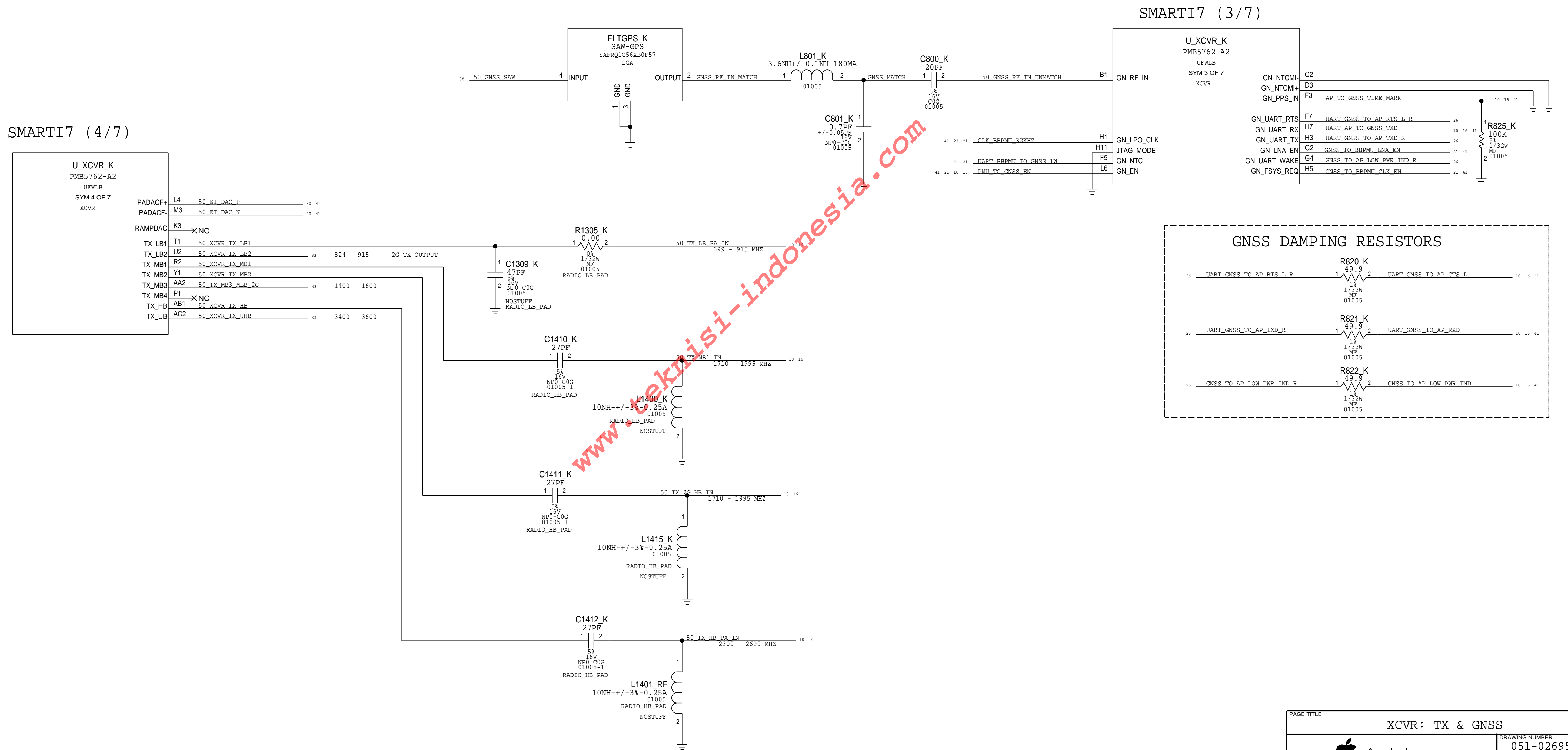
## D




PAGE TITLE		BB: DIGITAL PWR	
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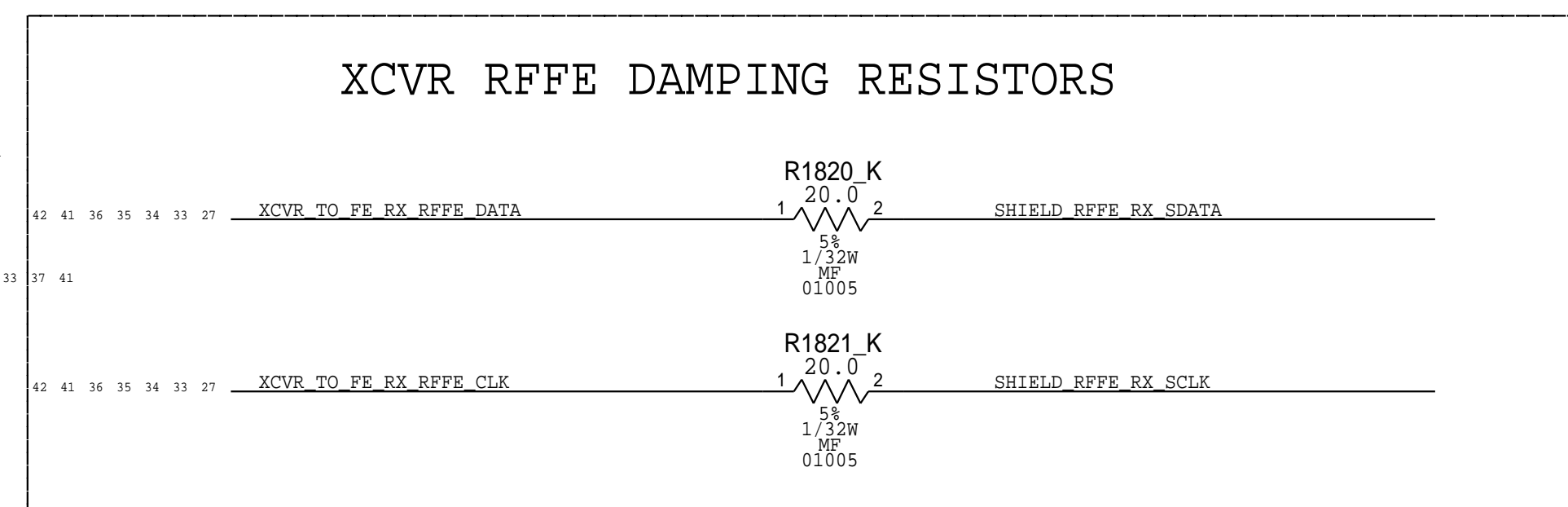
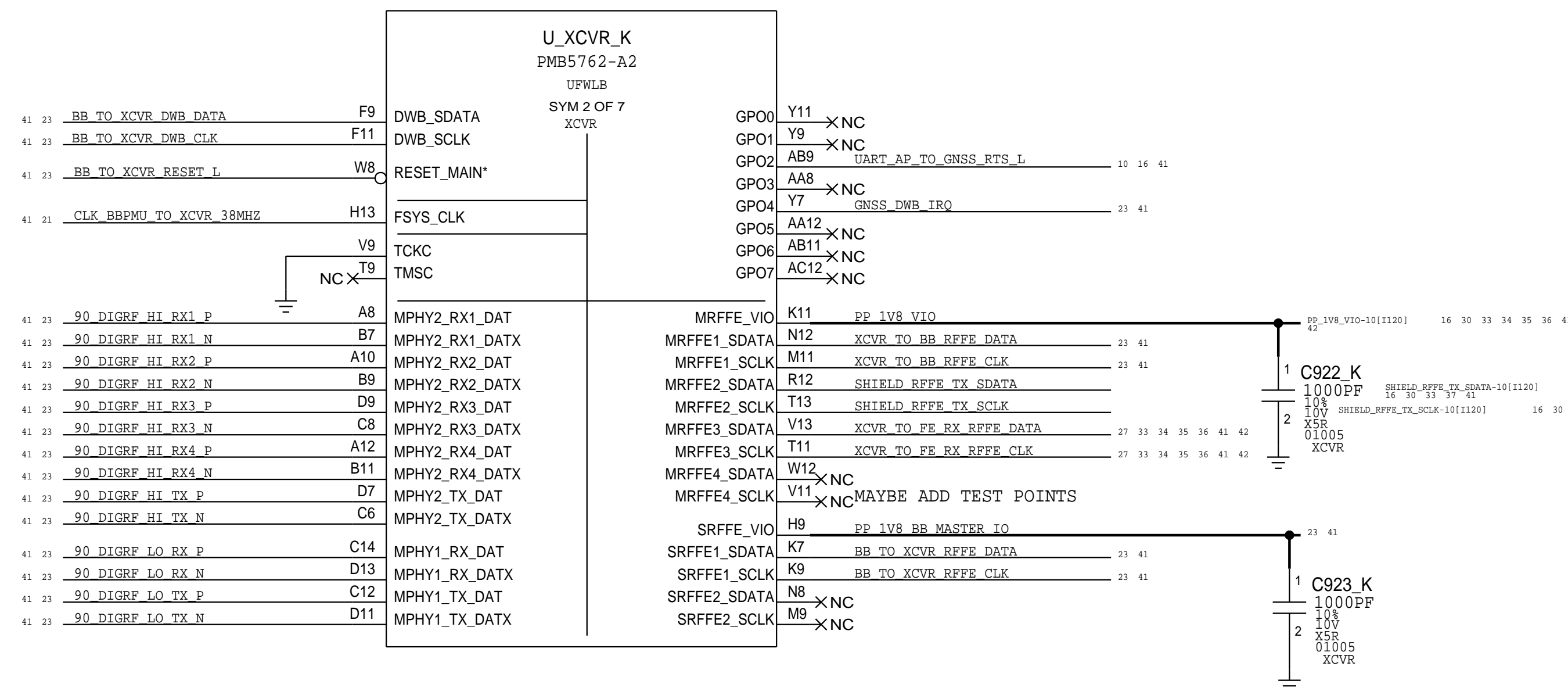
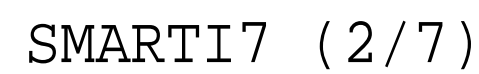
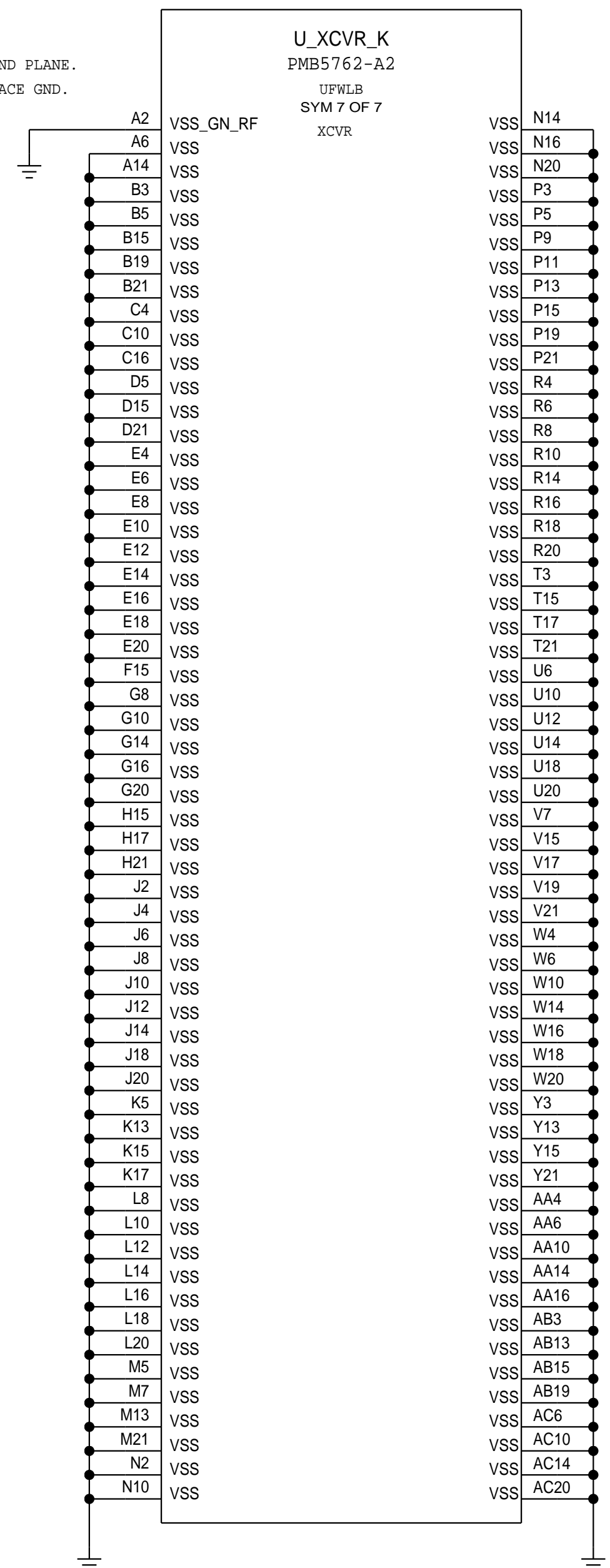
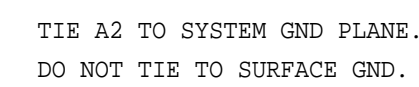
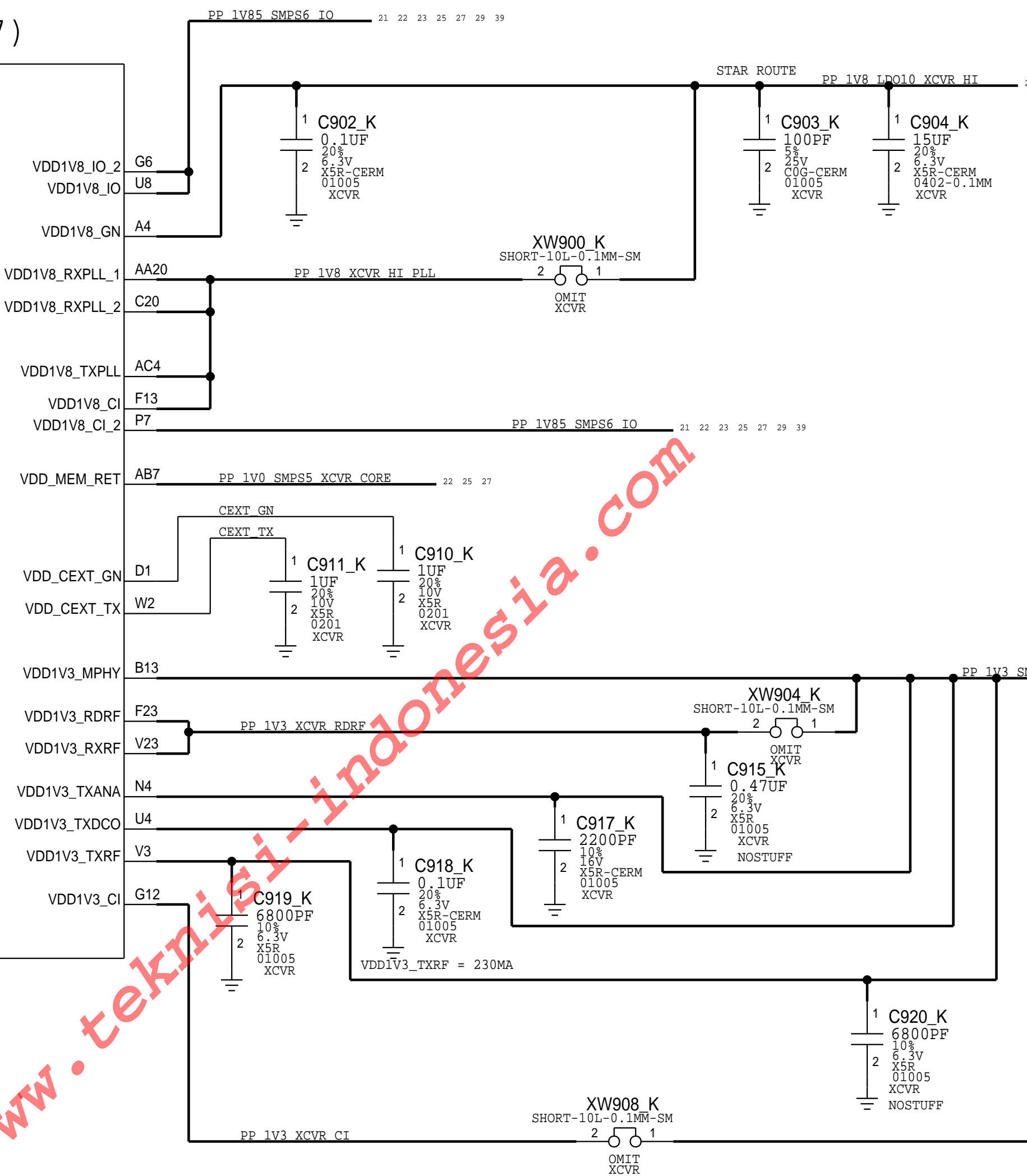
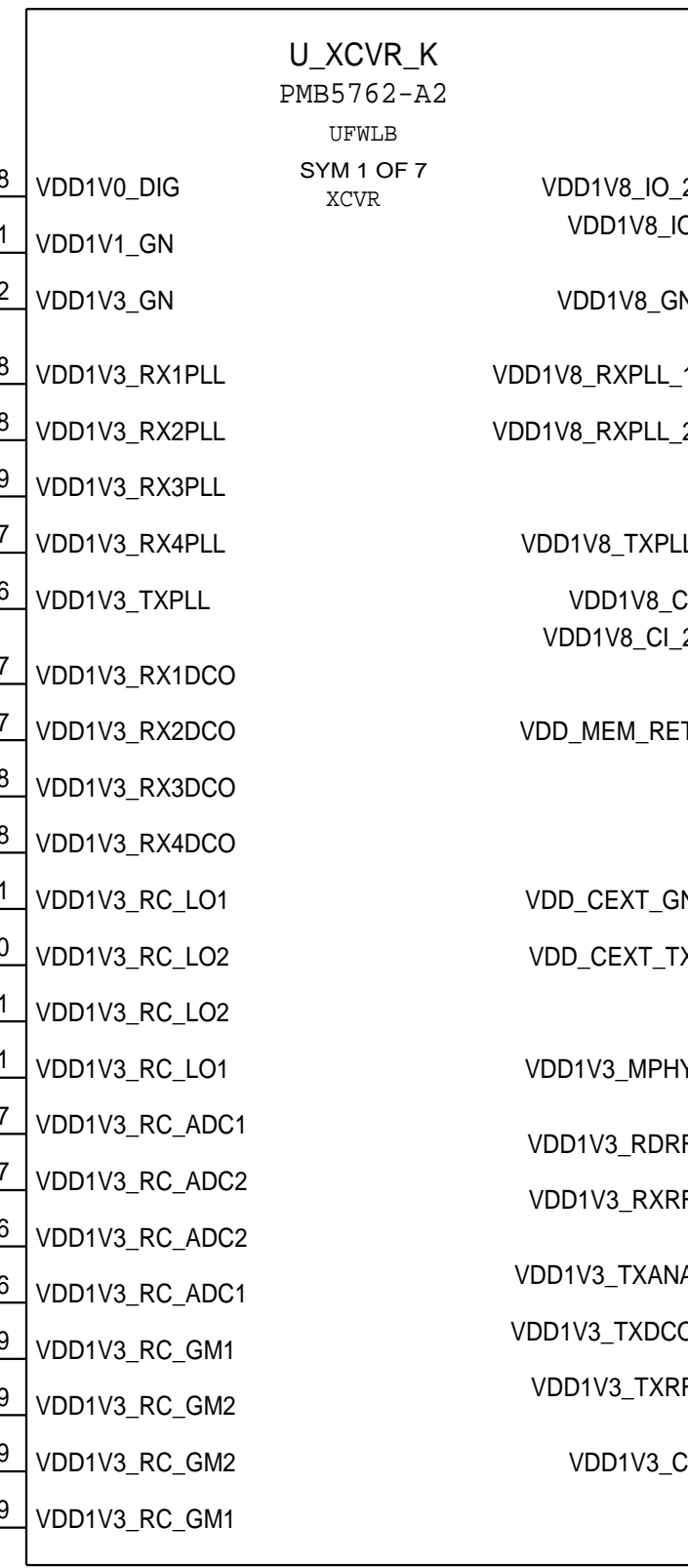
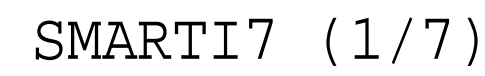
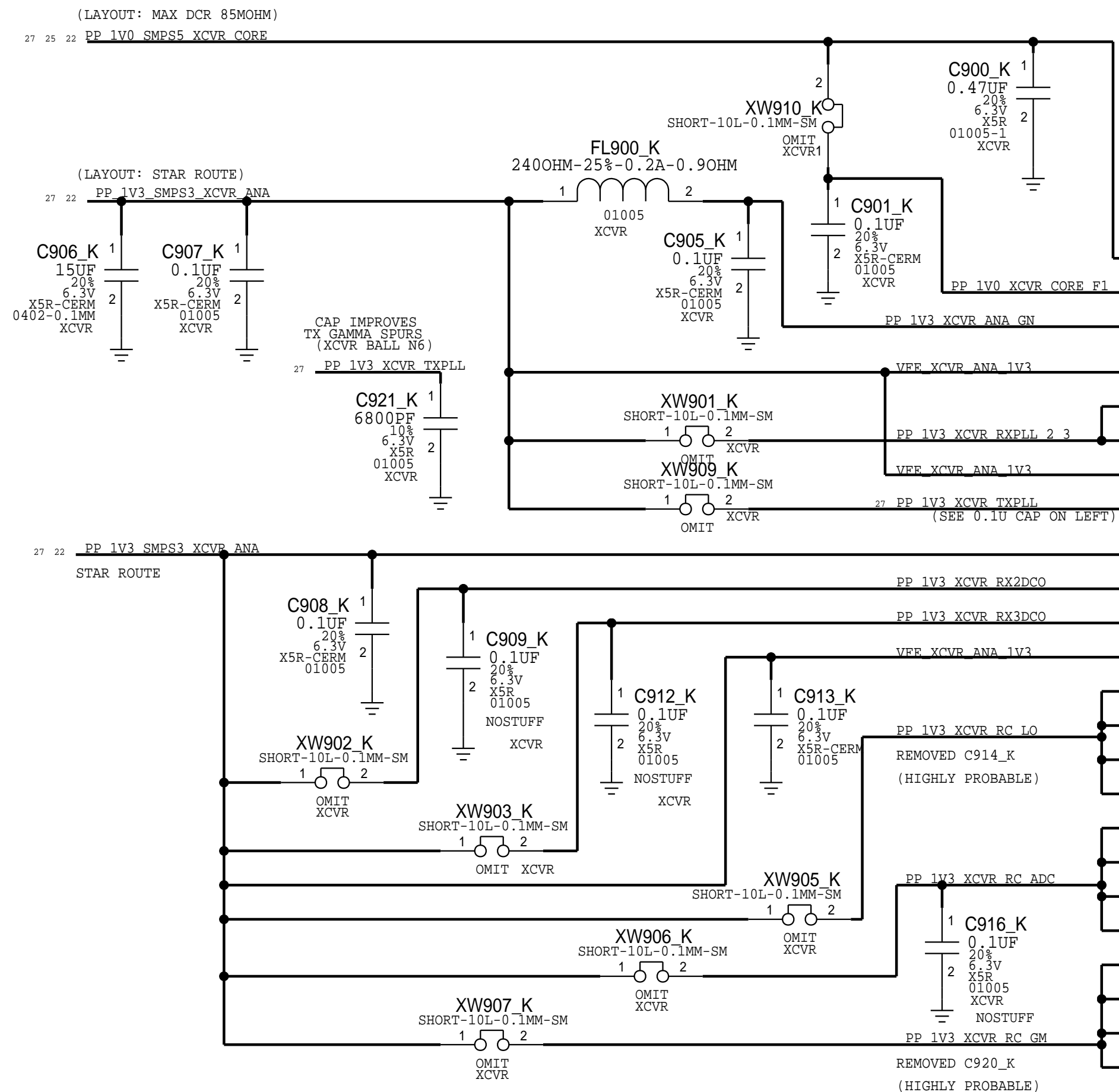
## XCVR : TRANSMIT &amp; GNSS




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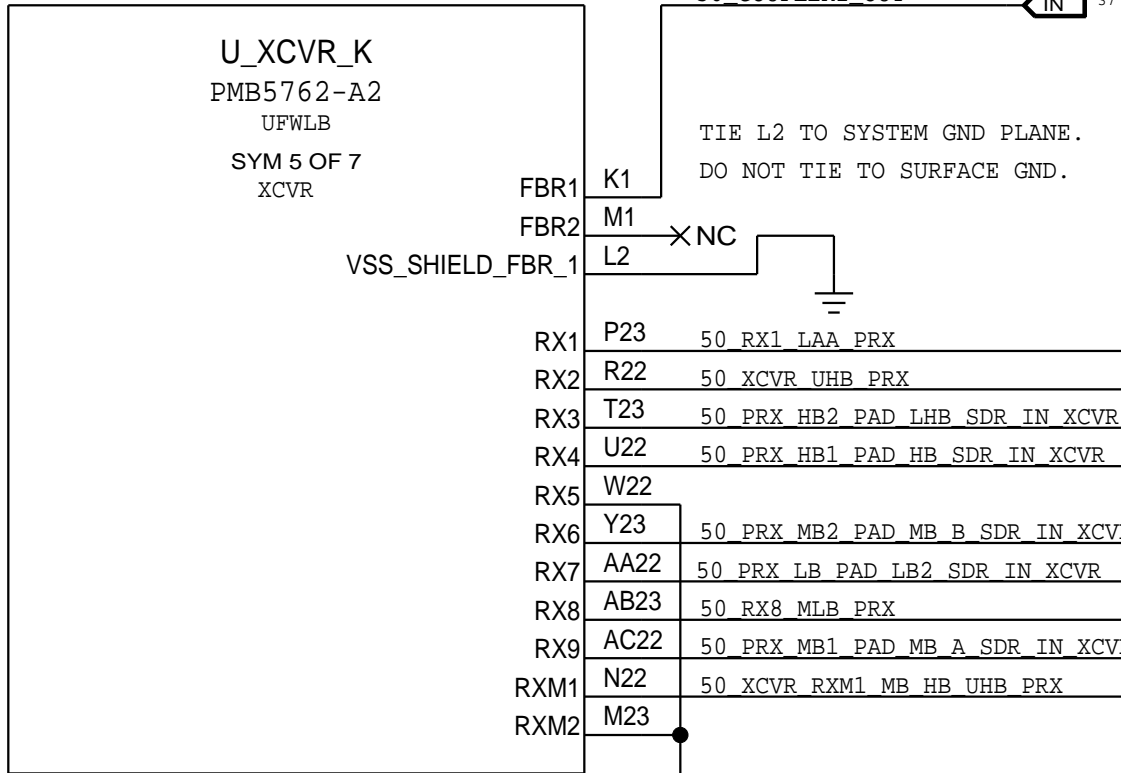
## XCVR: INTERFACE & PWR



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XCVR: INTERFACE & PWR			
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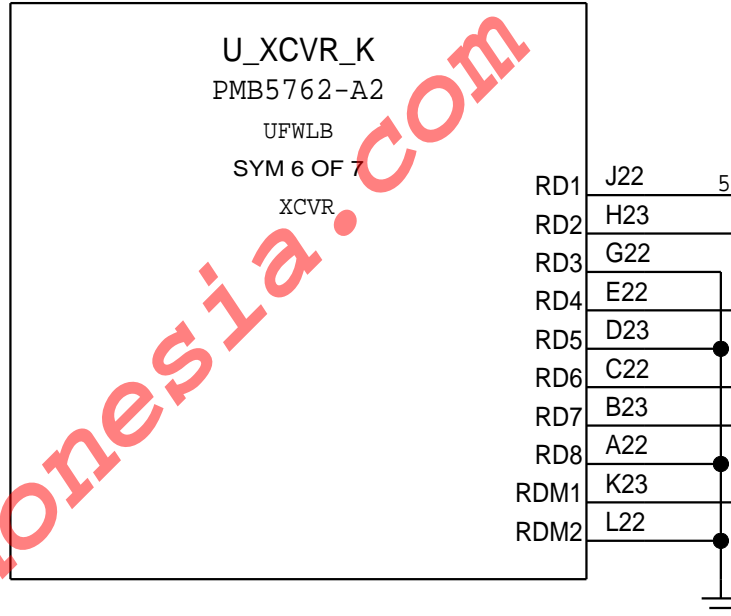
XCVR: PRIMARY/DIVERSITY RX

SMARTI7 PRX (5/7)



CONNECT ALL UNUSED RX PORTS TO GND.

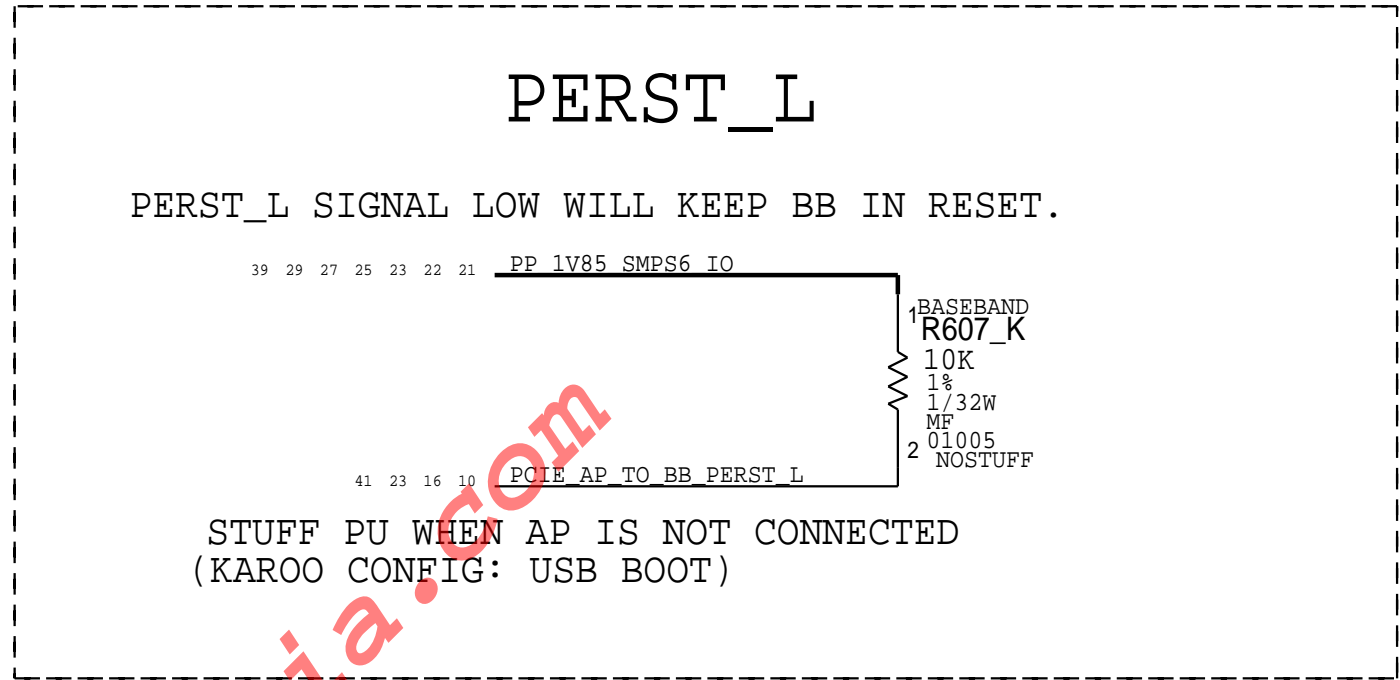
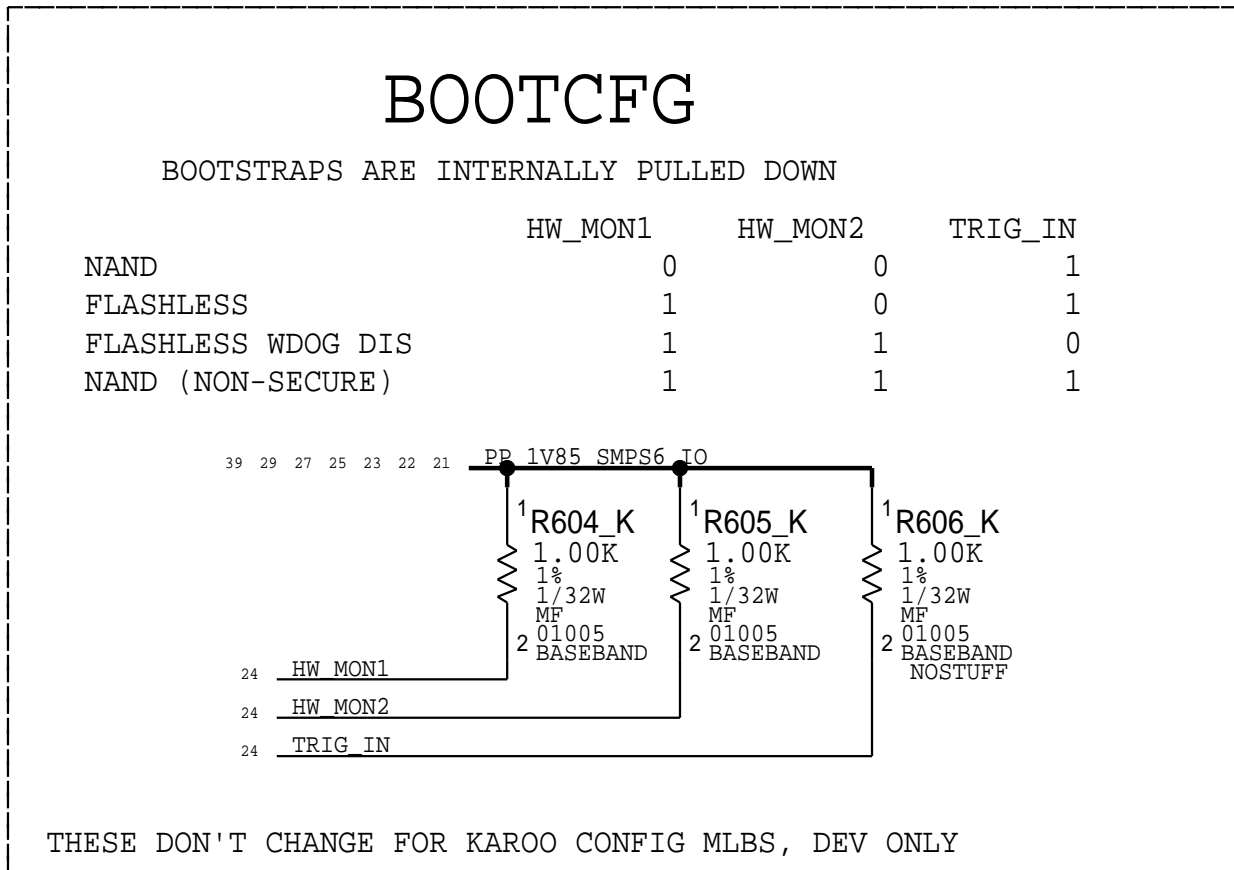
SMARTI7 DRX (6/7)



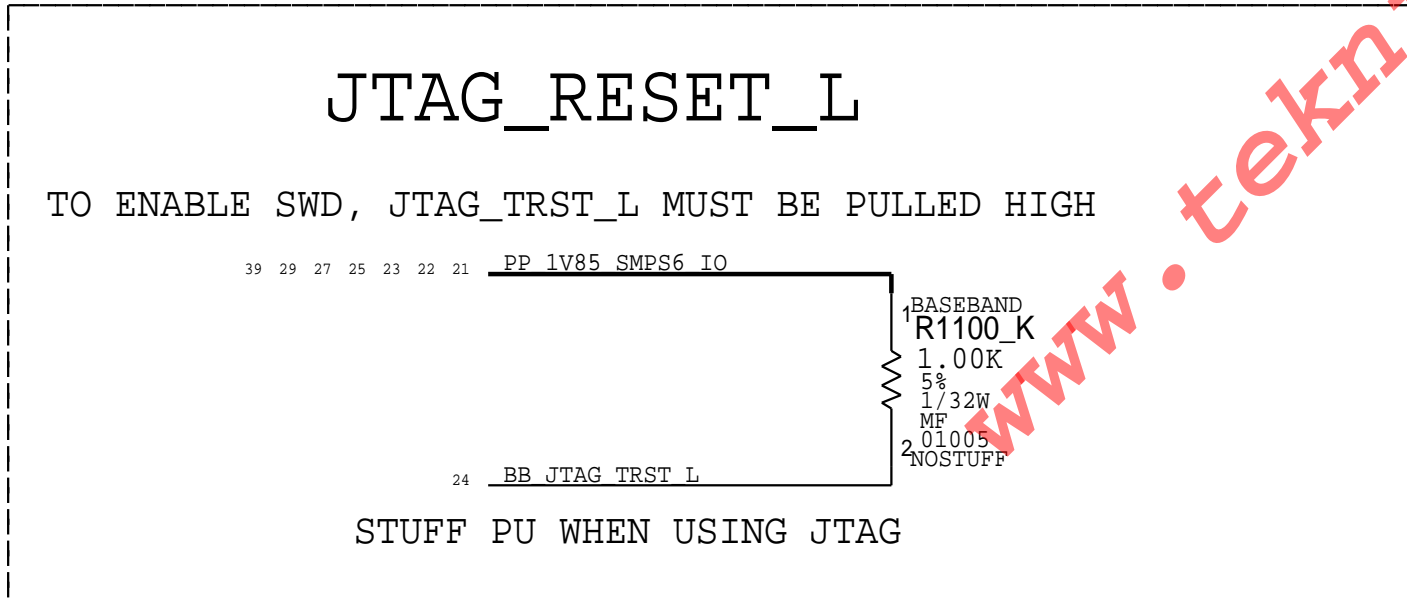
S7 PORT MAP CHANGE 10/11/2016:  
USE RD6 INSTEAD OF RD3.  
CONNECT ALL UNUSED RD PORTS TO GND.

PAGE TITLE		
XCVR: PRX DRX		
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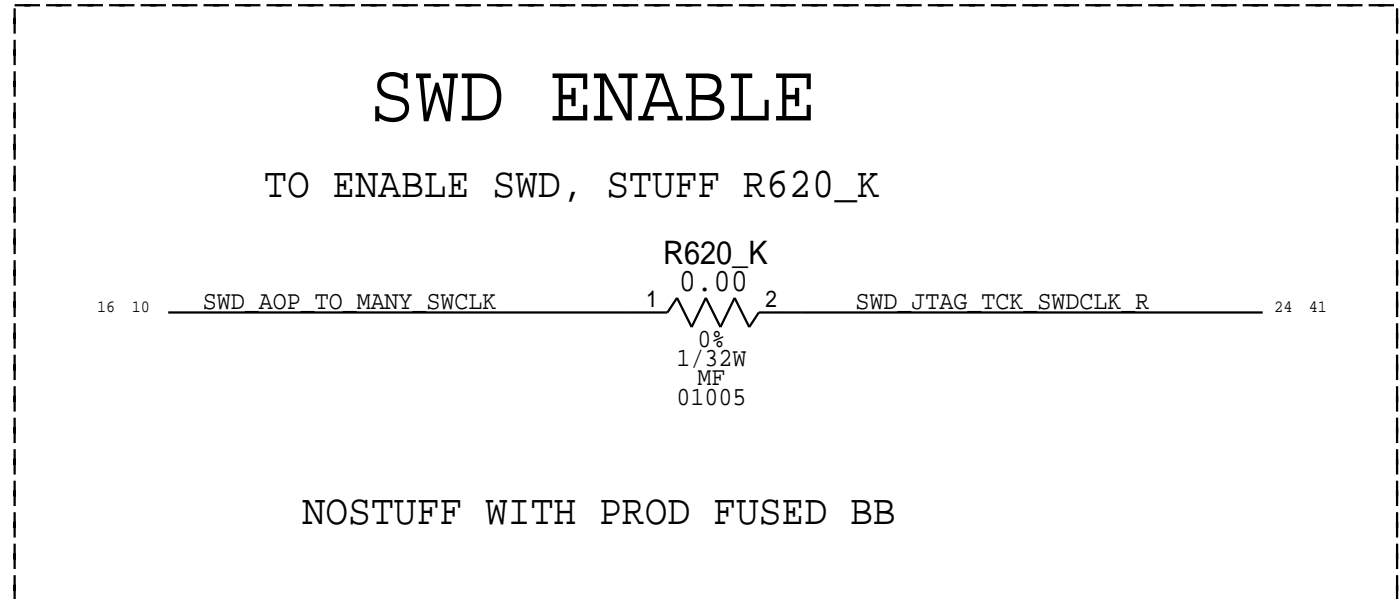
# KAROO CONFIG



DEFAULTS SET TO AP/FLASHLESS BOOT



HW BUG IN BASEBAND A/B SILICON, FIXED IN C SILICON  
NOSTUFF, STARTING AT EVT

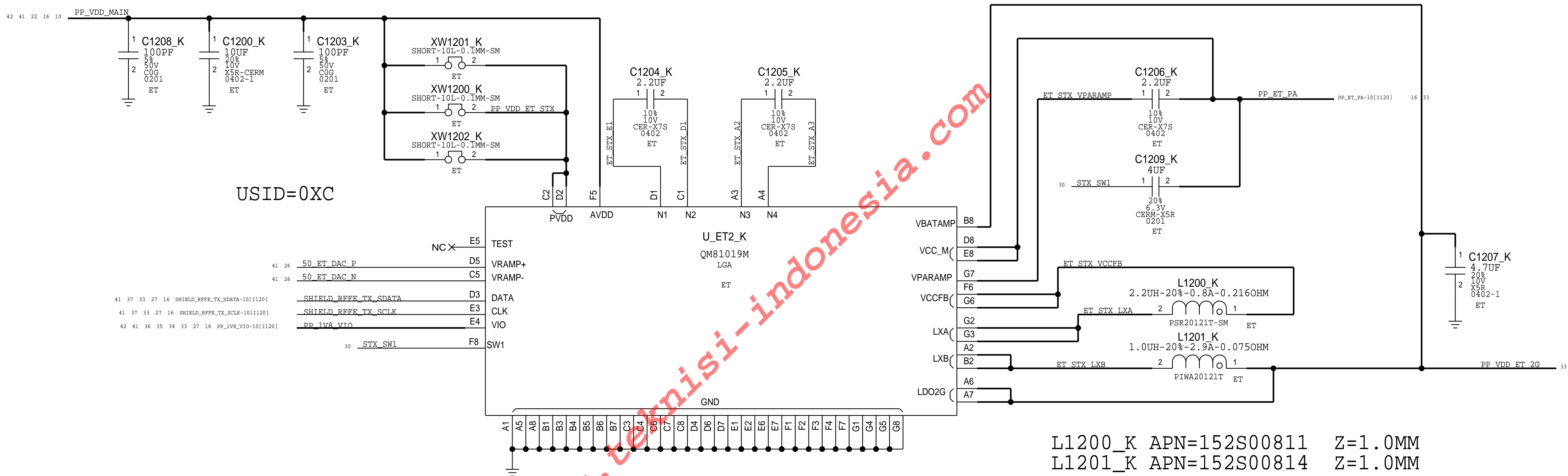


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ET MODULATOR

ALPES STX QM81019 E1.0.1 MODULE




STUFFED: C1204\_K, C1205\_K, C1206\_K: KYOCERA APN=138S00167  
ALTERNATE: C1204\_K, C1205\_K, C1206\_K: MURATA APN=138S00237

PAGE TITLE		
ET		
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HB SPAD

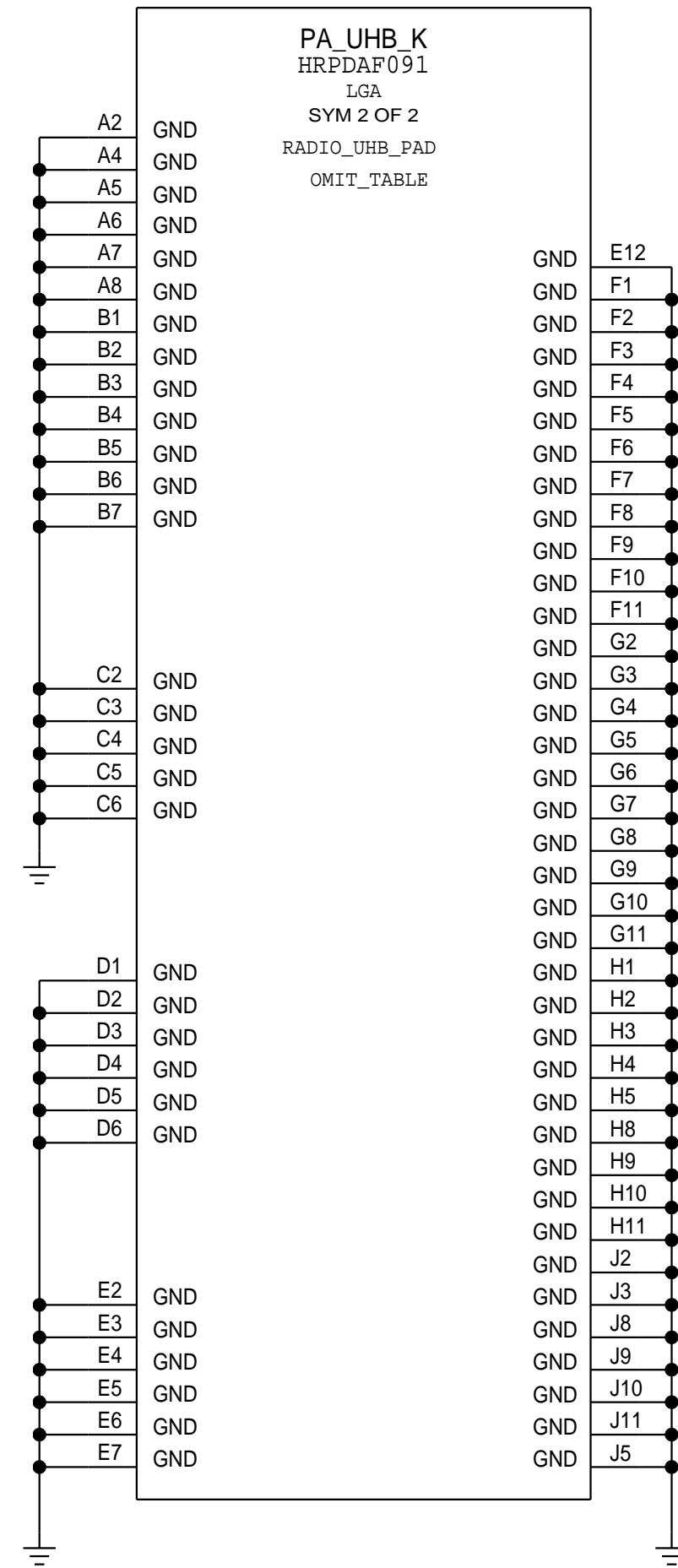
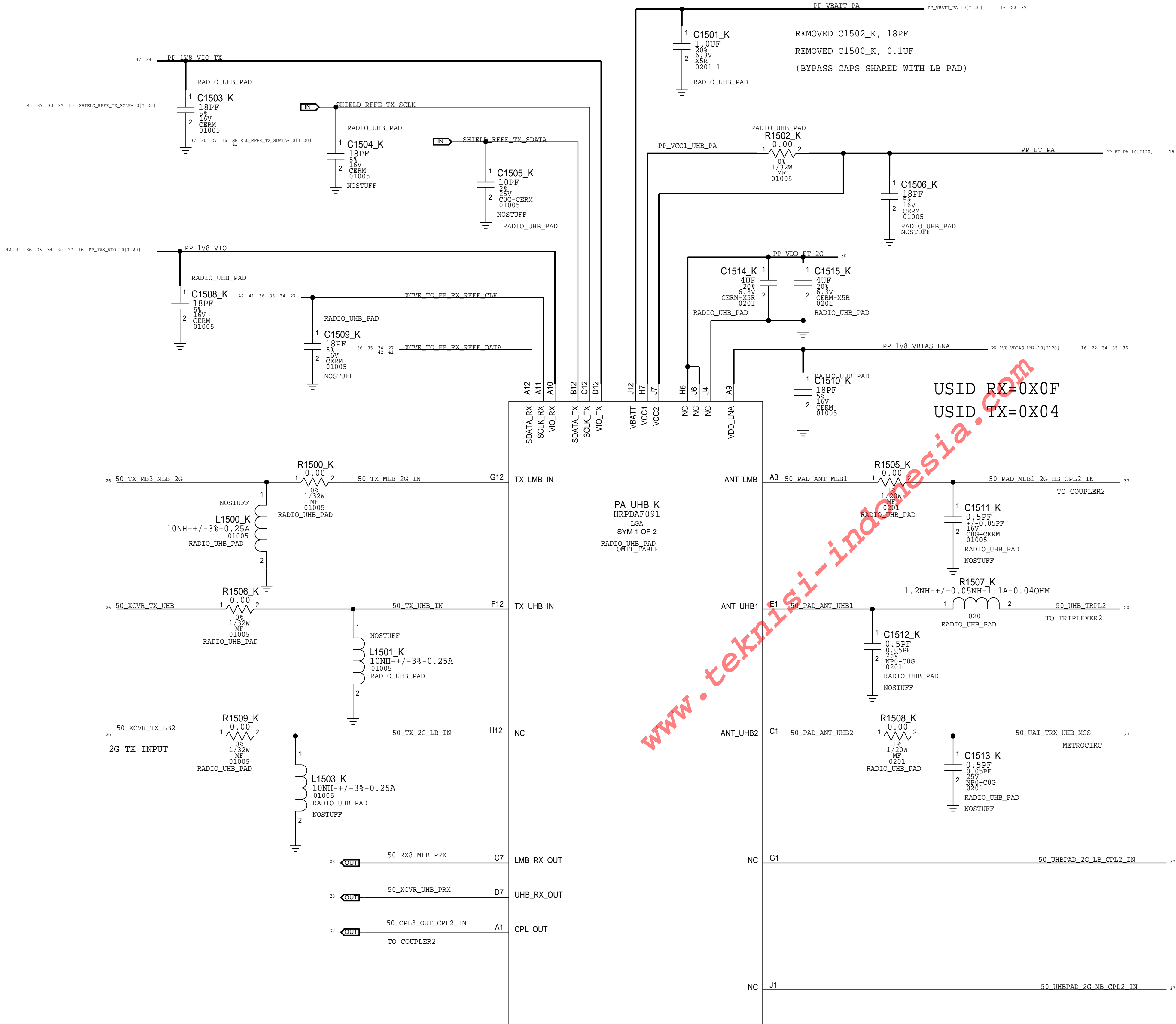
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# UHB LMB SPAD

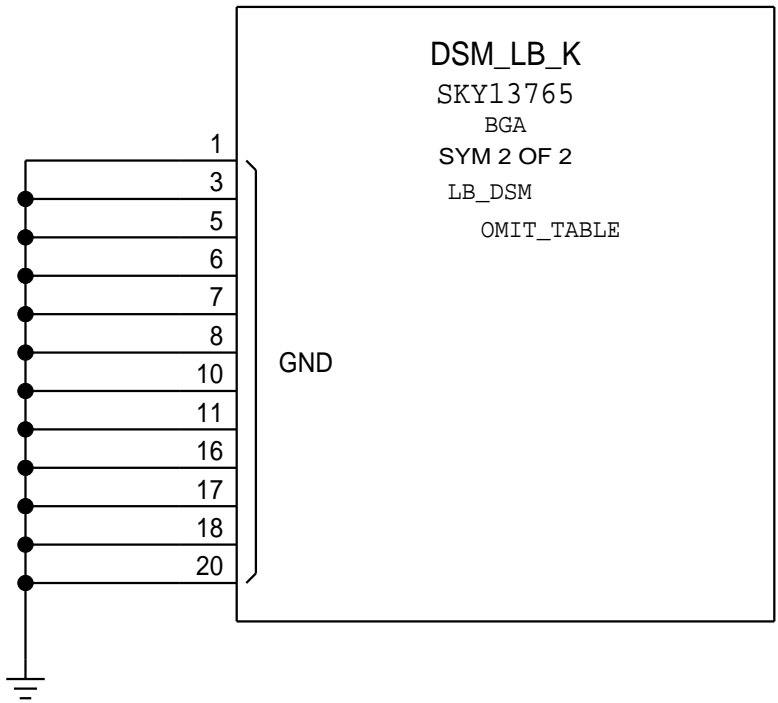
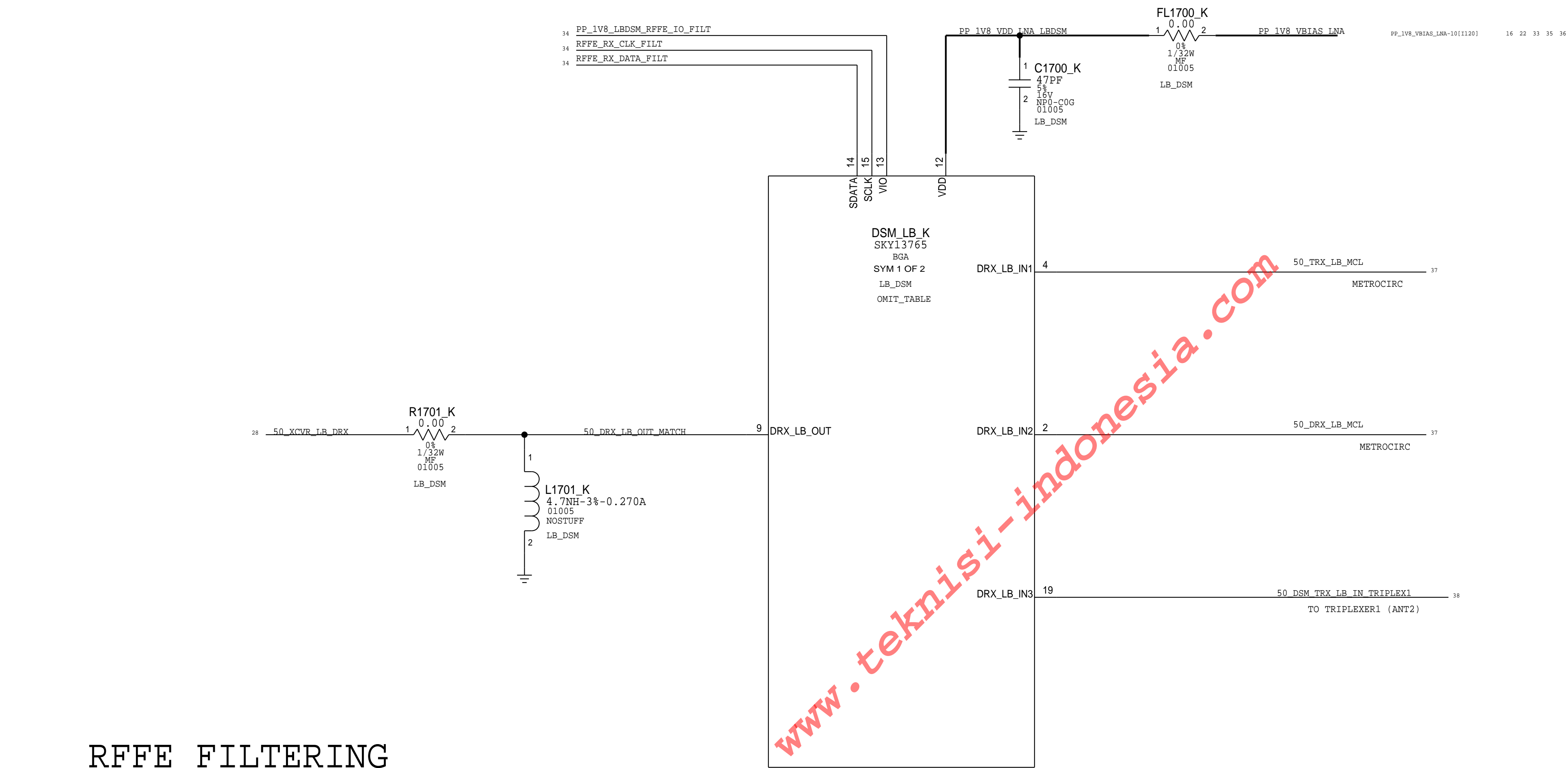



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LB DIVERSITY RECEIVE LNA

RFFE FILTERING

USID RX=0X09



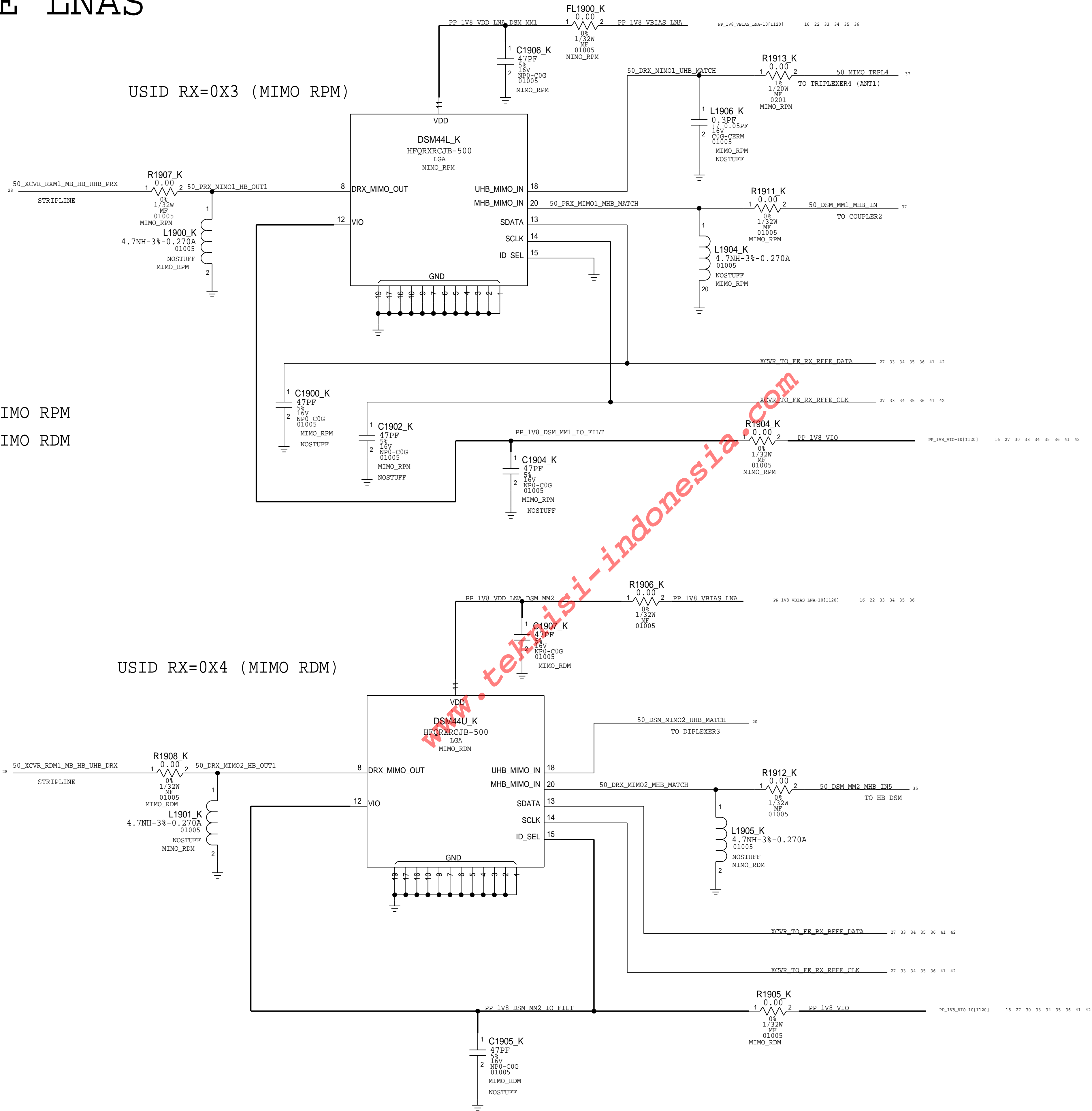
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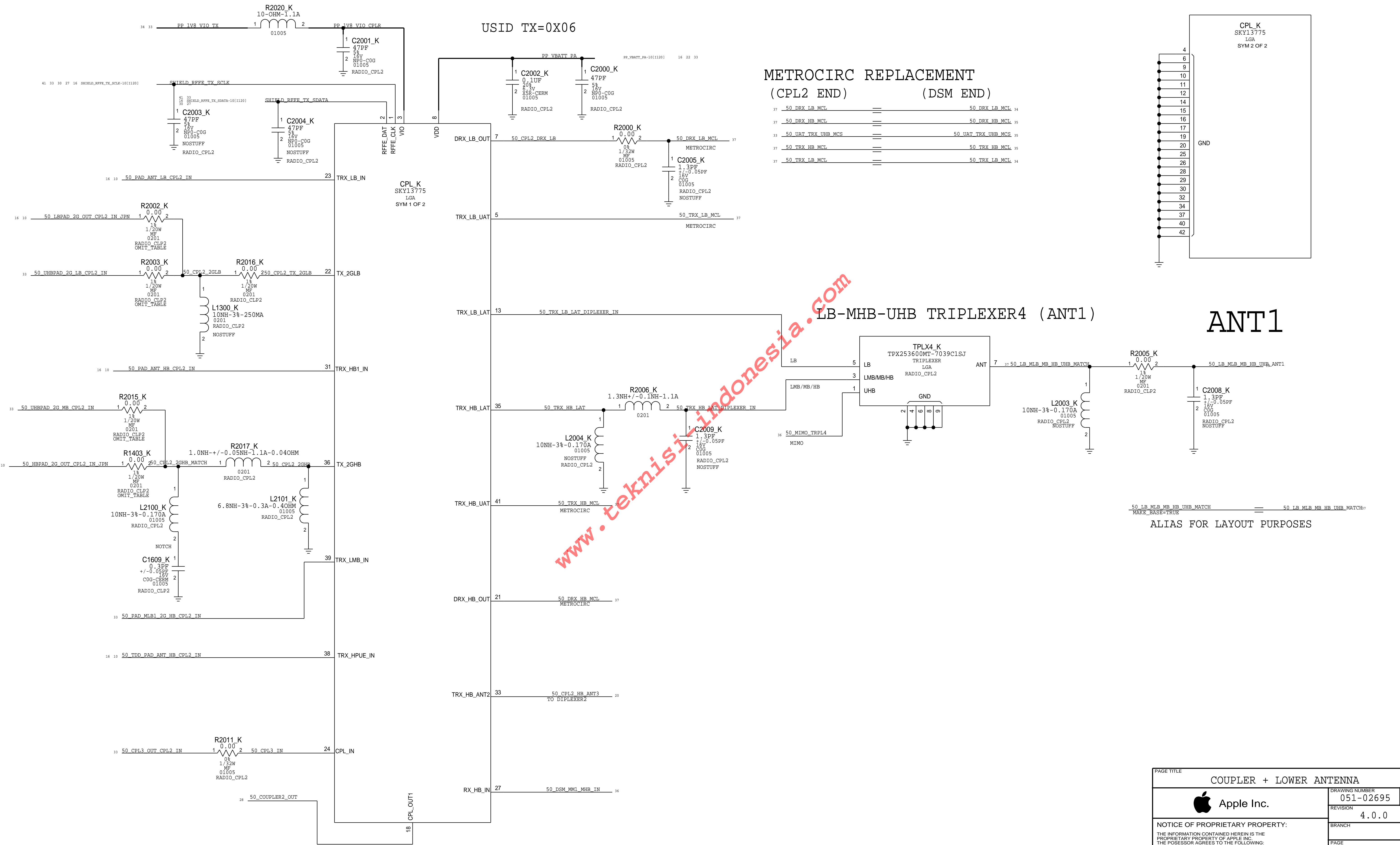
MIMO RECEIVE LNAS


ID\_SEL = 0, MIMO RPM  
ID\_SEL = 1, MIMO RDM



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COUPLER & LOWER ANTENNA



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## D

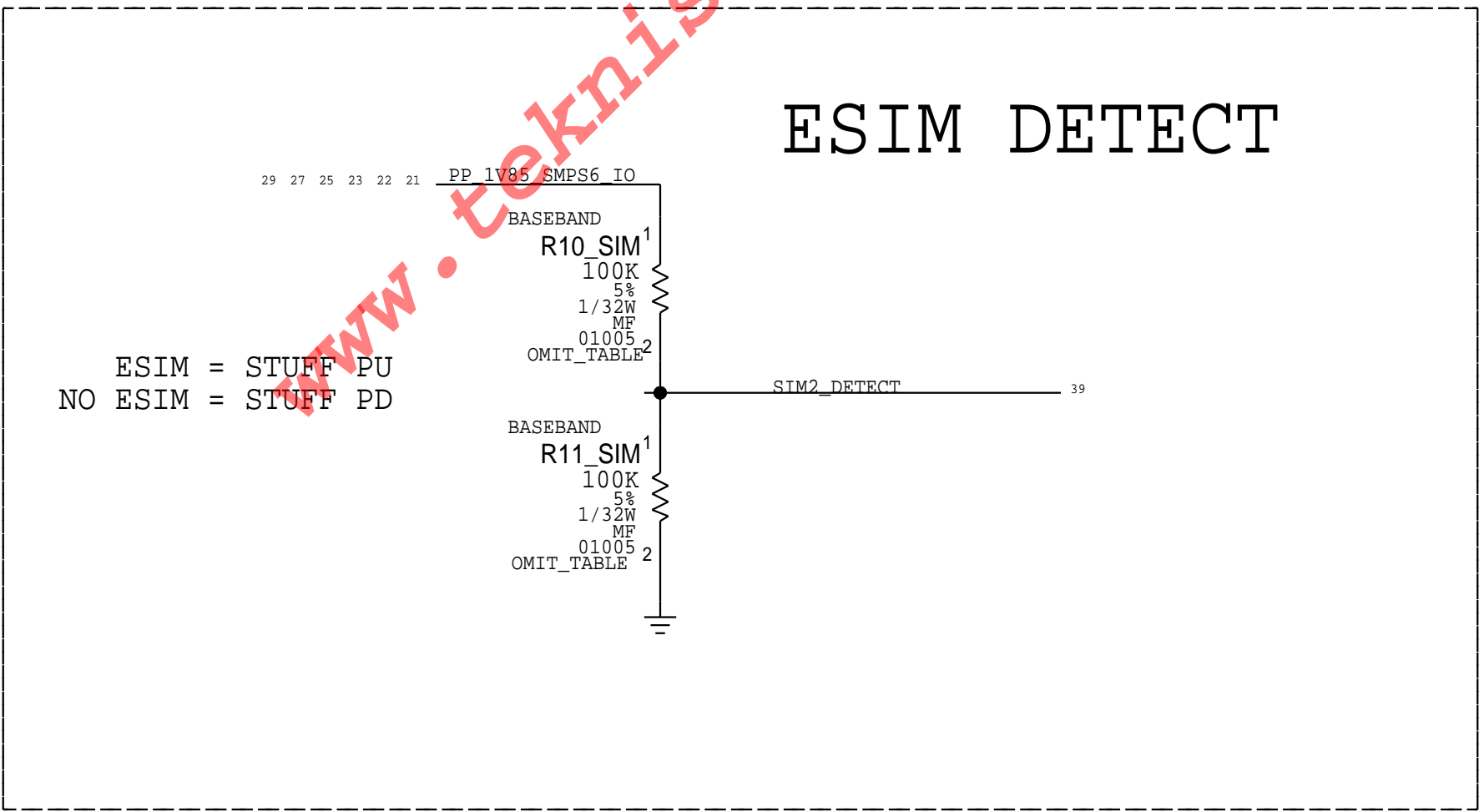
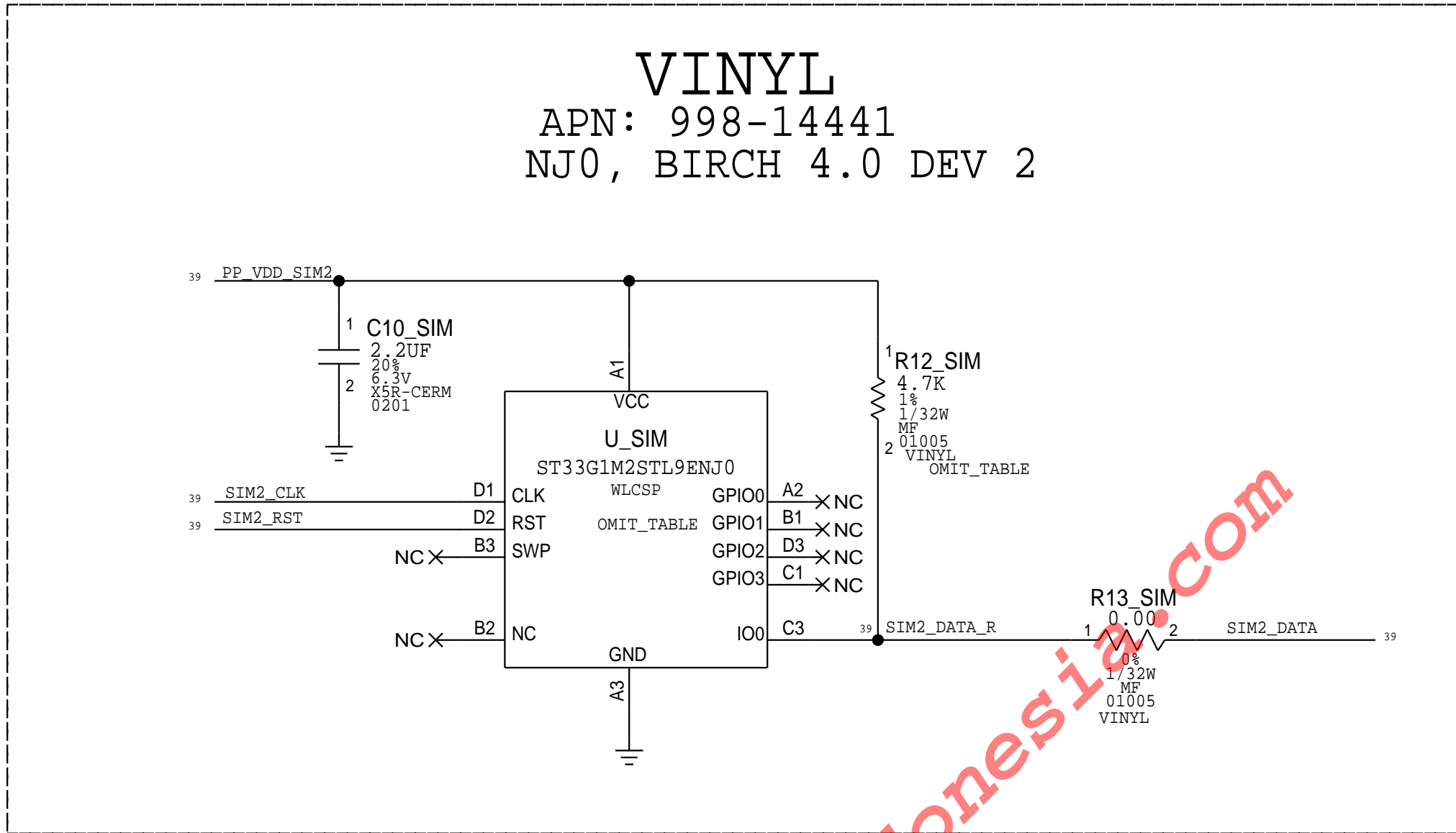



A



ESIM

41	40	23	SIM2_CLK	==	SIM2_CLK	39
			MAKE_BASE=TRUE			
41	40	23	SIM2_DATA	==	SIM2_DATA	39
			MAKE_BASE=TRUE			
41	40	23	SIM2_RST	==	SIM2_RST	39
			MAKE_BASE=TRUE			
41	40	23	SIM2_DETECT	==	SIM2_DETECT	39
			MAKE_BASE=TRUE			
41	40	25	PP_VDD_SIM2	==	PP_VDD_SIM2	39
			MAKE_BASE=TRUE			
41			SIM2_DATA_R	==	SIM2_DATA_R	39
			MAKE_BASE=TRUE			



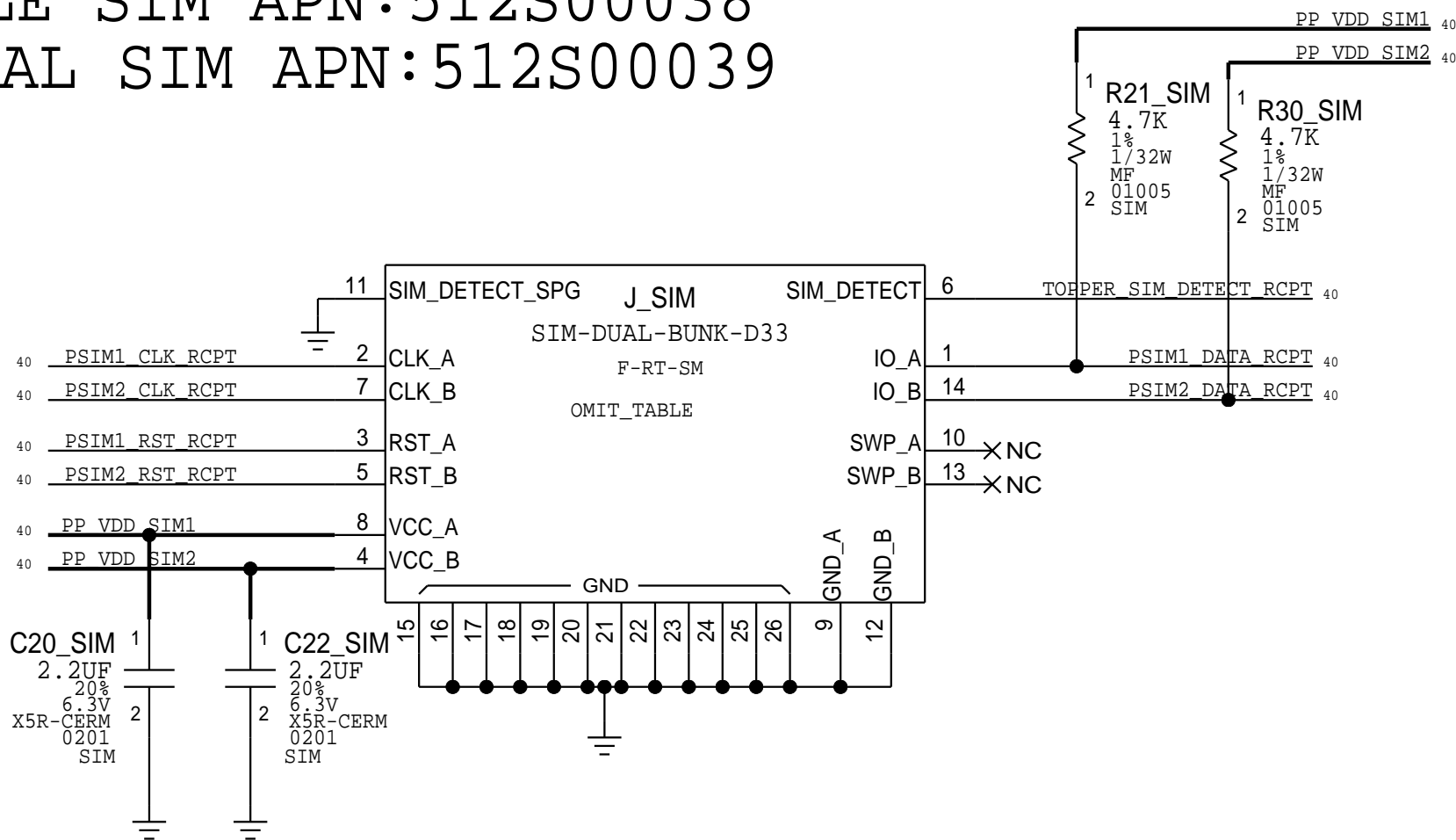
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		39		OF	47

# PSIM

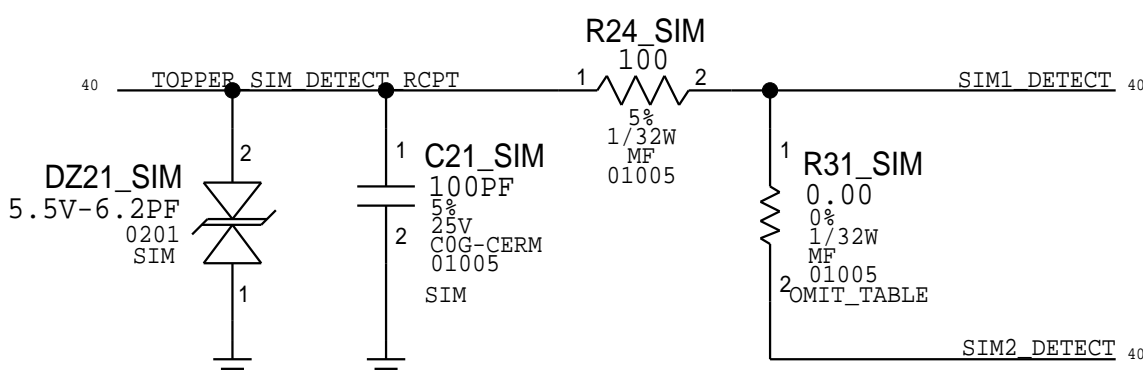
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SINGLE SIM APN:512S00038

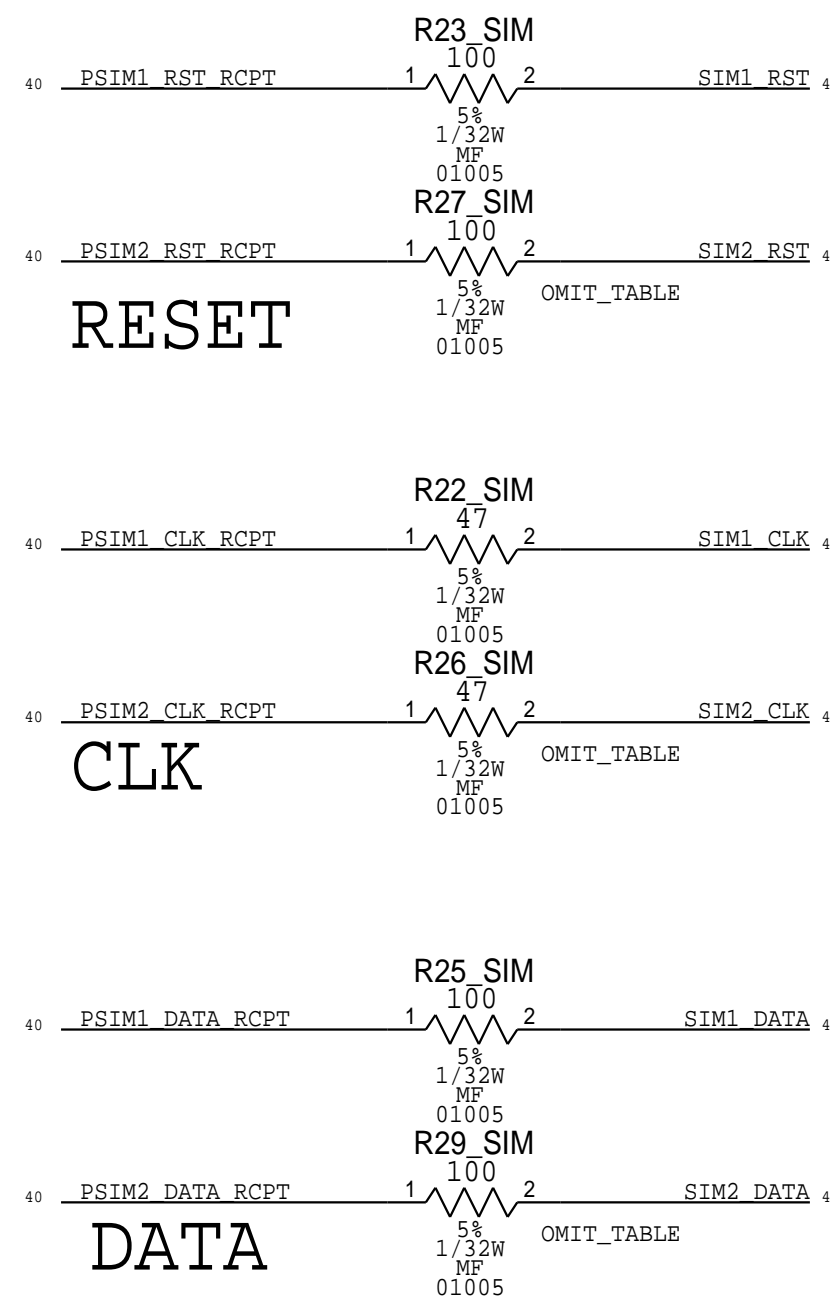
DUAL SIM APN:512S00039



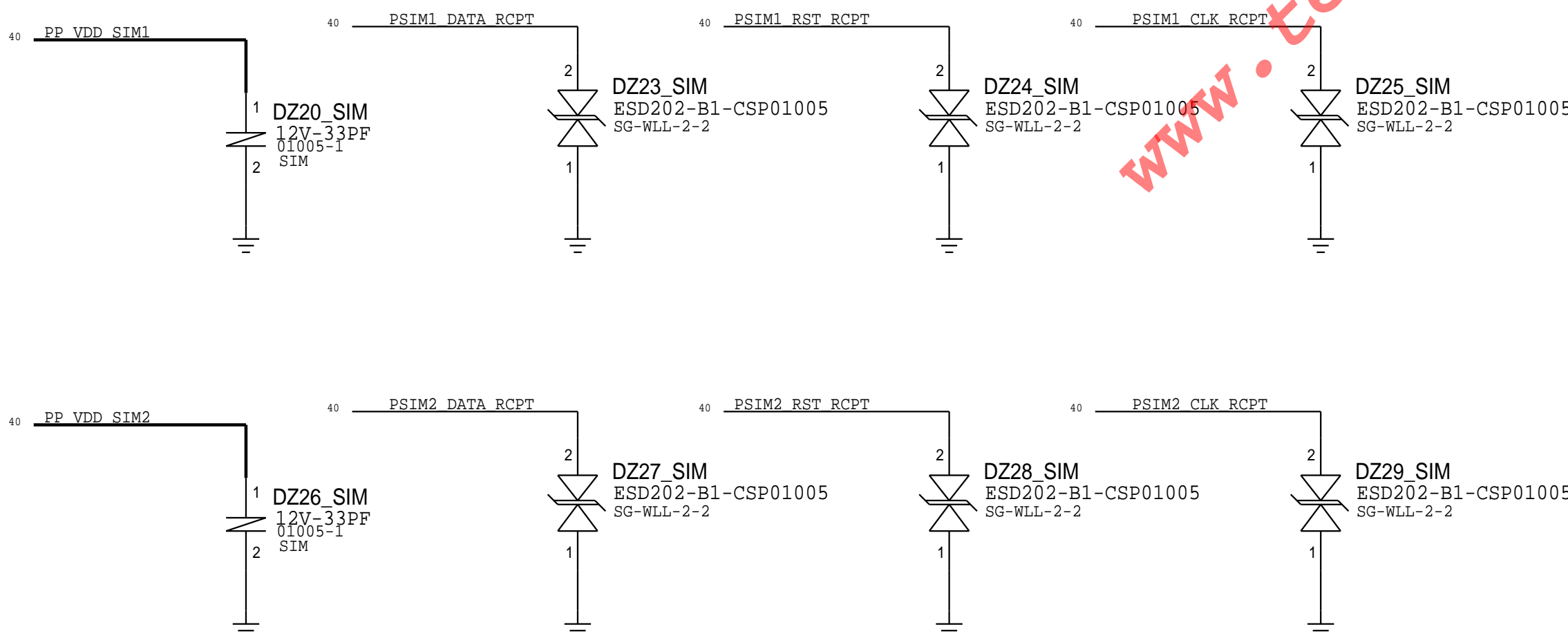
## DUAL SIM DETECT



## EOS RESISTORS

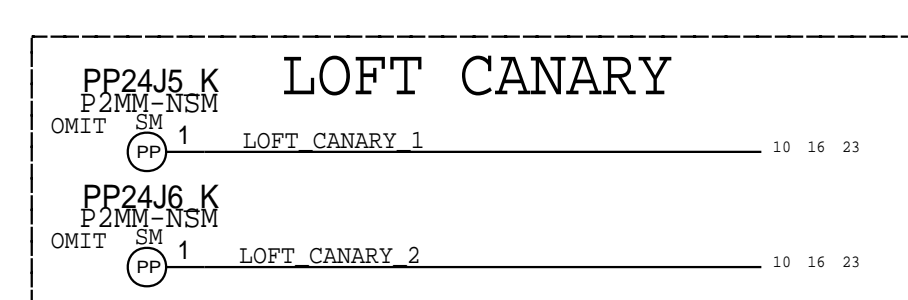
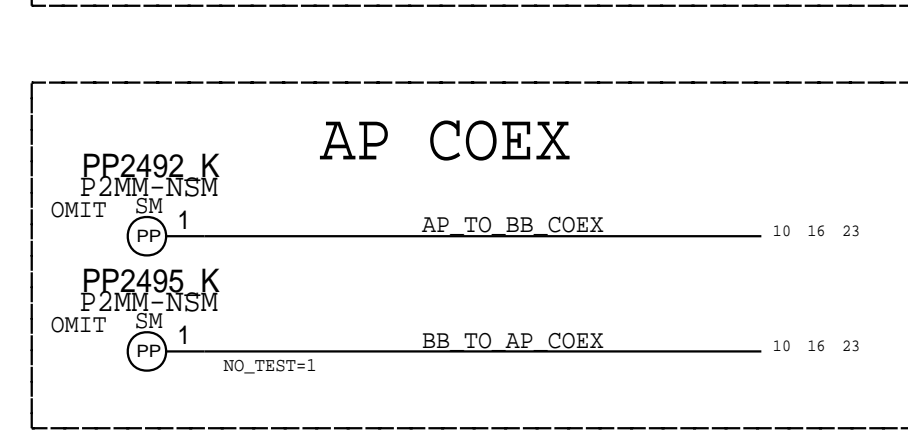
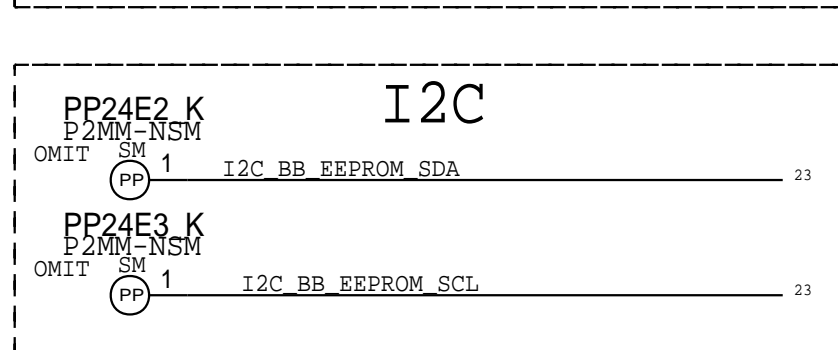
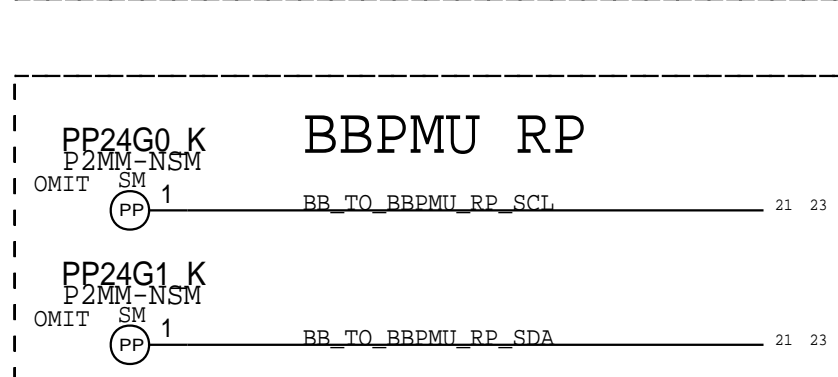
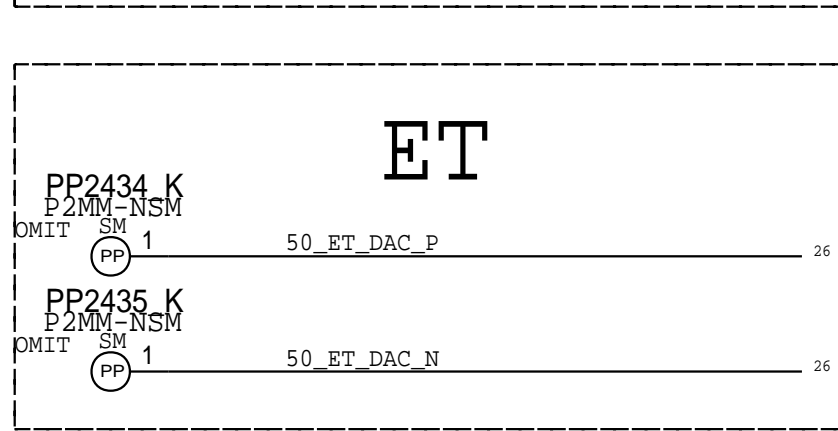
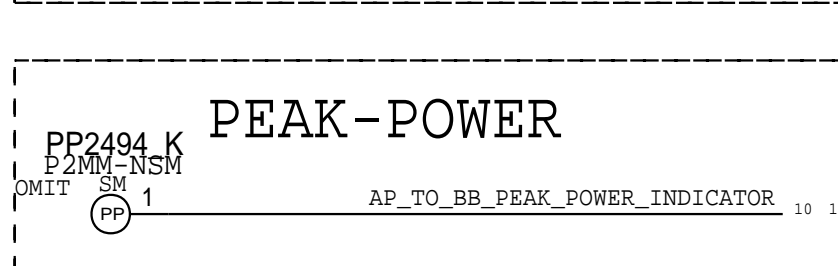
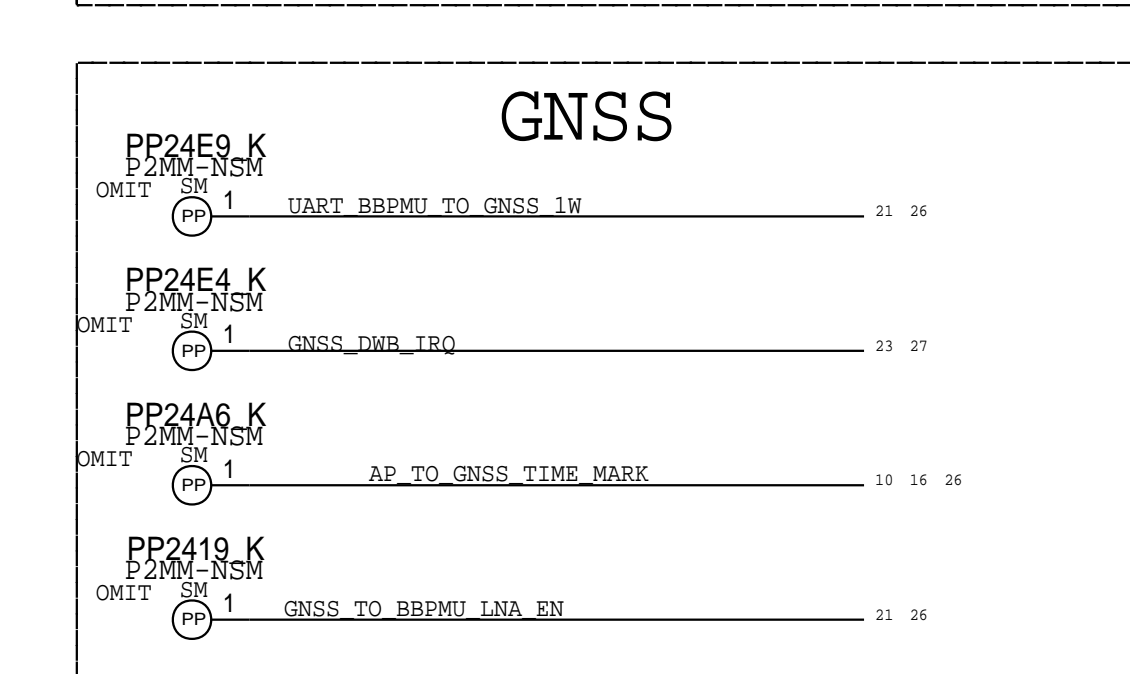
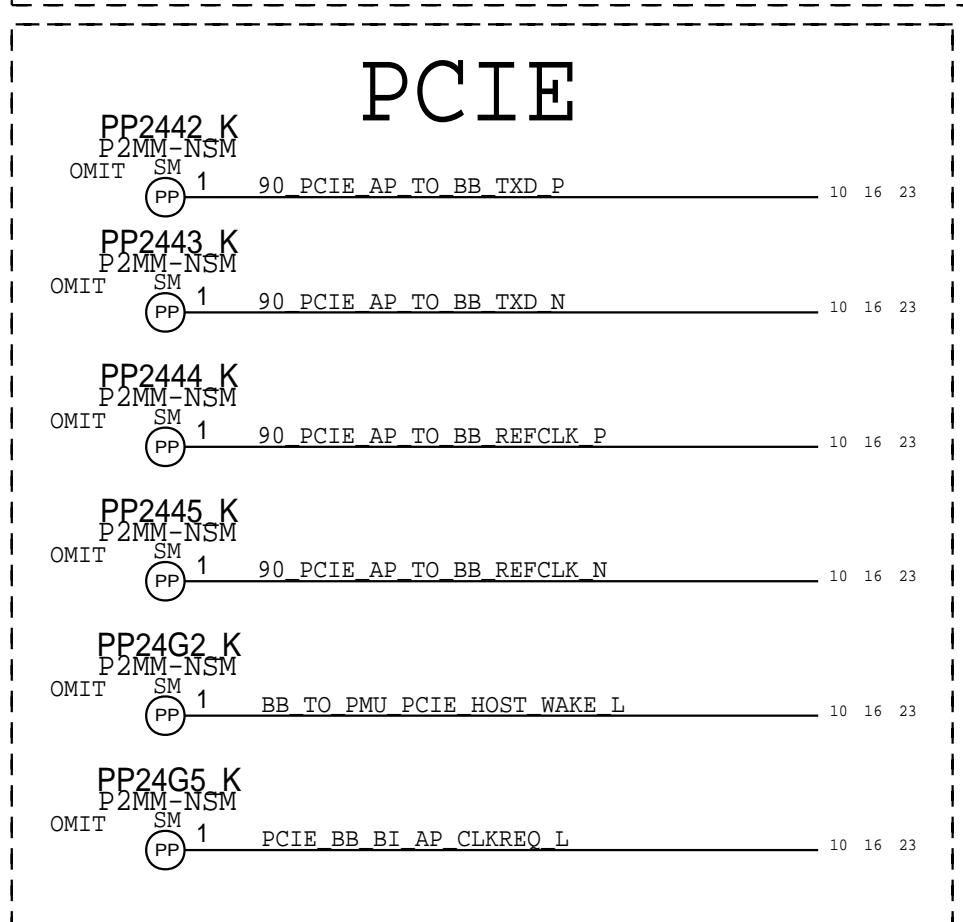
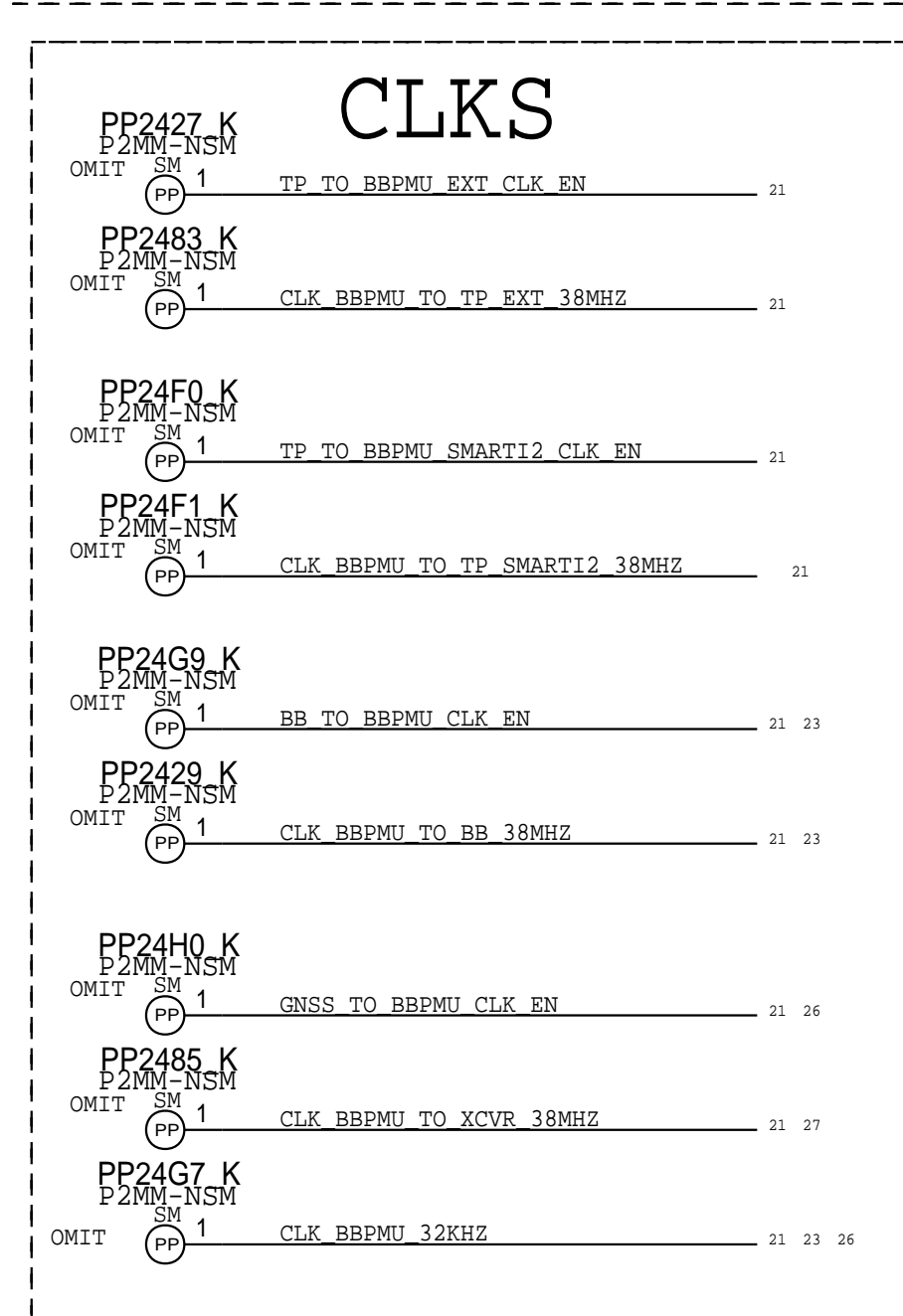
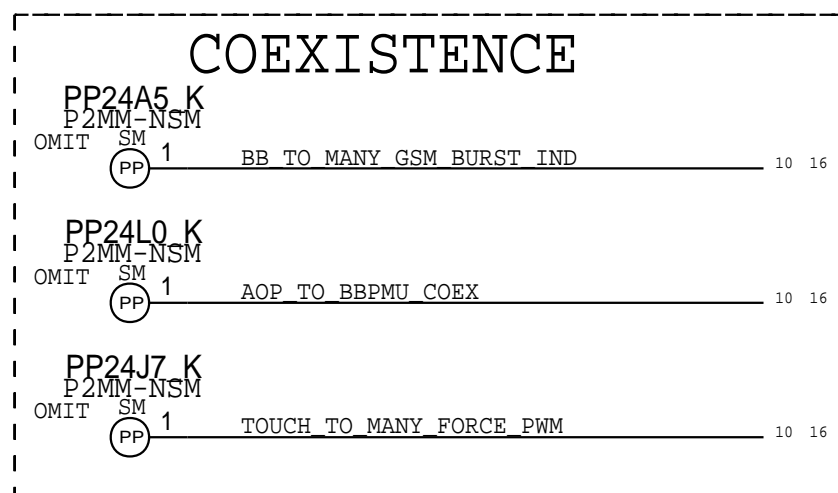
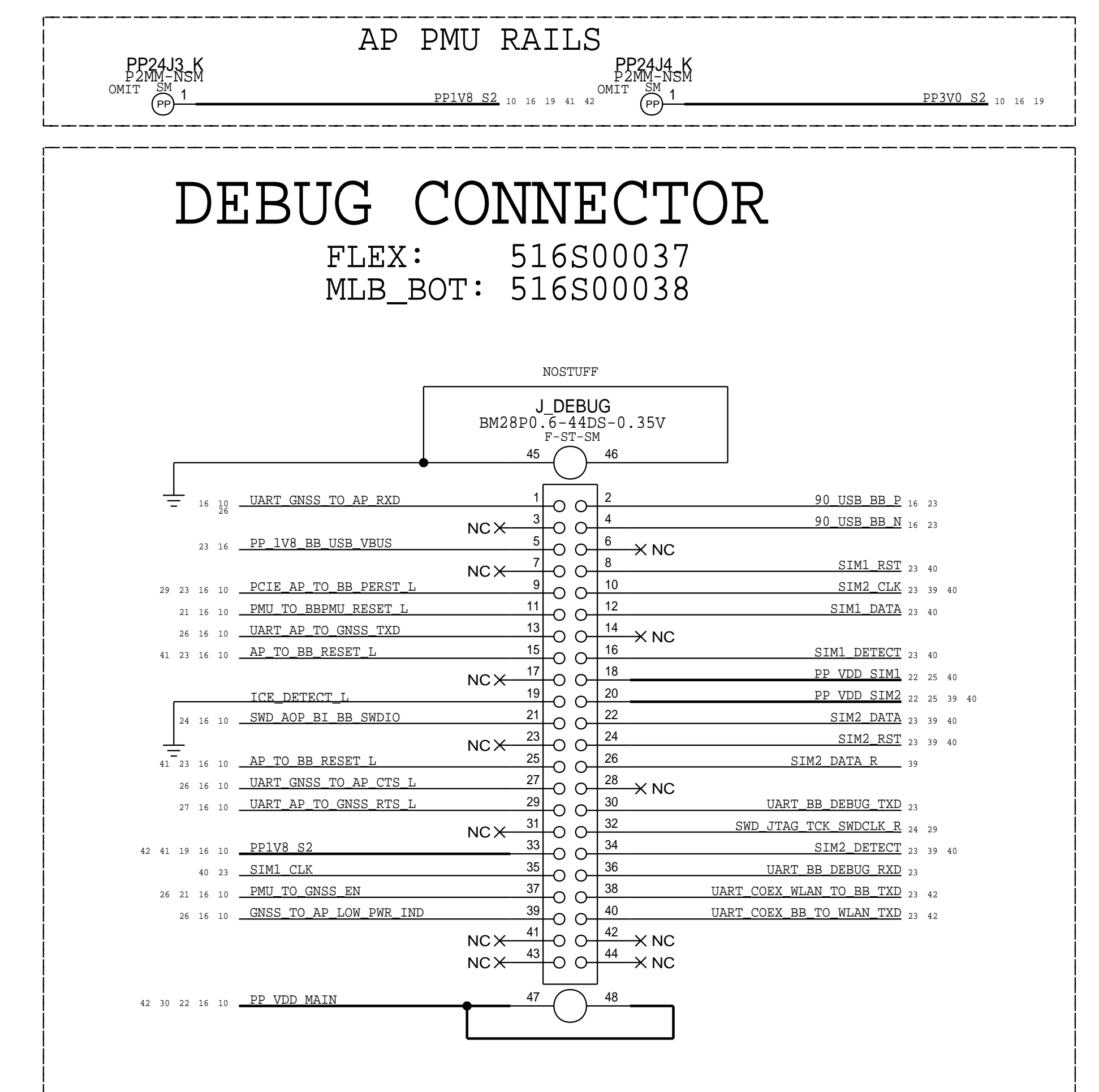
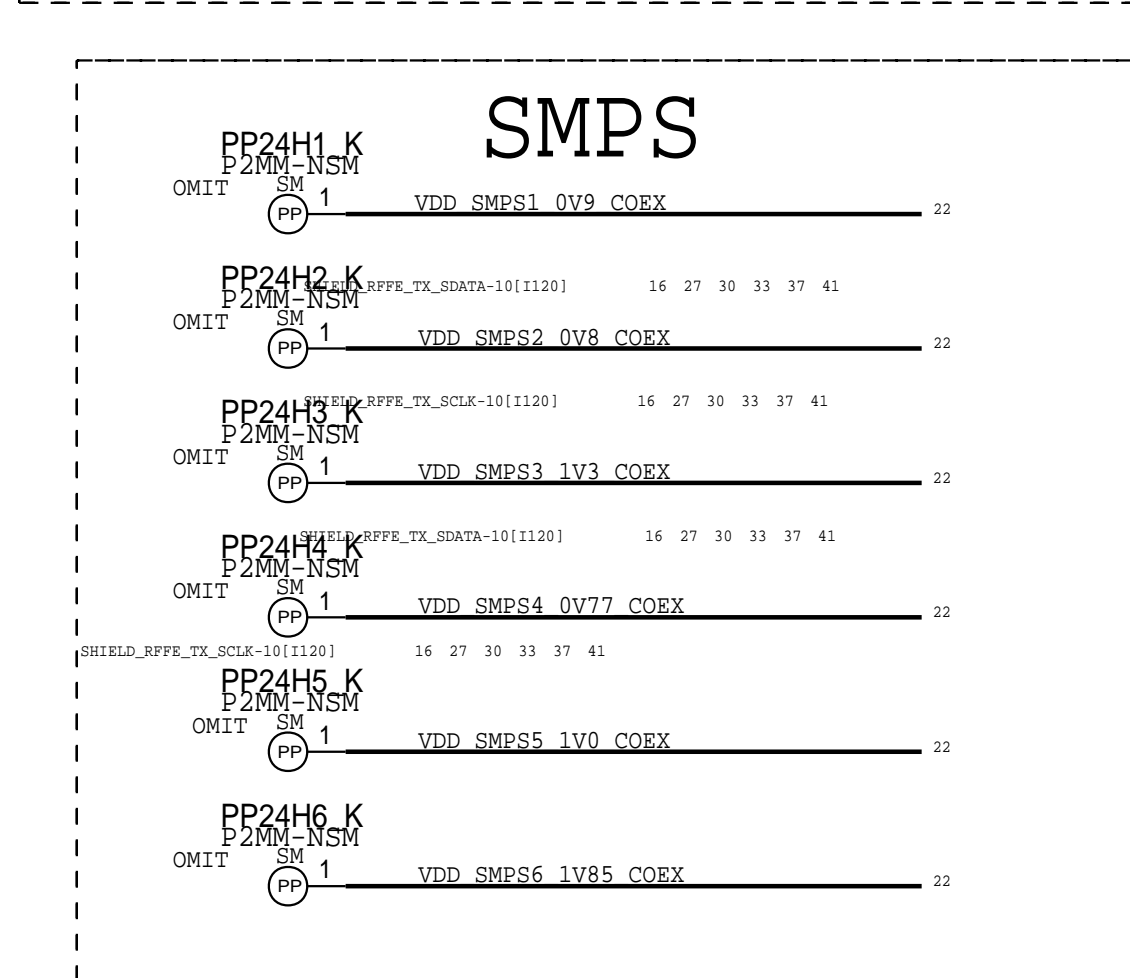
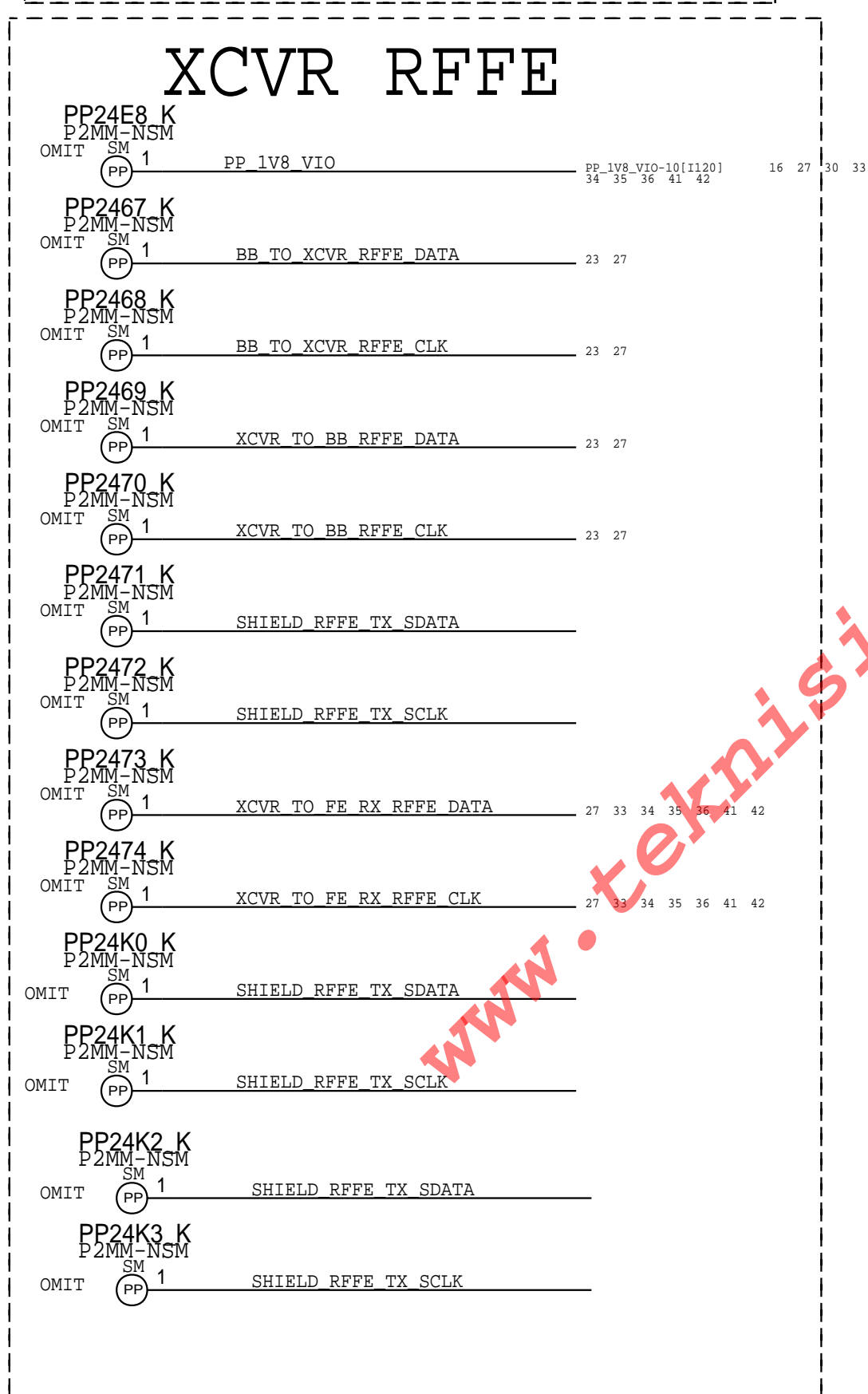
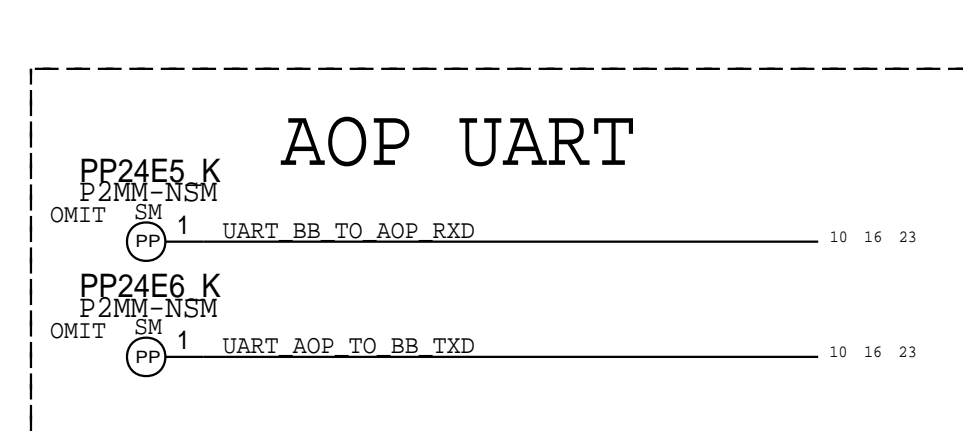
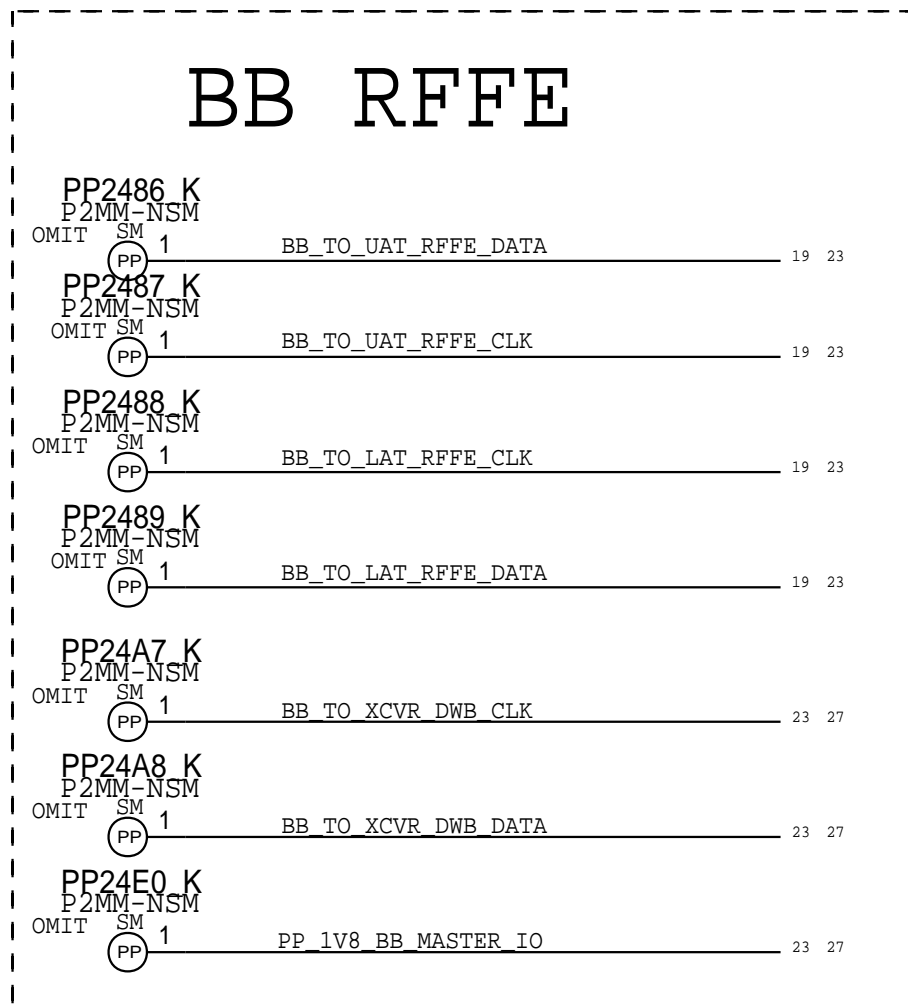
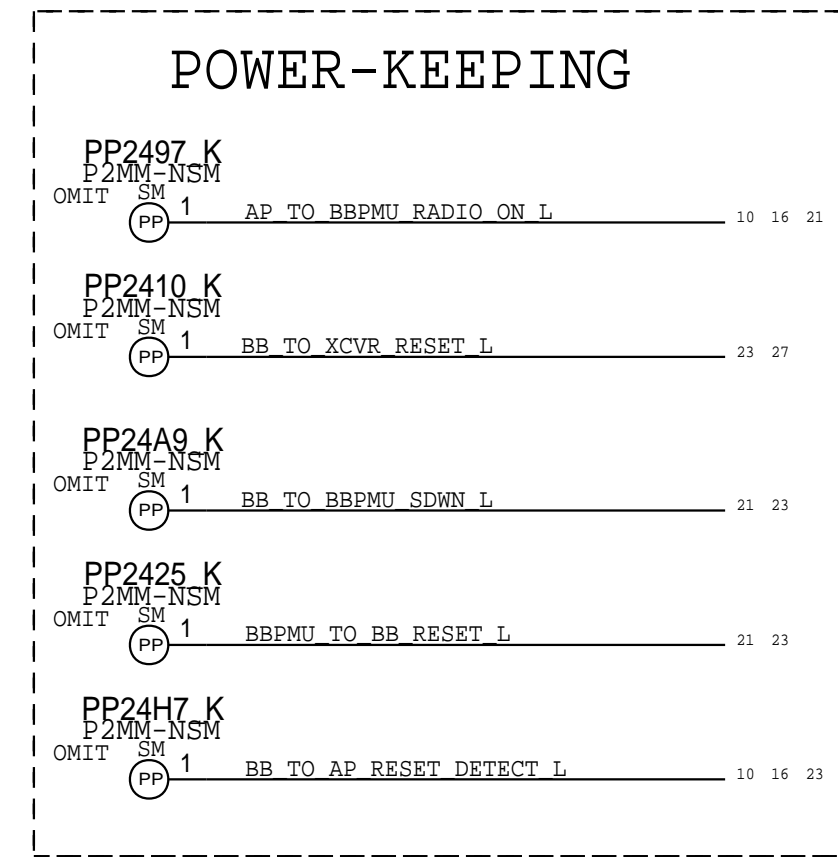
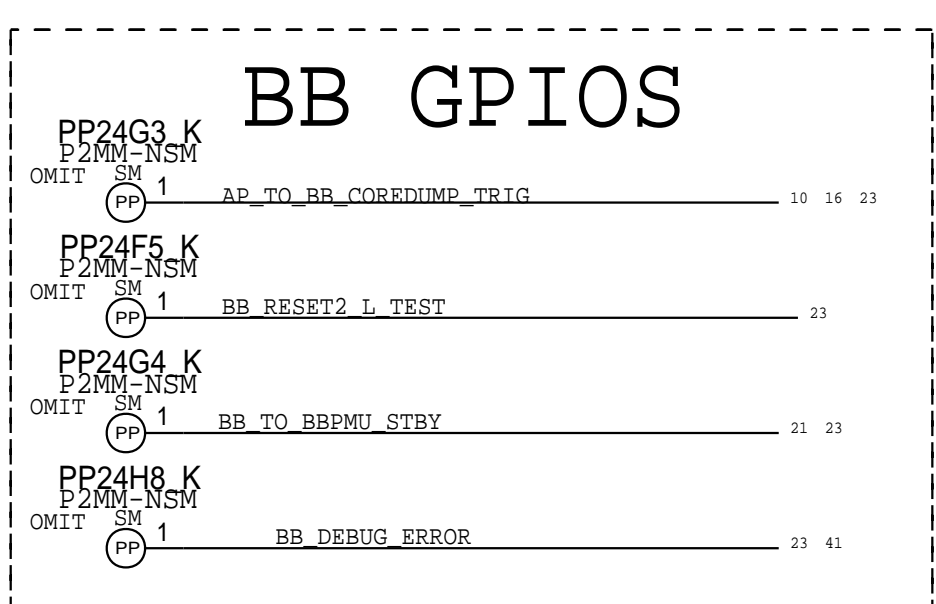
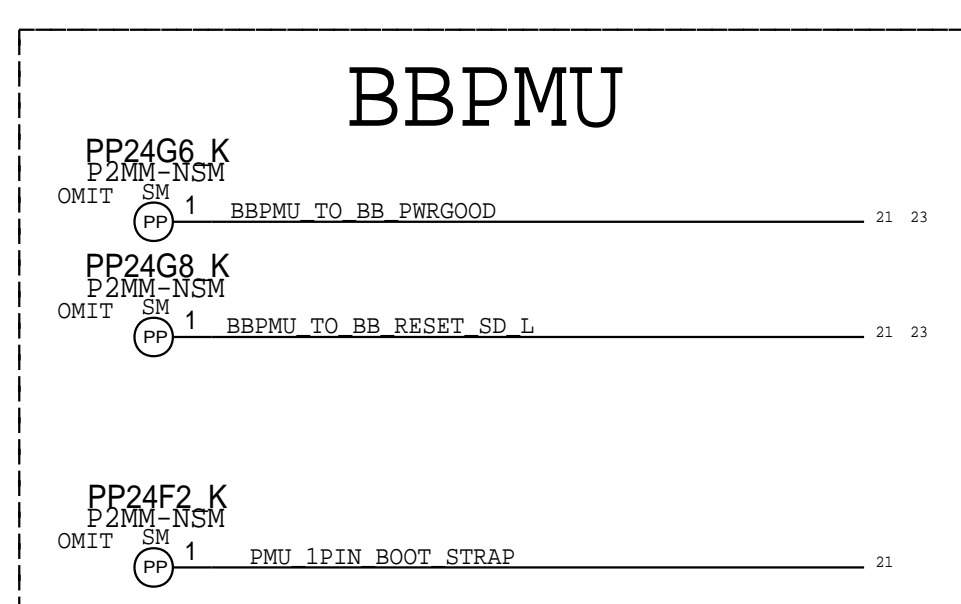
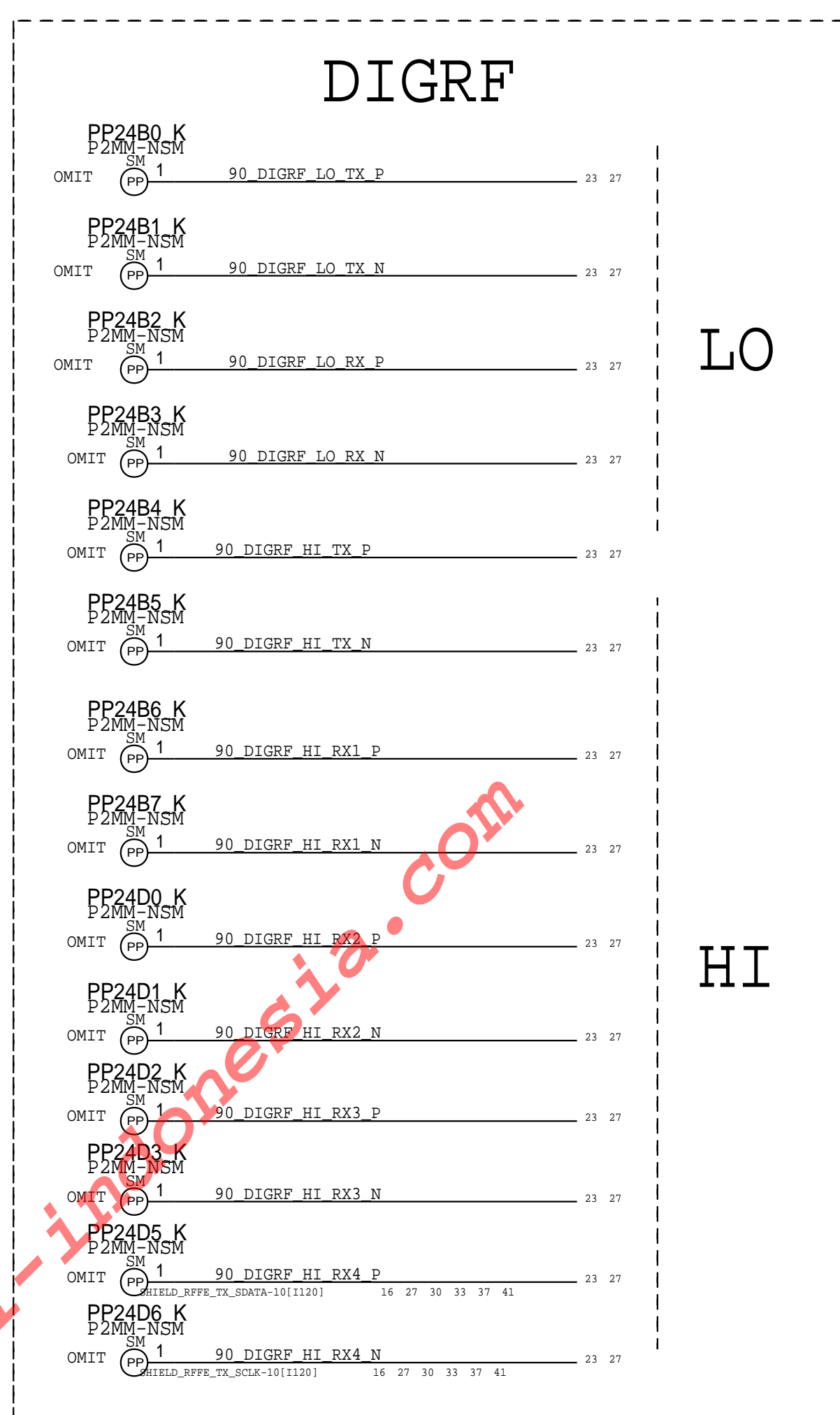
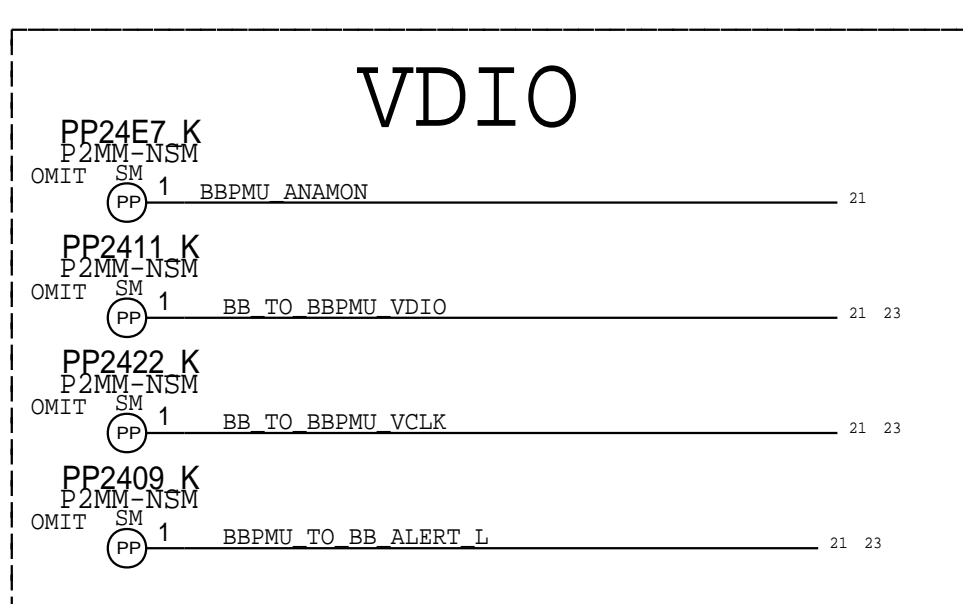
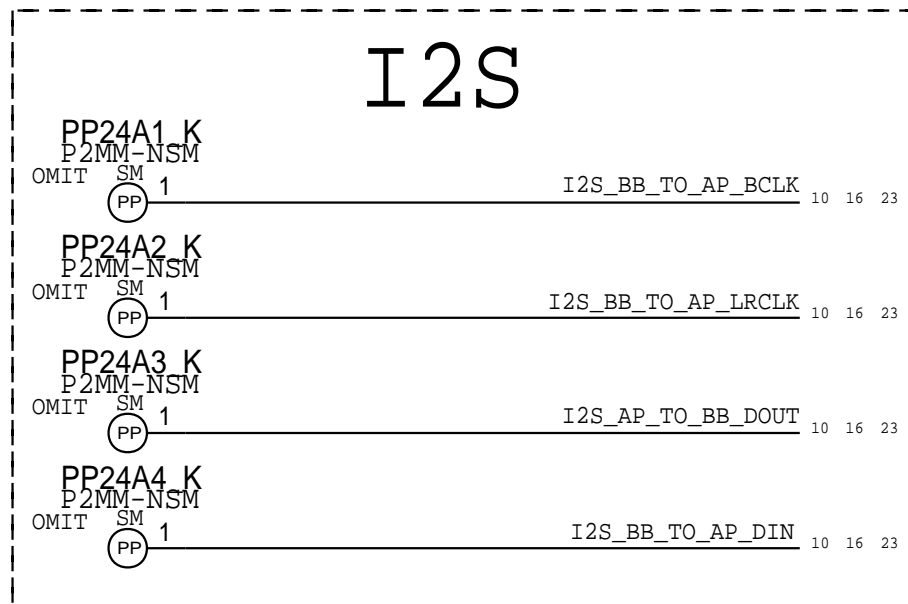
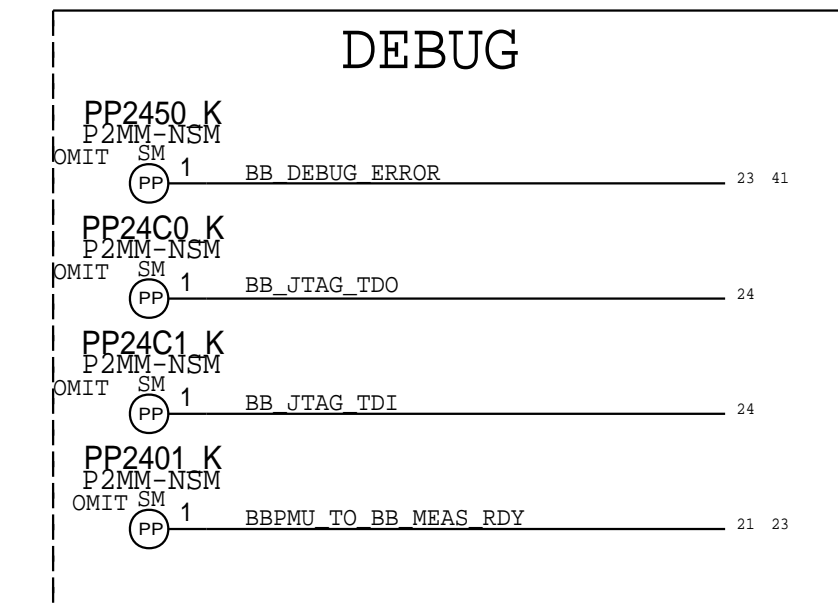


## ESD DIODES





# DEBUG: TEST POINTS



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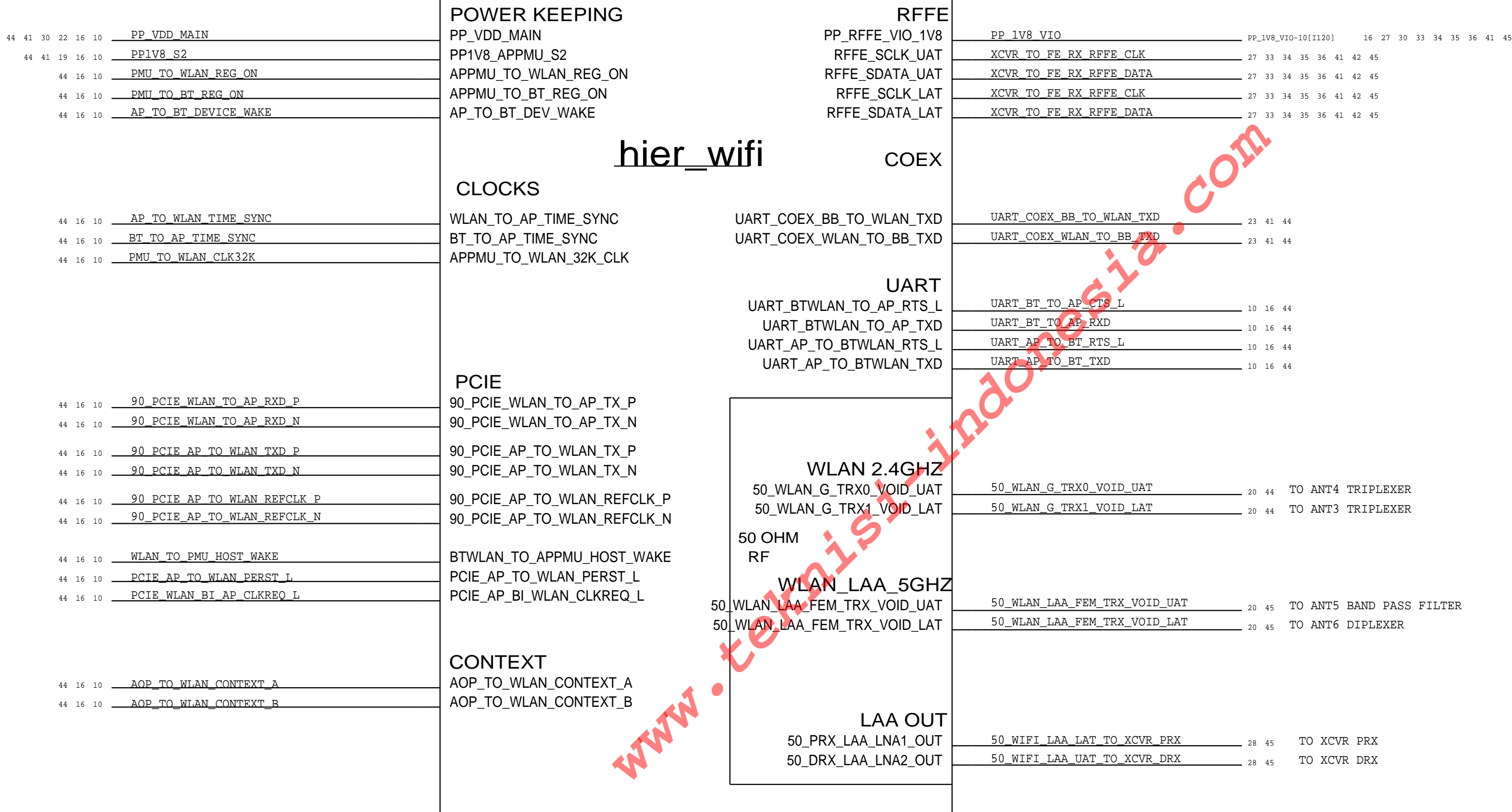



SYMBOL: WIFI

HIERARCHICAL SYMBOL FOR HIER\_WIFI

DIETCOKE

HIER\_WIFI



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2. ALL CAPACITANCE VALUES ARE IN MICROFARADS.
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4	0011669799	ENGINEERING RELEASED	2018-03-16

## X1049 HIER\_WIFI (DIETCOKE)

LAST\_MODIFICATION=Fri Mar 16 10:21:00 2018

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43	1	WIFI: TABLE OF CONTENTS		
44	2	DIETCOKE		
45	3	FEM MODULES		

## WLAN SYMBOL IO PORTS

## POWER

```

45 44 42 (IO) PP_VDD_MAIN
VOLTAGE=3.8
45 44 42 (IO) PP1V8_S2
VOLTAGE=1.8

```

## CONTROL

```

44 42 IO PMU TO WLAN REG ON
44 42 IO PMU TO BT REG ON
44 42 IO AP TO BT DEVICE WAKE

```

## CLOCKS

```

44 42 IO PMU TO WLAN CLK32K
44 42 IO AP TO WLAN TIME SYNC
44 42 IO BT TO AP TIME SYNC

```

## WLAN PCIE

```

44 |> IO 90 PCIE AP TO WLAN REFCLK P
44 |> IO 90 PCIE AP TO WLAN REFCLK N
44 |> IO 90 PCIE AP TO WLAN TXD P
44 |> IO 90 PCIE AP TO WLAN TXD N
44 |> IO 90 PCIE WLAN TO AP RXD P
44 |> IO 90 PCIE WLAN TO AP RXD N
44 |> IO PCIE AP TO WLAN PERST L
44 |> IO PCIE WLAN BI AP CLKREQ L
44 |> IO WLAN TO PMU HOST WAKE

```

## BLWLAN UART


```

44 42 10 UART AP TO BT TXD
44 42 10 UART BT TO AP RXD
44 42 10 UART AP TO BT RTS L
44 42 10 UART BT TO AP CTS L

```

## AOP

```

44 42  AOP TO WLAN CONTEXT A
44 42  AOP TO WLAN CONTEXT B

```

## COEX

```

44 42 IO UART COEX BB TO WLAN TXD
44 42 IO UART COEX WLAN TO BB TXD

```

## ANTENNA

```

44 42 IO 50 WLAN G TRX0 VOID UAT
44 42 IO 50 WLAN G TRX1 VOID LAT
45 42 IO 50 WLAN LAA FEM TRX VOID UAT
45 42 IO 50 WLAN LAA FEM TRX VOID LAT

```

## RF

```



45 42 IO 50 WIFI LAA LAT TO XCVR PRX
45 42 IO 50 WIFI LAA UAT TO XCVR DRX

```

## RFFE

45 42 IO PP 1V8 VIO

```


45 42  XCVR TO FE RX RFFE CLK
45 42  XCVR TO FE RX RFFE DATA
45 42  XCVR TO FE RX RFFE CLK
45 42  XCVR TO FE RX RFFE DATA

```

## U\_WLAN\_W ALTERNATES

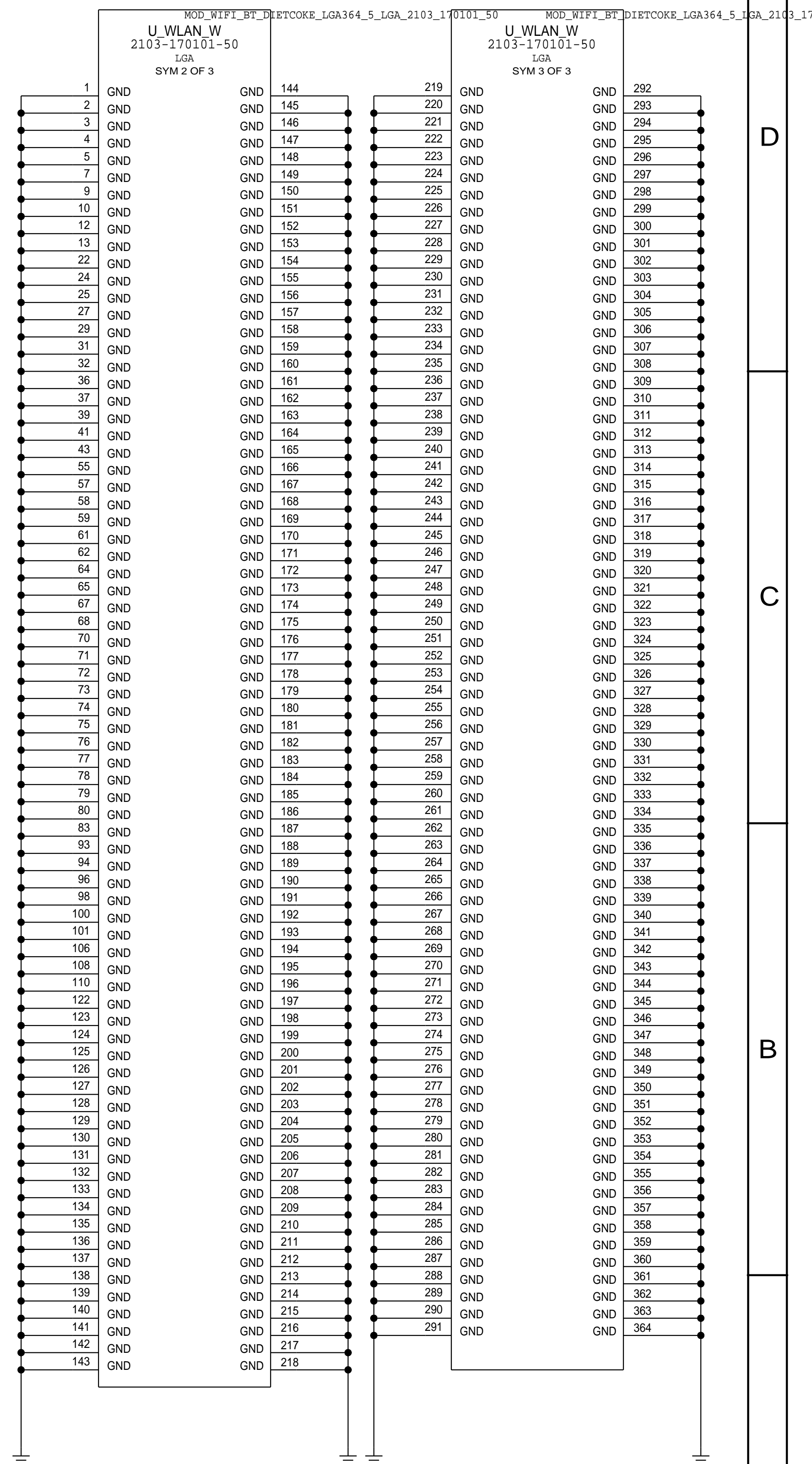
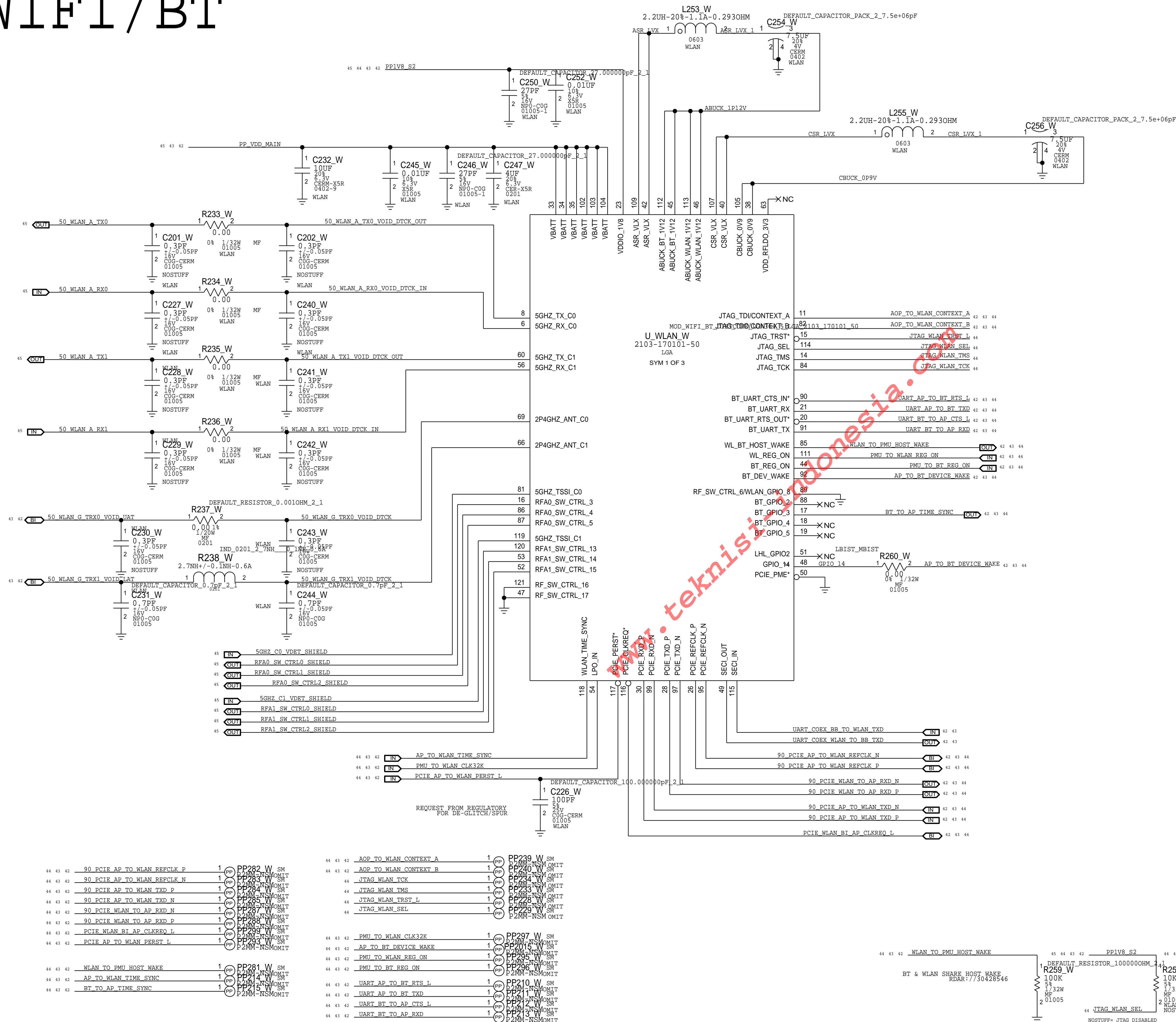
PART NUMBER	ALTERNATE FOR PART NUMBER	BOM OPTION	REF DES	COMMENTS:
998-14250	998-14229	BOM_TABLE_ALTS	U_WLAN_W	WIFI/BT MODULE

SCHEMATIC APN: 051-02623

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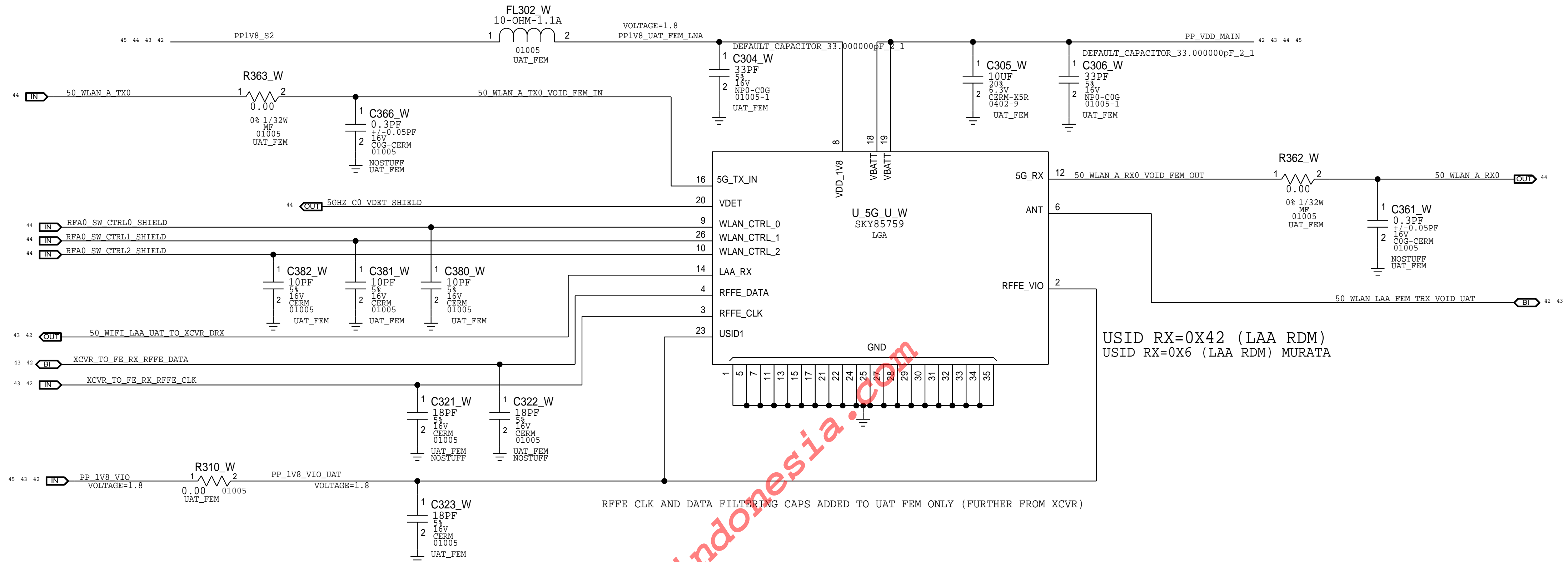
## WIFI / BT



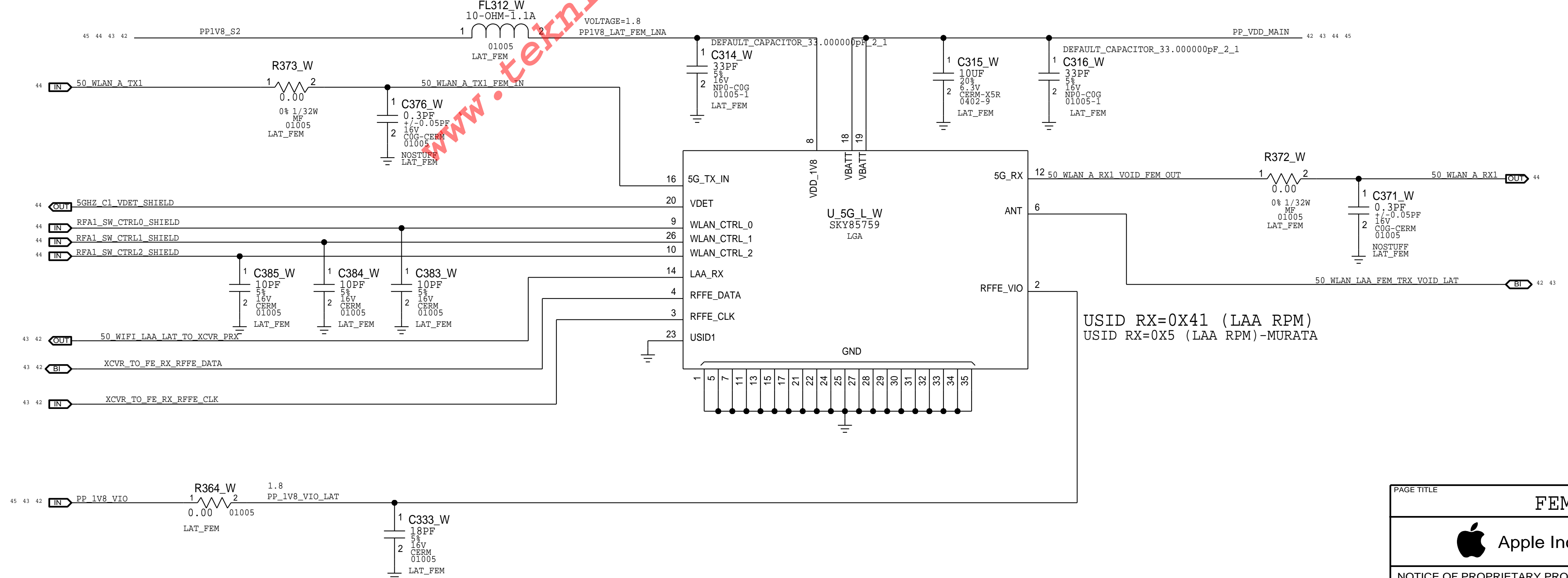



# FEM MODULES

## 5GHZ UAT FEED



## 5GHZ LAT FEED



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