PROFESSIONAL DIGITAL TWO-WAY RADIO

MOTOTRBO™ XPR™ 7000 SERIES DETAILED SERVICE MANUAL

Foreword

This manual covers all models of the XPR series Portable Radios, unless otherwise specified. It includes all the information necessary to maintain peak product performance and maximum working time, using levels 1 and 2 maintenance procedures. This level of service goes down to the board replacement level and is typical of some local service centers, Motorola Authorized Dealers, self-maintained customers, and distributors.

Product Safety and RF Exposure Compliance

Before using this product, read the operating instructions for safe usage contained in the Product Safety and RF Exposure booklet enclosed with your radio.

ATTENTION!

This radio is restricted to occupational use only to satisfy FCC RF energy exposure requirements. Before using this product, 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 6881095C98) to ensure compliance with RF energy exposure limits.

For a list of Motorola-approved antennas, batteries, and other accessories, visit the following web site which lists approved accessories:http://www.motorola.com/governmentandenterprise

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Document History

The following major changes have been implemented in this manual since the previous edition:

Edition	Description	Date
68009497001-A	Initial Release	TBA

Notes

Table of Contents

List of Figures

List of Tables

Related Publications

*CD consists of:
XPR™ 6300/6350 User Guide
XPR™ 6300/6350 Quick Reference Card
XPR™ 6500/6550 User Guide
XPR™ 6500/6550 Quick Reference Card
Safety Leaflet

Notes

Commercial Warranty

Limited Warranty

MOTOROLA COMMUNICATION PRODUCTS

I. What This Warranty Covers And For How Long

MOTOROLA INC. (“MOTOROLA”) warrants the MOTOROLA manufactured Communication Products listed below (“Product”) against defects in material and workmanship under normal use and service for a period of time from the date of purchase as scheduled below:

XPR Series Digital Portable Radios	Two (2) Years
Product Accessories (Excluding Batteries and Chargers)	One (1) Year

The portables additionally ship with a standard 1-year Repair Service Advantage (RSA) (for U.S. customers) or 1-year Extended Warranty (for Canada customers). However, at the time of order, you may choose to omit these warranties. For more RSA or Extended Warranty information, please refer to the portable price pages or Motorola Online (https://businessonline.motorola.com) > Resource Center > Services > Service Product Offerings > Repair Service Advantage or Extended Warranty.

Motorola, at its option, will at no charge either repair the Product (with new or reconditioned parts), replace it (with a new or reconditioned Product), or refund the purchase price of the Product during the warranty period provided it is returned in accordance with the terms of this warranty. Replaced parts or boards are warranted for the balance of the original applicable warranty period. All replaced parts of Product shall become the property of MOTOROLA.

This express limited warranty is extended by MOTOROLA to the original end user purchaser only and is not assignable or transferable to any other party. This is the complete warranty for the Product manufactured by MOTOROLA. MOTOROLA assumes no obligations or liability for additions or modifications to this warranty unless made in writing and signed by an officer of MOTOROLA. Unless made in a separate agreement between MOTOROLA and the original end user purchaser, MOTOROLA does not warrant the installation, maintenance or service of the Product.

MOTOROLA cannot be responsible in any way for any ancillary equipment not furnished by MOTOROLA which is attached to or used in connection with the Product, or for operation of the Product with any ancillary equipment, and all such equipment is expressly excluded from this warranty. Because each system which may use the Product is unique, MOTOROLA disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

II. General Provisions

This warranty sets forth the full extent of MOTOROLA'S responsibilities regarding the Product. Repair, replacement or refund of the purchase price, at MOTOROLA's option, is the exclusive remedy. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. IN NO EVENT SHALL MOTOROLA BE LIABLE FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVINGS OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE SUCH PRODUCT, TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW.

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SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION OR EXCLUSIONS MAY NOT APPLY.

This warranty gives specific legal rights, and there may be other rights which may vary from state to state.

IV. How To Get Warranty Service

You must provide proof of purchase (bearing the date of purchase and Product item serial number) in order to receive warranty service and, also, deliver or send the Product item, transportation and insurance prepaid, to an authorized warranty service location. Warranty service will be provided by Motorola through one of its authorized warranty service locations. If you first contact the company which sold you the Product, it can facilitate your obtaining warranty service. You can also call Motorola at 1-800-927-2744 US/Canada.

V. What This Warranty Does Not Cover

A. Defects or damage resulting from use of the Product in other than its normal and customary manner.

B. Defects or damage from misuse, accident, water, or neglect.

C. Defects or damage from improper testing, operation, maintenance, installation, alteration, modification, or adjustment.

D. Breakage or damage to antennas unless caused directly by defects in material workmanship.

E. A Product subjected to unauthorized Product modifications, disassemblies or repairs (including, without limitation, the addition to the Product of non-Motorola supplied equipment) which adversely affect performance of the Product or interfere with Motorola's normal warranty inspection and testing of the Product to verify any warranty claim.

F. Product which has had the serial number removed or made illegible.

G. Rechargeable batteries if:

- any of the seals on the battery enclosure of cells are broken or show evidence of tampering.
- the damage or defect is caused by charging or using the battery in equipment or service other than the Product for which it is specified.

H. Freight costs to the repair depot.

I. A Product which, due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with MOTOROLA's published specifications or the FCC type acceptance labeling in effect for the Product at the time the Product was initially distributed from MOTOROLA.

J. Scratches or other cosmetic damage to Product surfaces that does not affect the operation of the Product.

K. Normal and customary wear and tear.

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MOTOROLA will defend, at its own expense, any suit brought against the end user purchaser to the extent that it is based on a claim that the Product or parts infringe a United States patent, and MOTOROLA will pay those costs and damages finally awarded against the end user purchaser in any such suit which are attributable to any such claim, but such defense and payments are conditioned on the following:

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B. that MOTOROLA will have sole control of the defense of such suit and all negotiations for its settlement or compromise; and

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VII. Governing Law

This Warranty is governed by the laws of the State of Illinois, USA.

Battery and Charger Warranty

Workmanship Warranty

The workmanship warranty guarantees against defects in workmanship under normal use and service.

All MOTOTRBO Batteries	Two (2) Years
IMPRES Chargers (Single-Unit and Multi-Unit, Non-Display)	Two (2) Years
IMPRES Chargers (Multi-Unit with Display)	One (1) Year

Capacity Warranty

The capacity warranty guarantees 80% of the rated capacity for the warranty duration.

Nickel Metal-Hydride (NiMH) or Lithium-Ion (Li-Ion) Batteries	12 Months
IMPRES Batteries, When Used Exclusively with IMPRES Chargers	18 Months

Section 1

INTRODUCTION

1.0 Notations Used in This Manual

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

NOTE An operational procedure, practice, or condition that is essential to emphasize.

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

2.0 Radio Description

The XPR series portable radios are available in the following frequency ranges and power levels.

Table 1-1. Radio Frequency Ranges and Power Levels

Frequency Band	Bandwidth	Power Level
VHF	136–174 MHz	1 or 5 Watt
UHF	403–527 MHz	1 or 4 Watt

These radios are among the most sophisticated two-way radios available. They have a robust design for radio users who need high performance, quality, and reliability in their daily communications. This architecture provides the capability of supporting a multitude of legacy and advanced features resulting in a more cost-effective two-way radio communications solution.

Notes

Section 2

MAINTENANCE

1.0 Introduction

This chapter provides details about the following

- Preventive maintenance (inspection and cleaning).
- Safe handling of CMOS and LDMOS devices.
- Repair procedures and techniques

2.0 Preventive Maintenance

Periodic visual inspection and cleaning is recommended.

2.1 Inspection

Check that the external surfaces of the radio are clean, and that all external controls and switches are functional. It is not recommended to inspect the interior electronic circuitry.

2.2 Cleaning Procedures

The following procedures describe the recommended cleaning agents and the methods to be used when cleaning the external and internal surfaces of the radio. External surfaces include the front cover, housing assembly and battery case. These surfaces should be cleaned whenever a periodic visual inspection reveals the presence of smudges, grease, and/or grime.

NOTE Internal surfaces should be cleaned only when the radio is disassembled for service or repair.

The only recommended agent for cleaning the external radio surfaces is a 0.5% solution of a mild dishwashing detergent in water. The only factory recommended liquid for cleaning the printed circuit boards and their components is isopropyl alcohol (100% by volume).

Caution

Use all chemicals as prescribed by the manufacturer. Be sure to follow all safety precautions as defined on the label or material safety data sheet.

The effects of certain chemicals and their vapors can have harmful results on certain plastics. Avoid using aerosol sprays, tuner cleaners and other chemicals.

Cleaning External Plastic Surfaces

Apply the 0.5% detergent-water solution sparingly with a stiff, non-metallic, short-bristled brush to work all loose dirt away from the radio. Use a soft, absorbent, lintless cloth or tissue to remove the solution and dry the radio. Make sure that no water remains entrapped near the connectors, cracks, or crevices.

Cleaning Internal Circuit Boards and Components

Isopropyl alcohol (100%) may be applied with a stiff, non-metallic, short-bristled brush to dislodge embedded or caked materials located in hard-to-reach areas. The brush stroke should direct the dislodged material out and away from the inside of the radio. Make sure that controls or tunable components are not soaked with alcohol. Do not use high-pressure air to hasten the drying process since this could cause the liquid to collect in unwanted places. After completing of the cleaning process, use a soft, absorbent, lintless cloth to dry the area. Do not brush or apply any isopropyl alcohol to the frame, front cover or back cover.

NOTE Always use a fresh supply of alcohol and a clean container to prevent contamination by dissolved material (from previous usage).

2.3 Safe Handling of CMOS and LDMOS Devices

Complementary metal-oxide semiconductor (CMOS) and Laterally Diffused Metal Oxide Semiconductor (LDMOS) devices are used in this family of radios, and are susceptible to damage by electrostatic 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 CMOS/LDMOS circuits and are especially important in low humidity conditions.

DO NOT attempt to disassemble the radio without first referring to the following CAUTION statement.

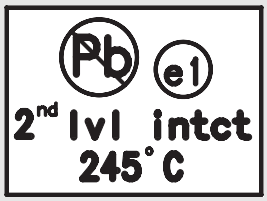
Caution

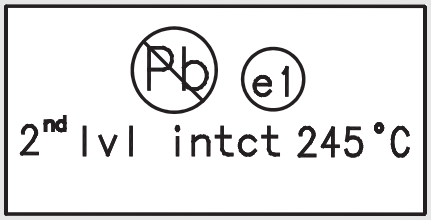
This radio contains static-sensitive devices. Do not open the radio unless you are properly grounded. Take the following precautions when working on this unit:

- Store and transport all CMOS/LDMOS devices in conductive material so that all exposed leads are shorted together. Do not insert CMOS/LDMOS devices into conventional plastic “snow” trays used for storage and transportation of other semiconductor devices.
- Ground the working surface of the service bench to protect the CMOS/LDMOS device. We recommend using a wrist strap, two ground cords, a table mat, and a floor mat.
- Wear a conductive wrist strap in series with a 100k resistor to ground. (Replacement wrist straps that connect to the bench top covering are Motorola part number 4280385A59).
- Do not wear nylon clothing while handling CMOS/LDMOS devices.
- Do not insert or remove CMOS/LDMOS devices with power applied. Check all power supplies used for testing CMOS/LDMOS devices to be certain that there are no voltage transients present.
- When straightening CMOS/LDMOS pins, provide ground straps for the apparatus used.
- When soldering, use a grounded soldering iron.
- If at all possible, handle CMOS/LDMOS devices by the package and not by the leads. Prior to touching the unit, touch an electrical ground to remove any static charge that you may have accumulated. The package and substrate may be electrically common. If so, the reaction of a discharge to the case would cause the same damage as touching the leads.

3.0 Repair Procedures and Techniques — General

NOTE Environmentally Preferred Products (EPP) (refer to the marking on the printed circuit boards — examples shown below) were developed and assembled using environmentally preferred components and solder assembly techniques to comply with the European Union's **Restriction of Hazardous Substances (ROHS) Directive 2002/95/EC** and **Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC**. To maintain product compliance and reliability, use only the Motorola specified parts in this manual.





Any rework or repair on Environmentally Preferred Products must be done using the appropriate lead-free solder wire and lead-free solder paste as stated in the following table:

Table 2-2. Lead Free Solder Wire Part Number List

Motorola Part Number	Alloy	Flux Type	Flux Content by Weight	Melting Point	Supplier Part number	Diameter	Weight
1088929Y01	95.5Sn/3.8Ag/0.7Cu	RMA Version	2.7-3.2%	217C	52171	0.015"	1lb spool

Table 2-3. Lead Free Solder Paste Part Number List

Motorola Part Number	Manufacturer Part Number	Viscosity	Type	Composition & Percent Metal	Liquid Temperature
1085674C03	NC-SMQ230	900-1000KCPs Brookfield (5rpm)	Type 3 (-325/+500)	(95.5%Sn-3.8%Ag-0.7%Cu) 89.3%	217°C

Parts Replacement and Substitution

When damaged parts are replaced, identical parts should be used. If the identical replacement part is not locally available, check the parts list for the proper Motorola part number and order the part from the nearest Motorola Radio Products and Solutions Organization (RPSO) listed in Appendix A of this manual.

Rigid Circuit Boards

The family of radios uses bonded, multi-layer, printed circuit boards. Since the inner layers are not accessible, some special considerations are required when soldering and unsoldering components. The printed through holes may interconnect multiple layers of the printed circuit. Therefore, exercise care to avoid pulling the plated circuit out of the hole.

When soldering near connector:

- Avoid accidentally getting solder in the connector.
- Be careful not to form solder bridges between the connector pins.
- Examine your work closely for shorts due to solder bridges.

Chip Components

Use the RLN4062 Hot-Air Repair Station for chip component replacement. Adjust the temperature control to 370°C (700°F), and adjust the airflow to a minimum setting. Airflow can vary due to component density.

- **To remove a chip component**:

1. Use a hot-air hand piece and position the nozzle of the hand piece approximately 0.3 cm (1/8") above the component to be removed.
2. Begin applying the hot air. Once the solder reflows, remove the component using a pair of tweezers.
3. Using a solder wick and a soldering iron or a power desoldering station, remove the excess solder from the pads.

- **To replace a chip component using a soldering iron**:

1. Select the appropriate micro-tipped soldering iron and apply fresh solder to one of the solder pads.
2. Using a pair of tweezers, position the new chip component in place while heating the fresh solder.
3. Once solder wicks onto the new component, remove the heat from the solder.
4. Heat the remaining pad with the soldering iron and apply solder until it wicks to the component. If necessary, touch up the first side. All solder joints should be smooth and shiny.

- **To replace a chip component using hot air**:

1. Use the hot-air hand piece and reflow the solder on the solder pads to smooth it.
2. Apply a drop of solder paste flux to each pad.
3. Using a pair of tweezers, position the new component in place.
4. Position the hot-air hand piece approximately 0.3 cm (1/8”) above the component and begin applying heat.
5. Once the solder wicks to the component, remove the heat and inspect the repair. All joints should be smooth and shiny.

Notes

Section 3

TEST EQUIPMENT AND SERVICE AIDS

1.0 Recommended Test Equipment

The list of equipment contained in Table 3-1 includes most of the standard test equipment required for servicing Motorola portable radios.

Table 3-1. Recommended Test Equipment

Equipment	Characteristics	Example	Application
Service Monitor	Can be used as a substitute for items marked with an asterisk (*)	Aeroflex 2975 (www.aeroflex.com), Motorola R2670, or equivalent	Frequency/deviation meter and signal generator for wide-range troubleshooting and alignment
Digital RMS Multimeter *	100 µV to 300 V 5 Hz to 1 MHz 10 Mega Ohm Impedance	Fluke 179 or equivalent (www.fluke.com)	AC/DC voltage and current measurements. Audio voltage measurements
RF Signal Generator *	100 MHz to 1 GHz -130 dBm to +10 dBm FM Modulation 0 kHz to 10 kHz Audio Frequency 100 Hz to 10 kHz	Agilent N5181A (www.agilent.com), Ramsey RSG1000B (www.ramseyelectronics.com), or equivalent	Receiver measurements
Oscilloscope *	2 Channel 50 MHz Bandwidth 5 mV/div to 20 V/div	Leader LS8050 (www.leaderusa.com), Tektronix TDS1001b (www.tektronix.com), or equivalent	Waveform measurements
Power Meter and Sensor *	5% Accuracy 100 MHz to 500 MHz 50 Watts	Bird 43 Thruline Watt Meter (www.bird-electronic.com) or equivalent	Transmitter power output measurements
RF Millivolt Meter	100 mV to 3 V RF 10 kHz to 1 GHz	Boonton 92EA (www.boonton.com) or equivalent	RF level measurements
Power Supply	0 V to 32 V 0 A to 20 A	B&K Precision 1790 (www.bkprecision.com) or equivalent	Voltage supply

2.0 Service Aids

Table 3-2 lists the service aids recommended for working on the radio. While all of these items are available from Motorola, most are standard workshop equipment items, and any equivalent item capable of the same performance may be substituted for the item listed.

Table 3-2. Service Aids

Motorola Part No.	Description	Application
RLN4460_	Portable Test Set	Enables connection to the audio/accessory jack. Allows switching for radio testing.
RVN5115_	Customer Programming Software on CD-ROM	Allows servicer to program radio parameters, tune and troubleshoot radios.
PMKN4012_B	Portable Programming Cable	This cable connects the radio to a USB port for radio programming and data applications.
PMKN4013_C	Portable Programming, Testing & Alignment Cable	This cable connects the radio to a USB port for radio programming, testing and alignment.
PMNN4076_	7.5V Universal Battery Eliminator	Connects to radio via battery eliminator cable.
58012022001	RF Adaptor	Adapts radio's antenna port to BNC cabling of test equipment.
PMLN6154_	RF Adaptor Holder	Holds RF Adaptor
32012193001	Rubber Gasket	Holds RF connector in place
5880348B33	DMR SMA to BNC RF Adaptor	Adapts radio's antenna port to BNC cabling of test equipment.
PMHN4085_	Bench Test Housing Eliminator	Interconnects radio to power supply. Provides for troubleshooting of the radio when the housing is removed.
NLN9839_	Vacuum Pump Kit	Allows servicer to test for leakages.
NTN4265_	Pressure Pump Kit	Allows servicer to locate leakages.
5871134M01	Connector Fitting	This connector allows the vacuum hose to be connected to the radio chassis.
3271133M01	Fitting Seal	This seal secures the connector fitting to the radio chassis.

3.0 Programming, Testing and Alignment Cable

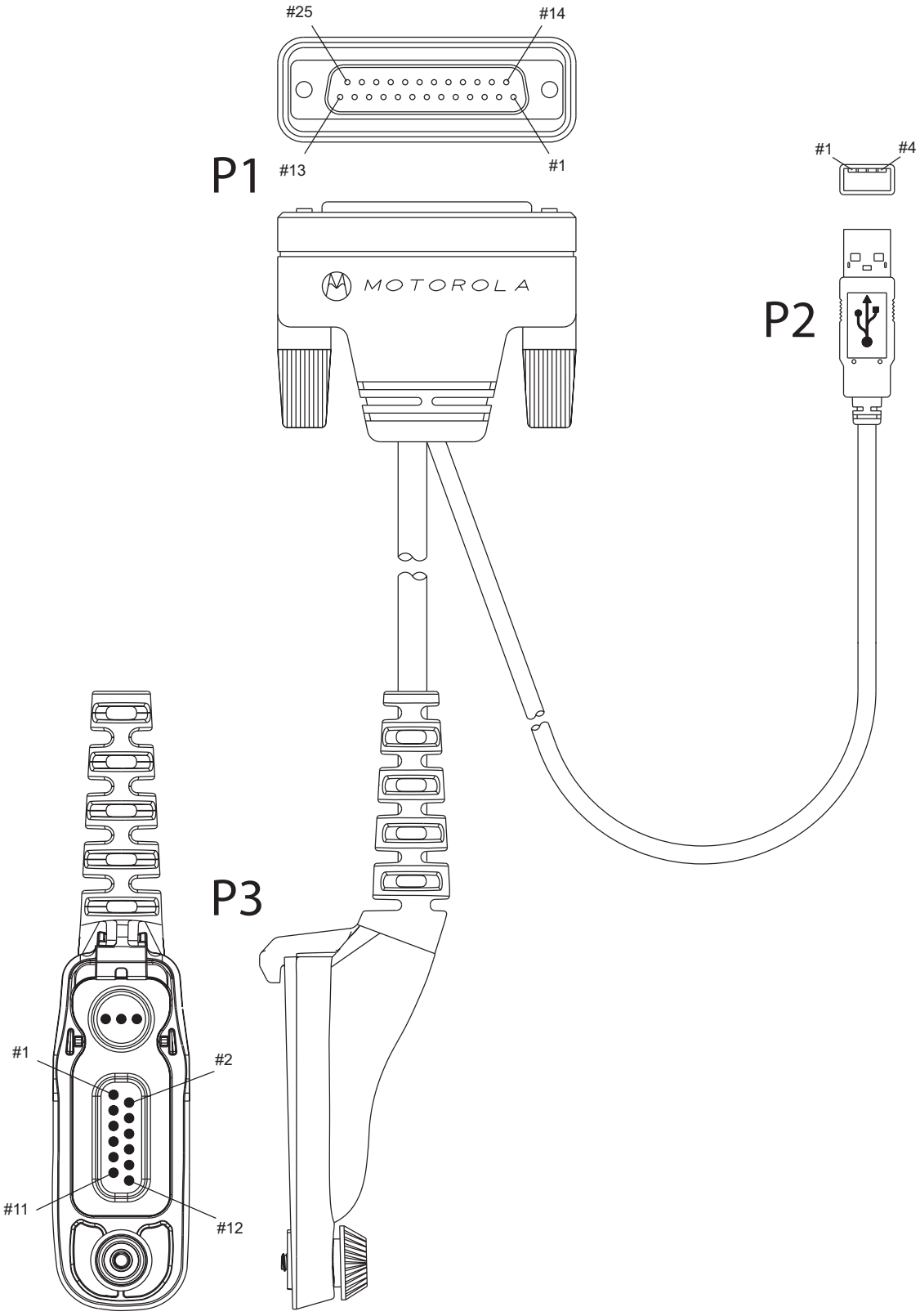


Figure 3-1. Programming, Testing and Alignment Cable

Table 3-3. Pin Configuration of Side Connector

CONNECTION			
P1	**P2**	**P3**	
Pin	**Pin**	**Pin**	**Function**
		1	GROUND
	1	3	VCC (5V)
	3	4	DATA+
	2	5	DATA-
16	4	6	GROUND
1 & 5		7	EXTERNAL SPEAKER+
2 & 7		8	EXTERNAL SPEAKER-
20		9	EXTERNAL PTT
17		10	EXTERNAL MIC+
16		11	EXTERNAL MIC-

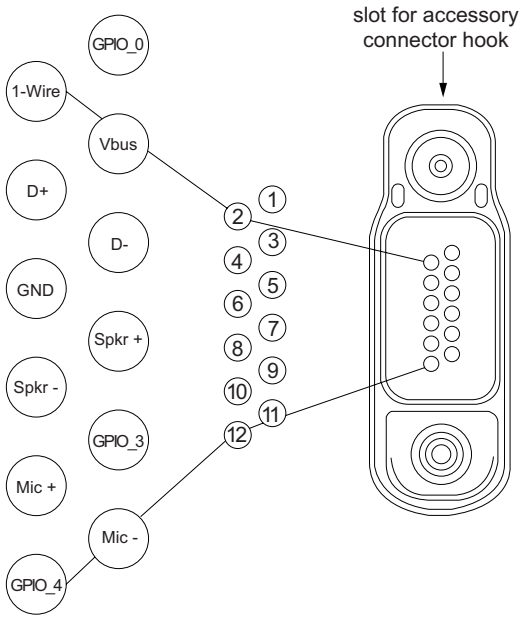


Figure 3-2. Pin Layout of Side Connector

Section 4

POWER UP SELF-TEST

1.0 Power-Up Error Codes (Display Model only)

Upon powering up, the radio performs certain tests to determine if its basic electronics and software are in working order. Any error detected has an associated error code that is presented on the radio display. These error codes are intended to be used by a service technician when the radio generates the Self Test Fail Tone. If these tests are successfully completed, the radio will generate the Self Test Tone.

There are two classes of detectable errors, fatal and non-fatal. If it is considered as a fatal error, then the normal radio operation will be inhibited. Fatal errors include hardware errors detected by the microprocessor and certain memory errors. These memory errors include incorrect ROM checksum, incorrect RAM checksum, and incorrect checksums of codeplug (Persistent Storage) blocks that contain operating parameters. If the codeplug block operating parameters are corrupted, operation of the unit on the proper frequency, system, and group are in question. Attempts to use this information could provide the user with a false sense of security that others are receiving his messages. Corrupted codeplug blocks of call IDs, or their associated aliases are considered non-fatal errors. While the user may be inconvenienced, normal communication is still possible.

Table 4-4. Power-Up Error Codes

Error Code	Description	Error Type	Corrective Action
ERROR 01/02	Call ID or associated aliases codeplug block checksum is wrong.	Non-Fatal	Normal communication is still possible, but the user may be inconvenienced. Reprogram codeplug.
ERROR 01/22	Tuning Codeplug block checksum is wrong.	Non-Fatal	Normal communication is still possible.
FAIL 01/82	External Codeplug block checksum is wrong.	Fatal	Reprogram codeplug.
FAIL 01/92	Secure Codeplug check-sum error	Fatal	Reprogram codeplug.
FAIL 01/A2	Tuning Codeplug block checksum is wrong.	Fatal	Reprogram codeplug.
FAIL 01/81	ROM Checksum is wrong.	Fatal	Reprogram FLASH Memory, then retest. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
FAIL 01/88	Radio RAM Test Failure.	Fatal	Retest radio by turning it off and turning it on again. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
FAIL 01/90 or FAIL 02/90	General hardware test failure.	Fatal	Retest radio by turning it off and turning it on again. If message reoccurs, replace main board or send radio to nearest Motorola Depot.

Table 4-4. Power-Up Error Codes (Continued)

Error Code	Description	Error Type	Corrective Action
FAIL 02/81	DSP ROM Checksum is wrong.	Fatal	Reprogram FLASH Memory, then retest. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
FAIL 02/82	DSP RAM1 test failure.	Fatal	Retest radio by turning it off and turning it on again. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
FAIL 02/84	DSP RAM2 test failure.	Fatal	Retest radio by turning it off and turning it on again. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
FAIL 02/88	DSP RAM test failure.	Fatal	Retest radio by turning it off and turning it on again. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
FAIL 02/C0	DSP ROM Checksum is wrong.	Fatal	Retest radio by turning it off and turning it on again. If message reoccurs, replace main board or send radio to nearest Motorola Depot.
No Display	Display module is not connected properly. Display module is damaged.	Fatal	Check connection between main board and display module. Replace with new display module.

NOTE A non-display radio emits only the Self Test Fail Tone if it fails the self-test.

2.0 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 Motorola Authorized MOTO**TRBO** dealer should be contacted. Use Table 4-5. to aid in understanding particular operational error codes.

Table 4-5. Operational Error Codes

Error Code	Description	Error Type	Corrective Action
FAIL 001	Synthesizer Out-of-Lock	NON-FATAL	1. Reprogram the codeplug. 2. Refer to Detailed Service Manual.
FAIL 002	Personality checksum or system block error	NON-FATAL	Reprogram the codeplug.

Section 5

RADIO INFORMATION

1.0 General Controller Block

The controller section is the central interface between the various subsystems of the radio, namely front panel, option board, RF, and Bluetooth/GPS.

The controller section consists of 4 main ICs. These are the Freon OMAPL138 Host/DSP Processor (U1000), NAND Flash memory (U2100), mDDR memory (U2000), and CPCAP Audio/Power Management (U3000). Freon processor (U1000) needs only one clock for operation. That is 19.2 MHz square-wave @ 1.2V pp. 19.2 MHz clock source is provided by TCXO. The power management architecture is centered on the CPCAP (U3000). A battery supplies power directly to the electronic on/off control as RAWB+. When the radio is turned on, ON/OFF_SW (on/off/volume control) will trigger the electronic on/off control. Radio will be turned-off under one of three conditions; they are ONB turned off, low battery, or thermal shutdown.

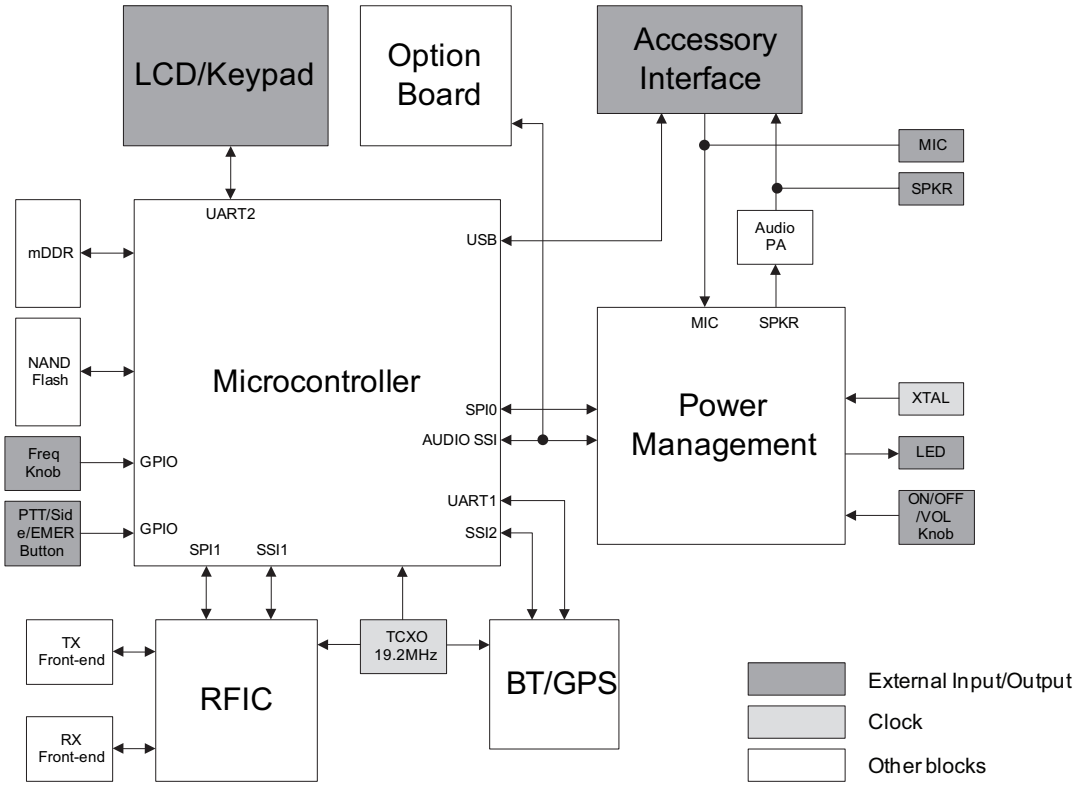


Figure 5-1: Controller Block Diagram

1.1 FGU

The synthesizer is powered from 1.8V, 2.8V and 5V supplied from CPCAP IC, U3000. The synthesizer in turns generates a super-filtered of 4.5V which powers up the VCO where the output signals of VCO are feedback to RFIC to complete the PLL. The output of VCO is providing output power level of 0 to 6dBm to ROD_VCO_IN. An external 19.2MHz non-tunable TCXO is used as the main clock source. The 19.2MHz TCXO output is fed directly to GPS and FREON whereas CPCAP uses 19.2MHz from ROD_19.2MHz_CLKOUT. The radio uses a 2-port modulation scheme i.e. through low port and high port modulation at loop filter. This approach was undertaken to obtain flatter high port modulation sensitivity response across TX frequencies, larger passing margin for ACP and better modulation flatness across temperature.

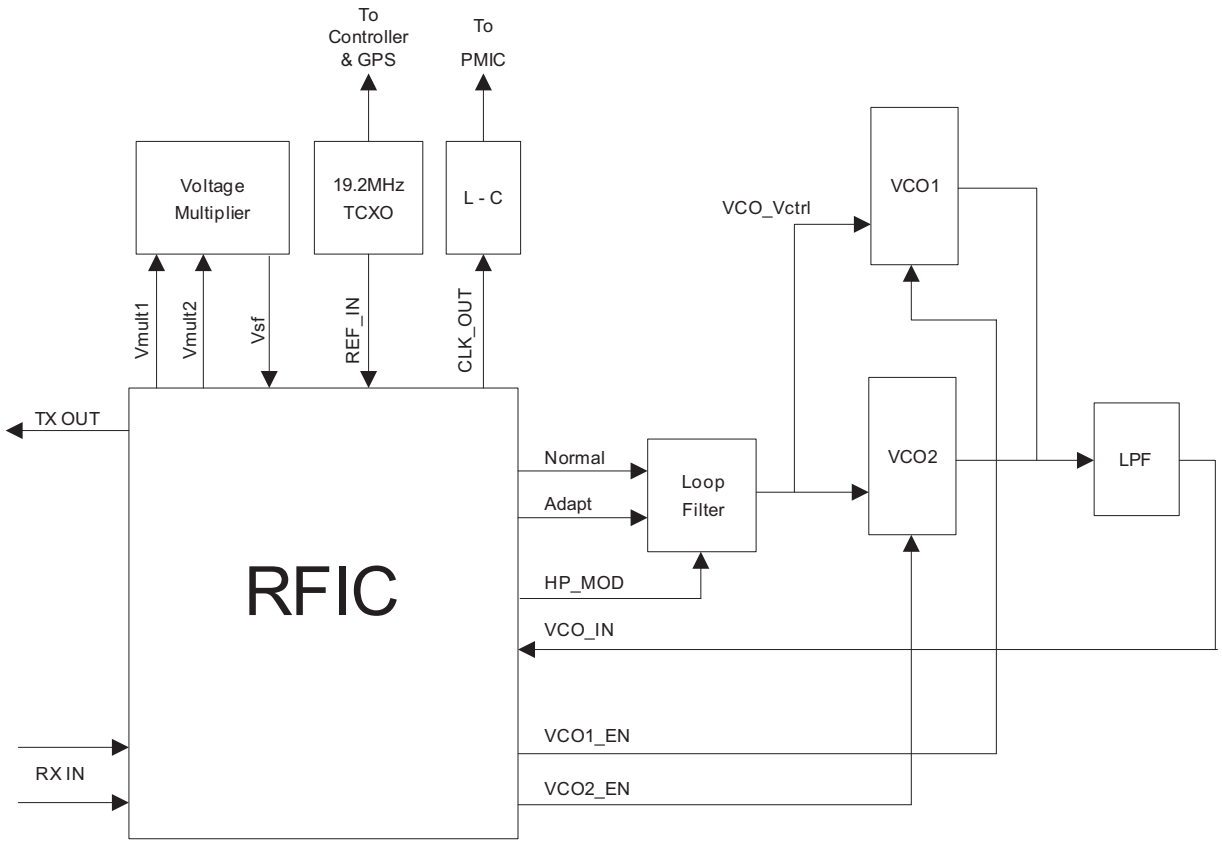


Figure 5-2: FGU

1.2 Receiver

The receiver frontend is defined as being the circuitry from the antenna input to the RFIC (U0001). The received signal from antenna will pass through the harmonic filter and antenna switch. The antenna switch provide selection between receive and transmit path. The receive signal which was routed to the receive path will then flow through a highpass filter. The combination of harmonic filter and the highpass filter will create a bandpass filter response from 403MHz to 527Mhz. The output signal of the highpass filter will then fed into the low noise amplifier (LNA). In UHF, the LNA provide 8 – 10dB gain depending on the RF frequency.

After being amplified, the RF signal is further filtered by a varactor tuned bandpass filter. This bandpass filter is electronically control by the RFIC (RXFE_TUNE voltage ranging from 0V to a maximum of 5V). The external RF detector (U0460) provide strong RF interference signal detection for the receiver. Depending on the level of the interference signal and mode of operation, step attenuator (U0480) will be trigger to provide protection to the RFIC from saturation. The Balun (T0490) is a 1:1 transformer providing single ended to differential transformation. Output of the Balun will then be fed to the RFIC for backend processing.

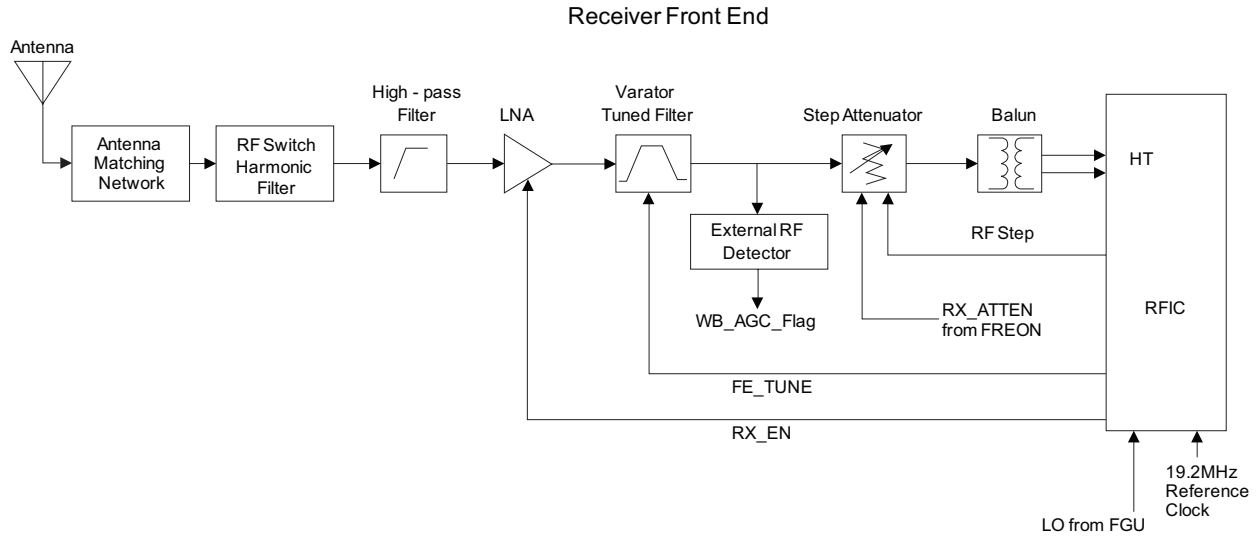


Figure 5-3: Receiver

1.3 Transmitter

The transmitter contains five basic circuits: power amplifier, antenna switch, harmonic filter, 50 ohms RF switch & antenna matching network, and power control.

The power amplifier is a 3-stage discrete design consisting of a Pre-driver, Driver and final PA. The gain of both Driver and final PA are controlled by Vcontrol from power control circuit.

The antenna matching network is used to match the antenna's impedance to the 50 ohms RF switch.

The transmitter power control uses discrete integrator (U0900) approach, the first stage is an I-V converter which converts current drained by Power Amplifier Driver (Q0710) and Power Amplifier Final (Q0720) across R0700 into a voltage drop and the second stage is an integrator used to control and shape the output Vcontrol to bias both PAs.

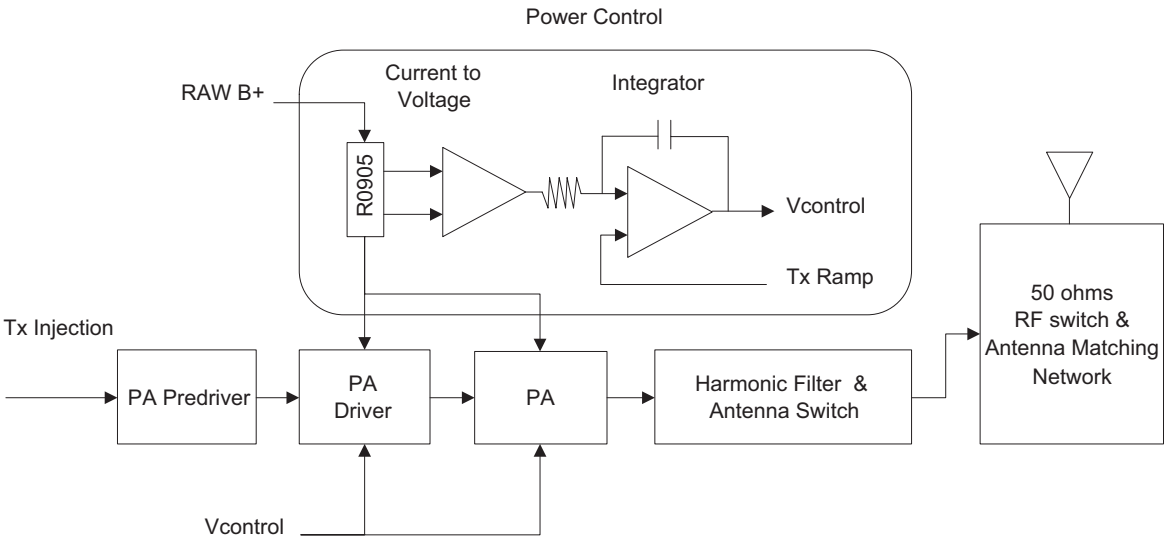


Figure 5-4: Transmitter

1.4 GPS

The GPS section is a receiver which operates on 1 frequency, 1.57542GHz. It consists of Front-end and Back-end. The front-end is made up of Diplexer, first SAW filter, LNA, second SAW filter and input match. The back-end is made up of mixer, PLL for generation of LO, back-end, baseband & microcontroller. The entire back-end is inside the GPS IC (NL5500).

The function of Dual band diplexer is to isolated BT and GPS band and attenuates transmit & receive signals of main transceiver. The first SAW filter will filters spurious signals with frequencies close to GPS frequency and the GPS signals will be amplified by LNA for better sensitivity. The second SAW filter will provide additional filtering of spurious signals. The last stage is the input match for NL5500 which is to provide impedance matching between 2nd SAW and TI IC.

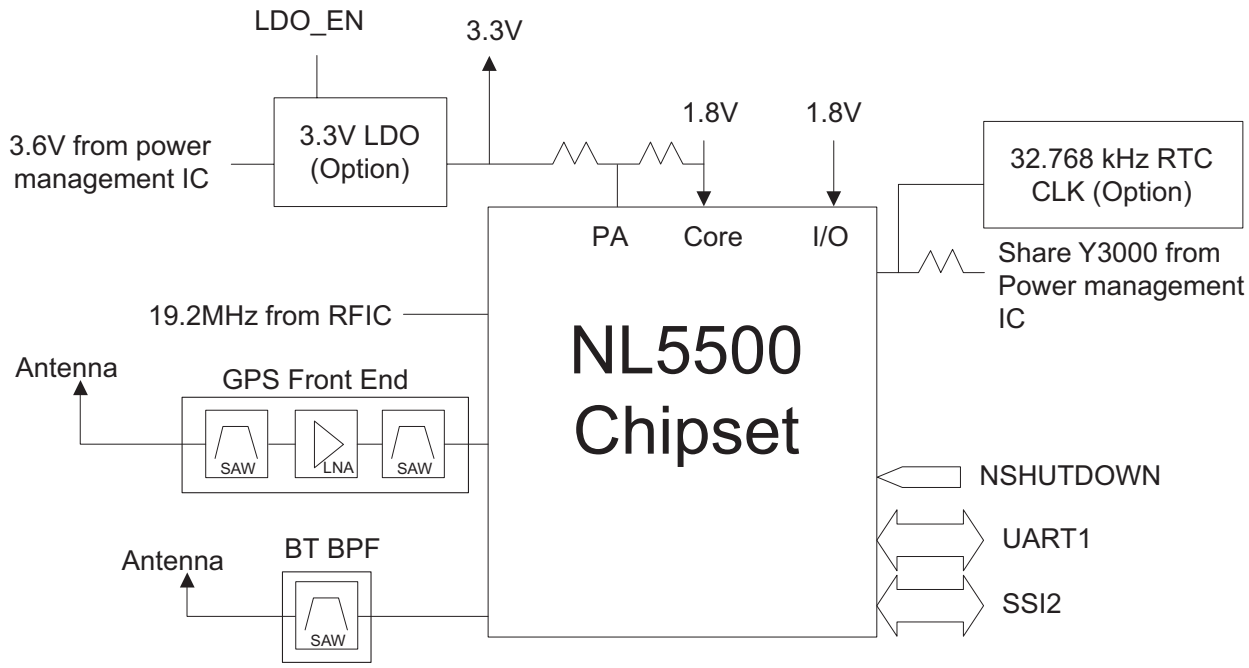


Figure 5-5: GPS

1.5 Keypad and LCD

The keypad and LCD display communicate to the Freon processor via the Integrated Control Interface (ICI). The ICI is a RS232 UART type connection to the front cover housing which combines all keypad and LCD functions into a single interface. The keypad interfaces to the LPC1114 (for LKP) or LPC1754 (for FKP) by using a Row/Column resistor ladder into 2 of the ADC inputs along with an Op Amp to generate an interrupt. Information about which key has been pressed will be sent back to the Freon processor over the RS232 interface. The Mono LCD controller is the IST3753 driver IC. Commands and data sent from the Freon via the RS232 interface is translated to a SPI protocol and communicated to the IST3753 via a SPI interface. The Color LCD controller is the HX8340B driver IC. Commands and data sent from the Freon via the RS232 interface is translated to an 8-bits MCU-I80 series parallel interface protocol. The LPC1114 and LPC1745 are able to be reset from the Freon as well as receive firmware updates from the Freon.

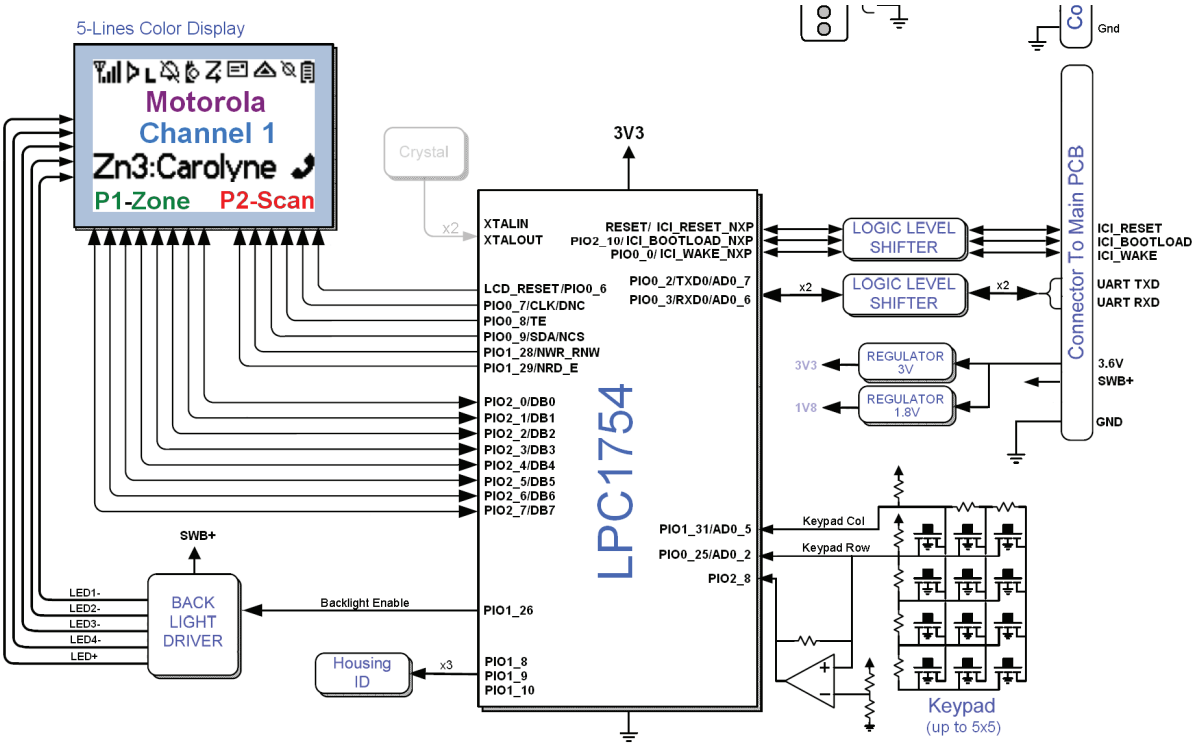


Figure 5-6: Full Keypad

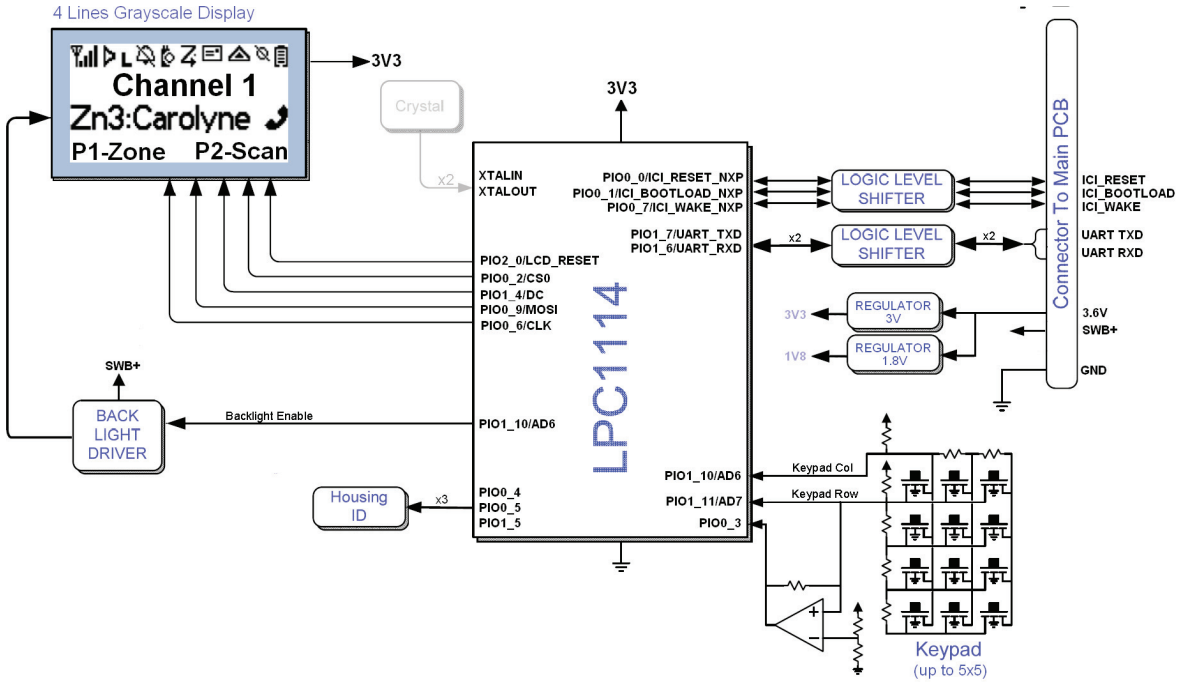


Figure 5-7: Limited Keypad

1.6 GOB

Generic Option Board is powered by SWB+ (7.5V).

TX Line Tri-State Control Circuit takes SSI_CLK and SSI_FSYNC as input to control the state in the SSI_TX line. As an example, it can be a counter which starts counting on SSI_FSYNC, and when the count reaches 32, it will enable the SSI_TX line buffer to enable data sending. When the count reaches 128, it will reset to 0 and disable the SSI_TX line buffer and move the SSI_TX line to Tri-State.

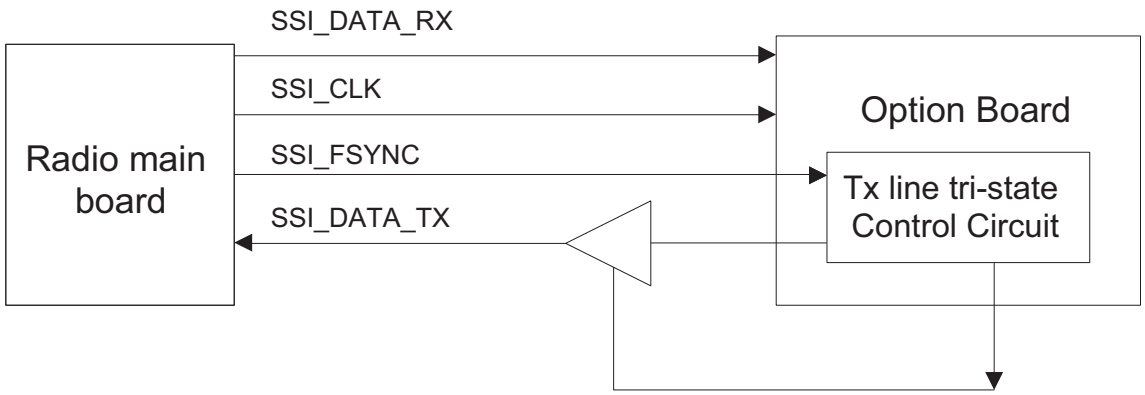
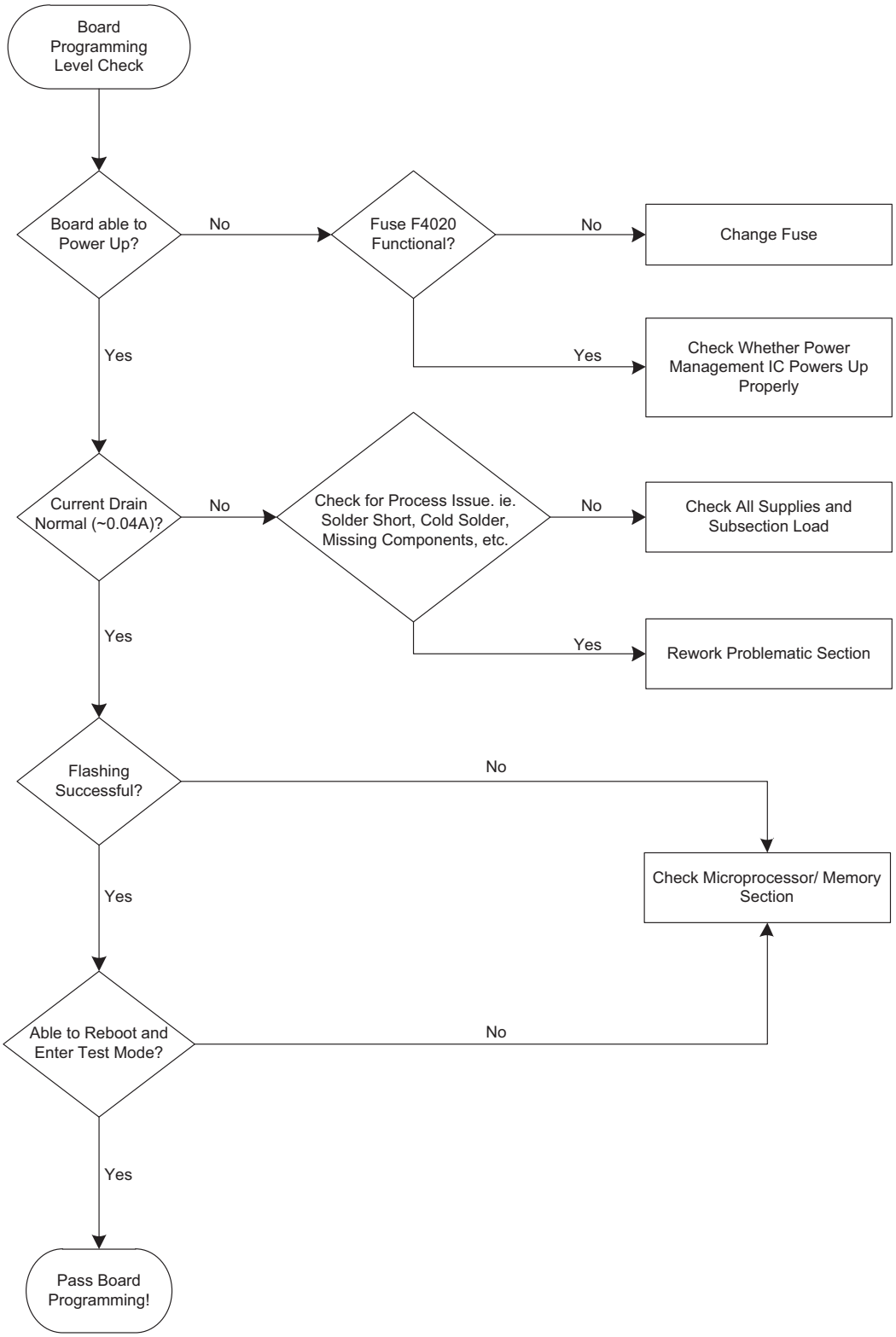
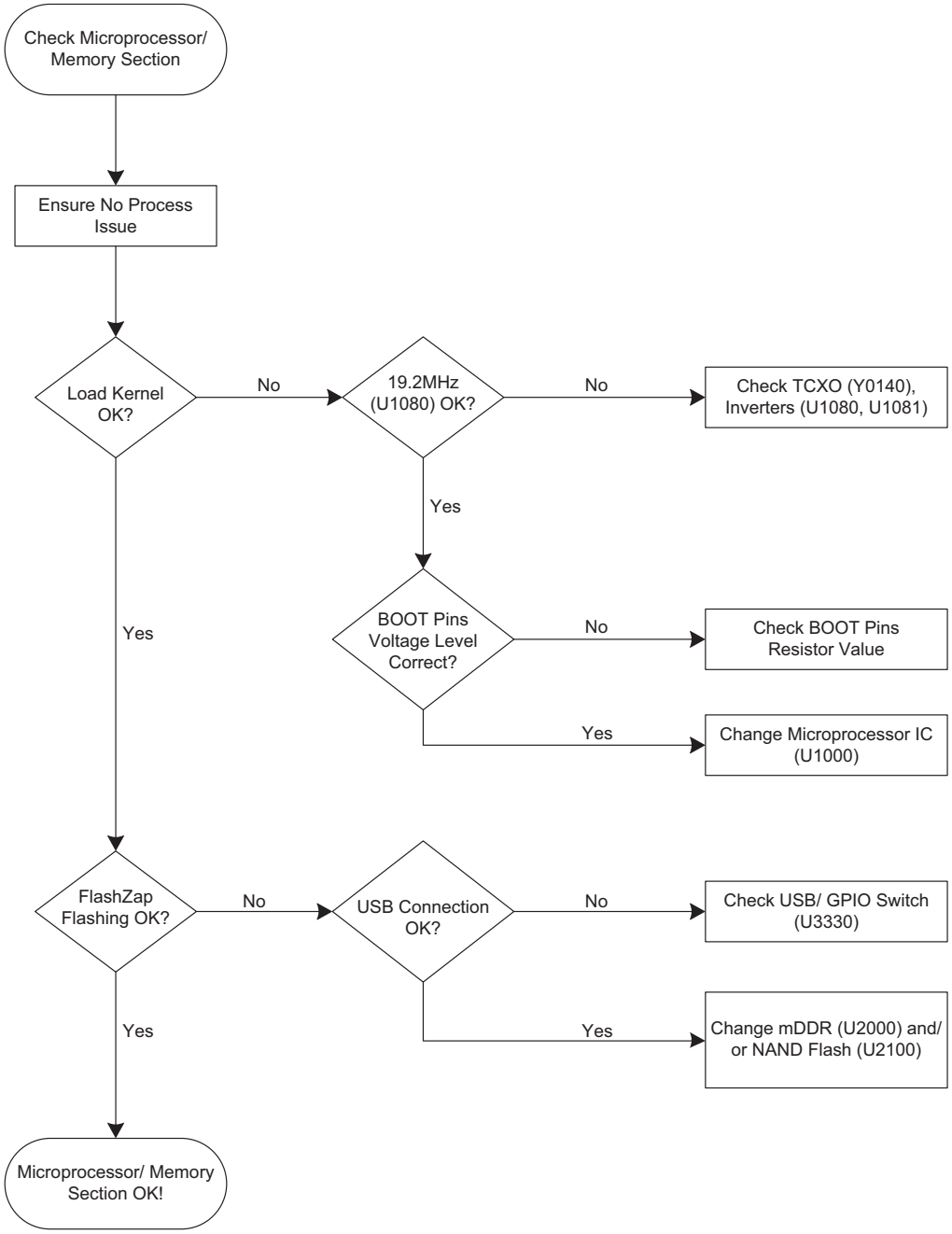


Figure 5-8: GOB

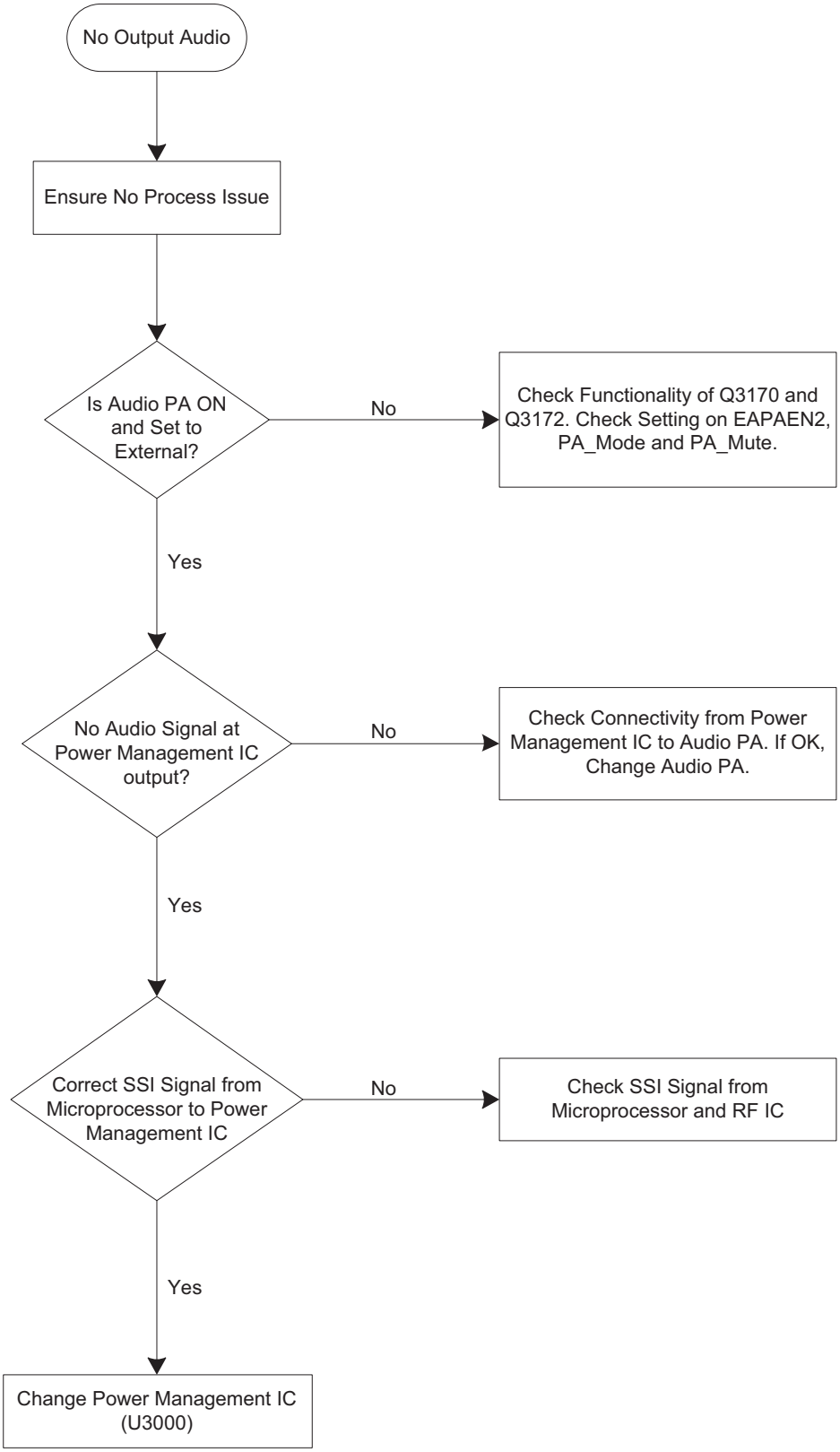
1.7 Troubleshooting Charts



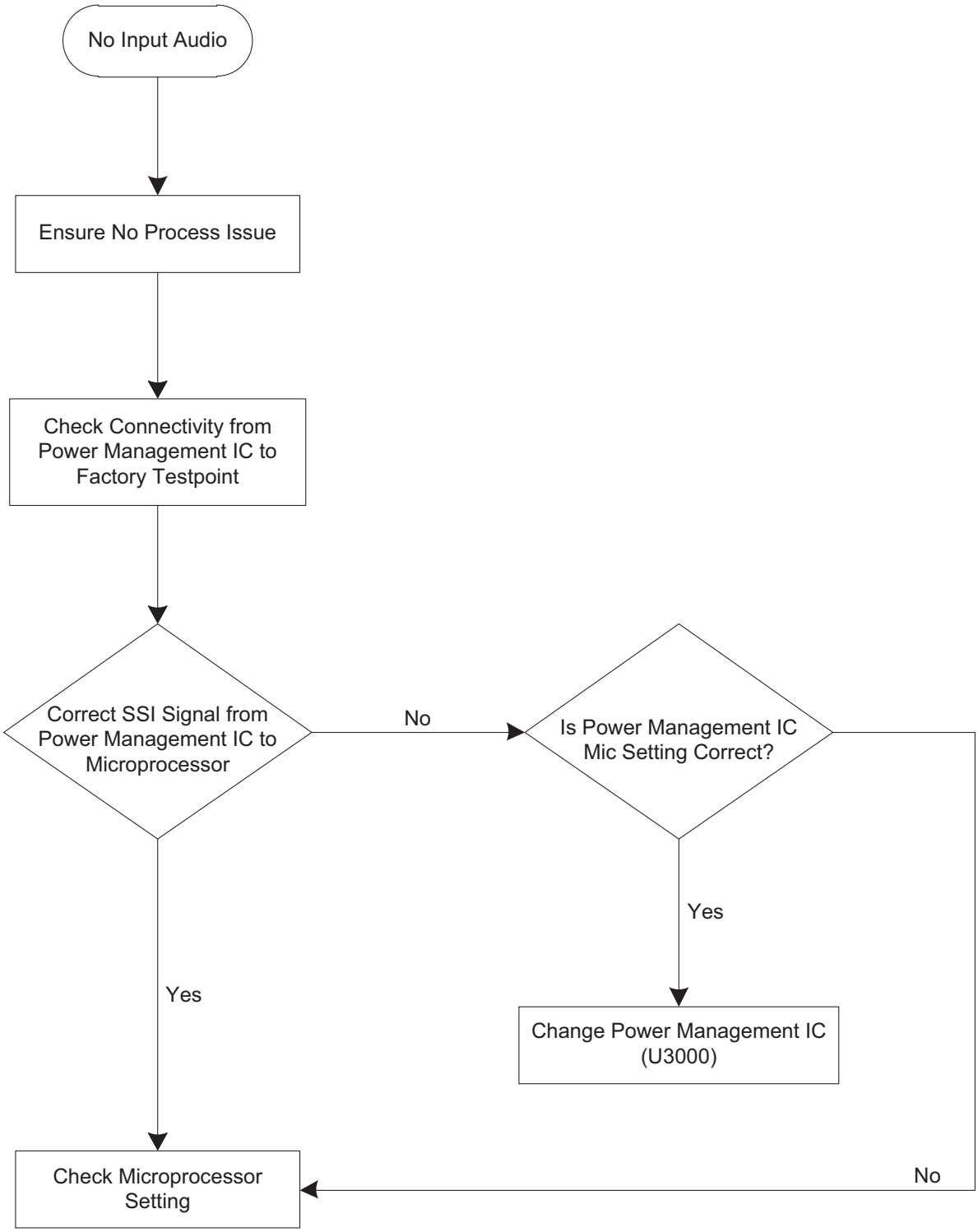
Troubleshooting Flow Chart for Controller (Sheet 1 of 4)



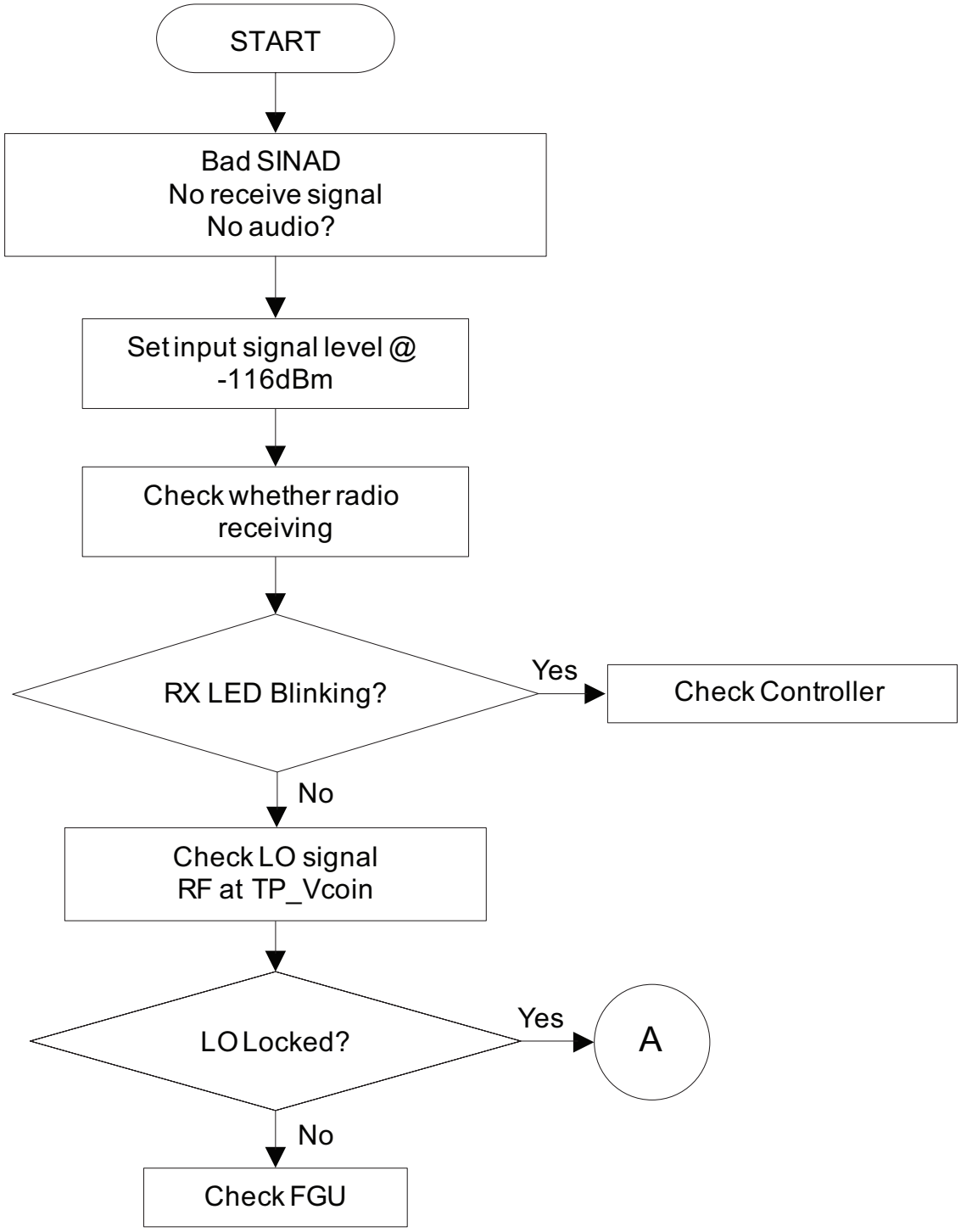
Troubleshooting Flow Chart for Controller (Sheet 2 of 4)



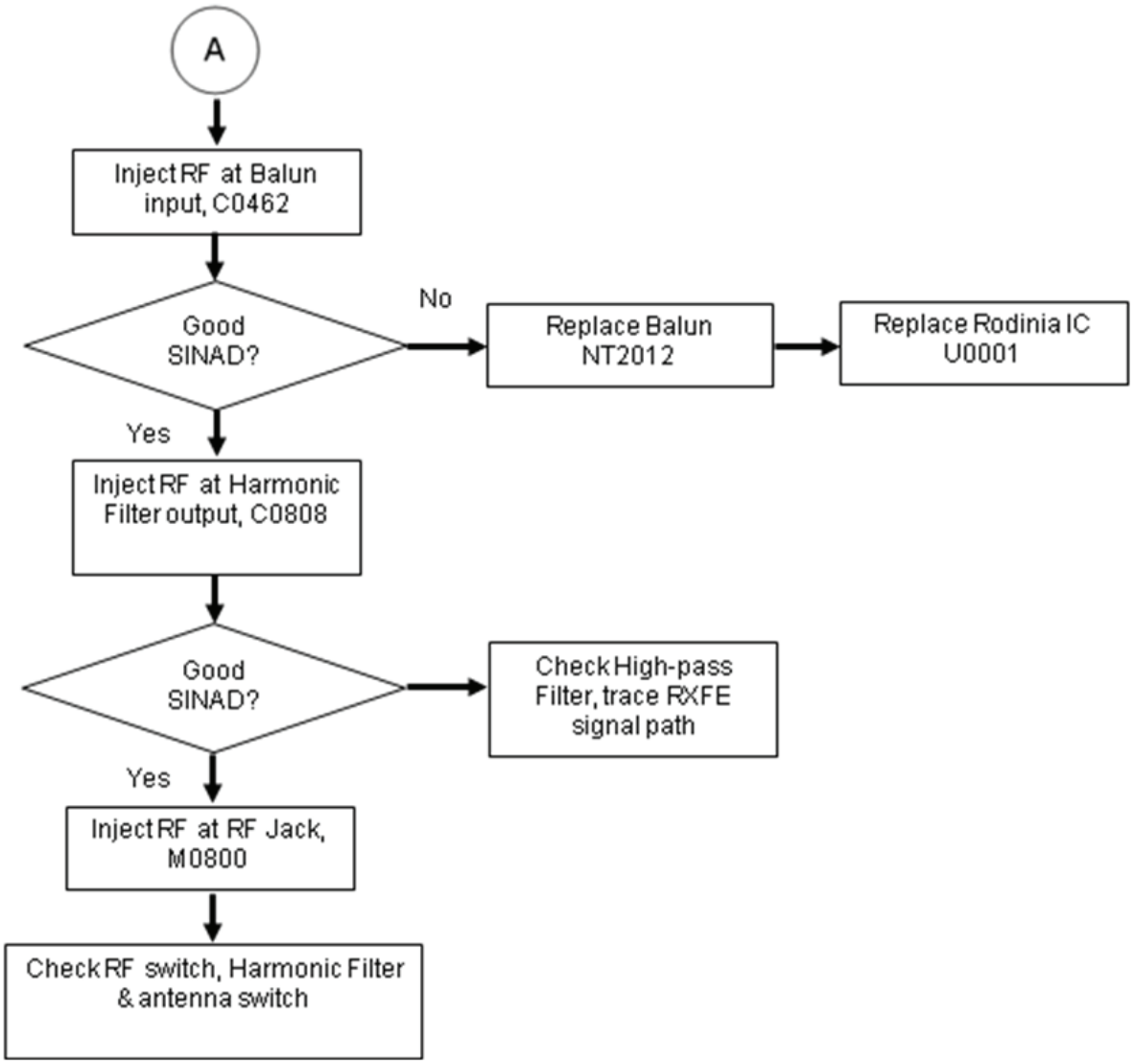
Troubleshooting Flow Chart for Controller (Sheet 3 of 4)



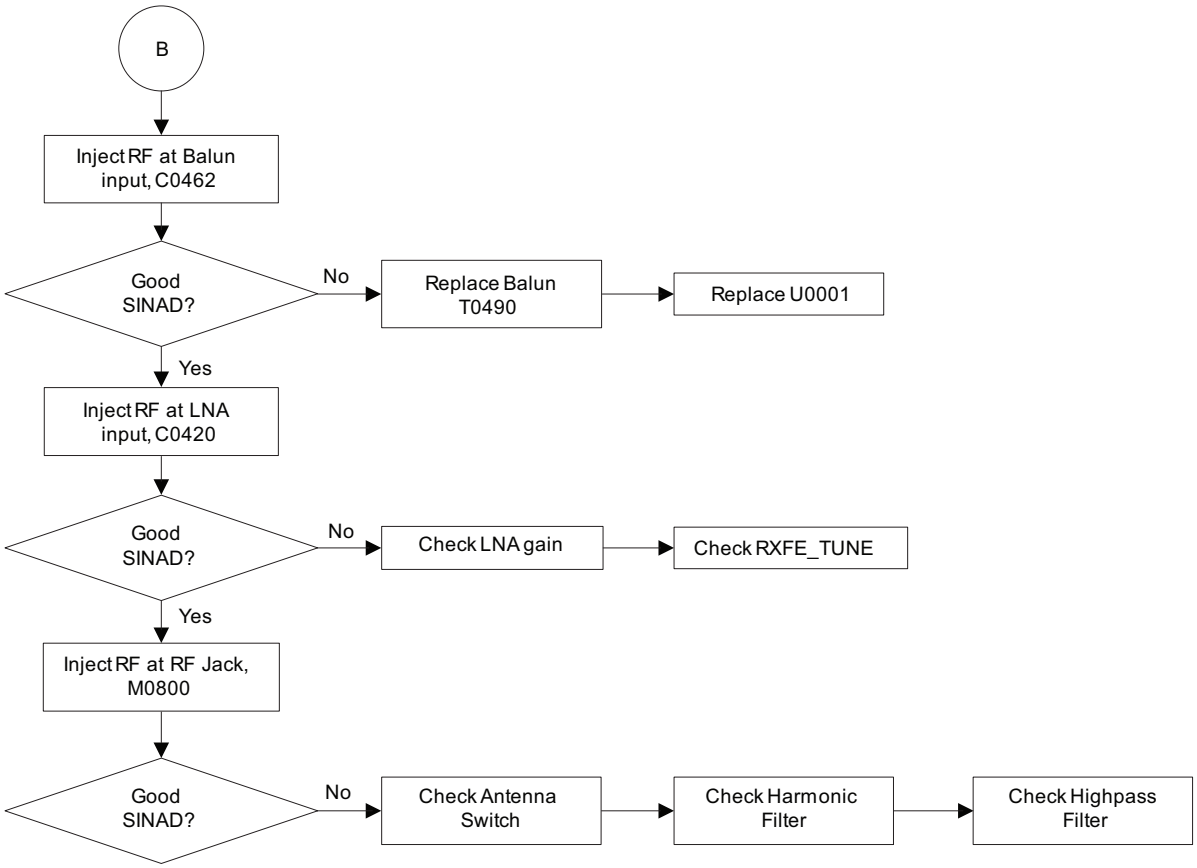
Troubleshooting Flow Chart for Controller (Sheet 4 of 4)



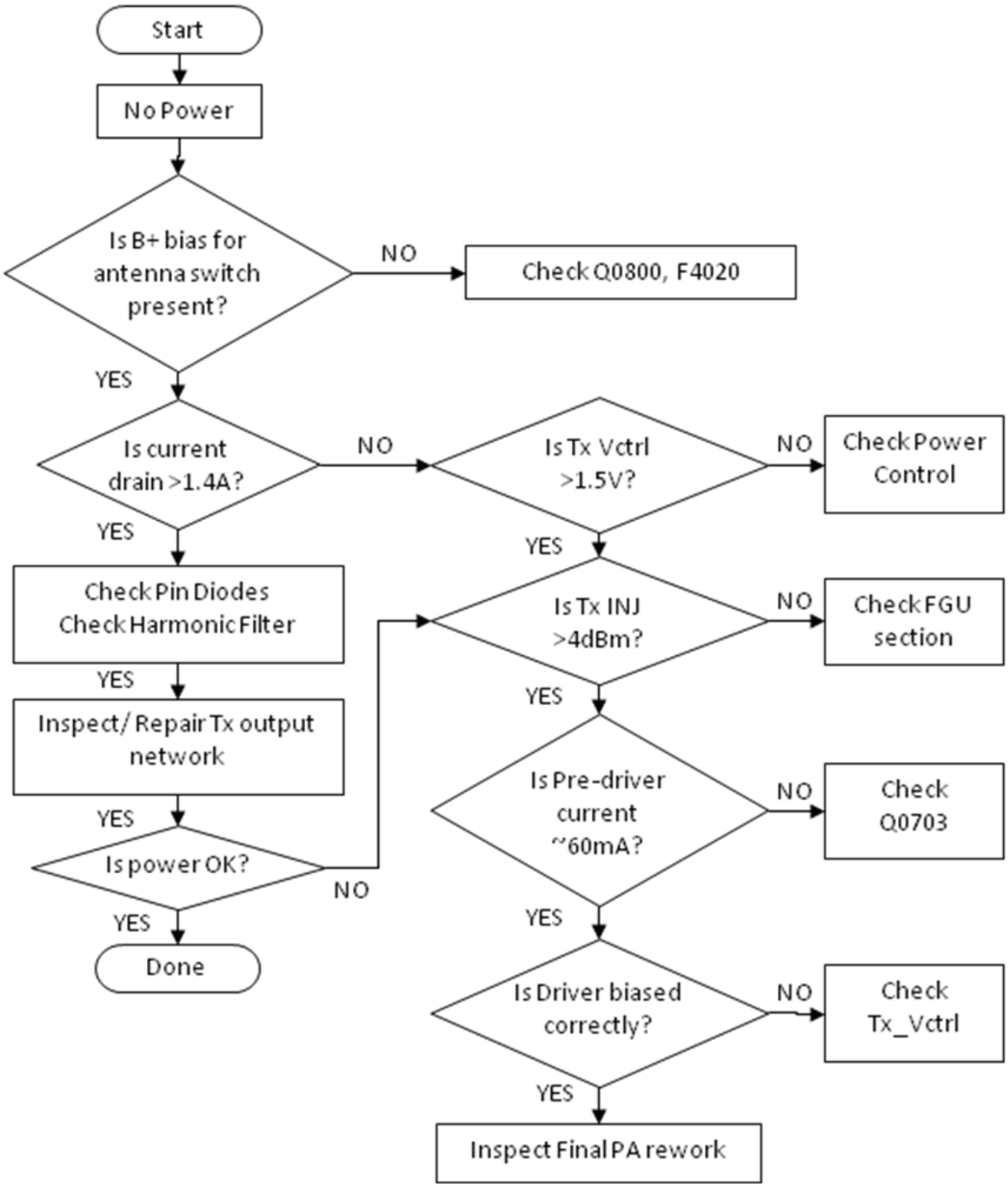
Troubleshooting Flow Chart for Receiver (Sheet 1 of 3)



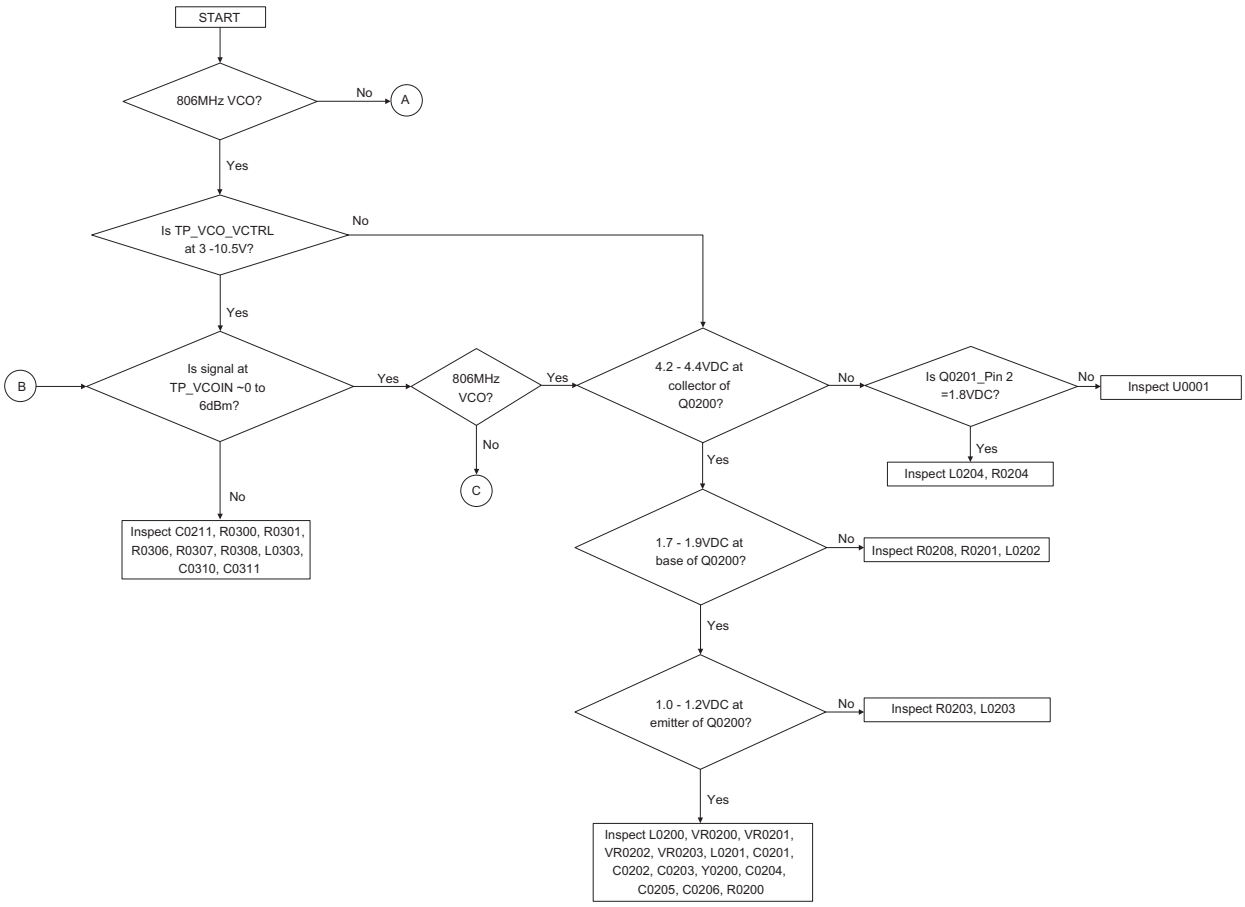
Troubleshooting Flow Chart for Receiver (Sheet 2 of 3)



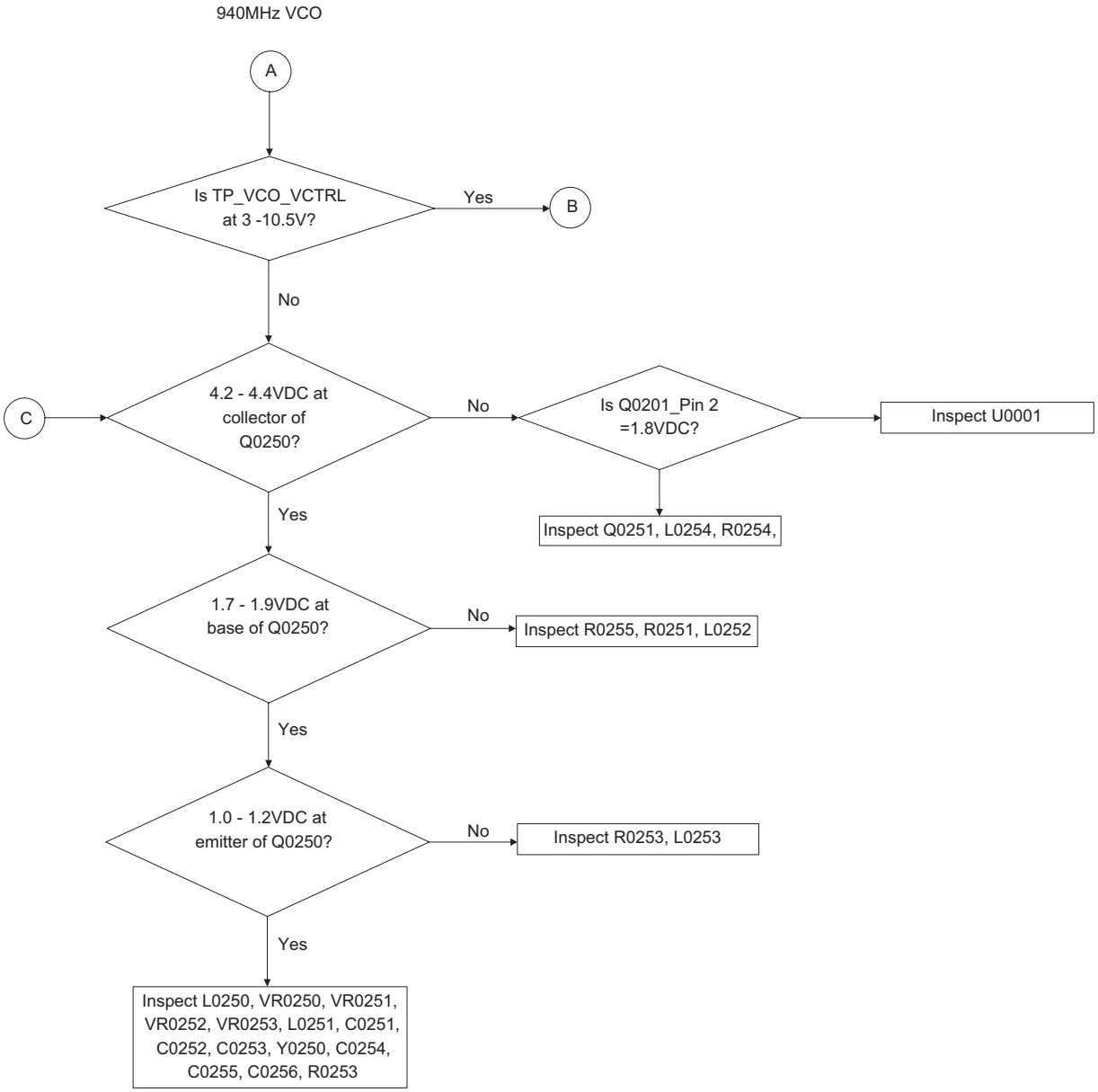
Troubleshooting Flow Chart for Receiver (Sheet 2 of 3)



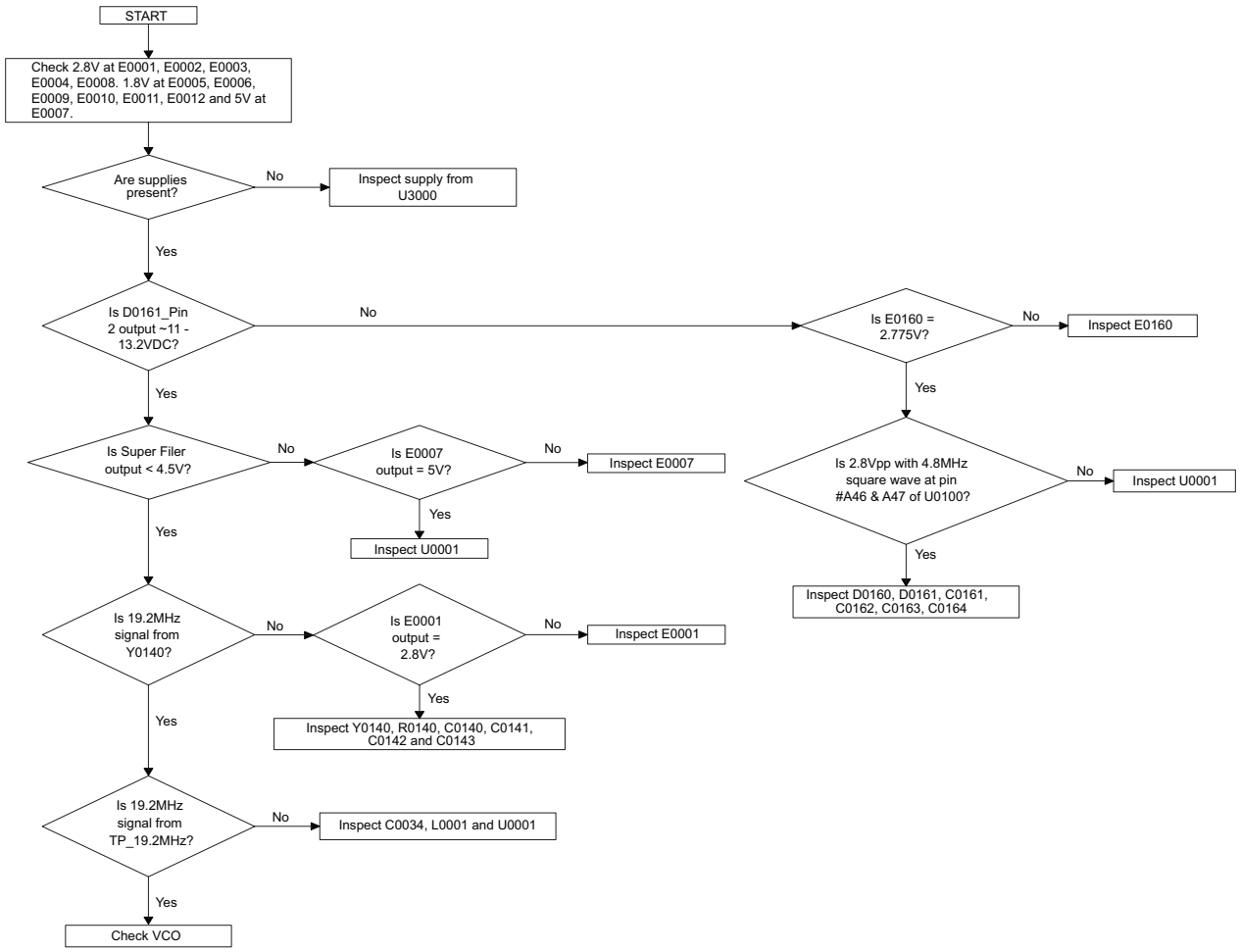
Troubleshooting Flow Chart for Transmitter



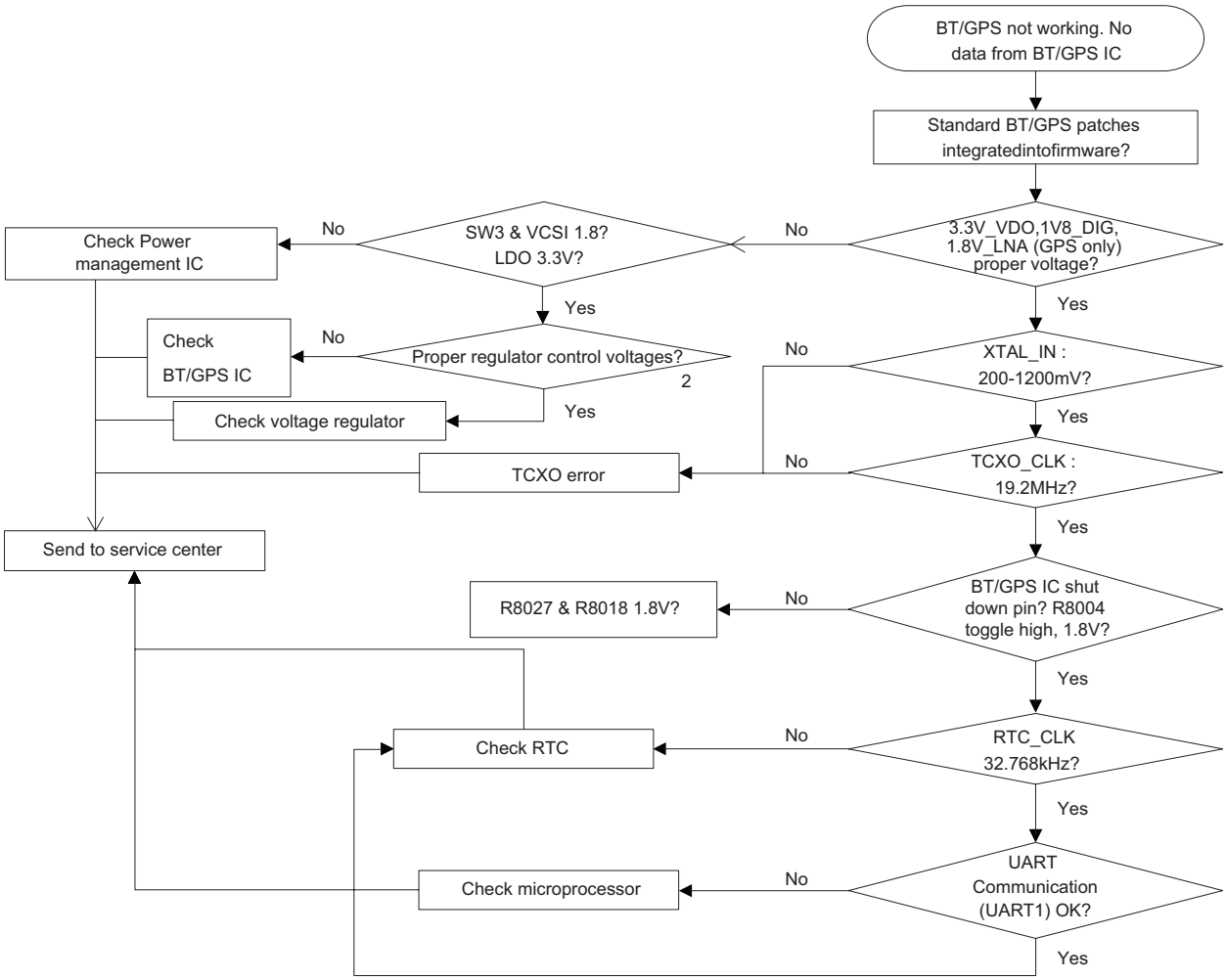
Troubleshooting Flow Chart for VCO (Sheet 1 of 2)



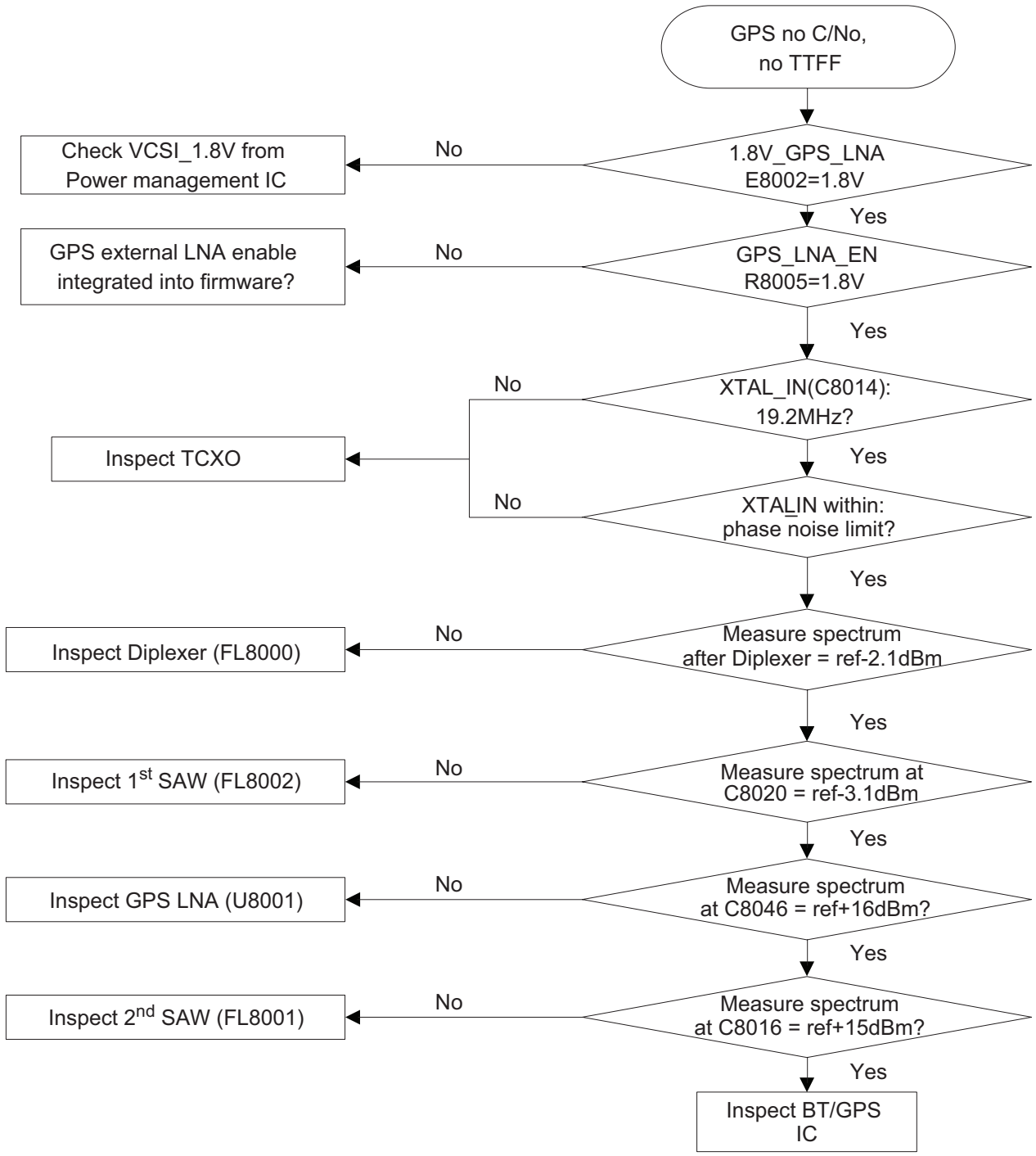
Troubleshooting Flow Chart for VCO (Sheet 2 of 2)



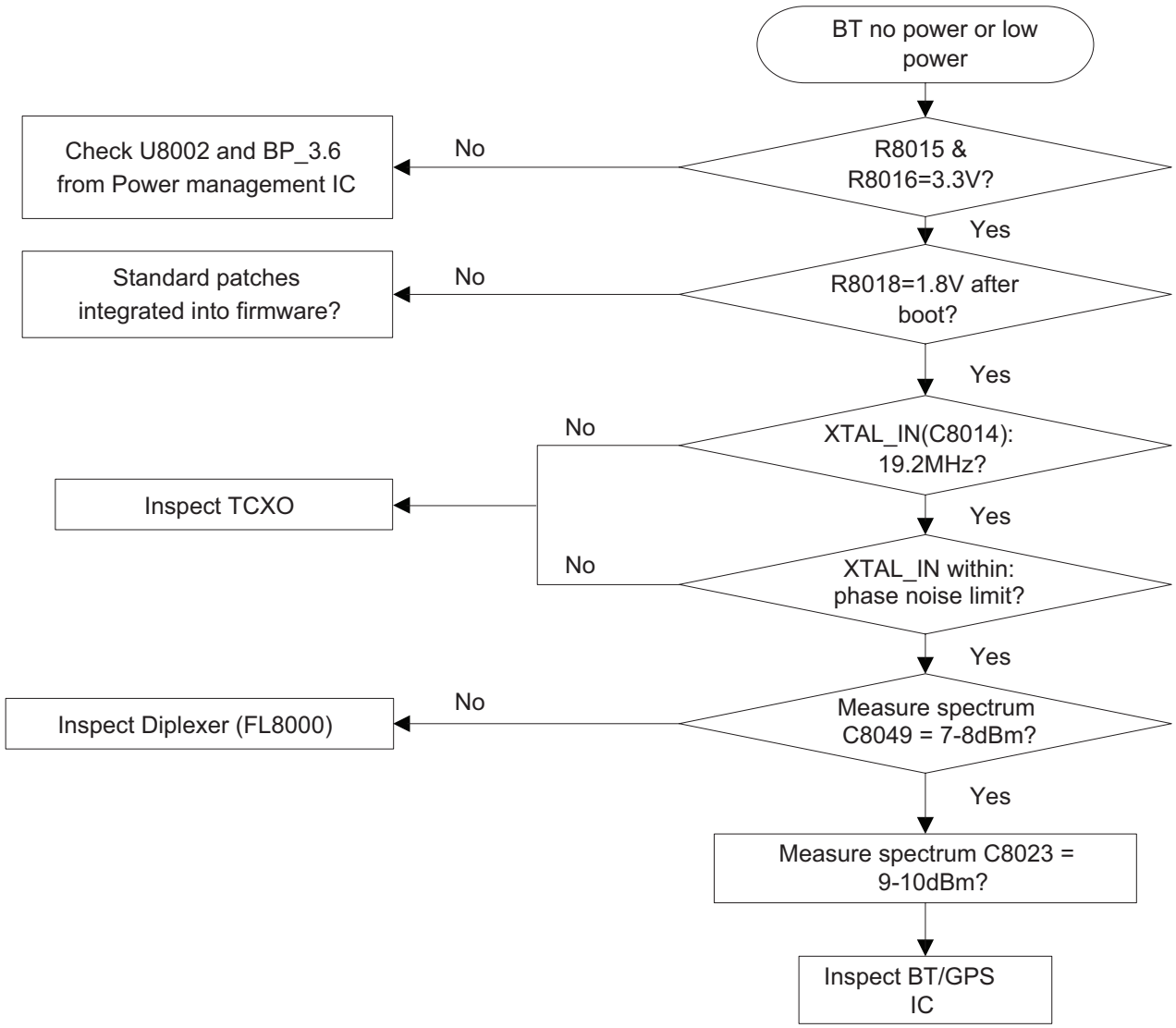
Troubleshooting Flow Chart for Synthesizer



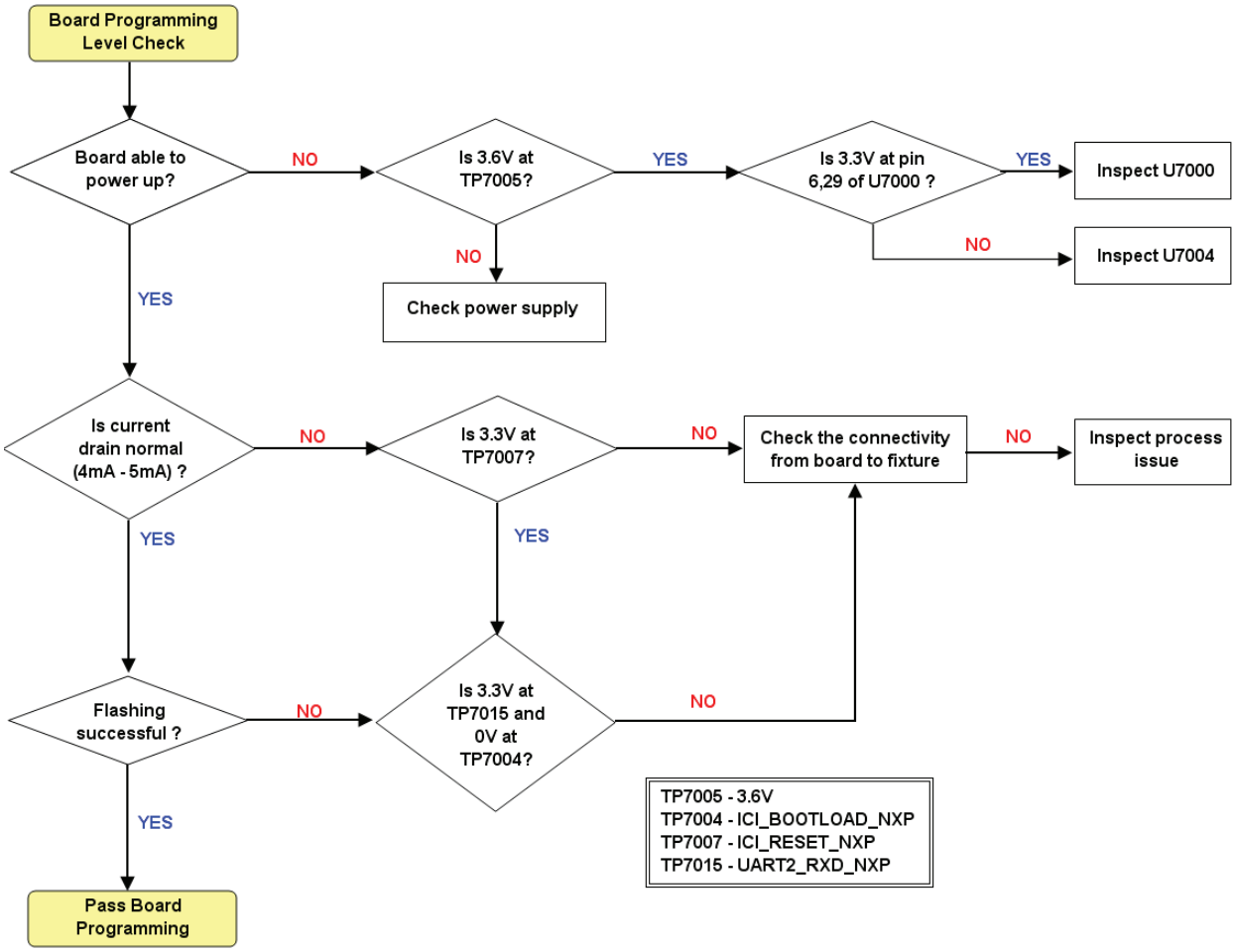
Troubleshooting Flow Chart for GPS/Bluetooth (Sheet 1 of 3)



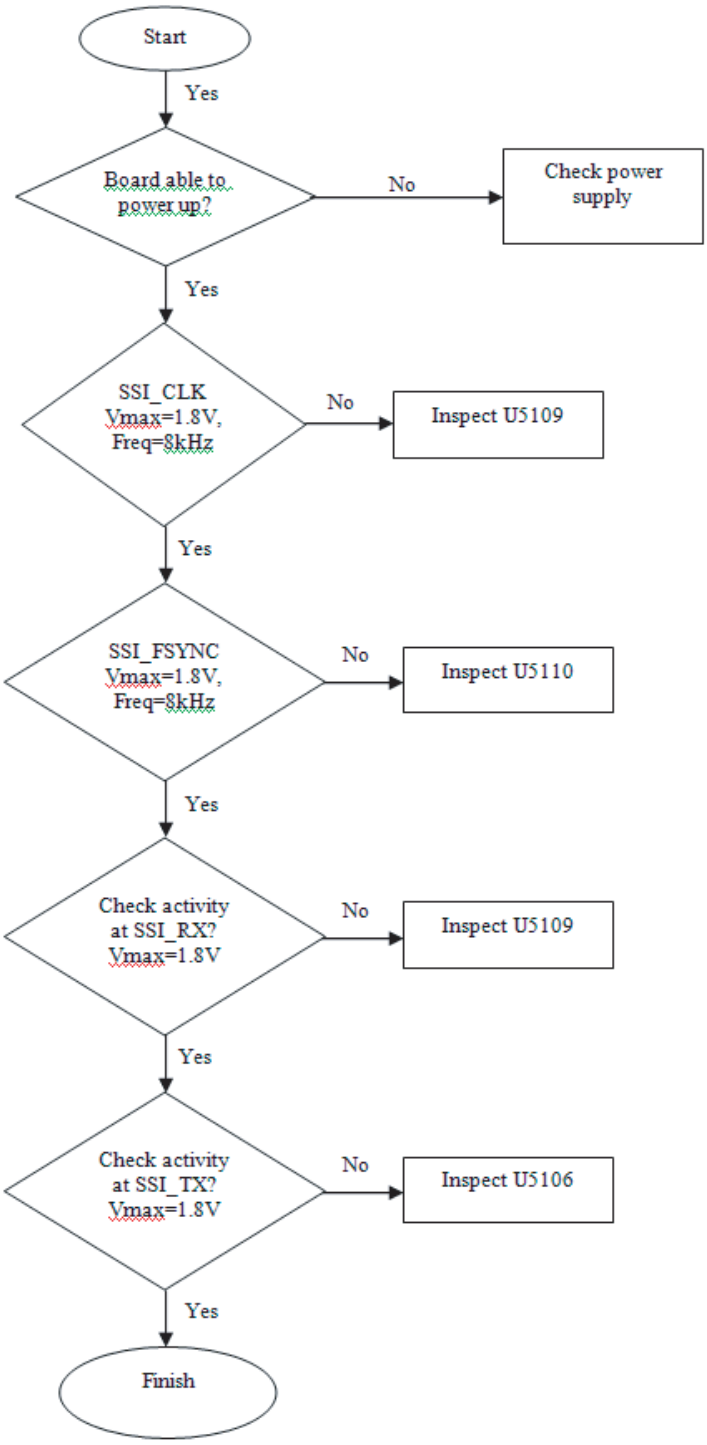
Troubleshooting Flow Chart for GPS/Bluetooth (Sheet 2 of 3)



Troubleshooting Flow Chart for GPS/Bluetooth (Sheet 2 of 3)



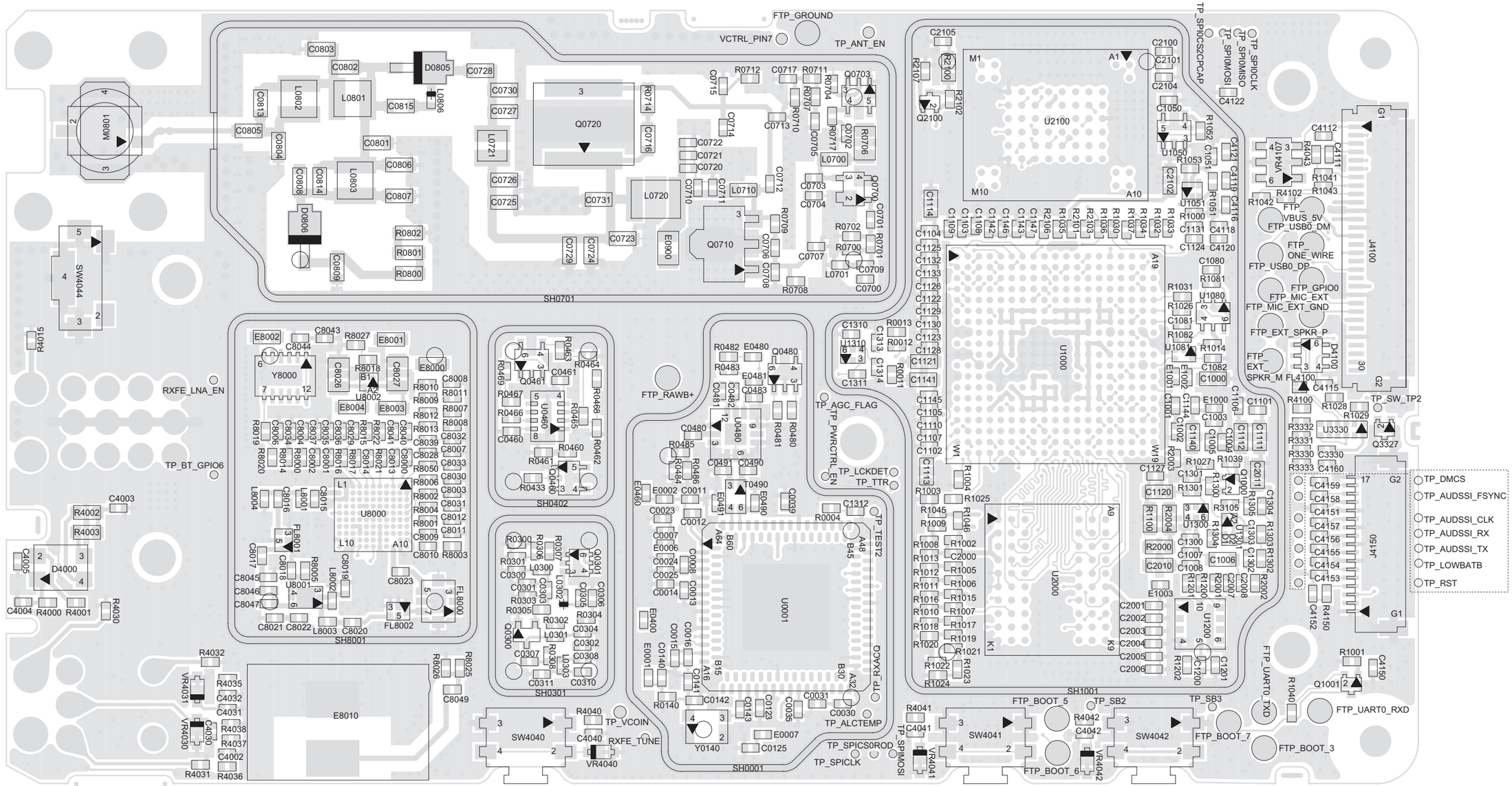
Troubleshooting Flow Chart for Keypad



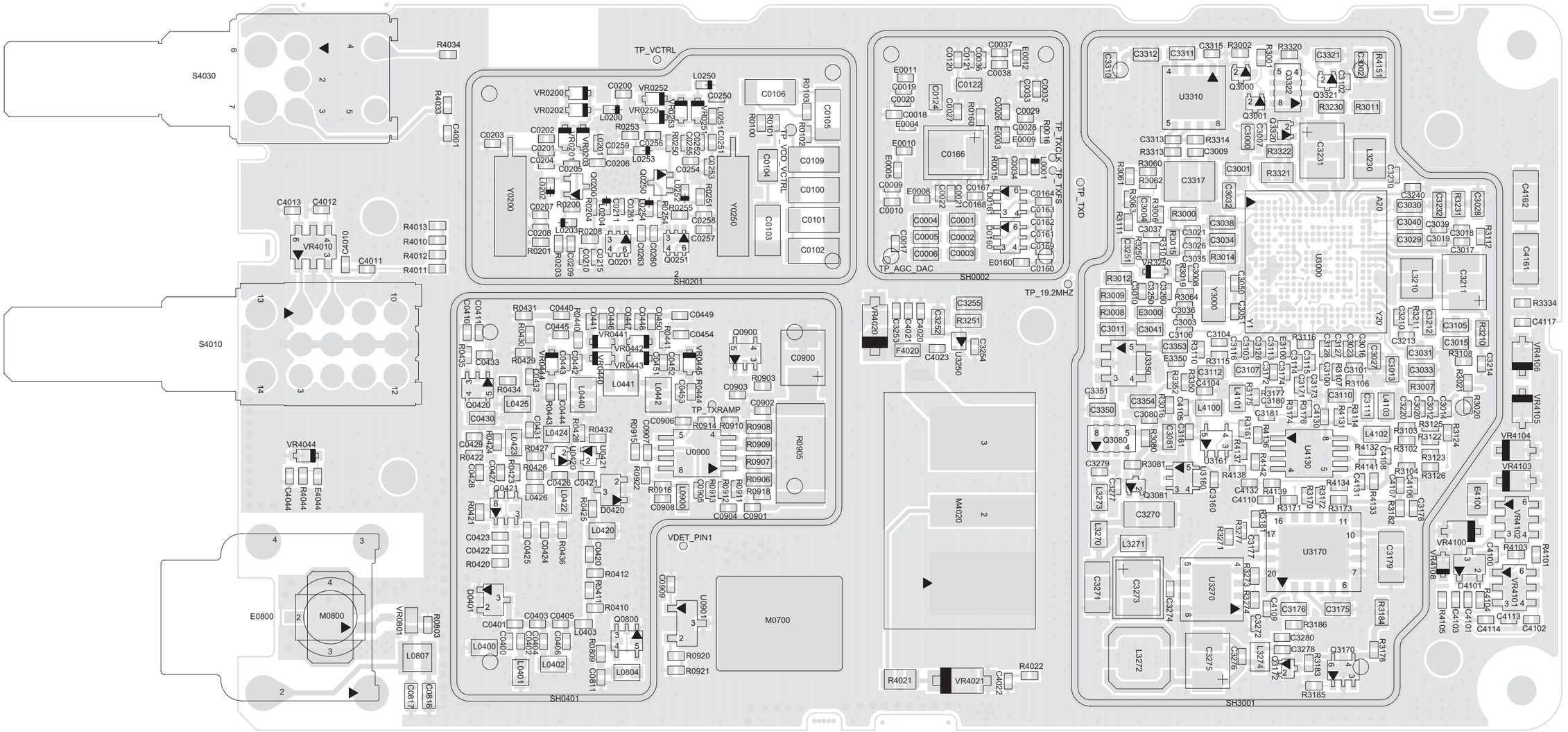
*To check SSI lines, GOB needs to connect with radio
*All the SSI lines must probe with oscilloscope

Troubleshooting Flow Chart for GOB

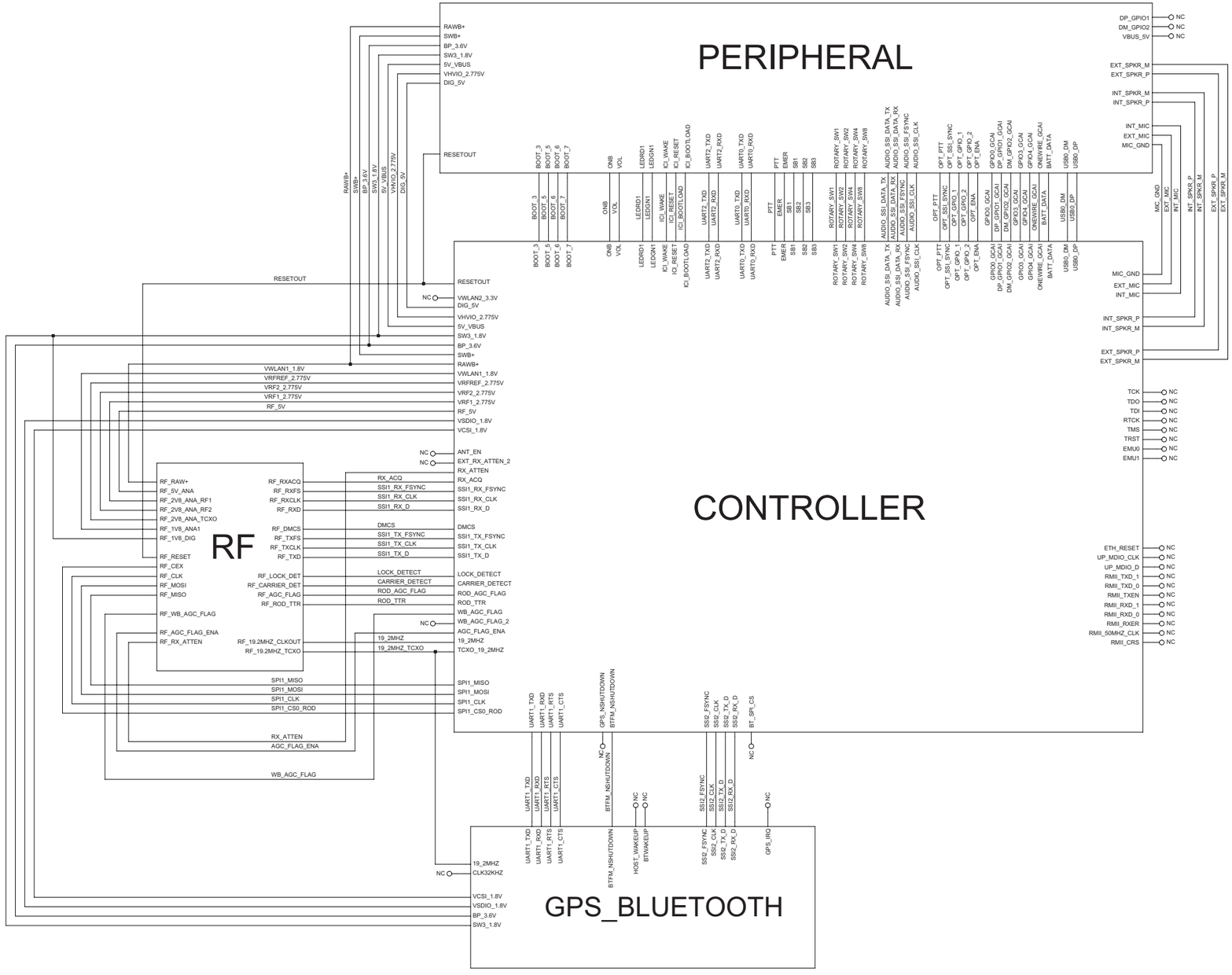
2.0 Circuit Board/Schematic Diagrams and Parts List for UHF



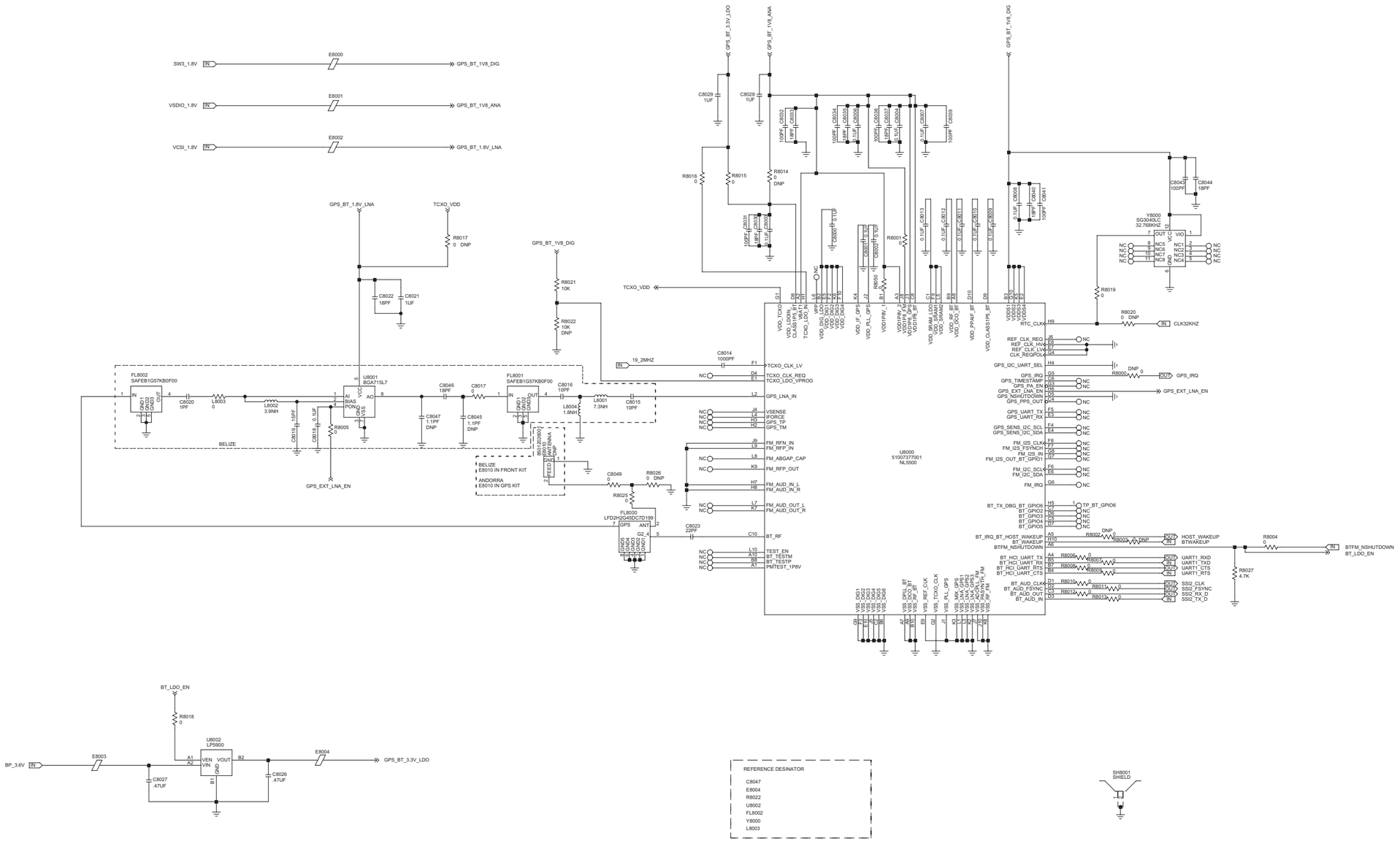
Main Board UHF Top Side PCB No. 84012180001_C

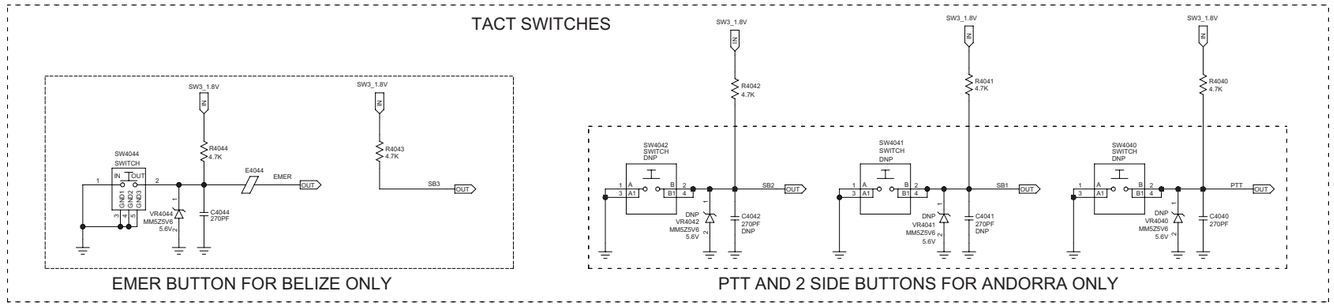


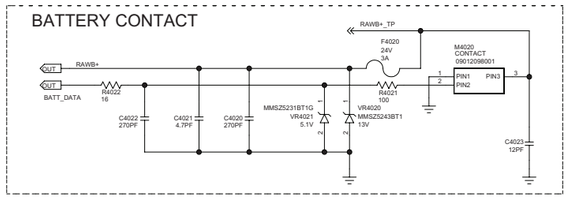
Main Board UHF Bottom Side PCB No. 84012180001_C

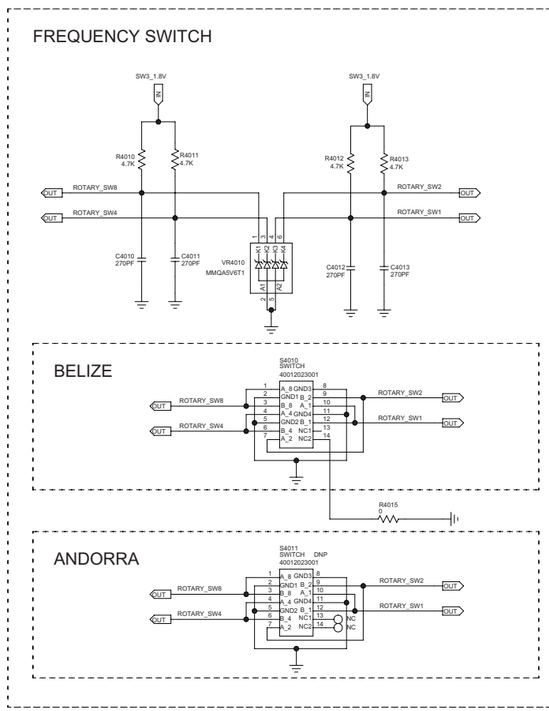


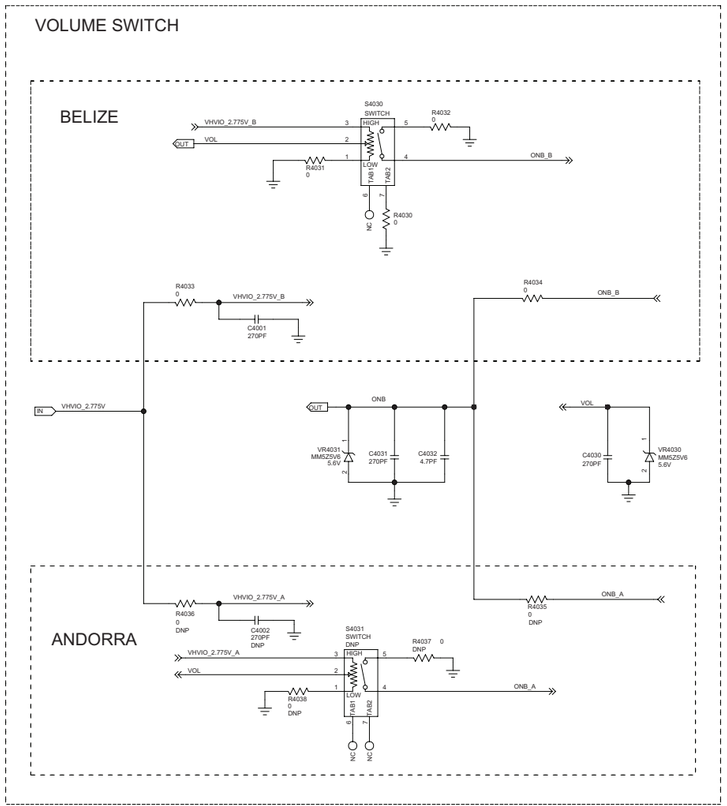
NL5500 GPS/BT SCHEMATIC

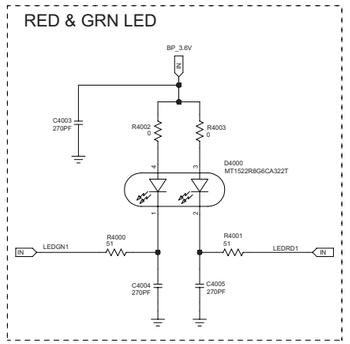


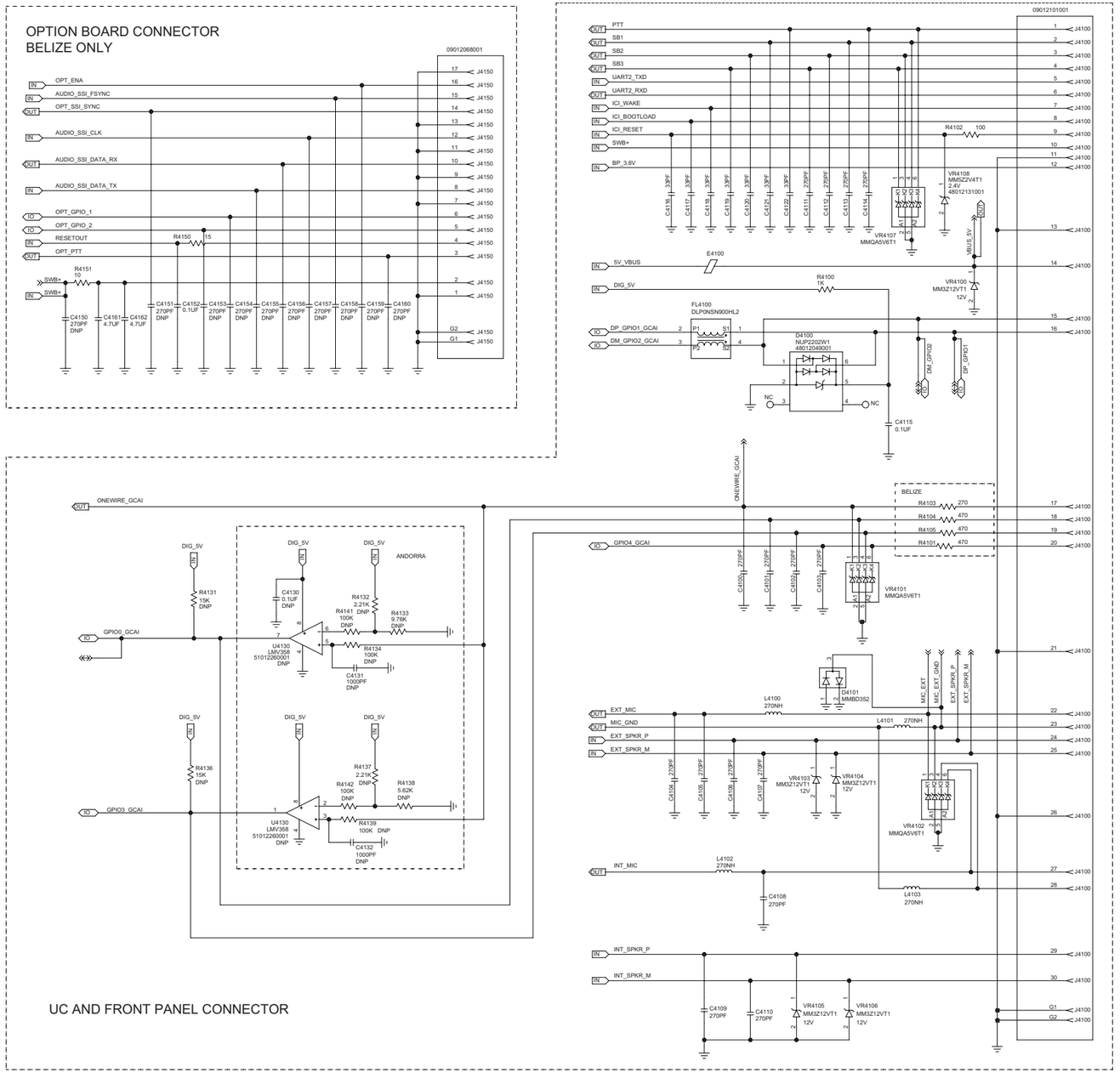






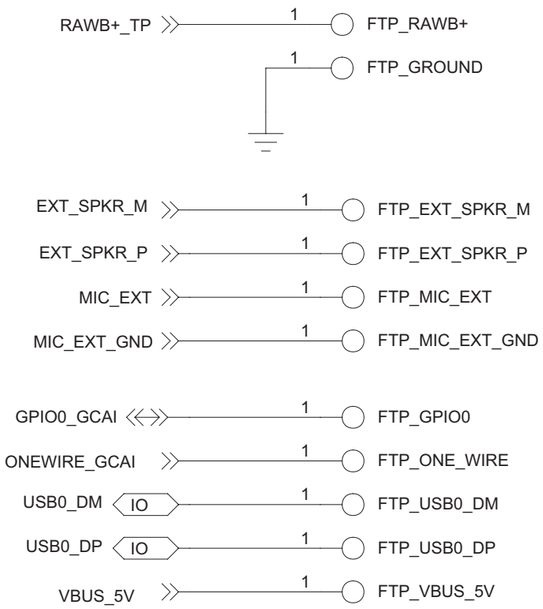






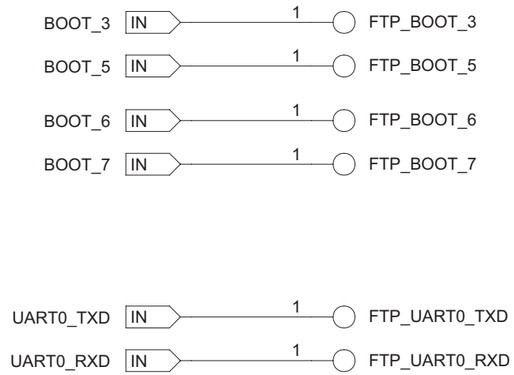
FACTORY TEST POINTS

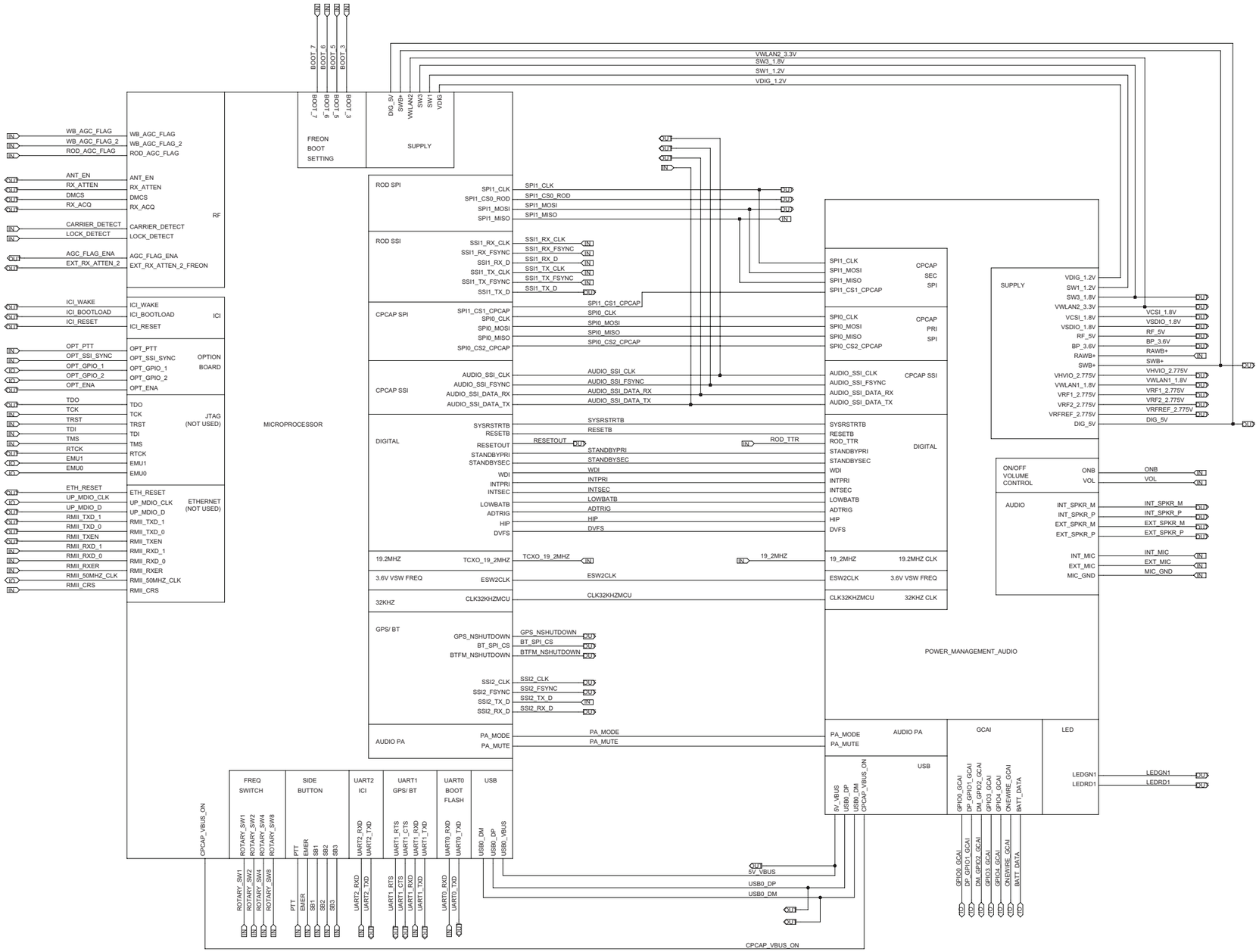
1.5MM DIAMETER
FOR TEST & TUNE AND RE-FLASHING



FACTORY TEST POINTS

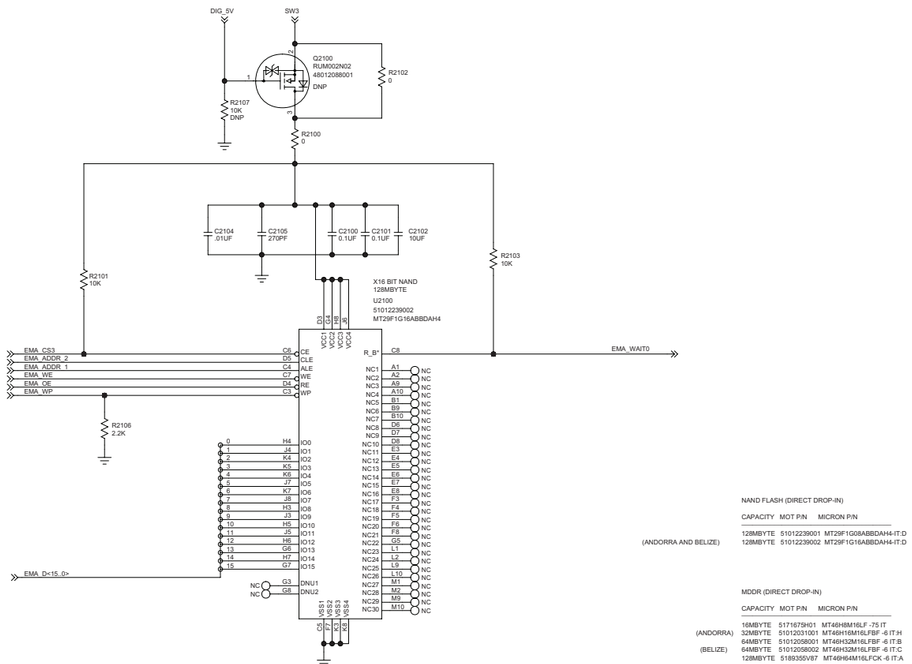
1.5MM DIAMETER
FOR BLANK BOARD FLASHING





Do Not Distribute

FLASH



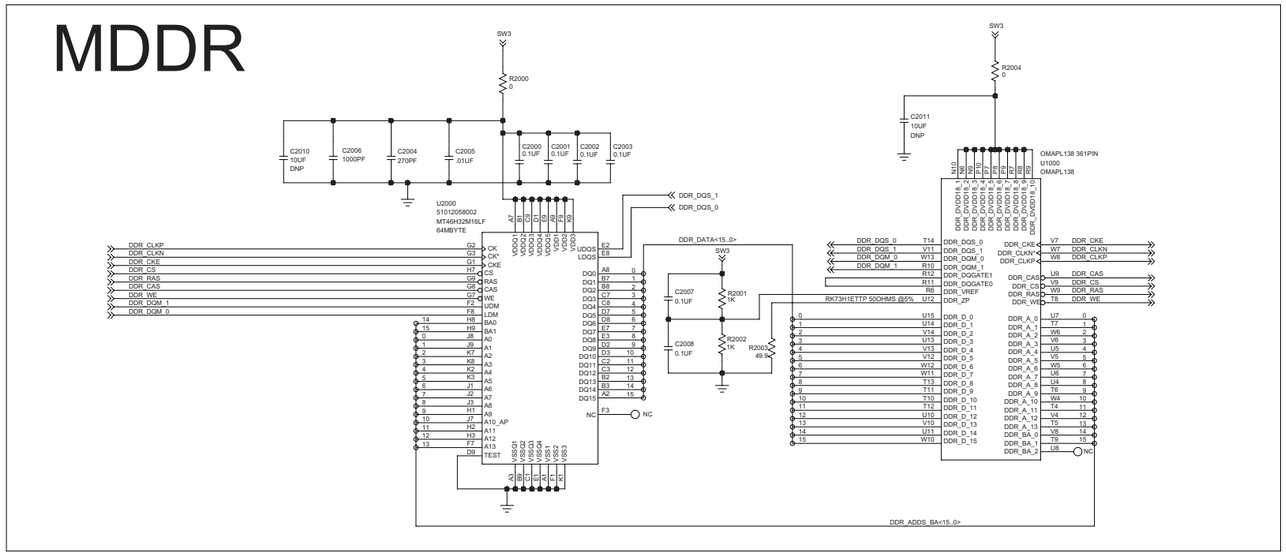
NAND FLASH (DIRECT DROP-IN)

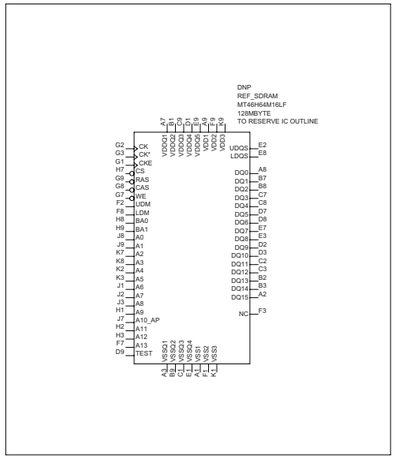
	CAPACITY	MOT P/N	MICRON P/N
	128MBYTE	51012239001	MT29F1G08ABBDAH4-IT:D
(ANDORRA AND BELIZE)	128MBYTE	51012239002	MT29F1G16ABBDAH4-IT:D

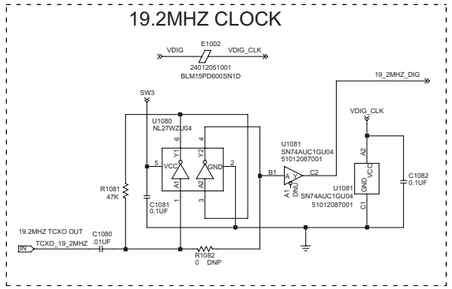
MDDR (DIRECT DROP-IN)

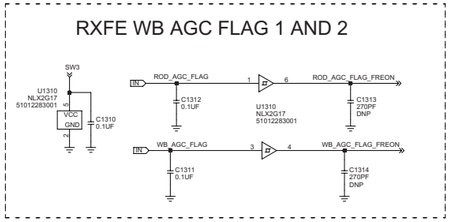
	CAPACITY	MOT P/N	MICRON P/N
	16MBYTE	5171675H01	MT46H8M16LF -75 IT
(ANDORRA)	32MBYTE	51012031001	MT46H16M16LFBF -6 IT:H
	64MBYTE	51012058001	MT46H32M16LFBF -6 IT:B
(BELIZE)	64MBYTE	51012058002	MT46H32M16LFBF -6 IT:C
	128MBYTE	5189350V87	MT46H64M16LFCK -6 IT:A

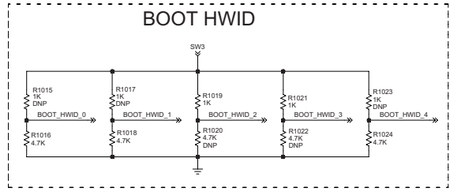
MDDR

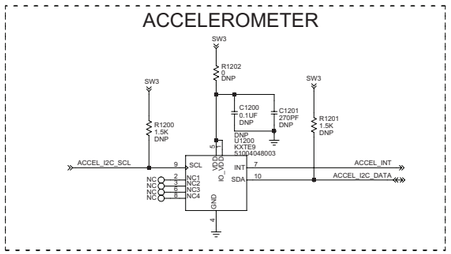


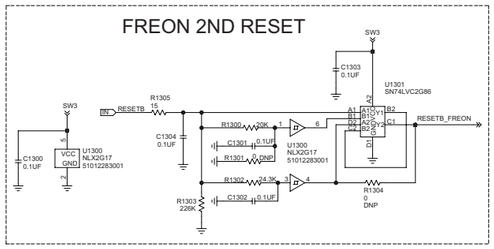


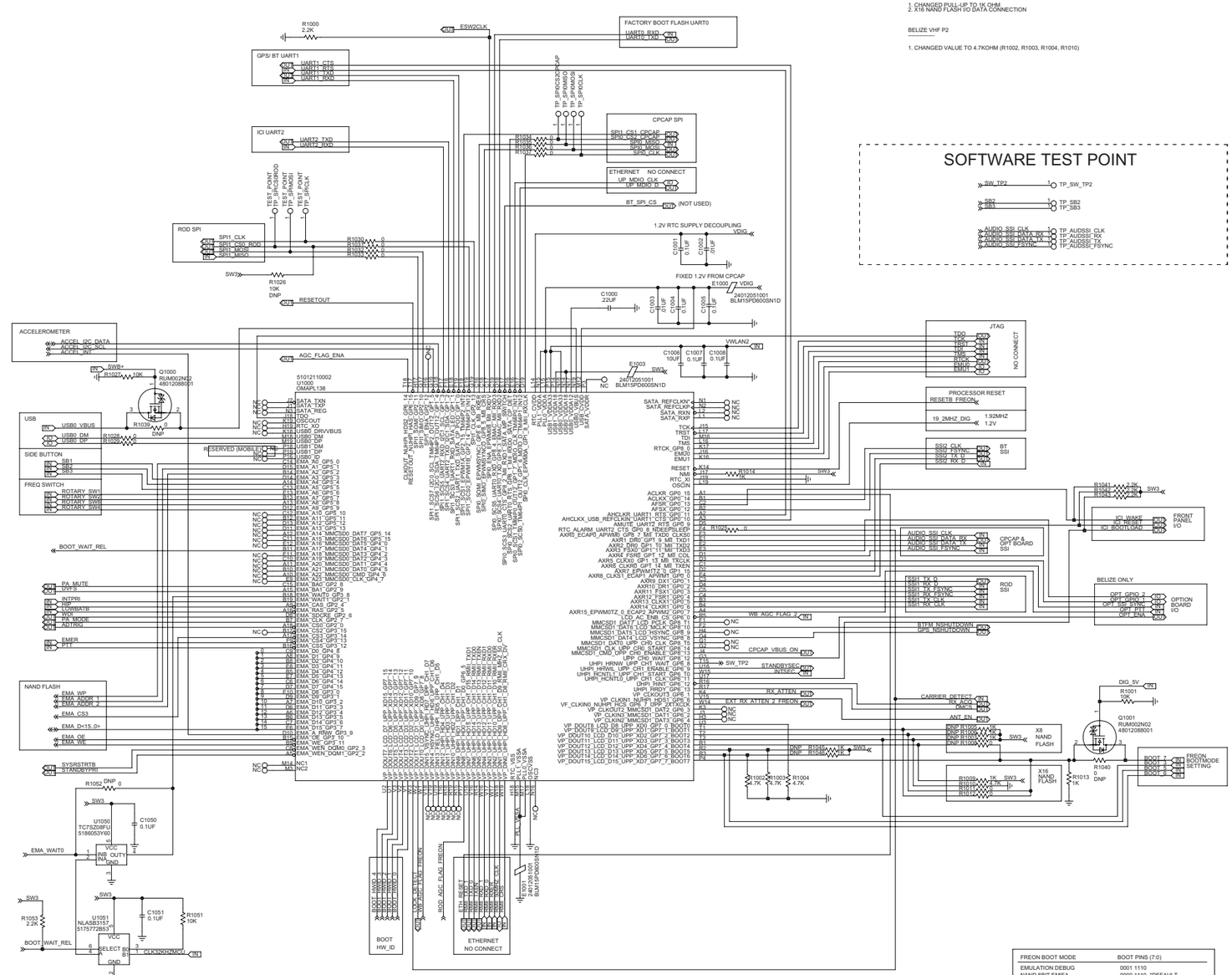












BELIZE VHF P1

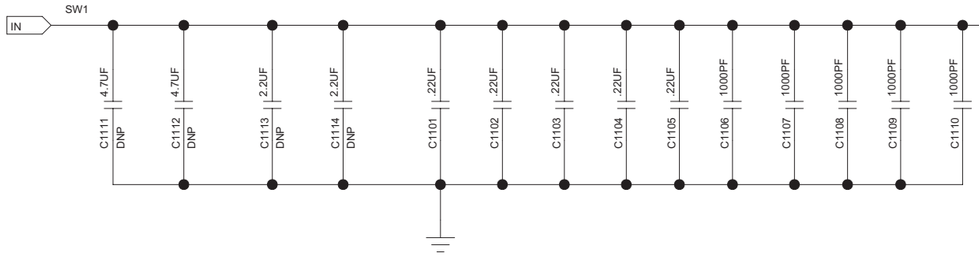
1. CHANGED PULL-UP TO 1K OHM.
2. X16 NAND FLASH I/O DATA CONNECTION

BELIZE VHF P2

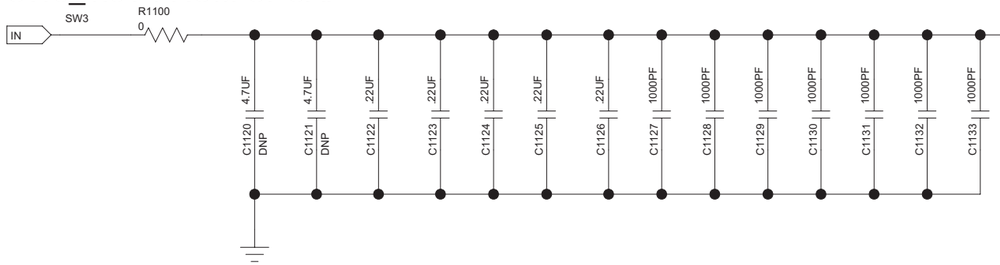
1. CHANGED VALUE TO 4.7KOHM (R1002, R1003, R1004, R1010)

FREON BOOT MODE	BOOT PINS (7:0)
EMULATION DEBUG	0001 1110
NAND 8BIT EMIFA	0000 1110 *DEFAULT
NAND 16BIT EMIFA	0001 0000
UART0 19.2MHZ	1001 0110

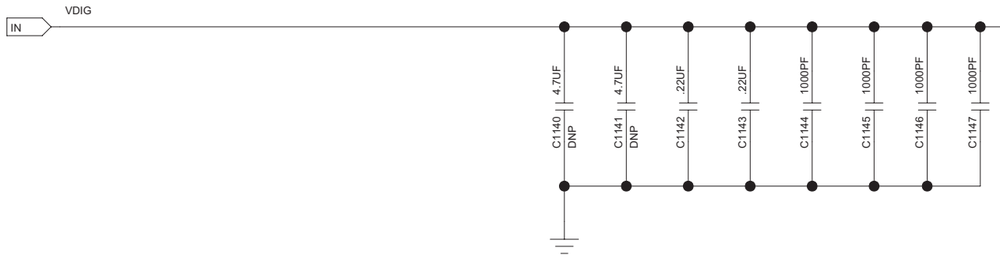
VARIABLE 1.2V FROM CPCAP

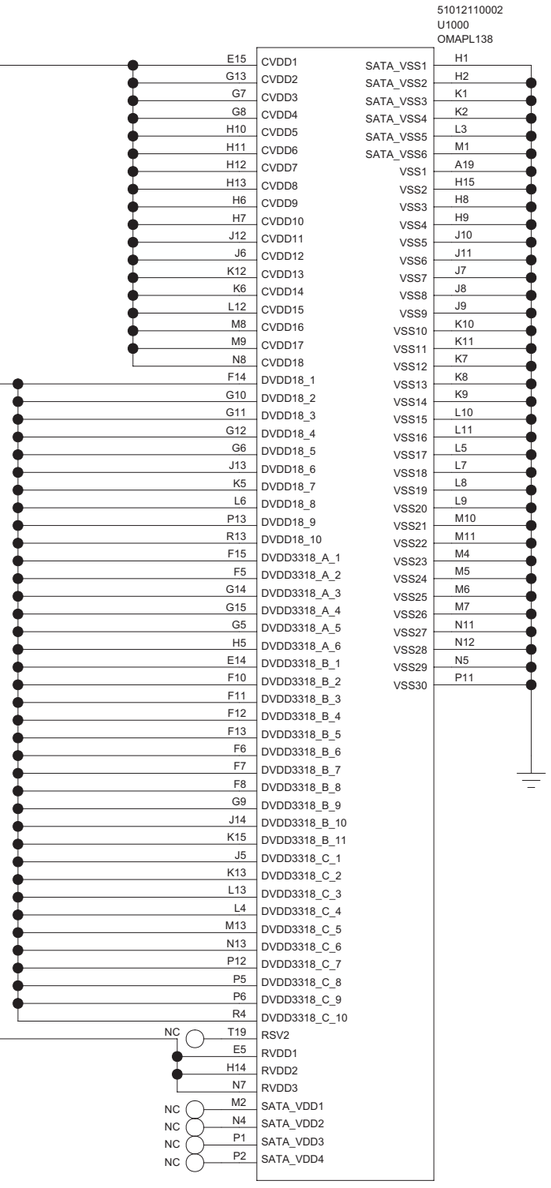


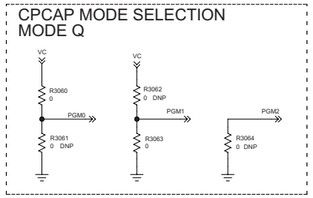
SW3_1.8V FROM CPCAP

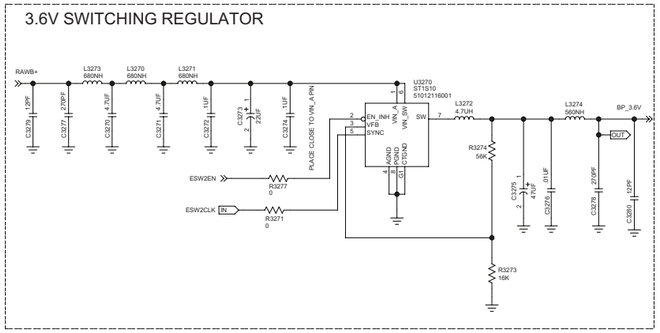


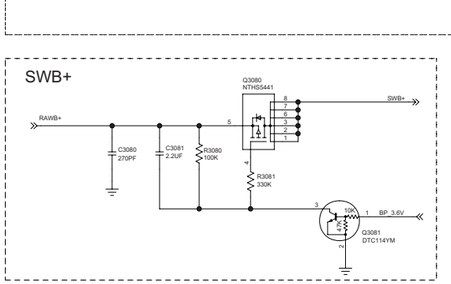
FIXED 1.2V FROM CPCAP

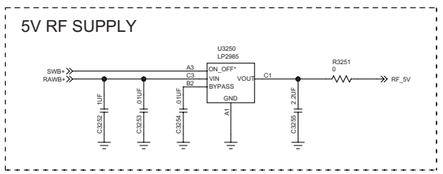


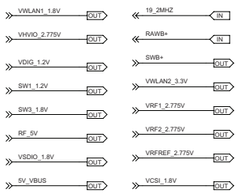


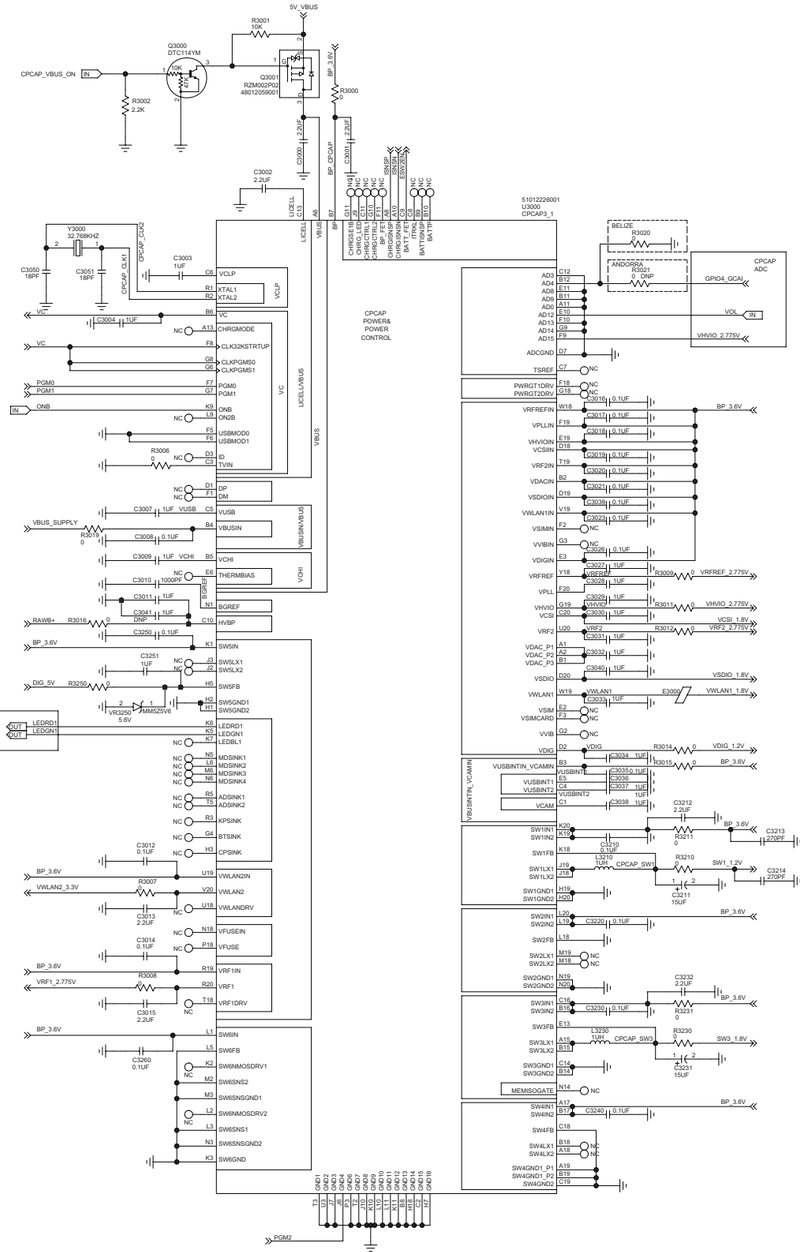


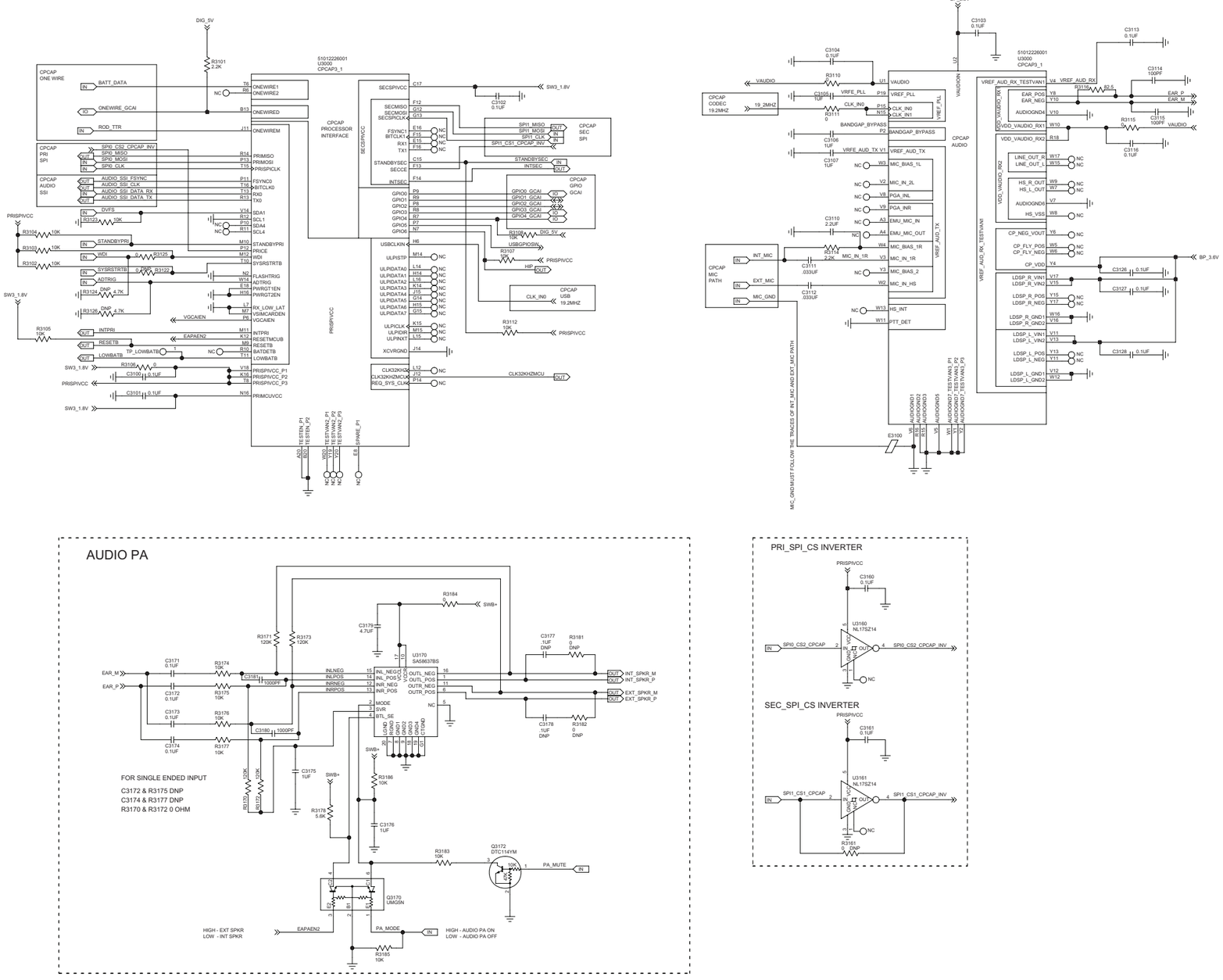




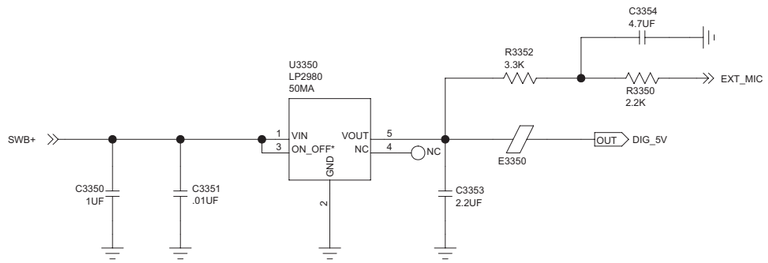




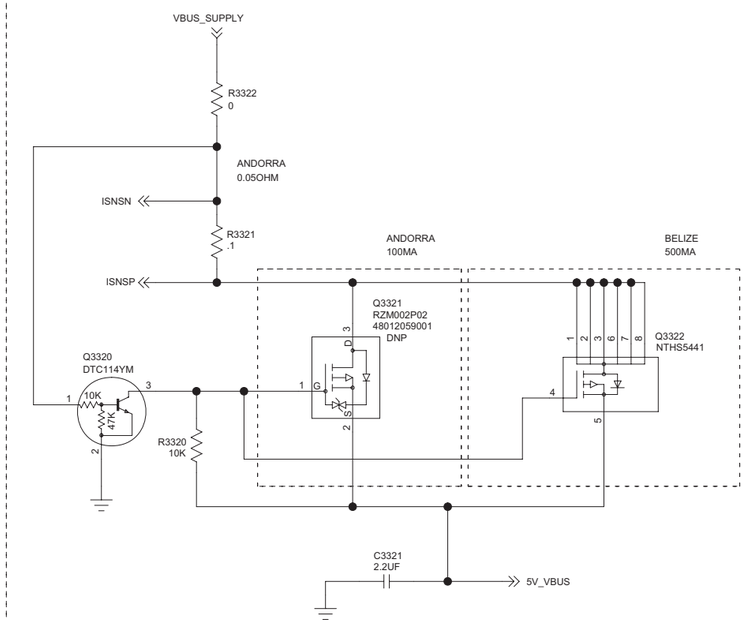




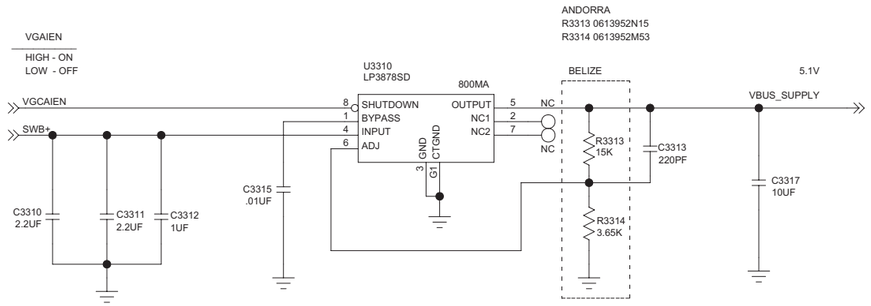
5V DIGITAL SUPPLY



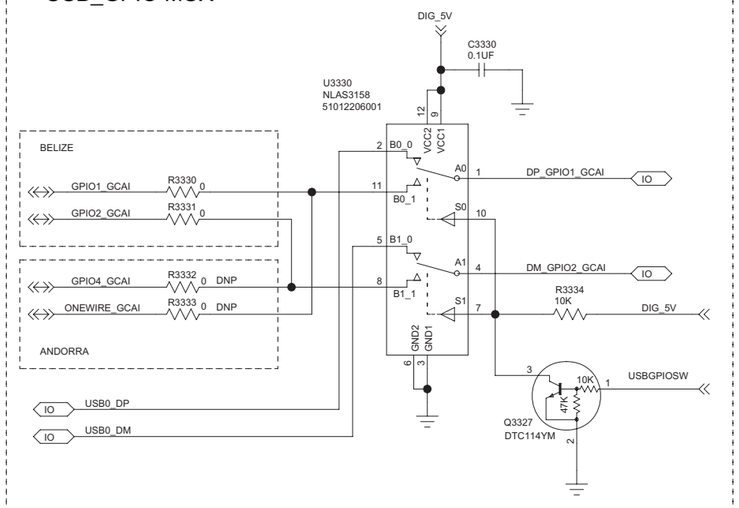
5V VBUS 100MA & 500MA CURRENT LIMIT CIRCUITRY

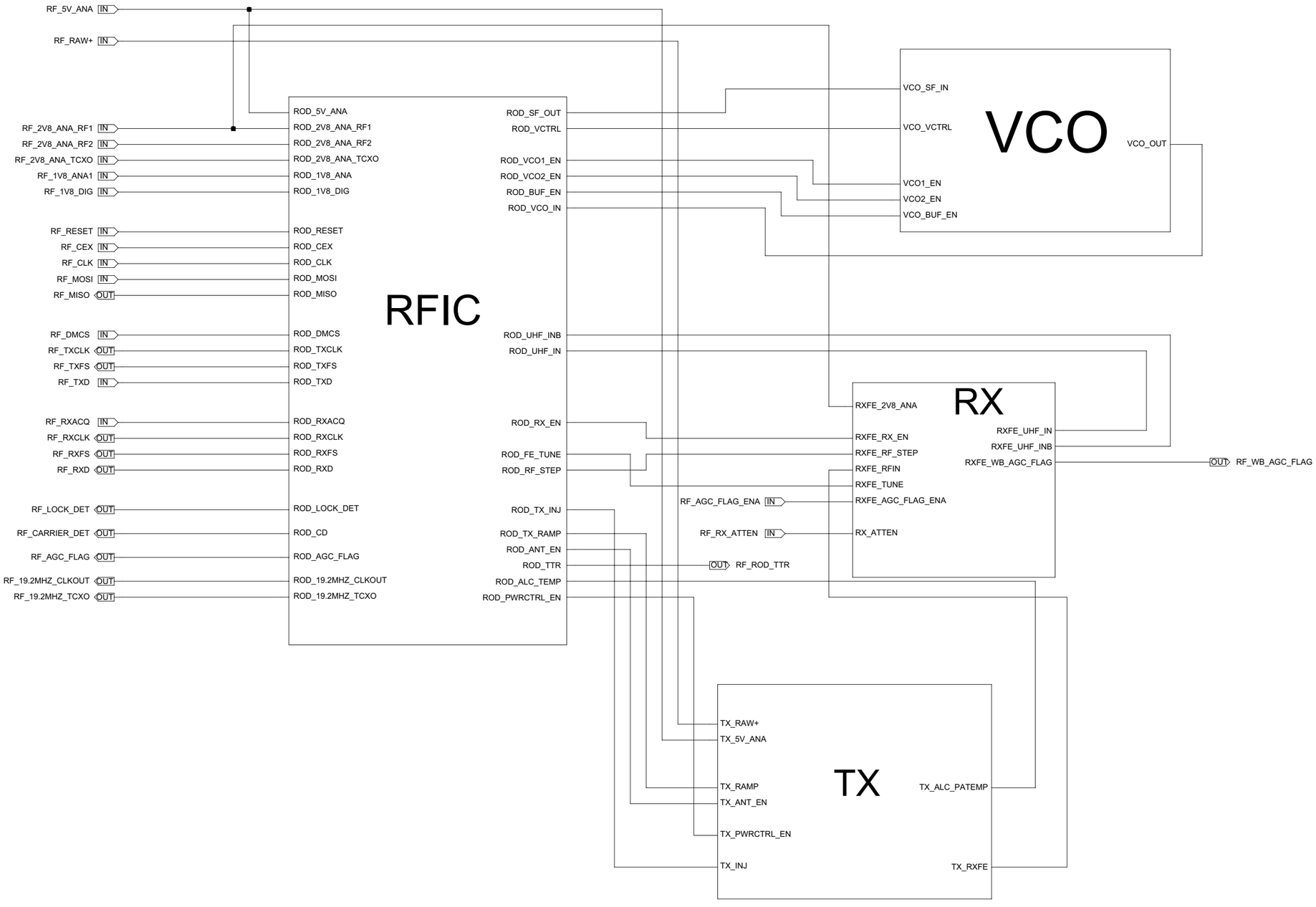


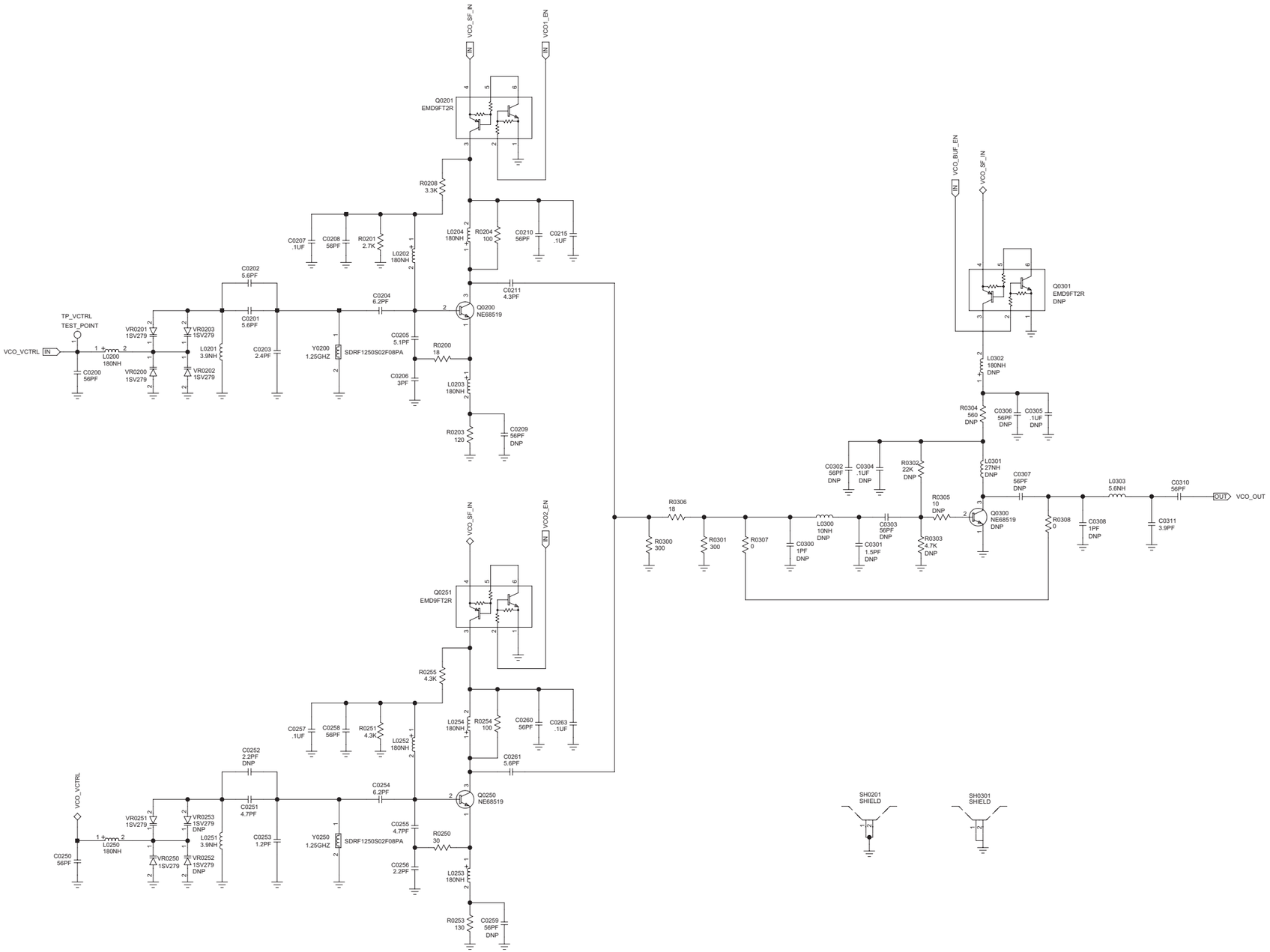
5.1V VBUS SUPPLY

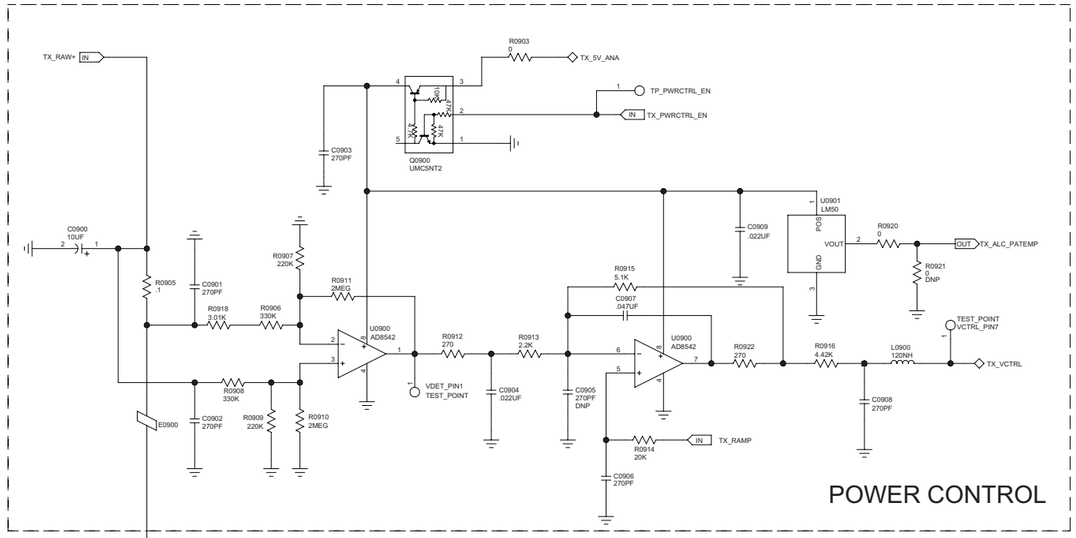


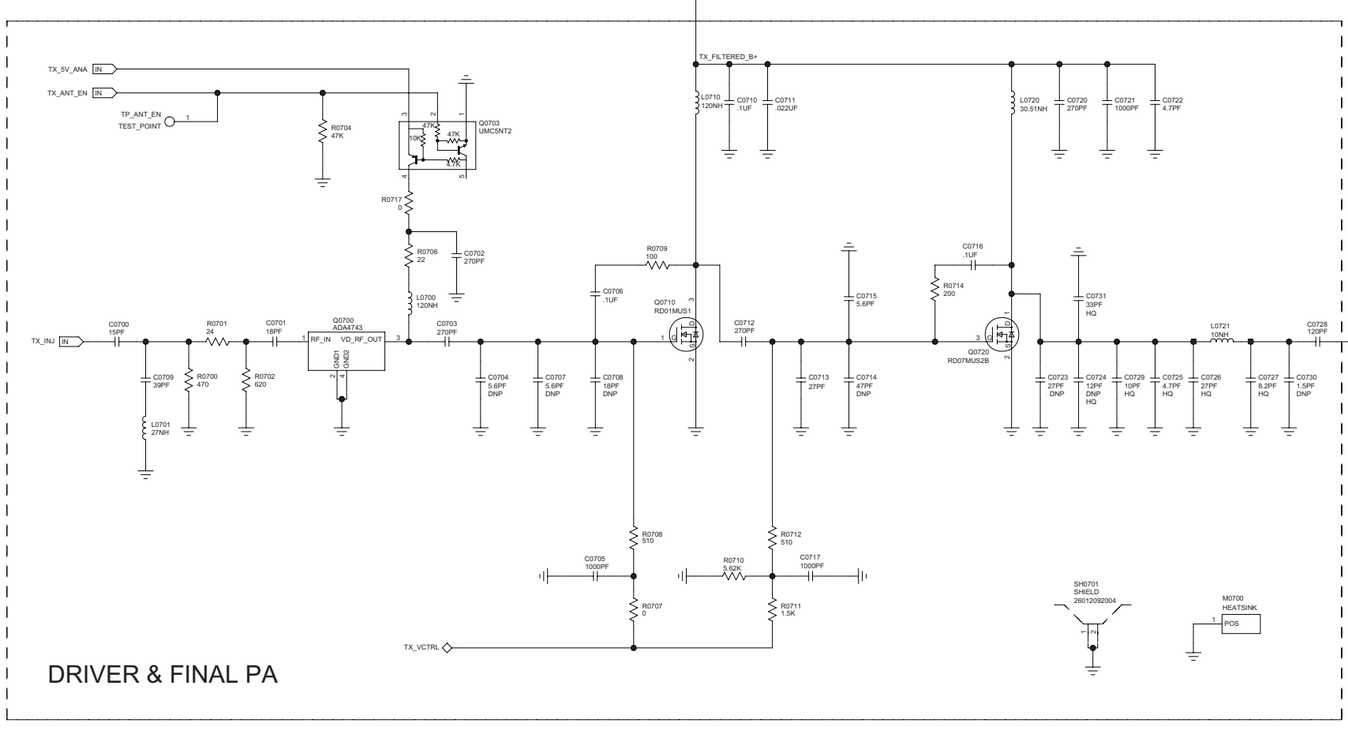
USB_GPIO MUX

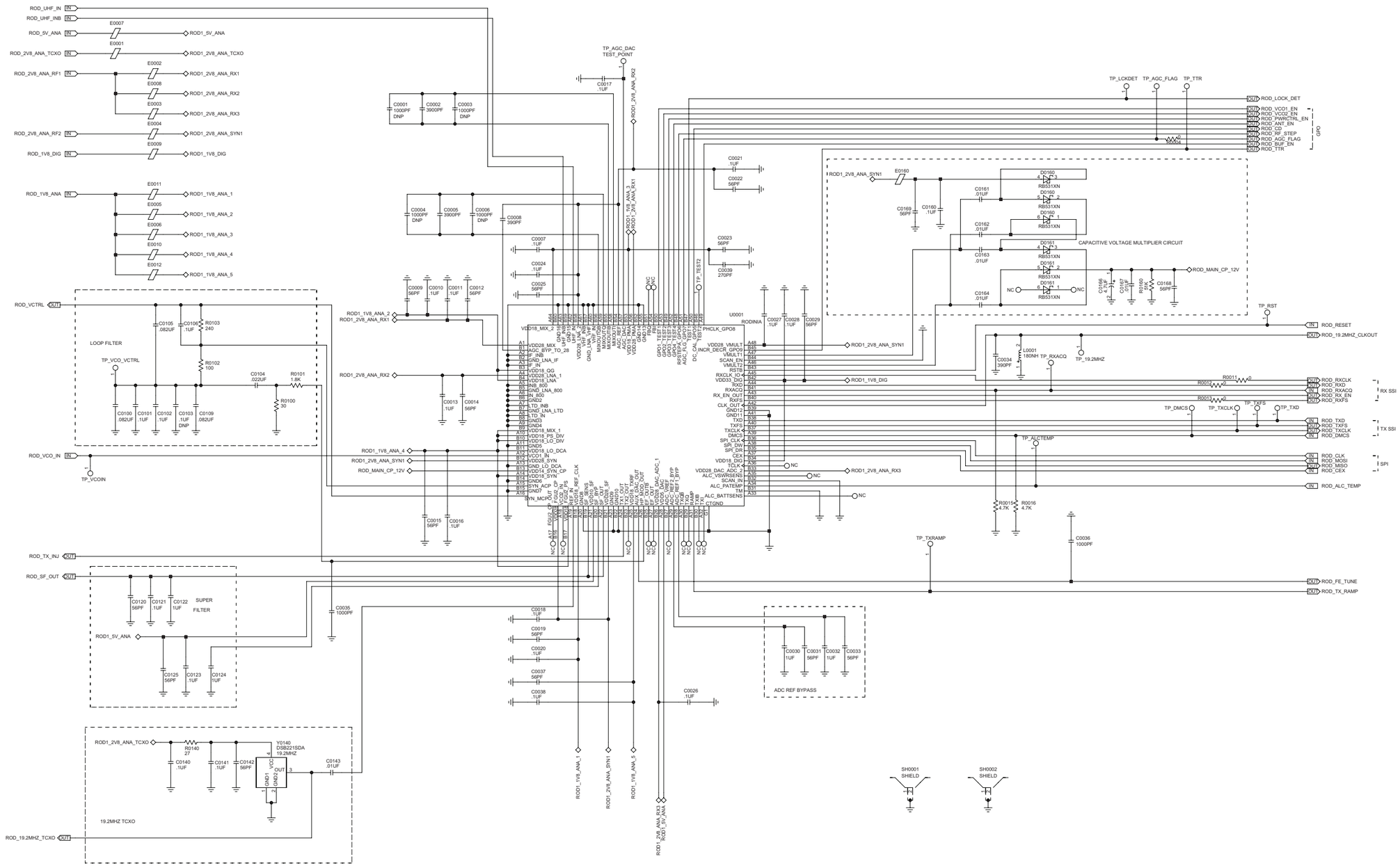


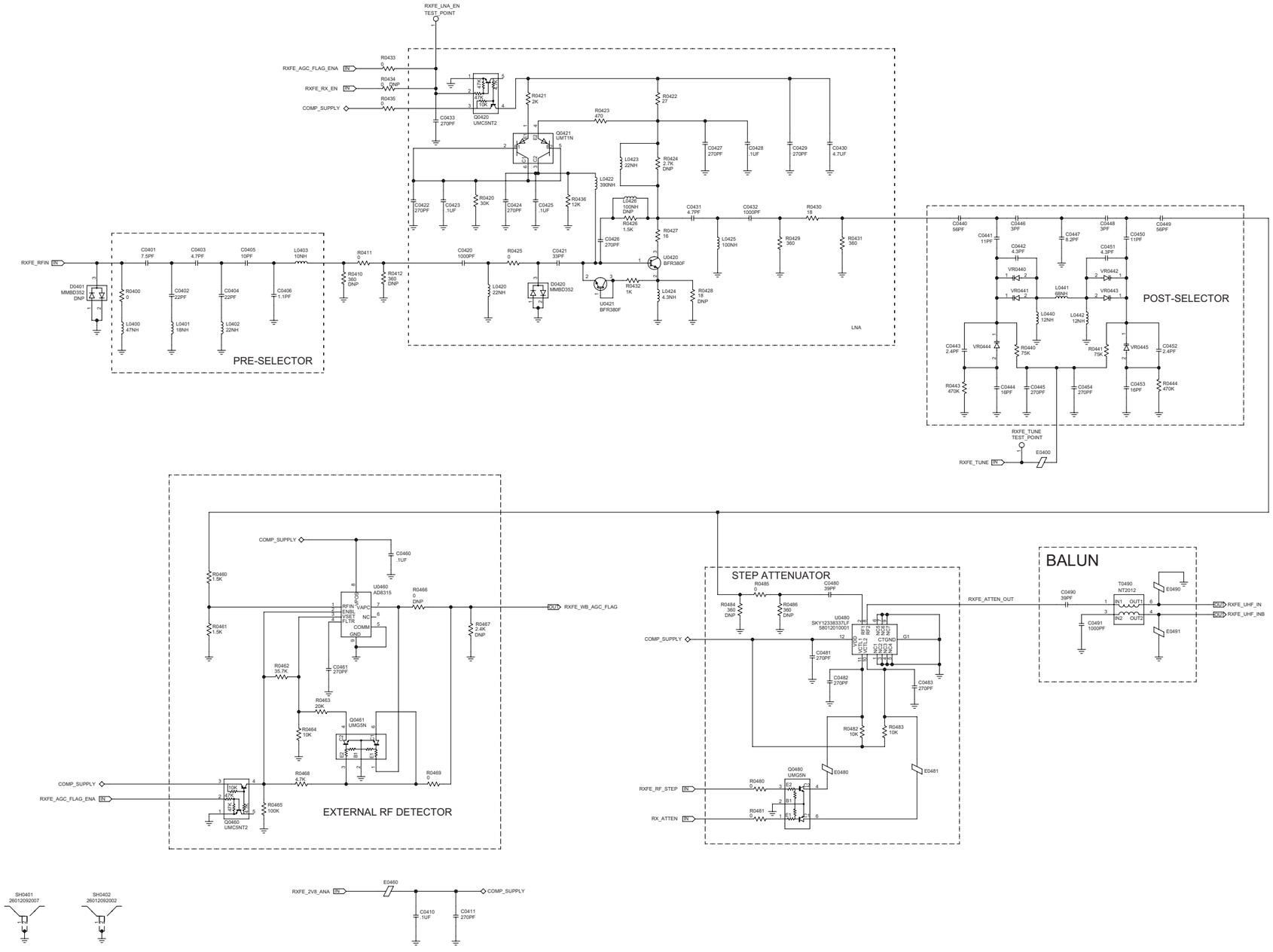












UHF Radio Parts List (84012180001_c)

Circuit Ref	Motorola Part No.
C0001	NOTPLACED
C0002	NOTPLACED
C0003	21012105001
C0004	21012105001
C0005	NOTPLACED
C0006	NOTPLACED
C0007	2113945Y02
C0008	2113944A47
C0009	2113944A52
C0010	2113945Y02
C0011	2113945Y02
C0012	2113944A52
C0013	2113945Y02
C0014	2113944A52
C0015	2113944A52
C0016	2113945Y02
C0017	2113945Y02
C0018	2113945Y02
C0019	2113944A52
C0020	2113945Y02
C0021	2113945Y02
C0022	2113944A52
C0023	2113944A52
C0024	2113945Y02
C0025	2113944A52
C0026	2113945Y02
C0027	2113945Y02
C0028	2113945Y02
C0029	2113944A52
C0030	2113956A51
C0031	2113944A52
C0032	2113956A51
C0033	2113944A52
C0034	2113945A04
C0035	2113945A09
C0036	2113945A09
C0037	2113944A52
C0050	2113945Y02
C0100	21012044001
C0101	21012044001
C0102	21012044001
C0103	21012044001
C0104	21012021001
C0105	21012044003
C0106	21012021001
C0109	21012044001
C0110	NOTPLACED
C0111	NOTPLACED
C0120	2113944A52
C0121	2113945Y02
C0122	2113956B31
C0123	2113945Y02
C0124	2113956B31
C0125	2113944A52
C0140	2113945Y02
C0141	2113945Y02
C0142	2113944A52
C0143	2113945B02
C0160	2113945Y02
C0161	2113945B02
C0162	2113945B02
C0163	2113945B02
C0164	2113945B02
C0166	2313960D05
C0167	2113945Y02
C0168	2113944A52
C0169	2113944A52
C0170	2113944A52
C0171	2113944A52
C0172	2113945Y02
C0173	2113944A52
C0175	2113944A52
C0176	2113944A52
D0160	4871852M02
D0161	4871852M01
E0001	2409134J27
E0002	2409134J27
E0003	2409134J27
E0004	2409134J27
E0005	2409134J27
E0006	2409134J27
E0007	2409134J27
E0008	2409134J27
E0009	2409134J27
E0010	2409134J27
E0011	2409134J27
E0012	2409134J27
E0013	2409134J27
E0014	2409134J27
L0001	2475122C40
R0001	0613952R66
R0003	0613952R66
R0011	0613952R66
R0012	0613952R66
R0013	0613952R66
R0015	0613952Q89
R0016	0613952Q89
R0100	0613952Q36
R0101	0613952Q82
R0102	0613952Q47
R0103	0613952Q60
R0140	0613952Q35
R0160	NOTPLACED
SH0001	26012092001
SH0002	26012092006
U0001	51009877001
Y0140	4875185M04
C0200	2113944A50
C0201	2115153H25
C0202	2115153H23
C0204	2115153H14
C0205	2115153H21
C0206	2115153H27
C0207	2113945Y02
C0208	2113944A50
C0209	2113944A50
C0210	2113944A50
C0211	2113944A40
C0215	2113945Y02
C0216	2113944A50
C0217	NOTPLACED
C0218	NOTPLACED
C0219	NOTPLACED
C0220	2113944A50
C0221	2115153H03
C0300	NOTPLACED
C0301	NOTPLACED
C0303	NOTPLACED
C0305	NOTPLACED
C0306	NOTPLACED
C0307	NOTPLACED
C0308	NOTPLACED
C0309	2115153H20
C0310	2115153H26
C0311	2115153H23
C0312	NOTPLACED
L0200	2415429H47
L0201	2414017N18
L0203	2415429H47
L0204	2415429H47
L0205	2414032F31
L0206	2414017P02
L0301	NOTPLACED
L0302	NOTPLACED
L0303	NOTPLACED
L0304	NOTPLACED
L0306	2488090Y16
L0307	NOTPLACED
Q0200	4885061Y01
Q0201	4815272H01
Q0202	4815267H01
Q0300	NOTPLACED
R0200	0613952Q25
R0201	0613952R08
R0202	0613952Z67
R0203	0613952Q49
R0204	0613952Q51
R0208	0613952Q73
R0209	0613952Q90
R0210	0613952R16
R0211	0613952G67
R0212	0613952G67

Circuit Ref	Motorola Part No.
R0302	NOTPLACED
R0303	NOTPLACED
R0304	NOTPLACED
R0305	NOTPLACED
R0307	NOTPLACED
R0308	0613952R66
R0309	NOTPLACED
R0310	NOTPLACED
R0311	0613952R66
R0312	0613952R66
R0314	0613952R66
R0315	0613952R66
SH0201	26012092014
SH0301	26012092002
VR0200	4805656W87
VR0201	4805656W87
VR0202	4805656W87
VR0203	4805656W87
C0400	2113944A33
C0401	2113944A41
C0402	2113944A80
C0403	2113944A38
C0404	2113944A80
C0405	2113944A31
C0406	2113944A52
C0407	2113944A17
C0408	2113944A28
C0409	2113944A26
C0410	2113944A28
C0415	2113945Y02
C0416	2113945A11
C0417	2113945A11
C0420	2113944A81
C0421	2113944A52
C0422	2113945A11
C0423	2113945Y02
C0424	2113945A11
C0425	2113945Y02
C0426	2113945A11
C0427	2113945A11
C0428	2113945Y02

Circuit Ref	Motorola Part No.
C0429	2113945A11
C0430	2113946D07
C0431	2113944A80
C0432	0613952R66
C0440	2113944A30
C0441	2113944A28
C0442	2113944A27
C0443	2113944A28
C0444	2113944A30
C0445	2113944A19
C0447	2113944A30
C0448	2113944A84
C0449	2115153H20
C0450	2113944A29
C0451	2113944A05
C0452	2113944A22
C0460	2113945Y02
C0461	2113944A52
C0480	2113944A52
C0481	2113944A52
C0482	2113944A52
C0483	2113944A52
C0490	2113944A52
C0491	2113944A52
D0401	NOTPLACED
D0420	4813974A19
E0460	2409134J27
E0480	2409134J27
E0481	2409134J27
E0490	2409134J27
E0491	2409134J27
L0400	2415429H33
L0401	2415429H32
L0402	2415429H38
L0403	2416540H27
L0404	2416540H25
L0405	2416540H27
L0420	2415429H35
L0422	2415429H47
L0423	2415429H35
L0424	2415429H17

Circuit Ref	Motorola Part No.
L0426	NOTPLACED
L0440	2414032F35
L0441	2414032F35
L0443	2416540H24
L0444	2416540H24
Q0420	4815055H01
Q0421	4815267H01
Q0460	4815055H01
Q0461	4815066H01
Q0480	4815066H01
R0410	NOTPLACED
R0411	0613952R66
R0412	NOTPLACED
R0420	0613952R12
R0421	0613952Q80
R0422	0613952Q35
R0423	0613952Q65
R0424	NOTPLACED
R0425	0613952R66
R0426	0613952Q73
R0427	0613952Q30
R0428	NOTPLACED
R0429	0613952Q56
R0430	0613952Q35
R0431	0613952Q56
R0432	0613952Q73
R0433	NOTPLACED
R0434	0613952R66
R0435	0613952R66
R0438	0613952Q25
R0439	0613952Q35
R0460	0613952Q77
R0461	0613952Q77
R0462	0613952N37
R0463	0613952N46
R0464	0613952N01
R0465	0613952R25
R0466	NOTPLACED
R0467	NOTPLACED
R0468	0613952Z48
R0469	0613952R66

Circuit Ref	Motorola Part No.
R0480	0613952R66
R0481	0613952R66
R0482	0613952R01
R0483	0613952R01
R0484	NOTPLACED
R0485	0613952R66
R0486	NOTPLACED
R0490	0613952R03
SH0401	26012092007
SH0402	26012092002
T0490	2515396H02
U0420	4885316E32
U0421	4885316E32
U0460	5180390L83
U0480	58012010001
C0700	2113945A03
C0701	2113945A03
C0702	2113945A03
C0703	2113944A31
C0704	2113944A31
C0705	2113945Y02
C0706	2113945Y02
C0707	NOTPLACED
C0708	NOTPLACED
C0709	2113945Y02
C0710	2113945Y02
C0711	2113945A09
C0712	2113944M30
C0713	2113944M33
C0714	2113944M36
C0715	2113944M36
C0716	2113945D04
C0717	2113945A09
C0718	2113945Y02
C0720	2113945A03
C0721	2113945A09
C0722	2113945Y02
C0723	2175662M06
C0724	2175662M06
C0725	2175662M48
C0726	2113944M26

Circuit Ref	Motorola Part No.
C0727	2113944M15
C0728	2113944M30
C0729	2175662M48
C0730	2113944M30
C0731	2113944A31
C0732	2113944A31
C0801	2113944M20
C0802	2113944M11
C0803	2113944M26
C0804	2113944M24
C0805	2113944C04
C0806	2113944M25
C0807	2113944M25
C0808	2113944C04
C0809	2113944C49
C0811	2113944A45
C0812	NOTPLACED
C0813	2113944M15
C0814	NOTPLACED
C0816	2113944M28
C0817	2113944M14
C0900	2316410H03
C0901	2113944A52
C0902	2113944A52
C0903	2113944A52
C0904	2113945B04
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C0906	2113944A52
C0907	2113945B06
C0908	2113944A52
C0909	2113945B04
D0805	4815897H01
D0806	4815897H01
E0800	02012010001
E0900	7686949J14
L0700	2414017N22
L0702	2414017N10
L0710	2414017N19
L0711	2414017N15
L0712	2414017N10
L0713	2414017N15

Circuit Ref	Motorola Part No.
L0720	24012026003
L0721	24012026009
L0722	24012026013
L0801	2416066H02
L0802	2416066H02
L0803	2416066H02
L0804	2416066H02
L0805	2415347H05
L0807	2416066H02
L0900	2414017N25
M0700	2615193H01
M0800	0987378K01
M0801	NOTPLACED
Q0700	4802246J29
Q0703	4815055H01
Q0710	4816547H01
Q0720	4816548H02
Q0800	4815055H01
Q0900	4815055H01
R0700	0613952Q60
R0701	0613952Q33
R0702	0613952Q60
R0704	0613952R17
R0706	0613958H33
R0707	0613952Q85
R0708	0613952Q45
R0709	0613952Q56
R0711	0613952R66
R0712	0613952Q50
R0714	0613952H56
R0800	0613952H47
R0801	0613952H47
R0802	0613952H47
R0803	0613952R01
R0905	0615043C01
R0906	06012043001
R0907	06012042001
R0908	06012043001
R0909	06012042001
R0910	0675679M01
R0911	0675679M01

Circuit Ref	Motorola Part No.
R0912	0613952Q59
R0913	0613952Q81
R0914	0613952N30
R0915	0613952Q90
R0916	0613952R66
R0917	0613952R66
R0918	0613952M47
R0922	0613952Q59
R0923	NOTPLACED
SH0701	26012092013
U0900	51012154001
U0901	5115022H01
VR0801	4888116D01
C1000	2113946C02
C1001	2113946B04
C1002	2113945B02
C1003	2113945B02
C1004	2113946B04
C1005	2113946B04
C1006	2113956B54
C1007	2113946B04
C1008	2113946B04
C1050	2113946B04
C1051	2113946B04
C1080	2113945B02
C1081	2113946B04
C1082	2113946B04
C1101	2113946B06
C1102	2113946B06
C1103	2113946B06
C1104	2113946B06
C1105	2113946B06
C1106	2113944A52
C1107	2113944A52
C1108	2113944A52
C1109	2113944A52
C1110	2113944A52
C1111	NOTPLACED
C1112	NOTPLACED
C1113	NOTPLACED
C1114	NOTPLACED

Circuit Ref	Motorola Part No.
C1120	NOTPLACED
C1121	NOTPLACED
C1122	2113946B06
C1123	2113946B06
C1124	2113946B06
C1125	2113946B06
C1126	2113946B06
C1127	2113944A52
C1128	2113944A52
C1129	2113944A52
C1130	2113944A52
C1131	2113944A52
C1132	2113944A52
C1133	2113944A52
C1140	NOTPLACED
C1141	NOTPLACED
C1142	2113946B06
C1143	2113946B06
C1144	2113944A52
C1145	2113944A52
C1146	2113944A52
C1147	2113944A52
C1200	NOTPLACED
C1201	NOTPLACED
C1300	2113946B04
C1301	2113946B04
C1302	2113946B04
C1303	2113946B04
C1304	2113946B04
C1310	2113946B04
C1311	2113946B04
C1312	2113946B04
C1313	NOTPLACED
C1314	NOTPLACED
C2000	2113946B04
C2001	2113946B04
C2002	2113946B04
C2003	2113946B04
C2004	2113944A52
C2005	2113945B02
C2006	2113945A09

Circuit Ref	Motorola Part No.
C2007	2113946B04
C2008	2113946B04
C2010	NOTPLACED
C2011	NOTPLACED
C2100	2113946B04
C2101	2113946B04
C2102	2113956B54
C2104	2113945B02
C2105	2113944A52
E1000	24012051001
E1001	24012051001
E1002	24012051001
E1003	24012051001
Q1000	48012088001
Q1001	48012088001
Q2100	NOTPLACED
R1000	0613952Q81
R1001	0613952R01
R1002	0613952Q89
R1003	0613952Q89
R1004	0613952Q89
R1005	NOTPLACED
R1006	NOTPLACED
R1007	NOTPLACED
R1008	NOTPLACED
R1009	0613952Q73
R1010	0613952Q89
R1011	0613952R66
R1012	0613952R66
R1013	0613952Q73
R1014	0613952Q73
R1015	NOTPLACED
R1016	0613952Q89
R1017	NOTPLACED
R1018	0613952Q89
R1019	0613952Q73
R1020	NOTPLACED
R1021	0613952Q73
R1022	NOTPLACED
R1023	NOTPLACED
R1024	0613952Q89

Circuit Ref	Motorola Part No.
R1025	0613952R66
R1026	NOTPLACED
R1027	0613952R01
R1028	0613952R66
R1029	0613952R66
R1030	0613952R66
R1031	0613952R66
R1032	0613952R66
R1033	0613952R66
R1034	0613952R66
R1035	0613952R66
R1036	0613952R66
R1037	0613952R66
R1039	NOTPLACED
R1040	NOTPLACED
R1041	0613952Q81
R1042	0613952Q81
R1043	0613952Q81
R1045	NOTPLACED
R1046	NOTPLACED
R1051	0613952R01
R1052	NOTPLACED
R1053	0613952Q81
R1081	0613952R17
R1082	NOTPLACED
R1100	0613952G67
R1200	NOTPLACED
R1201	NOTPLACED
R1202	NOTPLACED
R1300	0613952N30
R1301	NOTPLACED
R1302	0613952N38
R1303	0613952P35
R1304	NOTPLACED
R1305	0613952Q35
R2000	0613952G67
R2001	0613952M01
R2002	0613952M01
R2003	0613952K68
R2004	0613952G67
R2100	0613952G67

Circuit Ref	Motorola Part No.
R2101	0613952R01
R2102	0613952R66
R2103	0613952R01
R2106	0613952Q81
R2107	NOTPLACED
SH1001	26012092005
U1000	51012110002
U1050	5186053Y60
U1051	5175772B53
U1080	5115001H02
U1081	51012087001
U1200	NOTPLACED
U1300	51012283001
U1301	5164852H55
U1310	51012283001
U2000	51012058002
U2100	51012239002
C3000	2113946D05
C3001	2113946D05
C3002	2113946D05
C3003	2113956A51
C3004	2113946D02
C3007	2113956A51
C3008	2113946B04
C3009	2113956A51
C3010	2113945A09
C3011	2113956B21
C3012	2113946B04
C3013	2113946D05
C3014	2113946B04
C3015	2113946D05
C3016	2113946B04
C3017	2113946B04
C3018	2113946B04
C3019	2113946B04
C3020	2113946B04
C3021	2113946B04
C3023	2113946B04
C3026	2113946B04
C3027	2113946D02
C3028	2113946D02

Circuit Ref	Motorola Part No.
C3029	2113946D02
C3030	2113946D02
C3031	2113946D02
C3032	2113946D02
C3033	2113946D02
C3034	2113946D02
C3035	2113946B04
C3036	2113956A51
C3037	2113956A51
C3038	2113946D02
C3039	2113946B04
C3040	2113946D02
C3041	NOTPLACED
C3050	2113944A28
C3051	2113944A28
C3080	2113944A52
C3081	2113956B33
C3100	2113946B04
C3101	2113946B04
C3102	2113946B04
C3103	2113946B04
C3104	2113946B04
C3105	2113946D02
C3106	2113956A51
C3107	2113946D02
C3110	2113946D05
C3111	2113945C25
C3112	2113945C25
C3113	2113946B04
C3114	2113944A40
C3115	2113944A40
C3116	2113946B04
C3126	2113946B04
C3127	2113946B04
C3128	2113946B04
C3160	2113946B04
C3161	2113946B04
C3171	2113946B04
C3172	2113946B04
C3173	2113946B04
C3174	2113946B04

Circuit Ref	Motorola Part No.
C3175	2113956B21
C3176	2113956B21
C3177	NOTPLACED
C3178	NOTPLACED
C3179	2113956D35
C3180	2113945A09
C3181	2113945A09
C3210	2113946B04
C3211	2316410H05
C3212	2113946D05
C3213	2113944A52
C3214	2113944A52
C3220	2113946B04
C3230	2113946B04
C3231	2316410H05
C3232	2113946D05
C3240	2113946B04
C3250	2113946B04
C3251	2113956B21
C3252	2113956B21
C3253	2113945B02
C3254	2113945B02
C3255	2113946D05
C3260	2113946B04
C3270	2113956D35
C3271	2113956D35
C3272	2113945Y02
C3273	2313960D09
C3274	2113945Y02
C3275	2316410H04
C3276	2113945B02
C3277	2113944A52
C3278	2113944A52
C3279	2113944A26
C3280	2113944A26
C3310	2113956B33
C3311	2113956B33
C3312	2113956B21
C3313	2113944A44
C3315	2113945B02
C3317	2113956E91
C3321	2113946D05
C3330	2113946B04
C3350	2113956B21
C3351	2113945B02
C3353	2113946D05
C3354	2113946D07
E3000	24009323001
E3100	2471132D14
E3350	2409134J25
L3210	2475262H01
L3230	2475262H01
L3270	2416307H01
L3271	2416307H01
L3272	2475720M02
L3273	2416307H01
L3274	2464675H01
Q3000	4816134H01
Q3001	48012059001
Q3080	4813970A62
Q3081	4816134H01
Q3170	4815066H01
Q3172	4816134H01
Q3320	4816134H01
Q3321	NOTPLACED
Q3322	4813970A62
Q3327	4816134H01
R3000	0613952G67
R3001	0613952R01
R3002	0613952Q81
R3006	0613952R66
R3007	0613952G67
R3008	0613952G67
R3009	0613952G67
R3011	0613952G67
R3012	0613952G67
R3014	0613952G67
R3015	0613952G67
R3016	0613952R66
R3019	0613952R66
R3020	0613952R66
R3021	NOTPLACED
R3060	0613952R66
R3061	NOTPLACED
R3062	NOTPLACED
R3063	0613952R66
R3064	NOTPLACED
R3080	0613952R25
R3081	0613952Z80
R3101	0613952Q81
R3102	0613952R01
R3103	0613952R01
R3104	0613952R01
R3105	0613952R01
R3106	0613952R66
R3107	0613952R01
R3108	0613952R01
R3110	0613952R66
R3111	0613952R66
R3112	0613952R01
R3114	0613952Q81
R3115	0613952R66
R3116	0613952K89
R3122	NOTPLACED
R3123	0613952R01
R3124	NOTPLACED
R3125	0613952R66
R3126	NOTPLACED
R3161	NOTPLACED
R3170	0613952R27
R3171	0613952R27
R3172	0613952R27
R3173	0613952R27
R3174	0613952N01
R3175	0613952N01
R3176	0613952N01
R3177	0613952N01
R3178	0613952Q91
R3181	NOTPLACED
R3182	NOTPLACED
R3183	0613952N01
R3184	0613952G67
R3185	0613952N01
R3186	0613952N01
R3210	0613952G67
R3211	0613952R66
R3230	0613952G67
R3231	0613952G67
R3250	0613952R66
R3251	0613952G67
R3271	0613952R66
R3273	0613952Z56
R3274	0613952Z68
R3277	0613952R66
R3313	0613952N18
R3314	0613952M55
R3320	0613952R01
R3321	0616416H01
R3322	0613952G67
R3330	0613952R66
R3331	0613952R66
R3332	NOTPLACED
R3333	NOTPLACED
R3334	0613952R01
R3350	0613952Q81
R3352	0613952Q85
SH3001	26012092009
U3000	51012226001
U3160	5114007A43
U3161	5114007A43
U3170	5175075M01
U3250	5171389M02
U3270	51012116001
U3310	5171103N01
U3330	51012206001
U3350	5189092V44
VR3250	4805656W76
Y3000	4809995L15
C4001	2113944A52
C4002	NOTPLACED
C4003	2113944A52
C4004	2113944A52
C4005	2113944A52
C4010	2113944A52

Circuit Ref	Motorola Part No.
C4011	2113944A52
C4012	2113944A52
C4013	2113944A52
C4020	2113944A52
C4021	2113944A17
C4022	2113945A03
C4023	2113944A26
C4030	2113944A52
C4031	2113944A52
C4032	2113944A17
C4040	2113944A52
C4041	NOTPLACED
C4042	NOTPLACED
C4044	2113944A52
C4100	2113945A03
C4101	2113945A03
C4102	2113945A03
C4103	2113944A52
C4104	2113944A48
C4105	2113944A33
C4106	2113944A52
C4107	2113944A52
C4108	2113944A52
C4109	2113944A52
C4110	2113944A52
C4111	2113944A52
C4112	2113944A52
C4113	2113944A52
C4114	2113944A52
C4115	2113946B04
C4116	2113944A31
C4117	2113944A31
C4118	2113944A31
C4119	2113944A31
C4120	2113944A31
C4121	2113944A31
C4122	2113944A31
C4130	NOTPLACED
C4131	NOTPLACED
C4132	NOTPLACED
C4150	NOTPLACED

Circuit Ref	Motorola Part No.
C4151	NOTPLACED
C4152	2113946B04
C4153	NOTPLACED
C4154	NOTPLACED
C4155	NOTPLACED
C4156	NOTPLACED
C4157	NOTPLACED
C4158	NOTPLACED
C4159	NOTPLACED
C4160	NOTPLACED
C4161	2113956D35
C4162	NOTPLACED
D4000	48009340001
D4100	48012049001
D4101	4813974A19
E4044	2471132D14
E4100	7686949J14
F4020	6515076H01
FL4100	2571601G01
J4100	09012101001
J4150	09012068001
L4100	2415429H45
L4101	2415429H45
L4102	2415429H45
L4103	2415429H45
M4020	09012098001
R4000	0613952Q42
R4001	0613952Q42
R4002	0613952G67
R4003	0613952G67
R4010	0613952Q89
R4011	0613952Q89
R4012	0613952Q89
R4013	0613952Q89
R4015	0613952R66
R4021	0613958H49
R4022	0613952Q30
R4030	0613952R66
R4031	0613952R66
R4032	0613952R66
R4033	0613952R66

Circuit Ref	Motorola Part No.
R4034	0613952R66
R4035	NOTPLACED
R4036	NOTPLACED
R4037	NOTPLACED
R4038	NOTPLACED
R4040	0613952Q89
R4041	0613952Q89
R4042	0613952Q89
R4043	0613952Q89
R4044	0613952Q89
R4100	0613952Q73
R4101	0613952Q65
R4102	0613952Q49
R4103	0613952Q59
R4104	0613952Q65
R4105	0613952Q65
R4131	NOTPLACED
R4132	NOTPLACED
R4133	NOTPLACED
R4134	NOTPLACED
R4136	NOTPLACED
R4137	NOTPLACED
R4138	NOTPLACED
R4139	NOTPLACED
R4141	NOTPLACED
R4142	NOTPLACED
R4150	0613952Q29
R4151	0613952B01
S4010	40012023001
S4030	1875103C04
SW4040	NOTPLACED
SW4041	NOTPLACED
SW4042	NOTPLACED
SW4044	4086470Z01
U4130	NOTPLACED
VR4010	4813979P10
VR4020	4813977C23
VR4021	4813977C11
VR4030	4805656W76
VR4031	4805656W76
VR4040	NOTPLACED

Circuit Ref	Motorola Part No.
VR4041	NOTPLACED
VR4042	NOTPLACED
VR4044	4805656W76
VR4100	4815040H01
VR4101	4813979P10
VR4102	4813979P10
VR4103	4815040H01
VR4104	4815040H01
VR4105	4815040H01
VR4106	4815040H01
VR4107	4813979P10
VR4108	48012131001
C8000	2113946B04
C8001	2113946B04
C8002	2113946B04
C8003	2113946B04
C8004	2113946B04
C8006	2113946B04
C8007	2113946B04
C8008	2113946B04
C8009	2113946B04
C8010	2113946B04
C8011	2113946B04
C8012	2113946B04
C8013	2113946B04
C8014	2113944A52
C8015	2113743N26
C8016	2113743N26
C8017	0613952R66
C8018	2113946B04
C8019	2113944A27
C8020	2115153H03
C8021	2113956A51
C8022	2113944A28
C8023	2113944A29
C8026	2113945G98
C8027	2113945G98
C8028	2113956A51
C8029	2113956A51
C8030	2113944A28
C8031	2113944A46

Circuit Ref	Motorola Part No.
C8032	2113944A46
C8033	2113944A28
C8034	2113944A46
C8035	2113944A28
C8036	2113944A46
C8037	2113944A28
C8039	2113944A46
C8040	2113944A28
C8041	2113944A46
C8043	2113944A46
C8044	2113944A28
C8045	NOTPLACED
C8046	2113944A28
C8047	NOTPLACED
C8049	0613952R66
E8000	7686949J08
E8001	7686949J08
E8002	7686949J08
E8003	7686949J08
E8004	7686949J08
E8010	NOTPLACED
FL8000	91012018002
FL8001	91012013001
FL8002	91012013001
L8001	24014300040
L8002	2471672Y02
L8003	0613952R66
L8004	2414017P04
R8000	NOTPLACED
R8001	0613952R66
R8002	NOTPLACED
R8003	NOTPLACED
R8004	0613952R66
R8005	0613952R66
R8006	0613952R66
R8007	0613952R66
R8008	0613952R66
R8009	0613952R66
R8010	0613952R66
R8011	0613952R66
R8012	0613952R66

Circuit Ref	Motorola Part No.
R8013	0613952R66
R8014	NOTPLACED
R8015	0613952R66
R8016	0613952R66
R8017	NOTPLACED
R8018	0613952R66
R8019	0613952R66
R8020	NOTPLACED
R8021	0613952R01
R8022	NOTPLACED
R8025	0613952R66
R8026	NOTPLACED
R8027	0613952Q89
R8050	0613952R66
SH8001	26012092003
U8000	51007377001
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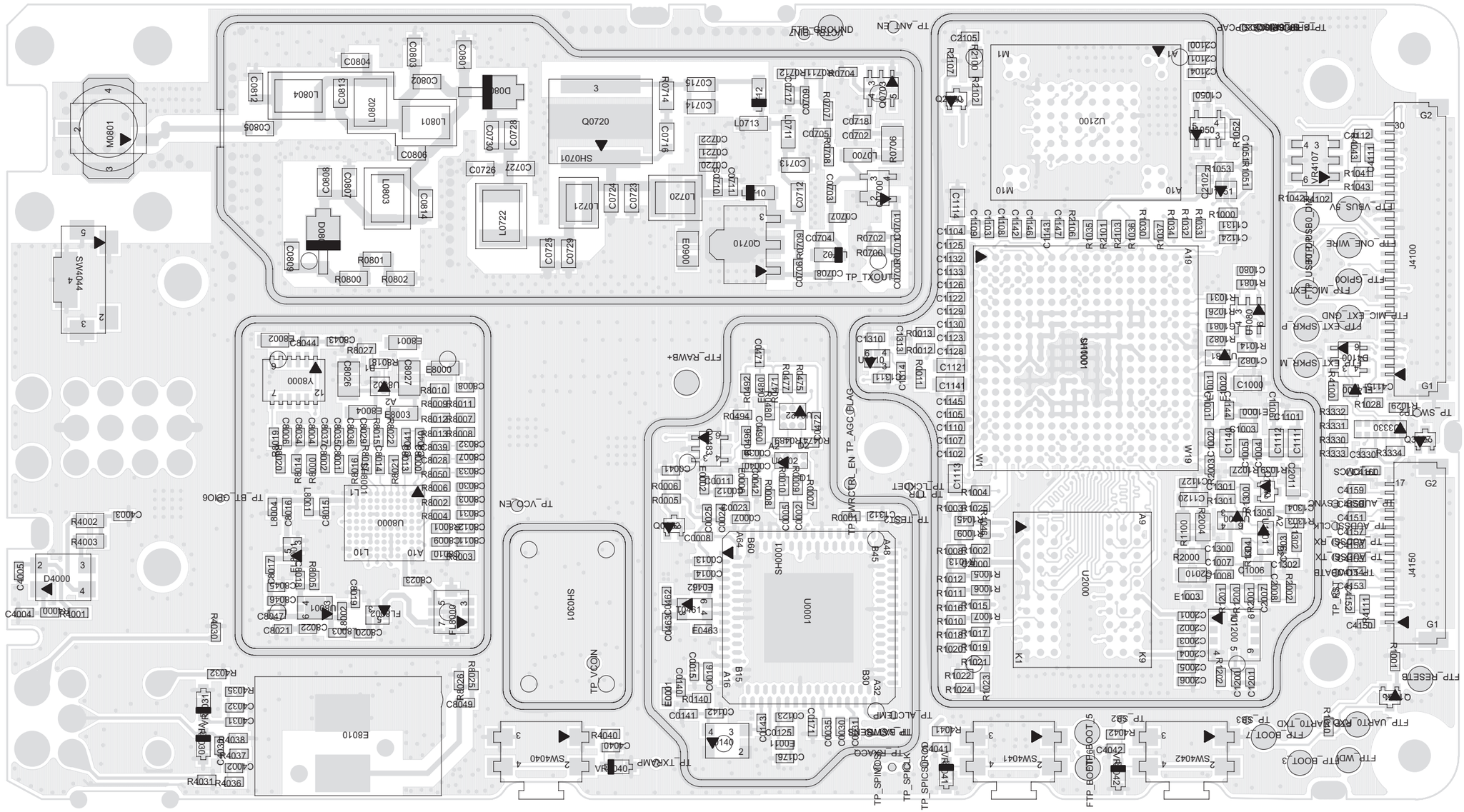
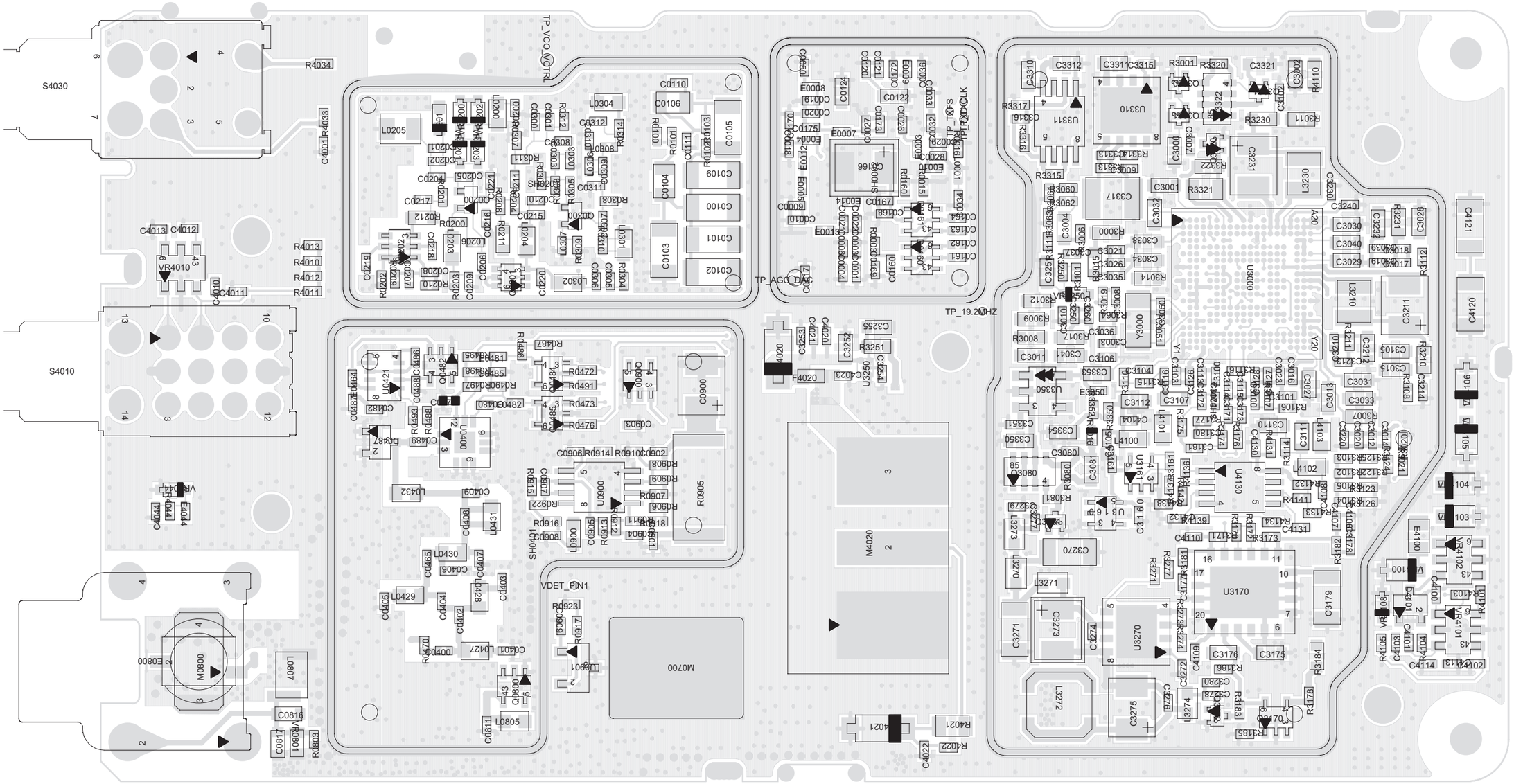
U8002	5175771A37
Y8000	93012017001

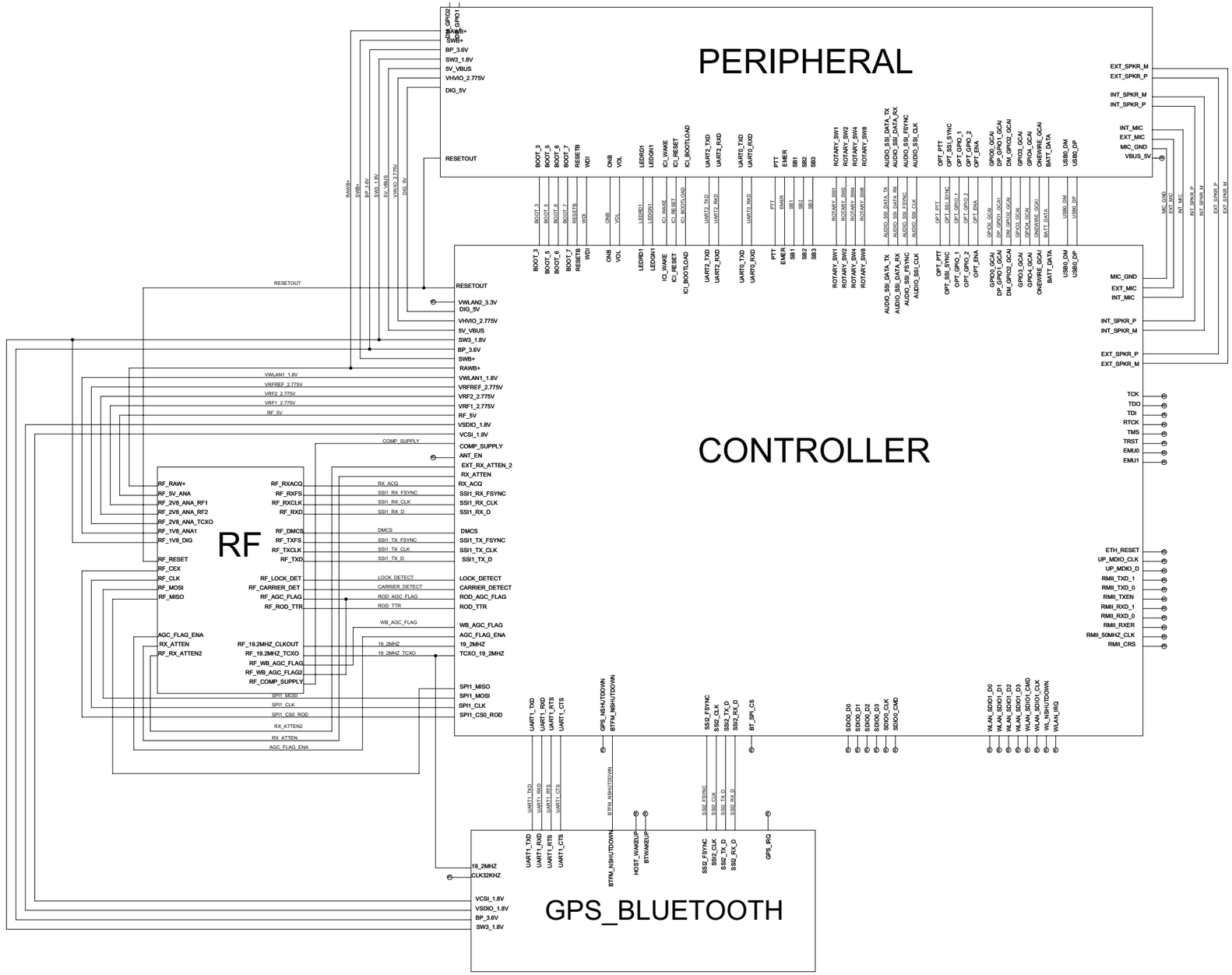
3.0 Circuit Board/Schematic Diagrams and Parts List for VHF



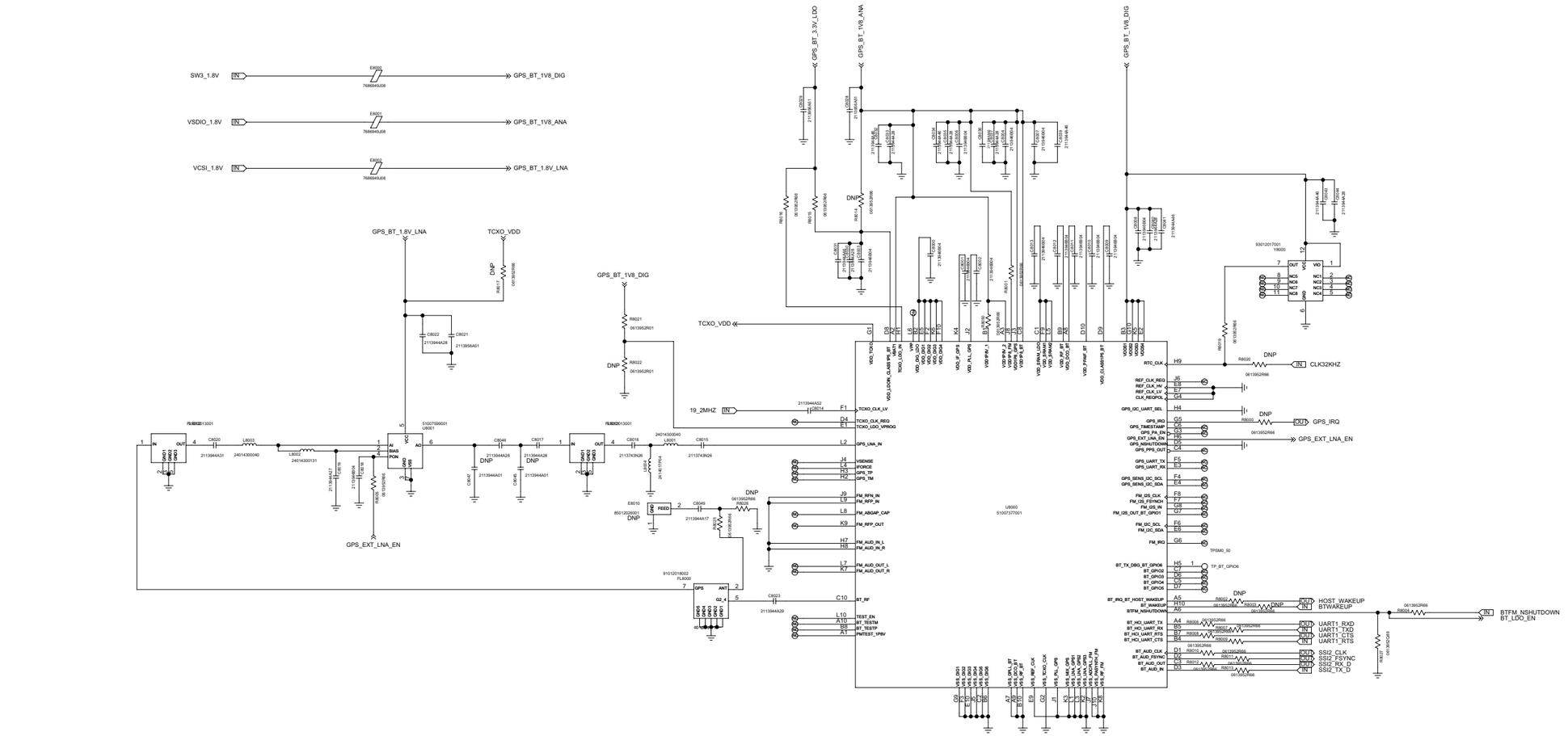
Main Board VHF Top Side PCB No. 84012275001_A



Main Board VHF Bottom Side PCB No. 84012275001_A



NL5500 GPS/BT SCHEMATIC



REFERENCE DESINATOR

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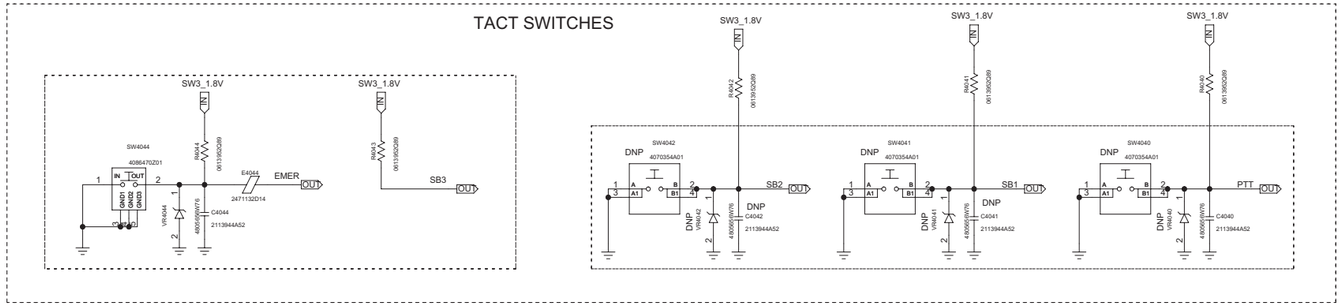
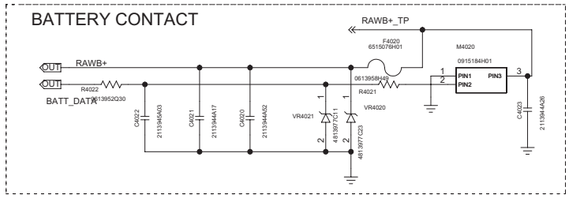
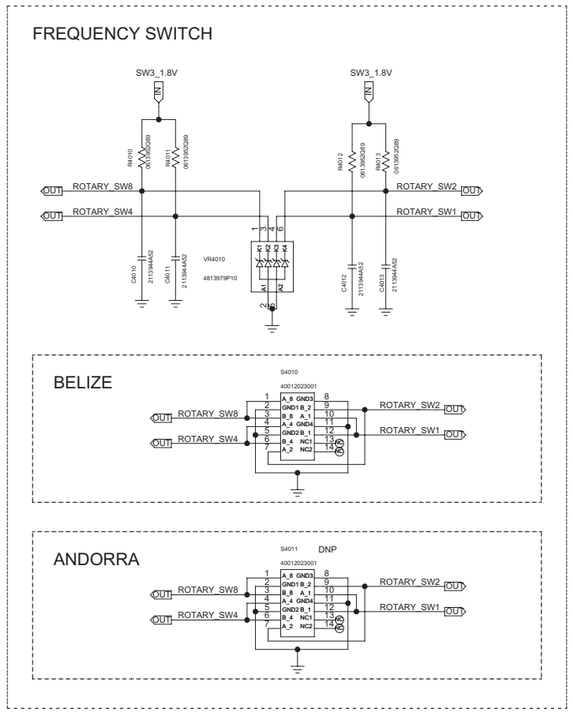
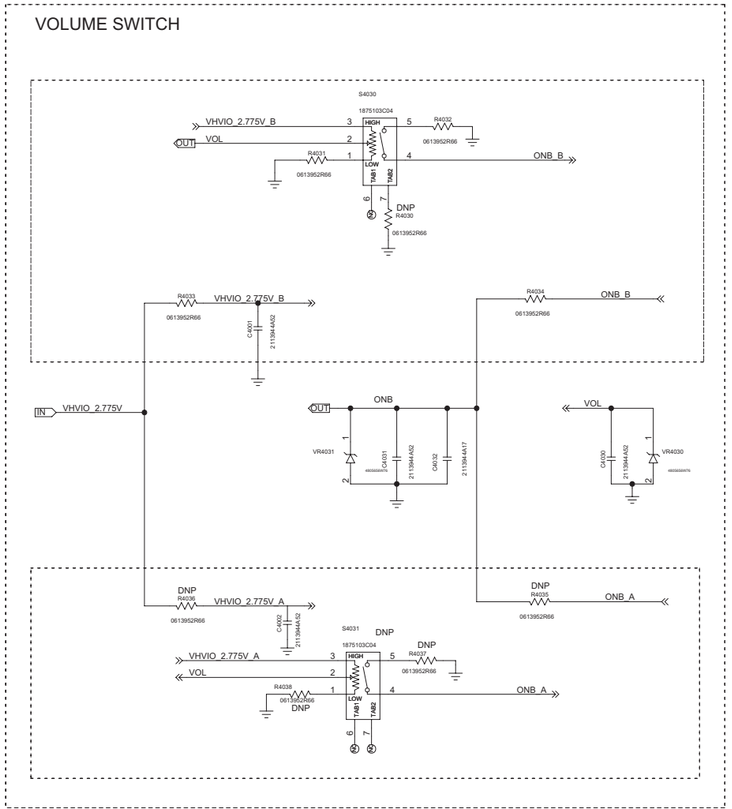
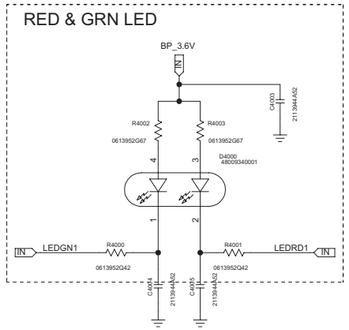
R8022
U8002
FL8002
Y8000
L8003

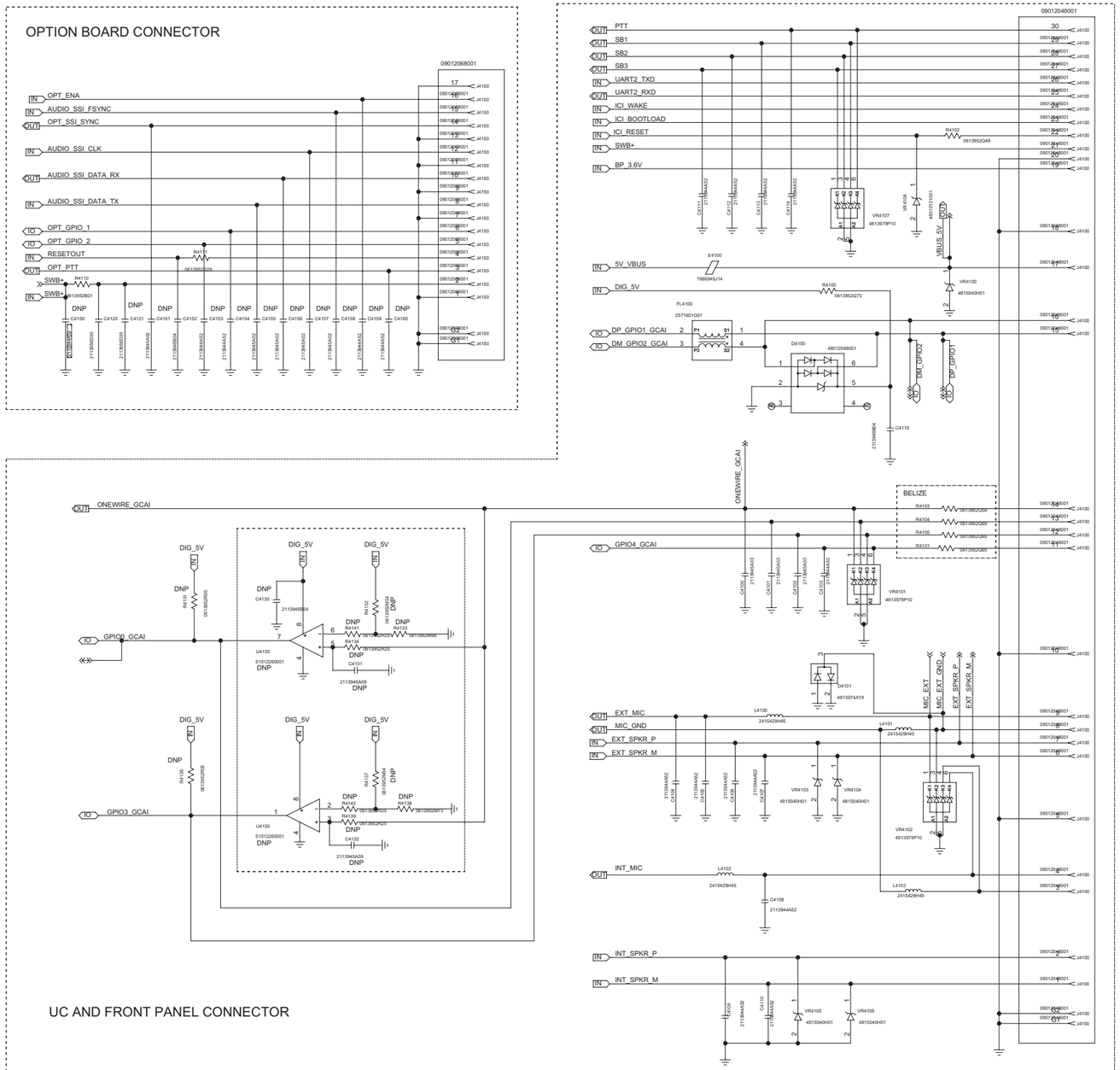


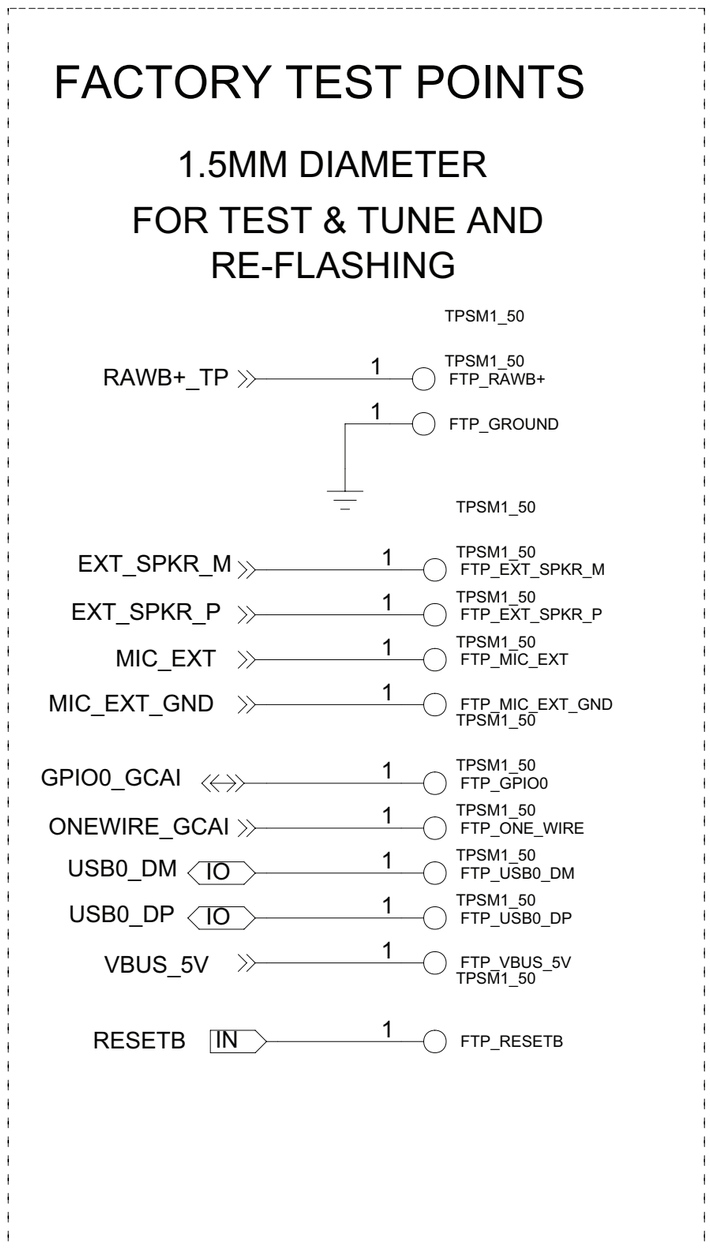


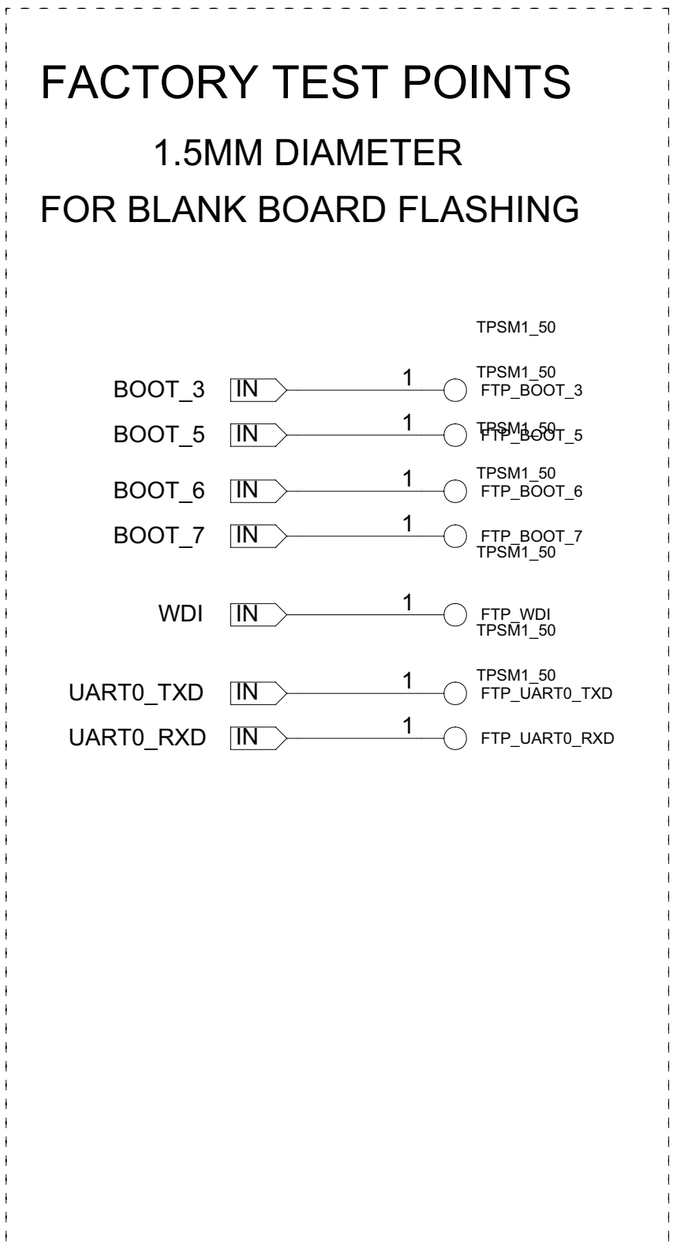


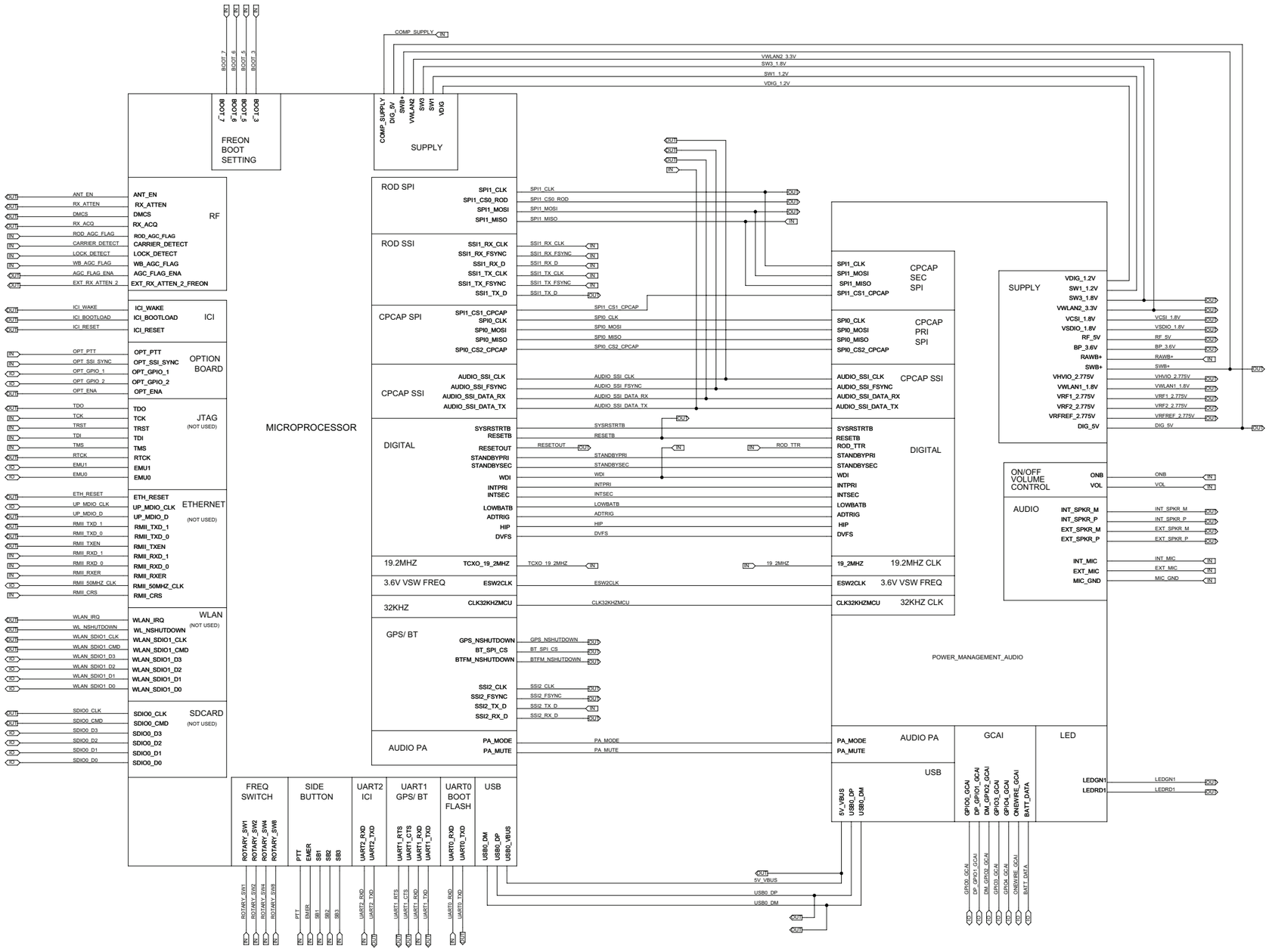




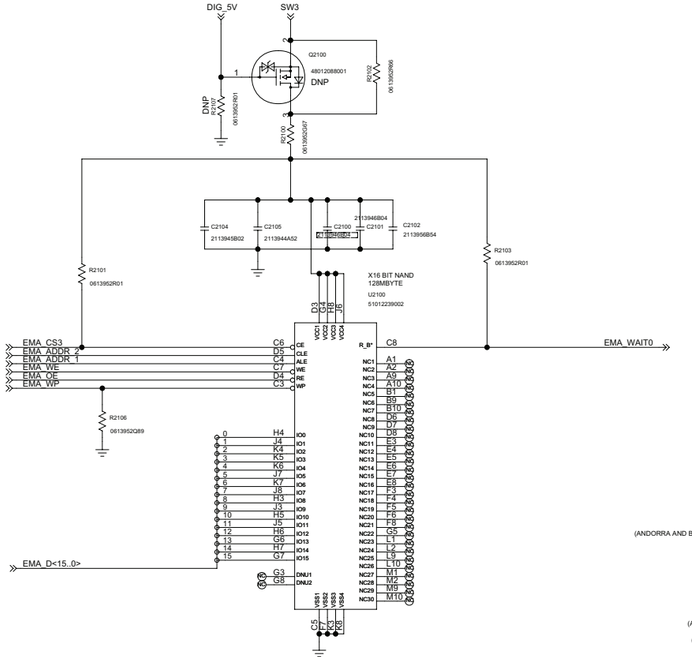




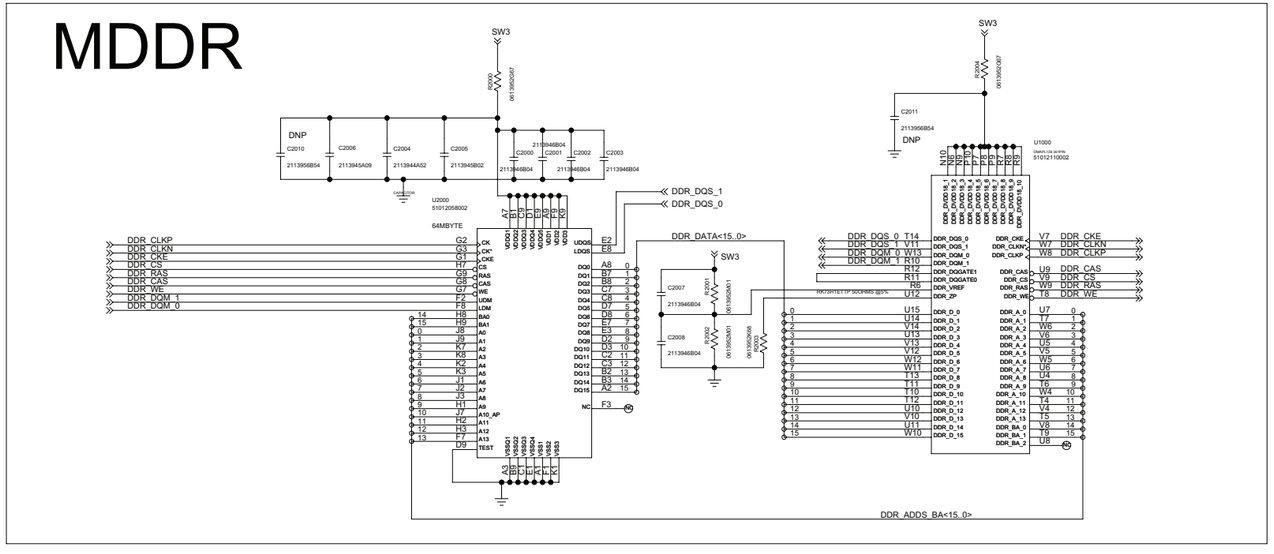


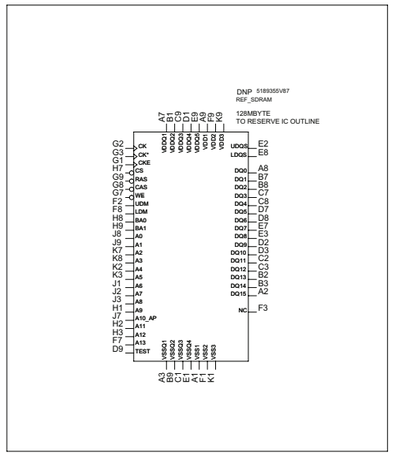


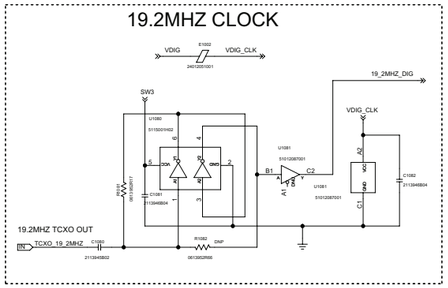
FLASH

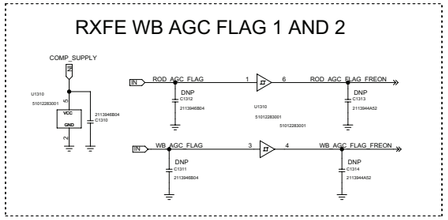


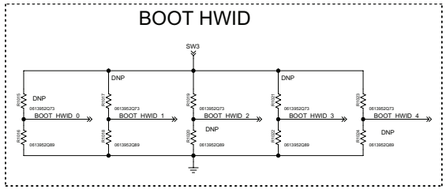
MDDR

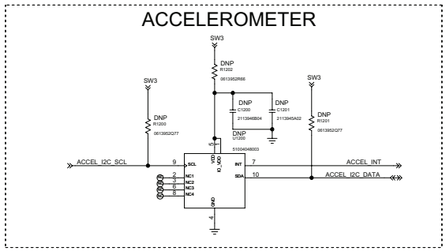


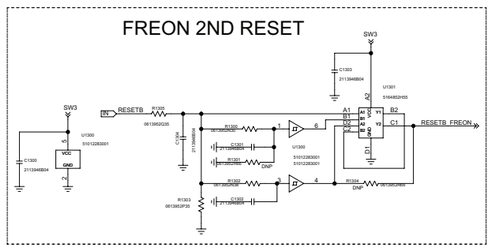


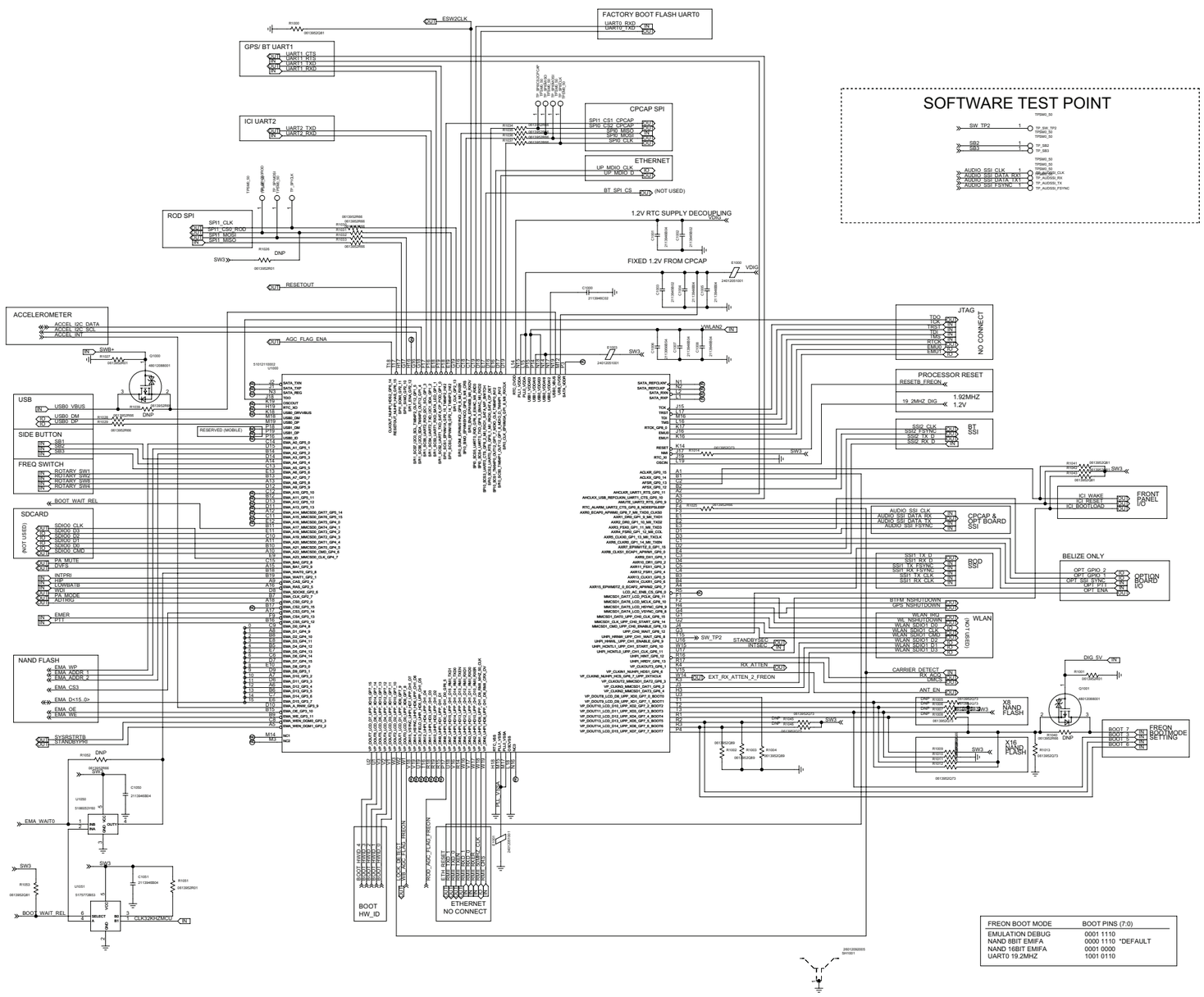












FREON BOOT MODE	BOOT PINS (7:0)
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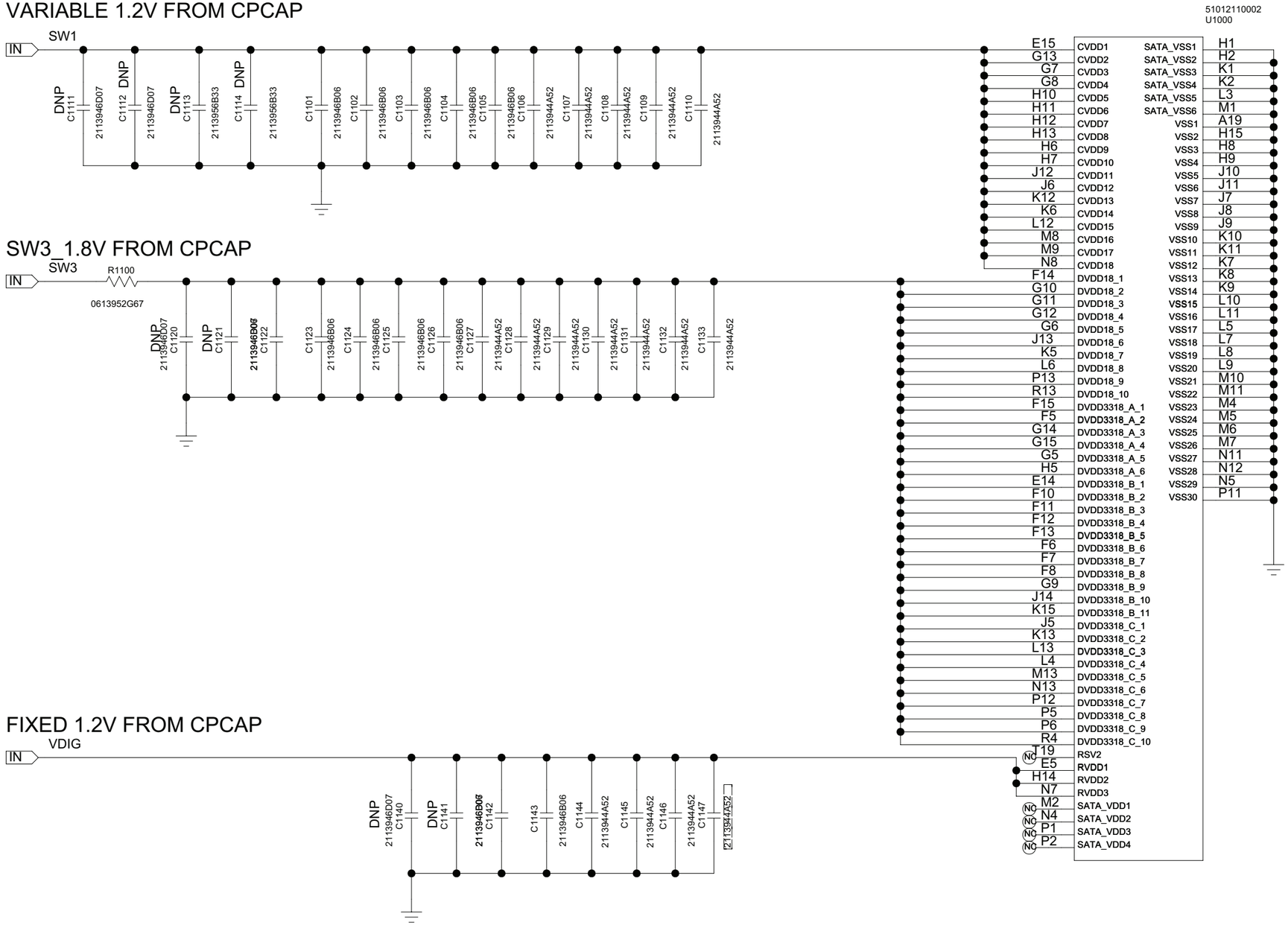
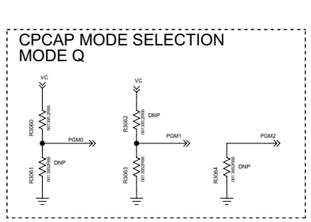
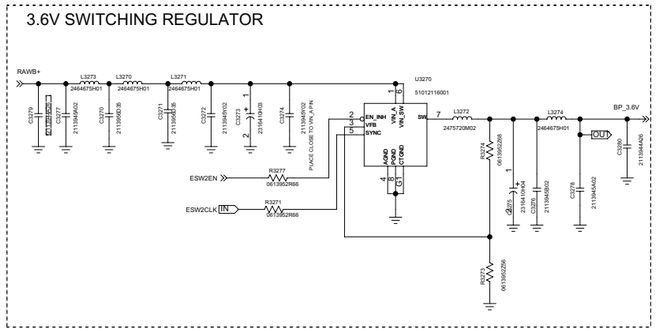
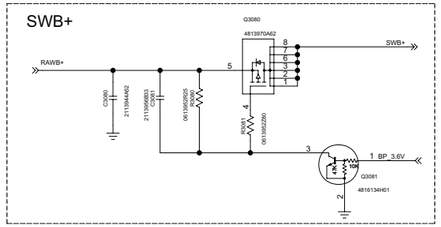
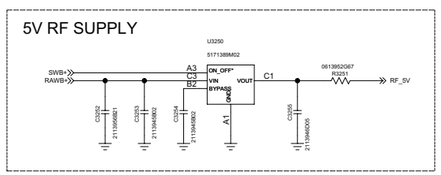
NAND 16BIT EMIFA	0001 0000
UART0 19.2MHZ	1001 0110

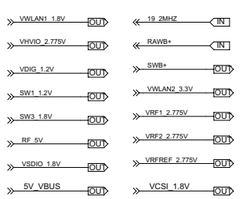


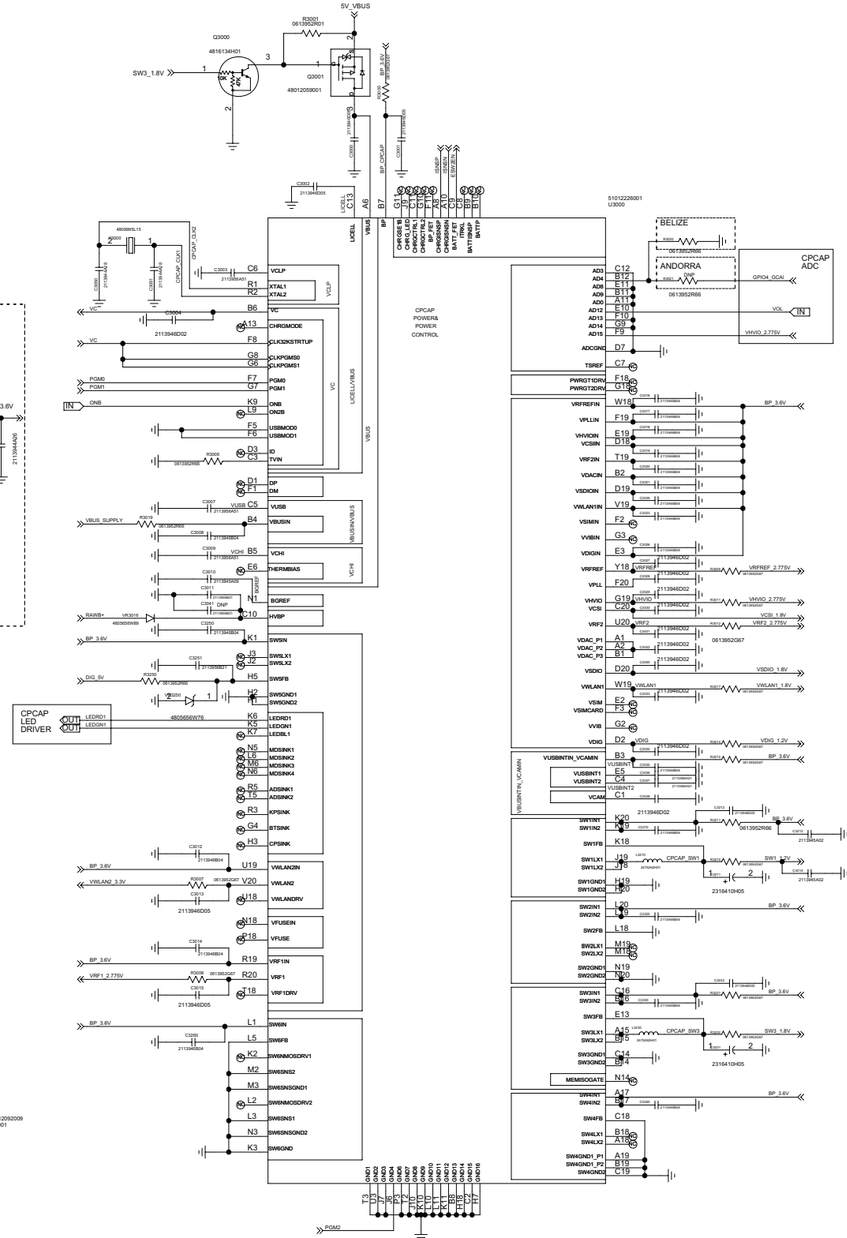


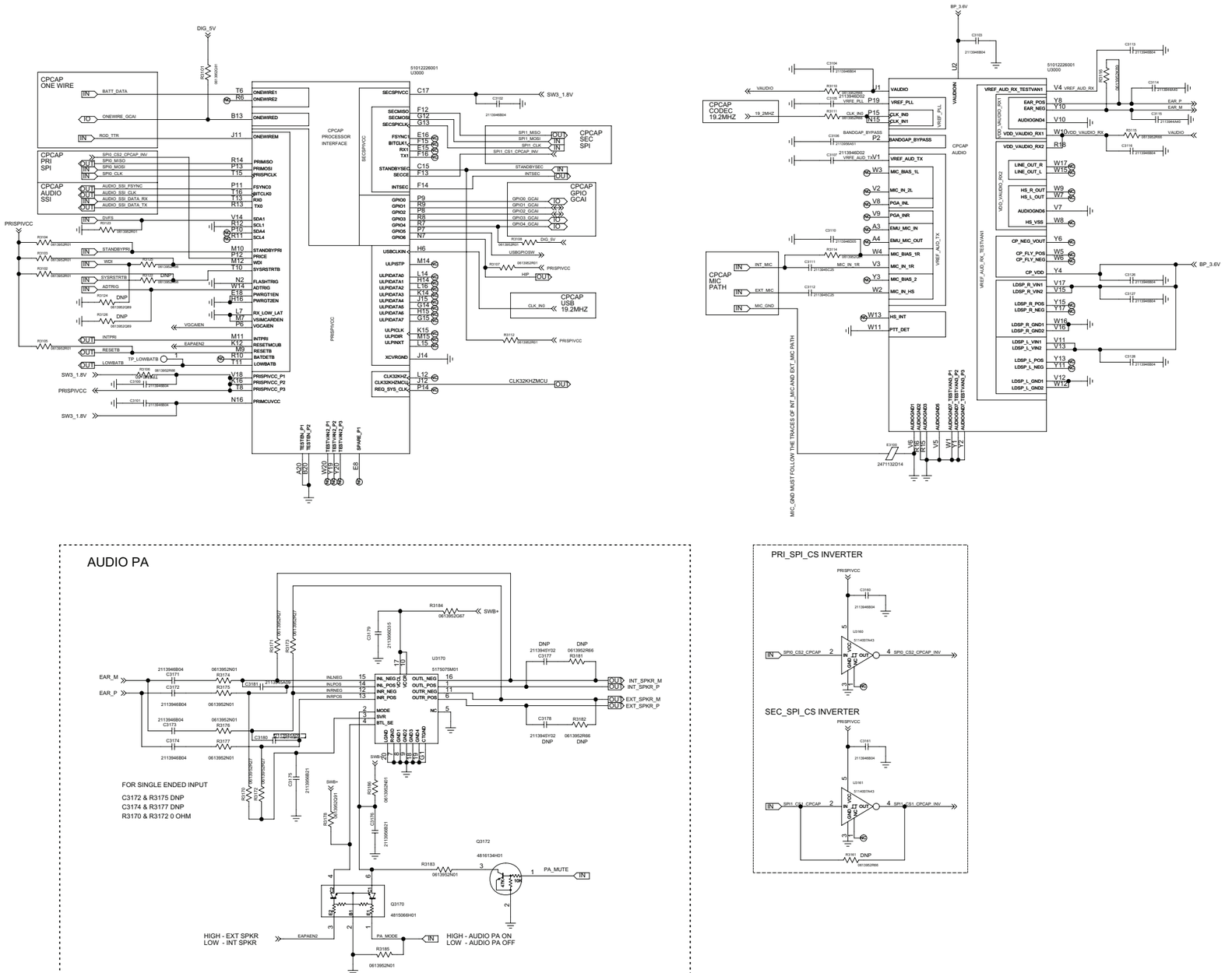


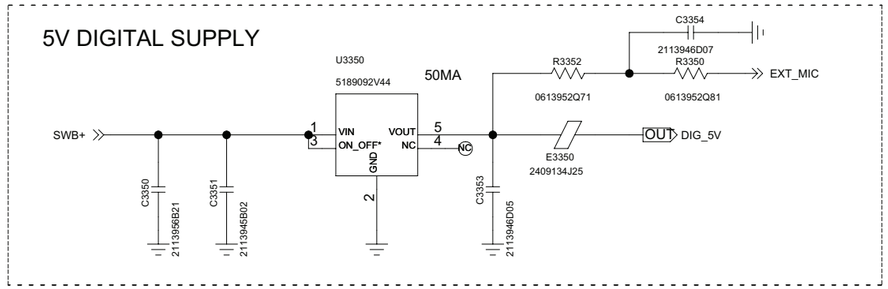


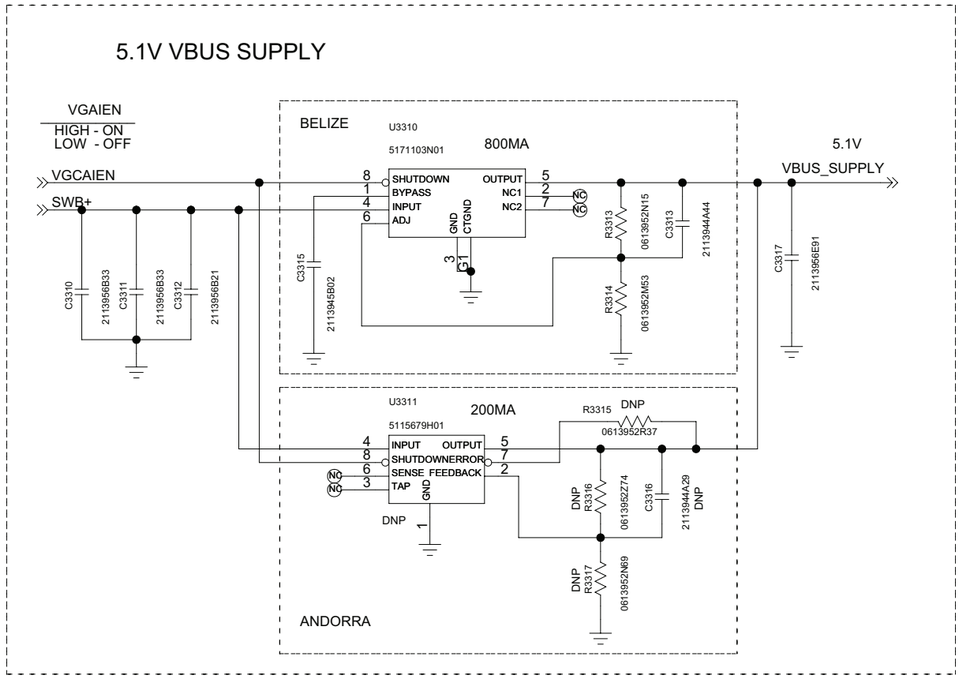


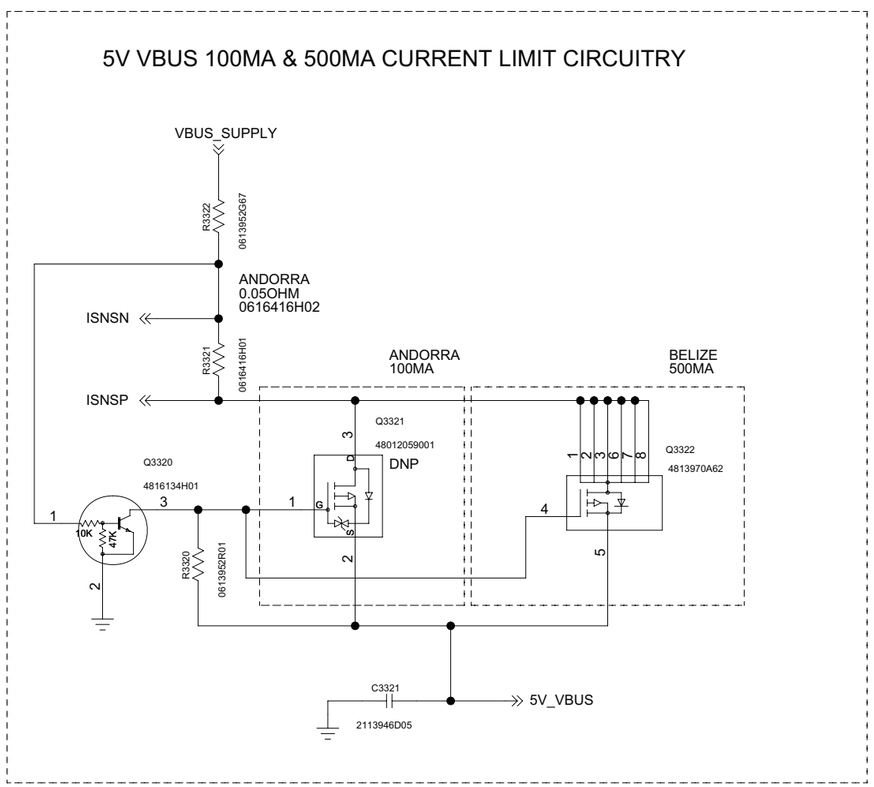


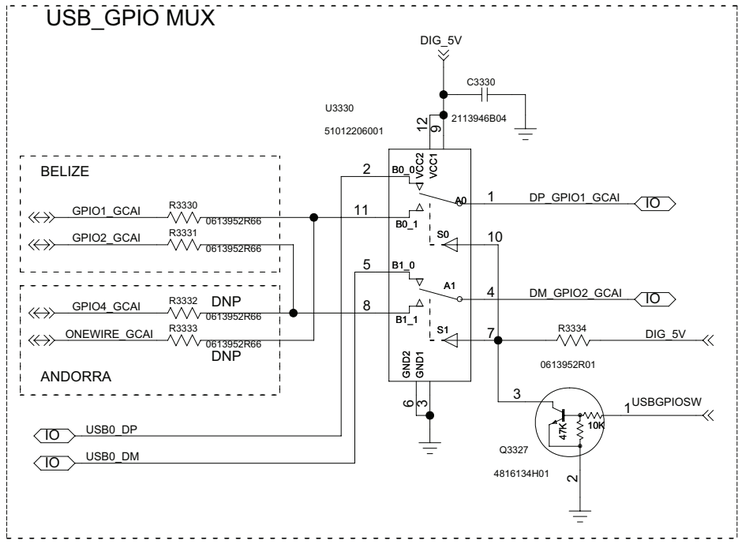


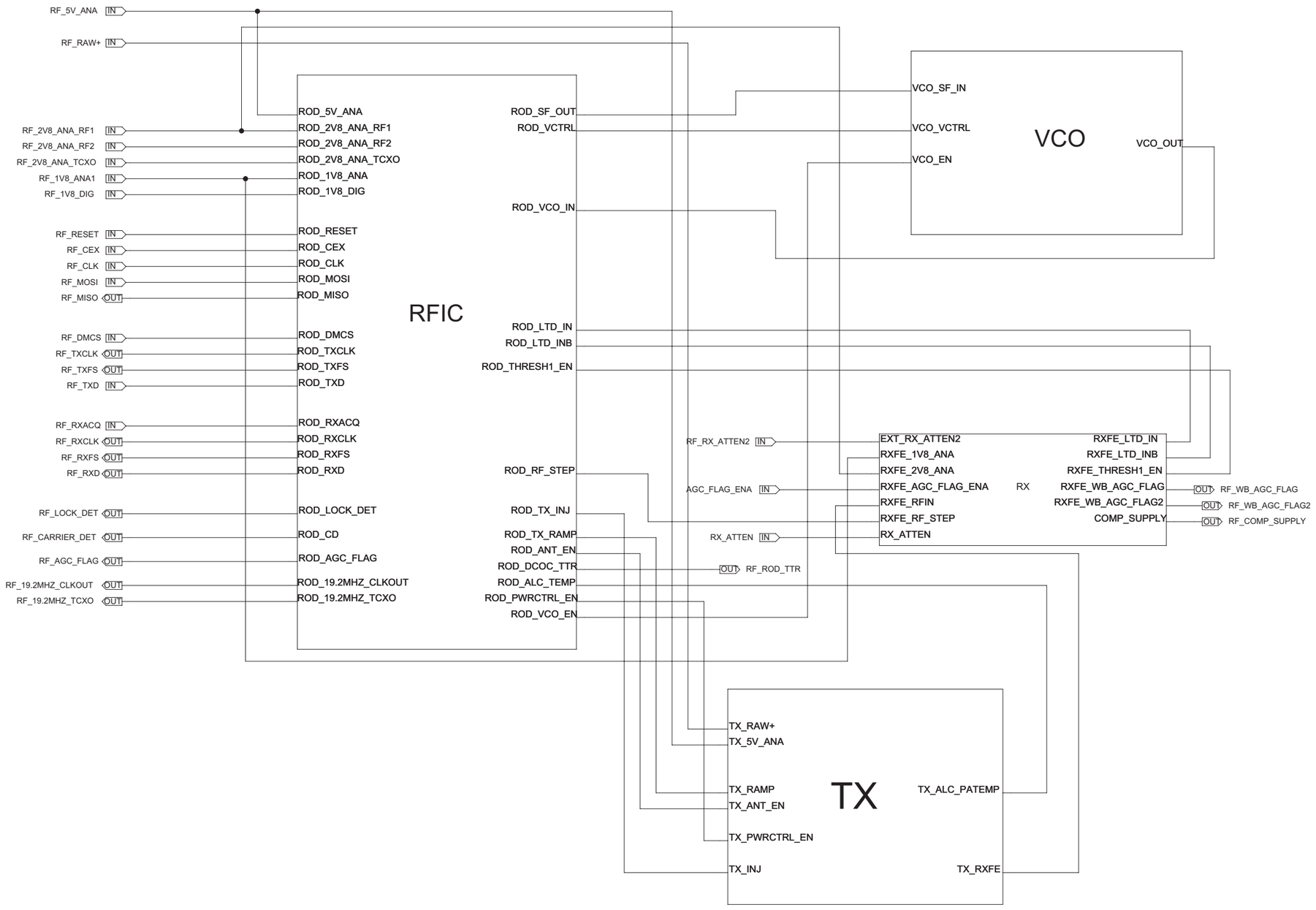


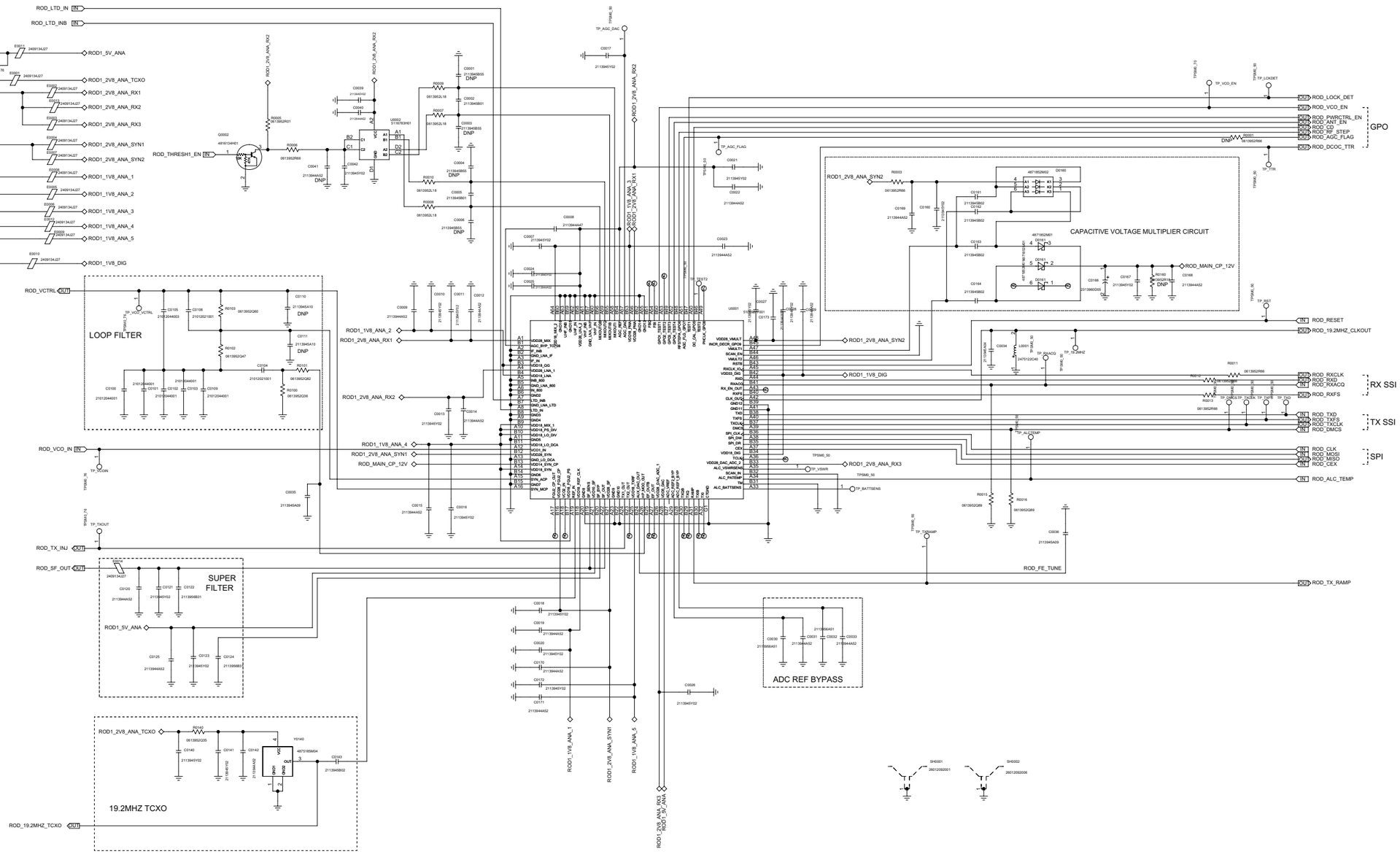








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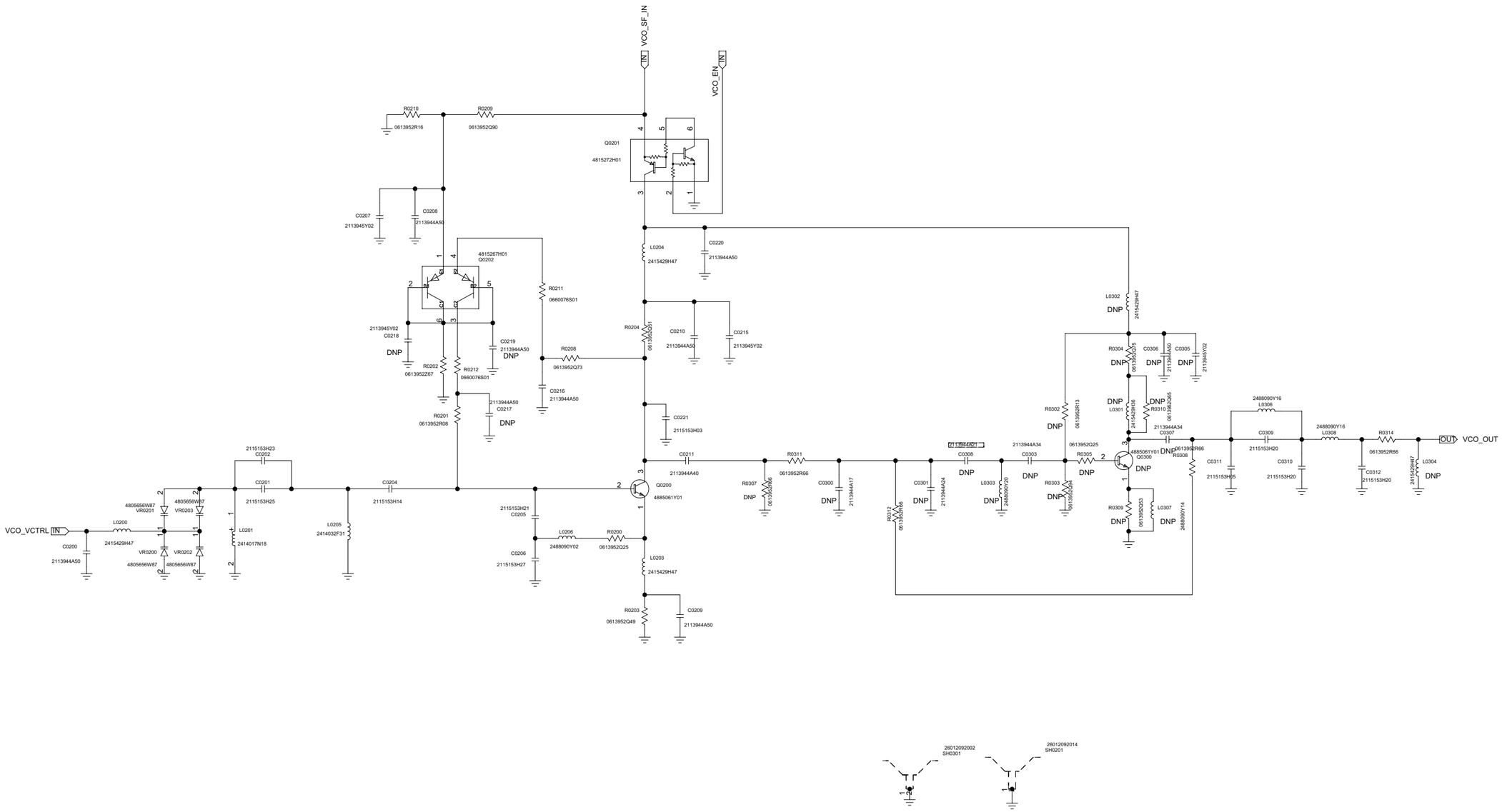
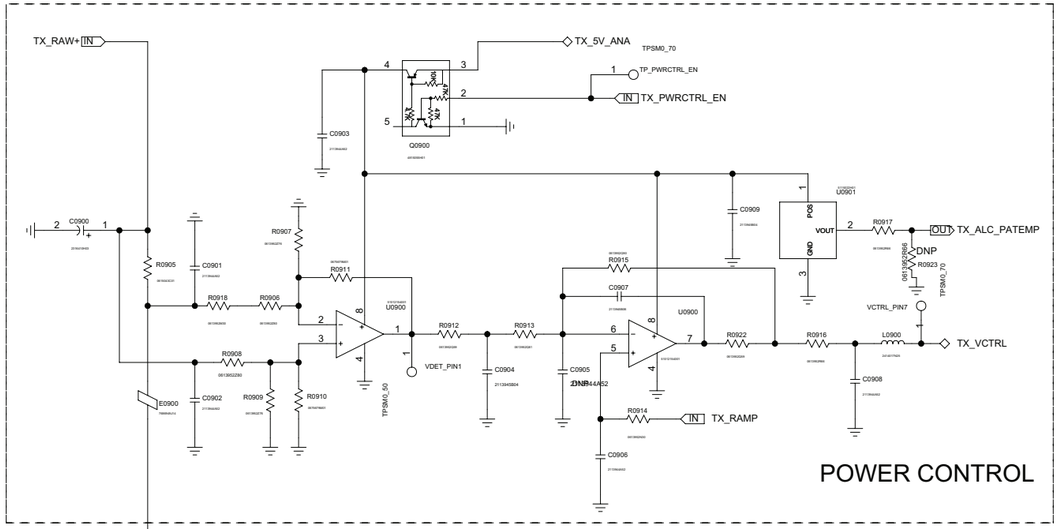
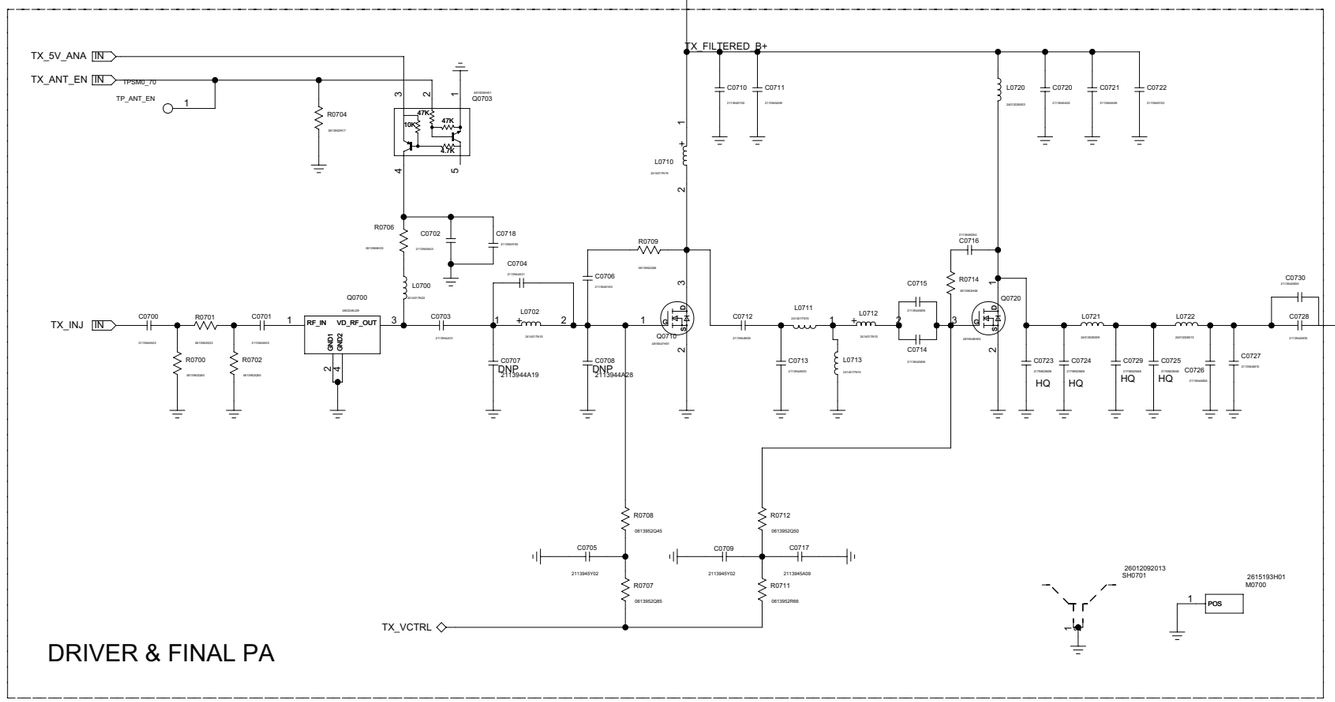
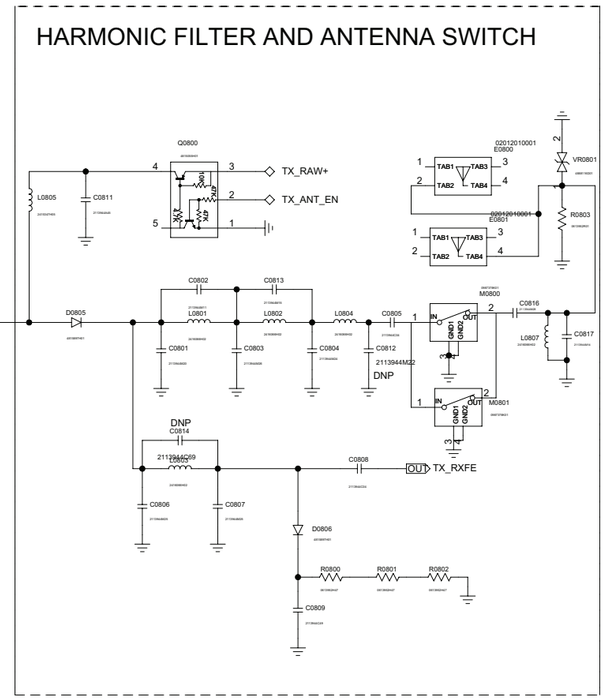
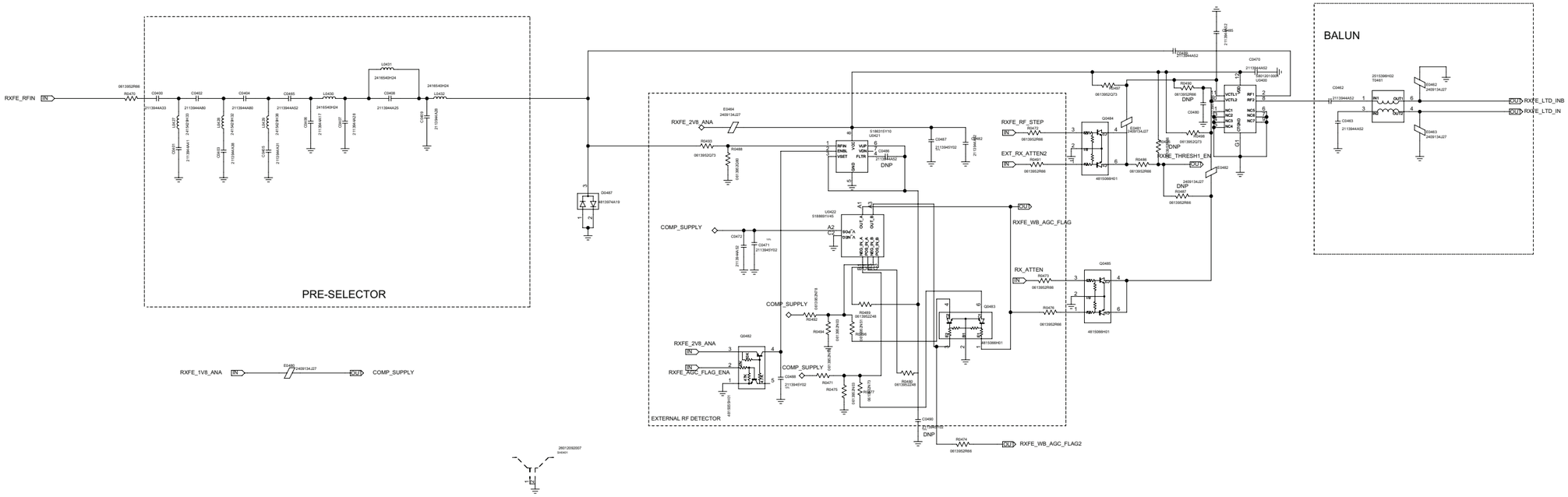
ROD_LTD_INB
ROD_5V_ANA
ROD1_5V_ANA
ROD_2V8_ANA_TCXO
ROD1_2V8_ANA_TCXO
ROD_2V8_ANA_RF1
ROD1_2V8_ANA_RX1
ROD1_2V8_ANA_RX2
ROD1_2V8_ANA_RX3
ROD_2V8_ANA_RF2
ROD1_2V8_ANA_SYN1
ROD1_2V8_ANA_SYN2
ROD_1V8_ANA
ROD1_1V8_ANA_1
ROD1_1V8_ANA_2
ROD1_1V8_ANA_3
ROD1_1V8_ANA_4
ROD1_1V8_ANA_5
ROD_1V8_DIG
ROD1_1V8_DIG
ROD_THRESH1_EN
ROD_VCTRL
LOOP FILTER
ROD_VCO_IN
ROD_TX_INJ
ROD_SF_OUT
SUPER FILTER
ROD1_5V_ANA
19.2MHZ TCXO
ROD_19.2MHZ_TCXO
U0001
U0002
CAPACITIVE VOLTAGE MULTIPLIER CIRCUIT
ROD_MAIN_CP_12V
ADC REF BYPASS
ROD_LOCK_DET
ROD_VCO_EN
ROD_PWRCTRL_EN
ROD_ANT_EN
ROD_CD
ROD_RF_STEP
ROD_AGC_FLAG
ROD_DCOC_TTR
GPO
ROD_RESET
ROD_19.2MHZ_CLKOUT
ROD_RXCLK
ROD_RXD
ROD_RXACQ
ROD_RXFS
RX SSI
ROD_TXD
ROD_TXFS
ROD_TXCLK
ROD_DMCS
TX SSI
ROD_CLK
ROD_MOSI
ROD_MISO
ROD_CEX
SPI
ROD_ALC_TEMP
ROD_FE_TUNE
ROD_TX_RAMP
DNP
SH0001
SH0002











VHF Radio Parts List (84012275001_5)

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C0008	2113944A47
C0009	2113944A34
C0010	2113945Y02
C0011	2113945Y02
C0012	2113944A34
C0013	2113945Y02
C0014	2113944A34
C0015	2113944A34
C0016	2113945Y02
C0017	2113945Y02
C0018	2113945Y02
C0019	2113944A34
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C0022	2113944A34
C0023	2113944A34
C0026	2113945Y02
C0027	2113945Y02
C0028	2113945Y02
C0029	2113944A34
C0030	2113956A51
C0031	2113944A34
C0032	2113956A51
C0033	2113944A34
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C0035	2113945A09
C0036	NOTPLACED
C0037	2113944A34
C0038	2113945Y02
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C0101	21012044001
C0102	21012044001
C0103	NOTPLACED
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C0105	21012044002
C0106	21012044001
C0109	21012044002
C0120	2113944A34
C0121	2113945Y02
C0122	2113956B31
C0123	2113945Y02
C0124	2113956B31
C0125	2113944A34
C0140	2113945Y02
C0141	2113945Y02
C0142	2113944A34
C0143	2113945B02
C0160	2113945Y02
C0161	2113945B02
C0162	2113945B02
C0163	2113945B02
C0164	2113945B02
C0166	2313960D05
C0167	2113945B02
C0168	2113944A34
C0169	2113944A34
D0160	4871852M01
D0161	4871852M01
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E0002	2409134J25
E0003	2409134J25
E0004	2409134J25
E0005	2409134J25
E0006	2409134J25
E0007	2409134J25
E0008	2409134J25
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E0012	2409134J25
E0160	2409134J25
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R0013	0613952R66
R0015	0613952Q89
R0016	0613952Q89
R0100	0613952Q36
R0101	0613952Q82
R0102	0613952Q49
R0103	0613952Q58
R0140	0613952Q35
R0160	0613952R18
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SH0002	26012092006
U0001	51BBBBBB001
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C0202	2115153H21
C0203	2115153H12
C0204	2115153H22
C0205	2115153H20
C0206	2115153H14
C0207	2113945Y02
C0208	2113944A34
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C0211	2115153H18
C0215	2113945Y02
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C0254	2115153H22
C0255	2115153H19
C0256	2115153H11
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C0263	2113945Y02
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C0301	NOTPLACED
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C0308	NOTPLACED
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L0201	2471672Y02
L0202	2475122C40
L0203	2475122C40
L0204	2475122C40
L0250	2475122C40
L0251	2471672Y02
L0252	2475122C40
L0253	2475122C40
L0254	2475122C40
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Q0201	4815272H01
Q0250	4885061Y01
Q0251	4815272H01
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R0201	0613952Q83
R0203	0613952Q51
R0204	0613952Q49
R0208	0613952Q85
R0250	0613952Q36
R0251	0613952Q88
R0253	0613952Q52
R0254	0613952Q49
R0255	0613952Q88
R0300	0613952Q60
R0301	0613952Q60
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R0304	NOTPLACED
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R0307	0613952R66
R0308	0613952R66
SH0201	26012092008
SH0301	26012092002
VR0200	4805656W87
VR0201	4805656W87
VR0202	4805656W87

Circuit Ref	Motorola Part No.
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VR0250	4805656W87
VR0251	4805656W87
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VR0253	NOTPLACED
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C0401	2113944A20
C0402	NOTPLACED
C0403	2113944A25
C0404	NOTPLACED
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C0406	2113944A24
C0407	2113944A02
C0408	2113944A20
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C0411	2113944A46
C0412	NOTPLACED
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C0415	2113944A15
C0416	2113944A07
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C0470	2113944A45
C0471	2113944A34
C0480	2113944A48
C0482	2113944A45
C0485	NOTPLACED
C0486	2113944A45
C0487	2113945Y02
C0488	2113945Y02
D0480	4884800Y03
D0486	4884800Y03
D0487	4813974A19
E0400	2480640Z01
E0462	2480640Z01
E0463	2480640Z01
E0464	2480640Z01
L0400	2471902Y04

Circuit Ref	Motorola Part No.
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L0406	2415429H40
L0407	NOTPLACED
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Q0481	4815055H01
Q0482	4815055H01
Q0483	4815066H01
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R0401	0613952R19
R0403	0613952R01
R0404	0613952R01
R0475	0613952R01
R0476	0613952R66
R0480	0613952Q79
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R0487	0613952Q18
R0488	0613952Q77
R0489	0613952N54
R0490	0613952N01
R0491	0613952R66
R0492	NOTPLACED
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R0494	0613952Z48
R0495	0613952M89
SH0401	26012092007
T0461	2515396H02
U0421	5180390L83
VR0400	4815096H01
VR0401	4815096H01
VR0402	4815096H01
VR0403	4815096H01
VR0404	4815096H01
VR0405	4815096H01
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C0701	2115153H39
C0702	2113945A02
C0703	2113945A02
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C0705	2113945A09
C0706	2113946K02
C0707	NOTPLACED

Circuit Ref	Motorola Part No.
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C0712	2113945A02
C0713	2113944A30
C0714	NOTPLACED
C0715	2113944A19
C0716	2113944C46
C0717	2113945A09
C0720	2113945A02
C0721	2113945A09
C0722	2113944A17
C0723	NOTPLACED
C0724	NOTPLACED
C0725	2175662M27
C0726	2175662M05
C0727	2175662M34
C0728	2113944M40
C0729	2175662M01
C0730	NOTPLACED
C0731	2175662M07
C0801	2113944M12
C0802	2113944C68
C0803	2113944M12
C0804	2113944C67
C0805	2113944C46
C0806	2113944C67
C0807	2113944M01
C0808	2113944C46
C0809	2113944M36
C0811	2113945A02
C0813	2113944M01
C0814	NOTPLACED
C0815	2113944C46
C0816	NOTPLACED
C0817	NOTPLACED
C0900	2316410H03
C0901	2113945A02
C0902	2113945A02
C0903	2113945A02
C0904	2113945B04
C0905	NOTPLACED

Circuit Ref	Motorola Part No.
C0906	2113944A45
C0907	2113945B06
C0908	2113945A02
C0909	2113945B04
D0805	4815897H01
D0806	4815897H01
E0800	02012010001
E0801	NOTPLACED
E0900	7686949J14
L0700	2414017N25
L0701	2488090Y18
L0710	2414017N25
L0720	2460591E64
L0721	2471406L02
L0801	24012026011
L0802	24012026011
L0803	24012026011
L0804	2415429H47
L0806	2475122C37
L0807	2471406L02
L0900	2414017N25
M0700	2615193H01
M0800	0987378K01
M0801	NOTPLACED
Q0700	4802246J29
Q0703	4815055H01
Q0710	4816547H01
Q0720	4816548H02
Q0800	4815055H01
Q0900	4815055H01
R0700	0613952Q65
R0701	0613952Q34
R0702	0613952Q68
R0704	0613952R17
R0706	0613958H33
R0707	0613952R66
R0708	0613952Q66
R0709	0613952Q49
R0710	0613952M73
R0711	0613952M18
R0712	0613952Q66
R0714	0613952H56
R0717	0613952R66

Circuit Ref	Motorola Part No.
R0800	0613952H47
R0801	0613952H47
R0802	0613952H47
R0803	0613952R01
R0809	0613952R66
R0903	0613952R66
R0905	0615043C01
R0906	0613952Z80
R0907	0613952Z76
R0908	0613952Z80
R0909	0613952Z76
R0910	0675679M01
R0911	0675679M01
R0912	0613952Q59
R0913	0613952Q81
R0914	0613952N30
R0915	0613952Q90
R0916	0613952M63
R0918	0613952M30
R0920	0613952R66
R0921	NOTPLACED
R0922	0613952Q59
SH0701	26012092004
U0900	51012154001
U0901	5115022H01
VR0801	4888116D01
C1000	2113946C02
C1001	2113946B04
C1002	2113945B02
C1003	2113945B02
C1004	2113946B04
C1005	2113946B04
C1006	2113956B54
C1007	2113946B04
C1008	2113946B04
C1050	2113946B04
C1051	2113946B04
C1080	2113945B02
C1081	2113946B04
C1082	2113946B04
C1101	2113946B06
C1102	2113946B06
C1103	2113946B06

Circuit Ref	Motorola Part No.
C1104	2113946B06
C1105	2113946B06
C1106	2113944A52
C1107	2113944A52
C1108	2113944A52
C1109	2113944A52
C1110	2113944A52
C1111	NOTPLACED
C1112	NOTPLACED
C1113	NOTPLACED
C1114	NOTPLACED
C1120	NOTPLACED
C1121	NOTPLACED
C1122	2113946B06
C1123	2113946B06
C1124	2113946B06
C1125	2113946B06
C1126	2113946B06
C1127	2113944A52
C1128	2113944A52
C1129	2113944A52
C1130	2113944A52
C1131	2113944A52
C1132	2113944A52
C1133	2113944A52
C1140	NOTPLACED
C1141	NOTPLACED
C1142	2113946B06
C1143	2113946B06
C1144	2113944A52
C1145	2113944A52
C1146	2113944A52
C1147	2113944A52
C1200	NOTPLACED
C1201	NOTPLACED
C1300	2113946B04
C1301	2113946B04
C1302	2113946B04
C1303	2113946B04
C1310	2113946B04
C1311	NOTPLACED
C1312	NOTPLACED
C2000	2113946B04

Circuit Ref	Motorola Part No.
C2001	2113946B04
C2002	2113946B04
C2003	2113946B04
C2004	2113945A02
C2005	2113945B02
C2006	2113945A09
C2007	2113946B04
C2008	2113946B04
C2010	NOTPLACED
C2011	NOTPLACED
C2100	2113946B04
C2101	2113946B04
C2102	2113956B54
C2104	2113945B02
C2105	2113945A02
E1000	2480640Z01
E1001	2480640Z01
E1002	2480640Z01
E1003	2480640Z01
Q1000	48012088001
Q1001	48012088001
Q2100	NOTPLACED
R1000	0613952Q81
R1001	0613952R01
R1002	0613952Q89
R1003	0613952Q89
R1004	0613952Q89
R1005	NOTPLACED
R1006	NOTPLACED
R1007	NOTPLACED
R1008	NOTPLACED
R1009	0613952Q73
R1010	0613952Q89
R1011	0613952R66
R1012	0613952R66
R1013	0613952Q73
R1014	0613952Q73
R1015	NOTPLACED
R1016	0613952Q89
R1017	NOTPLACED
R1018	0613952Q89
R1019	0613952Q73
R1020	NOTPLACED

Circuit Ref	Motorola Part No.
R1021	NOTPLACED
R1022	0613952Q89
R1023	0613952Q73
R1024	NOTPLACED
R1025	0613952R66
R1026	NOTPLACED
R1027	0613952R01
R1028	0613952R66
R1029	0613952R66
R1030	0613952R66
R1031	0613952R66
R1032	0613952R66
R1033	0613952R66
R1034	0613952R66
R1035	0613952R66
R1036	0613952R66
R1037	0613952R66
R1039	NOTPLACED
R1040	NOTPLACED
R1041	0613952Q81
R1042	0613952Q81
R1043	0613952Q81
R1045	NOTPLACED
R1046	NOTPLACED
R1051	0613952R01
R1052	NOTPLACED
R1053	0613952Q81
R1081	0613952R17
R1082	NOTPLACED
R1100	0613952G67
R1200	NOTPLACED
R1201	NOTPLACED
R1202	NOTPLACED
R1300	0613952N30
R1301	NOTPLACED
R1302	0613952N38
R1303	0613952P35
R1304	NOTPLACED
R1310	NOTPLACED
R2000	0613952G67
R2001	0613952M01
R2002	0613952M01
R2003	0613952K68

Circuit Ref	Motorola Part No.
R2004	0613952G67
R2100	0613952G67
R2101	0613952R01
R2102	0613952R66
R2103	0613952R01
R2106	0613952Q81
R2107	NOTPLACED
SH1001	26012092005
U1000	51012110002
U1050	5186053Y60
U1051	5175772B53
U1080	5115001H02
U1081	51012087001
U1200	NOTPLACED
U1300	51012283001
U1301	5164852H55
U1310	5114007A43
U2000	51012058002
U2100	51012239002
C4001	2113945A02
C4002	2113945A02
C4003	2113945A02
C4004	2113945A02
C4005	2113945A02
C4010	2113945A02
C4011	2113945A02
C4012	2113945A02
C4013	2113945A02
C4020	2113945A02
C4021	2113944A17
C4022	2113945A02
C4030	2113945A02
C4031	2113945A02
C4032	2113944A17
C4040	2113945A02
C4041	NOTPLACED
C4042	NOTPLACED
C4044	2113945A02
C4100	2113945A02
C4101	2113945A02
C4102	2113945A02
C4103	2113945A02
C4104	2113945A02

Circuit Ref	Motorola Part No.
C4105	2113945A02
C4106	2113945A02
C4107	2113945A02
C4108	2113945A02
C4109	2113945A02
C4110	2113945A02
C4111	2113945A02
C4112	2113945A02
C4113	2113945A02
C4114	2113945A02
C4120	2113956D35
C4121	2113956D35
C4130	NOTPLACED
C4131	NOTPLACED
C4132	NOTPLACED
C4150	NOTPLACED
C4151	NOTPLACED
C4152	NOTPLACED
C4153	NOTPLACED
C4154	NOTPLACED
C4155	NOTPLACED
C4156	NOTPLACED
C4157	NOTPLACED
C4158	NOTPLACED
C4159	NOTPLACED
C4160	NOTPLACED
D4000	48009340001
D4100	48012049001
E4044	2471132D14
E4100	7686949J14
F4020	6515076H01
FL4100	2571601G01
J4100	09012048001
J4150	09012068001
L4100	2415429H45
L4101	2415429H45
L4102	2415429H45
L4103	2415429H45
M4020	0915184H01
P5	2887818K02
P6	2887818K02
R4000	0613952Q42
R4001	0613952Q42

Circuit Ref	Motorola Part No.
R4002	0613952G67
R4003	0613952G67
R4010	0613952Q89
R4011	0613952Q89
R4012	0613952Q89
R4013	0613952Q89
R4021	0613958H49
R4022	0613952Q30
R4030	NOTPLACED
R4031	0613952R66
R4032	0613952R66
R4033	0613952R66
R4034	0613952R66
R4035	NOTPLACED
R4036	NOTPLACED
R4037	NOTPLACED
R4038	NOTPLACED
R4040	0613952Q89
R4041	0613952Q89
R4042	0613952Q89
R4043	0613952Q89
R4044	0613952Q89
R4100	0613952Q73
R4101	0613952Q65
R4102	0613952Q49
R4103	0613952Q59
R4104	0613952Q65
R4105	0613952Q65
R4110	0613952B01
R4131	NOTPLACED
R4132	NOTPLACED
R4133	NOTPLACED
R4134	NOTPLACED
R4136	NOTPLACED
R4137	NOTPLACED
R4138	NOTPLACED
R4139	NOTPLACED
R4141	NOTPLACED
R4142	NOTPLACED
S4030	1875103C04
SW4040	NOTPLACED
SW4041	NOTPLACED
SW4042	NOTPLACED

Circuit Ref	Motorola Part No.
SW4044	4086470Z01
U4130	NOTPLACED
VR4010	4813979P10
VR4020	4813977C23
VR4021	4813977C11
VR4030	4805656W76
VR4031	4805656W76
VR4040	NOTPLACED
VR4041	NOTPLACED
VR4042	NOTPLACED
VR4044	4805656W76
VR4100	4815040H01
VR4101	4813979P10
VR4102	4813979P10
VR4103	4815040H01
VR4104	4815040H01
VR4105	4815040H01
VR4106	4815040H01
VR4107	4813979P10
VR4108	48012131001
C3000	2113946D05
C3001	2113946D05
C3002	2113946D05
C3003	2113956A51
C3004	2113946D02
C3007	2113956A51
C3008	2113946B04
C3009	2113956A51
C3010	2113945A09
C3011	2113956B21
C3012	2113946B04
C3013	2113946D05
C3014	2113946B04
C3015	2113946D05
C3016	2113946B04
C3017	2113946B04
C3018	2113946B04
C3019	2113946B04
C3020	2113946B04
C3021	2113946B04
C3023	2113946B04
C3026	2113946B04
C3027	2113946D02

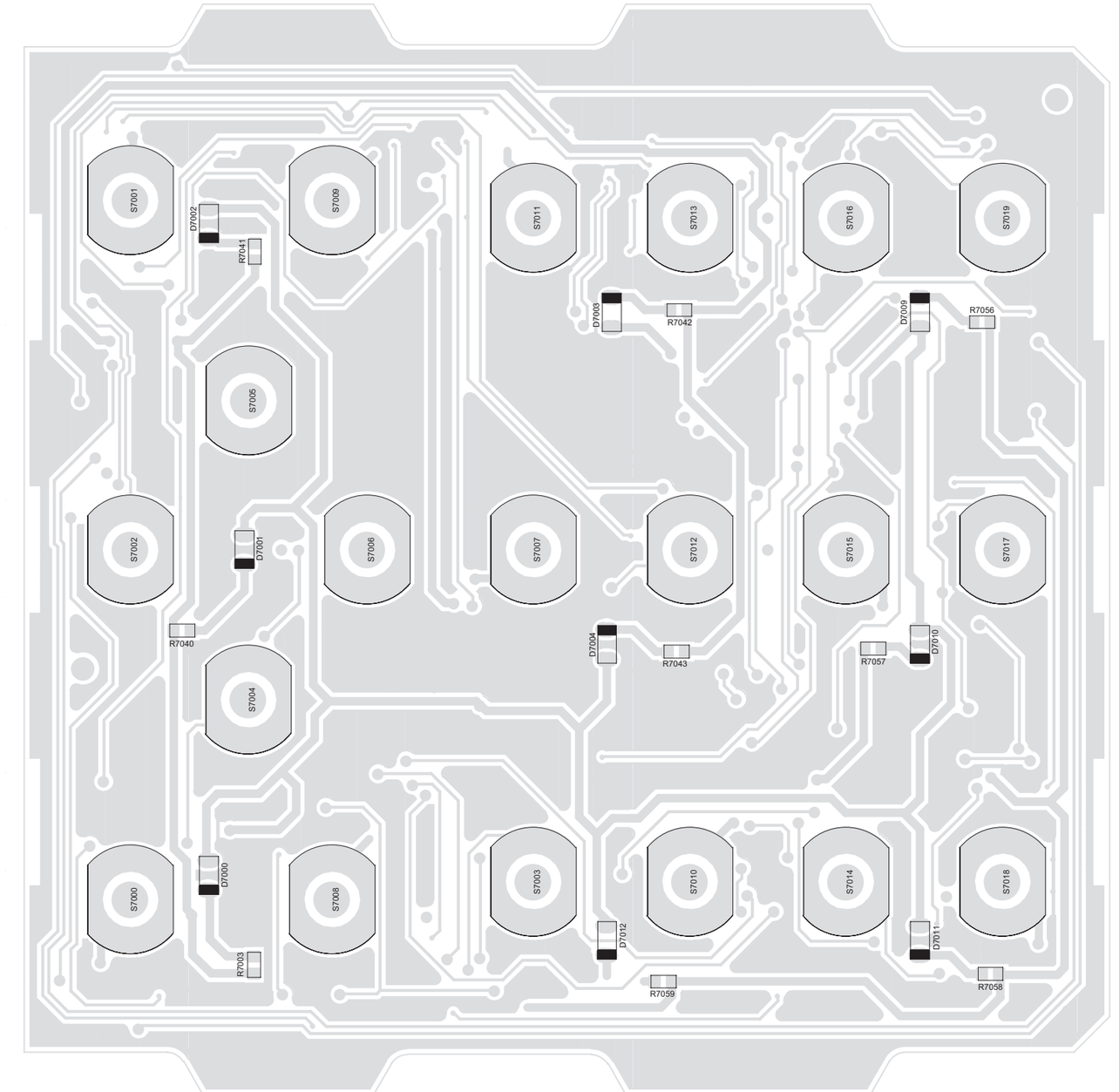
Circuit Ref	Motorola Part No.
C3028	2113946D02
C3029	2113946D02
C3030	2113946D02
C3031	2113946D02
C3032	2113946D02
C3033	2113946D02
C3034	2113946D02
C3035	2113946B04
C3036	2113956A51
C3037	2113956A51
C3038	2113946D02
C3039	2113946B04
C3040	2113946D02
C3041	NOTPLACED
C3050	2113944A28
C3051	2113944A28
C3080	2113945A02
C3081	2113956B33
C3100	2113946B04
C3101	2113946B04
C3102	2113946B04
C3103	2113946B04
C3104	2113946B04
C3105	2113946D02
C3106	2113956A51
C3107	2113946D02
C3110	2113946D05
C3111	2113945C25
C3112	2113945C25
C3113	2113946B04
C3114	2113944A40
C3115	2113944A40
C3116	2113946B04
C3126	2113946B04
C3127	2113946B04
C3128	2113946B04
C3160	2113946B04
C3161	2113946B04
C3171	2113946B04
C3172	2113946B04
C3173	2113946B04
C3174	2113946B04
C3175	2113956B21
C3176	2113956B21
C3177	NOTPLACED
C3178	NOTPLACED
C3179	2113956D35
C3180	2113945A09
C3181	2113945A09
C3210	2113946B04
C3211	2316410H05
C3212	2113946D05
C3213	2113945A02
C3214	2113945A02
C3220	2113946B04
C3230	2113946B04
C3231	2316410H05
C3232	2113946D05
C3240	2113946B04
C3250	2113946B04
C3251	2113956B21
C3252	2113956B21
C3253	2113945B02
C3254	2113945B02
C3255	2113946D05
C3260	2113946B04
C3270	2113956D35
C3271	2113956D35
C3272	2113945Y02
C3273	2316410H03
C3274	2113945Y02
C3275	2316410H04
C3276	2113945B02
C3277	2113945A02
C3278	2113945A02
C3310	2113956B33
C3311	2113956B33
C3312	2113956B21
C3313	2113944A44
C3315	2113945B02
C3316	NOTPLACED
C3317	2113956E91
C3321	2113946D05
C3330	2113946B04
C3350	2113956B21
C3351	2113945B02
C3353	2113946D05
C3354	2113946F03
E3100	2471132D14
E3350	2409134J25
L3210	2475262H01
L3230	2475262H01
L3270	2464675H01
L3271	2464675H01
L3272	2475720M02
Q3000	4816134H01
Q3001	48012059001
Q3080	4813970A62
Q3081	4816134H01
Q3170	4815066H01
Q3172	4816134H01
Q3320	4816134H01
Q3321	NOTPLACED
Q3322	4813970A62
Q3327	4816134H01
R3000	0613952G67
R3001	0613952R01
R3006	0613952R66
R3007	0613952G67
R3008	0613952G67
R3009	0613952G67
R3011	0613952G67
R3012	0613952G67
R3014	0613952G67
R3015	0613952G67
R3017	0613952G67
R3019	0613952R66
R3020	0613952R66
R3021	NOTPLACED
R3060	0613952R66
R3061	NOTPLACED
R3062	NOTPLACED
R3063	0613952R66
R3064	NOTPLACED
R3080	0613952R25
R3081	0613952Z80
R3101	0613952Q81
R3102	0613952R01
R3103	0613952R01
R3104	0613952R01
R3105	0613952R01
R3106	0613952R66
R3107	0613952R01
R3108	0613952R01
R3110	0613952R66
R3111	0613952R66
R3112	0613952R01
R3114	0613952Q81
R3115	0613952R66
R3116	0613952K89
R3122	NOTPLACED
R3123	0613952R01
R3124	NOTPLACED
R3125	0613952R66
R3126	NOTPLACED
R3161	NOTPLACED
R3170	0613952R27
R3171	0613952R27
R3172	0613952R27
R3173	0613952R27
R3174	0613952N01
R3175	0613952N01
R3176	0613952N01
R3177	0613952N01
R3178	0613952Q91
R3181	NOTPLACED
R3182	NOTPLACED
R3183	0613952N01
R3184	0613952G67
R3185	0613952N01
R3186	0613952N01
R3210	0613952G67
R3211	0613952R66
R3230	0613952G67
R3231	0613952G67
R3250	0613952R66
R3251	0613952G67
R3270	0613952G67
R3271	0613952R66
R3273	0613952Z56
R3274	0613952Z68
R3275	0613952G67

Circuit Ref	Motorola Part No.
R3277	0613952R66
R3313	0613952N15
R3314	0613952M53
R3315	NOTPLACED
R3316	NOTPLACED
R3317	NOTPLACED
R3320	0613952R01
R3321	0616416H01
R3322	0613952G67
R3330	0613952R66
R3331	0613952R66
R3332	NOTPLACED
R3333	NOTPLACED
R3334	0613952R01
R3350	0613952Q81
R3352	0613952Q71
SH3001	26012092009
U3000	51012226001
U3160	5114007A43
U3161	5114007A43
U3170	5175075M01
U3250	5171389M02
U3270	51012116001
U3310	5171103N01
U3311	NOTPLACED
U3330	51012206001
U3350	5189092V44
VR3016	4805656W89
VR3250	4805656W76
Y3000	4809995L15
C8000	2113946B04
C8001	2113946B04
C8002	2113946B04
C8003	2113946B04
C8004	2113946B04
C8006	2113946B04
C8007	2113946B04
C8008	2113946B04
C8009	2113946B04
C8010	2113946B04
C8011	2113946B04
C8012	2113946B04
C8013	2113946B04

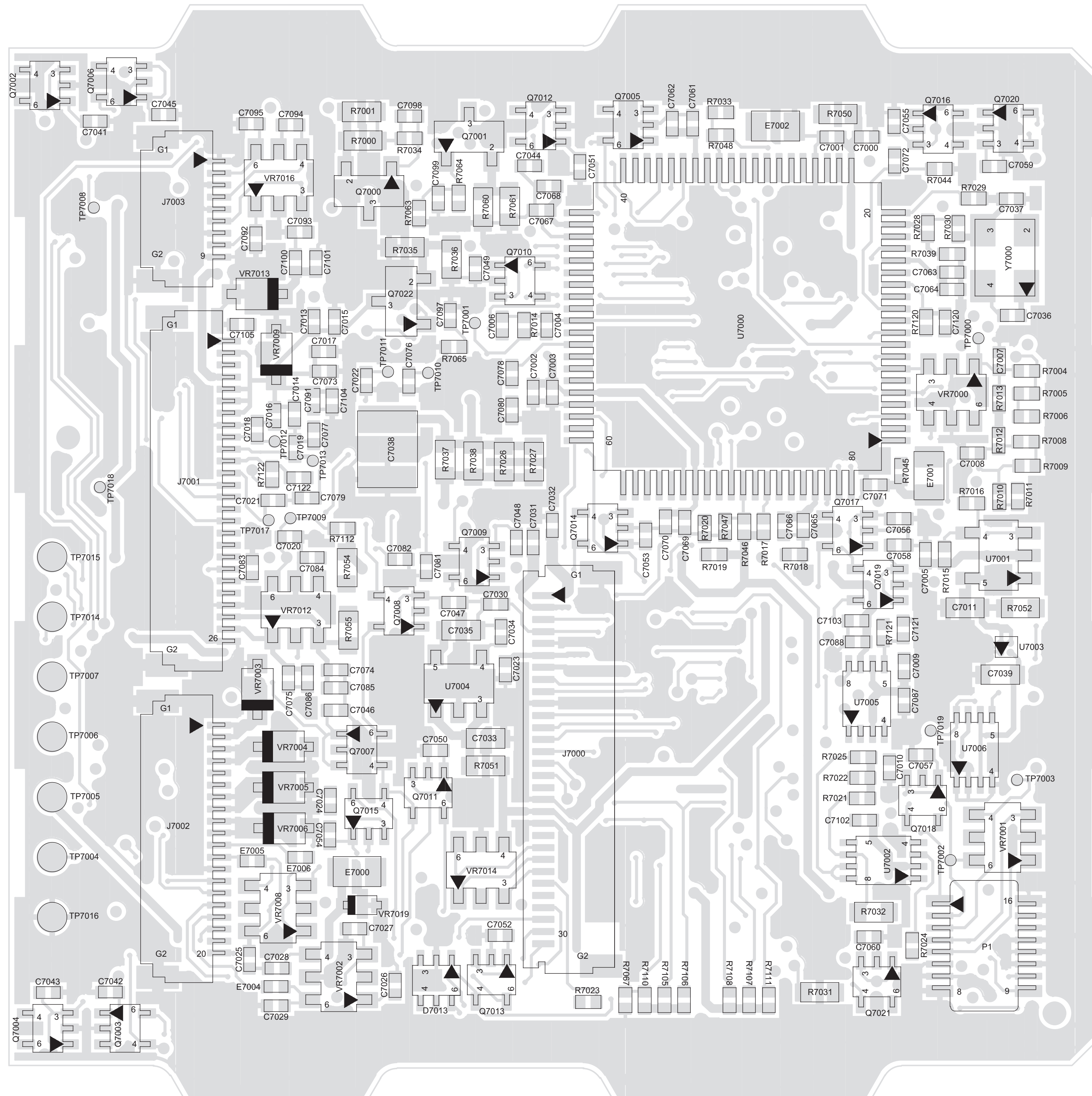
Circuit Ref	Motorola Part No.
C8014	2113944A52
C8015	2113743N26
C8016	2113743N26
C8017	2113944A28
C8018	2113946B04
C8019	2113944A27
C8020	2113944A31
C8021	2113956A51
C8022	2113944A28
C8023	2113944A29
C8026	2113945G98
C8027	2113945G98
C8028	2113956A51
C8029	2113956A51
C8030	2113944A28
C8031	2113944A40
C8032	2113944A40
C8033	2113944A28
C8034	2113944A40
C8035	2113944A28
C8036	2113944A40
C8037	2113944A28
C8039	2113944A40
C8040	2113944A28
C8041	2113944A40
C8043	2113944A40
C8044	2113944A28
C8045	NOTPLACED
C8046	2113944A28
C8047	NOTPLACED
C8049	2113944A17
E8000	7686949J08
E8001	7686949J08
E8002	7686949J08
E8003	7686949J08
E8004	7686949J08
FL8000	91012018002
FL8001	91012013001
FL8002	91012013001
L8001	24014300040
L8002	24014300131
L8003	24014300040
L8004	2414017P04

Circuit Ref	Motorola Part No.
R8000	NOTPLACED
R8001	0613952R66
R8002	NOTPLACED
R8003	NOTPLACED
R8004	0613952R66
R8005	0613952R66
R8006	0613952R66
R8007	0613952R66
R8008	0613952R66
R8009	0613952R66
R8010	0613952R66
R8011	0613952R66
R8012	0613952R66
R8013	0613952R66
R8014	NOTPLACED
R8015	0613952R66
R8016	0613952R66
R8017	NOTPLACED
R8018	0613952R66
R8019	0613952R66
R8020	NOTPLACED
R8021	0613952R01
R8022	NOTPLACED
R8025	0613952R66
R8026	NOTPLACED
R8027	0613952Q89
R8050	0613952R66
SH8001	26012092003
U8000	51007377001
U8001	51007599001
U8002	5175771A37
Y8000	93012017001
PCB	84012180001
PASTE	11012015001
S4010	40012023001
E0800	02012010001
E0801	NOTPLACED
M0800	0987378K01
M0801	NOTPLACED
-	3385980Z01
-	1104555J01

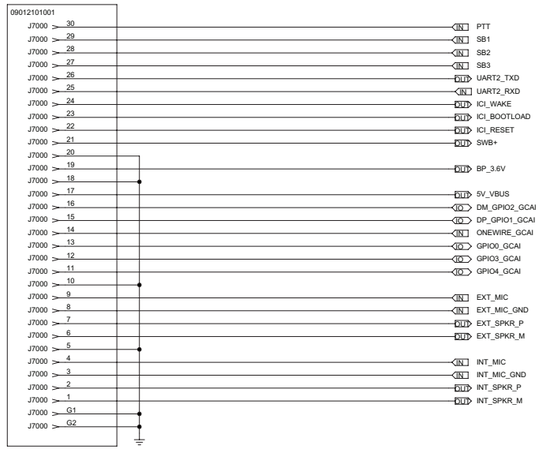
4.0 Circuit Board/Schematic Diagrams and Parts List for Full Keypad



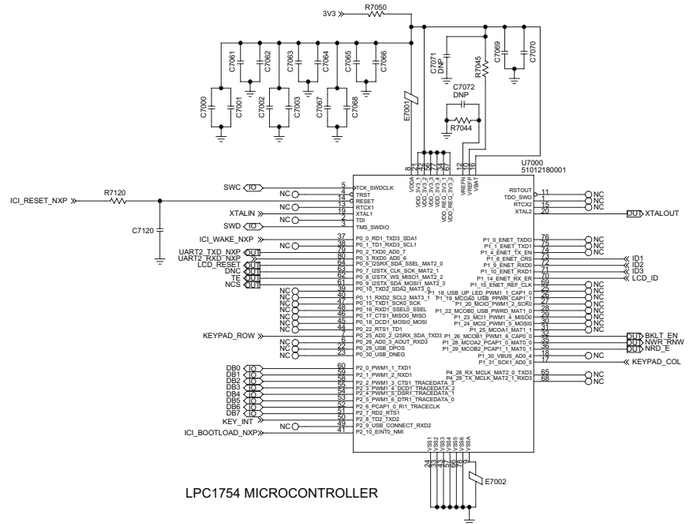
Main Board Full Keypad Top Side PCB No. 84012225002_B



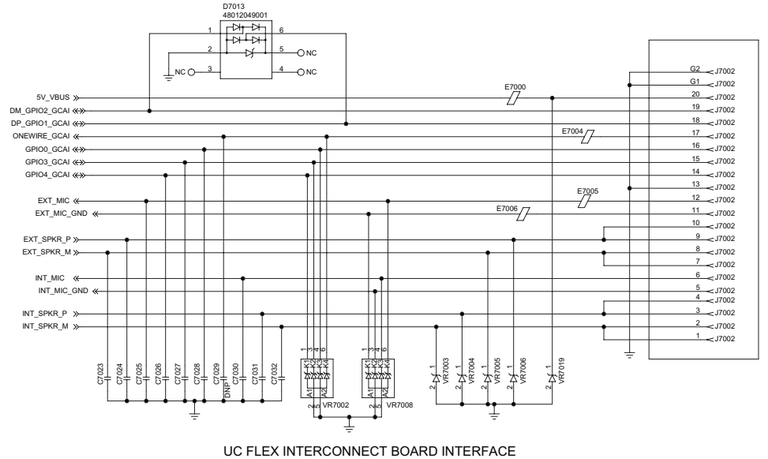
Main Board Full Keypad Bottom Side PCB No. 84012225002_B



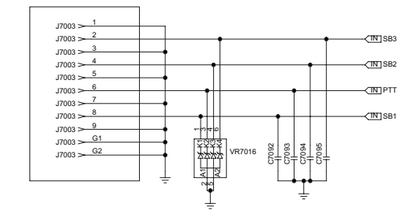
MAINBOARD INTERCONNECT BOARD INTERFACE



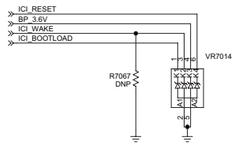
LPC1754 MICROCONTROLLER

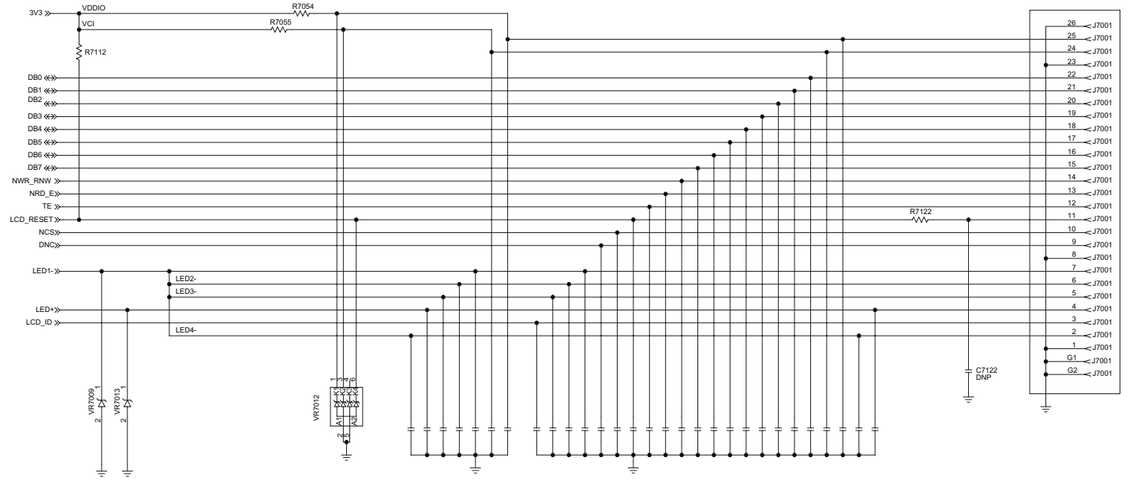


UC FLEX INTERCONNECT BOARD INTERFACE

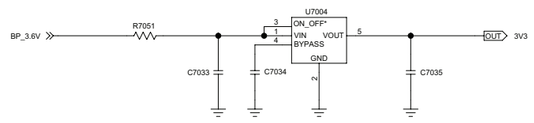


PTT/SIDE CONTROL FLEX INTERCONNECT BOARD INTERFACE

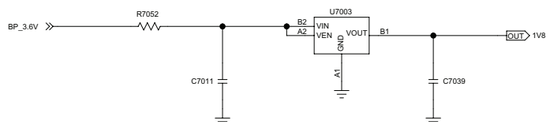




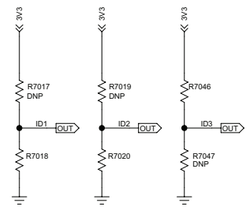
LDO 3V3 REGULATOR



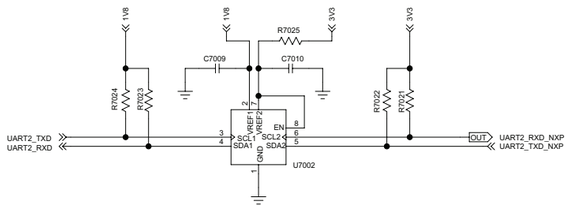
LDO 1.8V REGULATOR



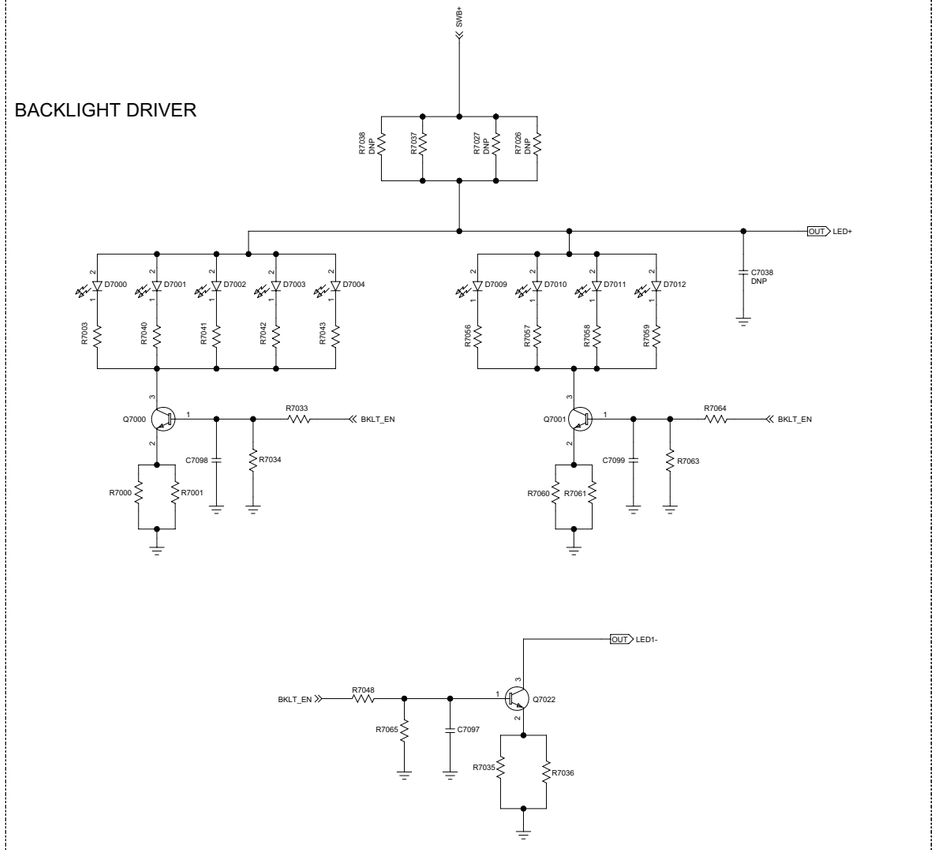
HOUSING ID



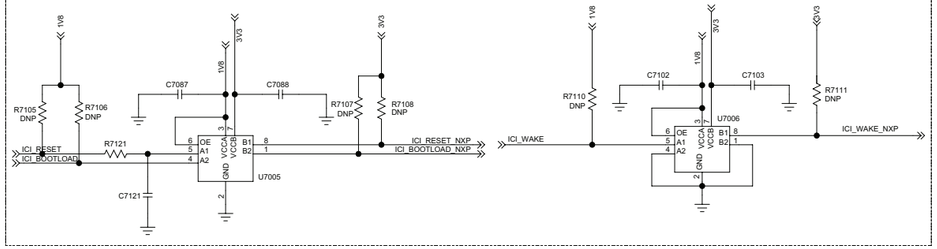
LEVEL SHIFTER



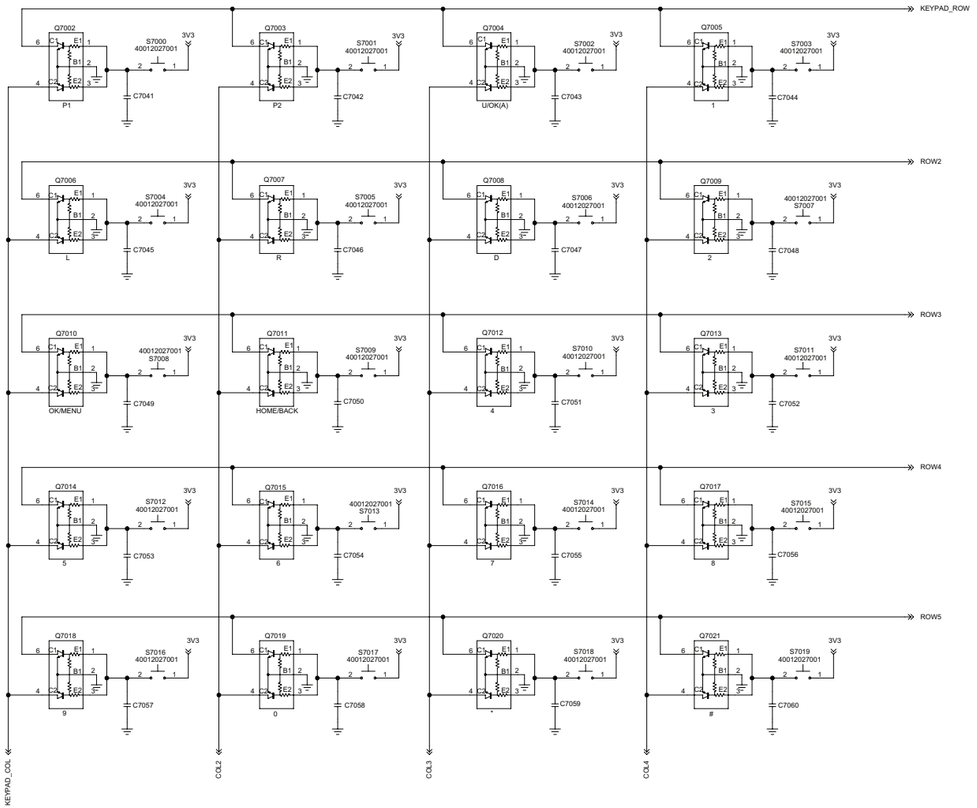
BACKLIGHT DRIVER



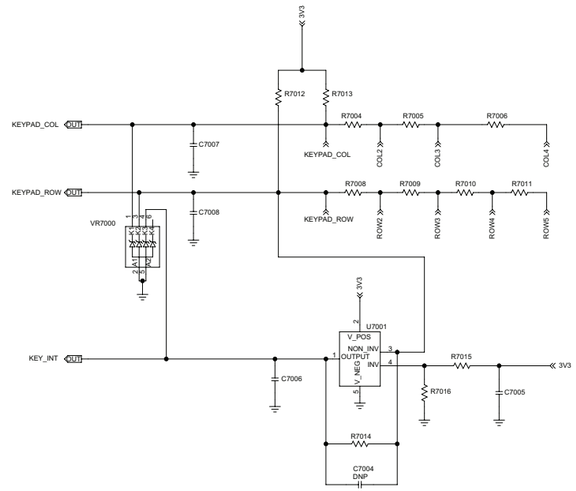
LEVEL SHIFTER



KEYPAD MATRIX

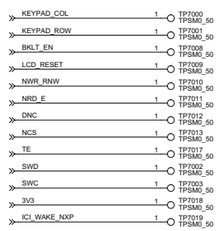


KEYPAD DECODER

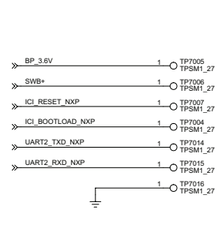


BELIZE			ANDORRA		
P1	U	P2	L	OK	R
L		R	MN		BC
OK	D	HM	P1		P2
1	2	3			
4	5	6			
7	8	9			
*	0	#			

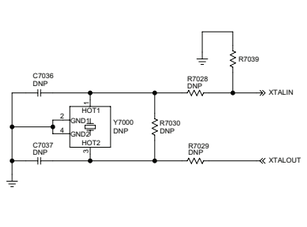
DEVELOPMENT TEST POINTS



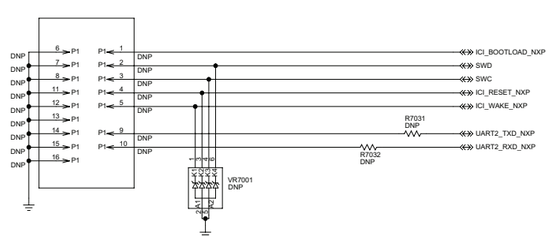
FACTORY TEST POINTS



REFERENCE CLOCK



KEYPAD BOARD - SWD/JTAG INTERFACE



Full Keypad Radio Parts List (84012225002_B)

Circuit Ref	Motorola Part No.
C7000	2113946B04
C7001	2113945B02
C7002	2113946B04
C7003	2113945B02
C7004	NOTPLACED
C7005	2113944A46
C7006	2113944A46
C7007	2113944A46
C7008	2113944A46
C7009	2113946B04
C7010	2113946B04
C7011	2113956B21
C7012	2113945B02
C7013	2113946B04
C7014	2113946B04
C7015	2113944A46
C7016	2113944A46
C7017	2113944A46
C7018	2113944A46
C7019	2113944A46
C7020	2113944A46
C7021	2113944A46
C7022	2113944A46
C7023	2113944A46
C7024	2113944A46
C7025	2113944A46
C7026	2113944A46
C7027	2113944A46
C7028	2113944A46
C7029	NOTPLACED
C7030	2113944A46
C7031	2113944A46
C7032	2113944A46
C7033	2113956B21
C7034	2113945B02
C7035	2113946D05
C7036	2113944A26
C7037	2113944A26
C7038	2113944A40
C7039	2113946D05
C7040	2113944A40
C7041	2113944A46
C7042	2113944A46
C7043	2113944A46
C7044	2113944A46
C7045	2113944A46
C7046	2113944A46
C7047	2113944A46
C7048	2113944A46
C7049	2113944A46
C7050	2113944A46
C7051	2113944A46
C7052	2113944A46
C7053	2113944A46
C7054	2113944A46
C7055	2113944A46
C7056	2113944A46
C7057	2113944A46
C7058	2113944A46
C7059	2113944A46
C7060	2113944A46
C7061	2113946B04
C7062	2113945B02
C7063	2113946B04
C7064	2113945B02
C7065	2113946B04
C7066	2113945B02
C7067	2113946B04
C7068	2113945B02
C7069	2113946B04
C7070	2113945B02
C7071	NOTPLACED
C7072	NOTPLACED
C7073	2113946B04
C7074	2113946B04
C7075	2113946B04
C7076	2113944A46
C7077	2113944A46
C7078	2113944A46
C7079	2113944A46
C7080	2113944A46
C7081	2113944A46
C7082	2113944A46
C7083	2113944A46
C7084	2113944A46
C7085	2113944A46
C7086	2113944A46
C7087	2113946B04
C7088	2113946B04
C7091	2113944A46
C7092	2113944A46
C7093	2113944A46
C7094	2113944A46
C7095	2113944A46
C7097	NOTPLACED
C7098	NOTPLACED
C7099	NOTPLACED
C7100	2113944A46
C7101	2113946B04
C7102	2113946B04
C7103	2113946B04
C7104	2113946B04
C7105	2113944A46
C7120	2113946B04
C7121	2113946B04
C7122	NOTPLACED
D7000	4888112M10
D7001	4888112M10
D7002	4888112M10
D7003	4888112M10
D7004	4888112M10
D7009	4888112M10
D7010	4888112M10
D7011	4888112M10
D7012	4888112M10
D7013	48012049001
E7000	7686949J14
E7001	2480675U01
E7002	2480675U01
J7000	09012048001
J7001	09012035001
J7002	09012049001
J7003	09012088001
P1	NOT PLACED
Q7000	4813973M07
Q7001	4813973M07
Q7002	4815066H01
Q7003	4815066H01
Q7004	4815066H01
Q7005	4815066H01
Q7006	4815066H01
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Q7008	4815066H01
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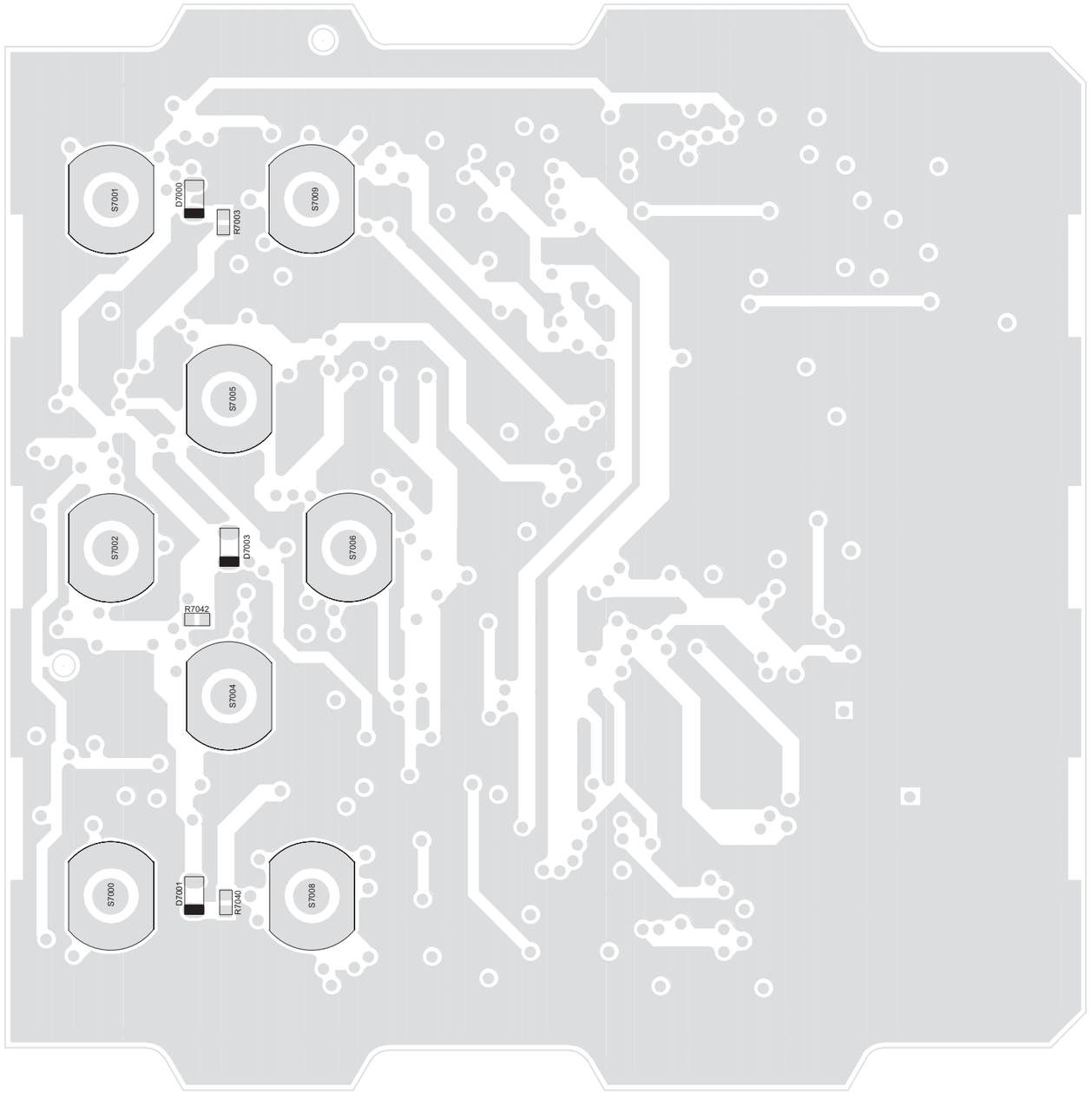
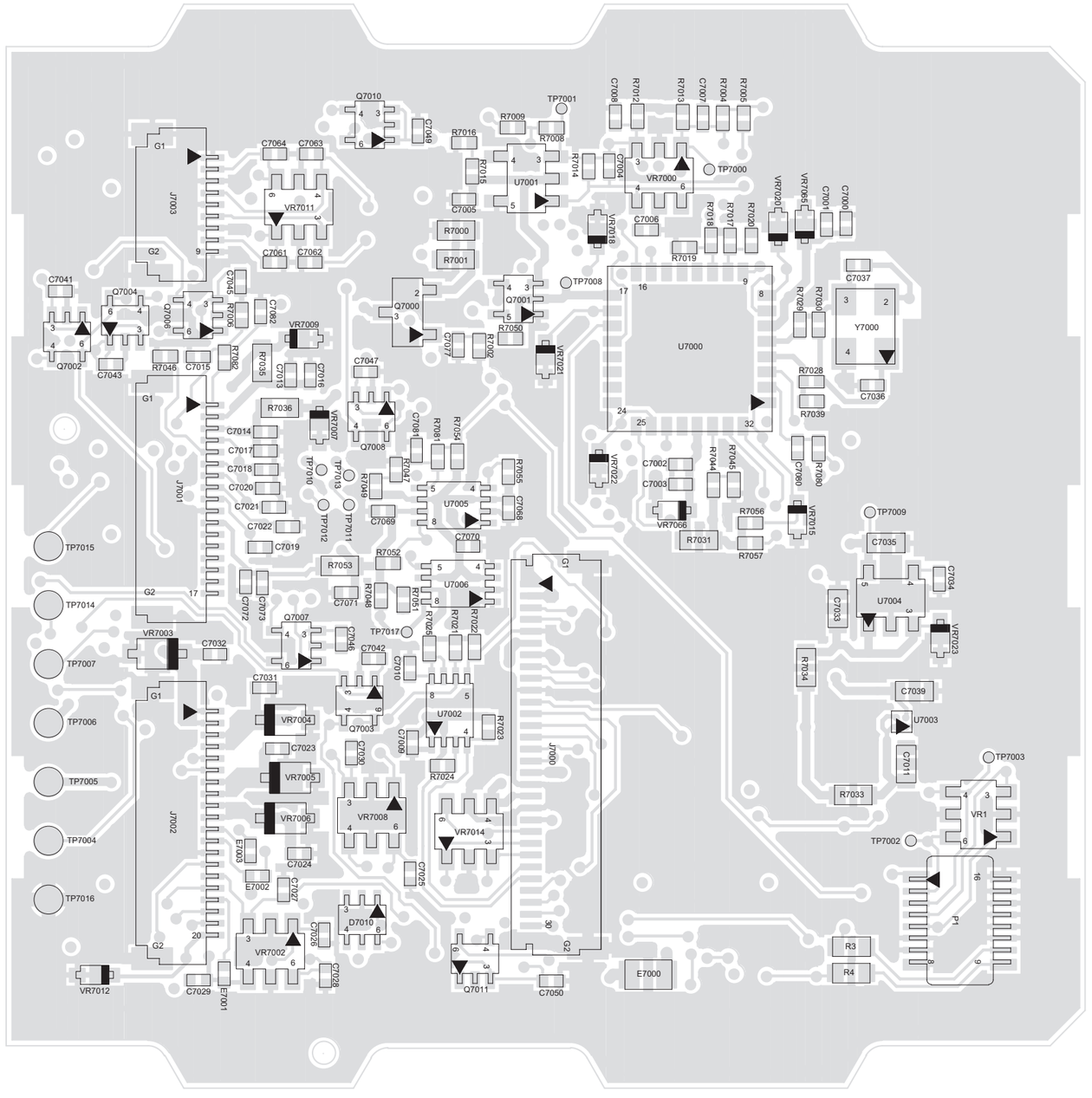
Q7010	4815066H01
Q7011	4815066H01
Q7012	4815066H01
Q7013	4815066H01
Q7014	4815066H01
Q7015	4815066H01
Q7016	4815066H01
Q7017	4815066H01
Q7018	4815066H01
Q7019	4815066H01
Q7020	4815066H01
Q7021	4815066H01
Q7022	4813973M07
R1	0613952G67
R2	0613952G67
R3	0613952G67
R4	0613952G67
R5	0613952G67
R7	0613952G67
R7000	0613952H51
R7001	0613952H51
R7003	0613952R66
R7004	0613952N12
R7005	0613952Z58
R7006	0613952N62
R7008	0613952N12
R7009	0613952Z58
R7010	0613952N62
R7011	0613952P12
R7012	0613952Z67
R7013	0613952Z67
R7014	0613952R49
R7015	0613952Z67
R7016	0613952Z86
R7017	NOTPLACED
R7018	0613952R01

Circuit Ref	Motorola Part No.
R7019	NOTPLACED
R7020	0613952R01
R7021	0613952Q81
R7022	0613952Q81
R7023	0613952N01
R7024	0613952N01
R7025	0613952R32
R7026	0613952N58
R7027	0613952N38
R7028	NOT PLACED
R7029	NOT PLACED
R7030	NOT PLACED
R7031	NOT PLACED
R7032	NOT PLACED
R7033	0613952Q65
R7034	0613952R01
R7035	0613952H51
R7036	0613952H51
R7037	0613952N34
R7038	0613952N70
R7039	0613952R66
R7040	0613952R66
R7041	0613952R66
R7042	0613952R66
R7043	0613952R66
R7044	0613952R66
R7045	0613952R66
R7046	0613952R66
R7047	NOTPLACED
R7048	0613952Q65
R7056	0613952R66
R7057	0613952R66
R7058	0613952R66
R7059	0613952R66
R7060	0613952H53
R7061	0613952H53
R7063	0613952R01
R7064	0613952Q65
R7065	0613952R01
R7067	NOTPLACED
R7105	NOTPLACED
R7106	NOTPLACED
R7107	NOTPLACED
R7108	NOTPLACED
R7110	NOTPLACED
R7111	NOTPLACED
R7112	0613952N01
R7120	0613952Q35
R7121	0613952Q35
R7122	0613952R66
R8	0613952G67
R9	0613952G67
U7000	51012180001
U7001	5115014H01
U7002	5164852H47
U7003	5115391H01
U7004	5115391H01
U7005	51012205001
U7006	51012205001
VR1	4813979P10
VR7000	4813979P10
VR7001	NOT PLACED
VR7002	4813979P10
VR7003	4815040H01
VR7004	4815040H01
VR7005	4815040H01
VR7006	4815040H01
VR7008	4813979P10
VR7009	4815040H01
VR7012	4813979P10
VR7013	4815040H01
VR7014	4813979P10
VR7016	4813979P10
VR7019	4805656W76
Y7000	NOTPLACED
MYLAR	40012027001
PASTE	11012015001
PCB	84012225001

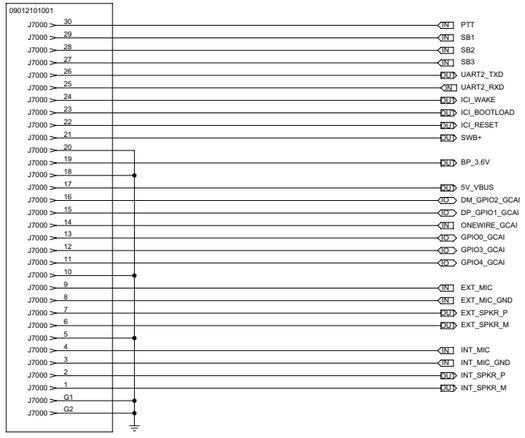
5.0 Circuit Board/Schematic Diagrams and Parts List for Limited Keypad



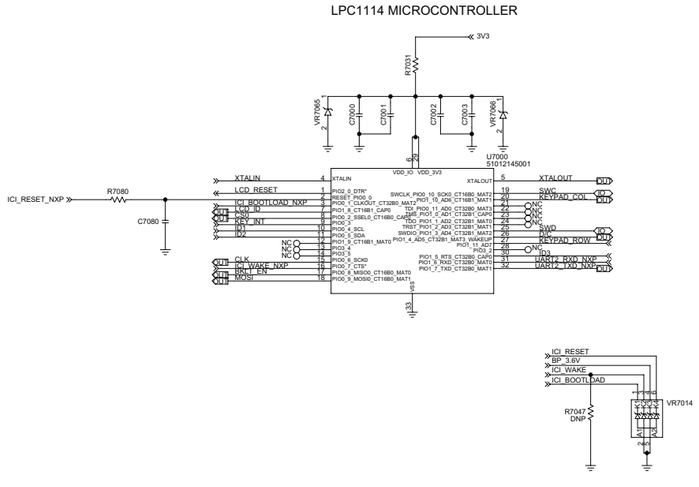
Main Board Limited Keypad Top Side PCB No. 84012213003_C

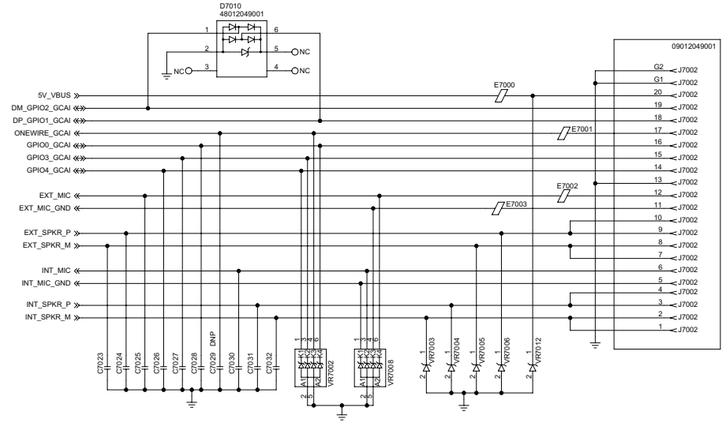


Main Board Full Keypad Bottom Side PCB No. 84012213003_C

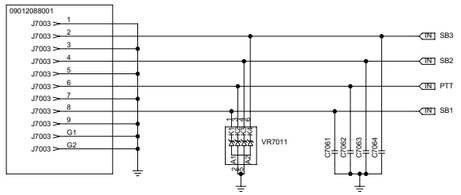


MAINBOARD INTERCONNECT BOARD INTERFACE

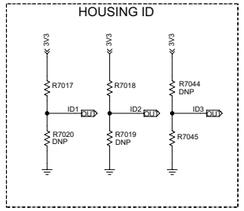


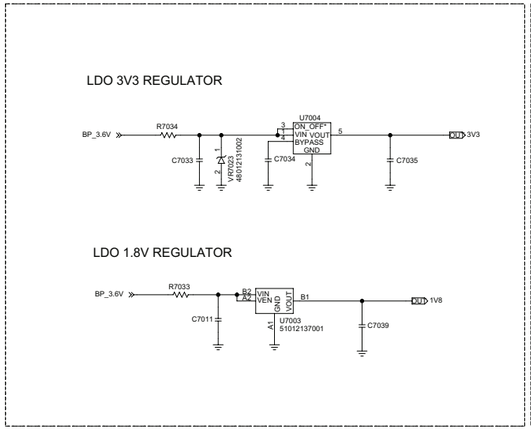


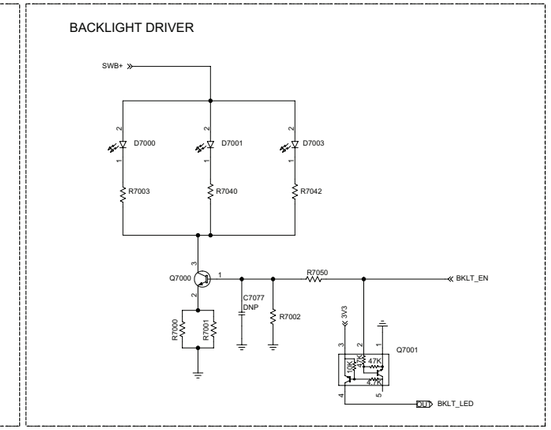
UC FLEX INTERCONNECT BOARD INTERFACE

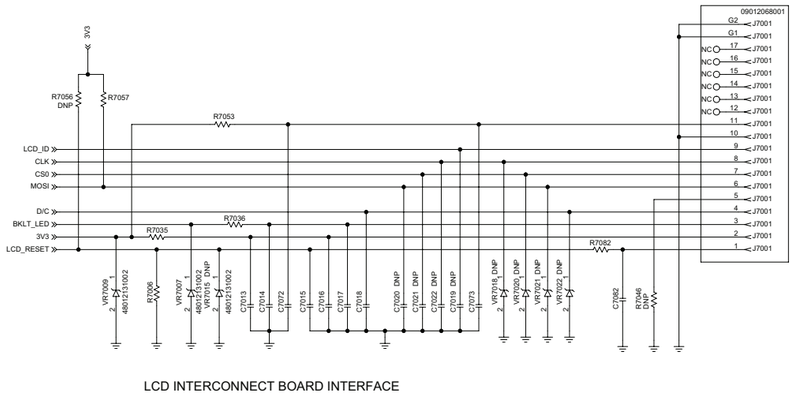


PTT/SIDE CONTROL FLEX INTERCONNECT BOARD INTERFACE

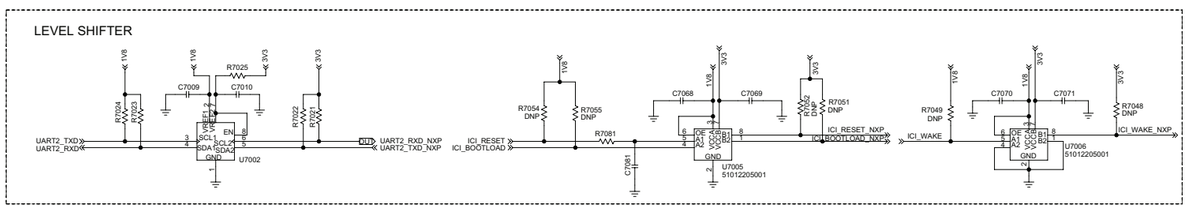




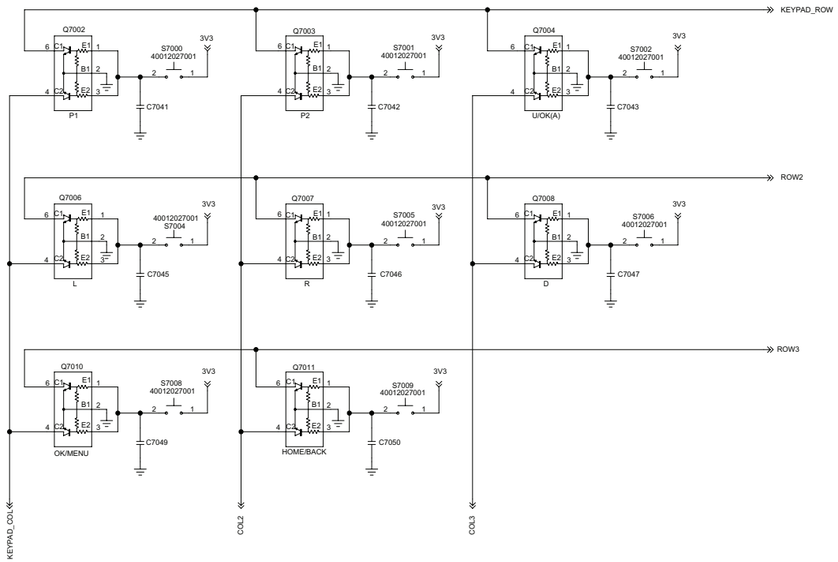




LCD INTERCONNECT BOARD INTERFACE

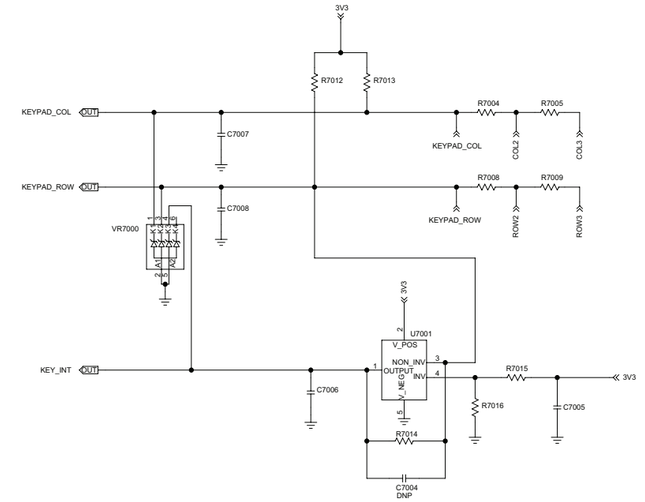


KEYPAD MATRIX

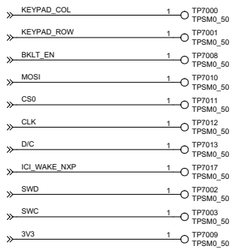


BELIZE			ANDORRA		
P1	U	P2	L	OK	R
L		R	MN		BC
OK	D	HM	P1		P2
1	2	3			
4	5	6			
7	8	9			
*	0	#			

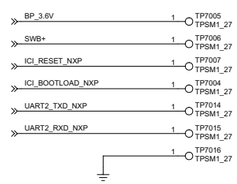
KEYPAD DECODER



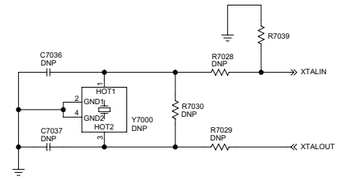
DEVELOPMENT TEST POINTS



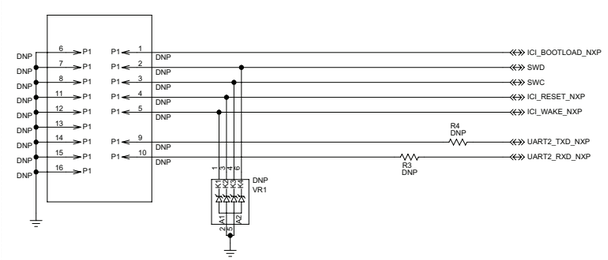
FACTORY TEST POINTS



REFERENCE CLOCK



KEYPAD BOARD - SWD/JTAG INTERFACE

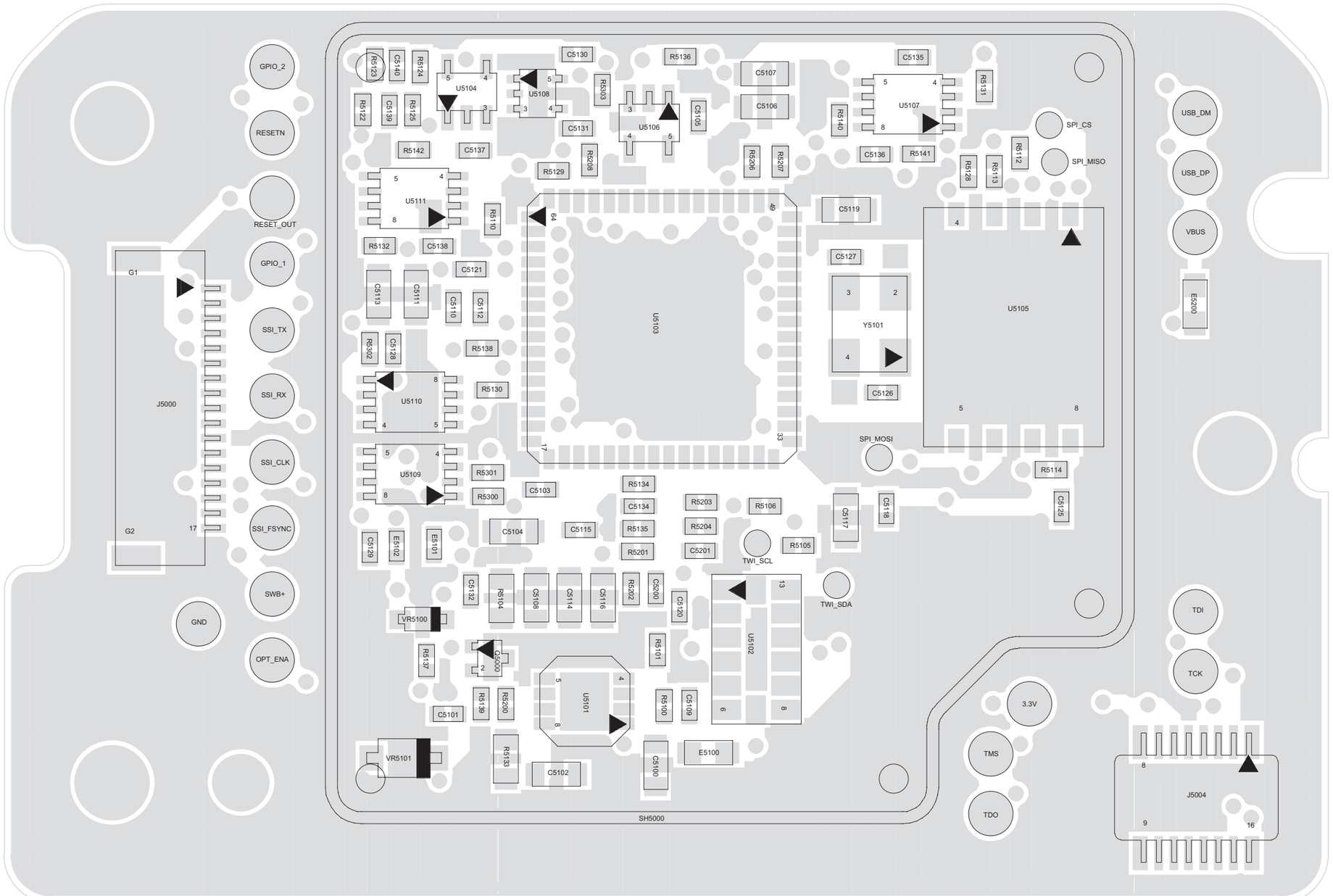


Limited Keypad Radio Parts List (84012213003_C)

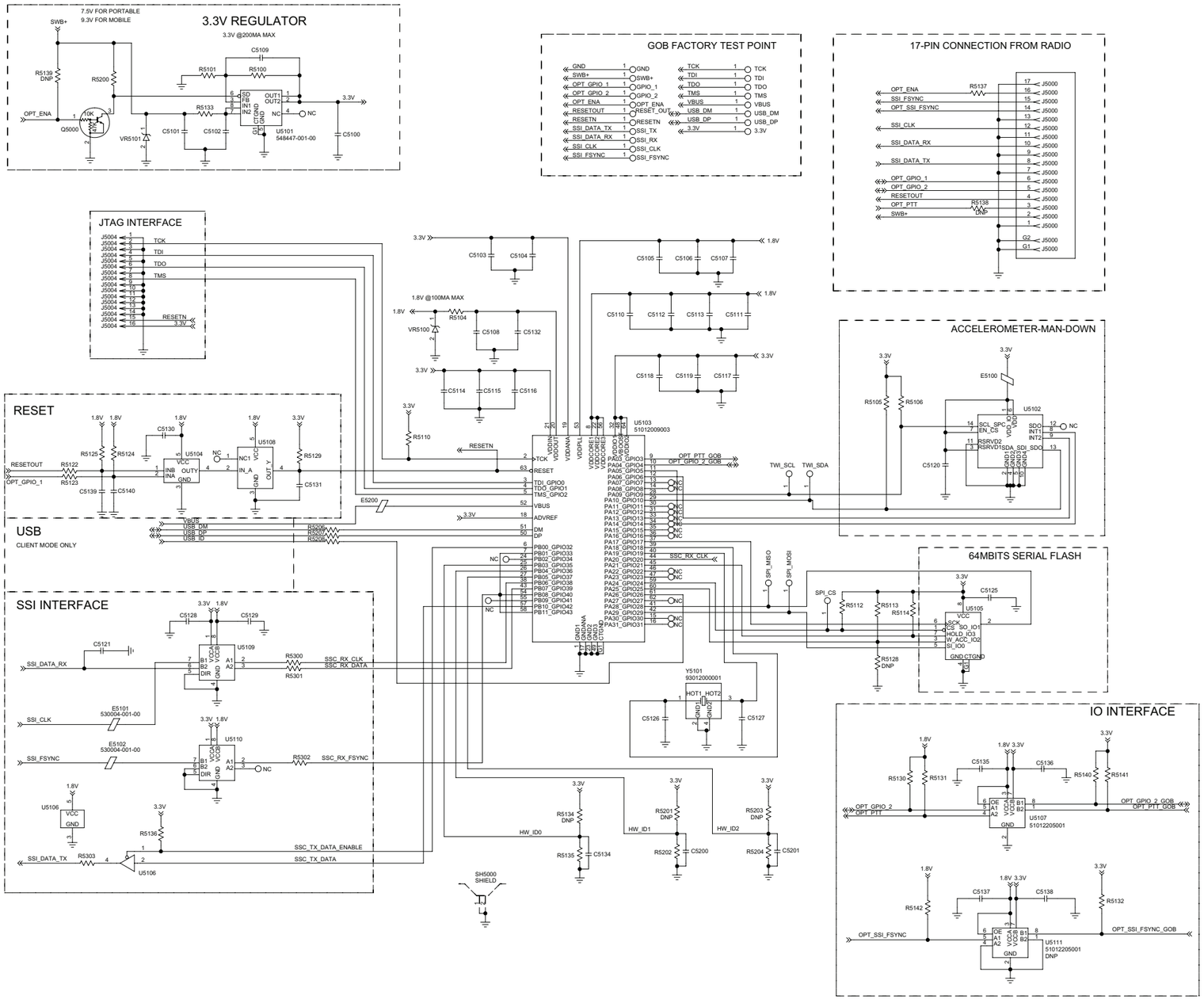
Circuit Ref	Motorola Part No.
C7000	2113946B04
C7001	2113945B02
C7002	2113946B04
C7003	2113945B02
C7004	NOTPLACED
C7005	2113944A46
C7006	2113944A46
C7007	2113944A46
C7008	2113944A46
C7009	2113946B04
C7010	2113946B04
C7011	2113956B21
C7012	2113945B02
C7013	2113946B04
C7014	2113946B04
C7015	2113944A46
C7016	2113944A46
C7017	2113944A46
C7018	2113944A46
C7019	2113944A46
C7020	2113944A46
C7021	2113944A46
C7022	2113944A46
C7023	2113944A46
C7024	2113944A46
C7025	2113944A46
C7030	2113944A46
C7031	2113944A46
C7032	2113944A46
C7033	2113956B21
C7034	2113945B02
C7035	2113946D05
C7036	NOTPLACED
C7037	NOTPLACED
C7038	2113944A40
C7039	2113946D05
C7040	2113944A40
C7041	2113944A46
C7042	2113944A46
C7043	2113944A46
C7045	2113944A46
C7046	2113944A46
C7049	2113944A46
C7050	2113944A46
C7065	NOTPLACED
C7066	NOTPLACED
C7068	2113946B04
C7069	2113946B04
C7070	2113946B04
C7071	2113946B04
C7077	NOTPLACED
C7090	2113946B04
C7091	NOTPLACED
C7092	2113946B04
D7000	4888112M10
D7001	4888112M10
D7002	4888112M10
D7003	4888112M10
D7010	48012049001
E7000	7686949J14
J7000	09012062001
J7001	09012068001
J7002	09012068001
P1	2887818K02
Q7000	4813973M07
Q7001	4815055H01
Q7002	4815066H01
Q7003	4815066H01
Q7004	4815066H01
Q7006	4815066H01
Q7007	4815066H01
Q7010	4815066H01
Q7011	4815066H01
R3	0613952G67
R4	0613952G67
R7000	0613952H60
R7001	0613952H60
R7002	0613952R01
R7003	0613952R66
R7004	0613952N12
R7005	0613952Z58
R7008	0613952N12
R7009	0613952Z58
R7012	0613952Z67
R7013	0613952Z67
R7014	0613952R49
R7015	0613952Z67
R7016	0613952Z86
R7017	0613952R01
R7018	NOTPLACED
R7019	0613952R01
R7020	NOTPLACED
R7021	0613952Q81
R7022	0613952Q81
R7023	0613952N01
R7024	0613952N01
R7025	0613952R32
R7026	0613952N58
R7027	0613952N38
R7028	NOTPLACED
R7029	NOTPLACED
R7030	NOTPLACED
R7031	0613952G67
R7033	0613952G67
R7034	0613952G67
R7035	0613952G67
R7036	0613952H64
R7037	0613952N34
R7038	0613952N70
R7039	0613952R66
R7040	0613952R66
R7041	0613952R66
R7042	0613952R66
R7044	NOTPLACED
R7045	0613952R01
R7046	NOTPLACED
R7050	0613952Q65
R7060	NOTPLACED
R7061	NOTPLACED
R7062	NOTPLACED
R7063	NOTPLACED
R7064	NOTPLACED
R7065	NOTPLACED
R7066	0613952N01
R7067	NOTPLACED
R7068	0613952N01
R7090	0613952Q25
R7091	0613952R66
R7092	0613952Q25
SH7000	26012127001
U7000	51012145001
U7001	5115014H01
U7002	5164852H47
U7003	5115391H01
U7004	5115391H01
U7005	51012205001
U7006	51012205001
VR1	4813979P10
VR7000	4813979P10
VR7003	4815040H01
VR7004	4815040H01
VR7005	4815040H01
VR7006	4815040H01
VR7007	4805656W76
VR7008	4813979P10
VR7010	4805656W76
VR7011	4805656W76
VR7014	4813979P10
Y7000	NOTPLACED
MYLAR	**40012040001**
PASTE	11012015001
PCB	**84012286001**

6.0 Circuit Board/Schematic Diagrams and Parts List for GOB

GOB Top Side PCB No. 84012198001_A



GOB Bottom Side PCB No. 84012198001_A



GOB Radio Parts List (84012198001_5*)*

Circuit Ref	Motorola Part No.
C5100	2113946S35
C5101	2113945A05
C5102	2113946S35
C5103	2113945Y02
C5104	2113945D01
C5105	2113945A11
C5106	2113945D01
C5107	2113956B21
C5108	2113956B21
C5109	2113945A05
C5110	2113945A11
C5111	2113945D01
C5112	2113945Y02
C5113	2113956B21
C5114	2113956B21
C5115	2113945Y02
C5116	2113945D01
C5117	2113945D01
C5118	2113945Y02
C5119	2113956B21
C5120	2113945Y02
C5121	2113944A46
C5125	2113945Y02
C5126	2115153H22
C5127	2115153H22
C5128	2113945Y02
C5129	2113945Y02
C5130	2113945Y02
C5131	2113945Y02
C5132	2113945A05
C5134	2113945Y02
C5135	2113945Y02
C5136	2113945Y02
C5137	2113945Y02
C5138	2113945Y02
C5200	2113945Y02
C5201	2113945Y02
E5100	7686949J08
E5101	530004-001-00

Circuit Ref	Motorola Part No.
E5102	530004-001-00
E5200	24001720002
J5000	0988248Y01
J5004	2887818K02
PASTE	11012015001
PCB	84012198001
Q5000	4816134H01
R5100	0613952P15
R5101	0613952N87
R5104	0613952G67
R5105	0613952R01
R5106	0613952R01
R5110	0613952R01
R5112	0613952R25
R5113	0613952R25
R5114	0613952R25
R5122	0613952Q25
R5124	0613952R01
R5125	0613952R32
R5128	NOT PLACED
R5129	0613952R01
R5130	0613952R25
R5131	0613952R25
R5132	0613952R25
R5133	0613952G67
R5134	NOT PLACED
R5135	0613952R01
R5136	0613952R01
R5137	0613952R66
R5138	NOT PLACED
R5139	NOT PLACED
R5140	0613952R25
R5141	0613952R25
R5142	0613952R01
R5200	0613952R01
R5201	NOT PLACED
R5202	0613952R01
R5203	0613952R01
R5204	NOT PLACED
R5206	0613952K58
R5207	0613952K58

Circuit Ref	Motorola Part No.
R5208	0613952R01
R5300	0613952Q33
R5301	0613952Q33
R5302	0613952Q33
R5303	0613952Q33
SH5000	26012099001
U5101	548447-001-00
U5102	5175772B43
U5103	0104035J82
U5104	5186053Y60
U5105	51012007001
U5107	51012205001
U5108	5189153N01
U5109	5171767H01
U5110	5171767H01
U5111	NOT PLACED
Y5101	93012000001
U5106	5188085K03

Notes

Appendix A Replacement Parts Ordering

1.0 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.

2.0 Motorola Online

Motorola Online users can access our online catalog at

https://www.motorola.com/businessonline

To register for online access, please call 800-422-4210 (for U.S. and Canada Service Centers only). International customers can obtain assistance at https://www.motorola.com/businessonline

3.0 Mail Orders

Mail orders are only accepted by the US Federal Government Markets Division (USFGMD).

Motorola
7031 Columbia Gateway Drive
3rd Floor - Order Processing
Columbia, MD 21046
U.S.A.

4.0 Telephone Orders

The Radio Products and Solutions Organization*
(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 (United States and Canada)

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)

5.0 Fax Orders

The Radio Products and Solutions Organization*
(United States and Canada)
1-800-622-6210
847-576-3023 (United States and Canada)

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

6.0 Parts Identification

The Radio Products and Solutions Organization*
(United States and Canada)
1-800-422-4210

7.0 Product Customer Service

Radio Products and Solutions Organization (United States and Canada)
1-800-927-2744

* The Motorola Radio Products and Solutions Organization (RPSO) was formerly known as the Radio Products Services Division (RPSD) and/or the Accessories and Aftermarket Division (AAD).

Appendix B Motorola Service Centers

1.0 Servicing Information

If a unit requires further testing, knowledge and/or details of component level troubleshooting or service than is customarily performed at the basic level, please send the radio to a Motorola Service Center as listed below.

2.0 Motorola Service Center

45D Butterfield Trail
El Paso, TX 79906

Tel: 1-800-227-6772

3.0 Motorola Canadian Technical Logistics Center

Motorola Canada Ltd.
8133 Warden Avenue
Markham, Ontario, L6G 1B3

Tel: 800-543-3222
Fax: 888-331-9872 / 905-948-5970

4.0 Motorola Federal Technical Center

4395 Nicole Drive
Lanham, MD 20706

Tel: 800-969-6680
Fax: 800-784-4113

Notes

Glossary

This glossary contains an alphabetical listing of terms and their definitions that are applicable to portable and mobile subscriber radio products. All terms do not necessarily apply to all radios, and some terms are merely generic in nature.

Term	Definition
Analog	Refers to a continuously variable signal or a circuit or device designed to handle such signals.
Band	Frequencies allowed for a specific purpose.
CPS	Customer Programming Software: Software with a graphical user interface containing the feature set of a radio.
Default	A pre-defined set of parameters.
Digital	Refers to data that is stored or transmitted as a sequence of discrete symbols from a finite set; most commonly this means binary data represented using electronic or electromagnetic signals.
DPL	Digital Private-Line: A type of digital communications that utilizes privacy call, as well as memory channel and busy channel lock out to enhance communication efficiency.
FCC	Federal Communications Commission.
Frequency	Number of times a complete electromagnetic-wave cycle occurs in a fixed unit of time (usually one second).
GPIO	General-Purpose Input/Output: Pins whose function is programmable.
GPS	Global Positioning System
IC	Integrated Circuit: 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.
IF	Intermediate Frequency.
kHz	kilohertz: One thousand cycles per second. Used especially as a radio-frequency unit.
LCD	Liquid-Crystal Display: An LCD uses two sheets of polarizing material with a liquid-crystal solution between them. An electric current passed through the liquid causes the crystals to align so that light cannot pass through them.
LED	Light Emitting Diode: An electronic device that lights up when electricity is passed through it.
MDC	Motorola Digital Communications.

Term	Definition
MHz	Megahertz: One million cycles per second. Used especially as a radio-frequency unit.
Paging	One-way communication that alerts the receiver to retrieve a message.
PC Board	Printed Circuit Board. Also referred to as a PCB.
PL	Private-Line Tone Squelch: A continuous sub-audible tone that is transmitted along with the carrier.
Programming Cable	A cable that allows the CPS to communicate directly with the radio using USB.
Receiver	Electronic device that amplifies RF signals. A receiver separates the audio signal from the RF carrier, amplifies it, and converts it back to the original sound waves.
Repeater	Remote transmit/receive facility that re-transmits received signals in order to improve communications range and coverage (conventional operation).
RF	Radio Frequency: The portion of the electromagnetic spectrum between audio sound and infrared light (approximately 10 kHz to 10 GHz).
RX	Receive.
Signal	An electrically transmitted electromagnetic wave.
Spectrum	Frequency range within which radiation has specific characteristics.
Squelch	Muting of audio circuits when received signal levels fall below a pre-determined value. With carrier squelch, all channel activity that exceeds the radio’s preset squelch level can be heard.
TOT	Time-out Timer: A timer that limits the length of a transmission.
TPL	Tone Private Line
Transceiver	Transmitter-receiver. A device that both transmits and receives analog or digital signals. Also abbreviated as XCVR.
Transmitter	Electronic equipment that generates and amplifies an RF carrier signal, modulates the signal, and then radiates it into space.
TX	Transmit.
UHF	Ultra-High Frequency.
USB	Universal Serial Bus: An external bus standard that supports data transfer rates of 12 Mbps.
VIP	Vehicle Interface Port.
XPR	Refers to Digital Professional Radio model names in the MOTOTRBO Professional Digital Two-Way Radio System.

Motorola Solutions, Inc.
1303 East Algonquin Road
Schaumburg, Illinois 60196 U.S.A.

May 2012.

www.motorolasolutions.com/mototrbo

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