ASTRO®
XTS™ 2500
XTS™ 2250
XTS™ 1500

MT 1500 and
PR 1500

Portable Radios

Detailed Service Manual

MOTOROLA
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Foreword

The information contained in this manual relates to all ASTRO® XTS™ 2500 / XTS™ 2250 / XTS™ 1500 digital portable radios and MT 1500 and PR 1500 portable radios, unless otherwise specified. This manual provides sufficient information to enable qualified service shop technicians to troubleshoot and repair a radio to the component level.

For details on the operation of the radio or level 1 or 2 maintenance procedures, refer to the applicable manuals, which are available separately. A list of publications is provided in this manual in the section, “Related Publications” on page x.

Safety Information

Before operating a radio, please read the RF energy awareness information and operating instructions in the Product Safety and RF Exposure booklet enclosed with your radio (Motorola Publication part number 68P81095C98) to ensure compliance with RF energy exposure limits.

Manual Revisions

Changes which occur after this manual is printed are described in FMRs (Florida Manual Revisions). These FMRs provide complete replacement pages for all added, changed, and deleted items, including pertinent parts list data, schematics, and component layout diagrams.

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Table of Contents

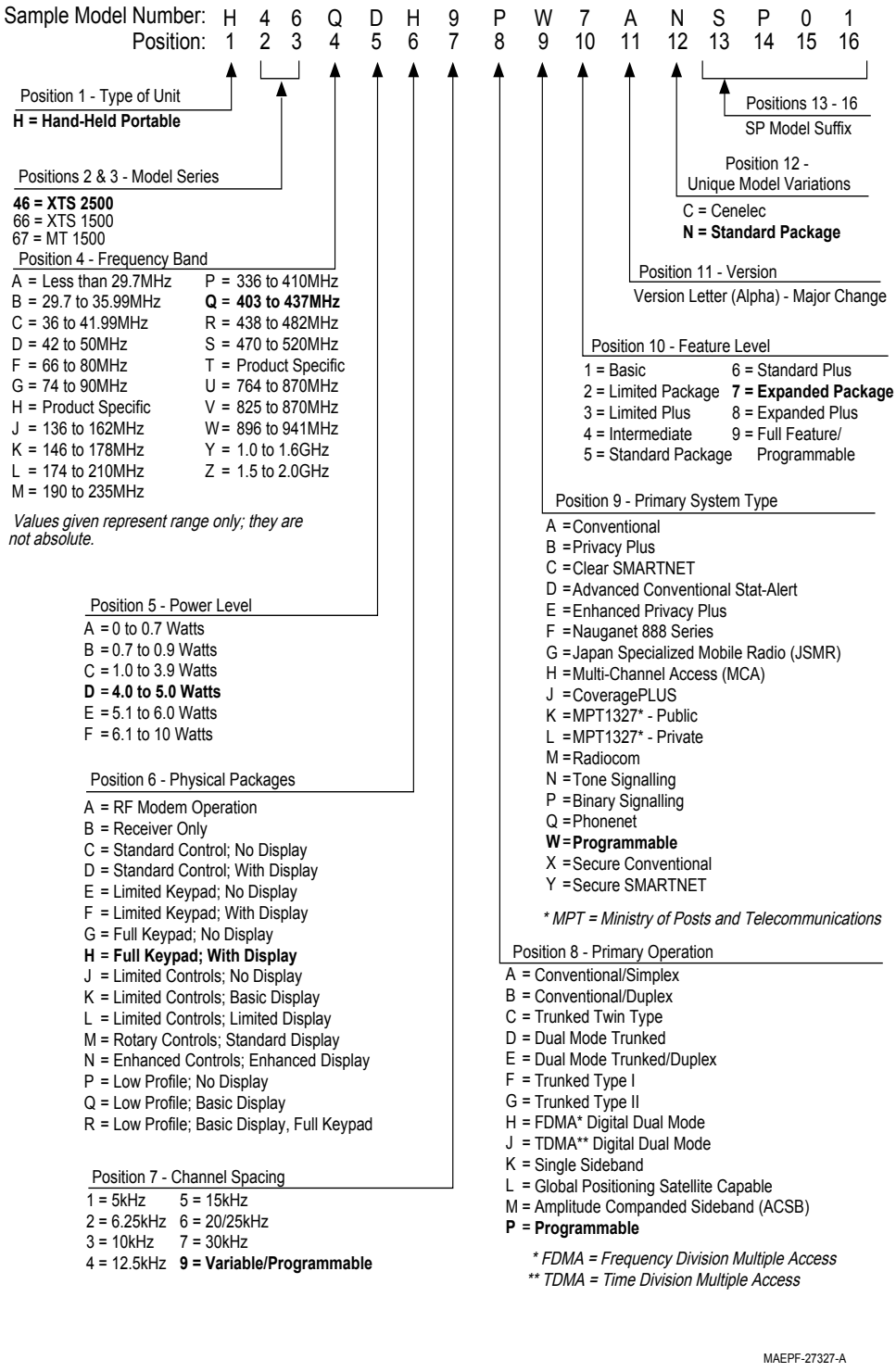
List of Figures

List of Tables

Related Publications

Model Numbering, Charts, and Specifications

Portable Radio Model Numbering System



ASTRO XTS 2500/XTS 2250 Model Chart

MODEL NUMBER	DESCRIPTION
H46UCC9PW5AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model I
H46UCD9PW5AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model 1.5
H46UCF9PW6AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model II
H46UCH9PW7AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model III
H46UCC9PW5ANI	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2250 Basic Model
H46UCD9PW5ANI	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2250 Model 1.5
H46UCH9PW7ANI	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2250 Advanced Model
H46KDC9PW5AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model I
H46KDD9PW5AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model 1.5
H46KDF9PW6AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model II
H46KDH9PW7AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model III
H46KDC9PW5ANI	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Basic Model
H46KDD9PW5ANI	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Model 1.5
H46KDH9PW7ANI	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Advanced Model
H46QDC9PW5AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model I
H46QDD9PW5AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model 1.5
H46QDF9PW6AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model II
H46QDH9PW7AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model III
H46QDD9PW5ANI	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Model 1.5
H46QDH9PW7ANI	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Advanced Model
H46SDC9PW5AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model I
H46SDD9PW5AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model 1.5
H46SDF9PW6AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model II
H46SDH9PW7AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model III
H46SDD9PW5ANI	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Model 1.5
H46SDH9PW7ANI	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Advanced Model

ITEM NUMBER	DESCRIPTION	H46UCC9PW5AN	H46UCD9PW5AN	H46UCF9PW6AN	H46UCH9PW7AN	H46UCC9PW5ANI	H46UCD9PW5ANI	H46UCH9PW7ANI	H46KDC9PW5AN	H46KDD9PW5AN	H46KDF9PW6AN	H46KDH9PW7AN	H46KDC9PW5ANI	H46KDD9PW5ANI	H46KDH9PW7ANI	H46QDC9PW5AN	H46QDD9PW5AN	H46QDF9PW6AN	H46QDH9PW7AN	H46QDD9PW5ANI	H46QDH9PW7ANI	H46SDC9PW5AN	H46SDD9PW5AN	H46SDF9PW6AN	H46SDH9PW7AN	H46SDD9PW5ANI	H46SDH9PW7ANI
–	Antenna (See “Accessories” in the Basic Service Manual)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
–	Battery (See “Accessories” in the Basic Service Manual)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
–	Carry Accessories (See “Accessories” in the Basic Service Manual)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
–	Hardware (See “Exploded Views and Parts Lists” in the Basic Service Manual)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4385665D01_	Adapter, Remote Speaker Microphone	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1505579Z01_	Cover, Dust, Accessory Connector	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7285726C01	Display Module, 700/800		X	X	X		X	X																			
7285726C04	Display Module, VHF / UHF R1 / UHF R2								X	X	X		X	X		X	X	X	X	X	X		X	X	X	X	X
NTN9637_	Front Cover Kit, XTS 2500 Model I	X						X							X							X					
NTN9638_	Front Cover Kit, XTS 2500 Model II			X																							
NTN9639_	Front Cover Kit, XTS 2500 Model III				X																						
NNTN4438_	Front Cover Kit, XTS 2250 Basic Model					X						X															
NNTN4440_	Front Cover Kit, XTS 2250 Advanced Model						X																				
PMTN4083_	Front Cover Kit, XTS 2500 Model II									X						X									X		
PMTN4084_	Front Cover Kit, XTS 2500 Model III										X						X									X	
PMTN4094_	Front Cover Kit, XTS 2250 Advanced Model											X						X									X
PMTN4097_	Front Cover Kit, XTS 2500 Model 1.5		X						X						X								X				
PMTN4103_	Front Cover Kit, XTS 2250 Model 1.5					X						X						X									X
3385082E01	Nameplate, XTS 2500, Model I/1.5/II/III	X	X	X	X			X	X	X	X				X	X	X	X			X	X	X	X			
3385082E02	Nameplate, XTS 2250 Basic, 1.5, and Advanced Models				X	X	X					X	X	X					X	X					X	X	
PMUF6541_	RF/VOCON Board Kit, 700/800	X	X	X	X	X	X																				
NUF6541_	RF/VOCON Board Kit, 700/800 (alternate board)	X	X	X	X	X	X																				
PMLD8908_	RF/VOCON Board, VHF							X	X	X	X	X	X	X													
NLD8908_	RF/VOCON Board, VHF (alternate board)							X	X	X	X	X	X	X													
PMUE4270_	RF/VOCON Board, UHF Range 1														X	X	X	X	X								
NLE4270_	RF/VOCON Board, UHF Range 1 (alternate board)														X	X	X	X	X								
PMUE4271_	RF/VOCON Board, UHF Range 2																			X	X	X	X	X	X		
NLE4271_	RF/VOCON Board, UHF Range 2 (alternate board)																			X	X	X	X	X	X		

NOTE: X = Item included.

(Model chart continues on next page.)

ASTRO XTS 2500/XTS 2250 Model Chart (continued)

MODEL NUMBER	DESCRIPTION
H46UCC9PW5AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model I
H46UCD9PW5AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model 1.5
H46UCF9PW6AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model II
H46UCH9PW7AN	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2500 Model III
H46UCC9PW5ANI	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2250 Basic Model
H46UCD9PW5ANI	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2250 Model 1.5
H46UCH9PW7ANI	700/800 MHz, 1-3 Watts, ASTRO Digital XTS 2250 Advanced Model
H46KDC9PW5AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model I
H46KDD9PW5AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model 1.5
H46KDF9PW6AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model II
H46KDH9PW7AN	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model III
H46KDC9PW5ANI	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Basic Model
H46KDD9PW5ANI	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Model 1.5
H46KDH9PW7ANI	136-174 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Advanced Model
H46QDC9PW5AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model I
H46QDD9PW5AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model 1.5
H46QDF9PW6AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model II
H46QDH9PW7AN	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model III
H46QDD9PW5ANI	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Model 1.5
H46QDH9PW7ANI	380-470 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Advanced Model
H46SDC9PW5AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model I
H46SDD9PW5AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model 1.5
H46SDF9PW6AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model II
H46SDH9PW7AN	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2500 Model III
H46SDD9PW5ANI	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Model 1.5
H46SDH9PW7ANI	450-520 MHz, 1-5 Watts, ASTRO Digital XTS 2250 Advanced Model

ITEM NUMBER	DESCRIPTION
PMUF2607_	Tanapa, XTS 2500 Model I, 700/800
PMUF1216_	Tanapa, XTS 2500 Model 1.5, 700/800
PMUF2608_	Tanapa, XTS 2500 Model II, 700/800
PMUF2609_	Tanapa, XTS 2500 Model III, 700/800
PMUF3711_	Tanapa, XTS 2250 Basic Model, 700/800
PMUF1215_	Tanapa, XTS 2250 Model 1.5, 700/800
PMUF3713_	Tanapa, XTS 2250 Advanced Model, 700/800
PMUD1917_	Tanapa, XTS 2500 Model I, VHF
PMUD2080_	Tanapa, XTS 2500 Model 1.5, VHF
PMUD1918_	Tanapa, XTS 2500 Model II, VHF
PMUD1919_	Tanapa, XTS 2500 Model III, VHF
PMUD2871_	Tanapa, XTS 2250 Basic Model, VHF
PMUD2002_	Tanapa, XTS 2250 Model 1.5, VHF
PMUD2873_	Tanapa, XTS 2250 Advanced Model, VHF
PMUE2109_	Tanapa, XTS 2500 Model I, UHF Range 1
PMUE2383_	Tanapa, XTS 2500 Model 1.5, UHF Range 1
PMUE2110_	Tanapa, XTS 2500 Model II, UHF Range 1
PMUE2111_	Tanapa, XTS 2500 Model III, UHF Range 1
PMUE2254_	Tanapa, XTS 2250 Model 1.5, UHF Range 1
PMUE2285_	Tanapa, XTS 2250 Advanced Model, UHF Range 1
PMUE2112_	Tanapa, XTS 2500 Model I, UHF Range 2
PMUE2244_	Tanapa, XTS 2500 Model 1.5, UHF Range 2
PMUE2113_	Tanapa, XTS 2500 Model II, UHF Range 2
PMUE2114_	Tanapa, XTS 2500 Model III, UHF Range 2
PMUE2250_	Tanapa, XTS 2250 Model 1.5, UHF Range 2
PMUE2288_	Tanapa, XTS 2250 Advanced Model, UHF Range 2
6881094C04_	User's Guide, XTS 2500 Model I
6881098C39	User's Guide, XTS 2500 Model 1.5
6881094C05_	User's Guide, XTS 2500 Model II
6881094C06_	User's Guide, XTS 2500 Model III
9964416H06_	User's Guide CD, XTS 2500, Models I, 1.5, II, III
9964416H08_	User's Guide CD, XTS 2250 Basic, 1.5, and Advanced Models

NOTE: X = Item included.

ASTRO XTS 1500/MT 1500 Model Chart

MODEL NUMBER									DESCRIPTION
H66UCC9PW5AN									700/800 MHz, 1-3 Watts, ASTRO Digital XTS 1500
	H67UCC9PW5AN								700/800 MHz, 1-3 Watts, MT 1500
		H66KDC9PW5AN							136-174 MHz, 1-5 Watts, ASTRO Digital XTS 1500
			H67KDC9PW5AN						136-174 MHz, 1-5 Watts, MT 1500
				H66QDC9PW5AN					380-470 MHz, 1-5 Watts, ASTRO Digital XTS 1500
					H67QDC9PW5AN				380-470 MHz, 1-5 Watts, MT 1500
						H66SDC9PW5AN			450-520 MHz, 1-5 Watts, ASTRO Digital XTS 1500
							H67SDC9PW5AN		450-520 MHz, 1-5 Watts, MT 1500
								ITEM NUMBER	DESCRIPTION
X	X	X	X	X	X	X	X	–	Antenna (See “Accessories” in the Basic Service Manual)
X	X	X	X	X	X	X	X	–	Battery (See “Accessories” in the Basic Service Manual)
X	X	X	X	X	X	X	X	–	Carry Accessories (See “Accessories” in the Basic Service Manual)
X	X	X	X	X	X	X	X	–	Hardware (See “Exploded Views and Parts Lists” in the Basic Service Manual)
X	X	X	X	X	X	X	X	4385665D01_	Adapter, Remote Speaker Microphone
X	X	X	X	X	X	X	X	1585746D04_	Cover, Dust, Accessory Connector
X		X		X		X		PMTN4079_	Front Cover Kit, XTS 1500
	X		X		X		X	PMTN4080_	Front Cover Kit, MT 1500
X		X		X		X		3386597Z01	Nameplate, XTS 1500
	X		X		X		X	3386597Z02	Nameplate, MT 1500
X	X							PMUF6541_	RF/VOCON Board Kit, 700/800
		X	X					PMLD8908_	RF/VOCON Board, VHF
				X	X			PMUE4270_	RF/VOCON Board, UHF Range 1
						X	X	PMUE4271_	RF/VOCON Board, UHF Range 2
X								PMUF1154_	Tanapa, XTS 1500, 700/800, 9600 digital, trunked
X								PMUF1155_	Tanapa, XTS 1500, 700/800, 3600 analog/digital, trunked
X								PMUF1156_	Tanapa, XTS 1500, 700/800, conventional
	X							PMUF1152_	Tanapa, MT 1500, 700/800, analog, conventional
	X							PMUF1153_	Tanapa, MT 1500, 700/800, analog, trunked
		X						PMUD1966_	Tanapa, XTS 1500, VHF, 9600 digital, trunked
		X						PMUD1967_	Tanapa, XTS 1500, VHF, 3600 analog/digital, trunked
		X						PMUD1968_	Tanapa, XTS 1500, VHF, conventional
			X					PMUD1969_	Tanapa, MT 1500, VHF, analog, conventional
			X					PMUD1970_	Tanapa, MT 1500, VHF, analog, trunked
				X				PMUE2289_	Tanapa, XTS 1500, UHF Range 1, 9600 digital, trunked
				X				PMUE2290_	Tanapa, XTS 1500, UHF Range 1, 3600 analog/digital, trunked
				X				PMUE2291_	Tanapa, XTS 1500, UHF Range 1, conventional
					X			PMUE2292_	Tanapa, MT 1500, UHF Range 1, analog, conventional
					X			PMUE2293_	Tanapa, MT 1500, UHF Range 1, analog, trunked
						X		PMUE2294_	Tanapa, XTS 1500, UHF Range 2, 9600 digital, trunked
						X		PMUE2295_	Tanapa, XTS 1500, UHF Range 2, 3600 analog/digital, trunked
						X		PMUE2296_	Tanapa, XTS 1500, UHF Range 2, conventional
							X	PMUE2297_	Tanapa, MT 1500, UHF Range 2, analog, conventional
							X	PMUE2298_	Tanapa, MT 1500, UHF Range 2, analog, trunked
X		X		X		X		6804113J52_	User’s Guide, XTS 1500
	X		X		X		X	6804113J71_	User’s Guide, MT 1500
X	X	X	X	X	X	X	X	9964416H06_	User’s Guide CD, XTS 1500 and MT 1500

NOTE: X = Item included.

PR 1500 Model Chart

MODEL NUMBER				DESCRIPTION
AAH79KDC9PW5AN				136-174 MHz, 1-5 Watts, PR1500
	AAH79QDC9PW5AN			380-470 MHz, 1-5 Watts, PR 1500
		AAH79SDC9PW5AN		450-520 MHz, 1-5 Watts, PR 1500
			ITEM NUMBER	DESCRIPTION
X	X	X	–	Antenna (See “Accessories” in the Basic Service Manual)
X	X	X	–	Battery (See “Accessories” in the Basic Service Manual)
X	X	X	–	Carry Accessories (See “Accessories” in the Basic Service Manual)
X	X	X	–	Hardware (See “Exploded Views and Parts Lists” in the Basic Service Manual)
X	X	X	4385665D01_	Adapter, Remote Speaker Microphone
X	X	X	1585746D04_	Cover, Dust, Accessory Connector
X	X	X	PMTN4106_	Front Cover Kit, PR 1500
X	X	X	3386597Z03	Nameplate, PR 1500
X			PMLD8908_	RF/VOCON Board, VHF
	X		PMUE4270_	RF/VOCON Board, UHF Range 1
		X	PMUE4271_	RF/VOCON Board, UHF Range 2
X			PMUD2071_	Tanapa, PR 1500, VHF, analog, conventional
	X		PMUE2359_	Tanapa, PR 1500, UHF Range 1, analog, conventional
		X	PMUE2360_	Tanapa, PR 1500, UHF Range 2, analog, conventional
X	X	X	6881098C40_	User’s Guide, PR 1500
X	X	X	9964416H07_	User’s Guide CD, PR 1500

NOTE: X = Item included.

Model History Table

The following table includes all of the ASTRO XTS 2500/XTS2250/XTS 1500/MT 1500/PR 1500 portable radio models from the beginning of this product line to date. It shows the model number, description for the model number, and the part numbers for the front cover kit and the main board kit.

Model Number	Description	Front Cover Kit Number	Main Board Kit Number
H46UCC9PW5AN	700/800 MHz 1–3 Watt XTS 2500 Model I	NTN9637	PMUF6541
H46UCD9PW5AN	700/800 MHz 1–3 Watt XTS 2500 Model 1.5	PMTN4097	PMUF6541
H46UCF9PW6AN	700/800 MHz 1–3 Watt XTS 2500 Model II	NTN9638	PMUF6541
H46UCH9PW7AN	700/800 MHz 1–3 Watt XTS 2500 Model III	NTN9639	PMUF6541
H46UCC9PW5ANI	700/800 MHz 1–3 Watt XTS 2250 Basic Model	NNTN4438	PMUF6541
H46UCD9PW5ANI	700/800 MHz 1–3 Watt XTS 2250 Model 1.5	PMTN4103	PMUF6541
H46UCH9PW7ANI	700/800 MHz 1–3 Watt XTS 2250 Advanced Model	NNTN4440	PMUF6541
H66UCC9PW5AN	700/800 MHz 1–3 Watt XTS 1500	NNTN4943	PMUF6541
H67UCC9PW5AN	700/800 MHz 1–3 Watt MT 1500	NNTN4944	PMUF6541
H46KDC9PW5AN	136-174 MHz 1–5 Watt XTS 2500 Model I	NTN9637	PMLD8908
H46KDD9PW5AN	136-174 MHz 1–5 Watt XTS 2500 Model 1.5	PMTN4097	PMLD8908
H46KDF9PW6AN	136-174 MHz 1–5 Watt XTS 2500 Model II	PMTN4083	PMLD8908
H46KDH9PW7AN	136-174 MHz 1–5 Watt XTS 2500 Model III	PMTN4084	PMLD8908
H46KDC9PW5ANI	136-174 MHz 1–5 Watt XTS 2250 Basic Model	NNTN4438	PMLD8908
H46KDD9PW5ANI	136-174 MHz 1–5 Watt XTS 2250 Model 1.5	PMTN4103	PMLD8908
H46KDH9PW7ANI	136-174 MHz 1–5 Watt XTS 2250 Advanced Model	PMTN4094	PMLD8908
H66KDC9PW5AN	136-174 MHz 1–5 Watt XTS 1500	PMTN4079	PMLD8908
H67KDC9PW5AN	136-174 MHz 1–5 Watt MT 1500	PMTN4080	PMLD8908
AAH79KDC9PW5AN	136-174 MHz 1–5 Watt PR 1500	PMTN4106	PMLD8908
H46QDC9PW5AN	380-470 MHz 1–5 Watt XTS 2500 Model I	NTN9637	PMUE4270
H46QDD9PW5AN	380-470 MHz 1–5 Watt XTS 2500 Model 1.5	PMTN4097	PMUE4270
H46QDF9PW6AN	380-470 MHz 1–5 Watt XTS 2500 Model II	PMTN4083	PMUE4270
H46QDH9PW7AN	380-470 MHz 1–5 Watt XTS 2500 Model III	PMTN4084	PMUE4270
H46QDD9PW5ANI	380-470 MHz 1–5 Watt XTS 2250 Model 1.5	PMTN4103	PMUE4270
H46QDH9PW7ANI	380-470 MHz 1–5 Watt XTS 2250 Advanced Model	PMTN4094	PMUE4270
H66QDC9PW5AN	380-470 MHz 1–5 Watt XTS 1500	PMTN4079	PMUE4270
H67QDC9PW5AN	380-470 MHz 1–5 Watt MT 1500	PMTN4080	PMUE4270
AAH79QDC9PW5AN	380-470 MHz 1–5 Watt PR 1500	PMTN4106	PMUE4270
H46SDC9PW5AN	450-520 MHz 1–5 Watt XTS 2500 Model I	NTN9637	PMUE4271
H46SDD9PW5AN	450-520 MHz 1–5 Watt XTS 2500 Model 1.5	PMTN4097	PMUE4271
H46SDF9PW6AN	450-520 MHz 1–5 Watt XTS 2500 Model II	PMTN4083	PMUE4271
H46SDH9PW7AN	450-520 MHz 1–5 Watt XTS 2500 Model III	PMTN4084	PMUE4271
H46SDD9PW5ANI	450-520 MHz 1–5 Watt XTS 2250 Model 1.5	PMTN4103	PMUE4271
H46SDH9PW7ANI	450-520 MHz 1–5 Watt XTS 2250 Advanced Model	PMTN4094	PMUE4271
H66SDC9PW5AN	450-520 MHz 1–5 Watt XTS 1500	PMTN4079	PMUE4271
H67SDC9PW5AN	450-520 MHz 1–5 Watt MT 1500	PMTN4080	PMUE4271
AAH79SDC9PW5AN	450-520 MHz 1–5 Watt PR 1500	PMTN4106	PMUE4271

Specifications for 700/800 MHz Radios

All specifications are per Telecommunications Industries Association TIA-603, unless otherwise noted.

GENERAL	RECEIVER	TRANSMITTER
FCC ID: **700/800 MHz:** AZ489FT5804 **Temperature Range:** **Operating:** –30°C to +60°C **Storage:** –40°C to +85°C **Power Supply:** Nickel-Cadmium Battery (NiCd) *or* Nickel-Metal-Hydride Battery (NiMH) **Battery Voltage:** **Nominal:** 7.5 Volts **Range:** 6 to 9 Volts **Transmit Current Drain (typical):** 1250mA **Receive Current Drain (Rated Audio):** 220mA **Standby Current Drain:** 70mA **Recommended Battery:** **High-Capacity NiCd:** NTN9815 *or* **Ultra-High-Capacity NiMH:** NTN9858 *or* **High-Capacity NiCd FM:** NTN9816* *or* **Ultra–High-Capacity NiMH FM:** NTN9857* Optional FM (Factory Mutual) Battery: * FM Intrinsically Safe: Class I, II, III **Dimensions:** **Height x Width x Depth** **Radio Less Battery:** 6.0" x 2.3" x 1.5" **With NiCd Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **With NiMH Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **Weight** **Radio Less Battery:** 11.0 oz. **With NiCd Ultra-High Capacity:** 20.0 oz. **With NiMH Ultra-High Capacity:** 20.5 oz.	**Frequency Range:** **700 MHz:** 764 to 767; 773 to 776 MHz **800 MHz:** 851 to 870 MHz **Quieting Sensitivity (typical) (20dBQ):** 0.23µV **Usable Sensitivity (typical):** **(12dB SINAD):** 0.25µV **Intermodulation (typical):** –74dB **Selectivity (typical):** **(25kHz Channel):** –72dB **(12.5kHz Channel):** –63dB **Spurious Rejection (typical):** –75dB **Frequency Stability:** **(–30+60°C; 25°C reference):** 1.5ppm **Rated Audio:** 500mW **FM Hum and Noise (typical):** **(25kHz channel):** –47dB **(12.5kHz channel):** –40dB **Distortion (at Rated Audio; typical):** 2.5% **Channel Spacing:** 12.5/20/25 kHz	**RF Power:** **806 - 870 MHz:** 3 Watts **764 - 806 MHz:** 2.5 Watts **Frequency Range:** **700 MHz:** 764 to 767; 773 to 776; 794 to 797; 803 to 806 MHz **800 MHz:** 806 to 824; 851 to 870 MHz **Frequency Stability (typical):** **(–30 to +60°C; 25°C ref.):** 1.5ppm **Emission (typical conducted):** -75dBc<1GHz **FM Hum and Noise (typical):** **(25 kHz channel):** –43dB **(12.5 kHz channel):** –40dB **Distortion (typical):** 2% **Modulation Limiting:** 25 kHz chnls ±5.0kHz 20 kHz chnls ±4.0kHz 12.5 kHz chnls ±2.5kHz **Emissions Designators:** 16K0F3E,11K0F3E, 8K10F1D, and 8K10F1E

Specifications for VHF Radios

All specifications are per Telecommunications Industries Association TIA-603, unless otherwise noted.

GENERAL	RECEIVER	TRANSMITTER
FCC ID: **136–174 MHz:** AZ489FT3807 **Temperature Range:** **Operating:** –30°C to +60°C **Storage:** –40°C to +85°C **Power Supply:** Nickel-Cadmium Battery (NiCd) *or* Nickel-Metal-Hydride Battery (NiMH) **Battery Voltage:** **Nominal:** 7.5 Volts **Range:** 6 to 9 Volts **Transmit Current Drain (typical):** 1900mA **Receive Current Drain (Rated Audio):** 220mA **Standby Current Drain:** 70mA **Recommended Battery:** **High-Capacity NiCd:** NTN9815 *or* **Ultra-High-Capacity NiMH:** NTN9858 *or* **High-Capacity NiCd FM:** NTN9816* *or* **Ultra–High-Capacity NiMH FM:** NTN9857* Optional FM (Factory Mutual) Battery: * FM Intrinsically Safe: Class I, II, III **Dimensions:** **Height x Width x Depth** **Radio Less Battery:** 6.0" x 2.3" x 1.5" **With NiCd Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **With NiMH Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **Weight** **Radio Less Battery:** 11.0 oz. **With NiCd Ultra-High Capacity:** 20.0 oz. **With NiMH Ultra-High Capacity:** 20.5 oz.	**Frequency Range:** **136–174 MHz** **Quieting Sensitivity (typical) (20dBQ):** 0.23µV **Usable Sensitivity (typical):** **(12dB SINAD):** 0.25µV **Intermodulation (typical):** –78dB **Selectivity (typical):** **(25kHz Channel):** –80dB **(12.5kHz Channel):** –63dB **Spurious Rejection (typical):** –80dB **Frequency Stability:** **(–30+60°C; 25°C reference):** 2.5ppm **Rated Audio:** 500mW **FM Hum and Noise (typical):** **(25kHz channel):** –52dB **(12.5kHz channel):** –40dB **Distortion (at Rated Audio; typical):** 1% **Channel Spacing:** 12.5/25 kHz	**Frequency Range:** **136–174 MHz** **RF Power:** **136–174 MHz:** 5 Watts **Frequency Stability (typical):** **(–30 to +60°C; 25°C ref.):** 2.5ppm **Emission (typical conducted):** –65dBc<1GHz **FM Hum and Noise (typical):** **(25 kHz channel):** –46dB **(12.5 kHz channel):** –42dB **Distortion (typical):** 1% **Modulation Limiting:** 25 kHz chnls ±5.0kHz 12.5 kHz chnls ±2.5kHz **Emissions Designators:** 16K0F3E,11K0F3E, 8K10F1D, and 8K10F1E

Specifications for UHF Range 1 Radios

All specifications are per Telecommunications Industries Association TIA-603, unless otherwise noted.

GENERAL	RECEIVER	TRANSMITTER
FCC ID: **380–470 MHz:** AZ489FT4865 **Temperature Range:** **Operating:** –30°C to +60°C **Storage:** –40°C to +85°C **Power Supply:** Nickel-Cadmium Battery (NiCd) *or* Nickel-Metal-Hydride Battery (NiMH) **Battery Voltage:** **Nominal:** 7.5 Volts **Range:** 6 to 9 Volts **Transmit Current Drain (typical):** 2100mA **Receive Current Drain (Rated Audio):** 220mA **Standby Current Drain:** 80mA **Recommended Battery:** **High-Capacity NiCd:** NTN9815 *or* **Ultra-High-Capacity NiMH:** NTN9858 *or* **High-Capacity NiCd FM:** NTN9816* *or* **Ultra–High-Capacity NiMH FM:** NTN9857* Optional FM (Factory Mutual) Battery: * FM Intrinsically Safe: Class I, II, III **Dimensions:** **Height x Width x Depth** **Radio Less Battery:** 6.0" x 2.3" x 1.5" **With NiCd Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **With NiMH Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **Weight** **Radio Less Battery:** 11.0 oz. **With NiCd Ultra-High Capacity:** 20.0 oz. **With NiMH Ultra-High Capacity:** 20.5 oz.	**Frequency Range:** **380–470 MHz** **Quieting Sensitivity (typical) (20dBQ):** 0.23µV **Usable Sensitivity (typical):** **(12dB SINAD):** 0.25µV **Intermodulation (typical):** –73dB **Selectivity (typical):** **(25kHz Channel):** –73dB **(12.5kHz Channel):** –63dB **Spurious Rejection (typical):** –80dB **Frequency Stability:** **(–30+60°C; 25°C reference):** 2.0ppm **Rated Audio:** 500mW **FM Hum and Noise (typical):** **(25kHz channel):** –52dB **(12.5kHz channel):** –40dB **Distortion (at Rated Audio; typical):** 2% **Channel Spacing:** 12.5/25 kHz	**Frequency Range:** **380–470 MHz** **RF Power:** **380–470 MHz:** 5 Watts **Frequency Stability (typical):** **(–30 to +60°C; 25°C ref.):** 2.0ppm **Emission (typical conducted):** –65dBc<1GHz **FM Hum and Noise (typical):** **(25 kHz channel):** –46dB **(12.5 kHz channel):** –42dB **Distortion (typical):** 1% **Modulation Limiting:** 25 kHz chnls ±5.0kHz 12.5 kHz chnls ±2.5kHz **Emissions Designators:** 16K0F3E,11K0F3E, 8K10F1D, and 8K10F1E

Specifications for UHF Range 2 Radios

All specifications are per Telecommunications Industries Association TIA-603, unless otherwise noted.

GENERAL	RECEIVER	TRANSMITTER
FCC ID: **450–520 MHz:** AZ489FT4866 **Temperature Range:** **Operating:** –30°C to +60°C **Storage:** –40°C to +85°C **Power Supply:** Nickel-Cadmium Battery (NiCd) *or* Nickel-Metal-Hydride Battery (NiMH) **Battery Voltage:** **Nominal:** 7.5 Volts **Range:** 6 to 9 Volts **Transmit Current Drain (typical):** 2000mA **Receive Current Drain (Rated Audio):** 220mA **Standby Current Drain:** 80mA **Recommended Battery:** **High-Capacity NiCd:** NTN9815 *or* **Ultra-High-Capacity NiMH:** NTN9858 *or* **High-Capacity NiCd FM:** NTN9816* *or* **Ultra–High-Capacity NiMH FM:** NTN9857* Optional FM (Factory Mutual) Battery: * FM Intrinsically Safe: Class I, II, III **Dimensions:** **Height x Width x Depth** **Radio Less Battery:** 6.0" x 2.3" x 1.5" **With NiCd Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **With NiMH Ultra-High Cap.:** 6.0" x 2.3" x 2.0" **Weight** **Radio Less Battery:** 11.0 oz. **With NiCd Ultra-High Capacity:** 20.0 oz. **With NiMH Ultra-High Capacity:** 20.5 oz.	**Frequency Range:** **450–520 MHz** **Quieting Sensitivity (typical) (20dBQ):** 0.23µV **Usable Sensitivity (typical):** **(12dB SINAD):** 0.25µV **Intermodulation (typical):** –75dB **Selectivity (typical):** **(25kHz Channel):** –73dB **(12.5kHz Channel):** –63dB **Spurious Rejection (typical):** –80dB **Frequency Stability:** **(–30 to +60°C; 25°C reference):** 2.0ppm **Rated Audio:** 500mW **FM Hum and Noise (typical):** **(25kHz channel):** –52dB **(12.5kHz channel):** –45dB **Distortion (at Rated Audio; typical):** 2% **Channel Spacing:** 12.5/25 kHz	**Frequency Range:** **450–520 MHz** **RF Power:** **450–520 MHz:** 5 Watts **Frequency Stability (typical):** **(–30 to +60°C; 25°C reference):** 2.0ppm **Emission (typical conducted):** –70dBc<1GHz **FM Hum and Noise (typical):** **(25 kHz channel):** –45dB **(12.5 kHz channel):** –41dB **Distortion (typical):** 1% **Modulation Limiting:** 25 kHz chnls ±5.0kHz 12.5 kHz chnls ±2.5kHz **Emissions Designators:** 16K0F3E,11K0F3E, 8K10F1D, and 8K10F1E

Chapter 1 Introduction

1.1 General

This manual includes all the information needed to maintain peak product performance and maximum working-time. This detailed level of service (component level) is typical of some service centers, self-maintained customers, and distributors. This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radios Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

Conduct the basic performance checks first. This will verify the actual need for analyzing the radio and help pinpoint the functional problem area. In addition, the technician will become familiar with the radio test mode of operation, which is a helpful tool. If any basic receive or transmitter parameters fail, then the radio should be aligned per the radio alignment procedure.

Included in other areas of this manual are disassembly/reassembly procedures, functional block diagrams, detailed theory of operation, troubleshooting charts and waveforms, schematics and parts lists, and exploded view and parts list. The technician should be very familiar with these sections to aid in determining the problem circuit. Also included are component location diagrams to aid in locating individual circuit components and some IC diagrams, which point out some convenient probe points.

The theory of operation sections of this manual contain detailed descriptions of the operations of many circuits. Once the area of the problem is located, it would be strongly advisable to review the operation of the circuit pertaining to the troubleshooting flow chart.

1.2 Notations Used in This Manual

Throughout the text in this publication, you will notice the use of warnings, cautions, and notes. These notations are used to emphasize that safety hazards exist, and care must be taken and observed.

NOTE: An operational procedure, practice, or condition, etc., which is essential to emphasize.

Caution

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in equipment damage.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

DANGER indicates an imminently hazardous situation which, if not avoided, <u>will</u> result in death or injury.

In this publication you will also find the use of the asterisk symbol (*) to indicate a negative or NOT logic true signal.

Chapter 2 Overall Characteristics

2.1 Introduction

This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radios Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

The ASTRO XTS 2500 digital portable radio is a dual-band, 700/800 MHz (trunked/conventional), microcontroller-based transceiver incorporating a Digital Signal Processor (DSP). The microcontroller handles the general radio control, monitors status, and processes commands input from the keypad or other user controls. The DSP processes the typical analog signals and generates the standard signaling digitally to provide compatibility with existing analog systems. In addition, it provides for digital modulation techniques, utilizing voice encoding techniques with error correction schemes, to provide the user with enhanced range and audio quality all in a reduced bandwidth channel requirement. It allows embedded signaling which can mix system information and data with digital voice to add the capability of supporting a multitude of system features.

The three ASTRO XTS 2500 digital portable radio models (I, II, and III) are available in the 700/800 MHz (764-870 MHz) band.

The ASTRO XTS 2500 digital portable radio consists of:

- a **main board**,
- a **universal flex**, and
- **display** and **keypad** assemblies (models II and III only).

The **main board** contains the microcontroller unit (MCU) and its associated memory and memory management integrated circuit (IC), the audio power amplifier, and a switching regulator. The board also contains the digital signal processor (DSP) and its support IC and associated memories. All transmit, receive, and frequency generation circuitry, including the digital receiver back-end IC and the reference oscillator are included on the main board.

The **universal flex** contains the universal connector, speaker, and a microphone.

The **display** module is a six-line x 12-character, liquid-crystal display (LCD) with associated circuitry. This module utilizes chip-on-flex technology and is not considered field-repairable.

The **keypad** module is either a 3 x 2 (Model II), or a 3 x 6 (Model III) button module with backlighting.

2.2 Analog Mode of Operation-Receiving

When the radio is *receiving*, the signal comes from the antenna connector to the radio board, passes through the RX/TX switch and the receiver front end. The signal is then filtered, amplified, and mixed with the first local-oscillator signal generated by the voltage-controlled oscillator (VCO).

The resulting intermediate frequency (IF) signal (109.65 MHz) is fed to the IF circuitry, where the signal is again filtered and amplified. This amplified signal is passed to the digital back-end IC, where it is mixed with the second local oscillator to create the second IF at 2.25 MHz. It is then converted to a digital bit stream and mixed a third time to produce a baseband signal. This signal is passed to the Vocoder and Controller (VOCON) circuitry through a current-driven output. Please see page 4-11 for a detailed description of the VOCON functional blocks.

In the VOCON circuitry, the DSP decodes the information in the signal and identifies the appropriate destination for it. For a voice signal, the DSP will route the digital voice data to the CODEC for conversion to an analog signal. The CODEC will then present the signal to the audio power amplifier, which drives the speaker. For signaling information, the DSP will decode the message and pass it to the microcontroller unit.

2.3 Analog Mode of Operation-Transmitting

When the radio is *transmitting*, microphone audio is passed through gain stages to the CODEC, where the signal is digitized. The CODEC passes digital data to the DSP, where pre-emphasis and low-pass (splatter) filtering is done. The DSP returns this signal to a digital-to-analog converter (D/A), where it is reconverted into an analog signal and scaled for application to the voltage-controlled oscillator as a modulation signal.

Transmitted signaling information is accepted by the DSP from the microcontroller unit, coded appropriately, and passed to the D/A, which handles it the same as a voice signal. Modulation information is passed to the synthesizer along the modulation line. A modulated carrier is provided to the RF PA, which transmits the signal under dynamic power control.

2.4 ASTRO Mode (Digital Mode) of Operation

In the ASTRO mode (digital mode) of operation, the transmitted or received signal is limited to a discrete set of deviation levels, instead of varying continuously. The receiver handles an ASTRO-mode signal identically to an analog-mode signal up to the point where the DSP decodes the received data. In the ASTRO receive mode, the DSP uses a specifically defined algorithm to recover information.

In the ASTRO transmit mode, microphone audio is processed identically to an analog mode, with the exception of the algorithm the DSP uses to encode the information. This algorithm will result in deviation levels that are limited to discrete levels.

2.5 Main Board Overview

The receiver front end consists of two wide-band varactor-tunable filters:

1. a wide-band, low-noise amplifier, and
2. an active mixer stage.

The receive path of the antenna switch feeds directly into a preselector filter, followed by a Low Noise Amplifier (LNA) and a post-selector filter, then the mixer. Both front-end filters are implemented as multi-layer ceramic (MLC), with embedded Inductor Capacitor (LC) components. Both filters are supplied with a single control voltage from one of the Power Control IC DACs (Digital-to-Analog Converters). The output of the post-selector filter is sent to the active mixer stage.

The frequency generation function is performed by three ICs and associated circuitry. The reference oscillator provides a frequency standard to the synthesizer/prescaler IC, which controls the Voltage-Controlled Oscillator Buffer (VCOB) IC. The synthesizer/prescaler circuit module incorporates frequency-division and comparison circuitry to keep the VCO signals stable. The synthesizer/prescaler IC is controlled by the microcontroller unit through a serial bus.

The receiver back end consists of a single, three-pole crystal filter and the digital back-end IC (ABACUS-III). Final IF filtering is done digitally in the DSP.

The digital back-end IC (ABACUS-III) consists of the following:

- an amplifier
- the second mixer
- an IF analog-to-digital converter

- a baseband down-converter, and
- a 18 MHz synthesis circuit to provide a sampling clock to the circuitry. The second LO is generated by discrete components external to the IC. The output of the ABACUS-III IC is a current-driven digital bit stream.

The transmitter consists of an RF driver IC and a final stage power amplifier. The RF driver IC gets an injection signal from the VCO. Transmit power is controlled by a power-control IC that monitors the output of a directional coupler and adjusts the PA control voltages correspondingly. The signal passes through a RX/TX switch that uses PIN diodes to automatically provide an appropriate interface to transmit or receive signals.

2.6 Vocoder Circuitry Overview

In the VOCON circuitry, the digital-signal processor (DSP) supports IC digital filters, discriminates the signal, and passes it to the DSP. The DSP decodes the information in the signal and identifies the following destination for the signal:

- For a voice signal, the DSP routes the digital voice data to the Coder-Decoder (CODEC) for conversion to an analog signal. The CODEC then presents the signal to the audio power amplifier, which drives the speaker.
- For signaling information, the DSP decodes the message and passes it to the microcontroller unit.

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Chapter 3 Radio Power

3.1 Introduction

This chapter of the manual provides a detailed circuit description of the power distribution for an ASTRO XTS 2500 digital portable radio. This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radios Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

3.2 Radio Power Up or Down

Radio power up begins when the radio ON/OFF/Volume control knob is turned to the on position, placing 7.5 volts on the MECH_SW line. This signal activates the pass element (Q702 through Q703), enabling SW_B+ and GCAP_B+.

When the GCAP IC (U703) detects a low to high voltage transition on GCAP_B+, it turns ON and enables voltage supplies VSW1, VSW2, V2 and Vref. As soon as these voltages come up, the 1.55V regulator ramps up (only on the NUF6541G board), and the Flipper IC (U600) drives the Watch Dog Interrupt (WDI) line "high" in order to enable VCC5 (regulator U702) and maintain GCAP in the ON state. If WDI were to remain "low," GCAP would turn off after 50 msec.

The user starts the power down sequence by turning the ON/OFF/Volume control knob to the Off position, removing the MECH_SW signal from the radio. This does not immediately remove power because GCAP has control of Q703 through Vref., and U600 through WDI maintains GCAP (U703) active. Both the MCU and Flipper monitor MECH_SW. After MECH_SW is removed, the Flipper IC waits 125msec before releasing WDI, to allow for software cleanup. The software has the ability to prolong this time if it is necessary to complete its operations. When WDI is released, GCAP shuts down its supplies and the rest of the radio through Q702.

3.3 General

In the XTS 2500 radio, power (B+) is distributed to one board that contains both the transceiver and controller sections. There is an additional backup battery (Motorola part number 6003710K08) mounted directly on the board; see the basic service manual for details.

Power for the radio is provided through a battery supplying a nominal 7.5Vdc directly to the transceiver. The battery is available in the following forms:

- NTN9815A Nickel-Cadmium, Hi Capacity
- NTN9816A Nickel-Cadmium, Hi Capacity, FM Approved
- NTN9857A Nickel-Metal-Hydride, Ultra Hi Capacity, FM Approved
- NTN9858A Nickel-Metal-Hydride, Ultra Hi Capacity

B+ from the battery is electrically switched to most of the radio, rather than routed through the ON/OFF/Volume control knob, S501. The electrical switching of B+ supports a “keep-alive” mode. Under software control, even when the ON/OFF/Volume control knob has been turned to the “off” position, power remains on until the MCU completes its power-down, at which time the radio is physically powered-down.

3.4 B+ Routing for 700/800 MHz Main Board

Refer to Figure 3-1 and the appropriate schematic diagram in the back of this manual.

Raw B+ (7.5V) from the battery enters the radio through a 3-contact connector (B500). From B500 it is routed through a ferrite bead (E500) to the fuse (F500) where RAW_B+ is distributed throughout the RF section as UNSW_B+.

UNSW_B+ provides power to the following:

- the mechanical switch (S501)
- the radio's LED (D501)
- the voltage regulator (U503), which charges the lithium battery

and the voltage regulator (U702); then routes through the connector (J601, pin 3). U702 will be discussed in the B+ and +5V routing for the voice encoder (vocoder) and controller (VOCON) section.

During the transmit mode, UNSW_B+ routes through a ferrite bead (E101) to the Power Control IC (PCIC) (U102), the RF driver (U101), through another ferrite bead (E102) to the final power amplifier (Q101). UNSW_B+ also routes through the Field Effect Transistor (FET) switch (Q702) where it becomes SW_B+. SW_B+ powers a 5V linear regulator (U500), which supplies 5V to the PCIC (U102).

During the receive mode, the linear regular (U500) provides 5V to the mixer (U1) and the ABACUS III IC (U401). U500 also provides 5V to the Frequency Generation Unit's (FGU) FracN (U201) and VCOs.

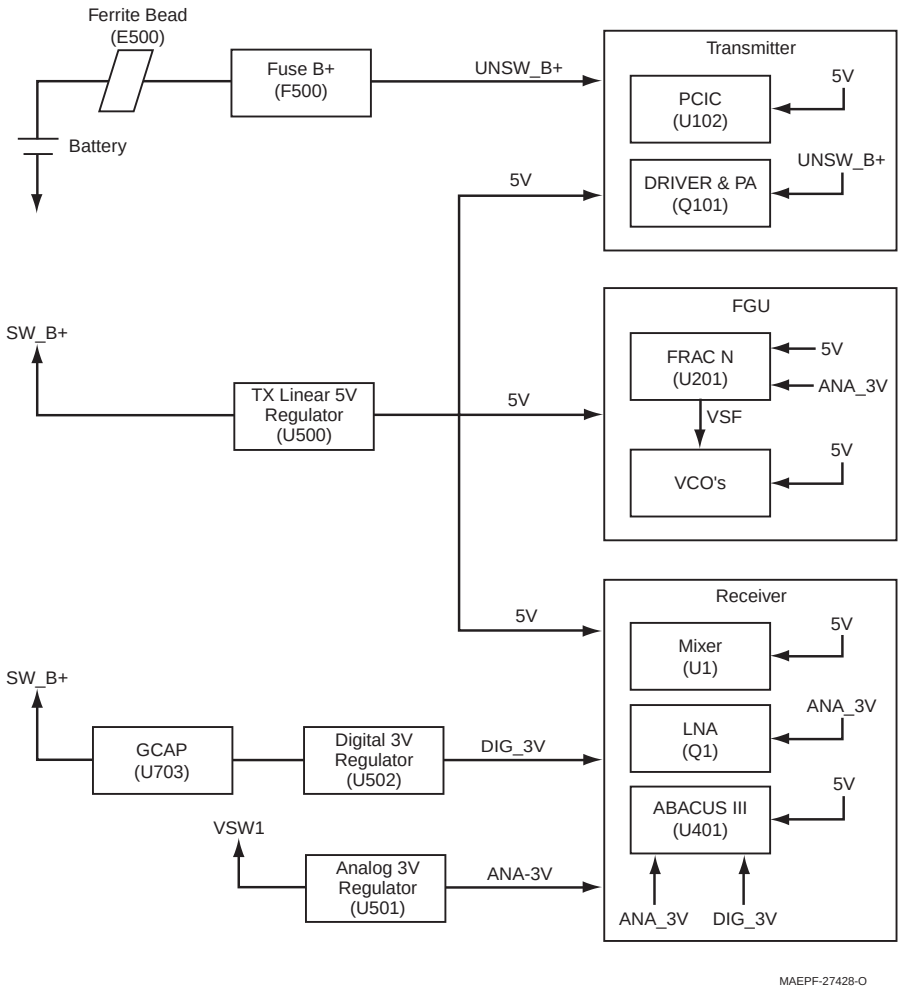


Figure 3-1. B+ Routing for 700/800 MHz Main Board

3.5 B+ and +5V Routing for VOCON

Refer to Figure 3-2 and the appropriate schematic diagrams in the back of this manual.

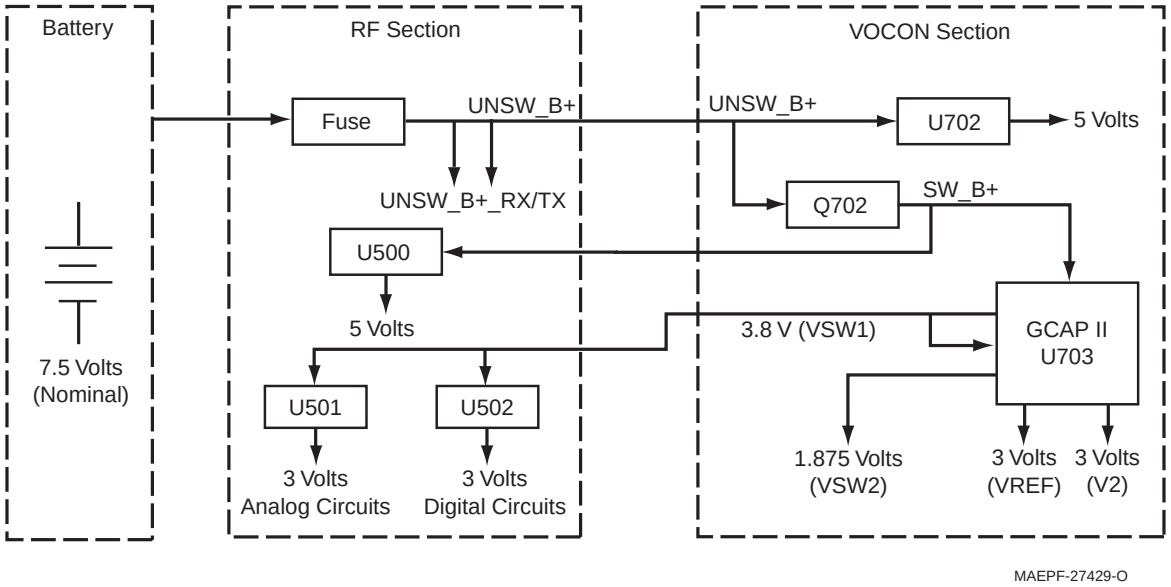


Figure 3-2. XTS 2500 DC Distribution (for all other kits)

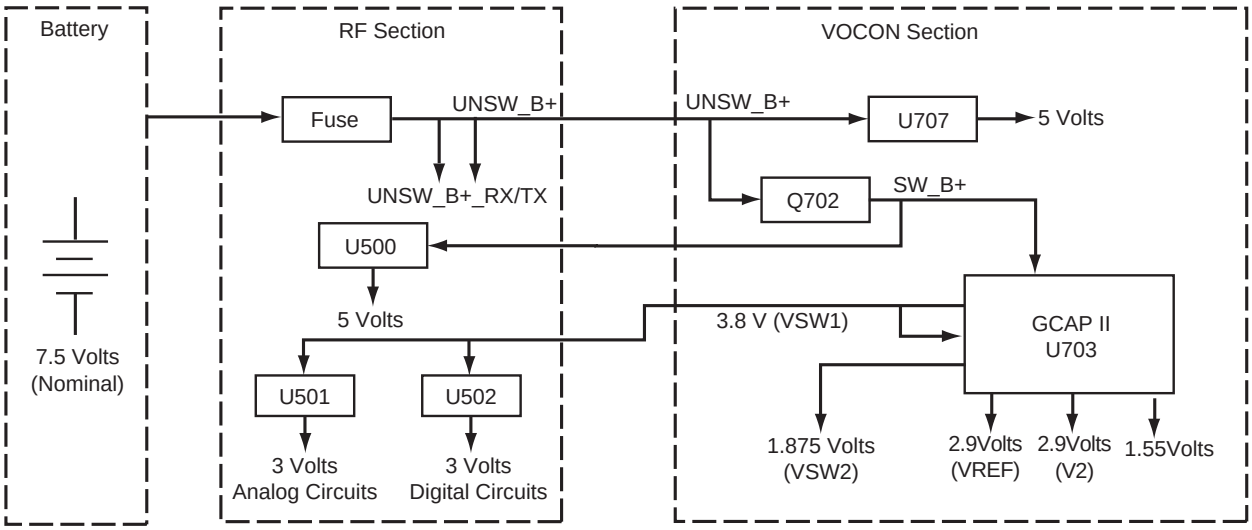


Figure 3-3. XTS 2500 DC Distribution (for kit NUF6541G only)

Power for the radio is derived from a 7.5 volt battery (UNSW_B+), which is applied through the RF section to regulator (U702), (U707 for kit NUF6541G only) and transistor (Q702) in the VOCON section.

Transistor Q702 is a solid-state power switch that provides SW_B+ to the GCAP IC and to U500 (the 5V regulator) in the RF section.

The digital circuits in the VOCON section are powered from regulators located in the GCAP IC (U703) and an external 5Vdc regulator (VCC5, U707), and an external 1.55Vdc regulator (VREG_1_55, on kit NUF6541G only). The GCAP IC provides three software-programmable supplies (VSW1, VSW2, V2) and a 3V Reference Out. VSW1 provides voltage to the 3V regulators (U501 and U502) in the RF section.

Table 3-1 on page 3-4 lists the supply voltages and the circuits that use these voltages.

Table 3-1. Power Supply Configuration for VOCON Section

Supply Name	Output Voltage	Supply Type	Unprogrammed Output Voltage	Circuits Supplied
UNSW_B+	9V - 6V 7.5V (nominal)	Battery	N/A	• VCC5 Input • Mechanical Switch • Power Switch • Secure Module • Real Time Clock Battery
SW_B+	9V - 6V 7.5 (nominal)	Battery	N/A	• VSW1 Input (GCAP) • Audio Power Amplifier • Side Connector • SW_B+ to RF section • GCAP IC • USB circuitry • Keypad/Display LEDs
VCC5	5V	Linear regulator	N/A	• Int./Ext. MIC Bias • Audio Pre-amplifier • Flipper IC • Keypad/Display LEDs
VSW1	3.8V	Switching regulator Software programmable	3.2V	• 3V regulators (RF) • VSW2 Input • V2 Input
VSW2	1.8V	Switching regulator Software programmable	2.2V	(All other kits) • Patriot Core • Patriot EIM • FLASH IC • SRAM (NUF6541G only) • Patriot EIM • FLASH IC • SRAM
V2	3V 2.9V (NUF6541G only)	Linear regulator Software programmable	2.775V	• Patriot I/O Ring • Flipper IC • EEPOT • Display • 16.8 MHz Buffer
Kit NUF6541G only				
VREG_1_55V	1.55Vdc	Linear regulator	N/A	• Patriot Core

Chapter 4 Detailed Theories of Operation

4.1 Introduction

This chapter provides a detailed circuit description of the ASTRO XTS 2500/2250/1500 radio board. When reading the theory of operation, refer to the appropriate schematic and component location diagrams located in the back of this manual. This detailed theory of operation can help isolate the problem to a particular component.

This manual is to be used in conjunction with the ASTRO XTS 2500, XTS 2250, XTS 1500, MT 1500 Digital Portable Radios Basic Service Manual (Motorola part number 6881094C09), which uses the pass/fail service approach to radio problems.

4.2 Frequency Synthesis

4.2.1 700/800 MHz

The complete synthesizer subsystem consists of the following:

- the **reference oscillator** (Y200)
- the **voltage-controlled oscillators** (Q210, Q212, and Q214)
- a **buffer IC** (U250)
- a **second external transmit (TX) buffer (Q217)**
- the **synthesizer** (U201).

The **reference oscillator** contains a temperature-compensated 16.8MHz crystal. This oscillator is digitally tuned and contains a temperature-referenced, six-bit, analog-to-digital (A/D) converter. The output of the oscillator (pin 3 on Y200) is applied to pin 23 (XTAL1) of U210 through capacitor C243 and resistor R217.

The **voltage-controlled oscillators** are varactor-tuned. The voltage (2–11V) varies as it is being applied to varactors D210, D211, and D212 of their respective VCO. The capacitance of the varactors also varies, thereby changing the output frequency of the VCOs. The three VCOs are used to cover the entire 700/800 MHz band.

- VCO1 covers the RX (downlink) 800 MHz band and the talkaround 700 MHz (764–776 MHz) band.
- VCO2 covers the TX (uplink) 700/800 MHz (794–824 MHz) band.
- VCO3 covers the talkaround 800 MHz (850–870 MHz) band and the RX (downlink) 700 MHz band.

VCO1, VCO2, and VCO3 are selected using aux1, aux2, and aux4, respectively. TX and RX mode are controlled using aux3: High for RX; Low for TX.

The **buffer IC** (U250) includes a TX, RX, and prescaler buffer. The main purpose of the prescaler buffer is to individually maintain a constant output and provide isolation.The TX buffer is chosen by setting pin 19 of U250 high; the RX buffer is chosen by setting pin 19 of U250 low. The prescaler buffer is always on. An additional external TX buffer is used with **Q217**.

The **synthesizer IC** (U201) consists of the following:

- a prescaler
- a programmable loop divider

- a divider control logic
- a phase detector
- a charge pump
- an A/D converter for low-frequency digital modulation
- a balance attenuator to balance the high-frequency analog modulation to the low-frequency digital modulation,
- a 13V positive-voltage multiplier
- a serial interface for control
- a filter for the regulated 5 and 3 volts

The 13V, being generated by the positive voltage multiplier circuitry, should be present at pin 47 of U201. The serial interface (SRL) is connected to the microprocessor via the data line (pin 7 of U201), the clock line (pin 8 of U201), and the chip-enable line (pin 9 of U201).

The complete synthesizer subsystem works as follows:

1. The buffered output of the VCO is present at pin 8 of U250 in RX mode and at pin 10 during the TX mode.
2. The output of the prescaler buffer is present at pin 12 of U250 and applied to pin 32 of U201. The prescaler in U201 is a dual-modulus type with selectable divider ratios. This divider ratio is controlled by the loop divider, which in turn receives its inputs from the SRL. The loop divider adds or subtracts phase to the prescaler divider by changing the divider ratio via the modulus control line.
3. The output of the prescaler is then applied to the loop divider.
4. The output of the loop divider is then applied to the phase detector. The phase detector will compare the loop divider's output signal with the signal from the VCO. The VCO signal is divided down after it is applied to pin 32 of U201. The result of the signal comparison is a pulsed dc signal which is applied to the charge pump.
5. The charge pump outputs a current that will be present at pin 43 of U201. The loop filter, consisting of C229, C228, C221, C295, C291, C292, C298, R210, R212, and R207, will transform this current into a voltage that will be applied to varactors D210, D211, and D212, and alter the output frequency of the VCO.

In order to modulate the PLL, the following two-port modulation method is utilized: The analog modulating signal is applied to (1) the A/D converter as well as to (2) the balance attenuator.

1. The A/D converter converts the low-frequency analog modulating signal into a digital code. When the digital code is applied to the loop divider, it causes the carrier to deviate.
2. The balance attenuator is used to adjust the VCO's deviation sensitivity to high-frequency modulating signals.

4.2.2 UHF Range 1

For UHF Range 1 (380–470 MHz), the complete synthesizer subsystem consists of the following:

- The **reference oscillator** (Y200)
- Two **voltage-controlled oscillators** (TX and RX)
- Two **voltage-controlled oscillator discrete buffers** (TX and RX)
- The **synthesizer** (U202)

The **reference oscillator** contains a temperature-compensated 16.8 MHz crystal. This oscillator is digitally tuned and contains a temperature-referenced, six-bit, analog-to-digital (A/D) converter. The output of the oscillator (pin 3 on Y200) is applied to pin 23 (XTAL1) of U202 through capacitor C214.

The **voltage-controlled oscillators** (VCOs) are varactor-tuned. The voltage (2–11V) varies as it is being applied to varactors D251 to D254 and D271 to D274 of their respective VCO. The capacitance of the varactors also varies, thereby changing the output frequency of the VCOs. Both VCOs are used to cover the entire 90 MHz bandwidth of this UHF range (380–470 MHz):

- TX VCO covers the transmit frequencies from 380–470 MHz
- RX VCO covers the receive frequencies from 306.65–396.65 MHz

The **TX and RX VCOs** are selected using AUX 3 and AUX 2, respectively. Both VCOs are connected to the same prescaler filter (C289, L277 and C290) feeding back to PREIN of the U202, through C291.

The **synthesizer** IC consists of the following:

- A prescaler
- A programmable loop divider
- A divider logic control
- A phase detector
- A charge pump
- An A/D converter for low-frequency digital modulation
- A balance attenuator to balance the high-frequency analog modulation to the low-frequency digital modulation
- A 13V positive voltage multiplier
- A serial interface for control
- A filter for the regulated 5 and 3 volts

The 13V, being generated by the positive voltage multiplier circuitry, should be present at pin 47 of U202. The serial interface (SRL) is connected to the microprocessor via the data line (pin 7 of U202), the clock line (pin 8 of U202), and the chip-enable line (pin 9 of U202).

The complete synthesizer subsystem works as follows:

1. The buffered output of the VCO is present at R267 in receive mode and R289 during transmit mode.
2. The output of the prescaler filter is present at C291 and applied to pin 32 of U202. The prescaler in U202 is a dual-modulus type with selectable divider ratios. This divider ratio is controlled by the loop divider, which in turn receives its input from the SRL. The loop divider adds or subtracts phase to the prescaler divider by changing the divider ratio via the modulus control line.
3. The output of the prescaler is then applied to the loop divider.
4. The output of the loop divider then feeds the phase detector. The phase detector will compare the loop divider's output signal form the VCOs. The VCO signal is divided down after it is applied to pin 32 of U202. The result of the comparison is a pulsed DC signal which is applied to the charge pump.
5. The charge pump outputs a current that will be present at pin 43 of U202. The loop filter consisting of R202, C202, R203, C203, R201, C201, C236, C237, C238, C239 and C240 will convert this current into a voltage that will be applied to varactors D251, D252, D253, D254, D271, D272, D273 and D274 to alter the output frequency of the VCO.

In order to modulate the PLL, the following two-port modulation method is utilized: The analog modulating signal is applied to (1) the A/D converter as well as to (2) the balance attenuator:

1. The A/D converter converts the low-frequency analog modulating signal into a digital code. When the digital code is applied to the loop divider, it causes the carrier to deviate.

2. The balance attenuator is used to adjust the VCO's deviation sensitivity to high-frequency modulating signals.

4.2.3 UHF Range 2

For UHF Range 2 (450–520 MHz), the complete synthesizer subsystem consists of the following:

- The **reference oscillator** (Y200)
- Two **voltage-controlled oscillators** (TX and RX)
- One **voltage-controlled oscillator buffer IC** (U250)
- The **synthesizer** (U202)

The **reference oscillator** contains a temperature-compensated 16.8 MHz crystal. This oscillator is digitally tuned and contains a temperature-referenced, six-bit, analog-to-digital (A/D) converter. The output of the oscillator (pin 3 on Y200) is applied to pin 23 (XTAL1) of U202 through capacitor C214.

The **voltage-controlled oscillators** (VCOs) are varactor-tuned. The voltage (2–9.5V) varies as it is being applied to varactors D251 to D254 and D270 to D273 of their respective VCO. The capacitance of the varactors also varies, thereby changing the output frequency of the VCOs. Both VCOs are used to cover the entire 70 MHz bandwidth of this UHF range (450–520 MHz):

- TX VCO covers the transmit frequencies from 450–520 MHz
- RX VCO covers the receive frequencies from 376.65–446.65 MHz

The **TX and RX VCOs** are selected using AUX 3 from U202. Both VCOs are connected to the same prescaler filter (C292, L266 and R266) feeding back to PREIN of the U202, through C293.

The **synthesizer** IC consists of the following:

- A prescaler
- A programmable loop divider
- A divider logic control
- A phase detector
- A charge pump
- An A/D converter for low-frequency digital modulation
- A balance attenuator to balance the high-frequency analog modulation to the low-frequency digital modulation
- A 13V positive voltage multiplier
- A serial interface for control
- A filter for the regulated 5 and 3 volts

The 13V, being generated by the positive voltage multiplier circuitry, should be present at pin 47 of U202. The serial interface (SRL) is connected to the microprocessor via the data line (pin 7 of U202), the clock line (pin 8 of U202), and the chip-enable line (pin 9 of U202).

The complete synthesizer subsystem works as follows:

1. The buffered output of the VCO is present at R294 in receive mode and R275 during transmit mode.
2. The output of the prescaler filter is present at C293 and applied to pin 32 of U202. The prescaler in U202 is a dual-modulus type with selectable divider ratios. This divider ratio is controlled by the loop divider, which in turn receives its input from the SRL. The loop divider adds or subtracts phase to the prescaler divider by changing the divider ratio via the modulus control line.

3. The output of the prescaler is then applied to the loop divider.
4. The output of the loop divider then feeds the phase detector. The phase detector will compare the loop divider's output signal form the VCOs. The VCO signal is divided down after it is applied to pin 32 of U202. The result of the comparison is a pulsed DC signal which is applied to the charge pump.
5. The charge pump outputs a current that will be present at pin 43 of U202. The loop filter consisting of R202, C202, R203, C203, R201, C201, C236, C237, C238, C239 and C240 will convert this current into a voltage that will be applied to varactors D251, D252, D253, D254, D270, D271, D272, and D273 to alter the output frequency of the VCO.

In order to modulate the PLL, the following two-port modulation method is utilized: The analog modulating signal is applied to (1) the A/D converter as well as to (2) the balance attenuator:

1. The A/D converter converts the low-frequency analog modulating signal into a digital code. When the digital code is applied to the loop divider, it causes the carrier to deviate.
2. The balance attenuator is used to adjust the VCO's deviation sensitivity to high-frequency modulating signals.

4.3 Antenna Switch

An electronic PIN diode switch steers RF between the receiver and transmitter. The common node of the switch is at capacitor C120 for 700/800 MHz, at capacitors C171 and C192 for UHF Range 1, or at capacitors C171 and C180 for UHF Range 2.

For 700/800 MHz:

1. In transmit mode:
   a. RF is routed to the anode of diode CR101.
   b. Bias current, sourced from U102, pin 32 is routed through PIN diodes CR101 and CR102, biasing them to a low-impedance state.
2. In receive mode:
   a. RF is routed to pin 1 of FL1.
   b. PIN diodes CR101 and CR102 are unbiased and thus at high impedance.

For UHF (both ranges):

1. In transmit mode:
   a. RF is routed to the anode of diode D170.
   b. Bias current, sourced from RAW_B+ is routed through PIN diodes D170 and D171, biasing them to a low-impedance state.
2. In receive mode:
   a. RF is routed through C179 to pre-selector filter.
   b. PIN diodes D170 and D171 are unbiased and thus at high impedance

4.4 Receiver

The receiver consists of the following:

- Front end
- Back end

4.4.1 Front End

4.4.1.1 700/800 MHz

For the purposes of this discussion, the receiver front end is defined as being the circuitry from the antenna switch to the output of the IF crystal filter. The 700/800 MHz front end converts the received RF signal to the 1st IF frequency of 109.65 MHz, while at the same time providing for spurious immunity and adjacent channel selectivity. A review of the interstage components of the front end follows, with emphasis on troubleshooting considerations.

The received RF signal is passed through **antenna switch** input matching components C101, L105, and C114, tank components C106 and L103 (which are anti-resonant at the radio's transmitter frequencies), and output matching components C103 and L104. Both PIN diodes CR102 and CR104 must be back-biased to properly route the received signal.

The stage following the antenna switch is a 50-ohm, multi-layer ceramic (MLC) varactor-tuned preselector (FL1). The **preselector (FL1)** is positioned after the antenna switch to provide the receiver preamp with some protection against strong signal, out-of-band signals and first-image suppression.

After the preselector (FL1), the received signal is applied to a 15dB step attenuator to provide additional protection against strong signals. The attenuator is controlled by a DSP based algorithm that continuously monitors signal strength. When the ON threshold is exceeded (approximately –95dBm), the attenuator is activated via a DAC in the PCIC by the host. The attenuator remains activated until the signal drops below the OFF threshold (approximately -115dBm including the 15dB attenuation). Hysteresis and timer functions are included in the algorithm to enhance performance. The algorithm controlling the attenuator is enabled via the CPS for each personality. When the algorithm is disabled, the attenuator is essentially a short circuit from input to output. After the attenuator, the received signal is applied to the **receiver preamp, Q1**. The preamp is a transistor, which has been biased and matched for optimum intermodulation (IM), noise figure (NF), and gain performance. Components L1 and C1 match the input (gate 1) of the amp to the first preselector output, while D1 provides some breakdown protection for Q1. The output of the amp's second MLC preselector is matched to C8, L6, and C5. The preamp is supplied by a 3V analog regulator and is biased at approximately 0.75Vdc at the base and 1.7Vdc at the collector. The L1 and C3 network provide improved third order linearity at low.

The output of the amp is matched to a second **three-pole preselector (FL2)** of the type previously discussed. The subsequent stage in the receiver chain is the **1st mixer U1**, which uses low-side injection in the 800 MHz band and high-side injection in the 700 MHz band, to convert the RF carrier to an intermediate frequency (IF) of 109.65 MHz. Since low-side injection is used in the 800 MHz band, the LO frequency is offset below the RF carrier by 109.65 MHz, or Flo = Frf - 109.65 MHz. The mixer utilizes Bi-CMOS technology in a double-balanced, Gilbert Cell configuration.

A balun transformer (T2) is used to couple the RF signal into the mixer. The primary winding of T2 is matched to the preceding stage by capacitor C10 and inductor L7. The secondary winding of T2 provides a differential output. The center tap pin is grounded via a 100-ohm resistor that sets the mixer bias current. The differential signal is applied to the mixer via L8 and L9 for improved linearity.

The final stage in the receiver front end is a **three-pole crystal filter (FL3)**. The crystal filter provides some of the receiver's adjacent channel selectivity. The input to the crystal filter is matched to the 1st mixer using components L10, L11, C17, L12, and C18. The output of the crystal filter is matched to the input with components C19, L13, C20, and L14. The crystal filter provides at least 80dB of second image protection and improves IM distortion in the ABACUS III IC.

4.4.1.2 UHF Range 1

For the purposes of this discussion, the receiver front end is defined as being the circuitry from the antenna switch to the output of the IF crystal filter. The UHF R1 front end converts the received RF signal to the 1st IF frequency of 73.35 MHz, while at the same time providing for spurious immunity and adjacent channel selectivity. A review of the interstage components of the front end follows, with emphasis on troubleshooting considerations.

The received RF signal is passed through **quarter wavelength components** C192, L176 and C178 (which are anti-resonant at the radio's transmitter frequencies). Both PIN diodes D170 and D171 must be reverse biased to properly route the received RF signal.

The stage following the antenna switch is a 50-ohm, varactor-tuned preselector filter. The **preselector** is positioned after the antenna switch to provide the receiver preamp with some protection against strong signal, out-of-band signals and first-image suppression.

After the preselector, the received signal is applied to a 15dB step attenuator to provide additional protection against strong signals. The attenuator is controlled by a DSP based algorithm that continuously monitors signal strength. When the ON threshold is exceeded (approximately –95dBm), the attenuator is activated via a DAC in the PCIC by the host. The attenuator remains activated until the signal drops below the OFF threshold (approximately –115dBm including the 15dB attenuation). Hysteresis and timer functions are included in the algorithm to enhance performance. The algorithm controlling the attenuator is enabled via the CPS for each personality. When the algorithm is disabled, the attenuator is essentially a short circuit from input to output. After the attenuator, the received signal is applied to the **receiver preamp, Q29**. The preamp is a transistor, which has been biased and matched for optimum intermodulation (IM), noise figure (NF), and gain performance. Components L63 and C71 match the input of the amp to the first preselector output. The output of the amp's second preselector is matched to L31, C35, L74, and C41. The preamp is supplied by a 5V analog regulator and is biased at approximately 0.75Vdc at the base and 2Vdc at the collector.

The output of the amp is matched to a second **two-pole preselector** filter of the type previously discussed. The subsequent stage in the receiver chain is the **1st mixer U1**, which uses low-side injection, to convert the RF carrier to an intermediate frequency (IF) of 73.35 MHz. Since low-side injection is used, the LO frequency is offset below the RF carrier by 73.35 MHz, or Flo = Frf – 73.35 MHz. The mixer utilizes Bi-CMOS technology in a double-balanced, Gilbert Cell configuration.

A balun transformer (T51) is used to couple the RF signal into the mixer. The primary winding of T51 is matched to the preceding stage by capacitors C80 and C51. The secondary winding of T51 provides a differential output. The center tap pin is grounded via an 82-ohm resistor that sets the mixer bias current. The differential signal is applied to the mixer via R52 and R53 for improved linearity.

The final stage in the receiver front end is a **three-pole crystal filter (FL51)**. The crystal filter provides some of the receiver's adjacent channel selectivity. The input to the crystal filter is matched to the 1st mixer using components L72, L73, C60, L54, and C57. The output of the crystal filter is matched to the input with components C58, L55, C59, and L56. The crystal filter provides at least 80dB of second image protection and improves IM distortion in the ABACUS III IC.

4.4.1.3 UHF Range 2

For the purposes of this discussion, the receiver front end is defined as being the circuitry from the antenna switch to the output of the IF crystal filter. The UHF R2 front end converts the received RF signal to the 1st IF frequency of 73.35 MHz, while at the same time providing for spurious immunity and adjacent channel selectivity. A review of the interstage components of the front end follows, with emphasis on troubleshooting considerations.

The received RF signal is passed through **quarter wavelength components** C180, L176 and C178 (which are anti-resonant at the radio's transmitter frequencies). Both PIN diodes D170 and D171 must be reverse biased to properly route the received RF signal.

The stage following the antenna switch is a **step attenuator**. This attenuator provides 15dB step attenuation to protect the receiver from strong RF signals. The attenuator is controlled by a DSP-based algorithm that continuously monitors signal strength. When the ON threshold is exceeded (approximately –95dBm), the attenuator is activated via a DAC in the PCIC by the host. The attenuator remains activated until the signal drops below the OFF threshold (approximately –115dBm including the 15dB attenuation). Hysteresis and timer functions are included in the algorithm to enhance performance. The algorithm controlling the attenuator is enabled via the CPS for each personality. When the algorithm is disabled, the attenuator is essentially a short circuit from input to output.

Next is the varactor-tuned **preselector** filter. The preselector is positioned right after the sep attenuator to provide the receiver preamp with some protection against strong signal, out-of-band signals, and first-image suppression.

After the preselector, the received signal is applied to the receiver **preamp**, Q1. The preamp is a transistor, which has been biased and matched for optimum intermodulation (IM), noise figure (NF), and gain performance. Components L3 and C7 match the input of the amp to the first preselector output. The preamp is supplied by a 5V analog regulator and is biased at approximately 0.75 Vdc at the base and 2 Vdc at the collector.

The output of the amp is matched to a second **two-pole preselector** filter of the type previously discussed. The match is via C10 and L5. The subsequent stage in the receiver chain is the **1st mixer U1**, which uses low-side injection, to convert the RF carrier to an intermediate frequency (IF) of 73.35 MHz. Since low-side injection is used, the LO frequency is offset below the RF carrier by 73.35 MHz, or Flo = Frf – 73.35 MHz. The mixer utilizes Bi-CMOS technology in a double-balanced, Gilbert Cell configuration.

A balun transformer (T51) is used to couple the RF signal into the mixer. The primary winding of T51 is matched to the preceding stage by capacitor C52. The secondary winding of T51 provides a differential output. The center tap pin is grounded via a 47-ohm resistor that sets the mixer bias current. The differential signal is applied to the mixer via L50 and L51 for improved linearity.

The final stage in the receiver front end is a **three-pole crystal filter (FL51)**. The crystal filter provides some of the receiver's adjacent channel selectivity and intermodulation. The crystal filter provides at least 80dB of second image protection and improves IM distortion in the ABACUS III IC.

4.4.2 Back End

In the **ABACUS IC (U401)**, the first IF frequency is amplified and then down-converted to the second IF frequency (2.25 MHz). At this point, the analog signal is converted into two digital bit streams by a sigma-delta A/D converter. The bit streams are then digitally filtered, mixed down to baseband, and filtered again. The output data stream is then sent to the Patriot IC, where it is decoded to produce the recovered audio.

The ABACUS IC (U401) is electronically programmable. The amount of filtering, which is dependent on the radio channel spacing and signal type, is controlled by the microcomputer. Additional filtering, which used to be provided externally by a conventional ceramic filter, is replaced by internal digital filters in the ABACUS IC.

The ABACUS IC contains a feedback Automatic Gain Control (AGC) circuit to expand the dynamic range of the sigma-delta converter. The differential output data contains the quadrature (I and Q) information in 16-bit words, the AGC information in a 9-bit word, imbedded word sync information, and fill bits. Two synthesizers are available on the chip for second LO and sampling clock (18 MHz) generation.

For 700/800 MHz, the second LO/VCO is a Colpitts oscillator built around transistor Q401. A varactor diode (D401) in the VCO is used to adjust the VCO frequency. The control signal for the varactor is derived from a loop filter consisting of C409, R405, C416, R403, and C415. The sampling clock is derived from a negative resistance generator (on the chip) available at CLKP, CLKN, and an external tank circuit (L405, C443, and D402). The loop filter for the clock is realized by C444, R411, and C450.

For UHF, the second LO/VCO is a Colpitts oscillator built around transistor Q401. Varactor diodes (D402 and D403) in the VCO are used to adjust the VCO frequency. The control signal for the varactor is derived from a loop filter consisting of C440, R417, C441, R418, and C480. The sampling clock is derived from a negative resistance generator (on the chip) available at CLKP, CLKN, and an external tank circuit (L403, C423, and D401). The loop filter for the clock is realized by C448, R408, and C425.

4.5 Transmitter

4.5.1 700/800 MHz

The 700/800 MHz RF power amplifier (PA) consists of

- a RF driver (**U101**) and
- a Lateral Diffusion Metal Oxide Semiconductor (LDMOS) ring final (**Q101**).

The RF PA design (including matches) has a nominal input and output impedance of 50 ohms.

An RF input drive level of approximately +6dBm, supplied from the VCO buffer IC (U250) and the discrete TX buffer (Q216), is applied to pin 16 of **U101**. The dc power is applied to pins 6, 7, and 14 of **U101** and to the drain of **Q101** via a filtered unswitched B+. Power control is achieved through the varying of the dc bias (and thus the gain) to pin 1 of **U101** and the gate of **Q101**. The amplified RF signal leaves the RF final PA (**Q101**) at the drain and is applied to the directional coupler (U106) via an impedance match. The RF signal passes through the coupler, a discrete antenna switch, and a discrete harmonic filter before finally reaching the antenna launch connector.

A portion of the forward RF power is sampled by the directional coupler (U106), applied to the diode (D103) for rectification, and the resulting dc signal is fed back to pin 1 of the Power Control IC (PCIC, U102). This dc signal is representative of the forward RF power being passed through the directional coupler (U106). The dc signal is used by the PCIC to regulate the the transmitted RF power level.

The PCIC is the heart of the power control loop. The rectified feedback is internally compared to an internal Digital-to-Analog Converter (DAC) output voltage in the PCIC to determine the amount of DC bias voltage at pin 4. This voltage at pin 4 of the PCIC controls the gain (and thus the output power, as explained above) of the RF driver (**U101**) and the LDMOS final (**Q101**) via a fixed resistor divider network.

U102 senses the temperature of the printed circuit board (PCB) near the LDMOS final (**Q101**) and provides a dc level representative of this temperature to pin 30 of the PCIC. The PCIC uses this input to cut back the output power level after a certain temperature threshold is reached. This ensures (1) radio integrity while transmitting in extreme ambient conditions hotter than the radio's operating temperature range and (2) acts as a safety feature to prevent any thermal runaway fault conditions.

Pin 32 of the PCIC powers the Temperature Sense IC (U102) and forward biases the antenna switch diodes (CR101 and CR102) while the radio is in transmit mode. This routes the RF signal from the transmitter to the antenna, as explained above. The antenna switch diodes are unbiased during the receive and standby modes; therefore, any RF signal present at the antenna is applied to the receiver.

4.5.2 UHF

The UHF RF power amplifier (PA) consists of

- an RF driver (**U101**) and
- a Lateral Diffusion Metal Oxide Semiconductor (LDMOS) ring final (**Q198**).

For UHF Range 1, an RF input drive level of approximately +3dBm is supplied from the discrete TX buffer (Q272). For UHF Range 2, the input drive level (approximately +3dBm) is supplied from the VCO buffer IC (U250). For both UHF ranges, this input drive level is applied to pin 16 (RFIN) of **U101**. The dc power is applied to pins 6, 7, and 14 of **U101** and to the drain of **Q198** via a filtered RAW_B+. Power control is achieved through the varying of the dc bias (and thus the gain) to pin 1 of **U101** and the gate of **Q198**. The amplified RF signal leaves the RF final PA (**Q198**) at the drain and is applied to the discrete directional coupler via an impedance match. The RF signal passes through the coupler, a discrete antenna switch, and a discrete harmonic filter before finally reaching the antenna launch connector.

A portion of the forward RF power is sampled by the directional coupler, applied to the diode (D172) for rectification, and the resulting dc signal is fed back to pin 1 of the Power Control IC (PCIC, U102). This dc signal is representative of the forward RF power being passed through the directional coupler. The dc signal is used by the PCIC to regulate the transmitted RF power level.

The PCIC is the heart of the power control loop. The rectified feedback is internally compared to an internal Digital-to-Analog Converter (DAC) output voltage in the PCIC to determine the amount of DC bias voltage at pin 4. This voltage at pin 4 of the PCIC controls the gain (and thus the output power, as explained above) of the RF driver (**U101**) and the LDMOS final (**Q198**) via a fixed resistor divider network.

U103 senses the temperature of the printed circuit board (PCB) near the LDMOS final (**Q198**) and provides a dc level representative of this temperature to pin 30 of the PCIC. The PCIC uses this input to cut back the output power level after a certain temperature threshold is reached. This ensures (1) radio integrity while transmitting in extreme ambient conditions hotter than the radio's operating temperature range and (2) acts as a safety feature to prevent any thermal runaway fault conditions.

Pin 32 of the PCIC powers the Temperature Sense IC (U102) and forward biases the antenna switch diodes (D170 and D171) while the radio is in transmit mode. This routes the RF signal from the transmitter to the antenna, as explained above. The antenna switch diodes are unbiased during receive and standby modes; therefore, any RF signal present at the antenna is applied to the receiver.

4.6 VOCON Functional Blocks

The three main functional blocks of the VOCON section consist of the following sections:

- the Controller and Memory Section, consisting of the following components:
  - the Patriot IC (U800)
  - the dual-core processor with the microcontroller unit (MCU) and a digital signal processor (DSP)
  - the SRAM IC (U804) and FLASH IC (U803) memory devices.
- the Audio and Power Section, consisting of the following components:
  - the GCAP II IC (U703)
  - a 5V Linear Regulator (U702)
  - a 1.55V Linear Regulator (for kit NUF6541G only)
  - the audio pre-amplifier (U706)
  - the audio power amplifier (U708), and
  - the EEPOT (U704).
- the Interface Support Section, consisting of the following components:
  - the digital support IC Flipper (U600)
  - the ESD protection circuitry
  - the side connector interface circuitry, and
  - the Option board.

4.6.1 Controller and Memory Section

Three main ICs are in the controller and memory section of the main board schematic: the Patriot IC (U800), the static RAM (SRAM) (U804), and the Flash memory (U803).

4.6.1.1 Patriot IC (U800)

The Patriot IC (U800) is a dual-core processor containing both a 32-bit microcontroller unit (MCU) and a 16-bit digital signal processor (DSP) in one IC package. It comes in a 256 pin, ball grid array (BGA) package with 1mm pitch solder balls. The Patriot is supplied with two voltages: 1.8 volts (E801) and 3 volts (E800). The 1.8-volt supply is used as the core voltage as well as the interface to the memory devices and display. Most of the pins on the Patriot operate from the 3-volt supply.

The NUF6541G kit uses a new dual-core processor which requires some different operating voltages. The 1.8V supply is used as the interface to the memory devices - unchanged from the original processor. A 1.55V supply is used for the core voltage and the clock amplifier module. The remaining pins of the processor use a 2.9V supply.

Note: GPIO voltage for the NUF6541A and NUF6541D kits is 3.0V.
GPIO voltage for the NUF6541G kit is 2.9V.

There are two main clocks that are provided to the Patriot:

1. The CKIH pin (L711) is provided a 16.8MHz sine wave; this is the most important clock since it is internally used to generate the clocks for both the MCU and DSP cores, as well as most of the peripherals.
2. A 3-volt peak-to-peak 32kHz square wave (U605 pin 2) is generated by the Flipper IC U600 and supplied to the CKIL pin on the Patriot. While not as widely used as the 16.8MHz clock, the 32kHz clock is needed by some components in the Patriot, including the reset circuitry.

4.6.1.1.1 Microcontroller Unit (MCU)

The MCU portion of the Patriot has 22.5Kx32 bits of internal RAM and 1Kx32 bits of internal ROM. The internal ROM is used for the bootstrapping code. The MCU has several peripherals, including the following:

- an External Interface Module (EIM)
- the Multiple Queue Serial Peripheral Interface (MQSPI)
- two Universal Asynchronous Receiver/Transmitter (UART) modules, and
- the One-Wire Interface module.

The MCU communicates internally to the DSP through the MCU/DSP Interface (MDI).

External Interface Module (EIM)

The External Interface Module (EIM) is the MCU's interface to the SRAM (U804), Flash Memory (U803), and the display. The EIM lines include the following:

- 24 external address lines
- 16 external bi-directional data lines
- 6 chip selects lines
- read/write line, and
- output enable line, among others.

All of the EIM lines operate at 1.8-volt logic levels; the EIM operates at the MCU clock speed.

Multiple Queue Serial Peripheral Interface (MQSPI)

The Multiple Queue Serial Peripheral Interface (MQSPI) is the MCU's programming interface to other ICs. The Patriot has two independent SPI busses, and each has its own clock line, data-out line (MOSI), and data-in line (MISO). There are 10 SPI chip selects (SPICS) that are programmable to either SPI A, the RF board's SPI bus, or to SPI B, the dedicated VOCON SPI bus. The devices on the SPI A bus include the following:

- the PCIC and FRACN IC on the SPICS4, and
- the ABACUS III on SPICS5.

The two SPI B chip selects are for the GCAP II U703 on SPICS2 and the Flipper IC U600 on SPICS3. All of the lines of the SPI module operate at the GPIO voltage logic level (see section 4.6.1.1.).

There are several devices on the RF board that only have one bi-directional SPI data line. Components U801, U802, and Q801 are configured by the MCU GPIO pin TOUT13 (MISOA_SEL) to route the data line to the appropriate pin on the Patriot depending on which SPI device is being accessed.

Universal Asynchronous Receiver/Transmitter (UART)

The Patriot has two Universal Asynchronous Receiver/Transmitter (UART) modules. UART1 (primary UART) handles the RS 232 lines while UART 2 is not used. The primary UART has the following lines:

- a receive data line URXD
- a transmit data line UTXD, and
- hardware flow control signals RTS (request to send) and CTS (clear to send).

All UART lines are operating at the GPIO voltage logic level (see section 4.6.1.1.). The translation to 5-volt logic levels for the accessory side connector will be discussed in the Flipper section.

One-Wire Interface

The MCU has a One-Wire Interface module that is used to communicate to a One-Wire device like a USB cable or a smart battery using the Dallas Semiconductor protocol. This module has one external pin, OWIRE_DAT (Q706 pin 1), and it uses the GPIO voltage logic level (see section 4.6.1.1.).

4.6.1.1.2 Digital Signal Processor (DSP)

The DSP portion of the Patriot has 84Kx24 bits of program RAM and 62Kx16 bits of data RAM.The DSP has its own set of peripherals including the following:

- the Baseband Interface Port (BBP)
- the DSP Timer module, and
- the Serial Audio Codec Port (SAP).

Additionally, the DSP shares some peripherals with the MCU, including the USB interface and the General Purpose Input/Output module (GPIO).

Baseband Interface Port (BBP)

The Baseband Interface Port (BBP) module is the DSP's serial synchronous interface (SSI) to the RF board. The BBP has independent sections for the receiver and the transmitter. The receiver BBP pins include

- the receive data pin SRDB
- the receive clock signal pin SC0B, and
- the receive frame synchronization (sync) signal pin SC1B.

The transmitter's BBP pins include

- the transmit data pin STDB (R816)
- the transmit clock signal pin SCKB (TCLK test point), and
- the transmit frame sync signal pin SC2B (TSYNC).

All BBP lines use the GPIO voltage level (see section 4.6.1.1.).

DSP Timer Module

While the BBP receive clock and frame sync signals are supplied by the ABACUS III from the RF board, the BBP transmit clock and frame sync signals are generated by the DSP Timer. The BBP receive clock, connected to the DSP Timer input pin TI0, is used as a reference to generate the BBP transmit clock and frame sync signals. The BBP transmit clock and frame sync signals, along with the BBP transmit data signal, are connected to the Digital-to-Analog Converter (DAC) on the RF board.

Serial Audio Codec Port (SAP)

The Serial Audio Codec Port (SAP) module is the DSP's serial synchronous interface (SSI) to the audio codec on the GCAP II IC. The SAP interface consist of four signals:

- the SAP clock line pin SCKA (DCLK test point)
- the SAP frame sync line pin SC2A (SYNC test point)
- the SAP receive data line pin SRDA (TX test point), and
- the transmit data line pin STDA (R768).

The SAP clock is generated by the Flipper IC U600, and it is a 520kHz, 3-volt peak-to-peak square wave. The SAP frame sync signal is also generated by the Flipper IC U600, and it is an 8 kHz, 3-volt peak-to-peak square wave.

On the NUF6541G kit, the SAP clock is generated by the dual-core processor U800, and it is a 256 kHz, 2.9-V peak-to-peak square wave. The SAP frame sync signal is generated by the dual-core processor U800, and it is an 8 kHz, 2.9-V peak-to-peak square wave.

Universal Serial Bus (USB)

The Patriot's USB peripheral, shared by the MCU and the DSP, provides the required buffering and protocol to communicate on the Universal Serial Bus. The Patriot supports USB slave functionality.

- For receive data: the USB differentially decoded data comes from the Flipper IC URXD_RTS pin into the Patriot URTS1 pin, while the single-ended USB data positive signal goes to pin PA2_USB_VPIN, and the single-ended USB data minus signal goes to pin URXD1. The two data lines are used to detect the single-ended zero state.
- For transmit data: the USB data comes out of the Patriot UTXD1 pin and goes to the Flipper IC TXD_USB_VPO pin. The USB transmit single-ended zero signal is generated from the Patriot PC0_USB_VMOUT pin.

General Purpose Input/Output Module (GPIO)

The GPIO (General Purpose Input/Output) Module is shared by the MCU and the DSP. This module consists of four 16-pin bi-directional ports and a 15 pin bi-directional port. While some of these pins on these ports are being used for other functions (UART, SPI, SAP, BBP, and Interrupt pins), the remaining pins on those ports may be programmed to become GPIOs that may be used by either the DSP or the MCU. Each GPIO pin has up to 8 alternate output functions and up to 4 alternate input functions. This allows for the GPIO pins to be routed internally to pertinent Patriot modules. Additionally, the GPIO module adds selectable edge-triggered or level-sensitive interrupt functionality to the GPIO pins. Some examples of GPIO pins include the following:

- the Audio PA control signals (EXT_SPKR_SEL, AUDIO_PA_EN, and AUDIO_MODE_SEL)
- the EEPOT control signals (EEPOT_INC*, EEPOT_U_D*, EEPOT_CS*, and EEPOT_CS*_EXT), and
- the LED control signals (RED_LED and GREEN_LED).

4.6.1.2 SRAM (U804)

The static RAM (SRAM) is an asynchronous, 512-kilobyte CMOS device that is capable of 70 ns access speed. It is supplied with 1.8 volts. The SRAM has 18 address lines and 16 data lines connected to the External Interface Module (EIM) of the Patriot IC through the ADDR(23:0) and DATA(15:0) busses.

The SRAM has an active low chip-select EN_CE that is connected to the EIM CS2_N pin. When the SRAM EN_CE pin is not asserted, the SRAM is in standby mode, which reduces current consumption.

Two other control signals from the EIM that change the mode of the SRAM are the read/write signal (R/W), and the output enable signal (OE). The R/W of the EIM is connected to the SRAM EN_WE pin while the OE signal from the EIM is connected to the SRAM EN_OE pin. The SRAM is in read mode when the EN_WE pin is not asserted and the EN_OE pin is asserted. The SRAM is in write mode when the EN_WE pin is asserted, regardless of the state of the EN_OE pin.

The other SRAM pins are the lower byte enable pin EN_BLE and the upper byte enable pin EN_BHE. These pins are used to determine which byte (EN_BLE controls data lines 0-7 and EN_BHE controls data lines 8-15) is being used when there is a read or a write request from the Patriot. The EN_BLE pin is controlled by the EIM EB1_N signal while the EN_BHE pin is controlled by the EB0_N signal.

4.6.1.3 Flash Memory (U803)

The Flash memory IC is a 4-megabyte CMOS device with simultaneous read/write or simultaneous read/erase operation capabilities with 70 ns access speed. It is supplied with 1.8 volts. The Flash memory has its 21 address lines and 16 data lines connected to the EIM of the Patriot IC through the ADDR(23:0) and DATA(15:0) busses. The Flash memory contains host firmware, DSP firmware, codeplug data, and tuning values.

The RESET_OUT of the Patriot IC (U800) is at the GPIO voltage logic level (see section 4.6.1.1.). Components CR800 and R812 are used to convert the voltage down to a 1.8-volt logic level, and this 1.8 volt reset signal is fed to the Flash RESET pin. When this pin is asserted (active low logic), the Flash is in reset mode. In this mode, the internal circuitry powers down and the outputs become high impedance connections.

The Flash active low chip select pin, EN_CE, is connected to the active low CS0 pin (TP_CS0 test point) of the EIM. When the EN_CE is not asserted, the Flash is in standby mode which reduces the current consumption.

Several other active low controls pins determine what mode the Flash memory is in:

- the address valid pin ADV which is connected to the EIM LBA signal
- the output enable pin EN_OE that is connected to the EIM OE signal, and
- the write enable pin EN_WE which connected to the EIM EB1 signal.

For read mode, the ADV and EN_OE pins would be asserted while the EN_WE pin would not be asserted. When the EN_WE is asserted and the EN_OE pin is non-asserted, the Flash would operate in the write mode.

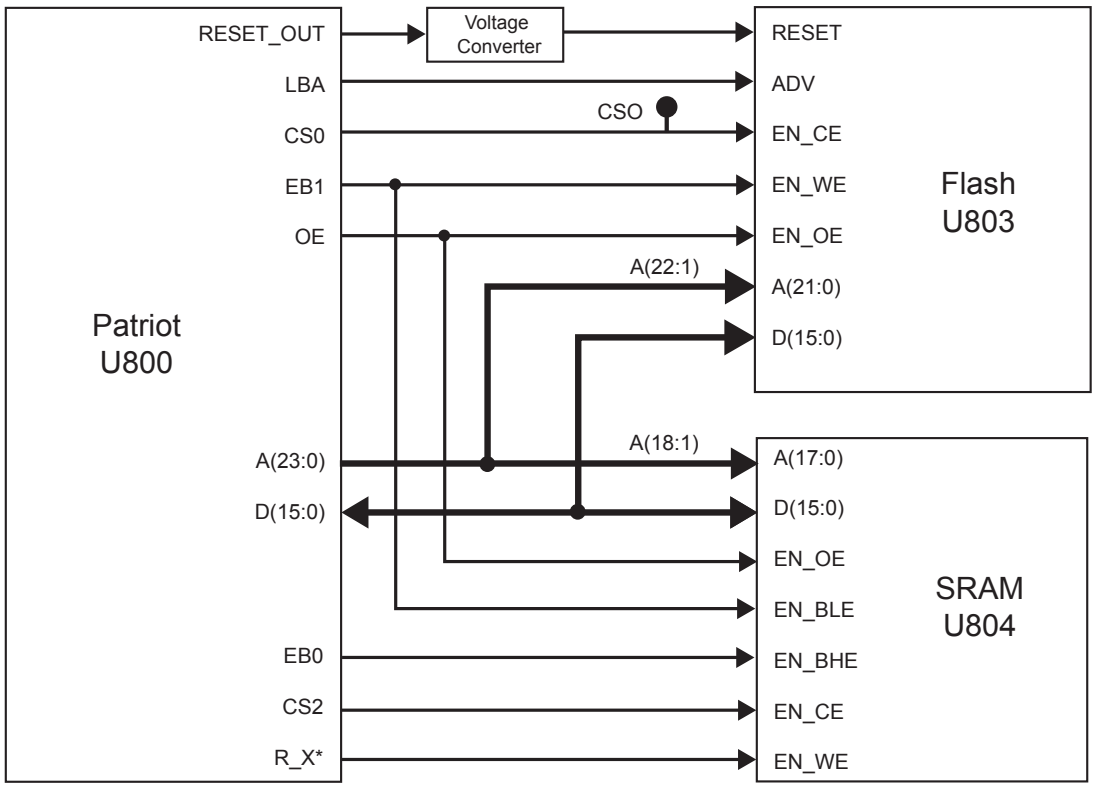


Figure 4-1. Controller Memory Interface

4.6.2 Audio and Power Section

Five main ICs reside in the audio and power section of the schematic diagram:

- the GCAP II IC (U703)
- the 5-volt regulator (U702)
- the 1.55Vdc regulator (NUF6541G Kit only)
- the audio pre-amplifier (U706)
- the audio power amplifier (U708), and
- the EEPOT (U704).

4.6.2.1 GCAP II IC (U703)

The GCAP II is a mixed signal (analog and digital) IC that provides the following functionality:

- control
- audio, and
- voltage regulation.

It comes in a 100 pin, ball grid array (BGA) package with 0.8mm pitch solder balls. The GCAP II is supplied with switched battery voltage GCAP_B+ (R788).

4.6.2.1.1 Voltage Regulation

The GCAP contains several voltage regulators that are used in the design of the VOCON section:

- VSW1
- VSW2, and
- V2.

The VSW1 regulator is a programmable switching regulator that uses the switched battery voltage as its input on pin PSRC1. The output voltage of VSW1 (R762) is programmable by the Patriot through the SPI bus. The initial output of VSW1 is 3.2 volts, and then this voltage gets programmed to 3.8 volts. The VSW1 voltage is supplied to the RF section and to the input pins of the VSW2 and V2 regulators.

The VSW2 regulator is a SPI programmable switching regulator that uses VSW1 as its input on pin PSRC2. The initial output of VSW2 (R763) is 2.2 volts, and then this voltage gets programmed to 1.875 volts (referred to as 1.8 volts throughout this document). The VSW2 voltage is supplied to the Patriot IC (U800) (core voltage and the EIM voltage), the SRAM (U804), the Flash memory (U803), and the Option board connector (J601).

The V2 regulator is a SPI programmable linear regulator that uses VSW1 as its input on pin VIN2. The initial output of V2 (R770) is 2.775 volts, and then this voltage gets programmed to 3 volts (for kits NUF6541A and NUF6541D, 2.9 volts (for kit NUF6541G). The V2 voltage is supplied to the Patriot IC U800 (I/O ring - SPI, BBP, SAP, UART, GPIO, etc.), the Flipper IC U600, the EEPOT U704, and the many discrete components that interface with the Patriot IC and the Flipper IC.

4.6.2.1.2 Microcontroller Unit (MCU) Interface

The GCAP IC has the following four-wire SPI connection to the Patriot IC (SPI B):

1. The SPI B clock is connected to the SPI_CLK pin (test point B_CLK).
2. The SPI B MOSI line is connected to the SPI_DW pin (test point BMOSI).
3. The SPI B MISO line is connected to the SPI_DR pin (test point BMISO).
4. The GCAP SPI B chip select signal is connected to the CE pin.

Through this interface, the Patriot IC can program the voltage regulators, the codec, the transmit and receive audio filters and amplifiers, as well as read information from the analog to digital converter and the real time clock.

The GCAP IC has an 8-bit analog to digital converter (A/D) with general-purpose six channels and four voltage-monitoring channels. The six general purpose A/D channels are assigned to monitor the following:

- volume (A/D 5)
- the three position toggle switch (A/D 1)
- the emergency button (A/D 0)
- the battery status line (A/D 2), and
- the board identification voltage (A/D 4).

Battery voltage is also monitored by the A/D. The Patriot activates and reads the A/D values through the SPI bus.

The real time clock (RTC) module of the GCAP IC consists of several counters to determine elapsed time. The Patriot reads the RTC registers through the SPI bus. The RTC is supplied with voltage from a backup Lithium rechargeable battery (LI_CELL) and a 32.768kHz clock signal from the Flipper IC to the GCAP XTAL1 pin.

4.6.2.1.3 Audio Circuitry

A 13-bit codec, internal to GCAP and programmable by Patriot through the SPI bus, converts microphone audio into a digital bit stream for processing by the DSP. The codec also converts receive audio data that was processed by the DSP into an analog audio signal for amplification to a speaker. The codec interfaces to the DSP through the 4-wire SAP bus. The following are the codec pin assignments on the GCAP (U703):

- The 520 kHz codec clock, generated by the Flipper IC, is on the DCLK pin.
- The 8 kHz codec frame sync signal, also generated by the Flipper IC, is on the FSYNC pin.
- The codec transmit data signal is on the TX pin.
- The codec receive data signal is on the RX pin.
- For kit NUF6541G only, the 256 kHz codec clock, generated by the DSP, is on the DCLK pin.
- For kit NUF6541G only, the 8 kHz codec frame sync signal, also generated by the DSP, is on the FSYNC pin.

In order for the codec to operate with those clock and frame sync signals, a 13 MHz clock (R600), generated by the Flipper IC, is supplied to the GCAP CLK_IN pin.

The GCAP contains internal amplification, filtering, and multiplexing functionality for both receive and transmit audio. These functions are Patriot programmable through the SPI bus:

- The input for the internal microphone audio (R720) is the MICIN_NEG pin.
- The input for the external microphone audio (R726) is the AUX_MIC_NEG pin.
- The output for the speaker audio is the EXTOUT pin (C703).

4.6.2.2 5-Volt Regulator (U702), (U707 for NUF6541G kit only)

The 5-volt regulator uses UNSW_B+ as its input voltage. The Flipper IC Watch Dog Interrupt (WDI) line controls the regulator's SHUTDOWN pin. The 5-volt supply (U702 pin 5) is used by the following:

- the Flipper IC U600
- the audio pre-amplifier U706

- the microphone bias circuitry (R717 & R727)
- bi-directional voltage translators
- battery data line isolation circuitry, and
- Electrostatic Discharge (ESD) protection circuitry.

4.6.2.3 1.55-V Regulator

The 1.55-V regulator is made up of the following components: U705, Q710, R715, R765, R737, R712, C714, C712, C709, C711 (check the NUF6541G kit BOM for part values and placement). This circuit uses VSW1 to bias the regulator while VSW2 sources the current. This voltage is used by the dual-core processor U800 for its core voltage and clock amplifier. The 1.55-V regulator is only instantiated on the NUF6541G VOCON kit.

4.6.2.4 Audio Pre-amplifier (U706)

The audio pre-amplifier (U706) is a single package 5-pin op-amp supplied with 5 volts. This pre-amp stage provides a fixed gain, which is selected by the components R702 and R705. The input (U706, pin 4) is the EXTOUT pin from the GCAP, while the output (U706, pin 1) of this stage goes to the audio PA.

4.6.2.5 Audio Power Amplifier (U708)

The audio power amplifier (PA) U708 consists of the following:

- two BTL amplifiers,
- complementary outputs, and
- control logic.

Each of the amplifiers has a fixed gain - the external audio PA gain is set by components R706 and R708 while the internal audio PA gain is set by components R700 and R703. The MODE pin (U708, pin 4) voltage determines the operation of the amplifier. That voltage is controlled by the Patriot GPIO lines: AUDIO_PA_EN (Q701 pin 3) and AUDIO_MODE_SEL (Q700 pin 1). The table below describes how the Patriot GPIO lines configure the audio PA.

Table 4-1. Audio PA Configuration

AUDIO_PA_EN	AUDIO_MODE_SEL	Audio PA Status	MODE Voltage (V)
0	0	Standby	V_mode > 7V
0	1	Mute	1.5V < V_mode < 6V
1	0	On	V_mode < 0.5V
1	1	On	V_mode < 0.5V

The SELECT pin (U708, pin 6) is used to switch the audio path between internal and external speaker. The voltage on that pin is determined by the EXT_SPKR_SEL line from Patriot and the Q701 transistor. When the voltage at the SELECT pin is high (B+), then the audio is routed to the internal speaker lines. When the voltage at the SELECT pin is low (V_select < 0.5V), then the audio is routed to the external speaker lines.

4.6.2.6 EEPOT (U704)

The EEPOT is a digitally programmable potentiometer with 256 taps and a total resistance of 50Ω. This 10-pin package contains two independent potentiometers, one for each microphone line. The EEPOT resistance values are programmed by the two Patriot GPIOs:

- EEPOT_INC* (U704 pin 9) and
- EEPOT_U_D* (U704 pin 2).

The EEPOT_INC* signal increments the resistance value up or down, which depends on the EEPOT_U_D* signal. The EEPOT_CS* line (U704 pin 10) is asserted when the internal microphone gain is being changed. Similarly, the EEPOT_CS_XST* (U704 pin 1) is asserted for external microphone gain changes. The EEPOT is supplied with the voltage from the GCAP II V2 regulator.

4.6.3 Interface Support Section

The interface support section includes the following:

- the Flipper IC (U600)
- the ESD protection circuitry, and
- the universal connector interface circuitry.

4.6.3.1 Flipper IC (U600)

The Flipper IC U600 is an application-specific integrated circuit (ASIC) device designed for the XTS radio product line. It comes in a 64-pin, mBGA package with 0.8 mm pitch solder balls. The Flipper is supplied with 5 volts and the processor's GPIO voltage, and it uses the 16.8MHz clock (L711) as its master clock. The Flipper IC is programmable by the Patriot IC through the SPI bus.

The Flipper IC supports many functions, including the following:

- radio side connector interface
- bi-directional logic level translation
- boot data path control
- USB transceiver
- One-Wire option detect support
- watchdog timer
- 32 kHz oscillator with CMOS output
- 13 MHz reference generation for the GCAP II, and
- SSI clock and frame sync generator.

4.6.3.1.1 Side Connector Interface, Logic Level Translation, and Boot Data Path Control

The Flipper facilitates the interface to the radio's side connector. Some of the side connector lines are at 5-volt logic levels, so the Flipper IC converts those lines to the GPIO voltage logic level (see section 4.6.1.1.) to interface to the Patriot. These lines include the RS 232 CTS (test point CTS1) and RTS (test point RTS1) lines, the RS232 data out line (test point USB_D+), and the RS232 data in line (test point USB_D-).

Another function that the Flipper provides with these lines is boot data path control. Boot data path is as follows: boot data in is multiplexed onto the RS232 data out line while the boot data out is multiplexed with the SB9600 data line. This alternate data path is only used to Flash code into a radio for the first time. The Patriot, through the SPI bus, controls this feature.

4.6.3.1.2 Universal Serial Bus (USB) Transceiver

The USB transceiver, internal to the Flipper IC, is capable of transmitting and receiving serial data at a rate of 12 megabits per second. The differential USB data comes from the side connector, through the 22 ohm resistors (R680 and R681), the isolation switch (Q600), and finally to the USB_DPLUS and USB_DMINUS pins on the Flipper. The USB receive interface from the Flipper to the Patriot is as follows:

- USB_DPLUS routed to USB_VPI
- USB_DMINUS routed to USB_VMI_RXD, and
- the differential decoded data comes out of the URXD_RTS pin and goes to the Patriot URTS1 pin.

The Patriot monitors the single-ended data lines to detect the single ended zero state.

The USB transmitter is enabled when the USB_SUSP and USB_TXENAB signals are both driven low by the Patriot. The single-ended data comes out of the Patriot on the UTXD1 pin and goes to the Flipper TXD_USB_VPO pin. The data is driven out differentially on the USB_DPLUS and USB_DMINUS pins, which go to the side connector. The Patriot sends the single-ended zero signal from pin PC0_USB_VMOUT to the Flipper USB_FSEZ pin.

When a USB cable is detected, the USB_DIS pin (Q600, pin 2) goes high. This controls the isolation switch (Q600) so that the data on those lines are routed to the USB transceiver. If a USB cable is not detected, the USB_DIS pin is low and the USB transceiver on the Flipper is isolated from the side connector. This isolation is done primarily because the RS232 data lines are 5-volt lines, so the switch is to protect the transceiver (since it operates at a lower voltage) and the USB data lines.

On the NUF6541G kit, the USB transceiver on the Flipper IC is not used. Instead, a discrete USB transceiver U607 is used. This transceiver is provided with 5V and 2.9V. The 5V powers an internal 3.3V voltage regulator on the transceiver which is used as the voltage for the USB data pins D+ and D- as well as the VPU pin. The 2.9V is used by the remaining pins as they interface to the dual-core processor.

4.6.3.1.3 One-Wire Support

New options and accessories that attach to the side connector will be identified by the Patriot using the One-Wire protocol.

The Option Select 2 pin on the side connector also serves as the One-Wire data pin (R666). This signal is connected to the ONE_WIRE_OPT pin. This pin is connected to the Patriot's One-Wire bus ONE_WIRE_UP through an internal isolation switch controlled by a Patriot GPIO line to the Flipper ONE_WIRE_EN_X pin. This isolation is needed to prevent possible contention on the One-Wire bus when a smart battery is attached to the radio.

These new accessories are grounded to pin 10 (test point CTS1) of the side connector. When this occurs, the Flipper pin KVL_USB_DET_X is asserted and the Patriot detects the change. The Patriot then asserts the ONE_WIRE_EN_X pin on the Flipper to connect the side connector One-Wire line to the Patriot's One-Wire bus.

In the case of the USB cable, the Patriot reads the One-Wire data from the cable, and upon determining that a USB cable is attached, it programs the Flipper for USB mode.

4.6.3.1.4 Watchdog Timer

The Flipper monitors the position of the radio's on/off button on the BP_SEN_X pin; that signal is located on Q707, pin 3.

Table 4-2. Flipper Monitors Radio On or Off

Q707, pin 3 Voltage	Radio Condition
Ground	Off
3 Volts	On

When the radio is turned off, a counter inside the Flipper IC begins incrementing. That counter may be refreshed by the Patriot through the SPI bus. This gives the software enough time to complete its tasks before power down from the Patriot IC. If the counter is not refreshed by the time the count is complete, then the Flipper pin WD_OUT goes low, which in turn shuts down the GCAP voltage regulators. During normal radio operation, WD_OUT should be high (V2 regulated voltage).

4.6.3.1.5 32 kHz Oscillator and CMOS output

The 32 kHz oscillator circuitry uses a separate voltage supply pin (VDD3_XTL) than the other 3-volt portions of the Flipper IC. This 32 kHz clock is used by the GCAP's real time clock (RTC) module to keep track of time. The VDD3_XTS pin is supplied with the backup lithium (Li) rechargeable battery voltage, LI_CELL. The oscillator circuitry is internal to the Flipper IC. The 32.768 kHz crystal (Y600), with additional load capacitors (C823) and (C824), is located next to the IC.

The output of this oscillator is a LI_CELL volt (around 3 volts), peak-to-peak 32.768 kHz square wave, on pin REF32_OUT. This clock goes to two destinations: the Patriot CKIL pin (U605, pin 2) as a square wave and the GCAP XTAL1 pin (C606) as a sine wave.

4.6.3.1.6 13 MHz Reference Generation for GCAP II

A 13 MHz reference is required by GCAP II for the codec time base and the SSI clock generator module, internal to the Flipper. A phase locked loop (PLL) (using the 16.8 MHz clock, which is provided to the Flipper REF_16_IN pin) is used to generate the 13 MHz. An external RC loop filter network, consisting of R601, C600, and C603, is connected to the PLL_LFT pin.

The RC network of R600 and C601 conditions the 13 MHz reference output pin, REF_13_OUT. The signal at REF_13_OUT is a 3-volt, peak-to-peak, square wave, and the RC filter produces a lower level triangle wave that is suitable for the GCAP II.

For Kit NUF6541G, there is a two pole RC network consisting of R600, C601, R628, and R632, which conditions the 13MHz clock output. The 13MHz output from flipper is a 2.9-volt, peak-to-peak square wave. The RC filter network produces a lower level triangle wave that can be handled by GCAP II.

The 13-MHz reference is disabled as the Flipper powers-up. The 13-MHz reference is enabled by the Patriot through the SPI bus; this signal should be present during normal radio operation.

4.6.3.1.7 SSI Clock and Frame Sync Generator

The Flipper generates the SSI clock and frame sync signals for the SAP bus used by the Patriot, GCAP, and encryption module. These signals are generated from the 13 MHz reference. The SSI clock output pin is labeled SSI_CLK, and the frequency is 520 kHz. The SSI frame sync output pin is FRSYNC, and the frequency is 8 kHz. These signal are not active when the Flipper comes out of reset, so they are programmed by Patriot through the SPI bus.

The Flipper provides four 16-bit Time Division Multiplex (TDM) slots per frame on the SAP bus:

- The first slot (slot 0) begins immediately after the frame sync pulse, and this slot is used by the GCAP.
- The SEC_SS_X pin is active for the first 8-bits of the second slot (slot 1). This signal is used by the encryption module to synchronize its input and output to the SSI frame.
- The other two slots are reserved for possible design additions in the future.
- On the NUF6541G kit, the Flipper IC is not programmed to generate the SSI clock or SSI frame sync signal. The dual-core processor U800 generates these signals.

4.6.3.2 ESD Protection Circuitry

Several components on the VOCON section were added to protect the circuitry from Electrostatic Discharge (ESD). The side connector signal lines are exposed and require ESD protection components. These protection components include:

- 5.6 volt zeners (VR659 and VR662) on the CTS and RTS lines, microphone lines, and the option select lines
- 12 volt zener (VR650) on the internal and external speaker audio lines
- 13 volt zener (VR658) on the OPTB+ line, and
- low capacitance ESD suppressors (VR678, VR651, and VR652) on the USB data lines.

4.6.3.3 Universal Connector (Side Connector) Interface Circuitry

An important circuit in the side connector interface is the Option Select 2 line comparator. The op-amp (U601) is used as a comparator for the option select 2 line. The voltage divider network of R658 and R673 determines the comparator threshold. The remaining components on the side connector interface consist of current-limiting serial resistors and noise-suppressing shunt capacitors.

4.6.3.3.1 Universal Connector (Side Connector) and Option Selects

The universal connector is located on the side of the radio. It is the external port or interface to the outside, and is used for programming and interfacing to external accessories. The universal connector is connected to the main board via a flex circuit at connector J650.

Most of the signals are extensions of circuits described in other areas of this manual. However, there are two option select pins used to configure special modes: Option Select 1 and Option Select 2. These pins are controlled by accessories connected to the universal connector. Connections to the universal connector and J650 are shown in Figure 4-2 and Figure 4-3, respectively.

Table 4-3 outlines their functions as defined at the universal connector.

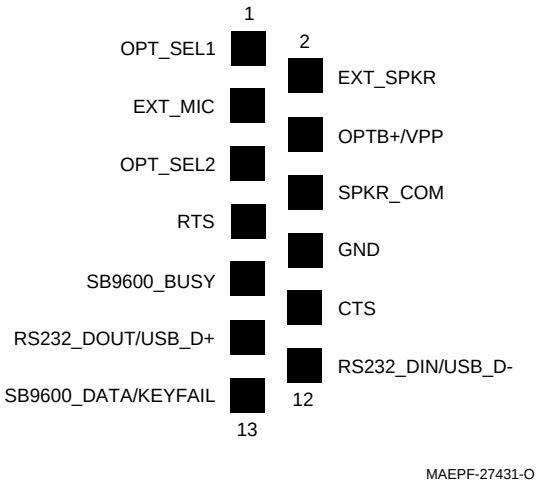


Figure 4-2. Universal (Side) Connector

Signal Name	J650-Pin #
OPT_SEL1	11
EXT_SPKR	9
EXT_MIC	13
OPTB+/VPP	12
OPT_SEL2	7
SPKR_COM	5
RTS	10
GND	3
SB9600_BUSY	8
CTS	1
RS232_DOUT/USB_D+	6
SB9600_DATA/KEYFAIL	2
RS232_DIN/USB_D-	4

MAEPF-27467-O

Figure 4-3. VOCON Connector J650

Table 4-3. Option Select Functions

FUNCTION	Option Select 1	Option Select 2
External PTT	0	0
No Function (Normal)	1	1
Man Down	1	0
External Speaker	0	1

4.6.3.4 The Option Board

The Option Board consists of the "keypad module" and the "display module" for models II and III of the XTS 2500 radio.

4.6.3.4.1 Display Module

An optional integral 96 pixels by 64 pixels LCD display module is available with either a 3 x 2 keypad with a navigational button (Model II radios), or 3 x 6 keypad with a navigational button (Model III radios). This unit is not considered field-repairable. The display module is connected to the VOCON section through the flex connector (J900).

The display is controlled by the Patriot's MCU core. The MCU core programs the display through the following:

- EIM data lines D0 - D7 (pins 9 through 16, respectively),
- the display chip select line (pin 5),
- the EIM "write only" line (pin 8), and
- the EIM address 0 line (pin 7).

The EIM address 0 is used to select the register to be programmed. The Patriot may reset the display module through pin 6. The display is supplied with 1.8 volts (C901) to pin 17and 3 volts (C902) to pin 18.

The Patriot GPIO BL_EN controls the display backlighting; that signal goes to pin 43 of the J601 connector (on the radio board), and the corresponding pin 3 of the J901 connector (on the Option board).

Pin 4 of the J601 connector (on the radio board), and the corresponding pin 42 on the J901 connector (on the Option board) is supplied with 7.5 volts. The 7.5 volts is used to power the LEDs on the display module.

Pin 2 of the J601 connector (on the radio board), and the corresponding pin 44 on the J901 connector (on the Option board), is supplied with the V2 regulated voltage. The V2 regulated voltage is used to power DISPLAY_VCC.

Pin 1 of the J601 connector (on the radio board), and the corresponding pin 45 on the J901 connector (on the Option board), is supplied with 1.8 volts. The 1.8 volts is used to power DISPLAY_VDD.

4.6.3.4.2 Keypad Module

The keypad module is connected to the main board through flex connector (J601) on the radio board schematic and J901 on the Option board schematic. The keypad is read though a row-and-column matrix made up of ROW0, ROW1, ROW2, ROW3, ROW4, ROW5, ROW6 and COL0, COL1, and COL2. This totals 18 keys on the keypad. When a key is pressed, a row and a column are connected to one another.

The Patriot determines a key press by a scanning algorithm. Each column line is configured as an open drain output and pulled low. The Patriot then scans the row pins (each row pin has an internal pull up resistor). If a row signal is read low, then the Patriot determines that a key was pressed. If none of the row signal lines are low, then another column line is pulled low and the row scanning routine occurs.

The Patriot GPIO BL_EN controls the keypad backlighting; that signal goes to pin 43 of the J601 connector (on the radio board), and the corresponding pin 3 of the J901 connector (on the Option board). Pin 42 is supplied with 7.5 volts, which is used to power the LEDs on the keypad module.

4.6.3.5 System Clocks

The Patriot is supplied with two clocks:

1. The first clock, a 16.8 MHz sine wave, comes from the RF portion of the radio. It is conditioned by the clock buffer circuit, which includes Q705, U805, L712, L711, R729, R722, R821, R723, R728, R781, R740, R782, C718, C781, and C726.

   On kit no. NUF6541G, the 16.8 MHz clock is conditioned by a clock buffer circuit, which includes Q709, R797, R722, R740, C726, C718, and C719. The output of this buffer can be measured at C726.

   The output of this buffer (L711) goes to the Patriot CKIH pin, as well as the Flipper REF_16_IN pin.

2. The other clock supplied to Patriot is a 32.768 kHz square wave. This clock is generated by the Flipper IC's internal oscillator and an external 32.768 kHz crystal (Y600). This clock is connected to the Patriot CKIL pin.

4.6.4 Transmit Audio Path

The internal microphone audio comes onto the main board through the side connector (J650, pin 18), and the internal microphone bias is set by the circuitry that includes R717, R718, and C730.

The internal microphone signal is connected to the MICIN_NEG pin, which is the input terminal on the GCAP internal op-amp A3. The values of R720, R719, and the resistance of EEPOT (U704) (digital potentiometer) set the gain of the A3 op-amp. The Patriot GPIO lines program the EEPOT.

The external microphone audio comes onto the main board through the universal connector (J650, pin 6,) and the external microphone bias is set by the circuitry that includes R727, R724, and C747. The external microphone signal is connected to the AUX_MIC_NEG pin, which is an input terminal on the GCAP internal op-amp A5. The values of R726, R730, and the resistance of the EEPOT (U704) set the gain of the A5 op-amp.

The Patriot, through the SPI bus, programs a multiplexer to select one of the microphone signals. Then, the selected amplified microphone signal goes through a programmable gain amplifier before it goes to the codec for analog-to-digital conversion. The resulting digital data is filtered and sent to the DSP on the SAP CODEC_TX line from the GCAP TX pin. After some additional filtering and processing, the DSP sends the data, out from the STDB pin, to the RF portion of the board to the Digital-to-Analog (DAC).

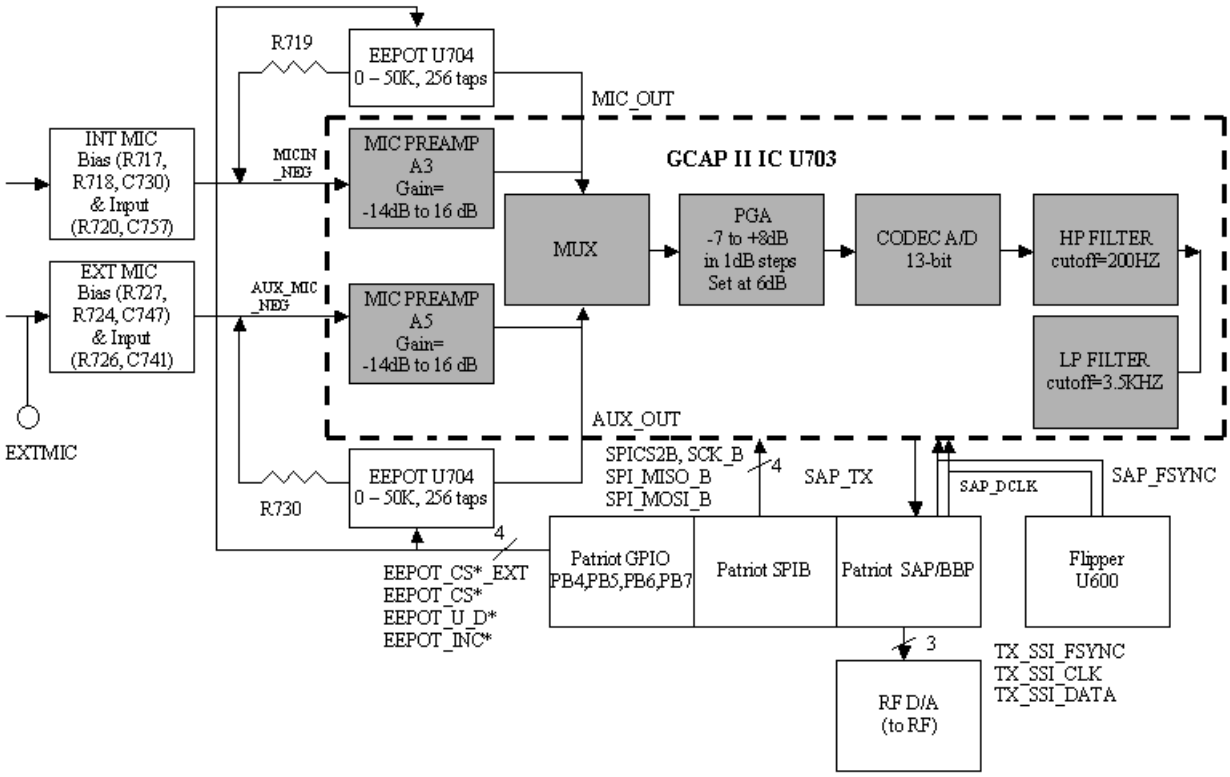
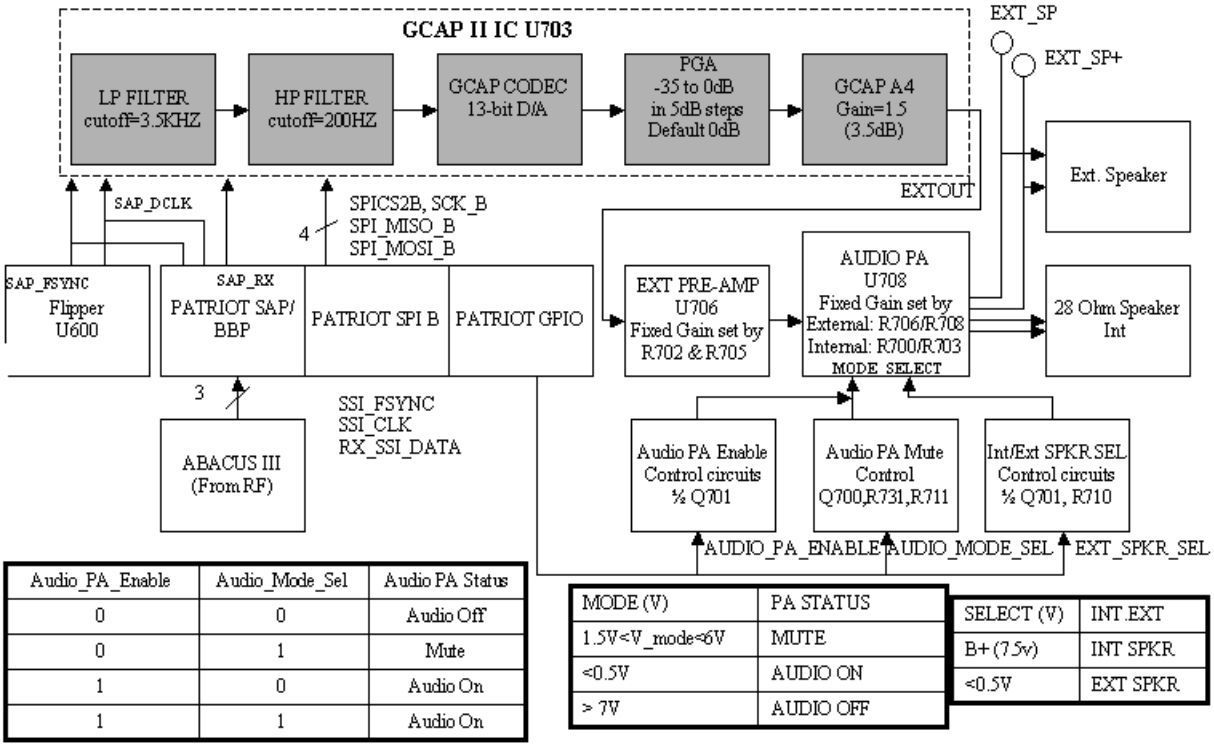


Figure 4-4. VOCON Transmit Audio Path

4.6.5 Receive Audio Path

The receive audio data comes from the ABACUS III IC to the Patriot SRDB pin. The DSP decodes the data and sends it out through the SAP_RX line to the GCAP RX pin. The codec filters and converts the digital data into an analog audio signal, and this signal is sent to a programmable gain amplifier. The Patriot programs a multiplexer to route the audio signal to the A4 amplifier, which has a fixed gain of 3.5 dB. The output of the A4 amplifier is pin EXTOUT.

From the EXTOUT pin, the audio signal goes through the pre-amplifier gain stage, comprised of the audio pre-amp (U706). This stage provides a fixed gain, which is selected by the components R702 and R705. This amplified audio is then sent to the audio power amplifier (U708). This stage provides a fixed gain - the external audio PA gain is set by components R706 and R708 while the internal audio PA gain is set by components R700 and R703. The Patriot selects whether the amplified audio gets routed to the internal speaker or to the external speaker.



Audio_PA_Enable	Audio_Mode_Sel	Audio PA Status
0	0	Audio Off
0	1	Mute
1	0	Audio On
1	1	Audio On

MODE (V)	PA STATUS
1.5V<V_mode<6V	MUTE
<0.5V	AUDIO ON
> 7V	AUDIO OFF

SELECT (V)	INT.EXT
B+ (7.5v)	INT SPKR
<0.5V	EXT SPKR

Figure 4-5. VOCON Receive Audio Path

Chapter 5 Troubleshooting Procedures

5.1 Introduction

The purpose of this chapter is to aid in troubleshooting problems with the ASTRO XTS 2500 digital portable radio. It is intended to have enough detail to localize the malfunctioning circuit and isolate the defective component.

Caution

Most of the ICs are static sensitive devices. Do not attempt to troubleshoot or disassemble a board without first referring to the following Handling Precautions section.

This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radio Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

5.2 Handling Precautions

Complementary metal-oxide semiconductor (CMOS) devices, and other high-technology devices, are used in this family of radios. While the attributes of these devices are many, their characteristics make them susceptible to damage by electrostatic discharge (ESD), or high-voltage charges. Damage can be latent, resulting in failures occurring weeks or months later. Therefore, special precautions must be taken to prevent device damage during disassembly, troubleshooting, and repair. Handling precautions are mandatory for this radio, and are especially important in low-humidity conditions. DO NOT attempt to disassemble the radio without observing the following handling precautions:

1. Eliminate static generators (plastics, Styrofoam, etc.) in the work area.
2. Remove nylon or double-knit polyester jackets, roll up long sleeves, and remove or tie back loose hanging neckties.
3. Store and transport all static-sensitive devices in ESD-protective containers.
4. Disconnect all power from the unit before ESD-sensitive components are removed or inserted, unless otherwise noted.
5. Use a static-safeguarded workstation, which can be accomplished through the use of an anti-static kit (Motorola part number 01-80386A82). This kit includes a wrist strap, two ground cords, a static-control table mat, and a static-control floor mat.
6. Always wear a conductive wrist strap when servicing this equipment. The Motorola part number for a replacement wrist strap that connects to the table mat is 42-80385A59.
7. When performing hot-air repair in close proximity to the backup battery (reference number M500), remove the backup battery before performing any rework to avoid damaging the battery.

5.3 Voltage Measurement and Signal Tracing

It is a good idea to check the battery voltage under load. This can be done by measuring the OPT_B+ _VPP pin at the universal (side) connector (pin 4). The battery voltage should remain at or above 7.0 Vdc. If the battery voltage is less than 7.0 Vdc, the battery should be recharged or replaced, as necessary, prior to analyzing the radio.

In most situations, the problem circuit may be identified using a multimeter, RF millivoltmeter, oscilloscope (preferably with 100 MHz bandwidth or more), and a spectrum analyzer.

Caution

When checking a transistor or module, either in or out of circuit, do not use an ohmmeter having more than 1.5 volts dc appearing across the test leads, or use an ohms scale of less than x100.

5.4 Standard Bias Table

Table 5-1 outlines some standard supply voltages and system clocks that should be present under normal operation. These should be checked as a first step to any troubleshooting procedure.

Table 5-1. Standard Operating Bias

Signal Name	Nominal Value	Tolerance	Probe Point
13MHz	13 MHz	+/- 100 ppm	C601 R632 (for NUF6541G only)
32K_FLIPPER	32.768 KHz	+/- 400 Hz	U605 pin 2
32K_CLK	32.768 KHz	+/- 400 Hz	C606
16_8_filtered	16.8 MHz		R821 R797 (for NUF6541G only)
Buffered_16.8	16.8 MHz		L711 C726 (for NUF6541G only)
POR	3.0 V	+/- 5%	D511, pin 2
RESET_OUT	3.0 V	+/- 5%	R808
VSW1	3.85 VdC	+/- 5%	R762
VSW2	1.85 Vdc	+/- 5%	R763
V2	3.0 Vdc (for NUF6541A & NUF6541D) 2.9 Vdc (for NUF6541G)	+/- 5%	R770
GCAP_B+	7.5 Vdc	6.0-9.0 Vdc	R788
UNSW_B+	7.5 Vdc	6.0-9.0 Vdc	Q702, pin 5
SW_B+	7.5 Vdc	6.0-9.0 Vdc	R775
VCC5	5.0V	+/- 5%	C719 C716 (for NUF6541G only)
VREG_1_55V	1.55 Vdc	+/- 5%	C709 (for NUF6541G only)

5.5 Power-Up Self-Check Errors

Each time the radio is turned on, the microcontroller unit (MCU) and the digital signal processor (DSP) perform some internal diagnostics. These diagnostics consist of checking the programmable devices such as the FLASH ROMs, internal and external EEPROMs, and SRAM devices. At the end of the power-up self-check routines, if an error exists, the appropriate error codes may be read using the Customer Programming Software (CPS) from the RS232/USB bus on the universal (side) connector.

Table 5-2. Power-up Self-Check Error Codes

Error Code	Description	Corrective Action
01/02	FLASH ROM codeplug Checksum Non-Fatal Error	Reprogram the codeplug
01/12	Security Partition Checksum Non-Fatal Error	Send radio to depot
01/20	ABACUS Tune Failure Non-Fatal Error	Turn radio off, then on
01/22	Tuning Codeplug Checksum Non-Fatal Error	Send radio to depot
01/81	Host ROM Checksum Fatal Error	Send radio to depot
01/82	FLASH ROM codeplug Checksum Fatal Error	Reprogram the codeplug
01/88	External RAM Fatal Error (Note: Not a checksum error.)	Send radio to depot
01/90	General Hardware Failure Fatal Error	Turn radio off, then on
01/92	Security Partition Checksum Fatal Error	Send radio to depot
01/93	FLASHport Authentication Code Failure	Send radio to depot
01/98	Internal RAM Fail Fatal Error	Send radio to depot
01/A2	Tuning Codeplug Checksum Fatal Error	Send radio to depot
02/81	DSP ROM Checksum Fatal Error	Send radio to depot
02/88	DSP RAM Fatal Error (Note: Not a checksum error.)	Turn radio off, then on
02/90	General DSP Hardware Failure (DSP startup message not received correctly)	Turn radio off, then on.

NOTE: If you have an earlier version of the radio, it may display either 09/10 or 09/90. This is the result of a programming error, and can be cleared by turning the radio off and on. If the problem persists, send the radio to the depot. Newer radios will not display this error code.

In the case of multiple errors, the codes are logically ORed and the results displayed.

5.6 Operational Error Codes

During radio operation, the radio performs dynamic tests to determine if the radio is working properly. Problems detected during these tests are presented as error codes on the radio's display. The presence of an error code should prompt a user that a problem exists and that a service technician should be contacted. Use Table 5-3 to aid in understanding particular operational error codes.

Table 5-3. Operational Error Code Displays

Error Code	Description	Corrective Action
FAIL 001	Synthesizer Out-of-Lock	a. Reprogram external codeplug b. Send radio to depot
FAIL 002	Selected Mode/Zone Codeplug Checksum Error	Reprogram external codeplug

5.6.1 Power-Up, Self-Check Diagnostics, and Repair (Not for Field Use)

The following are additional action items to be utilized for the diagnosis and resolution of the aforementioned error codes:

Table 5-4. Additional Error Code Action Items

Error Code	Corrective Action
01/02	This non-fatal error will likely recover if the radio's power is cycled. In the event that this does not resolve the issue, the radio should be re-flashed. As a last resort, the FLASH ROM (U402) should be replaced.
01/12	The radio should be sent to the depot for re-flashing of the security codeplug.
01/20	Cycling the radio power should resolve this issue.
01/22	The radio should be sent to the depot for re-flashing of the tuning codeplug, followed by re-tuning of the radio.
01/81	The radio should be sent to the depot for re-flashing of the host code.
01/82	The radio should be sent to the depot for re-flashing of the radio codeplug.
01/88	Re-flashing of the radio should be performed first. If this fails to resolve the issue, then replacement of the SRAM (U403) is necessary.
01/90	Cycle power to the radio. Continued failure indicates a likely IC failure (GCAP, PCIC, FLIPPER, ABACUS). In this event, the radio should be sent to the depot for isolation and repair of the problem IC.
01/92	The radio should be sent to the depot for reprogramming of the security codeplug.
01/93	The radio should be sent to the depot for re-flashing of the host code.
01/98	Send the radio to the depot for replacement of the SRAM (U403).
01/A2	The radio should be sent to the depot for re-flashing of the tuning codeplug followed by re-tuning of the radio.
02/81	The radio should be sent to the depot for examination and/or replacement of either the FLASH (U402), or the Patriot MCU/DSP (U401).

Table 5-4. Additional Error Code Action Items (Continued)

Error Code	Corrective Action
02/88	Cycle power to the radio. If this does not fix the problem, then the radio should be sent to the depot for re-flashing of the DSP code. Continued failure requires examination and/or replacement of the SRAM (U403).
02/90	Cycle power to the radio. If this fails to fix the problem, then the radio should be sent to the depot for re-flashing of the DSP code. Continued failure may require replacement of U401, the Patriot MCU/DSP.

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Chapter 6 Troubleshooting Charts

6.1 Introduction

This chapter contains detailed troubleshooting flowcharts. These flowcharts are for use as a guide in determining the problem areas. They are not a substitute for the knowledge of circuit operation and astute troubleshooting techniques. It is advisable to refer to the related detailed circuit descriptions in the theory sections prior to troubleshooting a radio.

This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radios Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

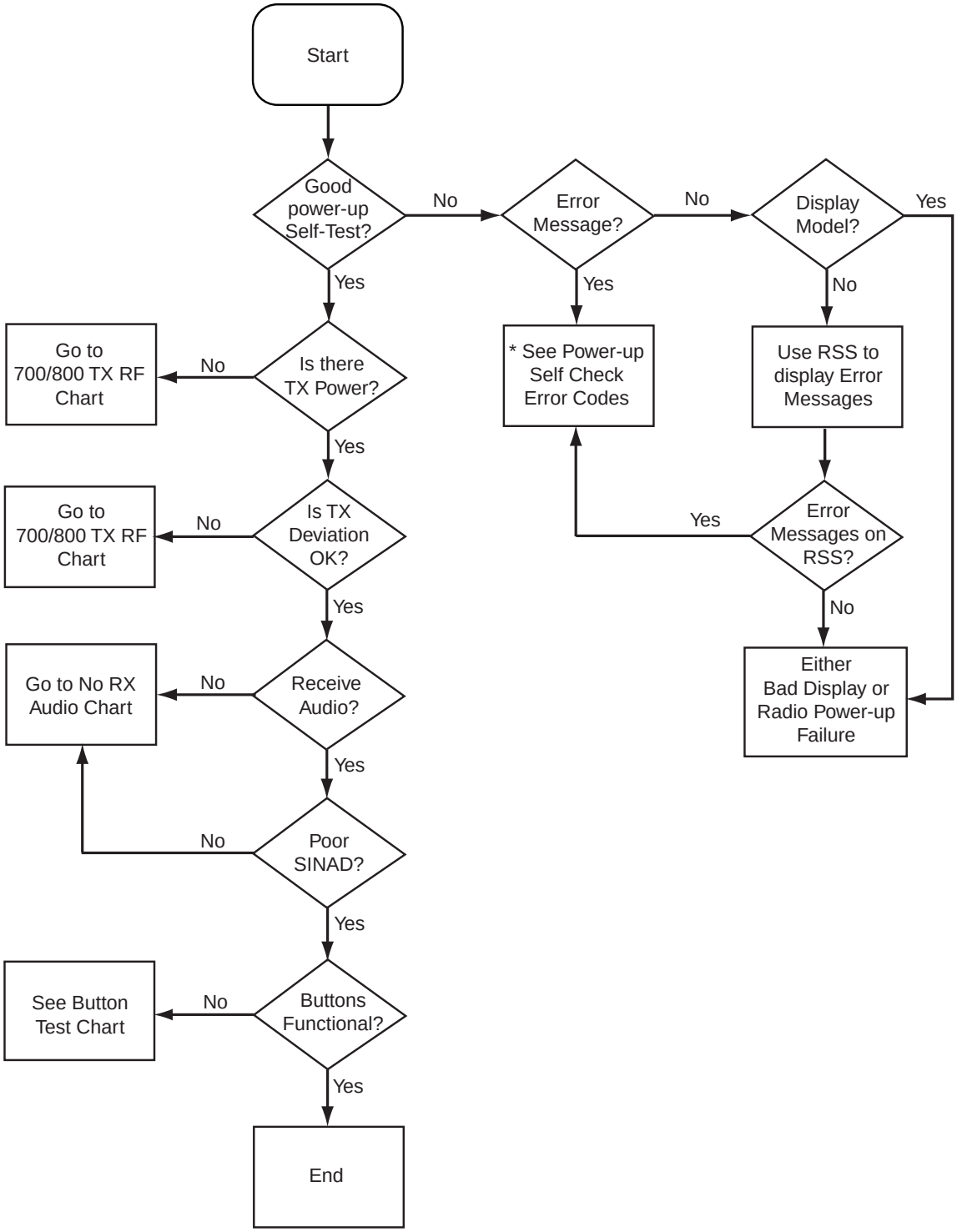
6.2 List of Troubleshooting Flowcharts

Most troubleshooting flowcharts end up by pointing to an IC to replace. **It is not always noted, but it is good practice to verify supplies and grounds to the affected IC and to trace continuity to the malfunctioning signal and related circuitry before replacing any IC.** For instance, if a clock signal is not available at a destination IC, continuity from the source IC should be checked before replacing the source IC.

Table 6-1. List of Troubleshooting Flowcharts

NOTE: µC is used in several of the following troubleshooting charts.
µC = microcontroller unit (MCU).

6.3 700/800 MHz Radio Main Troubleshooting Chart



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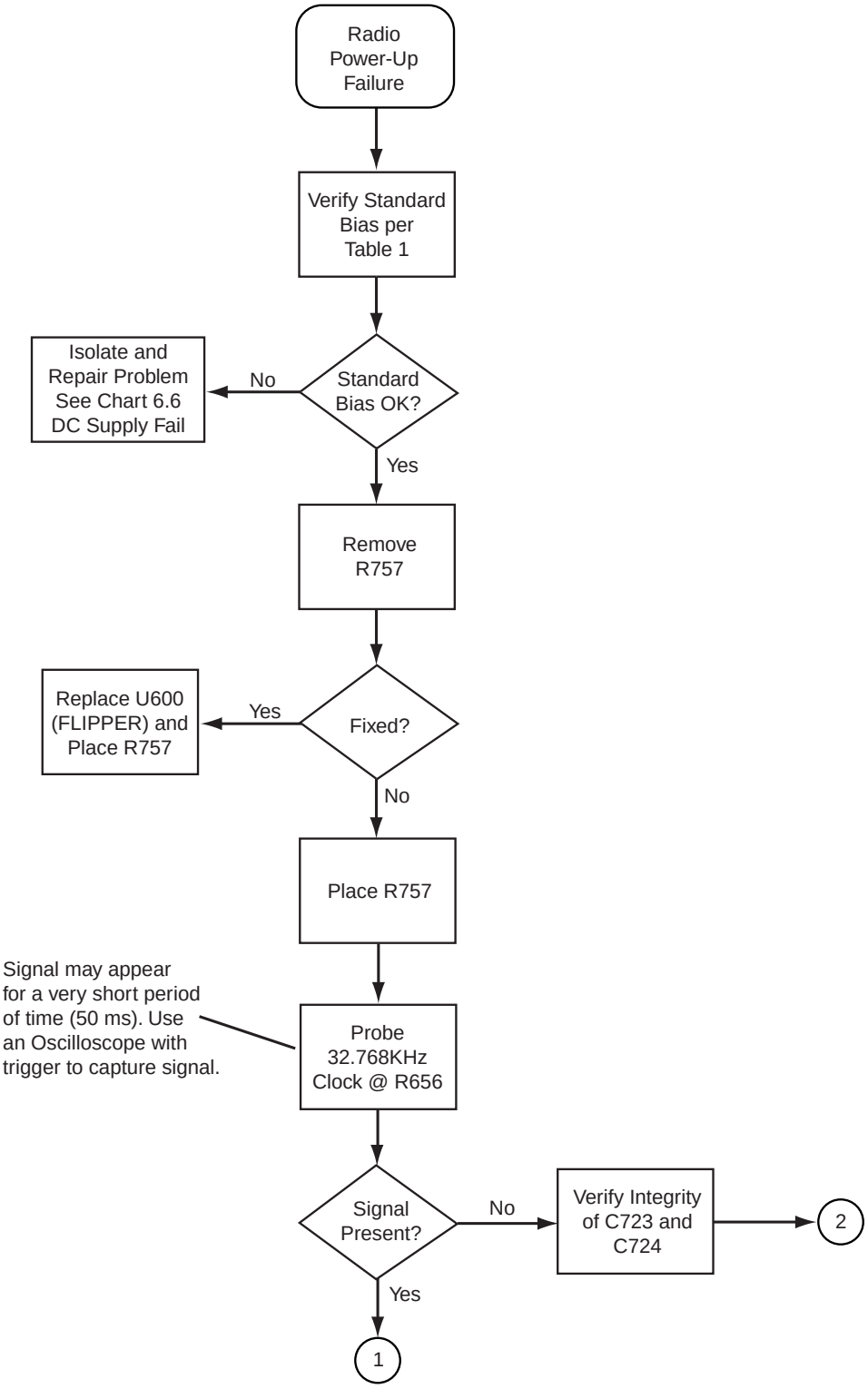
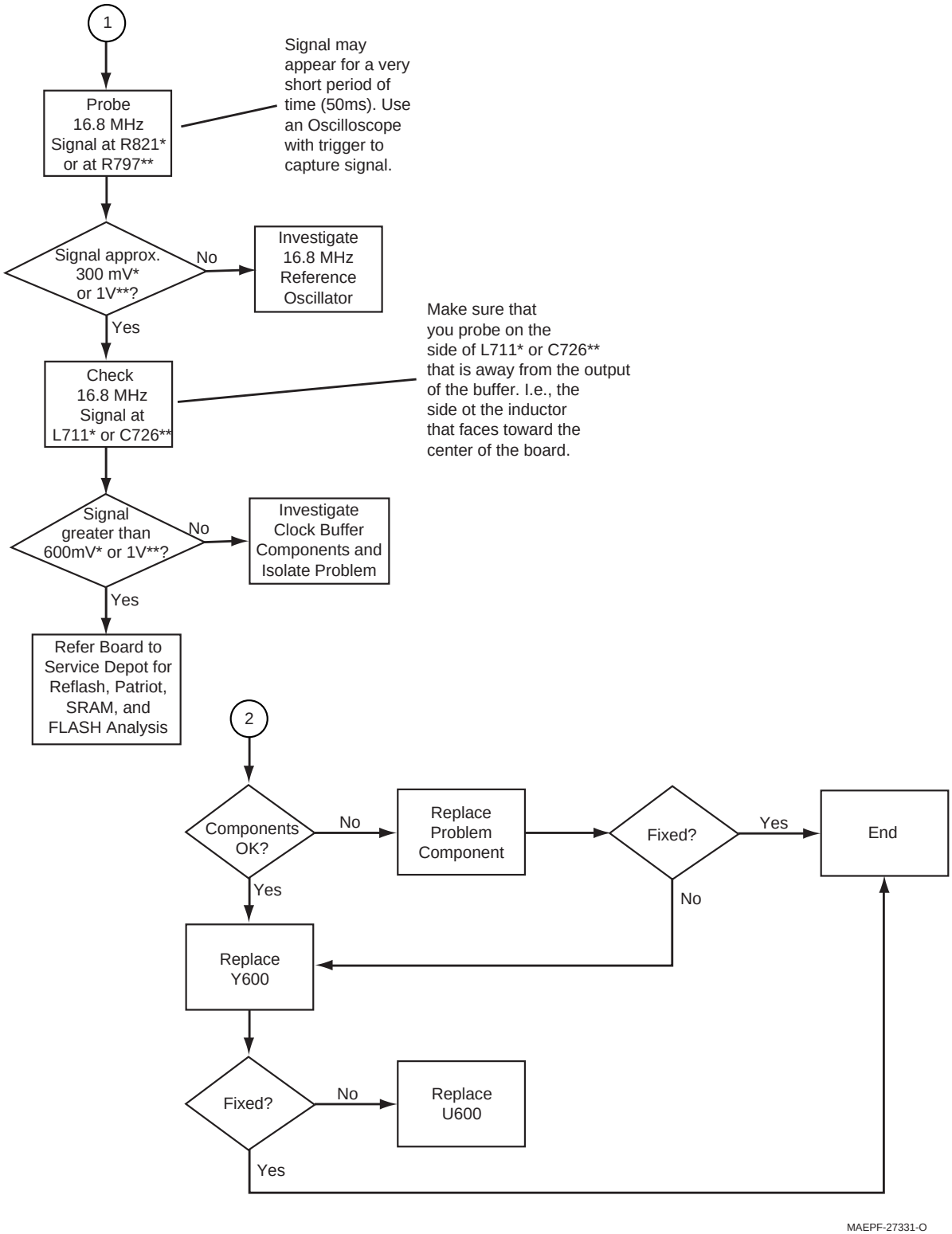
*Please see Table 5-2 on page 5-3.

6.4 Radio Power-Up Fail Troubleshooting Chart (1 of 2)

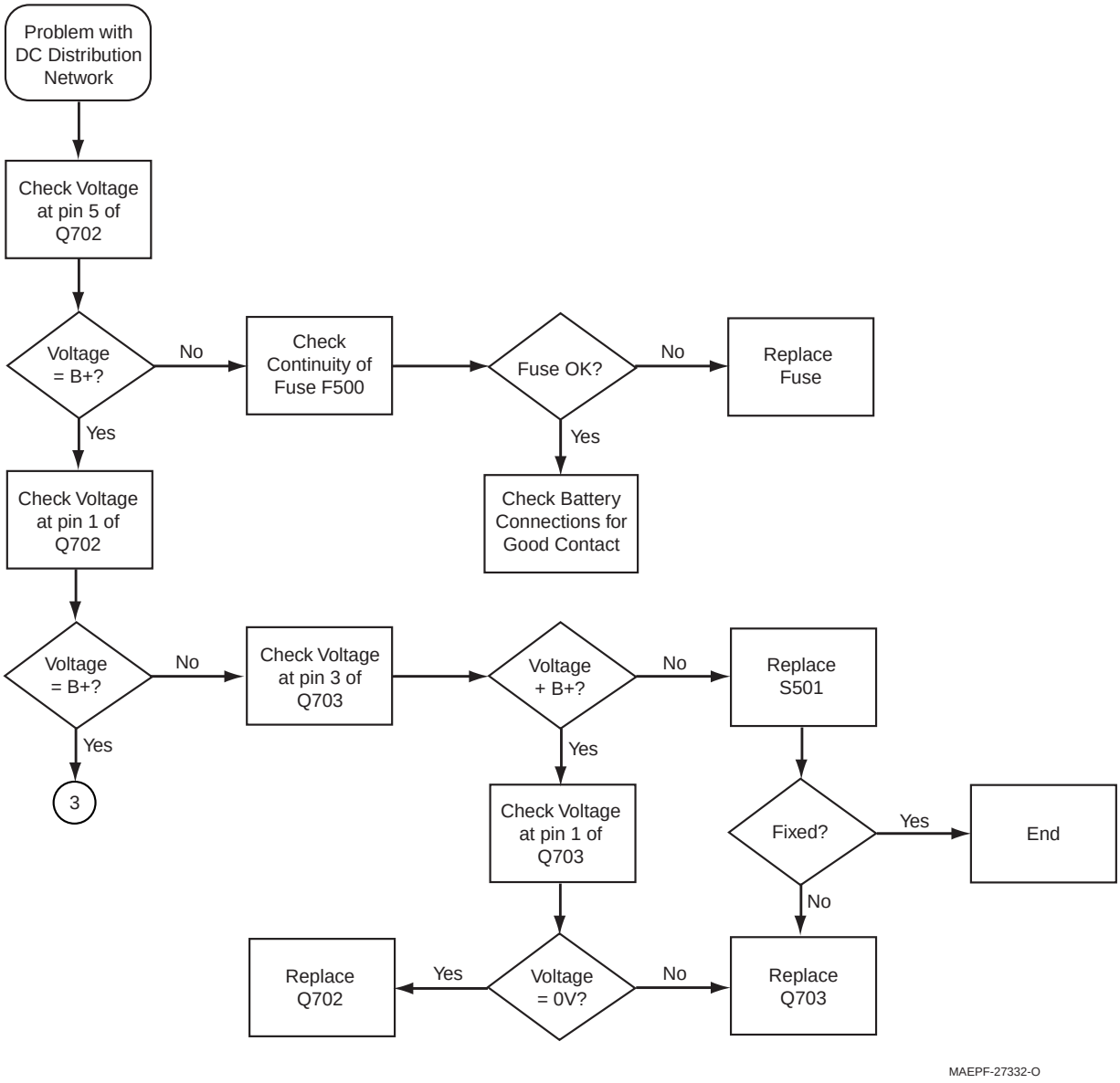


6.5 Radio Power-Up Fail Troubleshooting Chart (2 of 2)

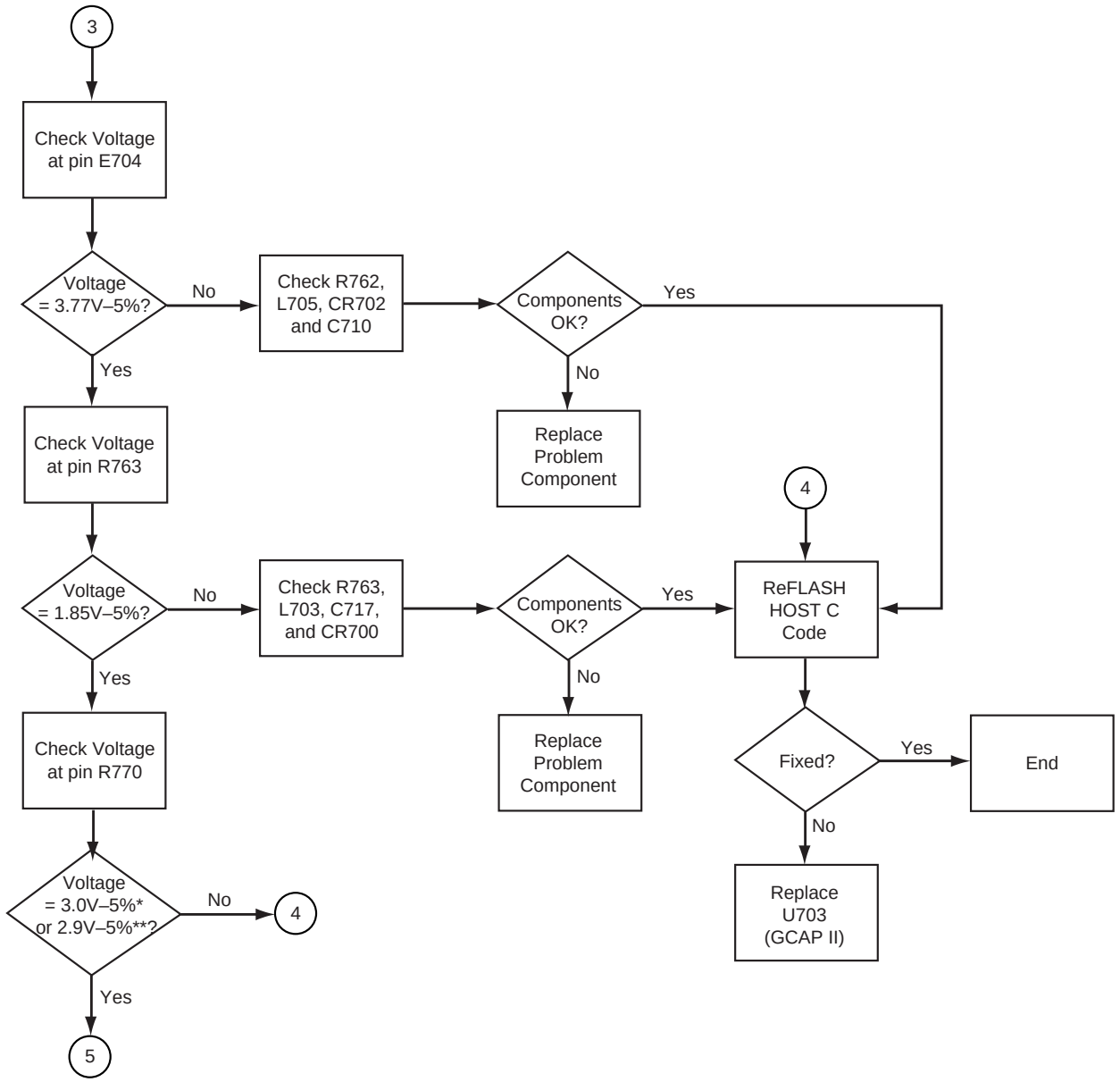


* affects kits NUF6541A and NUF6541D
**affects kit NUF6541G only

6.6 DC Supply Fail Troubleshooting Chart (1 of 3)

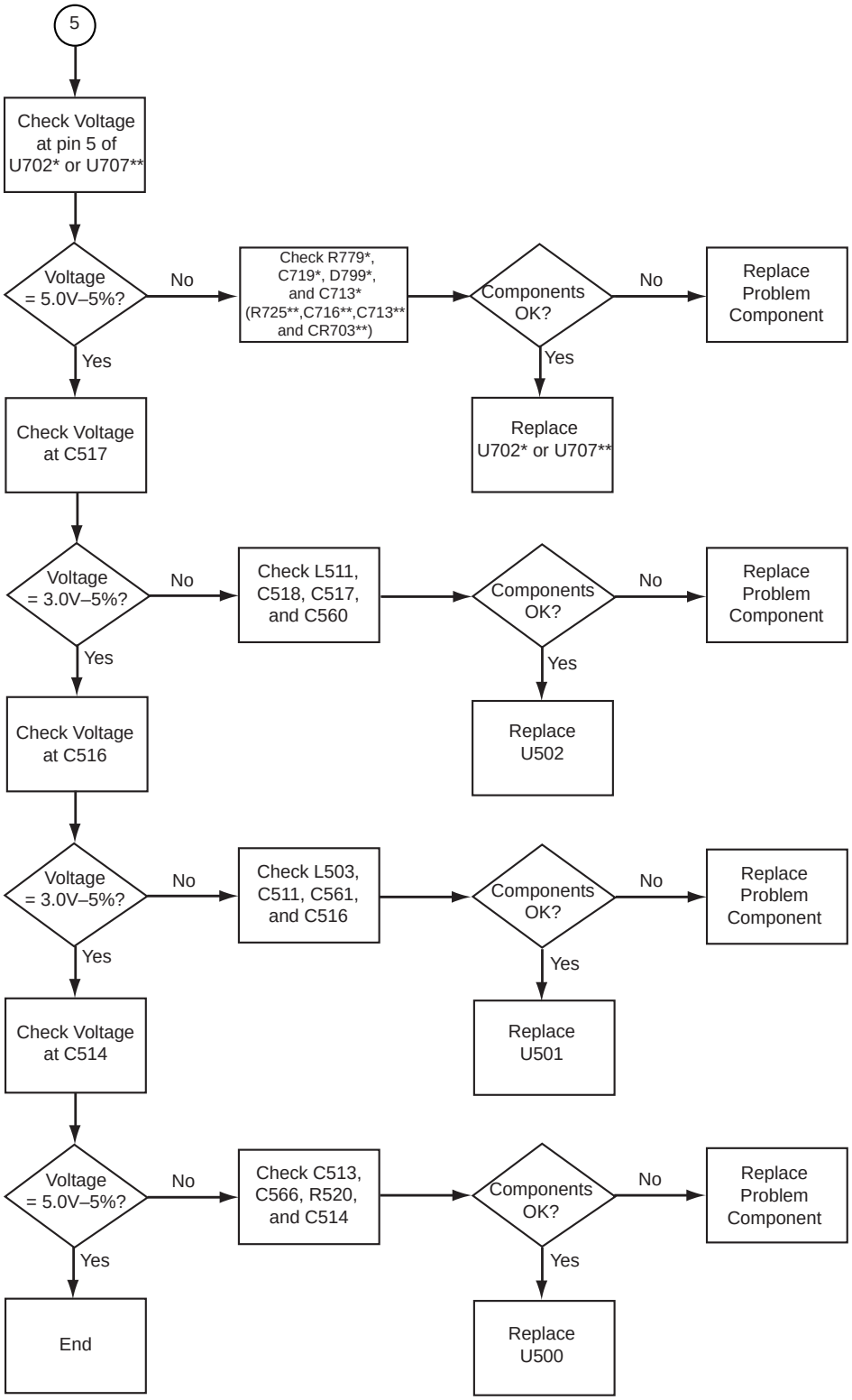


6.7 DC Supply Fail Troubleshooting Chart (2 of 3)



* affects kits NUF6541A and NUF6541D
**affects kit NUF6541G only

6.8 DC Supply Fail Troubleshooting Chart (3 of 3)



* affects kits NUF6541A and NUF6541D
** affects kit NUF6541G only

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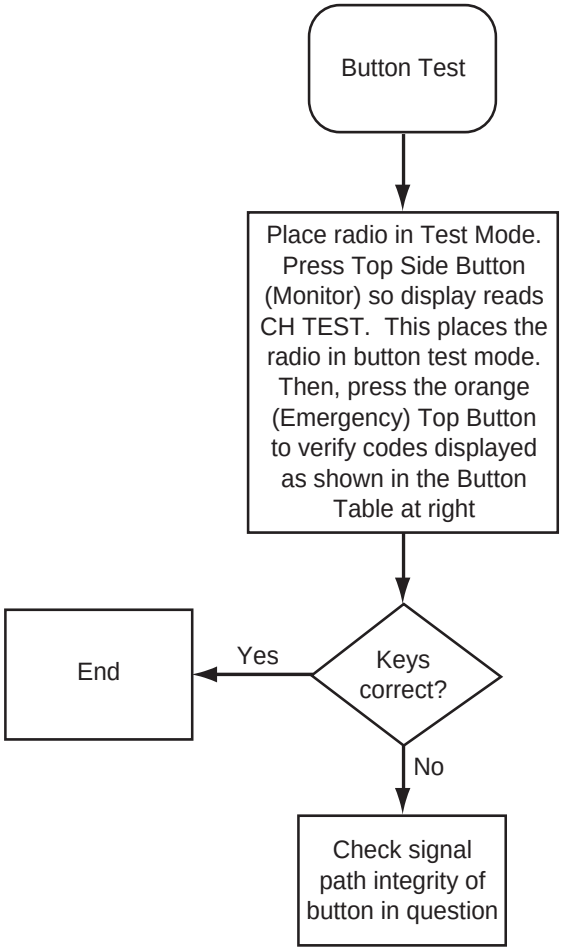
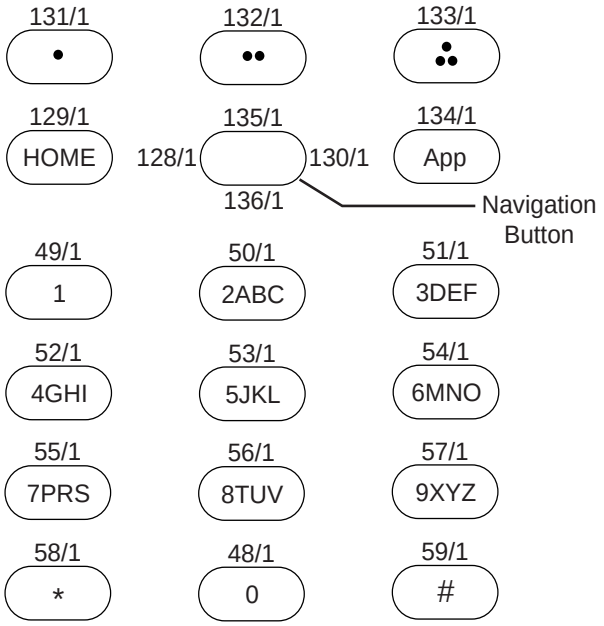
6.9 Button Test Troubleshooting Chart



Synopsis
This chart relates to a failure in the button functions. Basic Failure modes are as follows: 1) Failure in keypad flex assembly. 2) Bad Connection 3) Defective Switches or pads 4) Defective A/D port in GCAP II

Button Table

Button	Code	Chart
PTT	1/ 0-1	
Top Button (Emergency)	3/ 0-1	C.6
Side Button 1 (Monitor)	96/ 0-1	C.6
Side Button 2	97/ 0-1	C.6
Side Button 3	98/ 0-1	C.6
Channel Select (Frequency)	4/ 0-15	C.8
Volume Control Knob	0/ 0-220	C.7
Zone Select	65/ 0-2	C.8



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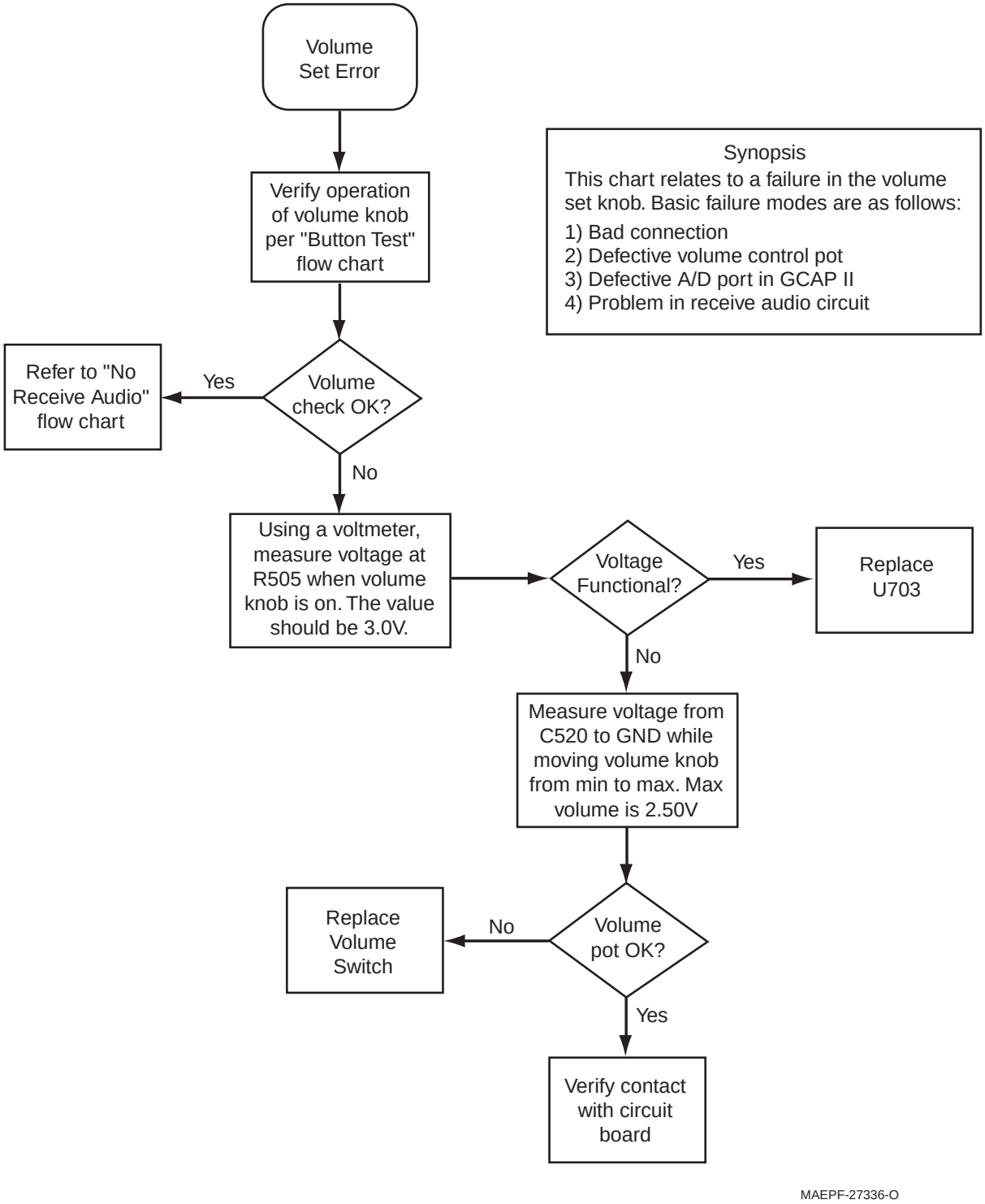
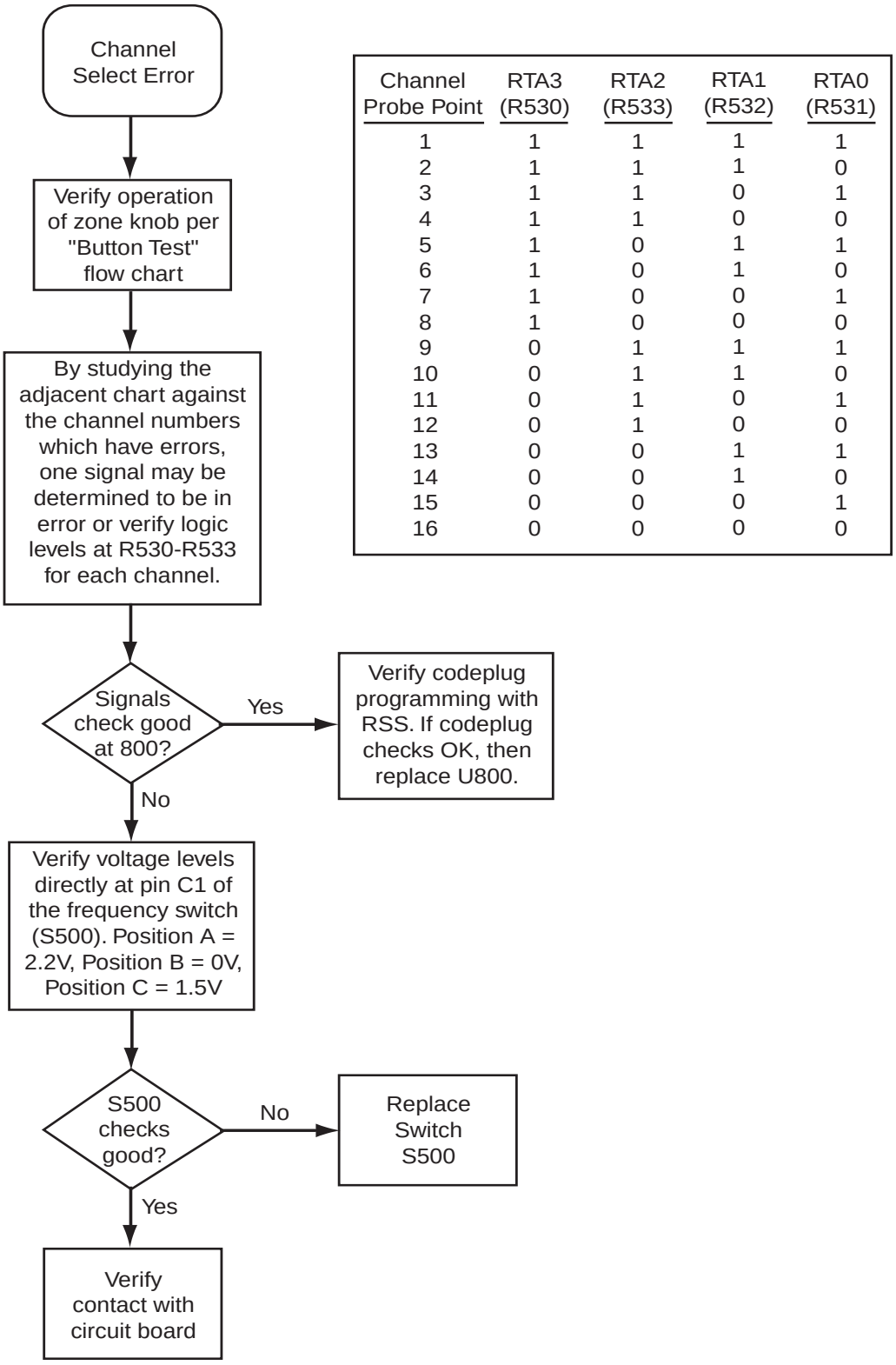
6.10 Volume Set Error Troubleshooting Chart



6.11 Zone/Channel Select Error Troubleshooting Chart



Channel Probe Point	RTA3 (R530)	RTA2 (R533)	RTA1 (R532)	RTA0 (R531)
1	1	1	1	1
2	1	1	1	0
3	1	1	0	1
4	1	1	0	0
5	1	0	1	1
6	1	0	1	0
7	1	0	0	1
8	1	0	0	0
9	0	1	1	1
10	0	1	1	0
11	0	1	0	1
12	0	1	0	0
13	0	0	1	1
14	0	0	1	0
15	0	0	0	1
16	0	0	0	0

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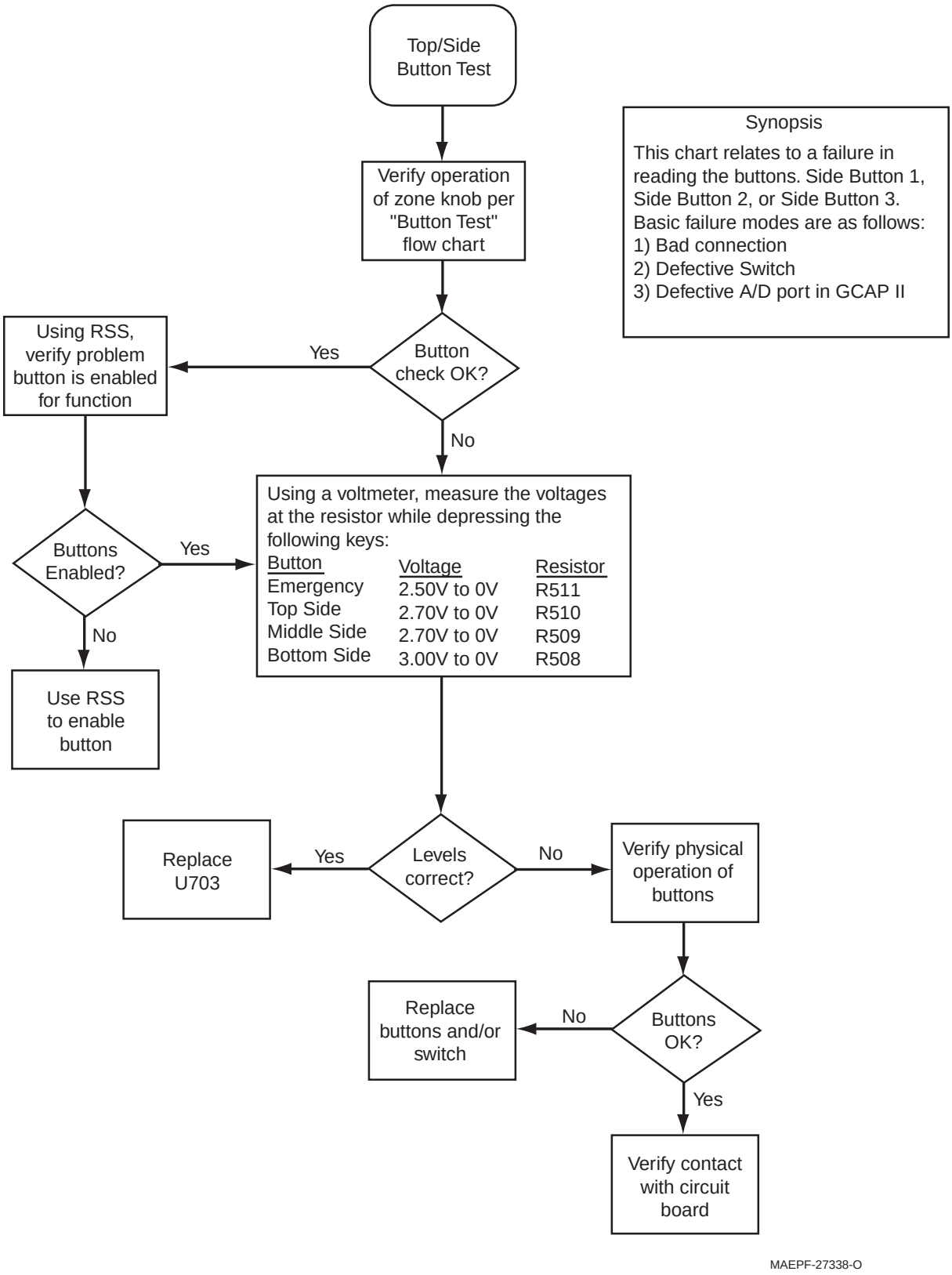
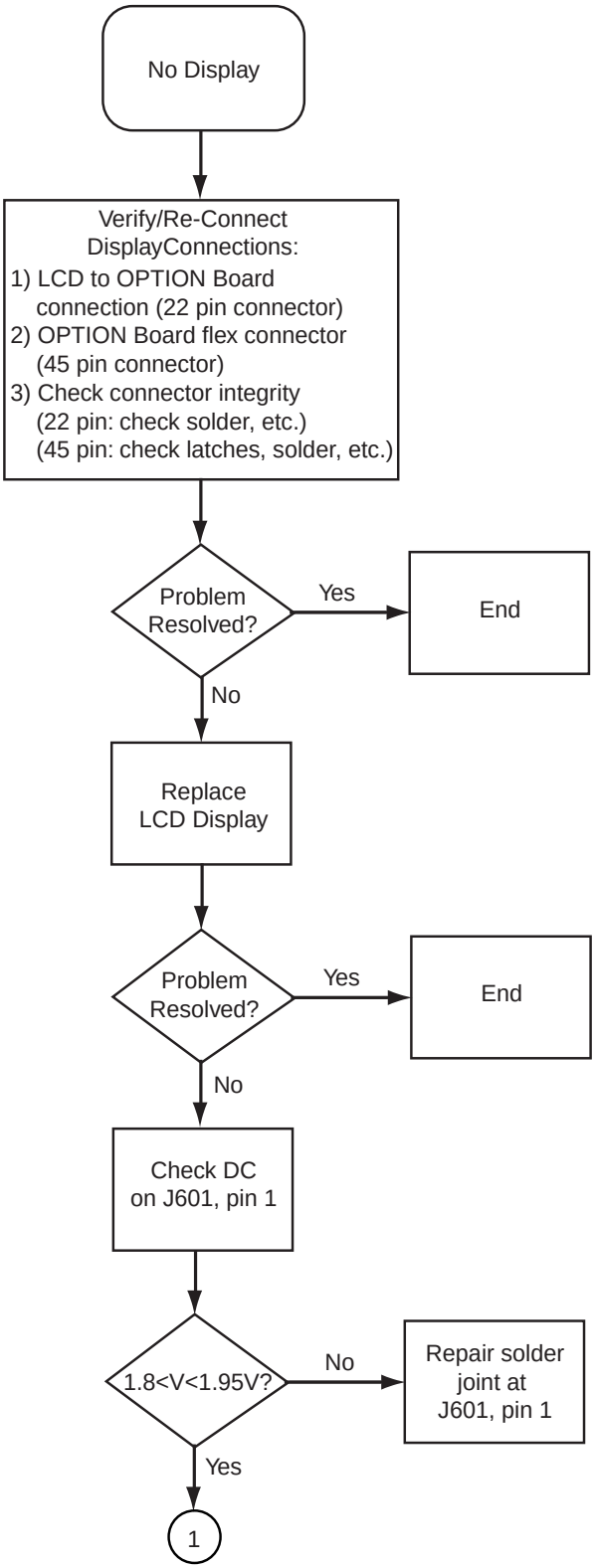
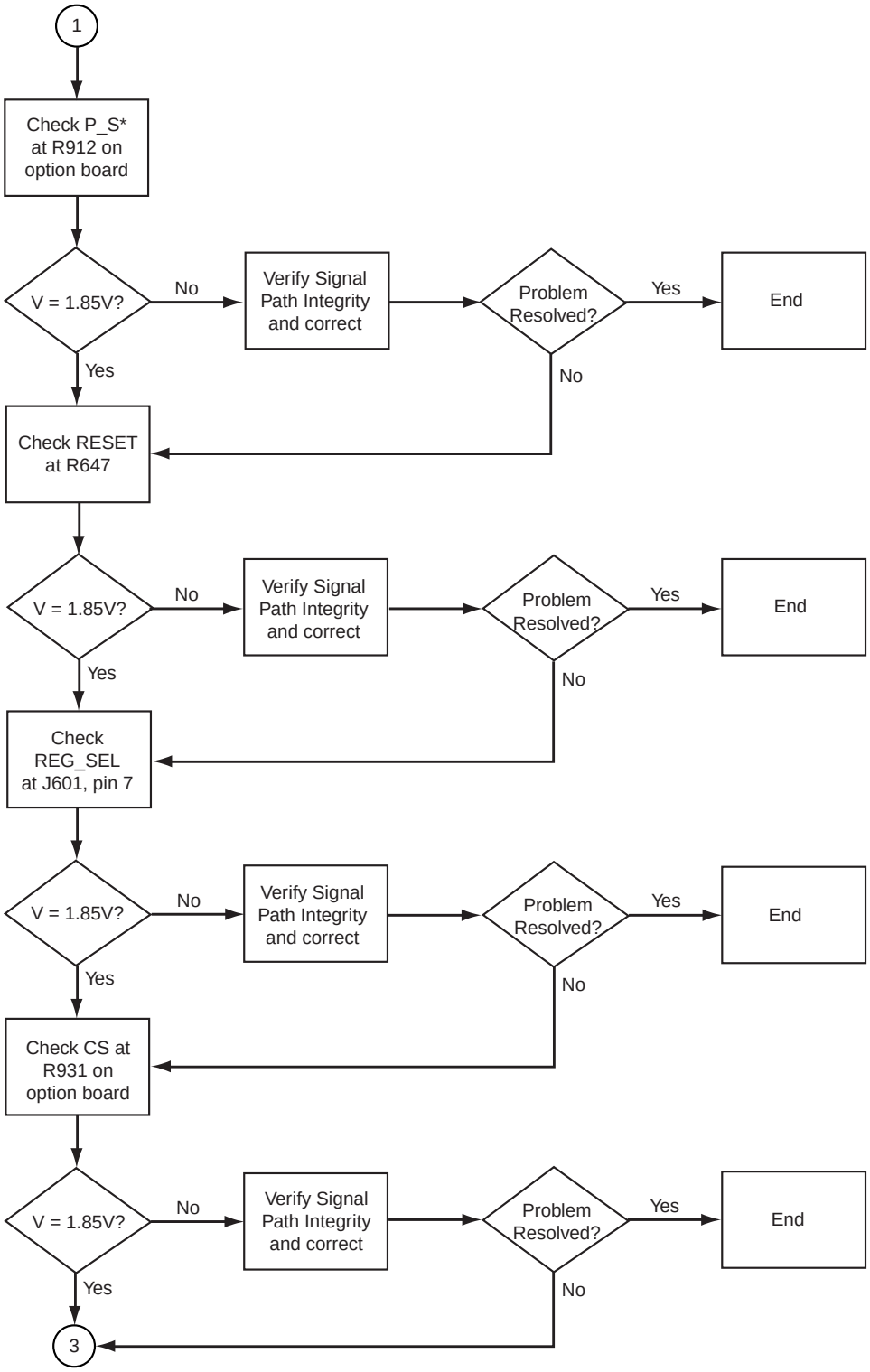
6.12 Top/Side Button Error Troubleshooting Chart



6.13 No Display Troubleshooting Chart (1 of 3)

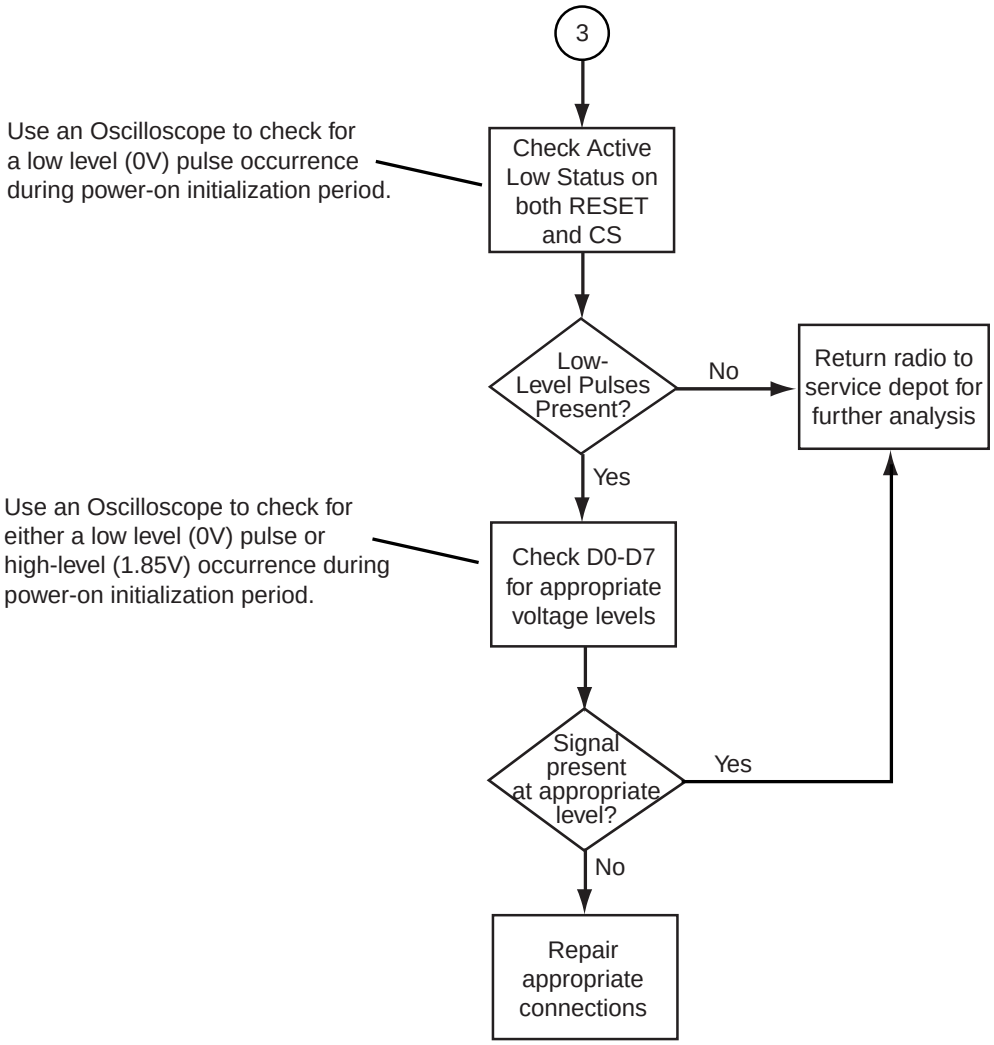


6.14 No Display Troubleshooting Chart (2 of 3)

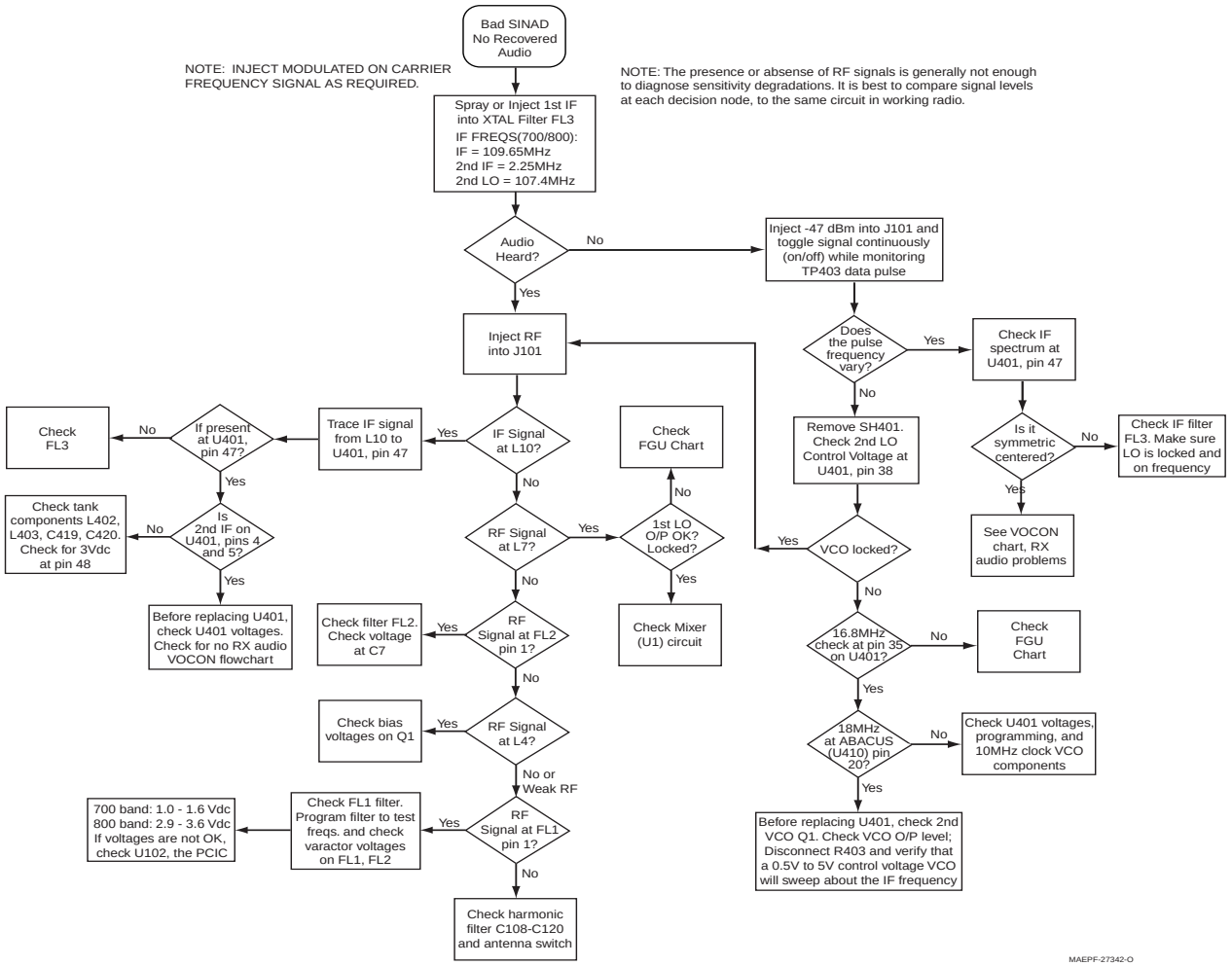


MAEPF-27340-O

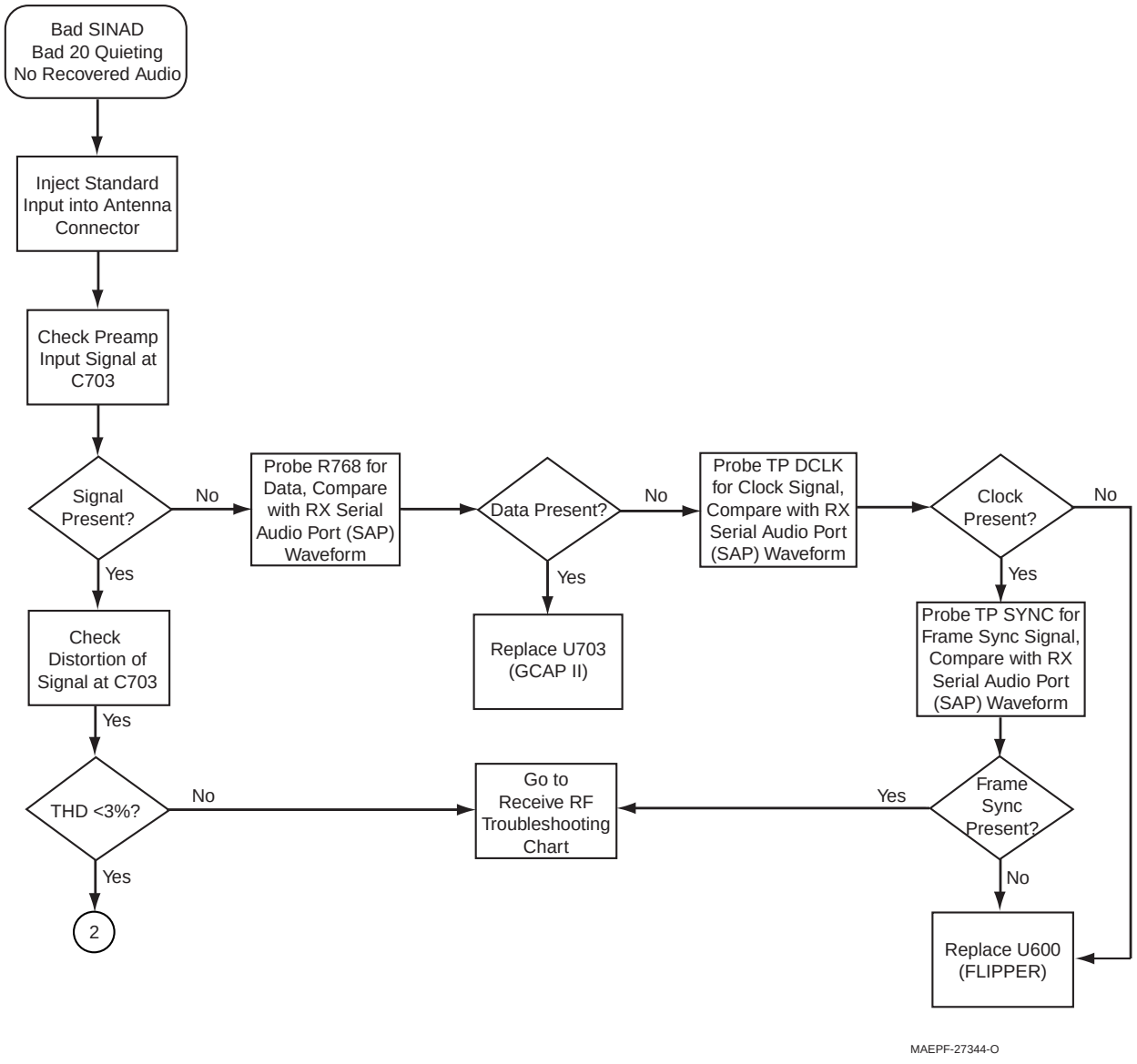
6.15 No Display Troubleshooting Chart (3 of 3)



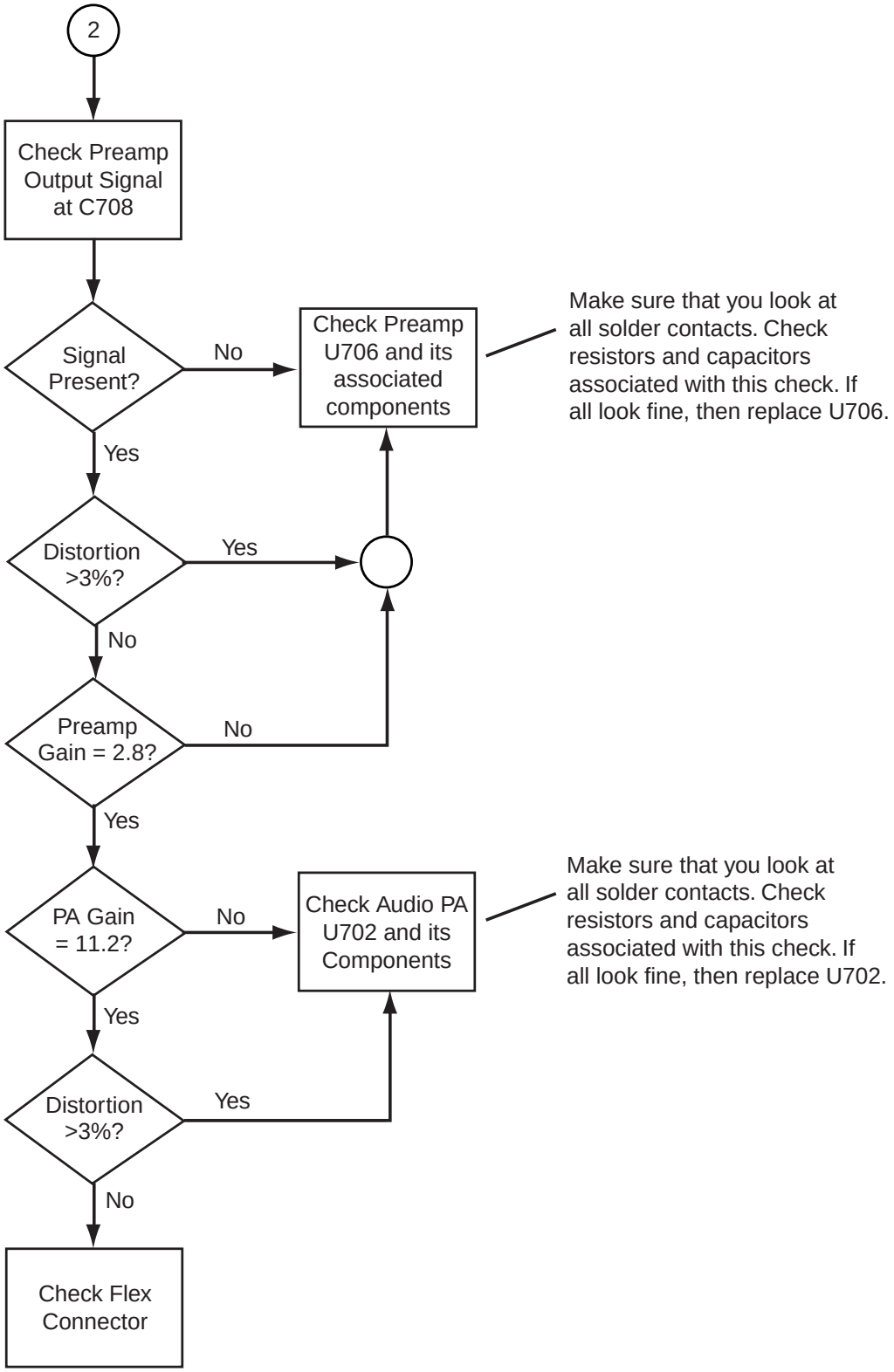
6.16 700/800 MHz Receive RF Troubleshooting Chart



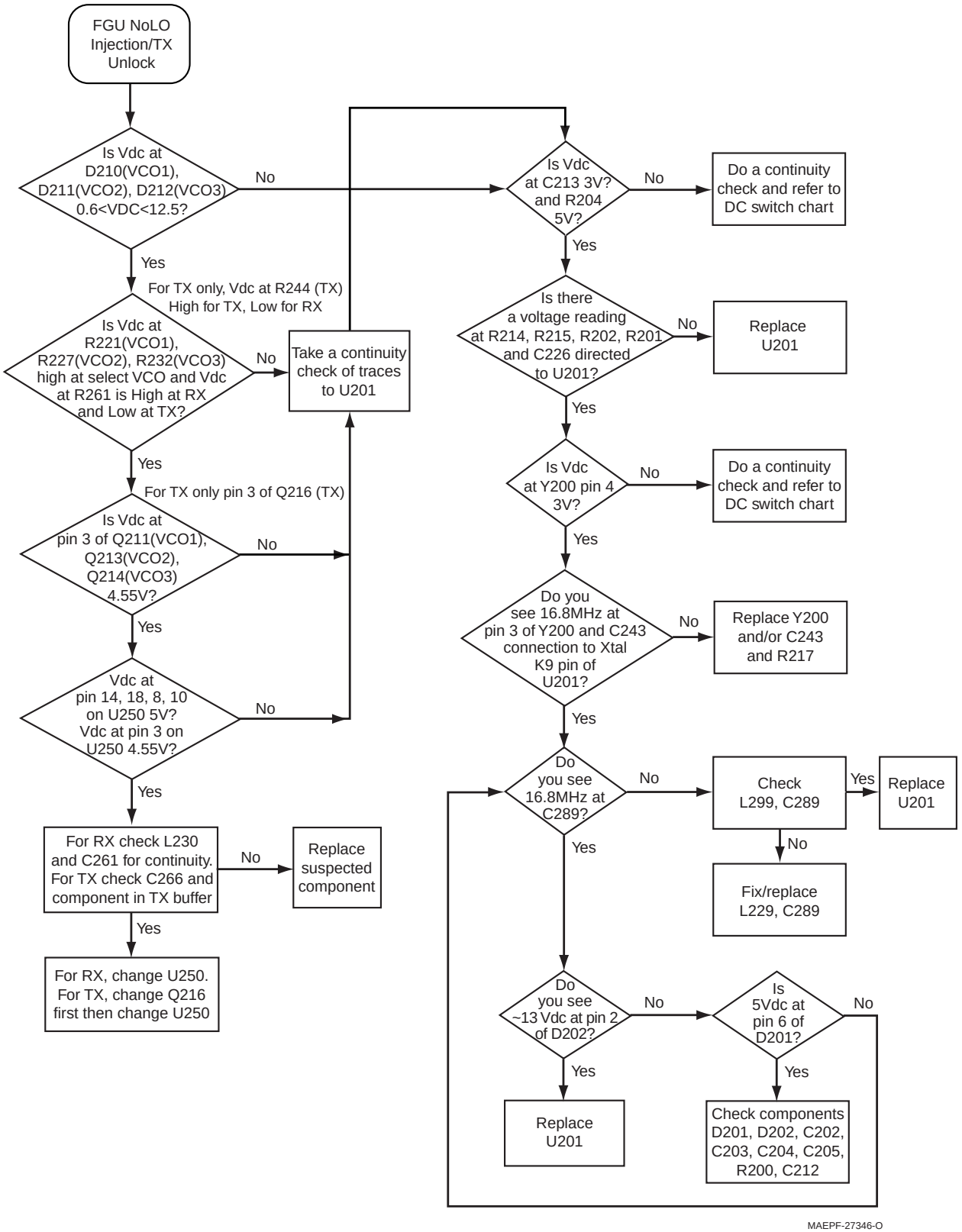
6.17 VOCON Receive Audio Troubleshooting Chart (1 of 2)



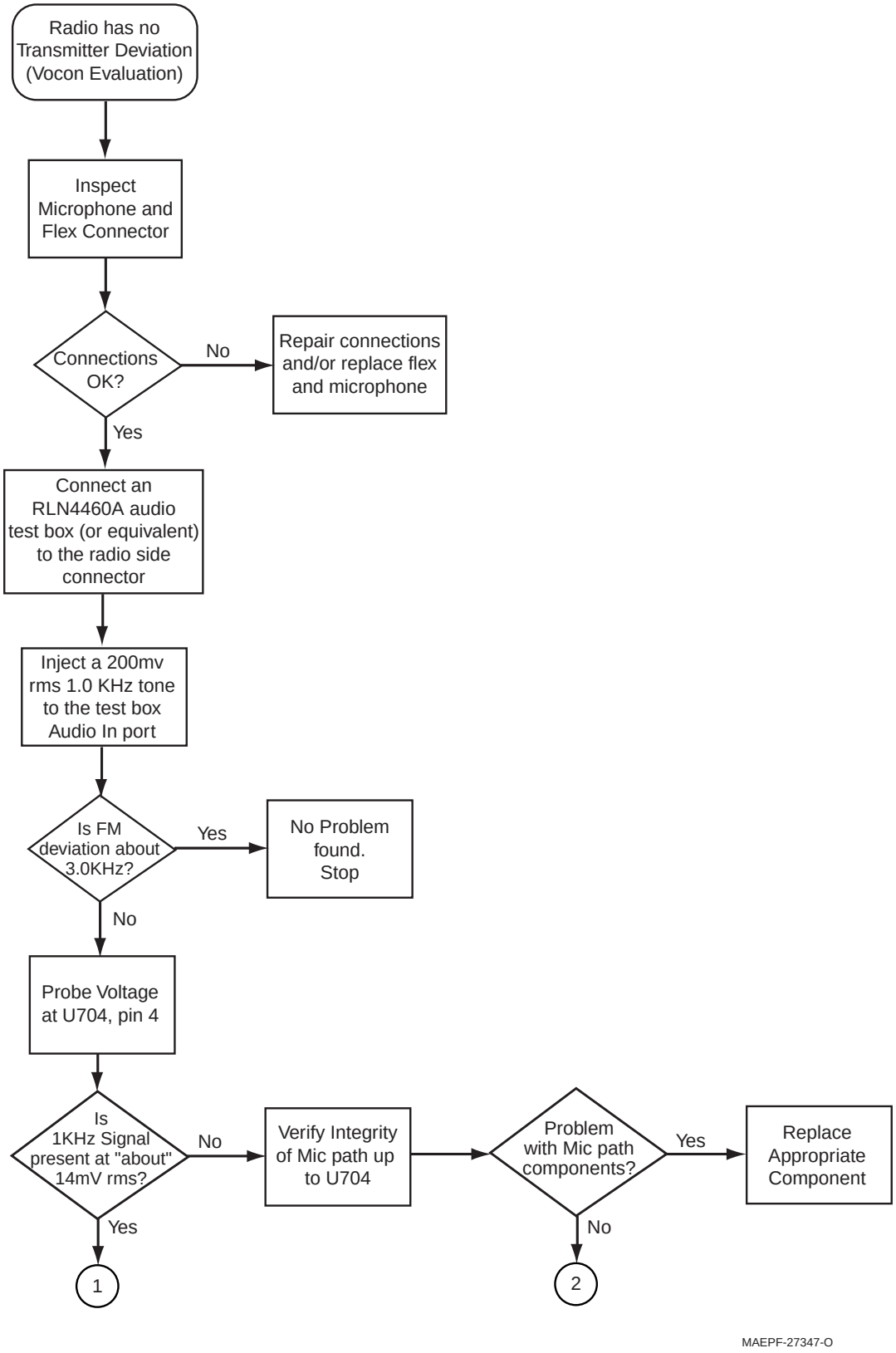
6.18 VOCON Receive Audio Troubleshooting Chart (2 of 2)



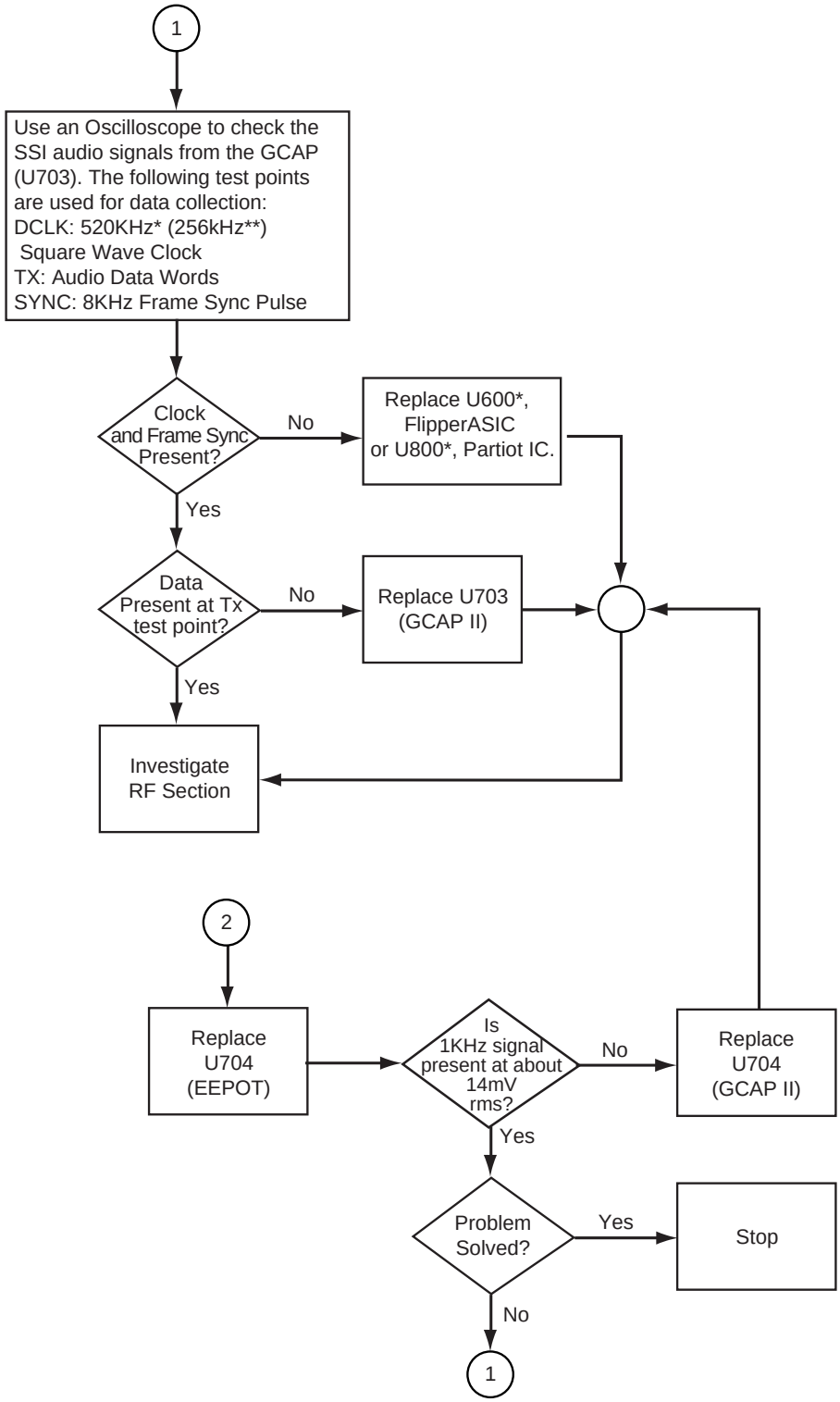
6.19 700/800 MHz Frequency Generation Unit Troubleshooting Chart



6.20 VOCON Transmit Audio Troubleshooting Chart (1 of 2)



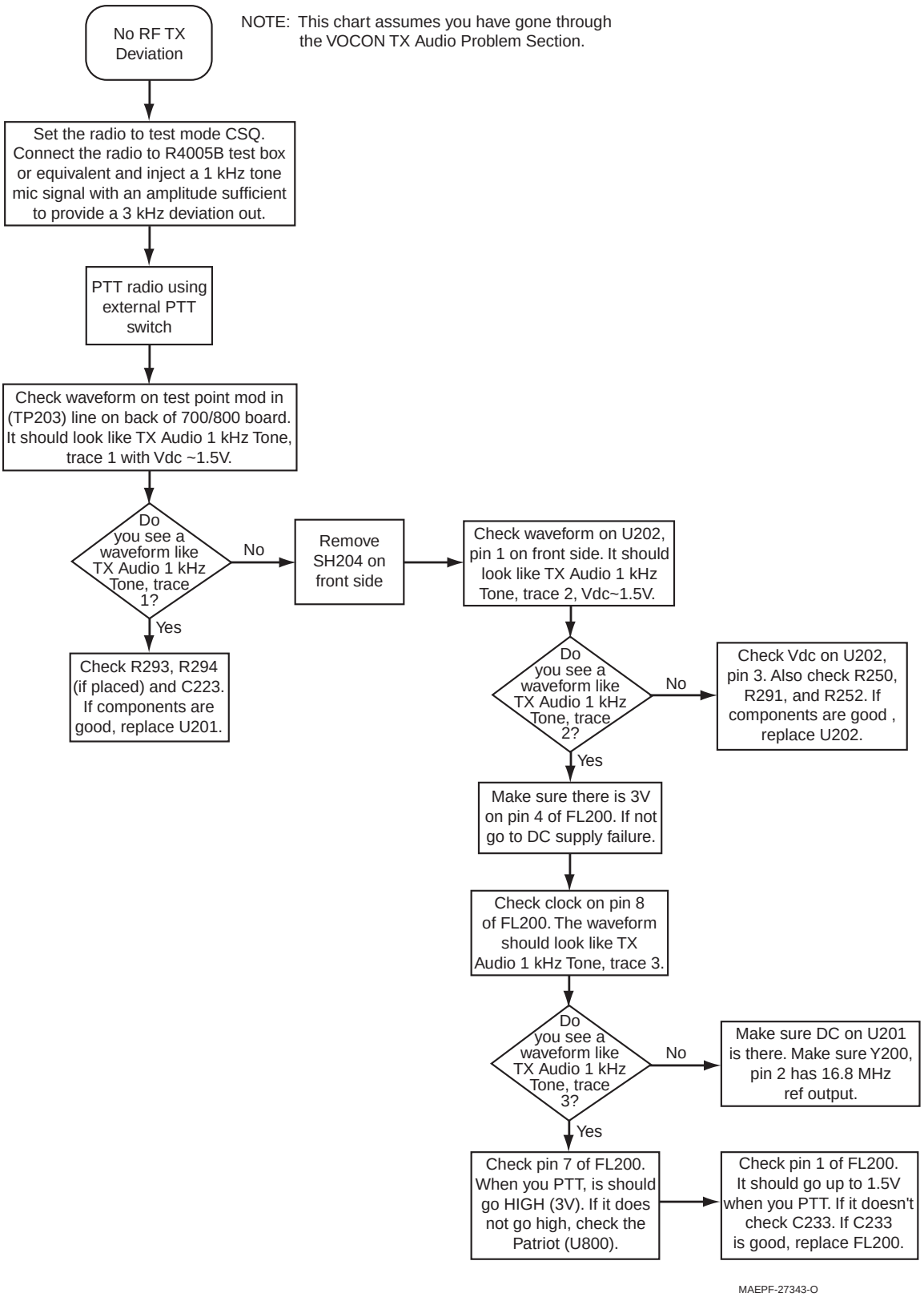
6.21 VOCON Transmit Audio Troubleshooting Chart (2 of 2)



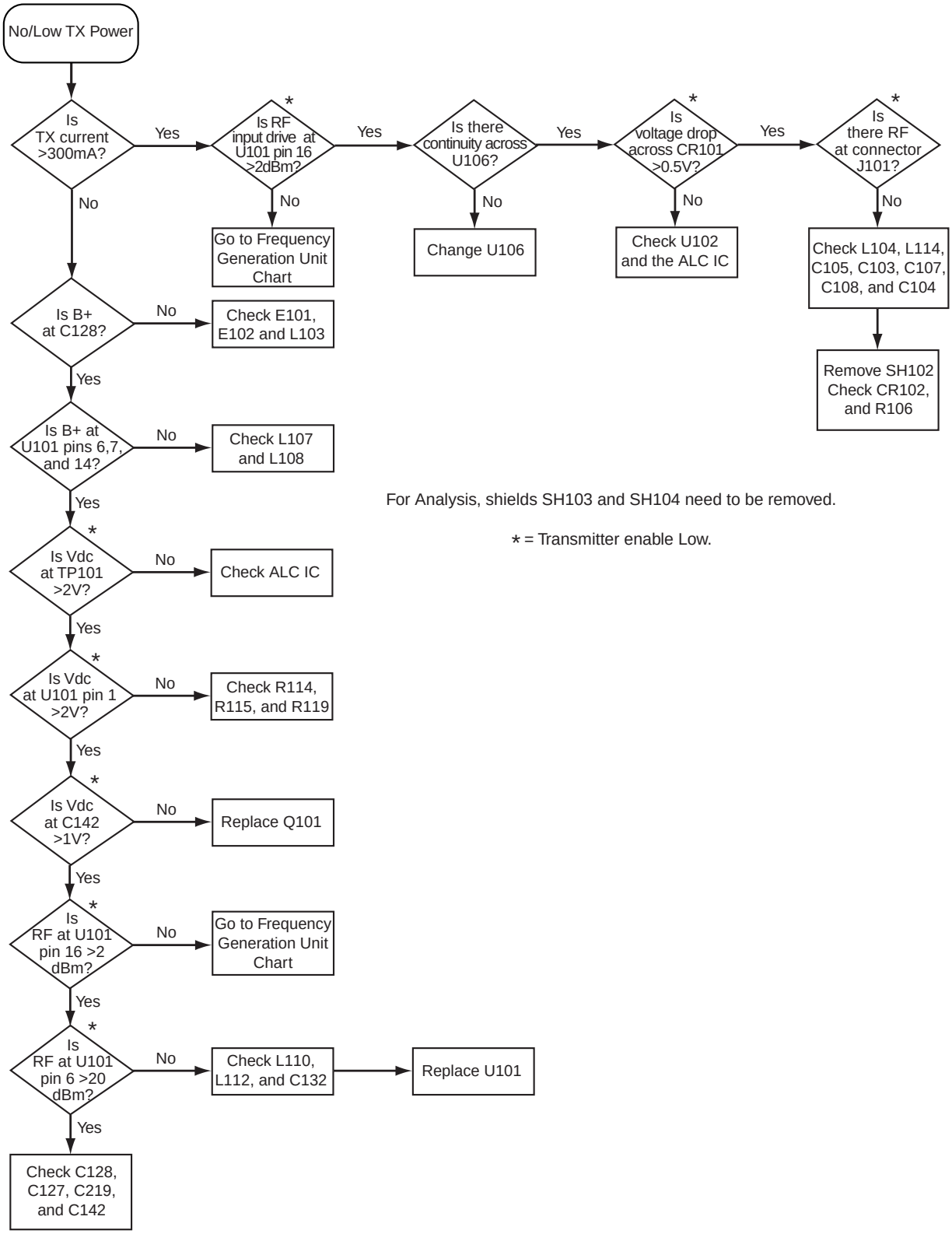
* affects kits NUF6541A and NUF6541D
**affects kit NUF6541G only

MAEPF-27348-O

6.22 No Transmit Deviation Troubleshooting Chart



6.23 700/800 MHz Transmitter RF Troubleshooting Chart



For Analysis, shields SH103 and SH104 need to be removed.

* = Transmitter enable Low.

MAEPF-27349-O

Chapter 7 Troubleshooting Waveforms

7.1 Introduction

This chapter contains images of waveforms that might be useful in verifying operation of certain parts of the circuitry. These waveforms are for reference only; the actual data depicted will vary depending upon operating conditions. This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radios Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

7.2 List of Waveforms

Table 7-1 lists each waveform and the page on which the waveform can be found.

Table 7-1. List of Waveforms

7.3 RF Test Points

The following RF block diagram and accompanying table (Table 7-2) shows the location of key probe points (PP) and test points (TP) for the XTS 2500 radio.

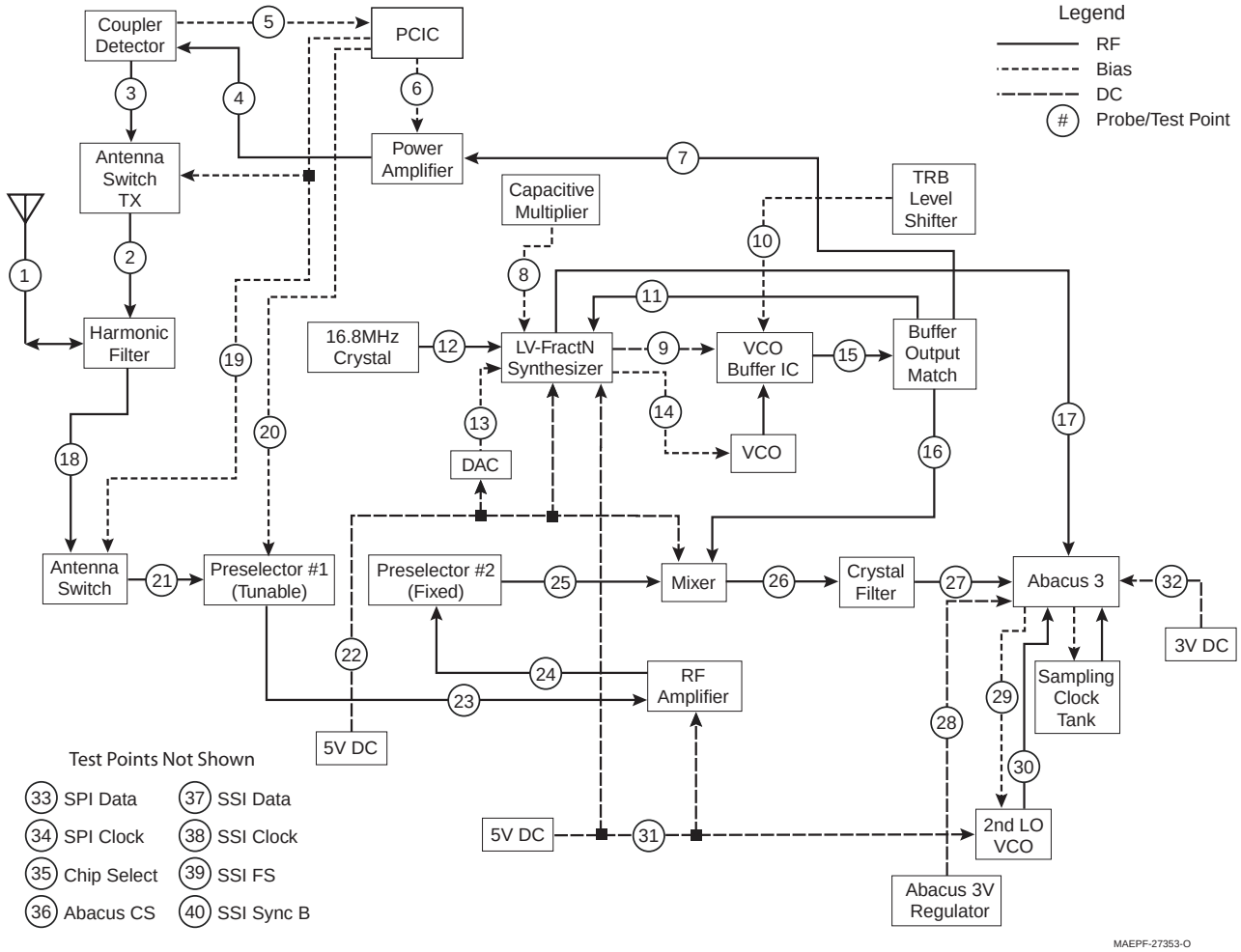


Figure 7-1. RF Block Diagram Test Points

Table 7-2. RF Block Diagram Probe/Test Points

PP/TP	Name	Location	Under RF Shield?	Page
1	Antenna Input	J101, pin 5	No.	7-6
2	TX Signal at Harmonic Filter Input	C105	Yes.	7-7
3	Coupler RF Out	U103, pin 1	No.	7-8
4	TX Signal at PA	Q101, pin 2	No.	7-9
5	Coupler RF Feedback to PCIC	TP102	No.	7-10
6	PCIC Control Voltage	TP101	No.	7-11
7	TX LO	SH205	No.	7-12
8	Higher Level Voltage Multiplier	C207	Yes.	7-13
9	Superfilter Output	C240	Yes.	7-14
10	TRB	TP001	No.	7-15
11	Prescalar Input to FracN Synthesizer	C236	Yes.	7-16
12	Reference Crystal Output	R217	No.	7-17
13	Mod In	TP203	No.	7-18
14	1st LO Control Voltage	TP202	No.	7-19
15	VCO Output	*	Yes.	7-20
16	VCO RX LO	C261	Yes.	7-21
17	Frequency Out (16.8 MHz)	SH202	No.	7-22
18	RX RF Input at Antenna Switch	FL1, pin 1	No.	7-23
19	Antenna Switch Bias	U103, pin 1	No.	7-24
20	Preselector Tuning Voltage	FL1, pin 3; FL2, pin 3	No.	7-25
21	RX RF Input after Antenna Switch	FL1, pin 1	No.	7-26
22	Analog 5V	U500, pin 5	No.	7-27
23	Preselector 1 Output	FL1, pin 2	No.	7-28
24	Low-Noise Amplifier Output	FL2, pin 1	No.	7-29
25	Preselector 2 Output	FL2, pin 2	No.	7-30
26	Mixer Out (IF)	SH1	No.	7-31
27	Crystal Filter Out	SH2	No.	7-32
28	Abacus Analog 3V	U501, pin 5	No.	7-33
29	2nd LO Control Voltage	U401, pin 38	Yes.	7-34
30	2nd LO VCO Buffer Output	SH402	No.	7-35
31	Analog 5V	U500, pin 5	No.	7-36
32	Abacus Digital 3V	U502, pin 5	No.	7-37
33	SPI Data	R802	No.	7-44
34	SPI CLK	R803	No.	7-45
35	Universal Chip Select	U102, pin 29	Yes.	7-46

Table 7-2. RF Block Diagram Probe/Test Points (Continued)

PP/TP	Name	Location	Under RF Shield?	Page
36	Abacus Chip Select	U401, pin 25	Yes.	7-47
37	RX SSI Data	TP403	No.	7-48
38	RX SSI Clock	TP404	No.	7-49
39	RX SSI Frame Sync	TP402	No.	7-50
40	Rx SSI Sync B	TP401	No.	7-51

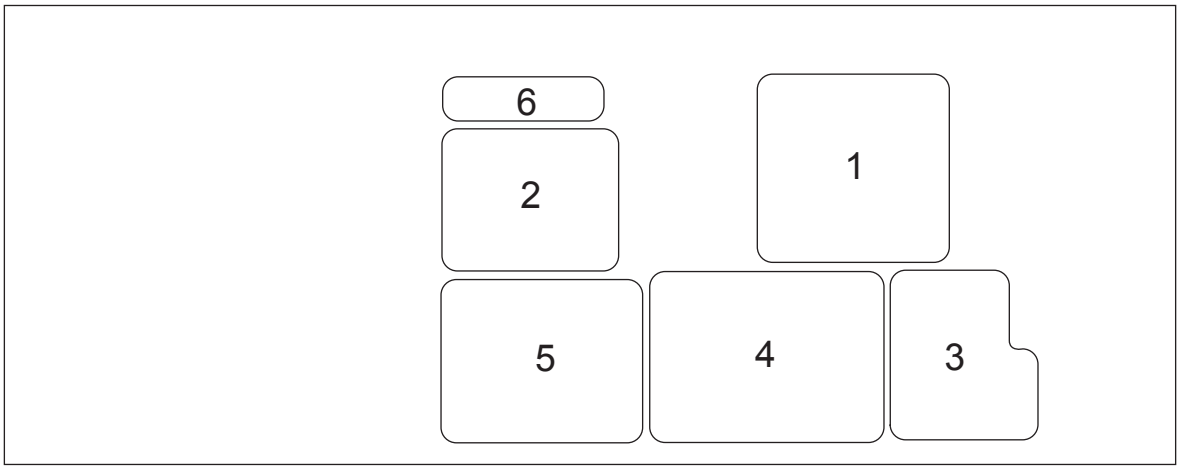
PP = Probe Point
TP = Test Point

* C261 for LO Output
C266 for TX Output
C236 for Preselector Output

Note: For test/probe points indicated with the SH prefix, use an HP 85024A High Frequency Probe to detect a signal. The probe should be placed in center of the hole located on the top of the shield. Make sure the probe does not touch the shield or any other components.

7.4 Main Circuit Board RF Shield Locations

Viewed from Side 1

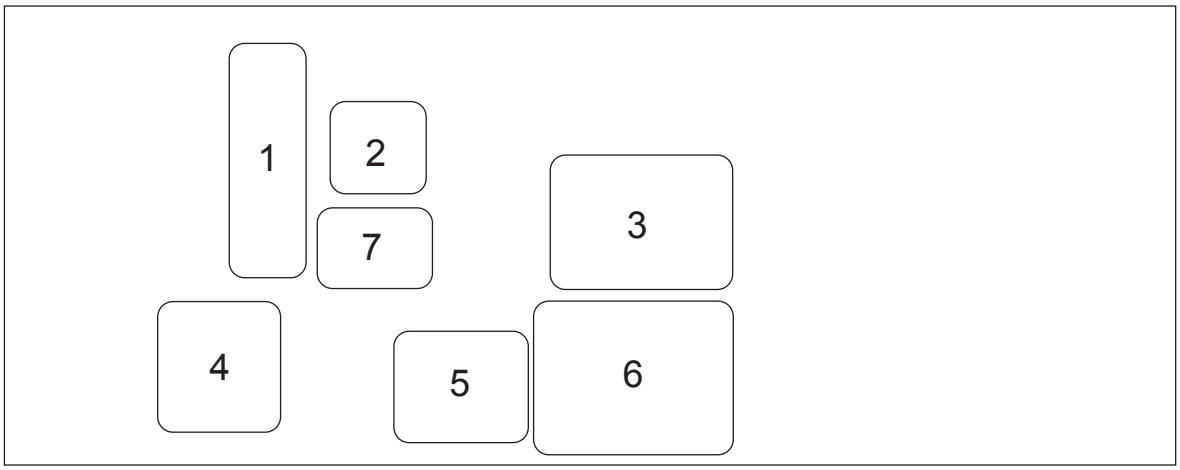


MAEPF-27489-O

Table 7-3. Main Circuit Board Side 1 RF Shields

Item Number	Reference Number	Motorola Part Number	Description
1	SH401	2685089D01	Shield, ABACUS
2	SH201	2685081D01	Shield, Synthesizer
3	SH103	2685083D01	Shield, Harmonic Top
4	SH104	2685085D01	Shield, PA
5	SH205	2685086D01	Shield, VCO Top
6	SH204	2685241D01	Shield, DAC

Viewed from Side 2

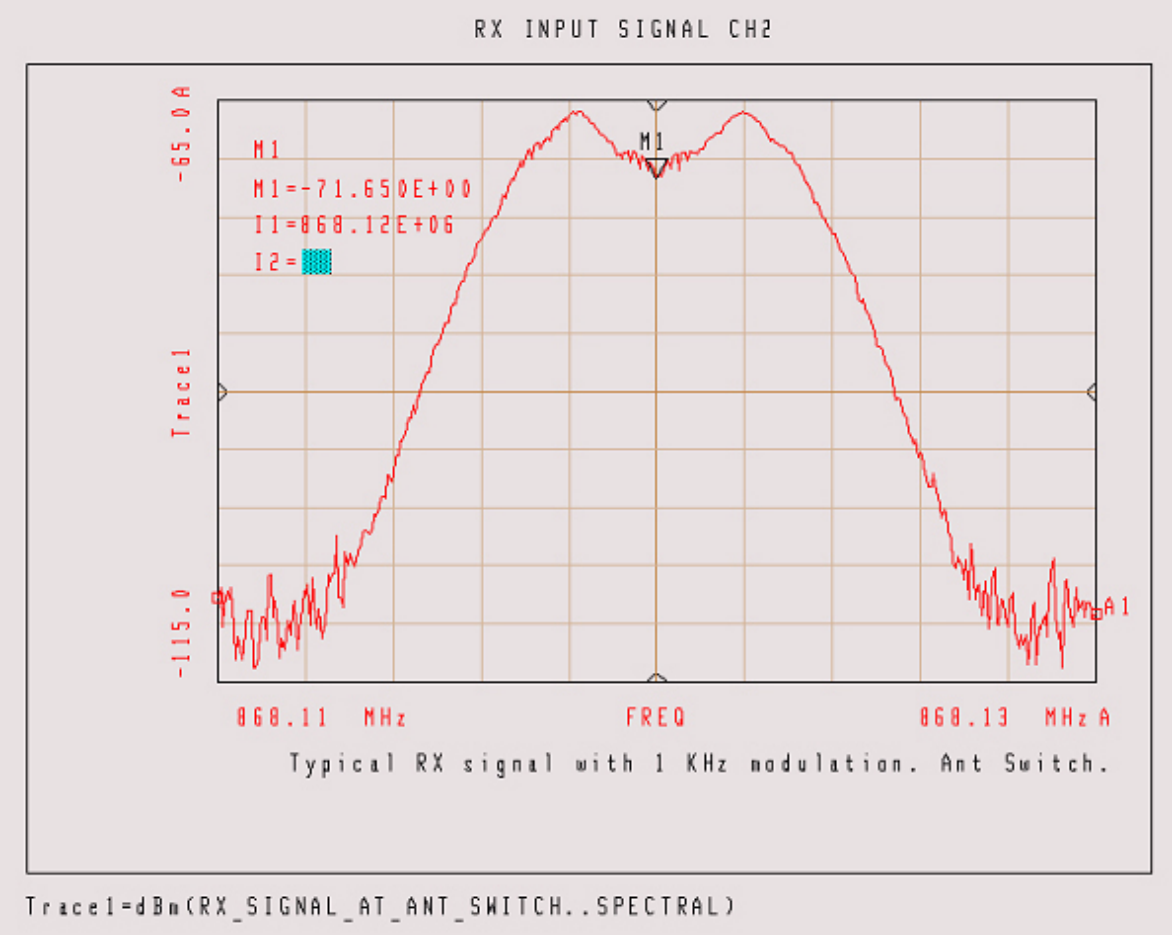


MAEPF-27488-O

Table 7-4. Main Circuit Board Side 2 RF Shields

Item Number	Reference Number	Motorola Part Number	Description
1	SH1	2685090D01	Shield, Mixer
2	SH402	2685080D01	Shield, 2nd LO
3	SH202	2685088D01	Shield, Frac-N
4	SH102	2685084D01	Shield, Harmonic Bottom
5	SH101	2685082D01	Shield, PCIC
6	SH203	2685087D01	Shield, VCO Bottom
7	SH2	2685242D01	Shield, Crystal IF

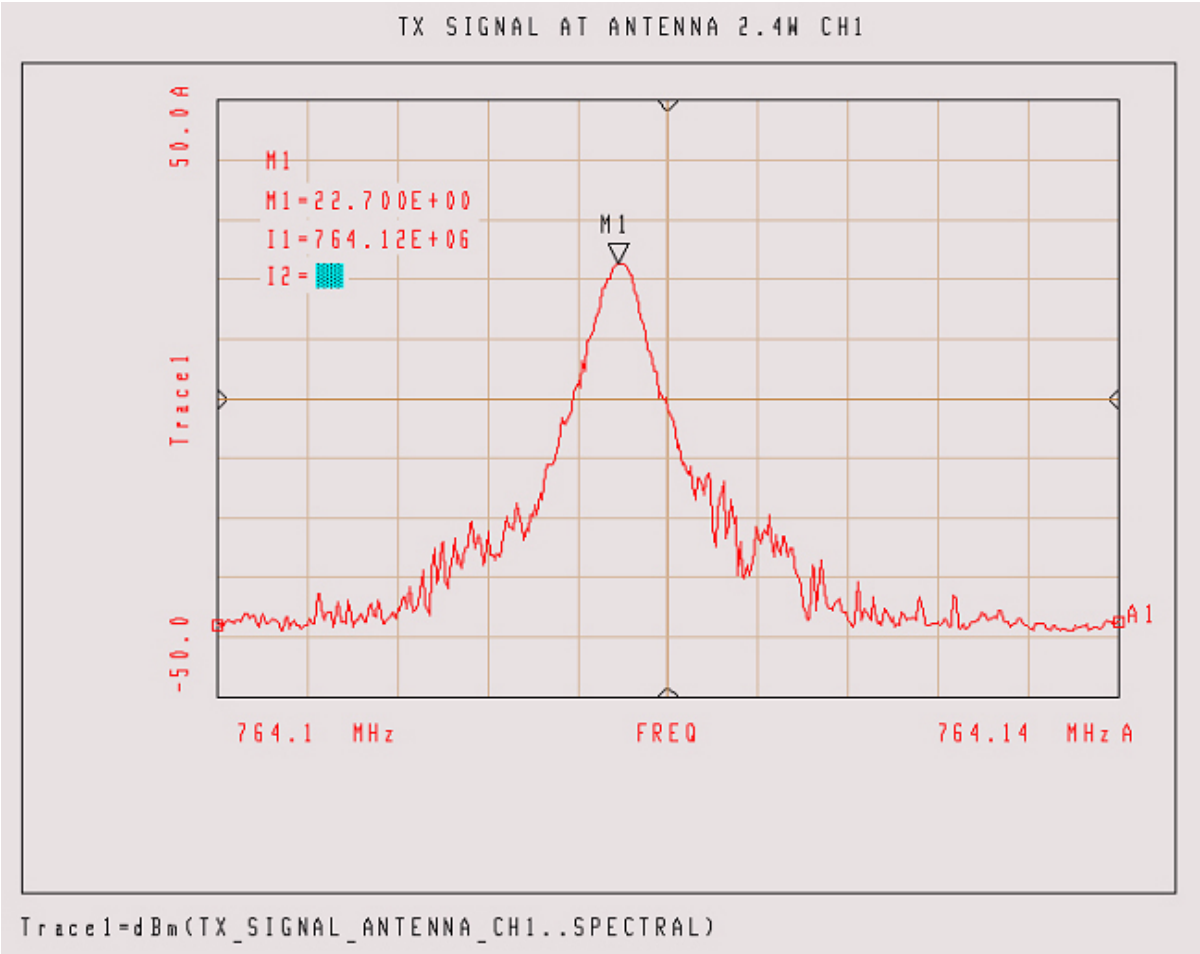
7.5 PP1 Antenna Input



Probe point: J101, pin 5.

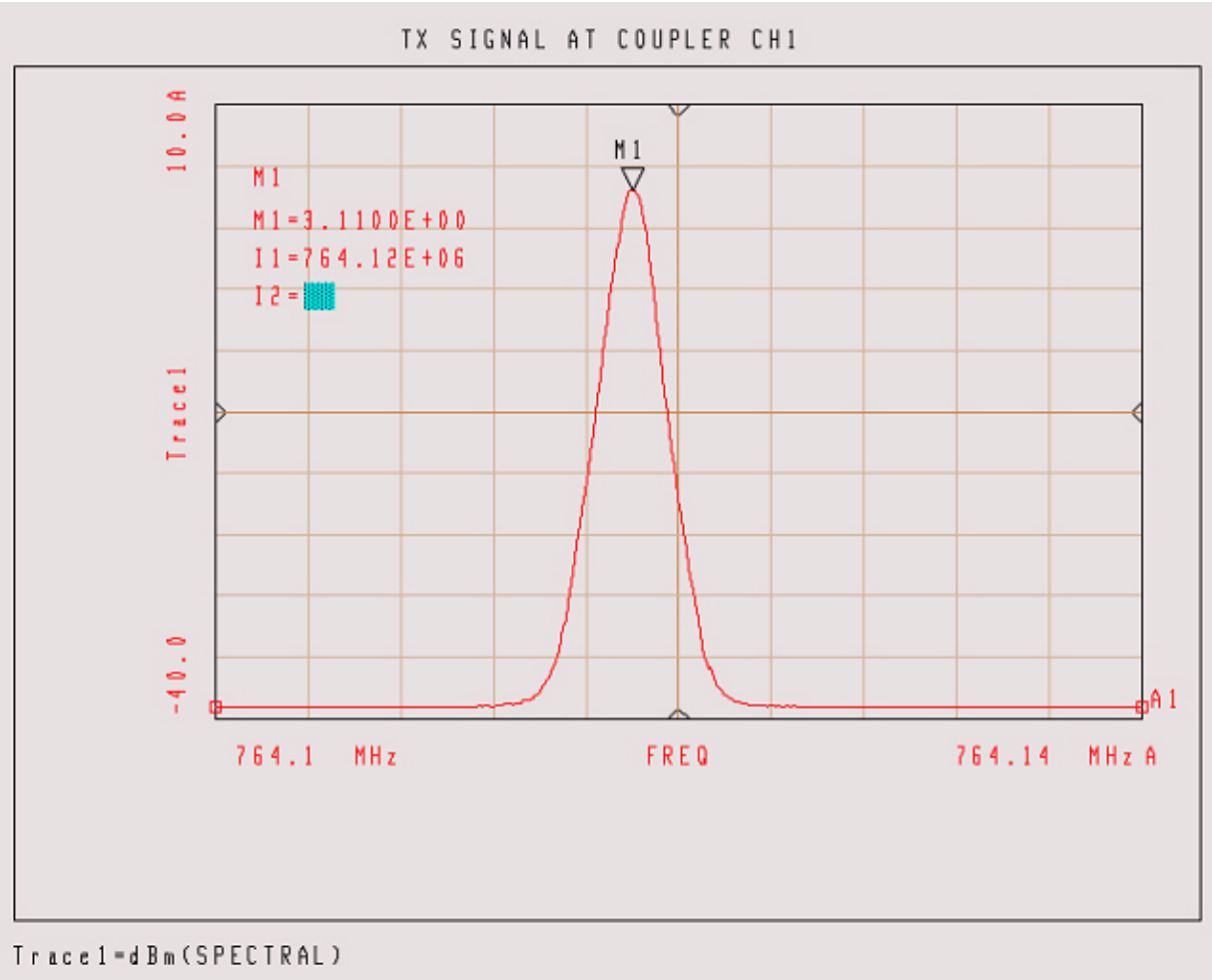
Typical RX signal with 1 kHz modulation. Display shows modulation components of carrier.

7.6 PP2 TX Signal at Harmonic Filter Input



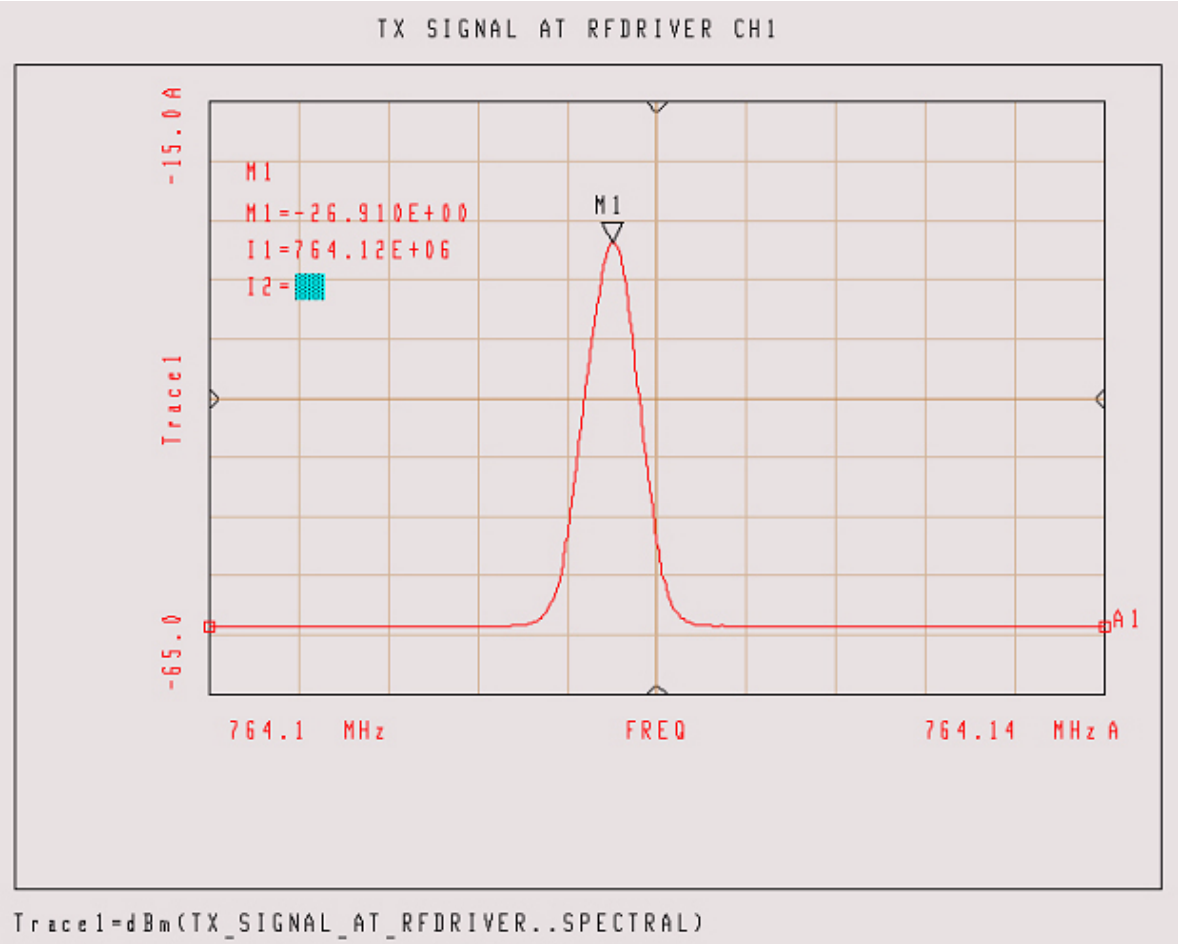
Probe point: C105 (located under shield).

7.7 PP3 Coupler RF Out



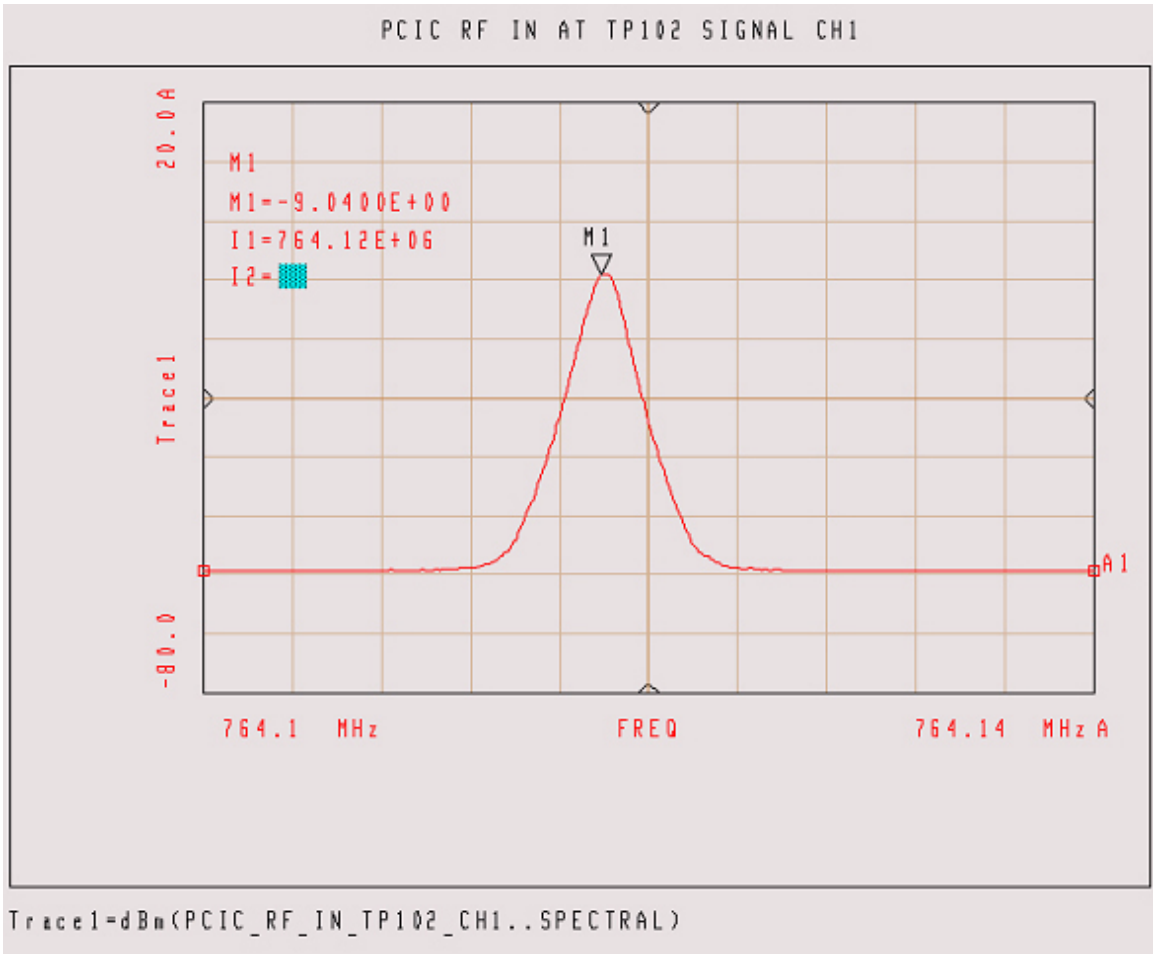
Probe point: U103, pin 1.

7.8 PP4 TX Signal at PA



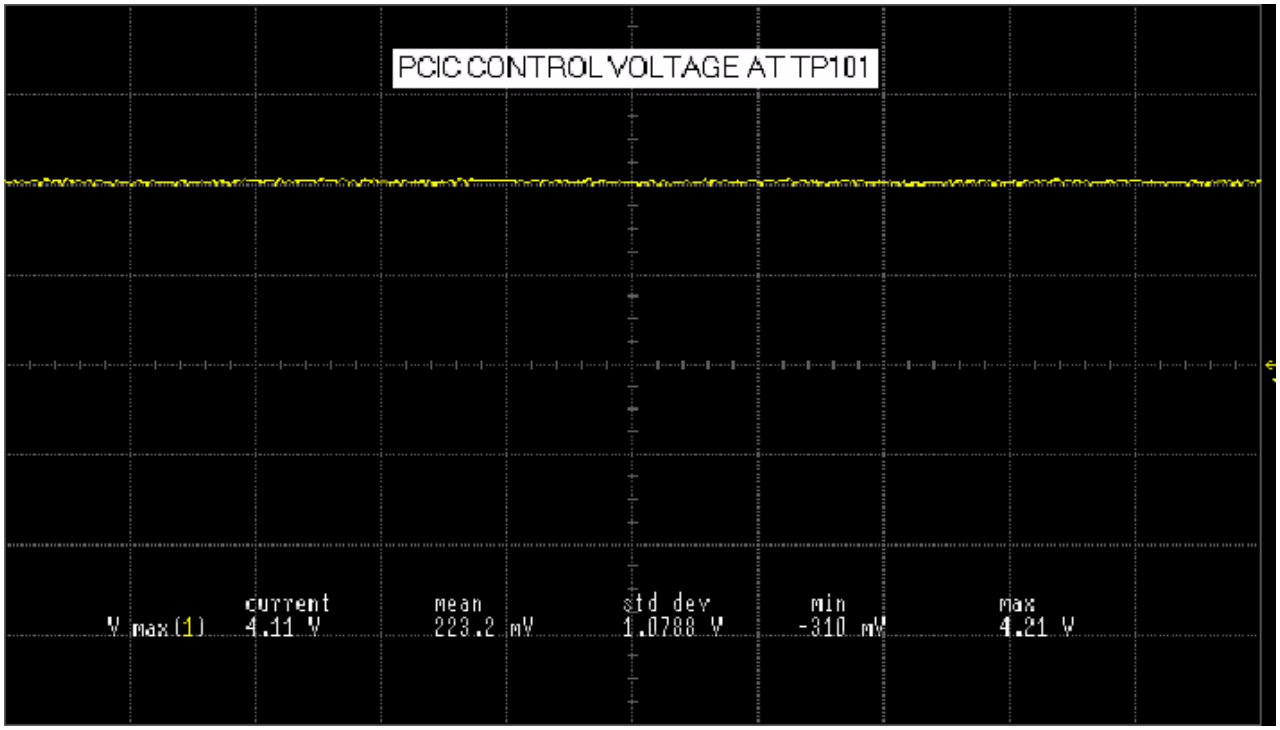
Probe point: Q101, pin 2.

7.9 TP5 Coupler RF Feedback to PCIC



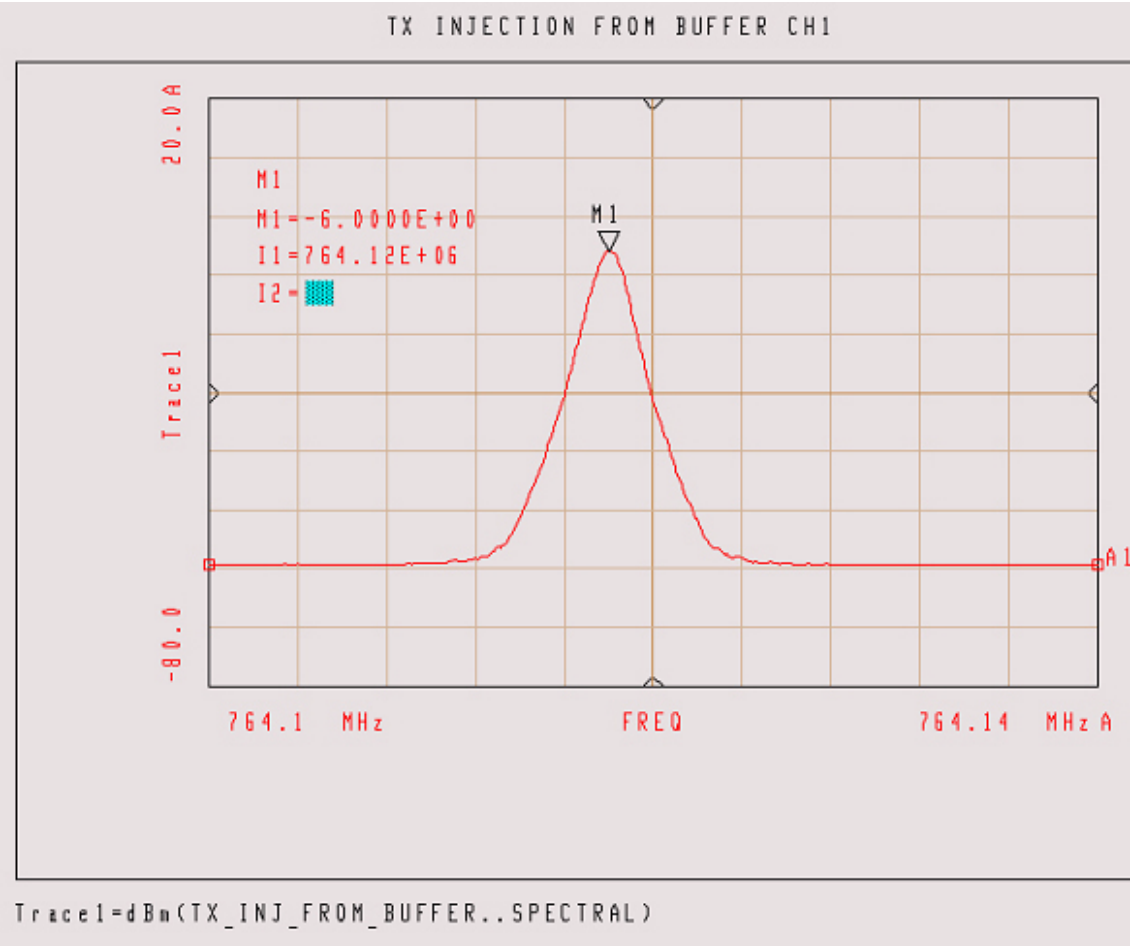
Test point: TP102.

7.10 TP6 PCIC Control Voltage



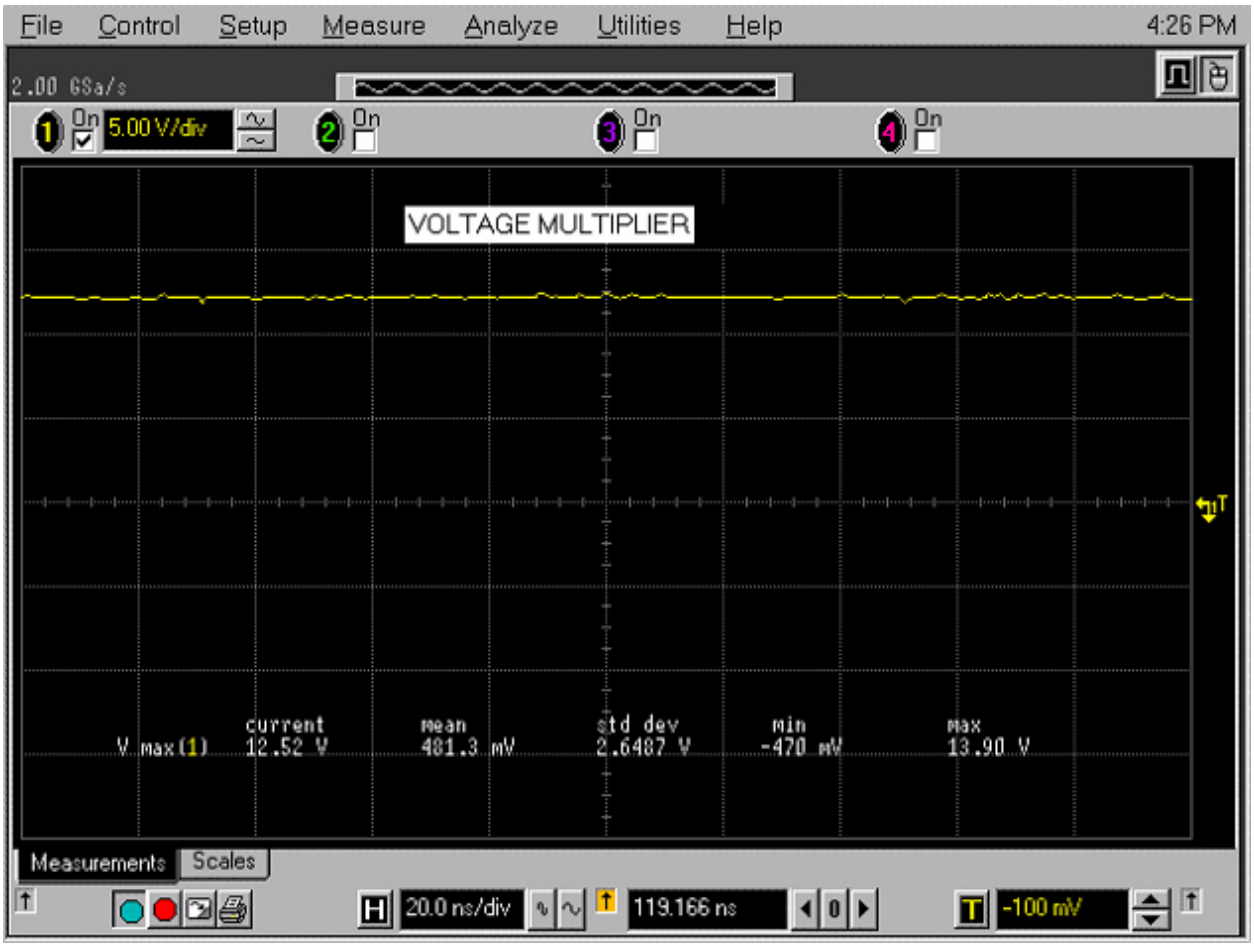
Test point: TP101.

7.11 PP7 TX LO



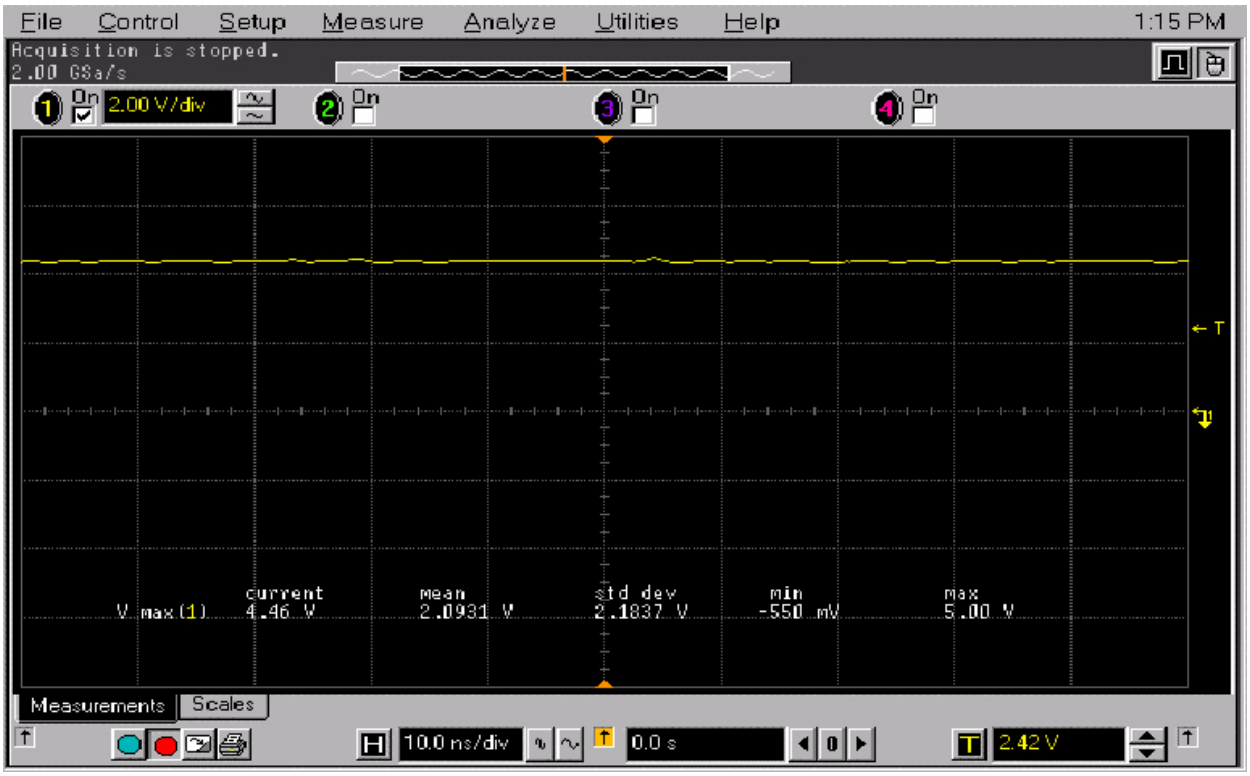
Probe point: Shield SH205.

7.12 PP8 Higher Level Voltage Multiplier



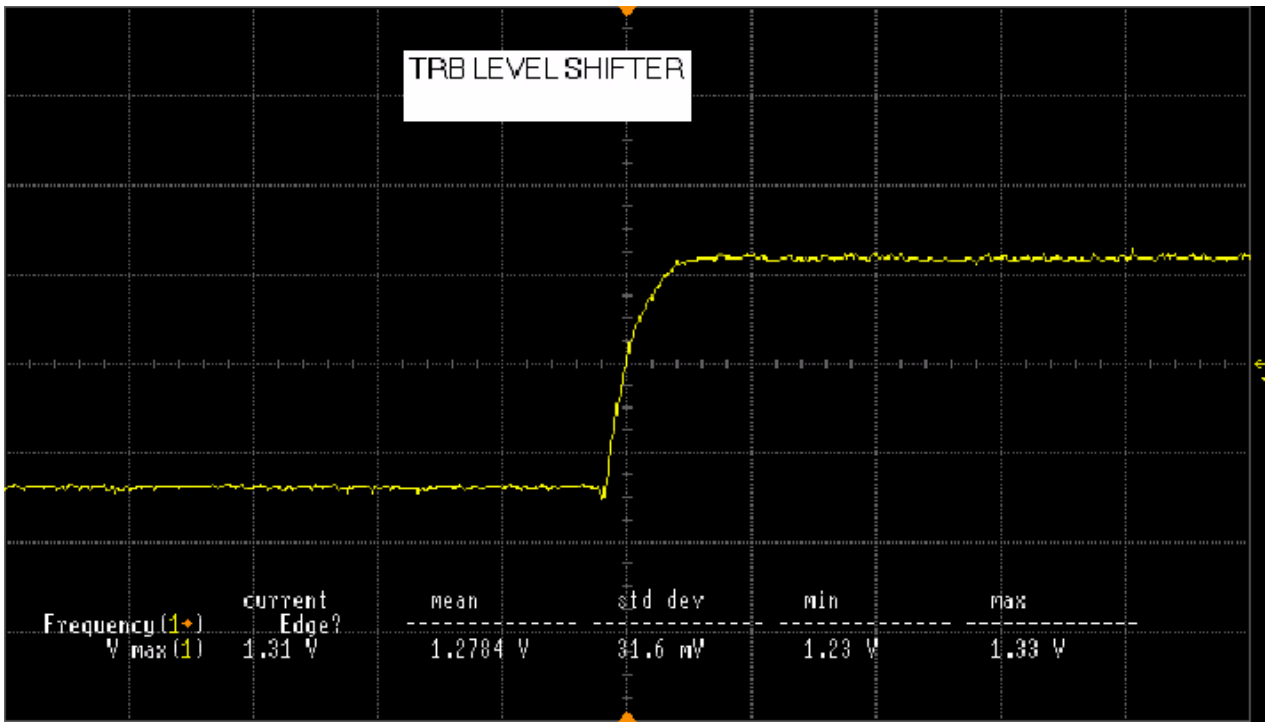
Probe point: C207 (located under shield).

7.13 PP9 Superfilter Output



Probe point: C240 (located under shield).

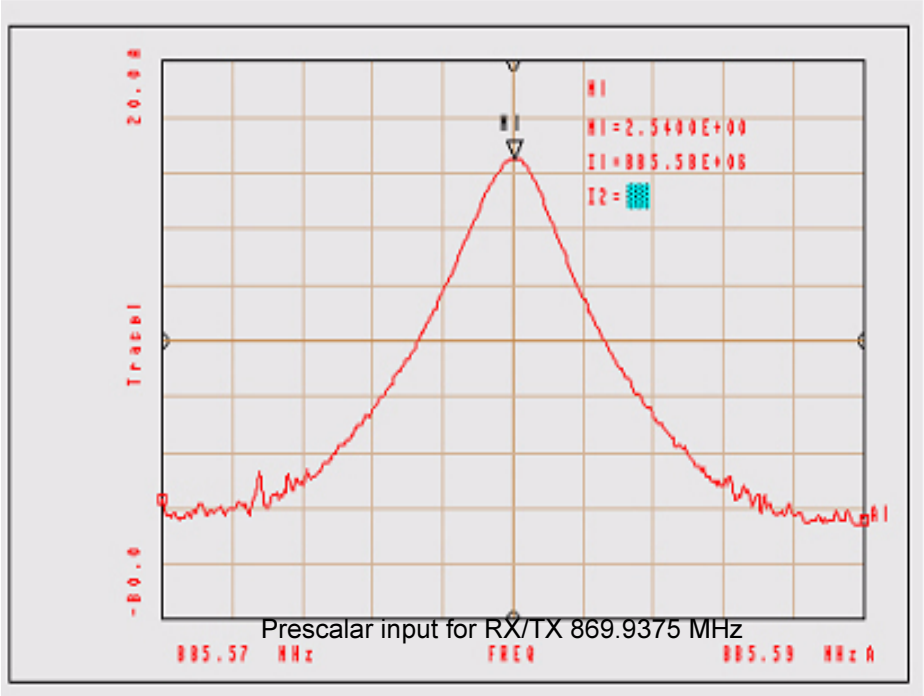
7.14 TP10 TRB



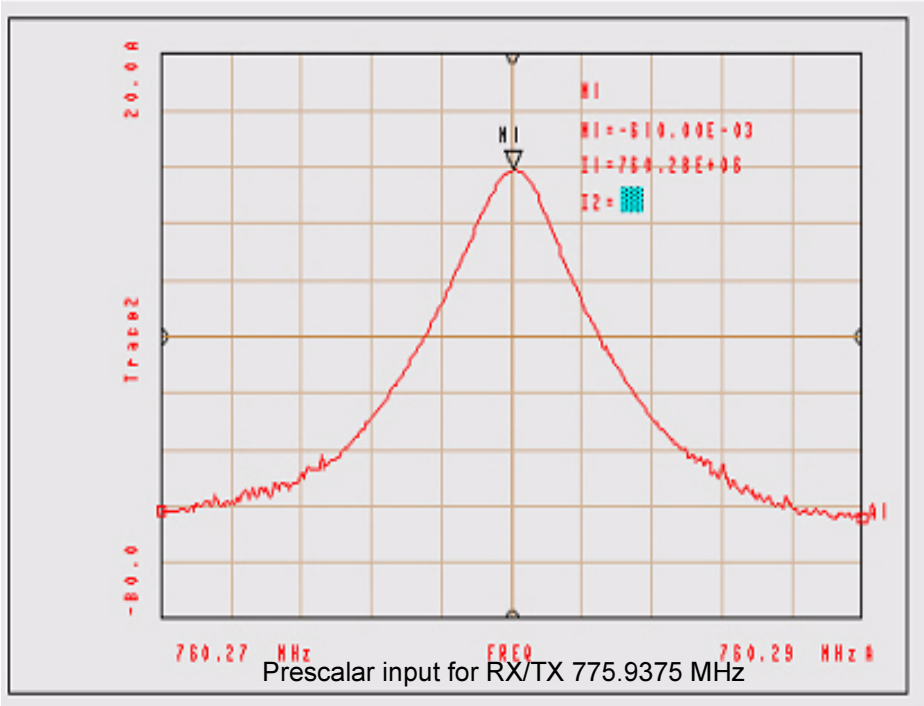
Test point: TP001.

Signal shows transition between RX mode (low) and TX mode (high).

7.15 PP11 Prescalar Input to FracN Synthesizer



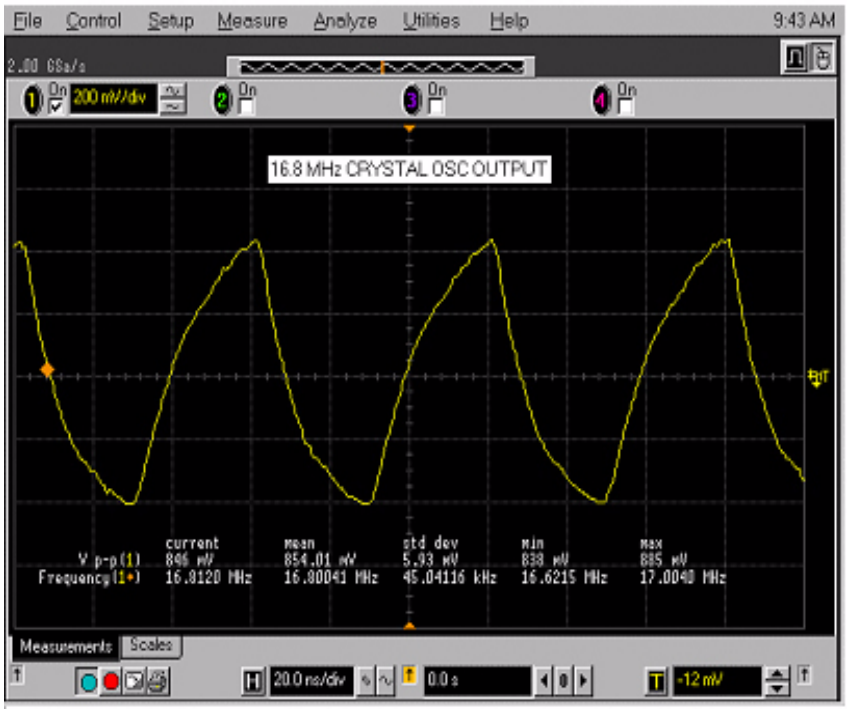
Prescalar input for RX/TX 869.9375 MHz

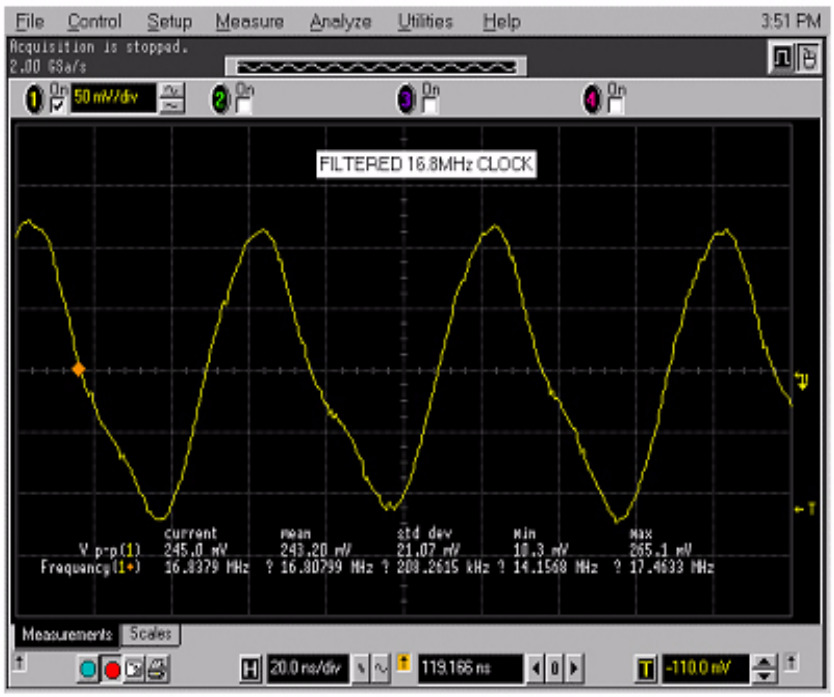


Prescalar input for RX/TX 775.9375 MHz

Probe point: C236 (located under shield).

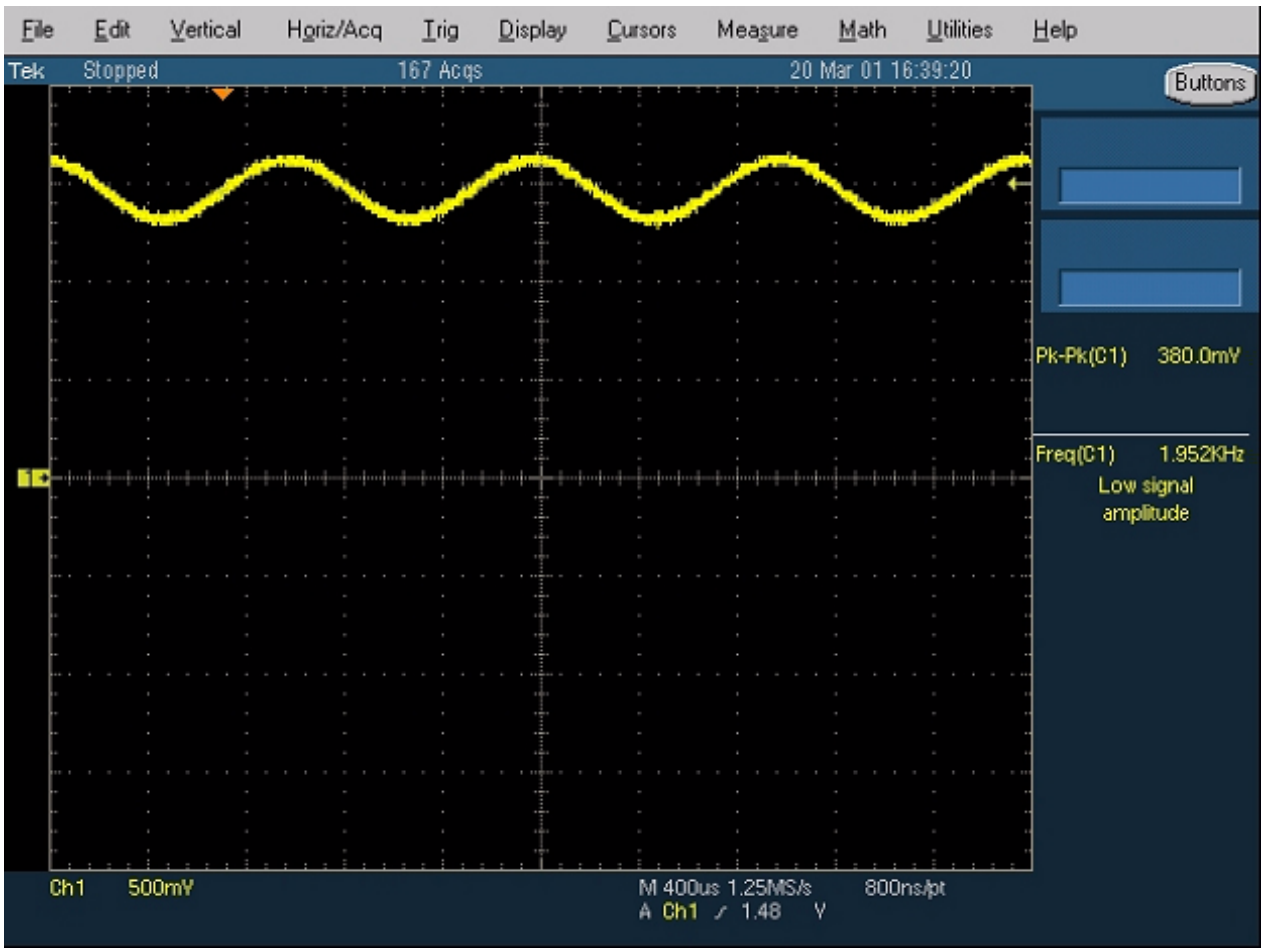
7.16 PP12 Reference Crystal Output





Probe point: R217.
Crystal output AC coupled. Peak-to-peak value is accurate.

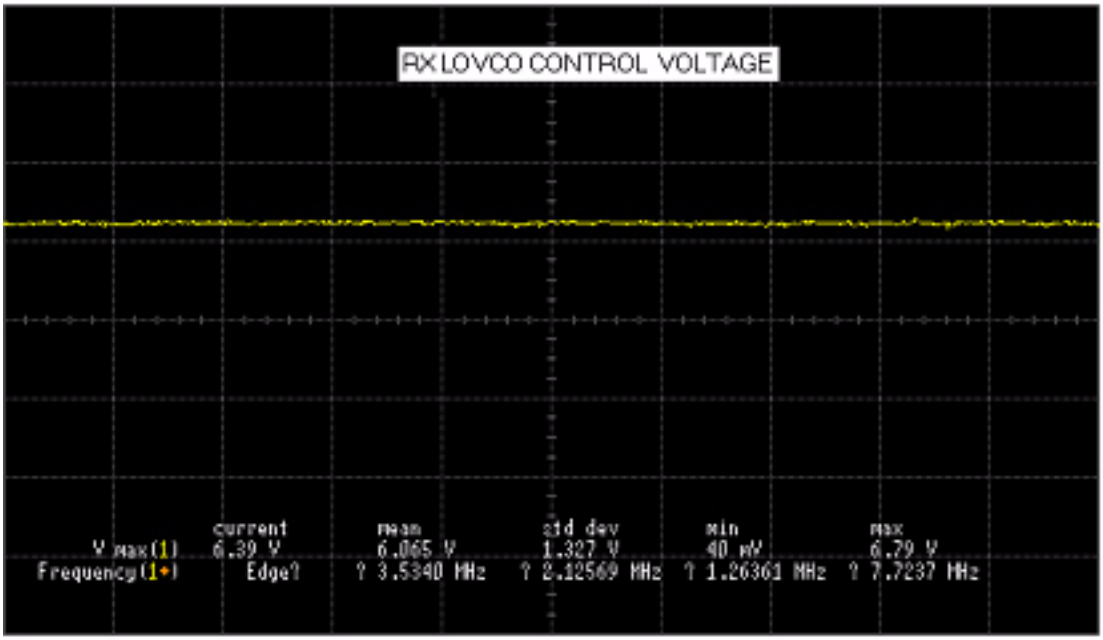
7.17 TP13 Mod In

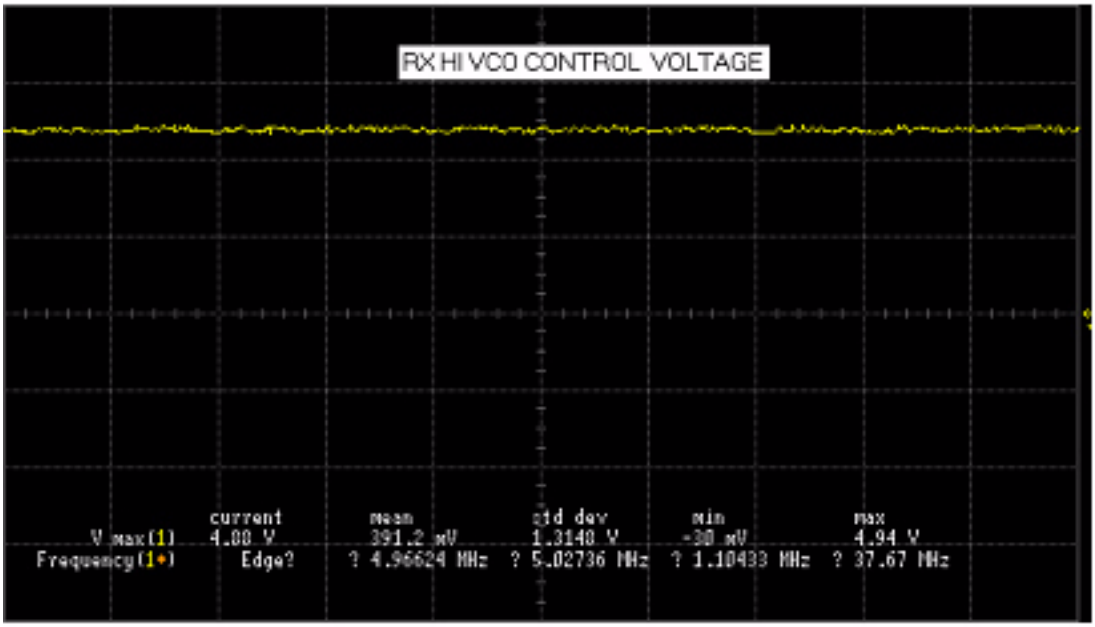


Test point: TP203.

7.18 TP14 1st LO Control Voltage

Typical value when tuned to receive at 758.475 MHz.



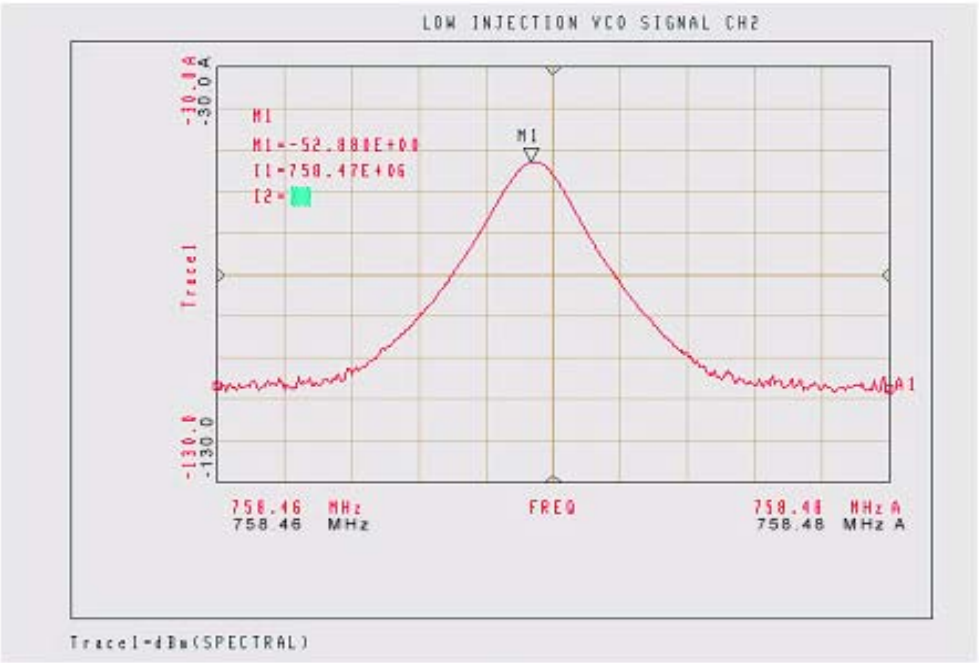


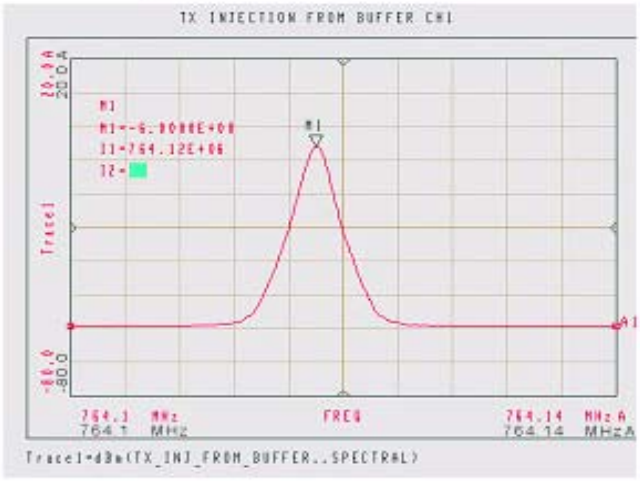
Typical value when tuned to receive at 873.775 MHz.

Test point TP202

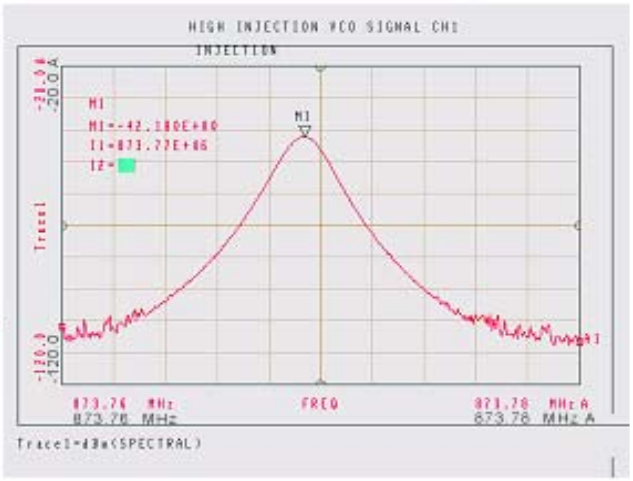
7.19 PP15 VCO Output

RX VCO LOW Injection





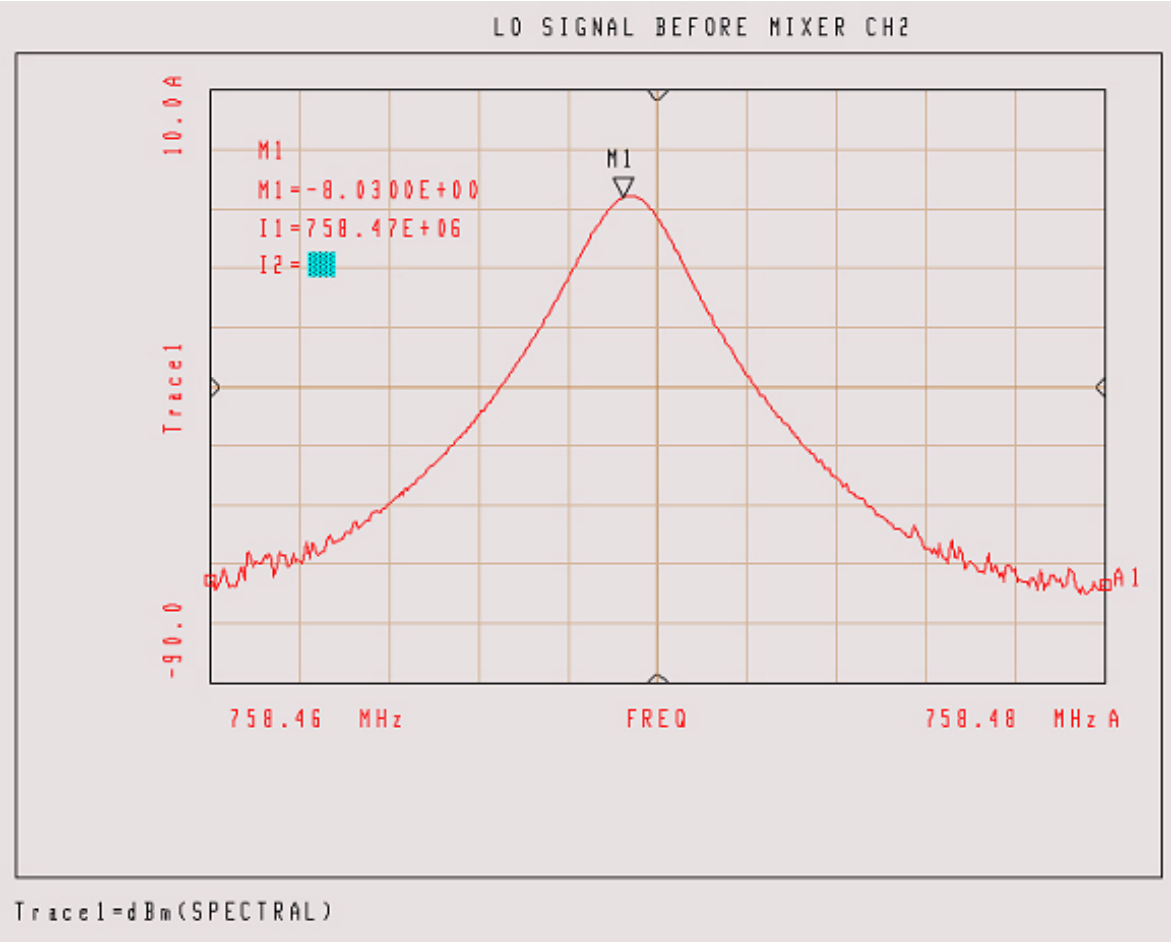
TX VCO



RX VCO HIGH Injection

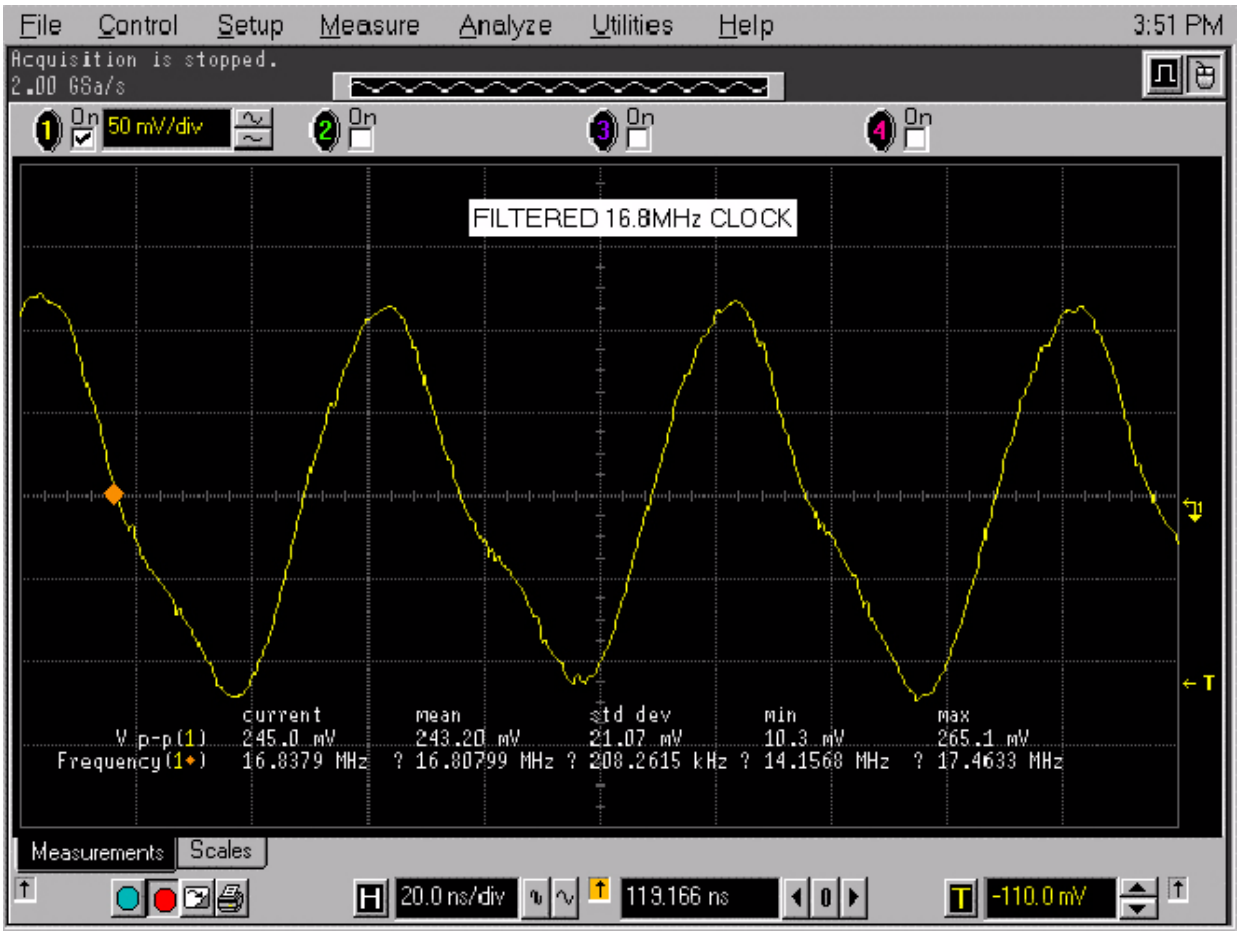
Probe point: C261 for LO Output (located under shield)
C266 for TX Output (located under shield)
C236 for Preselector Output (located under shield).

7.20 PP16 VCO RX LO



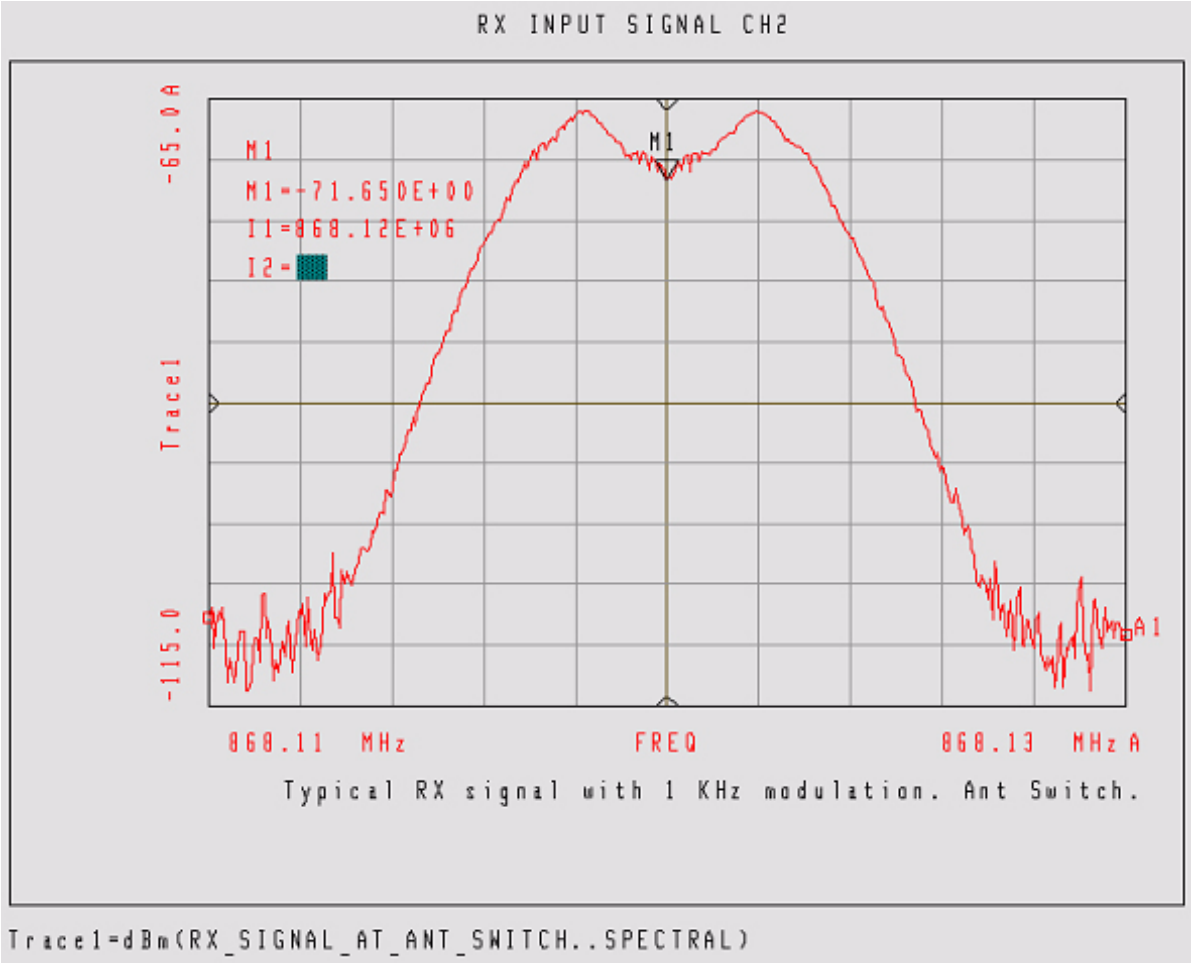
Probe point: C261 (located under shield).

7.21 PP17 Frequency Out (16.8 MHz)



Probe point: Shield SH202.

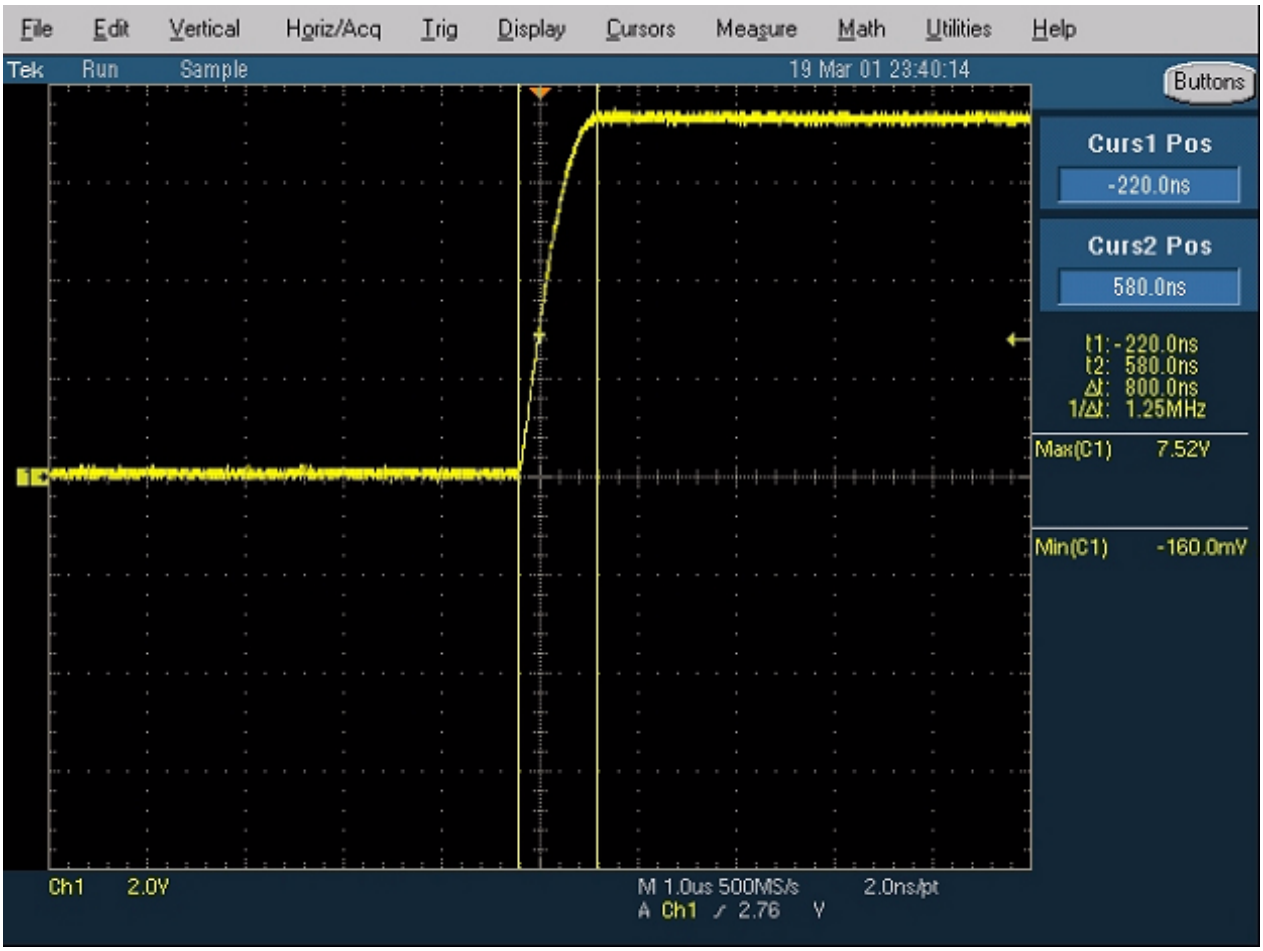
7.22 PP18 RX RF Input at Antenna Switch



Probe point: FL1, pin 1.

Typical RX signal with 1 kHz modulation. Display shows modulation components of carrier.

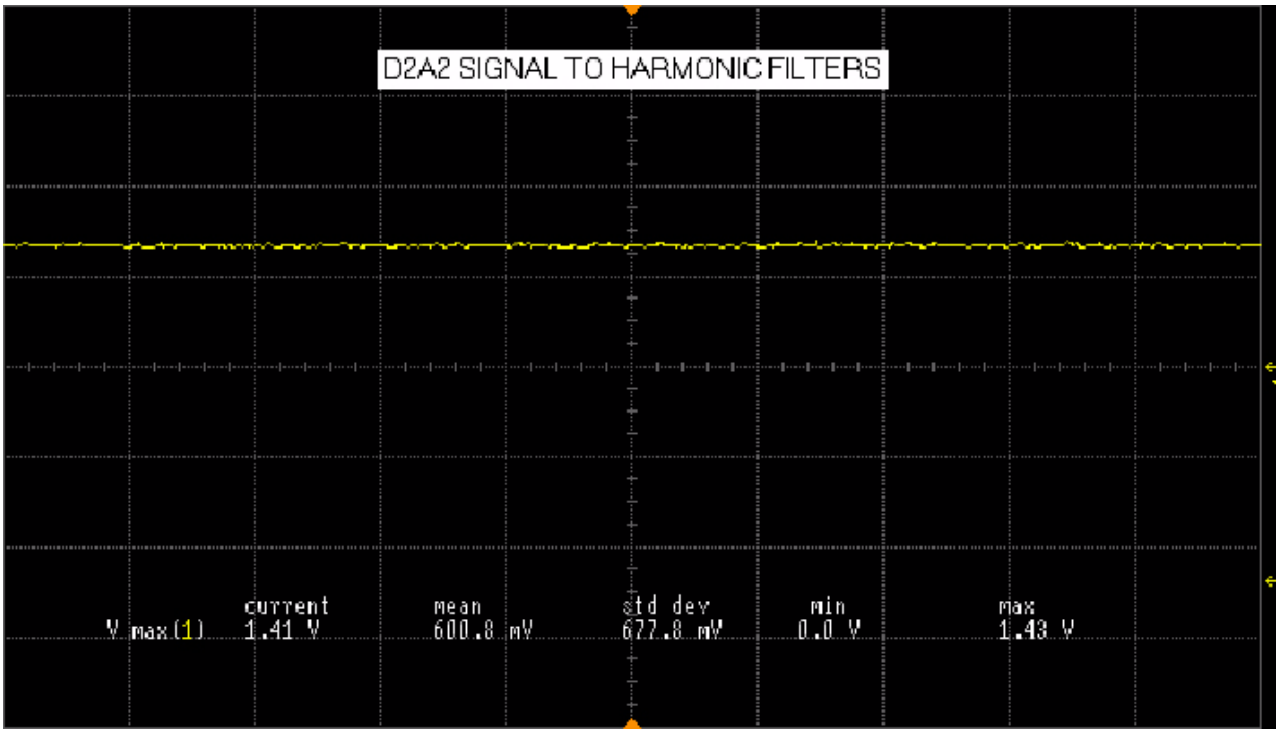
7.23 PP19 Antenna Switch Bias



Probe point: U103, pin 1.

Display shows transition between RX mode (low) and TX mode (high).

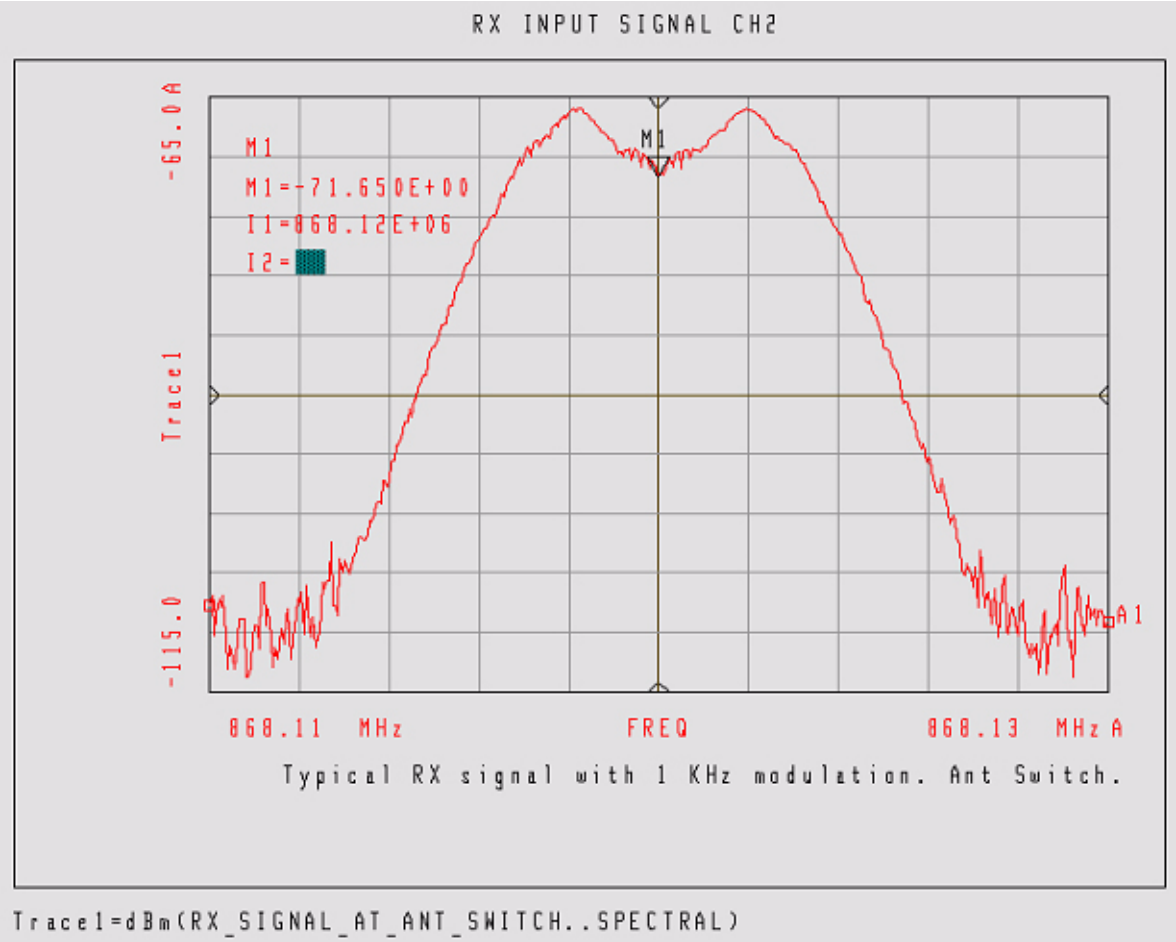
7.24 PP20 Preselector Tuning Voltage



Probe point: FL1, pin 3; FL2, pin 3.

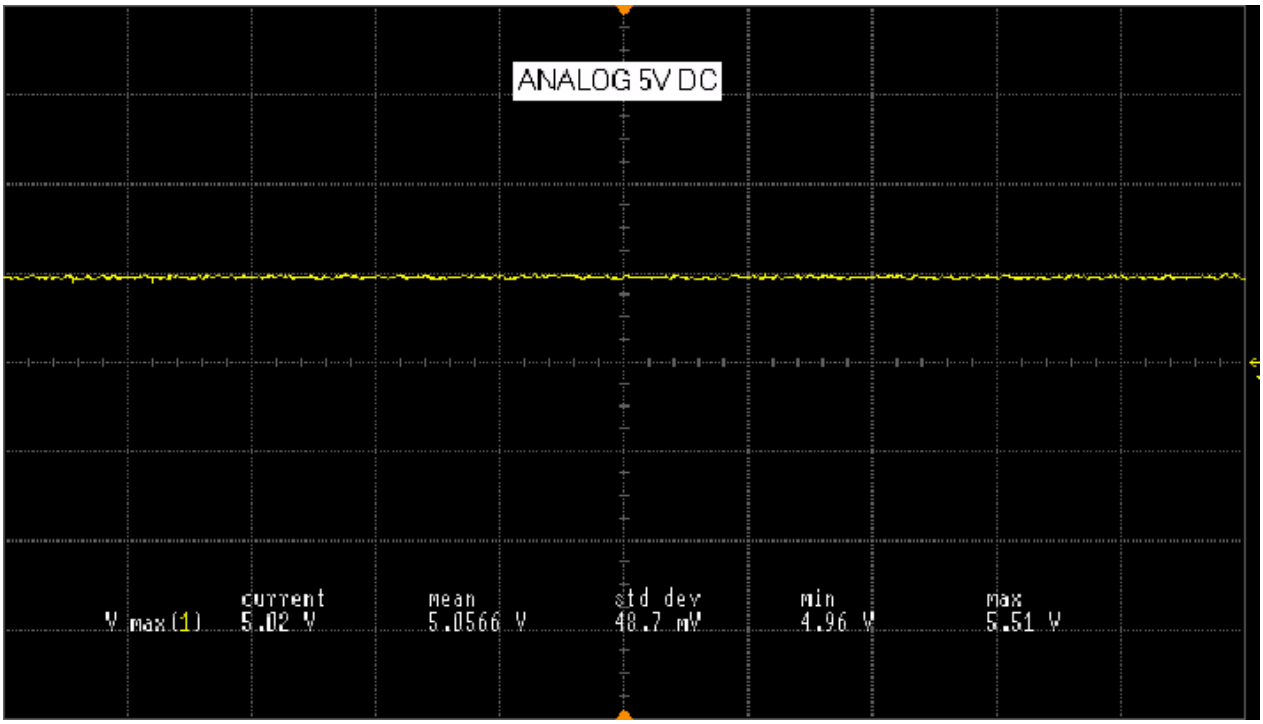
This is a typical value when tuned to receive at 764.125 MHz.

7.25 PP21 RX RF Input after Antenna Switch



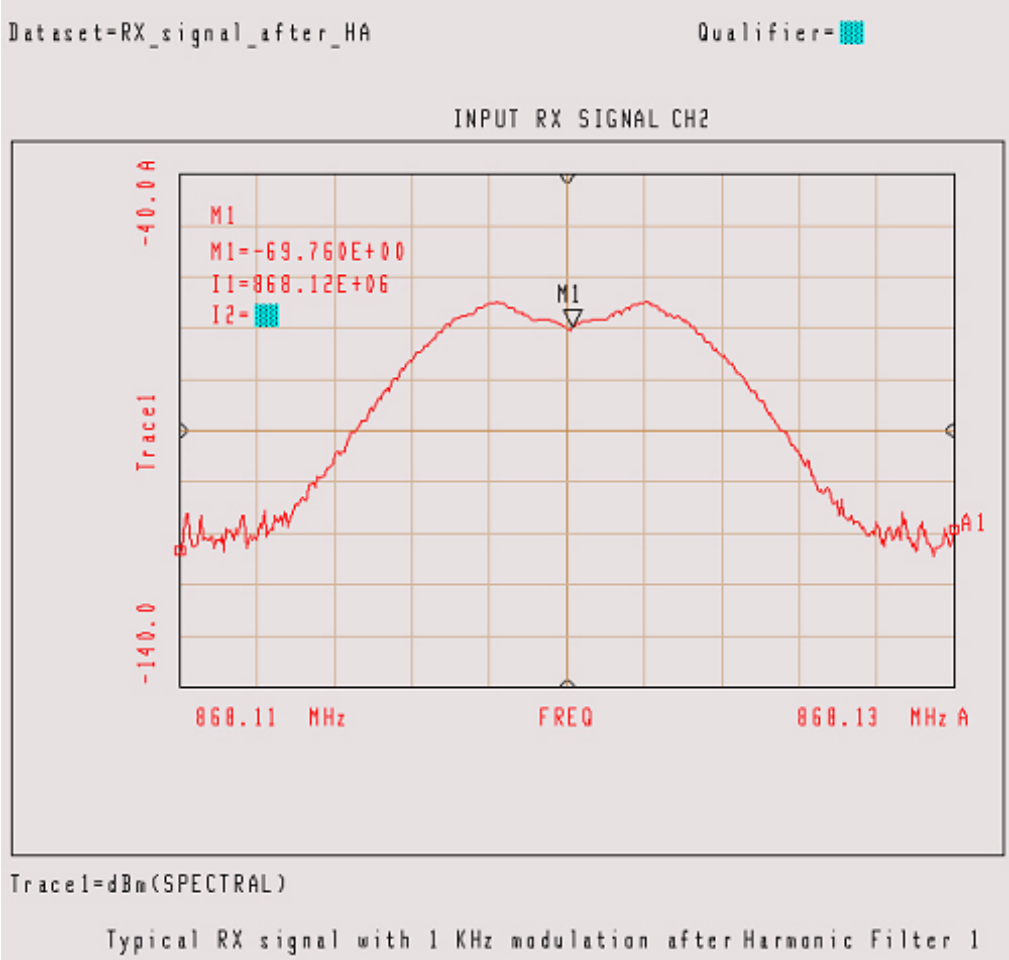
Probe point: FL1, pin 1.

7.26 PP22 Analog 5V



Probe point: U500, pin 5.

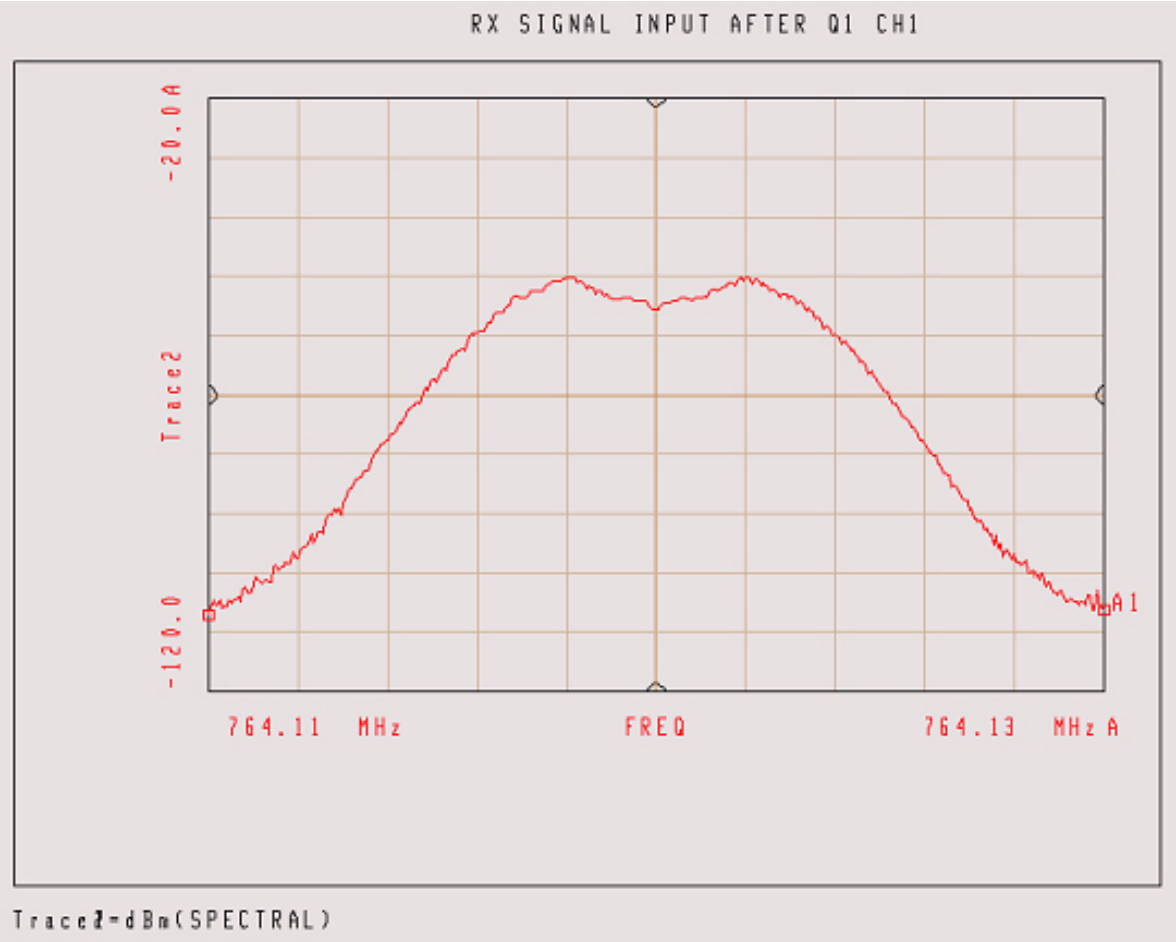
7.27 PP23 Preselector 1 Output



Probe point: FL1, pin 2.

Typical RX signal with 1 kHz modulation. Display shows modulation components of carrier.

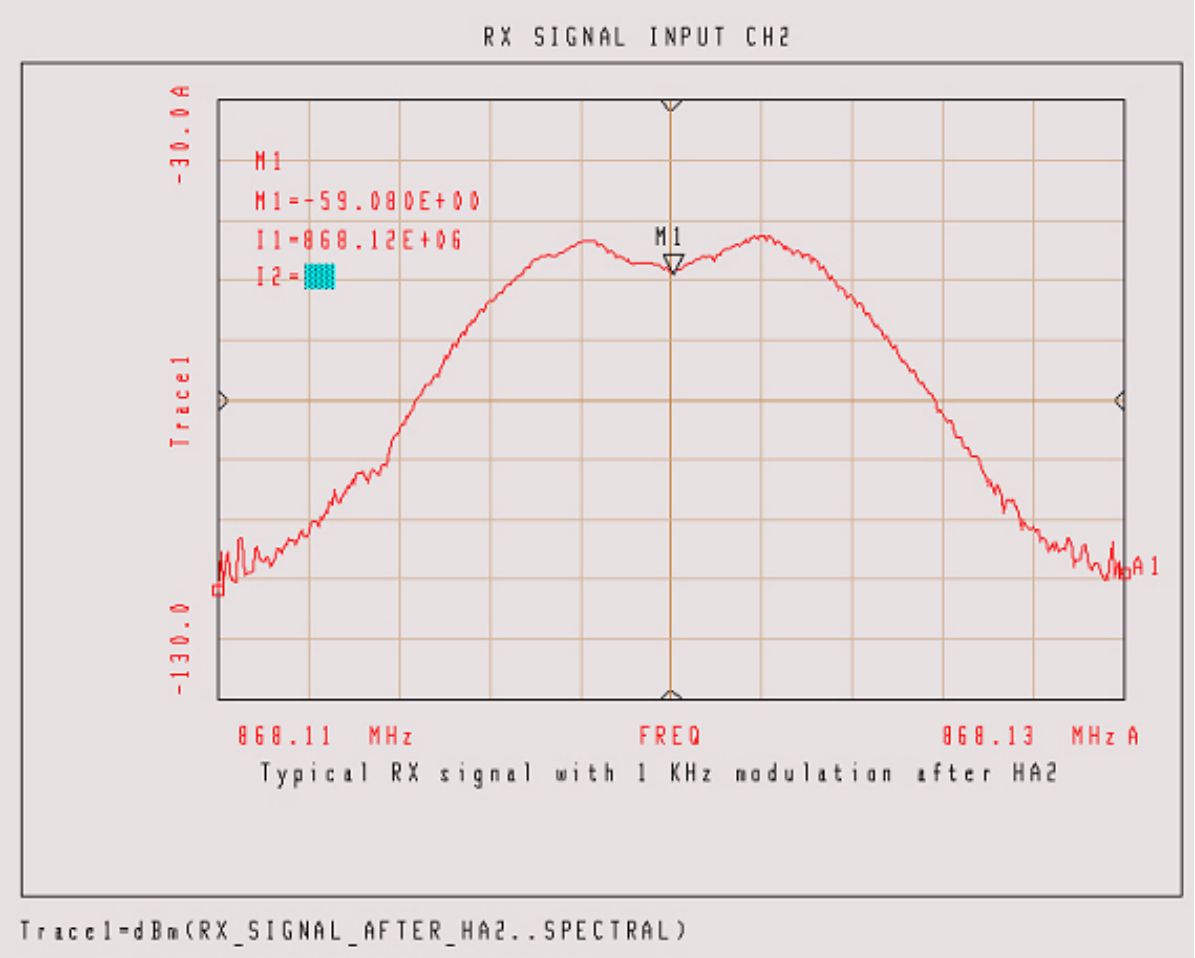
7.28 PP24 Low-Noise Amplifier Output



Probe point: FL2, pin 1.

Typical RX signal with 1 kHz modulation. Display shows modulation components of carrier.

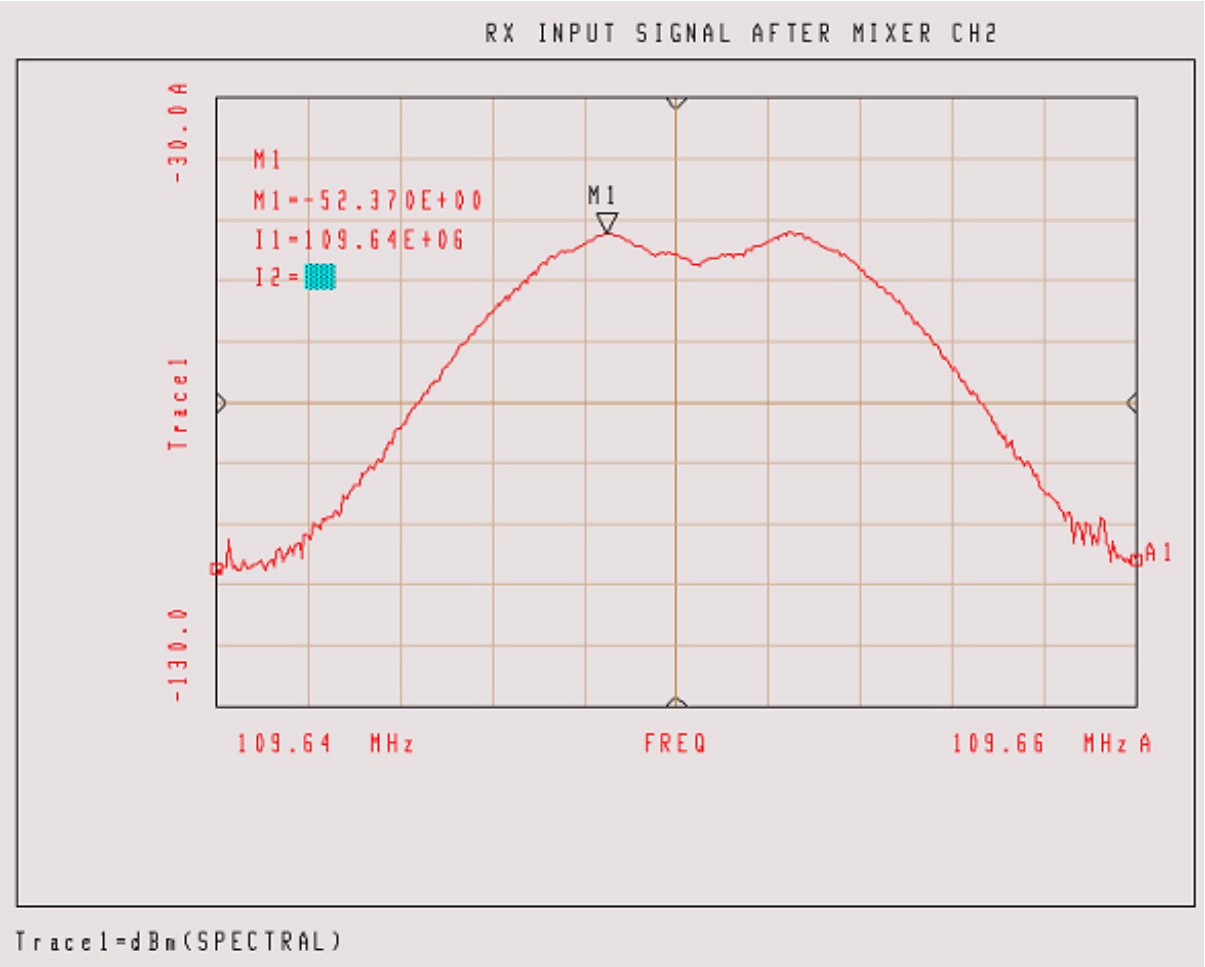
7.29 PP25 Preselector 2 Output



Probe point: FL2, pin 2.

Typical RX signal with 1 kHz modulation. Display shows modulation components of carrier.

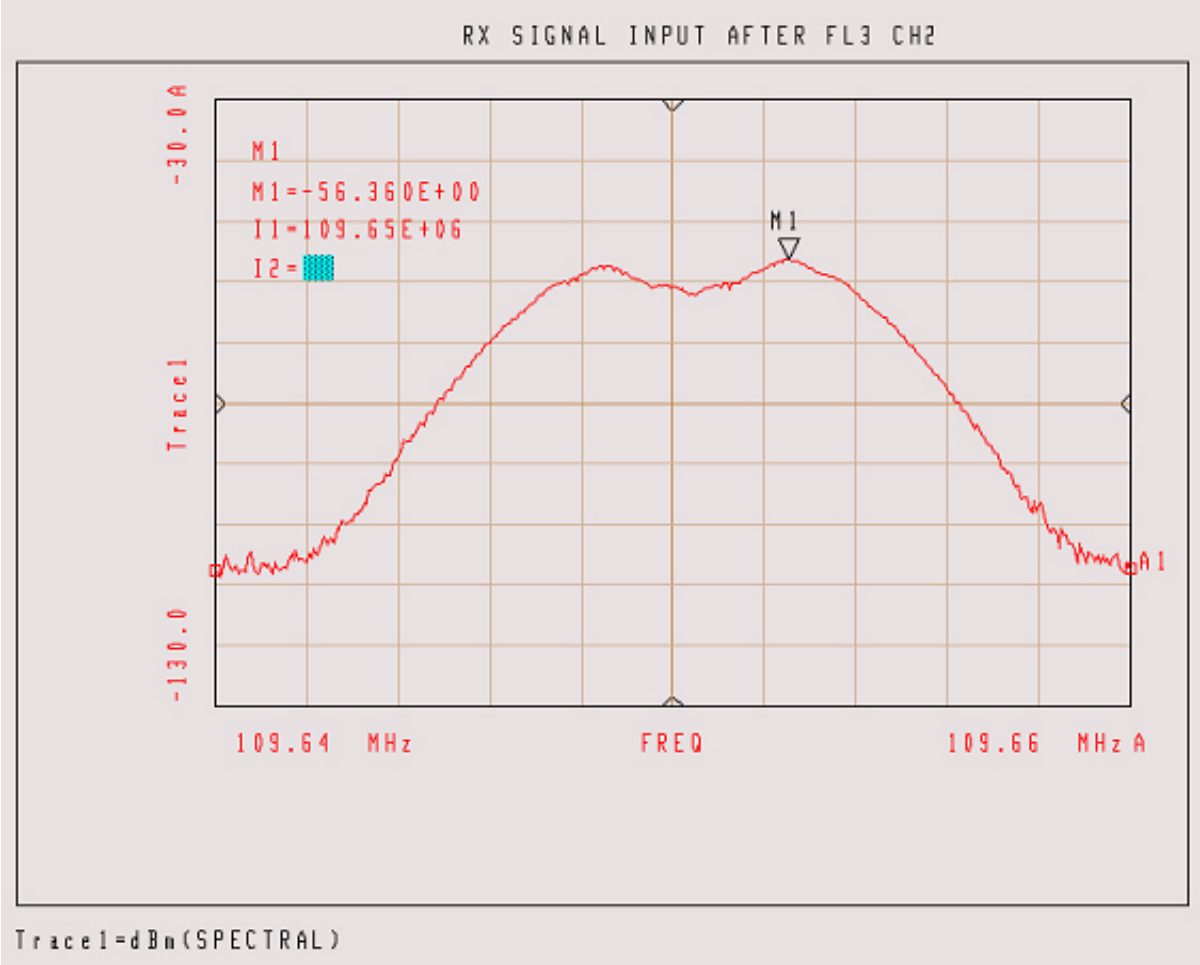
7.30 PP26 Mixer Out (IF)



Probe point: Shield SH1.

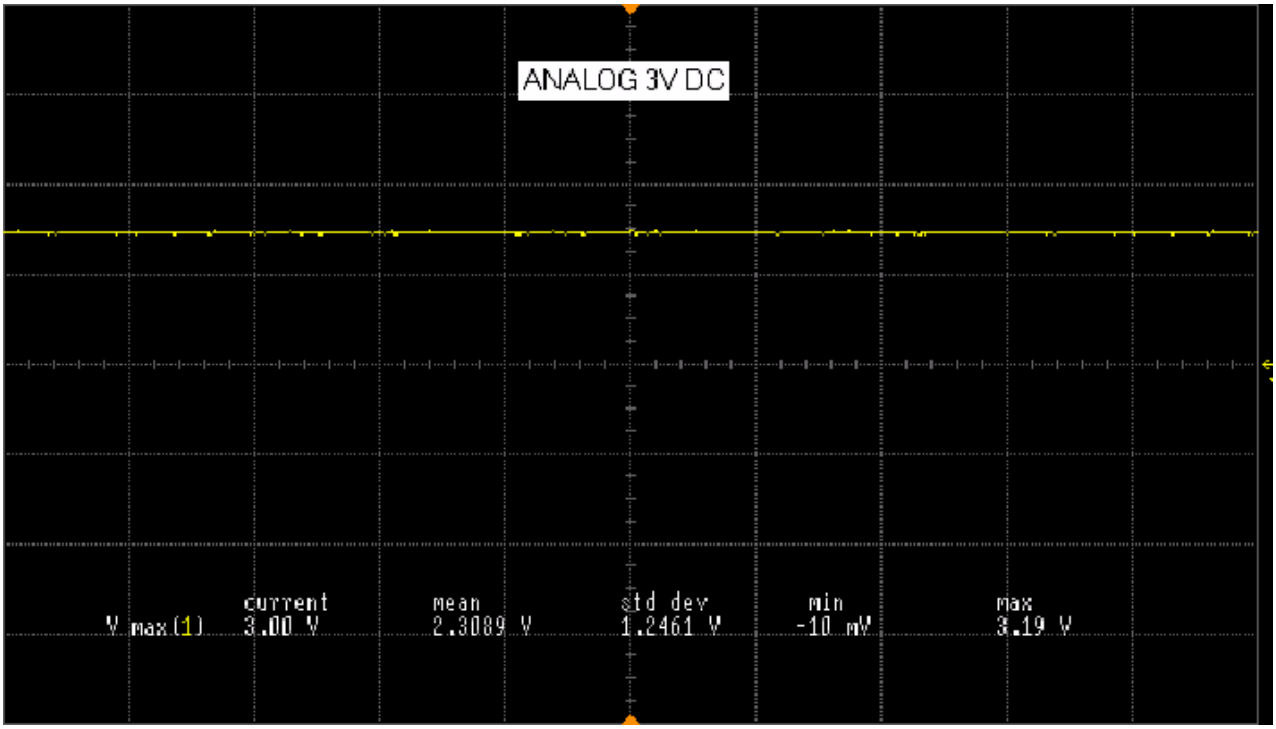
Typical RX signal with 1 kHz modulation. Display shows modulation components of carrier.

7.31 PP27 Crystal Filter Out



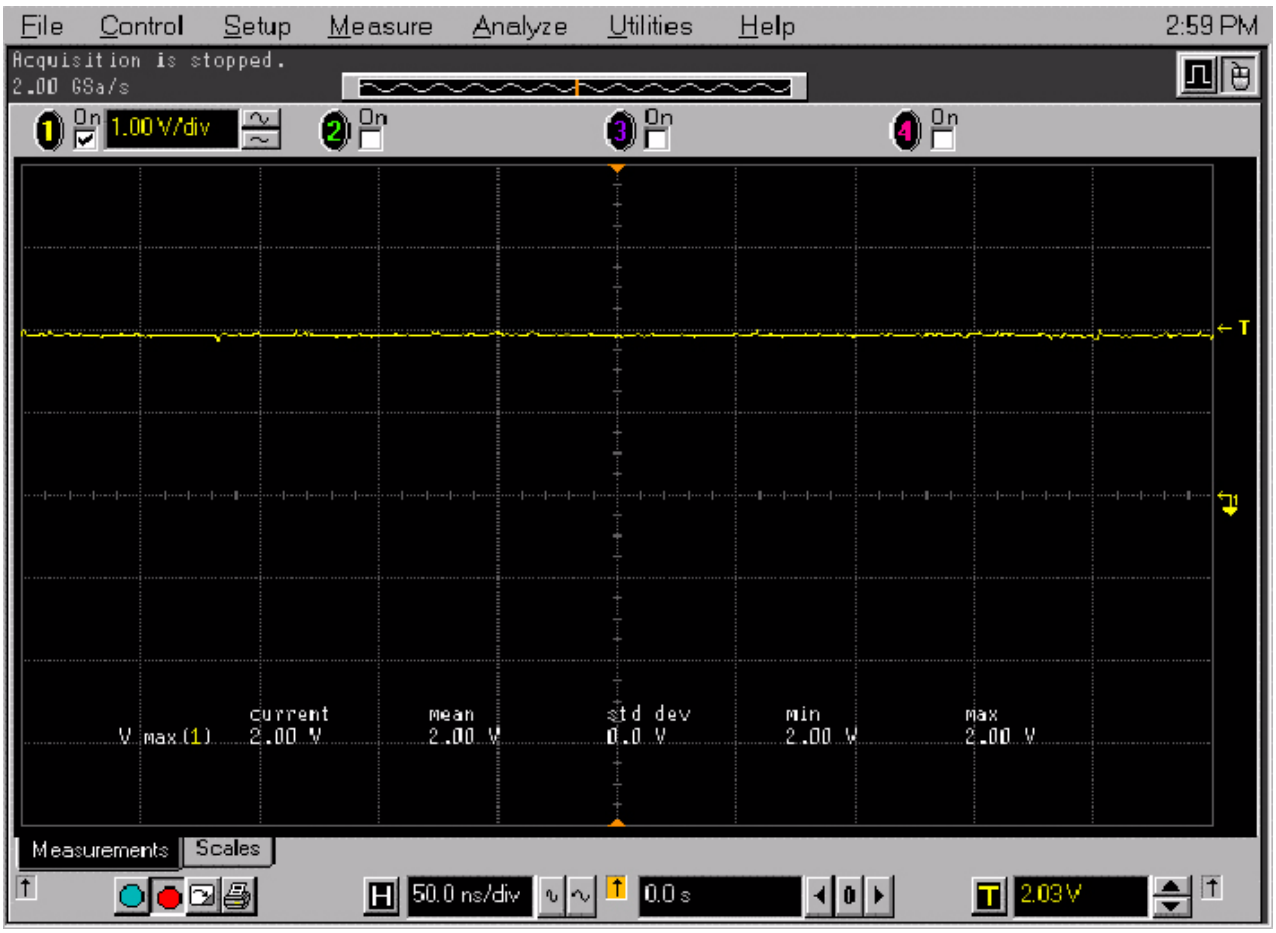
Probe point: Shield SH2.

7.32 PP28 Abacus Analog 3V



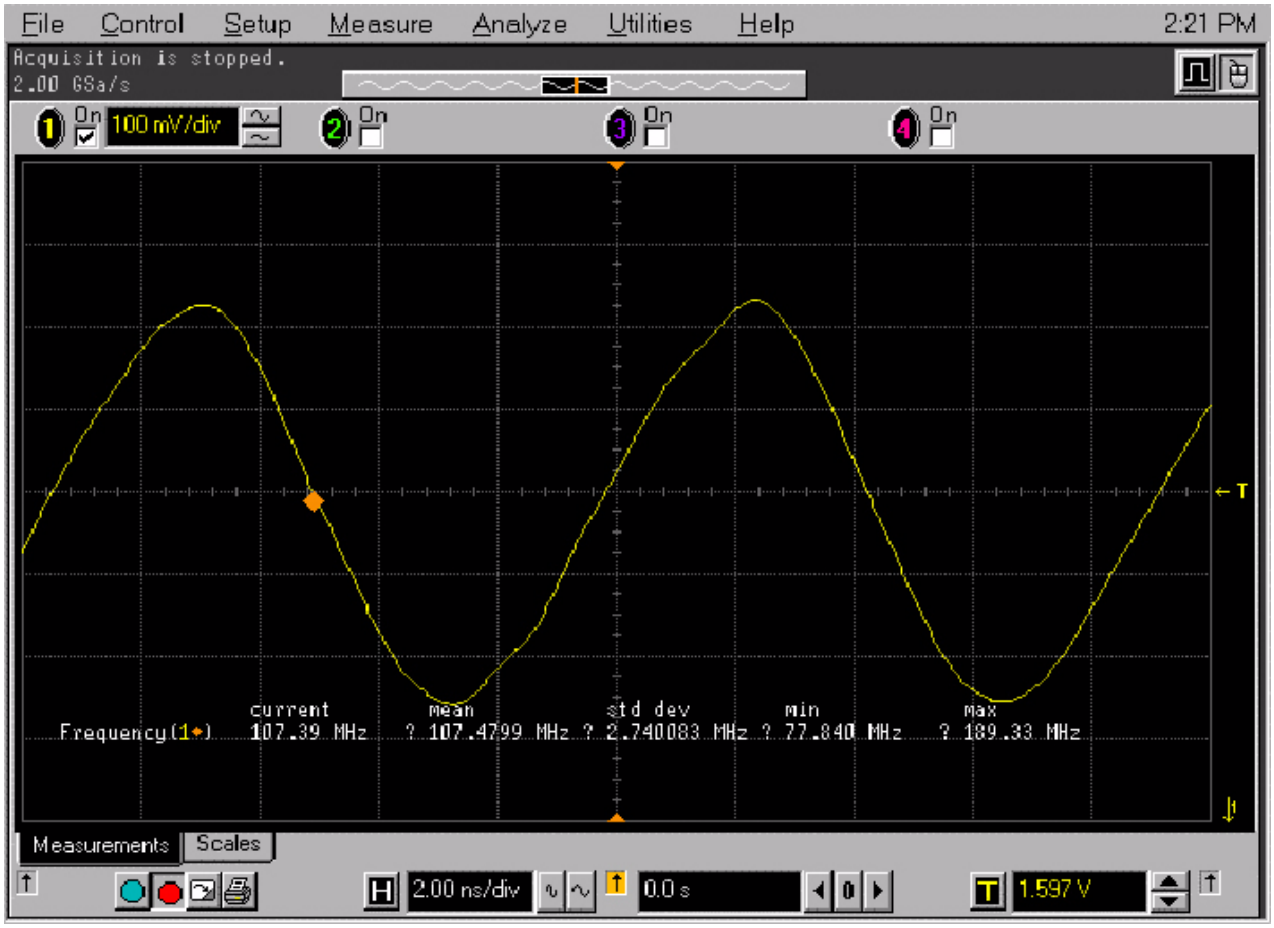
Probe point: U501, pin 5.

7.33 PP29 2nd LO Control Voltage



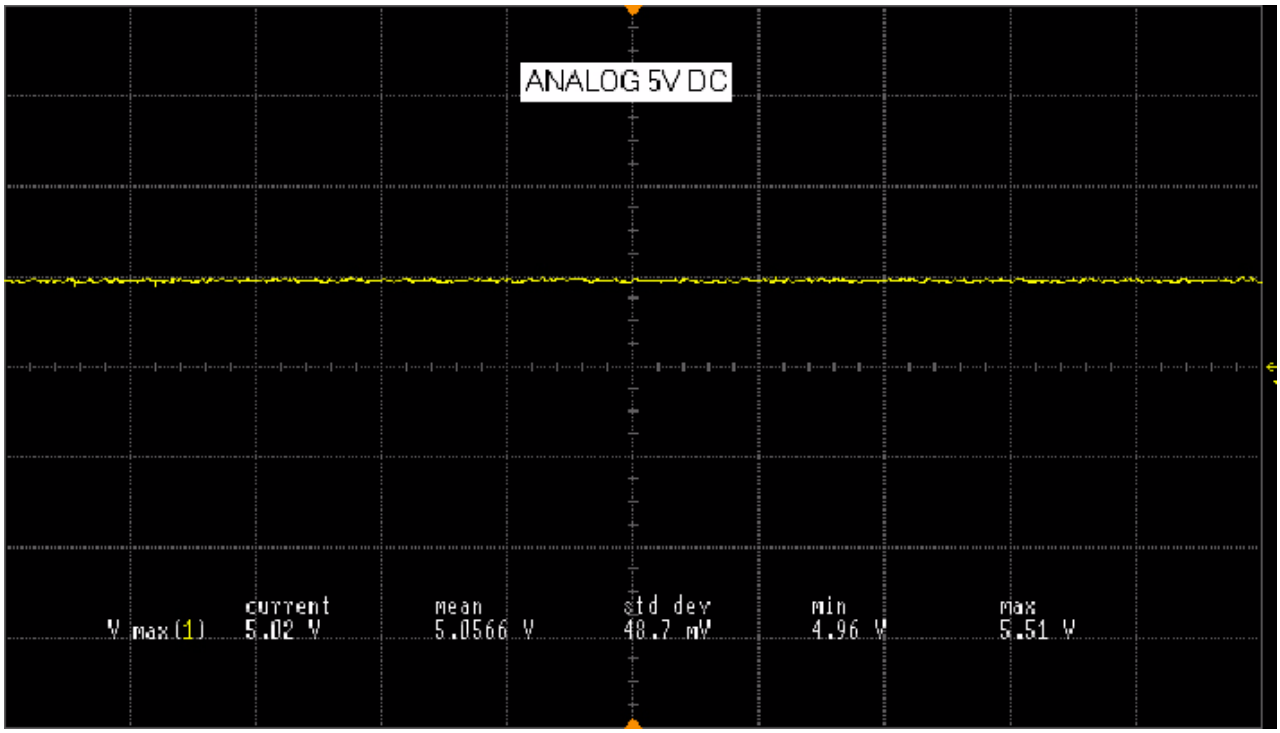
Probe point: U401, pin 38 (located under shield).

7.34 PP30 2nd LO VCO Buffer Output



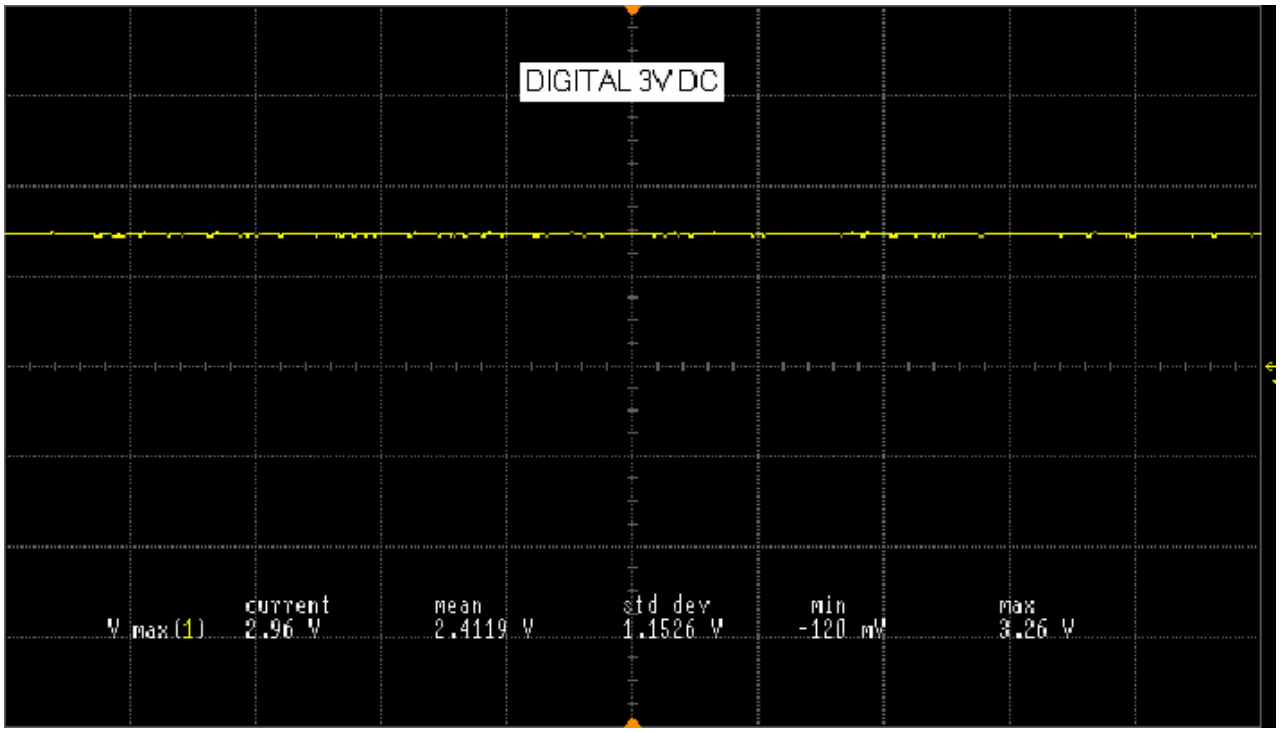
Probe point: Shield SH402.

7.35 PP31 Analog 5V DC



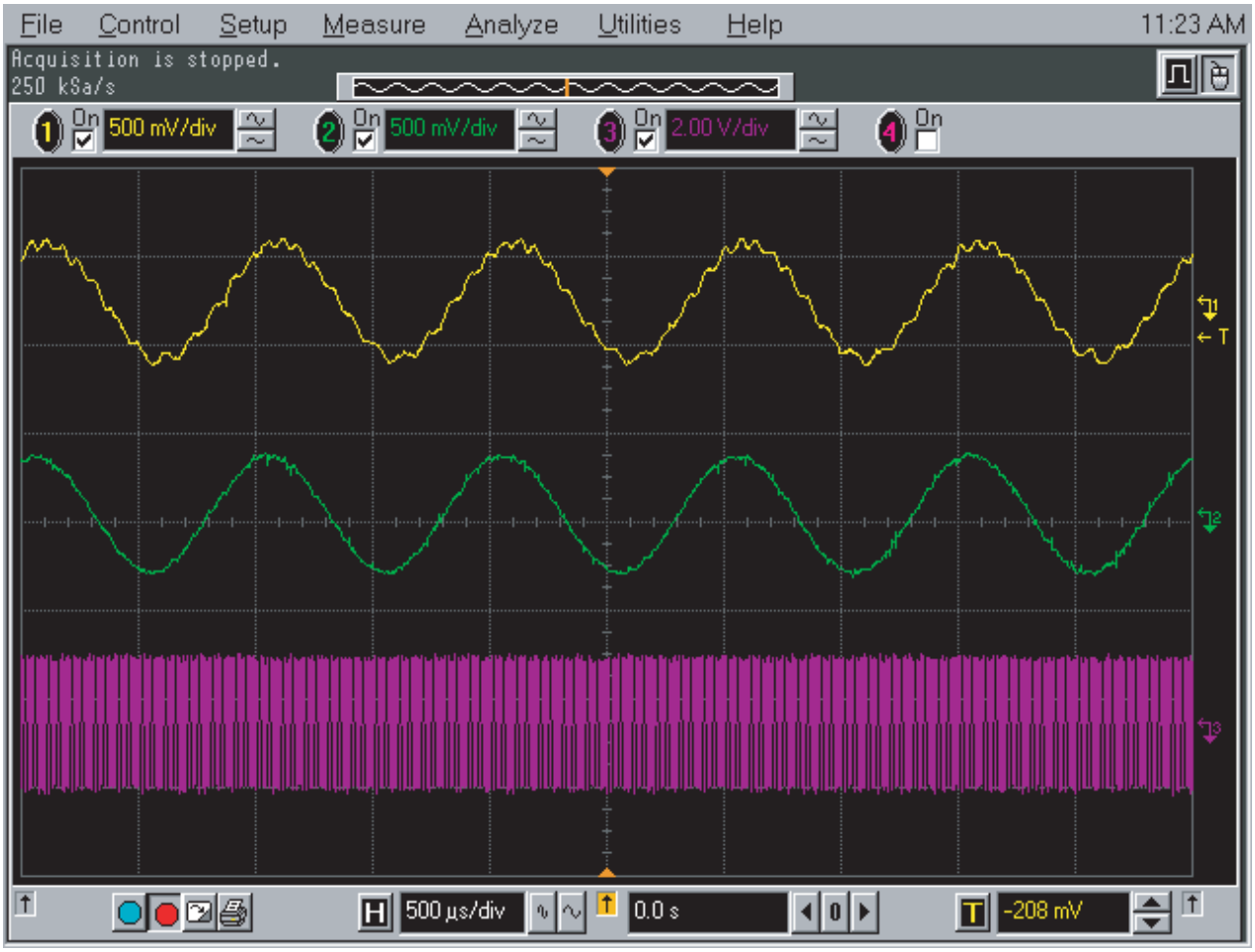
Probe point: U500, pin 5.

7.36 PP32 Abacus Digital 3V



Probe point: U502, pin 5.

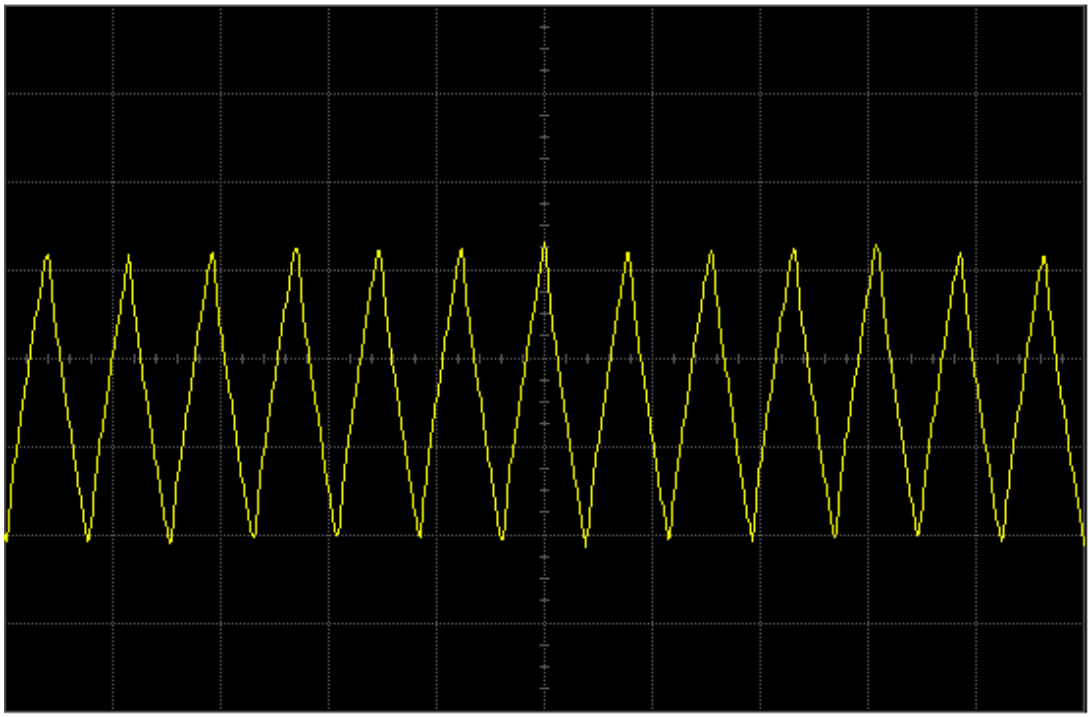
7.37 TX Audio 1 kHz Tone



Trace 1: TP203 Mod In (640 mVp-p 1 kHz tone 1.5 Vdc)
Trace 2: U202, pin 1 (620 mVp-p 1 kHz tone)
Trace 3: FL200, pin 8 (1.2 MHz square wave 0 to 3 V)

Note: Transmit audio 1 kHz tone, which provides 3 kHz deviation.

7.38 13 MHz Clock

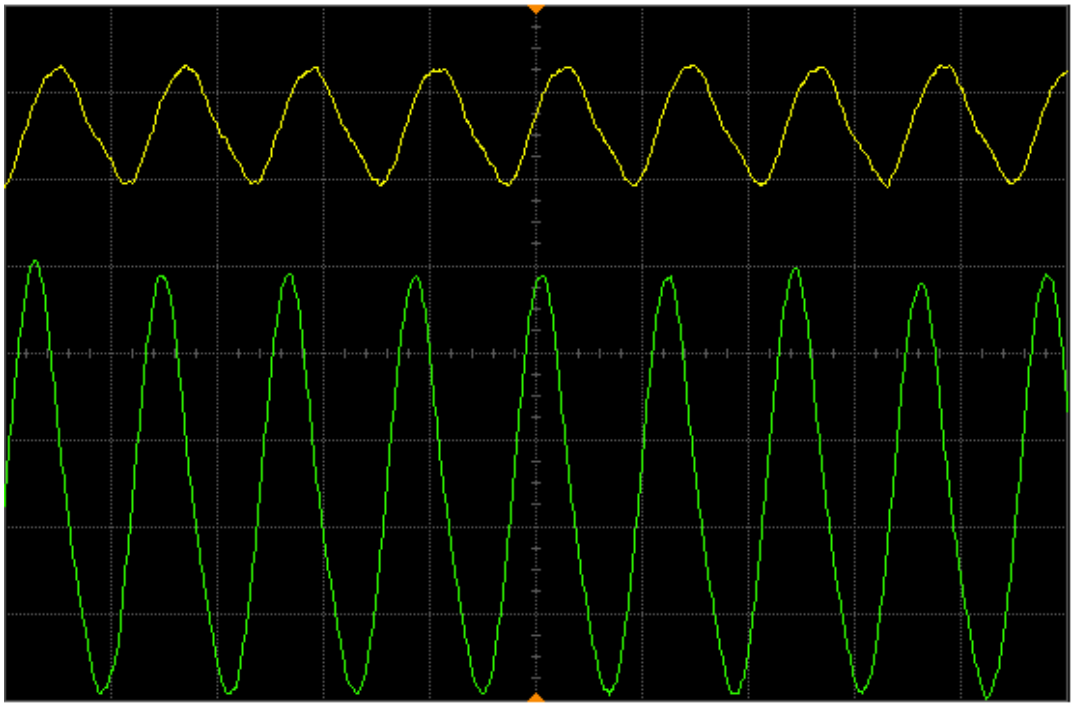


Acquisition	Sampling mode real time Configuration 4GSa/s Memory depth automatic Memory depth 1004pts Sampling rate automatic Sampling rate 1.00 GSa/s Averaging off 9-bit BW Filter off Interpolation on
Channel 1	Scale 200 mV/div Offset 1.604 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Time base	Scale 100 ns/div Position 92.181816 µs Reference center
Trigger	Mode edge Sweep auto Hysteresis normal Holdoff time 60 ns Coupling DC Source channel 1 Trigger level 1.379 V Slope rising

13 MHz clock from U600 to U703.
Trace 1: Trace recorded at R600.

For Kit NUF6541G:
Trace 1: Trace recorded at R632 (approximately 700mV peak-to-peak).

7.39 16.8 MHz Buffer Input and Output



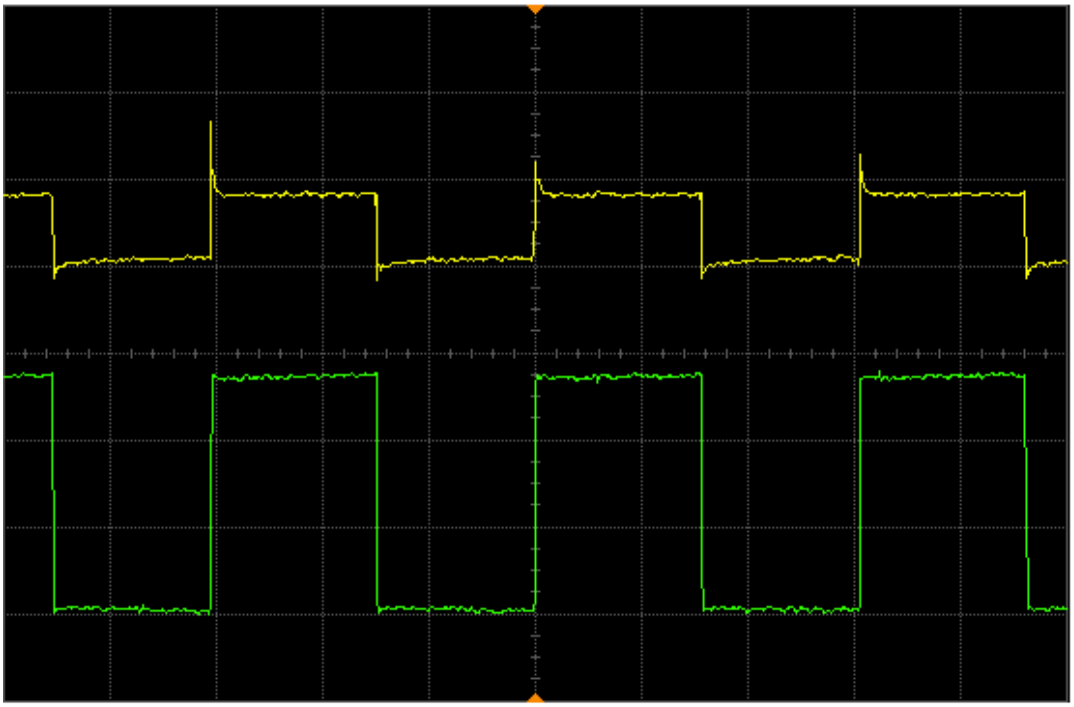
Acquisition	Sampling mode real time Configuration 4GSa/s Memory depth automatic Memory depth 1004pts Sampling rate automatic Sampling rate 2.00 GSa/s Averaging off 9-bit BW Filter off Interpolation on
Channel 1	Scale 200 mV/div Offset 644 mV Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Channel 2	Scale 200 mV/div Offset 913 mV Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Time base	Scale 50.0 ns/div Position 0.0 s Reference center
Trigger	Mode edge Sweep auto Hysteresis normal Holdoff time 60 ns Coupling DC Source channel 1 Trigger level 1.168 V Slope rising

Trace 1: Buffer input at R821.
Trace 2: Buffer output at L711.

For Kit NUF6541G:
Trace 1: Buffer input at R797.
Trace 2: Buffer output at C726.

Note: There should be no voltage gain between the Buffer's input and output. The 16.8MHz clock should be an approximately 1V peak-to-peak since wave.

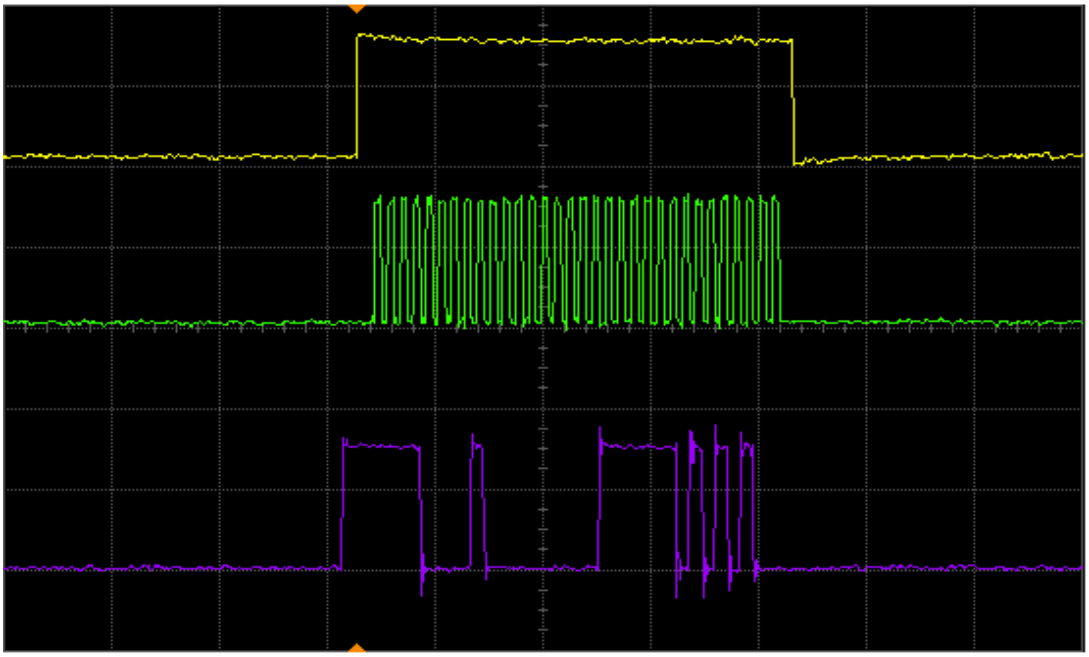
7.40 32.768 kHz Clock Outputs



Acquisition	Sampling mode real time Configuration 4GSa/s Memory depth automatic Memory depth 1004pts Sampling rate automatic Sampling rate 10.0 MSa/s Averaging off 9-bit BW Filter off Interpolation on
Channel 1	Scale 1.00 V/div Offset -1.58 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Channel 2	Scale 1.00 V/div Offset 2.97 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Time base	Scale 10.0 µs/div Position 0.0 s Reference center
Trigger	Mode edge Sweep auto Hysteresis normal Holdoff time 60 ns Coupling DC Source channel 2 Trigger level 1.400 V Slope rising

Trace 1: Output at C606 (to real time clock module of GCAP II).
Trace 2: Output at U605, pin 2 (to Patriot CKIL input).

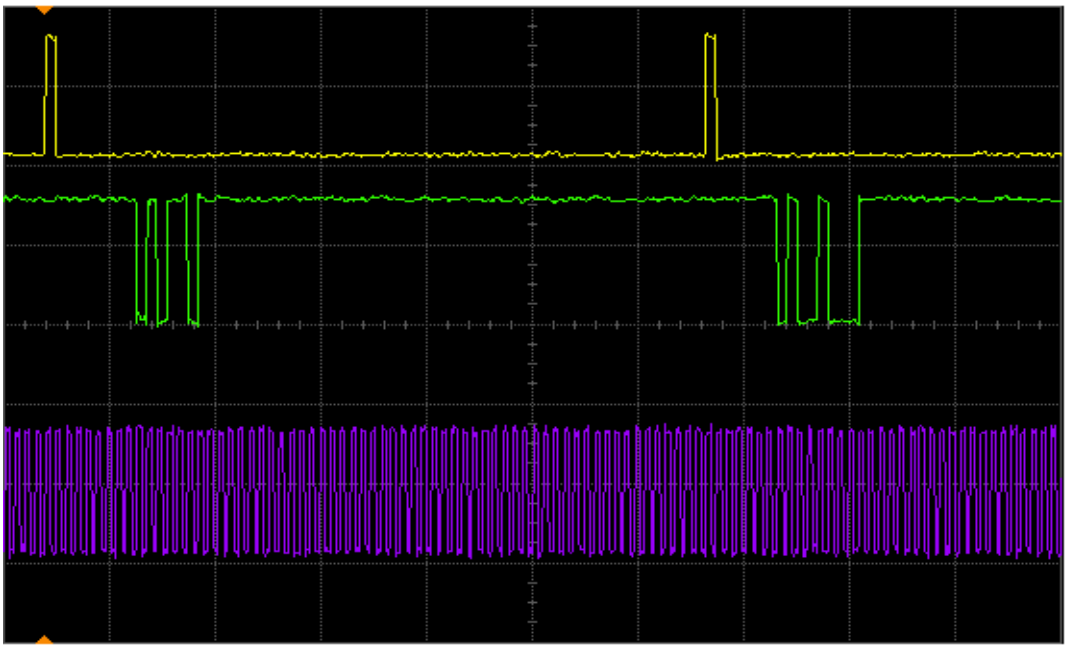
7.41 SPI B Data



Acquisition	Sampling mode real time Configuration 4GSa/s Memory depth automatic Memory depth 1004pts Sampling rate automatic Sampling rate 50.0 MSa/s Averaging off 9-bit BW Filter off Interpolation on
Channel 1	Scale 1.99 V/div Offset -4.21 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Channel 2	Scale 2.00 V/div Offset -260 mV Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Channel 3	Scale 2.00 V/div Offset 5.76 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Time base	Scale 2.00 µs/div Position 3.454546 µs Reference center
Trigger	Mode edge Sweep auto Hysteresis normal Holdoff time 60 ns Coupling DC Source channel 1 Trigger level 810 mV Slope rising

Trace 1: GCAP chip enable (not active high)
Trace 2: SPI data clock
Trace 3: SPI data to GCAP II.

7.42 RX Serial Audio Port (SAP)



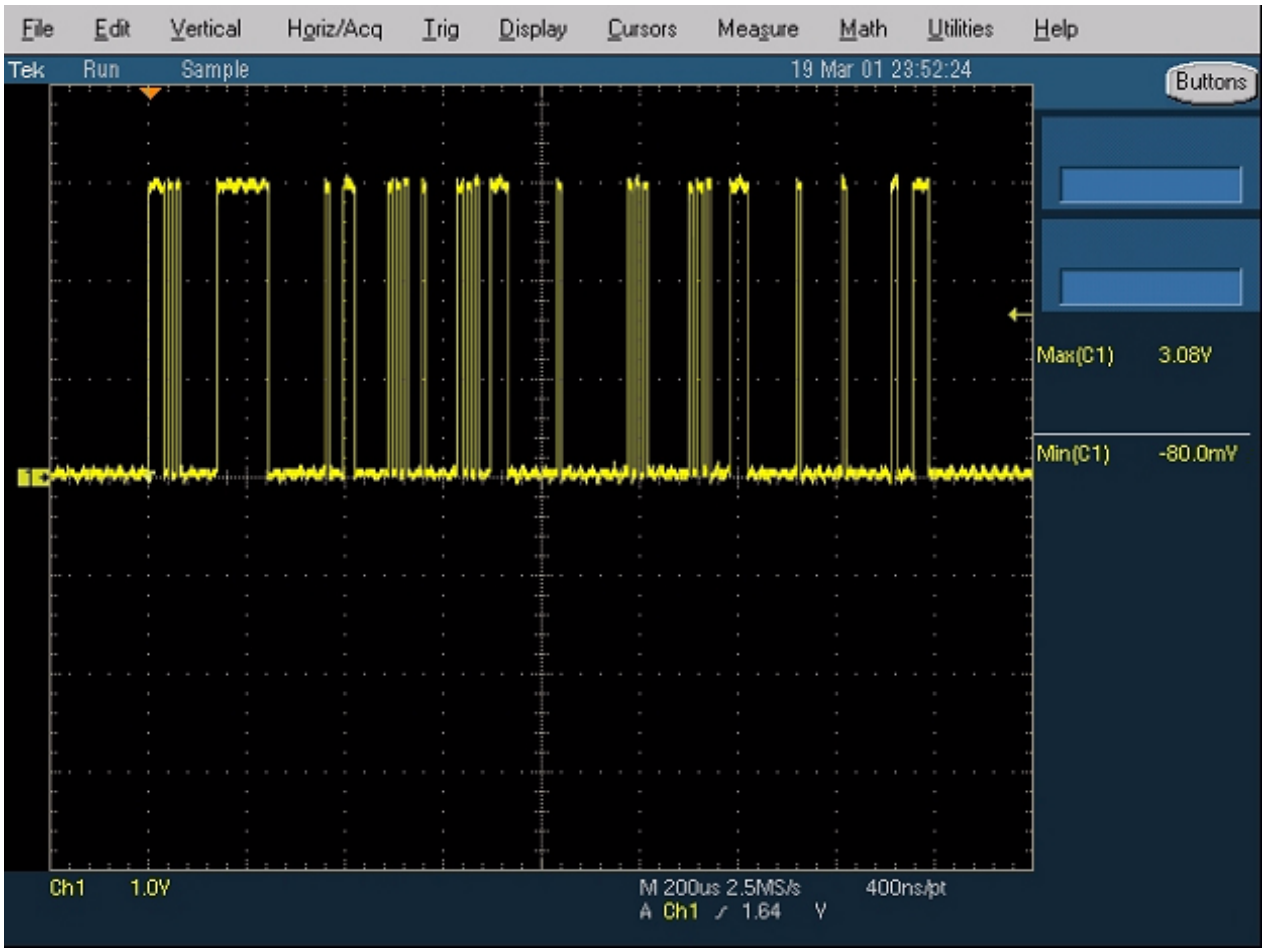
Acquisition	Sampling mode real time Configuration 4GSa/s Memory depth automatic Memory depth 1004pts Sampling rate automatic Sampling rate 5.00 MSa/s Averaging off 9-bit BW Filter off Interpolation on
Channel 1	Scale 1.99 V/div Offset -4.21 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Channel 2	Scale 2.00 V/div Offset -210 mV Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Channel 3	Scale 2.00 V/div Offset 5.55 V Coupling DC Impedance 1M Ohm Attenuation 10.00 : 1 Atten units ratio Skew 0.0 s Ext adapter None Ext coupler None Ext gain 1.00E+00 Ext offset 0.0E+00
Time base	Scale 20.0 µs/div Position 92.181816 µs Reference center
Trigger	Mode edge Sweep auto Hysteresis normal Holdoff time 60 ns Coupling DC Source channel 1 Trigger level 810 mV Slope rising

Note: TX is identical, except the data is probed at test point “TX”.

Trace 1: 8 kHz frame sync (each word is 13 bits after falling edge of FSYNC)
Trace 2: SAP data (audio data from GCAP II CODEC to Patriot DSP)
Trace 3: 520 kHz bit clock.

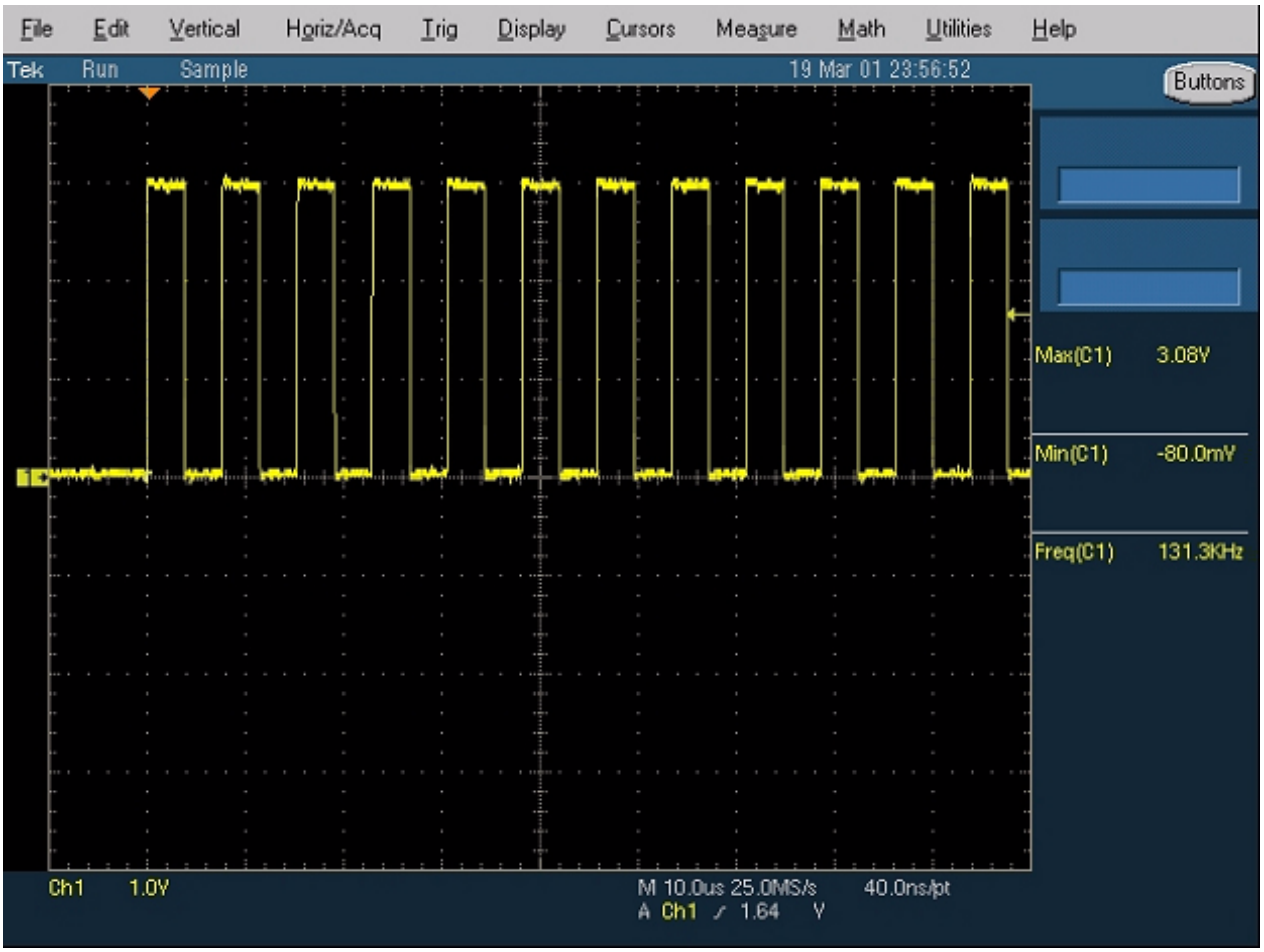
Trace 1: For kit NUF6541G, the frame sync is a 8 kHz 2.9V peak-to-peak square wave.
Trace 3: For kit NUF6541G, the SAP clock runs at 256 kHz and is a 2.9V peak-to-peak square wave.

7.43 PP33 SPI Data



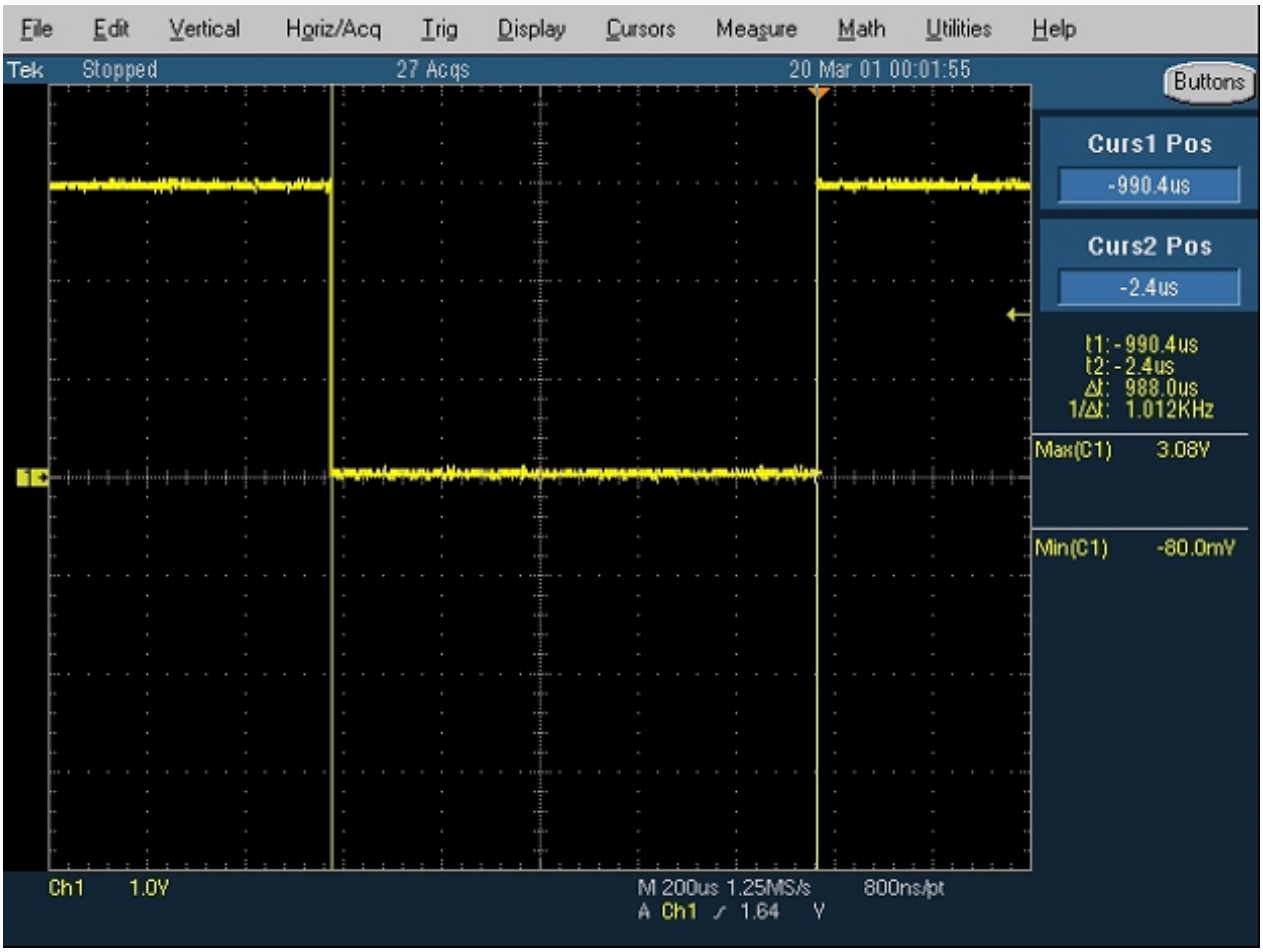
Probe Point: R802.

7.44 PP34 SPI CLK



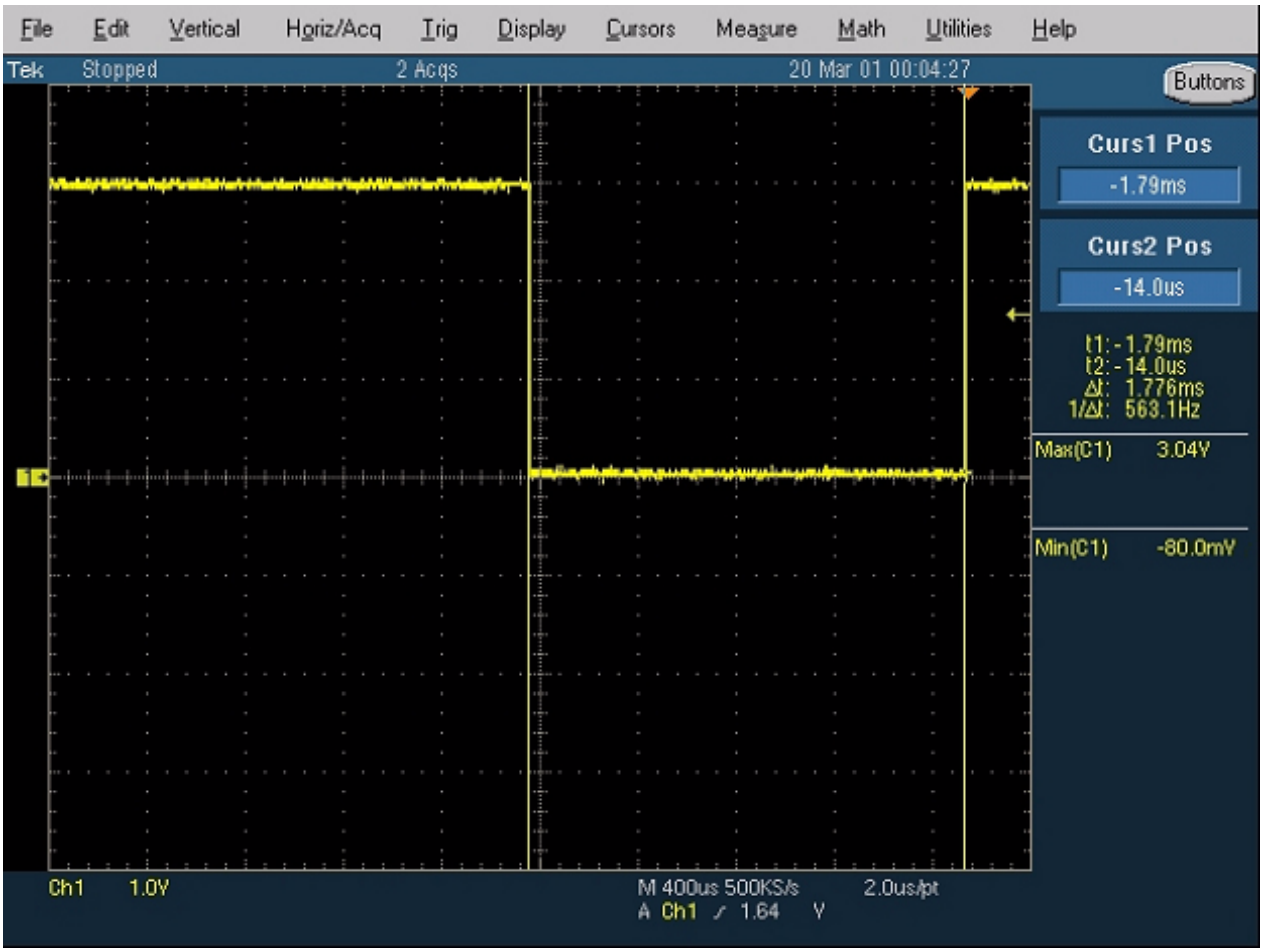
Probe Point: R803.

7.45 PP35 Universal Chip Select



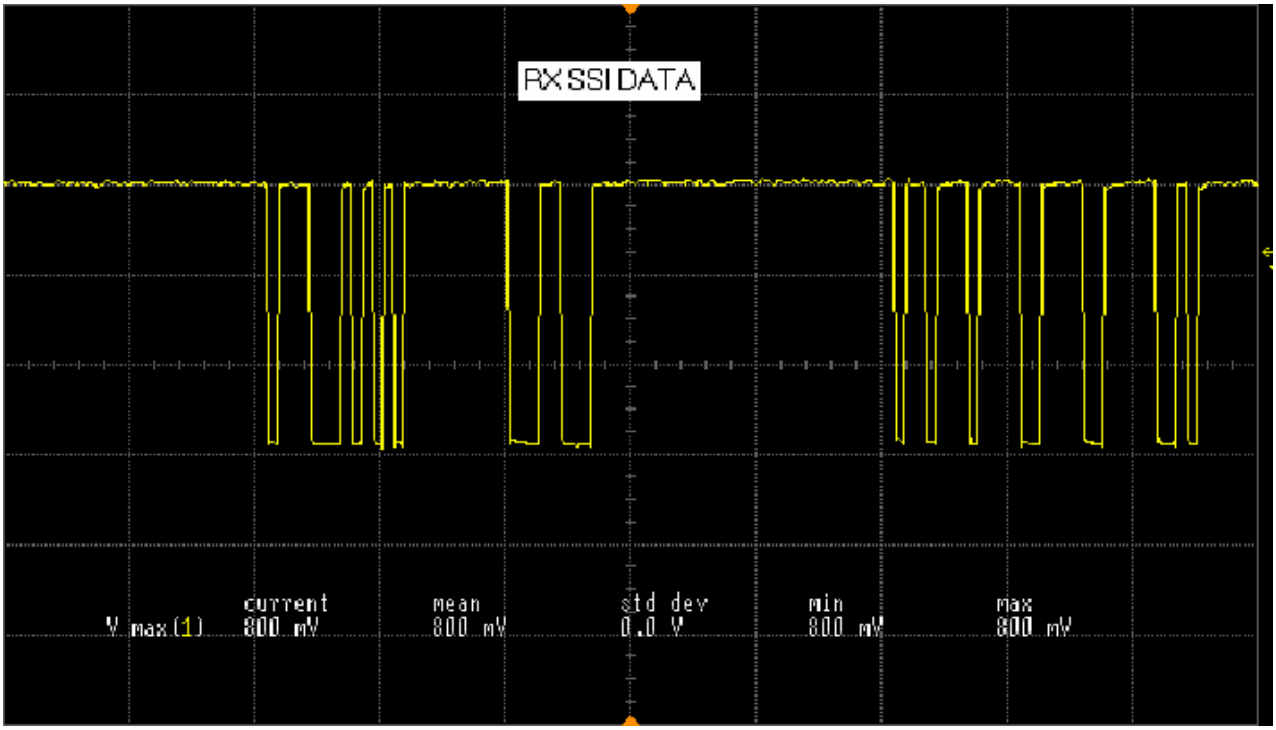
Probe Point: U102, pin 29 (located under shield).

7.46 PP36 Abacus Chip Select



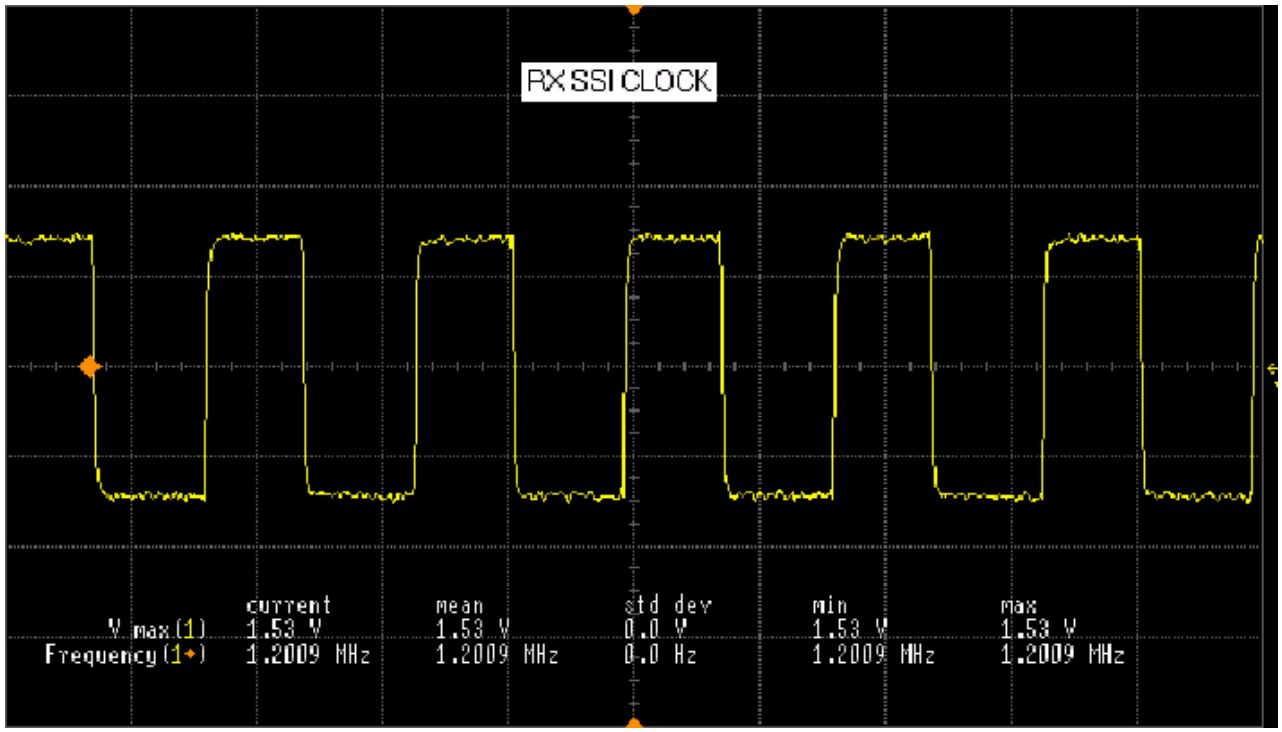
Probe Point: U401, pin 25 (located under shield).

7.47 TP37 RX SSI Data



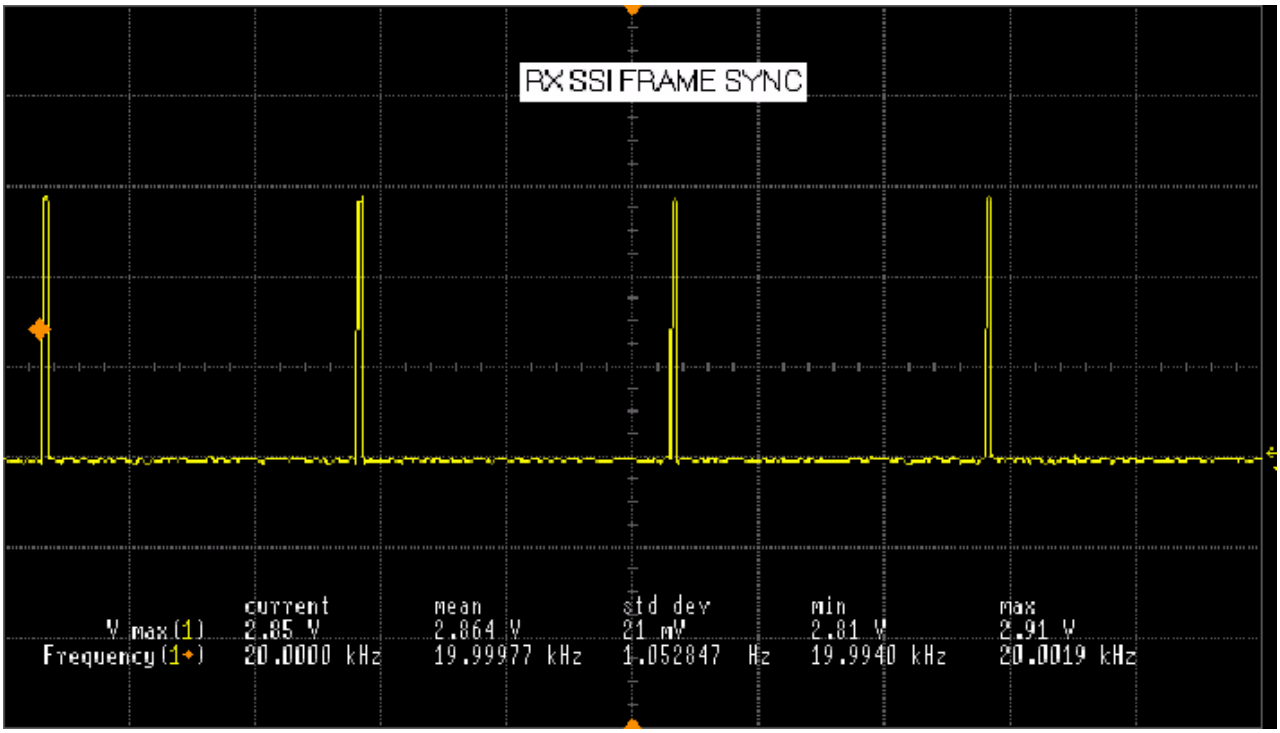
Test Point: TP403.

7.48 TP38 RX SSI Clock



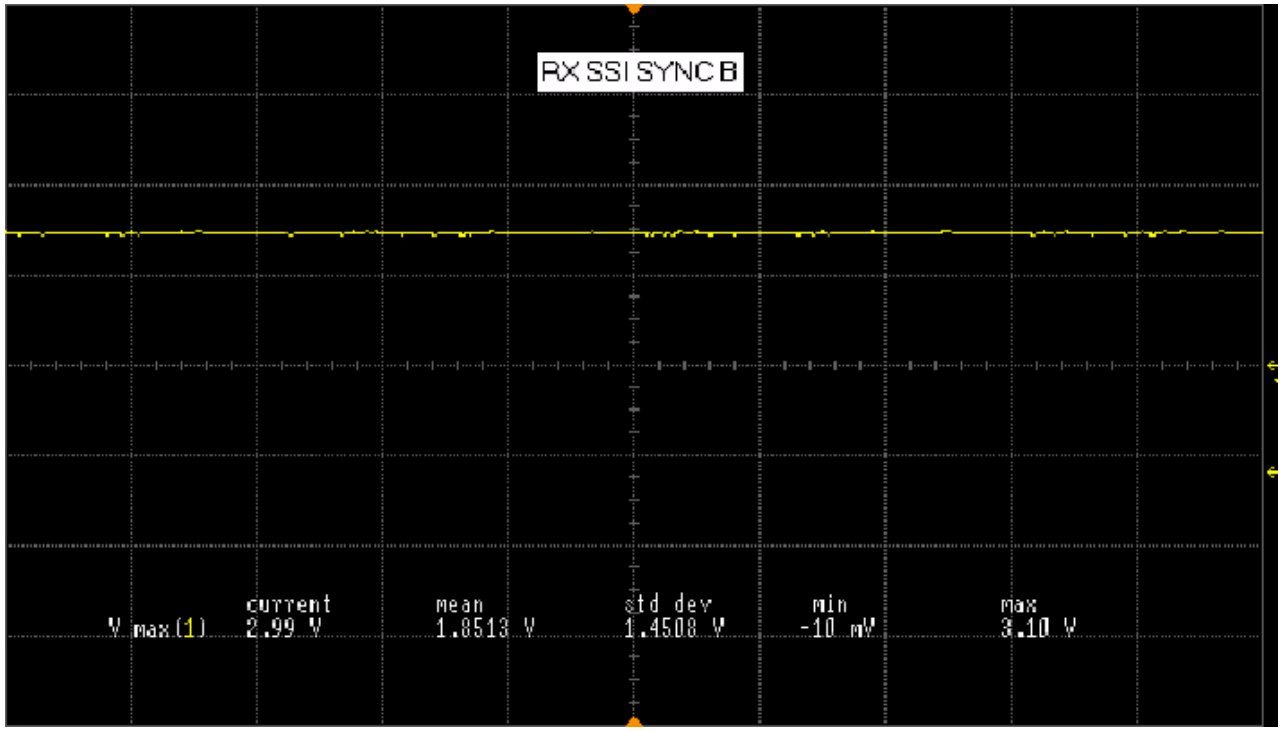
Test Point: TP404.

7.49 TP39 RX SSI Frame Sync



Test Point: TP402.

7.50 TP40 RX SSI Sync B



Test Point: TP401.

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Chapter 8 Troubleshooting Tables

8.1 Introduction

This chapter contains troubleshooting tables necessary to isolate a problem to the component level. Use these tables in conjunction with Chapter 4, Detailed Theories of Operation (page 4-1), Chapter 5, Troubleshooting Procedures (page 5-1), Chapter 6, Troubleshooting Charts (page 6-1), and Chapter 7, Troubleshooting Waveforms (page 7-1). This manual is to be used in conjunction with the ASTRO XTS 2500 Digital Portable Radios Basic Service Manual (Motorola part number 68P81094C09), which uses the pass/fail service approach to radio problems.

A blank entry in the “To/From” column of J601 indicates the signal is accessible only at J601.

8.2 Tables

Table 8-1. Main Board to Keypad Board Flex Assembly (J601)

J601 Pin Number	Description	To/From
1	VSW2	R763
2	V2	R770
3	UNSW_B+	Q702, pin 5
4	SW_B+	Q702, pin 1
5	HOST_WAKE	
6	WAKEUP	
7	REGISTER_SEL	
8	DISPLAY_SEL	
9	SCKB	R620
10	SPI_MOSI_B	R621
11	SPI_MISO_B	R622
12	SSI_CLK	R616
13	SSI_FSYNC	R617
14	SAP_TX	R625
15	SAP_RX	R626
16	KEYPAD_ROW0	
17	KEYPAD_ROW1	
18	KEYPAD_ROW2	
19	KEYPAD_ROW3	

Table 8-1. Main Board to Keypad Board Flex Assembly (J601) (Continued)

J601 Pin Number	Description	To/From
20	KEYPAD_ROW4	
21	KEYPAD_ROW5	
22	KEYPAD_ROW6	
23	KEYPAD_ROW7	
24	KEYPAD_COL0	
25	KEYPAD_COL1	
26	KEYPAD_COL2	
27	DO	R637
28	D1	R638
29	D2	R639
30	D3	R640
31	D4	R641
32	D5	R642
33	D6	R643
34	D7	R644
35	KEYFAIL	
36	CKIH	R646
37	BOOT*	
38	TEST_TAMPER	
39	DISPLAY_RESET	R647
40	UCM_SPARE1	
41	ENC_RXD	
42	ENC_TXD	
43	BL_EN	
44	UCM_SPARE2	
45	GROUND	
46	GROUND	
47	GROUND	

Table 8-2. Main Board to Universal (Side) Connector Flex Assembly (J601)

J101 Pin Number	Description	To/From	Side Connector Number
1	GND	GND (TP)	8
2	INT_SPKR+	L653	
3	INT_SPKR-	L650	
4	OPT_SEL1	R667	1
5	EXT_SPKR+	EXTSP+ (TP)	2
6	EXT_MIC	EXTMIC (TP)	3
7	OPT_B+_VPP	VPP (TP)	4
8	OPT_SEL2	R666	5
9	SPKR_COM	EXT_SP (TP)	6
10	RTS_USB_PWR	RTS1 (TP)	7
11	GND	GND(TP)	8
12	LH_BUSY	BUSY (TP)	9
13	CTS	CTS1 (TP)	10
14	RS232_TX_USB+	USB_D+ (TP)	11
15	RS232_RX_USB-	USB_D- (TP)	12
16	LH_DATA_KEYFAIL	BUS (TP)	13
17	NOT USED		
18	INT_MIC	L652	
19	GND	GND (TP)	8
20	GND	GND(TP)	8

Table 8-3. FLASH (U402) Pinout

U402 Pin Number	Description	To/From	Comment	Accessible on Main Board?
B4	BURSTCLK			No
E7	CS0	TP_CS0	Active Low	Yes
F8	EN_OE			No
C5	EN_WE			No
D6	WRITE PROTECT			No
C4	ADV	ADV		Yes

Table 8-3. FLASH (U402) Pinout (Continued)

U402 Pin Number	Description	To/From	Comment	Accessible on Main Board?
B5	RESET	CR800, pin 2	1.875V	Yes
E8	ADDRESS 1			No
D8	ADDRESS 2			No
C8	ADDRESS 3			No
B8	ADDRESS 4			No
A8	ADDRESS 5			No
B7	ADDRESS 6			No
A7	ADDRESS 7			No
C7	ADDRESS 8			No
A2	ADDRESS 9			No
B2	ADDRESS 10			No
C2	ADDRESS 11			No
A1	ADDRESS 12			No
B1	ADDRESS 13			No
C1	ADDRESS 14			No
D2	ADDRESS 15			No
D1	ADDRESS 16			No
D4	ADDRESS 17			No
B6	ADDRESS 18			No
A6	ADDRESS 19			No
C6	ADDRESS 20			No
B3	ADDRESS 21			No
C3	ADDRESS 22			No
D7	ADDRESS 23	R814		Yes
A3	GROUND			No
F1	GROUND			No
G2	GROUND			No
G8	GROUND			No
E2	DATA 15			No
F2	DATA 14			No
F3	DATA 13			No

Table 8-3. FLASH (U402) Pinout (Continued)

U402 Pin Number	Description	To/From	Comment	Accessible on Main Board?
D5	DATA 12			No
F4	DATA 11			No
F5	DATA 10			No
F6	DATA 9			No
G7	DATA 8			No
G1	DATA 7			No
E3	DATA 6			No
G3	DATA 5			No
E4	DATA 4			No
G5	DATA 3			No
E5	DATA 2			No
E6	DATA 1			No
F7	DATA 0			No
A5	VPP	CR801, pin 3	1.875V	Yes
G6	VSW2	C850	1.875V	Yes
E1	VSW2	C850	1.875V	Yes
G4	VSW2	C850	1.875V	Yes
A4	VSW2	C850	1.875V	Yes

Table 8-4. SRAM (U403) Pinout

U403 Pin Number	Description	To/From	Comment	Accessible on Main Board?
A2	EN_OE			No
G5	R_W			Yes
A1	LB			No
B2	UB			No
B5	CS1			No
A6	CS2			No
A3	ADDRESS 1			No
A4	ADDRESS 2			No
A5	ADDRESS 3			No
B3	ADDRESS 4			No
B4	ADDRESS 5			No
C3	ADDRESS 6			No
C4	ADDRESS 7			No
D4	ADDRESS 8			No
H2	ADDRESS 9			No
H3	ADDRESS 10			No
H4	ADDRESS 11			No
H5	ADDRESS 12			No
G3	ADDRESS 13			No
G4	ADDRESS 14			No
F3	ADDRESS 15			No
F4	ADDRESS 16			No
E4	ADDRESS 17			No
D3	ADDRESS 18			No
H1	ADDRESS 19			No
D1	GROUND			No
E6	GROUND			No
E3	GROUND			No
H6	NOT USED			No
G2	NOT USED			No

Table 8-4. SRAM (U403) Pinout (Continued)

U403 Pin Number	Description	To/From	Comment	Accessible on Main Board?
G1	DATA 15			No
F1	DATA 14			No
F2	DATA 13			No
E2	DATA 12			No
D2	DATA 11			No
C2	DATA 10			No
C1	DATA 9			No
B1	DATA 8			No
G6	DATA 7	R644		Yes
F6	DATA 6	R643		Yes
F5	DATA 5	R642		Yes
E5	DATA 4	R641		Yes
D5	DATA 3	R640		Yes
C6	DATA 2	R639		Yes
C5	DATA 1	R638		Yes
B6	DATA 0	R637		Yes
D6	VSW2	C818	1.875V	Yes
E1	VSW2	C818	1.875V	Yes

Table 8-5. Patriot MCU/DSP (U401) Pinout

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
H10	EEPOT_INC*	U704, pin 9	Active Low	Yes
J14	EXT_SPKR_SEL	Q704, pin 5		Yes
C14	AUDIO_PA_EN	Q701, pin 3		Yes
B14	HOST_WAKE			No
F6	BATTERY_ID	D701		Yes
E5	MECH_SW_BAR	POWER (TP)	Active Low	Yes
J6	INT_PTT	R507	Active Low	Yes
J5	GCAP_INT	TP728		Yes

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
J4	OPT_SEL1	U201 pin 1		Yes
J3	UART_INT*			No
C16	8KHZ_INT	SYNC	8 KHz Pulse	Yes
G11	OPT_SEL2_IN	U601 pin 1		Yes
F1	KEYPAD_ROW0	J601, pin 16		Yes
H4	KEYPAD_ROW1	J601, pin 17		Yes
H6	KEYPAD_ROW2	J601, pin 18		Yes
G2	KEYPAD_ROW3	J601, pin 19		Yes
G11	KEYPAD_ROW4	J601, pin 20		Yes
G7	KEYPAD_ROW5	J601, pin 21		Yes
H7	KEYPAD_ROW6	J601, pin22		Yes
H1	UCM_SPARE1	J601, pin 39		Yes
D1	KEYPAD_COL0	J601, pin 23		Yes
G5	KEYPAD_COL1	J601, pin 24		Yes
F3	KEYPAD_COL2	J601, pin 25		Yes
G4	ENC_RESET	J601, pin 42		Yes
F2	BOOT*			No
E1	WAKEUP	J601, pin 6		Yes
H6	SPARE2_ENC	J601, pin 44		Yes
G3	NOT USED			No
E7	NOT USED			No
A8	NOT USED			No
F8	MISOA_SEL	Q801, pin 1	Data Line	Yes
E8	SB3	R510		Yes
G8	SB2	R509		Yes
C3	SB1	R508		Yes
D4	LOCK_DET	C123	Active Low	Yes
A2	NOT USED			No
B2	RTA3	VR596, pin 2		Yes
A3	RTA2	VR593, pin 2		Yes
B3	RTA1	VR595, pin 1		Yes

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
B4	RTA0	VR594, pin 2		Yes
A7	VSW2	E801	1.875V	Yes
P3	VSW2	E801	1.875V	Yes
P6	VSW2	E801	1.875V	Yes
T9	VSW2	E801	1.875V	Yes
N10	VSW2	E801	1.875V	Yes
R16	VSW2	E801	1.875V	Yes
H9	V2	E800	3.0V	Yes
G9	V2	E800	3.0V	Yes
E15	V2	E800	3.0V	Yes
A16	V2	E800	3.0V	Yes
K10	V2	E800	3.0V	Yes
C12	V2	E800	3.0V	Yes
D8	V2	E800	3.0V	Yes
B7	V2	E800	3.0V	Yes
A4	V2	E800	3.0V	Yes
A16	V2	E800	3.0V	Yes
H2	V2	E800	3.0V	Yes
K3	VSW2	E801	1.875V	Yes
R8	VSW2	E801	1.875V	Yes
G15	VSW2	E801	1.875V	Yes
C10	VSW2	E801	1.875V	Yes
K12	URXD1_USB_VMI			No
L16	URTS1_XRXD			No
F13	ADTRIG			No
B16	P-URXD2			No
D14	P-URTS2			No
B12	RX_SSI_DATA	TP403	Data From Abacus to DSP	Yes
C11	TX_SSI_CLK	R259	1.536 MHz	Yes
B10	RED_LED	Q501, pin 3	Active High	Yes

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
D10	GREEN_LED	Q501, pin 5	Active High	Yes
B11	TX_SSI_FSYNC	R251	48 KHz	Yes
J10	SAP_TX	TX	GCAP to DSP Tx Audio Data	Yes
J15	SAP_DCLK	DCLK	520 KHz	Yes
K16	SAP_FSYNC	SYNC	8 KHz Pulse	Yes
D7	MISOA	U801, pin 4	SPI A Data Out	Yes
D3	MISOB	BMISO	SPI B Data Out	Yes
E6	NOT USED			No
F7	NOT USED			No
D6	NOT USED			No
C5	NOT USED			No
A9	NOT USED			No
B8	NOT USED			No
B9	NOT USED			No
A10	NOT USED			No
G6	BT_DISABLE			No
D13	NOT USED			No
S15	BT_WAKE			No
F11	RX_SSI_CLK	TP404		Yes
B15	OPT_SEL2_OUT	R666		Yes
J13	AUDIO_MODE_SEL	Q700, pin 1		Yes
J16	EEPOT_CS_EXT*	U704, pin 1		Yes
J12	EEPOT_U_D*	U704, pin 2		Yes
H11	EEPOT_CS*	U704, pin 10		Yes
A5	GROUND	GROUND		No
N6	GROUND	GROUND		No
P8	GROUND	GROUND		No
P11	GROUND	GROUND		No
M11	GROUND	GROUND		No

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
L15	GROUND	GROUND		No
H16	GROUND	GROUND		No
F14	GROUND	GROUND		No
G14	GROUND	GROUND		No
E13	GROUND	GROUND		No
B13	GROUND	GROUND		No
K15	GROUND	GROUND		No
D9	GROUND	GROUND		No
C8	GROUND	GROUND		No
B5	GROUND	GROUND		No
C2	GROUND	GROUND		No
C1	GROUND	GROUND		No
H3	GROUND	GROUND		No
K15	GROUND	GROUND		No
T8	GROUND	GROUND		No
H15	GROUND	GROUND		No
C9	GROUND	GROUND		No
B6	ABACUS_CS*	U401, pin 25	Active Low	Yes
E2	UNIVERSAL_SPI_CS*	C222	Active Low	Yes
D2	FLPR_CS*		Active Low	No
E3	SPICS2B		Active High	No
E4	SCK_B	B_CLK	SPI B Clock	Yes
B1	NOT USED			No
F4	NOT USED			No
F5	SPI_MOSI_B	BMOSI	SPI B Data (VOCON)	Yes
C7	SPI_CLK_A	SCKA	SPI A Clock	Yes
C6	MOSIA	R803	SPI A Data (RF Devices)	Yes
G10	NOT USED			No
G16	NOT USED			No

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
J11	SAP_RX	R768	DSP to GCAP Rx Audio Data	Yes
A12	RX_SSI_FSYNC	TP402	20 KHz pulse	Yes
A11	RX_SSI_CLK	TP404	1.2 MHz	Yes
E9	TX_SSI_DATA	R816	Data From DSP to A/D	Yes
C15	BSY_OUT_CTS*			No
F12	UTXD2			No
D15	USB_SUSP			No
E14	NOT USED			No
D16	NOT USED			No
G12	UCTS1_USB_SPEED*			No
K11	UTXD1_USB_VPO			No
K14	USB_VMO			No
K13	USB_TX_EN			No
D5	8 KHZ_INT	SYNC	8 KHz Pulse	R406
H14	BL_EN	J601, pin 43		Yes
K4	LV_DETECT	D511, pin 1	3.0V	Yes
F9	NOT USED			No
J2	SC_FILT_EN	FL200, pin 7		No
A6	16_8_MHZ	C452	16.8 MHz	Yes
J7	32K_FLIPPER	U605, pin 2	32.768 KHz	Yes
G13	NOT USED			No
J1	MOD	Q604, pin 3	Bootstrap mode > 2.7V	Yes
A13	NOT USED			No
M6	NOT USED			No
R1	NOT USED			No
N3	NOT USED			No
M5	NOT USED			No
P2	NOT USED			No
P1	NOT USED			No

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
N1	NOT USED			No
M4	NOT USED			No
M3	NOT USED			No
M2	NOT USED			No
M1	NOT USED			No
L4	NOT USED			No
L3	NOT USED			No
L1	NOT USED			No
L2	NOT USED			No
K2	NOT USED			No
T1	NOT USED			No
R2	NOT USED			No
T2	NOT USED			No
K7	NOT USED			No
N2	NOT USED			No
L5	NOT USED			No
L6	NOT USED			No
C4	NOT USED			No
L13	NOT USED			No
D11	ONE_WIRE_EN*		Active Low	No
E16	KVL_USB_DET*		Active Low	No
F15	16.8_MHZ_OUT	16out (TP)		No
K5	BAT_BUS_EN*	Q704, pin 2	Active Low	Yes
H8	NOT USED			No
F16	RESET	R808	Reset = 0V	Yes
K6	USB_VPI			No
H12	BL_FREQ			No
H13	NOT USED			No
E10	NOT USED			No
F10	NOT USED			No
D12	TCK	TCK	ONCE/JTAG	Yes

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
C13	TMS	TMS	ONCE/JTAG	Yes
E11	TRST	TRST	ONCE/JTAG	Yes
A14	TDO	TDO	ONCE/JTAG	Yes
E12	TDI	TDI	ONCE/JTAG	Yes
M16	NOT USED			No
L14	NOT USED			No
P15	NOT USED			No
L11	NOT USED			No
M14	NOT USED			No
N16	NOT USED			No
L12	NOT USED			No
M12	CKO	CKO	Disabled	Yes
N15	NOT USED			No
M15	NOT USED			No
R12	ADDRESS 0	J601, pin 7		Yes
T13	ADDRESS 1			No
M10	ADDRESS 2			No
T12	ADDRESS 3			No
P13	ADDRESS 4			No
M9	ADDRESS 5			No
P10	ADDRESS 6			No
P12	ADDRESS 7			No
N9	ADDRESS 8			No
R10	ADDRESS 9			No
P9	ADDRESS 10			No
L10	ADDRESS 11			No
T10	ADDRESS 12			No
R9	ADDRESS 13			No
L9	ADDRESS 14			No
K9	ADDRESS 15			No
J9	ADDRESS 16			No

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
L8	ADDRESS 17			No
M8	ADDRESS 18			No
N8	ADDRESS 19			No
K8	ADDRESS 20			No
L7	ADDRESS 21			No
T7	ADDRESS 22			No
R7	ADDRESS 23	R814		Yes
R3	DATA 15			No
T3	DATA 14			No
N4	DATA 13			No
P4	DATA 12			No
R4	DATA 11			No
J8	DATA 10			No
T4	DATA 9			No
N5	DATA 8			No
P5	DATA 7	R644		Yes
R5	DATA 6	R643		Yes
T5	DATA 5	R642		Yes
R6	DATA 4	R641		Yes
T6	DATA 3	R640		Yes
M7	DATA 2	R639		Yes
N7	DATA 1	R638		Yes
P7	DATA 0	R637		Yes
N11	R_W			No
T11	NOT USED			No
R14	NOT USED			No
N12	CS3*			No
T14	CS2			No
R11	NOT USED			No
R15	CS0	TP_CS0	Active Low	Yes
P16	OE_EN			No

Table 8-5. Patriot MCU/DSP (U401) Pinout (Continued)

U401 Pin Number	Description	To/From	Comment	Accessible on Main Board?
M13	EB1_N			No
R13	EBO_N			No
N14	NOT USED			No
T16	WAIT			No
P14	NOT USED			No
N13	ADV			No
T15	B_CLK			No

Table 8-6. Flipper (U301) Pinout

U301 Pin Number	Description	To/From	Comment	Accessible on Main Board?
E7	RXDIN_ENC_3V			No
D5	RS232_DI_USB-	Q601, pin 3	RS232 Data In / USB Data -	Yes
C7	RS232_DO_USB+	R601, pin 6	RS232 Data Out / USB Data +	Yes
A8	RTS	D303 pin 3	Request to Send (RS232)	Yes
D7	CTS		Clear to Send (RS232)	No
H8	CTS_FILLREQ_3V	R657		Yes
H3	16.8 MHz	L711	Probe toward inside of board	Yes
H6	13MHZ	C601	13 MHz Clock (OUT)	Yes
H5	PLL_LFT	C600	PLL Loop Filter	Yes
F4	SAP_DCLK	DCLK	520 KHz	Yes
E5	SAP_FSYNC	SYNC	8 KHz Pulse	Yes
G4	UCM_SS	R611		Yes
G2	V2	C605	3.0V	Yes
F1	V2	C605	3.0V	Yes
F3	VSS3_DC	GROUND		No
F2	VSS3_AC	GROUND		No
D8	VCC5	C604	5.0V	Yes
C8	VSS5	GROUND		Yes
A7	LI_CELL	D602, pin 3	3.0-3.3V	Yes

Table 8-6. Flipper (U301) Pinout (Continued)

U301 Pin Number	Description	To/From	Comment	Accessible on Main Board?
C6	VSS3_XTL	GROUND		Yes
A4	UART_TX	UTX		Yes
C4	UART_RX	URX		Yes
G3	ONE_WIRE_UP			No
G7	KVL_USB_DET			No
G1	ONE_WIRE_EN*			No
B5	BSY_IN_RTS			No
C5	BSY_OUT_CTS			No
E4	UCTS1_USB_SPEED *			No
C1	USB_TXENAB			No
D1	UTXD1_USP_VPO			No
B1	USB_VMO			No
C3	URTS1_XRXD			No
C2	USB_VPI			No
D2	URXD1_USB_VMI			No
E3	USB_SUSP			No
B2	SCK_B	B_CLK	Spi B Clock	Yes
B3	SPI_MOSIB	BMOSI	Spi Data Write to FLIPPER	Yes
A2	SPI_MISOB	BMISO	Spi Data Read From FLIPPER	Yes
A1	FLPR_CS*			No
A3	UART_INT*			No
F5	GCAP_RESET_X	C698		Yes
H4	TEST_MODE1	GROUND		No
H1	TES_MODE2	GROUND		No
G6	OUT_DIS	GROUND		No
G5	SCAN_EN	GROUND		No
A6	XTAL32_IN			Yes
B6	XTAL32_OUT			Yes
A5	REF32_OUT	U605, pin 1	32.768 KHZ Square Wave	Yes
B7	BYPASS_32	GROUND		Yes

Table 8-6. Flipper (U301) Pinout (Continued)

U301 Pin Number	Description	To/From	Comment	Accessible on Main Board?
B4	BP_SEN_X	R714	0 V	Yes
D4	WD_OUT	R757	Watchdog Int to GCAP II	Yes
H2	ONE_WIRE_OPT	R666		Yes
D6	SB96D_BDO_KF_5V	R674		Yes
B8	LH_BUSY	R670	Longhorn Busy	Yes
D3	USB_DIS	Q600, pin 2		Yes
E2	USB_DPLUS	Q601, pin 1	USB Data Plus	Yes
E1	USB_DMINUS	Q601, pin 4	USB Data Minus	Yes
E8	SB96D_BDO_KF_3V	NC		No
F6	SB96D_BDO_3V			No
H7	RTS_FILLSEN_3V	NC		No
G8	CTS_FILLREQ_3V			No
F8	TXDO_BDI_ENC_3V			No
F7	TXDO_BDI_UP_3V			No
E6	RXDIN_ENC_3V			No

Table 8-7. GCAP II (U501) Pinout

U501 Pin #	Description	To/From	Comment	Accessible on VOCON?
A2	BOARD_ID	R766	0 V	Yes
B2	AD3			No
B3	AD2	R771		Yes
A3	AD1	VR591, pin 2		Yes
D4	EMERGENCY	R512		Yes
C4	LV_DETECT	D511, pin 2	Active Low	Yes
B4	ADTRIG			No
A4	CONV_BYP	C750		Yes
B5	V3	C753	Unused Voltage Regulator	Yes
A5	VIN3	R762	3.77V	Yes
D5	VSEN1	GROUND		No

Table 8-7. GCAP II (U501) Pinout (Continued)

U501 Pin #	Description	To/From	Comment	Accessible on VOCON?
C5	VSIN	R762	3.77V	Yes
C6	VSIM1	C743	Unused Voltage Regulator	Yes
A6	V1	C749	Unused Voltage Regulator	Yes
B6	VIN1	C725	At Battery Voltage Level	Yes
D6	LI_CELL	D602, pin 3	3.0-3.3V	Yes
D7	CHARGE	NC		No
A7	XTAL1	C606	32.768 KHz Square Wave	Yes
B7	XTAL2	TP799		Yes
A8	PRSC2	E704	3.77V	Yes
B8	LX2	CR700	262.144 KHz Square Wave	Yes
A9	PGND1	GROUND		No
B9	FB2	R763	1.85V	Yes
C8	ON	R760		Yes
A10	FB1	R762	3.77V	Yes
B10	LX1	CR702	262.144 KHz Square Wave	Yes
C9	PWRON	C725	At Battery Voltage Level	Yes
D8	INT_EXT	GROUND		No
C10	PSRC1	L708	At Battery Voltage Level	Yes
E7	WDI	R757	3.0V	Yes
D10	MOSPORTB	C725	At Battery Voltage Level	Yes
D9	ISENSE	NC		No
E8	CHRGC	NC		No
E9	SQ_OUT	NC		No
E10	BPOS	C725	At Battery Voltage Level	Yes
F7	BATTERY	NC		No
F8	AUX_BAT	NC		No
F9	AUX_FET	NC		No
F10	MAIN_FET	NC		No
E6	PGM2	R788	At Battery Voltage Level +/ - 5%	Yes

Table 8-7. GCAP II (U501) Pinout (Continued)

U501 Pin #	Description	To/From	Comment	Accessible on VOCON?
G8	PGM1	R788	At Battery Voltage Level +/ - 5%	Yes
G10	AGND1	GROUND		No
G9	REF	C728	3.0V	Yes
H9	PA_DRV	NC		No
H10	PA_SENSE	NC		No
G7	PGM0	GROUND		No
H8	LS3_RX	NC		No
J10	DGND	GROUND		No
K10	LS3TX_PABPOS	GROUND		No
K1	MIC_OUT	U704, pin 6	AC Mic Signal	Yes
G4	STANDBY	R721	3.0V	Yes
K2	AUX_OUT	U704 pin 5	AC Mic Signal	Yes
H3	AUX_MIC_NEG	R730	Virtual AC Ground	Yes
J3	MB_CAP	C732		Yes
H4	EXT_MIC	NC		No
K3	MIC_BIAS	C732		Yes
J4	CD_CAP	C754		Yes
K4	VAG	C734	Voltage Analog Ground	Yes
J5	V2	R770	3.0V	Yes
K5	VIN2	R762	3.77V	Yes
G5	ON2	NC		No
H5	EXTOUT	C703	AC RX Audio Signal	Yes
K6	SPKR_OUT	NC		No
J6	SPKR_IN	NC		No
H6	SPKR_NEG	NC		No
H7	SPKR_POS	NC		No
K7	LS1IN_TG1A	GROUND		No
J7	LS1OUT_TG1	NC		No
G6	LS2IN_TG2A	GROUND		No
F6	LS2OUT_TG2			No

Table 8-7. GCAP II (U501) Pinout (Continued)

U501 Pin #	Description	To/From	Comment	Accessible on VOCON?
K8	ALRT_GND			No
K9	ALRT_OUT	NC		No
J9	ALRT_VCC	NC		No
J8	SIMI_O	NC		No
A1	VOLUME	C520	0-2.5V	Yes
B1	AGND3	GROUND		No
C3	DWN_OUT	NC		No
C2	DWN_IN	GROUND		No
C1	CMP_OUT	NC		No
D3	DSC_INN	GROUND		No
D2	DSC_INP	GROUND		No
D1	SCK_B	B_CLK	Spi Data Clock	Yes
E4	SPI_MISO_B	BMISO	Spi Data Read From GCAP	Yes
E3	SPI_MOSI_B	BMOSI	Spi Data Write To GCAP	Yes
E2	SR_VCCIN	NC		No
E1	SR_VCCOUT	NC		No
F3	SR_IN	NC		No
F2	SR_OUT	NC		No
F1	GCAP_INT	TP728	GCAP Interrupt	Yes
F4	SPICS2B			No
F5	13MHZ	C601	13 MHz	Yes
E5	SAP_DCLK	DCLK	520 KHz	Yes
G1	SAP_TX	TX	TX Audio Data To DSP	Yes
G2	SAP_RX	R768	RX Audio Data From DSP	Yes
G3	SAP_FSYNC	SYNC	8 KHz Frame Sync	Yes
H1	AGND4	GROUND		No
J1	AGND2	GROUND		No
H2	MICIN_POS	C734		Yes
J2	MICIN_NEG	R719	Virtual Ground	Yes

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Chapter 9 Schematics, Board Overlays, and Parts Lists

9.1 Introduction

This chapter contains the schematics, board layouts, and parts lists for the XTS 2500/2250/1500 radios. Use them in conjunction with the theory of operation and the troubleshooting procedures, charts, and waveforms to isolate a problem to the component level.

Table 9-1. 700/800 MHz Schematics, Board Overlays and Parts Lists

Table 9-1. 700/800 MHz Schematics, Board Overlays and Parts Lists (Continued)

Table 9-2. VHF Schematics, Board Overlays and Parts Lists

Table 9-3. UHF Range 1 Schematics, Board Overlays and Parts Lists

Table 9-4. UHF Range 2 Schematics, Board Overlays and Parts Lists

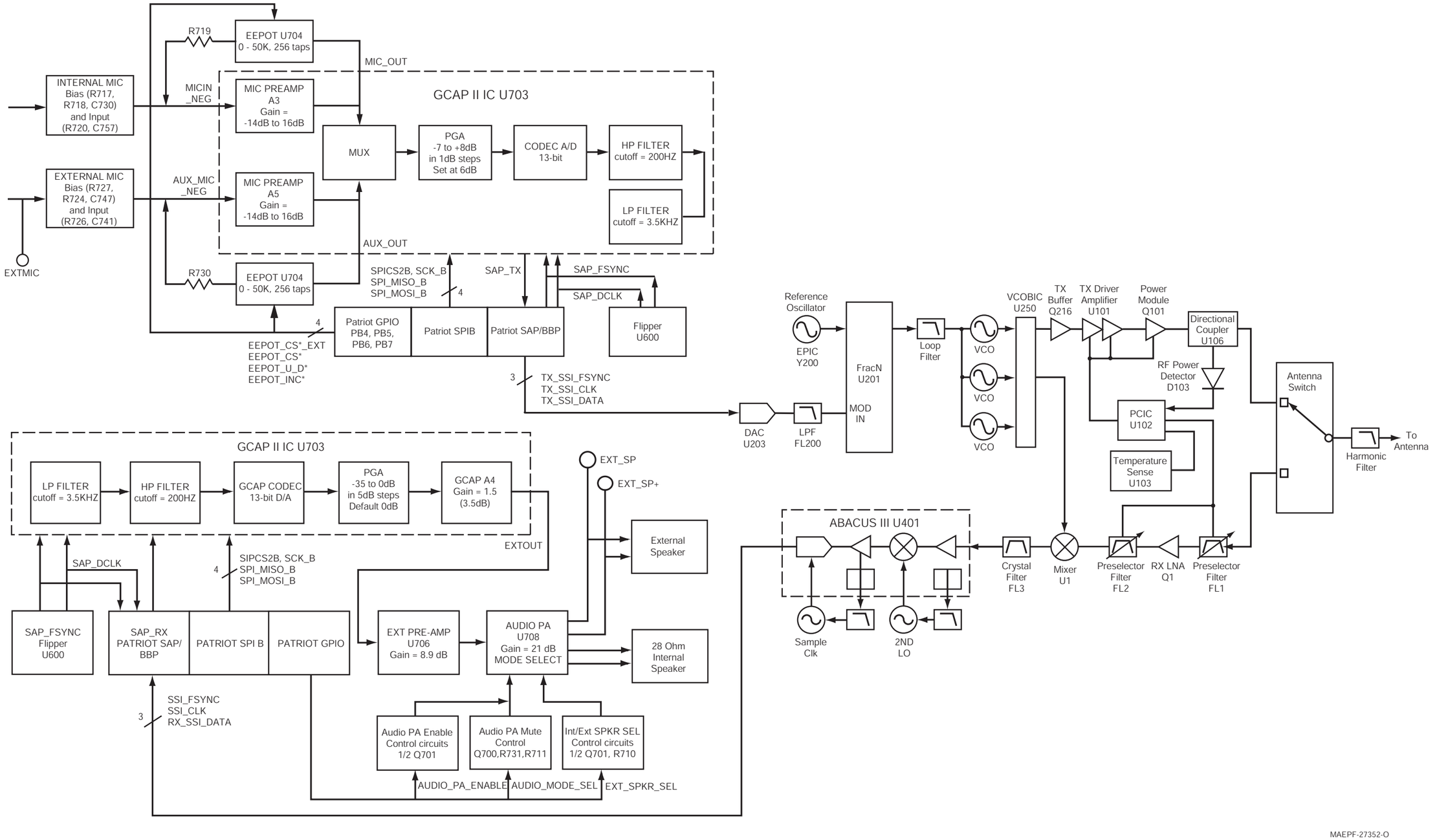
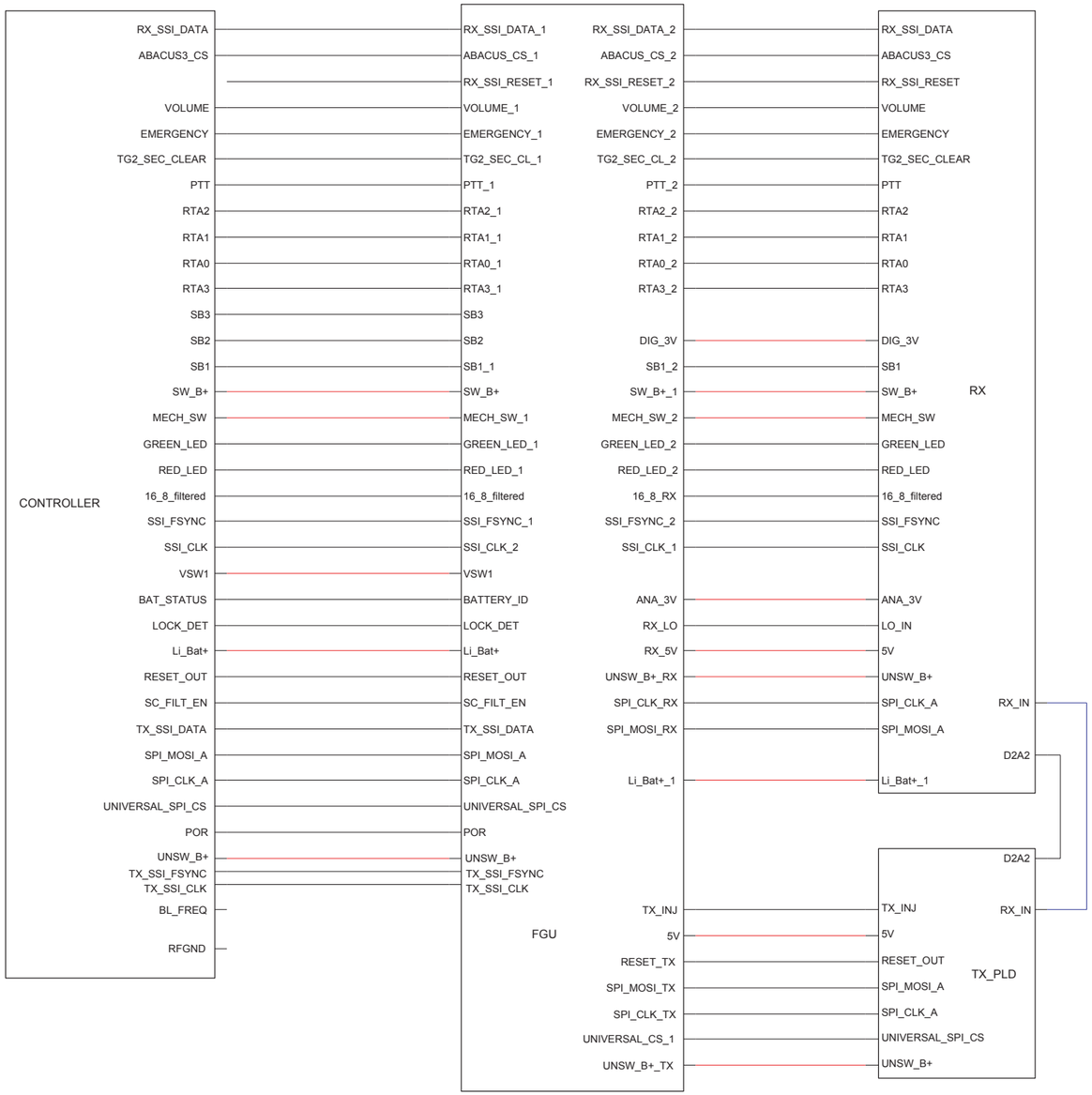


Figure 9-1. Radio Interconnect Block Diagram



Reference Designators Used:

001 - 099	Receiver front end
100 - 199	Transmitter
200 - 299	FGU
400 - 499	Receiver back end
500 - 599	DC and Controls
600 - 699	Flipper and Interface
700 - 799	GCAP II
800 - 899	Patriot and Memory

63B810 95C22-0

Figure 9-2. PMUF6541A Top Level Schematic

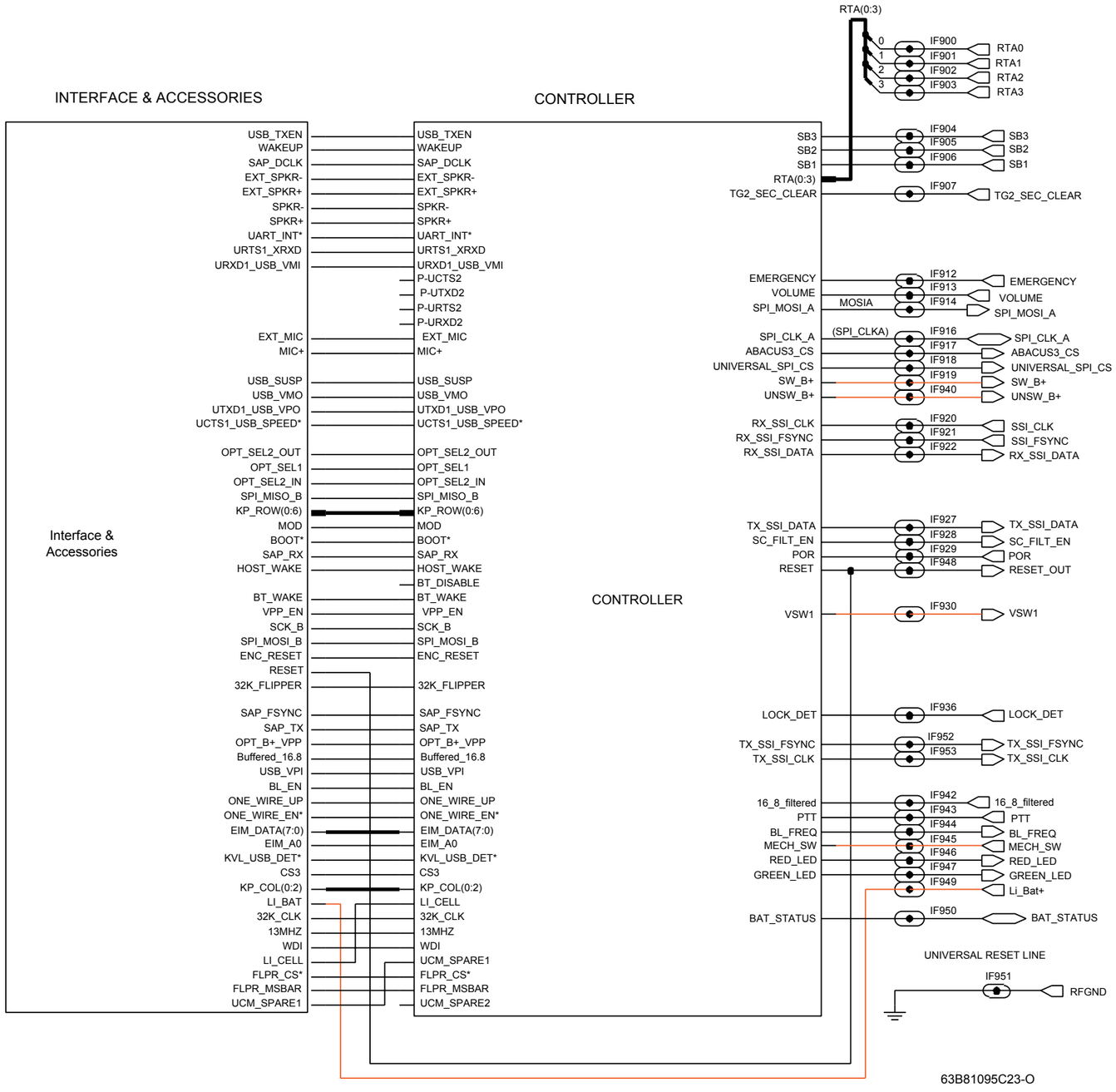


Figure 9-3. PMUF6541A Controller Interface Schematic

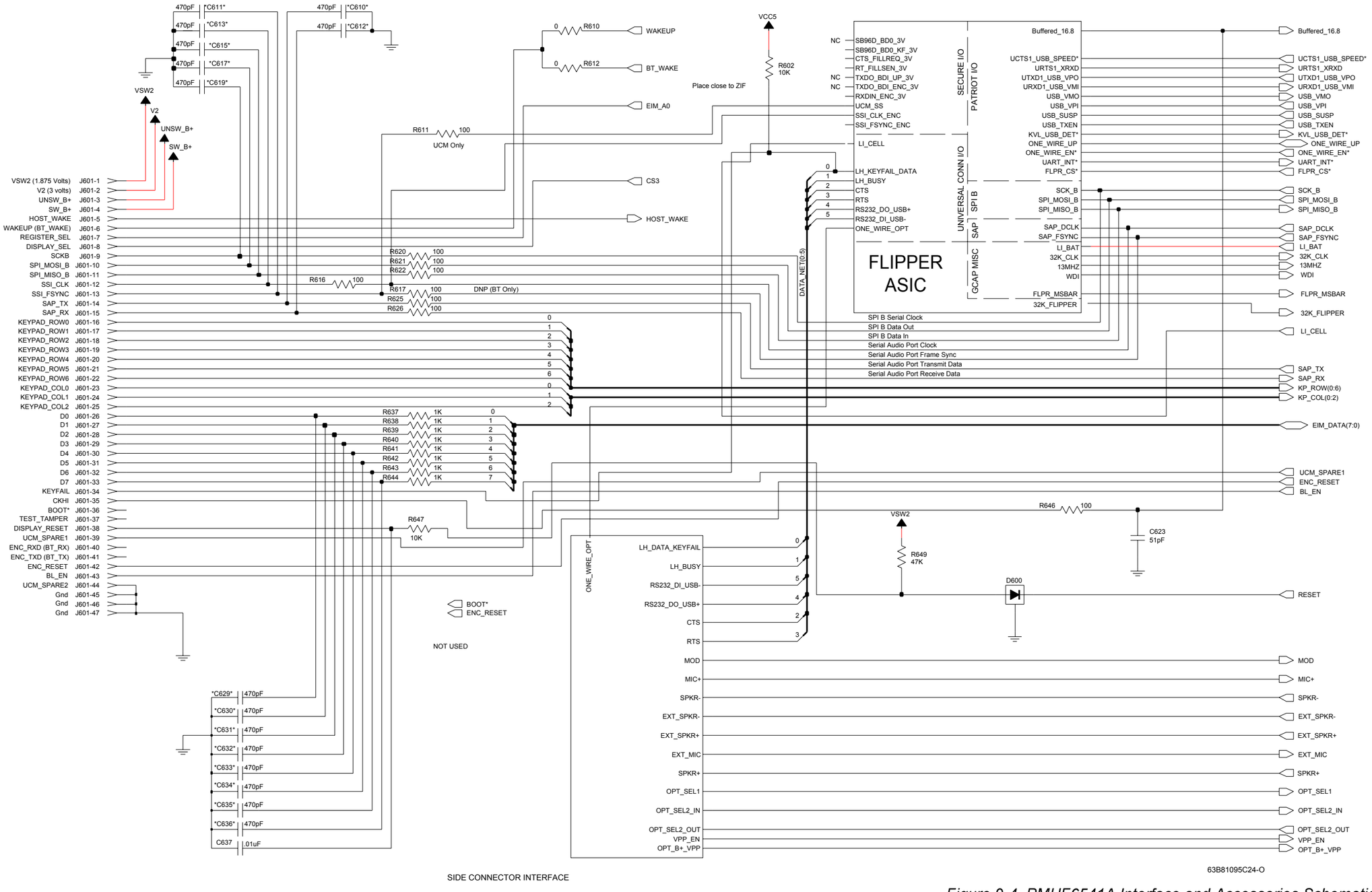


Figure 9-4. PMUF6541A Interface and Accessories Schematic

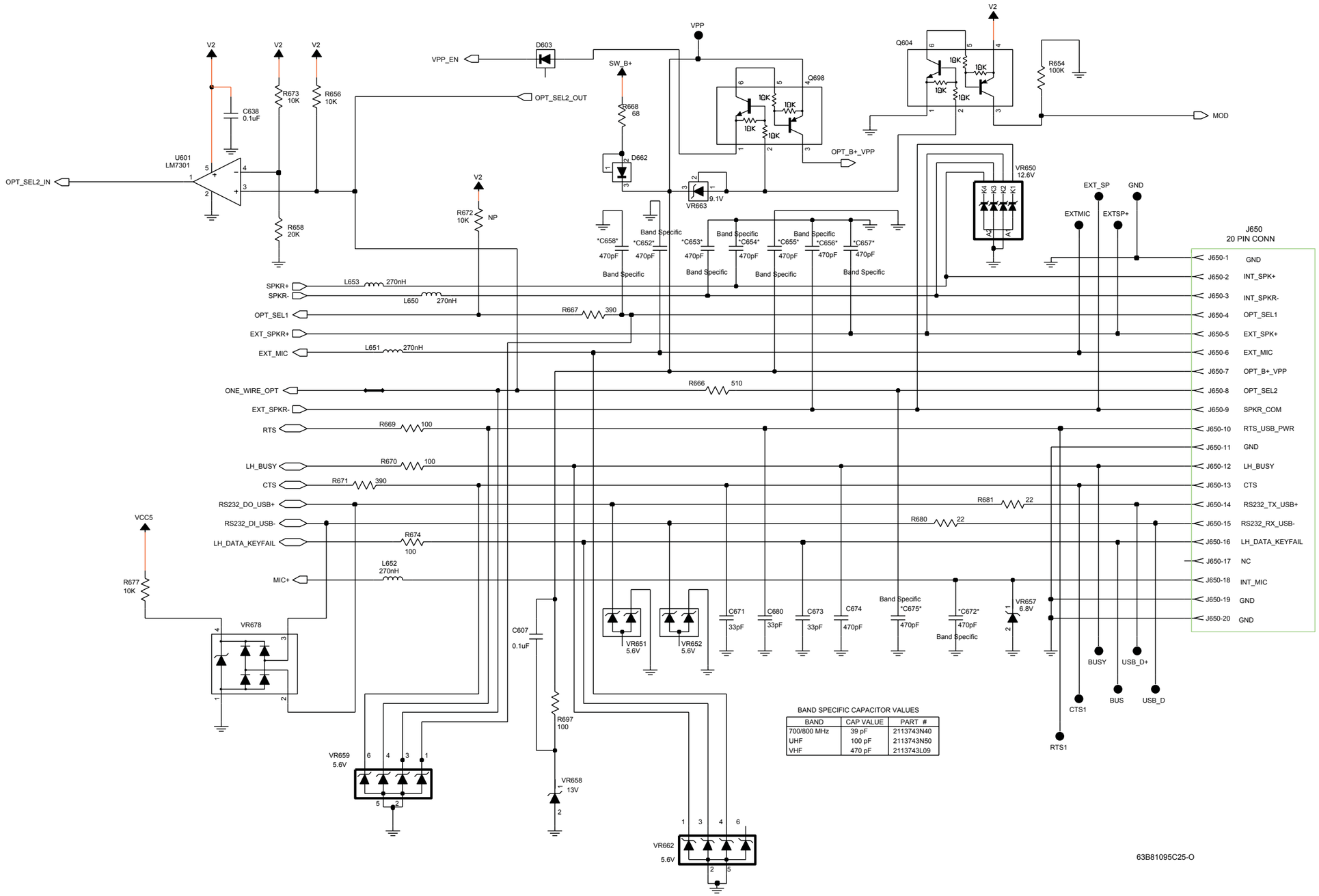


Figure 9-5. PMUF6541A Side Connector Schematic

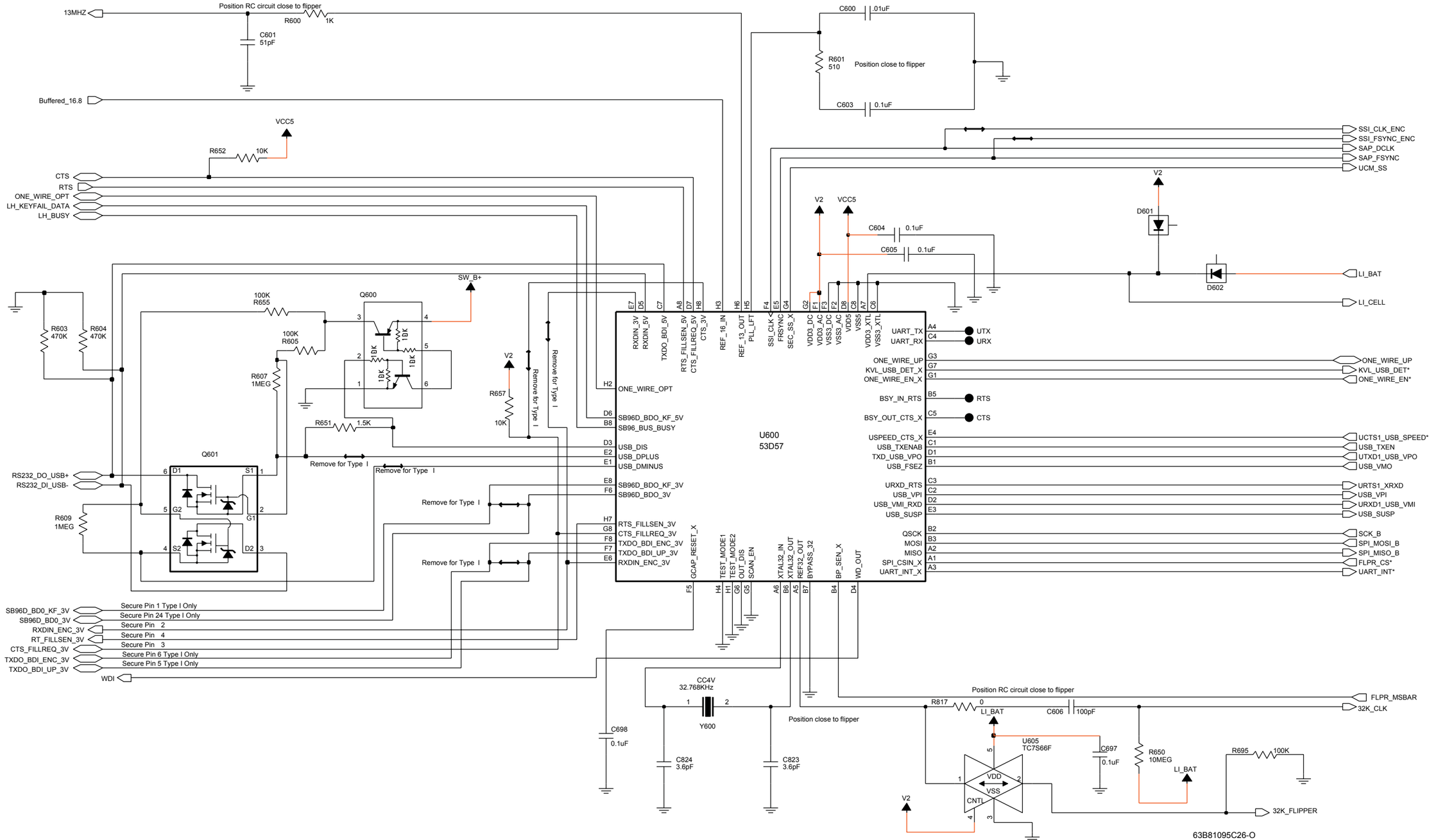


Figure 9-6. PMUF6541A Flipper Schematic

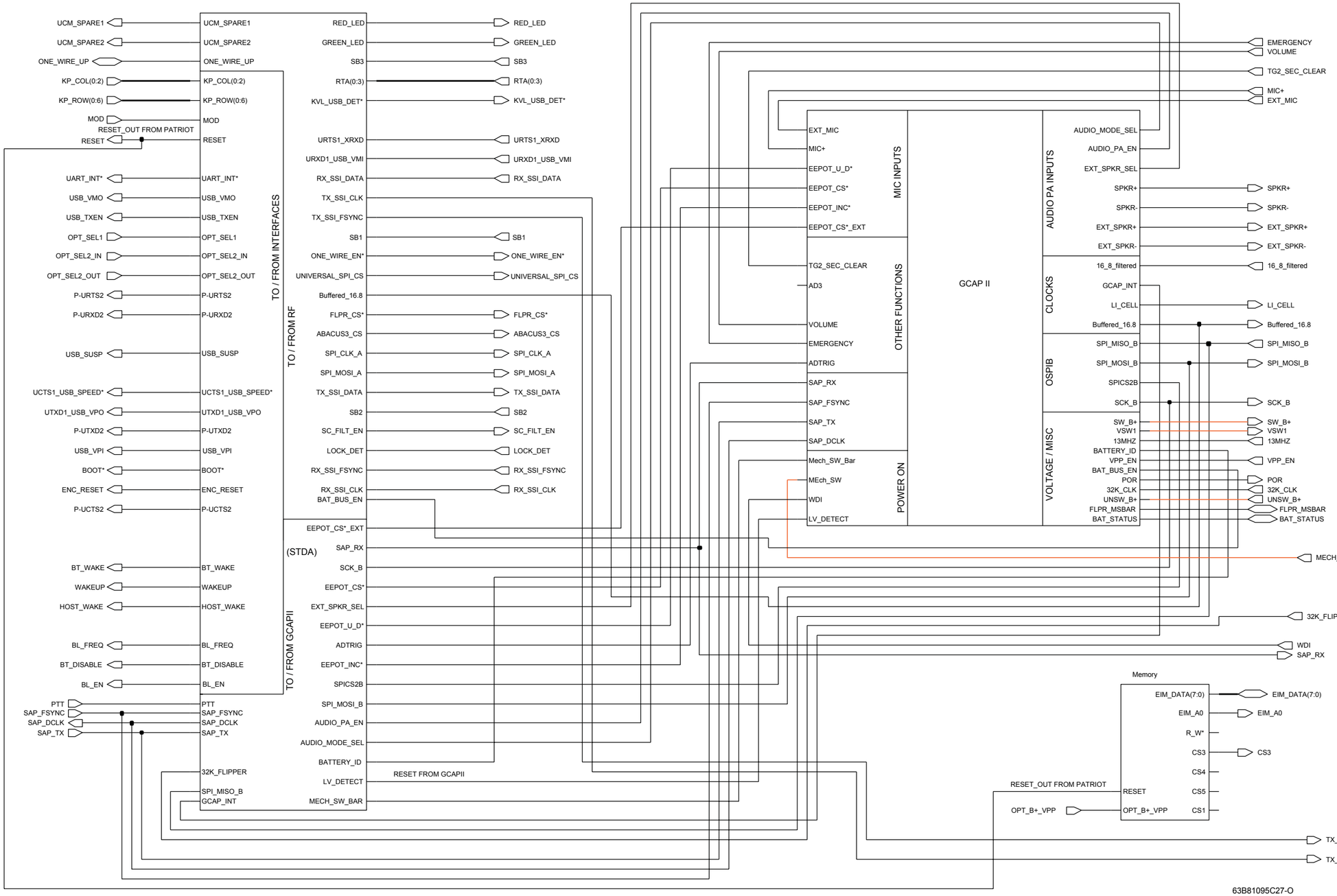


Figure 9-7. PMUF6541A Controller Schematic

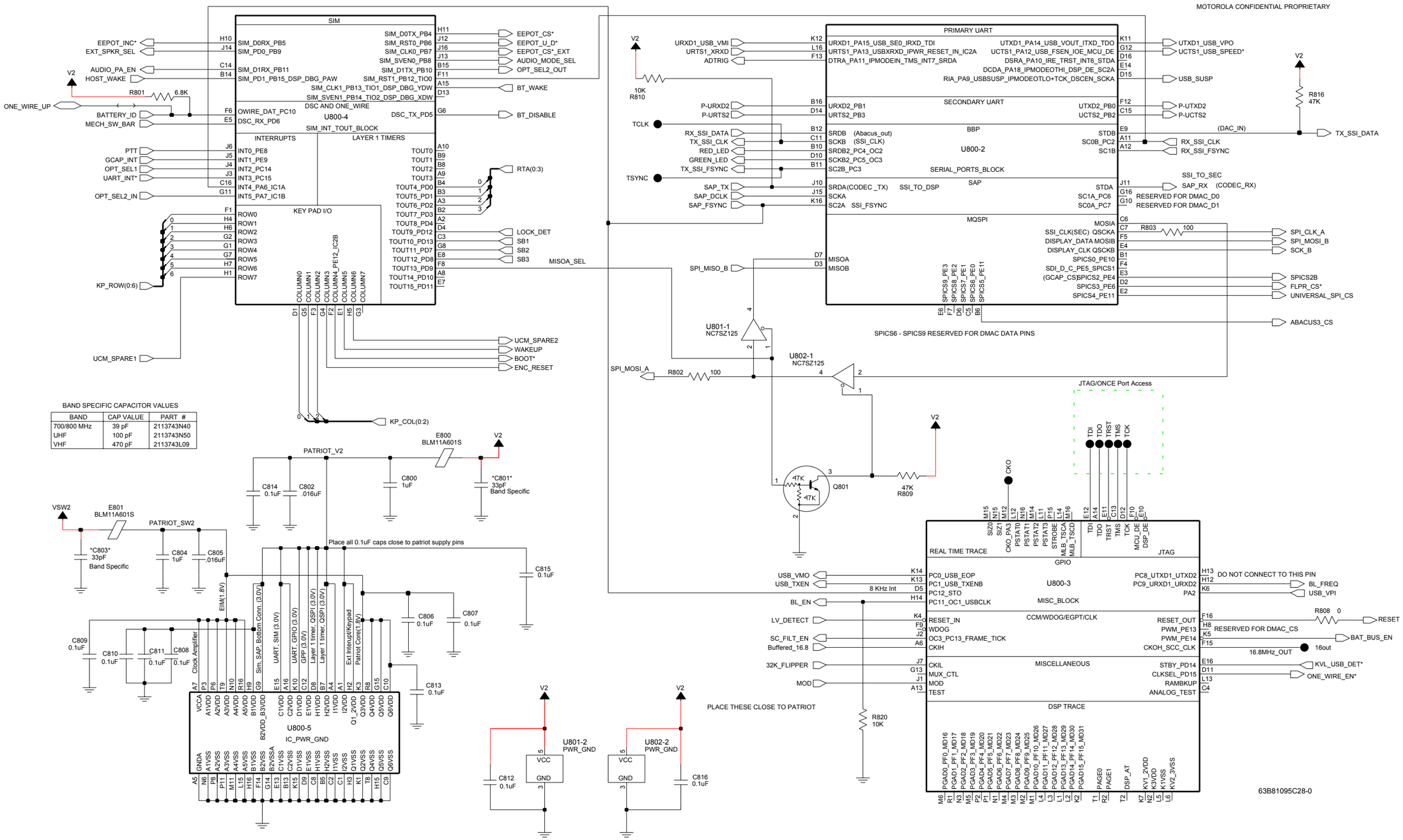


Figure 9-8. PMUF6541A Patriot (U800) Schematic

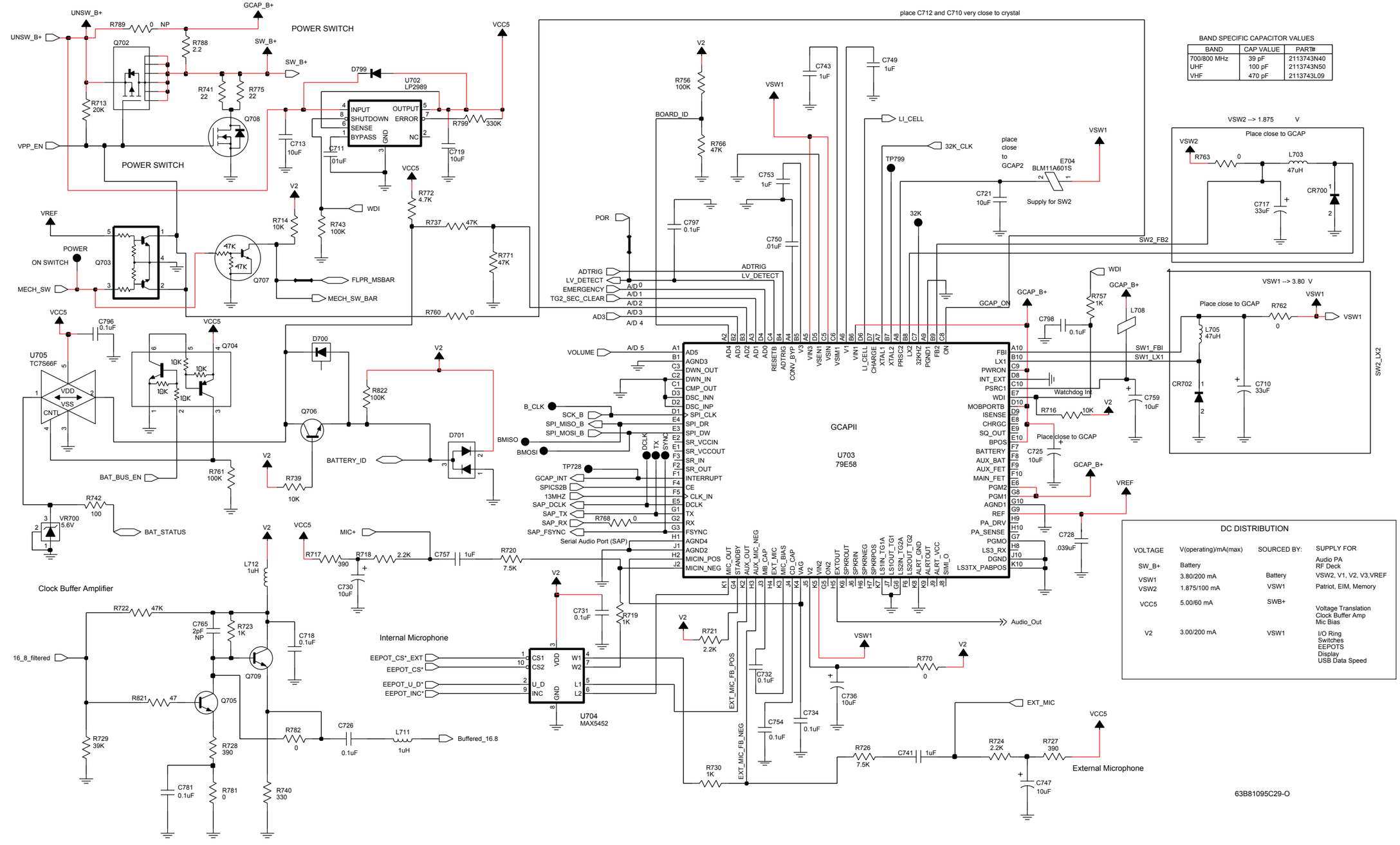


Figure 9-9. PMUF6541A GCAP II/DC and Audio Schematic, Sheet 1 of 2

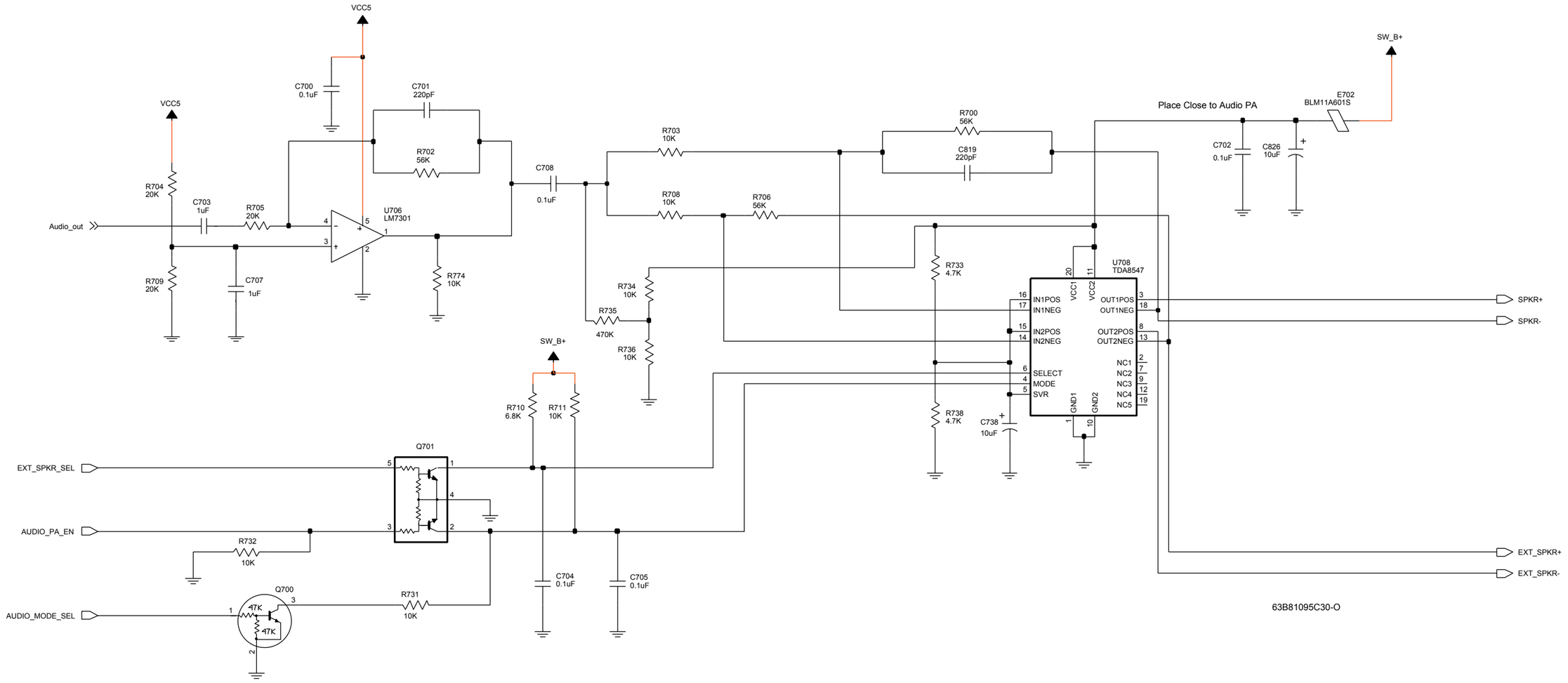


Figure 9-10. PMUF6541A GCAP II/Audio PA Schematic, Sheet 2 of 2

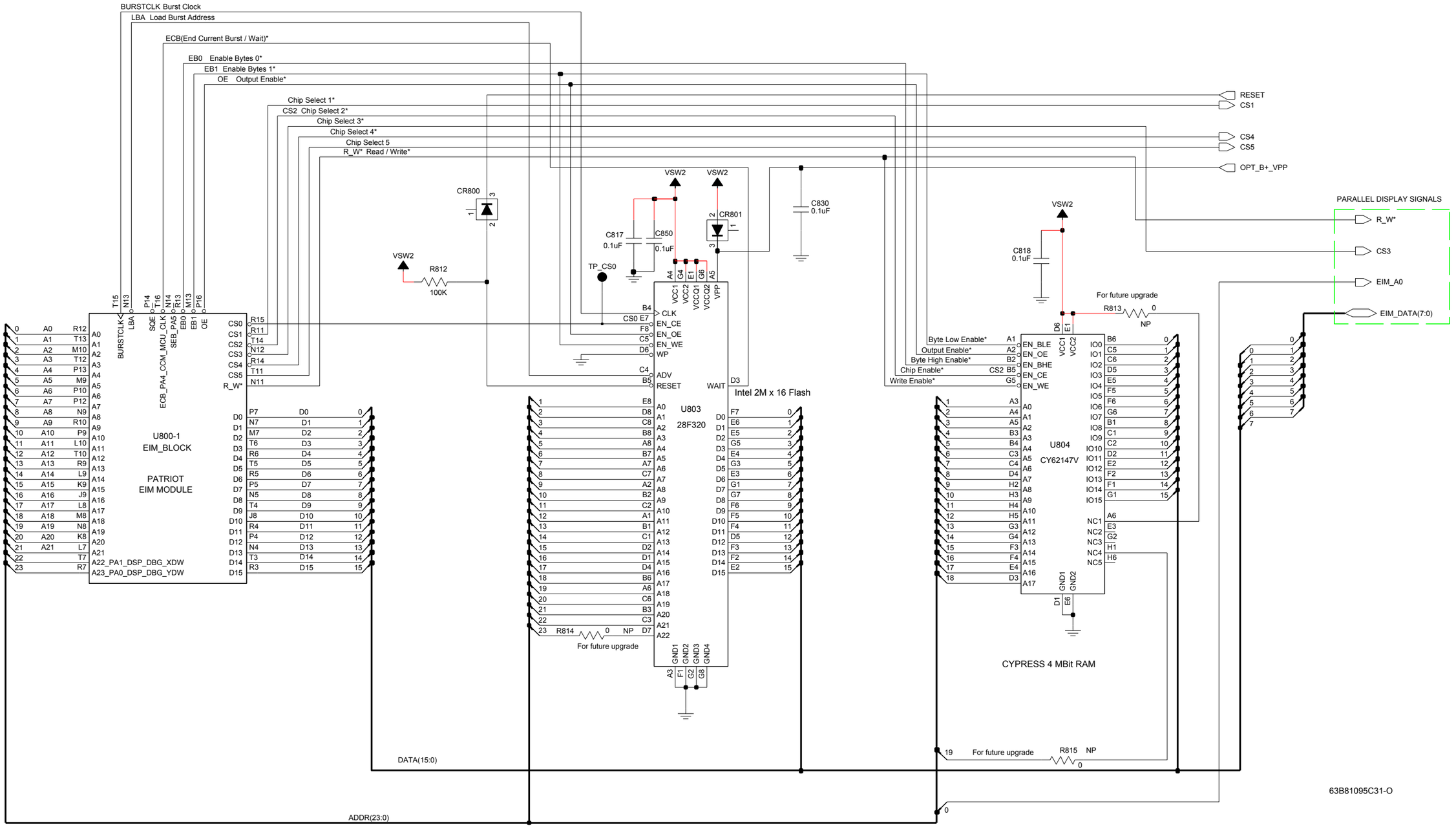


Figure 9-11. PMUF6541A Memory Schematic

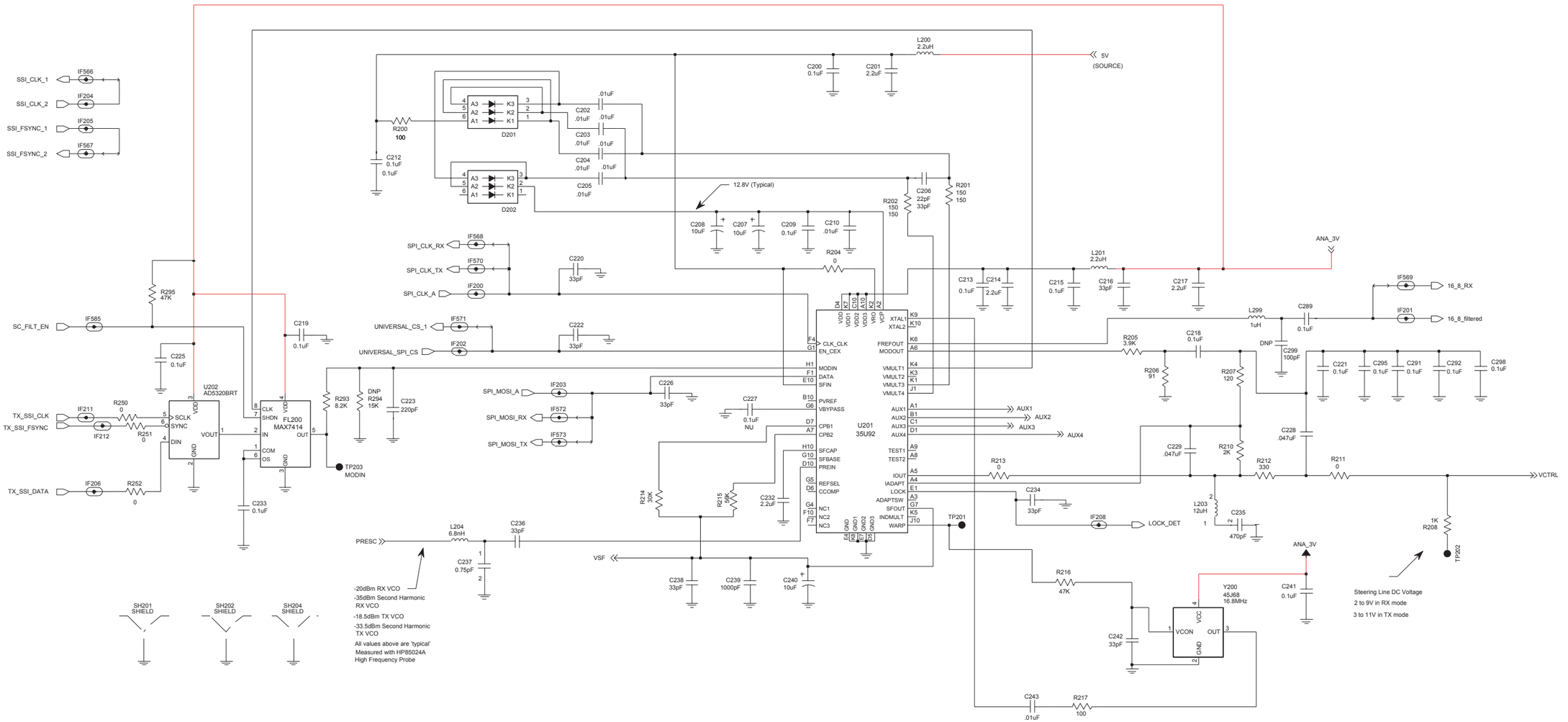


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Figure 9-12. PMUF6541A Frequency Generation Unit (FGU) Schematic, Sheet 1 of 3

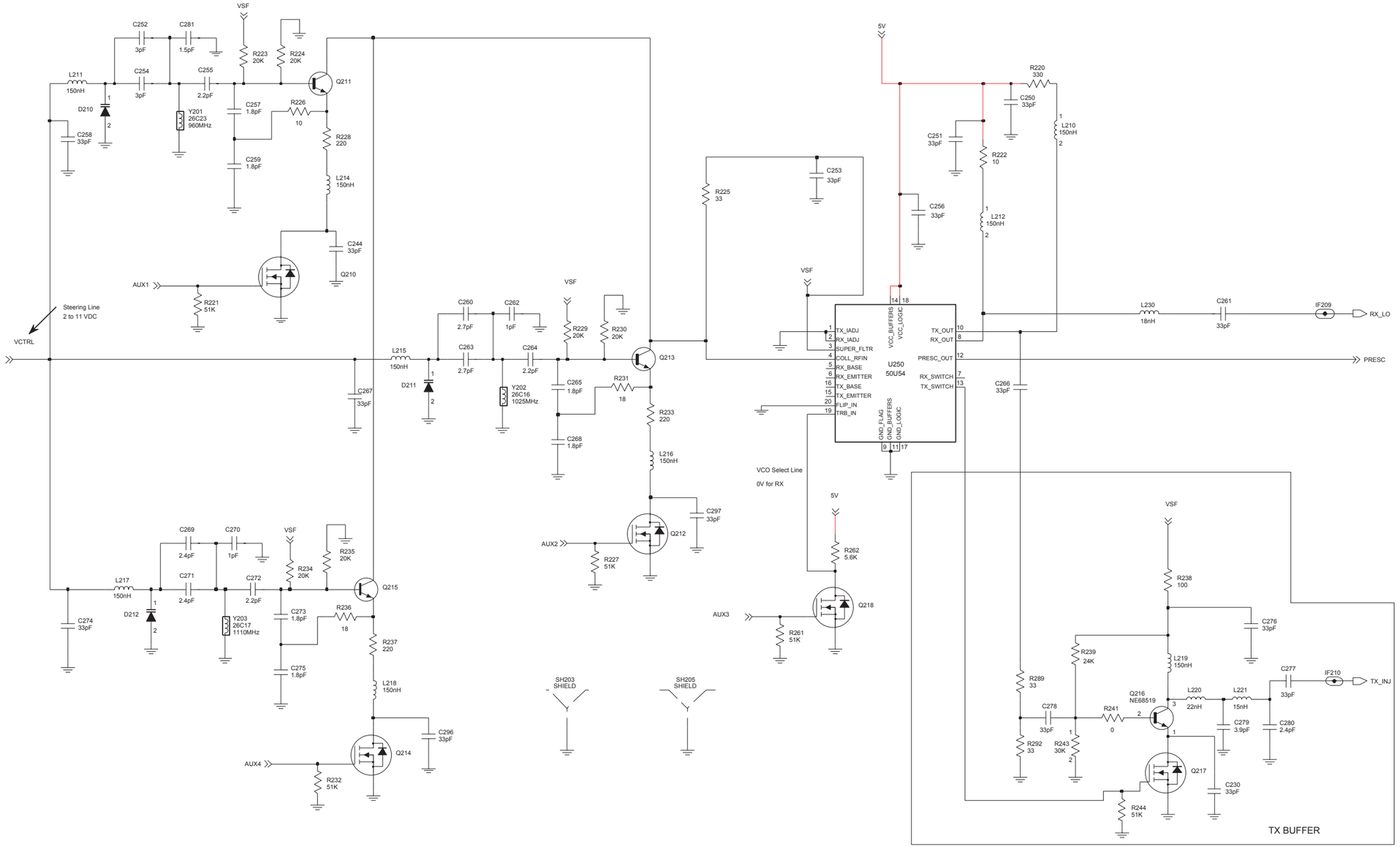

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Figure 9-13. PMUF6541A Frequency Generation Unit (FGU) Schematic Sheet 2 of 3

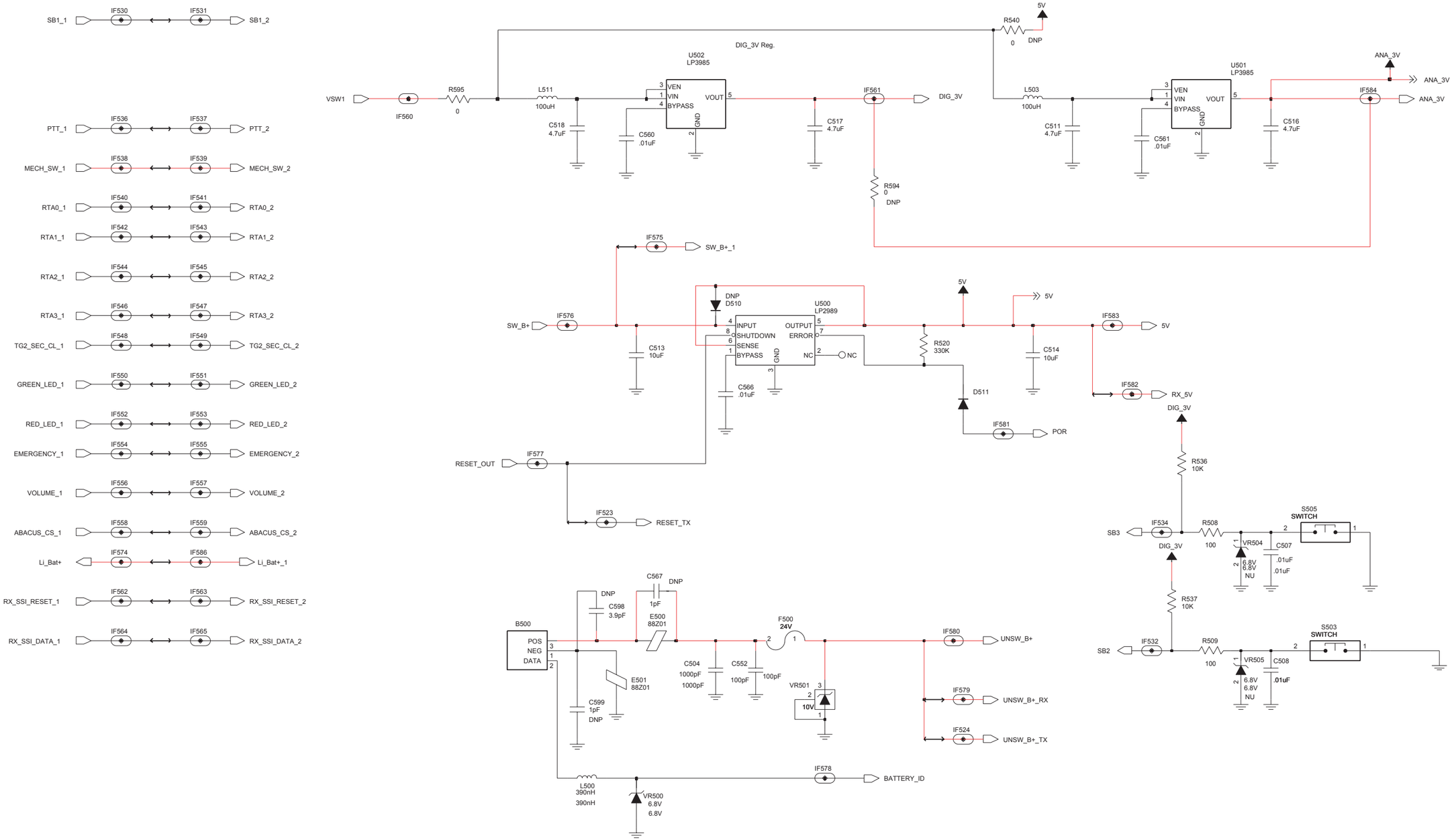

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Figure 9-14. PMUF6541A Frequency Generation Unit (FGU) Schematic, Sheet 3 of 3

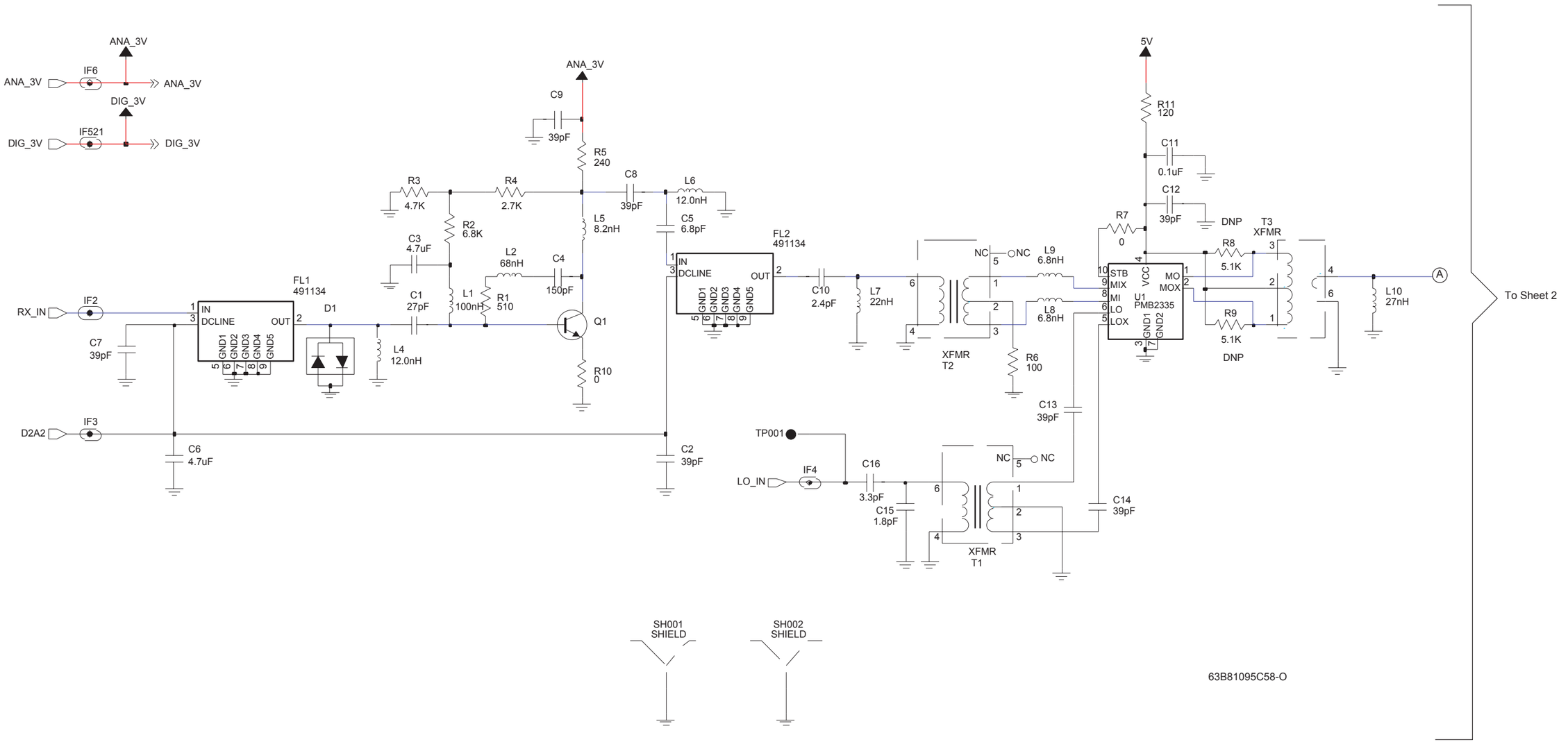

Figure 9-15. PMUF6541A Receiver Schematic, Sheet 1 of 3

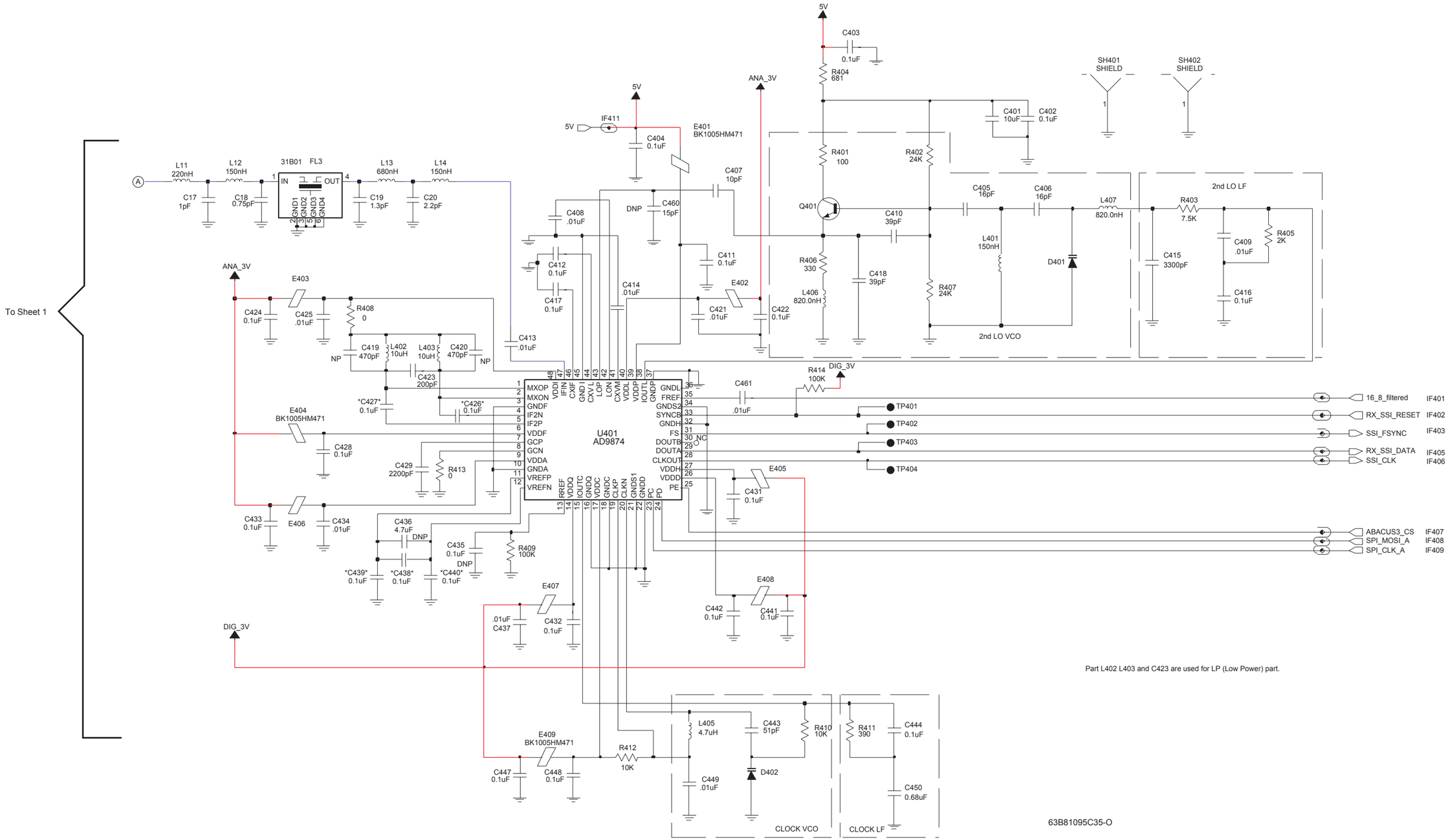

Figure 9-16. PMUF6541A Receiver Schematic, Sheet 2 of 3

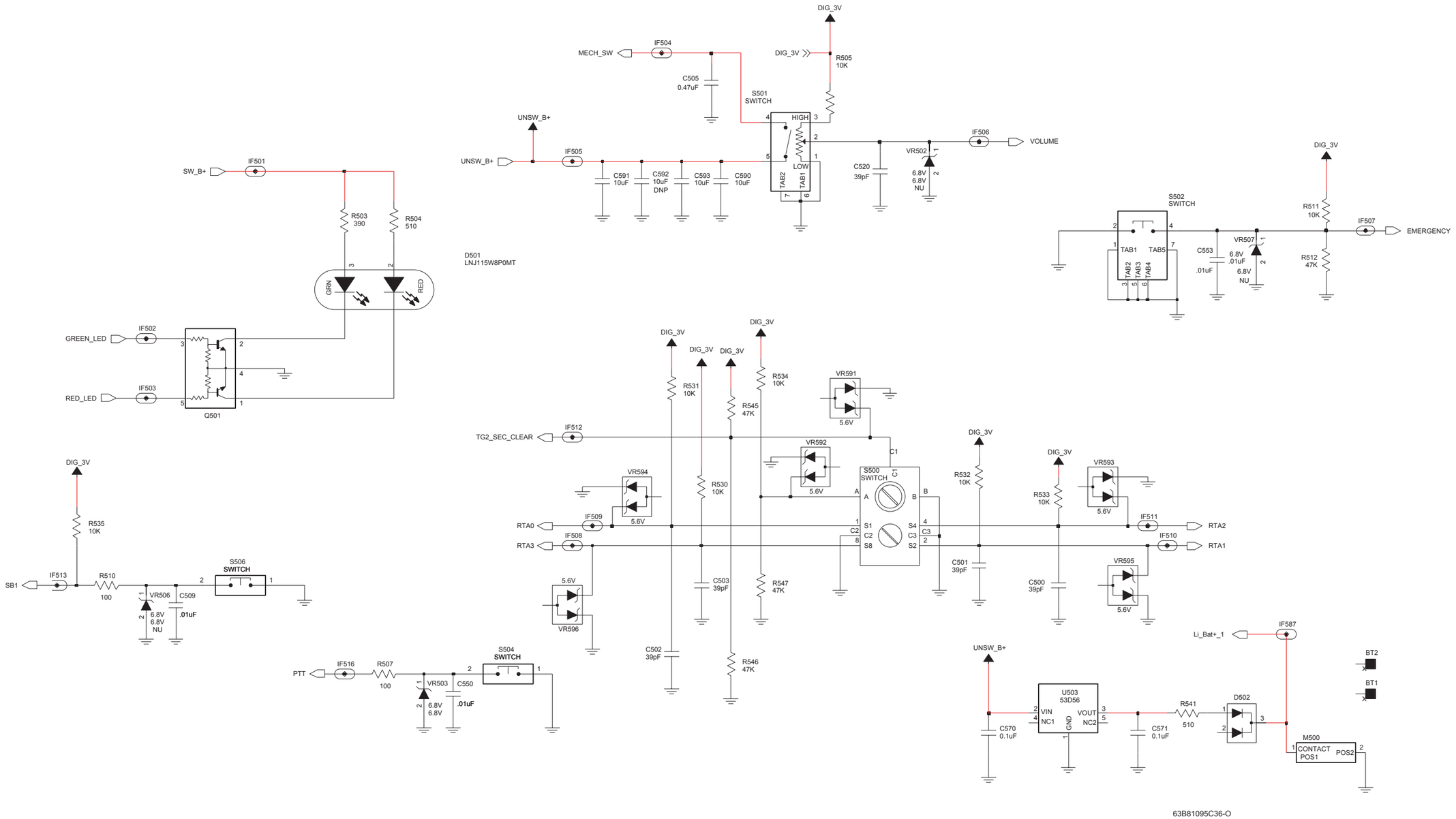

Figure 9-17. PMUF6541A Receiver Schematic, Sheet 3 of 3

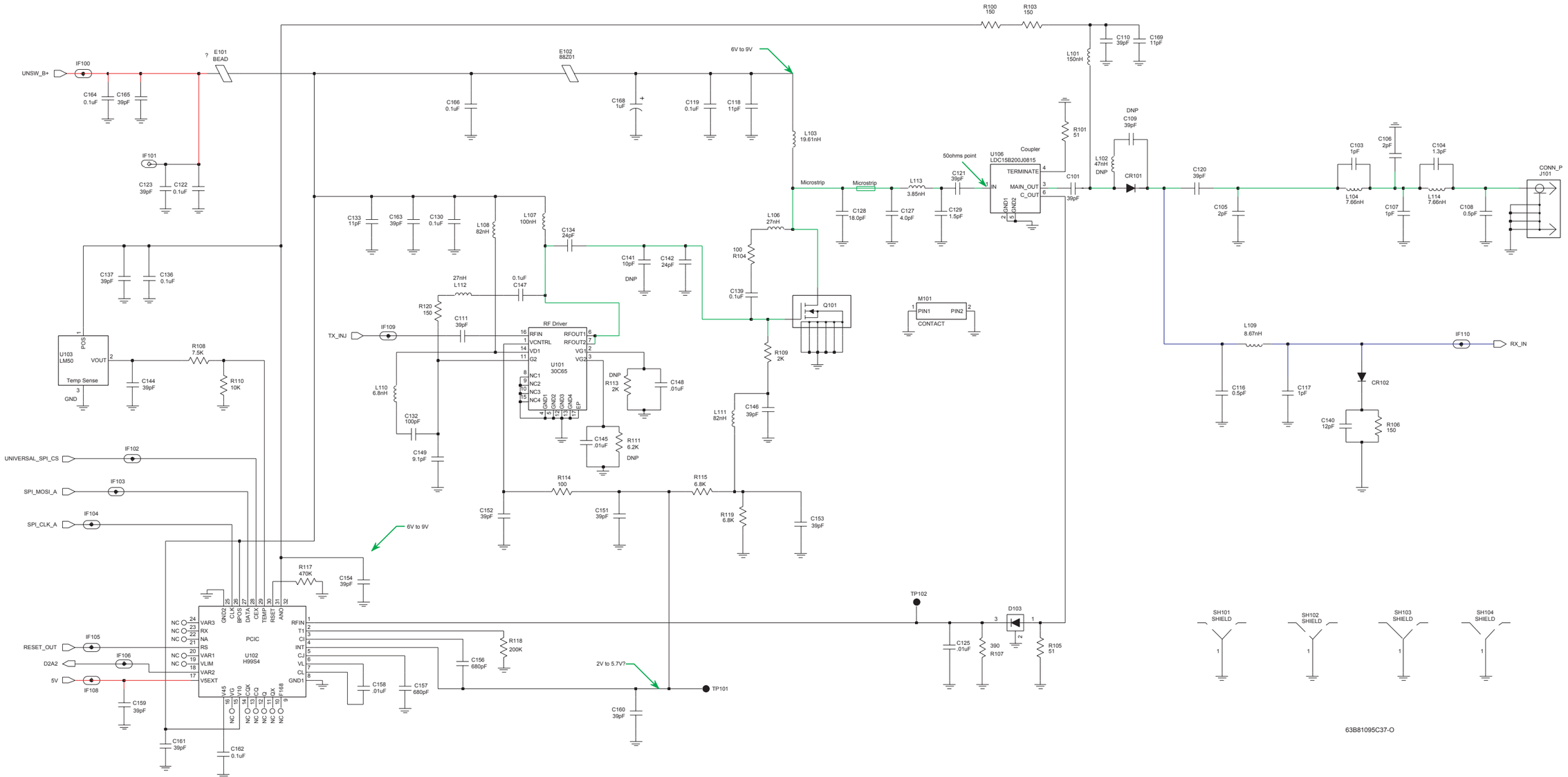

Figure 9-18. PMUF6541A Transmitter Subsection (Ring PA) Schematic

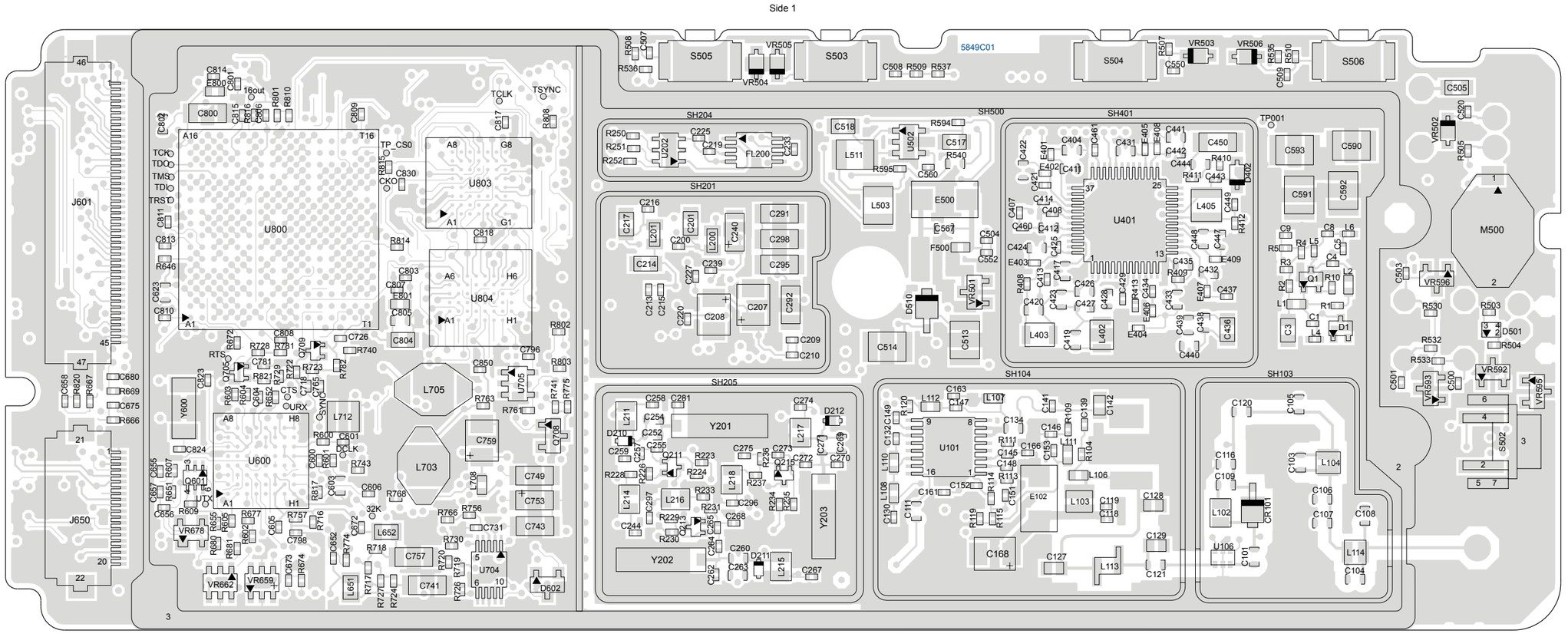

Figure 9-19. PMUF6541A Main Circuit Board Component Location Detail, Side 1

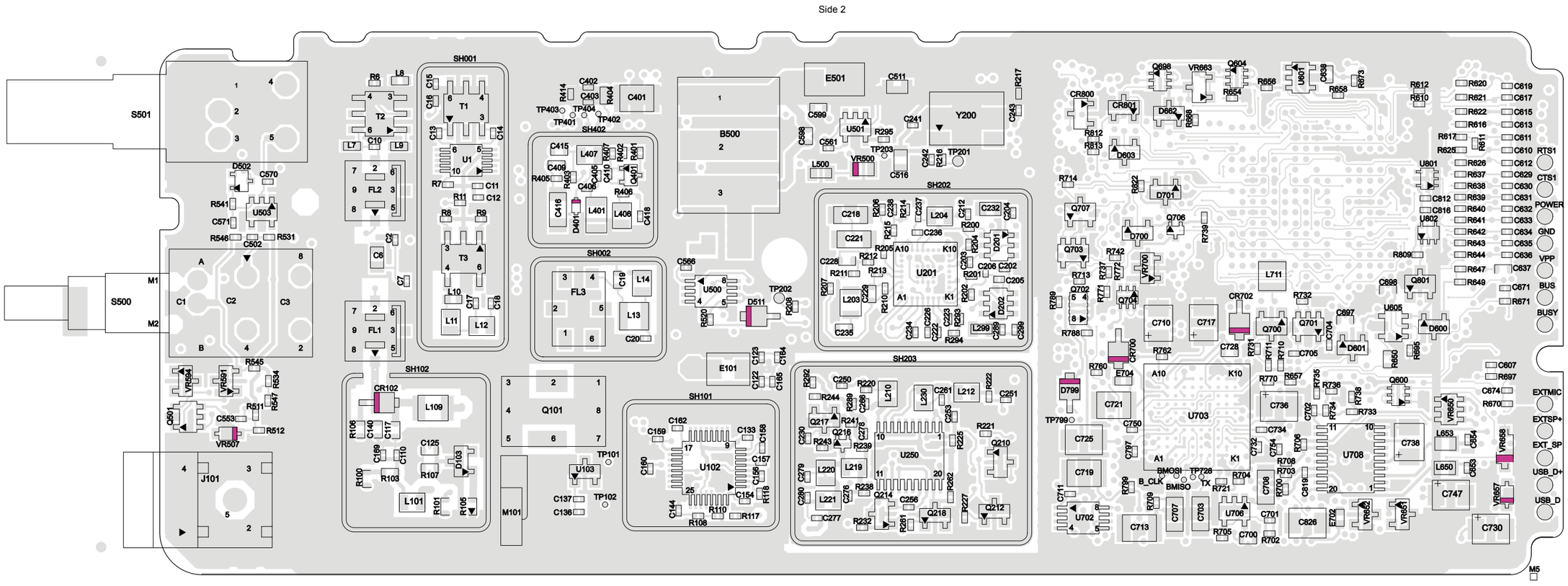

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Figure 9-20. PMUF6541A Main Circuit Board Component Location Detail, Side 2

PMUF6541A Main Circuit Board Electrical Parts List

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
		BATTERY:
B500	0986237A02	Connector
		Capacitor, Fixed: pF ±5%; 50V unless otherwise stated
C1	2113743N36	27
C2	2113743N40	39
C3	2113928C04	4.7uF 6.3V 10%
C4	2113743N54	150
C5	2113743N22	6.8
C6	2113928C04	4.7uF 6.3V 10%
C7 thru C9	2113743N40	39
C10	2113743N11	2.4 ±0.25
C11	2113743M24	0.1 uF +80-20%
C12 thru C14	2113743N40	39
C15	2104801Z12	1.8 16V
C16	2113743N14	3.3 ±0.25
C17	2113743Q03	1.0 ±0.1
C18	2113743N02	0.75 ±0.25
C19	2113740F06	1.3 ±30
C20	2113743Q10	2.2 ±0.1
C101	2113930F41	39
C103	2113930F03	1 ±0.1 50V
C104	2113740F06	1.3 ±30
C105, C106	2113930F10	2.0 ±0.25 50V
C107	2113930F03	1.0 ±0.1 50V
C108	2113740F01	0.5 ±30
C109	Not Placed	-
C110	2113743N40	39
C111	2113930F41	39
C116	2113740F01	0.5 ±30
C117	2113930F03	1 ±0.1 50V
C118	2113743N27	11
C119	2113743M24	0.1 uF +80-20%
C120, C121	2113930F41	39
C122	2113743M24	0.1 uF +80-20%
C123	2113743N40	39
C125	2113931F49	.01 uF
C127	2103689A17	4.0 ±0.25
C128	2103689A08	18 ±0.05
C129	2103689A32	1.5 pF ±0.05 pF
C130	2113743M24	0.1 uF +80-20%
C132	2113743N50	100
C133	2113743N27	11
C134	2113930F36	24
C136	2113743M24	0.1 uF +80-20%
C137	2113743N40	39
C139	2113743M24	0.1 uF +80-20%
C140	2113930F29	12
C141	Not Placed	-
C142	2103689A47	24 pF High - Q capacitor
C144	2113743N40	39
C145	2113743L41	.01 uF 10%
C146	2113743N40	39
C147	2113743M24	0.1 uF +80-20%
C148	2113743L41	.01 uF 10%
C149	2113743N25	9.1 ±0.5
C151 thru C154	2113743N40	39
C156, C157	2113743L13	680 10%
C158	2113743L41	0.1 uF 10%
C159 thru C161	2113743N40	39
C162	2113743M24	0.1 uF +80-20%
C163	2113743N40	39
C164	2113743M24	0.1 uF +80-20%
C165	2113743N40	39
C166	2113743M24	0.1 uF +80-20%
C168	2311049A08	1 uF
C169	2113743N27	11.0
C200	2113743M24	0.1 uF +80-20%
C201	2113743F18	2.2 uF 16V
C202 thru C205	2113743L41	.01 uF 10%
C206	2113743N38	33
C207, C208	2311049A57	10 uF 10% 16V
C209	2113743M24	0.1 uF +80-20%
C210	2113743L41	.01 uF 10%
C212, C213	2113743M24	0.1 uF +80-20%
C214	2113743F18	2.2 uF 16V
C215	2113743M24	0.1 uF +80-20%
C216	2113743N38	33
C217	2113743F18	2.2 uF 16V
C218	2185419D06	0.1uF Super L/D
C219	2113743M24	0.1 uF +80-20%
C220	2113743N38	33
C221	2185419D06	0.1 uF Super L/D
C222	2113743N38	33
C223	2113743L01	220 10%
C225	2113743M24	0.1 uF +80-20%
C226	2113743N38	33
C227	2113743M24	0.1 uF +80-20%
C228, C229	2113743E12	.047 uF 10%
C230	2113743N38	33
C232	2113743F18	2.2 uF 16V
C233	2113743M24	0.1 uF +80-20%
C234	2113743N38	33
C235	2113931F17	470
C236	2113743N38	33
C237	2113743N02	0.75 ±0.25
C238	2113743N38	33
C239	2113743L17	.001 uF 10%
C240	2311049A59	10 uF 10% 6V
C241	2113743M24	0.1 uF +80-20%
C242	2113743N38	33
C243	2113743L41	.01 uF 10%
C244	2113743N38	33
C250, C251	2113743N38	33
C252	2113740L05	3 ±0.1
C253	2113743N38	33
C254	2113740L05	3 ±0.1
C255	2113743Q10	2.2 ±0.1
C256	2113743N38	33
C257	2104801Z12	1.8 16V
C258	2113743N38	33
C259	2104801Z12	1.8 16V
C260	2113740L04	2.7 ±0.1
C261	2113743N38	33
C262	2113743Q03	1 ±0.1
C263	2113740L04	2.7 ±0.1
C264	2113743Q10	2.2 ±0.1
C265	2104801Z12	1.8 16V
C266, C267	2113743N38	33
C268	2104801Z12	1.8 16V
C269	2113740L03	2.4 ±0.1
C270	2113743Q03	1 ±0.1
C271	2113740L03	2.4 ±0.1

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C272	2113743Q10	2.2 ±0.1
C273	2104801Z12	1.8 16V
C274	2113743N38	33
C275	2104801Z12	1.8 16V
C276 thru C278	2113743N38	33
C279	2113743N16	3.9 ±0.25
C280	2113743N11	2.4 ±0.25
C281	2113743Q07	1.5 ±1
C289	2113743M24	0.1 uF +80-20%
C291, C292	2185419D06	0.1 uF
C295	2185419D06	0.1 uF
C296, C297	2113743N38	33
C298	2185419D06	0.1 uF
C299	Not Placed	-
C401	2113743T19	10 uF 16V
C402, C403	2113743M24	0.1 uF +80-20%
C404	2113932E20	0.10 uF 10% 16V
C405, C406	2113743N31	16
C407	2113743N26	10
C408	2113743L41	.01 uF 10%
C409	2113931F49	.01 uF 5% 50V
C410	2113743N40	39
C411, C412	2113932E20	0.10 uF 10% 16V
C413, C414	2113743L41	.01 uF 10%
C415	2113931F37	3300
C416	2109720D14	0.1 uF
C417	2113932E20	0.1 uF 10% 16V
C418	2113743N40	39
C419, C420	Not Placed	-

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C421	2113743L41	.01 uF 10%
C422	2113932E20	0.1 uF 10% 16V
C423	2113740F58	200 ±30
C424	2113932E20	0.10 uF 10% 16V
C425	2113743L41	.01 uF 10%
C426 thru C428	2113932E20	0.1 uF 10% 16V
C429	2113743L25	2200 10%
C431 thru C433	2113932E20	0.1 uF 10% 16V
C434	2113743L41	.01 uF 10%
C435	Not Placed	-
C436	2113928C04	4.7 uF 6.3V 10%
C437	2113743L41	.01 uF 10%
C438 thru C442	2113932E20	0.1 uF 10% 16V
C443	2113743N43	51
C444	2113932E20	0.1 uF 10% 16V
C447, C448	2113932E20	0.1 uF 10% 16V
C449	2113743L41	.01 10%
C450	2113743B27	0.68 uF 10%
C460	Not Placed	-
C461	2113743L41	.01 uF 10%
C500 thru C503	2113743N40	39
C504	2113743L17	.001 uF 10%
C505	2113743A27	0.47 uF 10% 16V
C507 thru C509	2113743L41	.01 uF 10%
C511	2113928C04	4.7 uF 6.3V 10%
C513, C514	2113743T19	10 uF 16V

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C516 thru C518	2113928C04	4.7 uF 6.3V 10%
C520	2113743N40	39
C550	2113743L41	.01 uF 10%
C552	2113743N50	100
C553	2113743L41	.01 uF 10%
C560, C561	2113743L41	.01 uF 10%
C566	2113743L41	.01 uF 10%
C567	Not Placed	-
C570, C571	2113743M24	0.1 uF +80 -20%
C590	2311049A22	10 uF
C598, C599	Not Placed	-
C600	2113743L41	.01 uF 10%
C601	2113743N43	51
C603	2113932E20	0.10 uF 10% 16V
C604 thru C607	2113743M24	0.1 uF +80 -20%
C610 thru C613	2113743N40	39
C615	2113743N40	39
C617	2113743N40	39
C619	2113743N40	39
C623	2113930F44	51
C629 thru C636	2113743N40	39
C637	2113931F49	.01 uF 5% 50V
C638	2113932E20	0.10 uF 10% 16V
C652 thru C658	2113743N40	39
C671	2113743N38	33
C672	2113743N40	39
C673	2113743N38	33

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C674	2113743L09	470 10%
C675	2113743N40	39
C680	2113743N38	33
C697, C698	2113932E20	0.10 uF 10% 16V
C700	2113932E20	0.10 uF 10% 16V
C701	2113743L01	220 10%
C702	2113743M24	0.1 uF +80 -20%
C703	2113743B29	1 uF
C704, C705	2113743M24	0.1 uF +80 -20%
C707, C708	2113743B29	1 uF
C710	2311049C52	33 uF 10% 10V
C711	2113743L41	.01 uF 10%
C713	2113743T19	10 uF 16V
C717	2311049C52	33 uF 10% 10V
C718	2113743M24	0.1 uF +80 -20%
C719	2113743T19	10 uF 16V
C721	2113743T19	10 uF 16V
C725	2311049A57	10 uF 10% 16V
C726	2113743M24	0.1 uF +80 -20%
C728	2113743E11	.039 uF 10%
C730	2311049A57	10 uF 10% 16V
C731, C732	2113743M24	0.1 uF +80 -20%
C734	2113743M24	0.1 uF +80 -20%
C736	2311049A57	10 uF 10% 16V
C738	2311049A57	10 uF 10% 16V
C741	2113743B29	1 uF
C743	2113743B29	1 uF
C747	2311049A57	10 uF 10% 16V
C749	2113743B29	1 uF
C750	2113743L41	.01 uF 10%
C753	2113743B29	1 uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C754	2113743M24	0.1 uF +80 -20%
C757	2113743B29	1 uF
C759	2311049A57	10 uF 10% 16V
C765	Not Placed	-
C781	Not Placed	-
C796 thru C798	2113743M24	0.1 uF +80 -20%
C800	2113743B29	1 uF
C801	2113743N40	39
C802	2113743E04	.016 uF
C803	2113743N40	39
C804	2113928E01	1 uF 10% 10V
C805	2113743E04	.016 uF
C806 thru C818	2113743M24	0.1 uF +80 -20%
C819	2113743L01	220 10%
C823, C824	2113743N15	3.6 ±0.25
C826	2311049A57	10 uF 10% 16V
C830	2113743M24	0.1 uF +80 -20%
C850	2113743M24	0.1 uF +80 -20%
		DIODE: See Note 1.
CR101, CR102	4805656W24	Pin RF
CR700	4813833A20	Schottky 1A 40V
CR702	4813833A20	Schottky 1A 40V
CR800, CR801	4805129M90	Schottky barrier
D1	4813825A19	Schottky
D103	4813825A05	30V
D201, D202	4802233J09	Triple
D210 thru D212	4809877C08	Varactor
D401	4809877C13	Varactor
D402	4862824C01	Varactor
D501	4809118D02	Dual Red/Green
D502	4805218N57	Dual
D510	Not Placed	-
D511	4813833A20	Schottky
D600 thru D603	4805129M90	Schottky barrier
D662	4805129M90	Schottky barrier
D700	4805129M90	Schottky barrier
D701	4805129M06	Triple
D799	4813833A20	Schottky
		CORE:
E101	2484657R01	Ferrite Bead
E102	2405688Z01	Ferrite Bead
E401 thru E409	2480640Z01	Ferrite Bead
E500, E501	2405688Z01	Ferrite Bead
E702	2480574F01	600 Ohm Ferrite Bead
E704	2480574F01	600 Ohm Ferrite Bead
E800, E801	2480574F01	600 Ohm Ferrite Bead
		FUSE:
F500	6580542Z01	3A
		FILTER: See Note 1.
FL1, FL2	9185004D01	760 - 870 MHz Dual Varactor
FL3	4885631B01	109.65 MHz
FL200	9185130D01	Low pass, switched capacitor
		JACK:
J101	2880658Z02	Connector, 5 Pin
J601	0905505Y08	Connector, 45 Pin
J650	0905505Y02	Connector, 20 Pin
		COIL, RF:
L1	2413926G19	100 nH 5%
L2	2409377M14	68 nH 5%
L4	2409154M14	12 nH
L5	2409154M12	8.2 nH
L6	2409154M14	12 nH
L7	2409377M08	22 nH 5%
L8, L9	2413926G05	6.8 nH 5%
L10	2413926G12	27 nH 5%
L11	2462587V38	220 nH 5%
L12	2462587V36	150 nH 5%
L13	2462587N64	680 nH
L14	2462587V36	150 nH 5%
L101	2462587V36	150 nH 5%
L102	Not Placed	-
L103	2460591B80	19.61 nH
L104	2460591A11	7.66 nH
L106	2413926G12	27 nH 5%
L107	2413926G19	100 nH 5%
L108	2413926G18	82 nH 5%
L109	2460591B22	8.67 nH
L110	2413926G05	6.8 nH 5%
L111	2413926G18	82 nH 5%
L112	2413926G12	27 nH 5%
L113	2409348J03	3.85 nH 10%
L114	2460591A11	7.66 nH
L200, L201	2462587Q20	2.2 uH 20%
L203	2462587P25	12 uH 5%
L204	2462587V21	6.8 nH 5%
L210 thru L212	2462587V36	150 nH 5%
L214 thru L219	2462587V36	150 nH 5%
L220	2462587V26	22 nH 5%
L221	2462587V24	15 nH 5%
L230	2462587V25	18 nH 5%
L299	2462587Q47	1 uH 10%
L401	2462587T17	150 nH 5%
L402, L403	2405769X05	10 uH
L405	2462587N76	4.7 uH 5%
L406, L407	2462587V73	820 nH 5%
L500	2462587Q42	390 nH 10%
L503	2462587L50	100 uH
L511	2462587L50	100 uH
L650 thru L653	2404574Z14	270 nH 2%
L703	2486085A06	47 uH
L705	2486085A06	47 uH
L708	2480574F01	600 Ohm
L711, L712	2462587N68	1 uH
		CONTACTS:
M101	3905643V01	Contact, Antenna Ground
M500	0985888K02	Socket, Backup Battery Holder
		TRANSISTOR: See Note 1.
Q1	4805585Q19	NPN
Q101	5185633C10	800 MHz Ring
Q210	4805218N11	DMOS FET
Q211	4805793Y01	NPN
Q212	4805218N11	DMOS FET
Q213	4805793Y01	NPN
Q214	4805218N11	DMOS FET
Q215, Q216	4805793Y01	NPN
Q217, Q218	4805218N11	DMOS FET
Q401	4805218N63	NPN
Q501	4805921T09	ROHM Inverter Driver Dual NPN
Q600	4805723X03	DUAL NPN-PNP
Q601	4809579E35	FET DUAL N-CHAN

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
Q604	4805723X03	DUAL NPN-PNP
Q698	4805723X03	DUAL NPN-PNP
Q700	4880048M01	NPN Digital Switch
Q701	4805921T09	Inverter Driver Dual NPN
Q702	4885844C01	FET
Q703	4805921T09	Inverter Driver Dual NPN
Q704	4805723X03	DUAL NPN-PNP
Q705, Q706	4805793Y01	NPN
Q707	4880048M01	NPN Digital Switch
Q708	4805218N11	DMOS FET
Q709	4805793Y01	NPN
Q801	4880048M01	NPN Digital Switch
		RESISTOR: Ohms ±5%; 1/8W, Unless Otherwise Stated
R1	0662057M67	510
R2	0662057M94	6.8k
R3	0662057M90	4.7k
R4	0662057M84	2.7k
R5	0662057M59	240
R6	0662057M50	100
R7	0662057M01	0
R8, R9	Not Placed	-
R10	0662057M01	0
R11	0662057M59	240
R100	0662057A29	150
R101	0662057A18	51
R103	0662057A29	150
R104	0662057M50	100
R105	0662057A18	51
R106	0662057A29	150
R107	0662057A39	390
R108	0662057M95	7.5k
R109	0662057M81	2k

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R110	0662057M98	10k
R111, R113	Not Placed	-
R114	0662057M50	100
R115	0662057M94	6.8k
R117	0662057N39	470k
R118	0662057N30	200k
R119	0662057M94	6.8k
R120	0662057M54	150
R200	0662057M50	100
R201, R202	0662057M54	150
R204	0662057M01	0
R205	0662057M88	3.9k
R206	0662057M49	91
R207	0662057M52	120
R208	0662057M74	1k
R210	0662057M81	2k
R211	0662057M01	0
R212	0662057M62	330
R213	0662057M01	0
R214	0662057N10	30k
R215	0662057N17	56k
R216	0662057N15	47k
R217	0662057M50	100
R220	0662057M62	330
R221	0662057N16	51k
R222	0662057M26	10
R223, R224	0662057N06	20k
R225	0662057M38	33
R226	0662057M26	10
R227	0662057N16	51k
R228	0662057M58	220

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R229, R230	0662057N06	20k
R231	0662057M32	18
R232	0662057N16	51k
R233	0662057M58	220
R234, R235	0662057N06	20k
R236	0662057M32	18
R237	0662057M58	220
R238	0662057M50	RES. CHIP 100
R239	0662057N08	24k, 5%
R241	0662057M01	0
R243	0662057N10	30k
R244	0662057N16	51k
R250 thru R252	0662057M01	0
R261	0662057N16	51k
R262	0662057M92	5.6k
R289, R292	0662057M38	33
R293	0662057M96	8.2k
R294	Not Placed	-
R295	0662057N15	47k
R401	0662057M50	100
R402	0662057N08	24k, 5%
R403	0662057M95	7.5k
R404	0662057T55	681, 1%
R405	0662057M81	2k
R406	0662057M62	330
R407	0662057N08	24k, 5%
R408	0662057M01	0
R409	0662057N23	100k
R410	0662057M98	10k
R411	0662057M64	390
R412	0662057M98	10k

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R413	0662057M01	0
R414	0662057N23	100k
R503	0662057M64	390
R504	0662057M67	510
R505	0662057M98	10K
R507 thru R510	0662057M50	100
R511	0662057M98	10k
R512	0662057N15	47k
R520	0662057N35	330k
R530 thru R537	0662057M98	10k
R540	Not Placed	-
R541	0662057M67	510
R545 thru R547	0662057N15	47k
R594	Not Placed	-
R595	0662057M01	0
R600	0662057M74	1k
R601	0662057M67	510
R602	0662057M98	10k
R603, R604	0662057N39	470k, 5%
R605	0662057N23	100k
R607, R609	0662057N47	1 M, 5%
R610	Not Placed	-
R611	0662057M50	100
R612	Not Placed	-
R616	0662057M50	100
R617	Not Placed	-
R620 thru R626	0662057M50	100

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R637 thru R644	0662057M74	1k
R646	0662057M50	100
R647	0662057M98	10k
R649	0662057N15	47k
R650	0662057B46	10 M, 5%
R651	0662057M78	1.5k
R652	0662057M98	10k
R654, R655	0662057N23	100k
R656, R657	0662057M98	10k
R658	0662057N06	20k
R666	0662057M67	510
R667	0662057M64	390
R668	0662057M46	68
R669, R670	0662057M50	100
R671	0662057M64	390
R672	Not Placed	-
R673	0662057M98	10k
R674	0662057M50	100
R677	0662057M98	10k
R680, R681	0662057M34	22
R695	0662057N23	100k
R697	0662057M50	100
R700, R702	0662057N17	56k
R703	0662057M98	10k
R704, R705	0662057N06	20k
R706	0662057N17	56k
R708	0662057M98	10k
R709	0662057N06	20k
R710	0662057M94	6.8k

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R711	0662057M98	10k
R713	0662057N06	20k
R714, R716	0662057M98	10k
R717	0662057M64	390
R718	0662057M82	2.2k
R719	0662057M74	1k
R720	0662057M95	7.5k
R721	0662057M82	2.2k
R722	0662057N15	47k
R723	0662057M74	1k
R724	0662057M82	2.2k
R726	0662057M95	7.5k
R727, R728	0662057M64	390
R729	0662057N13	39k
R730	0662057M74	1k
R731, R732	0662057M98	10k
R733	0662057M90	4.7k
R734	0662057M98	10k
R735	0662057N39	470k, 5%
R736	0662057M98	10k
R737	0662057N15	47k
R738	0662057M90	4.7k
R739	0662057M98	10k
R740	0662057M62	330
R741	0662057M34	22
R742	0662057M50	100
R743	0662057N23	100k
R756	0662057N23	100k
R757	0662057M74	1k
R760	Not Placed	-
R761	0662057N23	100k

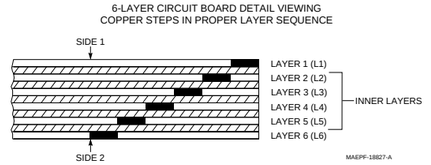
ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R762, R763	0662057M01	0
R766	0662057N15	47k
R768, R770	0662057M01	0
R771	0662057N15	47K
R772	0662057M90	4.7k
R774	0662057M98	10k
R775	0662057M34	22
R779	0662057M26	10
R781	0662057M01	0
R782	Not Placed	-
R788	0662057M10	2.2
R789	Not Placed	-
R799	0662057N35	330k
R800	0662057N15	47k
R801	0662057M94	6.8k
R802, R803	0662057M50	100
R808	0662057M01	0
R809	0662057N15	47k
R810	0662057M98	10k
R812	0662057N23	100k
R813 thru R815	Not Placed	-
R816	0662057N15	47k
R817	0662057M01	0
R820	0662057M98	10k
R821	0662057M42	47
R822	0662057N23	100k
		SWITCH:
S500	4085775C01	Frequency, Dual Function
S501	1880619Z02	Volume Potentiometer
S502	4085358D01	Tactile Actuator

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
S503 thru S506	4080523Z01	Tactile Actuator
		SHIELD:
SH1	2685090D01	Mixer
SH2	2685242D01	Filter
SH101	2685082D01	PCIC
SH102	2685084D01	Harmonic Bottom
SH103	2685083D01	Harmonic Top
SH104	2685085D01	PA
SH201	2685081D01	Synthesizer
SH202	2685088D01	Fractional-N
SH203	2685087D01	VCO Bottom
SH204	2685241D01	DAC
SH205	2685086D01	VCO Top
SH401	2685089D01	ABACUS
SH402	2685080D01	2nd LO Filter
		TRANSFORMER:
T1, T2	2580541Z02	2T
T3	2585918C01	2T, Pins 4 thru 6 5T, Pins 1 thru 3
		MODULE: See Note 1.
U1	5185130C91	RF Mixer
U101	5185130C65	Tx Driver Amplifier
U102	5185765B26	Power Control (PCIC)
U103	5185963A15	Temperature Sensor
U106	5185368C84	Directional Coupler
U201	5105835U92	Synthesizer Frac N
U202	5185368C83	Digital-to-Analog Converter
U250	5105750U54	VCO Buffer
U401	5185963A85	ABACUS III
U500	5185353D13	Regulator 5V
U501, U502	5185353D14	Regulator 3V
U503	5185353D56	3.3V Linear Regular

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
U600	5185353D57	Flipper
U601	5109731C15	Operational Amplifier
U605	5105492X92	Bilateral Switch
U702	5185353D13	Regulator 5V
U703	5109879E58	GCAPII
U704	5185353D35	Dual EEPOT
U705	5105492X92	Bilateral Switch
U706	5109731C15	Operational Amplifier
U708	5102463J44	Audio PA
U800	5109841C69	PATRIOT
U801, U802	5109522E53	Single Buffer
U803	5185368C95	Flash Memory
U804	5185130C38	Static RAM (SRAM)
		ZENER DIODE: See Note 1.
VR500	4802245J51	6.8V
VR501	4880140L15	10V
VR504, VR505, VR507	4809788E06	6.8V
VR591 thru VR596	4805656W03	Dual 5.6V
VR650	4813832C72	Transient Suppressor Quad 12V
VR651, VR652	4805656W03	Dual 5.6V
VR657	4809788E06	6.8V
VR658	4813830C26	13V
VR659, VR662	4805656W08	QUAD 5.8V
VR663	4813830A22	9.1V 5%
VR678	4802021P15	Diode Array Low Capacitance
VR700	4813830A15	5.6V 5%
		CRYSTAL: See Note 2.
Y200	4802245J68	Reference Oscillator 16.8 MHz
Y201	4885426C23	Resonator 960 MHz
Y202	4885426C16	Resonator 1025 MHz
Y203	4885426C17	Resonator 1110 MHz
Y600	4809995L05	Quartz 32.768 kHz

Notes:

1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.
2. When ordering crystals, specify carrier frequency, crystal frequency, crystal type number, and Motorola part number.
3. Part value notations:
   $p=10^{-12}$
   $n=10^{-9}$
   $\mu=10^{-6}$
   $m=10^{-3}$
   $k=10^{3}$
   $M=10^{6}$
4. ITEM refers to the component reference designator. SIDE refers to the location of the component on the board; S1=Side 1, S2=Side 2.
5. The PMUF6541A RF Board uses a 6-layer printed circuit board.



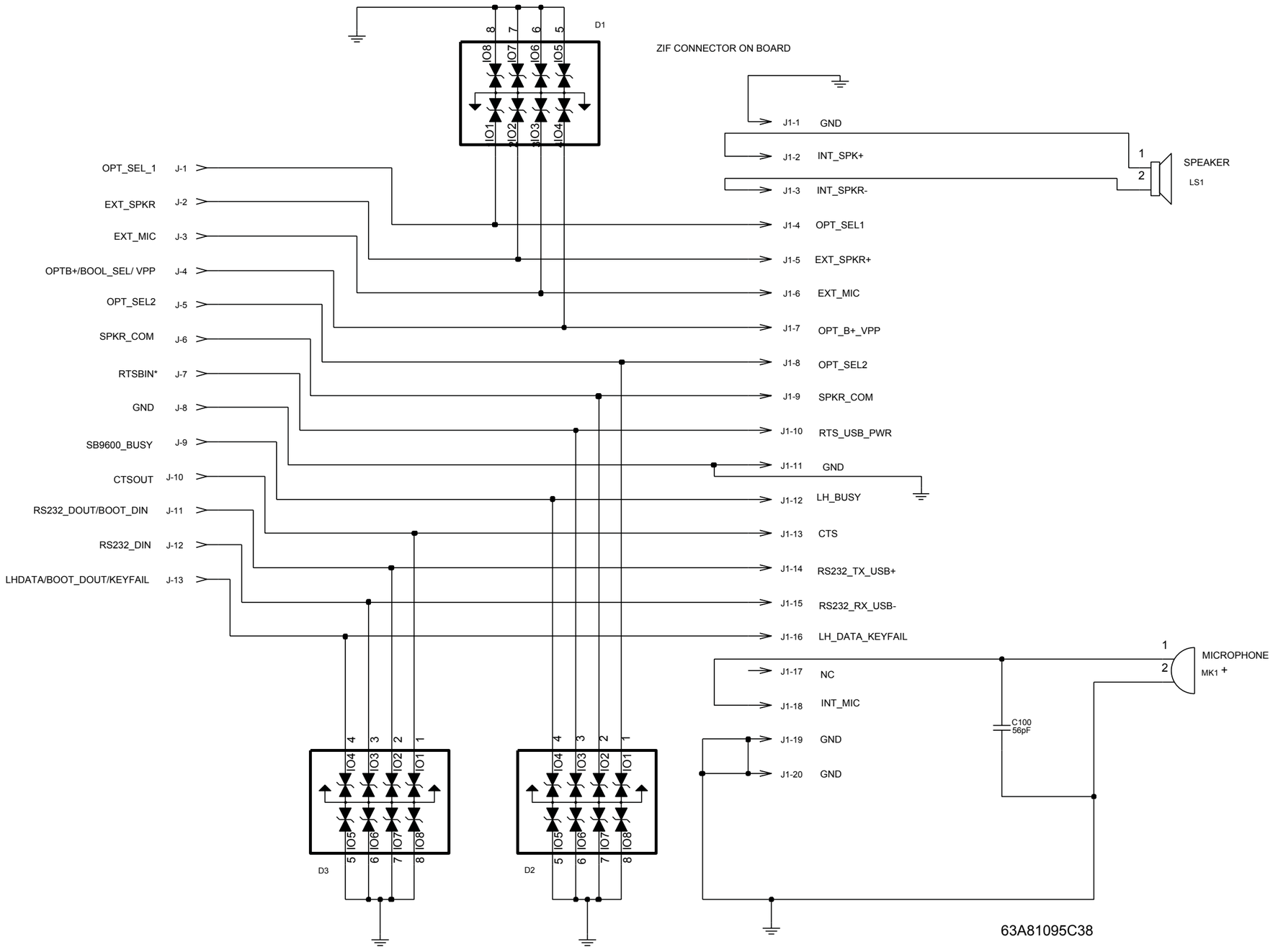


Figure 9-21. 8485939D01 Speaker/Microphone Flex Assembly

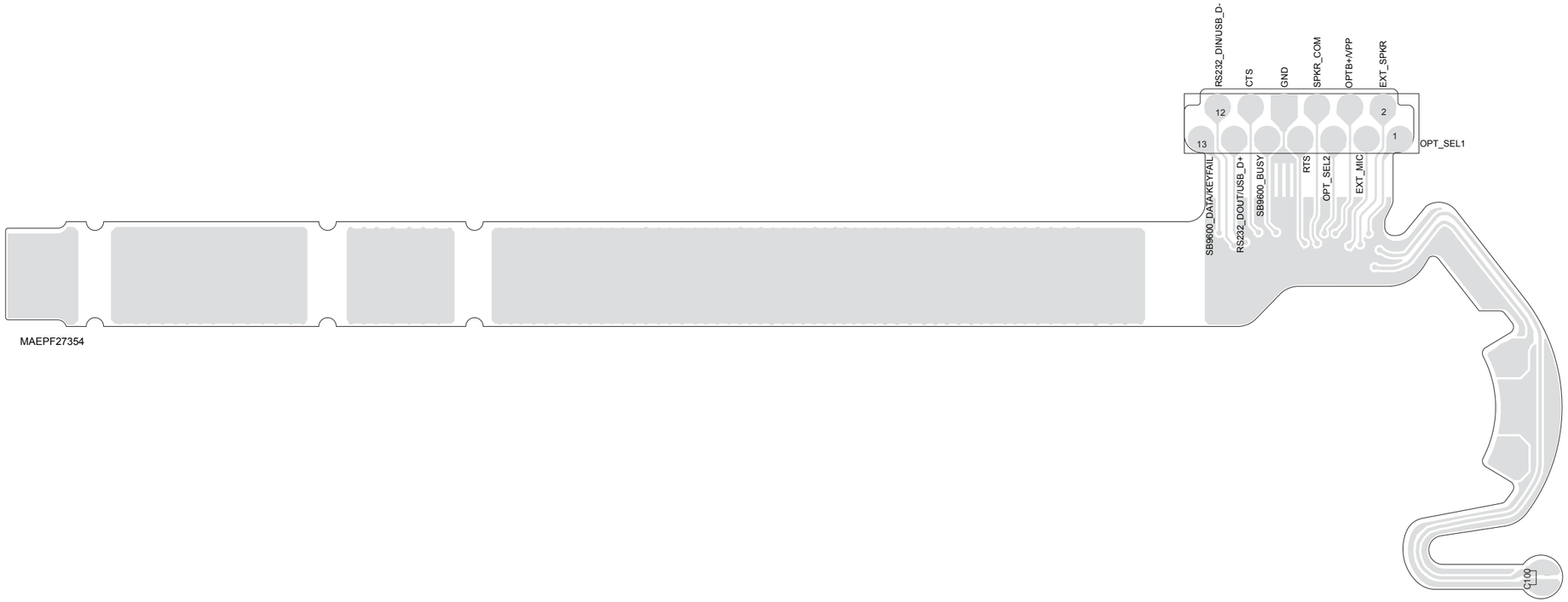
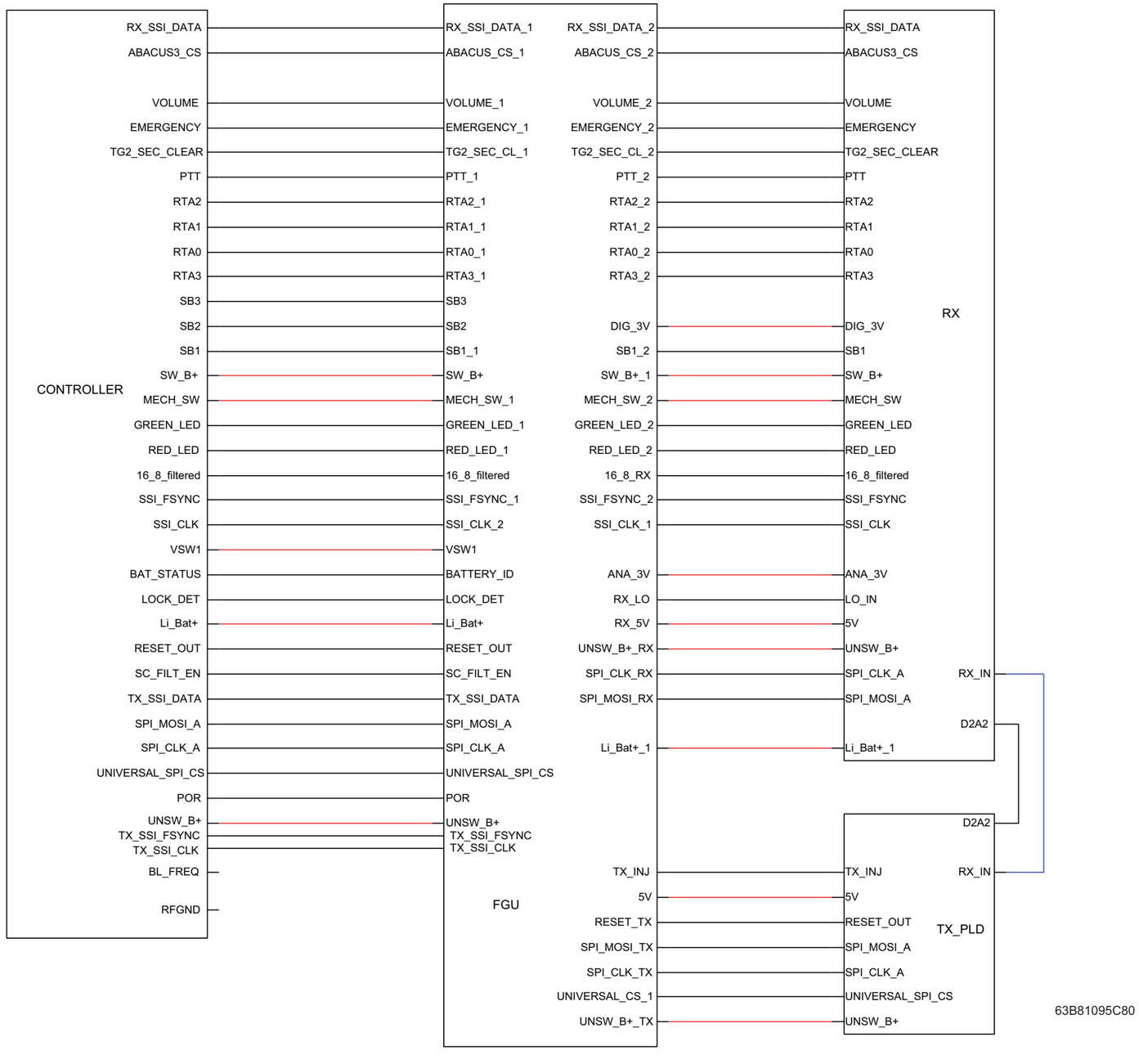


Figure 9-22. 8485939D01 Speaker/Microphone Flex Circuit, Side 1

Figure 9-23. 8485939D01 Speaker/Microphone Flex Circuit, Side 2



Reference Designators Used:

001 - 099	Receiver front end
100 - 199	Transmitter
200 - 299	FGU
400 - 499	Receiver back end
500 - 599	DC and Controls
600 - 699	Flipper and Interface
700 - 799	GCAP II
800 - 899	Patriot and Memory

Figure 9-24. PMUF6541D/F Top Level Schematic

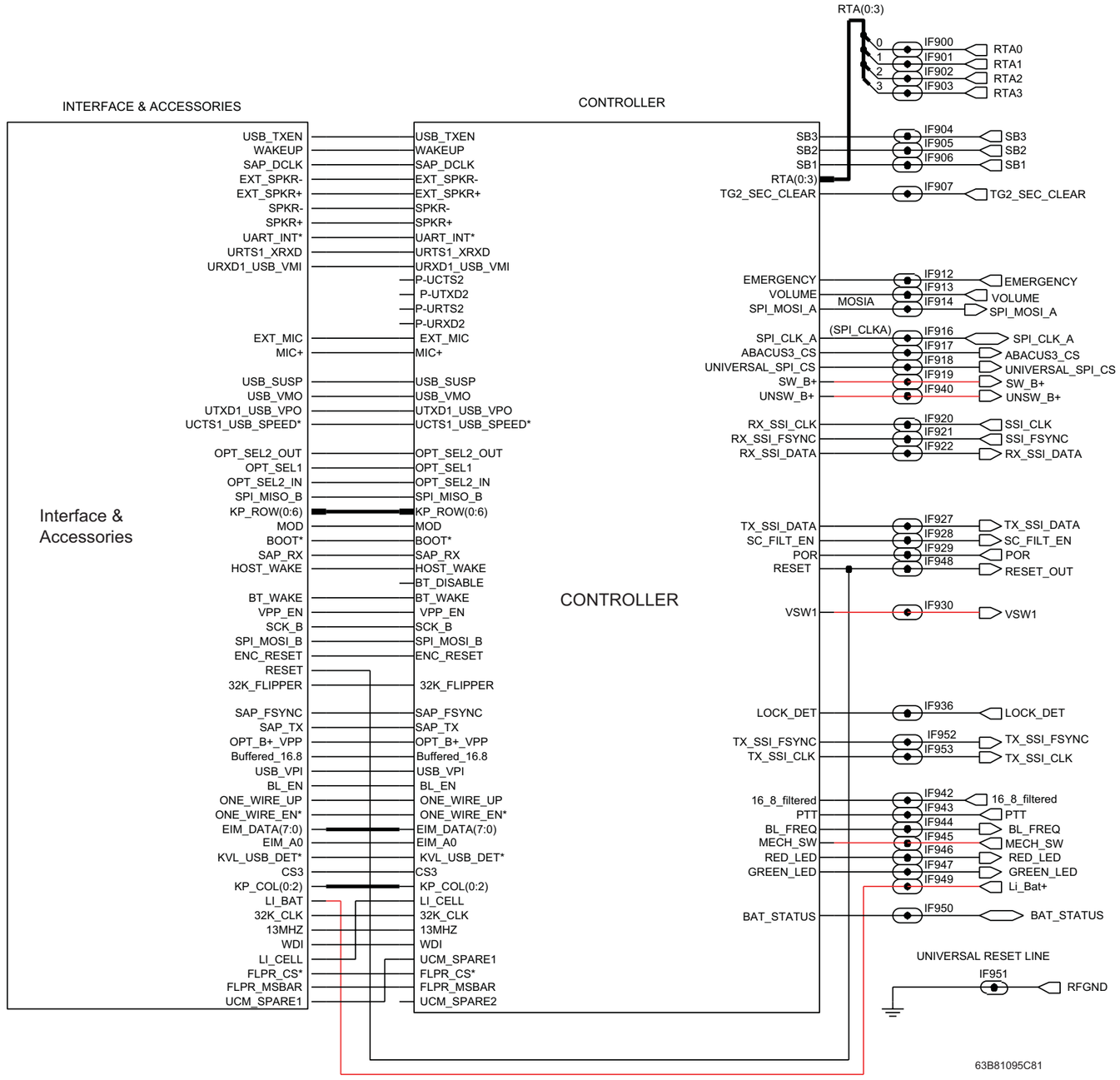


Figure 9-25. PMUF6541D/F Controller Interface Schematic

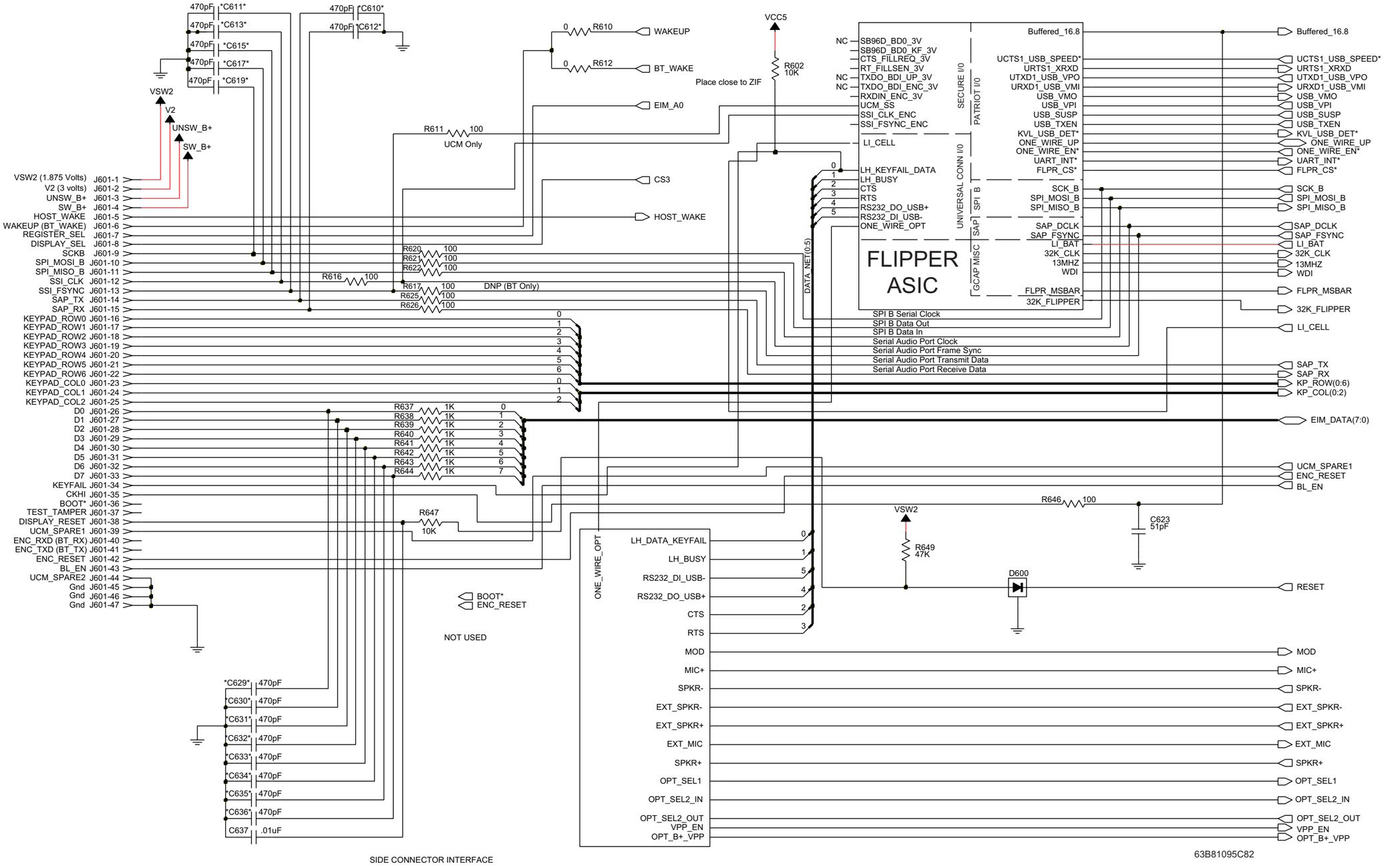
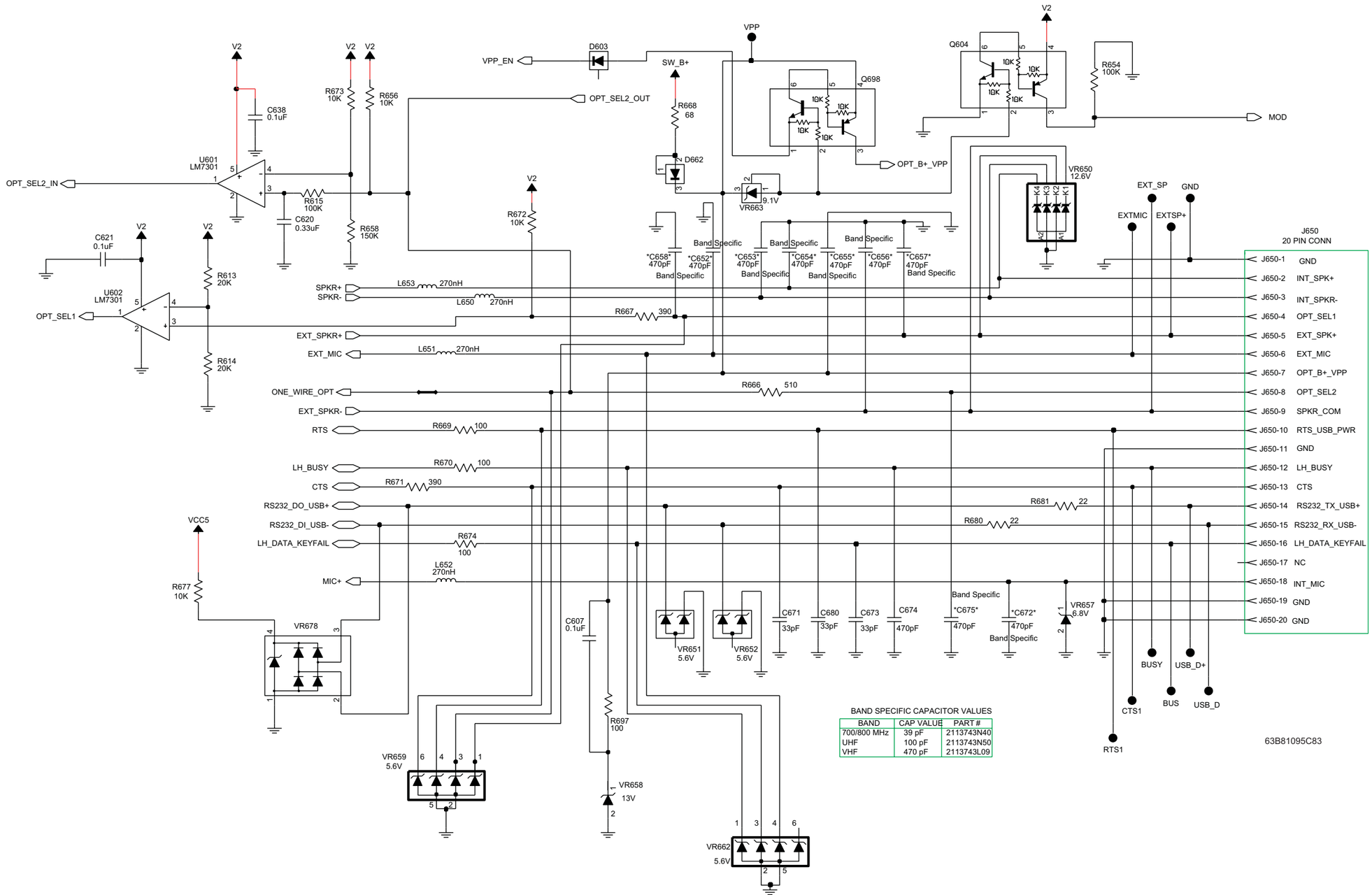


Figure 9-26. PMUF6541D/F Interface and Accessories Schematic



BAND SPECIFIC CAPACITOR VALUES

BAND	CAP VALUE	PART #
700/800 MHz	39 pF	2113743N40
UHF	100 pF	2113743N50
VHF	470 pF	2113743L09

Figure 9-27. PMUF6541D/F Side Connector Schematic

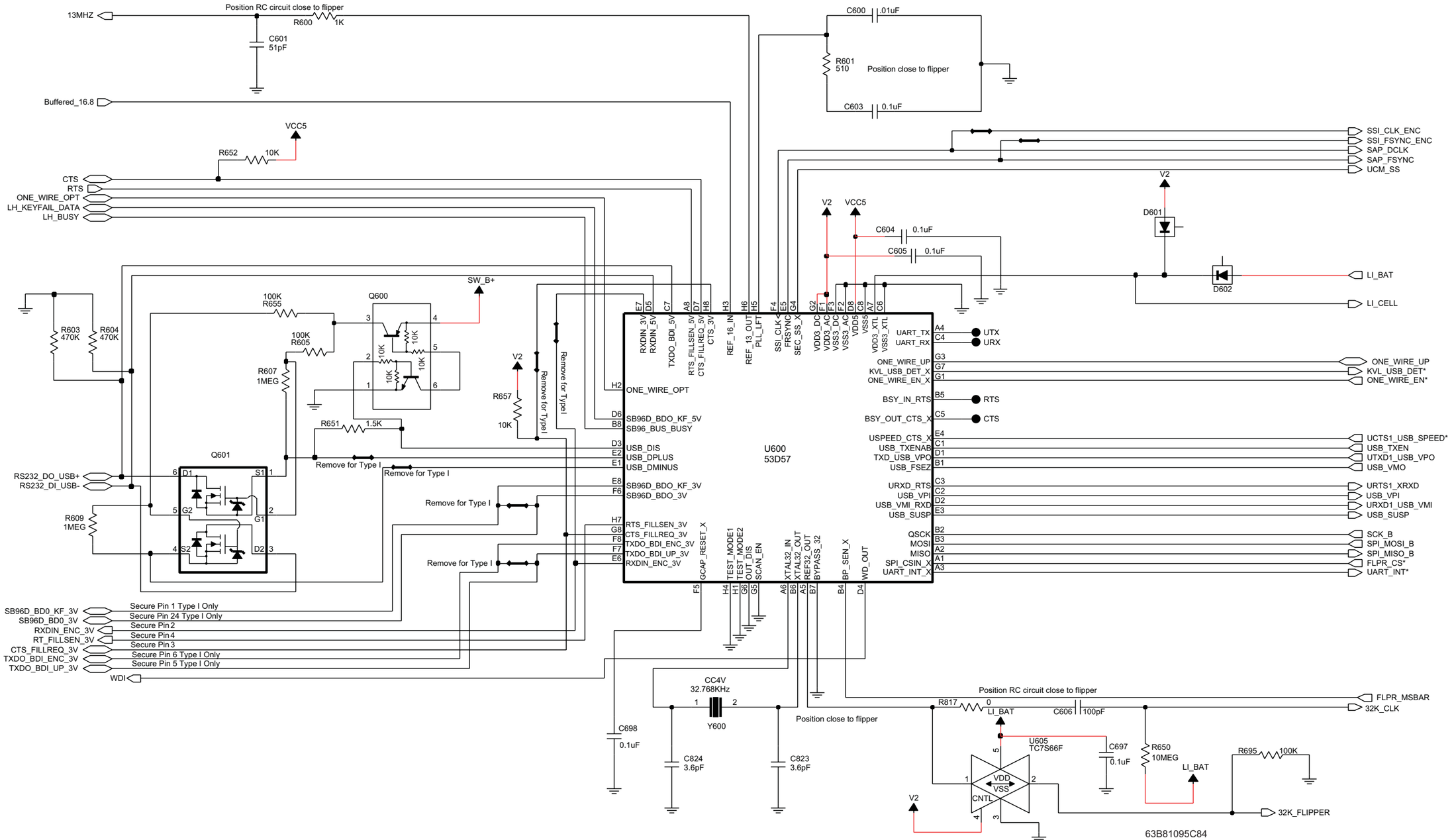


Figure 9-28. PMUF6541D/F Flipper Schematic

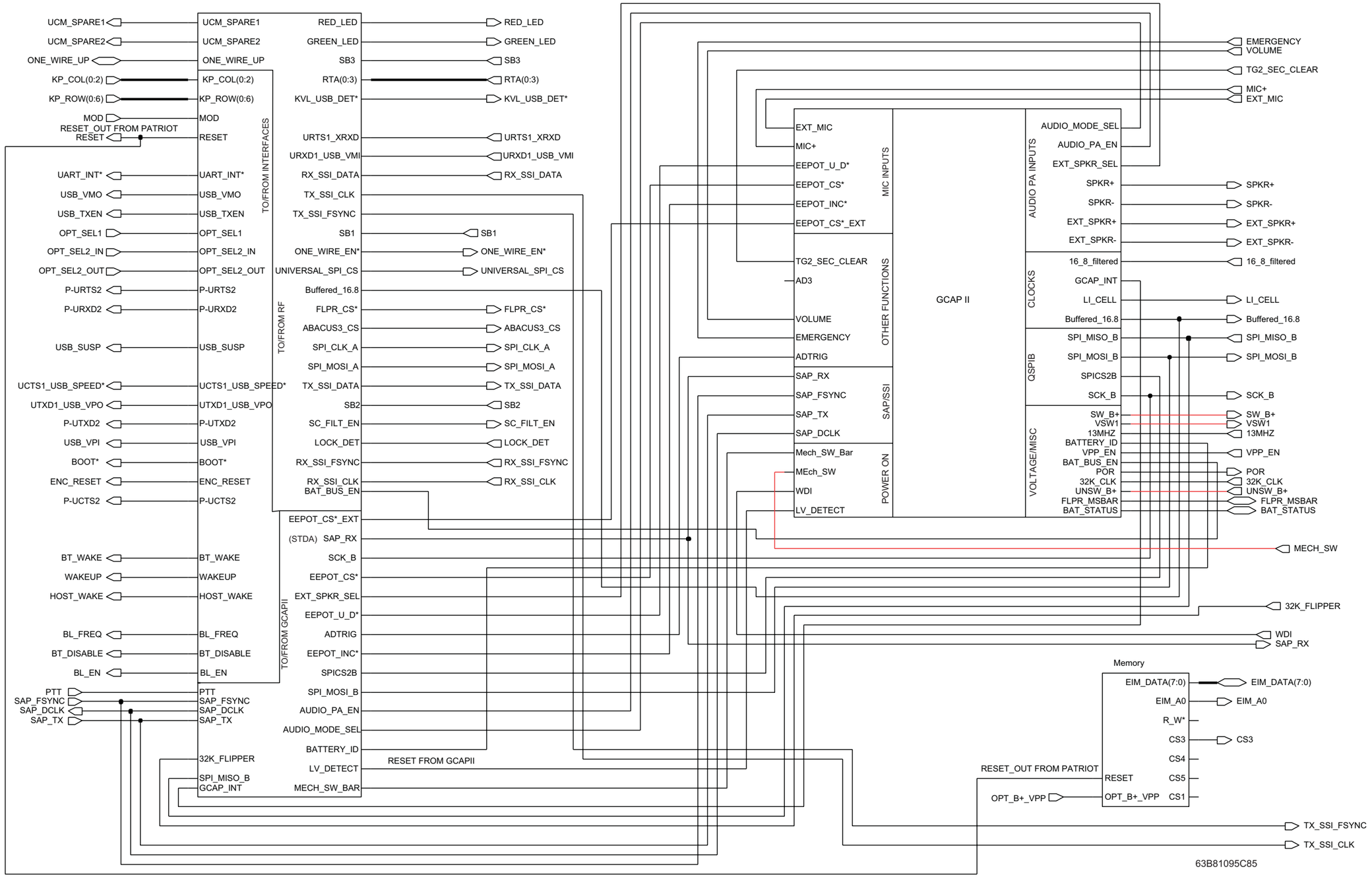


Figure 9-29. PMUF6541D/F Controller Schematic

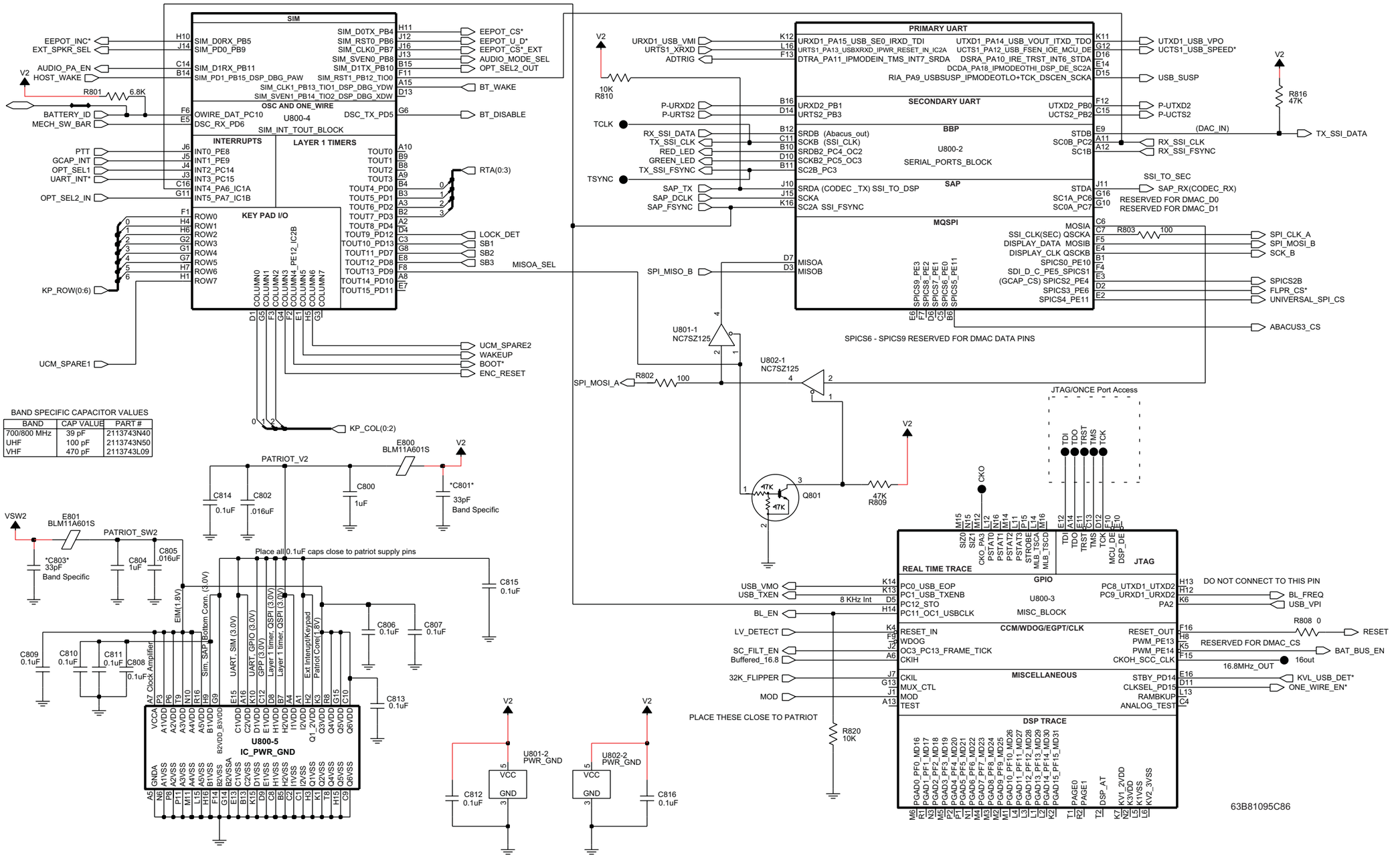


Figure 9-30. PMUF6541D/F Patriot (U800) Schematic

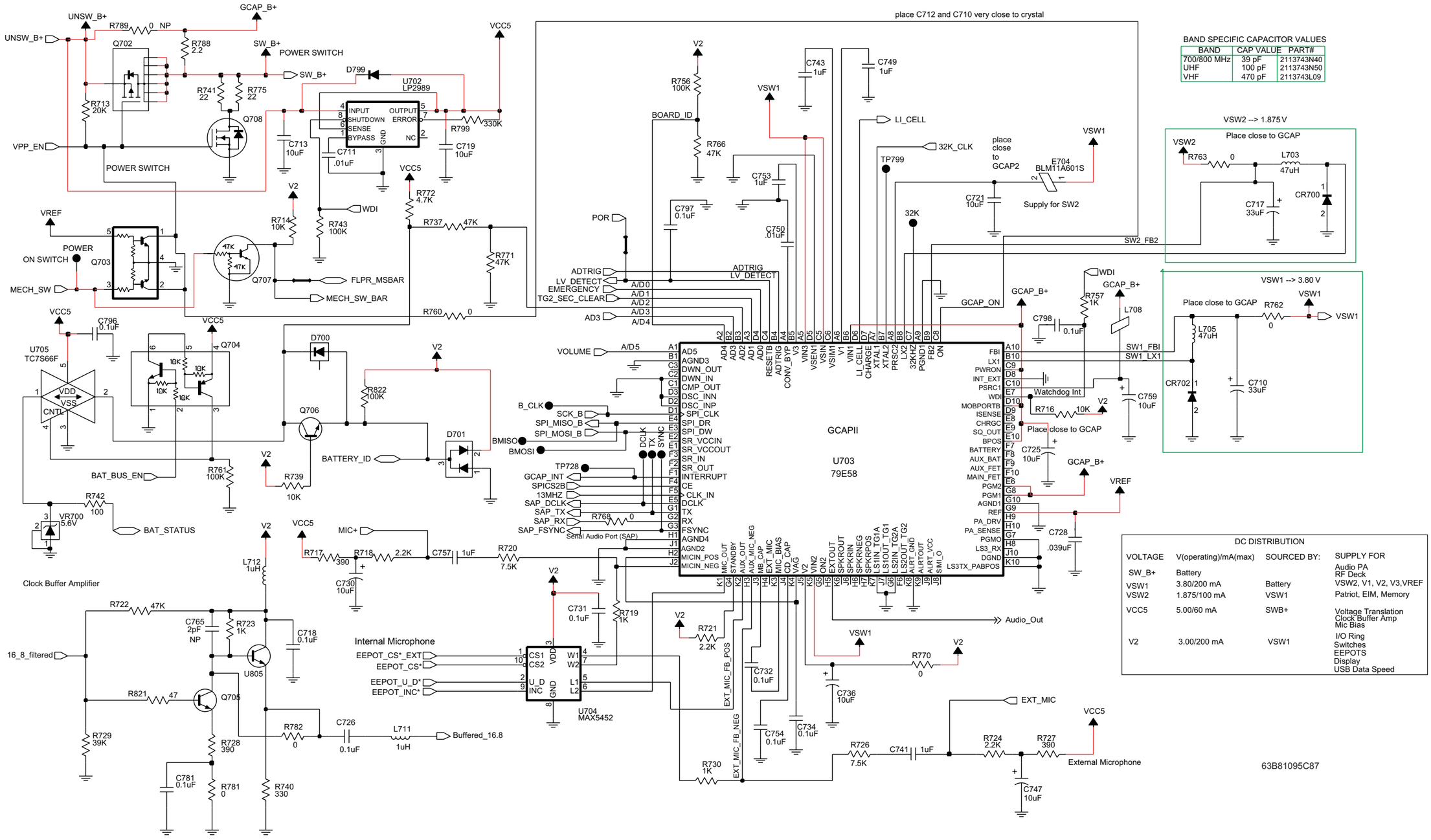


Figure 9-31. PMUF6541D/F GCAP II/DC and Audio Schematic, Sheet 1 of 2

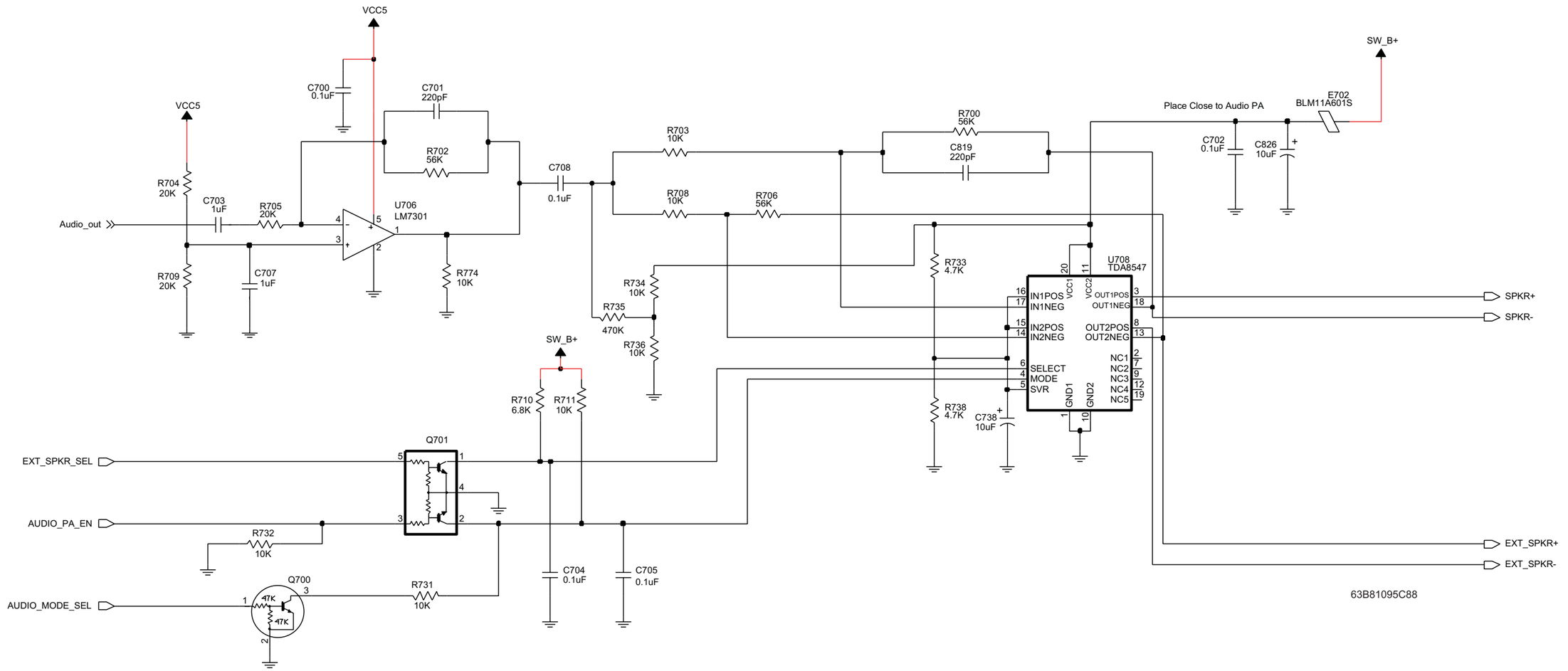


Figure 9-32. PMUF6541D/F GCAP II/DC and Audio Schematic, Sheet 2 of 2

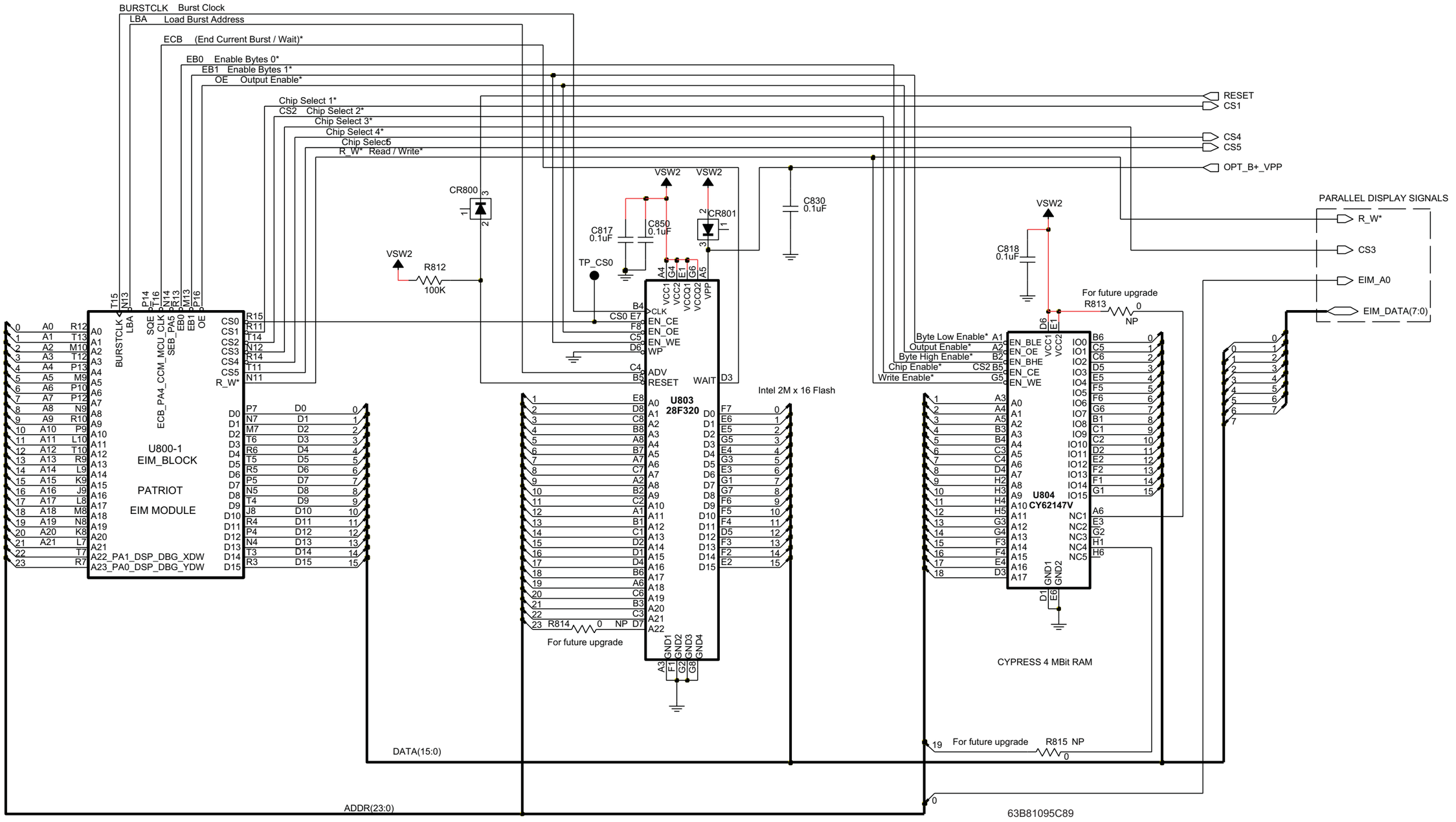


Figure 9-33. PMUF6541D/F Memory Schematic

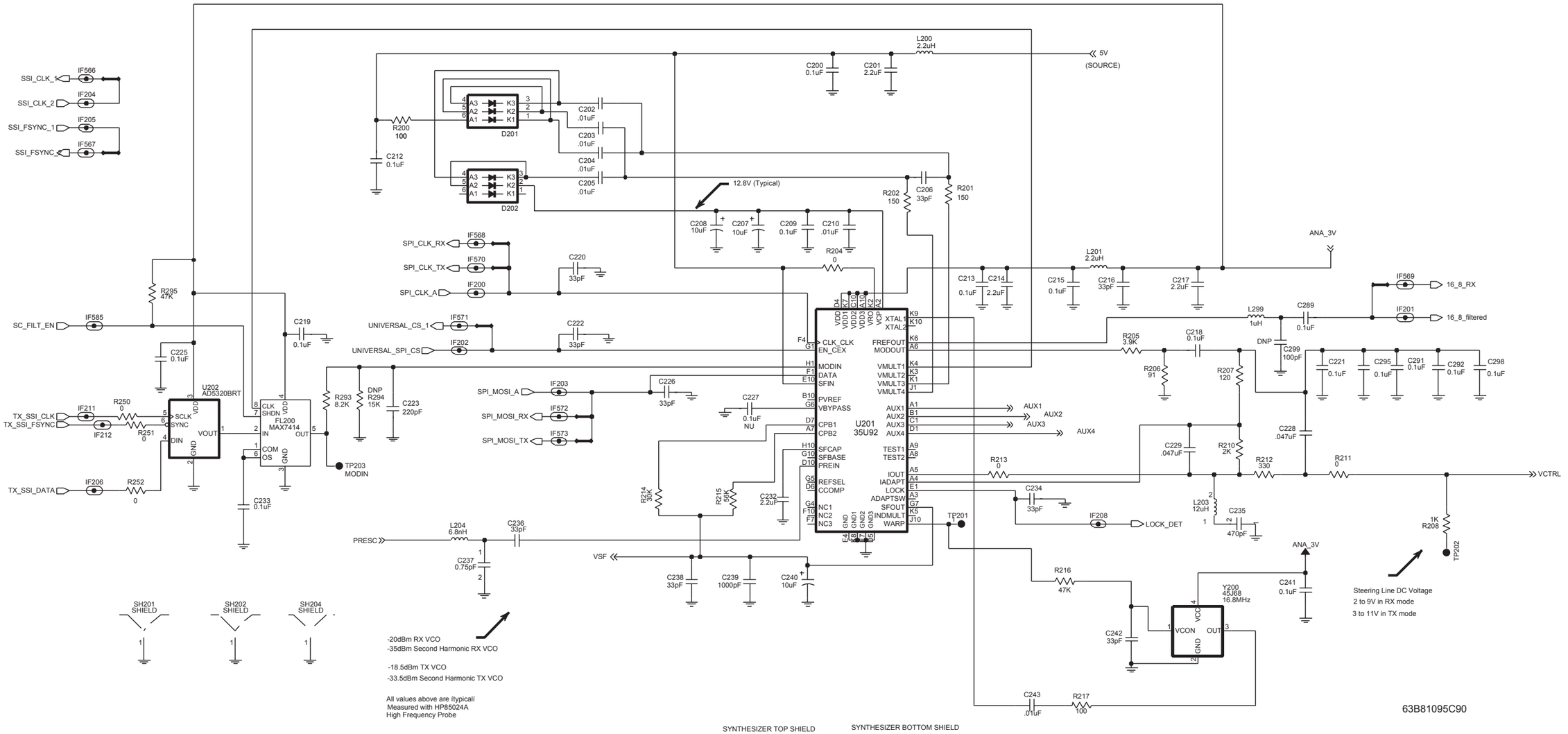


Figure 9-34. PMUF6541D/F Frequency Generation Unit (FGU) Schematic, Sheet 1 of 3

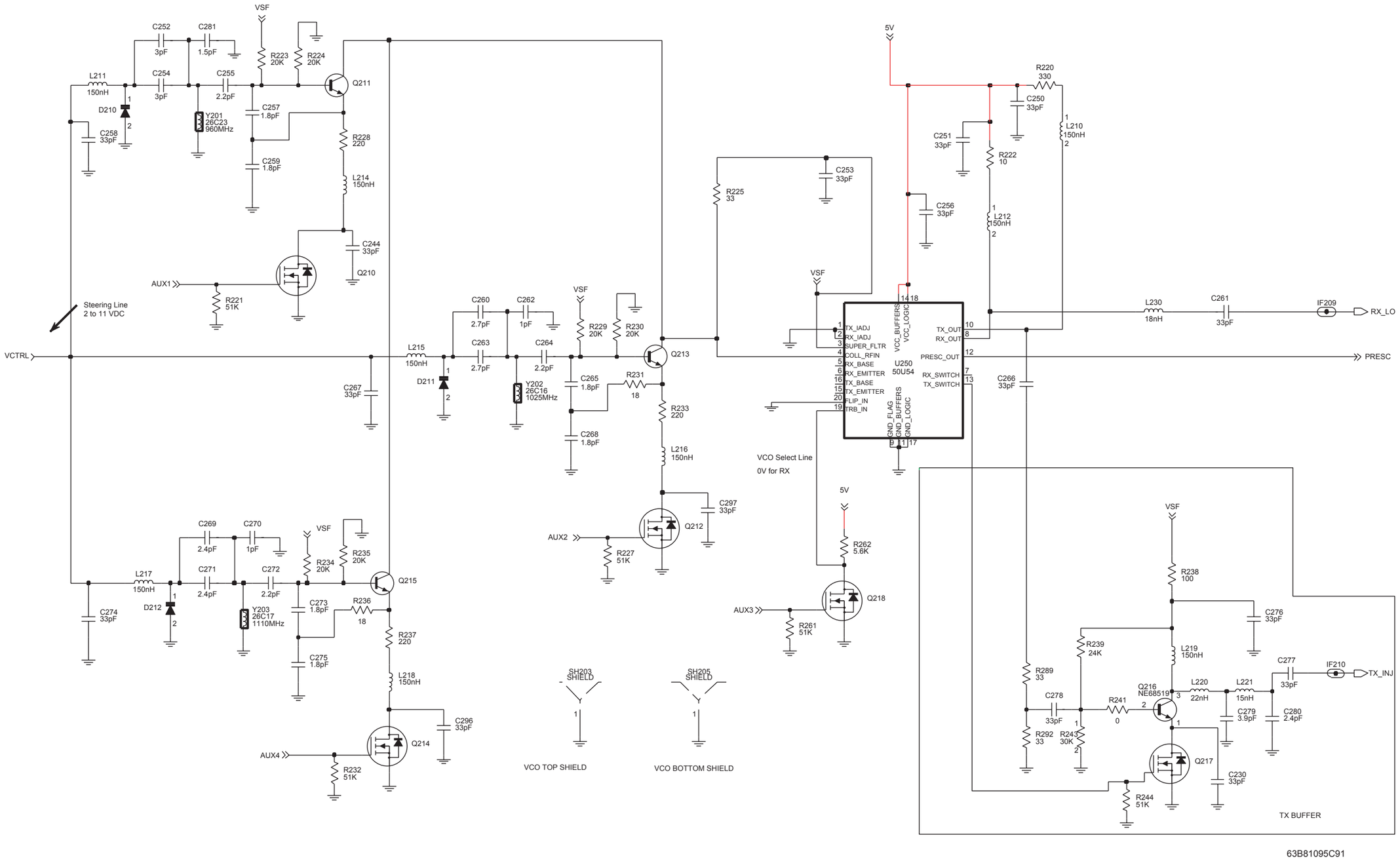


Figure 9-35. PMUF6541D/F Frequency Generation Unit (FGU) Schematic, Sheet 2 of 3

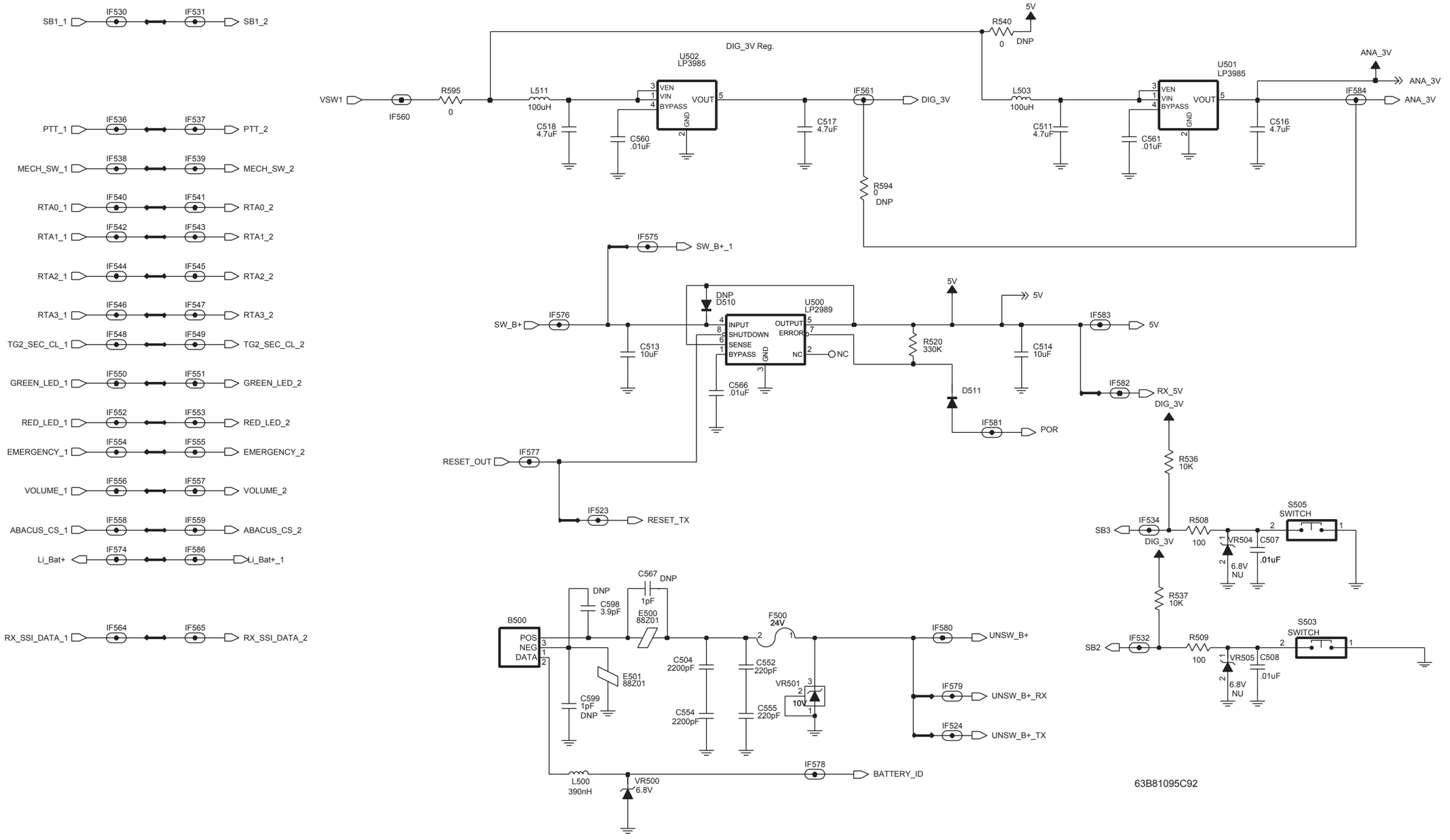


Figure 9-36. PMUF6541D/F Frequency Generation Unit (FGU) Schematic, Sheet 3 of 3

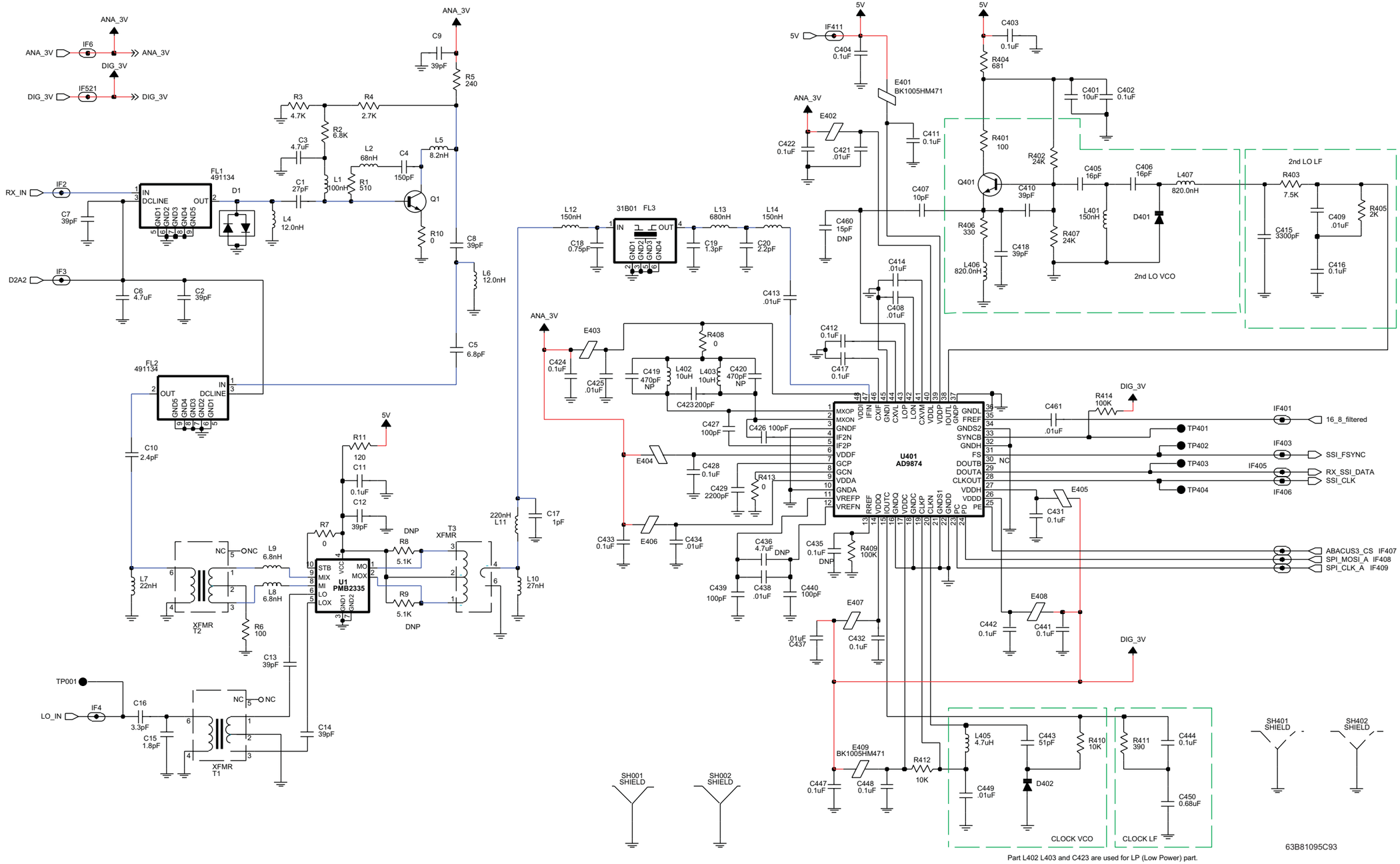


Figure 9-37. PMUF6541D/F Receiver Schematic, Sheet 1 of 2

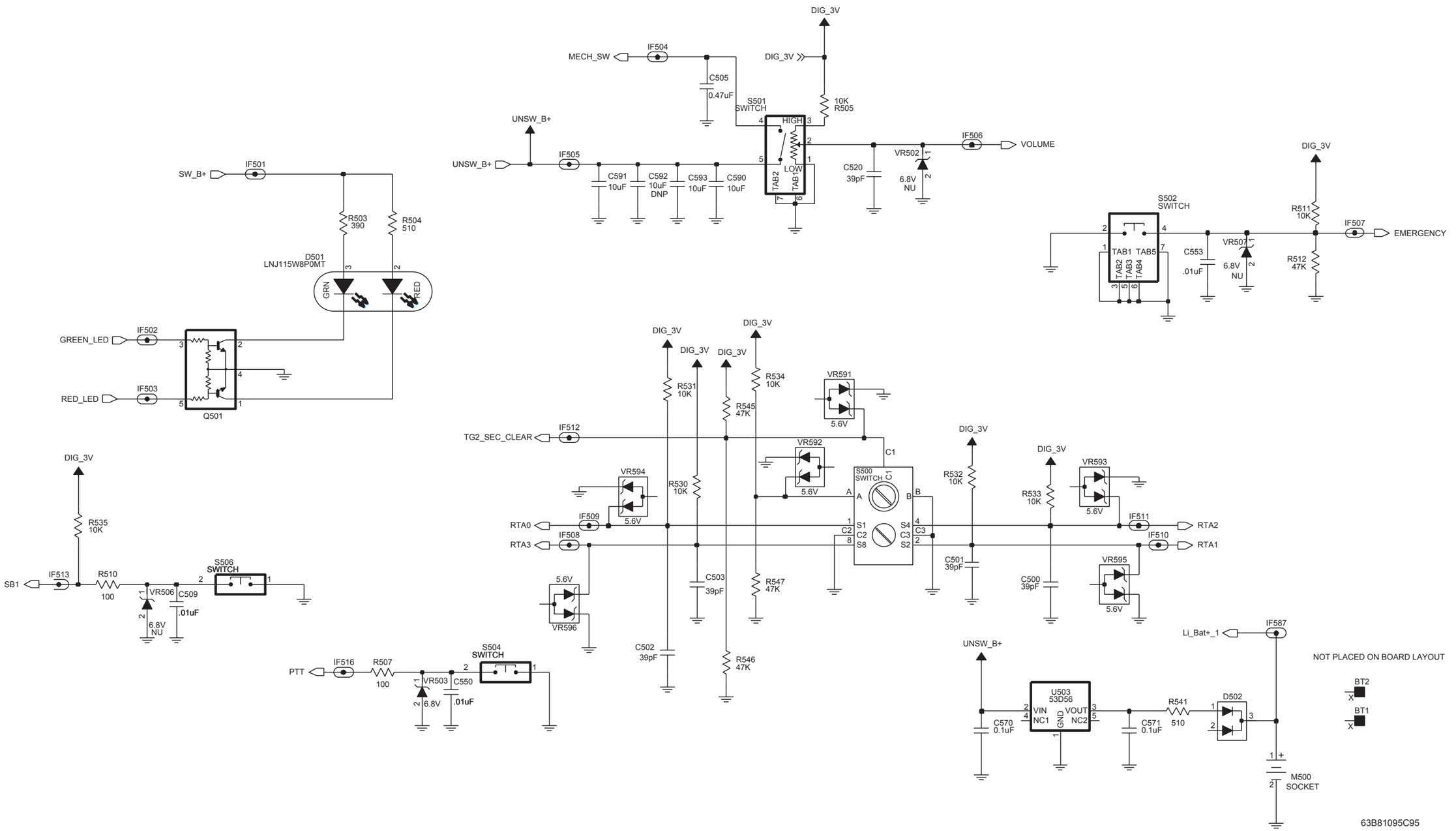


Figure 9-38. PMUF6541D/F Receiver Schematic, Sheet 2 of 2

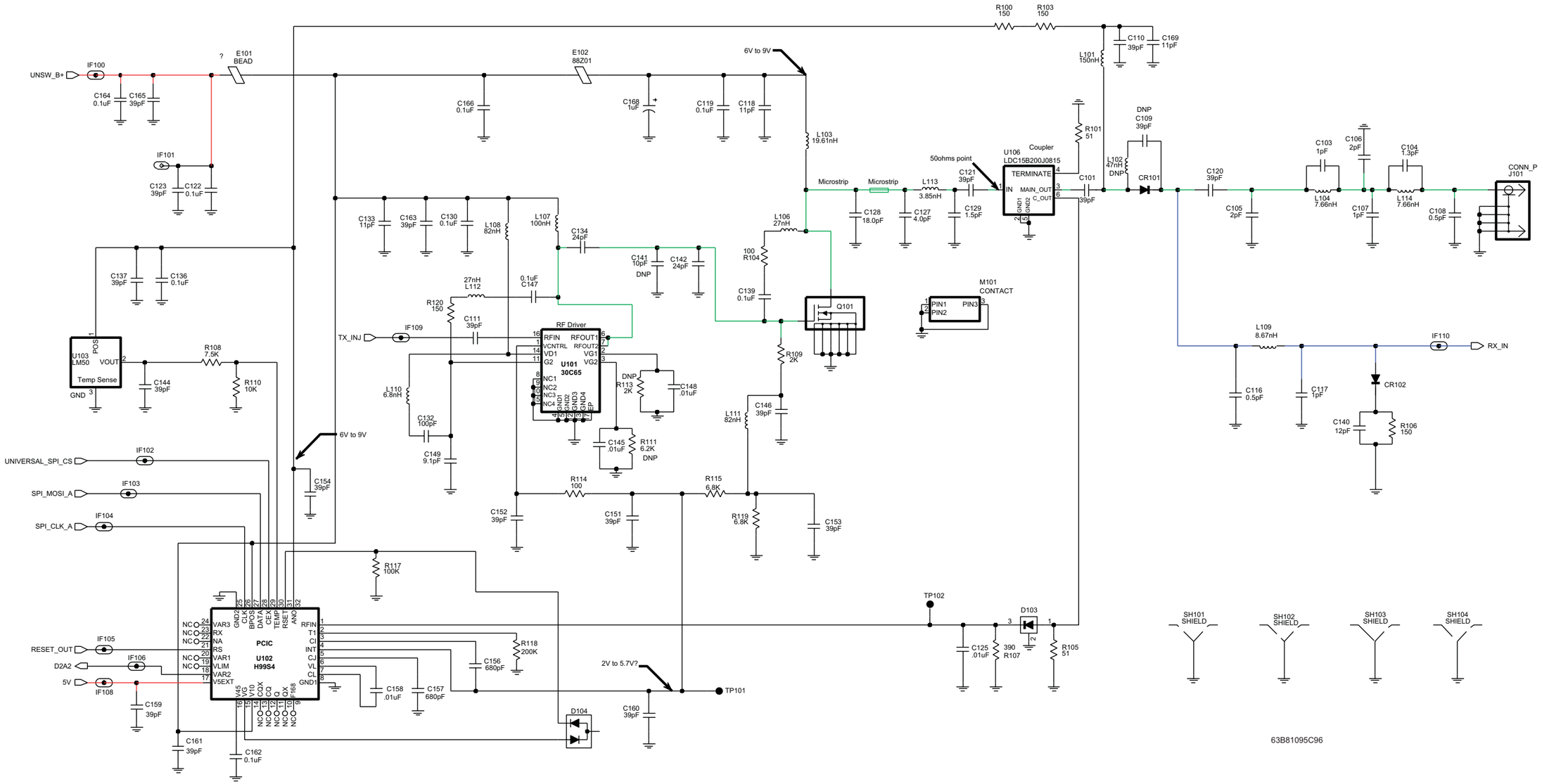
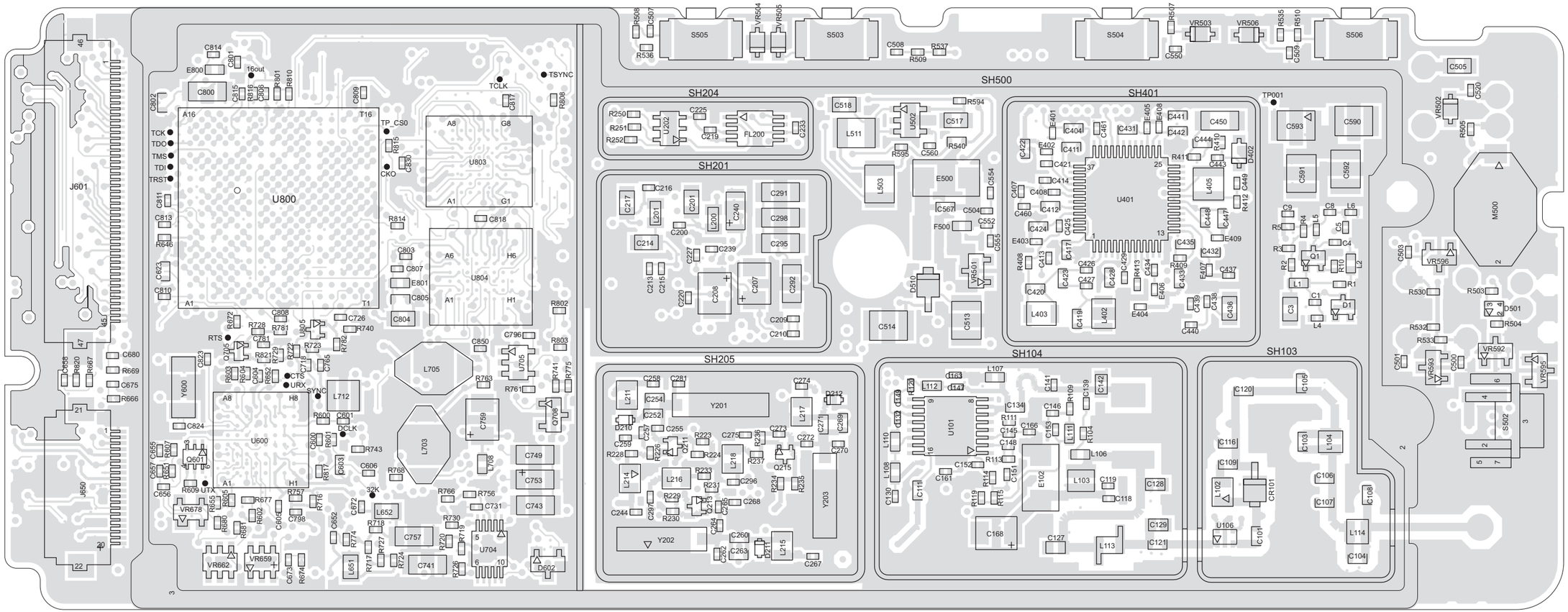


Figure 9-39. PMUF6541D/F Transmitter Subsection (Ring PA) Schematic

VIEWED FROM SIDE 1



MAEPF27482

Figure 9-40. PMUF6541D/F Main Circuit Board Component Location Detail, Viewed from Side 1

VIEWED FROM SIDE 2

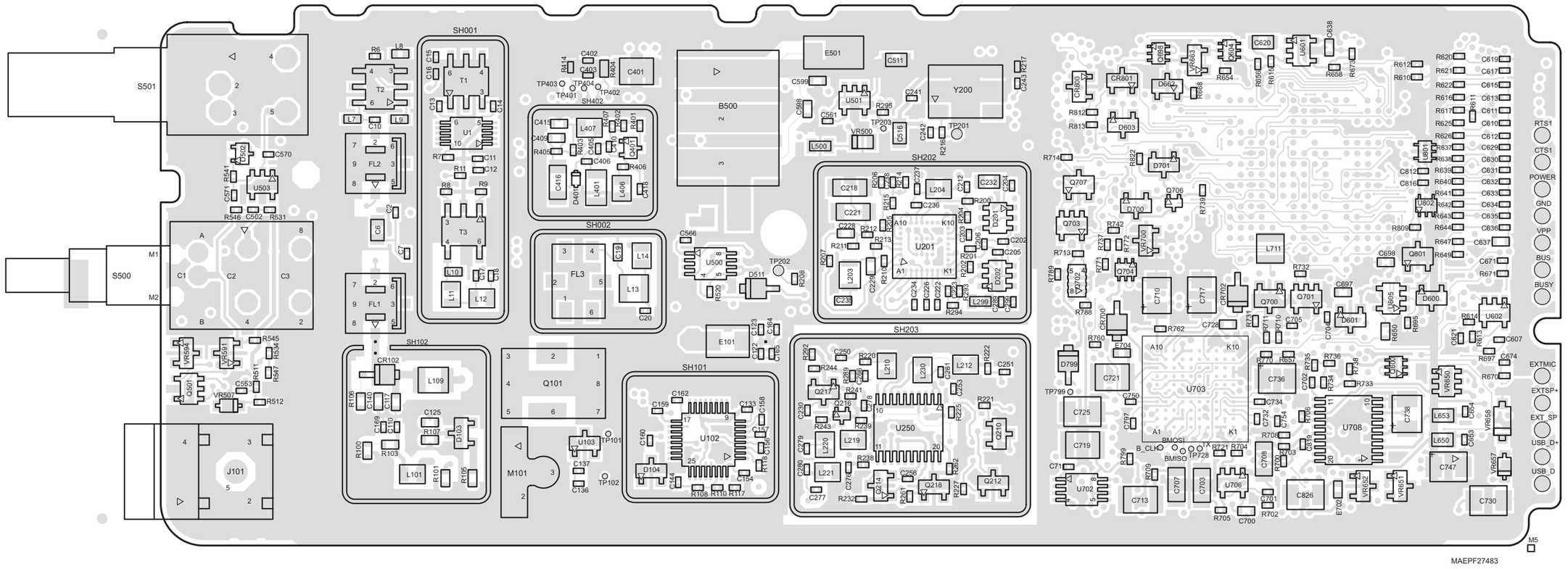


Figure 9-41. PMUF6541D/F Main Circuit Board Component Location Detail, Viewed from Side 2

PMUF6541D/F Main Circuit Board Electrical Parts List

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
		BATTERY:
B500	0986237A02	Connector
		Capacitor, Fixed: pF ±5%; 50V unless otherwise stated
C1	2113743N36	27
C2	2113743N40	39
C3	2113928C04	4.7uF 6.3V 10%
C4	2113743N54	150
C5	2113743N22	6.8
C6	2113928C04	4.7uF 6.3V 10%
C7 thru C9	2113743N40	39
C10	2113743N11	2.4 ±0.25
C11	2113743M24	0.1 uF +80-20%
C12 thru C14	2113743N40	39
C15	2104801Z12	1.8 16V
C16	2113743N14	3.3 ±0.25
C17	2113743Q03	1.0 ±0.1
C18	2113743N02	0.75 ±0.25
C19	2113740F06	1.3 ±30
C20	2113743Q10	2.2 ±0.1
C101	2113930F41	39
C103	2113930F03	1 ±0.1 50V
C104	2113740F06	1.3 ±30
C105, C106	2113930F10	2.0 ±0.25 50V
C107	2113930F03	1.0 ±0.1 50V
C108	2113740F01	0.5 ±30
C109	Not Placed	-
C110	2113743N40	39
C111	2113930F41	39
C116	2113740F01	0.5 ±30
C117	2113930F03	1 ±0.1 50V
C118	2113743N27	11
C119	2113743M24	0.1 uF +80-20%
C120, C121	2113930F41	39
C122	2113743M24	0.1 uF +80-20%
C123	2113743N40	39
C125	2113931F49	.01 uF
C127	2103689A17	4.0 ±0.25
C128	2103689A08	18 ±0.05
C129	2103689A32	1.5 pF ±0.05 pF
C130	2113743M24	0.1 uF +80-20%
C132	2113743N50	100
C133	2113743N27	11
C134	2113930F36	24
C136	2113743M24	0.1 uF +80-20%
C137	2113743N40	39
C139	2113743M24	0.1 uF +80-20%
C140	2113930F29	12
C141	Not Placed	-
C142	2103689A47	24 pF High - Q capacitor
C144	2113743N40	39
C145	2113743L41	.01 uF 10%
C146	2113743N40	39
C147	2113743M24	0.1 uF +80-20%
C148	2113743L41	.01 uF 10%
C149	2113743N25	9.1 ±0.5
C151 thru C154	2113743N40	39
C156, C157	2113743L13	680 10%
C158	2113743L41	0.1 uF 10%
C159 thru C161	2113743N40	39
C162	2113743M24	0.1 uF +80-20%
C163	2113743N40	39
C164	2113743M24	0.1 uF +80-20%
C165	2113743N40	39
C166	2113743M24	0.1 uF +80-20%
C168	2311049A08	1 uF
C169	2113743N27	11.0
C200	2113743M24	0.1 uF +80-20%
C201	2113743F18	2.2 uF 16V
C202 thru C205	2113743L41	.01 uF 10%
C206	2113743N38	33
C207, C208	2311049A57	10 uF 10% 16V
C209	2113743M24	0.1 uF +80-20%
C210	2113743L41	.01 uF 10%
C212, C213	2113743M24	0.1 uF +80-20%
C214	2113743F18	2.2 uF 16V
C215	2113743M24	0.1 uF +80-20%
C216	2113743N38	33
C217	2113743F18	2.2 uF 16V
C218	2185419D06	0.1uF Super L/D
C219	2113743M24	0.1 uF +80-20%
C220	2113743N38	33
C221	2185419D06	0.1 uF Super L/D
C222	2113743N38	33
C223	2113743L01	220 10%
C225	2113743M24	0.1 uF +80-20%
C226	2113743N38	33
C227	2113743M24	0.1 uF +80-20%
C228, C229	2113743E12	.047 uF 10%
C230	2113743N38	33
C232	2113743F18	2.2 uF 16V
C233	2113743M24	0.1 uF +80-20%
C234	2113743N38	33
C235	2113931F17	470
C236	2113743N38	33
C237	2113743N02	0.75 ±0.25
C238	2113743N38	33
C239	2113743L17	.001 uF 10%
C240	2311049A59	10 uF 10% 6V
C241	2113743M24	0.1 uF +80-20%
C242	2113743N38	33
C243	2113743L41	.01 uF 10%
C244	2113743N38	33
C250, C251	2113743N38	33
C252	2113740L05	3 ±0.1
C253	2113743N38	33
C254	2113740L05	3 ±0.1
C255	2113743Q10	2.2 ±0.1
C256	2113743N38	33
C257	2104801Z12	1.8 16V
C258	2113743N38	33
C259	2104801Z12	1.8 16V
C260	2113740L04	2.7 ±0.1
C261	2113743N38	33
C262	2113743Q03	1 ±0.1
C263	2113740L04	2.7 ±0.1
C264	2113743Q10	2.2 ±0.1
C265	2104801Z12	1.8 16V
C266, C267	2113743N38	33
C268	2104801Z12	1.8 16V
C269	2113740L03	2.4 ±0.1
C270	2113743Q03	1 ±0.1
C271	2113740L03	2.4 ±0.1

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C272	2113743Q10	2.2 ±0.1
C273	2104801Z12	1.8 16V
C274	2113743N38	33
C275	2104801Z12	1.8 16V
C276 thru C278	2113743N38	33
C279	2113743N16	3.9 ±0.25
C280	2113743N11	2.4 ±0.25
C281	2113743Q07	1.5 ±1
C289	2113743M24	0.1 uF +80-20%
C291, C292	2185419D06	0.1 uF
C295	2185419D06	0.1 uF
C296, C297	2113743N38	33
C298	2185419D06	0.1 uF
C299	2485803E01	Inductor 1.8uH Ferrite Core (used in PMUF6541F only)
C401	2113743T19	10 uF 16V
C402, C403	2113743M24	0.1 uF +80-20%
C404	2113932E20	0.10 uF 10% 16V
C405, C406	2113743N31	16
C407	2113743N26	10
C408	2113743L41	.01 uF 10%
C409	2113931F49	.01 uF 5% 50V
C410	2113743N40	39
C411, C412	2113932E20	0.10 uF 10% 16V
C413, C414	2113743L41	.01 uF 10%
C415	2113931F37	3300
C416	2109720D14	0.1 uF
C417	2113932E20	0.1 uF 10% 16V
C418	2113743N40	39

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C419, C420	Not Placed	-
C421	2113743L41	.01 uF 10%
C422	2113932E20	0.1 uF 10% 16V
C423	2113740F58	200 ±30
C424	2113932E20	0.10 uF 10% 16V
C425	2113743L41	.01 uF 10%
C426, C427	2113743N50	100
C428	2113932E20	0.1 uF 10% 16V
C429	2113743L25	2200 10%
C431 thru C433	2113932E20	0.1 uF 10% 16V
C434	2113743L41	.01 uF 10%
C435, C436	Not Placed	-
C437, C438	2113743L41	.01 uF 10%
C439, C440	2113743N50	100
C441, C442	2113932E20	0.1 uF 10% 16V
C443	2113743N43	51
C444	2113932E20	0.1 uF 10% 16V
C447, C448	2113932E20	0.1 uF 10% 16V
C449	2113743L41	.01 10%
C450	2113743B27	0.68 uF 10%
C460	Not Placed	-
C461	2113743L41	.01 uF 10%
C500 thru C503	2113743N40	39
C504	2113743L25	2200 10%
C505	2113743A27	0.47 uF 10% 16V
C507 thru C509	2113743L41	.01 uF 10%
C511	2113928C04	4.7 uF 6.3V 10%

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C513, C514	2113743T19	10 uF 16V
C516 thru C518	2113928C04	4.7 uF 6.3V 10%
C520	2113743N40	39
C550	2113743L41	.01 uF 10%
C552	2113743L01	220 10%
C553	2113743L41	.01 uF 10%
C554	2113743L25	2200 10%
C555	2113743L01	220 10%
C560, C561	2113743L41	.01 uF 10%
C566	2113743L41	.01 uF 10%
C567	Not Placed	-
C570, C571	2113743M24	0.1 uF +80 -20%
C590, C591	23113743T19	10 uF, 16V
C592	Not Placed	-
C593	2113743T19	10 uF 16V
C598, C599	Not Placed	-
C600	2113743L41	.01 uF 10%
C601	2113743N43	51
C603	2113932E20	0.10 uF 10% 16V
C604, C605	2113743M24	0.1 uF +80 -20%
C606	2113743N50	100
C607	2113743M24	0.1 uF +80 -20%
C610 thru C613	2113743N40	39
C615	2113743N40	39
C617	2113743N40	39
C619	2113743N40	39
C620	2113743A19	0.1 uF 16V 10%
C621	2113743M24	0.1 uF +80 -20%

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C623	2113930F44	51
C629 thru C636	2113743N40	39
C637	2113931F49	.01 uF 5% 50V
C638	2113932E20	0.10 uF 10% 16V
C652 thru C658	2113743N40	39
C671	2113743N38	33
C672	2113743N40	39
C673	2113743N38	33
C674	2113743L09	470 10%
C675	2113743N40	39
C680	2113743N38	33
C697, C698	2113932E20	0.10 uF 10% 16V
C700	2113932E20	0.10 uF 10% 16V
C701	2113743L01	220 10%
C702	2113743M24	0.1 uF +80 -20%
C703	2113743B29	1 uF
C704, C705	2113743M24	0.1 uF +80 -20%
C707	2113743B29	1 uF
C708	2109720D14	0.1 uF
C710	2311049C52	33 uF 10% 10V
C711	2113743L41	.01 uF 10%
C713	2113743T19	10 uF 16V
C717	2311049C52	33 uF 10% 10V
C718	2113743M24	0.1 uF +80 -20%
C719	2113743T19	10 uF 16V
C721	2113743T19	10 uF 16V
C725	2311049A57	10 uF 10% 16V
C726	2113743M24	0.1 uF +80 -20%
C728	2113743E11	.039 uF 10%
C730	2311049A57	10 uF 10% 16V

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C731, C732	2113743M24	0.1 uF +80 -20%
C734	2113743M24	0.1 uF +80 -20%
C736	2311049A57	10 uF 10% 16V
C738	2311049A57	10 uF 10% 16V
C741	2113743B29	1 uF
C743	2113743B29	1 uF
C747	2311049A57	10 uF 10% 16V
C749	2113743B29	1 uF
C750	2113743L41	.01 uF 10%
C753	2113743B29	1 uF
C754	2113743M24	0.1 uF +80 -20%
C757	2113743B29	1 uF
C759	2311049A57	10 uF 10% 16V
C765	Not Placed	-
C781	Not Placed	-
C796 thru C798	2113743M24	0.1 uF +80 -20%
C800	2113743B29	1 uF
C801	2113743N40	39
C802	2113743E04	.016 uF
C803	2113743N40	39
C804	2113928E01	1 uF 10% 10V
C805	2113743E04	.016 uF
C806 thru C818	2113743M24	0.1 uF +80 -20%
C819	Not Placed	
C823, C824	2113743N15	3.6 ±0.25
C826	2311049A57	10 uF 10% 16V
C830	2113743M24	0.1 uF +80 -20%
C850	2113743M24	0.1 uF +80 -20%
		DIODE: See Note 1.
CR101, CR102	4805656W24	Pin RF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
CR700	4813833A20	Schottky 1A 40V
CR702	4813833A20	Schottky 1A 40V
CR800, CR801	4805129M90	Schottky barrier
D1	4813825A19	Schottky
D103	4813825A05	30V
D104	4805129M06	Dual SOT 23
D201, D202	4802233J09	Triple
D210 thru D212	4809877C08	Varactor
D401	4809877C13	Varactor
D402	4862824C01	Varactor
D501	4809118D02	Dual Red/Green
D502	4805218N57	Dual
D510	Not Placed	-
D511	4813833A20	Schottky
D600 thru D603	4805129M90	Schottky barrier
D662	4805129M90	Schottky barrier
D700	4805129M90	Schottky barrier
D701	4805129M06	Triple
D799	4813833A20	Schottky
		CORE:
E101	2484657R01	Ferrite Bead
E102	2405688Z01	Ferrite Bead
E401 thru E409	2480640Z01	Ferrite Bead
E500, E501	2405688Z01	Ferrite Bead
E702	2480574F01	600 Ohm Ferrite Bead
E704	2480574F01	600 Ohm Ferrite Bead
E800, E801	2480574F01	600 Ohm Ferrite Bead
		FUSE:

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
F500	6580542Z01	3A
		FILTER: See Note 1.
FL1, FL2	9185004D01	760 - 870 MHz Dual Varactor
FL3	4885631B01	109.65 MHz
FL200	9185130D01	Low pass, switched capacitor
		JACK:
J101	2880658Z04	SMA Connector, 5 Pin
J601	0905505Y10	Connector, 45 Pin
J650	0905505Y09	Connector, 20 Pin
		COIL, RF:
L1	2413926G19	100 nH 5%
L2	2409377M14	68 nH 5%
L4	2409154M14	12 nH
L5	2409154M12	8.2 nH
L6	2409154M14	12 nH
L7	2409377M08	22 nH 5%
L8, L9	2413926G05	6.8 nH 5%
L10	2413926G12	27 nH 5%
L11	2462587V38	220 nH 5%
L12	2462587V36	150 nH 5%
L13	2462587N64	680 nH
L14	2462587V36	150 nH 5%
L101	2462587V36	150 nH 5%
L102	Not Placed	-
L103	2460591B80	19.61 nH
L104	2460591A11	7.66 nH
L106	2413926G12	27 nH 5%
L107	2413926G19	100 nH 5%
L108	2413926G18	82 nH 5%
L109	2460591B22	8.67 nH
L110	2413926G05	6.8 nH 5%
L111	2413926G18	82 nH 5%
L112	2413926G12	27 nH 5%

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
L113	2409348J03	3.85 nH 10%
L114	2460591A11	7.66 nH
L200, L201	2462587Q20	2.2 uH 20%
L203	2462587P25	12 uH 5%
L204	2462587V21	6.8 nH 5%
L210 thru L212	2462587V36	150 nH 5%
L214 thru L219	2462587V36	150 nH 5%
L220	2462587V26	22 nH 5%
L221	2462587V24	15 nH 5%
L230	2462587V25	18 nH 5%
L299	2462587Q47	1 uH 10% (used in PMUF6541D only)
L299	2113743A19	0.1uF 16V 10% (used in PMUF6541F only)
L401	2462587T17	150 nH 5%
L402, L403	2405769X05	10 uH
L405	2405769C06	4.7 uH 5% (used in PMUF6541D only)
L405	2405769X06	Ind Chip 4700NH 5% (used in PMUF6541F only)
L406, L407	2462587V73	820 nH 5%
L500	2462587Q42	390 nH 10%
L503	2462587L50	100 uH
L511	2462587L50	100 uH
L650 thru L653	2404574Z14	270 nH 2%
L703	2486085A06	47 uH
L705	2486085A06	47 uH
L708	2480574F01	600 Ohm
L711, L712	2462587N68	1 uH
		CONTACTS:
M101	3985931D02	Ground Clip
M500	0985888K02	Socket, Backup Battery Holder

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
		TRANSISTOR: See Note 1.
Q1	4805585Q19	NPN
Q101	5185633C10	800 MHz Ring
Q210	4805218N11	DMOS FET
Q211	4805793Y01	NPN
Q212	4805218N11	DMOS FET
Q213	4805793Y01	NPN
Q214	4805218N11	DMOS FET
Q215, Q216	4805793Y01	NPN
Q217, Q218	4805218N11	DMOS FET
Q401	4805218N63	NPN
Q501	4805921T09	ROHM Inverter Driver Dual NPN
Q600	4805723X03	DUAL NPN-PNP
Q601	4809579E35	FET DUAL N-CHAN
Q604	4805723X03	DUAL NPN-PNP
Q698	4805723X03	DUAL NPN-PNP
Q700	4880048M01	NPN Digital Switch
Q701	4805921T09	Inverter Driver Dual NPN
Q702	4885844C01	FET
Q703	4805921T09	Inverter Driver Dual NPN
Q704	4805723X03	DUAL NPN-PNP
Q705, Q706	4805793Y01	NPN
Q707	4880048M01	NPN Digital Switch
Q708	4805218N11	DMOS FET
Q709	4805793Y01	NPN (used in PMUF6541D only)
Q801	4880048M01	NPN Digital Switch
		RESISTOR: Ohms ±5%; 1/8W, Unless Otherwise Stated
R1	0662057M67	510
R2	0662057M94	6.8k
R3	0662057M90	4.7k
R4	0662057M84	2.7k
R5	0662057M59	240, 5%
R6	0662057M50	100
R7	0662057M01	0
R8, R9	Not Placed	-
R10	0662057M01	0
R11	0662057M52	120
R100	0662057A29	150
R101	0662057A18	51
R103	0662057A29	150
R104	0662057M50	100
R105	0662057A18	51
R106	0662057A29	150
R107	0662057A39	390
R108	0662057M95	7.5k
R109	0662057M81	2k
R110	0662057M98	10k
R111, R113	Not Placed	-
R114	0662057M50	100
R115	0662057M94	6.8k
R117	0662057N23	100k
R118	0662057N30	200k
R119	0662057M94	6.8k
R120	0662057M54	150
R200	0662057M50	100
R201, R202	0662057M54	150
R204	0662057M01	0
R205	0662057M88	3.9k
R206	0662057M49	91, 5%
R207	0662057M52	120
R208	0662057M74	1k
R210	0662057M81	2k
R211	0662057M01	0
R212	0662057M62	330
R213	0662057M01	0
R214	0662057N10	30k
R215	0662057N17	56k
R216	0662057N15	47k
R217	0662057M50	100
R220	0662057M62	330
R221	0662057N16	51k
R222	0662057M26	10
R223, R224	0662057N06	20k
R225	0662057M38	33
R226	0662057M23	7.5
R227	0662057N16	51k
R228	0662057M58	220
R229, R230	0662057N06	20k
R231	0662057M32	18
R232	0662057N16	51k
R233	0662057M58	220
R234, R235	0662057N06	20k
R236	0662057M32	18
R237	0662057M58	220
R238	0662057M50	RES. CHIP 100
R239	0662057N08	24k, 5%
R241	0662057M01	0
R243	0662057N10	30k
R244	0662057N16	51k
R250 thru R252	0662057M01	0
R261	0662057N16	51k
R262	0662057M92	5.6k
R289, R292	0662057M38	33
R293	0662057M96	8.2k
R294	Not Placed	-
R295	0662057N15	47k
R401	0662057M50	100
R402	0662057N08	24k, 5%
R403	0662057M95	7.5k
R404	0662057T55	681, 1%
R405	0662057M81	2k
R406	0662057M62	330
R407	0662057N08	24k, 5%
R408	0662057M01	0
R409	0662057N23	100k
R410	0662057M98	10k
R411	0662057M64	390
R412	0662057M98	10k
R413	0662057M01	0
R414	0662057N23	100k
R503	0662057M64	390
R504	0662057M67	510
R505	0662057M98	10K
R507 thru R510	0662057M50	100
R511	0662057M98	10k
R512	0662057N15	47k
R520	0662057N35	330k
R530 thru R537	0662057M98	10k
R540	Not Placed	-
R541	0662057M67	510
R545 thru R547	0662057N15	47k
R594	Not Placed	-
R595	0662057M01	0

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R600	0662057M74	1k
R601	0662057M67	510
R602	0662057M98	10k
R603, R604	0662057N39	470k, 5%
R605	0662057N23	100k
R607, R609	0662057N47	1 M, 5%
R610	Not Placed	-
R611	0662057M50	100
R612	Not Placed	-
R613, R614	0662057N06	20k
R615	0662057N23	100k
R616	0662057M50	100
R617	Not Placed	-
R620 thru R622	0662057M50	100
R623, R624	0662057M50	100 (used in PMUF6541D only)
R625, R626	0662057M50	100
R637 thru R644	0662057M74	1k
R646	0662057M50	100
R647	0662057M98	10k
R649	0662057N15	47k
R650	0662057B46	10 M, 5%
R651	0662057M78	1.5k
R652	0662057M98	10k
R654, R655	0662057N23	100k
R656, R657	0662057M98	10k
R658	0662057V32	150k, 1%
R666	0662057M67	510
R667	0662057M64	390

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R668	0662057M46	68
R669, R670	0662057M50	100
R671	0662057M64	390
R672, R673	0662057M98	10k
R674	0662057M50	100
R677	0662057M98	10k
R680, R681	0662057M34	22
R695	0662057N23	100k
R697	0662057M50	100
R700, R702	0662057N17	56k
R703	0662057M98	10k
R704, R705	0662057N06	20k
R706	0662057N17	56k
R708	0662057M98	10k
R709	0662057N06	20k
R710	0662057M94	6.8k
R711	0662057M98	10k
R713	0662057N06	20k
R714, R716	0662057M98	10k
R717	0662057M64	390
R718	0662057M82	2.2k
R719	0662057M74	1k
R720	0662057M95	7.5k
R721	0662057M82	2.2k
R722	0662057N15	47k
R723	0662057M74	1k (used in PMUF6541D only)
R723	0662057M70	680 (used in PMUF6541F only)
R724	0662057M82	2.2k
R726	0662057M95	7.5k
R727	0662057M64	390

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R728	0662057M64	390 (used in PMUF6541D only)
R728	0662057M70	680 (used in PMUF6541F only)
R729	0662057N13	39k
R730	0662057M74	1k
R731, R732	0662057M98	10k
R733	0662057M90	4.7k
R734	0662057M98	10k
R735	0662057N39	470k, 5%
R736	0662057M98	10k
R737	0662057N15	47k
R738	0662057M90	4.7k
R739	0662057M98	10k
R740	0662057M62	330 (used in PMUF6541D only)
R740	0662057M70	680 (used in PMUF6541F only)
R741	0662057M34	22
R742	0662057M50	100
R743	0662057N23	100k
R756	0662057N23	100k
R757	0662057M74	1k
R760	Not Placed	-
R761	0662057N23	100k
R762, R763	0662057M01	0
R766	0662057N15	47k
R768, R770	0662057M01	0
R771	0662057N15	47K
R772	0662057M90	4.7k
R774	0662057M98	10k
R775	0662057M34	22
R779	0662057M26	10 (used in PMUF6541D only)
R781	0662057M01	0
R782	Not Placed	-
R788	0662057M10	2.2

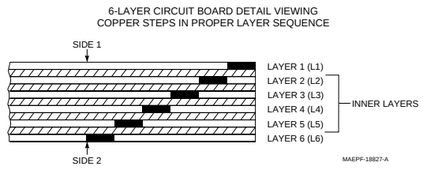
ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R789	Not Placed	-
R799	0662057N35	330k
R800	0662057N15	47k (used in PMUF6541D only)
R801	0662057M94	6.8k
R802, R803	0662057M50	100
R808	0662057M01	0
R809	0662057N15	47k
R810	0662057M98	10k
R812	0662057N23	100k
R813 thru R815	Not Placed	-
R816	0662057N15	47k
R817	0662057M01	0
R820	0662057M98	10k
R821	0662057M42	47
R822	0662057N23	100k
		SWITCH:
S500	4085131E01	Frequency, Dual Function
S501	1880619Z03	Volume Potentiometer
S502	4085358D02	Tactile Actuator
S503 thru S506	4080523Z01	Tactile Actuator
		SHIELD:
SH1	2685090D01	Mixer
SH2	2685242D01	Filter
SH101	2685082D01	PCIC
SH102	2685084D01	Harmonic Bottom
SH103	2685083D01	Harmonic Top
SH104	2685085D01	PA
SH201	2685081D01	Synthesizer
SH202	2685088D01	Fractional-N
SH203	2685087D01	VCO Bottom
SH204	2685241D01	DAC

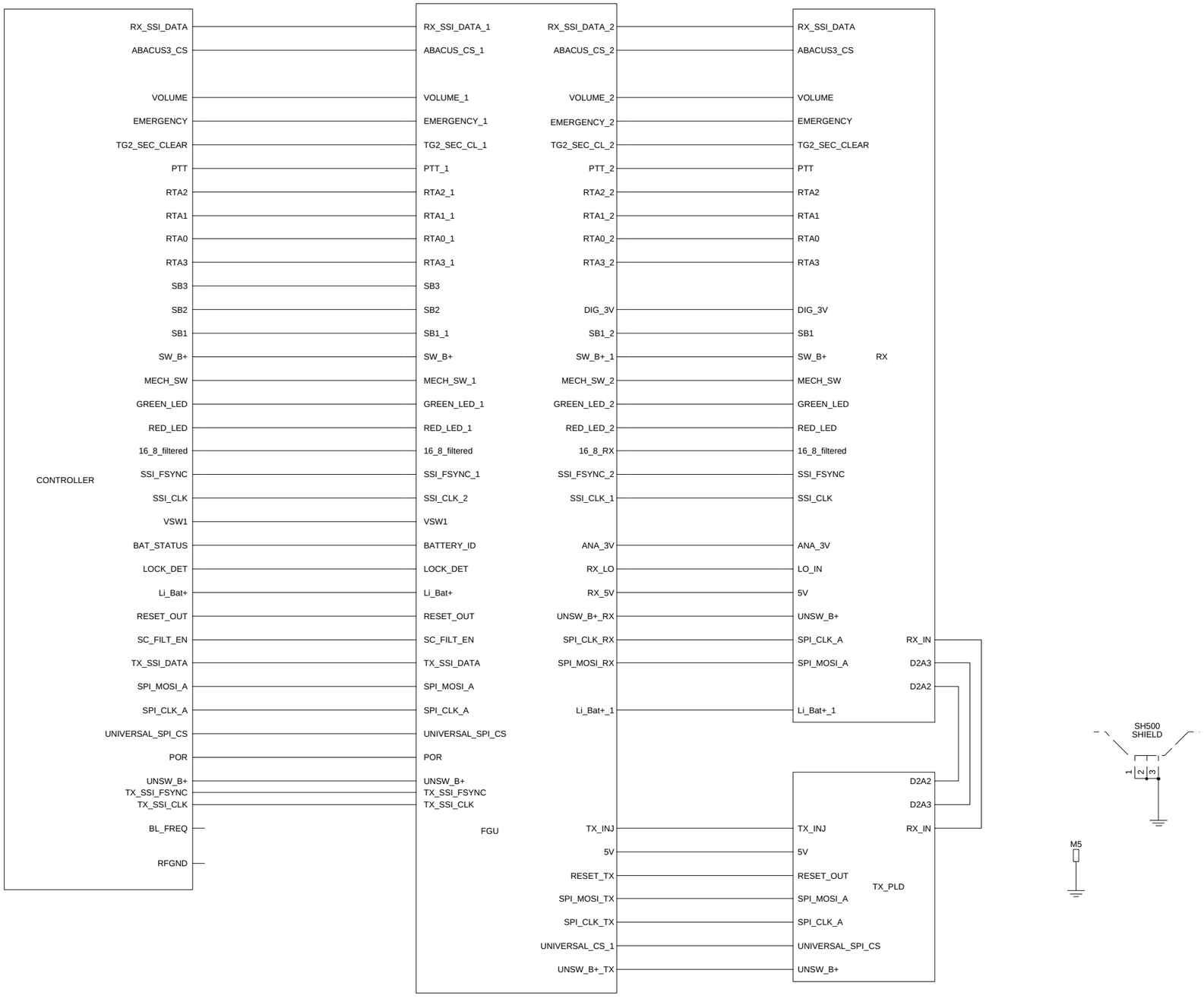
ITEM	MOTOROLA PART NUMBER	DESCRIPTION
SH205	2685086D01	VCO Top
SH401	2685089D01	ABACUS
SH402	2685080D01	2nd LO Filter
		TRANSFORMER:
T1, T2	2580541Z02	2T
T3	2585918C01	2T, Pins 4 thru 6 5T, Pins 1 thru 3
		MODULE: See Note 1.
U1	5185130C91	RF Mixer
U101	5185130C65	Tx Driver Amplifier
U102	5185765B26	Power Control (PCIC)
U103	5185963A15	Temperature Sensor
U106	5185368C84	Directional Coupler
U201	5105835U92	Synthesizer Frac N
U202	5185368C83	Digital-to-Analog Converter
U250	5105750U54	VCO Buffer
U401	5185963A85	ABACUS III
U500	5185353D13	Regulator 5V
U501, U502	5185353D14	Regulator 3V
U503	5185353D56	3.3V Linear Regular
U600	5185368C66	Flipper
U601	5109731C15	Operational Amplifier
U602	5109731C15	Operational Signal Amplifier
U605	5105492X92	Bilateral Switch
U702	5185353D13	Regulator 5V
U703	5109879E58	GCAPII
U704	5185353D35	Dual EEPOT
U705	5105492X92	Bilateral Switch
U706	5109731C15	Operational Amplifier
U708	5102463J44	Audio PA
U800	5109841C69	PATRIOT
U801, U802	5109522E53	Single Buffer
U803	5185368C95	Flash Memory

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
U804	5185130C38	Static RAM (SRAM)
		ZENER DIODE: See Note 1.
U805	4805793Y01	Trans Mini SOT NPN Low Noise (used in PMUF6541F only)
VR500	4802245J51	6.8V
VR501	4880140L15	10V
VR502 thru VR507	4809788E06	6.8V
VR591 thru VR596	4805656W03	Dual 5.6V
VR650	4813832C72	Transient Suppressor Quad 12V
VR651, VR652	4805656W03	Dual 5.6V
VR657	4809788E06	6.8V
VR658	4813830C26	13V
VR659, VR662	4805656W08	QUAD 5.8V
VR663	4813830A22	9.1V 5%
VR678	4802021P15	Diode Array Low Capacitance
VR700	4813830A15	5.6V 5%
		CRYSTAL: See Note 2.
Y200	4802245J68	Reference Oscillator 16.8 MHz
Y201	4885426C23	Resonator 960 MHz
Y202	4885426C16	Resonator 1025 MHz
Y203	4885426C17	Resonator 1110 MHz
Y600	4809995L05	Quartz 32.768 kHz

Notes:

1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.
2. When ordering crystals, specify carrier frequency, crystal frequency, crystal type number, and Motorola part number.
3. Part value notations:
   $p=10^{-12}$
   $n=10^{-9}$
   $\mu=10^{-6}$
   $m=10^{-3}$
   $k=10^{3}$
   $M=10^{6}$
4. ITEM refers to the component reference designator. SIDE refers to the location of the component on the board; S1=Side 1, S2=Side 2.
5. The PMUF6541D/F RF Board uses a 6-layer printed circuit board.





Reference Designators Used:

001 - 099	Receiver front end
100 - 199	Transmitter
200 - 299	FGU
400 - 499	Receiver back end
500 - 599	DC and Controls
600 - 699	Flipper and Interface
700 - 799	GCAP II
800 - 899	Patriot and Memory

Figure 9-42. PMUF6541G Top Level Schematic

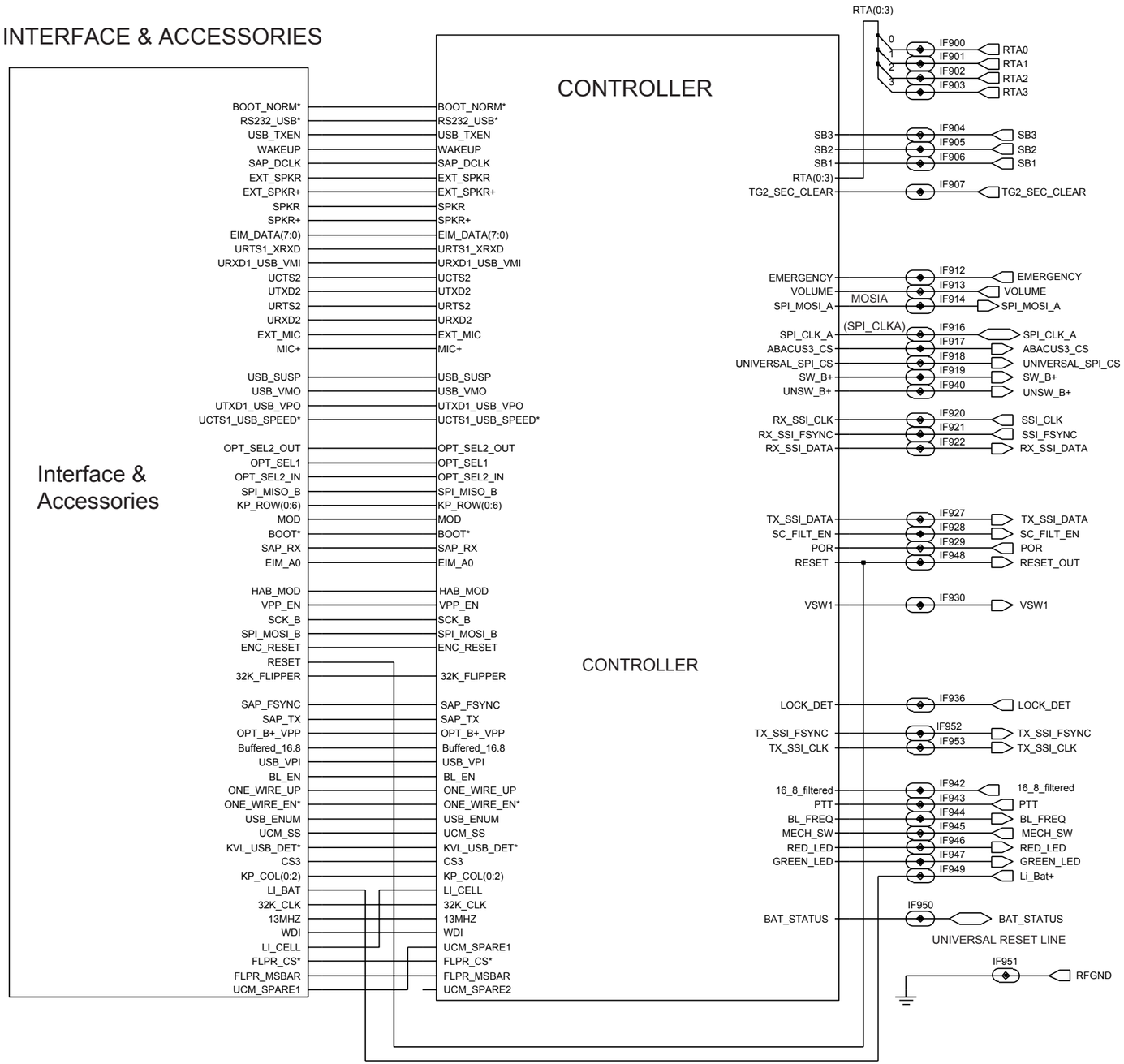


Figure 9-43. PMUF6541G Controller Interface Schematic

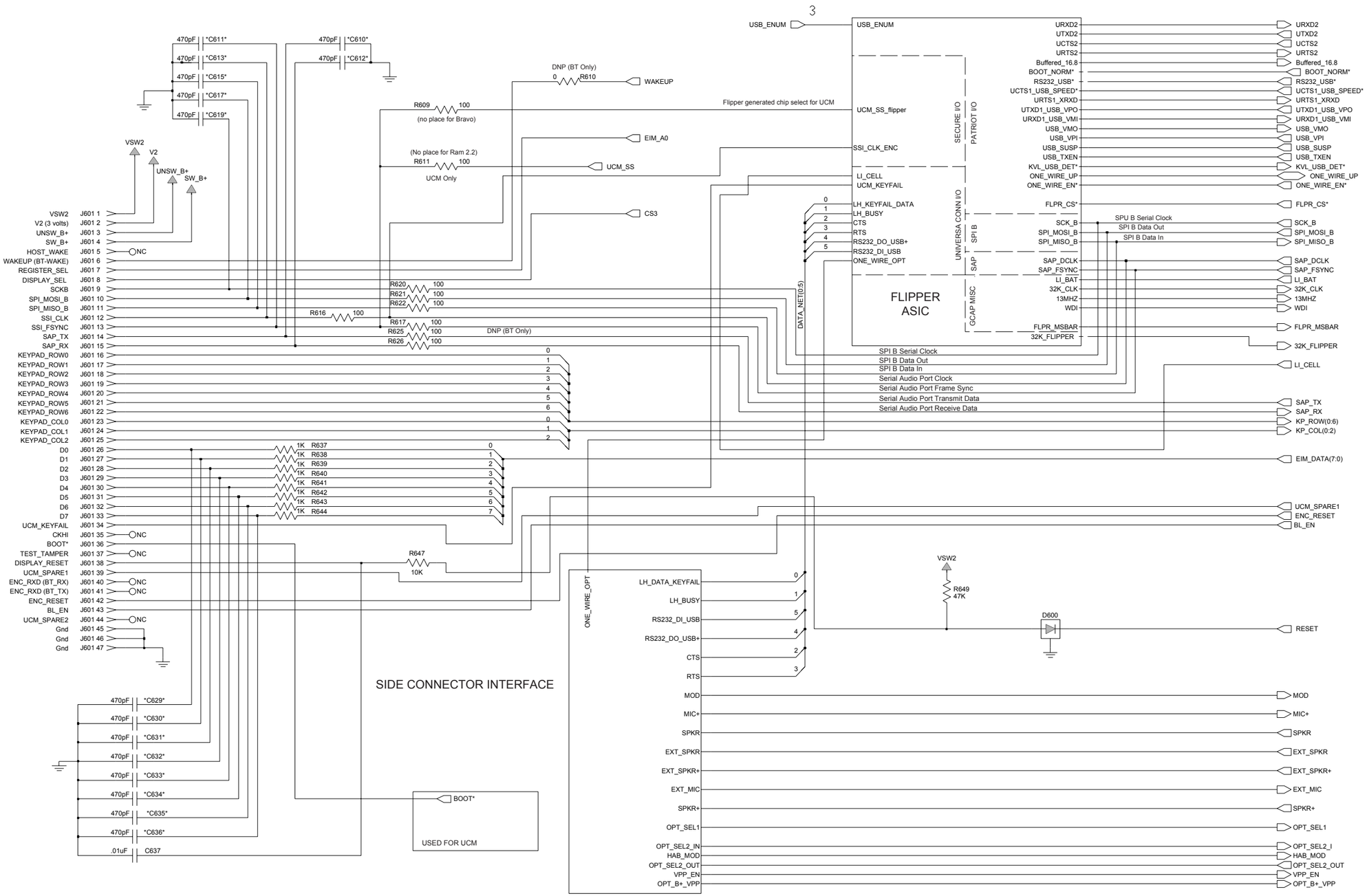
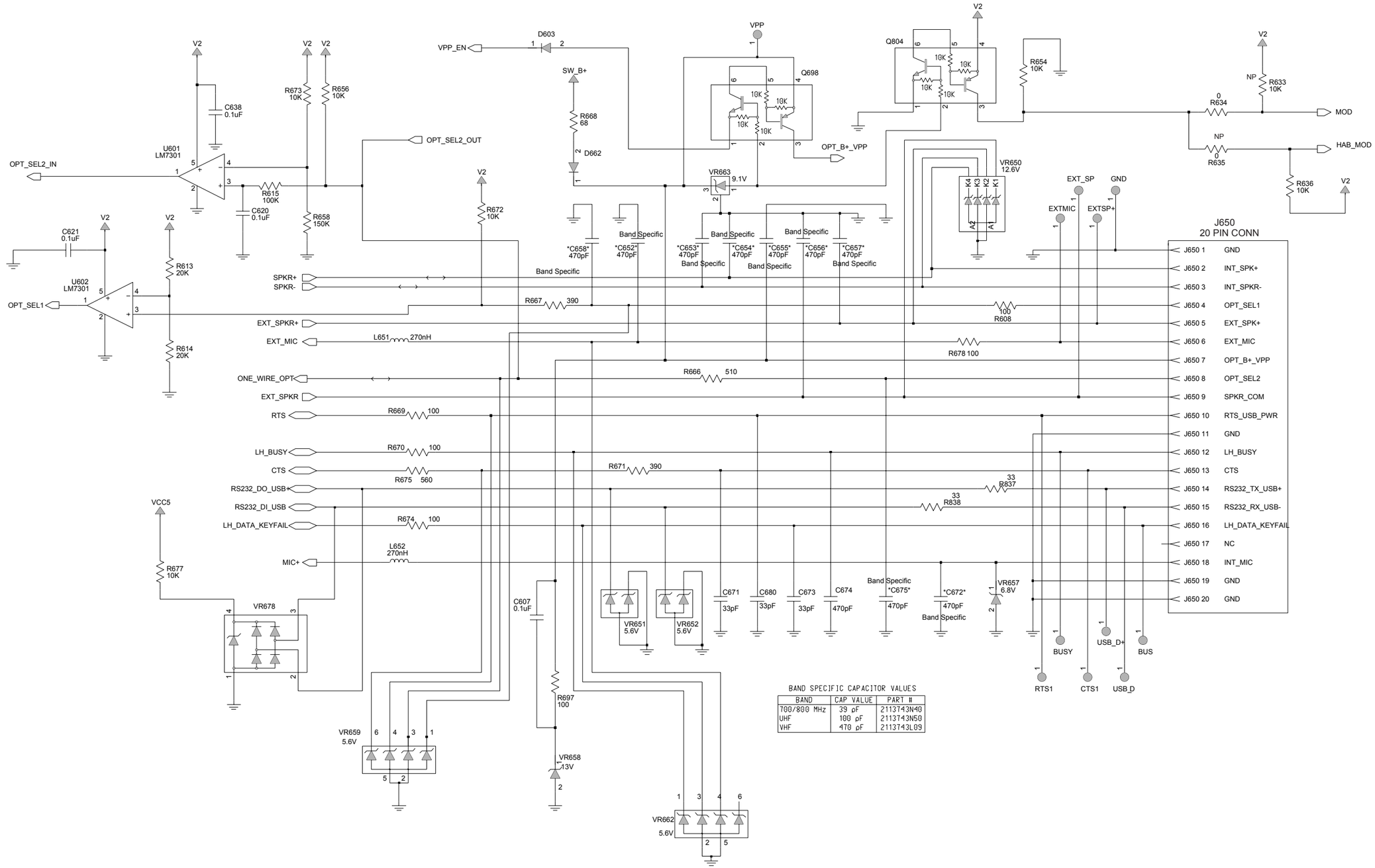


Figure 9-44. PMUF6541G Interface and Accessories Schematic



BAND SPECIFIC CAPACITOR VALUES

BAND	CAP VALUE	PART #
700/800 MHz	39 pF	2113743N40
UHF	100 pF	2113743N50
VHF	470 pF	2113743L09

Figure 9-45. PMUF6541G Side Connector Schematic

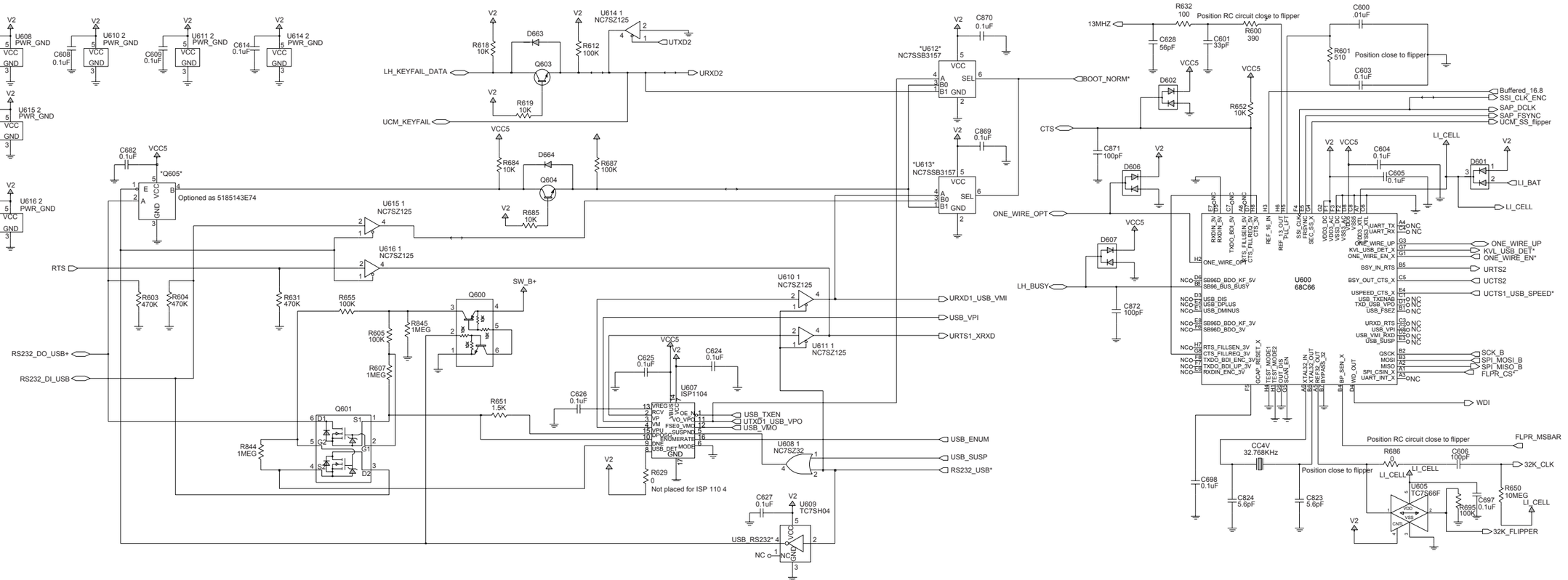


Figure 9-46. PMUF6541G Flipper Schematic

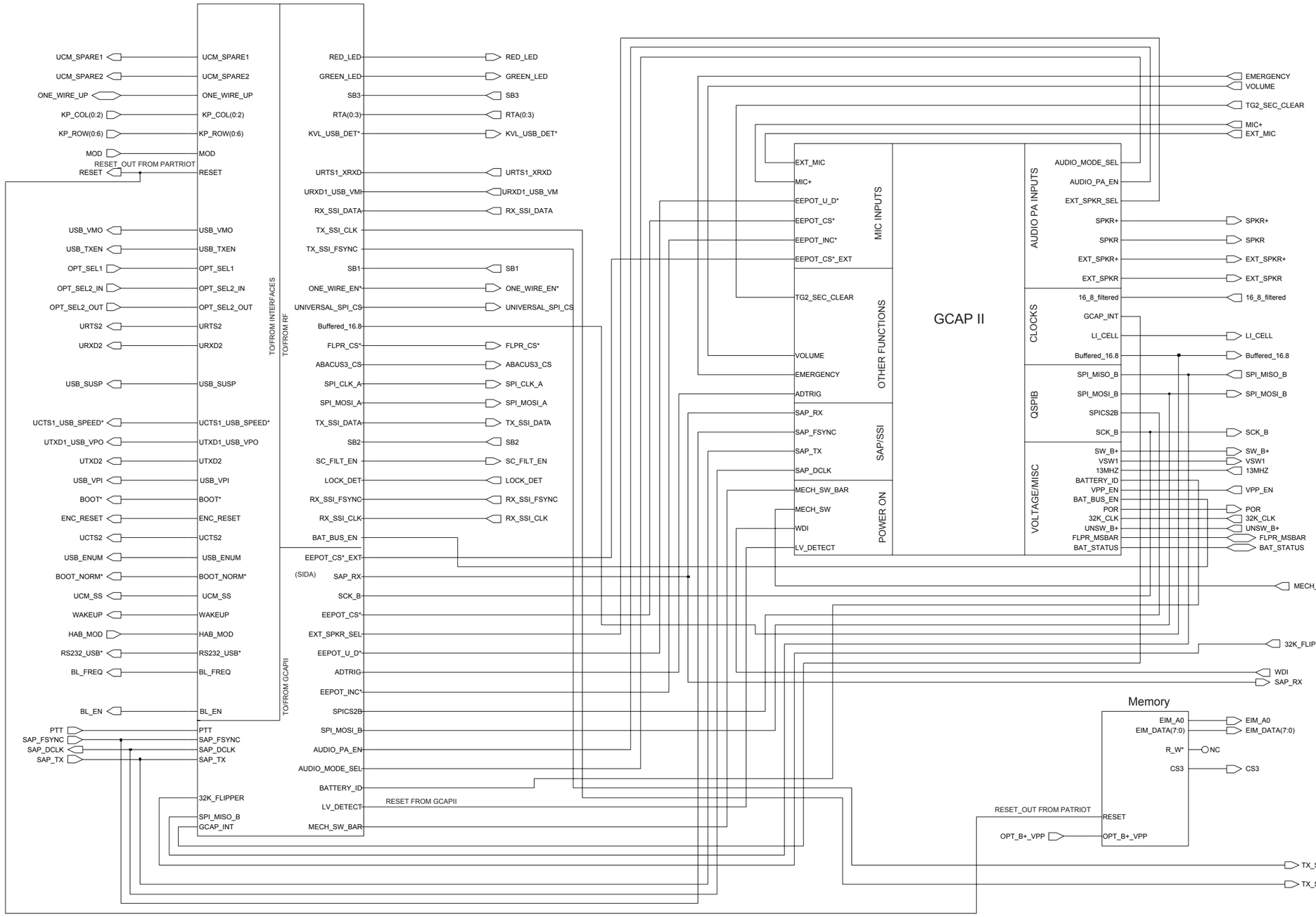


Figure 9-47. PMUF6541G Controller Schematic

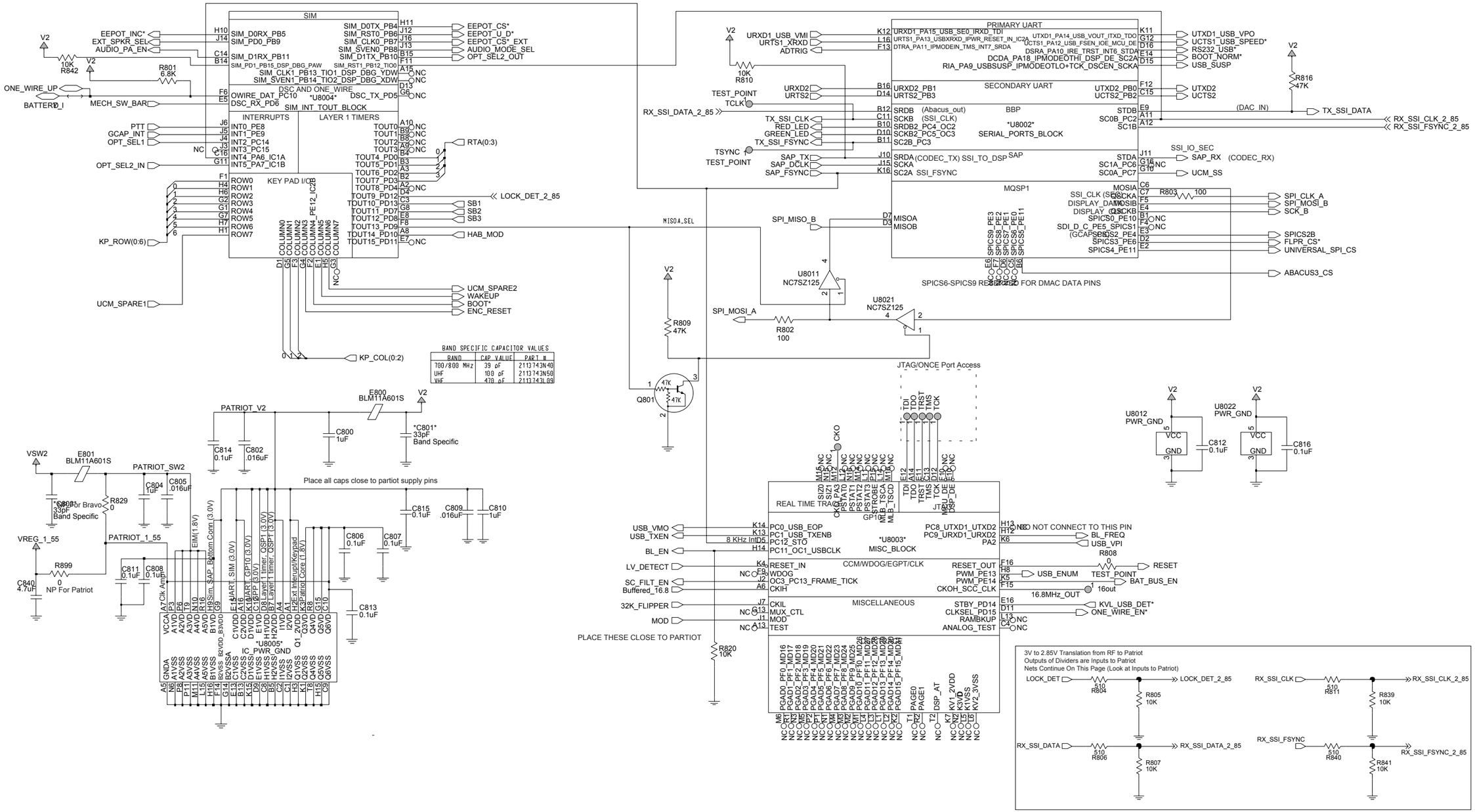


Figure 9-48. PMUF6541G Patriot (U800) Schematic

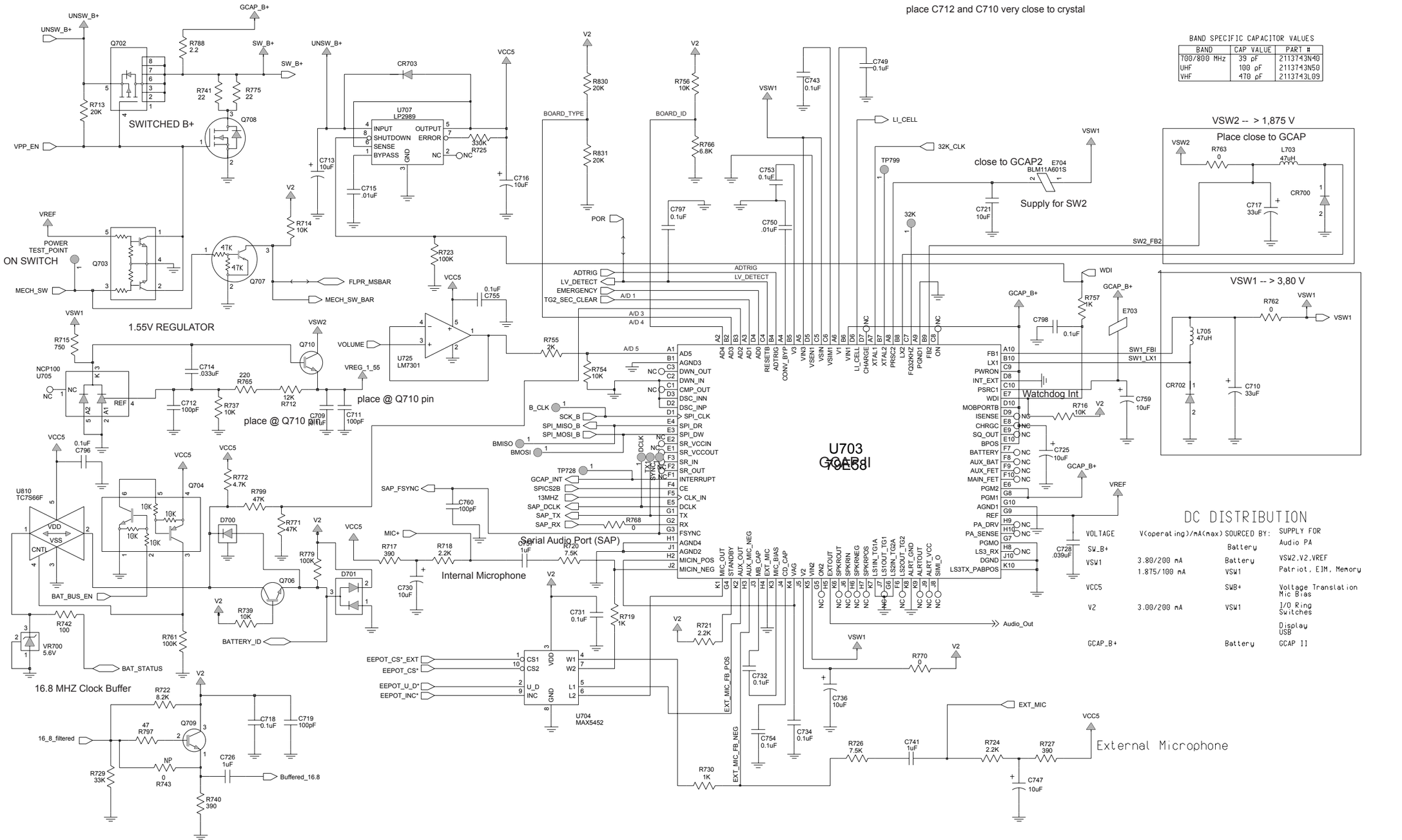


Figure 9-49. PMUF6541G GCAP II/DC and Audio Schematic, Sheet 1 of 2

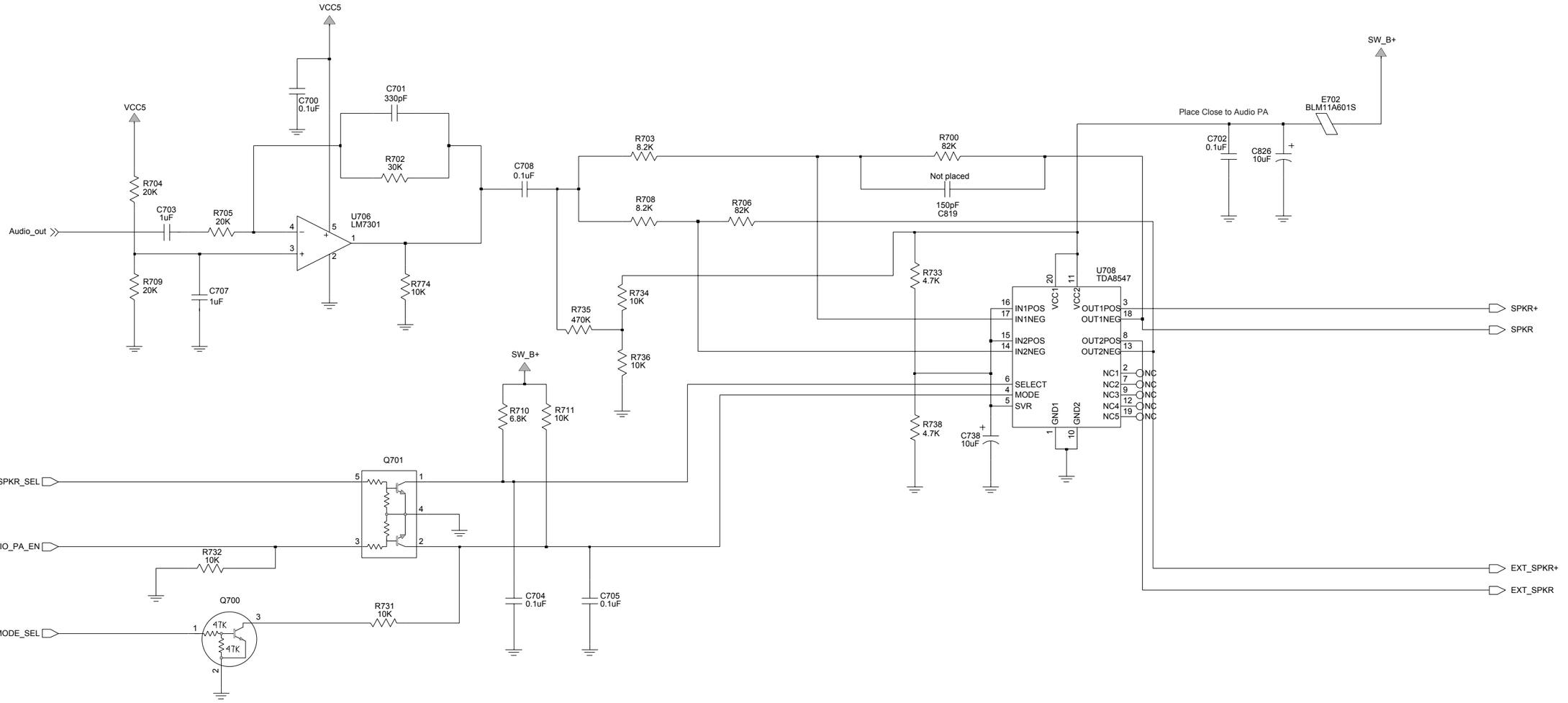


Figure 9-50. PMUF6541G GCAP II/DC and Audio Schematic, Sheet 2 of 2

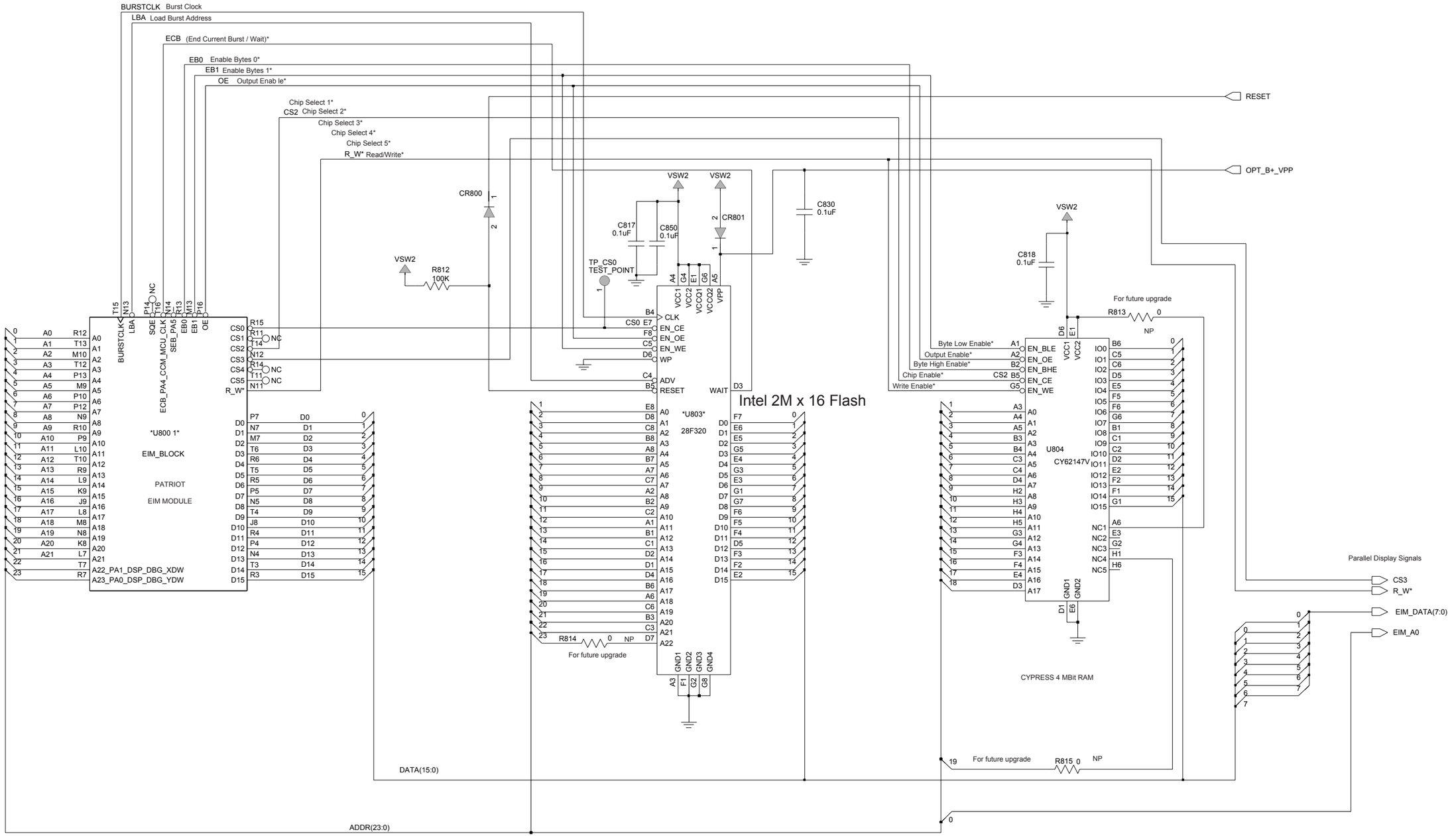


Figure 9-51. PMUF6541G Memory Schematic

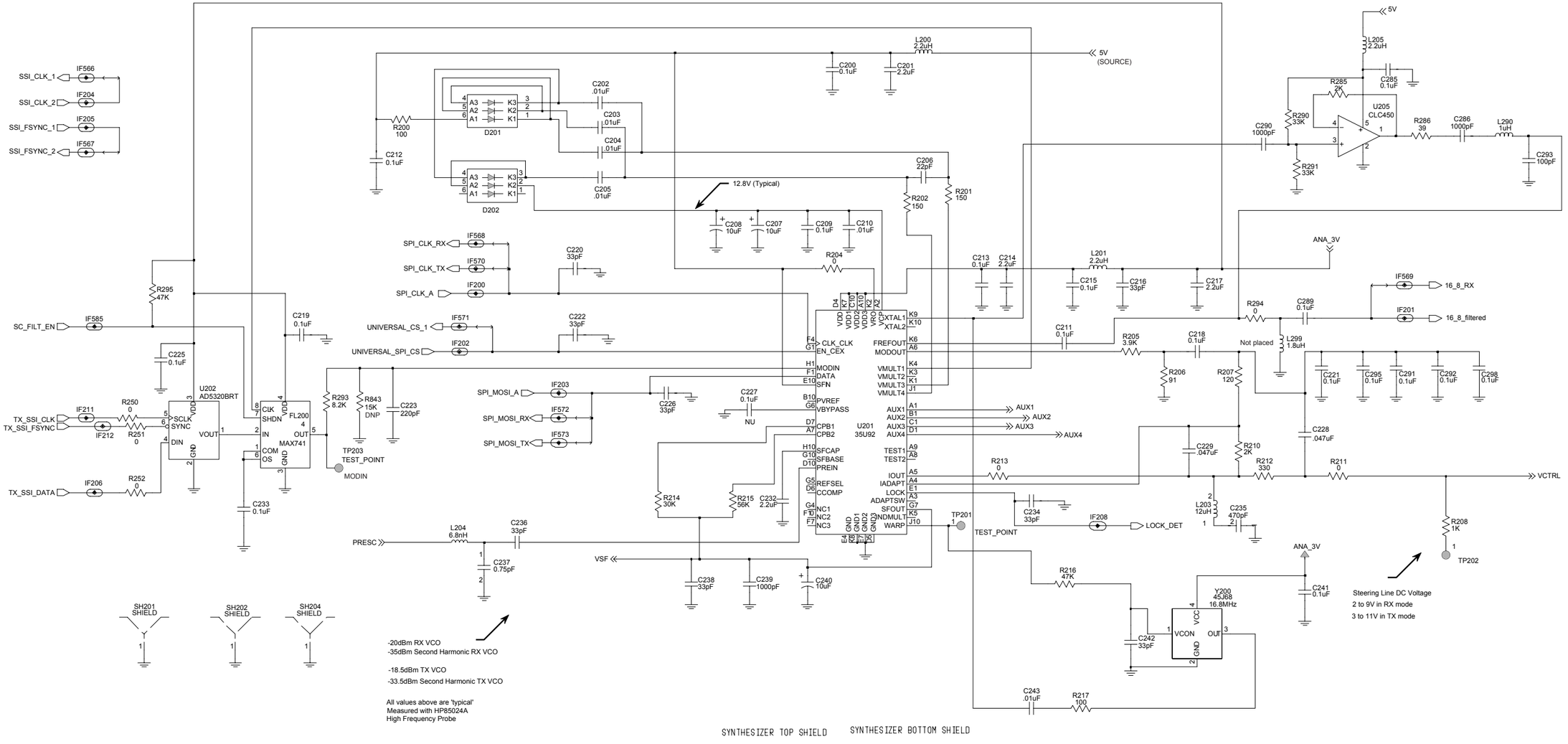


Figure 9-52. PMUF6541G Frequency Generation Unit (FGU) Schematic, Sheet 1 of 3

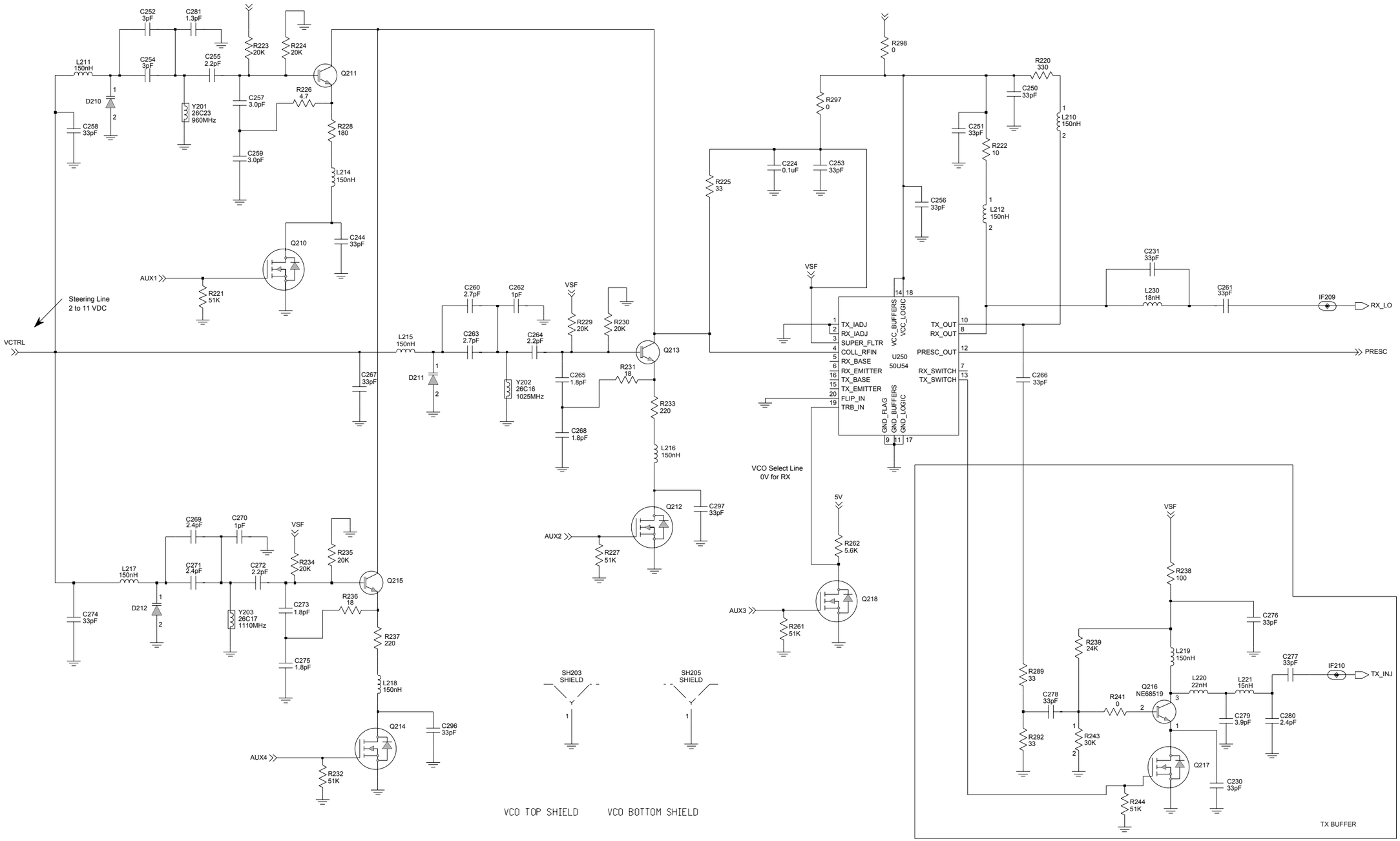


Figure 9-53. PMUF6541G Frequency Generation Unit (FGU) Schematic, Sheet 2 of 3

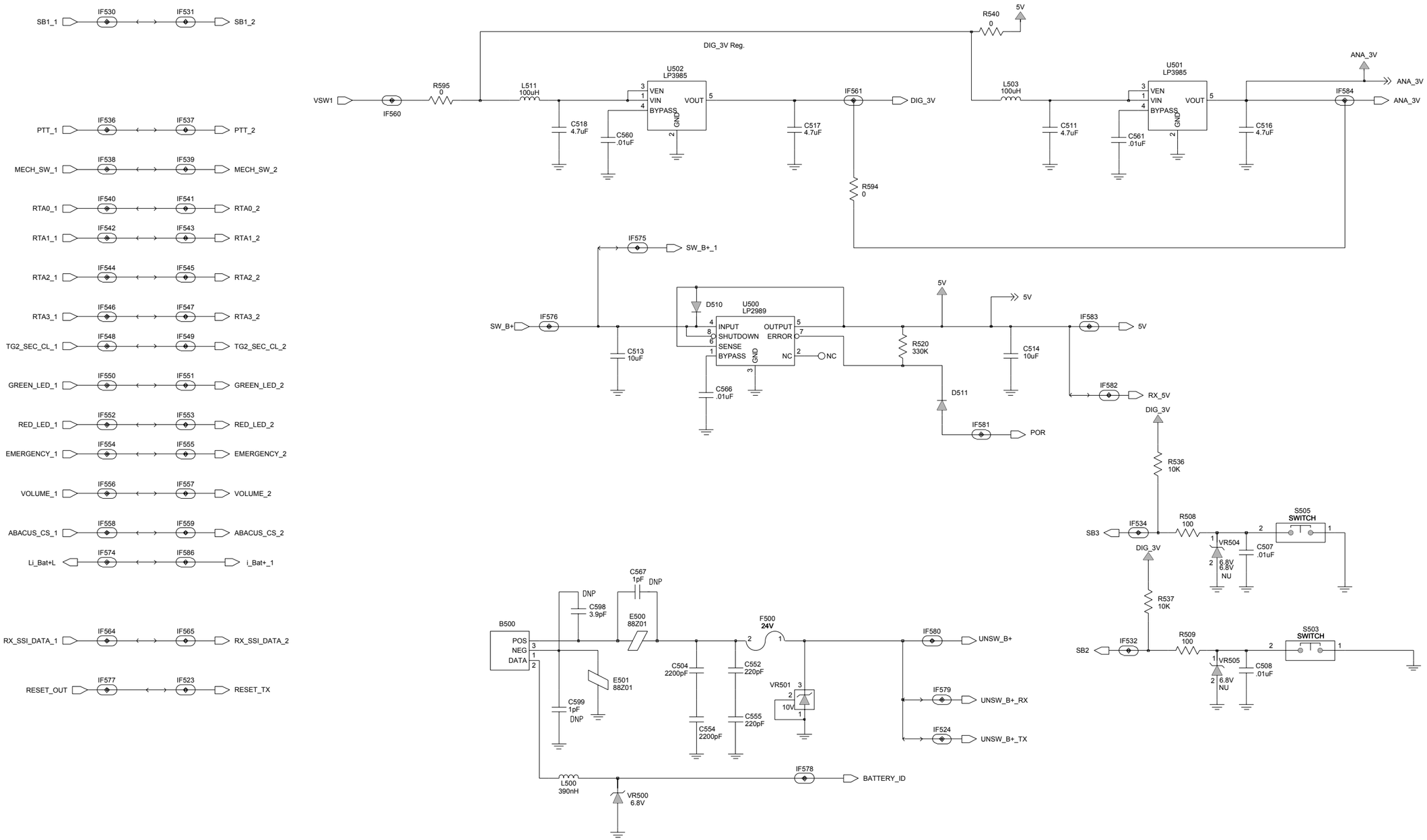
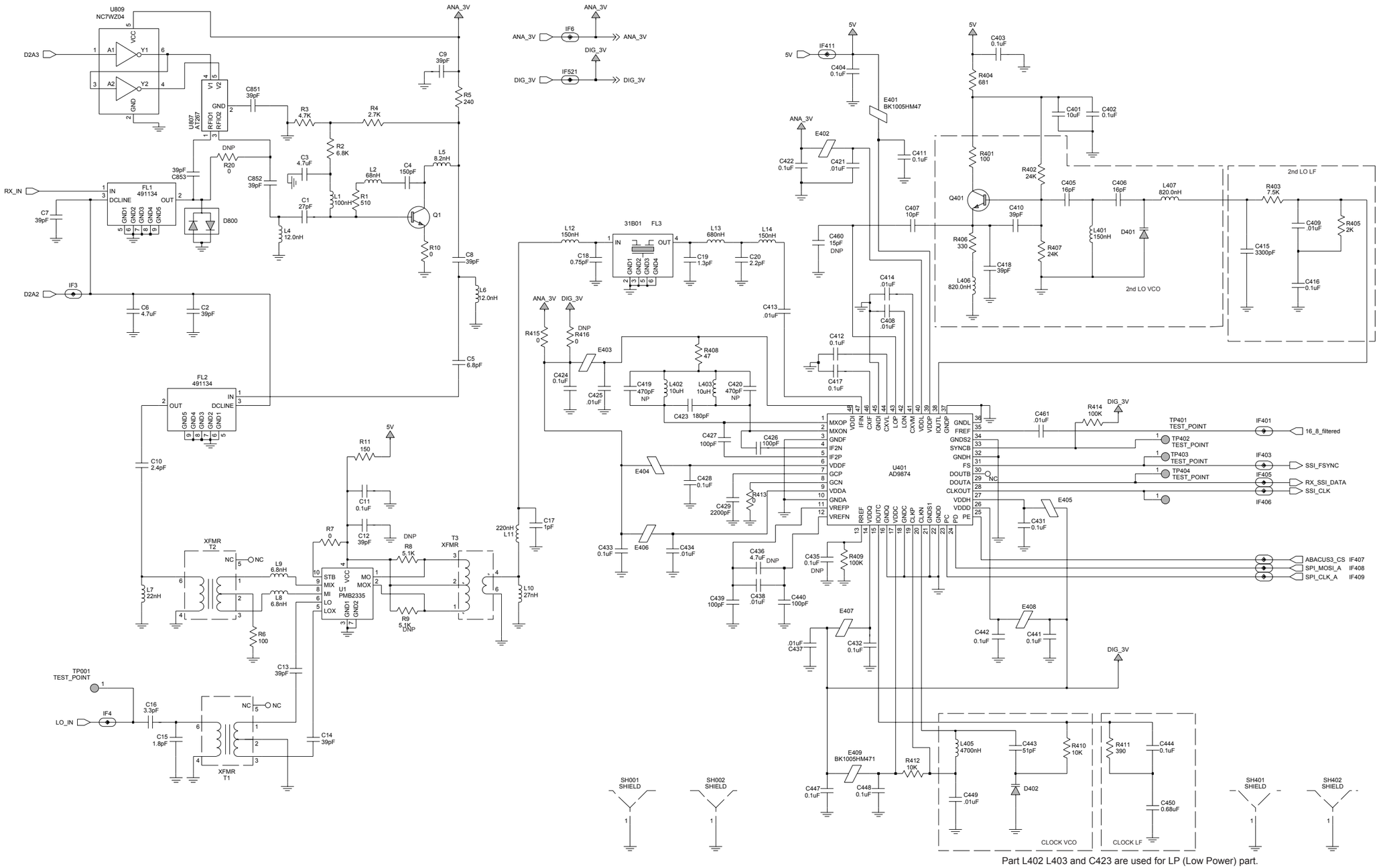


Figure 9-54. PMUF6541G Frequency Generation Unit (FGU) Schematic, Sheet 3 of 3



Part L402 L403 and C423 are used for LP (Low Power) part.

Figure 9-55. PMUF6541G Receiver Schematic, Sheet 1 of 2

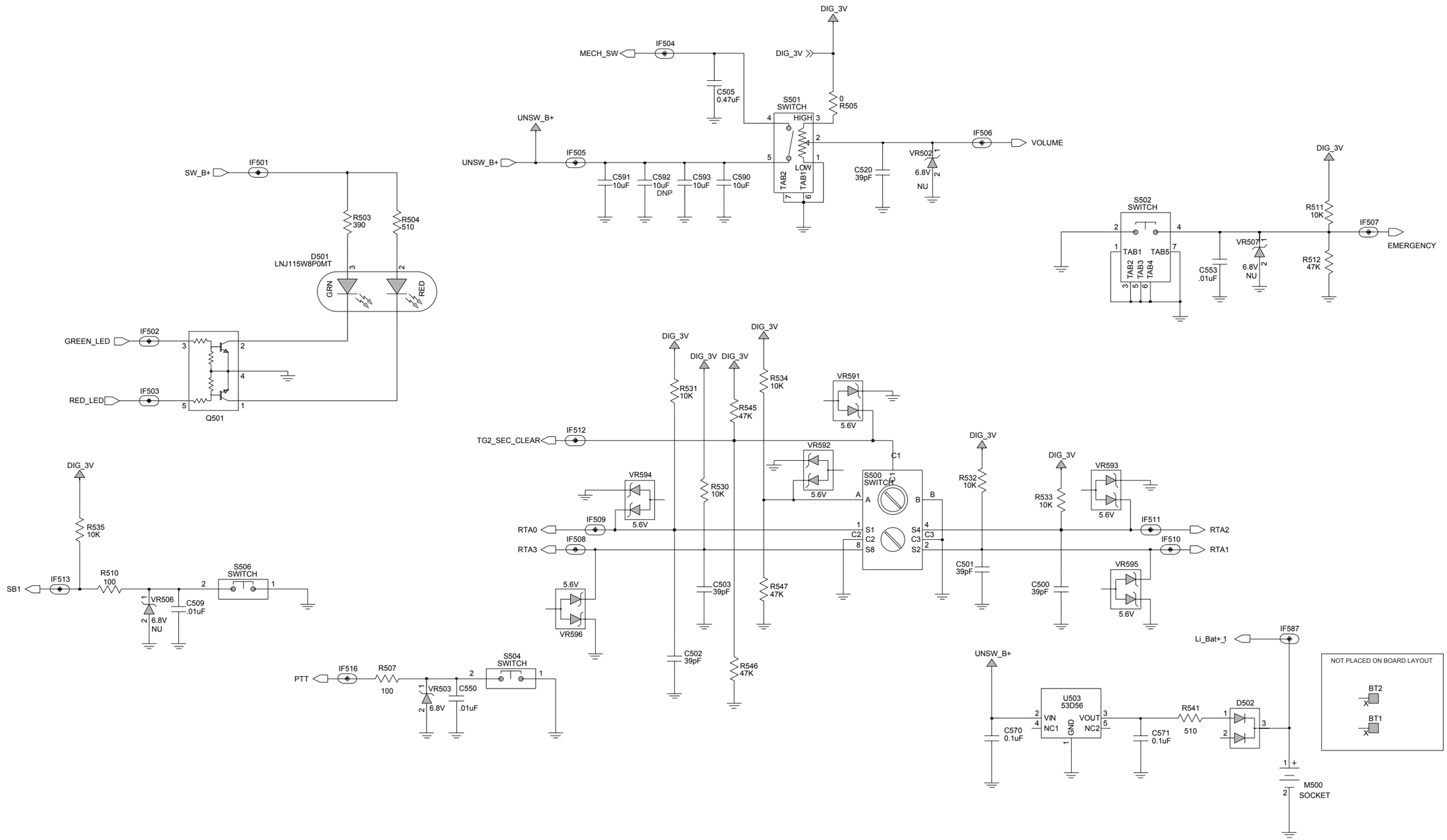


Figure 9-56. PMUF6541G Receiver Schematic, Sheet 2 of 2

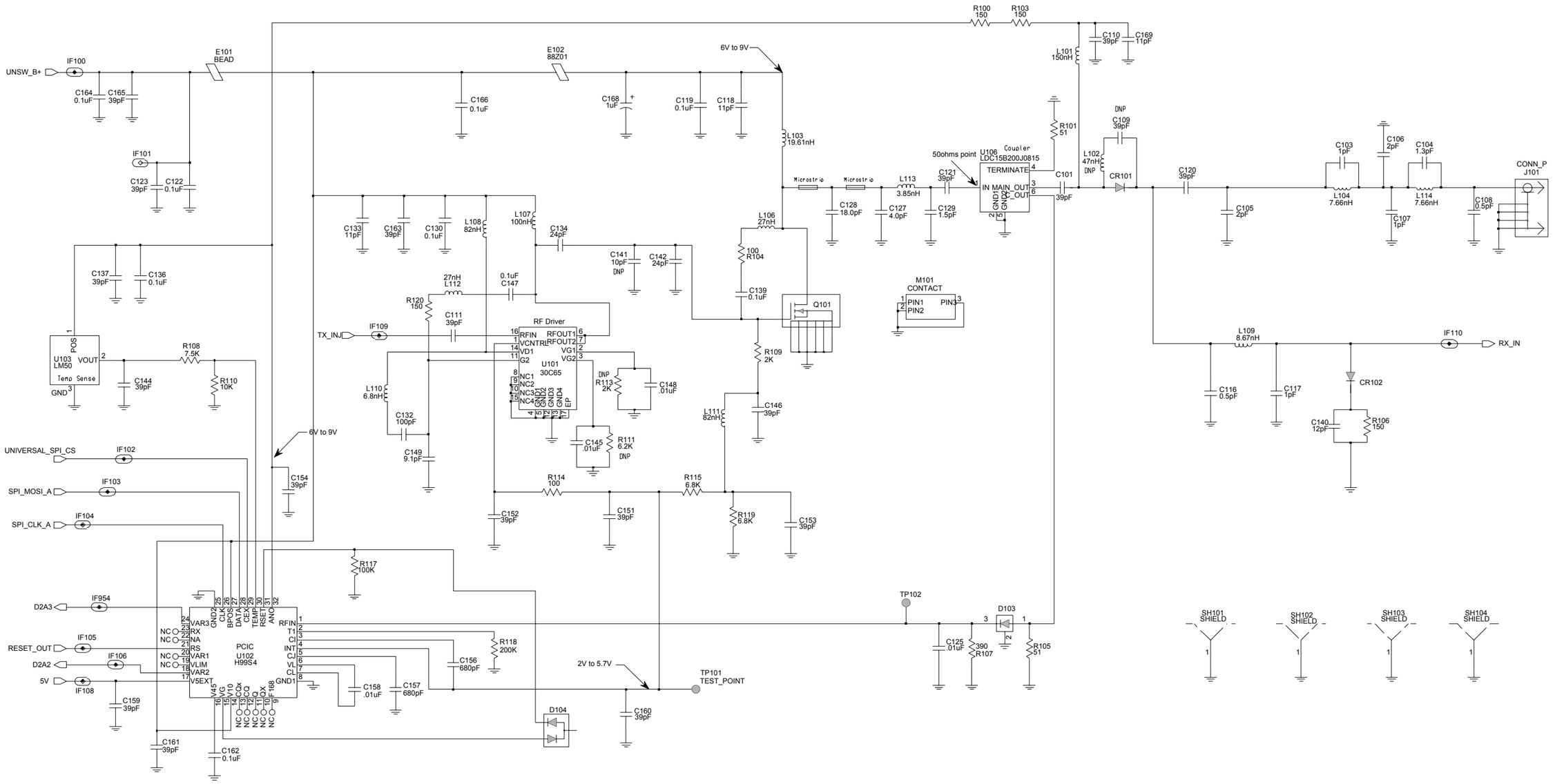


Figure 9-57. PMUF6541G Transmitter Subsection (Ring PA) Schematic

VIEWED FROM SIDE 1

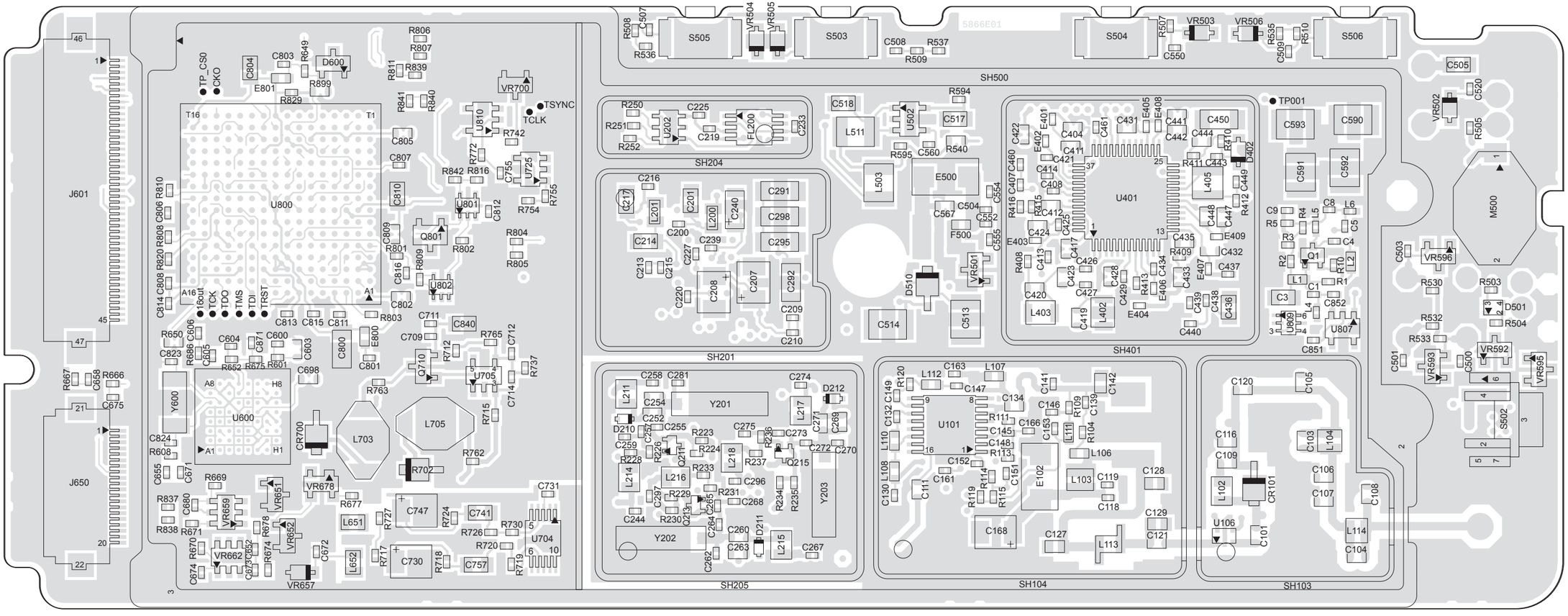


Figure 9-58. PMUF6541G Main Circuit Board Component Location Detail, Viewed from Side 1

VIEWED FROM SIDE 2

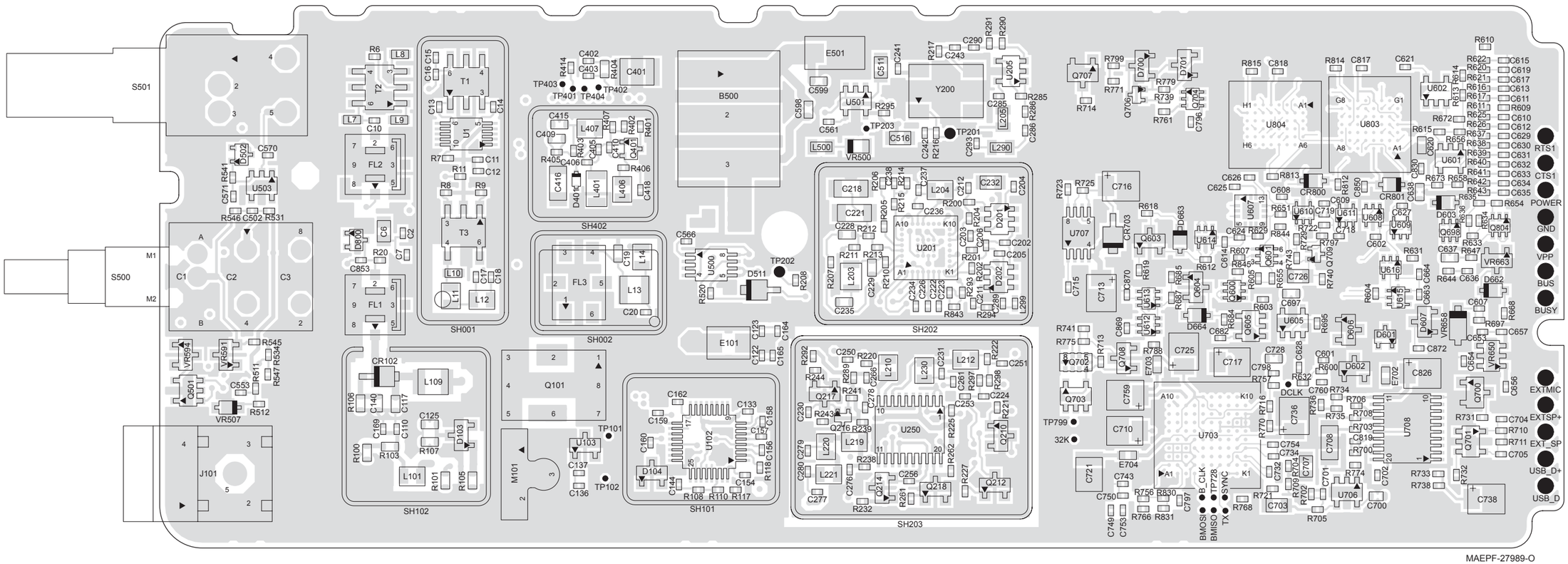


Figure 9-59. PMUF6541G Main Circuit Board Component Location Detail, Viewed from Side 2

PMUF6541G Main Circuit Board Electrical Parts List

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
B500	0986237A02	CONNECTOR (CONTACT BATTERY)
C1	2113743N36	CAP CHIP 27.0 PF 5% COG
C10	2113743N11	CAP CHIP 2.4 PF +-.25PF COG
C101	2113740F41	CAP CHIP REEL CL1 +/-30 39
C103	2113740F03	CAP CHIP REEL CL1 +/-30 1.0
C104	2113740F06	CAP CHIP REEL CL1 +/-30 1.3
C105	2113740F10	CAP CHIP REEL CL1 +/-30 2.0
C106	2113740F10	CAP CHIP REEL CL1 +/-30 2.0
C107	2113740F03	CAP CHIP REEL CL1 +/-30 1.0
C108	2113740F01	CAP CHIP REEL CL1 +/-30 .50
C109	NOTPLACED	64AM DUMMY PART NUMBER
C11	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C110	2113743N40	CAP CHIP 39.0 PF 5% COG
C111	2113740F41	CAP CHIP REEL CL1 +/-30 39
C116	2113740F01	CAP CHIP REEL CL1 +/-30 .50
C117	2113740F03	CAP CHIP REEL CL1 +/-30 1.0
C118	2113743N27	CAP CHIP 11.0 PF 5% COG
C119	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C12	2113743N40	CAP CHIP 39.0 PF 5% COG
C120	2113740F41	CAP CHIP REEL CL1 +/-30 39
C121	2113740F41	CAP CHIP REEL CL1 +/-30 39
C122	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C123	2113743N40	CAP CHIP 39.0 PF 5% COG
C125	2113741F49	CAP CHIP CL2 X7R REEL 10000
C127	2103689A17	CAP CHIP CL1 4.0 +/-0.25 PF
C128	2103689A08	CAP CHIP CL1 18.0 +/-5%
C129	2103689A32	CAP CHIP CL1 1.5 +/-0.05 PF
C13	2113743N40	CAP CHIP 39.0 PF 5% COG
C130	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C132	2113743N50	CAP CHIP 100 PF 5% COG
C133	2113743N27	CAP CHIP 11.0 PF 5% COG
C134	2113740F36	CAP CHIP REEL CL1 +/-30 24
C136	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C137	2113743N40	CAP CHIP 39.0 PF 5% COG
C139	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C14	2113743N40	CAP CHIP 39.0 PF 5% COG
C140	2113740F29	CAP CHIP REEL CL1 +/-30 12
C141	NOTPLACED	64AM DUMMY PART NUMBER
C142	2103689A47	SL240J HIGH - Q CAPACITOR, UCN033
C144	2113743N40	CAP CHIP 39.0 PF 5% COG
C145	2113743L41	CAP CHIP 10000 PF 10% X7R
C146	2113743N40	CAP CHIP 39.0 PF 5% COG
C147	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C148	2113743L41	CAP CHIP 10000 PF 10% X7R
C149	2113743N25	CAP CHIP 9.1 PF + -.5PF COG
C15	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C151	2113743N40	CAP CHIP 39.0 PF 5% COG
C152	2113743N40	CAP CHIP 39.0 PF 5% COG
C153	2113743N40	CAP CHIP 39.0 PF 5% COG
C154	2113743N40	CAP CHIP 39.0 PF 5% COG
C156	2113743L13	CAP CHIP 680 PF 10% X7R
C157	2113743L13	CAP CHIP 680 PF 10% X7R
C158	2113743L41	CAP CHIP 10000 PF 10% X7R
C159	2113743N40	CAP CHIP 39.0 PF 5% COG
C16	2113743N14	CAP CHIP 3.3 PF +-.25PF COG
C160	2113743N40	CAP CHIP 39.0 PF 5% COG
C161	2113743N40	CAP CHIP 39.0 PF 5% COG
C162	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C163	2113743N40	CAP CHIP 39.0 PF 5% COG
C164	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C165	2113743N40	CAP CHIP 39.0 PF 5% COG
C166	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C168	2311049A08	CAP TANT CHIP 1 10 35 A/P
C169	2113743N27	CAP CHIP 11.0 PF 5% COG
C17	2113743Q03	CAP CHIP 1.0 PF +/-.1PF 20*40
C18	2113743N02	CAP CHIP 0.75 PF +-.25PF COG
C19	2113740F06	CAP CHIP REEL CL1 +/-30 1.3
C2	2113743N40	CAP CHIP 39.0 PF 5% COG
C20	2113743Q10	CAP CHIP 2.2 PF +/-.1PF 20*40
C200	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C201	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C202	2113743L41	CAP CHIP 10000 PF 10% X7R
C203	2113743L41	CAP CHIP 10000 PF 10% X7R
C204	2113743L41	CAP CHIP 10000 PF 10% X7R
C205	2113743L41	CAP CHIP 10000 PF 10% X7R
C206	2113743N38	CAP CHIP 33.0 PF 5% COG
C207	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C208	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C209	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C210	2113743L41	CAP CHIP 10000 PF 10% X7R
C211	NOTPLACED	64AM DUMMY PART NUMBER
C212	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C213	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C214	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C215	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C216	2113743N38	CAP CHIP 33.0 PF 5% COG
C217	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C218	2185419D06	CAP CER SUPER L/D 0.1UF
C219	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C220	2113743N38	CAP CHIP 33.0 PF 5% COG
C221	2185419D06	CAP CER SUPER L/D 0.1UF
C222	2113743N38	CAP CHIP 33.0 PF 5% COG
C223	2113743L01	CAP CHIP 220 PF 10% X7R
C224	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C225	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C226	2113743N38	CAP CHIP 33.0 PF 5% COG
C227	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C228	2113743E12	CAP CHIP .047 UF 10% X7R
C229	2113743E12	CAP CHIP .047 UF 10% X7R
C230	2113743N38	CAP CHIP 33.0 PF 5% COG
C231	NOTPLACED	64AM DUMMY PART NUMBER
C232	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C233	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C234	2113743N38	CAP CHIP 33.0 PF 5% COG
C235	2113741F17	CAP CHIP CL2 X7R REEL 470
C236	2113743N38	CAP CHIP 33.0 PF 5% COG
C237	2113743N02	CAP CHIP 0.75 PF +-.25PF COG

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C238	2113743N38	CAP CHIP 33.0 PF 5% COG
C239	2113743L17	CAP CHIP 1000 PF 10% X7R
C240	2311049A59	CAP TANT CHIP A/P 10UF 10% 6V
C241	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C242	2113743N38	CAP CHIP 33.0 PF 5% COG
C243	2113743L41	CAP CHIP 10000 PF 10% X7R
C244	2113743N38	CAP CHIP 33.0 PF 5% COG
C250	2113743N38	CAP CHIP 33.0 PF 5% COG
C251	2113743N38	CAP CHIP 33.0 PF 5% COG
C252	2113740L05	CAP CER CHIP 3.0 PF +-0.1PF
C253	2113743N38	CAP CHIP 33.0 PF 5% COG
C254	2113740L05	CAP CER CHIP 3.0 PF +-0.1PF
C255	2113743Q10	CAP CHIP 2.2 PF +/-.1PF 20*40
C256	2113743N38	CAP CHIP 33.0 PF 5% COG
C257	2104801Z17	CAP CER NPO 3.0PF 16V 1005 SMD
C258	2113743N38	CAP CHIP 33.0 PF 5% COG
C259	2104801Z17	CAP CER NPO 3.0PF 16V 1005 SMD
C260	2113740L04	CAP CER CHIP 2.7 PF +-0.1PF
C261	2113743N38	CAP CHIP 33.0 PF 5% COG
C262	2113743Q03	CAP CHIP 1.0 PF +/-.1PF 20*40
C263	2113740L04	CAP CER CHIP 2.7 PF +-0.1PF
C264	2113743Q10	CAP CHIP 2.2 PF +/-.1PF 20*40
C265	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C266	2113743N38	CAP CHIP 33.0 PF 5% COG
C267	2113743N38	CAP CHIP 33.0 PF 5% COG
C268	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C269	2113740L03	CAP CER CHIP 2.4 PF +-0.1PF
C270	2113743Q03	CAP CHIP 1.0 PF +/-.1PF 20*40

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C271	2113740L03	CAP CER CHIP 2.4 PF +-0.1PF
C272	2113743Q10	CAP CHIP 2.2 PF +/-.1PF 20*40
C273	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C274	2113743N38	CAP CHIP 33.0 PF 5% COG
C275	2104801Z12	CAP CER NPO 1.8PF 16V 1005 SMD
C276	2113743N38	CAP CHIP 33.0 PF 5% COG
C277	2113743N38	CAP CHIP 33.0 PF 5% COG
C278	2113743N38	CAP CHIP 33.0 PF 5% COG
C279	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C280	2113743N11	CAP CHIP 2.4 PF +-.25PF COG
C281	2104801Z09	CAP CER NPO 1.3PF 16V 1005 SMD
C285	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C286	2113743L17	CAP CHIP 1000 PF 10% X7R
C289	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C290	2113743L17	CAP CHIP 1000 PF 10% X7R
C291	2185419D06	CAP CER SUPER L/D 0.1UF
C292	2185419D06	CAP CER SUPER L/D 0.1UF
C293	2113743N50	CAP CHIP 100 PF 5% COG
C295	2185419D06	CAP CER SUPER L/D 0.1UF
C296	2113743N38	CAP CHIP 33.0 PF 5% COG
C297	2113743N38	CAP CHIP 33.0 PF 5% COG
C298	2185419D06	CAP CER SUPER L/D 0.1UF
C3	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C4	2113743N54	CAP CHIP 150 PF 5% COG
C401	2113743T19	CAP 10UF 16V CER 3225 X5R
C402	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C403	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C404	2.113743'E20	CAP CHIP .10 UF 10%
C405	2113743N31	CAP 16PF 20X40
C406	2113743N31	CAP 16PF 20X40
C407	2113743N26	CAP CHIP 10.0 PF 5% COG
C408	2113743L41	CAP CHIP 10000 PF 10% X7R
C409	2113741F49	CAP CHIP CL2 X7R REEL 10000
C410	2113743N40	CAP CHIP 39.0 PF 5% COG
C411	2113743E20	CAP CHIP .10 UF 10%
C412	2113743E20	CAP CHIP .10 UF 10%
C413	2113743L41	CAP CHIP 10000 PF 10% X7R
C414	2113743L41	CAP CHIP 10000 PF 10% X7R
C415	2113741F37	CAP CHIP CL2 X7R REEL 3300
C416	2109720D14	CAP CER CHIP LOW DIST .1 UF
C417	2113743E20	CAP CHIP .10 UF 10%
C418	2113743N40	CAP CHIP 39.0 PF 5% COG
C419	NOTPLACED	64AM DUMMY PART NUMBER
C420	NOTPLACED	64AM DUMMY PART NUMBER
C421	2113743L41	CAP CHIP 10000 PF 10% X7R
C422	2113743E20	CAP CHIP .10 UF 10%
C423	2113740F57	CAP CHIP REEL CL1 +/-30 180
C424	2113743E20	CAP CHIP .10 UF 10%
C425	2113743L41	CAP CHIP 10000 PF 10% X7R
C426	2113743N50	CAP CHIP 100 PF 5% COG
C427	2113743N50	CAP CHIP 100 PF 5% COG
C428	2113743E20	CAP CHIP .10 UF 10%
C429	2113743L25	CAP CHIP 2200 PF 10% X7R
C431	2113743E20	CAP CHIP .10 UF 10%
C432	2113743E20	CAP CHIP .10 UF 10%
C433	2113743E20	CAP CHIP .10 UF 10%
C434	2113743L41	CAP CHIP 10000 PF 10% X7R

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C435	NOTPLACED	64AM DUMMY PART NUMBER
C436	NOTPLACED	64AM DUMMY PART NUMBER
C437	2113743L41	CAP CHIP 10000 PF 10% X7R
C438	2113743L41	CAP CHIP 10000 PF 10% X7R
C439	2113743N50	CAP CHIP 100 PF 5% COG
C440	2113743N50	CAP CHIP 100 PF 5% COG
C441	2113743E20	CAP CHIP .10 UF 10%
C442	2113743E20	CAP CHIP .10 UF 10%
C443	2113743N43	CAP CHIP 51.0 PF 5% COG
C444	2113743E20	CAP CHIP .10 UF 10%
C447	2113743E20	CAP CHIP .10 UF 10%
C448	2113743E20	CAP CHIP .10 UF 10%
C449	2113743L41	CAP CHIP 10000 PF 10% X7R
C450	2113743B27	CAP CHIP .680 UF 10% X7R
C460	NOTPLACED	64AM DUMMY PART NUMBER
C461	2113743L41	CAP CHIP 10000 PF 10% X7R
C5	2113743N22	CAP CHIP 6.8 PF + -.5PF COG
C500	2113743N40	CAP CHIP 39.0 PF 5% COG
C501	2113743N40	CAP CHIP 39.0 PF 5% COG
C502	2113743N40	CAP CHIP 39.0 PF 5% COG
C503	2113743N40	CAP CHIP 39.0 PF 5% COG
C504	2113743L25	CAP CHIP 2200 PF 10% X7R
C505	2113743A27	CAP CHIP .470 UF 10% 16V
C507	2113743L41	CAP CHIP 10000 PF 10% X7R
C508	2113743L41	CAP CHIP 10000 PF 10% X7R
C509	2113743L41	CAP CHIP 10000 PF 10% X7R
C511	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C513	2113743T19	CAP 10UF 16V CER 3225 X5R
C514	2113743T19	CAP 10UF 16V CER 3225 X5R
C516	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C517	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C518	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C520	2113743N40	CAP CHIP 39.0 PF 5% COG
C550	2113743L41	CAP CHIP 10000 PF 10% X7R
C552	2113743L01	CAP CHIP 220 PF 10% X7R
C553	2113743L41	CAP CHIP 10000 PF 10% X7R
C554	2113743L25	CAP CHIP 2200 PF 10% X7R
C555	2113743L01	CAP CHIP 220 PF 10% X7R
C560	2113743L41	CAP CHIP 10000 PF 10% X7R
C561	2113743L41	CAP CHIP 10000 PF 10% X7R
C566	2113743L41	CAP CHIP 10000 PF 10% X7R
C567	NOTPLACED	64AM DUMMY PART NUMBER
C570	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C571	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C590	2113743T19	CAP 10UF 16V CER 3225 X5R
C591	2113743T19	CAP 10UF 16V CER 3225 X5R
C592	NOTPLACED	64AM DUMMY PART NUMBER
C593	2113743T19	CAP 10UF 16V CER 3225 X5R
C598	NOTPLACED	64AM DUMMY PART NUMBER
C599	NOTPLACED	64AM DUMMY PART NUMBER
C6	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C600	2113743L41	CAP CHIP 10000 PF 10% X7R
C601	2113743N38	CAP CHIP 33.0 PF 5% COG
C602	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C603	2113743E20	CAP CHIP .10 UF 10%
C604	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C605	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C606	2113743N50	CAP CHIP 100 PF 5% COG
C607	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C608	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C609	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C610	2113743N40	CAP CHIP 39.0 PF 5% COG
C611	2113743N40	CAP CHIP 39.0 PF 5% COG
C612	2113743N40	CAP CHIP 39.0 PF 5% COG
C613	2113743N40	CAP CHIP 39.0 PF 5% COG
C614	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C615	2113743N40	CAP CHIP 39.0 PF 5% COG
C617	2113743N40	CAP CHIP 39.0 PF 5% COG
C619	2113743N40	CAP CHIP 39.0 PF 5% COG
C620	2113743E20	CAP CHIP .10 UF 10%
C621	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C624	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C625	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C626	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C627	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C628	2113743N44	CAP CHIP 56.0 PF 5% COG
C629	2113743N40	CAP CHIP 39.0 PF 5% COG
C630	2113743N40	CAP CHIP 39.0 PF 5% COG
C631	2113743N40	CAP CHIP 39.0 PF 5% COG
C632	2113743N40	CAP CHIP 39.0 PF 5% COG
C633	2113743N40	CAP CHIP 39.0 PF 5% COG
C634	2113743N40	CAP CHIP 39.0 PF 5% COG
C635	2113743N40	CAP CHIP 39.0 PF 5% COG

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C636	2113743N40	CAP CHIP 39.0 PF 5% COG
C637	2113741F49	CAP CHIP CL2 X7R REEL 10000
C638	2113743E20	CAP CHIP .10 UF 10%
C652	2113743N40	CAP CHIP 39.0 PF 5% COG
C653	2113743N40	CAP CHIP 39.0 PF 5% COG
C654	2113743N40	CAP CHIP 39.0 PF 5% COG
C655	2113743N40	CAP CHIP 39.0 PF 5% COG
C656	2113743N40	CAP CHIP 39.0 PF 5% COG
C657	2113743N40	CAP CHIP 39.0 PF 5% COG
C658	2113743N40	CAP CHIP 39.0 PF 5% COG
C663	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C664	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C671	2113743N38	CAP CHIP 33.0 PF 5% COG
C672	2113743N40	CAP CHIP 39.0 PF 5% COG
C673	2113743N38	CAP CHIP 33.0 PF 5% COG
C674	2113743L09	CAP CHIP 470 PF 10% X7R
C675	2113743N40	CAP CHIP 39.0 PF 5% COG
C680	2113743N38	CAP CHIP 33.0 PF 5% COG
C682	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C697	2113743E20	CAP CHIP .10 UF 10%
C698	2113743E20	CAP CHIP .10 UF 10%
C7	2113743N40	CAP CHIP 39.0 PF 5% COG
C700	2113743E20	CAP CHIP .10 UF 10%
C701	2113743L05	CAP CHIP 330 PF 10% X7R
C702	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C703	2113743A31	CAP CHIP 1.0 UF 10% X7R
C704	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C705	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C707	2113743A31	CAP CHIP 1.0 UF 10% X7R
C708	2109720D14	CAP CER CHIP LOW DIST .1 UF
C709	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C710	2311049C52	CAP TANT CHIP 33UF 10% 10V
C711	2113743N54	CAP CHIP 150 PF 5% COG
C712	2113944B03	CAP CER CHP 270.0PF 25V 5%
C713	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C714	2311049A98	CAP TANT CHIP 47 UF 10V 10%
C715	2113743L41	CAP CHIP 10000 PF 10% X7R
C716	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C717	2311049C52	CAP TANT CHIP 33UF 10% 10V
C718	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C719	2113743N50	CAP CHIP 100 PF 5% COG
C721	2113743T19	CAP 10UF 16V CER 3225 X5R
C725	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C726	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C728	2113743E11	CAP CHIP .039 UF 10% X7R
C730	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C731	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C732	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C734	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C736	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C738	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C741	2113743A31	CAP CHIP 1.0 UF 10% X7R
C743	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C747	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C749	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C750	2113743L41	CAP CHIP 10000 PF 10% X7R
C753	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C754	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C755	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C757	2113743A31	CAP CHIP 1.0 UF 10% X7R
C759	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C760	2113743N50	CAP CHIP 100 PF 5% COG
C796	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C797	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C798	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C8	2113743N40	CAP CHIP 39.0 PF 5% COG
C800	2113743B29	CAP CHIP 1.00 UF 10% 16V
C801	2113743N40	CAP CHIP 39.0 PF 5% COG
C802	2113743E04	CER CHIP CAP .016UF
C803	2113743N40	CAP CHIP 39.0 PF 5% COG
C804	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C805	2113743E04	CER CHIP CAP .016UF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C806	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C807	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C808	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C809	2113743E04	CER CHIP CAP .016UF
C810	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C811	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C812	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C813	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C814	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C815	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C816	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C817	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C818	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C819	NOTPLACED	64AM DUMMY PART NUMBER
C823	2113743N20	CAP CHIP 5.6 PF + -.5PF COG
C824	2113743N20	CAP CHIP 5.6 PF + -.5PF COG
C826	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C830	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C850	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C851	2113743N40	CAP CHIP 39.0 PF 5% COG
C852	2113743N40	CAP CHIP 39.0 PF 5% COG
C853	2113743N40	CAP CHIP 39.0 PF 5% COG

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C869	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C870	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C871	2113743N50	CAP CHIP 100 PF 5% COG
C872	2113743N50	CAP CHIP 100 PF 5% COG
C9	2113743N40	CAP CHIP 39.0 PF 5% COG
CR101	4805656W24	DIODE, PIN RF
CR102	4805656W24	DIODE, PIN RF
CR700	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR701	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR702	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR703	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR800	4805656W37	TSTR BAT54HT1
CR801	4805656W37	TSTR BAT54HT1
D103	4813825A05	DIODE 30V HOT CARRIER MMBD301L
D104	4805129M06	DIODE MMBD7000
D201	4802233J09	DIODE TRIPLE SOT25-RH
D202	4802233J09	DIODE TRIPLE SOT25-RH
D210	4809877C08	DIODE VARACTOR 1SV279 SMD
D211	4809877C08	DIODE VARACTOR 1SV279 SMD
D212	4809877C08	DIODE VARACTOR 1SV279 SMD
D401	4809877C13	DIODE VARACTOR ISV305 SMD
D402	4862824C01	DIODE VARACTOR
D501	4809118D02	LED BICOLOR LNJ115W8POMT
D502	4805218N57	DIODE DUAL

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
D510	NOTPLACED	64AM DUMMY PART NUMBER
D511	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D600	4805129M90	DIODE SOT PKGD
D601	4805218N57	DIODE DUAL
D602	4805129M06	DIODE MMBD7000
D603	4805656W37	TSTR BAT54HT1
D606	4805129M06	DIODE MMBD7000
D607	4805129M06	DIODE MMBD7000
D662	4805656W37	TSTR BAT54HT1
D663	4805656W37	TSTR BAT54HT1
D664	4805656W37	TSTR BAT54HT1
D700	4805129M90	DIODE SOT PKGD
D701	4805129M06	DIODE MMBD7000
D800	4813825A19	DIODE SCHOTTKY BARRIER SERIES
E101	2484657R01	INDUCTOR BEAD CHIP
E102	2405688Z01	INDUCTOR FERRITE BEAD
E401	2480640Z01	SURFACE MOUNT FERRITE BEAD
E402	2480640Z01	SURFACE MOUNT FERRITE BEAD
E403	2480640Z01	SURFACE MOUNT FERRITE BEAD
E404	2480640Z01	SURFACE MOUNT FERRITE BEAD
E405	2480640Z01	SURFACE MOUNT FERRITE BEAD
E406	2480640Z01	SURFACE MOUNT FERRITE BEAD
E407	2480640Z01	SURFACE MOUNT FERRITE BEAD
E408	2480640Z01	SURFACE MOUNT FERRITE BEAD
E409	2480640Z01	SURFACE MOUNT FERRITE BEAD

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
E500	2405688Z01	INDUCTOR FERRITE BEAD
E501	2405688Z01	INDUCTOR FERRITE BEAD
E702	2480574F01	IND FERRITE CHIP 600 OHM 0603
E703	2480574F01	IND FERRITE CHIP 600 OHM 0603
E704	2480574F01	IND FERRITE CHIP 600 OHM 0603
E800	2480574F01	IND FERRITE CHIP 600 OHM 0603
E801	2480574F01	IND FERRITE CHIP 600 OHM 0603
E802	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
F500	6580542Z01	FUSE CHIP SMT TR/1608FF 3A
FL1	9185004D01	LC FLTR, MULITILAYER CERAMIC
FL2	9185004D01	LC FLTR, MULITILAYER CERAMIC
FL200	9185130D01	FLTR SW CAP 3 POLE BUTTERW
FL3	4885631B01	XTAL FILT 3 POLE 109.65 MOTORO
J101	2880658Z04	CONNECTOR (SMA)
J601	0905505Y10	CONN 45 PIN ZIF
J650	0905505Y09	CONN 20 PIN ZIF
L1	2413926G19	IND 100 NH 5%
L10	2413926G12	IND 27.0 NH 5%
L101	2462587V36	CHIP IND 150 NH 5% 0805
L102	NOTPLACED	64AM DUMMY PART NUMBER
L103	2460591B80	COIL AIR WOUND INDUC 19.61
L104	2460591A11	COIL AIR WOUND INDUC 7.66
L106	2413926G12	IND 27.0 NH 5%
L107	2413926G19	IND 100 NH 5%
L108	2413926G18	IND 82.0 NH 5%
L109	2460591B22	COIL AIR WOUND INDUC 8.67
L11	2462587V38	CHIP IND 220 NH 5% 0805
L110	2413926G05	IND 6.8 NH 5%
L111	2413926G18	IND 82.0 NH 5%
L112	2413926G12	IND 27.0 NH 5%
L113	2409348J03	IND AIR CORE 3.85NH 10% 2214
L114	2460591A11	COIL AIR WOUND INDUC 7.66
L12	2462587V36	CHIP IND 150 NH 5% 0805
L13	2462587N64	CHIP IND 680 NH 5%
L14	2462587V36	CHIP IND 150 NH 5% 0805
L2	2409377M14	IND CHIP WW 68 NH 5% 1608
L200	2462587Q20	IND CHIP 2,200 NH 20%
L201	2462587Q20	IND CHIP 2,200 NH 20%
L203	2462587P25	CHIP IND 12000 NH 5%
L204	2462587V21	CHIP IND 6.8 NH 5% 0805
L205	2462587Q20	IND CHIP 2,200 NH 20%
L210	2462587V36	CHIP IND 150 NH 5% 0805
L211	2462587V36	CHIP IND 150 NH 5% 0805
L212	2462587V36	CHIP IND 150 NH 5% 0805
L214	2462587V36	CHIP IND 150 NH 5% 0805
L215	2462587V36	CHIP IND 150 NH 5% 0805
L216	2462587V36	CHIP IND 150 NH 5% 0805
L217	2462587V36	CHIP IND 150 NH 5% 0805
L218	2462587V36	CHIP IND 150 NH 5% 0805
L219	2462587V36	CHIP IND 150 NH 5% 0805
L220	2462587V26	CHIP IND 22 NH 5% 0805
L221	2462587V24	CHIP IND 15 NH 5% 0805
L230	2462587V25	CHIP IND 18 NH 5% 0805
L290	2462587Q47	IND CHIP 1,000 NH 10%
L299	NOTPLACED	64AM DUMMY PART NUMBER
L4	2409154M14	IND CER MLTILYR 12.0NH 1005
L401	2462587T17	IND CHIP 150NH 5% LOW PRO
L402	2405769X05	COIL INDUCTOR
L403	2405769X05	COIL INDUCTOR
L405	2405769X06	IND CHIP 4700 NH 5%
L406	2462587V73	IND CHIP 820.0 NH 5%
L407	2462587V73	IND CHIP 820.0 NH 5%
L5	2409154M12	IND MTLILYR 8.2NH 1005
L500	2462587Q42	IND CHIP 390 NH 10%
L503	2462587L50	FERRITE INDUCTOR 100UH
L511	2462587L50	FERRITE INDUCTOR 100UH
L6	2409154M14	IND CER MLTILYR 12.0NH 1005
L651	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L652	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L7	2409377M08	IND CHIP WW 22 NH 5% 1608
L703	2486085A06	COIL 47UH SMT POWER INDUCTOR
L705	2486085A06	COIL 47UH SMT POWER INDUCTOR
L713	2486085A06	COIL 47UH SMT POWER INDUCTOR
L8	2413926G05	IND 6.8 NH 5%
L9	2413926G05	IND 6.8 NH 5%
M101	3985931D02	CLIP GND
M500	0985888K02	SKT RTC BTTY LEAP
PCB	8485866E01	PCB 700/800 MHZ
Q1	4805585Q19	TRANSISTOR
Q101	5185633C10	MODE 800MHZ RING
Q210	4805218N11	XISTOR SOT RH BST82
Q211	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q212	4805218N11	XISTOR SOT RH BST82
Q213	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q214	4805218N11	XISTOR SOT RH BST82
Q215	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q216	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q217	4805218N11	XISTOR SOT RH BST82
Q218	4805218N11	XISTOR SOT RH BST82
Q401	4805218N63	RF TRANS SOT 323 BFQ67W
Q501	4805921T09	XSTR DUAL ROHM FMG8
Q600	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q601	4809579E35	TSTR FET DUAL N-CHAN FDG3601N
Q603	4813824A10	TSTR NPN 40V .2A GEN PURP
Q604	4813824A10	TSTR NPN 40V .2A GEN PURP
Q605	5185143E74	IC SINGLE FET BUS SWITCH
Q698	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q700	4880048M01	TSTR NPN DIG 47K/47K
Q701	4805921T09	XSTR DUAL ROHM FMG8
Q702	4885844C01	XSTR FET
Q703	4805921T09	XSTR DUAL ROHM FMG8
Q704	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q706	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q707	4880048M01	TSTR NPN DIG 47K/47K
Q708	4805218N11	XISTOR SOT RH BST82
Q709	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q801	4880048M01	TSTR NPN DIG 47K/47K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
Q804	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
R1	0662057M67	RES. CHIP 510 5% 20X40
R10	0662057M01	RES. CHIP 0 5% 20X40
R100	0662057A29	CHIP RES 150 OHMS 5%
R101	0662057A18	CHIP RES 51 OHMS 5%
R103	0662057A29	CHIP RES 150 OHMS 5%
R104	0662057M50	RES. CHIP 100 5% 20X40
R105	0662057A18	CHIP RES 51 OHMS 5%
R106	0662057A29	CHIP RES 150 OHMS 5%
R107	0662057A39	CHIP RES 390 OHMS 5%
R108	0662057M95	RES. CHIP 7500 5% 20X40
R109	0662057M81	RES. CHIP 2000 5% 20X40
R11	0662057M54	RES. CHIP 150 5% 20X40
R110	0662057M98	RES. CHIP 10K 5% 20X40
R111	NOTPLACED	64AM DUMMY PART NUMBER
R113	NOTPLACED	64AM DUMMY PART NUMBER
R114	0662057M50	RES. CHIP 100 5% 20X40
R115	0662057M94	RES. CHIP 6800 5% 20X40
R117	0662057N23	RES. CHIP 100K 5% 20X40
R118	0662057N30	RES. CHIP 200K 5% 20X40
R119	0662057M94	RES. CHIP 6800 5% 20X40
R120	0662057M54	RES. CHIP 150 5% 20X40
R2	0662057M94	RES. CHIP 6800 5% 20X40
R20	NOTPLACED	64AM DUMMY PART NUMBER
R200	0662057M50	RES. CHIP 100 5% 20X40
R201	0662057M54	RES. CHIP 150 5% 20X40
R202	0662057M54	RES. CHIP 150 5% 20X40
R204	0662057M01	RES. CHIP 0 5% 20X40
R205	0662057M88	RES. CHIP 3900 5% 20X40
R206	0662057M49	RES CHIP 91 5% 20X40
R207	0662057M52	RES. CHIP 120 5% 20X40
R208	0662057M74	RES. CHIP 1000 5% 20X40
R210	0662057M81	RES. CHIP 2000 5% 20X40
R211	0662057M01	RES. CHIP 0 5% 20X40
R212	0662057M62	RES. CHIP 330 5% 20X40
R213	0662057M01	RES. CHIP 0 5% 20X40
R214	0662057N10	RES. CHIP 30K 5% 20X40
R215	0662057N17	RES. CHIP 56K 5% 20X40
R216	0662057N15	RES. CHIP 47K 5% 20X40
R217	0662057M50	RES. CHIP 100 5% 20X40
R220	0662057M62	RES. CHIP 330 5% 20X40
R221	0662057N16	RES. CHIP 51K 5% 20X40
R222	0662057M26	RES. CHIP 10 5% 20X40
R223	0662057N06	RES. CHIP 20K 5% 20X40
R224	0662057N06	RES. CHIP 20K 5% 20X40
R225	0662057M38	RES. CHIP 33 5% 20X40
R226	0662057M18	RES. CHIP 4.7 5% 20X40
R227	0662057N16	RES. CHIP 51K 5% 20X40
R228	0662057M56	RES. CHIP 180 5% 20X40
R229	0662057N06	RES. CHIP 20K 5% 20X40
R230	0662057N06	RES. CHIP 20K 5% 20X40
R231	0662057M32	RES. CHIP 18 5% 20X40
R232	0662057N16	RES. CHIP 51K 5% 20X40
R233	0662057M58	RES. CHIP 220 5% 20X40
R234	0662057N06	RES. CHIP 20K 5% 20X40
R235	0662057N06	RES. CHIP 20K 5% 20X40
R236	0662057M32	RES. CHIP 18 5% 20X40
R237	0662057M58	RES. CHIP 220 5% 20X40
R238	0662057M50	RES. CHIP 100 5% 20X40
R239	0662057N08	RES CHIP 24K 5% 20X40
R241	0662057M01	RES. CHIP 0 5% 20X40
R243	0662057N10	RES. CHIP 30K 5% 20X40
R244	0662057N16	RES. CHIP 51K 5% 20X40
R250	0662057M01	RES. CHIP 0 5% 20X40
R251	0662057M01	RES. CHIP 0 5% 20X40
R252	0662057M01	RES. CHIP 0 5% 20X40
R261	0662057N16	RES. CHIP 51K 5% 20X40
R262	0662057M92	RES. CHIP 5600 5% 20X40
R285	0662057M81	RES. CHIP 2000 5% 20X40
R286	0662057M40	RES. CHIP 39 5% 20X40
R289	0662057M38	RES. CHIP 33 5% 20X40
R290	0662057N11	RES. CHIP 33K 5% 20X40
R291	0662057N11	RES. CHIP 33K 5% 20X40
R292	0662057M38	RES. CHIP 33 5% 20X40
R293	0662057M96	RES. CHIP 8200 5% 20X40
R294	0662057M01	RES. CHIP 0 5% 20X40
R295	0662057N15	RES. CHIP 47K 5% 20X40
R297	0662057M01	RES. CHIP 0 5% 20X40
R298	NOTPLACED	64AM DUMMY PART NUMBER
R3	0662057M90	RES. CHIP 4700 5% 20X40
R4	0662057M84	RES. CHIP 2700 5% 20X40
R401	0662057M50	RES. CHIP 100 5% 20X40
R402	0662057N08	RES CHIP 24K 5% 20X40
R403	0662057M95	RES. CHIP 7500 5% 20X40
R404	0662057T55	CHIP RES 681 OHMS 1 %
R405	0662057M81	RES. CHIP 2000 5% 20X40
R406	0662057M62	RES. CHIP 330 5% 20X40
R407	0662057N08	RES CHIP 24K 5% 20X40
R408	0662057M42	RES. CHIP 47 5% 20X40
R409	0662057N23	RES. CHIP 100K 5% 20X40
R410	0662057M98	RES. CHIP 10K 5% 20X40
R411	0662057M64	RES. CHIP 390 5% 20X40
R412	0662057M98	RES. CHIP 10K 5% 20X40
R413	0662057M01	RES. CHIP 0 5% 20X40
R414	0662057N23	RES. CHIP 100K 5% 20X40
R415	0662057M01	RES. CHIP 0 5% 20X40
R416	NOTPLACED	64AM DUMMY PART NUMBER
R5	0662057M59	RES CHIP 240 5% 20X40
R503	0662057M64	RES. CHIP 390 5% 20X40
R504	0662057M67	RES. CHIP 510 5% 20X40
R505	0662057M01	RES. CHIP 0 5% 20X40
R507	0662057M50	RES. CHIP 100 5% 20X40
R508	0662057M50	RES. CHIP 100 5% 20X40
R509	0662057M50	RES. CHIP 100 5% 20X40
R510	0662057M50	RES. CHIP 100 5% 20X40
R511	0662057M98	RES. CHIP 10K 5% 20X40
R512	0662057N15	RES. CHIP 47K 5% 20X40
R520	0662057N35	RES. CHIP 330K 5% 20X40
R530	0662057M98	RES. CHIP 10K 5% 20X40
R531	0662057M98	RES. CHIP 10K 5% 20X40
R532	0662057M98	RES. CHIP 10K 5% 20X40
R533	0662057M98	RES. CHIP 10K 5% 20X40
R534	0662057M98	RES. CHIP 10K 5% 20X40
R535	0662057M98	RES. CHIP 10K 5% 20X40
R536	0662057M98	RES. CHIP 10K 5% 20X40
R537	0662057M98	RES. CHIP 10K 5% 20X40
R540	NOTPLACED	64AM DUMMY PART NUMBER
R541	0662057M67	RES. CHIP 510 5% 20X40
R545	0662057N15	RES. CHIP 47K 5% 20X40
R546	0662057N15	RES. CHIP 47K 5% 20X40
R547	0662057N15	RES. CHIP 47K 5% 20X40
R594	NOTPLACED	64AM DUMMY PART NUMBER
R595	0662057M01	RES. CHIP 0 5% 20X40
R6	0662057M50	RES. CHIP 100 5% 20X40

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R600	0662057M64	RES. CHIP 390 5% 20X40
R601	0662057M67	RES. CHIP 510 5% 20X40
R603	0662057N39	RES. CHIP 470K 5% 20X40
R604	0662057N39	RES. CHIP 470K 5% 20X40
R605	0662057N23	RES. CHIP 100K 5% 20X40
R607	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R608	0662057M50	RES. CHIP 100 5% 20X40
R609	NOTPLACED	64AM DUMMY PART NUMBER
R610	NOTPLACED	64AM DUMMY PART NUMBER
R611	0662057M50	RES. CHIP 100 5% 20X40
R612	0662057N23	RES. CHIP 100K 5% 20X40
R613	0662057N06	RES. CHIP 20K 5% 20X40
R614	0662057N06	RES. CHIP 20K 5% 20X40
R615	0662057N23	RES. CHIP 100K 5% 20X40
R616	0662057M50	RES. CHIP 100 5% 20X40
R617	NOTPLACED	64AM DUMMY PART NUMBER
R618	0662057M98	RES. CHIP 10K 5% 20X40
R619	0662057M98	RES. CHIP 10K 5% 20X40
R620	0662057M50	RES. CHIP 100 5% 20X40
R621	0662057M50	RES. CHIP 100 5% 20X40
R622	0662057M50	RES. CHIP 100 5% 20X40
R625	0662057M50	RES. CHIP 100 5% 20X40
R626	0662057M50	RES. CHIP 100 5% 20X40
R629	NOTPLACED	64AM DUMMY PART NUMBER
R631	0662057N39	RES. CHIP 470K 5% 20X40
R632	0662057M50	RES. CHIP 100 5% 20X40
R633	NOTPLACED	64AM DUMMY PART NUMBER
R634	0662057M01	RES. CHIP 0 5% 20X40
R635	NOTPLACED	64AM DUMMY PART NUMBER
R636	NOTPLACED	64AM DUMMY PART NUMBER
R637	0662057M74	RES. CHIP 1000 5% 20X40
R638	0662057M74	RES. CHIP 1000 5% 20X40
R639	0662057M74	RES. CHIP 1000 5% 20X40
R640	0662057M74	RES. CHIP 1000 5% 20X40
R641	0662057M74	RES. CHIP 1000 5% 20X40
R642	0662057M74	RES. CHIP 1000 5% 20X40
R643	0662057M74	RES. CHIP 1000 5% 20X40
R644	0662057M74	RES. CHIP 1000 5% 20X40
R647	0662057M98	RES. CHIP 10K 5% 20X40
R649	0662057N15	RES. CHIP 47K 5% 20X40
R650	0662057B46	CHIP RES 10.0 MEG OHMS 5%
R651	0662057M78	RES. CHIP 1500 5% 20X40
R652	0662057M98	RES. CHIP 10K 5% 20X40
R654	0662057M98	RES. CHIP 10K 5% 20X40
R655	0662057N23	RES. CHIP 100K 5% 20X40
R656	0662057M98	RES. CHIP 10K 5% 20X40
R658	0662057V32	RESISTOR, 150 KOHM, 20X40, 1%
R666	0662057M67	RES. CHIP 510 5% 20X40
R667	0662057M64	RES. CHIP 390 5% 20X40
R668	0662057M46	RES. CHIP 68 5% 20X40
R669	0662057M50	RES. CHIP 100 5% 20X40
R670	0662057M50	RES. CHIP 100 5% 20X40
R671	0662057M64	RES. CHIP 390 5% 20X40
R672	0662057M98	RES. CHIP 10K 5% 20X40
R673	0662057M98	RES. CHIP 10K 5% 20X40
R674	0662057M50	RES. CHIP 100 5% 20X40
R675	0662057M68	RES CHIP 560 5% 20X40
R677	0662057M98	RES. CHIP 10K 5% 20X40
R678	0662057M50	RES. CHIP 100 5% 20X40
R684	0662057M98	RES. CHIP 10K 5% 20X40
R685	0662057M98	RES. CHIP 10K 5% 20X40
R686	0662057M01	RES. CHIP 0 5% 20X40
R687	0662057N23	RES. CHIP 100K 5% 20X40
R695	0662057N23	RES. CHIP 100K 5% 20X40
R697	0662057M50	RES. CHIP 100 5% 20X40
R7	0662057M01	RES. CHIP 0 5% 20X40
R700	0662057N21	RES. CHIP 82K 5% 20X40
R702	0662057N10	RES. CHIP 30K 5% 20X40
R703	0662057M96	RES. CHIP 8200 5% 20X40
R704	0662057N06	RES. CHIP 20K 5% 20X40
R705	0662057N06	RES. CHIP 20K 5% 20X40
R706	0662057N21	RES. CHIP 82K 5% 20X40
R708	0662057M96	RES. CHIP 8200 5% 20X40
R709	0662057N06	RES. CHIP 20K 5% 20X40
R710	0662057M94	RES. CHIP 6800 5% 20X40
R711	0662057M98	RES. CHIP 10K 5% 20X40
R712	0662057V28	RES CHIP 110K 1% 1/16W
R713	0662057N06	RES. CHIP 20K 5% 20X40
R714	0662057M98	RES. CHIP 10K 5% 20X40
R715	0662057N30	RES. CHIP 200K 5% 20X40
R716	0662057M98	RES. CHIP 10K 5% 20X40
R717	0662057M64	RES. CHIP 390 5% 20X40
R718	0662057M82	RES. CHIP 2200 5% 20X40
R719	0662057M74	RES. CHIP 1000 5% 20X40
R720	0662057M95	RES. CHIP 7500 5% 20X40
R721	0662057M82	RES. CHIP 2200 5% 20X40
R722	0662057M96	RES. CHIP 8200 5% 20X40
R723	0662057N23	RES. CHIP 100K 5% 20X40
R724	0662057M82	RES. CHIP 2200 5% 20X40
R725	0662057N35	RES. CHIP 330K 5% 20X40
R726	0662057M95	RES. CHIP 7500 5% 20X40
R727	0662057M64	RES. CHIP 390 5% 20X40
R729	0662057N11	RES. CHIP 33K 5% 20X40
R730	0662057M74	RES. CHIP 1000 5% 20X40
R731	0662057M98	RES. CHIP 10K 5% 20X40
R732	0662057M98	RES. CHIP 10K 5% 20X40
R733	0662057M90	RES. CHIP 4700 5% 20X40
R734	0662057M98	RES. CHIP 10K 5% 20X40
R735	0662057N39	RES. CHIP 470K 5% 20X40
R736	0662057M98	RES. CHIP 10K 5% 20X40
R737	0662057M01	RES. CHIP 0 5% 20X40
R738	0662057M90	RES. CHIP 4700 5% 20X40
R739	0662057M98	RES. CHIP 10K 5% 20X40
R740	0662057M64	RES. CHIP 390 5% 20X40
R741	0662057M34	RES. CHIP 22 5% 20X40
R742	0662057M50	RES. CHIP 100 5% 20X40
R743	NOTPLACED	64AM DUMMY PART NUMBER
R754	0662057V02	RES CHIP 10K 1% 1/16W
R755	0662057U84	RES CHIP 2K 1% 1/16W
R756	0662057M98	RES. CHIP 10K 5% 20X40
R757	0662057M74	RES. CHIP 1000 5% 20X40
R761	0662057N23	RES. CHIP 100K 5% 20X40
R762	0662057M01	RES. CHIP 0 5% 20X40
R763	0662057M01	RES. CHIP 0 5% 20X40
R766	0662057M94	RES. CHIP 6800 5% 20X40
R768	0662057M01	RES. CHIP 0 5% 20X40
R770	0662057M01	RES. CHIP 0 5% 20X40
R771	0662057N15	RES. CHIP 47K 5% 20X40
R772	0662057M90	RES. CHIP 4700 5% 20X40
R774	0662057M98	RES. CHIP 10K 5% 20X40
R775	0662057M34	RES. CHIP 22 5% 20X40
R779	0662057N23	RES. CHIP 100K 5% 20X40
R788	0662057M10	RES CHIP 2.2 5% 20X40

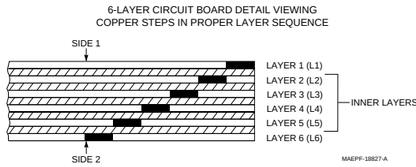
ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R797	0662057M42	RES. CHIP 47 5% 20X40
R799	0662057N15	RES. CHIP 47K 5% 20X40
R8	NOTPLACED	64AM DUMMY PART NUMBER
R801	0662057M94	RES. CHIP 6800 5% 20X40
R802	0662057M50	RES. CHIP 100 5% 20X40
R803	0662057M50	RES. CHIP 100 5% 20X40
R804	0662057M67	RES. CHIP 510 5% 20X40
R805	0662057M98	RES. CHIP 10K 5% 20X40
R806	0662057M67	RES. CHIP 510 5% 20X40
R807	0662057M98	RES. CHIP 10K 5% 20X40
R808	0662057M01	RES. CHIP 0 5% 20X40
R809	0662057N15	RES. CHIP 47K 5% 20X40
R810	0662057M98	RES. CHIP 10K 5% 20X40
R811	0662057M67	RES. CHIP 510 5% 20X40
R812	0662057N23	RES. CHIP 100K 5% 20X40
R813	NOTPLACED	64AM DUMMY PART NUMBER
R814	NOTPLACED	64AM DUMMY PART NUMBER
R815	NOTPLACED	64AM DUMMY PART NUMBER
R816	0662057N15	RES. CHIP 47K 5% 20X40
R820	0662057M98	RES. CHIP 10K 5% 20X40
R829	NOTPLACED	64AM DUMMY PART NUMBER
R830	0662057N06	RES. CHIP 20K 5% 20X40
R831	0662057N06	RES. CHIP 20K 5% 20X40
R837	0662057M38	RES. CHIP 33 5% 20X40
R838	0662057M38	RES. CHIP 33 5% 20X40
R839	0662057M98	RES. CHIP 10K 5% 20X40
R840	0662057M67	RES. CHIP 510 5% 20X40
R841	0662057M98	RES. CHIP 10K 5% 20X40
R842	0662057M98	RES. CHIP 10K 5% 20X40
R843	NOTPLACED	64AM DUMMY PART NUMBER
R844	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R845	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R9	NOTPLACED	64AM DUMMY PART NUMBER
S500	4085131E01	SWITCH FREQ DUAL FUNCTION
S501	1880619Z03	POT VOLUME TAPE & REEL
S502	4085358D02	SWITCH TACTILE
S503	4080523Z01	SWITCH, TACT
S504	4080523Z01	SWITCH, TACT
S505	4080523Z01	SWITCH, TACT
S506	4080523Z01	SWITCH, TACT
SH001	2685090D01	SHLD MIXER
SH002	2685242D01	SHLD FILTER
SH101	2685082D01	SHLD PCIC
SH102	2685084D01	SHLD HARMONIC BOT
SH103	2685083D01	SHLD HARMONIC TOP
SH104	2685085D01	SHLD PA
SH201	2685081D01	SHLD SYN
SH202	2685088D01	SHLD FRAC N
SH203	2685087D01	SHLD VCO BOT
SH204	2685241D01	SHLD DAC
SH205	2685086D01	SHLD VCO TOP
SH401	2685089D01	SHLD ABACUS
SH402	2685080D01	SHLD 2ND LO FLTR
T1	2580541Z02	BALUN TRANSFORMER (NEW)
T2	2580541Z02	BALUN TRANSFORMER (NEW)
T3	2585918C01	XFMR SMALL SIGNAL SURFACE MT
U1	5185130C91	IC MIXER RF SOIC 10
U101	5185130C65	IC VHF/UHF/800 MHZ LDMOS DRIVER
U102	5185765B26	IC PWR CTRL IN MOS20
U103	5185963A15	IC TEMPERTURE SENSOR 1M50C
U106	5185368C84	DIRECTIONAL CPLR 7/ 800MHZ
U201	5105835U92	CC LVFRACN
U202	5185368C83	IC 12 BIT DAC
U205	5186358E01	IC ANALOG OP-AMP CLC450
U250	5105750U54	IC PKG DIE VCO BUFFER
U401	5185963A85	IC-ABACUS III-LP
U500	5185353D13	IC MINI SO-8 HI PRECISION REG 5V
U501	5185353D14	IC SOT23-5 HI PRECISION REG 3V
U502	5185353D14	IC SOT23-5 HI PRECISION REG 3V
U503	5185353D56	IC 3.3V LINEAR REGULATOR MC78LC 33N
U600	5185368C66	IC CUSTOM FLIPPER
U601	5109731C15	IC OP AMP SNGL OPA237 SOT23
U602	5109731C15	IC OP AMP SNGL OPA237 SOT23
U605	5105492X92	IC CMOS BILATERAL SWITCH
U607	5187970L15	IC USB TRANS FULL-SPEED
U608	5185368C12	IC 1.8V SN LOGIC GATE
U609	5105492X03	IC SNG HI SPD L-MOS NOT GATE
U610	5109522E53	IC SNGL BUF NC7S125P5X SC70
U611	5109522E53	IC SNGL BUF NC7S125P5X SC70
U612	5109817F62	IC SPDT SWITCH/ MULTIPLEXER
U613	5109817F62	IC SPDT SWITCH/ MULTIPLEXER
U614	5109522E53	IC SNGL BUF NC7S125P5X SC70
U615	5109522E53	IC SNGL BUF NC7S125P5X SC70
U616	5109522E53	IC SNGL BUF NC7S125P5X SC70
U703	5109879E58	IC,COMP,,AUDIO AND POWER MANAGEMENT
U704	5185353D35	IC DUAL EEPOT 256 TAP
U705	5185143E59	IC ADJ SWITCHING VOLT REG
U706	5109731C15	IC OP AMP SNGL OPA237 SOT23
U707	5185353D13	IC MINI SO-8 HI PRECISION REG 5V
U708	5102463J44	AUDIO AMPLIFIER TDA8547TS
U725	5109731C15	IC OP AMP SNGL OPA237 SOT23
U800	5185353D42	IC PATRIOT BRAVO 17X17
U801	5109522E53	IC SNGL BUF NC7S125P5X SC70
U802	510952253	IC SNGL BUF NC7S125P5X SC70
U803	5185956E16	IC FLASH 32MB 1.8V 60NS
U804	5185130C38	IC SRAM 4MG
U807	5185130C83	IC 15DB DIGITAL ATTEUATOR SOT25 PKG
U809	5185143E12	IC INVERTER DUAL SC70
U810	5105492X92	IC CMOS BILATERAL SWITCH
VR500	4802245J51	DIODE_ZEVER_6.8V
VR501	4880140L15	DIODE SOT ZENER 10V TAPE&REEL
VR502	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR503	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR504	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR505	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR506	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR507	4809788E06	DIODE ZENER 6.8V UDZ6.8B

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
VR591	4805656W03	DIODE DUAL 5.6V ZENER
VR592	4805656W03	DIODE DUAL 5.6V ZENER
VR593	4805656W03	DIODE DUAL 5.6V ZENER
VR594	4805656W03	DIODE DUAL 5.6V ZENER
VR595	4805656W03	DIODE DUAL 5.6V ZENER
VR596	4805656W03	DIODE DUAL 5.6V ZENER
VR650	4813832C72	TRANS SUP QUAD 12V
VR651	4805656W03	DIODE DUAL 5.6V ZENER
VR652	4805656W03	DIODE DUAL 5.6V ZENER
VR657	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR658	4813830C26	DIODE 13V 'H3' MMSZ5243BT1
VR659	4805656W08	DIODE ZENER QUAD
VR662	4805656W08	DIODE ZENER QUAD
VR663	4813830A22	DIODE 9.1V 5% 225MW MMBZ5239B_
VR678	4802021P15	ZENER SR05
VR700	4813830A15	DIODE 5.6V 5% 225MW MMBZ5232B_
Y200	4802245J68	OSC, REF 16.8 MHZ 1.5 PPM
Y201	4885426C23	CER RESONATOR 960 MHZ
Y202	4885426C16	CER RESONATOR 1025 MHZ
Y203	4885426C17	CER RESONATOR 1110 MHZ
Y600	4809995L05	XTAL QUARTZ 32.768KHZ CC4V-T1
	1205059A92	SPEC FOR XTS5000 SERIES PORT RADIO
-	1105033S13	RIBBON LBL
-	1010041C22	SOLDER PASTE
-	1105033S02	RIBBON LABEL LT. PACK LABEL
-	5405569Y02	LBL BARCODE APC
-	6003710K08	BAT,LI,3.3V,3MAH,,COINCELL, RECHARGA

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
-	5685647D01	UNI-BOARD CLAMSHELL
-	5405569Y03	LABEL BARCODE
-	4285633D01	RETAINING CLIP

Notes:

1. For optimum performance, order replacement diodes, transistors, and circuit modules by Motorola part number only.
2. When ordering crystals, specify carrier frequency, crystal frequency, crystal type number, and Motorola part number.
3. Part value notations:
   $p=10^{-12}$
   $n=10^{-9}$
   $\mu=10^{-6}$
   $m=10^{-3}$
   $k=10^{3}$
   $M=10^{6}$
4. ITEM refers to the component reference designator. SIDE refers to the location of the component on the board; S1=Side 1, S2=Side 2.
5. The PMUF6541G RF Board uses a 6-layer printed circuit board.



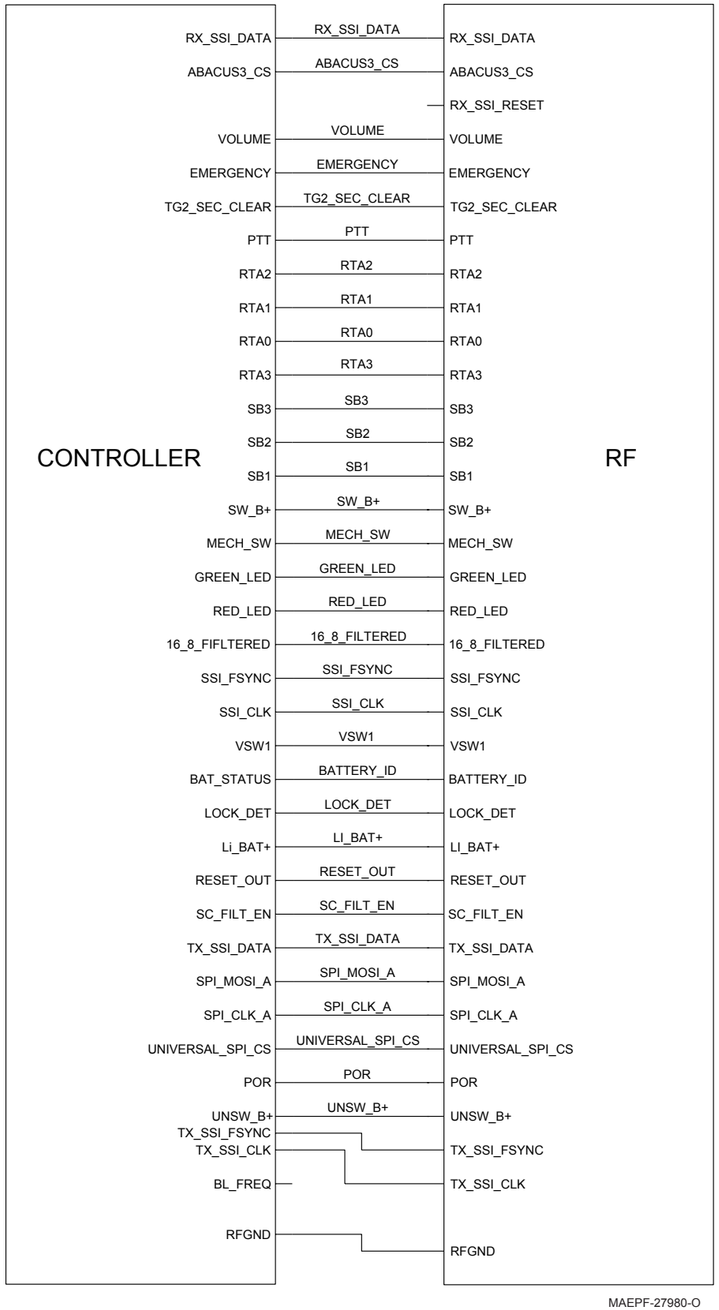


Figure 9-60. PMLD8908A Top-Level Schematic

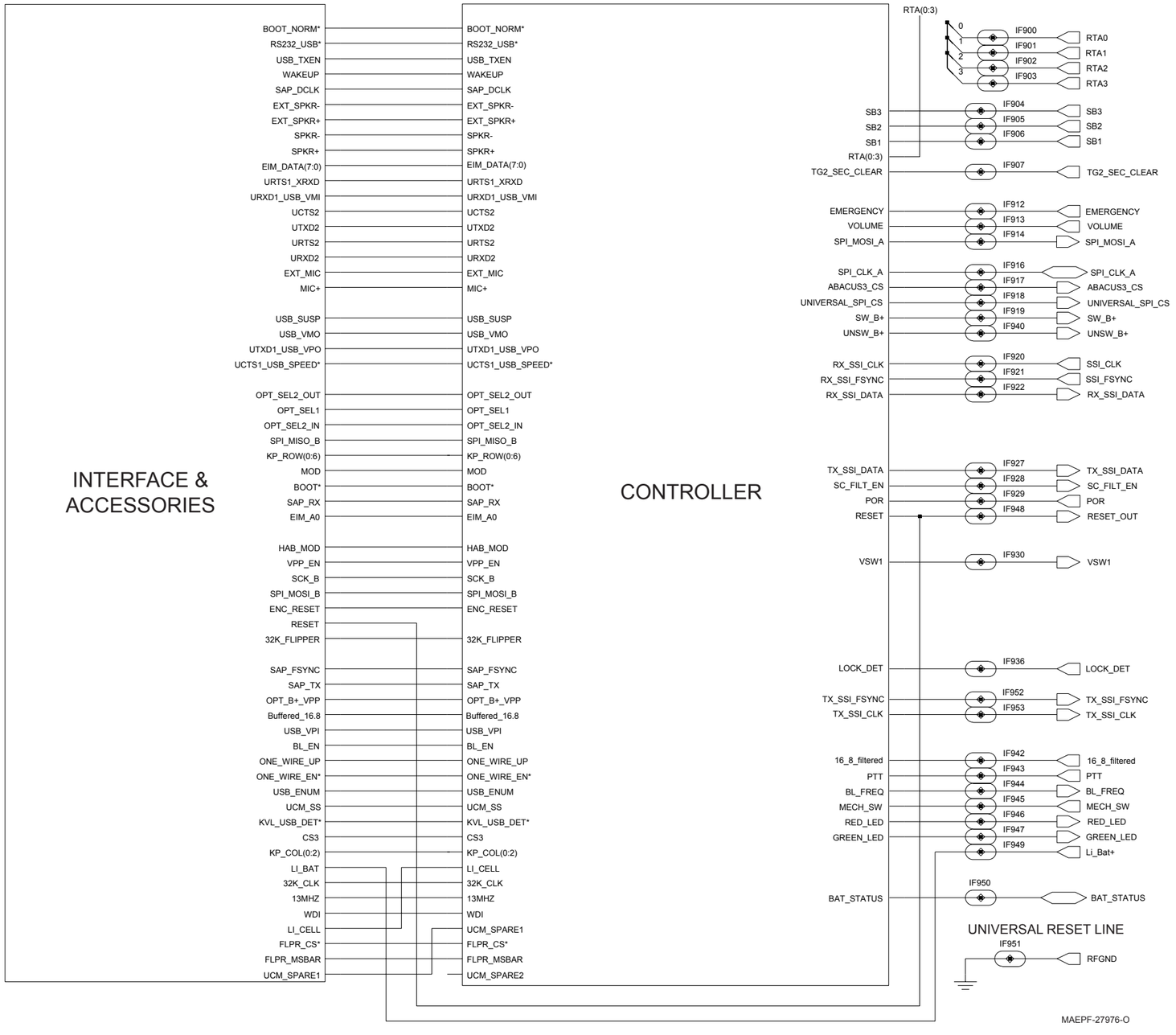


Figure 9-61. PMLD8908A Controller Interface Schematic

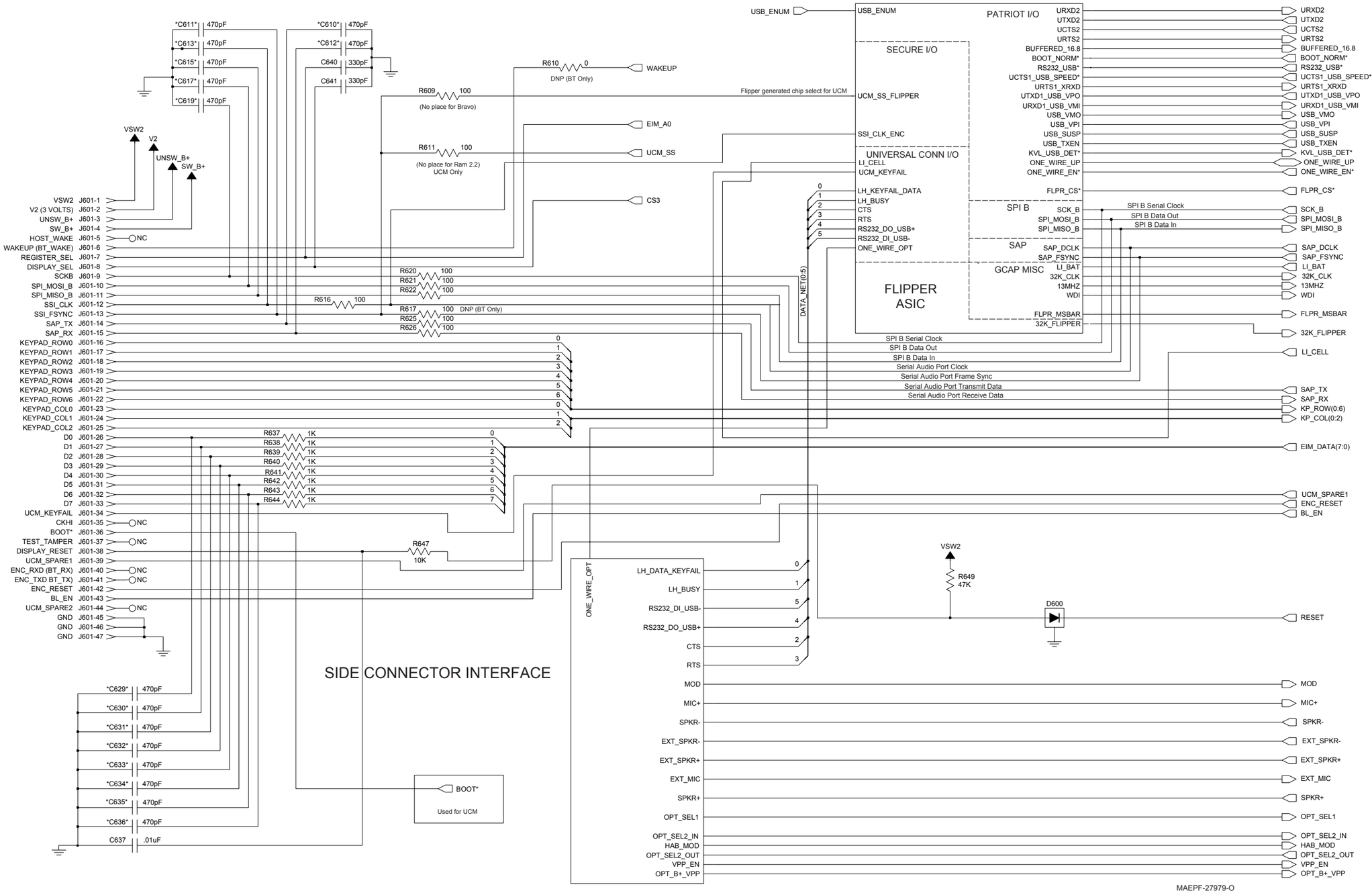


Figure 9-62. PMLD8908A Interface and Accessories Schematic

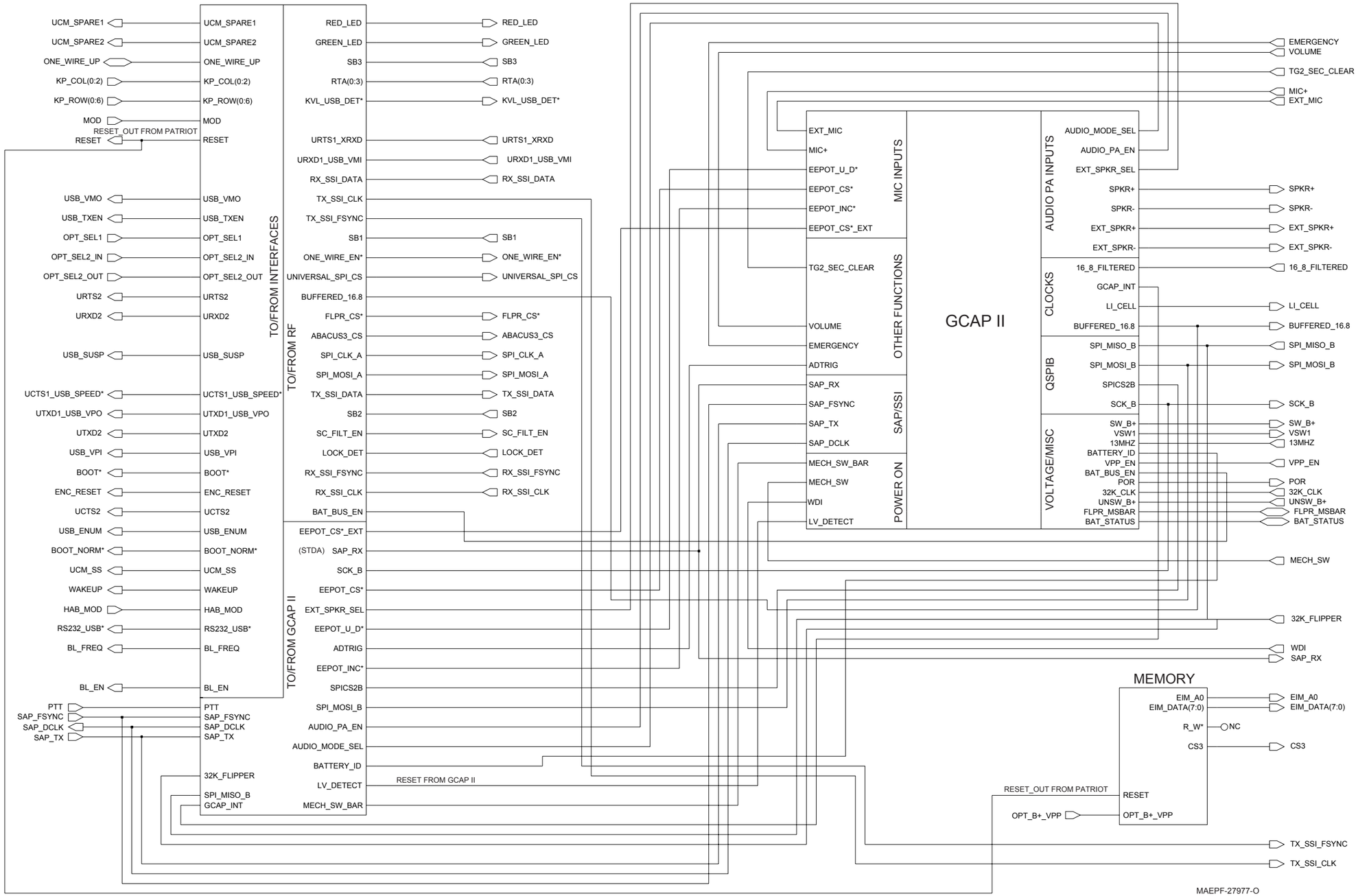


Figure 9-63. PMLD8908A Controller Schematic

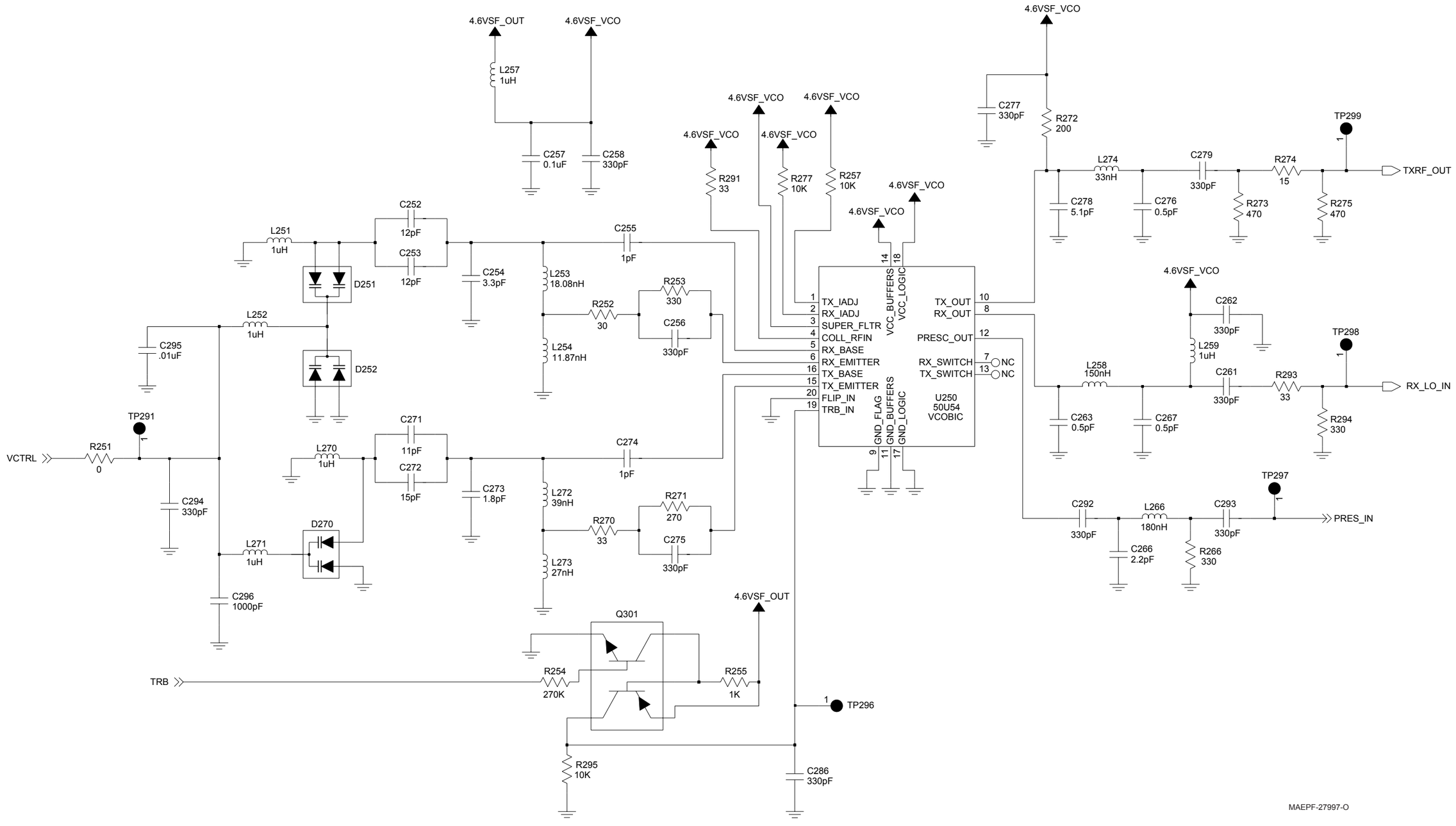


Figure 9-64. PMLD8908A Frequency Generation Unit (FGU) Schematic, Sheet 1 of 3

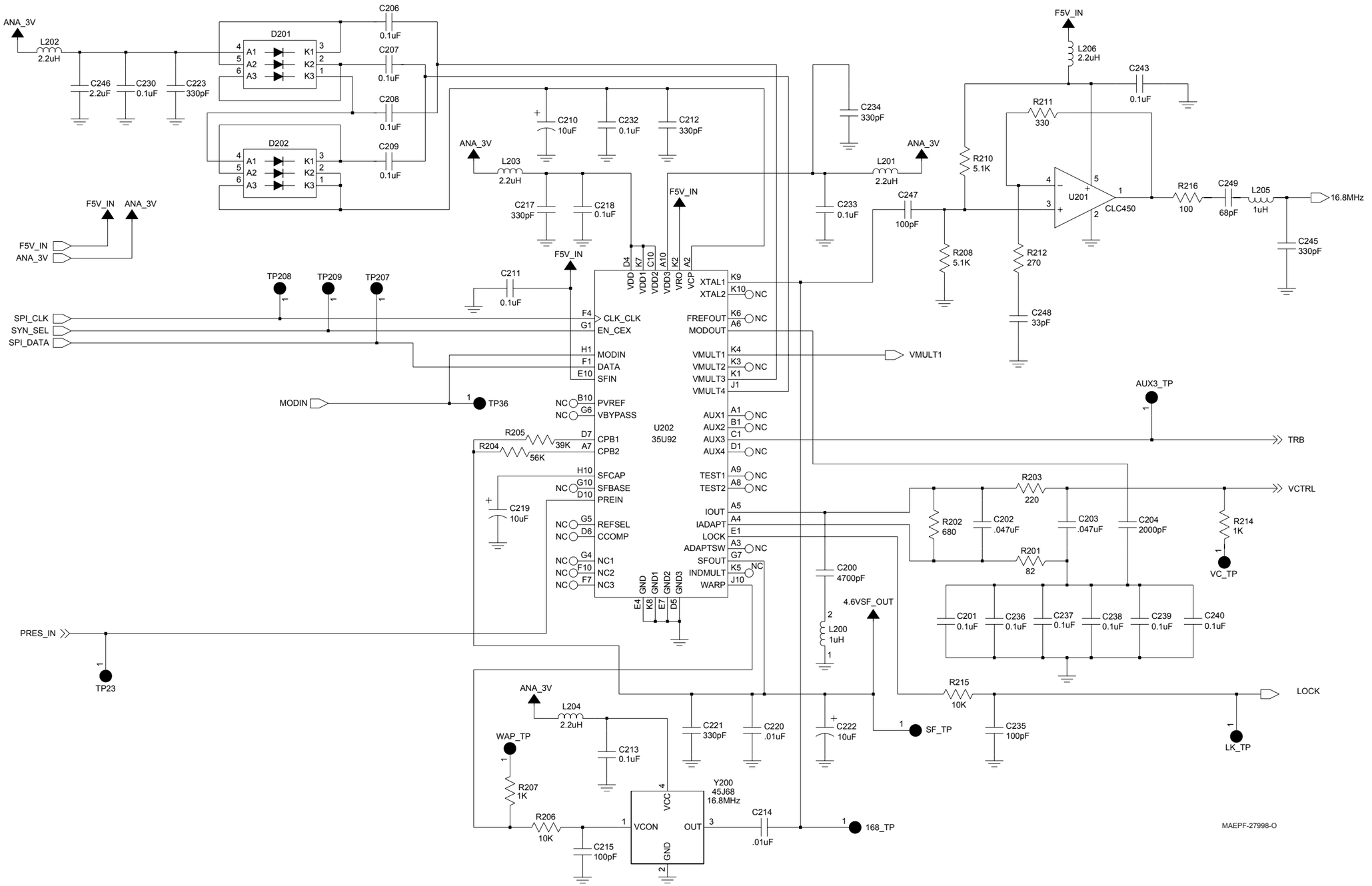


Figure 9-65. PMLD8908A Frequency Generation Unit (FGU) Schematic, Sheet 2 of 3

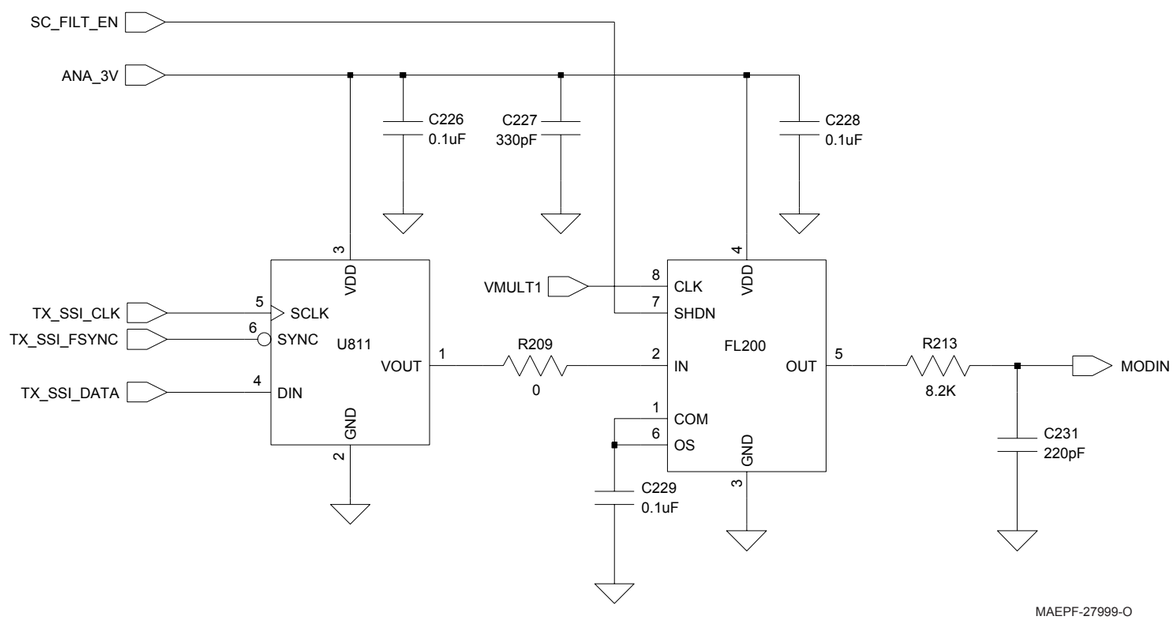


Figure 9-66. PMLD8908A Frequency Generation Unit (FGU) Schematic, Sheet 3 of 3

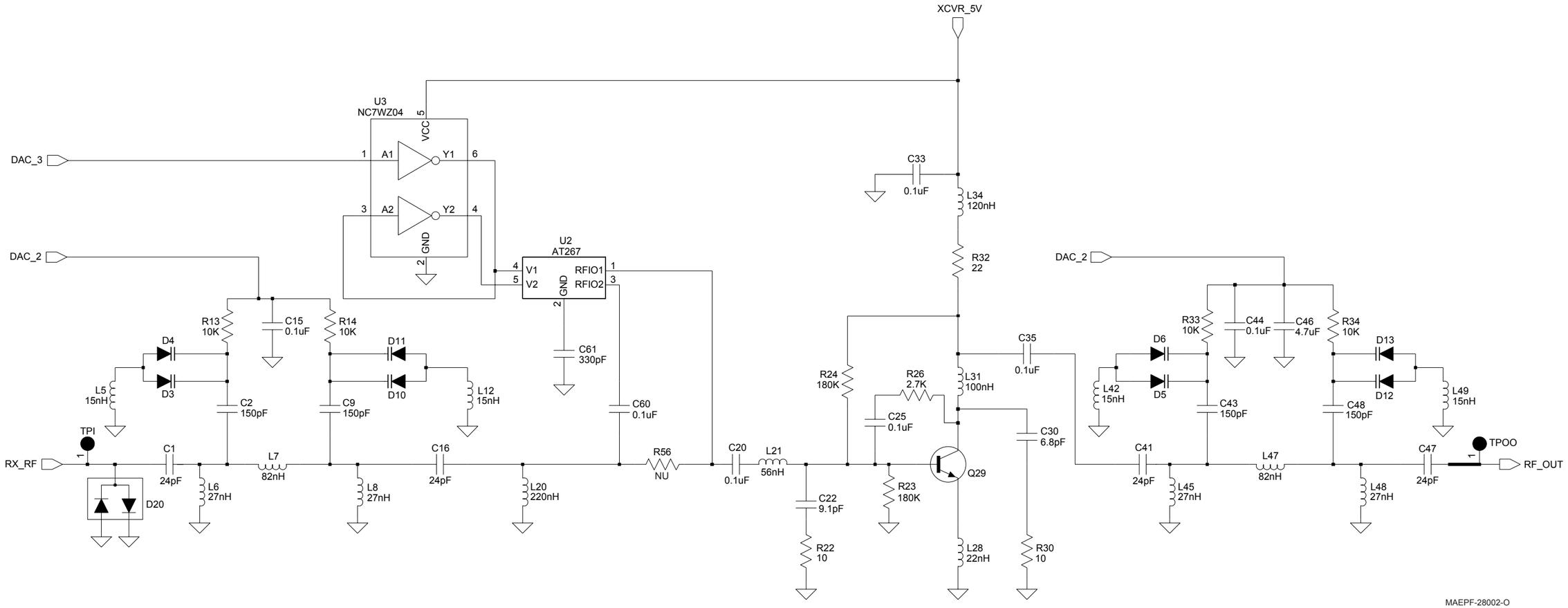


Figure 9-67. PMLD8908A Receiver Schematic, Sheet 1 of 4

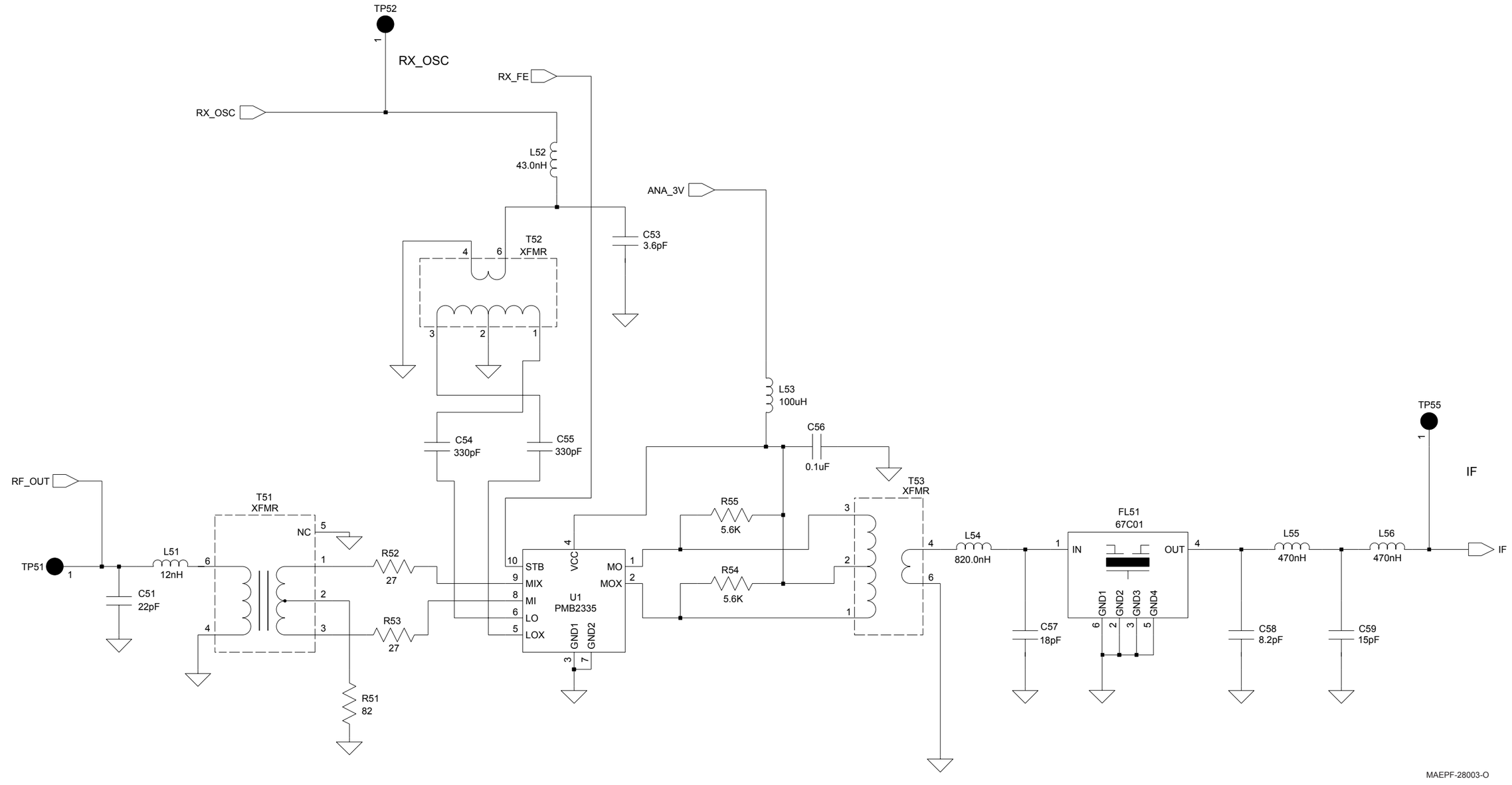


Figure 9-68. PMLD8908A Receiver Schematic, Sheet 2 of 4

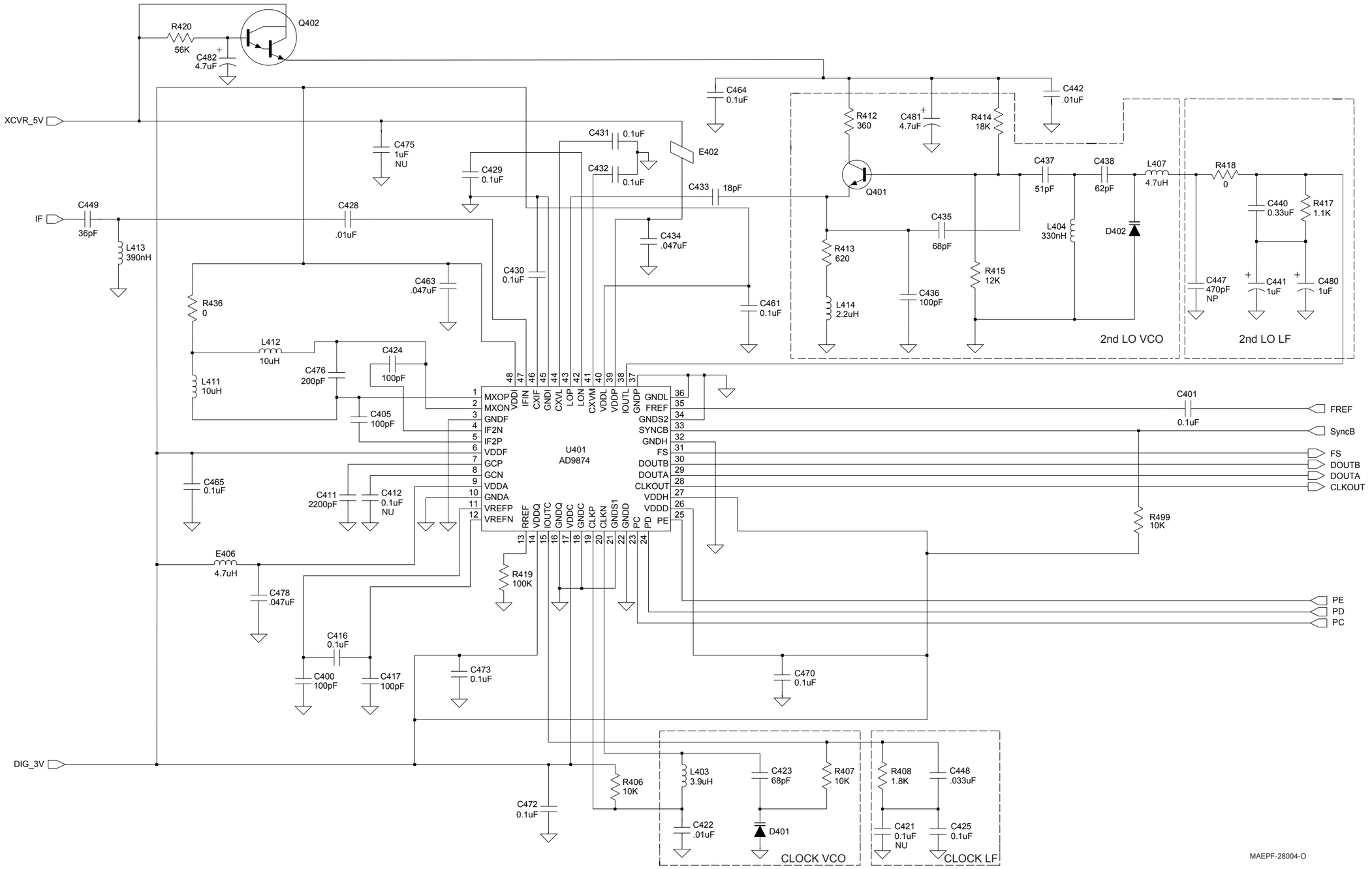


Figure 9-69. PMLD8908A Receiver Schematic, Sheet 3 of 4

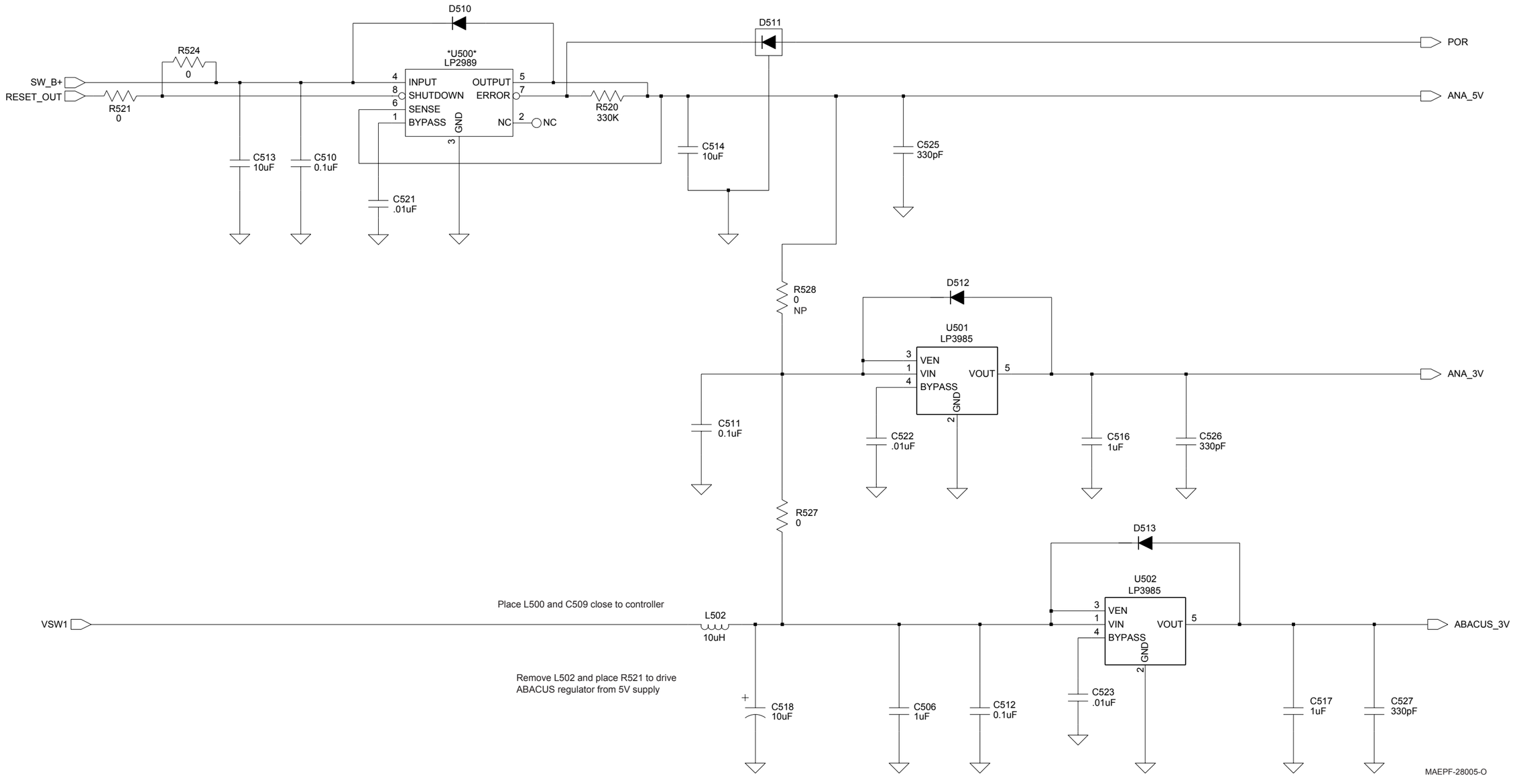


Figure 9-70. PMLD8908A Receiver Schematic, Sheet 4 of 4

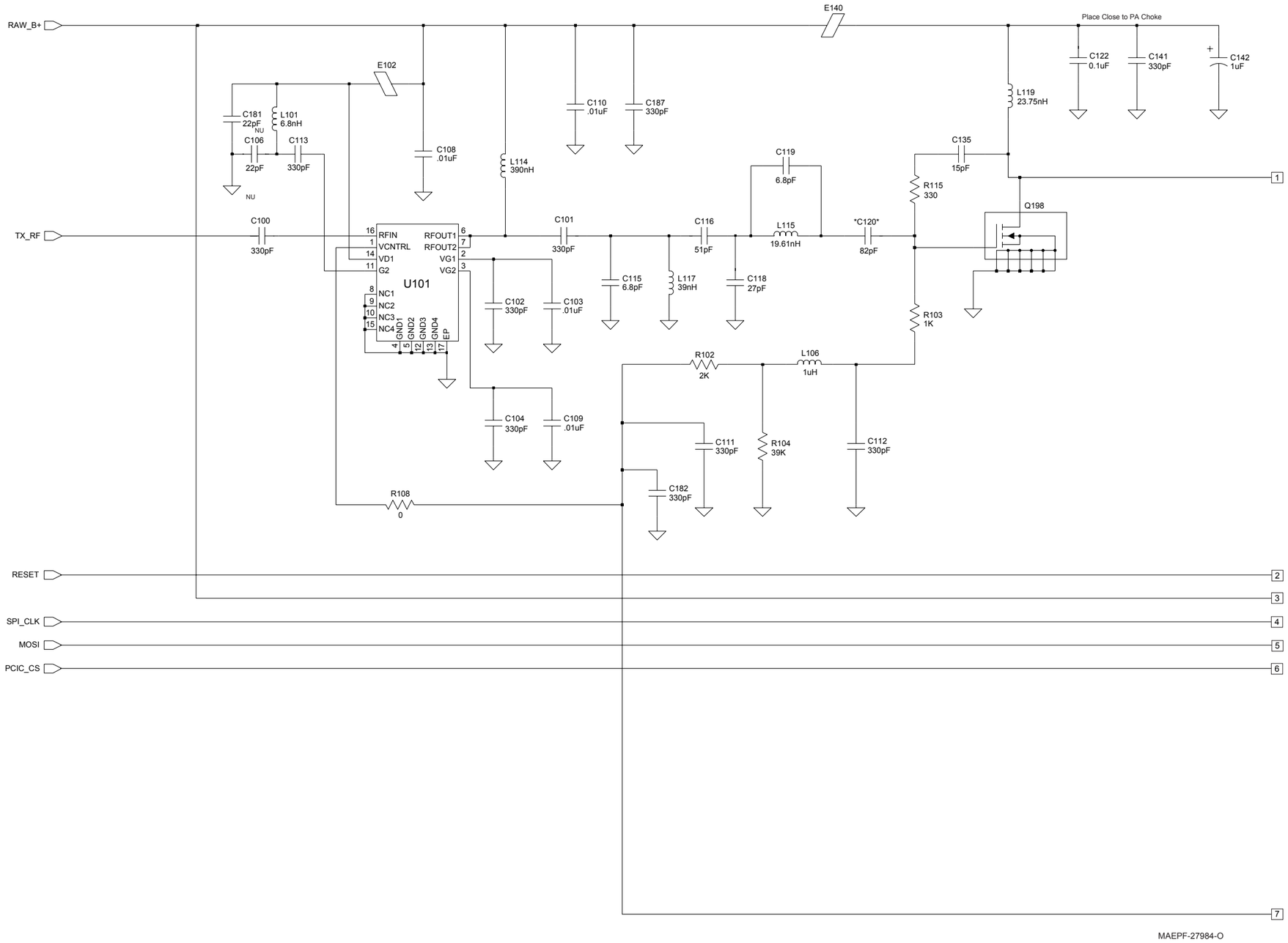


Figure 9-71. PMLD8908A Transmitter Schematic, Sheet 1 of 2

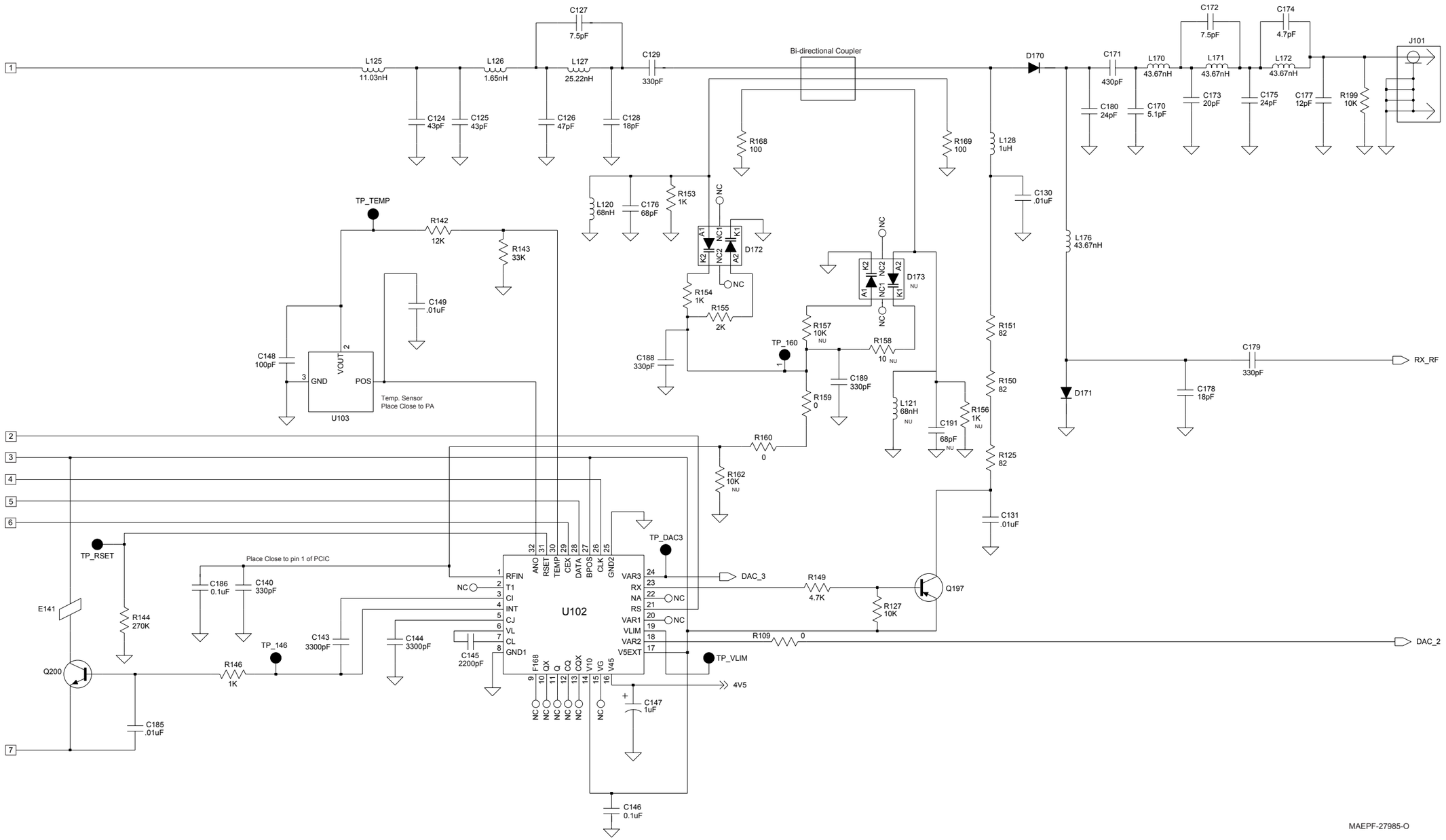


Figure 9-72. PMLD8908A Transmitter Schematic, Sheet 2 of 2

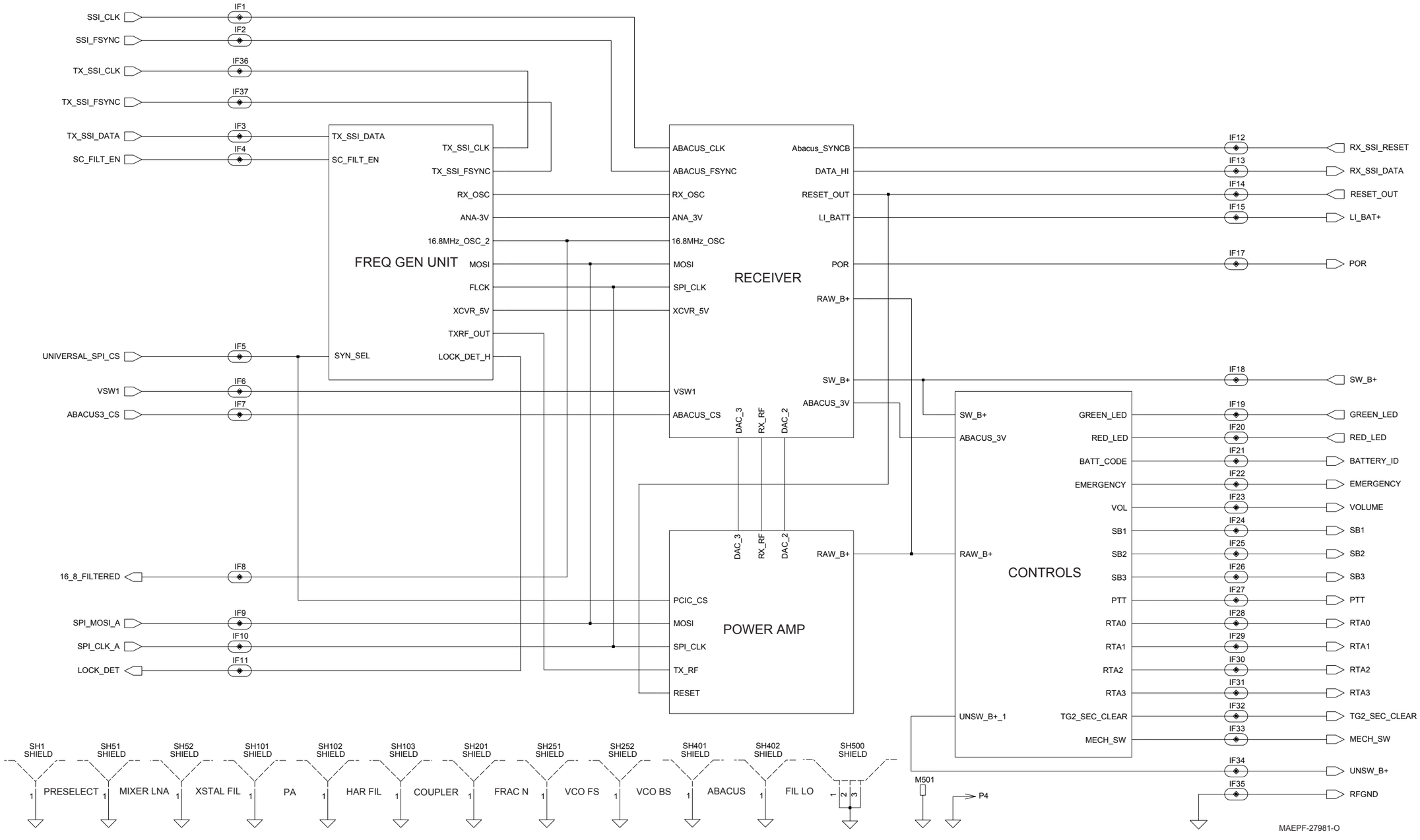


Figure 9-73. PMLD8908A RF Schematic

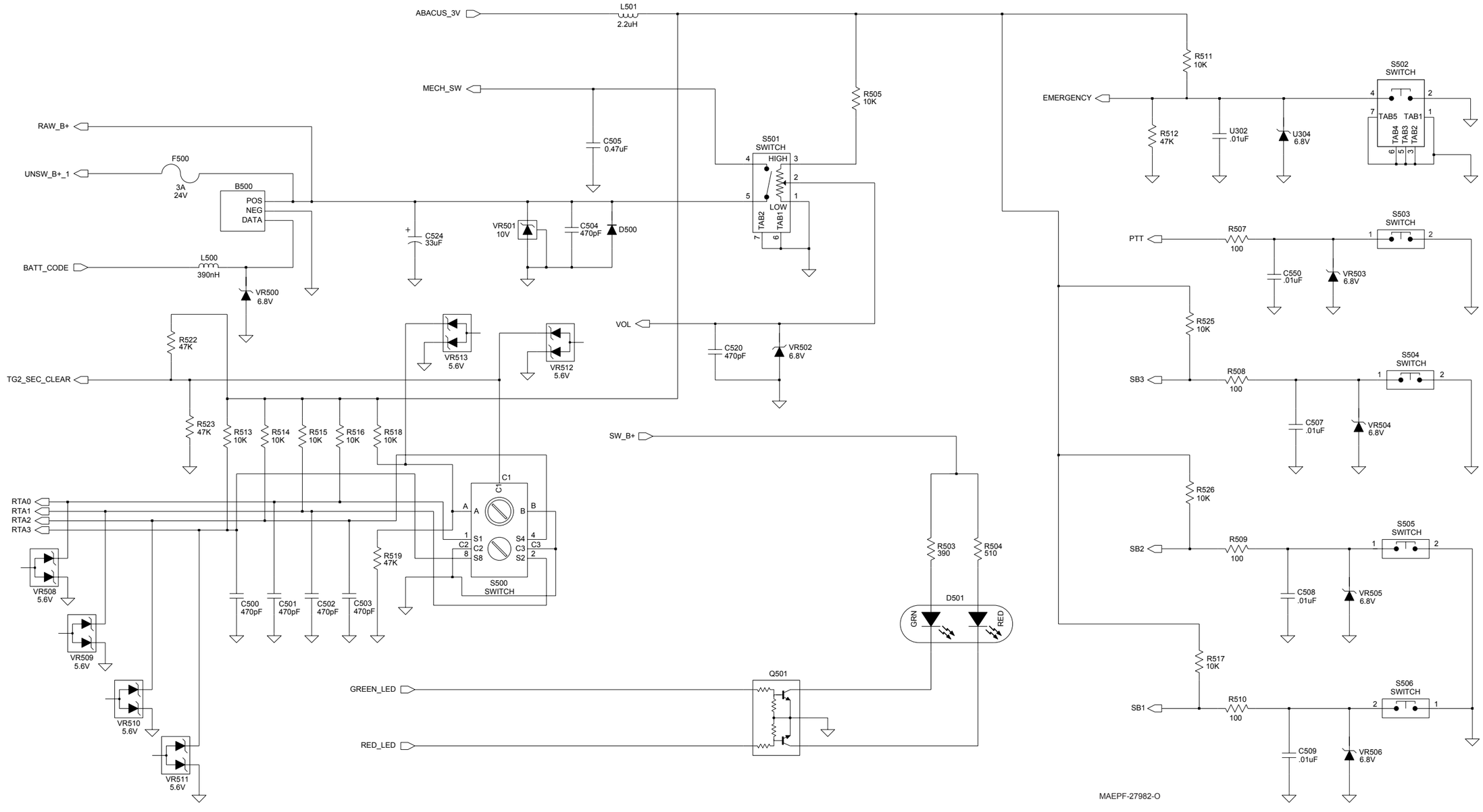


Figure 9-74. PMLD8908A RF Controls Schematic

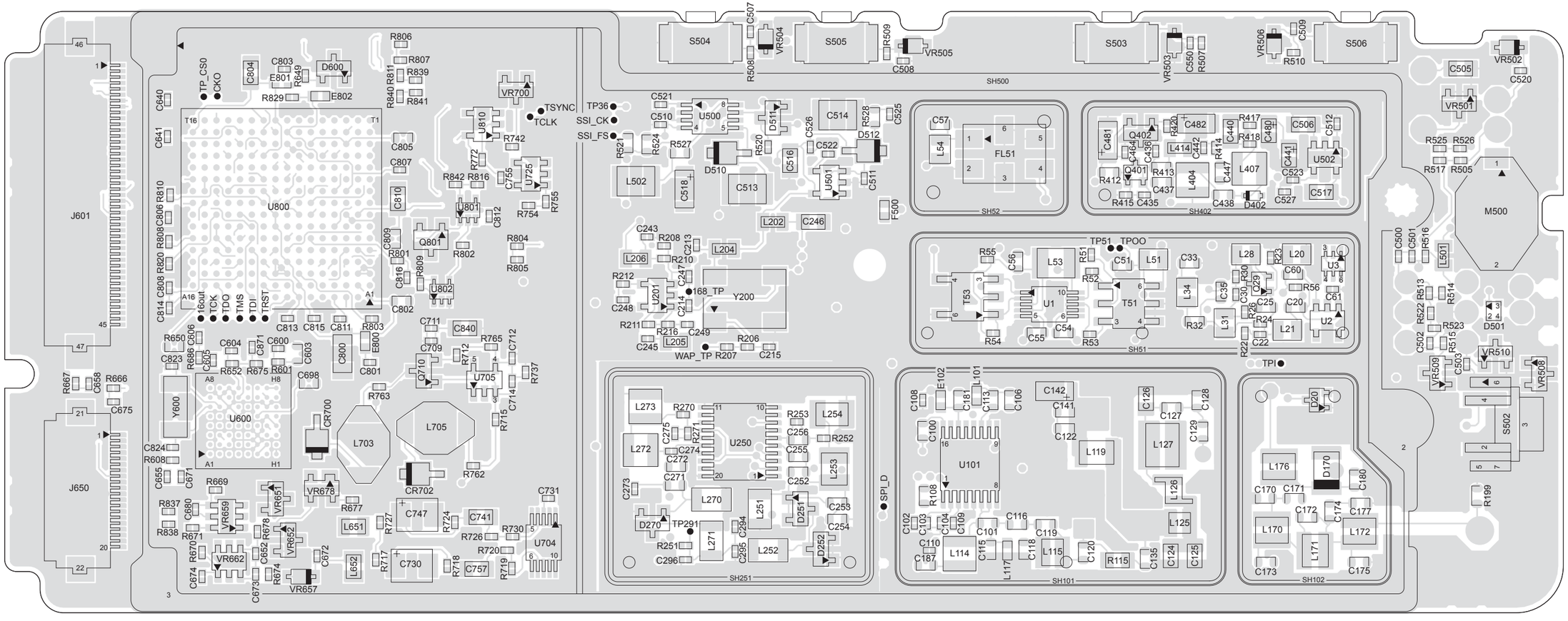


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Figure 9-75. PMLD8908A Main Circuit Board Component Location Diagram – Side 1

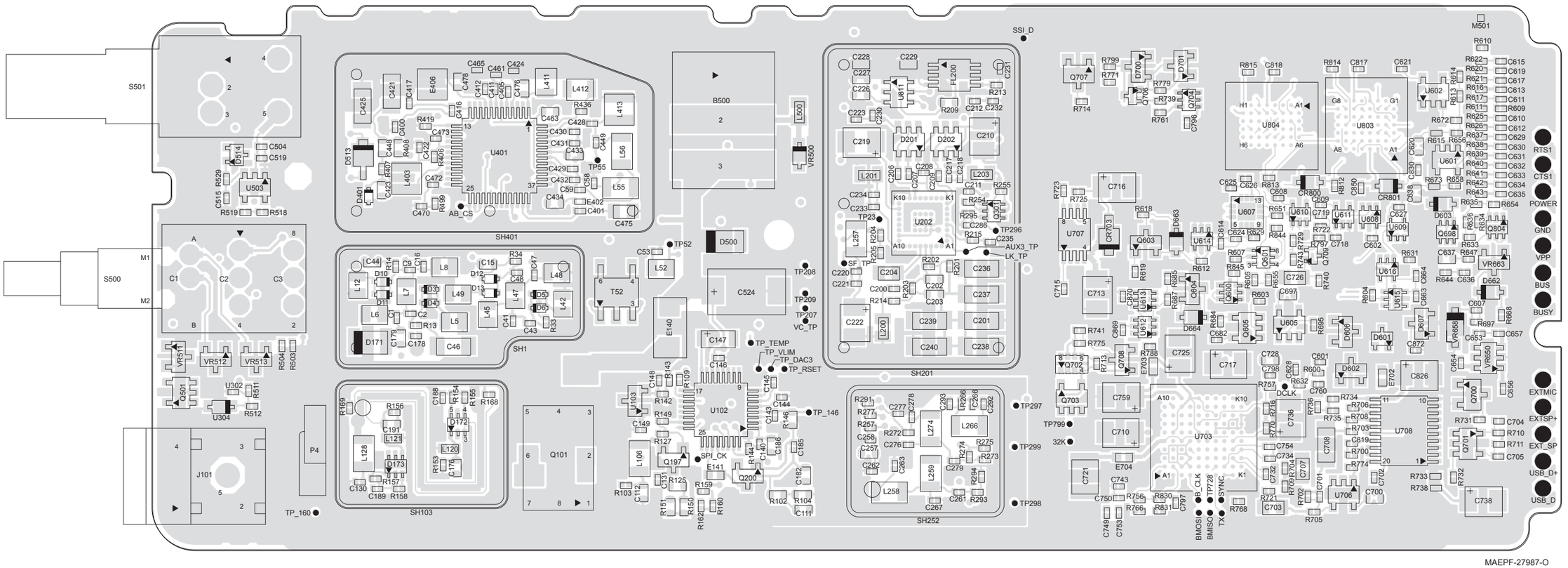


Figure 9-76. PMLD8908A Main Circuit Board Component Location Diagram – Side 2

PMLD8908A Main Circuit Board Electrical Parts List

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C1	2113743N35	CAP, 24pF
C2	2113743N54	CAP, 150pF
C9	2113743N54	CAP, 150pF
C15	2113932E20	CAP, 0.1uF
C16	2113743N35	CAP, 24pF
C20	2113932E20	CAP, 0.1uF
C22	2113743N25	CAP, 9.1pF
C25	2113932E20	CAP, 0.1uF
C30	2113743Q22	CAP, 6.8pF
C33	2113932E20	CAP, 0.1uF
C35	2113932E20	CAP, 0.1uF
C41	2113743N35	CAP, 24pF
C43	2113743N54	CAP, 150pF
C44	2113932E20	CAP, 0.1uF
C46	2113743G26	CAP, 4.7uF
C47	2113743N35	CAP, 24pF
C48	2113743N54	CAP, 150pF
C51	2113930F35	CAP, 22pF
C53	2113743N15	CAP, 3.6pF
C54	2113740F63	CAP, 330pF
C55	2113740F63	CAP, 330pF
C56	2113932E20	CAP, 0.1uF
C57	2113930F33	CAP, 18pF
C58	2113743N24	CAP, 8.2pF
C59	2113743N30	CAP, 15pF
C60	2113932E20	CAP, 0.1uF
C61	2113743L05	CAP, 330pF
C100	2113740F63	CAP, 330pF
C101	2113740F63	CAP, 330pF
C102	2113743L05	CAP, 330pF
C103	2113743L41	CAP, .01uF
C104	2113743L05	CAP, 330pF
C106	2113930F35	CAP, 22pF
C108	2113743L41	CAP, .01uF
C109	2113743L41	CAP, .01uF
C110	2113743L41	CAP, .01uF
C111	2113740F63	CAP, 330pF
C112	2113740F63	CAP, 330pF
C113	2113740F63	CAP, 330pF
C115	2113740L14	CAP, 6.8pF
C116	2113740L35	CAP, 51pF
C118	2113740L28	CAP, 27pF
C119	2113740L14	CAP, 6.8pF
C120	2113740F49	CAP, 82pF
C122	2113932E20	CAP, 0.1uF
C124	2113740A44	CAP, 43pF
C125	2113740A44	CAP, 43pF
C126	2113740A46	CAP, 47pF
C127	2113740L15	CAP, 7.5pF
C128	2113740L24	CAP, 18pF
C129	2113740F63	CAP, 330pF
C130	2113743L41	CAP, .01uF
C131	2113743L41	CAP, .01uF
C135	2113930F31	CAP, 15pF
C140	2113743L05	CAP, 330pF
C141	2113740F63	CAP, 330pF
C142	2311049A37	CAPP, 1uF
C143	2113743L29	CAP, 3300pF
C144	2113743L29	CAP, 3300pF
C145	2113743L25	CAP, 2200pF
C146	2113743M24	CAP, 0.1uF
C147	2311049A37	CAPP, 1uF
C148	2113743N50	CAP, 100pF
C149	2113743L41	CAP, .01uF
C170	2113740L11	CAP, 5.1pF
C171	2113741F16	CAP, 430pF
C172	2113740L15	CAP, 7.5pF
C173	2113740L25	CAP, 20pF
C174	2113740L10	CAP, 4.7pF
C175	2113740L27	CAP, 24pF
C176	2113740F47	CAP, 68pF
C177	2113740L20	CAP, 12pF
C178	2113743N32	CAP, 18pF
C179	2113740F63	CAP, 330pF
C180	2113740L27	CAP, 24pF
C181	2113930F35	CAP, 22pF
C182	2113740F63	CAP, 330pF
C185	2113743L41	CAP, .01uF
C186	2113932E20	CAP, 0.1uF
C187	2113740F63	CAP, 330pF
C188	2113743L05	CAP, 330pF
C189	2113743L05	CAP, 330pF
C191	2113740F47	CAP, 68pF
C200	2113743L33	CAP, 4700pF
C201	2109720D14	CAP, 0.1uF
C202	2113743E12	CAP, .047uF
C203	2113743E12	CAP, .047uF
C204	2109720D20	CAP, 2000pF
C206	2113743M24	CAP, 0.1uF
C207	2113743M24	CAP, 0.1uF
C208	2113743M24	CAP, 0.1uF
C209	2113743M24	CAP, 0.1uF
C210	2311049A57	CAPP, 10uF
C211	2113743M24	CAP, 0.1uF
C212	2113743L05	CAP, 330pF
C213	2113743M24	CAP, 0.1uF
C214	2113743L41	CAP, .01uF
C215	2113743N50	CAP, 100pF
C217	2113743L05	CAP, 330pF
C218	2113743M24	CAP, 0.1uF
C219	2311049A57	CAPP, 10uF
C220	2113743L41	CAP, .01uF
C221	2113743L05	CAP, 330pF
C222	2311049A57	CAPP, 10uF
C223	2113743L05	CAP, 330pF
C226	2113932E20	CAP, 0.1uF
C227	2113931F13	CAP, 330pF
C228	2113932E20	CAP, 0.1uF
C229	2113932E20	CAP, 0.1uF
C230	2113743M24	CAP, 0.1uF
C231	2113743L01	CAP, 220pF
C232	2113743M24	CAP, 0.1uF
C233	2113743M24	CAP, 0.1uF
C234	2113743L05	CAP, 330pF
C235	2113743N50	CAP, 100pF
C236	2109720D14	CAP, 0.1uF
C237	2109720D14	CAP, 0.1uF
C238	2109720D14	CAP, 0.1uF
C239	2109720D14	CAP, 0.1uF
C240	2109720D14	CAP, 0.1uF
C243	2113743M24	CAP, 0.1uF
C245	2113743L05	CAP, 330pF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C246	2113743F18	CAP, 2.2uF
C247	2113743N50	CAP, 100pF
C248	2113743N38	CAP, 33pF
C249	2113743N46	CAP, 68pF
C252	2113740F29	CAP, 12pF
C253	2113740F29	CAP, 12pF
C254	2113740F15	CAP, 3.3pF
C255	2113740F03	CAP, 1pF
C256	2113740F63	CAP, 330pF
C257	2113743E20	CAP, 0.1uF
C258	2113743L05	CAP, 330pF
C261	2113743L05	CAP, 330pF
C262	2113743L05	CAP, 330pF
C263	2113743N01	CAP, 0.5pF
C266	2113743N10	CAP, 2.2pF
C267	2113743N01	CAP, 0.5pF
C271	2113740F28	CAP, 11pF
C272	2113740F31	CAP, 15pF
C273	2104801Z12	CAP, 1.8pF
C274	2113743Q03	CAP, 1pF
C275	2113743L05	CAP, 330pF
C276	2113743N01	CAP, 0.5pF
C277	2113743L05	CAP, 330pF
C278	2113743N19	CAP, 5.1pF
C279	2113743L05	CAP, 330pF
C286	2113743L05	CAP, 330pF
C292	2113743L05	CAP, 330pF
C293	2113743L05	CAP, 330pF
C294	2113743L05	CAP, 330pF
C295	2113743L41	CAP, .01uF
C296	2113743L17	CAP, 1000pF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C400	2113743N50	CAP, 100pF
C401	2113743M24	CAP, 0.1uF
C405	2113743N50	CAP, 100pF
C411	2113743L25	CAP, 2200pF
C412	2113743M24	CAP, 0.1uF
C416	2113743M24	CAP, 0.1uF
C417	2113743N50	CAP, 100pF
C421	2113741B69	CAP, 0.1uF
C422	2113743L41	CAP, .01uF
C423	2113930F47	CAP, 68pF
C424	2113743N50	CAP, 100pF
C425	2113741B69	CAP, 0.1uF
C428	2113743L41	CAP, .01uF
C429	2113743M24	CAP, 0.1uF
C430	2113743M24	CAP, 0.1uF
C431	2113743M24	CAP, 0.1uF
C432	2113743M24	CAP, 0.1uF
C433	2113740F33	CAP, 18pF
C434	2113743E12	CAP, .047uF
C435	2113743N46	CAP, 68pF
C436	2113743N50	CAP, 100pF
C437	2113740F44	CAP, 51pF
C438	2113740F46	CAP, 62pF
C440	2113743A24	CAP, 0.33uF
C441	2311049A86	CAPP, 1uF
C442	2113743L41	CAP, .01uF
C447	2113930F67	CAP, 470pF
C448	2113743E10	CAP, .033uF
C449	2113743N39	CAP, 36pF
C461	2113743M24	CAP, 0.1uF
C463	2113743E12	CAP, .047uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C464	2113743M24	CAP, 0.1uF
C465	2113743M24	CAP, 0.1uF
C470	2113743M24	CAP, 0.1uF
C472	2113743M24	CAP, 0.1uF
C473	2113743M24	CAP, 0.1uF
C475	2113928E01	CAP, 1uF
C476	2113740F58	CAP, 200pF
C478	2113743E12	CAP, .047uF
C480	2311049A86	CAPP, 1uF
C481	2311049A62	CAPP, 4.7uF
C482	2311049A62	CAPP, 4.7uF
C500	2113743L09	CAP, 470pF
C501	2113743L09	CAP, 470pF
C502	2113743L09	CAP, 470pF
C503	2113743L09	CAP, 470pF
C504	2113743L09	CAP, 470pF
C505	2113743A27	CAP, 0.47uF
C506	2113928E01	CAP, 1uF
C507	2113743L41	CAP, .01uF
C508	2113743L41	CAP, .01uF
C509	2113743L41	CAP, .01uF
C510	2113743M24	CAP, 0.1uF
C511	2113743M24	CAP, 0.1uF
C512	2113743M24	CAP, 0.1uF
C513	2113743T19	CAP, 10uF
C514	2113743T19	CAP, 10uF
C515	2113743M24	CAP, 0.1uF
C516	2113928E01	CAP, 1uF
C517	2113928E01	CAP, 1uF
C518	2311049A59	CAPP, 10uF
C519	2113743M24	CAP, 0.1uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C520	2113743L09	CAP, 470pF
C521	2113743L41	CAP, .01uF
C522	2113743L41	CAP, .01uF
C523	2113743L41	CAP, .01uF
C524	2311049A22	CAPP, 33uF
C525	2113743L05	CAP, 330pF
C526	2113743L05	CAP, 330pF
C527	2113743L05	CAP, 330pF
C550	2113743L41	CAP, .01uF
C600	2113743L41	CAP, .01uF
C601	2113743N38	CAP, 33pF
C602	2113743M24	CAP, 0.1uF
C603	2113932E20	CAP, 0.1uF
C604	2113743M24	CAP, 0.1uF
C605	2113743M24	CAP, 0.1uF
C606	2113743N50	CAP, 100pF
C607	2113743M24	CAP, 0.1uF
C608	2113743M24	CAP, 0.1uF
C609	2113743M24	CAP, 0.1uF
C610	2113743L09	CAP, 470pF
C611	2113743L09	CAP, 470pF
C612	2113743L09	CAP, 470pF
C613	2113743L09	CAP, 470pF
C614	2113743M24	CAP, 0.1uF
C615	2113743L09	CAP, 470pF
C617	2113743L09	CAP, 470pF
C619	2113743L09	CAP, 470pF
C620	2113932E20	CAP, 0.1uF
C621	2113743M24	CAP, 0.1uF
C624	2113743M24	CAP, 0.1uF
C625	2113743M24	CAP, 0.1uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C626	2113743M24	CAP, 0.1uF
C627	2113743M24	CAP, 0.1uF
C628	2113743N44	CAP, 56pF
C629	2113743L09	CAP, 470pF
C630	2113743L09	CAP, 470pF
C631	2113743L09	CAP, 470pF
C632	2113743L09	CAP, 470pF
C633	2113743L09	CAP, 470pF
C634	2113743L09	CAP, 470pF
C635	2113743L09	CAP, 470pF
C636	2113743L09	CAP, 470pF
C637	2113931F49	CAP, .01uF
C638	2113932E20	CAP, 0.1uF
C640	2113743L05	CAP, 330pF
C641	2113743L05	CAP, 330pF
C652	2113743L09	CAP, 470pF
C653	2113743L09	CAP, 470pF
C654	2113743L09	CAP, 470pF
C655	2113743L09	CAP, 470pF
C656	2113743L09	CAP, 470pF
C657	2113743L09	CAP, 470pF
C658	2113743L09	CAP, 470pF
C663	2113743M24	CAP, 0.1uF
C664	2113743M24	CAP, 0.1uF
C671	2113743N38	CAP, 33pF
C672	2113743L09	CAP, 470pF
C673	2113743N38	CAP, 33pF
C674	2113743L09	CAP, 470pF
C675	2113743L09	CAP, 470pF
C680	2113743N38	CAP, 33pF
C682	2113743M24	CAP, 0.1uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C697	2113932E20	CAP, 0.1uF
C698	2113932E20	CAP, 0.1uF
C700	2113932E20	CAP, 0.1uF
C701	2113743L05	CAP, 330pF
C702	2113743M24	CAP, 0.1uF
C703	2113743A31	CAP, 1uF
C704	2113743M24	CAP, 0.1uF
C705	2113743M24	CAP, 0.1uF
C707	2113743A31	CAP, 1uF
C708	2109720D14	CAP, 0.1uF
C709	2113743M24	CAP, 0.1uF
C710	2311049C52	CAPP, 33uF
C711	2113743N50	CAP, 100pF
C712	2113743N50	CAP, 100pF
C713	2311049A57	CAPP, 10uF
C714	2113743L50	CAP, .033uF
C715	2113743L41	CAP, .01uF
C716	2311049A57	CAPP, 10uF
C717	2311049C52	CAPP, 33uF
C718	2113743M24	CAP, 0.1uF
C719	2113743N50	CAP, 100pF
C721	2113743T19	CAP, 10uF
C725	2311049A57	CAPP, 10uF
C726	2113928E01	CAP, 1uF
C728	2113743E11	CAP, .039uF
C730	2311049A57	CAPP, 10uF
C731	2113743M24	CAP, 0.1uF
C732	2113743M24	CAP, 0.1uF
C734	2113743M24	CAP, 0.1uF
C736	2311049A57	CAPP, 10uF
C738	2311049A57	CAPP, 10uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C741	2113743A31	CAP, 1uF
C743	2113743M24	CAP, 0.1uF
C747	2311049A57	CAPP, 10uF
C749	2113743M24	CAP, 0.1uF
C750	2113743L41	CAP, .01uF
C753	2113743M24	CAP, 0.1uF
C754	2113743M24	CAP, 0.1uF
C755	2113743M24	CAP, 0.1uF
C757	2113743A31	CAP, 1uF
C759	2311049A57	CAPP, 10uF
C760	2113743N50	CAP, 100pF
C796	2113743M24	CAP, 0.1uF
C797	2113743M24	CAP, 0.1uF
C798	2113743M24	CAP, 0.1uF
C800	2113743B29	CAP, 1uF
C801	2113743L09	CAP, 470pF
C802	2113743E04	CAP, .016uF
C803	2113743L09	CAP, 470pF
C804	2113928E01	CAP, 1uF
C805	2113743E04	CAP, .016uF
C806	2113743M24	CAP, 0.1uF
C807	2113743M24	CAP, 0.1uF
C808	2113743M24	CAP, 0.1uF
C809	2113743E04	CAP, .016uF
C810	2113928E01	CAP, 1uF
C811	2113743M24	CAP, 0.1uF
C812	2113743M24	CAP, 0.1uF
C813	2113743M24	CAP, 0.1uF
C814	2113743M24	CAP, 0.1uF
C815	2113743M24	CAP, 0.1uF
C816	2113743M24	CAP, 0.1uF

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
C817	2113743M24	CAP, 0.1uF
C818	2113743M24	CAP, 0.1uF
C819	2113743N54	CAP, 150pF
C823	2113743N20	CAP, 5.6pF
C824	2113743N20	CAP, 5.6pF
C826	2311049A57	CAPP, 10uF
C830	2113743M24	CAP, 0.1uF
C840	2113928C04	CAP, 4.7uF
C850	2113743M24	CAP, 0.1uF
C869	2113743M24	CAP, 0.1uF
C870	2113743M24	CAP, 0.1uF
C871	2113743N50	CAP, 100pF
C872	2113743N50	CAP, 100pF
CR700	4813833A20	DIODE, MBRM140T3
CR702	4813833A20	DIODE, MBRM140T3
CR703	4813833A20	DIODE, MBRM140T3
CR800	4805656W37	DIODE, BAT54HT1
CR801	4805656W37	DIODE, BAT54HT1
CTS1	TPSM1_524	TEST_POINT
D3	4809877C13	VARACTOR DIODE, 1SV305
D4	4809877C13	VARACTOR DIODE, 1SV305
D5	4809877C13	VARACTOR DIODE, 1SV305
D6	4809877C13	VARACTOR DIODE, 1SV305
D10	4809877C13	VARACTOR DIODE, 1SV305
D11	4809877C13	VARACTOR DIODE, 1SV305
D12	4809877C13	VARACTOR DIODE, 1SV305
D13	4809877C13	VARACTOR DIODE, 1SV305
D20	4813825A19	DIODE, MMBD352
D170	4802482J02	SCHOTTKY DIODE, MA4P959
D171	4802482J02	SCHOTTKY DIODE, MA4P959

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
D172	4802197J83	SCHOTTKY DIODE, MBD330DWT1
D173	4802197J83	SCHOTTKY DIODE, MBD330DWT1
D201	4802233J09	DIODE, IMN10
D202	4802233J09	DIODE, IMN10
D251	4805649Q13	VARACTOR DIODE, 1SV228
D252	4805649Q13	VARACTOR DIODE, 1SV228
D270	4805649Q13	VARACTOR DIODE, 1SV228
D401	4809877C08	VARACTOR DIODE, 1SV279
D402	4809877C08	VARACTOR DIODE, 1SV279
D500	4880107R01	DIODE, BYD17D
D501	4809118D02	DIODE, LNJ115W8P0MT
D510	4813833A20	DIODE, MBRM140T3
D511	4805129M90	DIODE, BAT54
D512	4813833A20	DIODE, MBRM140T3
D513	4813833A20	DIODE, MBRM140T3
D514	4805218N57	DIODE, RB715F
D600	4805129M90	DIODE, BAT54
D601	4805218N57	DIODE, RB715F
D602	4805129M06	DIODE, MMBD7000
D603	4805656W37	DIODE, BAT54HT1
D606	4805129M06	DIODE, MMBD7000
D607	4805129M06	DIODE, MMBD7000
D662	4805656W37	DIODE, BAT54HT1
D663	4805656W37	DIODE, BAT54HT1
D664	4805656W37	DIODE, BAT54HT1
D700	4805129M90	DIODE, BAT54
D701	4805129M06	DIODE, MMBD7000
E102	2480574F01	FERRITE BEAD, BLM11A601S
E140	2405688Z01	FERRITE BEAD, 88Z01

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
E141	2480574F01	FERRITE BEAD, BLM11A601S
E402	2480640Z01	FERRITE BEAD, BK1005HM471
E406	2462587N76	FERRITE BEAD, IDCTR, 4.7uH
E702	2480574F01	FERRITE BEAD, BLM11A601S
E703	2480574F01	FERRITE BEAD, BLM11A601S, 10uH
E704	2480574F01	FERRITE BEAD, BLM11A601S
E800	2480574F01	FERRITE BEAD, BLM11A601S
E801	2480574F01	FERRITE BEAD, BLM11A601S
E802	2480574F01	FERRITE BEAD, BLM11A601S
EXTMIC	TPSM1_524	TEST_POINT
EXTSP+	TPSM1_524	TEST_POINT
EXT_SP	TPSM1_524	TEST_POINT
F500	6580542Z01	FUSE
FL51	9185367C01	CRYSTAL FILTER, 67C01
FL200	9185130D01	SWITCH FILTER, MAX7414
GND	TPSM1_524	TEST_POINT
J101	2880658Z02	CONN_P
J601	0905505Y10	CONN_J
J650	0905505Y09	CONN_J
L5	2462587V24	IDCTR, 15nH
L6	2462587V27	IDCTR, 27nH
L7	2462587V33	IDCTR, 82nH
L8	2462587V27	IDCTR, 27nH
L12	2462587V24	IDCTR, 15nH
L20	2462587V38	IDCTR, 220nH
L21	2462587V31	IDCTR, 56nH

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
L28	2462587V26	IDCTR, 22nH
L31	2462587V34	IDCTR, 100nH
L34	2462587V35	IDCTR, 120nH
L42	2462587V24	IDCTR, 15nH
L45	2462587V27	IDCTR, 27nH
L47	2462587V33	IDCTR, 82nH
L48	2462587V27	IDCTR, 27nH
L49	2462587V24	IDCTR, 15nH
L51	2462587V23	IDCTR, 12nH
L52	2462587V60	IDCTR, 43.0nH
L53	2462587L50	IDCTR, 100uH
L54	2462587V73	IDCTR, 820.0nH
L55	2462587T23	IDCTR, 470nH
L56	2462587T23	IDCTR, 470nH
L101	2485930A05	IDCTR, 6.8nH
L106	2462587T30	IDCTR, 1uH
L114	2462587N60	IDCTR, 390nH
L115	2460591B80	IDCTR, 19.61nH
L117	2485930A14	IDCTR, 39nH
L119	2479990E01	IDCTR, 23.75nH
L120	2409377M14	IDCTR, 68nH
L121	2409377M14	IDCTR, 68nH
L125	2479990B01	IDCTR, 11.03nH
L126	2409348J01	IDCTR, 1.65nH
L127	2460591M62	IDCTR, 25.22nH
L128	2462587T30	IDCTR, 1uH
L170	2479990N01	IDCTR, 43.67nH
L171	2479990N01	IDCTR, 43.67nH
L172	2479990N01	IDCTR, 43.67nH
L176	2479990N01	IDCTR, 43.67nH
L200	2462587Q47	IDCTR, 1uH

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
L201	2462587Q20	IDCTR, 2.2uH
L202	2462587Q20	IDCTR, 2.2uH
L203	2462587Q20	IDCTR, 2.2uH
L204	2462587Q20	IDCTR, 2.2uH
L205	2462587Q47	IDCTR, 1uH
L206	2462587Q20	IDCTR, 2.2uH
L251	2462587T30	IDCTR, 1uH
L252	2462587T30	IDCTR, 1uH
L253	2460591C35	IDCTR, 18.08nH
L254	2460591C03	IDCTR, 11.87nH
L257	2462587T30	IDCTR, 1uH
L258	2462587T17	IDCTR, 150nH
L259	2462587T30	IDCTR, 1uH
L266	2462587T18	IDCTR, 180nH
L270	2462587T30	IDCTR, 1uH
L271	2462587T30	IDCTR, 1uH
L272	2462587N48	IDCTR, 39nH
L273	2462587N46	IDCTR, 27nH
L274	2462587T40	IDCTR, 33nH
L403	2462587N75	IDCTR, 3.9uH
L404	2462587N59	IDCTR, 330nH
L407	2462587N76	IDCTR, 4.7uH
L411	2405769X05	IDCTR, 10uH
L412	2405769X05	IDCTR, 10uH
L413	2462587N60	IDCTR, 390nH
L414	2462587Q51	IDCTR, 2.2uH
L500	2462587Q42	IDCTR, 390nH
L501	2462587Q51	IDCTR, 2.2uH
L502	2462587L50	IDCTR, 100uH
L651	2404574Z14	IDCTR, 270nH
L652	2404574Z14	IDCTR, 270nH

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
L703	2486085A06	IDCTR, 47uH
L705	2486085A06	IDCTR, 47uH
M500	0985888K02	SOCKET
M501	PT39PLTA12	CONTACT
P4	3905643V01	CONN_P
POWER	TPSM1_524	TEST_POINT
Q29	4805218N63	RF LOW NOISE TRANSISTOR, BFQ67W
Q101	5185633C28	RF POWER AMPLIFIER, 33C28
Q197	4813824A17	PNP TRANSISTOR, MMBT3906
Q200	4805128M12	SOT TRANSISTOR, BCW60B
Q301	4805921T11	DUAL PNP TRANSISTOR, 21T11
Q401	4805218N63	RF LOW NOISE TRANSISTOR, BFQ67W
Q402	4805128M19	TRANSISTOR, MMBTA13
Q501	4805921T09	DUAL TRANSISTOR, FMG8A
Q600	4805723X03	NPN-PNP TRANSISTOR, UMD3N
Q601	4809579E35	N-CHANNEL FET, FDG6301N
Q603	4813824A10	NPN TRANSISTOR, MMBT3904
Q604	4813824A10	NPN TRANSISTOR, MMBT3904
Q605	5185368C54	FET SWITCH, SN74CBTD1G125
Q698	4805723X03	NPN-PNP TRANSISTOR, UMD3N
Q700	4880048M01	NPN TRANSISTOR IC, DTC144EKA
Q701	4805921T09	DUAL TRANSISTOR, FMG8A

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
Q702	4885844C01	FET TRANSISTOR, SI5441DC
Q703	4805921T09	DUAL TRANSISTOR, FMG8A
Q704	4805723X03	NPN-PNP TRANSISTOR, UMD3N
Q706	4805793Y01	LOW NOISE TRANSISTOR, NE68519
Q707	4880048M01	NPN TRANSISTOR IC, DTC144EKA
Q708	4805218N11	SOT TRANSISTOR, MMBF170
Q709	4805793Y01	LOW NOISE TRANSISTOR, NE68519
Q710	4813824A13	NPN TRANSISTOR, MMBTA06
Q801	4880048M01	NPN TRANSISTOR IC, DTC144EKA
Q804	4805723X03	NPN-PNP TRANSISTOR, UMD3N
R13	0662057M98	RES, 10K
R14	0662057M98	RES, 10K
R22	0662057M26	RES, 10
R23	0662057N29	RES, 180K
R24	0662057N29	RES, 180K
R26	0662057M84	RES, 2.7K
R30	0662057M26	RES, 10
R32	0662057A09	RES, 22
R33	0662057M98	RES, 10K
R34	0662057M98	RES, 10K
R51	0662057M48	RES, 82
R52	0662057M36	RES, 27
R53	0662057M36	RES, 27
R54	0662057M92	RES, 5.6K
R55	0662057M92	RES, 5.6K
R56	0662057M50	RES, 100

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R102	0662057A56	RES, 2K
R103	0662057M74	RES, 1K
R104	0662057A87	RES, 39K
R108	0662057B47	RES, 0
R109	0662057M01	RES, 0
R115	0662057C63	RES, 330
R125	0662057A23	RES, 82
R127	0662057M98	RES, 10K
R142	0662057N02	RES, 13K
R143	0662057N05	RES, 18K
R144	0662057N33	RES, 270K
R146	0662057A49	RES, 1K
R149	0662057M90	RES, 4.7K
R150	0662057A23	RES, 82
R151	0662057A23	RES, 82
R153	0662057U76	RES, 1K
R154	0662057M74	RES, 1K
R155	0662057M81	RES, 2K
R156	0662057U76	RES, 1K
R157	0662057M98	RES, 10K
R158	0662057M26	RES, 10
R159	0662057M01	RES, 0
R160	0662057M01	RES, 0
R162	0662057M98	RES, 10K
R168	0662057M50	RES, 100
R169	0662057M50	RES, 100
R199	0662057A73	RES, 10K
R201	0662057M48	RES, 82
R202	0662057M70	RES, 680
R203	0662057M58	RES, 220
R204	0662057N17	RES, 56K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R205	0662057N13	RES, 39K
R206	0662057M98	RES, 10K
R207	0662057M74	RES, 1K
R208	0662057M91	RES, 5.1K
R209	0662057B47	RES, 0
R210	0662057M91	RES, 5.1K
R211	0662057M62	RES, 330
R212	0662057M60	RES, 270
R213	0662057M96	RES, 8.2K
R214	0662057M74	RES, 1K
R215	0662057M98	RES, 10K
R216	0662057M50	RES, 100
R251	0662057M01	RES, 0
R252	0662057M37	RES, 30
R253	0662057M62	RES, 330
R254	0662057N33	RES, 270K
R255	0662057M74	RES, 1K
R257	0662057M98	RES, 10K
R266	0662057M62	RES, 330
R270	0662057M38	RES, 33
R271	0662057M60	RES, 270
R272	0662057M57	RES, 200
R273	0662057M66	RES, 470
R274	0662057M30	RES, 15
R275	0662057M66	RES, 470
R277	0662057M98	RES, 10K
R291	0662057M38	RES, 33
R293	0662057M38	RES, 33
R294	0662057M62	RES, 330
R295	0662057M98	RES, 10K
R406	0662057M98	RES, 10K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R407	0662057M98	RES, 10K
R408	0662057A55	RES, 1.8K
R412	0662057A38	RES, 360
R413	0662057A44	RES, 620
R414	0662057N05	RES, 18K
R415	0662057N01	RES, 12K
R417	0662057M75	RES, 1.1K
R418	0662057M01	RES, 0
R419	0662057N23	RES, 100K
R420	0662057N17	RES, 56K
R436	0662057M01	RES, 0
R499	0662057M98	RES, 10K
R503	0662057M64	RES, 390
R504	0662057M67	RES, 510
R505	0662057M98	RES, 10K
R507	0662057M50	RES, 100
R508	0662057M50	RES, 100
R509	0662057M50	RES, 100
R510	0662057M50	RES, 100
R511	0662057M98	RES, 10K
R512	0662057N15	RES, 47K
R513	0662057M98	RES, 10K
R514	0662057M98	RES, 10K
R515	0662057M98	RES, 10K
R516	0662057M98	RES, 10K
R517	0662057M98	RES, 10K
R518	0662057M98	RES, 10K
R519	0662057N15	RES, 47K
R520	0662057N35	RES, 330K
R521	0662057B47	RES, 0
R522	0662057N15	RES, 47K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R523	0662057N15	RES, 47K
R524	0662057B47	RES, 0
R525	0662057M98	RES, 10K
R526	0662057M98	RES, 10K
R527	0662057B47	RES, 0
R528	0662057B47	RES, 0
R529	0662057M67	RES, 510
R600	0662057M64	RES, 390
R601	0662057M67	RES, 510
R603	0662057N39	RES, 470K
R604	0662057N39	RES, 470K
R605	0662057N23	RES, 100K
R607	0662057N47	RES, 1MEG
R608	0662057M50	RES, 100
R609	0662057M50	RES, 100
R610	0662057M01	RES, 0
R611	0662057M50	RES, 100
R612	0662057N23	RES, 100K
R613	0662057N06	RES, 20K
R614	0662057N06	RES, 20K
R615	0662057N23	RES, 100K
R616	0662057M50	RES, 100
R617	0662057M50	RES, 100
R618	0662057M98	RES, 10K
R619	0662057M98	RES, 10K
R620	0662057M50	RES, 100
R621	0662057M50	RES, 100
R622	0662057M50	RES, 100
R625	0662057M50	RES, 100
R626	0662057M50	RES, 100
R629	0662057M01	RES, 0

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R631	0662057N39	RES, 470K
R632	0662057M50	RES, 100
R633	0662057M98	RES, 10K
R634	0662057M01	RES, 0
R635	0662057M01	RES, 0
R636	0662057M98	RES, 10K
R637	0662057M74	RES, 1K
R638	0662057M74	RES, 1K
R639	0662057M74	RES, 1K
R640	0662057M74	RES, 1K
R641	0662057M74	RES, 1K
R642	0662057M74	RES, 1K
R643	0662057M74	RES, 1K
R644	0662057M74	RES, 1K
R647	0662057M98	RES, 10K
R649	0662057N15	RES, 47K
R650	0662057B46	RES, 10MEG
R651	0662057M78	RES, 1.5K
R652	0662057M98	RES, 10K
R654	0662057M98	RES, 10K
R655	0662057N23	RES, 100K
R656	0662057M98	RES, 10K
R658	0662057V32	RES, 150K
R666	0662057M67	RES, 510
R667	0662057M64	RES, 390
R668	0662057M46	RES, 68
R669	0662057M50	RES, 100
R670	0662057M50	RES, 100
R671	0662057M64	RES, 390
R672	0662057M98	RES, 10K
R673	0662057M98	RES, 10K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R674	0662057M50	RES, 100
R675	0662057M68	RES, 560
R677	0662057M98	RES, 10K
R678	0662057M50	RES, 100
R684	0662057M98	RES, 10K
R685	0662057M98	RES, 10K
R686	0662057M01	RES, 0
R687	0662057N23	RES, 100K
R695	0662057N23	RES, 100K
R697	0662057M50	RES, 100
R700	0662057N21	RES, 82K
R702	0662057N10	RES, 30K
R703	0662057M96	RES, 8.2K
R704	0662057N06	RES, 20K
R705	0662057N06	RES, 20K
R706	0662057N21	RES, 82K
R708	0662057M96	RES, 8.2K
R709	0662057N06	RES, 20K
R710	0662057M94	RES, 6.8K
R711	0662057M98	RES, 10K
R712	0662057V04	RES, 12K
R713	0662057N06	RES, 20K
R714	0662057M98	RES, 10K
R715	0662057M71	RES, 750
R716	0662057M98	RES, 10K
R717	0662057M64	RES, 390
R718	0662057M82	RES, 2.2K
R719	0662057M74	RES, 1K
R720	0662057M95	RES, 7.5K
R721	0662057M82	RES, 2.2K
R722	0662057M96	RES, 8.2K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R723	0662057N23	RES, 100K
R724	0662057M82	RES, 2.2K
R725	0662057N35	RES, 330K
R726	0662057M95	RES, 7.5K
R727	0662057M64	RES, 390
R729	0662057N11	RES, 33K
R730	0662057M74	RES, 1K
R731	0662057M98	RES, 10K
R732	0662057M98	RES, 10K
R733	0662057M90	RES, 4.7K
R734	0662057M98	RES, 10K
R735	0662057N39	RES, 470K
R736	0662057M98	RES, 10K
R737	0662057V02	RES, 10K
R738	0662057M90	RES, 4.7K
R739	0662057M98	RES, 10K
R740	0662057M64	RES, 390
R741	0662057M34	RES, 22
R742	0662057M50	RES, 100
R743	0662057M01	RES, 0
R754	0662057V02	RES, 10K
R755	0662057U84	RES, 2K
R756	0662057M98	RES, 10K
R757	0662057M74	RES, 1K
R761	0662057N23	RES, 100K
R762	0662057M01	RES, 0
R763	0662057M01	RES, 0
R765	0662057U60	RES, 220
R766	0662057M94	RES, 6.8K
R768	0662057M01	RES, 0
R770	0662057M01	RES, 0

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R771	0662057N15	RES, 47K
R772	0662057M90	RES, 4.7K
R774	0662057M98	RES, 10K
R775	0662057M34	RES, 22
R779	0662057N23	RES, 100K
R788	0662057M10	RES, 2.2
R797	0662057M42	RES, 47
R799	0662057N15	RES, 47K
R801	0662057M94	RES, 6.8K
R802	0662057M50	RES, 100
R803	0662057M50	RES, 100
R804	0662057M67	RES, 510
R805	0662057M98	RES, 10K
R806	0662057M67	RES, 510
R807	0662057M98	RES, 10K
R808	0662057M01	RES, 0
R809	0662057N15	RES, 47K
R810	0662057M98	RES, 10K
R811	0662057M67	RES, 510
R812	0662057N23	RES, 100K
R813	0662057M01	RES, 0
R814	0662057M01	RES, 0
R815	0662057M01	RES, 0
R816	0662057N15	RES, 47K
R820	0662057M98	RES, 10K
R829	0662057M01	RES, 0
R830	0662057N06	RES, 20K
R831	0662057N06	RES, 20K
R837	0662057M38	RES, 33
R838	0662057M38	RES, 33
R839	0662057M98	RES, 10K

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
R840	0662057M67	RES, 510
R841	0662057M98	RES, 10K
R842	0662057M98	RES, 10K
R844	0662057N47	RES, 1MEG
R845	0662057N47	RES, 1MEG
RTS1	TPSM1_524	TEST_POINT
S500	4085131E01	SWITCH
S501	1880619Z02	SWITCH
S502	4085358D02	SWITCH
S503	4080523Z01	SWITCH
S504	4080523Z01	SWITCH
S505	4080523Z01	SWITCH
S506	4080523Z01	SWITCH
SH1	2686707Z01	SHIELD
SH51	2686700Z01	SHIELD
SH52	2686699Z01	SHIELD
SH101	2686702Z01	SHIELD
SH102	2686701Z01	SHIELD
SH103	2686708Z01	SHIELD
SH201	2686705Z01	SHIELD
SH251	2686703Z01	SHIELD
SH252	2685310E01	SHIELD
SH401	2686706Z01	SHIELD
SH402	2686698Z01	SHIELD
SH500	2685785D01	SHIELD
T51	2580541Z02	XFMR
T52	2585918C02	XFMR
T53	2585918C01	XFMR
U1	5185130C91	RF MIXER IC, PMB2335
U2	5185130C83	15dB DIGITAL ATTENUATOR IC, AT267

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
U3	5185143E12	DUAL INVERTOR IC, NC7WZ04
U101	5185130C65	LDMOS DRIVER IC, 30C65
U102	5185765B26	POWER CONTROL IC, H99S4
U103	5185963A15	TEMPERATURE SENSOR, LM50
U201	5186358E01	OPAMP IC LMH6723, CLC450
U202	5105835U92	LVFRACTN SYNTHESIZER IC, 35U92
U250	5105750U54	VCO BUFFER IC, 50U54
U302	2113743L41	CAP, .01uF
U304	4809788E06	ZENER 6.8V, UDZTE-176.8B
U401	5185963A85	ABACUS III IC, AD9874
U500	5185353D13	IC REG 5V, LP2989
U501	5185353D14	IC REG 3V, LP3985
U502	5185353D14	IC REG 3V, LP3985
U503	5185353D56	IC REG 3.3V, 53D56
U600	5185353D57	FLIPPER IC, 53D57
U601	5109731C15	OPAMP IC OPA237, LM7301
U602	5109731C15	OPAMP IC OPA237, LM7301
U605	5105492X92	CMOS SWITCH IC, TC7S66F
U607	5187970L15	USB TRANS IC, ISP1104
U608	5185368C12	1.8V LOGIC GATE, NC7SZ32
U609	5105492X03	L-MOS NOT GATE IC, TC7SH04
U610	5109522E53	BUFFER IC, NC7SZ125
U611	5109522E53	BUFFER IC, NC7SZ125
U612	5187423J01	MULTIPLEXER / SWITCH IC, NC7SSB3157
U613	5187423J01	MULTIPLEXER / SWITCH IC, NC7SSB3157
U614	5109522E53	BUFFER IC, NC7SZ125

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
U615	5109522E53	BUFFER IC, NC7SZ126
U616	5109522E53	BUFFER IC, NC7SZ127
U703	5109879E58	GCAP II AUDIO / POWER IC, 79E58
U704	5185353D35	DUAL EEPOT IC, MAX5452
U705	5113816A73	ADJST 1.7% IC, NCP100
U706	5109731C15	OPAMP IC OPA237, LM7301
U707	5185353D13	IC REG 5V, LP2989
U708	5102463J44	AUDIO AMPLIFIER, TDA8547
U725	5109731C15	OPAMP IC OPA237, LM7301
U800	5109841C69	PATRIOT BRAVO MICROPROCESSOR, EIM_BLOCK
U801	5109522E53	BUFFER IC, NC7SZ125
U802	5109522E53	BUFFER IC, NC7SZ125
U803	5185368C95	32MB FLASH IC, 28F320
U804	5185130C38	4MB SRAM IC, CY62147V
U810	5105492X92	CMOS SWITCH IC, TC7S66F
U811	5185368C83	12 BIT DAC IC, AD5320BRT
USB_D	TPSM1_524	TEST_POINT
USB_D+	TPSM1_524	TEST_POINT
VPP	TPSM1_524	TEST_POINT
VR500	4809788E06	ZENER, UDZTE-176.8B
VR501	4880140L15	ZENER, MMBZ5240B
VR502	4809788E06	ZENER, UDZTE-176.8B
VR503	4809788E06	ZENER, UDZTE-176.8B
VR504	4809788E06	ZENER, UDZTE-176.8B
VR505	4809788E06	ZENER, UDZTE-176.8B
VR506	4809788E06	ZENER, UDZTE-176.8B
VR508	4805656W03	ZENER, MMBZ5V6
VR509	4805656W03	ZENER, MMBZ5V6

ITEM	MOTOROLA PART NUMBER	DESCRIPTION
VR510	4805656W03	ZENER, MMBZ5V6
VR511	4805656W03	ZENER, MMBZ5V6
VR512	4805656W03	ZENER, MMBZ5V6
VR513	4805656W03	ZENER, MMBZ5V6
VR650	4813832C72	ZENER, MMQA12V
VR651	4805656W03	ZENER, MMBZ5V6
VR652	4805656W03	ZENER, MMBZ5V6
VR657	4809788E06	ZENER, UDZTE-176.8B
VR658	4813830C26	ZENER, MMSZ5243B
VR659	4805656W08	ZENER, MMQA5V6T1
VR662	4805656W08	ZENER, MMQA5V6T1
VR663	4813830A22	ZENER, MMBZ5239B
VR678	4802021P15	ZENER, SR05
VR700	4813830A15	ZENER, MMBZ5232B
Y200	4802245J68	REF OSCILLATOR 16.8MHz, 45J68
Y600	4809995L05	QUARTZ CRYSTAL 32.768KHZ, CC4V

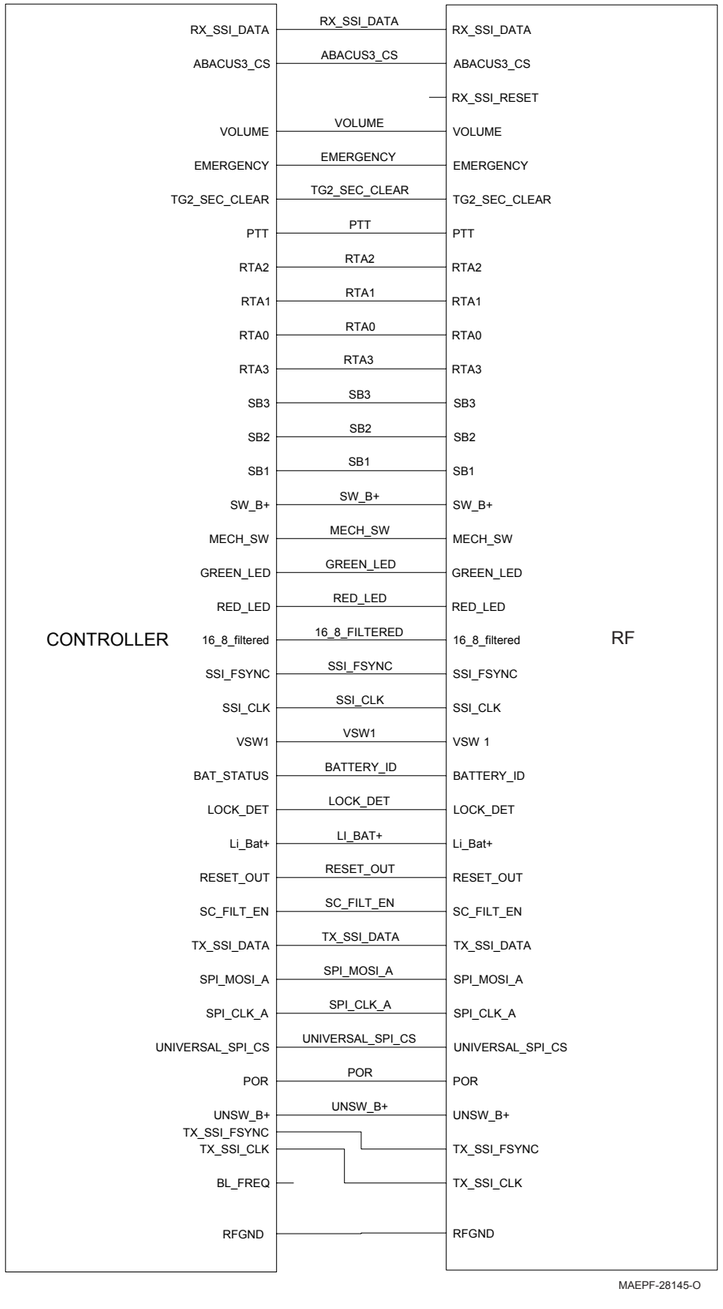


Figure 9-77. PMUE4270A Top-Level Schematic

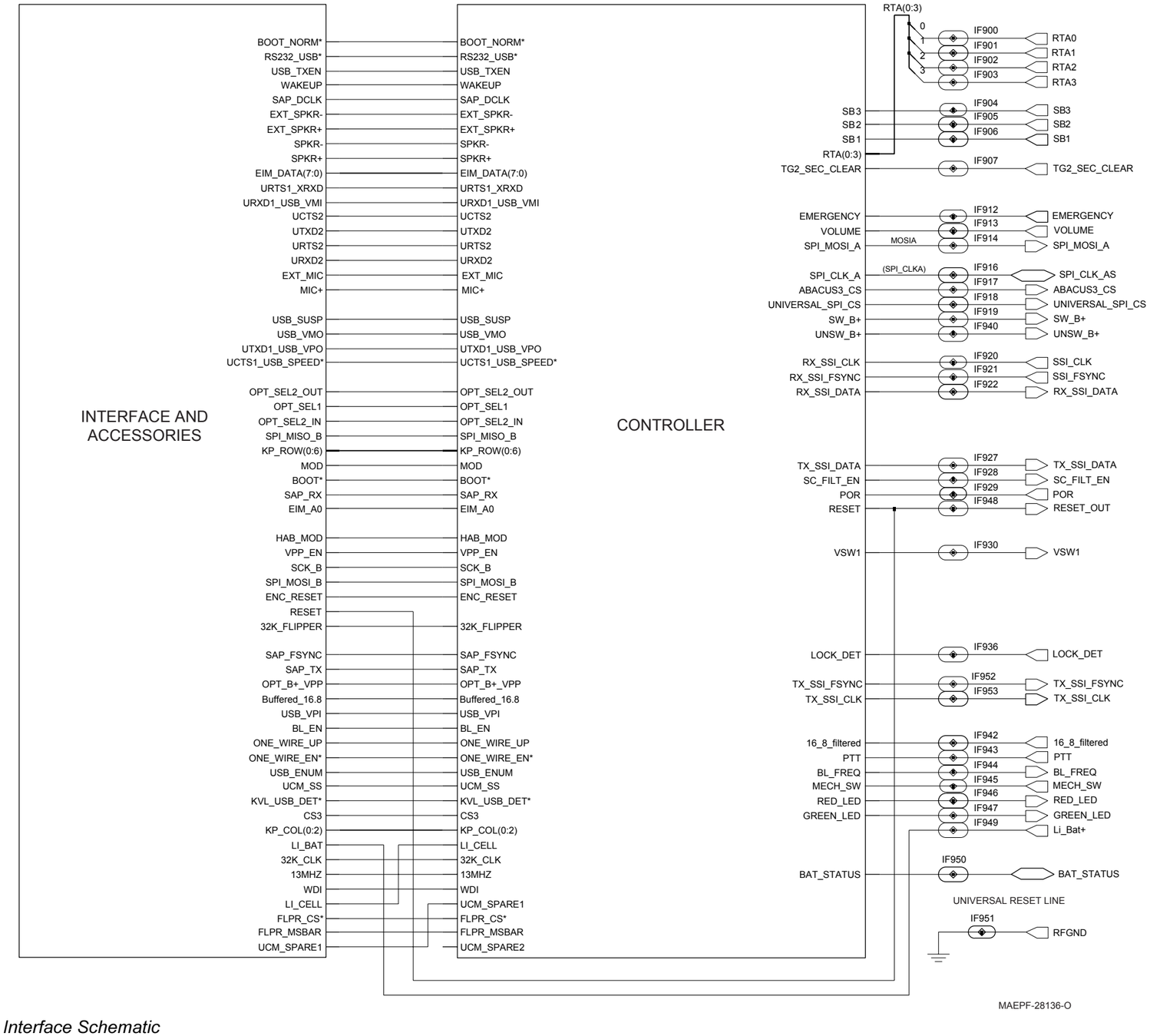


Figure 9-78. PMUE4270A Controller Interface Schematic

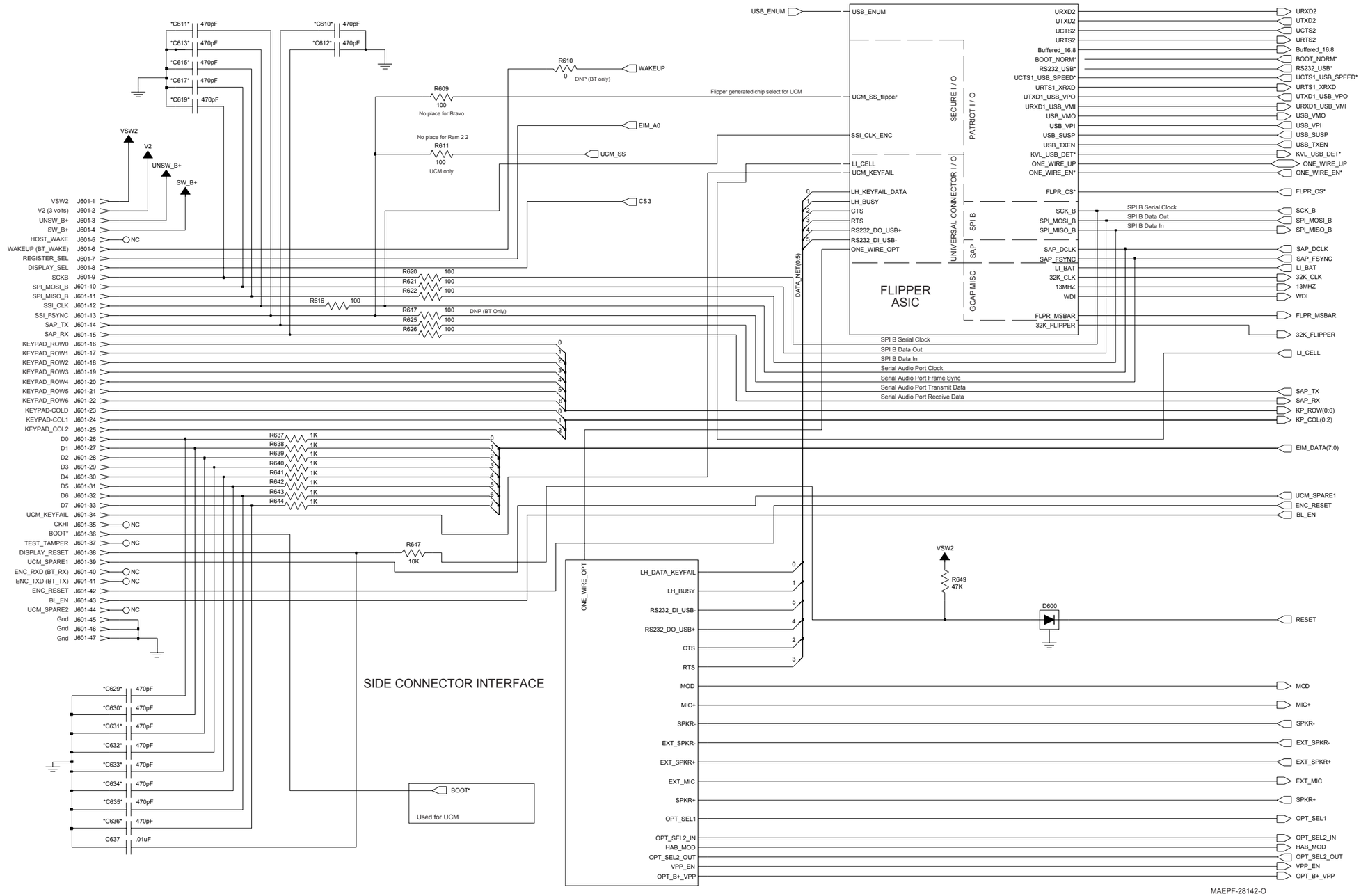


Figure 9-79. PMUE4270A Interface and Accessories Schematic

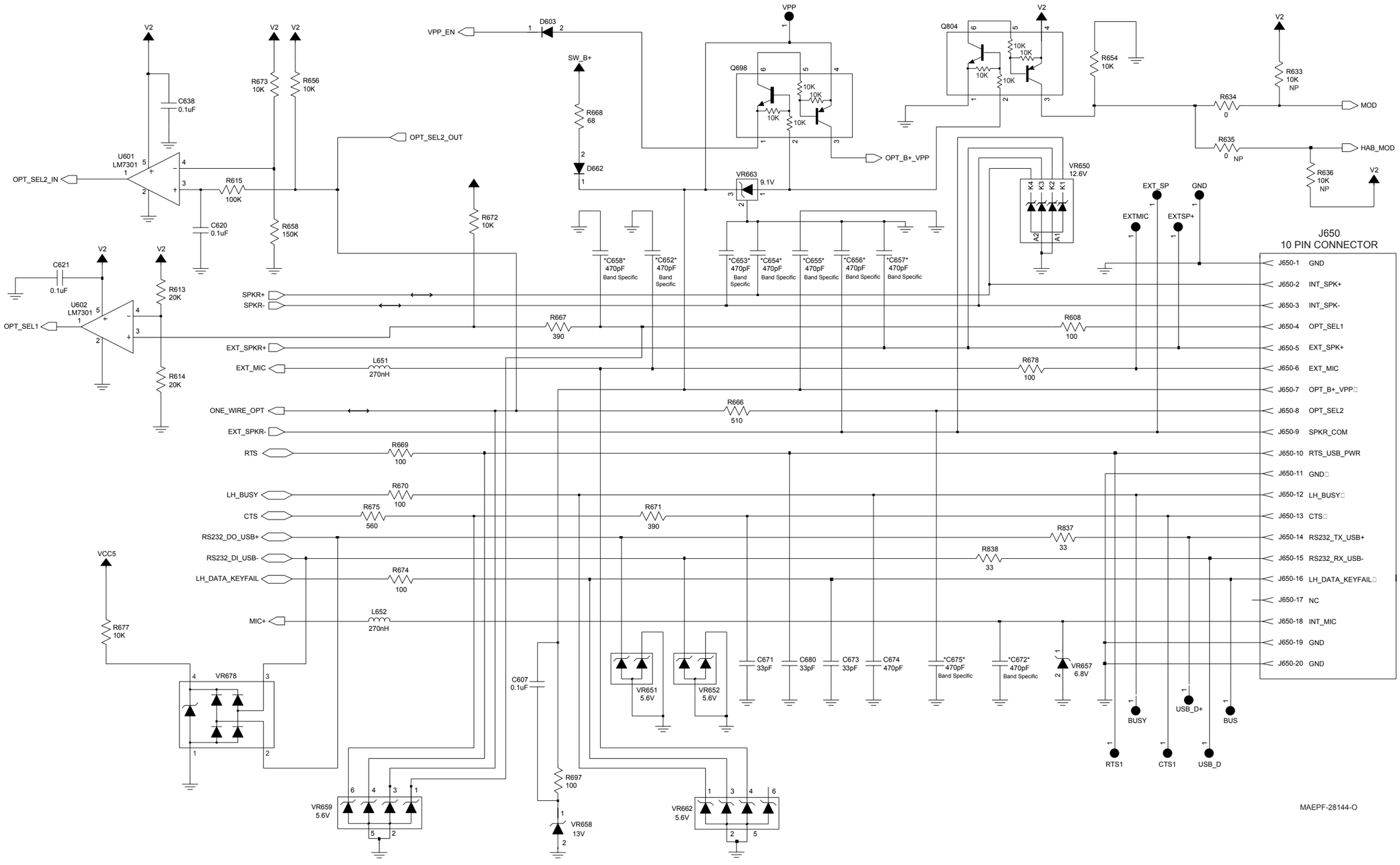


Figure 9-80. PMUE4270A Side Connector Schematic

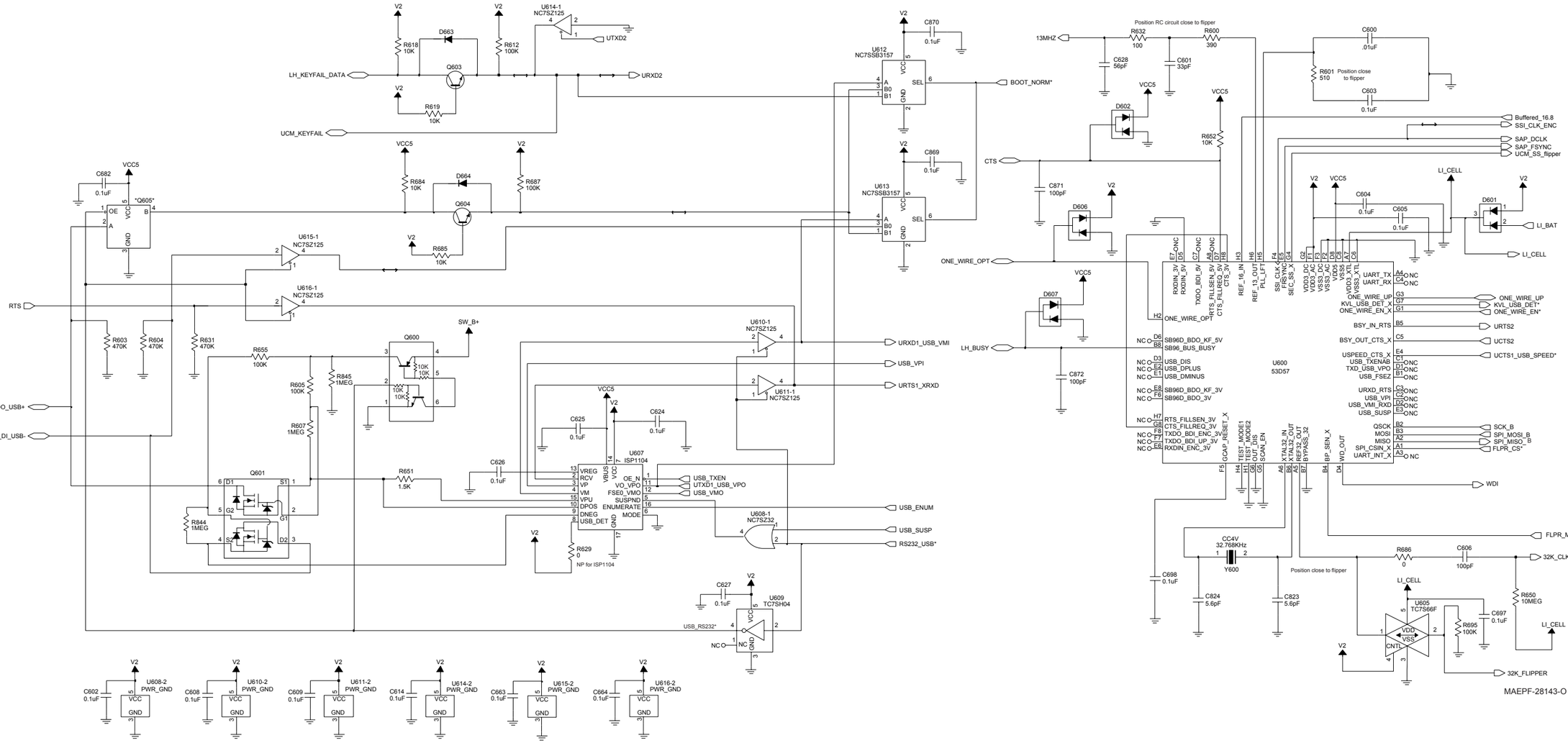


Figure 9-81. PMUE4270A Flipper Schematic

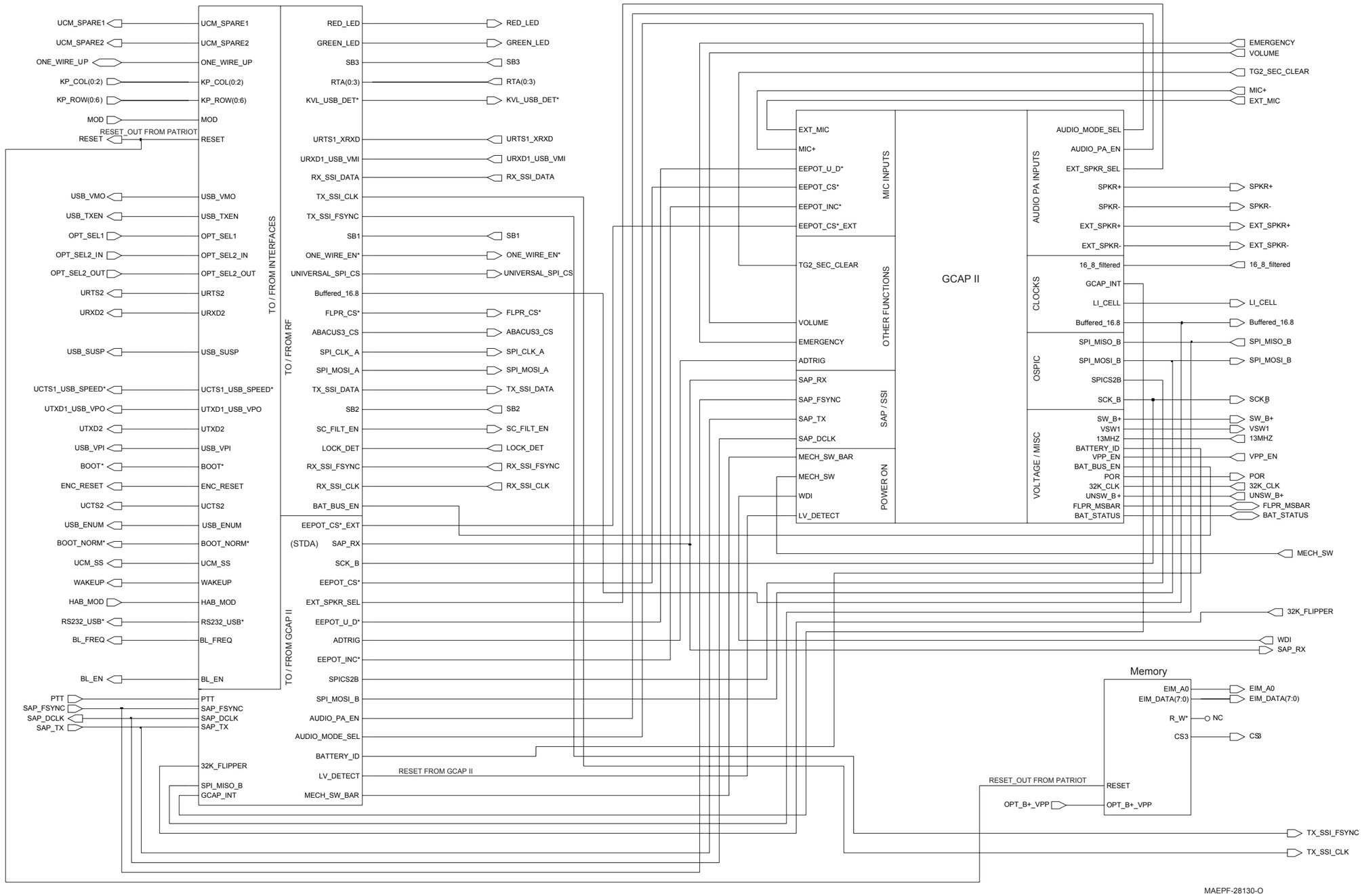


Figure 9-82. PMUE4270A Controller Schematic

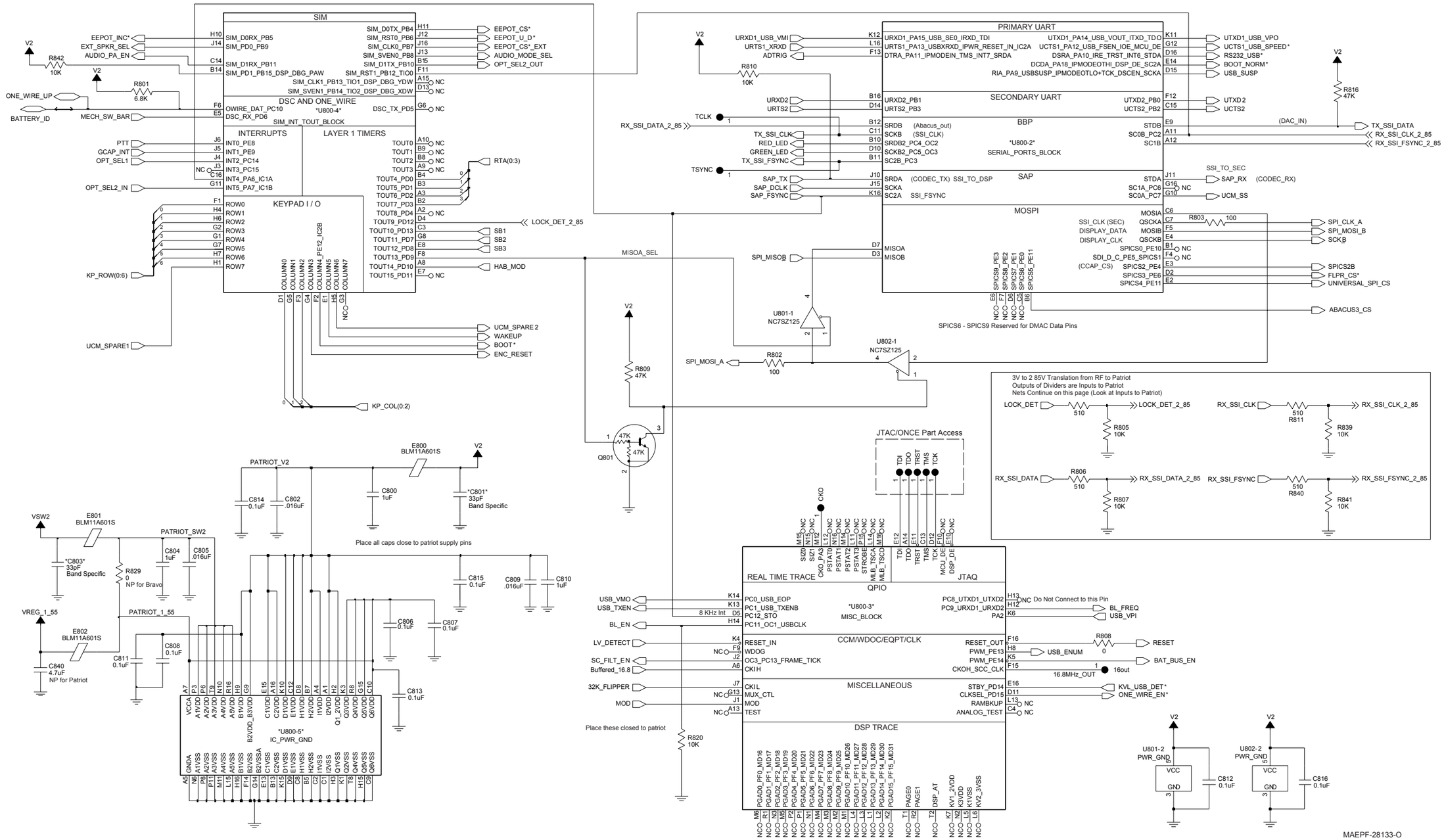


Figure 9-83. PMUE4270A Patriot (U800) Schematic

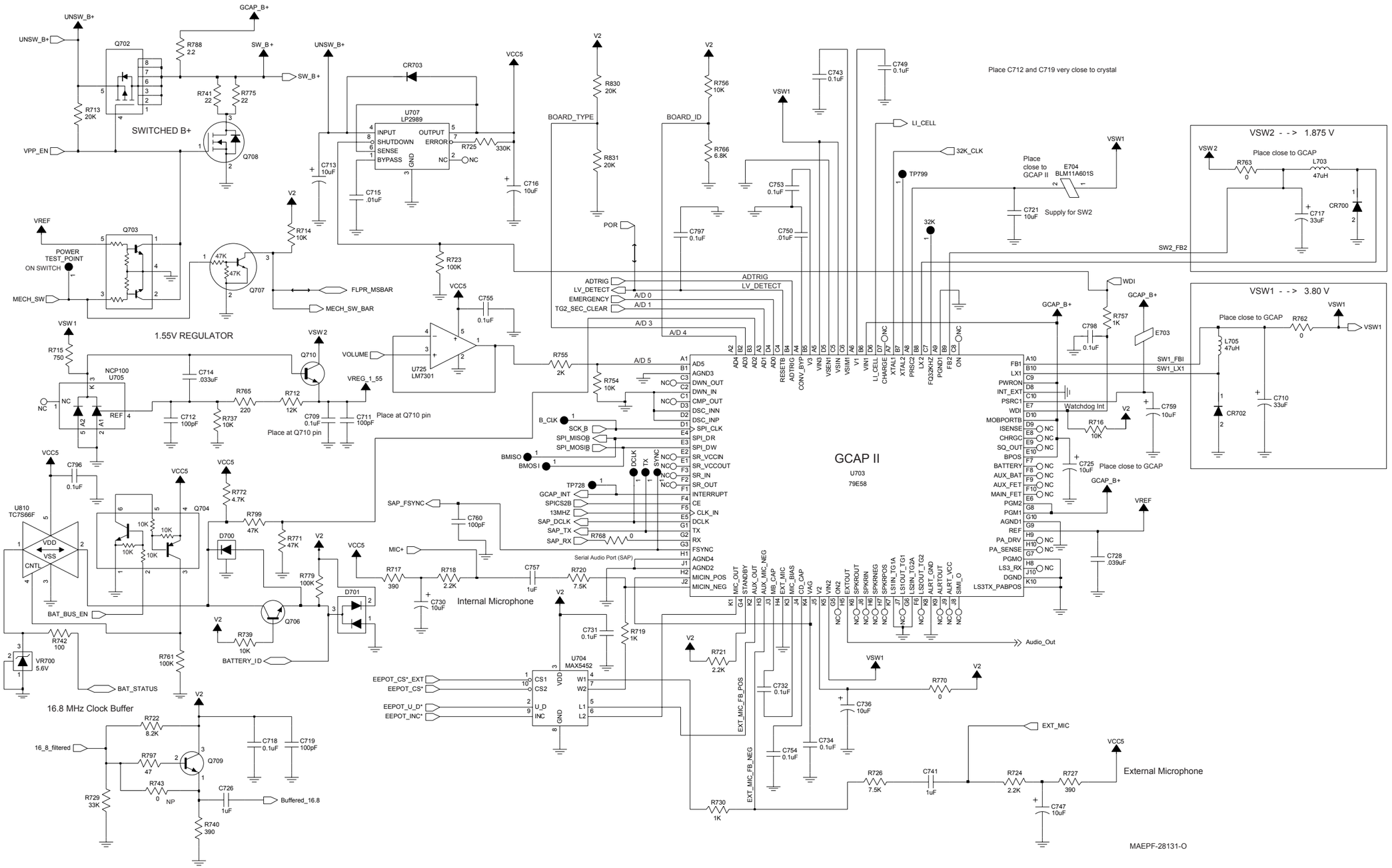


Figure 9-84. PMUE4270A GCAP II/DC and Audio Schematic, Sheet 1 of 2

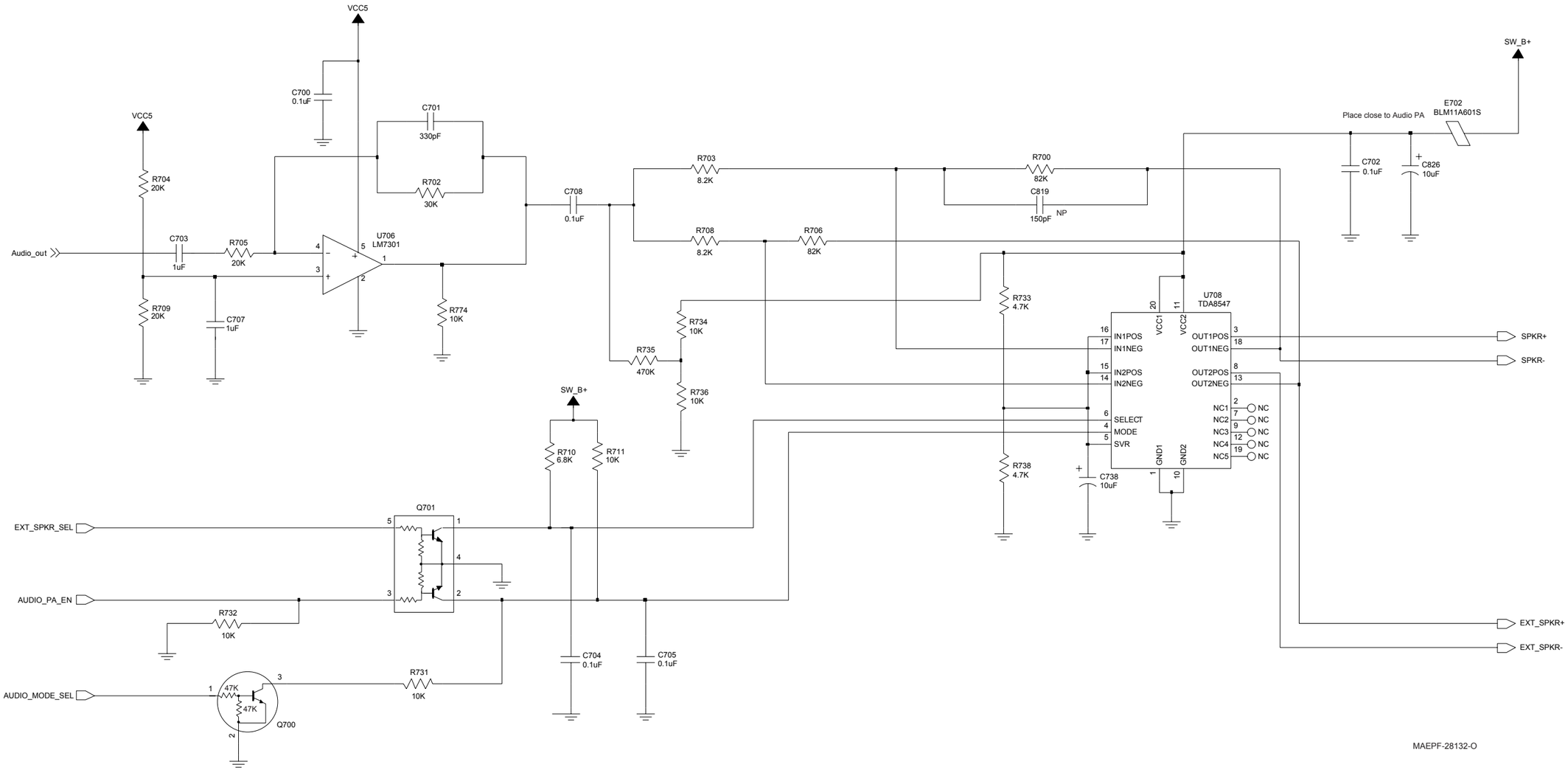


Figure 9-85. PMUE4270A GCAP II/DC and Audio Schematic, Sheet 2 of 2 (Audio PA)

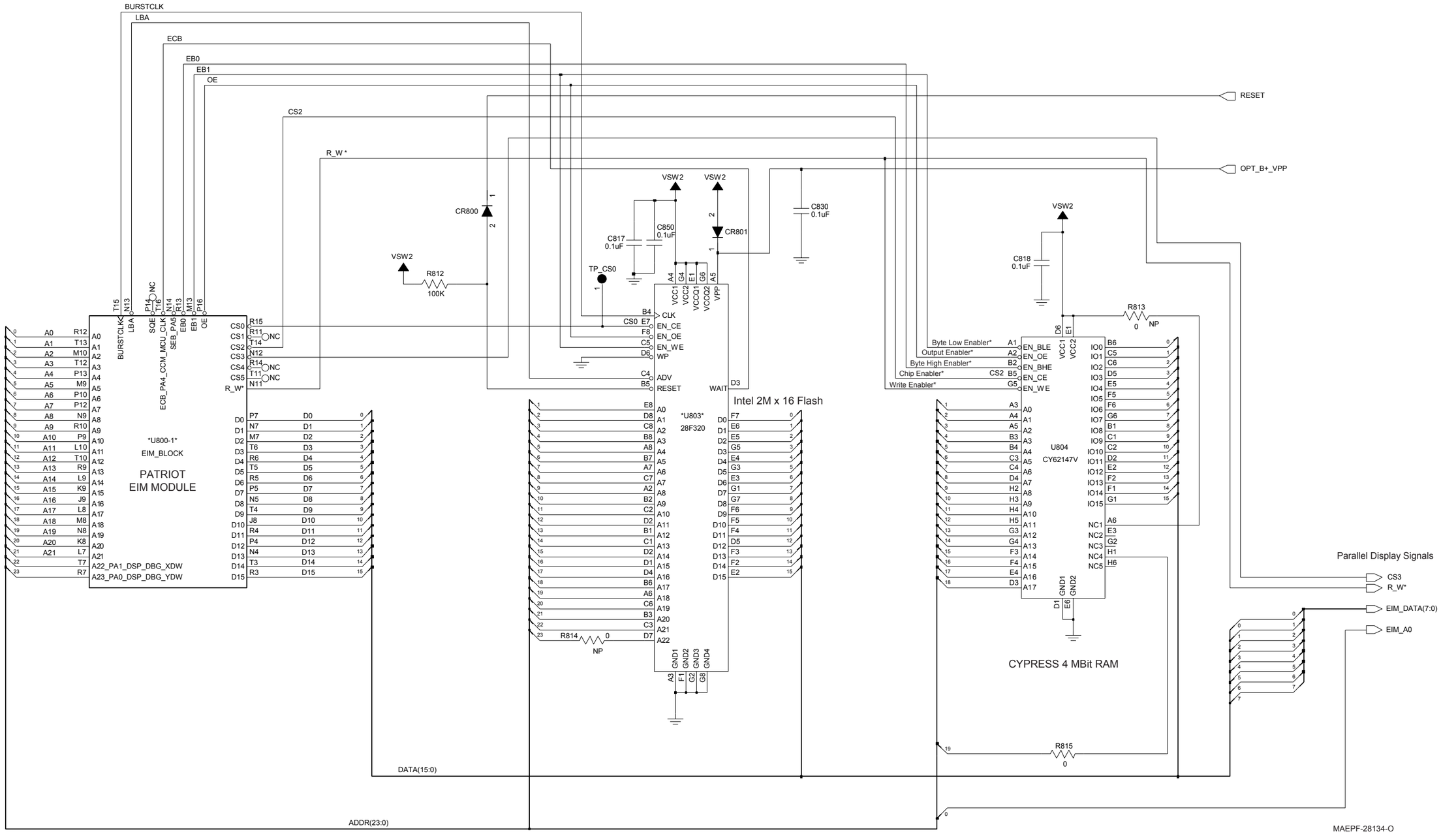


Figure 9-86. PMUE4270A Memory Schematic

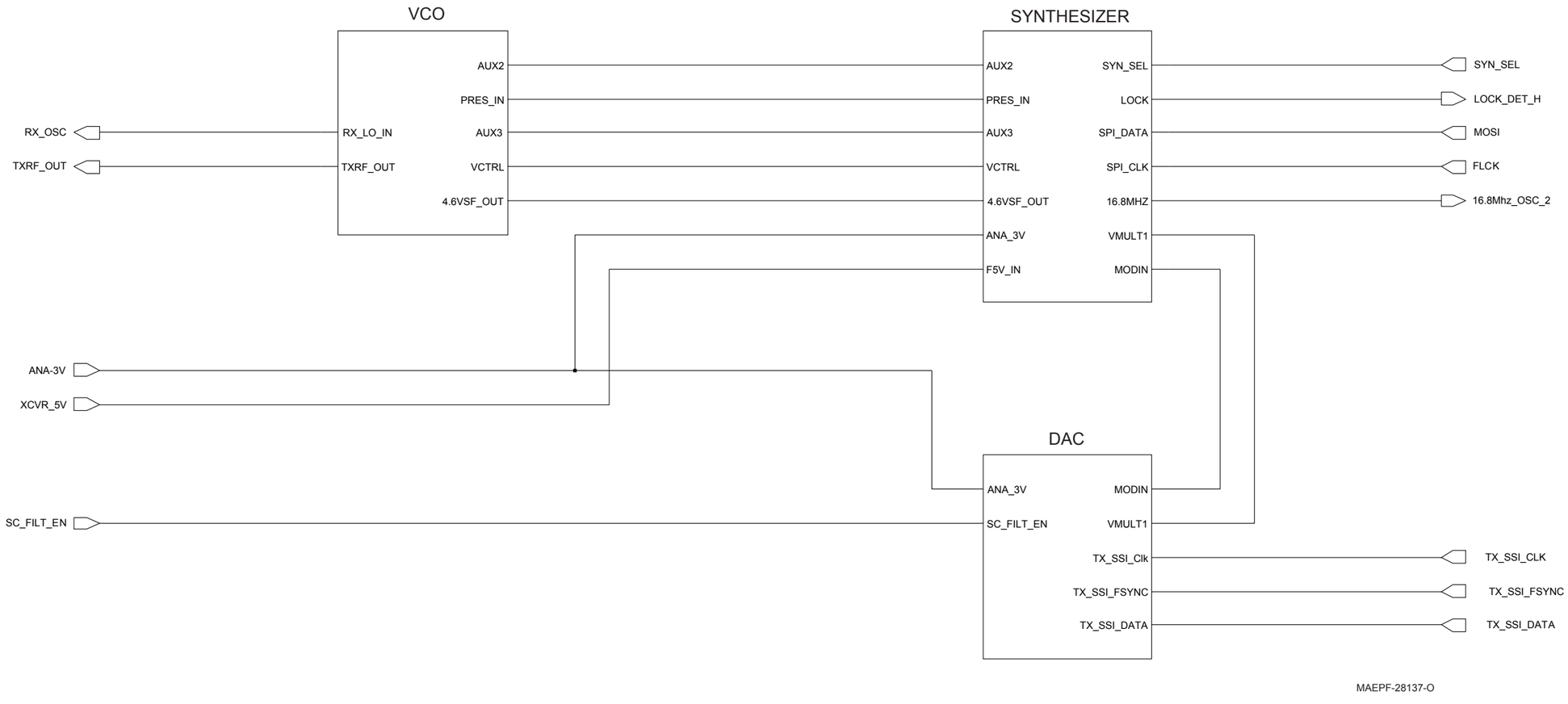


Figure 9-87. PMUE4270A Frequency Generation Unit (FGU) Schematic, Sheet 1 of 5

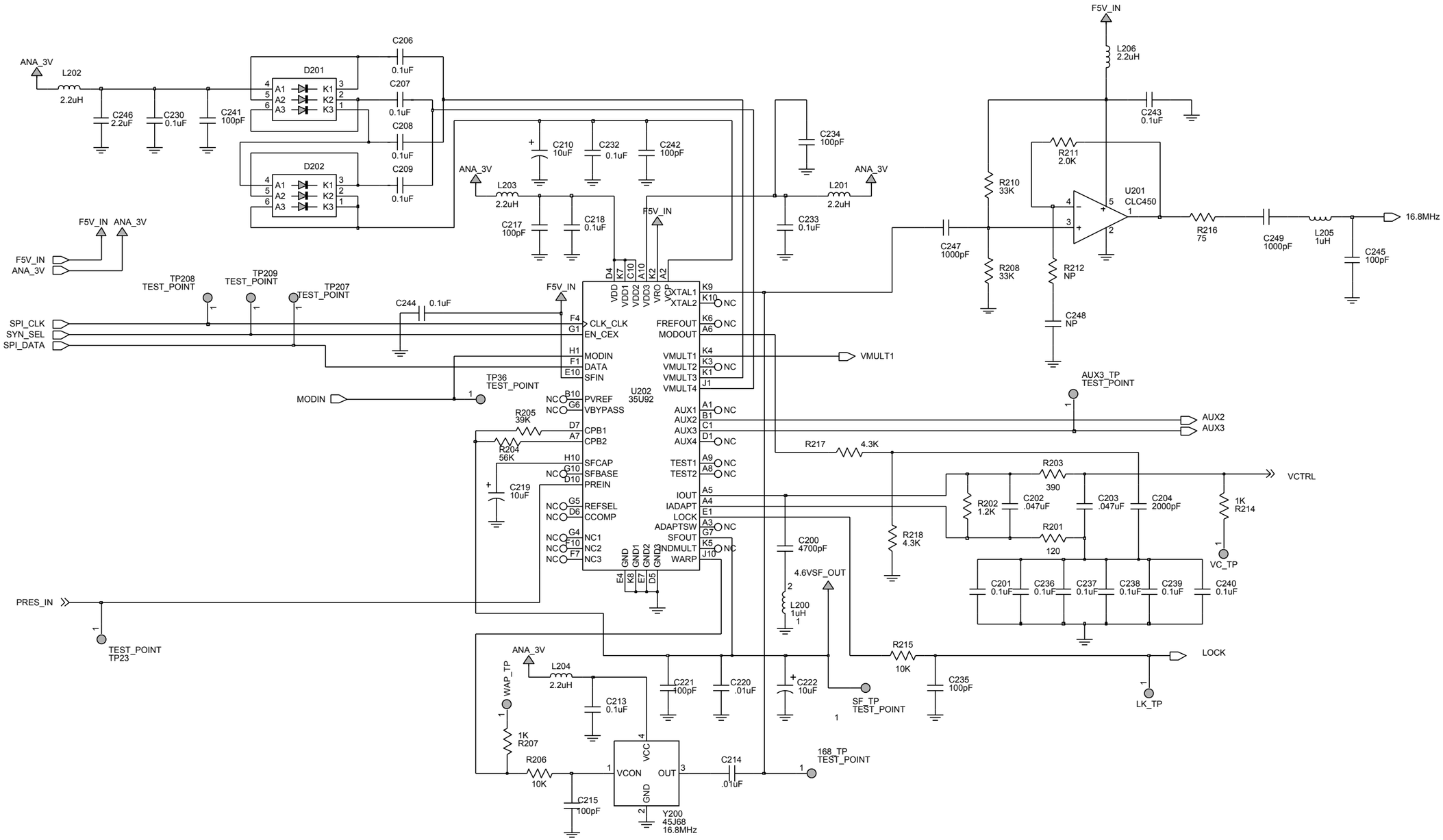


Figure 9-88. PMUE4270A Frequency Generation Unit (FGU) Schematic, Sheet 2 of 5 (Synthesizer)

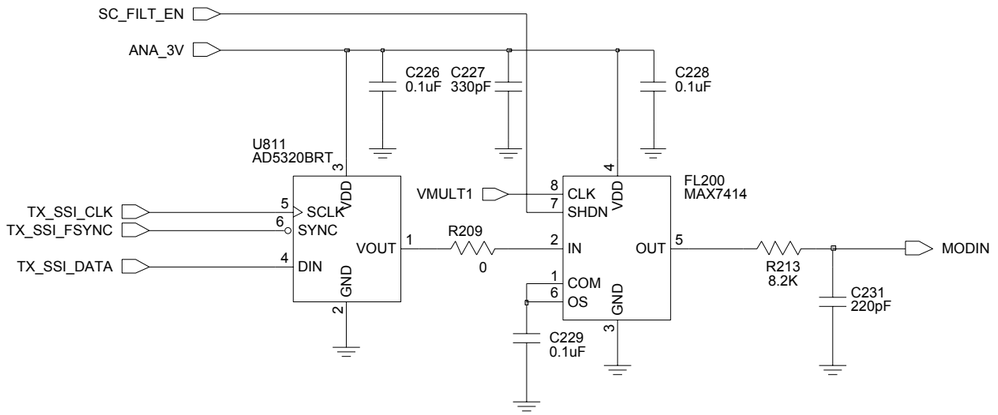


Figure 9-89. PMUE4270A Frequency Generation Unit (FGU) Schematic, Sheet 3 of 5 (Digital-to-Analog Converter)

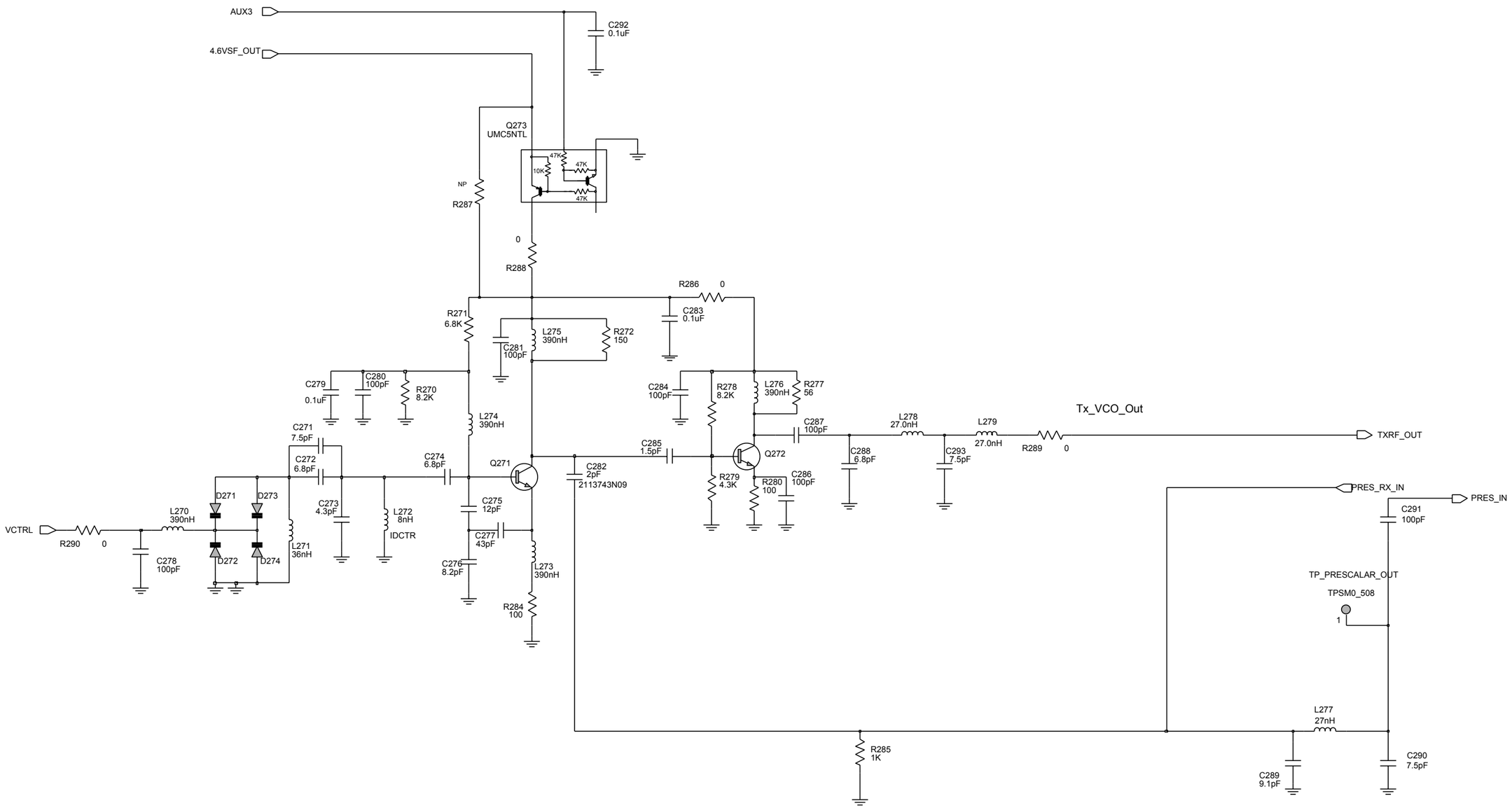


Figure 9-90. PMUE4270A Frequency Generation Unit (FGU) Schematic, Sheet 4 of 5 (Transmitter VCO)

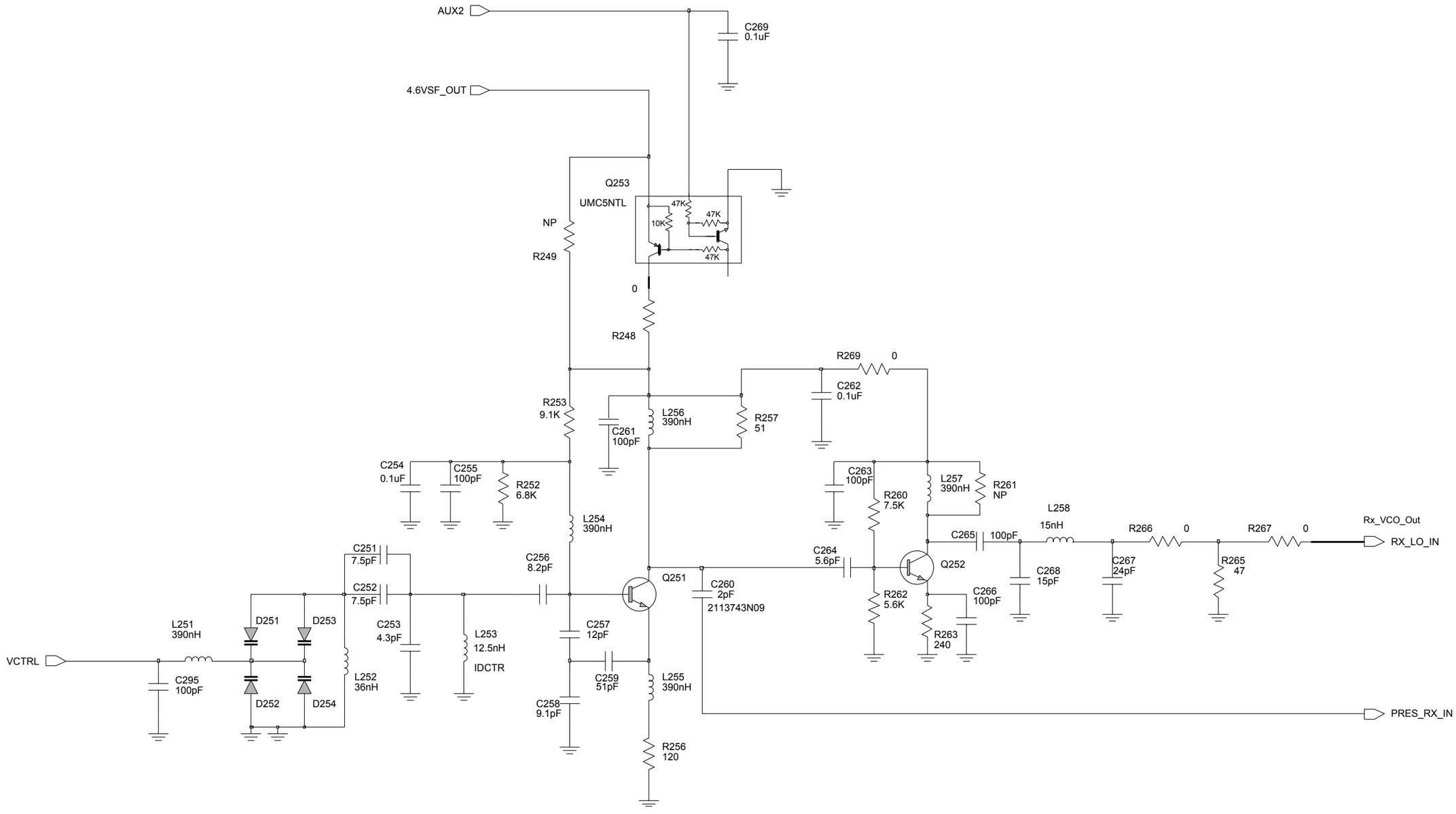


Figure 9-91. PMUE4270A Frequency Generation Unit (FGU) Schematic, Sheet 5 of 5 (Receiver VCO)

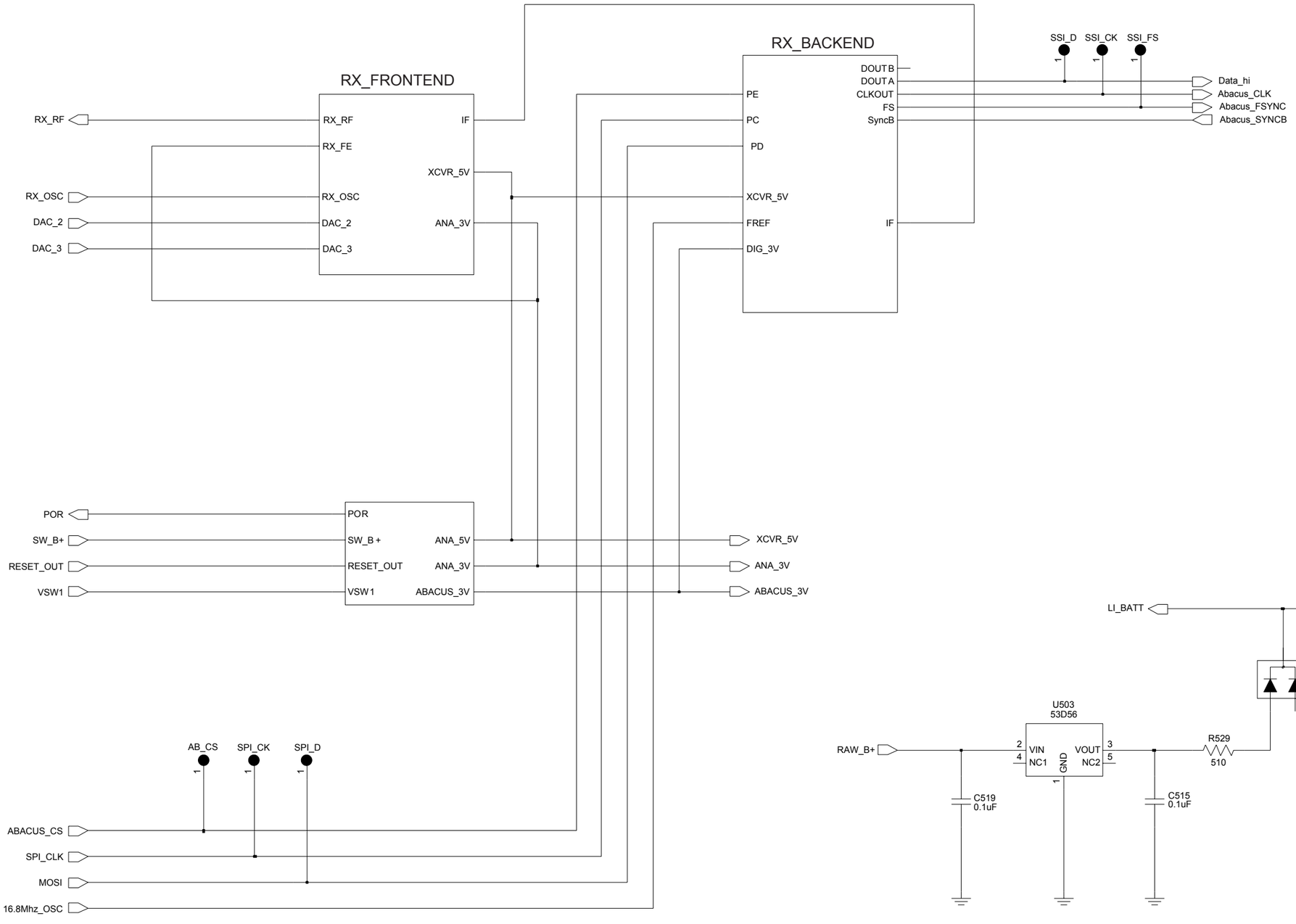


Figure 9-92. PMUE4270A Receiver Schematic, Sheet 1 of 6

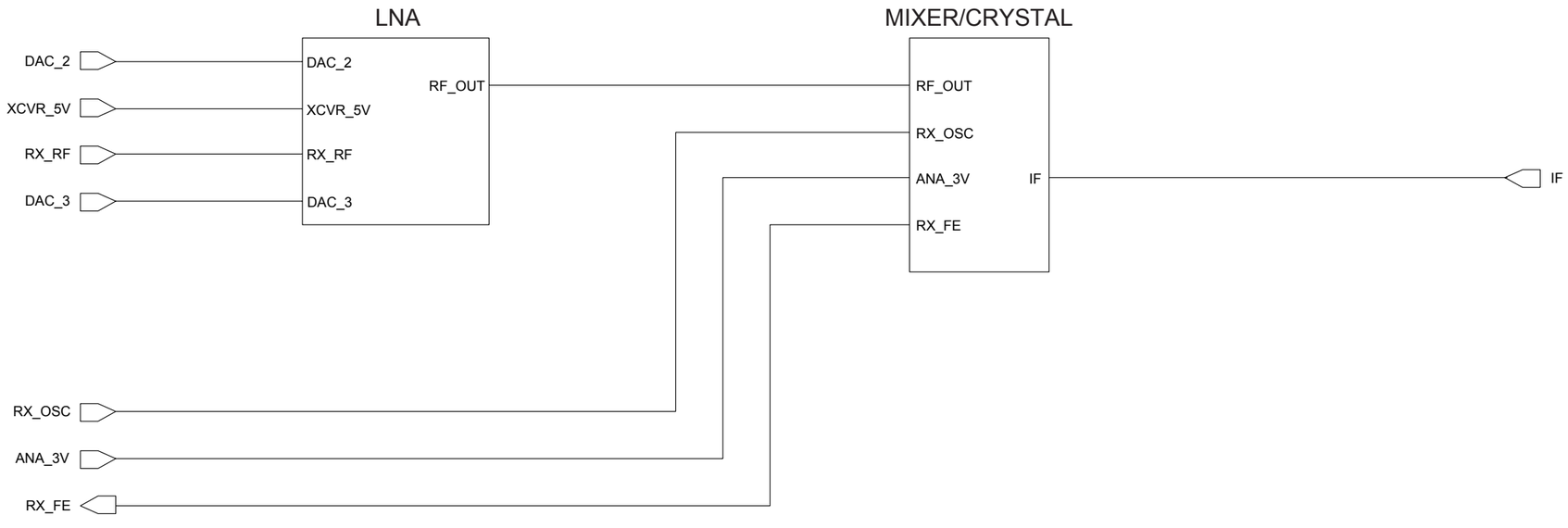


Figure 9-93. PMUE4270A Receiver Schematic, Sheet 2 of 6 (Front End)

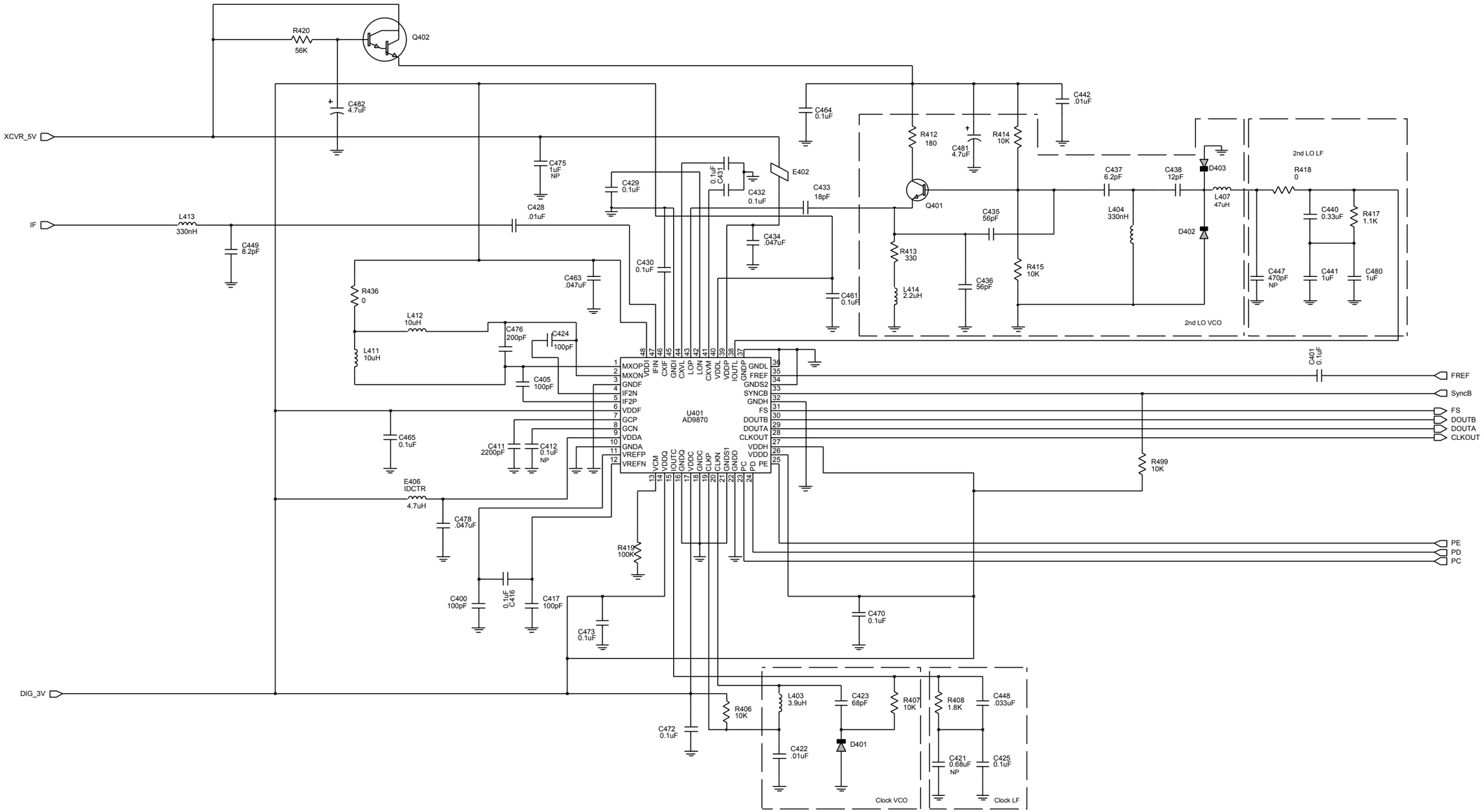


Figure 9-94. PMUE4270A Receiver Schematic, Sheet 3 of 6 (Back End)

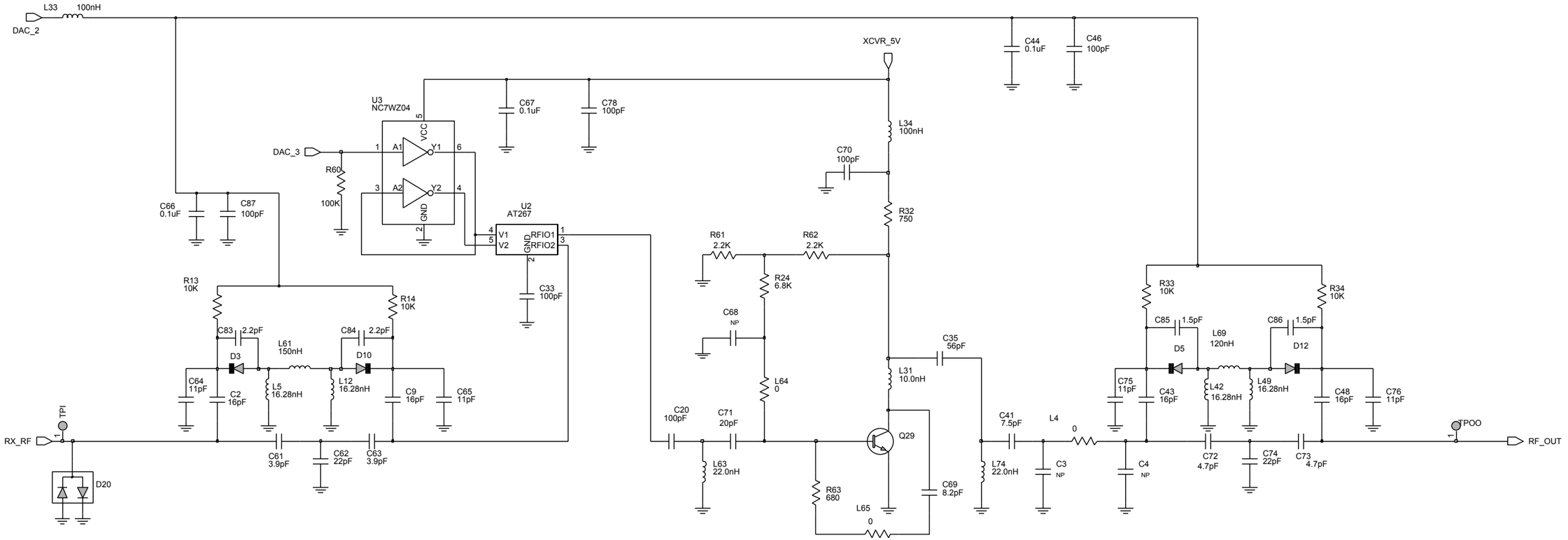


Figure 9-95. PMUE4270A Receiver Schematic, Sheet 4 of 6 (LNA Pre-Select)

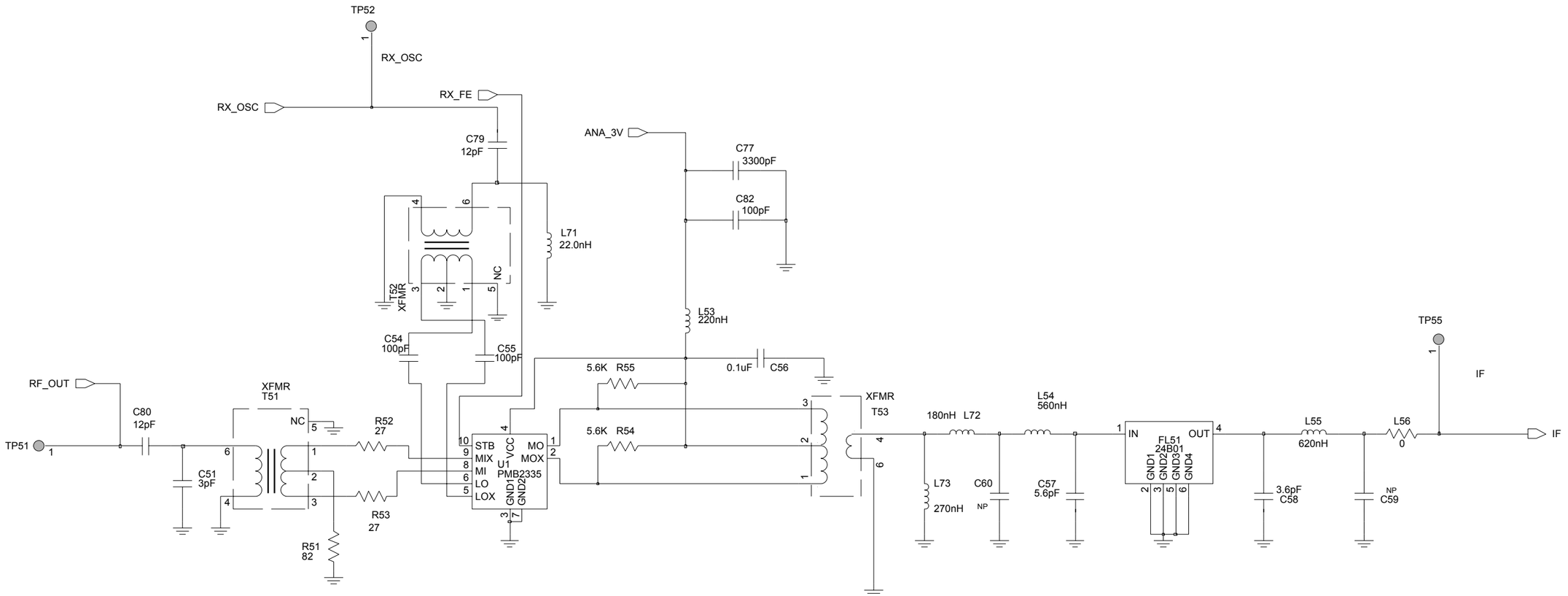


Figure 9-96. PMUE4270A Receiver Schematic, Sheet 5 of 6 (Mixer)

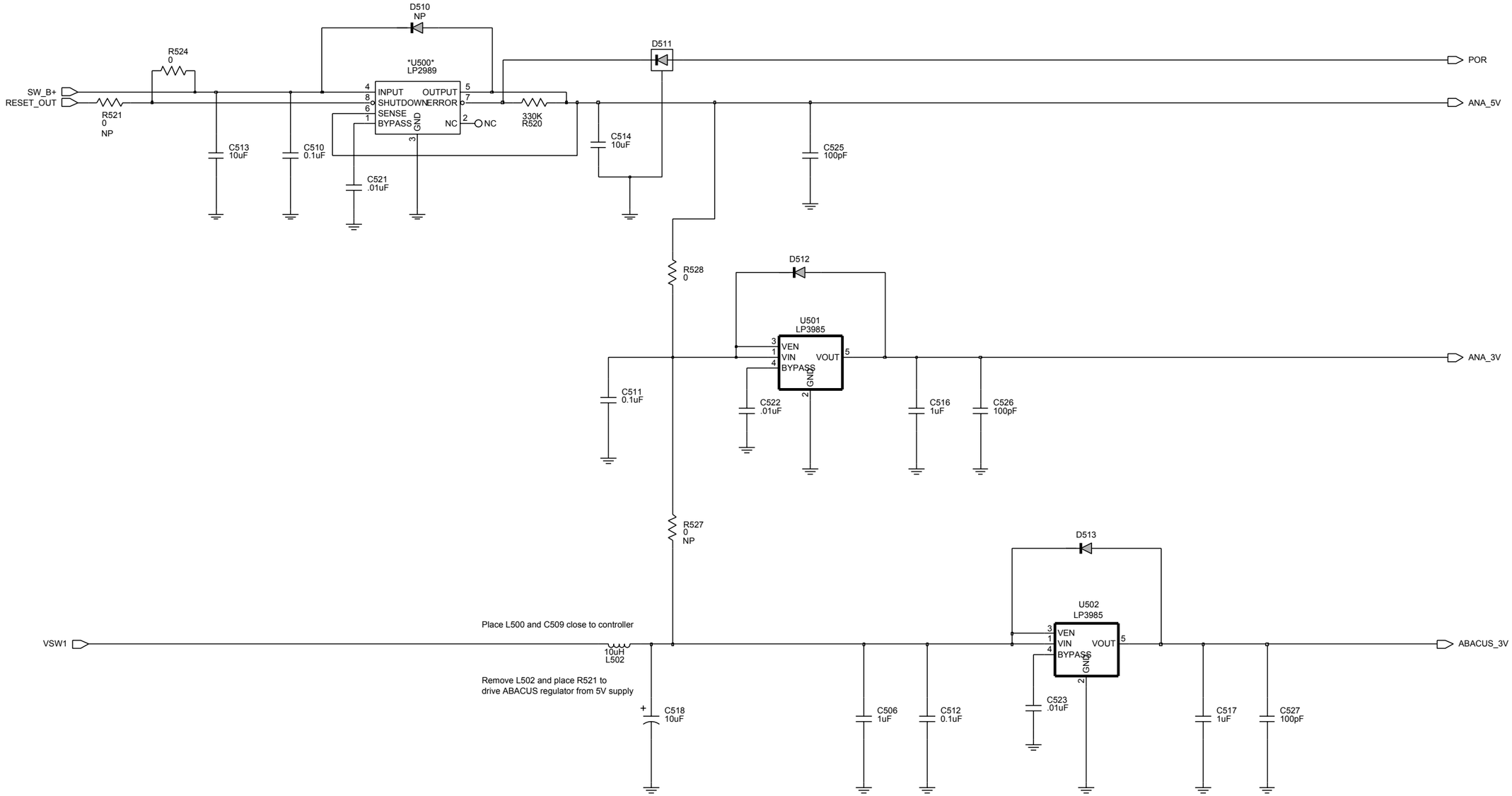


Figure 9-97. PMUE4270A Receiver Schematic, Sheet 6 of 6 (Regulators)

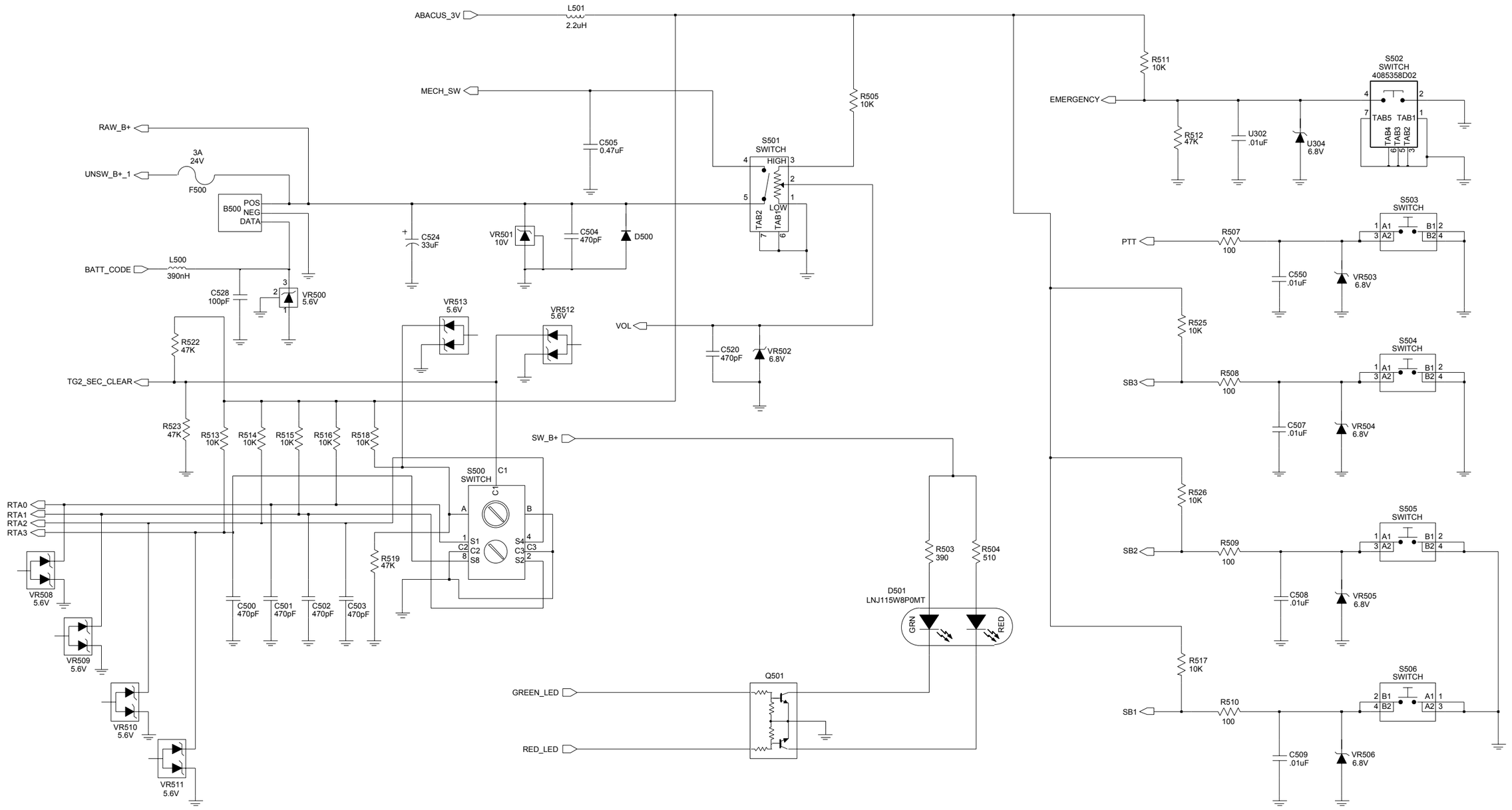


Figure 9-98. PMUE4270A Controls

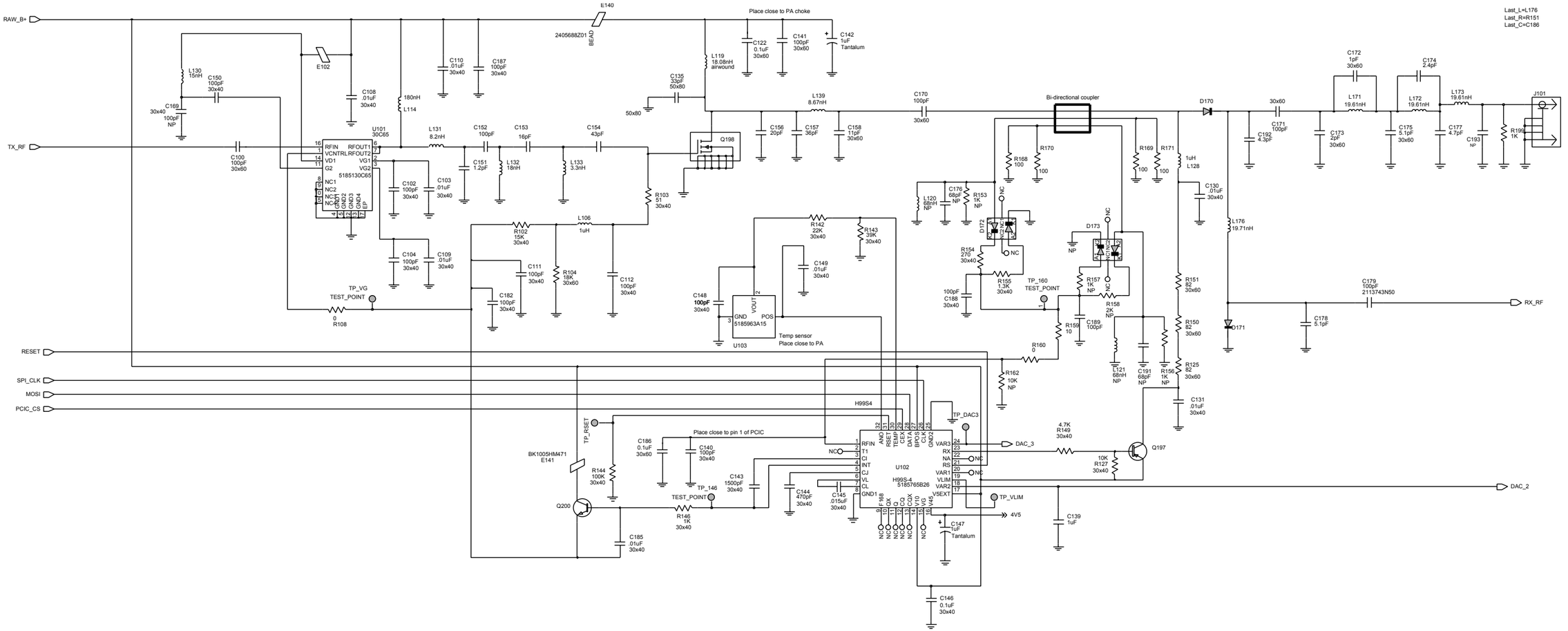


Figure 9-99. PMUE4270A Transmitter Subsection (Ring PA) Schematic

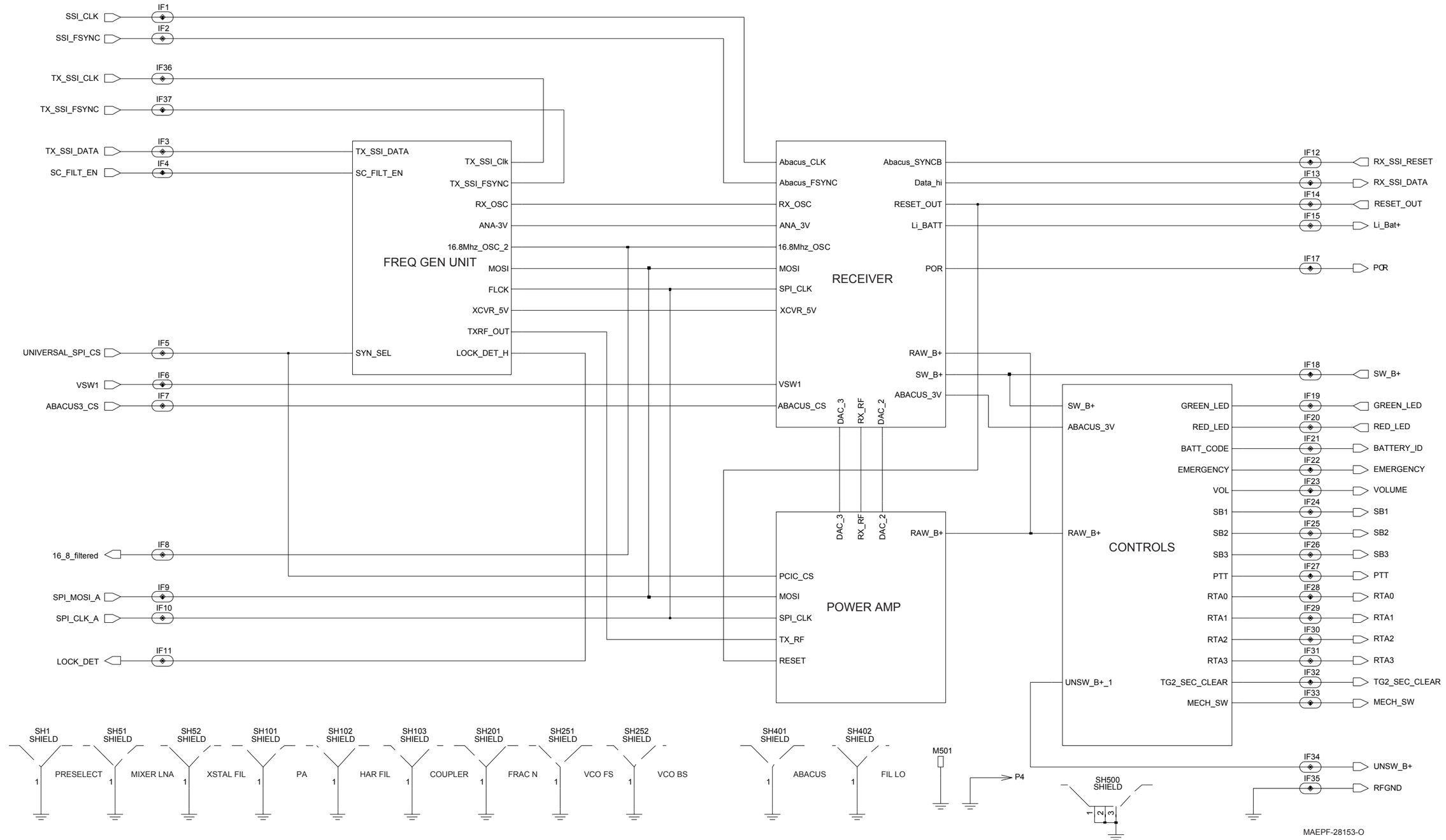
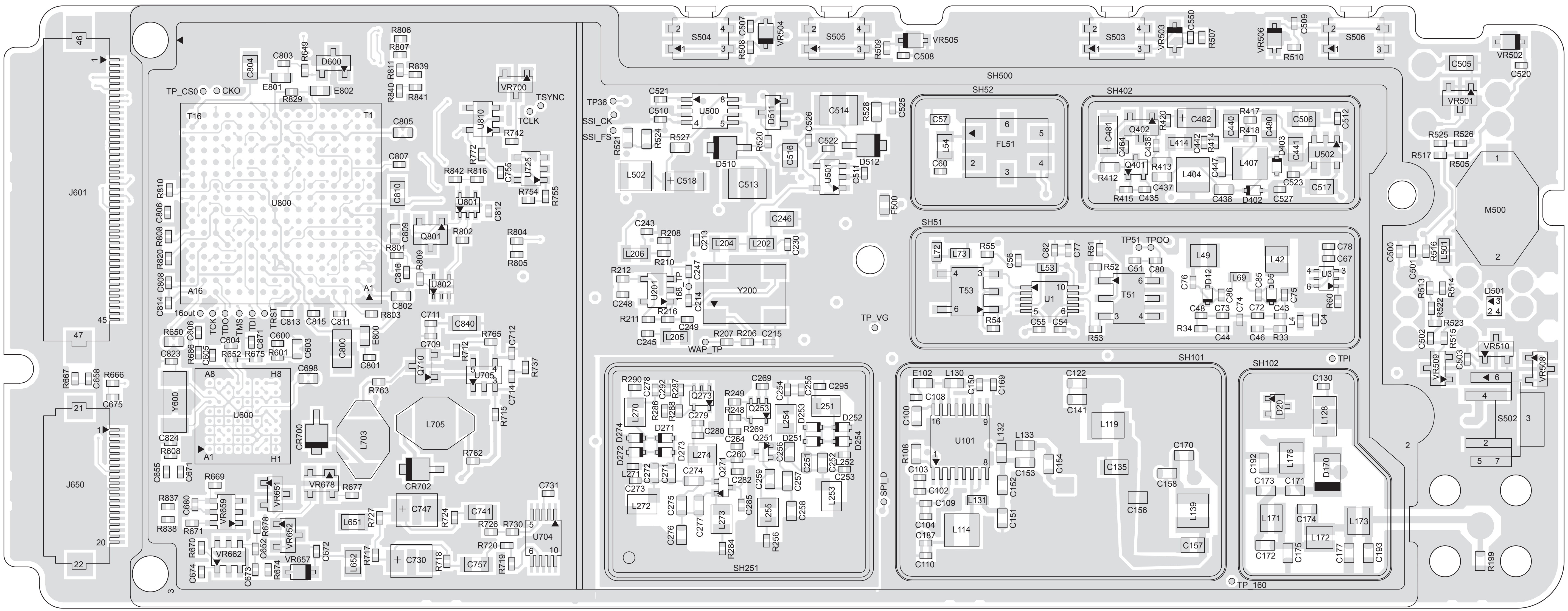


Figure 9-100. PMUE4270A RF Schematic

Viewed From Side 1



MAEPF-28154-O

Figure 9-101. PMUE4270A Main Circuit Board Component Location Diagram – Side 1

Viewed From Side 2

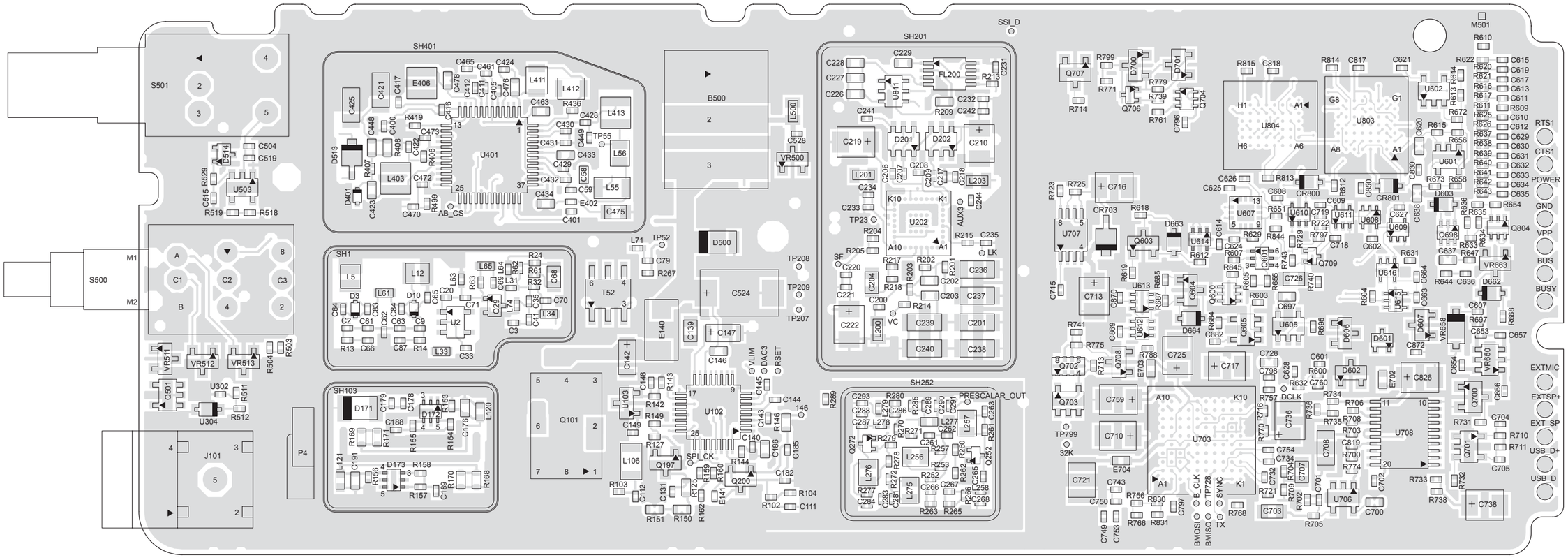


Figure 9-102. PMUE4270A Main Circuit Board Component Location Diagram – Side 2

PMUE4270A Main Circuit Board Electrical Parts List

Reference Designator	Motorola Part Number	Description
B500	0986237A02	CONNECTOR (CONTACT BATTERY)
C100	2113740F51	CAP CHIP REEL CL1 +/-30 100
C102	2113743N50	CAP CHIP 100 PF 5% COG
C103	2113743L41	CAP CHIP 10000 PF 10% X7R
C104	2113743N50	CAP CHIP 100 PF 5% COG
C108	2113743L41	CAP CHIP 10000 PF 10% X7R
C109	2113743L41	CAP CHIP 10000 PF 10% X7R
C110	2113743L41	CAP CHIP 10000 PF 10% X7R
C111	NOTPLACED	GCAM DUMMY PART NUMBER
C112	2113743N50	CAP CHIP 100 PF 5% COG
C122	2113743E20	CAP CHIP. 10 UF 10%
C130	2113743L41	CAP CHIP 10000 PF 10% X7R
C131	2113743L41	CAP CHIP 10000 PF 10% X7R
C135	2113740A41	CAP CHIP REEL CL1 +/-30 33
C139	2311049A86	CAP TAN CHIP 1UF 20% 10V 0805
C140	2113743N50	CAP CHIP 100 PF 5% COG
C141	2113740F51	CAP CHIP REEL CL1 +/-30 100
C142	2311049A37	CAP TANT CHIP 1 20 20
C143	2113743L21	CAP CHIP 1500 PF 10% X7R
C144	2113743L09	CAP CHIP 470 PF 10% X7R
C145	2113743M04	CAP CHIP 15000 PF +80-20% Y5V
C146	2113743E20	CAP CHIP. 10 UF 10%
C147	2311049A37	CAP TANT CHIP 1 20 20
C148	2113743N50	CAP CHIP 100 PF 5% COG
C149	2113743L41	CAP CHIP 10000 PF 10% X7R
C150	2113743N50	CAP CHIP 100 PF 5% COG
C151	2113740F05	CAP CHIP REEL CL1 +/-30 1.2
C152	2113740F51	CAP CHIP REEL CL1 +/-30 100
C153	2113740L23	CAP 16.0PF 50V 2.0%
C154	2113740F42	CAP CHIP REEL CL1 +/-30 43
C156	2103689A45	CAP CHIP CL1 20+/-5%PF
C157	2113740A42	CAP CHIP REEL CL1 +/-30 36
C158	2113740F28	CAP CHIP REEL CL1 +/-30 11
C170	2113740F51	CAP CHIP REEL CL1 +/-30 100
C171	2113740F51	CAP CHIP REEL CL1 +/-30 100
C172	2113740F03	CAP CHIP REEL CL1 +/-30 1.0
C173	2113740F10	CAP CHIP REEL CL1+/-30 2.0
C174	2113740F12	CAP CHIP REEL CL1 +/-30 2.4
C175	2113740F20	CAP CHIP REEL CL1 +/-30 5.1
C176	NOTPLACED	GCAM DUMMY PART NUMBER
C177	2113740F19	CAP CHIP REEL CL1 +/-30 4.7
C178	2113743N19	CAP CHIP 5.1 PF +-.5PF COG
C179	2113743N50	CAP CHIP 100 PF 5% COG
C182	2113743N50	CAP CHIP 100 PF 5% COG
C185	2113743L41	CAP CHIP 10000 PF 10% X7R
C186	2113743E20	CAP CHIP. 10 UF 10%
C187	2113743N50	CAP CHIP 100 PF 5% COG
C188	2113743N50	CAP CHIP 100 PF 5% COG
C189	2113743N50	CAP CHIP 100 PF 5% COG
C191	NOTPLACED	GCAM DUMMY PART NUMBER
C192	2113740F18	CAP CHIP REEL CL1 +/-30 4.3
C193	NOTPLACED	GCAM DUMMY PART NUMBER
C2	2113743N31	CAP CHIP 16.0 PF 5% COG
C20	2113743N50	CAP CHIP 100 PF 5% COG
C200	2113743L33	CAP CHIP 4700 PF 10% X7R
C201	2185419D06	CAP CER SUPER L/D 0.1UF
C202	2113743E12	CAP CHIP .047UF 10% X7R
C203	2113743E12	CAP CHIP .047UF 10% X7R
C204	2109720D20	CAP CHIP LOW DIST 2000 SOV
C206	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C207	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C208	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C209	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C210	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C213	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C214	2113743L41	CAP CHIP 10000 PF 10% X7R
C215	2113743N50	CAP CHIP 100 PF 5% COG
C217	2113743N50	CAP CHIP 100 PF 5% COG
C218	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C219	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C220	2113743L41	CAP CHIP 10000 PF 10% X7R
C221	2113743N50	CAP CHIP 100 PF 5% COG
C222	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C226	2113743E20	CAP CHIP. 10 UF 10%
C227	2113740F51	CAP CHIP REEL CL1 +/-30 100
C228	2113743E20	CAP CHIP. 10 UF 10%
C229	2113743E20	CAP CHIP. 10 UF 10%
C230	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C231	2113743L01	CAP CHIP 220 PF 10% X7R
C232	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C233	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C234	2113743N50	CAP CHIP 100 PF 5% COG
C235	2113743N50	CAP CHIP 100 PF 5% COG
C236	2185419D06	CAP CER SUPER L/D 0.1UF
C237	2185419D06	CAP CER SUPER L/D 0.1UF
C238	2185419D06	CAP CER SUPER L/D 0.1UF
C239	2185419D06	CAP CER SUPER L/D 0.1UF
C240	2185419D06	CAP CER SUPER L/D 0.1UF
C241	2113743N50	CAP CHIP 100 PF 5% COG
C242	2113743N50	CAP CHIP 100 PF 5% COG
C243	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C244	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C245	2113743N50	CAP CHIP 100 PF 5% COG
C246	2113743F18	CAP CHIP 2.2 UF 16V +80-20%
C247	2113743L17	CAP CHIP 1000 PF 10% X7R
C248	NOTPLACED	
C249	2113743L17	CAP CHIP 1000 PF 10% X7R
C251	2113740L15	CAP CER CHIP 7.5 PF+-0.1PF
C252	2113740L15	CAP CER CHIP 7.5 PF+-0.1PF
C253	2113743N17	"CAP CHIP 4.3 PF +-.25PF COG"
C254	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C255	2113743N50	CAP CHIP 100 PF 5% COG
C256	2113740L16	CAP CER CHIP 8.2 PF+-0.1PF
C257	2113740L20	CAP 12.0 PF 50V 2.0 %
C258	2113740L17	CAP CER CHIP 9.1 PF+-0.1PF
C259	2113740L35	CAP 51.0 PF 50V 2.0%
C260	2113743N09	CAP CHIP 2.0PF +-.25PF COG
C261	2113743N50	CAP CHIP 100 PF 5% COG
C262	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C263	2113743N50	CAP CHIP 100 PF 5% COG
C264	2113743N20	CAP CHIP 5.6 PF +-.5PF COG
C265	2113743N50	CAP CHIP 100 PF 5% COG
C266	2113743N50	CAP CHIP 100 PF 5% COG
C267	2113743N35	CAP CHIP 24.0 PF 5% COG
C268	2113743N30	CAP CHIP 15.0PF 5% COG
C269	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C271	2113740L15	CAP CER CHIP 7.5 PF+-0.1PF
C272	2113740L14	CAP CER CHIP 6.8PF +-0.1PF
C273	2113743N17	"CAP CHIP 4.3 PF +-.25PF COG"
C274	2113740L14	CAP CER CHIP 6.8PF +-0.1PF
C275	2113740L20	CAP 12.0 PF 50V 2.0 %
C276	2113740L16	CAP CER CHIP 8.2 PF+-0.1PF
C277	2113740L35	CAP 51.0 PF 50V 2.0%

Reference Designator	Motorola Part Number	Description
C278	2113743N50	CAP CHIP 100 PF 5% COG
C279	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C280	2113743N50	CAP CHIP 100 PF 5% COG
C281	2113743N50	CAP CHIP 100 PF 5% COG
C282	2113743N09	CAP CHIP 2.0PF +-.25PF COG
C283	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C284	2113743N50	CAP CHIP 100 PF 5% COG
C285	2113743N07	CAP CHIP 1.5PF +-.25PF COG
C286	2113743N50	CAP CHIP 100 PF 5% COG
C287	2113743N50	CAP CHIP 100 PF 5% COG
C288	2113743N22	CAP CHIP 6.8 PF +-.5PF COG
C289	2113743N25	CAP CHIP 9.1 PF +-.5PF COG
C290	2113743N23	CAP CHIP 7.5 PF +-.5PF COG
C291	2113743N50	CAP CHIP 100 PF 5% COG
C292	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C293	2113743N23	CAP CHIP 7.5 PF +-.5PF COG
C295	2113743N50	CAP CHIP 100 PF 5% COG
C3	NOTPLACED	GCAM DUMMY PART NUMBER
C33	2113743N50	CAP CHIP 100 PF 5% COG
C35	2113743N44	CAP CHIP 56.0 PF 5% COG
C4	NOTPLACED	GCAM DUMMY PART NUMBER
C400	2113743N50	CAP CHIP 100 PF 5% COG
C401	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C405	2113743N50	CAP CHIP 100 PF 5% COG
C41	2113743N23	CAP CHIP 7.5 PF +-.5PF COG
C411	2113743L25	CAP CHIP 2200 PF 10% X7R
C412	NOTPLACED	GCAM DUMMY PART NUMBER
C416	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C417	2113743N50	CAP CHIP 100 PF 5% COG
C421	NOTPLACED	GCAM DUMMY PART NUMBER
C422	2113743L41	CAP CHIP 10000 PF 10% X7R
C423	2113740F47	CAP CHIP REEL CL1 +/-30 68
C424	2113743N50	CAP CHIP 100 PF 5% COG

Reference Designator	Motorola Part Number	Description
C425	2113741B69	CAP CHIP CL2 X7R REEL 100000
C428	2113743L41	CAP CHIP 10000 PF 10% X7R
C429	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C43	2113743N31	CAP CHIP 16.0 PF 5% COG
C430	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C431	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C432	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C433	2113740F33	CAP CHIP REEL CL1 +/-30 18
C434	2113743E12	CAP CHIP .047UF 10% X7R
C435	2113743N44	CAP CHIP 56.0 PF 5% COG
C436	2113743N44	CAP CHIP 56.0 PF 5% COG
C437	2113740F22	CAP CHIP REEL CL1 +/-30 6.2
C438	2113740F32	CAP CHIP REEL CL1+/-30 16
C44	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C440	2113743A24	CAP CHIP .330 UF 10% 16V
C441	2311049A86	CAP TAN CHIP 1UF 20% 10V 0805
C442	2113743L41	CAP CHIP 10000 PF 10% X7R
C447	NOTPLACED	GCAM DUMMY PART NUMBER
C448	2113743E10	CAP CHIP .033 UF 10% X 7R
C449	2113743N24	CAP CHIP 8.2 PF + -.5PF COG
C46	2113743N50	CAP CHIP 100 PF 5% COG
C461	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C463	2113743E12	CAP CHIP .047UF 10% X7R
C464	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C465	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C470	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C472	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

Reference Designator	Motorola Part Number	Description
C473	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C475	NOTPLACED	GCAM DUMMY PART NUMBER
C476	2113740F58	CAP CHIP REEL CL1 +/-30 200
C478	2113743E12	CAP CHIP .047UF 10% X7R
C48	2113743N31	CAP CHIP 16.0 PF 5% COG
C480	2311049A86	CAP TAN CHIP 1UF 20% 10V 0805
C481	2311049A62	CAP TAN CHIP A/P 4.7 10 10
C482	2311049A62	CAP TAN CHIP A/P 4.7 10 10
C500	2113743L09	CAP CHIP 470 PF 10% X7R
C501	2113743L09	CAP CHIP 470 PF 10% X7R
C502	2113743L09	CAP CHIP 470 PF 10% X7R
C503	2113743L09	CAP CHIP 470 PF 10% X7R
C504	2113743L09	CAP CHIP 470 PF 10% X7R
C505	2113743A27	CAP CHIP .470 UF 10% 16V
C506	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C507	2113743L41	CAP CHIP 10000 PF 10% X7R
C508	2113743L41	CAP CHIP 10000 PF 10% X7R
C509	2113743L41	CAP CHIP 10000 PF 10% X7R
C51	2113743N13	CAP CHIP 3.0 PF +-.25PF COG
C510	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C511	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C512	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C513	2113743T19	CAP 10UF 16V CER 3225 X5R
C514	2113743T19	CAP 10UF 16V CER 3225 X5R
C515	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C516	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C517	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C518	2311049A59	CAP TANT CHIP A/P 10UF 10% 6V
C519	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

Reference Designator	Motorola Part Number	Description
C520	2113743L09	CAP CHIP 470 PF 10% X7R
C521	2113743L41	CAP CHIP 10000 PF 10% X7R
C522	2113743L41	CAP CHIP 10000 PF 10% X7R
C523	2113743L41	CAP CHIP 10000 PF 10% X7R
C524	2311049A45	CAP TANT CHIP 10 10 35
C525	2113743N50	CAP CHIP 100 PF 5% COG
C526	2113743N50	CAP CHIP 100 PF 5% COG
C527	2113743N50	CAP CHIP 100 PF 5% COG
C528	2113743N50	CAP CHIP 100 PF 5% COG
C54	2113743N50	CAP CHIP 100 PF 5% COG
C55	2113743N50	CAP CHIP 100 PF 5% COG
C550	2113743L41	CAP CHIP 10000 PF 10% X7R
C56	2113743N01	CAP CHIP 0.5 PF +-.25 PF COG
C57	2113740L12	CAP CER CHIP 5.6PF +-0.1PF
C58	2113740L07	CAP CER CHIP 3.6PF +-0.1PF
C59	NOTPLACED	GCAM DUMMY PART NUMBER
C60	NOTPLACED	GCAM DUMMY PART NUMBER
C600	2113743L41	CAP CHIP 10000 PF 10% X7R
C601	2113743N38	CAP CHIP 33.0 PF 5% COG
C602	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C603	2113743E20	CAP CHIP. 10 UF 10%
C604	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C605	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C606	2113743N50	CAP CHIP 100 PF 5% COG
C607	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C608	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C609	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C61	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C610	2113743N40	CAP CHIP 39.0 PF 5% COG
C611	2113743N40	CAP CHIP 39.0 PF 5% COG

Reference Designator	Motorola Part Number	Description
C612	2113743N40	CAP CHIP 39.0 PF 5% COG
C613	2113743N40	CAP CHIP 39.0 PF 5% COG
C614	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C615	2113743N40	CAP CHIP 39.0 PF 5% COG
C617	2113743N40	CAP CHIP 39.0 PF 5% COG
C619	2113743N40	CAP CHIP 39.0 PF 5% COG
C62	2113743N34	CAP CHIP 22.0 PF 5% COG
C620	2113743E20	CAP CHIP. 10 UF 10%
C621	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C624	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C625	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C626	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C627	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C628	2113743N44	CAP CHIP 56.0 PF 5% COG
C629	2113743N40	CAP CHIP 39.0 PF 5% COG
C63	2113743N16	CAP CHIP 3.9 PF +-.25PF COG
C630	2113743N40	CAP CHIP 39.0 PF 5% COG
C631	2113743N40	CAP CHIP 39.0 PF 5% COG
C632	2113743N40	CAP CHIP 39.0 PF 5% COG
C633	2113743N40	CAP CHIP 39.0 PF 5% COG
C634	2113743N40	CAP CHIP 39.0 PF 5% COG
C635	2113743N40	CAP CHIP 39.0 PF 5% COG
C636	2113743N40	CAP CHIP 39.0 PF 5% COG
C637	2113741F49	CAP CHIP CL2 X7R REEL 10000
C638	2113743E20	CAP CHIP. 10 UF 10%
C64	2113743N27	CAP CHIP 11.0 PF 5% COG
C65	2113743N27	CAP CHIP 11.0 PF 5% COG
C652	2113743N40	CAP CHIP 39.0 PF 5% COG
C653	2113743N40	CAP CHIP 39.0 PF 5% COG
C654	2113743N40	CAP CHIP 39.0 PF 5% COG

Reference Designator	Motorola Part Number	Description
C655	2113743N40	CAP CHIP 39.0 PF 5% COG
C656	2113743N40	CAP CHIP 39.0 PF 5% COG
C657	2113743N40	CAP CHIP 39.0 PF 5% COG
C658	2113743N40	CAP CHIP 39.0 PF 5% COG
C66	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C663	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C664	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C67	2113928N01	CAP CER CHIP 0.1UF 10% 6.3
C671	2113743N38	CAP CHIP 33.0 PF 5% COG
C672	2113743N40	CAP CHIP 39.0 PF 5% COG
C673	2113743N38	CAP CHIP 33.0 PF 5% COG
C674	2113743L09	CAP CHIP 470 PF 10% X7R
C675	2113743N40	CAP CHIP 39.0 PF 5% COG
C68	NOTPLACED	GCAM DUMMY PART NUMBER
C680	2113743N38	CAP CHIP 33.0 PF 5% COG
C682	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C69	2113743N24	CAP CHIP 8.2 PF + -.5PF COG
C697	2113743E20	CAP CHIP. 10 UF 10%
C698	2113743E20	CAP CHIP. 10 UF 10%
C70	2113743N50	CAP CHIP 100 PF 5% COG
C700	2113743E20	CAP CHIP. 10 UF 10%
C701	2113743L05	CAP CHIP 330 PF 10% X7R
C702	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C703	2113743A31	CAP CHIP 1.0 UF 10% X7R
C704	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C705	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C707	2113743A31	CAP CHIP 1.0 UF 10% X7R
C708	2109720D14	CAP CER CHIP LOW DIST 0.1UF
C709	2113743M24	CAP CHIP 100000 PF +80-20% Y5V

Reference Designator	Motorola Part Number	Description
C71	2113743N33	CAP CHIP 20.0 PF 5% COG
C710	2311049C52	CAP TANT CHIP 33UF 10% 10V
C711	2113743N50	CAP CHIP 100 PF 5% COG
C712	2113743N50	CAP CHIP 100 PF 5% COG
C713	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C714	2113743L50	CAP CHIP 33000 PF 10%
C715	2113743L41	CAP CHIP 10000 PF 10% X7R
C716	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C717	2311049C52	CAP TANT CHIP 33UF 10% 10V
C718	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C719	2113743N50	CAP CHIP 100 PF 5% COG
C72	2113743N18	CAP CHIP 4.7 PF +-.25PF COG
C721	2113743T19	CAP 10UF 16V CER 3225 X5R
C725	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C726	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C728	2113743E11	CAP CHIP .039 UF 10% X 7R
C73	2113743N18	CAP CHIP 4.7 PF +-.25PF COG
C730	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C731	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C732	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C734	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C736	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C738	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C74	2113743N34	CAP CHIP 22.0 PF 5% COG
C741	2113743A31	CAP CHIP 1.0 UF 10% X7R
C743	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C747	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V

Reference Designator	Motorola Part Number	Description
C749	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C75	2113743N27	CAP CHIP 11.0 PF 5% COG
C750	2113743L41	CAP CHIP 10000 PF 10% X7R
C753	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C754	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C755	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C757	2113743A31	CAP CHIP 1.0 UF 10% X7R
C759	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C76	2113743N27	CAP CHIP 11.0 PF 5% COG
C760	2113743N50	CAP CHIP 100 PF 5% COG
C77	2113743L29	CAP CHIP 3300PF 10% X7R
C78	2113743N50	CAP CHIP 100 PF 5% COG
C79	2113743N28	CAP CHIP 12.0 PF 5% COG
C796	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C797	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C798	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C80	2113743N28	CAP CHIP 12.0 PF 5% COG
C800	2113743B29	CAP CHIP 1.00 UF 10% 16V
C801	2113743L09	CAP CHIP 470 PF 10% X7R
C802	2113743E04	CER CHIP CAP .016UF
C803	2113743L09	CAP CHIP 470 PF 10% X7R
C804	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C805	2113743E04	CER CHIP CAP .016UF
C806	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C807	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C808	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C809	2113743E04	CER CHIP CAP .016UF
C810	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V

Reference Designator	Motorola Part Number	Description
C811	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C812	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C813	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C814	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C815	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C816	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C817	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C818	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C819	NOTPLACED	GCAM DUMMY PART NUMBER
C82	2113743N50	CAP CHIP 100 PF 5% COG
C823	2113743N20	CAP CHIP 5.6 PF +-.5PF COG
C824	2113743N20	CAP CHIP 5.6 PF +-.5PF COG
C826	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C83	2113743N10	CAP CHIP 2.2 PF +-.25PF COG
C830	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C84	2113743N10	CAP CHIP 2.2 PF +-.25PF COG
C840	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C85	2113743N07	CAP CHIP 1.5PF +-.25PF COG
C850	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C86	2113743N07	CAP CHIP 1.5PF +-.25PF COG
C869	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C87	2113743N50	CAP CHIP 100 PF 5% COG
C870	2113743M24	CAP CHIP 100000 PF +80-20% Y5V
C871	2113743N50	CAP CHIP 100 PF 5% COG
C872	2113743N50	CAP CHIP 100 PF 5% COG
C9	2113743N31	CAP CHIP 16.0 PF 5% COG

Reference Designator	Motorola Part Number	Description
CR700	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR702	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR703	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR800	4805656W37	TSTR BAT54HT1
CR801	4805656W37	TSTR BAT54HT1
D10	4809877C13	DIODE VARACTOR ISV305 SMD
D12	4809877C13	DIODE VARACTOR ISV305 SMD
D170	4802482J02	PIN DIODE SMD
D171	4802482J02	PIN DIODE SMD
D172	4802197J83	DUAL SHOTTKY DIODE MBD330DWT1
D173	NOTPLACED	GCAM DUMMY PART NUMBER
D20	4813825A19	DIODE SCHOTTKY BARRIER SERIES
D201	4802233J09	DIODE TRIPLE SOT25-RH
D202	4802233J09	DIODE TRIPLE SOT25-RH
D251	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D252	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D253	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D254	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D271	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D272	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D273	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D274	4815002H01	"DIODE,VARACTOR DIODE,,,,,30V ,,,SIL"
D3	4809877C13	DIODE VARACTOR ISV305 SMD
D401	4809877C08	DIODE VARACTOR 1SV279 SMD
D402	4809877C13	DIODE VARACTOR ISV305 SMD
D403	4809877C13	DIODE VARACTOR ISV305 SMD

Reference Designator	Motorola Part Number	Description
D5	4809877C13	DIODE VARACTOR ISV305 SMD
D500	4880107R01	RECTIFIER
D501	4809118D02	LED BICOLOR LNJ115W8POMT
D510	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D511	4805129M90	DIODE SOT PKGD
D512	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D513	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D514	4805218N57	DIODE DUAL
D600	4805129M90	DIODE SOT PKGD
D601	4805218N57	DIODE DUAL
D602	4805129M06	DIODE MMBD7000
D603	4805656W37	TSTR BAT54HT1
D606	4805129M06	DIODE MMBD7000
D607	4805129M06	DIODE MMBD7000
D662	4805656W37	TSTR BAT54HT1
D663	4805656W37	TSTR BAT54HT1
D664	4805656W37	TSTR BAT54HT1
D700	4805129M90	DIODE SOT PKGD
D701	4805129M06	DIODE MMBD7000
E102	2480574F01	IND FERRITE CHIP 60OHM 0603
E140	2405688Z01	INDUCTOR FERRITE BEAD
E141	2480640Z01	SURFACE MOUNT FERRITE BEAD
E402	2480640Z01	SURFACE MOUNT FERRITE BEAD
E406	2462587N76	CHIP IND 4700NH 5%
E702	2480574F01	IND FERRITE CHIP 60OHM 0603
E703	2480574F01	IND FERRITE CHIP 60OHM 0603
E704	2480574F01	IND FERRITE CHIP 60OHM 0603
E800	2480574F01	IND FERRITE CHIP 60OHM 0603

Reference Designator	Motorola Part Number	Description
E801	2480574F01	IND FERRITE CHIP 60OHM 0603
E802	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
F500	6580542Z01	FUSE CHIP SMT TR/1608FF 3A
FL200	9185130D01	FLTR SW CAP 3 POLE BUT-TERW
FL51	9185924B01	"FILTER, 73.35 MHZ 3-POLE CRYST"
J101	2880658Z04	Connector (SMA)
J601	0905505Y10	CONN 45 PIN ZIF
J650	0905505Y09	CONN 20 PIN ZIF
L106	2462587T30	IND CHIP 1000NH 5% LOW PRO
L114	2462587N56	CHIP IND 180NH 5%
L119	2460591C35	COIL AIR WOUND INDUC 18.08
L12	2460591C16	COIL AIR WOUND INDUC 16.28
L120	NOTPLACED	GCAM DUMMY PART NUMBER
L121	NOTPLACED	GCAM DUMMY PART NUMBER
L128	2462587T30	IND CHIP 1000NH 5% LOW PRO
L130	2413926G09	IND 15.0 NH 5%
L131	2413926G06	IND 8.2 NH 5%
L132	2413926G10	IND 18.0 NH 5%
L133	2413926G01	IND 3.3 NH +/- 0.3 NH
L139	2460591B22	COIL AIR WOUND INDUC 8.67
L171	2460591B80	COIL AIR WOUND INDUC 19.61
L172	2460591B80	COIL AIR WOUND INDUC 19.61
L173	2460591B80	COIL AIR WOUND INDUC 19.61
L176	2460591D24	COIL AIR WOUND INDUC 19.71
L200	2462587Q47	IND CHIP 1000 NH 10%
L201	2462587Q20	"IND CHIP 2,200NH 20%"
L202	2462587Q20	"IND CHIP 2,200NH 20%"
L203	2462587Q20	"IND CHIP 2,200NH 20%"
L204	2462587Q20	"IND CHIP 2,200NH 20%"
L205	2462587Q47	IND CHIP 1000 NH 10%
L206	2462587Q20	"IND CHIP 2,200NH 20%"
L251	2462587V41	IND CHIP 390 NH 10%

Reference Designator	Motorola Part Number	Description
L252	2487319K20	IND CER WW 36NH 5% 1005 SMD
L253	2415010H02	"COIL,AW,12.5UH,2%,,,AIR,28A WG,,,SM"
L254	2462587V41	IND CHIP 390 NH 10%
L255	2462587V41	IND CHIP 390 NH 10%
L256	2462587V41	IND CHIP 390 NH 10%
L257	2462587V41	IND CHIP 390 NH 10%
L258	2487319K16	IND CER WW 15NH 5% 1005 SMD
L270	2462587V41	IND CHIP 390 NH 10%
L271	2487319K20	IND CER WW 36NH 5% 1005 SMD
L272	2415010H01	"COIL,AW,8NH,2%,,,AIR,,RH,28 AWG,,,SM"
L273	2462587V41	IND CHIP 390 NH 10%
L274	2462587V41	IND CHIP 390 NH 10%
L275	2462587V41	IND CHIP 390 NH 10%
L276	2462587V41	IND CHIP 390 NH 10%
L277	2413926G12	IND 27.0 NH 5%
L278	2409154M18	IND CER MLTILYR 27.0NH 1005
L279	2409154M18	IND CER MLTILYR 27.0NH 1005
L31	2409154M88	"FIXED INDUC-TOR,CHIP,10NH,5%,,.46OHM"
L33	2409377M17	"IDCTR,CHIP,100NH,5%,400MA, .58OHM,SM"
L34	2409377M17	"IDCTR,CHIP,100NH,5%,400MA, .58OHM,SM"
L4	0662057M01	RES. CHIP 0 5% 20X40
L403	2462587N75	CHIP IND 3900 NH 5%
L404	2462587N59	CHIP IND 330NH 5%
L407	2462587N76	CHIP IND 4700NH 5%
L411	2405769X05	COIL INDUCTOR
L412	2405769X05	COIL INDUCTOR
L413	2462587N59	CHIP IND 330NH 5%
L414	2462587Q51	"IND CHIP 2,200 NH 10%"
L42	2460591C16	COIL AIR WOUND INDUC 16.28

Reference Designator	Motorola Part Number	Description
L49	2460591C16	COIL AIR WOUND INDUC 16.28
L5	2460591C16	COIL AIR WOUND INDUC 16.28
L500	2462587Q42	IND CHIP 390NH 10%
L501	2462587Q51	"IND CHIP 2,200 NH 10%"
L502	2405452C68	TYPE E4424-M WITH CER BASE
L53	2409377M36	IND CHIP WW 220 NH 5% 1608
L54	2413926K32	IND CER CHIP 560.0 NH 5%
L55	2462587T25	IND CHIP 620NH 5% LOW PRO
L56	0662057C01	CHIP RES 0 OHMS .050 OHMS
L61	2409377M34	IND CHIP WW 150 NH 5% 1608
L63	2409154M92	IND CER MLTILYR 22.0NH 1005
L64	0662057M01	RES. CHIP 0 5% 20X40
L65	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
L651	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L652	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L69	2409377M19	IND CHIP WW 22 NH 5% 1608
L703	2486085A06	COIL 47UH SMT POWER INDUCTOR
L705	2486085A06	COIL 47UH SMT POWER INDUCTOR
L71	2409154M17	IND CER MLTILYR 22.0NH 1005
L72	2409377M35	"IDCTR,CHIP,180NH,5%,240MA, 1.25OHM,S"
L73	2409377M37	"IDCTR,CHIP,270NH,5%,170MA, 2.3OHM,SM"
L74	2409154M17	IND CER MLTILYR 22.0NH 1005
M500	0985888K02	SKT RTC BTTY LEAP
M501	NOTPLACED	GCAM DUMMY PART NUMBER
P4	3905643V01	CONTACT ANT GRD
PCB	8486734Z02	"BOARD, PC, UHF BAND1"
Q101	5185633C51	"AMP,FET,,380MHZMIN,520MHZ MAX,,,MDL,"
Q197	4813824A17	XSTR PNP40V .2A GENPB=100-300
Q200	4805128M12	TSTR BCW 60B (RH) (869826)

Reference Designator	Motorola Part Number	Description
Q251	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q252	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q253	4809939C05	TSTR DUAL NPN/PNP UMH 5
Q271	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q272	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q273	4809939C05	TSTR DUAL NPN/PNP UMH 5
Q29	4805585Q19	TRANSISTOR
Q401	4805218N63	RF TRANS SOT 323 BFQ67W
Q402	4805128M19	TSTR SOT23 MMBTA13 RH
Q501	4805921T09	XSTR DUAL ROHM FMG8
Q600	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q601	4809579E35	TSTR FET DUAL N-CHAN FDG360IN
Q603	4813824A10	TSTR NPN 40V .2A GEN PURP
Q604	4813824A10	TSTR NPN 40V .2A GEN PURP
Q605	5185143E74	IC SINGLE FET BUS SWITCH
Q698	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q700	4880048M01	TSTR NPN DIG 47K/47K
Q701	4805921T09	XSTR DUAL ROHM FMG8
Q702	4885844C01	XSTR FET
Q703	4805921T09	XSTR DUAL ROHM FMG8
Q704	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q706	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q707	4880048M01	TSTR NPN DIG 47K/47K
Q708	4805218N11	XISTOR SOT RH BST82
Q709	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q710	4813824A13	XSTR NPN 80V .5A DRIVER B=50
Q801	4880048M01	TSTR NPN DIG 47K/47K

Reference Designator	Motorola Part Number	Description
Q804	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
R102	0662057N03	RES. CHIP 15K 5% 20X40
R103	0662057M43	RES. CHIP 51 5% 20X40
R104	0662057N05	RES. CHIP 18K 5% 20X40
R108	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R125	0662057A23	CHIP RES 82 OHMS 5%
R127	0662057M98	RES CHIP 10K 5% 20X40
R13	0662057M98	RES CHIP 10K 5% 20X40
R14	0662057M98	RES CHIP 10K 5% 20X40
R142	0662057V11	RES CHIP 22K 1% 1/16W
R143	0662057V17	RES CHIP 39K 1% 1/16W
R144	0662057N23	RES CHIP 100K 5% 20X40
R146	0662057A49	CHIP RES 1000 OHMS 5%
R149	0662057M90	RES. CHIP 4700 5% 20X40
R150	0662057A23	CHIP RES 82 OHMS 5%
R151	0662057A23	CHIP RES 82 OHMS 5%
R153	NOTPLACED	GCAM DUMMY PART NUMBER
R154	0662057M60	RES. CHIP 270 5% 20X40
R155	0662057M77	RES. CHIP 1300 5% 20X40
R156	NOTPLACED	GCAM DUMMY PART NUMBER
R157	NOTPLACED	GCAM DUMMY PART NUMBER
R158	NOTPLACED	GCAM DUMMY PART NUMBER
R159	0662057M26	RES. CHIP 10 5% 20X40
R160	0662057M01	RES. CHIP 0 5% 20X40
R162	NOTPLACED	GCAM DUMMY PART NUMBER
R168	0662057A25	CHIP RES 100 OHMS 5%
R169	0662057A25	CHIP RES 100 OHMS 5%
R170	0662057A25	CHIP RES 100 OHMS 5%
R171	0662057A25	CHIP RES 100 OHMS 5%
R199	0662057A49	CHIP RES 1000 OHMS 5%
R201	0662057M52	RES. CHIP 120 5% 20X40
R202	0662057M76	RES. CHIP 1200 5% 20X40
R203	0662057M64	RES. CHIP 390 5% 20X40

Reference Designator	Motorola Part Number	Description
R204	0662057N17	RES. CHIP 56K 5% 20X40
R205	0662057N13	RES. CHIP 39K 5% 20X40
R206	0662057M98	RES CHIP 10K 5% 20X40
R207	0662057M74	RES. CHIP 1000 5% 20X40
R208	0662057N11	RES.CHIP 33K 5% 20X40
R209	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R210	0662057N11	RES.CHIP 33K 5% 20X40
R211	0662057M81	RES. CHIP 2000 5% 20X40
R212	NOTPLACED	
R213	0662057M96	RES. CHIP 8200 5% 20X40
R214	0662057M74	RES. CHIP 1000 5% 20X40
R215	0662057M98	RES CHIP 10K 5% 20X40
R216	0662057M47	RES. CHIP 75 5% 20X40
R217	0662057M89	RES. CHIP 4300 5% 20X40
R218	0662057M94	RES. CHIP 6800 5% 20X40
R24	0662057M94	RES. CHIP 6800 5% 20X40
R248	0662057M01	RES. CHIP 0 5% 20X40
R249	NOTPLACED	GCAM DUMMY PART NUMBER
R252	0662057M94	RES. CHIP 6800 5% 20X40
R253	0662057M97	RES. CHIP 9100 5% 2
R256	0662057M52	RES. CHIP 120 5% 20X40
R257	0662057M43	RES. CHIP 51 5% 20X40
R260	0662057M95	RES. CHIP 7500 55 20X40
R261	NOTPLACED	GCAM DUMMY PART NUMBER
R262	0662057M92	RES. CHIP 5600 5% 20X40
R263	0662057M59	RES. CHIP 240 5% 20X40
R265	0662057M42	RES. CHIP 47 5% 20X40
R266	0662057M01	RES. CHIP 0 5% 20X40
R267	0662057M01	RES. CHIP 0 5% 20X40
R269	0662057M01	RES. CHIP 0 5% 20X40
R270	0662057M96	RES. CHIP 8200 5% 20X40
R271	0662057M94	RES. CHIP 6800 5% 20X40
R272	0662057M54	RES. CHIP 150 5% 20X40

Reference Designator	Motorola Part Number	Description
R277	NOTPLACED	GCAM DUMMY PART NUMBER
R278	0662057M96	RES. CHIP 8200 5% 20X40
R279	0662057M89	RES. CHIP 4300 5% 20X40
R280	0662057M50	RES. CHIP 100 5% 20X40
R284	0662057M50	RES. CHIP 100 5% 20X40
R285	0662057M74	RES. CHIP 1000 5% 20X40
R286	0662057M01	RES. CHIP 0 5% 20X40
R287	NOTPLACED	GCAM DUMMY PART NUMBER
R288	0662057M01	RES. CHIP 0 5% 20X40
R289	0662057M01	RES. CHIP 0 5% 20X40
R290	0662057M01	RES. CHIP 0 5% 20X40
R32	0662057M71	RES. CHIP 750 5% 20X40
R33	0662057M98	RES CHIP 10K 5% 20X40
R34	0662057M98	RES CHIP 10K 5% 20X40
R406	0662057M98	RES CHIP 10K 5% 20X40
R407	0662057M98	RES CHIP 10K 5% 20X40
R408	0662057A55	CHIP RES 1800 OHM 5%
R412	0662057A31	CHIP RES 180 OHMS 5%
R413	0662057A37	CHIP RES 330 OHMS 5%
R414	0662057M98	RES CHIP 10K 5% 20X40
R415	0662057M98	RES CHIP 10K 5% 20X40
R417	0662057M75	RES. CHIP 1100 5% 20X40
R418	0662057M01	RES. CHIP 0 5% 20X40
R419	0662057N23	RES CHIP 100K 5% 20X40
R420	0662057N17	RES. CHIP 56K 5% 20X40
R436	0662057M01	RES. CHIP 0 5% 20X40
R499	0662057M98	RES CHIP 10K 5% 20X40
R503	0662057M64	RES. CHIP 390 5% 20X40
R504	0662057M67	RES. CHIP 510 5% 20X40
R505	0662057M98	RES CHIP 10K 5% 20X40
R507	0662057M50	RES. CHIP 100 5% 20X40
R508	0662057M50	RES. CHIP 100 5% 20X40
R509	0662057M50	RES. CHIP 100 5% 20X40
R51	0662057M48	RES. CHIP 82 5% 20X40

Reference Designator	Motorola Part Number	Description
R510	0662057M50	RES. CHIP 100 5% 20X40
R511	0662057M98	RES CHIP 10K 5% 20X40
R512	0662057N15	RES. CHIP 47K 5% 20X40
R513	0662057M98	RES CHIP 10K 5% 20X40
R514	0662057M98	RES CHIP 10K 5% 20X40
R515	0662057M98	RES CHIP 10K 5% 20X40
R516	0662057M98	RES CHIP 10K 5% 20X40
R517	0662057M98	RES CHIP 10K 5% 20X40
R518	0662057M98	RES CHIP 10K 5% 20X40
R519	0662057N15	RES. CHIP 47K 5% 20X40
R52	0662057M36	RES. CHIP 27 5% 20X40
R520	0662057N35	RES. CHIP 330K 5% 20X40
R521	NOTPLACED	GCAM DUMMY PART NUMBER
R522	0662057N15	RES. CHIP 47K 5% 20X40
R523	0662057N15	RES. CHIP 47K 5% 20X40
R524	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R525	0662057M98	RES CHIP 10K 5% 20X40
R526	0662057M98	RES CHIP 10K 5% 20X40
R527	NOTPLACED	GCAM DUMMY PART NUMBER
R528	0662057B47	CHIP RES 0 OHMS +-.050 OHMS
R529	0662057M67	RES. CHIP 510 5% 20X40
R53	0662057M36	RES. CHIP 27 5% 20X40
R54	0662057M92	RES. CHIP 5600 5% 20X40
R55	0662057M92	RES. CHIP 5600 5% 20X40
R60	0662057N23	RES CHIP 100K 5% 20X40
R600	0662057M64	RES. CHIP 390 5% 20X40
R601	0662057M67	RES. CHIP 510 5% 20X40
R603	0662057N39	RES. CHIP 470K 5% 20X40
R604	0662057N39	RES. CHIP 470K 5% 20X40
R605	0662057N23	RES CHIP 100K 5% 20X40
R607	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R608	0662057M50	RES. CHIP 100 5% 20X40
R609	NOTPLACED	GCAM DUMMY PART NUMBER

Reference Designator	Motorola Part Number	Description
R61	0662057M82	RES. CHIP 2200 5% 20X40
R610	NOTPLACED	GCAM DUMMY PART NUMBER
R611	0662057M50	RES. CHIP 100 5% 20X40
R612	0662057N23	RES CHIP 100K 5% 20X40
R613	0662057N06	RES. CHIP 20K 5% 20X40
R614	0662057N06	RES. CHIP 20K 5% 20X40
R615	0662057N23	RES CHIP 100K 5% 20X40
R616	0662057M50	RES. CHIP 100 5% 20X40
R617	NOTPLACED	GCAM DUMMY PART NUMBER
R618	0662057M98	RES CHIP 10K 5% 20X40
R619	0662057M98	RES CHIP 10K 5% 20X40
R62	0662057M82	RES. CHIP 2200 5% 20X40
R620	0662057M50	RES. CHIP 100 5% 20X40
R621	0662057M50	RES. CHIP 100 5% 20X40
R622	0662057M50	RES. CHIP 100 5% 20X40
R625	0662057M50	RES. CHIP 100 5% 20X40
R626	0662057M50	RES. CHIP 100 5% 20X40
R629	NOTPLACED	GCAM DUMMY PART NUMBER
R63	0662057M70	RES. CHIP 680 5% 20X40
R631	0662057N39	RES. CHIP 470K 5% 20X40
R632	0662057M50	RES. CHIP 100 5% 20X40
R633	NOTPLACED	GCAM DUMMY PART NUMBER
R634	0662057M01	RES. CHIP 0 5% 20X40
R635	NOTPLACED	GCAM DUMMY PART NUMBER
R636	0662057M98	RES CHIP 10K 5% 20X40
R637	0662057M74	RES. CHIP 1000 5% 20X40
R638	0662057M74	RES. CHIP 1000 5% 20X40
R639	0662057M74	RES. CHIP 1000 5% 20X40
R640	0662057M74	RES. CHIP 1000 5% 20X40
R641	0662057M74	RES. CHIP 1000 5% 20X40
R642	0662057M74	RES. CHIP 1000 5% 20X40
R643	0662057M74	RES. CHIP 1000 5% 20X40
R644	0662057M74	RES. CHIP 1000 5% 20X40
R647	0662057M98	RES CHIP 10K 5% 20X40

Reference Designator	Motorola Part Number	Description
R649	0662057N15	RES. CHIP 47K 5% 20X40
R650	0662057B46	CHIP RES 10.0 MEG OHMS 5%
R651	0662057M78	RES. CHIP 1500 5% 20X40
R652	0662057M98	RES CHIP 10K 5% 20X40
R654	0662057M98	RES CHIP 10K 5% 20X40
R655	0662057N23	RES CHIP 100K 5% 20X40
R656	0662057M98	RES CHIP 10K 5% 20X40
R658	0662057V32	RES CHIP 150K 1% 1/16W
R666	0662057M67	RES. CHIP 510 5% 20X40
R667	0662057M64	RES. CHIP 390 5% 20X40
R668	0662057M46	RES. CHIP 68 5% 20X40
R669	0662057M50	RES. CHIP 100 5% 20X40
R670	0662057M50	RES. CHIP 100 5% 20X40
R671	0662057M64	RES. CHIP 390 5% 20X40
R672	0662057M98	RES CHIP 10K 5% 20X40
R673	0662057M98	RES CHIP 10K 5% 20X40
R674	0662057M50	RES. CHIP 100 5% 20X40
R675	0662057M68	RES. CHIP 560 5% 20X40
R677	0662057M98	RES CHIP 10K 5% 20X40
R678	0662057M50	RES. CHIP 100 5% 20X40
R684	0662057M98	RES CHIP 10K 5% 20X40
R685	0662057M98	RES CHIP 10K 5% 20X40
R686	0662057M01	RES. CHIP 0 5% 20X40
R687	0662057N23	RES CHIP 100K 5% 20X40
R695	0662057N23	RES CHIP 100K 5% 20X40
R697	0662057M50	RES. CHIP 100 5% 20X40
R700	0662057N21	RES. CHIP 82K 5% 20X40
R702	0662057N10	RES. CHIP 30K 5% 20X40
R703	0662057M96	RES. CHIP 8200 5% 20X40
R704	0662057N06	RES. CHIP 20K 5% 20X40
R705	0662057N06	RES. CHIP 20K 5% 20X40
R706	0662057N21	RES. CHIP 82K 5% 20X40
R708	0662057M96	RES. CHIP 8200 5% 20X40
R709	0662057N06	RES. CHIP 20K 5% 20X40

Reference Designator	Motorola Part Number	Description
R710	0662057M94	RES. CHIP 6800 5% 20X40
R711	0662057M98	RES CHIP 10K 5% 20X40
R712	0662057V04	RES CHIP 12K 1% 1/16W
R713	0662057M98	RES CHIP 10K 5% 20X40
R714	0662057M98	RES CHIP 10K 5% 20X40
R715	0662057M71	RES. CHIP 750 5% 20X40
R716	0662057M98	RES CHIP 10K 5% 20X40
R717	0662057M64	RES. CHIP 390 5% 20X40
R718	0662057M82	RES. CHIP 2200 5% 20X40
R719	0662057M74	RES. CHIP 1000 5% 20X40
R720	0662057M95	RES. CHIP 7500 55 20X40
R721	0662057M82	RES. CHIP 2200 5% 20X40
R722	0662057M96	RES. CHIP 8200 5% 20X40
R723	0662057N23	RES CHIP 100K 5% 20X40
R724	0662057M82	RES. CHIP 2200 5% 20X40
R725	0662057N35	RES. CHIP 330K 5% 20X40
R726	0662057M95	RES. CHIP 7500 55 20X40
R727	0662057M64	RES. CHIP 390 5% 20X40
R729	0662057N11	RES. CHIP 33K 5% 20X40
R730	0662057M74	RES. CHIP 1000 5% 20X40
R731	0662057M98	RES CHIP 10K 5% 20X40
R732	0662057M98	RES CHIP 10K 5% 20X40
R733	0662057M90	RES. CHIP 4700 5% 20X40
R734	0662057M98	RES CHIP 10K 5% 20X40
R735	0662057N39	RES. CHIP 470K 5% 20X40
R736	0662057M98	RES CHIP 10K 5% 20X40
R737	0662057V02	RES CHIP 10K 1% 1/16W
R738	0662057M90	RES. CHIP 4700 5% 20X40
R739	0662057M98	RES CHIP 10K 5% 20X40
R740	0662057M64	RES. CHIP 390 5% 20X40
R741	0662057M34	RES. CHIP 22 5% 20X 40
R742	0662057M50	RES. CHIP 100 5% 20X40
R743	NOTPLACED	GCAM DUMMY PART NUMBER
R754	0662057V02	RES CHIP 10K 1% 1/16W

Reference Designator	Motorola Part Number	Description
R755	0662057U84	RES CHIP 2K 1% 1/16W
R756	0662057M98	RES CHIP 10K 5% 20X40
R757	0662057M74	RES. CHIP 1000 5% 20X40
R761	0662057N23	RES CHIP 100K 5% 20X40
R762	0662057M01	RES. CHIP 0 5% 20X40
R763	0662057M01	RES. CHIP 0 5% 20X40
R765	0662057U60	RES CHIP 220 1% 1/16W
R766	0662057M94	RES. CHIP 6800 5% 20X40
R768	0662057M01	RES. CHIP 0 5% 20X40
R770	0662057M01	RES. CHIP 0 5% 20X40
R771	0662057N15	RES. CHIP 47K 5% 20X40
R772	0662057M90	RES. CHIP 4700 5% 20X40
R774	0662057M98	RES CHIP 10K 5% 20X40
R775	0662057M34	RES. CHIP 22 5% 20X 40
R779	0662057N23	RES CHIP 100K 5% 20X40
R788	0662057M10	RES. CHIP 2.2 5% 20X40
R797	0662057M42	RES. CHIP 47 5% 20X40
R799	0662057N15	RES. CHIP 47K 5% 20X40
R801	0662057M94	RES. CHIP 6800 5% 20X40
R802	0662057M50	RES. CHIP 100 5% 20X40
R803	0662057M50	RES. CHIP 100 5% 20X40
R804	0662057M67	RES. CHIP 510 5% 20X40
R805	0662057M98	RES CHIP 10K 5% 20X40
R806	0662057M67	RES. CHIP 510 5% 20X40
R807	0662057M98	RES CHIP 10K 5% 20X40
R808	0662057M01	RES. CHIP 0 5% 20X40
R809	0662057N15	RES. CHIP 47K 5% 20X40
R810	0662057M98	RES CHIP 10K 5% 20X40
R811	0662057M67	RES. CHIP 510 5% 20X40
R812	0662057N23	RES CHIP 100K 5% 20X40
R813	NOTPLACED	GCAM DUMMY PART NUMBER
R814	NOTPLACED	GCAM DUMMY PART NUMBER
R815	NOTPLACED	GCAM DUMMY PART NUMBER
R816	0662057N15	RES. CHIP 47K 5% 20X40

Reference Designator	Motorola Part Number	Description
R820	0662057M98	RES CHIP 10K 5% 20X40
R829	NOTPLACED	GCAM DUMMY PART NUMBER
R830	0662057N06	RES. CHIP 20K 5% 20X40
R831	0662057N06	RES. CHIP 20K 5% 20X40
R837	0662057M38	RES. CHIP 33 5% 20X40
R838	0662057M38	RES. CHIP 33 5% 20X40
R839	0662057M98	RES CHIP 10K 5% 20X40
R840	0662057M67	RES. CHIP 510 5% 20X40
R841	0662057M98	RES CHIP 10K 5% 20X40
R842	0662057M98	RES CHIP 10K 5% 20X40
R844	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R845	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
S500	4085131E01	SWITCH FREQ DUAL FUNC-TION
S501	1880619Z02	POTENTIOMETER (VOLUME)
S502	4085358D02	SWITCH TACTILE
S503	4070354A01	LIGHT TOUCH SWITCH-SMD
S504	4070354A01	LIGHT TOUCH SWITCH-SMD
S505	4070354A01	LIGHT TOUCH SWITCH-SMD
S506	4070354A01	LIGHT TOUCH SWITCH-SMD
SH1	2686707Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH101	2686702Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH102	2686701Z01	"SHIELD, SM SLDRD,CRS,,PLTD"
SH103	2686708Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH201	2686705Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH251	2685086D01	SHLD VCO TOP
SH252	2685082D01	SHLD PCIC
SH401	2686706Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH402	2686698Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH500	NOTPLACED	GCAM DUMMY PART NUMBER

Reference Designator	Motorola Part Number	Description
SH51	2686700Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH52	2686699Z01	"SHIELD, SM SLDRD,CRS,,PLTD"
T51	2580541Z02	BALUN TRANSFORMER (NEW)
T52	2580541Z02	BALUN TRANSFORMER (NEW)
T53	2585918C01	XFMR SMALL SIGNAL SURFACE MT
U1	5185130C91	IC MIXER RF SOIC 10
U101	5185130C65	IC VHF/UHF/800 MHZ LDMOS DRIVER
U102	5185765B26	IC PWR CTRL IN MOS20
U103	5185963A15	IC TEMPERATURE SENSOR 1M50C
U2	5185130C83	IC 15DB DIGITAL ATTEUATOR SOT25 PKG
U201	5185956E66	"IC,OP AMP,1PER PKG,,,,,,,LMH6723,IC"
U202	5105835U92	CC LVFRACN
U3	5185143E12	IC INVERTER DUAL SC70
U302	2113743L41	CAP CHIP 10000 PF 10% X7R
U304	4809788E06	DIODE ZENER 6.8V UDZ6.8B
U401	5185963A85	IC-ABACUS III-LP
U500	5185353D13	IC MINI SO-8 HI PRECISION REG 5V
U501	5185353D14	IC SOT23-5 HI PRECISION REG 3V
U502	5185353D14	IC SOT23-5 HI PRECISION REG 3V
U503	5185353D56	IC 3.3V LINEAR REGULATOR MC78LC 33N
U600	5185368C66	IC CUSTOM FLIPPER
U601	5109731C15	IC OP AMP SNGL OPA237 SOT23
U602	5109731C15	IC OP AMP SNGL OPA237 SOT23
U605	5105492X92	IC CMOS BILATERAL SWITCH
U607	5187970L15	IC USB TRANS FULL-SPEED
U608	5185368C12	IC 1.8V SN LOGIC GATE

Reference Designator	Motorola Part Number	Description
U609	5105492X03	IC SNG HI SPD L-MOS NOT GATE
U610	5109522E53	IC SNGL BUF NC7S125P5X SC70
U611	5109522E53	IC SNGL BUF NC7S125P5X SC70
U612	5109817F62	IC SPDT SWITCH / MULTI-PLEXER
U613	5109817F62	IC SPDT SWITCH / MULTI-PLEXER
U614	5109522E53	IC SNGL BUF NC7S125P5X SC70
U615	5109522E53	IC SNGL BUF NC7S125P5X SC70
U616	5109522E53	IC SNGL BUF NC7S125P5X SC70
U703	5109879E58	IC 4.3 GCAPII SN104616DGGMR BG
U704	5185353D35	IC DUAL EEPOT 256 TAP
U705	5113816A73	IC ADJST 1.7% TOL SHUNT REG 20MA
U706	5109731C15	IC OP AMP SNGL OPA237 SOT23
U707	5185353D13	IC MINI SO-8 HI PRECISION REG 5V
U708	5102463J44	AUDIO AMPLIFIER TDA8547TS
U725	5109731C15	IC OP AMP SNGL OPA237 SOT23
U800	5188017U01	"IC, UCNTLR,,SM,,DSP56XXX,,16BITS,,,"
U801	5109522E53	IC SNGL BUF NC7S125P5X SC70
U802	5109522E53	IC SNGL BUF NC7S125P5X SC70
U803	5185956E16	"IC,FLSH,,32MB,2MX16,60,SM,BGA,,IC F"
U804	5185130C38	IC SRAM 4 MG
U810	5105492X92	IC CMOS BILATERAL SWITCH
U811	5185368C83	IC 12 BIT DAC
VR500	4813830A15	TSTR 5.6V 5% 20MA 225MW
VR501	4880140L15	10V ZENER

Reference Designator	Motorola Part Number	Description
VR502	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR503	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR504	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR505	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR506	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR508	4805656W03	DIODE DUAL 5.6V ZENER
VR509	4805656W03	DIODE DUAL 5.6V ZENER
VR510	4805656W03	DIODE DUAL 5.6V ZENER
VR511	4805656W03	DIODE DUAL 5.6V ZENER
VR512	4805656W03	DIODE DUAL 5.6V ZENER
VR513	4805656W03	DIODE DUAL 5.6V ZENER
VR650	4813832C72	TRANS SUP QUAD 12V
VR651	4805656W03	DIODE DUAL 5.6V ZENER
VR652	4805656W03	DIODE DUAL 5.6V ZENER
VR657	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR658	4813830C26	DIODE 13V 'H3' MMSZ5243BT1
VR659	4805656W08	DIODE ZENER QUAD
VR662	4805656W08	DIODE ZENER QUAD
VR663	4813830A22	DIODE 9.1V 5% 225MW MMBZ5239B_
VR678	4802021P15	ZENER SR05
VR700	4813830A15	TSTR 5.6V 5% 20MA 225MW
Y200	4802245J68	"OSC, REF 16.8MHZ 1.5 PPM"
Y600	4809995L05	XTAL QUARTZ 32.768KHZ CC4V-T1

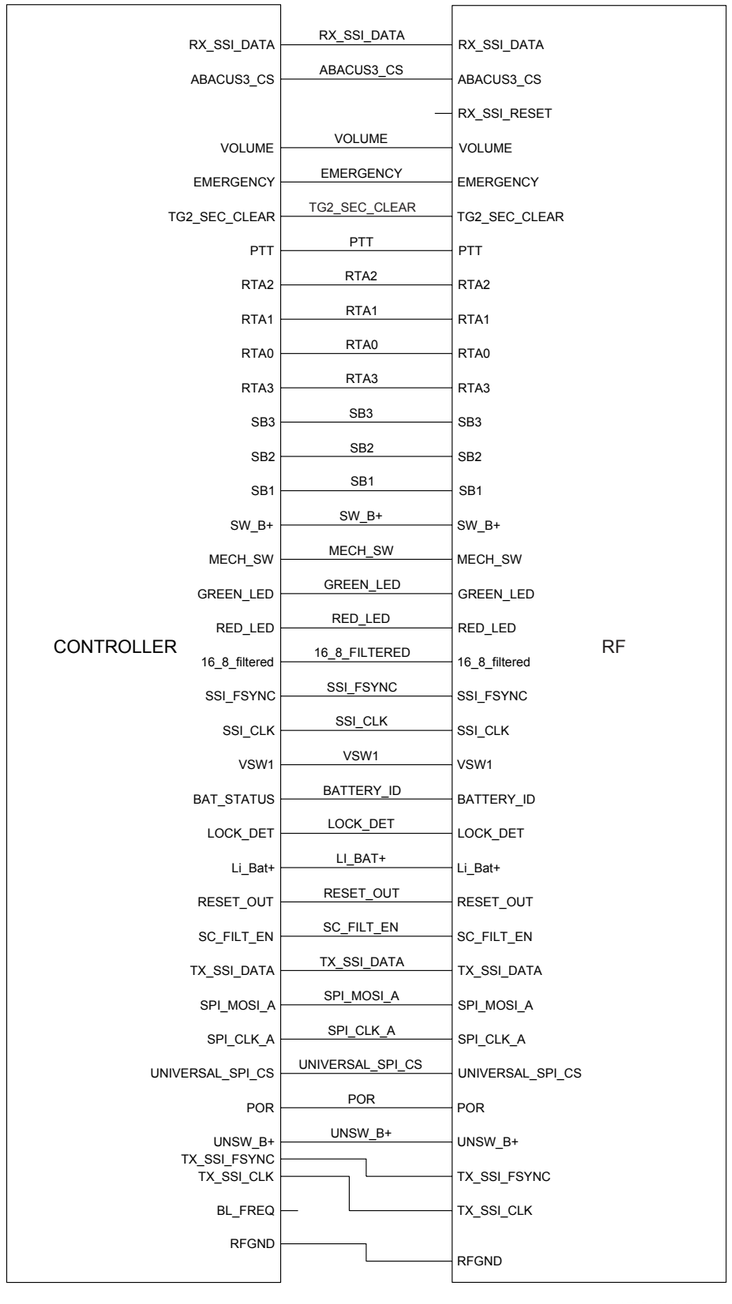


Figure 9-103. PMUE4271A Top-Level Schematic

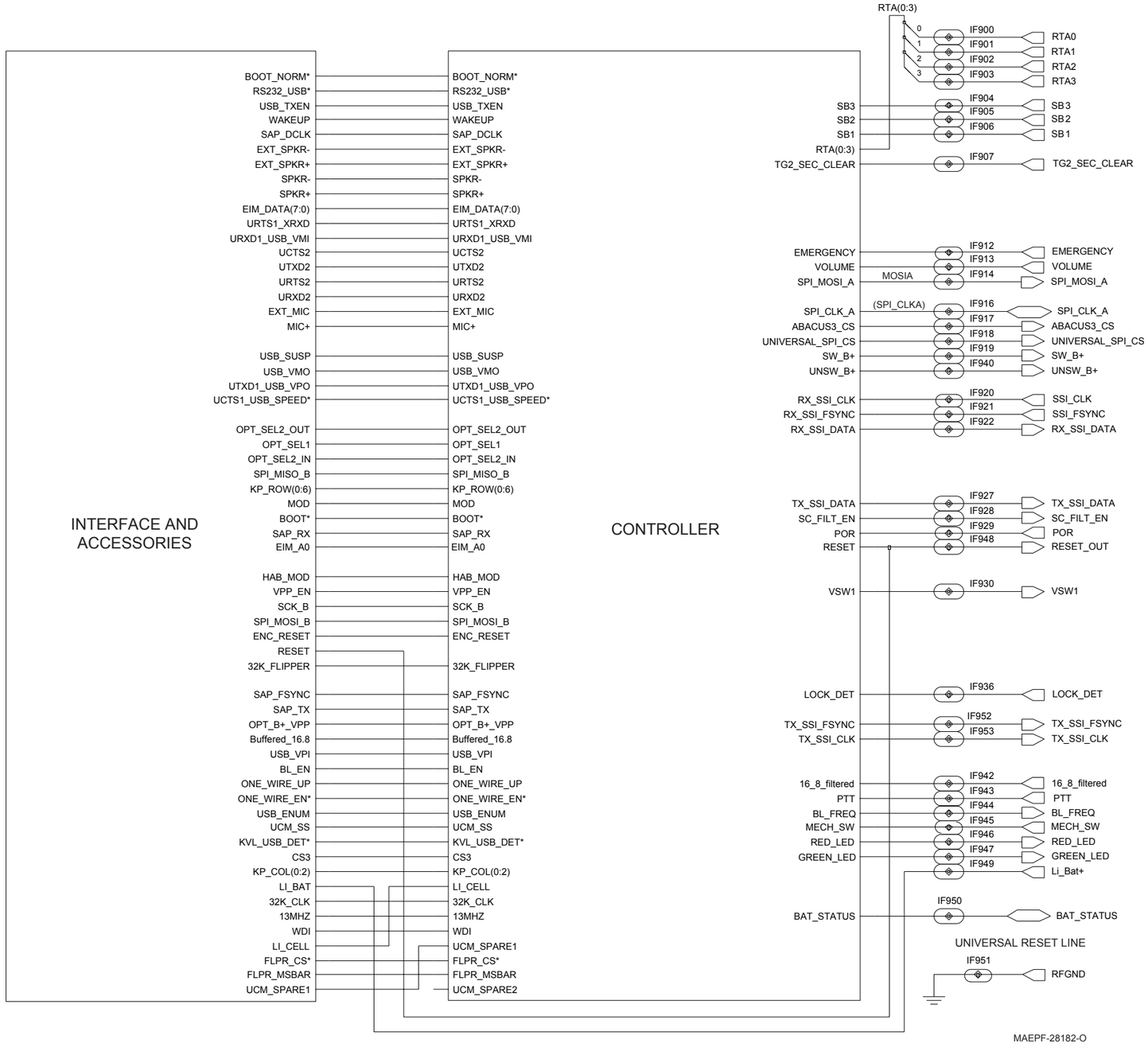


Figure 9-104. PMUE4271A Controller Interface Schematic

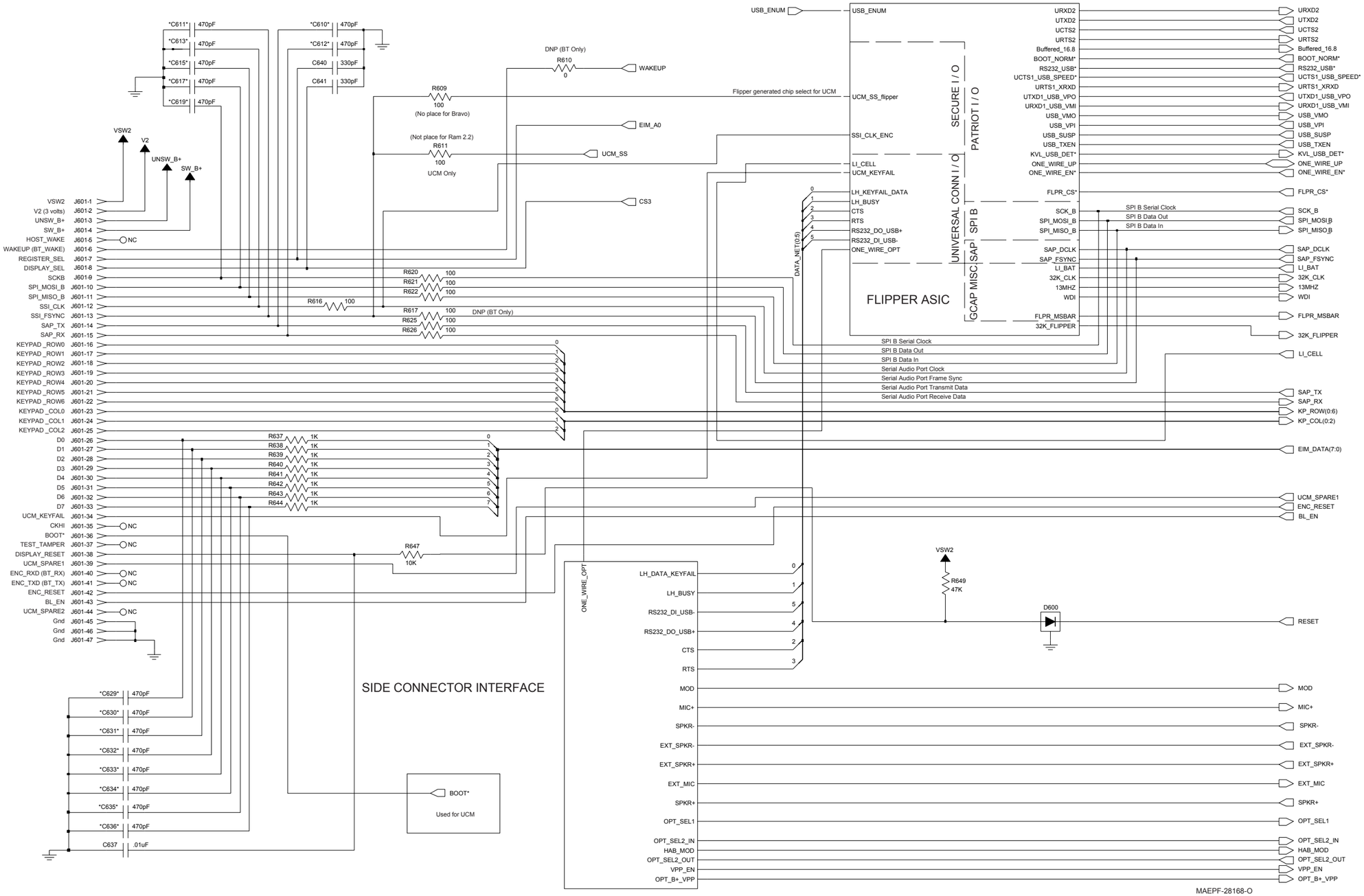


Figure 9-105. PMUE4271A Interface and Accessories Schematic

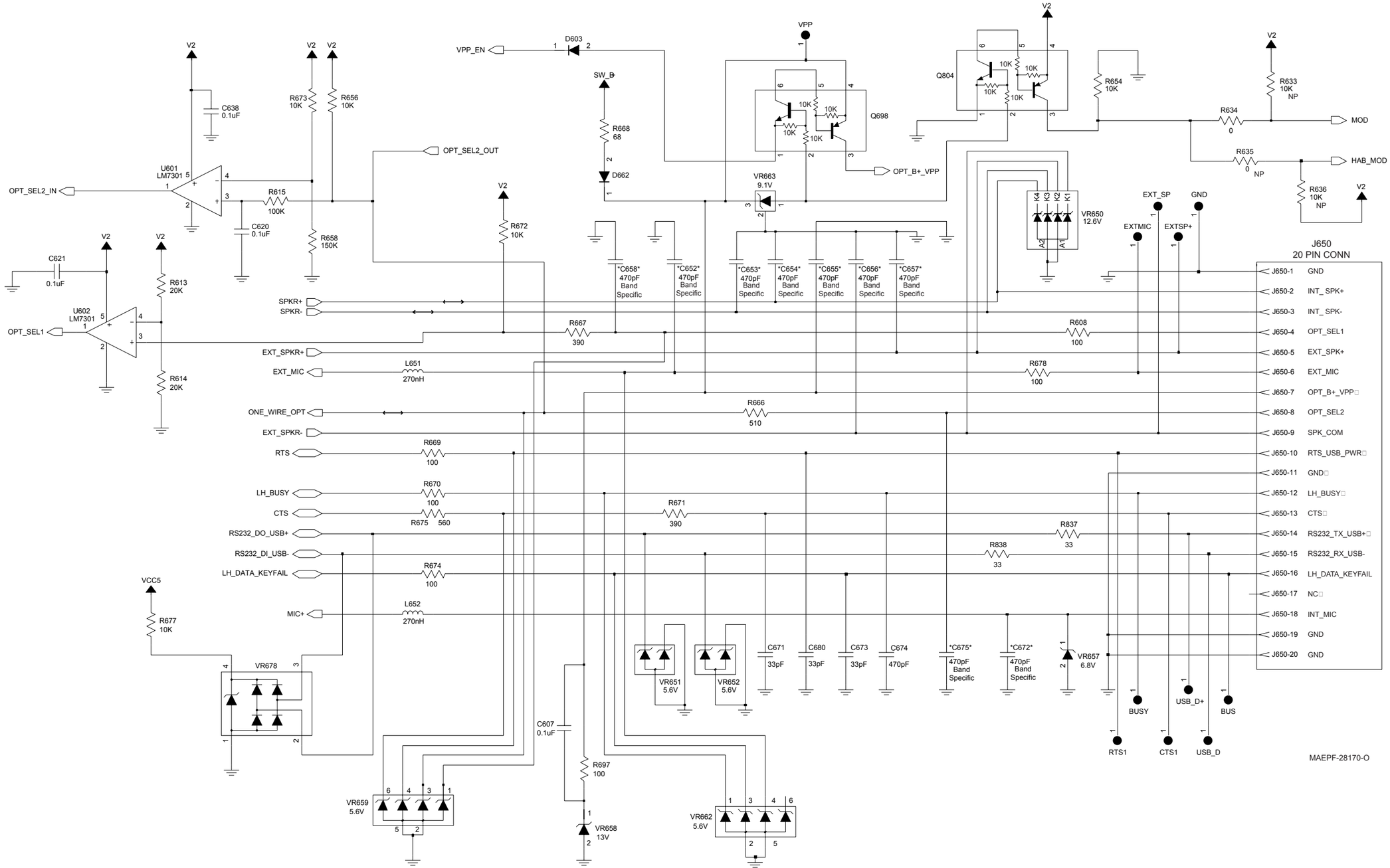
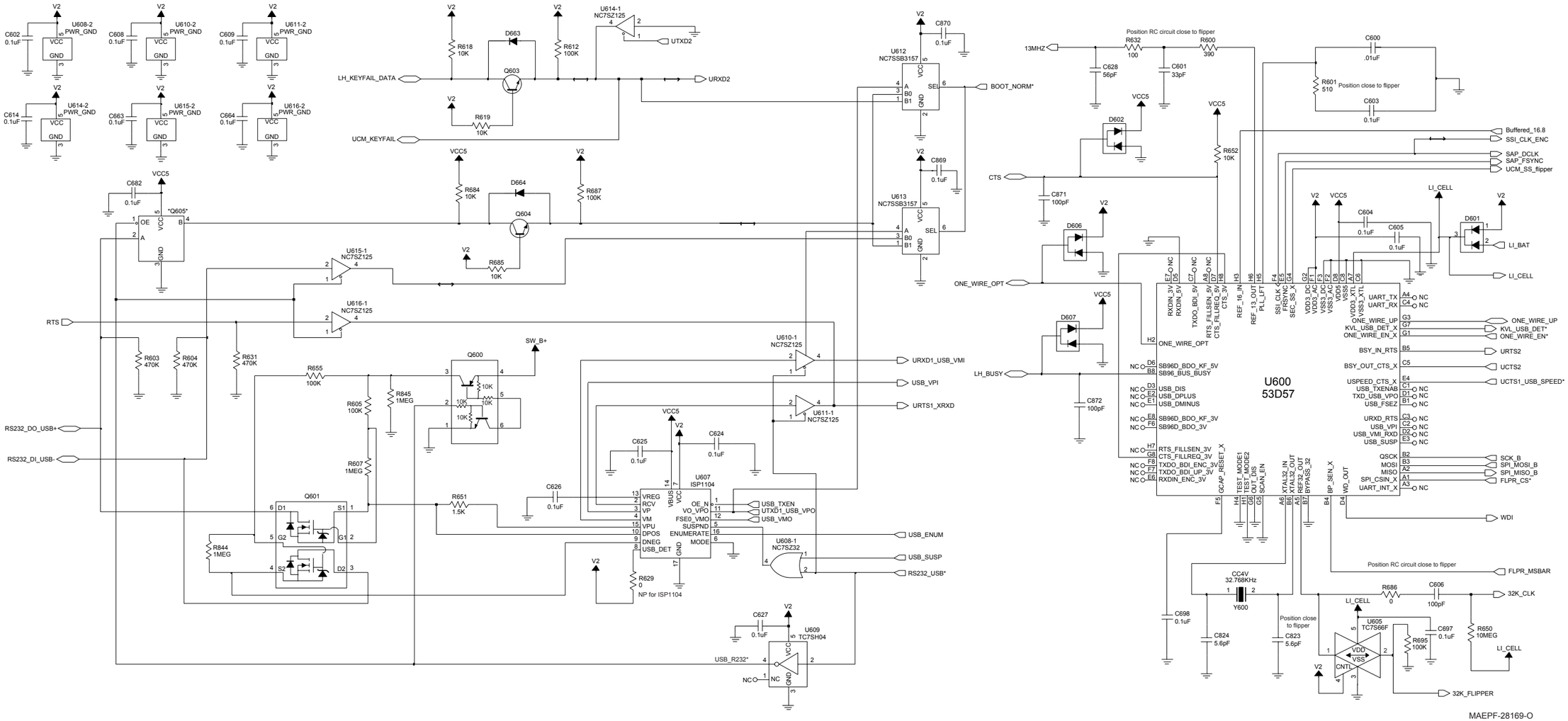


Figure 9-106. PMUE4271A Side Connector Schematic



MAEPF-28169-O

Figure 9-107. PMUE4271A Flipper Schematic

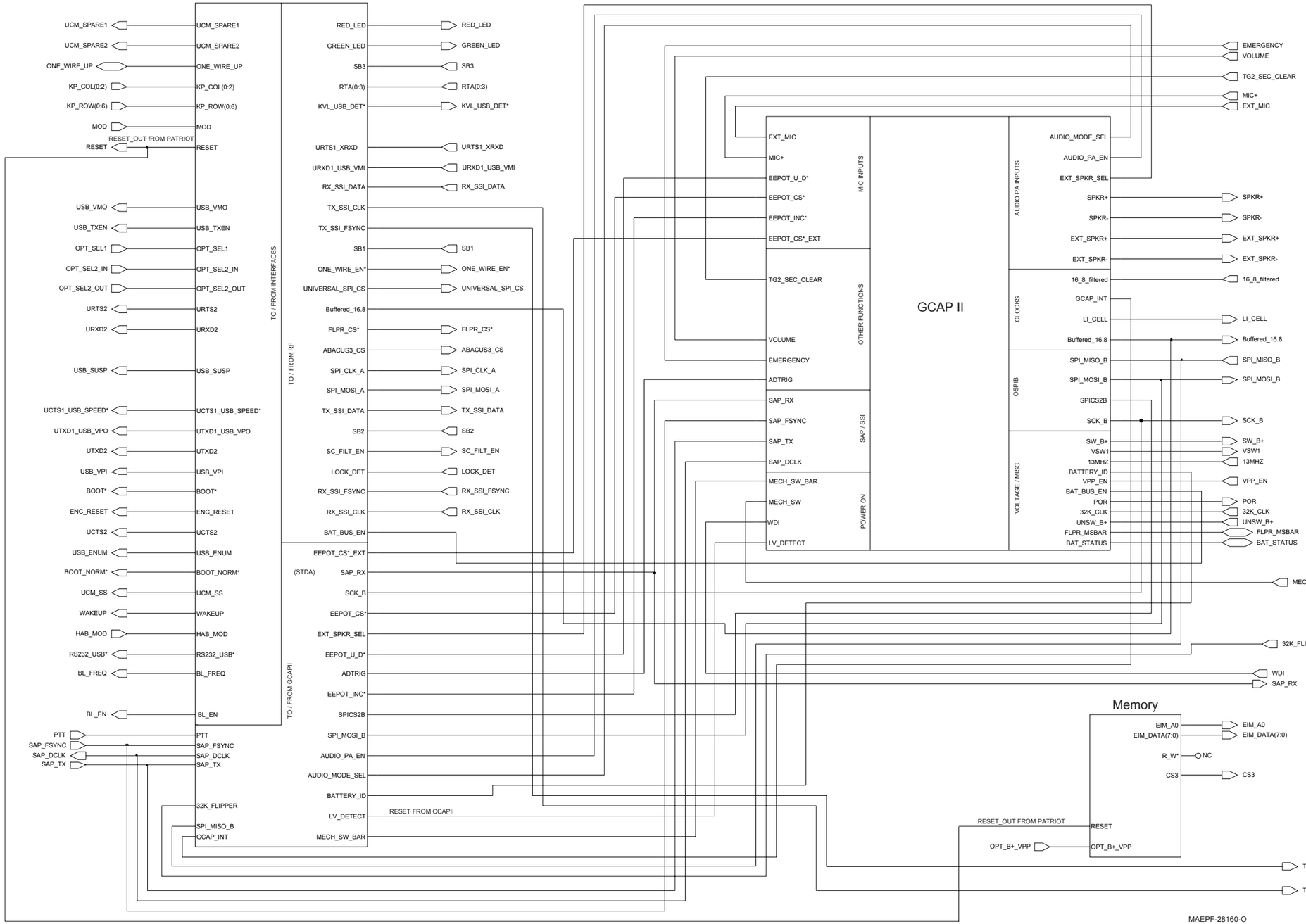


Figure 9-108. PMUE4271A Controller Schematic

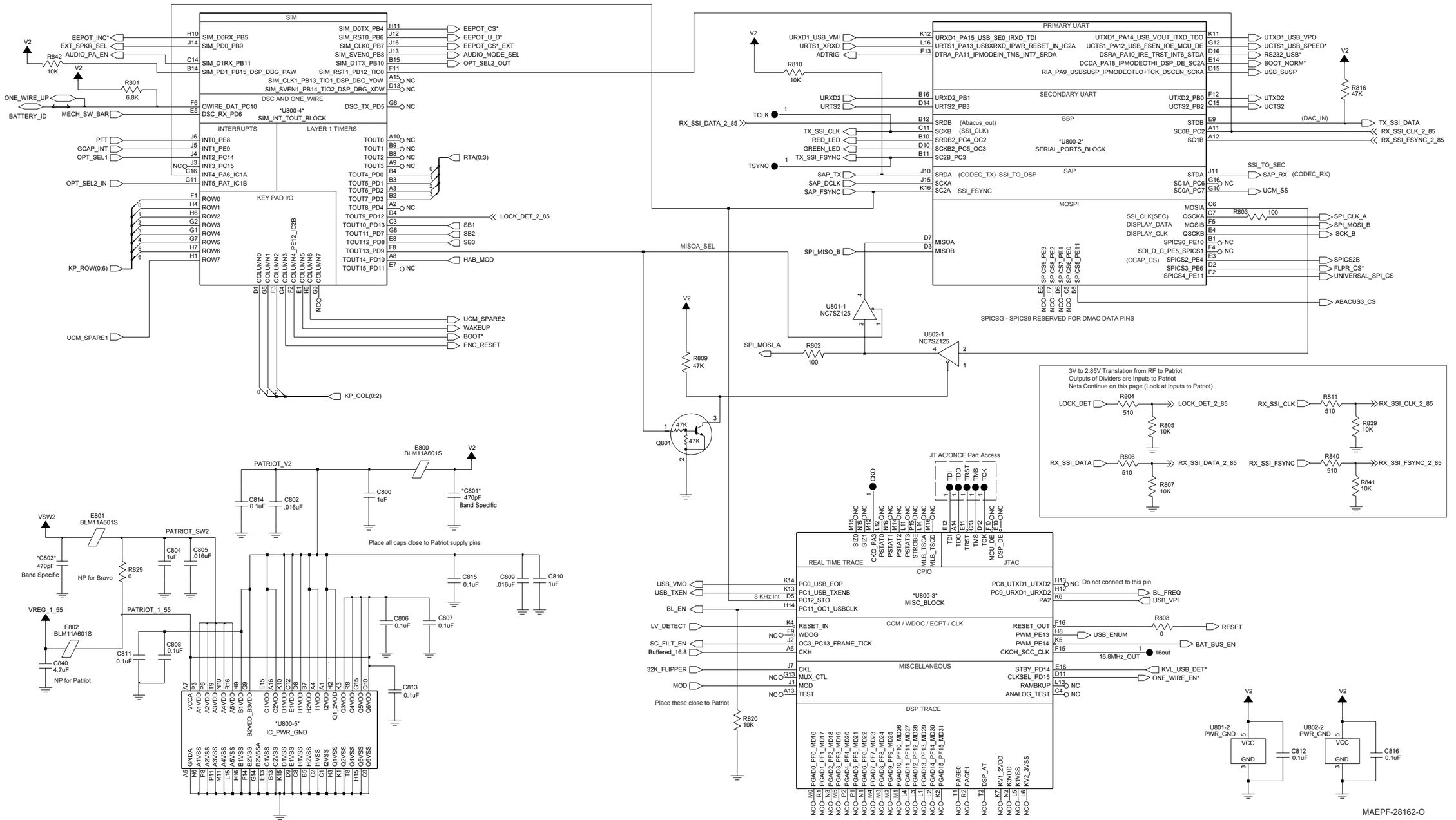


Figure 9-109. PMUE4271A Patriot (U800) Schematic

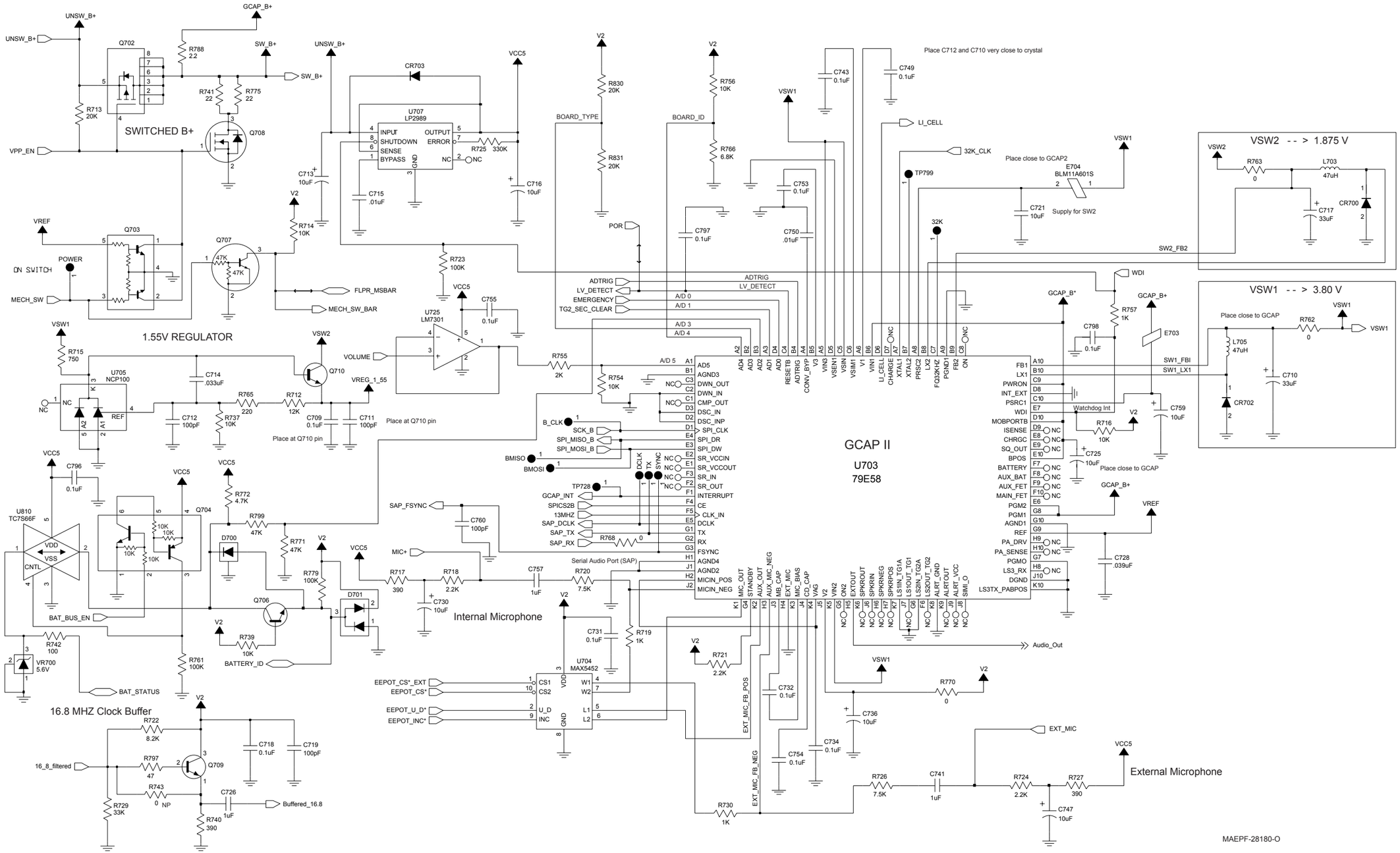


Figure 9-110. PMUE4271A GCAP II/DC and Audio Schematic, Sheet 1 of 2

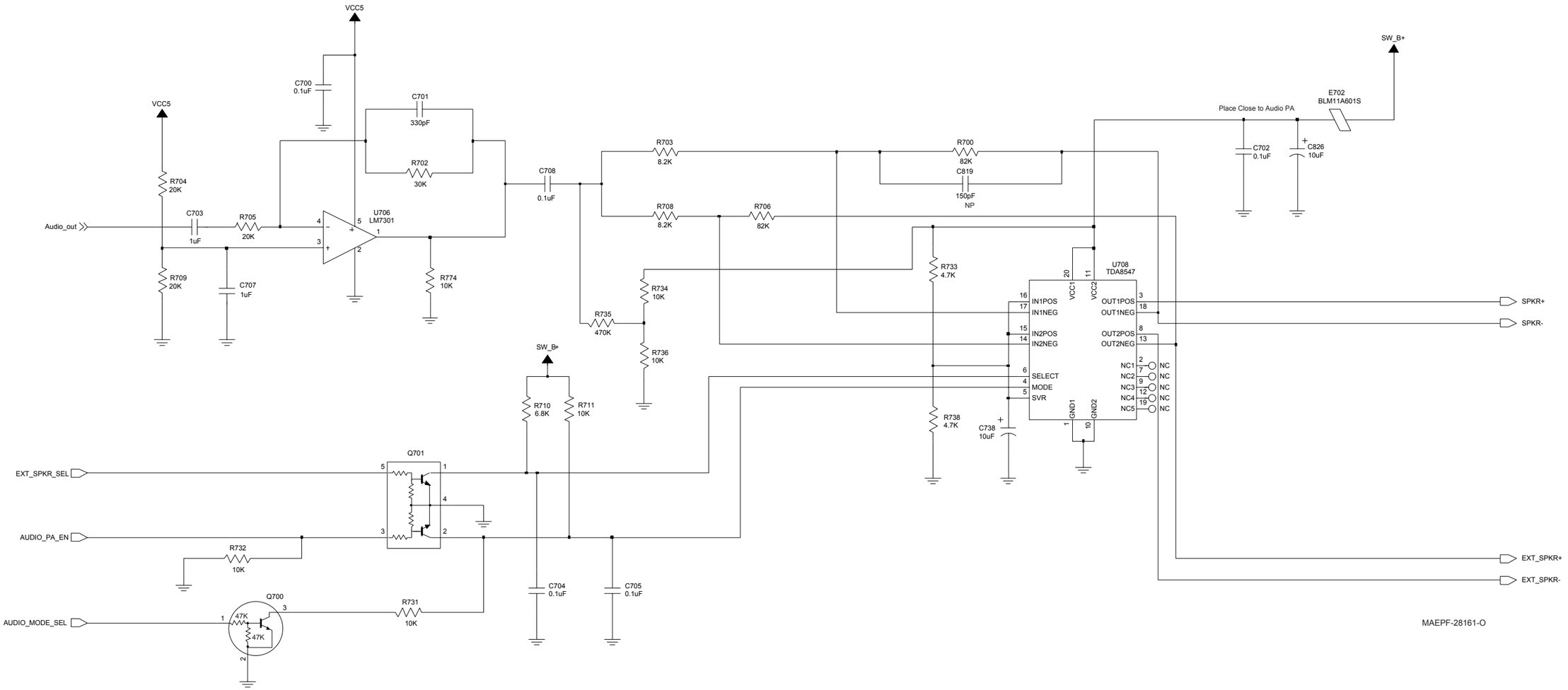


Figure 9-111. PMUE4271A GCAP II/DC and Audio Schematic, Sheet 2 of 2 (Audio PA)

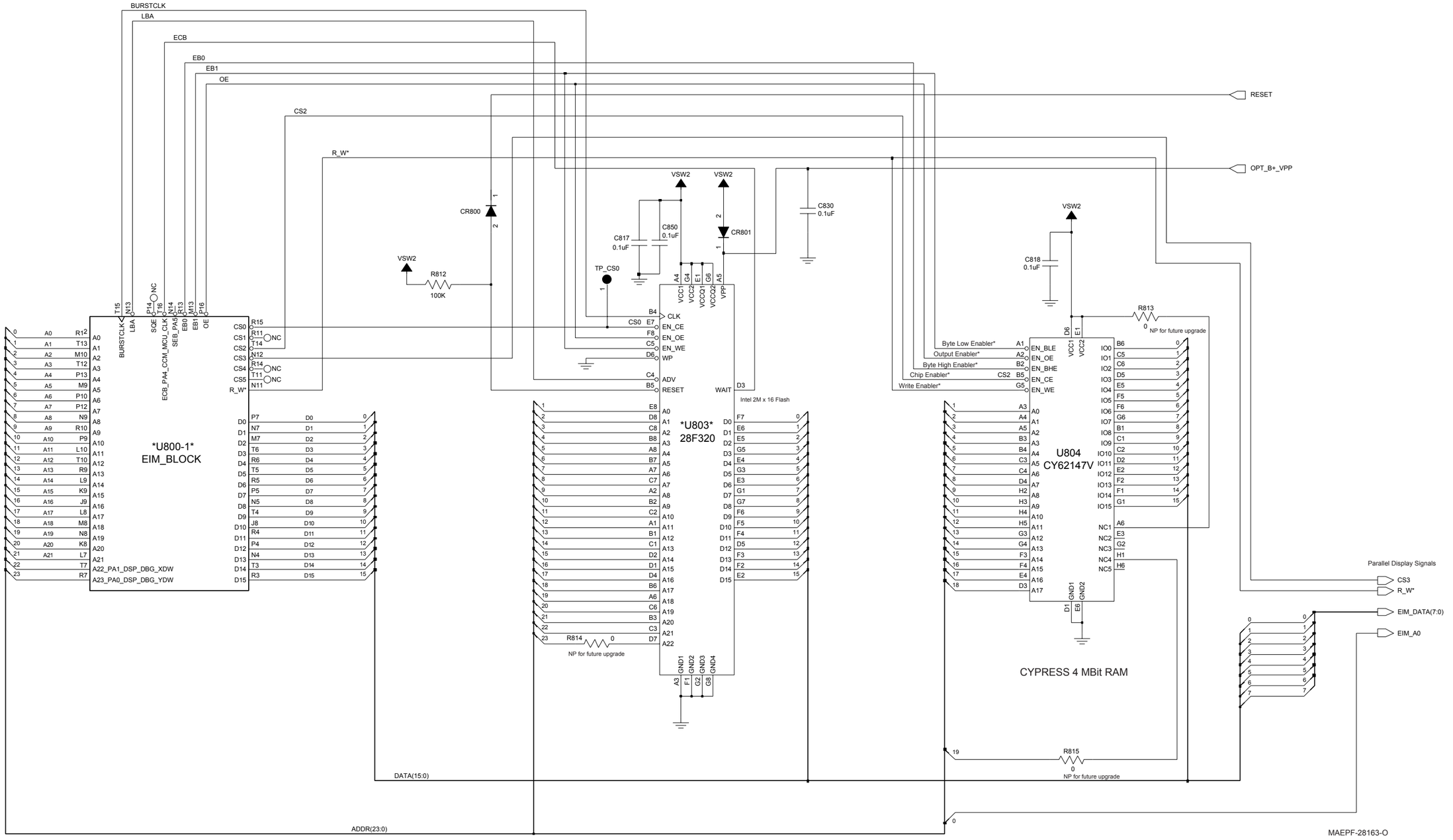


Figure 9-112. PMUE4271A Memory Schematic

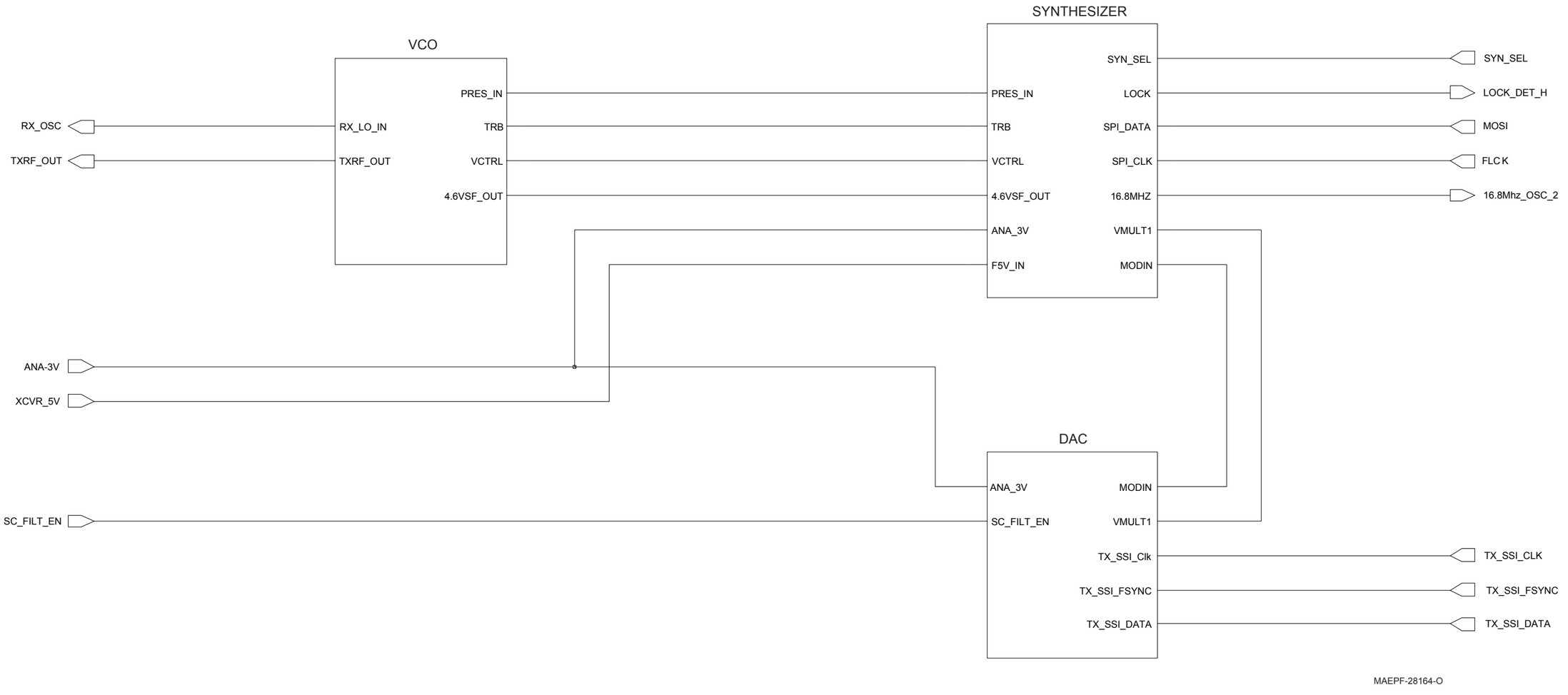


Figure 9-113. PMUE4271A Frequency Generation Unit (FGU) Schematic, Sheet 1 of 4

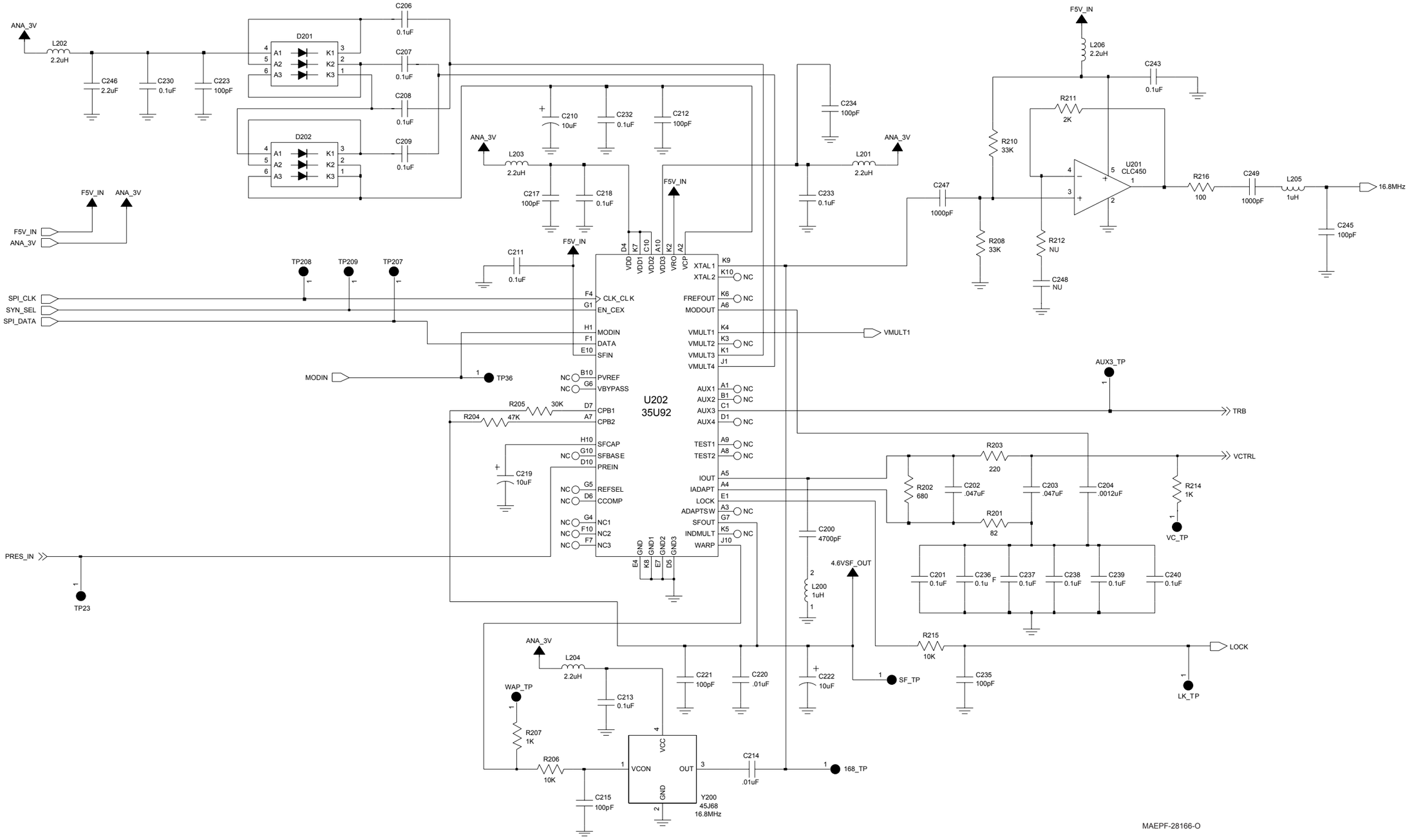


Figure 9-114. PMUE4271A Frequency Generation Unit (FGU) Schematic, Sheet 2 of 4 (Synthesizer)

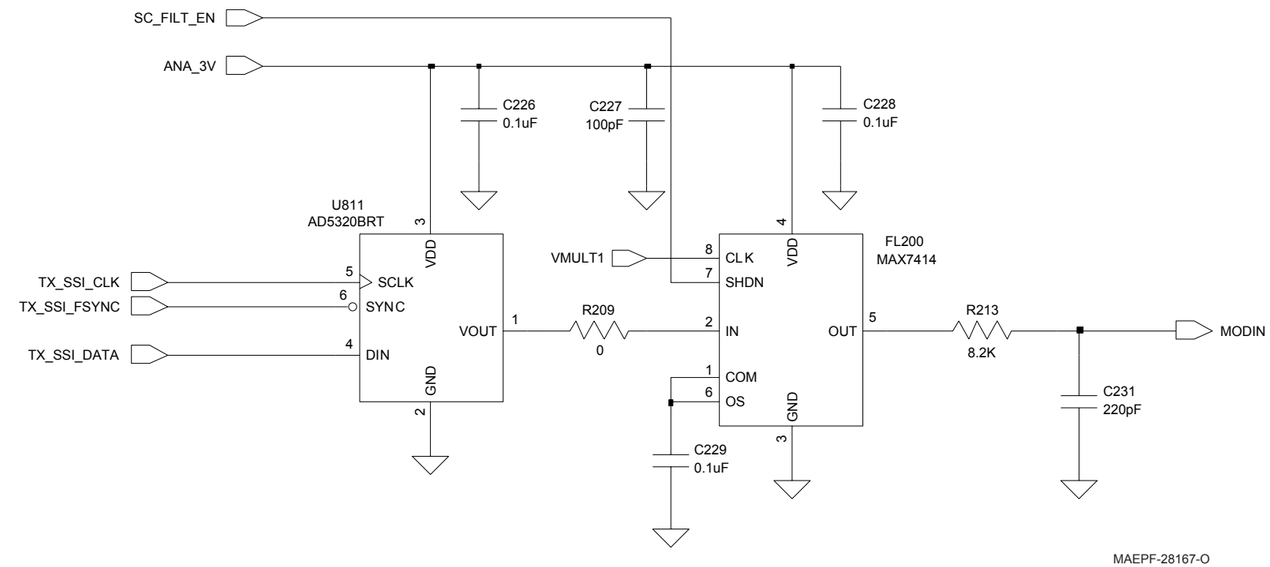


Figure 9-115. PMUE4271A Frequency Generation Unit (FGU) Schematic, Sheet 3 of 4 (Digital-to-Analog Converter)

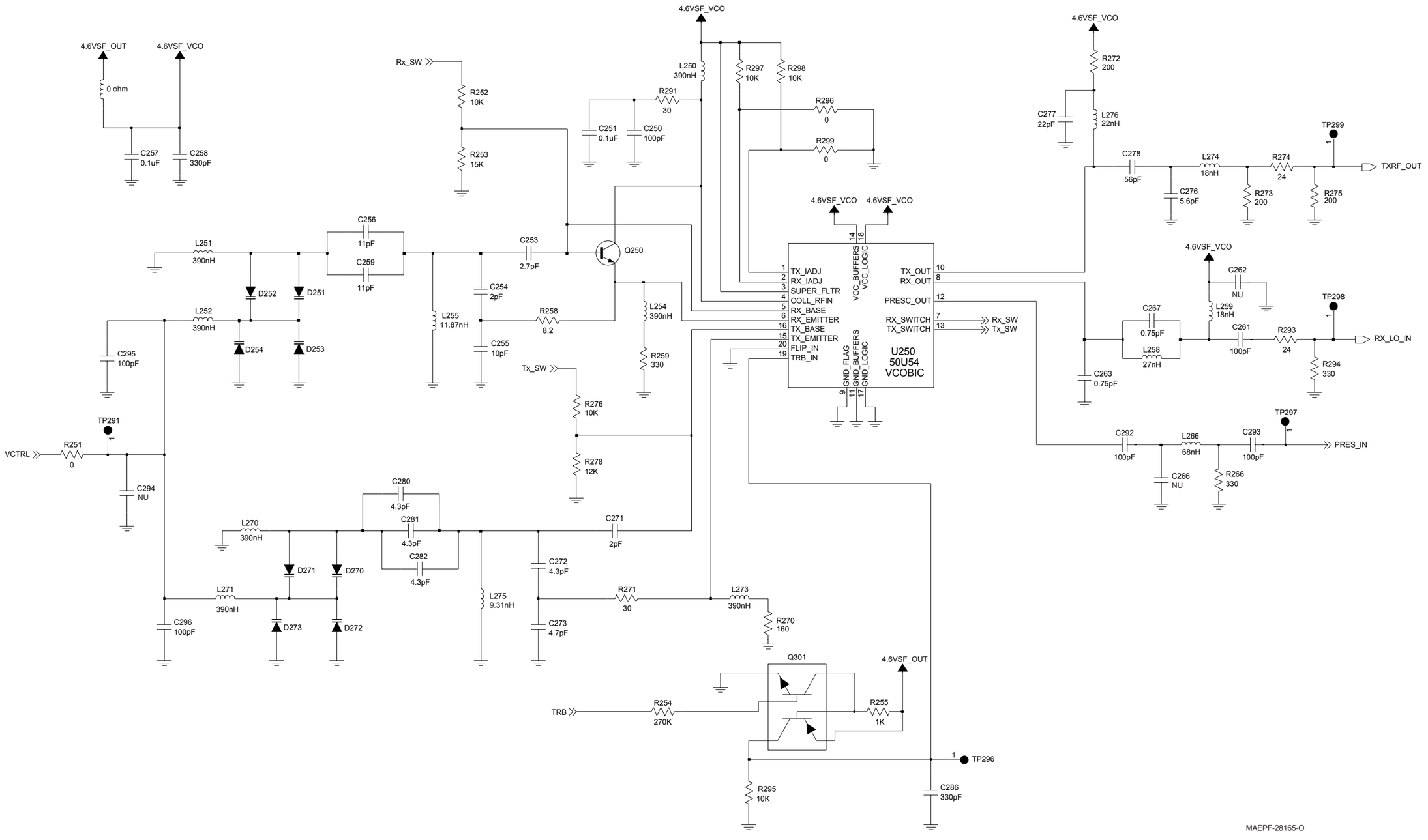


Figure 9-116. PMUE4271A Frequency Generation Unit (FGU) Schematic, Sheet 4 of 4 (VCO)

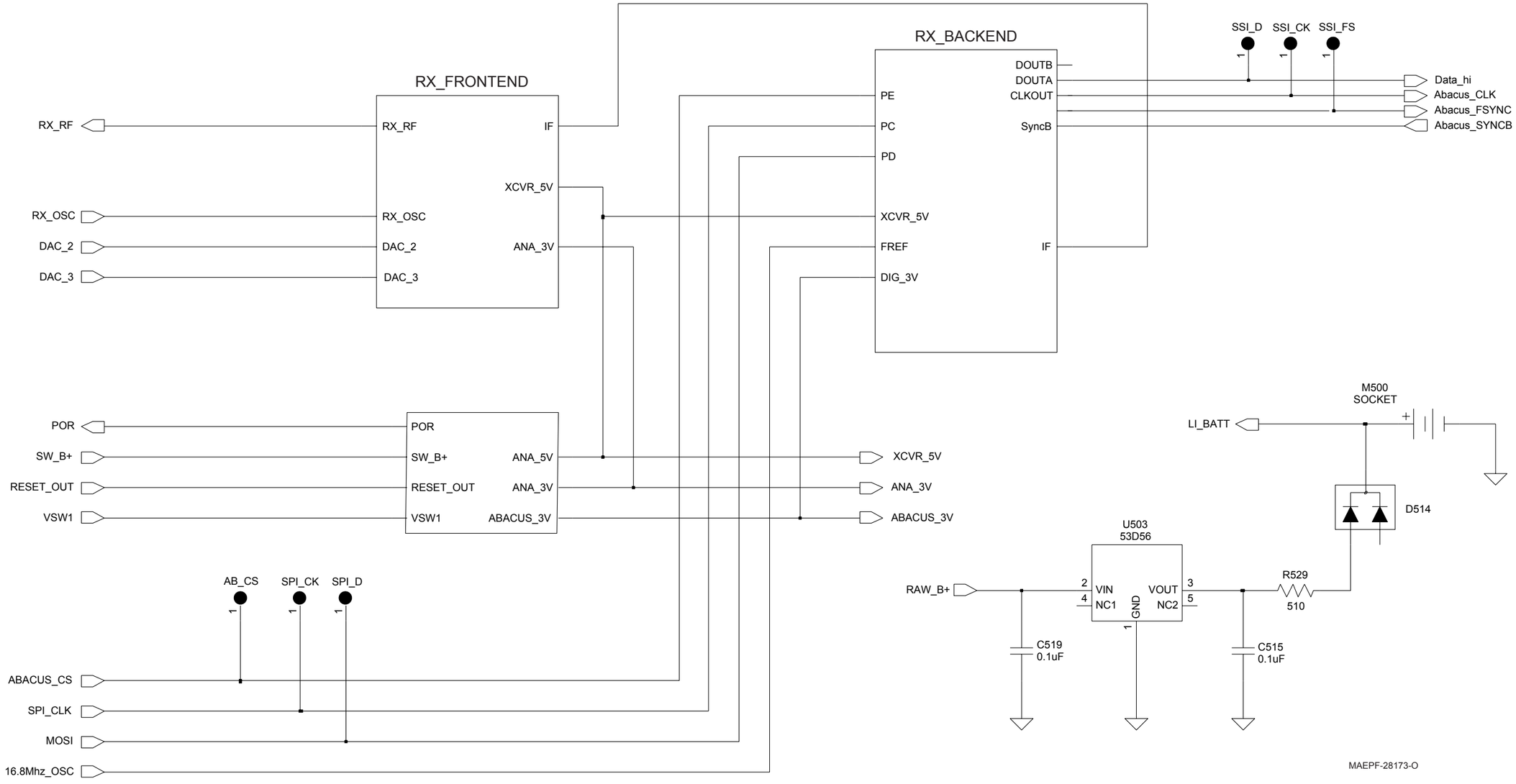


Figure 9-117. PMUE4271A Receiver Schematic, Sheet 1 of 6

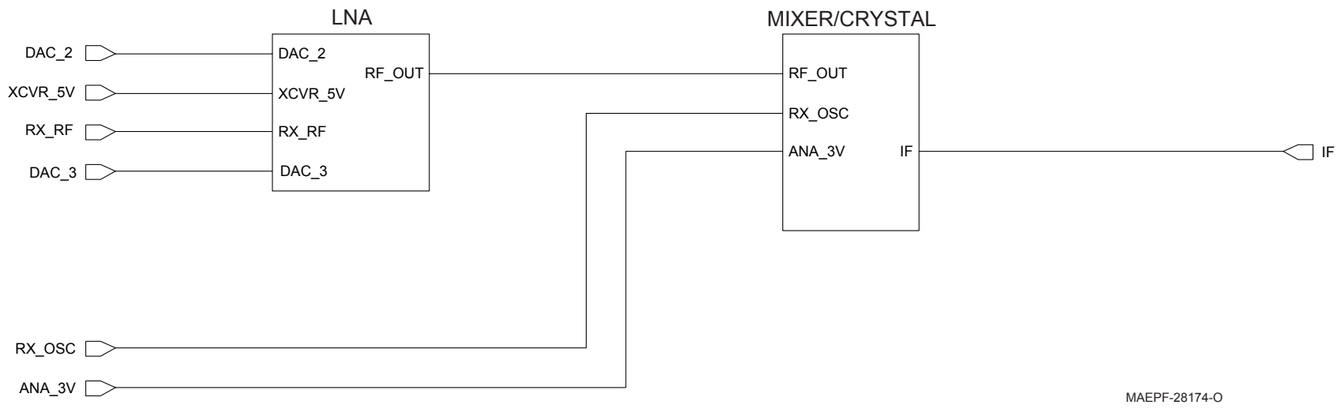


Figure 9-118. PMUE4271A Receiver Schematic, Sheet 2 of 6 (Front End)

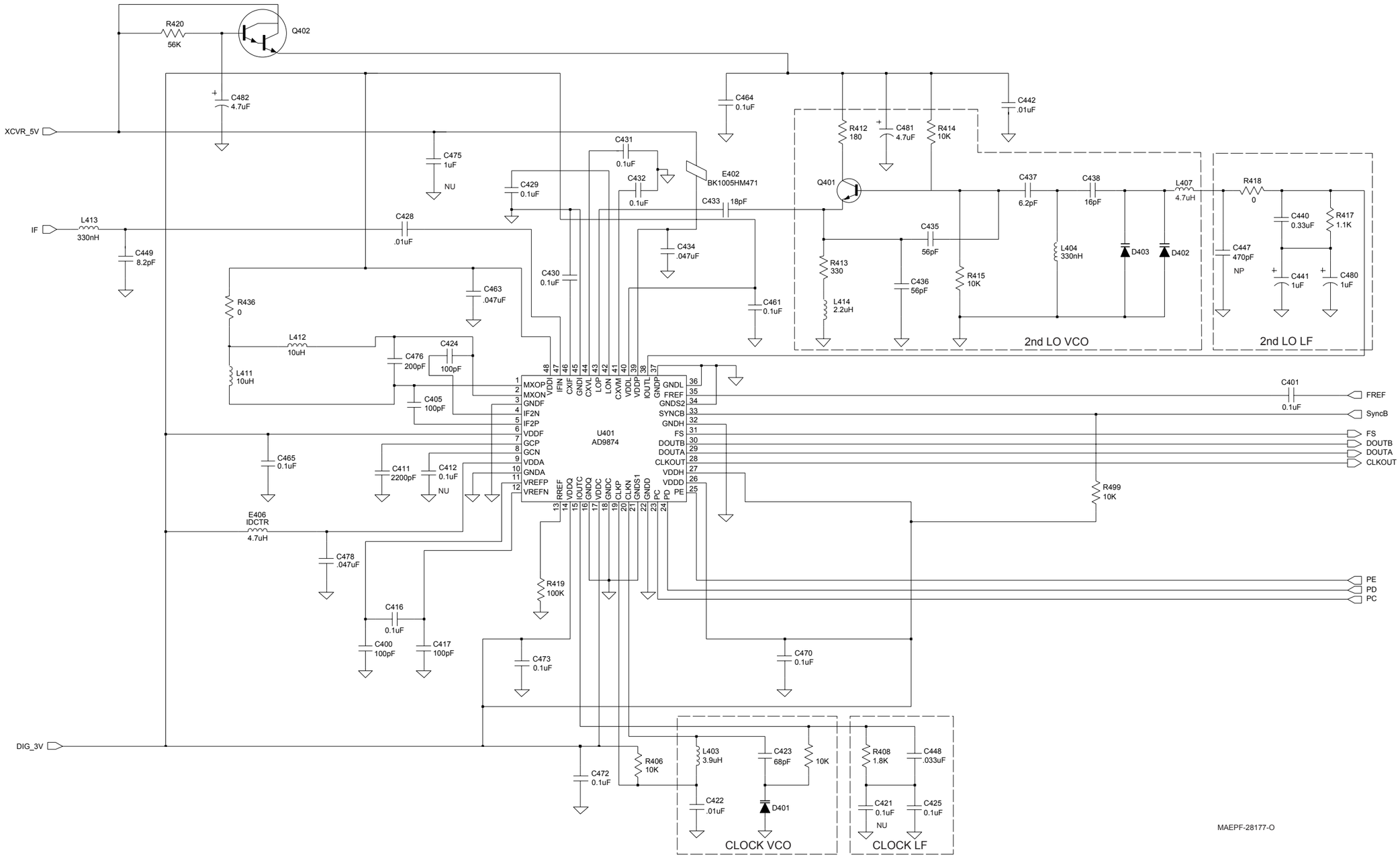


Figure 9-119. PMUE4271A Receiver Schematic, Sheet 3 of 6 (Back End)

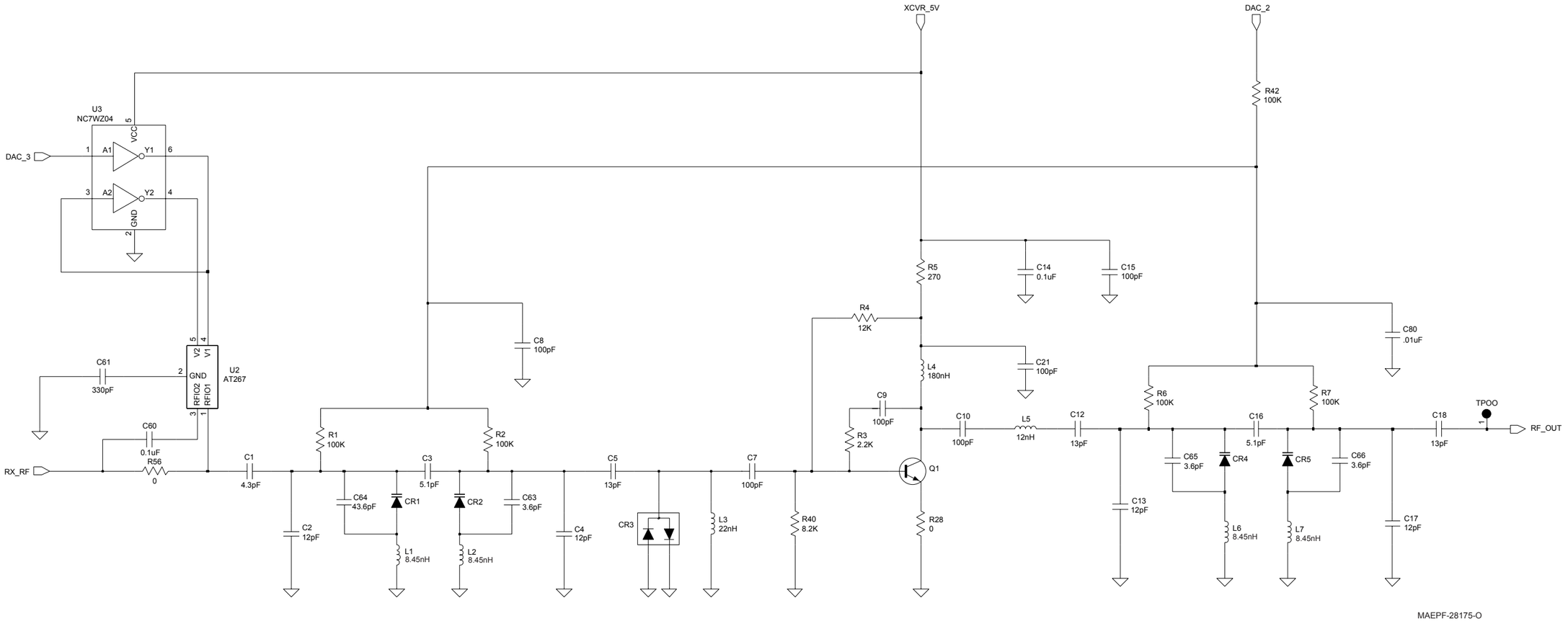


Figure 9-120. PMUE4271A Receiver Schematic, Sheet 4 of 6 (LNA Pre-Select)

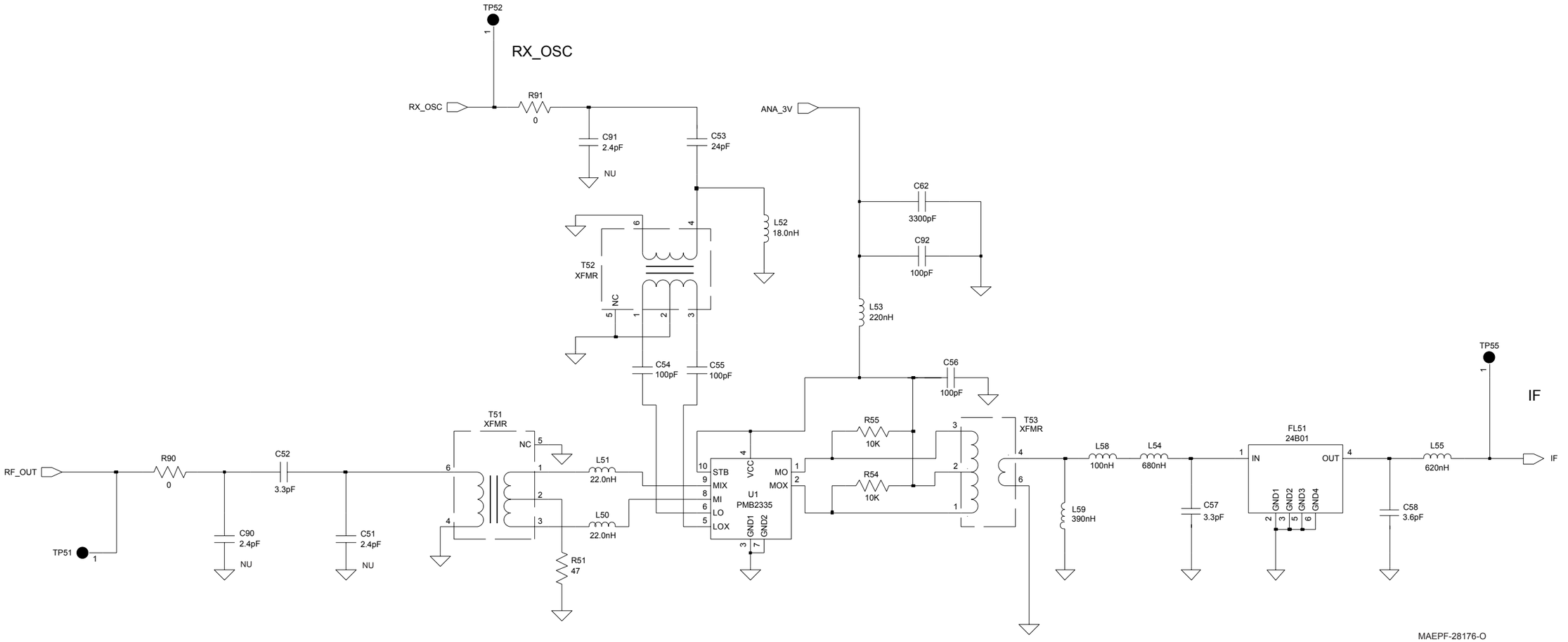


Figure 9-121. PMUE4271A Receiver Schematic, Sheet 5 of 6 (Mixer)

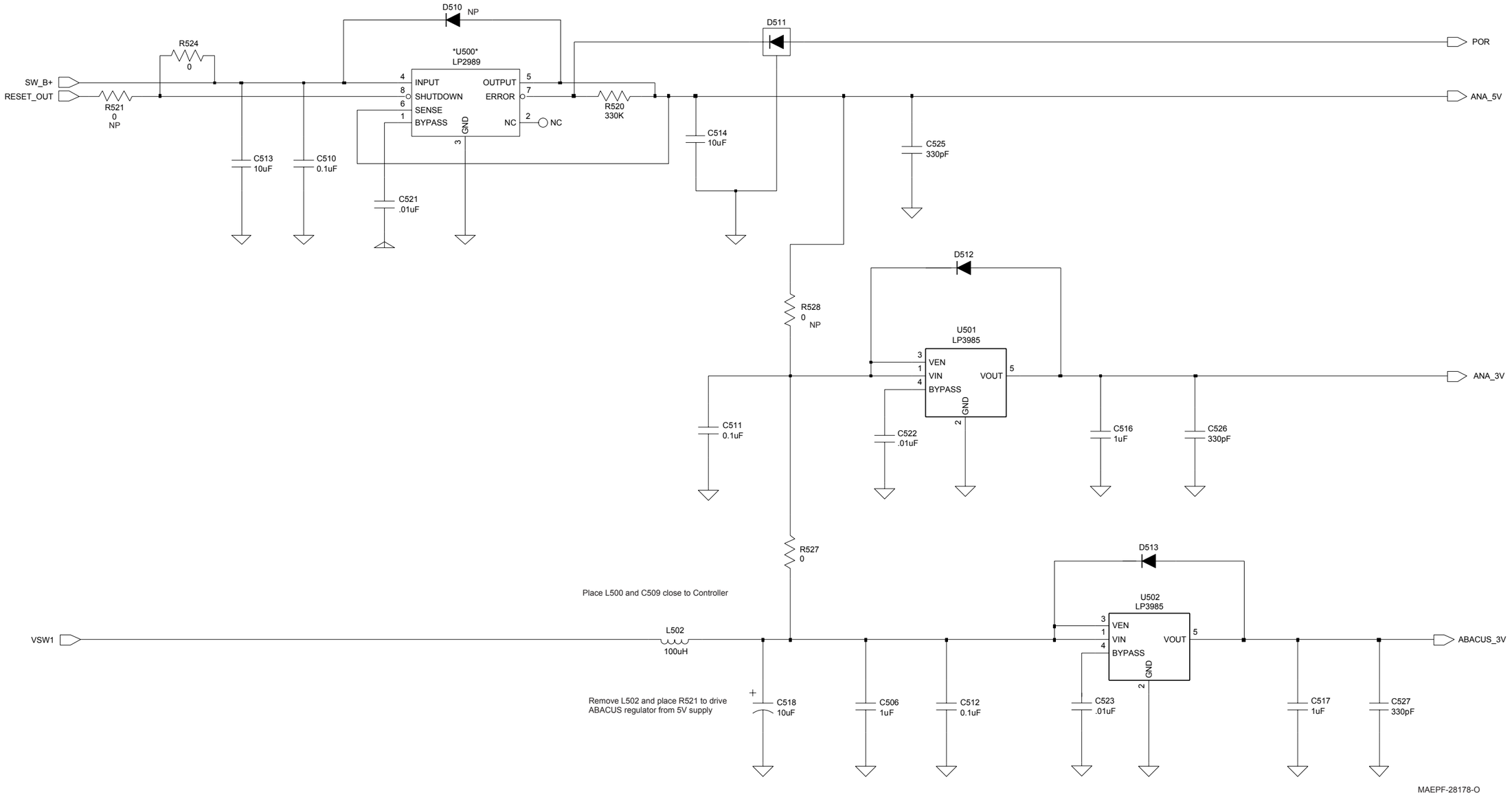


Figure 9-122. PMUE4271A Receiver Schematic, Sheet 6 of 6 (Regulators)

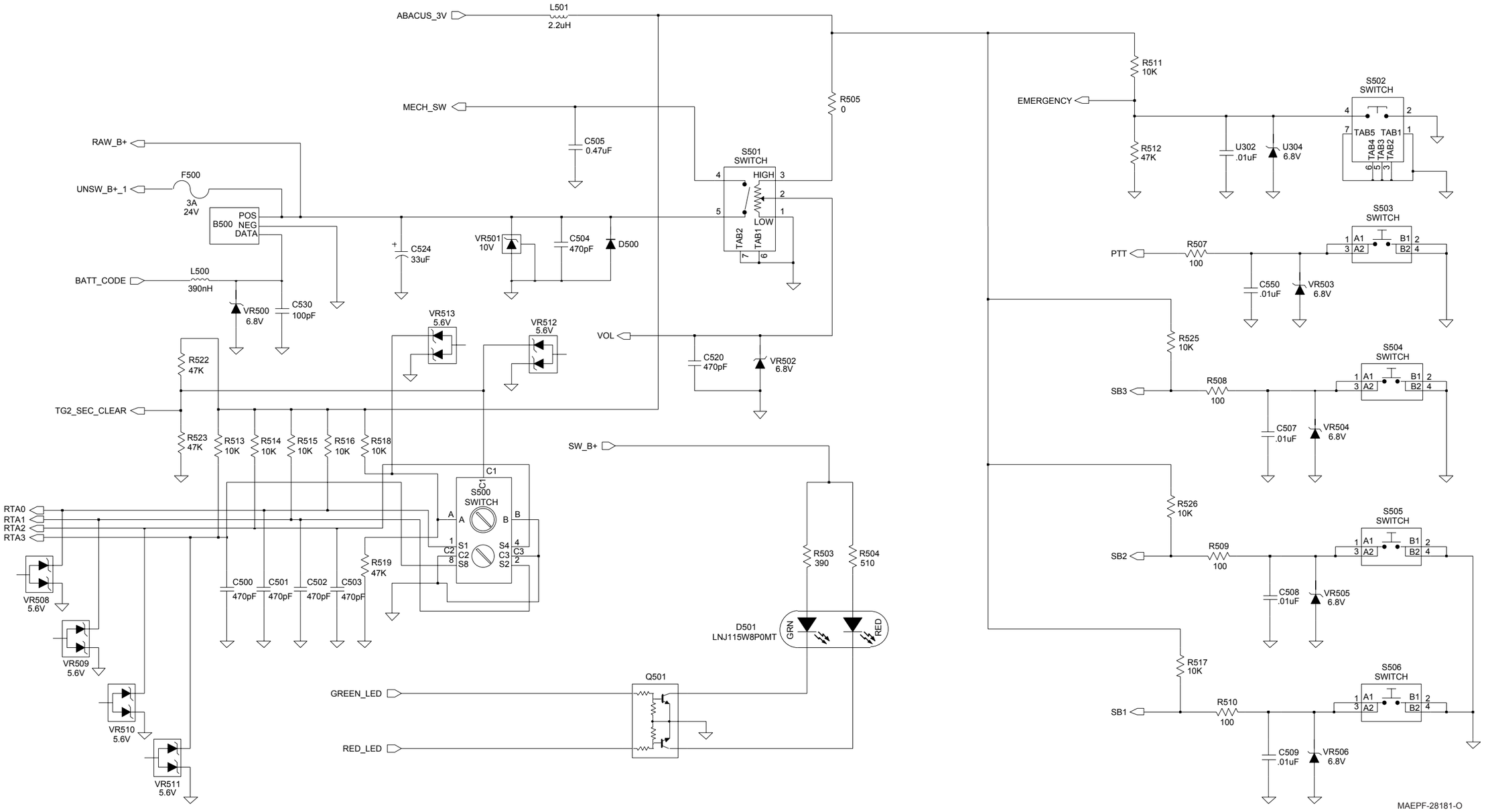


Figure 9-123. PMUE4271A Controls

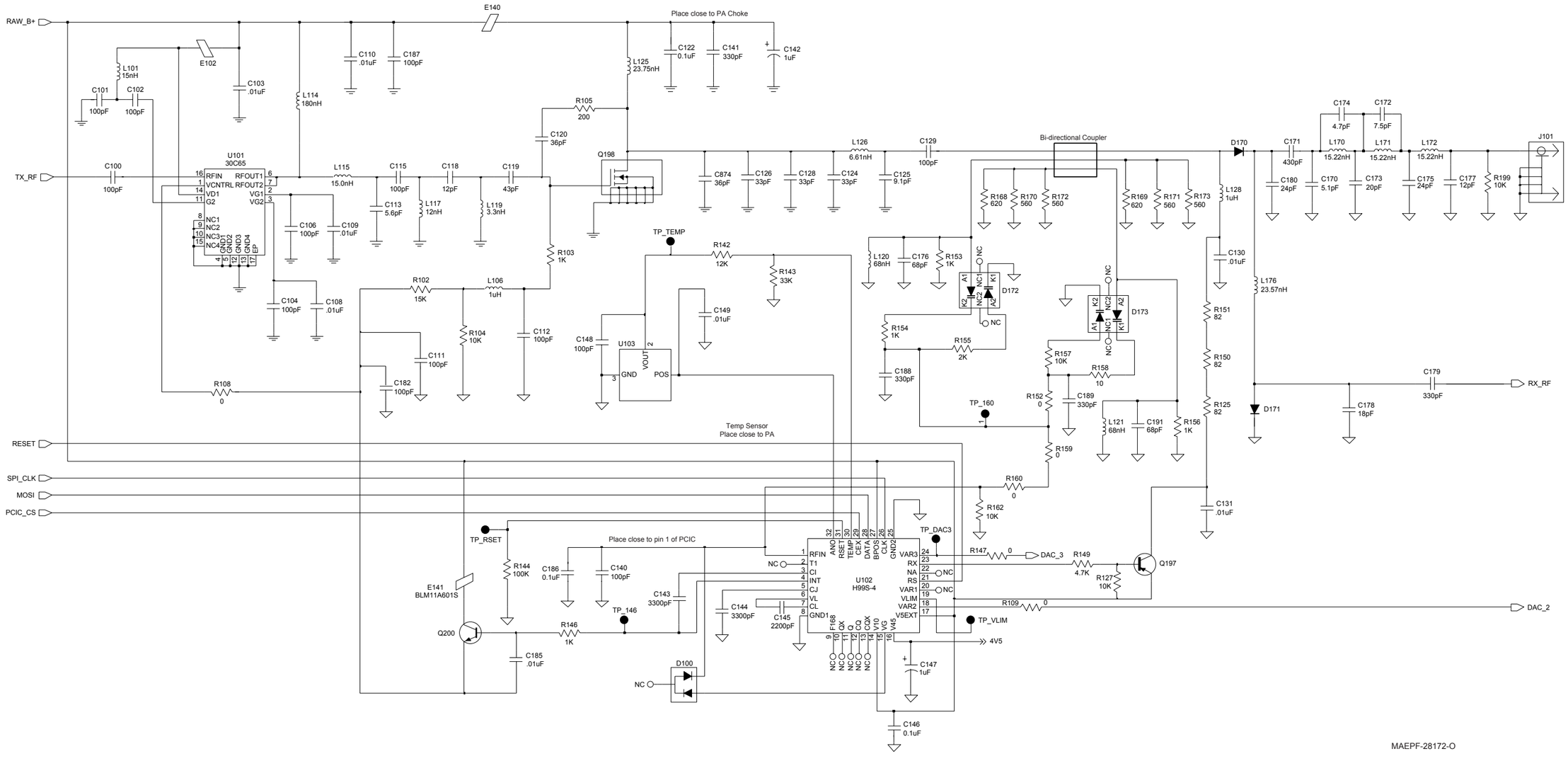


Figure 9-124. PMUE4271A Transmitter Subsection (Ring PA) Schematic

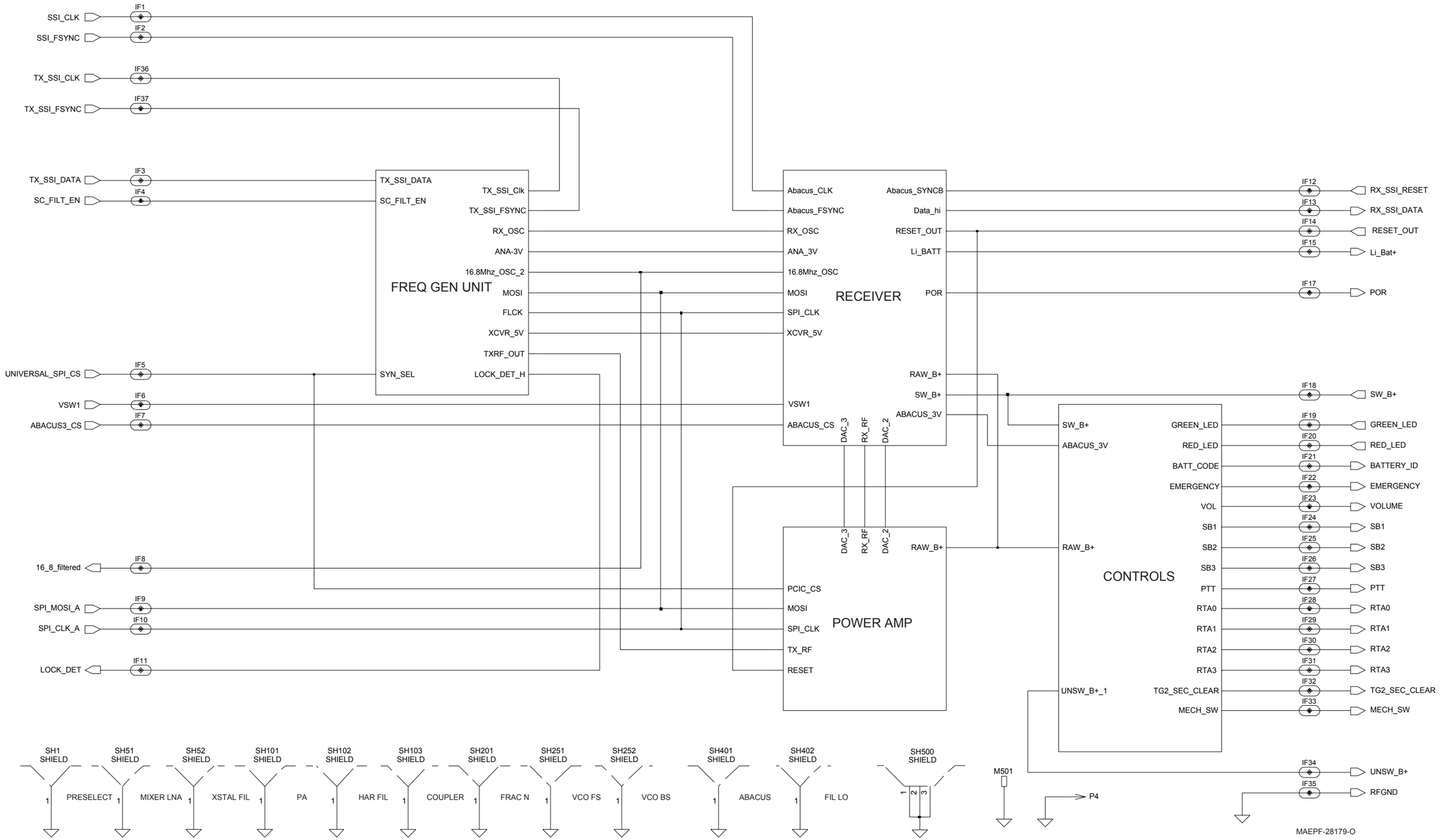


Figure 9-125. PMUE4271A RF Schematic

VIEWED FROM SIDE 1

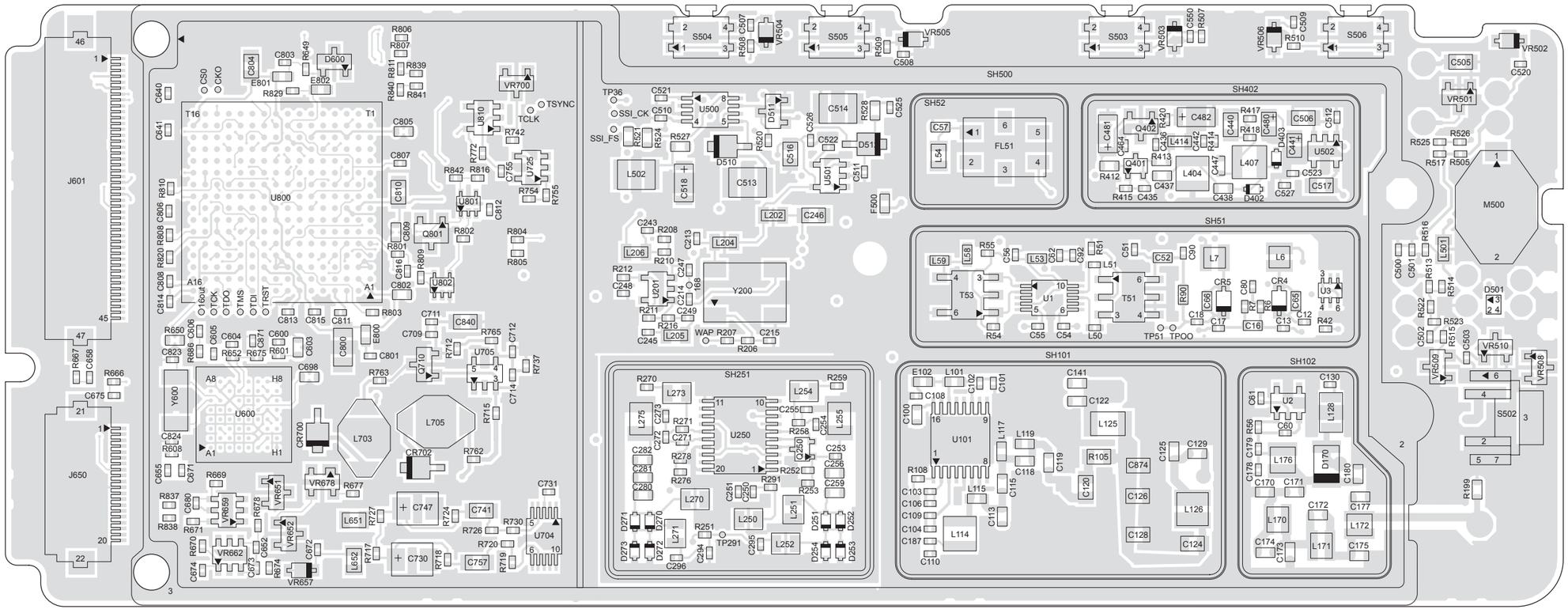
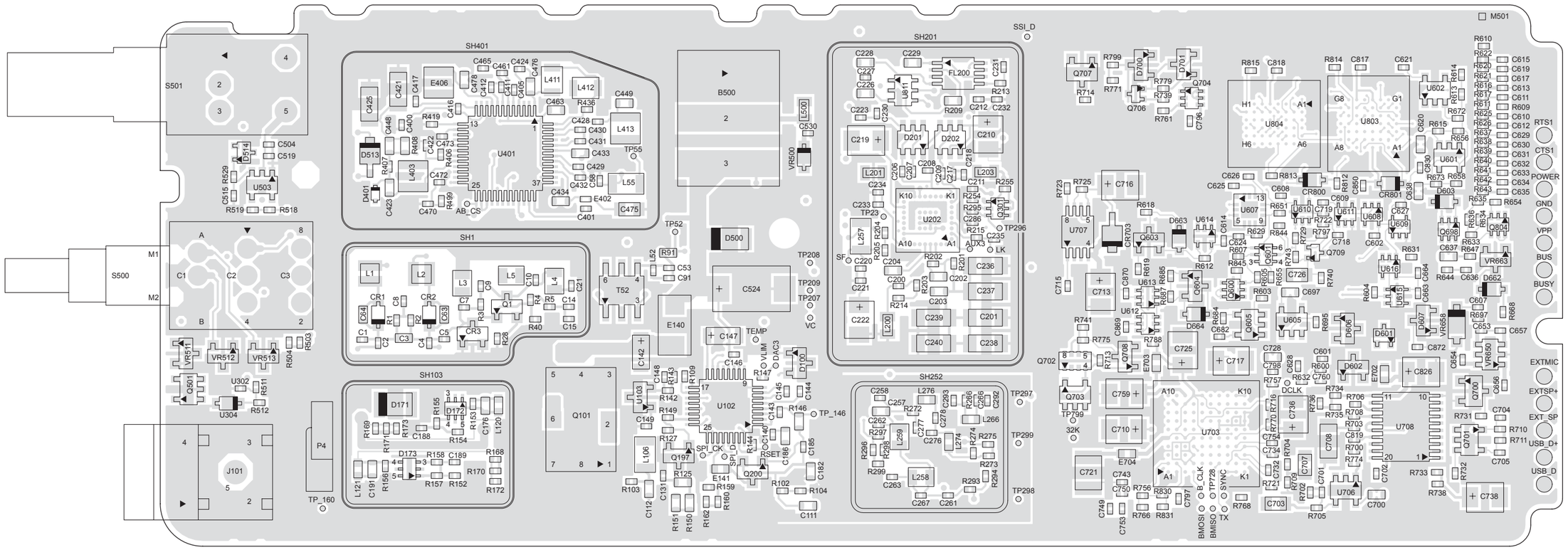


Figure 9-126. PMUE4271A Main Circuit Board Component Location Diagram – Side 1

VIEWED FROM SIDE 2



MAEPF-28184-O

Figure 9-127. PMUE4271A Main Circuit Board Component Location Diagram – Side 2

PMUE4271A Main Circuit Board Electrical Parts List

Reference Designator	Motorola Part Number	Description
B500	0986237A02	CONNECTOR (CONTACT BATTERY)
C1	2113743N17	"CAP CHIP 4.3 PF +.25PF COG"
C10	2113743N50	CAP CHIP 100 PF 5% COG
C100	2113740F51	CAP CHIP REEL CL1 30 100
C102	2113743N50	CAP CHIP 100 PF 5% COG
C103	2113743L41	CAP CHIP 10000 PF 10% X7R
C104	2113743N50	CAP CHIP 100 PF 5% COG
C106	2113743N50	CAP CHIP 100 PF 5% COG
C108	2113743L41	CAP CHIP 10000 PF 10% X7R
C109	2113743L41	CAP CHIP 10000 PF 10% X7R
C110	2113743L41	CAP CHIP 10000 PF 10% X7R
C111	2113740F51	CAP CHIP REEL CL1 30 100
C112	2113740F51	CAP CHIP REEL CL1 30 100
C113	2113740L11	CAP CER CHIP 5.1 PF +0.1PF
C115	2113740F51	CAP CHIP REEL CL1 30 100
C118	2113740F28	CAP CHIP REEL CL1 30 11
C119	2113740F42	CAP CHIP REEL CL1 30 43
C12	2113743N29	CAP CHIP 13.0 PF 5% COG
C122	2113743E20	CAP CHIP. 10 UF 10%
C124	2113740A39	CAP CHIP REEL CL1 30 27
C125	2113740L05	CAP CER CHIP 3.0 PF0.1PF
C126	2113740A36	CAP CHIP REEL CL1 30 20
C129	2113740F51	CAP CHIP REEL CL1 30 100
C13	2113743N29	CAP CHIP 13.0 PF 5% COG
C130	2113743L41	CAP CHIP 10000 PF 10% X7R
C131	2113743L41	CAP CHIP 10000 PF 10% X7R
C14	2113743M24	CAP CHIP 100000 PF 20% Y5V
C140	2113743N50	CAP CHIP 100 PF 5% COG
C141	2113740F51	CAP CHIP REEL CL1 30 100
C142	2311049A37	CAP TANT CHIP 1 20 20
C143	2113743L21	CAP CHIP 1500 PF 10% X7R
C144	2113743L09	CAP CHIP 470 PF 10% X7R
C145	2113743M04	CAP CHIP 15000 PF 20% Y5V
C146	2113743M24	CAP CHIP 100000 PF 20% Y5V
C147	2311049A37	CAP TANT CHIP 1 20 20
C148	2113743N50	CAP CHIP 100 PF 5% COG
C149	2113743L41	CAP CHIP 10000 PF 10% X7R
C15	2113743N50	CAP CHIP 100 PF 5% COG
C16	2113740L11	CAP CER CHIP 5.1 PF +0.1PF
C17	2113743N29	CAP CHIP 13.0 PF 5% COG
C170	2113740L10	CAP CER CHIP 4.7 PF +0.1PF
C171	2113740F51	CAP CHIP REEL CL1 30 100
C172	2113740F03	CAP CHIP REEL CL1 30 1.0
C173	2113740L10	CAP CER CHIP 4.7 PF +0.1PF
C174	2113740F09	CAP CHIP REEL CL1 30 1.8
C175	2113740L13	CAP CER CHIP 6.2 PF+0.1PF
C177	2113740L09	CAP CER CHIP 4.3 PF +0.1PF
C178	2113743N09	CAP CHIP 2.0PF +.25PF COG
C179	2113743N50	CAP CHIP 100 PF 5% COG
C18	2113743N29	CAP CHIP 13.0 PF 5% COG
C182	2113740F51	CAP CHIP REEL CL1 30 100
C185	2113743L41	CAP CHIP 10000 PF 10% X7R
C186	2113743E20	CAP CHIP. 10 UF 10%
C187	2113743N50	CAP CHIP 100 PF 5% COG
C188	2113743N50	CAP CHIP 100 PF 5% COG
C189	2113743N50	CAP CHIP 100 PF 5% COG
C2	2113743N29	CAP CHIP 13.0 PF 5% COG
C200	2113743L33	CAP CHIP 4700 PF 10% X7R
C201	2185419D06	CAP CER SUPER L/D 0.1UF
C202	2113743E12	CAP CHIP .047UF 10% X7R
C203	2113743E12	CAP CHIP .047UF 10% X7R
C204	2185419D08	CAP CER SUPER L/D 0.0012UF
C206	2113743M24	CAP CHIP 100000 PF 20% Y5V
C207	2113743M24	CAP CHIP 100000 PF 20% Y5V
C208	2113743M24	CAP CHIP 100000 PF 20% Y5V
C209	2113743M24	CAP CHIP 100000 PF 20% Y5V
C21	2113743N50	CAP CHIP 100 PF 5% COG
C210	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C211	2113743M24	CAP CHIP 100000 PF 20% Y5V
C212	2113743N50	CAP CHIP 100 PF 5% COG
C213	2113743M24	CAP CHIP 100000 PF 20% Y5V
C214	2113743L41	CAP CHIP 10000 PF 10% X7R
C215	2113743N50	CAP CHIP 100 PF 5% COG
C217	2113743N50	CAP CHIP 100 PF 5% COG
C218	2113743M24	CAP CHIP 100000 PF 20% Y5V
C219	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C220	2113743L41	CAP CHIP 10000 PF 10% X7R
C221	2113743N50	CAP CHIP 100 PF 5% COG
C222	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C223	2113743N50	CAP CHIP 100 PF 5% COG
C226	2113743E20	CAP CHIP. 10 UF 10%
C227	2113743N50	CAP CHIP 100 PF 5% COG
C228	2113743E20	CAP CHIP. 10 UF 10%
C229	2113743E20	CAP CHIP. 10 UF 10%
C230	2113743M24	CAP CHIP 100000 PF 20% Y5V
C231	2113743L01	CAP CHIP 220 PF 10% X7R
C232	2113743M24	CAP CHIP 100000 PF 20% Y5V
C233	2113743M24	CAP CHIP 100000 PF 20% Y5V
C234	2113743N50	CAP CHIP 100 PF 5% COG
C235	2113743N50	CAP CHIP 100 PF 5% COG
C236	2185419D06	CAP CER SUPER L/D 0.1UF
C237	2185419D06	CAP CER SUPER L/D 0.1UF
C238	2185419D06	CAP CER SUPER L/D 0.1UF
C239	2185419D06	CAP CER SUPER L/D 0.1UF
C240	2185419D06	CAP CER SUPER L/D 0.1UF
C243	2113743M24	CAP CHIP 100000 PF 20% Y5V
C245	2113743N50	CAP CHIP 100 PF 5% COG
C246	2113743F18	CAP CHIP 2.2 UF 16V 20%
C247	2113743L17	CAP CHIP 1000 PF 10% X7R
C249	2113743L17	CAP CHIP 1000 PF 10% X7R
C250	2113743N50	CAP CHIP 100 PF 5% COG
C251	2113743M24	CAP CHIP 100000 PF 20% Y5V
C253	2113743N12	CAP CHIP 2.7 PF +.25PF COG
C254	2113743N09	CAP CHIP 2.0PF +.25PF COG
C255	2113743N26	CAP CHIP 10.0 PF 5% COG
C256	2113740F28	CAP CHIP REEL CL1 30 11
C257	2113743E20	CAP CHIP. 10 UF 10%
C258	2113743L05	CAP CHIP 330 PF 10% X7R
C259	2113740F28	CAP CHIP REEL CL1 30 11
C261	2113743N50	CAP CHIP 100 PF 5% COG
C263	2113743N09	CAP CHIP 2.0PF +.25PF COG
C267	2113743N05	CAP CHIP 1.2 PF +.25PF COG
C271	2113743N09	CAP CHIP 2.0PF +.25PF COG
C272	2113743N17	"CAP CHIP 4.3 PF +.25PF COG"
C273	2113743N18	CAP CHIP 4.7 PF +.25PF COG
C276	2113743N20	CAP CHIP 5.6 PF +.5PF COG
C277	2113743N34	CAP CHIP 22.0 PF 5% COG
C278	2113743N44	CAP CHIP 56.0 PF 5% COG
C280	2113740F18	CAP CHIP REEL CL1 30 4.3
C281	2113740F18	CAP CHIP REEL CL1 30 4.3
C282	2113740F18	CAP CHIP REEL CL1 30 4.3
C286	2113743L05	CAP CHIP 330 PF 10% X7R
C292	2113743N50	CAP CHIP 100 PF 5% COG
C293	2113743N50	CAP CHIP 100 PF 5% COG
C295	2113743N50	CAP CHIP 100 PF 5% COG
C296	2113743N50	CAP CHIP 100 PF 5% COG
C3	2113740L11	CAP CER CHIP 5.1 PF +0.1PF
C4	2113743N29	CAP CHIP 13.0 PF 5% COG
C400	2113743N50	CAP CHIP 100 PF 5% COG
C401	2113743M24	CAP CHIP 100000 PF 20% Y5V
C405	2113743N50	CAP CHIP 100 PF 5% COG

Reference Designator	Motorola Part Number	Description
C411	2113743L25	CAP CHIP 2200 PF 10% X7R
C416	2113743M24	CAP CHIP 100000 PF 20% Y5V
C417	2113743N50	CAP CHIP 100 PF 5% COG
C422	2113743L41	CAP CHIP 10000 PF 10% X7R
C423	2113740F47	CAP CHIP REEL CL1 30 68
C424	2113743N50	CAP CHIP 100 PF 5% COG
C425	2113741B69	CAP CHIP CL2 X7R REEL 100000
C428	2113743L41	CAP CHIP 10000 PF 10% X7R
C429	2113743M24	CAP CHIP 100000 PF 20% Y5V
C430	2113743M24	CAP CHIP 100000 PF 20% Y5V
C431	2113743M24	CAP CHIP 100000 PF 20% Y5V
C432	2113743M24	CAP CHIP 100000 PF 20% Y5V
C433	2113740F33	CAP CHIP REEL CL1 30 18
C434	2113743E12	CAP CHIP .047UF 10% X7R
C435	2113743N44	CAP CHIP 56.0 PF 5% COG
C436	2113743N44	CAP CHIP 56.0 PF 5% COG
C437	2113740F22	CAP CHIP REEL CL1 30 6.2
C438	2113740F32	CAP CHIP REEL CL130 16
C440	2113743A24	CAP CHIP .330 UF 10% 16V
C441	2311049A86	CAP TAN CHIP 1UF 20% 10V 0805
C442	2113743L41	CAP CHIP 10000 PF 10% X7R
C448	2113743E10	CAP CHIP .033 UF 10% X 7R
C449	2113740F25	CAP CHIP REEL CL130 8.2
C461	2113743M24	CAP CHIP 100000 PF 20% Y5V
C463	2113743E12	CAP CHIP .047UF 10% X7R
C464	2113743M24	CAP CHIP 100000 PF 20% Y5V
C465	2113743M24	CAP CHIP 100000 PF 20% Y5V
C470	2113743M24	CAP CHIP 100000 PF 20% Y5V
C472	2113743M24	CAP CHIP 100000 PF 20% Y5V
C473	2113743M24	CAP CHIP 100000 PF 20% Y5V
C476	2113740F58	CAP CHIP REEL CL1 30 200
C478	2113743E12	CAP CHIP .047UF 10% X7R

Reference Designator	Motorola Part Number	Description
C480	2311049A86	CAP TAN CHIP 1UF 20% 10V 0805
C481	2311049A62	CAP TAN CHIP A/P 4.7 10 10
C482	2311049A62	CAP TAN CHIP A/P 4.7 10 10
C5	2113743N29	CAP CHIP 13.0 PF 5% COG
C500	2113743N50	CAP CHIP 100 PF 5% COG
C501	2113743N50	CAP CHIP 100 PF 5% COG
C502	2113743N50	CAP CHIP 100 PF 5% COG
C503	2113743N50	CAP CHIP 100 PF 5% COG
C504	2113743L09	CAP CHIP 470 PF 10% X7R
C505	2113743A27	CAP CHIP .470 UF 10% 16V
C506	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C507	2113743L41	CAP CHIP 10000 PF 10% X7R
C508	2113743L41	CAP CHIP 10000 PF 10% X7R
C509	2113743L41	CAP CHIP 10000 PF 10% X7R
C510	2113743M24	CAP CHIP 100000 PF 20% Y5V
C511	2113743M24	CAP CHIP 100000 PF 20% Y5V
C512	2113743M24	CAP CHIP 100000 PF 20% Y5V
C513	2113743T19	CAP 10UF 16V CER 3225 X5R
C514	2113743T19	CAP 10UF 16V CER 3225 X5R
C515	2113743M24	CAP CHIP 100000 PF 20% Y5V
C516	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C517	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C518	2311049A59	CAP TANT CHIP A/P 10UF 10% 6V
C519	2113743M24	CAP CHIP 100000 PF 20% Y5V
C52	2113740L06	CAP CER CHIP 3.3 PF0.1PF
C520	2113743N50	CAP CHIP 100 PF 5% COG
C521	2113743L41	CAP CHIP 10000 PF 10% X7R
C522	2113743L41	CAP CHIP 10000 PF 10% X7R
C523	2113743L41	CAP CHIP 10000 PF 10% X7R
C524	2311049A22	CAP TANT CHIP 33 10 16 A/P
C525	2113743N50	CAP CHIP 100 PF 5% COG
C526	2113743N50	CAP CHIP 100 PF 5% COG
C527	2113743N50	CAP CHIP 100 PF 5% COG

Reference Designator	Motorola Part Number	Description
C530	2113743N50	CAP CHIP 100 PF 5% COG
C54	2113743N50	CAP CHIP 100 PF 5% COG
C55	2113743N50	CAP CHIP 100 PF 5% COG
C550	2113743L41	CAP CHIP 10000 PF 10% X7R
C56	2113743N50	CAP CHIP 100 PF 5% COG
C57	2113740L12	CAP CER CHIP 5.6PF +0.1PF
C58	2113743N15	CAP CHIP 3.6 PF +.25PF COG
C60	2113743M24	CAP CHIP 100000 PF 20% Y5V
C600	2113743L41	CAP CHIP 10000 PF 10% X7R
C601	2113743N38	CAP CHIP 33.0 PF 5% COG
C602	2113743M24	CAP CHIP 100000 PF 20% Y5V
C603	2113743E20	CAP CHIP. 10 UF 10%
C604	2113743M24	CAP CHIP 100000 PF 20% Y5V
C605	2113743M24	CAP CHIP 100000 PF 20% Y5V
C606	2113743N50	CAP CHIP 100 PF 5% COG
C607	2113743M24	CAP CHIP 100000 PF 20% Y5V
C608	2113743M24	CAP CHIP 100000 PF 20% Y5V
C609	2113743M24	CAP CHIP 100000 PF 20% Y5V
C61	2113743L05	CAP CHIP 330 PF 10% X7R
C610	2113743N40	CAP CHIP 39.0 PF 5% COG
C611	2113743N40	CAP CHIP 39.0 PF 5% COG
C612	2113743N40	CAP CHIP 39.0 PF 5% COG
C613	2113743N40	CAP CHIP 39.0 PF 5% COG
C614	2113743M24	CAP CHIP 100000 PF 20% Y5V
C615	2113743N40	CAP CHIP 39.0 PF 5% COG
C617	2113743N40	CAP CHIP 39.0 PF 5% COG
C619	2113743N40	CAP CHIP 39.0 PF 5% COG
C62	2113743L29	CAP CHIP 3300PF 10% X7R
C620	2113743E20	CAP CHIP. 10 UF 10%
C621	2113743M24	CAP CHIP 100000 PF 20% Y5V
C624	2113743M24	CAP CHIP 100000 PF 20% Y5V
C625	2113743M24	CAP CHIP 100000 PF 20% Y5V
C626	2113743M24	CAP CHIP 100000 PF 20% Y5V
C627	2113743M24	CAP CHIP 100000 PF 20% Y5V

Reference Designator	Motorola Part Number	Description
C628	2113743N44	CAP CHIP 56.0 PF 5% COG
C629	2113743L05	CAP CHIP 330 PF 10% X7R
C63	2113740L05	CAP CER CHIP 3.0 PF0.1PF
C630	2113743L05	CAP CHIP 330 PF 10% X7R
C631	2113743L05	CAP CHIP 330 PF 10% X7R
C632	2113743L05	CAP CHIP 330 PF 10% X7R
C633	2113743L05	CAP CHIP 330 PF 10% X7R
C634	2113743L05	CAP CHIP 330 PF 10% X7R
C635	2113743L05	CAP CHIP 330 PF 10% X7R
C636	2113743L05	CAP CHIP 330 PF 10% X7R
C637	2113741F49	CAP CHIP CL2 X7R REEL 10000
C638	2113743E20	CAP CHIP. 10 UF 10%
C64	2113740L05	CAP CER CHIP 3.0 PF0.1PF
C65	2113740L05	CAP CER CHIP 3.0 PF0.1PF
C652	2113743N50	CAP CHIP 100 PF 5% COG
C653	2113743N50	CAP CHIP 100 PF 5% COG
C654	2113743N50	CAP CHIP 100 PF 5% COG
C655	2113743N50	CAP CHIP 100 PF 5% COG
C656	2113743N50	CAP CHIP 100 PF 5% COG
C657	2113743N50	CAP CHIP 100 PF 5% COG
C658	2113743N50	CAP CHIP 100 PF 5% COG
C66	2113740L05	CAP CER CHIP 3.0 PF0.1PF
C663	2113743N50	CAP CHIP 100 PF 5% COG
C664	2113743M24	CAP CHIP 100000 PF 20% Y5V
C671	2113743N38	CAP CHIP 33.0 PF 5% COG
C672	2113743N50	CAP CHIP 100 PF 5% COG
C673	2113743N38	CAP CHIP 33.0 PF 5% COG
C674	2113743L09	CAP CHIP 470 PF 10% X7R
C675	2113743N50	CAP CHIP 100 PF 5% COG
C680	2113743N38	CAP CHIP 33.0 PF 5% COG
C682	2113743M24	CAP CHIP 100000 PF 20% Y5V
C697	2113743E20	CAP CHIP. 10 UF 10%
C698	2113743E20	CAP CHIP. 10 UF 10%
C7	2113743N50	CAP CHIP 100 PF 5% COG

Reference Designator	Motorola Part Number	Description
C700	2113743E20	CAP CHIP. 10 UF 10%
C701	2113743L05	CAP CHIP 330 PF 10% X7R
C702	2113743M24	CAP CHIP 100000 PF 20% Y5V
C703	2113743A31	CAP CHIP 1.0 UF 10% X7R
C704	2113743M24	CAP CHIP 100000 PF 20% Y5V
C705	2113743M24	CAP CHIP 100000 PF 20% Y5V
C707	2113743A31	CAP CHIP 1.0 UF 10% X7R
C708	2109720D14	CAP CER CHIP LOW DIST 0.1UF
C709	2113743M24	CAP CHIP 100000 PF 20% Y5V
C710	2311049C52	CAP TANT CHIP 33UF 10% 10V
C711	2113743N50	CAP CHIP 100 PF 5% COG
C712	2113743N50	CAP CHIP 100 PF 5% COG
C713	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C714	2113743L50	CAP CHIP 33000 PF 10%
C715	2113743L41	CAP CHIP 10000 PF 10% X7R
C716	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C717	2311049C52	CAP TANT CHIP 33UF 10% 10V
C718	2113743M24	CAP CHIP 100000 PF 20% Y5V
C719	2113743N50	CAP CHIP 100 PF 5% COG
C721	2113743T19	CAP 10UF 16V CER 3225 X5R
C725	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C726	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C728	2113743E11	CAP CHIP .039 UF 10% X 7R
C730	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C731	2113743M24	CAP CHIP 100000 PF 20% Y5V
C732	2113743M24	CAP CHIP 100000 PF 20% Y5V
C734	2113743M24	CAP CHIP 100000 PF 20% Y5V
C736	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C738	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C741	2113743A31	CAP CHIP 1.0 UF 10% X7R

Reference Designator	Motorola Part Number	Description
C743	2113743M24	CAP CHIP 100000 PF 20% Y5V
C747	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C749	2113743M24	CAP CHIP 100000 PF 20% Y5V
C750	2113743L41	CAP CHIP 10000 PF 10% X7R
C753	2113743M24	CAP CHIP 100000 PF 20% Y5V
C754	2113743M24	CAP CHIP 100000 PF 20% Y5V
C755	2113743M24	CAP CHIP 100000 PF 20% Y5V
C757	2113743A31	CAP CHIP 1.0 UF 10% X7R
C759	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C760	2113743N50	CAP CHIP 100 PF 5% COG
C796	2113743M24	CAP CHIP 100000 PF 20% Y5V
C797	2113743M24	CAP CHIP 100000 PF 20% Y5V
C798	2113743M24	CAP CHIP 100000 PF 20% Y5V
C8	2113743N50	CAP CHIP 100 PF 5% COG
C80	2113743L41	CAP CHIP 10000 PF 10% X7R
C800	2113743B29	CAP CHIP 1.00 UF 10% 16V
C801	2113743N50	CAP CHIP 100 PF 5% COG
C802	2113743E04	CER CHIP CAP .016UF
C803	2113743N50	CAP CHIP 100 PF 5% COG
C804	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C805	2113743E04	CER CHIP CAP .016UF
C806	2113743M24	CAP CHIP 100000 PF 20% Y5V
C807	2113743M24	CAP CHIP 100000 PF 20% Y5V
C808	2113743M24	CAP CHIP 100000 PF 20% Y5V
C809	2113743E04	CER CHIP CAP .016UF
C810	2113928E01	CAP CER CHIP 1.0 UF 10 % 10V
C811	2113743M24	CAP CHIP 100000 PF 20% Y5V
C812	2113743M24	CAP CHIP 100000 PF 20% Y5V
C813	2113743M24	CAP CHIP 100000 PF 20% Y5V
C814	2113743M24	CAP CHIP 100000 PF 20% Y5V
C815	2113743M24	CAP CHIP 100000 PF 20% Y5V
C816	2113743M24	CAP CHIP 100000 PF 20% Y5V
C817	2113743M24	CAP CHIP 100000 PF 20% Y5V

Reference Designator	Motorola Part Number	Description
C818	2113743M24	CAP CHIP 100000 PF 20% Y5V
C823	2113743N20	CAP CHIP 5.6 PF +.5PF COG
C824	2113743N20	CAP CHIP 5.6 PF +.5PF COG
C826	2311049A57	CAP TANT CHIP A/P 10UF 10% 16V
C830	2113743M24	CAP CHIP 100000 PF 20% Y5V
C840	2113928C04	CAP CER CHIP 4.7UF 6.3V10%0805
C850	2113743L05	CAP CHIP 330 PF 10% X7R
C869	2113743M24	CAP CHIP 100000 PF 20% Y5V
C870	2113743M24	CAP CHIP 100000 PF 20% Y5V
C871	2113743N50	CAP CHIP 100 PF 5% COG
C872	2113743N50	CAP CHIP 100 PF 5% COG
C874	2113740A43	CHIP CAPACITORS 39PF +5%
C9	2113743N50	CAP CHIP 100 PF 5% COG
C91	2113743N27	CAP CHIP 11.0 PF 5% COG
C92	2113743N50	CAP CHIP 100 PF 5% COG
CR1	4862824C01	DIODE VARACTOR
CR2	4862824C01	DIODE VARACTOR
CR3	4880154K03	SOT MMBD353 RH DIODE DUAL SCHT
CR4	4862824C01	DIODE VARACTOR
CR5	4862824C01	DIODE VARACTOR
CR700	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR702	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR703	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
CR800	4805656W37	TSTR BAT54HT1
CR801	4805656W37	TSTR BAT54HT1
D170	4802482J02	PIN DIODE SMD
D171	4802482J02	PIN DIODE SMD
D172	4802197J83	DUAL SHOTTKY DIODE MBD330DWT1
D173	4802197J83	DUAL SHOTTKY DIODE MBD330DWT1

Reference Designator	Motorola Part Number	Description
D201	4802233J09	DIODE TRIPLE SOT25-RH
D202	4802233J09	DIODE TRIPLE SOT25-RH
D251	4809877C08	DIODE VARACTOR 1SV279 SMD
D252	4809877C08	DIODE VARACTOR 1SV279 SMD
D253	4809877C08	DIODE VARACTOR 1SV279 SMD
D254	4809877C08	DIODE VARACTOR 1SV279 SMD
D270	4809877C08	DIODE VARACTOR 1SV279 SMD
D271	4809877C08	DIODE VARACTOR 1SV279 SMD
D272	4809877C08	DIODE VARACTOR 1SV279 SMD
D273	4809877C08	DIODE VARACTOR 1SV279 SMD
D401	4809877C08	DIODE VARACTOR 1SV279 SMD
D402	4809877C13	DIODE VARACTOR ISV305 SMD
D403	4809877C13	DIODE VARACTOR ISV305 SMD
D500	4880107R01	RECTIFIER
D501	4809118D02	LED BICOLOR LNJ115W8POMT
D510	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D511	4805129M90	DIODE SOT PKGD
D512	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D513	4813833A20	DIODE SCHOTTKY 1A 40V PWRMITE
D514	4805218N57	DIODE DUAL
D600	4805129M90	DIODE SOT PKGD
D601	4805218N57	DIODE DUAL
D602	4805129M06	DIODE MMBD7000
D603	4805656W37	TSTR BAT54HT1
D606	4805129M06	DIODE MMBD7000
D607	4805129M06	DIODE MMBD7000
D662	4805656W37	TSTR BAT54HT1

Reference Designator	Motorola Part Number	Description
D663	4805656W37	TSTR BAT54HT1
D664	4805656W37	TSTR BAT54HT1
D700	4805129M90	DIODE SOT PKGD
D701	4805129M06	DIODE MMBD7000
E102	2480574F01	IND FERRITE CHIP 60OHM 0603
E140	2405688Z01	INDUCTOR FERRITE BEAD
E141	2480574F01	IND FERRITE CHIP 60OHM 0603
E402	2480640Z01	SURFACE MOUNT FERRITE BEAD
E406	2462587N76	CHIP IND 4700NH 5%
E702	2480574F01	IND FERRITE CHIP 60OHM 0603
E703	2480574F01	IND FERRITE CHIP 60OHM 0603
E704	2480574F01	IND FERRITE CHIP 60OHM 0603
E800	2480574F01	IND FERRITE CHIP 60OHM 0603
E801	2480574F01	IND FERRITE CHIP 60OHM 0603
E802	0662057B47	CHIP RES 0 OHMS +.050 OHMS
F500	6580542Z01	FUSE CHIP SMT TR/1608FF 3A
FL200	9185130D01	FLTR SW CAP 3 POLE BUT-TERW
FL51	9185924B01	"FILTER, 73.35 MHZ 3-POLE CRYST"
J101	2880658Z04	Connector (SMA)
J601	0905505Y10	CONN 45 PIN ZIF
J650	0905505Y09	CONN 20 PIN ZIF
L1	2460591A12	COIL AIR WOUND INDUC 8.45
L101	2413926G09	IND 15.0 NH 5%
L106	2462587T30	IND CHIP 1000NH 5% LOW PRO
L114	2462587N56	CHIP IND 180NH 5%
L115	2485930A08	IND 12.0NH 5%
L117	2485930A08	IND 12.0NH 5%
L119	2485930A22	IND 2.2NH 0.3NH

Reference Designator	Motorola Part Number	Description
L125	2479990E01	COIL AIR WOUND/GREEN COLOR 23.
L126	2460591L05	COIL AIR WOUND INDUC 10.12
L128	2462587T30	IND CHIP 1000NH 5% LOW PRO
L170	2460591B48	COIL AIR WOUND INDUC 15.22
L171	2460591B48	COIL AIR WOUND INDUC 15.22
L172	2460591B48	COIL AIR WOUND INDUC 15.22
L176	2460591B48	COIL AIR WOUND INDUC 15.22
L2	2460591A12	COIL AIR WOUND INDUC 8.45
L200	2462587Q47	IND CHIP 1000 NH 10%
L201	2462587Q20	"IND CHIP 2,200NH 20%"
L202	2462587Q20	"IND CHIP 2,200NH 20%"
L203	2462587Q20	"IND CHIP 2,200NH 20%"
L204	2462587Q20	"IND CHIP 2,200NH 20%"
L205	2462587Q47	IND CHIP 1000 NH 10%
L206	2462587Q20	"IND CHIP 2,200NH 20%"
L250	2462587V41	IND CHIP 390 NH 10%
L251	2462587V41	IND CHIP 390 NH 10%
L252	2462587V41	IND CHIP 390 NH 10%
L254	2462587V41	IND CHIP 390 NH 10%
L255	2460591C03	COIL AIR WOUND INDUC 11.87
L257	0611077A01	RES CHIP JUMPER
L258	2462587V27	CHIP IND 27 NH 5% 0805
L259	2462587V30	CHIP IND 47NH 5% 0805
L266	2409377M14	IND CHIP WW 68 NH 5% 1608
L270	2462587V41	IND CHIP 390 NH 10%
L271	2462587V41	IND CHIP 390 NH 10%
L273	2462587V41	IND CHIP 390 NH 10%
L274	2409377M07	"IDCTR,CHIP,18NH,5%,700MA,.17OH"
L275	2460591C02	COIL AIR WOUND INDUC 9.31
L276	2409377M08	IND CHIP WW 22 NH 5% 1608
L3	2462587V26	CHIP IND 22 NH 5% 0805
L4	2462587V37	CHIP IND 180 NH 5% 0805

Reference Designator	Motorola Part Number	Description
L403	2462587N75	CHIP IND 3900 NH 5%
L404	2462587N59	CHIP IND 330NH 5%
L407	2462587N76	CHIP IND 4700NH 5%
L411	2405769X05	COIL INDUCTOR
L412	2405769X05	COIL INDUCTOR
L413	2462587N59	CHIP IND 330NH 5%
L414	2462587Q51	"IND CHIP 2,200 NH 10%"
L5	2462587V23	CHIP IND 12 NH 5% 0805
L50	2409154M92	IND CER MLTILYR 22.0NH 1005
L500	2462587Q42	IND CHIP 390NH 10%
L501	2462587Q51	"IND CHIP 2,200 NH 10%"
L502	2462587L50	CHIP IND 100000 NH 10%
L51	2409154M92	IND CER MLTILYR 22.0NH 1005
L53	2409377M36	IND CHIP WW 220 NH 5% 1608
L54	2413926K32	IND CER CHIP 560.0 NH 5%
L55	2462587T25	IND CHIP 620NH 5% LOW PRO
L58	2409377M35	"IDCTR,CHIP,180NH,5%,240MA,1.25"
L59	2409377M37	"IDCTR,CHIP,270NH,5%,170MA,2.3O"
L6	2460591A12	COIL AIR WOUND INDUC 8.45
L60	2409154M62	"FIXED INDUC-TOR,CHIP,8.2NH,5%,,"
L651	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L652	2404574Z14	IND CHIP WW 270NH 2% 2012 SMD
L7	2460591A12	COIL AIR WOUND INDUC 8.45
L703	2486085A06	COIL 47UH SMT POWER INDUCTOR
L705	2486085A06	COIL 47UH SMT POWER INDUCTOR
M500	0985888K02	SKT RTC BTTY LEAP
P4	3905643V01	CONTACT ANT GRD
PCB	8486771Z01	"PWB,MN,,,8 LAYER"
Q1	4802245J44	NPN SILICON BIPOLAR TRAN-SISTOR

Reference Designator	Motorola Part Number	Description
Q101	5185633C51	"AMP,FET,,380MHZMIN,520MHZ MAX,,"
Q197	4813824A17	XSTR PNP40V .2A GENPB=100-300
Q200	4805128M12	TSTR BCW 60B (RH) (869826)
Q250	4805218N63	RF TRANS SOT 323 BFQ67W
Q301	4805921T11	XSTR DUAL PNP
Q401	4805218N63	RF TRANS SOT 323 BFQ67W
Q402	4805128M19	TSTR SOT23 MMBTA13 RH
Q501	4805921T09	XSTR DUAL ROHM FMG8
Q600	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q601	4809579E35	TSTR FET DUAL N-CHAN FDG360IN
Q603	4813824A10	TSTR NPN 40V .2A GEN PURP
Q604	4813824A10	TSTR NPN 40V .2A GEN PURP
Q605	5185143E74	IC SINGLE FET BUS SWITCH
Q698	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q700	4880048M01	TSTR NPN DIG 47K/47K
Q701	4805921T09	XSTR DUAL ROHM FMG8
Q702	4885844C01	XSTR FET
Q703	4805921T09	XSTR DUAL ROHM FMG8
Q704	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
Q706	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q707	4880048M01	TSTR NPN DIG 47K/47K
Q708	4805218N11	XISTOR SOT RH BST82
Q709	4805793Y01	TRANS MINI SOT NPN LOW NOISE
Q710	4813824A13	XSTR NPN 80V .5A DRIVER B=50
Q801	4880048M01	TSTR NPN DIG 47K/47K
Q804	4805723X03	TRANS DUAL NPN-PNP UMD3N ROHM
R1	0662057N23	RES CHIP 100K 5% 20X40
R102	0662057N03	RES. CHIP 15K 5% 20X40

Reference Designator	Motorola Part Number	Description
R103	0662057M74	RES. CHIP 1000 5% 20X40
R104	0662057N05	RES. CHIP 18K 5% 20X40
R108	0662057M01	RES. CHIP 0 5% 20X40
R109	0662057M01	RES. CHIP 0 5% 20X40
R125	0662057A23	CHIP RES 82 OHMS 5%
R127	0662057M98	RES CHIP 10K 5% 20X40
R142	0662057V11	RES CHIP 22K 1% 1/16W
R143	0662057V17	RES CHIP 39K 1% 1/16W
R144	0662057N23	RES CHIP 100K 5% 20X40
R146	0662057A49	CHIP RES 1000 OHMS 5%
R147	0662057M01	RES. CHIP 0 5% 20X40
R149	0662057M90	RES. CHIP 4700 5% 20X40
R150	0662057A23	CHIP RES 82 OHMS 5%
R151	0662057A23	CHIP RES 82 OHMS 5%
R154	0662057M67	RES. CHIP 510 5% 20X40
R155	0662057M74	RES. CHIP 1000 5% 20X40
R159	0662057M01	RES. CHIP 0 5% 20X40
R160	0662057M01	RES. CHIP 0 5% 20X40
R168	0662057M55	RES. CHIP 160 5% 20X40
R169	0662057M55	RES. CHIP 160 5% 20X40
R170	0662057M55	RES. CHIP 160 5% 20X40
R171	0662057M55	RES. CHIP 160 5% 20X40
R199	0662057A73	CHIP RES 10K OHMS 5%
R2	0662057N23	RES CHIP 100K 5% 20X40
R201	0662057M48	RES. CHIP 82 5% 20X40
R202	0662057M70	RES. CHIP 680 5% 20X40
R203	0662057M58	RES. CHIP 220 5% 20X40
R204	0662057N15	RES. CHIP 47K 5% 20X40
R205	0662057N10	RES. CHIP 30K 5% 20X40
R206	0662057M98	RES CHIP 10K 5% 20X40
R207	0662057M74	RES. CHIP 1000 5% 20X40
R208	0662057N11	RES. CHIP 33K 5% 20X40
R209	0662057B47	CHIP RES 0 OHMS +.050 OHMS
R210	0662057N11	RES. CHIP 33K 5% 20X40

Reference Designator	Motorola Part Number	Description
R211	0662057M81	RES. CHIP 2000 5% 20X40
R213	0662057M96	RES. CHIP 8200 5% 20X40
R214	0662057M74	RES. CHIP 1000 5% 20X40
R215	0662057M98	RES CHIP 10K 5% 20X40
R216	0662057M50	RES. CHIP 100 5% 20X40
R251	0662057M01	RES. CHIP 0 5% 20X40
R252	0662057M98	RES CHIP 10K 5% 20X40
R253	0662057N03	RES. CHIP 15K 5% 20X40
R254	0662057N33	RES. CHIP 270K 5% 20X40
R255	0662057M74	RES. CHIP 1000 5% 20X40
R258	0662057M23	RES. CHIP 7.5 5% 20X40
R259	0662057M62	RES. CHIP 330 5% 20X40
R266	0662057M62	RES. CHIP 330 5% 20X40
R270	0662057M52	RES. CHIP 120 5% 20X40
R271	0662057M37	RES. CHIP 30 5% 20X40
R272	0662057M57	RES. CHIP 200 5% 20X40
R273	0662057M57	RES. CHIP 200 5% 20X40
R274	0662057M33	RES. CHIP 20 5% 20X10
R275	0662057M57	RES. CHIP 200 5% 20X40
R276	0662057M98	RES CHIP 10K 5% 20X40
R278	0662057N01	RES. CHIP 12K 5% 20X40
R28	0662057M10	RES. CHIP 2.2 5% 20X40
R291	0662057M37	RES. CHIP 30 5% 20X40
R293	0662057M33	RES. CHIP 20 5% 20X10
R294	0662057M62	RES. CHIP 330 5% 20X40
R295	0662057M98	RES CHIP 10K 5% 20X40
R296	0662057M01	RES. CHIP 0 5% 20X40
R299	0662057M01	RES. CHIP 0 5% 20X40
R3	0662057M78	RES. CHIP 1500 5% 20X40
R4	0662057N01	RES. CHIP 12K 5% 20X40
R40	0662057M96	RES. CHIP 8200 5% 20X40
R406	0662057M98	RES CHIP 10K 5% 20X40
R407	0662057M98	RES CHIP 10K 5% 20X40
R408	0662057A55	CHIP RES 1800 OHM 5%

Reference Designator	Motorola Part Number	Description
R412	0662057A31	CHIP RES 180 OHMS 5%
R413	0662057A37	CHIP RES 330 OHMS 5%
R414	0662057M98	RES CHIP 10K 5% 20X40
R415	0662057M98	RES CHIP 10K 5% 20X40
R417	0662057M75	RES. CHIP 1100 5% 20X40
R418	0662057M01	RES. CHIP 0 5% 20X40
R419	0662057N23	RES CHIP 100K 5% 20X40
R42	0662057N23	RES CHIP 100K 5% 20X40
R420	0662057N17	RES. CHIP 56K 5% 20X40
R436	0662057M01	RES. CHIP 0 5% 20X40
R499	0662057M98	RES CHIP 10K 5% 20X40
R5	0662057M66	RES. CHIP 470 5% 20X40
R503	0662057M64	RES. CHIP 390 5% 20X40
R504	0662057M67	RES. CHIP 510 5% 20X40
R505	0662057M98	RES CHIP 10K 5% 20X40
R507	0662057M50	RES. CHIP 100 5% 20X40
R508	0662057M50	RES. CHIP 100 5% 20X40
R509	0662057M50	RES. CHIP 100 5% 20X40
R51	0662057M42	RES. CHIP 47 5% 20X40
R510	0662057M50	RES. CHIP 100 5% 20X40
R511	0662057M98	RES CHIP 10K 5% 20X40
R512	0662057N15	RES. CHIP 47K 5% 20X40
R513	0662057M98	RES CHIP 10K 5% 20X40
R514	0662057M98	RES CHIP 10K 5% 20X40
R515	0662057M98	RES CHIP 10K 5% 20X40
R516	0662057M98	RES CHIP 10K 5% 20X40
R517	0662057M98	RES CHIP 10K 5% 20X40
R518	0662057M98	RES CHIP 10K 5% 20X40
R519	0662057N15	RES. CHIP 47K 5% 20X40
R520	0662057N35	RES. CHIP 330K 5% 20X40
R522	0662057N15	RES. CHIP 47K 5% 20X40
R523	0662057N15	RES. CHIP 47K 5% 20X40
R524	0662057B47	CHIP RES 0 OHMS +.050 OHMS
R525	0662057M98	RES CHIP 10K 5% 20X40

Reference Designator	Motorola Part Number	Description
R526	0662057M98	RES CHIP 10K 5% 20X40
R527	0662057B47	CHIP RES 0 OHMS +.050 OHMS
R529	0662057M67	RES. CHIP 510 5% 20X40
R54	0662057M98	RES CHIP 10K 5% 20X40
R55	0662057M98	RES CHIP 10K 5% 20X40
R57	0662057M01	RES. CHIP 0 5% 20X40
R6	0662057N23	RES CHIP 100K 5% 20X40
R600	0662057M64	RES. CHIP 390 5% 20X40
R601	0662057M67	RES. CHIP 510 5% 20X40
R603	0662057N39	RES. CHIP 470K 5% 20X40
R604	0662057N39	RES. CHIP 470K 5% 20X40
R605	0662057N23	RES CHIP 100K 5% 20X40
R607	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R608	0662057M50	RES. CHIP 100 5% 20X40
R611	0662057M50	RES. CHIP 100 5% 20X40
R612	0662057N23	RES CHIP 100K 5% 20X40
R613	0662057N06	RES. CHIP 20K 5% 20X40
R614	0662057N06	RES. CHIP 20K 5% 20X40
R615	0662057N23	RES CHIP 100K 5% 20X40
R616	0662057M50	RES. CHIP 100 5% 20X40
R618	0662057M98	RES CHIP 10K 5% 20X40
R619	0662057M98	RES CHIP 10K 5% 20X40
R620	0662057M50	RES. CHIP 100 5% 20X40
R621	0662057M50	RES. CHIP 100 5% 20X40
R622	0662057M50	RES. CHIP 100 5% 20X40
R625	0662057M50	RES. CHIP 100 5% 20X40
R626	0662057M50	RES. CHIP 100 5% 20X40
R631	0662057N39	RES. CHIP 470K 5% 20X40
R632	0662057M50	RES. CHIP 100 5% 20X40
R634	0662057M01	RES. CHIP 0 5% 20X40
R636	0662057M98	RES CHIP 10K 5% 20X40
R637	0662057M50	RES. CHIP 100 5% 20X40
R638	0662057M50	RES. CHIP 100 5% 20X40
R639	0662057M50	RES. CHIP 100 5% 20X40

Reference Designator	Motorola Part Number	Description
R640	0662057M50	RES. CHIP 100 5% 20X40
R641	0662057M50	RES. CHIP 100 5% 20X40
R642	0662057M50	RES. CHIP 100 5% 20X40
R643	0662057M50	RES. CHIP 100 5% 20X40
R644	0662057M50	RES. CHIP 100 5% 20X40
R647	0662057M98	RES CHIP 10K 5% 20X40
R649	0662057N15	RES. CHIP 47K 5% 20X40
R650	0662057B46	CHIP RES 10.0 MEG OHMS 5%
R651	0662057M78	RES. CHIP 1500 5% 20X40
R652	0662057M98	RES CHIP 10K 5% 20X40
R654	0662057M98	RES CHIP 10K 5% 20X40
R655	0662057N23	RES CHIP 100K 5% 20X40
R656	0662057M98	RES CHIP 10K 5% 20X40
R658	0662057V32	RES CHIP 150K 1% 1/16W
R666	0662057M67	RES. CHIP 510 5% 20X40
R667	0662057M64	RES. CHIP 390 5% 20X40
R668	0662057M46	RES. CHIP 68 5% 20X40
R669	0662057M50	RES. CHIP 100 5% 20X40
R670	0662057M50	RES. CHIP 100 5% 20X40
R671	0662057M64	RES. CHIP 390 5% 20X40
R672	0662057M98	RES CHIP 10K 5% 20X40
R673	0662057M98	RES CHIP 10K 5% 20X40
R674	0662057M50	RES. CHIP 100 5% 20X40
R675	0662057M68	RES. CHIP 560 5% 20X40
R677	0662057M98	RES CHIP 10K 5% 20X40
R678	0662057M50	RES. CHIP 100 5% 20X40
R684	0662057M98	RES CHIP 10K 5% 20X40
R685	0662057M98	RES CHIP 10K 5% 20X40
R686	0662057M01	RES. CHIP 0 5% 20X40
R687	0662057N23	RES CHIP 100K 5% 20X40
R695	0662057N23	RES CHIP 100K 5% 20X40
R697	0662057M50	RES. CHIP 100 5% 20X40
R7	0662057N23	RES CHIP 100K 5% 20X40
R700	0662057N21	RES. CHIP 82K 5% 20X40

Reference Designator	Motorola Part Number	Description
R702	0662057N10	RES. CHIP 30K 5% 20X40
R703	0662057M96	RES. CHIP 8200 5% 20X40
R704	0662057N06	RES. CHIP 20K 5% 20X40
R705	0662057N06	RES. CHIP 20K 5% 20X40
R706	0662057N21	RES. CHIP 82K 5% 20X40
R708	0662057M96	RES. CHIP 8200 5% 20X40
R709	0662057N06	RES. CHIP 20K 5% 20X40
R710	0662057M94	RES. CHIP 6800 5% 20X40
R711	0662057M98	RES CHIP 10K 5% 20X40
R712	0662057V04	RES CHIP 12K 1% 1/16W
R713	0662057M98	RES CHIP 10K 5% 20X40
R714	0662057M98	RES CHIP 10K 5% 20X40
R715	0662057M71	RES. CHIP 750 5% 20X40
R716	0662057M98	RES CHIP 10K 5% 20X40
R717	0662057M64	RES. CHIP 390 5% 20X40
R718	0662057M82	RES. CHIP 2200 5% 20X40
R719	0662057M74	RES. CHIP 1000 5% 20X40
R720	0662057M95	RES. CHIP 7500 55 20X40
R721	0662057M82	RES. CHIP 2200 5% 20X40
R722	0662057M96	RES. CHIP 8200 5% 20X40
R723	0662057N23	RES CHIP 100K 5% 20X40
R724	0662057M82	RES. CHIP 2200 5% 20X40
R725	0662057N35	RES. CHIP 330K 5% 20X40
R726	0662057M95	RES. CHIP 7500 55 20X40
R727	0662057M64	RES. CHIP 390 5% 20X40
R729	0662057N11	RES. CHIP 33K 5% 20X40
R730	0662057M74	RES. CHIP 1000 5% 20X40
R731	0662057M98	RES CHIP 10K 5% 20X40
R732	0662057M98	RES CHIP 10K 5% 20X40
R733	0662057M90	RES. CHIP 4700 5% 20X40
R734	0662057M98	RES CHIP 10K 5% 20X40
R735	0662057N39	RES. CHIP 470K 5% 20X40
R736	0662057M98	RES CHIP 10K 5% 20X40
R737	0662057V02	RES CHIP 10K 1% 1/16W

Reference Designator	Motorola Part Number	Description
R738	0662057M90	RES. CHIP 4700 5% 20X40
R739	0662057M98	RES CHIP 10K 5% 20X40
R740	0662057M64	RES. CHIP 390 5% 20X40
R741	0662057M34	RES. CHIP 22 5% 20X 40
R742	0662057M50	RES. CHIP 100 5% 20X40
R754	0662057V02	RES CHIP 10K 1% 1/16W
R755	0662057U84	RES CHIP 2K 1% 1/16W
R756	0662057M98	RES CHIP 10K 5% 20X40
R757	0662057M74	RES. CHIP 1000 5% 20X40
R761	0662057N23	RES CHIP 100K 5% 20X40
R762	0662057M01	RES. CHIP 0 5% 20X40
R763	0662057M01	RES. CHIP 0 5% 20X40
R765	0662057U60	RES CHIP 220 1% 1/16W
R766	0662057M94	RES. CHIP 6800 5% 20X40
R768	0662057M01	RES. CHIP 0 5% 20X40
R770	0662057M01	RES. CHIP 0 5% 20X40
R771	0662057N15	RES. CHIP 47K 5% 20X40
R772	0662057M90	RES. CHIP 4700 5% 20X40
R774	0662057M98	RES CHIP 10K 5% 20X40
R775	0662057M34	RES. CHIP 22 5% 20X 40
R779	0662057N23	RES CHIP 100K 5% 20X40
R788	0662057M10	RES. CHIP 2.2 5% 20X40
R797	0662057M42	RES. CHIP 47 5% 20X40
R799	0662057N15	RES. CHIP 47K 5% 20X40
R801	0662057M94	RES. CHIP 6800 5% 20X40
R802	0662057M50	RES. CHIP 100 5% 20X40
R803	0662057M50	RES. CHIP 100 5% 20X40
R804	0662057M67	RES. CHIP 510 5% 20X40
R805	0662057M98	RES CHIP 10K 5% 20X40
R806	0662057M67	RES. CHIP 510 5% 20X40
R807	0662057M98	RES CHIP 10K 5% 20X40
R808	0662057M01	RES. CHIP 0 5% 20X40
R809	0662057N15	RES. CHIP 47K 5% 20X40
R810	0662057M98	RES CHIP 10K 5% 20X40

Reference Designator	Motorola Part Number	Description
R811	0662057M67	RES. CHIP 510 5% 20X40
R812	0662057N23	RES CHIP 100K 5% 20X40
R816	0662057N15	RES. CHIP 47K 5% 20X40
R820	0662057M98	RES CHIP 10K 5% 20X40
R830	0662057N06	RES. CHIP 20K 5% 20X40
R831	0662057N06	RES. CHIP 20K 5% 20X40
R837	0662057M38	RES. CHIP 33 5% 20X40
R838	0662057M38	RES. CHIP 33 5% 20X40
R839	0662057M98	RES CHIP 10K 5% 20X40
R840	0662057M67	RES. CHIP 510 5% 20X40
R841	0662057M98	RES CHIP 10K 5% 20X40
R842	0662057M98	RES CHIP 10K 5% 20X40
R844	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R845	0662057N47	RES. CHIP 1.0 MEG 5% 20X40
R90	0662057B47	CHIP RES 0 OHMS +.050 OHMS
R91	0662057B47	CHIP RES 0 OHMS +.050 OHMS
S500	4085131E01	SWITCH FREQ DUAL FUNC-TION
S501	1880619Z02	POTENTIOMETER (VOLUME)
S502	4085358D02	SWITCH TACTILE
S503	4070354A01	LIGHT TOUCH SWITCH-SMD
S504	4070354A01	LIGHT TOUCH SWITCH-SMD
S505	4070354A01	LIGHT TOUCH SWITCH-SMD
S506	4070354A01	LIGHT TOUCH SWITCH-SMD
SH1	2686707Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH101	2686702Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH102	2686701Z01	"SHIELD, SM SLDRD,CRS,,PLTD"
SH103	2686708Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH201	2686705Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH251	2685086D01	SHLD VCO TOP
SH252	2685082D01	SHLD PCIC

Reference Designator	Motorola Part Number	Description
SH401	2686706Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH402	2686698Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH51	2686700Z01	"SHIELD,SM SLDRD,CRS,,PLTD"
SH52	2686699Z01	"SHIELD, SM SLDRD,CRS,,PLTD"
T51	2580541Z02	BALUN TRANSFORMER (NEW)
T52	2580541Z02	BALUN TRANSFORMER (NEW)
T53	2585918C01	XFMR SMALL SIGNAL SURFACE MT
U1	5185130C91	IC MIXER RF SOIC 10
U101	5185130C65	IC VHF/UHF/800 MHZ LDMOS DRIVER
U102	5185765B26	IC PWR CTRL IN MOS20
U103	5185963A15	IC TEMPERATURE SENSOR 1M50C
U2	5185130C83	IC 15DB DIGITAL ATTEUATOR SOT23
U201	5185956E66	"IC,OP AMP,1PER PKG,,,,,,,LMH67"
U202	5105835U92	CC LVFRACN
U250	5105750U54	IC PKG DIE VCO BUFFER
U3	5185143E12	IC INVERTER DUAL SC70
U302	2113743L41	CAP CHIP 10000 PF 10% X7R
U304	4809788E06	DIODE ZENER 6.8V UDZ6.8B
U401	5185963A85	IC-ABACUS III-LP
U500	5185353D13	IC MINI SO-8 HI PRECISION REG
U501	5185353D14	IC SOT23-5 HI PRECISION REG 3V
U502	5185353D14	IC SOT23-5 HI PRECISION REG 3V
U503	5185353D56	IC 3.3V LINEAR REGULATOR MC78L
U600	5185368C66	IC CUSTOM FLIPPER
U601	5109731C15	IC OP AMP SNGL OPA237 SOT23

Reference Designator	Motorola Part Number	Description
U602	5109731C15	IC OP AMP SNGL OPA237 SOT23
U605	5105492X92	IC CMOS BILATERAL SWITCH
U607	5187970L15	IC USB TRANS FULL-SPEED
U608	5185368C12	IC 1.8V SN LOGIC GATE
U609	5105492X03	IC SNG HI SPD L-MOS NOT GATE
U610	5109522E53	IC SNGL BUF NC7S125P5X SC70
U611	5109522E53	IC SNGL BUF NC7S125P5X SC70
U612	5109817F62	IC SPDT SWITCH / MULTIPLEXER
U613	5109817F62	IC SPDT SWITCH / MULTIPLEXER
U614	5109522E53	IC SNGL BUF NC7S125P5X SC70
U615	5109522E53	IC SNGL BUF NC7S125P5X SC70
U616	5109522E53	IC SNGL BUF NC7S125P5X SC70
U703	5109879E58	IC 4.3 GCAPII SN104616DGGMR BG
U704	5185353D35	IC DUAL EEPOT 256 TAP
U705	5113816A73	IC ADJST 1.7% TOL SHUNT REG 20
U706	5109731C15	IC OP AMP SNGL OPA237 SOT23
U707	5185353D13	IC MINI SO-8 HI PRECISION REG
U708	5102463J44	AUDIO AMPLIFIER TDA8547TS
U725	5109731C15	IC OP AMP SNGL OPA237 SOT23
U800	5188017U01	"IC, UCNTLR,,SM,,DSP56XXX,,16BI"
U801	5109522E53	IC SNGL BUF NC7S125P5X SC70
U802	5109522E53	IC SNGL BUF NC7S125P5X SC70
U803	5185956E16	"IC,FLSH,,32MB,2MX16,60,SM, BGA,"
U804	5185130C38	IC SRAM 4 MG

Reference Designator	Motorola Part Number	Description
U810	5105492X92	IC CMOS BILATERAL SWITCH
U811	5185368C83	IC 12 BIT DAC
VR500	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR501	4880140L15	10V ZENER
VR502	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR503	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR504	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR505	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR506	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR508	4805656W03	DIODE DUAL 5.6V ZENER
VR509	4805656W03	DIODE DUAL 5.6V ZENER
VR510	4805656W03	DIODE DUAL 5.6V ZENER
VR511	4805656W03	DIODE DUAL 5.6V ZENER
VR512	4805656W03	DIODE DUAL 5.6V ZENER
VR513	4805656W03	DIODE DUAL 5.6V ZENER
VR650	4813832C72	TRANS SUP QUAD 12V
VR651	4805656W03	DIODE DUAL 5.6V ZENER
VR652	4805656W03	DIODE DUAL 5.6V ZENER
VR657	4809788E06	DIODE ZENER 6.8V UDZ6.8B
VR658	4813830C26	DIODE 13V 'H3' MMSZ5243BT1
VR659	4805656W08	DIODE ZENER QUAD
VR662	4805656W08	DIODE ZENER QUAD
VR663	4813830A22	DIODE 9.1V 5% 225MW MMBZ5239B_
VR678	4802021P15	ZENER SR05
VR700	4813830A15	TSTR 5.6V 5% 20MA 225MW
Y200	4802245J68	"OSC, REF 16.8MHZ 1.5 PPM"
Y600	4809995L05	XTAL QUARTZ 32.768KHZ CC4V-T1

Appendix A Replacement Parts Ordering

A.1 Basic Ordering Information

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Crystal orders should specify the crystal type number, crystal and carrier frequency, and the model number in which the part is used.

A.2 Radio Board Ordering Information

When ordering a replacement Radio Board, refer to the applicable Model Chart in the front of this manual, read the note at the bottom of the Model Chart, and include the proper information with your order.

A.3 Motorola Online

Motorola Online users can access our online catalog at

https://www.motorola.com/businessonline

To register for online access:

- Domestic customers: please call 800-814-0601 (U.S. and Canada).
- International customers: please go to https://www.motorola.com/businessonline and click on "Sign Up Now."

A.4 Mail Orders

Send written orders to the following addresses:

United States and Canada Orders (except for U.S. Federal Government orders):

Motorola Inc.
Radio Products and Services Division*
Attention: Order Processing
2200 Galvin Drive
Elgin, IL 60123
U.S.A.

U.S. Federal Government Orders:

Motorola Inc.
U.S. Federal Government Markets Division
Attention: Order Processing
7230 Parkway Drive
Landover, MD 21076
U.S.A.

International Orders:

Motorola Inc.
Radio Products and Services Division*
Attention: International Order Processing
2200 Galvin Drive
Elgin, IL 60123
U.S.A.

A.5 Telephone Orders

Radio Products and Services Division*
(United States and Canada)
7:00 AM to 7:00 PM (Central Standard Time)
Monday through Friday (Chicago, U.S.A.)
1-800-422-4210
1-847-538-8023 (International Orders)

U.S. Federal Government Markets Division (USFGMD)
1-800-826-1913 Federal Government Parts - Credit Cards Only
8:30 AM to 5:00 PM (Eastern Standard Time)

A.6 Fax Orders

Radio Products and Services Division*
(United States and Canada)
1-800-622-6210
1-847-576-3023 (International)

USFGMD
(Federal Government Orders)
1-800-526-8641 (For Parts and Equipment Purchase Orders)

A.7 Parts Identification

Radio Products and Services Division*
(United States and Canada)
1-800-422-4210, menu 3

A.8 Product Customer Service

Customer Response Center
(Non-technical Issues)
1-800-247-2346
FAX:1-800-247-2347

*The Radio Products and Services Division (RPSD) was formerly known as the Customer Care and Services Division (CCSD) and/or the Accessories and Aftermarket Division (AAD).

Glossary

Term	Definition
A/D	**Analog-to-Digital converter; converts an instantaneous dc voltage level to a corresponding digital value.**
ABACUS IC	Custom integrated circuit providing a digital receiver intermediate frequency (IF) backend.
ALC	**A**utomatic **L**evel **C**ontrol; a circuit in the transmit RF path that controls RF power amplifier output, provides leveling over frequency and voltage, and protects against high VSWR.
CODEC	**CO**der/**DEC**oder.
D/A	**D**igital-to-**A**nalog converter; converts a digital value to a corresponding dc voltage value.
DSP	**D**igital **S**ignal **P**rocessor. A microcontroller specifically tailored for signal processing computations.
DSP Code	**D**igital **S**ignal **P**rocessor **Code**; object code executed by the Digital Signal Processor in an ASTRO XTS 2500 subscriber radio. The DSP is responsible for computation-intensive tasks, such as decoding ASTRO signaling.
Firmware	Code executed by an embedded processor such as the Host or DSP in a subscriber radio. This type of code is typically resident in non-volatile memory and as such is more difficult to change than code executed from RAM.
FGU	**F**requency **G**eneration **U**nit. This unit generates ultra-stable, low-phase noise master clock and other derived synchronization clocks that are distributed throughout the communication network.
FLASHcode	A 13-digit code which uniquely identifies the System Software Package and Software Revenue Options that are enabled in a particular subscriber radio. FLASHcodes are only applicable for radios which are upgradeable through the FLASHport process.
FLASHport™	A Motorola term that describes the ability of a radio to change memory. Every FLASHport radio contains a FLASHport EEPROM memory chip that can be software written and rewritten to, again and again.
FracN	A Motorola-proprietary, CMOS fractional-N frequency synthesizer with built-in dual-port modulation.
GCAP	**G**lobal **C**ontrol **A**udio and **P**ower

Term	Definition
Host	The Motorola microcontroller unit.
Host Code	Object code executed by the Host Processor in an ASTRO subscriber radio. The Host is responsible for control-oriented tasks such as decoding and responding to user inputs.
Host Port	Parallel memory mapped interface consisting of eight registers in the DSP.
IC	**I**ntegrated **C**ircuit. An assembly of interconnected components on a small semiconductor chip, usually made of silicon. One chip can contain millions of microscopic components and perform many functions.
IMBE	A sub-band, voice encoding algorithm used in ASTRO digital voice.
ISW	**I**nbound **S**ignaling **W**ord; data transmitted on the control channel from a subscriber unit to the central control unit.
KRSIC	Digital Signal Processor **S**upport **IC**; custom integrated circuit providing peripheral functions for the DSP.
LSH	**L**ow **S**peed **H**andshake; 150 baud digital data sent to the radio during trunked operation while receiving audio.
MCU	**M**icro **C**ontroller **U**nit. Also written as µC. A microprocessor that contains RAM and ROM components, as well as communications and programming peripherals.
Open Architecture	A controller configuration that utilizes a microprocessor with extended ROM, RAM, and EEPROM.
OSW	**O**utbound **signaling W**ord; data transmitted on the control channel from the central controller to the subscriber unit.
PC Board	**P**rinted **C**ircuit board.
PCIC	**P**ower **C**ontrol **I**ntegrated **C**ircuit. The power control IC is intended for closed-loop bias control of power amplifiers. The device facilitates accurate control of the current delivered to the power amplifier (PA) via a control voltage.
PL	**P**rivate-**L**ine® tone squelch; a continuous sub-audible tone that is transmitted along with the carrier.
PLL	**P**hase-**L**ocked **L**oop; a circuit in which an oscillator is kept in phase with a reference, usually after passing through a frequency divider.
PTT	**P**ush-**T**o-**T**alk; the switch located on the left side of the radio which, when pressed, causes the radio to transmit.
Registers	Short-term data-storage circuits within the microcontroller unit or programmable logic IC.

Term	Definition
Repeater	Remote transmit/receive facility that re-transmits received signals in order to improve communications coverage.
RESET	**Reset** line; an input to the microcontroller that restarts execution.
RF PA	**R**adio **F**requency **P**ower **A**mplifier. Amplifier having one or more active devices to amplify radio signals.
RSS	**R**adio **S**ervice **S**oftware.
RPT/TA	**R**e**P**ea**T**er/**T**alk-**A**round.
RX DATA	Recovered digital data line.
Serial Communication Interface Input Line (SCI IN)	A full-duplex (receiver/transmitter) asynchronous serial interface.
Signal Qualifier Mode	An operating mode in which the radio is muted, but still continues to analyze receive data to determine RX signal type.
SCI IN	**S**erial **C**ommunication **I**nterface **IN**put line.
Smart RIB	**Smart R**adio **I**nterface **B**ox; a service aid that enables communications between the radio and the computer's serial communications adapter. Used in conjunction with the RSS to read the DSP Code, FLASHcode, Host Code, and model number.
Softpot	Software potentiometer; a computer-adjustable electronic attenuator.
Software	Computer programs, procedures, rules, documentation, and data pertaining to the operation of a system.
SPI	**S**erial **P**eripheral **I**nterface; how the microcontroller communicates to modules and ICs through the CLOCK and DATA lines.
Squelch	Muting of audio circuits when received signal levels fall below a pre-determined value.
SRAM	**S**tatic-**RAM** chip used for volatile, program/data memory.
SSI	**S**ynchronous **S**erial **I**nterface on the DSP, consisting of six signals and used for an RX and TX modulated data interface to the KRSIC.
Standby Mode	An operating mode whereby the radio is muted but still continues to monitor data.
System Central Controllers	Main control unit of the trunked dispatch system; handles ISW and OSW messages to and from subscriber units (see ISW and OSW).
System Select	The act of selecting the desired operating system with the system-select switch (also, the name given to this switch).

Term	Definition
TSOP	**T**hin **S**mall-**O**utline **P**ackage. A type of dynamic random-access memory (DRAM) package that is commonly used in memory applications.
UART	**U**niversal **A**synchronous **R**eceiver **T**ransmitter. A microchip with programming that controls a computer's interface to its attached serial devices.
VCO	**V**oltage-**C**ontrolled **O**scillator; an oscillator in which the frequency of oscillation can be varied by changing a control voltage.
VCOB IC	**V**oltage-**C**ontrolled **O**scillator **B**uffer **IC**.
Vocoder	**VO**ice en**CODER**; the DSP-based system for digitally processing the analog signals, includes the capabilities of performing voice compression algorithms or voice encoding.
VSELP	**V**ector **S**um **E**xcited **L**inear **P**redictive coding; a voice encoding technique used in ASTRO digital voice.
VSWR	**V**oltage **S**tanding **W**ave **R**atio. The ratio of the maximum voltage to the minimum voltage on a transmission line. An indicator of how well an RF device's input or output impedance matches the nominal impedance of the system.

Index

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T

V

W

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